GTX™ 330, GTX™ 330D TRANSPONDER INSTALLATION MANUAL

GARMIN™

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This manual reflects the operation of software version 4.01. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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NOTE

Throughout this document references made to GTX 330 shall equally apply to the GTX 330D except where specifically noted.

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GTX 330 HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GTX 330 and GTX 330D 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	**0311**	**2-6-04**	**GTX 330D Only. Switch/Diplexer Assembly reworked to prevent +200 volt supply line from shorting to the chassis.**

1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents the mechanical and electrical installation requirements for the GTX 330 Mode S Transponder and GTX 330D Diversity Mode S Transponder. Throughout this manual, the term GTX 330 applies to both transponders unless otherwise stated.

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 330 is a panel mounted Non-Diversity Mode S Transponder while the GTX 330D is a Diversity Mode S Transponder. The GTX 330D employs two antennas, one intended to be mounted on the top and the other on the bottom of the aircraft. The design meets RTCA/DO-181C and EUROCAE ED-73A specifications.

The GTX 330 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 330 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse for 18 seconds.

The GTX 330 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 330 with software version 4.01 meets Mode S Enhanced Surveillance (EHS) requirements. Mode S Enhanced Surveillance is used predominantly in European airspace. It provides information consisting of additional aircraft parameters (see JAA NPA 20-12a) to ground radar systems. Fixed wing aircraft that can provide the list of eight Downlink Aircraft Parameters (DAPs) listed in BDS Registers 4,0, 5,0 and 6,0 (See Section 1.5 Interface Summary) are considered to be Mode S EHS capable. If these conditions cannot be met the aircraft will not be considered EHS capable. Compliance with Enhanced Surveillance may require additional interface between aircraft systems and the GTX 330.

The GTX 330 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 330 for its Transponder data capability and the aircraft's Flight ID, which may be the registration number or other call sign. The GTX 330 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 330 screen displays pressure altitude, density altitude, temperature, and timer functions, depending on equipment connections and configuration selection. The unit also features an altitude monitor, TIS traffic advisories and flight timers. A voice or tone audio output announces altitude deviation, TIS traffic advisory and count down timer expiration.

The GTX 330 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 330 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.

CAUTION

The GTX 330 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.

1.3 TIS System Capabilities

The GTX 330 also provides uplink information such as Traffic Information Service (TIS). TIS is a ground-based service providing relative location of all ATCRBS Mode A and Mode C transponder equipped aircraft within a specified service volume. The TIS ground sensor uses real time track reports to generate traffic notification. TIS provides a graphic display of traffic advisory information in the cockpit for non-TCAS equipped aircraft.

Advisory traffic information is available to aircraft equipped with a Mode S data link such as the Garmin GTX 330 transponder. Advisory traffic information may be displayed on a Garmin 400/500 Series unit.

The GTX 330 unit can also be incorporated in installations with other compatible control/display units such as the Garmin GNS 480 (CNX80) and MX20 Multifunction Display (MFD).

Surveillance data includes all transponder equipped aircraft within the coverage volume. Aircraft without an operating transponder are invisible to TIS. TIS displays traffic within seven nautical miles from 3000 feet below to 3500 feet above the requesting aircraft. The pilot sees the location, relative direction and altitude of other aircraft.

1.4 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.

1.5 Interface Summary

The GTX 330 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 power input (11 to 33 Volts).
- 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.
- Diversity: GTX 330 is available with or without the diversity feature.

The GTX 330 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 (4,0) Selected Vertical Intention
- BDS (5,0) Track and Turn Report
- BDS (6,0) Heading and Speed 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 330, 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 330 does not support BDS (3,0).

1.6 Technical Specifications

1.6.1 Environmental Qualification Form

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

GTX 330 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.

1.6.1 Electrical Specifications

Characteristic	Specification
TSO, JTSO; GTX 330	TSO-C112*, JTSO-2C112a.
TSO, JTSO; GTX 330D	TSO-C112*, JTSO-2C112a.
TSO ENV CAT	Refer to Environmental Qualification Form
FCC Authorization	Emission Designator 12M0M1D
Applicable Documents	RTCA DO-160D, DO-181C, EuroCAE ED-73A
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 ±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 ≤ 0.5 V; High ≥ 8 V
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.

1.6.2 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 330/GTX 330D Unit Weight	3.4 lbs. (1.5 kg)
GTX 330/GTX 330D Rack Weight (Installed with rack and connectors)	4.2 lbs. (1.9 kg)

1.6.3 Power Requirements

Characteristic	Specification
Input Voltage Range	11.0 to 33.0 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

1.7 Installation Approval

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR Part 43 or the applicable airworthiness requirements. For GTX 330 TSO compliance and STC, see Appendix A. For antenna TSO compliance, refer to antenna manufacturer's literature.

1.8 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 330 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 330 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.

1.9 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 330 Mode S Transponder, related hardware and optional accessories. Installation of the GTX 330 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 330 is available under the following part numbers:

2.2.1 Configurations Available

Model	Catalog Part Number	Unit Part Number	Diversity	Front Panel Color	Install Kit/Docs*	TSO Class
GTX 330	010-00230-00	011-00455-00	No	Black	No	2A1 121 010
GTX 330	010-00230-01	011-00455-00	No	Black	Yes	2A1 121 010
GTX 330	010-00230-20	011-00455-20	No	Gray	No	2A1 121 010
GTX 330	010-00230-21	011-00455-20	No	Gray	Yes	2A1 121 010
GTX 330D	010-00293-00	011-00455-10	Yes	Black	No	2A1 121 011
GTX 330D	010-00293-01	011-00455-10	Yes	Black	Yes	2A1 121 011
GTX 330D	010-00293-20	011-00455-30	Yes	Gray	No	2A1 121 011
GTX 330D	010-00293-21	011-00455-30	Yes	Gray	Yes	2A1 121 011

* **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, Install Rack, GTX 330	115-00294-00
Sub Assy, Backplate, GTX 330	011-00582-00 (For use with GTX 330)
Sub Assy, Backplate, GTX 330D	011-00582-01 (For use with GTX 330D)
Garmin GTX 330 Antenna kit* (two required for diversity)	010-10160-00

* **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 330.

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 330 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 Location Considerations

Antenna mounting should utilize the aircraft manufactures Type Certificated antenna location and style of antenna. If a second (diversity) antenna is installed in the aircraft, considerations for its mounting should be made as outlined in Figure 2-1. The antenna installation should be installed in accordance with Advisory Circular 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 2.5)

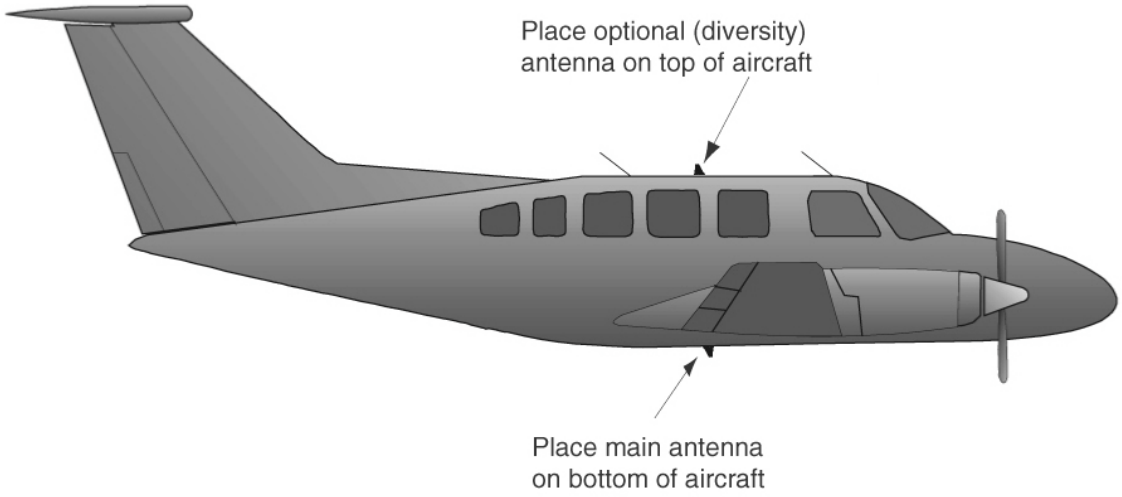

Figure 2-1. Antenna Installation Considerations

A. The antenna(s) (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 effect its radiation pattern.

B. The main antenna should be mounted vertically on the bottom of the aircraft. The optional second (diversity) antenna should be mounted vertically on top of the aircraft. Horizontal separation must be no more than 7.6 meters (25 feet).

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 330.

NOTE

If the antenna is being installed on a composite aircraft, ground planes must be considered. 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 the 1.5 dB maximum loss figure (including connectors) may be used.

Max. Length (feet – [m])	Insertion loss (dB/100ft)	ECS Type	MIL-C-17 Type	RG Type
6' 1.3" [1.86m]	18.0		M17/128-RG400	RG-400
7' 7.3" [2.32m]	14.45	3C142B		
9' 2.0" [2.79m]	12.00		M17/112-RG304	RG-304
12' 6.0" [3.81m]	8.80	311601	M17/127-RG393	RG-393
15' 5.4" [4.71m]	7.12	311501		
19' 9.4" [6.03m]	5.56	311201		
30' 3.6" [9.24m]	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 330 meets all applicable TSO requirements without forced air cooling. The application of forced air cooling to the rear air nozzle of the GTX 330 is highly recommended to provide beneficial cooling to the unit.

The GTX 330 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 330 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	±45°
From Top	30°
From Bottom	10°

2.8.2 Mechanical Installation

NOTE

Avoid installing the unit near heat sources. If this is not possible, insure 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 insure 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.

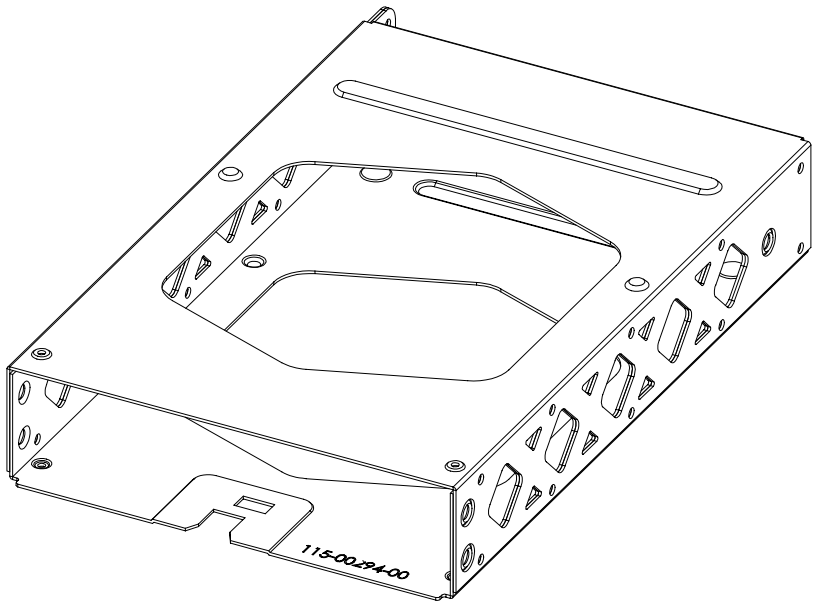

Figure 2-2. GTX 330 Unit Rack (115-00294-00)

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3 INSTALLATION PROCEDURE

3.1 Unpacking Unit

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

Retain the original shipping containers for storage. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement 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 330 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 330 into the rack. Incorrect wiring could cause internal component damage.

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

Manufacturer	62 pin D-Subminiature connector (P3301)		
	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	Hand Crimping Tool	16, 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, 18 and 20 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 J3301

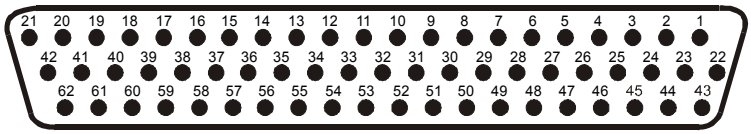

Figure 4-1. Rear Connector, J3301

Table 4-1. P3301 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. P3301 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	TIS CONNECT SELECT*	In
47	AUDIO MUTE SELECT*	--
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	In
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 11-33 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 330 unit can be configured to track a 28 Vdc, 14 Vdc, 5 Vdc or 5 Vac lighting bus using these inputs. The GTX 330 can also automatically adjust for ambient lighting conditions based on the photocell. Refer to Sections 5.2.5 and 5.2.6 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 330 is not configurable for different types of temperature sensors. The temperature-input specification is 1 microamp per degree Kelvin (1 μA/°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 V or the resistance to ground is < 375 Ω. 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 330 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 330, 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 330 must receive altitude from suitable altitude reporting devices through serial input connections. Altitude input to the GTX 330 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 330 Installation

A dual GTX 330 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 330 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 330s, in a system with one GNS 480 (CNX80).

