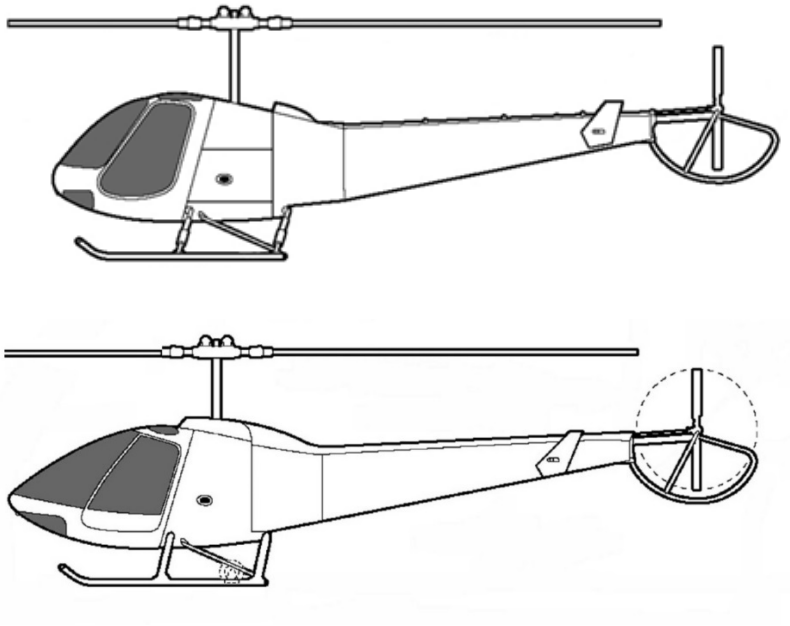
ENSTROM
HELICOPTER CORPORATION

# ENSTROM F-28F/280F SERIES MAINTENANCE MANUAL

## SUPPLEMENT 1

## AVIONIC SYSTEMS



For FAA approval, the Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.


The Enstrom Helicopter Corporation
2209 22nd Street
Menominee, Michigan 49858-3515

Telephone: 906-863-1200
Fax: 906-863-6821

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RECOMMENDED CHANGE REPORT

This maintenance manual is prepared and distributed by The Enstrom Helicopter Corporation and is intended for use by personnel responsible for maintaining Enstrom F-28F, 280F, and 280FX helicopters. This manual is periodically revised. If, in the opinion of the user, any information has been omitted or requires clarification, please direct your comments to Enstrom via this form (duplicate) or other similar form. Send the recommended changes to:

The Enstrom Helicopter Corporation
2209 22nd Street
Menominee, MI 49858-3515

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Manual Identification: Enstrom F-28F/280F Series Maintenance Manual Supplement 1
Manual Date: November 18, 2008
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# RECORD OF REVISIONS

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| 2 | Dec 8/08 | Dec 8/08 | JW | | | | |
| 3 | Nov 11/11 | Nov 11/11 | JW | | | | |
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| 6 | Aug 3/15 | Aug 3/15 | JW | | | | |
| 7 | Aug 28/17 | Aug 28/17 | JW | | | | |
| 8 | Jan 15/19 | Mar 26/19 | JW | | | | |
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# INTRODUCTION

## Avionic System(s) Effectivity

A. The data presented in this supplement is applicable to the optional avionic systems listed in the following table:

**Avionic System(s)**

| Avionic System | Enstrom Part Number |
|---|---|
| Attitude Indicator | 28-22062-( ) |
| Collective Control Installation (Dual Start) | 28-16080-101 |
| Directional Gyro | 28-22062-( ) |
| GDL 69/69A | 28-22082-( ) |
| GMA 350Hc | 28-22048-5 |
| GNC 255A | 28-22063-5 |
| GNS 430W | 28-22037-( ) |
| GNS 530W | 28-22050-( ) |
| GTN 650 | 28-22112-3 |
| GTX 330 | 28-22028-1 |
| GTX 345 | 28-22028-3 |
| KX 165A COMM/NAV | 28-22063-( ) |
| MD200-306 VOR/LOC/GS Indicator | 28-22095-1 |
| MD200-706 VOR/LOC/GS Indicator | 28-22095-3 |
| SAE5-35 Altitude Data System | 28-22090-( ) |
| SL30 | 28-22069-1 |

## Aircraft Effectivity

A. The data presented in this F-28F/280F Series Maintenance Manual Supplement is applicable to all Enstrom F-28F and 280F series model helicopters.

## Supplemental Changes and Revisions

A. Subsequent to the publication of the initial issue of this supplement, changes in the avionics equipment, support concepts and procedures, as well as information developed by experience may affect the contents of this supplement. To ensure that coverage in the supplement continues to reflect such changes, revised information is released by one of the following methods:

1. Revision - A revision alters portions of the manual by replacement, addition, and/or removal of pages.

2. Reissue - A reissue of this supplement will occur when the amount of changes warrants complete reissue.

3. Service Directive Bulletins – Used to direct the owner/operator and/or maintenance personnel to make mandatory changes, improvements, or inspections to the aircraft applicable to the entire fleet or a segment of the fleet that are typically safety/airworthiness related. The information provided in the Service Directive Bulletins will be incorporated in the maintenance manual as needed at a later date. At the time of incorporation, the Service Directive Bulletin is superseded by the maintenance manual, and accomplishment or sign-off of the Service Directive Bulletin in the maintenance records book is no longer required. A detailed entry should be made in the maintenance records to indicate that the Service Directive Bulletin is superseded by the maintenance manual.

4. Service Information Letters – Used to transmit information, recommendations, and general service instructions to the aircraft owner/operator and/or maintenance personnel applicable to the entire fleet or a segment of the fleet. The information provided in the Service Information Letters will be incorporated into the maintenance manual as needed at a later date.

5. Service Instructions – Used to provide the owner/operator and/or maintenance personnel with information that is applicable to specific aircraft and does not meet the criteria of a Service Information Letter or Service Directive Bulletin. Service Instructions will not be distributed to the entire fleet.

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Service Information Letters and Service Directive Bulletins incorporated into the maintenance manual are logged in the Service Information Letter Index or the Service Directive Bulletin Index (as appropriate) located on the Enstrom Helicopter website: www.enstromhelicopter.com (follow the applicable link under the Technical Publications section of the Technical Support page). Each index numerically lists all Service Information Letters and Service Directive Bulletins, respectively, and identifies those which have been incorporated into the maintenance manual. All Service Information Letters and Service Directive Bulletins are also located under the Technical Publications section of the website.

Notice of recently released Service Information Letters and Service Directive Bulletins is provided via email notification. Registration to receive publication mailing notifications can be coordinated through the Enstrom Technical Publications Administrator.

## Application of Warnings, Cautions, and Notes

A. Throughout this supplement, it is necessary to highlight or emphasize important points to avoid injury to personnel, damage to equipment, or unnecessary confusion while performing maintenance procedures. The terms “WARNING,” “CAUTION,” and “NOTE” are used to draw attention to instructions or information deserving special consideration.

B.

**WARNING**

**Calls attention to use of materials, processes, methods, procedures, or limits that must be followed to avoid injury to personnel.**

C.

**CAUTION**

**Calls attention to methods and procedures that must be followed to avoid damage to equipment.**

D.

**NOTE**

**Calls attention to information essential to highlight for clarification of procedures or to make a task easier.**

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# CHAPTER 1

# SL30 NAV COM

# SECTION 1

# SYSTEM DESCRIPTION

## 1-1. System Description

A. The SL30 NAV/COM unit is a VHF Navigation/Communications Transceiver utilizing high performance Digital Signal Processing (DSP) filtering. It includes a 760-channel VHF Com transceiver and a 200-channel VOR/LOC/GS navigation receiver.

B. Functions and features of the SL30 include automatic decoding of the Morse code station identifier for VOR/LOC, memory storage for most-used frequency, built-in course deviation indicator, standby Com and Nav frequency monitoring, Nav receiving for both VOR and LOC navigation signals, and built in Glideslope receiver.

C. The components of the SL30 system include the panel mounted SL30 unit and nav and com antennas. The SL30 provides output to a VOR/LOC/GS Indicator and to either a VOX ICS or an audio panel.

D. Power to the SL30 unit is provided via the **COM** circuit breaker (CB27) (5 Amp) and the **NAV** circuit breaker (CB39) (2 Amp) located on the left side of the center pedestal.

E. Refer to the 280FX Rotorcraft Flight Manual Supplement and the current vendor operating manuals/instructions for operation of the SL30 system.

## 1-2. Vendor Publications

A. The SL30 is to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft. The applicable vendor manuals are listed in Table 1-1.

**Table 1-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| SL30 | SL30 Nav Com Pilot's Guide | Garmin International<br>1200 E. 151st Street<br>Olathe, KS 66062 |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the SL30 system are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The SL30 contains no user serviceable components or assemblies. Operations involving the removal of the SL30 or any other line-replaceable unit (LRU) installed as a part of the SL30 must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to the respective Pilot's Operating Guide and Reference when troubleshooting problems with the SL30.

### 3-3. Periodic Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **SL30 NAV/COM** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the electrical cables, and mounts for security, damage, and obvious defects. | |
| 2. Inspect the antennas and mount for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on the Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

## 4-1. SL30

### 4-1-1. Removal – SL30

A. Turn the SL30 and aircraft power off. Pull the NAV and COM circuit breakers out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. The SL30 is mounted in a tray in the radio panel of the console. Using a 3/32 hex driver, turn the cam lock to release the unit from the tray. Pull the SL30 unit from the radio panel.

### 4-1-2. Inspection/Repair – SL30

A. Inspect the condition and security of the tray and electrical interface.

B. Inspect the condition and security of electrical cables.

C. Repair procedures are not available for the SL30.

### 4-1-3. Installation – SL30

A. Install the SL30 into the radio panel tray and lock the unit into the tray.

B. Remove the cable tie or other similar device from the NAV and COM circuit breaker stems and push the stems in to set the circuit breaker.

## 4-2. Wiring Harnesses/Connectors – SL30

### 4-2-1. Removal – Wiring Harnesses/Connectors – SL30

**CAUTION**

**Before removing or adjusting any electrical component, ensure all electrical power is off and the battery is disconnected.**

A. Refer to Diagram 1-1 for the SL30 wiring interface.

B. Remove the attaching hardware, clamps, connectors, leads, or wiring.

C. Identify the connectors, leads, or wiring.

D. Remove the component.

### 4-2-2. Inspection – Wiring Harnesses/Connectors – SL30

A. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

B. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

### 4-2-3. Repair – Wiring Harnesses/Connectors – SL30

A. Tighten lose terminal connectors, mounting hardware, and electrical component attachments.

B. Replace miscellaneous electrical components that fail to meet the inspection requirements.

C. Clean corrosion from the connections and receptacles with contact cleaner.

### 4-2-4. Installation – Wiring Harnesses/Connectors – SL30

A. Refer to Diagram 1-1 for the SL30 wiring interface.

B. Install the electrical component and secure with attaching hardware, clamps, or cable ties.

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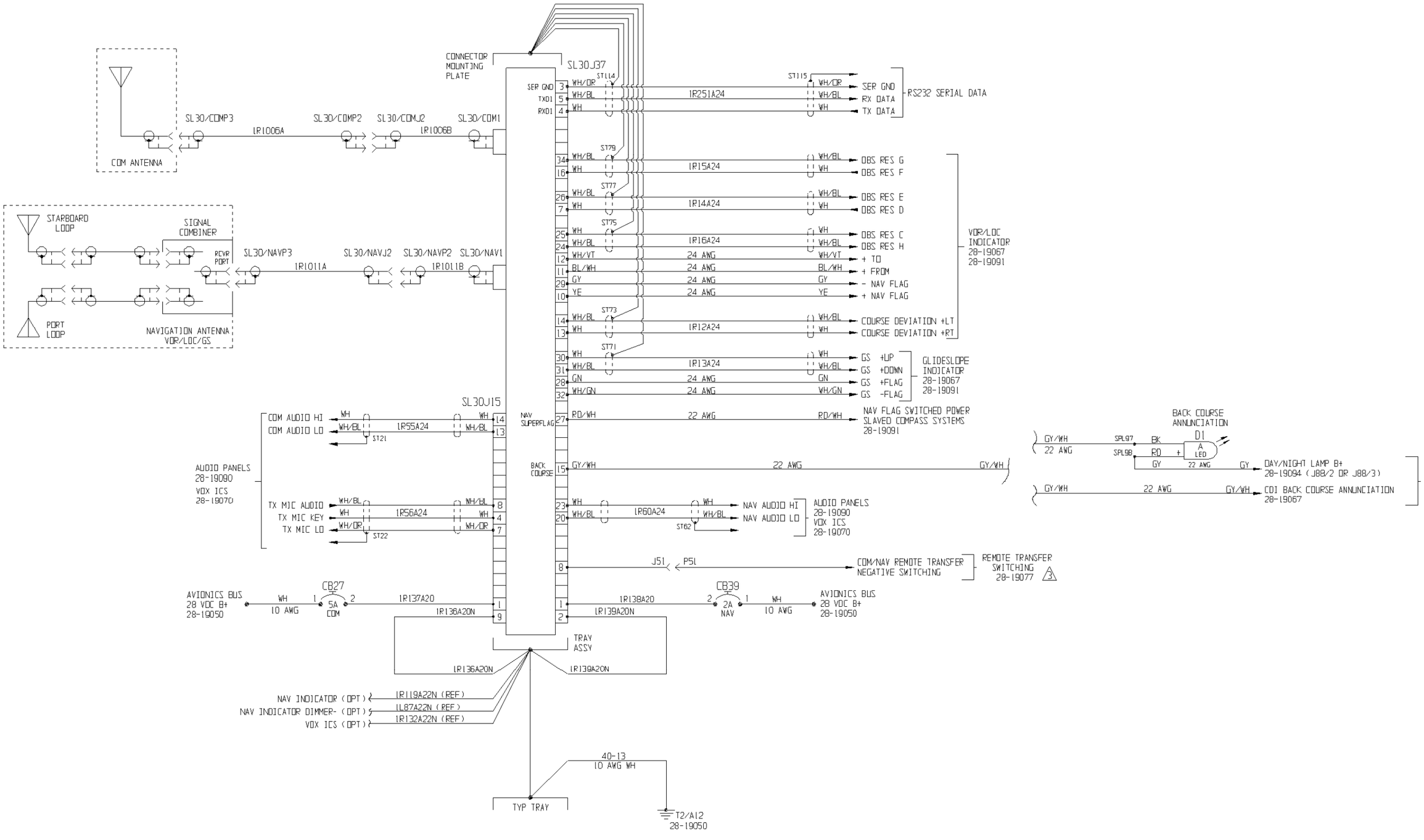


Diagram 1-1. SL30, Sheet 1 of 1
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# CHAPTER 2

# SANDIA SAE5-35 ALTITUDE DATA SYSTEM

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The Sandia SAE5-35 is a solid state altitude data system (blind encoder) that converts pressure altitude into a digital output. The data output is referenced to 29.92 in Hg (1013 Millibars).

B. The Sandia SAE5-35 outputs altitude data via Gillham Grey Code or two independent RS232 digital outputs to Mode C transponders. The transponders utilized include the Bendix/King KT73, KT76A, and KT76C; and the Garmin GTX327 and GTX330.

C. Two configurations of the Sandia SAE5-35 system are available. They are part numbers 28-22090-1 and 28-22090-3. P/N 28-22090-1 is the standard system installation and P/N 28-22090-3 is the standard system with the “Altitude In-Flight Monitoring” function.

D. Power to the Sandia SAE5-35 encoder is provided via the **ENCDR** circuit breaker (CB) (2 Amp) located on the lower left side of the center pedestal.

E. Refer to the 280FX Rotorcraft Flight Manual Supplement and the current vendor operating manuals/instructions for operation of the Sandia SAE5-35 altitude data system.

### 1-2. Vendor Publications

A. The Sandia SAE5-35 is to be operated and maintained I/A/W the current vendor’s instructions to ensure the continued airworthiness of the aircraft. The applicable vendor manuals are listed in Table 2-1.

**Table 2-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| Sandia SAE5-35 | 1. SAE5-35 Pilot’s Guide, Document 305221<br><br>2. SAE5-35 Altitude Data System Installation Manual, Document 305186 | Sandia Aerospace, Inc.<br>3700 Osuna Rd. NE, Suite 171<br>Albuquerque, NM 87109 |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the Sandia SAE5-35 system are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The Sandia SAE5-35 contains no user serviceable components or assemblies. Operations involving the removal of the Sandia SAE5-35 or any other line-replaceable unit (LRU) installed as a part of the Sandia SAE5-35 must be done by authorized maintenance technicians.

B. The Sandia SAE5-35 requires calibration every 24 mouths. Refer to the installation manual when calibrating the Sandia SAE5-35.

### 3-2. Troubleshooting

A. No troubleshooting guidelines are available for the Sandia SAE5-35.

### 3-3. Periodic Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **SANDIA SAE5-35 ALTITUDE DATA SYSTEM** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the electrical cables, and mounts for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-511-5, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

## 4-1. Sandia SAE5-35

### 4-1-1. Removal – Sandia SAE5-35

A. Turn the Sandia SAE5-35 and aircraft power off. Pull the ENCDR circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. The Sandia SAE5-35 is installed onto a tray mounted on a back panel bracket inside the pedestal.

C. Disconnect the electrical cables.

D. Slide the unit out of the tray.

### 4-1-2. Inspection/Repair – Sandia SAE5-35

A. Inspect the condition and security of the mounting bracket and electrical interface.

B. Inspect the condition and security of electrical cables.

C. Repair procedures are not available for the Sandia SAE5-35.

### 4-1-3. Installation – Sandia SAE5-35

A. Install the Sandia SAE5-35 onto the tray.

B. Connect the electrical cables.

C. Remove the cable tie or other similar device from the ENCDR circuit breaker stem and push the stem in to set the circuit breaker.

## 4-2. Wiring Harnesses/Connectors – Sandia SAE5-35

### 4-2-1. Removal – Wiring Harnesses/Connectors – Sandia SAE5-35

**CAUTION**

**Before removing or adjusting any electrical component, ensure all electrical power is off and the battery is disconnected.**

A. Refer to Diagram 2-1 for the SL30 wiring interface.

B. Remove the attaching hardware, clamps, connectors, leads, or wiring.

C. Identify the connectors, leads, or wiring.

D. Remove the component.

### 4-2-2. Inspection – Wiring Harnesses/Connectors – Sandia SAE5-35

A. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

B. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

### 4-2-3. Repair – Wiring Harnesses/Connectors – Sandia SAE5-35

A. Tighten lose terminal connectors, mounting hardware, and electrical component attachments.

B. Replace miscellaneous electrical components that fail to meet the inspection requirements.

C. Clean corrosion from the connections and receptacles with contact cleaner.

### 4-2-4. Installation – Wiring Harnesses/Connectors – Sandia SAE5-35

A. Refer to Diagram 2-1 for the Sandia SAE5-35 wiring interface.

B. Install the electrical component and secure with attaching hardware, clamps, or cable ties.

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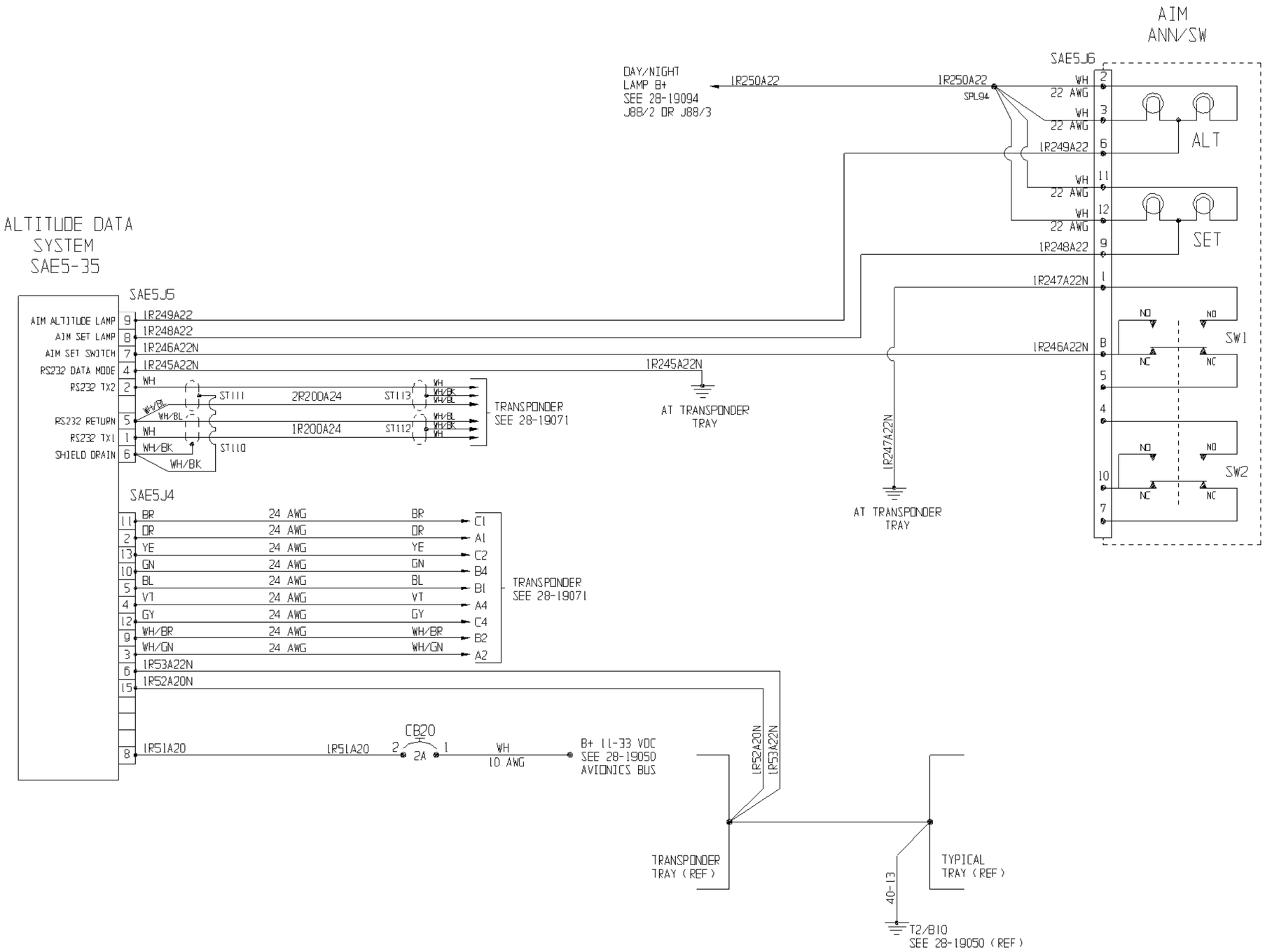



Diagram 2-1. Sandia SAE5-35, Sheet 1 of 1
Rev. 1, Nov 21/08

# CHAPTER 3

# GNS 430W/530W GPS/WAAS NAVIGATOR

# SECTION 1

# SYSTEM DESCRIPTION

## 1-1. System Description

A. The 430W/530W GPS/WAAS Navigator is a panel-mounted product that contains a GPS/WAAS receiver for GPS approved primary navigation under TSO C146a, and also VHF Com and VHF Nav radios in an integrated system unit with a moving map and color display. The graphical display is used to depict traffic, weather, or terrain data.

B. Four configurations of the 430W installation are available. They are part numbers 28-22037-5, 28-22037-7, 28-22037-9, and 28-22037-101. Four configurations of the 530W installation are available. They are part numbers 28-22050-5, 28-22050-7, 28-22050-103, and 28-22050-105. The dash numbers differentiate between installations with or without VOR/LOC/GS activation and between installations that are upper or lower panel mounted.

C. The 430W/530W provides optional output to a VOR/LOC/GS Indicator and to either a VOX ICS or an audio panel.

D. Power to the 430W/530W unit is provided via the **COMM/NAV GPS** (28-22037-5 or 28-22050-5) or the **COMM GPS** (28-22037-7 or 28-22050-7) circuit breaker (CB40) (5 Amp) and the **COMM TX** circuit breaker (CB41) (5 Amp) located on the left side of the lower panel.

E. Refer to the 280FX Rotorcraft Flight Manual Supplement and the current vendor operating manuals/instructions for operation of the 430W/530W.

## 1-2. Vendor Publications

A. The 430W/530W is to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft. The applicable vendor manuals are listed in Table 3-1.

**Table 3-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GNS 430W | 1. 400W Series Pilot's Guide and Reference<br>2. 400W Series Installation Manual | Garmin International<br>1200 E. 151st Street<br>Olathe, KS 66062 |
| GNS 530W | 1. 500W Series Pilot's Guide and Reference<br>2. 500W Series Installation Manual | |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GNS 430W/530W are “on condition”.

# SECTION 3

# SERVICING, CLEANING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

## 3-1. Servicing

A. The 430W/530W contains no user serviceable components or assemblies. Operations involving the removal of the 430W/530W or any other line-replaceable unit (LRU) installed as a part of the 430W/530W must be done by authorized maintenance technicians.

## 3-2. Cleaning

A. The front bezel, keypad, and display can be cleaned with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

## 3-3. Troubleshooting

A. If error indications are displayed on the 430W/530W, consult the Troubleshooting section contained in the applicable installation manual, listed under reference documentation in Table 3-1.

## 3-4. Periodic Maintenance Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GARMIN GNS 430W/530W GPS/WAAS NAVIGATOR** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the unit for security of attachment. | |
| 2. Inspect all knobs and buttons for legibility. | |
| 3. Inspect condition of wiring, routing, and attachment/clamping. | |

### 3-4.1. Periodic Maintenance Inspections – Display Backlight

A. The display backlight lamp is rated by the manufacturer as having a usable life of 20,000 hours. This life may be more or less than the rated time depending on operating conditions of the 430W/530W, the backlight lamp may dim and the display may not perform as well in direct sunlight conditions. The user must determine by observation when the display brightness is not suitable for its intended use. Contact the authorized repair station when the backlight lamp requires service.

