GARMIN®

GTX 3XX Part 23

AML STC Installation Manual

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RECORD OF REVISIONS

Revision	Revision Date	Description
5	2/22/16	Complete re-write and re-organization of document to add GTX 3X5 and modify existing GTX 33X information.

CURRENT REVISION DESCRIPTION

Section	Description
All	Completely revised to incorporate new GTX 3X5 ADS-B content.

INFORMATION SUBJECT TO EXPORT CONTROL LAWS

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DEFINITIONS OF WARNINGS, CAUTIONS, AND NOTES

WARNING

*A **Warning** means that injury or death is possible if the instructions are not obeyed.*

CAUTION

*A **Caution** means that damage to the equipment is possible.*

NOTE

*A **Note** gives more information.*

WARNING

This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This notice is being provided in accordance with California's Proposition 65. If you have any questions or would like more information, please refer to our website at www.garmin.com/prop65.

WARNING

Perchlorate Material – special handling may apply.
Refer to www.dtsc.ca.gov/hazardouswaste/perchlorate.

CAUTION

The GTX 330, GTX 330D, GTX 335, and GTX 345 have a special anti-reflective coated display that is sensitive to waxes and abrasive cleaners. CLEANERS THAT HAVE AMMONIA WILL CAUSE DAMAGE TO THE ANTI-REFLECTIVE COATING. Clean the display with a clean, lint-free cloth and a cleaner that is safe for anti-reflective coatings.

NOTE

All screen shots used in this document are current at the time of publication. Screen shots are intended to provide visual reference only. All information depicted in screen shots, such as software file names, versions, and part numbers, is subject to change and may not be up to date.

TABLE OF CONTENTS

1 GENERAL DESCRIPTION 1-1

1.1 Introduction 1-2
1.2 Terminology 1-2
1.3 Scope 1-4
1.4 System Overview 1-7
1.5 System Installation 1-26
1.6 Antennas 1-31
1.7 Technical Specifications 1-32
1.8 Reference Documentation 1-33
1.9 STC Permission 1-34

2 LIMITATIONS 2-1

2.1 Operational Limitations 2-1
2.2 Installation Limitations 2-1

3 INSTALLATION OVERVIEW 3-1

3.1 Pre-Installation Information 3-2
3.2 Garmin Available Installation Materials 3-3
3.3 Installation Materials Not Supplied 3-4
3.4 Crimping Tools 3-5
3.5 Test Equipment 3-5
3.6 Installation Precautions 3-5
3.7 GTX Series Minimum System Configurations 3-6
3.8 Upgrade of Existing GTX 33X 3-7
3.9 Optional Wireless Interface to PED (GTX 345/345R Only) 3-7
3.10 External Sensors, Devices, and Interface Considerations 3-10
3.11 Placards/Labels 3-16
3.12 Switches and Annunciators 3-16
3.13 Cooling 3-16
3.14 Antenna Considerations 3-17
3.15 GPS Coaxial Cable Requirements (GTX 3X5 with SBAS/GPS) 3-22
3.16 General Installation Practices 3-23
3.17 Cable and Wiring Considerations 3-24
3.18 General Electrical Bonding 3-25
3.19 Electrical Load Analysis 3-31

4 INSTALLATION PROCEDURE 4-1

4.1 Structural Installation 4-2
4.2 GTX 3XX Weight and Balance 4-31
4.3 Electrical Installation 4-32
4.4 Garmin Altitude Encoder and Configuration Module Installation 4-43
4.5 GTX Installation 4-46
4.6 AFMS Completion 4-49

5 SOFTWARE UPDATE 5-1

5.1 Software Check 5-2
5.2 GTX 33X Software Update 5-5
5.3 GTX 3X5/3X5R Software Update 5-7

TABLE OF CONTENTS CONTINUED

6 POST INSTALLATION CONFIGURATION 6-1

6.1 System Configuration Overview 6-3
6.2 Mounting, Wiring, and Power Checks 6-4
6.3 GTX 3X5 Panel Mount Configuration 6-5
6.4 GTX 3X5 Remote Unit Configuration 6-27
6.5 GTN 6XX/7XX Configuration with GTX 6-36
6.6 GNS 400W/500W Series Configuration 6-37
6.7 GNS 480 Configuration with GTX 6-38
6.8 GTX 3X5 Configuration with Legacy G950/1000 6-39
6.9 GTX 330/330D Configuration 6-59
6.10 GTX 33X Configuration with GTN 6XX/7XX 6-78

7 OPERATION/PERFORMANCE CHECKOUT 7-1

7.1 Ground Checks - Interfaces (Configuration Mode) 7-2
7.2 Ground Checks - Interfaces (Normal Mode) 7-6
7.3 Ground Checks - Performance 7-12
7.4 Documentation Checks 7-16

8 CONNECTOR PINOUT 8-1

8.1 GTX 33X 8-1
8.2 GTX 3X5 8-8

APPENDIX A MECHANICAL DRAWINGS A-1

APPENDIX B INTERCONNECT DRAWINGS B-1

APPENDIX C EQUIPMENT COMPATIBILITY AND CONFIGURATION C-1

C.1 Remote Control C-2
C.2 GPS Source C-3
C.3 Altitude Source C-5
C.4 Radar Altimeters C-7
C.5 Heading Source C-8
C.6 Audio Panels C-10
C.7 Traffic and Weather Display C-11
C.8 Traffic Sensors (GTX 345 Only) C-13
C.9 Bluetooth C-14
C.10 UAT Out Control C-14

APPENDIX D CONSTRUCTION AND VALIDATION OF STRUCTURES D-1

D.1 Static Test Loads D-1
D.2 Determining Static Load Capability D-2

APPENDIX E ACCEPTABLE HARDWARE E-1

LIST OF FIGURES

Figure 1-1 GTX 330 or GTX 330D Interface Summary 1-10
Figure 1-2 GTX 330/330D Front Panel 1-10
Figure 1-3 GTX 33 or GTX 33D Interface Summary 1-15
Figure 1-4 GTN 6XX Transponder Control 1-16
Figure 1-5 GTN 7XX Transponder Control 1-16
Figure 1-6 GNS 480 Transponder Control 1-16
Figure 1-7 GTX 335/345 Front Panel 1-17
Figure 1-8 GTX 335 or GTX 335R Interface Summary 1-20
Figure 1-9 GTX 345 or GTX 345R Interface Summary 1-22
Figure 1-10 GTX 3X5R Legacy G950/1000 Interface Summary 1-24
Figure 1-11 Garmin Altitude Encoder 1-25
Figure 3-1 Test Harness for Bluetooth Verification 3-8
Figure 3-2 GPS Antenna Location (GTX 3X5 with SBAS/GPS) 3-21
Figure 3-3 Electrical Bond Preparation - Nut Plate 3-27
Figure 3-4 Electrical Bond Preparation - Bolt/Nut Joint 3-27
Figure 3-5 Electrical Bond Preparation - Terminal Lug 3-27
Figure 3-6 Bonding Strap 3-29
Figure 3-7 Transponder Antenna Minimum Ground Plane Radius 3-30
Figure 3-8 GPS/SBAS Antenna Minimum Ground Plane Radius 3-31
Figure 3-9 Ammeter Placement for Current Measurements 3-33
Figure 3-10 GTX Electrical Load Tabulation Form 3-35
Figure 3-11 GTX Electrical Load Tabulation Form (Sample) 3-37
Figure 3-12 Battery Capacity Analysis Example 3-39
Figure 4-1 GTX 330/330D Installation (Existing) 4-5
Figure 4-2 GTX 3X5 Installation 4-6
Figure 4-3 Panel Cutout Detail for GTX 330/330D and GTX 3X5 4-7
Figure 4-4 Avionics Rack Mounting Rail Considerations 4-9
Figure 4-5 GTX 33/33D Installation 4-11
Figure 4-6 GTX 3X5 Installation, Standard Mount, Horizontal Surface 4-12
Figure 4-7 General Bracket Design 4-13
Figure 4-8 G1000 Remote Mount Installation 4-14
Figure 4-9 G1000 Remote Mount Installation, View Looking Forward 4-15
Figure 4-10 Transponder Remote Rack Sheet Metal Bracket Assembly 4-17
Figure 4-11 GTX 3X5R Remote Rack Installation Details 4-18
Figure 4-12 Fiberglass Insulation for Carbon Fiber Material 4-21
Figure 4-13 Aluminum Tape Joint 4-21
Figure 4-14 Grounding to Instrument Panel with Aluminum Tape and Grounding Strap 4-22
Figure 4-15 Remote Mount GTX Example 4-23
Figure 4-16 Tube and Fabric Assembly 4-26
Figure 4-17 External Traffic Annunciator 4-30
Figure 4-18 Shielded Wire Preparation 4-34
Figure 4-19 GTX 330/330D Backshell Assembly 4-37
Figure 4-20 GTX 33/33D Connector and Backshell Assembly 4-39
Figure 4-21 GTX 3X5 Connector Kits 4-41
Figure 4-22 GTX 3X5 with GPS Backplate Assembly P/N 011-02976-01 4-42
Figure 4-23 Garmin Altitude Encoder Assembly 4-44
Figure 4-24 Configuration Module Assembly 4-45
Figure 5-1 GTX 330 Start-Up Screen 5-2

LIST OF FIGURES CONTINUED

Figure 5-2 GTX 330 Product Data Page 5-2
Figure 5-3 GTX 3X5 Start-Up Screen 5-3
Figure 5-4 GTX 3X5 Product Data Page 5-3
Figure 5-5 GTN 6XX/7XX System Page 5-3
Figure 5-6 Legacy G950/1000 System Status Page 5-4
Figure 5-7 Software Update Connection 5-5
Figure 5-8 GTX 3X5 Install Tool Software Upload Page 5-8
Figure 6-1 Audio Page 1 6-5
Figure 6-2 Audio Page 2 6-6
Figure 6-3 Audio Page 3 6-6
Figure 6-4 RS-232 Interface Page 6-7
Figure 6-5 RS-422 Output Page 6-9
Figure 6-6 A429 In Page 6-10
Figure 6-7 A429 Output Page 6-11
Figure 6-8 HSDB Interface Page 6-12
Figure 6-9 Discrete In Page 6-13
Figure 6-10 Discrete Out Page 6-15
Figure 6-11 Unit Page 6-16
Figure 6-12 Display Pages 6-17
Figure 6-13 Sensor Page 6-19
Figure 6-14 Internal Alt Encoder 6-21
Figure 6-15 Internal Alt Encoder Adjustment 6-22
Figure 6-16 Panel Mount Internal AHRS Settings 6-23
Figure 6-17 Diagnostics Page 6-26
Figure 6-18 USB-A and USB-B Connectors 6-27
Figure 6-19 Audio Configuration Page 6-28
Figure 6-20 Interface Configuration Page (Serial) 6-29
Figure 6-21 Interface Configuration Page (A429) 6-29
Figure 6-22 Interface Configuration Page (Discretes) 6-30
Figure 6-23 Interface Configuration Page (HSDB) 6-30
Figure 6-24 Unit Configuration Page 6-31
Figure 6-25 Display Configuration Page 6-32
Figure 6-26 Sensor Configuration Page (Garmin Altitude Encoder) 6-33
Figure 6-27 Sensor Configuration Page (GPS) 6-33
Figure 6-28 Sensor Configuration Page (Internal AHRS) 6-34
Figure 6-29 Sensor Configuration Page (Additional Sensors) 6-34
Figure 6-30 Airframe Configuration Page 6-35
Figure 6-31 Aircraft Configuration Page 6-35
Figure 6-32 Main RS-232 Config Page 6-37
Figure 6-33 GTX 335R System Upload 6-40
Figure 6-34 GTX 335R System Upload Item 6-41
Figure 6-35 GTX 335R GIA 1 RS-232 / ARINC 429 Configuration 6-41
Figure 6-36 GTX 335R GIA 2 RS-232 / ARINC 429 Configuration 6-42
Figure 6-37 GTX 335R XPDR RS-232 / ARINC 429 Configuration 6-42
Figure 6-38 GTX 335R XPDR Configuration 6-43
Figure 6-39 GTX 335R System Status 6-43
Figure 6-40 RS-232/ARINC 429 CONFIG TAS/TCAS Traffic System Active 6-45
Figure 6-41 RS-232/ARINC 429 CONFIG TAS/TCAS Traffic System Off 6-45

LIST OF FIGURES CONTINUED

Figure 6-42 GIA2 I/O Configuration TAS/TCAS Mode Discrete Active 6-46
Figure 6-43 GIA2 I/O Configuration TAS/TCAS Mode Discrete Off 6-46
Figure 6-44 System Configuration Unchecked GTS 6-47
Figure 6-45 HSDB System Data Paths Unchecked GTS 6-48
Figure 6-46 Aircraft Configuration 6-48
Figure 6-47 GTX 345R System Upload Item 6-49
Figure 6-48 GTX 345R GIA 2 RS-232 / ARINC 429 Configuration 6-50
Figure 6-49 GTX 335R GIA 2 RS-232 / ARINC 429 Configuration 6-50
Figure 6-50 GTX 345R GIA 2 RS-485 Configuration 6-51
Figure 6-51 GTX 345R GIA 2 Discrete Out I/O Configuration 6-51
Figure 6-52 GTX 345R XPDR RS-232 / ARINC 429 Configuration 6-52
Figure 6-53 GTX 345R Transponder Configuration 6-52
Figure 6-54 GMA Audio Configuration 6-53
Figure 6-55 GTX 345R System Status 6-53
Figure 6-56 Dual GTX 3X5 System Upload Item 6-54
Figure 6-57 GTX 345R GIA1 RS-232/ARINC 429 Configuration 6-55
Figure 6-58 GTX 335R GIA 2 RS-232 / ARINC 429 Configuration 6-55
Figure 6-59 GTX 345R GIA 2 RS-485 Configuration 6-56
Figure 6-60 GTX 345R GIA 2 Discrete Out I/O Configuration 6-56
Figure 6-61 DUAL GTX 345R XPDR RS-232 / ARINC 429 Configuration 6-57
Figure 6-62 DUAL GTX 3X5 TRANSPONDER Configuration 6-57
Figure 6-63 GTX 3X5 System Status 6-58
Figure 6-64 Jump To Page 6-59
Figure 6-65 Audio Mode First Page 6-60
Figure 6-66 Audio Mode Second Page 6-60
Figure 6-67 Traffic Messages Page 6-61
Figure 6-68 Display Mode Page 6-61
Figure 6-69 Key Lighting Page 6-63
Figure 6-70 Contrast Mode Page 6-64
Figure 6-71 VFR Key Configuration Page 6-64
Figure 6-72 ARINC 429 Input First Page 6-65
Figure 6-73 ARINC 429 Input Second Page 6-65
Figure 6-74 ARINC 429 Output Page 6-66
Figure 6-75 RS-232 Input-Output Page 6-67
Figure 6-76 Configuration Page - First 6-69
Figure 6-77 Configuration Page - Second 6-69
Figure 6-78 Temperature Page 6-71
Figure 6-79 Mode S US Tail # Page 6-71
Figure 6-80 Mode S Address HEX Page 6-71
Figure 6-81 Flight ID Pwr-Up Entry Page 6-73
Figure 6-82 Power-Up Config Entry Page 6-74
Figure 6-83 Power-Up Same as Tail Page 6-74
Figure 6-84 GPS Configuration Page 6-75
Figure 6-85 A/C Type Page 6-75
Figure 6-86 Aircraft Size Page 6-76
Figure 6-87 ADS-B Page 6-77
Figure 6-88 EHS Page 6-77
Figure 6-89 Interfaced Equipment 6-78

LIST OF FIGURES CONTINUED

Figure 6-90 XPDR1 Configuration Page 6-79
Figure 6-91 Inputs/Outputs Page 6-80
Figure 6-92 XPDR Installation Settings Page 6-84
Figure 6-93 Microsoft Windows Calculator 6-87
Figure 6-94 Audio Configuration Page 6-89
Figure 6-95 Test Tone Page 6-90
Figure 6-96 Test Audio Page 6-91
Figure 7-1 Example EMC Source/Victim Matrix 7-15
Figure 8-1 Rear View, Connector P3301 8-1
Figure 8-2 Rear View, Connector J3301 8-4
Figure 8-3 Rear View, Connector J3251 8-8
Figure 8-4 Rear View, Connector J3252 8-11
Figure A-1 GTX 33/33D Dimensions and Center of Gravity A-2
Figure A-2 GTX 33/33D Mounting Rack/Connector Assembly A-3
Figure A-3 GTX 330 Dimensions and Center of Gravity A-4
Figure A-4 GTX 330 Mounting Rack Assembly Overview A-5
Figure A-5 GTX 3X5 Panel Mount Dimensions and Center of Gravity A-6
Figure A-6 GTX 3X5 Panel Mount Rack Assembly A-7
Figure A-7 GTX 3X5 Horizontal Remote Mount Dimensions and Center of Gravity A-8
Figure A-8 GTX 3X5 Horizontal Remote Mount Rack Assembly A-9
Figure A-9 GTX 3X5 G1000 Remote Mount Dimensions and Center of Gravity A-10
Figure A-10 GTX 3X5 G1000 Remote Mount Assembly A-11
Figure A-11 GTX 3X5 Connector and Vent Location A-12
Figure A-12 Optional Altitude Sensor A-13
Figure B-1 GTX 33X Power and Ground Interconnect B-3
Figure B-2 GTX 33X to GNS 400W/500W Series B-5
Figure B-3 GTX 33X - GTN 6XX/7XX Interconnect B-7
Figure B-4 GTX 33X - GNS 480 (CNX80) interconnect B-9
Figure B-5 GTX 33X - MFD Typical Interconnect B-11
Figure B-6 GTX 33X - AHRS/Heading Data Source Interconnect B-12
Figure B-7 GTX 33X - Altitude Data Source Interconnect B-13
Figure B-8 GTX 33X - Audio Panel Interconnect B-15
Figure B-9 GTX 33X - GDL 88 With GPS Interconnect B-16
Figure B-10 GTX 33X - Radio Altimeter Source Interconnect B-16
Figure B-11 GTX 3X5 - Power, Ground, and Configuration Module Interconnect B-17
Figure B-12 GTX 3X5 Switches B-19
Figure B-13 GTX 335 - Legacy G950/1000 Interconnect B-20
Figure B-14 GTX 345 - Legacy G950/1000 Interconnect B-21
Figure B-15 Dual GTX 3X5 - Legacy G950/1000 Interconnect B-23
Figure B-16 GTX 3X5 - GNS 480 (CNX80) Interconnect B-25
Figure B-17 GTX 335 - GNS 400W/500W Series Interconnect B-26
Figure B-18 GTX 335 and GTX 345 - Single GNS 400W/500W Series Interconnect B-27
Figure B-19 GTX 345 - GNS 400W/500W Series Interconnect B-28
Figure B-20 GTX 335 - GTN 6XX/7XX Interconnect B-29
Figure B-21 Single/Dual GTX 335 - Single GTN 6XX/7XX Interconnect B-30
Figure B-22 GTX 345 - GTN 6XX/7XX Interconnect B-31
Figure B-23 GTX 345 - Single/Dual GTN 6XX/7XX Interconnect B-33
Figure B-24 GTX 345 and GTX 335 - Single GTN 6XX/7XX B-35

LIST OF FIGURES CONTINUED

Figure B-25 GTX 335 - GDU 620 TIS-A Display Interconnect B-36
Figure B-26 GTX 3X5 - GTX 3XX Altitude Data Source Interconnect B-37
Figure B-27 GTX 3X5 - AHRS Heading Data Source Interconnect B-39
Figure B-28 GTX 3X5 - Audio Interconnect B-40
Figure B-29 GTX 335/GTX 335R - Traffic System Interconnect B-40
Figure B-30 GTX 345/GTX 345R - Traffic System Interconnect B-41
Figure B-31 GTX 3X5 - Radio Altimeter Interconnect B-42
Figure B-32 GTX 345/345R - Flight Stream Interconnect B-42
Figure B-33 GTX 3X5 to GTX 3XX Interconnect B-43
Figure B-34 External Traffic Annunciator B-43
Figure D-1 Upward Static Load Test D-3
Figure D-2 Forward/Sideward Static Load Test D-3

LIST OF TABLES

Table 1-1 GTX 33X Unit List ... 1-4
Table 1-2 GTX 3X5/3X5R Unit List ... 1-5
Table 1-3 GTX Interfaces ... 1-8
Table 1-4 Transponder Control Reference Documents ... 1-15
Table 1-5 GTX 3XX Pre-Installation Checklist ... 1-26
Table 1-6 GTX 3X5 with Legacy G950/1000 Pre-Installation Checklist ... 1-27
Table 1-7 Electrical Load ... 1-32
Table 1-8 Garmin Documents ... 1-33
Table 1-9 Federal Aviation Administration Documents ... 1-34
Table 1-10 Industry Standards ... 1-34
Table 3-1 GTX 33X/GTX 3X5 Connector Kit Options ... 3-3
Table 3-2 GTX 33X/GTX 3X5 Backplate Assembly Options ... 3-3
Table 3-3 GTX 33X/GTX 3X5 Mount Rack Options ... 3-3
Table 3-4 GTX 3X5 Configuration Module ... 3-3
Table 3-5 Permitted Installation Ethernet Cable P/Ns ... 3-4
Table 3-6 Recommended Crimping Tools ... 3-5
Table 3-7 Bluetooth Reception Verification Check ... 3-9
Table 3-8 Approved Control and Display Sources ... 3-10
Table 3-9 Altitude Source Options ... 3-11
Table 3-10 Multiple Pressure Altitude Source Priority ... 3-11
Table 3-11 Heading Source Options ... 3-12
Table 3-12 Multiple True Heading Source Priority ... 3-12
Table 3-13 GPS Priority List ... 3-13
Table 3-14 Radar Altimeter Priority List ... 3-14
Table 3-15 Version 2 Compliance with Installation of Multiple ADS-B Out Equipment ... 3-16
Table 3-16 Maximum Antenna-to-Transponder Separation ... 3-18
Table 3-17 Maximum dB loss allowed From Transponder to Antenna ... 3-18
Table 3-18 Coaxial Cable Specifications ... 3-19
Table 3-19 Typical Cable Connector Loss ... 3-19
Table 3-20 GTX 3X5 GPS Antennas ... 3-20
Table 3-21 GPS dB Loss Allowance ... 3-22
Table 3-22 Ground Plane Definitions and Ground Path Resistance Requirements ... 3-26
Table 3-23 Airframe Bonding Hardware ... 3-29
Table 4-1 Mounting Hardware ... 4-10
Table 4-2 Instrument Grounding Parts ... 4-22
Table 4-3 Hardware for Tube and Fabric Shelf Installation ... 4-24
Table 4-4 Weight of GTX Configurations ... 4-31
Table 4-5 Example Weight and Balance Calculation ... 4-31
Table 4-6 Shield Wire Assembly ... 4-34
Table 4-7 GTX 330/330D Backshell/Connector Assembly ... 4-36
Table 4-8 GTX 33/33D Backshell/Connector Assembly ... 4-39
Table 4-9 GTX 3X5 Connector Kit Hardware ... 4-41
Table 4-10 Standard and G1000 Mount Backplate Hardware ... 4-42
Table 4-11 Altitude Encoder Kit, P/N 011-03080-00 ... 4-43
Table 4-12 Configuration Module Kit, P/N 011-00979-03 ... 4-45

LIST OF TABLES CONTINUED

Table 6-1 Panel Mount Audio Settings 6-5
Table 6-2 Panel Mount Altitude and Timer Expired Alert Settings 6-6
Table 6-3 Panel Mount Traffic Alert Settings 6-6
Table 6-4 RS-232 Channel Selections 6-7
Table 6-5 RS-422 Output Selections 6-9
Table 6-6 ARINC 429 Inputs 6-10
Table 6-7 ARINC 429 Outputs 6-11
Table 6-8 HSDB Formats 6-12
Table 6-9 Discrete Input Configuration 6-14
Table 6-10 Discrete Output Configuration 6-15
Table 6-11 Panel Mount Unit Settings 6-16
Table 6-12 Panel Mount Display Settings 6-17
Table 6-13 Panel Mount Altitude Source Settings 6-19
Table 6-14 Panel Mount GPS Source 6-20
Table 6-15 Panel Mount Alt Encoder Settings 6-21
Table 6-16 Panel Mount ADS-B Settings 6-24
Table 6-17 Panel Mount Aircraft Settings 6-25
Table 6-18 RS-232 Input/Output Configuration 6-36
Table 6-19 RS-232 Input/Output Configuration 6-37
Table 6-20 ARINC 429 Output Configuration 6-37
Table 6-21 RS-232 Input/Output Configuration 6-38
Table 6-22 Active Traffic Systems 6-44
Table 6-23 Jump To Selections 6-59
Table 6-24 Message Selection Descriptions 6-60
Table 6-25 Display Mode Selections 6-61
Table 6-26 Display Backlight Page 6-62
Table 6-27 BKLT (Backlight) Selections 6-62
Table 6-28 BKLT SRCE (Backlight Source) Selections 6-62
Table 6-29 Key Lighting Selections 6-63
Table 6-30 Key Lighting Source Selections 6-63
Table 6-31 Contrast Mode 6-64
Table 6-32 VFR Key Selections 6-64
Table 6-33 ARINC 429 Inputs 6-65
Table 6-34 ARINC 429 Output Selections 6-66
Table 6-35 ARINC 429 Transmit Data Labels 6-67
Table 6-36 RS-232 Input/Output Selections 6-68
Table 6-37 Altitude Format Selections 6-69
Table 6-38 Squat Switch Configuration 6-70
Table 6-39 Auto Flight Timer Selection Description 6-70
Table 6-40 Mode S Address, Aircraft Registration Page Selections 6-73
Table 6-41 Mode S Flight ID Page Selections 6-73
Table 6-42 GPS Configuration Page Selections 6-75
Table 6-43 Aircraft Type Selections 6-75
Table 6-44 Transponder Selections 6-79
Table 6-45 Port 1 RS-232 Input 6-80

LIST OF TABLES CONTINUED

Table 6-46 Port 1 RS-232 Output 6-81
Table 6-47 Port 2 RS-232 Input 6-81
Table 6-48 Port 2 RS-232 Output 6-82
Table 6-49 RS-232 Channel Baud Rate Selections 6-82
Table 6-50 RS-232 Channel Parity Selection 6-82
Table 6-51 ARINC 429 Speed Selections 6-82
Table 6-52 ARINC 429 Input Selections (Channels 1-3) 6-83
Table 6-53 ARINC 429 Output Selections 6-83
Table 6-54 Aircraft Weight Selections 6-84
Table 6-55 Air/Ground Logic Selections 6-85
Table 6-56 Maximum Airspeed Selections 6-86
Table 6-57 Address Type Selections 6-86
Table 6-58 Flight ID Type Selections 6-87
Table 7-1 Ramp Test Pressure Altitude Check Scenario 7-9
Table 8-1 GTX 33/33D J3301 Pin Assignments 8-2
Table 8-2 GTX 330/330D J3301 Pin Assignments 8-4
Table 8-3 Lighting/Power Pin Assignments 8-6
Table 8-4 Temperature Probe Pin Assignments 8-7
Table 8-5 GTX 33X Encoded Altitude Outputs 8-7
Table 8-6 GTX 33X Discrete Outputs 8-8
Table 8-7 GTX 33X Discrete Inputs 8-8
Table 8-8 GTX 3X5 J3251 Pin Assignments 8-9
Table 8-9 GTX 345 J3252 Pin Assignments 8-11
Table 8-10 Lighting/Power Pin Assignments 8-12
Table 8-11 GTX 3X5 Power Control Inputs 8-12
Table 8-12 GTX 3X5 Encoded Altitude Outputs 8-13
Table 8-13 GTX 3X5 Discrete Outputs 8-14
Table 8-14 GTX 3X5 Configurable Discrete Output Pins 8-14
Table 8-15 GTX 3X5 Discrete Inputs 8-15
Table 8-16 GTX 3X5 Configurable Discrete Input Pins 8-15
Table C-1 Remote Control C-2
Table C-2 GPS Source C-3
Table C-3 Altitude Sources C-5
Table C-4 Radar Altimeters C-7
Table C-5 Heading Source C-8
Table C-6 Audio Panels C-10
Table C-7 Traffic and Weather Display - GTX 345 .... C-11
Table C-8 Traffic Only Display - GTX 33X and GTX 335 .... C-12
Table C-9 Traffic Sensors (GTX 345 Only) C-13
Table C-10 Bluetooth C-14
Table C-11 UAT Out Control C-14
Table D-1 Example Static Test Loads for GTX 33D D-1
Table E-1 Screws E-1
Table E-2 Washer E-1
Table E-3 Nuts E-2

LIST OF TABLES CONTINUED

Table E-4 Nutplates E-2
Table E-5 Clipnut E-2
Table E-6 Rivets E-2
Table E-7 Rivets, Blind E-2

1 GENERAL DESCRIPTION

1.1 Introduction....1-2
1.2 Terminology....1-2
1.3 Scope....1-4
1.3.1 Approved Aircraft, Systems, and Equipment....1-4
1.3.2 Approved Aircraft with Systems Not Covered by the STC....1-6
1.3.3 Part 23 Aircraft Not Identified on the AML....1-6
1.3.4 Other Aircraft Not Identified....1-6
1.4 System Overview....1-7
1.4.1 GTX Interface Summary....1-8
1.4.2 GTX 330/330D....1-9
1.4.3 GTX 33/33D....1-14
1.4.4 GTX 3X5 Non-G1000 Interface....1-16
1.4.5 GTX 335R/345R with Legacy G950/1000....1-23
1.4.6 Garmin Altitude Encoder....1-25
1.5 System Installation....1-26
1.5.1 Pre-Installation Checklist....1-26
1.5.2 Altitude Input....1-28
1.5.3 GPS Position Source....1-29
1.5.4 Mutual Suppression Bus....1-29
1.5.5 Air/Ground Determination....1-29
1.5.6 Aircraft Heading Input (Optional)....1-30
1.5.7 Radar Altimeter Input (Optional)....1-30
1.5.8 External Traffic System (Optional, GTX 345/345R Only)....1-30
1.5.9 No Display Traffic Alerting (Optional, GTX 345/345R Only)....1-30
1.5.10 External Sensors, Devices, and Interfaces....1-30
1.5.11 Equipment Not Included In This STC....1-30
1.6 Antennas....1-31
1.6.1 Transponder Antenna Requirements....1-31
1.6.2 GPS Antenna Requirements (GTX 3X5 with SBAS/GPS Only)....1-31
1.7 Technical Specifications....1-32
1.7.1 Power Requirements....1-32
1.7.2 Environmental Qualification Form....1-33
1.8 Reference Documentation....1-33
1.9 STC Permission....1-34

1.1 Introduction

This manual gives the physical, mechanical, and electrical properties as well as instructions, conditions, and limitations for installation and approval of the Garmin GTX 33/33D/330/330D and GTX 335/335R/345/345R series transponders.

Refer to the *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List* for required hardware and software configuration.

1.2 Terminology

Unless specified differently, references made to GTX are applicable to all of the Garmin GTX 33X and GTX 3X5 systems. GTX 33X is applicable to the GTX 330/330D/33/33D and GTX 3X5 is applicable to the GTX 335/335R/345/345R transponder system families. ADS-B refers to ADS-B Out and ADS-B In, ADS-B Out refers to Version 2 ADS-B Out only.

ADS-B In refers to TIS-B traffic and FIS-B weather received from ground stations over UAT and ADS-B and ADS-R traffic targets received directly over 1090 MHz or 978 MHz (UAT). ADS-B Out is the transmission of ownship position, altitude, velocity, and other information to other aircraft and ATC ground based surveillance systems.

References to metallic aircraft in this manual are those with an aluminum skin. Nonmetallic aircraft refers to all other aircraft (e.g., wooden aircraft, aircraft with composite skin, or aircraft with tube and fabric construction).

The term squitter refers to a burst or broadcast of aircraft-tracking data that is transmitted periodically by a Mode S transponder without interrogation from a controller's radar.

Abbreviations used in this manual are:

AC	Advisory Circular
ADC	Air Data Computer
ADLP	Airborne Data Link Processor
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-R	Automatic Dependent Surveillance - Rebroadcast
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AHRS	Attitude Heading Reference System
AML	Approved Model List
ATC	Air Traffic Control
ATCRBS	Air Traffic Control Radar Beacon System
CFR	Code of Federal Regulations
CSA	Conflict Situational Awareness
EFIS	Electronic Flight Instrument System
EGNOS	European Geostationary Navigation Overlay Service
EHS	Enhanced Surveillance
ELA	Electrical Load Analysis
ELT	Emergency Locator Transmitter
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference

ES	Extended Squitter
EQF	Environmental Qualification Form
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FIS-B	Flight Information Services - Broadcast
GAE	Garmin Altitude Encoder
GDU	Garmin Display Unit
GNS	Garmin Navigation System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GTN	Garmin Touch Navigator
GTX	Garmin Transponder
HIRF	High Intensity Radio Field
HSDB	High-Speed Data Bus
IEL	Indirect Effects of Lightning
IM	Installation Manual
LRU	Line Replaceable Unit
MM	Maintenance Manual
OAT	Outside Air Temperature
OEM	Original Equipment Manufacturer
PED	Portable Electronic Device
POH	Pilot Operating Handbook
RF	Radio Frequency
RTCA	Radio Technical Commission for Aeronautics
SBAS	Satellite Based Augmentation Systems
SPI	Special Position Identification
SRM	Structural Repair Manual
STC	Supplemental Type Certificate
TAS	Traffic Advisory System
TC	Type Certificate
TCAS	Traffic Alert and Collision Avoidance System
TIS	Traffic Information Service
TSO	Technical Standard Order
UAT	Universal Access Transceiver
USB	Universal Serial Bus
VFR	Visual Flight Rules
WAAS	Wide Area Augmentation System

1.3 Scope

This installation manual gives the modifications needed for the installation of the Garmin GTX 33X and GTX 3X5 system with ADS-B Out and ADS-B In functionality under AML STC SA01714WI.

The data in this manual supports:

- Upgrade of a Garmin GTX 33X transponder to be ADS-B Out compliant
- Replacement of a Garmin GTX 33X with a Garmin GTX 3X5
- Replacement of a non-Garmin transponder with an ADS-B compliant Garmin GTX 33X or GTX 3X5 transponder
- Upgrade specific Legacy G950/1000 flight deck systems for ADS-B In capabilities and ADS-B Out compliance with a GTX 335R or GTX 345R unit

Refer to the STC Equipment List and appendix C of this manual for approved G950/1000 installations.

Parts of the transponder installation not required for ADS-B functionality, such as optional discrete inputs, do not require STC approval. These parts are included in this manual as reference only.

All makes and models of airplanes on the AML are applicable, with possible limitations between transponder units. The installer must make the decision if each aircraft is applicable. Installers must use this manual to estimate each installation before modification of any Type Certified aircraft to make sure the applicability of this STC is met.

1.3.1 Approved Aircraft, Systems, and Equipment

This installation manual is applicable to the modification of an aircraft in the Part 23 AML STC SA01714WI to install or replace the equipment in the list below. This STC is the approval for the interface to equipment in appendix C.

Table 1-1 GTX 33X Unit List

Unit	Description	P/N
GTX 330 w/ ES	Black front, panel mounted, Non-diversity with extended squitter	011-00455-60
GTX 330 w/ ES	Gray front, panel mounted, Non-diversity with extended squitter	011-00455-80
GTX 330D w/ ES	Black front, panel mounted, diversity with extended squitter	011-00455-70
GTX 330D w/ ES	Gray front, panel mounted, diversity with extended squitter	011-00455-90
GTX 33 w/ ES	Remote mounted, non-diversity with extended squitter	011-00779-20
GTX 33 w/ ES	Remote mounted, non-diversity, enhanced surveillance with extended squitter	011-00779-30
GTX 33D w/ ES	Remote mounted, diversity with extended squitter	011-00779-21

Table 1-2 GTX 3X5/3X5R Unit List

Unit	Description	P/N
GTX 335	Black front, panel mounted, extended squitter w/o internal GPS source	011-03300-00
GTX 335 NV	Black front, panel mounted, extended squitter w/o internal GPS source, night vision compatible	011-03300-20
GTX 335 GPS	Black front, panel mounted, extended squitter with internal GPS source	011-03300-40
GTX 335R	Remote mounted, extended squitter w/o internal GPS source	011-03301-00
GTX 335R GPS	Remote mounted, extended squitter with internal GPS source	011-03301-40
GTX 345	Black front, panel mounted, extended squitter w/o internal GPS source	011-03302-00
GTX 345 GPS	Black front, panel mounted, extended squitter with internal GPS source	011-03302-40
GTX 345R	Remote mounted, extended squitter w/o internal GPS source	011-03303-00
GTX 345R GPS	Remote mounted, extended squitter with internal GPS source	011-03303-40

1.3.2 Approved Aircraft with Systems Not Covered by the STC

Aircraft identified on the Approved Model List (AML) have been found to meet a minimum required configuration for applicability of the STC. Some of these aircraft may have been modified over the years or have been interfaced with systems which are not identified or approved in this manual for use with the GTX system. It is the installer's responsibility to use the supplied data to determine if the STC can be applied to the aircraft or not. Use this manual to estimate each installation before modification of any Type Certificated aircraft to make sure the Part 23 GTX AML STC is applicable.

Installers and other certificated personnel can get FAA approval for installation and operational use of the GTX equipment with systems not identified in this manual, such as for aircraft certificated under 14 CFR Parts 25, 27, or 29, through a field approval, STC, or TC. Refer to AC 20-138( ) and other applicable guidance before an application for installation and operational approval is submitted. AC 21-40( ) gives information for the STC approval procedure and AC 43-210 gives information for the field approval procedure.

The GTX NV (Night Vision) unit(s) may only be installed in aircraft that are compatible with Night Vision Imaging Systems (i.e., approved to use NVGs). The display aspects of the GTX NV unit(s) will affect the prior approval of the NVIS installation. NVIS evaluation and certification is outside the scope of this STC and must be coordinated separately.

1.3.3 Part 23 Aircraft Not Identified on the AML

Aircraft identified in AC 23.1309-1E as class I, II, III, or IV airplanes which are not identified on the AML can be possible selections for installation of the GTX 33X or GTX 3X5. Installers must contact Garmin Technical Support with drawings of the aircraft's possible installation. Engineering analysis can include these aircraft in a revision of the STC AML. Data in this manual may be used for the installation but additional FAA approval is required.

1.3.4 Other Aircraft Not Identified

Transport Category Aircraft (Part 25), and Rotorcraft (Part 27/29) are not part of this STC. These aircraft may be possible selections for installation of this system. Installers should contact Garmin about possible information that can help an installation of this type. Data in this manual may be used for the installations but additional FAA approval is required.

1.4 System Overview

ADS-B technology improves situational awareness and flight safety. A Garmin transponder with ADS-B Out functions will automatically transmit position, velocity, and heading information to other aircraft and ground stations. The air traffic control system uses transponder requests for appropriate aircraft information, but ADS-B Out gives automatic transmission of aircraft information without a request.

The Garmin transponders approved by this STC are the group of GTX 33X and GTX 3X5 transponders. The GTX 33X includes: GTX 33 and 330 non-Diversity, and GTX 33D and GTX 330D Diversity. The optional Extended Squitter (ES) upgrade of any of the GTX 33X transponders is required to give ADS-B Out functionality. The GTX 3X5 includes: GTX 335 and 345 panel mounted units, and GTX 335R and 345R remote mounted transponders, all with ADS-B Out functionality. ADS-B In functionality is given by the GTX 345/345R units. ADS-B In gives TIS-B and FIS-B data through UAT and 1090 MHz to approved displays. The GTX 3X5 transponders have an optional Garmin altitude encoder to meet the required barometric pressure altitude source and an optional internal GPS/SBAS source that meets the required GNSS position source integrity for ADS-B Out.

Garmin GTX 33X and GTX 3X5 transponders have a radio transmitter/receiver that operates on L-Band radio frequencies. These transponders receive ground radar or TCAS interrogations and transmit a coded response of pulses to ground based radar on a frequency of 1090 MHz. Each unit has IDENT capability and replies to ATCRBS Mode A, Mode C and Mode S All-Call interrogations.

1.4.1 GTX Interface Summary

The GTX units use ARINC 429, RS-232, discrete inputs and outputs to transmit and receive data with other LRUs and systems on an aircraft. The GTX 345 adds Garmin High Speed Data Bus (HSDB) interfaces. GTX interfaces are shown in table 1-3. For interconnect information, refer to appendix B.

Table 1-3 GTX Interfaces

Interface Description	Input/Output	GTX 33/33D/330/ 330D Qty	GTX 335/335R Qty	GTX 345/345R Qty
RS-232	In/Out	2	3	4
ARINC 429	In	4	2	2
	Out	2	1	1
Gillham Gray Code altitude input	In	1	1	1
OAT probe [5]	In	1	1	1
Analog audio output	Out	1	1	1
Discrete	In	6	6 [4]	6 [4]
	Out	2	1	1
	In/Out [1]	-	2	4
Suppression bus	In/Out	1	1	1
Configuration/pressure sensor module interface	In/Out [2]	-	1	1
USB data port	In/Out	-	1	1
Lighting bus	In [3]	1	1	1
Switched power output	Out	1	1	1
Time Mark	In/Out	-	1	1
HSDB	In/Out	-	-	2
RS-422	Out	-	-	1

[1] Configurable to be a input or output on a per-discrete basis.

[2] Can interface to a configuration module or a combination configuration/pressure sensor module.

[3] Panel mounted units only.

[4] If the Gillham Gray Code is not used, these pins can be used as additional discrete inputs.

[5] This is not covered under this STC.

1.4.2 GTX 330/330D

GTX 330/330D units are stand alone, panel mounted units that operate through the integrated display. GTX 330/330D units can be controlled by an external control unit such as the GTN 6XX/7XX or the GNS 480. They can show TIS-A information on a GNS 400W/500W Series, GNS 480 (CNX80), or GTN 6XX/7XX unit, through an RS-232 digital interface.

GTX 330/330D units provide these features:

- Mode S transponder
- ADS-B Out capability
- Entry of squawk code
- Shows squawk code
- In Flight ID entry (software version 8.02 or later)
- Shows pressure altitude
- Shows density altitude
- Shows outside air temp
- Shows flight timers
- Audio output
- TIS-A traffic output to a compatible display
- Altitude deviation alerts

The GTX 330/330D display shows when the unit transmits ADS-B information. The unit shows an ADS-B Out failure to tell the crew that the unit has a degraded ADS-B Out system.

GTX 330/330D units use these interfaces:

- ARINC 429
- RS-232
- Gray code
- Discrete I/O

Power is supplied by the aircraft's avionics bus. Non-diversity GTX 330 units interface with a transponder antenna attached to the bottom of the fuselage. GTX 330D diversity units interface to a transponder antenna attached to the top of the fuselage as well as the antenna attached to the bottom.

Figure 1-1 gives information on the interfaces to the GTX 330 or GTX 330D. Refer to section 7 for more information about inputs.

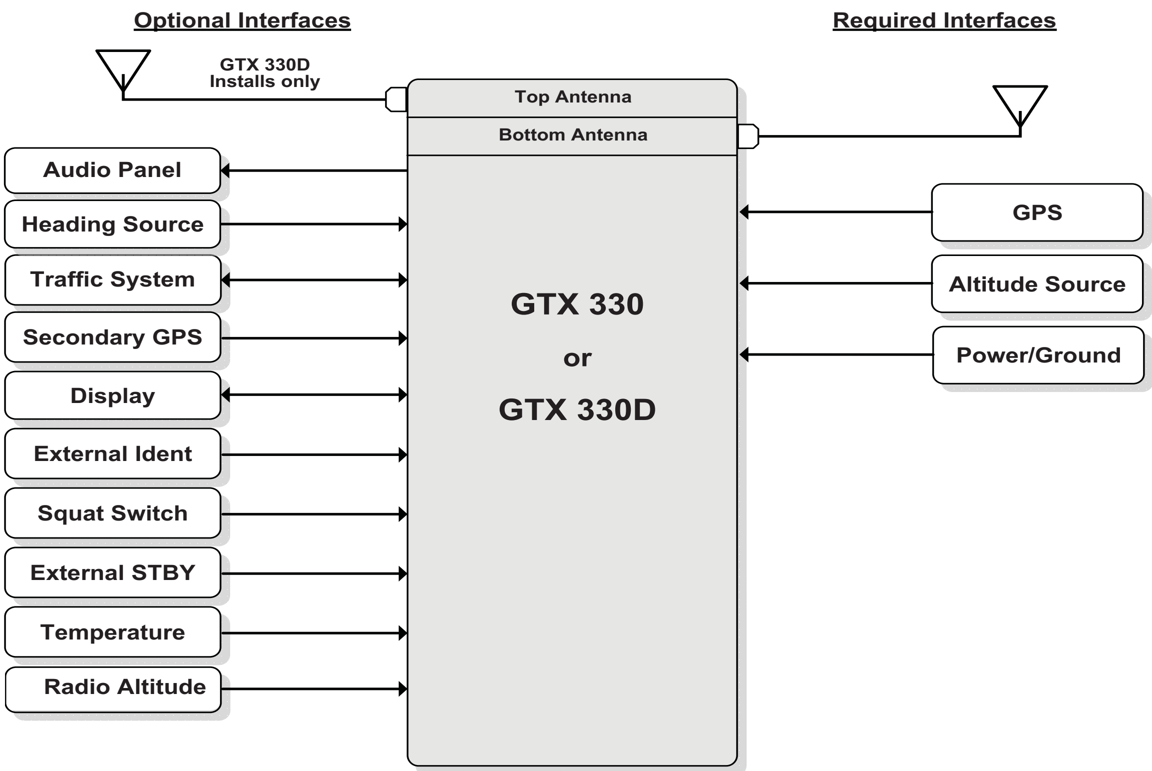

Figure 1-1 GTX 330 or GTX 330D Interface Summary

Figure 1-2 is the GTX 330/330D front panel. Refer to *GTX 330 Pilot's Guide*, or *GTX 33X and GTX 3X5 ADS-B Maintenance Manual* for more information about the controls and their functions.

Figure 1-2 GTX 330/330D Front Panel

NOTE

If the transponder is in the ON or ALT operating mode, the transponder becomes an active part of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder will reply to interrogations from aircraft with TCAS installed.

Key Selection Functions:

OFF	De-energizes the GTX 330.
STBY	Sets the unit to standby mode. Push the **STBY** key when the GTX 330 is de-energized to automatically energize the unit on in standby mode. When in standby mode, the transponder does not reply to interrogations. If software v7.04 or earlier is used and Automated Airborne Determination is not selected from another source, push and hold the **STBY** key to put the unit into ground (GND) mode. The transponder does not reply to ATCRBS interrogations when GND is shown. It squitters and replies to discretely addressed Mode S interrogations. If software v8.02 or later is used, GND mode is automatically set with a squat switch or a signal from an approved control/display unit such as a GTN 6XX/7XX, GNS 400W/500W Series, or GNS 480. GND mode is not shown on the display, even when active, when software v8.02 or later is used.
ON	Energizes the unit with Mode A and Mode S on. Push the **ON** key when the GTX 330 is de-energized to automatically energize the unit in Mode A and transmit a squawk code when interrogated. The transponder replies to Mode A and Mode S interrogations, as shown by the reply symbol ®. The replies do not include altitude information.
ALT	Energizes the unit with Mode A, Mode C, and Mode S on. Push the **ALT** key when the GTX 330 is de-energized to automatically energize the unit in altitude reporting mode. The transponder replies to identification, altitude, and Mode S interrogations as shown by the reply symbol ®. Replies to altitude interrogations include the standard pressure altitude received from an external altitude source, which is not adjusted for barometric pressure. The ALT mode can be set in aircraft not installed with an altitude encoder. The reply signal does not include altitude information.
IDENT	Push the **IDENT** key to activate the Special Position Identification (SPI) pulse for 18 seconds, and identify the transponder from others on an air traffic controller's screen. When the SPI pulse is activated, the word “IDENT” shows in the upper left corner of the display.
VFR	Sets the transponder code to the pre-programmed VFR code (Set to 1200 at the factory). Push the **VFR** key again to restore the previous identification.
FUNC	Changes the page shown on the right side of the display. Data shown includes pressure altitude, flight time, altitude monitor, count up, and count down timers. In the Configuration mode, moves through the function pages.
START/STOP	Starts and stops the altitude monitor, count up, count down, and flight timers.

CRSR	Starts entry of the start time for the count-down timer and cancels transponder code entry. Selects changeable fields in Configuration mode. If software v8.02 or later is used, hold the **CRSR** key when the unit is energized to put it into a Ground Test mode. Ground Test mode puts the aircraft into an airborne mode for test purposes.
CLR	Resets the count up, count down, and flight timers. Cancels the key pushed during code selection and count down entry. Used in Configuration mode.
8	Decrease contrast and display brightness when the respective fields are shown and puts the number eight into the count-down timer. Used in Configuration mode.
9	Increases contrast and display brightness when the related fields are shown and puts the number nine into the count-down timer. Used in Configuration mode.

Display Functions:

PRESSURE ALT	Shows the altitude data supplied to the GTX 330 in feet, hundreds of feet (flight level), or meters, as configured at installation.
FLIGHT TIME	Shows the flight time, controlled by the **START/STOP** key or by one of four airborne sources (squat switch, GPS ground speed recognition, air data airspeed recognition, or altitude increase) as configured during installation. The timer starts when the GTX 330 determines that the aircraft is airborne.
ALT MONITOR	Controlled by **START/STOP** key. Starts a voice alarm and shows a warning when the aircraft goes above the altitude limit.
OAT/DALT	Shows when the GTX 330 is configured with temperature input. Shows outside air temperature and density altitude.
COUNT UP	Timer controlled by **START/STOP** and **CLR** keys.
COUNT DOWN	Timer controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial count down time is recorded with the **0 - 9** keys.
CONTRAST	This page is only shown if manual contrast mode is selected in Configuration mode. Contrast is controlled by the **8** and **9** keys.
DISPLAY	This page is only shown if manual backlighting mode is selected in Configuration mode. Backlighting is controlled by the **8** and **9** keys.
ADS-B TX	Controlled by **START/STOP** key. Starts/stops extended squitter function.
FLT ID PWR-UP ENTRY	If the GTX 33X uses software v7.04 or earlier and the system is configured for FLT ID PWR-UP ENTRY, the FLIGHT ID entry page will show when the GTX 330 energizes. This lets the pilot/crew put in the specified flight ID for transmission to ATC interrogations.
FLIGHT ID	If the GTX 33X uses software v8.02 or later and the system is configured to let the pilot change the flight ID, then the flight ID can be put in with the **CRSR** key. If not, the flight ID is set in configuration mode and cannot be changed during normal operation.

1.4.3 GTX 33/33D

GTX 33/33D units are remote mounted and require a display/control interface as supplied by the GTN 6XX/7XX or GNS 480 to be installed in accordance with this STC. Basic transponder functions of the GTX 33/33D are identical to the GTX 330/330D. The GTX 33/33D installation requires the use of the approved control source. Many optional functions are not required or detailed in this installation manual because the GTX 33/33D is controlled through the GTN 6XX/7XX or GNS 480.

GTX 33/33D units provide:

- Mode S transponder
- ADS-B Out capability
- TIS-A traffic output to a compatible display
- Optional functions given with the control/display source

The transponder supplies a message to the control sources when the unit has an ADS-B Out failure. This alerts the crew that the unit has a degraded ADS-B system.

GTX 33/33D units communicate through:

- ARINC 429
- RS-232
- Gray code
- Discrete I/O

Power is supplied by the aircraft's avionics bus. Non-diversity GTX 33 units interface with a transponder antenna attached to the bottom of the fuselage. GTX 33D units interface to a transponder antenna attached to the top of the fuselage and an antenna attached to the bottom.

Figure 1-3 shows the interfaces given for the GTX 33 or GTX 33D. Details about each input are given in section 7.

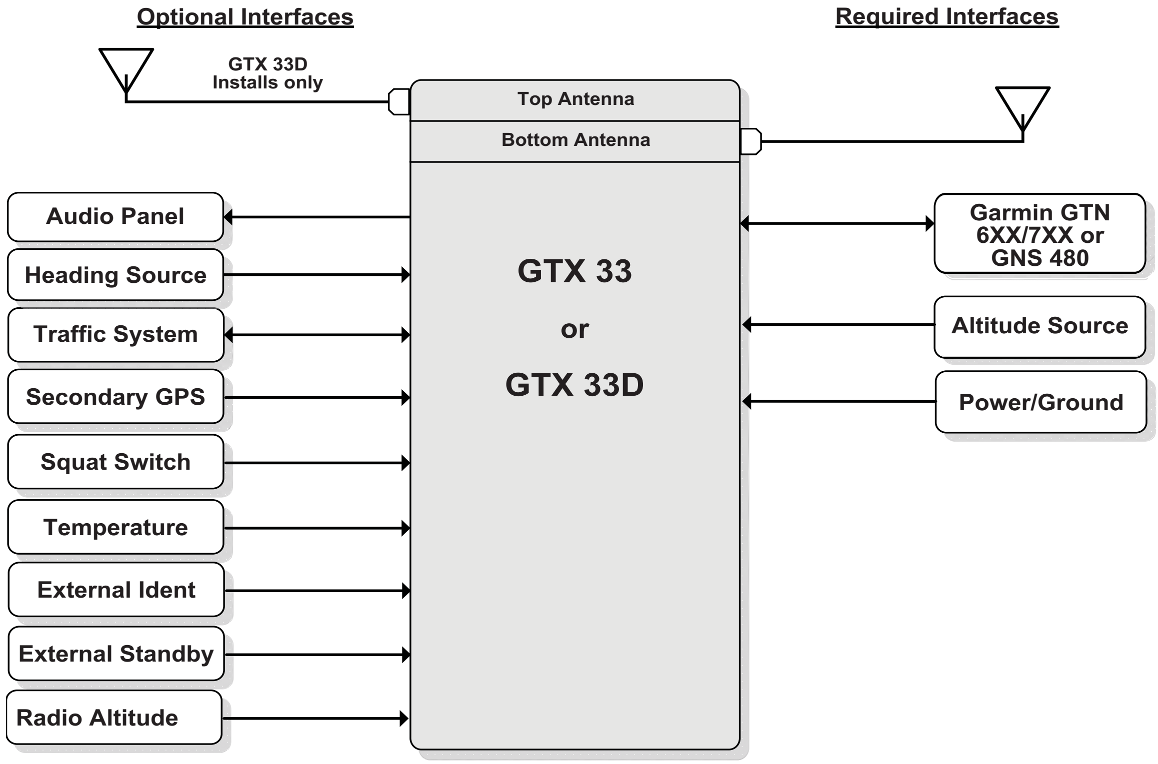

Figure 1-3 GTX 33 or GTX 33D Interface Summary

Figure 1-4 and figure 1-5 shows the GTX control page from the GTN 6XX and GTN 7XX series touch screen navigator. Figure 1-6 shows the GTX control page from the GNS 480 series navigator.

Refer to the Garmin documents in table 1-4 for information about the controls and their functions.

Table 1-4 Transponder Control Reference Documents

Document	Garmin P/N
GTN 625/635/650 Cockpit Reference Guide (CRG)	190-01004-04
GTN 625/635/650 Pilot's Guide	190-01004-03
GTN 725/750 Cockpit Reference Guide (CRG)	190-01007-04
GTN 725/750 Pilot's Guide	190-01007-03
GNS 480 (CNX80) Color GPS/NAV/COM Installation Manual	560-0982-01
GNS 480 Color GPS/WAAS/NAV/COM Pilot's Guide	560-0984-01
GTX 3X5 Pilot's Guide	190-01499-00

Figure 1-4 GTN 6XX Transponder Control

Figure 1-5 GTN 7XX Transponder Control

Figure 1-6 GNS 480 Transponder Control

1.4.4 GTX 3X5 Non-G1000 Interface

The GTX 3X5 has remote and panel mounted units. The remote mounted units have an equivalent interface to the GTN 6XX/7XX or GNS 480 as the GTX 33/33D units as shown in figure 1-4, figure 1-5, and figure 1-6. Refer to *GTX 3X5 Pilot's Guide* or *GTX 33X and GTX 3X5 ADS-B Maintenance Manual* for more information about the controls and their functions.

Figure 1-7 GTX 335/345 Front Panel

NOTE

If the transponder is in the ON or ALT operating mode, the transponder becomes an active part of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder will reply to interrogations from aircraft with TCAS installed.

Key Selection Functions for GTX 335/345:

OFF	De-energizes the GTX 335/345.
SBY	Selects the Standby mode. Push the **STBY** key when the GTX 335/345 is de-energized to automatically energize the unit on in standby mode. When in standby mode, the transponder does not reply to any interrogations but new codes can be put in and a SBY indication will show on the display.
ON	Selects the On mode, which gives Mode A and Mode S replies, but Mode C altitude reporting is prevented. Push the **ON** key when the GTX 335/345 is de-energized to automatically energize the unit in Mode A, and transmit a squawk code when interrogated. ADS-B Out will not return barometric altitude as it switches to GPS altitude while in this mode. Interrogations are shown by the reply symbol (R). For On mode, the replies do not include altitude information.
ALT	Altitude mode is automatically selected when the aircraft becomes airborne, through the use of the units air/ground logic, or when the **ALT** key is pushed. Push the **ALT** key when the GTX 335/345 is de-energized to automatically energize the unit in altitude reporting mode. While the aircraft is on the ground and in ALT mode, the transponder does not give Mode A and Mode C replies, but it does give acquisition squitter and replies to discretely addressed Mode S interrogations. While the aircraft is in ALT mode and airborne it will give Mode A, Mode C, and Mode S replies and give transmissions of acquisition and extended squitter, to include ADS-B Out. All transponder interrogation replies are shown by the Reply symbol (R).
IDENT	Push the **IDENT** key to start the Special Position Identification (SPI) Pulse for 18 seconds, to show the transponder return from others on an air traffic controller's screen. During the IDENT period the word “IDENT” shows in the upper left corner of the display.

VFR	Sets the transponder code to the pre-programmed VFR code selected in Configuration mode (set to 1200 at the factory). Push the **VFR** key again to restore the identification code used before.
FUNC	In normal mode, push the **FUNC** key to change the subpage group shown on the right side of the display. Subpages include: Flight ID, Pressure Altitude, Flight Time, Altitude Monitor, System Count Up, and Count Down Timers. In the Configuration mode, moves through the function pages.
ENT	Accepts entry for selected item and moves the cursor to the next changeable item, or function selection, in configuration and normal operation. Starts and stops the Altitude Monitor, Count Up, Count Down, and Flight timers.
CRSR	Selects changeable fields in configuration and normal operation. Starts entry of the start time for the Count Down timer and cancels transponder code entry. Hold the **CRSR** key to put the unit into a Ground Test mode that forces the aircraft into an airborne status for tests.
CLR	Resets the Count Up, Count Down, and Flight timers. Cancels the key pushed before during code selection, Count Down entry, or flight ID entry. Used in Configuration mode to scroll through the function pages.
8	Used as a scroll-up key to move through page groups in normal and configuration mode.
9	Used as a scroll-down key to move through page groups in normal and configuration mode.

Display Functions:

FLIGHT ID	If the system is configured to ALLOW PILOT TO EDIT FLT ID in configuration mode to YES, the FLIGHT ID can be changed by the pilot at any time in normal mode. This lets the pilot/crew to put in the specific Flight ID for transmission to ATC interrogations.
UP COUNTER	Timer controlled by **ENT** and **CLR** keys.
DOWN COUNTER	Timer controlled by **ENT**, **CLR**, and **CRSR** keys. The initial Count Down time is put in with the **0 - 9** keys.
FLIGHT TIMER	Shows the Flight Time, controlled by the **ENT** key or by one of four airborne sources (squat switch, GPS ground speed recognition, air data airspeed recognition or altitude increase) as configured during installation. The timer starts when the GTX 3X5 finds that the aircraft is airborne.
TRIP TIMER	Timer controlled by **ENT** and **CLR** keys.
PRESSURE ALT	Shows the altitude data supplied to the GTX 3X5 in feet, hundreds of feet (i.e., flight level), or meters, selected at configuration.
ALT MONITOR	Controlled by **ENT** key. Operates a voice alarm and warning annunciator when above altitude limit.
SAT/DALT	Shows when the GTX 3X5 is configured with temperature input. Shows Static Air Temperature and Density Altitude.
CONTRAST/OFFSET	Contrast is controlled by the **8** and **9** keys.
BACKLIGHT/OFFSET	This page is only shown if photocell backlighting mode is selected in

Configuration mode. Backlighting is controlled by the **8** and **9** keys.

MESSAGES Tells crew of transponder faults, fails and advisory messages. MSG shows when a message is generated, **CRSR** and **ENT** keys accesses messages to view and acknowledgment.

BLUETOOTH This page is only shown on the GTX 345 when configured for Bluetooth at installation. When selected, allows PED to pair to the GTX 345 and device management to show ADS-B In data.

1090ES TX CTRL This is only shown when the unit is configured for 1090ES OUT CONTROL in Configuration mode to be PILOT SET. When configured, this can be highlighted by the **CRSR** key, changed by the **8** and **9** keys, and selected by **ENT** key. Sets the extended squitter function on or off.

GTX 335/335R

The GTX 335/335R units are panel or remote mounted units that have Mode S with ADS-B Out extended squitter capability. The panel mounted units contain an integrated display while the remote mounted unit requires an interface to a control source for normal operation and functionality. Continuous battery power from the unswitchable battery bus or similar is required for the GTX 335/335R models with GPS /SBAS receivers to let the GTX 335/335R connect to the satellites while de-energized and improve GPS receiver warm-up time.

GTX 335/335R units have these features:

- Mode S transponder
- ADS-B Out capability
- Optional internal GNSS receiver
- Optional Garmin altitude encoder module (GAE pressure sensor module)
- Entry of squawk code and flight ID
- Show squawk code and flight ID
- Show pressure altitude
- Show outside air temp
- Show density altitude
- Show flight timers
- Audio output
- TIS-A traffic output to a compatible display

The transponder provides an ADS-B Out failure message to alert the crew that the unit has a degraded ADS-B system.

GTX 335/335R units interface through these:

- ARINC 429
- RS-232
- Gray code
- Discrete I/O

Figure 1-8 shows the interfaces for the GTX 335 or GTX 335R.

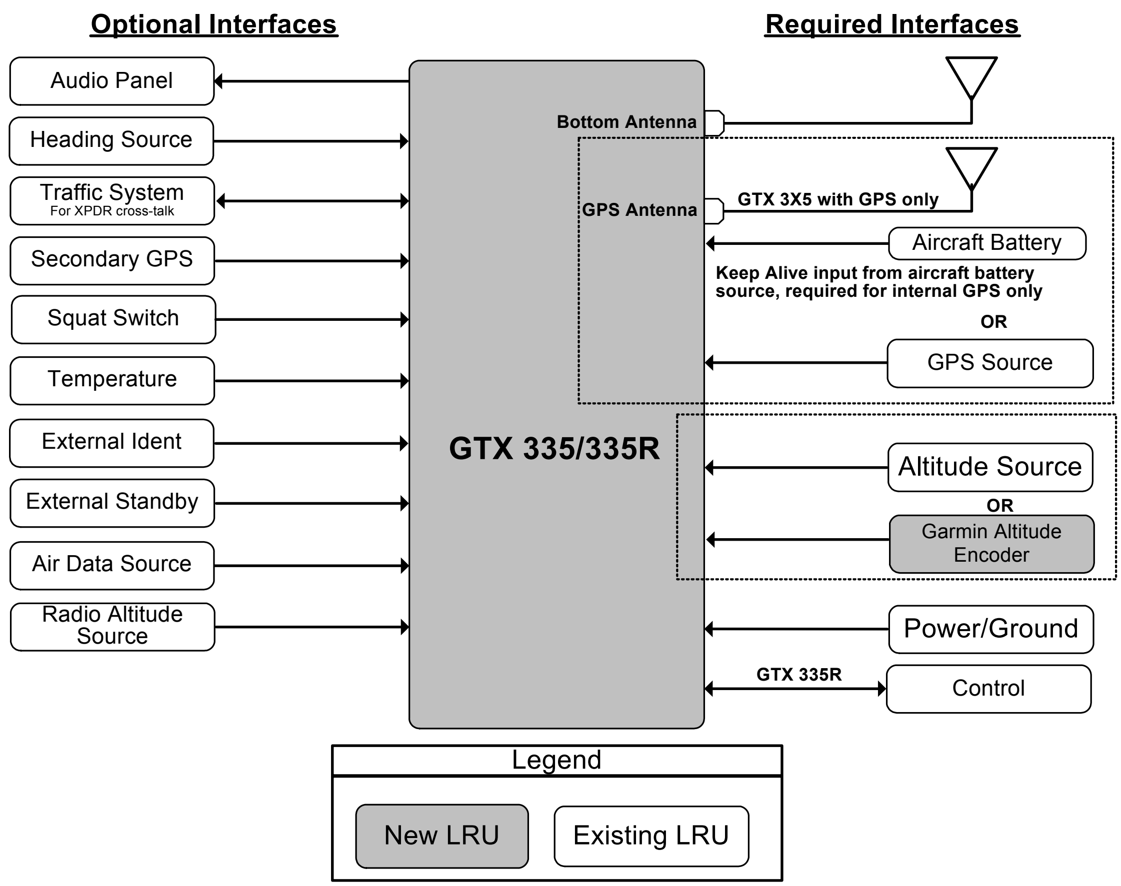

Figure 1-8 GTX 335 or GTX 335R Interface Summary

GTX 345/345R

The GTX 345/345R units are panel or remote mounted units that supply Mode S with ADS-B Out extended squitter, and UAT and 1090 receivers for ADS-B In capabilities. The panel mounted units have an integrated display while the remote mounted unit requires an interface to a control source for normal operation and functionality. Continuous battery power from the unswitchable battery bus or similar is required to the GTX 345/345R models with SBAS/GPS receivers to let the GTX 345/345R interface to satellites while de-energized and decrease GPS receiver warm-up time.

GTX 345/345R units have these features:

- Mode S transponder
- ADS-B Out capability
- ADS-B In capability with built-in 1090 MHz and UAT receivers
- Optional internal GNSS receiver
- Optional Garmin altitude encoder module (GAE pressure sensor module)
- Entry of squawk code and flight ID
- Show squawk code and flight ID
- Show pressure altitude
- Show outside air temp
- Show density altitude
- Show flight timers
- Audio output
- Bluetooth interface to show weather and traffic on portable devices

The transponder provides an ADS-B failure message to alert the crew that the unit has a degraded ADS-B (In or Out) system.

GTX 345/345R units interface through these:

- HSDB
- ARINC 429
- RS-232
- RS-422
- Gray code
- Discrete I/O

Figure 1-9 shows the interfaces for the GTX 345 or GTX 345R.

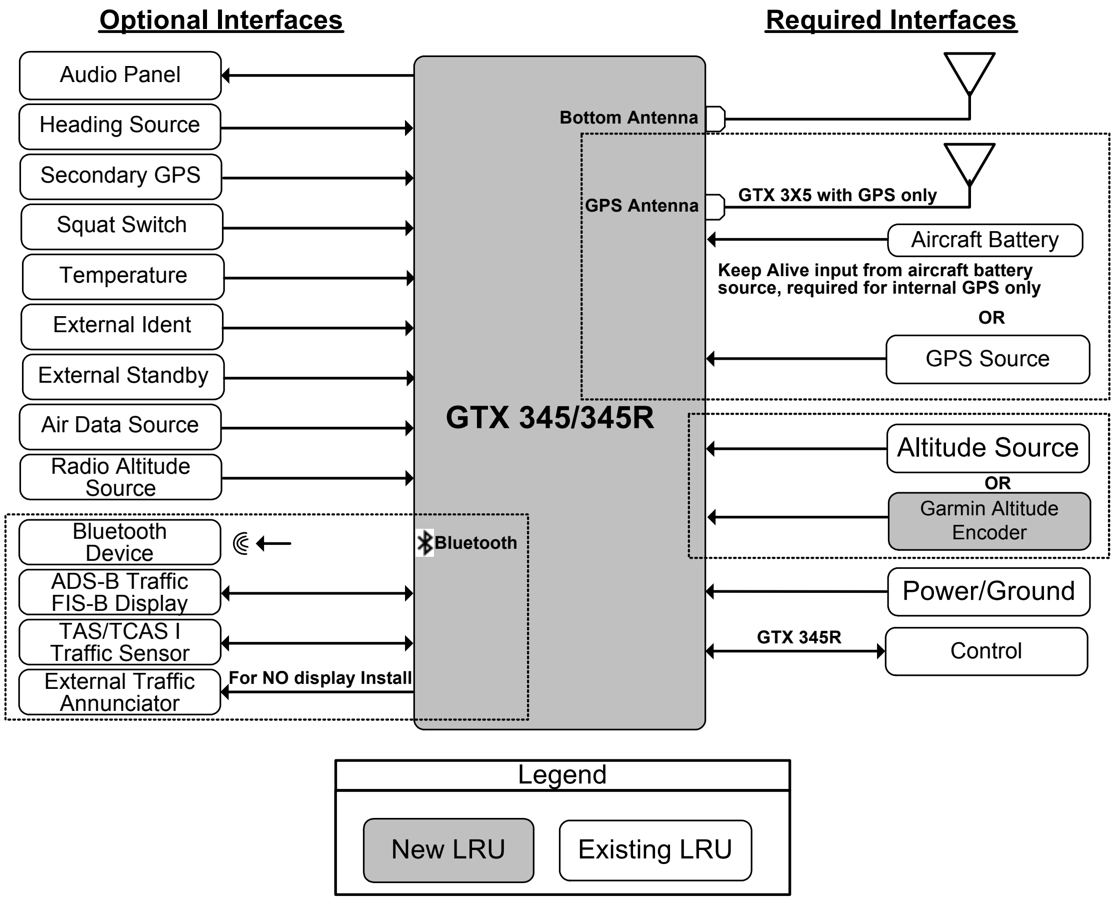

Figure 1-9 GTX 345 or GTX 345R Interface Summary

1.4.5 GTX 335R/345R with Legacy G950/1000

NOTE

If the TAS/TCAS system is connected to the GTX in a Legacy G950/1000 aircraft, the TAS/TCAS system will not be certified. Aircraft with operational requirements to maintain a certified TAS/TCAS system should not connect the active traffic system with the GTX 345R in Legacy G950/G1000 aircraft.

The Legacy G950/1000 configuration includes specific G950/1000 systems that can be updated with an interface card to allow the GTX 335R or GTX 345R unit to interface to the G950/1000 system for ADS-B capabilities. The GTX 335R provides basic transponder capabilities with ADS-B Out functionality. The GTX 345R provides all the functions listed under the GTX 345/345R section, but the ADS-B In traffic and weather will be shown as an emulation of the GDL 90 weather and traffic displays. The GTX 345R gives FIS-B weather (NEXRAD and METARS) and TIS-B traffic through the GDL 90 format. The GTX 345R provides TIS-B traffic and FIS-B weather on PEDs through Bluetooth.

- Traffic shown on the G950/1000 through RS-232 with the legacy traffic protocol is software limited (the minimum GDU 1XXX software is v7.10 and the minimum GIA 63X software is v5.31).
- Weather shown on the G950/1000 through RS-422 with the MX format protocol is software limited (the minimum GDU 1XXX software is v12.00 and the minimum GIA 63X software is v6.20).
- The GTX 3X5R with internal GPS is required if it interfaces to G950/1000 systems with software versions below GIA 63W version 7.00 and GDU 1XXX v13.00. It is possible to use the GIA 63W as a GPS data source to the GTX for ADS-B compliance.

Continuous battery power from the unswitchable battery bus or similar is supplied to the GTX 3X5R models with SBAS/GPS receivers to let the GTX 3X5R interface to satellites while de-energized and decrease GPS receiver warm-up time.

Figure 1-10 shows the GTX 335R or GTX 345R interface for the Legacy G950/1000 system.

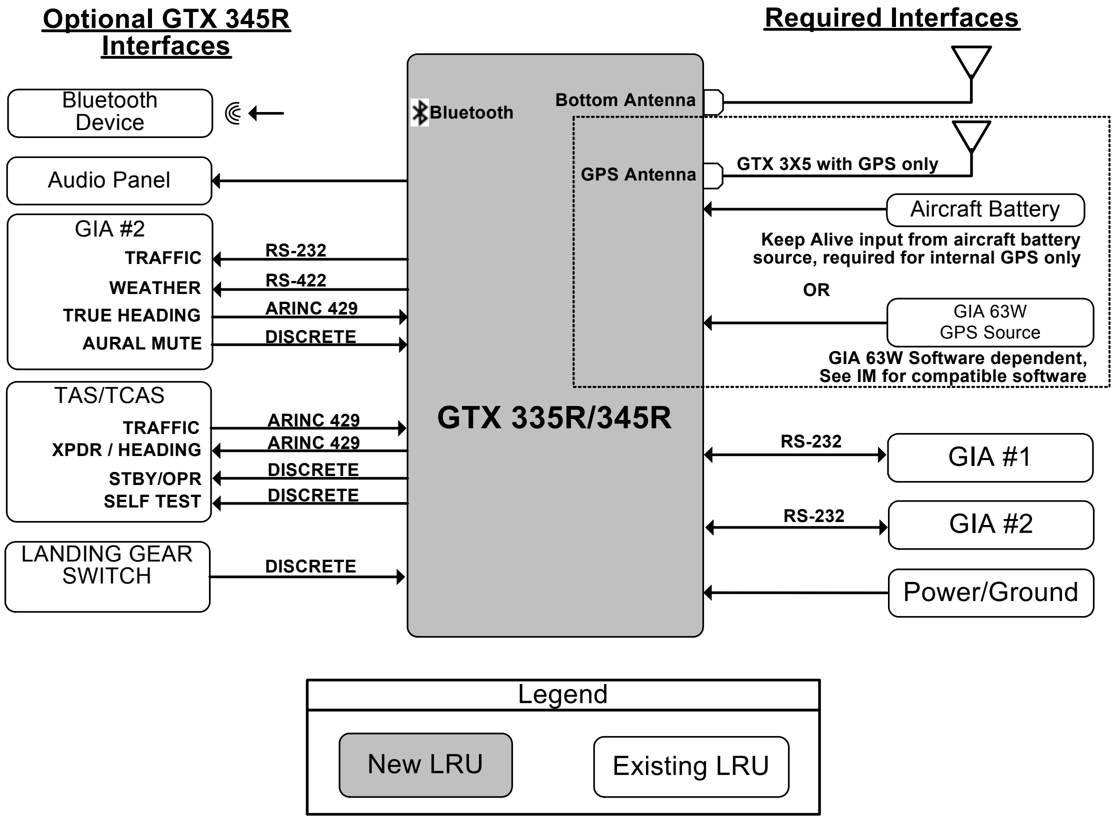

Figure 1-10 GTX 3X5R Legacy G950/1000 Interface Summary

1.4.6 Garmin Altitude Encoder

The Garmin Altitude Encoder (GAE) module supplies the required barometric altitude source for ADS-B Out compliance. The sensor module has a fitting that allows the module to be connected to the static system. The GAE attaches to the rear connector plate with two screws, and has short, unshielded wires to connect to the GTX 3X5 unit through the rear D-sub connector with the same connection as the configuration module. The GAE contains the configuration module. If the GAE altitude encoder is used, a separate configuration module is not required. Refer to section 4.4.1 for installation guidance.

Figure 1-11 Garmin Altitude Encoder

1.5 System Installation

This section gives equipment information to install the GTX system and related hardware. For interconnect diagrams, refer to appendix B.

1.5.1 Pre-Installation Checklist

Before a GTX system installation starts, the installer must make sure the aircraft meets the prerequisites for the installation of the GTX system under this STC. Use the checklists from table 1-5 or table 1-6 to determine the necessary requirements that must be met before the installation of the GTX is started in a specific aircraft. Make sure each of the items are completed as necessary before modification starts.

- Table 1-5 is the pre-installation checklist to install a GTX 33X or GTX 3X5 in an aircraft without a G950/1000 installed.
- Table 1-6 is the pre-installation checklist to install a GTX 3X5R in an aircraft with a Legacy G950/1000 installed.

Table 1-5 GTX 3XX Pre-Installation Checklist

Prerequisite	Reference	Required						Complete
		GTX 330/330D	GTX 33/33D	GTX 335/335R	GTX 335/335R With GPS	GTX 345/345R	GTX 345/345R With GPS	
Aircraft is on AML	AML	✓	✓	✓	✓	✓	✓	❑
Approved uncorrected pressure altitude source or GAE option installed.	Appendix C	✓	✓	✓	✓	✓	✓	❑
Approved control source for remote units installed (GTN 6XX/7XX, GNS 480 (CNX80))	Appendix C		✓ [1]	✓ [1]	✓ [1]	✓ [1]	✓ [1]	❑
Adequate Bluetooth reception verified for GTX 345R installation	Section 3.9.1					✓	✓	❑
Approved SBAS/GPS system installed	Appendix C	✓	✓	✓		✓		❑
Satisfactory SBAS/GPS antenna installed	Section 3.14 and Section 3.15	✓	✓	✓	✓	✓	✓	❑
Satisfactory transponder antenna installed	Section 3.14	✓	✓	✓	✓	✓	✓	❑
Satisfactory attachment provisions have been identified		✓	✓	✓	✓	✓	✓	❑

Prerequisite	Reference	Required						Complete
		GTX 330/330D	GTX 33/33D	GTX 335/335R	GTX 335/335R With GPS	GTX 345/345R	GTX 345/345R With GPS	
Satisfactory electrical bonding provisions have been identified	Section 3.18	✓	✓	✓	✓	✓	✓	❑
Planned equipment interfaces are approved under the STC or have other FAA approval	Appendix C	✓	✓	✓	✓	✓	✓	❑
Installation/operational limitations reviewed to make sure no adverse impact to installation	Section 2	✓	✓	✓	✓	✓	✓	❑
Aircraft electrical system is sufficient for the installation	Section 3.19	✓	✓	✓	✓	✓	✓	❑
Aircraft does not have a TCAS II system	Section 2	✓	✓	✓	✓	✓	✓	❑
Aircraft does not have a Rockwell Collins Radio Tuning Unit (RTU)	Section 2	✓	✓	✓	✓	✓	✓	❑

[1] Required for GTX remote mount units only.

Table 1-6 GTX 3X5 with Legacy G950/1000 Pre-Installation Checklist

Prerequisite	Reference	Required				Complete
		GTX 335R	GTX 335R With GPS	GTX 345R	GTX 345R With GPS	
Aircraft is on AML	AML	✓	✓	✓	✓	❑
Required G950/1000 software installed	Section 1.4.5	✓	✓	✓	✓	❑
Satisfactory GIA 63W software installed	Section 1.4.5	✓		✓		❑
Satisfactory SBAS/GPS antenna installed	Section 3.14 and Section 3.15		✓		✓	❑

Prerequisite	Reference	Required				Complete
		GTX 335R	GTX 335R With GPS	GTX 345R	GTX 345R With GPS	
Adequate Bluetooth reception verified for GTX 345R installation	Section 3.9.1			✓	✓	❑
Satisfactory attachment provisions have been identified		✓	✓	✓	✓	❑
Satisfactory electrical bonding provisions have been identified	Section 3.18	✓	✓	✓	✓	❑
Planned equipment interfaces are approved under the STC or other FAA approval	Appendix C	✓	✓	✓	✓	❑
Installation/operational limitations reviewed to make sure no adverse impact to installation	Section 2	✓	✓	✓	✓	❑
Aircraft electrical system is sufficient for installation	Section 3.19	✓	✓	✓	✓	❑
Aircraft does not have a TCAS II system	Section 2	✓	✓	✓	✓	❑

1.5.2 Altitude Input

An altitude encoder, air data computer, or other source that can supply uncorrected pressure altitude information must be installed for ADS-B operation. The GTX 33X and GTX 3X5 receives external air data in these formats:

- ARINC 429
- RS-232
- Gray Code

The GTX 3X5 series transponders can get altitude information from the GTX 3X5 back plate-attached Garmin altitude encoder (GAE), which also has a configuration module. For installation requirements of the Garmin Altitude Encoder on the GTX 3X5 refer to appendix A. Refer to appendix C for a list of compatible altitude sources.

1.5.3 GPS Position Source

NOTE

For the Transponder to send precision and integrity information required by AC-20-165A Version 2 compliant equipment, the GPS unit's RS-232 serial output must be configured to the extended ADS-B format. This is shown through selections with a "+" in the selections title (i.e., ADS-B OUT+GTX Mode S+ Panel GTX w TIS+).

NOTE

The ADS-B Version 2 approval requires an approved GPS/SBAS source. For installers to use a GPS navigator other than those specified in the approved equipment list, it is possible that an STC will be required to approve ADS-B with the selected configuration. This STC only approves those GPS/SBAS part numbers listed in the approved equipment list. Both hardware part numbers and software versions of the GPS/SBAS unit must meet the requirements listed in the approved equipment list. If a software update is required, the installer must go to the Garmin Dealer Resource Center or contact Garmin for updated information. It is possible that navigator installations can meet the hardware requirements but not have the correct version of software installed.

A very important component to supply compliant ADS-B Out is the position source to the GTX. The GTX 33X series transponders must have an external GPS/SBAS source that complies with ADS-B requirements. The GTX 3X5 can use an external GPS/SBAS input or use the optional internal GPS/SBAS receiver (only specific models of the GTX 3X5 are equipped with internal GPS). The position sources in the *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*, provides a list of the required GPS receiver part number and software combinations that are approved to interface with the GTX to meet the equipment requirements specified in 14 CFR 91.227. This equipment and software must be installed before the installation detailed in this STC is started.

1.5.4 Mutual Suppression Bus

Other equipment on the aircraft can transmit and receive in the same frequency band as the GTX transponder system, such as DME, TAS/TCAS system, or another transponder. Mutual Suppression is a synchronous pulse which is sent to the other equipment to suppress transmission of a different transmitter/receiver during the pulse train transmission. The GTX transmission can be suppressed by an external source and other equipment on board can be suppressed by the GTX system. This feature is designed to reduce mutual interference.

If a transponder, DME, TAS/TCAS system, or other equipment that use the L-band is installed on the aircraft, make sure a suppression line is connected between the GTX transponder system and the other equipment to prevent mutual interference. For the suppression I/O interconnect diagrams between the GTX 33X and GTX 3X5 series transponder system and other equipment, refer to appendix B.

1.5.5 Air/Ground Determination

The GTX system will change automatically to an airborne state if it senses the aircraft has become airborne. Depending on configuration settings, the GTX can determine the air/ground state through a discrete input or an assortment of inputs from a GPS source, radio atimeter source, or air data source.

1.5.6 Aircraft Heading Input (Optional)

The GTX accepts heading information from ARINC 429, RS-232, or HSDB (GTX 345/345R units only) sources as given in section 1.5. For a list of compatible equipment, refer to appendix C.

The supply of ownship heading to the GTX 345/345R improves correlation performance when it includes an external traffic system. The GTX includes ownship heading information in the ADS-B Out transmission, if available.

1.5.7 Radar Altimeter Input (Optional)

The radar altimeter input is used to determine the Conflict Situational Awareness (CSA) decreased sensitivity levels or can help determine the airborne state of the aircraft. This interface is only available for GTX 3X5 units or GTX 33X units with minimum software v8.02. For a list of compatible equipment, refer to appendix C.

The GTX 3X5 must include a radar altimeter input if an external traffic sensor is interfaced and there is a radar altimeter installed in the aircraft.

1.5.8 External Traffic System (Optional, GTX 345/345R Only)

The GTX 345/345R interfaces to an external TAS or TCAS system for traffic correlation and control. For a list of compatible traffic systems refer to appendix C.

The GTX 3X5 must include a radar altimeter input if an external traffic sensor is interfaced and there is a radar altimeter installed in the aircraft.

1.5.9 No Display Traffic Alerting (Optional, GTX 345/345R Only)

For GTX 345/345R installations without a traffic display, a traffic system annunciator and the audio output must be connected as shown in appendix B to provide audible and visual traffic alerts. This includes GTX 345 panel mount installations without a traffic display and a remote mounted GTX 345R with a GNS 480 (traffic display not available for FIS-B). Traffic can be shown on an optional Personal Electronic Device (PED) Bluetooth-enabled device compatible with Garmin Pilot software.

1.5.10 External Sensors, Devices, and Interfaces

When the GTX 33X and GTX 3X5 transponders are interfaced to external sensors, the sensors must be installed in accordance with the sensor manufacturer's data. This manual does not give data for the installation, attachment or approval of any external sensors or devices. Refer to section 6 and appendix B for more details on permitted inputs and configurations.

1.5.11 Equipment Not Included In This STC

The GTX interfaces to aircraft systems other than those shown in this installation manual not included in this STC may require more analysis for certification and/or other FAA airworthiness approval. This STC does not include these systems:

- TCAS II systems
- Rockwell Collins Pro Line 21 System

1.6 Antennas

This STC does not install the related antennas. This STC upgrades or replaces a transponder installation. The transponder and GPS/SBAS antennas are considered to be related equipment.

1.6.1 Transponder Antenna Requirements

The GTX transponder series requires that L-Band UHF antennas be approved to TSO-C66( ) or C74( ) and the aircraft ground plane must be electrically bonded to the antenna baseplate with a direct current (DC) resistance less than or equal to 2.5 milliohms. The installer must find whether or not the aircraft's current antenna and installation meets these requirements. If the antenna does not meet these requirements, the installer is responsible to get an FAA approval for the installation of compliant equipment. If a GTX transponder was installed before, changes to the antenna or coax are not required. Refer to section 3 for transponder antenna guidance.

1.6.2 GPS Antenna Requirements (GTX 3X5 with SBAS/GPS Only)

Antenna performance is very important to GPS/SBAS operation. The GTX 3X5 with GPS/SBAS must be installed with one of these antennas to get satisfactory performance. The installation of these antennas must have been FAA approved before, or concurrently approved (i.e., field approval), or installation must be completed through Garmin SBAS/GPS antenna AML STC SA02018SE-D. Before any modifications are started, Make sure the GPS/SBAS antenna(s) can be installed on the aircraft through one of these procedures. Refer to section 3 for GPS antenna guidance.

1.7 Technical Specifications

1.7.1 Power Requirements

The GTX 33X or GTX 3X5 units can operate at 14 or 28 VDC. Table 1-7 lists current draw specifications.

Table 1-7 Electrical Load

Unit	Characteristic	Specification	
		14 VDC	28 VDC
GTX 33X	Maximum full TSO reply rate	3.1 A	1.6 A
	Maximum quiescent	1.1 A	0.85 A
GTX 335	Input current, typical	0.57 A	0.29 A
	Input current, maximum	0.86 A	0.43 A
GTX 335, w/ GPS	Input current, typical	0.72 A	0.36 A
	Input current, maximum	1.22 A	0.61 A
GTX 345	Input current, typical	0.72 A	0.36 A
	Input current, maximum	1.30 A	0.65 A
GTX 345, w/ GPS	Input current, typical	1.07 A	0.54 A
	Input current, maximum	1.43 A	0.72 A
GTX 335/345, w/ GPS	KEEP ALIVE input current	65 µA typical	20 µA typical
		85 µA maximum	40 µA maximum

1.7.2 Environmental Qualification Form

The installer must obtain the latest revision of the GTX Environmental Qualification Form (EQF). To get a copy of the EQF, refer to Garmin's Dealer Resource Center. For the applicable GTX EQF part number, refer to table 1-8.

1.8 Reference Documentation

Table 1-8 Garmin Documents

Document	P/N
GTX 330/GTX 33/GTX 328 Environmental Qualification Form	005-00131-03
GTX 3X5 Environmental Qualification Form	005-00752-02
GTX 33X and GTX 3X5 ADS-B AML STC Equipment List	005-00734-05
GTX 33X and GTX 3X5 ADS-B Maintenance Manual	190-00734-11
GTX 330/330D Mode S Transponder Pilot's Guide	190-00207-00
GTX 330/330D TSO Installation Manual	190-00207-02
G1000 System Installation Manual	190-00303-00
GTX 33/33D TSO Installation Manual	190-00906-00
GNS 400W Series Installation Manual	190-00356-08
GNS 500W Series Installation Manual	190-00357-08
AFMS, GTX 33X and GTX 3X5 AML STC	190-00734-15
GTN 625/635/650 TSO Installation Manual	190-01004-02
GTN 625/635/650 Pilot's Guide	190-01004-03
GTN 725/750 TSO Installation Manual	190-01007-02
GTN 725/750 Pilot's Guide	190-01007-03
GTN 6XX/7XX Part 23 AML STC Installation Manual	190-01007-A3
GTX 3X5 Series Transponder Pilot's Guide	190-01499-00
GTX 3X5 Series Transponder G1000 Pilot's Guide	190-01499-01
GTX 3X5 TSO Installation Manual	190-01499-02
GNS 480 (CNX80) Color GPS/NAV/COM Installation Manual	560-0982-01
Flight Stream 110/210 TSO Installation Manual	190-01700-00
14 CFR 91.227 ADS-B Out Compatible Equipment	190-01533-00

Table 1-9 Federal Aviation Administration Documents

Document	P/N
FAA Advisory Circular, Airworthiness Approval of Automatic Dependent Surveillance-Broadcast (ADS-B) Out Systems	AC 20-165A
FAA Advisory Circular, Airworthiness Approval for ADS-B In Systems and Applications	AC 20-172A
FAA Advisory Circular, Guide for Obtaining a Supplemental Type Certificate	AC 21-40A
FAA Advisory Circular, System Safety Analysis and Assessment for Part 23 Airplanes	AC 23.1309-1E
FAA Advisory Circular, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair	AC 43.13-1B
FAA Advisory Circular, Acceptable Methods, Techniques, and Practices - Aircraft Alterations	AC 43.13-2B
FAA Order, Type Certification	Order 8110.4C
Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance)	Form 337

Table 1-10 Industry Standards

Document	P/N
Standard Guide for Aircraft Electrical Load and Power Source Capacity Analysis	ASTM F2490-05
Aerospace Systems Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety	SAE ARP1870

1.9 STC Permission

Consistent with FAA Order 8110.4C and FAA AC 21-40A, a permission letter to use this STC data is available for download at Garmin's Dealer Resource Center.

2 LIMITATIONS

2.1 Operational Limitations 2-1
2.2 Installation Limitations 2-1
2.2.1 Equipment Interfaced to the GTX 2-2
2.2.2 Preservation of Certified Systems 2-2
2.2.3 Major Alterations 2-2
2.2.4 Antennas 2-2
2.2.5 Pressurized Aircraft 2-2
2.2.6 Legacy G950/1000 2-2

The TSO authorizations with the RTCA/DO-178B software levels by function are in *GTX 330/330D TSO Installation Manual*, *GTX 33/33D TSO Installation Manual*, and *GTX 3X5 TSO Installation Manual*.

2.1 Operational Limitations

Refer to the AFMS for operational limitations. It is available at the Garmin Dealer Resource Center. All functions of the GTX 33X and GTX 3X5 transponders meet the applicable design assurance qualifications for airplane Class I, Class II, Class III, and Class IV in accordance with AC 23.1309-1E figure 2.

2.2 Installation Limitations

GTX 3XX panel mounted units must be installed within reach of the pilot and the display must be viewable by the pilot with minimal head movement. If replacing the GTX 3XX, the unit can be installed in the same location as a previously installed transponder.

The Air Tractor AT-401 series, AT-402 series, and AT-502 series aircraft specified on the AML must have the optional avionics mounting installation (P/N 61337-X) installed as a prerequisite for the installation of a panel mount transponder. If this cannot be accomplished, a remote mounted GTX unit must be installed with an approved control source. The Air Tractor AT-504 aircraft specified on the AML must have the optional avionics mounting installation (P/N 13750-X) installed as a prerequisite for the installation of a panel mount transponder. If this cannot be accomplished, a remote mounted GTX unit must be installed with an approved control source.

The Garmin altitude encoder should not be used as the altitude source in aircraft certified to fly above 30,000 feet. The GTX should be installed in temperature controlled environments in aircraft certified to fly above 25,000 feet. Refer to the applicable environmental qualification form to identify more GTX installation limitations for the possible LRU installation.