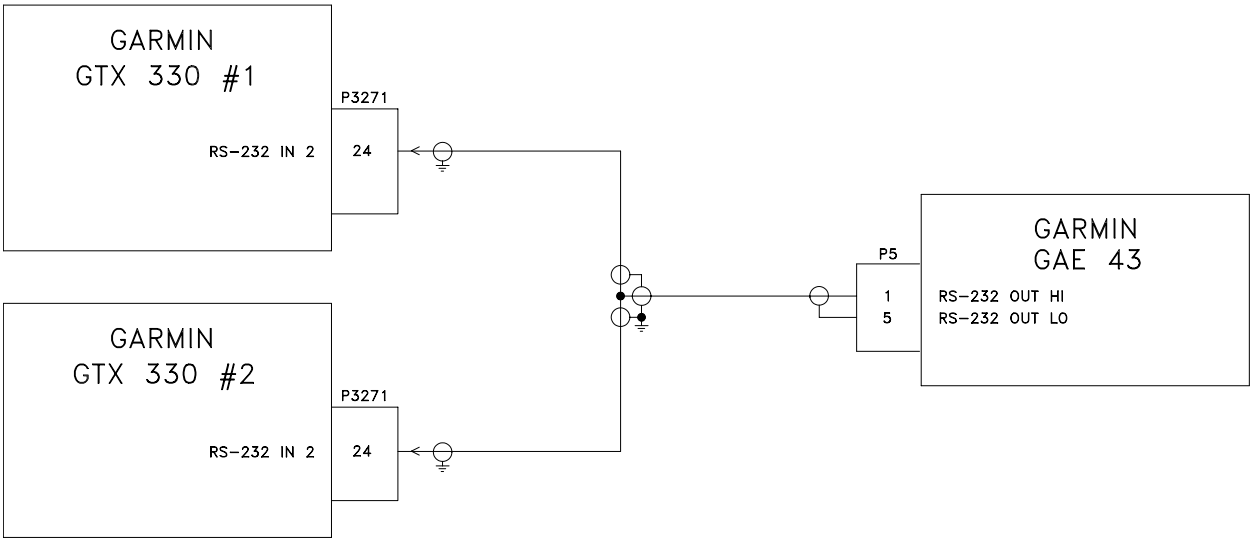

Figure 4-2. Dual GTX 330, Single Encoder, Serial Input Connections

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 330 priority for selecting encoded altimeter interconnections. The GTX 330 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 330 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 330 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 330 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 330 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
TIS CONNECT SELECT*	46	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 Ω. 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 330 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.

When TIS CONNECT SELECT is inactive ("Standby" is displayed on the 400/500 Series units) the GTX 330 logs onto TIS service when a momentary ground is applied to P3301-46. When TIS is active, a momentary ground logs off of TIS service. Refer to Figures C-1, C-3, C-4, C-7 and C-8 for TIS CONNECT SELECT connections and to Sections 5.2.2, 5.2.3, 5.2.8 and 5.2.9 for TIS configuration.

An AUDIO MUTE SELECT mute switch may be used to control TIS audio alerts. TIS (Traffic) Mute must be clearly marked with MUTE ON/MUTE OFF or TIS Audio ON/Audio OFF labels. 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 and 5.2.3. for AUDIO configuration.

4.6 Serial Data Electrical Characteristics

The GTX 330 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 330 manages support for several equipment interfaces. The GTX 330 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. TIS data is included on the same high-speed ARINC 429 bus.

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.

NOTE

The GTX 330 is currently FAA approved to display TIS traffic information on Garmin 400/500 Series, GNS 480 (CNX80) and MX20 products only.

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 and C-8 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 333 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 330 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 330 installation interfaces with a GNS 480 (CNX80) in the aircraft, the GNS 480 (CNX80) must be turned off during GTX 330 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 J3302, (and J3303 for GTX 330D) to an antenna or a 50 Ω, 5-Watt load. The GTX 330 transmits Mode S acquisition squitter replies about once per second whether interrogations are received or not.

Beginning with SW version 3.06, the GTX 330 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.

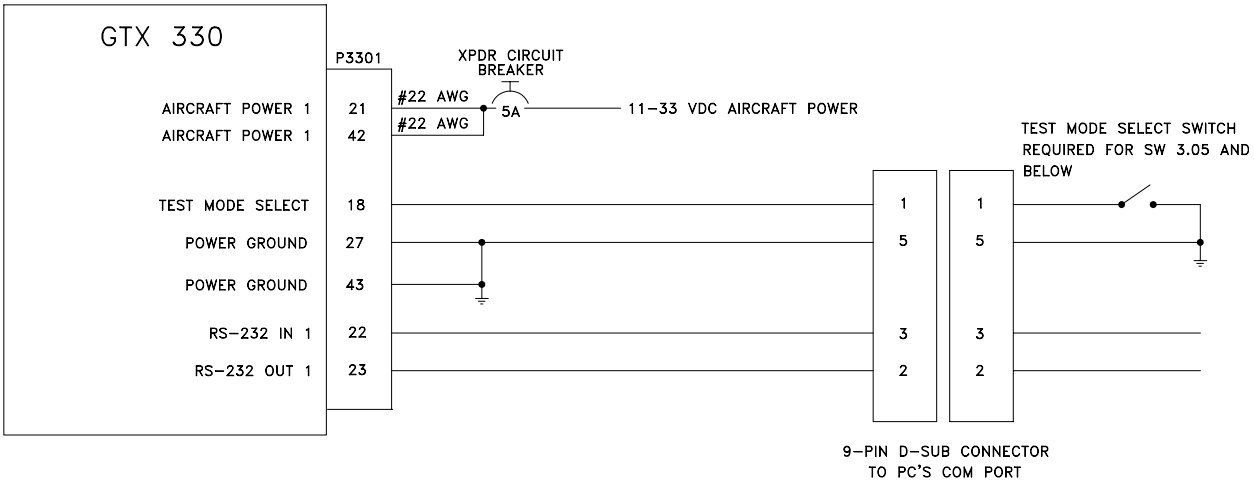

Figure 4-3. GTX 330, Software Update Connections

4.6.3 Aircraft with Both TIS and TCAS/TCAD Installed

Refer to Figure C-8 for wiring connections. If redundant traffic systems are desired in the aircraft, such as TIS and TCAD/TCAS, both systems cannot be connected to the same 400/500 Series unit to display traffic simultaneously. In a multiple traffic system/multiple 400/500 Series unit installation, connect ARINC 429 CHANNEL 1 from the GTX 330 to only one of the 400/500 Series units and ARINC 429 CHANNEL 2 to the other 400/500 Series unit.

Connect the TIS CONNECT SELECT line from the GTX 330 to the 400/500 Series unit receiving TIS data. The TCAD/TCAS system may now be connected to the second 400/500 Series unit.

Refer to Section 5 for configuration. Configure ARINC 429 output CHANNEL 1 for GARMIN W/TIS and ARINC 429 output CHANNEL 2 for GARMIN. TIS is then enabled over CHANNEL 1 when the GTX 330 is connected to a Garmin 400/500 Series unit through the ARINC 429 wiring.

All configured input data that is concentrated through the GTX 330 via ARINC 429 lines, is received in the second 400/500 Series unit via ARINC 429 CHANNEL 2 while the GTX 330 is active. No data is received over ARINC 429 CHANNEL 2 while the GTX 330 is in remote standby. (Remote standby is usually used as part of a dual transponder installation.)

4.6.4 ARINC 429 Input/Output

The ARINC 429 Output 2 port, J3301 pins 30 and 28, is at a high-impedance when in remote standby, therefore not active. When two GTX 330s 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 330s at any given time.

The GTX 330 ARINC 429 Output 1 port is active when J3301 pin 13 is grounded [EXTERNAL STANDBY SELECT (remote STANDBY)]. In installations having a transponder combination of GTX 330/GTX 327 (or GTX 330/other transponder), the GARMIN and GARMIN W/TIS formats from the ARINC 429 Output 1 port, J3301 pins 34 and 37, are available if the GTX 330 has SW 3.03 and above.

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.

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5 POST INSTALLATION CONFIGURATION AND CHECKOUT PROCEDURE

Perhaps the most important factor in the GTX 330 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 insure 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 330 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 330 Front Panel

NOTE

The GTX 330 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 330. 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 replies to All-Call 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 1200 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 330 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 330 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 330 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 3.06 or higher. Software version 4.01 is required for Mode S Enhanced Surveillance (EHS).

When connecting the GTX 330 to a GNS 480 (CNX80) the transponder can be configured from either the GNS 480 (CNX80) or the GTX 330. Although possible from the GNS 480 (CNX80), configuration from the GTX 330 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
- Traffic Messages
- Display Mode
- Display Backlight
- Key Backlight
- Contrast
- 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

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

AUDIO MODE (First) Page

AUDIO MODE (Second) Page

VOICE and VOLUME

Select desired VOICE. The choice of OFF is not available for traffic (TIS) audio. 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 and **2** through **5** are voice messages. Choose each selection to listen to the message.

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. **3** = "Traffic," when a TIS traffic alert is received (similar to a "Traffic Advisory" in TCAS terms). **4** = "Timer Expired," when the countdown timer expires. **5** = "Traffic Not Available," when TIS service is not available or out of range of an operating TIS Mode S site. **6** through **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 Traffic Information Page

TRAFFIC INFORMATION Page

TRAFFIC MESSAGES

Sets the Traffic Messages to either Tone or Message. Traffic Information Service (TIS) provides notification of close proximity traffic.

5.2.4 Display Mode Page

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.

5.2.5 Display Backlight Page

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 330 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 330.
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 330 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.

5.2.6 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 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 330 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 330.
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.

5.2.7 Contrast Configuration Page

CONTRAST CONFIGURATION Page

CONTRAST MODE

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 330 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.

5.2.8 ARINC 429 Configuration Pages

ARINC 429 INPUT (First) Page

ARINC 429 INPUT (Second) Page

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.

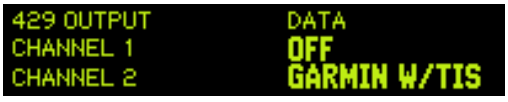
SPEED (Channel 1 – 3)

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



ARINC 429 OUTPUT Page

The GTX 330 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.

SELECTION	DESCRIPTION
CHANNEL 1 (DATA)	DATA SOURCE: OFF, ADLP, GARMIN or GARMIN W/TIS. 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, GARMIN or GARMIN W/TIS. DEFAULTS to GARMIN W/TIS. (See Figure C-5, Note 2 for description of Garmin format.) Do not select GARMIN W/TIS if the aircraft contains another traffic detection system.

In aircraft having multiple traffic systems and multiple 400/500 Series units, configure ARINC 429 output CHANNEL 1 for GARMIN W/TIS and ARINC 429 output CHANNEL 2 for GARMIN. TIS is then enabled over CHANNEL 1.

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
130	Intruder Range (0 – 8 sets)
131	Intruder Altitude (0 – 8 sets)
132	Intruder Bearing (0 – 8 sets)
357 (EXT)	End of Transmission

5.2.9 RS-232 Input and Output Page

RS-232 INPUT-OUTPUT Page

RS-232 INPUT (Altitude Source, GPS Data)

This is the electrical source for the GTX 330 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.
REMOTE + TIS	RS-232 serial output remote data with TIS.

5.2.10 Operation Configuration Pages

First CONFIGURATION Page

VS RATE (Vertical Speed Rate)

This field is the typical vertical speed for climb/descent of the aircraft. The settable number determines the rate of climb the GTX 330 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 330 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 330 VFR key. In the United States, 1200 is the VFR code for any altitude. The default is set to 1200.

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

Second CONFIGURATION Page

The squat switch field may be set to either YES or NO. Selecting YES in this field sets the GTX 330 to use the squat switch to determine lift off. Selecting NO sets the GTX 330 to use Automated Airborne Determination from other sources.

DELAY TIME

This is the number of seconds the aircraft must be on the ground before the GTX 330 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.

5.2.11 Temperature Page

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 330.

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.