### 3-4.2. Periodic Maintenance Inspections – Battery Replacement

A. The 430W/530W has an internal keep-alive battery that will last about 10 years. The battery is used for GPS system information. Regular planned replacement is not necessary. The 430W/530W will display a 'low battery' message when replacement is required. Once the low battery message is displayed, the battery should be replaced within 1 to 2 months.

B. If the battery is not replaced and becomes totally discharged, the 430W/530W will remain fully operational, but the GPS signal acquisition time may be increased. This acquisition time can be reduced by entering a new seed position each time the unit is powered on. There is no loss of function or accuracy of the 430W/530W unit with a dead battery.

C. The battery must be replaced by a factory authorized repair station.

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-511-5, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

## 4-1. GNS 430W/530W

### 4-1-1. Removal – GNS 430W/530W

A. Turn the 430W/530W and aircraft power off. Pull the COMM GPS or COMM/NAV GPS and the COMM TX circuit breakers out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. To remove the 430W/530W unit from the mounting rack, insert a 3/32-inch hex drive tool into the access hole at the bottom of the unit face. Rotate the hex tool counterclockwise until the unit is forced out about 3/8 inch and can be freely pulled from the rack.

C. Slide the unit out of the tray.

### 4-1-2. Inspection/Repair – GNS 430W/530W

A. Inspect the condition and security of the mounting bracket and electrical interface.

B. Inspect the condition and security of electrical cables.

C. Repair procedures are not available for the 430W/530W unit.

### 4-1-3. Installation – GNS 430W/530W

A. The 430W/530W unit is installed in the rack by sliding it straight in until it stops, about 1 inch short of the final position. Insert the hex drive tool into the access hole at the bottom of the unit face. Rotate the hex tool clockwise while pressing on the left side of the bezel until the unit is firmly seated in the rack.

B. Remove the cable tie or other similar device from the COMM GPS or COMM/NAV GPS and the COMM TX circuit breaker stems and push the stem in to set the circuit breaker.

## 4-2. Wiring Harnesses/Connectors – GNS 430W/530W

### 4-2-1. Removal – Wiring Harnesses/Connectors – GNS 430W/530W

**CAUTION**

**Before removing or adjusting any electrical component, ensure all electrical power is off and the battery is disconnected.**

A. Refer to Diagram 3-1 for the 430W/530W wiring interface.

B. Remove the attaching hardware, clamps, connectors, leads, or wiring.

C. Identify the connectors, leads, or wiring.

D. Remove the component.

### 4-2-2. Inspection – Wiring Harnesses/Connectors – GNS 430W/530W

A. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

B. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

### 4-2-3. Repair – Wiring Harnesses/Connectors – GNS 430W/530W

A. Tighten lose terminal connectors, mounting hardware, and electrical component attachments.

B. Replace miscellaneous electrical components that fail to meet the inspection requirements.

C. Clean corrosion from the connections and receptacles with contact cleaner.

### 4-2-4. Installation – Wiring Harnesses/Connectors – GNS 430W/530W

A. Refer to Diagram 3-1 for the GNS 430W/530W wiring interface.

B. Install the electrical component and secure with attaching hardware, clamps, or cable ties.

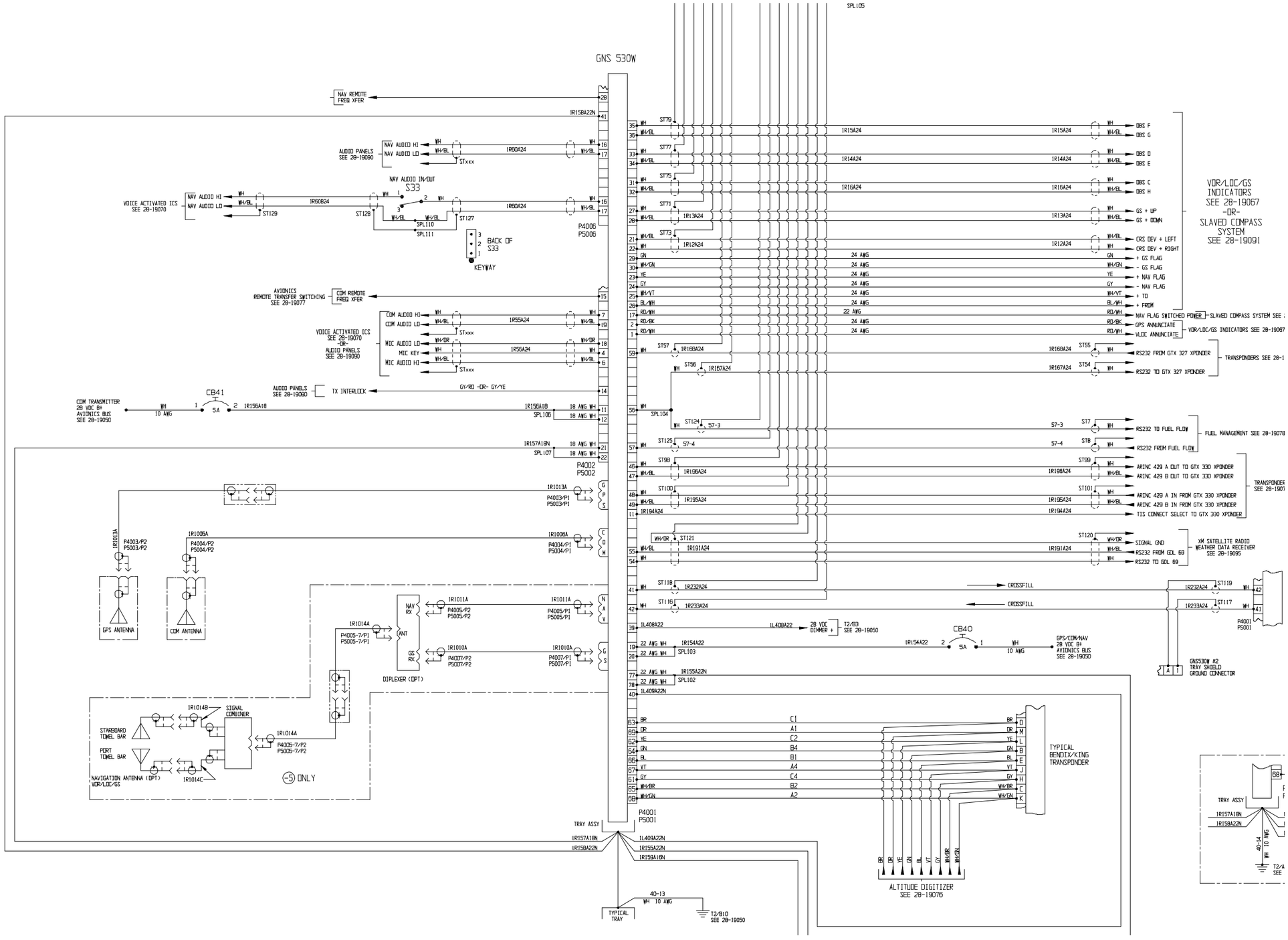



Diagram 3-1. GNS 430W/530W, Sheet 1 of 1
Rev. 2, Dec 8/08
3-7/3-8 (Blank)

# CHAPTER 4

# GDL 69/69A XM SATELLITE WEATHER/RADIO

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The GDL 69/69A unit is a remote datalink receiver that delivers XM WX Satellite Weather™ to a Garmin navigation system such as the GNS 430W/530W.

B. Two configurations of the GDL 69/69A installation are available. They are part numbers 28-22082-5 and 28-22082-7. Part number 28-22082-5 provides continuous XM Weather coverage and also XM Satellite Radio for audio entertainment. Part number 28-22082-7 provides XM Weather only.

C. The GDL 69A interfaces with the cockpit audio panel control to provide XM Satellite Radio audio entertainment through the aircraft's audio system.

D. Power to the GDL 69/69A unit is provided via the **XM DL** circuit breaker (CB42) (5 Amp) located on the left side of the lower panel.

E. Refer to the 280FX Rotorcraft Flight Manual Supplement and the current vendor operating manuals/instructions for operation of the GDL 69/69A.

### 1-2. Vendor Publications

A. The GDL 69/69A is to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft. The applicable vendor manuals are listed in Table 4-1.

**Table 4-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GDL 69/69A | 400W/500W Series Pilot's Guide Addendum for Optional Displays<br><br>GDL 69/69A Installation Manual | Garmin International<br>1200 E. 151st Street<br>Olathe, KS 66062 |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GDL 69/69A are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The GDL 69/69A contains no user serviceable components or assemblies. Operations involving the removal of the GDL 69/69A or any other line-replaceable unit (LRU) installed as a part of the GDL 69/69A must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. If XM satellite information is not available on the control display unit, consult the Troubleshooting section contained in the GDL 69/69A Installation Manual, listed under reference documentation in Table 4-1.

### 3-3. Periodic Maintenance Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GARMIN GDL 69/69A** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the unit for security of attachment. | |
| 2. Inspect condition of wiring, routing, and attachment/clamping. | |
| 3. Verify the GDL 69/69A unit operation by viewing XM Satellite information on the GNS 430W/530W or other applicable display unit, or by checking the XM Information or XM Status page on the GNS 430W/530W or other applicable display unit. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-511-5, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

## 4-1. GDL 69/69A

### 4-1-1. Removal – GDL 69/69A

A. Turn the GNS 430W/530W or other applicable display unit and aircraft power off. Pull the XM DL, COMM GPS or COMM/NAV GPS, and the COMM TX circuit breakers out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. The GDL 69/69A is installed onto a tray mounted in the forward end of the tailcone.

C. Disconnect the electrical cables.

D. Slide the unit out of the tray.

### 4-1-2. Inspection/Repair – GDL 69/69A

A. Inspect the condition and security of the mounting bracket and electrical interface.

B. Inspect the condition and security of electrical cables.

C. Repair procedures are not available for the GDL 69/69A unit.

### 4-1-3. Installation – GDL 69/69A

A. Install the GDL 69/69A onto the tray.

B. Connect the electrical cables.

C. Remove the cable tie or other similar device from the XM DL, COMM GPS or COMM/NAV GPS, and the COMM TX circuit breaker stems and push the stem in to set the circuit breaker.

D. Verify the GDL 69/69A operation by viewing the XM Satellite information on the GNS 430W/530W or applicable display unit, or by checking the XM Information or XM Status page on the GNS 430W/530W or applicable display unit.

E. If the GDL 69/69A unit is removed and replaced with a different GDL 69/69A unit, the XM radio service may require re-activation. Follow the instructions in the Installation Manual ("Activation with XM Satellite Radio") listed under reference documentation in Table 4-1.

## 4-2. Wiring Harnesses/Connectors – GDL 69/69A

### 4-2-1. Removal – Wiring Harnesses/Connectors – GDL 69/69A

**CAUTION**

**Before removing or adjusting any electrical component, ensure all electrical power is off and the battery is disconnected.**

A. Refer to Diagram 4-1 for the GDL 69/69A wiring interface.

B. Remove the attaching hardware, clamps, connectors, leads, or wiring.

C. Identify the connectors, leads, or wiring.

D. Remove the component.

### 4-2-2. Inspection – Wiring Harnesses/Connectors – GDL 69/69A

A. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

B. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

### 4-2-3. Repair – Wiring Harnesses/Connectors – GDL 69/69A

A. Tighten lose terminal connectors, mounting hardware, and electrical component attachments.

B. Replace miscellaneous electrical components that fail to meet the inspection requirements.

C. Clean corrosion from the connections and receptacles with contact cleaner.

### 4-2-4. Installation – Wiring Harnesses/Connectors – GDL 69/69A

A. Refer to Diagram 4-1 for the GDL 69/69A wiring interface.

B. Install the electrical component and secure with attaching hardware, clamps, or cable ties.

C. Verify the GDL 69/69A operation by viewing the XM Satellite information on the GNS 430W/530W or applicable display unit, or by checking the XM Information or XM Status page on the GNS 430W/530W or applicable display unit.

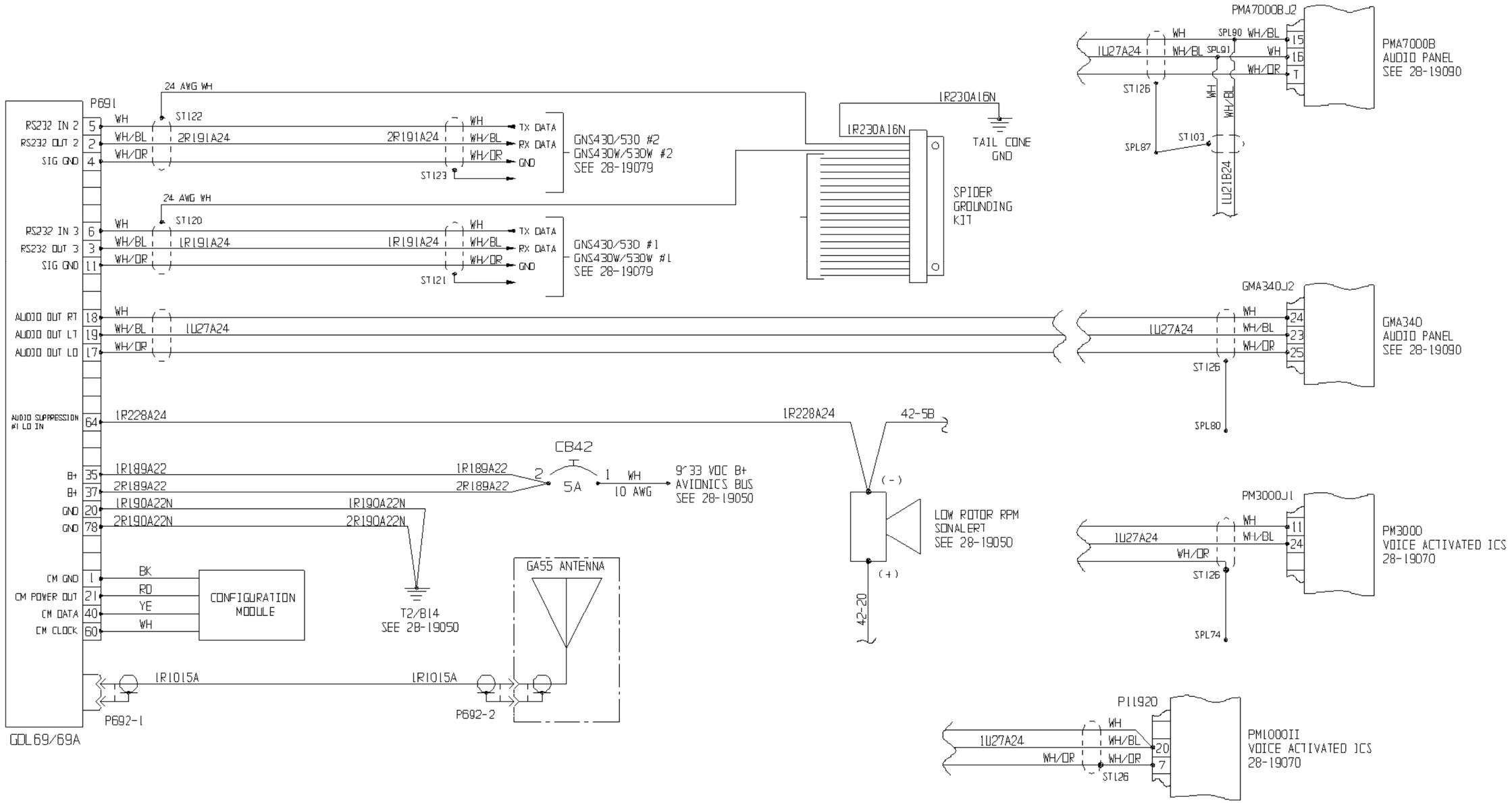



Diagram 4-1. GDL 69/69A, Sheet 1 of 1
Rev. 2, Dec 8/08

# CHAPTER 5

# ATTITUDE INDICATOR AND DIRECTIONAL GYRO

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The Attitude Indicator Installation, P/N 28-22062-( ), provides an indication of the aircraft's attitude relative to the earth by means of an electrically powered gyroscope. The unit is mounted in the instrument panel. Power to the attitude indicator is provided via the **HRZN GYRO** circuit breaker (CB23) located on the left side of the center pedestal. This installation consists of several configurations depending on the manufacturer (refer to Figure 5-1).

B. The Directional Gyro Installation, P/N 28-22062-( ), provides a heading indication displayed on a rotating compass card by means of an electrically powered gyroscope. The unit is mounted in the instrument panel. Power to the directional gyro is provided via the **DIR GYRO** circuit breaker (CB24) located on the left side of the center pedestal. This installation consists of several configurations depending on the manufacturer (refer to Figure 5-1).

C. Each gyro contains internal lighting and a power monitor indication. The attitude indicator contains a slip indicator attached to the base of the display bezel.

### 1-2. Vendor Manuals

A. The following components listed in Table 5-1 are to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 5-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| Attitude Gyro<br>RCA 26 Series | Installation/Operation Guide, Publication No. 1403 | Kelly Manufacturing Company<br>555 South Topeka<br>Wichita, KS 67202<br>www.kellymfg.com |
| Slip Indicator for<br>Model 300-14E(L)<br>Part Number 6648-1009-0901 | Field Replacement or Installation of Inclinometer, 0050-1002, latest revision | Castleberry Instruments & Avionics, Austin, TX<br>www.ciamfg.com |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the gyro systems are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The attitude indicator and directional gyro installations contain no user serviceable components or assemblies. Operations involving the removal of either of the gyros must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to electrical schematics in Diagram 5-1 when troubleshooting the attitude indicator or directional gyro installations.

### 3-3. Periodic Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **ATTITUDE INDICATOR AND/OR DIRECTIONAL GYRO** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the electrical wiring and mounts for security, damage, and obvious defects. | |
| 2. Inspect the gyro unit and mount for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-165A, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

## 4-1. Attitude Indicator/Directional Gyro

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

**Maintenance procedures are identical for either the attitude indicator or directional gyro installation.**

**See Figure 5-1 of this supplement for gyro location(s) in the instrument panel.**

### 4-1-1. Removal

**CAUTION**

**The attitude indicator and directional gyro are delicate electro-mechanical instruments, which must be handled with care. Rough handling can result in damage to the instrument and reduce performance and life of the instrument.**

A. Remove the appropriate gyro in accordance with Paragraph 7-18.A Steps (1) through (4) of the maintenance manual.

B. Attitude indicator only: Remove the slip indicator by removing the two attachment screws. Pull the slip indicator up over the adjustment knob.

### 4-1-2. Inspection

A. Inspect the gyro unit(s) in accordance with Paragraph 7-19 of the maintenance manual.

### 4-1-3. Repair

A. Replace the gyro unit(s) if the cover glass is loose, cracked, broken, or when the unit is defective.

B. Attitude indicator only: Replace the slip indicator if it is damaged or defective.

### 4-1-4. Installation

**CAUTION**

**The attitude indicator and directional gyro are delicate electro-mechanical instruments, which must be handled with care. Rough handling can result in damage to the instrument and reduce performance and life of the instrument.**

A. Install the gyro unit(s) in accordance with Paragraph 7-18.A Steps (5) through (7) of the maintenance manual.

**NOTE**

**See Figure 5-1 of this supplement for gyro location in the instrument panel.**

B. Attitude indicator only:

1) Ensure that the aircraft is on a level surface.

2) Verify that the ball in the slip indicator comes to rest between the lubber lines when viewed straight on. Check the slip indicator ball level with a reference level tool ("L" bubble or equivalent). Place the reference tool on the aircraft floor or place the "L" bubble on the lip of the bezel at the bottom of the slip indicator glass, as appropriate. Adjust the slip indicator ball to correspond with the ball position in the reference level tool.

C. Attitude indicator only: If required, install the slip indicator.

**NOTE**

**For P/N 6648-1009-0901 slip indicator (Castleberry), refer to the *Field Replacement or Installation of Inclinometer* procedure (ref. Table 5-1).**

1) Position the slip indicator housing such that the ball is centered between the lubber lines. Install screws and tighten until snug.

2) Check the bubble level in accordance with 4-1-4.B.

3) Tighten the screws to 2 to 4 in-lbs/0.23-0.45 Nm.

D. Apply power to the gyro(s). Check that the OFF flag moves out of view and lighting is working properly.

**NOTE**

**The flag on the Castleberry instrument will not retract until the gyroscope is up to operational speed. This may take up to two minutes. The flag on the RC Allen instrument will retract as soon as adequate power is applied.**

## 4-2. Wiring Harnesses/Connectors

A. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

B. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

## 4-3. Figures and Diagrams

A. The installation locations and parts of the attitude indicator and directional gyro configurations are shown in Figure 5-1.

B. The configuration wiring interfaces are shown in Diagram 5-1.

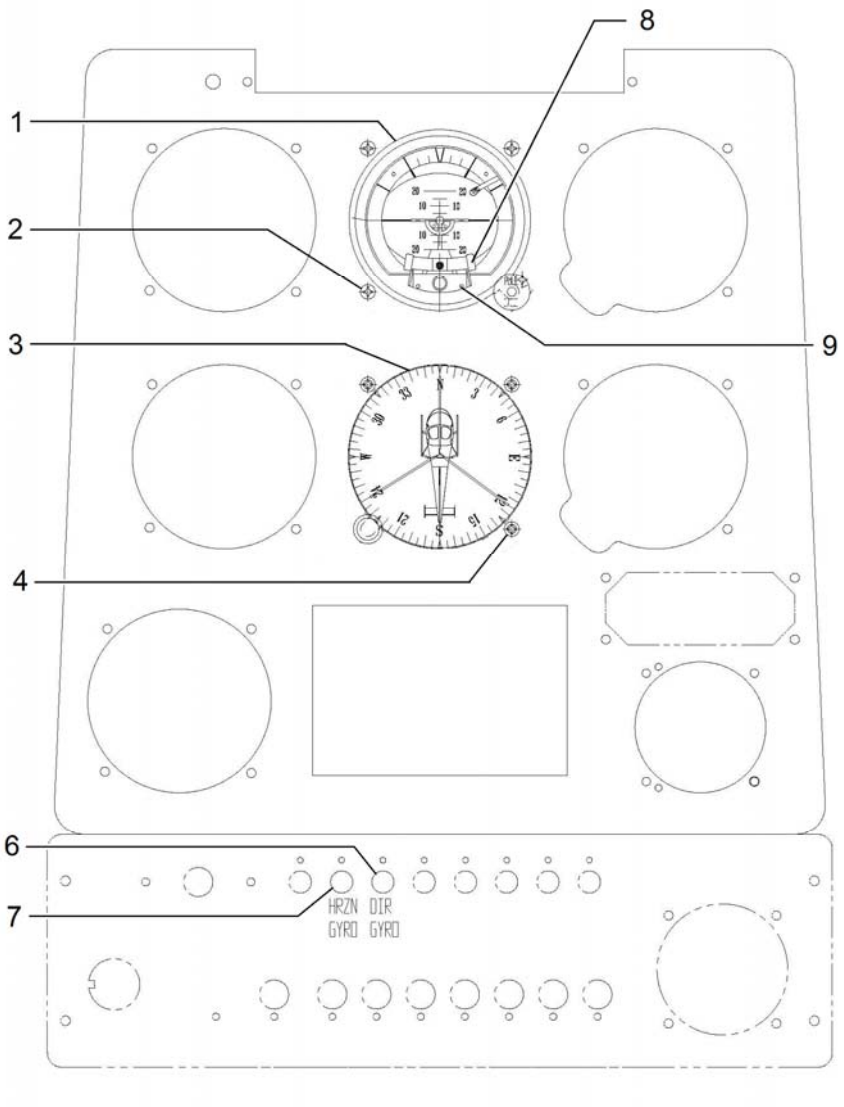
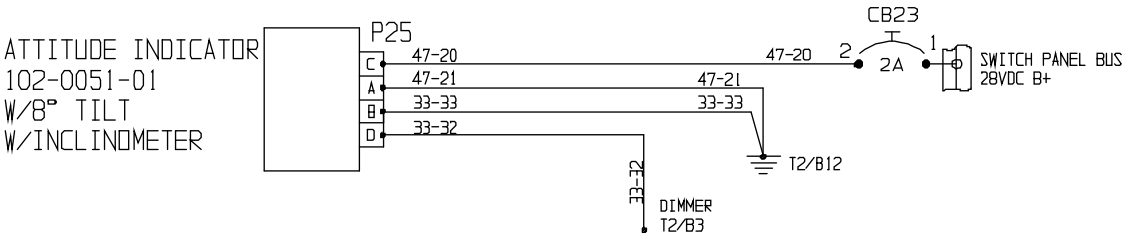