2.2.1 Equipment Interfaced to the GTX

Only the interface connections between the GTX 33X or GTX 3X5 and other aircraft systems as specified in this manual are approved in the GTX 33X and GTX 3X5 AML STC. GTX interfaces to other aircraft systems not identified in this installation manual require more analysis for certification and/or other FAA airworthiness approval. If the GNS 480 is the control source for the GTX 3XX transponder, it must also be the position source. If the GNS 430W/530W and GTN 6XX/7XX are both interfaced to a GTX 33/330/335/335R unit for TIS-A traffic, the GNS 430W/530W must be the control source and the GTN 6XX/7XX TIS-A control must be off.

The GTX 3X5 is not approved to interface with TCAS II traffic systems.

The GTX 3XX is not approved to interface with Collins Radio Tuning Unit (RTU).

Additional interfaces that are possible with either the GTX 33X or the GTX 3X5, but are not supported by this STC are as follows:

- Installation of switches.
- Installation of outside air temperature probes.
- Diversity - diversity installations completed under this AML STC are only allowed in those aircraft that were previously equipped with diversity transponders.
- Enhanced Surveillance - the equipment connections required to meet Mode S Enhanced Surveillance (EHS) criteria is not covered in the design data associated with this AML STC.

2.2.2 Preservation of Certified Systems

The installer must use the data in this manual to keep the necessary qualities of the aircraft and the certified systems in accordance with the aircraft manufacturer's first design and the requirements of 14 CFR Part 23.

2.2.3 Major Alterations

The installation of the GTX 33X or GTX 3X5 system is a major alteration to the aircraft type design. After a major alteration, the aircraft must be returned to service in a procedure satisfactory to the applicable aviation authority. An example would be a completed FAA Form 337 submitted to the applicable FAA office. This form must have the major alteration to include the equipment and systems the GTX is interfaced to.

2.2.4 Antennas

The GTX 33X or GTX 3X5 units can only use transponder and SBAS/GPS antennas that comply with the requirements as specified in section 1.6.1 and section 1.6.2. Installation of antennas are not in this STC and separate approval is necessary. Antennas, cables, and wiring to be interfaced to the GTX transponder system must not be installed in fuel bays.

2.2.5 Pressurized Aircraft

Changes to the pressure vessel are not part of the GTX 33X and GTX 3X5 Part 23 AML STC. More data from the aircraft manufacturer or other FAA approved data is necessary.

2.2.6 Legacy G950/1000

If there is an operational requirement to have a TAS/TCAS system installed, the active traffic system cannot interface to the GTX 345R unit for correlated traffic on the certified display. The TAS/TCAS system must maintain the traffic display.

3 INSTALLATION OVERVIEW

3.1 Pre-Installation Information....3-2
3.2 Garmin Available Installation Materials....3-3
3.3 Installation Materials Not Supplied....3-4
3.4 Crimping Tools....3-5
3.5 Test Equipment....3-5
3.6 Installation Precautions....3-5
3.7 GTX Series Minimum System Configurations....3-6
3.7.1 GTX 330/330D or GTX 33/33D ADS-B Out Installation....3-6
3.7.2 GTX 335/335R ADS-B Out Installation....3-6
3.7.3 GTX 345/345R ADS-B Out and ADS-B In Installation....3-6
3.7.4 No Display Traffic Alerting (Optional, GTX 345/345R Only)....3-6
3.8 Upgrade of Existing GTX 33X....3-7
3.9 Optional Wireless Interface to PED (GTX 345/345R Only)....3-7
3.9.1 Bluetooth Reception Verification....3-8
3.10 External Sensors, Devices, and Interface Considerations....3-10
3.10.1 Control and Display Source....3-10
3.10.2 Altitude Source (Required)....3-11
3.10.3 Multiple Uncorrected Pressure Altitude Source....3-11
3.10.4 Heading Source....3-12
3.10.5 Multiple Heading Sources....3-12
3.10.6 GPS Sources....3-13
3.10.7 Radio Altimeter Source (Optional)....3-14
3.10.8 External Traffic System (Optional, GTX 345/345R Only)....3-14
3.10.9 Traffic System in Non-G1000....3-14
3.10.10 Traffic System in Legacy G950/G1000....3-15
3.10.11 Installation with Other ADS-B Out Systems....3-15
3.11 Placards/Labels....3-16
3.12 Switches and Annunciators....3-16
3.13 Cooling....3-16
3.14 Antenna Considerations....3-17
3.14.1 Transponder Antenna....3-17
3.14.2 Transponder Antenna Location....3-18
3.14.3 Transponder Antenna Installation....3-18
3.14.4 GPS Antenna (GTX 3X5 with SBAS/GPS)....3-19
3.14.5 GPS Antenna Location (GTX 3X5 with SBAS/GPS)....3-20
3.15 GPS Coaxial Cable Requirements (GTX 3X5 with SBAS/GPS)....3-22
3.16 General Installation Practices....3-23
3.16.1 Circuit Protection and Power Distribution....3-23
3.16.2 Audio Interference....3-23
3.17 Cable and Wiring Considerations....3-24
3.17.1 Pressurized Aircraft Considerations....3-24
3.17.2 Shield Termination Considerations....3-24
3.18 General Electrical Bonding....3-25
3.18.1 Aluminum Surface Preparation....3-27
3.18.2 Bonding Jumper....3-28
3.18.3 Transponder Antenna Bonding....3-29
3.18.4 GPS Antenna Bonding....3-30
3.19 Electrical Load Analysis....3-31

3.19.1 Aircraft Without Existing Electrical Load Analysis 3-31
3.19.2 Electrical Load is Decreased After Modification 3-31
3.19.3 Electrical Load is Increased After Modification 3-32
3.19.4 Performing an Electrical Load Analysis by Measurement 3-32
3.19.5 Battery Capacity Analysis 3-39

3.1 Pre-Installation Information

NOTE

Always use satisfactory avionics installation procedures. Refer to FAA Advisory Circulars (ACs) AC 43.13-1B, AC 43.13-2B, or later approved revisions.

Complete the applicable pre-installation checklist in section 1.5.1.

This section contains instructions for:

- Installation and related hardware necessary for the GTX 33X or GTX 3X5 series units.
- Requirements for selection of correct locations in the aircraft.
- Requirements for support structures, mechanical alignment, and wire installation.
- Any restrictions or requirements on nearby equipment.

For correct system installation think about:

- The structural integrity of the installation location in accordance with AC 43.13-2B, Chapter 1.
- The applicable model specific information per the manufacturer's guidance. Refer to section 4 for more installation and electrical bonding information.

For correct system installation do these steps:

1. Complete an electrical load analysis on the aircraft to make sure that the aircraft electrical system can carry the GTX electrical load. Refer to section 3.19.
2. Determine the installation location for the GTX.
3. Make sure that the mounting rack is sufficient for the selected location.
4. Complete a weight and balance to make sure that the location is in permitted limits. Refer to section 4.
5. Make sure the Bluetooth reception is sufficient for GTX 345R units. Refer to section 3.9.1.
6. Determine cable routing.
7. Make sure that the interfaced equipment is sufficient and that correct approval is possible.
8. Any other necessary modifications.
9. Prepare the mount rack for installation.
10. Do the post-installation checkout before the work area is closed. Refer to section 7.

3.2 Garmin Available Installation Materials

Refer to table 3-1 through table 3-4 for a list of standard kit items available from Garmin.

Table 3-1 GTX 33X/GTX 3X5 Connector Kit Options

Unit	Item	P/N
GTX 33/33D	Connector kit	011-01012-01
GTX 330/330D	Connector kit	011-00583-00
GTX 335/335R	Connector kit	011-02977-00
GTX 345/345R	Connector kit	011-02977-01

Table 3-2 GTX 33X/GTX 3X5 Backplate Assembly Options

Unit	Item	P/N
GTX 33	Backplate assembly	011-00582-00
GTX 33D	Backplate assembly	011-00582-01
GTX 330	Backplate assembly	011-00582-00
GTX 330D	Backplate assembly	011-00582-01
GTX 3X5 standard or G1000 mount with GPS	Backplate assembly	011-02976-01
GTX 3X5 standard or G1000 mount without GPS	Backplate assembly	011-02976-00

Table 3-3 GTX 33X/GTX 3X5 Mount Rack Options

Unit	Item	P/N
GTX 33/33D	Install rack	115-00629-00
GTX 330/330D	Install rack	115-00294-00
GTX 3X5 standard mount	Install rack	115-01771-00
GTX 3X5 G1000 mount	Install rack	115-02250-00

Table 3-4 GTX 3X5 Configuration Module

Unit	Item	P/N
GTX 3X5	Configuration module	011-00979-03
GTX 3X5	Garmin Altitude Encoder with configuration module	011-03080-00

3.3 Installation Materials Not Supplied

NOTE

The GTX series models are used with standard aviation accessories. Refer to appendix E for permitted installation hardware that can be necessary but not supplied. Refer to AC 43.13-1B, Chapter 11, sections 5 through 7 for wire selection and sizing information.

These items are necessary for installation, but are not supplied:

- Insulated stranded wire (MIL-W-22759/16 or equivalent)
- Shielded wire (MIL-C-27500 cable that uses M22759/18 wire (TG) or ETFE jacket (14), or equivalent)
- Coaxial cable. Refer to section 3.14.3 and section 3.15 for specifications.
- Aircraft grade Category 5 Ethernet cable for installations that use HSDB interfaces. Refer to table 3-5 for more information.
- Aircraft hardware for installation, which includes screws, nuts/nutplates, washers, and rivets. Refer to appendix E. Refer to acceptable hardware in appendix E.
- Circuit breaker
- Tie wraps or lacing cord
- Ring terminals
- Shield terminators (MS83519/2-X or equivalent)
- Silicone fusion tape, A-A-59163 (MIL-I-46852C), or equivalent
- USB A-to-B cable (for interface between a laptop computer and the GTX 3X5)

Table 3-5 Permitted Installation Ethernet Cable P/Ns

Manufacturer	P/N
PIC Wire and Cable	E10424 (24 AWG)
Carlisle IT	392404 (24 AWG)
Thermax	MX100Q-24 (24 AWG)

3.4 Crimping Tools

Connectors used for the GTX series transponders use crimp contacts. The recommended contact crimping tools for the D-Sub connectors are shown in table 3-6.

NOTE

GTX 330 transponders use a card edge connector to ground shields. Use AMP P/N 90272-1 crimper for card edge contact pins.

Table 3-6 Recommended Crimping Tools

Manufacturer	Hand Crimping Tool	High Density 22-28 AWG	
		Positioner	Insertion/ Extraction Tool
Military Spec.	M22520/2-01	M22520/2-09	M81969/14-01 M81969/1-04
Positronic	9507-0-0-0	9502-4-0-0	4811-2-0-0
AMP	601966-1	601966-6	91067-1
Daniels	AFM8	K42	M81969/1-04
Astro	615717	615725	M81969/1-04

3.5 Test Equipment

This test equipment is required for the installation:

- Ramp tester with traffic (e.g., IFR 6000 or equivalent for system performance and checkout).
- Pitot/static test set for system performance and checkout for altitude reporting verification.
- To measure the electrical bonding between system components and aircraft ground, a Milliohm meter with a precision of ±0.1 mΩ or better is required.
- An ammeter with a precision of ±0.5 amps and a current capacity sufficient for the total aircraft load for the ELA.

3.6 Installation Precautions

NOTE

Installation instructions are for use in synchronization with the avionics installation practices in AC 43.13-1B, AC 43.13-2B, and FAA approved revisions.

Installation precautions:

- Installation of a GTX 33X or GTX 3X5 system can require the avionics shelves to be changed. It can also require a new structure.
- A new wiring harness is required.
- A change of the static pressure system can be necessary if a compatible altitude encoder is not installed.

3.7 GTX Series Minimum System Configurations

3.7.1 GTX 330/330D or GTX 33/33D ADS-B Out Installation

The minimum system required items for GTX 330/330D or GTX 33/33D installation:

- GTX 330/330D or GTX 33/33D transponder
- Transponder antenna(s)
- Approved GPS/SBAS source (refer to appendix C)
- Approved GTX 33/33D control source for remote mounted units only (refer to appendix C)
- Approved altitude source (refer to appendix C)

3.7.2 GTX 335/335R ADS-B Out Installation

The minimum system required items for GTX 335/335R ADS-B Out (only) installation:

- GTX 3X5 transponder
- Transponder antenna
- Approved GPS/SBAS source (refer to appendix C)
  - GTX 335/335R with optional internal GPS/SBAS receiver
- Approved GPS/SBAS antenna (refer to appendix C)
- Approved GTX 335R control source for remote mounted units (refer to appendix C)
- Approved altitude source (refer to appendix C)
  - Optional Garmin altitude encoder

3.7.3 GTX 345/345R ADS-B Out and ADS-B In Installation

The minimum system required items for GTX 345/345R ADS-B In and Out installation:

- GTX 345/345R transponder
- Transponder antenna
- Approved GPS/SBAS source (refer to appendix C)
  - GTX 345/345R with optional internal GPS/SBAS Receiver
- Approved GPS/SBAS antenna (refer to appendix C)
- Approved GTX 345R control source for remote mounted units only (refer to appendix C)
- Audio panel
- Approved altitude source (refer to appendix C)
  - Optional Garmin altitude encoder
- Approved ADS-B In display source for TIS-B and FIS-B (refer to appendix C)

3.7.4 No Display Traffic Alerting (Optional, GTX 345/345R Only)

The following are required for remote mount GTX 345R installations with a GNS 480 or panel mount GTX 345 installations without a traffic display. The minimum system required items for GTX 345/345R no display traffic alerting:

- GTX 345/345R transponder
- Transponder antenna
- Approved GPS/SBAS source (refer to appendix C)
  - GTX 345/345R with optional internal GPS/SBAS Receiver
- Approved GPS/SBAS antenna (refer to appendix C)
- Approved GTX 345R control source for remote mounted units only (refer to appendix C)
- Audio panel
- Approved altitude source (refer to appendix C)
  - Optional Garmin altitude encoder
- Traffic annunciator (refer to section 4)

3.8 Upgrade of Existing GTX 33X

If the GTX 33X is identified in the Equipment List, it is ADS-B Out compliant. If it is not identified in the Equipment List, the unit must be upgraded or replaced. To be ADS-B Out compliant, software, configuration, and interface to an approved position source, must be completed as shown in this manual.

Complete these actions:

- Software update is done in accordance with the procedures (refer to section 5)
- An approved position source is connected to the GTX (refer to appendix C)
- The transponder is configured in accordance with the Post Installation Configuration (refer to section 6)
- For remote GTX installations (refer to section 6):
    - Make sure the transponder is configured with the GTN or GNS 480 as a control source
- For GTX 335R/345R with Legacy G950/1000 (refer to section 6):
    - Make sure the transponder is configured in accordance with the G950/1000 Legacy interface
- Complete all checkout instructions and include all documentation requirements (refer to section 7)
    - Do an inspection of the installation to make sure the design data is in compliance with this manual.

3.9 Optional Wireless Interface to PED (GTX 345/345R Only)

This section contains information for the use of PEDs to show ADS-B (FIS-B, TIS-B) data through Bluetooth when connected to the GTX 345/345R. A PED with an operational Garmin Pilot account is required.

If the GTX 345 (not a Flight Stream 110/210) is interfaced to a PED, it will provide attitude to the interfaced PED. This installation requires calibration of the AHRS. Refer to section 4.1.2.2 for installation and section 6.3.5 for configuration. The GTX 345/345R must be installed within 30 degrees of an orthogonal plane so the internal attitude sensor will pass calibration. If the GTX 345/345R Bluetooth is not enabled, the $\pm$30 degree limitation does not apply.

The GTX 345/345R units are approved to interface to a Flight Stream 110/210 to supply ADS-B data to a PED through the Flight Stream Bluetooth. The Flight Stream installation provides a Bluetooth option if the GTX 3X5R does not pass the checkout in section 3.9.1.

If the GTX 345/345R unit interfaces to a Flight Stream 110/210 unit, the GTX 345/345R internal Bluetooth must be disabled through the GTX 3X5 Installation Tool.

- Refer to section 6 to disable the Bluetooth.
- Refer to the *Flight Stream 110/210 TSO Installation Manual* for applicable checkout procedures.

3.9.1 Bluetooth Reception Verification

NOTE

For best reception results, the GTX 345R should be installed with the connectors facing away from the crew (i.e., the Garmin label should face the pilot). It is recommended to install the GTX 345R unit as close to the crew as possible and minimize the amount of metallic obstructions between the unit and the crew.

A pre-installation verification checkout should be conducted to make sure the GTX 345R Bluetooth feature has the capability to connect during normal aircraft operation. This makes sure the location for installation of the GTX 345R unit will let the user connect to PEDs.

- Load the PC based Install Tool as described in section 6.4.
- Use figure 3-1 to temporarily energize and configure the GTX 345R unit.
- Complete table 3-7 prior to the installation of GTX 345R units to make sure there is Bluetooth reception.

If the GTX 345R interfaces to a FS 110/210 device, then disable the GTX 345/345R Bluetooth functionality. It is not necessary to complete the GTX 345R verification check. For G950/1000 systems, if the GTX 345R is installed in the G1000 system rack behind the MFD or PFD, it is not necessary to do the verification check.

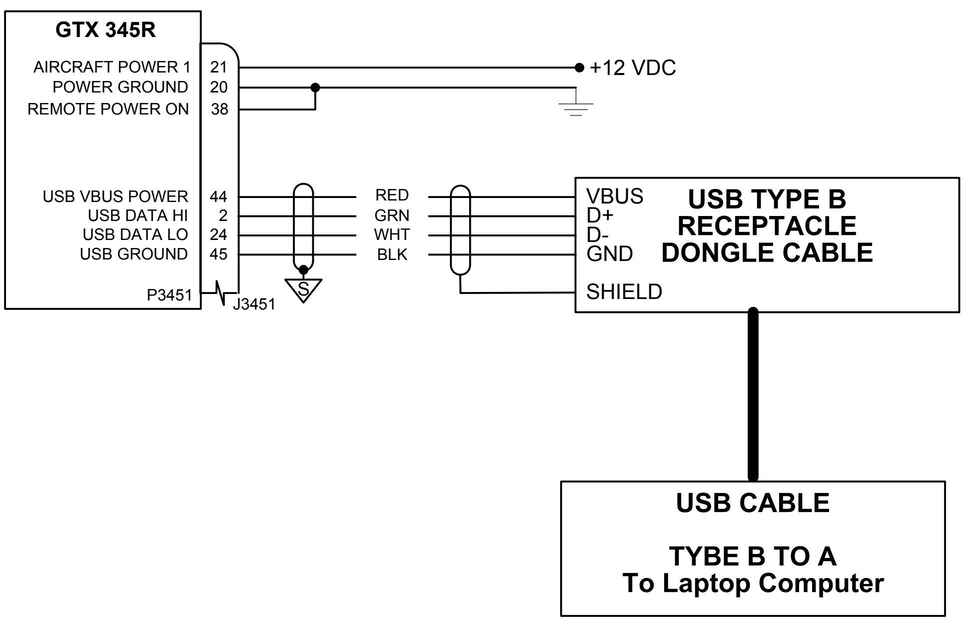

Figure 3-1 Test Harness for Bluetooth Verification

Table 3-7 Bluetooth Reception Verification Check

Item		Complete
1	Identify GTX 345R location for Installation.	❑
2	Temporarily place GTX 345R unit in the location for installation.	❑
3	Energize the unit.	❑
4	Use the GTX 3X5 Install Tool to make sure Bluetooth is selected.	❑
5	Temporarily install panels or hatches equivalent to the installation with the GTX 345R energized and Bluetooth selected.	❑
6	Pair a PED with a Garmin Pilot account to the GTX 345R. Make sure there is satisfactory reception and connectivity for pilot and crew.	❑
7	If reception and connectivity is not sufficient, move the unit until performance is satisfactory.	❑

3.10 External Sensors, Devices, and Interface Considerations

Install sensors in accordance with the sensor manufacturer's data. This manual does not give data for the installation of any external sensors or devices. Refer to appendix C for a list of the permitted types of inputs available. Refer to section 6 for possible GTX configuration selections.

The GTX accepts data from many sources. If more than one source is used, the GTX will accept data as given in this section. The input priority of each external data source cannot be changed.

3.10.1 Control and Display Source

This section contains information for when the GTX 33X and GTX 3X5 are interfaced to the aircraft control and display panel sources. When remote mounted units are installed (i.e., GTX 33/33D and GTX 335R/345R) an approved control source is required to operate the remote mounted unit.

This STC also approves the installation and interface of a GTX 3X5 in some aircraft with a G950/1000. The G950/1000 system provides the transponder controls when interfaced to the GTX 3X5.

The GTX 345/345R units supply ADS-B In to approved displays. Units that are approved as a control or display source are as follows:

Table 3-8 Approved Control and Display Sources

Unit	Control	ADS-B Traffic	ADS-B Weather
GTN 6XX/7XX	RS-232	HSDB	HSDB
GNS 480	RS-232	N/A	N/A
GNS 4XX/5XX	N/A	ARINC 429	RS-232
G950/1000	RS-232	RS-232 [1] [2]	RS-422 [1] [3]

[1] The G950/1000 interface includes select aircraft models and software versions.

[2] Must have GDU software version 7.10 or newer and GIA 63(W) software version 5.31 or newer to display traffic.

[3] Must have GDU software version 12.00 or newer and GIA 63(W) software version 6.20 or newer to display weather.

For aircraft with a G950/1000, the GTX 345R units can interface with an approved active traffic source. The pilot control to the TAS/TCAS system is removed from the G950/1000 display. The GTX 345R units control the TAS/TCAS system with the air/ground logic when interfaced to a G950/G1000 display. The TAS/TCAS system is automatically put into operating mode if the aircraft is airborne and standby mode if the aircraft is on the ground. These other functions are supplied through the GTX 3X5 Installation Tool:

- Selection of Operate Mode for the external traffic sensor to do TAS/TCAS traffic inspections.
- Traffic self-test to do a system traffic test of the TAS/TCAS system.
- The Install Tool provides a Ground Test feature for installers to place the transponder in an airborne state to conduct the required transponder checks. For GDU software v15.00 and later, the Ground Test feature exists on the MFD.

3.10.2 Altitude Source (Required)

The GTX 33X or GTX 3X5 requires a source of uncorrected pressure altitude. The GTX units accept altitude information from an altitude encoder, air data computer, EFIS, or encoding altimeter. Refer to table 3-9 for more information. Refer to appendix C for a list of compatible altitude sources.

Table 3-9 Altitude Source Options

Altitude Source	Transponder Unit
ARINC 429	GTX 33X and GTX 3X5
RS-232	GTX 33X and GTX 3X5
Gray Code	GTX 33X and GTX 3X5
Garmin Altitude Encoder (GAE)	GTX 3X5 (Only)

3.10.3 Multiple Uncorrected Pressure Altitude Source

The GTX units accepts uncorrected pressure altitude from many sources. If more than one source of altitude data is supplied to the GTX, only valid data from the highest priority source is used. If the highest priority source becomes unavailable, then the data comes from the next-highest priority source. The priorities of the altitude sources are as follows - from highest to lowest.

Table 3-10 Multiple Pressure Altitude Source Priority

Priority	Altitude Source	Notes
1	ARINC 429 Label 203 from an ADC	GTX 33X and GTX 3X5
2	ARINC 429 Label 203 from an EFIS/ADC	GTX 33X and GTX 3X5
3	RS-232 from an ADC	GTX 33X and GTX 3X5
4	RS-232 from a 25ft-resolution altitude source	GTX 33X and GTX 3X5
5	RS-232 from a remote control panel	GTX 33X and GTX 3X5
6	Garmin Altitude Encoder (GAE)	GTX 3X5 Only
7	Gray code Altitude	GTX 33X and GTX 3X5
8	RS-232 from a 100ft-resolution altitude source	GTX 33X and GTX 3X5

3.10.4 Heading Source

This section contains information for interfacing the aircraft heading source to the GTX. The heading data is used in ADS-B Out transmissions to give more ownship information.

The GTX 345/345R units use True Heading information to make correlation performance better when the GTX 345/345R is connected to an external traffic system. If True heading is not available the GTX 345/345R can use the magnetic variation if supplied to help with traffic correlation. Refer to table 3-11 for the list of possible heading selections.

Make sure the LRU that supplies the heading supplies the correct heading label. Refer to appendix C for approved heading sources.

Table 3-11 Heading Source Options

True Heading Data Source	Source	Transponder Unit
ARINC 429 Label 314	True Heading	GTX 33X and GTX 3X5
RS-232	True Heading	GTX 3X5
ARINC 429 Label 320	Magnetic Heading	GTX 33X and GTX 3X5
RS-232	Magnetic Heading	GTX 33X and GTX 3X5
RS-232	Magnetic Variation	GTX 345/345R

3.10.5 Multiple Heading Sources

The GTX unit accepts heading data from multiple sources. If multiple sources of heading data are supplied to the GTX then only correct data from the highest priority source is used. If the highest priority source becomes unavailable then the next-highest priority source supplies the data. The priorities of the heading sources are as follows - from highest to lowest.

Table 3-12 Multiple True Heading Source Priority

Priority	Heading Source	Notes
1	ARINC 429 Label 314 from heading	GTX 33X and GTX 3X5
2	ARINC 429 Label 320 from heading	GTX 33X and GTX 3X5
3	ARINC 429 Label 314 from AHRS	GTX 33X and GTX 3X5
4	ARINC 429 Label 320 from AHRS	GTX 33X and GTX 3X5
5	ARINC 429 Label 314 from EFIS	GTX 33X and GTX 3X5
6	ARINC 429 Label 320 from EFIS	GTX 33X and GTX 3X5
7	RS-232 True Heading from remote control panel	GTX 3X5
8	RS-232 Magnetic Heading from remote control panel	GTX 33X and GTX 3X5

3.10.6 GPS Sources

This section contains installation information to interface the required GPS/SBAS source to the GTX.

The GTX 33X or GTX 3X5 requires a GPS/SBAS source for ADS-B Out and In. The GTX units accept GPS data from approved sources and software versions to supply the required information. Refer to appendix C for a list of compatible GPS sources.

If more than one source of GPS data is supplied then the GTX will automatically select the best source. If the quality criteria of the GPS sources are equal then the GPS sources are prioritized as follows - from highest to lowest.

Table 3-13 GPS Priority List

Priority	Source	Unit	Notes
1	HSDB	GTN #1	GTX 345/345R Only
2	RS-232	GPS source #1	GTX 33X or GTX 3X5
3	HSDB	GTN #2	GTX 345/345R Only
4	RS-232	GPS source #2	GTX 33X or GTX 3X5
5	Internal GPS/SBAS	GTX 3X5	GTX 3X5 Only

3.10.7 Radio Altimeter Source (Optional)

NOTE

This interface is only compatible with the GTX3X5 units or GTX 33X units with software version 8.XX or later.

The radar altimeter input is an optional input to the GTX 33X or GTX 3X5 that is used with other LRUs for air/ground determination or to find Conflict Situational Awareness (CSA) decreased sensitivity levels for the GTX 345/345R units.

- Refer to appendix C for compatible radio altimeter sources and equipment configuration.
- Refer to appendix B Interconnect Diagrams for equipment interconnect diagrams.

Table 3-14 Radar Altimeter Priority List

Priority	Source	Unit	Notes
1	ARINC 429 Label 164	Radar Altimeter	GTX 33X or GTX 3X5
2	ARINC 429 Label 164	EFIS/ADC	GTX 33X or GTX 3X5
3	RS-232	Remote Control Unit	GTX 33X or GTX 3X5
4	HSDB Height Above Terrain	Approved HSDB source #1	GTX 345/345R Only
5	HSDB Height Above Terrain	Approved HSDB source #2	GTX 345/345R Only

3.10.8 External Traffic System (Optional, GTX 345/345R Only)

The GTX 345/345R units give possible selections to interface a TAS/TCAS system to the GTX to show correlated traffic.

- Refer to appendix C for compatible traffic systems.
- Refer to section 6 for equipment configuration.
- Refer to appendix B for equipment interconnect diagrams.

3.10.9 Traffic System in Non-G1000

The GTX 345/345R units supply correlated traffic to approved displays. The GTX 345/345R can use optional discrete connections to automatically put the external traffic system in operate or standby depending on the air/ground state of the aircraft. The GTX 345/345R units also provide the capability to do a self-test command to the external traffic system through a discrete connection. Refer to appendix B for interconnect diagrams.

3.10.10 Traffic System in Legacy G950/G1000

The GTX 345/345R units provide correlated traffic through the GDL 90 format on the G950/1000 system. This requires the active traffic system to be deconfigured from the G950/1000 system. This replaces the G950/1000 control of the TAS/TCAS system with controls from the GTX. The GTX must be configured for the applicable traffic system in accordance with section 6. It must be wired as shown in appendix B. The discrete interfaces (Standby, Operate, and Self-test) are required connections from the GTX to the TAS/TCAS system, if applicable. The GTX monitors the air/ground state of the aircraft and the operational state of the TAS/TCAS system. It automatically places the traffic system in the correct mode.

The GTX 3X5 Installation Tool is required to do scheduled operational checks on the transponder and TAS/TCAS system. With the exception of GDU software v15.XX, the ground test function on the MFD will place the transponder into an airborne state to conduct the necessary checks. The Install Tool is still required for the TAS/TCAS system. An external traffic system operate function, on the State page of the GTX 3X5 Installation Tool, allows the GTX to over-ride the air/ground state of the aircraft and place the external traffic system in Operating Mode. This function allows the maintainer to do any required TAS/TCAS system tests and inspections. An external traffic Self-Test function, on the State page of the GTX 3X5 Installation Tool, allows the GTX to put the external traffic system in Self-Test mode to make sure the traffic picture is accurate and wiring is connected correctly.

3.10.11 Installation with Other ADS-B Out Systems

If the GTX 33X or GTX 3X5 transponder is being installed in an aircraft with other ADS-B Out capable equipment, the other ADS-B Out equipment should be Version 2 compliant (TSO-C166b/RTCA DO-260B or TSO-C154c/DO-282B). The UAT or 1090 ES transmit functionality of a Version 1 compliant system should be disabled if it is not upgraded to be Version 2 compliant.

Table 3-15 identifies actions that should be taken to make sure only Version 2 compliant ADS-B and UAT systems are able to transmit.

Table 3-15 Version 2 Compliance with Installation of Multiple ADS-B Out Equipment

	If the other ADS-B Out System is:	Action
GTX 33X or GTX 3X5 with ADS-B Out (TSO-C166b / DO-260B) (ADS-B Version 2 Compliant)	TSO-C154c / DO-282B UAT equipment (UAT Version 2 Compliant)	None. Both systems are Version 2 compliant.
	TSO-C154b / DO-282A UAT equipment (UAT Version 1 Compliant)	Option 1: Upgrade UAT equipment to be Version 2 compliant. Contact equipment manufacturer for possible upgrade selections.
		Option 2: Disable transmit functionality of Version 1 compliant equipment. Refer to equipment manufacturer's installation manual for instructions.
	TSO-C166b / DO-260B 1090ES equipment (ADS-B Version 2 Compliant)	Two ADS-B Out systems on the same link should not be operated at the same time. Disable transmit functionality of other ADS-B equipment. Refer to equipment manufacturer's installation manual for instructions.
	TSO-C166a / DO-260A 1090ES equipment (ADS-B Version 1 Compliant)	

3.11 Placards/Labels

New circuit breakers, switches, and annunciators installed for the GTX 33X or GTX 3X5 unit must be labeled. Refer to the applicable interconnect drawings in appendix B. In order to prepare and install placards or labels:

- Put the placard or label in a location adjacent to the switch, annunciator, circuit breaker, etc.
- Make sure the placard or label is readable in all cockpit lighting conditions.
    - Ambient flood lighting is satisfactory.
- Make sure the placard or label is not easily erased, damaged, or obscured.
- Text color should be black or white.
    - Do not use amber, red, or green.
- Font size should be 10 or 12 pt (minimum 0.10 in.).
- Font weight should be normal or bold with a solid color.
- Font style should be regular, non-italic, and easy to read.

3.12 Switches and Annunciators

The GTX 33X and GTX 3X5 can be connected to external switches for the usual functions. Momentary switches for TRAFFIC MUTE and IDENT are optional and should be connected as shown in the interconnection diagrams. Refer to appendix B. As required, toggle switches for other functions can be attached to discrete inputs to set system parameters. Refer to section 8 for GTX 33X and GTX 3X5 available discrete outputs and inputs.

3.13 Cooling

The GTX 33X and GTX 3X5 do not require external cooling. The GTX 3X5 transponders have a rear air nozzle that allows for the application of forced air cooling. Make sure there are no obstructions to the air inlets or fan exhaust if used.

3.14 Antenna Considerations

This section contains general installation guidance to make sure the installed antennas meet the GTX transponder and ADS-B requirements. The approval of antenna installations is outside the scope of this STC.

3.14.1 Transponder Antenna

This STC does not install the transponder antenna. The transponder antenna(s) is considered to be existing equipment. If an existing GTX transponder is already installed, no changes to the antenna or coax are required.

When upgrading from a non-Garmin transponder, the existing approved transponder antenna should be verified to meet these requirements:

- Be approved to TSO-C66( ) or C74( ), and
- The aircraft ground plane should be electrically bonded to the antenna baseplate, which should achieve direct current (DC) resistance less than or equal to 2.5 milliohms.

The installer should determine whether or not the aircraft's current antenna and installation meets the above requirements. If the antenna does not meet these requirements, the installer is responsible for obtaining FAA approval for the installation of compliant equipment.

3.14.2 Transponder Antenna Location

For the most optimum transponder antenna location installation:

- The transponder antenna should be located away from major protrusions (i.e., engine(s), propeller(s), and antenna masts).
  - It should be as far as practical from landing gear doors, access doors, or other openings that can affect its radiation pattern.
- The transponder antenna must be attached vertically on the bottom of the aircraft.
  - For diversity units, the second antenna must be attached vertically on the top of the aircraft.
- The transponder antenna must be installed at least 20 inches from any FADEC (Full Authority Digital Engine Control).
- The transponder antenna must be installed at least 20 inches from any transponder, TAS/TCAS, DME, or other L-Band antenna.

Table 3-16 Maximum Antenna-to-Transponder Separation

Transponder Antenna Cable Assembly Cable Loss [1]	Maximum Antenna Spacing [2]
0.75 dB ≤ Cable Loss < 1.0 dB	137 inches
1.0 dB ≤ Cable Loss < 2.0 dB	122 inches

[1] Cable assembly cable loss includes loss of the coaxial cable with connectors.

[2] Measured from center of UAT/1090 Antenna to the center of transponder antenna.

Table 3-17 Maximum dB loss allowed From Transponder to Antenna

GTX 33X	GTX 3X5
1.5 dB	2.0dB

3.14.3 Transponder Antenna Installation

NOTE

Installation approval for the transponder antenna is not supplied through this STC. Refer to the antenna manufacturer's installation guidance for the particular model antenna for minimum performance specifications.

Refer to the aircraft manufacturer's data and the antenna manufacturer's installation instructions for attaching the transponder antenna. The installer can use other FAA approved data to gain a separate antenna installation approval.

Table 3-18 gives examples of the recommended antenna cable vendors and the type of cable used for specific lengths of cable. Any cable that meets the minimum specifications is satisfactory for the installation.

Table 3-18 is for reference only and shows some applicable cable types. Any 50 Ω, double-shielded coaxial cable assembly that meets airworthiness requirements and the permitted attenuation requirements (with connectors) can be used. When cable loss is calculated, a loss of 0.2 dB can be used for each connection.

Table 3-18 Coaxial Cable Specifications

Insertion Loss (dB/100ft) [1]	Carlisle IT Type [2]	MIL-C-17 Type [3]	RG Type [4]
18.5	N/A	M17/128-RG400	RG-400
11.1	N/A	M17/112-RG304	RG-304
9.2	N/A	M17/127-RG393	RG-393
15.2	3C142B	N/A	N/A
9.2	311601	N/A	N/A
7.5	311501	N/A	N/A
5.8	311201	N/A	N/A
3.8	310801	N/A	N/A

[1] RG type coaxial cable insertion loss can change significantly between manufacturers. The insertion loss for RG type cables shown in this column is considered the worst case scenario. Refer to the cable manufacturer's specification sheet for actual attenuation (insertion loss) for the cable being used.

[2] Supplier information (for reference only): Carlisle IT: 5300 W. Franklin Drive Franklin, WI 53132 Tel: 800-327-9473 www.carlisle.com

[3] Supplier information: Refer to current issue of Qualified Products List QPL-17.

[4] RG types are obsolete and are reference only and replaced by M17 type numbers.

Table 3-19 Typical Cable Connector Loss

Connector Type	Approximate dB Loss
TNC	0.08 dB
BNC	0.20 dB
C	0.15 dB

3.14.4 GPS Antenna (GTX 3X5 with SBAS/GPS)

Installation approval for the GPS antenna is not provided through this STC. The installer can use other FAA approved data to gain a separate antenna installation approval. Antenna performance is very important to successful operation when the optional internal GPS/SBAS receiver in the GTX 3X5 transponder is used.

Table 3-20 lists approved SBAS/GPS antennas that meet Garmin's minimum performance specifications.

Section 3.14.5 provides antenna location information that should be used to make sure an existing antenna location is satisfactory for use with the GTX 3X5 transponder.

Refer to Garmin’s GPS/SiriusXM Antenna STC SA02018SE-D for installation of Garmin GPS antennas listed in table 3-20.

For installation of non-Garmin antennas in table 3-20, refer to the antenna manufacturer’s installation guidance.

Table 3-20 GTX 3X5 GPS Antennas

Model Description	Connector Type	Manufacturer	Part Number
GA 35, GPS/SBAS	TNC	Garmin	013-00235-()
GA 36, GPS/SBAS	TNC	Garmin	013-00244-()
GA 37, GPS/SBAS/XM	TNC	Garmin	013-00245-()
A33W, WAAS	TNC	Garmin	013-00261-()
GPS / VHF	TNC / BNC	Comant	CI-2580-200
GPS / VHF	TNC / BNC	Comant	CI-2728-200
GPS / XM / VHF	TNC / TNC / BNC	Comant	CI-2580-410
GPS / XM / VHF	TNC / TNC / BNC	Comant	CI-2728-410
GPS / WAAS	TNC	Comant	CI-428-200
GPS / XM	TNC / TNC	Comant	CI-428-410

3.14.5 GPS Antenna Location (GTX 3X5 with SBAS/GPS)

NOTE

When a combination antenna is attached, the recommended distance of two feet or more is not applicable to the distance between the antenna elements (e.g., GPS and COM, GPS and SiriusXM). This is provided that the combination antenna is TSO authorized and has been tested to meet Garmin's minimum performance standards.

These installation guidelines meet the intent of AC 20-138B Chapter 12, Section 12-1. Meeting all of the installation guidelines is not possible on some aircraft. These guidelines are listed in order of importance to achieve optimum performance. The installer should use their best judgment to balance the installation guidelines.

GPS antennas should be installed as follows:

- As close to level as possible. If the normal flight attitude is not known, substitute with the waterline, which is typically referenced as level while a weight and balance check is done.
- Mount in a location to minimize the effects of airframe shadowing during typical maneuvers. Mounting farther away from the tail section decreases signal blockage.
- Mounted no closer than two feet from any VHF COM antenna.
- Mounted no closer than two feet from any antennas emitting more than 25 watts of power.
- Mounted no closer than nine inches (center to center) from other antennas.
- Maintain a constant gain pattern and limit degradation by the windscreen, avoid attaching the antenna closer than 3 inches from the windscreen.
- For installations with more than one antenna, the antennas should not be attached in a straight line from the front to the rear of the fuselage. This is so a single lightning strike does not damage all antennas.

When possible, 12-inch center-to-center spacing between GPS antennas must be used. If 12-inch spacing is not possible, the maximum center-to-center spacing possible must be used, but never less than 9-inch center-to-center spacing.

An aircraft EMC check can show if there is a degradation of GPS in the presence of interference signals. Refer to section 7. If an EMC check reveals unsatisfactory interference, select a different GPS Antenna location or insert a GPS notch filter in line with the VHF COM or the (re-radiating) ELT transmitter that is causing interference.

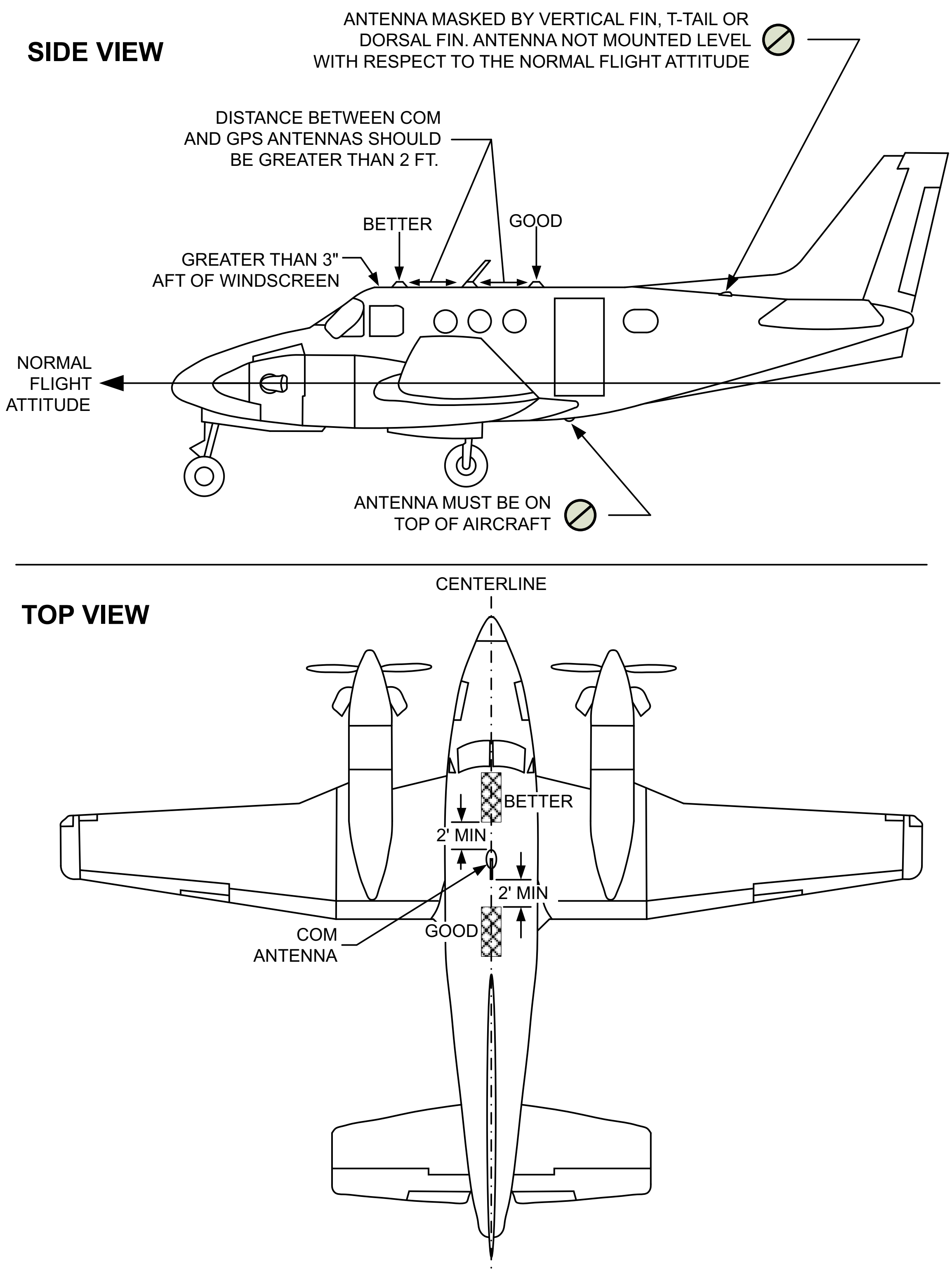

Figure 3-2 GPS Antenna Location (GTX 3X5 with SBAS/GPS)

3.15 GPS Coaxial Cable Requirements (GTX 3X5 with SBAS/GPS)

This section supplies information on the GPS antenna cable requirements. The location of the GTX 3X5 unit GPS Antenna compared to other COM transceivers and antennas is very important. During the post-installation checkout, susceptibility to harmonics of VHF COM transmitters is analyzed. If problems occur, better isolation or distance can be required between the GPS and COM antennas. A 1575.42 MHz notch filter can be installed in series with the antenna coaxial of the VHF COM transceiver to decrease or eliminate the harmonic interference. A notch filter for this use (P/N 330-00067-00) is available from Garmin. Refer to section 3.6 for installation location information.

Table 3-21 GPS dB Loss Allowance

Unit	Minimum	Maximum
GTX 3X5 Internal GPS	1.5 dB	6.5 dB

To reduce or stop signal interference, the GPS antenna cable assembly loss must be in accordance with table 3-21. Think about additional loss from coaxial connectors and adapters (e.g., TNC to BNC) when cable loss is calculated. A typical loss of 0.2 dB can be used for each connection. To keep integrity of the WAAS signal, the GPS Antenna coaxial cable must have a minimum of two shields (e.g., RG-400 or RG-142B).

GPS antennas listed in Table 3-20 require a cable loss between 1.5 dB and 6.5 dB. If RG-142B or RG-400 is used, then 1.5 dB is equal to a length of approximately 6.5 feet of cable with a connector on each end.

RG-142B or RG-400 cable can be used if the length is less than 35 feet. For longer lengths, use low-loss, double- or triple-shielded, 50Ω coaxial cable.

For very short cables where the loss is less than 1.5 dB, add more cable to increase the loss to within 1.5 dB and 6.5 dB. This cable can be coiled, taking into account the minimum bend radius of the cable.

When the antenna position is selected, make sure that the routing of the coaxial cable from the antenna to the GTX 3X5 Internal GPS is correct. Correct selection of coaxial cable and installation of connectors is very important to GPS signal performance.

If a VHF COM transmitter causes problems with the GPS on the selected frequencies as listed in the post installation checkout, the problem can be because of the ELT. To find out if the ELT is a problem, disconnect the ELT antenna coaxial at the ELT unit. If the ELT is found to cause the problem, contact the ELT manufacturer.

3.16 General Installation Practices

3.16.1 Circuit Protection and Power Distribution

The circuit protection device for the GTX units must be a push-pull manually resettable circuit breaker (e.g., Klixon 7274 or 7277 series circuit breakers). A single circuit breaker must be used by the GTX unit. Do not try to put together more than one unit or system on the same circuit breaker unless specifically approved by the manufacturer. The GTX should be connected to an avionics bus (non-essential bus) so power is supplied when the avionics master switch is energized. If not reusing an existing circuit breaker location, the circuit breaker should be located so it can be readily reset in flight.

3.16.2 Audio Interference

Take care to keep effects from coupled interference and ground loops to a minimum. Coupled interference can be caused in audio system cables when they are put near large AC electric fields, AC voltage sources and pulse equipment (e.g., strobes, spark plugs, magnetos, EL displays, CRTs, etc.). Interference can also get into audio system cables by magnetic induction when they are put near large AC current conductors or switched DC equipment (e.g., heaters, solenoids, fans, autopilot servos, etc.).

Ground loops are caused when there is more than one path in which return currents flow or when signal returns have the same path as large currents from other equipment. These large currents make differences in ground potential between the different equipment operating in the aircraft. These differences in potential can produce an additive effect on audio panel input signals. The audio panel can receive the input signal plus an unwanted component injected by ground differentials, a common cause of alternator-related interference. Terminating audio shields at one end eliminates a potential ground loop injection point. The interconnect diagrams and accompanying notes in appendix B should be followed closely to minimize interference effects.

3.17 Cable and Wiring Considerations

NOTE

Care must be taken to sufficiently support and protect the wiring because of its thinner insulation if MIL-W-22759/18 wire is used.

Wire selection should be in accordance with AC 43.13-1B Chapter 11, Sections 5 through 7. Wiring should be installed in accordance with AC 43.13-1B Chapter 11, Sections 8 through 13. Follow these guidelines to prevent damage to the aircraft and systems.

- The wire harness should not be located near flight control cables, high electrical capacity lines or fuel/oil lines.
- The wire harness should be located in a protected area of the aircraft.
- Do not route the wire harness or cables near high-energy sources.
- Make sure the routing of the wire harness does not come in contact with sources of high heat, EMI or RF interference.
- Make sure there is ample space for the wire harness and mating connectors. Avoid sharp bends.
- Do a visual inspection to make sure all coaxial cables are connected before trying to operate the equipment.

3.17.1 Pressurized Aircraft Considerations

Wiring that penetrates the pressure vessel must be installed in accordance with the Type Design Data for the aircraft. Use existing provisions for any wires that penetrate the pressure bulkhead (e.g., existing bulkhead connectors or existing sealed wire through-holes). Additional holes in the pressure vessel are beyond the scope of the GTX 33X and GTX 3X5 Part 23 AML STC and require more data from the aircraft manufacturer or other FAA approved data.

3.17.2 Shield Termination Considerations

Shield termination at non-Garmin equipment end must be as short as possible and must not exceed three inches in length unless the manufacturer's installation requirements specify differently. When there are no requirements given by the manufacturer's installation manual, the shields can be connected to the metal connector backshell when the backshell is grounded to airframe chassis ground. Alternatively, the shield termination can be directly connected to airframe chassis ground.

All shields must have continuity at any intermediate connectors used unless specified differently. Audio line shields should be continuous from end-to-end and be grounded at only one end to prevent ground loops. The interconnect diagrams, and accompanying notes in appendix B, should be closely followed to minimize interference effects.

If wiring from the GTX goes to a unit that uses overbraided wires then the new wiring at the unit must also be overbraided. If the wiring passes through bulkhead connectors then each segment must be overbraided and the overbraid must be grounded at both ends unless instructed differently in the equipment's installation manual. The overbraid must be terminated as close to the connector as possible and in accordance with manufacturer's installation requirements.

3.18 General Electrical Bonding

NOTE

The reconditioned value in table 3-22 is for installation. During service life checks, the periodic test value is used. If the maintenance check shows resistance above the periodic test value, the bonding must be improved to reach the reconditioned value.

Electrical equipment chassis, shield/ground terminations, antennas, supporting brackets, and racks must be electrically bonded to the aircraft's ground reference as shown in table 3-22. Refer to section 5 of SAE ARP1870 when surface preparation is required to achieve electrical bond. The electrical bond must achieve direct current (DC) resistance less than or equal to the reconditioned value shown in table 3-22 for the aircraft type and model.

For some aircraft the instrument panel is attached with vibration mounts. For these aircraft it must be verified that the vibration-isolated instrument panel is grounded to the airframe metallic structure with a bonding jumper the same or equivalent to the specification below. If a jumper is not installed, a bonding strap with this criteria must be installed:

- The cross sectional area of the strap must be greater than 0.016 sq inches (approx 20800 circular mils). A 7/16-inch or wider tubular braid (QQB575R30T437, 24120 circular mils) or a ¾-inch or wider flat braid (QQB575F36T781, 20,800 circular mils) must be used.
- The strap length should be as short as possible and must not exceed six inches in length. Detailed design of a bonding strap meeting these requirements is shown in section 3.18.

Electrical bonding must be verified by inspection using a calibrated milliohm meter. Refer to section 3.5. An equivalent OEM procedure can also be substituted.

Brackets installed to the main aircraft metallic structure with four or more rivets can provide sufficient electrical bond to allow equipment chassis or install rack to be bonded to the bracket.

The correct material finish is important when mating untreated or bare dissimilar metals. Materials should be galvanically-compatible. When corrosion protection is removed to make an electrical bond, any exposed area after the bond should be protected again.

Additional guidance is found in AC 43.13-1B and SAE ARP 1870. Refer to figure 3-3, figure 3-4, and figure 3-5 for typical electrical bonding preparation examples.

Table 3-22 Ground Plane Definitions and Ground Path Resistance Requirements

Aircraft Type/Model		Ground Reference	Maximum Resistance Between GTX Chasis and Ground Reference (mΩ)		Notes
			Periodic	Reconditioned	
Metal airframe		Nearby Metal Structure	10.0	2.5	
Tube and fabric airframe		Nearby Metal Structure	10.0	2.5	
Composite VFR-only Models					
Aermacchi	S.211A	Instrument Panel	50.0	25.0	
Diamond	DA20-A1 DA20-C1	Instrument Panel	50.0	25.0	
	DA 40 DA 40 NG				
GROB	G115 G115A G115B	Instrument Panel	50.0	25.0	
	G115C G115C2 G115D G115D2 G115EG	Instrument Panel	50.0	25.0	[2]
	G120A	Instrument Panel	50.0	25.0	[2]
Triton	A500	Instrument Panel	50.0	25.0	[2]
Composite IFR-Models					
Beech	390	Nearby structure lightning ground foil	10.0	5.0	
Cessna	LC40-550FG LC41-550FG LC42-550FG	Nearby aluminum lightning ground strip/bar	10.0	5.0	
Cirrus	SR20 SR22 SR22T	Local grounded structure (such as seat support structure, entry step)	10.0	5.0	
Diamond	DA 40 DA 40 F DA 40 NG	Nearby structure lightning ground tube	10.0	5.0	[1]
	DA 42 DA 42 NG	Remote avionic box or local grounded structure	10.0	5.0	
Liberty	XL-2	Local grounded structure	10.0	5.0	
Triton	A500	Local grounded structure	10.0	5.0	

[1] Diamond DA 40 and DA 40 F with Diamond OSB 40-004/3 incorporated, or aircraft with similar factory-installed lightning protection supporting IFR operation.

[2] IFR models must use values of 10.0, and 5.0 for bonding tests and use aircraft lightning ground per the aircraft SRM or other manufacturer-approved data as ground reference instead of the instrument panel.

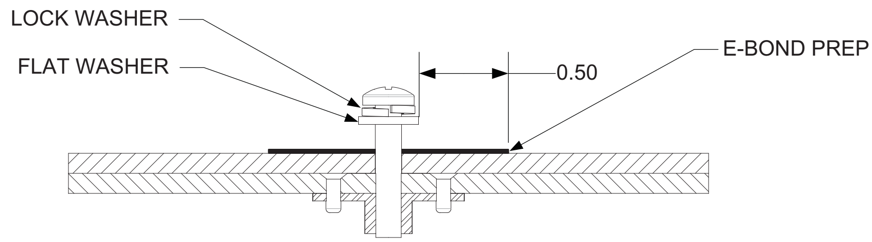

Figure 3-3 Electrical Bond Preparation - Nut Plate

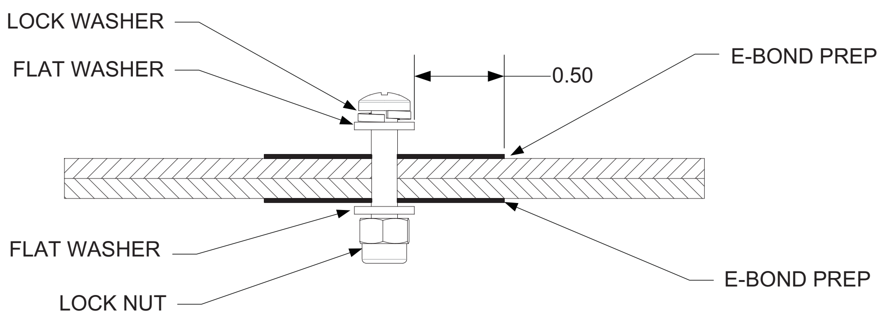

Figure 3-4 Electrical Bond Preparation - Bolt/Nut Joint

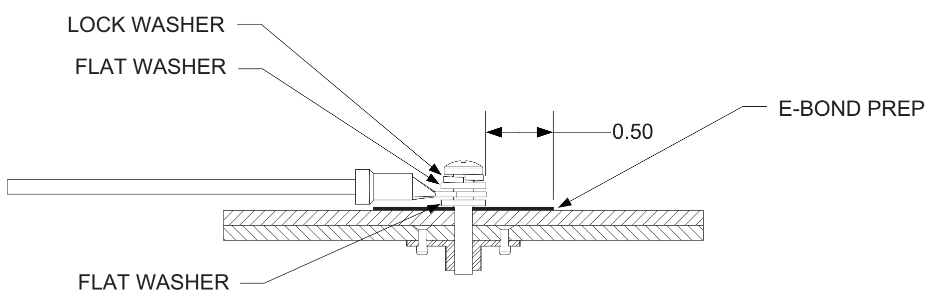

Figure 3-5 Electrical Bond Preparation - Terminal Lug

3.18.1 Aluminum Surface Preparation

This general procedure is recommended to prepare an aluminum surface for correct electrical bonding.

1. Clean grounding location with solvent.
2. Remove non-conductive films or coatings from the grounding location.
3. Apply a chemical conversion coat such as Alodine 1200 to the bare metal.
4. When the chemical conversion coat is dry, clean the area.
5. Install bonding equipment at grounding location.
6. After the bond is complete, if any films or coatings were removed from the surface, reapply a film or coating to the surrounding area.

Refer to SAE ARP1870 Sections 5.1 and 5.5 for a more detailed procedure.

3.18.2 Bonding Jumper

A bonding strap can be fabricated and installed to make sure the vibration-isolated instrument panel is grounded to metallic structure.

- The bonding strap length must not exceed six inches in length.
- The bonding strap must not loop back on itself. The strap must not bend more than 45 degrees.
- Refer to Bonding Jumper Installations in AC 43.13-1B Chapter 11 for guidance on attaching the bonding strap to structure.

Install the bonding jumper with this procedure. Refer to figure 3-6 and table 3-23. Assemble a bonding strap by securely attaching terminal lugs (item 2) to each end of the overbraid.

1. Select a location to minimize the presence of moisture and allow for easy inspection.
2. Make sure all surface preparation material (e.g., primer, paint, etc.) is removed between the large diameter flat washer (item 6) under the terminal lug and metallic surface on the aircraft (instrument panel and aircraft metallic structure or aircraft ground).
3. After assembly and bonding check, prime the airframe structure or instrument panel in accordance with one of these:
   - The approved aircraft maintenance manual
   - MIL-PRF-85285 Type I, Color to suit (36081 Flat Gray Preferable) Coating: Polyurethane, Aircraft and Support Equipment
   - MIL-PRF-23377 Type I, Class N, Primer Coatings: Epoxy, High-Solids
4. Install one end of the bonding strap to the instrument panel and the other end to aircraft metallic structure (or aircraft ground).

Table 3-23 Airframe Bonding Hardware

Item Number Refer to Figure 3-6	Description
1	Tinned copper flat braid, 3/4", QQB575F36T781
	Or
	Tinned copper tubular braid, 7/16", QQB575R30T437
2	Terminal lug, 5/16-inch, uninsulated, MS20659-131
3	Bolt, 5/16-inch, AN5-XA
4	Lock washer, 5/16-inch, NASM35338-45
5	Flat washer, 5/16-inch, NAS1149F0563P
6	Flat washer, 0.063-inch thick, NASM970-5 (AN970-5)
7	Locknut, 5/16-inch, AN363-524

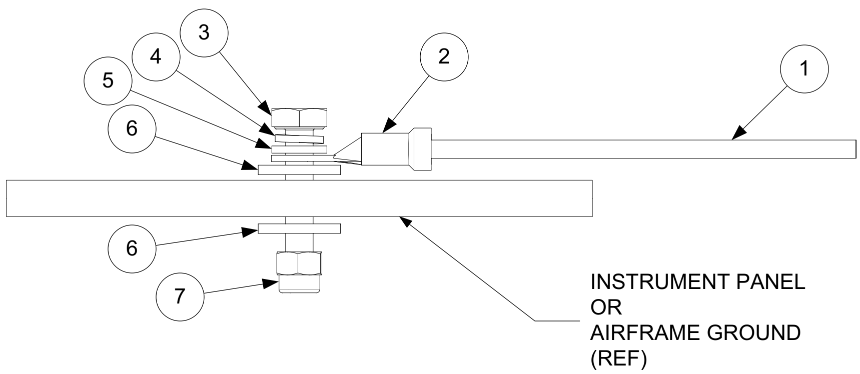

Figure 3-6 Bonding Strap

3.18.3 Transponder Antenna Bonding

CAUTION

If the antenna is struck by lightning, the foil by itself may not be sufficient to dissipate lightning currents. Additional protection may be needed depending on the construction of the structure to which the antenna is attached. Refer to aircraft SRM for more information.

NOTE

For nonmetallic aircraft, the ground plane can be composed of heavy duty aluminum foil tape, such as 3M P/N 438, 3M P/N 436, or other adhesive backed dead soft foil with aluminum 7.2 mils or greater.

Obey these precautions when planning installation of the antenna:

1. The ground plane should be 12 inches minimum radius around the perimeter of the antenna. Refer to figure 3-7. For metallic aircraft, the surrounding metal skin that the antenna is attached supplies the ground plane.
2. The antenna baseplate must be electrically bonded to the ground plane.
3. The electrical bond must achieve direct current (DC) resistance less than or equal to 2.5 mΩ.

4. The paint on the outer skin of the aircraft, under the footprint of the antenna baseplate should not be removed unless it is necessary to meet bonding requirements.

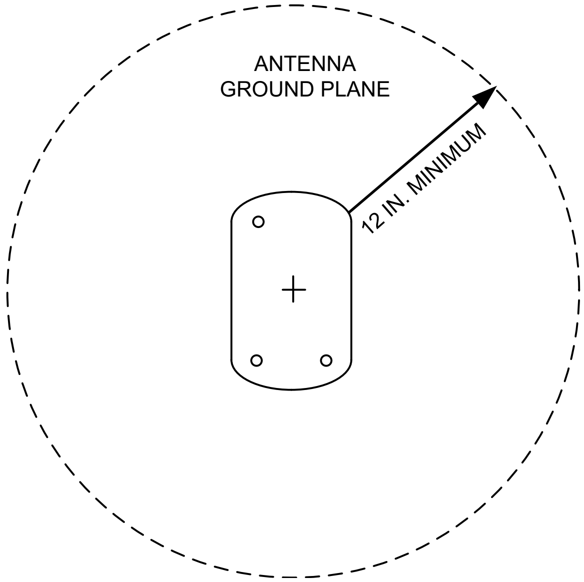

Figure 3-7 Transponder Antenna Minimum Ground Plane Radius

3.18.4 GPS Antenna Bonding

CAUTION

If the antenna is struck by lightning, the foil by itself may not be sufficient to dissipate lightning currents. Additional protection may be needed depending on the construction of the structure to which the antenna is attached. Refer to aircraft SRM for more information.

NOTE

For non-metallic aircraft, the ground plane can be composed of heavy duty aluminum foil tape, such as 3M P/N 438, 3M P/N 436, or other adhesive backed dead soft foil with aluminum 7.2 mils or greater.

Obey these precautions when planning installation of the antenna:

1. The ground plane should be 7.5 inches minimum radius around the perimeter of the antenna. Refer to figure 3-8. For metallic aircraft, the surrounding metal skin on which the antenna is attached supplies the ground plane.
2. The antenna baseplate must be electrically bonded to the ground plane.
3. The electrical bond must achieve direct current (DC) resistance less than or equal to 2.5 milliohms.
4. The paint on the outer skin of the aircraft, under the footprint of the antenna baseplate, should not be removed unless it is necessary to meet bonding requirements.

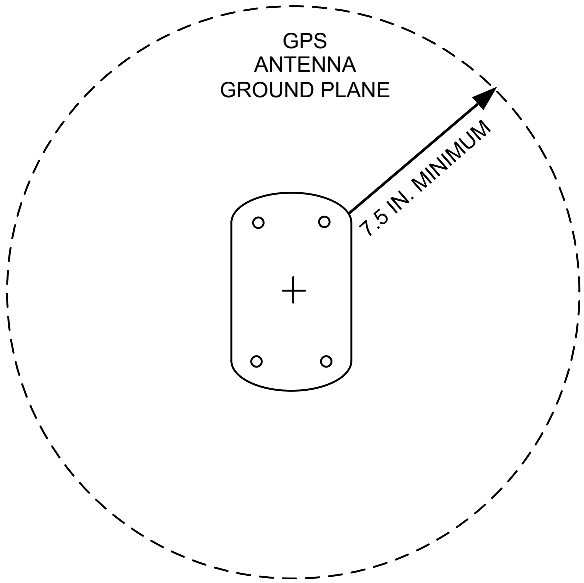

Figure 3-8 GPS/SBAS Antenna Minimum Ground Plane Radius

3.19 Electrical Load Analysis

NOTE

Circuits should be protected in accordance with the approved data in this document. Refer to the guidelines in AC 43.13-1B, Chapter 11, Section 4 and to appendix B for recommended circuit breaker ratings.

An electrical load analysis (ELA) must be completed on each aircraft prior to installation to make sure the aircraft electrical system is capable of supporting the GTX. The purpose of the ELA is to show compliance with 14 CFR 23.1351. As part of the installation it must be shown that the maximum electrical system demand does not exceed 80% of the alternator data plate rating. Satisfactory completion of the ELA should be recorded on FAA Form 337. There are several approaches that can be taken as given in this section. For each approach use the GTX 33X or GTX 3X5 current draw values listed in table 1-7.

3.19.1 Aircraft Without Existing Electrical Load Analysis

Prior to undertaking a complete ELA, the net change to the electrical load resulting from the GTX installation should be found. The results of this analysis determines how to proceed. If there is a net decrease in electrical load as a result of the installation of the GTX (i.e., removal of existing equipment), no more electrical load analysis is required. If there is a net increase in electrical load as a result of the installation of the GTX, proceed to section 3.19.3.

3.19.2 Electrical Load is Decreased After Modification

In instances when older systems are replaced with newer equipment, the electrical load presented to the power system may be decreased. If the overall load on the electrical system is decreased as a result of the GTX installation, no more analysis is required. This assumes that the electrical system was within all limits prior to the GTX installation. The amended electrical load calculation should be added to the aircraft permanent records to document the electrical load reduction.

3.19.3 Electrical Load is Increased After Modification

If it is found that the electrical load has increased then a complete electrical load analysis must be done to show that the capacity of the alternator/generator is sufficient for the electrical load. For guidance on preparing an ELA, refer to ASTM F 2490-05, Standard Guide for Aircraft Electrical Load and Power Source Capacity Analysis. Alternatively, the loads under different operating conditions can be measured. Refer to section 3.19.4 for more information.

3.19.4 Performing an Electrical Load Analysis by Measurement

This section describes how to do an ELA for a single alternator/single battery electrical system. This should be modified accordingly for aircraft with multiple batteries or alternators. For Commuter Category aircraft, an electrical load analysis that accounts for the electrical loads applied to the electrical system in probably combinations and for probable durations is required. It must be shown that the maximum electrical demand for each alternator does not exceed 80% of the alternator data plate rating.

Section Definitions

- Normal operation: the primary electrical power generating system is operating normally.
- Emergency operation: the primary electrical power generating system is inoperative.

If the installation of the GTX increases the overall load, an electrical load analysis must be done. Because of the age of some equipment, there is not always sufficient information about the current draw of this equipment. One permitted method of doing an electrical load analysis is to determine the electrical loads by measurement. The measurements must account for loads applied to the electrical system in probable combinations and durations for aircraft operation.

An in-circuit or clamp-on, calibrated ammeter with 0.5 A or better precision can be used for current measurement. Record the continuous (data plate/nameplate) rate for the alternator and battery.

CAUTION

To avoid damage to equipment, make sure the ammeter is capable of handling the anticipated load.

CAUTION

The pitot heat should only be switched on long enough to take the current measurement and then switched off. The pitot probe can get hot so care should be exercised to avoid burns or damaging the unit.

1. Use the blank electrical load tabulation form provided in figure 3-10 to compile a list of electrical loads on the aircraft (generally, this is a list of circuit breakers and circuit breaker switches). Refer to the example in figure 3-11.
2. Identify whether each load is continuous (e.g., GPS) or intermittent (e.g., stall warning horn, landing gear).
3. Use the worst-case flight condition to identify whether each load is used in a particular phase of flight for normal operation. If some loads are mutually exclusive and will not be energized simultaneously (e.g., pitot heat and air conditioning), use only those loads for the worst-case condition.

4. Identify whether each load is used in a particular phase of flight for emergency operation. As a minimum these systems include:
   - COM radio #1
   - NAV radio #1
   - Transponder and associated altitude source
   - Audio panel
   - Stall warning system (if applicable)
   - Pitot heat
   - Landing light (switched on during landing only)
   - Instrument panel dimming
5. Connect the calibrated ammeter in line between the external power source and the master relay circuit as shown in figure 3-9. This will eliminate errors because of the charging current drawn by the battery.

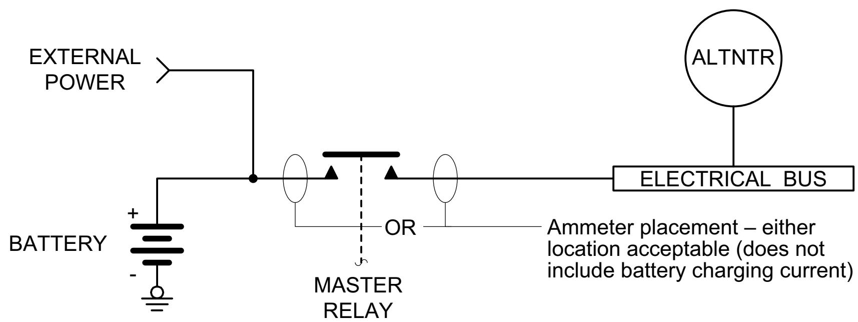

Figure 3-9 Ammeter Placement for Current Measurements

6. Make sure all circuit breakers are closed.
7. Apply external power to the aircraft. Power source voltage should be set to nominal alternator voltage (usually 13.8 VDC or 27.5 VDC).
8. Turn on the battery master switch.
   - Intermittent electrical loads are not measured. It is assumed that if more current is required beyond what the alternator can supply, this short-duration demand is supplied by the battery.
9. Set the lighting as given below. These settings will be used for every current measurement that follows:
   - All instrument panel and flood lights should be set to maximum brightness.
   - Any other displays with a backlight should be set to 50% brightness.
10. Use the tabulation completed above and switch on all continuous electrical loads used in the taxiing phase. Record ammeter current reading (measurement (a) in figure 3-10). Obey these precautions for this measurement:
    - The autopilot circuit breaker should be closed.
    - The autopilot should not be engaged.

11. Use the tabulation completed above and switch on all continuous electrical loads used in the normal takeoff/landing phase. Record ammeter current reading. Measurements must be taken with the landing lights ON and OFF (measurements (b1) and (b2) in figure 3-10). Obey these precautions for this measurement:
    - The autopilot circuit breaker should be closed, and the autopilot should be engaged.
    - Use the tabulation completed above and switch on all continuous electrical loads used in the normal cruise phase. Record the ammeter current reading (measurement (c) in figure 3-10).
12. Use the tabulation completed above and switch on all continuous electrical loads used in the emergency cruise phase. Record the ammeter current reading. Record the current drawn with the landing light switched OFF and again with the landing light switched ON.
13. Use the tabulation completed above and switch on all continuous electrical loads that are used for the emergency landing phase. Record the ammeter current reading.
14. Use the values measured and recorded. Complete the ELA using the blank electrical load tabulation form in figure 3-10. Make sure the maximum demand does not exceed 80% of the alternator data plate rating.

Electrical Load Tabulation

When the pitot heat and landing light are switched on simultaneously it is permissible for electrical load to exceed 80% of the alternator data plate rating during the takeoff/landing phase of flight.

Electrical load should:

- Not exceed 95% of the alternator data plate rating
- Not exceed 80% of the alternator data plate rating with the Pitot heat on and the landing light off

ELECTRICAL LOAD TABULATION FORM

Date: __________ **Tail Number:** __________

Circuit/System	Circuit Breaker Number	Operating Time	Phase(s) of flight during which circuit/system is used				
			Normal Operation			Emergency Operation	
			Taxiing 10 min	TO/Land 10 min	Cruise 60 min	Cruise (*Calculated*)	Land 10 min
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
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			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐

Figure 3-10 GTX Electrical Load Tabulation Form
Sheet 1 of 2

ELECTRICAL LOAD TABULATION FORM (CONTINUED)

Date: __________ **Tail Number:** __________

Circuit/System	Circuit Breaker Number	Operating Time	Normal Operation: Taxiing 10 min	Normal Operation: TO/Land 10 min	Normal Operation: Cruise 60 min	Emergency Operation: Cruise (*Calculated*)	Emergency Operation: Land 10 min
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
______	______	______	☐	☐	☐	☐	☐
Total current used (amps):			______ (a)	______ Ldg Lt ON (b1) ______ Ldg Lt OFF (b2)	______ (c)	______ (d)	______ (e)
÷ Alternator rating (amps): ____							
x 100% = Percent of alternator capacity used:			______% (< 80%)	______% Ldg Lt ON (< 95%) ______% Ldg Lt OFF (< 80%)	______% (< 80%)	N/A	N/A
		Pass/Fail:	______	______	______		

Phase(s) of flight during which circuit/system is used

Notes:

Figure 3-10 GTX Electrical Load Tabulation Form
Sheet 2 of 2

ELECTRICAL LOAD TABULATION FORM

Date: ____________ **Tail Number:** NXMPL1

Circuit/System	Circuit Breaker Number	Operating Time	Phase(s) of flight during which circuit/system is used: Normal Operation — Taxiing 10 min	Normal Operation — TO/Land 10 min	Normal Operation — Cruise 60 min	Emergency Operation — Cruise (*Calculated*)	Emergency Operation — Land 10 min
Alternator Field	A1	Continuous	☒	☒	☒	☐	☐
Annunciator Panel	C1	Continuous	☒	☒	☒	☒	☒
Vacuum Warning	C2	Intermittent	☐	☐	☐	☐	☐
Stall Warning	C3	Intermittent	☐	☐	☐	☐	☐
Gear Warning	C4	Intermittent	☐	☐	☐	☐	☐
Gear Actuator	C5	Intermittent	☐	☐	☐	☐	☐
Cluster Gauge	D1	Continuous	☒	☒	☒	☒	☒
Ignition	D2	Intermittent	☐	☐	☐	☐	☐
PFD	D3	Continuous	☒	☒	☒	☒	☒
Turn Coordinator	D4	Continuous	☒	☒	☒	☐	☐
Gear Relay	D5	Intermittent	☐	☐	☐	☐	☐
ADC	E1	Continuous	☒	☒	☒	☒	☒
Panel Lights	E2	Continuous	☒	☒	☒	☒	☒
Glareshield Lights	E3	Continuous	☒	☒	☒	☒	☒
AHRS	E4	Continuous	☒	☒	☒	☒	☒
Flap Actuator	E5	Intermittent	☐	☐	☐	☐	☐
COM 1	F1	Continuous	☒	☒	☒	☒	☒
GPS/NAV 1	F2	Continuous	☒	☒	☒	☒	☒
COM 2	F3	Continuous	☒	☒	☒	☐	☐
GPS/NAV 2	F4	Continuous	☒	☒	☒	☐	☐
Autopilot	F5	Continuous	☒	☒	☒	☐	☐
Audio Panel	G1	Conts. [1]	☒	☒	☒	☒	☒
Radio Blower	G2	Continuous	☒	☒	☒	☐	☐
ADF	G3	Continuous	☒	☒	☒	☐	☐
Transponder	G4	Continuous	☒	☒	☒	☒	☒
GDL 69	H1	Continuous	☒	☒	☒	☐	☐
TCAD	H2	Continuous	☒	☒	☒	☐	☐
JPI Engine Monitor	H3	Continuous	☒	☒	☒	☒	☒
Bose Headsets	H5	Continuous	☒	☒	☒	☒	☒
Altitude Encoder	J1	Continuous	☒	☒	☒	☒	☒
Strobe Light	SW1	Continuous	☒	☒	☒	☒	☒
Navigation Lights	SW2	Continuous	☒	☒	☒	☒	☒
Recognition Lights	SW3	Continuous	☒	☒	☒	☒	☒
Landing Light	SW4	Continuous	☒	☒	☐	☐	☐
Pitot Heat	SW5	Continuous	☐	☒	☒	☒	☒

Figure 3-11 GTX Electrical Load Tabulation Form (Sample)
Sheet 1 of 2

ELECTRICAL LOAD TABULATION FORM (CONTINUED)

Date: ____________ **Tail Number:** NXMPL1

Circuit/System	Circuit Breaker Number	Operating Time	Normal Operation: Taxiing 10 min	Normal Operation: TO/Land 10 min	Normal Operation: Cruise 60 min	Emergency Operation: Cruise (*Calculated*)	Emergency Operation: Land 10 min
Elevator Trim	SW6	Intermittent	☐	☐	☐	☐	☐
Boost Pump	SW7	Intermittent	☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
			☐	☐	☐	☐	☐
Total current used (amps):			47.5 (a)	60.0 Ldg Lt ON (b1); 44.7 Ldg Lt OFF (b2)	43.5 (c)	34.0 (d)	48.1 (e)
÷ Alternator rating (amps): 68							
x 100% = Percent of alternator capacity used:			68 % (< 80%)	86 % Ldg Lt ON (< 95%); 64 % Ldg Lt OFF (< 80%)	62 % (< 80%)	N/A	N/A
Pass/Fail:			Pass	Pass	Pass		

Phase(s) of flight during which circuit/system is used

Notes:

[1] During taxi phase, the Autopilot circuit breaker is closed but the autopilot is not engaged.

Figure 3-11 GTX Electrical Load Tabulation Form (Sample)
Sheet 2 of 2

3.19.5 Battery Capacity Analysis

If it is determined that the modification results in an increase in electrical load then it must be further verified that the aircraft electrical system remains in compliance which includes both electrical generation capacity and if loads have been increased, that reserve battery capacity remains adequate to support loads essential to continued safe flight and landing. If the existing battery does not meet the battery capacity requirements, a battery that has sufficient capacity must be installed.

Refer to ASTM document F 2490 - 05, Standard Guide for Aircraft Electrical Load and Power Source Capacity Analysis for more information.

1. Examine the nameplate capacity of the battery and assume 75% is available.
   For example, 12A-h = 720A-min, therefore 720 A-min X 75% = 540 A-min.
2. Estimate the normal or pre-loadshed cruise condition (assume worst case cruise at night).
   For example, 15 A X 5 min = 75 A-min. This assumes 5 minutes for the pilot to shed non-essential loads. Any automatic load shedding can be assumed to be immediate and need not be considered in the pre-loadshed calculations.
3. Determine the minimum cruise load necessary to maintain flight after the generator/alternator has failed. For example, 10 A.
4. Determine the consumption required during the landing approach.
   For example, 20 A for 5 min = 100 A-min. The cruise duration is therefore:

$$\frac{\text{Battery Capacity – Pre-loadshed + Landing Load}}{\text{Cruise Load}} = \frac{(a) - ((b) + (d))}{(c)}$$

$$= \frac{540 \text{ A-min} - (75 \text{ A-min} + 100 \text{ A-min})}{10 \text{ A}}$$

$$= \frac{365 \text{ A-min}}{10 \text{ A}}$$

$$= 36.5 \text{ min}$$

Figure 3-12 Battery Capacity Analysis Example

4 INSTALLATION PROCEDURE

4.1 Structural Installation....4-2
4.1.1 Location and Mounting....4-2
4.1.2 General Requirements for All Installations....4-3
4.1.3 General Requirements for Installation in Metallic Aircraft....4-15
4.1.4 General Requirements for Installation in Composite Aircraft....4-18
4.1.5 General Requirements for Tube and Fabric Aircraft....4-23
4.1.6 Installation and Removal Procedure....4-26
4.2 GTX 3XX Weight and Balance....4-30
4.3 Electrical Installation....4-31
4.3.1 Wiring (Addition/Change)....4-31
4.3.2 Special Tools Required....4-31
4.3.3 Power Distribution....4-31
4.3.4 Wire and Cable Considerations....4-31
4.3.5 Coaxial Cable Preparation....4-31
4.3.6 Wire Harness Construction....4-31
4.3.7 Shielded Cable Preparation....4-32
4.3.8 Cable Bundle Termination on Backshell Assembly....4-34
4.3.9 Connector and Backplate Assembly for GTX 330/330D....4-35
4.3.10 Connector and Backplate Assembly for GTX 33/33D....4-37
4.3.11 Connector and Backplate Assembly for GTX 3X5....4-39
4.4 Garmin Altitude Encoder and Configuration Module Installation....4-42
4.4.1 Garmin Altitude Encoder....4-42
4.4.2 Configuration Module Installation....4-44
4.5 GTX Installation....4-45
4.5.1 GTX 330/330D Installation....4-45
4.5.2 GTX 33/33D Installation....4-45
4.5.3 GTX 335/345 Installation....4-46
4.5.4 GTX 3X5R With Standard Remote or G1000 System Rack Mount....4-46
4.5.5 Garmin Altitude Encoder Installation....4-47
4.6 AFMS Completion....4-48

The general requirements in this section apply to the GTX 33X and GTX 3X5 transponder installation. For more mechanical drawings and validation of structure information, refer to appendix A and appendix D.

4.1 Structural Installation

NOTE

Existing transponder installations may not meet the requirements in this section. Make sure the installation location for the GTX meets the requirements before the aircraft is modified.

4.1.1 Location and Mounting

The following conditions must be met for installation of the transponder.

- Maintain a minimum of three inches between the edge of the mounting rack nearest the connector and any nearby objects to provide clearance for the connectors, wire harness and antenna cables.
- Use hardware listed in appendix E, unless indicated differently.
- Electrical bond requirements can limit possible installation locations:
  - For metal aircraft, the unit must be electrically bonded to the aircraft metallic structure. Refer to section 3.18 and table 3-22.
  - For nonmetallic aircraft, the unit must be electrically bonded to the aircraft ground plane. Refer to section 3.18 and table 3-22.
- A validation of structures test is required as outlined in appendix D, unless indicated differently.

4.1.1.1 Panel Mount Installations, GTX 330/330D and GTX 3X5

This information affects panel mount installations of the transponder:

- Panel mount transponders can be installed in an existing avionics stack with a minimum width of 6.30 in. and at least 1.68 in. of vertical space.
- A minimum distance is required forward of the instrument panel to accommodate the length of the transponder, connectors, and the wire harness:
  - At least 14.25 in. is required for the GTX 330/GTX 330D.
  - At least 13.10 in. is required for the GTX 335/GTX 345.
- Modification to the instrument panel mounting rails for the avionics stack may be necessary for the transponder mounting rack.
- Support of the forward end of the transponder mounting rack to other avionics racks or an aircraft structure is required.

4.1.1.2 Remote Rack Installations, GTX 33/33D and GTX 3X5R

The following conditions must be met for a remote installation of the transponder:

1. Existing structure can be used for a remote rack installation if it meets the following requirements:
   a) Sheet aluminum structure must be at least 0.050 in. thick.
   b) Brackets must be at least 0.032 in. thick.
   c) Mounting plate must not span greater than 12 in. in width or length without direct attachment to aircraft structure.
2. Minor modifications can be made to existing brackets or mounting plates to adjust for the remote rack fastener hole pattern.
   a) Maintain an edge distance of at least 2 X D (2 X the fastener diameter) (center of hole to edge of part).
   b) Maintain a minimum of 3 X D (center to center) between holes.

NOTE

The GTX 33/33D and GTX 335R/345R with standard remote rack can be added to an existing electrical or avionics shelf if the installed weight of the unit and remote rack, when combined with the weight of the existing shelf components, is no more than the weight allowed by the shelf (e.g., reference placard on shelf indicating max weight and aircraft equipment records). A validation of structures test is not required for this type of installation.

NOTE

The GTX 335R/345R with standard remote rack can be oriented in vertical or horizontal positions. Refer to appendix A for the outline drawings.

4.1.1.3 Legacy G950/1000 Remote Mount Installation

The GTX 335R/GTX 345R can replace an existing GTX 32 or GTX 33 in a G1000 system rack. Remove the existing modular rack for the GTX 32 or GTX 33 and retain the nutplate kit components used to secure the modular rack to the G1000 system rack. The nutplate kit components can be reused for installation of the G1000 remote mount rack for the GTX 335R/GTX 345R.

NOTE

If removing an existing GTX 32 or GTX 33 from a G1000 system rack, it is recommended to use the same location for installation of the GTX 335R/GTX 345R. The GTX 335R/GTX 345R can also be used with a stand alone remote mount installation alternative elsewhere in the aircraft. Refer to section 4.1.1.2 for more information.

4.1.2 General Requirements for All Installations

4.1.2.1 Panel Mount Installations, GTX 330/330D and GTX 3X5

If the GTX 345 Bluetooth is enabled (i.e., PED connected), the GTX 345 must be installed within 30 degrees of an orthogonal plane so the internal attitude sensor will pass calibration.

Figure 4-1 and figure 4-2 illustrate the avionics rack mounting rails used in GTX 330/GTX 330D and GTX 335/GTX 345 installations. In order to satisfy the structural requirements for the installation of GTX 330/GTX 330D or GTX 335/GTX 345 transponders, the following conditions must be met:

1. If existing structure is to be used for attaching the GTX 330/GTX 330D, the avionics stack brackets or rails must be at least 0.032 in. thick.
2. If support brackets or rails need to be fabricated for this installation, they should be fabricated and attached to the aircraft instrument panel structure in accordance with the methods outlined in FAA AC 43.13-2B Chapter 2, AC 43.13-1B Chapter 4, and the following requirements:
   a) Use 2024-T3 sheet aluminum (bare or Clad), minimum of 0.032 in. thick.
   b) Use sheet metal techniques (bend radius, fillets, etc.) applicable to material type and thickness.
   c) Secure the GTX 330/GTX 330D or GTX 335/GTX 345 mounting rack with two #6 flat head screws on each instrument panel rail (refer to figure 4-1 and figure 4-2). Nuts, nutplates, or clipnuts can be used to secure the #6 screws.
   d) Make sure fabricated parts are protected from corrosion. Apply epoxy primer that meets MIL-P-23377 Class N, or other corrosion protection methods listed in the aircraft's maintenance manual.

e) Fabricate and install support straps at the forward end of the mounting rack to attach to existing racks as given in FAA AC 43.13-2B, Chapter 2.

NOTE

For GTX 3X5 only, make sure straps or other means of support do not obstruct the vent on the side of the unit (refer to figure A-11) if forced air cooling is desired.

3. Area around the fastener holes on the side of the rail that attaches to the GTX 330/GTX 330D mounting rack must be cleaned and prepared for electrical bond per section 3.18 of this manual.
4. Make sure no screw heads or other obstructions prevent the transponder from fully engaging in the rack.
5. Exercise caution during installation of the rack to the instrument panel. Deformation of the rack can make it difficult to install and remove the transponder.

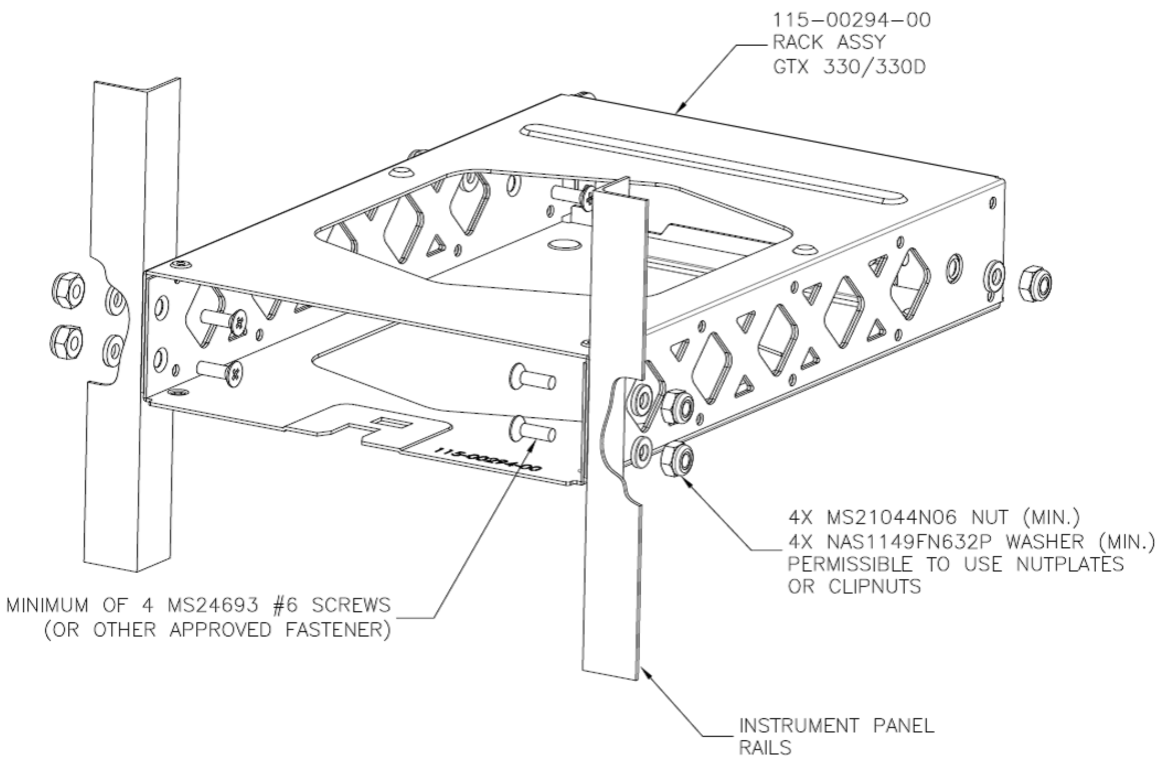


Figure 4-1 GTX 330/330D Installation (Existing)

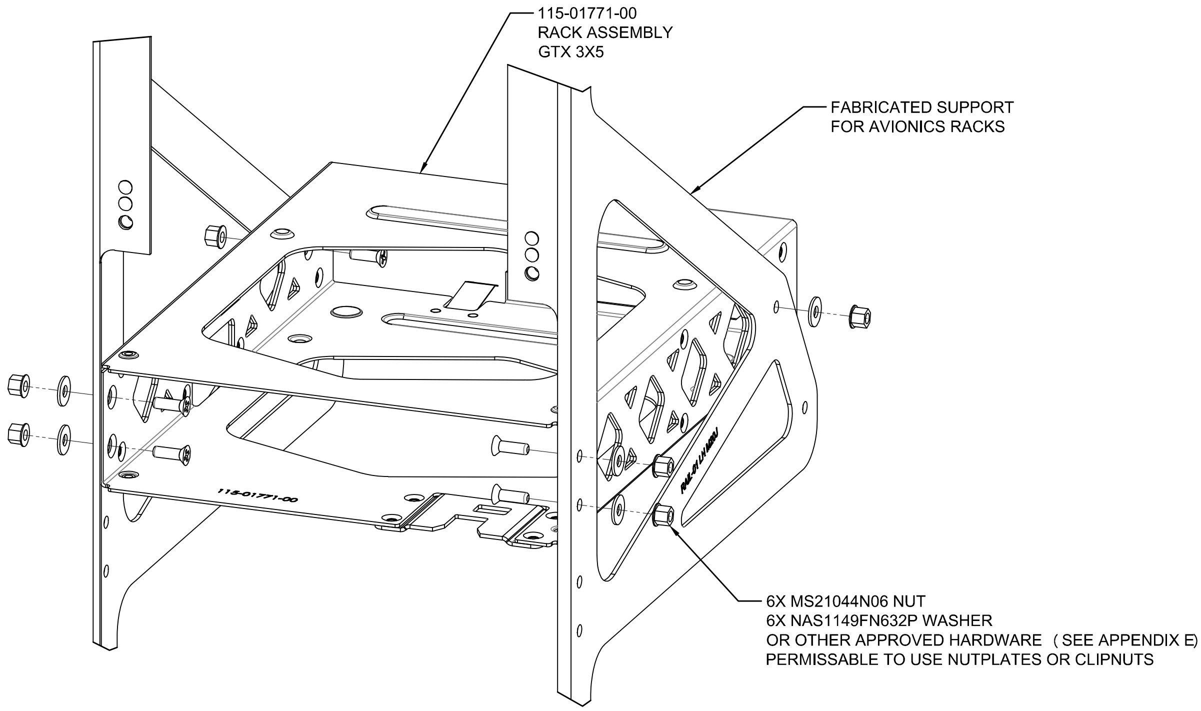


Figure 4-2 GTX 3X5 Installation

Avionics Stack Cutout

Some instrument panels can require minor modifications to increase width or height of the avionics stack cutout to accommodate installation of the GTX 330/GTX 330D or GTX 335/GTX 345.