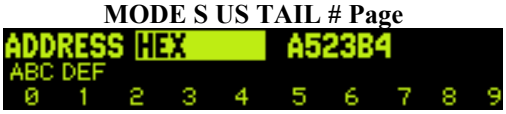
Once the aircraft address is entered, the unit remains on in the same mode as before.

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. Press the FUNC key repeatedly to toggle through the pages until you come to the address entry page. [For a shortcut, select the Aircraft Configuration Menu page (see para 5.2.1.) and then CRSR-9-9-9-CRSR and the FUNC key three times.]
   a. The page that appears is either ADDRESS US TAIL# N _ _ _ _ _ .
   b. Or ADDRESS HEX _ _ _ _ _ _ .

MODE S US TAIL # Page



MODE S Address HEX Page

NOTE

It is not necessary for the installer to convert a US aircraft registration number (N-number) to a Hex address. The GTX 330 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

Flight ID can be entered in TSO Class 2A units, P/N 010-00230-( ) and 010-00293-( ).

NOTE

When a Flight ID Number contains a space, the GTX 330 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 330 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.

FLIGHT ID PWR-UP ENTRY Page

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.

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.

An important factor to consider while configuring the GTX 330 is this:

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 Mode S addresses. The two fixed selections do not require any transponder interaction from the flight crew, whereas **POWER UP ENTRY** always does.

PWR-UP CONFIG ENTRY Page

PWR-UP SAME AS TAIL Page

5.2.13 Mode S Aircraft Type Page

Used for air to air communication with TCAS.

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 INPUT Page

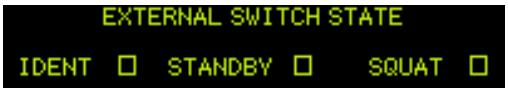
GRAY CODE

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



EXTERNAL SWITCH Page

IDENT

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.

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.

5.2.17 RS-232 Input Page

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.

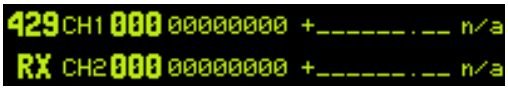
If FADC or ADC is selected as an input, true or static air temperature (SAT), outside or total air temperature (TAT), indicated air speed (IAS), true air speed (TAS), density altitude (DALT), pressure altitude (PALT*), current barometric pressure (BARO) and vertical speed (VSPD) can be viewed.

SELECTION	DESCRIPTION
GSPD	Ground speed in knots
LAT	Latitude in degrees
LON	Longitude in degrees
TRK	Track in degrees

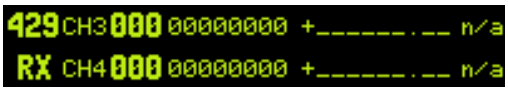
SELECTION	DESCRIPTION
GSPD	Ground speed in knots
PALT	Pressure altitude in feet

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

5.2.18 ARINC 429 Channels Pages



ARINC 429 CHANNELS 1 and 2



ARINC 429 CHANNELS 3 and 4

The GTX 330 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 rate are as follows:

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)

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

GPS/FMS NAVIGATION SYSTEM (GPS)

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

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

AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

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

5.3 Enhanced Surveillance (EHS)

The following table shows equipment connections required to meet Mode S Enhanced Surveillance (EHS) criteria. Included are a list of parameters to other on-board avionics equipment formats that are accepted. The Req'd field denotes which formats are needed to make the GTX 330 system Mode S EHS capable.

It is the responsibility of the installing agency to determine whether the equipment that interfaces with the Garmin GTX 330 Mode S transponder actually provides the required output. Make sure the interfacing equipment outputs the correct parameter to the GTX 330 to meet Mode S EHS. See the vendor's specification for configuring the external data sources for the data they are capable of providing.

Parameter	Label	Req'd	ARINC 429					RS-232	
			AHRS	ADC	AFCS	GPS/FMS Nav	EFIS Display	Shadin Fuel/Air Data	GPS Nav
AFCS Modes	271	No			X				
Barometric Altitude Rate	212	Yes		X			X	X	
Barometric Setting	234 235	No			X		X		
FCU Selected Altitude	102	Yes[1]			X		X		
FMS Selected Altitude	102	Yes[1]				X			
Ground Speed	312	Yes				X			X
Ground Track Angle	313	Yes				X			X
Indicated Airspeed	206	Yes[2]		X			X	X	
Inertial Vertical Velocity	365	No	X						
Mach Number	205	Yes[2]		X			X		
Magnetic Heading	320	Yes	X				X		
Roll Angle	325	Yes	X				X		
True Airspeed	210	Yes[3]		X			X	X	
True Track Angle Rate		Yes[3]							

Note 1: Supplying one selected altitude is sufficient Mode S EHS compliance.
Note 2: Supplying either Indicated Airspeed or Mach is sufficient Mode S EHS compliance.
Note 3: Supplying either True Airspeed or True Track Angle Rate is sufficient Mode S EHS compliance.

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APPENDIX A CERTIFICATION DOCUMENTS

A.1 STC

United States of America
Department of Transportation -- Federal Aviation Administration

Supplemental Type Certificate

Number ST01125WI

This certificate issued to Garmin International
1200 E. 151st Street
Olathe, KS 66062

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 *of the* Civil Air *Regulations.*

Original Product - Type Certificate Number: A3SO

Make: Piper

Model: PA-32-260

Description of Type Design Change: Installation of Garmin GTX 330 Mode S Transponder with Traffic Information System Capability. Data Required: (1) FAA Approved Airplane Flight Manual Supplement (AFMS), for Piper PA32 with Garmin GNS 430 VHF Communication Transceiver / VOR/ILS Receiver / GPS Receiver; or (2) FAA Approved Airplane Flight Manual Supplement (AFMS), for Piper PA32 with Garmin GNS 530 VHF Communication Transceiver / VOR/ILS Receiver / GPS Receiver; dated 11/21/2002; or later FAA Approved Revisions to (1) or (2).

Limitations and Conditions: Compatibility of this design change with previously approved modifications must be determined by the installer. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

Descriptive data pertaining to this design change are considered inadequate for duplication of other products. This approval is limited to only the installation made in Piper model PA-32-260, Serial Number 32-7100002. This STC does not permit manufacturing of parts for multiple installations.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: March 11, 2002

Date of issuance: December 12, 2002

Date reissued:

Date amended:

By direction of the Administrator

Harvey E. Nero
(Signature)

Harvey E. Nero
FAA Program Manager
Wichita Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

FAA Form 8110-2(10-68) PAGE 1 of 2 PAGES *This certificate may be transferred in accordance with FAR 21.47.*

A.2 Continued Airworthiness

Other than for regulatory periodic functional checks, maintenance of the GTX 330 is "on condition" only. Refer to the GTX 330 Maintenance Manual (Garmin P/N 190-00207-05). Periodic maintenance of the GTX 330 is not required.

This section provides assistance to the installing agency in preparing Instructions for Continued Airworthiness (ICA) in response to Bulletin Number HBAW 98-18, "Checklist for Instructions for Continued Airworthiness for Major Alterations Approved Under the Field Approval Process", effective 10/7/98.

Aviation Authority approved installers are hereby granted permission to reference appropriate service instructions and excerpts from this Installation Manual to accomplish the Instructions for Continued Airworthiness. This permission does not construe suitability of the documents. It is the applicant's responsibility to determine the suitability of the documents for the ICA.

Following is a suggested ICA for a Garmin GTX 330 unit installation. Some of the checklist items do not apply, in which case they should be marked "N/A" (Not Applicable).

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS, GARMIN GTX 330

1. Introduction

[Aircraft that has been altered: Registration (N-) number, Make, Model and Serial Number]

Content, Scope, Purpose and Arrangement:	This document identifies the Instructions for Continued Airworthiness for the modification of the above aircraft by installation of a Garmin GTX 330.
Applicability:	Applies to aircraft altered by installation of the Garmin GTX 330.
Definitions/Abbreviations:	None, N/A.
Precautions:	None, N/A.
Units of Measurement:	None, N/A.
Referenced Publications:	Garmin GTX 330 Installation Manual, P/N 190-00207-02 Garmin GTX 330 Maintenance Manual, P/N 190-00207-05 Garmin STC # ST01125WI. Garmin GTX 330 Pilot's Guide, P/N 190-00207-00.
Distribution:	This document should be a permanent aircraft record.

2. Description of the Alteration

Installation of the Garmin GTX 330, with interface to Encoding Altimeter or Blind Encoder. Refer to Section 4 and Appendix C of this manual for interconnect information. Antenna installation, removal and replacement should be in accordance with applicable provisions of FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A.

3. Control, Operation Information

Refer to the GTX 330 Pilot's Guide.

4. Servicing Information

N/A

5. Maintenance Instructions

Maintenance of the GTX 330 is 'on condition' only. Periodic maintenance is not required. Refer to the GTX 330 Maintenance Manual.

6. Troubleshooting Information

Refer to the GTX 330 Maintenance Manual.

7. Removal and Replacement Information

Refer to Section 2 of this manual. If the unit is removed and reinstalled, a functional check of the equipment should be conducted in accordance with Section 5 of this manual.

8. Diagrams

Refer to Section 2, Section 4 and Appendices B and C of this manual.

9. Special Inspection Requirements

N/A

10. Application of Protective Treatments

N/A

11. Data: Relative to Structural Fasteners

Antenna installation, removal and replacement should be in accordance with applicable provisions of FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A. Also, refer to Section 2 of this manual.

12. Special Tools

N/A

13. This Section is for Commuter Category Aircraft Only

A. Electrical loads: Refer to Section 1.6.3 of this manual.
B. Methods of balancing flight controls: N/A.
C. Identification of primary and secondary structures: N/A.
D. Special repair methods applicable to the airplane: Antenna installation, removal, and replacement should be in accordance with applicable provisions of FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A.

14. Overhaul Period

No additional overhaul time limitations.

15. Airworthiness Limitation Section

N/A.

16. Revision

To revise this ICA, a letter must be submitted to the local FSDO with a copy of the revised FAA Form 337, and revised ICA. The FAA inspector accepts the change by signing Block 3 and including the following statement:

"The attached revised/new Instructions for Continued Airworthiness (date _____) for the above aircraft or component major alteration have been accepted by the FAA, superseding the Instructions for Continued Airworthiness (date _____)."

17. Assistance

Flight Standards Inspectors have the resources to respond to questions regarding the ICA.

18. Implementation and Record Keeping

For major alterations performed in accordance with FAA field approval policy, the owner/operator operating under Part 91 is responsible for ensuring that the ICA is made part of the applicable Section 91.409 inspection program for their aircraft. This is accomplished when a maintenance entry is made in the aircraft's maintenance record in accordance with Section 43.9. This entry records the major alteration and identifies the original ICA location (e.g., Block 8 of FAA Form 337, dated _____) along with a statement that the ICA is now part of the aircraft's inspection/maintenance requirements.

GTX 330 Airborne ATCRBS/Mode S Transponder Equipment

TYPE/MODEL/PART NO (Unit P/N)	TSO COMPLIANCE*	JTSO COMPLIANCE*	Diversity
010-00230-( ) (011-00455-00, -20)	C112 Class 2A	2C112a Level 2s	No
010-00293-( ) (011-00455-10, -30)	C112 Class 2A	2C112a Level 2s	Yes
010-00308-( ) Obsolete (011-00455-40,-50)	C112 Class 1A	2C112a Level 1s	Yes

* **Notes**: See Section 2.2 for part number, and complete TSO classification and description.
All versions of the 011-00455-( ) are class 2A except -(40), -(50) which are class 1A and are obsolete.