**Figure 5-1. Attitude Indicator and Directional Gyro Installations**

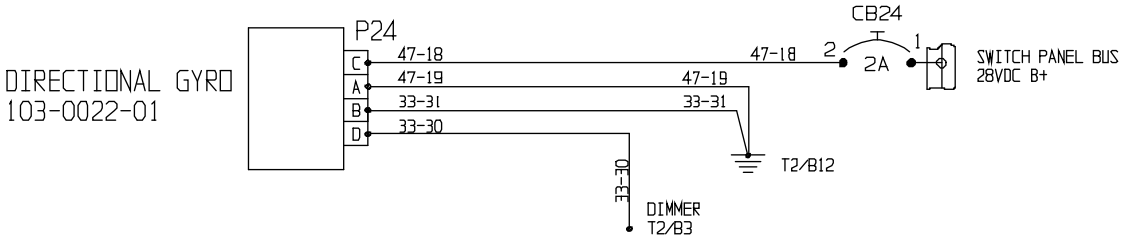
**Figure 5-1. Attitude Indicator and Directional Gyro Installations**

| Item | Part Number | Component | Quantity |
|---|---|---|---|
| - | 28-22062-101 | Attitude Indicator Installation (Castleberry Instruments & Avionics) | REF |
| - | 28-22062-5 | Attitude Indicator Installation (RC Allen / Kelly Manufacturing) | REF |
| - | 28-22062-7 | Directional Gyro Installation (RC Allen / Kelly Manufacturing) | REF |
| - | 28-22062-9 | Directional Gyro Installation (Castleberry Instruments & Avionics) | REF |
| 1 | 504-0006-95204 | Attitude Indicator (Used with -101) | 1 |
| -1* | 504-0006-95205 | Attitude Indicator (Used with -101) | 1 |
| -1 | 102-0051-01 | Attitude Indicator (Used with -5) | 1 |
| 2 | AN515B6R16 | . Screw Used with (-101) | 3 |
| -2 | AN515B6R14 | . Screw (Used with -5) | 3 |
| 3 | 505-0001-95604 | Directional Gyro (Used with -9) | 1 |
| -3* | 505-0001-95603 | Directional Gyro (Used with -9) | 1 |
| -3 | 103-0022-01 | Directional Gyro (Used with -7) | 1 |
| 4 | AN515B6R16 | . Screw (Used with -9) | 3 |
| -4 | AN515B6R7 | . Screw (Used with -7) | 3 |
| -5 | MS3116F8-4S | Connector | 1 |
| 6 | MS26574-1 | Circuit Breaker (1 Amp) (Used with -101) | 1 |
| -6 | MS26574-2 | Circuit Breaker (2 Amp) (Used with -5) | 1 |
| 7 | MS26574-1 | Circuit Breaker (1 Amp) (Used with -9) | 1 |
| -7 | MS26574-2 | Circuit Breaker (2 Amp) (Used with -7) | 1 |
| 8** | 6648-1009-0901 | . Slip Indicator | 1 |
| -8† | 444-0010-01 | . Slip Indicator | 1 |
| 9** | N/A | . . Screw | 2 |
| -9† | N/A | . . Screw | 2 |

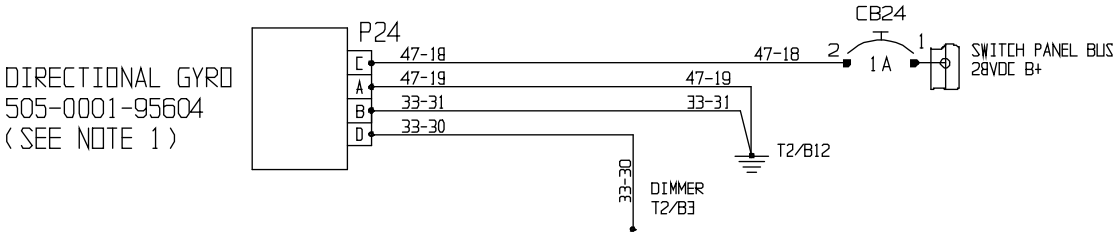
- ITEM NOT ILLUSTRATED
* 14V Electrical System
** Included with attitude indicator P/N 504-0006-952( ) (Castleberry)
† Included with attitude indicator P/N 102-0051-01 (RC Allen/Kelly)



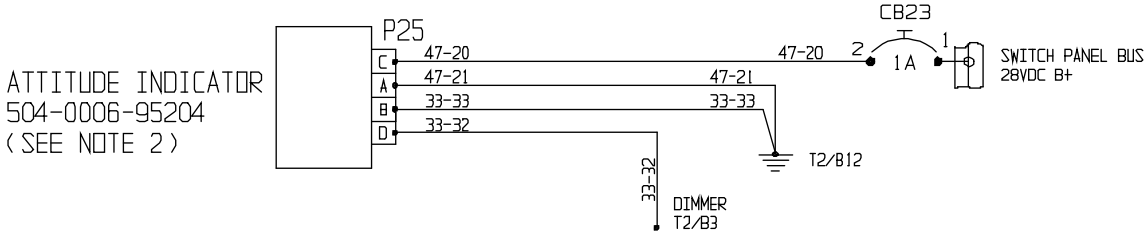

28-22062-3 ATTITUDE INDICATOR INTERFACE




28-22062-5 DIRECTIONAL GYRO INTERFACE




28-22062-7 DIRECTIONAL GYRO INTERFACE




28-22062-9 ATTITUDE INDICATOR INTERFACE

NOTE 1: 14V BUS, REFERENCE 505-0001-95603
P24 PIN OUT DEFINED ON THE 14V PIN OUT PLACARD AFFIXED TO THE UNIT

NOTE 2: 14V BUS, REFERENCE 504-0006-95205
P25 PIN OUT DEFINED ON THE 14V PIN OUT PLACARD AFFIXED TO THE UNIT

**Diagram 5-1. Attitude Indicator and Directional Gyro Wiring Schematics**

# CHAPTER 6

# KX 165A NAV/COM

# SECTION 1

# SYSTEM DESCRIPTION

## 1-1. System Description

A. The KX 165A is a VHF NAV/COM transceiver. The KX 165A NAV/COM installation, P/N 28-22063-( ), includes the KX 165A NAV/COM unit, COM and NAV antennas, and the wiring interface to a VOR/LOC/GS indicator and an audio panel or VOX ICS.

B. One of two configurations may be installed; P/N 28-22063-1 (760 channel COM, 25 kHz increments) and P/N 28-22063-3 (2280 channel COM; 8.33 kHz increments).

C. Power to the KX 165A NAV/COM installation is provided via the **COM1**/**NAV1** (or **COM2/NAV2**) circuit breaker (CB35, 7 ½ A) located on the upper left side of the center pedestal.

D. Refer to the Rotorcraft Flight Manual Supplement for operation of the KX 165A.

## 1-2. Vendor Manuals

A. The following component listed in Table 6-1 is to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 6-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| KX 165A NAV/COM | Installation Manual, Manual Number 006-10542-0003, Revision 3, or later approved revision | Bendix/King (by Honeywell)<br>9201-B San Mateo Blvd. NE<br>Albuquerque, New Mexico<br>87112<br>Support US & Canada:<br>855-250-7027<br>Support International:<br>602-365-7027<br>techsupport@bendixking.com |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the KX 165A NAV/COM system are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The KX 165A NAV/COM installation contains no user serviceable components or assemblies. Operations involving the removal of the KX 165A unit must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to electrical schematic in Diagram 6-1 when troubleshooting the KX 165A NAV/COM installation.

### 3-3. Periodic Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **KX 165A NAV/COM** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the electrical wiring and mounts for security, damage, and obvious defects. | |
| 2. Inspect the KX 165A unit and mount for security, damage, and obvious defects. | |
| 3. Inspect the COM and NAV antennas and mount for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-165A, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

## 4-1. KX 165A NAV/COM

**NOTES**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

**See Figure 6-2 of this supplement for the KX 165A location in the instrument panel.**

### 4-1-1. Removal

A. Turn the KX 165A unit and aircraft power off. Pull the COM/NAV circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. Turn the locking screw counterclockwise using a 3/32” Allen wrench until the unit disengages from the mounting rack.

C. Pull the unit out of the mounting rack by pulling on the metal tabs located behind the front panel on each side of the unit.

### 4-1-2. Inspection

A. Inspect the KX 165A in accordance with Paragraph 7-19 of the maintenance manual.

### 4-1-3. Repair

A. Replace the KX 165A if the cover glass is loose, cracked, broken, or if the unit is defective.

### 4-1-4. Installation

A. Looking at the top of the unit, make sure the front lobe of the hold-down device is in a vertical position.

B. Slide the unit into the mounting rack until the lobe touches the mounting rack notch.

C. Insert a 3/32” Allen wrench through the hole in the front panel to engage the locking screw. Turn clockwise until the rear lobe engages the mounting rack. Continue turning until the unit is secure in the mounting rack. Do not over tighten.

D. Remove the cable tie or other similar device from the COM/NAV circuit breaker stem and push the stem in to set the circuit breaker.

## 4-2. Wiring Harnesses/Connectors

### 4-2-1. Removal – Wiring Harnesses/Connectors

**CAUTION**

**Before removing or adjusting any electrical component, ensure all electrical power is off and the battery is disconnected.**

A. Refer to Diagram 6-1 for the KX 165A wiring interface.

B. Remove the attaching hardware, clamps, connectors, leads, or wiring.

C. Identify the connectors, leads, or wiring.

D. Remove the component.

### 4-2-2. Inspection – Wiring Harnesses/Connectors

A. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

B. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

### 4-2-3. Repair – Wiring Harnesses/Connectors

A. Tighten lose terminal connectors, mounting hardware, and electrical component attachments.

B. Replace miscellaneous electrical components that fail to meet the inspection requirements.

C. Clean corrosion from the connections and receptacles with contact cleaner.

### 4-2-4. Installation – Wiring Harnesses/Connectors

A. Refer to Diagram 6-1 for the KX 165A wiring interface.

B. Install the electrical component and secure with attaching hardware, clamps, or cable ties.

**NOTE**

**Keep antenna cables separate from the main harness.**

## 4-3. Figures and Diagrams

A. The KX 165A NAV/COM system installation is shown in Figure 6-1. The parts are listed in Figure 6-2.

B. The configuration wiring interface is shown in Diagram 6-1.

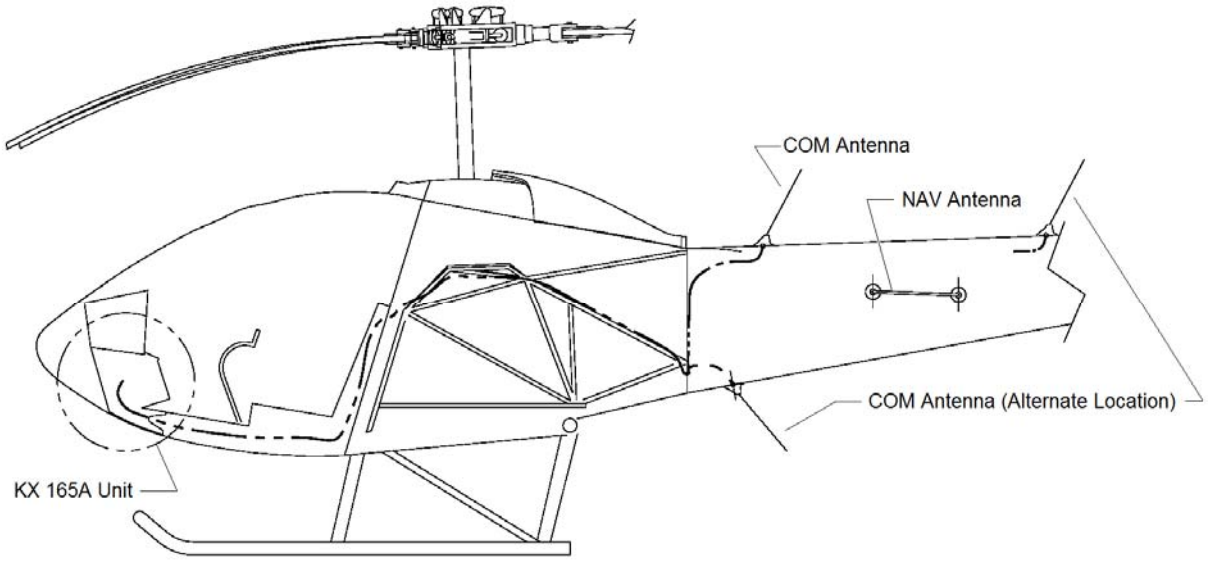
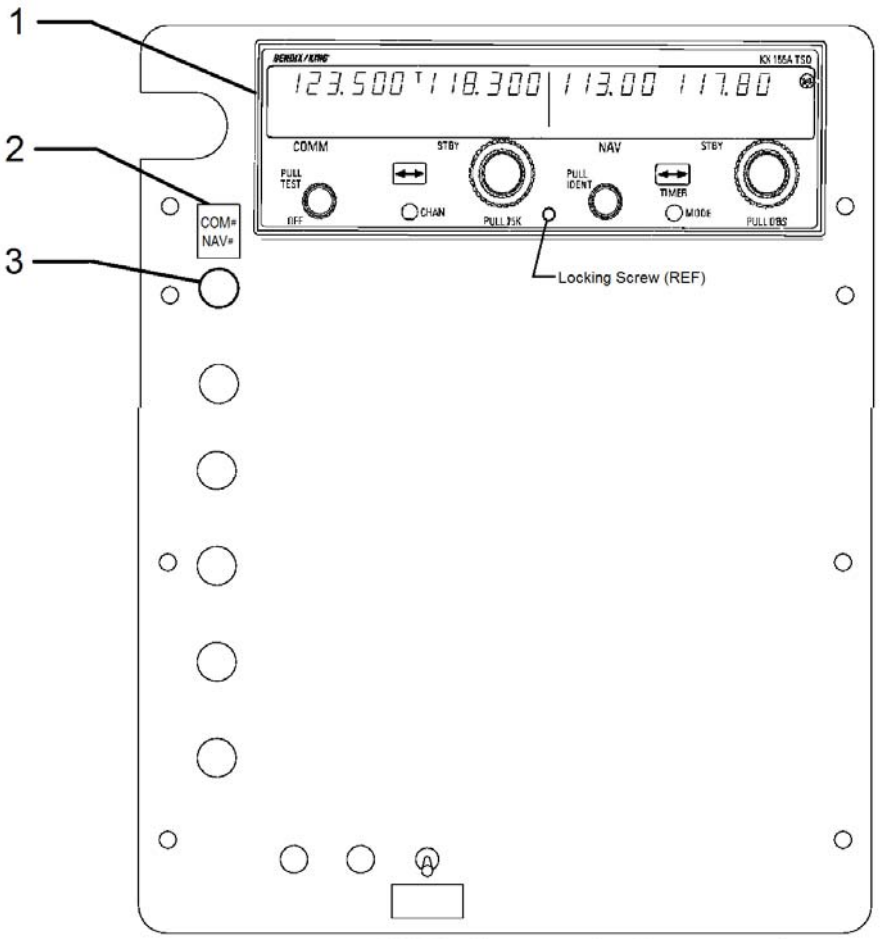



**Figure 6-1. KX 165A NAV/COM System Installation**




NOTE: Panel layout may vary depending on customer preferences.

| Item | Part Number | Component | Quantity |
|---|---|---|---|
| - | 28-22063-1 | KX 165A NAV/COM Installation (760 channel) | REF |
| - | 28-22063-3 | KX 165A NAV/COM Installation (2280 channel) | REF |
| 1 | 069-01033-0101 | . KX 165A (25 kHz increments) | 1 |
| -1 | 069-01033-0201 | . KX 165A (8.33 kHz increments) | 1 |
| - | 050-03378-0000 | . . KX 165A Installation Kit | 1 |
| 2 | 28-19064-( ) | . Placard | 1 |
| 3 | MS26574-7½ | . Circuit Breaker | 1 |
| -4 | MS51957-26 | . . Screw | 1 |
| - | 28-22183-1 | Antenna Installation (COM1) | REF |
| - | 28-22183-117 | Antenna Installation (COM2) (Alternate) | REF |
| - | 28-22183-121 | Antenna Installation (COM1) (Alternate) | REF |
| -5 | DMC63-2 | . Antenna (VHF COM) (gasket supplied) | 1 |
| -6 | AN507C-832R10 | . . Screw | 3 |
| - | 28-22183-115 | Antenna Installation (VOR/LOC/GS) | REF |
| -7 | CI205-3 | . Antenna (VOR/LOC/GS) | 1 |
| -8 | MS24693-C55 | . . Screw | 16 |
| -9 | 748 | . . Sealant (RTV, Dow Corning Brand) | A/R |

- ITEM NOT ILLUSTRATED

**Figure 6-2. KX 165A Installation**

**INTENTIONALLY LEFT BLANK**

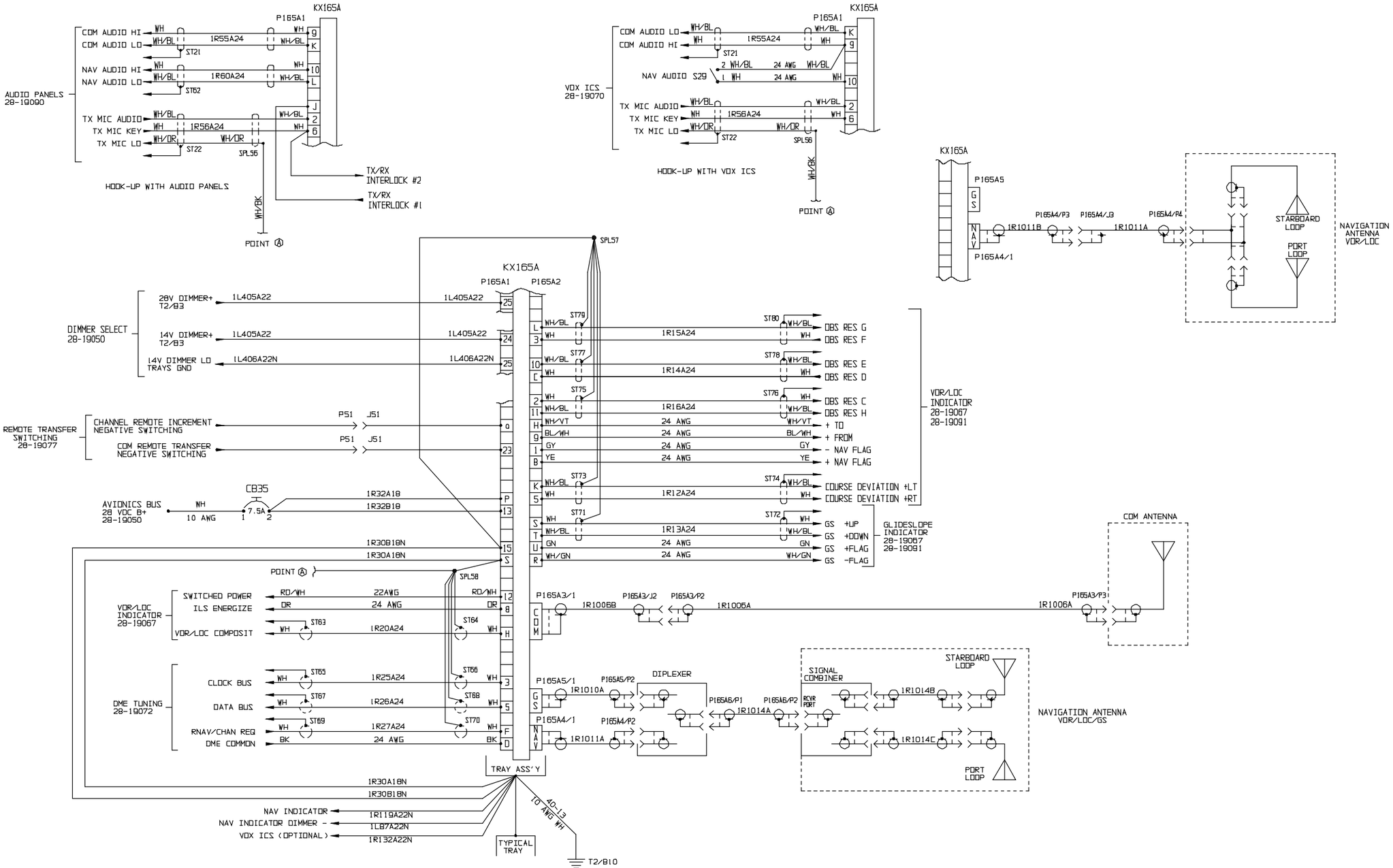



Diagram 6-1. KX 165A
Rev. 4, Jan 9/14
6-9/6-10 (Blank)

# CHAPTER 7

# GTX 330 TRANSPONDER WITH ADS-B OUT

# SECTION 1

# SYSTEM DESCRIPTION

## 1-1. System Description

A. The GTX 330 with ADS-B Out is installed as part number 28-22028-1. The components of the GTX 330 installation include the panel-mounted GTX 330 unit and a bottom-mounted antenna.

**NOTE**

**When combined, the Garmin GTX 330 with Extended Squitter (ES) and the Garmin GTN 650 GPS/NAV/COM have been shown to fully comply with AC 20-165A and 14 CFR 91.227 when installed in accordance with Garmin's installation instructions. This configuration will be compliant with the 2020 ADS-B Out mandate defined in 14 CFR 91.225.**

B. For ADS-B Out system functionality, the GTX 330 is configured with the extended squitter (ES) feature and is interfaced with the GTN 650 for position input and the A-30 altitude encoder for barometric altitude input. The GTX 330 performs the following ADS-B Out functions: Transmission of ADS-B Out data on 1090 extended squitter (1090ES) (1090 MHz), Integration of data from internal and external sources to transmit data as required per 14 CFR 91.227, and Pressure Altitude Broadcast Inhibit.

C. The GTX 330 may also be interfaced to other equipment such as an audio panel or VOX ICS and an OAT probe.

D. Power to the GTX 330 installation is provided via the **XPNDR** circuit breaker (CB33) (5 Amp) located on the left side of the center pedestal.

E. Refer to the F-28F/280FX Rotorcraft Flight Manual Supplement 28-AC-070 for GTX 330 with ADS-B Out limitations and basic operation instructions.

F. The following component listed in Table 7-1 is to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 7-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GTX 330 Transponder | GTX 330 Installation Manual, Document No 190-00207-02, latest revision | Garmin International, Inc.<br>1200 East 151st Street<br>Olathe, KS 66062<br>Tele: (913) 397-8200<br>Fax: (913) 397-8282<br>www.garmin.com |
| | GTX 330 Pilot's Guide, Document No. 190-00207-00, latest revision | |
| | GTX 330/D Maintenance Manual, Document No. 190-00207-05, latest revision | |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GTX 330 with ADS-B Out system are “on condition.” No component-level overhaul is required for the GTX 330 with ADS-B Out installation.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

**NOTE**

**Portions of Section 3 originate from Garmin Manual, 190-00734-11, GTX 330/33 with ADS-B Out System Maintenance Manual. (Copyright 2015 Garmin Ltd or its Subsidiaries. All Rights Reserved.)**

### 3-1. Servicing

A. Performing maintenance on the GTX 330 is limited to identifying, troubleshooting, and replacing components according to the parts list in Figure 7-1. Replacement and/or servicing should occur when an item fails to operate only after the authorized maintenance technician troubleshoots the system.

### 3-2. Troubleshooting

A. Refer to Table 7-2, Table 7-3 Section 2 of the GTX Maintenance Manual, and the electrical schematics, Diagram 7-1 through Diagram 7-3, when troubleshooting the GTX 330 installation.

**Table 7-2. GTX 330 Transponder Troubleshooting**

| Symptom | Recommended Action |
|---|---|
| Transponder will not turn on | Ensure the XPNDR circuit breaker is closed. |
| | Ensure connectors are seated on transponder and transponder is seated properly in mounting rack. |
| Poor transponder performance. Weak or intermittent radar contact reported by ATC. | Check and verify integrity of the antenna installation, ground planes, and coaxial cables. |
| | Check for proper electrical bonding/grounding of the antenna installation. |
| | Test coaxial cables for insertion loss and VSWR (voltage standing wave radio). |
| Loss of, or incorrect altitude reporting by the transponder | Check and verify the integrity of the transponder-altitude encoder interface, including wiring and altitude encoder operation. |
| Transponder audio too quiet/loud | Verify that the volume setting is at or above the minimum required setting. |
| Incorrect Mode S Aircraft Data Transmitted | Check the configuration mode settings and reset if necessary. |
| Transponder will not come out of standby | Check the transponder select switch for proper output. |

**Table 7-3. GTX 330 Transponder Failure/Fault Messages**

| Failure Message | Cause | Corrective Action |
|---|---|---|
| Transponder FAIL message | The internal transmit or squitter monitors have detected a failure. | Return the unit to Garmin. |
| Fatal Error Page Displayed | THE GTX 330 has failed the internal power-up integrity check. | Return the unit to Garmin. |
| NO ADSB | The transponder has insufficient data to support ADS-B Out transmission. | Ensure the aircraft has a clear view of the sky. |
| | | Ensure position source (GPS) is powered and receiving valid GPS position data. |
| | | Ensure ADS-B TX is selected to ON. |

## 3-3. Periodic Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GTX 330 With ADS-B Out** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the electrical wiring, coaxial cables, and mounts for security, damage, and obvious defects. | |
| 2. Inspect the GTX 330 unit and mount for security, damage, and obvious defects. Inspect any bonding straps for corrosion, loose connections, or damage. | |
| 3. Inspect the antenna and mount for security, damage, and obvious defects. | |

B. Every 24 calendar months, the GTX 330 must be tested and shown to comply with 14 CFR Part 91.411, 91.413, and Part 43 Appendix E and F. See Section 4-1-6.

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-511-5, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

**NOTE**

**Portions of Section 4 originate from Garmin Manual, 190-00734-11, GTX 330/33 with ADS-B Out System Maintenance Manual. (Copyright 2015 Garmin Ltd or its Subsidiaries. All Rights Reserved.)**

## 4-1. GTX 330

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

**NOTE**

**Replacement of the GPS position source requires that the GTX 330 be tested and shown to comply with 14 CFR Part 91.225 and 91.227.**

### 4-1-1. Cleaning

A. The front bezel, keypad, and display can be cleaned with a microfiber cloth or with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

### 4-1-2. Removal

A. Remove power to the GTX 330 unit. Pull the **XPNDR** circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker stem.

B. Insert the 3/32-inch hex drive tool into access hole on the unit face. Turn the hex tool counterclockwise until the unit is forced out about 3/8 inch.