In order to satisfy the structural requirements for the installation of the panel mount transponders, the following conditions must be met:

- A cutout cannot be made into aircraft primary structure.
- Cutout area must not affect any subpanel structure.
- Refer to figure 4-3 for dimensions of cutouts.
- Radius corners and remove burrs from cut edges. Apply corrosion protection or finish paint to the cut edge.

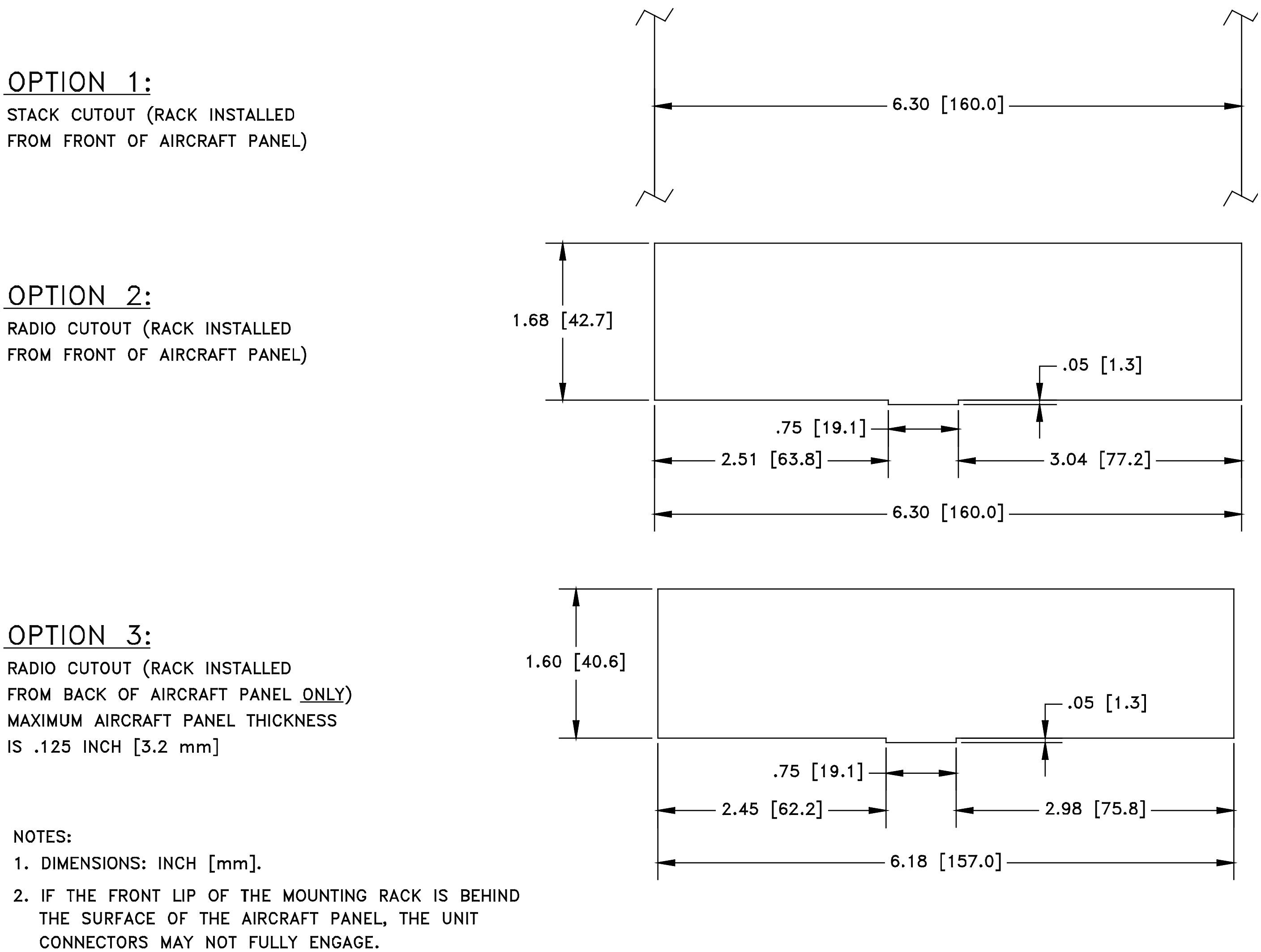


Figure 4-3 Panel Cutout Detail for GTX 330/330D and GTX 3X5

Modification of Avionics Stack Mounting Rails

Existing mounting rails can contain holes from previously installed equipment. If existing rail holes do not match holes in the GTX 330/GTX 330D or GTX 335/GTX 345 mounting rack, it is permitted to modify the rails through the addition of fastener holes to accept installation of the mounting rack. If more fastener holes are required, the following conditions should be adhered to:

- Maintain a distance at least 2 X D from the edge of the rail for the other fastener holes.
- Maintain at least 3 X D distance between holes when adding holes among the existing holes.

If existing brackets or mounting rails are found to be incorrect for installation of the GTX 330/330D or GTX 335/345, new parts need to be fabricated. In some cases, there can be too many holes from previous avionics mounting tray installations. If new parts are to be fabricated, adhere to the following conditions:

- Remove existing mounting rails or brackets from instrument panel. Avoid enlargement of existing rivet holes.
- Fabricate new parts as close to the original design as possible (extrusion or sheet metal). Use the same material thickness and type with only the holes necessary for the planned avionics stack.
- If material type of the original rails or brackets is unknown, replace with 2024-T3 (bare or Clad) aluminum of the same thickness as the original part. Use sheet metal techniques (bend radius, fillets, etc.) applicable to material type and thickness.
- Make sure fabricated parts are protected from corrosion. Apply epoxy primer that meets MIL-P-23377 Class N, or other corrosion protection methods listed in the aircraft's maintenance manual. Area around the fastener holes on the side of the fabricated rail that attaches to the GTX mounting rack must be cleaned and prepared for electrical bond per section 3.18 of this manual.
- Install fabricated mounting rails to instrument panel. Use same number and size of rivets as original rivets removed.

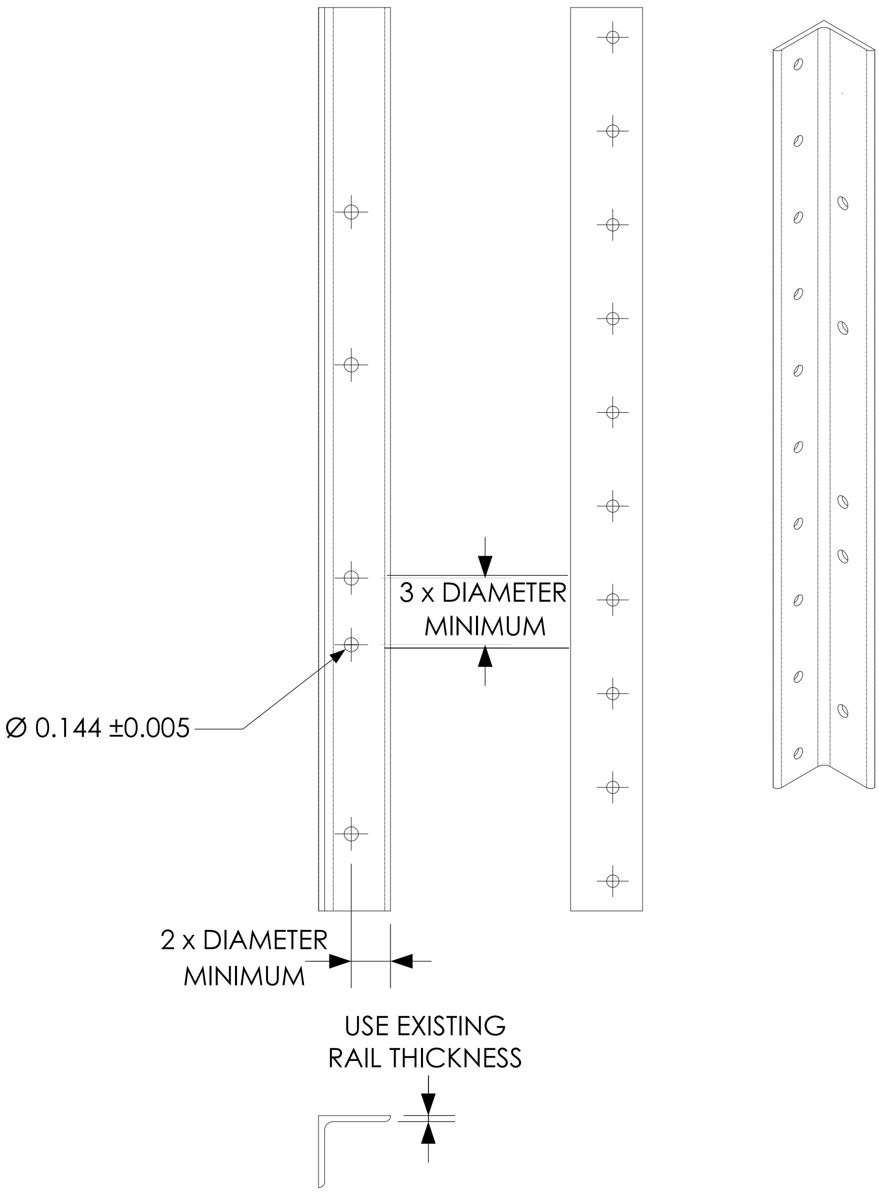


Figure 4-4 Avionics Rack Mounting Rail Considerations

4.1.2.2 Remote Mount Installations, GTX 33/33D and GTX 3X5R

In order to satisfy the structural requirements for the GTX 33/GTX 33D or GTX 335R/GTX 345R installation, the following conditions must be met:

1. If existing structure is to be used for installation of the GTX 33/33D or GTX 335R/GTX 345R, it must meet the following requirements:
   a) Sheet aluminum structure must be at least 0.050 in. thick
   b) Brackets must be at least 0.032 in. thick
   c) Make sure the mounting plate does not span greater than 12 in. in width or length without direct attachment to aircraft structure.

2. It is satisfactory to reuse existing support brackets or plates. Minor modifications can be made to adjust for the GTX 33/33D or GTX 335R/345R mounting rack hole patterns.
   a) Maintain an edge distance of at least 2 X D (2 X the fastener diameter, center of hole to edge of part).
   b) Maintain a minimum of 4 X D (center to center) between holes.
3. If support brackets or plates need to be fabricated for this installation, they should be fabricated and attached to the aircraft structure in accordance with the methods outlined in FAA AC 43.13-2B Chapter 2, AC 43.13-1B Chapter 4, and the following requirements:
   a) Use 2024-T3 sheet aluminum (bare or Clad), minimum of 0.040 in. thick.
   b) Use sheet metal techniques (bend radius, fillets, etc.) applicable to material type and thickness.
   c) The bracket or plate must have the following number and size fastener holes for each remote mounting rack. Refer to appendix E for acceptable mounting hardware. Nuts or nutplates can be used to secure the screws:

Table 4-1 Mounting Hardware

Unit	Hardware	Quantity
GTX 33/33D	#8, Pan Head	4
GTX 3X5R Standard Remote Rack	#6, Flat Head	6

   d) Make sure fabricated parts are protected from corrosion. Apply epoxy primer that meets MIL-P-23377 Class N, or other corrosion protection methods listed in the aircraft's maintenance manual.
   e) Fabricate and install a support between the mounting tray and a nearby structural member of the aircraft, as recommended in FAA AC 43.13-2B, Chapter 2.
   f) Make sure the mounting plate does not span greater than 12 in. in width or length without direct attachment to aircraft structure. If the mounting plate must span more than 12 in., stiffeners and/or flange reinforcements are necessary to provide sufficient support. Refer to figure 4-7.
4. The GTX 33/GTX 33D with the vertical rack can be installed in the vertical orientation on a horizontal surface. The GTX 335R with the standard remote rack can be installed in any orientation on a horizontal or vertical surface. The GTX 345R with the standard remote rack must be installed within 30 degrees of an orthogonal plane so the internal attitude sensor will pass calibration Refer to section 3.9 for more about the PED interface that uses the attitude sensor information. If the GTX 345 Bluetooth is not enabled, the $\pm$30 degree limitation does not apply.

NOTE

If forced air cooling is desired, the vent on the GTX 335R/GTX 345R should remain unobstructed. Refer to figure A-11 and figure A-5 for vent location.

5. Clean and prepare area around the fastener holes on the side of the shelf or bracket that attaches to the transponder mounting rack for electrical bond per section 3.18 of this manual.

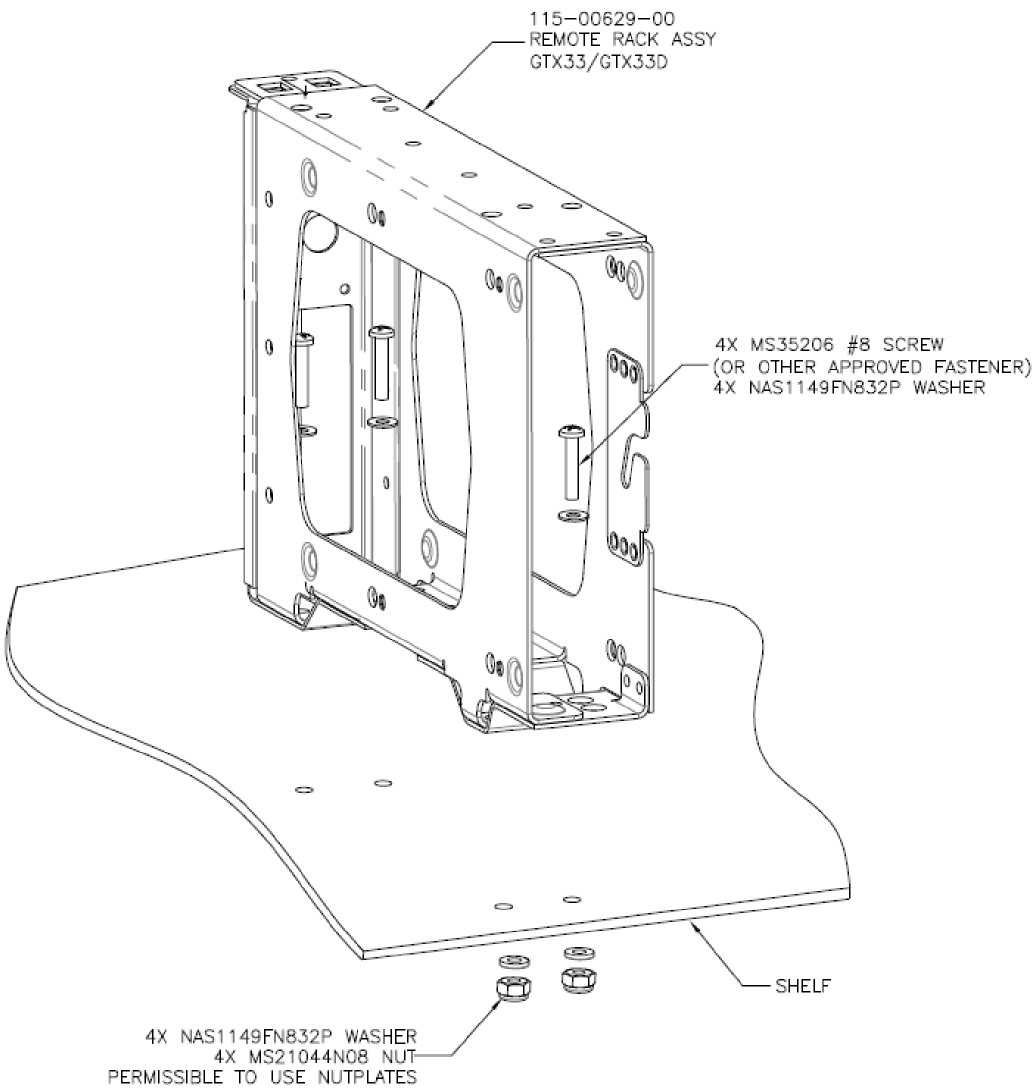


Figure 4-5 GTX 33/33D Installation

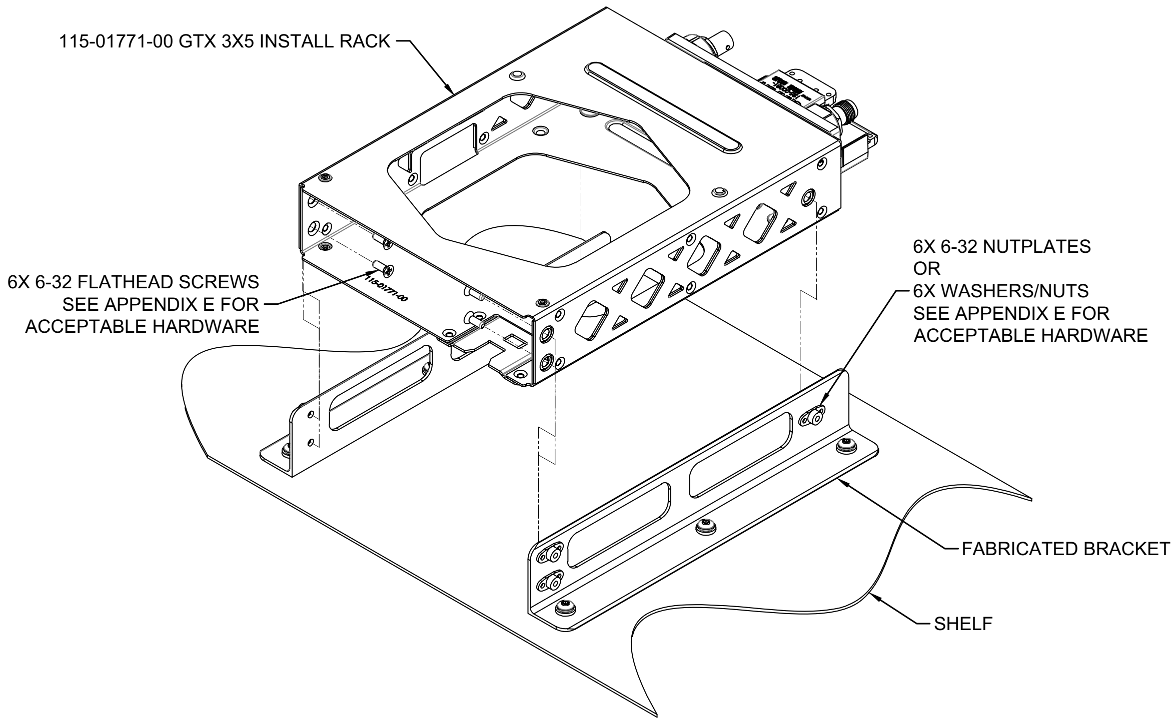
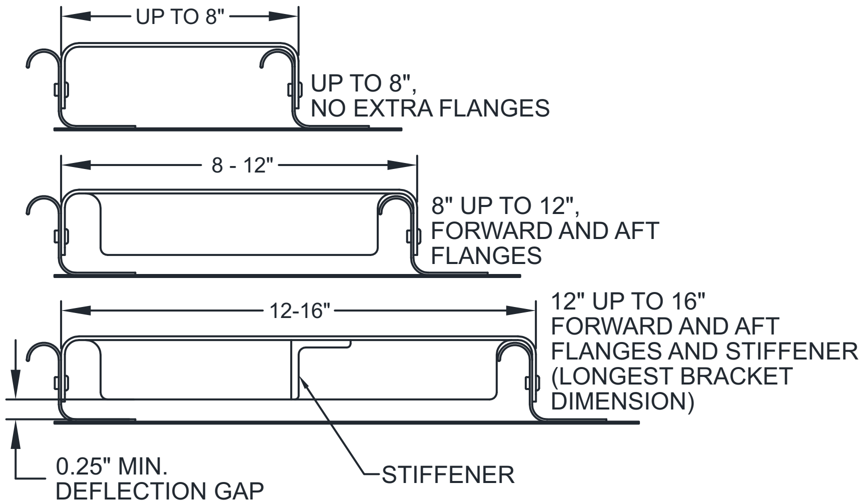
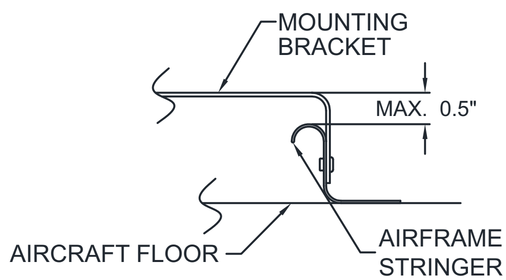


Figure 4-6 GTX 3X5 Installation, Standard Mount, Horizontal Surface

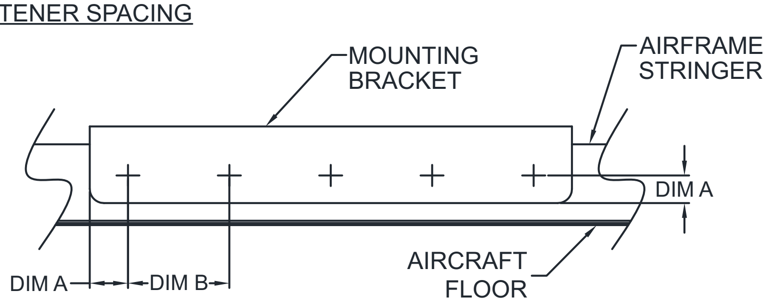
WIDTH DETAIL



MAX. HEIGHT DETAIL



FASTENER SPACING



CORRECT GUIDELINE TABLE:

HARDWARE	DIM. A		DIM. B
	MIN	MAX	
RIVETS	2*D	4*D	4*D - 8*D
SCREWS	2*D	4*D	4*D - 10*D

NOTE: "D" IS THE DIAMETER OF FASTENER

Figure 4-7 General Bracket Design

4.1.2.3 G1000 Remote Mount Installation

Figure 4-8 and figure 4-9 illustrate the installation of the G1000 remote rack. Use the nutplate kit shown below to secure the G1000 remote rack to the main G1000 system rack. The nutplate kit can be retained from the original GTX 32 or GTX 33 modular rack installation.

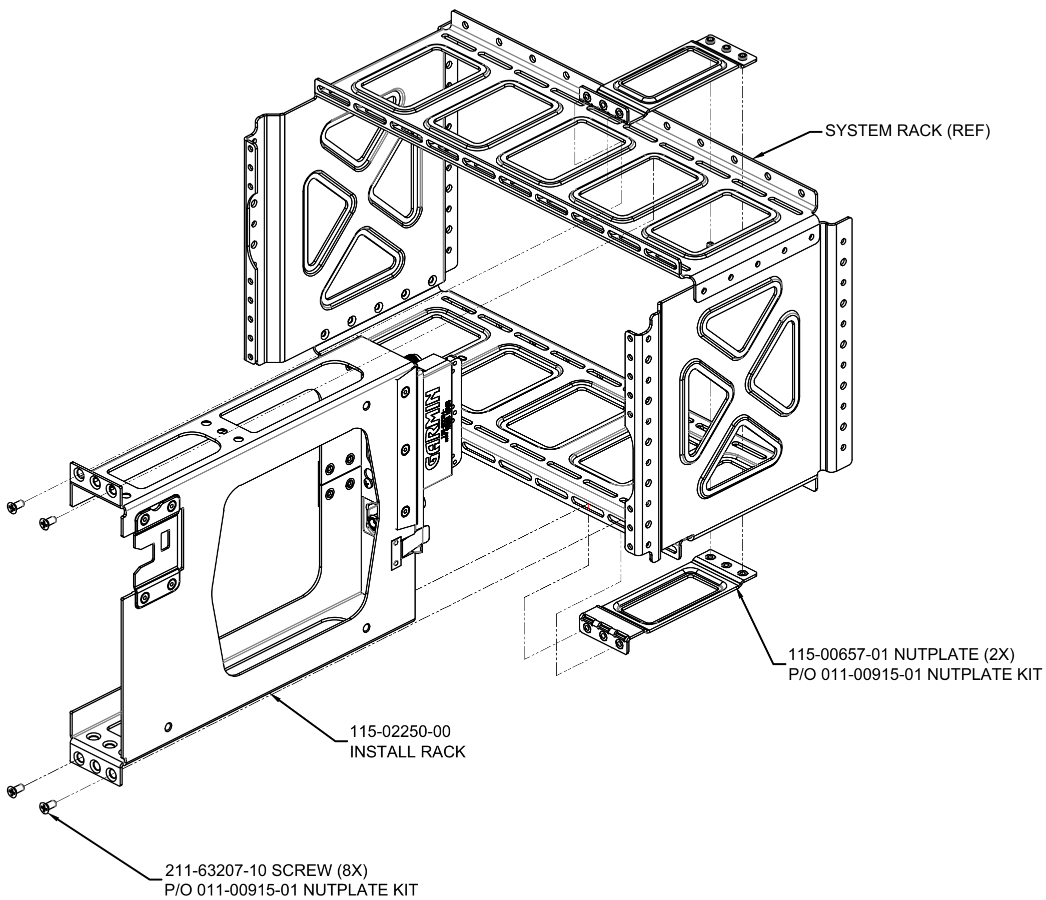


Figure 4-8 G1000 Remote Mount Installation

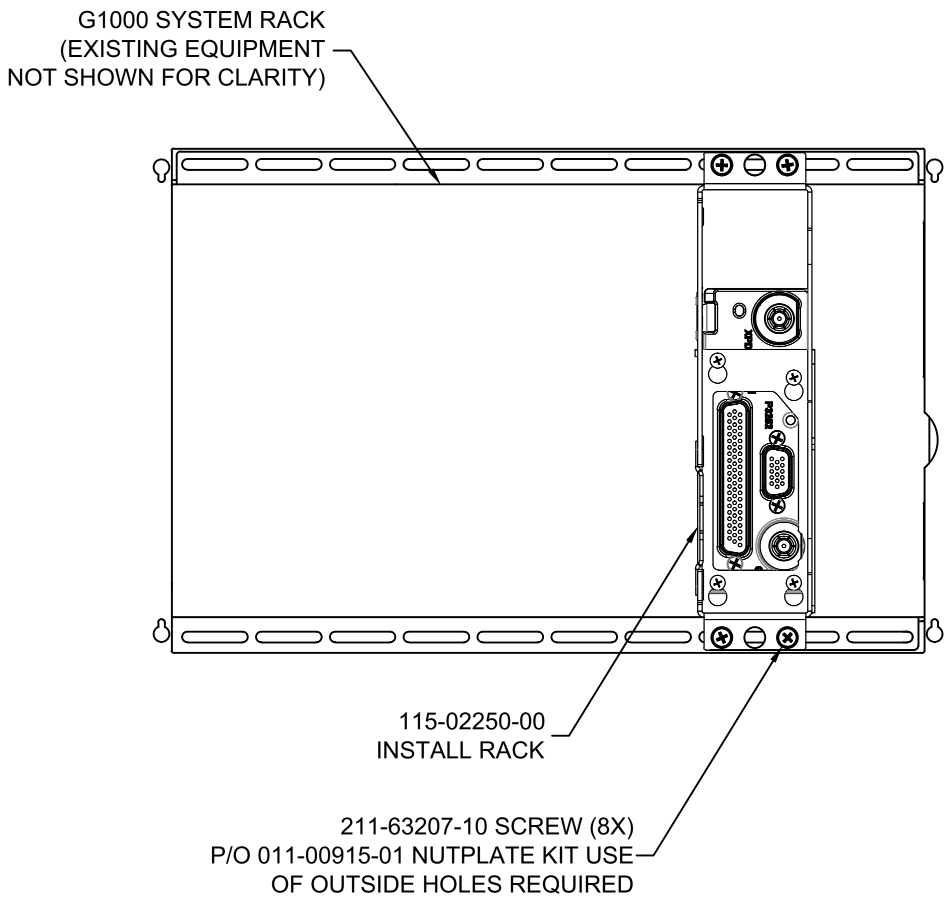


Figure 4-9 G1000 Remote Mount Installation, View Looking Forward

4.1.3 General Requirements for Installation in Metallic Aircraft

4.1.3.1 Remote Mount Installations, GTX 33/33D and GTX 3X5R

Figure 4-10 and figure 4-11 show examples of a remote mount transponder installation in a metallic aircraft. In addition to general installation guidance listed in section 4.1.2, the following conditions must be met.

For All Installations

Electrical bond preparation is required under the fastener head that screws into the nut plate. Refer to section 3.18 for more information.

Fabrication of Support Racks, Brackets, or Shelves

Fabricate parts to attach to metallic structure in accordance with the methods outlined in AC 43.13-2B Chapter 2 and AC 43.13-1B Chapter 4.

- Use 2024-T3 sheet (bare or clad) or angle aluminum with minimum 0.040 in. thickness.
- Use sheet metal techniques (bend radius, fillets, etc.) applicable to the material thickness and type.
- If required, fabricate stiffeners or include flanges to provide more strength.
- Rivets may be used in assembly of fabricated parts, however screws must be used between mounting rack and structure.

Figure 4-10 and figure 4-11 show examples of GTX 335R/345R standard remote rack installations. Other possible attachment selections include braces, flanges, longerons, etc. Refer to appendix D for more information on determination of the strength of a structural member.

NOTE

Stiffeners and flanges help strengthen fabricated brackets.

- Apply zinc chromate primer which meets FED STD TT-P-1757, epoxy primer which meets MIL-P-23377, or other corrosion protection methods listed in the aircraft's maintenance manual.
- Blind fasteners may be necessary in some installations.

NOTE

Only use structural blind fasteners NAS9301B (CherryMAX CR3213) rivets or equivalent.

Use of Existing Structure Where Structural Weight Limits are Unknown

- Select sheet aluminum structure that has a minimum thickness of 0.040 in.
- Structure must be rigidly attached to the aircraft through members capable of supporting substantial loads.

Use of Existing Structure Where Structural Weight Limits are Known

Make sure the installed weight of the transponder, remote rack, and existing equipment does not exceed the weight limit of the structure.

Follow guidance in AC 43.13-2B, Chapter 2 for installation of the mounting rack to existing structure.

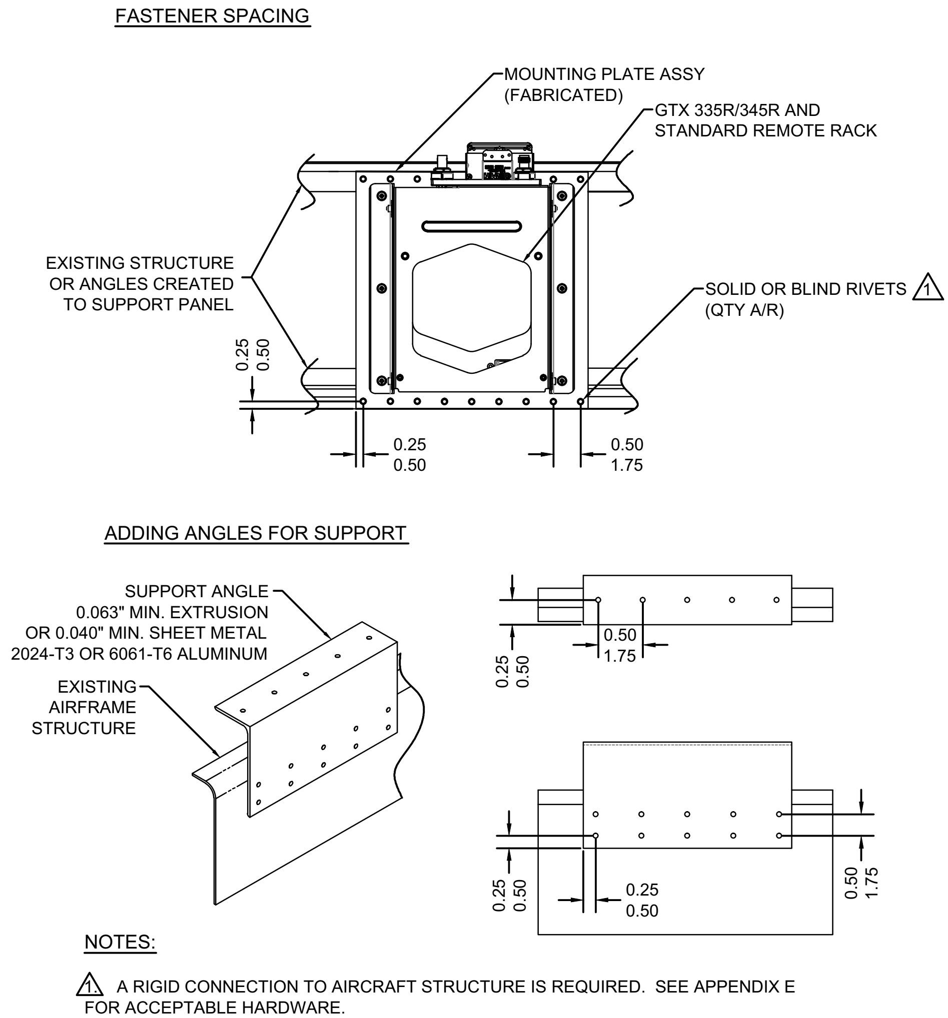
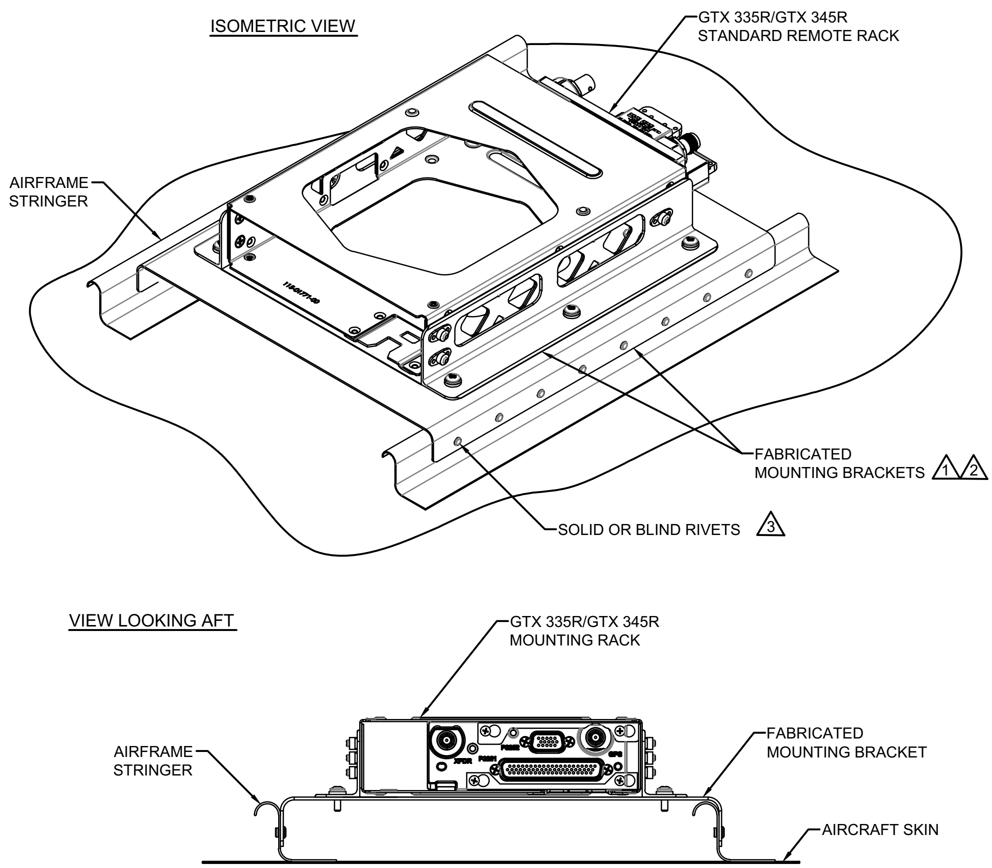


Figure 4-10 Transponder Remote Rack Sheet Metal Bracket Assembly



NOTES:

1. SEE GENERAL INSTALLATION REQUIREMENTS (SECTION 4) FOR GUIDANCE ON MATERIAL TYPE, THICKNESS, AND OTHER FABRICATION REQUIREMENTS.

2. APPLY CORROSION PROTECTION AS DEFINED IN SECTION 4 INSTALLATION REQUIREMENTS.

3. A RIGID CONNECTION TO AIRCRAFT STRUCTURE IS REQUIRED. USE BLIND OR SOLID RIVETS IDENTIFIED IN APPENDIX E.

Figure 4-11 GTX 3X5R Remote Rack Installation Details

4.1.4 General Requirements for Installation in Composite Aircraft

Follow general installation guidance provided in section 4.1.2. Installations of fabricated brackets or shelves in composite aircraft must be completed in accordance with guidance provided by the aircraft manufacturer, such as the aircraft's maintenance manual (MM) and/or structural repair manual (SRM). Repair procedures contained in the MM or SRM can be used to support the installation of new brackets or shelves fabricated for installation of the GTX 33X and GTX 3X5. The MM or SRM provides the following information:

- Materials generally used for structural repair, including but not limited to adhesives, resins, pre-preg tape and broad goods, core material, etc.
- Fabrication and processing procedures for structural repair
- Number of plies and stacking orientation/sequence
- Shape of repair
- Applicable dimensions and tolerances
- Protective coatings and sealants needed for the repair

Fabricated brackets or shelves can be metallic or composite structure as recommended in the MM or SRM. Use guidance from the aircraft's MM or SRM to do this procedure:

1. Pre-fit fabricated part(s) to make sure the installation location is correct.
2. Clean and dry the fabricated part(s) and the aircraft structure the part(s) will be attached to.
3. Prepare attachment surfaces on the fabricated part and the aircraft's installation location for application of adhesive.
4. Prepare composite plies considering orientation, stacking sequence, and size.
5. Reference the method of layup defined in the document.
6. Inspect the installed parts for flaws.
7. Make sure parts and joints have fully cured before installation of equipment.

Aircraft constructed out of non-metallic materials such as fiberglass, carbon composite material, or fabric must take special precautions to protect the GTX 33X and GTX 3X5 equipment from HIRF and indirect effects of lightning (IEL).

The GTX 33X mounting rack and any supporting brackets must be electrically bonded to the instrument panel. This can be accomplished using metallic structure, aluminum foil tape, or manufacturer-provided lightning ground. Refer to table 3-23.

If applicable bonding structure is not immediately accessible, bonding can be achieved using aluminum tape (3M P/N 436, 438 or other adhesive-backed dead soft aluminum foil with minimum 7.2 mils metal thickness). A tape maximum length-to-width ratio of 7:1 must be maintained (i.e., up to seven inches in length for every one inch in width). Additional guidance can be found in AC43.13-1B and SAE ARP1870, Sections 5.1 and 5.5.

Consider the following when identifying and bonding an applicable installation location for the GTX 33X:

- A correct installation location must accommodate a route between the GTX 33X location and the GTX 33X ground location for a strip of aluminum tape with a minimum width of four inches and a maximum length-to-width ratio of 7:1.
- If it is impractical to reach the instrument panel grounding location with aluminum tape only, and a bond strap must be used, then:
  - The tape must conform to a 5:1 length-to-width ratio.
  - The bonding strap must be at least one inch wide and no longer than five inches.
- If the aluminum tape will come in contact with carbon composite material, the tape must be electrically isolated from the carbon composite material to prevent corrosion because of dissimilar materials.
- The ground point must be located on a bare metal surface on the instrument panel or grounding structure.
- The aluminum tape must not have any tears in the joint or along the length of the tape. Tears will degrade the bonding performance.

The following procedure is recommended for implementation of the guidance above.

1. If the aluminum tape must be isolated from carbon composite material, secure a thin layer of fiberglass cloth to the carbon fiber with fiberglass resin as shown in figure 4-12.
2. Prepare the aluminum surface at the ground location per section 3.18.1.
   OR
   Identify or install a ground stud to which the bonding strap can be attached. Any new or existing ground stud shall be prepared for electrical bonding in accordance with section 3.18.
3. Route the aluminum tape between the transponder mounting rack and the grounding location. If needed to maintain the length-to-width ratio, the tape width can be overlapped in more than one strip. If two or more pieces of tape must be joined end-to-end, they can be joined as illustrated in figure 4-13.
4. Fold the end of the tape over twice for added thickness at the prepared grounding location.
5. If a bonding strap will be used to reach the grounding location, secure the end of the tape to the composite surface with an 0.063 in.-thick aluminum strip and three bolts and nuts, as shown in figure 4-14 and figure 4-15.
6. Make sure that the resistance between tape and the local grounding location does not exceed 2.5 mΩ.
7. Attach the aluminum tape to the transponder mounting rack.

8. Make sure that the resistance between the mating surfaces does not exceed 2.5 mΩ. Also make sure that the total resistance from transponder chassis to instrument panel or aircraft ground reference does not exceed the reconditioned value shown in table 3-22.

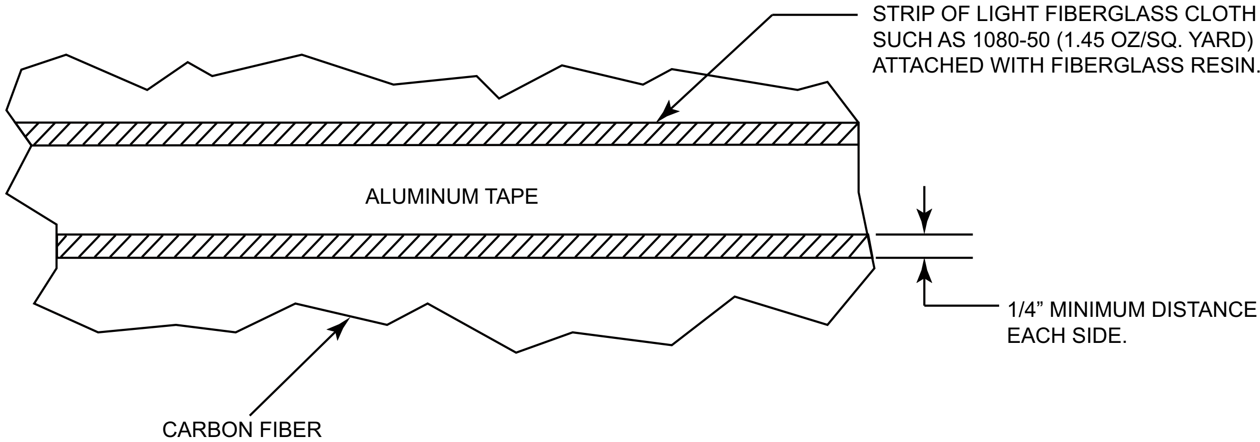


Figure 4-12 Fiberglass Insulation for Carbon Fiber Material

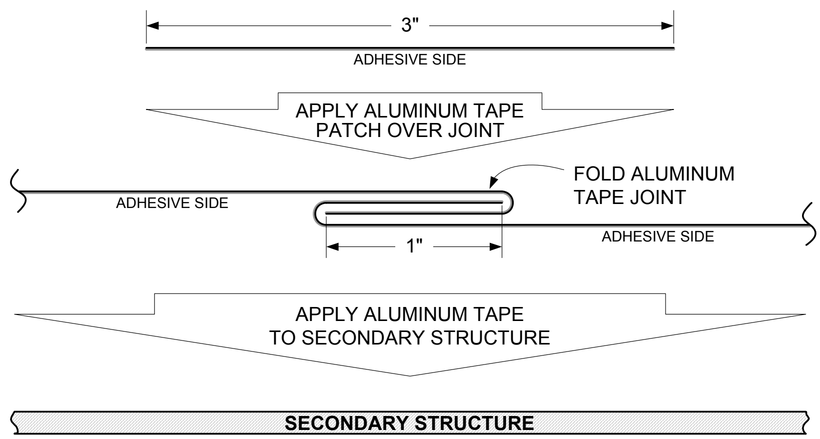


Figure 4-13 Aluminum Tape Joint

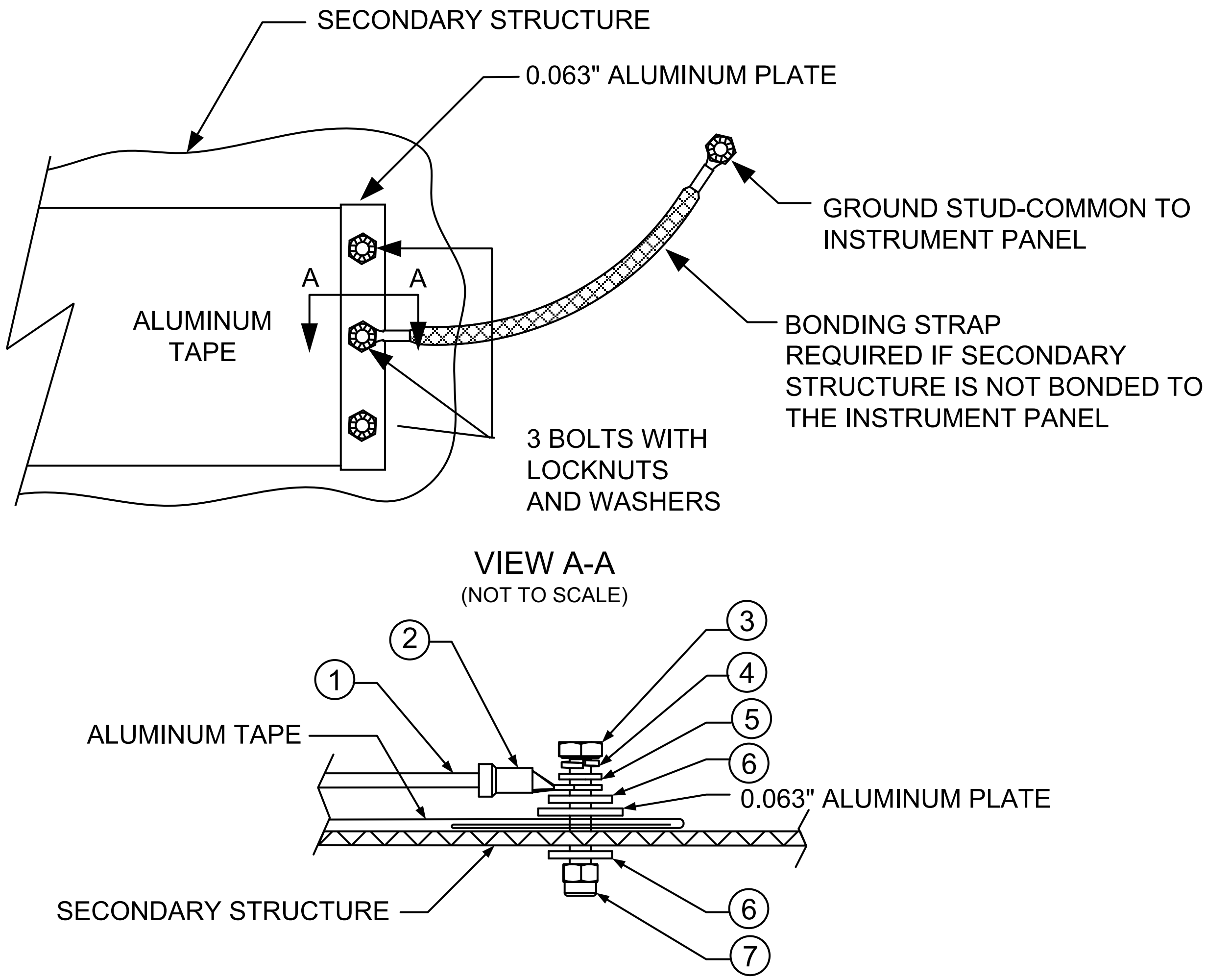
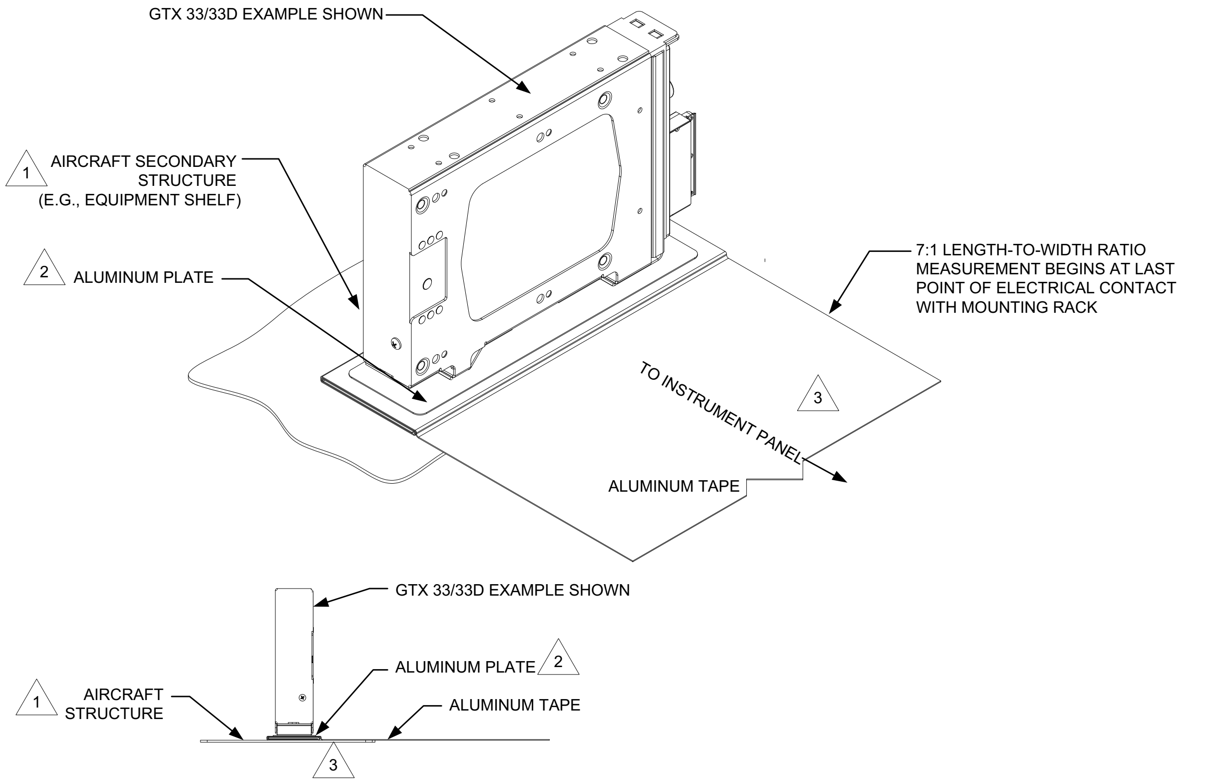


Figure 4-14 Grounding to Instrument Panel with Aluminum Tape and Grounding Strap

Table 4-2 Instrument Grounding Parts

Item Number (Refer to figure 4-14)	Description
1	Tinned copper flat braid, 3/4", QQB575F36T781 Or Tinned copper tubular braid, 7/16", QQB575R30T437
2	Terminal lug, 5/16-inch, uninsulated, MS20659-131
3	Bolt, 5/16-inch, AN5-XA
4	Lock washer, 5/16-inch, NASM35338-45
5	Flat washer, 5/16-inch, NAS1149F0563P
6	Flat washer, 0.063-inch thick, NASM970-5 (AN970-5)
7	Locknut, 5/16-inch, AN363-524



NOTES

1. AIRCRAFT SECONDARY STRUCTURE, SUCH AS AN EQUIPMENT SHELF, MUST HAVE CLEARANCE ON THE OPPOSITE SIDE FOR HARDWARE NEEDED TO INSTALL THE GTX 33X/3X5 TO THE AIRCRAFT STRUCTURE.

2. RECOMMENDED THICKNESS OF ALUMINUM PLATE IS 0.032”. ALUMINUM PLATE LENGTH AND WIDTH MUST BE AT LEAST 0.5” LARGER THAN THE GTX 33X/3X5 FOOTPRINT (MINIMUM 10.45” X 2.78” FOR SINGLE BONDING PLATE OR 1.75” X 3.11” FOR OPTIONAL DUAL BONDING PLATES). REMOVE ALL BURRS AND SHARP EDGES, RADIUS ALL SHARP CORNERS (1.25” MINIMUM, 0.25” RECOMMENDED).

3. GTX 33X UNIT MUST BE INSTALLED ON A HORIZONTAL SURFACE, BUT ORIENTATION IS UNRESTRICTED.

Figure 4-15 Remote Mount GTX Example

4.1.5 General Requirements for Tube and Fabric Aircraft

Remote Mount Installations, GTX 33/33D and GTX 3X5R

In addition to the general installation guidance, the following information applies for tube and fabric aircraft. For these aircraft, it is possible to use the tube structure as the support structure for an assembly that includes an installation plate or shelf with the mounting rack for the GTX 33 or GTX 3X5R. Figure 4-16 is an example installation that involves the use of MS21919 or AN742 clamps attached to the frame, with an aluminum plate or shelf as a surface for attaching the GTX 33 or GTX 3X5R mounting rack.

Materials Required but Not Supplied

Table 4-3 lists materials (or equivalents) that may be required to install a remote mount GTX in a tube and fabric aircraft.

Table 4-3 Hardware for Tube and Fabric Shelf Installation

Item Number Refer to figure 4-16	Description
1	Clamp, AN742-XX (dash number selected by tube diameter)
2	Bolt, AN3-XA (dash number selected by length needed at installation)
3	Washers, NASM970-3 (AN970-3)
4	Locking nut, #10
5 (not shown)	Clamp, MS21919-XX (dash number selected by tube diameter)

Tube and Fabric Mounting Shelf Installation

The clamp method for installation of the GTX 33 or GTX 3X5R mounting rack plate or shelf includes the following:

1. A minimum of four clamps (two clamps per set in offset pattern) are required. When considering the length of each side of the plate or shelf, only the third of the length closest to the corner should be used for attaching the clamp to the plate and tube structure.
   a) One or two mounting clamps used must be an AN742 series clamp for bonding purposes. For AN742-6 to AN742-10 clamp, two clamps minimum are required. For AN742-11 or larger clamp, one clamp minimum is required. Prepare the mounting hole that uses this clamp using the instructions outlined in section and figure 4-16.
   b) The AN742 clamp(s) must be electrically bonded to the installation plate and to the gusset through a spot face at least 0.125 in. larger in diameter than the clamp surface. Refer to FAA AC 43.13-1B Chapter 11 for guidance on attaching the clamp to the attaching surface and tubular structure.
2. An installation plate uses the four attaching points to secure the plate to the airframe. The installation plate must be at least .080 in. thick, 2024-T3. A stiffener is required if length in any dimension is greater than 12 inches. Refer to figure 4-7.
3. Perform a structural validation test per appendix D.

Fabricated Plate Bonding

Tube structure between 3/8 in. and 5/8 in. diameter must use two correctly-sized AN742 clamps (AN742-6 to AN742-10, as required for the installation) installed along one edge of the fabricated plate. Only these two locations require the AN742 clamps and surface treatment (on the airframe and fabricated plate) to meet bonding requirements for tube and fabric aircraft.

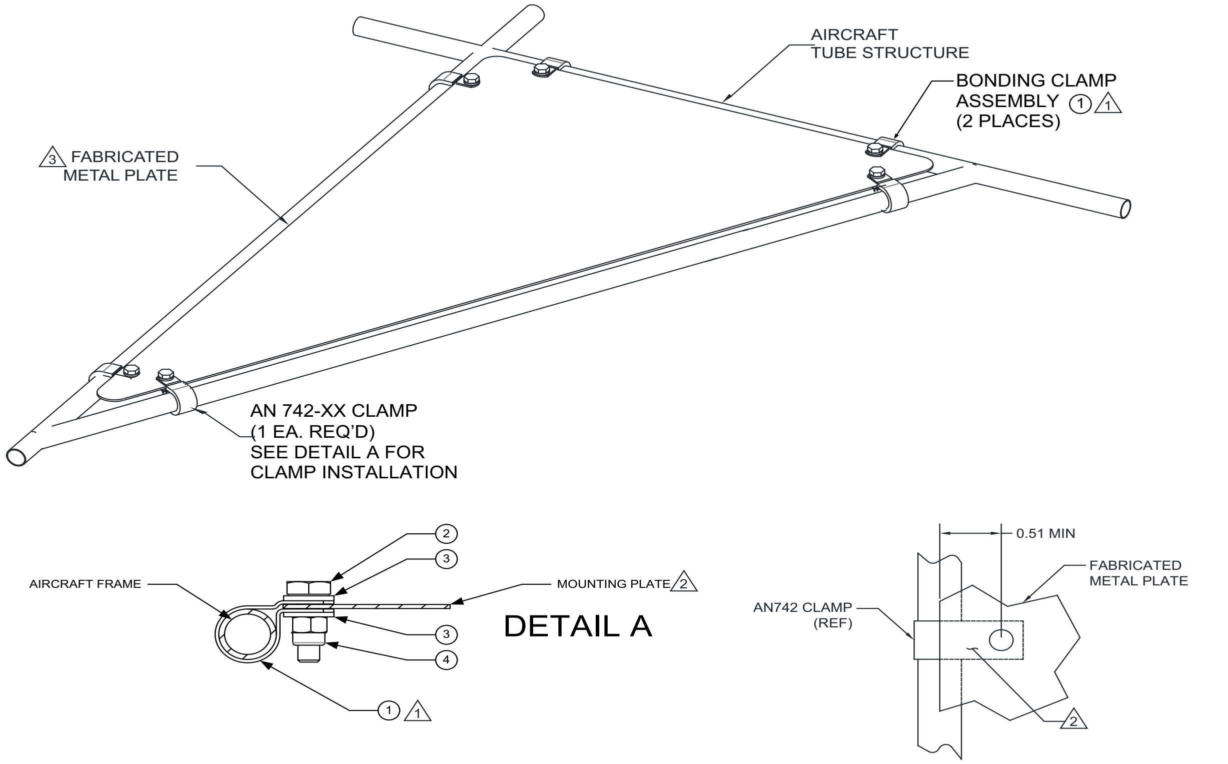
For tube structure 11/16 in. diameter or larger, a single, correctly-sized AN742 clamp (AN742-11 or larger, as required for the installation) must be installed on the fabricated plate. Only one clamp location requires an AN742 clamp and surface treatment (on the airframe and fabricated plate) to meet bonding requirements for tube and fabric aircraft.

The bonding clamp(s) must be installed underneath the fabricated plate to maximize the contact area between the clamp and the fabricated plate. Refer to figure 4-16 for more information about the use of AN742 clamps for bonding. When installed, make sure the resistance between the mating surfaces does not exceed 2.5 mΩ.

Make sure all surface preparation material (e.g., primer, paint, etc.) is removed between the clamp and the metallic tube over an area which is equal to the width of the clamp and 1 inch minimum length for steel tubes. To make sure a good contact surface exists, use a 2 inch minimum length for attachment to aluminum tubes.

After assembly and bonding check, prime the airframe tube and clamp in accordance with one of the following:

- The approved aircraft maintenance manual
- MIL-PRF-85285 Type I, Color to suit (36081 Flat Gray Preferable) Coating: Polyurethane, Aircraft And Support Equipment
- MIL-PRF-23377 Type I, Class N, Primer Coatings: Epoxy, High-Solids



NOTES

1. IF USING AN742-6 THROUGH AN742-10 CLAMPS, TWO BONDING CLAMP ASSEMBLIES MUST BE USED. IF USING AN742-11 OR LARGER CLAMPS, ONLY ONE BONDING CLAMP ASSEMBLY IS REQUIRED.

2. INSTALL BONDING CLAMP UNDER FABRICATED PLATE. MAKE SURE THERE IS MAXIMUM CONTACT AREA BETWEEN CLAMP AND FABRICATED METAL PLATE. FOLLOW GUIDANCE IN SECTION 3.18 FOR ELECTRICAL BONDING.

3. REFER TO THE INSTALLATION REQUIREMENTS IN SECTION 3 FOR GUIDANCE ON MATERIAL, THICKNESS, AND OTHER FABRICATION REQUIREMENTS.

Figure 4-16 Tube and Fabric Assembly

4.1.6 Installation and Removal Procedure

4.1.6.1 GTX 33/33D Remote Mount Installation and Removal

Installation

1. Visually inspect the connectors to verify there are not bent or damaged pins. Repair any damage.
2. Gently insert the GTX 33/33D into its rack. The handle should engage the locking mechanism used to secure the unit in place.
3. Press down on the GTX 33/33D handle to lock the unit into the rack.
4. Lock the handle to the GTX 33/33D body by tightening the Phillips head screw.

Refer to appendix A for mechanical drawings.

Removal

1. Gain access to the transponder.
2. Unlock the GTX 33/33D handle by loosening the Phillips screw on the handle.
3. Pull the handle upward to unlock the GTX 33/33D. Gently remove the unit from the rack.

4.1.6.2 GTX 330/330D Panel Mount Installation and Removal

CAUTION

Do not use excessive force when inserting the GTX 330/GTX 330D into the rack. This can cause damage to occur to the connectors, unit, and/or unit rack. If heavy resistance is felt during installation, stop! Remove the GTX 330/GTX 330D and identify the source of resistance.

CAUTION

Start the handle screw into the hole carefully, to avoid cross-threading. Do not apply torque in excess of 15 in-lbs to the handle screw. The application of torque exceeding 15 in-lbs to the screw will damage the LRU case and/or retaining hardware.

NOTE

It may be necessary to insert the hex drive tool into the access hole and turn the cam mechanism 90° counterclockwise to ensure correct position prior to placing the unit in the rack.

Installation

1. Slide the GTX 330/330D straight in the rack until it stops, about one inch short of the final position.
2. Insert a 3/32-inch hex drive tool into the access hole at the bottom of the unit face.
3. Turn the hex tool clockwise while pressing on the left side of the bezel until the unit is firmly seated in the rack.
4. Count the number of complete revolutions the hex screw can be turned until it cannot turn any more. Take care not to over-tighten. Three turns is the minimum for proper installation. If fewer than three turns are possible, ensure nothing obstructs the unit from fully seating in the rack. The mounting rack may need to be moved aft (toward the pilot) so that the aircraft panel does not obstruct the unit from properly engaging in the rack.

Refer to appendix A for mechanical drawings.

Removal

1. Insert the hex drive tool into the access hole at the bottom of the unit face and turn counterclockwise until the unit is forced out about 3/8 inch.
2. Pull the unit straight out of the rack.

4.1.6.3 GTX 3X5 Installation and Removal with Standard and G1000 System Rack Mount

CAUTION

The application of hex drive tool torque exceeding 8 in-lbs can damage the locking mechanism.

NOTE

When a unit is installed make sure the unit successfully energizes. Refer to section 6 for configuration procedures.

NOTE

Prior to placing the unit in the rack, to make sure the position of the retention mechanism is correct, it can be necessary to insert the hex drive tool into the access hole and turn the hex drive tool counterclockwise until it completely stops.

Installation

1. Slide unit in until it stops, approximately 3/8 inch short of the final position.
2. Insert a 3/32-inch hex drive tool into the access hole at the bottom of the unit face.
3. Push on the left side of the bezel and turn hex drive tool clockwise and apply 8 in-lbs of torque.

Removal

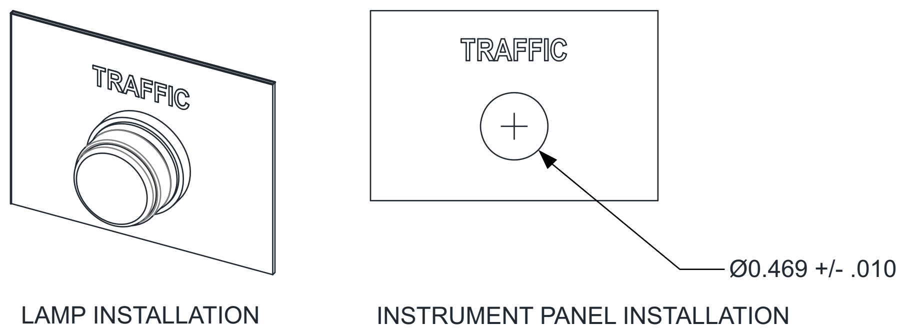
1. Insert the hex drive tool into the access hole on the unit face.
2. Turn hex drive tool counterclockwise until the hex drive tool stops.
3. Pull the unit from the rack.

4.1.6.4 Installation and Removal Procedures for Traffic Annunciator

For no-display (ADS-B Out only) installations, an optional traffic annunciator can be installed on aircraft's instrument panel. Refer to figure 4-17 for details.

Installation

1. Locate the traffic annunciator on the instrument panel.
2. Install the annunciator lamp in the instrument panel.



NOTES:

1. DIMENSIONS: INCHES
2. MODIFY INSTRUMENT PANEL BY DRILLING A HOLE THROUGH THE PANEL. CLEAN, DEBURR, AND APPLY CORROSION PROTECTION TO ANY BARE METAL CREATING BY DRILLING THE HOLD THROUGH THE PANEL. USE ZINC CHROMATE PRIMER PER FED STD TT-P-1757, EPOXY PRIMER MIL-P-23377, OR OTHER CORROSION PROTECTION AS SPECIFIED BY THE AIRCRAFT MANUFACTURER. APPLY ARTWORK USING SILK SCREEN OR SIMILAR METHOD. PREFERRED FONT AND SIZE IS ARIAL NARROW BOLD, 10 PT. ALTERNATELY, A LABEL WITH SIMILAR FONT HEIGHT AND SIZE MAY BE USED.

Figure 4-17 External Traffic Annunciator

Annunciator Lamp(s) Removal

1. Remove the annunciator lamp(s) from the instrument panel.
2. Disconnect the wiring.

4.2 GTX 3XX Weight and Balance

After the installation, a weight and balance computation is required. Follow the guidelines as established in AC 43.13-1B, Chapter 10, Section 2, as applicable. Make entries in the equipment list indicating items added, removed or relocated along with the date accomplished. Include your name and certificate number in the aircraft records.

Table 4-4 identifies the installed weight of the equipment. Refer to appendix A for equipment center of gravity (CG) dimensions. For example weight and balance data, refer to table 4-5. Weights shown include the unit, mounting rack, backplate, and connector.

Table 4-4 Weight of GTX Configurations

Items	Weight		Dimensions and CG
	lbs	kg	
GTX 33, Remote Mount	4.4	2.00	Refer to figure A-1
GTX 33D, Remote Mount	4.7	2.13	Refer to figure A-1
GTX 330, Panel Mount	4.2	1.91	Refer to figure A-3
GTX 330D, Panel Mount	4.3	1.95	Refer to figure A-3
GTX 335, Panel Mount	2.73	1.24	Refer to figure A-5
GTX 335, GPS, Panel Mount	2.87	1.30	Refer to figure A-5
GTX 345, Panel Mount	3.12	1.41	Refer to figure A-5
GTX 345, GPS, Panel Mount	3.22	1.46	Refer to figure A-5
GTX 335R, Standard Remote Mount	2.54	1.15	Refer to figure A-7
GTX 335R, GPS, Standard Remote Mount	2.68	1.22	Refer to figure A-7
GTX 335R, G1000 Remote Mount	2.53	1.15	Refer to figure A-10
GTX 335R, GPS, G1000 Remote Mount	2.67	1.21	Refer to figure A-10
GTX 345R, Standard Remote Mount	2.91	1.32	Refer to figure A-10
GTX 345R, GPS, Standard Remote Mount	3.01	1.37	Refer to figure A-10
GTX 345R, G1000 Remote Mount	2.90	1.32	Refer to figure A-10
GTX 345R, GPS, G1000 Remote Mount	3.01	1.36	Refer to figure A-10

Table 4-5 Example Weight and Balance Calculation

Previous Aircraft Weight and Balance Calculated (date)	**Useful Load (lbs.)**	**Empty Weight (lbs.)**	**C.G. (in)**	**Moment**
	1093.30	2306.70	138.83	320,239
Description of items removed from aircraft		Weight (lbs.)	Arm (in)	Moment
KT 76C Unit/Rack		2.61	55.00	143.55
Total removed		-2.61	55.00	-143.55
Description of items added to aircraft		**Weight (lbs.)**	**Arm (in)**	**Moment**
GTX 330 Unit/Rack/Connector		4.2	55.00	231.00
Total added		4.2	55.00	231.00
Change		1.59	55.00	87.45
New Aircraft Weight and Balance (date)	**Useful Load (lbs.)**	**Weight (lbs.)**	**C.G. (in)**	**Moment**
	1092.74	2308.29	138.77	320,327

4.3 Electrical Installation

4.3.1 Wiring (Addition/Change)

The modifications contained in this section are mandatory and applicable for all installations to meet the requirements of this STC.

- Refer to appendix C for Equipment Compatibility and Configuration.
- Refer to appendix B for the approved interface diagrams.

4.3.2 Special Tools Required

A crimp tool meeting MIL specification M22520/2-01 and a positioner/locator are required to make sure there are consistent, reliable crimp contact connections for the D-sub connector.

- Refer to table 3-6 for a list of recommended crimp tools.

4.3.3 Power Distribution

Circuit protection for the GTX must be a push-pull manually resettable circuit breaker (e.g., Klixon 7274 or 7277 Series circuit breakers). The circuit breaker must be labeled as specified in figure B-1 and readily accessible to the pilot.

4.3.4 Wire and Cable Considerations

Make sure damage does not occur to the wiring and cables during installation.

- Reference FAA AC 43.13-1B for installation guidance for wire routing and installation.

4.3.5 Coaxial Cable Preparation

Follow the manufacturer’s instructions for coaxial cable preparation.

4.3.6 Wire Harness Construction

The GTX 33X and GTX 335/335R units use a single 62 pin D-Sub connector.

The GTX 345/345R units use a 62 pin D-Sub and a 16 pin D-Sub connector.

Except for the antenna(s) and shield ground, all electrical connections are made through these D-Sub connectors. Shield grounds are terminated to the shield ground block attached to the backshell of the D-Sub connectors.

- Refer to section 8 for connector pinout information.
- Refer to appendix B for interconnect wiring diagrams and cable requirements for each signal.

4.3.7 Shielded Cable Preparation

NOTE

Solder sleeves with pre-installed shield drains should be used instead of separate shield terminators and individual wires. Although separate shield terminators and individual wires can be used, a preferred solder sleeve is the Raychem S02 Series with the thermochromic temperature indicator. These solder sleeves come with a pre-installed lead and effectively take the place of items 2 and 3 in figure 4-18. For detailed instructions on use, refer to the Raychem installation procedure.

Prepare all of the shielded cables using one of the methods shown in figure 4-18.

Keep shield drain components as short as practical with a maximum length of 3".

- Refer to section 4.3.8 for information on shield termination to the connector backshell.

The procedures in this section provide an outline for all shield wiring preparations (existing wiring included) terminated at the GTX connectors.

1. At the end of the shielded cable (3), strip back a 2.5" maximum length of the jacket to expose the braid.
2. Remove this exposed braid.
3. Carefully score the jacket 1/4" to 5/16" from the end.
4. Remove the jacket to leave the braid exposed.
5. Connect a 20 or 22 AWG wire (1) to the exposed shield of the prepared cable assembly.
    - Refer to figure 4-18.
    - Refer to AC 43.13-1B Chapter 11 for termination techniques.
6. Slide a shield terminator (3) onto the prepared cable assembly and connect the wire (2) to the shield using a heat gun approved for use with solder sleeves.
    - The chosen size of solder sleeve must accommodate both the number of conductors present in the cable and the wire (2) to be attached.
    - Repeat steps 1 through 3 as needed for the remaining shielded cables.
7. Strip the exposed twisted wire 0.17" from the end.
8. Crimp pins (4) onto the wires.
9. Crimp a correctly sized ring terminal (5) onto the end of each shield drain (2).
10. Repeat steps 4 – 6 for the remaining wires/shields.
11. Using the interconnect diagrams in appendix B, for the applicable connections and pinouts, insert the pin into the connector housing location. Refer to figure 4-18.
12. Make sure the pin is engaged into the connector by gently tugging on the wire.
13. Wrap the cable bundle with silicone fusion tape at the point where the backshell strain relief and cast housing contact the cable bundle.

Table 4-6 Shield Wire Assembly

Refer to figure 4-18	Description	Garmin P/N	Notes
1	Multiple Conductor Shielded Cable (Refer to appendix B for Interconnect Diagrams)	As Required	[1] [2]
2	Wire, Insulated (20-22 AWG), 3” max length	As Required	[1] [2]
3	Shield Terminator	As Required	[1] [2]
4	Pin Contacts, #22D	336-00021-00	[4] [5] [6]
5	Ring terminal, #8, insulated, 18-22 AWG,14-16 AWG, 12–10 AWG	MS25036-149 MS25036-153 MS25036-156	[1] [2] [3] [6]

[1] Item not supplied in connector kits and must be purchased separately.

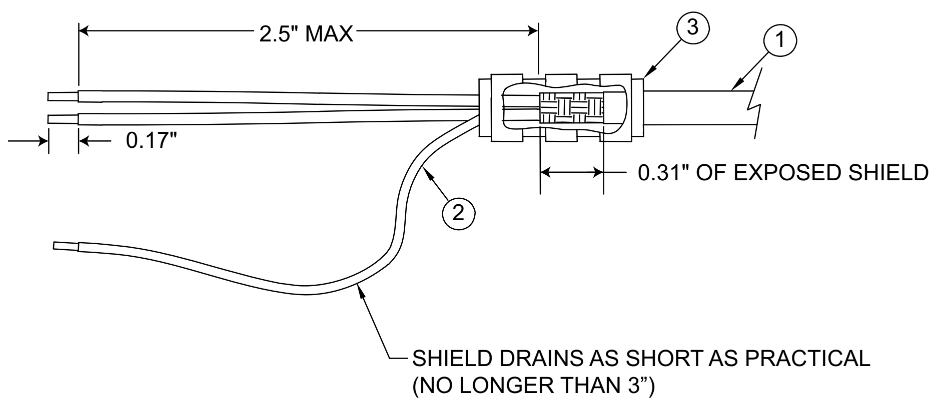
[2] Solder sleeve with pre-installed lead can be used instead of items 1 and 2.

[3] Not a Garmin part number.

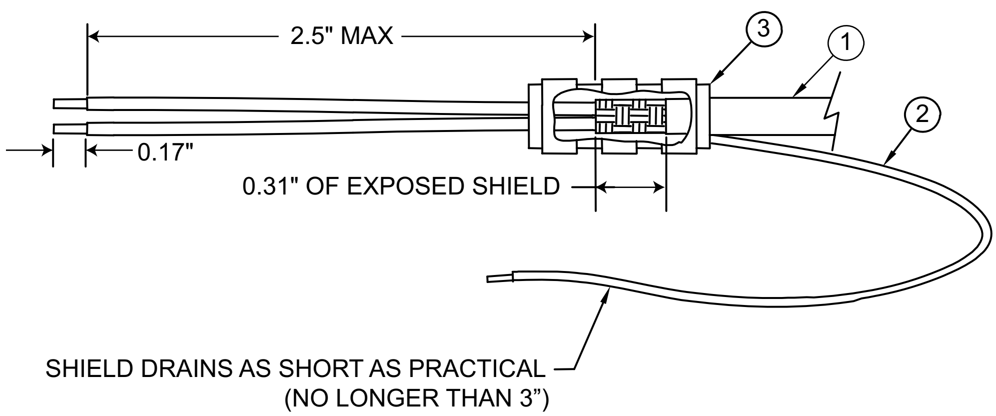
[4] Supplied as part of Sub Assy Connector Kits for GTX 33X or GTX 3X5.

[5] Supplied as part of GTX 33 or GTX 335R/345R Connector Kits.

[6] Part not shown in figure 4-18.



PREFERRED METHOD



ALTERNATE METHOD

Figure 4-18 Shielded Wire Preparation

4.3.8 Cable Bundle Termination on Backshell Assembly

CAUTION

Do not put the concave side of the strain relief clamp across the cable bundle. Placing the concave side of the strain relief clamp across the cable bundle will damage the cable bundle.

Terminate the cables to the backshell assembly after all shielded cables are prepared in accordance with section 4.3.7.

1. Terminate the crimped cable bundle contacts in the D-sub connector using the interconnect diagrams in appendix B for the correct connections and pinouts.
2. Make sure the pin is engaged into the connector by gently tugging on the wire.
3. For the GTX 3X5 units, install the configuration module wires into the connector.
   - Refer to section 4.4 for configuration module installation instructions.
4. Wrap the cable bundle with silicone fusion tape at the point where the backshell strain relief and cast housing will contact the cable bundle.
5. Place the smooth side of the backshell strain relief clamp across the cable bundle. Secure using three 4-40 x 0.375" pan head screws.
6. Terminate the ring terminals to the tapped holes on the backshell by placing ring terminal on the 8-32 x 0.312" pan head shield terminal screw in this order before finally inserting the screw into the tapped holes on the shield block:
   a) Split washer
   b) Flat washer
   c) First ring terminal
   d) Second ring terminal (if needed)

4.3.9 Connector and Backplate Assembly for GTX 330/330D

CAUTION

Make sure wires are connected correctly as described in section 4.3 before inserting the GTX into the rack. Incorrect wiring could cause internal component damage.

NOTE

Each tapped hole on the backshell only accommodates two ring terminals. It is preferred that a maximum of two wires be terminated per ring terminal. This will necessitate the use of a ring terminal, #8, insulated, 14-16 AWG (MS25036-153). If only a single wire is left, or if only a single wire is needed for this connector, a ring terminal, #8, insulated, 18-22 AWG (MS25036-149) can be used. It is permissible to terminate three wires per ring terminal.

The GTX 330 connector kit (P/N 011-00583-00) includes Garmin backshell assemblies and Garmin ground adapter assemblies. Backshell connectors give the installer the ability to terminate shield grounds at the backplate assembly using the shield block ground kit.

Refer to Table 4-7 for a list of Garmin part numbers for the D-sub connectors and the backshell assemblies.

1. Prepare all shielded wiring as shown in figure 4-18.
2. For all 22 gauge and smaller unshielded wiring, strip wire 0.17" from the end and crimp pins (P/N 336-00021-00) onto the wires.
3. Insert all (shielded and unshielded) terminated wires into the connector (6) in accordance with the aircraft wiring diagrams.
4. Insert all shield ground terminations into the ground block connector (2).
5. When all wiring is terminated in the connectors (2) and (6), attached connectors and backshell to backplate using screws (4) as shown in figure 4-19.

Table 4-7 GTX 330/330D Backshell/Connector Assembly

Refer to figure 4-19	Description	Garmin P/N	Qty	Notes
1	Backshell	330-00220-37	1	[1]
2	Shield block	330-00228-20	1	[1]
3	Nutplate, D-Sub, 37 Pos	125-00056-00	1	[1]
4	Screw, 4-40 x.500, PHP,SS/P, w/Nylon	211-60234-12	2	[1]
5	Screw, 4-40 x.500, FLH100, SS/P, Nyl	211-63234-12	2	[1]
6	Connector, D-Sub, HD, 62 Pin	330-00185-62	1	[1]
7	Silicon Fusion Tape	249-00114-00	AR	[2]
8	Wire Assembly	Refer to section 4.3.	AR	

[1] Supplied as part of sub Assy, Connector Kit, GTX 330 P/N 011-00583-00.

[1] Not supplied – must be purchased separately.

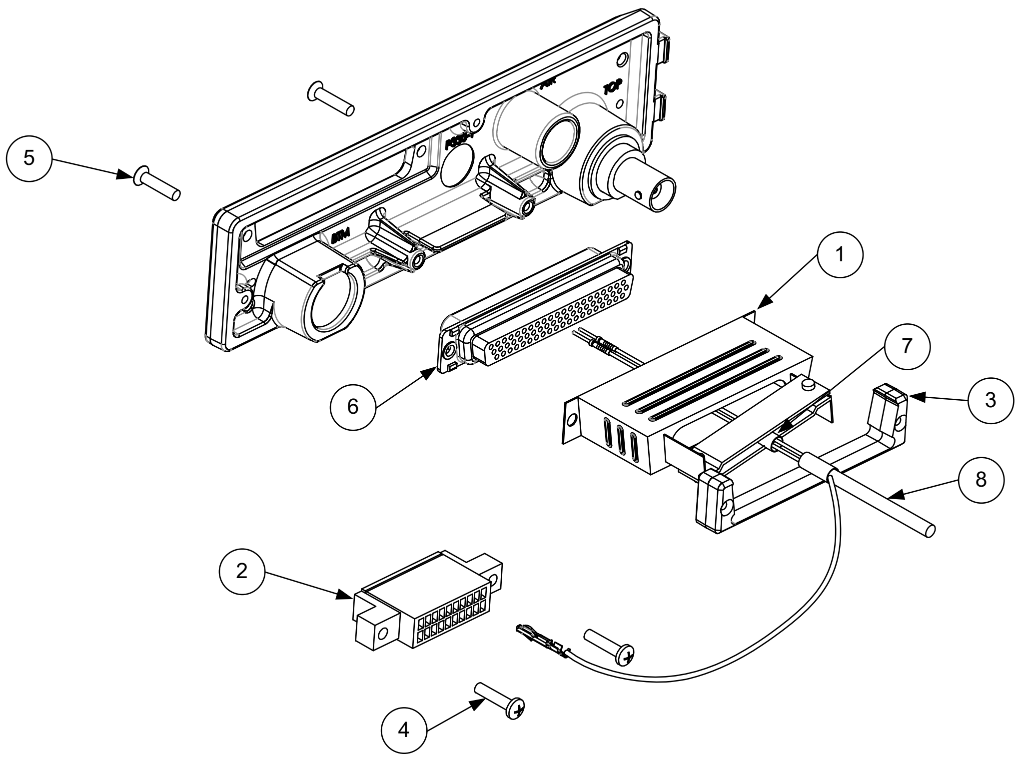


Figure 4-19 GTX 330/330D Backshell Assembly

4.3.10 Connector and Backplate Assembly for GTX 33/33D

CAUTION

Make sure the screws (3) are not too long. Damage will occur to the wiring if the screws (3) used to ground the shields to the shield block (2) are too long. make sure there is sufficient length present without protruding into the wire bundle.

Refer to table 4-8 for the GTX 33/33D installation connector/backshell assembly (P/N 011-01012-01). Backshell connectors give the installer the ability to terminate shield grounds at the backshell housing using the Shield Block ground kit.

1. For all 22 gauge and smaller unshielded wiring, strip wire 0.17” from the end and crimp pins (P/N 336-00021-00) onto the wires.
2. Insert all (shielded and unshielded) terminated wires into the connector (9) in accordance with the aircraft wiring diagrams.
3. Attach the Shield Block (2) to the backshell (1) by inserting the flathead screws (3) through the holes on the Shield Block and threading into the tapped holes on the backshell (1).
4. Wrap the cable bundle with Silicone Fusion Tape (13 or a similar version) at the point where the backshell strain relief and cast housing will contact the cable bundle.
5. Place the smooth side of the backshell strain relief (6) across the cable bundle and secure using the three screws (5). Make sure each half of the strain relief bar is supporting half of the cable bundle.
6. Attach the cover (7) to the backshell using two screws (8).
7. Terminate the ring terminals to the shield block (2) by placing items on the pan head screw (10) in this order:
   a) split washer (11)
   b) flat washer (12)
   c) first ring terminal
   d) second ring terminal, if needed before finally inserting the screw into the tapped holes on the shield block.
8. Insert the assembled connector into the backplate.

Table 4-8 GTX 33/33D Backshell/Connector Assembly

Refer to figure 4-20	Description	Garmin P/N	Qty	Notes
1	Backshell	125-00084-00	1	
2	Shield block	117-00147-01	1	
3	Screw, 4-40 x .250, FLHP100°, SS/P, w/Nylon	211-63234-08	4	
4	Wire Assembly	Refer to section 4.3.6.	AR	[1]
5	Screw, 4-40 x .375,PHP,SS/P, w/Nylon	211-60234-10	3	
6	Clamp	115-00499-03	1	
7	Cover	115-00500-03	1	
8	Screw, 4-40x .187, FLHP100, SS/P, w/Nylon	211-63234-06	2	
9	Connector, D-Sub, HD, 62 Pin	330-00185-62	1	
10	Screw, PHP, 8-32x.312", Stainless or Cad Plated Steel	MS51957-42, MS35206-242	AR	[1], [2]
11	Split Washer, #8, (.045" compressed thickness) Stainless or Cadmium plated steel	MS35338-137, MS35338-42	AR	[1], [2]
12	Flat Washer, #8, 032" thick, 174" ID, 375" OD, Stainless or Cad Plated Steel	NAS1149CN832R, NAS1149FN832P	AR	[1], [2]
13	Silicone Fusion Tape	249-00114-00	AR	[1]

[1] Not supplied – must be purchased separately.

[2] Not a Garmin part number.

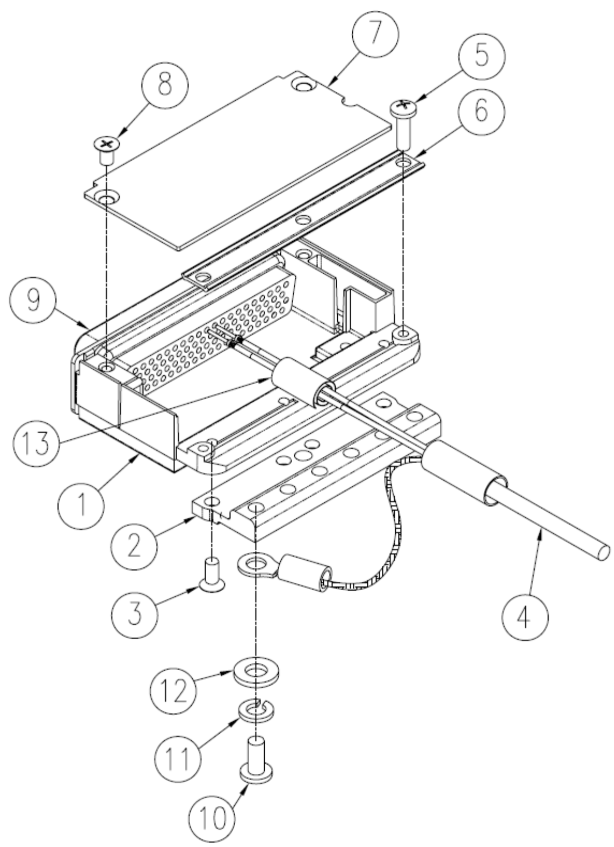


Figure 4-20 GTX 33/33D Connector and Backshell Assembly

4.3.11 Connector and Backplate Assembly for GTX 3X5

CAUTION

Damage can occur to the wiring if the screws used to ground the shields to the shield block are too long. Make sure a sufficient length is present without protruding into the wire bundle.

Refer to table 4-9 for GTX 3X5 connector kit hardware.

The backplate varies depending on the possible unit and mount selections. Backshell connectors give the installer the ability to terminate shield grounds at the backshell housing using the Shield Block ground kit.

1. For all 22 gauge and smaller unshielded wiring, strip wire 0.17” from the end and crimp pins (P/N 336-00021-00) onto the wires.
2. Insert all (shielded and unshielded) terminated wires into the connector(s) in accordance with the aircraft wiring diagrams.
3. Attach the Shield Block to the backshell(s) by inserting the flathead screws through the holes on the Shield Block and threading into the tapped holes on the backshell.
4. Wrap the cable bundle with Silicone Fusion Tape at the point where the backshell strain relief and cast housing will contact the cable bundle.
5. Place the smooth side of the backshell strain relief across the cable bundle and secure using the three screws. Make sure each half of the strain relief bar is supporting half of the cable bundle.
6. Attach the cover(s) to the backshell(s) using two each screws.
7. Terminate the ring terminals to the shield block by placing items on the pan head screw in this order:
   a) lock washer
   b) flat washer
   c) first ring terminal
   d) second ring terminal, if needed before finally inserting the screw into the tapped holes on the shield block.
8. Insert the assembled connector into the backplate.

Refer to table 4-9 for the list of connector kit items, dependent on which unit is used.

Refer to figure 4-21 for the connector kit assemblies.

Table 4-9 GTX 3X5 Connector Kit Hardware

Item	Description	P/N	QTY
1	Connector, hi-density, D-sub, mil crimp 62 ckt	330-00185-62	1
2	Sub-assembly, bkshl with hardware, 37/62 pin	011-00950-03	1
3	Sub-assembly, ground, adapter shell, 4&5	011-01169-01	1
4	Screw, 4-40x.250, FLHP 100, SS/P, w/Nylon	211-63234-06	2 ea connector
5	Connector, HiDens, D-Sub, Mil Crp,15ckt	330-00185-15	1
6	Sub-Assy, Bkshl with hardware, 9/15 Pin	011-00950-00	1
7	Sub-Assy, Grnd Adaptr, Shell 1-3	011-01169-00	1

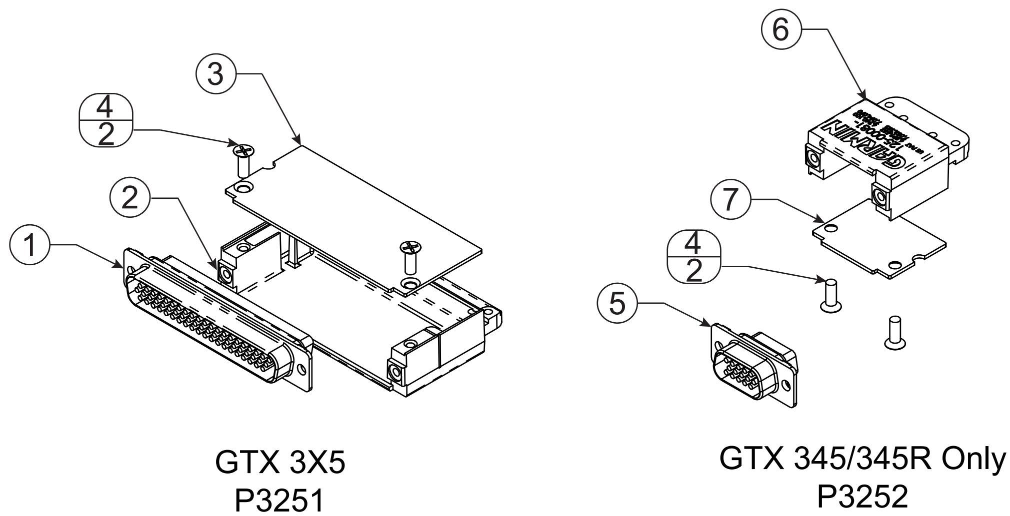


Figure 4-21 GTX 3X5 Connector Kits

Refer to table 4-10 for back plate items for the standard or G950/1000 mounting assembly.

Refer to the figure 4-22 for the back plate assembly.

