

GTX 328

Transponder

Installation Manual



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RECORD OF REVISIONS

Revision	Revision Date	Description	ECO #
A	01/05/07	Initial Release	---
B	02/05/07	Corrected EUROCAE Spec. & changed max. antenna cable loss spec.	43124
C	03/05/07	Removed Non-Applicable TSO Deviation	43519

DOCUMENT PAGINATION

Section	Page Range
Table of Contents	i – vi
Section 1	1-1 – 1-10
Section 2	2-1 – 2-8
Section 3	3-1 – 3-2
Section 4	4-1 – 4-10
Section 5	5-1 – 5-20
Appendix A	A-1 – A-2
Appendix B	B-1 – B-6
Appendix C	C-1 – C-24

This manual reflects the operation of software version 5.00. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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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.

CAUTION

The GTX 328 lens is coated with a special anti-reflective coating that 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.

TABLE OF CONTENTS

PARAGRAPH	PAGE
1 GENERAL DESCRIPTION.....	1-1
1.1 Introduction.....	1-1
1.2 Equipment Description	1-1
1.3 Mutual Suppression Pulses	1-2
1.4 Interface Summary.....	1-3
1.5 Technical Specifications	1-4
1.6 Certification	1-6
1.7 Aircraft Station Licensing Requirements.....	1-8
1.8 Limited Warranty.....	1-9
2 INSTALLATION OVERVIEW	2-1
2.1 Introduction.....	2-1
2.2 Installation Materials	2-1
2.3 Installation Considerations	2-2
2.4 Antenna Installation.....	2-2
2.5 Cabling and Wiring.....	2-3
2.6 Installation Approval Considerations for Pressurized Aircraft	2-5
2.7 Cooling Air	2-6
2.8 GTX 328 Installation	2-6
3 INSTALLATION PROCEDURE.....	3-1
3.1 Unpacking Unit.....	3-1
3.2 Electrical Connections	3-1
3.3 Circuit Breaker Placard.....	3-2
3.4 Post Installation Checkout	3-2
4 SYSTEM INTERCONNECTS	4-1
4.1 Pin Function List.....	4-1
4.2 Power and Lighting Function	4-3
4.3 Temperature Inputs.....	4-3
4.4 Altitude Functions	4-4
4.5 Discrete Functions	4-6
4.6 Serial Data Electrical Characteristics.....	4-8

PARAGRAPH

PAGE

5	POST INSTALLATION CONFIGURATION AND CHECKOUT PROCEDURE	5-1
5.1	Operation	5-1
5.2	Configuration Pages.....	5-5

APPENDIX A CERTIFICATION DOCUMENTS

A.1	External Documents.....	A-1
A.2	Continued Airworthiness	A-1

APPENDIX B ASSEMBLY AND INSTALLATION DRAWINGS

APPENDIX C INTERCONNECT DRAWINGS

LIST OF ILLUSTRATIONS

FIGURE	PAGE
2-1 Antenna Installation Considerations	2-2
2-2 GTX 330 Install Rack	2-7
4-1 Rear Connector, J3281	4-1
4-2 Dual GTX 328, Single Encoder, Serial Input Connections	4-5
4-3 GTX 328, Software Update Connections	4-9
5-1 GTX 328 Front Panel.....	5-1
B-1 GTX 328 Outline Drawing	B-1
B-2 GTX 328 Connector/Rack Assembly Drawing	B-3
B-3 GTX 328 Recommended Panel Cutout Dimensions.....	B-5
C-1 GTX 328 to 400/500 Series Units, Typical Interconnect Wiring Diagram	C-1
C-2 GTX 328 to GNS 480 (CNX80), Typical Interconnect Wiring Diagram.....	C-3
C-3 GTX 328 to GNS 480 (CNX80) and MFD, Simplified Interconnect Wiring Diagram.....	C-5
C-4 GTX 328 Interconnect Wiring Diagram, Discrete and Audio Connections	C-7
C-5 GTX 328 Interconnect Wiring Diagram, Serial Devices Connections	C-9
C-6 GTX 328 Interconnect Wiring Diagram, Altitude and Temperature Connections	C-11
C-7 Dual Transponder Interconnect Wiring Diagram, Dual Display Connections	C-13
C-8 GTX 328 Interconnect Wiring Diagram, Aircraft with TCAD/TCAS	C-17
C-9 Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections	C-19

LIST OF TABLES

TABLE	PAGE
3-1 Pin Contact Part Numbers.....	3-1
3-2 Recommended Crimp Tools	3-1
4-1 P3281 Pin Assignments	4-1
4-2 Aircraft Power Pin Assignments.....	4-3
4-3 Aircraft Lighting Pin Assignments	4-3
4-4 Temperature Probe Pin Assignments.....	4-3
4-5 Encoded Altitude Pin Assignments	4-4
4-6 Discrete Outputs Pin Assignments.....	4-6
4-7 Discrete Inputs Pin Assignments	4-7
4-8 RS-232 Pin Assignments	4-8
4-9 ARINC 429 Pin Assignments	4-10

GTX 328 HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GTX 328 Mode S Transponders. Mod Levels are listed with the associated service bulletin number, service bulletin date, and the purpose of the modification. The table is current at the time of publication of this manual (see date on front cover) and is subject to change without notice. Authorized Garmin Sales and Service Centers are encouraged to access the most up-to-date bulletin and advisory information on the Garmin Dealer Resource web site at www.garmin.com using their Garmin-provided user name and password.

MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION

1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents the mechanical and electrical installation requirements for the GTX 328 Mode S Transponder.

1.2 Equipment Description

CAUTION

The operation of cellular telephones or other cellular mobile devices aboard aircraft while airborne is prohibited by FCC rules. Due to the potential for interference with onboard systems, the operation of cellular communication devices while onboard an aircraft that is on the ground is subject to (FAA) 14 CFR 91.21.

(FCC) 47 CFR 22.925 prohibits airborne operation of cellular telephones installed in or carried aboard aircraft. Cellular telephones must not be operated aboard any aircraft while the aircraft is off the ground. When any aircraft leaves the ground, all cellular telephones on board that aircraft must be turned off.

Cellular telephones that are on, even in a monitoring state, can disrupt GPS performance.

The Garmin GTX 328 is a panel mounted Non-Diversity Mode S Transponder. The design meets RTCA/DO-181C and EUROCAE ED-73 B specifications.

The GTX 328 transponder is a radio transmitter and receiver that operates on radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The GTX 328 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse for 18 seconds.

The GTX 328 replies to ATCRBS Mode A, Mode C and Mode S All-Call interrogation. Mode A replies consist of any one of 4,096 codes, which differ in the position and number of pulses transmitted. Mode C replies include framing pulses and encoded altitude. Mode S interrogations are selective. The Mode S transponders can respond to a single directed interrogation from the ground station or another aircraft.

The GTX 328 is a Level 2 transponder, providing downlink of aircraft information. Ground stations can interrogate Mode S Transponders individually using a 24-bit ICAO Mode S address, which is unique to the particular aircraft. In addition, ground stations may interrogate a GTX 328 for its Transponder data capability and the aircraft's Flight ID, which may be the registration number or other call sign. The GTX 328 makes the maximum airspeed capability (set via configuration pages, see Section 5) available to TCAS systems on-board nearby aircraft to aid in the determination of TCAS advisories.

In addition to displaying the code, reply symbol and mode of operation, the GTX 328 screen displays pressure altitude, density altitude, temperature, and timer functions, depending on equipment connections and configuration selection. The unit also features an altitude monitor and flight timers. A voice or tone audio output announces altitude deviation and count down timer expiration.

The GTX 328 features multiple transmit/receive ARINC 429 and RS-232 data ports. The unit concentrates data from three ARINC 429 inputs, gray code, RS-232 input data and discrete inputs to the high-speed ARINC 429 output bus used by display systems such as the Garmin 400 Series/500 Series units.

The GTX 328 is configured with all key controls. The layout of the front panel keys and displays segregates the transponder's primary functions from the secondary functions. The unit can be configured so the aircraft avionics master bus can turn the unit on.

Provision is made for unit software upgrade by means of RS-232 data through rear connector pins. The installation of an optional connector is highly recommended. If the optional connector is placed in the aircraft, transponder removal and reinstallation for software upgrade is not required. The software can be changed while the unit is still mounted inside the aircraft.

1.3 Mutual Suppression Pulses

Other equipment on board the aircraft may transmit in the same frequency band as the transponder, such as DME or another transponder. Mutual suppression is a synchronous pulse that is sent to the other equipment to suppress transmission of a competing transmitter for the duration of the pulse train transmission. The transponder transmission may be suppressed by an external source and other equipment on board may be suppressed by the transponder. This feature is designed to limit mutual interference.

1.4 Interface Summary

The GTX 328 provides the following interface connections via the rear connector:

- Ten (10) encoding altimeter inputs.
- External IDENT input.
- External STBY input (useful for dual transponder installations).
- External suppression pulse input.
- Switched power output of up to 1.5 amps (for digital altitude encoder power).
- Aircraft dimming bus input voltage.
- Aircraft master switch turn-on option.
- Serial altitude or GPS groundspeed input.
- Serial altitude input. (Reduces wire count vs. parallel wire gray code altimeter interface.)
- Software update input.
- Supports Comm-A and Comm-B protocol.
- Temperature, Altitude Hold and Density Altitude.
- Digitally recorded voice and discrete warning annunciator activated by Altitude Hold when limits are exceeded.

The GTX 328 supports the following list of Binary Data Selector (BDS) registers:

- BDS (0,0) Air Initiated Comm-B (AICB)
- BDS (1,0) Data Link Capability Report
- BDS (1,7) Common Usage Ground Initiated Comm-B (GICB) Capability Report
- BDS (1,8) Mode S Specific Services GICB Capability Report
- BDS (1,9) Mode S Specific Services GICB Capability Report
- BDS (1,D) Mode S Specific Services Protocols (MSP) Capability Report
- BDS (2,0) Aircraft Identification

BDS register information is presented for the installation agency to understand the functionality of the GTX 328, and make a determination that the unit complies with the requirements of their civil aviation authorities. No further wiring or configuration programming is required for the unit.

Note that BDS (3,0) is only required for transponders compatible with ACAS/TCAS II. The GTX 328 does not support BDS (3,0).

1.5 Technical Specifications

1.5.1 Environmental Qualification Form

It is the responsibility of the installing agency to obtain the latest revision of the GTX 330/GTX 33/GTX 328 Environmental Qualification Form. The form is available directly from Garmin under the following part number:

GTX 330/GTX 33/GTX 328 Environmental Qualification Form,
Garmin part number 005-00131-03.

To obtain a copy of this form, see the dealer/OEM portion of the Garmin web site (www.garmin.com). The following tables present general environmental specifications. For detailed specifications, see the Environmental Qualification Form.

1.5.2 Electrical Specifications

Characteristic	Specification
TSO ENV CAT	Refer to Environmental Qualification Form
FCC Authorization	Emission Designator 12M0M1D
Applicable Documents	RTCA DO-160D, DO-181C, EuroCAE ED-73B
Unit Software	RTCA DO-178B Level D
Temperature Range	-45°C to +70°C (continuous operation)
Humidity	95% @ +50°C for 6 hours; 85% @ +38°C for 16 hours; Tested to Category A in DO-160D
Altitude	55,000 Feet
Transmitter Frequency	1090 MHz \pm 1 MHz
Transmitter Power	125 Watts minimum, 250 Watts nominal.
Receiver Frequency	1030 MHz
Receiver Sensitivity	-74 dBm nominal for 90% replies
Mode A Capability	4096 Identification Codes
Mode C Altitude Capability	100 Foot increments from -1000 to 62,700 feet.
Mode S Altitude Capability	25 Foot increments from -1000 to 50,175 feet with suitable serial data altitude. 100 Foot increments from -1000 to 62,700 feet.
Mode S Capability	Selective Identification Codes, Aircraft Type
External Suppression Input	Low \leq 0.5 V; High \geq 8 V, maximum is +33vDC
External Suppression Output	Output: minimum is +18V (for 300 ohm load) and maximum of +23V (for 2000 ohm load).
Audio Output	4.04 Vrms to 7.85 Vrms into a 500 Ω load

* **Note:** Refer to Paragraph 2.2.1 Configurations Available, for TSO class.

1.5.3 Physical Characteristics

Characteristic	Specification
Bezel Height	1.65 inches (42 mm)
Bezel Width	6.25 inches (159 mm)
Rack Height (Dimple to Dimple)	1.68 inches (43 mm)
Rack Width	6.30 inches (160 mm)
Depth Behind Panel with Connectors (measured from face of aircraft panel to rear of connector backshells)	11.25 inches (286 mm)
GTX 328 Unit Weight	3.4 lbs. (1.5 kg)
GTX 328 Rack Weight (Installed with rack and connectors)	4.2 lbs. (1.9 kg)

1.5.4 Power Requirements

Characteristic	Specification
Input Voltage Range	14/28 Vdc. See the Environmental Qualification Form for details on surge ratings and minimum/maximum operating voltages.
Power Input	22 Watts Typical, 45 Watts Maximum
Maximum Full TSO Reply Rate; 1200 PRF, Code7777	1.6 A @ 27.5 Vdc, 3.1 A @ 13.75 Vdc
Maximum Quiescent	0.85 A @ 27.5 Vdc, 1.1A @ 13.75 Vdc

1.6 Certification

This installation manual does not constitute an approval to install this equipment. The installation must be approved by the appropriate competent aviation authority.

The aircraft installation must have a 'Certificate of Return to Service' signed by an appropriately licensed (EASA Part 66/NAA) engineer before flight; or other certification as agreed with the local national airworthiness authority.

The conditions and tests required for TSO/ETSO 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/ETSO standards. TSO/ETSO 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. For antenna TSO/ETSO compliance, refer to antenna manufacturer's literature.

1.6.1 TSO/ETSO Compliance

See the following table for GTX 328 TSO/ETSO compliance.

Function	Performance Standard (TSO/ETSO/RTCA/ICAO)	Category	Applicable LRU SW Part Numbers
Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/MODE S) Airborne Equipment	TSO-C112	Class 2A	006-B0172-03 Rev. ()
Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/MODE S) Airborne Equipment	ETSO-2C112b	2C112b Level 2s	006-B0172-03 Rev. ()

1.6.2 TSO/ETSO Deviation

See the following table for GTX 328 TSO/ETSO deviations.

TSO/ETSO	Deviation
TSO-C112	1. Garmin was granted a deviation to use RTCA DO-178B, instead of RTCA DO-178A.
	2. Garmin was granted a deviation to use RTCA DO-160D instead of RTCA DO-160B.
	3. Garmin was granted a deviation to use DO-181C instead of DO-181/DO-181B, given the following modification: DO-181C Section 2.2.16.2.6.2 requires Mode S Transponders to include extended squitter capability. The GTX will not provide Mode S Extended Squitter for an ADS-B system.
ETSO-2C112b	1. Garmin was granted a deviation from ED73B, 1.4.2.2 to allow marking level indication on the chassis.

1.7 Aircraft Station Licensing Requirements

The Telecommunications Act of 1996, effective February 8, 1996, provides the FCC discretion to eliminate radio station license requirements for aircraft and ships. The GTX 328 installation must comply with current transmitter licensing requirements. To find out the specific details on whether a particular installation is exempt from licensing, visit the FCC web site <http://wireless.fcc.gov/aviation>.

If an aircraft license is required, make application for a license on FCC form 404, Application for Aircraft Radio Station License. The FCC also has a fax-on-demand service to provide forms by fax. The GTX 328 owner accepts all responsibility for obtaining the proper licensing before using the transponder.

CAUTION

The UHF transmitter in this equipment is guaranteed to meet Federal Communications Commission acceptance over the specified operating temperature range. Modifications to Garmin equipment not expressly approved by Garmin could invalidate the license and make it unlawful to operate the equipment.

For non-US installations consult the local spectrum management agency for requirements.

1.8 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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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.

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2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GTX 328 Mode S Transponder, related hardware and optional accessories. Installation of the GTX 328 should follow the data detailed in this manual. Cabling is fabricated by the installing agency to fit each particular aircraft. The installation should follow the guidance of FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A where applicable.

2.2 Installation Materials

The GTX 328 is available under the following part numbers:

2.2.1 Configurations Available

Model	Catalog Part Number	Unit Part Number	Front Panel Color	Install Kit/Docs*	TSO Class
GTX 328	010-00634-00	011-01684-00	Black	No	2A1 121 010
GTX 328	010-00634-01	011-01684-00	Black	Yes	2A1 121 010

* **Note:** Documentation includes pilot's guide and warranty registration card.

2.2.2 Equipment Available

Item	Garmin P/N
Sub Assy, Connector Kit, GTX 330	011-00583-00
SMP, GTX 330 Install Rack	115-00294-00
Sub Assy, Backplate, GTX 330	011-00582-00

* **Note:** A transponder antenna approved to TSO C66() or C74() that has been installed to meet the requirements of this manual may be approved for use with the GTX 328.

2.2.3 Additional Equipment Required

- Cables - The installer will supply all system cables including circuit breakers. Cable requirements and fabrication are detailed in Section 3 of this manual.
- Hardware - #6-32 x 100° Flat Head SS Screw [(MS24693, AN507R or other approved fastener) (6 ea.)] and #6-32 Self-Locking Nut [MS21042 or other approved fastener (6 ea.)]. Hardware required to mount the installation rack is not provided.
- Encoding Altitude Digitizer - Use encoding altimeter manufacturer's instructions, install according to FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A. The Garmin GAE 43 (Garmin P/N 013-00066-00) can provide altitude data in either serial or parallel gray code format.

2.3 Installation Considerations

The GTX 328 can interface with equipment including altimeters, Air Data Computer (ADC) and a temperature probe. RS-232 and ARINC 429 provide a serial communication path between interfacing equipment. Fabrication of a wiring harness is required.

Optional available discrete line interfaces are described in Section 4.5.2, Discrete Inputs, and shown in installation diagrams provided in Appendix C.

2.4 Antenna Installation

2.4.1 Antenna Location Considerations

Antenna mounting should utilize the aircraft manufactures Type Certificated antenna location and style of antenna. The antenna installation should be installed in accordance with AC 43.12-2A Chapter 3. Note that penetration of the pressure vessel on the pressurized aircraft requires additional data not contained in this manual. (See Section 2.6)

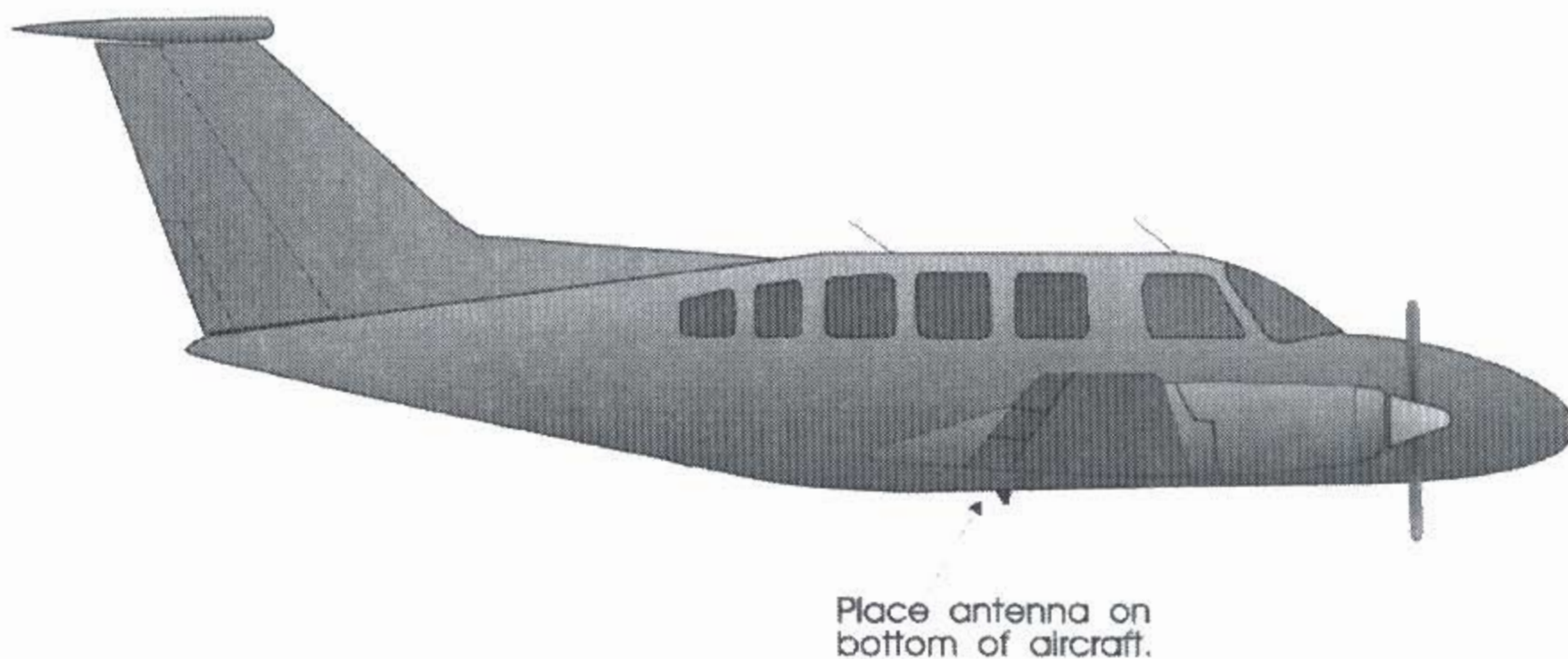


Figure 2-1. Antenna Installation Considerations

- A. The antenna (Garmin P/N 010-10160-00) should be mounted away from major protrusions, such as engine(s), propeller(s), and antenna masts. It should also be as far as practical from landing gear doors, access doors, or other openings that could affect its radiation pattern.
- B. The main antenna should be mounted vertically on the bottom of the aircraft.
- C. Avoid mounting the antenna within three feet of the ADF sense antenna or any other communication antenna and six feet from the DME antenna.
- D. To prevent RF interference, the antenna must be physically mounted a minimum distance of three feet from the GTX 328.

NOTE

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

2.4.2 Antenna Installation

Install the antenna according to the antenna manufacturer's instructions and FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A.

2.5 Cabling and Wiring

Use MIL-W-22759/16 or other approved wire, AWG #24 or larger wire for all connections. 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 #18 or #16 may be needed for power connections. 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 or 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.

The following table lists examples of the recommended antenna cable vendors and the type of cable to be used for specific lengths of cable. Any cable meeting specifications is acceptable for the installation.

The following table is for reference only, and lists some suitable cable types, along with the maximum length based on an assumed loss figure of 0.2 dB per connector. Any 50 Ω , double shielded coaxial cable assembly that meets airworthiness requirements and less than or equal to (\leq) 2dB maximum loss figure (including connectors) may be used.

Max. Length (feet – [m])	Insertion loss (dB/100ft)	ECS Type	MIL-C-17 Type	RG Type
8' 11" [2.71m]	18.0		M17/128-RG400	RG-400
11' 1" [3.37m]	14.45	3C142B		
13' 4" [4.06m]	12.00		M17/112-RG304	RG-304
18' 2" [5.54m]	8.8	311601	M17/127-RG393	RG-393
22' 6" [6.85m]	7.12	311501		
28' 9" [8.77m]	5.56	311201		
44' 1" [13.43m]	3.63	310801		
Supplier Information		Vendor: Electronic Cable Specialists 5300 W. Franklin Drive Franklin, WI 53132 Tel: 800-327-9473 414-421-5300 Fax: 414-421-5301 www.ecsdirect.com	See current issue of Qualified Products List QPL-17.	RG types are obsolete and are shown for reference only; replaced by M17 type numbers.

2.5.1 Cable Routing Considerations

When routing cables, observe the following precautions:

- All cable routing should be kept as short and as direct as practical.
- Avoid sharp bends.
- Avoid routing cables near power sources (e.g., 400 Hz generators, trim motors, etc.) or near power for fluorescent lighting.
- Avoid routing antenna cables near ADF antenna cable (allow at least a 12-inch separation).

2.6 Installation Approval Considerations for Pressurized Aircraft

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

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

1. Obtain approved antenna installation design data from the aircraft manufacturer.
2. Obtain an FAA approved Supplemental Type Certificate (STC) pertaining to and valid for the subject antenna installation.
3. Contact the FAA Aircraft Certification Office in the appropriate Region and request identification of FAA Designated Engineering Representatives (DERs) who are authorized to prepare and approve the required antenna installation engineering data.
4. 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.

2.7 Cooling Air

The GTX 328 meets all applicable TSO requirements without forced air cooling. The application of forced air cooling to the rear air nozzle of the GTX 328 is highly recommended to provide beneficial cooling to the unit.

The GTX 328 was designed to handle a constant interrogation of 450 Pulse Repetition Frequency (PRF) per second, with short periods of 1200 PRF. Rate limit is set at 1200 PRF. A typical radar site would interrogate the transponder once every 5 to 10 seconds for approximately 100 milliseconds at a 400 PRF rate. In very high traffic areas with multiple ground stations and TCAS traffic it is possible to have long term PRF rates above 450 PRF.

2.8 GTX 328 Installation

2.8.1 Viewing Angle

Ensure that any mounting location will offer sufficient viewing angle. The display has been proven to meet specifications when seen within the following envelope of viewing positions:

Direction	Pilot's Viewing Angle
Left and Right	$\pm 45^{\circ}$
From Top	30°
From Bottom	10°

2.8.2 Mechanical Installation

NOTE

Avoid installing the unit near heat sources. If this is not possible, ensure that additional cooling is provided. Allow adequate space for installation of cables and connectors. The installer will supply and fabricate all of the cables. All wiring must be in accordance with FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A.

1. Assemble the connector/rack kit according to Figure B-2. Install the rack assembly according to the dimensions given in Figure B-1 and paragraph 1.6.2, Physical Characteristics. Mounting brackets are not supplied due to the wide range of mounting configurations available. Suitable mounting brackets may be fabricated from sheet metal or angle stock. To ensure a sturdy mount, rear support for the unit must be provided.
2. Looking at the bottom of the transponder, make sure the front lobe of the locking mechanism is in a vertical position. This can be accomplished by using a 3/32" hex wrench through the face plate.
3. Slide the unit into the rack until the front lobe of the unit touches the rack.
4. Turn the hex wrench clockwise until unit is secured in the rack. Continue turning until tight. Do not overtighten the screw.
5. To remove the unit from the rack, turn the 3/32" hex wrench counterclockwise until it disengages from the rack.