C. Carefully pull the unit straight out of the rack.

### 4-1-3. Installation

**NOTE**

**Do not use excessive force when inserting the GTX 330 into the rack. This may damage the connectors, unit, and/or unit rack.**

A. Slide the GTX 330 in the rack straight in until it stops.

B. Insert the 3/32-inch hex drive tool into access hole at the bottom of the unit face.

C. Rotate the hex tool clockwise while pressing on the left side of the bezel until the unit is secured in the rack.

D. Count the number of complete revolutions the hex screw can be turned until it cannot turn any more. Do not overtighten the screw. Three turns is the minimum for proper installation. If fewer than three turns are possible, ensure there are no obstructions to the unit fully seating in the rack.

E. Remove the cable tie or other similar device from the **XPNDR** circuit breaker stem and push the stem in to set the circuit breaker.

### 4-1-4. Functional Checkout

A. No software or configuration loading is required if the removed GTX is reinstalled. This does not include units that had software and configuration files deleted during the repair testing process. Continue to GTX Test (Section 4-1-6 and Section 4-1-7).

B. If a new or repaired or exchange GTX is installed, the correct configuration parameters must be set per Section 4-1-5 and the correct software files must be loaded to the unit per Section 4-1-8.

C. When checkout procedures have been completed, record the following information in appropriate aircraft maintenance logs.

1) Part number and version number of any software updates performed during maintenance.

2) Record part and serial number of any LRU which was replaced.

### 4-1-5. Configuration

A. Configure the GTX 330 as defined in the tables that follow.

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

2) Turn the power off to exit the configuration pages. Then turn on again (without holding the FUNC key) for normal operation.

3) Configure Audio Mode Configuration Page with the following parameters:

| Audio Mode Configuration Page | | | Notes |
|---|---|---|---|
| **AUDIO** | **VOLUME** APPROX 50% | | Adjust/test volume to an appropriate level per customer requirement |
| **VOICE FEMALE** | **MESSAGE** | | |
| | AUDIO | PAGE CHANGE | |
| ALTITUDE MONITOR | **MESSAGE** | **ENABLED** | |
| COUNT DOWN TIMER | **MESSAGE** | | |

4) Configure Traffic Information Page with the following parameters:

| Traffic Information Page | Notes |
|---|---|
| TRAFFIC MESSAGES **TONE** | No action taken |

5) Configure Display Mode Configuration Page with the following parameters:

| DISPLAY MODE Configuration Page | Notes |
|---|---|
| DISPLAY MODE **AUTO** LEVEL **75** | |

6) Configure Display Backlight Configuration Page with the following parameters:

| DISPLAY BACKLIGHT Configuration Page | Notes |
|---|---|
| BKLT **AUTO** LVL **624** RSP TIME **2** MIN **08**<br>BKLT SRCE **28V** SLOPE **37** OFFSET **37** | Adjust Offset to match/sync to other installed equipment |

7) Configure Key Lighting Configuration Page with the following parameters:

| KEY LIGHTING Configuration Page | Notes |
|---|---|
| KEY **AUTO** LVL **624** RSP TIME **2** MIN **08**<br>KEY SRCE **28V** SLOPE **37** OFFSET **37** | Adjust Offset to match/sync to other installed equipment |

8) Configure Contrast Configuration Page with the following parameters:

| CONTRAST Configuration Page | Notes |
|---|---|
| CONTRAST MODE **AUTO 50** | Adjust Contrast per customer requirement |

9) Configure VFR Key Configuration Page with the following parameters:

| VFR KEY Configuration Page | Notes |
|---|---|
| VFR KEY **ENABLE** | |

10) Configure ARINC 429 Configuration Page with the following parameters:

| ARINC 429 Configuration Page | | | Notes |
|---|---|---|---|
| 429 INPUT | SPEED | DATA | |
| CHANNEL 1 | **LOW** | **OFF** | |
| CHANNEL 2 | **LOW** | **OFF** | |
| 429 INPUT | SPEED | DATA | |
| CHANNEL 3 | **LOW** | **OFF** | |
| CHANNEL 4 | | **OFF** | |
| 429 OUTPUT | | DATA | |
| CHANNEL 1 | | **OFF** | |
| CHANNEL 2 | | **OFF** | |

11) Configure RS-232 Input/Output Page with the following parameters:

| RS-232 INPUT/OUTPUT Page | | Notes |
|---|---|---|
| RS232 INPUT | OUTPUT | For remote operation and ADS-B position source from GTN 650 |
| CHNL 1 **REMOTE** | **REMOTE** | |
| CHNL 2 **OFF** | **OFF** | |

12) Configure Operation Configuration Page with the following parameters:

| OPERATION Configuration Page | | | | Notes |
|---|---|---|---|---|
| VS RATE **0500** | FORMAT | **FEET** | | |
| VFR ID **1200** | ALT ALRT DEV | **200ft** | | |
| SQUAT SWITCH? **YES** | SENSE | **LOW** | | |
| DELAY TIME **3** | AUTO FLT TMR? | **MAN** | | |

13) Configure Temperature Page with the following parameters:

| TEMPERATURE Page | Notes |
|---|---|
| TEMPERATURE<br>SENSOR INSTALLED **YES** UNITS **°C** | |

14) Configure Mode S Address Entry Pages with the following parameters:

| MODE S ADDRESS ENTRY PAGES | Notes |
|---|---|
| **ADDRESS US TAIL# NXXXXX**<br>**HEX AXXXXX** | Enter US tail # and/or Hex adddress per customer requirement. US TAIL# is typical in the U.S.<br>(Non-US customers enter a Hex address) |

15) Configure Mode S Flight ID Pages with the following parameters:

| MODE S FLIGHT ID PAGES | Notes |
|---|---|
| **FLT ID SAME AS TAIL AIRXXXXX**<br>**POWER UP ENTRY AIRXXXXX**<br>**CONFIG ENTRY AIRXXXXX** | Select and enter flight ID per customer requirement. SAME AS TAIL is typical in the U.S. (SAME AS TAIL selection is not applicable to Non-US customers) |

16) Configure GPS Configuration Page with the following parameters:

| GPS Configuration page | Notes |
|---|---|
| GPS X OFST **0** GPS Y OFST **8**<br>GPS INTEGRITY **1E-7** | |

17) Configure Mode S Aircraft Type Page with the following parameters:

| MODE S AIRCRAFT TYPE Page | Notes |
|---|---|
| AC TYPE **ROTOR** MAX A/S **<=150kt** | |

18) Configure Aircraft Size Page with the following parameters:

| AIRCRAFT SIZE PAGE | Notes |
|---|---|
| AC LENGTH TYPE **LENGTH <= 15mt**<br>AC WIDTH TYPE **WIDTH <= 11.5mt** | |

19) Configure ADS-B TX Page with the following parameters:

| ADS-B TX PAGE | Notes |
|---|---|
| ADS-B TX **PILOT SET**<br>1090 IN **NO** UAT IN **NO** | |

20) Configure EHS Page with the following parameters:

| EHS PAGE | Notes |
|---|---|
| EHS **DISABLE** | |

### 4-1-6. GTX Test – Regulatory Test

A. Perform the following required regulatory tests every 24 calendar months, or any time the transponder is removed or replaced. (A Mode S transponder ramp tester such as an Aeroflex IFR-6000 or TIC TR-220 is required for the tests.) The transponder should be operating in normal mode.

1) Altitude Reporting Equipment Test 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.

### 4-1-7. GTX Test – ADS-B Out Test

A. Ensure the aircraft is in a location where a GPS signal can be received.

B. Power on the aircraft/avionics and ensure that the GTX is powered on.

C. Ensure the ADS-B TX is selected ON.

D. Temporarily put the GTX into airborne mode as follows:

1) If the GTX squat switch input (P3301-17) is connected, raise the collective up to simulate an airborne condition.

2) If the GTX squat switch input (P3301-17) is not connected, temporarily configure this input such that the sensed data is airborne:

a. Start the GTX in configuration mode (hold the OFF key to power down the unit, then hold the FUNC key and press the ON key).

b. Press the FUNC key until the “SQUAT SWITCH?” page is displayed. Then use the CRSR and 8/9 keys to change the setting to “YES” and the “SENSE” to “LOW.” Press the CRSR key until no fields are highlighted to save the changes.

c. Restart the GTX in normal mode.

E. Ensure the GPS source being checked has acquired a position.

F. Select ALT mode on the GTX.

G. Using the transponder test set (such as an Aeroflex IRF-6000), verify the following ADS-B Out parameters are being transmitted:

1) NACv ≥ 1

2) SDA ≥ 2

3) SIL ≥ 3

4) NACq ≥ 8

5) NIC ≥ 7

H. Change the GTX squat switch configuration back to previous as follows:

1) Place the collective fully down.

2) If the GTX squat switch configuration settings were changed in step D, change the GTX settings back to previous as defined in Section 4-1-5.

I. Test is complete; select STBY mode on the GTX.

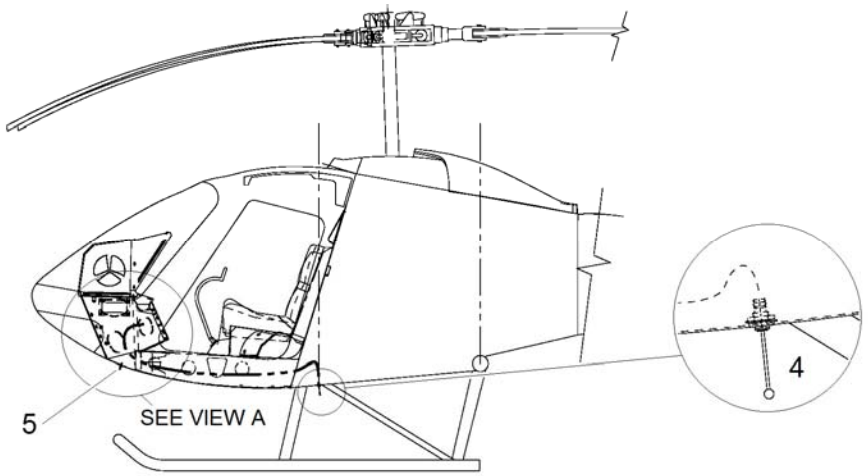
### 4-1-8. Software Update

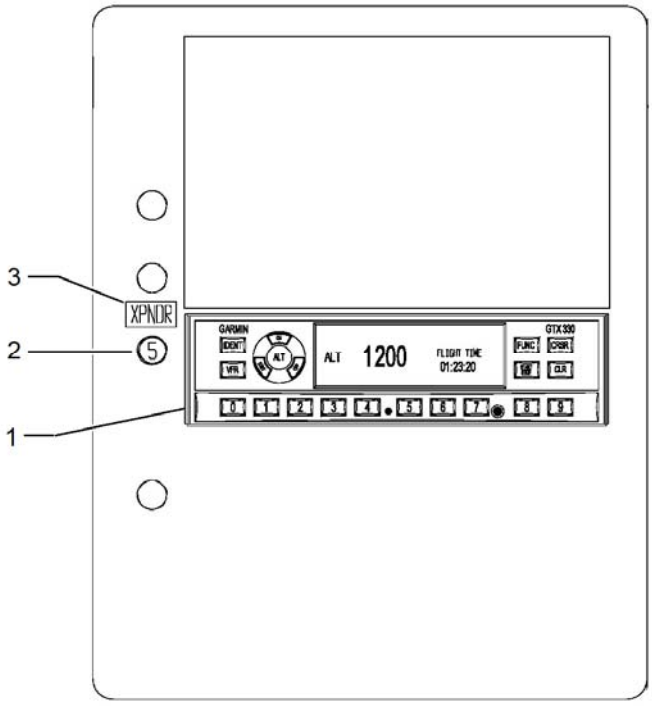
A. Verify the software version number matches the approved software version listed in Enstrom Rotorcraft Flight Manual Supplement 28-AC-070. The software version will appear on the start up screen after power up. If the replaced unit does not have the approved version of software installed, software can be downloaded from the Garmin Dealer Resource Center at www.flyGarmin.com.

## 4-2. Figures and Diagrams

A. The GTX 330 installation is shown in Figure 7-1.

B. The GTX 330 wiring interfaces are shown in Diagram 7-1 through Diagram 7-3.




VIEW A

| Item | Part Number | Component | Quantity |
|---|---|---|---|
| - | 28-22028-1 | GTX 330 ES Mode S Installation | REF |
| 1 | 010-00230-61 | . GTX 330 ES Mode S Transponder | 1 |
| 2 | MS26574-5 | . Circuit Breaker | 1 |
| 3 | 28-19064-1 | . Placard | 1 |
| - | 28-22183-127 | Antenna Installation | REF |
| 4 | AV-22 | . Antenna | 1 |
| 5 | C307PS | Temperature Probe | 1 |

**Figure 7-1. GTX 330 Installation**

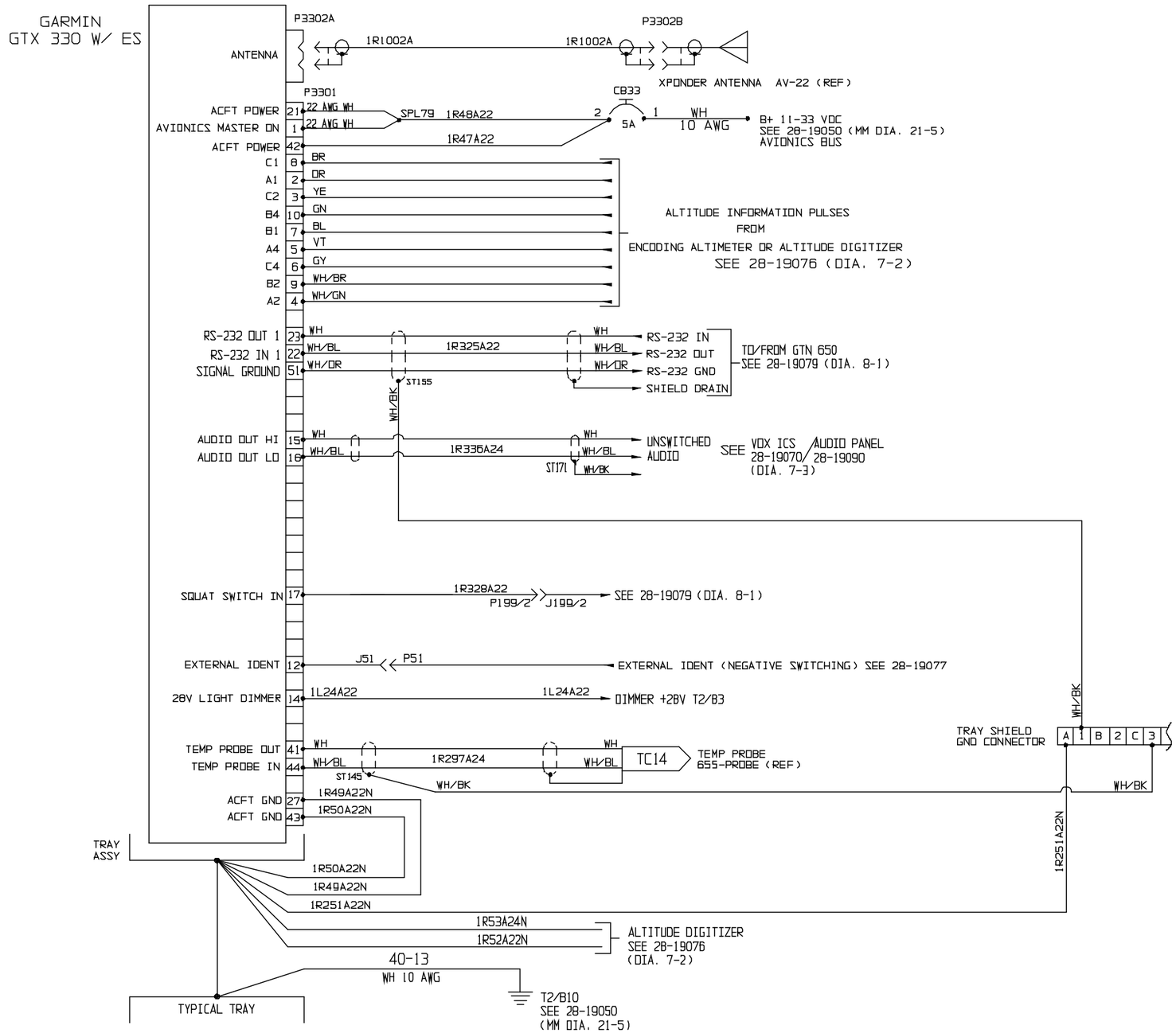



Diagram 7-1. GTX 330 with ADS-B Out (Ref. 28-19071 Rev. F)

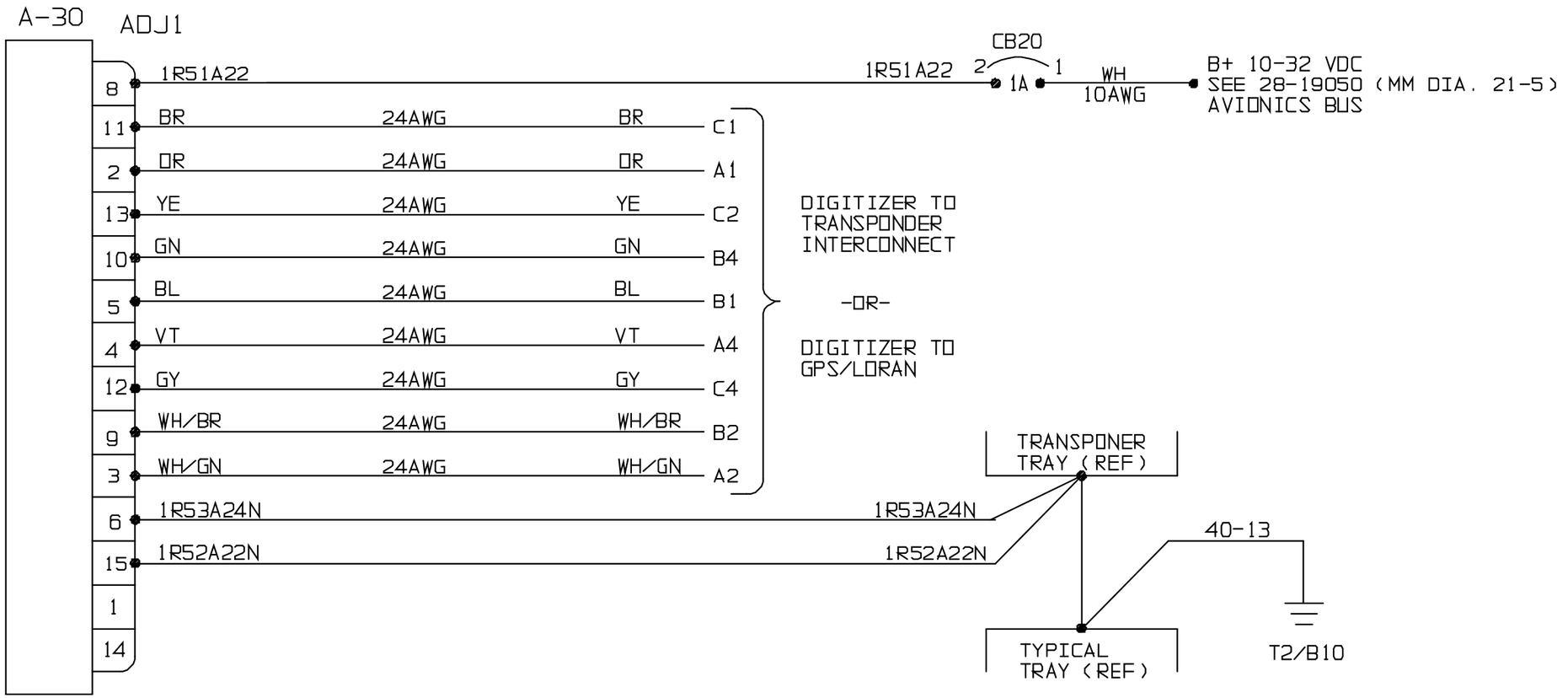



Diagram 7-2. GTX 330 with ADS-B Out – A-30 Altitude Digitizer Interface (Ref. 28-19076-1 Rev. B)

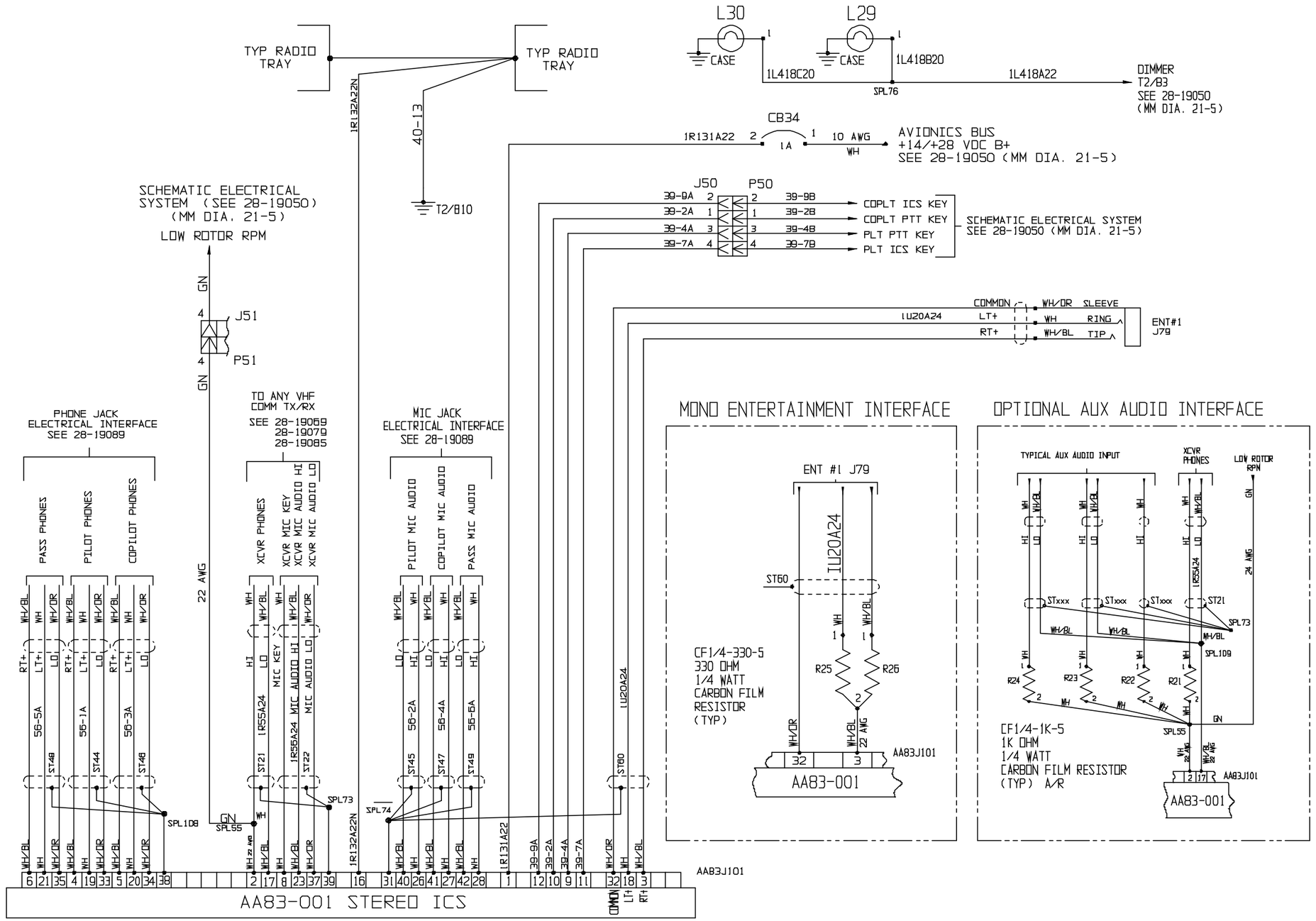



Diagram 7-3. GTX 330 with ADS-B Out – AA83-001 Stereo ICS Interface (Ref. 28-19070-101 Rev. D)

# CHAPTER 8

# GTN 650 GPS/NAV/COM

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The GTN 650 installation part number is 28-22112-3. The components of the GTN 650 installation include:

(1) GTN 650 unit installed in the radio console

(2) Nav, Com, and GPS antennas

(3) Optional remote NAV AUDIO switch depending on the audio panel system installed

B. The GTN 650 is interfaced with an audio panel or VOX ICS audio system. The GTN 650 may also be interfaced with any of the following equipment options:

(1) GMA 350Hc audio panel for display of marker beacon annunciation and for Telligence voice command function

(2) GNC/GTR COM/NAV/COM radio to provide serial position information.

(3) GTX transponder for remote operation as an ADS-B Out position source and to display ADS-B In information

(4) CDI, slaved compass system, EHSI, or an EFIS system to provide a visual presentation of VOR, GPS, LOC and GS information

(5) Fuel management system

C. The GTN 650 utilizes Navigation, Basemap, SafeTaxi, Terrain and Obstacle databases for the map display. A Secure Digital (SD) card is used to load and store various types of data. For basic flight operations, the SD card is required for Terrain, Obstacle, and SafeTaxi database storage as well as Jeppesen aviation database updates.

D. Power to the GTN 650 is provided via the **COM** circuit breaker (CB44) (5 Amp) and the **NAV/GPS** circuit breaker circuit breaker (CB43) (5 Amp) located on the left side of the lower console. The **NAV/GPS** circuit breaker also provides power to the CDI.

(1) If the installation includes an additional NAV/COM radio, the circuit breakers are assigned **COM 1** and **NAV 1/GPS**.