Table 4-10 Standard and G1000 Mount Backplate Hardware

Item	Description	P/N	QTY
1	DCP, Connector Plate, GTX3x5, with Secondaries	125-00307-10	1
2	Conn, Male/Female Special BNC	330-00053-01	1
3	Washer, Shoulder, GNC400	212-00022-00	2
4	Conn, M/F, Spec, BNC/TNC	330-00053-02	1
5	Screw, 4-40x.250, PHP, SS/P, w/Nylon	211-60234-08	4

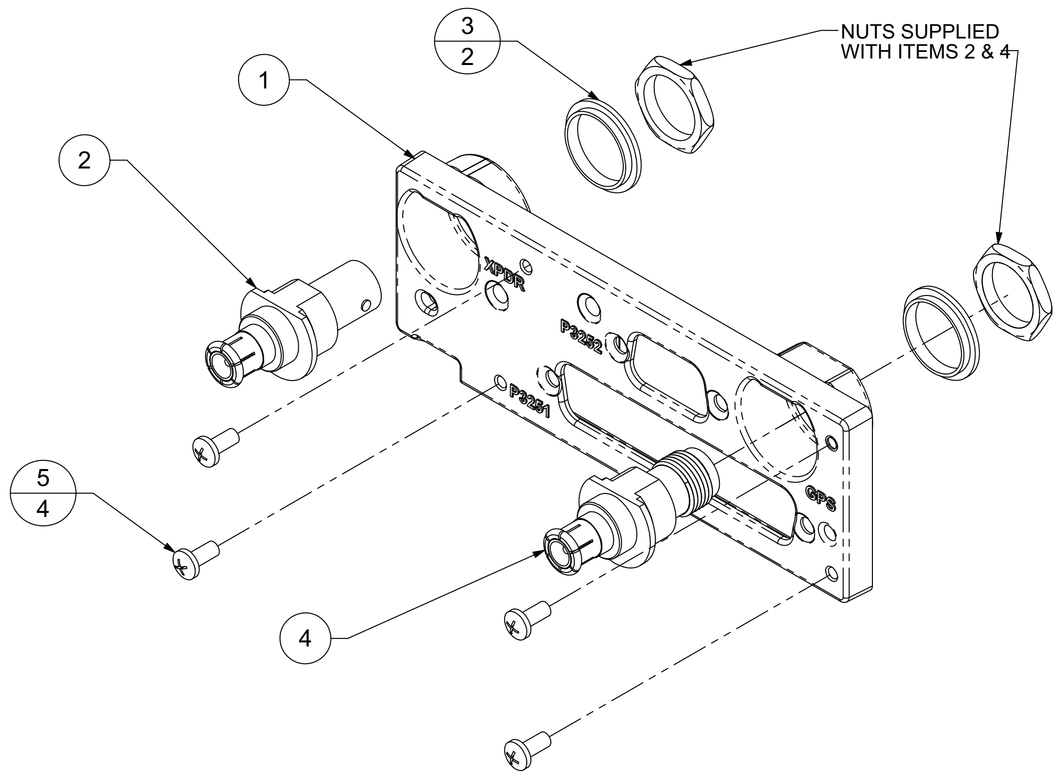


Figure 4-22 GTX 3X5 with GPS Backplate Assembly P/N 011-02976-01

4.4 Garmin Altitude Encoder and Configuration Module Installation

The GTX 3X5 series transponders require the installation of a configuration module or the Garmin Altitude Encoder with an integrated configuration module. Refer to section 4.5.5 for aircraft guidance.

The Garmin Altitude Encoder is installed on the backplate as shown in figure 4-23.

The configuration module is installed in the connector assembly as shown in figure 4-24.

4.4.1 Garmin Altitude Encoder

1. Crimp pin contacts onto each wire of the four-conductor wire harness. Strip 0.17" of insulation from each wire prior to crimping.
2. Insert newly crimped pin contacts and wires into the correct locations in the connector housing as shown in appendix B.
3. Mount the Garmin Altitude Encoder to the backplate using 2 each countersunk screws as shown in figure 4-23. Torque screws to 8 in-lbs.
4. Plug the four-conductor wire harness into the connector on the Garmin Altitude Encoder. Make sure there are no pneumatic leaks or sealant in the lines and fittings.

Table 4-11 Altitude Encoder Kit, P/N 011-03080-00

Description	P/N	QTY
Sub-assembly, Garmin Altitude Encoder, Unit Only	011-03080-01	1
Screw, 4-40x.250, PHP,SS/P with Nylon	211-60234-08	2
Screw, 4-40x.250, FLHP 100,SS/P, Nylon	211-63234-08	2
Harness,4 Cond, GAE 12	325-00421-00	1

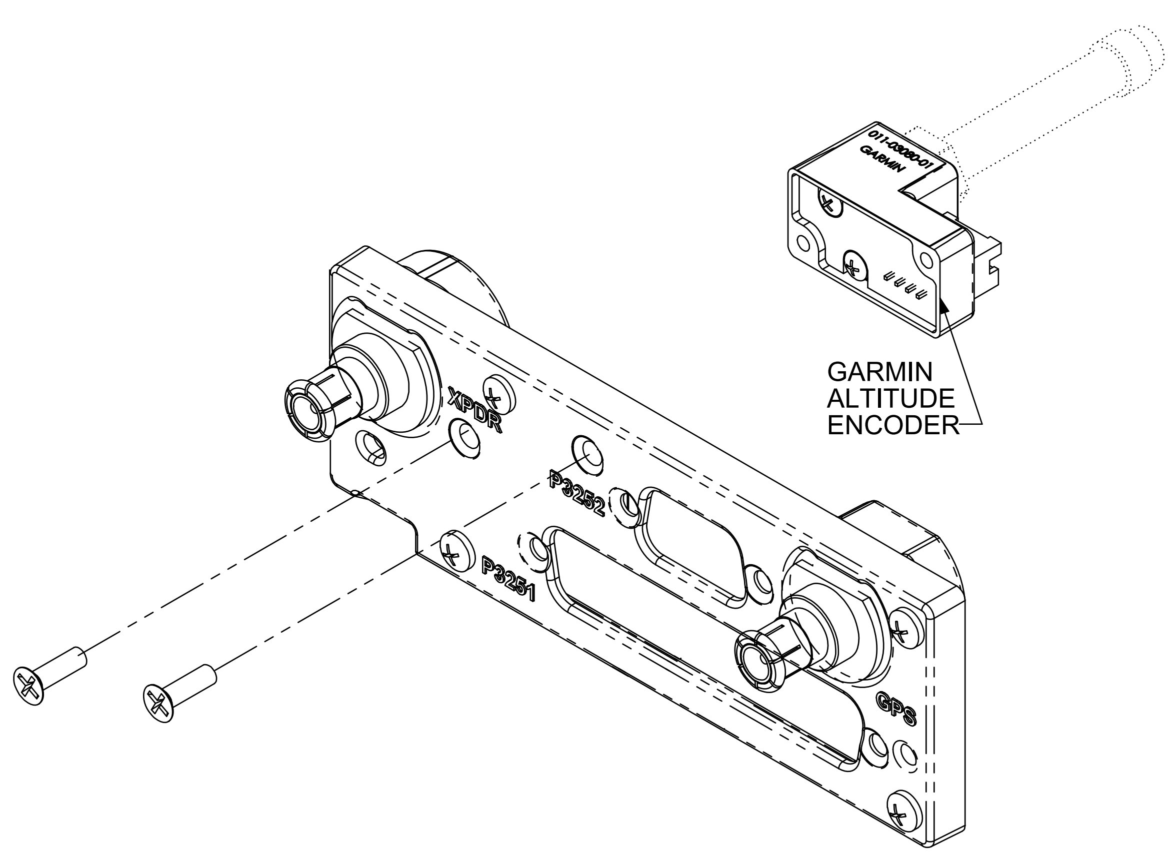


Figure 4-23 Garmin Altitude Encoder Assembly

The static port is 1/8-27 ANPT female threads. The mating fitting must have 1/8-27 ANPT male threads. Refer to the aircraft manufacturer's documentation for pneumatic tubing and fitting part numbers that can be used.

4.4.2 Configuration Module Installation

1. Crimp pin contacts (3) onto each wire of the four-conductor wire harness (2). Strip 0.17" of insulation from each wire prior to crimping.
2. Insert newly crimped pin contacts and wires (2, 3) into the correct locations in the connector housing as shown in figure 4-24.
3. Plug the four-conductor wire harness (2) into the connector on the PCB board (1).
4. Insert PCB board (1) into the backshell recess.
5. Orient the connector housing so that the inserted four-conductor wire harness (2) is on the same side of the backshell, as the inserted PCB board (1), as shown in figure 4-24.

Table 4-12 Configuration Module Kit, P/N 011-00979-03

Item	Description	P/N	QTY
1	Configuration Module, PCB Board Assembly w/EEPROM	011-02178-00	1
2	4-Conductor Harness	325-00122-00	1
3	Pin Contact, Crimp, #22D	336-00021-00	4

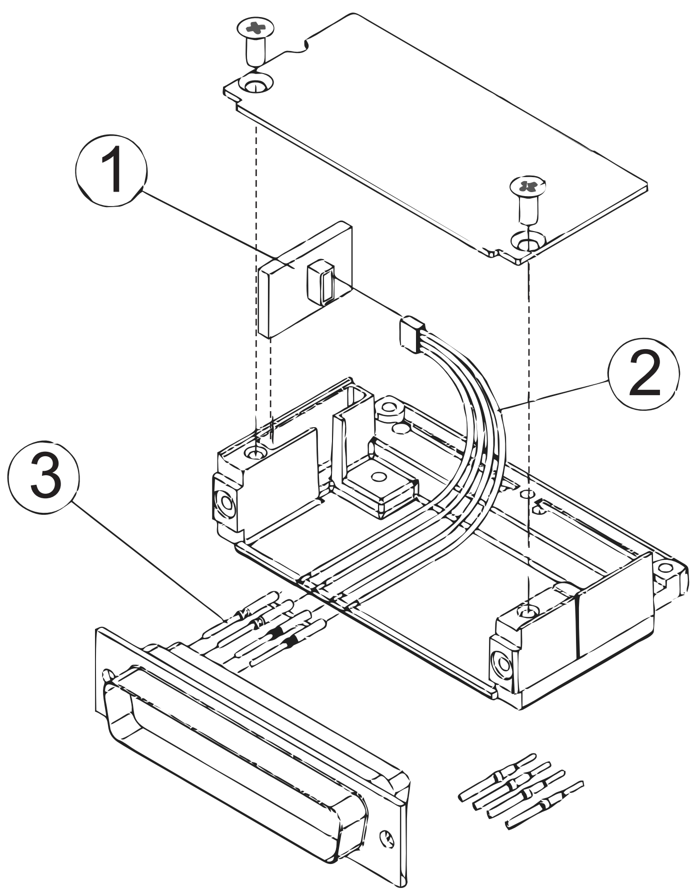


Figure 4-24 Configuration Module Assembly

4.5 GTX Installation

Install the GTX after completion of the continuity and power checks. The GTX should be installed into the rack and secured correctly. The GTX backplate must be connected to the wiring harness and antenna coaxial cables.

4.5.1 GTX 330/330D Installation

CAUTION

Be sure not to over-tighten the unit into the rack. Torque exceeding 15 in-lbs can damage the locking mechanism.

NOTE

It can be necessary to insert the hex drive tool into the access hole and rotate the cam mechanism 90° counterclockwise to insure correct position prior to placing the unit in the rack.

1. Slide the GTX 330/330D in the rack straight in until it stops about 1 inch short of the final position.
2. A 3/32-inch hex drive tool is then inserted into the access hole at the bottom of the unit face.
3. Turn the hex tool clockwise while the left side of the bezel is pushed until the unit is firmly seated in the rack.
4. Make sure there are no obstructions to the unit fully seating in the rack. The mounting rack may need to be moved aft (toward the pilot) such that the aircraft panel does not obstruct the unit from engaging in the rack. Torque to 15 in-lbs.
5. Refer to section 6 and section 7 for system configuration, calibration and checkout.

4.5.2 GTX 33/33D Installation

1. Visually inspect the connectors to make sure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GTX 33/33D into its rack. The handle should engage the locking mechanism used to secure the unit in place.
3. Push down on the GTX 33/33D handle to lock the unit into the rack.
4. Lock the handle to the GTX 33/33D body by tightening the Phillips head screw.
5. Refer to section 6 and section 7 for system configuration, calibration and checkout.

4.5.3 GTX 335/345 Installation

CAUTION

Do not to over-tighten the unit into the rack. Torque exceeding 8 in-lbs can damage the locking mechanism.

NOTE

It may be necessary to insert the hex drive tool into the access hole and rotate the cam mechanism 90 degrees counterclockwise to make sure the cam mechanism is in the correct position before placing the unit into the rack.

1. Slide the GTX 3X5 straight in the rack until it stops, about one inch short of the final position.
2. Insert a 3/32-inch hex drive tool into the access hole at the bottom of the unit face.
3. Turn the hex tool clockwise while the left side of the bezel is pushed until the unit is firmly seated in the rack.
4. Make sure nothing obstructs the unit from fully seating in the rack. The mounting rack may need to be moved aft (toward the pilot) so that the aircraft panel does not obstruct the unit from engaging in the rack. Torque to 8 in-lbs.
5. Refer to section 6 and section 7 for system configuration, calibration and checkout.

4.5.4 GTX 3X5R With Standard Remote or G1000 System Rack Mount

CAUTION

Do not to over-tighten the unit into the rack. Torque exceeding 8 in-lbs can damage the locking mechanism.

NOTE

It can be necessary to insert the hex drive tool into the access hole and rotate the cam mechanism 90 degrees counterclockwise to make sure the cam mechanism is in the correct position before placing the unit into the rack.

1. Visually inspect the connectors and pins to make sure they are not bent or damaged. Repair any damage.
2. Slide the GTX 3X5 straight in the rack until it stops, about one inch short of the final position.
3. Insert a 3/32-inch hex drive tool into the access hole at the bottom of the unit face.
4. Turn the hex tool clockwise while the left side of the bezel is pushed until the unit is firmly seated in the rack.
5. Make sure nothing obstructs the unit from fully seating in the rack. Torque to 8 in-lbs.
6. Refer to section 6 and section 7 for system configuration, calibration and checkout.

4.5.5 Garmin Altitude Encoder Installation

CAUTION

Make sure there are no pneumatic leaks. Make sure there is no fluid, sealant, or particles inside the lines and fittings.

The installer is required to:

- Fabricate static hose connections.
- Label the hose near the unit.
- Attach the aircraft static pressure source to the Garmin Altitude Encoder.

Refer to section 3.6 for general guidance and installation information.

1. Secure the Garmin Altitude Encoder to the GTX 3X5 back plate assembly with two screws.
2. Connect the wiring harness to the Garmin Altitude Encoder.
3. Static System Connection
   a) For aircraft with independent static systems and two transponders, the transponders should be installed on different static systems. If no second static system is available, then it is satisfactory to install transponders on the same static system.
   b) Refer to the aircraft manufacturer's documentation for pneumatic tubing and fitting part numbers that can be used to connect the static system to the GAE female 1/8-27 ANPT. Refer to 14 CFR Part 43 appendix E for approved practices to connect the GAE to the aircraft static system.
   c) Do not exceed the aircraft manufacturer's minimum bend radius. Avoid routing near aircraft control cables, structure, or high temperature lines, tubing, and components. The GAE must not be the low point of the static plumbing lines, to avoid moisture or debris collecting at or near the unit. The static line must be labeled near the unit.
   d) Modifications must not interfere with the previously approved effectiveness of the static system drains, the effectiveness of the alternate static source selector switch (if applicable), or the independence of dual static systems (if applicable).
   e) Modifications to the static port surface, aircraft surface near the static port, or other changes that would affect the relationship between measured static air pressure and true ambient static air pressure are outside the scope of this STC.
4. Refer to section 6 and section 7 for system configuration, calibration and checkout.

4.6 AFMS Completion

Section 1.4 of the GTX 33X and GTX 3X5 AFMS is intended to specify the installation configuration for the GTX system. It is the responsibility of the installer to mark in the appropriate boxes in the AFMS with indelible ink using the following guidance.

Equipment Installed

The Equipment Installed subsection indicates the type of GTX transponder installed. Mark the boxes as described for Transponder #1, and for Transponder #2 if a dual installation was performed.

[1] GTX 330
[2] GTX 330D
[3] GTX 33
[4] GTX 33D
[5] GTX 335
[6] GTX 335R
[7] GTX 345
[8] GTX 345R

Mark box [1] if the installed transponder is part number 011-00455-60 or 011-00455-80.

Mark box [2] if the installed transponder is part number 011-00455-70 or 011-00455-90.

Mark box [3] if the installed transponder is part number 011-00779-20 or 011-00779-30.

Mark box [4] if the installed transponder is part number 011-00779-21.

Mark box [5] if the installed transponder is part number 011-03300-00, 011-03300-20, or 011-03300-40.

Mark box [6] if the installed transponder is part number 011-03301-00 or 011-03301-40.

Mark box [7] if the installed transponder is part number 011-03302-00 or 011-03302-40.

Mark box [8] if the installed transponder is part number 011-03303-00 or 011-03303-40.

Interfaced GPS/SBAS Position Source

The Interfaced GPS/SBAS Position Source subsection describes the GPS position source(s) used by the GTX transponder(s). Mark the boxes as described for GPS #1, and for GPS #2 if dual GPS sources are interfaced to the transponder(s).

[1] Internal
[2] GTN 6XX/7XX Series
[3] GNS 400W/500W Series
[4] GNS 480
[5] GIA 63
[6] GDL 88 (GTX 330 Only)

Mark box [1] if the installed transponder(s) part number is 011-03300-40, 011-03301-40, 011-03302-40, or 011-03303-40, and the Internal GPS source is configured.

Mark box [2] if the installed transponder(s) is interfaced with a GTN 6XX/7XX input per appendix C and appendix B of this manual.

Mark box [3] if the installed transponder(s) is interfaced with a GNS 400W/500W input per appendix C and appendix B of this manual.

Mark box [4] if the installed transponder(s) is interfaced with a GNS 480 input per appendix C and appendix B of this manual.

Mark box [5] if the installed transponder(s) is interfaced with a GIA 63 input per appendix C and appendix B of this manual.

Mark box [6] if the installed GTX 330 transponder(s) is interfaced with a GDL 88 with GPS input per appendix C and appendix B of this manual.

Interfaced Pressure Altitude Source

The Interfaced Pressure Altitude Source subsection describes the Altitude source(s) used by the GTX transponder(s). Mark the boxes as described for Pressure Altitude Source #1, and for Pressure Altitude Source #2 if dual Altitude sources are interfaced to the transponder(s).

[1] __________
[2] Garmin Altitude Encoder

Mark box [1] if the installed transponder(s) is interfaced with an external Pressure Altitude Source input per appendix B and appendix C of this manual. Write the Manufacturer and Model of the interfaced source in the space provided.

Mark box [2] if the installed transponder(s) is configured to utilize Pressure Altitude from the optional Garmin Altitude Encoder.

Interfaced Remote Control Display

The Interfaced Remote Control Display subsection describes the display that is interfaced to provide control function for remotely mounted transponders. Mark the boxes as described for Transponder #1, and for Transponder #2 if a dual installation was performed.

[1] GTN 6XX/7XX
[2] GNS 480
[3] G950/1000 Display

Mark box [1] if the installed transponder is interfaced with a GTN 6XX/7XX per appendix B and appendix C of this manual.

Mark box [2] if the installed transponder is interfaced with a GNS 480 per appendix B and appendix C of this manual.

Mark box [3] if the installed transponder is interfaced with a G950/1000 system per appendix B and appendix C of this manual.

Interfaced Active Traffic System

The Interfaced Active Traffic System subsection describes the traffic system that is interfaced to the GTX for traffic correlation. Mark the boxes as described.

[1] None

[2] TCAD

[3] TAS/TCAS

Mark box [1] if the installed transponder is not interfaced with an active traffic system.

Mark box [2] if the installed transponder is interfaced with a 9900BX per appendix C and figure B-30 of this manual.

Mark box [3] if the installed transponder is interfaced with a Garmin GTS, Honeywell KMH/KTA, or L-3 Skywatch traffic system per appendix C and figure B-30 of this manual.

5 SOFTWARE UPDATE

5.1 Software Check 5-2
5.1.1 GTX 330/330D Software Version Check 5-2
5.1.2 GTX 3X5 Software Version Check 5-3
5.1.3 GTX 33/33D/3X5R Software Version Check (GTN 6XX/7XX) 5-3
5.1.4 GTX 3X5R Software Version Check (Legacy G950/1000) 5-4
5.2 GTX 33X Software Update 5-5
5.2.1 GTX 33X Software Loading 5-6
5.3 GTX 3X5/3X5R Software Update 5-7
5.3.1 GTX 3X5/3X5R Software Loading 5-8

NOTE

The modifications in this section are mandatory to meet the requirements of AC 20-165A and this STC. These modifications are applicable for ALL installations associated with this STC.

NOTE

Screen shots in this section are provided for reference only. For current approved GTX software versions, refer to GTX 33X and GTX 3X5 ADS-B AML STC Equipment List.

5.1 Software Check

The software version must match the approved version in *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*. DO NOT continue if the software version number does not match those specified or if the software is not successfully loaded. Troubleshoot and resolve the issue before continuing. Do a software version check after the software is loaded.

5.1.1 GTX 330/330D Software Version Check

1. Energize the GTX 330/330D in normal mode.
2. Observe the start up screen.

Figure 5-1 GTX 330 Start-Up Screen

3. Push the **8** key or the **9** key until you see the SYS software version screen.

Figure 5-2 GTX 330 Product Data Page

4. Make sure that the software version number matches the approved version as specified in *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*.

5.1.2 GTX 3X5 Software Version Check

1. Start the GTX 3X5 in normal mode.
2. Observe the start-up screen until you see "PRESS ENT FOR PRODUCT DATA."

Figure 5-3 GTX 3X5 Start-Up Screen

3. Push the **ENT** key to go to the software version screen.
4. Make sure that the version number matches the approved version as specified in *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*.

Figure 5-4 GTX 3X5 Product Data Page

5.1.3 GTX 33/33D/3X5R Software Version Check (GTN 6XX/7XX)

Follow these steps to make sure the GTX 33/33D software version is correct as interfaced with the GTN 6XX/7XX Series Navigators.Refer to the GTN 6XX/7XX Series pilot guides for more information.

1. Push the **External LRUs** key on the GTN 6XX/7XX System Page.
2. Observe the reported GTX software version number.
3. Make sure the version number identified is correct as specified in the *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*.

Figure 5-5 GTN 6XX/7XX System Page

5.1.4 GTX 3X5R Software Version Check (Legacy G950/1000)

Follow these steps to make sure the GTX 3X5R software version is correct when interfaced with the Legacy G950/1000. Refer to the applicable G1000 Series Pilot Guides or Installation Manuals for more information.

1. On the G950/1000 PFD, put the unit into configuration mode.
2. On the System Status page, scroll to the GTX LRU.
3. Observe the reported GTX software version number.
4. Make sure the version number matches the approved version shown in the *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*.

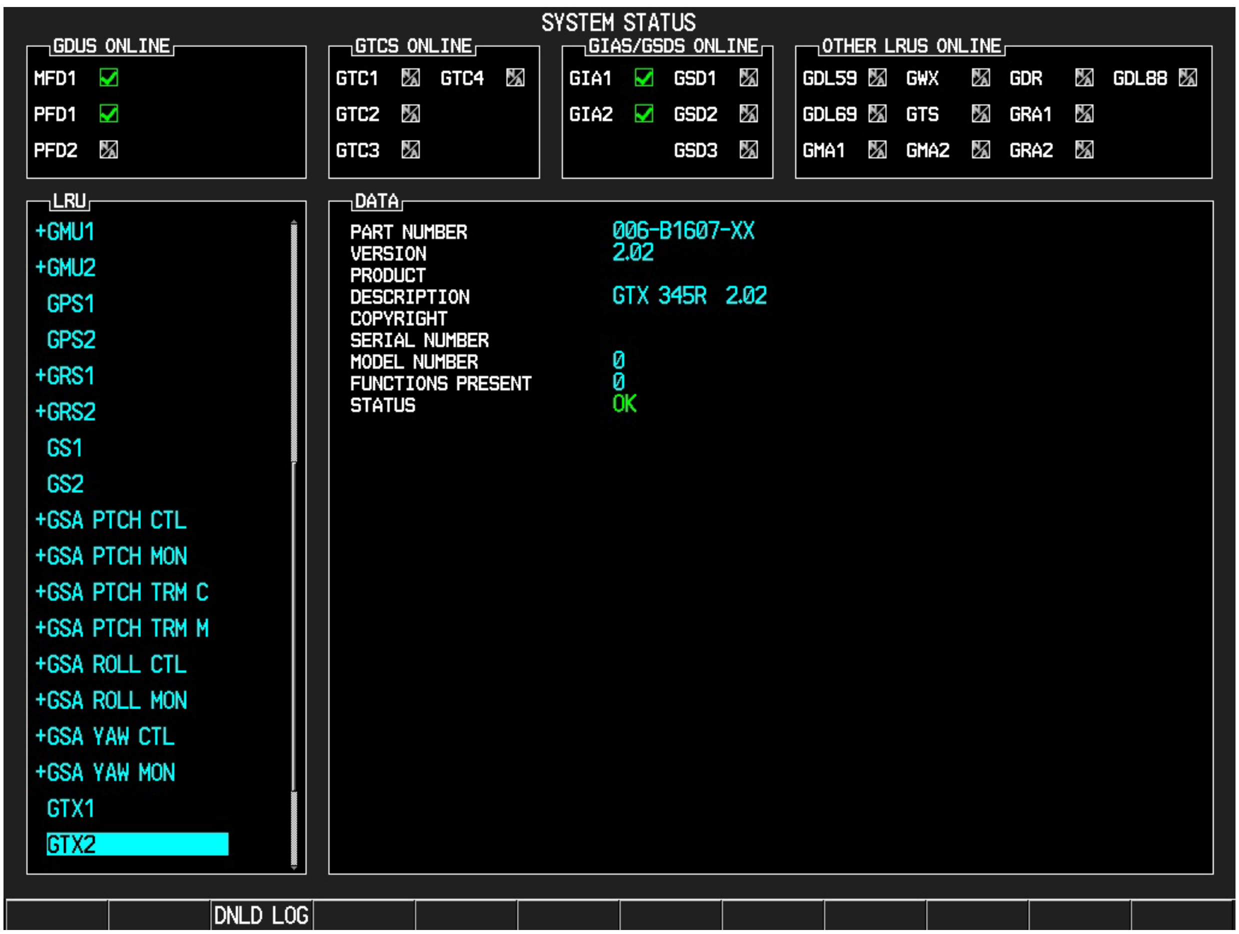


Figure 5-6 Legacy G950/1000 System Status Page

5.2 GTX 33X Software Update

The GTX 33X software can be updated in the Configuration mode and in Test mode.

Updating software on the GTX 330 in Configuration mode does not require the **TEST MODE SELECT** switch. The **TEST MODE SELECT** switch is required to update software in the GTX 33 series.

Refer to figure 5-7 for software update connections.

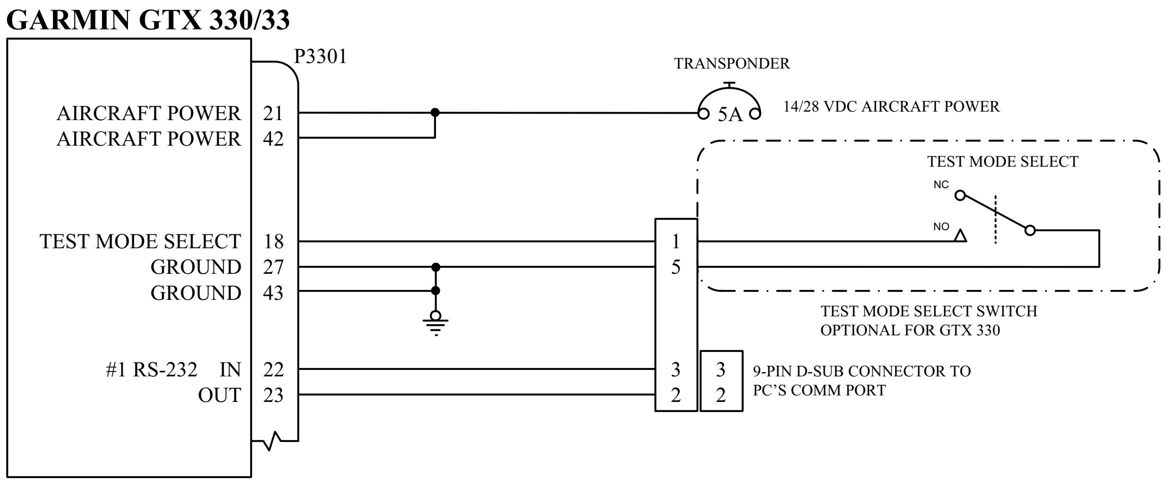


Figure 5-7 Software Update Connection

The GTX comes pre-loaded with software. If new software is to be installed on a GTX unit, it is required that the software is obtained from the Garmin Dealer Resource Center. For dual GTX 33X installations follow the software loading procedures in Section 5.2.1.

5.2.1 GTX 33X Software Loading

CAUTION

Connect J3302 (GTX 33/330/33D/330D) and J3303 (GTX 330D/33D) to a 50 ohm, 5 watt load if the unit is removed from the aircraft and operated. The GTX transmits Mode S acquisition squitter replies once per second whether interrogations are received or not.

NOTE

The MS-DOS window on the computer communicating with the transponder will show a progress indication (in percentages) for the loading of the software.

1. Access the Dealer Resource Center on Garmin's website.
2. Obtain the transponder software as specified in *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List* and download on a laptop computer.
3. Access the target directory for the software on the laptop computer.
4. Extract the files by double clicking on the downloaded .exe file.
5. De-energize the GTX.
6. Connect the test harness to the GTX and laptop. Refer to figure 5-7 for more information.
7. Set the **TEST MODE** switch (if used) on the test harness.
8. Energize the GTX.
9. Double click on the file UPLOADXX.BAT (XX is an incremental number assigned to a specific software version). The program will start communicating with the GTX.
10. The upload process could take up to six minutes to complete.
11. When the upload is completed, the unit will reset itself, and re-energize.
12. De-energize the GTX.
13. Remove the test harness between the laptop and the GTX.
14. Install the GTX into the aircraft and energize the system.
15. Make sure the correct software version shows.

5.3 GTX 3X5/3X5R Software Update

CAUTION

If the unit is removed from the aircraft and operated, connect the transponder antenna connection to a 50 ohm 5 watt load. The GTX transmits Mode S acquisition squitter pulses once per second whether interrogations are received or not. Failure to connect a dummy load or antenna during this procedure will cause the transponder to fail and possibly damage the unit.

CAUTION

Do not de-energize the unit until "Update Complete" is shown next to all selected items. Failure to do so could result in equipment damage.

If the unit does not have the approved version of software installed, software can be downloaded from the Dealer Resource Center on Garmin's website. For dual GTX installations, the software loading procedures must be carried out on each GTX.

5.3.1 GTX 3X5/3X5R Software Loading

1. Download the latest GTX 3X5/3X5R software from the Dealer Resource Center on Garmin's website.
2. Under "Step 1 - Select a File," select the **Browse** key and locate the Boot Block software file containing the GTX 3X5/3X5R software previously loaded.
3. Under "Step 2 - Upload Options," select the options to be updated.
4. Select the **Upload** key.
5. Wait for the upload to complete. Individual files will be marked as complete as they are installed.
6. Under "Step 1 - Select a File," select the **Browse** key and locate the Main System software file containing the GTX 3X5/3X5R software previously downloaded.
7. Under "Step 2 - Upload Options," select the remaining options to be updated.
8. Wait for the upload to complete. Individual files will be marked as complete as they are installed.
9. After successful completion of the update, make sure that the correct software versions and part numbers show on the Transponder page under the Product Data group. If any software items did not load, select those items and attempt to upload again.

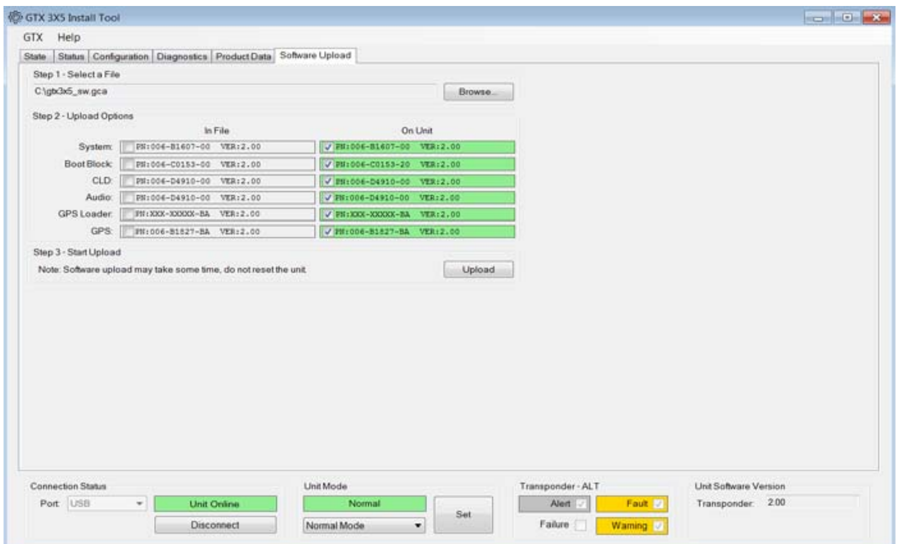


Figure 5-8 GTX 3X5 Install Tool Software Upload Page

6 POST INSTALLATION CONFIGURATION

6.1 System Configuration Overview 6-3
6.2 Mounting, Wiring, and Power Checks....6-4
6.3 GTX 3X5 Panel Mount Configuration 6-5
6.3.1 Audio Settings 6-5
6.3.2 Input/Output Configuration....6-7
6.3.3 Unit Settings....6-16
6.3.4 Display Pages 6-17
6.3.5 Sensors 6-19
6.3.6 Airframe 6-24
6.3.7 Aircraft 6-25
6.3.8 Diagnostics....6-26
6.4 GTX 3X5 Remote Unit Configuration 6-27
6.4.1 Audio Configuration Page....6-27
6.4.2 Interface Configuration Pages....6-29
6.4.3 Unit Configuration Page....6-31
6.4.4 Display Configuration Page 6-32
6.4.5 Sensor Configuration....6-33
6.4.6 Airframe Configuration Page 6-35
6.4.7 Aircraft Configuration Page 6-35
6.5 GTN 6XX/7XX Configuration with GTX....6-36
6.5.1 Transponder Remote Control 6-36
6.5.2 ADS-B In Display (GTX 345 Only) 6-36
6.6 GNS 400W/500W Series Configuration....6-37
6.7 GNS 480 Configuration with GTX....6-38
6.8 GTX 3X5 Configuration with Legacy G950/1000 6-39
6.8.1 GTX 335R Configuration....6-40
6.8.2 Active Traffic System De-Configuration with G950/1000 6-44
6.8.3 GTX 345R Configuration....6-49
6.8.4 Dual Transponder Configuration 6-54
6.9 GTX 330/330D Configuration....6-59
6.9.1 Configuration Menu Page 6-59
6.9.2 Audio Mode Pages 6-60
6.9.3 Traffic Information Page....6-61
6.9.4 Display Mode Page 6-61
6.9.5 Display Backlight Page 6-62
6.9.6 Key Lighting Page....6-63
6.9.7 Contrast Configuration Page 6-64
6.9.8 VFR Key Configuration Page 6-64
6.9.9 ARINC 429 Configuration Pages....6-65
6.9.10 RS-232 Input and Output Page....6-67
6.9.11 Operation Configuration Pages 6-69
6.9.12 Temperature Page....6-71
6.9.13 Mode S Address Entry Pages 6-71
6.9.14 US Tail and Hex Address Entry Pages....6-71
6.9.15 Mode S Flight ID Pages 6-73
6.9.16 GPS Configuration Page 6-75
6.9.17 MODE S Aircraft Type Page 6-75
6.9.18 Aircraft Size Page....6-76

6.9.19 ADS-B Page 6-77
6.9.20 EHS Page 6-77
6.10 GTX 33X Configuration with GTN 6XX/7XX 6-78
6.10.1 Transponder Inputs and Outputs 6-80
6.10.2 RS-232 Configuration 6-80
6.10.3 ARINC 429 Configuration 6-82
6.10.4 Transponder Installation Settings Page 6-83
6.10.5 Transponder Audio Configuration 6-89

6.1 System Configuration Overview

NOTE

If a GTX 335(R) is replaced with a GTX 345(R) or a GTX 345(R) is replaced with a GTX 335(R), the configuration file should be saved by selecting Configuration, Save, under the GTX tab on the Install Tool. Once the configuration is saved, Reset the configuration under the same tab, then reload the saved configuration. Once complete the unit can continue to be configured.

This section contains instructions for configuring each installation. Section 7 contains checks to make sure the system is correctly installed and functions.

The checkout log contained in Appendix A of *GTX 33X and GTX 3X5 ADS-B Maintenance Manual* must be filled out during the checkout procedures. The completed checkout log sheet must be maintained with the aircraft permanent records to document the configuration of the installation.

Checkout procedures are covered in section 7. The required GTX configuration are as follows:

1. Complete the installation checks (refer to section 6.2).
2. Configure the GTX 3X5 in accordance with section 6.3 and section 6.4 (refer to appendix C for specific configuration items).
3. Configure the GTX 33X in accordance with section 6.9 (refer to appendix C for specific configuration items).
4. Configure the GTX interfacing LRU's with section 6.5 through 6.8, and section 6.10 (refer to appendix C for specific configuration items).
5. Complete the ground checks to make sure the GTX unit interfaces to the external equipment (refer to section 7).
6. Complete the configuration and checkout log (refer to section 7.4.2).
7. Complete the required and specified ground checks (refer to section 7).
8. Update the aircraft documentation (refer to section 7.4).

6.2 Mounting, Wiring, and Power Checks

CAUTION

Make sure there are no pins misaligned or bent before inserting the GTX into the mounting rack. Bent or misaligned pins will result in damage to the GTX or failed procedures.

CAUTION

Make sure the wire harness does not touch any moving part.

CAUTION

Make sure all lighting buses are set to their lowest adjustment before the unit is energized. The lowest adjustment prevents damage to the unit in case of any wiring errors. Incorrect lighting bus wiring could cause damage to the GTX.

The wiring harness must be examined for correct connections to the aircraft systems and other avionics equipment before the unit is installed and energized. Point-to-point continuity must be completed to expose any faults such as shorting to ground or wiring discrepancies. All faults or discrepancies must be corrected before proceeding.

Before and during the installation make sure:

1. All cables are secured.
2. Shields are connected to shield blocks of the connectors.
3. Movement of the flight and engine controls do not interfere with cabling and control systems.
4. Wire is installed as described in section 4.3.

After the installation and continuity check make sure these items are completed:

1. Power and ground check.
2. Faults and discrepancies are corrected.
3. GTX installation rack and unit are correctly secured.

6.3 GTX 3X5 Panel Mount Configuration

System and interface settings are shown in configuration mode specific to the GTX 3X5 installation. The configuration settings are stored in internal memory. The configuration settings are also stored in the external configuration module, if installed. The GAE module operates as a configuration module. GTX 3X5 panel mount units are configurable from the display or the GTX 3X5 Install Tool. Refer to section 6.4 to configure GTX 3X5 panel mount units with the GTX 3X5 Install Tool.

1. Push and hold the **ENT** key when the unit is energized to go into configuration mode.
2. Push and hold the **OFF** key until the unit de-energizes to exit configuration mode.
3. Push the **FUNC** key to cycle through the pages.
4. Push the **8** or **9** key to scroll up or down on the page without an active field selected.
5. Push the **CRSR** key to access items on the page.
6. Push the **8** or **9** key to cycle through the selections of an item on the page.
7. Push the **ENT** key to move within the page with a field highlighted.
8. Push the **CLR** key to move to previous selection on the page.
9. Push the **FUNC** key to exit the page.

6.3.1 Audio Settings

Audio settings set the audio output, volume, and alert type

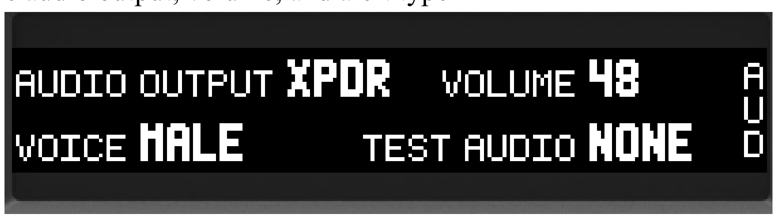


Figure 6-1 Audio Page 1

Set the GTX 3X5 audio settings per the following table.

Table 6-1 Panel Mount Audio Settings

ITEM	CONFIGURATION	NOTES
Audio Output	XPDR	Use the audio output of the transponder.
Volume	50	Settings can vary for user preference (use the **8** or **9** key to adjust volume). The interface checkout procedure in section 7.1.2 must be performed to make sure that the volume is configured to an appropriate level.
Voice	MALE or FEMALE	Setting can vary for user preference. Default is MALE.
Test Audio [1]	NONE	Default
	TONE	Solid beep
	MSG 1	“Leaving Altitude”
	MSG 2	“Timer Expired”
	MSG 3	“Traffic 12 O'clock 5 Miles”

[1] The test audio files are only used to assist while setting the appropriate volume level of the transponder, once complete the unit automatically defaults back to NONE.

Figure 6-2 Audio Page 2

Altitude and Timer Expired Alert (Panel Mount Units Only)

Set the GTX 3X5 Altitude and Timer Expired Alert settings per the following table.

Table 6-2 Panel Mount Altitude and Timer Expired Alert Settings

ITEM	CONFIGURATION	NOTES
ALTITUDE ALRT	OFF	Setting can vary for user preference
	MESSAGE	
	MESSAGE W/ CHIME	
TIMER EXPIRED ALRT	OFF	Setting can vary for user preference
	MESSAGE	
	MESSAGE W/ CHIME	

Figure 6-3 Audio Page 3

Traffic Alert

Set the GTX 3X5 Traffic Alert per the following table.

Table 6-3 Panel Mount Traffic Alert Settings

ITEM	CONFIGURATION	NOTES
TRAFFIC ALERT	OFF	Setting can vary for user preference
	MESSAGE	
	MESSAGE W/ CHIME	

6.3.2 Input/Output Configuration

Configures the inputs and outputs of the RS-232, ARINC 429, discrete, and HSDB interfaces.

RS-232

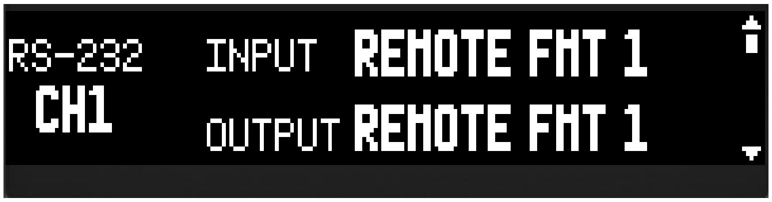


Figure 6-4 RS-232 Interface Page

Sets the RS-232 interfaces for input and output formats for channels 1 through 4.

Table 6-4 RS-232 Channel Selections

Selection	Input/Output	Available Channels	Description	Notes
Off	Input/Output	1-4	No information is transmitted or received.	
ADC FMT 1	Input	1-3	Supports Shadin G/S/Z ADC formats.	
ADS-B+ FMT 1	Input/Output	1-3	Receives/transmits necessary ADS-B GPS data at 9600 baud.	[4]
ADS-B+ FMT 2	Input/Output	1-3	Receives/transmits necessary ADS-B GPS data at 38400 baud.	[4]
ALT FMT 1	Output	1-3	Outputs pressure altitude in 25 or 100 ft resolution depending on the source of the data.	[1]
ALT FMT 1 25 ft	Input	1-3	Supports Sandia/Icarus/ACK/TRANS-CAL altitude format with 25 ft or lower encoding.	
ALT FMT 1 100 ft	Input	1-3	Supports Sandia/Icarus/ACK/TRANS-CAL altitude format with a parallel Gray code source of 100 ft encoding.	
ALT FMT 3 25 ft	Input	1-3	Supports Shadin altitude format with 25 ft or lower encoding.	
ALT FMT 3 100 ft	Input	1-3	Supports Shadin altitude format with a parallel Gray code source or 100 ft encoding.	
CONNEXT FMT 1	Input/Output	1-4	Supports G3X for ADS-B In weather and traffic.	[1] [3]
CONNEXT FMT 3	Input	1-4	Supports input from a Flight Stream 110/210.	[3]
GDL	Input/Output	1-3	Supports GDL 88 interface.	[1]
GNS	Input/Output	1-4	Supports GNS 400W/500W series ADS-B In weather (traffic supported over ARINC 429). Also provides GPS data.	[3]
LGCY REMOTE 1	Input/Output	1-3	Supports transponder interface to Legacy G950/G1000.	

Selection	Input/Output	Available Channels	Description	Notes
LGCY REMOTE 2	Input/Output	1-3	Supports transponder interface and TIS-A traffic to Legacy G950/G1000.	[2]
LGCY TRAFFIC	Output	1-4	Supports GDL 90 traffic interface to Legacy G950/G1000.	[3]
REMOTE FMT 1	Input/Output	1-3	Supports transponder interface to GTN, GNS 480, and G950/1000 SW v15.XX.	
REMOTE FMT 2	Input/Output	1-3	Supports transponder interface and TIS-A traffic to GTN, GNS 480, and G950/1000 SW v15.XX.	[2]
TIS-A OUT FMT	Output	1-3	Outputs TIS-A traffic for non-certified displays: GPSMAP 396/496/695/696, G3X, and G300.	[1] [2]
TRAFFIC FMT 4	Input/Output	4	Supports Ryan TCAD.	[3]
XPDR FMT 1	Input/Output	1-3	Supports transponder interface to GX000.	[1]
XPDR FMT 2	Input/Output	1-3	Supports transponder interface and TIS-A traffic to GX000.	[1] [2]

[1] Format not supported with this STC for the GTX 3X5.

[2] Applicable for GTX 335 installations only.

[3] Applicable for GTX 345 installations only.

[4] GTX 3X5 unit with internal GPS required for output.

RS-422 Output (GTX 345 Only)

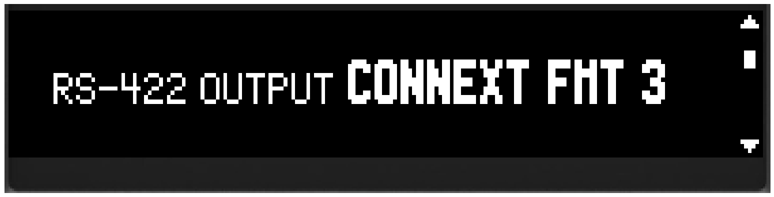


Figure 6-5 RS-422 Output Page

RS-422 supports ADS-B In weather to a Legacy G950/1000 installation.

Table 6-5 RS-422 Output Selections

Selection	Input/Output	Description	Notes
Off	Output	Information is not transmitted.	
CONNEXT FMT 3	Output	Supports output to Flight Stream 110/210.	
MX FMT 1	Output	Supports GMX 200 and G950/G1000.	[2]
MX FMT 2	Output	Supports MX20.	[1]

[1] Format is not supported with this STC for the GTX 3X5.

[2] With this STC, this format is supported only for G950/G1000 installations for ADS-B In traffic (requires GDU software v12.00 or later and GIA software v6.20 or later).

ARINC 429

NOTE

All ARINC 429 configuration formats are available on all channels/ports.

Figure 6-6 A429 In Page

Table 6-6 ARINC 429 Inputs

Selection	Description	Notes
OFF	Information is not received.	
AHRS	Receives heading, roll, pitch, and yaw information from systems with AHRS.	
ADC	Receives altitude, airspeed, and altitude rate information from air data systems.	
ARINC 743A	Receives GPS information from ARINC 743A.	[1]
EFIS AIR DATA	Receives altitude, airspeed, altitude rate, and heading information from EFIS and ADC systems.	
FLIGHT CONTROL	Receives selected altitude, barometric setting, and non-standard pitch discrete data for Bendix King KFC 225.	[1]
HEADING	Receives heading information.	
MODE S CTRL PNL	Receives ARINC 718 labels for ATCRBS Control and Flight ID.	[1]
RADIO ALTITUDE	Receives radar altitude information.	
TRAFFIC 1	Receives traffic information from Garmin GTS 8XX systems.	[2]
TRAFFIC 2	Receives traffic information from L-3 Comm SKY497 Skywatch and SKY899 Skywatch HP.	[2]
TRAFFIC 5	Receives traffic information from KTA 870 (KTA 810), KTA 970 (KTA 910), KMH 880 (KMH 820), and KMH 980 (KMH 920).	[2]

[1] Format not supported with this STC for the GTX 3X5.

[2] Applicable to GTX 345 installations only.

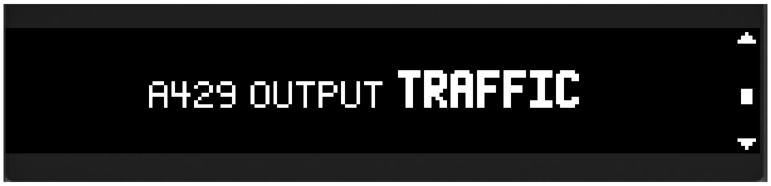


Figure 6-7 A429 Output Page

Table 6-7 ARINC 429 Outputs

Selection	Description	Notes
OFF	Information is not transmitted	
FORMAT 1	Mode S control panel	[1]
FORMAT 2	Garmin concentrator	[1]
FORMAT 3	Garmin concentrator and Mode S control panel	[1]
FORMAT 4	Garmin TAS and GPS data	
FORMAT 5	Garmin concentrator, Garmin TAS, and GPS data	
FORMAT 6	Mode S control panel, Garmin TAS, and GPS data	[1]
FORMAT 7	Garmin concentrator, Mode S control panel, Garmin TAS, and GPS data	[1]
FORMAT 8	Garmin TIS-A	[2]
FORMAT 9	Garmin concentrator and Garmin TIS-A	[1] [2]
TRAFFIC	ADS-B traffic output for GNS 400W/500W series units	[3]

[1] Format not supported with this STC for the GTX 3X5.

[2] Applicable for GTX 335 installations only.

[3] Applicable for GTX 345 installations only.

HSDB Interface (GTX 345 Only)

Sets the presence of specific HSDB devices interfaced to the GTX 345. Selections are YES or NO.

Figure 6-8 HSDB Interface Page

Table 6-8 HSDB Formats

Selection	Description	Notes
GDU 620	Select YES or NO for each selection depending on whether or not the interface is included in the particular installation.	[1]
GTN		
GTS		[1]
GX000		[1]

[1] Format not supported with this STC for the GTX 3X5.

Discrete In

Set the function of each configurable discrete as necessary for the installation. Refer to section 8 for pinout information.

NOTE

Any discrete input or output designated as "configurable" can be configured for any available configurable discrete input/output unless specified otherwise.

NOTE

The source priority is based on selections made during configuration. Refer to section 3.10.

Figure 6-9 Discrete In Page

Table 6-9 Discrete Input Configuration

Function	Selection	Description
AIR DATA	NONE	Switches between two ARINC 429 ADC sources or two EFIS ADC sources. Source 1 and 2 are set during configuration. Source 1 is used when the discrete is open and Source 2 is used when the discrete is grounded.
	P3251 - 58	
ALT DATA	NONE	Selects between two pressure altitude sources.
	Configurable	
AUD MUTE	NONE	Incoming audio will be muted until discrete is opened. This is connected to a high priority audio such as TAWS.
	Configurable	
AUD CNCL	NONE	When this discrete is grounded by a momentary switch, audio alerts are canceled.
	P3251 - 37	
EXTERNAL SUPPRESSION I/O	NONE	A synchronous pulse which is sent to the other equipment to suppress transmission of a competing transmitter/receiver for the duration of the transmission.
	P3251-18	
GILLHAM	ENABLED: No	Activates all ten Gillham/Gray code inputs. If this configuration is set to “Enabled: No”, then these discrete pins are available to be configured for another function that is configurable.
	ENABLED: Yes (P3251 - 10-13; 32-34; 53-55)	
ID SLCT	NONE	Selects the system ID and overrides configuration setting. GTX 1 system ID is selected when this discrete is open. GTX 2 system ID is selected when the discrete is grounded.
	Configurable [1]	
IDENT	NONE	When this discrete is grounded by a momentary switch, the SPI activates.
	P3251 - 36	
STANDBY	NONE	When this discrete is grounded, the unit will go into standby mode.
	P3251 - 14	
SQUAT	NONE	This input determines the on-ground status of the aircraft. It is active low, and a ground on this input can be configured to mean On Ground or In Air.
	P3251 - 57	
TIS-A SELECT	NONE	GTX 335 only. When this discrete is momentarily grounded, TIS-A will toggle between operate/standby.
	Configurable	

[1] Only available for configurable discrete outputs on P3251.

Discrete Out

Figure 6-10 Discrete Out Page

Table 6-10 Discrete Output Configuration

Function	Selection	Description
ALT ALERT	NONE	When this discrete is grounded it indicates a deviation from the preset altitude setting.
	Configurable	
EQUIP STS	NONE	If the unit needs service soon, this discrete will switch between open and ground for the first 30 seconds after power up. If after 30 seconds, there is no detection of ADS-B In/Out failures the discrete opens. The discrete will ground if any ADS-B In/Out failures are detected after 30 seconds.
	Configurable	
FAIL 1	NONE	Failure of transponder causes discrete to ground.
	P3251 - 17	
FAIL 2	NONE	Failure of transponder causes discrete to open.
	Configurable	
RPLY ACTV	NONE	Discrete grounds when transponder is replying to interrogations.
	Configurable	
TCAD SL	NONE	Supports automatic control and integration with Ryan TCAD and Avidyne TAS600 Series traffic systems. Applicable to GTX 345 installations only.
	Configurable	
TRFC STBY	NONE	Commands TAS/TCAS standby/operate. Discrete output operation automatically set through TAS/TCAS Input Configuration. Applies to GTX 345 only.
	Configurable [1]	
TRFC TEST	NONE	Commands TAS/TCAS into test mode. Applies to GTX 345 only.
	Configurable [1]	
TRFC ALRT	NONE	When a traffic alert is active, this discrete will ground. Applies to GTX 345 only. Used for external traffic annunciator lamp.
	Configurable	

[1] Only available for configurable discrete outputs on P3251.

6.3.3 Unit Settings

Figure 6-11 Unit Page

Set the GTX 3X5 UNIT settings per the following table.

Table 6-11 Panel Mount Unit Settings

ITEM	CONFIGURATION	NOTES
FIS-B PROCESSING	ENABLED	Set to ENABLED for GTX 345 units for ADS-B weather data.
	DISABLED	
ALTITUDE UNITS	FLIGHT LVL	Sets both pressure and density altitude units. Setting can vary for user preference.
	FEET	
	METERS	
TEMPERATURE UNITS	CELSIUS	Setting can vary for user preference.
	FAHRENHEIT	
INSTALLATION ID [1]	1	Set as 1 for primary unit, if dual transponders installed set 2 for second unit.
	2	
VFR ID	1200	Range in octal is 0000-7777. Default is 1200.
ALTITUDE ALERT DEVIATION	Configurable Range is 200 ft to 999 ft	This field determines the altitude offset from selected altitude to generate an altitude alert. This field is applicable only if the Altitude Alert configuration parameter is selected on the Audio Configuration page.
RESTORE PAGES ON POWER-UP	NO	Select YES to save the selected pages set in normal operating mode as the new default page settings next time the unit is powered on.
	YES	
BLUETOOTH	ENABLED	GTX 345 units only. Set to DISABLE if interfacing to a Flight Stream 110/210.
	DISABLED	

[1] The “ID SLCT” discrete overwrites the configuration setting.

6.3.4 Display Pages

NOTE

Under night conditions, make sure the brightness levels match the lighting levels of other equipment in the panel.

Figure 6-12 Display Pages

Set the GTX 3X5 DISPLAY settings to the following table.

Table 6-12 Panel Mount Display Settings

ITEM	CONFIGURATION	NOTES
DISPLAY BACKLIGHT	PHOTCELL [1] LIGHTING BUS [2]	Sets the source for the display backlight control and adjustment.
MINIMUM LEVEL	Range is: 0-100 [3]	Sets the minimum brightness of the display. The higher the number, the brighter the minimum brightness. Recommended minimum level should not be below 5.
KEYPAD BACKLIGHT	PHOTCELL [1] LIGHTING BUS [2]	Sets the source for the keypad backlight control and adjustment.
MINIMUM LEVEL	Range is: 0-100 [3]	Sets the minimum brightness of the keypad. The higher the number, the brighter the minimum brightness. Recommended minimum level should not be below 5.
PHOTOCELL TRANSITION	Range is: 5-50 [3] Default is: 5	Sets a point on the lighting bus. When the lighting bus is below this point, the GTX uses the photocell to adjust the display brightness.
SLOPE	Range is: 0-100 [3] Default is: 50	Sets the sensitivity of the photocell input level. Adjusting the slope higher results in a greater display brightness change for a given increase in photocell input level.
OFFSET	Range is: 0-100 [3] Default is: 50	Adjusts the lighting level up or down for any given photocell input level. Use the offset settings to match lighting curves with other installed equipment in the panel.

ITEM	CONFIGURATION	NOTES
LIGHTING BUS INPUT VLTG	5 VAC 5 VDC 14 VDC 28 VDC	Select the Lighting Bus voltage input used
DISPLAY AND BEZEL KEY LIGHTING SLOPE	Range is 0-100 [3] Default is 50	Sensitivity of the display or bezel keys for a given lighting bus input level. Set the slope higher for a brighter display for a given increase in the lighting bus input level.
DISPLAY AND BEZEL KEY LIGHTING OFFSET	Range is 0-100 [2] Default is 50	Adjusts lighting level up or down for any given lighting bus input level. Use the offset setting to match lighting curves with other equipment in the panel.
DEFAULT BACKLIGHT OFFSET	Range is -10 to 99 [2] Default is 0	Manually sets the default backlight offset. Setting can vary for user preference.
DEFAULT CONTRAST OFFSET	Range is -50 to 50 [2] Default is 0	Manually sets the default contrast offset. Setting can vary for user preference.

[1] Lighting level is selected by ambient lighting.

[2] Lighting level is selected by lighting bus input.

[3] Blackout Flight Deck (e.g., blanket) to simulate night conditions to determine preferred lighting level.

6.3.5 Sensors

OAT Sensor Installed

Select NO for OAT INSTALLED. Discrete interface to an external OAT probe is not covered under this STC.

Figure 6-13 Sensor Page

Altitude Source 1 and 2

NOTE

Altitude sources do not need to be set. The GTX uses both altitude sources if set. If no altitude sources are selected, the GTX will use any altitude source in priority order. Refer to section 3.10.2.

Set the GTX 3X5 primary and secondary altitude sources per the following table.

Table 6-13 Panel Mount Altitude Source Settings

ITEM	CONFIGURATION	NOTES
ALTITUDE SOURCE 1 and ALTITUDE SOURCE 2 [1]	NONE	Not valid for ALTITUDE SOURCE 1. An Altitude source is required.
	RS232 1	Select if Altitude input is from RS232 port 1.
	RS232 2	Select if Altitude input is from RS232 port 2.
	RS232 3	Select if Altitude input is from RS232 port 3.
	A429 1	Select if Altitude input is from ARINC 429 port 1.
	A429 2	Select if Altitude input is from ARINC 429 port 2.
	HSDB	Select if using GTN HSDB (GTX 345 only).
	GILLHAM	Select if Gillham Gray Code is used.
	ALT ENC	Select if Garmin Altitude Encoder is used.

[1] Sets the secondary altitude source.

GPS 1 and 2

Set the GTX 3X5 primary and secondary GPS settings per the following table.

Table 6-14 Panel Mount GPS Source

ITEM	CONFIGURATION	NOTES
GPS 1 SRC and GPS 2 SRC [1]	NONE	A GPS source is required.
	INTRNL	Select if GTX 3X5 with GPS is used.
	RS232 1	Select if GPS input is from RS232 port 1.
	RS232 2	Select if GPS input is from RS232 port 2.
	RS232 3	Select if GPS input is from RS232 port 3.
	RS232 4 [3]	Select if GPS input is from RS232 port 4.
	A429 1	Not supported on this STC.
	A429 2	Not supported on this STC.
	GTN 1 [2] [3]	Select if using GTN 1 HSDB.
	GTN 2 [2] [3]	Select if using GTN 2 HSDB.
	GIA 1 [3]	Not supported on this STC.
	GIA 2 [3]	Not supported on this STC.
INTGRTY [4]	UNK	NOT USED - Not ADS-B Out Compliant.
	1E-3	NOT USED - Not ADS-B Out Compliant.
	1E-5	NOT USED - Not ADS-B Out Compliant.
	1E-7	Select for ADS-B Out Compliance.
	AUTO	Select if using a Garmin GPS Unit.
LAT OFST [4]	Range is: -6mt to 6 mt (Increments of 2mt)	Installer must measure to determine an accurate GPS Antenna Offset from the Datum. *UNK is not an approved option.*
LON OFST [4]	Range is: 2mt to 60mt (Increments of 2mt)	Installer must measure to determine an accurate GPS Antenna Offset from the Datum. *UNK is not an approved option.*

[1] Sets the secondary GPS source.

[2] Make sure the GTN selection matches the correct GTN GPS source in the GTN.

[3] Applicable to the GTX 345 Only.

[4] There are separate configuration settings for GPS 1 and GPS 2.

Internal Alt Encoder

NOTE

A minimum of three test points is required for calibration.

Figure 6-14 Internal Alt Encoder

Set the GTX 3X5 Altitude Alert settings to the following table.

Table 6-15 Panel Mount Alt Encoder Settings

ITEM	CONFIGURATION	NOTES
INSTALLED	YES	Select YES if a Garmin Altitude Encoder is installed, otherwise select NO.
	NO	
CEILING	Range is: 8000 ft to 30,000 ft	Select aircraft Maximum Operating Altitude. *GAE is only rated to 30,000ft.*
TEST POINTS	Range is: 3 to 20 [1]	A minimum of 3 test points are required. These values are used to calibrate the GAE. Calibration is required prior to flight. [2]

[1] The maximum number of test points is limited by the aircraft ceiling setting.

[2] If there is an inaccuracy during the altitude checks, recalibration with additional test points is required.

Internal Alt Encoder Adjustment

Figure 6-15 Internal Alt Encoder Adjustment

Set the Garmin Altitude Encoder module altitude to match the primary altitude display.

1. Connect a Pitot/static test set to the aircraft. Use the Pitot/static test set and if applicable the aircraft altimeter for altitude verification.
2. With the initial test point selected, run the Pitot/static system to the selected TEST ALT value.
3. Once the Pitot/static test set stabilizes at the TEST ALT value, push the **ENT** key on the panel to select the CORRECTION value.
4. Change the CORRECTION value using the **8** or **9** key until the MEASURED value indicates the TEST ALT value.
5. Once the CORRECTION value is set, Push the **ENT** key to go back to the TEST ALT selection.
6. Select the next TEST ALT test point and change the Pitot/static test set to match the TEST ALT value. Run to that altitude.
7. Continue to calibrate the Garmin Altitude Encoder using steps 2 through 6 until all test points identified.
8. Once all test points are successfully completed push the **CRSR** key to exit.

If using the GTX 3X5 Install Tool

1. With a Pitot/static test set connected, select the Garmin Altitude Encoder tab under the Sensor tab in the Configuration section.
2. On the Installed option, select the GAE-12.
3. Select the appropriate ceiling based on the aircraft’s maximum operating altitude.
4. Select a minimum of 3 Point Counts.
5. Select the **Set** key.
6. Adjust the Pitot/static test set to match the first altitude test point.
7. Once the Pitot/static altitude matches the Point Altitude, select the **Start** key under the automatic adjustment.
8. Once the correction value is stable and the measured altitude box turns green, select “Continue.”
9. Adjust the Pitot/static test set to match the next altitude test point.
10. Once the Pitot/static test set matches the test point, select “Continue.”
11. Once the correction value is stable and the measured value turns green, select “Continue.”
12. Continue to calibrate the Garmin Altitude Encoder using steps 9 through 11 until the calibration is complete.

Internal AHRS Orientation (GTX 345 Only)

Sets connectors and vent to the orientation of the unit. Sets the yaw angle of the unit compared to the centerline of aircraft. Refer to figure A-11.

Set the GTX 345 Internal AHRS with the following table.

Figure 6-16 Panel Mount Internal AHRS Settings

ITEM	CONFIGURATION	NOTES
CONNECTORS	UNKNOWN	Select which orientation the GTX 345 connectors are in reference to the direction of flight.
	R WING	
	L WING	
	UP	
	DOWN	
	FORWARD	
	AFT	
VENT	UNKNOWN	Select which orientation the GTX 345 vent is in reference to the direction of flight.
	R WING	
	L WING	
	UP	
	DOWN	
	FORWARD	
	AFT	
YAW	-30° to 30°	Select the YAW orientation of the GTX 345 unit in reference to the aircraft center line. [1]
OFFSETS	CALIBRATE	Once all orientation items are entered, push the **ENT** key to calibrate unit or select Calibrate in the Install Tool.

[1] Use a digital protractor or equivalent. Calibrate the protractor on a flat surface on the aircraft centerline in the YAW orientation and obtain a ZERO value. Place the protractor on a flat surface on the GTX 345 unit in the YAW orientation and obtain the angle difference from the aircraft centerline.

6.3.6 Airframe

NOTE

*When a portable ADS-B In receiver system (e.g., GDL 39) is in use, both 1090ES and UAT In settings can be set to **YES**.*

Set the GTX 3X5 ADSB settings per the following table.

Table 6-16 Panel Mount ADS-B Settings

ITEM	CONFIGURATION	NOTES
ACRFT CATGY	UNKNOWN	Select the appropriate aircraft category in accordance with the aircraft type data. *(Unknown should not be selected in accordance with the STC.)*
	LIGHT	
	SMALL	
	HIGH PERFORMANCE	
	ROTORCRAFT	
	GLIDER	
	LIGHTER-THAN-AIR	
	ULTRALIGHT	
	UAV	
ACFT MAX A/S	UNKNOWN	Select the appropriate aircraft maximum airspeed in accordance with the aircraft type data. *(Unknown should not be selected in accordance with the STC.)*
	<=75 kt	
	<=150 kt	
	<=300 kt	
	<=600 kt	
	<=1200 kt	
	>1200 kt	
AIRCRAFT LENGTH	UNKNOWN	Select the appropriate aircraft length in accordance with the aircraft type data. *(Unknown should not be selected in accordance with the STC.)*
	<=15 meters	
	<=25 meters	
	<=35 meters	
	<=45 meters	
	<=55 meters	
	<=65 meters	
	<=75 meters	
	<=85 meters	
	>85 meters	
AIRCRAFT WIDTH	UNKNOWN	Select the appropriate aircraft length in accordance with the aircraft type data. *(Unknown should not be selected in accordance with the STC.)*
	<=23.0 meters	
	<=28.5 meters	
	<=33.0 meters	
	<=34.0 meters	
	<=38.0 meters	
	<=39.5 meters	
	<=45.0 meters	
	<=52.0 meters	
	<=59.0 meters	
	<=67.0 meters	
	<=72.5 meters	
	<=80.0 meters	
	>80.0 meters	

ITEM	CONFIGURATION	NOTES
1090ES OUT CONTROL	DISABLED	Sets 1090ES ADS-B transmission function. Select ENABLED or PILOT SET. [1]
	ENABLED	
	PILOT SET	
UAT OUT RMT CONTROL	N/A	This function is not supported on the STC.
1090ES IN CAPABLE	NO	Determines if the aircraft can receive 1090ES ADS_B messages. Select YES for GTX 345 units. Select YES when a portable ADS-B In receiver system (e.g., GDL 39) is in use.
	YES	
UAT IN CAPABLE	NO	Determines if the aircraft can receive UAT ADS-B messages. Select YES for GTX 345 units. Select YES when a portable ADS-B In receiver system (e.g., GDL 39) is in use.
	YES	
ADS-B IN PROCESSING	DISABLED	GTX 345 units only. Select ENABLED.
	ENABLED	

[1] For Legacy G950/1000 installations with GDU software older than v9.10, this must be set to “Enabled.” For all other Legacy G950/1000 installations with GDU software after v9.10, “Enabled” or “Pilot Set” are acceptable.

6.3.7 Aircraft

Set the GTX 3X5 AIRCRAFT settings per the following table.

Table 6-17 Panel Mount Aircraft Settings

ITEM	CONFIGURATION	NOTES
AIRCRAFT TAIL NUMBER	Enter Aircraft Tail Number	On Panel mount units use display keys 0-9 to enter the alphanumeric aircraft tail number.
ADDRESS [1]	HEX	Sets the ICAO address in octal or hex format. Verify value with aircraft registration records.
	OCTAL	
ALLOW PILOT TO EDIT FLT ID	NO	Setting can vary for user preference. Select YES to allow pilot to change FLT ID.
	YES	
DEFAULT FLT ID	TAIL	Sets the default flight ID used in normal mode. Select TAIL unless an operational need to change the value is required.
	ENTRY	
FLIGHT ID PREFIX	NONE	Sets the flight ID prefix with the carrier abbreviation (e.g., Garmin AT is GAT). Select NONE unless an operational need to change the value is required.
	ENTRY	

[1] If the tail number is recognized as a US registered tail number, the ICAO address is automatically filled by the GTX. It only needs to be verified against the aircraft registration records.

6.3.8 Diagnostics

Figure 6-17 Diagnostics Page

The Diagnostics page shows information for troubleshooting purposes.

- Discrete input state
- Lighting bus voltages
- Photocell voltages
- Outside air temperature
- Display temperature
- RS-232 channels
- ARINC 429 channels
- Gillham input state
- GPS Source 1 and GPS Source 2 status
- HSDB status (GTX 345)

6.4 GTX 3X5 Remote Unit Configuration

NOTE

Screen shots in this section are example configurations only.

The GTX 3X5 Installation Tool requires Windows XP, Vista, or Windows 7. There is no support for Apple products at this time. Use a PC and the GTX 3X5 Install Tool to configure units without a display. Panel mount units can also be configured through the Install Tool. Selections for remote mount units are identical to those for panel mount units. Refer to section 6.3. The GTX 3X5 Install Tool (P/N 006-A0271-01) is available at Garmin's Dealer Resource Center. A USB-A plug to USB-B plug cable (not provided) is necessary.

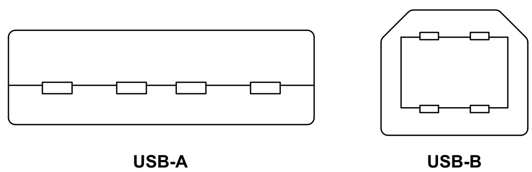


Figure 6-18 USB-A and USB-B Connectors

To use the GTX 3X5 Install Tool:

1. De-energize the unit.
2. Connect the USB-A to USB-B cable between the computer and the USB-B receptacle installed in the aircraft wire harness.
3. Energize the unit.
4. Launch the GTX 3X5 Install Tool.
5. Select the Configuration tab.

6.4.1 Audio Configuration Page

Select the settings for the configuration parameters included under Audio Options: Output, Volume, and Voice. Test Audio is only used to assist with volume adjustments. Select the desired settings for the configuration parameters included under Audio Alerts: Timer Expired, Traffic, Altitude Monitor, and Altitude Deviation (if the altitude monitor is enabled). The Altitude Monitor, Altitude Deviation and Timer Expired configuration parameters are applicable to panel mount units only. The Altitude Deviation configuration parameter is on the Unit Settings page on the GTX unit itself (panel mount units). Refer to section 6.3.1 for additional guidance on these configuration items approved under this STC.

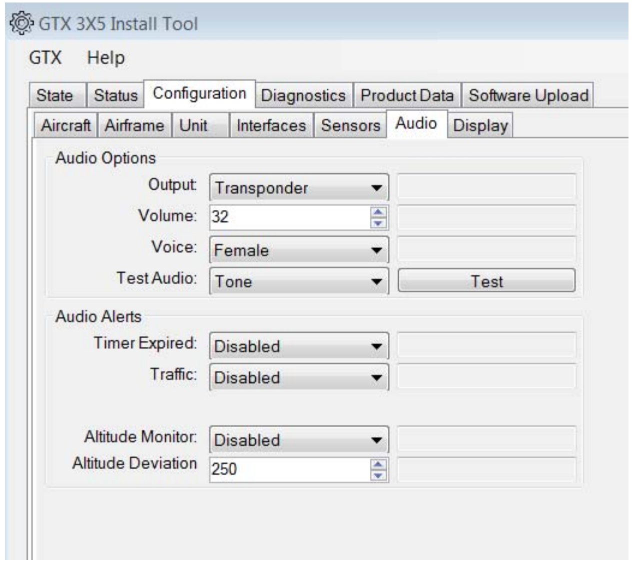


Figure 6-19 Audio Configuration Page

6.4.2 Interface Configuration Pages

Select the settings for the RS-232, RS-422 (GTX 345 only), ARINC 429, HSDB (GTX 345 only), and Discrete interface configuration parameters. Refer to section 6.3.2 for additional guidance on these configuration items approved under this STC.

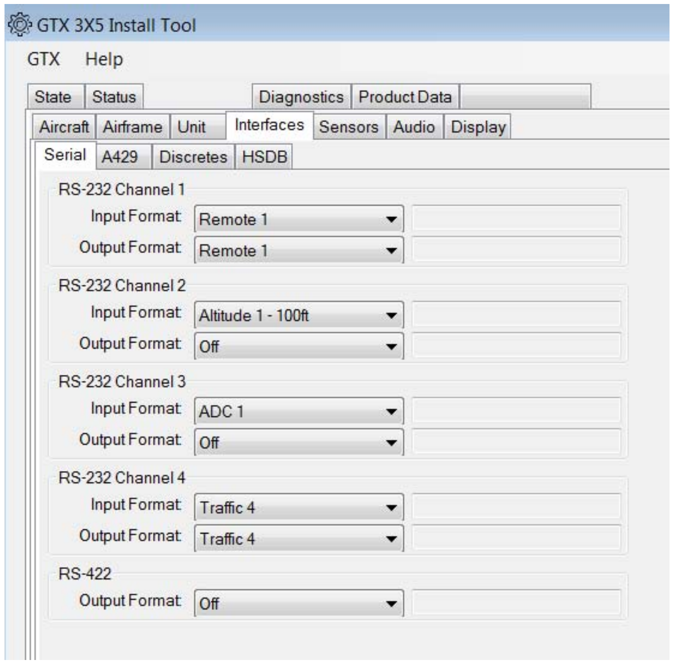


Figure 6-20 Interface Configuration Page (Serial)

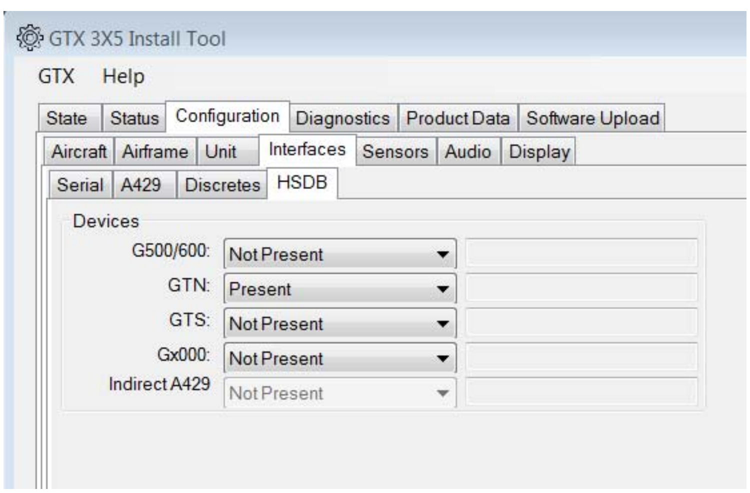


Figure 6-21 Interface Configuration Page (A429)

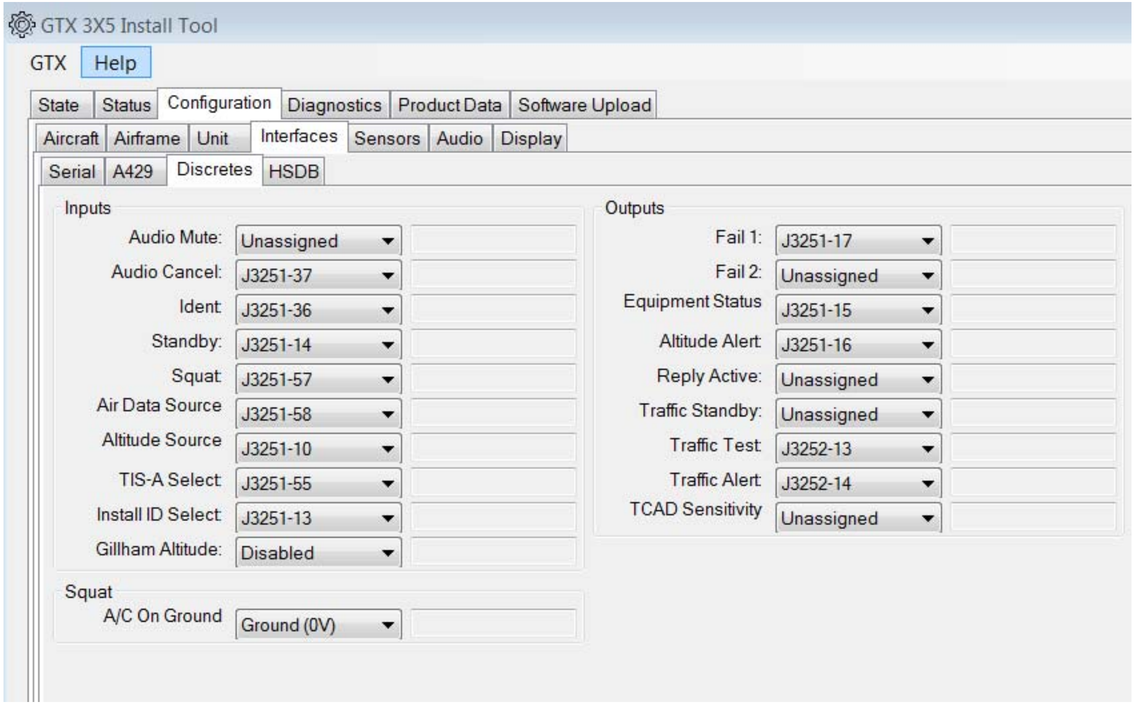


Figure 6-22 Interface Configuration Page (Discretes)

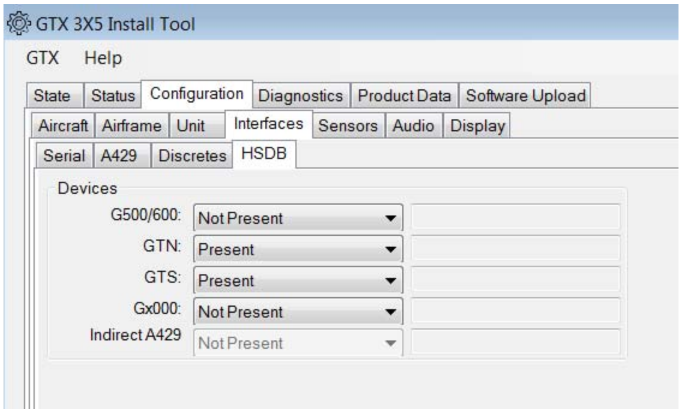


Figure 6-23 Interface Configuration Page (HSDB)

6.4.3 Unit Configuration Page

Select the settings for the following configuration parameters in the Identification section: VFR Squawk Code and Installation ID. Select the settings for the following configuration parameters in the Unit Options section: FIS-B and Bluetooth are only valid for the GTX 345 units. Select the settings for the following configuration parameters in the Display Options section (applicable to panel mount units only): Altitude Units, Temperature Units, and Restore Pages on. Refer to section 6.3.3 for additional guidance on these configuration items approved under this STC.

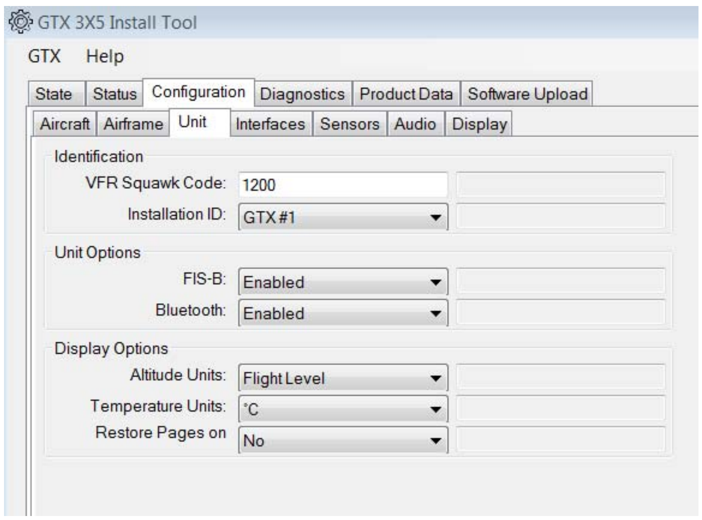


Figure 6-24 Unit Configuration Page

6.4.4 Display Configuration Page

This section applies to panel mount units only. Select the settings for the following configuration parameters in the Display Backlight section: Source and Minimum Brightness. Select the settings for the following configuration parameters in the Key Backlight section: Source and Minimum Brightness. Select the settings for the following configuration parameters in the Photocell Curve section: Slope, Offset, and Transition. Select the settings for the following configuration parameters in the Lighting Bus Curve section: Slope, Offset, and Bus Type. Select the settings for the following configuration parameters in the Defaults section: Brightness Offset and Contrast Offset. Refer to section 6.3.4 for additional guidance on these configuration items approved under this STC.

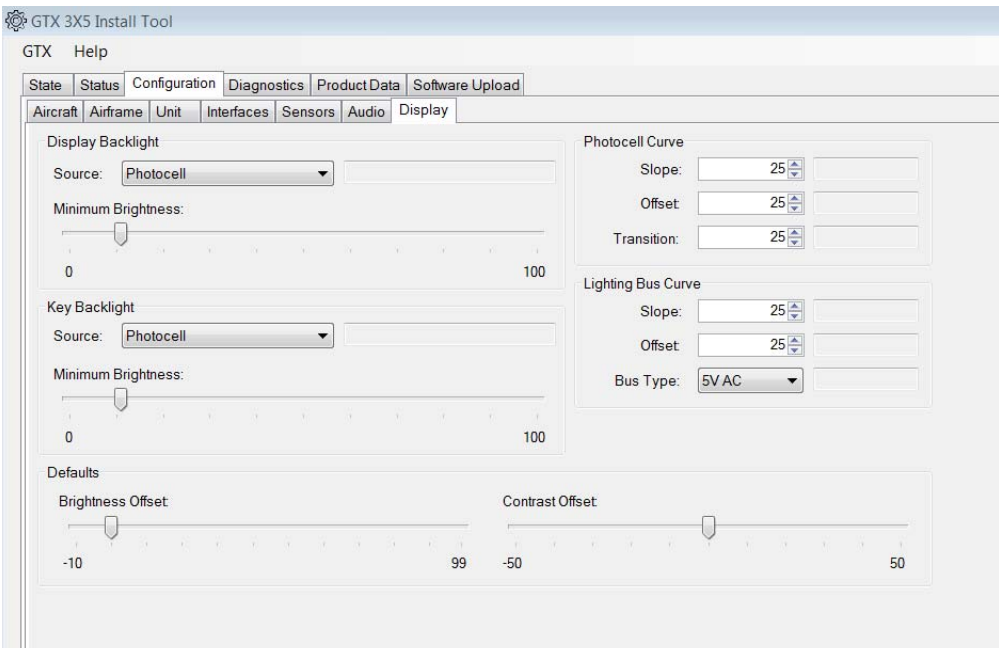


Figure 6-25 Display Configuration Page

6.4.5 Sensor Configuration

Garmin Altitude Encoder

Refer to section 6.3.5 for Garmin Altitude Encoder calibration.

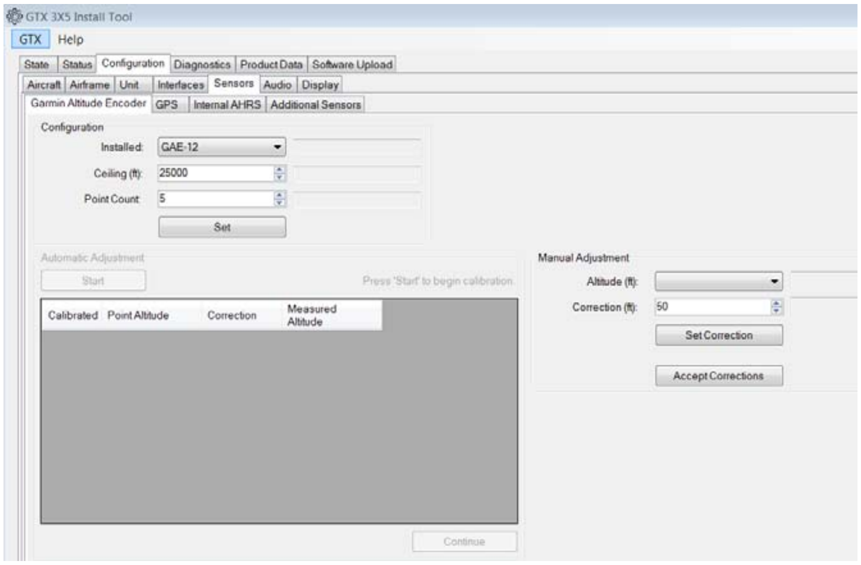


Figure 6-26 Sensor Configuration Page (Garmin Altitude Encoder)

GPS

Select the settings for the following configuration parameters for both GPS 1 and GPS 2 if applicable: Source, Source Integrity Level, Lateral Antenna Offset, Longitudinal Antenna Offset, and System Design Assurance. The System Design Assurance configuration parameter is not available when configuring a panel mount GTX 3X5 unit through the unit's display (automatically set to Level B (<=10^-7)). Refer to section 6.3.5 for additional guidance on these configuration items approved under this STC.

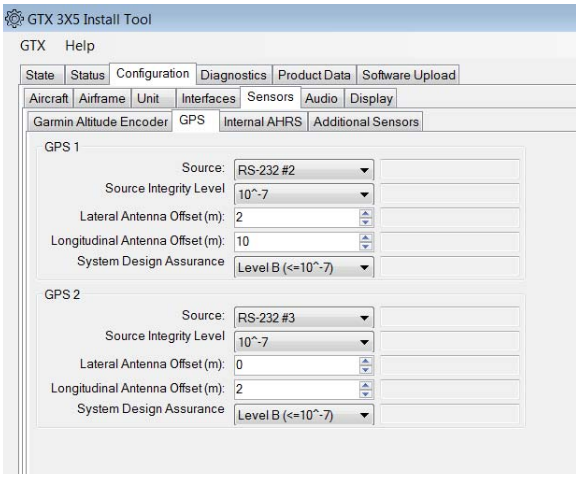


Figure 6-27 Sensor Configuration Page (GPS)

Internal AHRS (GTX 345 Only)

Select the settings for the following configuration parameters in the Orientation section: Connectors, Vent, and Yaw. Once the orientation is set the internal AHRS can be calibrated via the Offset section. Refer to section 6.3.5 for additional guidance on these configuration items approved under this STC and how to calibrate the internal AHRS.

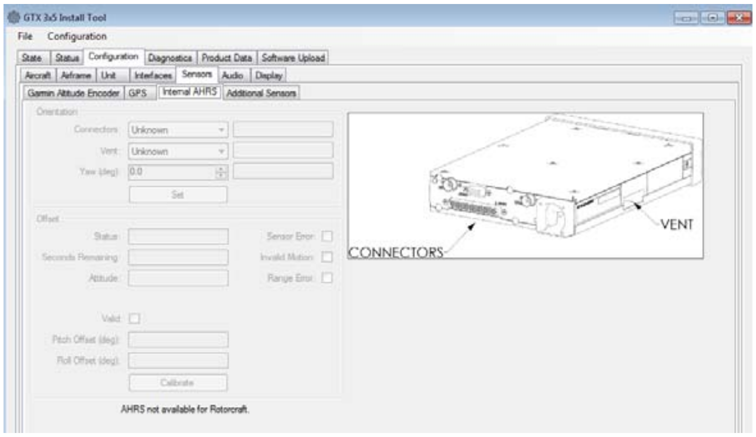


Figure 6-28 Sensor Configuration Page (Internal AHRS)

Additional Sensors

Select the settings for the following configuration parameters in the Altitude Sources section: Primary and Secondary. This STC does not approve the interface to an external OAT sensor. Additional approval is required. Refer to section 6.3.5 for additional guidance on these configuration items approved under this STC.

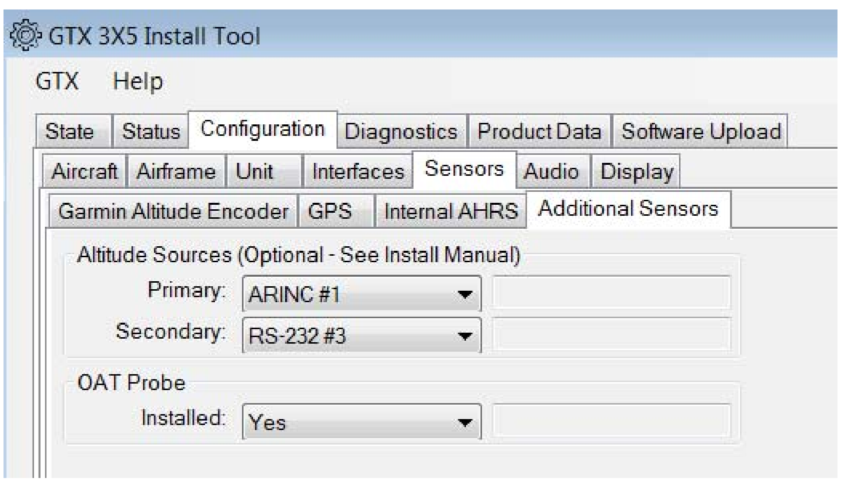


Figure 6-29 Sensor Configuration Page (Additional Sensors)

6.4.6 Airframe Configuration Page

Select the settings for the following configuration parameters in the Airframe Configuration section: Max Airspeed, Length, Width, and Category. Select the settings for the following configuration parameters in the Operational Options section: 1090 ES In Capable, UAT In Capable, 1090 ES Out Control, UAT Out Remote, and ADS-B In Processing. Refer to section 6.3.6 for additional guidance on these configuration items approved under this STC.

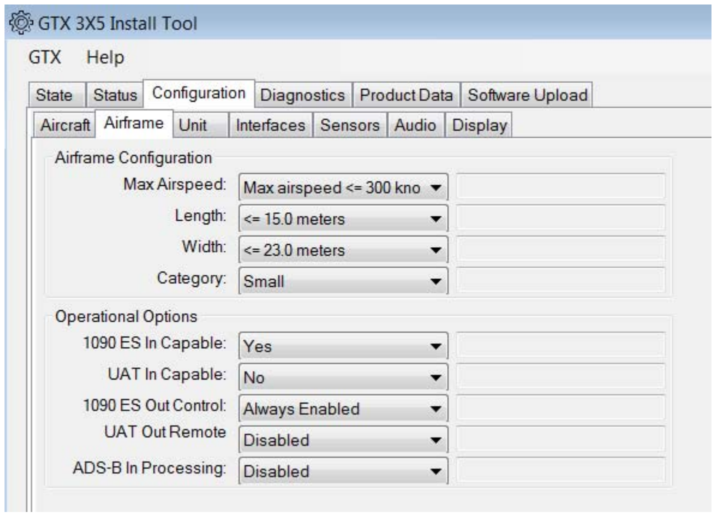


Figure 6-30 Airframe Configuration Page

6.4.7 Aircraft Configuration Page

Select the settings for the following configuration parameters in the Aircraft Configuration section: Aircraft Registration, ICAO Address Format, and ICAO Address. Select the settings for the following configuration parameters in the Flight ID section: Allow Pilot Entry, Default Selection, Default (if applicable), Prefix Selection, and Prefix (if applicable). Refer to section 6.3.7 for additional guidance on these configuration items approved under this STC.

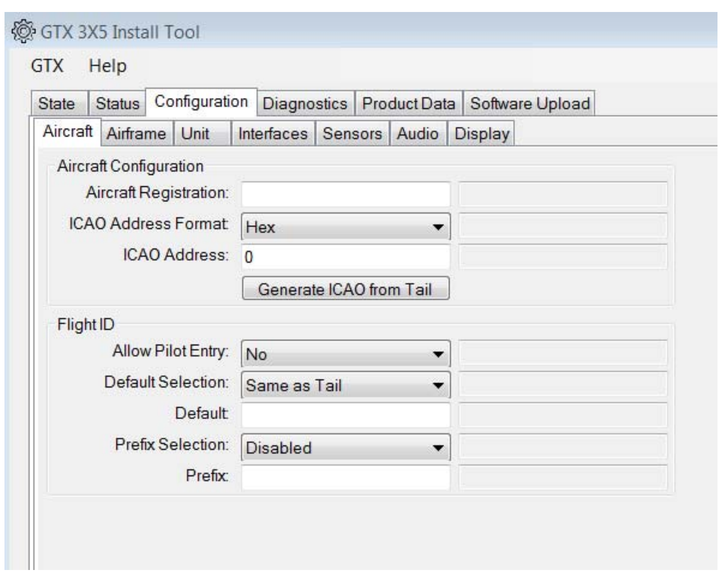


Figure 6-31 Aircraft Configuration Page

6.5 GTN 6XX/7XX Configuration with GTX

This section gives details for configuring the GTN 6XX/7XX to provide Transponder Remote Control and/or ADS-B In Display functions when interfaced to a GTX Transponder.