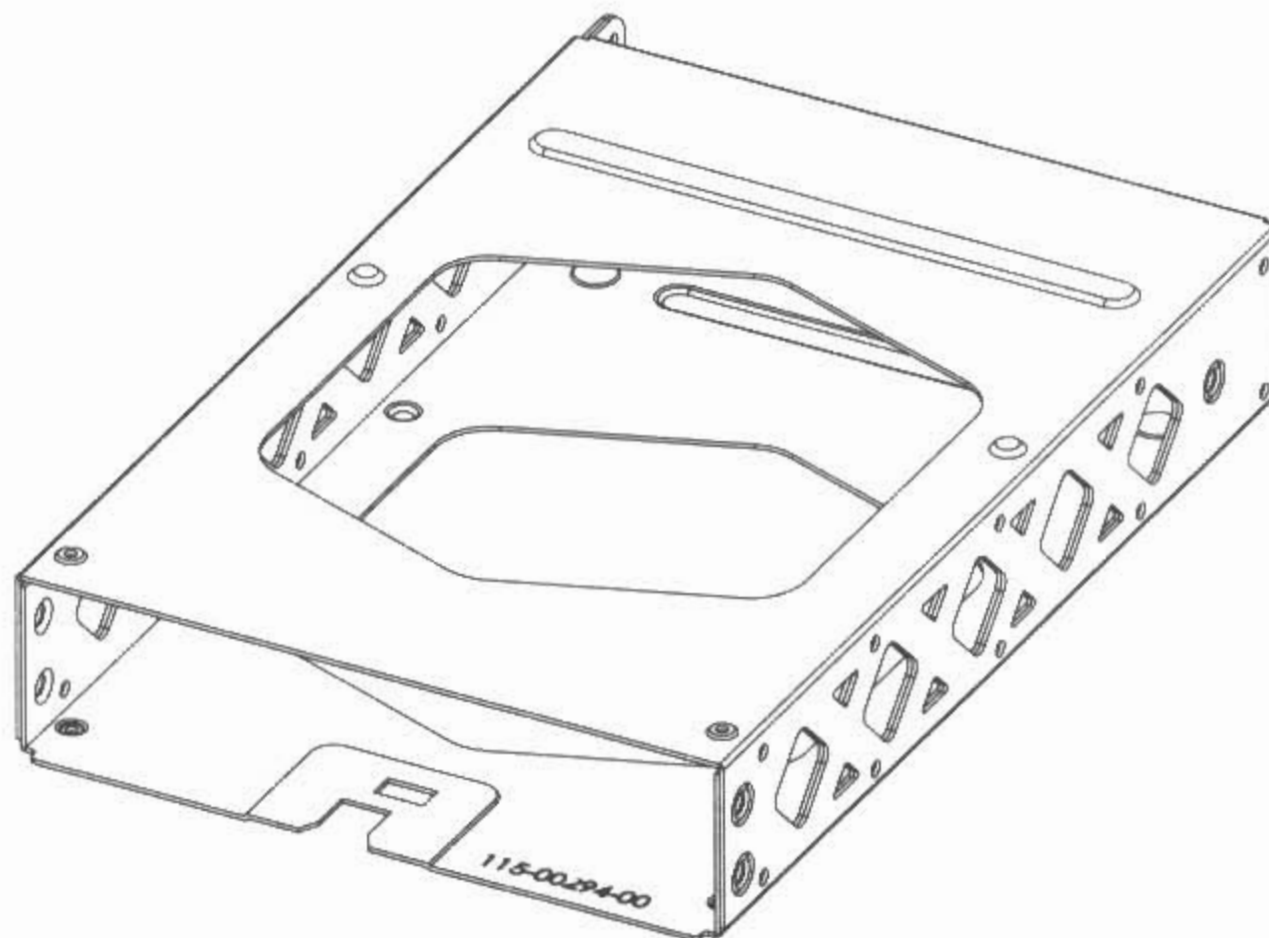


Figure 2-2. GTX 330 Install Rack (115-00294-00)

3 INSTALLATION PROCEDURE

3.1 Unpacking Unit

Carefully unpack the equipment and make a visual inspection of the unit for evidence of damage incurred during shipment. If the unit is damaged, notify the carrier and file a claim. To justify a claim, save the original shipping container and all packing materials. Do not return the unit to Garmin until the carrier has authorized the claim.

Retain the original shipping containers for storage. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement of the item within the container.

3.2 Electrical Connections

All electrical connections, except for the antenna(s) and shield ground, are made through a single, 62 pin D-subminiature connector (see Figure 4-1). The card-edge connector may be used to terminate shield grounds to the GTX 328 back plate. Table 4-1 lists the electrical connections of all input and output signals. See Appendix C for interconnect wiring diagrams and cable requirements for each signal. Required connector and associated hardware are supplied in the connector kit (P/N 011-00583-00).

CAUTION

Check wiring connections for errors before inserting the GTX 328 into the rack. Incorrect wiring could cause internal component damage.

Table 3-1. Pin Contact Part Numbers (Hi Density)

Manufacturer (Note 1)	62 pin D-Subminiature connector (P3281)		
	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 (Hi Density)

Manufacturer (Note 1)	Hand Crimping Tool	18-20 AWG		22-28 AWG	
		Positioner (Note 3)	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 AWG 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. Contact Garmin for crimp instructions for use with 16 AWG contact.

3.3 Circuit Breaker Placard

Install a Circuit Breaker Placard labeled Transponder or Transponder 1, Transponder 2 as appropriate as indicated in FAA Advisory Circular AC 43.13-2A, paragraph 27c(4).

3.4 Post Installation Checkout

After the installation is complete, refer to Section 5 for system configuration.

Verify proper operation of the transponder by testing in accordance with Appendix F to 14 CFR Part 43 – ATC Transponder Tests and Inspections.

4 SYSTEM INTERCONNECTS

4.1 Pin Function List

4.1.1 J3281

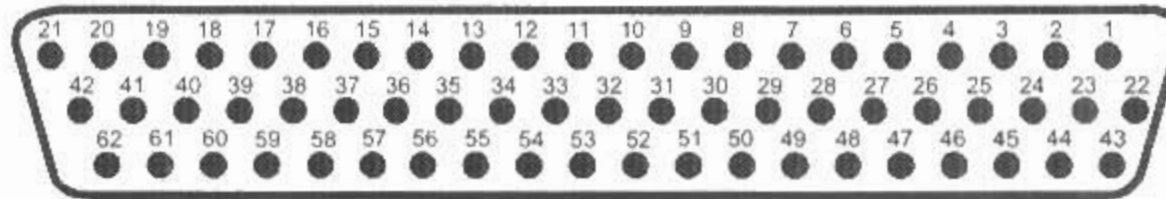


Figure 4-1. Rear Connector, J3281

Table 4-1. P3281 Pin Assignments

Pin	Pin Name	I/O
1	AVIONICS MASTER ON SELECT	In
2	ALTITUDE A1	In
3	ALTITUDE C2	In
4	ALTITUDE A2	In
5	ALTITUDE A4	In
6	ALTITUDE C4	In
7	ALTITUDE B1	In
8	ALTITUDE C1	In
9	ALTITUDE B2	In
10	ALTITUDE B4	In
11	ALTITUDE D4	In
12	EXTERNAL IDENT SELECT*	In
13	EXTERNAL STANDBY SELECT*	In
14	28 V LIGHTING BUS HI	In
15	AUDIO OUT HI	Out
16	AUDIO OUT LO	Out
17	SQUAT SWITCH IN	In
18	RESERVED	--
19	ALTITUDE ALERT ANNUNCIATE*	Out
20	RESERVED	--
21	AIRCRAFT POWER 1	In
22	RS-232 IN 1	In
23	RS-232 OUT 1	Out
24	RS-232 IN 2	In
25	RS-232 OUT 2	Out
26	ARINC 429 IN 3 A	In
27	POWER GROUND	--
28	ARINC 429 OUT 2 B	Out
29	ARINC 429 IN 3 B	In
30	ARINC 429 OUT 2 A	Out
31	EXTERNAL SUPPRESSION I/O	I/O

* Denotes Active Low (Ground to activate).

Table 4-1. P3281 Pin Assignments (Cont'd)

Pin	Pin Name	I/O
32	ARINC 429 IN 1 A	In
33	ARINC 429 IN 2 A	In
34	ARINC 429 OUT 1 B	Out
35	ARINC 429 IN 1 B	In
36	ARINC 429 IN 2 B	In
37	ARINC 429 OUT 1 A	Out
38	RESERVED	--
39	RESERVED	--
40	SPARE	--
41	CURRENT TEMPERATURE PROBE OUT	Out
42	AIRCRAFT POWER 1	In
43	POWER GROUND	--
44	CURRENT TEMPERATURE PROBE IN	In
45	14 V/5 V LIGHTING BUS HI	In
46	RESERVED	--
47	AUDIO MUTE SELECT*	In
48	ARINC 429 IN 4 A	In
49	ARINC 429 IN 4 B	In
50	ALTITUDE COMMON (GROUND)	In
51	RESERVED	--
52	RESERVED	--
53	RESERVED	--
54	RESERVED	--
55	SPARE	--
56	AIRCRAFT POWER 2	In
57	SPARE	--
58	RESERVED	--
59	SPARE	--
60	AIRCRAFT POWER 2	In
61	SPARE	--
62	SWITCHED POWER OUT	Out

* Denotes Active Low (Ground to activate).

4.2 Power and Lighting Function

Power Input requirements and Lighting Bus input are listed in the following tables. The power-input pins accept 14/28 Vdc. AIRCRAFT POWER 2 is for connecting to an alternate power source, such as on aircraft with two electrical buses. Switched Power Out is a power source available for devices such as a remote digital altitude encoder. Refer to Figures C-1 and C-2 for power and lighting interconnections.

4.2.1 Aircraft Power

Table 4-2. Aircraft Power Pin Assignments

Pin Name	Pin Number	I/O
AIRCRAFT POWER 1	21	In
AIRCRAFT POWER 1	42	In
AIRCRAFT POWER 2	56	In
AIRCRAFT POWER 2	60	In
SWITCHED POWER OUT	62	Out
POWER GROUND	27	--
POWER GROUND	43	--

4.2.2 Lighting Bus

The GTX 328 unit can be configured to track a 28 Vdc, 14 Vdc, 5 Vdc or 5 Vac lighting bus using these inputs. The GTX 328 can also automatically adjust for ambient lighting conditions based on the photocell. Refer to Sections 5.2.4 and 5.2.5 for lighting configuration.

Table 4-3. Aircraft Lighting Pin Assignments

Pin Name	Pin Number	I/O
14 V/5 V LIGHTING BUS HI	45	In
28 V LIGHTING BUS HI	14	In

4.3 Temperature Inputs

Table 4-4. Temperature Probe Pin Assignments

Pin Name	Pin Number	I/O
CURRENT TEMPERATURE PROBE OUT	41	Out
CURRENT TEMPERATURE PROBE IN	44	In

Temperature input is used for Outside Air Temperature (OAT) display and Density Altitude computations. The type of temperature probe required is a current sensor type, such as an EDMO P/N 655-PROBE or Davtron P/N C307PS. Connect the red wire to pin 41 and the black wire to pin 44. The GTX 328 is not configurable for different types of temperature sensors. The temperature-input specification is 1 microamp per degree Kelvin (1 $\mu\text{A}/^\circ\text{K}$). Refer to Figure C-6 for the temperature probe interconnect and to Section 5.2.11 for probe configuration.

4.4 Altitude Functions

Parallel gray code altitude inputs are considered active if either the voltage to ground is $< 1.9\text{ V}$ or the resistance to ground is $< 375\ \Omega$. These inputs are considered inactive if the voltage to ground is 11-33 Vdc. Refer to Figures C-6 and C-9 for parallel gray code and serial data altitude interconnections. Carefully check encoder input lines for correct connection after wiring is complete.

NOTES

The GTX 328 contains internal altitude code line isolation diodes to prevent the unit from pulling the encoder lines to ground when the transponder is turned off.

If two separate altitude encoders are connected to the GTX 328, one providing parallel gray code and the other, serial data, the unit selects only one for use at a time, with serial data input receiving the highest priority.

For altimeters that can be connected in both serial data and parallel gray code format, such as the Garmin GAE 43 (Garmin P/N 013-00066-00), select one or the other but not both wiring connections.

Among the surveillance items the Mode S transponder will transmit to the ground stations and other aircraft are altitude reporting in 25-foot increments with the proper encoder. In order to report altitude in 25-foot increments the GTX 328 must receive altitude from suitable altitude reporting devices through serial input connections. Altitude input to the GTX 328 received from parallel wire gray code encoders is supplied to the unit in 100-foot increments and thus reported in 100-foot increments.

4.4.1 Altimeter Inputs

Table 4-5. Encoded Altitude Pin Assignments

Pin Name	Pin Number	I/O
ALTITUDE D4	11	In
ALTITUDE A1	2	In
ALTITUDE A2	4	In
ALTITUDE A4	5	In
ALTITUDE B1	7	In
ALTITUDE B2	9	In
ALTITUDE B4	10	In
ALTITUDE C1	8	In
ALTITUDE C2	3	In
ALTITUDE C4	6	In
ALTITUDE COMMON	50	--
RS-232 IN 2	24	In

4.4.2 Altimeter Calibration and Checkout

Refer to Section 5.2.14 for the gray code altitude checkout.

4.4.3 Altimeter Interconnect, Dual GTX 328 Installation

A dual GTX 328 installation can accept either parallel wire gray code altimeter input or RS-232 serial data input as shown in Figure 4-2. If transponder number 2 is a Garmin GTX 327, connect the RS-232 output from the altitude encoder to J3271 pin 19 (refer to GTX 327 Transponder Installation Manual, P/N 190-00187-02).

Refer to Figure C-9, Sheet 1 for dual GTX 328 gray code altimeter interconnections. Refer to Figure C-9, Sheets 2 and 3 for dual altimeter interconnections to a GNS 480 (CNX80). The GNS 480 (CNX80) can receive digital data from only one transponder at a time. Due to system configuration, dual transponders must be identical, i.e. dual GTX 328s, in a system with one GNS 480 (CNX80).

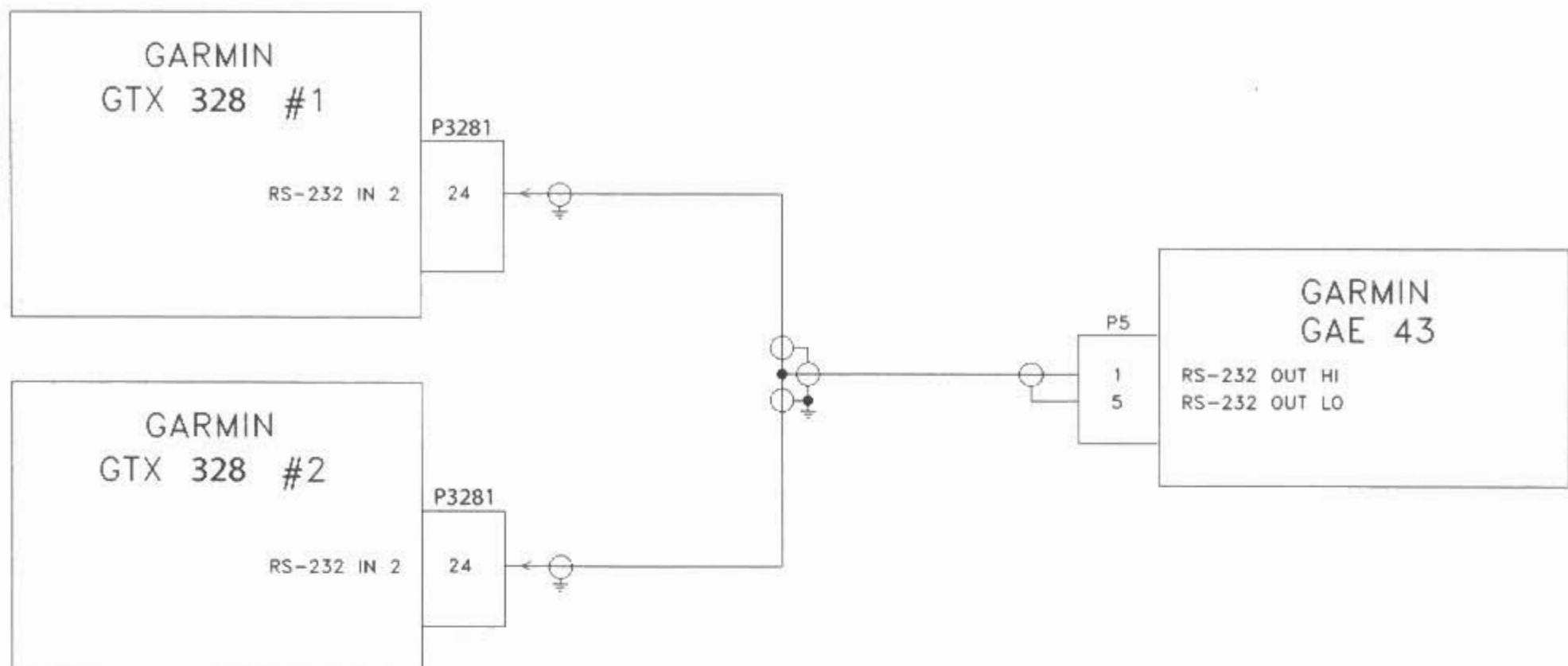


Figure 4-2. Dual GTX 328, Single Encoder, Serial Input Connections

For complete dual installations containing two encoders, it is best to connect one encoder to each transponder.

4.4.4 Altimeter Selection Priority

The installer must be aware of the GTX 328 priority for selecting encoded altimeter interconnections. The GTX 328 searches in this sequence for altitude, and stops when it finds a valid pressure altitude input.

Only approved devices may provide altitude to the GTX 328 in accordance with 14 CFR 91.217. In addition, all altitude reporting devices installed in the aircraft must meet certification requirements of 14 CFR 91.413. The installer must select an altitude reporting device that is a certified altitude source for the particular aircraft.

Altitude reporting equipment order of precedence:

- 1) ARINC 429 Air Data Computer (label 203, if configured W/ALT) (25')
- 2) ARINC 429 EFIS (label 203, if configured W/ALT) (25')
- 3) RS-232 data from GNS 480 (CNX80) if so connected*
- 4) RS-232 Fuel/Air Data Computer (if configured W/ALT.) (25')
- 5) Shadin Altitude Serializer/Encoder (if configured for 25')
- 6) Icarus Altitude Serializer/Encoder (if configured for 25')
- 7) Parallel wire Gray Code input (100')
- 8) Shadin Altitude Serializer/Encoder (if configured for 100')
- 9) Icarus Altitude Serializer/Encoder (if configured for 100')

It is the installing agency's responsibility to determine that the installed encoder is compatible with the selected altitude reporting criteria, either 100' or 25'. Refer to Section 5.2.8 and 5.2.9 for the altitude data reporting configuration.

* For additional information, refer to GNS 480 (CNX80) Installation Manual 560-0982-01 for the altitude data reporting configuration when connecting a GTX 328 to a GNS 480 (CNX80).

4.5 Discrete Functions

4.5.1 Discrete Outputs

External suppression should be connected if a DME is installed in the aircraft avionics system. The GTX 328 suppression I/O pulses may not be compatible with all models of DME. Known incompatible units include the Bendix/King KN 62, KN 64 and KNS 80. These models have an output-only suppression port and can be damaged by the GTX 328 mutual suppression output. In this case, leave the suppression pin open.

Table 4-6. Discrete Outputs Pin Assignments

Pin Name	Pin Number	I/O
ALTITUDE ALERT ANNUNCIATE*	19	Out
EXTERNAL SUPPRESSION I/O	31	In/Out

* This output is considered active if either the voltage to ground is < 1.9 V or the resistance to ground is < 375 Ω . This output is considered inactive if the voltage to ground is 11-33 Vdc.

4.5.2 Discrete Inputs

Table 4-7. Discrete Inputs Pin Assignments

Pin Name	Pin Number	I/O
EXTERNAL IDENT SELECT*	12	In
EXTERNAL STANDBY SELECT*	13	In
SQUAT SWITCH IN	17	In
AUDIO MUTE SELECT*	47	In

* These inputs are considered active if either the voltage to ground is < 1.9 V or the resistance to ground is $< 375 \Omega$. These inputs are considered inactive if the voltage to ground is 11-33 Vdc.

EXTERNAL IDENT SELECT (remote IDENT) is a momentary input.

Refer to Figure C-4 for the squat switch interconnect and to Sections 5.2.10. and 5.2.15 for the squat switch configuration.

EXTERNAL STANDBY SELECT (remote STANDBY) is a momentary input used when two GTX 328 systems are installed in an aircraft. Refer to Figures C-4, C-7 and C-9 for the EXTERNAL STANDBY SELECT interconnect and to Sections 5.2.15 for verifying external standby configuration. When EXTERNAL STANDBY SELECT is grounded, ARINC 429 OUT PORT 1 remains active, while PORT 2 is inactive.

The muting feature may be enabled through a Multi-Function display. In order to prevent inadvertent muting, the status of muting must default to "Mute off" upon each power cycle. Refer to Figures C-1, C-4, and C-8 for AUDIO MUTE SELECT connections and to Sections 5.2.2 for AUDIO configuration.

4.6 Serial Data Electrical Characteristics

The GTX 328 can be configured to include GPS, Airdata, AHRS, EFIS/Airdata, and ADLP ARINC 429 inputs, functioning as an ARINC 429 data concentrator.

Since the Garmin 400/500 Series products have only two ARINC 429 input ports, the GTX 328 manages support for several equipment interfaces. The GTX 328 has four ARINC 429 input ports, making it capable of taking altitude, air data, heading, EFIS selected course and possible future features, and then concentrating it on the ARINC 429 OUT 2 port. This line is then wired to an ARINC 429 input port on the 400/500 Series products.

Airborne Data Link Processor (ADLP) is reserved for future data link applications. ADLP requires an ARINC 429 input and output. The ADLP interface allows the Mode S data link transponder to function as a modem. An ADLP performs functions requiring sending and/or receiving data from ground sensors via Mode S interrogations and replies.

4.6.1 RS-232 Input/Output

Table 4-8. RS-232 Pin Assignments

Pin Name	Pin Number	I/O
RS-232 OUT 1	23	Out
RS-232 IN 1	22	In
RS-232 OUT 2	25	Out
RS-232 IN 2	24	In

The RS-232 outputs conform to EIA Standard RS-232C with an output voltage swing of at least ± 5 V when driving a standard RS-232 load. Refer to Figures 4-3, C-2, C-3, C-5, C-6, C-7, C-8, and C-9 for RS-232 serial data interconnect and to Sections 5.2.9 and 5.2.17 for RS-232 serial data configuration.

When connecting two GTX 328 transponders to a GPS, the unit can only receive RS-232 serial data from one unit at a time. Use a DPDT switch for connecting both serial data and External Standby Select. Refer to Figure C-9, Sheets 2 and 3.

4.6.2 RS-232 Input/Output, Software Update Connections

When the GTX 328 is installed in an aircraft an optional RS-232 serial data connector should be installed in the aircraft for future software upgrades, negating the need to remove the transponder from the aircraft panel. The connector can be mounted anywhere convenient for access, such as under the instrument panel, on a remote avionics shelf or in the instrument panel itself. Be sure to label the connector for Software Update. Do not include the Test Mode Select switch in the aircraft. See Figure 4-3 for software update connections.

If the GTX 328 installation interfaces with a GNS 480 (CNX80) in the aircraft, the GNS 480 (CNX80) must be turned off during GTX 328 software upload, due to loading of RS-232 port 1.

NOTE

The installation of an optional software upgrade connector is highly recommended. If the connector is wired in the aircraft, transponder removal and reinstallation for software upgrade is not required.

CAUTION

If the unit is removed from the aircraft and operated, always connect J3282 to an antenna or a 50 Ω , 5-Watt load. The GTX 328 transmits Mode S acquisition squitter replies about once per second whether interrogations are received or not.

The GTX 328 software can be updated in the Configuration mode as well as in Test mode. Updating software in Configuration mode does not require the TEST MODE SELECT switch. See Figure 4-3 for software update connections.

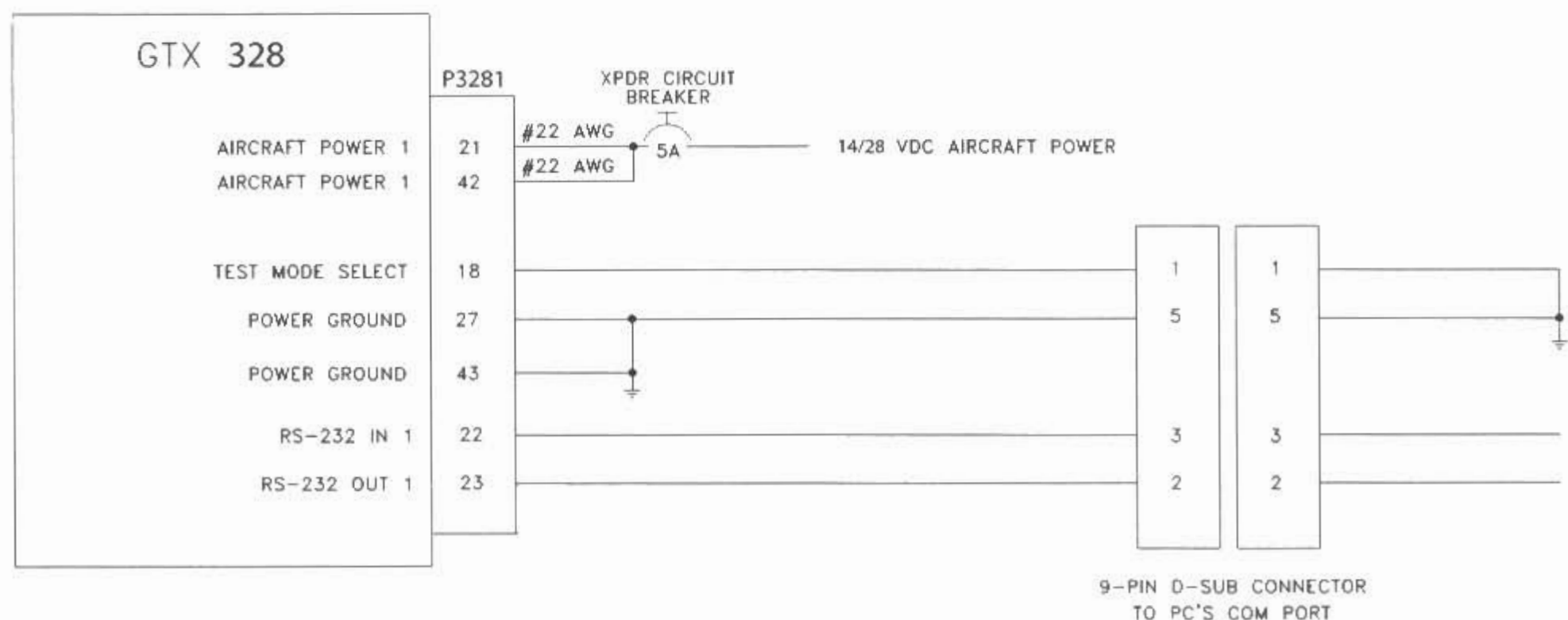


Figure 4-3. GTX 328, Software Update Connections

4.6.3 ARINC 429 Input/Output

The ARINC 429 Output 2 port (J3281 pins 30 and 28), is at a high-impedance when in remote standby, therefore not active. When two GTX 328s are installed, the two ARINC 429 Output 2 ports may be hard wired together since the EXTERNAL STANDBY SELECT input is active for only one of the two GTX 328s at any given time.

The GTX 328 ARINC 429 Output 1 port is active when J3281 pin 13 is grounded [EXTERNAL STANDBY SELECT (remote STANDBY)]. In installations having a transponder combination of GTX 328/GTX 330 (or GTX 328/other transponder), the GARMIN format from the ARINC 429 Output 1 port (J3281 pins 34 and 37) is available.

Table 4-9. ARINC 429 Pin Assignments

Pin Name	Pin Number	I/O
ARINC 429 OUT 1A	37	Out
ARINC 429 OUT 1B	34	Out
ARINC 429 IN 1A	32	In
ARINC 429 IN 1B	35	In
ARINC 429 IN 2A	33	In
ARINC 429 IN 2B	36	In
ARINC 429 OUT 2A	30	Out
ARINC 429 OUT 2B	28	Out
ARINC 429 IN 3A	26	In
ARINC 429 IN 3B	29	In
ARINC 429 IN 4A	48	In
ARINC 429 IN 4B	49	In

The ARINC 429 outputs conform to ARINC 429 electrical specifications when loaded with up to 5 standard ARINC 429 receivers. Refer to Figures C-1, C-3, C-5, C-7 and C-8 for the ARINC 429 serial data interconnect and Sections 5.2.8 and 5.2.18 for ARINC 429 serial data configuration.

5 POST INSTALLATION CONFIGURATION AND CHECKOUT PROCEDURE

Perhaps the most important factor in the GTX 328 transponder configuration and checkout is the Mode S address entry. Refer to Section 5.2.12 for Mode S address entry pages.

CAUTION

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

Verify proper operation of the transponder during a flight test under VFR conditions. If the unit detects an internal failure mode the word FAIL is displayed on the screen.

Make sure an approved device is installed for reporting altitude in accordance with 14 CFR 91.217. Refer to Section 4.4.4 for altimeter data selection priority.

5.1 Operation

NOTE

The coverage you can expect from the GTX 328 is limited to line of sight. Low altitude or antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.