E. Refer to F-28F/280FX Rotorcraft Flight Manual Supplement 28-AC-069 for GTN 650 limitations and basic operation instructions.

### 1-2. Vendor Manuals

A. The following components listed in Table 8-1 are to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 8-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GTN 650 | GTN 625/635/650 Installation Manual, Document No 190-01004-02, latest revision | Garmin International, Inc.<br>1200 East 151st Street<br>Olathe, KS 66062<br>Tele: (913) 397-8200<br>Fax: (913) 397-8282<br>www.garmin.com |
| | GTN 625/635/650 Pilot's Guide, Document No. 190-01004-03, latest revision | |
| | GTN 625/635/650 Cockpit Reference Guide, Document No. 190-01004-04, latest revision | |
| | GTN 6XX/7XX Part 27 AML STC Maintenance Manual, Document No. 190-01007-B1, latest revision | |
| | GTN 6XX/7XX Telligence Voice Command Guide, Document No. 190-01007-50, latest revision | |

## SECTION 2

## AIRWORTHINESS LIMITATIONS

### 2-1. Airworthiness Limitations

A. For FAA approval, the Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, this Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GTN 650 installation are "on condition."

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The GTN 650 installation contains no user serviceable components or assemblies. Operations involving the removal of the GTN 650 must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to the electrical schematics (Diagram 8-1 and Diagram 8-2) when troubleshooting the GTN 650 installation. If the GTN 650 unit fails to operate after troubleshooting efforts, contact Garmin aviation product support for assistance (ref. para. 1-2).

### 3-3. Periodic Inspections/Maintenance

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GTN 650** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the antennas, electrical wiring and mounts for security, damage, and obvious defects. | |
| 2. Inspect the GTN 650 unit and mount for security, damage, and obvious defects. | |
| 3. Inspect interfaced fuel management system equipment (if equipped) for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on the Basic Weight and Balance Record, as required.**

## 4-1. GTN 650

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

### 4-1-1. Cleaning

A. The GTN displays use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes, and abrasive cleaners. **Do not use cleaners with ammonia**. Clean the lens using a clean, lint-free or microfiber cloth and eyeglass lens cleaner that is specified as safe for anti-reflective coatings. Clean water is also acceptable for cleaning the front bezel, keypad, and display. Care should be taken to avoid scratching the surface of the display.

B. Select the Utilities page group from the Home page, then touch Clean Screen key to start Screen Cleaning Mode. Touch the Home key to exit Screen Cleaning Mode.

### 4-1-2. Removal

A. Remove power to the GTN 650 unit. Pull the **COM** and **NAV/GPS** circuit breakers out. Disable the circuit breakers by installing a cable tie or other similar device around each circuit breaker stem.

B. Insert the 3/32-inch hex drive tool into access hole on the unit face. Rotate the hex tool counterclockwise until the unit is forced out about 3/8 inch and the hex drive tool completely stops.

C. Carefully pull the unit from the rack.

### 4-1-3. Installation

**NOTE**

**Do not use excessive force when inserting the GTN 650 into the rack. This may damage the connectors, unit, and/or unit rack.**

A. Insert the GTN 650 unit into the rack by sliding it straight in until it stops, about 3/8 inch short of the final position.

B. Insert the 3/32-inch hex drive tool into access hole on the unit face. Rotate the hex tool clockwise while pressing on the left side of the bezel until the unit is firmly seated in the rack. Do not overtighten the unit into the rack. Exceeding 15 in-lbs/1.7 Nm can damage the locking mechanism.

C. Remove the cable tie or other similar device from the **COM** and **NAV/GPS** circuit breaker stems and push the stems in to set the circuit breakers.

### 4-1-4. Functional Check

A. Perform return-to-service procedures in accordance *GTN 6XX/7XX Maintenance Manual*, Document 190-01007-B1, latest revision. Modify the installed GTN 650 configuration settings in accordance with the applicable figure reference listed below.

(1) Main SW V5.00: refer to Figure 8-2.

(2) Main SW V6.41 (or later FAA-approved versions): refer to Figure 8-4.

B. If the returned GTN 650 is used as the ADS-B Out position source, perform the following:

(1) GTX 330ES: Verify the ADS-B Out function in accordance with Chapter 7, Section 4-1-7.

(2) GTX 345: Verify the ADS-B Out function in accordance with Chapter 13, Section 4-1-6, C.

C. Optional fuel management system interface: Configure a replacement Miniflo-L (Shadin) in accordance with Figure 8-3 (refer also to the Miniflo-L Operating Manual, Document Number OP91204E for data entry and functional test procedures).

D. If required, refer to the applicable chapter within this supplement for the configuration set-up procedures associated with other equipment interfaced with the GTN 650.

### 4-1-5. Software Update

A. Verify the software version number matches the approved software version listed in Enstrom Rotorcraft Flight Manual Supplement 28-AC-069. The software version will appear on the start-up screen after power up. If the replaced unit does not have the approved version of software installed, software can be downloaded from the Garmin Dealer Resource Center at www.flyGarmin.com.

## 4-2. Figures and Diagrams

A. The GTN 650 installation is shown in Figure 8-1.

B. Configuration set-up pages: refer to paragraph 4-1-4, A, and 4-4-4, C.

C. The GTN 650 wiring interface is shown in Diagram 8-1.

D. The GTN 650/fuel management wiring interface is shown in Diagram 8-2.

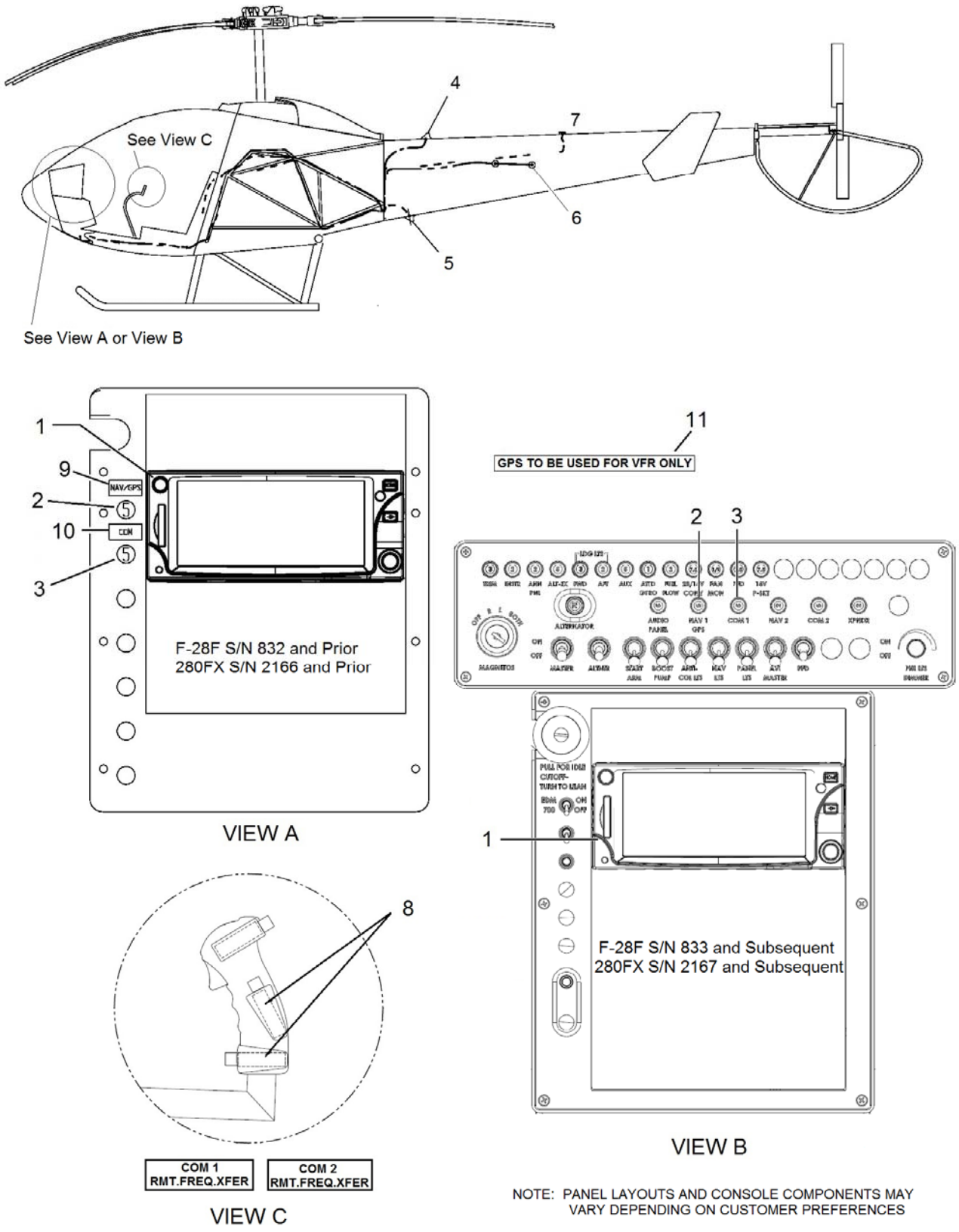



**Figure 8-1. GTN 650 Installation**

Figure 8-1. GTN 650 Installation

| Item | Part Number | Description | Quantity |
|---|---|---|---|
| - | 28-22112-1 | GTN 650 Installation (S/S by 28-22112-3) | REF |
| - | 28-22112-3 | GTN 650 Installation | REF |
| - | 010-00813-A0 | GTN 650 Kit | REF |
| 1 | 011-02256-00 | . GTN 650 | 1 |
| - | 011-00979-03 | . Configuration Module Kit | 1 |
| -* | 010-01157-41 | . Helo, Americas North | A/R |
| -* | 010-01157-42 | . Helo, Americas South | A/R |
| -* | 010-01157-43 | . Helo, Atlantic North | A/R |
| -* | 010-01157-44 | . Helo, Atlantic South | A/R |
| -* | 010-01157-45 | . Helo, Pacific North | A/R |
| -* | 010-01157-46 | . Helo, Pacific South | A/R |
| 2** | MS26574-5 (5 amp) | . Circuit Breaker | 1 |
| 2 | 7277-5-5 (5 amp) | . Circuit Breaker | 1 |
| 3** | MS26574-5 (5 amp) | . Circuit Breaker | 1 |
| 3 | 7277-5-5 (5 amp) | . Circuit Breaker | 1 |
| 4 | 28-22183-1 | Antenna Installation, VHF COM 1 | REF |
| - | DMC63-1/A | . Antenna | 1 |
| - | MS24693-C51 | . . Screw | 3 |
| 5 | 28-22183-117 | Antenna Installation, VHF COM 2 (alternate for 28-22183-1) | REF |
| - | C1292-1 | . Antenna | 1 |
| - | AN507-C832R10 | . . Screw | 3 |
| 6 | 28-22183-115 | Antenna Installation, VOR/LOC/GS | REF |
| - | CI205-3 | . Antenna System | 1 |
| - | MS24693-C55 | . . Screw | 16 |
| 7 | 4196582-121 | Antenna Installation, GPS | REF |
| 7 | 4196582-123 | Antenna Installation, GPS (alternate for 4196582-121) | REF |
| - | 013-00235-00 | . Antenna | 1 |
| - | MS51959-50 | . . Screw (used with 4196582-121) | 4 |
| - | 8-32 UNC-2A x 1.00 | . . Screw (used with 4196582-123) | 4 |
| 8* | 4119835-33 | . Placard | 1 |
| 9** | 28-19064-1 | . Placard | 1 |
| 10** | 28-19064-1 | . Placard | 1 |
| 11 | 28-19064-1 | . Placard | 1 |

– Not illustrated

* Per customer requirements

** F28-F S/N 832 and prior; 280FX S/N 2166 and prior

**INTENTIONALLY LEFT BLANK**

| ARINC 429 Configuration Page | | |
|---|---|---|
| | **Speed** | **Data** |
| ARINC 429 In 1 | --- | OFF |
| ARINC 429 In 2 | --- | OFF |
| ARINC 429 Out 1 | --- | OFF |
| ARINC 429 Out 2 | --- | OFF |
| SDI | | LNAV 1 (Note 1) |

Notes:
1) No action taken

| RS-232 Configuration Page | | | Notes |
|---|---|---|---|
| | **Input** | **Output** | |
| RS232 1 | GTX Mode S+ #1 | GTX Mode S+ #1 | Note 1 |
| | OFF | OFF | Note 2 |
| RS232 2 | Fuel Format 2 | Aviation Output 1 | Note 3 |
| | OFF | OFF | Note 2 |
| RS232 3 | OFF | OFF | |
| RS232 4 | OFF | OFF | |

Notes:
1) For Garmin GTX 330ES W/ADS-B Out and remote operation is desired
2) When not connected
3) When interfaced to a Shadin Miniflo-L

| HSDB (Ethernet) Configuration Page | | Notes |
|---|---|---|
| Ethernet Port 1 | Not Connected | |
| Ethernet Port 2 | Not Connected | |
| Ethernet Port 3 | Not Connected | |
| Ethernet Port 4 | Not Connected | |

| Interfaced Equipment Page | | |
|---|---|---|
| **Unit** | **Present** | **Type** |
| Cross-Side Nav | Not Present | - - - |
| GDL 69/69A | Not Present | - - - |
| GDL 88 | Not Present | - - - |
| Transponder #1 | Present | GTX Mode S+ (Note 1) |
| | Not Present | - - - (Note 2) |
| Transponder #2 | Not Present | - - - |
| GSR 56 | Not Present | - - - |

Notes:
1) For Garmin GTX 330ES W/ADS-B Out and remote operation is desired
2) When not connected

| Main Indicator (Analog) Configuration page | |
|---|---|
| Calibrate OBS Resolver | Calibrate (Note 1) |
| CDI Key | Enabled |
| Selected Course For GPS | Allowed |
| Selected Course For VOR/LOC | Allowed |
| V-Flag State | Normal |

Notes:
1) Calibrate with CDI or slaved compass system, as applicable

| Lighting Configuration Page | |
|---|---|
| **Display** | **Keys** |
| **Source**<br>Lighting Bus 1 | **Source**<br>Lighting Bus 1 |
| **Minimum Level**<br>5.00% | **Minimum Level**<br>5.00% |

| Photocell Configuration Page | | |
|---|---|---|
| **Response Time**<br>2sec | **Slope**<br>50 | **Offset**<br>50 (Note 1) |
| | **Key Backlight Cutoff**<br>80% | **Photocell Transition**<br>10% |

Notes:
1) Adjust Offset to match/sync to other installed equipment

| Lighting Bus Configuration Page | | |
|---|---|---|
| **Lighting Bus 1**<br>28V DC | | |
| **Response Time**<br>0sec | **Slope**<br>15 | **Offset**<br>15 (Note 1) |
| **Lighting Bus 2**<br>28V DC | (Note 2) | |
| **Response Time**<br>2sec | **Slope**<br>50 | **Offset**<br>50 |

Notes:
1) Adjust Offset to match/sync to other installed equipment
2) Lighting Bus 2 not applicable

| Audio Configuration Page |
|---|
| **Alert Volume**<br>50%<br>(Adjust per customer requirement) |

| Traffic Configuration Page |
|---|
| N/A (Not applicable at this time) |

| Main System Configuration Page | |
|---|---|
| Airframe Type | Rotorcraft |
| Air/Ground Threshold | 10KT |
| Air/Ground Discrete | Active for Ground |
| GPS Antenna Height Above Ground | 5.5 feet |
| Fuel Type | AV Gas |
| GPS Select | Auto |
| Heading Source Input | Not Connected |
| Radio Altimeter Input | Not Connected |
| Altitude Source Input | Not Connected |
| Enhanced Lighting Mode | Disabled |
| Crossfill Status Alert | Disabled |
| System ID | GTN 1 |

| Com Configuration Page | |
|---|---|
| Com Radio | Enabled |
| Com RF Squelch | 80% (Note 1) |
| Mic 1 Gain | +12db (Note 1) |
| Sidetone Volume | +60.0db (Note 1) |

Notes:
1) Adjust per customer requirement

| VOR/LOC/GS Configuration Page | | Notes |
|---|---|---|
| Nav Radio | Enabled | |
| Selected Course | - - - | |
| Calibrate OBS Resolver | | No action taken |
| ARINC 429 Speed RX | Low | No action taken |
| ARINC 429 Speed TX | Low | No action taken |
| SDI | VOR/ILS 1 | No action taken |
| DME Mode | | No action taken |
| DME Channel Mode | | No action taken |

Figure 8-2. GTN 650 Configuration Set-Up, Main SW V5.00 (Ref. 28-19079-9 Rev. F)
(Sheet 1 of 2) Rev. 8, Jan 15/19

| Discrete Configuration Page |
|---|
| N/A (No action taken) |

| Waypoint Configuration Page | |
|---|---|
| Mark on Target | Disabled |

| Terrain Configuration Page |
|---|
| Not applicable at this time |

| Com Transmit Power Configuration Page | |
|---|---|
| Com Transmit Power | |
| **Normal** | 16W |
| ▬▬ | |

| Flight Simulator Configuration Page |
|---|
| Not applicable at this time |

| System - Setup (Note 1) | |
|---|---|
| CDI Scale | Auto |
| ILS CDI Capture | Auto Switch |
| Local Offset | Adjust to Local time |
| Time Format | Local 12 hour |
| Runway Surface | Any |
| Runway Length | 0 FT |
| Com Channel Spacing | 25.0 kHz (Note 2) |
| Crossfill | Disabled |
| Notes:<br>1) These settings can be modified per customer requirements unless noted otherwise<br>2) Switch to 8.33 KHz prior to shipment per customer requirement (Europe/Asia) | |

| System - Alerts (Note 1) | |
|---|---|
| Arrival | Active |
| Proximity | 3.0 NM |
| Airspace Alerts | All Active |
| Altitude Buffer | 200 FT |
| Notes:<br>1) These settings can be modified per customer requirements unless noted otherwise | |

| System - Units (Note 1) | |
|---|---|
| Nav Angle | Magnetic (°) |
| Temperature | Celsius (°) |
| Fuel | Gallons (GAL) |
| Position Format | LAT/LON |
| Notes:<br>1) These settings can be modified per customer requirements unless noted otherwise | |

| System – Ownship Configuration | |
|---|---|
| Color Ownship | This setting can be modified per customer requirements unless otherwise noted |
|  3-Blade Rotorcraft | |

| System – Audio | |
|---|---|
| Click Volume | 60% (Note 1) |
| HTAWS Alert Voice | N/A (Not applicable at this time) |
| Voice Callout | N/A (Not applicable at this time) |
| Notes:<br>1) This setting can be modified per customer requirements unless otherwise noted | |

| System – Backlight | |
|---|---|
| Manual Offset | N/A (Not applicable at this time) |

Figure 8-2. GTN 650 Configuration Set-Up, Main SW V5.00 (Ref. 28-19079-9 Rev. F)
(Sheet 2 of 2) Rev. 8, Jan 15/19

| Group 1 Configuration Page | | | Notes | | |
|---|---|---|---|---|---|
| L = | XXXX<br>Enter K-FACTOR | LEFT K-FACTOR | EXAMPLE:<br>K-FACTOR* OF 41.6 | left window<br>4 | right window<br>160 |
| | | | (*The K-FACTOR value entered should match the K-FACTOR identified on the fuel flow transducer.) | | |
| R = | 0 | RIGHT K-FACTOR | N/A | | |
| A = | 0 | LEFT FUEL FLOW OFFSET | N/A | | |
| b = | 0 | RIGHT FUEL FLOW OFFSET | N/A | | |
| U = | 0 | FUEL UNITS | 0 = GALLONS | | |
| E = | 0 | NUMBER OF ENGINES | 0 = SINGLE | | |
| C = | 0 | LOW FUEL CUT OFF | 0 = OFF | | |
| o = | 5 OR 0 | GPS OUTPUT | 5 = INTERFACED TO A GARMIN GTN 650<br>0 = OFF | | |
| I = | 1 OR 0 | GPS INPUT | 1 = INTERFACED TO A GARMIN GTN 650<br>0 = OFF | | |
| d = | 0 | ENDURANCE WARNING TIME | 0 = 45 MIN | | |
| F = | 0 | ENGINE TYPE | 0 = INJECTOR/TURBINE | | |
| u = | 0 | IGNORE LORAN WARNINGS | 0 = NO | | |
| s = | 5 | LOW FUEL LEVEL | 5 = 5 GALLONS | | |

| Group 2 Configuration Page | | | Notes |
|---|---|---|---|
| o = | 5 OR 0 | GPS OUTPUT | 5 = INTERFACED TO A GARMIN GTN 650<br>0 = OFF |
| I = | 1 OR 0 | GPS INPUT | 1 = INTERFACED TO A GARMIN GTN 650<br>0 = OFF |
| d = | 0 | ENDURANCE WARNING TIME | 0 = 45 MIN |
| F = | 0 | ENGINE TYPE | 0 = INJECTOR/TURBINE |
| u = | 0 | IGNORE LORAN WARNINGS | 0 = NO |
| s = | 5 | LOW FUEL LEVEL | 5 = 5 GALLONS |

| Initial Programming |
|---|
| SET FULL FUEL TO 40 GALLONS |

Figure 8-3. GTN 650 – Fuel Management System Interface Configuration Set-Up (Ref. 28-19078-1 Rev. A)

| ARINC 429 Configuration Page | | | Notes |
|---|---|---|---|
| | Speed | Data | |
| ARINC 429 In 1 | - - - | OFF | |
| ARINC 429 In 2 | - - - | OFF | |
| ARINC 429 Out 1 | - - - | OFF | |
| ARINC 429 Out 2 | - - - | OFF | |
| SDI | | LNAV 1 | No action taken |

| RS-232 Configuration Page | | | Notes |
|---|---|---|---|
| | Input | Output | |
| RS232 1 | GTX Mode S+ #1 | GTX Mode S+ #1 | For Garmin GTX 345 |
| | OFF | OFF | When not connected |
| RS232 2 | Fuel Format 2 | Aviation Output 1 | For Shadin Miniflo |
| | OFF | OFF | When not connected |
| RS232 3 | OFF | Aviation Output 1 | For GTR/GNC |
| | OFF | OFF | When not connected |
| RS232 4 | GMA Format 2 | GMA Format 2 | For GMA |
| | OFF | OFF | When not connected |
| More RS-232 Setup | Disable Forward ALT to GTX | | For Garmin GTX 345 |
| | No Action | | When not connected |

| HSDB (Ethernet) Configuration Page | | Notes |
|---|---|---|
| Ethernet Port 1 | Not Connected | |
| Ethernet Port 2 | Not Connected | |
| Ethernet Port 3 | Connected | For Garmin GTX 345 |
| | Not Connected | When not connected |
| Ethernet Port 4 | Not Connected | |

| Interfaced Equipment Page | | | Notes |
|---|---|---|---|
| Unit | Present | Type | |
| Cross-Side Nav | Not Present | - - - | |
| GDL 69/69A | Not Present | - - - | |
| GDL 88 | Not Present | - - - | |
| ADS-B In Source | Present | GTX #1 | For Garmin GTX 345 |
| | Not Present | - - - | When not connected |
| GDU #1 | Not Present | - - - | |
| GDU #2 | Not Present | - - - | |
| GDU #3 | Not Present | - - - | |
| Transponder #1 | Present | GTX Mode S+ | For Garmin GTX 345 |
| | Not Present | - - - | When not connected |
| Transponder #2 | Not Present | - - - | |
| GSR 56 | Not Present | - - - | |

| Main Indicator (Analog) Configuration page | | Notes |
|---|---|---|
| Calibrate OBS Resolver | Calibrate | Calibrate for CDI/Slaved Compass System |
| CDI Key | Enabled | |
| Selected Course For GPS | Allowed | |
| Selected Course For VOR/LOC | Allowed | |
| V-Flag State | Normal | |

| Lighting Configuration Page | | Notes |
|---|---|---|
| Display | Keys | |
| Source: Lighting Bus 1 | Source: Photocell | |
| Minimum Level: 5.00% | Minimum Level: 5.00% | |

| Photocell Configuration Page | | | Notes |
|---|---|---|---|
| Response Time: 2sec | Slope: 50 | Offset: 50 | Adjust Offset to match/sync to other installed equipment |
| | Key Backlight Cutoff: 80% | Photocell Transition: 10% | |

| Lighting Bus Configuration Page | | | Notes |
|---|---|---|---|
| Lighting Bus 1: 28V DC | | | |
| Response Time: 0sec | Slope: 15 | Offset: 15 | Adjust Offset to match/sync to other installed equipment |
| Lighting Bus 2: 28V DC | | | |
| Response Time: 2sec | Slope: 50 | Offset: 50 | Lighting Bus 2 not applicable |

| Audio Configuration Page | Notes |
|---|---|
| Alert Volume: 50% | Adjust per customer requirement |

| Voice Command Configuration Page | | | Notes |
|---|---|---|---|
| Voice Commands | | | For GMA Voice Commands, otherwise disable all.<br>Disable all for EASA specified configuraiton. (Delivery to Europe) |
| "Say..." Commands | | Mute Tone | |

| Traffic Configuration Page | | Notes |
|---|---|---|
| Traffic Intruder Symbol Color | White | |
| GTN Control of Traffic System | Yes | |

| Main System Configuration Page | | Notes |
|---|---|---|
| Airframe Type | Rotorcraft | |
| Air/Ground Threshold | 10KT | |
| Air/Ground Discrete | Active for Ground | |
| GPS Antenna Height Above Ground | 5.5 feet | |
| Fuel Type | AV Gas | |
| GPS Select | Auto | |
| Heading Source Input | Not Connected | |
| Radio Altimeter Input | Not Connected | |
| Altitude Source Input | Connected | For Garmin GTX 345 |
| | Not Connected | When not connected |
| Enhanced Lighting Mode | Disabled | |
| Crossfill Status Alert | Disabled | |
| System ID | GTN 1 | |
| Database Sync | Pilot Control | |
| Airspace Labels | Enabled | |
| Checklist Page | Task List | |
| Blackout Mode | Disabled | |

