



GTX 33X and GTX 3X5 ADS-B Maintenance Manual

**Contains Instructions for Continued Airworthiness for
STC SA01714WI**

**Aircraft make, model, registration number, and serial
number and accompanying STC configuration
information in Appendix A must be completed and saved
with aircraft permanent records.**

© 2021 Garmin International or its subsidiaries
All Rights Reserved

Except as expressly provided herein, no part of this manual may be reproduced, copied, transmitted, disseminated, downloaded or stored in any storage medium, for any purpose without the express prior written consent of Garmin. Garmin hereby grants permission to download a single copy of this manual and of any revision to this manual onto a hard drive or other electronic storage medium to be viewed and to print one copy of this manual or of any revision hereto, provided that such electronic or printed copy of this manual or revision must contain the complete text of this copyright notice and provided further that any unauthorized commercial distribution of this manual or any revision hereto is strictly prohibited.

Garmin[®] is a registered trademark of Garmin International or its subsidiaries. GDU[™] and GTN[™] are trademarks of Garmin International or its subsidiaries. These trademarks may not be used without the express permission of Garmin.

Adobe[®] is a registered trademark of Adobe Systems Incorporated. All rights reserved.

The Bluetooth word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Garmin is under license. Other trademarks and trade names are those of their respective owners.

At Garmin, we value your opinion.

For comments about this guide, please e-mail Techpubs.Salem@garmin.com

For comments about Garmin aviation products, email Avionics@garmin.com.

Garmin International, Inc.
1200 E. 151st Street
Olathe, KS 66062 USA
Telephone: (913) 397-8200
www.garmin.com

Garmin (Europe) Ltd.
Liberty House, Bulls Copse Road
Hounslow Business Park
Southampton, SO40 9LR, UK
Phone: +44 (0) 23 8052 4000
Fax: +44 (0) 23 8052 4004

Garmin AT, Inc.
2345 Turner Rd., SE
Salem, OR 97302 USA
Telephone: (503) 581-8101

INFORMATION SUBJECT TO EXPORT CONTROL LAWS

This document may contain information that is subject to the Export Administration Regulations (EAR) issued by the United States Department of Commerce (15 CFR, Chapter VII, Subchapter C) and may not be exported, released, or disclosed to foreign nationals inside or outside of the United States without first obtaining an export license.

The information in this document is subject to change without notice. For updates and supplemental information regarding the operation of Garmin products, visit flyGarmin.com.

Software License Notification

AES Encryption

The product may include AES file encryption software, © 2002 DR. Brian Gladman, subject to the following license:

The free distribution and use of this software in both source and binary form is allowed (with or without changes) provided:

- Distributions of this source code include the above copyright notice, this list of conditions, and the following disclaimer.
- Distribution in binary form include the above copyright notice, this list of conditions, and the following disclaimer in the documentation and/or other associated materials.
- The copyright holder's name is not used to endorse products built using this software without specific written permission.

Alternatively, provided this notice is retained in full, this product may be distributed under the terms of the GNU General Public License (GPL) in which case the provisions of the GPL apply instead of those given above.

Disclaimer

The AES file encryption software is provided "as is" with no explicit or implied warranties in respect of its properties, including, but not limited to, correctness and/or fitness for purpose.

SOFTWARE LICENSE AGREEMENT FOR GARMIN AVIATION PRODUCTS

The software embedded in your Garmin product (the “Licensed Software”) is owned by Garmin International, Inc. (“Garmin” or “us”). The Licensed Software is protected under copyright laws and international copyright treaties. The Licensed Software is provided under this Software License Agreement (hereinafter the “Agreement”) and is subject to the following terms and conditions which are agreed to by End User (“Licensee”, “you” or “your”), on the one hand, and Garmin and its licensors and affiliated companies of Garmin and its licensors, on the other hand. The Licensed Software is licensed, not sold, to you. Garmin and Licensee may be referred to individually as a “Party” or jointly as the “Parties.”

IMPORTANT: CAREFULLY READ THIS ENTIRE AGREEMENT BEFORE USING THIS PRODUCT. INSTALLING, COPYING, OR OTHERWISE USING THIS PRODUCT INDICATES YOUR ACKNOWLEDGMENT THAT YOU HAVE READ THIS AGREEMENT AND AGREE TO ITS TERMS AND CONDITIONS. IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS, YOU MAY NOT USE THIS PRODUCT.

1. **Definitions.** The following capitalized terms shall have the meanings set forth below:

- a. “Device” means any Garmin device that is delivered by or on behalf of Garmin to Licensee onto which the Licensed Software is installed.
- b. “Documentation” means Garmin's then-current instructional, technical or functional documentation relating to the Devices or Licensed Software which is delivered or made available by Garmin in connection with this Agreement.
- c. “Licensed Software” means the software in binary executable form that is embedded in the Devices and/or made available for use on the Devices via a software loader card.
- d. “Permitted Purpose” means operating and using the Device on which the Licensed Software is installed for the Device's intended use.

2. **License.**

- a. **License Grant.** Subject to the terms and conditions of this Agreement and Licensee's compliance with the terms and conditions of this Agreement, Garmin hereby grants to Licensee a limited, royalty-free, non-exclusive, non-sublicenseable, non-transferable and revocable right and license to use and perform the Licensed Software as installed on the Devices and the Documentation solely for the Permitted Purpose and only during the term of this Agreement, provided that the Licensed Software may only be used by Licensee on Devices on which the Licensed Software has been installed or otherwise made available by Garmin.
- b. **Reservation of Rights.** Garmin retains exclusive ownership of all right, title and interest in and to the Licensed Software and Documentation. All of Garmin's rights in and to the Licensed Software and Documentation not expressly licensed to Licensee under Section 2.1 are expressly reserved for Garmin. Nothing contained in this Agreement shall be construed as conferring by implication, acquiescence, or estoppel any license or other right upon Licensee. Without limiting the foregoing, the Parties acknowledge and agree that this Agreement grants Licensee a license of the Licensed Software under the terms of Section 2.1, and shall not in any manner be construed as a sale of the Licensed Software or any rights in the Licensed Software.

3. **Restrictions; Protection and Third Party Devices.**

- a. **Prohibited Uses.** Licensee shall not, shall not attempt to and shall not permit any third party to:
(a) sublicense, lease, loan, sell, resell, market, transfer, rent, disclose, demonstrate, or distribute the Licensed Software or Documentation to any third party; (b) uninstall the Licensed Software from the Device on which it was originally installed; (c) make any use of or perform any acts with respect to the Licensed Software or Documentation other than as expressly permitted in accordance with the terms of this Agreement; (d) use the Licensed Software or Documentation in any manner that violates any applicable law; (e) reproduce or copy the Licensed Software; (f) modify, adapt, alter, translate, port, create derivative works of, reverse engineer, decompile or disassemble the Licensed Software or Documentation or otherwise derive the source code or other proprietary information or trade secrets from the Licensed Software; (g) remove, alter, or obscure any proprietary notices from the Licensed Software or Documentation; (h) use the Licensed Software or Documentation to provide services to third parties (such as business process outsourcing, service bureau applications or third party training); (i) use the Licensed Software on any equipment, hardware or device other than a Device; or (j) export, re-export or otherwise distribute, directly or indirectly, the Licensed Software or Documentation to a jurisdiction or country to which the export, re-export or distribution of such Licensed Software or Documentation is prohibited by applicable law.

- b. Protection of Software and Documentation. Licensee shall use its best efforts to protect the Licensed Software and Documentation from unauthorized access, distribution, modification, display, reproduction, disclosure or use with at least the same degree of care as Licensee normally uses in protecting its own software and documentation of a similar nature from unauthorized access, distribution, modification, display, reproduction, disclosure or use. Licensee shall limit access to the Licensed Software and Documentation to only those employees of Licensee who require access to the Licensed Software or Documentation for the Permitted Purpose and who have been made aware of the restrictions set forth in this Agreement. Licensee shall take prompt and appropriate action to prevent unauthorized use or disclosure of the Licensed Software and Documentation.

4. Term and Termination.

- a. Term. The term of this Agreement shall commence on the Effective Date, and shall continue in perpetuity thereafter, unless terminated earlier as provided in this Section 4.
- b. Termination by Garmin. Garmin may immediately terminate this Agreement upon written notice to Licensee if Licensee commits a material breach of this Agreement or breaches a material term of this Agreement.
- c. Effect of Termination. Upon any termination of this Agreement for any Party: (a) Licensee shall immediately cease all use of the Licensed Software and Documentation; (b) all rights and licenses granted to Licensee to the Licensed Software and Documentation and Garmin's related obligations shall immediately terminate; and (c) Sections 4.3, 5 and 6 shall survive.

5. Disclaimer; Limitations of Liability; Indemnity.

- a. **DISCLAIMER. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, THE LICENSED SOFTWARE AND DOCUMENTATION (INCLUDING ANY RESULTS TO BE OBTAINED FROM ANY USE OF THE LICENSED SOFTWARE AND DOCUMENTATION) ARE PROVIDED "AS IS" AND "AS AVAILABLE" WITH NO WARRANTIES, GUARANTEES OR REPRESENTATIONS AND NEITHER GARMIN NOR ITS AFFILIATES MAKE ANY REPRESENTATION, WARRANTY OR GUARANTEE, STATUTORY OR OTHERWISE, UNDER LAW OR FROM THE COURSE OF DEALING OR USAGE OF TRADE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INTERFERENCE, NON-INFRINGEMENT, TITLE, OR SIMILAR, UNDER THE LAWS OF ANY JURISDICTION. GARMIN DOES NOT WARRANT THAT THE LICENSED SOFTWARE OR DOCUMENTATION WILL MEET LICENSEE'S REQUIREMENTS OR THAT OPERATION OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR FREE. LICENSEE ASSUMES THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LICENSED SOFTWARE AND DOCUMENTATION. THE LICENSED SOFTWARE IS NOT INTENDED FOR USE IN ANY NUCLEAR, MEDICAL, OR OTHER INHERENTLY DANGEROUS APPLICATIONS, AND GARMIN DISCLAIMS ALL LIABILITY FOR ANY DAMAGE OR LOSS CAUSED BY SUCH USE OF THE LICENSED SOFTWARE.**
- b. **EXCLUSION OF DAMAGES; LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, UNDER NO CIRCUMSTANCES AND REGARDLESS OF THE NATURE OF ANY CLAIM SHALL GARMIN BE LIABLE TO LICENSEE FOR AN AMOUNT IN EXCESS OF USD \$100, OR BE LIABLE IN ANY AMOUNT FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR INDIRECT DAMAGES, LOSS OF GOODWILL OR PROFITS, LIQUIDATED DAMAGES, DATA LOSS, COMPUTER FAILURE OR MALFUNCTION, ATTORNEYS' FEES, COURT COSTS, INTEREST OR EXEMPLARY OR PUNITIVE DAMAGES, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OR NON-PERFORMANCE OF THE LICENSED SOFTWARE OR DOCUMENTATION, EVEN IF GARMIN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSS OR DAMAGES.**
- c. Indemnity. Licensee shall indemnify, defend and hold Garmin and its affiliates harmless against any and all losses, claims, actions, causes of action, liabilities, demands, fines, judgments, damages and expenses suffered or incurred by Garmin or its affiliated companies in connection with: (a) any use or misuse of the Licensed Software or Documentation by Licensee or any third party in Licensee's reasonable control; or (b) Licensee's breach of this Agreement.

6. General.

- a. No Devices or Services. Licensee acknowledges and agrees that nothing in this Agreement shall be construed as requiring Garmin to: (a) provide or supply the Devices or any other devices or hardware to Licensee; (b) grant any

- licenses to any software other than the Licensed Software; or (c) provide any services, such as support, maintenance, installation or professional services for the Licensed Software.
- b. **Non-Exclusive.** Each Party's rights and obligations under this Agreement are non-exclusive. Garmin is not precluded from marketing, licensing, providing, selling or distributing the Licensed Software or Documentation, or any other products, software, documentation or services, either directly or through any third party.
 - c. **Assignment.** Licensee may not assign this Agreement or any of its rights, interests or obligations hereunder without the prior written consent of Garmin. Any purported assignment in violation of this Section 6.3 shall be null and void. Subject to the foregoing, this Agreement shall be binding upon and shall inure to the benefit of the Parties and their respective successors and permitted assigns and transferees.
 - d. **Feedback and Data.** Licensee may from time to time provide feedback, comments, suggestions, questions, ideas, or other information to Garmin concerning the Licensed Software or Documentation or Garmin's products, services, technology, techniques, processes or materials ("Feedback"). Garmin may in connection with any of its products or services freely use, copy, disclose, license, distribute and otherwise exploit such Feedback in any manner without any obligation, payment, royalty or restriction whether based on intellectual property rights or otherwise.
 - e. **Governing Law.** The validity, interpretation and enforcement of this Agreement will be governed by the substantive laws, but not the choice of law rules, of the state of Kansas. This Agreement shall not be governed by the 1980 UN Convention on Contracts for the International Sale of Goods.
 - f. **Legal Compliance.** You represent and warrant that (i) you are not located in a country that is subject to a U.S. Government embargo, or has been designated by the U.S. Government as a "terrorist supporting" country, and (ii) you are not listed on any U.S. Government list of prohibited or restricted parties.
 - g. **Injunctive Relief.** The Parties acknowledge and agree that irreparable damage would occur if any provision of this Agreement was not performed in accordance with its specific terms or was otherwise breached and as such, the Parties will be entitled to an injunction or injunctions to prevent breaches of this Agreement and to enforce specifically the performance of the terms and provisions of this Agreement without proof of actual damages, this being in addition to any other remedy to which any Party is entitled at law or in equity.
 - h. **Amendments and Waivers.** This Agreement may be amended and any provision of this Agreement may be waived, provided that any such amendment or waiver will become and remain binding upon a Party only if such amendment or waiver is set forth in a writing by such Party. No course of dealing between or among any persons having any interest in this Agreement will be deemed effective to modify, amend or discharge any part of this Agreement or any rights or obligations of any Party under or by reason of this Agreement. No delay or failure in exercising any right, power or remedy hereunder will affect or operate as a waiver thereof; nor will any single or partial exercise thereof or any abandonment or discontinuance of steps to enforce such a right, power or remedy preclude any further exercise thereof or of any other right, power or remedy. The rights and remedies hereunder are cumulative and not exclusive of any rights or remedies that any Party would otherwise have.
 - i. **Severability.** The provisions of this Agreement will be severable in the event that for any reason whatsoever any of the provisions hereof are invalid, void or otherwise unenforceable, any such invalid, void or otherwise unenforceable provisions will be replaced by other provisions which are as similar as possible in terms to such invalid, void or otherwise unenforceable provisions but are valid and enforceable and the remaining provisions will remain valid and enforceable to the fullest extent permitted by applicable law, in each case so as to best preserve the intention of the Parties with respect to the benefits and obligations of this Agreement.
 - j. **No Third-Party Beneficiaries.** This Agreement is solely for the benefit of the Parties and does not confer on third parties any remedy, claim, reimbursement, claim of action or other right in addition to those existing without reference to this Agreement.
 - k. **Entire Agreement.** This Agreement shall constitute the entire agreement between Garmin and you with respect to the subject matter hereof and will supersede all prior negotiations, agreements and understandings of Garmin and you of any nature, whether oral or written, with respect to such subject matter.
 - l. **Interpretation.** In this Agreement: (a) headings are for convenience only and do not affect the interpretation of this Agreement; (b) the singular includes the plural and vice versa; (c) the words 'such as', 'including', 'particularly' and similar expressions are not used as, nor are intended to be, interpreted as words of limitation; (d) a reference to a person includes a natural person, partnership, joint venture, government agency, association, corporation or other body corporate; a thing includes a part of that thing; and a party includes its successors and permitted assigns; and (e) no rule of construction applies to the disadvantage of a Party because that Party was responsible for the preparation of this Agreement. Any translation of this Agreement from English is provided as a convenience only. If this Agreement is translated into a language other than English and there is a conflict of terms between the English version and the other language version, the English version will control.

RECORD OF REVISIONS

Revision	Revision Date	Description
6	12/08/17	Updated GTX 33/330 software to v8.04. Updated GTX 3X5 main software to v2.12 and ADSB software to v2.10. Added models to bonding Table B-1.
7	09/09/19	Added Diversity unit part numbers and descriptions.
8	06/16/21	Added GI 275 as control for GTX 345 units.

CURRENT REVISION DESCRIPTION

Section	Description
Page i	Updated copyright date and Software License Agreement.
1.4	Added GI 275 documents to Table 1-1 Reference Documentation.
3	Added GI 275 as controller and display for remote GTX 345.
3.3	Added Figure 3-6 GI 275 Transponder Control depicting the control page for the GTX 345.
4.2	Updated the FAA-approved Airworthiness Limitations statement per the FAA.

DEFINITIONS OF WARNINGS, CAUTIONS, AND NOTES



WARNING

Warnings indicate that immediate attention must be given to avoid potential equipment damage and personal injury should the instructions be disregarded.



CAUTION

Cautions indicate an alert to potential damage to the equipment if the procedural step is not directly followed.



NOTE

Notes indicate additional information is needed.



WARNING

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



WARNING

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



CAUTION

*The GTX 330/330D and GTX 335/345 units have a special anti-reflective coated display that is sensitive to waxes and abrasive cleaners. **CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING.** It is important to clean the display using a clean, lint-free cloth, with a cleaner that is safe for anti-reflective coatings.*

TABLE OF CONTENTS

1	INTRODUCTION.....	1-1
1.1	Content, Scope, Purpose.....	1-2
1.2	Organization	1-2
1.3	Applicability	1-3
1.4	Publications	1-3
1.5	Revision and Distribution.....	1-3
1.6	Reference.....	1-4
2	SYSTEM DESCRIPTION.....	2-1
2.1	GTX 330/330D.....	2-2
2.2	GTX 33/33D.....	2-4
2.3	GTX 335/335D/335R/335DR	2-6
2.4	GTX 345/345D/345R/345DR	2-8
2.5	GTX 335R/335DR/345R/345DR with Legacy G1000	2-10
2.6	Electrical Load Information	2-11
3	GTX CONTROL AND OPERATION	3-1
3.1	GTX 330/330D.....	3-2
3.2	GTX 335/335D/345/345D.....	3-4
3.3	GTX 33/33D and GTX 335R/335DR/345R/345DR.....	3-7
3.4	GTX 335R/335DR/345R/345DR with Legacy G1000	3-8
3.5	GTX 3X5 Install Tool	3-10
4	INSTRUCTIONS FOR CONTINUED AIRWORTHINESS.....	4-1
4.1	Applicability	4-2
4.2	Airworthiness Limitations	4-2
4.3	Servicing Information	4-3
4.4	Maintenance Intervals	4-4
4.5	Visual Inspection.....	4-5
4.6	Electrical Bonding Test.....	4-7
4.7	Additional Instructions.....	4-7
5	TROUBLESHOOTING	5-1
5.1	GTX General Troubleshooting.....	5-2
5.2	GTX Failure Annunciations	5-4
5.3	GTX 33X Connector Pinout Information.....	5-11
5.4	GTX 3X5 Connector Pinout Information.....	5-15
6	UNIT REMOVAL AND RE-INSTALLATION.....	6-1
6.1	GTX 330/330D.....	6-2
6.2	GTX 33/33D.....	6-4
6.3	GTX 3X5.....	6-5
6.4	Transponder Antenna	6-19
7	SOFTWARE.....	7-1
7.1	Software Check	7-2
7.2	GTX 33/330 Software Update.....	7-5
7.3	GTX 3X5 Software Update.....	7-7
8	SYSTEM CONFIGURATION AND CHECKOUT	8-1
8.1	Overview	8-2
8.2	System Checkout.....	8-2
8.3	GTX 33/330 Configuration	8-3
8.4	GTX 3X5 Configuration	8-4
8.5	GTX Airborne Test Mode	8-5

8.6	Regulatory Test	8-7
8.7	ADS-B Out Test	8-8
8.8	GTX 3X5 with TCAS System Test (GX000 Only)	8-9
9	SYSTEM RETURN TO SERVICE PROCEDURE.....	9-1
9.1	Maintenance Records	9-1
APPENDIX A INSTALLATION SPECIFIC INFORMATION.....		A-1
APPENDIX B SPECIAL BONDING PROCEDURES.....		B-1
B.1	Considerations for Untreated or Bare Dissimilar Metals	B-2
B.2	Preparation of Aluminum Surfaces	B-5
B.3	Composite Aircraft.....	B-6
B.4	Tube-and-Fabric Aircraft	B-10
B.5	Bonding Jumper	B-12

LIST OF FIGURES

Figure 2-1	GTX 330 or GTX 330D Interface Summary	2-3
Figure 2-2	GTX 33 or GTX 33D Interface Summary	2-5
Figure 2-3	GTX 335/335D/335R/335DR Interface Summary	2-7
Figure 2-4	GTX 345/345D/345R/345DR Interface Summary	2-9
Figure 2-5	GTX 335R/335DR/345R/345DR Interface Summary with Legacy G1000	2-10
Figure 3-1	GTX 330/330D Front Panel	3-2
Figure 3-2	GTX 335/335D/345/345D Front Panel	3-4
Figure 3-3	GTN 7XX Transponder Control	3-7
Figure 3-4	GTN 6XX Transponder Control	3-7
Figure 3-5	GNS 480 Transponder Control	3-7
Figure 3-6	GI 275 Transponder Control	3-7
Figure 3-7	G1000 Transponder Control	3-9
Figure 3-8	G1000 Transponder Control	3-9
Figure 3-9	USB A and USB B Connectors	3-10
Figure 3-10	GTX 3X5 State Page	3-11
Figure 3-11	GTX 3X5 Status Page	3-12
Figure 3-12	GTX 3X5 Configuration Group	3-13
Figure 3-13	GTX 3X5 Diagnostics Group	3-14
Figure 3-14	GTX 3X5 Product Data Group	3-15
Figure 5-1	GTX (All Models) Transponder Troubleshooting	5-3
Figure 5-2	GTX 330/330D Transponder Failure/Fault Messages	5-4
Figure 5-3	GTX 33/33D Transponder Failure/Fault Messages	5-5
Figure 5-4	GTX 3X5 Transponder Alerts	5-6
Figure 5-5	Rear View, Connector P3301	5-11
Figure 5-6	GTX 33/330 ARINC 429 Connections	5-14
Figure 5-7	Rear View, Connector J3251	5-15
Figure 5-8	Rear View, Connector J3252	5-17
Figure 6-1	GTX 330 Mounting Rack/Connector Assembly	6-3
Figure 6-2	GTX 33 Mounting Rack/Connector Assembly	6-4
Figure 6-3	GTX 3X5 Connector Kits	6-5
Figure 6-4	GTX 3X5 without GPS Back Plate Assembly (P/N 011-02976-00)	6-6
Figure 6-5	GTX 3X5 with GPS Back Plate Assembly (P/N 011-02976-01)	6-6
Figure 6-6	GTX 3X5 Vertical Mount without GPS, Back Plate Assembly (P/N 011-02976-10)	6-7
Figure 6-7	GTX 3X5 Vertical Mount with GPS, Back Plate Assembly (P/N 011-02976-11)	6-8
Figure 6-8	GTX 3X5 Vertical Mount with TNC XPDR Back Plate Assembly (P/N 011-02976-12)	6-8
Figure 6-9	GTX 3X5D with Backplate Assembly (P/N 011-04340-02)	6-9
Figure 6-10	GTX 3X5DR with Backplate Assembly (P/N 011-04340-10)	6-10
Figure 6-11	GTX 3X5 Mounting Rack/Connector Assembly	6-12
Figure 6-12	GTX 3X5R Standard Mounting Rack/Connector Assembly	6-14
Figure 6-13	GTX 3X5R G1000 Mounting Rack/Connector Assembly	6-14
Figure 6-14	GTX 3X5R Vertical Mounting Rack/Connector Assembly	6-16
Figure 6-15	Garmin Altitude Encoder with Back Plate Assembly	6-18
Figure 7-1	GTX 330 Start-Up Screen	7-2
Figure 7-2	GTX 330 Product Data Page	7-2
Figure 7-3	GTX 3X5 Start-Up Screen	7-3
Figure 7-4	GTX 3X5 Product Data Page	7-3
Figure 7-5	GTN 6XX/7XX System Page	7-3
Figure 7-6	GX000 System Status Page	7-4

Figure 7-7	Software Update Connection	7-5
Figure 7-8	GTX 3X5 Install Tool Software Upload Page	7-8
Figure B-1	Electrical Bonding Preparation – Nut Plate	B-2
Figure B-2	Electrical Bonding Preparation – Bolt/Nut Joint	B-2
Figure B-3	Electrical Bond Preparation – Terminal Lug	B-2
Figure B-4	Fiberglass Insulation for Carbon Material	B-6
Figure B-5	Aluminum Tape Joint	B-7
Figure B-6	Aluminum Tape Ground Termination	B-8
Figure B-7	Remote GTX Aluminum Tape Installation	B-9
Figure B-8	Electrical Bonding Using Conductive Clamp	B-11
Figure B-9	Bonding Strap	B-13

LIST OF TABLES

Table 1-1	Reference Documentation	1-3
Table 2-1	GTX Electrical Load	2-11
Table 4-1	Maintenance Intervals	4-4
Table 5-1	GTX 33X Pinout	5-11
Table 5-2	GTX 33X Encoded Altitude Pin Assignments	5-13
Table 5-3	GTX 33/330 Discrete Outputs	5-13
Table 5-4	GTX 33/330 Discrete Inputs	5-14
Table 5-5	GTX 33/330 RS-232 Connections	5-14
Table 5-6	J3251 Pinout	5-15
Table 5-7	J3252 Pinout	5-17
Table 5-8	GTX 3X5/3X5R Encoded Altitude Pin Assignments	5-18
Table 5-9	GTX 3X5/3X5R Discrete Outputs	5-19
Table 5-10	GTX 3X5/3X5R Configurable Output Pins	5-19
Table 5-11	GTX 3X5/3X5R Discrete Inputs	5-20
Table 5-12	GTX 3X5/3X5R Configurable Input Pins	5-20
Table 5-13	GTX 3X5/3X5R RS-232 Connections	5-21
Table 5-14	GTX 3X5/3X5R ARINC 429 Connections	5-21
Table 5-15	GTX 345/345R RS-422 Connections	5-21
Table 5-16	GTX 345/345R HSDB Connections	5-22
Table 6-1	GTX 3X5 Connector Kit Hardware	6-5
Table 6-2	Standard/G1000 Mount Back Plate Hardware	6-5
Table 6-3	Vertical Mount Back Plate Hardware	6-7
Table 6-4	Standard and G1000 Mount Backplate Hardware	6-9
Table 6-5	Vertical Mount Backplate Hardware	6-10
Table 6-6	Garmin Altitude Encoder Kit - P/N 011-03080-00	6-18
Table 8-1	Ramp Test Pressure Altitude Check Scenario	8-9
Table B-1	Ground Plane Definitions and Ground Path Resistance Requirements	B-3
Table B-2	Composite Airframe Bonding Hardware	B-7
Table B-3	Tube and Fabric Airframe Bonding Hardware	B-10
Table B-4	Airframe Bonding Hardware	B-13

1 INTRODUCTION

1.1	Content, Scope, Purpose	1-2
1.2	Organization.....	1-2
1.3	Applicability	1-3
1.4	Publications.....	1-3
1.5	Revision and Distribution	1-3
1.6	Reference	1-4
1.6.1	Terminology	1-4
1.6.2	Acronyms	1-4

1.1 Content, Scope, Purpose

This document provides Instructions for Continued Airworthiness (ICA) of the GTX 33X and GTX 3X5 with ADS-B functionality installed and compliant to ADS-B Out version 2, under AML STC SA01714WI. This document satisfies the requirements for continued airworthiness as defined by 14 CFR Part 23.1529 and Appendix G. Information in this document is required to maintain the continued airworthiness of the GTX 33X and GTX 3X5.

1.2 Organization

The following outline briefly describes the organization of this manual.

Section 2: System Overview

Provides a description of the GTX 33X and GTX 3X5 equipment installed by this STC.

Section 3: Control and Operation

Provides basic control and operation information specifically tailored to maintenance practices.

Section 4: Instructions for Continued Airworthiness

Provides instructions for continued airworthiness of the GTX 33X and GTX 3X5 ADS-B units.

Section 5: Troubleshooting

Provides troubleshooting information to aid in diagnosing and resolving problems with GTX 33X and GTX 3X5 system equipment.

Section 6: Unit Removal and Reinstallation

Provides instructions for the removal and replacement of GTX 33X and GTX 3X5 ADS-B units.

Section 7: Software

Provides instructions for loading software on GTX 33X and GTX 3X5 ADS-B units.

Section 8: System Configuration and Checkout

Provides instructions for configuring and testing of GTX 33X and GTX 3X5 system equipment.

Section 9: System Return to Service Procedure

Specifies return-to-service procedures to be performed upon completion of maintenance to GTX 33X and GTX 3X5 system equipment.

Appendix A: Aircraft Specific Information

Provides a template to record aircraft specific installation and configuration data for GTX 33X and GTX 3X5 system equipment.

Appendix B: Special Bonding Procedures

Provides instructions for achieving an electrical bond with GTX 33X and GTX 3X5 system equipment.

1.3 Applicability

This document applies to all aircraft with either the GTX 33X or the GTX 3X5 installed in accordance with STC SA01714WI. Modification of an aircraft by this Supplemental Type Certificate (STC) obligates the aircraft operator to include the maintenance information provided by this document in the operator's Aircraft Maintenance Manual and the operator's Aircraft Scheduled Maintenance Program.

1.4 Publications

In addition to this manual, the following documents are recommended to perform maintenance based on the installed and interfaced equipment. It is the responsibility of the owner/operator to ensure the latest applicable versions of these documents are used during operation, servicing, or maintenance of the airplane.

Table 1-1 Reference Documentation

Document	Garmin Part Number
<i>GTX 33X and GTX 3X5 ADS-B AML STC Equipment List</i>	005-00734-05
<i>GTN 625/635/650 Pilot's Guide</i>	190-01004-03
<i>AFMS, GTX 33X and GTX 3X5 AML STC</i>	190-00734-15
<i>GTN 725/750 Pilot's Guide</i>	190-01007-03
<i>GNS 400W Series Installation Manual</i>	190-00356-08
<i>GNS 500W Series Installation Manual</i>	190-00357-08
<i>GNS 480 (CNX80) Color GPS/NAV/COM Installation Manual</i>	560-0982-01
<i>GNS 480 Pilot's Guide</i>	190-00502-00
<i>G1000 System Installation Manual</i>	190-00303-00
<i>GTN 6XX/7XX Part 23 AML STC Installation Manual</i>	190-01007-A3
<i>GTX 3XX Part 23 AML STC Installation Manual</i>	190-00734-10
<i>GI 275 Pilot's Guide</i>	190-02246-01
<i>GI 275 Part 23 AML STC Installation Manual</i>	190-02246-10

1.5 Revision and Distribution

This document is required for maintaining the continued airworthiness of the aircraft. Garmin Dealers may obtain the latest revision of this document at the Garmin [Dealer Resource Center](#), website.

Dealers are notified of manual revision changes via a Garmin Service Bulletin.

Owner and operators may obtain the latest revision of this document at www.flyGarmin.com or by contacting a Garmin dealer. Garmin contact information is available at www.flyGarmin.com.

1.6 Reference

1.6.1 Terminology

Except where specifically noted, references made to “GTX 33X” or “GTX 3X5” will apply to the GTX 330/330D/33/33D or GTX 335/335D/335R/335DR/345/345D/345R/345DR, respectively.

ADS-B or 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 as well as ADS-B and ADS-R traffic targets received directly over 1090 MHz or UAT.

Throughout this document references will be made to metallic aircraft. For the purposes of this manual, metallic aircraft will be 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).

Unless otherwise stated, all units of measure are US standard units.

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.

1.6.2 Acronyms

AC:	Advisory Circular	ICA:	Instructions for Continued Airworthiness
ADC:	Air Data Computer	ICAO:	International Civil Aviation Organization
ADS-B:	Automatic Dependent Surveillance - Broadcast	I/O:	Input/Output
AHRS:	Attitude Heading Reference System	MFD:	Multifunction Display
AML:	Approved Model List	PED:	Portable Electronic Device
ATC:	Air Traffic Control	SBAS:	Satellite-Based Augmentation System
ATCRBS:	Air Traffic Control Radar Beacon System	SPI:	Special Position Identifier
EGNOS:	European Geostationary Navigation Overlay Service	SRM:	Structural Repair Manual
ES:	Extended Squitter	STC:	Supplemental Type Certificate
FAA:	Federal Aviation Administration	TAS:	Traffic Advisory System
FIS-B:	Flight Information System-Broadcast	TCAS:	Traffic Alert and Collision Avoidance System
GAE:	Garmin Altitude Encoder	TIS:	Traffic Information Service
GNS:	Garmin Navigation System	TSO:	Technical Standard Order
GNSS:	Global Navigation Satellite System	UAT:	Universal Access Transceiver
GPS:	Global Positioning System	VSWR:	Voltage Standing Wave Ratio
GTN:	Garmin Touchscreen Navigator	WAAS:	Wide Area Augmentation System
GTX:	Garmin Transponder		

2 SYSTEM DESCRIPTION

2.1	GTX 330/330D	2-2
2.2	GTX 33/33D	2-4
2.3	GTX 335/335D/335R/335DR.....	2-6
2.4	GTX 345/345D/345R/345DR.....	2-8
2.5	GTX 335R/335DR/345R/345DR with Legacy G1000.....	2-10
2.6	Electrical Load Information.....	2-11

Garmin GTX 33X and GTX 3X5 units operate on radar frequencies, receiving ground radar or TCAS interrogations. The GTX transmits 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 interrogation. The GTX 345/345D/345R/345DR units include ADS-B In which provides TIS-B and FIS-B data via UAT and 1090 MHz. The GTX 3X5 units offer an optional Garmin altitude encoder to meet the required barometric pressure altitude source and an optional internal GPS/SBAS source to meet the required GNSS position source integrity for ADS-B Out.

The Garmin transponders approved by this STC are in the family of GTX 33X and GTX 3X5 transponders.

The ES option of the GTX 33X units provides ADS-B extended squitter functionality.

The GTX 33X models include:

- GTX 33
- GTX 330
- GTX 33D
- GTX 330D

The GTX 3X5 units all provide ADS-B Out functionality. GTX 345/345R units provide ADS-B In. The GTX 3X5 models include:

- GTX 335
- GTX 335D
- GTX 345
- GTX 345D
- GTX 335R
- GTX 335DR
- GTX 345R
- GTX 345DR

ADS-B technology improves situational awareness and flight safety. A Garmin transponder with ADS-B capabilities will automatically transmit position, velocity, and heading information to other aircraft and ground stations. The current air traffic control system depends on a transponder request for pertinent aircraft information, whereas ADS-B provides automatic transmission of aircraft information without a request.

