

GTS Processor

Installation Manual

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Garmin International, Inc.
1200 E. 151st Street
Olathe, KS 66062 USA
Telephone: 913.397.8200
Aviation Panel-Mount Technical Support Line (Toll Free) 1.888.606.5482
www.garmin.com

Garmin (Europe) Ltd.
Liberty House, Bulls Copse Road
Hounsdown Business Park
Southampton, SO40 9RB U.K.
+44/ (0) 870.8501241

Garmin AT, Inc.
2345 Turner Rd., SE
Salem, OR 97302 USA
Telephone: 503.581.8101

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1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the GTS Processor as a Traffic Advisory System (TAS) (GTS 825), Traffic Collision Avoidance System (TCAS I) (GTS 855), and Traffic Collision Avoidance System (TCAS II) (GTS 8000).

1.2 Equipment Description

The GTS Processor is a microprocessor-based Line Replaceable Unit (LRU) that uses active interrogations of Mode S and Mode A/C transponders to provide Traffic Advisories and Resolution Advisories (GTS 8000 only) to the pilot. When installed in a system the GTS Processor can be configured as a TAS (GTS 825) or can be upgraded to a TCAS I (GTS 855) or TCAS II (GTS 8000) by purchasing an enablement card from Garmin. The GTS Processor meets the TSO/ETSO requirements for the configured traffic system function (TAS, TCAS I, or TCAS II). When installed with a 1090 MHz ADS-B transmit class of equipment the GTS Processor also utilizes passive surveillance. Traffic is displayed on an external MFD via ARINC 429 and/or Ethernet High Speed Data Bus (HSDB). An aural alert is also provided to inform the crew a traffic advisory (TA) or resolution advisory (RA) (GTS 8000 only) will be displayed.

A top-mounted directional antenna is used to derive bearing of the intruder aircraft, which is displayed with relative altitude to own aircraft. Top antenna transmitted interrogations are directional, reducing the number of transponders that receive the interrogation, and thus reducing potential garble on the 1090 MHz band. For GTS 825 and GTS 855 installations, a bottom monopole or directional (highly recommended) antenna is optional. For GTS 8000 installations, a bottom monopole or directional (highly recommended) antenna is required. Bottom antenna transmit interrogations and broadcasts (GTS 8000 only) are omni directional, using a monopole antenna or a directional antenna. A bottom directional antenna installation gives the benefit of intruder bearing visibility for targets that are shaded from the top directional antenna. The target bearing accuracy may be degraded for bottom directional antenna installations on aircraft with fixed gear.

NOTE

GTS Processor installations, configured as a GTS 855 TCAS I or GTS 825 TAS, require a Garmin-approved transponder capable of receiving TCAS II broadcast data.

NOTE

GTS Processor installations, configured as a GTS 8000 TCAS II, require a GTX 3000 or other Garmin-approved RTCA DO-185A/B compatible transponder.

NOTE

The GTS Processor is not to be installed in an aircraft with a TSO-C119a-only compatible transponder.

NOTE

A co-installed mode S transponder should be connected to the mutual suppression bus, and meet the mutual suppression requirements of DO-181A or later

Refer to Table 1-1 for a list of compatible transponders.

Table 1-1 Compatible Transponders

GTX Transponder Model	Capable of Receiving TCAS II Broadcast Data (Required for GTS Processor)	ADS-B Capable	RTCA DO-185A/B Compatible
GTX 330/330D	Yes ⁽³⁾	Yes ⁽²⁾	No
GTX 330 ES/330D ES	Yes ⁽³⁾	Yes	No
GTX 33/33D ⁽¹⁾	Yes ⁽³⁾	Yes ⁽²⁾	No
GTX 33 ES/33D ES ⁽¹⁾	Yes ⁽³⁾	Yes	No
GTX 328	Yes ⁽⁴⁾	No	No
GTX 3000	Yes	Yes	Yes

1. Remote mounted transponders require a compatible controller. Contact Garmin for details.

2. Factory update is required to allow ADS-B functionality.

3. GTX Software version 6.11 or higher.

4. GTX Software version 6.10 or higher.

1.2.1 GTS Processor Configuration Options

Table 1-2 lists the GTS Processor surveillance configuration options, enabled at the time of installation.

Table 1-2 Configuration Options

Model Number	Garmin Part Number	Applicable TSO	Traffic Advisory System (TAS)	Traffic Alert and Collision Avoidance System (TCAS I)	Traffic Alert and Collision Avoidance System (TCAS II)	1090 ES ADS-B Receiver	Transmit Power (Watts)
GTS 825	011-02571-00	TSO-C147	X			X	400
GTS 855*	011-02571-00	TSO-C118		X		X	400
GTS 8000*	011-02571-00	TSO-C119c			X	X	400

*Requires upgrade using GTX Processor TCAS I/TCAS II Enablement Process. See Section XXX for instructions.

1.3 Interface Summary

The GTS Processor is designed as an open architecture system that uses typical ARINC 429, RS-232, and Ethernet communications interfaces.

1.4 Technical Specifications

1.4.1 Environmental Qualification Form

It is the responsibility of the installing agency to obtain the latest revision of the GTS Processor Environmental Qualification Form. To obtain a copy of this form, see the dealer/OEM portion of the Garmin web site (www.garmin.com). This form is available directly from Garmin under the following part number:

GTS Processor Environmental Qualification Form, Garmin part number 005-00630-02

1.4.2 Physical Characteristics

Table 1-3 Physical Characteristics

Characteristics	Specifications
GTS Processor Width w/out rack	3.42 inches (86.9 mm)
GTS Processor Height w/out rack	6.25 inches (158.8 mm)
GTS Processor Width with vertical rack	3.67 inches (93.1 mm)
GTS Processor Height with vertical rack	6.74 inches (171.1 mm)
GTS Processor Depth with vertical rack	15.48 inches (396.7 mm)
GTS Processor Width with horizontal rack	6.42 inches (163.1 mm)
GTS Processor Height with horizontal rack	4.10 inches (104.1 mm)
GTS Processor Depth with horizontal rack	14.79 inches (375.7 mm)
GTS Processor Depth w/Connector Kit	14.78 inches (375.4 mm)
GTS Processor Unit Weight w/out Connector Kit	11.30 lbs (5.13 kg)
GTS Processor Unit Weight with Connector Kit w/Vertical Rack	12.65 lbs (5.74 kg)
GTS Processor Unit Weight with Connector Kit w/Horizontal Rack	13.25 lbs (6.01 kg)

1.4.3 General Specifications

Table 1-4 contains general specifications. For detailed environmental specifications, see the Environmental Qualification Form.

Table 1-4 General Specifications

Characteristics	Specifications
Operating Temperature Range	-55°C to +70°C.
Humidity	95% non-condensing
Altitude Range	-1,500 ft to 55,000 ft
Software Compliance	RTCA/DO-178B level B
Hardware Compliance	RTCA/DO-254 Level B
Environmental Compliance	RTCA/DO-160F

1.4.4 Power Requirements

Tables list the power requirements for the GTS Processor

Table 1-5 Maximum Operation Current Draw

Characteristics	Specifications
GTS Processor Power Consumption	2.5 A max operating at 28.0 Vdc 5.0 A max operating at 14.0 Vdc

Table 1-6 Maximum Boot-Up Current Draw

Characteristics	Specifications
GTS Processor Boot-Up Current Draw	2.5 A at 28.0 Vdc for 700 ms 5.0 A at 14.0 Vdc for 700 ms

1.5 Certification

The conditions and tests required for TSO/ETSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO/ETSO standards. TSO/ETSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

The following tables provide a list of applicable TSO/ETSOs for the GTS Processor.

1.5.1 GTS Processor TSO/ETSO Compliance

When installed as a system, the GTS Processor, which includes a GA 58 (or other Garmin approved antenna), and a CDTI (Cockpit Display of Traffic Information) comprise what Garmin considers to be a minimum generic GTS Processor system installation. The GTS Processor lacks a display and by itself is an incomplete system and cannot completely meet the requirements of TSO-C119c/ETSO-C119c, TSO-C118/ETSO-C118 or TSO-C147/ETSO-C147.

Table 1-7 TSO/ETSO Compliance

GTS Processor Configuration	Function	TSO/ETSO	Category	Applicable LRU SW Part Numbers	Applicable CLD Part Numbers
GTS 8000	Traffic Alert and Collision Avoidance System (TCAS II) Airborne Equipment	TSO-C119c ETSO-C119c		All 006-B1244-0() through 006-B1244-2() except 006-B1244-00 through 006-B1244-03	006-C0081-2()
GTS 855	Traffic Alert and Collision Avoidance System (TCAS I) Airborne Equipment	TSO-C118 ETSO-C118		All 006-B1224-0() through 006- B1224-2() except 006- B1224-00 through 006-B1224-03	006-C0081-2()
GTS 825	Traffic Advisory System (TAS) Airborne Equipment	TSO-C147 ETSO-C147	Class A	All 006-B1224-0() through 006- B1224-2() except 006- B1224-00 through 006- B1224-03	006-C0081-2()
GTS 8000, GTS 855, and GTX 825	Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Service – Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz)	TSO-C166b† ETSO-C166a†	Class A1S/ Type 1 Receiving Only* Class A1/ Type 1 Receiving Only*	All 006- B1224-0() through 006- B1224-2() except 006-B1224-00 through 006-B1224-03	006-C0081-2()

*Equipment is capable of TSO-C166b/ETSO-C166a Class A1S/Type 1 Receiving Only per RTCA/DO-260B when installed with a single antenna.

*Equipment is capable of TSO-C166b/ETSO-C166a Class A1/Type 1 Receiving Only when installed with diversity antennas.

*The Class level is dependent upon the installation.

NOTE

A statement identifying whether the installation is TSO-C166b/ETSO-C166a Class A1S/Type 1 Receiving Only or TSO-C166b/ETSO-C166a Class A1/Type 1 Receiving Only, per RTCA/DO-260B, should be included in the ship's log during Installation.

† Installation of this Receiving Only class of equipment is intended only for those aircraft in which a 1090 MHz ADS-B transmit class of equipment, or other complementary ADS-B link transmit class of equipment (such as UAT), is already installed. When no such ADS-B link transmit class of equipment is installed, the ADS-B receive functionality is disabled by disabling the 'ADSB TX Capable' configuration option (see section 3.9.2).

1.5.2 GTS Processor TSO/ETSO Deviations

Table 1-8 TSO/ETSO Deviations

TSO/ETSO	Deviation
TSO-C118	1. Garmin was granted a deviation from TSO-C118 section a.(1) to use RTCA DO-197A, instead of RTCA DO-197 as the Minimum Performance Standard
	2. Garmin was granted a deviation from TSO-C118 section a.(2) to use RTCA DO-160F, instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	3. Garmin was granted a deviation from TSO-C118 section a.(3)(i) to use RTCA DO-178B instead of RTCA DO-178A.
	4. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.2.1 to use the Interrogations Spectrum requirement of RTCA DO-185B section 2.2.3.3 instead of the requirement of RTCA DO-197A section 2.2.3.2.1.
	5. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.5 to use the "Mode C Only All-Call" format specified by RTCA DO-185B section 2.2.3.8.1 instead of the "Mode C" format for ATCRBS interrogations.
	6. Garmin was granted a deviation from RTCA DO-197A section 2.2.6 to use selective Mode S interrogations following all the applicable protocols for Mode-S surveillance interrogations in the NAS as stated in DO-185B and DO-181D.
	7. Garmin was granted a deviation from RTCA DO-197A section 2.2.9.1 to realize the bearing estimation function using a direction finding antenna augmented by tracked correlated ADS-B data when such data is available and of sufficient integrity.
	8. Garmin was granted a deviation from RTCA DO-197A section 2.2.11 to use the suppression pulse on the aircraft suppression bus specified by RTCA DO-185B section 2.2.3.12 (70 +/-1 µs from top antenna and 90 +/-1 µs from bottom antenna) instead of 100 +/-5 µs.

Table 1-8 TSO/ETSO Deviations, Continued

ETSO-C118	1. Garmin was granted a deviation from ETSO-C118 section 3.1.1 to use RTCA DO-197A, instead of RTCA DO-197 as the Minimum Performance Standard.
	2. Garmin was granted a deviation from ETSO-C118 section 3.1.2 to use EUROCAE ED-14F, instead of EUROCAE ED-14D as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	3. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.2.1 to use the Interrogations Spectrum requirement of RTCA DO-185B section 2.2.3.3 instead of the requirement of RTCA DO-197A section 2.2.3.2.1.
	4. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.5 to use the "Mode C Only All-Call" format specified by RTCA DO-185B section 2.2.3.8.1 instead of the "Mode C" format for ATCRBS interrogations.
	5. Garmin was granted a deviation from RTCA DO-197A section 2.2.9.1 to realize the bearing estimation function using a direction finding antenna augmented by tracked correlated ADS-B data when such data is available and of sufficient integrity.
	6. Garmin was granted a deviation from RTCA DO-197A section 2.2.11 to use the suppression pulse on the aircraft suppression bus specified by RTCA DO-185B section 2.2.3.12 (70 +/-1 µs from top antenna and 90 +/-1 µs from bottom antenna) instead of 100 +/-5 µs.
TSO-C119c	1. Garmin was granted a deviation from RTCA DO-185B section 2.2.3.13.2.1.1 to not have the ability to interface with FAA TSO-C119a compatible transponder units.
	2. Garmin was granted a deviation from RTCA DO-185B section 2.2.4.4.2.2.b to use the Enhanced Preamble Detection method of RTCA DO-260B Appendix I section I.4.1
	3. Garmin was granted a deviation from RTCA DO-185B section 2.2.4.4.2.2.c to use the Baseline Multi-sample bit and confidence declaration technique of RTCA DO-260B Appendix I section I.4.2.3.1.
	4. Garmin was granted a deviation from RTCA DO-185B section 2.2.6.7.2 to realize the bearing estimation function using a direction finding antenna augmented by tracked correlated ADS-B data when such data is available and of sufficient integrity.
ETSO-C119c	1. Garmin was granted a deviation from ETSO-C119c to use EUROCAE ED-14F instead of EUROCAE ED-14D as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from RTCA DO-185B section 2.2.3.13.2.1.1 to not have the ability to interface with FAA TSO-C119a compatible transponder units.
	3. Garmin was granted a deviation from RTCA DO-185B section 2.2.4.4.2.2.b to use the Enhanced Preamble Detection method of RTCA DO-260B Appendix I section I.4.1.
	4. Garmin was granted a deviation from RTCA DO-185B section 2.2.4.4.2.2.c to use the Baseline Multi-sample bit and confidence declaration technique of RTCA DO-260B Appendix I section I.4.2.3.1.
	5. Garmin was granted a deviation from RTCA DO-185B section 2.2.6.7.2 to realize the bearing estimation function using a direction finding antenna augmented by tracked correlated ADS-B data when such data is available and of sufficient integrity.

Table 1-8 TSO/ETSO Deviations, Continued

TSO-C147	1. Garmin was granted a deviation from TSO-C147 section 1.c to use RTCA DO-160F, instead of RTCA DO-160D as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-C147 Appendix 1 section 1.6 to use selective Mode S interrogations as specified by RTCA DO-185A section 2.2.3.9 and 2.2.4.5.4.2 following all the applicable protocols for Mode-S surveillance interrogations in the NAS as stated in RTCA DO-185B and RTCA DO-181D.
	3. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.2.1 to use the Interrogations Spectrum requirement of RTCA DO-185B section 2.2.3.3 instead of the requirement of RTCA DO-197A section 2.2.3.2.1.
	4. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.5 to use the "Mode C Only All-Call" format specified by RTCA DO-185B section 2.2.3.8.1 instead of the "Mode C" format for ATCRBS interrogations.
	5. Garmin was granted a deviation from RTCA DO-197A section 2.2.9.1 to realize the bearing estimation function using a direction finding antenna augmented by tracked correlated ADS-B data when such data is available and of sufficient integrity.
	6. Garmin was granted a deviation from RTCA DO-197A section 2.2.11 to use the suppression pulse on the aircraft suppression bus specified by RTCA DO-185B section 2.2.3.12 (70 +/-1 μ s from top antenna and 90 +/-1 μ s from bottom antenna) instead of 100 +/-5 μ s.
ETSO-C147	1. Garmin was granted a deviation from ETSO-C147 section 3.1.2 to use EUROCAE ED-14F, instead of EUROCAE ED-14D as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from ETSO-C147 Appendix 1 section 1.6 to use selective Mode S interrogations as specified by RTCA DO-185B section 2.2.3.9 and 2.2.4.5.4.2 following all the applicable protocols for Mode-S surveillance interrogations in the NAS as stated in RTCA DO-185B and RTCA DO-181D.
	3. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.2.1 to use the Interrogations Spectrum requirement of RTCA DO-185B section 2.2.3.3 instead of the requirement of RTCA DO-197A section 2.2.3.2.1
	4. Garmin was granted a deviation from RTCA DO-197A section 2.2.3.5 to use the "Mode C Only All-Call" format specified by RTCA DO-185B section 2.2.3.8.1 instead of the "Mode C" format for ATCRBS interrogations.
	5. Garmin was granted a deviation from RTCA DO-197A section 2.2.9.1 to realize the bearing estimation function using a direction finding antenna augmented by tracked correlated ADS-B data when such data is available and of sufficient integrity.
	6. Garmin was granted a deviation from RTCA DO-197A section 2.2.11 to use the suppression pulse on the aircraft suppression bus specified by RTCA DO-185B section 2.2.3.12 (70 +/-1 μ s from top antenna and 90 +/-1 μ s from bottom antenna) instead of 100 +/-5 μ s.
ETSO-C166a	1. Garmin was granted a deviation from ETSO-C166a, section 4.2 to allow not marking the unit with the class information, which is instead provided in the installation and operation manual.
	2. Garmin was granted a deviation from ETSO-C166a to use RTCA DO-260B instead of RTCA DO-260A as the Minimum Performance Standard.
	3. Garmin was granted a deviation from ETSO-C166a to use RTCA DO-160F instead of RTCA DO-160E as the Environmental Standard.
	4. Garmin was granted a deviation from RTCA DO-260B section 2.2.4.3.4.7.3.b to use the Conservative and Brute Force error correction techniques specified by RTCA DO-260B section 2.2.4.4.3.1 instead of 2.2.4.4.2.2.d and Appendix A, Section 3 of RTCA DO-185B.
	5. Garmin was granted a deviation from RTCA DO-260B section 2.2.4.5.b to use the Conservative and Brute Force error correction techniques specified by RTCA DO-260B section 2.2.4.4.3.1 instead of section 2.2.4.4.2.2.d and Appendix A, Section 3 of RTCA DO-185B.

1.6 Reference Documents

The following publications are sources of additional information for installing the GTS Processor. Before installing the GTS Processor, the installer should read all referenced materials along with the manual.

Table 1-9 Reference Documents

Part Number	Document
190-00313-11	Jackscrew Backshell Installation Instructions
190-00303-00	G1000 System Installation Manual
190-00587-51	GTS Processor System Maintenance Manual
190-00903-00	G1000 System Maintenance Manual LJ/VLJ
190-00907-00	G1000 System Maintenance Manual Standard Piston/Turboprop Aircraft

1.7 Aviation Limited Warranty

All Garmin avionics products are warranted to be free from defects in materials or workmanship for: one year from the date of purchase for new Remote-Mount and Panel-Mount products; one year from the date of purchase for new portable products and any purchased newly-overhauled products; six months for newly-overhauled products exchanged through a Garmin Authorized Service Center; and 90 days for factory repaired or newly-overhauled products exchanged at Garmin in lieu of repair. Within the applicable 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 apply to: (i) cosmetic damage, such as scratches, nicks and dents; (ii) consumable parts, such as batteries, unless product damage has occurred due to a defect in materials or workmanship; (iii) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes; (iv) damage caused by service performed by anyone who is not an authorized service provider of Garmin; or (v) damage to a product that has been modified or altered without the written permission of Garmin. In addition, Garmin reserves the right to refuse warranty claims against products or services that are obtained and/or used in contravention of the laws of any country.

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

IN NO EVENT SHALL GARMIN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Garmin retains the exclusive right to repair or replace (with a new or newly-overhauled replacement product) the product 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.

Online Auction Purchases: Products purchased through online auctions are not eligible for warranty coverage. 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.

International Purchases: A separate warranty may be provided by international distributors for devices purchased outside the United States depending on the country. If applicable, this warranty is provided by the local in-country distributor and this distributor provides local service for your device. Distributor warranties are only valid in the area of intended distribution. Devices purchased in the United States or Canada must be returned to the Garmin service center in the United Kingdom, the United States, Canada, or Taiwan for service.

Garmin International, Inc.
1200 East 151st Street
Olathe, Kansas 66062, U.S.A.
Phone:913/397.8200
FAX:913/397.0836

Garmin (Europe) Ltd.
Liberty House, Bulls Copse Road
Hounslow Business Park
Romsey, SO40 9RB, U.K.
Phone:44/ (0) 870.8501241
FAX:44/ (0) 870.850125

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2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GTS Processor and related hardware. Installation of the GTS Processor should follow the aircraft TC or STC requirements. Cabling is fabricated by the installing agency to fit each particular aircraft. The guidance of FAA advisory circulars AC 43.13-1B and AC 43.13-2B, where applicable, may be found useful for making retro-fit installations that comply with FAA regulations.

2.1.1 Unit Configurations

The GTS Processor is available under the following part numbers:

Table 2-1 Unit Configuration

Item	Applicable LRU Software Part Numbers	Applicable Custom Logic Device Part Numbers	Garmin P/N
GTS Processor, (011-02571-00)	All 006-B1244-0() through 006-B1244-2() except 006-B1244-00 through 006-B1244-03	006-C0081-2()	010-00962-00

2.1.2 Required Accessories

NOTE

Refer to the Dealer's Only portion of www.garmin.com for instructions on determining what accessories are needed.

Each of the following accessories are provided separately from the GTS Processor and is required to install the unit. Only one is required.

Table 2-2 Required Accessories

Installation Racks	Garmin P/N
GTS Processor Vertical Installation Rack	011-02572-00*
GTS Processor Horizontal Installation Rack	115-00784-00*

*Approved for use in RTCA DO-160F, Section 8, Category S, Curve C, Y, and L installations, as well as RTCA DO-160F, Section 8, Category U, Curve G installations.

For a GTS Processor installation with a single GA 58 directional antenna (GTS 855/GTS 825 only), 8 TNC connectors (not supplied), either straight or right angle, are required.

For a GTS Processor installation with dual GA 58 directional antennas (GTS 8000/GTS 855/GTS 825), 16 TNC connectors (not supplied), either straight or right angle, are required.

For a GTS Processor installation with a single GA 58 directional antenna and a monopole antenna (GTS 8000/GTS 855/GTS 825), 9 TNC connectors and 1 BNC connector (not supplied), either straight or right angle, are required.