Figure 8-4. GTN 650 Configuration Set-Up (Ref. 28-19079-9 Rev. H)
(NOTE: Refer to Paragraph 4-1-4 for SW applicability) (Sheet 1 of 3) Rev. 9, Apr 30/2020

| Com Configuration Page | | Notes |
|---|---|---|
| Com Radio | Enabled | |
| Com Squelch Mode | Advanced | |
| Mic 1 Gain | +12db | Adjust per customer requirement |
| Sidetone Source | External | |
| Sidetone Volume | +60.0db | Adjust per customer requirement |
| Sidetone Pilot Control | Enabled | |

| Advanced Com Squelch | | Notes |
|---|---|---|
| 25kHz | | |
| Low | 80% | |
| Mid | 80% | |
| High | 80% | Adjust all per customer requirement |
| 8.33kHz | | |
| Low | 80% | |
| Mid | 80% | |
| High | 80% | |

| Advanced Carrier Squelch | | Notes |
|---|---|---|
| 25kHz | | |
| Low | 55% | |
| Mid | 55% | |
| High | 55% | |
| 8.33kHz | | |
| Low | 0% | |
| Mid | 0% | |
| High | 0% | |

| VOR/LOC/GS Configuration Page | | Notes |
|---|---|---|
| Nav Radio | Enabled | |
| Selected Course | - - - | |
| Calibrate OBS Resolver | | No action taken |
| ARINC 429 Speed RX | Low | |
| ARINC 429 Speed TX | Low | |
| SDI | VOR/ILS 1 | |
| DME Mode | | No action taken |
| DME Channel Mode | | No action taken |
| LOC/GS Filtering | Disabled | |

| Discrete Configuration Page | Notes |
|---|---|
| N/A | No action taken/Default |

| Navigation Features Configuration Page | | Notes |
|---|---|---|
| Mark on Target | Disabled | |
| RF Procedure Legs | Disabled | |

| Vertical Navigation Configuration Page | | | Notes |
|---|---|---|---|
| Vertical Navigation Type | | | |
| **VCALC** | VNAV | | |
| Transition to Approach | Transition Altitude | VDI Scale | |
| | FL180 | 500 FT | |

| Ownship Configuration Page | | Notes |
|---|---|---|
| Color Ownship | | |
|  3-Blade Rotorcraft | | **The following settings can be modified per customer requirements unless noted otherwise** |

| Terrain Configuration Page | | | Notes |
|---|---|---|---|
| **Terrain Mode** | | **Alert Configuration** | |
| **HTerrain Proximity** | HTerrain Alerting | Audio Clips | |
| HTAWS | | Alert Settings | |
| | | **Airport Criteria** | |
| | | Runway Surface **Any** | |
| | | Minimum Length **0 FT** | |

| Com Transmit Power Configuration Page | | Notes |
|---|---|---|
| **Com Transmit Power** | | |
| **Normal** | 16W | |

| Flight Simulator Configuration Page | Notes |
|---|---|
| N/A | Not applicable at this time |

| Search and Rescue Configuration Page | Notes |
|---|---|
| N/A | Not applicable at this time |

| External Systems - Audio Panel | Notes |
|---|---|
| **Marker Beacon Display** | For GMA Marker Beacon Display, otherwise disable |

| System - SBAS Providers | Notes |
|---|---|
| **WAAS** | WAAS provides SBAS serive for North America and most of Central America |
| EGNOS | Switch to EGNOS prior to shipment per customer requirement (Europe) |
| MSAS | Switch to MSAS prior to shipment per customer requirement (Japan) |
| GAGAN | Switch to GAGAN prior to shipment per customer requirement (India) |

| System -GTX 345 FIS-B Weather | Notes |
|---|---|
| **Enabled** | For Garmin GTX 345 FIS-B Weather, otherwise disable |

| System - Setup | | Notes |
|---|---|---|
| CDI Scale | Auto | **The following settings can be modified per customer requirements unless noted otherwise** |
| ILS CDI Capture | Auto Switch | |
| Local Offset | Adjust to Local time | |
| Time Format | Local 12 hour | |
| Runway Surface | Any | |
| Runway Length | 0 FT | |
| Include User Airports | Enabled | |
| Com Channel Spacing | 25.0 kHz | Switch to 8.33 kHz prior to shipment per customer requirement (Europe/Asia) |
| Reverse Frequency Lookup | Toggled On | |
| Com Sidetone Control: | | |
| Link to COM VOL | Toggled Off | |
| Offset | +0% | |
| Keyboard Format | ABC | |
| Crossfill | Disabled | |

Figure 8-4. GTN 650 Configuration Set-Up (Ref. 28-19079-9 Rev. H)
(NOTE: Refer to Paragraph 4-1-4 for SW applicability) (Sheet 2 of 3) Rev. 9, Apr 30/2020

| System - Alerts | | Notes |
|---|---|---|
| Arival | Active | **The following settings can be modified per customer requirements unless noted otherwise** |
| Proximity | 3.0 NM | |
| Airspace Alerts | All Active | |
| Altitude Buffer | 200 FT | |

| System - Units | | Notes |
|---|---|---|
| Altitude/Verticle Speed | Feet (FT/FPM) | **The following settings can be modified per customer requirements unless noted otherwise** |
| Distance /Speed | Nautical Miles | |
| Fuel | Gallons (GAL) | |
| Nav Angle | Magnetic (°) | |
| Magnetic Variation | N/A | |
| Position Format | LAT/LON | |
| Pressure | Inches of Mercury | |
| Temperature | Celsius (°) | |

| System - Audio | | Notes |
|---|---|---|
| Click Volume | 60% | **Setting can be modified per customer requirements unless noted otherwise** |
| HTAWS Alert Voice | N/A | Not applicable at this time |
| Voice Callout | N/A | Not applicable at this time |

| System - Backlight | | Notes |
|---|---|---|
| Manual Offset | No Action | **Setting can be modified per customer requirements unless noted otherwise** |

| System - Connext Setup - GTX 345 | Notes |
|---|---|
| **Bluetooth** | For Garmin GTX 345 Bluetooth, otherwise disable |

| System - Voice Commands | Notes |
|---|---|
| **Voice Commands** | For GMA Voice Commands, otherwise disable<br>Disable for EASA specified configuration. (Delivery to Europe) |

Figure 8-4. GTN 650 Configuration Set-Up (Ref. 28-19079-9 Rev. H)
(NOTE: Refer to Paragraph 4-1-4 for SW applicability)
(Sheet 3 of 3) Rev. 9, Apr 30/2020

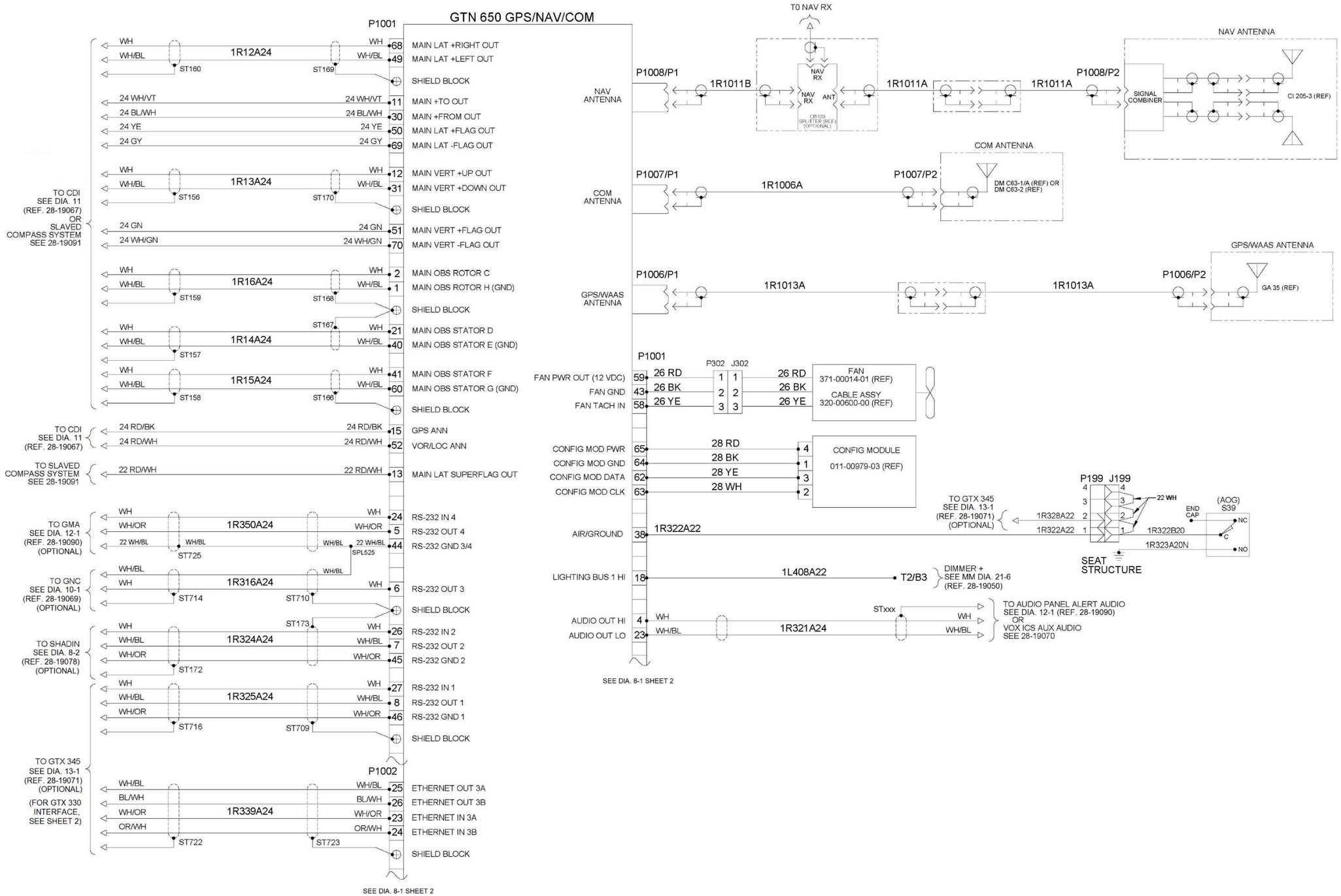



Diagram 8-1. GTN 650 Interface (Ref. 28-19079-9 Rev. H)
(Sheet 1 of 2) Rev. 9, Apr 30/2020
8-19/8-20 Blank

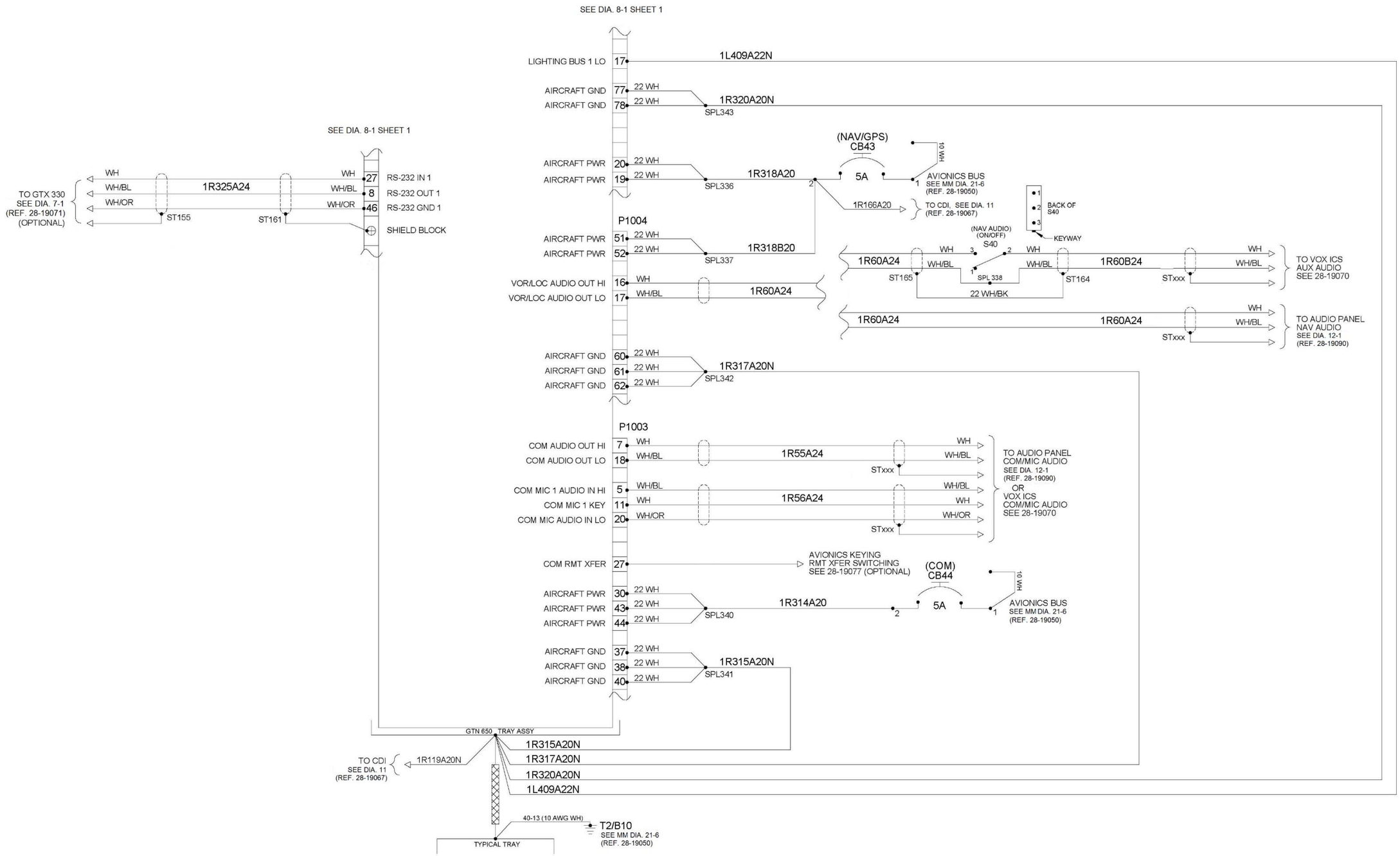



Diagram 8-1. GTN 650 Interface (Ref. 28-19079-9 Rev. H)
(Sheet 2 of 2) Rev. 9, Apr 30/2020

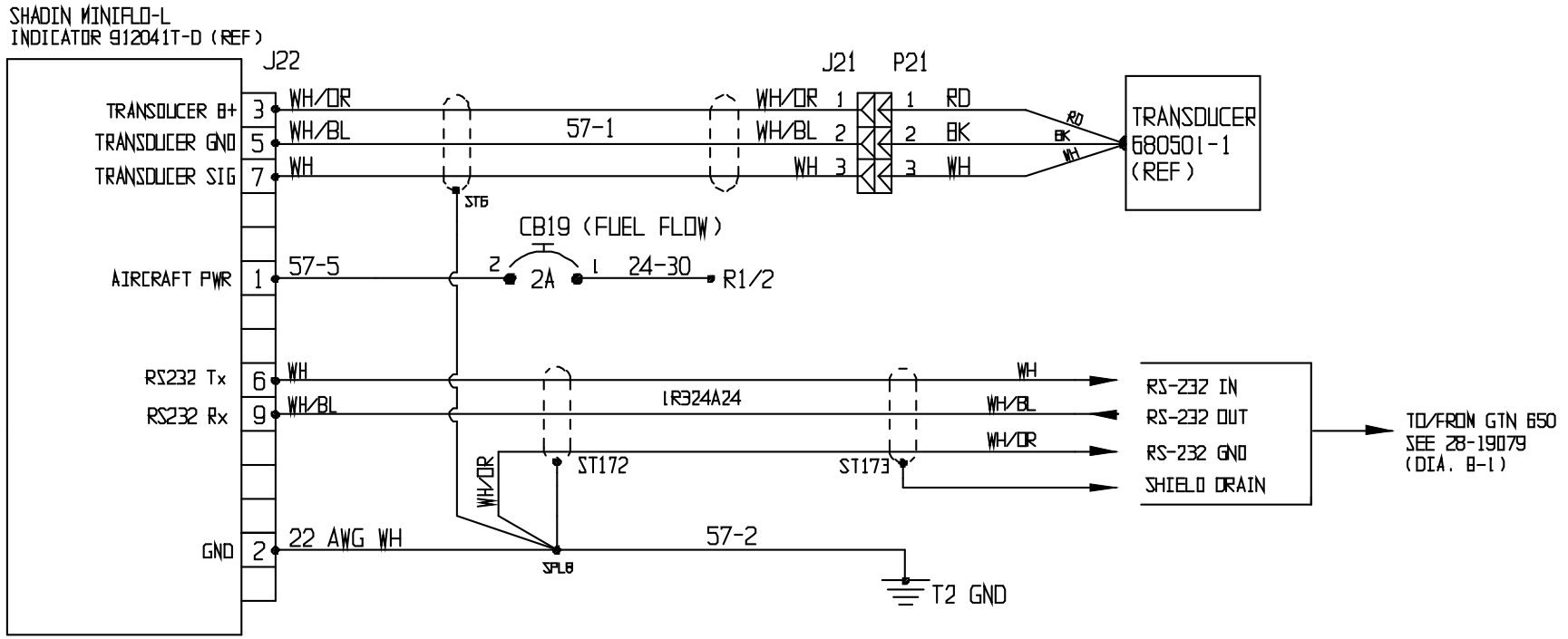



Diagram 8-2. GTN 650 – Fuel Management System Interface (Ref. 28-19078-1 Rev. A)

# CHAPTER 9

# DUAL START COLLECTIVE CONTROL INSTALLATION

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The collective control with dual start installation option is part number 28-16080-101.

B. The dual start feature allows the rotorcraft to be started from either the pilot or copilot positions. This is achieved with a momentary switch in the starboard-side collective stick. The switch is connected in parallel to the standard starting switch located in the port-side collective stick. The switch, when activated, closes the starter relay which then engages the starter motor.

C. When configured with the dual start collective control installation, the starboard-side collective stick is not equipped with a quick disconnect feature. Installation of both port- and starboard-side collective sticks is identical.

D. Refer to the applicable F-28F or 280FX Rotorcraft Flight Manual for limitations and basic operation instructions.

## SECTION 2

## AIRWORTHINESS LIMITATIONS

### 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the collective control with dual start installation are “on condition.”

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing, Troubleshooting, and Periodic Inspections

A. Refer to the F-28F/280F Series Maintenance Manual for servicing, troubleshooting, and periodic inspection procedures for the flight controls and electrical systems.

## SECTION 4

## SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-511-5, Basic Weight and Balance Record, as required (reference Enstrom F-28F/280F Series Maintenance Manual).**

### 4-1. Dual Start – Starboard-Side Collective Control (Figure 9-1)

#### 4-1-1. Removal

A. Remove the fiberglass seat deck.

B. Disconnect the starter button wires at the connector terminals.

C. Cut the safety wire and remove bolt (3) and washer (4) from the top of the collective stick socket (2).

D. Remove the collective stick (1) from the collective stick socket (2).

#### 4-1-2. Installation

A. Install the collective stick (1) into the collective stick socket (2) and align holes.

B. Install washer (4) and bolt (3). Torque bolt (50 in-lbs/5.7 Nm) and safety wire with MS20995C32.

C. Connect the wire terminals for the starter button.

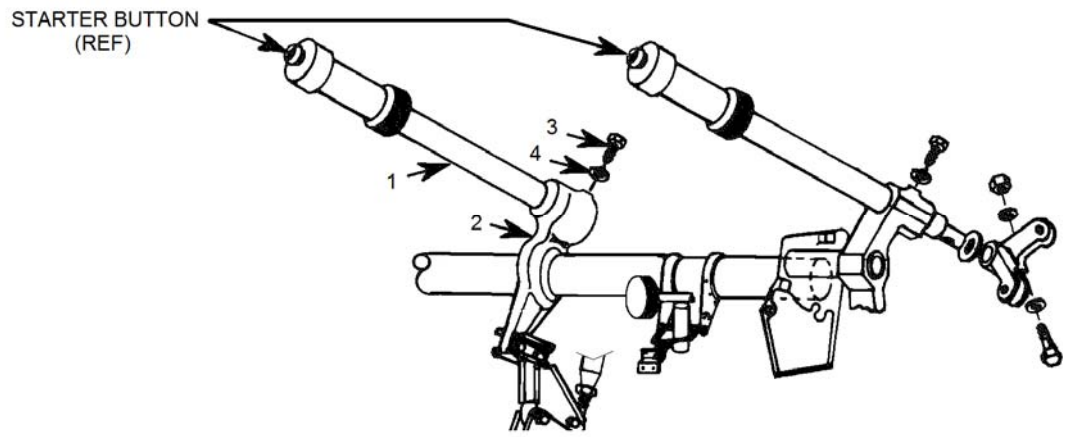
D. Cycle the collective stick up and down and rotate the throttle to check freedom of movement.

E. Install fiberglass seat deck.

### 4-2. Figures and Diagrams

A. The dual start collective control installation is shown in Figure 9-1.

B. The dual start collective control wiring interface is shown in Diagram 9-1.




| Item | Part Number | Description | Quantity |
|---|---|---|---|
| - | 28-16080-101 | Collective Control Installation | REF |
| 1 | 28-16039-5 | . Starboard (Copilot) Collective Stick Assembly (chrome plated finish) | REF |
| 1 | 28-16039-7 | . Starboard (Copilot) Collective Stick Assembly (flat black finish) | REF |
| 2 | 28-16029-3 | . Socket/Bellcrank Assembly | 1 |
| 3 | 28-16011-1 | . . Bolt | 1 |
| 4 | AN960-516L | . . Washer | 1 |
| - | MS20995C32 | . . Safety Wire | A/R |

**Figure 9-1. Starboard (Copilot) Dual Start Collective Stick Installation**

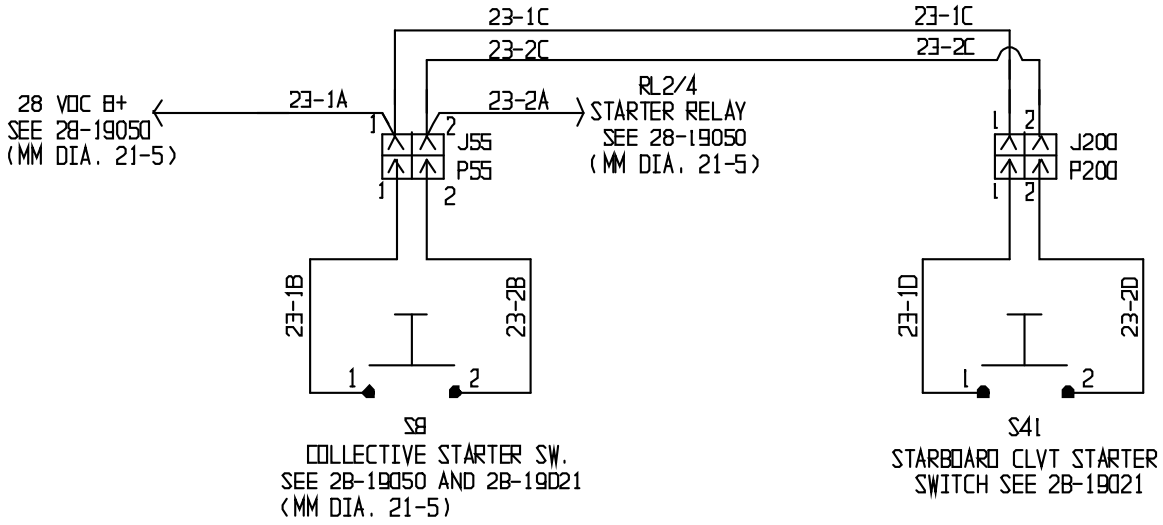



**Diagram 9-1. Dual Start Switch Interface**

# CHAPTER 10

# GNC 255A

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The GNC 255A is a VHF communications transceiver combined with 200-channel VOR, LOC, and GS navigation receivers. The com radio operates from 118.000 to 139.975 MHz in either 25 kHz or 8.33 kHz channel spacing. Transmitting power is 10W.

B. The GNC 255A installation part number is 28-22063-5.

C. The components of the GNC 255A include the panel mounted GNC 255A unit and Nav and Com antennas. The GNC 255A may be interfaced with a CDI, slaved compass system, EHSI, or an EFIS system and may also be interfaced to either a VOX ICS or an audio panel.

D. Power to the GNC 255A is provided via the **COM** circuit breaker (CB27) (5 Amp) and the **NAV** circuit breaker (CB39) (2 Amp) located on the left side of the lower instrument panel console. If equipped with a second transceiver unit (such as the GTN 650), power is provided via the **COM 1** or **COM 2** circuit breaker and **NAV 1** or **NAV 2** circuit breaker. The **NAV** circuit breaker may also provide power to the CDI.

E. Refer to F-28F/280FX Rotorcraft Flight Manual Supplement 28-AC-074 for GNC 255A limitations and basic operation instructions.

### 1-2. Vendor Manuals

A. The following components listed in Table 10-1 are to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 10-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GNC 255A | GTR 255/GNC 255 Installation Manual, Document No. 190-01182-02, latest revision | Garmin International, Inc.<br>1200 East 151st Street<br>Olathe, KS 66062<br>Tele: (913) 397-8200<br>Fax: (913) 397-8282<br>www.garmin.com |
| | GNC 255A/255B Pilot's Guide, Document No. 190-01182-01, latest revision | |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GNC 255A installation are “on condition.”