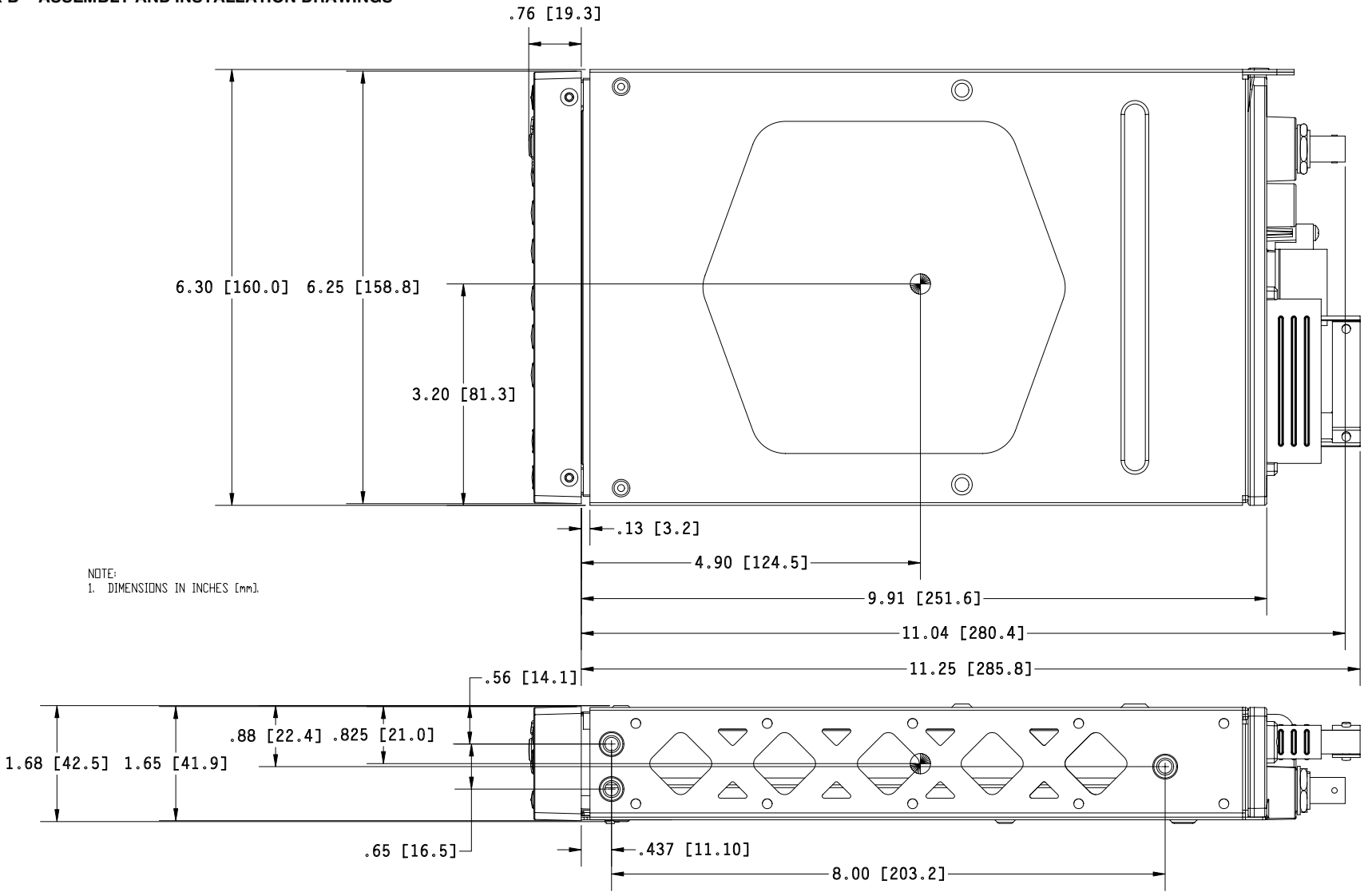


Figure B-1. GTX 330 Outline Drawing

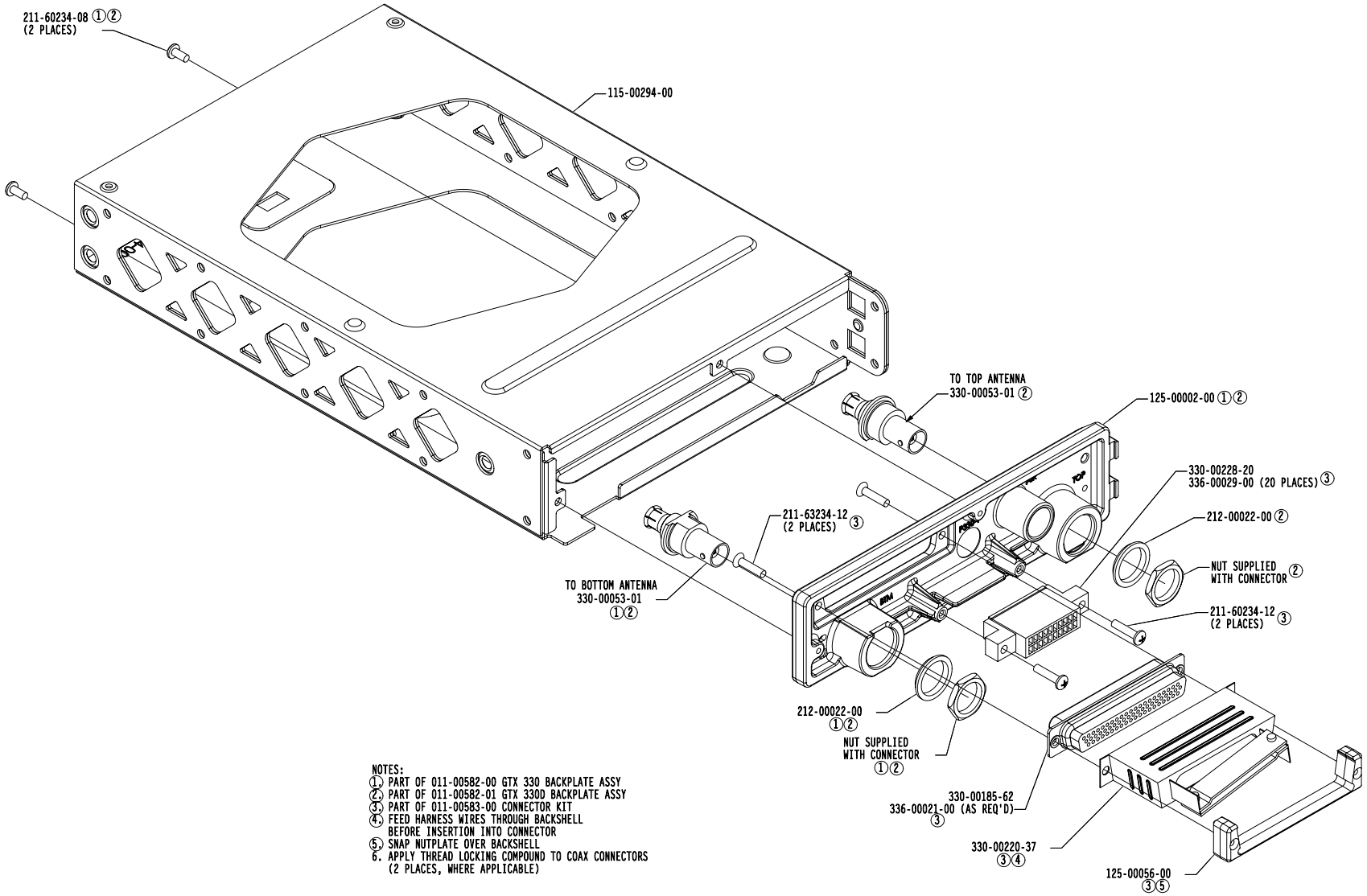
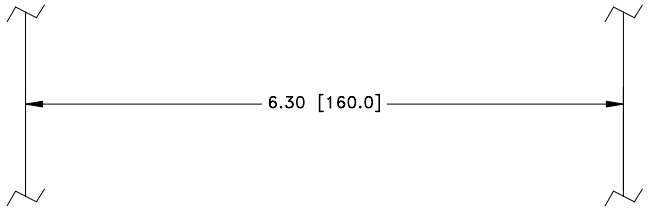


Figure B-2. GTX 330 Connector/Rack Assembly Drawing

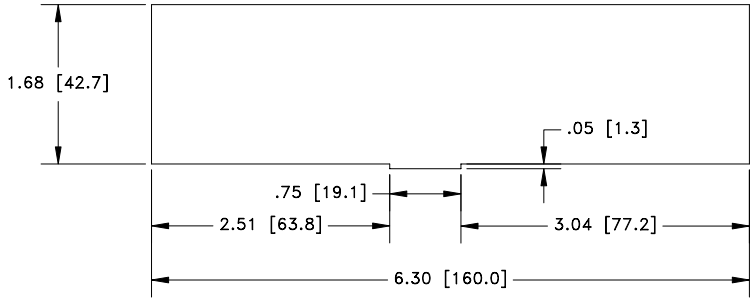
OPTION 1:

STACK CUTOUT (RACK INSTALLED FROM FRONT OF AIRCRAFT PANEL)



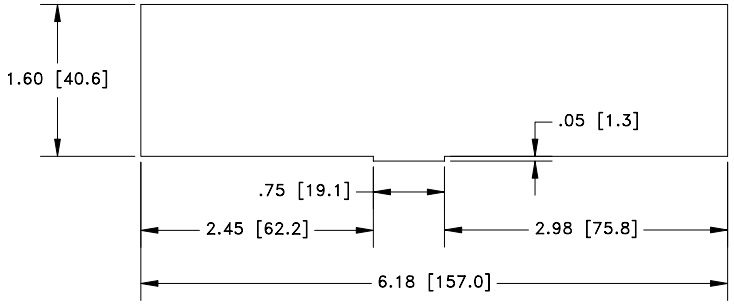
OPTION 2:

RADIO CUTOUT (RACK INSTALLED FROM FRONT OF AIRCRAFT PANEL)



OPTION 3:

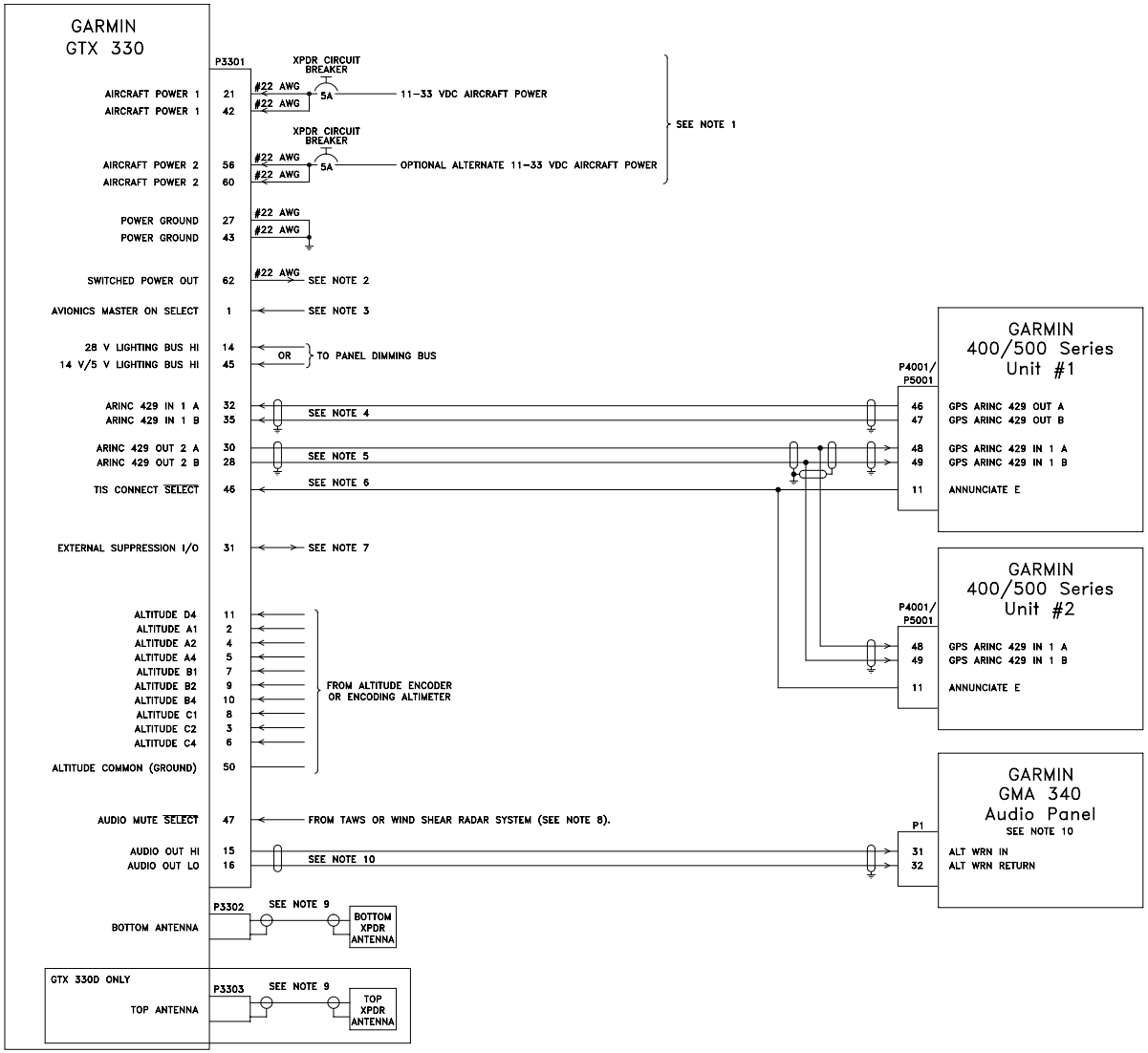
RADIO CUTOUT (RACK INSTALLED FROM BACK OF AIRCRAFT PANEL ONLY) MAXIMUM AIRCRAFT PANEL THICKNESS IS .125 INCH [3.2 mm]