Figure 5-1. GTX 328 Front Panel

NOTE

The GTX 328 should be turned off before starting aircraft engine(s).

5.1.1 Function Selector Switches

The function selection switches are:

- **OFF** — Powers off the GTX 328. Pressing the STBY, ON or ALT key powers on the transponder displaying the last active identification code.
- **STBY** — Selects the standby mode. When in standby mode, the transponder does not reply to any interrogations. Pressing and holding the STBY key selects ground (GND) mode if Automated Airborne Determination is not otherwise selected from another source. When GND is annunciated, the transponder does not respond to ATCRBS interrogations but squitters and replies to discretely addressed Mode S interrogations.
- **ON** — Selects Mode A and Mode S. In this mode, the transponder replies to Mode A, Mode C and Mode S interrogations, as indicated by the Reply Symbol (“®”), but the replies do not include altitude information.
- **ALT** — Selects Mode A, Mode C and Mode S. In ALT mode, the transponder replies to identification, altitude and Mode S interrogations as indicated by the Reply Symbol (“®”). Replies to altitude interrogations include the standard pressure altitude received from an external altitude source, which is not adjusted for barometric pressure. The ALT mode may be selected in aircraft not equipped with an optional altitude encoder; however, the reply signal does not include altitude information.

NOTE

Any time the function switch is in the ON or ALT position the transponder becomes an active part of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder also responds to interrogations from TCAS equipped aircraft.

- **IDENT** — Pressing the IDENT key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying the transponder return from others on an air traffic controller’s screen. During the IDENT period the word ‘IDENT’ appears in the upper left corner of the display.
- **VFR** — Sets the transponder code to the pre-programmed VFR code selected in Configuration mode (Set to 7000 at the factory). Pressing the VFR key again restores the previous identification code.
- **FUNC** — Changes the page shown on the right side of the display. Display data includes Pressure Altitude, Flight Time, Altitude Monitor, Count Up and Count Down timers. In the Configuration mode, steps through the function pages.
- **START/STOP** — Starts and stops the Altitude Monitor, Count Up, Count Down and Flight timers. In Configuration mode, steps through functions in reverse.

- **CRSR** — Initiates entry of the starting time for the Count Down timer and cancels transponder code entry. Selects changeable fields in Configuration mode.
- **CLR** — Resets the Count Up, Count Down and Flight timers. Cancels the previous keypress during code selection and Count Down entry. Used in Configuration mode.
- **8** — Reduces Contrast and Display Brightness when the respective fields are displayed and enters the number eight into the Count Down timer. Used in Configuration mode.
- **9** — Increases Contrast and Display Brightness when the respective fields are displayed and enters the number nine into the Count Down timer. Used in Configuration mode.

5.1.2 Code Selection

Code selection is entered with eight keys (0 – 7) providing 4,096 active identification codes. Pushing one of these keys begins the code selection sequence. The new code is not activated until the fourth digit is entered. Pressing the CLR key moves the cursor back to the previous digit. Pressing the CLR key when the cursor is on the first digit of the code, or pressing the CRSR key during code entry, removes the cursor and cancels data entry, restoring the previous code. You may press the CLR key up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers 8 and 9 are not used for code entry, only for entering a Count Down time, contrast and display brightness, and data selection in the Configuration mode.

NOTE

The selected identification code should be entered carefully, either one assigned by air traffic control for IFR flight or an applicable VFR transponder code.

- **Important Codes:**

1200 — VFR code for any altitude in the US (Refer to ICAO standards elsewhere)

2000 — VFR code commonly used in Europe (Refer to ICAO standards)

7000 — VFR code commonly used in Europe (Refer to ICAO standards)

7500 — Hijack code (Aircraft is subject to unlawful interference)

7600 — Loss of communications

7700 — Emergency

Avoid selecting code 7500 and all codes in the 7600-7777 range. These codes trigger special indicators in automated facilities. An aircraft's transponder code is used for ATC tracking purposes, therefore exercise care when making routine code changes.

5.1.3 Function Display

PRESSURE ALT	Displays the altitude data supplied to the GTX 328 in feet, hundreds of feet (i.e., flight level), or meters, depending on configuration.
FLIGHT TIME	Displays the Flight Time, controlled by the START/STOP key or by one of four airborne sources (squat switch, GPS ground speed recognition, airdata airspeed recognition or altitude increase) as configured during installation. The timer begins when the GTX 328 determines that the aircraft is airborne.
ALTITUDE MONITOR	Controlled by START/STOP key. Activates a voice alarm and warning annunciator when altitude limit is exceeded.
OAT/DALT	Displayed when the GTX 328 is configured with temperature input. Displays Outside Air Temperature and Density Altitude.
COUNT UP TIMER	Controlled by START/STOP and CLR keys.
COUNT DOWN TIMER	Controlled by START/STOP, CLR, and CRSR keys. The initial Count Down time is entered with the 0 – 9 keys.
CONTRAST	This page is only displayed if manual contrast mode is selected in Configuration mode. Contrast is controlled by the 8 and 9 keys.
DISPLAY	This page is only displayed if manual backlighting mode is selected in Configuration mode. Backlighting is controlled by the 8 and 9 keys.

5.2 Configuration Pages

NOTES

The configuration descriptions given in this section reflect software version 5.00 or higher.

When connecting the GTX 328 to a GNS 480 (CNX80) the transponder can be configured from either the GNS 480 (CNX80) or the GTX 328. Although possible from the GNS 480 (CNX80), configuration from the GTX 328 front panel offers more functions and easier to interpret displays.

Holding down the FUNC key and pressing the ON key provides access to the configuration pages. The FUNC key sequences forward through the configuration pages. The START/STOP key reverses through the pages, stopping at the Menu page. The CRSR key highlights selectable fields on each page. When a field is highlighted, the 0 – 9 keys enter numeric data and the 8 or 9 keys move through list selections. Press the CRSR key to accept changes. When a field is highlighted, pressing the FUNC key moves to the next configuration page without saving the changes.

Changes made through the configuration pages are stored in EEPROM memory. To exit the configuration pages, turn the power off. Then turn on again (without holding the FUNC key) for normal operation.

The configuration page sequence is as follows (menu categories are listed in parentheses):

- 'Jump To' Menu
- Audio and Messages #1
- Audio and Messages #2
- Display Mode
- Display Backlight
- Key Backlight
- Contrast
- VFR Key Configuration
- ARINC 429 Input #1 (First I/O Configuration page)
- ARINC 429 Input #2 (Second I/O Configuration page)
- ARINC 429 Output
- RS-232 Input Output
- Operation Configuration #1 (First Aircraft Configuration page)
- Operation Configuration #2 (Second Aircraft Configuration page)
- Temperature
- Aircraft Address
- Flight ID
- Aircraft Type
- Gray Code Input
- External Switch State
- Analog Input
- RS-232 Input Display
- ARINC 429 Input Display #1
- ARINC 429 Input Display #2

5.2.1 Configuration Menu Page

JUMP TO **DIAGNOSTICS**

CONFIGURATION MENU

CONFIGURATION MENU Page

The JUMP TO menu page provides the capability to select a Configuration mode starting page without having to step through all of the pages. Press the CRSR key and sequence through to the desired selection with the 8 and 9 keys. Jump to the selection by pressing the CRSR key again with the desired selection highlighted.

The FUNC key steps to the next configuration page, after which the START/STOP key reverses until stopping at the JUMP TO menu page.

SELECTION	DESCRIPTION
DIAGNOSTICS	Jumps to Gray Code Input page.
DISPLAY/AUDIO	Jumps to Audio Volume page.
I/O CONFIG	Jumps to ARINC 429 INPUT #1 page.
ACFT CONFIG	Jumps to Operation Configuration #1 page.

5.2.2 Audio Mode Pages

VOICE and VOLUME

Select desired VOICE. Make sure the volume level is sufficient for the aircraft environment involved.

MESSAGE

Message is used as a test function only. Message 0 is a continuous tone. Message 1 is a short tone, 2 and 4 are voice messages. Choose each selection to listen to the message.

AUDIO	VOLUME	
VOICE FEMALE	MESSAGE 0	
AUDIO MODE (First) Page		
ALTITUDE MONITOR	OFF	DISABLE
COUNT DOWN TIMER	OFF	
AUDIO MODE (Second) Page		

SELECTION	DESCRIPTION
VOICE (MALE/FEMALE)	Sets the voice to male or female. Default is male voice.
VOLUME	Volume is adjusted from 0 (default) to maximum with the 8 or 9 key.
MESSAGE (0-9)	Selected audio tones and messages: 0 = Toggles a continuous tone on and off. 1 = Attention Tone, precedes voice messages to attract the pilot's attention. 2 = "Leaving Altitude," when altitude monitor is active and the altitude deviation is exceeded. 4 = "Timer Expired," when the countdown timer expires. 3, 5, 6, 7, 8, and 9 are not used at this time.
ALTITUDE MONITOR	Off, tone or message
COUNT DOWN TIMER	Off, tone or message
PAGE CHANGE	Enables/Disables Altitude Monitor sub page when altitude deviation is exceeded.

5.2.3 Display Mode Page

DISPLAY MODE **AUTO** LEVEL **75**

DISPLAY MODE Page

DISPLAY MODE

SELECTION	DESCRIPTION
AUTO (Automatic)	DEFAULT. Display automatically changes between Positive mode (during the day) and Negative mode (at night), depending on ambient light level received by the photocell.
NGTV (Negative)	Display always has light characters on a black background, regardless of ambient lighting.
PSTV (Positive)	Display always has black characters on a light background, regardless of ambient lighting.

LEVEL

Sets the ambient light level for AUTO mode to change between negative and positive display. The higher the number, the brighter the ambient light level to change over. This field has a range of 0 (zero) to 99, with the default set to 75.

5.2.4 Display Backlight Page

BKLT **AUTO** LVL **624** RSP TIME **4** MIN **88**

BKLT SRCE **PHOTO** SLOPE **50** OFFSET **50**

DISPLAY BACKLIGHT Page

BKLT (Backlight)

SELECTION	DESCRIPTION
AUTO (Automatic)	DEFAULT. Display backlighting is automatically controlled, based on the parameters entered on this configuration page. When AUTO is selected, the DISPLAY page does not appear to the pilot.
MAN (Manual)	Display backlighting is controlled manually by the pilot on the GTX 328 DISPLAY page. No backlight parameters can be entered when the manual mode is selected.

LVL (Level)

Shows the current level of display backlighting, based on the lighting input source (lighting bus voltage, or the ambient light if the source is PHOTO) and the settings on this configuration page. This field has a range of 0 (zero) to 999. The level is set by pressing the 8 and 9 keys when MAN mode is selected. When in AUTO mode, the field is for display only.

RSP TIME (Response Time)

Sets the speed with which the brightness responds to ambient light changes (only for AUTO backlight mode). The higher the number, the slower the display responds. This field has a range of 0 to 7, with the default set to 4.

MIN (Minimum) (Auto Only)

Sets the minimum brightness of the display. The higher the number, the brighter the minimum brightness. Display minimum brightness has a range of 0 (zero) to 99, with the default set to 8. It is prudent to verify that display lighting characteristics match those of other equipment in the panel under night lighting conditions.

BKLT SRCE (Backlight Source)

SELECTION	DESCRIPTION
PHOTO (Photocell)	DEFAULT. Backlight level is determined by the ambient light level as measured by the photocell on the GTX 328.
14V	Backlight level tracks a 14 Volt DC aircraft lighting bus.
28V	Backlight level tracks a 28 Volt DC aircraft lighting bus.
5V	Backlight level tracks a 5 Volt DC aircraft lighting bus.

NOTE

If a lighting bus (any selection other than PHOTO) is selected, and the lighting bus control is turned to its minimum (daytime) setting, the display brightness tracks the GTX 328 photocell.

SLOPE (Auto Only)

Sets the sensitivity of the display brightness to changes in the input level. The higher the number, the brighter the display for a given increase in the input level. This field has a range of 0 (zero) to 99, with the default set to 50.

OFFSET (Auto Only)

Adjusts the lighting level up or down for any given input level. This field has a range of 0 (zero) to 99, and is set to 50 at the factory. This may also be used to match lighting curves with other equipment in the panel.

5.2.5 Key Lighting Page

The key lighting mode is always the same as the display backlight mode, so the mode must be changed on the Display Backlight configuration page. If the lighting mode is AUTO, then the key lighting parameters can be edited on this page.

KEY **AUTO** LVL **624** RSP TIME **4 MIN 08**
KEY SRCE **PHOTO** SLOPE **50** OFFSET **50**
KEY LIGHTING Page

KEY (Key Lighting)

SELECTION	DESCRIPTION
AUTO (Automatic)	Key lighting is automatically controlled based on the parameters entered on this configuration page.
MAN (Manual)	Key lighting is controlled manually by the pilot on the GTX 328 DISPLAY page.

LVL (Level)

Shows the current level of key lighting, based on the lighting input source (lighting bus voltage, or the ambient light if the source is PHOTO) and the settings on this configuration page. This field has a range of 0 (zero) to 999, but is not a user-entered field (display only).

RSP TIME (Response Time)

Sets the speed with which the brightness responds to ambient light changes (only for AUTO key lighting mode). The higher the number, the slower the key lighting responds. This field has a range of 0 to 7, and is set to 4 at the factory.

MIN (Minimum) (Auto Only)

Sets the minimum brightness of the key lighting. The higher the number, the brighter the minimum brightness. Key lighting minimum brightness has a range of 0 (zero) to 99, and is set to 8 at the factory. It is prudent to verify that key lighting characteristics match those of other equipment in the aircraft panel under night lighting conditions.

KEY SRCE (Key Lighting Source) (Auto Only)

SELECTION	DESCRIPTION
PHOTO (Photocell)	DEFAULT. Key lighting level is determined by the ambient light level as measured by the photocell on the GTX 328.
14V	Backlight level tracks a 14 Volt DC aircraft lighting bus.
28V	Backlight level tracks a 28 Volt DC aircraft lighting bus.
5V	Backlight level tracks a 5 Volt DC aircraft lighting bus.

SLOPE (Auto Only)

Sets the sensitivity of the key lighting brightness to changes in the input level. The higher the number, the brighter the key lighting for a given increase in the input level. This field has a range of 0 (zero) to 99, and is set to 50 at the factory.

OFFSET (Auto Only)

Adjusts the key lighting level up or down for any given input level. This field has a range of 0 (zero) to 99, and is set to 50 at the factory. This may also be used to match lighting curves with other equipment in the panel.

5.2.6 Contrast Configuration Page

CONTRAST MODE

CONTRAST MODE AUTO  050

CONTRAST CONFIGURATION Page

SELECTION	DESCRIPTION
AUTO (Automatic)	DEFAULT. Display contrast is automatically compensated for LCD temperature and other factors. An offset can be entered in the contrast level adjustment described below.
MAN (Manual)	Display contrast is manually adjusted either here or by the pilot using the GTX 328 CONTRAST page.

CONTRAST LEVEL ADJUSTMENT

This is a “slider” bar graph control. Use the 8 key to move the graph to the left, decreasing the numbers and contrast level. Use the 9 key to move it to the right, increasing the numbers and contrast level. In manual contrast mode, this is a direct adjustment of the display contrast. In automatic contrast mode, this adjusts the offset to the automatically compensated contrast, with the default set to an offset of 50.

5.2.7 VFR Key Configuration Page

VFR Key Functionality

Available settings are ENABLE or DISABLE. Use the 8 Key to select DISABLE, or the 9 Key to select the ENABLE setting.

VFR KEY **DISABLE**

VFR Key Configuration Page

SELECTION	DESCRIPTION
ENABLE	DEFAULT. The VFR Key functions normally in this setting.
DISABLE	When the VFR Key is disabled and the VFR key is pressed, the unit displays an advisory message that indicates no operation took place. Error message clears after 5 seconds elapses, or if the CLR key is pressed. All other keys behave normally.

5.2.8 ARINC 429 Configuration Pages

ARINC 429 INPUT

The ARINC 429 INPUT Pages configure the ARINC 429 input ports. Each port can be configured independently for the desired function(s). The ARINC 429 IN 1 INPUT allows automated start and stop of the flight timer and places the transponder in ground (GND) mode upon landing. The same input data source cannot be selected for multiple input channels 1 through 3. ADLP is included for future use.

429 INPUT SPEED DATA
CHANNEL 1 **LOW** **OFF**
CHANNEL 2 **LOW** **OFF**

ARINC 429 INPUT (First) Page

429 INPUT SPEED DATA
CHANNEL 3 **LOW** **OFF**
CHANNEL 4 **OFF**

ARINC 429 INPUT (Second) Page

SPEED (Channel 1 – 3)

SELECTION	DESCRIPTION
Low	Standard low-speed ARINC 429 (nominally 12.5 kilobits per second)
High	High-speed ARINC 429 (nominally 100 kilobits per second)

DATA (Channel 1 – 4)

CHANNEL	SELECTION	DESCRIPTION
All	OFF	No unit connected to this ARINC 429 input
1 through 3	GPS	Selected waypoint information and GPS ground speed recognition.
	ADC NO ALT	Temperature and speed information
	ADC W/ALT	Altitude, temperature and speed information
	AHRS	Attitude and heading information
	EF/AD NO ALT	Selected course, heading, temperature, joystick waypoint and speed information
	EF/AD W/ALT	Selected course, heading, temperature, joystick waypoint and speed information plus altitude data
4	ADLP	Airborne Data Link Processor. ADLP is available only on channel 4.

ARINC 429 OUTPUT

The GTX 328 can be configured to include GPS, Airdata, AHRS, EFIS/Airdata, and ADLP ARINC 429 inputs,

functioning as an ARINC 429 data concentrator. Refer to Section 4.6 SERIAL DATA ELECTRICAL CHARACTERISTICS for details. The ARINC 429 OUTPUT Pages configure the ARINC 429 output ports. Each port can be configured independently for the desired function(s). Both ARINC 429 outputs send high speed ARINC 429 data.

429 OUTPUT	DATA
CHANNEL 1	OFF
CHANNEL 2	OFF

ARINC 429 OUTPUT Page

SELECTION	DESCRIPTION
CHANNEL 1 (DATA)	DATA SOURCE: OFF, ADLP, or GARMIN. DEFAULTS to OFF. ARINC 429 input channel 4 sets the ARINC 429 output channel 1 to the same selection.
CHANNEL 2 (DATA)	DATA SOURCE: OFF or GARMIN. DEFAULTS to OFF. (See Figure C-5, Note 2 for description of Garmin format.)

The Garmin format is a data concentration function. The following data is sent out at specified intervals using high speed ARINC 429 (100 kHz). The transmit data labels and their rates are as follows:

Label	Data	Rate
100	Selected Course (degrees)	200 ms
203	Pressure Altitude (feet)	100 ms
204	Barometric Corrected Altitude (feet)	100 ms
206	Indicated Air Speed (knots)	100 ms
210	True Air Speed (knots)	100 ms
211	Total Air Temperature (degrees)	100 ms
213	Static Air Temperature (degrees)	100 ms
306	Joystick Lat	500 ms
307	Joystick Lon	500 ms
314	True Heading	100 ms
320	Magnetic Heading (degrees)	100 ms
371	GA Equipment Identifier	500 ms
377	Equipment Identifier	500 ms

The following data are sent out in packets approximately every 0.5 seconds at high speed (100 kHz), in the specified sequence:

Label	Data
350	Fault Summary
274	Transponder Control
313	Own Aircraft Track Angle
357 (RTS)	Request to Send
357 (EXT)	End of Transmission

5.2.9 RS-232 Input and Output Page

RS232 INPUT	OUTPUT
CHNL 1 OFF	ICARUS
CHNL 2 OFF	OFF

RS-232 INPUT (Altitude Source, GPS Data)

RS-232 INPUT-OUTPUT Page

This is the electrical source for the GTX 328 altitude and GPS data input. Refer to Section 4.4.4 for altimeter data selection priority.

SELECTION	DESCRIPTION
OFF	DEFAULT. The altitude code input is not from an RS-232 source.
GPS	RS-232 ground speed from a GPS device.
ICARUS ALT	RS-232 serial altitude from an Icarus Instruments 3000.
ICRS ALT 25ft	Reports Icarus Instruments 3000 altitude in 25-foot increments
ADC NO ALT	RS-232 serial air data information from Shadin ADC 200, 200+, 2000.
ADC W/ALT	RS-232 serial air data information from Shadin ADC 200, 200+, 2000 plus altitude data.
SHADIN ALT	RS-232 serial altitude from Shadin 8800T, 9000T, 9200T.
SHDN ALT 25ft	Reports Shadin 8800T, 9000T, 9200T altitude in 25-foot increments
FADC NO ALT	RS-232 serial air data from Shadin 9628XX-X family of Air Data Computers and Fuel/Air Data Computers.
FADC W/ALT	RS-232 serial air data from Shadin 9628XX-X family of Air Data Computers and Fuel/Air Data Computers plus altitude data.
REMOTE	RS-232 serial input remote data. Reserved for future use.

RS-232 OUTPUT (Altitude Source)

SELECTION	DESCRIPTION
OFF	DEFAULT for channel 2. No unit is connected to output of this channel.
ICARUS ALT	DEFAULT for channel 1. RS-232 serial altitude from an Icarus Instruments 3000.
REMOTE	RS-232 serial output remote data. Reserved for future use.

5.2.10 Operation Configuration Pages

VS RATE 0100 ^{f_m}	FORMAT FLIGHT LVL
VFR ID 1200	ALT ALRT DEV 200 ^{f_t}

VS RATE (Vertical Speed Rate)

First CONFIGURATION Page

This field is the typical vertical speed for climb/descent of the aircraft. The settable number determines the rate of climb the GTX 328 assumes as liftoff for starting the flight timer and operational functions. The range is 100 feet per minute to 9999 feet per minute, and is set to 500 fpm at the factory.

FORMAT (Altitude Format)

This field determines how the pressure altitude is shown on the GTX 328 display.

SELECTION	DESCRIPTION
FLIGHT LVL (Flight Level)	DEFAULT. The pressure altitude is displayed in hundreds of feet. For example, a pressure altitude of 12,300 feet is displayed as "FL 123".
FEET	Pressure altitude is displayed in feet.
METERS	Pressure altitude is displayed in meters.

VFR ID (VFR Transponder Code)

This field is the four-digit code that is selected when the user presses the GTX 328 VFR key. The default is set to 7000, which is the standard VFR code for most European airspace when no other code has been assigned. In the United States, 1200 is the VFR code for any altitude.

ALTITUDE ALERT DEVIATION (Altitude Format)

This field determines the amount of altitude difference from selected altitude to generate an altitude alert deviation. It is set to 200 feet, the minimum altitude, at the factory.

SQUAT SWITCH

The squat switch field may be set to either YES or NO. Selecting YES in this field sets the GTX 328 to use the squat switch to determine lift off. Selecting NO sets the GTX 328 to use Automated Airborne Determination from other sources.

SQUAT SWITCH? **NO** SENSE **LOW**
DELAY TIME **24** AUTO FLT TMR? **YES**

Second CONFIGURATION Page

DELAY TIME

This is the number of seconds the aircraft must be on the ground before the GTX 328 automatically switches to GND mode when it has a means of determining the aircraft is on the ground. It has a range of 0 (zero) seconds to 99 seconds, with the default set to 24 seconds.

AUTO FLIGHT TIMER

Available choices are MAN, CLEAR and ACCUM. Selecting CLEAR resets flight time to zero and starts the flight timer when lift off is sensed.

Selection	Description
MAN	Manual selection. DEFAULT. Flight timer START/STOP is controlled manually by the pilot.
CLEAR	Automated flight timer START/STOP resets to zero at every lift off.
ACCUM	Automated flight timer START/STOP accumulates, meaning, it continues counting up at lift off.

TEMPERATURE
SENSOR INSTALLED **NO** UNITS **°C**

TEMPERATURE Page

5.2.11 Temperature Page

SENSOR INSTALLED

Sets the Sensor to YES or NO. Default is NO.

UNITS

Sets the units to degrees Fahrenheit or Centigrade. Default is degrees C.

5.2.12 Mode S Address Entry Pages

NOTE

It is VERY important to enter the Mode S address correctly in the GTX 328.

When the unit is turned on for the first time, or an invalid address is recognized, the unit prompts the user to enter a valid aircraft address.

Once the aircraft address is entered, the unit remains on in the same mode as before.

5.2.12.1 US TAIL and Hex ADDRESS Entry Pages

For first time turn-on, proceed to step 5. Otherwise begin at step 1, with the unit turned off:

1. To enter the configuration pages, press and hold the FUNC key while powering on the unit.
2. Power the unit on by pressing the ON, ALT, or STBY key or turn on with the avionics master switch (while holding the FUNC key). The unit performs a self-test routine and displays a "Jump to Diagnostics" page.
3. Navigate to the address entry page by repeatedly pressing the FUNC Key.
 - a. The page that appears is either ADDRESS US TAIL# N ____.
 - b. Or ADDRESS HEX ____.



NOTE

It is not necessary for the installer to convert a US aircraft registration number (N-number) to a Hex address. The GTX 328 converts the US registration number to hexadecimal automatically.

4. To select between Hex or Tail number, press the CRSR key, then 8 or 9 key to move to the correct selection.
5. For entering either the address hex code or the US registration number, press the CRSR key 1 time. (This highlights the address field).
6. Enter the aircraft address using the number keys. Press a key repeatedly to scroll through the digit/alpha characters for that key.
7. Press the CRSR key to select the next numeric entry field. Enter the next character as stated in the previous step, then move onto the next one, repeating the process until the complete number is entered.

8. When finished, press the CRSR key to accept the number entry.
9. Using the FUNC and/or START/STOP keys, toggle through the pages to get off of, then back onto the aircraft address page. Verify that the address is correct.

The unit now contains a Mode S address and may be turned off. To power the unit on in the normal mode, press only the ON, ALT, or STBY key (without holding the FUNC key) or turn on with the avionics master switch.

MODE S ADDRESS, AIRCRAFT REGISTRATION PAGE

SELECTION	DESCRIPTION
US TAIL #	N-Registration Number
HEX	Hexadecimal code address

5.2.12.2 MODE S Flight ID Pages

NOTE

When a Flight ID Number contains a space, the GTX 328 automatically removes spaces in data transmission.

For operation requiring the flight crew to enter an aircraft identification designator each time the unit is powered up, select the page identified as FLIGHT ID PWR-UP ENTRY. When this choice is selected and the crew enters the Flight ID correctly, the flight number call sign for radio contact with ATC is the same flight identification that the GTX 328 Mode S transponder replies to ATC radar interrogations.

SELECTION	DESCRIPTION
SAME AS TAIL	If address is a US registration number, FLT ID can be the same.
POWER UP ENTRY	Enter FLT ID every time the unit is turned on in normal mode.
CONFIG ENTRY	Enter FLT ID in Configuration mode only.

The screen depicted here shows the FLIGHT ID PWR-UP ENTRY (choice 2) after the CRSR key is pressed, and the unit is ready to receive the flight identification.



For entering all Mode S Flight IDs:

1. Press the CRSR key once to highlight the address field.
2. Enter the aircraft address using the number keys. Pressing a key repeatedly scrolls through the digit/alpha characters for that key.
3. Press the CRSR key to select the next alphanumeric entry field. Enter the next character as stated in the previous step, then move onto the next one, repeating the process until the complete number is entered.
4. When finished, press the CRSR key to accept the number entry.
5. Using the FUNC and/or START/STOP keys, toggle through the pages to get off of, then back onto the aircraft address page. Verify that the address is correct.
6. Turn the unit off. Power the unit back on in the normal mode. If the FLIGHT ID PWR-UP ENTRY page was selected verify that the unit requests the correct page during system turn on.

The following should be considered when configuring the GTX 328:

POWER UP ENTRY requires that a variable Mode S Flight ID is entered each time the unit is powered on. The selections SAME AS TAIL and CONFIG ENTRY are fixed entries. The two fixed selections do not require any transponder interaction from the flight crew, whereas POWER UP ENTRY always does.