TNC 50 Ohm terminations (not supplied) are required for all unused antenna ports.

Table 2-3 Connector Kits

Connector Kits	Garmin P/N
GTS Processor Connector Kit	011-01360-00
GTS Connector Kit w/Config Module and USB Pigtail	011-01360-01
USB-B Pigtail (see GTS Configuration Options)	011-01782-00

Table 2-4 Optional Accessories

Optional Accessories	Garmin P/N
Color Coded Heat Shrink Kit	011-02817-00

NOTE

The GTS Processor is to be installed with a four-beam directional interrogation antenna mounted to the top of the aircraft as described in the antenna installation manual.

Table 2-5 Antennas

Antennas	Garmin P/N
GA 58 Directional Antenna, QMA (011-01346-00) NOTE: Refer to 190-00587-00 GTS 8XX Installation Manual for installation instructions	010-10720-00*
GA 58 Directional Antenna, TNC, (011-01346-02) NOTE: Refer to 190-000587-20 GA 58 Installation Manual for installation instructions.	010-10720-02*
Low Profile Directional Antenna	013-00276-XX**
Monopole Antenna	010-10160-00 or L-Band Monopole Antenna that meets TSO-C74c

*010-10720-00 and 010-10720-02 include mounting screws and o-ring, unless specifically requested to exclude.

**Or Sensor Systems Incorporated part number S72-1735-24 (long TNC connectors) or S72-1735-26 (short TNC connectors) that meet the requirements of Garmin part number 013-00276-0X or 013-00276-5X, respectively. Refer to the manufacturer's installation manual for installation instructions..

Table 2-6 Configuration Module

Configuration Module	Garmin P/N
Configuration Module*	011-00979-20

*Required for GTS Processor installations that do not have other means (such as a GDU XXXX Configuration Module) to store GTS Processor configuration data. Contact Garmin for additional guidance in determining applicability.

2.2 Installation Considerations

Fabrication of a wiring harness is required. Sound mechanical and electrical methods and practices are required for installation of the GTS Processor.

2.2.1 Antenna Considerations

Refer to GA 58 Installation Manual 190-00587-20 for antenna installation information.

NOTE

For GTS 855/GTS 825 installations, either a monopole antenna or directional antenna may be used if installing an optional bottom mounted antenna. For GTS 8000 installations, a bottom monopole or directional antenna is required. A bottom directional antenna installation (recommended) gives the benefit of intruder bearing visibility for targets that are shaded from the top directional antenna. The target bearing accuracy may be degraded for bottom directional antenna installations on aircraft with fixed gear.

2.2.1.1 TAS/TCAS Antenna Location

Refer to GA 58 Installation Manual 190-00587-20 for antenna installation information.

2.3 Electrical Bonding

Electrical equipment, supporting brackets, and racks should be electrically bonded to the aircraft's main structure. Refer to SAE ARP 1870 section 5 when surface preparation is required to achieve electrical bond. The electrical bond should achieve direct current (DC) resistance less than or equal to 2.5 milliohms to local structure to where the equipment is mounted. Compliance should be verified by inspection using a calibrated milliohm meter. An equivalent OEM procedure may also be substituted. There may be OEM-specific reasons for electrically isolating equipment or having a higher bond resistance. These reasons should be rationalized upon installation approval. In general, Garmin recommends that all GTS Processor equipment be electrically bonded.

Refer to GA 58 Installation Manual 190-00587-20 for antenna installation information.

For composite aircraft, the antenna baseplate must be electrically bonded to the common ground of other installed equipment for lightning purposes. This can be achieved through the antenna mounting screws.

2.4 Cabling and Wiring

The contacts used to facilitate the use of #18 AWG wire, if used for Aircraft Power and Aircraft Ground, have expanded-diameter barrels that extend out from the back of the standard D-sub connector body to accommodate the larger diameter wire. Appropriate heat shrink tubing should be utilized to provide sufficient insulation from surrounding contacts.

NOTE

When removing an expanded-diameter barrel contact, always cut off the expanded-diameter barrel before using an extraction tool to remove the contact.

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.

NOTE

All appliance to antenna coaxial cabling shall bundle top four channels as a group and bottom four channels as a group to prevent incorrect wiring between top and bottom channels.

A visual inspection shall be performed to verify that all coaxial cables are connected properly, before attempting to operate the equipment.

2.4.1 Coaxial Cable

The GTS Processor requires two sets of coaxial cable assemblies when a directional GA 58 antenna (or other Garmin approved antenna) is used for both top and bottom. Each set consists of four coaxial cable assemblies.

Each set of four cables must be assembled using the same type of coaxial cable in order to meet phase and attenuation matching requirements. In order for the system to operate in compliance with manufacturer specifications, the coaxial cable assemblies must not exceed the attenuation specifications as stated in this document. This section explains in further detail the coaxial cable and termination requirements.

NOTE

TNC connectors and BNC connectors, required for building the coaxial cable assemblies for some antenna options, are not provided.

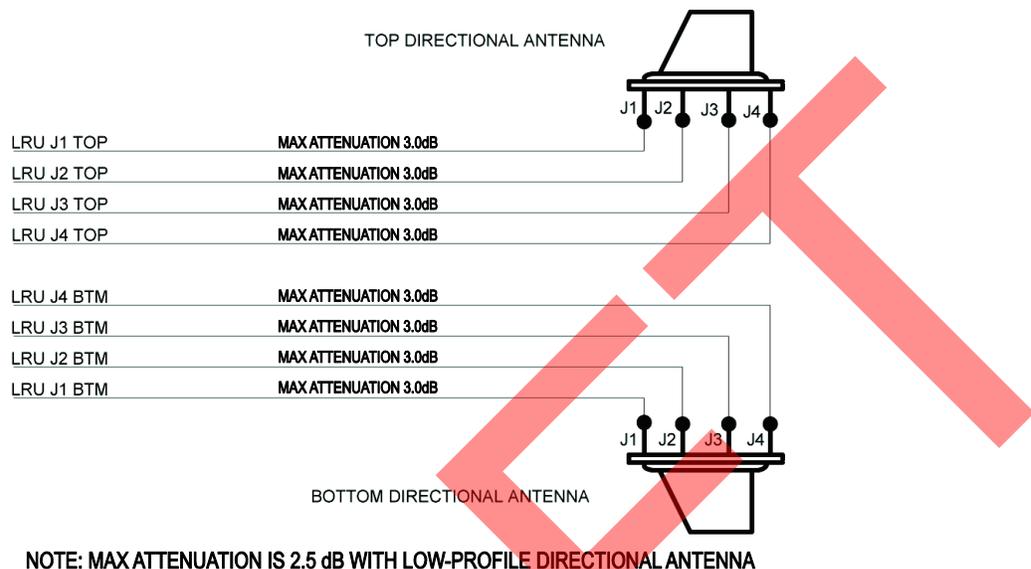
2.4.1.1 GTS Processor Installations

NOTE

For all GTS Processor installations, either a monopole antenna or directional antenna (recommended) may be used if installing a bottom mounted antenna. GTS 8000 installations require either a bottom-mounted directional (recommended) or monopole antenna. A bottom antenna is optional for GTS 855/ GTS 825 installations, but a bottom directional antenna is recommended for best performance. A bottom directional antenna installation gives the benefit of intruder bearing visibility for targets that are shaded from the top directional antenna. The target bearing accuracy may be degraded for bottom directional antenna installations on aircraft with fixed gear.

A GTS Processor installation with both top and bottom mounted directional antennas uses one set of coaxial cables for the four GTS Processor TOP jacks (J1 TOP, J2 TOP, J3 TOP, J4 TOP) that are connected to the corresponding top antenna jacks J1, J2, J3 and J4. A second set of coaxial cables are used for the four GTS Processor BTM jacks (J1 BTM, J2 BTM, J3 BTM, J4 BTM) that are connected to the corresponding bottom antenna jacks J1, J2, J3 and J4. Each cable assembly shall not exceed the maximum

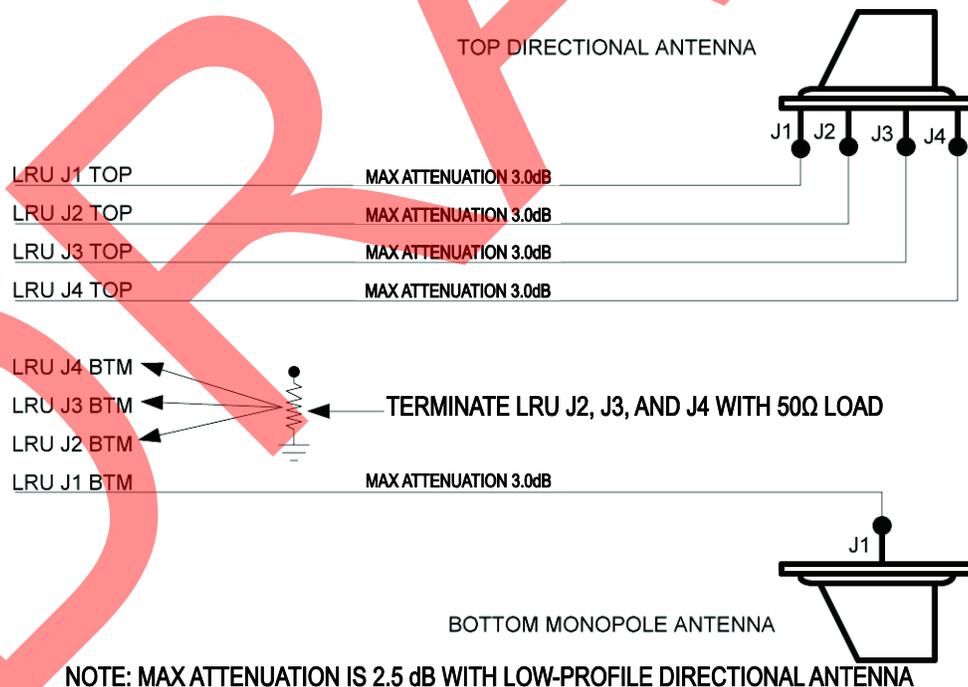
attenuation of 3.0dB at 1090MHz for a GA 58 directional antenna installations, and 2.5 dB for low-profile directional antenna installations as shown in Figure 2-1.



NOTE: MAX ATTENUATION IS 2.5 dB WITH LOW-PROFILE DIRECTIONAL ANTENNA

Figure 2-1 GTS Processor Installation with Top and Bottom Directional Antennas

If a bottom mount monopole antenna is installed, a single coaxial cable must be used to connect the GTS Processor bottom jack J1 BTM to the monopole antenna jack. The coaxial cable assembly shall not exceed the maximum attenuation of 3.0dB at 1090MHz for a GA 58 directional antenna and 2.5 dB for a low profile directional antenna as shown in Figure 2-2 and stated in Table 2-2. Each of the remaining GTS Processor bottom jacks (J2 BTM, J3 BTM, J4 BTM) are to be terminated using a 50Ω TNC termination.



NOTE: MAX ATTENUATION IS 2.5 dB WITH LOW-PROFILE DIRECTIONAL ANTENNA

Figure 2-2 GTS Processor Installation with Top Directional and Bottom Monopole Antennas

If no bottom mount antenna is installed, each of the GTS 855/GTS 825 bottom jacks (J1 BTM, J2 BTM, J3 BTM and J4 BTM) must be terminated with a 50Ω TNC termination shown in Figure 2-3.

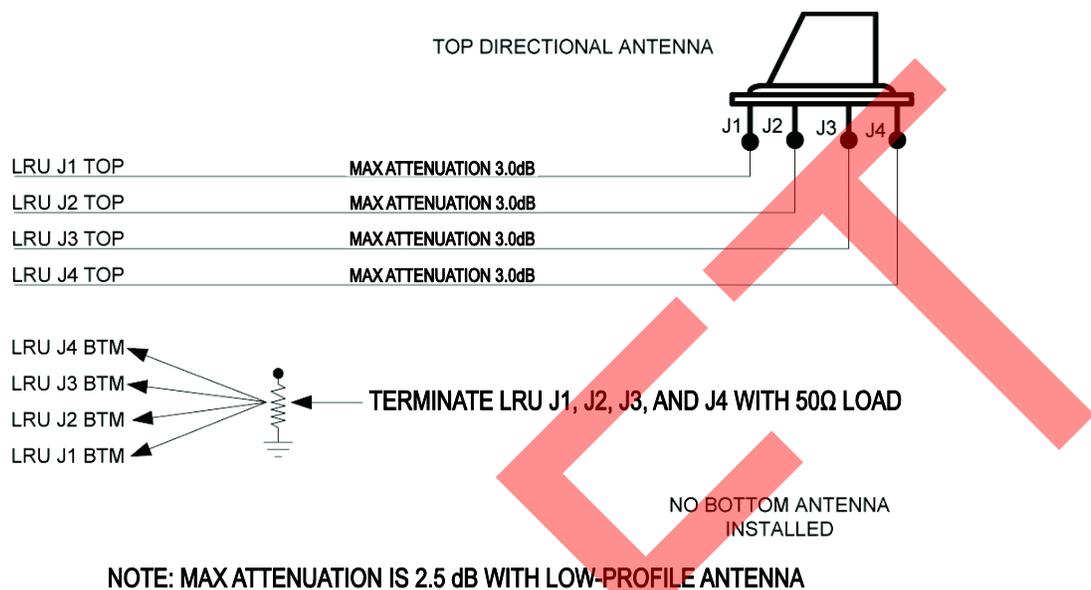


Figure 2-3 GTS 855/GTS 825 Installation with Top Directional Antenna and No Bottom Antenna

2.4.1.2 Fabrication of Coaxial Cable Assemblies

NOTE

TNC connectors, required to build coaxial cable assemblies, are not provided.

Table 2-1 lists the recommended coaxial cable vendors and the type of cable to be used for specific lengths of coaxial cable. The maximum coaxial cable lengths are calculated from the maximum signal attenuation at 1090 MHz for each coaxial cable type and an assumed loss figure of 0.035 dB per connector. The maximum coaxial cable lengths in Table 2-1 are for reference only, and are defined as the end to end length of a non-terminated coaxial cable. Actual cable lengths may vary depending on manufacturer specifications for the maximum cable attenuation and the RF coaxial connector loss.

It is the installing agency's responsibility to ensure that the coaxial cable assemblies meet the manufacturer's attenuation specifications as shown in Section 2-4 in order to comply with the system installation standards.

NOTE

Any in-line or bulkhead penetrations must be evaluated separately. It is the installing agency's responsibility to show airworthiness of the installed fabricated or purchased coaxial cable assemblies.

Table 2-7 Recommended Coaxial Length

Max Terminated Cable Attenuation (including connector loss)*					Max Cable Attenuation (dB/100ft)	ECS Type [1]	PIC Type [2]	MIL-C-17 Type [3]	RG Type [4]
Loss of 0.5 dB	Loss of 1.5 dB	Loss of 2.0 dB	Loss of 2.5 dB	Loss of 3.0 dB					
Max Coaxial Cable Lengths**									
2' 2" [0.66m]	7' 8" [2.34m]	10' 7" [3.23m]	13' 6" [4.11m]	16' 5" [5.00m]	17.2			M17/128- RG400	RG-400
2' 3" [0.69m]	8' 0" [2.44m]	11' 0" [3.35m]	14' 0" [4.27m]	17' 0" [5.18m]	16.7		S83204		
2' 5" [0.74m]	8' 6" [2.59m]	11' 9" [3.58m]	15' 0" [4.57m]	18' 3" [5.56m]	15.5			M17/60- RG142	RG-142
3' 0" [0.91m]	10' 7" [3.23m]	14' 7" [4.45m]	18' 7" [5.66m]	22' 7" [6.88m]	12.5	311901			
3' 2" [0.97m]	10' 11" [3.33m]	15' 0" [4.57m]	19' 2" [5.84m]	23' 3" [7.09m]	12.2		S44191		
3' 3" [0.99m]	11' 4" [3.45m]	15' 6" [4.72m]	19' 9" [6.02m]	24' 0" [7.32m]	11.8		S44193		
4' 3" [1.30m]	15' 0" [4.57m]	20' 6" [6.25m]	26' 2" [7.98m]	31' 9" [9.68m]	8.9	311601			
5' 0" [1.52m]	17' 9" [5.41m]	24' 5" [7.44m]	31' 0" [9.45m]	37' 10" [11.53m]	7.5		S67163		
5' 1" [1.55m]	18' 0" [5.49m]	24' 8" [7.52m]	31' 6" [9.60m]	38' 3" [11.66m]	7.4	311501			
<p>[1] Vendor: Electronic Cable Specialists 5300 W Franklin Drive, Franklin, WI 53132 Telephone: 800.327.9473 or 414.421.5300 Fax: 414.421.5301 Website: www.ecsdirect.com</p> <p>[2] Vendor: PIC Wire and Cable N53 W24747 S Corporate Circle, Sussex, WI 53089-0330 Telephone 800.742.3191 or 262.246.0500 Fax: 262.246.0450 Website: www.picwire.com</p> <p>[3] See current issue of Qualified Products List, QPL-17.</p> <p>[4] RG types are obsolete and are shown for reference only; replaced by M17 type numbers.</p>									

*The "Max Terminated Cable Attenuation" values listed include the maximum attenuation of both the maximum length of coaxial cable and two RF coaxial connectors at a frequency of 1090 MHz.

**Actual cable lengths may vary depending on manufacturer's cable attenuation and connector specifications.

Coaxial cable "sets" are required for GTS Processor installations. Each coaxial cable "set", which consist of 4 coaxial cable assemblies, must be length matched to the tolerances shown in Table 2-2.

Table 2-8 Coaxial Cable Set Length Tolerance

Coaxial Cable Set (consisting of four coaxial cable assemblies)	Length Tolerance*
GTS Processor TOP to top directional antenna	2" of each other
GTS Processor BOTTOM to bottom directional antenna	2" of each other

*Ensure cables do not exceed the maximum lengths as stated in Table 2-1 unless supported by manufacturers data for specific cables used.

NOTE

It is recommended that a two inch piece of adhesive heat shrink tubing be installed over all connector/cable interfaces. The heat shrink tubing should overlap the connector body as much as practical without interfering with the coupling nut.

NOTE

It is recommended that a color band be placed on both ends of each cable to match the color marking designating the mating jack connector.

NOTE

It is recommended that the nominal end to end coaxial cable (non-terminated) length for each set be recorded for the specific installation in the event that a particular coaxial cable assembly associated with an installed set should require replacement.

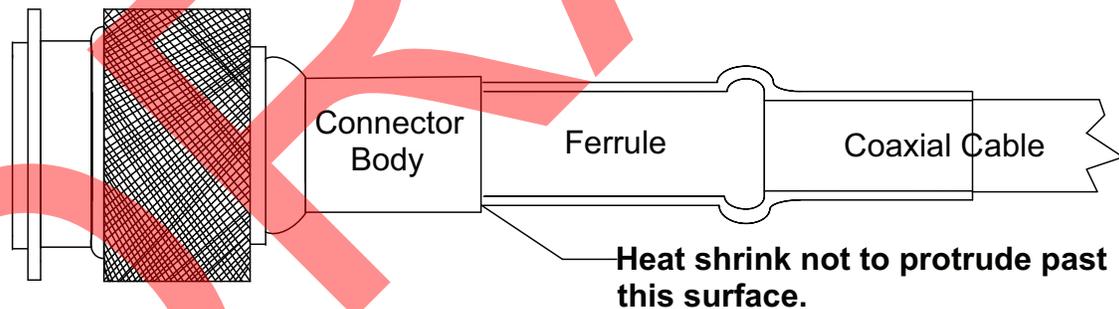


Figure 2-4 Heat Shrink Positioning

2.4.1.3 Coaxial Cable Assembly Repair and Rework

In the event that an individual coaxial cable assembly requires rework, the following rules apply:

Top or bottom GTS Processor to GA 58 (or other Garmin approved antenna) cables may be repaired with a reduction in length of 2" maximum.

Refer to Table 2-1 for recommended maximum cable assembly lengths for cable assemblies fabricated by the installer.

2.5 Cooling Requirements

The GTS Processor meets all TSO requirements without external cooling, however the application of forced air cooling to the rear air nozzle of the GTS Processor is highly recommended to provide beneficial cooling the the unit. A 5/8" diameter air fitting for AIR is provided on the front of the GTS Processor for the purpose of admitting cooling air if desired. If an external cooling hose is used, it should blow into the AIR fitting. If a form of forced air cooling is installed, make certain that rainwater cannot enter and be sprayed on the equipment.

For G1000 installations refer to the G1000 System Installation manual, Garmin part number 190-00303-00, for more information on cooling requirements.

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2.6 Mounting Requirements

The GTS Processor can be mounted vertically or horizontally using the installation racks shown in Figures 2-5 & 2-6. Refer to Appendix A for outline and installation drawings.