To configure the GTN 6XX/7XX:

1. Push and hold the **HOME** key of the GTN 6XX/7XX unit.
2. Energize the GTN 6XX/7XX unit.
3. Release the **HOME** key when the display shows.
4. Select the GTN Setup page.
5. Configure the GTN as described in the following sections to provide Transponder Remote Control and/or ADS-B In Display.

6.5.1 Transponder Remote Control

Transponder Remote Control is supplied by an RS-232 interface. For dual GTN installations, a GTN can control a GTX transponder interfaced to the other GTN through HSDB crossfill.

For the GTN that is interfaced directly to the GTX transponder:

1. Select the RS-232 page.
2. Configure the RS-232 Port that is interfaced to the GTX transponder as specified in the table below.

Table 6-18 RS-232 Input/Output Configuration

Selection	Description	Notes
GTX Mode S+	Provides remote transponder control of an interfaced GTX transponder.	This configuration also provides GPS position source and heading to the GTX transponder.
GTX w/TIS+	Provides remote transponder control of an interfaced GTX transponder and receives TIS-A Traffic data.	This configuration also provides GPS position source and heading to the GTX transponder.

In dual GTN installations, for the GTN that is not interfaced directly to the GTX transponder:

1. Select the Interfaced Equipment Page.
2. Configure the GTX transponder as Present.
3. Choose the GTX Mode S+ selection for Transponder Type.

6.5.2 ADS-B In Display (GTX 345 Only)

The GTN 6XX/7XX can be configured to display ADS-B In Traffic and Weather data that is provided by the GTX 345. This data is provided by an HSDB interface. Ensure the GTN Source ID on the GTN Main System Configuration page matches the GTN selection on the HSDB page of the GTX (e.g., GTN #1 to GTN 1).

1. Select the Interfaced Equipment Page.
2. Configure the ADS-B In Source to Present.
3. Choose the GTX #1/2 selection for ADS-B In Source Type.
4. Choose the TAS/TCAS selection for External Traffic Source if the GTX 345 is interfaced to an active traffic system.

6.6 GNS 400W/500W Series Configuration

NOTE

Refer to the aircraft specific wiring diagrams for the correct port connections used.

For all GTX installations, other than the GTX 345/345R, refer to table C-2 for GNS configuration.

For GTX 345/345R installations, this section gives instructions to configure GNS 400W/500W Series navigators to show ADS-B In Traffic and Weather data. The RS-232 and ARINC 429 configurations are necessary for this interface.

1. Push and hold the **ENT** key of the GNS 400W/500W Series unit.
2. Energize the GNS 400W/500W unit.
3. Release the **ENT** key when the display activates.

While in configuration mode, rotate small right knob to select pages.

Change data on the configuration page:

1. Push the small right knob to select the cursor.
2. Rotate the large right knob to move between data fields.
3. Rotate the small right knob to change a highlighted field.
4. Push the **ENT** key to accept the entry.

Configure the selectable RS-232 and ARINC 429 inputs and/or outputs as specified in the tables below.

Figure 6-32 Main RS-232 Config Page

Table 6-19 RS-232 Input/Output Configuration

Selection	Description	Configuration/Notes
ADSB TFC	ADS-B in Traffic Only.	This configuration will supply GPS position source to the GTX transponder.
ADSB TFC WX	ADS-B In Traffic and FIS-B Weather.	This configuration will supply GPS position source to the GTX transponder.

Table 6-20 ARINC 429 Output Configuration

Selection	Description	Configuration/Notes
ADSB TFC	ADS-B Traffic without TAS/TCAS.	
ADSB TFC w/TCAS	ADS-B Traffic correlated with TAS/TCAS Traffic.	

6.7 GNS 480 Configuration with GTX

This section provides details for configuring the GNS 480 to provide Remote Transponder Control functions and TIS-A traffic display if applicable (for the GTX 335) when interfaced to a GTX Transponder.

To configure the GNS 480:

1. Energize the GNS 480 unit.
2. Push, in sequence, line select key **1**, line select key **4**, and the **MENU/ENTER** key to enter Ground Maintenance mode.
3. From the SETUP page, select SERIAL PORTS.
4. Configure the RS-232 Port that is interfaced to the GTX transponder as specified in the table below.

Table 6-21 RS-232 Input/Output Configuration

Selection	Description	Notes
GTX +	Provides remote transponder control of an interfaced GTX transponder.	This configuration also provides GPS position source to the GTX transponder.
GTX w/TIS+	Provides remote transponder control of an interfaced GTX transponder and receives TIS-A Traffic data.	This configuration also provides GPS position source to the GTX transponder.

6.8 GTX 3X5 Configuration with Legacy G950/1000

This section provides details for configuring the GTX 3X5 with the Legacy G950/1000 integrated flight deck system. Make sure the GTX 3X5 unit is configured prior to configuring the G950/1000 system.

NOTE

In order for the Transponder to relay the additional accuracy and integrity required by AC-20-165A Version 2 compliant equipment, the G950/1000 system must utilize GIA 63W units with a minimum software version 7.00 or later. All other earlier versions of GIA 63(W) are not ADS-B Out compatible and require GTX 335R/345R with Internal GPS units.

NOTE

By interfacing the GTX 345R with an active traffic system, (i.e., GTS, KMH, SKYWATCH, TAS 6XX) the GTX automatically controls the traffic system and removes the pilot control of Standby, Operate, and Test. The GTX 3X5 Install Tool provides these keys for the purpose of testing. This interface removes the TSO-C147 / TSO-C118 compliance for an installed TAS/TCAS system. This solution provides an inclusive ADS-B traffic picture with correlation from an Active Traffic system. The GTX 335 is only approved to interface with the GTS traffic system.

NOTE

G950/1000 GDU SW versions 9.10 and later provide a traffic aural alert mute to the GTX 345 for aural muting below 500ft AGL. G950/1000 GDU SW versions below v9.10 with retractable gear require the GTX aural cancel discrete to be interfaced to the Landing Gear Switch when interfaced to an Active traffic system to provide traffic aural muting in an airport environment. G950/1000 GDU SW versions below v9.10 and are fixed gear aircraft without an approved Radar Altitude source interfaced to the GTX 3X5 cannot interface to an installed active traffic system for correlated traffic on the certified display.

NOTE

The steps contained in this section must be completed for each installed transponder.

This STC only supports Dual GTX 3X5 transponder installations for these aircraft:

- Cessna 208
- PA-46
- TBM 700 / 850 / 900

The dual configuration is limited to GTX 335R as the number 1 transponder and GTX 345R as the number 2 transponder.

Before aircraft modification, annotate the following system configurations. Enter configuration mode by holding down the **ENT** key while applying powering to the Displays.

Make sure the G950/1000 SW supports the installation of the GTX 3X5R using *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List* Rev. 9 (or later).

5. Unused RS-232 Channels for GIA1 and GIA2.
6. Unused ARINC 429 OUT Channels for GIA 1 and GIA2.
7. Unused RS-485 IN and OUT Channels for GIA1 and GIA2.

8. Verify GIA 2 Discrete OUT Annunciate 20* is available.

6.8.1 GTX 335R Configuration

This section is for the configuration of a single GTX 335R unit. Configuration items depicted in images will vary depending on aircraft and interfaced LRU's (shown as an example only).

1. The GTX 335R must be configured prior to configuring the G950/1000 system.
2. Download the appropriate GTX 3X5 G1000 Interface Card on a 2 GB SD card IAW *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List* Rev. 9 (or later).
3. Insert the Interface Card in the top slot of the PFD.
4. Enter the Configuration mode on all displays by holding the **ENT** key while powering the displays.
5. In the SYSTEM page group, select the SYSTEM UPLOAD subpage.
6. Under AIRFRAME, select the appropriate aircraft model and GDU software version from the dropdown list. Refer to figure 6-33 for an example, models vary depending on Interface Card used.

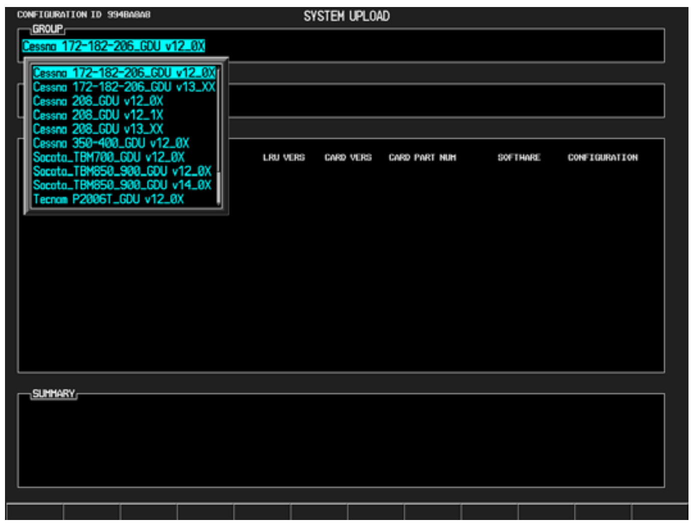


Figure 6-33 GTX 335R System Upload

7. Select the appropriate GTX 335R unit: Refer to figure 6-34 for an example.
   a. For TIS, select "GTX 335 with TIS."

b. Without TIS i.e., an active traffic system is installed, select “GTX 335 without TIS.”

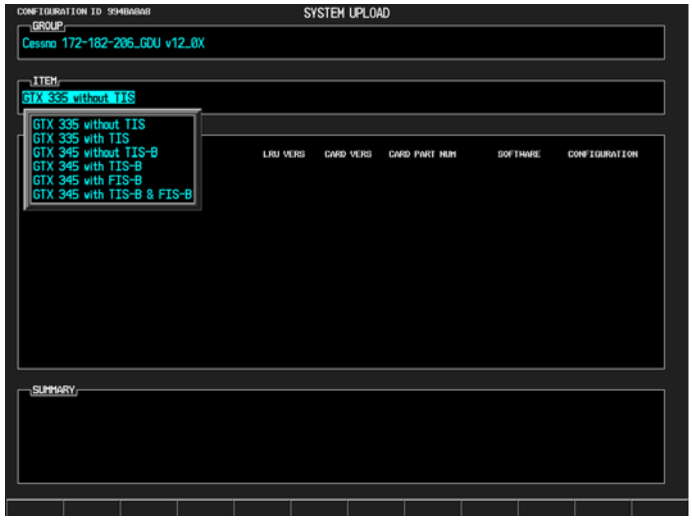


Figure 6-34 GTX 335R System Upload Item

8. Push the **LOAD** soft key.
9. Once the items are loaded, push the **UPDT CFG** soft key.
10. From the GIA1 subpage in the GIA group, select the **ACTV>SET** soft key. Refer to figure 6-35 for an example. The “ES” only appears for GDU versions 9.10 and later.

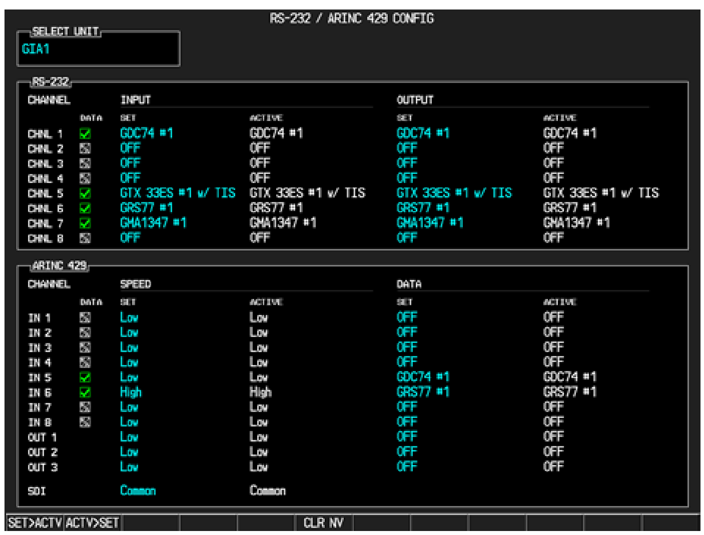


Figure 6-35 GTX 335R GIA 1 RS-232 / ARINC 429 Configuration

11. From the GIA2 subpage in the GIA page group, select the **ACTV>SET** soft key. Refer to figure 6-36 for an example. The “ES” only appears for GDU versions 9.10 and later.

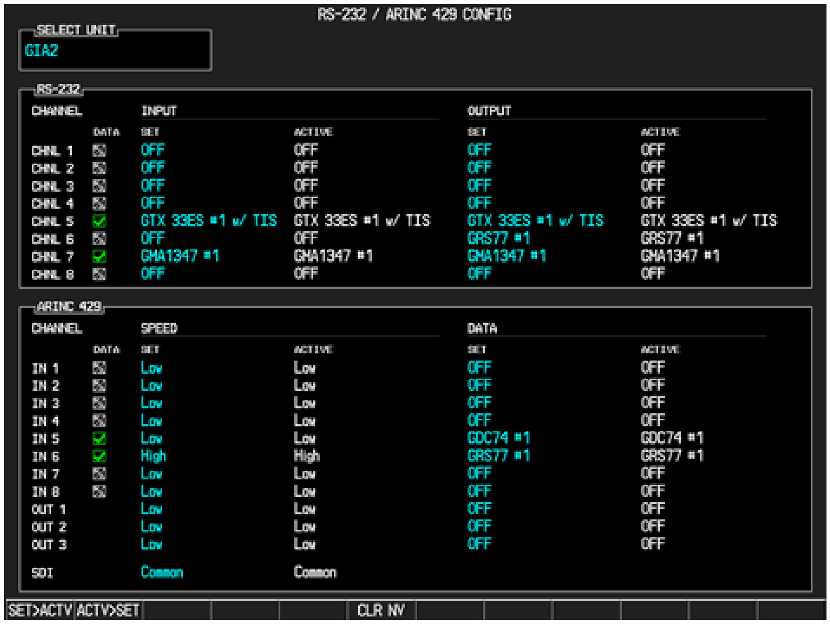


Figure 6-36 GTX 335R GIA 2 RS-232 / ARINC 429 Configuration

12. From the XPDR page group, select the **ACTV>SET** soft key. Refer to figure 6-37 for an example.

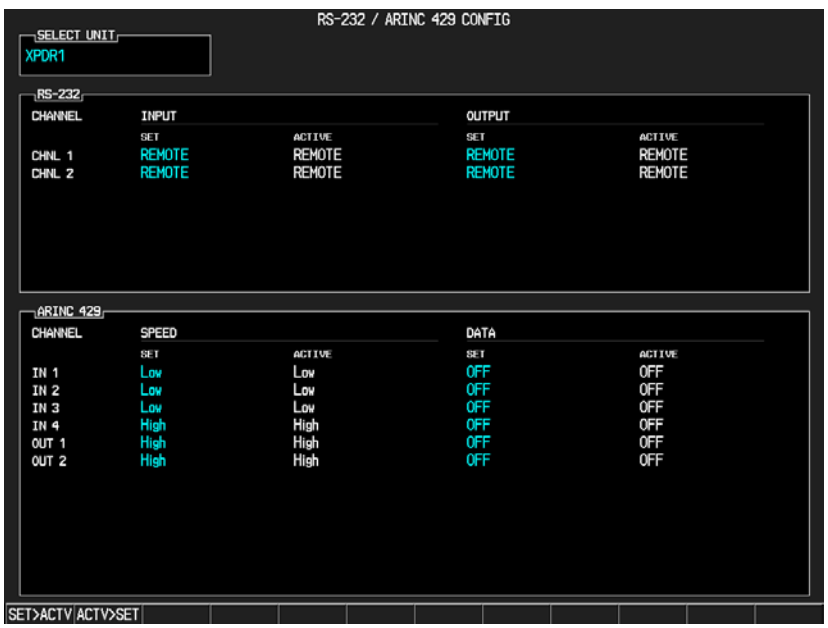


Figure 6-37 GTX 335R XPDR RS-232 / ARINC 429 Configuration

13. From the TRANSPONDER CONFIGURATION subpage group, select the **ACTV>SET** soft key. Refer to figure 6-38 for an example.

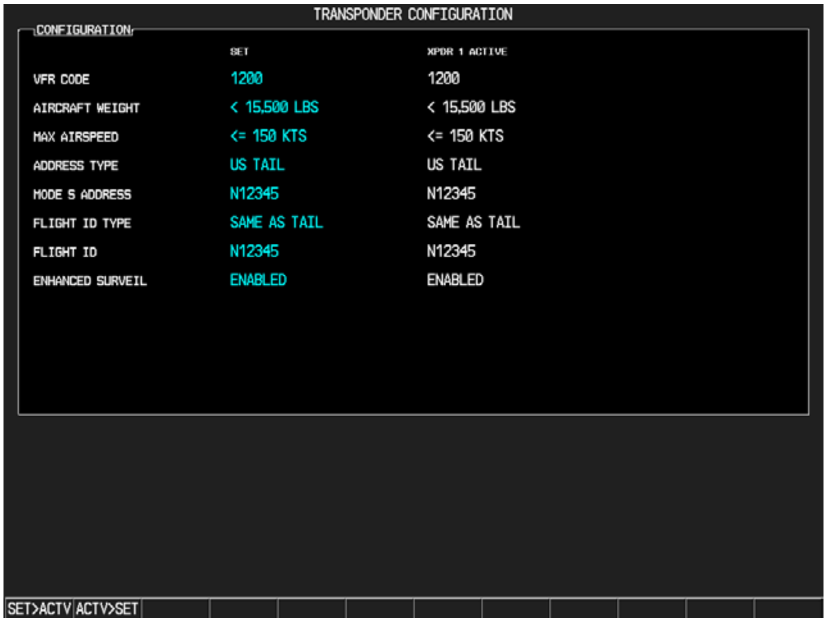


Figure 6-38 GTX 335R XPDR Configuration

14. From the SYSTEM STATUS page in the SYSTEM page group, make sure the system accepted the transponder. Refer to figure 6-39 for an example.
15. If the GTX STATUS is OK, put the system into normal mode by cycling power. Do the remainder of the required transponder checks.

Figure 6-39 GTX 335R System Status

6.8.2 Active Traffic System De-Configuration with G950/1000

This section provides details for de-configuring the TAS/TCAS system from the G950/1000 integrated flight deck system if interfacing to the GTX 345R for correlated traffic.

NOTE

If an active traffic system was previously installed and is interfaced to the GTX 345R for correlated traffic display on the G950/1000 system, the active traffic system must be de-configured from the G950/1000 system prior to configuration of the GTX 345R unit.

Table 6-22 Active Traffic Systems

Manufacturer	Active Traffic System	G1000 Interface	Section
Honeywell	KTA 870/970 (810/910) KMH 880/980 (820/920)	ARINC 429	section 6.8.2.1
L-3 Communication	SkyWatch 497 SkyWatch 899	ARINC 429	section 6.8.2.1
Avidyne (Ryan)	TAS 6XX (9900BX)	ARINC 429	section 6.8.2.1
Garmin	GTS 8XX	ARINC 429	section 6.8.2.1
Garmin	GTS 8XX	HSDB	section 6.8.2.2

6.8.2.1 ARINC 429 Traffic System De-configuration

This section is for de-configuring the KTA/KMH, SKYWATCH, TAS 6XX, and GTS 8XX if interfaced to the G950/1000 system using ARINC 429. Items depicted in images may vary in port configuration depending on aircraft. Use the images as an aid only.

1. On the RS-232 / ARINC 429 CONFIG page for GIA2, Configure ARINC 429 TRAFFIC ADVISORY setting to OFF. Refer to figure 6-40 and figure 6-41 for configuration and de-configuration information.
   a. Select the ARINC 429 CHANNEL IN port with TRAFFIC ADVISORY. Change the setting to OFF.
2. On the GIA I/O CONFIGURATION page for GIA2, configure the TAS TEST MODE and TAS STANDBY MODE discretes to OFF. Refer to figure 6-42 and figure 6-43 for configuration and de-configuration information.
   a. Select the DISCRETE OUT CHANNEL with TAS TEST MO DE. Change the setting to OFF.
   b. Select the DISCRETE OUT CHANNEL with TAS STANDBY MODE. Change the setting to OFF.

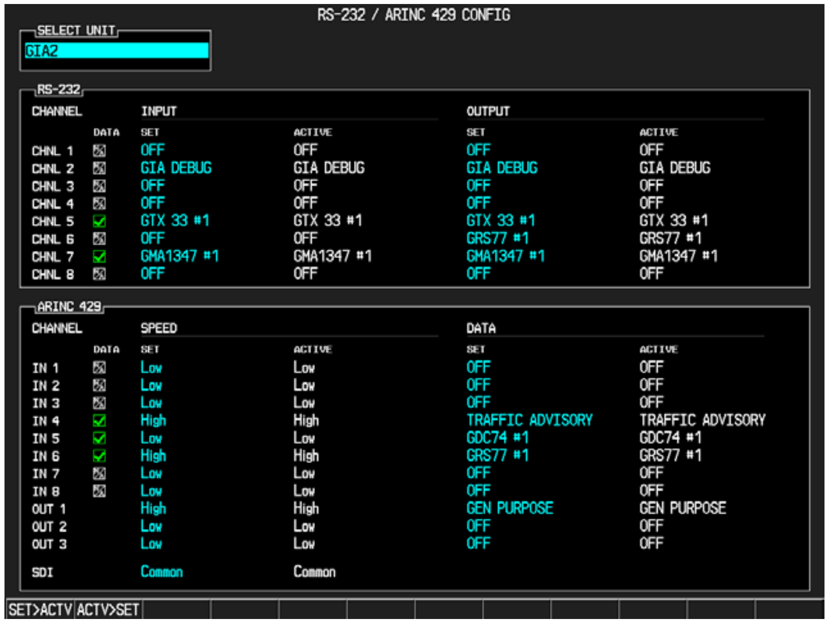


Figure 6-40 RS-232/ARINC 429 CONFIG TAS/TCAS Traffic System Active

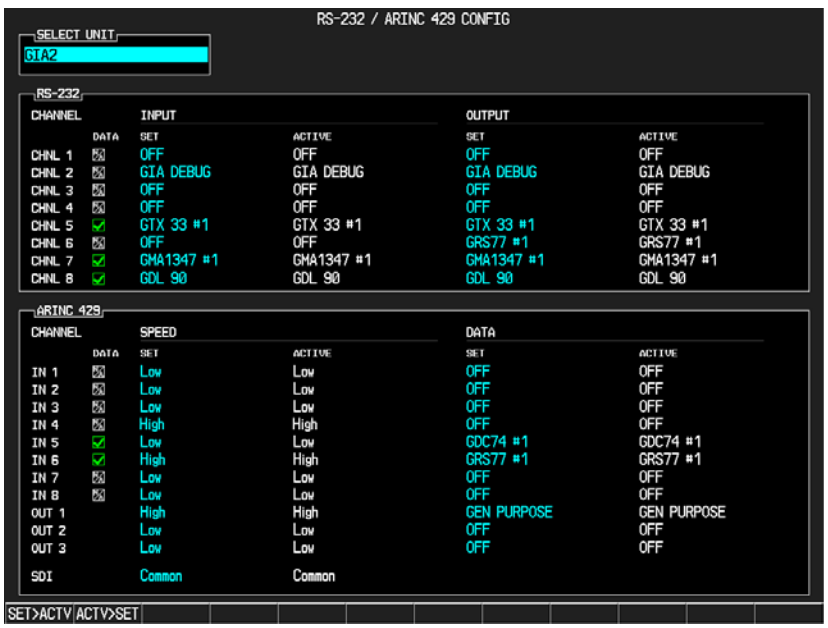


Figure 6-41 RS-232/ARINC 429 CONFIG TAS/TCAS Traffic System Off

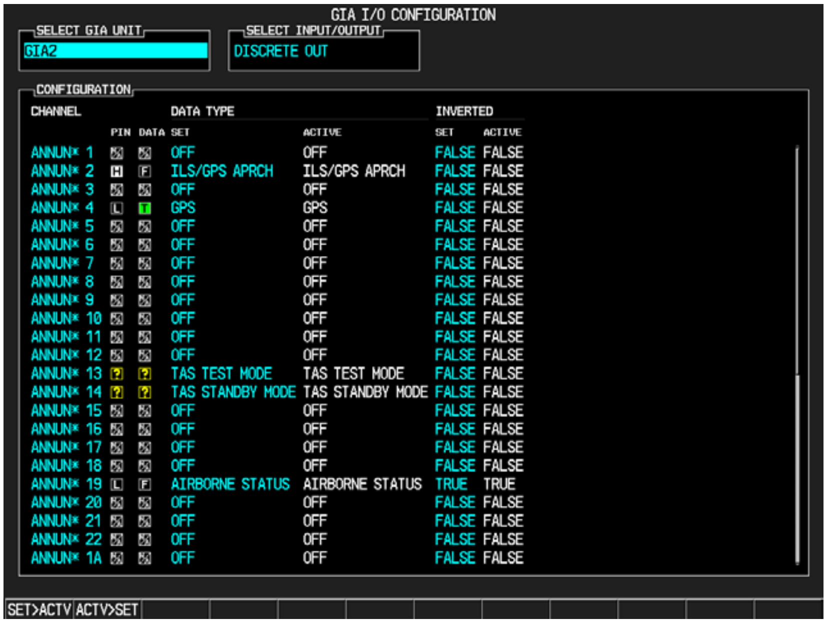


Figure 6-42 GIA2 I/O Configuration TAS/TCAS Mode Discrete Active

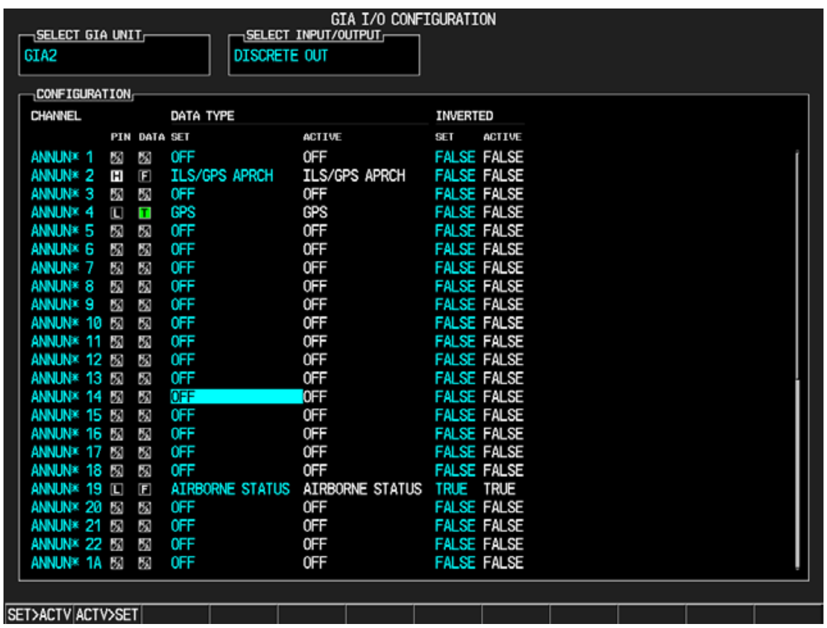


Figure 6-43 GIA2 I/O Configuration TAS/TCAS Mode Discrete Off

6.8.2.2 GTS HSDB Traffic System De-Configuration

This section describes the de-configuration of the GTS 8XX if interfaced to the G950/1000 system using HSDB. Items depicted in images may vary in port configuration depending on aircraft. Use the images as an aid only.

NOTE

The HSDB wires must be disconnected between the GTS 8XX and the G1000 prior to the de-configuration of the Active Traffic System.

1. On the SYSTEM CONFIGURATION page, uncheck the GTS. Refer to figure 6-44 for additional information.
2. On the SYSTEM DATA PATHS page for HSDB, uncheck the GTS. Refer to figure 6-55 for additional information.
3. Verify on the AIRCRAFT CONFIGURATION page that GTS no longer appears under LRU CONFIGURATION STATUS. Refer to figure 6-46 for additional information.

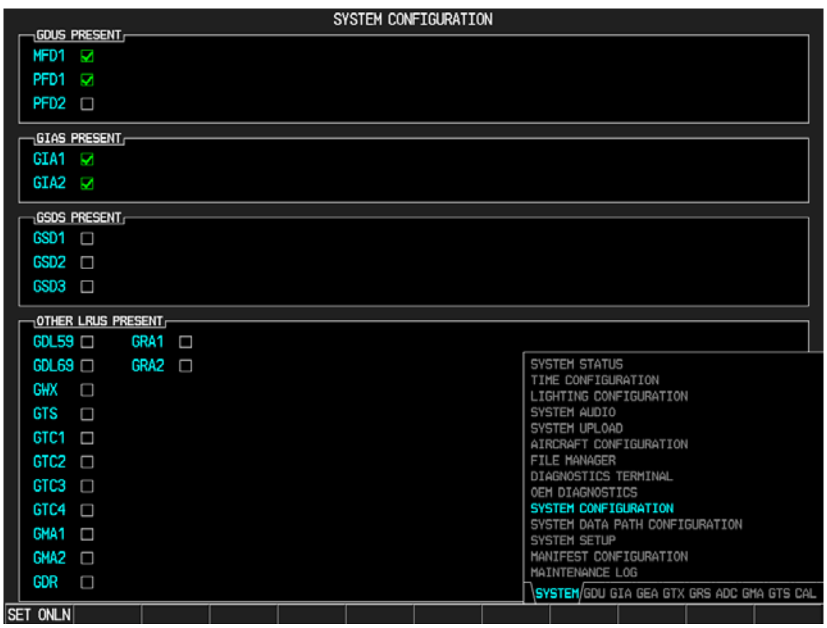


Figure 6-44 System Configuration Unchecked GTS

Figure 6-45 HSDB System Data Paths Unchecked GTS

Figure 6-46 Aircraft Configuration

6.8.3 GTX 345R Configuration

This section is for the configuration of a single GTX 345R unit. Configuration items depicted in the following images will vary with the aircraft and interfaced LRU's.

1. The GTX 345R must be configured prior to configuring the G950/1000 system.
2. Download the appropriate GTX 3X5 G1000 Interface Card on a 2 GB SD card IAW 005-00734-05 Rev. 9 (or later).
3. Insert the Interface Card in the top slot of the PFD.
4. Enter the Configuration mode on all displays by holding the **ENT** key while energizing the displays.
5. From the SYS page group, select the SYSTEM UPLOAD subpage.
6. Under AIRFRAME, select the appropriate aircraft model and GDU software version from the dropdown list.
7. Select the appropriate GTX 345R unit. Refer to figure 6-47 for an example.
    a. FIS-B Only: select "GTX 345 with FIS-B." Select if active traffic system is installed and the user/pilot does not want correlated traffic and wants to maintain pilot control of active traffic system.
    b. TIS-B Only: select "GTX 345 with TIS-B." Select if FIS-B ports are unavailable. This setting allows for an active traffic interface.
    c. FIS-B and TIS-B: select "GTX 345 with TIS-B & FIS-B." Select if ADS-B TIS-B traffic and FIS-B weather are desired. This setting allows for an active traffic interface.

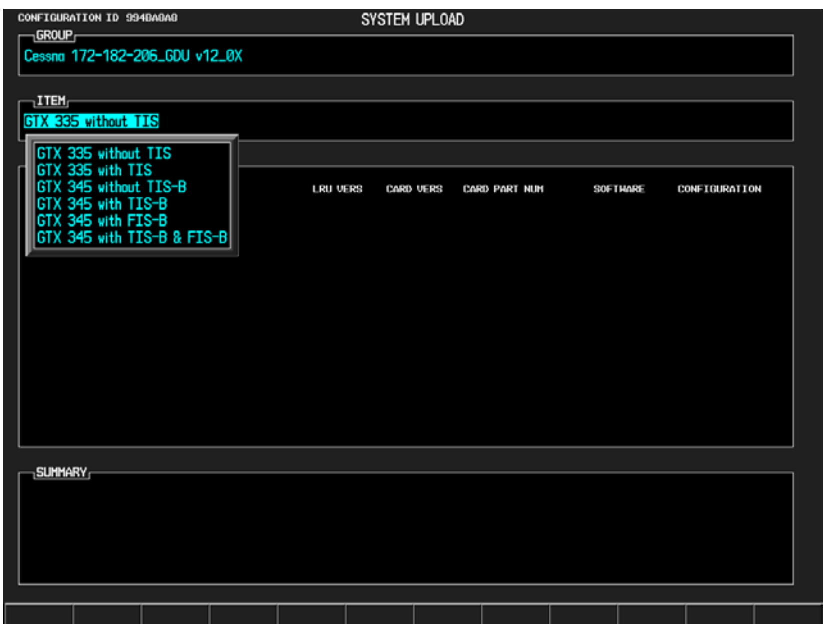


Figure 6-47 GTX 345R System Upload Item

8. Select the **LOAD** soft key.
9. Select the **UPDT CFG** soft key.
10. If TIS-B is connected, configure the appropriate RS-232 Port for "GDL 90" depending on which port is connected. Refer to figure 6-49 for an example.

11. If an active traffic system is interfaced to the GTX 345R, configure the appropriate ARINC 429 OUT Port for “GEN PURPOSE” depending on the connected port. Refer to figure 6-49 for an example.
12. From the GIA1 subpage in the GIA group, push the **ACTV>SET** soft key. Refer to figure 6-48 for an example. The “ES” only appears for GDU versions 9.10 and later.

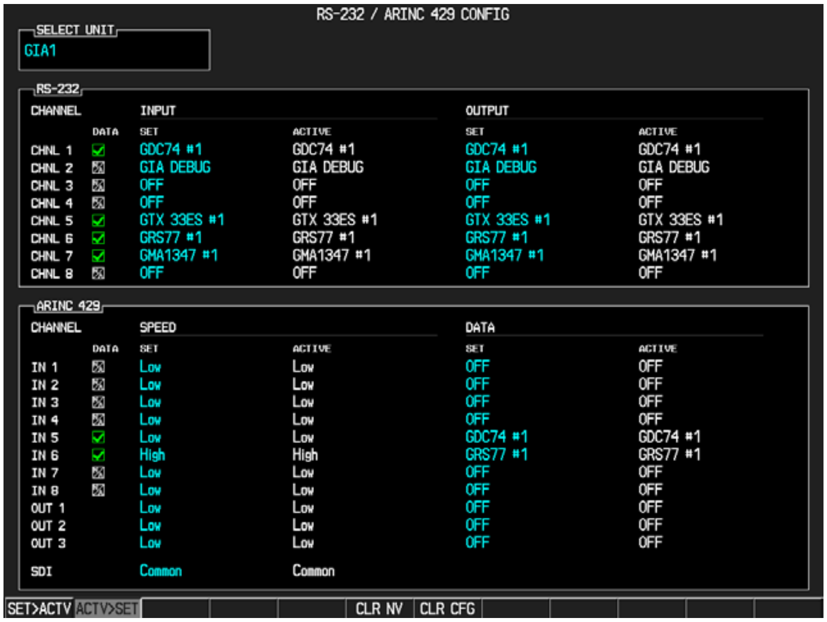


Figure 6-48 GTX 345R GIA 2 RS-232 / ARINC 429 Configuration

13. From the GIA2 subpage in the GIA page group, select the **ACTV>SET** soft key. Refer to figure 6-49 for an example. The “ES” only appears for GDU versions 9.10 and later.

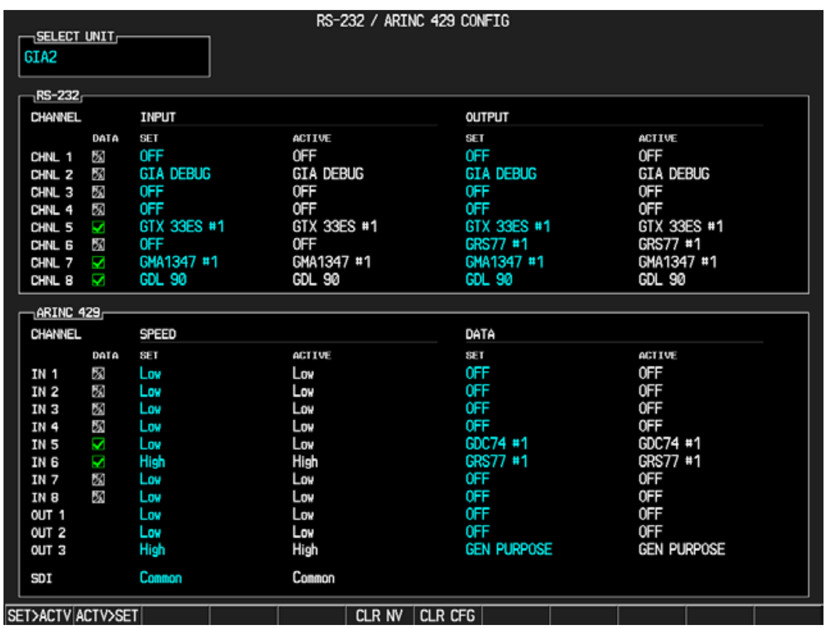


Figure 6-49 GTX 335R GIA 2 RS-232 / ARINC 429 Configuration

14. If FIS-B is connected, configure the appropriate RS-485 IN PORT for “GDL 90 ADS-B” depending on the connected port. Configure an available RS-485 OUTPUT Port for the “GDL 90 ADS-B.” Refer to figure 6-50 for an example.
15. Select the **ACTV>SET** soft key on the GIA(1 or 2) RS-485 page.

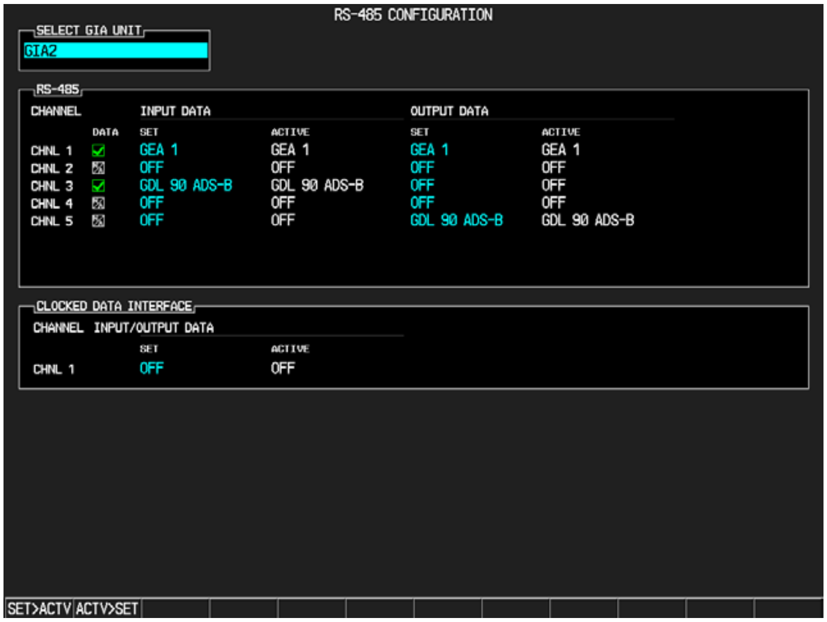


Figure 6-50 GTX 345R GIA 2 RS-485 Configuration

16. If TIS-B is connected, go to GIA2 Discrete OUT. Select the **ACTV>SET** soft key. Refer to figure 6-51 for an example. This is only valid for GDU software versions 9.10 and later.

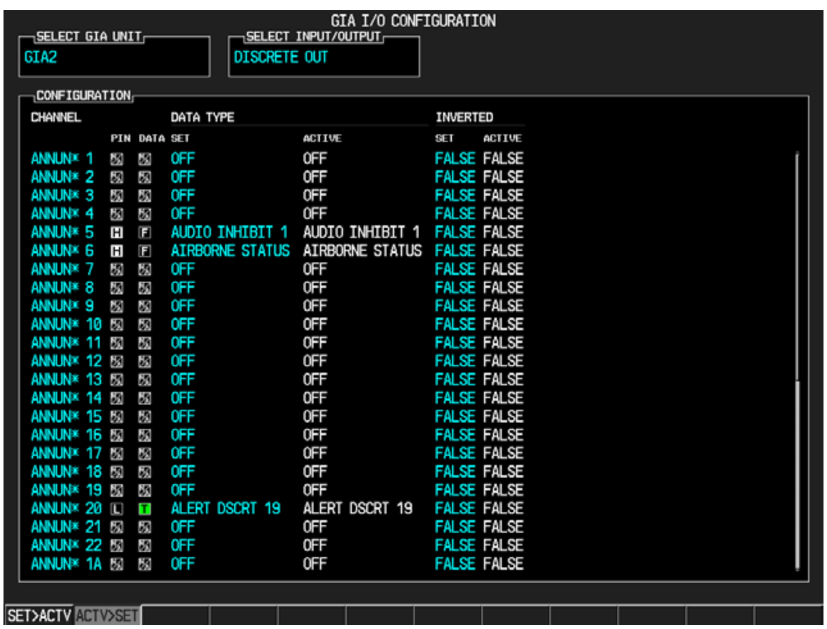


Figure 6-51 GTX 345R GIA 2 Discrete Out I/O Configuration

17. From the XPDR page group, push the **ACTV>SET** soft key. Refer to figure 6-52 for an example.

18. From the TRANSPONDER CONFIGURATION subpage group, push the **ACTV>SET** soft key. Refer to figure 6-53 for an example.

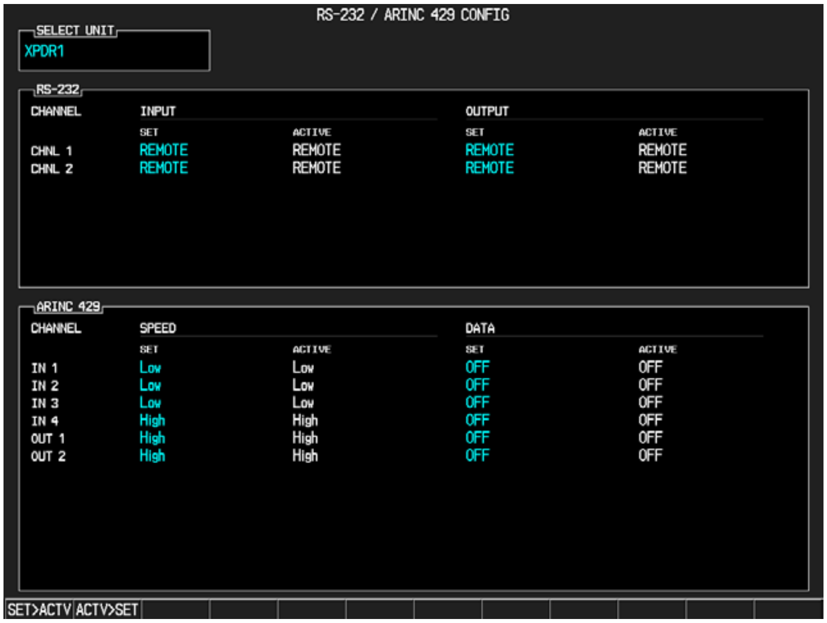


Figure 6-52 GTX 345R XPDR RS-232 / ARINC 429 Configuration

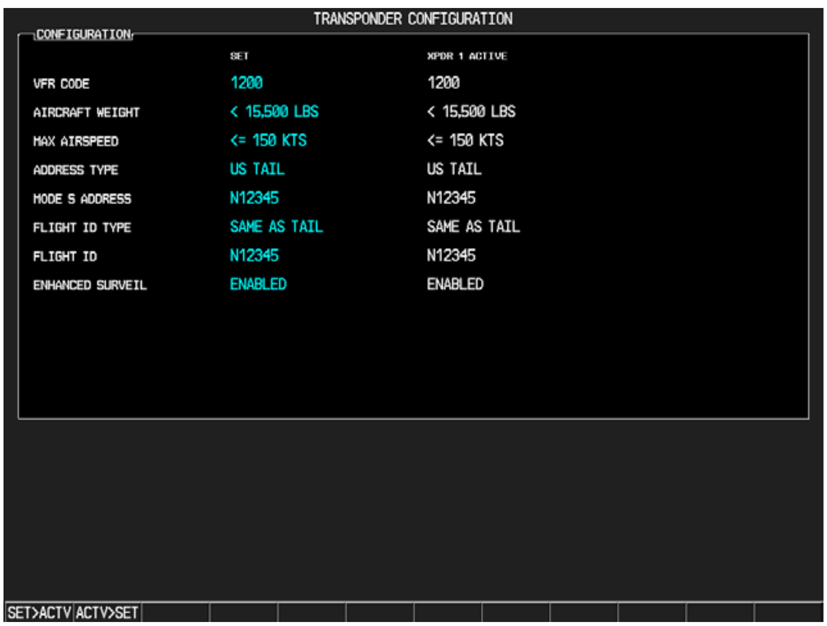


Figure 6-53 GTX 345R Transponder Configuration

19. Make sure the GTX 345R volume is adequate.

a. It may be necessary to adjust the volume settings on the "UNSWITCHED IN," or if the "ALTITUDE WARNING" discrete was used. Refer to figure 6-54 for an example. Recommended setting is "0."

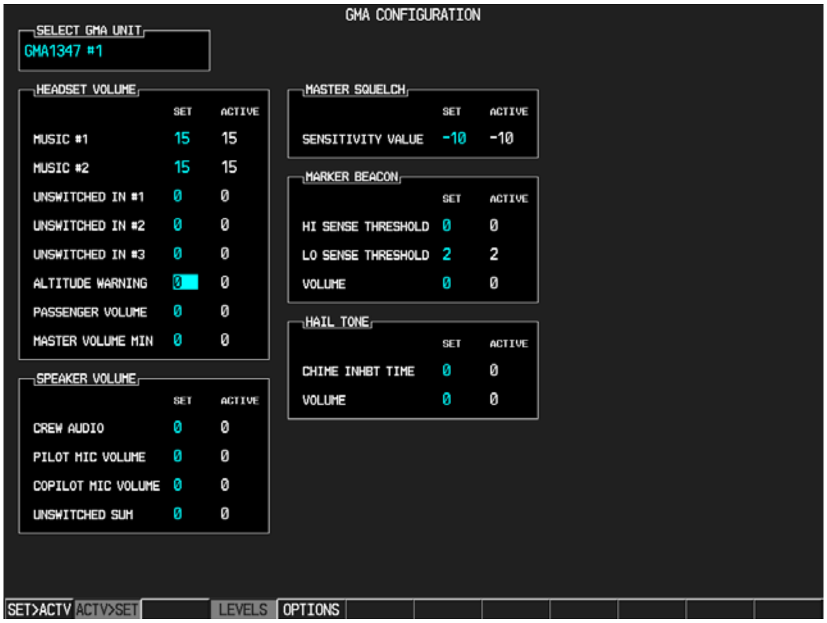


Figure 6-54 GMA Audio Configuration

20. From the SYSTEM STATUS page in the SYSTEM page group, make sure the system status for the transponder and GDL 90 (if configured) is OK. Refer to figure 6-55 for example.
21. If an active traffic system was interfaced to the GTX 345R unit, the unit must be configured according to the Traffic Sensors section of appendix C.
22. If the statuses are OK, recycle power into normal mode and perform the remainder of the required transponder checks.

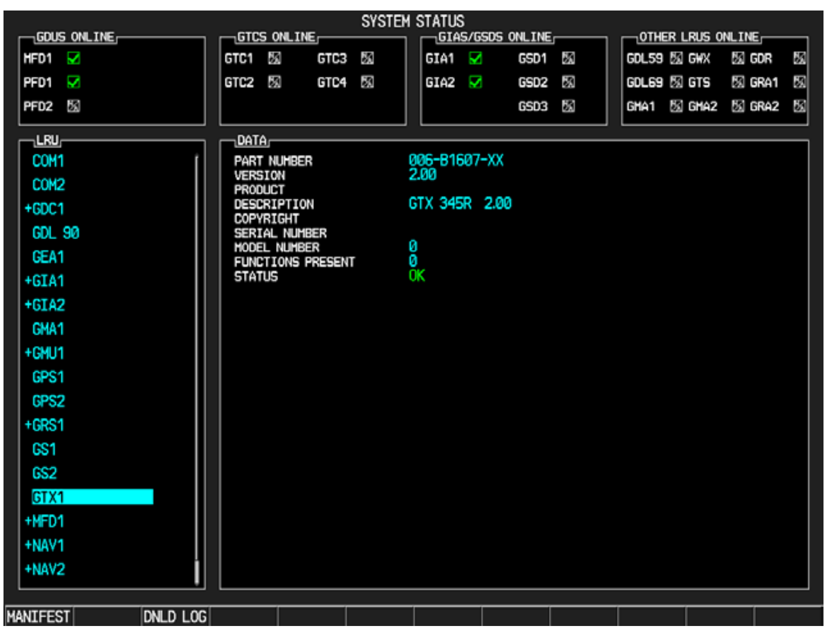


Figure 6-55 GTX 345R System Status

6.8.4 Dual Transponder Configuration

This section is for the configuration of dual GTX 3X5 transponders.

XPDR #1 must be a GTX 335R. XPDR #2 must be a GTX 345R. Configuration items depicted in the following images will vary depending on the aircraft and interfaced LRU's.

This STC only supports Dual GTX 3X5 transponder installations for the following aircraft:

- Cessna 208
- PA-46
- TBM 700 / 850 / 900

NOTE

All ADS-B IN configuration items must be interfaced to GIA 2 only, i.e., GDL 90 traffic, GDL 90 weather.

1. The GTX 335R and the GTX 345R must be configured prior to configuring the G950/1000 system.
2. Download the appropriate GTX 3X5 G1000 Interface Card on a 2 GB SD card IAW 005-00734-05 Rev. 9 (or later).
3. Insert the Interface Card in the top slot of the PFD.
4. Enter the Configuration mode on all displays by pushing the **ENT** key while energizing the displays.
5. From the SYSTEM page group, select the SYSTEM UPLOAD subpage.
6. Under AIRFRAME, select the appropriate aircraft model and GDU software version from the dropdown list.
7. Select: "GTX 335 #1, GTX 345 #2." Refer to figure 6-56 for an example.

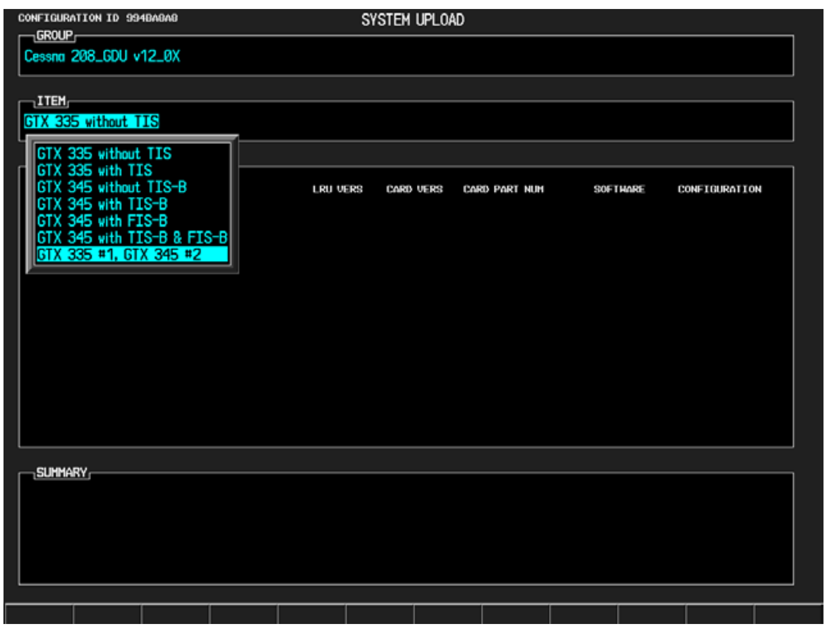


Figure 6-56 Dual GTX 3X5 System Upload Item

8. Push the **LOAD** soft key.

9. Push the **UPDT CFG** soft key.
10. From the GIA1 subpage in the GIA group, push the **ACTV>SET** soft key. Refer to figure 6-57 for an example.

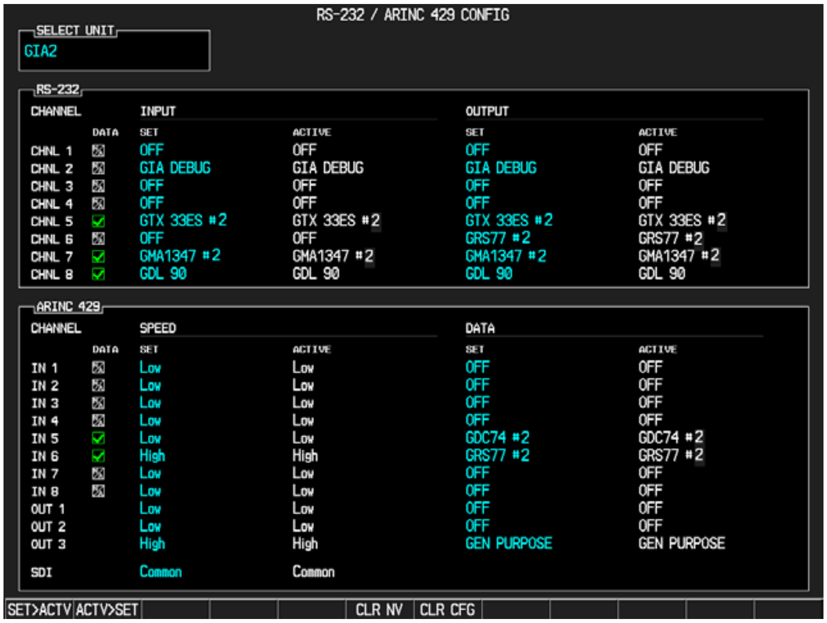


Figure 6-57 GTX 345R GIA1 RS-232/ARINC 429 Configuration

11. If TIS-B is connected, configure the appropriate GIA2 RS-232 Port for “GDL 90” depending on the connected port. Refer to figure 6-58 for an example.
12. If an active traffic system is interfaced to the GTX 345R, configure the appropriate ARINC 429 OUT Port for “GEN PURPOSE” depending on the connected port, refer figure 6-58 for an example.
13. Push the **ACTV>SET** soft key on the GIA2 page. Refer to figure 6-58 for an example.

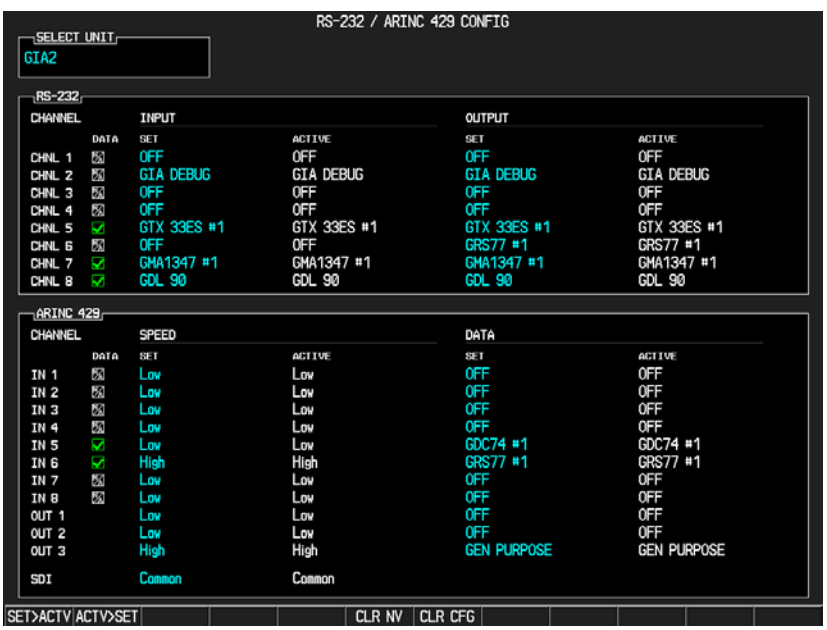


Figure 6-58 GTX 335R GIA 2 RS-232 / ARINC 429 Configuration

14. If FIS-B is connected, configure the appropriate GIA2 RS-485 IN PORT for “GDL 90 ADS-B” depending on the configured port. Configure an available RS-485 OUT Port. Refer to figure 6-59 for an example.
15. Push the **ACTV>SET** soft key on the GIA2 RS-485 page.

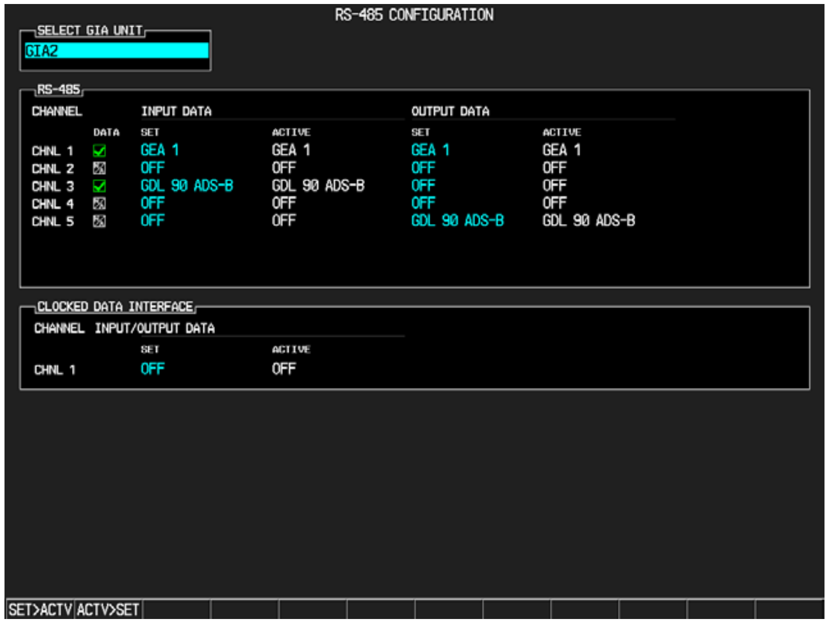


Figure 6-59 GTX 345R GIA 2 RS-485 Configuration

16. From GIA2 Discrete OUT, push the **ACTV>SET** soft key. Refer to figure 6-60 for an example. This is only valid for GDU software versions 9.10 and later.

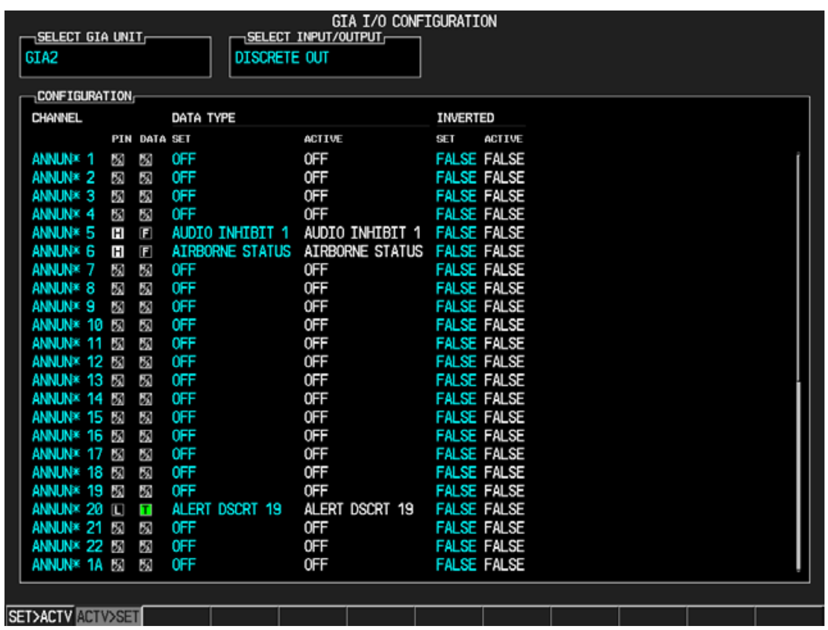


Figure 6-60 GTX 345R GIA 2 Discrete Out I/O Configuration

17. From the XPDR1 page group, push the **ACTV>SET** soft key. Refer to figure 6-61 for an example.

18. From the TRANSPONDER CONFIGURATION subpage group, push the **ACTV>SET** soft key. Refer to figure 6-62 for an example. Make sure all settings between XPDR 1 column and XPDR 2 column are the same. The system will not function properly if any differences exist.

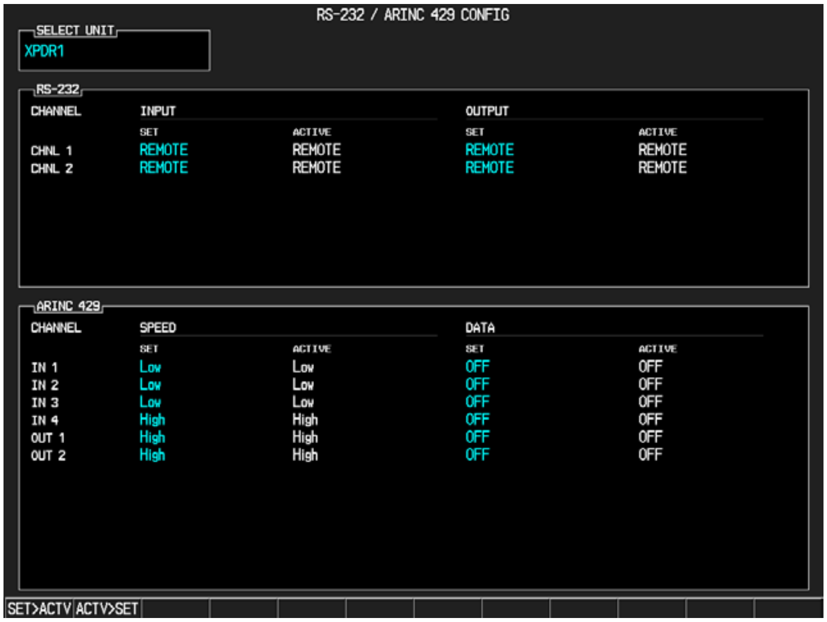


Figure 6-61 DUAL GTX 345R XPDR RS-232 / ARINC 429 Configuration

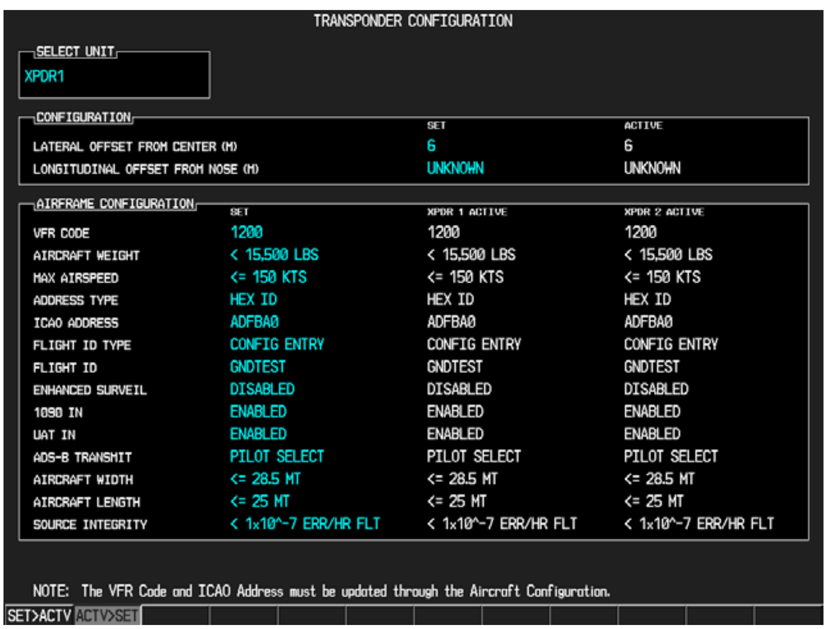


Figure 6-62 DUAL GTX 3X5 TRANSPONDER Configuration

19. From the SYSTEM STATUS page in the SYSTEM page group, make sure the system status for the transponder and GDL 90 (if configured) is OK. Refer to figure 6-63 for an example.
20. If an active traffic system was interfaced to the GTX 345R unit, the unit must be configured according to the Traffic Sensors section of appendix C.

21. If the statuses are OK, de-energize the unit. Energize the unit in normal mode and do the remainder of the required transponder checks.

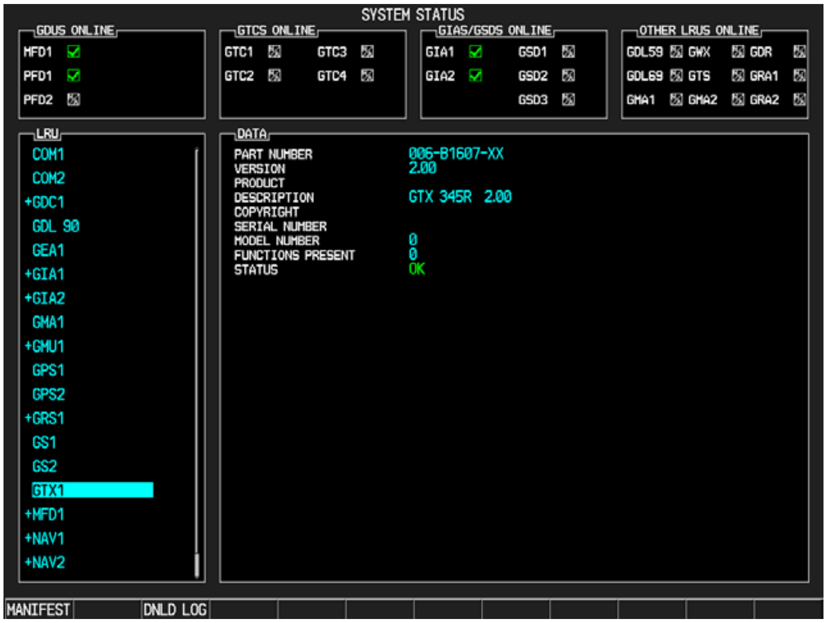


Figure 6-63 GTX 3X5 System Status

6.9 GTX 330/330D Configuration

NOTE

Configuration data must be recorded in the form provided in appendix A of GTX 33X and GTX 3X5 ADS-B Maintenance Manual and inserted into the permanent aircraft maintenance records.

NOTE

The configuration descriptions given in this section reflect the software version listed in GTX 33X and GTX 3X5 ADS-B AML STC Equipment List.

NOTE

The procedures contained in this section must be completed for each installed transponder.

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

Changes made through the configuration pages are stored in EEPROM memory. To exit the configuration pages, de-energize the unit. Energize again, without holding the **FUNC** key, for normal operation.

6.9.1 Configuration Menu Page

Figure 6-64 Jump To Page

Configuration Menu

The **JUMP TO** page provides the capability to select a configuration mode starting page without having to step through all of the pages. Push the **CRSR** key and sequence through to the applicable selection with the **8** and **9** keys. Jump to the selection by pushing the **CRSR** key again with the applicable selection highlighted.

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

Table 6-23 Jump To Selections

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

6.9.2 Audio Mode Pages

Figure 6-65 Audio Mode First Page

Figure 6-66 Audio Mode Second Page

Voice And Volume

Select applicable VOICE. The choice of **OFF** is not available for traffic (TIS) audio. The volume of the GTX must be set to make sure that aural messages/tones are audible under all anticipated noise environmental conditions.

Message

Message is used as a test function only. Message **0** is a continuous tone. Message **1** is a short tone and **2** through **5** are voice messages. Choose each selection to listen to the message.

Table 6-24 Message Selection Descriptions

Selection	Description
VOICE (MALE/FEMALE)	Sets the voice to male or female. Default is male voice.
VOLUME	Volume is adjusted from 0 (default) to maximum with the **8** or **9** key.
MESSAGE (0-9)	Selected audio tones and messages:
	0 = Toggles a continuous tone on and off.
	1 = Attention Tone, precedes voice messages to attract the pilot's attention.
	2 = "Leaving Altitude," when altitude monitor is active and the altitude
	deviation is exceeded.
	3 = "Traffic," when a TIS traffic alert is received (similar to a "Traffic
	Advisory" in TCAS terms).
	4 = "Timer Expired," when the countdown timer expires.
	5 = "Traffic Not Available," when TIS service is not available or out of range of an operating TIS Mode S site.
	6 through **9** are not used at this time.
ALTITUDE MONITOR	Off, tone or message
COUNT DOWN TIMER	Off, tone or message
PAGE CHANGE	Enables/disables altitude monitor subpage when altitude deviation is exceeded.

6.9.3 Traffic Information Page

NOTE

A test flight is recommended upon completion of the setup.

Figure 6-67 Traffic Messages Page

Traffic Messages

Sets the Traffic Messages to Tone or Message. TIS provides notification of close proximity traffic.

6.9.4 Display Mode Page

Figure 6-68 Display Mode Page

Table 6-25 Display Mode Selections

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

Level

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

6.9.5 Display Backlight Page

NOTE

If a lighting bus (any selection other than PHOTO) is selected, and the lighting bus control is set to its minimum (daytime) setting, the display brightness tracks the GTX 330 photocell.

Table 6-26 Display Backlight Page

Table 6-27 BKLT (Backlight) Selections

Selection	Description
AUTO (Automatic)	DEFAULT. Display backlighting is automatically controlled, based on the parameters put in on this configuration page. When AUTO is selected, the DISPLAY page does not show to the pilot.
MAN (Manual)	Display backlighting is manually controlled by the pilot on the GTX 330 DISPLAY page. No backlight parameters can be put in when the manual mode is selected.

LVL (Level)

Shows the current level of display backlighting, based on the lighting input source (lighting bus voltage, or the ambient light if the source is PHOTO) and the settings on this configuration page. This field has a range of 0 to 999. The level is set by pushing the **8** and **9** keys when MAN mode is selected. When in AUTO mode, the field shows only, it can not be changed.

RSP TIME (Response Time)

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

MIN (Minimum) (Auto Only)

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

Table 6-28 BKLT SRCE (Backlight Source) Selections

Selection	Description
PHOTO (Photocell)	DEFAULT. Backlight level is selected by the ambient light level as measured by the photocell on the GTX 330.
14V	Backlight level tracks a 14 VDC aircraft lighting bus.
28V	Backlight level tracks a 28 VDC aircraft lighting bus.
5V	Backlight level tracks a 5 VDC aircraft lighting bus.

SLOPE (Auto Only)

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

Offset (Auto Only)

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

6.9.6 Key Lighting Page

Figure 6-69 Key Lighting Page

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

Table 6-29 Key Lighting Selections

Selection	Description
AUTO (Automatic)	Key lighting is automatically controlled based on the parameters put in on this configuration page.
MAN (Manual)	Key lighting is controlled manually by the pilot on the GTX 330 DISPLAY page.

LVL (Level)

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

RSP TIME (Response Time)

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

MIN (Minimum) (Auto Only)

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

Table 6-30 Key Lighting Source Selections

Selection	Description
PHOTO (Photocell)	DEFAULT. Key lighting level is selected by the ambient light level as measured by the photocell on the GTX 330.
14V	Backlight level tracks a 14 Volt DC aircraft lighting bus.
28V	Backlight level tracks a 28 Volt DC aircraft lighting bus.
5V	Backlight level tracks a 5 Volt DC aircraft lighting bus.

SLOPE (Auto Only)

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

OFFSET (Auto Only)

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

6.9.7 Contrast Configuration Page

Figure 6-70 Contrast Mode Page

Table 6-31 Contrast Mode

Selection	Description
AUTO (Automatic)	DEFAULT. Display contrast is automatically compensated for LCD temperature and other factors. An offset can be put in for the contrast level adjustment .
MAN (Manual)	Display contrast is manually adjusted here or by the pilot using the GTX 330 CONTRAST page.

CONTRAST LEVEL ADJUSTMENT

Use the **8** key to decrease contrast level. Use the **9** key to increase the contrast level. In manual contrast mode, this is a direct adjustment of the display contrast. In automatic contrast mode, this adjusts the offset to the automatically compensated contrast, with the default set to an offset of 50.

6.9.8 VFR Key Configuration Page

Figure 6-71 VFR Key Configuration Page

VFR KEY FUNCTIONALITY

Available settings are Enable or Disable. Use the **8** Key to select Disable, or the **9** key to select the Enable setting.

Table 6-32 VFR Key Selections

Selection	Description
ENABLE	DEFAULT. The **VFR** key functions normally in this setting.
DISABLE	When the **VFR** key is disabled and the **VFR** key is pusheded, the unit shows an advisory message that indicates no operation took place. Advisory message clears after 5 seconds elapses, or if the **CLR** key is pushed. All other keys behave normally.

6.9.9 ARINC 429 Configuration Pages

Figure 6-72 ARINC 429 Input First Page

Figure 6-73 ARINC 429 Input Second Page

ARINC 429 INPUT

NOTE
All ARINC 429 input configuration settings are available on ARINC 429 input ports 1 through 3.

NOTE
The same input data source cannot be selected for multiple input ports.

The ARINC 429 INPUT Pages configure the ARINC 429 input ports. The ARINC 429 IN 1 INPUT allows automated start and stop of the flight timer and places the transponder in ground (GND) mode upon landing. ADLP is included for future use.

For a connection to a Garmin GTS, GARMIN TAS (HIGH) must be selected. Barometric data is not included in the GARMIN TAS format. A separate barometric data source is required.

Table 6-33 ARINC 429 Inputs

Selection	Description	Notes
OFF	No information received.	
ADC NO ALT	Temperature and speed information.	[1]
ADC W/ALT	Altitude, temperature, and speed information.	
AHRS	Attitude and heading information.	
EFIS NO ALT	Selected course, heading, temperature, joystick waypoint, and speed data.	[1]
EFIS W/ALT	Same as “EFIS NO ALT” with the addition of altitude data.	
FLIGHT CTRL	Selected altitude, barometric setting, and AFCS pitch discretes.	[1]
GPS/FMS	Selected waypoint information and GPS ground speed recognition.	[1]
GRMN DISPLAY	Same as “GPS/FMS” with added ability of receiving phase of flight data from a Garmin 400/500 Series (non-WAAS).	[1]
GRMN TAS	TAS Mode data from Garmin GTS 820/850.	[1]
GRMN 743A	Standard GNSS input. Includes position, velocity, and integrity data.	

[1] Format not supported with this STC for the GTX 33X.

[2] The “GRMN 743A” format does not fully support Version 2 ADS-B Out compliance with AC 20-165. For full compliance to AC 20-165, the RS-232 REMOTE input format must be used with a compatible SBAS/GPS position source.

ARINC 429 OUTPUT

NOTE

All ARINC 429 output configuration settings are available on ARINC 429 output ports 1 and 2.

Figure 6-74 ARINC 429 Output Page

The GTX 330 can be configured to include GPS, Airdata, AHRS, EFIS/Airdata, and ADLP ARINC 429 inputs, functioning as an ARINC 429 data concentrator. The ARINC 429 OUTPUT pages configure the ARINC 429 output ports. Each port can be configured independently for the applicable function(s). Both ARINC 429 outputs send high speed ARINC 429 data.

Table 6-34 ARINC 429 Output Selections

Selection	Description	Notes
OFF	No information transmitted or received.	
GARMIN	Data concentrator that combines data from GTX 33X data inputs.	[1]
GARMIN W/TIS	Same as “GARMIN” format but also includes TIS.	
GARMIN TAS	Supports Garmin GTS 8XX interface.	[1]

[1] Format not supported with this STC for the GTX 33X.

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

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

Table 6-35 ARINC 429 Transmit Data Labels

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

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

Label	Data
350	Fault Summary
274	Transponder Control
313	Own Aircraft Track Angle
357 (RTS)	Request to Send
130	Intruder Range (0 – 8 sets)
131	Intruder Altitude (0 – 8 sets)
132	Intruder Bearing (0 – 8 sets)
357 (EXT)	End of Transmission

6.9.10 RS-232 Input and Output Page

Figure 6-75 RS-232 Input-Output Page

In order to be ADS-B Out Version 2 compliant, one of the available RS-232 inputs to the GTX 330/330D must be set to REMOTE and connected to one of the approved position sources listed in *GTX 33X and GTX 3X5 ADS-B AML STC Equipment List*.

NOTE

For connections to an ADS-B Out Version 2 compliant position source, RS-232 Channel 1 is preferred. But Channel 2 is satisfactory if not possible to connect to Channel 1. Refer to appendix B and aircraft specific interconnect diagrams for interconnect information.

Table 6-36 RS-232 Input/Output Selections

Selection	Input/ Output	Description	Notes
OFF	Input/Output	Default setting, no data is transmitted/received, the altitude code input is not from an RS-232 source.	
ADC NO ALT	Input	RS-232 serial air data information from Shadin ADC 200, 200+, 2000.	[1]
ADC W/ALT	Input	RS-232 serial air data information from Shadin ADC 200, 200+, 2000 plus altitude data.	
FADC NO ALT	Input	RS-232 serial air data information from Shadin 9628XX-X family of Air Data Computers and Fuel/Air Data Computers.	[1]
FADC W/ALT	Input	RS-232 serial air data information from Shadin 9628XX-X family of Air Data Computers and Fuel/Air Data Computers plus altitude data.	[1]
GPS	Input	RS-232 ground speed from a GPS device.	[1]
ICARUS ALT	Input/Output	RS-232 serial altitude.	
ICRS ALT 25ft	Input	Reports altitude in 25-foot increments.	[1]
REMOTE	Input/Output	RS-232 serial remote data; receives SBAS/GPS information in the Garmin GNS “ADS-B OUT” or the Garmin GTN “ADS-B” format.	[2] [3] [4]
REMOTE + TIS	Output	RS-232 serial output remote data with TIS.	
SHADIN ALT	Input	RS-232 serial altitude from Shadin 8800T, 9000T, 9200T.	
SHDN ALT 25ft	Input	Reports Shadin 8800T, 9000T, 9200T altitude in 25-foot increments.	[1]

[1] Format not supported with this STC for the GTX 33X.

[2] For GTX 33X Software versions prior to v8.01, if REMOTE input is selected, it is the installer's responsibility to ensure the output selection for that channel is either OFF, REMOTE, or REMOTE + TIS.

[3] For GTX 330 w/ES Software versions v6.00 through v6.20 (ADS-B Out Version 1), it is the installer's responsibility to ensure the software version of the GPS Position source is compatible. GNS 430/530 WAAS Software versions 3.2 and later and GTN 6XX/7XX Software versions 2.00 and later are compatible with GTX 330 Software versions v6.00 through v6.20. Refer to the GNS 430/530 WAAS or GTN 6XX/7XX Installation Manual for configuration information for the SBAS/GPS source.

[4] For GTX 330 w/ES units with Software versions v7.01 or later (ADS-B Out Version 2), it is the installer’s responsibility to ensure the ADS-B Out system is compliant with AC 20-165 and to ensure compatibility between the GTX 330 and the ADS-B Out position source equipment. Refer to *14 CFR 91.227 ADS-B Out Compatible Equipment* for compatible equipment shown to be eligible for 14 CFR 91.227-compliant installations in accordance with AC 20-165.

6.9.11 Operation Configuration Pages

Figure 6-76 Configuration Page - First

VS RATE (Vertical Speed Rate)

This field is the typical vertical speed for climb/descent of the aircraft. The settable number determines the rate of climb the GTX 330 assumes as liftoff for starting the flight timer and operational functions. The range is 100 feet per minute to 9999 feet per minute, and is set to 500 fpm at the factory.

FORMAT (Altitude Format)

This field determines how the pressure altitude is shown on the GTX 330 display.

Table 6-37 Altitude Format Selections

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

VFR ID (VFR Transponder Code)

This field is the four-digit code that is selected when the user pushes the GTX 330 **VFR** key. 1200 is the VFR code for any altitude in the United States. The default is set to 1200.

ALTITUDE ALERT DEVIATION (Altitude Format)

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

SQUAT SWITCH

Figure 6-77 Configuration Page - Second

Table 6-38 Squat Switch Configuration

FIELD	Selection	Description	Configuration/notes
SQUAT SWITCH?	NO	DEFAULT. This sets the GTX to use automated airborne determination from other sources.	Refer to the description. This setting should only be used on those aircraft without an existing squat switch.
	YES	This sets the GTX to use the aircraft squat switch for airborne determination.	This is the **preferred** configuration of this STC. Refer to appendix B and aircraft specific wiring diagrams for interconnect information.
SENSE	HIGH	With the sense set to HIGH the unit will go into ground mode when Pin 17 (SQUAT SWITCH IN) is pulled high.	If the SQUAT SWITCH IN discrete is connected, and the aircraft air/ground state is On-Ground when the input is open or high, then select **HIGH**.
	LOW	With the sense set to LOW the unit will go into ground mode when Pin 17 (SQUAT SWITCH IN) is pulled low.	If the SQUAT SWITCH IN discrete is connected, and the aircraft air/ground state is On-Ground when the input is grounded, then select LOW.
DELAY TIME	2	This is the number of seconds the aircraft must be on the ground before the GTX 330 automatically switches to GND mode when it has a means of determining the aircraft is on the ground.	Default is 24. A setting of **2** is **required** for this STC.

AUTO FLIGHT TIMER

Available choices are MAN, CLEAR and ACCUM. Selecting CLEAR resets flight time to zero and starts the flight timer when transition from a ground to airborne state is sensed.

Table 6-39 Auto Flight Timer Selection Description

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

6.9.12 Temperature Page

Figure 6-78 Temperature Page

SENSOR INSTALLED

Sets the Sensor to YES or NO. Default is NO. This STC does not approve the interface to an external OAT probe.

UNITS

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

6.9.13 Mode S Address Entry Pages

NOTE

It is important to put in the Mode S address correctly in the GTX 330.

When the unit is energized for the first time, or an incorrect address is recognized, the unit prompts the user to put in a correct aircraft address.

When the aircraft address is recorded, the unit remains on in the same mode as before.

6.9.14 US Tail and Hex Address Entry Pages

When energized for the first time , proceed to step 5. If not energized for the first time, start at step 1, with the unit de-energized:

1. To go into the configuration pages, push and hold the **FUNC** key while the unit is energized.
2. Energize the unit by pushing the **ON**, **ALT**, or **STBY** key or energize with the avionics master switch (while holding the **FUNC** key). The unit does a self-test routine and shows a “Jump to Diagnostics” page.

Figure 6-79 Mode S US Tail # Page

Figure 6-80 Mode S Address HEX Page

3. Repeatedly push the **FUNC** key to go to the address entry page.
   - The page that shows is ADDRESS US TAIL# N _ _ _ _ _ or ADDRESS HEX _ _ _ _ _ _ .

NOTE

It is not necessary for the installer to convert a US aircraft registration number (N – Number) to a Hex address. The GTX 330 converts the US registration number to hexadecimal automatically.

4. To select between Hex or Tail number, push the **CRSR** key, then **8** or **9** key to move to the correct selection.
5. To put in the address hex code or the US registration number, push the **CRSR** key one time. (This highlights the address field).
6. Put in the aircraft address using the number keys. Push a key repeatedly to scroll through the digit/ alpha characters for that key.
7. Push the **CRSR** key to select the next numeric entry field. Put in the next character as stated in the previous step, then move onto the next one. Repeat the process until the number is complete.
8. When finished, push the **CRSR** key to accept the number entry.
9. Using the **FUNC** and/or **START/STOP** keys, toggle through the pages to get off of, then back onto the aircraft address page.
10. Make sure the address is correct.

The unit now contains a Mode S address and can be de-energized. To energize the unit in the normal mode, push only the **ON**, **ALT**, or **STBY** key (without holding the **FUNC** key) or energize with the avionics master switch.

Table 6-40 Mode S Address, Aircraft Registration Page Selections

Selection	Description
US TAIL #	N-Registration Number
HEX	Hexadecimal code address

6.9.15 Mode S Flight ID Pages

Flight ID can be recorded in TSO Class 2A units, P/N 011-00455-( ).

NOTE

When a flight ID number contains a space, the GTX 330 automatically removes spaces in data transmission.

Select the FLIGHT ID PWR UP ENTRY page if it is required the flight crew has to put in an aircraft identification designator each time the unit is energized. When the crew puts in the flight ID correctly, the flight number call sign for radio contact with ATC is the same flight identification the GTX 330 Mode S transponder replies to ATC radar interrogations.

Table 6-41 Mode S Flight ID Page Selections

Selection	Description
SAME AS TAIL	If address is a US registration number, FLT ID can be the same.
POWER UP ENTRY	Put in FLT ID every time the unit is energized in normal mode.
CONFIG ENTRY	Put in FLT ID in Configuration mode only.

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

Figure 6-81 Flight ID Pwr-Up Entry Page

Put in all Mode S flight IDs:

1. Push the **CRSR** key once to highlight the address field.
2. Put in the aircraft address using the number keys. Push a key repeatedly to scroll through the digit/alpha characters for that key.
3. Push the **CRSR** key to select the next alphanumeric entry field. Put in the next character as stated in the previous step, then move onto the next one, repeating the process until the number is complete.
4. Push the **CRSR** key to accept the number entry.
5. Using the **FUNC** and/or **START**/**STOP** keys, toggle through the pages to get leave, then back onto the aircraft address page.
6. Make sure the address is correct.
7. De-energize the unit.
8. Energize the unit in normal mode.
9. If the FLIGHT ID PWR-UP ENTRY page was selected make sure the unit requests the correct page during system start up.

The POWER UP ENTRY requires that a variable Mode S FLIGHT ID be put in each time the unit is energized. The selections SAME AS TAIL and CONFIG ENTRY are fixed entries.

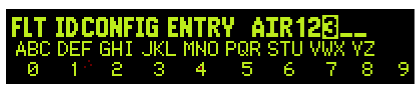


Figure 6-82 Power-Up Config Entry Page

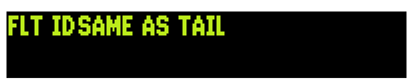


Figure 6-83 Power-Up Same as Tail Page

6.9.16 GPS Configuration Page

NOTE

The default setting for GPS INTEGRITY is 1E-3. A setting of 1E-7 is required for this STC.

Figure 6-84 GPS Configuration Page

Table 6-42 GPS Configuration Page Selections

Selection	Description
GPS X OFST	Set to a value between 6 (R) and 6 (L) in 2m steps, Default is Unknown
GPS Y OFST	Set to a value between 2 and 60 in 2m steps, Default is Unknown
GPS INTEGRITY	1E-7

6.9.17 MODE S Aircraft Type Page

Used to support Mode S protocols.

Figure 6-85 A/C Type Page

Table 6-43 Aircraft Type Selections

Selection	Description
AC TYPE	UNKNOWN, <15.5K Lb, >=15.5K Lb
MAX AIRSPEED	UNKNOWN, <=75 kt, <=150 kt, <=300 kt, or >300 kt.

AIRCRAFT TYPE

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

MAXIMUM AIRSPEED

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

6.9.18 Aircraft Size Page

Figure 6-86 Aircraft Size Page

AIRCRAFT LENGTH TYPE

Sets the length of the aircraft to less than or equal to 15 meters, less than or equal to 25 meters, less than or equal to 35 meters, less than or equal to 45 meters, less than or equal to 55 meters, less than or equal to 65 meters, less than or equal to 75 meters, less than or equal to 85 meters, or more than 85 meters. Put in the aircraft's minimum length category.

AIRCRAFT WIDTH TYPE

Sets the width of the aircraft to less than or equal to 11.5 meters, less than or equal to 23.0 meters, less than or equal to 28.5 meters, less than or equal to 33.0 meters, less than or equal to 34.0 meters, less than or equal to 38.0 meters, less than or equal to 39.5 meters, less than or equal to 45.0 meters, less than or equal to 52.0 meters, less than or equal to 59.5 meters, less than or equal to 67.0 meters, less than or equal to 72.5 meters, less than or equal to 80.0 meters, or more then 80.0 meters. Put in the aircraft's minimum width category.

6.9.19 ADS-B Page

NOTE

The settings in this section will affect future ADS-B features and capabilities provided to aircraft that are ADS-B Version 2 compliant in accordance with AC-20-165A but the effect of these settings are not apparent until these features are fully implemented. Please read the description carefully and set these parameters based on the each particular aircraft's ability to receive ADS-B data on the 1090 MHz and/or 978 MHz (UAT) band.

NOTE

If 1090 Input and UAT Input are both set to YES, it is important the aircraft actually has equipment capable of receiving ADS-B on both bands along with the capability to show from both bands simultaneously. If not, a complete traffic picture will not be given by the ADS-B ground stations.

Figure 6-87 ADS-B Page

ADS-B TX

This page is used to support ADS-B configurations. Automatic Dependant Surveillance-Broadcast (ADS-B) TX can be set to DISABLE, ENABLE, or PILOT SET. PILOT SET or ENABLE is required for this STC.

When ADS-B TX is set to PILOT SET ADS-B transmissions can be selected for ON or OFF by the crew. When ADS-B TX is set to ENABLE, ADS-B transmissions are automatically active whenever the GTX is operated in the GND, ON or ALT modes.

1090 In

The 1090 Input setting can be set to YES or NO. This setting controls bits in the transponder's ADS-B Out message that indicates if the aircraft has 1090 MHz ADS-B In equipment. If 1090 MHz ADS-B In equipment is installed in the aircraft, this setting should be set to YES. If not, set this to NO.

UAT In

The UAT Input setting can be set to YES or NO. This setting controls bits in the transponder's ADS-B Out message that indicates if the aircraft has 978 MHz (UAT) ADS-B In equipment. If 978 MHz (UAT) ADS-B In equipment is installed in the aircraft or if the owner/operator of the aircraft will be using a handheld UAT receiver for Traffic Information then this setting should be set to YES. If not, set this to NO.

6.9.20 EHS Page

Figure 6-88 EHS Page

EHS

Sets Enhanced Surveillance (EHS) to DISABLE or ENABLE. ENABLE is the default. When EHS is set to DISABLE there is no active enhanced surveillance.

6.10 GTX 33X Configuration with GTN 6XX/7XX

NOTE

In order for the Transponder to relay the precision and integrity information required by AC-20-165A Version 2 compliant equipment, the GPS unit's RS-232 serial output must be configured to the extended ADS-B format. This is indicated through selections with a + in the selections title, i.e., ADS-B OUT+, GTX Mode S+, Panel GTX w TIS+.

NOTE

Only those selections listed in table 6-44 are authorized for use with this STC.

NOTE

The steps contained in this section must be completed for each installed transponder.

This section provide information on configuring the transponder with the operator interface of a Garmin GTN 6XX/7XX series navigator. To configure the transponder, it must first be selected as present and the type of transponder installed must be specified.

Touch the **Interface Equipment** key on the GTN Setup page to access the Interfaced Equipment page. This page allows the configuration of the presence of:

- Cross-side navigator
- GDL 69/69A
- GDL 88
- Transponder #1
- Transponder #2
- GSR 56
- GWX

Figure 6-89 Interfaced Equipment

1. Select the present transponder based upon the installed equipment and the list below:

Table 6-44 Transponder Selections

Selection	Description
GTX Mode S+ #1	This selection is used for interfacing to a GTX 33/33D.
GTX Mode S+ #2	
GTX w/TIS + #1	This selection is used for interfacing to a GTX 33/33D that is providing TIS.
GTX w/TIS + #2	
Panel GTX w/TIS + #1	This selection is used for interfacing to a GTX 330/330D that is providing TIS (not currently supported).
Panel GTX w/TIS + #2	

2. Go to the External Systems page.
3. Touch the corresponding key for the transponder to be configured XPDR1 or XPDR2.

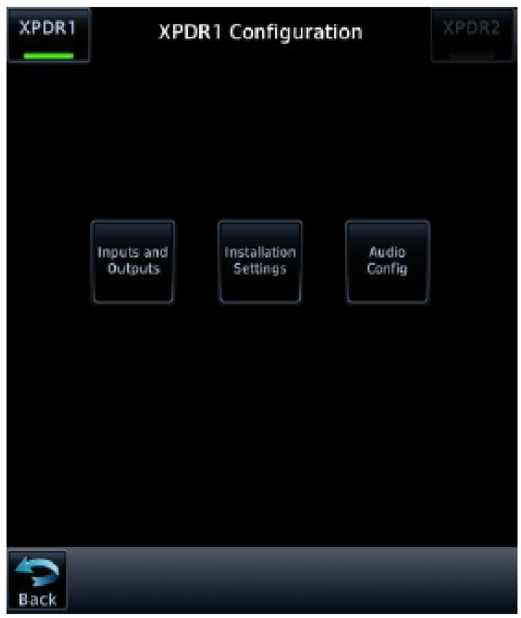


Figure 6-90 XPDR1 Configuration Page

6.10.1 Transponder Inputs and Outputs

Touch the **Inputs and Outputs** key on the XPDR Configuration page to access the XPDR Input/Outputs page. The transponder RS-232 port inputs can be configured by the GTN. RS-232 Port 1 input for the transponder can only be set to Remote, and is the default for Port 1 input. RS-232 Port 1 is used for control and remote configuring of the transponder.