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The GNC 255A installation contains no user serviceable components or assemblies. Operations involving the removal of the GNC 255A must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to the electrical schematic in Diagram 10-1 when troubleshooting the GNC 255A installation. If the GNC 255A unit fails to operate after troubleshooting efforts, contact Garmin aviation product support for assistance (ref. para. 1-2).

### 3-3. Periodic Inspections/Maintenance

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GNC 255A** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the antennas, electrical wiring and mounts for security, damage, and obvious defects. | |
| 2. Inspect the GNC 255A unit and mount for security, damage, and obvious defects. | |

## SECTION 4

## SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on the Basic Weight and Balance Record, as required.**

### 4-1. GNC 255A

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

#### 4-1-1. Cleaning

A. The front bezel, keypad, and display can be cleaned with a microfiber cloth or with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

#### 4-1-2. Removal

A. Remove power to the GNC 255A unit. Pull the **COM** and **NAV** circuit breakers out. Disable the circuit breakers by installing a cable tie or other similar device around each circuit breaker stem.

B. Insert the 3/32-inch hex drive tool into access hole on the unit face. Rotate the hex tool counterclockwise until the unit is forced out about 3/8 inch and the hex drive tool completely stops.

C. Carefully pull the unit from the rack.

#### 4-1-3. Installation

**NOTE**

**Do not use excessive force when inserting the GNC 255A into the rack. This may damage the connectors, unit, and/or unit rack.**

A. Insert the GNC 255A unit into the rack by sliding it straight in until it stops, about 3/8 inch short of the final position.

B. Insert the 3/32-inch hex drive tool into access hole on the unit face. Rotate the hex tool clockwise while pressing on the left side of the bezel until the unit is firmly seated in the rack. Do not overtighten the unit into the rack. Exceeding 15 in-lbs/1.7 Nm can damage the locking mechanism.

C. Remove the cable tie or other similar device from the **COM** and **NAV** circuit breaker stems and push the stems in to set the circuit breakers.

### 4-1-4. Functional Check

A. If the installation is a replacement, configure the GNC 255A in accordance with the configuration pages in Figure 10-2 and perform the post installation checkout in accordance with section 6 of the GTR 225/GNC 255 Installation Manual (para. 1-2).

### 4-1-5. Software Update

A. Verify the software version number matches the approved software version listed in Enstrom Rotorcraft Flight Manual Supplement 28-AC-074. The software version will appear on the start up screen after power up. If the replaced unit does not have the approved version of software installed, software can be downloaded from the Garmin Dealer Resource Center at www.flyGarmin.com.

## 4-2. Figures and Electrical Diagrams

A. The GNC 255A installation is shown in Figure 10-1.

B. The GNC 255A configuration set-up pages are shown in Figure 10-2.

C. The GNC 255A wiring interface is shown in Diagram 10-1.

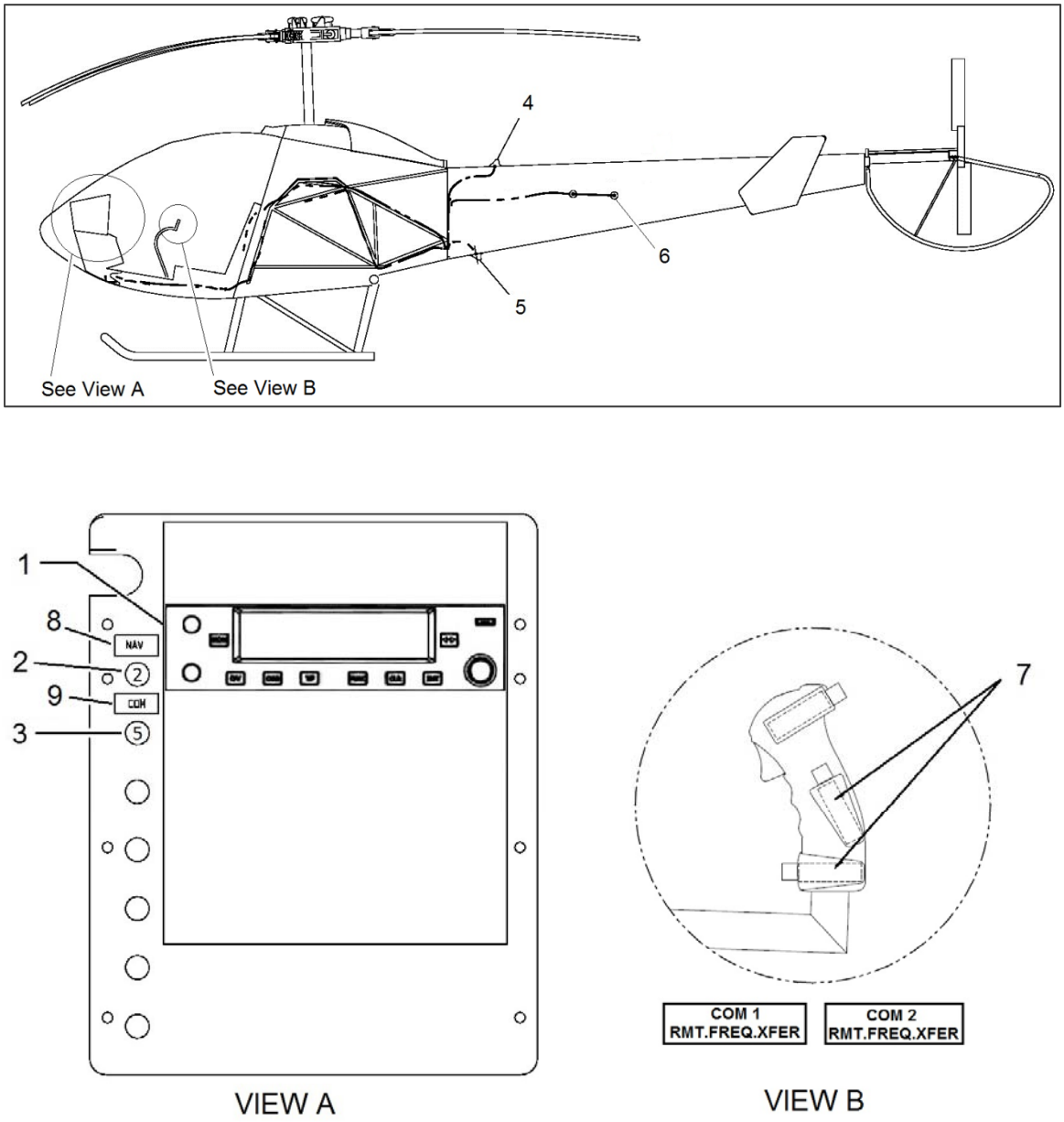



**Figure 10-1. GNC 255A Installation**

Figure 10-1. GNC 255A Installation

| Item | Part Number | Description | Quantity |
|---|---|---|---|
| - | 28-22063-5 | GNC 255A Installation | REF |
| - | 010-01025-50 | . GNC 255A Kit | REF |
| 1 | 011-02806-00 | . . GNC 255A | 1 |
| - | 006-D3844-00 | . . Frequency Data Worldwide | REF |
| 2 | MS26574-2 | . Circuit Breaker (2 amp) | 1 |
| 3 | MS26574-5 | . Circuit Breaker (5 amp) | 1 |
| - | 28-22183-1 | Antenna Installation, VHF COM 1 | REF |
| 4 | DMC63-1/A | . Antenna | 1 |
| - | MS24693-C51 | . . Screw | 3 |
| - | 28-22183-117 | Antenna Installation, VHF COM 2 (alternate for 28-22183-1) | REF |
| 5 | DMC63-1/A | . Antenna | 1 |
| - | MS24693-C51 | . . Screw | 3 |
| - | 28-22183-115 | Antenna Installation, VOR/LOC/GS | REF |
| 6 | CI205-3 | . Antenna System | 1 |
| - | MS24693-C55 | . . Screw | 16 |
| 7* | 4119835-33 | . Placard | 1 |
| 8 | 28-19064-1 | . Placard | 1 |
| 9 | 28-19064-1 | . Placard | 1 |

- Not illustrated
* Per customer requirements

**INTENTIONALLY LEFT BLANK**

| SYSTEM CONFIGURATION GROUP | | NOTES |
|---|---|---|
| ◄► = NEXT | **SERIAL PORT**<br>IO MODE .....AVN IN/MAPCOM<br>NONE | FOR INTERFACE TO GTN 650/750<br>WHEN NOT CONNECTED |
| ◄► = NEXT | **DST PRIORITY**<br>DST.....GPS,DME | |
| ◄► = NEXT | **INTERCOM ENABLE**<br>CONTROL.....DISPLAY | DISABLE INTERCOM IN NORMAL MODE |
| ◄► = NEXT | **BACKLIGHT**<br>DISPLAY.....LIGHT BUS 1<br>BEZEL KEY.....PHOTOCELL<br>DSP MIN.....1 KEY MIN.....1 | |
| ◄► = NEXT | **PHOTOCELL**<br>TRNSN.....10 SLOPE.....50<br>KEY CO.....80 OFFSET.....50 | ADJUST OFFSET TO MATCH/SYNC TO OTHER INSTALLED EQUIPMENT |
| ◄► = NEXT | **LIGHTING BUS 1**<br>INPUT.....28 VDC<br>SLOPE.....25<br>OFFSET.....15 | ADJUST OFFSET TO MATCH/SYNC TO OTHER INSTALLED EQUIPMENT |

| NAV CONFIGURATION GROUP | | NOTES |
|---|---|---|
| ◄► = NEXT | **CDI INDICATOR**<br>TYPE .....RESOLVER | FOR INTERFACE TO CDI OR SLAVED COMPASS SYSTEM (OBS CALIBRATION REQUIRED) |
| ◄► = NEXT | **ARINC 429**<br>N/A | NO ACTION TAKEN |
| ◄► = NEXT | **DME**<br>N/A | NO ACTION TAKEN |
| ◄► = NEXT | **FILTERED LOC/GS**<br>ENABLED .....OFF | |

| COM CONFIGURATION PAGE | | NOTES |
|---|---|---|
| ◄► = NEXT | **MIC GAIN**<br>MIC1 GAIN.....12 DB<br>MIC2 GAIN.....12 DB | ADJUST PER CUSTOMER REQUIREMENT |
| ◄► = NEXT | **COM CARRIER SQUELCH**<br>MODE.....BASIC<br>SPACING..... 25 kHz OR 8.33 kHz<br>SQUELCH.....0 | ADJUST PER CUSTOMER REQUIREMENT |
| ◄► = NEXT | **COM RX SQUELCH**<br>MODE.....BASIC<br>SPACING..... 25 kHz OR 8.33 kHz<br>SQUELCH.....80 | ADJUST PER CUSTOMER REQUIREMENT |

| AUDIO CONFIGURATION PAGE | | NOTES |
|---|---|---|
| ◄► = NEXT | **COM SIDETONE**<br>VOLUME .....90<br>MODE.....EXTERNAL<br>PILOT CONTROL.....ENABLED | ADJUST VOLUME PER CUSTOMER REQUIREMENT |
| ◄► = NEXT | **MIX NAV AUDIO**<br>MIXED WITH COM.....OFF | |
| ◄► = NEXT | **HI-FIDELITY AUDIO**<br>ENABLED.....OFF | |

| ICS CONFIGURATION PAGE (NORMAL MODE) | | NOTES |
|---|---|---|
| 118.250<br>ENT=DONE CLR=UNDO | **INTERCOM ON/OFF**<br>INTERCOM OFF | |
| 118.250<br>ENT=DONE CLR=UNDO | **SPEAKER ON/OFF**<br>SPEAKER OFF | |
| 118.250<br>ENT=DONE CLR=UNDO | **AUX AUDIO**<br>AUX OFF | |

| SYSTEM CONFIGURATION PAGE (NORMAL MODE) | | NOTES |
|---|---|---|
| 118.250<br>ENT=DONE CLR=UNDO | **COM SPACING**<br>CHNL SPACE 25.0 kHz | SWITCH TO 8.33 KHZ PRIOR TO SHIPMENT PER CUSTOMER REQUIREMENT<br>(TYPICAL FOR EUROPE/ASIA) |
| 118.250<br>ENT=DONE CLR=UNDO | **COM SIDETONE**<br>MODE: FIXED<br>OFFSET: N/A | ADJUST PER CUSTOMER REQUIREMENT |
| 118.250<br>ENT=DONE CLR=UNDO | **DISPLAY BRIGHTNESS**<br>BRIGHTNESS<br>OFFSET 0 | ADJUST PER CUSTOMER REQUIREMENT |
| 118.250<br>ENT=DONE CLR=UNDO | **DISPLAY CONTRAST**<br>OFFSET 0 | ADJUST PER CUSTOMER REQUIREMENT |

Figure 10-2. GNC 255 Configuration Set-Up (Ref. 28-19069-103 Rev. D)

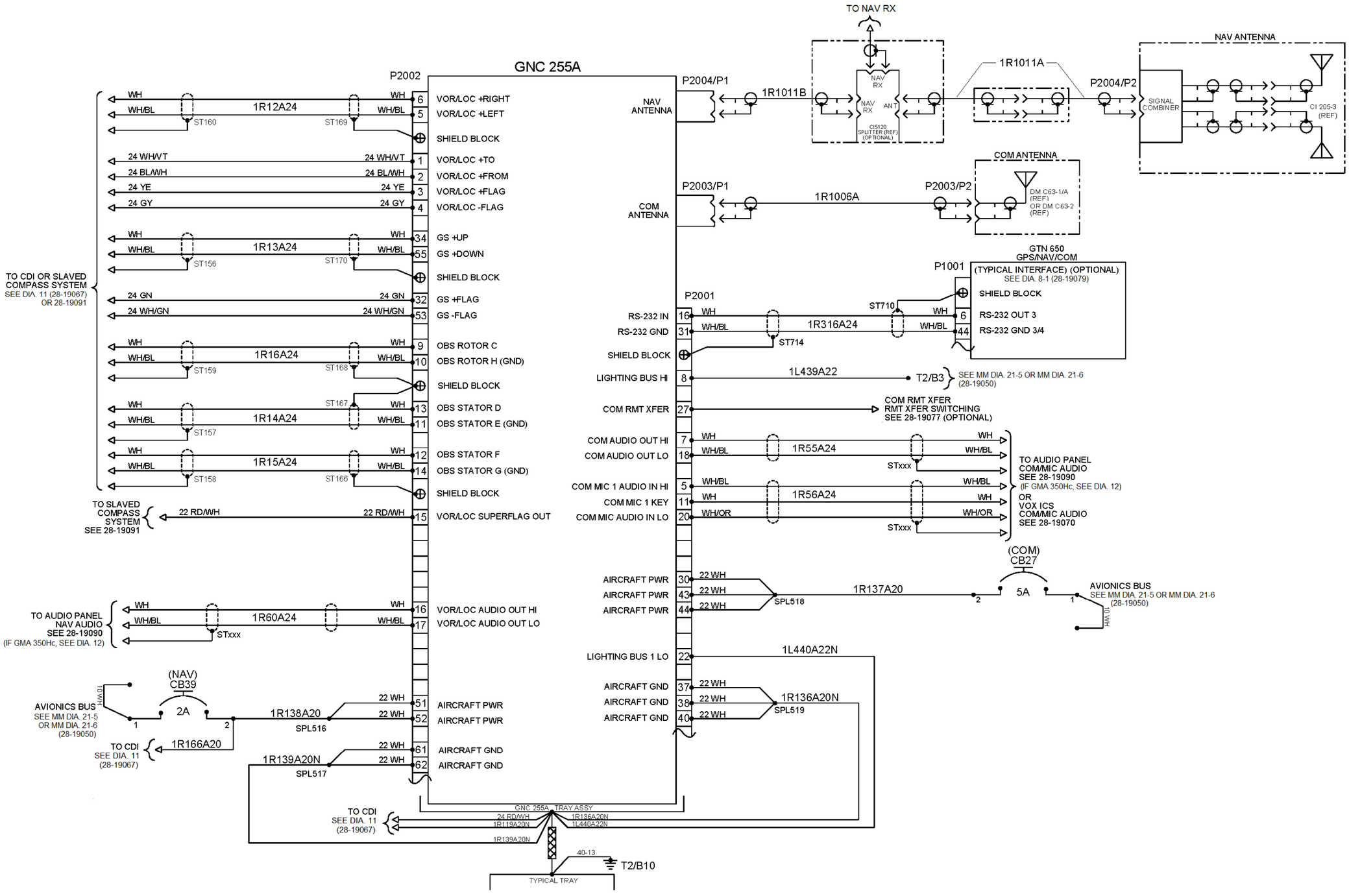



Diagram 10-1. GNC 255A (Ref. 28-19069-103 Rev. D)

# CHAPTER 11

# MD200 SERIES CDI

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The Mid-Continent MD200-706 Course Deviation Indicator is designed to operate with VHF and GPS navigational equipment to provide OMNI (VOR), GPS, localizer (VLOC), and glideslope (GS) information.

B. The MD200 Series installation part number is 28-22095-( ).

C. Power to the MD200 CDI is provided via the **NAV** or **NAV/GPS** circuit breaker located on the left side of the lower instrument panel console.

D. Refer to F-28F/280FX Rotorcraft Flight Manual Supplement 28-AC-069 (GTN 650 interface) or 28-AC-074 (GNC 255A interface), as applicable, for system interface limitations and basic operation instructions.

### 1-2. Vendor Manuals

A. The following components listed in Table 11-1 are to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 11-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| MD200-306 | Installation Manual and Operating Instructions, Number 8017972, latest revision | Mid-Continent Inst. Co., Inc.<br>9400 E. 34th Street N.<br>Wichita, KS 67226 |
| MD200-706 | Installation Manual and Operating Instructions, Model MD200-706/707, Number 9018582, latest revision | |

## SECTION 2

## AIRWORTHINESS LIMITATIONS

### 2-1. Airworthiness Limitations

A. The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, the Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the MD200 Series installation are "on condition."

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The MD200 Series CDI installation contains no user serviceable components or assemblies. Operations involving the removal of the MD200 Series CDI must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to the electrical schematic in Diagram 11-1 when troubleshooting the MD200-306 interfaced to a GTN 650.

B. Refer to the electrical schematic in Diagram 11-2 when troubleshooting the MD200-706 interfaced to a GNC 255A.

C. Refer to the electrical schematic in Diagram 11-3 when troubleshooting the MD200-706 interfaced to a GTN 650.

D. Refer to the applicable electrical schematic when troubleshooting MD200 Series CDI interfaced to other equipment.

E. If the MD200 Series unit fails to operate after troubleshooting efforts, refer to paragraph 1-2 for the manufacturer contact information and additional assistance.

### 3-3. Periodic Inspections/Maintenance

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **MD200 Series** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the MD200 Series unit and mount for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on the Basic Weight and Balance Record, as required.**

## 4-1. MD200 Series CDI

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

### 4-1-1. Removal

A. Remove the MD200 Series CDI in accordance with paragraph 7-18, A, steps 1 through 4 of the F-28F/280F Series Maintenance Manual.

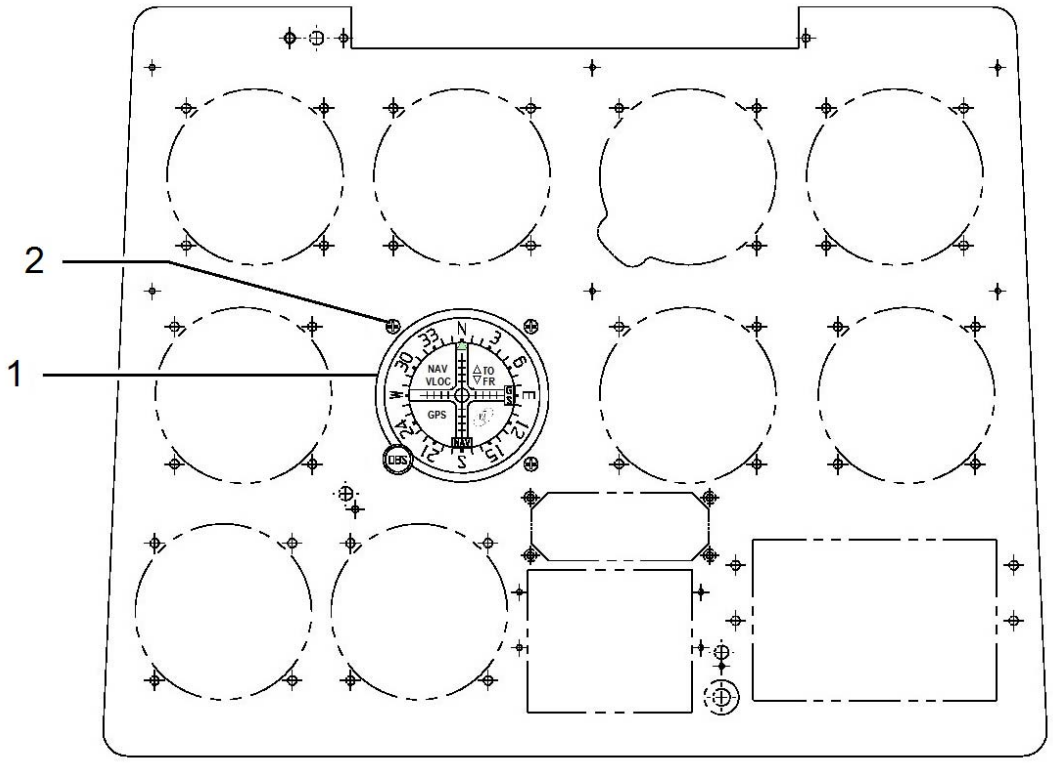
### 4-1-2. Installation

A. Install the MD200 Series CDI in accordance with paragraph 7-18, A, steps 5 through 7 of the F-28F/280F Series Maintenance Manual.

## 4-2. Figures and Electrical Diagrams

A. The GTN 650 installation is shown in Figure 11-1.

B. The GTN 650 wiring interfaces are shown in Diagrams 11-1 through 11-3.




| Item | Part Number | Description | Quantity |
|---|---|---|---|
| -1 | MD200-306 | . Indicator | 1 |
| 1 | MD200-706 | . Indicator | 1 |
| 2 | AN515B6R14 | . . Screw | 3 |
| 2 | MS35214-30 | . . Screw (alternate) | 3 |

**Figure 11-1. MD200 Series Installation**

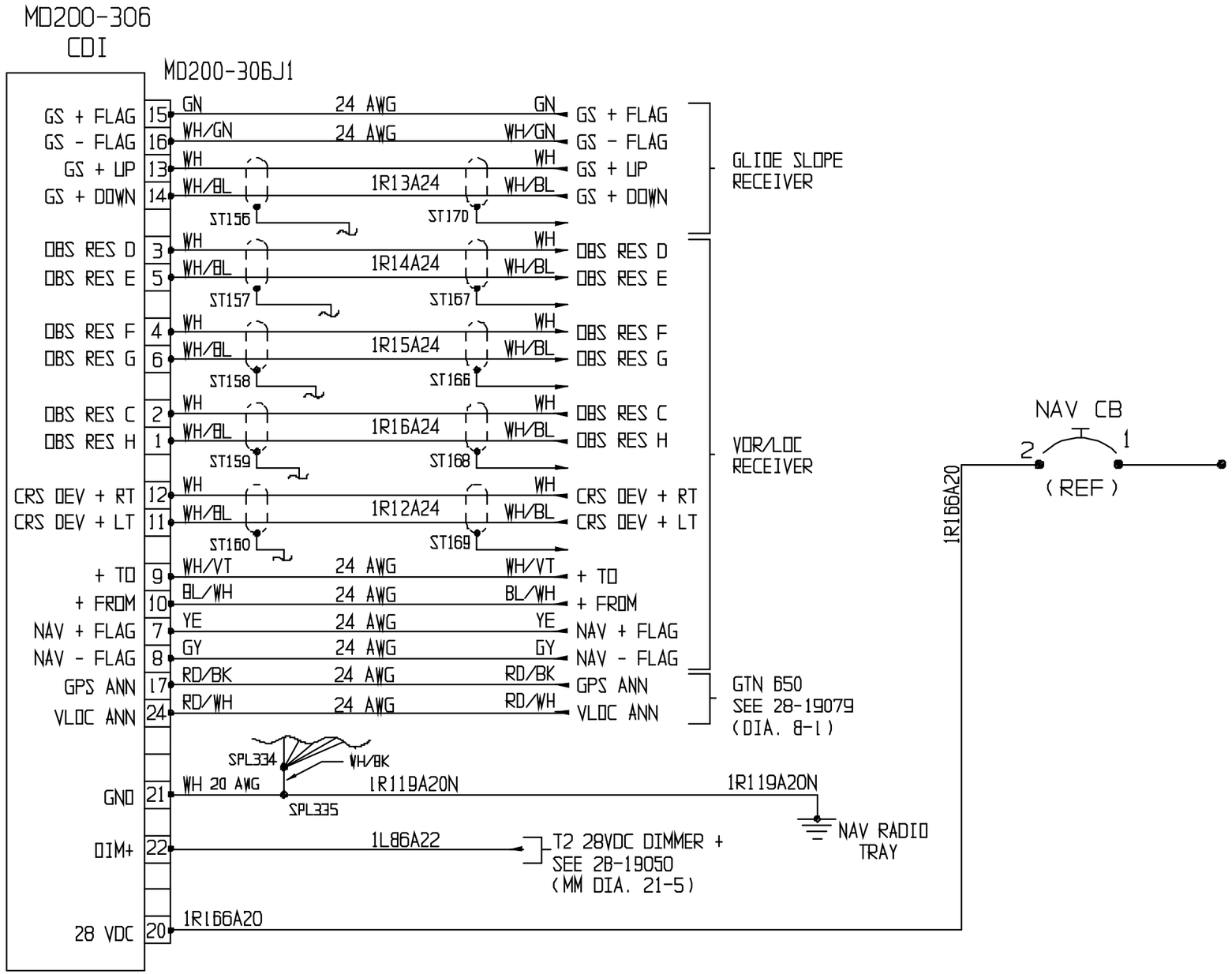



Diagram 11-1. GTN 650 – MD200-306 Interface (Ref. 28-19067-107 Rev. D)