2.1 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 display TIS-A information on an approved display unit, via an RS-232 digital interface.

GTX 330/330D units provide the following features.

- Mode S transponder
- ADS-B Out capability
- Entry and display of squawk code and flight ID
- Display of pressure altitude
- Display of density altitude
- Display of outside air temp
- Display of flight timers
- Audio output
- TIS-A traffic output to a compatible display

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

GTX 330/330D units communicate through the following interfaces.

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

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

Figure 2-1 provides a summary of the interfaces provided for the GTX 330 or GTX 330D. Refer to *GTX 3XX Part 23 AML STC Installation Manual* for interfaces allowed under this STC.

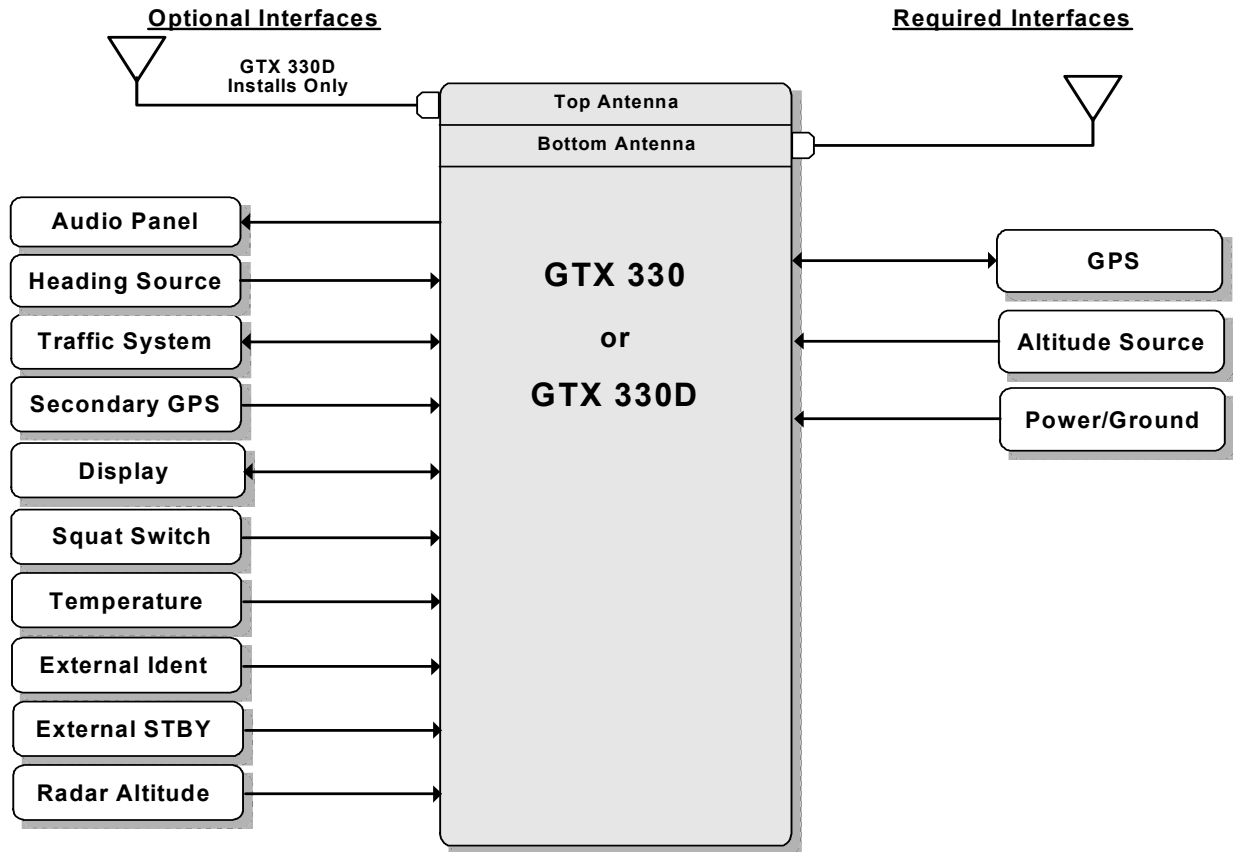


Figure 2-1 GTX 330 or GTX 330D Interface Summary

2.2 GTX 33/33D

GTX 33/33D units are remote mounted and require a display/control interface as provided by the GTN 6XX/7XX or GNS 480 in order to be installed in accordance with this STC. Basic transponder functions of the GTX 33/33D are identical to the GTX 330/330D.

GTX 33/33D units provide the following features.

- Mode S transponder
- ADS-B Out capability
- Entry and display of squawk code and flight ID*
- Display of pressure altitude*
- Display of density altitude*
- Display of outside air temp*
- Display of flight timers*
- Audio output
- TIS-A traffic output to a compatible display

*Requires supported external control and display system

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

GTX 33/33D units communicate through the following interfaces.

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

Power is provided by the aircraft's existing avionics bus. Non-diversity GTX 33 units interface with a transponder antenna mounted to the bottom of the fuselage. GTX 33D units interface to a transponder antenna mounted to the top of the fuselage as well as an antenna mounted to the bottom.

Figure 2-2 provides a summary of the interfaces provided for the GTX 33 or GTX 33D. Refer to *GTX 3XX Part 23 AML STC Installation Manual* for interfaces allowed under this STC.

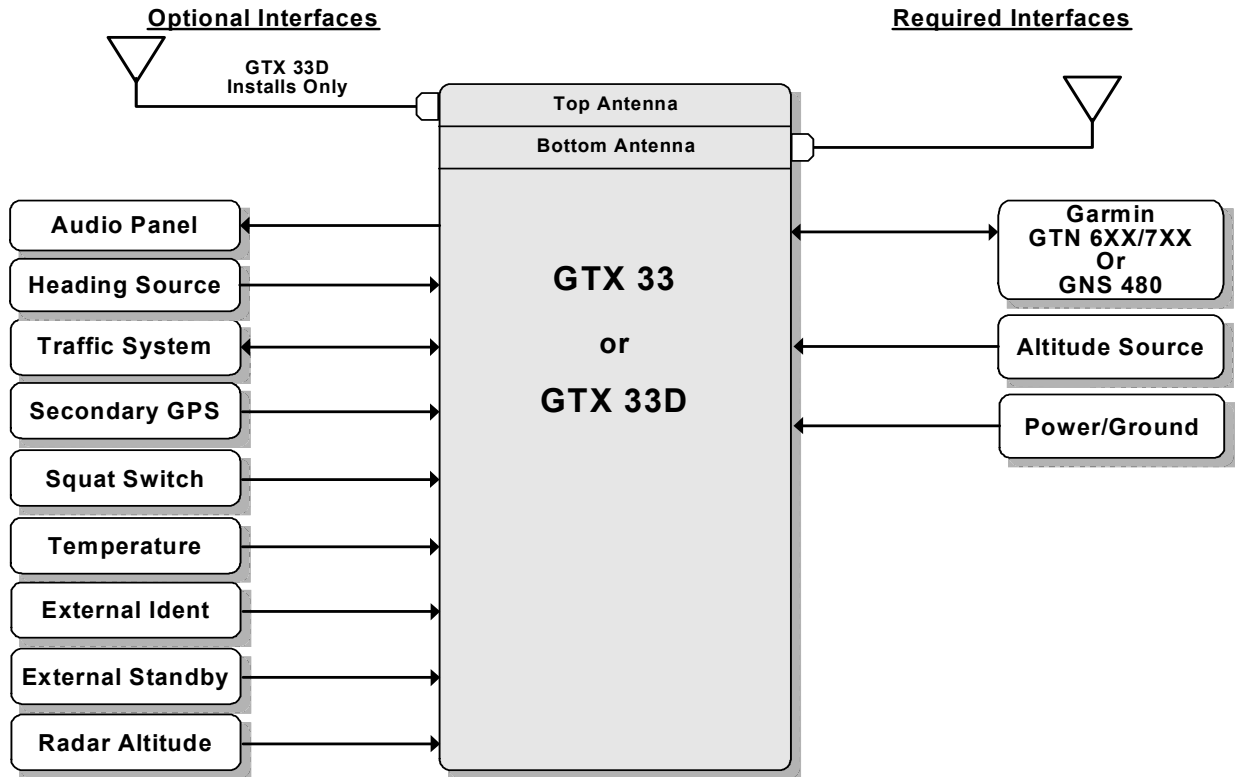


Figure 2-2 GTX 33 or GTX 33D Interface Summary

2.3 GTX 335/335D/335R/335DR

The GTX 335/335D/335R/335DR units are panel or remote mounted units providing Mode S with ADS-B Out extended squitter capability. The panel mounted unit contains an integrated display while the remote mounted unit requires an interface to a control source for normal operation and functionality.

GTX 335/335D/335R/335DR units provide the following features:

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

The transponder annunciates when the unit has an ADS-B Out failure to alert the crew that the unit has a degraded ADS-B system. GTX 335/335R units interface with a transponder antenna mounted to the bottom of the fuselage. GTX 335D/335DR units interface to a transponder antenna mounted to the top of the fuselage as well as an antenna mounted to the bottom.

GTX 335/335D/335R/335DR units communicate through the following interfaces:

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

Figure 2-3 provides a summary of the interfaces provided for the GTX 335/335D/335R/335DR. Refer to *GTX 3XX Part 23 AML STC Installation Manual* for interfaces allowed under this STC.

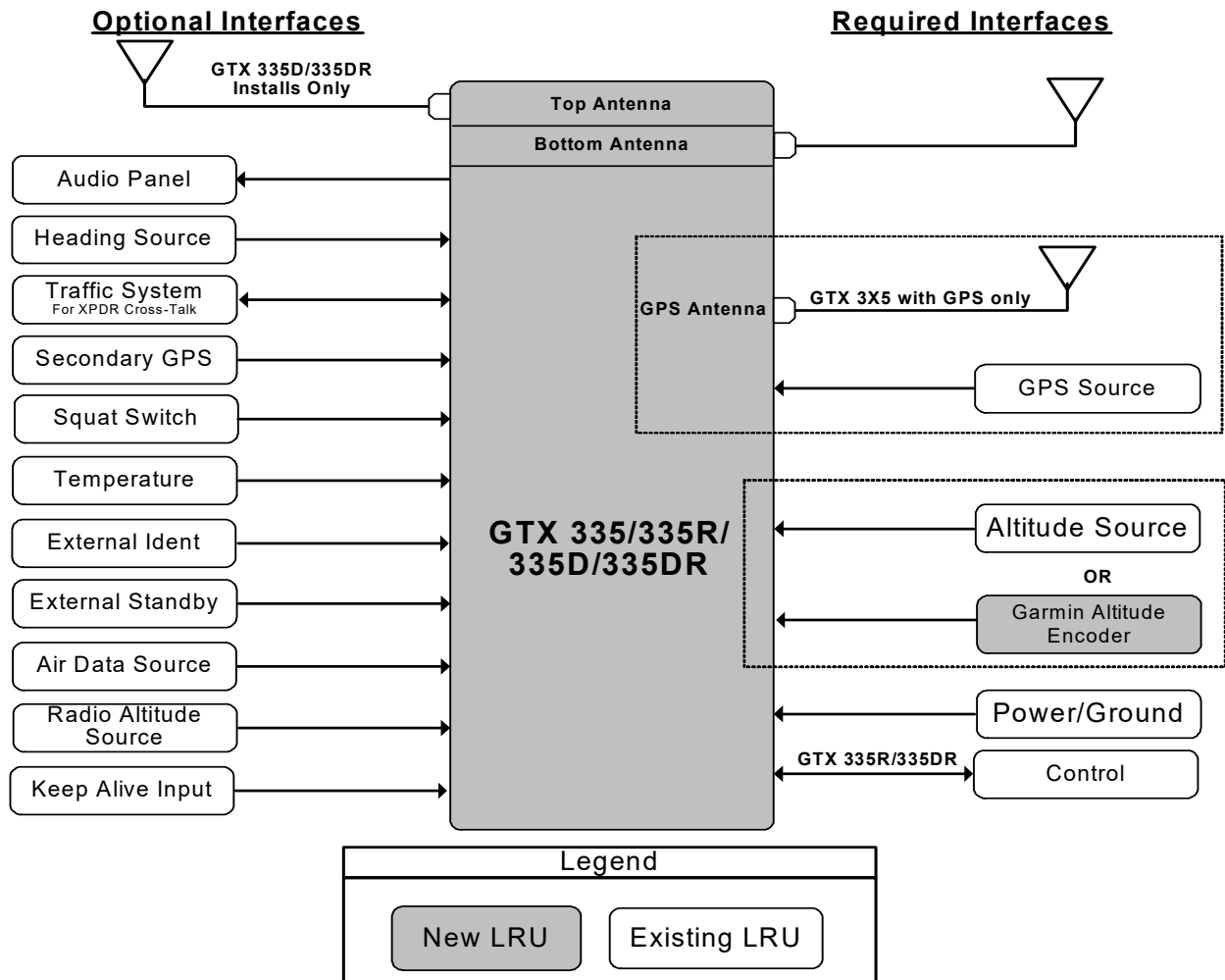


Figure 2-3 GTX 335/335D/335R/335DR Interface Summary

2.4 GTX 345/345D/345R/345DR

The GTX 345/345D/345R/345DR units are panel or remote mounted units providing Mode S with ADS-B Out extended squitter, and UAT and 1090 receivers for ADS-B In capabilities. The panel mounted unit contains an integrated display while the remote mounted units require an interface to a control source for normal operation and functionality.

GTX 345/345D/345R/345DR units provide the following 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 altitude encoder module
- Entry and display of squawk code and flight ID
- Display of pressure altitude
- Display of outside air temp
- Display of density altitude
- Display of flight timers
- Audio output
- Bluetooth interface for display of weather and traffic on portable devices

The transponder annunciates when the unit has an ADS-B failure to alert the crew that the unit has a degraded ADS-B In or ADS-B Out system. GTX 345/345R units interface with a transponder antenna mounted to the bottom of the fuselage. GTX 345D/345DR units interface to a transponder antenna mounted to the top of the fuselage as well as an antenna mounted to the bottom.

GTX 345/345D/345R/345DR units communicate through the following interfaces:

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

Figure 2-4 provides a summary of the interfaces provided for the GTX 345/345D/345R/345DR. Refer to *GTX 3XX Part 23 AML STC Installation Manual* for interfaces allowed under this STC.

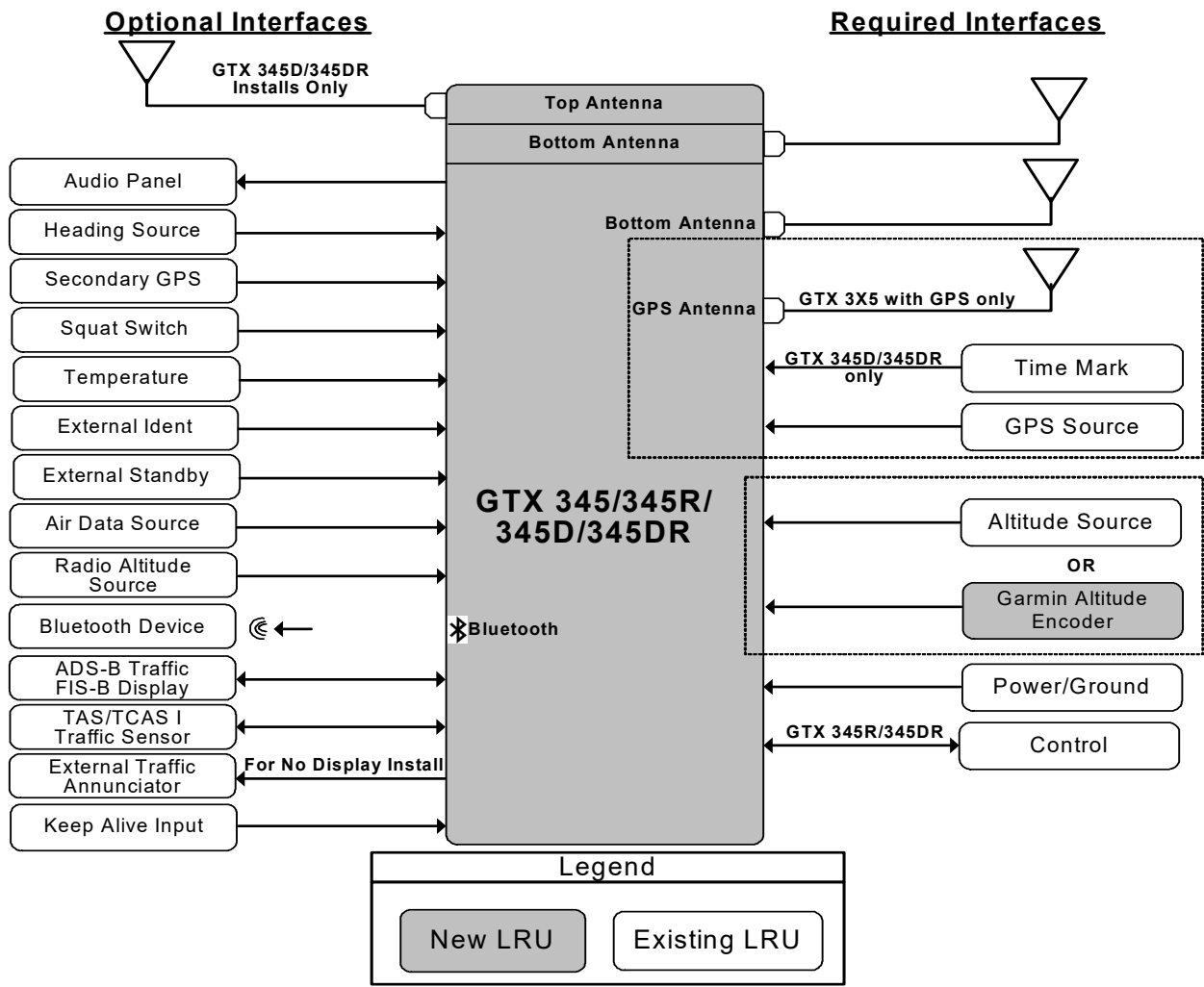


Figure 2-4 GTX 345/345D/345R/345DR Interface Summary

2.5 GTX 335R/335DR/345R/345DR with Legacy G1000

The Legacy G1000 configuration includes certain G1000 systems that can be updated with a G1000 interface card. The GTX 335R/335DR provides all the functions listed under the GTX 335/335D/335R/335DR to include ADS-B Out. The GTX 345R provides all the functions listed under the GTX 345/345D/345R/345DR with the exception that the ADS-B In traffic and weather will be displayed as an emulation of the GDL 90 weather and traffic displays. The GTX 345R/345DR provides FIS-B weather (NEXRAD and METARS) and TIS-B traffic within the confines of the GDL 90 interface. The GTX 345R/345DR provides TIS-B traffic and FIS-B weather on PED via Bluetooth. Refer to *GTX 3XX Part 23 AML STC Installation Manual* for additional information.

Figure 2-5 provides a basic summary of the GTX 335R/335DR/345R/345DR interface for the legacy G1000 system.

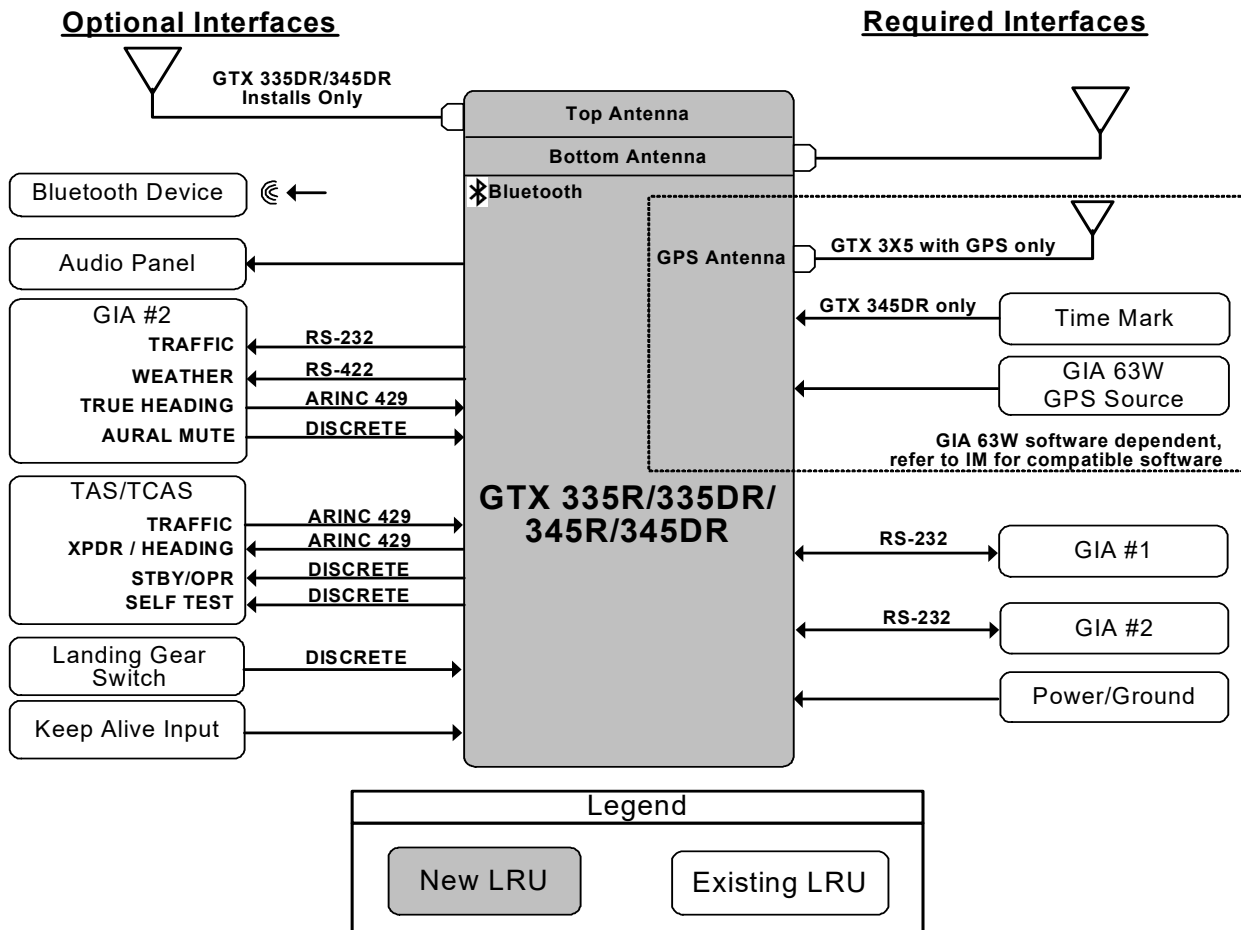


Figure 2-5 GTX 335R/335DR/345R/345DR Interface Summary with Legacy G1000

2.6 Electrical Load Information

Electrical load information for the GTX is provided below. Appendix A of this document contains details specific to the load changes for the installation.

Table 2-1 GTX Electrical Load

Unit	Characteristic	Specification	
		14 VDC	28 VDC
GTX 33/330	Maximum full TSO reply rate	3.1 A	1.6 A
	Maximum quiescent	1.1 A	0.85 A
GTX 335/335D	Input current, typical	0.57 A	0.29 A
	Input current, maximum	0.86 A	0.43 A
GTX 335, GPS	Input current, typical	0.72 A	0.36A
	Input current, maximum	1.22 A	0.61 A
GTX 345/345D	Input current, typical	0.72 A	0.36 A
	Input current, maximum	1.30 A	0.65 A
GTX 345, GPS	Input current, typical	1.07 A	0.54 A
	Input current, maximum	1.43 A	0.72 A
GTX 335/345, GPS	Input current, GPS KEEP ALIVE	65 μ A typical	20 μ A typical
		85 μ A maximum	40 μ A maximum

3 GTX CONTROL AND OPERATION

3.1	GTX 330/330D	3-2
3.2	GTX 335/335D/345/345D	3-4
3.3	GTX 33/33D and GTX 335R/335DR/345R/345DR	3-7
3.4	GTX 335R/335DR/345R/345DR with Legacy G1000	3-8
3.5	GTX 3X5 Install Tool	3-10
3.5.1	State Page	3-11
3.5.2	Status Page	3-12
3.5.3	Configuration Group	3-13
3.5.4	Diagnostics Group	3-14
3.5.5	Product Data Group	3-15
3.5.6	Software Upload	3-15

Control and operation of GTX 330/330D and GTX 335/335D/345/345D units occur through the front panel of the GTX. Control and operation of the remote mounted GTX 33/33D and GTX 335R/335DR/345R/345DR is handled through the external interface provided via the GTN 6XX/7XX, GNS 480, or GI 275 (GTX 345 only). ADS-B In information from the GTX 345 can be displayed through the external interface provided via the GTN 6XX/7XX, GNS 400W/500W Series, or GI 275 (GTX 345 only). Figure 3-3 and Figure 3-4 show display units control of the transponder. Figure 3-5 shows transponder control using the GNS 480. Figure 3-6 shows transponder control using the GI 275.

In specific installations, the GDU 1XXX (of the G1000 system) provides control and operation of the remote mounted GTX 335R/335DR/345R/345DR units. Section 3.4 describes the functions of the G1000 system.



NOTE

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

Important Codes

- 1200** VFR code for any altitude in the US (refer to ICAO standards)
- 7000** VFR code commonly used in Europe (refer to ICAO standards)
- 7500** Hijack code (aircraft is subject to unlawful interference)
- 7600** Loss of communications
- 7700** Emergency

Avoid selecting code 7500 and all codes in the 7600-7777 range. These codes trigger special emergency alerts in ATC monitoring facilities. An aircraft's transponder code is used for ATC tracking purposes, therefore be careful when making routine code changes.

3.1 GTX 330/330D



Figure 3-1 GTX 330/330D Front Panel

Function Selection Keys

The function selection keys are:

- OFF** Powers off the GTX 330.
- STBY** Selects the standby mode. Pressing the **STBY** key when the GTX 330 is powered off automatically powers the unit on in standby mode. When in standby mode, the transponder does not reply to interrogations. If using software v8.02 or later, GND mode is automatically determined using either a squat switch or calculated data from various system inputs including GPS data from an approved control/display unit such as a GTN 6XX/7XX, GNS 400W/500W Series, or GNS 480.
- ON** Selects Mode A and Mode S. Pressing the **ON** key when the GTX 330 is powered off automatically powers on the unit in Mode A and will transmit a squawk code when interrogated. The transponder replies to Mode A and Mode S interrogations, as indicated by the reply symbol (®). The replies do not include altitude information.



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 responds to interrogations from TCAS equipped aircraft.

- ALT** Selects Mode A, Mode C, and Mode S. Pressing the **ALT** key when the GTX 330 is powered off automatically powers on the unit in altitude reporting mode. The transponder replies to identification, altitude and Mode S interrogations as indicated by the reply symbol (®). Replies to altitude interrogations include the standard pressure altitude received from an external altitude source, which is not adjusted for barometric pressure.
- IDENT** Pressing the **IDENT** key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying the transponder return from others on an air traffic controller's screen. During the IDENT period, the word "IDENT" appears in the upper left corner of the display.
- VFR** Sets the transponder code to the pre-programmed VFR code selected in Configuration mode (Set to 1200 at the factory). Pressing the **VFR** key again restores the previous identification code.



NOTE

The VFR key is on (functional) by default, but can be disabled in configuration mode.

- FUNC** Changes the page shown on the right side of the display. Display data includes pressure altitude, flight time, altitude monitor, count up, and count down timers. In the Configuration mode, steps through the function pages.

- START/STOP** Starts and stops the altitude monitor, count up, count down, and flight timers.
- CRSR** Initiates entry of the starting time for the count down timer and cancels transponder code entry. Selects changeable fields in Configuration mode. If using software v8.02 or later, holding the **CRSR** key during power on will place the unit into a Ground Test mode that forces the aircraft into an airborne status for testing purposes.
- CLR** Resets the count up, count down, and flight timers. Cancels the previous key press during code selection and count down entry. Used in Configuration mode.
- 8** Reduces contrast and display brightness when the respective fields are displayed and enters the number eight into the count down timer. Used in Configuration mode.
- 9** Increases contrast and display brightness when the respective fields are displayed and enters the number nine into the count down timer. Used in Configuration mode.

Code Selection

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

Function Display

- PRESSURE ALT** Displays the altitude data supplied to the GTX 330 in feet, hundreds of feet (flight level), or meters, depending on configuration.
- FLIGHT TIME** Displays the flight time, controlled by the **START/STOP** key or by one of four airborne sources (squat switch, GPS ground speed recognition, air data airspeed recognition, or altitude increase) as configured during installation. The timer begins when the GTX 330 determines that the aircraft is airborne.
- ALT MONITOR** Controlled by **START/STOP** key. Activates a voice alarm and warning annunciator when altitude limit is exceeded.
- OAT/DALT** Displayed when the GTX 330 is configured with temperature input. Displays outside air temperature and density altitude.
- COUNT UP** Timer controlled by **START/STOP** and **CLR** keys.
- COUNT DOWN** Timer controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial count down time is entered with the **0 – 9** keys.
- CONTRAST** This page is only displayed if manual contrast mode is selected in Configuration mode. Contrast is controlled by the **8** and **9** keys.
- DISPLAY** This page is only displayed if manual backlighting mode is selected in Configuration mode. Backlighting is controlled by the **8** and **9** keys.
- ADS-B TX** Controlled by **START/STOP** key. Starts/stops extended squitter function.
- FLIGHT ID** If the GTX 33X is using software v8.02 or later and the system is configured to allow the pilot to edit the flight ID, then the flight ID may be entered using the **CRSR** key. Otherwise the flight ID is set in configuration mode and cannot be changed during normal operation.

3.2 GTX 335/335D/345/345D



Figure 3-2 GTX 335/335D/345/345D Front Panel

Function Selection Keys

The function selection keys are:

- OFF** Powers off the GTX 3X5.
- STBY** Selects the Standby mode. Pressing the **STBY** key when the GTX 3X5 is powered off automatically powers the unit on in standby mode. When in Standby mode, the transponder does not reply to interrogations but new codes can be entered and a SBY indication appears on the display.
- ON** Selects the On mode, which generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited. Pressing the **ON** key when the GTX 3X5 is powered off automatically powers on the unit in Mode A and will transmit a squawk code when interrogated. ADS-B Out will not return barometric altitude as it switches to GPS altitude in this mode. Interrogations are indicated by the reply symbol (®). The replies do not include altitude information.



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 responds to interrogations from TCAS equipped aircraft.

- ALT** Altitude mode is automatically selected when the aircraft becomes airborne using the unit's air/ground logic or when the **ALT** key is pressed. Pressing the **ALT** key when the GTX 3X5 is powered off automatically powers on the unit in altitude reporting mode. While the aircraft is on the ground and in ALT mode, the transponder does not allow Mode A and Mode C replies, but it does permit acquisition squitter and replies to Mode S interrogations. While the aircraft is in ALT mode and airborne, it will generate Mode A, Mode C and Mode S replies as well as transmit acquisition and extended squitter, including ADS-B Out. All transponder interrogations are indicated by the reply symbol (®).
- IDENT** Pressing the **IDENT** key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying the transponder return from others on an air traffic controller's screen. During the IDENT period, the word "IDENT" appears in the upper left corner of the display.
- VFR** Sets the transponder code to the pre-programmed VFR code selected in Configuration mode (Set to 1200 at the factory). Pressing the **VFR** key again restores the previous identification code.

FUNC	In normal mode, pressing the FUNC key changes 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, steps through the function pages.
ENT	Confirms entry for selected item and moves the cursor to the next editable 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. Initiates entry of the starting time for the count down timer and cancels transponder code entry. Holding the CRSR key during power on will place the unit into a Ground Test mode that forces the aircraft into an airborne status for testing purposes.
CLR	Resets the count up, count down and flight timers. Cancels the previous key press 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 navigate through page groups in normal and configuration mode.
9	Used as a scroll-down key to navigate through page groups in normal and configuration mode.

Code Selection

Code selection is entered with eight keys (0 – 7) providing 4,096 active identification codes. Pushing one of these keys begins the code selection sequence. The new code is not activated until the fourth digit is entered. Pressing the **CLR** key moves the cursor back to the previous digit. Pressing the **CLR** key when the cursor is on the first digit of the code, or pressing the **CRSR** key during code entry, removes the cursor and cancels data entry, restoring the previous code. The numbers 8 and 9 are not used for code entry, only for flight ID entry, count down time, aircraft tail number entry, and data selection in Configuration and Normal mode.

Configuration Mode

To enter configuration mode, press and hold the **ENT** key, then energize the unit. To exit configuration mode, press and hold the **OFF** key until the unit de-energizes.

- To cycle through the pages, press the **FUNC** key
- To access items on the page, press the **CRSR** key
- To cycle through the selections of an item on the page, press the **8** or **9** key
- To scroll up or down on the page when nothing is selected, press the **8** or **9** key
- To move within the page, press the **ENT** key
- To move to previous selection on the page, press the **CLR** key
- To exit the page, press the **FUNC** key

GTX 3X5 units may also be configured using the GTX 3X5 Install Tool. For configuration using the GTX 3X5 Install Tool, refer to Section 3.5.

Function Display

FLIGHT ID	If ALLOW PILOT TO EDIT FLT ID is configured to YES, the FLIGHT ID can be changed by the pilot at any time in normal mode. This allows the pilot/crew to enter 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 entered with the 0 – 9 keys.
FLIGHT TIMER	Displays 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 begins when the GTX 3X5 determines that the aircraft is airborne.
TRIP TIMER	Timer controlled by ENT and CLR keys.
PRESSURE ALT	Displays the altitude data supplied to the GTX 3X5 in feet, hundreds of feet (flight level), or meters, depending on configuration.
ALT MONITOR	Controlled by ENT key. Activates a voice alarm and warning annunciator when altitude limit is exceeded.
SAT/DALT	Displayed when the GTX 3X5 is configured with temperature input. Displays Static Air Temperature and Density Altitude.
CONTRAST/OFFSET	Contrast is controlled by the 8 and 9 keys.
BACKLIGHT/OFFSET	This page is only displayed if photocell backlighting mode is selected in Configuration mode. Backlighting is controlled by the 8 and 9 keys.
MESSAGES	Alerts crew of transponder faults, fails and advisory messages. MSG appears when a message is generated. CRSR and ENT keys access messages for acknowledgment and viewing.
BLUETOOTH	This page is only displayed on the GTX 345/345D when configured for Bluetooth at installation. When enabled, allows PED pairing to the GTX 345/345D and device management for display of ADS-B In data.
INTERNAL GPS	This page displays Lat/Long accuracy, number of connected satellites, horizontal figure of merit, whether the unit is using internal GPS, and overall status.
1090ES TX CTRL	This is only displayed when the unit is configured for 1090ES OUT CONTROL in Configuration mode to be PILOT SET. Once configured, this can be highlighted by the CRSR key, changed by the 8 and 9 keys, and selected by ENT key. Turns the extended squitter function on or off.