During initial installation a non-blank Flight ID must be entered. If POWER UP ENTRY is desired, set the unit to CONFIG ENTRY and enter the Flight ID or the tail number of the aircraft, then select POWERUP ENTRY.

FLT ID CONFIG ENTRY AIR123__
ABC DEF GHI JKL MNO PQR STU VWX YZ
0 1 2 3 4 5 6 7 8 9

PWR-UP CONFIG ENTRY Page
FLT ID SAME AS TAIL

PWR-UP SAME AS TAIL Page

5.2.13 Mode S Aircraft Type Page

Used for air to air communication with TCAS.

AC TYPE <15.5K_{Lb} MAX A/S <=150_{kt}

MODE S (A/C Type) Page

SELECTION	DESCRIPTION
AC TYPE	UNKNOWN, <15.5K Lb, >=15.5K Lb, or ROTOR.
MAX AIRSPEED	UNKNOWN, <=75 kt, <=150 kt, <=300 kt, or >300 kt.

AIRCRAFT TYPE

Sets the AIRCRAFT TYPE Message to ROTOR, to a weight of less than 15,500 pounds, more than or equal to 15,500 pounds, or unknown weight. Defaults to less than 15,500 pounds.

MAXIMUM AIRSPEED

Sets the AIRCRAFT AIRSPEED Message to a speed of less than or equal to 75 knots, between 75 knots and 150 knots, between 150 knots and 300 knots, more than 300 knots, or unknown airspeed. Defaults to less than or equal to 150 knots. Enter the aircraft's maximum cruising true airspeed capability.

5.2.14 Gray Code Input Page

GRAY CODE

daaabbccccc
GRAY 4124124124 DECODED
CODE 0000000000 ALTITUDE 12300_{ft}

GRAY CODE INPUT Page

This field shows the status (1 = ground, 0 = open) of each of the ten gray code altitude inputs. This information may aid in installation troubleshooting. This page is not used in systems that contain serial altitude input.

DECODED ALTITUDE

This field displays the gray code altitude input in feet. Verify that it is the correct altitude.

5.2.15 External Switch State Page

IDENT

EXTERNAL SWITCH STATE
IDENT ☐ STANDBY ☐ SQUAT ☐

EXTERNAL SWITCH Page

This field displays the state of the EXTERNAL IDENT discrete input. The box is filled when EXTERNAL IDENT is grounded.

STANDBY

This field displays the state of the EXTERNAL STANDBY discrete input. The box is filled when EXTERNAL STANDBY is grounded. If EXTERNAL STANDBY is active during power-up, the word FAIL appears on the screen after 30 seconds.

SQUAT

This field displays the state of the SQUAT SWITCH input. The box is filled when the SQUAT SWITCH input is active (the aircraft is on the ground as configured on the SETUP 2 page).

5.2.16 Analog Input Page

The Analog to Digital Converter counts are shown on the display, providing troubleshooting data.

14/5V LTG 000 PHOTO 000 LCD TEMP 000
28V LTG 000 OAT 000 UNIT TMP 000
ANALOG INPUT Page

14/5V LTG

This field displays the input level of the 14/5 V lighting bus.

PHOTO

This field displays the input level of the photocell.

LCD TEMP

This field displays the input level of the LCD temperature sensor.

28V LTG

This field displays the input level of the 28 V lighting bus.

OAT

This field displays the input level from the outside air temperature sensor.

UNIT TEMP

This field displays the input level from the unit temperature sensor.

RS232 CH1 OFF +_____ n/a
CH2 OFF +_____ n/a
RS-232 INPUT Page

5.2.17 RS-232 Input Page

Depending on the selected inputs on Channel 1 and Channel 2 from the RS-232 Input page (ref para 5.2.9), this page displays the information received on the channel. If GPS is selected as an input, ground speed can be viewed (GSPD), latitude (LAT), longitude (LON) and track (TRK).

If ICARUS or SHADIN-ALT is selected as an input pressure altitude (PALT) can be viewed.

If FADC or ADC is selected as an input, true or static air temperature (SAT), outside or total air temperature (TAT), indicated air speed (IAS), true air speed (TAS), density altitude (DALT), pressure altitude (PALT*), current barometric pressure (BARO) and vertical speed (VSPD) can be viewed.

* If ADC W/ALT or FADC W/ALT format selected.

5.2.18 ARINC 429 Channels Pages

The GTX 328 receives one of the following sets of ARINC 429 data on either ARINC 429 receivers #1, #2 or #3. The labels are chosen when selected in ARINC 429 INPUT, Section 5.2.8. The received data may be at either LOW or HIGH speed. The default is LOW. The transmit data labels and their rates are as follows:

```
429CH1 000 00000000 +----- n/a
RX CH2 000 00000000 +----- n/a
ARINC 429 CHANNELS 1 and 2
429CH3 000 00000000 +----- n/a
RX CH4 000 00000000 +----- n/a
ARINC 429 CHANNELS 3 and 4
```

AHRS COMPUTER (AHRS)

Label	Data
314	True Heading (degrees)
320	Magnetic Heading (degrees)
325	Roll Angle
365	Vertical Rate (feet/min)

AIR DATA COMPUTER (ADC)

Label	Data
203*	Pressure Altitude (feet)
204	Barometric Corrected Altitude (feet)
205	Mach Number
206	Indicated Air Speed (knots)
210	True Air Speed (knots)
211	Total Air Temperature (degrees)
212	Vertical Speed (feet/min)
213	Static Air Temperature (degrees)

* If ADC W/ALT or EF/AD W/ALT format selected.

EFIS DISPLAY SYSTEM (EF/AD)

Label	Data
100	Selected Course (degrees)
102	Selected Altitude (feet)
203*	Pressure Altitude (feet)
204	Barometric Corrected Altitude (feet)
205	Mach Number
206	Indicated Air Speed (knots)
210	True Air Speed (knots)
211	Total Air Temperature (degrees)
212	Vertical Speed (feet/min)
213	Static Air Temperature (degrees)
234	Barometric Setting (hPa)
235	Barometric Setting ("Hg)
306	Joystick Lat
307	Joystick Lon
314	True Heading
320	Magnetic Heading (degrees)
325	Roll Angle

* If ADC W/ALT or EF/AD W/ALT format selected.

GPS/FMS NAVIGATION SYSTEM (GPS)

Label	Data
102	Selected Altitude (feet)
312	Ground Speed (knots)
313	Track Angle

AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

Label	Data
102	Selected Altitude (feet)
234	Barometric Setting (hPa)
235	Barometric Setting ("Hg)
271	AFCS Pitch Discretes

APPENDIX A CERTIFICATION DOCUMENTS

A.1 External Documents

Guidance for the certification of Mode S airborne equipment that conforms to ICAO SARPs may be found in the document 'JAA Temporary Guidance Leaflet (TGL) 13 – Certification of Mode S Transponder Systems for Elementary Surveillance (ELS)', or subsequent equivalent approved document. This document can be accessed via the internet address
www.eurocontrol.int/msa/public/standard_page/modes_docs_ext_docs.html.

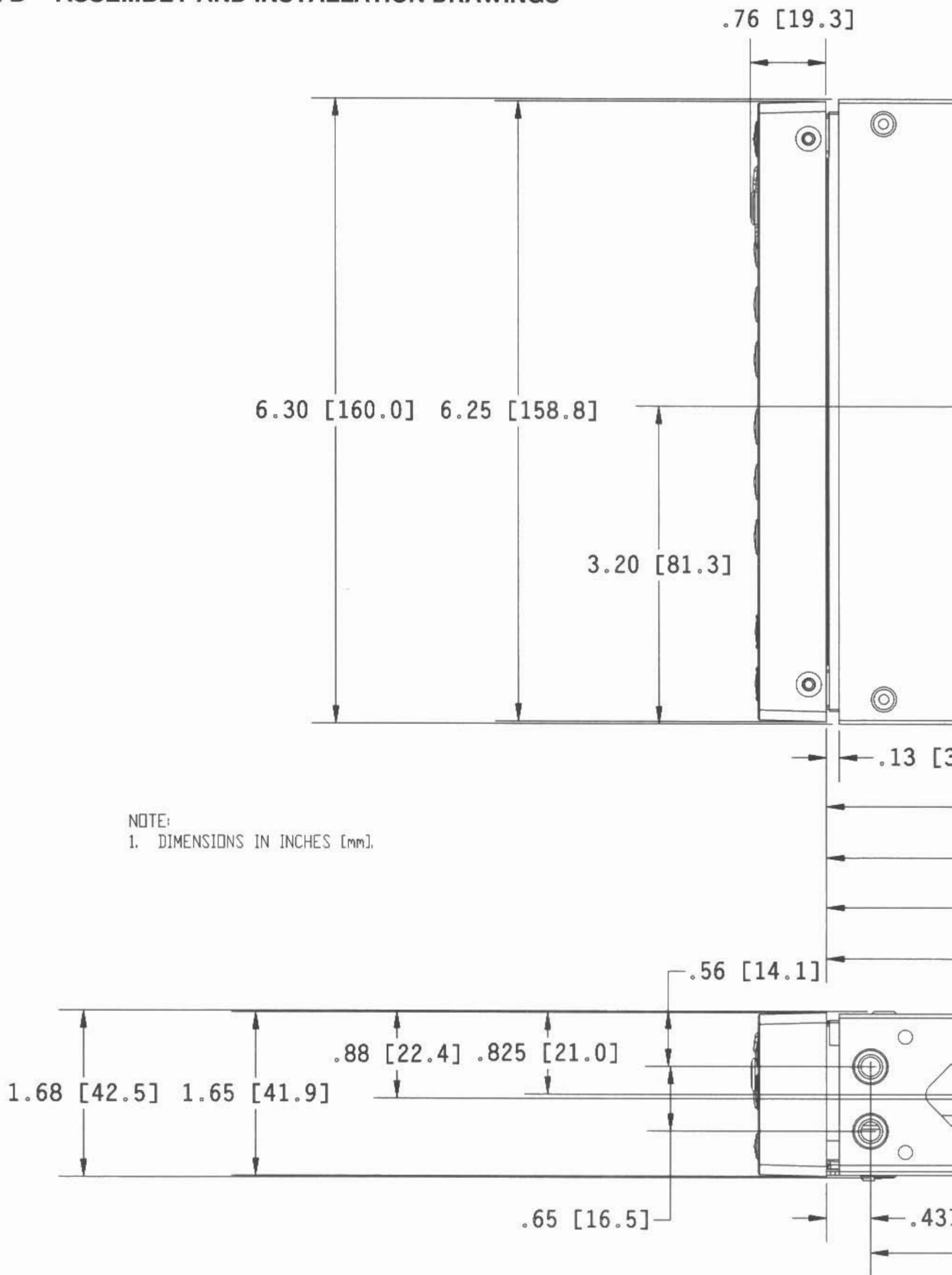
A.2 Continued Airworthiness

Other than for regulatory periodic functional checks, maintenance of the GTX 328 is "on condition" only. Refer to the GTX 328 Maintenance Manual (Garmin P/N 190-00420-05). Periodic maintenance of the GTX 328 is not required.

Refer to EASA ED Decision No 2003/19/RM, Annex II, Acceptable Means of Compliance to Part-145, Page 161. This document can be accessed via the internet address
http://www.easa.eu.int/doc/Agency_Mesures/Certification_Spec/decision_ED_2003_19_RM.pdf?

Refer to FAA Order 8300.10, Airworthiness Inspector's Handbook, Volume 2, Chapter 1, Section 1.21, Instructions for Continued Airworthiness. This document can be accessed via the internet address
www.faa.gov/library/manuals/examiners_inspectors/8300/.

APPENDIX B ASSEMBLY AND INSTALLATION DRAWINGS



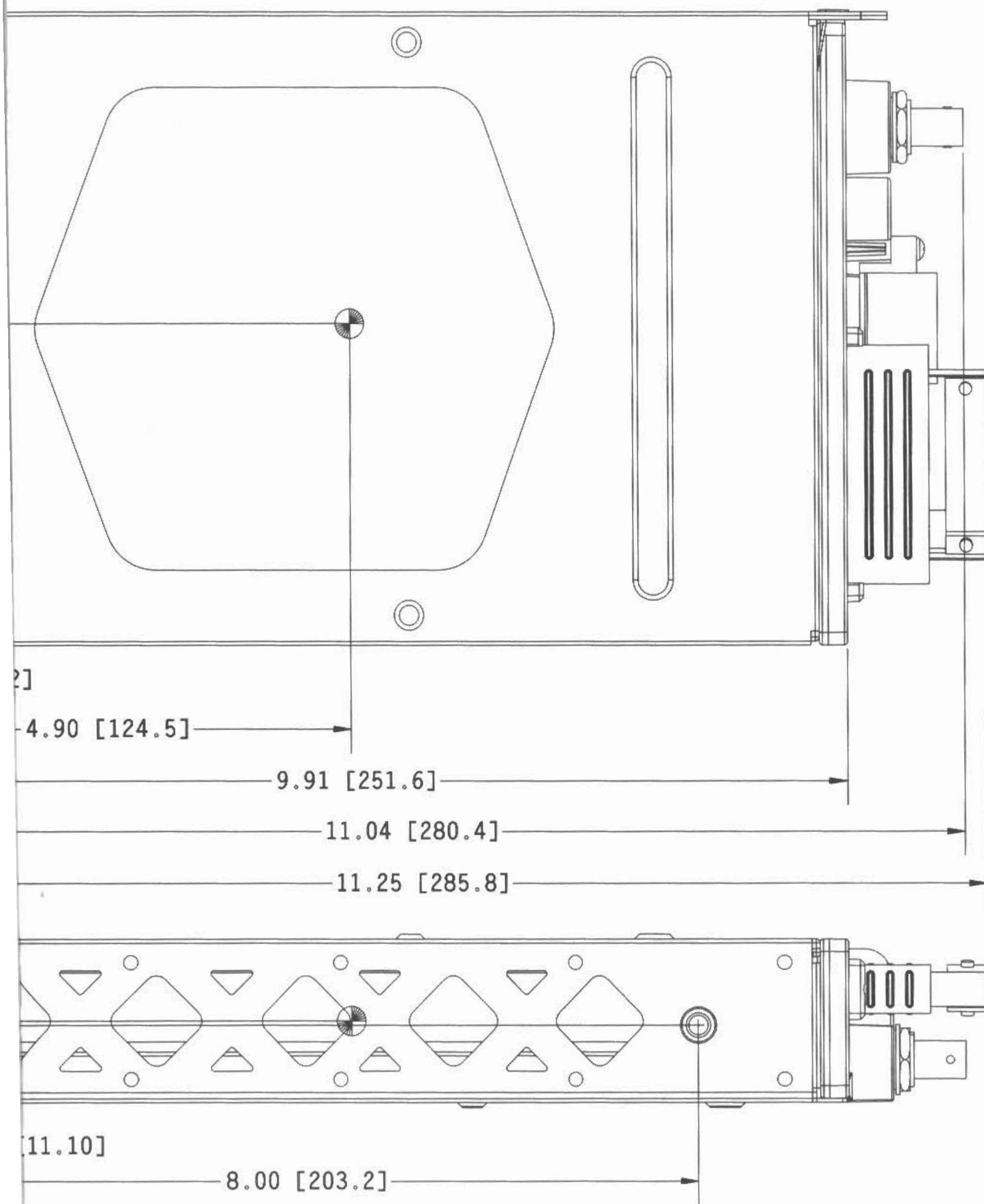
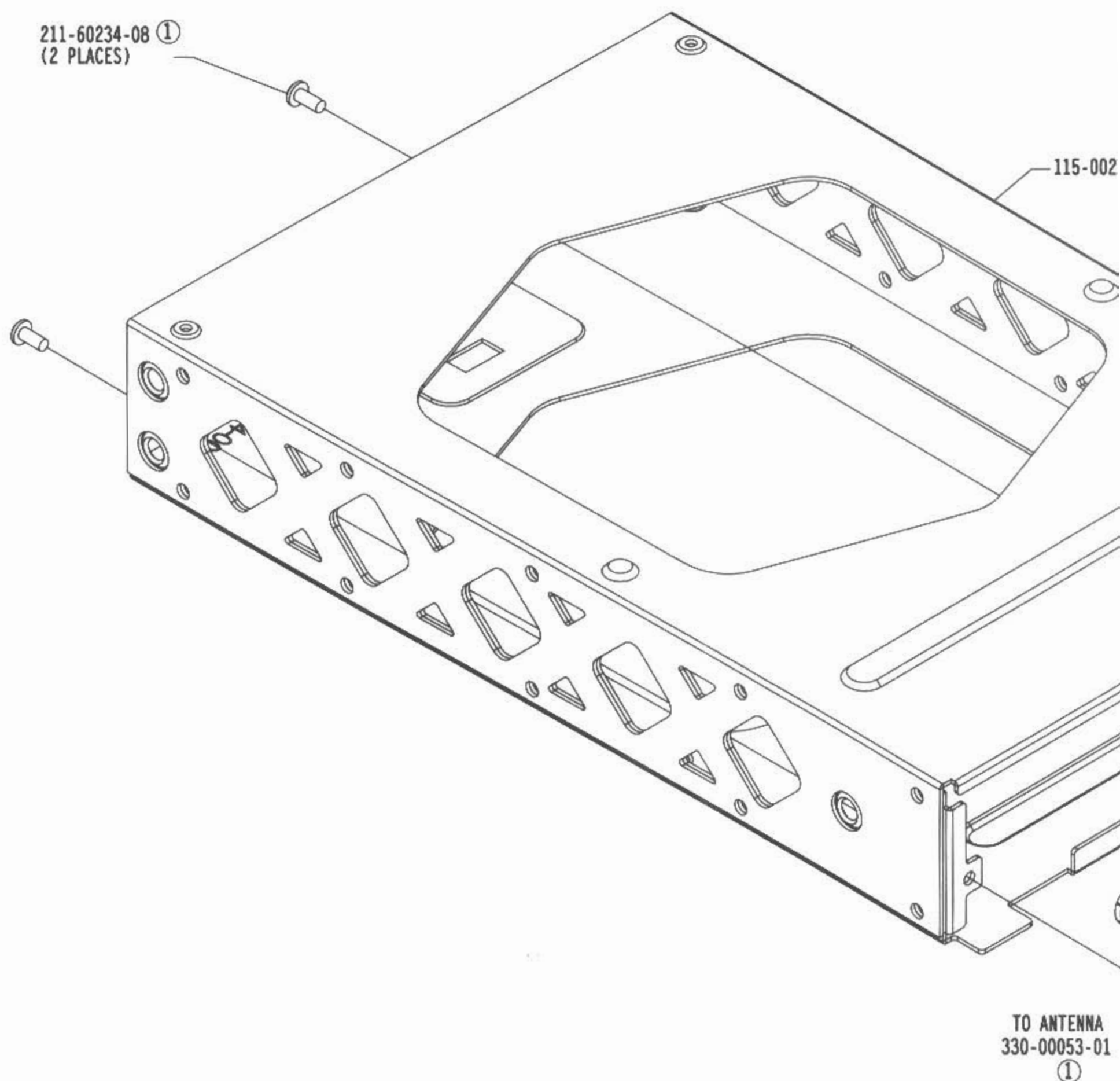


Figure B-1. GTX 328 Outline Drawing

APPENDIX B ASSEMBLY AND INSTALLATION DRAWINGS



NOTES:

- ① PART OF 011-00582-00 GTX 330 BACKPLATE ASSY
- ③ PART OF 011-00583-00 CONNECTOR KIT
- ④ FEED HARNESS WIRES THROUGH BACKSHELL BEFORE INSERTION INTO CONNECTOR
- ⑤ SNAP NUTPLATE OVER BACKSHELL
- ⑥ APPLY THREAD LOCKING COMPOUND TO COAX CONNECTOR

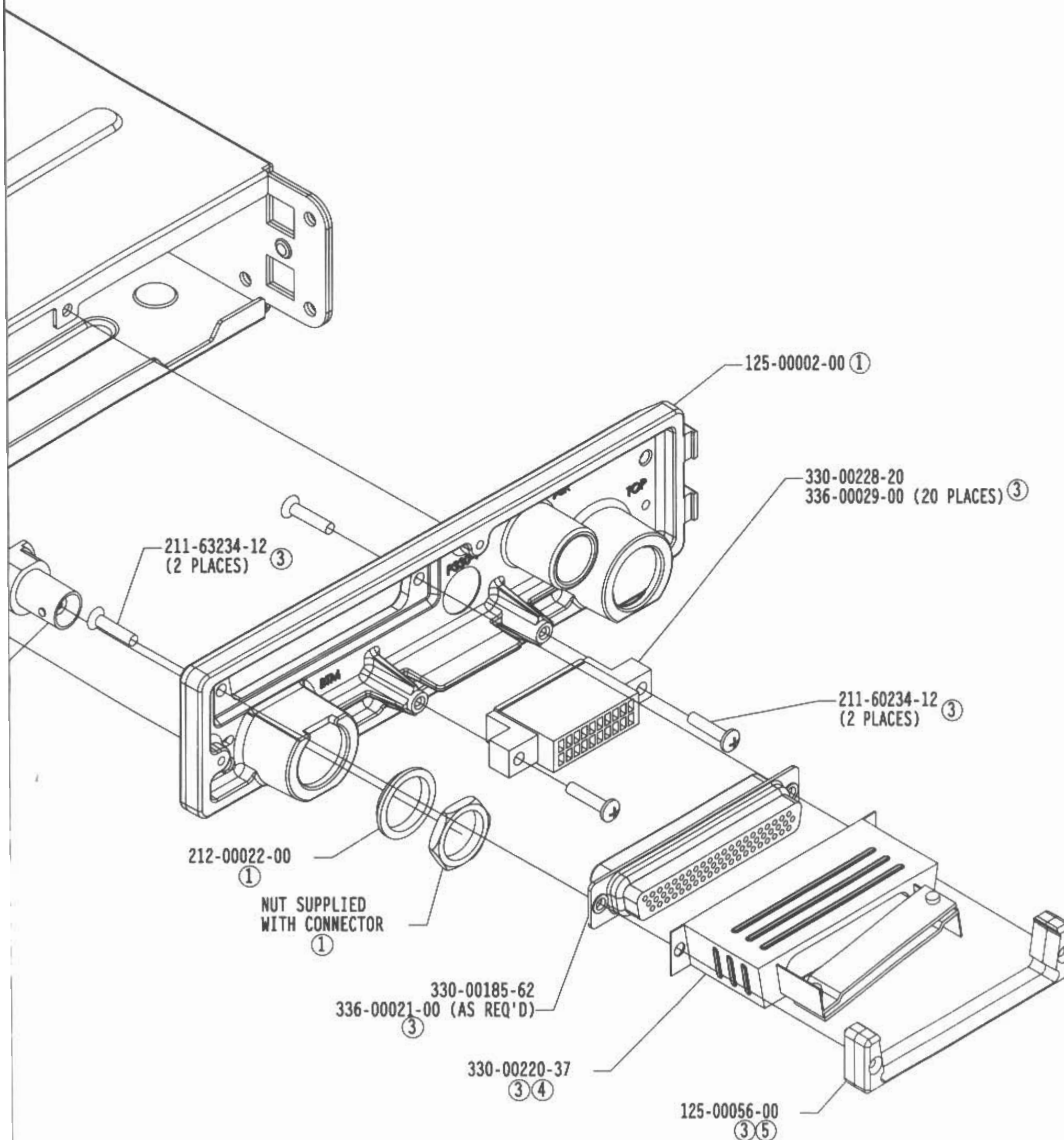
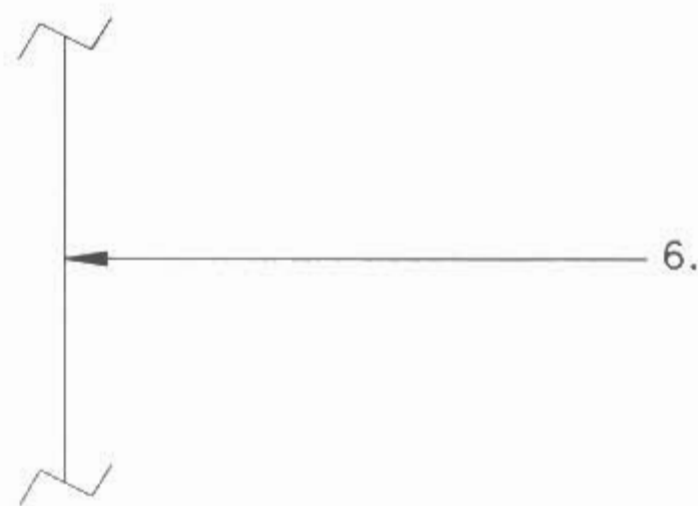


Figure B-2. GTX 328 Connector/Rack Assembly Drawing

APPENDIX B ASSEMBLY AND INSTALLATION DRAWINGS

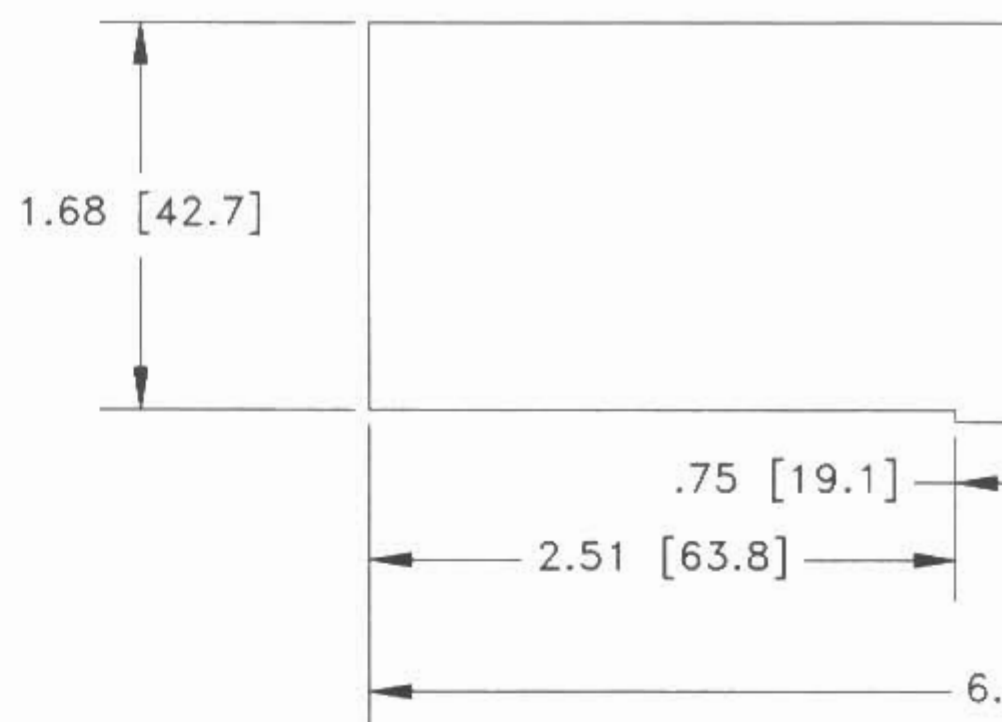
OPTION 1:

STACK CUTOUT (RACK INSTALLED
FROM FRONT OF AIRCRAFT PANEL)