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 330 Recommended Panel Cutout Dimensions



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 330.
3. AVIONICS MASTER ON SELECT (P3301–1), 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 (P3301–32 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 GROUNDED.
6. WHEN TIS IS USED IN THE AIRCRAFT DO NOT CONNECT ANOTHER TRAFFIC SYSTEM TO THE SAME 400/500 SERIES UNIT. REFER TO FIGURE C–8.
7. EXTERNAL SUPPRESSION (P3301–31) 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 (P3301–47) MUTES ALL GTX 330 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(S) AS FAR AS PRACTICAL FROM ANY HARNESS BUNDLE. IN NO CASE SHOULD THE ANTENNA CABLE(S) 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 ALTITUDE/TRAFFIC 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 330 to 400/500 Series Units, Typical Interconnect Wiring Diagram

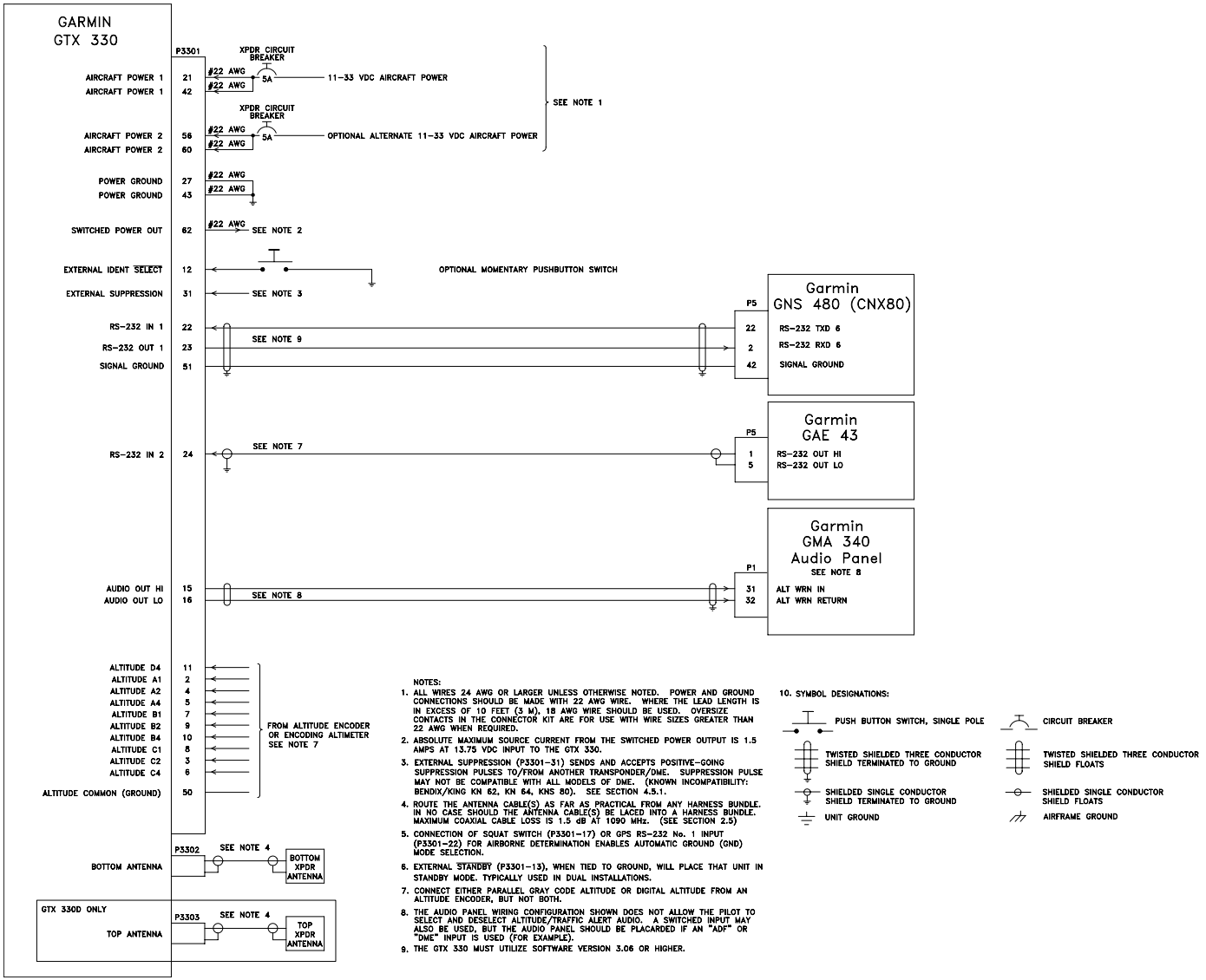
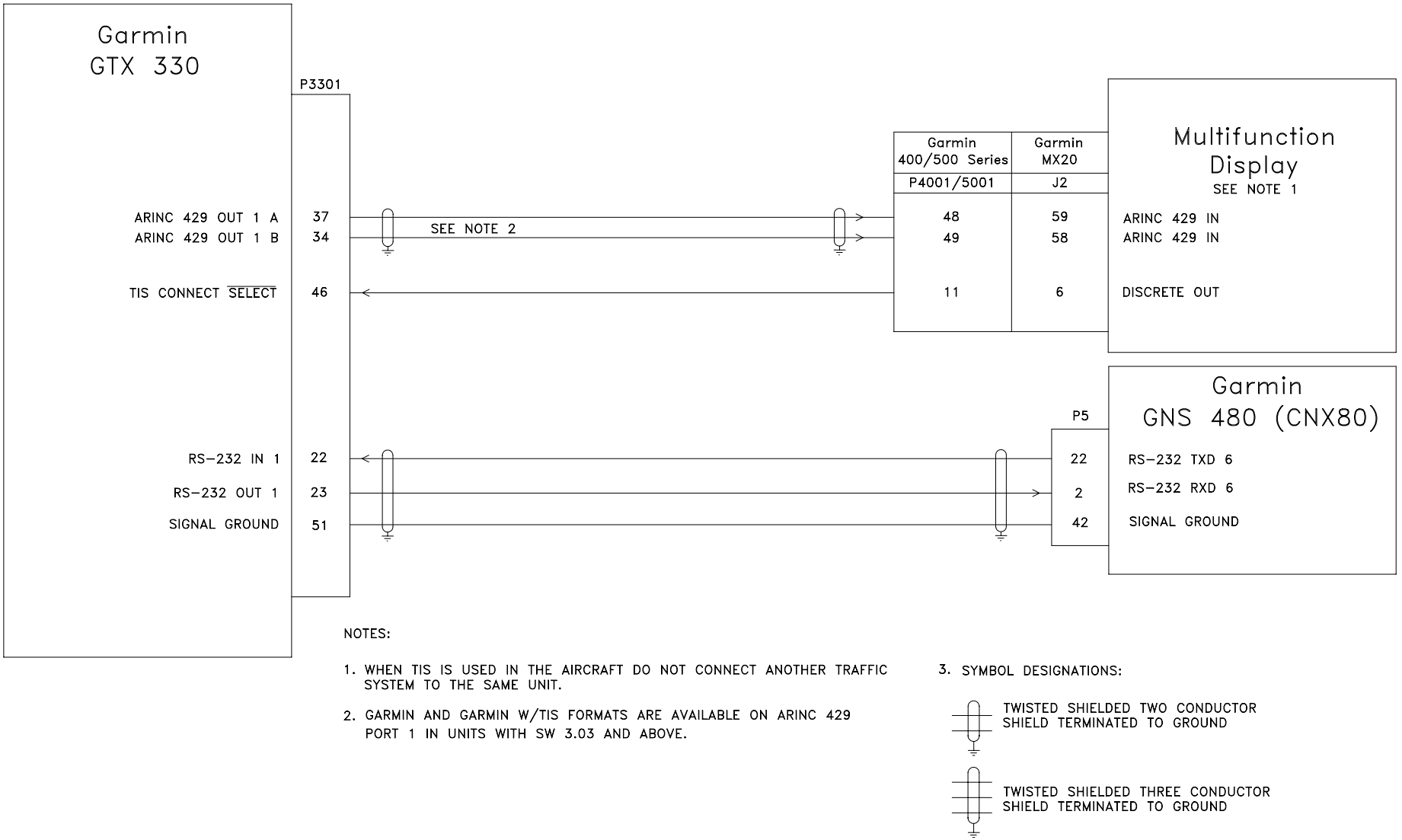


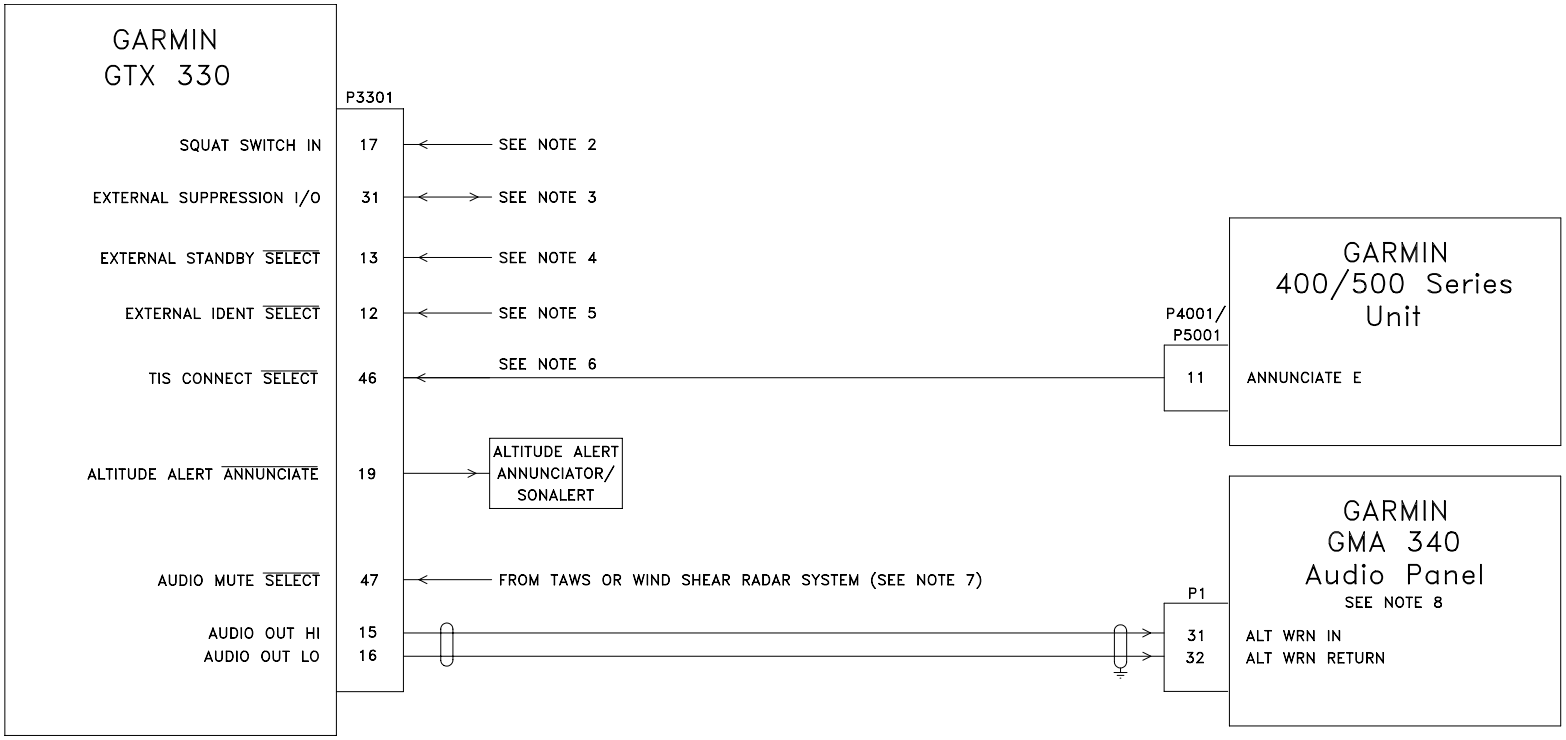
Figure C-2. GTX 330 to GNS 480 (CNX80), Typical Interconnect Wiring Diagram