3.3 GTX 33/33D and GTX 335R/335DR/345R/345DR

Figure 3-3, Figure 3-4, Figure 3-5, and Figure 3-6 show the GTX control pages associated with the GTN 6XX/7XX, GNS 480, and GI 275. Refer to the specific pilot guide and cockpit reference guide for details regarding control and function. Part numbers for these documents are listed in Table 1-1.



Figure 3-3 GTN 7XX Transponder Control



Figure 3-4 GTN 6XX Transponder Control



Figure 3-5 GNS 480 Transponder Control



Figure 3-6 GI 275 Transponder Control

3.4 GTX 335R/335DR/345R/345DR with Legacy G1000

With specific installations, the GDU 1XXX (of the G1000 system) provides control and operation of the remote mounted GTX 335R/335DR/345R/345DR units. Figure 3-7 and Figure 3-8 display screen shots of the GTX control pages associated with the G1000 system.

Refer to the specific aircrafts pilot guide for generic G1000 transponder control and functionality. In addition to the generic transponder operation, functionality has changed to incorporate the GTX 3X5 interface as follows.

Functions:

- GND** The **GND** soft key is unavailable with the GTX 3X5 transponders. “XPDR GND UNAVL” will annunciate any time the **GND** soft key is pressed and the unit will revert to the previous mode the unit was in prior to the **GND** soft key being pressed.
- ADS-B TX** The transmission of the ADS-B information is enabled/disabled by pressing the **ADS-B TX** soft key. ADS-B transmission defaults to enabled at each power cycle. In older GDU 1XXX software versions, the **ADS-B TX** soft key is not available; this function defaults to enabled. Do not disable ADS-B transmission unless requested by ATC.

Annunciations:

- ADS-B Fail** Any time the ADS-B Out system fails or the GPS signal is degraded, an ADS-B Fail message will annunciate.
- XPDR GND UNAVL** Any time the **GND** soft key is pressed the advisory message will annunciate to alert the ground mode is no longer available.



Figure 3-7 G1000 Transponder Control

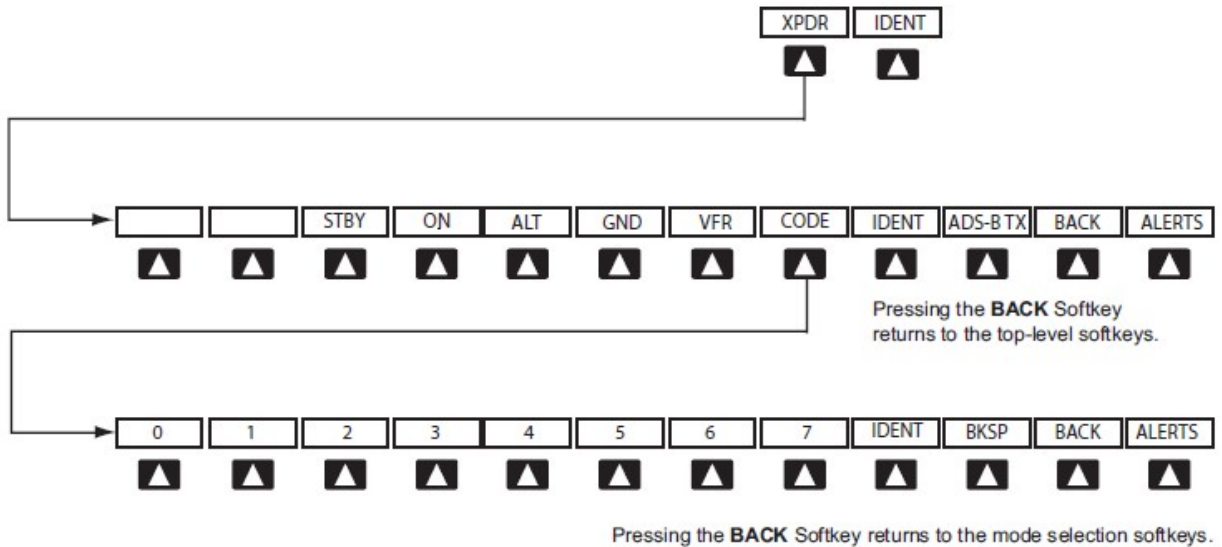


Figure 3-8 G1000 Transponder Control

3.5 GTX 3X5 Install Tool



NOTE

If the GTX 3X5 is configured to interface with a display control unit, the display control unit must be turned off or in configuration mode prior to running the GTX 3X5 Install Tool.



NOTE

The GTX 3X5 Install Tool pages shown within this manual may reflect older GTX 3X5 Install Tool versions. Some differences in operation may be observed when comparing information in this manual to later versions of the install tool.

The GTX 3X5 Install Tool is available for download from the Garmin [Dealer Resource Center](#). The GTX 3X5 Install Tool requires a computer with available USB 2.0 ports and Microsoft Windows XP or later.

A USB A-to-B cable is required to interface between a computer and the GTX 3X5. For additional details, refer to Figure 3-9. To use the GTX 3X5 Install Tool, remove power from the GTX 3X5. Remove power from the display control unit or verify it is in configuration mode. Connect the USB cable between the GTX 3X5 and the computer. Energize the GTX 3X5 and then run the GTX 3X5 Install Tool.

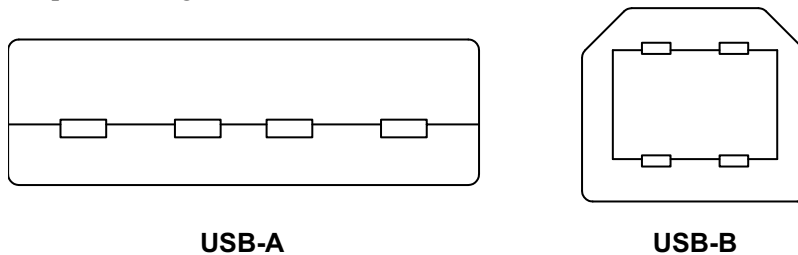


Figure 3-9 USB A and USB B Connectors

The install tool is used to check equipment status, load software, and configure the unit. To put a GTX 3X5 unit in configuration mode, change “Normal Mode” to “Configuration Mode” in the unit mode window. Click the **Set** key to enter configuration mode.

Green boxes indicate a function operating correctly. Red boxes indicated a failure. Yellow boxes indicate a fault or warning. Gray boxes indicate the presence of a pilot alert.

The bottom of the install tool displays unit information such as software version, connection status, and unit mode. The tool will also annunciate if alerts, faults, failures, or warnings exist. The menu bar at the top of the install tool has a **GTX** key and a **Help** key. The **GTX** key provides the following options:

- Save configuration
- Load configuration
- Reset configuration
- Push configuration from install tool to configuration module
- Exit

The **Help** key provides the following information:

- Part number
- Version number
- Copyright statement
- Software license agreements.

3.5.1 State Page

The State page of the GTX 3X5 Install Tool reports the current mode of the GTX 3X5, Flight ID, Squawk Code, and Pressure Altitude. This page allows selection of Ground Test and Traffic Test modes. This page also allows selection of Standby or Operate TCAS Modes.

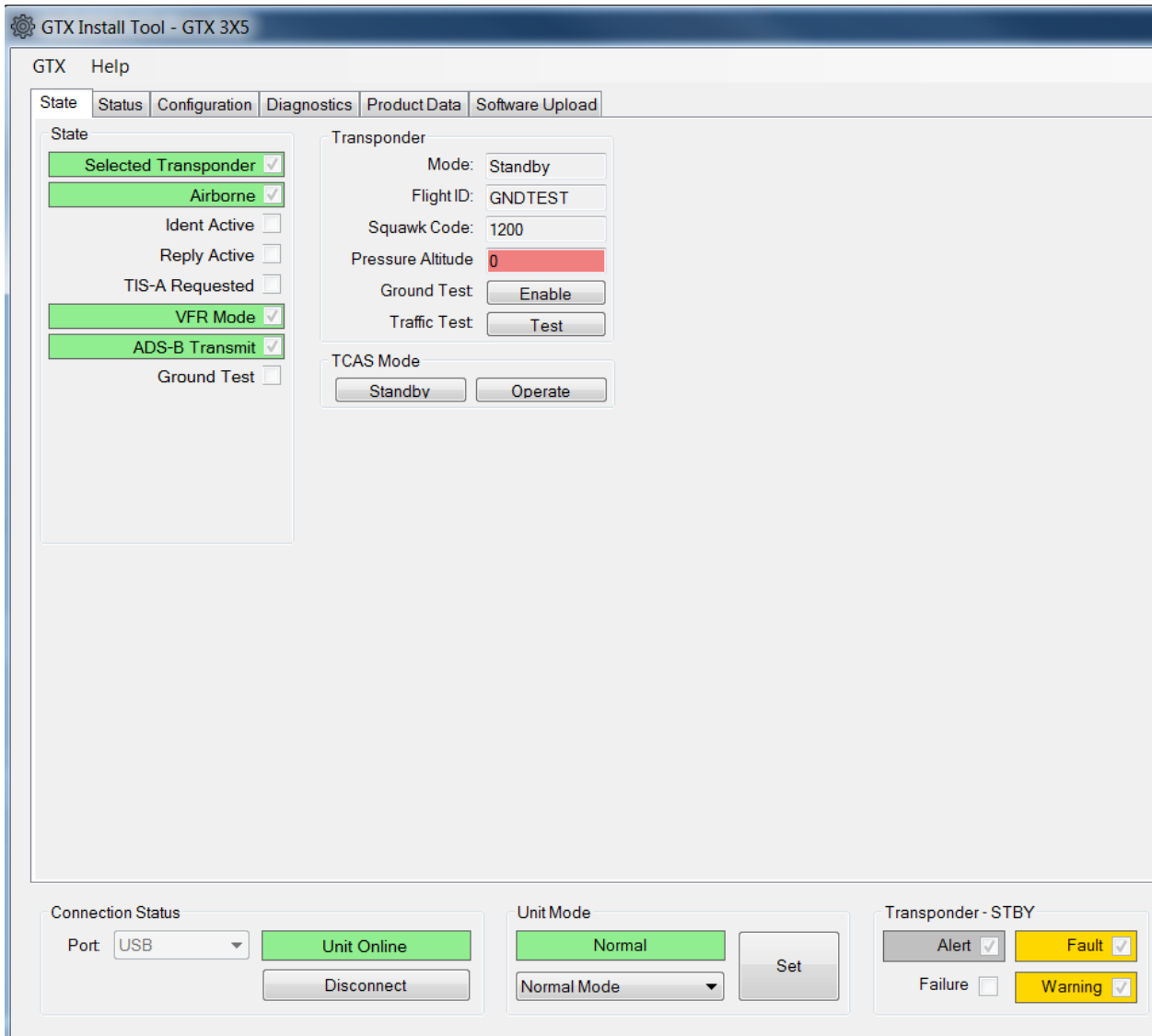


Figure 3-10 GTX 3X5 State Page

3.5.2 Status Page

The Status page reports failures, faults, warnings, and pilot alerts. Information such as whether there is a configuration module present is also displayed.

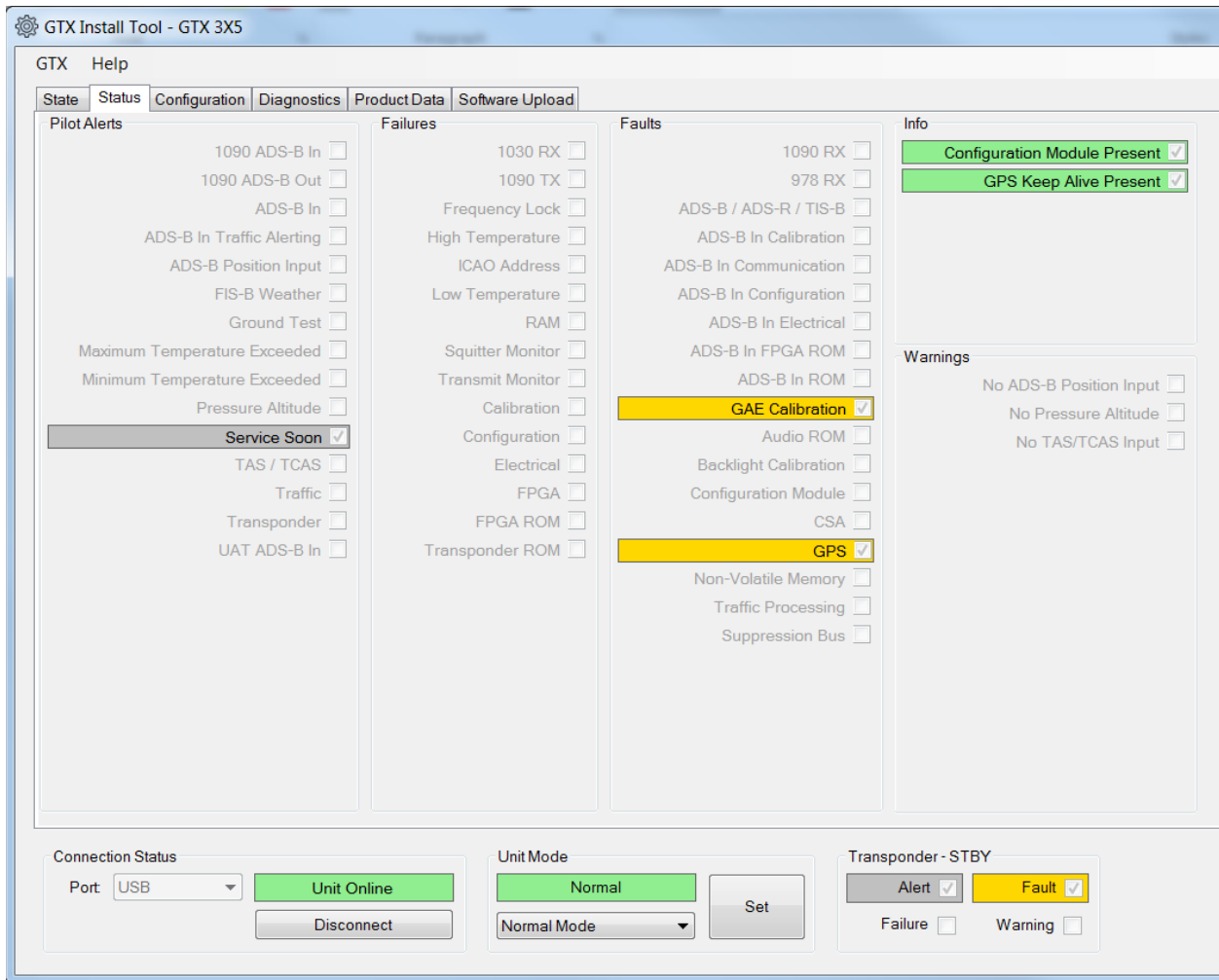


Figure 3-11 GTX 3X5 Status Page

3.5.3 Configuration Group

The Configuration group contains the following pages:

- Aircraft page - configuration of basic aircraft configuration and flight ID settings
- Airframe page - configuration of basic airframe configuration and operational options settings
- Unit page - configuration of identification code, unit options, and display options
- Interfaces page - configuration of serial, A429, discretes, and HSDB settings
- Sensors page - configuration of Garmin altitude encoder, GPS, internal AHRS, and additional sensors
- Audio page - configuration of audio options and alerts
- Display page - configuration of display and key backlight, photocell and lighting bus curves, and default offsets

All configurable settings must match GTX System Configuration Log retained in the aircraft permanent records.

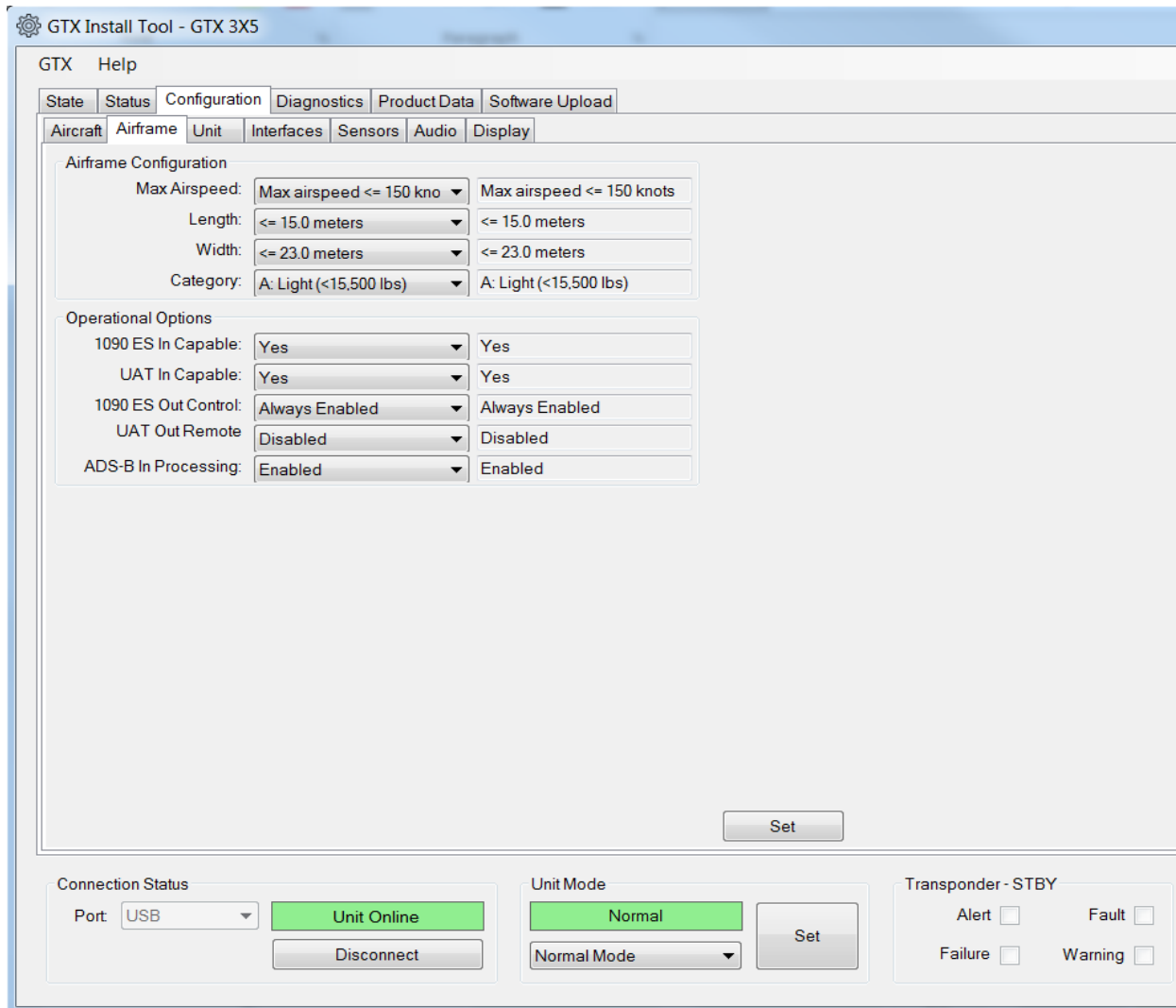


Figure 3-12 GTX 3X5 Configuration Group

3.5.4 Diagnostics Group



NOTE

GTX 3X5 must be in configuration mode to view connection status or get assert log.

The Diagnostics group contains the following pages:

- DAP - reports status of the necessary data supporting ADS-B requirements
- Discretes - reports status of discrete inputs, outputs, and allows the user to override the Output pins for testing purposes
- Connection status - reports status of A429 inputs, serial inputs, and HSDB
- Internal GPS - reports GPS acquisition status and signal strength
- Bluetooth - reports Bluetooth receiver status and paired devices
- Assert log - provides ability to download assert log for system troubleshooting

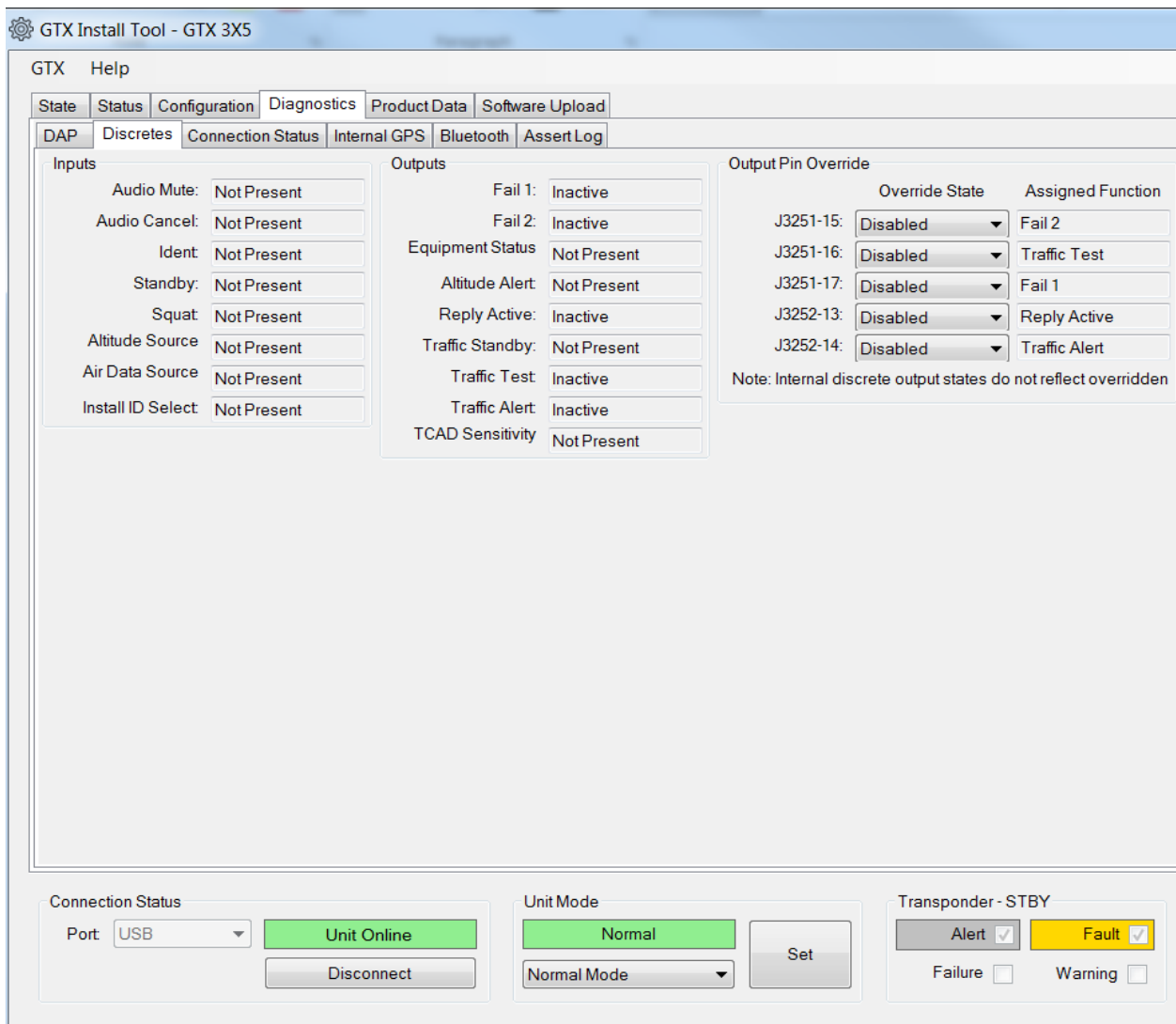


Figure 3-13 GTX 3X5 Diagnostics Group

3.5.5 Product Data Group

The product data group provides the following pages.

- Transponder page - displays basic system, FPGA, Boot Block, and Audio Database information
- ADS-B In page - displays basic system, FPGA, and Boot Block information
- GPS page - displays GPS and GPS loader information
- Garmin Altitude Encoder page - displays altitude encoder serial number
- Configuration page - displays configuration status of aircraft, unit, wiring, and display CRCs

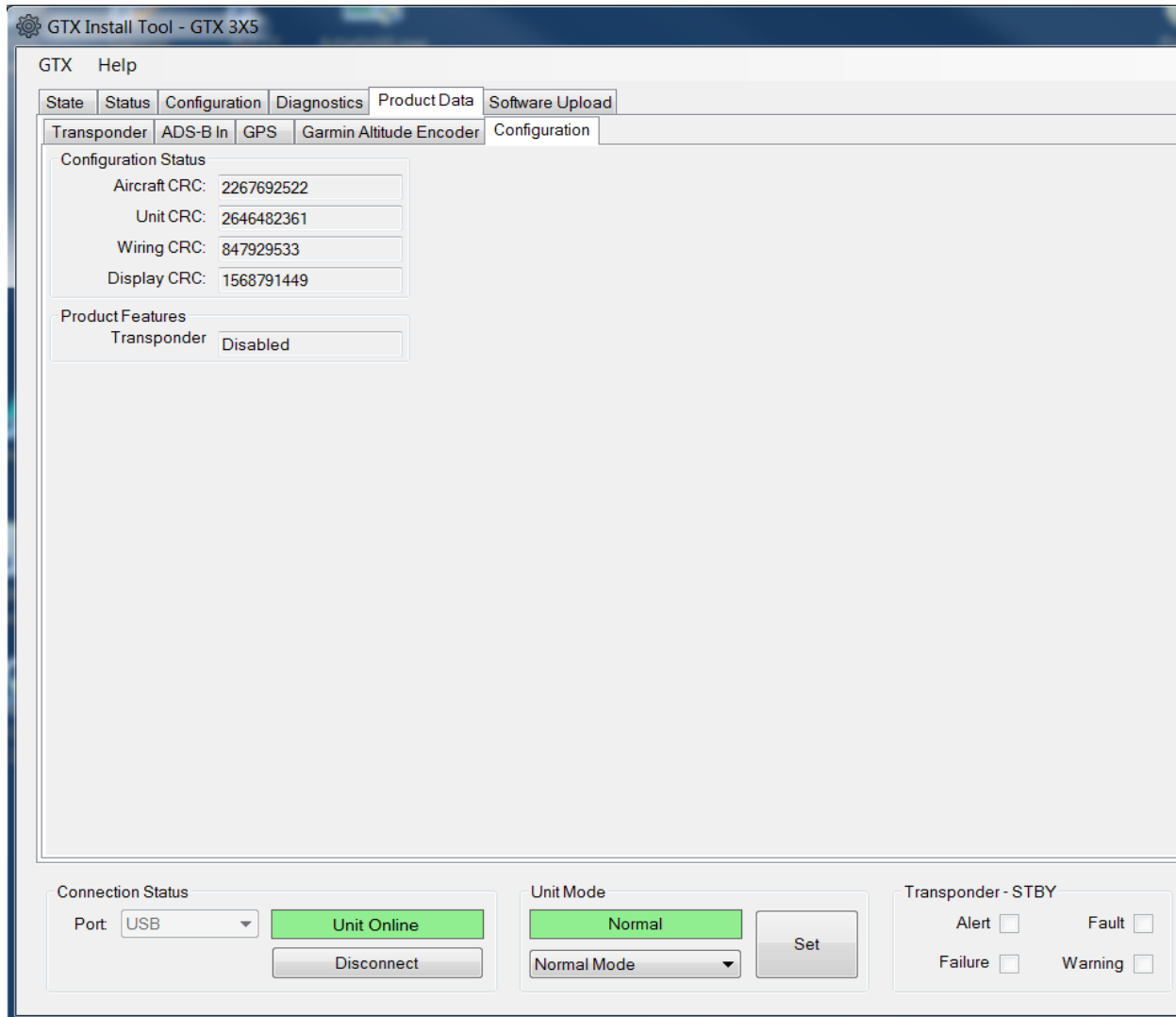


Figure 3-14 GTX 3X5 Product Data Group

3.5.6 Software Upload

Refer to Section 7.3 for details.

4 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

4.1	Applicability	4-2
4.2	Airworthiness Limitations	4-2
4.3	Servicing Information	4-3
4.3.1	On Condition Servicing.....	4-3
4.3.2	Special Tools	4-3
4.4	Maintenance Intervals.....	4-4
4.5	Visual Inspection	4-5
4.6	Electrical Bonding Test	4-7
4.7	Additional Instructions	4-7

This section provides Instructions for Continued Airworthiness for the GTX 33X and GTX 3X5 with ADS-B installation. This section satisfies the requirements for continued airworthiness as defined by 14 CFR Part 23.1529 and Part 23 appendix G. Information in this section is required to maintain the continued airworthiness of the GTX 33X and GTX 3X5 as installed under this AML STC.

4.1 Applicability

This document applies to all aircraft equipped with GTX 33X and GTX 3X5 units with ADS-B per STC SA01714WI.


Modification of an aircraft by this STC obligates the aircraft operator to include the maintenance information provided by this document in the operator's Aircraft Maintenance Manual and the operator's Aircraft Scheduled Maintenance Program.

4.2 Airworthiness Limitations

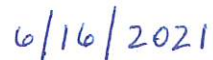
There are no new (or additional) airworthiness limitations associated with this equipment and/or installation..

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of Title 14 of the Code of Federal Regulations unless an alternative program has been FAA approved.

FAA APPROVED



JR Brownell
ODA STC Unit Administrator
ODA-240087-CE



Date

4.3 Servicing Information

GTX 33X and GTX 3X5 LRU maintenance is “on condition” only. Component-level overhaul is not required for the GTX 33X and GTX 3X5 with ADS-B installation.

4.3.1 On Condition Servicing

On Condition replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities as defined in Section 5 of this manual. Replacement and/or servicing should be made only after the technician troubleshoots the system by using the guidance in this manual along with common avionics maintenance practices.

4.3.2 Special Tools

The following tools are needed to perform maintenance tasks.

- Calibrated milliohm meter with an accuracy of ± 0.1 milliohm or better
- Calibrated transponder ramp tester
- Calibrated Pitot/static ramp tester
- GTX 3X5 Install Tool (remote units only)
- 50 Ω 5 watt antenna load

4.4 Maintenance Intervals

Table 4-1 shows systems and components, installed by this STC, which must undergo tests or checks at specific intervals. The inspections based on calendar elapsed time have specifically stated intervals.



NOTE

The maintenance intervals listed in the table below must be adhered to for each installed GTX.

Table 4-1 Maintenance Intervals

Item	Description/Procedure	Section	Interval
Equipment Removal and Reinstallation	Removal and reinstallation of GTX LRUs.	6	On Condition
Cleaning	The GTX 330 and GTX 335/335D/345/345D display and bezel may be cleaned periodically. Cleaning is accomplished using a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Avoid scratching the surface of the display.	N/A	On Condition
Antenna Visual Inspection	Removal and replacement.	4.5	On Condition
Lightning Strike - Actual or Suspected	Inspect the coaxial cable connections, GTX bonding hardware (including bonding straps and tape), antenna, and surrounding areas.	4.5	On Condition
	The GTX 33/330 and GTX 3X5 receiver sensitivity must be tested and shown to comply with Title 14 CFR Part 43 Appendix F.	4.	On Condition
Testing	The GTX 33/330 and GTX 3X5 must be tested and shown to comply with Title 14 CFR Part 91.227.	8.7	Replacement of GPS Position source(s).
Equipment Visual Inspection	A visual inspection of the equipment installed by this STC must be performed.	4.5	12 Calendar Months
Testing	The GTX 33/330 and GTX 3X5 must be tested and shown to comply with Title 14 CFR Part 91.411, 91.413, and Part 43 Appendix E and F.	4.	Refer to Title 14 CFR Part 91.411, 91.413, and Part 43 Appendix E and F.
Electrical Bonding Test	An electrical bonding test must be performed on equipment installed by this STC.	4.6	10 Years or 2000 hours

4.5 Visual Inspection

Perform a visual inspection in accordance with requirements in this section. Check for corrosion, damage, or other defects for each of the installed items. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors. Follow guidance in Section 6 for equipment removal and replacement. Refer to Appendix A of this manual for equipment locations. Refer to the specific Aircraft Maintenance Manual for instructions on removing any access panels.

GTX 330/330D/335/335D/345/345D Visual Inspection

During normal aircraft inspections not to exceed 12 calendar month intervals, conduct a visual inspection of the GTX 330/330D/335/335D/345/345D installation in the following locations.

Instrument Panel

1. Inspect all GTX 330/330D/335/335D/345/345D keys for legibility of labels and markings.
2. Inspect GTX 330/330D/335/335D/345/345D units for security of attachment.
3. Inspect mounting rack and hardware for integrity.
 - a. Verify the racks, fasteners, and support structure are in good condition and securely fastened.
 - b. Inspect for signs of corrosion.
 - c. For composite aircraft, inspect any aluminum foil tape used to ground the GTX and verify that it is not torn, damaged, or showing signs of corrosion. If any of these occur then the tape must be replaced. Refer to Appendix B for details.
4. Inspect any bonding straps for corrosion, loose connections, or signs of damage. Refer to Appendix B for details.
5. Inspect the condition of the wiring harnesses and coaxial cables.
 - a. Inspect all instrument panel wiring and coax for chafing, damage, proper routing of wire bundles and security of attachment in accordance with AC 43.13-1B, chapter 11, section 8, paragraph 11-96. Pay particular attention to possible areas of chafing.
 - b. Verify that the harness shows no signs of cracking, chafing, abrasion, melting, or any other form of damage.
 - c. Inspect the GTX 330/330D/335/335D/345/345D connectors for corrosion or other defects. Check the integrity of the shield block ground attachments to the harness connector assembly as well as the integrity of the individual shields and their attachment.

GTX 33/33D/335R/335DR/345R/345DR Visual Inspection

During normal aircraft inspections not to exceed 12 calendar month intervals, conduct a visual inspection of the GTX 33/33D/335R/335DR/345R/345DR installation in the following locations.