Figure 6-91 Inputs/Outputs Page

6.10.2 RS-232 Configuration

NOTE

For connections to an ADS-B Out Version 2 compliant position source, RS-232 Port 1 is preferred. But Port 2 is satisfactory if it is not possible to connect to Port 1. Refer to appendix B and aircraft specific interconnect diagrams for interconnect information.

This section gives RS-232 port settings and what each setting is used for. Select the correct input/output setting for the interfaced equipment.

Table 6-45 Port 1 RS-232 Input

Selection	Description	Configuration/Notes
REMOTE	RS-232 serial input remote data. Receives SBAS/GPS information in the Garmin GNS “ADSB DATA OUT” format.	This selection **must** be used for all GTX 33/33D connections intended to be ADS-B Out Version 2 compliant.

Table 6-46 Port 1 RS-232 Output

Selection	Description	Configuration/Notes
REMOTE	RS-232 serial output remote data	Use this setting when connected to a Garmin GTN 6XX/7XX.
REMOTE + TIS	RS-232 serial output remote data with TIS.	Use this setting when connected to a Garmin position source with TIS capabilities.

Table 6-47 Port 2 RS-232 Input

Selection	GTX 330/330D Equivalent	Description	Configuration/Notes
REMOTE	REMOTE	RS-232 serial input remote data. Receives SBAS/GPS information in the Garmin GNS “ADSB DATA OUT” format.	This selection **must** be used for all GTX 33/33D connections intended to be ADS-B Out Version 2 compliant.
Altitude Format 1	ICARUS ALT	RS-232 serial altitude from an Icarus Instruments 3000.	Refer to the description.
Altitude Format 2	ICRS ALT 25ft	Reports Icarus Instruments 3000 altitude in 25-foot increments	Refer to the description.
Airdata Format 2	ADC NO ALT	RS-232 serial air data information from Shadin ADC 200, 200+, 2000.	Refer to the description.
Airdata Format 1	ADC W/ALT	RS-232 serial air data information from Shadin ADC 200, 200+, 2000 plus altitude data.	Refer to the description.
Altitude Format 3	SHADIN ALT	RS-232 serial altitude from Shadin 8800T, 9000T, 9200T.	Refer to the description.
Altitude Format 4	SHDN ALT 25ft	Reports Shadin 8800T, 9000T, 9200T altitude in 25-foot increments	Refer to the description.
FADC Format 2	FADC NO ALT	RS-232 serial air data from Shadin 9628XX-X family of Air Data Computers and Fuel/Air Data Computers.	Refer to the description.
FADC Format 1	FADC W/ALT	RS-232 serial air data from Shadin 9628XX-X family of Air Data Computers and Fuel/Air Data Computers plus altitude data.	Refer to the description.
OFF	OFF	DEFAULT	Refer to the description.
GPS	GPS	RS-232 ground speed from a GPS device.	Refer to the description.

Table 6-48 Port 2 RS-232 Output

Selection	GTX 330/330D Equivalent	Description	Configuration/Notes
OFF	OFF	No unit is connected to output of this channel.	Use this setting when connected to a Garmin GNS 4XX/5XX.
REMOTE	REMOTE	RS-232 serial output remote data	This selection **must** be used when connected in a dual GTX 33/33D installation associated with this STC.
REMOTE + TIS	REMOTE + TIS	RS-232 serial output remote data with TIS.	Use this setting when connected to a Garmin position source with TIS capabilities.
Altitude Format 1	ICARUS ALT	Mimics RS-232 serial altitude as from an Icarus Instruments 3000.	Refer to the description.

Select the baud rate for each RS-232 channel.

Table 6-49 RS-232 Channel Baud Rate Selections

Selection	Description
9600	Sets the baud rate to 9600 Bd.
19200	Sets the baud rate to 19200 Bd.
28800	Sets the baud rate to 28800 Bd.
38400	Sets the baud rate to 38400 Bd.
57600	Sets the baud rate to 57600 Bd.

Select the parity for each RS-232 channel.

Table 6-50 RS-232 Channel Parity Selection

Selection	Description
Even Parity	Sets the Parity to Even.
No Parity	Sets the Parity to None.
Odd Parity	Sets the Parity to Odd.

6.10.3 ARINC 429 Configuration

Configure the four ARINC 429 input ports and the two ARINC 429 output ports. Select the correct speed for each port depending upon the installed interfaced equipment by touching the speed key and toggling the high or low selection. Each port can be configured independently for the desired functions by selecting the desired data format from the menu. The equipment listed in appendix C is compatible with the GTX 33/33D when connected through one of the ARINC 429 ports and configured as given in this manual. For more configuration information, refer to *GTN 6XX/7XX Part 23 AML STC Installation Manual*.

Table 6-51 ARINC 429 Speed Selections

Selection	Description
Low	Standard low-speed ARINC 429 (nominally 12.5 kB per second)
High	High-speed ARINC 429 (nominally 100 Kb per second)

Table 6-52 ARINC 429 Input Selections (Channels 1-3)

Selection	Description
OFF	No unit connected to this ARINC 429 input.
GPS	Selected waypoint information and GPS ground speed recognition.
ADC NOT ALT	Temperature and speed information.
ADC W/ALT	Altitude, temperature, and speed information.
AHRS	Attitude and heading information.
EFIS/ADC NOT ALT	Selected course, heading, temperature, joystick waypoint, and speed information.
EFIS/ADC W/ALT	Selected course, heading, temperature, joystick waypoint, and speed information plus altitude data.
GARMIN DISPLAY	Same as GPS with added ability of receiving phase of flight data.
GARMIN TAS	Traffic advisory system discretes.
GARMIN 743A	Standard GNS output - includes position, velocity, and integrity data.
AFCS	Selected altitude, baro setting, and pitch discretes.

Table 6-53 ARINC 429 Output Selections

Selection	Description
CHANNEL 1 (DATA)	• DATA SOURCE: OFF, GARMIN, GARMIN TAS, or GARMIN W/TIS. • Defaults to OFF. • ARINC 429 input channel 4 sets the ARINC 429 output channel 1 to the same selection.
CHANNEL 2 (DATA)	• DATA SOURCE: OFF, GARMIN, GARMIN TAS, or GARMIN W/TIS. • Defaults to GARMIN W/TIS. • Do not select GARMIN W/TIS if the aircraft contains another traffic detection system.

6.10.4 Transponder Installation Settings Page

Touch the **Installation Settings** key on the XPDR Configuration page to access the XPDR Installation Settings page.

Figure 6-92 XPDR Installation Settings Page

VFR BUTTON CODE

NOTE

Avoid selecting code 7500 and all codes in the 7600-7777 range. These codes trigger special indicators in automated facilities. An aircraft's transponder code is used for ATC tracking purposes.

Input a VFR transponder code by touching the key and typing the selected code into the keypad. This field has a range of 0000-7777.

AIRCRAFT WEIGHT

Select the weight of the aircraft in which the transponder is installed.

Table 6-54 Aircraft Weight Selections

Selection	Description
<15,500 LBS Low	Configures the aircraft weight to less than 15,500 lbs
>=15,500 LBS High	Configures the aircraft weight to equal to or greater than 15,500 lbs
ROTORCRAFT	Configures to rotorcraft use
UNKNOWN	Aircraft weight is unknown

AUTO STANDBY DELAY

This is the number of seconds the aircraft must be on the ground before the transponder automatically switches to GND mode when it has a means of determining the aircraft is on the ground. It has a range of 0 (zero) seconds to 99 seconds. The default value of 2 seconds is required for GTX software versions below v8.01 and the default value of 0 seconds is required for software v8.01 and later.

ALTITUDE CLIMB RATE FOR AIRBORNE TRANSITION

This is the climb rate that is required to transition from ground to airborne state. This field is adjustable from 100 fpm to 9999 fpm. This field should be set to the typical vertical speed climb rate of the aircraft. This number determines the rate of climb necessary for the GTN to assume lift-off for detecting an airborne state. Refer to the Pilot's Operating Handbook (POH) to determine this value. If the POH does not include aircraft climb rate information, use the default value of 300 fpm.

AIR/GROUND LOGIC

Select the source for the air/ground logic.

Table 6-55 Air/Ground Logic Selections

Selection	Description
Auto Airborne Off	The transponder will not automatically transition to operate mode when it senses the aircraft is airborne
Squat Switch	The transponder is connected to a squat switch to determine airborne state.
GPS Data	The transponder is using GPS data to determine the airborne state.
Altitude Data	The transponder is using an altitude source to determine the airborne state.

SQUAT SWITCH SENSE

The squat switch sense field can be set to High or Low. If the air/ground logic field is set to squat switch, the squat switch sense field is used to define the state of the squat switch input. If the squat sense field is set to High, then when the squat switch input is high, the aircraft is considered to be on the ground. If the squat sense field is set to low, then when the squat switch input is low, the aircraft is considered to be on the ground.

MAX AIRSPEED

Select the maximum true airspeed for the aircraft. The default value is <=150 KTS.

Table 6-56 Maximum Airspeed Selections

Selection	Description
<= 75 KTS	Max aircraft operating speeds less than or equal to 75 knots TAS.
<= 150 KTS	Max aircraft operating speeds less than or equal to 150 knots TAS.
<=300 KTS	Max aircraft operating speeds less than or equal to 300 knots TAS.
<=600 KTS	Max aircraft operating speeds less than or equal to 600 knots TAS.
<=1200 KTS	Max aircraft operating speeds less than or equal to 1200 knots TAS.
>1200 KTS	Max aircraft operating speeds greater than 1200 knots TAS.
UNKNOWN	Max aircraft speed is unknown.

ADDRESS TYPE

Select the method of entry of the aircraft address.

Table 6-57 Address Type Selections

Selection	Description
US Tail	N-Registration Number (GTN main software version 3.00 or later)
HEX ID	Allows technician to put in the aircraft registration number in hexadecimal code format

ADDRESS

NOTE

The Octal Mode S Address can be converted to hexadecimal format with the use of a scientific calculator. Microsoft Windows calculator can be used by selecting scientific view and then by putting in the octal code. With Oct selected on the calculator, put in the Octal Mode S Address. Change the selection to Hex, as shown in figure 6-93, and put in the shown Hex code into the address field on the GTN.

Put in the Aircraft Address. Put in the aircraft registration number in hexadecimal code format. The Octal code for the Mode S Address is an 8-digit number that can be found on the aircraft registration certificate. The Octal code can also be found at www.faa.gov. Put in the N-number of the aircraft into the N-number inquiry section of the website. Convert the Octal Mode S Address into hexadecimal format and put in the hex ID of the aircraft. If the Flight ID is configured to SAME AS TAIL, make sure the correct tail number shows in the Flight ID field.

Figure 6-93 Microsoft Windows Calculator

FLIGHT ID TYPE

For operation requiring the flight crew to put in an aircraft identification designator, select the page identified as PILOT ENTRY. When this choice is selected and the crew puts in the Flight ID correctly, the flight number call sign for radio contact with ATC is the same flight identification that the GTX 33/33D Mode S transponder replies to ATC radar interrogations.

Table 6-58 Flight ID Type Selections

Selection	Description
CONFIG ENTRY	Allows technician to put in Flight ID while in configuration mode only.
PILOT ENTRY	Forces pilot to put in Flight ID in the GTN in normal mode.
SAME AS TAIL	If Address Type is US Tail, allows Flight ID to use the same number.

Selecting PILOT ENTRY allows the Flight ID to remain the same as that recorded during the previous flight until it is updated, the crew is not prompted to update the Flight ID. The selections “SAME AS TAIL” and “CONFIG ENTRY” are fixed Mode S addresses.

FLIGHT ID

NOTE

Consult with the owner/operator of the aircraft to determine the preferred type of FLIGHT ID entry prior to configuring the Flight ID field.

Put in the flight ID number of the aircraft. This field allows 8 alphanumeric characters.

AIRCRAFT LENGTH

Sets the length of the aircraft to less than or equal to 15 meters (49 ft), less than or equal to 25 meters (82 ft), less than or equal to 35 meters (115 ft), less than or equal to 45 meters (148 ft), less than or equal to 55 meters (180 ft), less than or equal to 65 meters (213 ft), less than or equal to 75 meters (246 ft), less than or equal to 85 meters (279 ft), or more than 85 meters (279 ft).

Put in the aircraft’s minimum length category.

AIRCRAFT WIDTH

Sets the wingspan of the aircraft to less than or equal to 11.5 meters (38 ft), less than or equal to 23.0 meters (75 ft), less than or equal to 28.5 meters (94 ft), less than or equal to 33.0 meters (108 ft), less than or equal to 34.0 meters (112 ft), less than or equal to 38.0 meters (125 ft), less than or equal to 39.5 meters (130 ft), less than or equal to 45.0 meters (148 ft), less than or equal to 52.0 meters (171 ft), less than or equal to 59.5 meters (195 ft), less than or equal to 67.0 meters (220 ft), less than or equal to 72.5 meters (238 ft), less than or equal to 80.0 meters (262 ft), or more then 80.0 meters (262 ft).

Put in the aircraft's minimum width category.

ENHANCED SURVEILLANCE

Sets Enhanced Surveillance (EHS) to DISABLE or ENABLE. When EHS is set to DISABLE the enhanced surveillance function is not available.

SURVEILLANCE INTEGRITY LEVEL

When interfaced to the GTN, the GPS Integrity must be set to 1E-7. This field sets the correct GPS Integrity for the interfaced GPS receiver. Set to 1E-7.

The GPS INTEGRITY configuration field indicates the integrity of the GPS sensor that is connected to the transponder. It is measured in errors per flight hour, 1E-3 being the worst and 1E-7 being the best rating. This data is used in ADS-B transmissions.

TEMPERATURE SENSOR INSTALLED

This field determines if a temperature sensor is connected to the GTX 33/33D. The unit defaults to "No." This STC does not approve the interface to an external OAT probe.

ADS-B OUT (GTN SW v5.10 or Later Only)

NOTE

The settings in this section will affect future ADS-B features and capabilities provided to aircraft which are ADS-B Version 2 compliant in accordance with AC-20-165A but the effect of these setting is not apparent until these features are fully implemented. Please read the description carefully and set these parameters based on each particular aircraft's ability to receive ADS-B data on the 1090 MHz and/or 978 MHz (UAT) band.

NOTE

If 1090 Input and UAT Input are both set to YES, it is important that the aircraft actually has equipment capable of receiving ADS-B on both bands along with the capability to show from both bands simultaneously. If not, a complete traffic picture will not be given by the ADS-B ground stations.

1090 INPUT (GTN SW v3.00 or Later Only)

The 1090 Input setting can be set to YES or NO. This setting controls bits in the transponder's ADS-B Out message that indicates if the aircraft has 1090 MHz ADS-B In equipment. If 1090 MHz ADS-B In equipment is installed in the aircraft, this setting should be set to YES. If not, set this to NO.

UAT INPUT (GTN SW v3.00 or Later Only)

The UAT Input setting can be set to YES or NO. This setting controls bits in the transponder's ADS-B Out message that indicates if the aircraft has 978 MHz (UAT) ADS-B In equipment. If 978 MHz (UAT) ADS-B In equipment is installed in the aircraft or if the owner/operator of the aircraft will be using a handheld UAT receiver for Traffic Information then this setting should be set to YES. If not, set this to NO.

GPS Antenna Longitudinal offset (GTN SW v3.00 or Later Only)

Put in the GPS antenna longitudinal offset distance, rounded to the nearest meter from the nose of the aircraft. This offset is configurable from 2m to 60m.

GPS Antenna Lateral Offset (GTN SW v3.00 or Later Only)

Put in the GPS antenna lateral offset distance, rounded to the nearest meter from the centerline of the aircraft (left or right, looking forward). This offset is configurable from 0m to 6m.

6.10.5 Transponder Audio Configuration

NOTE

If Altitude Monitor and Count Down Timer fields are present, the settings associated with those fields have no affect and can be ignored.

Touch the **Audio Config** key on the XPDR Audio Configuration page to access the XPDR Audio Configuration page.

Figure 6-94 Audio Configuration Page

TIS ALERT

Select the desired audio type for TIS alerts. The choices are Off, Tone, or Message.

VOICE SETTING

Set the voice type to male or female.

VOLUME

Adjust the desired volume level for transponder audio. Volume is adjusted from 0 to +63 dB. The volume of the GTX must be set so as to make sure that aural messages/tones are audible under all anticipated cockpit noise environments.

TEST TONE (GTN SW v5.10 or Later Only)

Select the desired Test Tone. Touching the play key (triangle) on the XPDR Audio Configuration page will play the selected test tone.

Figure 6-95 Test Tone Page

TEST AUDIO (GTN SW v5.10 or Later Only)

Select the desired audio test message. Touching the play key (triangle) on the XPDR Audio Configuration page will play the selected test audio.

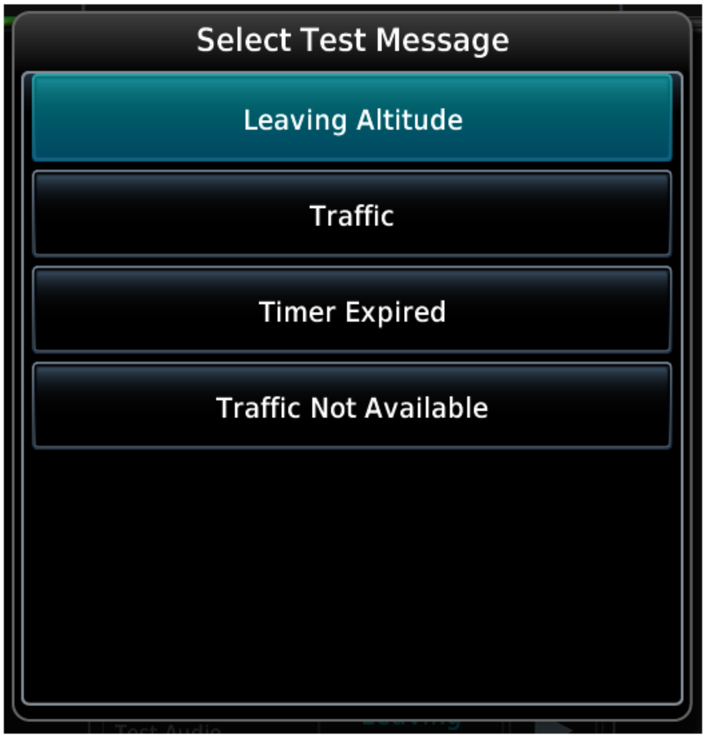


Figure 6-96 Test Audio Page

7 OPERATION/PERFORMANCE CHECKOUT

7.1 Ground Checks - Interfaces (Configuration Mode) 7-2
7.1.1 Airborne Mode 7-2
7.1.2 Audio Panel Interface 7-3
7.1.3 Radio Altimeter Interface 7-4
7.1.4 Discrete Switch Interfaces 7-5
7.2 Ground Checks - Interfaces (Normal Mode) 7-6
7.2.1 Air Data Interface 7-6
7.2.2 AHRS/IRU Interface 7-7
7.2.3 GPS Interface (External GPS Receiver) 7-7
7.2.4 Control Display Interface (GTX 33 and GTX 3X5R) 7-8
7.2.5 Interface (GTX 345) 7-8
7.2.6 External Traffic System Interface (GTX 345) 7-9
7.2.7 Temperature Interface (GTX 3X5) 7-10
7.2.8 TIS-A Interface (GTX 33/330/335) 7-10
7.2.9 TIS-B / FIS-B Interface (GTX 345) 7-10
7.3 Ground Checks - Performance 7-12
7.3.1 GPS Reception (Internal GPS Receiver) 7-12
7.3.2 Regulatory Tests 7-13
7.3.3 ADS-B Out Test 7-13
7.3.4 EMC Check 7-14
7.4 Documentation Checks 7-16
7.4.1 Airplane Flight Manual Supplement 7-16
7.4.2 Configuration and Checkout Log 7-16
7.4.3 Instructions for Continued Airworthiness 7-16

7.1 Ground Checks - Interfaces (Configuration Mode)

If a dual GTX installation is being performed, the performance and checkout procedures contained in this section must be completed for each installed transponder.

Certain test procedures require the use of a Mode S transponder ramp tester such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

7.1.1 Airborne Mode

Certain test procedures require the transponder to be placed in an airborne state to reply to any Mode A or Mode C interrogations. The GTX uses advanced Air/Ground logic to determine the state of the transponder. This logic must be temporarily bypassed in order to place the transponder in an airborne state. To place the transponder into an airborne state, perform the following procedure.

For GTX 33X software v7.4 and lower:

1. If the GTX squat switch input (P3307-17) is connected: put the connected switch in the airborne position.
2. If the GTX squat switch input (P3307-17) is not connected: temporarily configure this input sense state to airborne using one of the following procedures:

For panel mounted GTX 330 transponders:

a. Start the GTX in configuration mode (hold the **OFF** key to power down the unit, then hold the **FUNC** key and push the **ON** key).

b. Push the **FUNC** key until the SQUAT SWITCH page is displayed. Use the **CRSR** and **8**/**9** keys to change the setting to YES and the SENSE to LOW. Push the **CRSR** key until fields are no longer highlighted to save the change.

c. Restart the GTX in normal mode.

For remotely mounted GTX 33 transponders (GTN Interface):

d. Start the GTN in configuration mode (hold the **HOME** key while cycling power).

e. Navigate to the XPDR 1 Installation Settings page and set the Air/Ground Logic setting to Squat Switch and the Squat Switch Sense to Low.

f. Restart the GTN in normal mode.

For remotely mounted GTX 33 transponders (GNS 480 Interface):

g. Enter the configuration mode on the GNS 480.

h. Open the GTX configuration pages, and locate the SQUAT SWITCH setting.

i. Set the SQUAT SWITCH to YES and the SENSE to LOW. If a squat switch is present in the aircraft, configure the SENSE to override.

j. Restart the GNS 480 and transponder in normal mode.

For GTX 33X software v8.02 (and higher) and GTX 3X5:

Perform the applicable procedure for the GTX interface installed in the aircraft.

For panel mounted GTX 330 or GTX 3X5 transponders:

1. Start the GTX in Ground Test mode (hold the **CRSR** key and press the **ON** key).
2. "TEST" will be annunciated on the GTX 330, and a "GROUND TEST MODE" alert message will be displayed on the GTX 3X5 message screen.

For remotely mounted GTX 33 or GTX 3X5R transponders (GTN Interface):

1. Start the GTN in configuration mode (hold the **HOME** key while cycling power).
2. Navigate to the XPDR 1 Installation Settings page and press the **Force Airborne Test** key.
3. Restart the GTN in normal mode.

For remotely mounted GTX 33 transponders (GNS 480 Interface):

1. Enter configuration mode on the GNS 480.
2. Navigate to the GTX configuration pages and locate the SQUAT SWITCH setting.
3. Set the SQUAT SWITCH to "YES" and set the SENSE to "LOW." If a squat switch is present in the aircraft, configure the SENSE to override.
4. Restart the GNS 480 and transponder in normal mode. The transponder will now be in airborne mode.
5. After tests are completed, reconfigure the transponder and the GNS 480 back to their original settings.

For remotely mounted GTX 3X5R transponders (GNS 480, G1000 Interface):

1. Connect the GTX 3X5 Installation Tool to the GTX 3X5R unit.
2. Place the unit into Ground Test mode from the State page of the GTX 3X5 Installation Tool.

NOTE

The transponder should only be placed into Airborne Test mode for testing. Once testing is complete, either return the squat switch to original settings or remove the GTX from Ground Test mode.

7.1.2 Audio Panel Interface

The audio alert volume checkout can be performed during unit configuration as described in section 6.3.1. If the checkout procedure is performed during unit configuration, steps 1 and 2 of each of the following procedures should be skipped.

For panel mounted GTX 33X transponders:

1. Start the GTX in configuration mode (hold the **OFF** key to power down the unit, then hold the **FUNC** key and push the **ON** key).
2. Navigate to the Audio Mode page (press the **START/STOP** key to reach the "Jump To" menu. Select the DISPLAY/AUDIO item to jump to the Audio Mode page).
3. Choose each selection of the MESSAGE item to play the test audio.
4. Make sure the aural messages/tones will be heard under all anticipated cockpit noise conditions.

For panel mounted GTX 3X5 transponders:

1. Start the GTX 3X5 in configuration mode (hold the **OFF** key to power down the unit, then hold the **ENT** key and push the **ON** key).
2. Navigate to the AUD page (push the **FUNC** key to cycle through pages).
3. Choose each selection of the TEST AUDIO item to play the test audio.
4. Make sure the aural messages/tones will be heard under all anticipated cockpit noise conditions.

For remotely mounted GTX 33 transponders (GTN Interface):

1. Start the GTN in configuration mode (hold the **HOME** key while cycling power).
2. Navigate to the Transponder Audio Configuration menu (External Systems > XPDR > Audio Config).
3. Choose each selection of the TEST TONE and TEST AUDIO items. Touch the play key (triangle) to play the selected test audio.
4. Make sure the aural messages/tones will be heard under all anticipated cockpit noise conditions.

For remotely mounted GTX 3X5R transponders (PC Install Tool):

1. Start the GTX 3X5R in configuration mode. (With the GTX 3X5R powered off, connect a computer to the GTX 3X5R via USB. Apply power to the GTX 3X5R, then run the Install Tool.)
2. Navigate to the Audio Configuration page.
3. Choose each selection of the TEST AUDIO item. Select the **TEST** key to play the selected test audio.
4. Make sure the aural messages/tones will be heard under all anticipated cockpit noise conditions.

7.1.3 Radio Altimeter Interface

For panel mounted GTX 33X transponders:

1. Start the GTX in configuration mode (hold the **OFF** key to power down the unit, then hold the **FUNC** key and push the **ON** key).
2. Navigate to the 429 RX page (push the **START/STOP** key to reach the “Jump To” menu. Select the I/O CONFIG item to jump to the ARINC 429 RX page).
3. Check the A429 channel that is configured for RADAR ALTIMETER (the correct channel should be labeled 164).
4. Make sure the radar altitude provided is correct.

For panel mounted GTX 3X5 transponders:

1. Start the GTX 3X5 in configuration mode (hold the **OFF** key to power down the unit, then hold the **ENT** key and push the **ON** key).
2. Navigate to the DIAG page (push the **FUNC** key to cycle through pages).
3. Select the A429 channel that is configured for RADIO ALTITUDE (the correct channel should be labeled 164).
4. Make sure the radar altitude provided is correct.

For remotely mounted GTX 3X5R transponders:

1. Start the GTX 3X5R in configuration mode. (With the GTX 3X5R powered off, connect a computer to the GTX 3X5R via USB. Apply power to the GTX 3X5R, then run the Install Tool.)
2. Navigate to the Connection Status page under the Diagnostics tab on the GTX 3X5 Install Tool.
3. Check the A429 channel that is configured for RADAR ALTIMETER.
4. Make sure the radar altitude provided is correct.

7.1.4 Discrete Switch Interfaces

Perform the following procedure for each optional remote switch interfaced to the GTX transponder.

For panel mounted GTX 330 transponders:

1. Start the GTX in configuration mode (hold the **OFF** key to power down the unit, then hold the **FUNC** key and push the **ON** key).
2. Navigate to the External Switch State page (push the **START/STOP** key to reach the “Jump To” menu. Select the DIAGNOSTICS item to jump to the GRAY CODE page. push the **FUNC** key to cycle through pages).
3. Observe the External Switch States while activating each optional switch (for the squat switch this may require the switch to be manually pulled LOW or HIGH, depending on configuration).
4. Make sure External Switch State indicates when each optional switch is activated.

For panel mounted GTX 3X5 transponders:

1. Start the GTX 3X5 in configuration mode (hold the **OFF** key to power down the unit, then hold the **ENT** key and push the **ON** key).
2. Navigate to the DIAG page (push the **FUNC** key to cycle through pages).
3. Set the Discrete Inputs that are interfaced and configured for the GTX.
4. Observe the Discrete Input States while activating each optional switch (for the squat switch this may require the switch to be manually pulled LOW or HIGH, depending on configuration).
5. Make sure Discrete Input State indicates when each optional switch is activated.

For remotely mounted GTX 3X5R transponders:

1. Start the GTX 3X5R in configuration mode. (With the GTX 3X5R powered off, connect a computer to the GTX 3X5R via USB. Apply power to the GTX 3X5R, then run the Install Tool.)
2. Navigate to the Discretes page under the Diagnostics tab on the GTX 3X5 Install Tool.
3. Observe the Discrete Input States while activating each optional switch (for the squat switch this may require the switch to be manually pulled LOW or HIGH, depending on configuration).
4. Make sure Discrete Input State indicates when each optional switch is activated.

7.2 Ground Checks - Interfaces (Normal Mode)

If a dual GTX installation is being performed, the performance and checkout procedures contained in this section must be completed for each installed transponder.

Certain test procedures require the use of a Mode S transponder ramp tester such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

7.2.1 Air Data Interface

The GTX receives altitude data from an external source or internally from the optional Garmin Altitude Encoder. If a Garmin Altitude Encoder is included in the installation, it must be configured OFF for portions of the following procedure. Refer to section 6.3.5 for configuration instructions.

If the following steps do not perform correctly, check the electrical connections and configuration setup for the interfaced data source.

NOTE

After applying power to an altitude source it may take several minutes to warm up. During the warm-up period the Altitude display on the GTX will be dashed out.

1. Configure the Garmin Altitude Encoder OFF if it is included in the installation.
2. Power up the GTX in Normal Mode.
3. If there are multiple sources providing air data to the GTX, remove power from all but one source.
4. For remotely mounted GTX 33 or GTX 3X5R transponders: make sure the transponder field of the control display shows a red X when power is removed from the active source.

   For panel mounted GTX 330 or GTX 3X5 transponders: make sure that the appropriate data on the GTX is displayed and agrees with the active source.
5. If there are multiple sources, remove power from the currently active source and apply power to another source that has not been checked.
6. Repeat steps 3 and 4 until all available sources have been checked.
7. Configure the Garmin Altitude Encoder ON if it is included in the installation.
8. Remove power from all external air data sources.
9. Repeat step 4 to check the Garmin Altitude Encoder.

7.2.2 AHRS/IRU Interface

The GTX receives heading data from an external source. This check makes sure that the GTX is receiving data from these units.

1. Make sure the GTX is powered on and is transmitting (the unit is not in SBY mode).
2. Make sure the GTX is not in an "AIR" state.

Examine the electrical connections and configuration setup for the interfaced AHRS/IRU if the following steps do not perform correctly.

3. Using a test set capable of displaying ADS-B Out data, make sure heading reported from the active transponder matches that of the source.
4. Remove power from the heading source and make sure that the magnetic heading field is dashed out on the test set.
5. Repeat step 3 and step 4 for all transponders interfaced with an applicable heading source.

7.2.3 GPS Interface (External GPS Receiver)

The GTX receives position source data from an external source. This check makes sure the GTX is receiving data from these units. Make sure the GTX and the position source is powered on and has acquired a valid signal.

If the following steps do not perform correctly, examine the electrical connections and configuration setup for the interfaced position source.

NOTE

In order for the Transponder to relay the additional accuracy and integrity required by AC 20-165A Version 2 compliant equipment, the GPS unit's RS-232 serial output must be configured to the extended ADS-B format. This is indicated via selections with a "+" in the selections title (i.e., "ADS-B OUT+," "GTX Mode S+," "Panel GTX w TIS+").

1. If there are multiple sources providing position source data to the GTX, remove power from all but one source.
2. For remotely mounted GTX 33 or GTX 3X5R transponders: make sure an "ADS-B FAIL" system message or annunciation is not active on the interfaced control display.

   For panel mounted GTX 330 or GTX 3X5 transponders: make sure the "NO ADSB" annunciation is removed from the display.
3. If there are multiple sources, remove power from the currently active source and apply power to another source that has not been checked.
4. Repeat steps until all available sources have been checked.

7.2.4 Control Display Interface (GTX 33 and GTX 3X5R)

Perform the following checkout procedure for each control display that is interfaced to the remote transponder.

1. Power on the interfaced control display and the transponder in normal mode.
2. Make sure there is no red X over the transponder data field on the control display.
3. Make sure a code can be entered into the code field on the control display, change the code.
4. Make sure the new code that was entered is displayed in the transponder field.

If dual transponders are installed:

5. Select transponder 2 and repeat steps 2 through 4.
6. Pull the breaker on each transponders and make sure the correct transponder data field on the control display contains a red X.

7.2.5 Interface (GTX 345)

The GTX 345 can interface to PEDs via Bluetooth using internal hardware, or through a Flight Stream remote gateway.

NOTE

A compatible PED with the Garmin Pilot Application is required to perform the ground checks. Visit Garmin's website for a list of compatible devices.

7.2.5.1 Internal Bluetooth Setup

If a Flight Stream device is interfaced to the GTX 345, refer to Flight Stream installation data for Bluetooth setup and pairing procedures.

1. Place the GTX 345 into Bluetooth pairing mode by navigating to the Bluetooth page under the System menu.
2. Enable Bluetooth connectivity on the PED. Once enabled, the GTX 345 will be viewable in the list of available devices.
3. Select the GTX 345 from the list of available Bluetooth devices on the PED.

7.2.5.2 Bluetooth Interface Check

After pairing a compatible PED with the GTX 345 or Flight Stream, perform the following checkout using the Garmin Pilot application.

1. On the Garmin Pilot application, go to the Connext page.
2. Select the “GTX 345” from the list of devices and make sure the status is “Connected.”

If the GTX 345 is interfaced to a display capable of presenting traffic and/or weather data:

3. Crosscheck the traffic and/or weather data shown on the Garmin Pilot application against the data presented on the interfaced display.

7.2.6 External Traffic System Interface (GTX 345)

The following checkout procedure should be performed for GTX 345 units that are interfaced between an external traffic system (TAS/TCAS) and a traffic control display.

Examine the electrical connections and configuration setup for the GTX 345 and the interfaced TAS or TCAS system if the following steps do not perform correctly.

For a GTX 345 that is interfaced to a Garmin GTS 8XX, L-3 Communications SKY497/SKY899 SkyWatch®, or Honeywell KTA/KMH traffic system, and is not interfaced to a G950/1000:

1. Go to the Traffic page on the interfaced control display that is configured for traffic system control.
2. Make sure the TAS or TCAS system status does not indicate failed.
3. Make sure the TAS or TCAS system operating mode can be changed by selecting operate or standby on the display. Make sure the TAS or TCAS system status indicates the selected mode (operate or standby).
4. Change the TAS or TCAS operating mode to standby.
5. Select the traffic system test function on the display. Verify the TAS or TCAS system status indicates test mode, the traffic system executes its self-test, and a self-test pattern is displayed on the traffic display.

For a GTX 345 that is interfaced to an Avidyne (Ryan) TAS 6XX (9900BX) traffic system, and is not interfaced to a G950/1000:

1. Go to the Traffic page on the interfaced display configured for TCAD control.
2. Make sure the TCAD system status does not indicate failed.
3. Make sure the TCAD ground mode can be selected by changing the on or off selection in the TCAD control menu. Make sure the TCAD system status indicates ground when ground mode is selected and standby or operate otherwise.

For a GTX 345R that is interfaced to a TAS/TCAS traffic system, and is interfaced to a G950/1000:

This checkout procedure must be performed with the GTX 3X5 Install Tool and a TCAS ramp tester.

1. Set the aircraft altimeter to 29.92" to find the local pressure altitude.
2. Connect the GTX 345R unit to the GTX 3X5 Installation Tool.
3. Set the TCAS ramp tester to the scenario in the table below.

Table 7-1 Ramp Test Pressure Altitude Check Scenario

Intruder Type	Intruder Start Distance	Intruder Start Altitude	Vertical Speed	Velocity
ATCRBS	10 NM	Local pressure altitude (from step 1)	0 fpm	0 Kts

4. Select the Operate key on the GTX 3X5 Install Tool State page to put the TCAS system into Operate mode.
5. Start the intruder test scenario on the test set.
6. Make sure the intruder is shown with a relative altitude of “00” (same altitude as ownship) on the traffic display.

7. Select the Standby key on the GTX 3X5 Install Tool State page to put the TCAS system into Standby mode.
8. Select the Disconnect key on the GTX 3X5 Install Tool State page.
9. Disconnect the GTX 345R unit from the GTX 3X5 Install Tool.

7.2.7 Temperature Interface (GTX 3X5)

For panel mounted GTX 3X5 transponders:

1. Press the FUNC key to cycle through pages until OAT is displayed.
2. Remove power from all Air Data sources interfaced to the GTX.
3. Make sure the OAT is provided and is correct.

For panel mounted GTX 3X5 transponders:

1. Navigate to the ALT page (press the FUNC key to cycle through pages).
2. Use the 8/9 keys to scroll until SAT is displayed.
3. Remove power from all Air Data sources interfaced to the GTX.
4. Make sure the SAT is provided and is correct.

7.2.8 TIS-A Interface (GTX 33/330/335)

If a GTX installation includes a TIS-A display interface, the traffic interface must be verified.

1. Select the Traffic Map on the display.
2. Make sure that TIS FAIL is not displayed and that NO DATA (yellow) is not displayed.
3. On the Traffic Map page, make sure that the status of the traffic system is either TIS Standby or TIS Operating/Unavailable (i.e., TAS should not be displayed).

7.2.9 TIS-B / FIS-B Interface (GTX 345)

1. Go to the LRU status page on the interfaced display.

   For a GTX 345 interfaced to a GTN:

   a. Navigate to the GTX Status page (System > External LRUs)
   b. Make sure that the GTX Status is marked with a green check.

   For a GTX 345 interfaced to a GNS:

   a. Interfaced LRU status is not available on the GNS. This interface must be verified using steps 2-7.

For a GTX 345R interfaced to a G950/1000:

a. Use the FMS knob to navigate to the SYSTEM STATUS page in the AUX page group.

b. Make sure that the GTX Status is marked with a green check in the LRU INFO window.

For a GTX 345 interfaced to a GTN or a G950/1000:

The following steps are recommended and may be performed as a ground check if the aircraft is located within range of an FAA ground station and targets of opportunity are available. If this is not the case, it is recommended these checks be performed in flight within range of an FAA ground station.

For a GTX 345 interfaced to a GNS:

The following steps must be performed. If the aircraft is not located within range of an FAA ground station, an ADS-B ramp tester such as an Aeroflex IFR-6000 or TIC TR-220 must be used to provide simulated TIS-B and FIS-B data to the GTX. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

2. Go to the traffic page on the interfaced display.
3. Make sure there are no ADS-B FAIL or TRAFFIC FAIL annunciations on the traffic page.
4. Observe targets of opportunity from ADS-B equipped aircraft, or an FAA ground station.
5. Go to the weather page on the interfaced display.
6. Set the weather page to display multiple weather products. (It may take up to 10 minutes after power up for the system to begin receiving FIS-B weather products.)
7. Make sure at least one selected weather product displays a valid time stamp.

7.3 Ground Checks - Performance

If a dual GTX installation is being performed, the performance and checkout procedures contained in this section must be completed for each installed transponder.

Certain test procedures require the use of a Mode S transponder ramp tester such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

7.3.1 GPS Reception (Internal GPS Receiver)

NOTE

GPS reception checks are not necessary if an external GPS source is in use.

The GPS reception check is applicable to GTX 335 and GTX 345 units with the internal GPS receiver.

1. Make sure the LAT/LON on the ADS-B Out page matches a known reference.
2. Select 121.150 MHz on the COM transceiver to be tested.
3. Transmit for a period of 35 seconds.
4. Make sure the GPS position remains valid.
5. Repeat steps 3 and 4 for these frequencies:
   - 121.15 MHz
   - 121.17 MHz
   - 121.20 MHz
   - 121.22 MHz
   - 121.25 MHz
   - 131.20 MHz
   - 131.22 MHz
   - 131.25 MHz
   - 131.27 MHz
   - 131.30 MHz
   - 131.32 MHz
   - 131.35 MHz
6. For VHF radios that include 8.33 kHz channel spacing, include the following frequencies in addition to those in step 5.
   - 121.185 MHz
   - 121.190 MHz
   - 130.285 MHz
   - 131.290 MHz
7. Repeat steps 2 through 6 for all remaining COM transceivers in the aircraft.
8. Turn on the TCAS system and make sure the GPS position remains valid if the aircraft is TCAS equipped.
9. Use the SATCOM system to make sure the GPS position remains valid if the aircraft is SATCOM equipped.

7.3.2 Regulatory Tests

With the transponder operating in normal mode and in an airborne state (refer to section 7.1.1), the following regulatory tests are required to be performed. The Altitude Reporting Equipment Test is required to be performed for each altitude source interfaced to the transponder, including the Garmin Altitude Encoder.

These regulatory tests require the use of a Mode S transponder ramp tester such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

1. Altitude Reporting Equipment Tests in accordance with 14 CFR Part 91.411 and Part 43 Appendix E.
2. ATC Transponder Tests and Inspections in accordance with 14 CFR Part 91.413 and Part 43 Appendix F.

7.3.3 ADS-B Out Test

The ADS-B Out test procedure requires the use of a Mode S transponder ramp tester such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

1. Make sure the aircraft is in a location where a GPS signal is receivable (e.g., outdoors with a clear view of the sky).
2. Power on the aircraft/avionics.
3. Make sure the GPS source(s) have acquired a position.
4. Make sure the GTX transponder is in ADS-B TX mode.
5. Using the transponder test set, make sure the following ADS-B Out parameters are being transmitted:
    - Aircraft emitter category is Light Airplane < 15,500 pounds (On the TR-220 this is indicated as “A1”).
    - Aircraft Length documented in the aircraft checkout log.
    - Aircraft Width documented in aircraft checkout log.
    - 1090 ADS-B In Capability matches the configuration setting documented in the aircraft checkout log.
    - UAT (978) ADS-B In Capability matches the configuration setting documented in the aircraft checkout log.
6. Place the GTX transponder into airborne state (refer to section 7.1.1).
7. If dual GPS sources are connected to the GTX, disable the GPS source not being checked by covering the GPS antenna or removing power from that navigator.
8. Make sure that the GPS source not being checked is no longer receiving satellite data.
9. Make sure that the GPS source being checked has acquired position.
10. Select ALT mode on the GTX.
11. Using the transponder test set, make sure the following ADS-B Out parameters are being transmitted:
    - NACv $\geq$ 1
    - SDA $\geq$ 2
    - SIL $\geq$ 3
    - NACp $\geq$ 8
    - NIC $\geq$ 7
12. If dual GPS sources are connected to the GTX, repeat steps 6 through 10 for the other GPS source.

7.3.4 EMC Check

An EMC check must be conducted for each GTX after it is installed and all interfaces to external equipment are verified to be correctly working. The EMC check verifies that the GTX is not producing unacceptable interference in other avionics systems and that other avionics systems are not producing unacceptable interference in the GTX. An example EMC Source/Victim matrix is shown in figure 7-1.

1. Enter equipment installed in the aircraft into the Source row and Victim column of the fillable form.
2. Apply power to all avionics systems except the GTX.
3. Make sure all existing avionics systems are properly functioning.
4. Apply power to the GTX. (For the GTX 3X5R, connect a computer to the GTX 3X5R via USB before applying power to the unit. Apply power to the GTX 3X5R, then run the Install Tool.)
5. If the unit is a GTX 345 with the internal Bluetooth feature enabled, pair a compatible PED device to the GTX 345.
6. Remove power from all other avionics systems. (For the GTX 33, do not remove power from the interfaced control display.)
7. Apply power and/or operate the systems listed on the fillable form, one system at a time.
8. For panel mounted GTX 330 or GTX 3X5 transponders: make sure there are not any active faults on the GTX (panel mount unit).

   For remotely mounted GTX 33 transponders: make sure there are not any active fault message for the GTX 33 on the interfaced control display.

   For remotely mounted GTX 3X5R transponders: make sure there are not any active faults on the GTX 3X5 Install Tool Status page (remote mount unit).
9. Make sure that each system functions properly.

For VHF COM radios:

a. Monitor one local frequency, one remote (far field) frequency, and one unused frequency.

b. Make sure no unintended squelch breaks or audio tones interfere with communications.

For VHF NAV radios:

c. Monitor one local frequency, one remote (far field) frequency, and one unused frequency.

d. Make sure there are no guidance errors.

e. Make sure no audio tones interfere with the station ID.

10. Repeat steps 7 through 9 until every system listed on the fillable form has been checked.

	VICTIM																																			
SOURCE	Attitude Indicator	Airspeed Indicator	Altimeter	Vertical Speed Indicator	Turn and Bank Indicator	Heading Indicator	Magnetic Compass	Clock	OAT Indicator	Power Plant Instruments	Autopilot / SAS	Navigation Radio(s)	Communication Radio(s)	Engine Relight	Fuel Valve	Pitot Heat	Pulse Light	Generator	Pos Lt	Anti Coll Lt	Ldg Lts	Gov RPM Incr / Decr	Eng Deicing	Hyd System	Radar Altimeter	TAS/TCAS	GTX 3XX	Audio Panel	GTN	GMA 35 or GMA 35c	Traffic Sensor 1	Traffic Sensor 2				
Attitude Indicator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Airspeed Indicator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Altimeter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vertical Speed Indicator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Turn and Bank Indicator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Heading Indicator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Magnetic Compass	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Clock	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
OAT Indicator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Power Plant Instruments	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Autopilot / SAS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Navigation Radio(s)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Communication Radio(s)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Engine Relight	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fuel Valve	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pitot Heat	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pulse Light	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Generator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pos Lt	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Anti Coll Lt	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ldg Lts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gov RPM Incr / Decr	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Eng Deicing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hyd System	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Radar Altimeter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
TAS/TCAS	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
GTX 3XX	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Audio Panel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
GTN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flight Stream	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
GMA 35 or 35c	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Traffic Sensor 1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Traffic Sensor 2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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Figure 7-1 Example EMC Source/Victim Matrix

7.4 Documentation Checks

7.4.1 Airplane Flight Manual Supplement

Ensure that the Airplane Flight Manual Supplement (AFMS) is completed and inserted in the Airplane Flight Manual (AFM) or Pilot's Operating Handbook (POH).

1. Fill in the required airplane information in the AFMS.
2. Fill in the appropriate check boxes in the Installation Configuration section of the AFMS as described in section 4.6.
3. Insert the completed AFMS into the AFM or POH.

7.4.2 Configuration and Checkout Log

NOTE

If a dual GTX installation is being performed, a checkout log for each unit must be completed.

The configuration log sheet contained in Appendix A of *GTX 33X and GTX 3X5 ADS-B Maintenance Manual* should be completed during the initial installation and maintained with the aircraft permanent records.

1. Fill in the General Information for the aircraft and GTX transponders.
2. Calculate and record the change in electrical load.
3. List the equipment interfaced to the GTX transponder.
4. Complete the wire routing diagram that is appropriate for the type of aircraft.
5. Complete the Post Installation Configuration Log that is appropriate for the GTX transponder type.
6. Create new wiring diagrams indicative of the installation. Or markup the interconnect diagrams from the STC Installation Manual detailing which equipment was installed and how it was connected.

7.4.3 Instructions for Continued Airworthiness

Make sure that the appropriate information is filled in on the Instructions for Continued Airworthiness (ICA), in the GTX 33X and GTX 3X5 ADS-B Out Maintenance Manual, and ensure it is completed and inserted in the aircraft permanent records.

1. Fill out the Configuration and Checkout Log provided in Appendix A of the Maintenance Manual as described in Section 7.4.2.
2. Insert the Instructions for Continued Airworthiness (section 4 of the Maintenance Manual) and the completed Appendix A of the Maintenance Manual into the aircraft permanent records.

8 CONNECTOR PINOUT

8.1 GTX 33X 8-1
8.1.1 GTX 33/33D (J3301) 8-1
8.1.2 GTX 330/330D (J3301) 8-4
8.1.3 GTX 330/330D Power and Lighting Inputs 8-6
8.1.4 GTX 33/330 Temperature Inputs 8-7
8.1.5 GTX 33X Encoded Altitude Outputs 8-7
8.1.6 GTX 33X Discrete Outputs 8-8
8.1.7 GTX 33X Discrete Inputs 8-8
8.2 GTX 3X5 8-8
8.2.1 GTX 335/335R/345/345R (J3251) 8-8
8.2.2 GTX 345/345R (J3452) 8-11
8.2.3 GTX 3X5 Power and Lighting Inputs 8-11
8.2.4 GTX 3X5 Power Control Input 8-12
8.2.5 GTX 3X5 Encoded Altitude Outputs 8-12
8.2.6 GTX 3X5 Discrete Outputs 8-14
8.2.7 GTX 3X5 Discrete Inputs 8-15

NOTE

The information in this section is to select interfaces and function capabilities. It is not to be used to find other manufacturer's interfaced component requirements. Refer to interfaced equipment manufacturer's installation manuals for equipment specific requirements.

8.1 GTX 33X

This section gives the pin functions, inputs, and outputs of the GTX 33X series transponders.

8.1.1 GTX 33/33D (J3301)

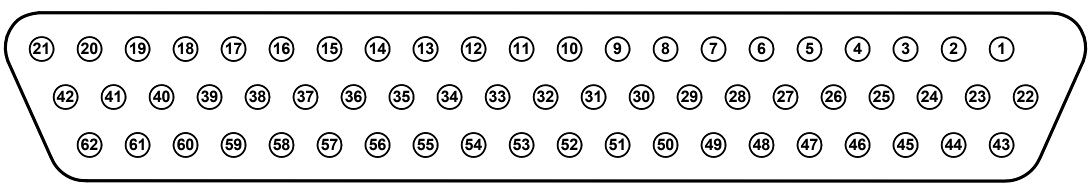


Figure 8-1 Rear View, Connector P3301

Table 8-1 GTX 33/33D J3301 Pin Assignments

Pin	Pin Name	I/O
1	RESERVED	In
2	ALTITUDE A1	In
3	ALTITUDE C2	In
4	ALTITUDE A2	In
5	ALTITUDE A4	In
6	ALTITUDE C4	In
7	ALTITUDE B1	In
8	ALTITUDE C1	In
9	ALTITUDE B2	In
10	ALTITUDE B4	In
11	ALTITUDE D4	In
12	EXTERNAL IDENT SELECT*	In
13	EXTERNAL STANDBY SELECT*	In
14	NOT USED	In
15	AUDIO OUT HI	Out
16	AUDIO OUT LO	Out
17	SQUAT SWITCH IN	In
18	RESERVED	--
19	ALTITUDE ALERT ANNUNCIATE*	Out
20	RESERVED	--
21	AIRCRAFT POWER 1	In
22	RS-232 IN 1	In
23	RS-232 OUT 1	Out
24	RS-232 IN 2	In
25	RS-232 OUT 2	Out
26	ARINC 429 IN 3 A	In
27	POWER GROUND	--
28	ARINC 429 OUT 2 B	Out
29	ARINC 429 IN 3 B	In
30	ARINC 429 OUT 2 A	Out
31	EXTERNAL SUPPRESSION I/O	I/O
32	ARINC 429 IN 1 A	In
33	ARINC 429 IN 2 A	In
34	ARINC 429 OUT 1 B	Out

Pin	Pin Name	I/O
35	ARINC 429 IN 1 B	In
36	ARINC 429 IN 2 B	In
37	ARINC 429 OUT 1 A	Out
38	RESERVED	--
39	RESERVED	--
40	SPARE	--
41	CURRENT TEMPERATURE PROBE OUT	Out
42	AIRCRAFT POWER 1	In
43	POWER GROUND	--
44	CURRENT TEMPERATURE PROBE IN	In
45	NOT USED	In
46	TIS CONNECT SELECT*	In
47	AUDIO MUTE SELECT*	In
48	ARINC 429 IN 4 A	In
49	ARINC 429 IN 4 B	In
50	ALTITUDE COMMON (GROUND)	--
51	SIGNAL GROUND	--
52	RESERVED	--
53	RESERVED	--
54	XPDR REMOTE POWER OFF	In
55	NOT USED	--
56	AIRCRAFT POWER 2	In
57	NOT USED	--
58	SIGNAL GROUND	--
59	NOT USED	--
60	AIRCRAFT POWER 2	In
61	NOT USED	--
62	SWITCHED POWER OUT	Out

* Shows an Active Low (ground to operate)

8.1.2 GTX 330/330D (J3301)

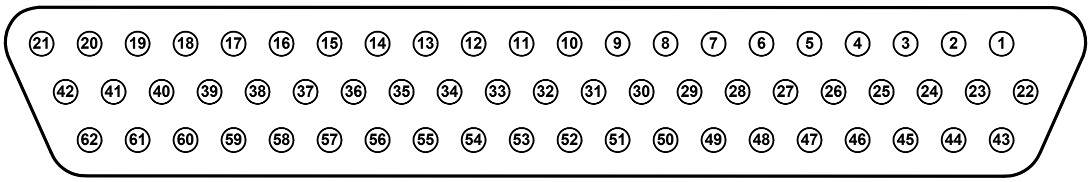


Figure 8-2 Rear View, Connector J3301

Table 8-2 GTX 330/330D J3301 Pin Assignments

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

Pin	Pin Name	I/O
27	POWER GROUND	--
28	ARINC 429 OUT 2 B	Out
29	ARINC 429 IN 3 B	In
30	ARINC 429 OUT 2 A	Out
31	EXTERNAL SUPPRESSION I/O	I/O
32	ARINC 429 IN 1 A	In
33	ARINC 429 IN 2 A	In
34	ARINC 429 OUT 1 B	Out
35	ARINC 429 IN 1 B	In
36	ARINC 429 IN 2 B	In
37	ARINC 429 OUT 1 A	Out
38	RESERVED	--
39	RESERVED	--
40	SPARE	--
41	CURRENT TEMPERATURE PROBE OUT	Out
42	AIRCRAFT POWER 1	In
43	POWER GROUND	--
44	CURRENT TEMPERATURE PROBE IN	In
45	14V / 5V LIGHTING BUS HI	In
46	TIS CONNECT SELECT*	In
47	AUDIO MUTE SELECT*	In
48	ARINC 429 IN 4 A	In
49	ARINC 429 IN 4 B	In
50	ALTITUDE COMMON (GROUND)	--
51	SIGNAL GROUND	--
52	RESERVED	--
53	RESERVED	--
54	RESERVED	--
55	SPARE	--
56	AIRCRAFT POWER 2	In
57	SPARE	--
58	RESERVED	--
59	SPARE	--
60	AIRCRAFT POWER 2	In

Pin	Pin Name	I/O
61	SPARE	--
62	SWITCHED POWER OUT	Out

* Shows an Active Low (ground to operate)

8.1.3 GTX 330/330D Power and Lighting Inputs

Power and lightening input requirements are recorded in this section. Refer to appendix B for power and lighting interconnections.

- The power input pins accept 14/28 VDC.
- AIRCRAFT POWER 2 is used to connect to a different power source.
- Switched Power Out is a power source available for a remote digital altitude encoder device.
- The GTX 330 unit is configurable to adjust to a 28 VDC, 14 VDC, or 5 VDC lighting bus.
- The GTX 330 automatically adjusts for ambient lighting conditions because of the photocell.

Table 8-3 Lighting/Power Pin Assignments

Pin Name	Pin Number	I/O	GTX Unit
AIRCRAFT POWER 1	21	In	All
AIRCRAFT POWER 1	42	In	All
AIRCRAFT POWER 2	56	In	All
AIRCRAFT POWER 2	60	In	All
SWITCHED POWER OUT	62	Out	All
POWER GROUND	27	--	All
POWER GROUND	43	--	All
14 V/5 V LIGHTING BUS HI	45	In	330/330D Only
28 V LIGHTING BUS HI	14	In	330/330D Only
SIGNAL GROUND	51	--	33/33D Only
SIGNAL GROUND	58	--	33/33D Only
XPDR REMOTE POWER OFF	54	In	33/33D Only

8.1.4 GTX 33/330 Temperature Inputs

- Outside Air Temperature (OAT) display and Density Altitude computations use temperature input.
- For GTX 33/33D installations, the external display system has the temperature function.

Table 8-4 Temperature Probe Pin Assignments

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

8.1.5 GTX 33X Encoded Altitude Outputs

Parallel Gray code altitude inputs are active if the voltage to ground is < 1.9 V or the resistance to ground is < 375 Ω. These inputs are inactive if the voltage to ground is 11-33 VDC.

Table 8-5 GTX 33X Encoded Altitude Outputs

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

8.1.6 GTX 33X Discrete Outputs

Table 8-6 GTX 33X Discrete Outputs

Pin Name	Pin Number	Unit	I/O
ALTITUDE ALERT ANNUNCIATE*	19	ALL	OUT
EXTERNAL SUPPRESSION I/O	31	ALL	IN/OUT
* INACTIVE: 11 ≤ Vin ≤ 33 VDC (open) ACTIVE: Vin ≤ 1.9 VDC or Rin ≤ 375 Ω (grounded) Sink current is internally limited to 200 μA max for grounded pin.			

8.1.7 GTX 33X Discrete Inputs

Table 8-7 GTX 33X Discrete Inputs

Pin Name	Pin Number	Unit	I/O
AVIONICS MASTER ON SELECT	1	330 ONLY	IN
EXTERNAL IDENT SELECT*	12	ALL	IN
EXTERNAL STANDBY SELECT*	13	ALL	IN
SQUAT SWITCH INPUT	17	ALL	IN
TIS CONNECT SELECT*	46	ALL	IN
AUDIO MUTE SELECT*	47	ALL	IN
* INACTIVE: 11 ≤ Vin ≤ 33 VDC or Rin ≥ 100 KΩ (open) ACTIVE: Vin ≤ 1.9 VDC or Rin ≤ 375 Ω (grounded) Sink current is internally limited to 200 μA max for grounded pin.			

8.2 GTX 3X5

This section gives the pin functions, inputs, and outputs of the GTX 3X5 series transponders.

8.2.1 GTX 335/335R/345/345R (J3251)

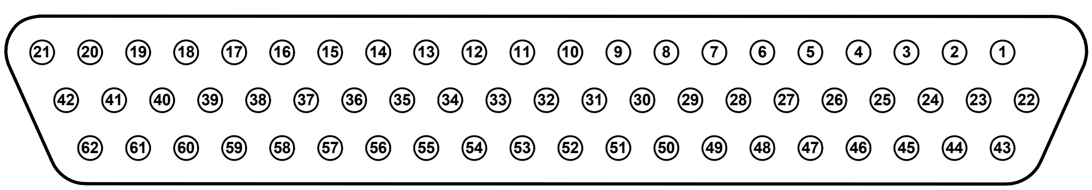


Figure 8-3 Rear View, Connector J3251

Table 8-8 GTX 3X5 J3251 Pin Assignments

Pin	Pin Name	I/O
1	ALT ENCODER/CONFIG MODULE CLOCK	In/Out
2	USB DATA HI	In/Out
3	TEMP PROBE IN	In
4	TIME MARK A	In/Out
5	ARINC 429 OUT A	Out
6	ARINC 429 OUT B	Out
7	RS-232 OUT 3	Out
8	RS-232 OUT 2	Out
9	RS-232 OUT 1	Out
10	ALTITUDE A1	In
11	ALTITUDE B1	In
12	ALTITUDE C1	In
13	ALTITUDE D4	In
14	EXTERNAL STANDBY SELECT	In
15	CONFIGURABLE DISCRETE 1	In/Out
16	CONFIGURABLE DISCRETE 2	In/Out
17	XPDR FAIL 1	Out
18	EXTERNAL SUPPRESSION	In/Out
19	LIGHTING BUS HI	In
20	AIRCRAFT GROUND	--
21	AIRCRAFT POWER 1	In
22	ALT ENCODER/CONFIG MODULE DATA	In/Out
23	ALT ENCODER/CONFIG MODULE GND	--
24	USB DATA LO	In/Out
25	TEMP PROBE OUT	Out
26	TIME MARK B	In/Out
27	ARINC 429 IN 1A	In
28	ARINC 429 IN 1B	In
29	RS-232 IN 3	In
30	RS-232 IN 2	In
31	RS-232 IN 1	In
32	ALTITUDE A2	In

Pin	Pin Name	I/O
33	ALTITUDE B2	In
34	ALTITUDE C2	In
35	RESERVED	In
36	EXTERNAL IDENT SELECT	In
37	AUDIO INHIBIT 2	In
38	POWER CONTROL	In
39	SWITCHED POWER OUT	Out
40	LIGHTING BUS LO	In
41	AIRCRAFT GROUND	In
42	AIRCRAFT POWER 1	In
43	ALT ENCODER/CONFIG MODULE POWER	In
44	USB VBUS POWER	In/Out
45	USB GND	--
46	AUDIO OUT HI	Out
47	AUDIO OUT LO	Out
48	ARINC 429 IN 2A	In
49	ARINC 429 IN 2B	In
50	RS-232 GND 3	--
51	RS-232 GND 2	--
52	RS-232 GND 1	--
53	ALTITUDE A4	In
54	ALTITUDE B4	In
55	ALTITUDE C4	In
56	ALTITUDE GROUND	--
57	SQUAT SWITCH	In
58	AIR DATA SELECT	In
59	POWER CONFIG	In
60	GPS KEEP ALIVE	In
61	AIRCRAFT POWER 2	In
62	AIRCRAFT POWER 2	In

8.2.2 GTX 345/345R (J3452)

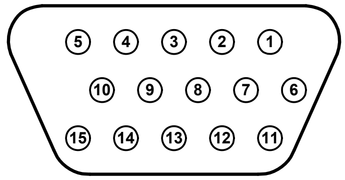


Figure 8-4 Rear View, Connector J3252

Table 8-9 GTX 345 J3252 Pin Assignments

Pin	Pin Name	I/O
1	ETHERNET OUT 1B	Out
2	ETHERNET IN 1B	In
3	ETHERNET OUT 2B	Out
4	ETHERNET IN 2B	In
5	RS-232 OUT 4	Out
6	ETHERNET OUT 1A	Out
7	ETHERNET IN 1A	In
8	ETHERNET OUT 2A	Out
9	ETHERNET IN 2A	In
10	RS-232 IN 4	In
11	RS-422 A	Out
12	RS-422 B	Out
13	CONFIGURABLE DISCRETE 11	In/Out
14	CONFIGURABLE DISCRETE 12	In/Out
15	RS-232 GND 4	--

8.2.3 GTX 3X5 Power and Lighting Inputs

Power and lighting input requirements are recorded in this section. Refer to appendix B for power and lighting interconnections.

- The power input pins accept 14/28 VDC.
- AIRCRAFT POWER 2 is used to connect to an alternate power source.
- Switched Power Out is a power source available for a remote digital altitude encoder device.
- The GTX 3X5 unit can adjust to a 28 VDC, 14 VDC, or 5 VDC lighting bus.
- The GTX 3X5 automatically adjust for ambient lighting conditions because of the photocell.

Table 8-10 Lighting/Power Pin Assignments

Pin Name	P3251 Pin Number	I/O	GTX Unit
AV PWR 1	21	I	ALL
AV PWR 1	42	I	ALL
AV PWR 2	61	I	ALL
AV PWR 2	62	I	ALL
GROUND (power ground)	20	I	ALL
GROUND (power ground)	41	I	ALL
SW PWR OUT	39	O	ALL
GPS KEEP ALIVE	60	I	ALL
LTNG HI	19	I	Panel Mount
LTNG LO	40	I	Panel Mount

8.2.4 GTX 3X5 Power Control Input

The PWR CONFIG input sets the remote on/off feature. This is connected to ground for a remote unit installation and not connected for a panel mount unit installation.

The PWR CONTROL input is dependent on the PWR CONFIG connection. This is used as a remote power on/off control or to use the power auto on feature when the avionics master is energized.

Table 8-11 GTX 3X5 Power Control Inputs

Pin Name	Pin Number	I/O	Connector
PWR CONFIG	59	I	P3251
PWR CONTROL	38	I	P3251

8.2.5 GTX 3X5 Encoded Altitude Outputs

- Parallel Gray code altitude inputs are active if the voltage to ground is < 1.9 V or the resistance to ground is < 375 Ω.
- These inputs are inactive if the voltage to ground is 11-33 VDC.
- The GTX 3X5 discrete I/O pins are configurable.
- If the Gillham input is not used in the configuration menu, then the Gillham code altitude pins can be used for other discrete input functions.
- If the Gillham input is used these pins will not be available for selection on other discrete inputs in the configuration menu.

Table 8-12 GTX 3X5 Encoded Altitude Outputs

Pin Name	Pin Number	I/O	Connect or
ALTITUDE A1	10	In	J3251
ALTITUDE A2	32	In	J3251
ALTITUDE A4	53	In	J3251
ALTITUDE B1	11	In	J3251
ALTITUDE B2	33	In	J3251
ALTITUDE B4	54	In	J3251
ALTITUDE C1	12	In	J3251
ALTITUDE C2	34	In	J3251
ALTITUDE C4	55	In	J3251
ALTITUDE D4	13	In	J3251
ALTITUDE COMMON	56	--	J3251

8.2.6 GTX 3X5 Discrete Outputs

Table 8-13 GTX 3X5 Discrete Outputs

Pin Name	Pin Number	Unit	I/O	Connector
TRANSPONDER FAIL #1	17	ALL	OUT	J3251
EXTERNAL SUPPRESSION I/O	18	ALL	IN/OUT	J3251
REPLY ACTIVE	X**	ALL	OUT	J3251/J3252
TRANSPONDER FAIL #2	X**	ALL	OUT	J3251/J3252
ALTITUDE ALERT ANNUNCIATE*	X**	ALL	OUT	J3251/J3252
ADS-B FUNCTION FAILURE	X**	ALL	OUT	J3251/J3252
TRAFFIC ALERT	X**	GTX 345/345R	OUT	J3251/J3252
TRAFFIC STANDBY/OPERATE	15, 16, or 17	GTX 345/345R	OUT	J3251
TRAFFIC TEST	15, 16, or 17	GTX 345/345R	OUT	J3251
* INACTIVE: 10 ≤ Vin ≤ 33 VDC or Rin ≥ 100 KΩ (open) ACTIVE: Vin ≤ 1.9 VDC with ≥ 75 µA sink current or Rin ≤ 375 Ω (grounded) Sink current is internally limited to 200 µA max for grounded pin. ** X shows that this discrete output can be used by any available configurable discrete output pin on the indicated connector(s). Refer to section 8.1.6 for a list of configurable pins.				

Table 8-14 GTX 3X5 Configurable Discrete Output Pins

Pin Name	Pin Number	Unit	I/O	Connector
TRANSPONDER FAIL #1	17	ALL	OUT	J3251
CONFIGURABLE DISCRETE #1	15	ALL	IN/OUT	J3251
CONFIGURABLE DISCRETE #2	16	ALL	IN/OUT	J3251
CONFIGURABLE DISCRETE #11	13	GTX 345/345R	IN/OUT	J3252
CONFIGURABLE DISCRETE #12	14	GTX 345/345R	IN/OUT	J3252

8.2.7 GTX 3X5 Discrete Inputs

Table 8-15 GTX 3X5 Discrete Inputs

Pin Name	Pin Number	Unit	I/O	Connector
TIS-A SELECT*	X**	GTX 335/335R	IN	J3251/J3252
ALTITUDE DATA SELECT*	X**	ALL	IN	J3251/J3252
AUDIO INHIBIT #1*	X**	ALL	IN	J3251/J3252
AUDIO INHIBIT #2*	37	ALL	IN	J3251
AIR DATA SELECT*	58	ALL	IN	J3251
SQUAT SWITCH	57	ALL	IN	J3251
EXTERNAL IDENT*	36	ALL	IN	J3251
EXTERNAL STANDBY*	14	ALL	IN	J3251
EXTERNAL SUPPRESSION I/O	18	ALL	IN/OUT	J3251
ID SELECT	X**	ALL	IN	J3251/J3252
* INACTIVE: 10 ≤ Vin ≤ 33 VDC or Rin ≥ 100 KΩ (open) ACTIVE: Vin ≤ 1.9 VDC with ≥ 75 μA sink current or Rin ≤ 375 Ω (grounded) Sink current is internally limited to 200 μA max for grounded pin. ** X shows that this discrete output can be used by any available configurable discrete output pin on the indicated connector(s). Refer to section 8.1.6 for a list of configurable pins.				

Table 8-16 GTX 3X5 Configurable Discrete Input Pins

Pin Name	Pin Number	Unit	I/O	Connector
AUDIO INHIBIT #2*	37	ALL	IN	J3251
AIR DATA SELECT*	58	ALL	IN	J3251
SQUAT SWITCH	57	ALL	IN	J3251
EXTERNAL IDENT*	36	ALL	IN	J3251
EXTERNAL STANDBY*	14	ALL	IN	J3251
CONFIGURABLE DISCRETE #1	15	ALL	IN/OUT	J3251
CONFIGURABLE DISCRETE #2	16	ALL	IN/OUT	J3251
CONFIGURABLE DISCRETE #11	13	GTX 345/345R	IN/OUT	J3252
CONFIGURABLE DISCRETE #12	14	GTX 345/345R	IN/OUT	J3252

APPENDIX A MECHANICAL DRAWINGS

Figure A-1 GTX 33/33D Dimensions and Center of Gravity A-2
Figure A-2 GTX 33/33D Mounting Rack/Connector Assembly A-3
Figure A-3 GTX 330 Dimensions and Center of Gravity A-4
Figure A-4 GTX 330 Mounting Rack Assembly Overview A-5
Figure A-5 GTX 3X5 Panel Mount Dimensions and Center of Gravity A-6
Figure A-6 GTX 3X5 Panel Mount Rack Assembly A-7
Figure A-7 GTX 3X5 Horizontal Remote Mount Dimensions and Center of Gravity A-8
Figure A-8 GTX 3X5 Horizontal Remote Mount Rack Assembly A-9
Figure A-9 GTX 3X5 G1000 Remote Mount Dimensions and Center of Gravity A-10
Figure A-10 GTX 3X5 G1000 Remote Mount Assembly A-11
Figure A-11 GTX 3X5 Connector and Vent Location A-12
Figure A-12 Optional Altitude Sensor A-13

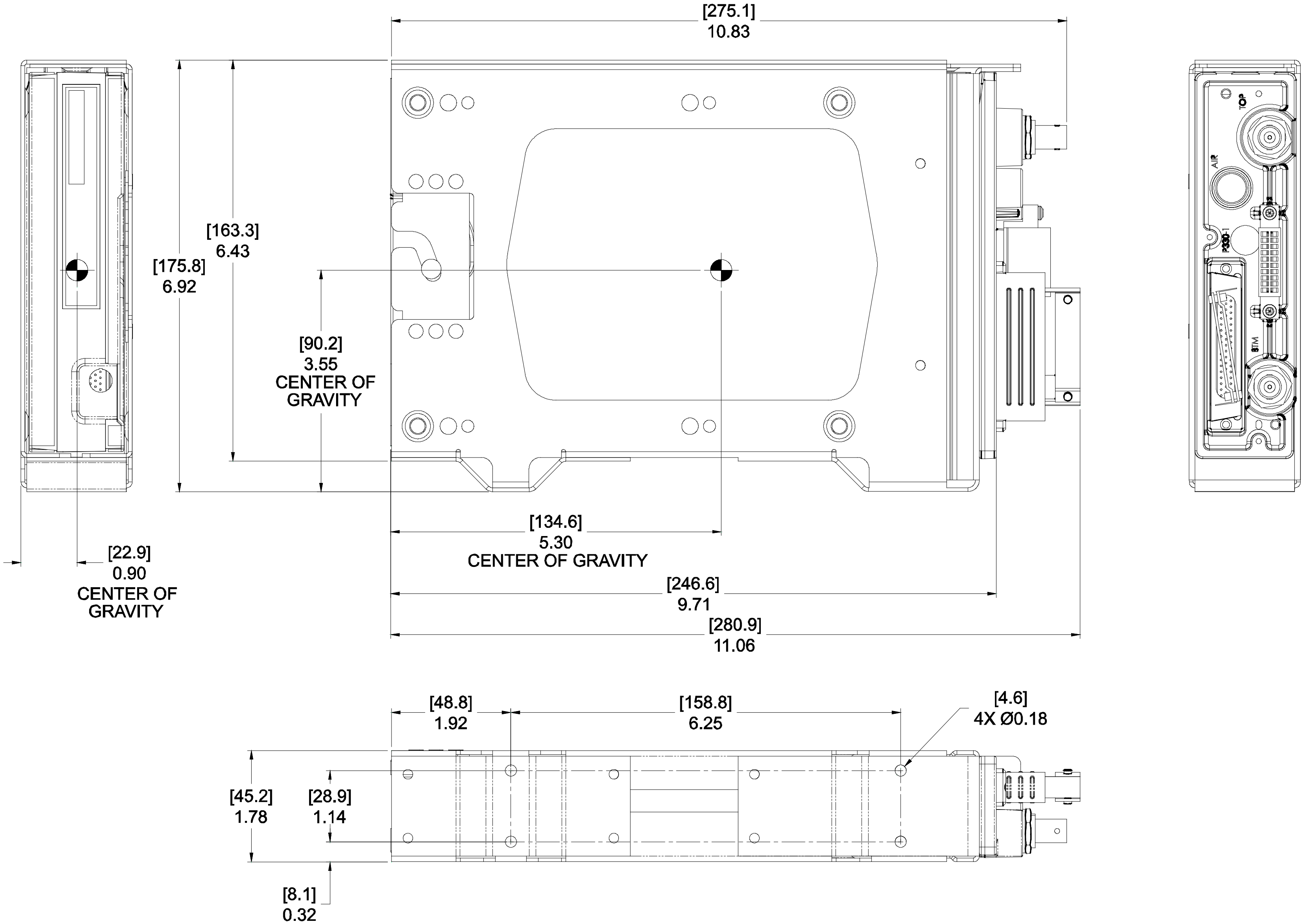


Figure A-1 GTX 33/33D Dimensions and Center of Gravity

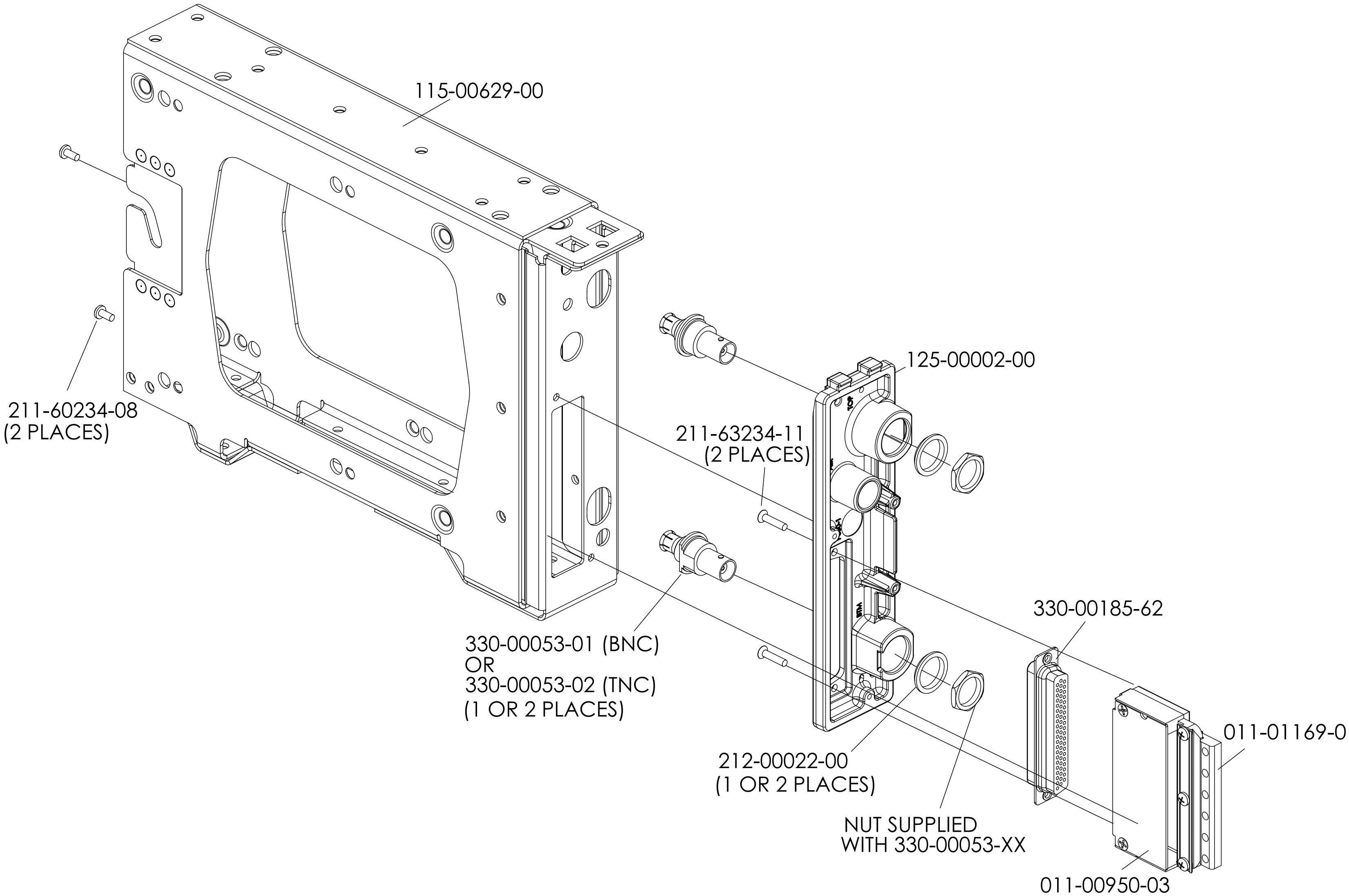


Figure A-2 GTX 33/33D Mounting Rack/Connector Assembly

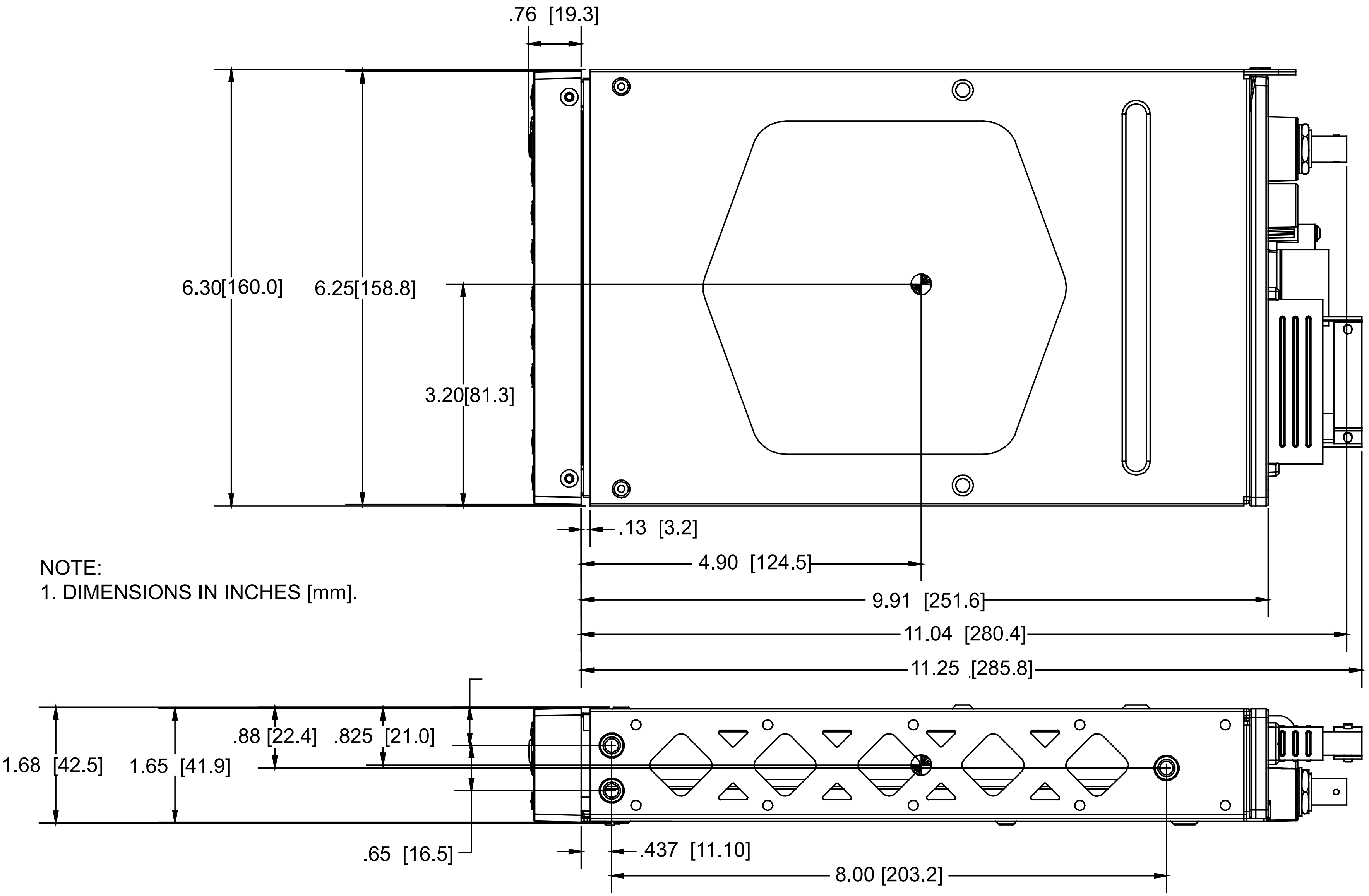
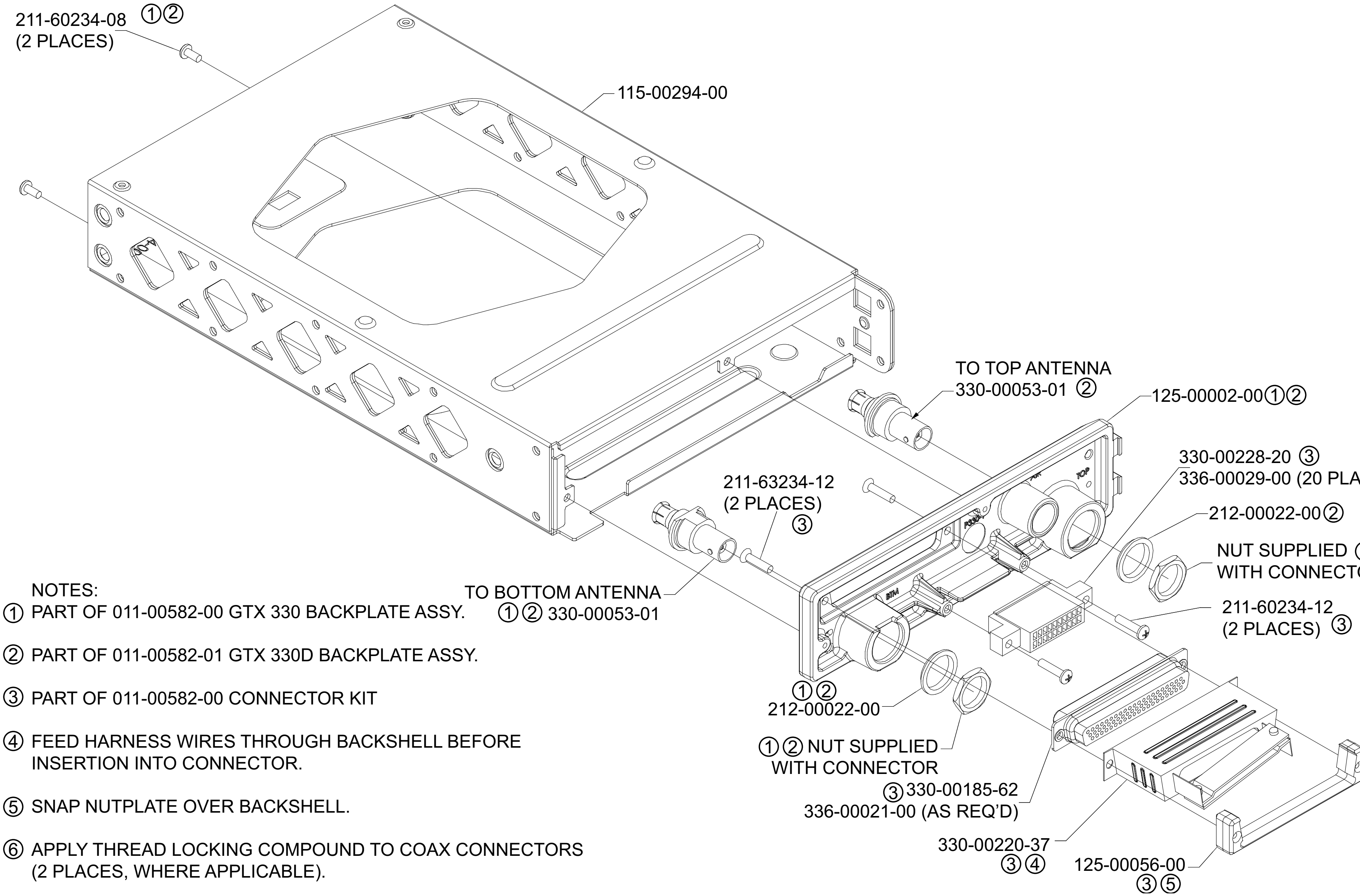


Figure A-3 GTX 330 Dimensions and Center of Gravity



NOTES:

① PART OF 011-00582-00 GTX 330 BACKPLATE ASSY.

② PART OF 011-00582-01 GTX 330D BACKPLATE ASSY.

③ PART OF 011-00582-00 CONNECTOR KIT

④ FEED HARNESS WIRES THROUGH BACKSHELL BEFORE INSERTION INTO CONNECTOR.

⑤ SNAP NUTPLATE OVER BACKSHELL.

⑥ APPLY THREAD LOCKING COMPOUND TO COAX CONNECTORS (2 PLACES, WHERE APPLICABLE).