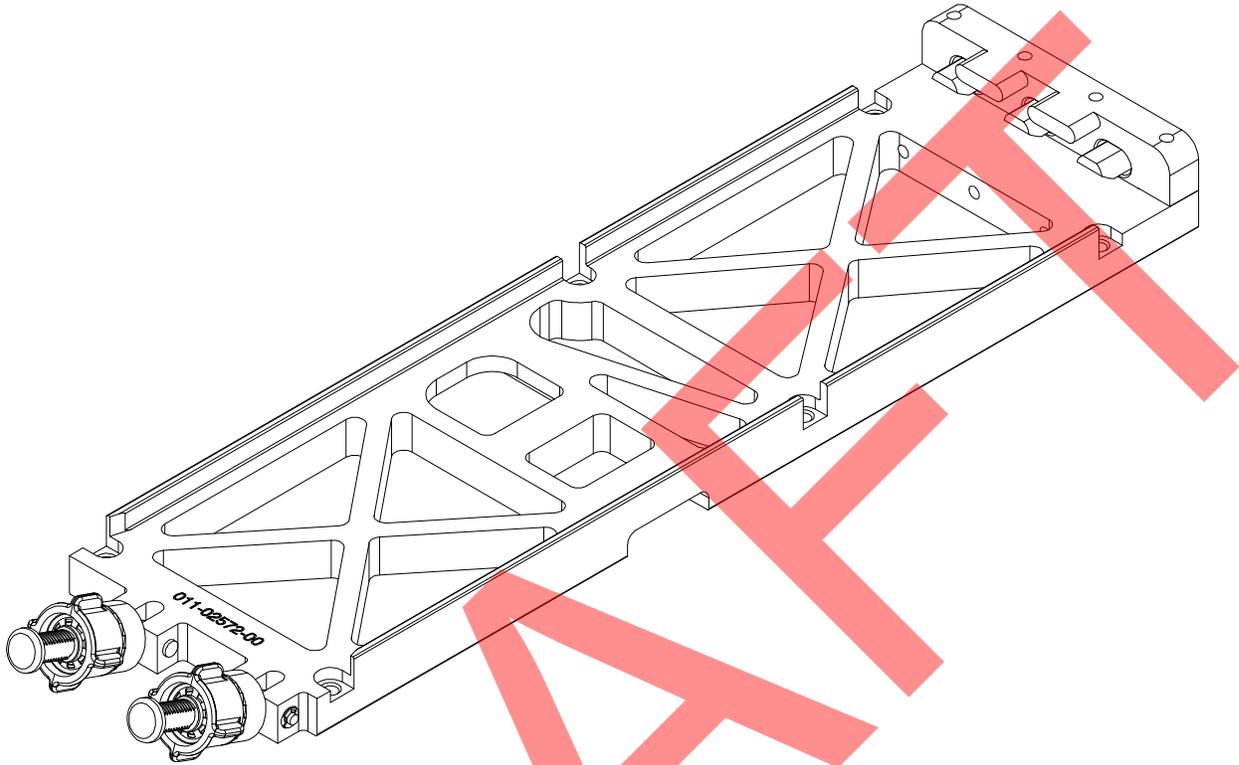


Figure 2-5 GTS Processor Vertical Installation Rack (Garmin P/N 011-02572-00)

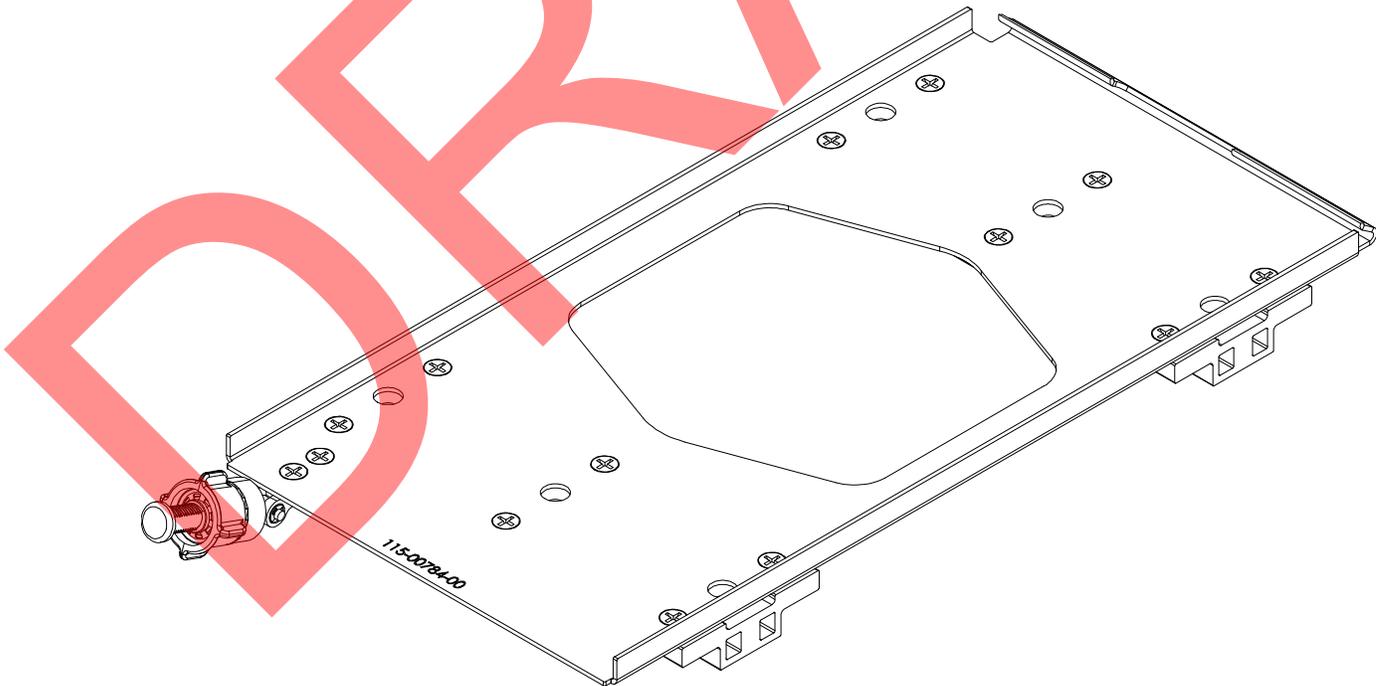


Figure 2-6 GTS Processor Horizontal Installation Rack (Garmin P/N 115-00784-00)

3 INSTALLATION PROCEDURE

3.1 Unpacking Unit

Carefully unpack the equipment and make a visual inspection of the unit for evidence of damage incurred during shipment. If the unit is damaged, notify the carrier and file a claim. To justify a claim, save the original shipping container and all packing materials. Do not return the unit to Garmin until the carrier has authorized the claim. Retain the original shipping containers for storage. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement.

3.2 Wiring Harness Installation

Allow adequate space for installation of cables and connectors. The installer shall supply and fabricate all of the cables. All electrical connections are made through two 78-pin high-density D subminiature connectors, and one 37-pin standard density connector. Section 4 defines the electrical characteristics of all input and output signals. Required connectors and associated hardware are supplied with the connector kit.

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

Table 3-1 Socket and Pin Contact Part Numbers

Manufacturer	78 Pin High Density D-Subminiature Connectors P8001 & P8002 37 Pin Standard Density D-Subminiature Connector P8003 19 Pin Circular Connector P651		
	High Density Pin (P8001 & P8002)	Standard Socket (P8003)	18 AWG Socket (P8003)
Garmin P/N	336-00021-00	336-00022-00	336-00023-00
Military P/N	M39029/58-360	M39029/63-368	N/A

Table 3-2 Socket Contact MIL SPEC M39029/5-115 Crimp Tooling

Manufacturer	Hand Crimping Tool	Positioner	Insertion/Extraction Tool
Tools Option 1			
Military P/N	M22520/1-01	M22520/1-02	M81969/14-11*
Daniels	AF8	TH1A	M81969/14-11*
Tools Option 2			
Military P/N	M22520/2-01	M22520/2-02	M81969/14-11*
Daniels	AFM8	K1S	M81969/14-11*

*Indicates plastic insertion/extraction tool

Table 3-3 Pin Contact GPN 336-00021-00 MIL SPEC M39029/58-360 Crimp Tooling

Manufacturer	Hand Crimping Tool	Positioner	Insertion/Extraction Tool
Military P/N	M22520/2-01	M22520/2-09	M81969/1-04
Daniels	AFM8	K42	(Note 2)
Positronic	9507-0	9502-4	(Note 2)
ITT Cannon	995-0001-584	(Note 2)	274-7048-000 (Note 1)
Tyco-AMP	601966-1	601966-6	91067-1
Astro	615717	615725	(Note 2)
Amphenol	(Note 2)	(Note 2)	(Note 2)

Note 1 - Indicates plastic insertion/extraction tool

Note 2 – Order by military part number

Table 3-4 Pin Socket Contacts GPN 336-00022-00 MIL SPEC M39029/63-368 and GPN 336-00023-00 Crimp Tooling

Manufacturer	Hand Crimping Tool	22 AWG Socket Contact GPN 336-00022-00 (M39029/63-368)		18 AWG Socket Contact GPN 336-00023-00	
		Positioner	Insertion/Extraction Tool	Positioner	Insertion/Extraction Tool
Military P/N	M22520/2-01	M22520/2-08	M81969/1-02	N/A	M81969/1-02
Daniels	AFM8	K13-1	(Note 2)	K774	(Note 2)
Positronic	9507-0	9502-5	(Note 2)	9502-11	(Note 2)
ITT Cannon	995-0001-584	995-0001-604	980-2000-426 (Note 1)	N/A	N/A
Tyco-AMP	601966-1	601966-5	91067-2	N/A	N/A
ASTRO	615717	615724	(Note 2)	NA	N/A
Amphenol	(Note 2)	(Note 2)	(Note 2)	N/A	N/A

Note 1 - Indicates plastic insertion/extraction tool

Note 2 – Order by military part number

NOTE

1. Non-Garmin part numbers shown are not maintained by Garmin and consequently are subject to change without notice.
2. Extracting a contact used for #18 AWG requires that the 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 and extractor due to the absence of the wire. A new contact must be used when reassembling the connector.

3.3 Backshell and Configuration Module Assemblies

The GTS Processor connector kits includes three Garmin backshell assemblies. The backshell assembly houses the configuration module, if applicable. Garmin's backshell also gives the installer the ability to easily terminate shield grounds at the backshell housing.

Refer to the Jackscrew Backshell Installation Instructions (Garmin part number 190-00313-11) for backshell assembly instructions.

Refer to the Jackscrew Configuration Module Installation Instructions (Garmin part number 190-00313-10) for configuration module assembly instructions.

3.4 GA 58 Antenna Installation

Refer to the GA 58 Installation Manual 190-00587-20 for installation instructions.

After antenna installation is complete, connect the four antenna cables ensuring each cable is connected to the correct antenna connector. Each antenna connector and cable should have a matching color band.

3.5 Sensor Systems Incorporated Low-Profile Antenna Installation

Refer to manufacturers recommended installation instructions.

After antenna installation is complete, connect the four antenna cables ensuring each cable is connected to the correct antenna connector. Each antenna connector and cable should have a matching color band.

3.6 Unit Installation

Refer to the applicable drawings in Appendix A Outline and Installation Drawings and Appendix B Interconnect Example of this manual for GTS Processor unit installation.

NOTE

GTS Processor units are not compatible with Garmin Integrated Flight Deck GDU software versions prior to 9.14.

3.7 Downloading and Installing the GTS Processor Install Tool

GTS Processor Configuration, Ramp Test, and Return to Service tests are performed (on some installations) using a computer (installed with Microsoft Windows XP or later) and the GTS Processor Install Tool, Garmin part number 006-A0242-10. The GTS Processor Install Tool allows for configuration, diagnostics, and upload of GTS Processor software. The tool is available for download from the Dealer Resource Center portion of the Garmin website (www.garmin.com). See the “readme” file (included in some versions) in the tool download for the latest GTS Processor Install Tool notes.

NOTE

A USB-A plug to USB-B plug cable (not provided) is required to interface between a computer USB-A receptacle and the GTS Processor USB-B receptacle installed in the wiring harness. This Dongle Cable is required to use the GTS Processor Install Tool, refer to Appendix B for interconnect drawing.

1. Go to the Dealer Resource section of www.garmin.com and save the “GTS Processor Install Tool.zip” file from the website to the PC.
2. Apply power to the GTS Processor and connect the unit to a USB port on the PC.
3. If a pop-up window titled “Found New Hardware Wizard” appears on the PC, select ‘Cancel’ to exit the wizard.



Figure 3-1 GTS Processor Install Tool – Installation

4. On the PC, locate the files “GTS Processor Install Tool.zip.” Extract the files from the zip file.
For computers with 32-bit Windows versions select the “Install Tool Installer 32-bit.msi” file.
For computers with 64-bit Windows versions select the “Install Tool Installer 64-bit.msi” file.

NOTE

The installation will be canceled if the installation file and the operating system do not match. On the PC, right click on ‘My Computer’ and select ‘Properties’ to determine if the PC is operating on a 32-bit or a 64-bit version of Windows.

5. On the PC, select 'Next' when prompted. Follow the wizard to setup the GTS Processor Install Tool. (Examples shown assume a Windows XP operating system, the required steps may vary with other Operating Systems.)



Figure 3-2 GTS Processor Install Tool – Installation

6. Select 'Next', when prompted or 'Browse', to select another folder.

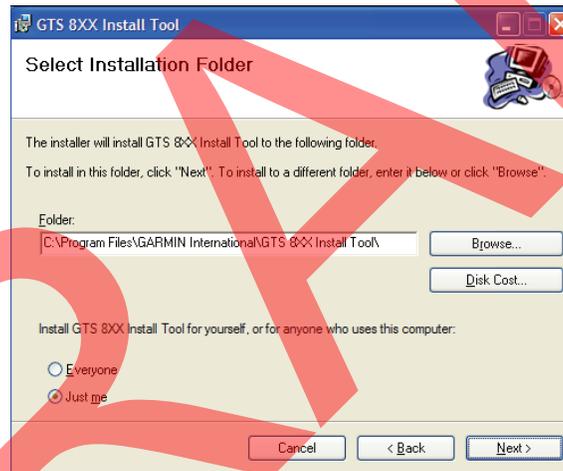


Figure 3-3 GTS Processor Install Tool – Installation

7. Select 'Next', when prompted, to start the installation.

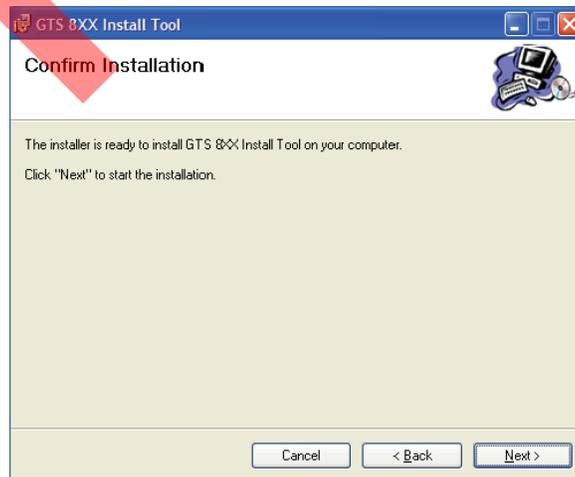


Figure 3-4 GTS Processor Install Tool – Installation

8. Wait until the installation has completed.

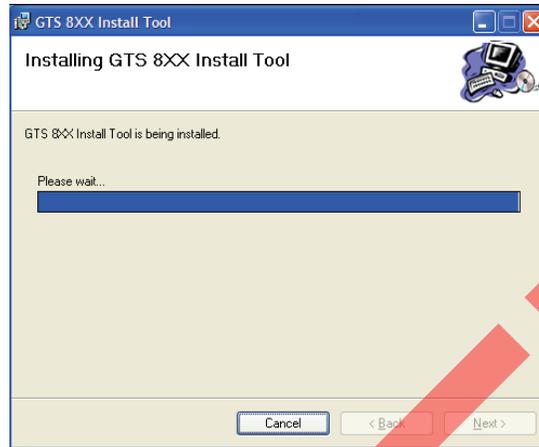


Figure 3-5 GTS Processor Install Tool – Installation

9. When the installation has completed, the following screen will be displayed. Select 'Close.'

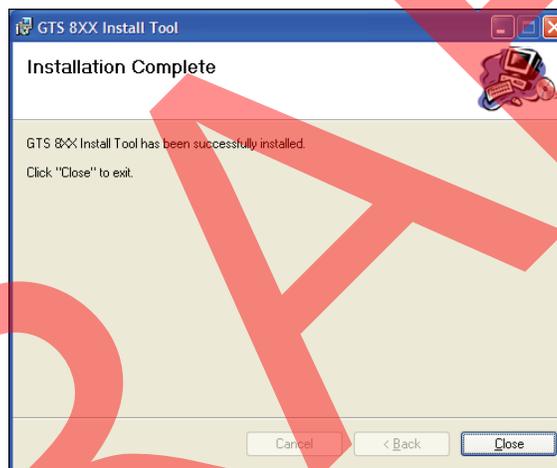


Figure 3-6 GTS Processor Install Tool – Installation

3.8 Downloading and Installing the GTS Assert Log Diagnosis Tool

The GTS Assert Log Diagnosis Tool (006-A0244-00) is used with the GTS 8XX Assert Log to assist in the diagnosis and resolution of asserts seen during the installation process and during post-installation flight operation. This tool allows for viewing/storing of the GTS Assert Log using a computer (installed with Microsoft Windows XP or later) and is available for download from the Dealers Resource Center portion of the Garmin website (www.garmin.com). See the “readme” file in the tool download for the latest installation/operation notes.

NOTE

A USB-A plug to USB-B plug cable (not provided) is required to interface between a computer USB-A receptacle and the GTS Processor USB-B receptacle installed in the wiring harness. This Dongle Cable is required to use the GTS Processor Install Tool, refer to Appendix B for interconnect drawing.

1. Go to the Dealer Resource section of www.garmin.com and save the “GTS Assert Log Diagnosis Install Tool.zip” file from the website to the PC.
2. On the PC, locate the files “GTS Processor Install Tool.zip.” Extract the files from the zip file.
3. Select (double click) the “Assert_Log_Diagnosis.msi” file.
4. On the PC, select ‘Next’ when prompted. Follow the wizard to setup the GTS Processor Install Tool. (Examples shown assume a Windows XP operating system, the required steps may vary with other Operating Systems.)

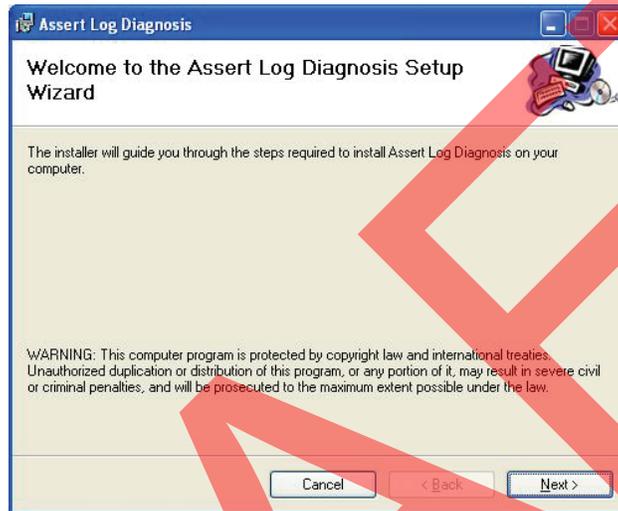


Figure 3-7 GTS Assert Log Diagnosis Tool – Installation

5. Select ‘Next’, when prompted or ‘Browse’, to select another folder. If desired, click on the Disk Cost button to view available storage drives and required disk space. Also a selection can be made to control the tool’s availability to users of the PC.

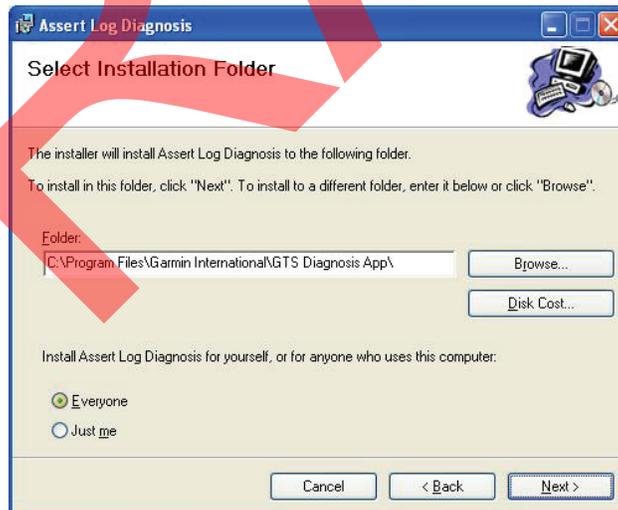


Figure 3-8 GTS Assert Log Diagnosis Tool – Installation

6. Select 'Next', when prompted to begin the installation.

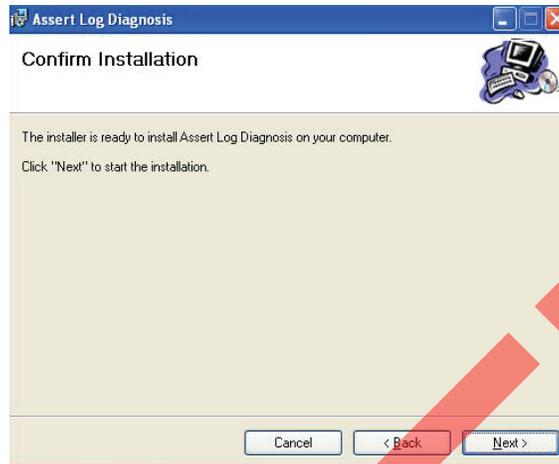


Figure 3-9 GTS Assert Log Diagnosis Tool – Installation

7. The installation progress is displayed.

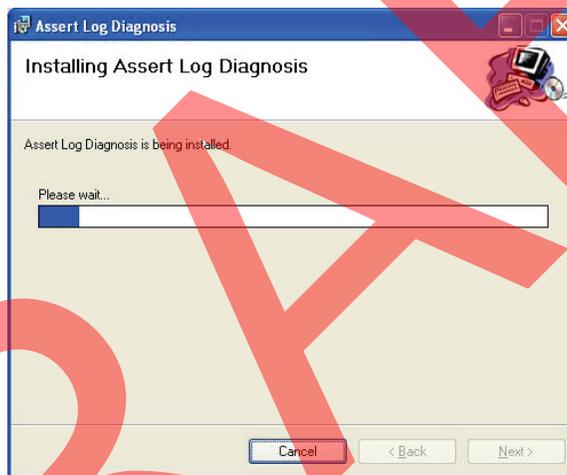


Figure 3-10 GTS Assert Log Diagnosis Tool – Installation

8. Verify that installation is successful, then select 'Close', to complete the installation.

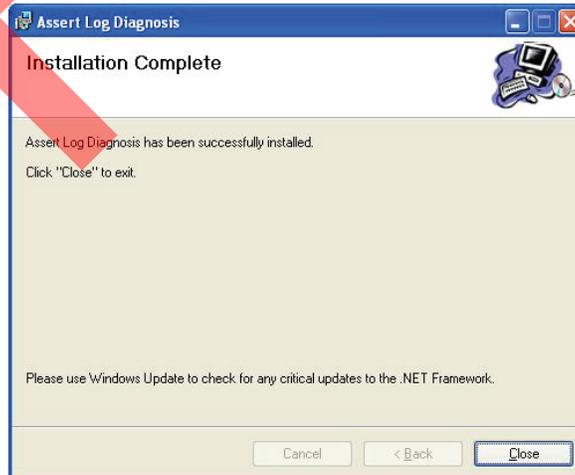


Figure 3-11 GTS Assert Log Diagnosis Tool – Installation

3.9 Post Installation Configuration & Checkout

The following actions must be performed after initial installation and after the equipment has been removed/disconnected then reinstalled/reconnected :

1. GTS Processor Configuration (Section 3.8.2)
2. Suppression Bus I/O Check (Section 3.8.3)
3. CDTI (Cockpit Display of Traffic Information) Display
4. Setup and Configuration (Section 3.8.4)
5. Calibration/Self Test (Section 3.8.5)
6. Ramp Test and Return To Service Tests (Section 3.8.6)
7. Antenna Verification (Section 3.8.7)

Before beginning the installation calibration, the installer must perform a visual inspection to verify the coaxial cables are installed correctly based upon the system and antenna configuration.