NOTES:

1. WHEN TIS IS USED IN THE AIRCRAFT DO NOT CONNECT ANOTHER TRAFFIC SYSTEM TO THE SAME UNIT.
2. GARMIN AND GARMIN W/TIS FORMATS ARE AVAILABLE ON ARINC 429 PORT 1 IN UNITS WITH SW 3.03 AND ABOVE.
3. SYMBOL DESIGNATIONS:

Figure C-3. GTX 330 to GNS 480 (CNX80) and MFD, Simplified Interconnect Wiring Diagram



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. SQUAT SWITCH IN (P3301–17) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND MODE UPON LANDING. LOGIC IS SET VIA A CONFIGURATION PAGE.
3. EXTERNAL SUPPRESSION (P3301–31) 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.
4. EXTERNAL STANDBY SELECT (P3301–13), WHEN TIED TO GROUND, WILL PLACE THAT UNIT IN STANDBY MODE. TYPICALLY USED IN DUAL INSTALLATIONS.
5. MOMENTARY CONNECTION OF EXTERNAL IDENT SELECT (P3301–12) TO GROUND WILL CAUSE THE GTX 330 TO TRANSMIT IDENT PULSES.
6. WHEN TIS IS USED IN THE AIRCRAFT DO NOT CONNECT ANOTHER TRAFFIC SYSTEM TO THE SAME 400/500 SERIES UNIT. REFER TO FIGURE C–8.
7. THE AUDIO MUTE SELECT INPUT (P3301–47) MUTES ALL GTX 330 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 ALTITUDE/TRAFFIC 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 330 Interconnect Wiring Diagram, Discrete and Audio Connections

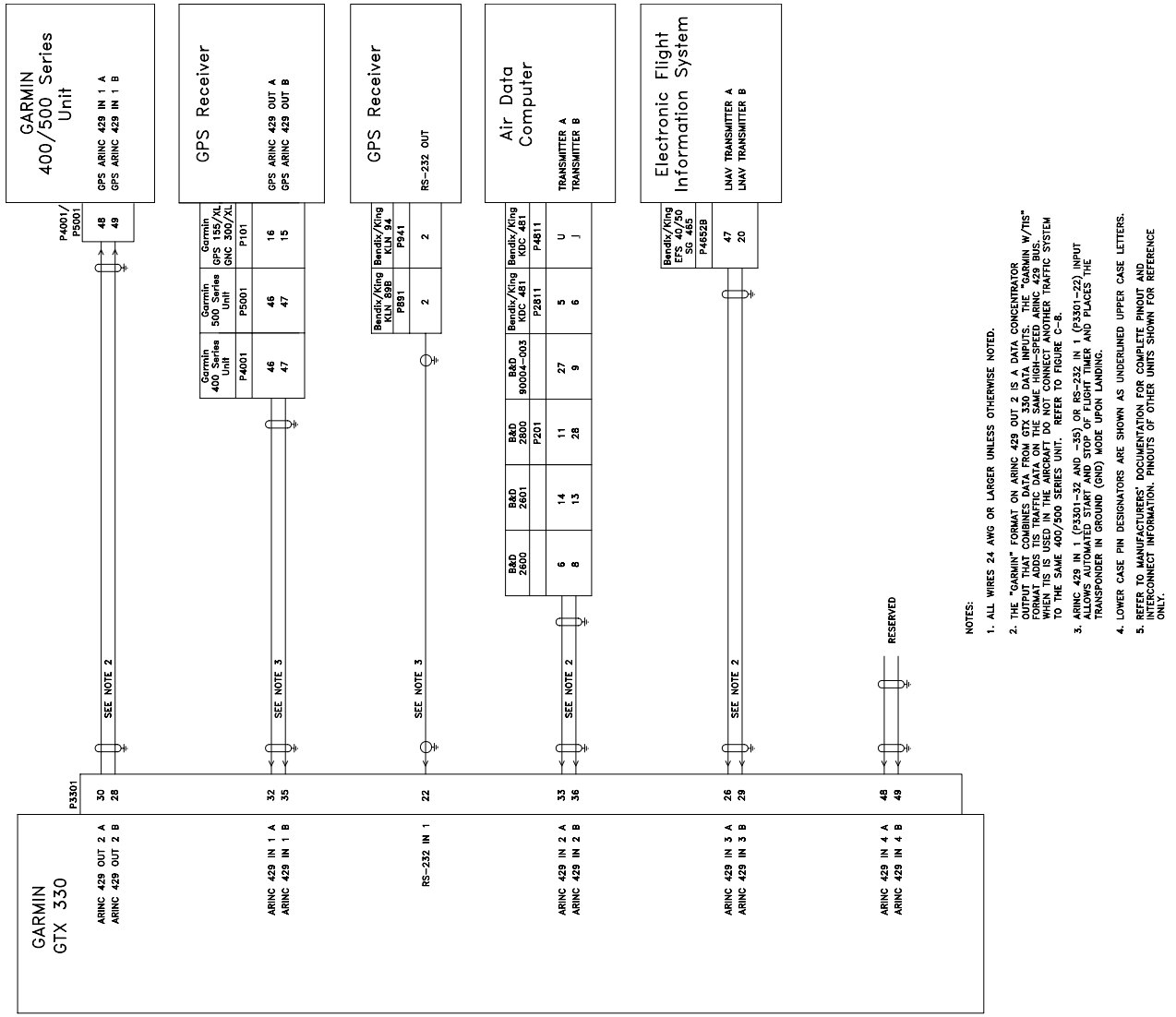
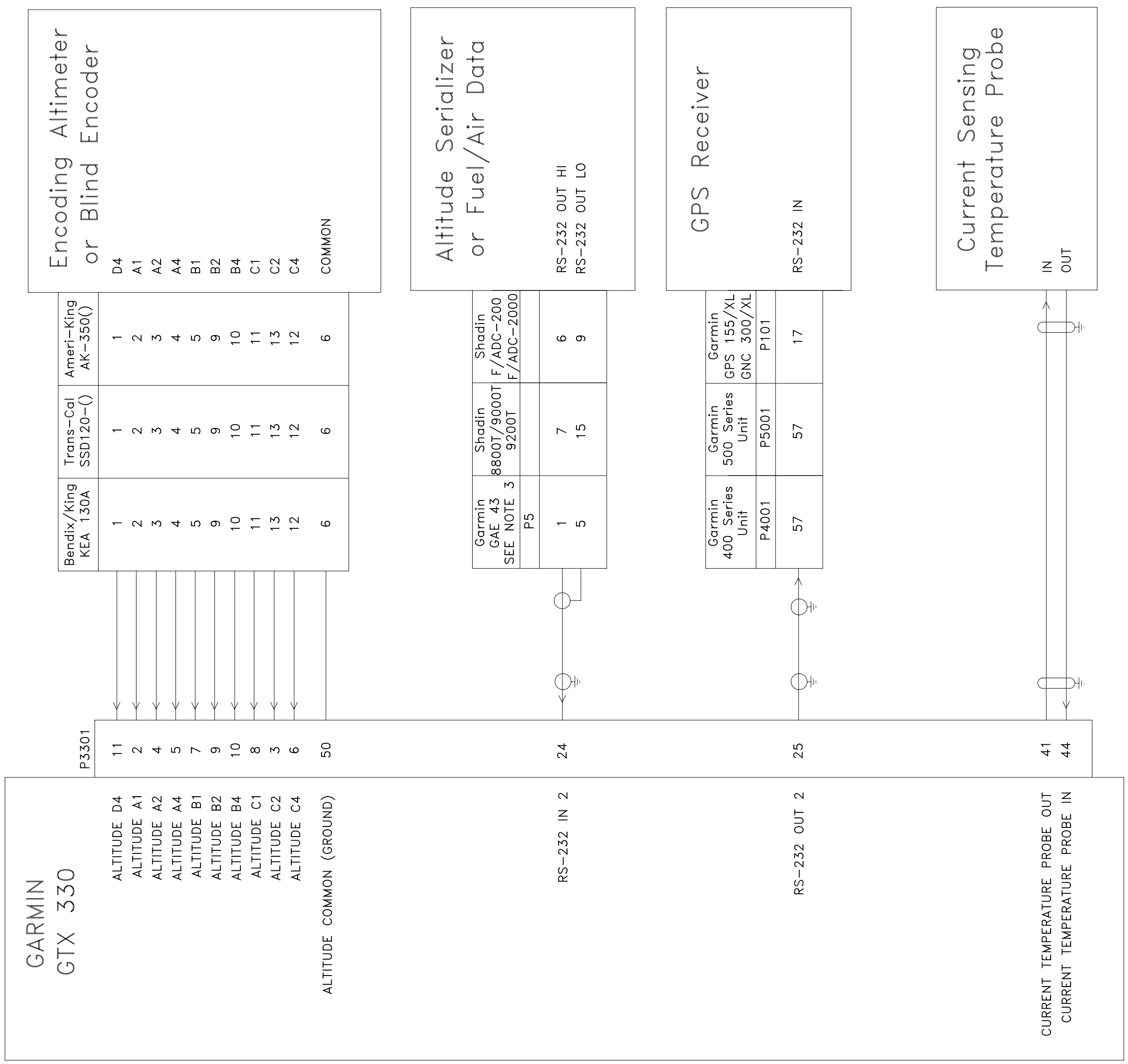


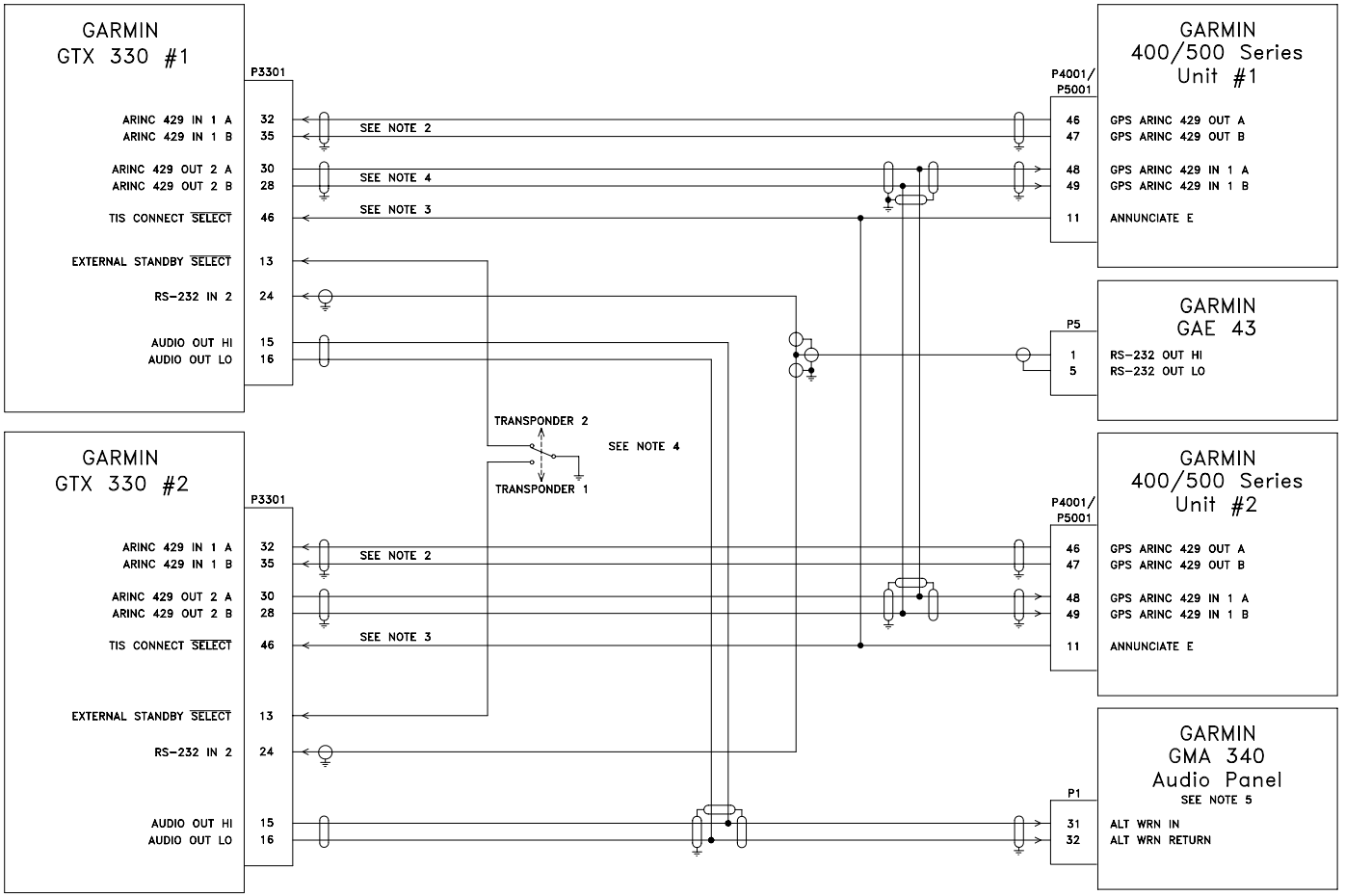
Figure C-5. GTX 330 Interconnect Wiring Diagram, Serial Devices Connections



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. ALTITUDE DATA MAY BE SUPPLIED BY PARALLEL OR SERIAL SOURCE. SOURCE USED IS SELECTED VIA A CONFIGURATION PAGE. ALTITUDE DATA SUPPLIED TO THE GTX 330 CAN ALSO BE OUTPUT TO ANOTHER UNIT VIA RS-232.
3. THE GAE 43 CAN ALSO PROVIDE ALTITUDE DATA IN THE FORM OF PARALLEL GRAY CODE.
4. REFER TO MANUFACTURERS' DOCUMENTATION FOR COMPLETE PINOUT AND INTERCONNECT INFORMATION. PINOUTS OF OTHER UNITS SHOWN FOR REFERENCE ONLY.
5. IF ARINC 429 IS CONECTED, THE GTX 330 WILL IGNORE RS-232 INPUT FROM THE GPS RECEIVER AND RS-232 ALTITUDE INPUT.