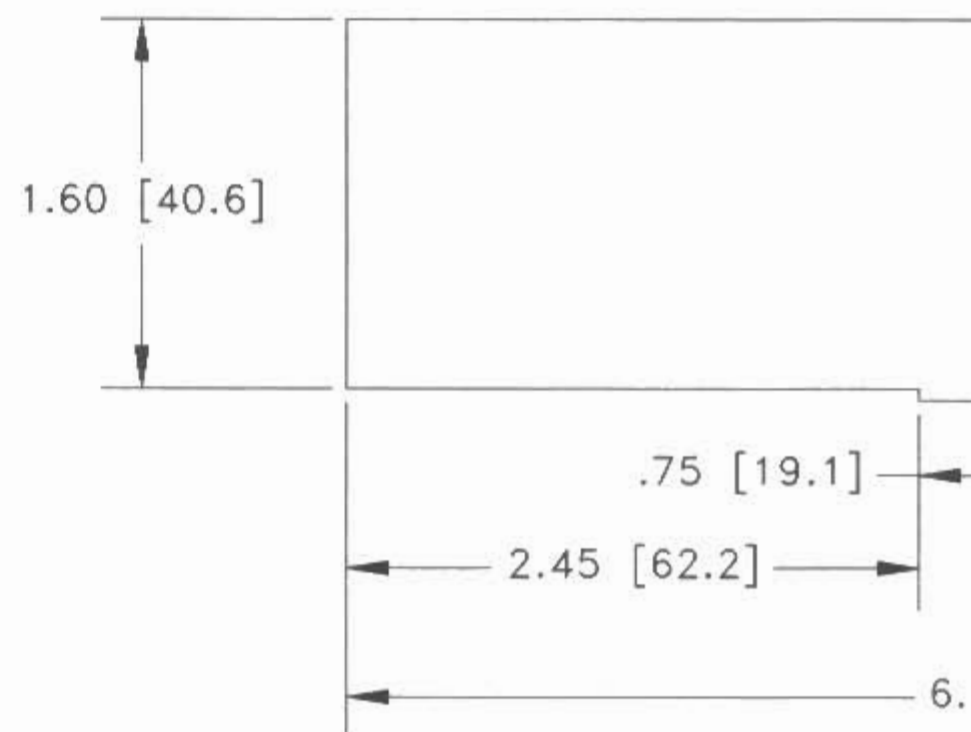
OPTION 2:

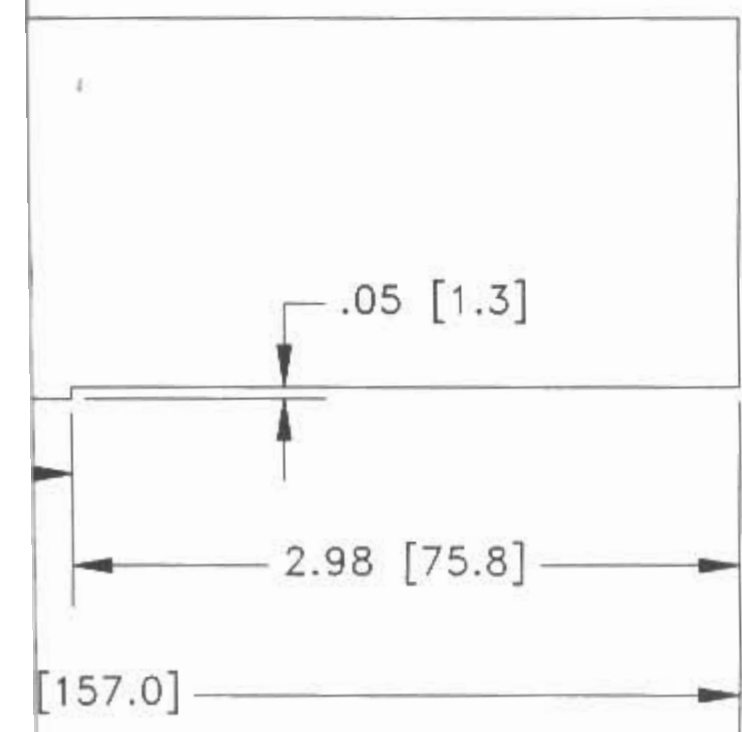
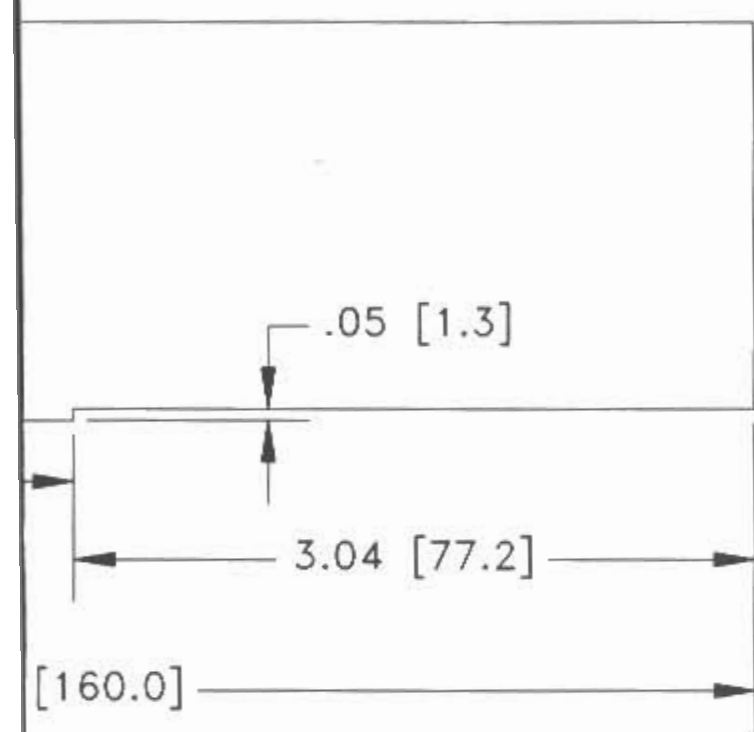
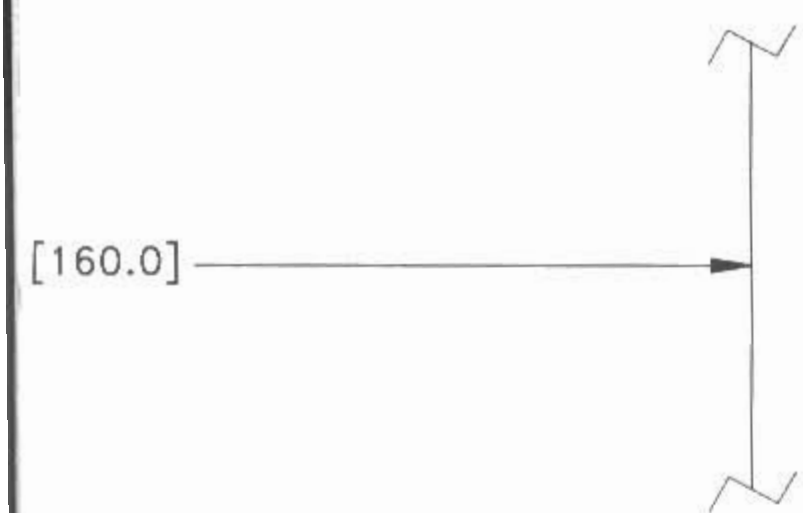
RADIO CUTOUT (RACK INSTALLED
FROM FRONT OF AIRCRAFT PANEL)



OPTION 3:

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



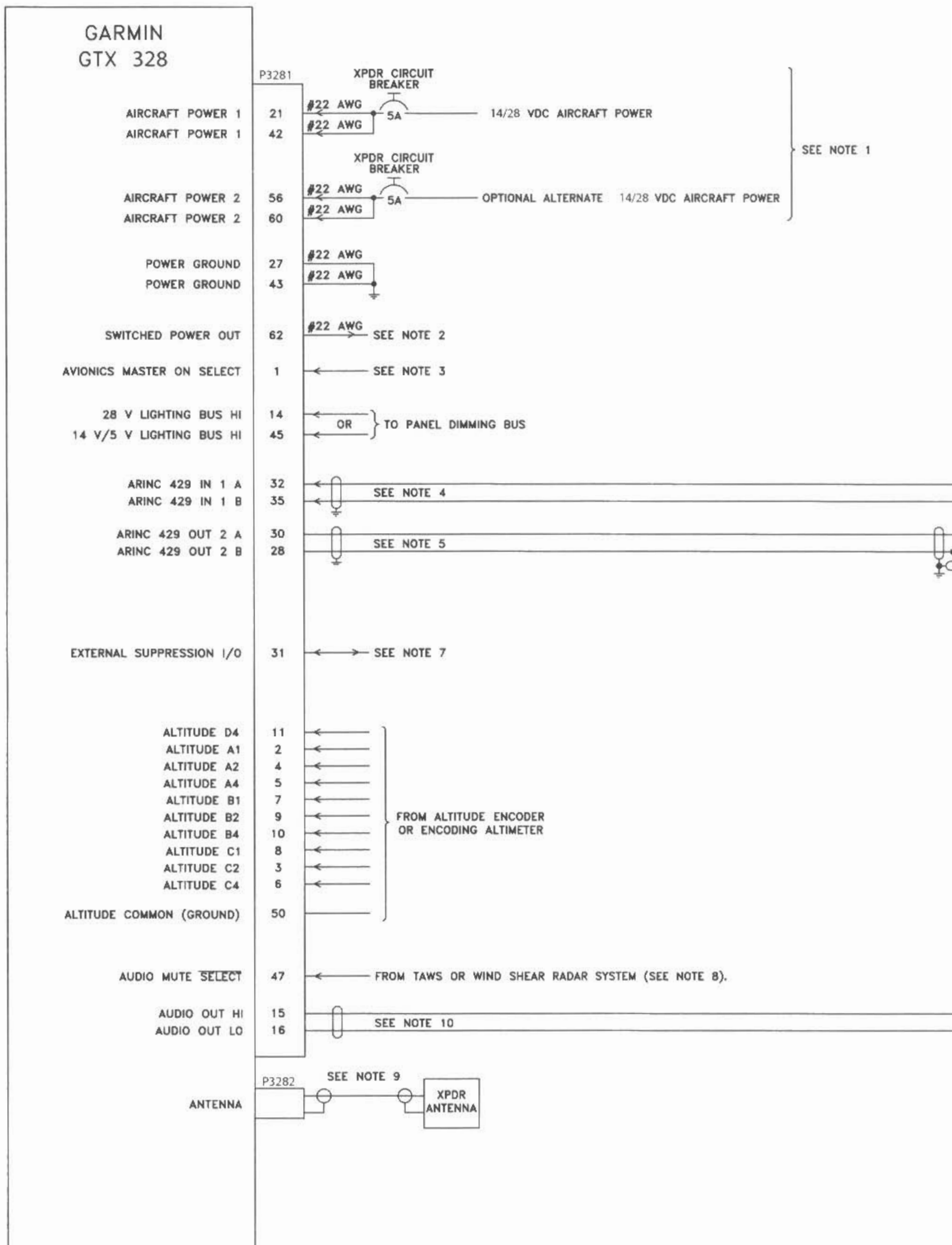


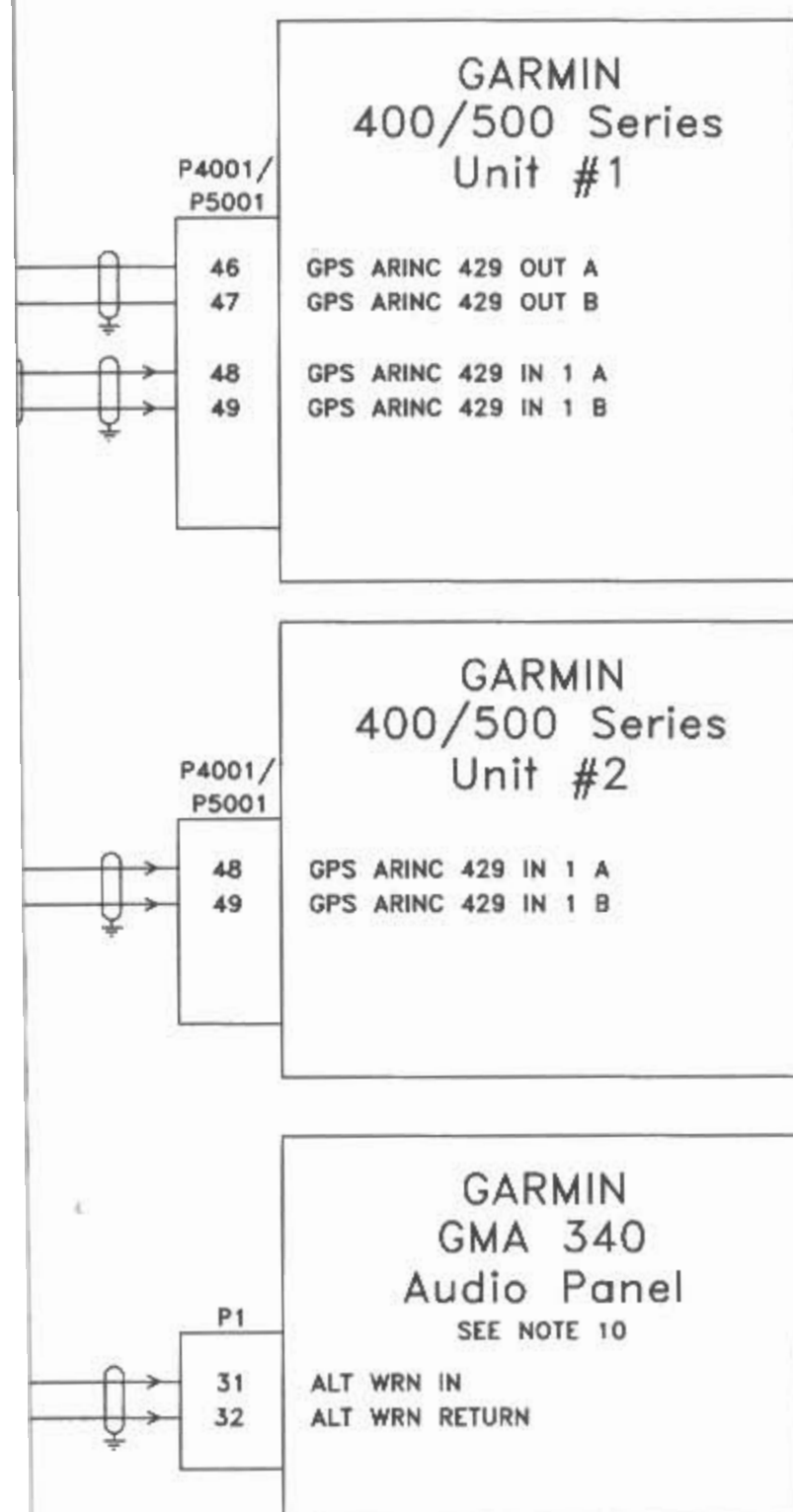
NOTES:

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

Figure B-3. GTX 328 Recommended Panel Cutout Dimensions

APPENDIX C INTERCONNECT DRAWINGS





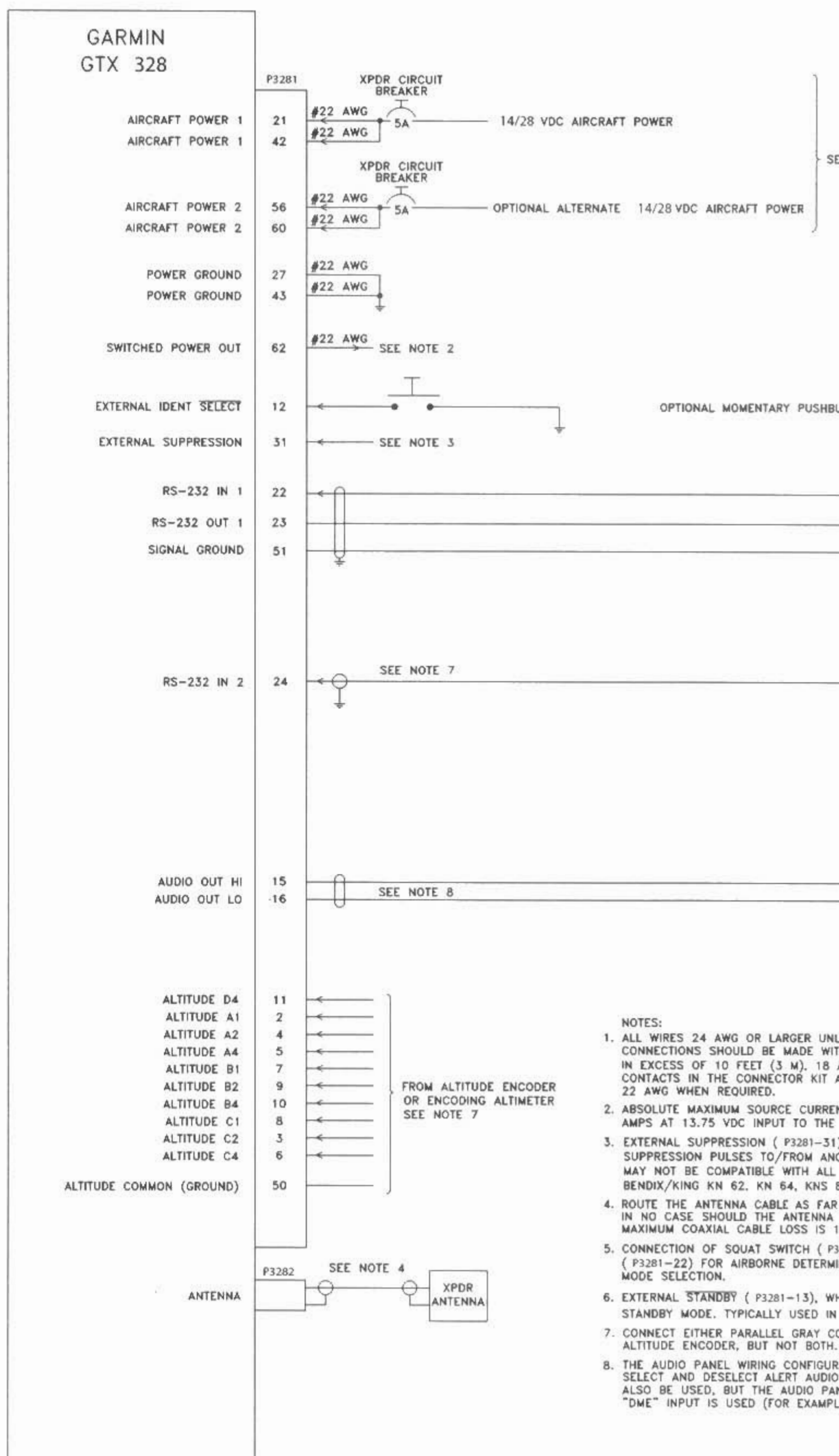
NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED. POWER AND GROUND CONNECTIONS SHOULD BE MADE WITH 22 AWG WIRE. WHERE THE LEAD LENGTH IS IN EXCESS OF 10 FEET (3 M), 18 AWG WIRE SHOULD BE USED. OVERSIZE CONTACTS IN THE CONNECTOR KIT ARE FOR USE WITH WIRE SIZES GREATER THAN 22 AWG WHEN REQUIRED.
2. ABSOLUTE MAXIMUM SOURCE CURRENT FROM THE SWITCHED POWER OUTPUT IS 1.5 AMPS AT 13.75 VDC INPUT TO THE GTX 328.
3. AVIONICS MASTER ON SELECT (P 3281-1), WHEN TIED TO AIRCRAFT POWER INPUT (P3301-21 OR -42) PROVIDES AUTOMATIC UNIT POWER UP. WHEN POWER IS APPLIED THE UNIT WILL POWER UP IN THE LAST MODE SELECTED.
4. ARINC 429 IN 1 (P 3281-32 AND -35) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND (GND) MODE UPON LANDING.
5. IF EXTERNAL STBY SELECT IS CONNECTED IN THIS CONFIGURATION, USE AIRINC 429 OUT 1 A AND 1 B, (PINS 37 AND 34) RATHER THAN AIRINC 429 OUT 2 A AND 2 B (PINS 30 AND 28) SHOWN. ALTITUDE DATA WILL NOT BE TRANSMITTED OVER AIRINC 429 PORT 2 TO THE 400/500 SERIES UNIT WHEN EXTERNAL STBY SELECT IS GROUNDING.
7. EXTERNAL SUPPRESSION (P3281-31) SENDS AND ACCEPTS POSITIVE-GOING SUPPRESSION PULSES TO/FROM ANOTHER TRANSPONDER/DME. SUPPRESSION PULSE MAY NOT BE COMPATIBLE WITH ALL MODELS OF DME. (KNOWN INCOMPATIBILITY: BENDIX/KING KN 62, KN 64, KNS 80). SEE SECTION 4.5.1.
8. THE AUDIO MUTE SELECT INPUT (P3281-47) MUTES ALL GTX 328 AUDIO WHEN OTHER SYSTEMS ARE OUTPUTTING HIGHER-PRIORITY AUDIO WARNINGS. REFER TO PARAGRAPH 4.5.2 FOR A DESCRIPTION OF A PILOT CONTROLLED AUDIO MUTE SELECT SWITCH.
9. ROUTE THE ANTENNA CABLE AS FAR AS PRACTICAL FROM ANY HARNESS BUNDLE. IN NO CASE SHOULD THE ANTENNA CABLE BE LACED INTO A HARNESS BUNDLE. MAXIMUM COAXIAL CABLE LOSS IS 1.5 dB AT 1090 MHz. (SEE SECTION 2.5)
10. THE AUDIO PANEL WIRING CONFIGURATION SHOWN DOES NOT ALLOW THE PILOT TO SELECT AND DESELECT ALERT AUDIO. A SWITCHED INPUT MAY ALSO BE USED, BUT THE AUDIO PANEL SHOULD BE PLACARDED IF AN "ADF" OR "DME" INPUT IS USED (FOR EXAMPLE).

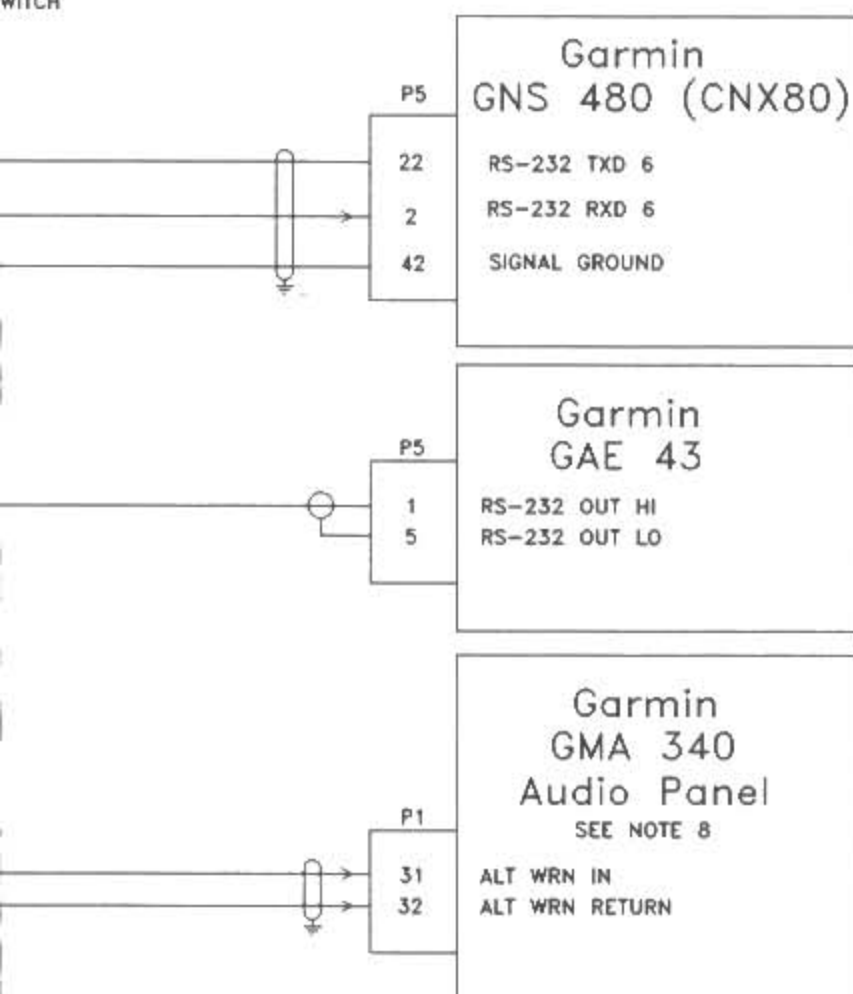
Figure C-1. GTX 328 to 400/500 Series Units, Typical Interconnect Wiring Diagram

APPENDIX C

INTERCONNECT DRAWINGS



SWITCH



OTHERWISE NOTED. POWER AND GROUND
WIRE. WHERE THE LEAD LENGTH IS
RE SHOULD BE USED. OVERSIZE
USE WITH WIRE SIZES GREATER THAN
THE SWITCHED POWER OUTPUT IS 1.5
B.
AND ACCEPTS POSITIVE-GOING
TRANSPONDER/DME. SUPPRESSION PULSE
OF DME. (KNOWN INCOMPATIBILITY:
SECTION 4.5.1.
ACTICAL FROM ANY HARNESS BUNDLE.
BE LACED INTO A HARNESS BUNDLE.
AT 1090 MHZ. (SEE SECTION 2.5)
OR GPS RS-232 No. 1 INPUT
ENABLES AUTOMATIC GROUND (GND)

TO GROUND, WILL PLACE THAT UNIT IN
INSTALLATIONS.