NOTE

Tests performed with a ramp tester should be performed away from buildings that may reflect the signal. Local air traffic control should be advised if the ramp tester has an altitude programmed into it that may cause interaction with other TCAS-equipped traffic.

3.9.1 GTS Processor Configuration/Checkout for Different Installation Types

Configuration instructions may differ according to the specifics of the installation. Refer to the following subsections for specific instruction applicable to different installation types.

3.9.1.1 FAA Approved Garmin Integrated Flight Deck/GTS Processor Installation

When installed as part of a Garmin Integrated Flight Deck via the Garmin High Speed Data Bus (HSDB), the GTS Processor must have FAA approved configuration data. Configuration data is loaded to the GTS Processor from an aircraft-specific software loader card.

GDUs using SW prior to v11.10 require that the Ramp Test and Return to Service Tests are accomplished using the GTS Processor Install Tool (Section 3.8.2). GDU SW v11.10 and newer allow the Ramp Test and Return to Service Tests to be accomplished via the GDU (Section 3.8.6).

For basic configuration information refer to the appropriate maintenance manual. For actual installation/checkout, use only aircraft manufacturer approved or STC checkout procedures.

3.9.1.2 Field Approved (Retrofit) Garmin G500/600 Installation

For GTS Processor units in G500/600 installations, refer to the GTS Processor STC Install Manual, (190-01279-00), for configuration procedures and instructions.

3.9.1.3 Field Approved (Retrofit) Garmin Integrated Flight Deck

Garmin Integrated Flight Deck refers to an installation with GIA 63/GIA 6XW integrated avionics units and GDU 1XXX displays. GTS Processor units require an ARINC 429 connection to the transponder for TCAS Equipage, but the transponder cannot be configured properly in the Garmin Integrated Flight Deck, and therefore cannot be installed via Field Approval method. Refer to Figure B-5 for interconnect example.

NOTE

Please check the aircraft warranty status before installation and/or with the aircraft manufacturer for guidance.

NOTE

ADS-B receive functionality is not available in a Field Approved Garmin Integrated Flight Deck installation.

3.9.1.4 Retrofitting a non-Garmin Integrated Flight Deck Installation such as a GNS 4XX/5XX(W) or GTC 650/750 unit with a GTS Processor

Configuration, software uploading, and Ramp Test and Return to Service Tests are accomplished using the GTS Processor Install Tool (Section 3.8.2).

NOTE

Installations that are unable to electronically display the software part number of the GTS Processor should affix a label on the GTS Processor LRU marked with the software part number to meet the TSO marking requirements. For the installer's convenience, a label has been applied adjacent to the LRU serial number tag.

3.9.1.5 Non-Garmin Installations with a GTS Processor

Configuration, software uploading, and Ramp Test and Return to Service Tests are accomplished using the GTS Processor Install Tool (Section 3.8.2).

NOTE

Installations that are unable to electronically display the software part number of the GTS Processor should affix a label on the GTS Processor LRU marked with the software part number to meet the TSO marking requirements. For the installer's convenience, a label has been applied adjacent to the LRU serial number tag.

3.9.2 Using the GTS Processor Install Tool

The following tabs are accessible with the GTS Processor Install Tool. Changing tabs may cause the GTS Processor unit to restart.

- Normal Tab – Reports System Faults, Status Flags, and Operating Status. Allows Ground Test Mode to be Enabled or Disabled.
- Configuration Tab – Allows selection of installation options
- Upload Tab – Allows upload of software to GTS Processor unit
- Assert Tab – Generates the assert log which can be submitted to Garmin Technical Support for troubleshooting.

Normal System Mode Tab

The Normal Tab displays various faults, flags, and operational information. When the Normal Tab is selected, the unit is commanded to Normal System Mode. ‘Alpha Values’ phase measurement values for the Top Antenna and Bottom Antenna (if a bottom directional antenna is installed) are found on the GTS Processor Install Tool Normal tab, and are updated only after a self-test (Section 3.8.5) is run. These antenna phase measurements are used to determine if the installation has adequate antenna ground planes.

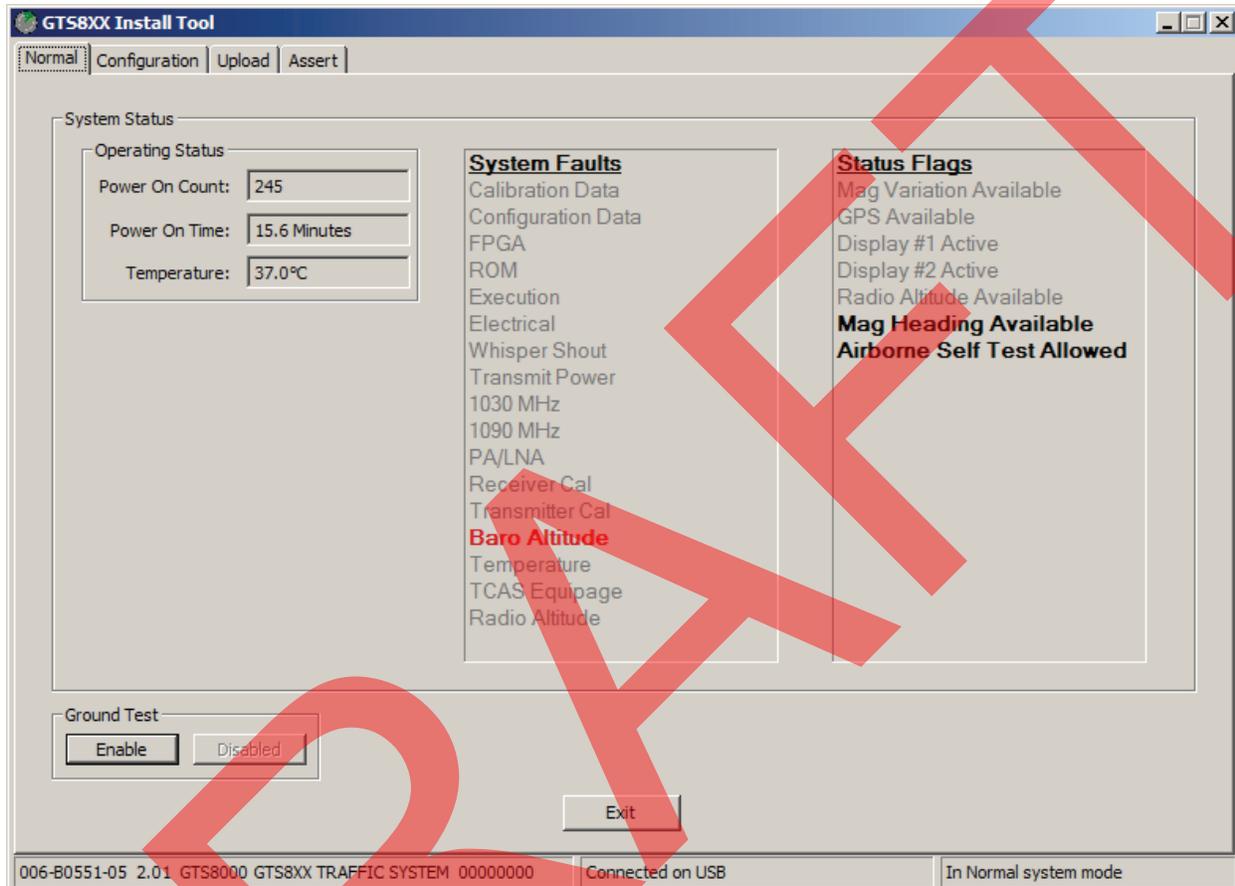


Figure 3-12 GTS Processor Install Tool – Normal Tab

Normal Mode –

System Faults:

Red Bold text indicates that a fault is active.

Gray text indicates that there is no active fault.

(System Faults are described in the Calibration/Self-Test Section 3.8.5)

Status Flags:

Black Bold text indicates that a flag is set.

Gray text indicates that the flag is not set.

(Status Flags are described in the Calibration/Self-Test Section 3.8.5)

Ground Test:

Enabled

Disabled

(Ground Test is described in the Ramp Test and Return to Service Tests Section 3.8.6).

Configuration System Mode Tab

The Configuration Tab displays configuration data and allows the installer to change the installation configuration. When the Configuration Tab is selected, the unit is commanded to Configuration System Mode.

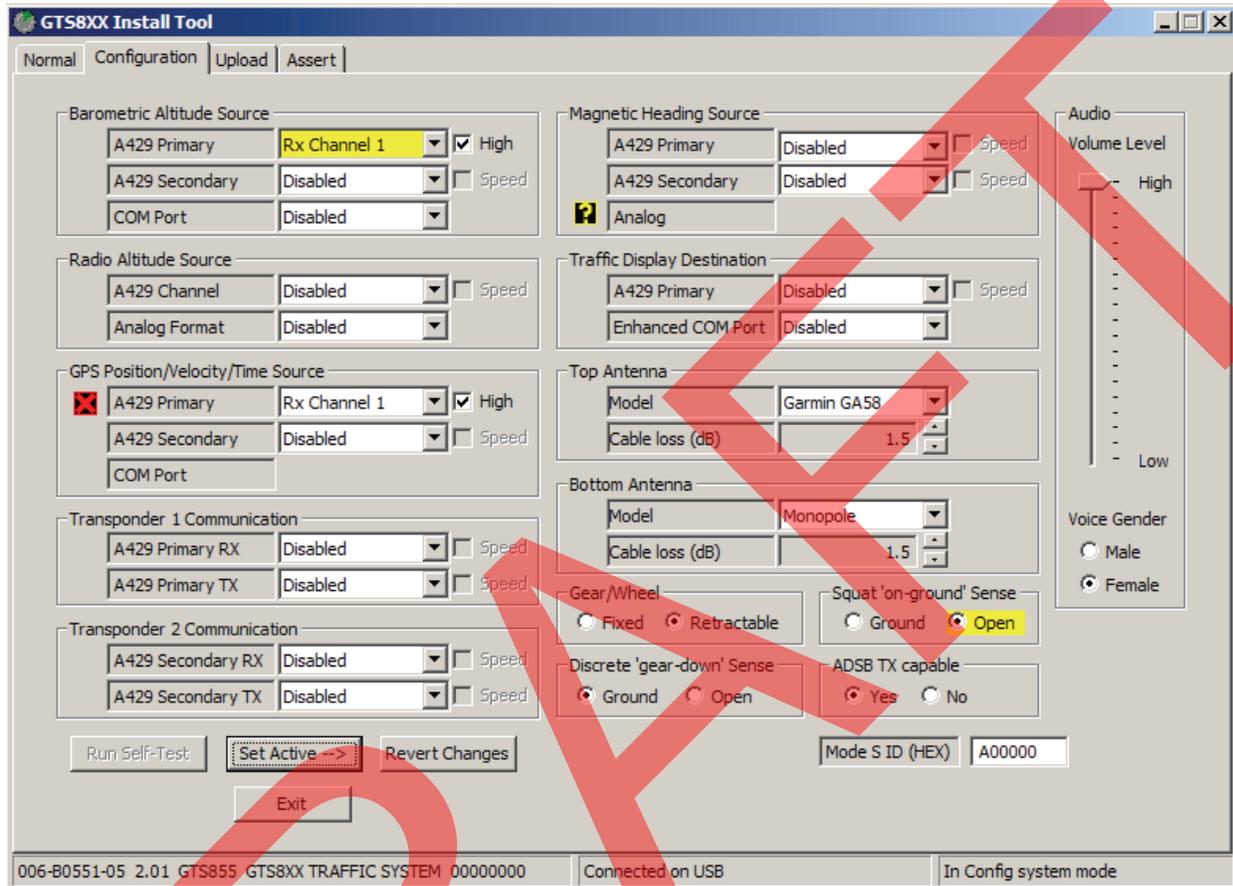


Figure 3-13 GTS Processor Install Tool – Configuration Tab (GTS 825 and GTS 855)

The Configuration Tab displays installation configuration options. Changes made in the Configuration Tab are not immediately committed to the GTS. Changed options will be colored yellow until 'Set Active' is selected.

Configuration Mode –

Barometric Altitude Source:

Note: At least one source must be selected (same altitude source used for the transponder).

Primary A429 RX Channels 1 - 6 or Disabled
Secondary A429 RX Channels 1 - 6 or Disabled
COM RS-232 Ports 1 - 5 or Disabled

Magnetic Heading Source (optional):

Primary A429 RX Channels 1 - 6 or Disabled
Secondary A429 RX Channels 1 - 6 or Disabled

Radio Altitude Source (optional):

A429 A429 RX Channels 1 - 6 or Disabled
Analog Disabled
ARINC 552
ARINC 552A
Bonzer MK10X
Collins ALT50
Collins ALT55
King KRA10
King KRA10A
King KRA405
Sperry AA100
Terra TRA3000/3500

GPS Position/Velocity/Time Source:

Note: At least one source required for ADS-B IN functionality.

Primary A429 RX Channels 1 - 6 or Disabled
Secondary A429 RX Channels 1 - 6 or Disabled

Traffic Display Destination:

Note: At least one source is required.

Primary A429 TX Channels 1 - 6 or Disabled
COM RS-232 Ports 1 - 5 or Disabled

Transponder 1 & 2 Communication:

Note: At least Transponder 1 RX and TX required for GTS 820 and GTS 850.

Primary should be configured for channels wired to Transponder 1.

Secondary should be configured for channels wired to Transponder 2 in a dual transponder installation.

Primary RX A429 RX Channels 1 - 6 or Disabled
Primary TX A429 TX Channels 1 - 6 or Disabled
Secondary RX A429 RX Channels 1 - 6 or Disabled
Secondary TX A429 TX Channels 1 - 6 or Disabled

Top Antenna:

Model

Garmin GA58
Sensor Systems

Cable loss (dB)

0.2 – 4.0

Note: Cable loss information is described in Fabrication of Coaxial Cable Assemblies Section 2.4.1.2.

Bottom Antenna:

Model None
 Monopole
 Garmin GA58
 Sensor Systems

Cable loss (dB) 0.2 – 4.0

Note: Cable loss information is described in Fabrication of Coaxial Cable Assemblies Section 2.4.1.2.

Note: All A429 options have the ability to select High or Low speed.

Note: If an input is inactive, a  will be displayed.

If an input is active, a  will be displayed.

If an input is in an unknown state, a  will be displayed.

Volume Level:

Allows audio volume level selection from 0 to -63 dB in 0.5 dB increments.
Maximum audio output is at least 80 mW into a 600 Ohm load. (6.93 Vrms)

Voice Gender:

Enter voice preference selection.

Gear/Wheel:

Enter type of aircraft gear design.

Discrete ‘gear-down’ Sense:

Indicate the type of gear down sense switch for the Gear Down and Locked* discrete input.
See Appendix B (Note 7) and Figure B-9 for Gear Down and Locked* discrete input.

Note: Discrete ‘gear-down’ sense is only enabled when ‘Retractable’ Gear/Wheel design is configured.

ADSB TX Capable:

Indicate whether aircraft is equipped with ADS-B transmitter.

Squat ‘on-ground’ Sense:

Indicate type of sense switch.

Note: For helicopter installations without a squat switch, the traffic system status valid discrete output can be wired to the air/ground discrete input to prevent the GTS from going to standby mode during extended hover. For such installations, configure squat ‘on-ground’ sense to ‘open’.

Mode S ID (HEX):

Enter Mode S transponder ID (must match the Mode S ID used by the transponder).

Set Active:

Must select Set Active to enable the settings on the GTS Processor.

Revert Changes:

Select to show current GTS Processor settings.

An incorrect configuration will be reverted back to previous settings.

Note: Default is “disabled” for all inputs and outputs.

Upload System Mode Tab

The Upload Tab displays version information for Boot Block, Region List, System, FPGA, Audio and Magnetic Variation. Boot Block updating is not allowed. For other files, select the appropriate image files and select upload.

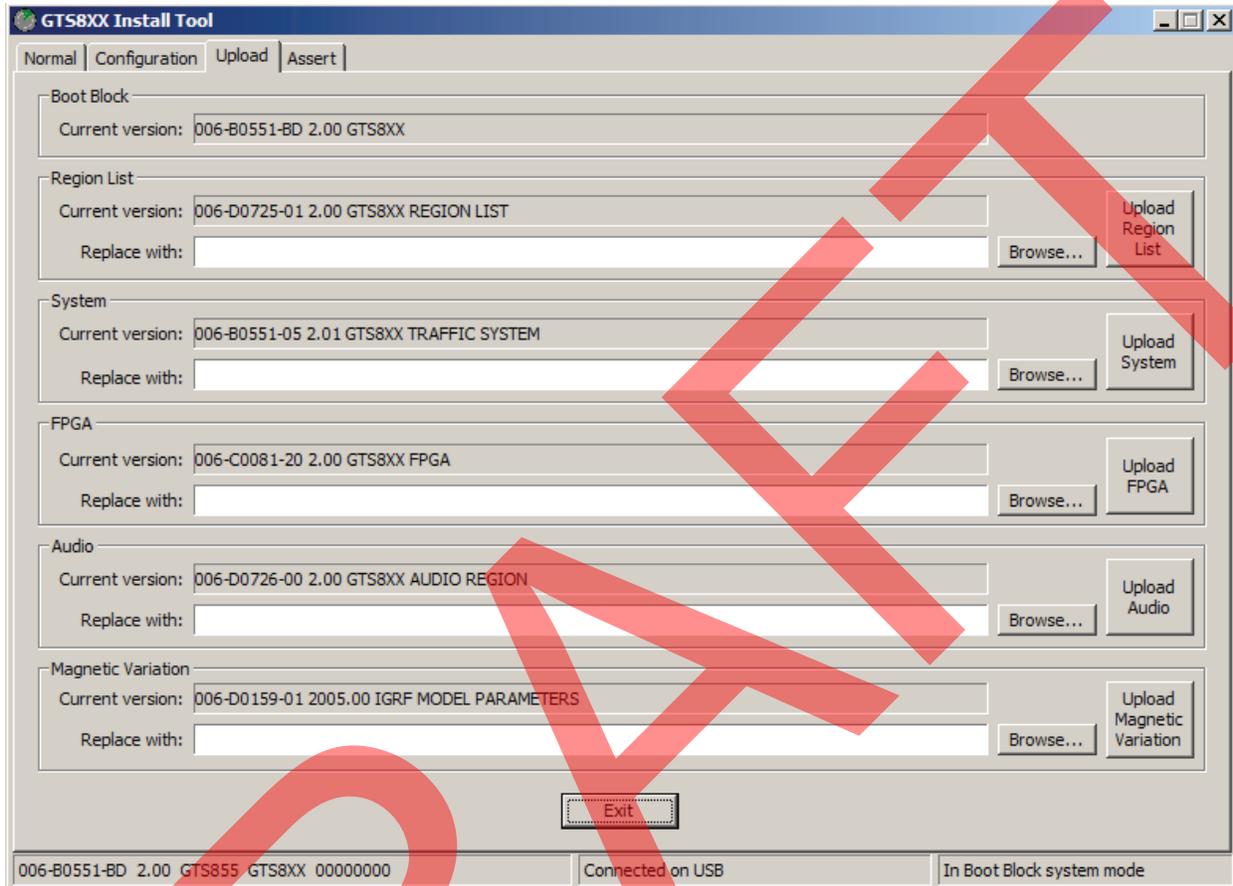


Figure 3-14 GTS Processor Install Tool – Upload Tab

Assert Tab

The Assert Tab gets and displays the contents of the assert log from the GTS. Select 'Get Assert Log' to retrieve the assert log from the GTS and 'Save Assert Log to File' to save the received log to a text file.

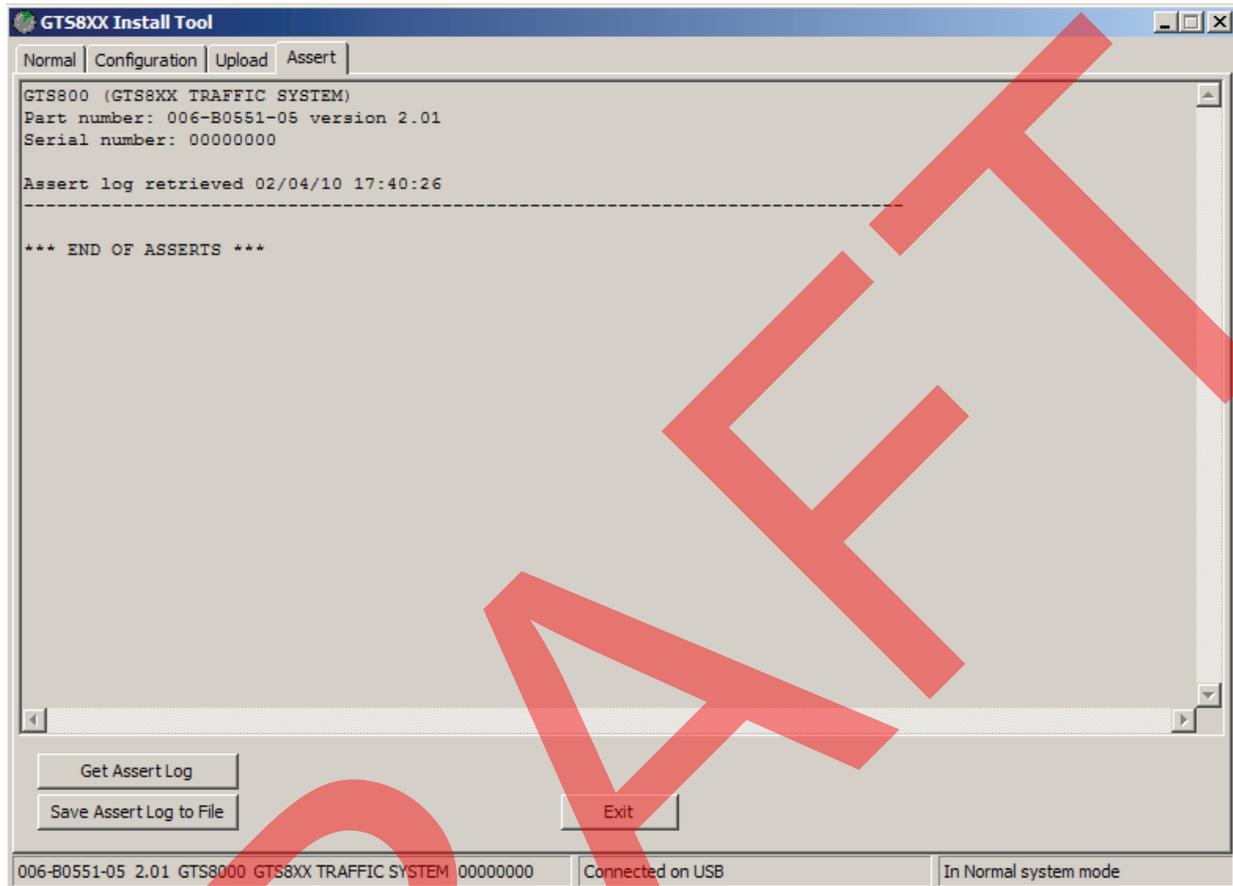


Figure 3-15 GTS Processor Install Tool – Assert Tab

3.9.3 Suppression Bus I/O Check

Other equipment onboard the aircraft may transmit and receive in the same frequency band as the GTS Processor (e.g. DME or transponder). Mutual Suppression is a synchronous pulse that is sent to other equipment to suppress transmission of a competing transmitter/receiver for the duration of the pulse train transmission. In order to limit mutual interference the GTS Processor transmission may be suppressed by other onboard equipment, and other onboard equipment may be suppressed by the GTS Processor. This will prevent a TA from being issued from an onboard transponder.