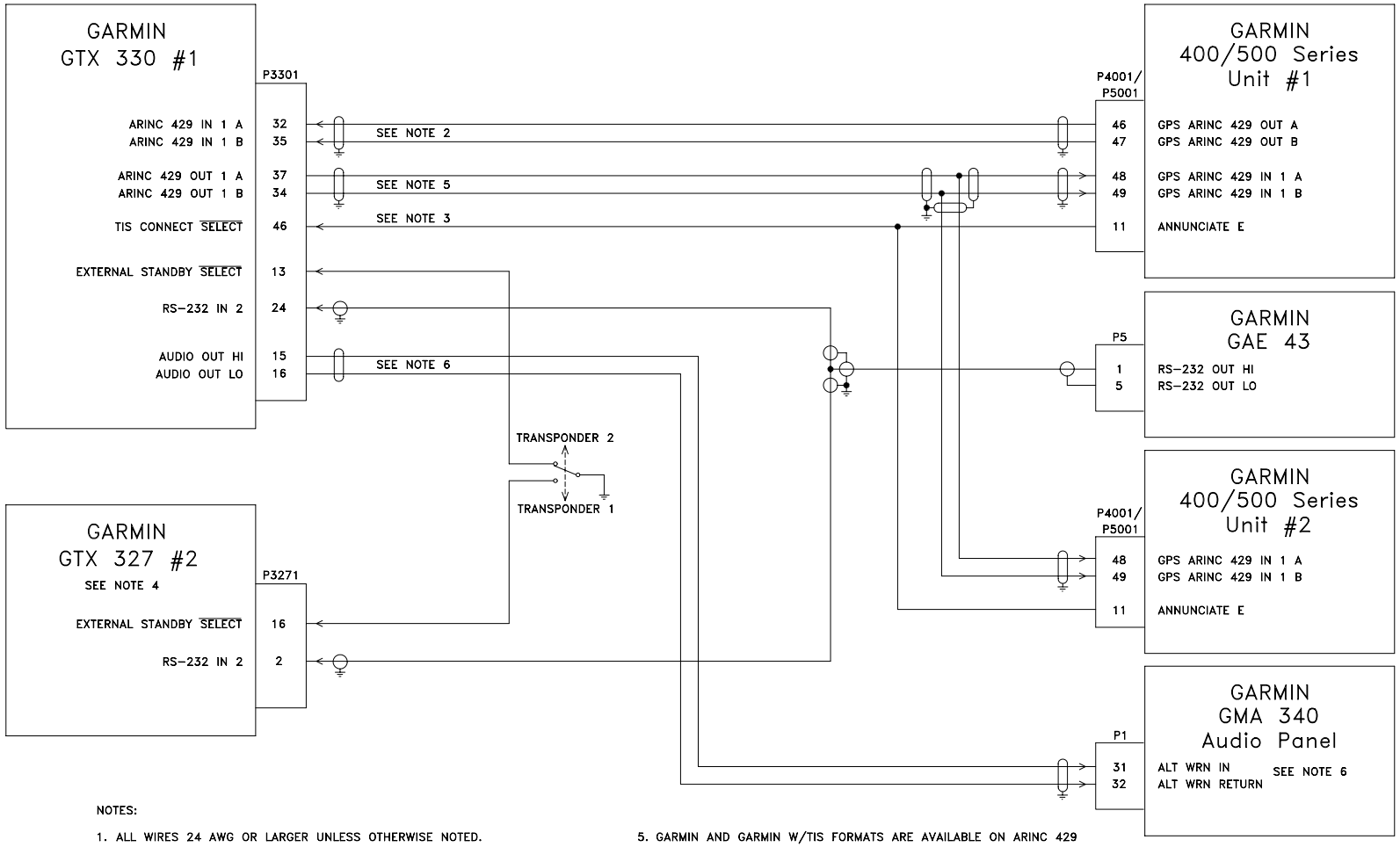
Figure C-6. GTX 330 Interconnect Wiring Diagram, Altitude and Temperature Connections



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. ARINC 429 IN 1 (P3301-32 AND -35) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND (GND) MODE UPON LANDING.
3. WHEN TIS IS USED IN THE AIRCRAFT DO NOT CONNECT ANOTHER TRAFFIC SYSTEM TO THE SAME 400/500 SERIES UNIT. REFER TO FIGURE C-8.
4. THE GTX 330 ARINC 429 OUT 2 PORT IS HIGH-IMPEDANCE WHEN THE EXTERNAL STANDBY SELECT INPUT IS GROUNDED. THIS ALLOWS ARINC 429 OUTPUTS FROM DUAL GTX 330 UNITS TO BE HARD-WIRED TOGETHER SINCE THE EXTERNAL STANDBY SELECT INPUT WILL BE ACTIVE FOR ONE OF THE TWO GTX 330'S AT ANY GIVEN TIME.
5. THE AUDIO PANEL WIRING CONFIGURATION SHOWN DOES NOT ALLOW THE PILOT TO SELECT AND DESELECT ALTITUDE/TRAFFIC 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).

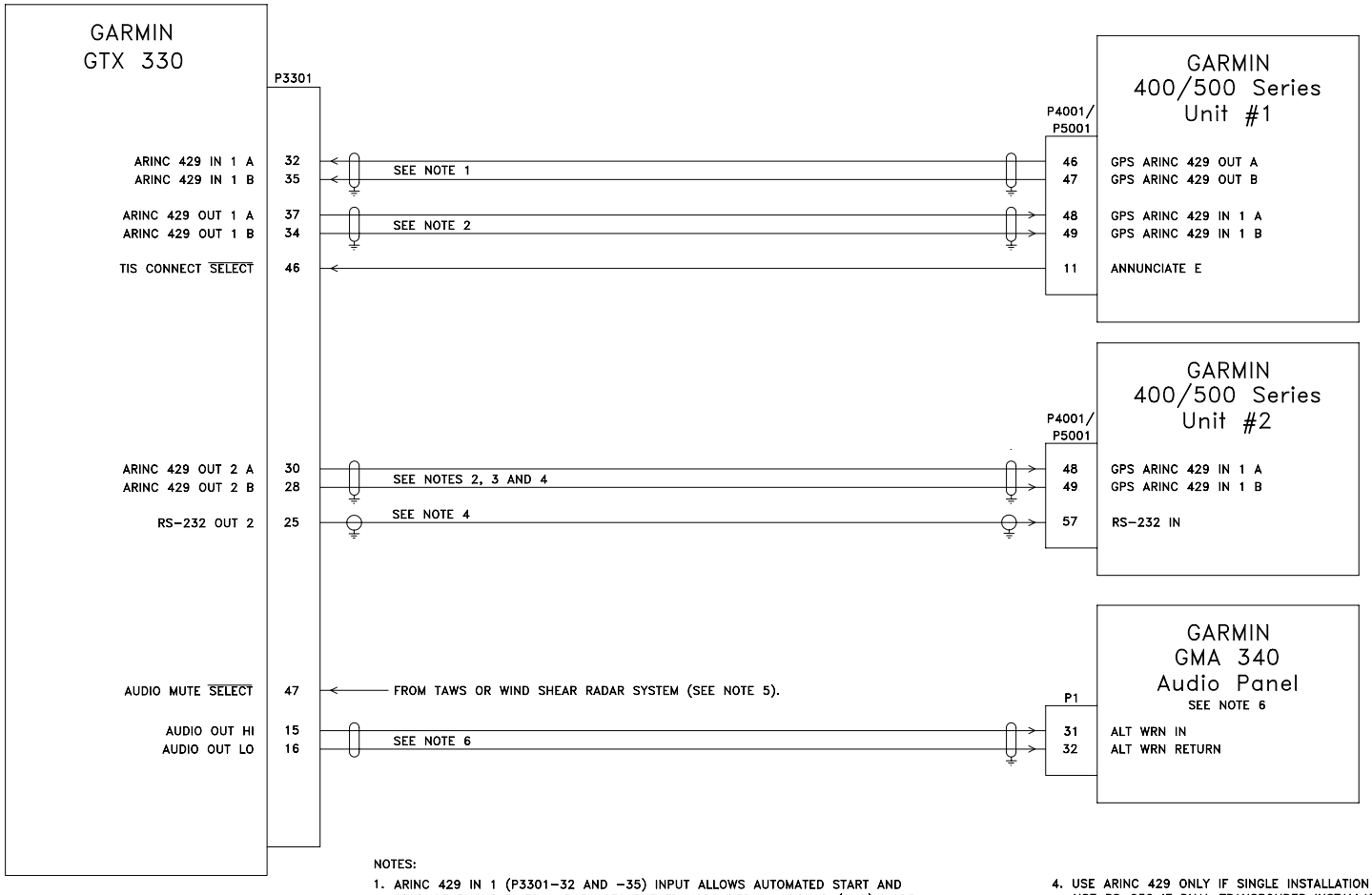
Figure C-7. Dual Transponder Interconnect Wiring Diagram, Dual Display Connections (Sheet 1 of 2)



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE NOTED.
2. ARINC 429 IN 1 (P3301-32 AND -35) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND (GND) MODE UPON LANDING.
3. WHEN TIS IS USED IN THE AIRCRAFT DO NOT CONNECT ANOTHER TRAFFIC SYSTEM TO THE SAME 400/500 SERIES UNIT. REFER TO FIGURE C-8.
4. FOR THE REMAINDER OF GTX 327 CONNECTIONS REFER TO GTX 327 TRANSPONDER INSTALLATION MANUAL, P/N 190-00187-02.
5. GARMIN AND GARMIN W/TIS FORMATS ARE AVAILABLE ON ARINC 429 PORT 1 IN UNITS WITH SW 3.03 AND ABOVE. UNLIKE PORT 2, ARINC 429 OUT PORT 1 REMAINS ACTIVE WHEN EXTERNAL STANDBY SELECT IS GROUNDED.
6. THE AUDIO PANEL WIRING CONFIGURATION SHOWN DOES NOT ALLOW THE PILOT TO SELECT AND DESELECT ALTITUDE/TRAFFIC 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-7. Dual Transponder Interconnect Wiring Diagram, Dual Display Connections (Sheet 2)



NOTES:

1. ARINC 429 IN 1 (P3301-32 AND -35) INPUT ALLOWS AUTOMATED START AND STOP OF FLIGHT TIMER AND PLACES THE TRANSPONDER IN GROUND (GND) MODE UPON LANDING.
2. WHEN TIS IS INSTALLED IN THE AIRCRAFT TIS MAY TRANSMIT DATA ON ARINC 429 OUTPUT 1 WHILE OTHER DATA MAY BE TRANSMITTED VIA ARINC 429 OUTPUT 2. THE OTHER TRAFFIC SYSTEM CAN THEN BE CONNECTED TO THE SECOND 400/500 SERIES UNIT. SEE SECTIONS 4 AND 5 FOR CONFIGURATION.
3. IN DUAL TRANSPONDER INSTALLATIONS, WHEN THE PRIMARY GTX 330 IS IN REMOTE STANDBY, ALTITUDE DATA IS NOT TRANSMITTED OVER ARINC 429 OUTPUT 2 LINES. IN ORDER TO PROVIDE ALTITUDE TO THE OTHER GPS UNIT CONTINUOUSLY, CONNECT THE RS-232 OUTPUT TO THE SECOND 400/500 SERIES UNIT (THE ONE NOT USED FOR TIS).
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 (P3301-47) MUTES ALL GTX 330 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 ALTITUDE/TRAFFIC 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 330 Interconnect Wiring Diagram, Aircraft with TIS and TCAD/TCAS

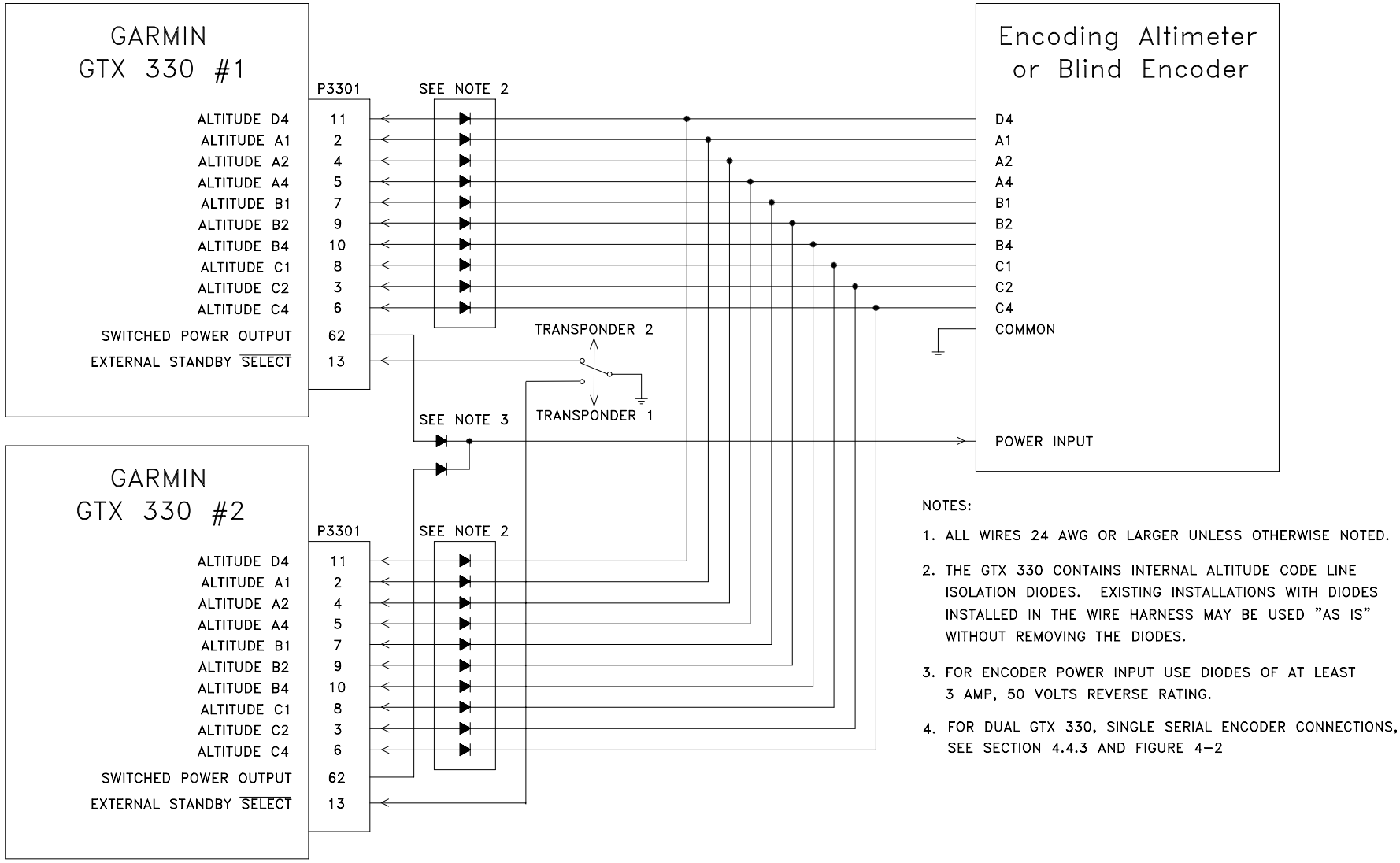


Figure C-9. Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections (Sheet 1 of 3)

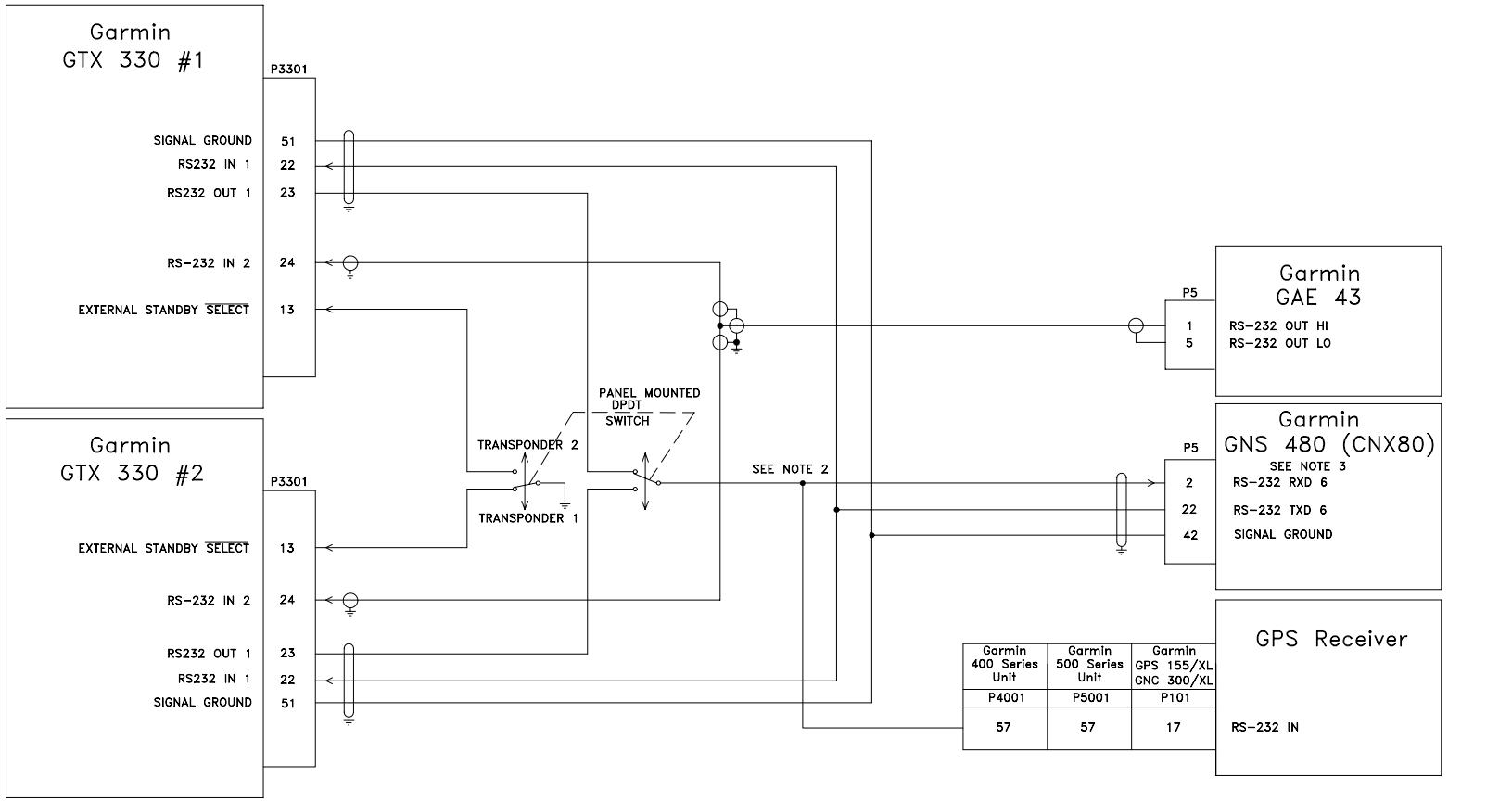


Figure C-9. Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections (Sheet 2)

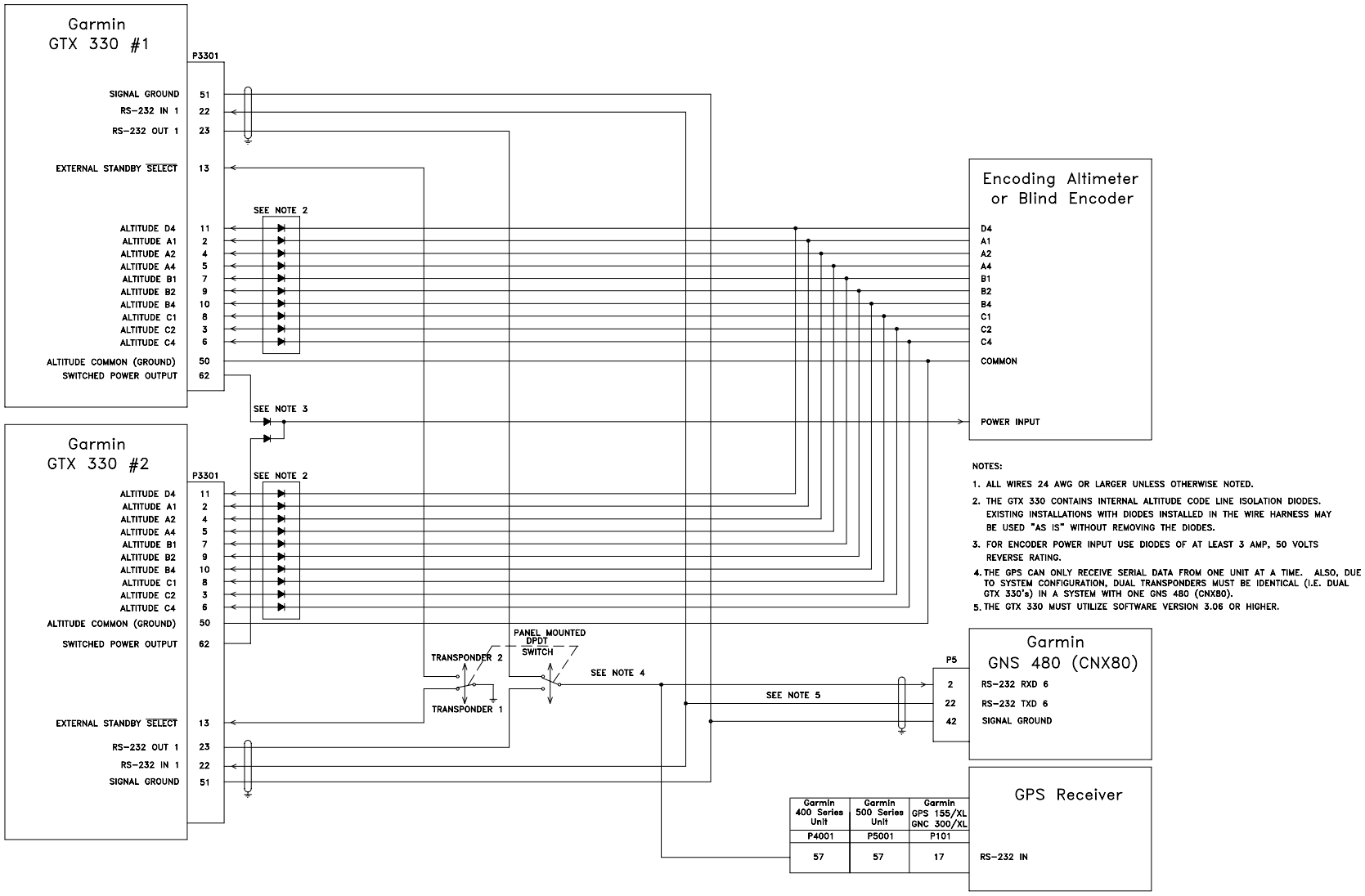


Figure C-9. Dual TXP Interconnect Wiring Diagram, Encoding Altitude Connections (Sheet 3)