ITUDE OR DIGITAL ALTITUDE FROM AN

SHOWN DOES NOT ALLOW THE PILOT TO
SWITCHED INPUT MAY
OULD BE PLACARDED IF AN "ADF" OR

10. SYMBOL DESIGNATIONS:

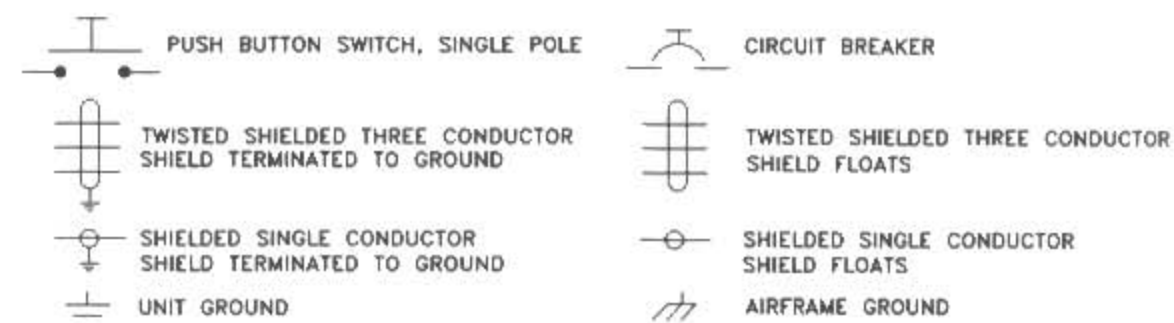
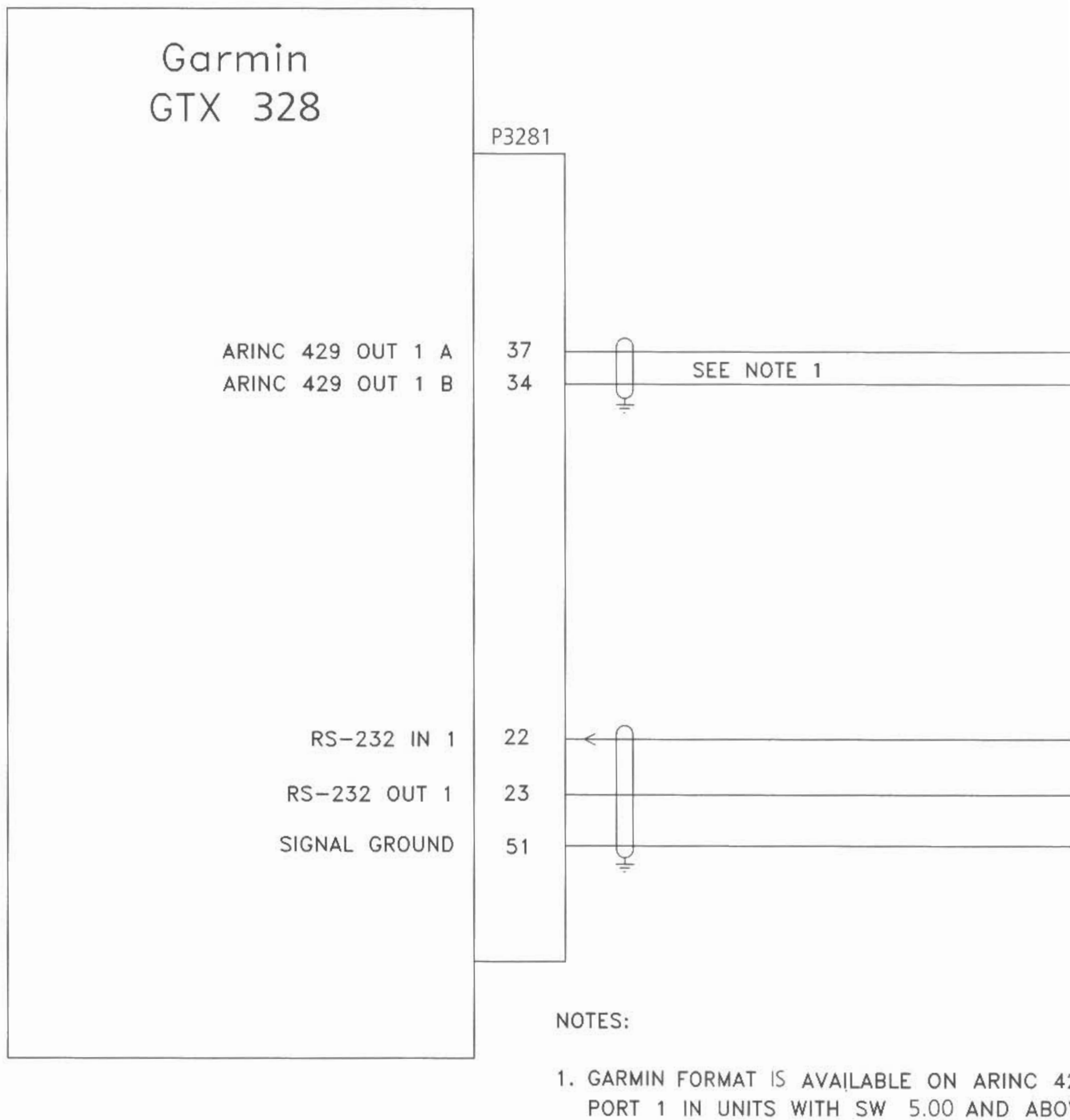
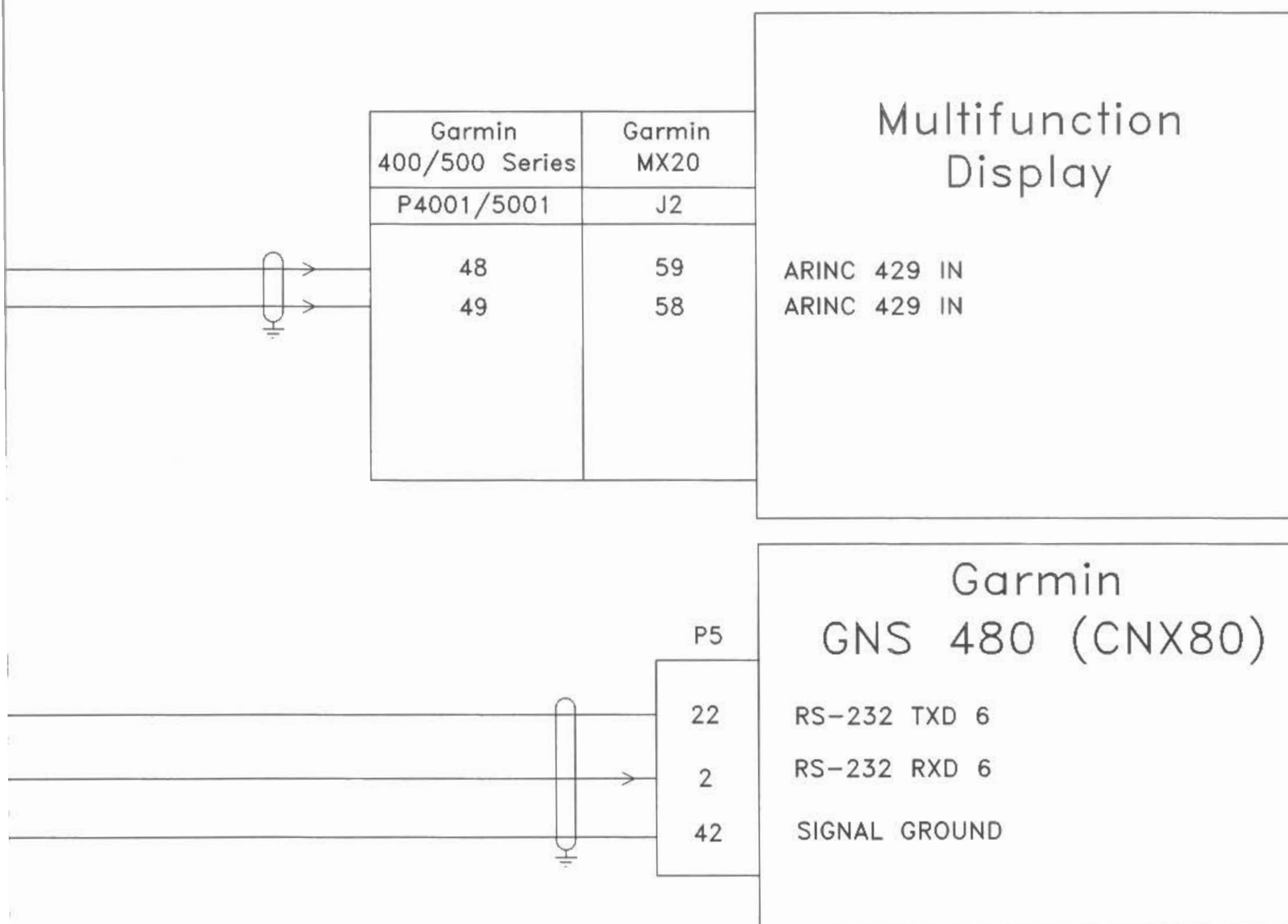


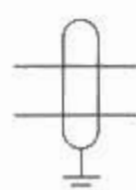
Figure C-2. GTX 328 to GNS 480 (CNX80), Typical Interconnect Wiring Diagram

APPENDIX C INTERCONNECT DRAWINGS

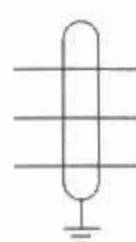




2. SYMBOL DESIGNATIONS:



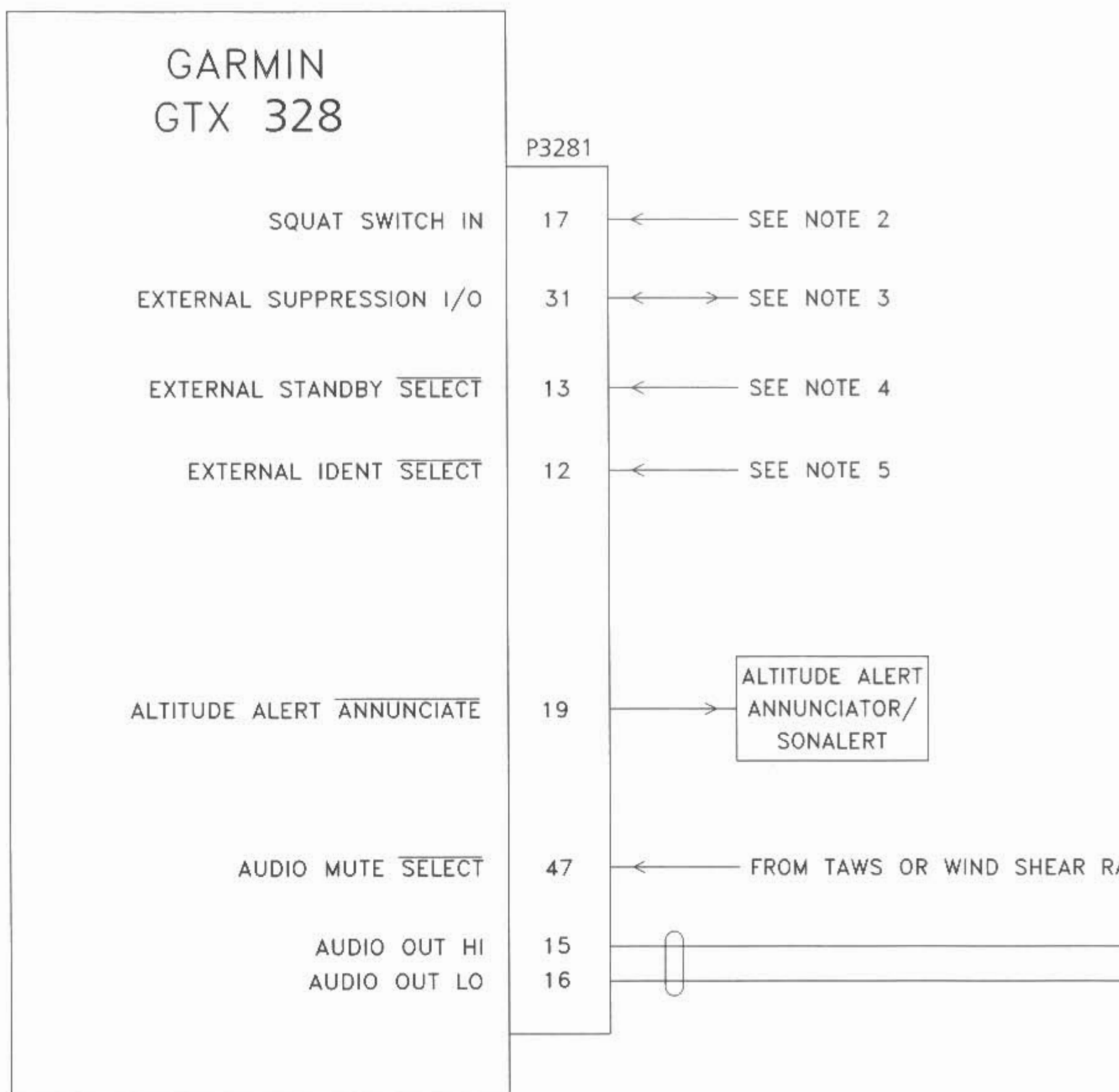
TWISTED SHIELDED TWO CONDUCTOR
SHIELD TERMINATED TO GROUND



TWISTED SHIELDED THREE CONDUCTOR
SHIELD TERMINATED TO GROUND

Figure C-3. GTX 328 to GNS 480 (CNX80) and MFD, Simplified Interconnect Wiring Diagram

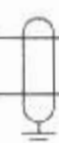
APPENDIX C INTERCONNECT DRAWINGS



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. SQUAT SWITCH IN (P3281-17) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND MODE UPON LAUNCH LOGIC IS SET VIA A CONFIGURATION PAGE.
3. EXTERNAL SUPPRESSION (P3281-31) SENDS AND ACCEPTS POSITIVE-GOING SUPPRESSION PULSES TO/FROM ANOTHER TRANSPONDER/DME. SUPPRESSION MAY NOT BE COMPATIBLE WITH ALL MODELS OF DME. (KNOWN INCOMPATIBLE: BENDIX/KING KN 62, KN 64, KNS 80). SEE SECTION 4.5.1.
4. EXTERNAL STANDBY SELECT (P3281-13), WHEN TIED TO GROUND, WILL PLACE THAT UNIT IN STANDBY MODE. TYPICALLY USED IN DUAL INSTALLATIONS.
5. MOMENTARY CONNECTION OF EXTERNAL IDENT SELECT (P3281-12) TO GROUND WILL CAUSE THE GTX 328 TO TRANSMIT IDENT PULSES.

SYSTEM (SEE NOTE 7)



P1

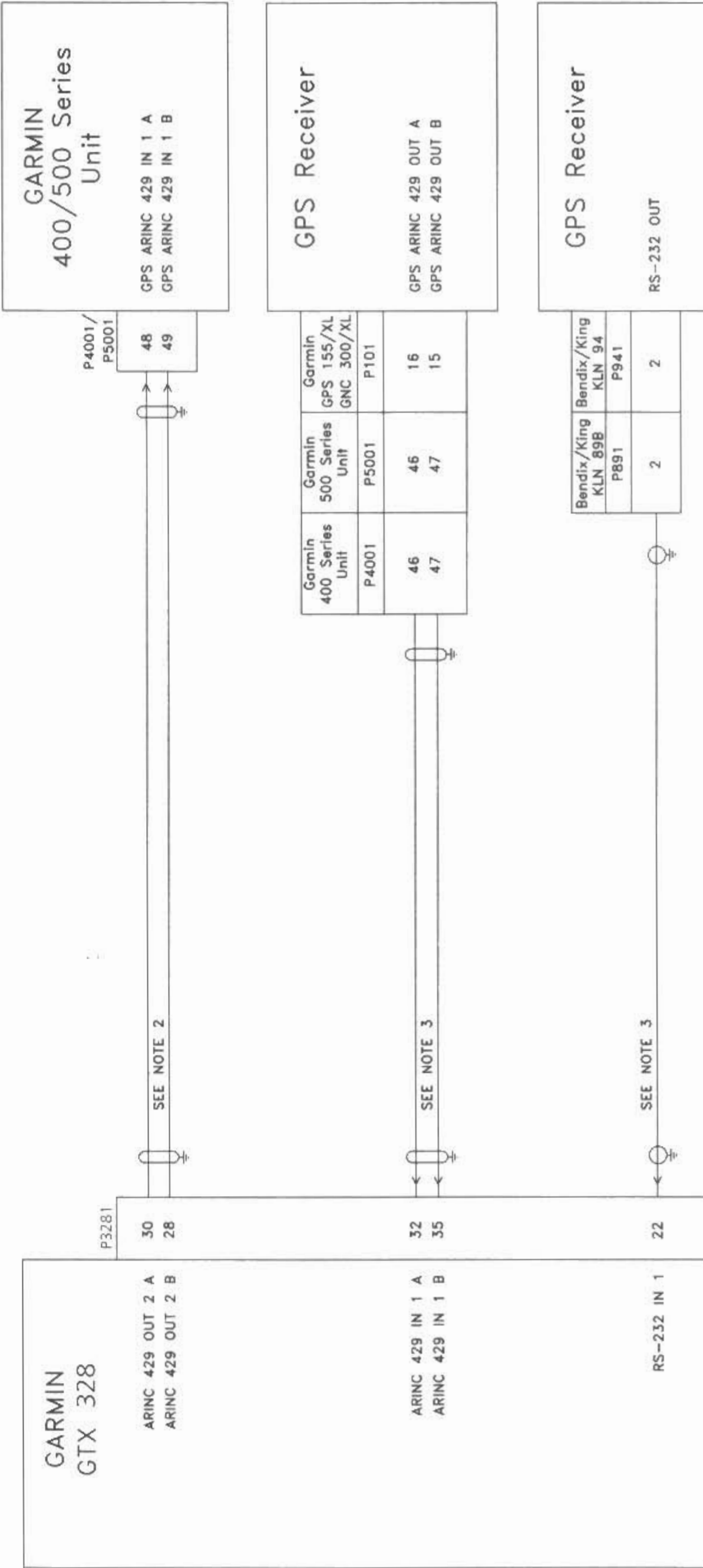
31
32

GARMIN
GMA 340
Audio Panel
SEE NOTE 8

ALT WRN IN
ALT WRN RETURN

7. THE AUDIO MUTE SELECT INPUT (P3281-47) MUTES ALL GTX 328 AUDIO WHEN OTHER SYSTEMS ARE OUTPUTTING HIGHER-PRIORITY AUDIO WARNINGS. REFER TO PARAGRAPH 4.5.2 FOR A DESCRIPTION OF A PILOT CONTROLLED AUDIO MUTE SELECT SWITCH.
8. THE AUDIO PANEL WIRING CONFIGURATION SHOWN DOES NOT ALLOW THE PILOT TO SELECT AND DESELECT ALERT AUDIO. A SWITCHED INPUT MAY ALSO BE USED, BUT THE AUDIO PANEL SHOULD BE PLACARDED IF AN "ADF" OR "DME" INPUT IS USED.

Figure C-4. GTX 328 Interconnect Wiring Diagram, Discrete and Audio Connections



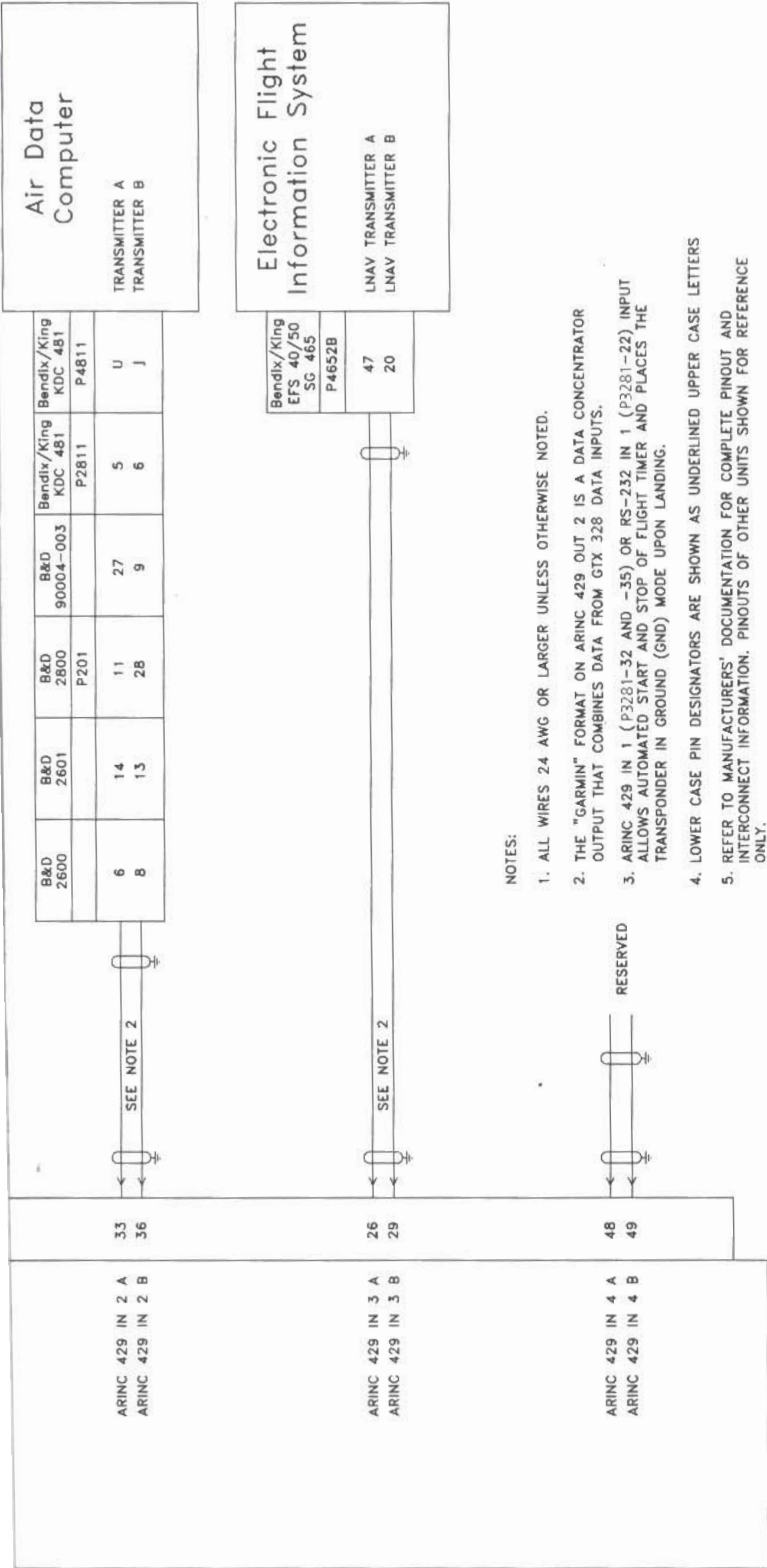
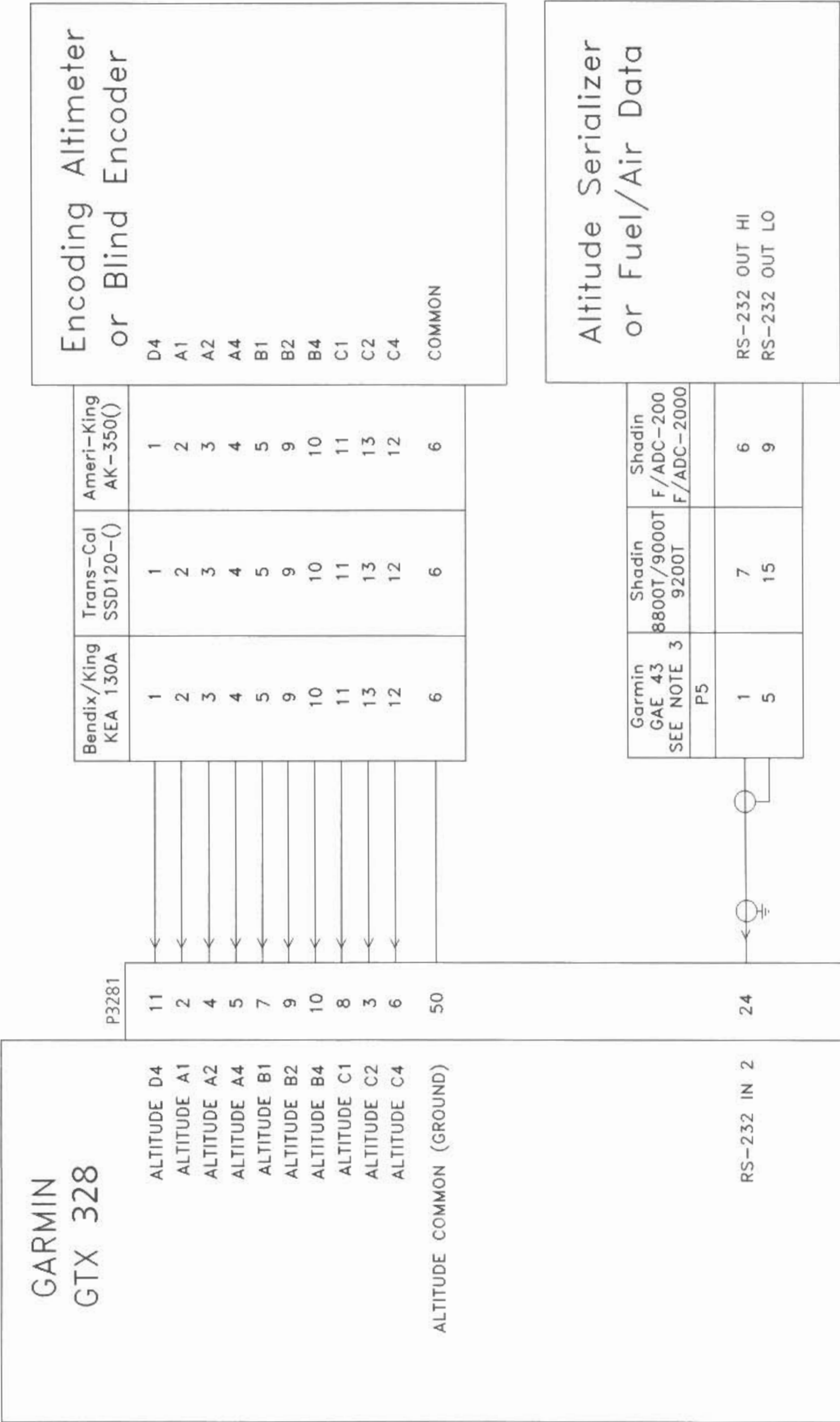


Figure C-5. GTX 328 Interconnect Wiring Diagram, Serial Devices Connections



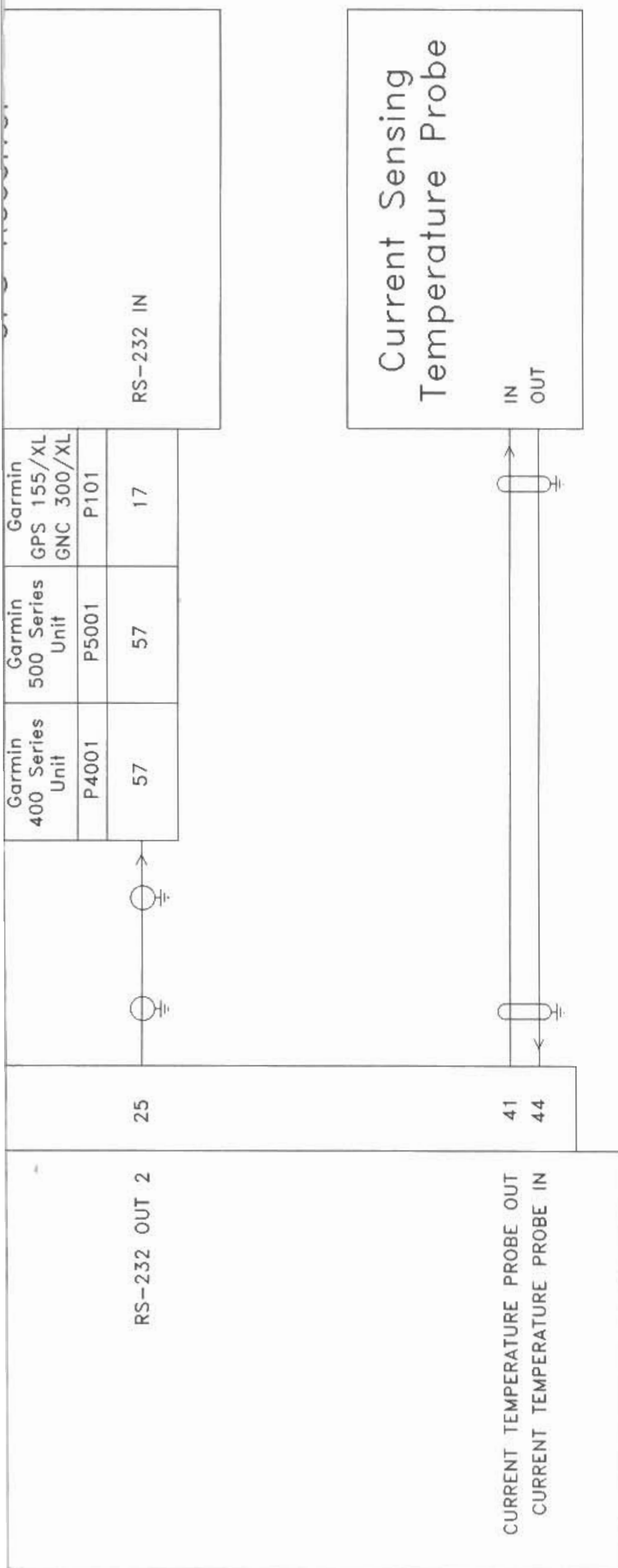
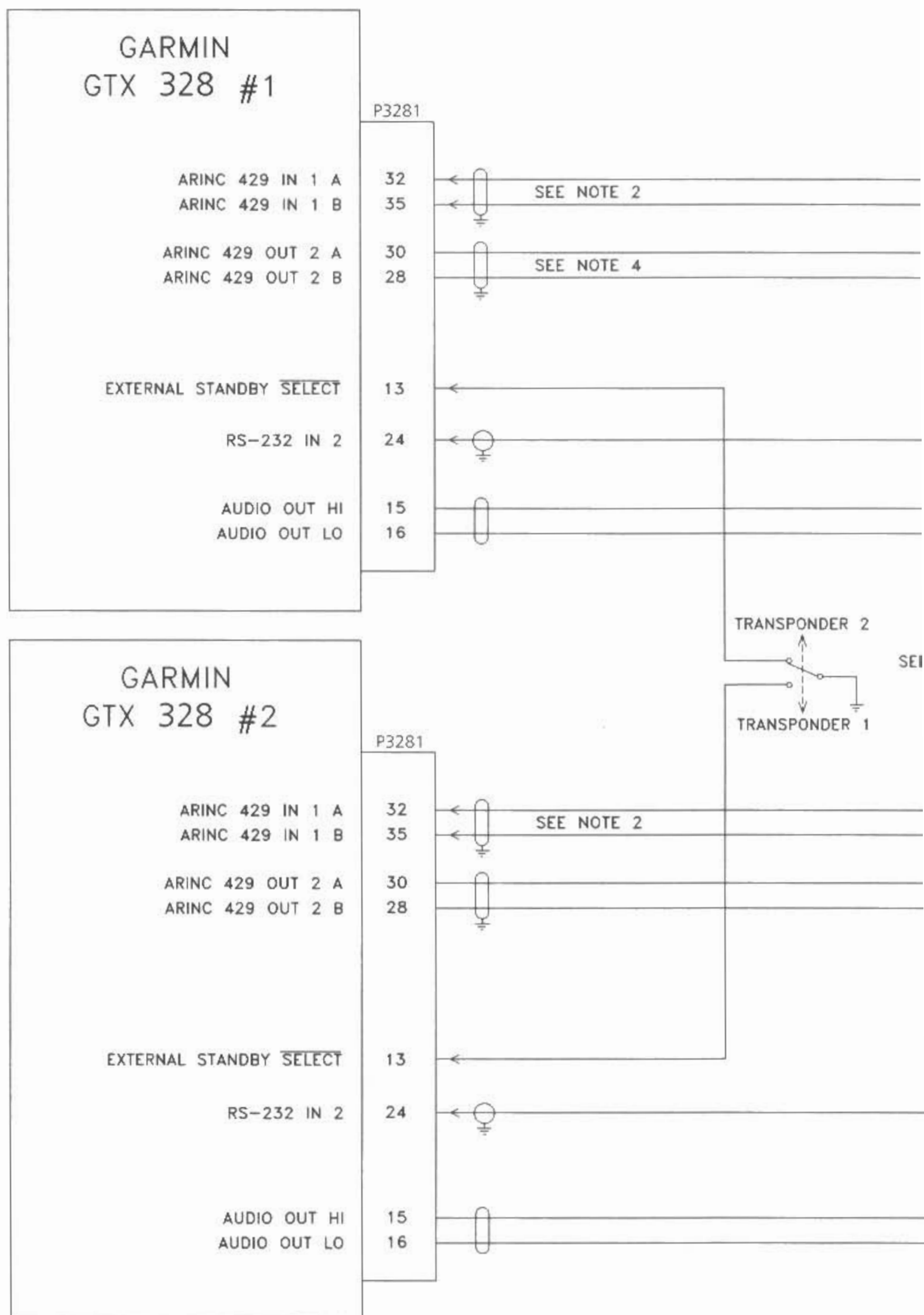