Remote Mount Rack

1. Inspect GTX 33/33D/335R/335DR/345R/345DR units for security of attachment.
2. Inspect mounting rack and hardware for integrity.
 - a. Verify the racks, fasteners, and support structure are in good condition and are securely fastened.
 - b. Inspect for signs of corrosion.
 - c. For composite aircraft, inspect any aluminum foil tape used to ground the GTX and verify that it is not torn, damaged, or showing signs of corrosion. If any of these occur then the tape must be replaced. Refer to Appendix B for details.
3. Inspect any bonding straps for corrosion, loose connections, or signs of damage. Refer to Appendix B for details.
4. Inspect the condition of the wiring harnesses and coaxial cables.
 - a. Verify that all wiring and cables are securely fastened.
 - b. Verify that the harness shows no signs of cracking, chaffing, abrasion, melting, or any other form of damage.
 - c. Inspect the GTX 33/33D/335R/335DR/345R/345DR connectors for corrosion or other defects. Check the integrity of the shield block ground attachments to the harness connector assembly as well as the integrity of the individual shields and their attachment.

Antenna Visual Inspection

During normal aircraft inspections not to exceed 12 calendar month intervals, conduct a visual inspection of the transponder antennas for the following.

1. Erosion, cracks, dents, or broken antenna. If these conditions are present, antenna must be replaced. Refer to antenna manufacturer's replacement instructions for details.
2. If the attachment is not secure, re-work the installation and complete electrical bonding test specified in Section 4.6.
3. Condition of base seals. In the event the antenna seal shows sign of damage or decomposition, re-seal and complete the electrical bonding test specified in Section 4.6.

Post Lightning Strike Inspection

A post lightning strike inspection must be performed for a suspected or actual lightning strike to antennas or any temperature sensor connected to the GTX unit. Inspect antenna or sensor and surrounding installation to verify that structural damage has not occurred around the areas where lightning may have attached. If there is visible sign of damage to the antenna or sensor, then it should be replaced.

Inspect the antenna coax connection to GTX unit, grounding hardware, bonding straps or tape, and surrounding areas of the remotely mounted GTX to verify damage has not occurred. Repair any damaged areas and components, then complete the electrical bonding test specified in Section 4.6.

4.6 Electrical Bonding Test

1. Disconnect the antenna coaxial cable from the GTX 33X or GTX 3X5.
2. Disconnect all connectors from the GTX 33X or GTX 3X5.
3. Measure the DC resistance between each of the following test points and the aircraft ground reference as defined in Table B-1 and verify the resistance is less than or equal to the appropriate periodic test resistance value.
 - Top metal case of GTX 330/330D/335/335D/345/345D #1 (if installed)
 - Top metal case of GTX 330/330D/335/335D/345/345D #2 (if installed)
 - GTX 33/33D/335R/335DR/345R/345DR #1 chassis (if installed)
 - GTX 33/33D/335R/335DR/345R/345DR #2 chassis (if installed)
4. If the resistance is more than the periodic test resistance value in Table B-1, the bond must be improved enough to meet the reconditioned resistance value.

4.7 Additional Instructions

Electrical load information for the GTX is provided in Section 2.6.

5 TROUBLESHOOTING

5.1	GTX General Troubleshooting	5-2
5.2	GTX Failure Annunciations.....	5-4
5.3	GTX 33X Connector Pinout Information	5-11
5.3.1	GTX 33X (J3301).....	5-11
5.3.2	Altitude Functions	5-13
5.3.3	Discrete Functions.....	5-13
5.3.4	RS-232 Input/Output	5-14
5.3.5	ARINC 429 Input/Output.....	5-14
5.4	GTX 3X5 Connector Pinout Information	5-15
5.4.1	GTX 3X5 (J3251).....	5-15
5.4.2	GTX 345/345D/345R/345DR (J3252).....	5-17
5.4.3	Altitude Functions	5-18
5.4.4	Discrete Functions.....	5-19
5.4.5	RS-232 Input/Output	5-21
5.4.6	ARINC 429 Input/Output.....	5-21
5.4.7	RS-422 Out.....	5-21
5.4.8	HSDB Input/Output.....	5-22

5.1 GTX General Troubleshooting

This section provides information to assist troubleshooting if problems occur after completing maintenance. Refer to the GTX System Configuration Log retained in the aircraft permanent records for a list of the interfaced equipment and system configuration data. When troubleshooting the GTX, refer to the wire routing drawings and interconnect wiring diagrams that are retained in the aircraft permanent records.

The following table describes possible symptoms associated with the Garmin transponders and provides corresponding actions for troubleshooting.

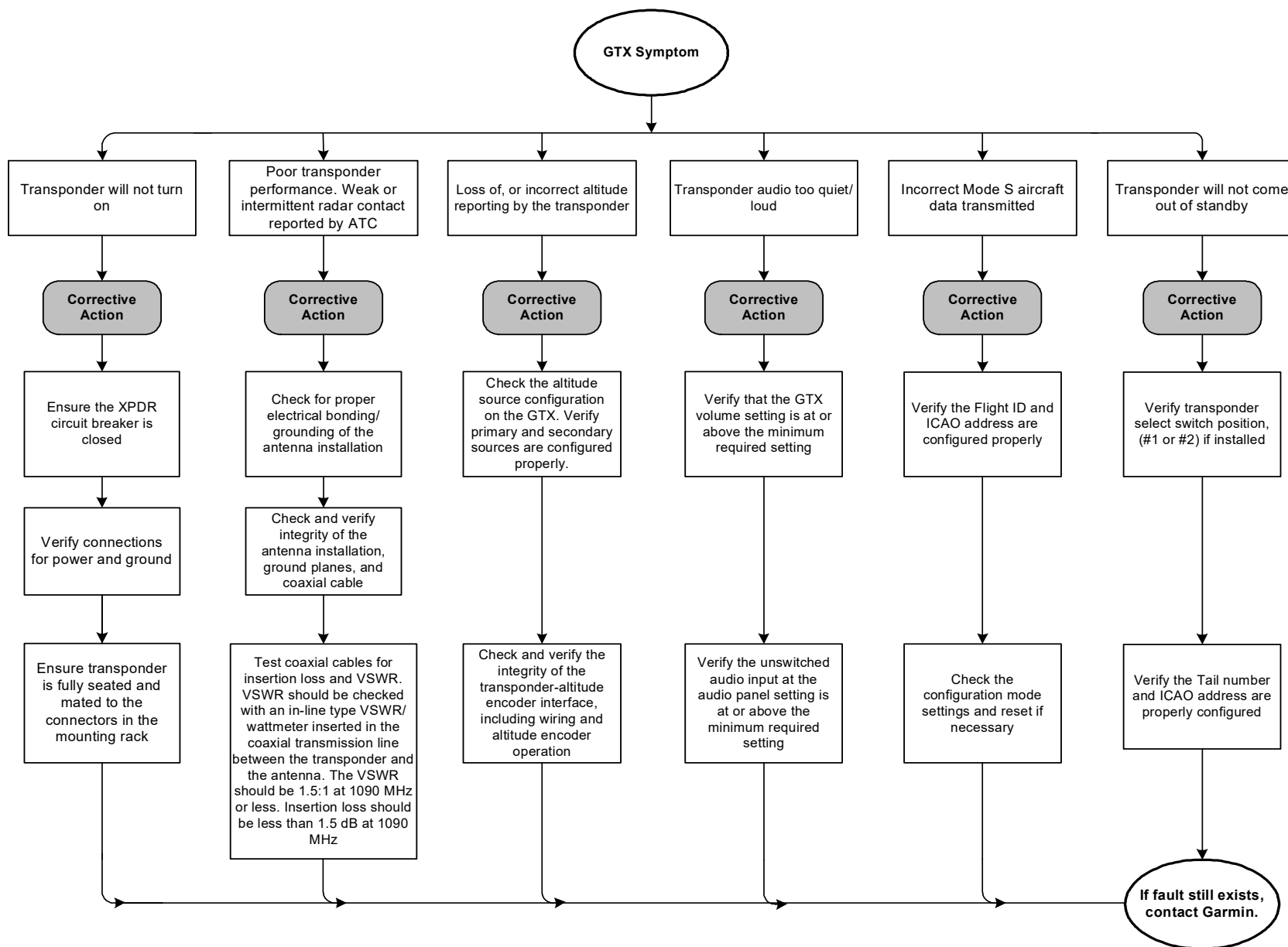


Figure 5-1 GTX (All Models) Transponder Troubleshooting

5.2 GTX Failure Annunciations

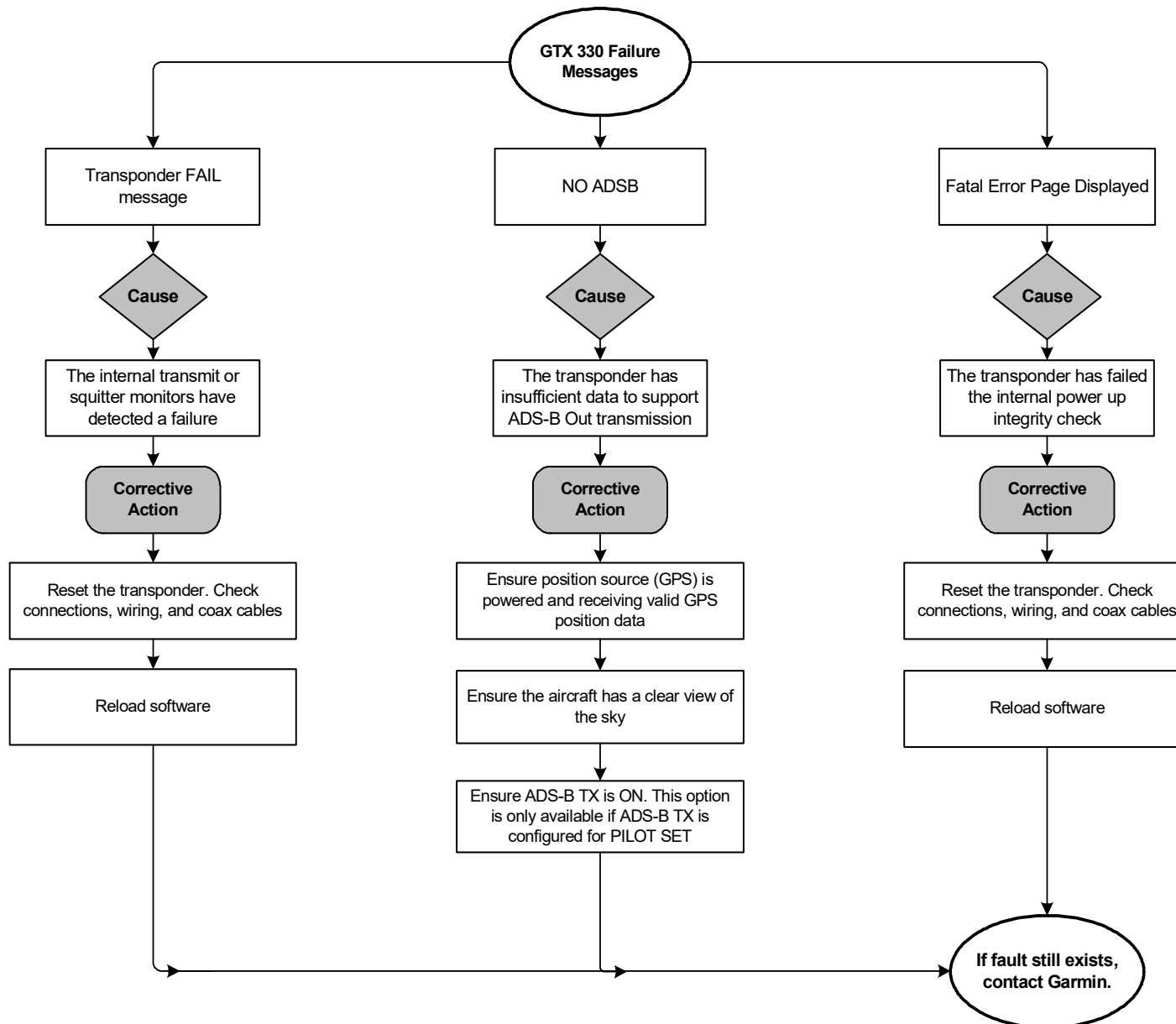


Figure 5-2 GTX 330/330D Transponder Failure/Fault Messages

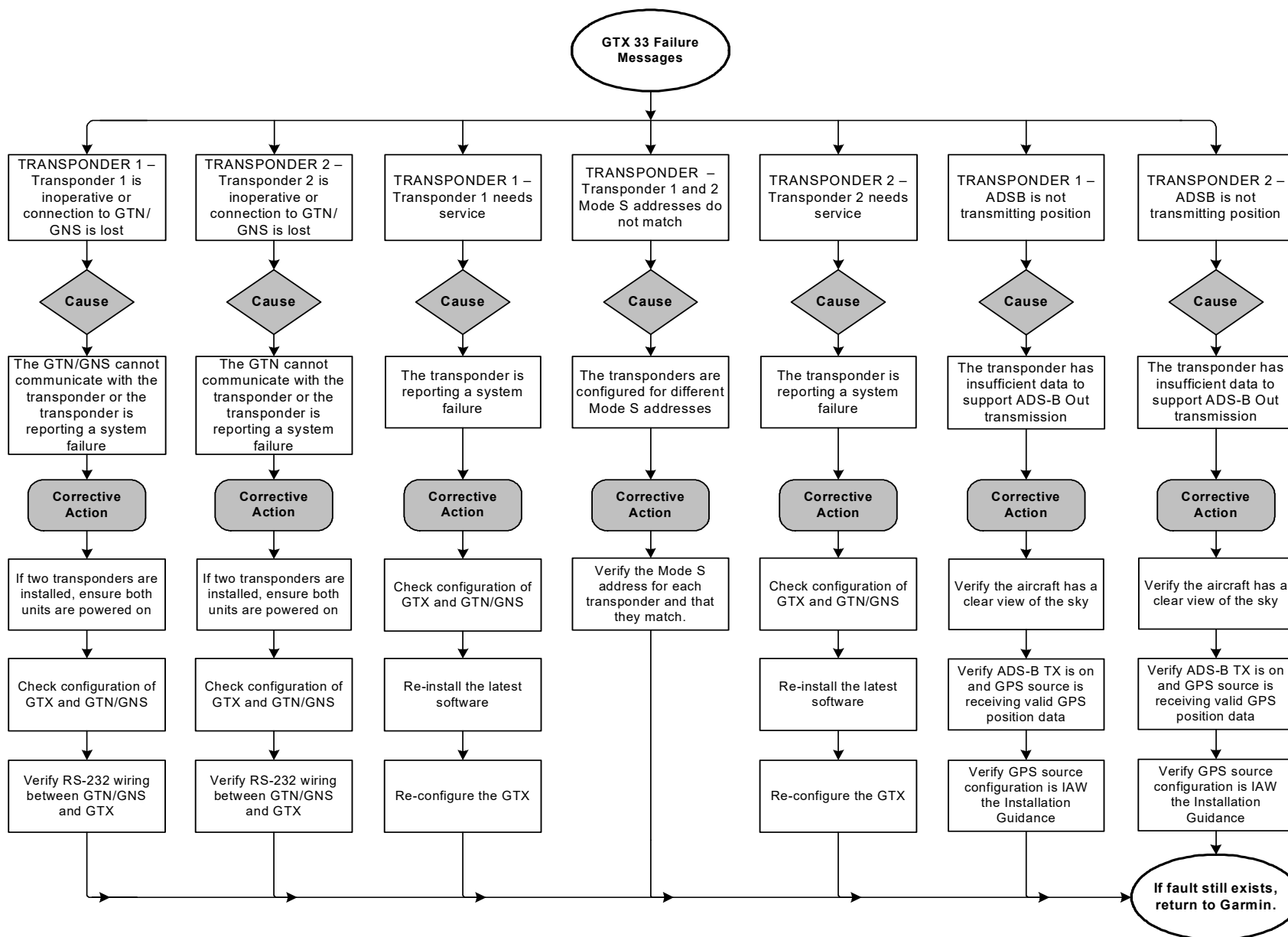


Figure 5-3 GTX 33/33D Transponder Failure/Fault Messages

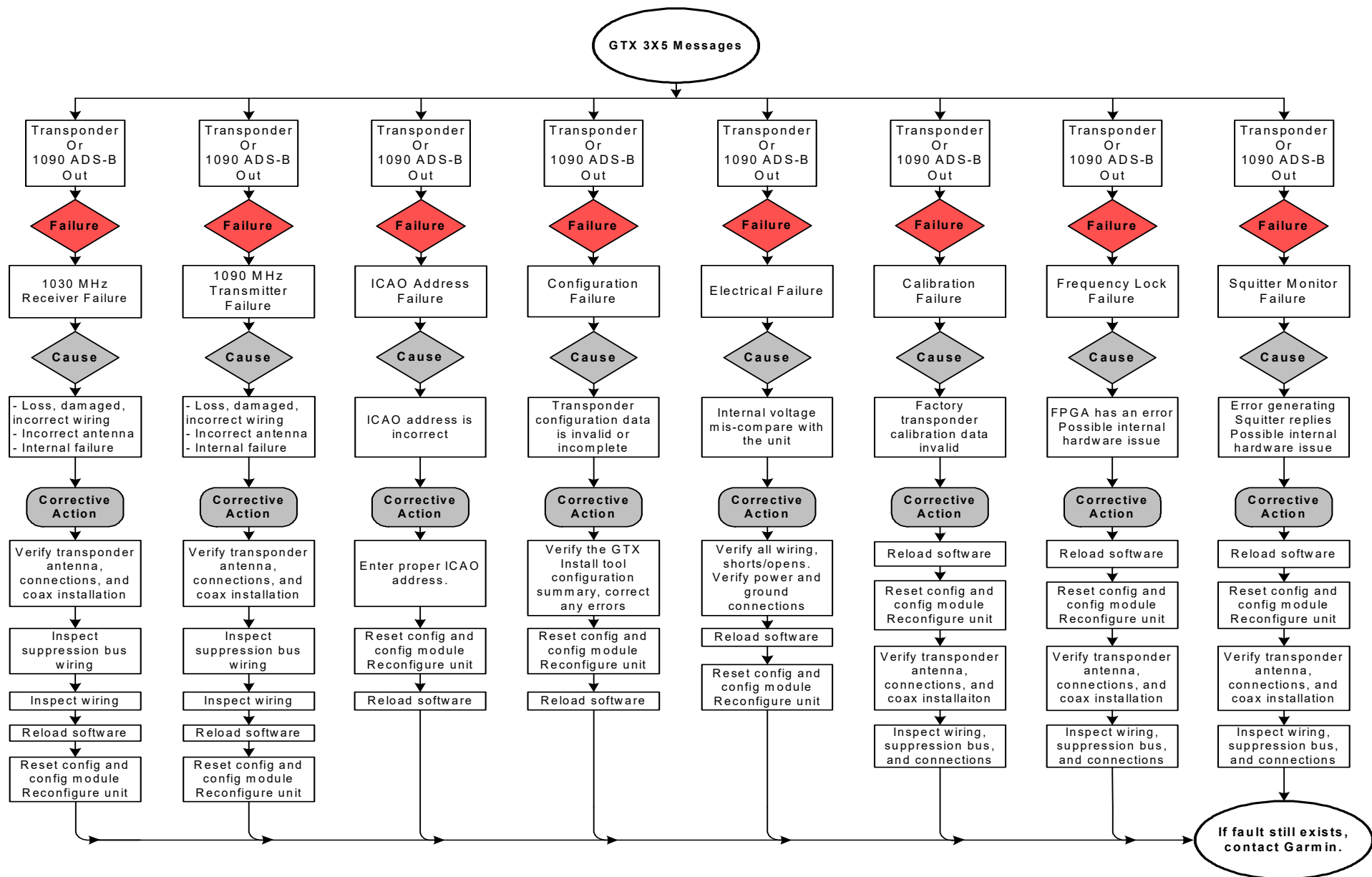


Figure 5-4 GTX 3X5 Transponder Alerts
Sheet 1 of 5

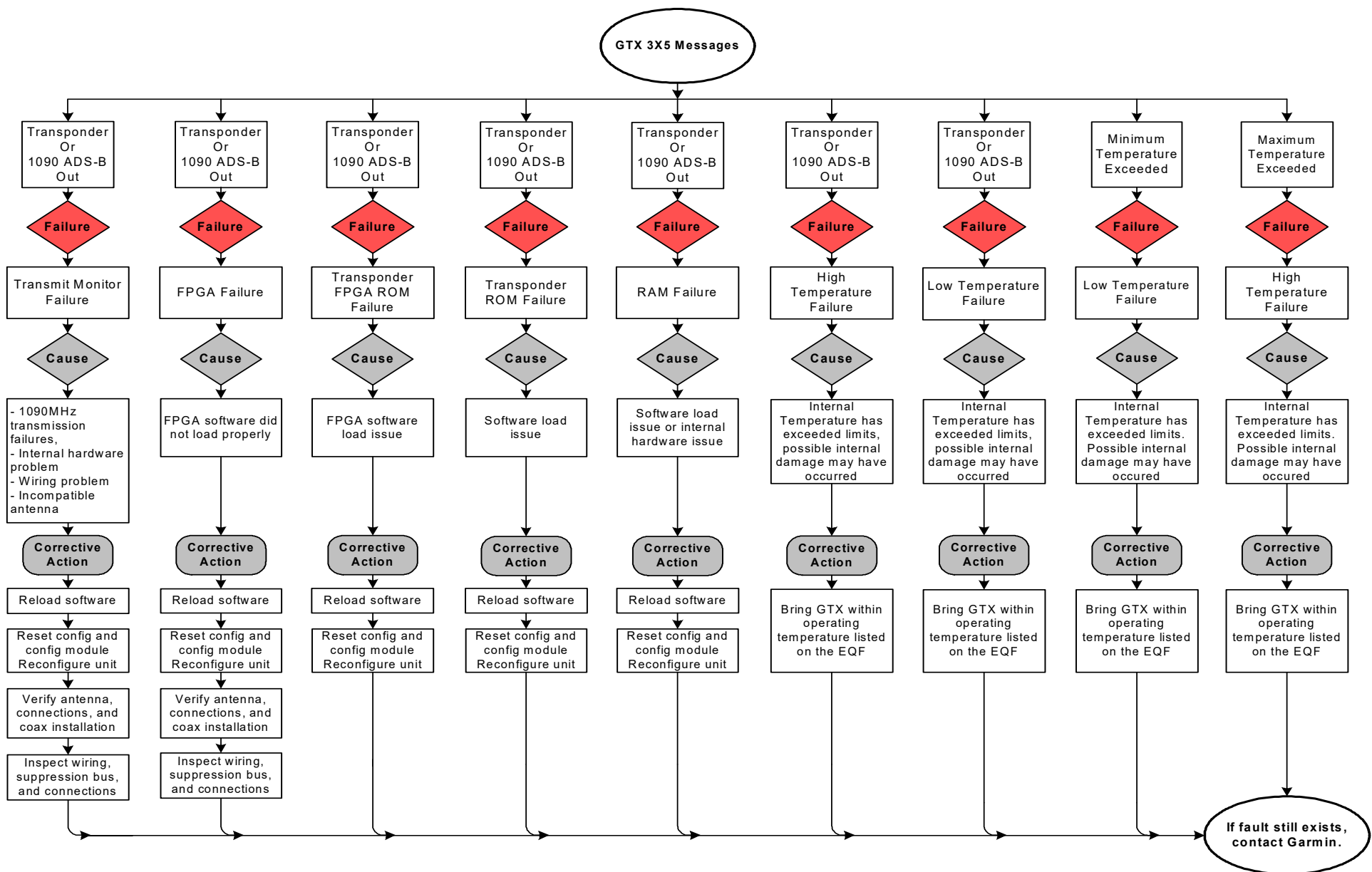


Figure 5-4 GTX 3X5 Transponder Alerts
Sheet 2 of 5

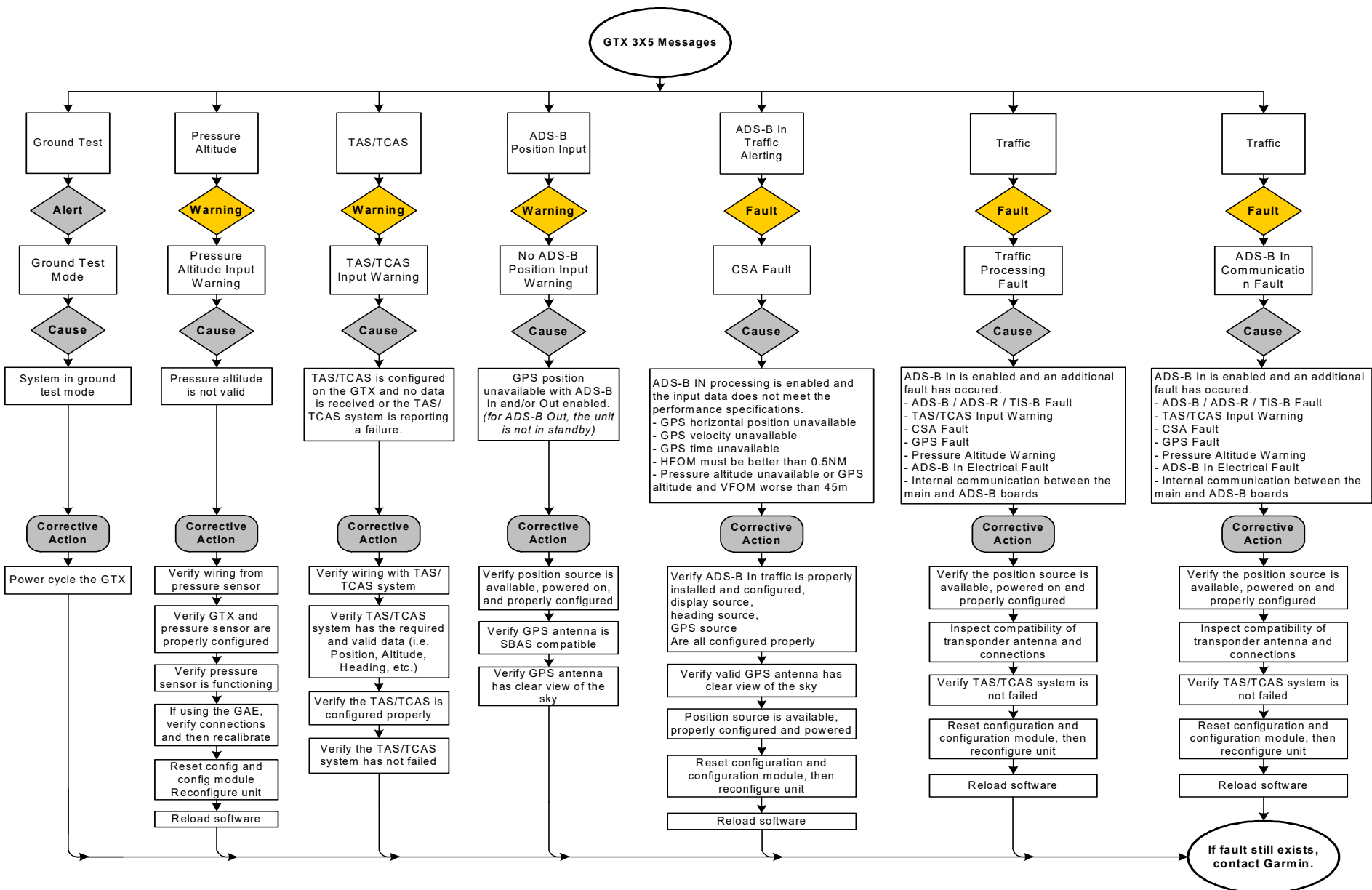


Figure 5-4 GTX 3X5 Transponder Alerts
Sheet 3 of 5

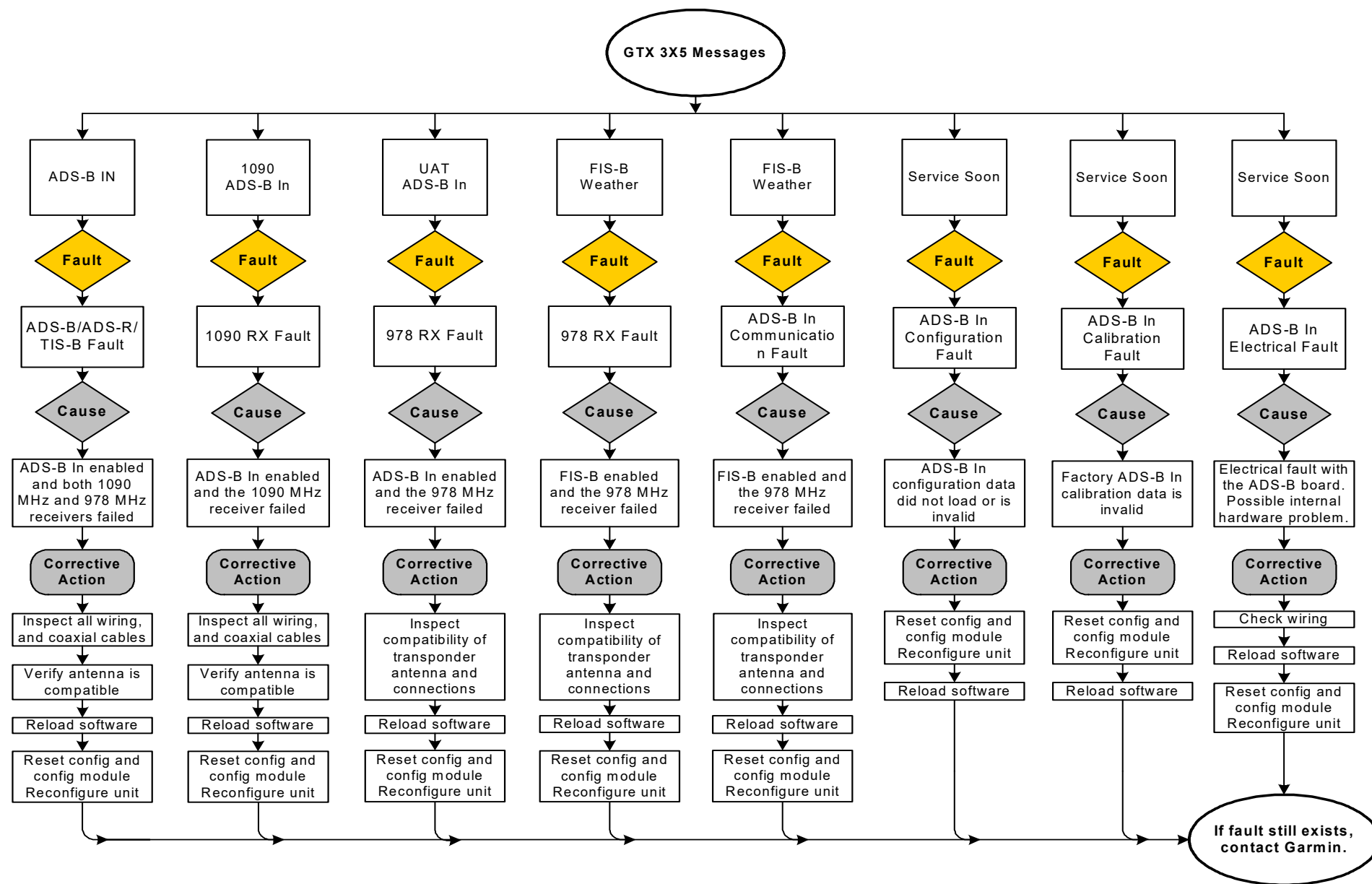


Figure 5-4 GTX 3X5 Transponder Alerts
Sheet 4 of 5

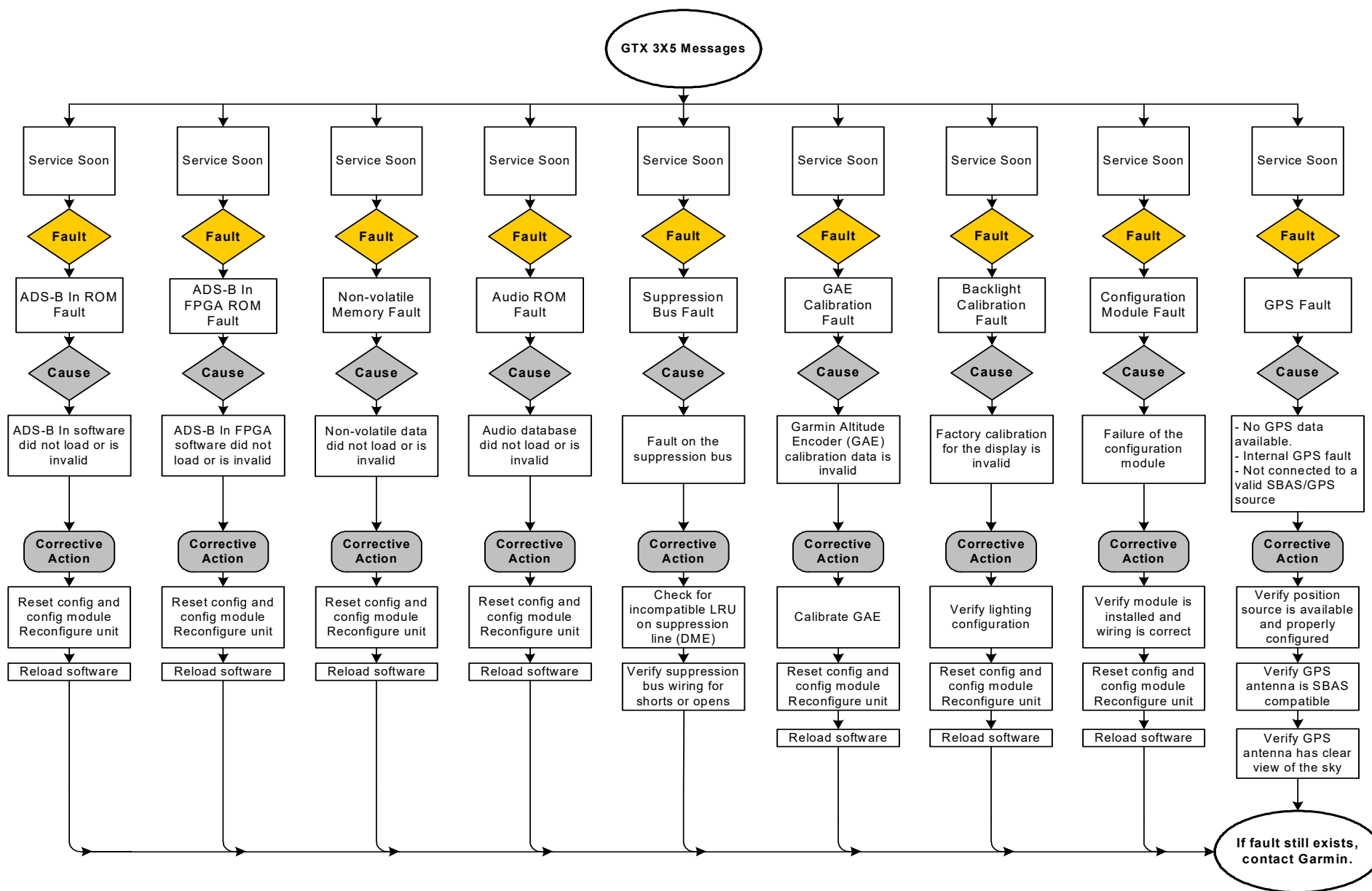


Figure 5-4 GTX 3X5 Transponder Alerts
Sheet 5 of 5

5.3 GTX 33X Connector Pinout Information

5.3.1 GTX 33X (J3301)

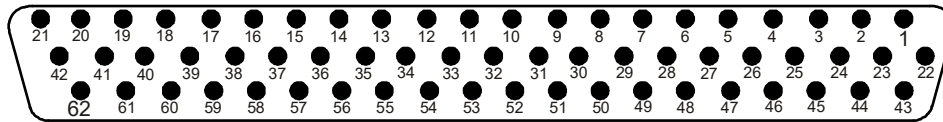


Figure 5-5 Rear View, Connector P3301

Table 5-1 GTX 33X Pinout

Pin	GTX 33/33D Pin Name	GTX 330/330D Pin Name	I/O
1	RESERVED	AVIONICS MASTER ON SELECT	IN
2	ALTITUDE A1	ALTITUDE A1	IN
3	ALTITUDE C2	ALTITUDE C2	IN
4	ALTITUDE A2	ALTITUDE A2	IN
5	ALTITUDE A4	ALTITUDE A4	IN
6	ALTITUDE C4	ALTITUDE C4	IN
7	ALTITUDE B1	ALTITUDE B1	IN
8	ALTITUDE C1	ALTITUDE C1	IN
9	ALTITUDE B2	ALTITUDE B2	IN
10	ALTITUDE B4	ALTITUDE B4	IN
11	ALTITUDE D4	ALTITUDE D4	IN
12	EXTERNAL IDENT SELECT*	EXTERNAL IDENT SELECT*	IN
13	EXTERNAL STANDBY SELECT*	EXTERNAL STANDBY SELECT*	IN
14	NOT USED	28 V LIGHTING BUS HI	IN
15	AUDIO OUT HI	AUDIO OUT HI	OUT
16	AUDIO OUT LO	AUDIO OUT LO	OUT
17	SQUAT SWITCH IN	SQUAT SWITCH IN	IN
18	RESERVED	RESERVED	--
19	ALTITUDE ALERT ANNUNCIATE*	ALTITUDE ALERT ANNUNCIATE*	OUT
20	RESERVED	RESERVED	--
21	AIRCRAFT POWER 1	AIRCRAFT POWER 1	IN
22	RS-232 IN 1	RS-232 IN 1	IN
23	RS-232 OUT 1	RS-232 OUT 1	OUT
24	RS-232 IN 2	RS-232 IN 2	IN
25	RS-232 OUT 2	RS-232 OUT 2	OUT
26	ARINC 429 IN 3 A	ARINC 429 IN 3 A	IN
27	POWER GROUND	POWER GROUND	--
28	ARINC 429 OUT 2 B	ARINC 429 OUT 2 B	OUT
29	ARINC 429 IN 3 B	ARINC 429 IN 3 B	IN