Perform a test of the GTS Processor Suppression Bus I/O by following these steps:

1. Ensure the GTS Processor is in Operate mode and the onboard transponder is in Airborne mode.
2. Verify there is no TA issued on or near own-aircraft position. If a TA occurs at own-aircraft position, ensure the Suppression I/O (P8002 pin 48) is properly connected to the Suppression I/O pin of the onboard transponder.

3.9.4 CDTI (Cockpit Display of Traffic Information) Display Setup and Configuration

For configuration of the displays, refer to their respective manuals.

- 500 Series Installation Manual (190-00181-02)
- GMX 200 Installation Manual (190-00607-04)
- GDU 620 Installation Manual (190-00601-04)
- GTS Processor System Maintenance Manual (190-00587-51)
- G1000 System Maintenance Manual LJ/VLJ (190-00903-00)

3.9.5 Calibration/Self Test

A self-test feature tests the (aural) alarm, attempts self calibration, and activates each display element in a pre-determined sequential pattern to allow visual verification that display outputs issued by the digital processor can be correctly interpreted by the pilot.

NOTE

Self tests may be performed indoors but signal multi-path from building walls may be a factor. If problems are experienced, self tests should be performed outside away from buildings, and where local traffic is not a factor.

With the GTS Processor powered up and Standby indicated on the CDTI, cycle the GTS Processor to Self Test. The self test feature of the GTS Processor tests the following internal parameters as well as performs calibration of various components in the GTS Processor:

NOTE

For helicopter installations without a squat switch, and wired as described in Note 6 of Appendix B, select standby mode on the CDTI and initiate the self test within 8 seconds before the unit changes back to operate mode.

- a) Calibration Data fault – Stored factory calibration parameters are invalid. Return unit to Garmin for service.
- b) Configuration Data fault – Stored system configuration parameters are invalid or Mode S address is invalid (All 0's or F's). Fault will persist until configuration is corrected. Attempt configuration per the Configuration Section 3.8.2. Download the assert log and send to Garmin for diagnosis per Assert Tab info in Section 3.8.2.
- c) FPGA fault – Check of the FPGA image failed. Fault will persist until valid FPGA image is loaded. If upload of FPGA image was recently attempted, retry the upload. Otherwise, return unit to Garmin for service.
- d) ROM fault – Internal non-volatile memory failure, or invalid data image detected. If upload of audio image or IGRF magnetic field image was recently attempted, retry the upload. Otherwise return unit to Garmin for service.
- e) Execution fault – CPU execution fault has occurred. Cycle power and retry self test. Download the assert log and send to Garmin for diagnosis per Assert Tab info in Section 3.8.2. If fault persists, return unit to Garmin for service.
- f) Electrical fault – One of the internal electrical voltages are out of range. Fault will persist until power is cycled. Check aircraft power supply. Download the assert log and send to Garmin for diagnosis per Assert Tab info in Section 3.8.2. If fault persists, return unit to Garmin for service.

-
- g) Whisper Shout fault – Transmitted power is out of tolerance. Check cable loss configuration, antenna installation and all cable connections and retry self test. If fault persists, return unit to Garmin for service.
 - h) Transmit Power fault - One of the internal transmitter power source voltages are out of range. Fault will persist until power is cycled. Check aircraft power supply. If fault persists, return unit to Garmin for service.
 - i) 1030 MHz fault - Transmit Frequency synthesizer is not locked. Cycle power and retry self test. If fault persists, return unit to Garmin for service.
 - j) 1090 MHz fault - Receive Frequency synthesizer is not locked. Cycle power and retry self test. If fault persists, return unit to Garmin for service.
 - k) Receiver Cal fault. Check antenna installation and all cable connections and retry self test. Ensure that self test occurs in area free of buildings and large objects that can reflect signals. Download the assert log and send to Garmin for diagnosis per Assert Tab info in Section 3.8.2. If fault persists, return unit to Garmin for service.

NOTE

Receiver self-calibration is performed prior to the transmitter self-calibration. In the event that a receiver calibration fault occurs, a transmitter self-calibration will not be performed.

- l) Transmitter Cal fault. Check antenna installation and all cable connections and retry self test. Ensure that self test occurs in area free of buildings and large objects that can reflect signals. Download the assert log and send to Garmin for diagnosis per Assert Tab info in Section 3.8.2. If fault persists, return unit to Garmin for service.

NOTE

A transmitter self-calibration can only be performed after a successful receiver self-calibration.

- m) Baro Altitude fault – Own ship barometric altitude calculation is invalid or has timed out. Check wiring to source of barometric altitude and ensure that source is operating. Fault will clear as soon as valid barometric altitude data is received.
- n) Temperature fault – Main board temperature or RF receiver temperature is greater than 100° Celsius or less than -60° Celsius. Fault will persist until internal temperature returns to acceptable range. Download the assert log and send to Garmin for diagnosis per Assert Tab info in Section 3.8.2.
- o) TCAS Equipage fault – TCAS Equipage data is not being received or has timed out for 800ms. Check wiring to TCAS Equipage data source and ensure that source is operating. Fault will clear as soon as valid TCAS Equipage data is received.
- p) Radio Altitude fault - Radio Altimeter has not remained active for five or more consecutive updates within the first ten surveillance updates after power up or reset, or the radio altitude status has been inactive for three or more consecutive seconds after the first ten seconds of operation. Check wiring to source of radio altitude and ensure that source is operating. Fault will clear as soon as valid radio altitude data is received.

The self test feature also checks the following external parameters:

- a) Mag Variation Available status – Magnetic variation data (difference between ‘True’ North and Magnetic North) is available.
- b) GPS Available status – GPS Position, Velocity and Time source is configured and valid data is available. Otherwise source is not configured, data is not available or data is not valid.
- c) Display #1 Active status – Traffic display #1 discrete input is active.
- d) Display #2 Active status – Traffic display #2 discrete input is active.
- e) Radio Altitude Available status – Radio altimeter source is configured, and valid data is available. Otherwise source is not configured, data is not available, or data is not valid.
- f) Mag Heading Available status – Magnetic heading source is configured, and valid data is available. Otherwise source is not configured, data is not available, or data is not valid.
- g) Airborne Self Test Allowed status – Self test while airborne is allowed if active, otherwise self test can only be initiated on the ground.

When the display receives an indication that a pilot initiated Self Test is in progress, this state is clearly annunciated on the traffic display and the following test patterns will be executed.



Figure 3-16 Self Test

Table 3-5 Self Test

Intruder #1 (transmitted in intruder number field)	
	2.0 NM
	Vertical Rate = Climbing, relative altitude = -200 feet
	TA, Bearing = -90 degrees
Intruder #2 (transmitted in intruder number field)	
	3.625 NM
	Vertical Rate = Descending, relative altitude = -1,000 feet
	Prox Traffic, Bearing = +33.75 degrees
Intruder #3 (transmitted in intruder number field)	
	3.625 NM
	No vertical rate, relative altitude = +1,000 feet
	Other traffic, bearing = -33.75 degrees.

Audio annunciation shall be:

GTS 825 - "TAS system Passed" or "TAS system Failed"

GTS 855 - "TCAS I system Passed" or "TCAS I system Failed"

GTS 8000 - "TCAS II system Passed" or "TCAS II system Failed"

Any faults and flags are also displayed on the Normal Tab of the GTS Processor Install Tool. Faults that occur will be colored in red and flags will be colored in black.

If self test fails, refer to the diagnostics data to determine a cause.

Ensure that no Intruder appears at close range to own aircraft.

NOTE

If the intruder appears at close range to own aircraft, verify that the mutual suppression line is connected between GTS Processor and other L-band equipment (transponder, DME, etc.).

3.9.6 Ramp Test and Return To Service Test

NOTE

For helicopter installations with the traffic system status valid discrete output wired to the air/ground discrete input, the ground test must be performed with the squat 'on-ground' sense temporarily configured as 'ground'. After performing the ground test, reconfigure the squat 'on-ground' sense to 'open'.

NOTE

Garmin Integrated Flight Deck HSDB installations with GDU software versions prior to 11.10 require the USB interface dongle cable (Appendix B) to allow use of the GTS Processor Install Tool to simulate flight conditions such as altitude of 50,000 feet, gear up, etc (Section 3.8.2). Garmin Integrated Flight Deck HSDB installations with GDU software versions 11.10 and newer can access the Ground Test from the MFD to perform these tests. Consult Garmin for details.

For Garmin Integrated Flightdeck HSDB installations with GDU Software Versions prior to 11.10: Activate ground test mode by clicking 'Enable' in the Ground Test field on the Normal Tab of the GTS Processor Install Tool.



Figure 3-17 Ground Test Enable, GTS Processor Install Tool

For Garmin Integrated Flightdeck HSDB installations with GDU Software Versions 11.10 and newer:

The Ground Test command is accessed from the MFD in normal mode while the aircraft is on the ground by pressing the softkey sequence 3, 4, 4, 3. After pressing the softkeys in sequence, a 'GND TEST' softkey appears, to allow the user to activate/deactivate the Ground Test. Press the 'GND TEST' softkey to begin the procedure.



Figure 3-18 GND TEST Softkey

Ground Test Procedure:

The GTS Processor must be in Ground Test mode to select a scenario that will properly converge and intercept the GTS Processor. The aircraft must be on the ground and the GTS Processor must be in Normal System mode and in Standby, to enable Ground Test mode.

NOTE

The GTS Processor will not accept the Ground Test command unless the unit is in Standby and the squat switch indicates the aircraft is on the ground.

NOTE

Configure Squat 'on-ground' sense as Open if no sense switch is installed. Leave Air/Ground* discrete Open. Configuration of Gear/Wheel as 'Fixed' will cause system to ignore the Gear Down and Locked* discrete input. See Appendix B (Notes 6 and 7) and Figure B-9 for Air/Ground* and Gear Down And Locked* discrete inputs.

The Ground Test simulates the GTS to be airborne at 50,000 ft with magnetic heading of 0°.

Use a ramp tester, such as a TIC TR220 or equivalent, to make the following setup and measurements to verify GTS Processor operational and surveillance functionality.

1. Position the test set directional antenna with a clear line of sight to the GTS Processor antenna at 90 degrees.
2. With the GTS Processor powered up and in Standby mode (indicated on the CDTI), cycle the GTS Processor to "Operate".
3. Select the following scenario:
Intruder Type—ATCRBS Intruder Start Distance—10 NM
Intruder Start Altitude—50,000 ft Vertical Speed—0 fpm
Velocity—360 Kts
4. Initiate the intruder scenario and verify that the following occurs:
 - a. Traffic should be acquired at approximately 10 NM at 90 degree bearing and co-altitude. Observe intruder closes on own aircraft at a rate of .1 NM/sec. Verify that only a single target is displayed in the expected quadrant.
 - b. The intruder should transition from Other Traffic (displayed as an open diamond with 00 displayed above), to proximate traffic (displayed as a filled white diamond with 00 displayed above), to a Traffic Advisory (TA) alarm.
 - c. The appropriate TA symbology (yellow filled circle with 00 displayed above) is displayed, for GTS 855/GTS 825 installations an audio annunciation of "Traffic! 3 O'clock! Same Altitude! 3 Miles!" is issued, when the intruder approaches within 3 NM. For GTS 8000 installations, audio annunciations per DO-185B will be spoken (Traffic! Traffic!).

NOTE

When a GTS Processor is configured not to have a Radar Altimeter installed and the gear is extended (in a retractable gear aircraft), the audio annunciation of Traffic will be inhibited.

3.9.7 Antenna Verification

NOTE

The GTS Processor must be in Ground Test mode to perform the antenna verification. Refer to Section 3.8.6 for Ground Test mode information.

The first step in antenna verification is to verify auto-calibration operates without indicating a fault.

1. With the GTS Processor powered up and “Standby” indicated on the CDTI (Cockpit Display of Traffic Information) cycle the GTS Processor to “Operate”. Each time the GTS Processor transitions between these modes, a self test of the antenna circuit is initialized. If the antenna connection is not correct the CDTI will display “Failure” indicating it will be necessary to recheck the antenna coaxial connections. If the CDTI displays “Operate” without indicating a fault, proceed to the next step of antenna verification.

Using a ramp tester, such as a TIC TR220 or equivalent, make the following set up and measurements to ensure the antenna is properly connected and the GTS Processor is operational.

2. Position the test set directional antenna with a clear line of sight to the GTS Processor antenna.
3. Ensure that the transmitter or receiver (RX/TX) under test is significantly closer to the ramp tester than another operating RX/TX, or erroneous and inaccurate results may occur. All four quadrants (forward, starboard, aft, and port) will be similarly tested to verify bearing of simulated intruder supplied via the ramp tester are correctly displayed on the CDTI.
4. Using the ramp tester, select the proper antenna gain and distance to aircraft.
5. Position ramp test set at 0 degrees.
6. Turn the test set on.
7. Connect the directional antenna to the ramp test set.
8. Set the multifunction test set to perform “TCAS” testing. Configure the GTS Processor to the normal operating mode.
9. Program a static intruder per the following scenario:

NOTE

See ramp test set operators manual to set the following parameters

Intruder Start Distance–2 NM

Intruder Start Altitude–50,000

Vertical Speed–0 fpm

Velocity–0 Kts

10. Set the intruder type as ATCRBS.
11. Verify a target is annunciated on the GTS Processor TAS/TCAS display at the correct bearing of approximately 0 degree azimuth at 2 NM and co-altitude (read as 00 above a filled diamond indicating proximate traffic).
12. Toggle intruder traffic to standby or off.
13. Reposition ramp test set and directional antenna to a starboard position of 90 degrees.
14. Reengage the same intruder scenario as above.
15. Verify a target is annunciated on the GTS Processor TAS/TCAS display at the correct bearing of approximately 90 degree azimuth at 2 NM and co-altitude.

-
16. Toggle intruder traffic to standby or off.
 17. Reposition ramp test set and directional antenna to an aft position of 180 degrees.
 18. Reengage the same intruder scenario as above.
 19. Verify a target is annunciated on the GTS Processor TAS/TCAS display at the correct bearing of approximately 180 degree azimuth at 2 NM and co-altitude.
 20. Toggle intruder traffic to standby or off.
 21. Reposition ramp test set and directional antenna to a port position of 270 degrees.
 22. Reengage the same intruder scenario as above.
 23. Verify a target is annunciated on the GTS Processor TAS/TCAS display at the correct bearing of approximately 270 degree azimuth at 2 NM and co-altitude.
 24. Toggle intruder traffic to standby or off
 25. If the bearing is not as anticipated, recheck the antenna coaxial connections by verifying the following:
 - Connections are made to the proper channels and color-coded heat shrink is the same color on both ends of cable
 - TNC connectors are correctly installed on cables
 - Correct antenna type is selected in the configuration

NOTE

If multiple targets are displayed during the antenna tests, recheck the antenna coaxial connections.

3.10 Continued Airworthiness

Maintenance of the GTS Processor is “on condition” only.

Antennas installed in lightning zone 1A of the aircraft require a cable check (verify the connectors are on tight) following a lightning strike to the antenna.

NOTE

It is the installer’s responsibility to properly document any Instructions for Continued Airworthiness as may be required by the local aircraft certification authorities.

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4 SYSTEM INTERCONNECTS

4.1 GTS Processor Pin Function List

4.1.1 P8001 (Digital)

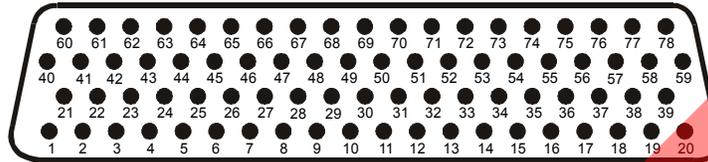


Figure 4-1 View of J8001 connector from back of unit

Table 4-1 P8001 Connector

Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	RS-232 OUT 1	Out
3	RS-232 IN 1	In
4	SIGNAL GROUND	--
5	RS-232 OUT 2	Out
6	RS-232 IN 2	In
7	SIGNAL GROUND	--
8	RS-232 OUT 3	Out
9	RS-232 IN 3	In
10	SIGNAL GROUND	--
11	RS-232 OUT 4	Out
12	RS-232 IN 4	In
13	SIGNAL GROUND	--
14	ARINC 429 OUT 1 A	Out
15	ARINC 429 OUT 1 B	Out
16	ARINC 429 IN 1 A	In
17	ARINC 429 IN 1 B	In
18	SIGNAL GROUND	--
19	GPS PPS 1 IN	In
20	SIGNAL GROUND	--
21	CONFIG MODULE POWER OUT	Out
22	SIGNAL GROUND	--
23	ARINC 429 OUT 2 A	Out
24	ARINC 429 OUT 2 B	Out
25	ARINC 429 IN 2 A	In
26	ARINC 429 IN 2 B	In
27	SIGNAL GROUND	--
28	ARINC 429 OUT 3 A	Out
29	ARINC 429 OUT 3 B	Out
30	ARINC 429 IN 3 A	In
31	ARINC 429 IN 3 B	In
32	SIGNAL GROUND	--
33	ARINC 429 OUT 4 A	Out
34	ARINC 429 OUT 4 B	Out
35	ARINC 429 IN 4 A	In

Table 4-1 P8001 Connector, continued

Pin	Pin Name	I/O
36	ARINC 429 IN 4 B	In
37	RS-422 IN A	In
38	RS-422 IN B	In
39	SIGNAL GROUND	--
40	CONFIG MODULE DATA	I/O
41	SIGNAL GROUND	--
42	ARINC 429 OUT 5 A	Out
43	ARINC 429 OUT 5 B	Out
44	ARINC 429 IN 5 A	In
45	ARINC 429 IN 5 B	In
46	SIGNAL GROUND	--
47	ARINC 429 OUT 6 A	Out
48	ARINC 429 OUT 6 B	Out
49	ARINC 429 IN 6 A	In
50	ARINC 429 IN 6 B	In
51	SIGNAL GROUND	--
52	ETHERNET OUT A	Out
53	ETHERNET OUT B	Out
54	ETHERNET IN A	In
55	ETHERNET IN B	In
56	SIGNAL GROUND	--
57	RS-422 OUT A	Out
58	RS-422 OUT B	Out
59	SIGNAL GROUND	--
60	CONFIG MODULE CLOCK	Out
61	RESERVED	--
62	RESERVED	--
63	RESERVED	--
64	RESERVED	--
65	RESERVED	--
66	RESERVED	--
67	RESERVED	--
68	RESERVED	--
69	SPARE	--
70	SPARE	--
71	SPARE	--
72	SPARE	--
73	GPS PPS IN 2 HI	In
74	GPS PPS IN 2 LO	In
75	USB VBUS POWER	In
76	USB DATA HI	I/O
77	USB DATA LO	I/O
78	USB GROUND	--

4.1.2 P8002 (Analog/Discrete)

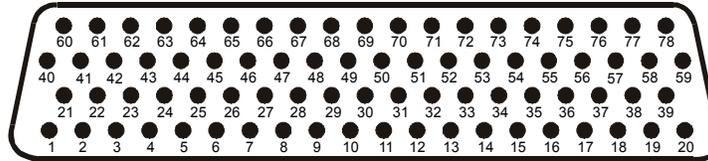


Figure 4-2 View of J8002 connector from back of unit

Table 4-2 P8002 Connector

Pin	Pin Name	Applicable Model**	I/O
1	SIGNAL GROUND		--
2	RA DISPLAY STATUS VALID* 1	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
3	RA DISPLAY STATUS VALID* 2	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
4	RESERVED		--
5	SIGNAL GROUND		--
6	AIR/GROUND*		In
7	SPARE		--
8	TRAFFIC DISPLAY 1 STATUS VALID*		In
9	TRAFFIC DISPLAY 2 STATUS VALID*		In
10	GEAR DOWN AND LOCKED*		In
11	ADVISORY INHIBIT* 1		In
12	ADVISORY CANCEL*		In
13	RESERVED		--
14	SELF TEST INHIBIT PROGRAM*		In
15	CLIMB INHIBIT* 1	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
16	CLIMB INHIBIT* 2	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
17	INCREASED CLIMB INHIBIT* 1	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
18	INCREASED CLIMB INHIBIT* 2	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
19	PERFORMANCE LIMIT*	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
20	RESERVED		--
21	SIGNAL GROUND		--
22	RESERVED		--
23	RESERVED		--
24	RESERVED		--
25	RESERVED		--
26	RESERVED		--
27	RESERVED		--
28	RESERVED		--

*Denotes that the signal is Active Low. Refer to Section 4.5.4 for signal description.

**Items in this column denote pin information specific to the listed model. Pin information applies to all models (GTS 8000, GTS 855, and GTS 825) if blank.

Table 4-2 P8002 Connector, continued

Pin	Pin Name	Applicable Model**	I/O
29	RESERVED		--
30	RESERVED		--
31	RESERVED		--
32	RESERVED		--
33	RESERVED		--
34	RESERVED		--
35	RESERVED		--
36	RESERVED		--
37	RESERVED		--
38	RESERVED		--
39	SIGNAL GROUND		--
40	SIGNAL GROUND		--
41	HEADING X HI		In
42	HEADING X LO (GROUND)		--
43	SIGNAL GROUND		--
44	HEADING Y HI		In
45	HEADING Y LO (GROUND)		--
46	SIGNAL GROUND		--
47	SPARE		--
48	EXTERNAL SUPPRESSION I/O		I/O
49	SIGNAL GROUND		--
50	ANNUN* 1 (CORRECTIVE RA)***	GTS 8000	Out
	ANNUN* 1 (TA DISPLAY ENABLE)***	GTS 855/GTS 825	Out
51	ANNUN* 2 (PREVENTIVE RA)***	GTS 8000	Out
	ANNUN* 2 (AURAL TA)***	GTS 855/GTS 825	Out
52	SPARE		--
53	ANNUN* 3 (VISUAL TA)		Out
54	TRAFFIC SYSTEM STATUS VALID*		Out
55	RESERVED		--
56	ADVISORY INHIBIT* 2	GTS 8000	In
	RESERVED	GTS 855/GTS 825	--
57	SIGNAL GROUND		--
58	ALERT AUDIO OUT HI		Out
59	ALERT AUDIO OUT LO		Out
60	HEADING Z HI (GROUND)		In
61	HEADING Z LO (GROUND)		--
62	SIGNAL GROUND		--
63	26 VAC HEADING REF HI		In
64	26 VAC HEADING REF LO		In
65	SIGNAL GROUND		--
66	SPARE		--
67	SPARE		--
68	HEADING VALID		In
69	HEADING VALID*		In
70	SIGNAL GROUND		--

*Denotes that the signal is Active Low. Refer to Section 4.5.4 for signal description.