Figure C-6. GTX 328 Interconnect Wiring Diagram, Altitude and Temperature Connections

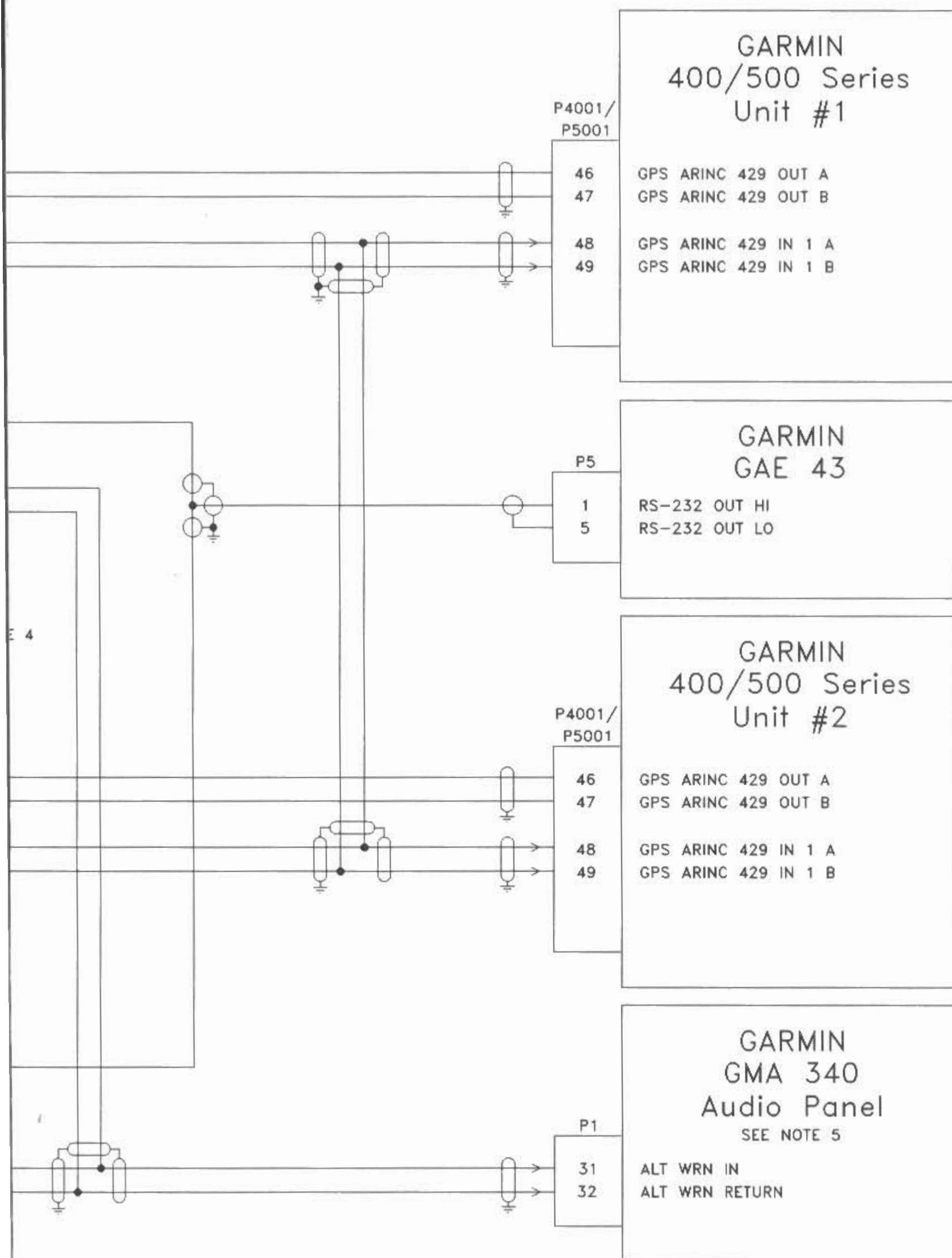
APPENDIX C INTERCONNECT DRAWINGS



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. ARINC 429 IN 1 (P3281-32 AND -35) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND (GND) MODE UPON LANDING.

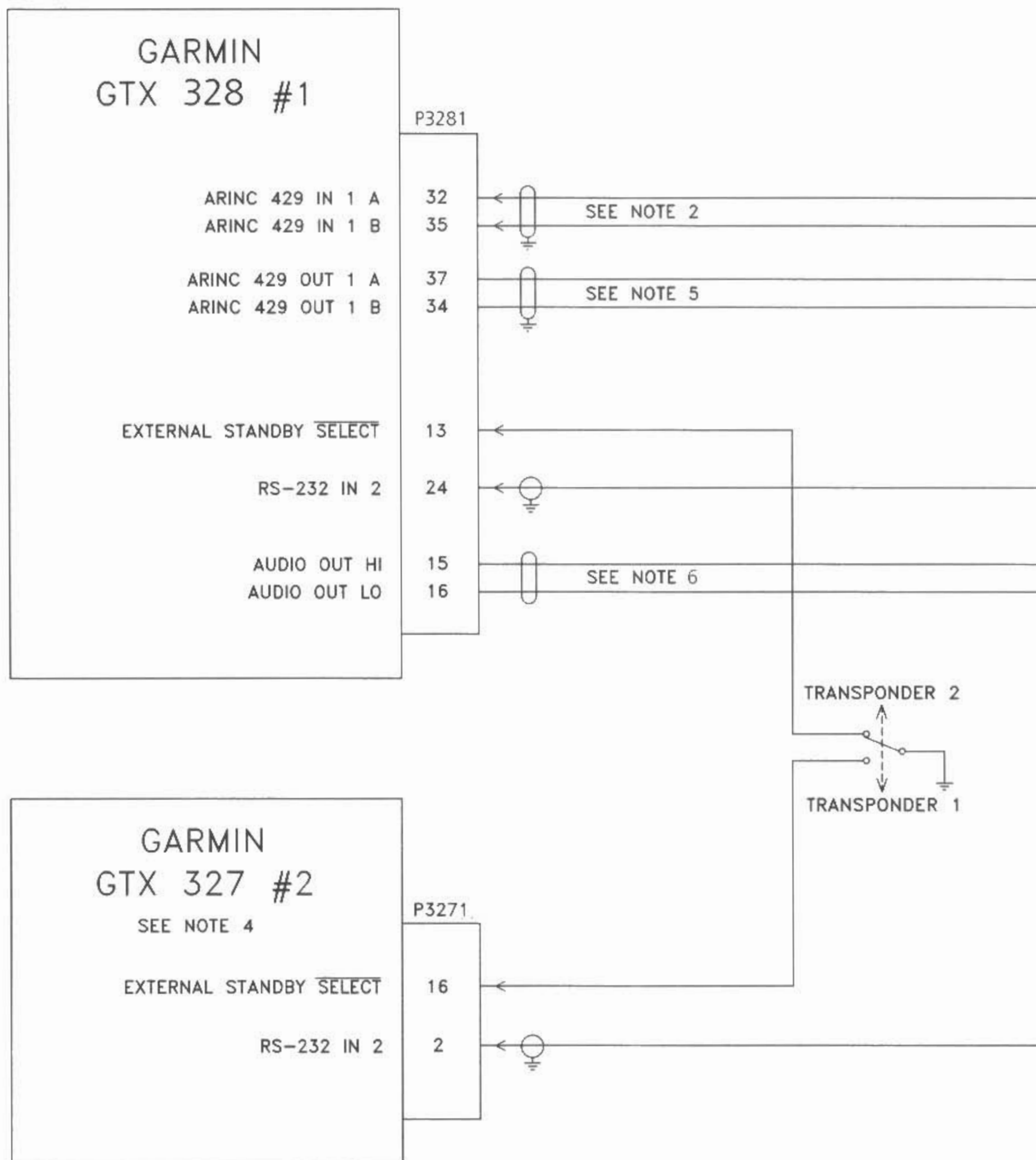
4. THE
THE
ARI
TOO
FOR
5. THE
THE
A S
BE



328 ARINC 429 OUT 2 PORT IS HIGH-IMPEDANCE WHEN
 RNAL STANDBY SELECT INPUT IS GROUNDED. THIS ALLOWS
 9 OUTPUTS FROM DUAL GTX 328 UNITS TO BE HARD-WIRED
 SINCE THE EXTERNAL STANDBY SELECT INPUT WILL BE ACTIVE
 OF THE TWO GTX 328'S AT ANY GIVEN TIME.

NO PANEL WIRING CONFIGURATION SHOWN DOES NOT ALLOW
 T TO SELECT AND DESELECT ALERT AUDIO.
 ED INPUT MAY ALSO BE USED, BUT THE AUDIO PANEL SHOULD
 RDED IF AN "ADF" OR "DME" INPUT IS USED (FOR EXAMPLE).

Figure C-7. Dual Transponder Interconnect Wiring Diagram, Dual Display Connections (Sheet 1 of 2)

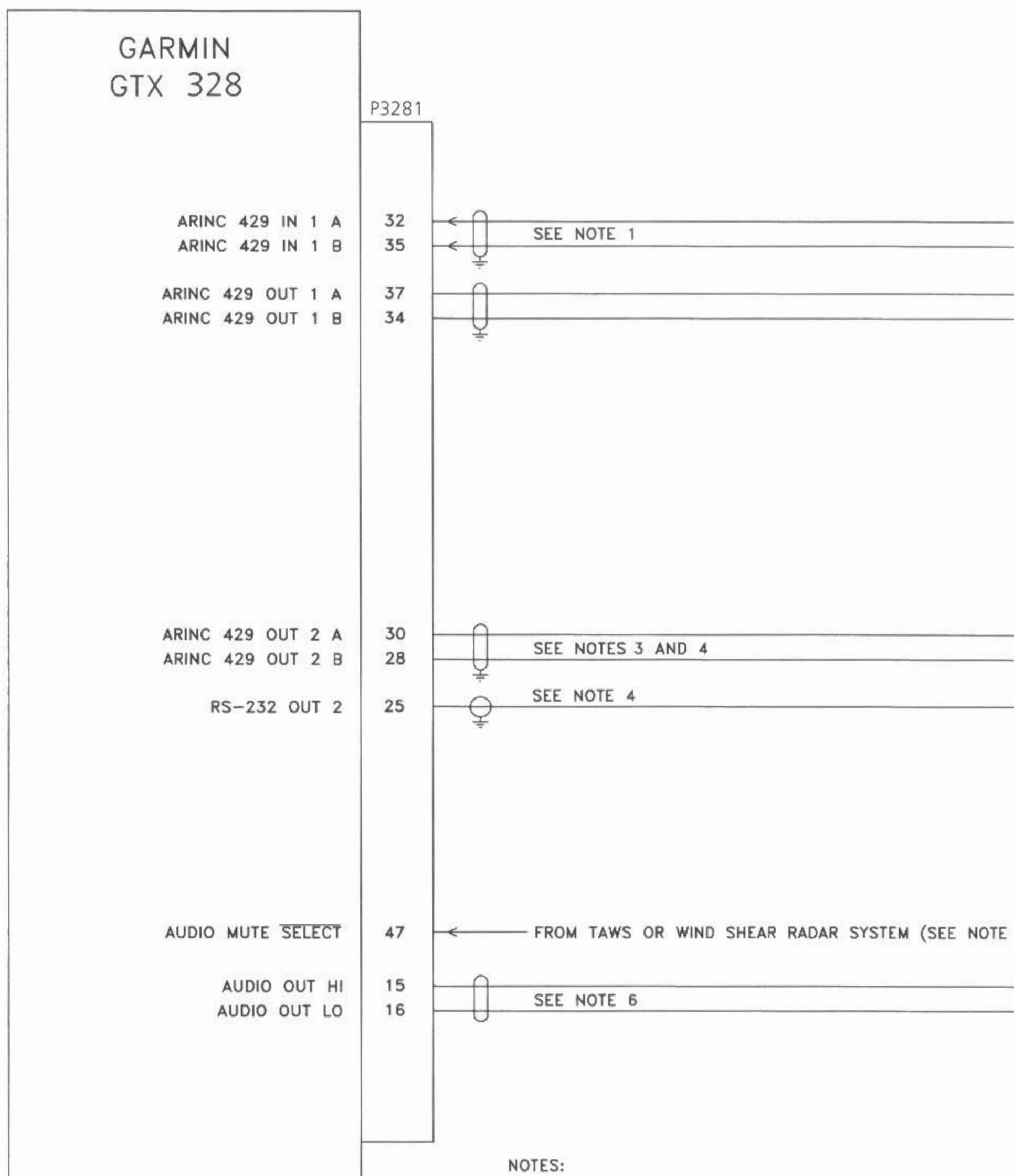


NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. ARINC 429 IN 1 (P3281-32 AND -35) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND (GND) MODE UPON LANDING.
4. FOR THE REMAINDER OF GTX 327 CONNECTIONS REFER TO GTX 327 TRANSPONDER INSTALLATION MANUAL, P/N 190-00187-02.

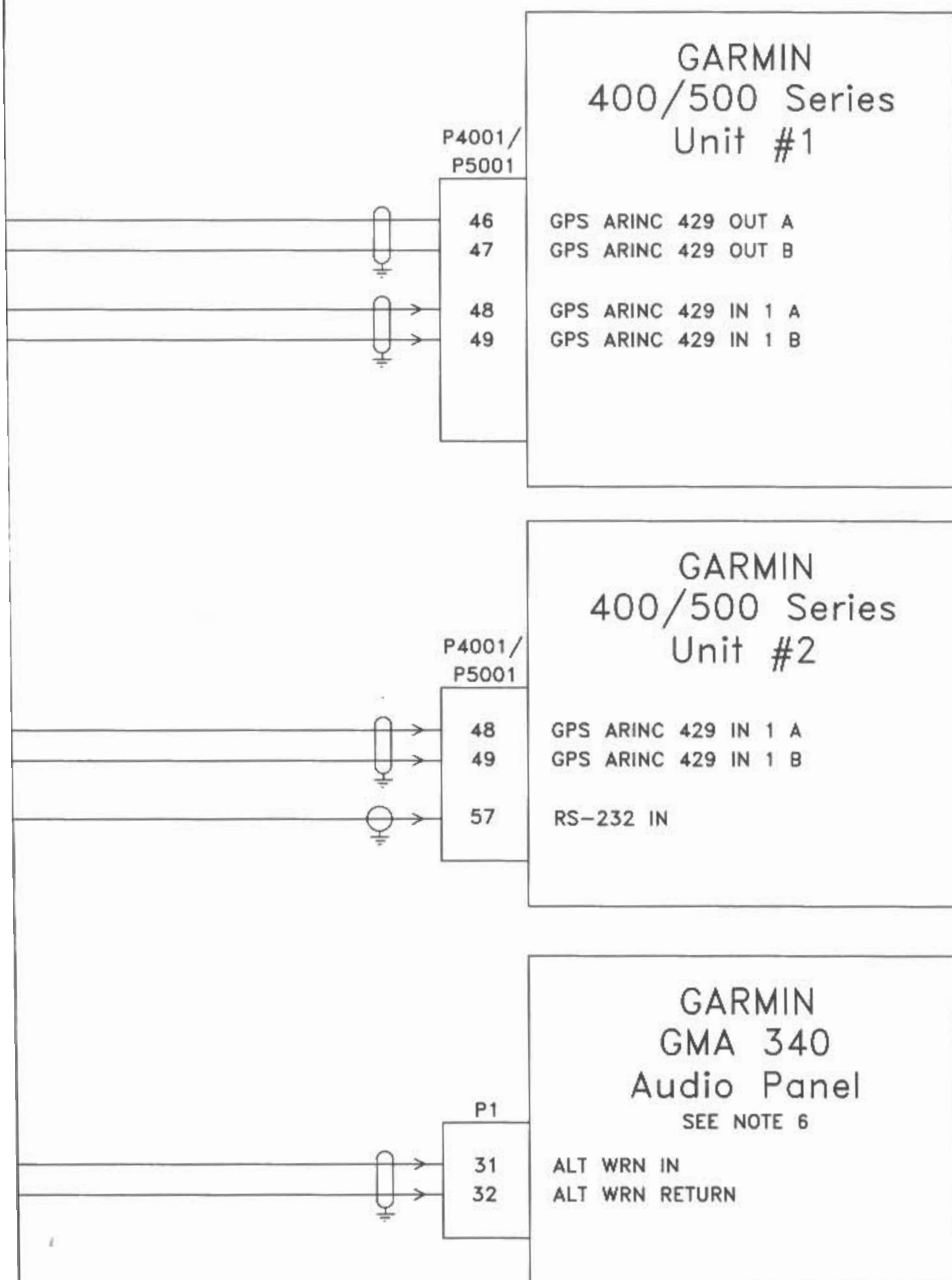
5. G
P
42
IS
6. T
T
A
B

APPENDIX C INTERCONNECT DRAWINGS



NOTES:

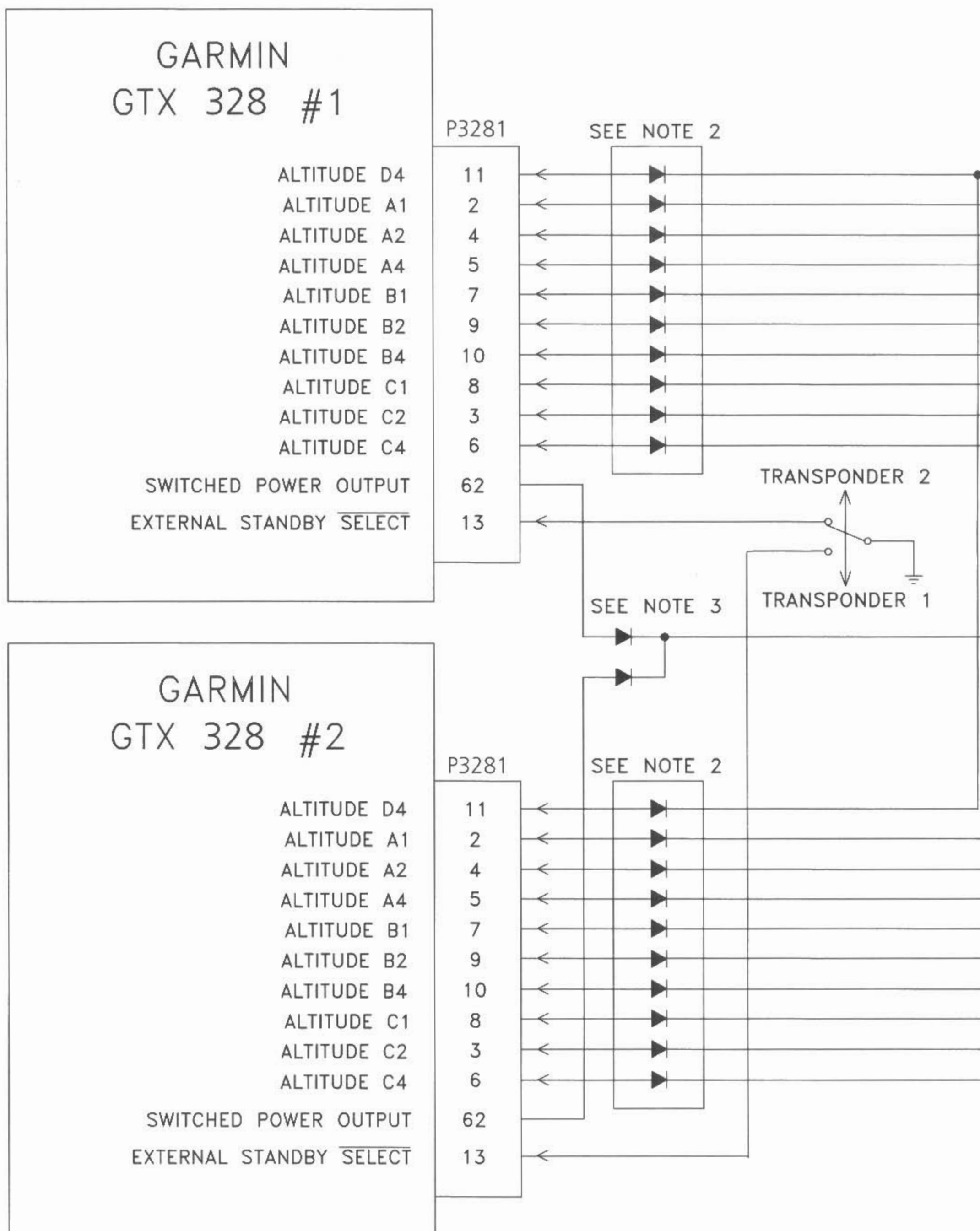
1. ARINC 429 IN 1 (P3281-32 AND -35) INPUT ALLOWS A STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN STANDBY UPON LANDING.
3. IN DUAL TRANSPONDER INSTALLATIONS, WHEN THE PRIMARY UNIT IS IN STANDBY, ALTITUDE DATA IS NOT TRANSMITTED OVER ARINC 429. IN ORDER TO PROVIDE ALTITUDE TO THE OTHER GPS UNIT, THE RS-232 OUTPUT TO THE SECOND 400/500 SERIES UNIT, MUST BE USED.



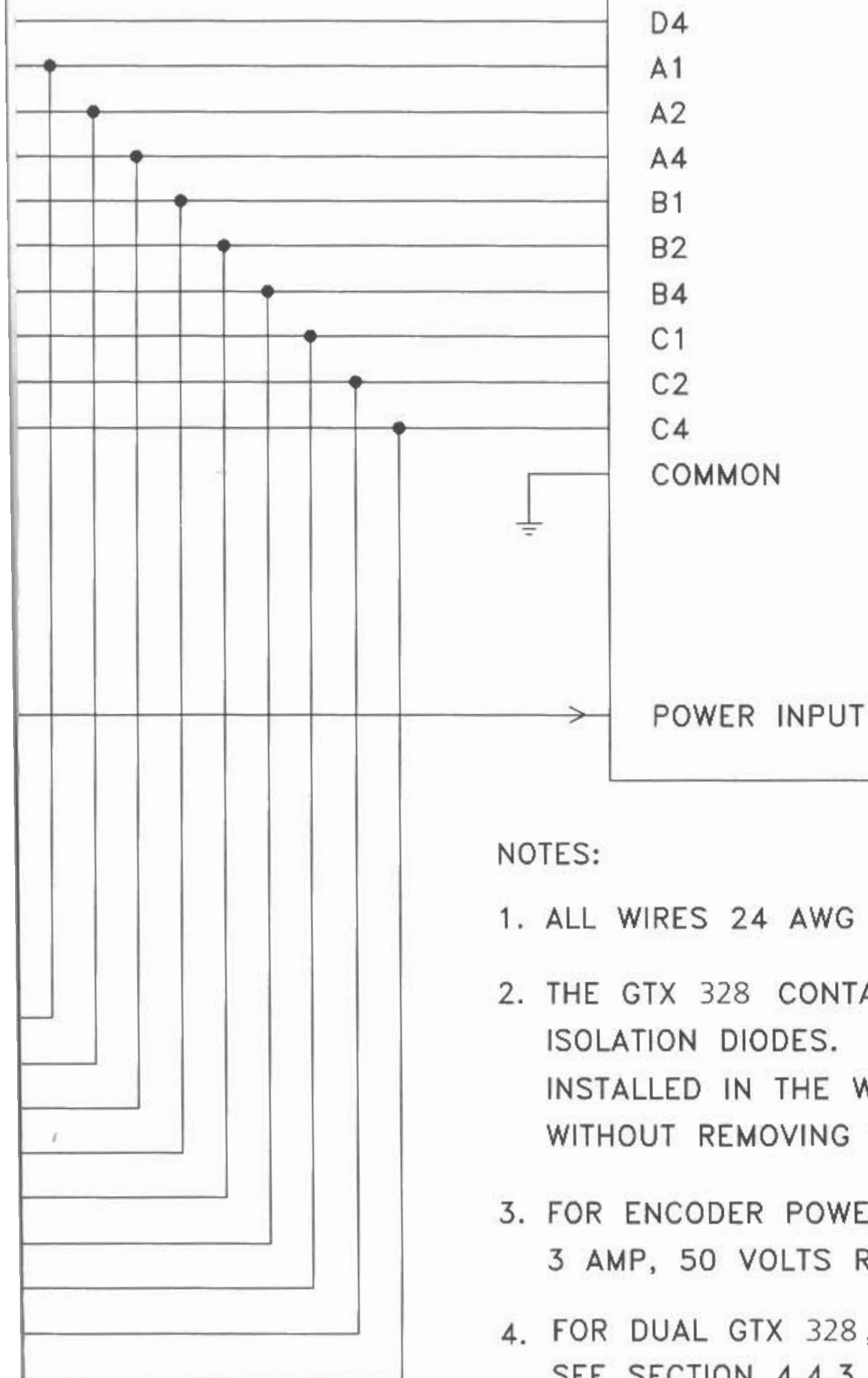
4. USE ARINC 429 ONLY IF SINGLE INSTALLATION (NO REMOTE STBY).
USE RS-232 IF DUAL TRANSPONDER INSTALLATION USING REMOTE STBY.
5. THE AUDIO MUTE SELECT INPUT (P3281-47) MUTES ALL GTX 328 AUDIO WHEN OTHER SYSTEMS ARE OUTPUTTING HIGHER-PRIORITY AUDIO WARNINGS. REFER TO PARAGRAPH 4.5.2 FOR A DESCRIPTION OF A PILOT CONTROLLED AUDIO MUTE SELECT SWITCH.
6. THE AUDIO PANEL WIRING CONFIGURATION SHOWN DOES NOT ALLOW THE PILOT TO SELECT AND DESELECT ALERT AUDIO.
A SWITCHED INPUT MAY ALSO BE USED, BUT THE AUDIO PANEL SHOULD BE PLACARDED IF AN "ADF" OR "DME" INPUT IS USED (FOR EXAMPLE).