Pin	GTX 33/33D Pin Name	GTX 330/330D Pin Name	I/O
30	ARINC 429 OUT 2 A	ARINC 429 OUT 2 A	OUT
31	EXTERNAL SUPPRESSION I/O	EXTERNAL SUPPRESSION I/O	I/O
32	ARINC 429 IN 1 A	ARINC 429 IN 1 A	IN
33	ARINC 429 IN 2 A	ARINC 429 IN 2 A	IN
34	ARINC 429 OUT 1 B	ARINC 429 OUT 1 B	OUT
35	ARINC 429 IN 1 B	ARINC 429 IN 1 B	IN
36	ARINC 429 IN 2 B	ARINC 429 IN 2 B	IN
37	ARINC 429 OUT 1 A	ARINC 429 OUT 1 A	OUT
38	RESERVED	RESERVED	--
39	RESERVED	RESERVED	--
40	SPARE	SPARE	--
41	CURRENT TEMPERATURE PROBE OUT	CURRENT TEMPERATURE PROBE OUT	OUT
42	AIRCRAFT POWER 1	AIRCRAFT POWER 1	IN
43	POWER GROUND	POWER GROUND	--
44	CURRENT TEMPERATURE PROBE IN	CURRENT TEMPERATURE PROBE IN	IN
45	NOT USED	14 V/5 V LIGHTING BUS HI	IN
46	TIS CONNECT SELECT*	TIS CONNECT SELECT*	IN
47	AUDIO MUTE SELECT*	AUDIO MUTE SELECT*	IN
48	ARINC 429 IN 4 A	ARINC 429 IN 4 A	IN
49	ARINC 429 IN 4 B	ARINC 429 IN 4 B	IN
50	ALTITUDE COMMON (GROUND)	ALTITUDE COMMON (GROUND)	IN
51	SIGNAL GROUND	SIGNAL GROUND	--
52	RESERVED	RESERVED	--
53	RESERVED	RESERVED	--
54	XPDR REMOTE POWER OFF	RESERVED	IN
55	NOT USED	SPARE	--
56	AIRCRAFT POWER 2	AIRCRAFT POWER 2	IN
57	NOT USED	SPARE	--
58	SIGNAL GROUND	RESERVED	--
59	NOT USED	SPARE	--
60	AIRCRAFT POWER 2	AIRCRAFT POWER 2	IN
61	NOT USED	SPARE	--
62	SWITCHED POWER OUT	SWITCHED POWER OUT	OUT

* Denotes Active-Low (Ground to activate)

5.3.2 Altitude Functions

Gillham code altitude inputs are considered active if either the voltage to ground is < 1.9 V or the resistance to ground is < 375 Ω. These inputs are considered inactive if the voltage to ground is 11-33 VDC.

Table 5-2 GTX 33X Encoded Altitude Pin Assignments

Pin Name	Pin Number	I/O	Unit (33X)
ALTITUDE D4	11	IN	Both
ALTITUDE A1	2	IN	Both
ALTITUDE A2	4	IN	Both
ALTITUDE A4	5	IN	Both
ALTITUDE B1	7	IN	Both
ALTITUDE B2	9	IN	Both
ALTITUDE B4	10	IN	Both
ALTITUDE C1	8	IN	Both
ALTITUDE C2	3	IN	Both
ALTITUDE C4	6	IN	Both
ALTITUDE COMMON	50	--	Both

5.3.3 Discrete Functions

Discrete Outputs

Table 5-3 GTX 33/330 Discrete Outputs

Pin Name	Pin Number	I/O	Unit (33X)
ALTITUDE ALERT ANNUNCIATE*	19	OUT	Both
EXTERNAL SUPPRESSION I/O	31	I/O	Both

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

Discrete Inputs

Table 5-4 GTX 33/330 Discrete Inputs

Pin Name	Pin Number	I/O	Unit (33X)	Connector
AVIONICS MASTER ON SELECT	1	IN	330 Only	P3301
EXTERNAL IDENT SELECT*	12	IN	Both	P3301
EXTERNAL STANDBY SELECT*	13	IN	Both	P3301
SQUAT SWITCH IN	17	IN	Both	P3301
TIS CONNECT SELECT*	46	IN	Both	P3301
AUDIO MUTE SELECT*	47	IN	Both	P3301
* INACTIVE: $10 \leq V_{in} \leq 33$ VDC or $R_{in} \geq 100$ k Ω (Open) ACTIVE: $V_{in} \leq 1.9$ VDC with ≥ 75 μ A sink current, or $R_{in} \leq 375$ Ω (GND) Sink current is internally limited to 200 μ A max for a grounded input.				

5.3.4 RS-232 Input/Output

Table 5-5 GTX 33/330 RS-232 Connections

Pin Name	Pin Number	I/O	Unit (33X)
RS-232 OUT 1	23	OUT	Both
RS-232 IN 1	22	IN	Both
RS-232 OUT 2	25	OUT	Both
RS-232 IN 2	24	IN	Both

5.3.5 ARINC 429 Input/Output

Figure 5-6 GTX 33/330 ARINC 429 Connections

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

5.4 GTX 3X5 Connector Pinout Information

5.4.1 GTX 3X5 (J3251)

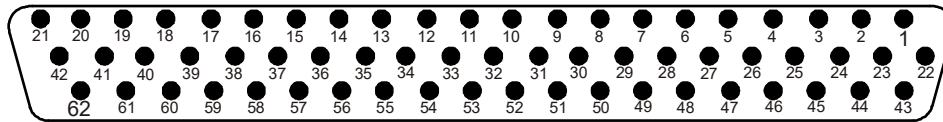


Figure 5-7 Rear View, Connector J3251

Table 5-6 J3251 Pinout

Pin	GTX 3X5 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	OUT
5	ARINC 429 OUT A	OUT
6	ARINC 426 OUT B	OUT
7	RS-232 OUT 3	OUT
8	RS-232 OUT 2	OUT
9	RS-232 OUT 1	OUT
10	ALITTUDE 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	IN
21	AIRCRAFT POWER 1	IN
22	ALT ENCODER/CONFIG MODULE DATA	IN/OUT
23	ALT ENCODER/CONFIG MODULE GND	IN
24	USB DATA LO	IN/OUT
25	TEMP PROBE OUT	OUT
26	TIME MARK B	OUT
27	ARINC 426 IN 1A	IN
28	ARINC 429 IN 1B	IN
29	RS-232 IN 3	IN

Pin	GTX 3X5 Pin Name	I/O
30	RS-232 IN 2	IN
31	RS-232 IN 1	IN
32	ALTITUDE A2	IN
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	--
42	AIRCRAFT POWER 1	--
43	ALT ENCODER/CONFIG MODULE POWER	--
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	--
61	AIRCRAFT POWER 2	--
62	AIRCRAFT POWER 2	--

5.4.2 GTX 345/345D/345R/345DR (J3252)

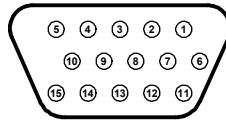


Figure 5-8 Rear View, Connector J3252

Table 5-7 J3252 Pinout

Pin	GTX 345/345R 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	--

5.4.3 Altitude Functions

Gillham code altitude inputs are considered active if either the voltage to ground is $< 1.9\text{ V}$ or the resistance to ground is $< 375\ \Omega$. These inputs are considered inactive if the voltage to ground is 11-33 VDC. The GTX 3X5/3X5R discrete I/O pins are configurable. If the Gillham input is not enabled in the configuration menu, then the Gillham code altitude pins can be used for other discrete input functions. If the Gillham input is enabled, these pins will not be available for selection on other discrete inputs in the configuration menu.

Table 5-8 GTX 3X5/3X5R Encoded Altitude Pin Assignments

Pin Name	Pin Number	I/O	Connector
ALTITUDE D4	13	IN	J3251
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 COMMON	56	--	J3251

5.4.4 Discrete Functions

Discrete Outputs

Table 5-9 GTX 3X5/3X5R Discrete Outputs

Pin Name	Pin Number	I/O	Unit	Connector
TRANSPONDER FAIL #1	17	OUT	All	J3251
EXTERNAL SUPPRESSION	18	IN/OUT	All	J3251
REPLY ACTIVE	X	OUT	All	J3251/J3252
TRANSPONDER FAIL #2	X	OUT	All	J3251/J3252
ALTITUDE ALERT*	X	OUT	All	J3251/J3252
EQUIPMENT STATUS	X	OUT	All	J3251/J3252
TRAFFIC ALERT	X	OUT	345/345D/ 345R/345DR	J3251/J3252
TRAFFIC STANDBY	X	OUT	345/345D/ 345R/345DR	J3251
TRAFFIC TEST	X	OUT	345/345D/ 345R/345DR	J3251
TCAD SENSITIVITY	X	OUT	345/345D/ 345R/345DR	J3251/J3252
ADS-B OUT FUNCTION FAIL	X	OUT	All	J3251/J3252
STANDBY ALERT	X	OUT	All	J3251/J3252
TRANSPONDER ACTIVE	X	OUT	All	J3251/J3252
DIVERSITY FAIL	X	OUT	335D/335DR/ 345D/345DR	J3251/J3252
<p>* INACTIVE: $10 \leq V_{in} \leq 33$ VDC or $R_{in} \geq 100$ kΩ (Open) ACTIVE: $V_{in} \leq 1.9$ VDC with ≥ 75 μA sink current, or $R_{in} \leq 375$ Ω (GND) Sink current is internally limited to 200 μA max for a grounded input.</p> <p>X Denotes that this discrete output can be configured to any available discrete output pin on either the J3251 or J3252 connectors. Refer to table 5-10 for a list of configurable output pins.</p>				

Table 5-10 GTX 3X5/3X5R Configurable Output Pins

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
TRANSPONDER FAIL #1	17	OUT	All	J3251
CONFIGURABLE DISCRETE #1	15	IN/OUT	All	J3251
CONFIGURABLE DISCRETE #2	16	IN/OUT	All	J3251
CONFIGURABLE DISCRETE #11	13	IN/OUT	345/345R	J3252
CONFIGURABLE DISCRETE #12	14	IN/OUT	345/345R	J3252

Discrete Inputs

Table 5-11 GTX 3X5/3X5R Discrete Inputs

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
TIS-A SELECT*	X	IN	335/335R	J3251
ALTITUDE SOURCE*	X	IN	All	J3251/J3252
AUDIO MUTE	X	IN	All	J3251/J3252
AUDIO CANCEL	37	IN	All	J3251
TRAFFIC AUDIO MUTE	X	IN	All	J3251/J3252
TRAFFIC AUDIO CANCEL	X	IN	All	J3251/J3252
AIR DATA SOURCE*	58	IN	All	J3251
SQUAT	57	IN	All	J3251
IDENT*	36	IN	All	J3251
STANDBY*	14	IN	All	J3251
INSTALL ID SELECT	13	IN	All	J3251
EXTERNAL SUPPRESSION I/O	18	IN/OUT	All	J3251
<p>* INACTIVE: $10 \leq V_{in} \leq 33$ VDC or $R_{in} \geq 100$ kΩ (Open) ACTIVE: $V_{in} \leq 1.9$ VDC with ≥ 75 μA sink current, or $R_{in} \leq 375$ Ω (GND) Sink current is internally limited to 200 μA max for a grounded input.</p>				
<p>X Denotes that this discrete input can be configured to any available discrete input pin on either the J3251 or J3252 connectors. Refer to table 5-12 for a list of configurable input pins.</p>				

Table 5-12 GTX 3X5/3X5R Configurable Input Pins

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
AUDIO INHIBIT #2	37	IN	All	J3251
AIR DATA SELECT	58	IN	All	J3251
SQUAT SWITCH	57	IN	All	J3251
EXTERNAL IDENT	36	IN	All	J3251
EXTERNAL STANDBY	14	IN	All	J3251
EXTERNAL SUPPRESSION I/O	18	IN/OUT	All	J3251
CONFIGURABLE DISCRETE #1	15	IN/OUT	All	J3251
CONFIGURABLE DISCRETE #2	16	IN/OUT	All	J3251
CONFIGURABLE DISCRETE #11	13	IN/OUT	345/345R	J3252
CONFIGURABLE DISCRETE #12	14	IN/OUT	345/345R	J3252

5.4.5 RS-232 Input/Output

Table 5-13 GTX 3X5/3X5R RS-232 Connections

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
RS-232 OUT 1	9	OUT	All	J3251
RS-232 IN 1	31	IN	All	J3251
RS-232 OUT 2	8	OUT	All	J3251
RS-232 IN 2	30	IN	All	J3251
RS-232 OUT 3	7	OUT	All	J3251
RS-232 IN 3	29	IN	All	J3251
RS-232 OUT 4	5	OUT	345/345R	J3252
RS-232 IN 4	10	IN	345/345R	J3252

5.4.6 ARINC 429 Input/Output

Table 5-14 GTX 3X5/3X5R ARINC 429 Connections

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
ARINC 429 IN 1A	27	IN	All	J3251
ARINC 429 IN 1B	28	IN	All	J3251
ARINC 429 OUT 1A	5	OUT	All	J3251
ARINC 429 OUT 1B	6	OUT	All	J3251
ARINC 429 IN 2A	48	IN	All	J3251
ARINC 429 IN 2B	49	IN	All	J3251

5.4.7 RS-422 Out

Table 5-15 GTX 345/345R RS-422 Connections

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
RS-422 A	11	OUT	345/345R	J3252
RS-422 B	12	OUT	345/345R	J3252

5.4.8 HSDB Input/Output

Table 5-16 GTX 345/345R HSDB Connections

Pin Name	Pin Number	I/O	Unit (335/345/ 335R/345R)	Connector
ETHERNET OUT 1A	6	OUT	345/345R	J3252
ETHERNET IN 1A	7	IN	345/345R	J3252
ETHERNET OUT 1B	1	OUT	345/345R	J3252
ETHERNET IN 1B	2	IN	345/345R	J3252
ETHERNET OUT 2A	8	OUT	345/345R	J3252
ETHERNET IN 2A	9	IN	345/345R	J3252
ETHERNET OUT 2B	3	OUT	345/345R	J3252
ETHERNET IN 2B	4	IN	345/345R	J3252

6 UNIT REMOVAL AND RE-INSTALLATION

6.1	GTX 330/330D	6-2
6.2	GTX 33/33D	6-4
6.3	GTX 3X5	6-5
6.3.1	GTX 335/335D/345/345D Panel Mounted Units.....	6-11
6.3.2	GTX 3X5R/3X5DR with Standard or GX000 System Rack Mount	6-13
6.3.3	GTX 3X5R/3X5DR with Vertical Mount.....	6-15
6.3.4	Garmin Altitude Encoder	6-17
6.4	Transponder Antenna.....	6-19

6.1 GTX 330/330D



WARNING

Ensure that the aircraft power is off before removal or reinstallation of the GTX 330/330D. Unplug any auxiliary power supply.

This section contains procedures and requirements for removal and re-installation of equipment installed under STC SA01714WI. After removal and reinstallation, the GTX 330/330D return to service procedures must be performed in accordance with Section 9.

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.

Re-installation



CAUTION

Do not over-tighten the unit in the rack. Torque exceeding 15 in-lbs can damage the locking mechanism.



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.

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.
5. Complete the appropriate return to service procedures in Section 9.

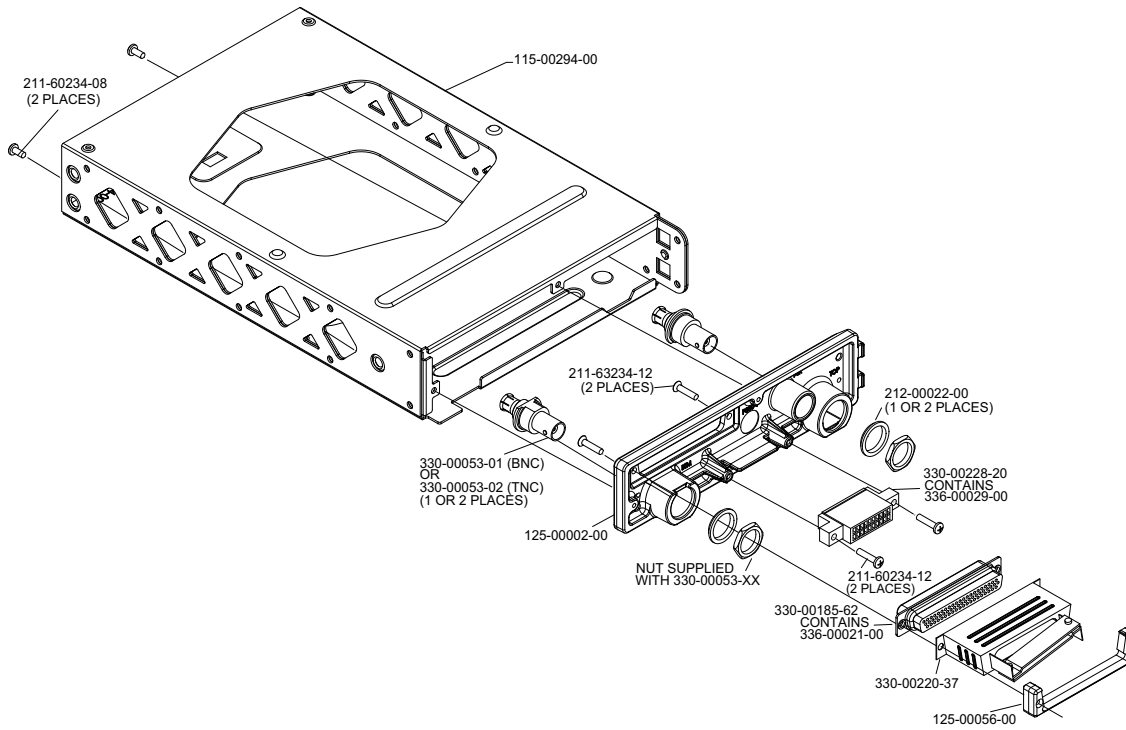


Figure 6-1 GTX 330 Mounting Rack/Connector Assembly

6.2 GTX 33/33D



WARNING

Ensure that the aircraft power is off before removal or re-installation of the GTX 33/33D.
Unplug any auxiliary power supply.

This section contains procedures and requirements for removal and installation of equipment installed under STC SA01714WI. After removal and re-installation, the GTX 33/33D return to service procedures must be performed in accordance with Section 9.

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.

Re-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.

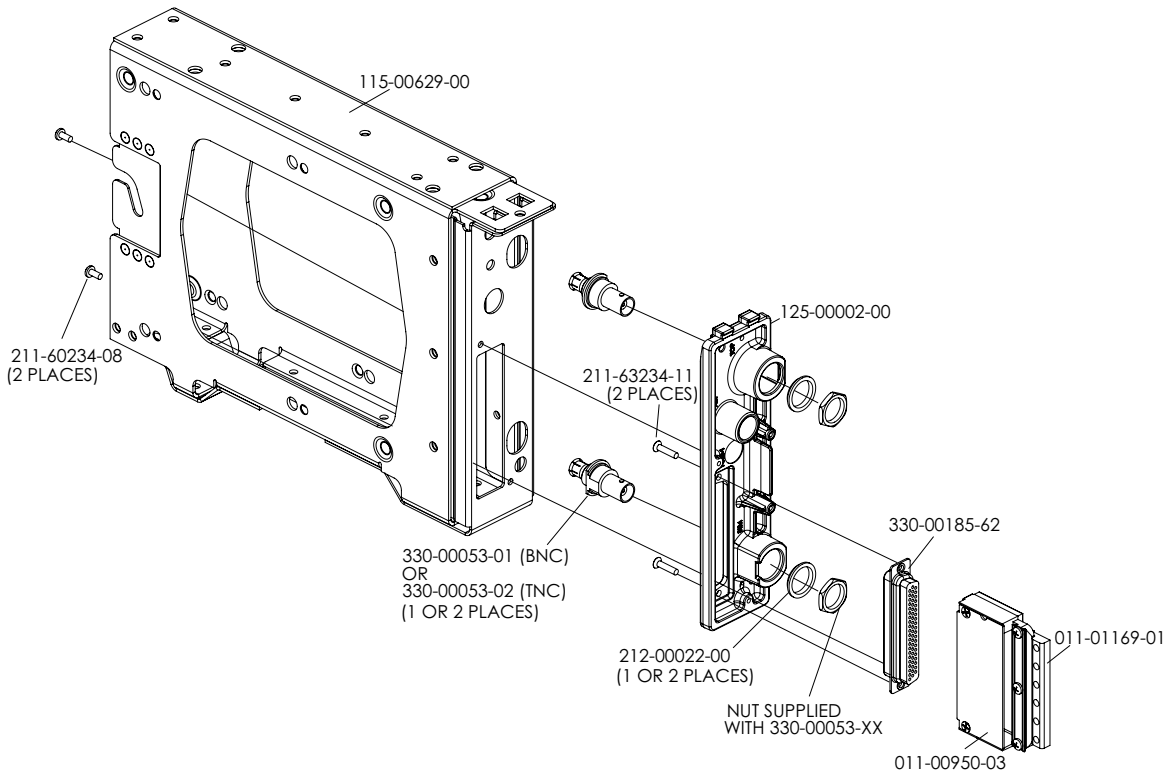


Figure 6-2 GTX 33 Mounting Rack/Connector Assembly

6.3 GTX 3X5

This section contains parts, procedures, and requirements for assembly, removal, and re-installation of GTX 3X5 equipment installed under STC SA01714WI. After removal and re-installation, the GTX 3X5 return to service procedures must be performed in accordance with Section 9.

Table 6-1 GTX 3X5 Connector Kit Hardware

Description	P/N	Qty
Connector, hi-dense, D-sub, mil crimp 62 ckt	330-00185-62	1
Sub-assembly, backshell with hardware, 37/62 pin	011-00950-03	1
Sub-assembly, ground adapter, shell 4&5	011-01169-01	1
Screw, 4-40 x .250, FLHP 100, SS/P, nylon	211-63234-06	2 ea connector
Connector, hi-dense, D-sub, mil crimp, 15 ckt	330-00185-15	1
Sub-assembly, backshell with hardware, 9/15 pin	011-00950-00	1
Sub-assembly, ground adapter, shell 1-3	011-01169-00	1

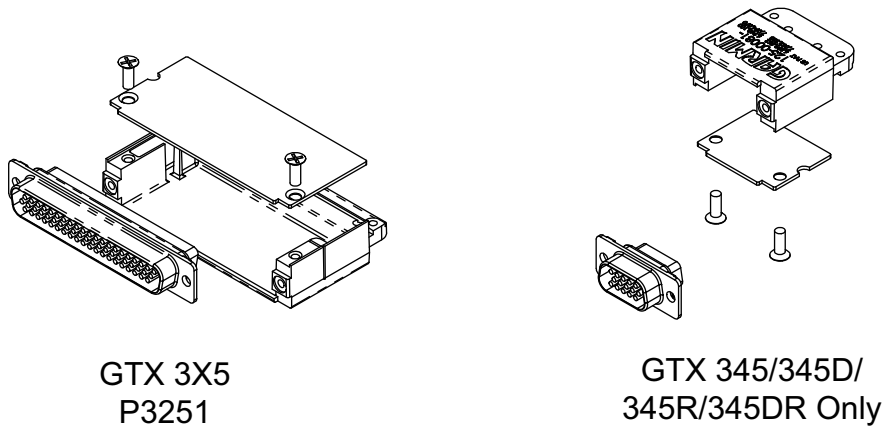


Figure 6-3 GTX 3X5 Connector Kits

Refer to Table 6-2 for the list of backplate items for the standard/G1000 mounting assembly. Refer to Figure 6-4 and Figure 6-5 for the backplate assembly.

Table 6-2 Standard/G1000 Mount Back Plate Hardware

Item	Description	P/N	Qty
1	DCP, connector plate, GTX 3X5, w/secondaries	125-00307-10	1
2	Connector, male/female special, BNC	330-00053-01	1
3	Washer, shoulder, GNC 400	212-00022-00	2
4	Connector, male/female, special, BNC/TNC	330-00053-02	1
5	Screw, 4-40 X .250, PHP, SS/P, nylon	211-60234-08	4

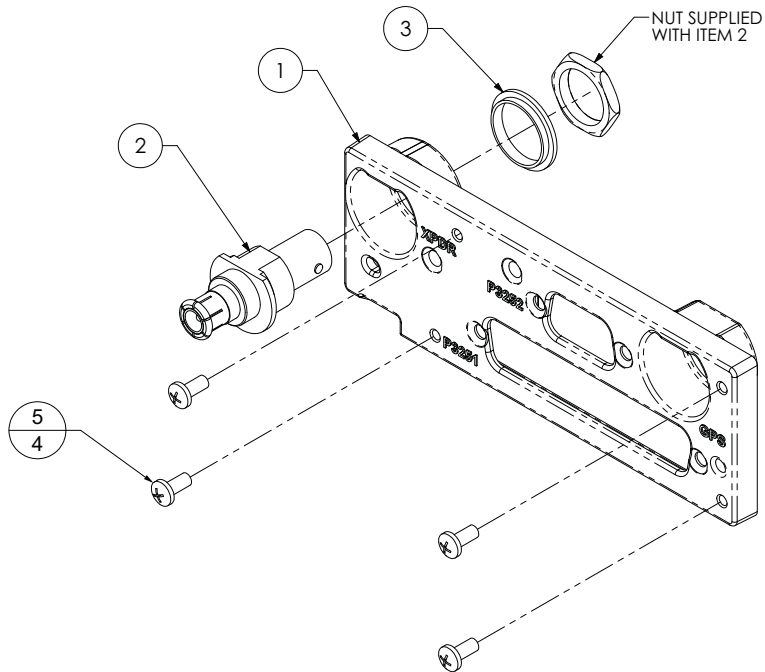


Figure 6-4 GTX 3X5 without GPS Back Plate Assembly (P/N 011-02976-00)

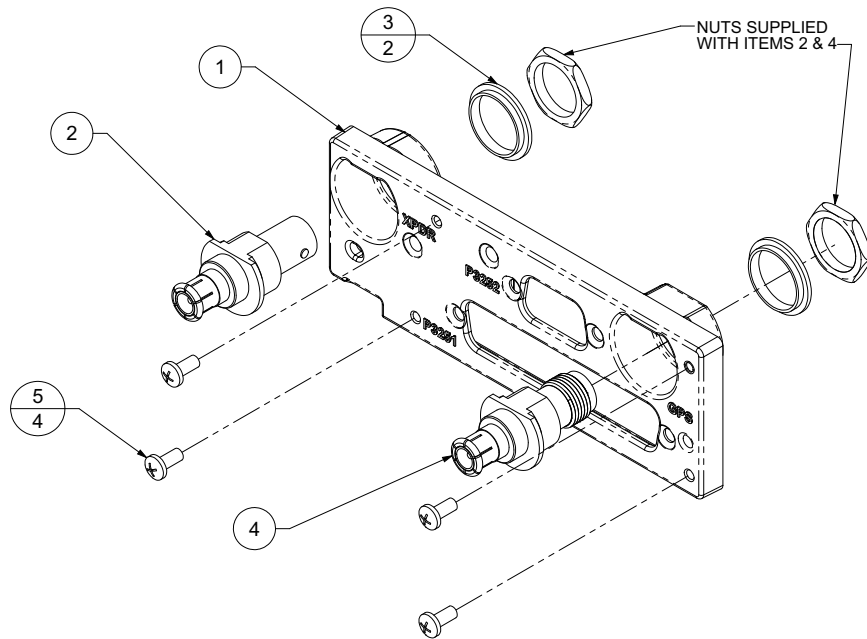


Figure 6-5 GTX 3X5 with GPS Back Plate Assembly (P/N 011-02976-01)

Refer to Table 6-3 for the list of backplate items for the vertical mounting assembly. Refer to Figure 6-6, Figure 6-7, and Figure 6-8 for the backplate assemblies.