**Items in this column denote pin information specific to the listed model. Pin information applies to all models (GTS 8000, GTS 855, and GTS 825) if blank.

***The Annunciator Outputs are configurable to perform the discrete output functions of ARINC 735 A/B.

Table 4-2 P8002 Connector, continued

Pin	Pin Name	Applicable Model**	I/O
71	ANALOG RADAR ALTIMETER HI		In
72	ANALOG RADAR ALTIMETER LO		In
73	SIGNAL GROUND		--
74	SELF TEST INITIALIZE SELECT*		In
75	TRAFFIC OPERATE/STANDBY*		In
76	ANALOG RADAR ALTIMETER VALID		In
77	SPARE		--
78	SIGNAL GROUND		--

*Denotes that the signal is Active Low. Refer to Section 4.5.4 for signal description.

**Items in this column denote pin information specific to the listed model. Pin information applies to all models (GTS 8000, GTS 855, and GTS 825) if blank.

DRAFT

4.1.3 P8003 (Power Supply)

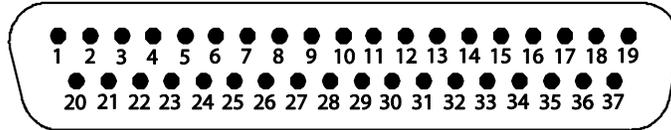


Figure 4-3 View of J8003 connector from back of unit

Table 4-3 P8002 Connector

Pin	Pin Name	I/O
1	POWER GROUND	--
2	AIRCRAFT POWER 1	In
3	AIRCRAFT POWER 1	In
4	AIRCRAFT POWER 2	In
5	AIRCRAFT POWER 2	In
6	POWER GROUND	--
7	RESERVED	--
8	RESERVED	--
9	RESERVED	--
10	RESERVED	--
11	POWER GROUND	--
12	RESERVED	--
13	RESERVED	--
14	POWER GROUND	--
15	RESERVED	--
16	RESERVED	--
17	POWER GROUND	--
18	TRAFFIC SYSTEM REMOTE POWER ON*	In
19	POWER GROUND	--
20	POWER GROUND	--
21	POWER GROUND	--
22	POWER GROUND	--
23	POWER GROUND	--
24	POWER GROUND	--
25	POWER GROUND	--
26	POWER GROUND	--
27	POWER GROUND	--
28	POWER GROUND	--
29	POWER GROUND	--
30	POWER GROUND	--
31	POWER GROUND	--
32	POWER GROUND	--
33	POWER GROUND	--
34	POWER GROUND	--
35	POWER GROUND	--
36	TRAFFIC SYSTEM REMOTE POWER OFF	In
37	POWER GROUND	--

An asterisk (*) following a signal name denotes that the signal is Active Low. Refer to Section 4.5.4 for signal description.

4.2 Power

4.2.1 Aircraft Power Functions

This section covers the power input requirements.

4.2.1.1 Aircraft Power

Table 4-4 Aircraft Power

Pin Name	Connector	Pin	I/O
AIRCRAFT POWER 1	P8003	2	In
AIRCRAFT POWER 1	P8003	3	In
AIRCRAFT POWER 2	P8003	4	In
AIRCRAFT POWER 2	P8003	5	In
POWER GROUND	P8003	21	--
POWER GROUND	P8003	22	--
POWER GROUND	P8003	23	--
POWER GROUND	P8003	24	--

Pins 2 and 3 are internally connected to form AIRCRAFT POWER 1. Pins 4 and 5 are internally connected to form AIRCRAFT POWER 2. AIRCRAFT POWER 1 and AIRCRAFT POWER 2 are “diode ORed” to provide aircraft power redundancy.

4.2.1.2 Remote Power

Table 4-5 Remote Power

Pin Name	Connector	Pin	I/O
TRAFFIC SYSTEM REMOTE POWER ON*	P8003	18	In
TRAFFIC SYSTEM REMOTE POWER OFF	P8003	36	In

An asterisk (*) following a signal name denotes that the signal is Active Low.

Used to remotely control power.

Remote Power ON*

ACTIVE: $V_{in} < 3$ VDC or grounded (Unit ON)

INACTIVE: $V_{in} > 8$ VDC or floating (Unit OFF)

Remote Power OFF

ACTIVE: $V_{in} > 8$ VDC (Unit OFF)

INACTIVE: $V_{in} < 3$ VDC or floating (Unit ON)

Table 4-6 Power On/Off Matrix

Active Low Remote Power On (J8003 Pin 18)		Active High Remote Power Off (J8003 Pin 36)		Expected Unit State
State	Level	State	Level	
Inactive	$V_{in} > 8$ VDC or Open	Inactive	$V_{in} < 3$ VDC or Open	OFF
Active	$V_{in} < 3$ VDC or Gnd	Inactive	$V_{in} < 3$ VDC or Open	ON
Inactive	$V_{in} > 8$ VDC or Open	Active	$V_{in} > 8$ VDC	OFF
Active	$V_{in} < 3$ VDC or Gnd	Active	$V_{in} > 8$ VDC	OFF

4.3 Serial Data

4.3.1 RS-232

Table 4-7 RS-232

Pin Name	Connector	Pin	I/O
RS-232 OUT 1	P8001	2	Out
RS-232 IN 1	P8001	3	In
RS-232 OUT 2	P8001	5	Out
RS-232 IN 2	P8001	6	In
RS-232 OUT 3	P8001	8	Out
RS-232 IN 3	P8001	9	In
RS-232 OUT 4	P8001	11	Out
RS-232 IN 4	P8001	12	In

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

4.3.2 RS-422

Table 4-8 RS-422

Pin Name	Connector	Pin	I/O
RS-422 IN A	P8001	37	In
RS-422 IN B	P8001	38	In
RS-422 OUT A	P8001	57	Out
RS-422 OUT B	P8001	58	Out

The RS-422 channels conform to EIA standard RS-422.

4.3.3 ARINC 429

Table 4-9 ARINC 429

Pin Name	Connector	Pin	I/O
ARINC 429 OUT 1 A	P8001	14	Out
ARINC 429 OUT 1 B	P8001	15	Out
ARINC 429 IN 1 A	P8001	16	In
ARINC 429 IN 1 B	P8001	17	In
ARINC 429 OUT 2 A	P8001	23	Out
ARINC 429 OUT 2 B	P8001	24	Out
ARINC 429 IN 2 A	P8001	25	In
ARINC 429 IN 2 B	P8001	26	In
ARINC 429 OUT 3 A	P8001	28	Out
ARINC 429 OUT 3 B	P8001	29	Out
ARINC 429 IN 3 A	P8001	30	In
ARINC 429 IN 3 B	P8001	31	In
ARINC 429 OUT 4 A	P8001	33	Out
ARINC 429 OUT 4 B	P8001	34	Out
ARINC 429 IN 4 A	P8001	35	In
ARINC 429 IN 4 B	P8001	36	In
ARINC 429 OUT 5 A	P8001	42	Out
ARINC 429 OUT 5 B	P8001	43	Out
ARINC 429 IN 5 A	P8001	44	In
ARINC 429 IN 5 B	P8001	45	In
ARINC 429 OUT 6 A	P8001	47	Out
ARINC 429 OUT 6 B	P8001	48	Out
ARINC 429 IN 6 A	P8001	49	In
ARINC 429 IN 6 B	P8001	50	In

The ARINC 429 outputs conform to ARINC 429 electrical specifications when loaded with up to 5 standard ARINC 429 receivers.

4.3.4 Ethernet

Table 4-10 Ethernet

Pin Name	Connector	Pin	I/O
ETHERNET OUT A	P8001	52	Out
ETHERNET OUT B	P8001	53	Out
ETHERNET IN A	P8001	54	In
ETHERNET IN B	P8001	55	In

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

4.3.5 USB

Table 4-11 USB

Pin Name	Connector	Pin	I/O
USB VBUS POWER**	P8001	75	In
USB DATA HI**	P8001	76	I/O
USB DATA LO**	P8001	77	I/O
USB GROUND	P8001	78	--

**Signals have ESD (Electrostatic Discharge) protection, but not lightning protection. USB TYPE B RECEPTACLE pigtail cable must be wired directly to P8001 to minimize lightning exposure.

This interface is used for unit configuration and software uploads. Conforms to the Universal Serial Bus Version 1.1 standard for a “full-speed” device.

4.4 Configuration

4.4.1 Configuration Module

Table 4-12 Configuration Module

Pin Name	Connector	Pin	I/O
CONFIG MODULE GROUND	P8001	1	--
CONFIG MODULE POWER OUT**	P8001	21	--
CONFIG MODULE DATA**	P8001	40	I/O
CONFIG MODULE CLOCK**	P8001	60	I/O

**Signals have ESD (Electrostatic Discharge) protection, but not lightning protection.

4.5 Analog/Discrete

4.5.1 Heading Input

4.5.1.1 26 Volt AC References

Table 4-13 26 Volt AC References

Pin Name	Connector	Pin	I/O
26 VAC HEADING REF HI	P8002	63	In
26 VAC HEADING REF LO	P8002	64	In

Used to sample AC inputs.

This signal must be the same phase and frequency as the indicator being driven.

Frequency:	400 Hz \pm 10%
Voltage:	22.6 Vrms to 28.6 Vrms
Input Impedance:	>10 k Ω

4.5.1.2 Radar Altimeter

Table 4-14 Radar Altimeter

Pin Name	Connector	Pin	I/O
ANALOG RADAR ALTIMETER HI	P8002	71	In
ANALOG RADAR ALTIMETER LO	P8002	72	In

Provides altitude information during approach. Input voltage range is 0 to 30Vdc. Compatible with Radar Altimeters listed in section 3.5.2.4.

4.5.2 Inputs From Compass System/Directional Gyros

Table 4-15 Inputs From Compass System/Directional Gyros

Pin Name	Connector	Pin	I/O
HEADING X	P8002	41	In
HEADING LO (GROUND)	P8002	42	--
HEADING Y HI	P8002	44	In
HEADING Y LO (GROUND)	P8002	45	--
HEADING Z HI (GROUND)	P8002	60	In
HEADING Z LO (GROUND)	P8002	61	--

Inputs heading information from a directional gyro.

3-wire synchro magnetic heading input, with HEADING Z grounded. Index reference is 0° as specified by ARINC 407.

Frequency:	400Hz ± 10%
Voltage:	11.8 Vrms nominal, 13.0 Vrms maximum
Input Impedance:	>10 kΩ
Resolution:	± 0.1° or better
Accuracy:	± 2°

NOTE

Both the active high Heading Valid discrete and the active low Heading Valid* discrete inputs to the GTS Processor must be valid for heading information to be used by the GTS Processor system.

If the Compass System/Directional Gyro provides an active high Heading Valid discrete output, wire to the GTS Processor active high Heading Valid discrete input, otherwise wire the GTS Processor active high Heading Valid discrete input to the circuit breaker output (14 Vdc or 28 Vdc) for the Compass System/Directional Gyro.

If the Compass System/Directional Gyro provides an active low Heading Valid* discrete output, wire to the GTS Processor active low Heading Valid* discrete input, otherwise wire the GTS Processor active low Heading Valid* discrete input to Ground.

4.5.3 Audio

Table 4-16 Audio

Pin Name	Connector	Pin	I/O
ALERT AUDIO OUT HI	P8002	58	Out
ALERT AUDIO OUT LO	P8002	59	Out

NOTE

Alert Audio shield should only be connected to ground on the Audio Panel end.

4.5.4 Active Low Discrete Inputs

Table 4-17 Active Low Discrete Inputs

Pin Name	Applicable Model**	Connector	Pin	I/O
RA DISPLAY STATUS VALID* 1	GTS 8000	P8002	2	In
RA DISPLAY STATUS VALID* 2	GTS 8000	P8002	3	In
AIR/GROUND*		P8002	6	In
TRAFFIC DISPLAY 1 STATUS VALID*		P8002	8	In
TRAFFIC DISPLAY 2 STATUS VALID*		P8002	9	In
GEAR DOWN AND LOCKED*		P8002	10	In
ADVISORY INHIBIT* 1		P8002	11	In
ADVISORY CANCEL*		P8002	12	In
SELF TEST INHIBIT PROGRAM*		P8002	14	In
CLIMB INHIBIT* 1	GTS 8000	P8002	15	In
RESERVED	GTS 855/ GTS 825			
CLIMB INHIBIT* 2	GTS 8000	P8002	16	In
RESERVED	GTS 855/ GTS 825			
INCREASED CLIMB INHIBIT* 1	GTS 8000	P8002	17	In
RESERVED	GTS 855/ GTS 825			
INCREASED CLIMB INHIBIT* 2	GTS 8000	P8002	18	In
RESERVED	GTS 855/ GTS 825			
PERFORMANCE LIMIT*	GTS 8000	P8002	19	In
RESERVED	GTS 855/ GTS 825			
HEADING VALID*		P8002	69	In
SELF TEST INITIALIZE SELECT*		P8002	74	In
TRAFFIC OPERATE/STANDBY*		P8002	75	In

*Denotes that the signal is Active Low.

ACTIVE: $0\text{ V} \leq V_{in} \leq 3.5\text{ V}$, or $R_{in} \leq 375\text{ ohms}$

INACTIVE: $8\text{ V} \leq V_{in} \leq 36\text{ V}$, or $R_{in} \geq 100\text{k ohms}$

Source current is internally limited to approximately 1 mA max for a grounded input

**Items in this column denote pin information specific to the listed model. Pin information applies to all models (GTS 8000/ GTS 855, and GTS 825) if blank

NOTE

The 'sense' of the AIR/GROUND* and the GEAR DOWN AND LOCKED* Active Low Discrete Inputs are configurable using the GTS Processor Install Tool.

Two discrete inputs (CLIMB INHIBIT* 1 and CLIMB INHIBIT* 2) have been provided to indicate that the aircraft cannot climb at the rate of 1500 feet per minute. The 1500 fpm climb limit condition should be assumed whenever CLIMB INHIBIT* 1 OR CLIMB INHIBIT* 2 are active.

Two discrete inputs (INCREASED CLIMB INHIBIT* 1 and INCREASED CLIMB INHIBIT* 2) have been provided to indicate that the aircraft cannot climb at the rate of 2500 feet per minute. The 2500 fpm climb limit condition should be assumed whenever INCREASED CLIMB INHIBIT* 1 OR INCREASED CLIMB INHIBIT* 2 are active.

Connect ADVISORY INHIBIT* 1 to the audio inhibit output from a higher priority audio source, such as TAWS.

ADVISORY CANCEL*, SELF TEST INITIALIZE SELECT*, and TRAFFIC OPERATE/STANDBY* inputs are driven with pulsed signals. When the switch is activated, these inputs provide the following functionality:

- ADVISORY CANCEL* cancels the audio for the currently playing aural alert (if any). This input can be connected to a Traffic Advisory acknowledge momentary switch to mute TA audio.
- SELF TEST INITIALIZE SELECT* initiates the Self Test function. In normal operating mode, transitions to the active state on this line toggles the intruder altitude filter between UNR (+9,900 ft to -9,900 ft), ABV (+9000 ft to -2700 ft), NRM (+2700 ft to -2700 ft), and BLW (+2700 ft to -9000 ft).
- TRAFFIC OPERATE/STANDBY* toggles between Operate and Standby modes.

4.5.5 Active High Discrete Inputs

Table 4-18 Active High Discrete Inputs

Pin Name	Connector	Pin	I/O
HEADING VALID	P8002	68	In
ANALOG RADAR ALTIMETER VALID	P8002	76	In

ACTIVE: $8\text{ V} \leq V_{in} \leq 36\text{ V}$

INACTIVE: $0\text{ V} \leq V_{in} \leq 3.5\text{ V}$, or $R_{in} \geq 100\text{k ohms}$

Sink current is internally limited to approximately 1 mA typical for an input connected to +28VDC.

4.5.6 Annunciator Output

Table 4-19 Annunciator Output

Pin Name	Applicable Model**	Connector	Pin	I/O
ANNUN* 1 (CORRECTIVE RA)	GTS 8000	P8002	50	Out
ANNUN* 1 (TA DISPLAY ENABLE)	GTS 855/ GTS 825			
ANNUN* 2 (PREVENTIVE RA)	GTS 8000	P8002	51	Out
ANNUN* 2 (AURAL TA)	GTS 855/ GTS 825			
ANNUN* 3 (VISUAL TA)***		P8002	53	Out
TRAFFIC SYSTEM STATUS VALID*		P8002	54	Out

*Denotes that the signal is Active Low.

ACTIVE: $0\text{ V} \leq V_{out} \leq 0.5\text{ V}$ or $R_{out} \leq 10\text{ ohms}$, sinking up to 500 mA

INACTIVE: $R_{out} \geq 100\text{k ohms}$ to ground, withstanding up to +36 VDC.

**Items in this column denote pin information specific to the listed model. Pin information applies to all models (GTS 8000, GTS 855, and GTS 825) if blank

***GTS 855/GTS 825: VISUAL TA stays active throughout a TA, and during a self test. GTS 8000: VISUAL TA, CORRECTIVE RA, and PREVENTIVE RA stay active during their respective state, and only one can be active at a time. VISUAL TA is active during a self test.

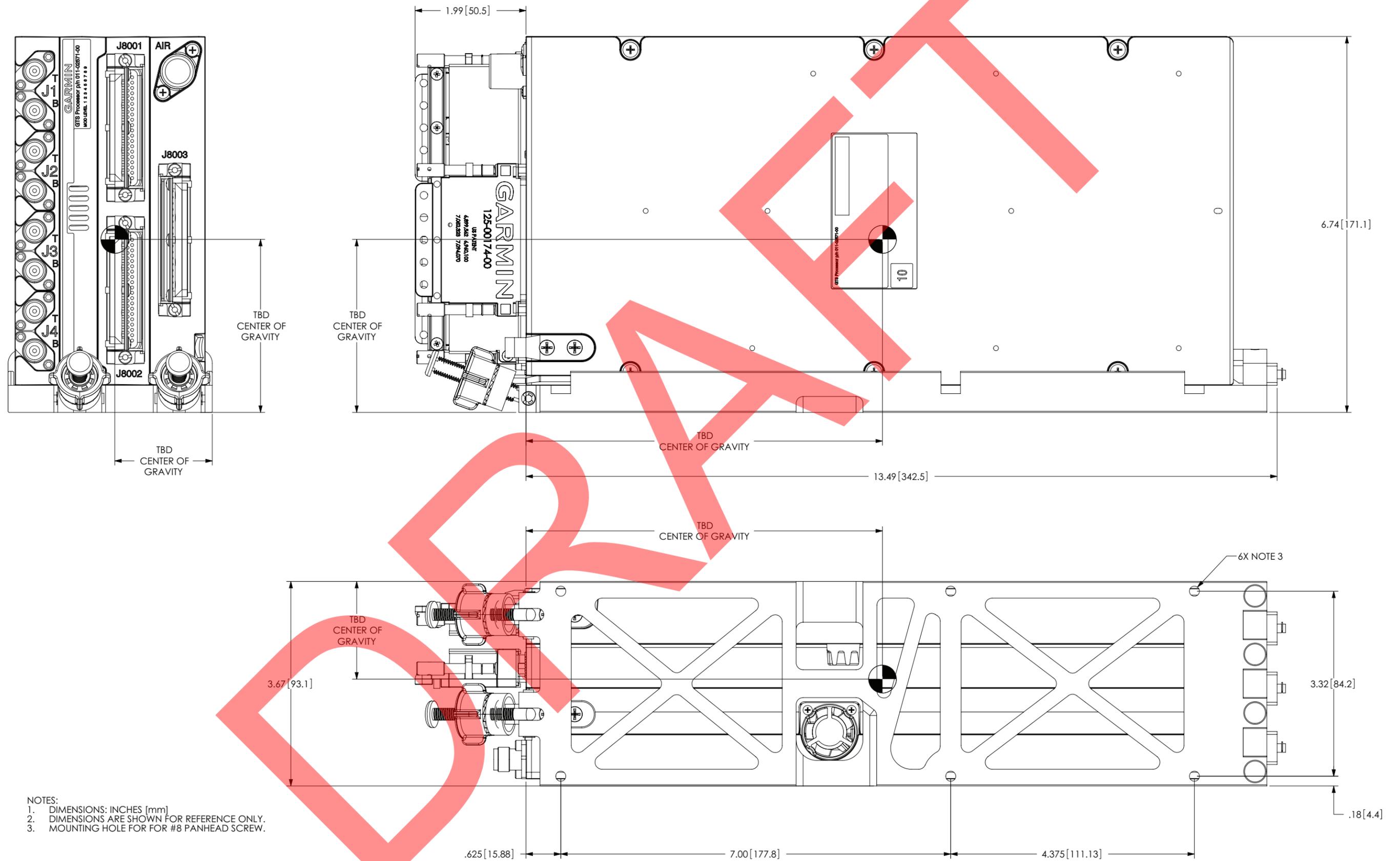
4.6 Mutual Suppression Bus

Table 4-20 Mutual Suppression Bus

Pin Name	Connector	Pin	I/O
EXTERNAL SUPPRESSION I/O	P8002	48	I/O

Mutual Suppression Input/Output bus compliant with ARINC 735A/B Attachment 8, with the exception that the maximum applied DC steady state voltage is +30.3V. Suppression I/O signal is pulsed under normal operation.

APPENDIX A Outline and Installation Drawings



- NOTES:
 1. DIMENSIONS: INCHES [mm]
 2. DIMENSIONS ARE SHOWN FOR REFERENCE ONLY.
 3. MOUNTING HOLE FOR FOR #8 PANHEAD SCREW.