Figure A-4 GTX 330 Mounting Rack Assembly Overview

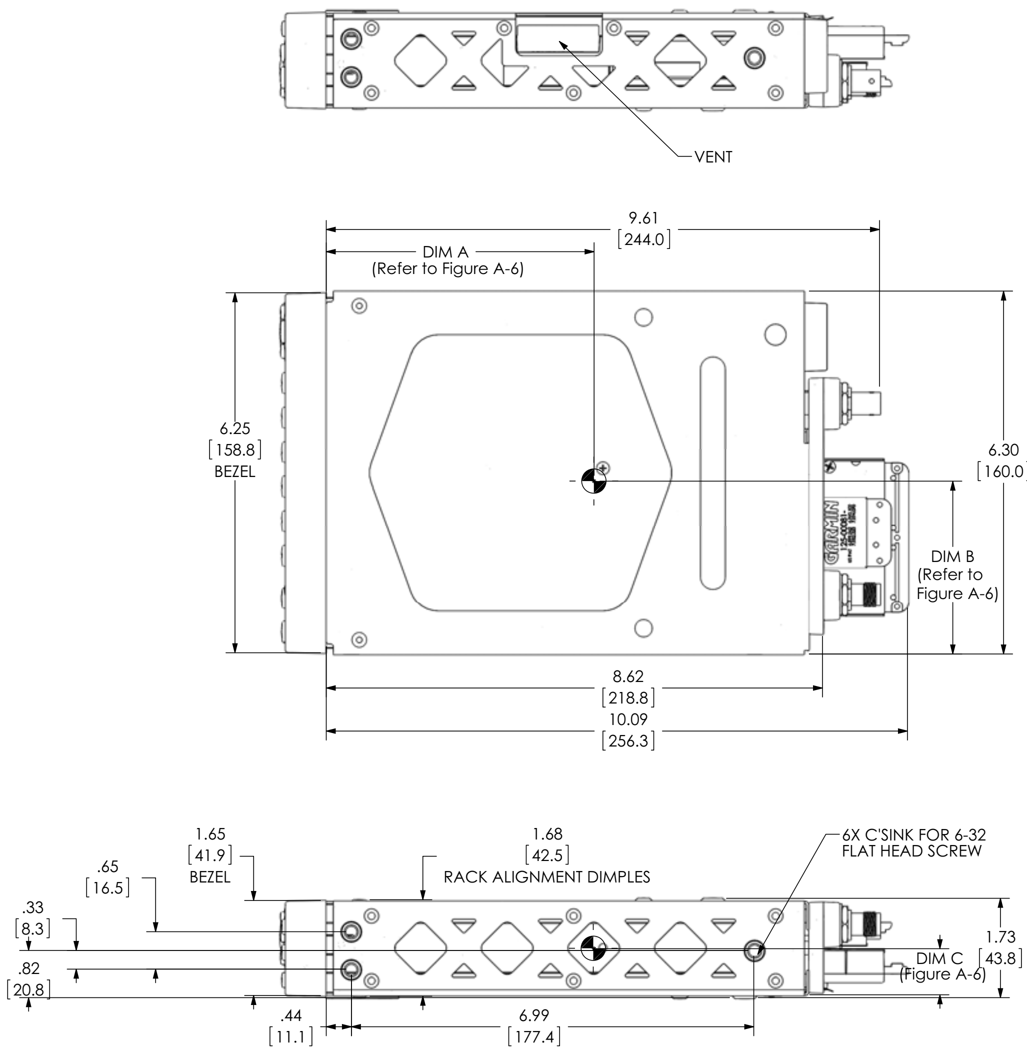


Figure A-5 GTX 3X5 Panel Mount Dimensions and Center of Gravity

STANDARD KIT	UNIT PN	UNIT DESCRIPTION	CONNECTOR KIT	CONFIG MODULE	RACK	Back Plate Assy	Mount Type	Dim A - inch (mm) (Refer to figure A-5)	Dim B - inch (mm) (Refer to figure A-5)	Dim C - inch (mm) (Refer to figure A-5)
010-01083-01	011-02974-00	Sub-Assy,GTX325,Blk	011-02977-00	011-00979-03	115-01771-01	011-02976-00	Panel	4.5 (114)	3.2 (81)	0.8 (20)
010-01214-01	011-03300-00	Sub-Assy,GTX335	011-02977-00	011-00979-03	115-01771-01	011-02976-00	Panel	4.5 (114)	3.2 (81)	0.8 (20)
010-01214-21	011-03300-20	Sub-Assy,GTX335, NV	011-02977-00	011-00979-03	115-01771-01	011-02976-00	Panel	4.5 (114)	3.2 (81)	0.8 (20)
010-01214-41	011-03300-40	Sub-Assy,GTX335,GPS	011-02977-00	011-00979-03	115-01771-01	011-02976-01	Panel	4.5 (114)	3.2 (81)	0.8 (20)
010-01216-00	011-03302-00	Sub-Assy,GTX345	011-02977-01	011-00979-03	115-01771-01	011-02976-00	Panel	4.7 (119)	3.0 (76)	0.8 (20)
010-01216-40	011-03302-40	Sub-Assy,GTX345, GPS	011-02977-01	011-00979-03	115-01771-01	011-02976-01	Panel	4.6 (117)	3.0 (76)	0.8 (20)

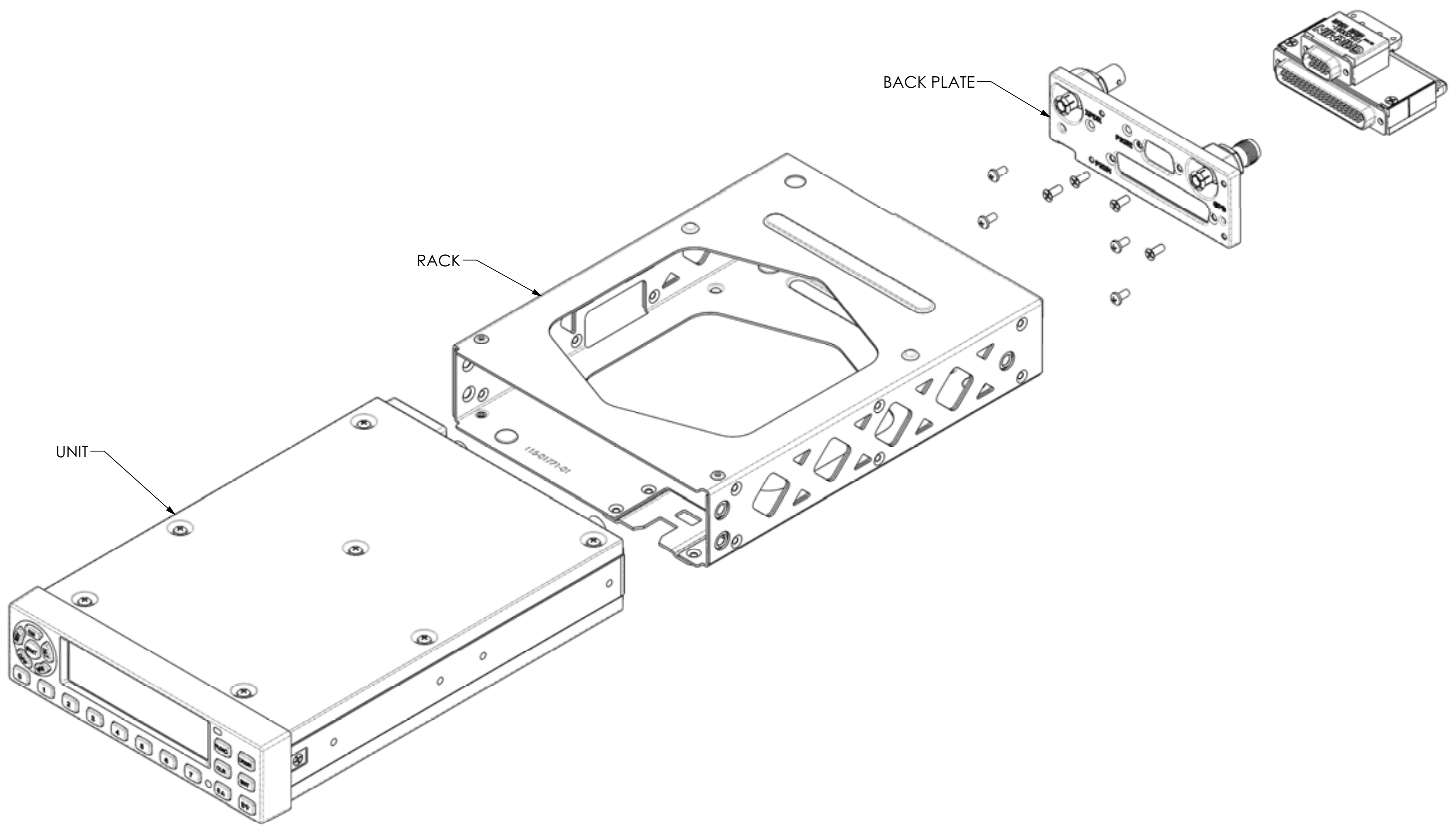


Figure A-6 GTX 3X5 Panel Mount Rack Assembly

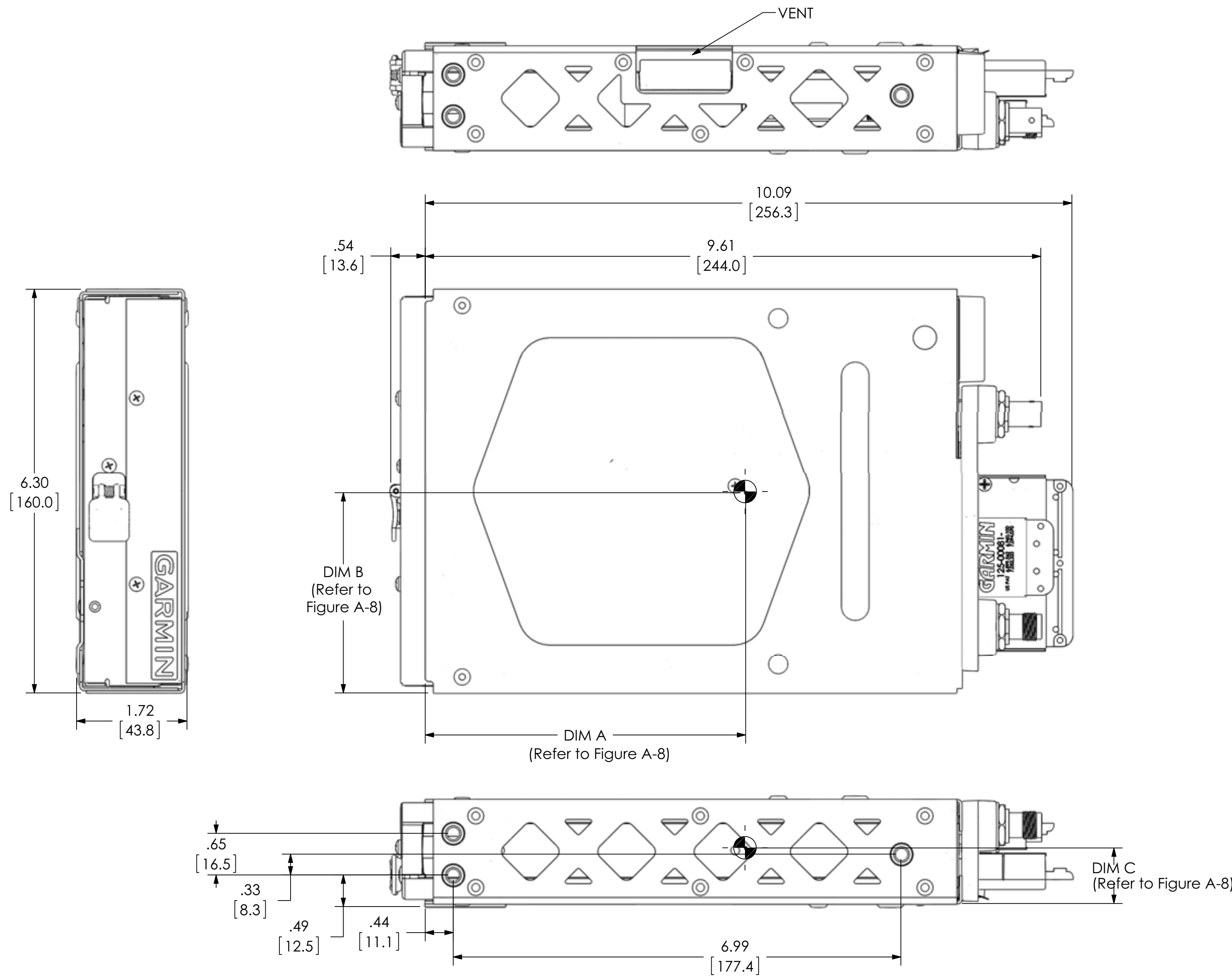


Figure A-7 GTX 3X5 Horizontal Remote Mount Dimensions and Center of Gravity

STANDARD KIT	UNIT PN	UNIT DESC	CONNECTOR KIT	CONFIG MODULE	RACK	Back Plate Assy	Mount Type	Dim A inch (mm) (Refer to Figure A-7)	Dim B inch (mm) (Refer to Figure A-7)	Dim C inch (mm) (Refer to Figure A-7)
010-01215-01	011-03301-00	Sub-Assy,GTX335R	011-02977-00	011-00979-03	115-01771-00	011-02976-00	Remote	4.8 (120)	3.3 (84)	0.8 (20)
010-01215-40	011-03301-40	Sub-Assy,GTX335R, GPS	011-02977-00	011-00979-03	115-01771-00	011-02976-01	Remote	4.9 (124)	3.2 (81)	0.8 (20)
010-01217-00	011-03303-00	Sub-Assy,GTX345R	011-02977-01	011-00979-03	115-01771-00	011-02976-00	Remote	5.0 (127)	3.0 (76)	0.8 (20)
010-01217-40	011-03303-40	Sub-Assy,GTX345R, GPS	011-02977-01	011-00979-03	115-01771-00	011-02976-01	Remote	5.0 (127)	3.1(79)	0.8 (20)

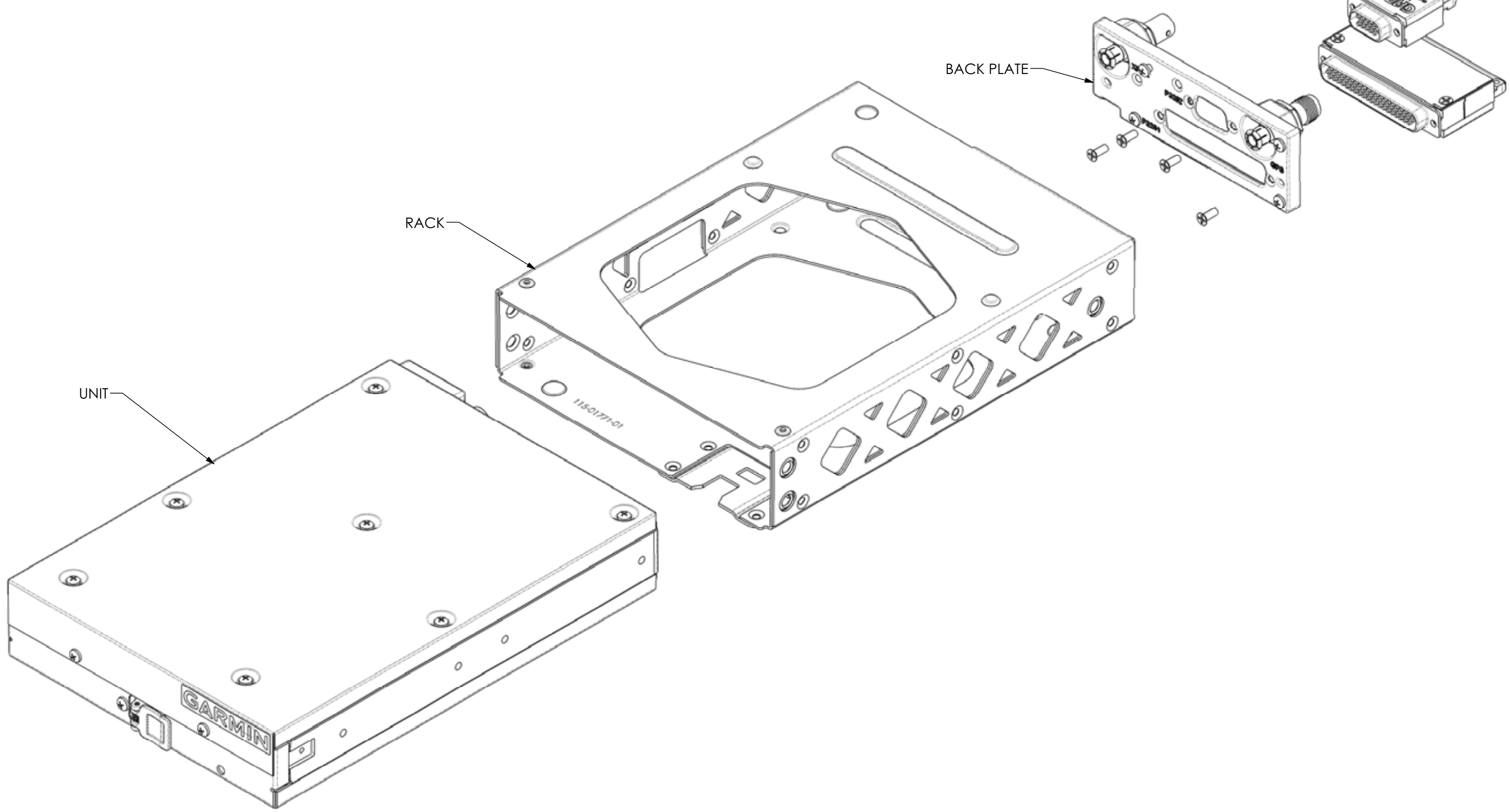


Figure A-8 GTX 3X5 Horizontal Remote Mount Rack Assembly

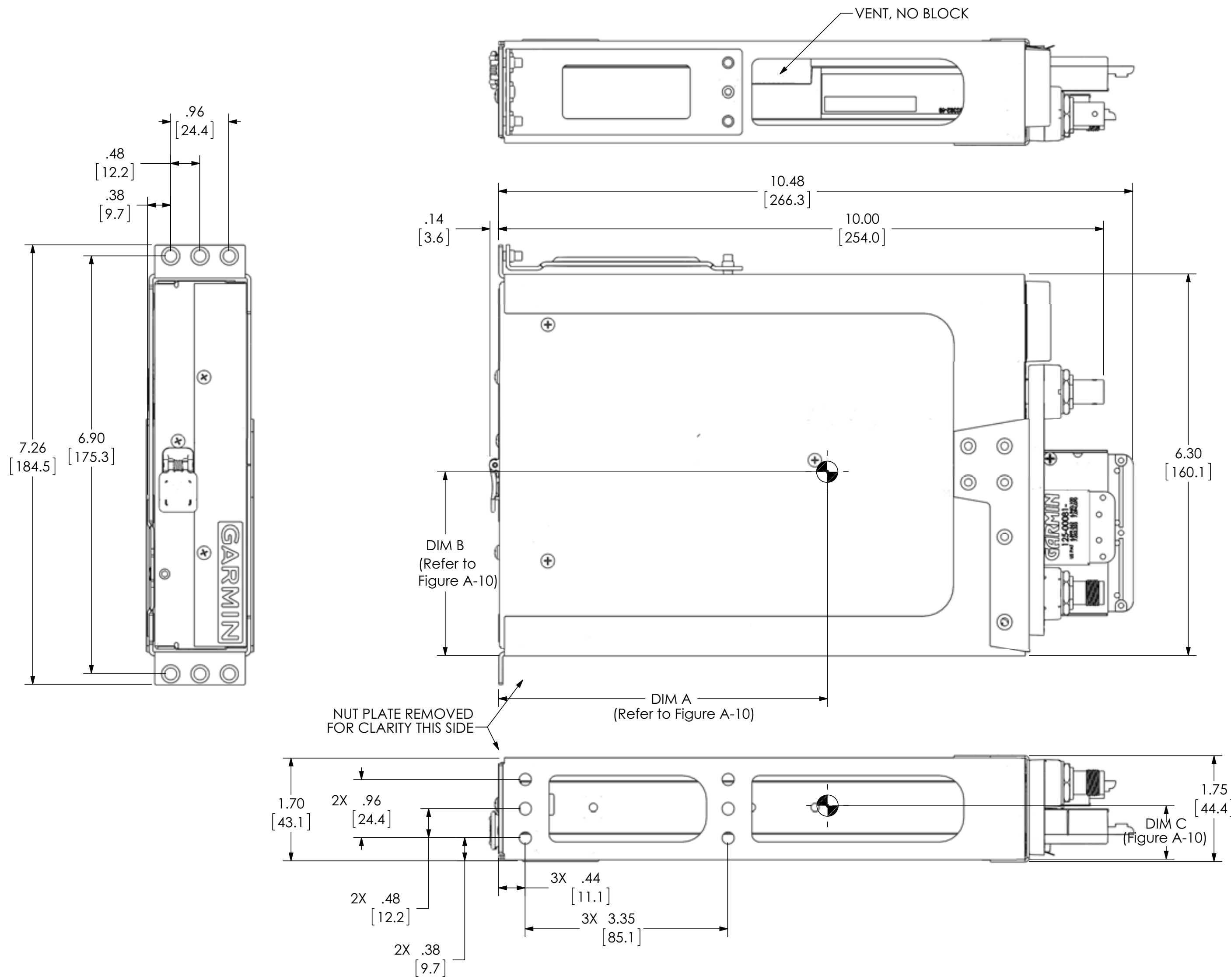


Figure A-9 GTX 3X5 G1000 Remote Mount Dimensions and Center of Gravity

STANDARD KIT	UNIT PN	UNIT DESC	CONNECTOR KIT	CONFIG MODULE	RACK	Back Plate Assy	Mount Type	Dim A inch(mm) Refer to figure A-9	Dim B inch(mm) Refer to figure A-9	Dim C inch(mm) Refer to figure A-9
G1000 mount	011-03301-00	Sub-Assy,GTX335R	011-02977-00	011-00979-03	115-02250-00	011-02976-00	G1000	5.3 (135)	3.2 (81)	0.7 (18)
G1000 mount	011-03301-40	Sub-Assy,GTX335R, GPS	011-02977-00	011-00979-03	115-02250-00	011-02976-01	G1000	5.3 (135)	3.2 (81)	0.8 (20)
G1000 mount	011-03303-00	Sub-Assy,GTX345R	011-02977-01	011-00979-03	115-02250-00	011-02976-00	G1000	5.4 (137)	3.0 (76)	0.8 (20)
G1000 mount	011-03303-40	Sub-Assy,GTX345R, GPS	011-02977-01	011-00979-03	115-02250-00	011-02976-01	G1000	5.4 (137)	3.1(79)	0.8 (20)

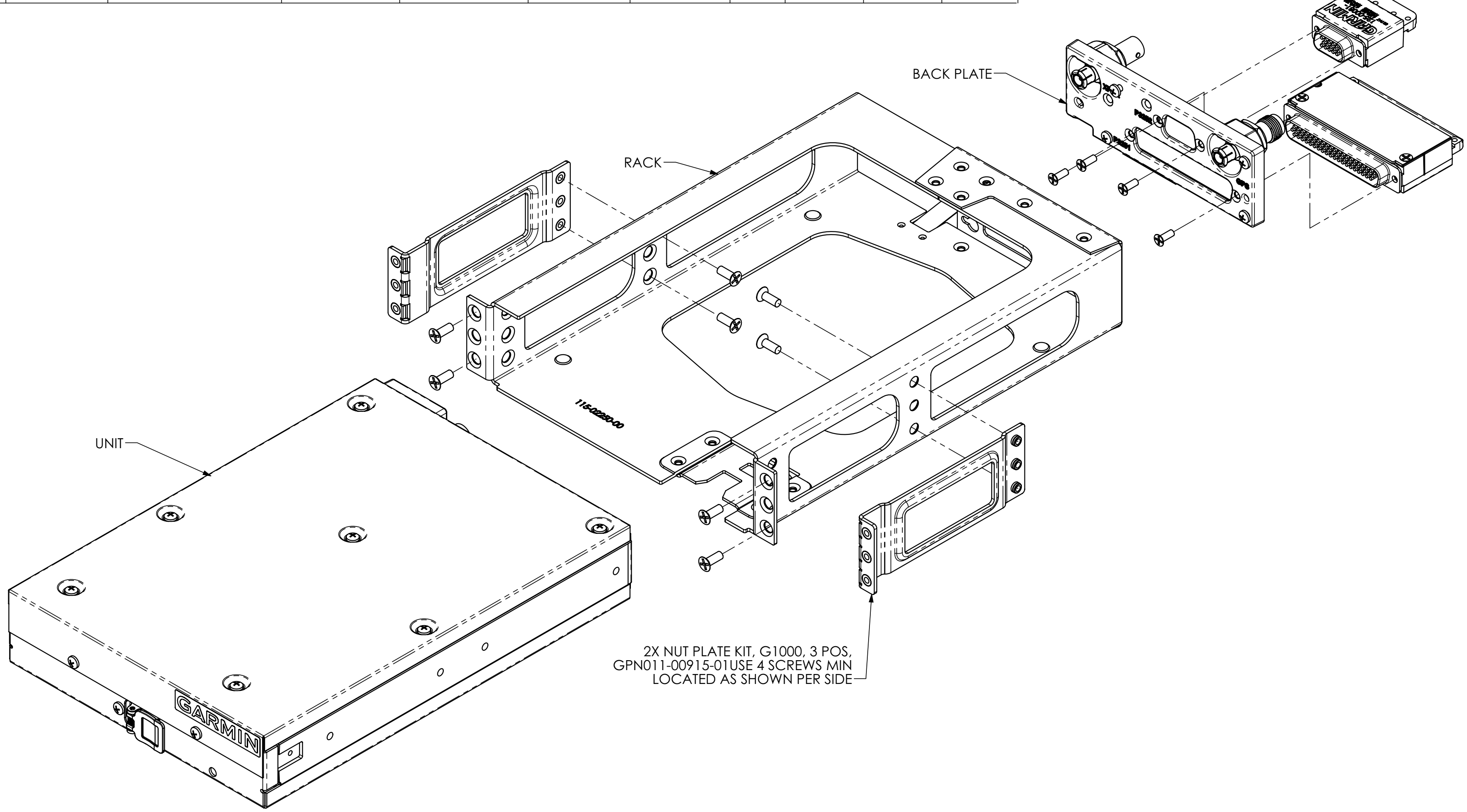


Figure A-10 GTX 3X5 G1000 Remote Mount Assembly

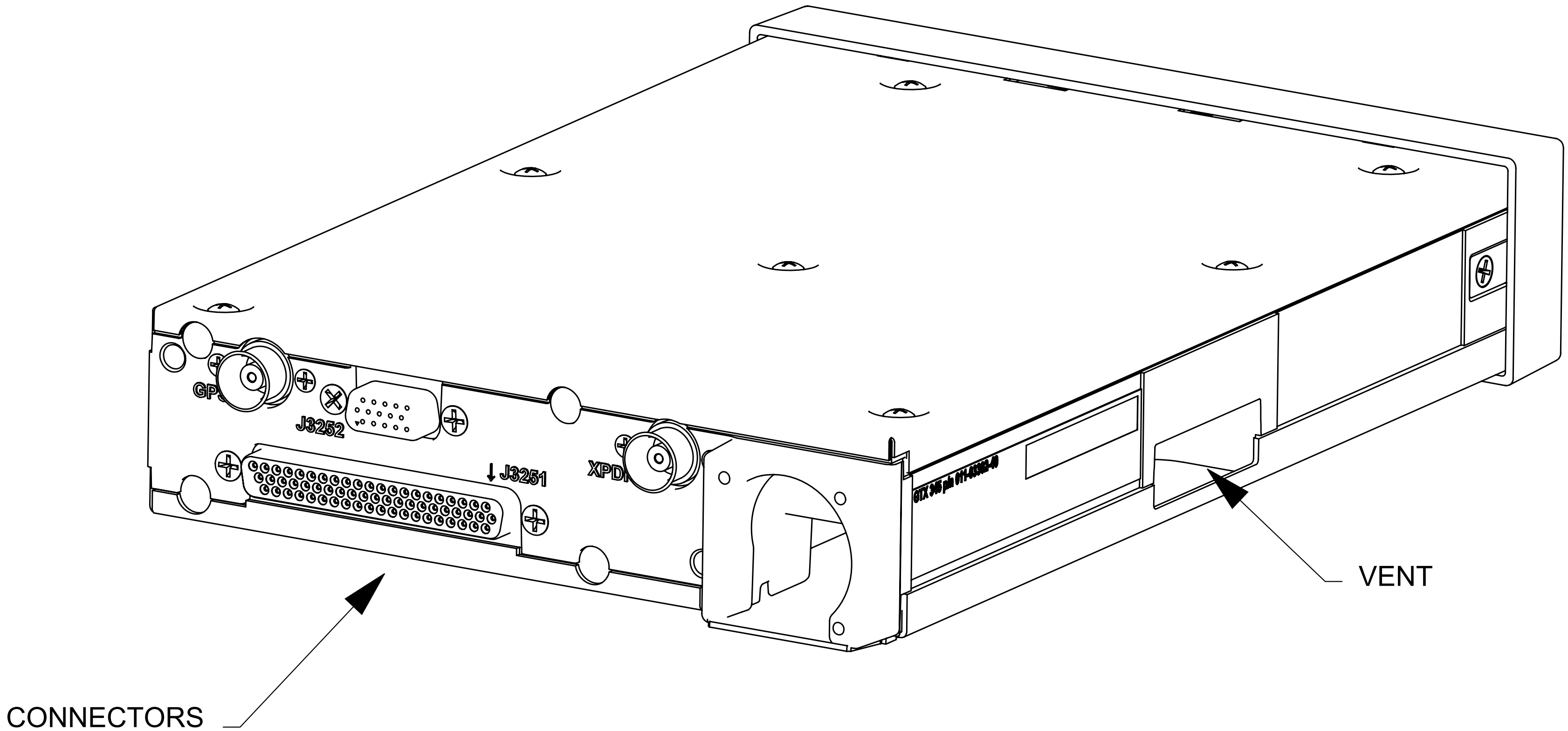


Figure A-11 GTX 3X5 Connector and Vent Location

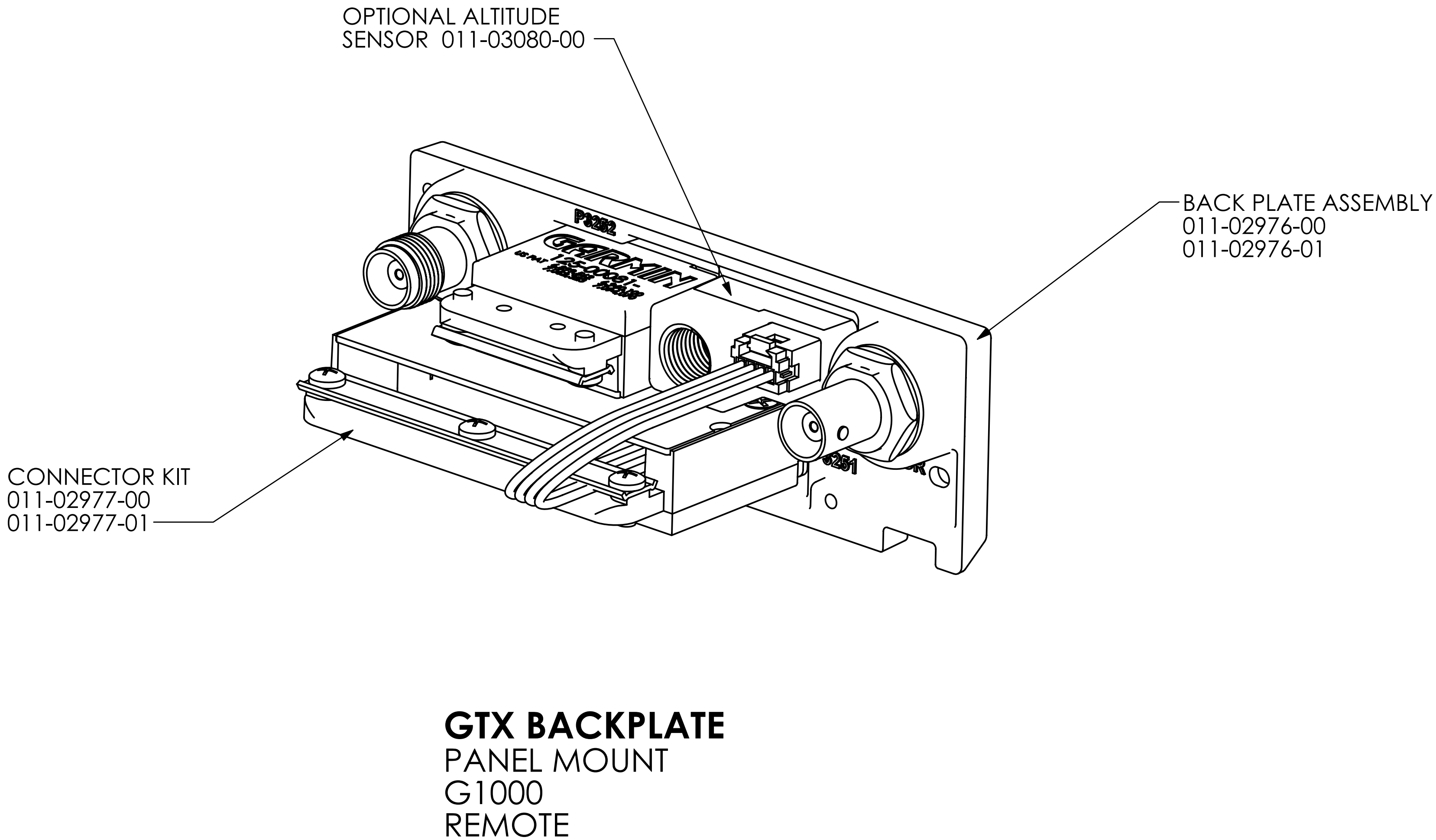


Figure A-12 Optional Altitude Sensor

APPENDIX B INTERCONNECT DRAWINGS

Figure B-1 GTX 33X Power and Ground Interconnect B-3
Figure B-2 GTX 33X to GNS 400W/500W Series B-5
Figure B-3 GTX 33X - GTN 6XX/7XX Interconnect B-7
Figure B-4 GTX 33X - GNS 480 (CNX80) interconnect B-9
Figure B-5 GTX 33X - MFD Typical Interconnect B-11
Figure B-6 GTX 33X - AHRS/Heading Data Source Interconnect B-12
Figure B-7 GTX 33X - Altitude Data Source Interconnect B-13
Figure B-8 GTX 33X - Audio Panel Interconnect B-15
Figure B-9 GTX 33X - GDL 88 With GPS Interconnect B-16
Figure B-10 GTX 33X - Radio Altimeter Source Interconnect B-16
Figure B-11 GTX 3X5 - Power, Ground, and Configuration Module Interconnect B-17
Figure B-12 GTX 3X5 Switches B-19
Figure B-13 GTX 335 - Legacy G950/1000 Interconnect B-20
Figure B-14 GTX 345 - Legacy G950/1000 Interconnect B-21
Figure B-15 Dual GTX 3X5 - Legacy G950/1000 Interconnect B-23
Figure B-16 GTX 3X5 - GNS 480 (CNX80) Interconnect B-25
Figure B-17 GTX 335 - GNS 400W/500W Series Interconnect B-26
Figure B-18 GTX 335 and GTX 345 - Single GNS 400W/500W Series Interconnect B-27
Figure B-19 GTX 345 - GNS 400W/500W Series Interconnect B-28
Figure B-20 GTX 335 - GTN 6XX/7XX Interconnect B-29
Figure B-21 Single/Dual GTX 335 - Single GTN 6XX/7XX Interconnect B-30
Figure B-22 GTX 345 - GTN 6XX/7XX Interconnect B-31
Figure B-23 GTX 345 - Single/Dual GTN 6XX/7XX Interconnect B-33
Figure B-24 GTX 345 and GTX 335 - Single GTN 6XX/7XX B-35
Figure B-25 GTX 335 - GDU 620 TIS-A Display Interconnect B-36
Figure B-26 GTX 3X5 - GTX 3XX Altitude Data Source Interconnect B-37
Figure B-27 GTX 3X5 - AHRS Heading Data Source Interconnect B-39
Figure B-28 GTX 3X5 - Audio Interconnect B-40
Figure B-29 GTX 335/GTX 335R - Traffic System Interconnect B-40
Figure B-30 GTX 345/GTX 345R - Traffic System Interconnect B-41
Figure B-31 GTX 3X5 - Radio Altimeter Interconnect B-42
Figure B-32 GTX 345/345R - Flight Stream Interconnect B-42
Figure B-33 GTX 3X5 to GTX 3XX Interconnect B-43
Figure B-34 External Traffic Annunciator B-43

This section contains wiring interconnect information and examples for the connections necessary for the installation of the GTX 33X and GTX 3X5 Series transponders.

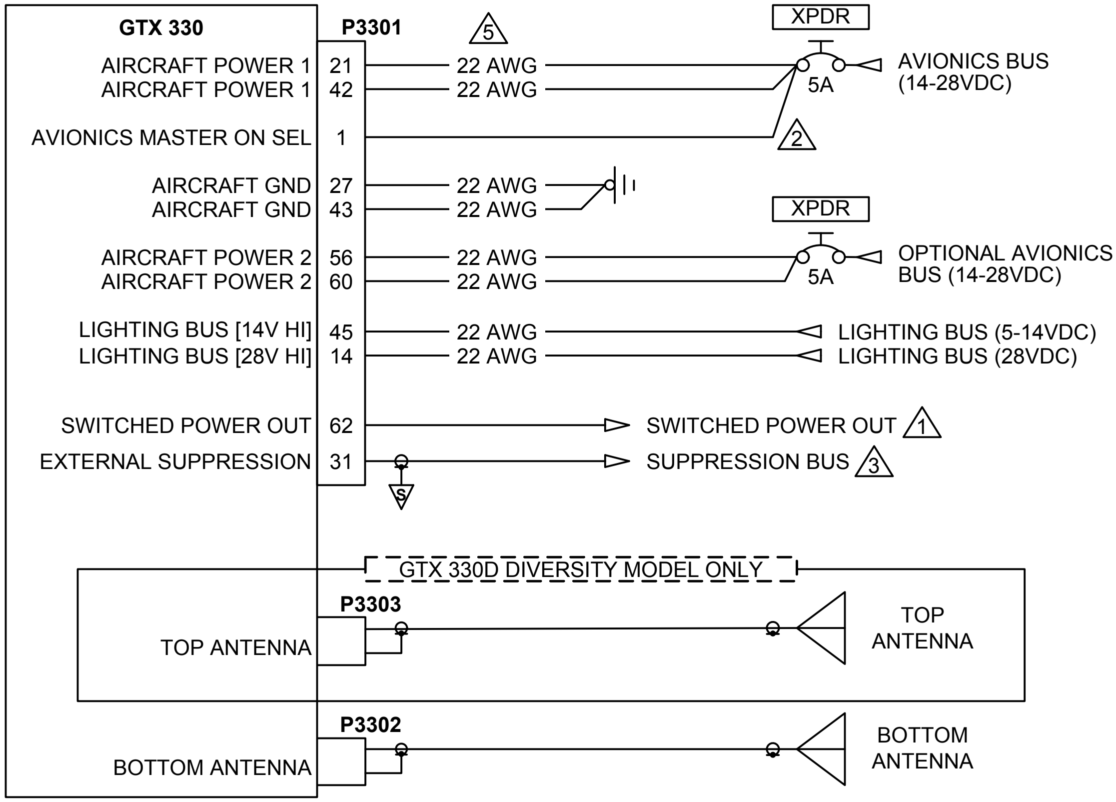
GENERAL NOTES

Each figure contained in this section has notes that must be followed. These general notes apply to all of the figures in this section:

- Unless specified differently, all wires are 24 AWG or larger.
- Antennas and associated cabling are shown for reference only.
- In dual GTX transponder installations, each transponder must be grounded separately using separate ground terminal/stud locations on the aircraft.
- If practical, power and ground wiring should be routed separately for each transponder.
- Route grounds and wire separately to improve safety if there is a wiring or grounding system failure.
- Designations for ground connections are as follows.

  Shield Block Ground

  Airframe Ground
- Shield ground terminations to the connector backshell must be 3.0 inches or less in length.
- Ground terminations of interfaced equipment can vary. Refer to the manufacturer’s installation manual for information.
- HDSB Ethernet wiring must use 24 AWG aircraft grade category 5 Ethernet cable. Refer to table 3-5 for approved Ethernet cable part numbers.
- HSDB, RS-232, and ARINC 429 ports shown are suggested port configurations unless specifically noted. GTX RS-232 Port 4 is not interchangeable with other RS-232 ports.
- Installations can require alternate port configurations and are permitted provided the equipment interfaces and data formats are available on alternate ports.



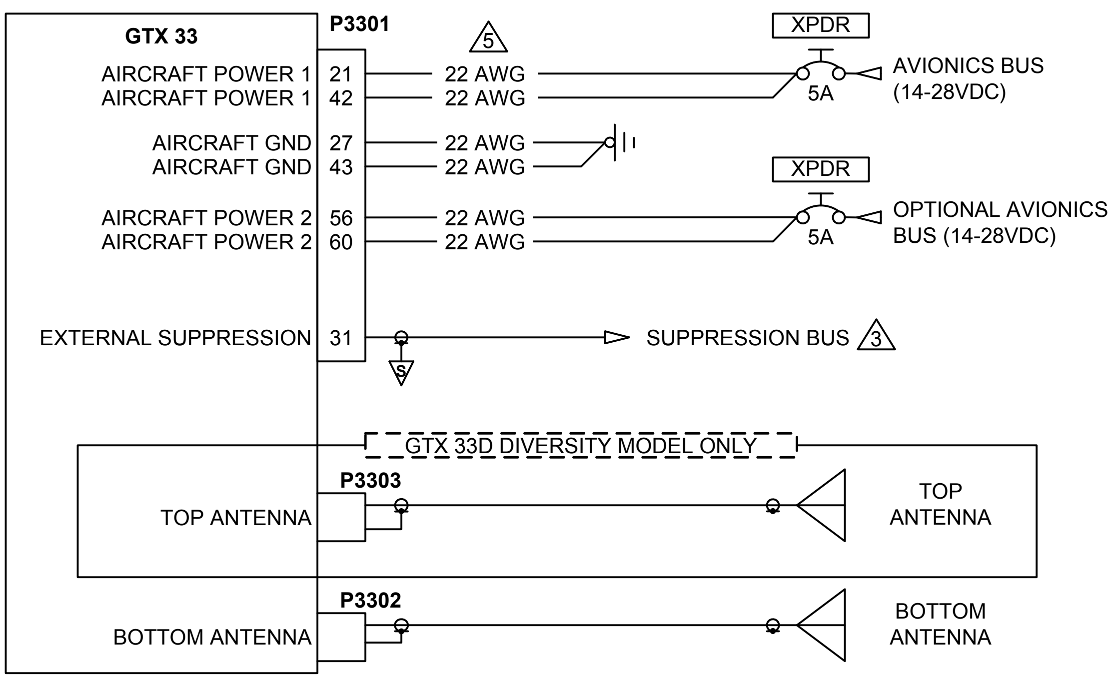


Figure B-1 GTX 33X Power and Ground Interconnect
Sheet 1 of 2

NOTES

1 ABSOLUTE MAXIMUM SOURCE CURRENT FROM THE SWITCHED POWER OUTPUT IS 1.5 AMPS @ SUPPLY VOLTAGE (14/28 VDC).

2 AVIONICS MASTER ON SELECT AUTOMATICALLY ENERGIZES THE UNIT TO THE LAST MODE SELECTED.

3 EXTERNAL SUPPRESSION SENDS AND ACCEPTS POSITIVE GOING SUPPRESSION PULSES TO/FROM ANOTHER TRANSPONDER/DME.

4 REFER TO THE GENERAL NOTES IDENTIFIED AT THE START OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

5 FOR 14 VDC INSTALLATIONS, THE USE OF TWO AIRCRAFT POWER AND TWO AIRCRAFT GROUND CONTACTS IN THE CONNECTOR IS RECOMMENDED FOR EACH POWER BUS CONNECTION. 28 VDC INSTALLATIONS ONLY REQUIRE ONE AIRCRAFT POWER AND ONE AIRCRAFT GROUND CONTACT IN THE CONNECTOR FOR EACH POWER BUS CONNECTION. WHERE THE LENGTH IS IN EXCESS OF 10 FEET, 18 AWG WIRE SHOULD BE USED. OVERSIZE CONTACTS IN THE CONNECTOR KIT ARE FOR USE WITH WIRE SIZES GREATER THAN 22 AWG WHEN REQUIRED.

Figure B-1 GTX 33X Power and Ground Interconnect
Sheet 2 of 2

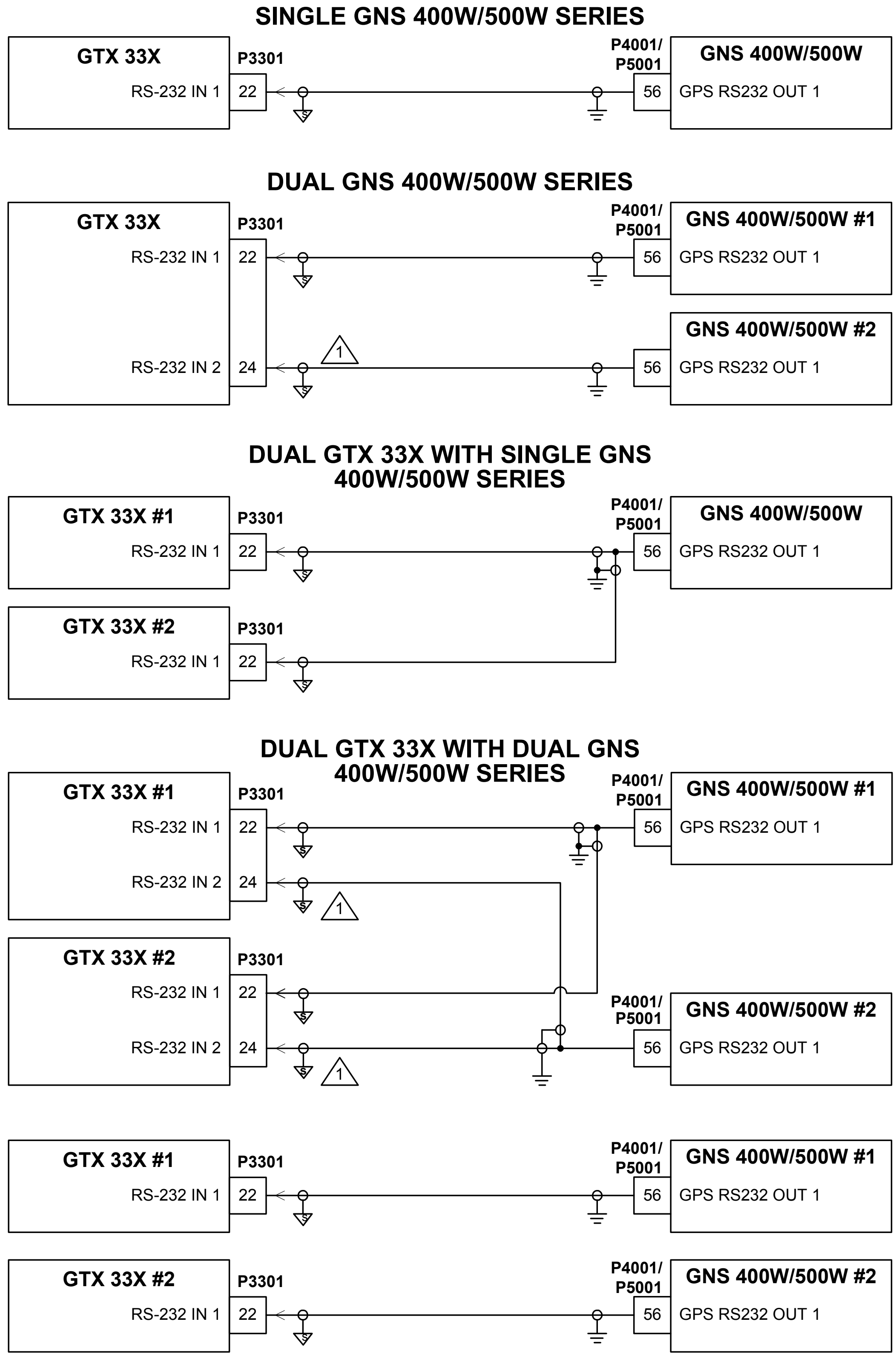


Figure B-2 GTX 33X to GNS 400W/500W Series
Sheet 1 of 2

NOTES

1. IF REDUNDANT GPS DATA IS WIRED AS SHOWN IN THIS CONFIGURATION, AN ALTERNATE AIR DATA SOURCE MUST BE USED.

2. REFER TO THE GENERAL NOTES IDENTIFIED AT THE START OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

Figure B-2 GTX 33X - GNS 400W/500W Series Interconnect
Sheet 2 of 2

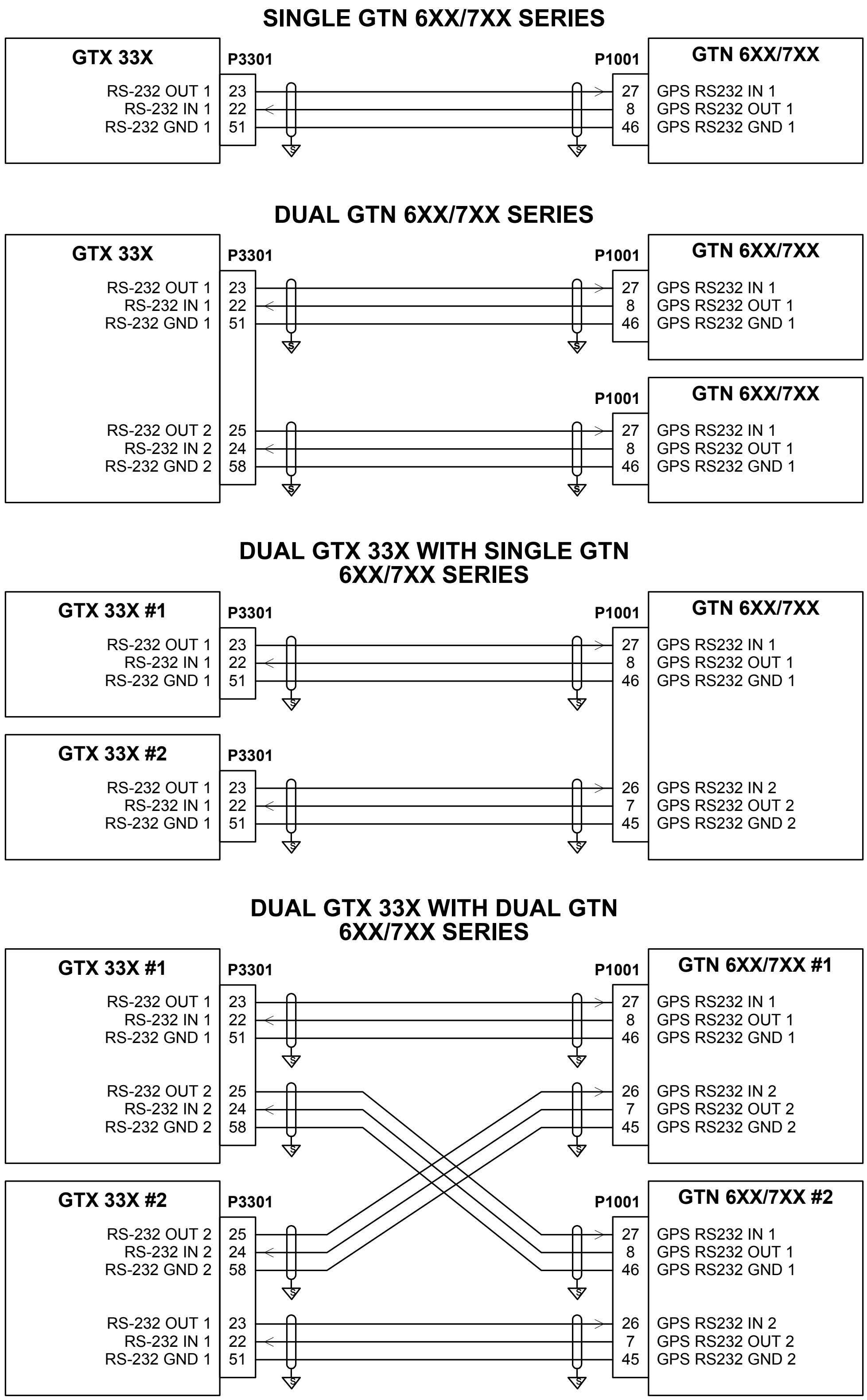


Figure B-3 GTX 33X - GTN 6XX/7XX Interconnect
Sheet 1 of 2

NOTES

1 REFER TO THE GENERAL NOTES IDENTIFIED AT THE START OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

Figure B-3 GTX 33X - GTN 6XX/7XX Interconnect
Sheet 2 of 2

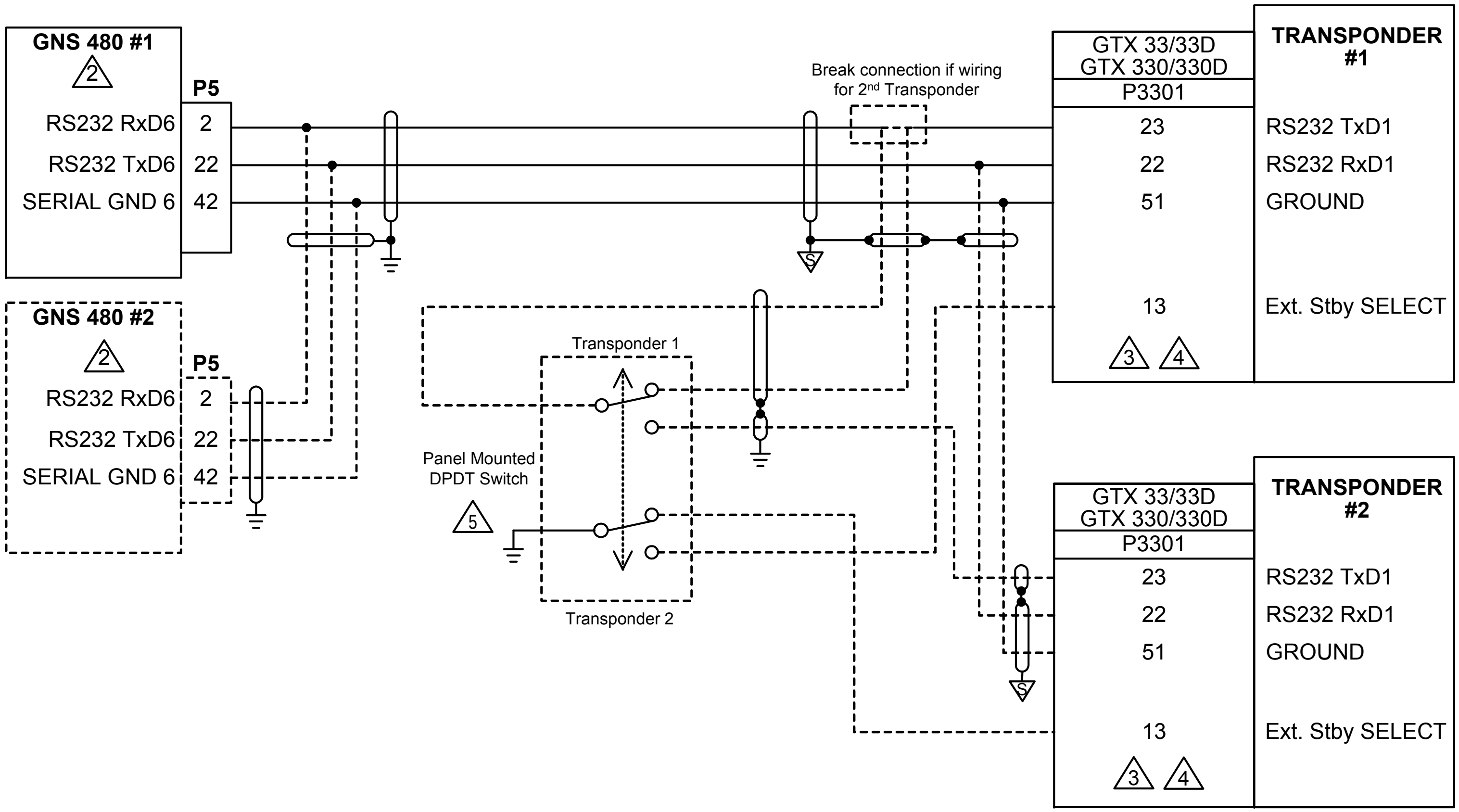


Figure B-4 GTX 33X - GNS 480 (CNX80) interconnect
Sheet 1 of 2

NOTES

1 REFER TO THE GENERAL NOTES IDENTIFIED AT THE START OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

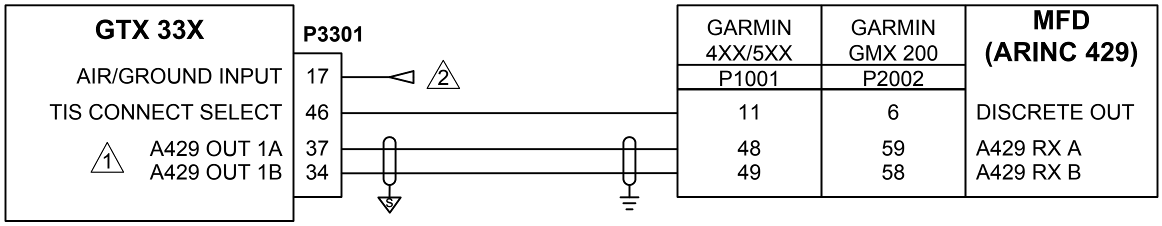
2 GNS 480 SW VERSION 2.40 OR HIGHER IS REQUIRED TO PROVIDE GPS/SBAS DATA FOR ADS-B OUT COMPLIANCE

3 THE GNS 480 WILL REMOTELY CONTROL THE GTX 33/330 TRANSPONDER. IF THE GTX 33/330 TRANSPONDER (SOFTWARE VERSION 3.06 OR HIGHER) HAS GRAY CODE ALTITUDE PROVIDED TO IT, IT WILL PROVIDE ALTITUDE TO THE GNS 480. IF THE GTX 33/330 HAS SERIAL ALTITUDE PROVIDED TO IT, THE GTX 33/330 WILL **NOT** PROVIDE ALTITUDE TO THE GNS 480.

4 GNS 480 SERIAL PORT 6 (RX/TX) AND GTX MUST BE CONFIGURED AS SHOWN IN TABLE C-2.

5 A SWITCH MUST BE INSTALLED TO ALLOW ONLY ONE TRANSPONDER TO BE ACTIVE AT A TIME. REFER TO *GNS 480 (CNX80) COLOR GPS/NAV/COM INSTALLATION MANUAL* FOR APPROVED SWITCHES.

Figure B-4 GTX 33X - GNS 480 (CNX80) Interconnect
Sheet 2 of 2



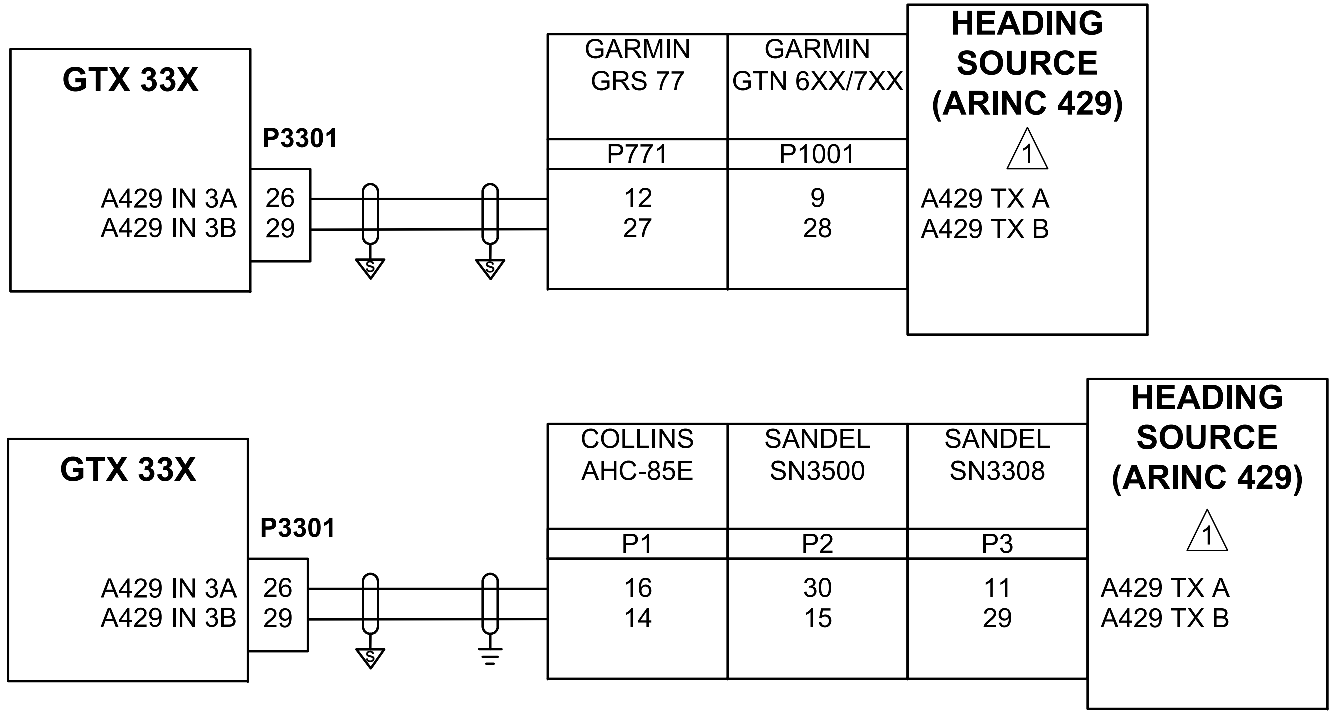
NOTES

1 WHEN TIS IS USED IN THE AIRCRAFT, DO NOT CONNECT ANOTHER TRAFFIC SYSTEM TO THE SAME UNIT.

2 AIR/GROUND INPUT IS CONNECTED TO THE AIRCRAFT GROUND POSITION, SQUAT OR WEIGHT ON WHEELS SWITCH

3 REFER TO THE GENERAL NOTES IDENTIFIED AT THE START OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

Figure B-5 GTX 33X - MFD Typical Interconnect



NOTES

1. REFER TO MANUFACTURER'S DOCUMENTATION FOR COMPLETE PINOUT AND INTERCONNECT INFORMATION.

2. REFER TO THE GENERAL NOTES IDENTIFIED AT THE START OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

Figure B-6 GTX 33X - AHRS/Heading Data Source Interconnect

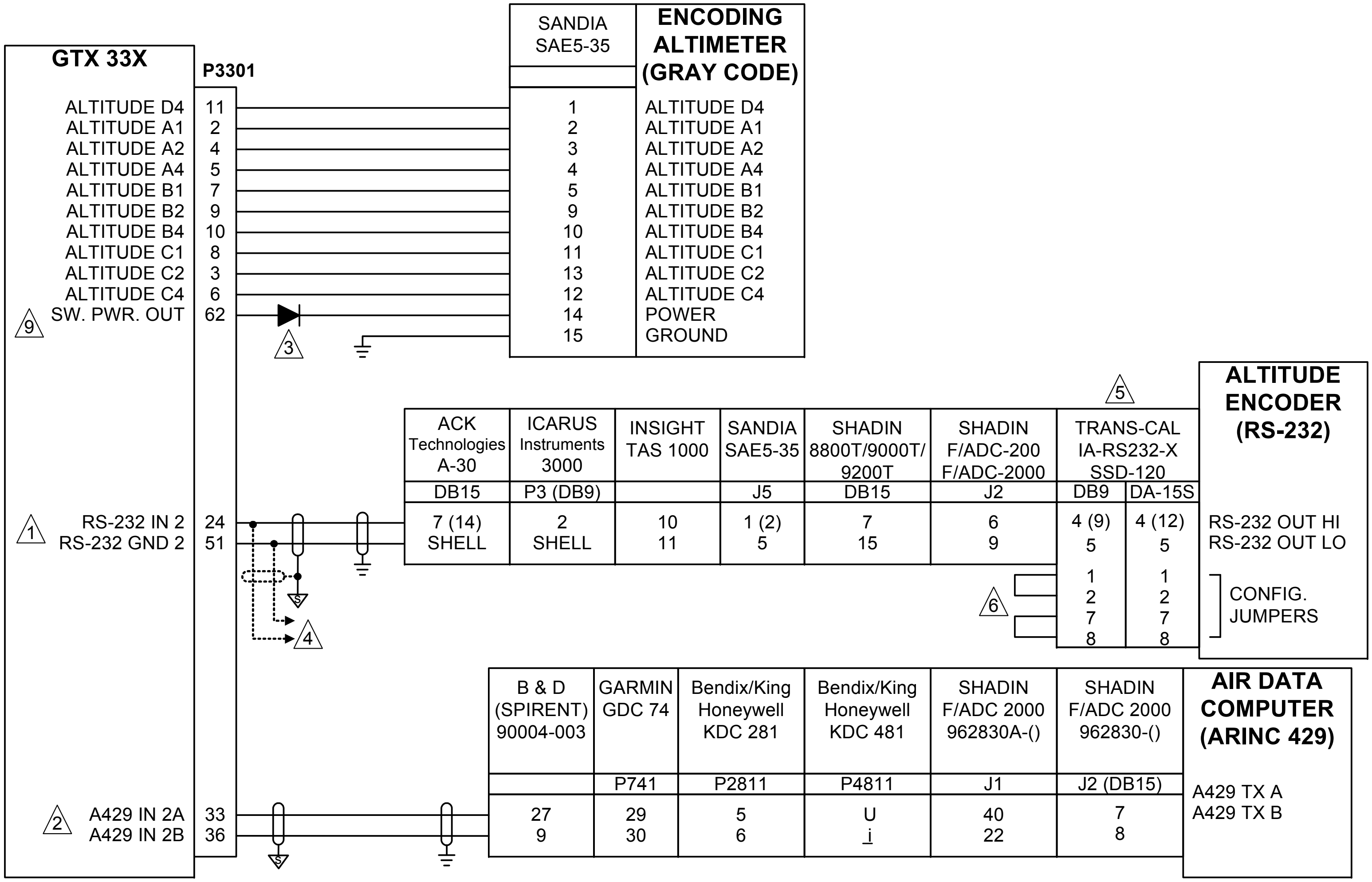


Figure B-7 GTX 33X - Altitude Data Source Interconnect
Sheet 1 of 2

NOTES

1. IF RS-232 PORT 2 IS ALREADY USED FOR ANOTHER PURPOSE, RS-232 PORT 1 CAN BE USED.

2. IF ARINC 429 IN PORT 2 IS ALREADY USED FOR ANOTHER PURPOSE, ARINC 429 IN PORT 1 CAN BE USED.

3. USE 1N4007 DIODE FOR ENCODER POWER.

4. TO GTX #2 IF INSTALLED. RS-232 SPLICE MUST BE MADE ADJACENT TO GTX #1 CONNECTOR AS SHOWN

5. IF USING THE SERIAL PORT SOFTWARE METHOD TO CONFIGURE THE OUTPUT OF THE ENCODER, MAKE SURE THE “TRIMBLE/GARMIN 9600 BPS” FORMAT IS SELECTED. REFER TO THE MANUFACTURERS INSTALLATION MANUAL FOR OTHER AVAILABLE RS232 TX PORTS.

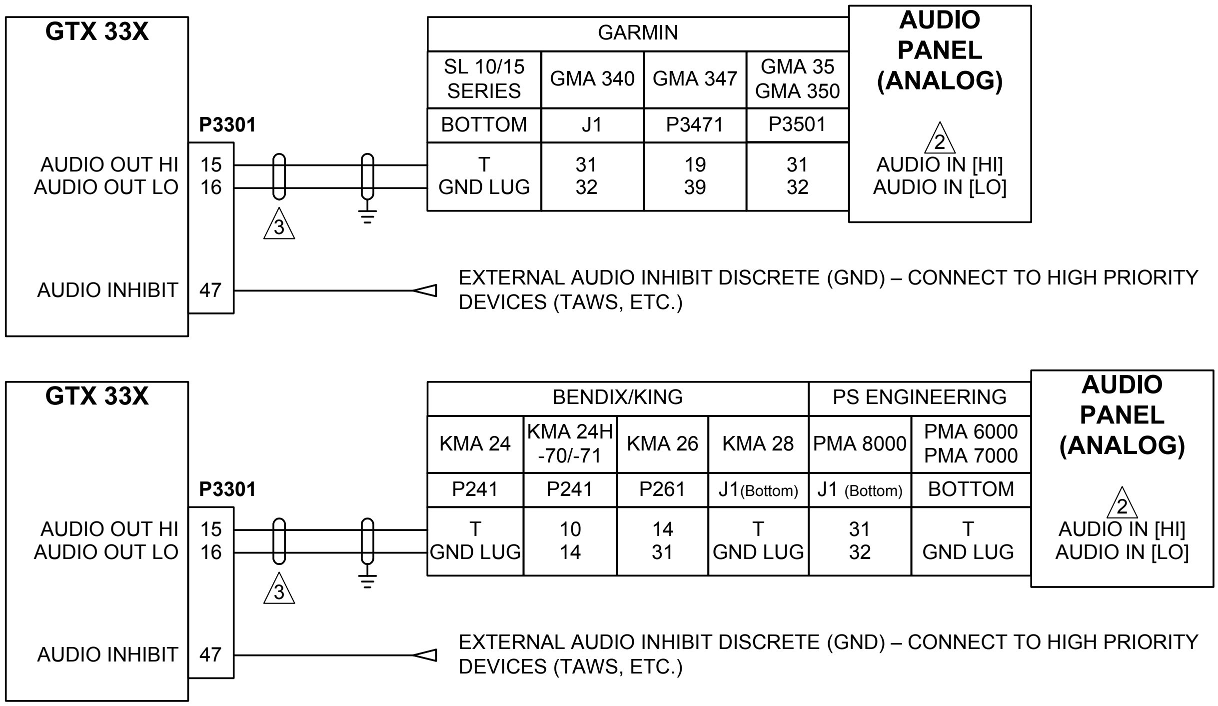
6. THE LENGTH OF THE STRAPS MUST BE LIMITED TO THE LENGTH SPECIFIED IN THE MANUFACTURER’S INSTALLATION MANUAL.

7. CHOICE OF GRAY CODE, RS-232, OR ARINC 429 INTERFACE DEPENDS ON INTERFACED EQUIPMENT. ONLY ONE AIR DATA SOURCE SHOULD BE HOOKED TO THE TRANSPONDER AT A TIME.

8. REFER TO GENERAL NOTES FOR MORE INFORMATION AND REQUIREMENTS.

9. POWERING SAE 5-35 THROUGH THE SWITCHED OUTPUT IS OPTIONAL.

Figure B-7 GTX 33X - Altitude Data Source Interconnect
Sheet 2 of 2



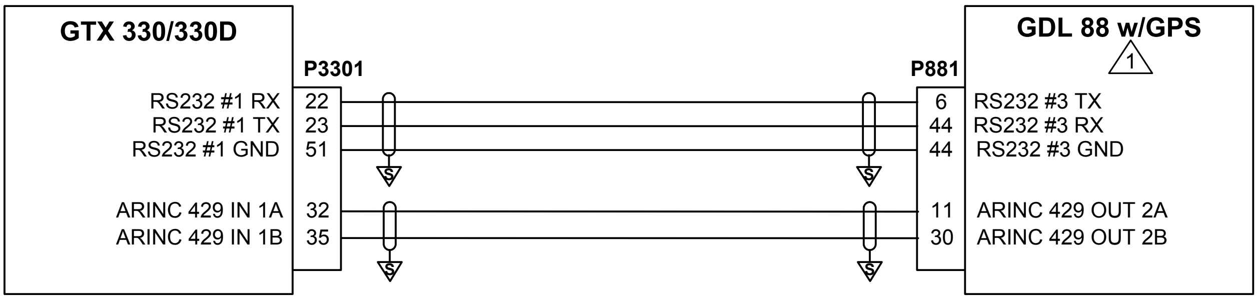
NOTES

1 REFER TO GENERAL NOTES FOR MORE INFORMATION AND REQUIREMENTS.

2 IT IS PERMITTED TO USE OTHER AVAILABLE UNSWITCHED, UNMUTED INPUTS. IF AUDIO PANEL DOES NOT HAVE AN AVAILABLE UNSWITCHED, UNMUTED INPUT, AUDIO FROM THE GTS PROCESSOR MUST BE MIXED WITH AN EXISTING AUDIO SOURCE USING RESISTORS TO ISOLATE THE AUDIO OUTPUT FROM EACH LRU. A TYPICAL VALUE FOR MIXING RESISTORS IS 390Ω ¼ W. THE AUDIO LEVELS OF EXISTING AUDIO SOURCES WILL HAVE TO BE RE-EVALUATED AFTER MIXING RESISTORS ARE INSTALLED.

3 SHIELDS FOR AUDIO CABLES SHOULD BE GROUNDED AT ONE END (WITH LEADS LESS THAN 3.0 INCHES) AND LEFT FLOATING AT THE OTHER END.

Figure B-8 GTX 33X - Audio Panel Interconnect

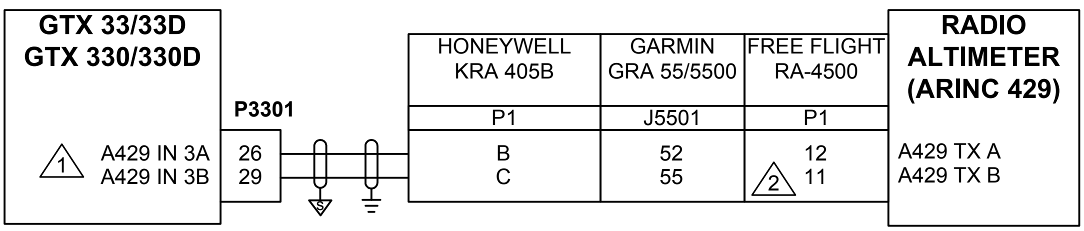


NOTES

1. THE GDL 88 WITH GPS CANNOT USE AN EXTERNAL GPS/SBAS OR INTERFACE TO A GTN.

2. REFER TO GENERAL NOTES FOR MORE INFORMATION AND REQUIREMENTS.

Figure B-9 GTX 33X - GDL 88 With GPS Interconnect



NOTES

1. IF ARINC 429 IN PORT 3 IS ALREADY USED FOR ANOTHER PURPOSE, ARINC 429 IN PORT 1 CAN BE USED.

2. ONLY APPLICABLE TO FREE FLIGHT RA-4500 P/N 84560-X2-XXXX.

3. REFER TO GENERAL NOTES FOR MORE INFORMATION AND REQUIREMENTS.

Figure B-10 GTX 33X - Radio Altimeter Source Interconnect

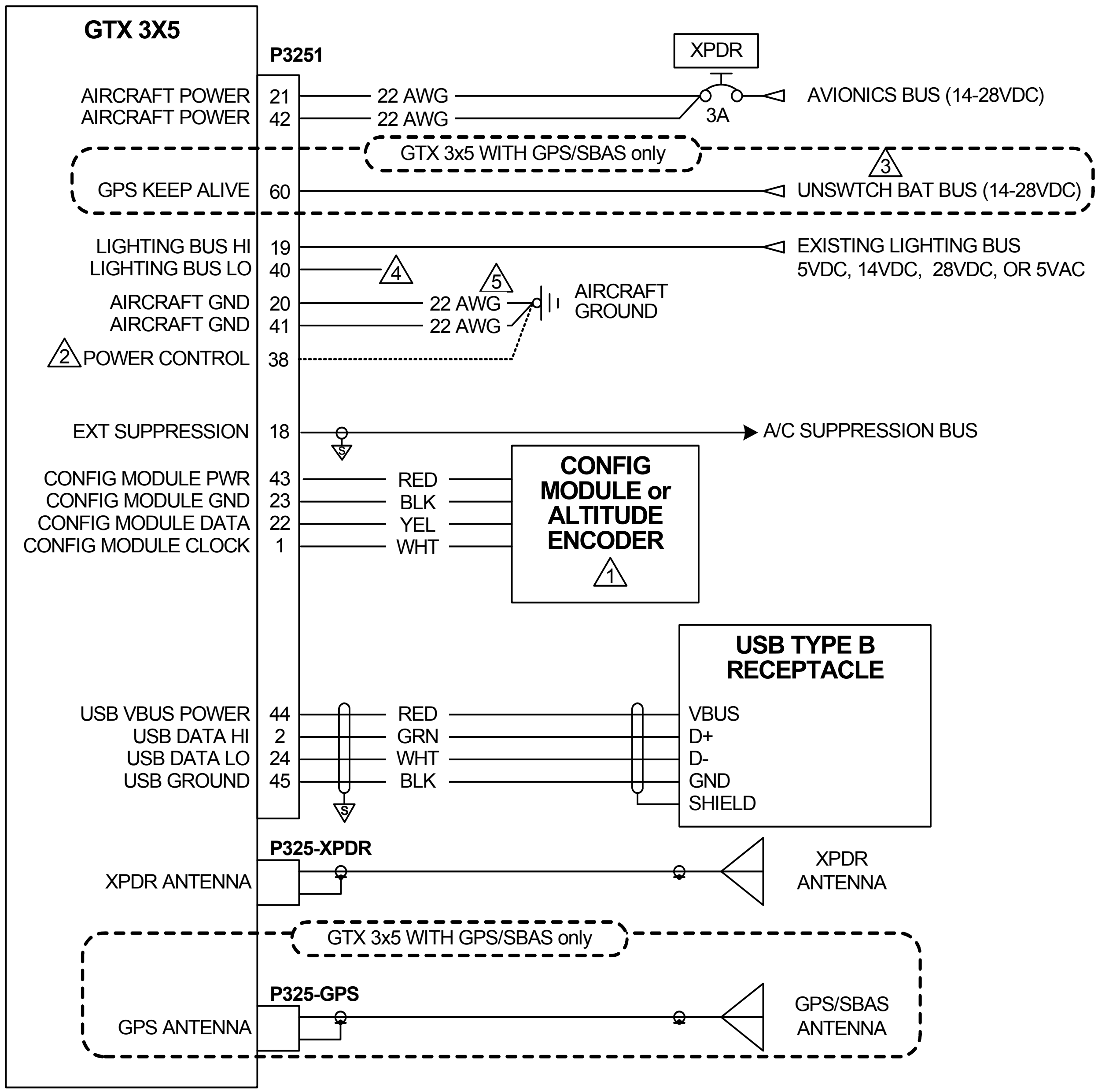


Figure B-11 GTX 3X5 - Power, Ground, and Configuration Module Interconnect
Sheet 1 of 2

NOTES

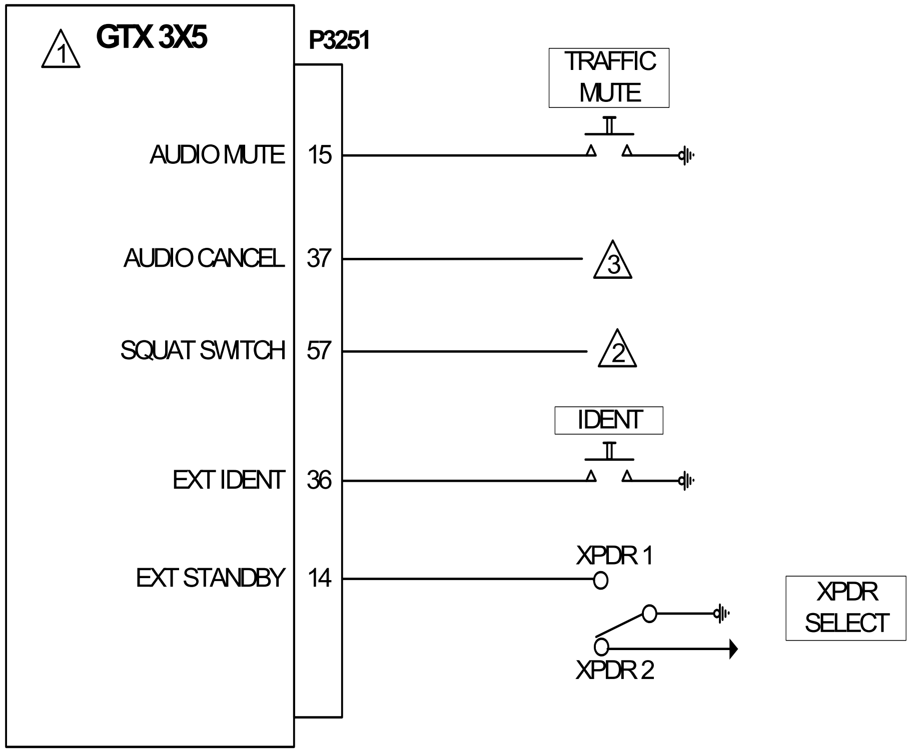
1. CONFIG MODULE REQUIRES WIRING HARNESS P/N: 325-00122-00. GAE PRESSURE/CONFIG MODULE REQUIRES WIRING HARNESS P/N: 325-00421-00. MODULE WIRING HARNESSES ARE NOT INTERCHANGEABLE. WIRE COLOR IN MODULE WIRING HARNESS DESIGNATES FUNCTION. CONNECT MODULE WIRING HARNESS TO GTX 3X5 ACCORDING TO WIRE COLOR.

2. GROUND PIN 38 FOR REMOTE POWER ON/OFF OPERATION.

3. GPS KEEP ALIVE IS REQUIRED FOR GPS INSTALLS. GPS KEEP ALIVE MUST BE CONNECTED TO THE UNSWITCHABLE BATTERY BUS (BUS DIRECTLY CONNECTED TO THE BATTERY). IF NOT CONNECTED, GPS MAY TAKE UP TO 20 MINUTES TO OBTAIN A GPS FIX.

4. REFER TO SECTION 8.2.3 FOR LIGHTING BUS CONNECTIONS.

Figure B-11 GTX 3X5 - Power, Ground, and Configuration Module Interconnect Sheet 2 of 2



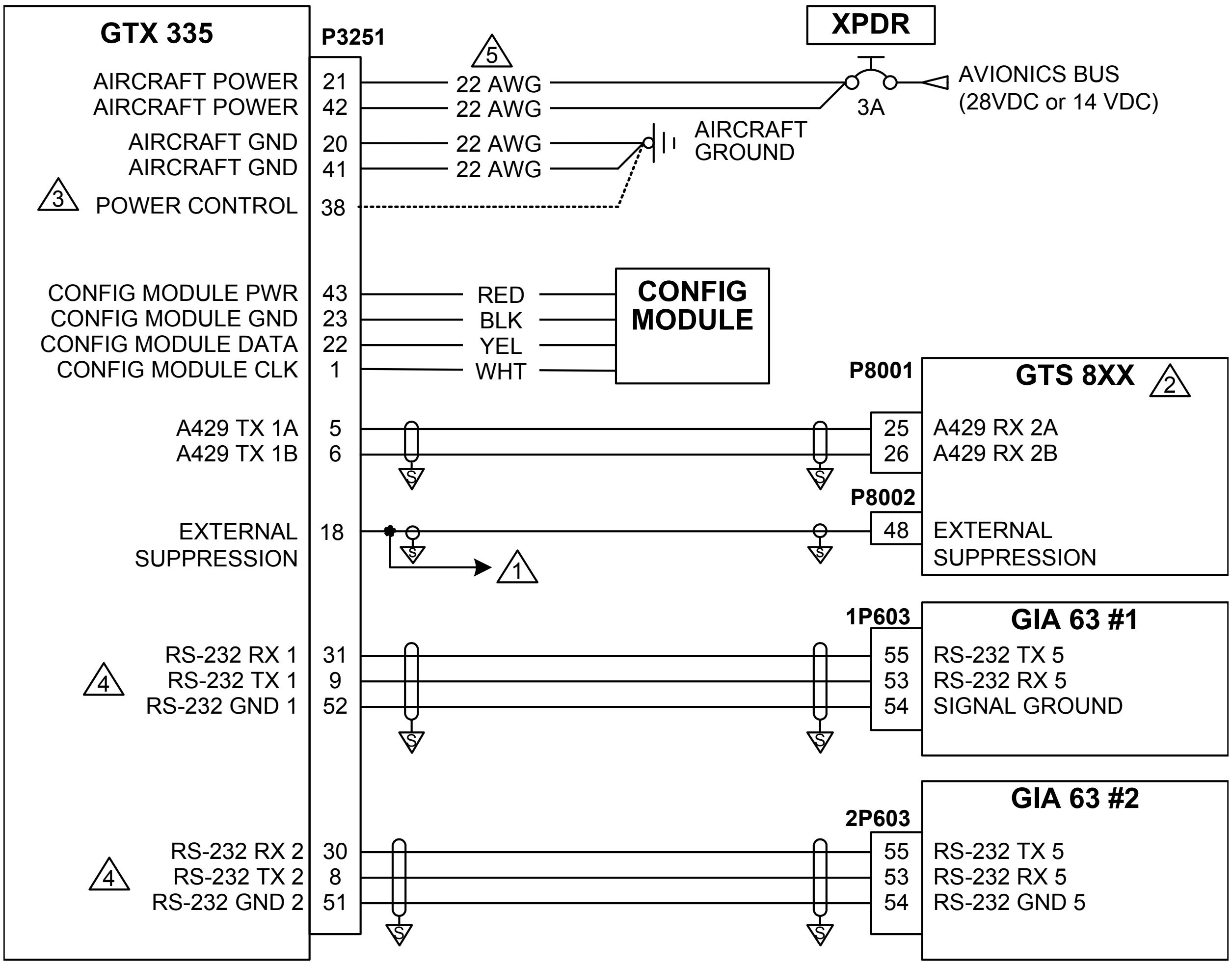
NOTES

1. CERTAIN DISCRETE I/O PINS ARE CONFIGURABLE. REFER TO PIN FUNCTION LIST FOR CONFIGURATION SELECTIONS.

2. THE SQUAT SWITCH INPUT CAN BE USED TO CONTROL AIR/GROUND STATUS. REFER TO SECTION 6.3.5 FOR MORE INFORMATION ABOUT THE INPUT SENSE CONFIGURATION.

3. AUDIO CANCEL IS CONFIGURED WITH LEGACY G950/1000 AIRCRAFT WITH SW V9.15 AND LATER. IT ALSO CAN BE WIRED TO TAWS INHIBIT FROM A TAWS ENABLED DEVICE.

Figure B-12 GTX 3X5 Switches



NOTES

1. CONNECTION TO AIRCRAFT SUPPRESSION BUS.

2. GTS 8XX IS THE ONLY SUPPORTED TRAFFIC SYSTEM THAT INTERFACES WITH THE GTX 335.

3. REFER TO SECTION 8.2.4 FOR MORE INFORMATION.

4. RS-232 PORTS 1 THROUGH 3 CAN BE USED.

5. SINGLE 22 AWG WIRE WITH 3A CIRCUIT BREAKER IS ALLOWED WITH WIRE RUNS LESS THAN 20 FT.
SINGLE 20 AWG WIRE WITH 5A CIRCUIT BREAKER IS ALLOWED WITH WIRE RUNS GREATER THAN 20 FT.

Figure B-13 GTX 335 - Legacy G950/1000 Interconnect

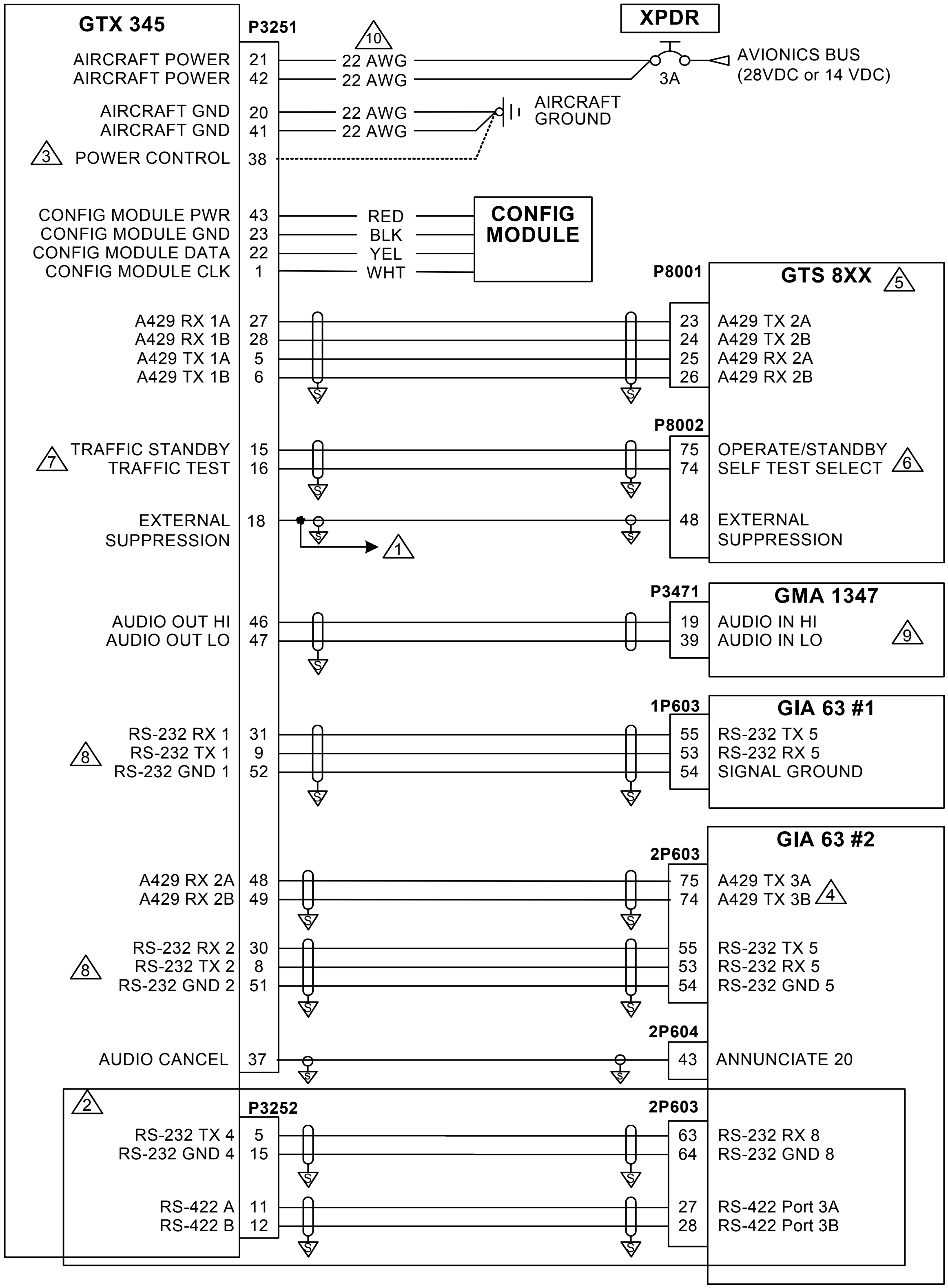


Figure B-14 GTX 345 - Legacy G950/1000 Interconnect
Sheet 1 of 2

NOTES

1 CONNECTION TO AIRCRAFT SUPPRESSION BUS.

2 GDL 90 EMULATION - RS-422 FIS-B CONNECTION AND RS-232 ADS-B IN TRAFFIC.

3 REFER TO SECTION 8.2.4 FOR MORE INFORMATION.

4 PROVIDES TRUE HEADING TO UNIT, REQUIRED IF EXTERNAL TRAFFIC SYSTEM IS INSTALLED. ANY AVAILABLE ARINC 429 PORT IS ALLOWED. THIS MUST BE CONFIGURED BY THE INSTALLER.

5 GTS 8XX SHOWN AS AN EXAMPLE, REFER TO EXTERNAL TRAFFIC SENSORS FOR ALTERNATE EXTERNAL TRAFFIC SYSTEM OPTIONS. ADDITIONAL EXTERNAL TRAFFIC CONFIGURATION IS REQUIRED.

6 GTX 345R PROVIDES AUTOMATIC CONTROL OF OPERATE/STANDBY BASED ON AIRBORNE STATUS. GTX 3X5 INSTALL TOOL PROVIDES TRAFFIC SELF TEST DISCRETE FOR EXTERNAL TRAFFIC VALIDATION.

7 CONFIGURABLE I/O DISCRETE. USE PINS ON P3251 ONLY.

8 RS-232 PORTS 1 THROUGH 3 CAN BE USED.

9 ANY UNSWITCHED AND UNMUTED AUDIO INPUT CAN BE USED.

10 SINGLE 22 AWG WIRE WITH 3A CIRCUIT BREAKER IS ALLOWED WITH WIRE RUNS LESS THAN 20 FT. SINGLE 20 AWG WIRE WITH 5A CIRCUIT BREAKER IS ALLOWED WITH WIRE RUNS GREATER THAN 20 FT.

Figure B-14 GTX 345 - Legacy G950/1000 Interconnect
Sheet 2 of 2

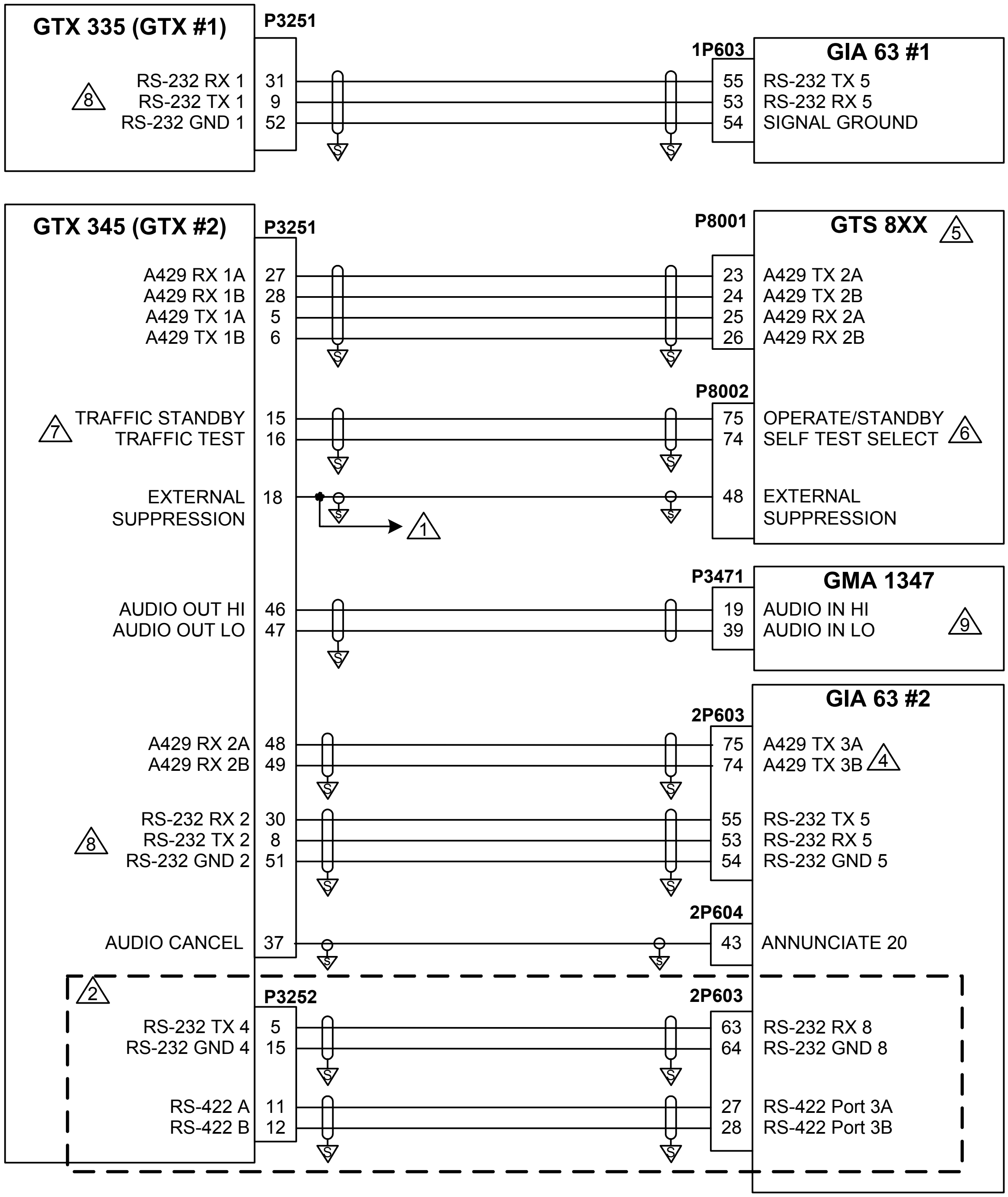


Figure B-15 Dual GTX 3X5 - Legacy G950/1000 Interconnect
Sheet 1 of 2

NOTES

1 CONNECTION TO AIRCRAFT SUPPRESSION BUS.

2 GDL 90 EMULATION - RS-422 FIS-B CONNECTION AND RS-232 ADS-B IN TRAFFIC.

3 REFER TO SECTION 8.2.4 FOR MORE INFORMATION.

4 PROVIDES TRUE HEADING TO UNIT, REQUIRED IF EXTERNAL TRAFFIC SYSTEM IS INSTALLED. ANY AVAILABLE ARINC 429 PORT IS ALLOWED. THIS MUST BE CONFIGURED BY THE INSTALLER.