Table 6-3 Vertical Mount Back Plate Hardware

Item	Description	P/N	Qty
1	DCP, connector plate, remote, GTX 3X5, w/secondaries	125-00343-10	1
2	Connector, male/female special, BNC	330-00053-01	1
3	Washer, shoulder, GNC 400	212-00022-00	2
4	Connector, male/female, special, BNC/TNC	330-00053-02	1
7	Washer, centering, no float	212-00022-10	1
8	Washer, split lock, size 8	212-00018-04	2
9	Screw, captive, 8-32, .62", 3/832 hex drv	211-00290-00	2

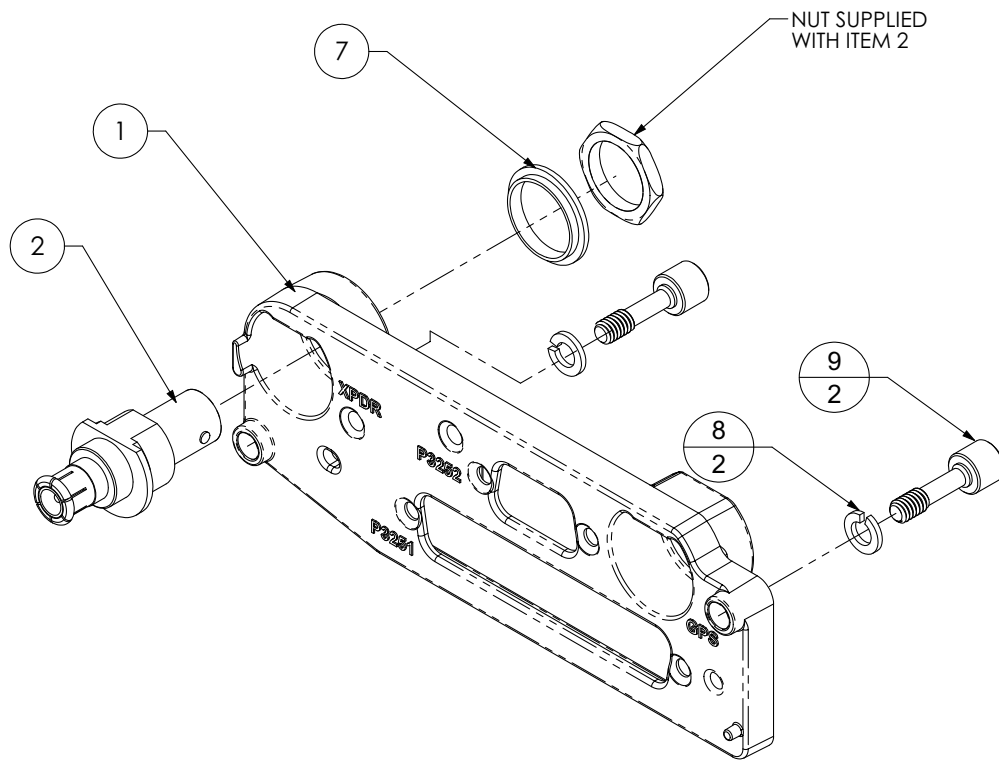
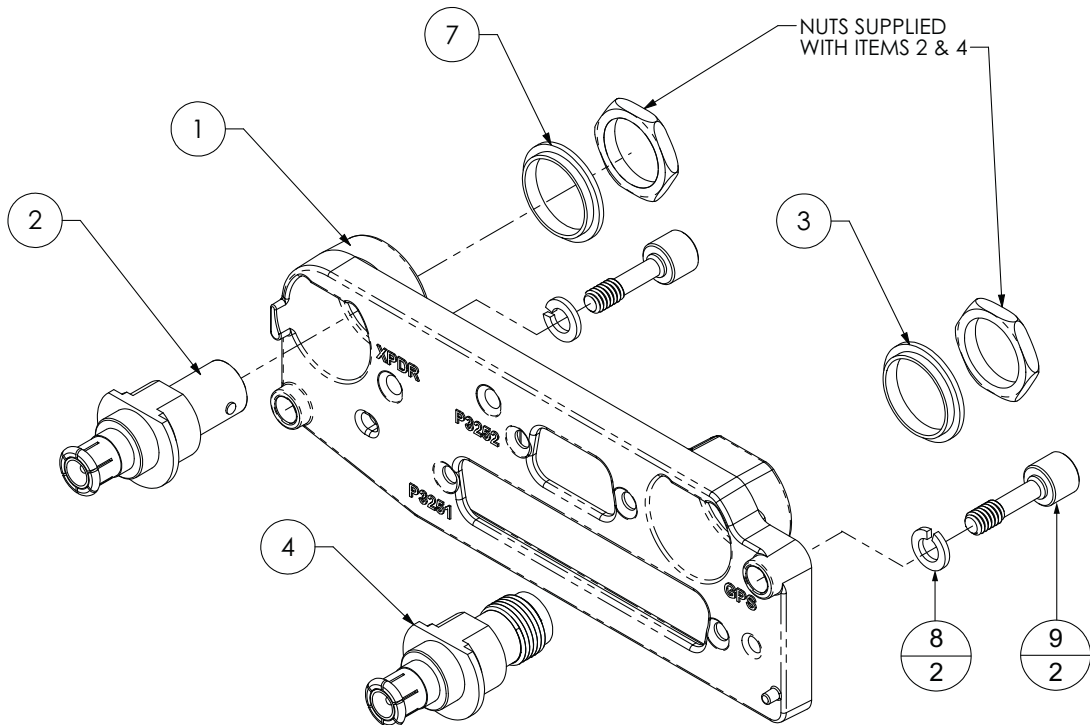
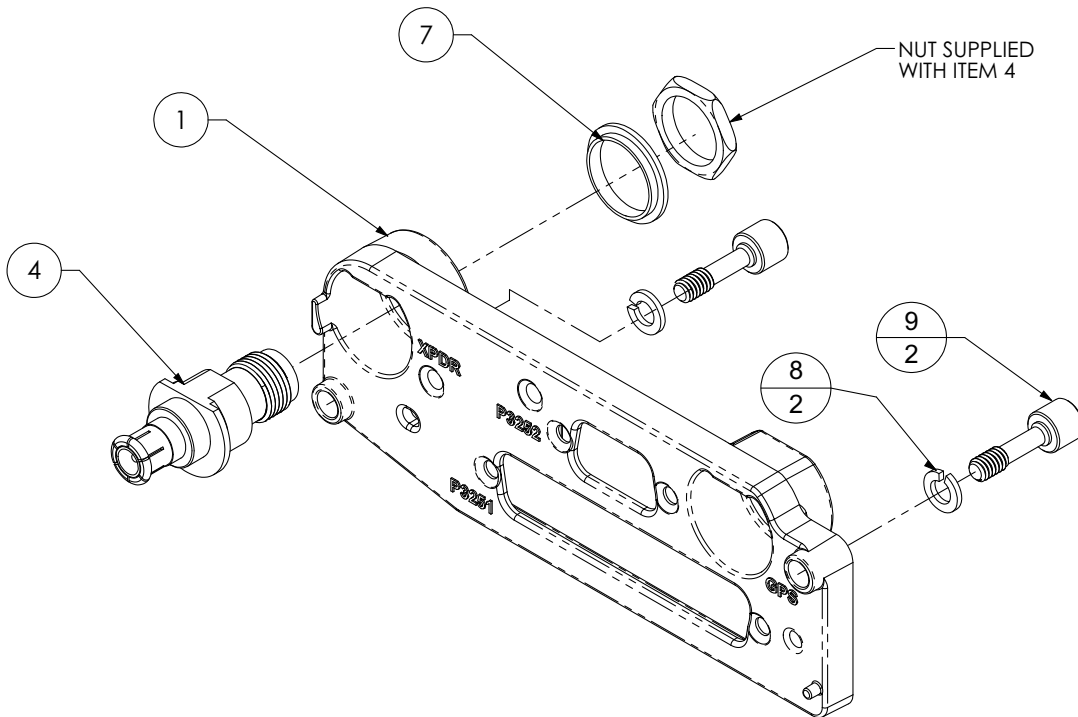


Figure 6-6 GTX 3X5 Vertical Mount without GPS, Back Plate Assembly (P/N 011-02976-10)



**Figure 6-7 GTX 3X5 Vertical Mount with GPS, Back Plate Assembly
(P/N 011-02976-11)**



**Figure 6-8 GTX 3X5 Vertical Mount with TNC XPDR Back Plate Assembly
(P/N 011-02976-12)**

Refer to Table 6-4 for the list of backplate items for the standard/G1000 mounting assembly for the GTX 3X5D, and refer to Figure 6-9 for the backplate assembly. Refer to Table 6-5 for the list of backplate items for the vertical mounting assembly for the GTX 3X5D, and refer to Figure 6-10 for the backplate assembly.

Table 6-4 Standard and G1000 Mount Backplate Hardware

Item	Description	P/N	QTY
1	DCP, connector plate, GTX 3X5D, with secondaries	125-00473-01	1
2	Conn, male/female special BNC	330-00053-01	2
3	Washer, shoulder, GNC400	212-00022-00	3
4	Conn, M/F, special BNC/RP-SMA	330-00053-08	1
5	Screw, 4-40 x 0.250, PHP, SS/P, w/ nylon	211-60234-08	4

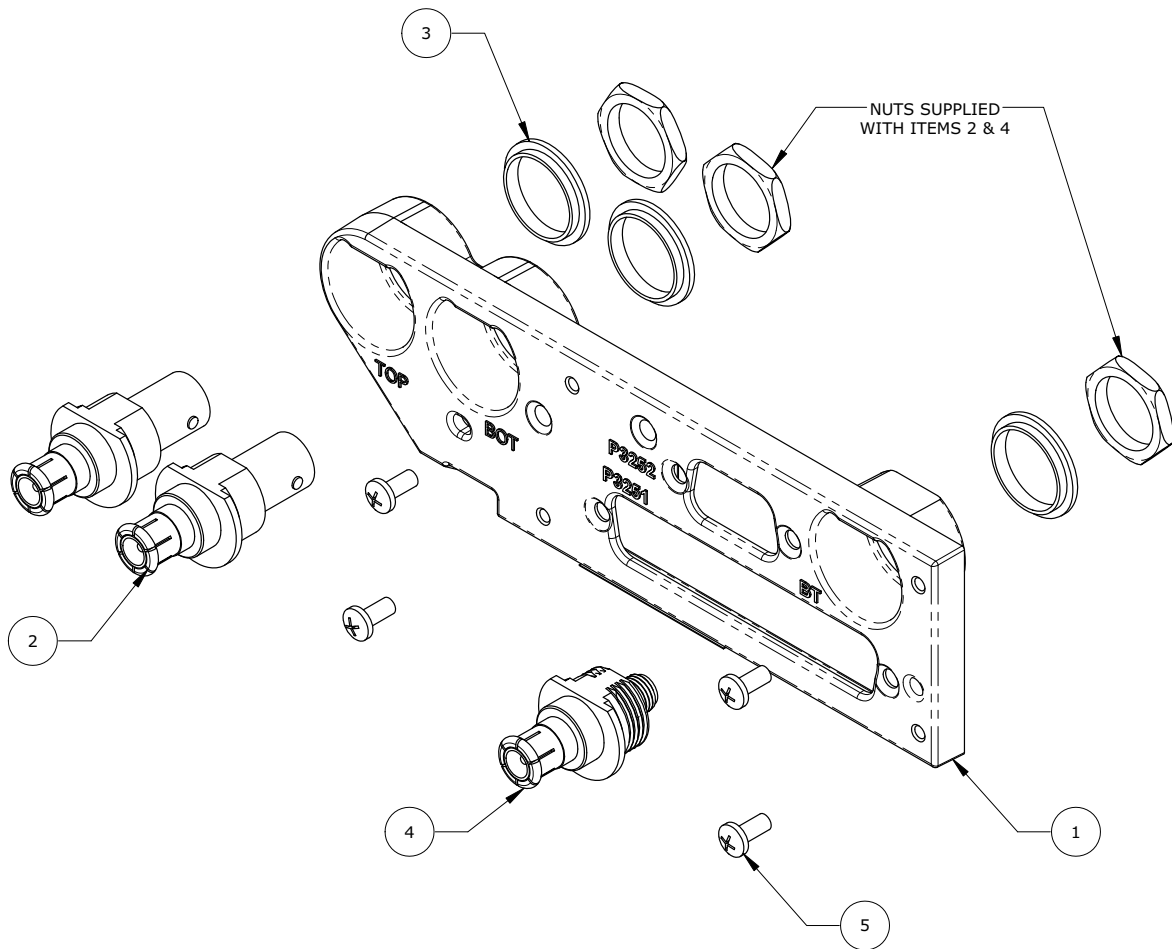


Figure 6-9 GTX 3X5D with Backplate Assembly (P/N 011-04340-02)

Table 6-5 Vertical Mount Backplate Hardware

Item	Description	P/N	QTY
1	DCP, connector plate, vert, GTX 3X5DR, with secondaries	125-00474-01	1
2	Conn, male/female special BNC	330-00053-01	2
3	Washer, shoulder, GNC400	212-00022-00	3
4	Conn, M/F, special BNC/RP-SMA	330-00053-08	1
5	Screw, captive, 8-32, 0.62", 3/32 hex drive	211-00290-00	2
6	Washer, split lock, size 8	212-00018-04	2

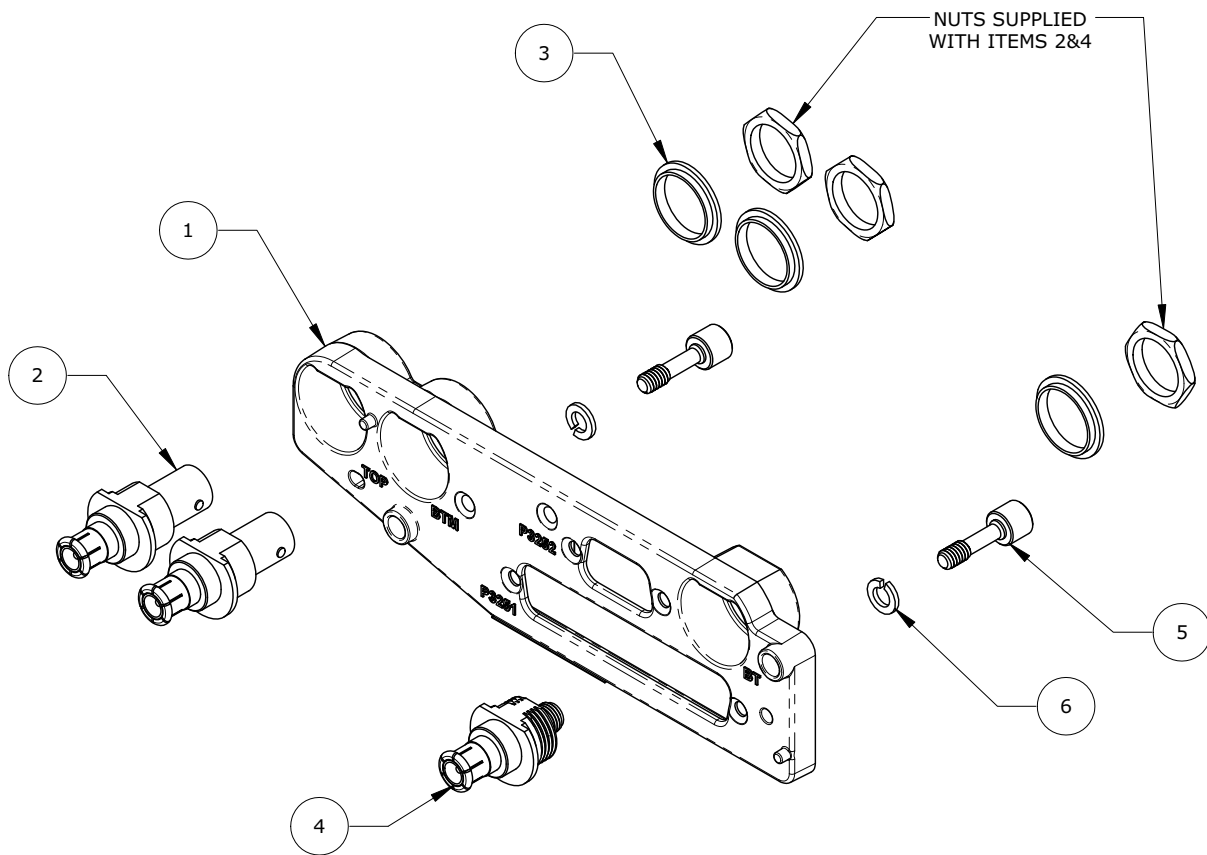


Figure 6-10 GTX 3X5DR with Backplate Assembly (P/N 011-04340-10)

6.3.1 GTX 335/335D/345/345D Panel Mounted Units



WARNING

*Ensure that the aircraft power is off before removal or re-installation of the GTX 3X5.
Unplug any auxiliary power supply.*

This section contains procedures and requirements for removal and re-installation of the GTX 335/335D/345/345D panel-mounted units installed under STC SA01714WI. After removal and re-installation, the GTX 335/335D/345/345D return to service procedures must be performed in accordance with Section 9.

Removal

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

Re-installation



CAUTION

Be sure 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° counterclockwise to ensure correct position prior to placing the unit in 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 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. Be careful 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.
5. Complete the applicable return to service procedures in Section 9.

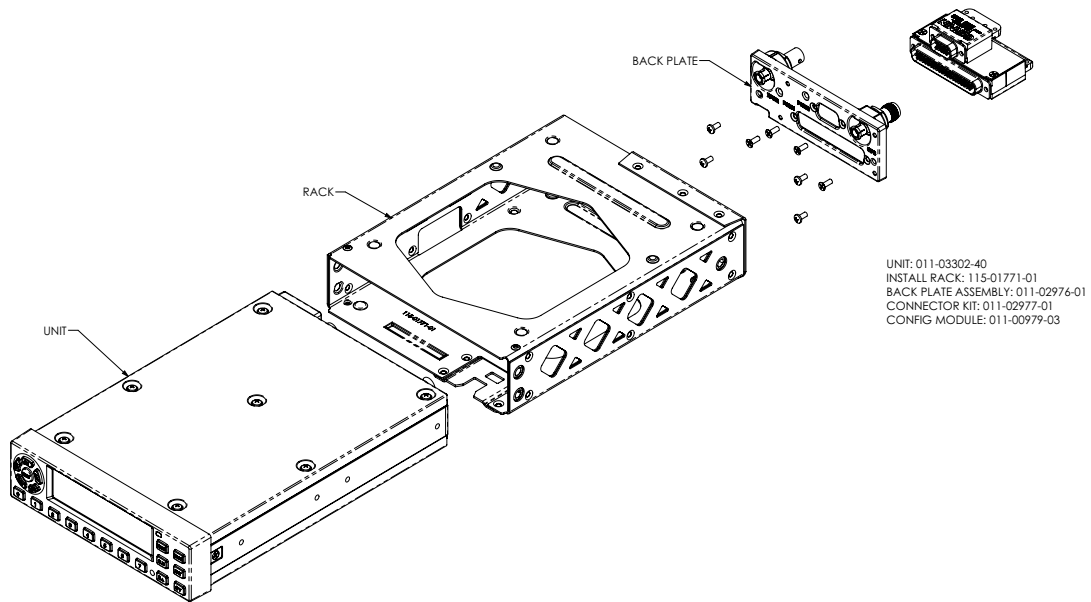


Figure 6-11 GTX 3X5 Mounting Rack/Connector Assembly

6.3.2 GTX 3X5R/3X5DR with Standard or GX000 System Rack Mount



WARNING

Ensure that the aircraft power is off before removal or re-installation of the GTX 3X5R. Unplug any auxiliary power supply.

This section contains procedures and requirements for removal and installation of GTX 335R/335DR/345R/345DR equipment installed using a standard remote mount or GX000 system rack mount. After removal and re-installation, the GTX 335R/335DR/345R/345DR return to service procedures must be performed in accordance with Section 9.

Removal

1. Gain access to the transponder.
2. Insert the hex drive tool into the access hole on the unit face and rotate counterclockwise until the unit is forced out about 3/8 inch.
3. Grab the pull-tab on the front of the unit and pull the unit straight out of the rack.

Re-installation



CAUTION

Be sure 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° counterclockwise to ensure correct position prior to placing the unit in the rack.

1. Visually inspect the connectors and pins to ensure 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 pressing on the left side of the bezel until the unit is firmly seated in the rack.
5. Count the number of complete revolutions the hex screw can be turned until it cannot turn any more. Be careful 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.
6. Complete the applicable return to service procedures in Section 9.

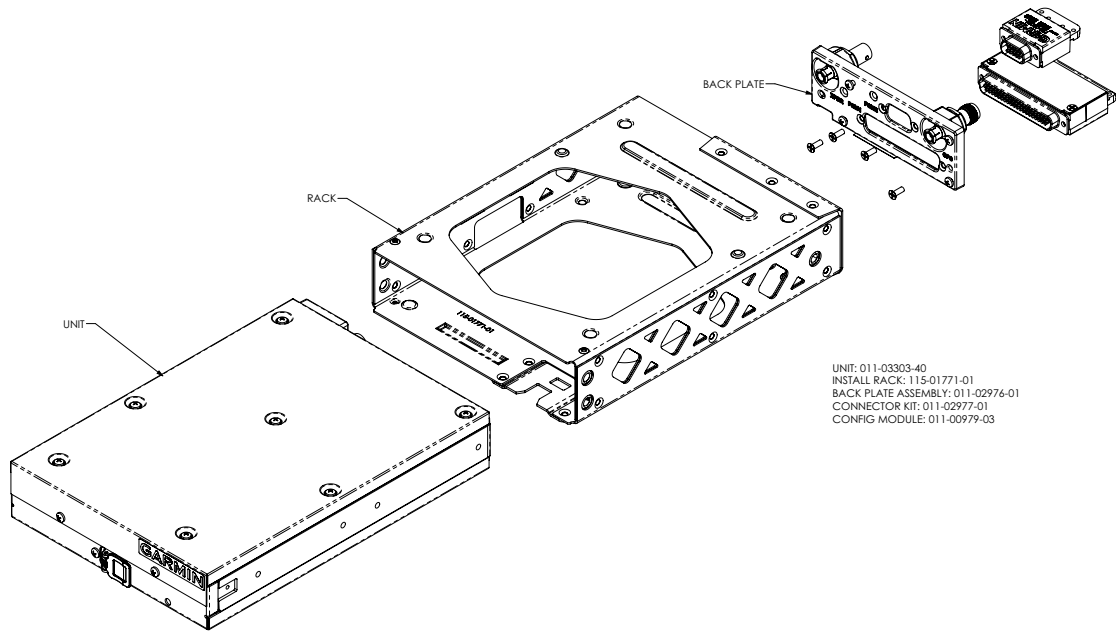


Figure 6-12 GTX 3X5R Standard Mounting Rack/Connector Assembly

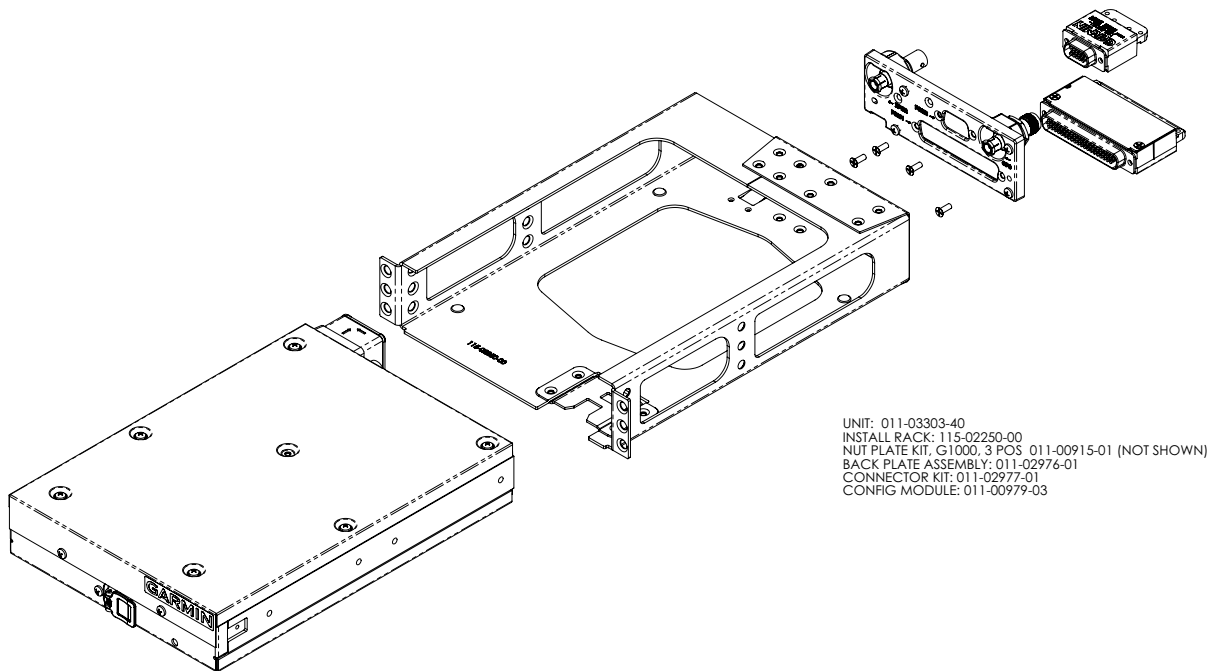


Figure 6-13 GTX 3X5R G1000 Mounting Rack/Connector Assembly

6.3.3 GTX 3X5R/3X5DR with Vertical Mount



CAUTION

*Before removal or re-installation of the GTX 3X5R, ensure the aircraft power is off.
Unplug any auxiliary power supply.*

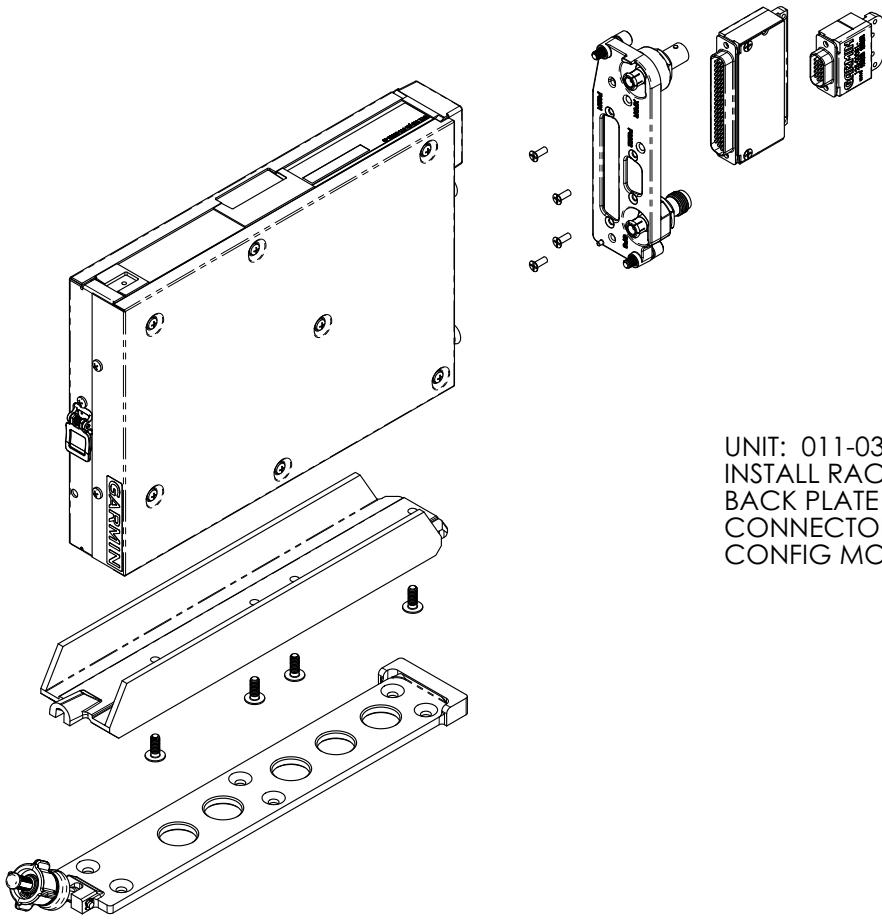
This section contains procedures for removal and installation of the GTX 335R/335DR/345R/345DR equipment installed using a vertical mount. After removal and re-installation, the GTX 335R/335DR/345R/345DR return to service procedures must be performed.

Removal

1. Gain access to the transponder.
2. Remove the two captive screws securing the back plate to the transponder body using a 3/32" hex tool.
3. Carefully remove the back plate and connector assembly from the unit.
4. While pulling, turn the large knob at the base of the unit counterclockwise until it can be pulled off the tab at the base of the unit.
5. Slide the unit forward and up until it clears the base plate.

Installation

1. Tilt the unit so that the toe of the GTX 3X5 shoe fully engages the base plate.
2. Ensure that the unit is fully engaged and in line with the base.
3. Lift the large knob on the install rack up and over the round protrusion on the base plate.
4. Turn the large knob clockwise until the unit is secure.
5. Carefully install the back plate onto the unit.
6. Secure with the two captive screws using a 3/32" hex tool.
7. Complete the applicable return to service procedures.



UNIT: 011-03303-40
INSTALL RACK: 011-03762-00
BACK PLATE ASSEMBLY: 011-02976-11
CONNECTOR KIT: 011-02977-01
CONFIG MODULE: 011-00979-03

Figure 6-14 GTX 3X5R Vertical Mounting Rack/Connector Assembly

6.3.4 Garmin Altitude Encoder



WARNING

*Ensure that the aircraft power is off before removal or re-installation of the GTX 3X5.
Unplug any auxiliary power supply.*

This section contains procedures and requirements for removal and installation of the Garmin altitude encoder equipment installed under STC SA01714WI. After removal and re-installation, the GTX 3X5 return to service procedures must be performed in accordance with Section 9.

Removal

1. Remove the transponder. Refer to Section 6.3 for details.
2. Remove the static line attached to the altitude encoder.
3. Disconnect wiring harness at the altitude encoder.
4. Remove two screws securing the unit to the back plate.

Re-installation

1. Secure altitude encoder to back plate assembly with two screws, torque to 8 in-lbs.
2. Connect wiring harness to altitude encoder.
3. Secure the static line to the altitude encoder using standard practices.
4. Install transponder. Refer to Section 6.3 for details.
5. Complete the applicable return to service procedures in Section 9.
6. Complete the static system and transponder checks described in Section 4.

Table 6-6 Garmin Altitude Encoder Kit - P/N 011-03080-00

Description	P/N	Qty
Sub-assembly, altitude encoder, unit only	011-03080-01	1
Screw, 4-40 x .250, PHP, SS/P, w/nyl	211-60234-08	2
Screw, 4-40 x .312, FLHP 100, SS/P, nyl	211-63234-09	2
Harness, 4 cond, Garmin altitude encoder	325-00421-00	1

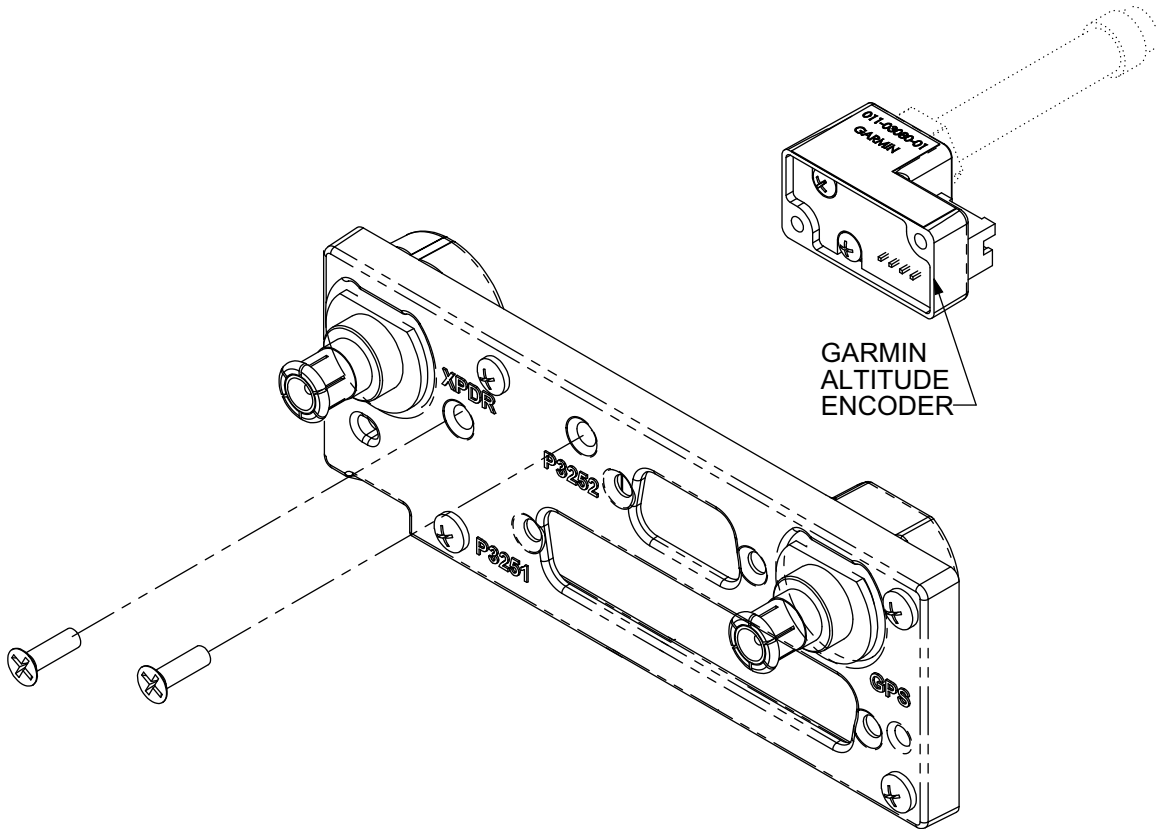


Figure 6-15 Garmin Altitude Encoder with Back Plate Assembly

6.4 Transponder Antenna

The transponder antenna(s) are not installed by this STC. Refer to the antenna manufacturer's maintenance information for removal and re-installation instructions.

7 SOFTWARE

7.1	Software Check	7-2
7.2	GTX 33/330 Software Update	7-5
7.2.1	Download Procedures	7-5
7.2.2	GTX 33/330 Software Loading.....	7-6
7.3	GTX 3X5 Software Update	7-7

7.1 Software Check

If software is loaded during maintenance, conduct a final software review.



NOTE

*It is essential that the software version is correct. Earlier GTX 33X software versions are non-compliant with ADS-B Out Version 2 requirements. If the software version and/or part number does not match those specified, or if the software is not successfully loaded, **DO NOT** continue. Troubleshoot and resolve the issue before continuing.*



NOTE

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

GTX 330/330D Software Version Check

1. Start the GTX 330/330D in normal mode.
2. Observe the start up screen. Refer to Figure 7-1 for details.



Figure 7-1 GTX 330 Start-Up Screen

3. Press either the 8 key or the 9 key until you see the SYS software version screen.
4. Verify the version number matches the approved version listed in the Equipment List. Refer to Figure 7-2 for details.



Figure 7-2 GTX 330 Product Data Page

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.” Refer to Figure 7-3 for details.



Figure 7-3 GTX 3X5 Start-Up Screen

3. Press the **ENT** key to navigate to the software version screen.
4. Verify the version number matches the approved version listed in the Equipment List. Refer to Figure 7-4 for details.



Figure 7-4 GTX 3X5 Product Data Page

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



NOTE

The following procedures provide an overview to verify the software version of the GTX 33/33D/3X5R when interfaced with the GTN 6XX/7XX. Refer to GTN 6XX/7XX Part 23 AML STC Installation Manual for additional details.

1. On the GTN 6XX/7XX System Page, touch the **External LRUs** key.
2. Observe the reported GTX software version number. Refer to Figure 7-5 for details.
3. Verify the version number matches the approved version listed in the Equipment List.

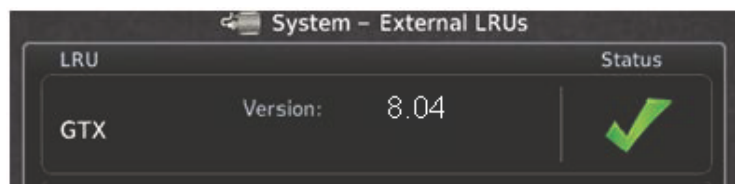


Figure 7-5 GTN 6XX/7XX System Page

GTX 3X5R Software Version Check (GX000)



NOTE

The following procedures provide an overview to verify the software version of the GTX 3X5R when interfaced with the GX000. Refer to the applicable G1000 Series Pilot Guides or Installation Manual for additional details.

1. On the GX000 PFD enter the configuration option.
2. On the System Status page, scroll to the GTX LRU.
3. Observe the reported GTX software version number. Refer to Figure 7-6 for details.
4. Verify the version number matches the approved version listed in the Equipment List.

SYSTEM STATUS

GDUS ONLINE	GIAS/GSDS ONLINE	OTHER LRUS ONLINE
MFD1 <input checked="" type="checkbox"/>	GIA1 <input checked="" type="checkbox"/>	GDL59 <input checked="" type="checkbox"/>
PFD1 <input checked="" type="checkbox"/>	GIA2 <input checked="" type="checkbox"/>	GWX <input checked="" type="checkbox"/>
PFD2 <input checked="" type="checkbox"/>	GSD1 <input checked="" type="checkbox"/>	GDL69 <input checked="" type="checkbox"/>
	GSD2 <input checked="" type="checkbox"/>	GTS <input checked="" type="checkbox"/>
		GMA1 <input checked="" type="checkbox"/>
		GMA2 <input checked="" type="checkbox"/>

LRU	DATA
GMA1 FPGA	PART NUMBER 006-B1607-XX
GMA1 RGN	VERSION 2.12
GMU1	PRODUCT
GMU1 FPGA	DESCRIPTION GTX 345 2.12
GMU2	COPYRIGHT
GMU2 FPGA	SERIAL NUMBER
GPS1	MODEL NUMBER 0
GPS2	FUNCTIONS PRESENT 0
GRS1	STATUS OK
GRS1 FPGA	
GRS1 MV DB	
GRS2	
GRS2 FPGA	
GRS2 MV DB	
GS1	
GS2	
GTX1	
MFD1	

DNLD LOG

Figure 7-6 GX000 System Status Page

7.2 GTX 33/330 Software Update

If a unit is replaced and does not have the approved version of software installed, software can be downloaded from the Dealer Resource Center at www.flyGarmin.com. For dual GTX installations the software loading procedures below must be carried out on each GTX.