Figure A-1 GTS Processor Vertical Outline Drawing

APPENDIX A Outline and Installation Drawings

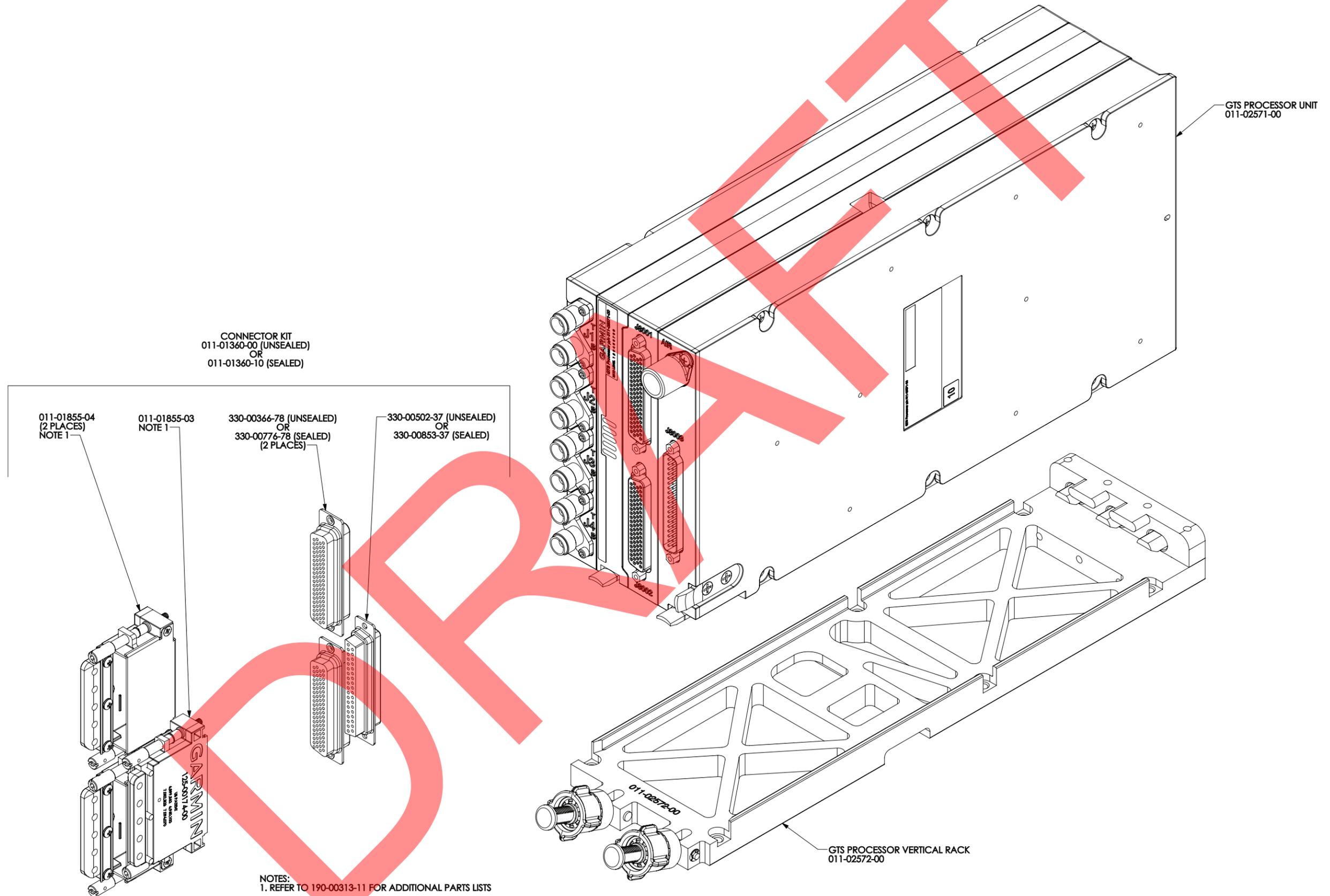
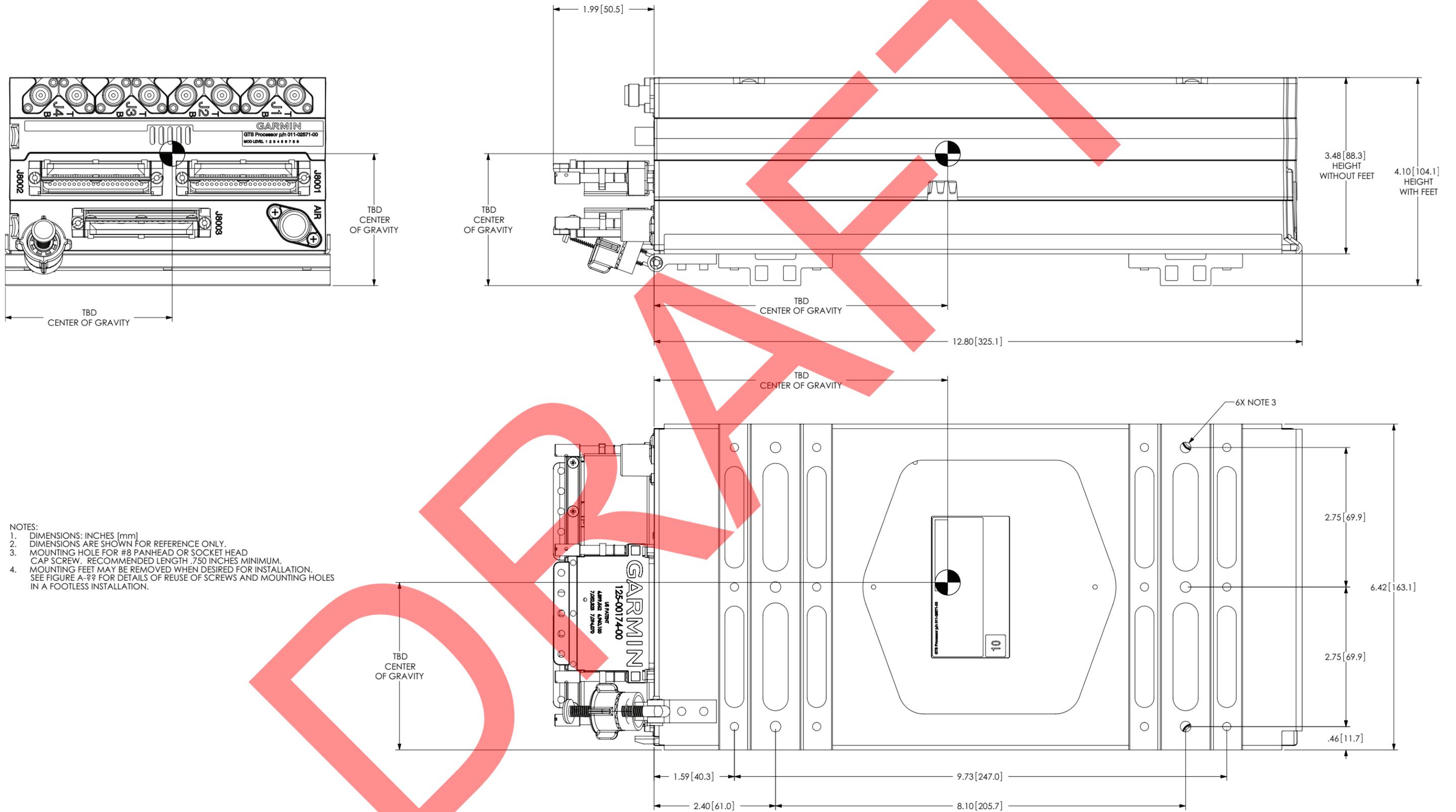


Figure A-2 GTS Processor Vertical Installation Drawing

APPENDIX A Outline and Installation Drawings



- NOTES:
1. DIMENSIONS: INCHES [mm]
 2. DIMENSIONS ARE SHOWN FOR REFERENCE ONLY.
 3. MOUNTING HOLE FOR #8 PANHEAD OR SOCKET HEAD CAP SCREW. RECOMMENDED LENGTH .750 INCHES MINIMUM.
 4. MOUNTING FEET MAY BE REMOVED WHEN DESIRED FOR INSTALLATION. SEE FIGURE A-?? FOR DETAILS OF REUSE OF SCREWS AND MOUNTING HOLES IN A FOOTLESS INSTALLATION.

Figure A-3 GTS Processor Horizontal Outline Drawing

APPENDIX A Outline and Installation Drawings

- NOTES:
1. RACK MAY BE INSTALLED WITH MOUNTING FEET ATTACHED, OR AFTER REMOVAL OF MOUNTING FEET. TO INSTALL RACK WITHOUT MOUNTING FEET, REMOVE FEET AND REUSE SCREWS (QUANTITY 6) IN THE EXTREME FRONT COUNTERSUNK MOUNTING HOLES (3 PLACES) AND THE EXTREME BACK COUNTERSUNK MOUNTING HOLES (3 PLACES).
 2. REFER TO 190-00313-11 FOR ADDITIONAL PARTS LISTS.

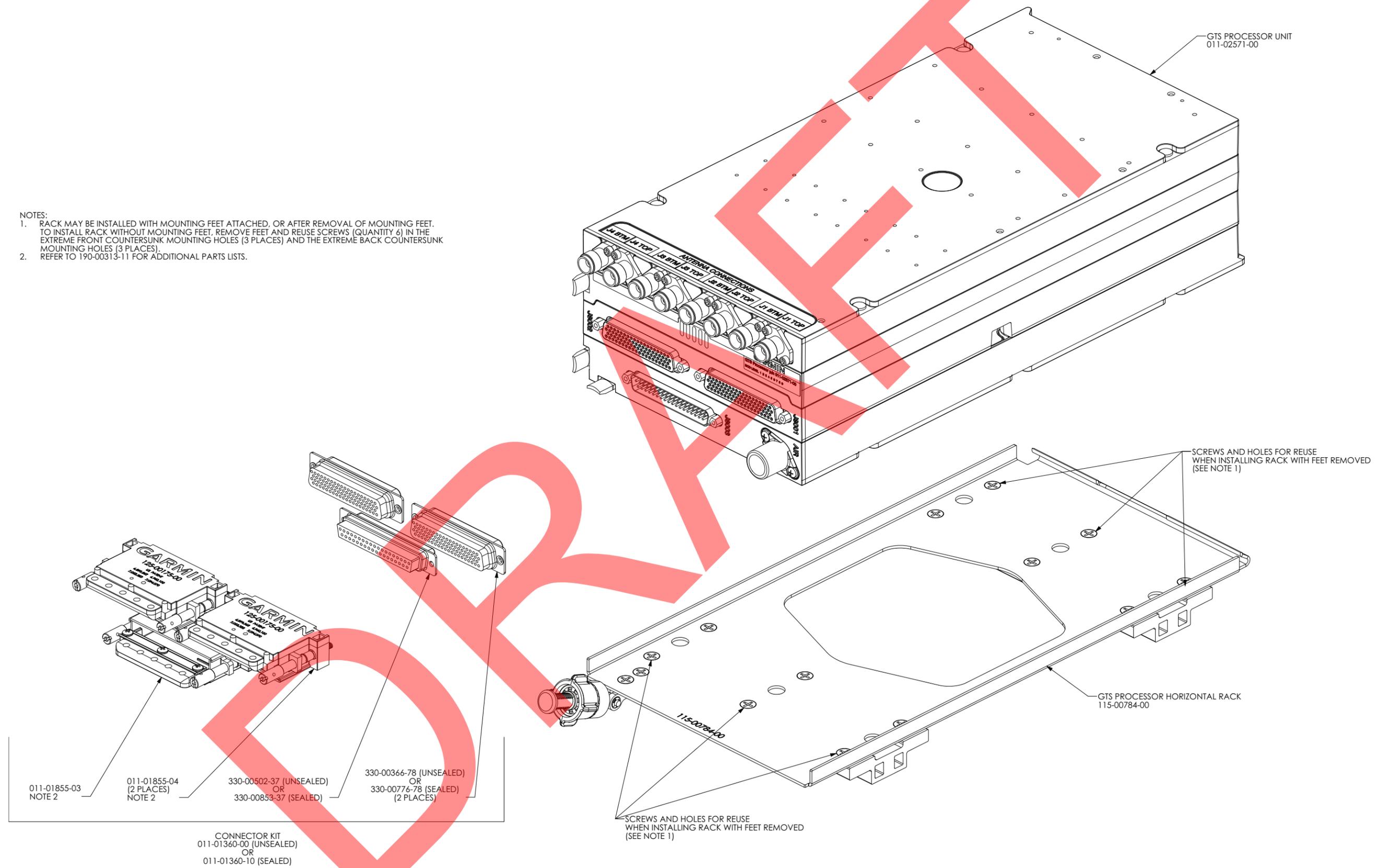


Figure A-4 GTS Processor Horizontal Installation Drawing

APPENDIX B Interconnect Examples

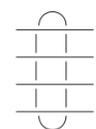
NOTES:

1. UNLESS OTHERWISE NOTED, ALL STRANDED WIRE MUST CONFORM TO MIL-W-22759/16 OR EQUIVALENT
2. UNLESS OTHERWISE NOTED, ALL SHIELDED WIRE MUST CONFORM TO MIL-C-27500 OR EQUIVALENT
3. UNLESS OTHERWISE NOTED, ALL WIRES ARE 24 GAUGE MINIMUM.
4. SYMBOL DESIGNATIONS

 SHIELDED SINGLE CONDUCTOR

 SHIELDED 2 CONDUCTOR

 SHIELDED 3 CONDUCTOR

 SHIELDED 4 CONDUCTOR

 AIRCRAFT GROUND

 GARMIN SHIELD BLOCK GROUND AND CIRCULAR CONNECTOR SHIELD GROUND

 WIRE SPLICE CONNECTION

 COAXIAL CABLE

N/C = NO CONNECTION

5. UNLESS OTHERWISE NOTED, ALL SHIELD GROUNDS MUST BE MADE TO THE RESPECTIVE CONNECTOR BACKSHELLS. ALL OTHER GROUNDS SHOULD BE TERMINATED TO AIRCRAFT GROUND AS CLOSE TO THE RESPECTIVE UNIT AS POSSIBLE.
6. CONFIGURE SQUAT 'ON GROUND' SENSE AS OPEN IF NO SENSE SWITCH IS INSTALLED. LEAVE AIR/GROUND* DISCRETE OPEN. FOR HELICOPTER INSTALLATIONS WITHOUT A SQUAT SWITCH, CONFIGURE SQUAT 'ON GROUND' SENSE AS OPEN, AND WIRE THE TRAFFIC SYSTEM STATUS VALID DISCRETE OUTPUT TO THE AIR/GROUND DISCRETE INPUT FOR NORMAL MODE OPERATION. SEE SECTION 3.10.7 FOR GROUND TEST INSTRUCTIONS. SEE SECTION 3.10.5 FOR SELF TEST INSTRUCTIONS.
7. CONFIGURATION OF GEAR/WHEEL AS FIXED WILL CAUSE SYSTEM TO IGNORE THE GEAR DOWN AND LOCKED* DISCRETE INPUT.
8. REFER TO SECTIONS 2.4 AND 4.3.1.1 FOR ADDITIONAL INFORMATION.
9. GTS 855/825 INSTALLATIONS REQUIRE ARINC 429 IN/OUT CONNECTIONS TO THE GTX 33/33D/330/330D/33ES/33DES/330ES/330DES/328 TRANSPONDER (CONFIGURED WITH "GARMIN TAS" FORMAT) FOR INTERFERENCE LIMITING PURPOSES. IF THE TRANSPONDER IS THE SOURCE OF BAROMETRIC ALTITUDE, A SEPARATE ARINC 429 OUTPUT FROM THE TRANSPONDER (CONFIGURED WITH "GARMIN" FORMAT) MUST BE CONNECTED TO THE GTS 855/825.
GTS 8000 INSTALLATIONS REQUIRE ARINC 429 IN/OUT CONNECTIONS TO A GTX 3000, OR OTHER RTCA DO-185A/B GARMIN-APPROVED COMPATIBLE TRANSPONDER. GTX 3000 BARO ALTITUDE AND TCAS EQUIPAGE DATA ARE PRESENT ON A SINGLE ARINC 429 INTERFACE.
FOR GTS 8000 INTERCONNECTION TO A GTX 3000, TX/XT INTERFACE MUST BE WIRED AS FOLLOWS: FROM GTX 3000 ARINC 429 OUTPUT CHANNEL 4 TO APPROPRIATELY CONFIGURED GTS 8000 ARINC INPUT, AND FROM APPROPRIATELY CONFIGURED GTS 8000 ARINC OUTPUT TO GTX 3000 ARINC 429 INPUT CHANNEL 8.
10. BOTH THE ACTIVE HIGH HEADING VALID DISCRETE AND THE ACTIVE LOW HEADING VAILD* DISCRETE INPUTS TO THE GTS 8XX MUST BE VAILD FOR HEADING INFORMATION TO BE USED BY THE GTS 8XX. SEE SECTION 4.6.2 FOR DETAILED INSTALLATION INFORMATION.
11. A GTX 33/33D/330/330D/328 TRANSPONDER IS REQUIRED FOR ALL GTS 855 AND 825 INSTALLATIONS. A GTX 33/33D/330/330D TRANSPONDER WITH ES (EXTENDED SQUITTER) IS REQUIRED FOR ADS-B. SUPPRESSION I/O IS THE ONLY APPROVED INTERFACE FOR THE GTX 32/320/320A/327 TRANSPONDERS. A GTX 328 TRANPSONDER IS NOT CAPABLE OF EXTENDED SQUITTER AND IS NOT ALLOWED FOR GTS PROCESSOR ADS-B OPERATION. **A GTX 3000, OR OTHER RTCA DO-185A/B GARMIN-APPROVED COMPATIBLE TRANSPONDER, IS REQUIRED FOR ALL GTS 8000 INSTALLATIONS.**
12. **THE GTS PROCESSOR SUPPRESSION I/O PULSES MAY NOT BE COMPATIBLE WITH ALL MODELS OF TRANSPONDERS AND DME UNITS THAT HAVE OUTPUT-ONLY SUPPRESSION, AND CAN BE DAMAGED BY THE GTS PROCESSOR MUTUAL SUPPRESSION OUTPUT. FOR TRANSPONDERS AND DME UNITS THAT HAVE OUTPUT-ONLY SUPPRESSION, AN IN-LINE DIODE MUST BE INSTALLED BETWEEN THE GTS PROCESSOR SUPPRESSION I/O (CATHODE) AND THE OUTPUT-ONLY SUPPRESSION LINE.**
13. IF INSTALLED, **THE USB PIGTAIL MUST BE WIRED DIRECTLY TO THE DSUB CONNECTOR. ALL USB EXTENSION CABLES MUST BE DISCONNECTED DURING FLIGHT.**