Figure C-8. GTX 328 Interconnect Wiring Diagram, Aircraft with TCAD/TCAS

APPENDIX C INTERCONNECT DRAWINGS



Encoding Altimeter or Blind Encoder

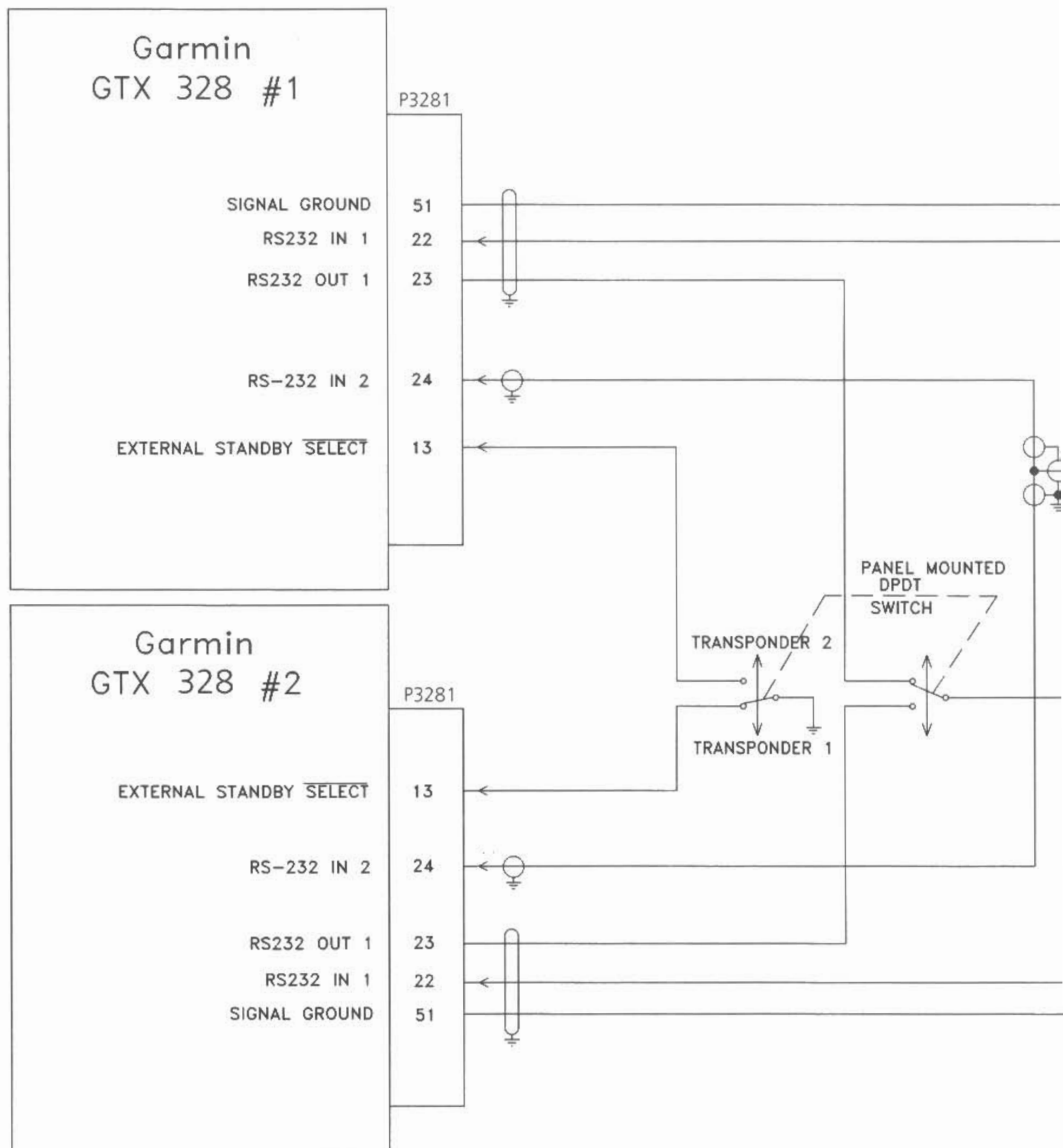


NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. THE GTX 328 CONTAINS INTERNAL ALTITUDE CODE LINE ISOLATION DIODES. EXISTING INSTALLATIONS WITH DIODES INSTALLED IN THE WIRE HARNESS MAY BE USED "AS IS" WITHOUT REMOVING THE DIODES.
3. FOR ENCODER POWER INPUT USE DIODES OF AT LEAST 3 AMP, 50 VOLTS REVERSE RATING.
4. FOR DUAL GTX 328, SINGLE SERIAL ENCODER CONNECTIONS, SEE SECTION 4.4.3 AND FIGURE 4-2

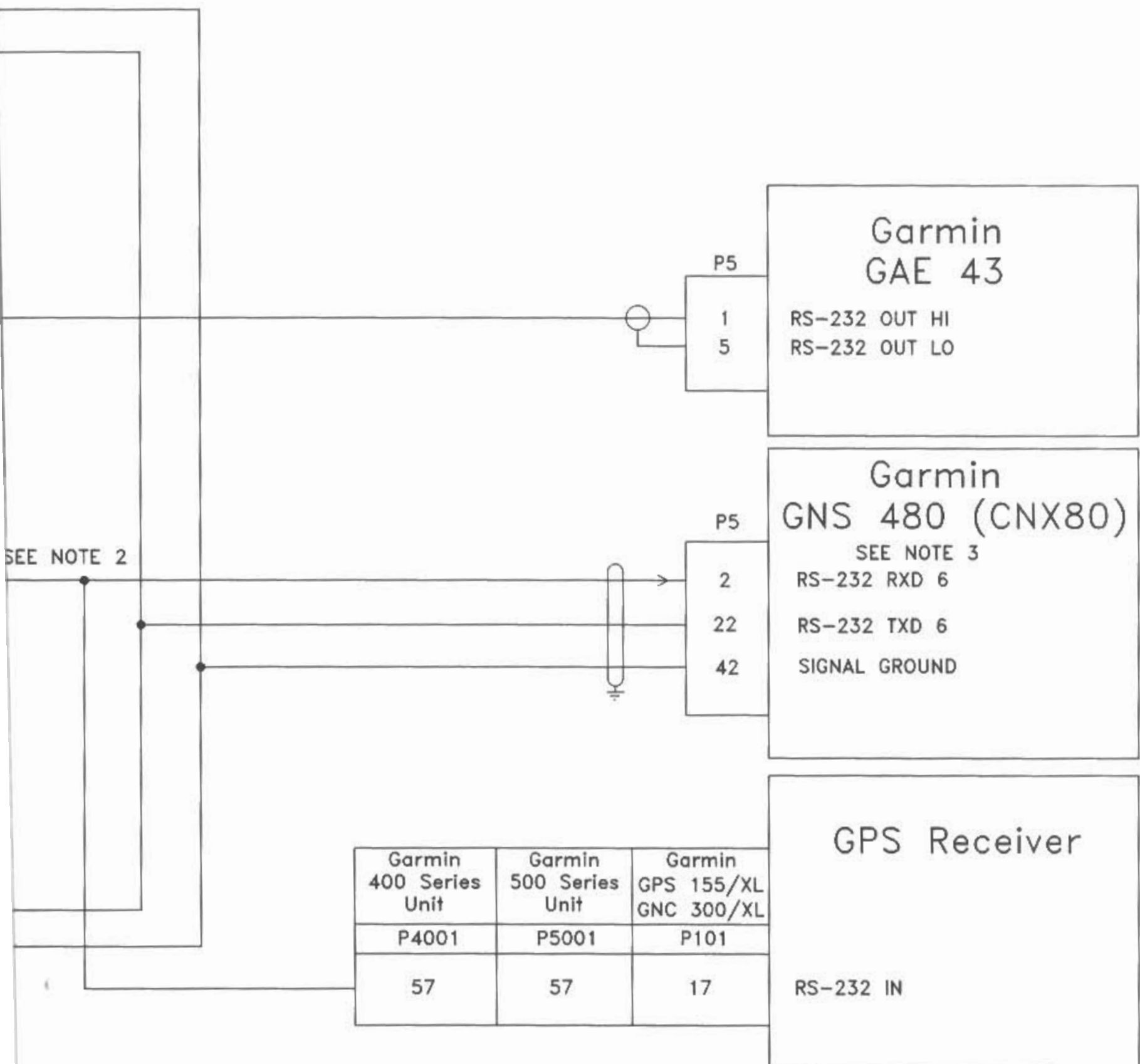
Figure C-9. Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections (Sheet 1 of 3)

APPENDIX C INTERCONNECT DRAWINGS



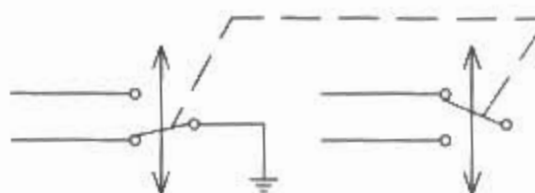
NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. THE GPS CAN ONLY RECEIVE SERIAL DATA FROM ONE UNIT AT A TIME. TO SYSTEM CONFIGURATION, DUAL TRANSPONDERS MUST BE IDENTICAL (TWO GTX 328's) OR ONE GTX 328 AND ONE GTX 330 IN A SYSTEM WITH ONE GPS.
3. THE GTX 328 MUST UTILIZE SOFTWARE VERSION 5.00 OR HIGHER.



4. SYMBOL DESIGNATIONS

- SHIELDED SINGLE CONDUCTOR
SHIELD TERMINATED TO GROUND
- SHIELDED SINGLE CONDUCTOR
SHIELD FLOATS
- TWISTED SHIELDED THREE CONDUCTOR
SHIELD TERMINATED TO GROUND

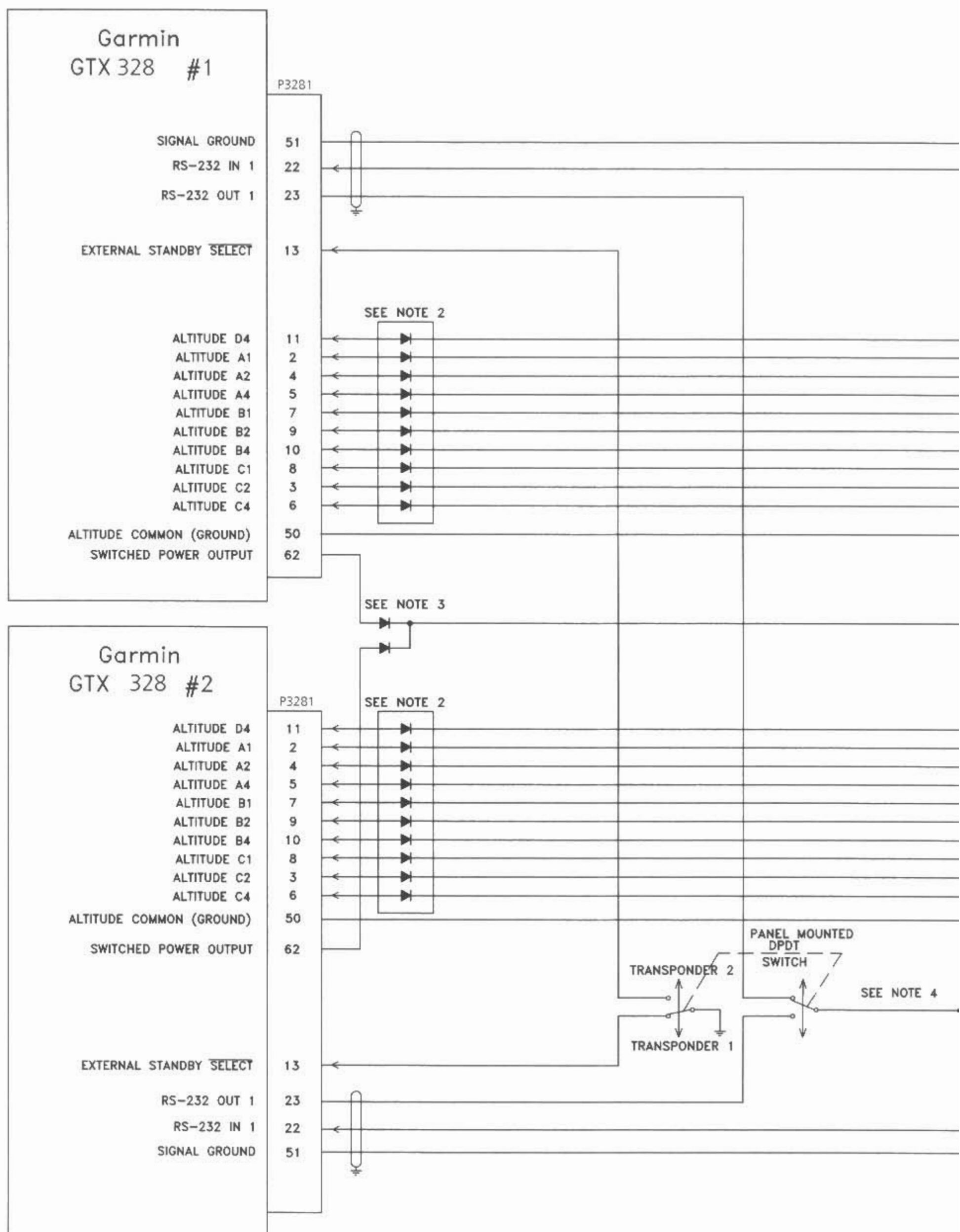


TOGGLE SWITCH,
DOUBLE POLE
DOUBLE THROW

ALSO, DUE
(I.E. DUAL
480 (CNX80).

Figure C-9. Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections (Sheet 2)

APPENDIX C INTERCONNECT DRAWINGS



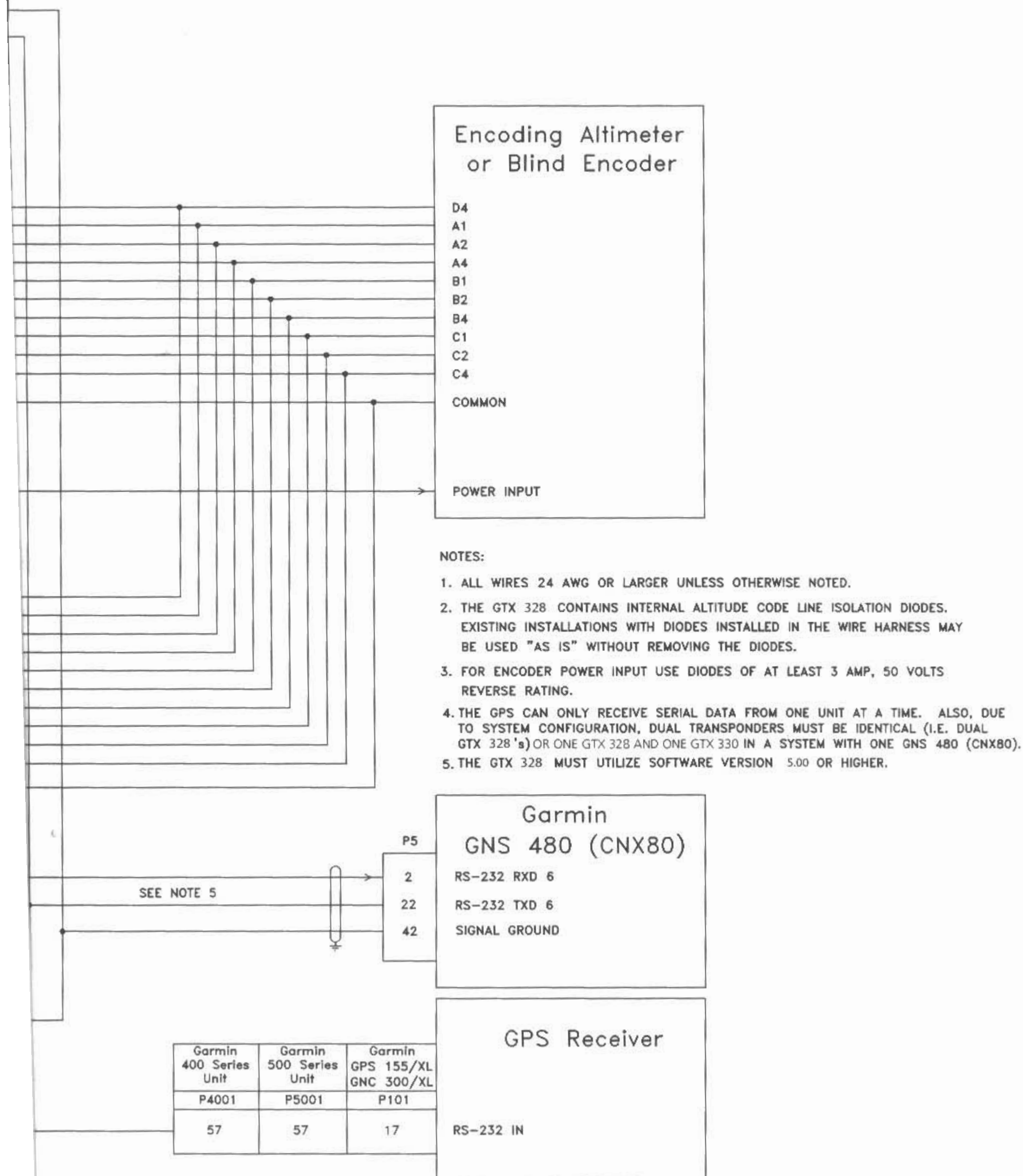


Figure C-9. Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections (Sheet 3)

IX C INTERCONNECT DRAWINGS

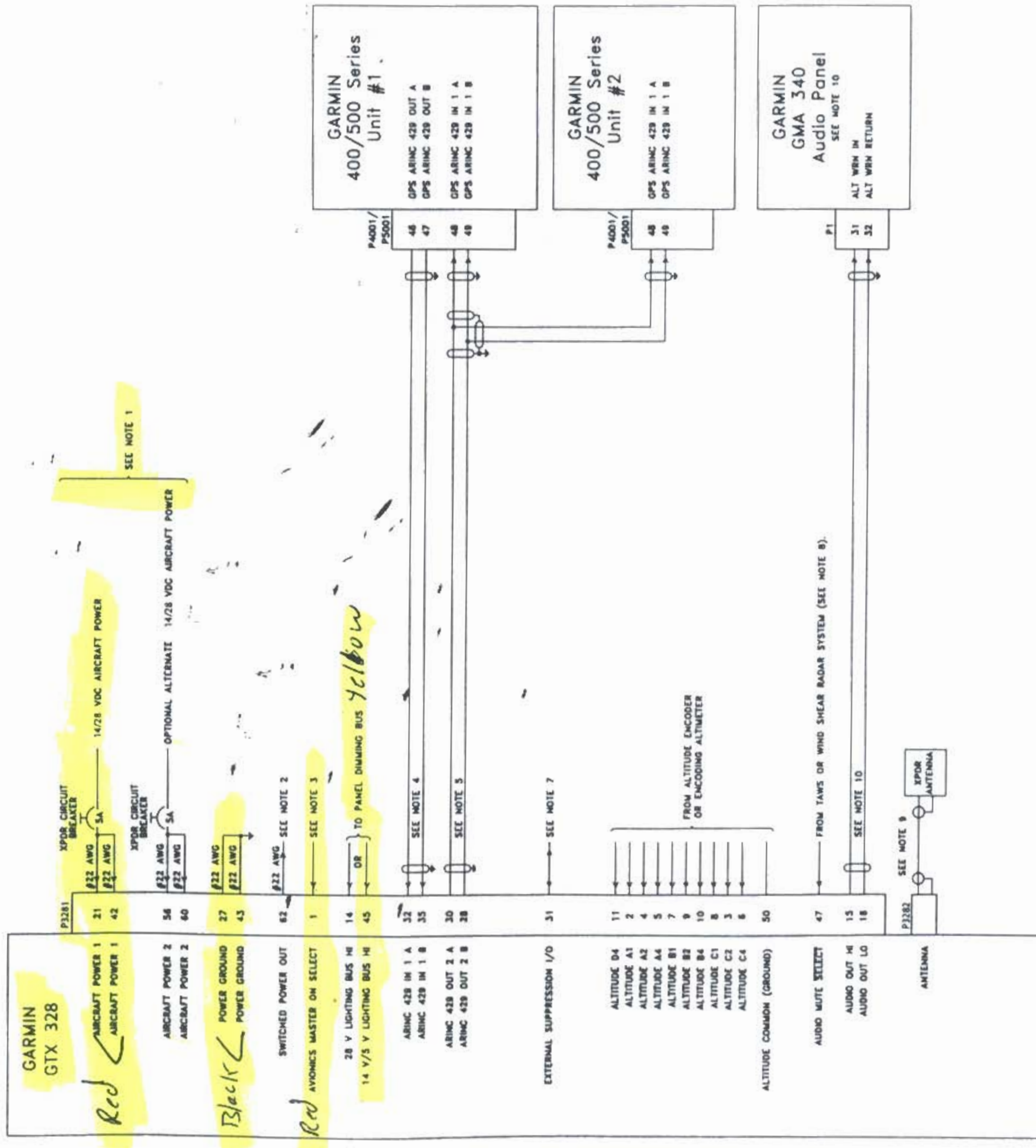


Figure C-1. GTX 328 to 400/500 Series Units, Typical Interconnect Wiring Diagram

CUSTOMER Rene SloatsDATE 10/09/08

AUDIO PANEL MODEL

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PILOTS MIC/KEY CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PILOT PTT CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PILOTS PHONE CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	COPILOTS MIC/KEY CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	COPILOTS PTT CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	COPILOTS PHONE CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 1 MIC
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 1 PHONE
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 2 MIC
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 2 PHONE
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 3 MIC
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 3 PHONE
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 4 MIC
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PASSENGER 4 PHONE
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAV 1 AUDIO
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAV 2 AUDIO
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	MARKER AUDIO
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	DME AUDIO
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ADF AUDIO
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ENTERTAINMENT 1 AUDIO
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ENTERTAINMENT 2 AUDIO

HSI/CDI MODEL

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAVIGATION LEFT
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAVIGATION RIGHT
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	LATERAL FLAG
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GLIDE SLOPE UP
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GLIDE SLOPE DOWN
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	VERT. FLAG
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 000
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 090
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 180
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 270
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS CALIBRATED

RECEIVER MODEL

RS232 INFORMATION

	YES	NO	N/A	COMMUNICATING WITH	YES	NO
PORT 1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 6	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 7	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 8	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

RECEIVER MODEL

ARINC 429 INFORMATION

	YES	NO	N/A	COMMUNICATING WITH	YES	NO
PORT 1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
PORT 5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

MFD MODEL

MULTI-FUNCTION DISPLAY			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	POS. INFO.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	FLIGHTPLAN
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ALTITUDE
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	WEATHER
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	MUSIC

YES	NO	N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	POWERS CHECKED
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DIMMERS CHECKED
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GROUNDS CHECKED

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GPS 1 RECEPTION CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GPS 2 RECEPTION CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	COM 1 RECEPTION CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	COM 2 RECEPTION CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAV 1 RECEPTION CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAV 2 RECEPTION CHECKED
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	MARKER RECEPTION CHECKED

AUTOPILOT MODEL

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAVIGATION LEFT
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAVIGATION RIGHT
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	LATERAL FLAG
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GLIDE SLOPE UP
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	GLIDE SLOPE DOWN
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	VERT. FLAG
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 000
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 090
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 180
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS 270
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OBS CALIBRATED

JS
10/9/08

THE CUSTOMER HARNESS HAS BEEN CHECKED AND PERFORMS WITHIN MANUFACTURERS SPECS.

Sterken Siwell

PRINT NAME

SIGNATURE

DATE

10/09/08



Inspectie Verkeer en Waterstaat

PH-SLO

Dhr. R. Sloots
Prinses Beatrixstraat 12
7051 AD VARSSEVELD

Datum
8 oktober 2008
Contactpersoon
D.J. de Lange
Doorkiesnummer
(070) 456 22 39
Bijlage(n)
-

Onderwerp
ICAO Technical address

Uw kenmerk
Uw brief van 7 oktober
Ons kenmerk
LTB/REG/

Geachte mevrouw, mijnheer, mijne heren,

Onder verwijzing naar de bovenvermelde aanvraag deel ik u mede, dat het navolgende ICAO Technical aircraft address is toegewezen:


ICAO Technical address	(binair)	:	010010000100101100001110
Idem	(hexadecimaal)	:	484B0E
Idem	(octaal)	:	22045416
Idem	(decimaal)	:	4737806

Nationaliteits-/inschrijvingskenmerk	:	PH-SLO
Fabrikant	:	Fokker, N.V. Koninklijke Nederlandse Vliegtuigenfabriek
Type-aanduiding	:	S.11.1
Fabrieksnummer	:	6281

Ik vertrouw u hiermede voldoende te hebben ingelicht.

Hoogachtend,
DE MINISTER VAN VERKEER EN WATERSTAAT,
namens deze,
De beheerder van het register van Nederlandse burgerluchtvaartuigen,

P. de Geus

1. Approving National Aviation Authority Country: FAA/UNITED STATES		2 AUTHORIZED RELEASE CERTIFICATE		3. Form Tracking Number: 5014207411		
4. Organization: GARMIN International 1200 E 151st Street Olathe, KS 66062		TSOA production approval number PT3742CE		5. Work Order/Contract/Invoice Number: 50142074		
6. Item:	7. Description:	8. Part Number:	9. Eligibility: *	10. Quantity:	11. Serial/Batch Number:	12. Status/Work:
1.	GTX328,Black,Standard	010-00634-01 (Includes 011-01684-00)	N/A	1	N/A	NEW
13. Remarks DOMESTIC						
s/n: 13K012470						
14. Certifies the items identified above were manufactured in conformity to: <input checked="" type="checkbox"/> Approved design data and are in a condition for safe operation <input type="checkbox"/> Non-approved design data specified in Block 13.						
15. Authorized Signature: 		16. Approval/Authorization No: ODARF240087CE		19. <input checked="" type="checkbox"/> 14 CFR 43.9 Return to Service Certifies that unless otherwise specified in Block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.		
17. Name (Typed or Printed): STEVEN CUMMINS		18. Date (m/d/y): Oct/09/2008		20. Authorized Signature: N/A		
				21. Approval/ Certificate No.: N/A		
				22. Name (Typed or Printed): N/A		
				23. Date (m/d/y): N/A		
User/Installer Responsibilities						
It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/ assembly.						
Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts parts/components/assemblies from the Airworthiness Authority of the country specified in Block 1.						
Statements in Block 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.						



FAA Station Repair # OPXR455L

22783 Airport Road N.E. • Aurora, OR 97002

e-mail: info@PCA.aero • Internet: www.PCA.aero

Rene Sloots
Prinses Beatrixstraat 12
Varsseveld 7051AD
Netherlands

JB Jansen
8034 Park Overlook Dr
Bethesda, MD 20817

Cust. Order No. 43845P			Salesman RW		Terms CSH		Invoice Date 10/14/2008		Date Shipped 10/14/2008		Shipped VIA UPS Ground	
Quantity Ordered	Quantity Shipped	Back Ordered	Item Number		Description				Unit Price		Extended Price	
1.00	1.00	0.00	GTX-328		Mode S Transponder Serial # 13K012470				\$2,645.00		\$2,645.00	
1.00	1.00	0.00	AK451		406 MHz ELT Serial # 451650				\$800.00		\$800.00	
1.00	1.00	0.00	PROC		Outside processing fees-8130				\$69.00		\$69.00	
1.00	1.00	0.00	FRE		Freight & Shipping				\$13.00		\$13.00	
1.00	1.00	0.00	HARN		Harness Labor				\$50.00		\$50.00	
<i>We Appreciate Your Business</i>									<i>Thank You</i>		\$3,564.00	
— COMMENTS —									Freight		\$0.00 \$0.00 \$13.00 \$3,577.00	
See Reverse Side for Conditions of Sale									TOTAL AMOUNT		\$3,577.00	