The GTX 330 software can be updated in Configuration mode as well as in Test mode. Updating software in Configuration mode does not require the **TEST MODE SELECT** switch. However, the **TEST MODE SELECT** switch is required for the GTX 33 series. Refer to Figure 7-7 for software update connections.

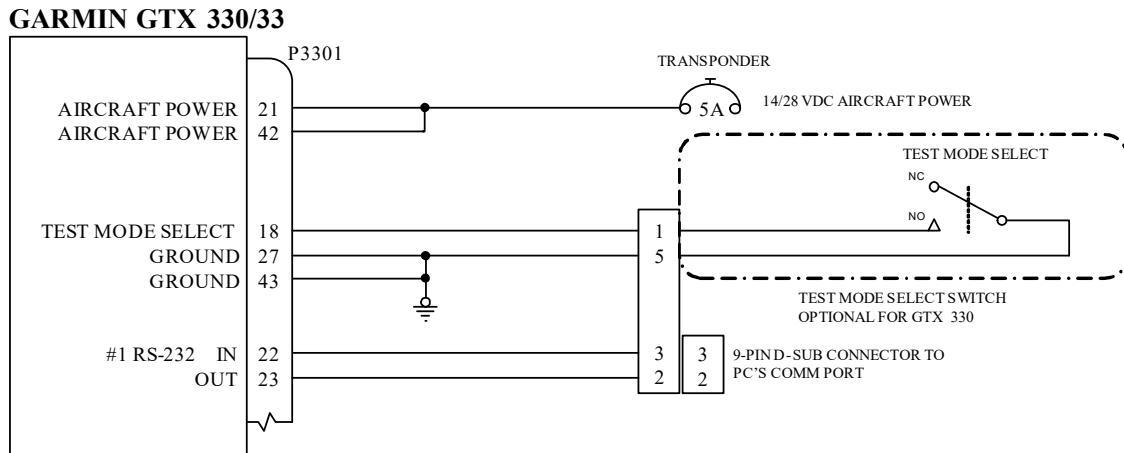


Figure 7-7 Software Update Connection

7.2.1 Download Procedures

1. Access the [Dealer Resource Center](http://www.flyGarmin.com) on Garmin's website.
2. Obtain the transponder software as specified in the Equipment List and download to 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.

7.2.2 GTX 33/330 Software Loading



CAUTION

If the unit is removed from the aircraft and operated, connect J3302 (GTX 33/330/33D/330D) and J3303 (GTX 330D/33D) to a 50 Ω 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.

1. Remove power from the GTX.
2. Connect the test harness to the GTX and laptop. Refer to Figure 7-7 for details.
3. Enable the **TEST MODE** switch on the test harness.
4. Power on the GTX.
5. Double click on the file UPLOADXX.BAT (XX is an incremental number assigned to a specific software version). The program will begin communicating with the GTX.
6. The upload process could take up to six minutes to complete.



NOTE

GTX 330 units will show a dynamic display test screen.

7. Once the upload is completed, the unit will reset itself, and turn on.
8. Remove power from the GTX.
9. Remove the test harness between the laptop and the GTX.
10. Install GTX into aircraft and power up system.
11. Verify the software version is correctly displayed.

7.3 GTX 3X5 Software Update



CAUTION

If the unit is removed from the aircraft and operated, connect the transponder antenna connection to a 50 Ω 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.

If a unit is replaced and does not have the approved version of software installed, software can be downloaded from the Dealer Resource Center at www.flyGarmin.com. For dual GTX installations the software loading procedures below must be carried out on each GTX.

For more information on downloading, installing, and utilizing the GTX 3X5 installation tool download the GTX 3X5 Install Tool Manual (P/N: 190-01499-30) from the [Dealer Resource Center](#).

Software may be loaded by performing the following steps on the Software Upload page.

1. Download the latest GTX 3X5 software from the Garmin [Dealer Resource Center](#).
2. Under “Step 1 - Select a File,” select the **Browse** key and locate the Boot Block software file containing the GTX 3X5 software previously downloaded.
3. Under “Step 2 - Upload Options,” select the options to be updated.
4. Select the **Upload** key.
5. Wait for 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 software previously downloaded.
7. Under “Step 2 - Upload Options,” select the remaining options to be updated.
8. Wait for upload to complete. Individual files will be marked as complete as they are installed.
9. After successful completion, verify the correct software versions and part numbers display on the Transponder page under the Product Data group.

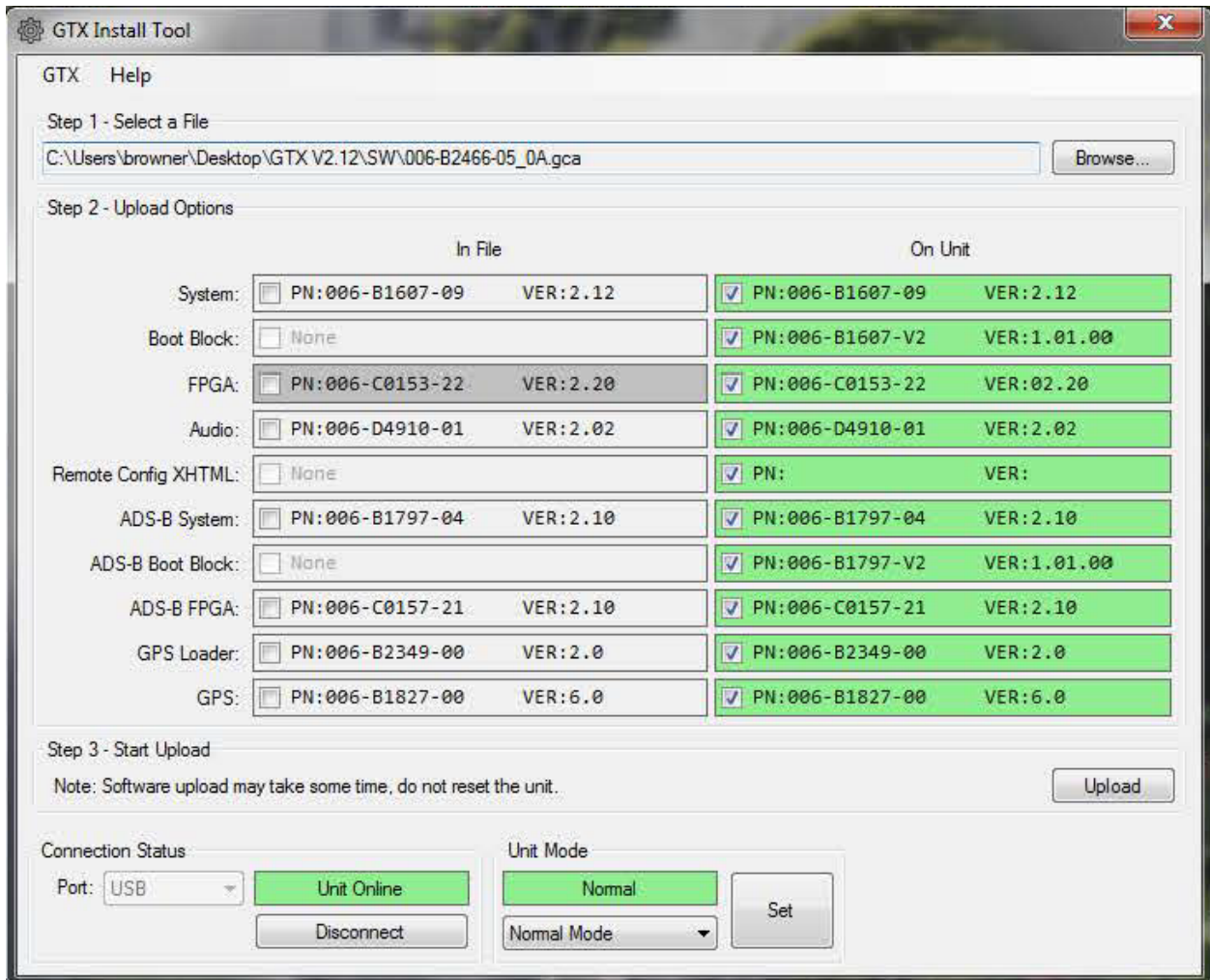


Figure 7-8 GTX 3X5 Install Tool Software Upload Page

8 SYSTEM CONFIGURATION AND CHECKOUT

8.1	Overview.....	8-2
8.2	System Checkout	8-2
8.3	GTX 33/330 Configuration.....	8-3
8.3.1	GTX 330/330D Configuration	8-3
8.3.2	GTX 33/33D Configuration (GTN 6XX/7XX).....	8-3
8.3.3	GTX 33/33D Configuration (GNS 480).....	8-3
8.4	GTX 3X5 Configuration.....	8-4
8.4.1	GTX 3X5/3X5D Configuration	8-4
8.4.2	GTX 3X5R/3X5DR Configuration (GTN 6XX/7XX, GNS 480, or G1000)	8-4
8.5	GTX Airborne Test Mode.....	8-5
8.5.1	GTX 33/330 Airborne Mode (v8.02 or higher).....	8-5
8.5.2	GTX 3X5 Airborne Mode	8-6
8.6	Regulatory Test.....	8-7
8.7	ADS-B Out Test.....	8-8
8.8	GTX 3X5 with TCAS System Test (GX000 Only).....	8-9

8.1 Overview

This section contains instructions for configuring the GTX as well as checks to ensure the system is properly installed and functioning correctly. The steps that are not applicable to a particular installation may be skipped.

8.2 System Checkout

Original GTX is Reinstalled

If the original GTX is reinstalled, configuration and software loading are not required. Continue to GTX Test (Section 8.5).

New, Repaired, or Exchanged GTX is Installed

If a new, repaired, or exchanged GTX is installed, the AML approved software (refer to Section 7.2 or Section 7.3) and the configuration files from the Post Install Checkout Log in the aircraft permanent records (refer to Section 8.3) must be loaded to the unit.

8.3 GTX 33/330 Configuration

Retrieve the Post Installation Checkout Log from the aircraft permanent records. For the maintenance activities that repaired or replaced the previous GTX, configure the GTX as defined by the data contained in the Post Installation Checkout Log.



NOTE

Ensure the Post Installation Checkout Log remains with the aircraft permanent records upon completion of any maintenance activities.

8.3.1 GTX 330/330D Configuration

Hold down the **FUNC** key and press 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 enter numeric data and the **8** or **9** keys move through list selections. Press the **CRSR** key to accept changes. When a field is highlighted, pressing the **FUNC** key moves to the next configuration page without saving the changes.

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

8.3.2 GTX 33/33D Configuration (GTN 6XX/7XX)

For GTX 33/33D installations interfacing to a GTN 6XX/7XX, configuration of the GTX is accomplished through the GTN 6XX/7XX. Access the Interfaced Equipment page by touching the **Interfaced Equipment** key on the GTN Setup page. Next, go to the External Systems page and touch the corresponding key for the transponder to be configured, XPDR1 or XPDR2 (if present). This key displays a page which allows the remote transponder to be configured.

8.3.3 GTX 33/33D Configuration (GNS 480)

For GTX 33/33D installations interfacing to a GNS 480, configuration of the GTX is accomplished through the GNS 480. Access the GTX configuration page from the GND Maintenance mode display of the GNS 480. This page will allow the remote transponder to be configured. Refer to the Equipment Setup and Configuration section of *GNS 480 (CNX80) Color GPS/NAV/COM Installation Manual* for detailed instructions.

8.4 GTX 3X5 Configuration

Retrieve the Post Installation Checkout log from the aircraft permanent records. For the maintenance activities that repaired or replaced the previous GTX, configure the GTX as defined by the data contained in the Post Installation Checkout Log.

8.4.1 GTX 3X5/3X5D Configuration

Hold down the **ENT** key and press the **ON** key to access the configuration pages. The **FUNC** key sequences forward through the configuration pages. The **CLR** key reverses through the pages. The **8** or **9** key scrolls up or down through the items on each configuration page. The **CRSR** key highlights selectable fields on each page. When a field is highlighted, the **0 – 9** keys enter numeric data and the **8** or **9** keys move through list selections. Press the **ENT** key to accept changes. When a field is highlighted, pressing the **FUNC** key moves to the next configuration page without saving the changes.

Changes made through the configuration pages are stored in EEPROM memory. To exit the configuration pages, reset the system power for normal mode.

8.4.2 GTX 3X5R/3X5DR Configuration (GTN 6XX/7XX, GNS 480, or G1000)

For GTX 3X5R installations interfacing to a GTN 6XX/7XX, GNS 480, or G1000 system, configuration of the GTX is accomplished through the GTX Installation Tool. Refer to GTX 3X5/3X5R Software Update (Section 7.3) for instructions on downloading, installing, and connecting the installation tool to the GTX 3X5/3X5R unit.

8.5 GTX Airborne Test Mode

Operation of the GTX 330/330D and GTX 3X5/3X5D is accomplished using the faceplate of the unit. Refer to Section 3.1 and Section 3.2 for details. The GTX 33/33D and GTX 3X5R/3X5DR are controlled using the GTN 6XX/7XX or GNS 480. Refer to Section 3.3 for details. The GTX 3X5R/3X5DR may be controlled by a G1000 system. Refer to Section 3.4 for details. Refer to the operational documents listed in Table 1-1 for basic GTX operation.



NOTE

For dual transponder installations, the procedures contained in this section must be completed for each installed transponder.



NOTE

A GTX or GTN in Ground Test mode or Airborne Test mode will automatically return to normal operation of the Air/Ground logic when the unit is powered off and then turned on in normal mode. When the unit is in Ground Test or Airborne Test mode, an alert message will be annunciated on the GTX or GTN screen.



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.

8.5.1 GTX 33/330 Airborne Mode (v8.02 or higher)

The transponder must 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 defeated in order to place the transponder in an airborne state for testing. To place the transponder into an airborne state, perform the following procedure for the GTX interface installed in the aircraft.

Panel Mounted Transponder

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 330/330D main screen.

Remote Mounted Transponder (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.

Remote Mounted Transponder (GTX 33/33D, GNS 480 Interface)

1. Enter the 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.

8.5.2 GTX 3X5 Airborne Mode

The transponder must 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 defeated in order to place the transponder in an airborne state for testing. To place the transponder into an airborne state, perform the following procedure for the GTX interface installed in the aircraft.

Panel Mounted Transponder

1. Start the GTX in Ground Test mode (hold the **CRSR** key and press the **ON** key).
2. A “GROUND TEST MODE” alert message will be displayed on the GTX 3X5 message screen.

Remote Mounted Transponder (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.

Remote Mounted Transponder (GTX 3X5R/3X5DR, GNS 480 Interface)

1. Connect the GTX 3X5 installation tool to the GTX 3X5R/3X5DR unit.
2. Place unit into ground test mode located on the state page.

Remote Mounted Transponder (GTX 3X5R/3X5DR, G1000/G950 Interface)

1. Connect the GTX 3X5 installation tool to the GTX 3X5R/3X5DR unit.
2. Place unit into ground test mode located on the state page.

Remote Mounted Transponder (GTX 3X5R/3X5DR, G1000/G950 Interface w/GDU SW v15.00 and higher)

The following is a method of placing a GTX 3X5 in an airborne state while on the ground without the use of the GTX 3X5 Install Tool.

1. Place the MFD in normal mode and place only the PFD 1 in configuration mode.
2. Go to the Transponder Configuration page and press the GND TEST soft key (only enabled when the aircraft is detected as on the ground).
3. Cycle the power on the PFD 1 only after the GND TEST soft key is pressed, ensuring power remains applied to the other displays.
4. The transponder is now in an airborne state for test purposes. Cycle aircraft power to take it out of ground test mode.

8.6 Regulatory Test

With the transponder operating in normal mode and in an airborne state (refer to Section 8.5), the following regulatory tests are required to be performed every 24 calendar months.

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.

If the transponder is removed, replaced, or modified, sufficient testing in accordance with Part 43 Appendix E paragraph C must be completed.

For software updates, only a basic system functional test is required to verify normal transponder operation and ADS-B system performance is functional.

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.

8.7 ADS-B Out Test

The following ADS-B Out parameters must be verified in accordance with Title 14 of the Code of Federal Regulations (14 CFR) § 91.227 any time the position source (GPS) is replaced/modified. The test is performed using a transponder ramp test set, such as the Aeroflex IFR-6000 or TIC TR-220. For instructions on operating the ramp tester, refer to the manufacturer's documentation.



NOTE

Software version 5.30 or later is required on the TR-220.

1. Ensure the aircraft is in a location where a GPS signal can be received (e.g., outdoors with a clear view of the sky).
2. Power on the aircraft/avionics and ensure that the GTX is powered on.
3. If the GTX is configured for pilot control of the ADS-B transmitter, ensure ADS-B TX is selected ON.
4. Temporarily put the GTX into airborne mode. Refer to Section 8.5.
5. If dual GPS sources are connected to the GTX, each GPS source must be checked separately by disabling the GPS source not being checked. Disable the GPS source not being checked by covering the GPS antenna or removing power from that navigator. Verify that the GPS source not being checked is no longer receiving satellite data.
6. Ensure the GPS source being checked has acquired a position.
7. Select ALT mode on the GTX.
8. Using the transponder test set, verify the following ADS-B Out parameters are being transmitted:
 - $NAC_v \geq 1$
 - $SDA \geq 2$
 - $SIL \geq 3$
 - $NAC_p \geq 8$
 - $NIC \geq 7$
9. If dual GPS sources are connected to the GTX, repeat steps 5 - 8 for the other GPS source.
10. Revert the GTX squat switch back to its previous configuration as follows.
 - a. If a connected squat switch was defeated in step 4, then place the connected switch back to the on-ground position.
 - b. If the GTX squat switch configuration settings were changed in step 4, revert the GTX settings back to the previous configuration as documented in the aircraft checkout log.
11. Select STBY mode on the GTX.

If no other service is to be performed, continue to the return-to-service checks in Section 9.1.

8.8 GTX 3X5 with TCAS System Test (GX000 Only)

The aircraft TCAS system test must be done with the GTX 3X5 Install Tool. Use a TCAS ramp tester and these steps to verify the TCAS system operation and surveillance functions correctly.

1. Set the aircraft altimeter to 29.92" to find the local pressure altitude.
2. Connect the GTX 3X5R/3X5DR unit to the GTX 3X5 Installation Tool.
3. Set the TCAS ramp tester to the scenario in Table 8-1.

Table 8-1 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 TCAS **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 TCAS **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 3X5R unit from the GTX 3X5 Install Tool.

If no other service is to be performed, continue to the return-to-service checks in Section 9.1.

9 SYSTEM RETURN TO SERVICE PROCEDURE

After removing and re-installing or replacing the GTX 33X or GTX 3X5, perform the system checkout procedures in Section 8.2.

9.1 Maintenance Records

After conducting the required return-to-service procedures in accordance with this document, the aircraft may be returned to service.

Record the following information in appropriate aircraft maintenance logs.

- Part number and version number of any software updates performed during maintenance
- Part number and serial number of any LRU which was replaced
- Any other applicable information related to the maintenance work performed on the aircraft

APPENDIX A INSTALLATION SPECIFIC INFORMATION

An [electronic fillable form](#) is available. Acrobat Reader 8.0 or later is necessary to view and fill out the form. You can download Acrobat Reader by visiting www.adobe.com.

AIRCRAFT SPECIFIC INFORMATION

GENERAL INFORMATION

Date: _____ / _____ / _____ By: _____

AIRCRAFT

AIRCRAFT MAKE: _____

AIRCRAFT MODEL: _____

AIRCRAFT SERIAL #: _____

AIRCRAFT REG. #: _____

HEX ADDRESS: _____

GTX #1

Unit P/N: _____ Mod Level: _____

Unit Model: _____ Serial #: _____

GTX #2 [N/A]

Unit P/N: _____ Mod Level: _____

Unit Model: _____ Serial #: _____

ELECTRICAL LOAD ANALYSIS

ITEMS REMOVED FROM AIRCRAFT	ELECTRICAL LOAD (A) [1]	COMMENT
Subtotal:		

ITEMS ADDED TO AIRCRAFT	ELECTRICAL LOAD (A) [1]	COMMENT
Subtotal		

Net Change in Bus Load:	
--------------------------------	--

[1] Use typical current draw when performing this calculation.

EQUIPMENT INTERFACED TO THE GTX

Document the equipment which is interfaced to the GTX. Use the following guidance when filling out the information.

- **Model(s):** Write in the model number or numbers of the equipment which is interfaced to the GTX.
- **GTX Port Numbers:** When applicable, write in the GTX port number or numbers used for the interface. This column is generally applicable only to serial ports such as RS-232 and ARINC 429.



NOTE

This information is optional and is not required to be completed or maintained with the aircraft records.

GTX #1 INTERFACED EQUIPMENT

Audio Panel

Model: _____

GTX Port Number: _____

Display

Model: _____

GTX Port Number: _____

Altitude Encoder

Model: _____

GTX Port Number: _____

GPS #1

Model: _____

GTX Port Number: _____

GPS #2

Model: _____

GTX Port Number: _____

Heading

Model: _____

GTX Port Number: _____

Air Data

Model: _____

GTX Port Number: _____

Traffic

Model: _____

GTX Port Number: _____

GDL

Model: _____

GTX Port Number: _____

GTX #2 INTERFACED EQUIPMENT

Audio Panel

Model: _____

GTX Port Number: _____

Display

Model: _____

GTX Port Number: _____

Altitude Encoder

Model: _____

GTX Port Number: _____

GPS #1

Model: _____

GTX Port Number: _____

GPS #2

Model: _____

GTX Port Number: _____

Heading

Model: _____

GTX Port Number: _____

Air Data

Model: _____

GTX Port Number: _____

Traffic

Model: _____

GTX Port Number: _____

GDL

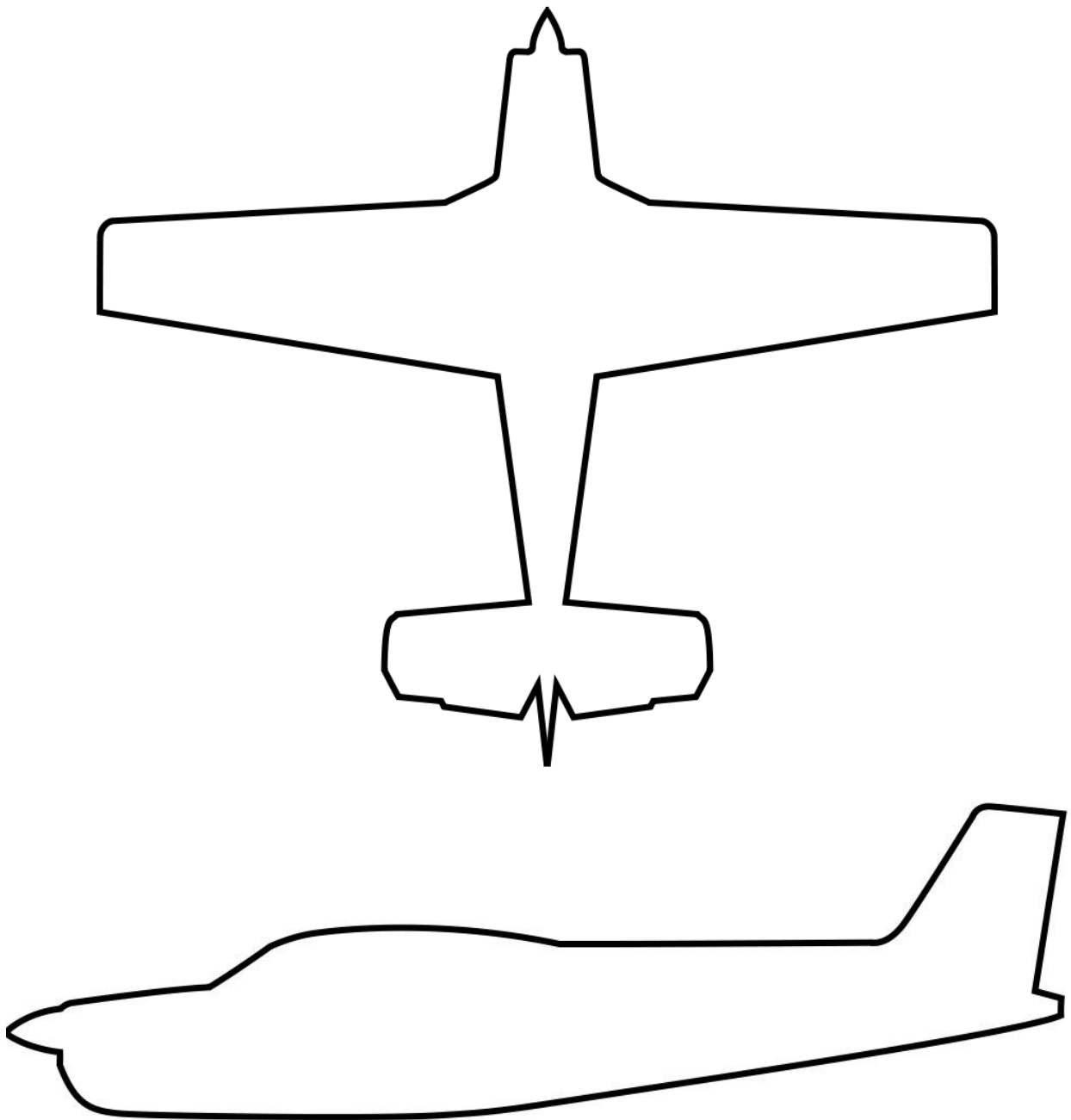
Model: _____

GTX Port Number: _____

Wire Routing

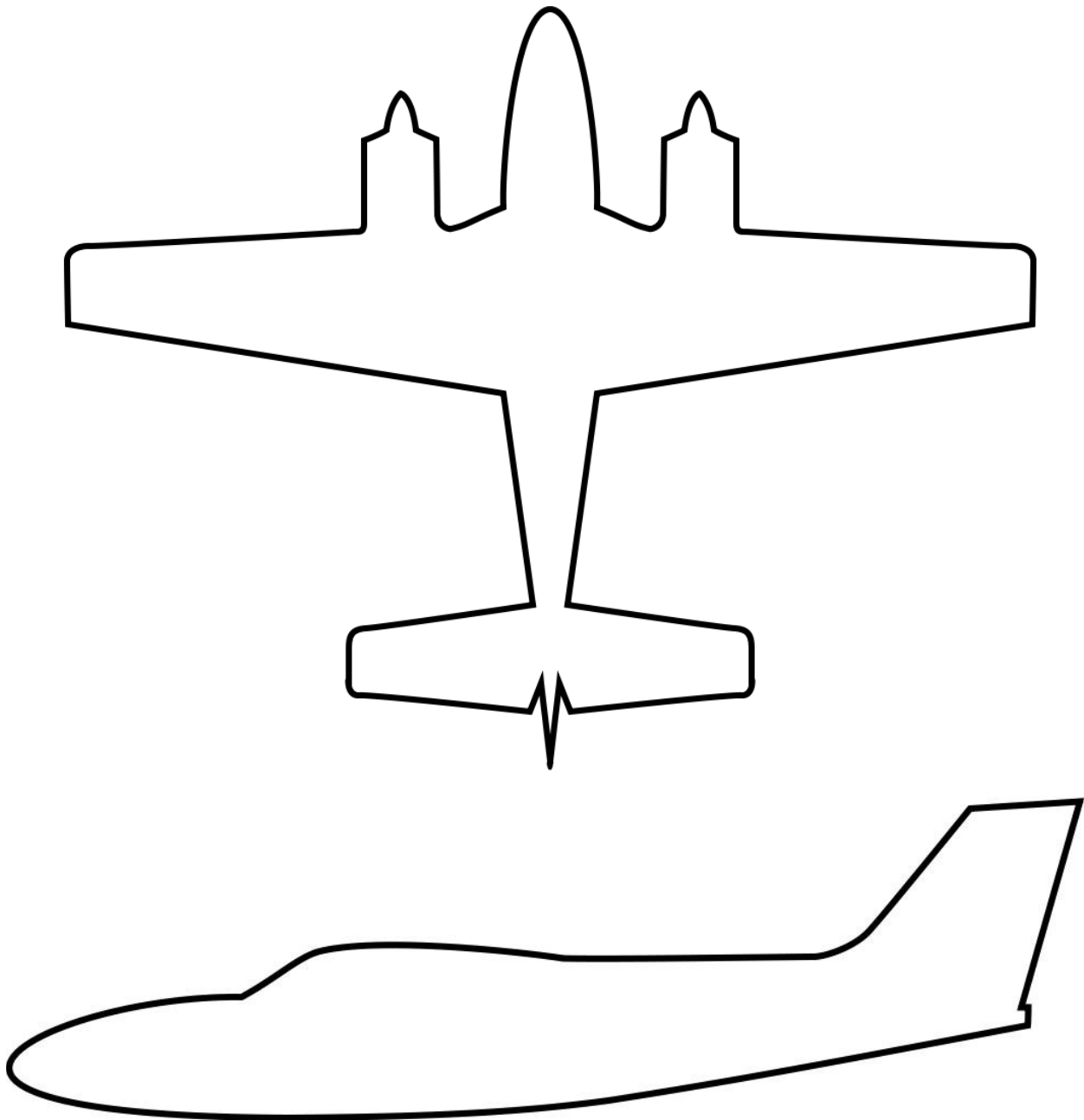
Single Engine

The following diagram depicts approximate location of all LRUs along with the wire routing for the GTX throughout the aircraft structure for a single-engine aircraft.



Twin Engine

The following diagram depicts approximate location of all LRUs along with the wire routing for the GTX throughout the aircraft structure for a twin-engine aircraft.



GTX 33X POST-INSTALLATION CONFIGURATION LOG

NOTE

This page applies to both GTX 330 and GTX 33 units. Post-installation configuration logs specific to each unit are included immediately following this page and must be filled out in addition to this page for your specific installation.

RS-232 Configuration

Transponder #1

Port 1: Input _____
 Output _____
 Port 2: Input _____
 Output _____

Transponder #2

Port 1: Input _____
 Output _____
 Port 2: Input _____
 Output _____

ARINC 429 CONFIGURATION

Transponder #1

Port 1: Input _____
 Output _____
 Port 2: Input _____
 Output _____
 Port 3: Input _____
 Port 4: Input _____

Speed: _____
 Speed: _____
 Speed: _____
 Speed: _____

Transponder #2

Port 1: Input _____
 Output _____
 Port 2: Input _____
 Output _____
 Port 3: Input _____
 Port 4: Input _____

Speed: _____
 Speed: _____
 Speed: _____
 Speed: _____

DISCRETE			
INPUT		OUTPUT	
AVIONICS MASTER ON SELECT	<input type="checkbox"/>	ALTITUDE ALERT ANNUNCIATE	<input type="checkbox"/>
EXTERNAL IDENT SELECT	<input type="checkbox"/>	EXTERNAL SUPPRESION I/O	<input type="checkbox"/>
EXTERNAL STANDBY SELECT	<input type="checkbox"/>		
SQUAT SWITCH IN	<input type="checkbox"/>		
TIS CONNECT SELECT	<input type="checkbox"/>		
AUDIO MUTE SELECT	<input type="checkbox"/>		

GTX 3X5 POST-INSTALLATION CONFIGURATION LOG

NOTE

This page applies to both GTX 335/335D/335R/335DR and GTX 345/345D/345R/345DR units. Post-installation configuration logs specific to each unit are included immediately following this page and must be filled out in addition to this page for your specific installation.

RS-232 Configuration

Transponder #1

Port 1: Input _____
 Output _____

Port 2: Input _____
 Output _____

Port 3: Input _____
 Output _____

Only available for GTX 345/345D/345R/345DR

Port 4: Input _____
 Output _____

Transponder #2

Port 1: Input _____
 Output _____

Port 2: Input _____
 Output _____

Port 3: Input _____
 Output _____

Only available for GTX 345/345D/345R/345DR

Port 4: Input _____
 Output _____

ARINC 429 CONFIGURATION

Transponder #1

Port 1: Input _____
 Output _____

Port 2: Input _____

Speed: _____

Speed: _____

Speed: _____

Transponder #2

Port 1: Input _____
 Output _____

Port 2: Input _____

Speed: _____

Speed: _____

Speed: _____

RS-422 Configuration (Only available for GTX 345/345D/345R/345DR)
--

Transponder #1

Port 1: Output _____

Transponder #2

Port 1: Output _____

HSDB Configuration (Only available for GTX 345/345D/345R/345DR)
--

Transponder #1

Port 1: _____

Port 2: _____

Transponder #2

Port 1: _____

Port 2: _____

DISCRETE			
INPUT		OUTPUT	
FUNCTION	PIN	FUNCTION	PIN
<input type="checkbox"/> TIS-A SELECT		<input type="checkbox"/> TRANSPONDER FAIL #1	
<input type="checkbox"/> ALTITUDE DATA SELECT		<input type="checkbox"/> EXTERNAL SUPPRESSION I/O	
<input type="checkbox"/> AUDIO MUTE		<input type="checkbox"/> REPLY ACTIVE	
<input type="checkbox"/> AUDIO CANCEL		<input type="checkbox"/> TRANSPONDER FAIL #2	
<input type="checkbox"/> AIR DATA SELECT		<input type="checkbox"/> ALTITUDE ALERT ANNUNCIATE	
<input type="checkbox"/> SQUAT SWITCH		<input type="checkbox"/> ADS-B FUNCTION FAILURE	
<input type="checkbox"/> EXTERNAL IDENT SELECT		<input type="checkbox"/> TRAFFIC ALERT	
<input type="checkbox"/> EXTERNAL STANDBY SELECT		<input type="checkbox"/> TRAFFIC STANDBY/OPERATE	
<input type="checkbox"/> EXTERNAL SUPPRESSION I/O		<input type="checkbox"/> TRAFFIC TEST	
<input type="checkbox"/> TRAFFIC AUDIO MUTE		<input type="checkbox"/> ADS-B OUT FUNCTION FAIL	
<input type="checkbox"/> TRAFFIC AUDIO CANCEL		<input type="checkbox"/> STANDBY ALERT	
		<input type="checkbox"/> TRANSPONDER ACTIVE	
		<input type="checkbox"/> DIVERSITY FAIL	

GTX 330 POST-INSTALLATION CONFIGURATION LOG



NOTE

A post-installation configuration log is available for the GTX 33 immediately following this configuration log.