5 GTS 8XX SHOWN AS AN EXAMPLE, REFER TO EXTERNAL TRAFFIC SENSORS FOR ALTERNATE EXTERNAL TRAFFIC SYSTEM OPTIONS. ADDITIONAL EXTERNAL TRAFFIC CONFIGURATION IS REQUIRED.

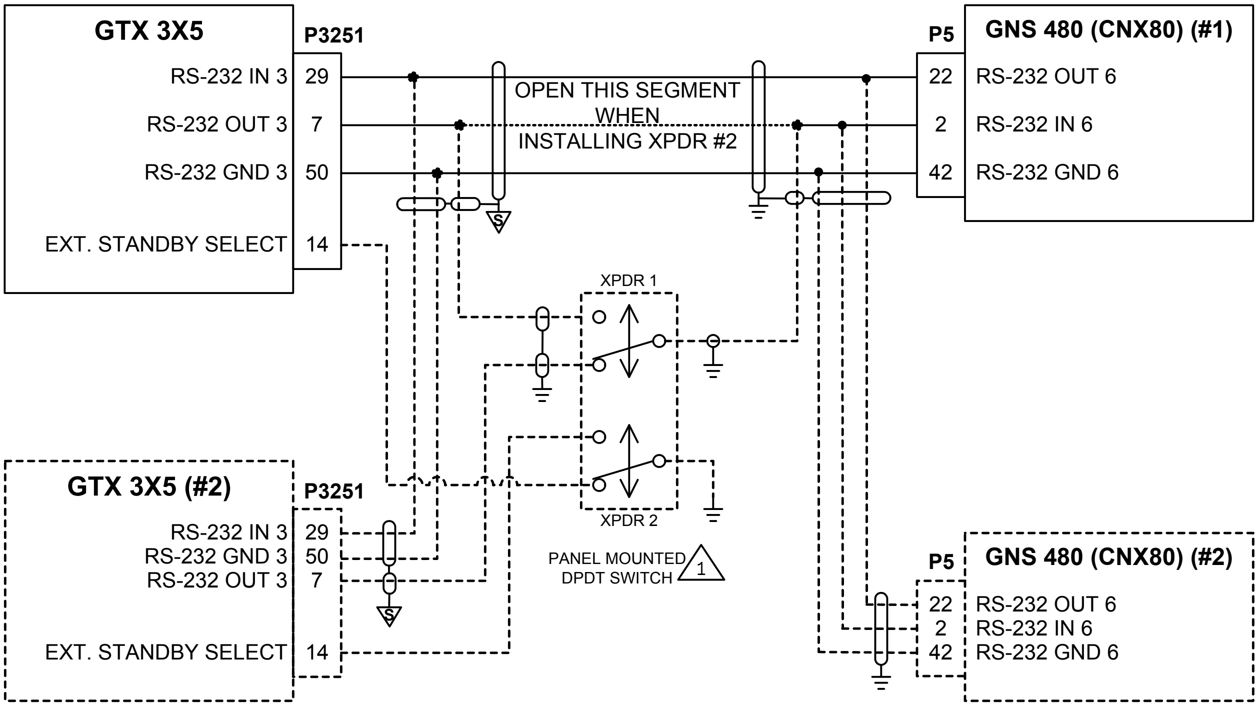
6 GTX 345R PROVIDES AUTOMATIC CONTROL OF OPERATE/STANDBY BASED ON AIRBORNE STATUS. GTX 3X5 INSTALL TOOL PROVIDES TRAFFIC SELF TEST DISCRETE FOR EXTERNAL TRAFFIC VALIDATION.

7 CONFIGURABLE I/O DISCRETE. USE PINS ON P3251 ONLY.

8 RS-232 PORTS 1 THROUGH 3 CAN BE USED.

9 ANY UNSWITCHED AND UNMUTED AUDIO INPUT CAN BE USED.

Figure B-15 Dual GTX 3X5 - Legacy G950/1000 Interconnect Sheet 2 of 2

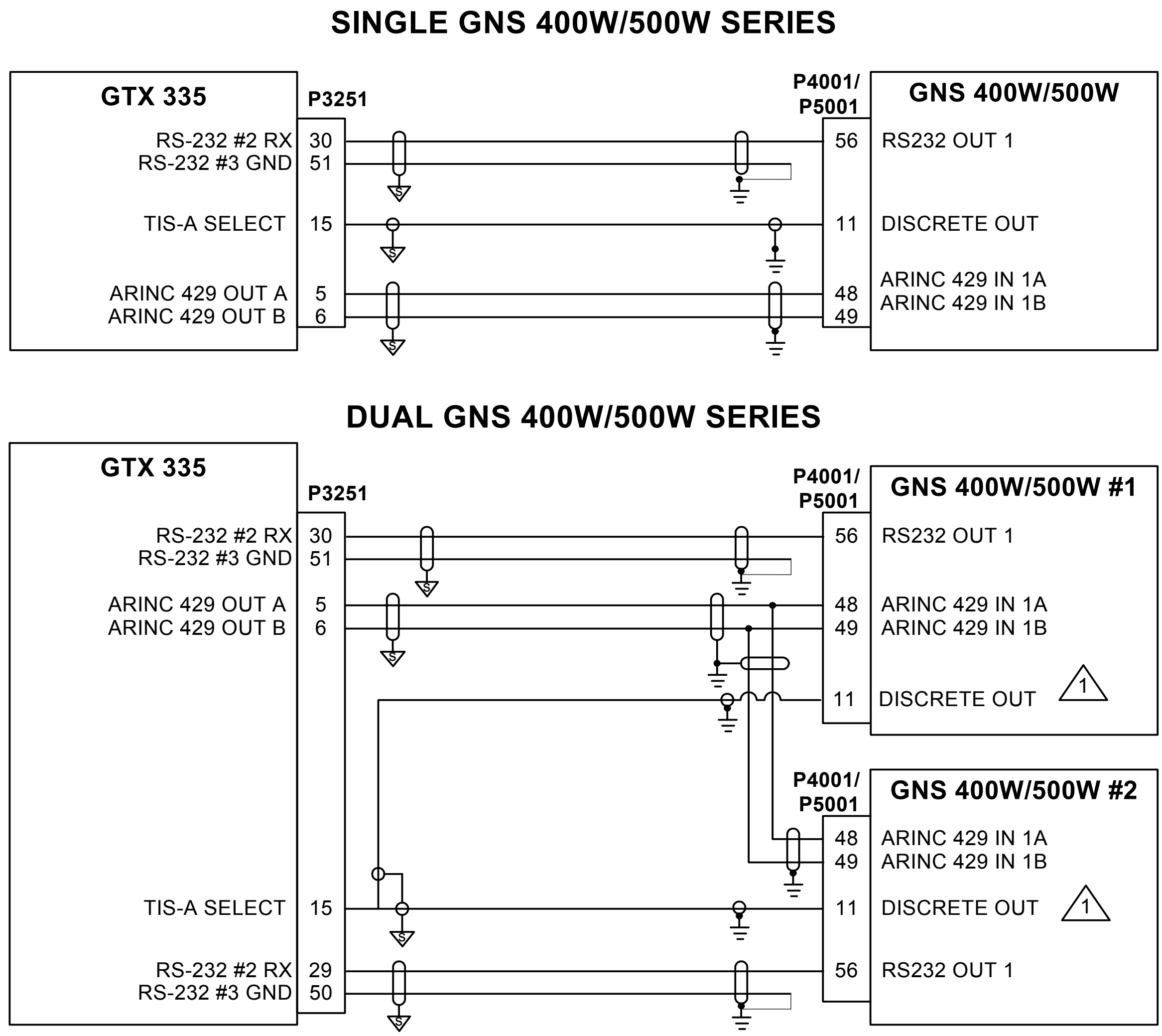


NOTES

1. WHEN INSTALLING A SECOND TRANSPONDER, A SWITCH MUST BE INSTALLED TO LET ONLY ONE TRANSPONDER TO BE ACTIVE AT A TIME. REFER TO *GNS 480 (CNX80) COLOR GPS/NAV/COM INSTALLATION MANUAL* FOR APPROVED DPDT SWITCHES.

2. DASHED LINES AND AREAS REPRESENT TRANSPONDER #2 AND GNS 480 #2 INSTALLATION INFORMATION.

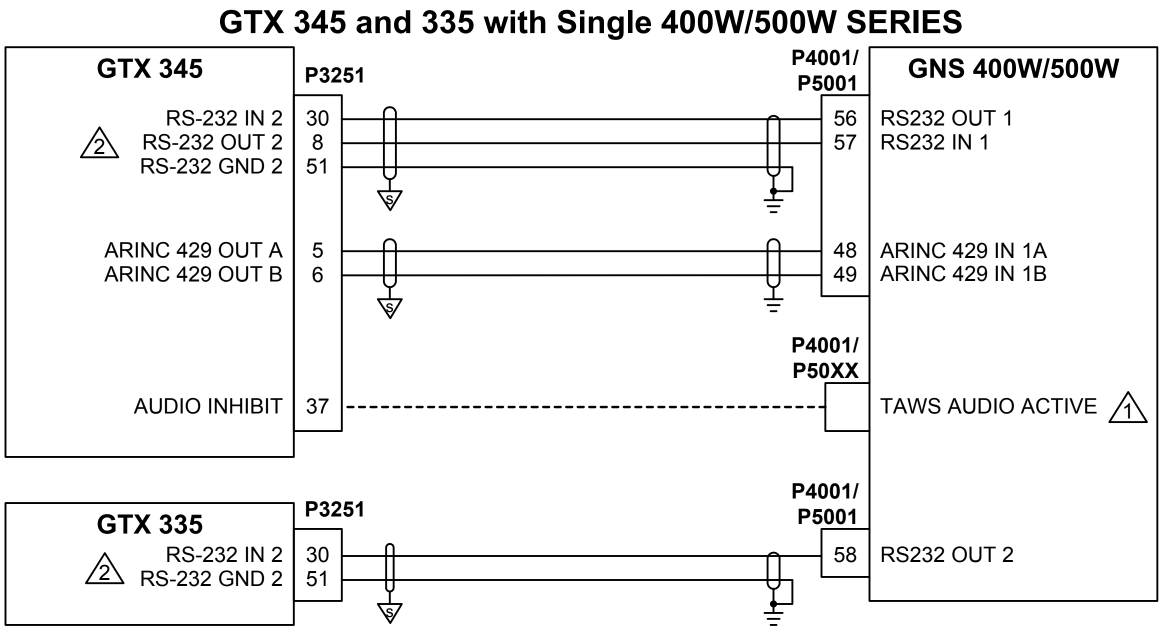
Figure B-16 GTX 3X5 - GNS 480 (CNX80) Interconnect



NOTES

1 CONNECTION SHOULD BE MADE TO BOTH NAVIGATOR #1 AND NAVIGATOR #2.

Figure B-17 GTX 335 - GNS 400W/500W Series Interconnect

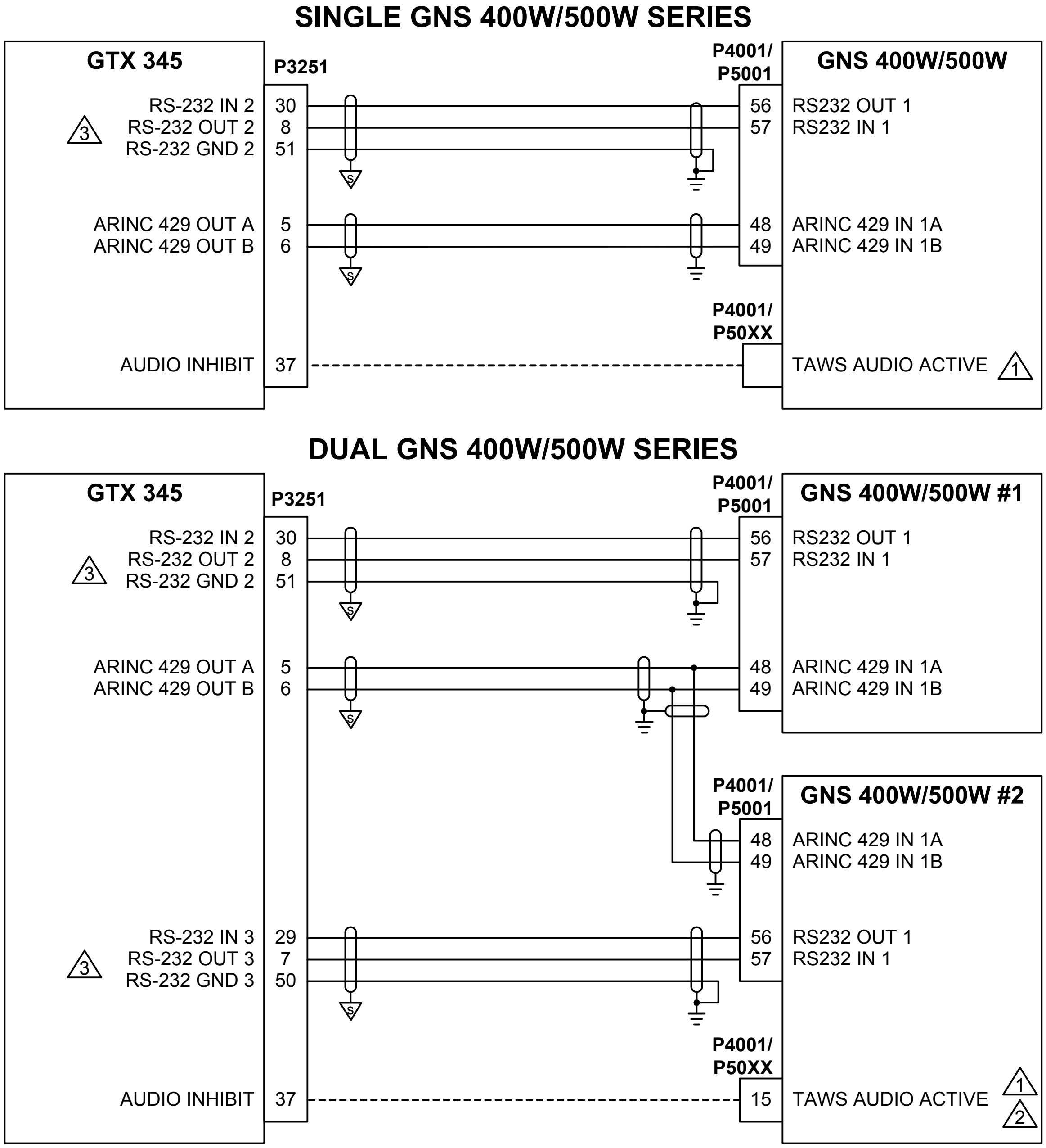


NOTES

1. TAWS AUDIO INHIBIT USED WITH GNS TAWS UNITS ONLY.

2. RS-232 PORTS 1 THROUGH 3 ARE AVAILABLE.

Figure B-18 GTX 335 and GTX 345 - Single GNS 400W/500W Series Interconnect



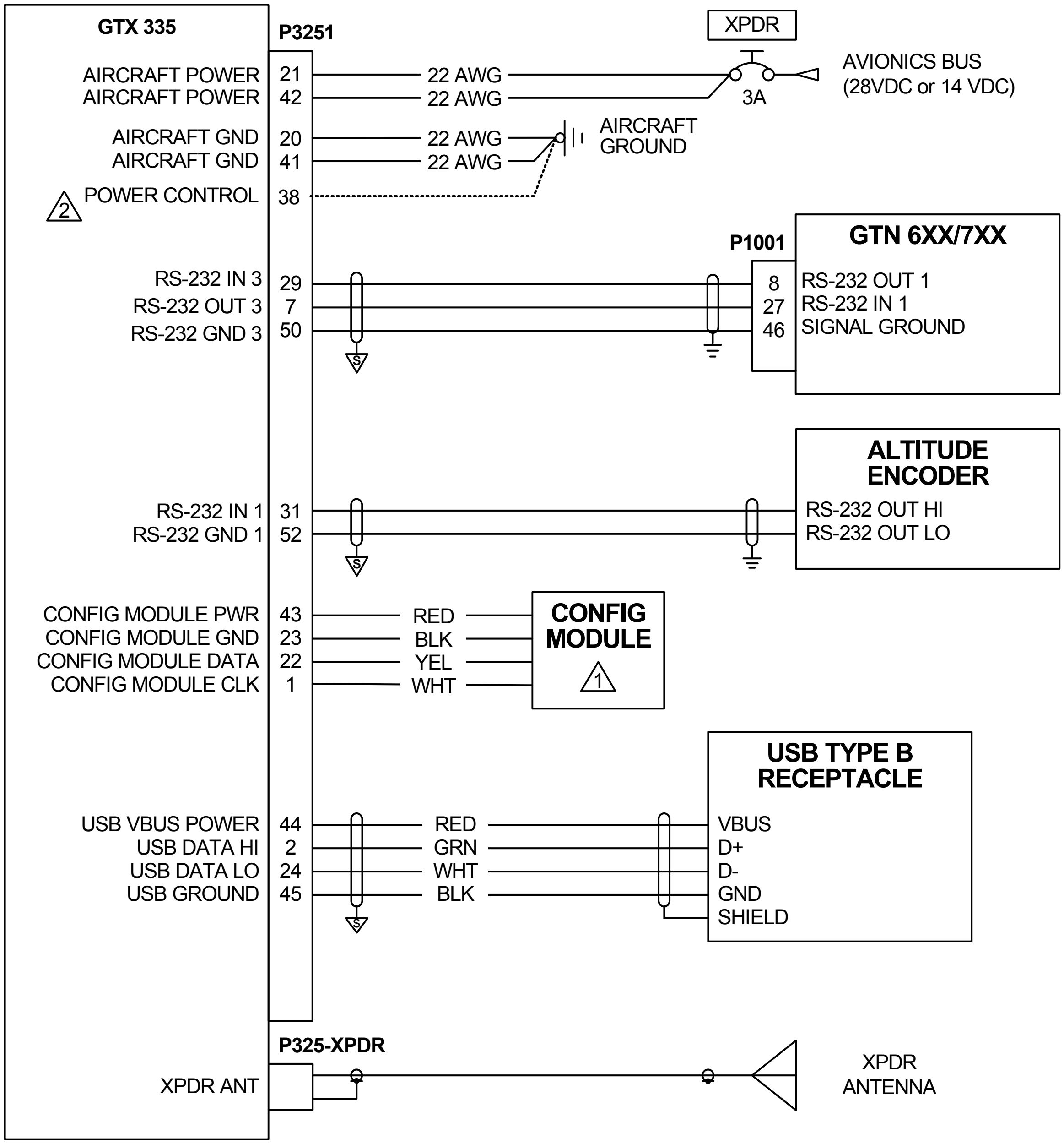
NOTES

1. TAWS AUDIO INHIBIT USED WITH GNS TAWS UNITS ONLY.

2. CONNECTION CAN BE MADE TO NAVIGATOR #1 INSTEAD OF NAVIGATOR #2.

3. RS-232 PORTS 1 THROUGH 3 ARE AVAILABLE.

Figure B-19 GTX 345 - GNS 400W/500W Series Interconnect

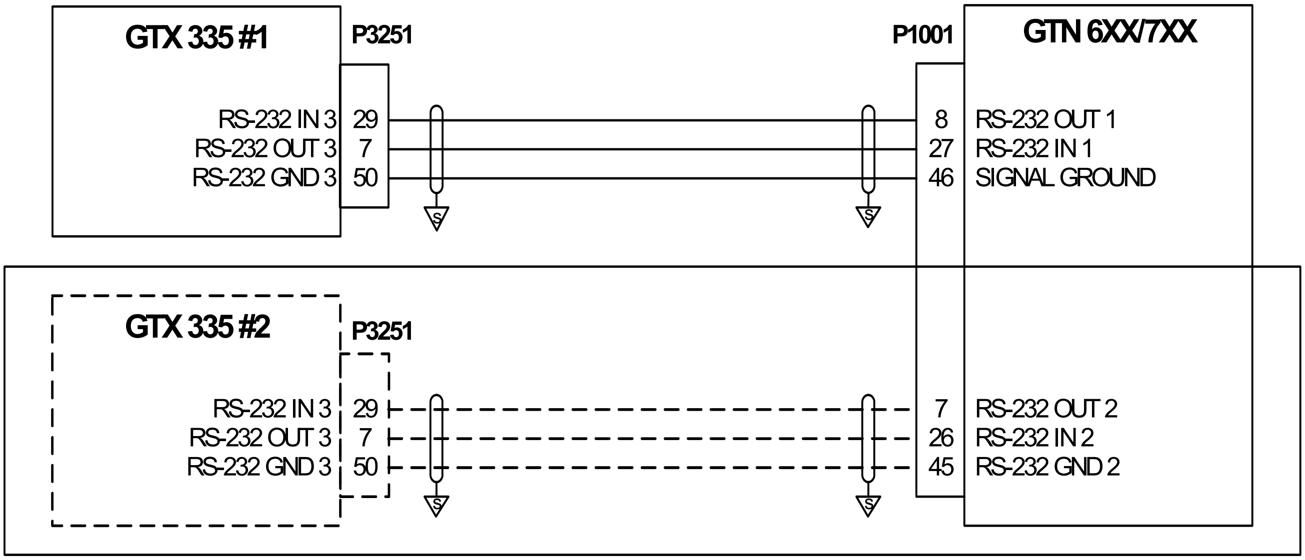


NOTES

1. CONFIG MODULE REQUIRES WIRE HARNESS P/N: 325-00122-00. GAE PRESSURE/CONFIG MODULE REQUIRES WIRE HARNESS P/N: 325-00421-00. MODULE WIRE HARNESSES ARE NOT INTERCHANGEABLE. WIRE COLOR IN MODULE WIRE HARNESS DESIGNATES FUNCTION. CONNECT MODULE WIRE HARNESS TO GTX 3X5 ACCORDING TO WIRE COLOR.

2. REFER TO SECTION 8.2.4 FOR DETAILS.

Figure B-20 GTX 335 - GTN 6XX/7XX Interconnect



NOTES

1. DASHED AREAS INDICATE MORE INTERCONNECTS FOR DUAL INSTALLATION AND ARE NOT REQUIRED FOR SINGLE INSTALLATION.

Figure B-21 Single/Dual GTX 335 - Single GTN 6XX/7XX Interconnect

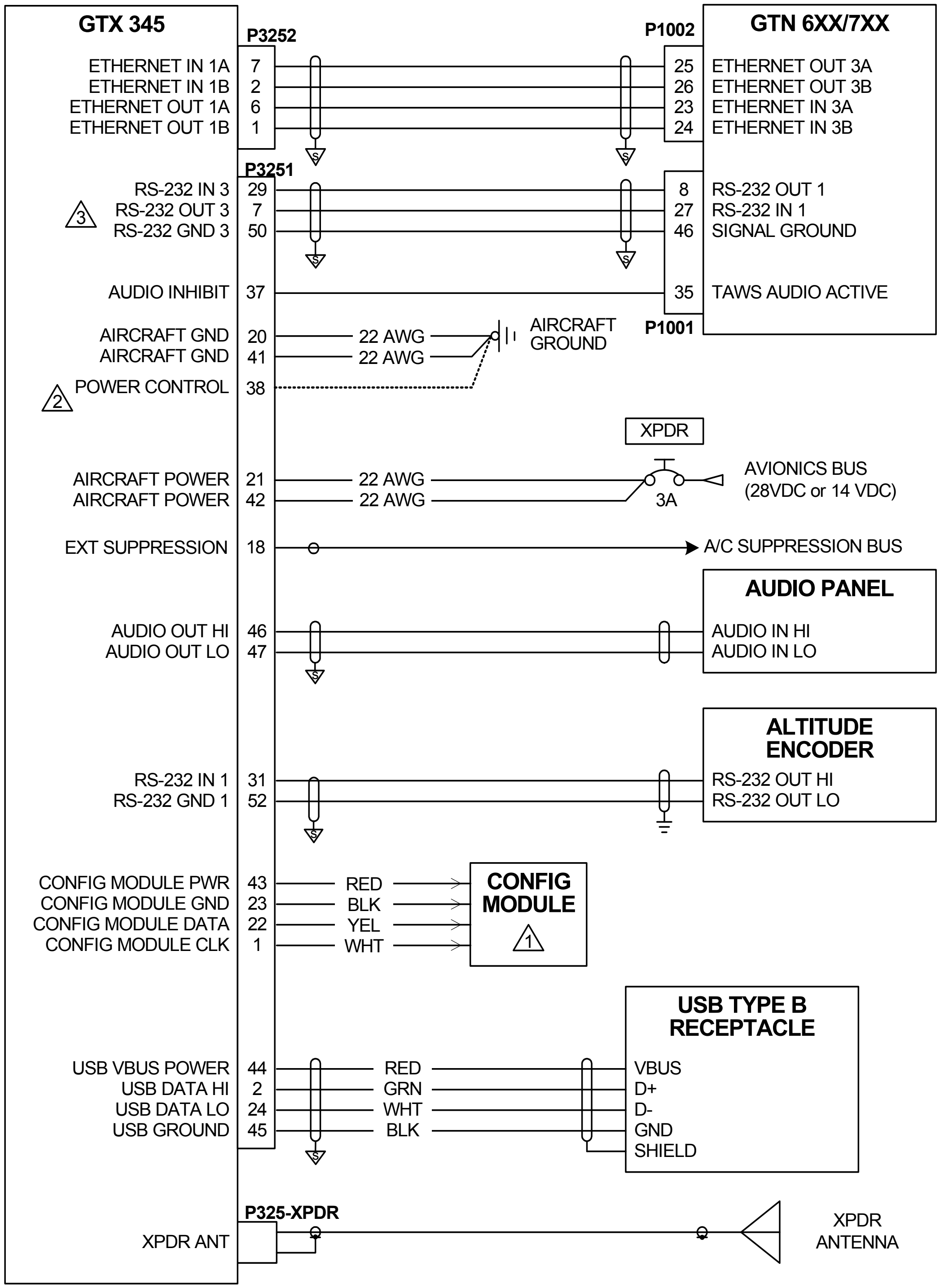


Figure B-22 GTX 345 - GTN 6XX/7XX Interconnect
Sheet 1 of 2

NOTES

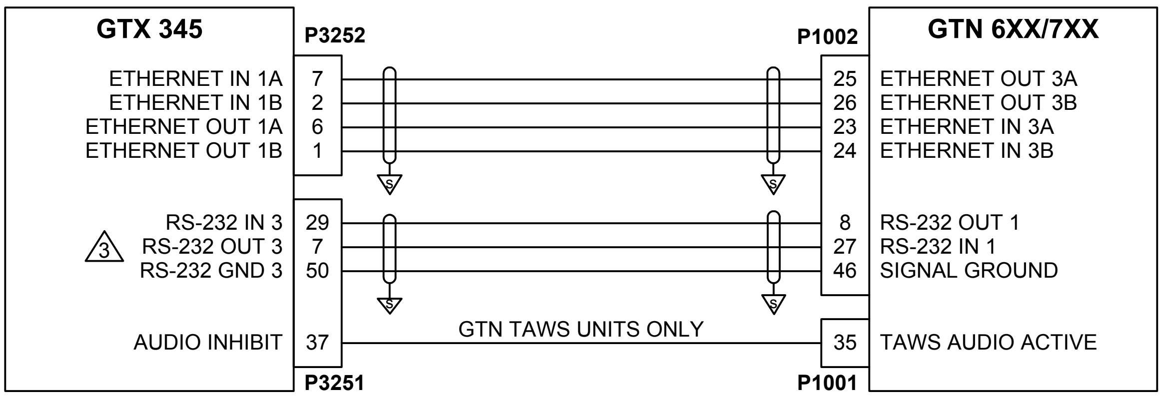
1 CONFIG MODULE REQUIRES WIRE HARNESS P/N: 325-00122-00. GAE PRESSURE/CONFIG MODULE REQUIRES WIRE HARNESS P/N: 325-00421-00. MODULE WIRE HARNESSES ARE NOT INTERCHANGEABLE. WIRE COLOR IN MODULE WIRE HARNESS DESIGNATES FUNCTION. CONNECT MODULE WIRE HARNESS TO GTX 3X5 ACCORDING TO WIRE COLOR.

2 REFER TO SECTION 8.2.4 FOR DETAILS.

3 RS-232 PORTS 1 THROUGH 3 AVAILABLE.

Figure B-22 GTX 345 - GTN 6XX/7XX Interconnect
Sheet 2 of 2

SINGLE GTX 345 or GTX 345R with SINGLE GTN 6XX/7XX



SINGLE GTX 345 or GTX 345R with DUAL GTN 6XX/7XXs

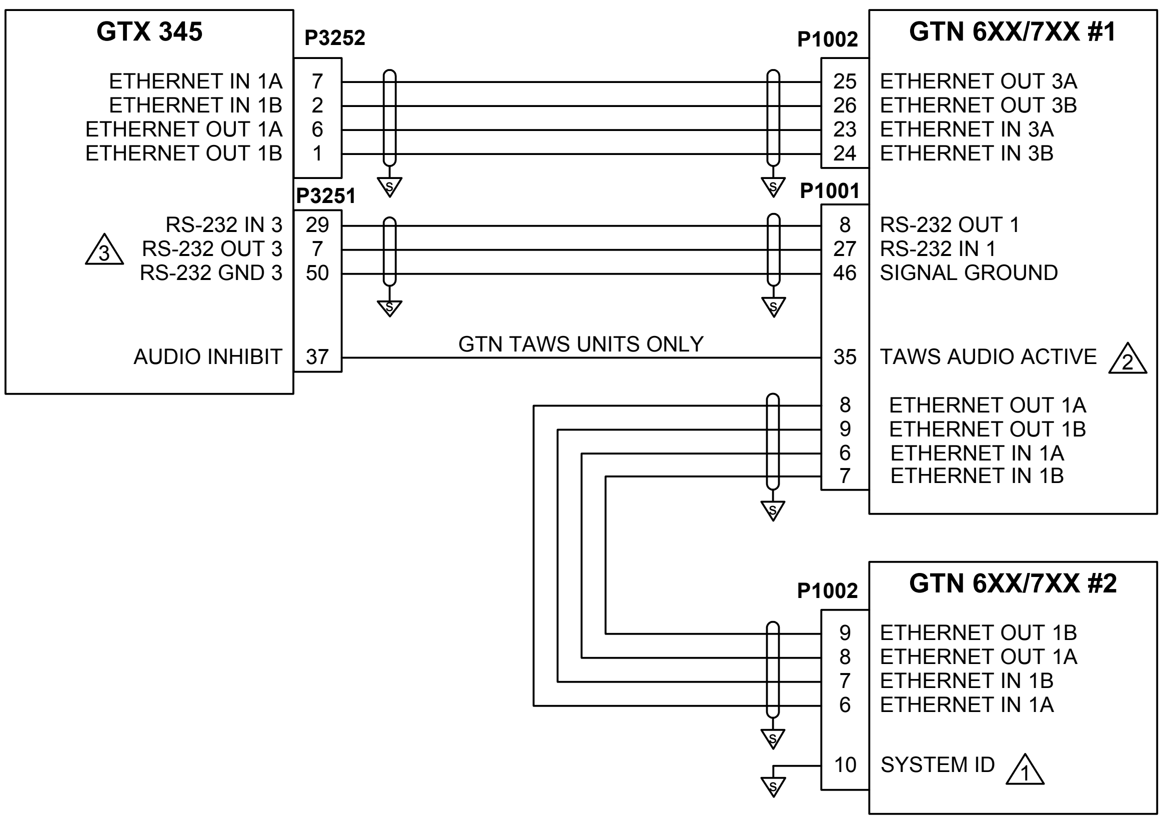


Figure B-23 GTX 345 - Single/Dual GTN 6XX/7XX Interconnect
Sheet 1 of 2

NOTES

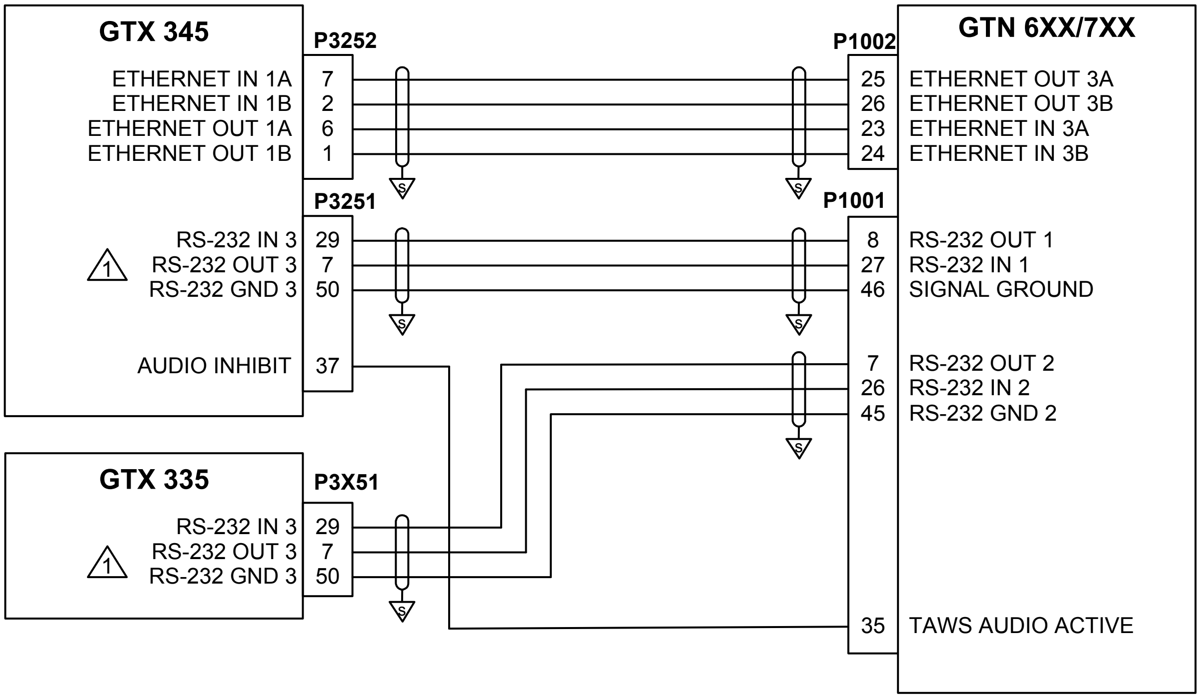
1. WHEN GTN 6XX/7XX IS THE ONLY INSTALLED GPS NAVIGATOR, OR GPS NAVIGATOR #1 IN A DUAL GPS NAVIGATOR INSTALLATION, CONFIGURE GTN 6XX/7XX AS GTN #1 BY LEAVING SYSTEM ID (P1002-10) NOT CONNECTED. WHEN THE GTN 6XX/7XX IS GPS NAVIGATOR #2 IN A DUAL GPS INSTALLATION, CONFIGURE GTN #2 BY GROUNDING SYSTEM ID (P1002-10) TO THE SHIELD BLOCK.

2. TAWS AUDIO INHIBIT FOR GTN 6XX/7XX TAWS UNITS ONLY.

3. RS-232 PORTS 1 THROUGH 3 AVAILABLE.

Figure B-23 GTX 345 - Single/Dual GTN 6XX/7XX Interconnect
Sheet 2 of 2

GTX 345 and 335 with GTN

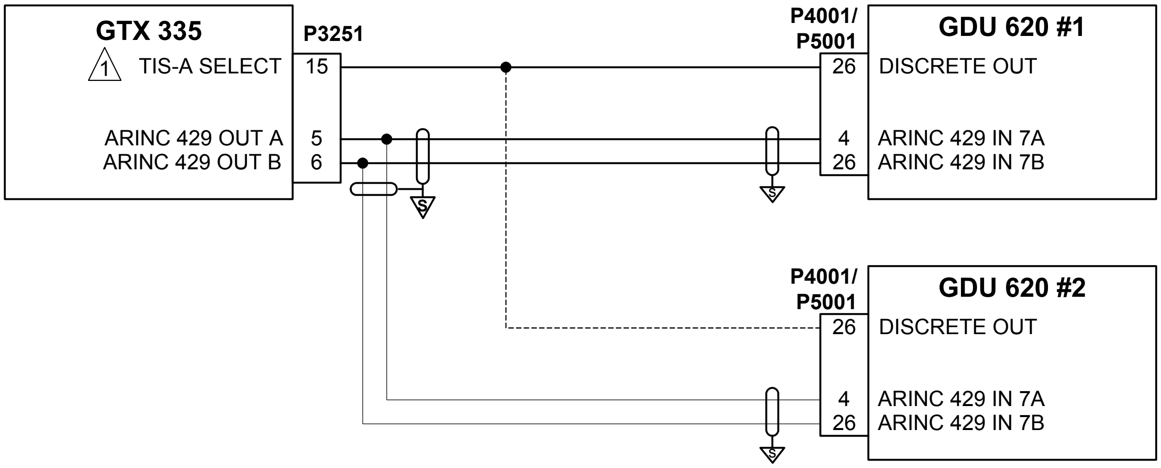


NOTES

1 RS-232 PORTS 1 THROUGH 3 AVAILABLE.

Figure B-24 GTX 345 and GTX 335 - Single GTN 6XX/7XX

GTX 335 with GDU 620 TIS-A Display



NOTES

1 CONFIGURABLE I/O DISCRETE.

Figure B-25 GTX 335 - GDU 620 TIS-A Display Interconnect

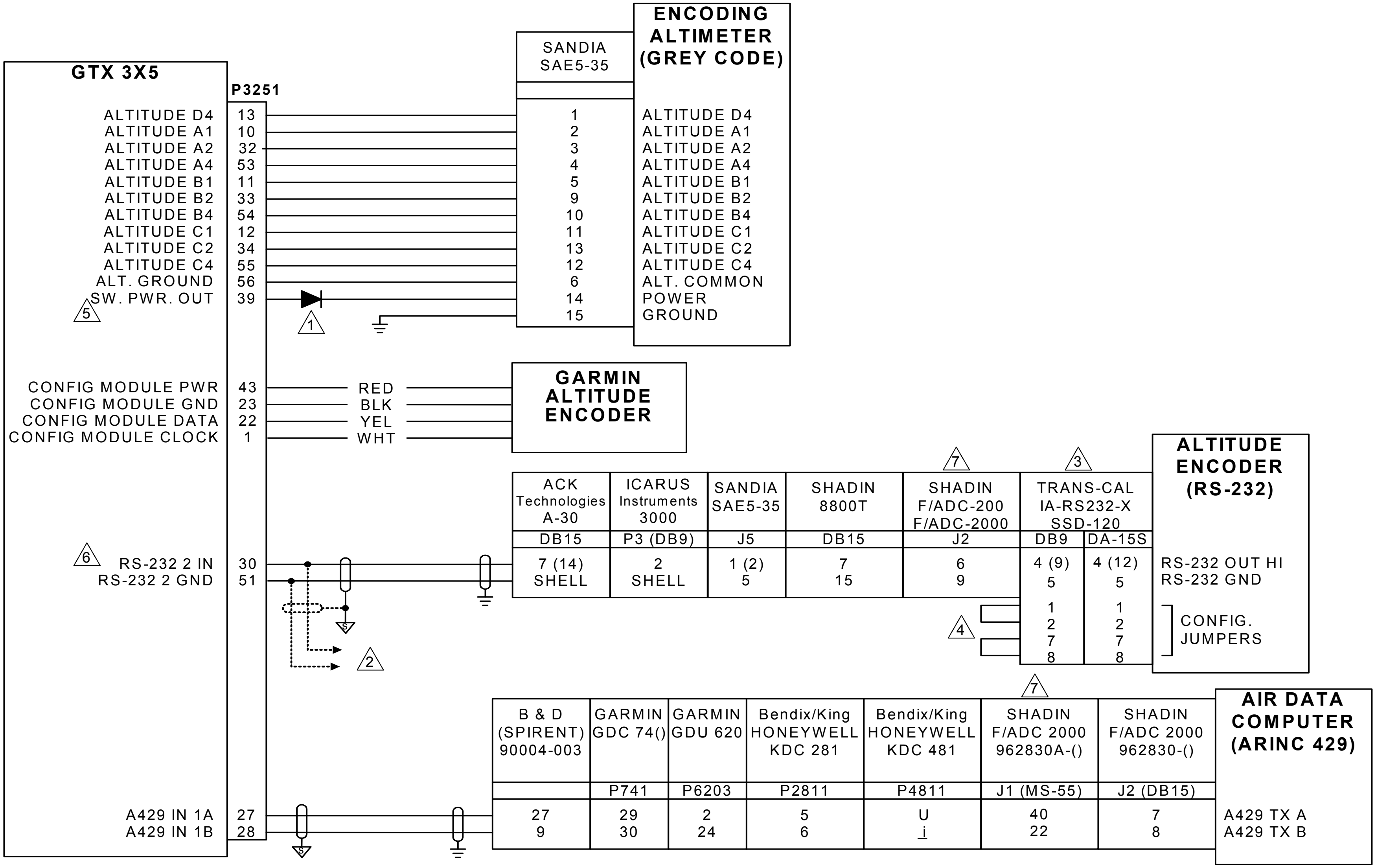


Figure B-26 GTX 3X5 - GTX 3XX Altitude Data Source Interconnect
Sheet 1 of 2

NOTES

1. USE 1N4007 DIODE FOR ENCODER POWER.

2. TO GTX #2 IF INSTALLED. RS-232 SPLICE MUST BE MADE ADJACENT TO GTX #1 CONNECTOR AS SHOWN.

3. CONFIGURE ENCODER OUTPUT TO "TRIMBLE/GARMIN 9600 BPS" FORMAT IF USING RS-232 SOFTWARE METHOD.

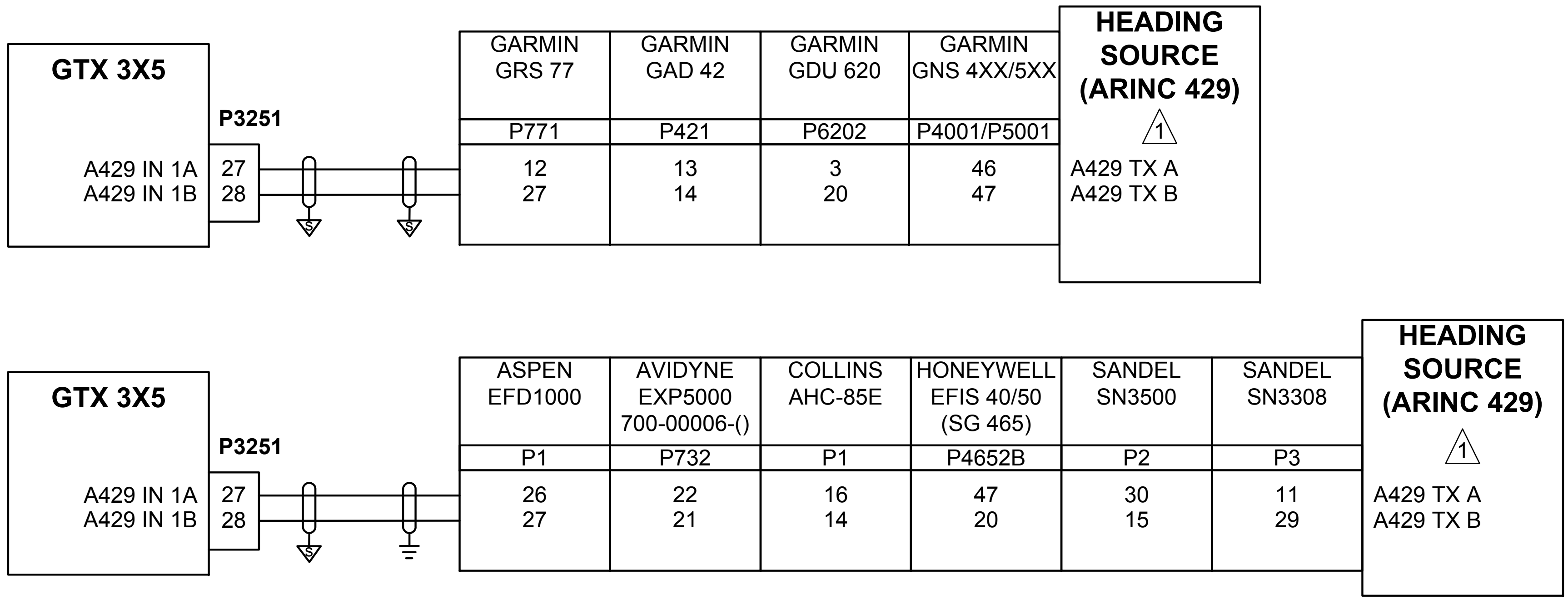
4. PN 2 CAN BE LEFT OPEN IF 100' RESOLUTION IS DESIRED (DEFAULT).LIMIT STRAP LENGTH TO SPECIFIED LENGTH IN THE MANUFACTURERS INSTALLATION MANUAL.

5. POWERING SAE 5-35 THROUGH THE SWITCHED OUTPUT IS OPTIONAL.

6. RS-232 PORTS 1 THROUGH 3 ARE AVAILABLE.

7. FOR THE SHADIN, ONLY 1 INPUT IS NECESSARY (I.E., RS-232 OR ARINC 429, BUT NOT BOTH).

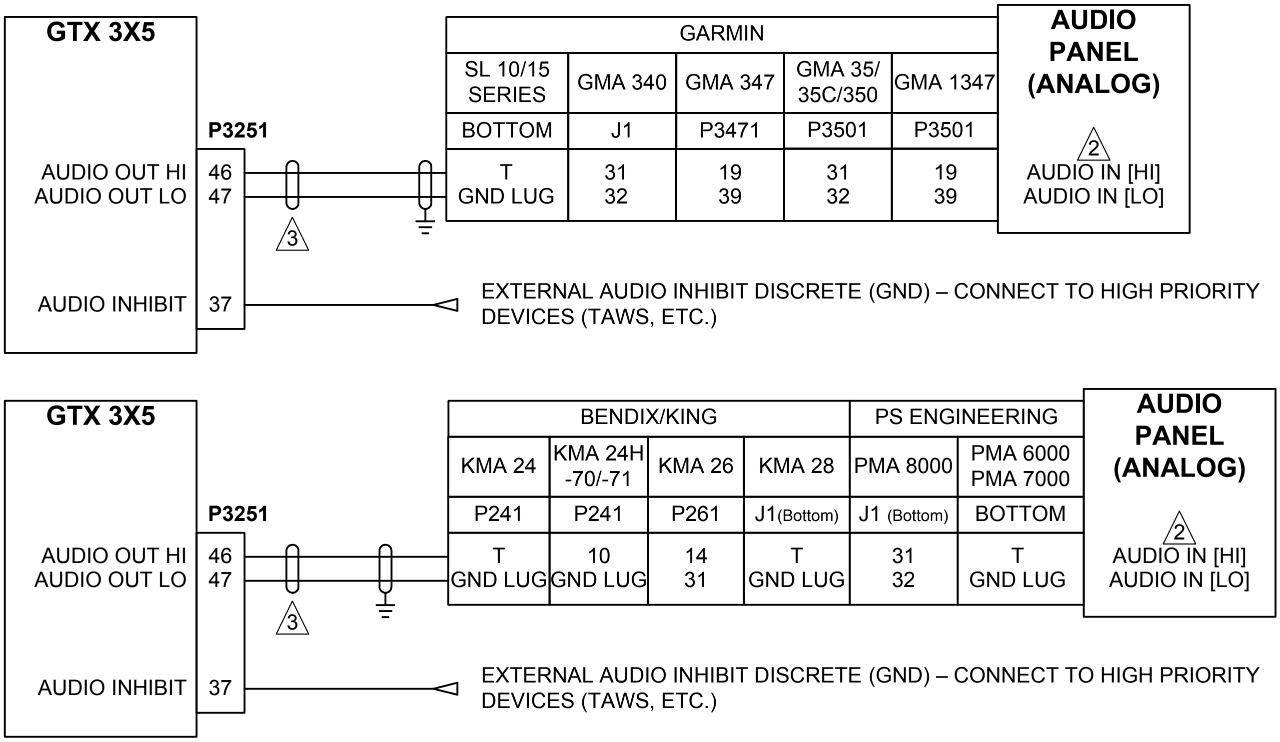
Figure B-26 GTX 3X5 - GTX 3XX Altitude Data Source Interconnect
Sheet 2 of 2



NOTES

1. SUPPORTED EQUIPMENT SHOWN CONNECTED IN PARALLEL.

Figure B-27 GTX 3X5 - AHRS Heading Data Source Interconnect



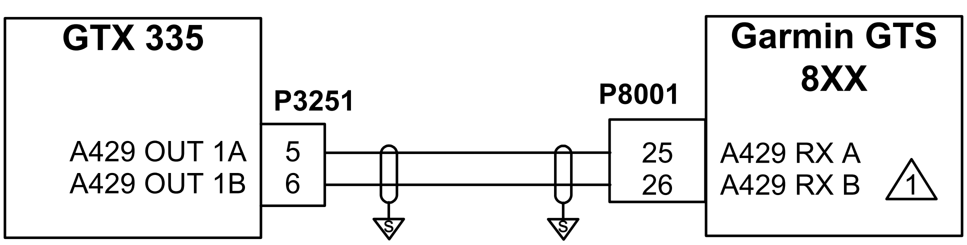
NOTES

1 REFER TO THE GENERAL NOTES AT THE BEGINNING OF THIS APPENDIX FOR MORE INFORMATION AND REQUIREMENTS.

2 IT IS PERMITTED TO USE OTHER AVAILABLE UNSWITCHED, UNMUTED INPUTS. IF AUDIO PANEL DOES NOT HAVE AN AVAILABLE UNSWITCHED, UNMUTED INPUT, AUDIO FROM THE GTS PROCESSOR MUST BE MIXED WITH AN EXISTING AUDIO SOURCE USING RESISTORS TO ISOLATE THE AUDIO OUTPUT FROM EACH LRU. A TYPICAL VALUE FOR MIXING RESISTORS IS 390Ω ¼ W. THE AUDIO LEVELS OF EXISTING AUDIO SOURCES WILL HAVE TO BE RE-EVALUATED AFTER MIXING RESISTORS ARE INSTALLED.

3 SHIELDS FOR AUDIO CABLES SHOULD BE GROUNDED AT ONE END (WITH LEADS LESS THAN 3.0 INCHES) AND LEFT FLOATING AT THE OTHER END.

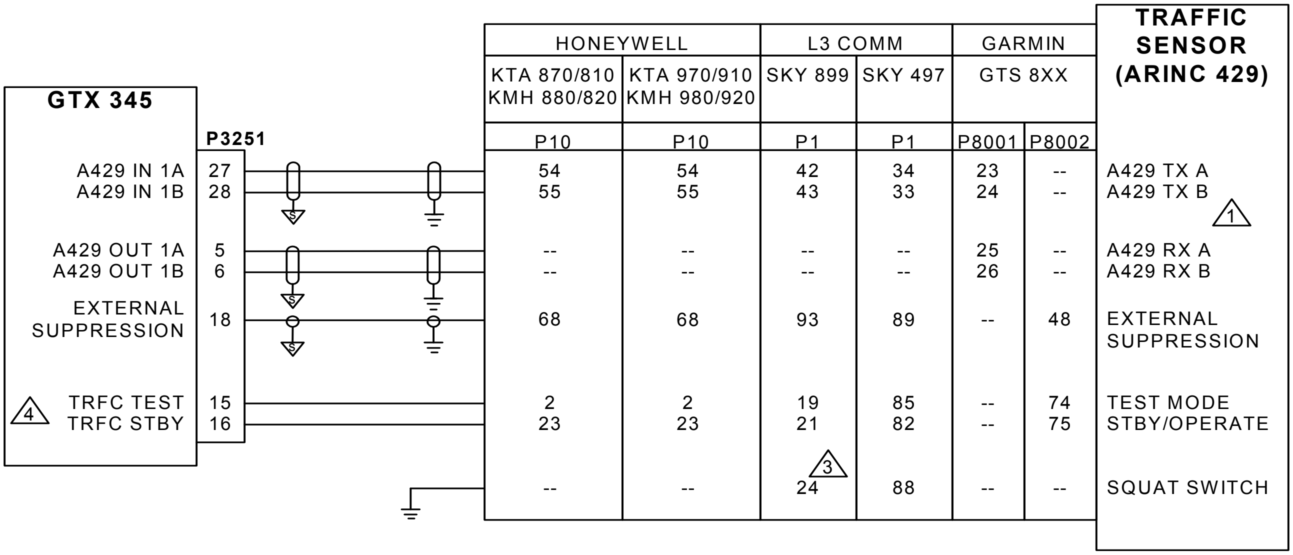
Figure B-28 GTX 3X5 - Audio Interconnect

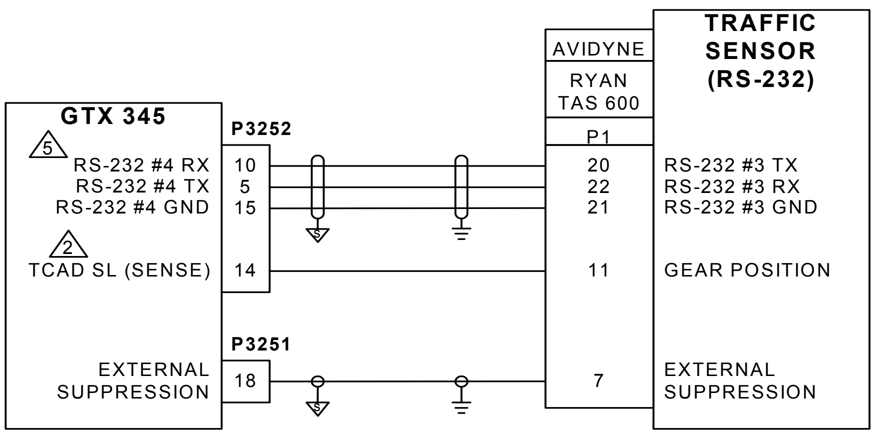


NOTES

1 THE GTS CONFIGURES AN INPUT/OUTPUT FORMAT FOR THE GTX 335. THE GTX 335 DOES NOT RECEIVE THE DATA FROM THE GTS. THE ARINC 429 FROM THE GTS SHOULD BE CONFIGURED FOR AN UNUSED PORT.

Figure B-29 GTX 335/GTX 335R - Traffic System Interconnect





NOTES

1. REFER TO SECTION 6 AND APPENDIX C FOR MORE REQUIRED CONFIGURATIONS FOR INTERFACING THE GTX 345R AND AN EXTERNAL TRAFFIC SENSOR IN G950/1000 EQUIPPED AIRCRAFT.

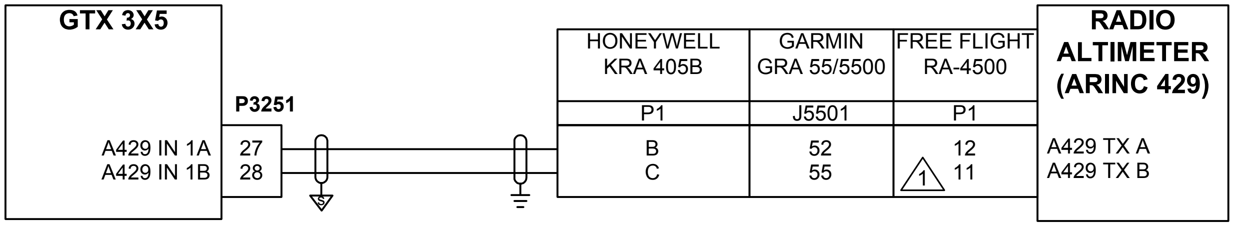
2. IF THIS DISCRETE IS ALREADY USED, ANY CONFIGURABLE OUTPUT DISCRETE CAN BE USED INSTEAD.

3. CONFIGURE THE TRC 899 “WEIGHT ON WHEELS” SWITCH AS “ACTIVE LOW.” REFER TO MANUFACTURER’S DOCUMENTATION FOR COMPLETE CONFIGURATION INFORMATION.

4. CONFIGURABLE FOR P3251 ONLY.

5. NON-CONFIGURABLE PORT. ONLY RS-232 PORT 4 CAN BE USED FOR THIS CONNECTION.

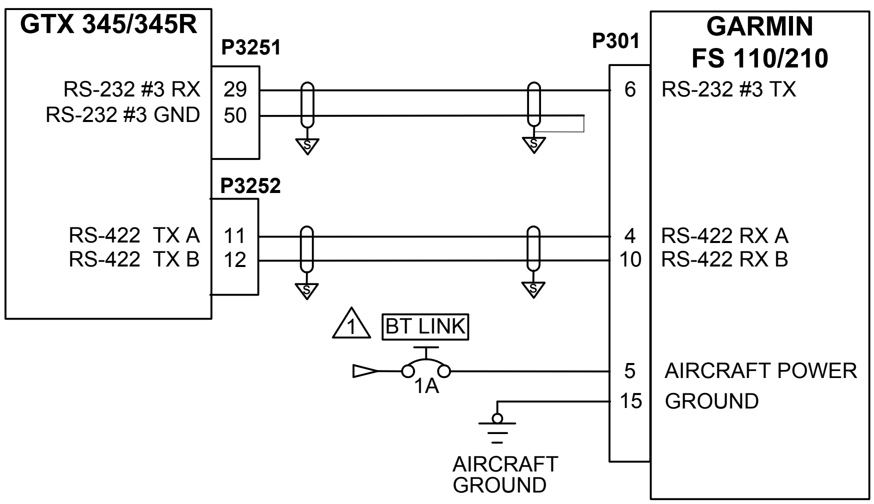
Figure B-30 GTX 345/GTX 345R - Traffic System Interconnect



NOTES

1. ONLY APPLICABLE TO FREE FLIGHT RA-4500 P/N 84560-X2-XXXX.

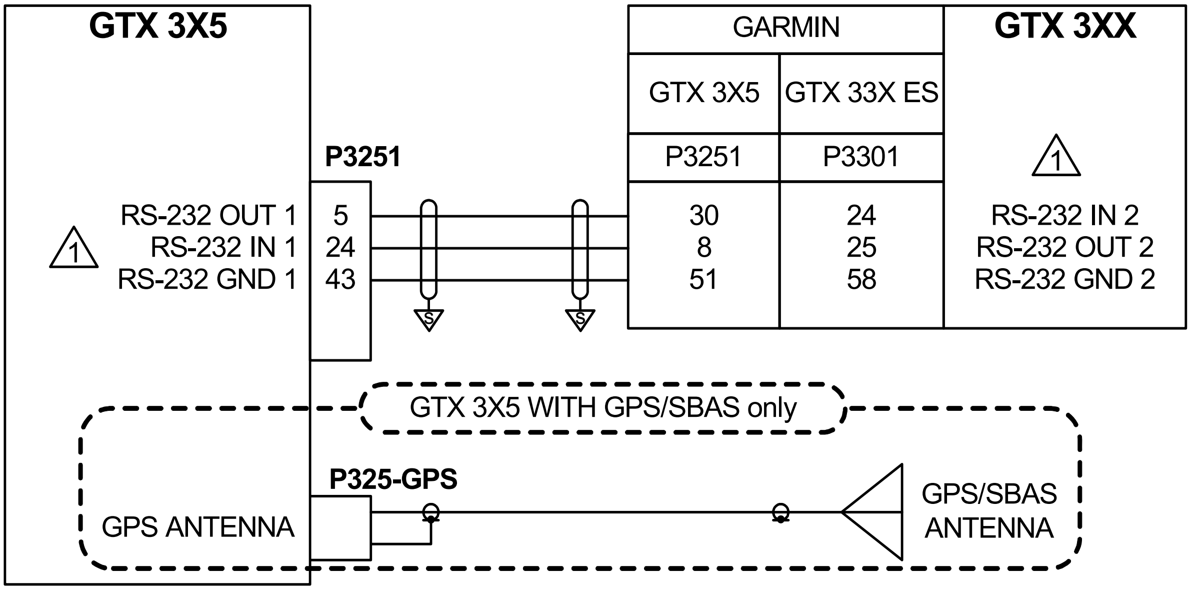
Figure B-31 GTX 3X5 - Radio Altimeter Interconnect



NOTES

1. CIRCUIT BREAKER SHOULD BE LABELED AS SHOWN.

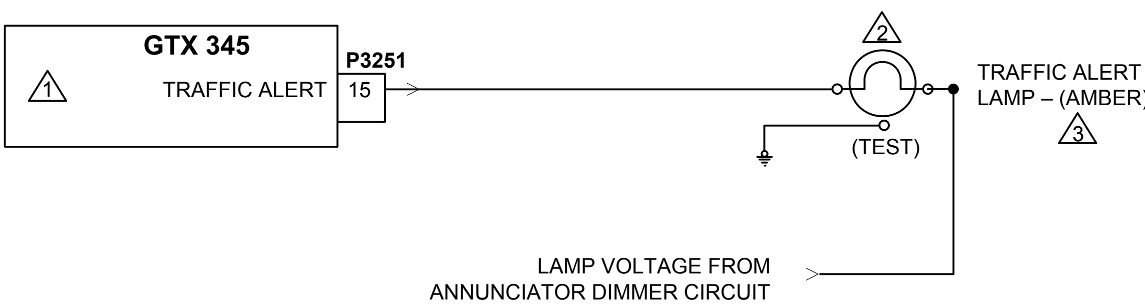
Figure B-32 GTX 345/345R - Flight Stream Interconnect



NOTE

1. FOR GTX 3X5 UNITS, RS-232 PORTS 1 THROUGH 3 ARE AVAILABLE.

Figure B-33 GTX 3X5 to GTX 3XX Interconnect



NOTES

1. CONFIGURABLE I/O DISCRETE.
2. USE MS25041-8 INDICATOR WITH MS25237-327 LAMP FOR 28 VDC DIMMER OR MS25237-330 LAMP FOR 14 VDC DIMMER.
3. LAMP IS REQUIRED WHEN THERE IS NO DISPLAY FOR TRAFFIC INSTALLATION. LAMP IS OPTIONAL FOR ALL OTHER INSTALLATIONS.

Figure B-34 External Traffic Annunciator

APPENDIX C EQUIPMENT COMPATIBILITY AND CONFIGURATION

C.1 Remote Control C-2
C.2 GPS Source C-3
C.3 Altitude Source C-5
C.4 Radar Altimeters C-7
C.5 Heading Source C-8
C.6 Audio Panels C-10
C.7 Traffic and Weather Display C-11
C.8 Traffic Sensors (GTX 345 Only) C-13
C.9 Bluetooth C-14
C.10 UAT Out Control C-14

The equipment listed in this section is compatible with the GTX 33X and GTX 3X5 series ADS-B transponders. Hardware that is not applicable to the GTX 33X or GTX 3X5 is marked with N/A in the Configuration Setting.

C.1 Remote Control

Table C-1 Remote Control

Manufacturer	Model	Data Format	Interface Config	GTX 33X Config	GTX 335 Config	GTX 345 Config	Notes
Garmin	GTN 6XX/7XX	RS-232	GTX Mode S+	REMOTE	REMOTE FMT 1	REMOTE FMT 1	Installations with no TIS
			GTX w/TIS+	REMOTE + TIS	REMOTE FMT 2	N/A	Installations with TIS
	GNS 480	RS-232	GTX +	REMOTE	REMOTE FMT 1	REMOTE FMT 1	Installations with no TIS
			GTX w/TIS+	REMOTE + TIS	REMOTE FMT 2	N/A	Installations with TIS
	G950/G1000	RS-232	GTX 33 [1] (or) GTX 33ES [2]	N/A	REMOTE FMT 1 [3] (or) LGCY REMOTE 1 [4]	REMOTE FMT 1 [3] (or) LGCY REMOTE 1 [4]	
			GTX 33 w/TIS [1] (or) GTX 33ES w/TIS [2]	N/A	REMOTE FMT 2 [3] (or) LGCY REMOTE 2 [4]	N/A	

[1] GDU software prior to v9.10

[2] GDU software v9.10 or later

[3] GDU software v15.00 or later

[4] GDU software prior to v15.00

C.2 GPS Source

GTX transponders configured for remote control receive GPS position source data from the remote interface.

Table C-2 GPS Source

<table>
<tr><th>Manufacturer</th><th>Model</th><th>Data Format</th><th>Interface Config</th><th>GTX 33X Config</th><th>GTX 3X5 Config</th><th>Notes</th></tr>
<tr><td rowspan="8">Garmin</td><td rowspan="2">G950/G1000</td><td rowspan="2">RS-232</td><td rowspan="2">GTX 33ES #1 [1]
OR
GTX 33ES #1 w/ TIS [2]</td><td rowspan="2">N/A</td><td>REMOTE FMT 1 [1,3]
(or)
REMOTE FMT 2 [2,3]</td><td rowspan="2">Applicable to installations with GIA software v7.00 or later and GDU software v13.00 or later (installations with earlier software versions should utilize internal GPS from the GTX 3X5). Note that the primary purpose of this interface is transponder control, however this format also includes GPS data. Refer to table C-1 for more information.</td></tr>
<tr><td>LGCY REMOTE 1 [1,4]
(or)
LGCY REMOTE 2 [2,4]</td></tr>
<tr><td>Internal</td><td>N/A</td><td>N/A</td><td>N/A</td><td>Refer to section 6.3.5 for information.</td><td></td></tr>
<tr><td rowspan="2">GTN 6XX/7XX</td><td>RS-232</td><td>ADS-B OUT +</td><td>Remote</td><td>ADS-B + FMT 1</td><td></td></tr>
<tr><td>HSDB</td><td>ADS-B In Source: GTX</td><td>N/A</td><td>GTN - Enabled</td><td>Applicable to GTX 345 installations only.</td></tr>
<tr><td rowspan="3">GNS 400W/500W</td><td rowspan="3">RS-232</td><td>ADSB TFC</td><td>N/A</td><td rowspan="2">GNS</td><td rowspan="2">Applicable to GTX 345 installations only. Note that the primary purpose of this interface is for ADS-B In data, however this format also includes GPS data. Refer to table C-7 for more information.</td></tr>
<tr><td>ADSB TFC WX</td><td>N/A</td></tr>
<tr><td>ADS-B OUT +</td><td>REMOTE</td><td>ADS-B + FMT 1</td><td>Supports GPS data only.</td></tr>
</table>

Manufacturer	Model	Data Format	Interface Config	GTX 33X Config	GTX 3X5 Config	Notes
Garmin	GNS 480	RS-232	GTX + [1]	REMOTE [1]	REMOTE FMT 1 [1]	The primary purpose of this interface is transponder control, however this format also includes GPS data. Refer to table C-1 for more information.
			GTX w/TIS+ [2]	REMOTE + TIS [2]	REMOTE FMT 2 [2]	
			ADS-B OUT +	REMOTE	ADS-B + FMT 1	
	GTX 3X5	RS-232	ADS-B + FMT 1	REMOTE	N/A	
			ADS-B + FMT 2	N/A	ADS-B + FMT 2	
	GDL 84/88 with GPS/ SBAS	ARINC 429	ARINC 743A	ARINC 743A	N/A	Applicable to GTX 330 installations only.

[1] Installations with no TIS

[2] Installations with TIS (GTX 335 only)

[3] Installations with GDU software v15.00 or later

[4] Installations with GDU software prior to v15.00

C.3 Altitude Source

Table C-3 Altitude Sources

Manufacturer	Model	Configuration Parameter	Interfacing Equipment Configuration	GTX 33X Configuration Setting	GTX 335 Configuration Setting	GTX 345 Configuration Setting	Notes
Garmin	G950/G1000	RS-232	Refer to the G950/G1000 section in table C-1 for configuration.	N/A	Refer to the G950/G1000 section in table C-1 for configuration.	Refer to the G950/G1000 section in table C-1 for configuration.	The Altitude data is provided to the GTX over the RS-232 control interface.
	GDC 74( )	ARINC 429	N/A	ADC w/ALT (Speed: LOW)	ADC (Speed: LOW)		
	GDU 620	ARINC 429	GENERAL (Speed: HIGH)	N/A	EFIS AIR DATA (Speed: HIGH)		Applicable to GTX 3X5 installations only. Note that this interface also provides heading data. Refer to table C-5 for more information.
	GTN 6xx/7xx	RS-232	GTX Mode S+ [1] (or) GTX w/TIS+ [2]	REMOTE	REMOTE FMT 1 [1] (or) REMOTE FMT 2 [2]		This configuration is primarily for purposes of transponder remote control, however this configuration also provides altitude data. Refer to table C-1 for more information.
	GAE	Configuration Module Port	N/A	N/A	Garmin Altitude Encoder: Present		Applicable to GTX 3X5 installations only.
ACK Tech	A-30	RS-232	N/A	ICARUS ALT	ALT FMT 1 25ft		Mod 8 or higher.
B & D	90004-003	ARINC 429	N/A	ADC w/ALT (Speed: LOW)	ADC (Speed: LOW)		
Honeywell (Bendix/ King)	KDC 281	ARINC 429	N/A	ADC w/ALT (Speed: LOW)	ADC (Speed: LOW)		
	KDC 481	ARINC 429	N/A	ADC w/ALT (Speed: LOW)	ADC (Speed: LOW)		
Icarus Instruments	3000	RS-232	N/A	ICARUS ALT	ALT FMT 1 100ft		
Insight	TAS 1000	RS-232	N/A	FADC W/ALT	N/A		

<table>
<tr><th>Manufacturer</th><th>Model</th><th>Configuration Parameter</th><th>Interfacing Equipment Configuration</th><th>GTX 33X Configuration Setting</th><th>GTX 335 Configuration Setting</th><th>GTX 345 Configuration Setting</th><th>Notes</th></tr>
<tr><td rowspan="2">Sandia</td><td rowspan="2">SAE 5-35</td><td>RS-232</td><td>N/A</td><td>ICARUS ALT</td><td colspan="2">ALT FMT 1 25ft</td><td>Either RS-232 or Gillham Gray Code format can be used to provide altitude data from the Sandia SAE 5-35 to the GTX 3X5.</td></tr>
<tr><td>Gillham Gray Code</td><td>N/A</td><td>ICARUS ALT</td><td colspan="2">Gillham Discretes ON</td><td></td></tr>
<tr><td rowspan="5">Shadin</td><td rowspan="2">8800T</td><td rowspan="2">RS-232</td><td>25ft or lower encoding</td><td rowspan="2">SHADIN ALT</td><td colspan="2">ALT FMT 3 25ft</td><td>Applicable to installations with the 8800T unit configured for 25ft or lower encoding.</td></tr>
<tr><td>100ft encoding</td><td colspan="2">ALT FMT 3 100ft</td><td>Applicable to installations with the 8800T unit configured for parallel Gray source or 100 ft encoding.</td></tr>
<tr><td>F/ADC-200</td><td>RS-232</td><td>N/A</td><td>ADC w/ALT</td><td colspan="2">ADC FMT 1</td><td></td></tr>
<tr><td rowspan="2">F/ADC-2000</td><td>RS-232</td><td>N/A</td><td>ADC w/ALT</td><td colspan="2">ADC FMT 1</td><td rowspan="2">Either the RS-232 or ARINC 429 data format can be used for the Shadin F/ADC-2000 interface to the GTX (not both).</td></tr>
<tr><td>ARINC 429</td><td>N/A</td><td>ADC w/ALT
(Speed: LOW)</td><td colspan="2">ADC
(Speed: LOW)</td></tr>
<tr><td rowspan="3">Trans-Cal Industries</td><td>IA-RS232-X</td><td>RS-232</td><td>N/A</td><td>ADC w/ALT</td><td colspan="2">ALT FMT 1 100ft</td><td></td></tr>
<tr><td rowspan="2">SSD120</td><td rowspan="2">RS-232</td><td>25ft or lower encoding</td><td>ADC w/ALT</td><td colspan="2">ALT FMT 1 25ft</td><td>Applicable to installations with the SSD120 unit configured for 25ft or lower encoding.</td></tr>
<tr><td>100ft encoding</td><td>ADC w/ALT</td><td colspan="2">ALT FMT 1 100ft</td><td>Applicable to installations with the SSD120 unit configured for parallel Gray source or 100 ft encoding.</td></tr>
</table>

[1] Installation with no TIS traffic

[2] Installation with TIS traffic (GTX 335 only)

C.4 Radar Altimeters

Table C-4 Radar Altimeters

Manufacturer	Model	Data Format	Interface Config	GTX 33X Config	GTX 3X5 Config	Notes
Free Flight	RA-4500	ARINC 429	N/A	EFIS W/ALT	RADIO ALTITUDE	
Garmin	GRA 55/5500	ARINC 429	N/A	EFIS W/ALT	RADIO ALTITUDE	
Honeywell (Bendix King)	KRA 405B	ARINC 429	N/A	EFIS W/ALT	RADIO ALTITUDE	

C.5 Heading Source

Table C-5 Heading Source

<table>
<tr><th>Manufacturer</th><th>Model</th><th>Configuration Parameter</th><th>Interfacing Equipment Configuration</th><th>GTX 33X Configuration Setting</th><th>GTX 335 Configuration Setting</th><th>GTX 345 Configuration Setting</th><th>Notes</th></tr>
<tr><td rowspan="6">Garmin</td><td>G950/G1000</td><td>ARINC 429</td><td>GEN PURPOSE</td><td>N/A</td><td>N/A</td><td>EFIS AIR DATA [3]
(Speed: HIGH)</td><td>Required for G950/1000 to GTX 345 installations with an external active traffic system interface. Provides true heading to GTX.</td></tr>
<tr><td>GRS 77</td><td>ARINC 429</td><td>N/A</td><td>AHRS [2]
(Speed: HIGH)</td><td colspan="2">AHRS [2]
(Speed: HIGH)</td><td></td></tr>
<tr><td>GAD 42</td><td>ARINC 429</td><td>N/A</td><td>N/A</td><td colspan="2">HEADING [1]
(Speed: LOW)</td><td>Applicable to GTX 3X5 installations only</td></tr>
<tr><td>GDU 620</td><td>ARINC 429</td><td>GENERAL</td><td>N/A</td><td colspan="2">EFIS AIR DATA [3]
(Speed: HIGH)</td><td>Applicable to GTX 3X5 installations only. Note that this interface also provides altitude data Refer to table C-3 for more information.</td></tr>
<tr><td>GTN 6XX/7XX</td><td>RS-232</td><td>GTX Mode S+ [4]
(or)
GTX w/TIS+ [6]</td><td>REMOTE</td><td colspan="2">REMOTE FMT 1 [4]
(or)
REMOTE FMT 2 [5]</td><td>This configuration is primarily for purposes of transponder remote control, however this configuration also provides magnetic heading. Refer to table C-1 for more information.</td></tr>
<tr><td>GNS 400W/500W</td><td>ARINC 429</td><td>ARINC 429</td><td>N/A</td><td colspan="2">HEADING [1]
(Speed: HIGH)</td><td>Applicable to GTX 3X5 installations only</td></tr>
</table>

<table>
<tr><th>Manufacturer</th><th>Model</th><th>Configuration Parameter</th><th>Interfacing Equipment Configuration</th><th>GTX 33X Configuration Setting</th><th>GTX 335 Configuration Setting</th><th>GTX 345 Configuration Setting</th><th>Notes</th></tr>
<tr><td>Aspen</td><td>EFD1000</td><td>ARINC 429</td><td rowspan="6">N/A</td><td>N/A</td><td colspan="2">HEADING [1]
(Speed: LOW)</td><td>Applicable to GTX 3X5 installations only</td></tr>
<tr><td>Avidyne</td><td>EXP5000
700-00006-()</td><td>ARINC 429</td><td>N/A</td><td colspan="2">HEADING [1]
(Speed: LOW)</td><td>Applicable to GTX 3X5 installations only</td></tr>
<tr><td>Collins</td><td>AHC-85E</td><td>ARINC 429</td><td>AHRS [2]
(Speed: HIGH)</td><td colspan="2">AHRS [2]
(Speed: HIGH)</td><td></td></tr>
<tr><td>Honeywell (Bendix/ King)</td><td>EFIS 40/50
(SG 465)</td><td>ARINC 429</td><td>N/A</td><td colspan="2">HEADING [1]
(Speed: LOW)</td><td>Applicable to GTX 3X5 installations only</td></tr>
<tr><td rowspan="2">Sandel</td><td>SN3500</td><td>ARINC 429</td><td>AHRS [2]
(Speed: LOW)</td><td colspan="2">AHRS [2]
(Speed: LOW)</td><td></td></tr>
<tr><td>SN3308</td><td>ARINC 429</td><td>AHRS [2]
(Speed: LOW)</td><td colspan="2">AHRS [2]
(Speed: LOW)</td><td></td></tr>
</table>

[1] Heading information only

[2] Attitude and heading information

[3] Altitude, airspeed, altitude rate, and heading information

[4] Installation with no TIS traffic

[5] Installation with TIS traffic (GTX 335 only)

[6] Configuration for GTX 33X and GTX 335 units only.

C.6 Audio Panels

Table C-6 Audio Panels

Manufacturer	Model	Data Format	GTX 33X Configuration Setting	GTX 3X5 Configuration Setting
Garmin	SL10 SL10MS SL10M SL10S SL15 SL15M GMA 1347 (G950/1000) GMA 1347D (G950/1000) GMA 340 GMA 347 GMA 35 GMA 350	Analog Audio	N/A	Audio: XPDR
Honeywell (Bendix/King)	KMA 24 KMA 24H-70/71 KMA 26 DMA 28			
PS Engineering	PMA 6000 PMA 7000 Series PMA 8000 Series			

C.7 Traffic and Weather Display

Table C-7 Traffic and Weather Display - GTX 345

Manufacturer	Model	Data Format	Interface Config	GTX 345 Config	Notes
Garmin	GTN 6XX/7XX	HSDB	ADS-B In Source: GTX	GTN	
	GNS 400W/500W [3]	RS-232	ADSB TFC	GNS	Supports traffic only (also includes GPS data from the GNS 400W/500W).
			ADSB TFC WX	GNS	Supports both traffic and weather (also includes GPS data from the GNS 400W/500W).
		ARINC 429	ADSB TFC	TRAFFIC	Supports ADS-B traffic without TAS/TCAS.
			ADSB TFC w/TCAS	TRAFFIC	Supports ADS-B traffic w/ TAS/TCAS correlation.
	G950/G1000 [4]	RS-232	GDL 90	LGCY TRAFFIC	Supports GTX 345R installations only (Legacy ADS-B traffic).
		RS-422	GDL 90 ADS-B	Garmin MX Series 1 [1] (or) Off [2]	Supports GTX 345R installations only (FIS-B weather).

[1] If GDU software v12.00 or later and GIA software v6.20 or later is used.

[2] If GDU software prior to v12.00 or GIA software prior to v6.20 is used.

[3] The GNS 400W/500W display of ADS-B In data requires the combination of one RS-232 and one ARINC 429 interface.

[4] Audio Cancel, P3251-37 on the GTX 345R unit must be configured if an active traffic system is interfaced.

Table C-8 Traffic Only Display - GTX 33X and GTX 335

Manufacturer	Model	Data Format	Interface Config	GTX 33X Config	GTX 335 Config	Notes
Garmin	GTN 6XX/7XX	RS-232	GTX w/TIS+	REMOTE + TIS	REMOTE FMT 2	Note that the primary purpose of this interface is for remote control, however this format also includes TIS-A data. Refer to table C-1 for more information.
	GDU 620	ARINC 429	GTX 330	GARMIN W/TIS	FORMAT 8	
	GNS 400W/500W	ARINC 429	GARMIN GTX 330	GARMIN W/TIS	FORMAT 8	Does not include controls for GTX.
	GNS 480	RS-232	GTX w/TIS+	REMOTE + TIS	REMOTE FMT 2	Note that the primary purpose of this interface is for remote control, however this format also includes TIS-A data. Refer to table C-1 for more information.
	G950/G1000	RS-232	GTX 33 w/TIS [1] (or) GTX 33ES w/TIS [2]	N/A	REMOTE FMT 2 [3] (or) LGCY REMOTE 2 [4]	Note that the primary purpose of this interface is for remote control, however this format also includes TIS-A data. Refer to table C-1 for more information.

[1] GDU software prior to v9.10

[2] GDU software v9.10 or later

[3] GDU software v15.00 or later

[4] GDU software prior to v15.00

C.8 Traffic Sensors (GTX 345 Only)

Table C-9 Traffic Sensors (GTX 345 Only)

Manufacturer	Model	Configuration Parameter	GTX 345 Input/Output	Interfacing Equipment Configuration	GTX 345 Configuration Setting	Notes
Garmin	GTS 8XX	ARINC 429	Input	Traffic Display Destination (Primary TX) [1]	TRAFFIC 1 (Speed - HIGH)	
			Output [2]	Pressure Altitude Source (Primary RX); Magnetic Heading Source (Primary RX); GPS Position/Velocity/Time Source (Primary RX); Transponder 1 Communication (Primary RX) [1]	FORMAT 5 (Speed - HIGH)	Data format includes Garmin TAS as well as Garmin concentrator. Required for G1000.GTS 8X5 system SW v2.10 or later is required. GTS 8XX system SW v2.01 or later is required.
			N/A	Transponder 1 Communication (Primary TX) [1] (Speed - HIGH)	N/A	Select a GTS 8XX TX channel that is NOT used because "Disabled" is not an option in the GTS 8XX Install Tool.
Honeywell (Bendix/King)	KTA 870/810 KMH 880/820 KTA 970/910 KMH 980/920	ARINC 429	Input	Controller - Discrete Intruder File Protocol - ARINC 735	TRAFFIC 5 (Speed - HIGH)	
L3 Comm	SKY 497 SKY 899	ARINC 429	Input	N/A	TRAFFIC 2 (Speed - HIGH)	
Avidyne	RYAN TAS 600 (9900BX)	RS-232	Input/Output	N/A	TRAFFIC FMT 4	Configuration setting available on RS-232 Channel 4 only.

[1] Configure the listed function(s) with the appropriate ARINC 429 channel based on the specific installation.

[2] ARINC 429 output from GTX 345 to GTS 800 is not required unless installed on G1000, but is required for all other GTS 8XX units.

C.9 Bluetooth

Table C-10 Bluetooth

Manufacturer	Model	Data Format	Input/Output	GTX 345 Config	Notes
Garmin	Internal	Bluetooth	N/A	Bluetooth: Enabled	
	Flight Stream 110/210	RS-232	Input	CONNEXT FMT 3	Both the RS-232 input and RS-422 output are required; internal bluetooth should be disabled on the GTX with a FS 110/210 installation. FS 110/210 software v2.40 or later required.
		RS-422	Output	CONNEXT FMT 3	

C.10 UAT Out Control

The interfaces in the table below allow a GTX 33X transponder to act as a control panel, providing squawk code, PABI, and other required ADS-B Out data to an interfaced UAT transmitter.

Table C-11 UAT Out Control

Manufacturer	Model	Data Format	Interface Config	GTX 33X Config	Notes
Garmin	GDL 84/88	RS-232	GTX Mode S	REMOTE	For installations where a GTX 33 transponder is controlled by a GTN that is also interfaced to a GDL 88 via HSDB, the RS-232 interface is not required. The GTX 33 will communicate indirectly with the GDL 88 through the GTN.

APPENDIX D CONSTRUCTION AND VALIDATION OF STRUCTURES

D.1 Static Test Loads....D-1
D.2 Determining Static Load Capability D-2

D.1 Static Test Loads

This appendix includes information necessary for testing load-carrying capabilities of equipment structures, such as shelves, mounting plates and mounting brackets, used to attach the GTX 33/GTX 33D or GTX 335R/GTX 345R remote rack.

Baggage compartments and cabins or cockpit floors are good installation platforms if the floor attach points meet the strength requirements. Support racks, brackets, or shelves should be fabricated and attached to the aircraft structure in accordance with the methods outlined in AC 43.13-2B Chapter 2. After the structure is installed, it should be tested as outlined in AC 43.13-2B Chapter 1 to make sure it is capable of supporting the required loads.

The installation must be capable of withstanding the load factors listed in the applicable table below for at least three seconds in each direction specified without damage or permanent deformation.

The installation weights of GTX 33/GTX 33D and GTX 335R/GTX 345R models including connector and mounting rack are listed in table 4-4. Use of testing values for the GTX 33D listed in table D-1 during static load testing will substantiate installation of any of the GTX 33/GTX 33D or GTX 335R/GTX 345R models listed in table 4-4. Alternately, the weight of specific GTX 33/GTX 33D or GTX 335R/GTX 345R model intended for installation can be used to determine new static test loads. Replace the weight value used in the example static test load calculations shown in table D-1.

NOTE

A validation of structure test is not required for composite aircraft installations or installations that use an existing avionics shelf previously approved to accommodate the weight of the installed equipment.

The combined installation weight of the GTX 33D, connector, and mounting rack is 4.70 lbs. Required static test loads (Load Factor x 4.70 lbs.) are listed in table D-1.

Table D-1 Example Static Test Loads for GTX 33D

Direction of Force	Load Factor	Static Test Load (Load Factor x (GTX 33D + Mounting Rack Weight))
Downward (Acrobatic Aircraft)	9.0 g	(9.0 x 4.70) = 42.3 lbs
Upward	4.5 g	(4.5 x 4.70) = 21.2 lbs
Sideward	3.0 g	(3.0 x 4.70) = 14.1 lbs
Forward	18.0 g	(18.0 x 4.70) = 84.6 lbs

D.2 Determining Static Load Capability

Determine GTX 33/GTX 33D or GTX 335R/GTX 345R installation structure static load capability as follows:

1. Mark and drill the holes where the GTX 33/GTX 33D or GTX 335R/GTX 345R remote rack will be attached.
2. Install fasteners for the remote rack in the holes which will be used to attach the GTX 33/GTX 33D or GTX 335R/GTX 345R using washers, nuts and nutplates to attach the remote rack to the desired aircraft surface. Note that some means of locking fastener must be used, e.g., lock nuts or steel nuts with lock washers.
3. For testing downward loading, use one of the following methods:
    a) Place shot bags or other weights totaling the required downward load specified in table D-1 within the footprint outlined by the remote rack fastener holes.
    b) Use a calibrated force gauge at the location of the center of gravity when the unit is attached.
4. Slowly apply the load to the structure. Make sure there is no damage or permanent deformation of the structure after three seconds.
5. Fasten a 36-inch loop of material such as fishing line, braided wire, or other similar material having a breaking strength of at least 150 lbs diagonally between two of the screws. Then fasten another loop diagonally between the other two screws, adjusting the length of the loop so it exactly matches the first.
6. Hook a calibrated force gauge through both loops and apply a sustained pull for at least three seconds in each of the other three directions (upward, sideward, and forward) at the calculated forces in table D-1. Refer to figure D-1 and figure D-2.
7. Examine the structure carefully. If there has been damage or permanent deformation, the structure is not applicable and must be replaced with one that is strong enough to withstand the test loads. Examine all aircraft stringers, bulkheads and skin surfaces, which can have direct or indirect contact with the fabricated support structure. If it is found that no damage or permanent deformation has occurred, the structure is of sufficient strength, and the GTX 33/GTX 33D or GTX 335R/GTX 345R remote rack can be permanently attached to it.

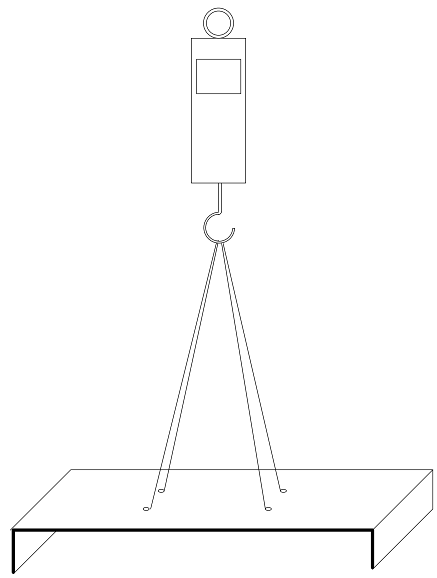


Figure D-1 Upward Static Load Test

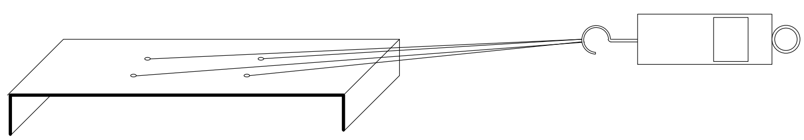


Figure D-2 Forward/Sideward Static Load Test

APPENDIX E ACCEPTABLE HARDWARE

Table E-1 Screws E-1
Table E-2 Washer E-1
Table E-3 Nuts E-2
Table E-4 Nutplates E-2
Table E-5 Clipnut E-2
Table E-6 Rivets E-2
Table E-7 Rivets, Blind E-2

Table E-1 Screws

Size	Structural/Non-Structural	Head	Specification Numbers
6-32	Non-Structural	Pan head	NASM35206 (MS35206) (AN515)
		Flat head	NASM24693 (MS24693) (AN507)
8-32	Non-Structural	Pan head	NASM35206 (MS35206) (AN515)
			NAS602
		Flat head	NASM24693 (MS24693) (AN507)
			NAS514P
	Structural	Pan head	NASM27039 (MS27039) (NAS220)
		Flat head	NASM24694 (MS24694) (AN509)
10-32	Non-structural	Flat head	XXXX
	Structural	Flat head	NASM24694 (MS24694) (AN509)

Table E-2 Washer

Size (Insider Diameter)	Thickness (inches)	Specification Numbers
#6	.016	NAS1149FN616P (AN960-6L)
	.032	NAS1149FN632P
#8	.016	NAS1149FN816P (AN960-8L)
	.032	NAS1149FN832P (AN960-8)
#10	.032	NAS1149XXXXXP (AN960-10L)
	.063	NAS1149F0363P (AN960-10)

Table E-3 Nuts

<table>
<tr><th>Size</th><th>Nut, Self-locking Metal, Hex, Thin</th><th>Nut, Self-locking Elastic, Hex, Thin</th><th>Nut, Self-locking Metal, Hex</th><th>Nut, Self-Locking Elastic, Hex</th></tr>
<tr><td>6-32</td><td rowspan="3">NASM21042
NAS1291
(MS21042)
(AN363)</td><td rowspan="3">NASM21083
NAS1022N
(MS21083)
(MS20364)
(AN364)</td><td rowspan="3">NASM21045
(MS21045)</td><td rowspan="3">NASM21044
NAS1021n
(MS21044N)
(MS20365)
(AN365)</td></tr>
<tr><td>8-32</td></tr>
<tr><td>10-32</td></tr>
</table>

Table E-4 Nutplates

<table>
<tr><th>Type</th><th>One Lug Fixed</th><th>One Lug FLoating</th><th>Two Lug Fixed</th><th>Two Lug Floating</th><th>Corner</th><th>Side-by-side</th></tr>
<tr><td>6-32</td><td rowspan="3">MS21051
MS21053
MS21071</td><td rowspan="3">MS21061</td><td rowspan="3">MS21047
MS21049
MS21069</td><td rowspan="3">MS21059
MS21075</td><td rowspan="3">MS21055
MS21057
MS21073</td><td rowspan="3">MS21086</td></tr>
<tr><td>8-32</td></tr>
<tr><td>10-32</td></tr>
</table>

Table E-5 Clipnut

Type	Specification Numbers
6-32	294667 (Monadnack)

Table E-6 Rivets

Type	Nominal Diameter (0.094) [1]	Nominal Diameter (0.125) [1]
Universal	MS20470AD3-X	MS20470AD4-X
Countersunk	MS20426AD3-X	MS20426AD4-X
Reduced Countersunk	NAS1097AD-X	--

[1] Length (X) as required.

Table E-7 Rivets, Blind

Type	Nominal Diameter (0.126) [1] [2]	Oversize Diameter (0.140) [1] [2]
Universal	CR3213-4-X NAS9601B-4-X	CR3243-4-X NAS9304B-4-X
Countersunk	CR3212-4-X NAS9302B-4-X	CR3242-4-X NAS9305B-4-X
Reduced Countersunk	CR3214-4-X NAS9303B-4-X	--

[1] Length (X) as required.
[2] “CR” denotes CherryMAX rivets.

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