Figure B-1 GTS Processor Interconnect Example Notes

APPENDIX B Interconnect Examples

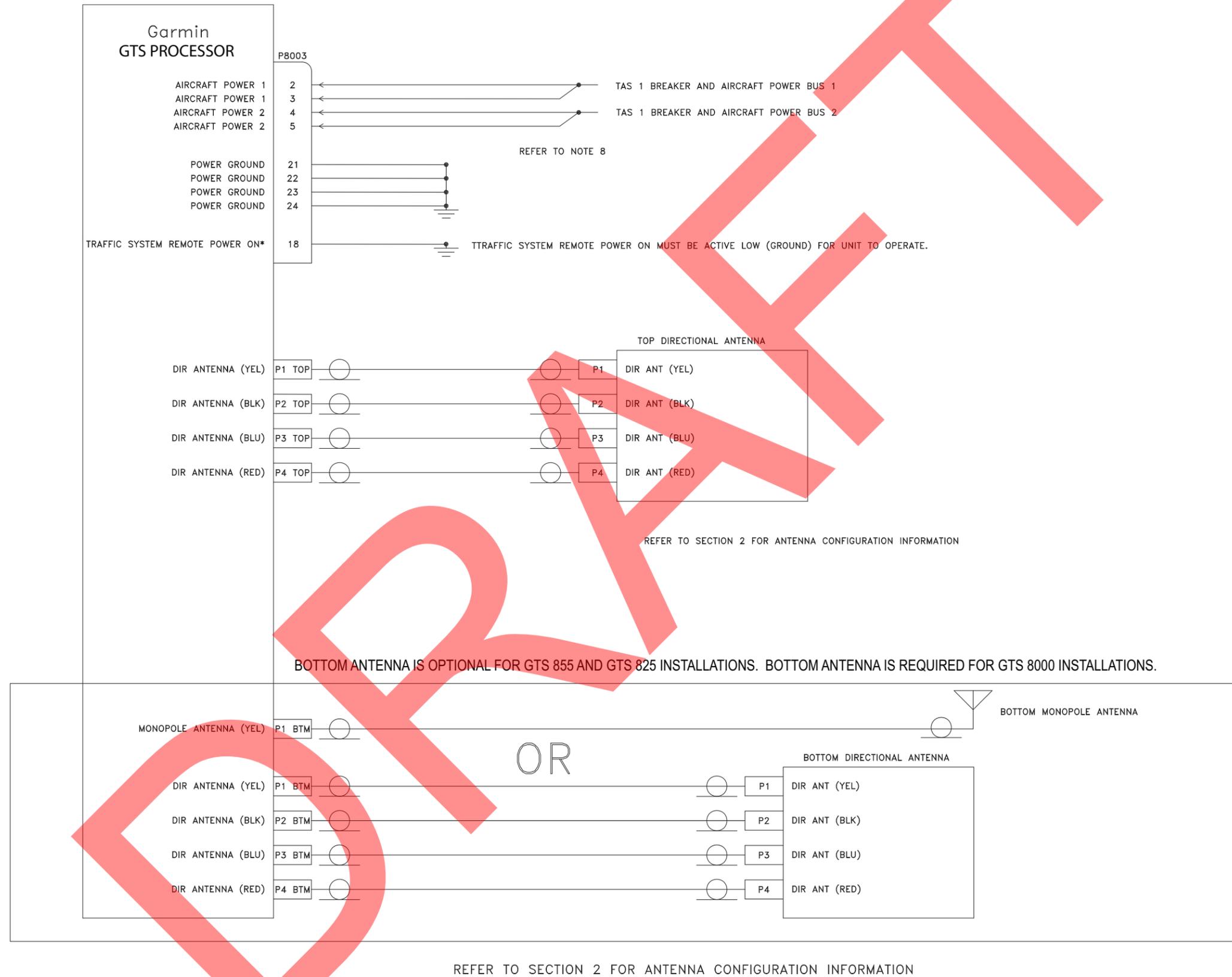


Figure B-2 GTS Processor Interconnect Example

APPENDIX B Interconnect Examples

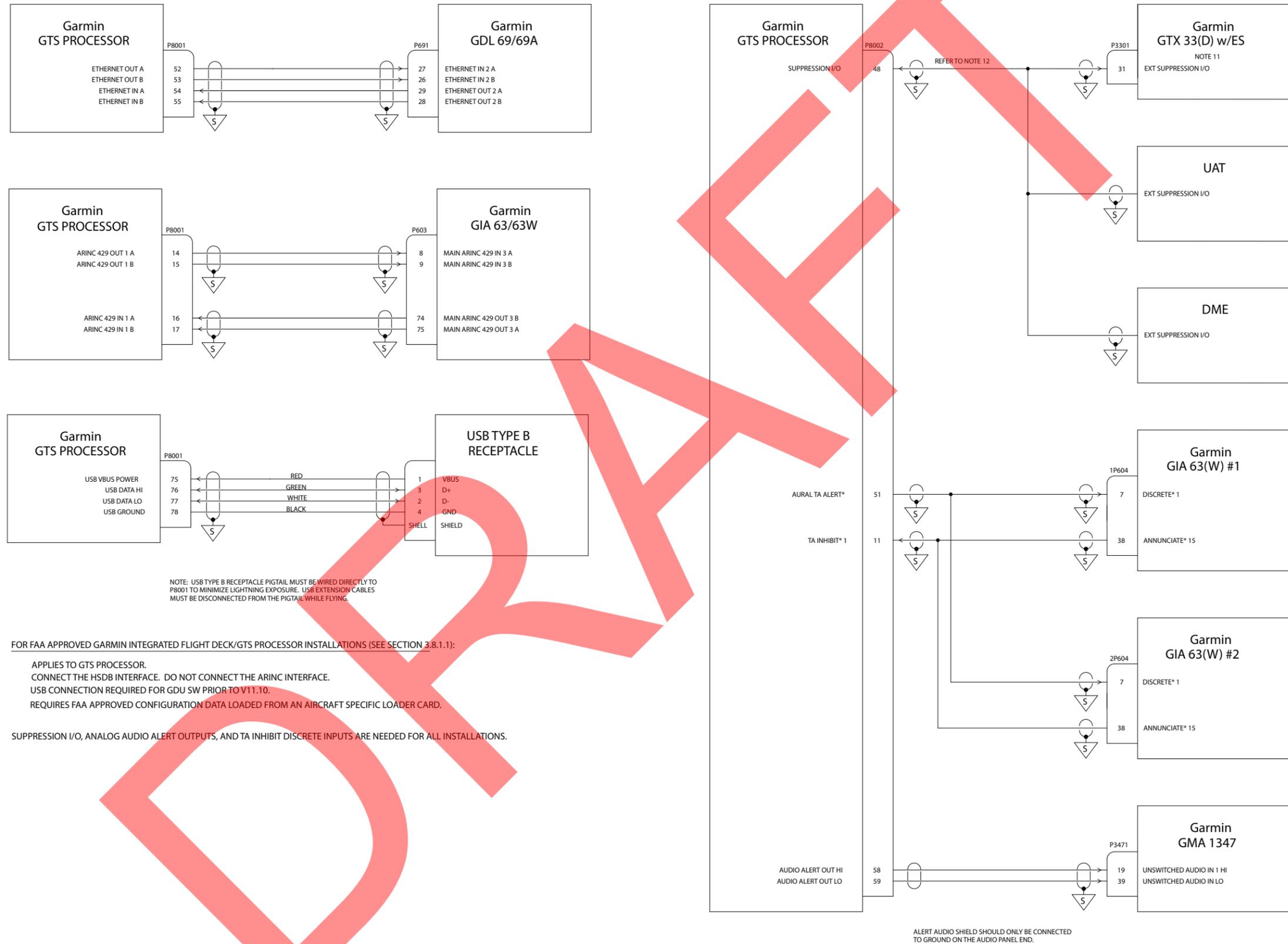
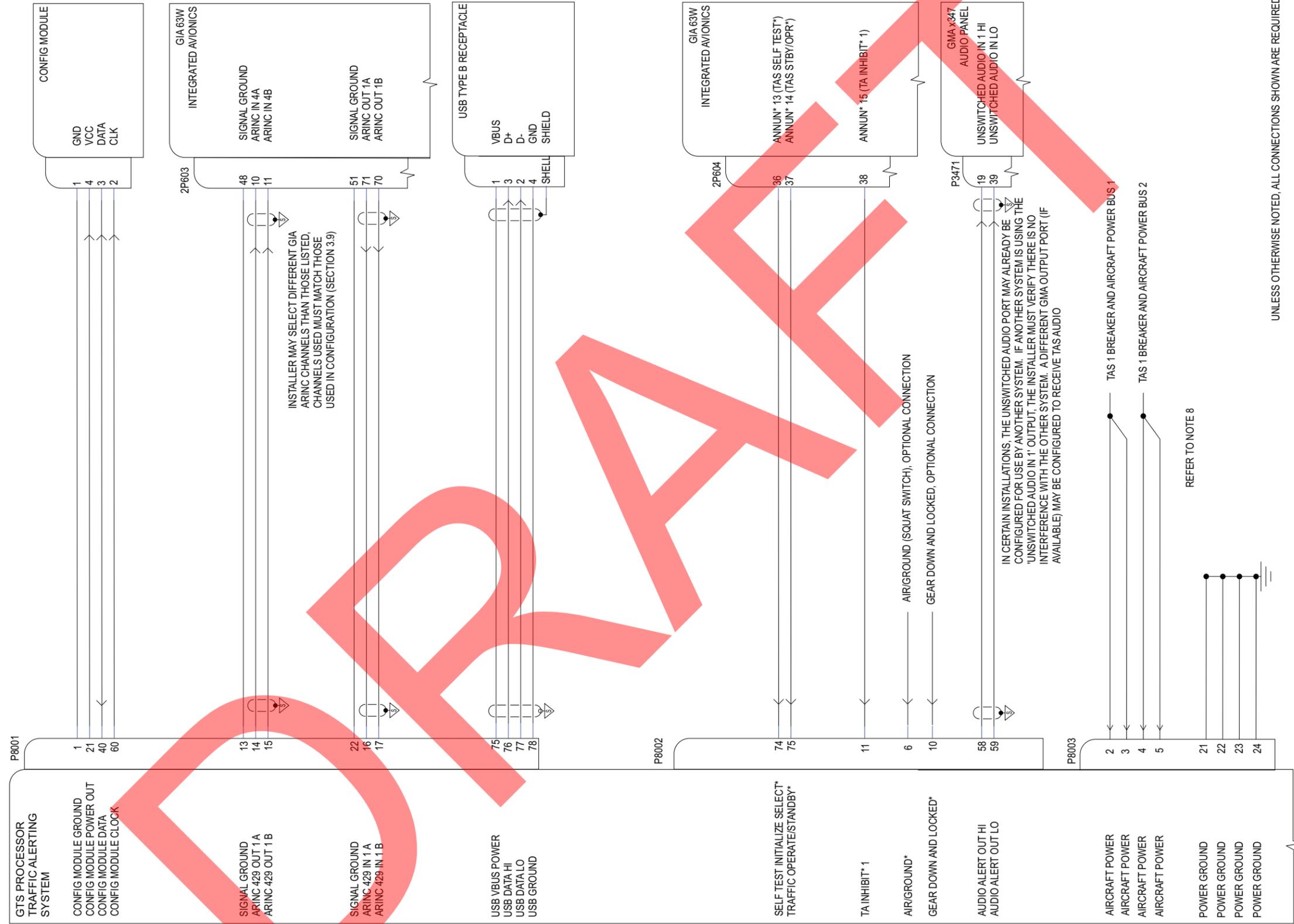


Figure B-3 GTS Processor Garmin Integrated Flight Deck Interconnect Example

APPENDIX B Interconnect Examples



UNLESS OTHERWISE NOTED, ALL CONNECTIONS SHOWN ARE REQUIRED

Figure B-4 GTS Processor Field Approved (Retrofit) Garmin Integrated Flight Deck Interconnect Example

APPENDIX B Interconnect Examples

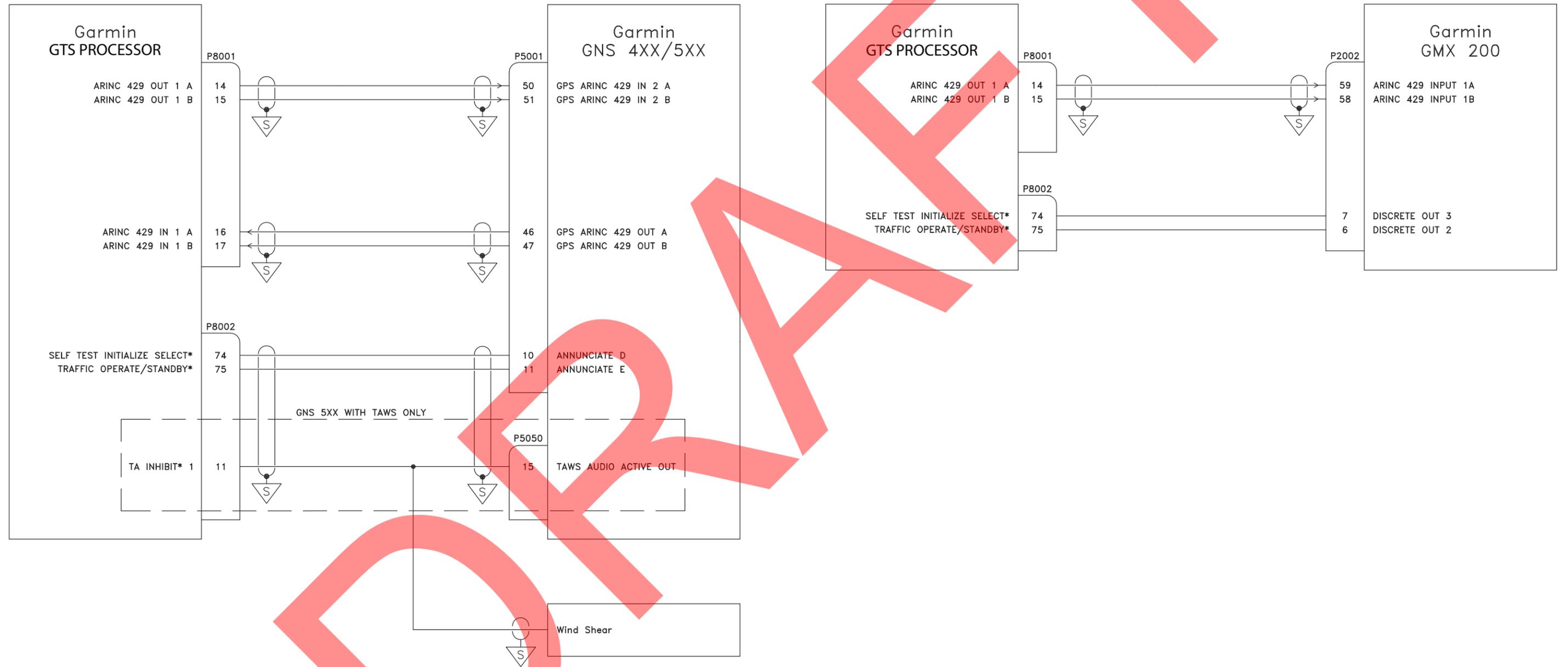
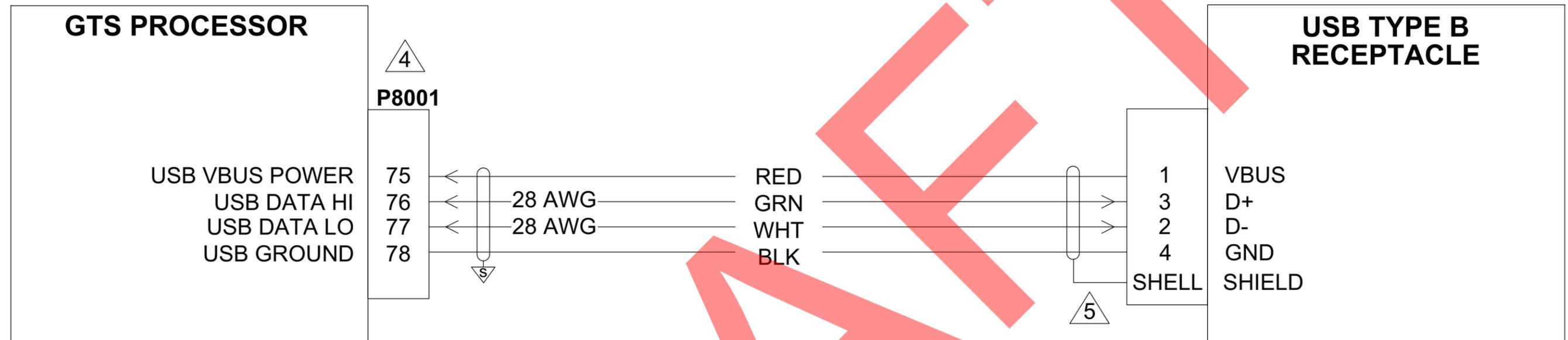


Figure B-5 GTS Processor GNS 4XX/5XX/GMX 200 Interconnect Example



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE SPECIFIED.
2. GROUND DESIGNATIONS:  SHIELD BLOCK GROUND  AIRFRAME GROUND
3. AT THE GTS PROCESSOR, CONNECT SHIELD GROUNDS TO THE CONNECTOR BACKSHELL -- THE SHIELD LEADS MUST BE LESS THAN 3.0 ". CONNECT OTHER SHIELD GROUNDS TO AIRCRAFT CHASSIS OR CONNECTOR BACKSHELL WITH AS SHORT A CONDUCTOR AS PRACTICAL FOLLOWING ANY EQUIPMENT MANUFACTURER'S REQUIREMENTS.
4. USB TYPE B RECEPTACLE PIGTAIL (P/N 011-01782-00) MUST BE WIRED DIRECTLY TO P8001 TO MINIMIZE LIGHTNING EXPOSURE.
5. THE USB PIGTAIL SHIELD DRAIN USES 28 AWG WIRE.

Figure B-7 GTS Processor Dongle Cable (see Sections 3.7 and 3.8.6)

APPENDIX B Interconnect Examples

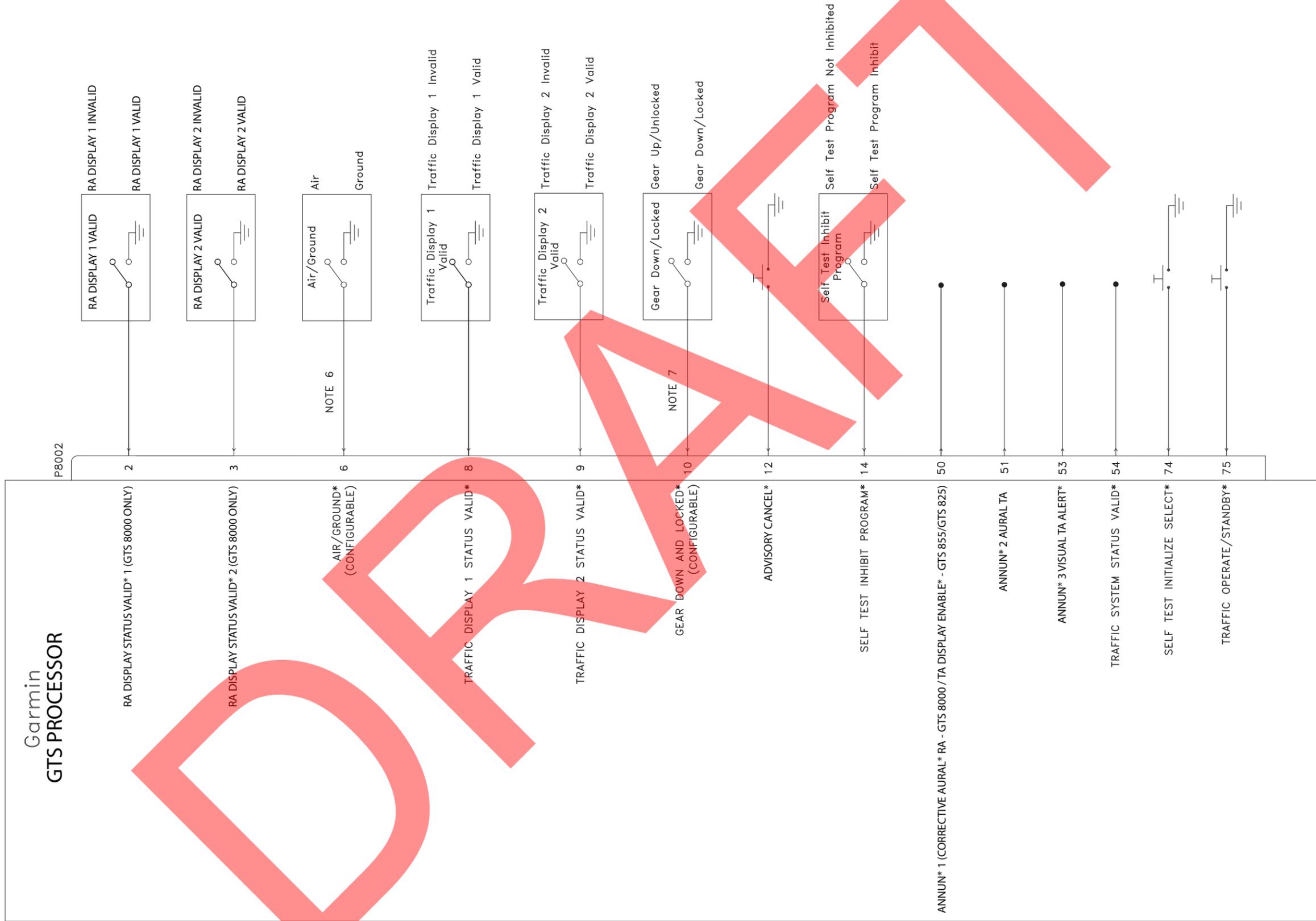
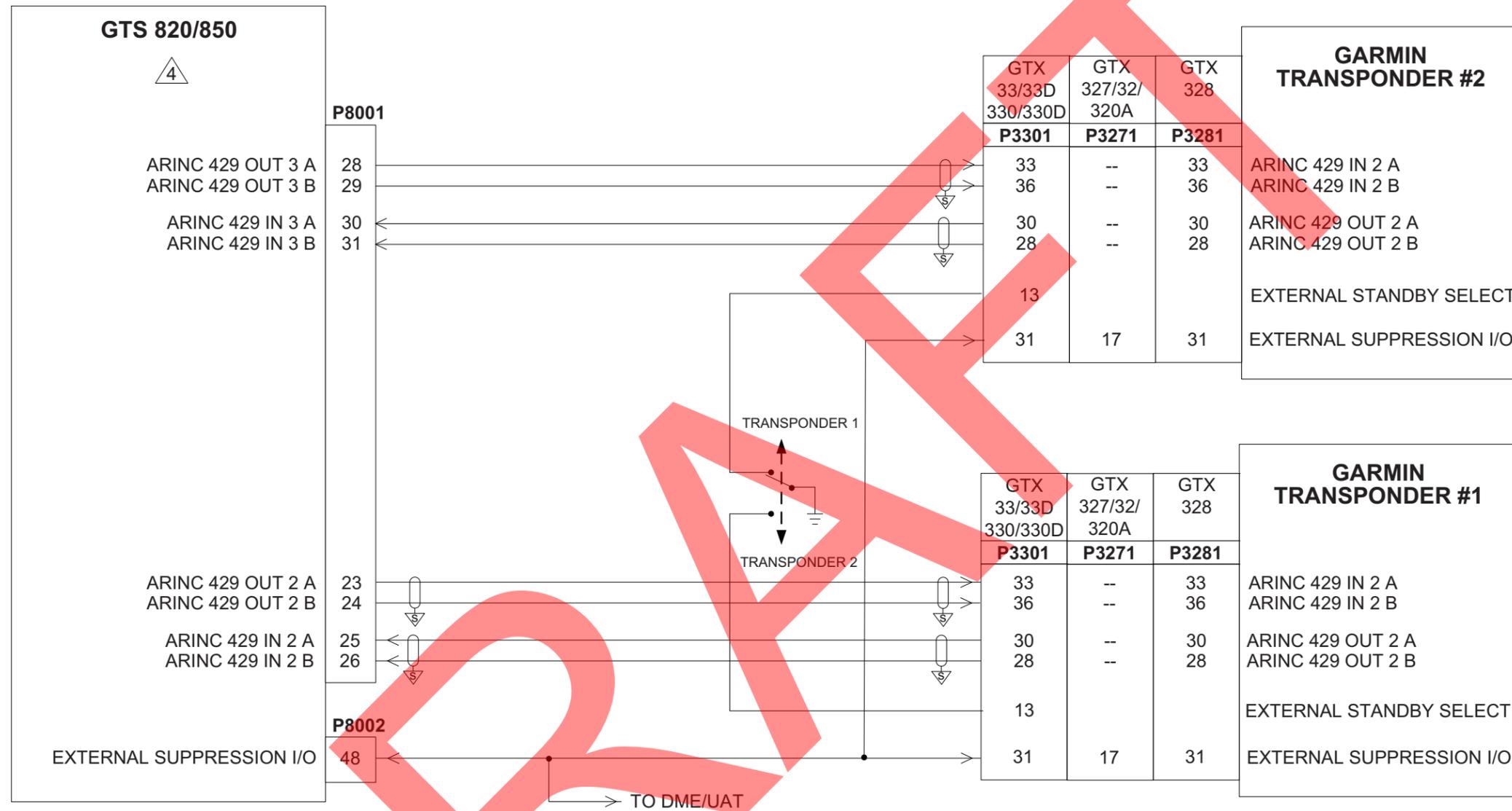


Figure B-8 GTS Processor Discrete Interconnect Example



Figure B-9 GTS Processor Configuration Module Interconnect Example

APPENDIX B Interconnect Examples



NOTES:

1. ALL WIRES 24 AWG OR LARGER UNLESS OTHERWISE SPECIFIED.
2. GROUND DESIGNATIONS: ▽ SHIELD BLOCK GROUND ≡ AIRFRAME GROUND
3. AT THE GTS 8XX, CONNECT SHIELD GROUNDS TO THE CONNECTOR BACKSHELL -- THE SHIELD LEADS MUST BE LESS THAN 3.0". CONNECT OTHER SHIELD GROUNDS TO AIRCRAFT CHASSIS WITH AS SHORT A CONDUCTOR AS PRACTICAL.
4. △ CONFIGURE THE ARINC 429 BUS SPEED TO MATCH THE GTS PROCESSOR OUTPUT SPEED.
5. REFER TO GARMIN TRANSPONDER INSTALLATION MANUAL FOR ADDITIONAL INSTALLATION DETAILS.
6. △ 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.
7. IF ONLY ONE TRANSPONDER IS INSTALLED, CONNECT AS SHOWN FOR TRANSPONDER #1.
8. THE GTS PROCESSOR IS NOT TO BE INSTALLED IN AN AIRCRAFT WITH A TSO-C119a-ONLY COMPATIBLE TRANSPONDER.

Figure B-10 GTS Processor Dual Transponder Interconnect Example