INSTALLATION SETTINGS

(All settings in this section must be the same for each installed transponder)

Voice Setting

Setting: _____

Message

Setting: _____

Count Down Timer

Setting: _____

Traffic Messages

Setting: _____

BKLT Source

Setting: _____

If **MAN** selected as BKLT Source, the additional fields below must be configured:

Level

Setting: _____

Min

Setting: _____

BKLT Source

Setting: _____

Slope

Setting: _____

Offset

Setting: _____

RSP Time

Setting: _____

Contrast Mode

Setting: _____

Volume

Setting: _____

Altitude Monitor

Setting: _____

Page Change

Setting: _____

Display Mode/Level

Setting: _____

KEY

Setting: _____

If **MAN** selected as KEY Source, the additional fields below must be configured:

Level

Setting: _____

Min

Setting: _____

KEY Source

Setting: _____

Slope

Setting: _____

Offset

Setting: _____

RSP Time

Setting: _____

VFR Key Configuration

Setting: _____

GTX 330 POST-INSTALLATION CONFIGURATION LOG

Transponder #1

VS Rate

Setting: _____

VFR ID

Setting: _____

Squat Switch

Setting: _____

Sense

Setting: _____

Delay Time

Setting: _____

Auto Flight Timer

Setting: _____

GPS X Ofst

Setting: _____

GPS Integrity

Setting: _____

Max A/S

Setting: _____

AC Width Type

Setting: _____

1090 IN

Setting: _____

EHS

Setting: _____

Format

Setting: _____

Altitude Alert Deviation

Setting: _____

Temperature Sensor Installed/**Units** Setting: _____ / _____**US Tail**

Setting: _____

Hex Address

Setting: _____

Mode S Flight ID

Setting: _____

ALLOW PILOT TO EDIT FLT ID

Setting: _____

GPS Y Ofst

Setting: _____

Aircraft Type

Setting: _____

AC Length Type

Setting: _____

ADS-B TX

Setting: _____

UAT IN

Setting: _____

Gray Code

Setting: _____

GTX 330 POST-INSTALLATION CONFIGURATION LOG

Transponder #2

VS Rate

Setting: _____

VFR ID

Setting: _____

Squat Switch

Setting: _____

Sense

Setting: _____

Delay Time

Setting: _____

Auto Flight Timer

Setting: _____

GPS X Ofst

Setting: _____

GPS Integrity

Setting: _____

Max A/S

Setting: _____

AC Width Type

Setting: _____

1090 IN

Setting: _____

EHS

Setting: _____

Format

Setting: _____

Altitude Alert Deviation

Setting: _____

Temperature Sensor Installed/Units

Setting: _____ / _____

US Tail

Setting: _____

Hex Address

Setting: _____

Mode S Flight ID

Setting: _____

ALLOW PILOT TO EDIT FLT ID

Setting: _____

GPS Y Ofst

Setting: _____

Aircraft Type

Setting: _____

AC Length Type

Setting: _____

ADS-B TX

Setting: _____

UAT IN

Setting: _____

Gray Code

Setting: _____

GTX 33 POST-INSTALLATION CONFIGURATION LOG

INSTALLATION SETTINGS

(All settings on this page will be the same for each installed transponder)

<p>VFR Button Code Setting: _____</p> <p>Aircraft Weight Setting: _____</p> <p>Auto Standby Delay Setting: _____ 2 _____</p> <p>Altitude Climb Rate for Airborne Transition Setting: _____</p> <p>Air/Ground Logic Setting: _____</p> <p>Squat Switch Sense Setting: _____</p> <p>Max Airspeed Setting: _____</p> <p>Address Type Setting: _____</p> <p>Address Setting: _____</p> <p>Flight ID Type Setting: _____</p>	<p>Flight ID Setting: _____</p> <p>Aircraft Length Setting: _____</p> <p>Aircraft Width Setting: _____</p> <p>Enhanced Surveillance Setting: _____</p> <p>Surveillance Integrity Level Setting: _____ IE-7 _____</p> <p>Temperature Switch Installed Setting: _____</p> <p>1090 Input Setting: _____</p> <p>UAT Input Setting: _____</p> <p>GPS Antenna Longitudinal Offset Setting: _____</p> <p>GPS Antenna Lateral Offset Setting: _____</p>
---	---

AUDIO CONFIGURATION

<p>Altitude Monitor Setting: _____ N/A – Has no effect _____</p> <p>Count Down Timer Setting: _____ N/A – Has no effect _____</p> <p>TIS Alert Setting: _____</p>	<p>Voice Setting Setting: _____</p> <p>Volume Setting: _____</p>
--	--

GTX 335/335D/335R/335DR POST-INSTALLATION CONFIGURATION LOG

NOTE

A post- installation configuration log is available for the GTX 345/345D/345R/345DR following this configuration log.

INSTALLATION SETTINGS

(All settings in this section must be the same for each installed transponder)

AUDIO

Audio Output: _____	Altitude Alert: _____
Volume: _____	Timer Expired Alert: _____
Voice: _____	Traffic Alert: _____
Test Audio: _____	

UNIT

Altitude Units: _____	Installation ID: _____
Temperature Units: _____	VFR ID: _____
Altitude Alert Deviation: _____	
Restore Pages On Power-Up: _____	

DISP (Only for Panel Mounted units)

Display Backlight: _____	Keypad Backlight: _____
Minimum Level: _____	Minimum Level: _____
Photocell Transition: _____	Lighting Bus Input VLTG: _____
Slope: _____	Slope: _____
Offset: _____	Offset: _____
Default Backlight Offset: _____	Default Contrast Offset: _____

SNSR

OAT Sensor Installed: _____	Altitude Source 1: _____
GPS 1 SRC: _____	Altitude Source 2: _____
INTGRTY: _____	GPS 2 SRC: _____
LAT OFST: _____	INTGRTY: _____
LON OFST: _____	LAT OFST: _____
Internal ALT Encoder Installed	Internal ALT Encoder Adjustment
Installed: _____	TEST ALT: _____
Ceiling: _____	Correction: _____
Test Points: _____	Measured: _____

ADS-B

ACFT CATGRY: _____	Aircraft Length: _____
ACTF MAX A/S: _____	Aircraft Width: _____
1090ES OUT Control: _____	1090ES IN Control: _____
UAT OUT RMT Control: _____	UAT IN Capable: _____
Aircraft Tail Number: _____	Allow Pilot to edit FLT ID: _____
Address: _____	Default FLT ID: _____
Number: _____	FLT ID PREFIX: _____
ADS-B IN Processing: _____	

Diversity

Top Antenna Cable Delay: _____	Bottom Antenna Cable Delay: _____
Top Antenna Cable Loss: _____	Bottom Antenna Cable Loss: _____

GTX 345/345D/345R/345DR POST-INSTALLATION CONFIGURATION LOG

INSTALLATION SETTINGS

(All settings in this section must be the same for each installed transponder)

AUDIO

Audio Output: _____	Altitude Alert: _____
Volume: _____	Timer Expired Alert: _____
Voice: _____	Traffic Alert: _____
Test Audio: _____	

UNIT

FIS-B Processing: _____	Altitude Units: _____
Installation ID: _____	Temperature Units: _____
VFR ID: _____	Altitude Alert Deviation: _____
Bluetooth Control: _____	Restore Pages On Power-Up: _____

DISP (Only for Panel Mounted units)

Display Backlight: _____	Keypad Backlight: _____
Minimum Level: _____	Minimum Level: _____
Photocell Transition: _____	Lighting Bus Input VLTG: _____
Slope: _____	Slope: _____
Offset: _____	Offset: _____
Default Backlight Offset: _____	Default Contrast Offset: _____

SNSR

OAT Sensor Installed: _____	Altitude Source 1: _____
	Altitude Source 2: _____
GPS 1 SRC: _____	GPS 2 SRC: _____
INTGRTY: _____	INTGRTY: _____
LAT OFST: _____	LAT OFST: _____
LON OFST: _____	LON OFST: _____
Internal ALT Encoder Installed	Internal ALT Encoder Adjustment
Installed: _____	TEST ALT: _____
Ceiling: _____	Correction: _____
Test Points: _____	Measured: _____
Internal AHRS Orientation	
Connectors: _____	
Vent: _____	
Yaw: _____	

ADS-B

ACFT CATGRY: _____	Aircraft Length: _____
ACTF MAX A/S: _____	Aircraft Width: _____
1090ES OUT Control: _____	1090ES IN Control: _____
UAT OUT RMT Control: _____	UAT IN Capable: _____
Aircraft Tail Number: _____	Allow Pilot to edit FLT ID: _____
Address: _____	Default FLT ID: _____
Number: _____	FLT ID PREFIX: _____
ADS-B IN Processing: _____	

Diversity

Top Antenna Cable Delay: _____	Bottom Antenna Cable Delay: _____
Top Antenna Cable Loss: _____	Bottom Antenna Cable Loss: _____

AIRCRAFT WIRING DIAGRAMS

Attach the aircraft wiring diagrams showing the equipment installed by this STC or a markup of the interconnect diagrams from the STC installation manual detailing which equipment was installed and how it was connected.

APPENDIX B SPECIAL BONDING PROCEDURES

B.1	Considerations for Untreated or Bare Dissimilar Metals.....	B-2
B.2	Preparation of Aluminum Surfaces.....	B-5
B.3	Composite Aircraft	B-6
B.4	Tube-and-Fabric Aircraft.....	B-10
B.5	Bonding Jumper	B-12

Refer to SAE ARP1870 Section 5 when surface preparation is required to achieve electrical bond.

B.1 Considerations for Untreated or Bare Dissimilar Metals

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 is completed should be protected again. Additional guidance can be found in AC 43.13-1B and SAE ARP1870. Typical electrical bonding preparation examples are shown in Figure B-1, Figure B-2, and Figure B-3.

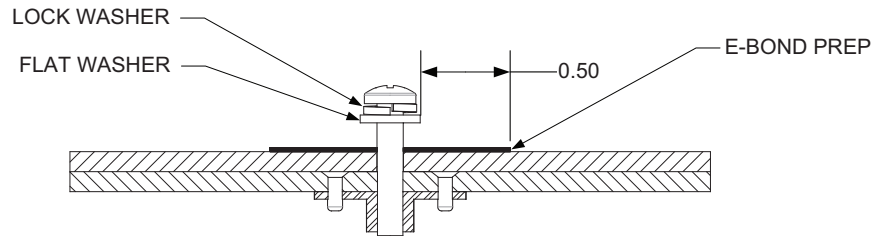


Figure B-1 Electrical Bonding Preparation – Nut Plate

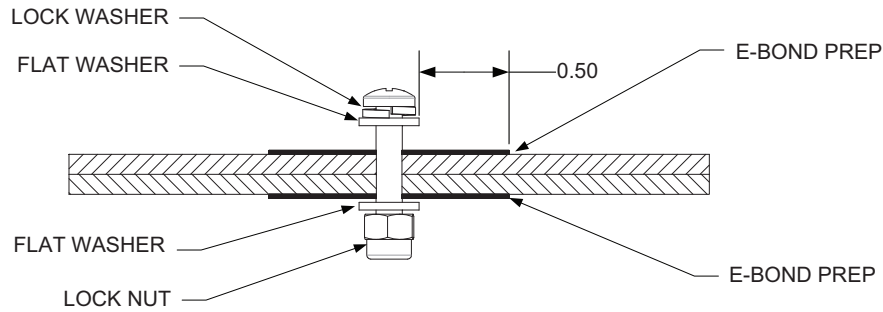


Figure B-2 Electrical Bonding Preparation – Bolt/Nut Joint

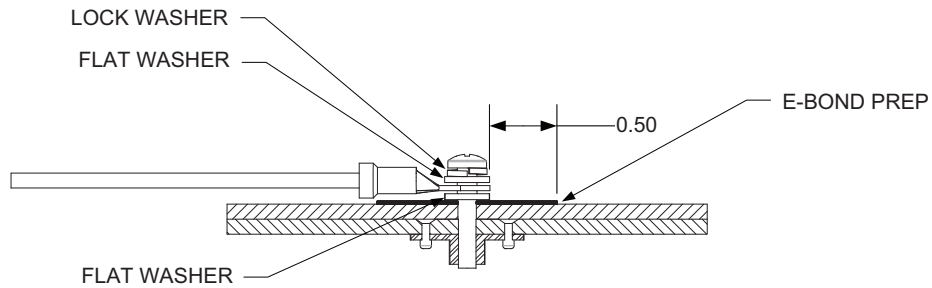


Figure B-3 Electrical Bond Preparation – Terminal Lug

Table B-1 Ground Plane Definitions and Ground Path Resistance Requirements

Aircraft Type/Model		Ground Reference	Maximum Resistance Between GTX Chassis 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 F DA 40 NG	Instrument panel	50.0	25.0	
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]
Ruschmeyer	R90-230RG	Instrument Panel	50.0	25.0	[2]
Slingsby Aviation	T67M260	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 bar/strip	10.0	5.0	
Cirrus	SR20 SR22 SR22T	Local grounded structure (such as seat support structure, entry step)	10.0	5.0	
Construzioni Aeronautiche Tecnam srl	P2010	Local grounded structure	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 DA 62	Remote avionic box or local grounded structure	10.0	5.0	
Liberty	XL-2	Local grounded structure	10.0	5.0	

Aircraft Type/Model		Ground Reference	Maximum Resistance Between GTX Chassis and Ground Reference (mΩ)		Notes
			Periodic	Reconditioned	
Triton	A500	Local grounded structure	10.0	5.0	

Notes:

- [1] Diamond DA 40 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.

B.2 Preparation of Aluminum Surfaces

The following general procedure is recommended to prepare an aluminum surface for proper 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. Once the chemical conversion coat is dry, clean the area.
5. Install bonding equipment at grounding location.
6. After the bond is complete, reapply a suitable film or coating to the surrounding area, if any films or coatings were removed from the surface.

For a more detailed procedure, refer to SAE ARP1870 Sections 5.1 and 5.5.

B.3 Composite Aircraft

Use the following guidance when repairing or replacing special bonding components. Use aluminum tape (3M P/N 436, 438, or other adhesive-backed dead soft aluminum foil with minimum 7.2 mils metal thickness) when replacing existing aluminum foil that has been damaged. 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). Maintain the existing aluminum tape routing, while maintaining the same width as the tape being replaced. Additional guidance can be found in AC 43.13-1B and SAE ARP1870, sections 5.1 and 5.5.

Additional considerations:

- Isolate tape from carbon composite material
- Verify tape does not have any tears in the joint or along the length of the tape
- Fold tape over twice to itself when bonding to metal part
- Cover folded tape area with thin aluminum plate
- Clean metal-to-metal contact points
- Secure plate and tape to metal part with multiple fasteners

When replacing damaged aluminum foil, the following procedure is recommended for bonding on composite structures.

1. 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 B-4.

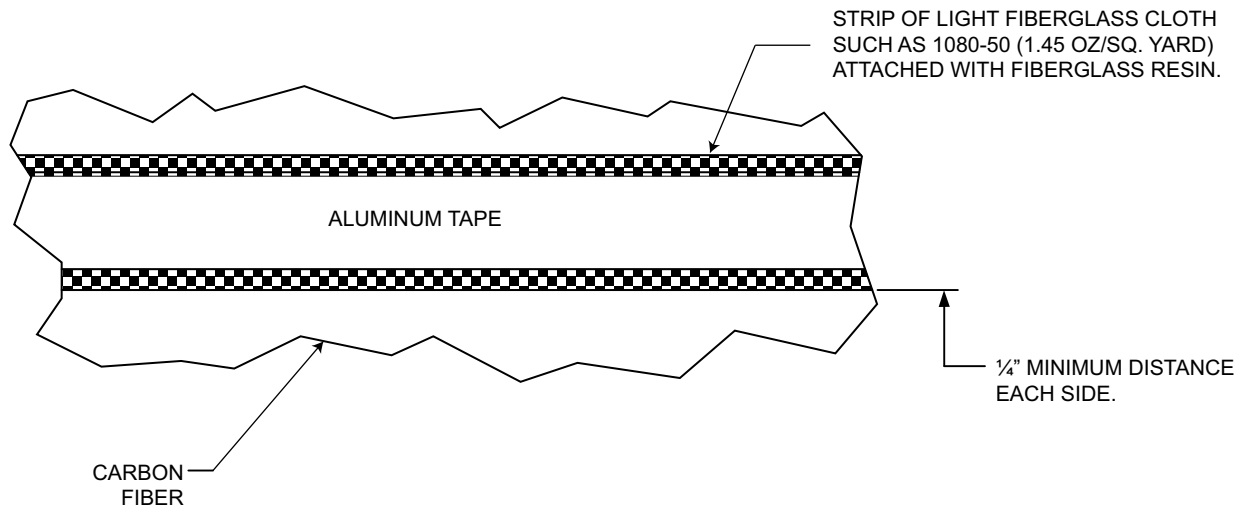


Figure B-4 Fiberglass Insulation for Carbon Material

2. Ensure the existing ground location is prepared in accordance with Section B.2.
3. Route the aluminum tape between the GTX install 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 B-5.
4. Fold the end of the tape over twice for added thickness at the prepared grounding location. The span of the fold should equal or exceed the width of the aluminum plate used to protect the aluminum tape from the fasteners.
5. Secure the end of the tape to the composite surface with the existing aluminum plate as shown in Figure B-6.

6. If any of the existing special bonding components are found to be damaged, use the braid and hardware specified in Table B-2 to replace the damaged items (refer to Figure B-6 and Figure B-7).
7. If multiple strips of tape were used, the plate must touch each strip to ensure grounding.
8. Ensure the bonding straps, aluminum plate, and associated hardware are reinstalled as shown in Figure B-7.
9. Verify the resistance between tape and the local grounding location does not exceed 2.5 mΩ.
10. Reinstall the GTX install rack and aluminum plate on the aluminum tape as shown in Figure B-7. The recommended torque for #6 screws is 12-15 in-lbs and for #10 screws is 20-25 in-lbs.
11. Verify the resistance between the GTX chassis and the aircraft ground structure specified in Table B-1 does not exceed the value specified in Table B-1.

Table B-2 Composite Airframe Bonding Hardware

Item Number	Description
1	Tinned copper flat braid, 3/4", QQB575F36T781 OR Tinned copper tubular braid, 7/16-inch, 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, AN363-535

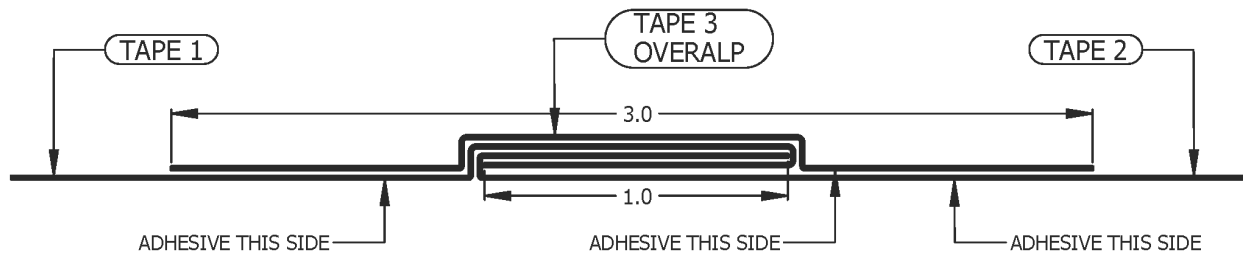


Figure B-5 Aluminum Tape Joint

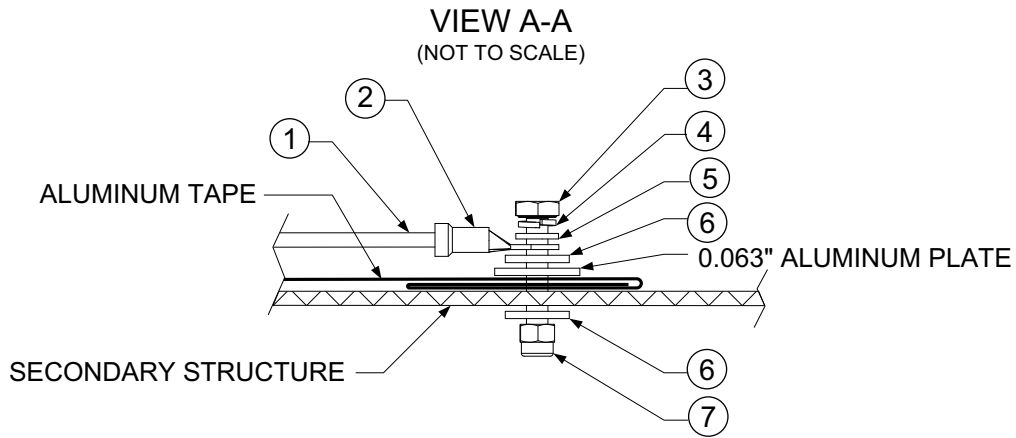
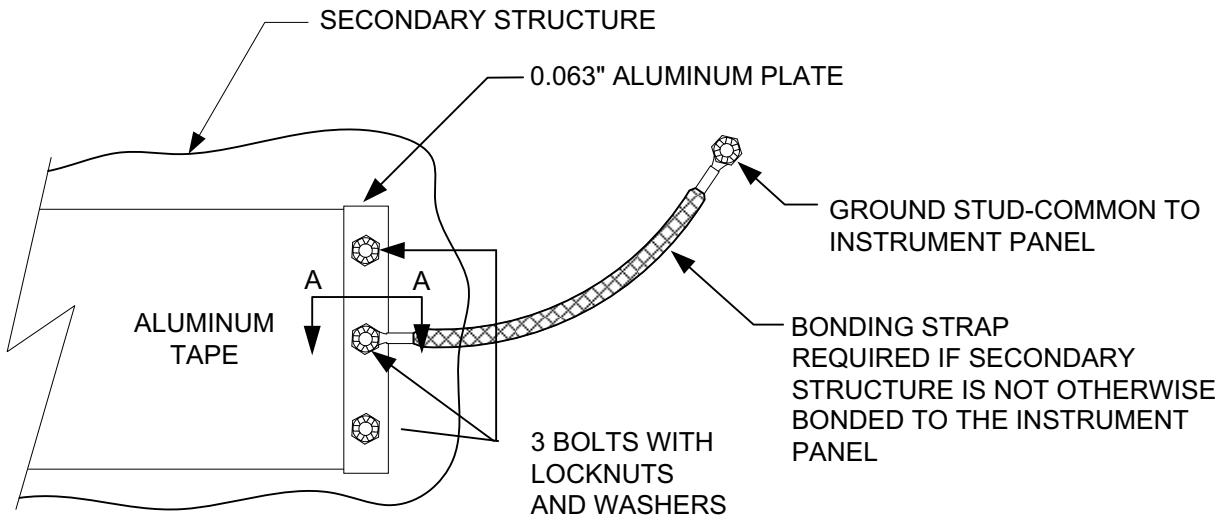
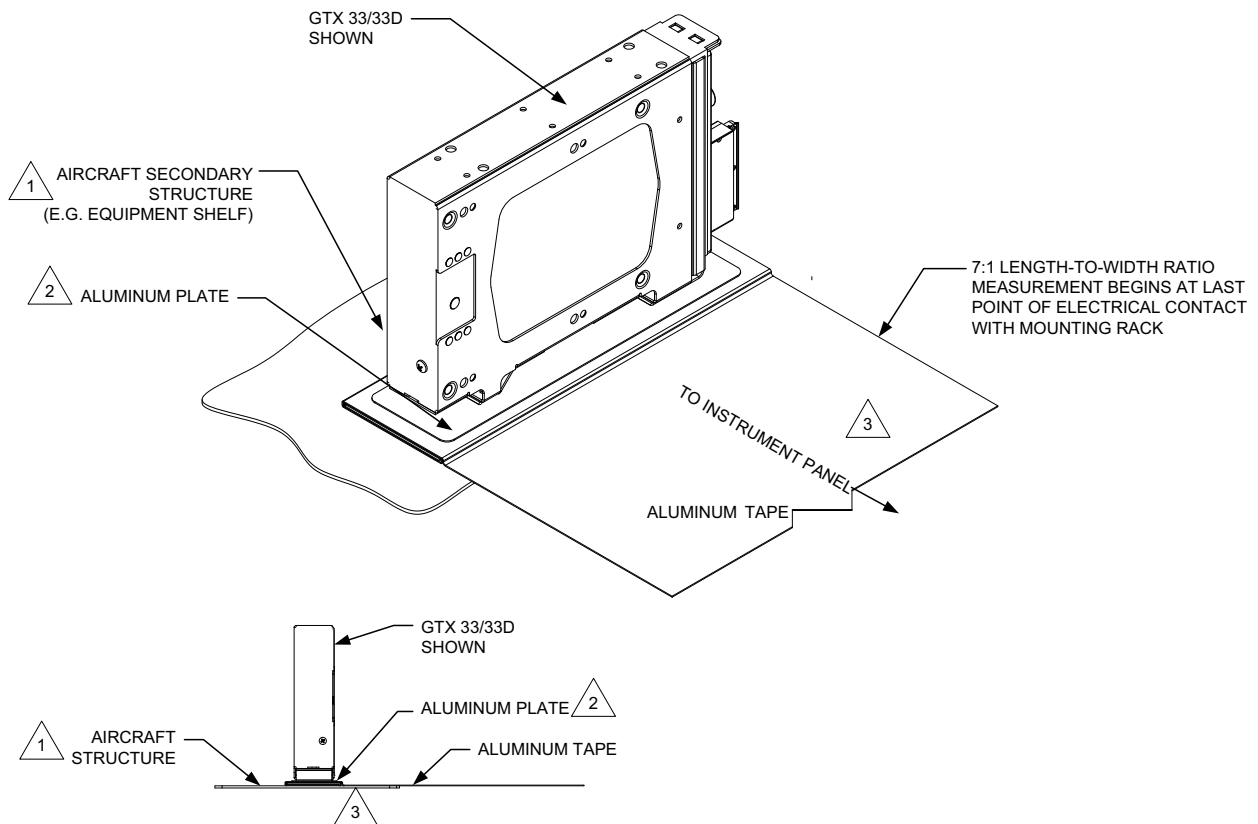


Figure B-6 Aluminum Tape Ground Termination



NOTES

1

AIRCRAFT SECONDARY STRUCTURE, SUCH AS AN EQUIPMENT SHELF MUST HAVE CLEARANCE ON THE OPPOSITE SIDE FOR HARDWARE NEEDED TO INSTALL THE GTX 33/33D/3X5R TO THE AIRCRAFT STRUCTURE.

2

RECOMMENDED THICKNESS OF ALUMINUM PLATE IS 0.032 INCHES. ALUMINUM PLATE LENGTH AND WIDTH MUST BE AT LEAST 0.5 INCHES LARGER THAN THE GTX 33/33D 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 INCHES MINIMUM, 0.25 INCHES RECOMMENDED).

3

GTX 33/33D UNITS MUST BE INSTALLED ON A HORIZONTAL SURFACE, BUT ORIENTATION IS UNRESTRICTED.

Figure B-7 Remote GTX Aluminum Tape Installation

B.4 Tube-and-Fabric Aircraft

If it is necessary to replace the existing AN742 clamp, install a new AN742 clamp in accordance with AC 43.13-1B Chapter 11, Section 11, *Clamping*, and Section 15, *Grounding and Bonding* and the following criteria.

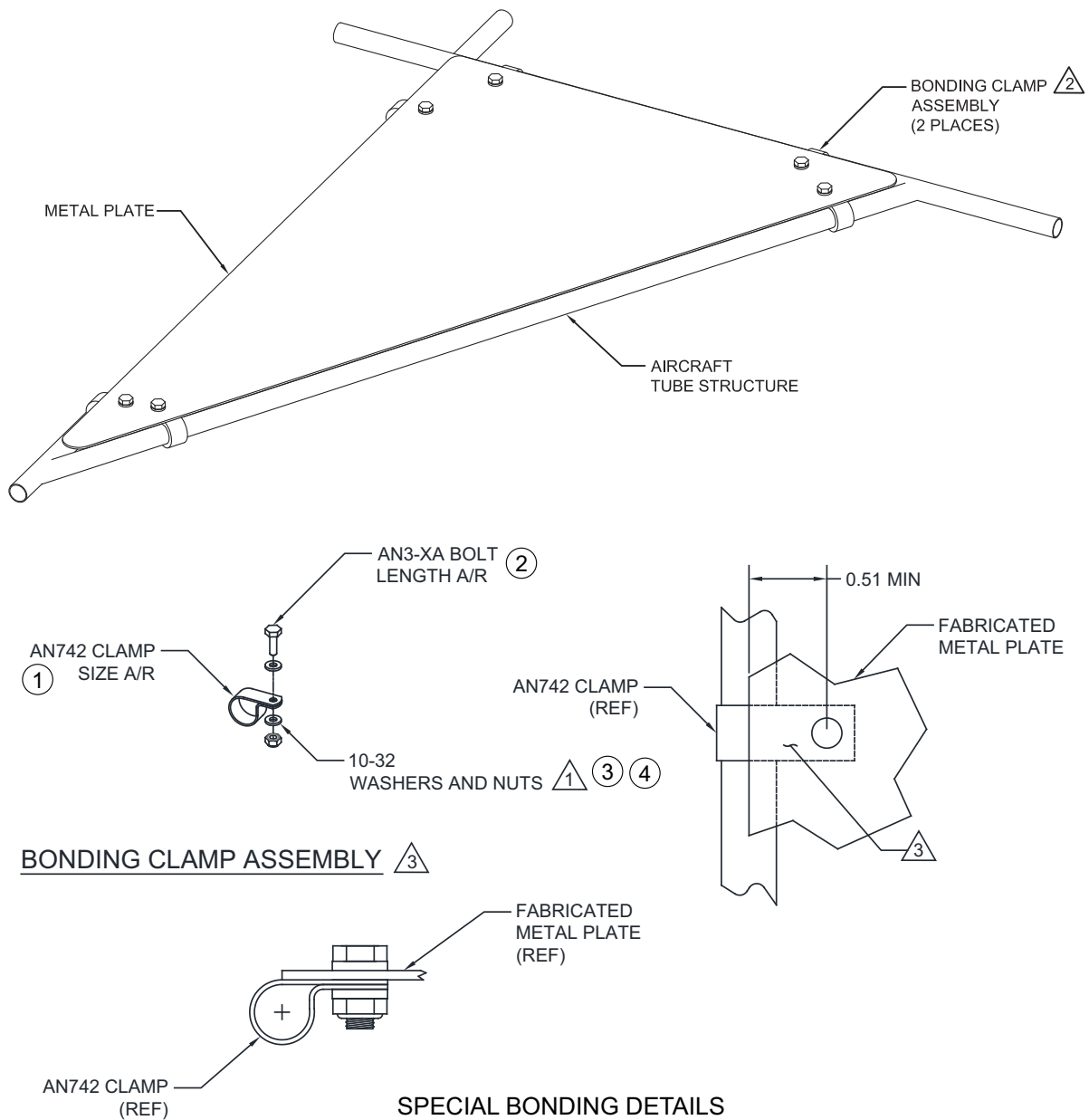
Refer to Table B-3 for hardware.

Install the conductive clamp on the tubular structure using the following procedure (refer to Figure B-8).

1. Ensure 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; 2 inch minimum length for attachment to aluminum tubes, to ensure a good contact surface.
2. Reinstall the existing bonding straps from the GTX mounting plate to the bonding clamp.
3. Verify the resistance between the GTX chassis and the aircraft ground structure does not exceed 2.5 mΩ.
4. 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

Table B-3 Tube and Fabric Airframe Bonding Hardware

Refer to Figure B-8	Conductive Clamp Assembly
1	Bonding clamp, AN742-XX (Dash number determined by tube diameter)
2	Bolt, #10, AN3-XA
3	Flat washer, NASM970-3 (AN970-3)
4	Locknut #10, AN363-1032



NOTES



USE WASHER AND NUTS IDENTIFIED IN TABLE B-3.



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.



INSTALL BONDING CLAMP UNDER FABRICATED METAL PLATE. ENSURE MAXIMUM CONTACT AREA BETWEEN CLAMP AND FABRICATED METAL PLATE. FOLLOW GUIDANCE IN SECTION B.1 FOR ELECTRICAL BONDING AND REFER TO FIGURE B-2 FOR ELECTRICAL BONDING PREPARATION OF THE BOLT/NUT JOINT.

Figure B-8 Electrical Bonding Using Conductive Clamp

B.5 Bonding Jumper

To replace any bonding strap from vibration-isolated instrument panel grounding to metallic structure, use the following criteria.

- 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

Remove the existing jumper. Install the replacement bonding jumper using the following procedure (refer to Figure B-9 and Table B-4).

1. Construct a bonding strap by securely attaching 5/16-inch inside diameter terminal lugs to each end of the overbraid.
2. Ensure 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 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
4. Install one end of the bonding strap to the instrument panel and the other end to aircraft metallic structure (or aircraft ground) as shown in Figure B-9.

Table B-4 Airframe Bonding Hardware

Refer to Figure B-9	Description
1	Tinned copper flat braid, 3/4-inch, 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

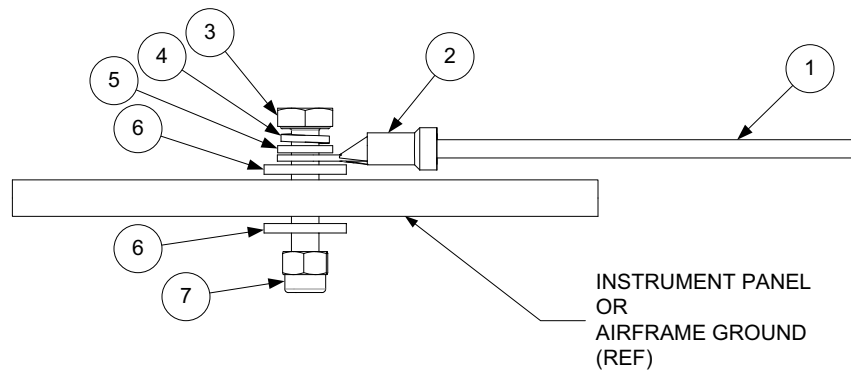


Figure B-9 Bonding Strap

GARMIN  **®**