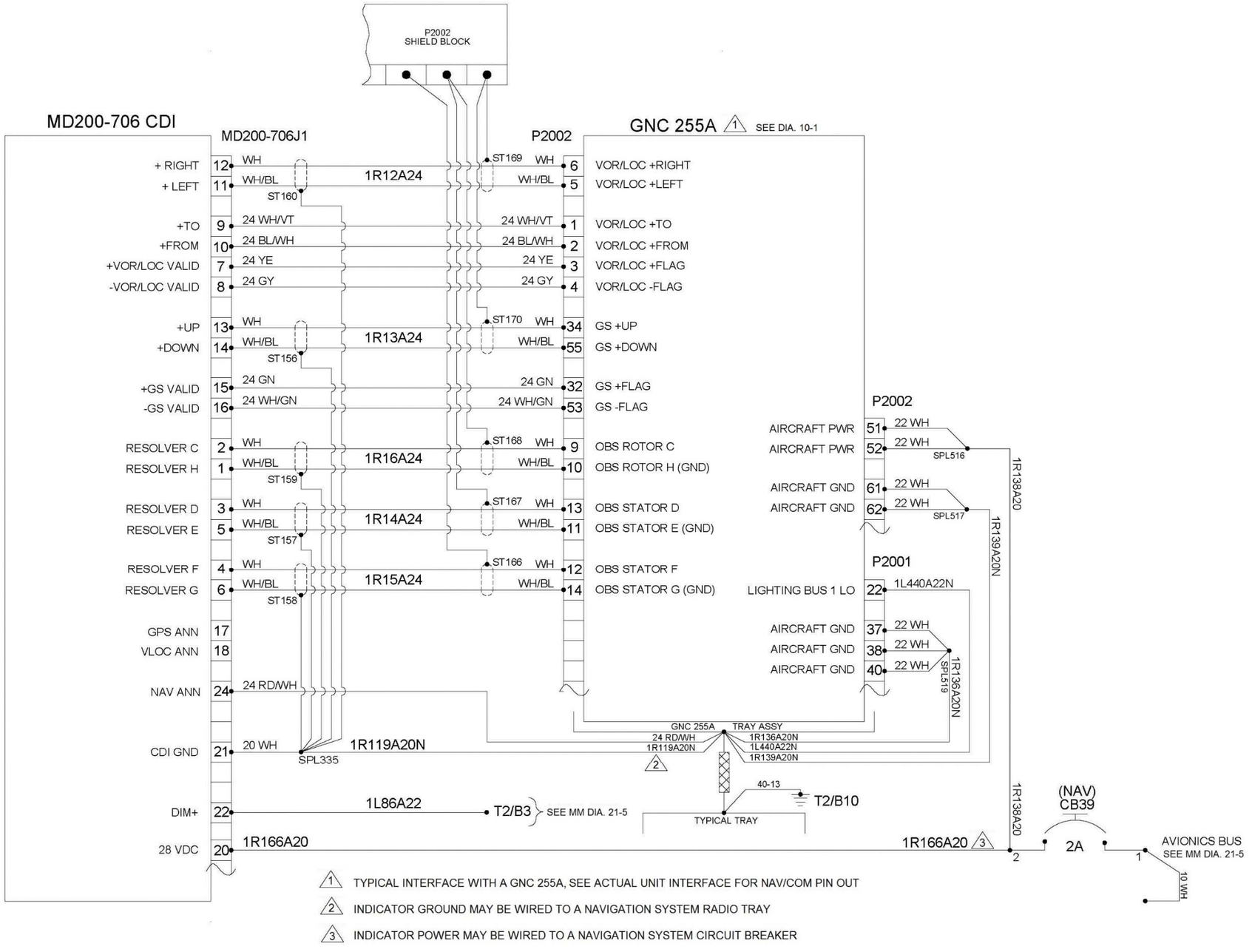



Diagram 11-2. GNC 255A – MD200-706 Interface (Ref. 28-19067-109 Rev. E)

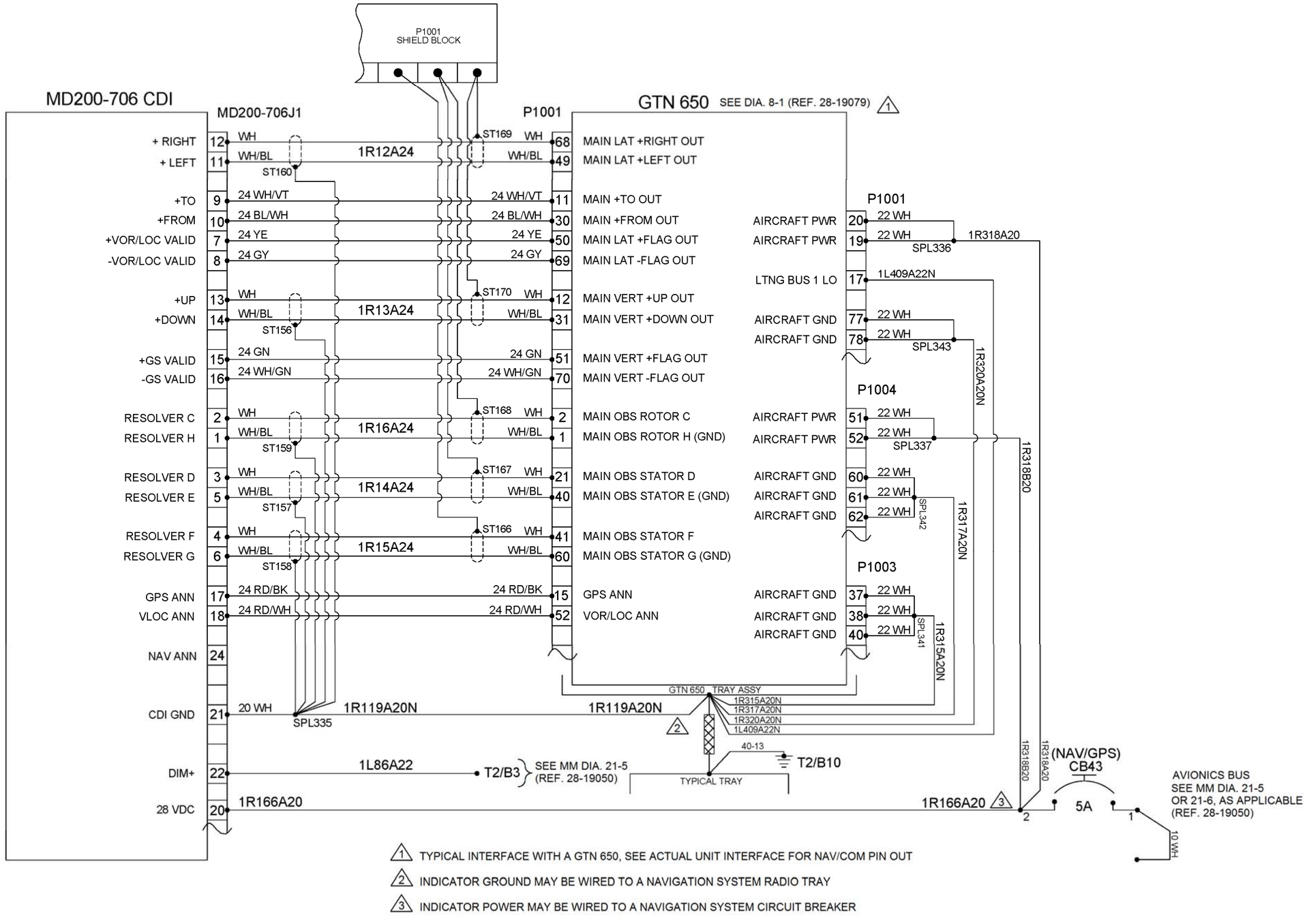



Diagram 11-3. GTN 650 – MD200-706 Interface (Ref. 28-19067-109 Rev. E)

# CHAPTER 12
# GMA 350Hc AUDIO PANEL
# SECTION 1
# SYSTEM DESCRIPTION

## 1-1. System Description

A. The Garmin GMA 350Hc is a horizontally oriented panel-mounted audio controller that collects, processes, and distributes audio signals between avionics, crew, and passengers. The GMA 350Hc digital signal processor cleans up audio using advanced filtering techniques and provides VOX control for mic inputs. It also includes digital recording and playback feature, allows ICS volume adjustments for pilot, copilot, and passenger, marker beacon receiver (outer, middle, and inner annunciators and audio) Bluetooth technology to wirelessly connect smartphones and tablets to stream audio and make phone calls, and voice recognition to enable the pilot (and optionally copilot) to control the GMA 350Hc using spoken commands.

B. The configuration part number is listed in Table 17-1. The configuration includes the GMA 350Hc audio panel unit, a marker beacon sensitivity toggle switch (**MKR SENS**) (SW93), a **GMA PLAY** button located in the radio console. An entertainment jack (J148) may also be located on the radio console or on the side of the pedestal. A marker beacon antenna is installed on the bottom of the tailcone.

**Table 12-1. GMA 350Hc Configuration Part Numbers**

| Part Number | Marker Beacon Receiver |
|---|---|
| 28-22048-5 | Yes |

C. The GMA 350Hc may be configured with a traditional avionic system: (VOR/LOC/GS, GPS, NAV/COM, transponder, etc., or with the Garmin G1000H Integrated Flight Deck.

D. Power to the audio panel is provided via the **AUDIO PANEL** circuit breaker (CB31, 5 A) located on the left side of the circuit breaker panel.

E. Refer to the F-28F/280FX Rotorcraft Flight Manual Supplement 28-AC-080 for general operational features of the GMA 350Hc audio panel.

## 1-2. Vendor Manuals

A. The following components listed in Table 12-2 are to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 12-2. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GMA 350Hc | GMA 350/350H Configuration Tool User's Guide, Document No. 190-01349-00, latest revision | Garmin International, Inc.<br>1200 East 151st Street<br>Olathe, KS 66062<br>Tele: (913) 397-8200<br>Fax: (913) 397-8282<br>www.garmin.com |
| | GMA 350/350c/350H/350Hc Installation Manual, Document No. 190-01134-11, latest revision | |
| | GMA 350/350H Audio Panel Maintenance Manual, Document No. 190-01134-13, latest revision | |
| | GMA 350H/350Hc Pilot's Guide, Document No. 190-01134-14, latest revision | |

# SECTION 2

# AIRWORTHINESS LIMITATIONS

## 2-1. Airworthiness Limitations

A. For FAA approval, this Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, this Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GMA 350Hc are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. The GMA 350Hc audio panel installation contains no user serviceable components or assemblies. Operations involving the removal of the audio panel must be done by authorized maintenance technicians.

### 3-2. Troubleshooting

A. Refer to the *GMA 350/350H Audio Panel Maintenance Manual* (para. 1-2) and the electrical schematic in Diagram 12-1 when troubleshooting the GMA 350Hc installation. If the audio panel fails to operate after troubleshooting efforts, contact Garmin aviation product support for assistance (ref. para. 1-2).

### 3-3. Periodic Inspections

A. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions. More frequent inspections may be required should adverse operating conditions be encountered.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GMA 350Hc AUDIO PANEL** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the antenna (if equipped), electrical wiring and mounts for security, damage, and obvious defects. | |
| 2. Inspect the GMA 350Hc audio panel unit and mount for security, damage, and obvious defects. | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on the Basic Weight and Balance Record, as required.**

## 4-1. GMA 350Hc Audio Panel

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28F/280F Series Maintenance Manual.**

### 4-1-1. Removal

A. Remove power to the GMA 350Hc audio panel unit.

B. Unlock the unit from the rack using the appropriate size hex wrench.

C. Carefully pull the unit from the rack.

### 4-1-2. Inspection

A. Verify the audio panel operation in accordance with paragraph 3-2 of the *GMA 350/350H Audio Panel Maintenance Manual* (para. 1-2).

### 4-1-3. Repair

A. Replace the audio panel if any of the tests performed in paragraph 4-1-2 fail.

### 4-1-4. Installation

**NOTE**

**Do not use excessive force when inserting the GMA 350Hc into the rack. This may damage the connectors, unit, and/or unit rack.**

A. Insert the GMA 350Hc unit into the rack.

B. Lock the unit in place using the appropriate size hex wrench.

### 4-1-5. Post Installation Configuration

A. If the installation is a replacement, modify the configuration settings utilizing the GMA 350/350H Configuration Tool v2.45, P/N 006-A0245-10 per the GMA 350/350H Configuration Tool User's Guide (Table 12-2).

(1) Configure the GMA 350Hc in accordance with Figure 12-3.

### 4-1-6. Post Installation Checkout – GMA 350Hc

A. Perform a post installation checkout in accordance with paragraph 3.8 of the GMA 350/350c/350H/350Hc Installation Manual (para. 1-2).

## 4-2. Software Update

A. Verify the software version number matches the approved software version listed in Enstrom Rotorcraft Flight Manual Supplement 28-AC-080. The software version information is available via the configuration tool (Table 12-2) or the GTN navigator system status page for interfaced equipment. If the replaced unit does not have the approved version of software installed, software can be downloaded from the Garmin Dealer Resource Center at www.flyGarmin.com.

## 4-3. Figures and Diagrams

A. GMA 350Hc installation parts list: Figure 12-1 and Figure 12-2.

B. GMA 350Hc installation configuration set-up: Figure 12-3.

D. GMA 350Hc audio panel wiring: Diagram 12-1.

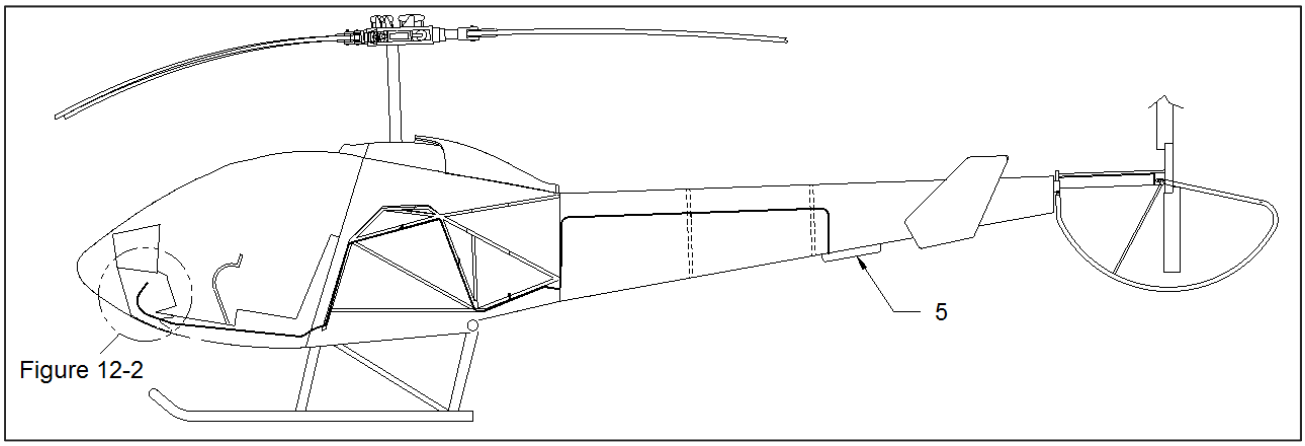
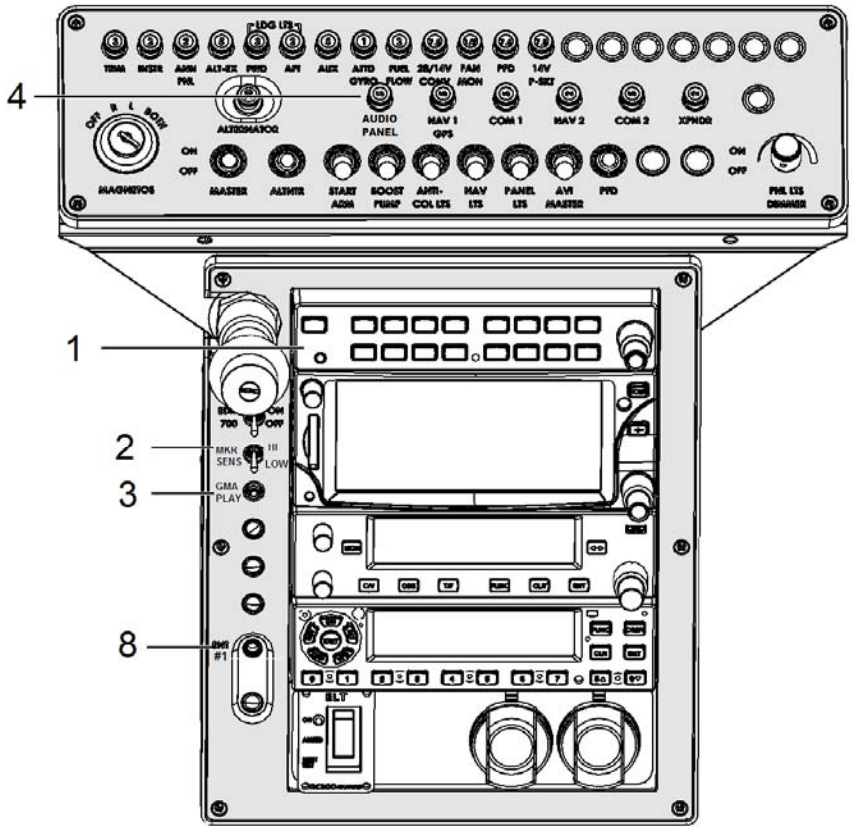



**Figure 12-1. GMA 350Hc Installation**




NOTE: PANEL LAYOUTS AND CONSOLE COMPONENTS MAY VARY DEPENDING ON CUSTOMER PREFERENCES.

| Item | Part Number | Component | Quantity |
|---|---|---|---|
| - | 28-22048-5 | GMA 350Hc Audio Panel Installation with Marker Beacon Receiver | REF |
| 1 | 011-02385-50 | . GMA 350Hc | 1 |
| - | 011-02302-00 | . Connector Kit (Included with GMA 350Hc) | REF |
| 2 | 7101SYZQE | . Switch (Used with 4220672-109) | 1 |
| 3 | 8121SYZGE | . Push Button Switch | 1 |
| 4 | 7277-5-5 (5 amp) | . Circuit Breaker | 1 |
| 5 | DMN43-1 | . . Antenna | 1 |
| -6 | AN960-8L | . . Washer | 3 |
| -7 | AN365-832A | . . Nut | 3 |
| 8 | 161-3402-E | . Entertainment Jack | 1 |
| -9* | 28-19065-11 | . Placard (VOICE COMMANDS DISABLED) | 1 |

\- Item not illustrated

* EASA-specific configuration only

**Figure 12-2. GMA 350Hc Installation**

**Status Tab**

GMA Software Version

| Product | Part Number | Version |
|---|---|---|
| Main System | 006-B2103-04 | 4.22C |
| Main Bootblock | 006-B2103-BG | 4.20C |
| Main Region List | 006-D3035-77 | 4.10C |
| Auxiliary System | 006-B2104-04 | 4.21C |
| Aux Bootblock | 006-B2104-BG | 4.20C |
| Aux Region List | 006-D3034-29 | 4.10C |
| Aux Config | 006-D3034-30 | 4.20C |
| ARC Database | 006-D3035-CJ | 4.23C |
| Audio Data | 006-D3034-36 | 4.20C |
| ASR DB1 (grammar) | 006-D3034-33 | 4.20 |
| ASR DB2 (lang) | 006-D3034-08 | 2.00 |
| ASR DB3 (g2P) | 006-D3034-09 | 2.00 |
| TTS Grammar | 006-D3034-23 | 4.10 |
| TTS Data | 006-D3034-24 | 4.10 |

**Discrete Inputs Tab**

| Discrete Inputs | GMA | Local |
|---|---|---|
| Generic Input 01 (J3501.16) | Pilot PTC Key or Pilot ICS Key | Pilot PTC Key or Pilot ICS Key |
| Generic Input 06 (J3502.30) | Copilot PTC Key or Copilot ICS Key | Copilot PTC Key or Copilot ICS Key |
| Generic Input 09 (J3502.14) | Disabled | Disabled |

Note: Set to Pilot/Copilot PTC Key to enable GMA Voice Commands.
Set to Pilot/Copilot ICS Key to disable GMA Voice Commands, which is required for EASA specified configurations (i.e. delevery to Europe).

Discrete Inputs Presets

| GMA | Local | |
|---|---|---|
| ☐ | ☐ | Enable 3D audio and speech recognition demonstration |
| ☐ | ☐ | Configure for both PTC keys and Keyed ICS |

**Options Tab**

GMA | Local

Tx Sidetone Generation

| GMA | Local | |
|---|---|---|
| ☐ | ☐ | Generate internal TX sidetone for COM1 |
| ☐ | ☐ | Generate internal TX sidetone for COM2 |
| ☐ | ☐ | Generate internal TX sidetone for COM3 |

Passenger Options

| GMA | Local | |
|---|---|---|
| ☑ | ☑ | Enable alerts to passengers |
| ☐ | ☐ | RCVR 5 (AUX 3) input is fifth passenger microphone |
| ☑ | ☑ | Disable 'copilot is passenger' user selection |
| ☑ | ☑ | Enable selected audio to passengers |
| ☐ | ☐ | Mute passengers to crew during alerts |
| ☑ | ☑ | Mute passengers to crew during PA |

Selected Audio to Copilot

| GMA | Local | |
|---|---|---|
| ☑ | ☑ | Enable selected audio to copilot when isolated |
| ☑ | ☑ | Enable selected audio to copilot during split-COM |

Other Muting

| GMA | Local | |
|---|---|---|
| ☐ | ☐ | Mute music 1 during intercom |
| ☐ | ☐ | Mute music 2 during intercom |
| ☐ | ☐ | Mute other COMs during TX |
| ☐ | ☐ | Mute Bluetooth during intercom |

Note: Options settings are shown as typical, and can be adjusted per customer requirement.

**Lighting Tab**

Backlight Lighting Bus Connection

| GMA | Local | |
|---|---|---|
| ☐ | ☐ | 14V Lighting Bus |
| ☑ | ☑ | 28V Lighting Bus |
| ☐ | ☐ | No Lighting Bus |

**Noise Compensation Tab**

Enable Noise Compensation

| GMA | Local | |
|---|---|---|
| ☐ | ☐ | Speaker |
| ☐ | ☐ | Heaset |

Note: Noise compensation settings are shown as typical, and can be adjusted per customer requirement.

**Marker Beacon Receiver Tab**

| Offset (dB) | GMA | Local |
|---|---|---|
| Audio Threshold Offset | -10 | -10 |
| Low Sensitivity Offset | 0 | 0 |
| High Sensitivity Offset | 0 | 0 |

Note: Offsets are shown as typical, and can be adjusted per customer requirement.

Figure 12-3. GMA 350Hc Configuration (Ref. 28-19090-13 Rev. D)
(Sheet 1 of 2) Rev. 8, Jan 15/19

**Volume Levels Tab**

| Volume Level (dB) | GMA | Local |
|---|---|---|
| Marker Beacon | 0 | 0 |
| Telephone (rear input) | 24 | 24 |
| Auxiliary Input 1 | 0 | 0 |
| Auxiliary Input 2 | 0 | 0 |
| Auxiliary Input 3 | 0 | 0 |
| Music 1 | 24 | 24 |
| Music 2 | | |
| User Inferface Sounds | 0 | 0 |
| Com 1 | 0 | 0 |
| Com 2 | 0 | 0 |
| Com 3 | 0 | 0 |
| Nav 1 | 0 | 0 |
| Nav 2 | 0 | 0 |
| Front-Panel Input Jack | 24 | 24 |
| Failsafe Warning | 0 | 0 |
| Alert Input 1 | 0 | 0 |
| Alert Input 2 | 0 | 0 |
| Alert Input 3 | 0 | 0 |
| Alert Input 4 | 0 | 0 |
| Pilot PA to Speaker | 0 | 0 |
| Copilot PA to Speaker | 0 | 0 |
| Alert Sum to Speaker | 0 | 0 |
| Selected Audio to Speaker | 0 | 0 |
| TTS | 0 | 0 |
| Bluetooth Music | 0 | 0 |
| Bluetooth Telephone | 0 | 0 |

Note: Volume levels are shown as typical, and can be adjusted per customer requirement.

**Squelch Levels Tab**

| Squelch Level (dB) | GMA | Local |
|---|---|---|
| COM1 Radio | -48 | -48 |
| COM2 Radio | -48 | -48 |
| COM 3 Radio | -48 | -48 |
| NAV1 Radio | -48 | -48 |
| NAV2 Radio | -48 | -48 |
| Auxiliary Input 1 | -48 | -48 |
| Auxiliary Input 2 | -48 | -48 |
| Auxiliary Input 3 | -48 | -48 |
| Failsafe Warning | -48 | -48 |
| Alert Input 1 | -48 | -48 |
| Alert Input 2 | -48 | -48 |
| Alert Input 3 | -48 | -48 |
| Alert Input 4 | -48 | -48 |

Note: Squelch levels are shown as typical, and can be adjusted per customer requirement.

**3D Audio Tab**

Pilot Seat Position

| GMA | Local | |
|---|---|---|
| ☑ | ☑ | Left Seat |
| ☐ | ☐ | Right Seat |

Figure 12-3. GMA 350Hc Configuration (Ref. 28-19090-13 Rev. D)
(Sheet 2 of 2) Rev. 8, Jan 15/19

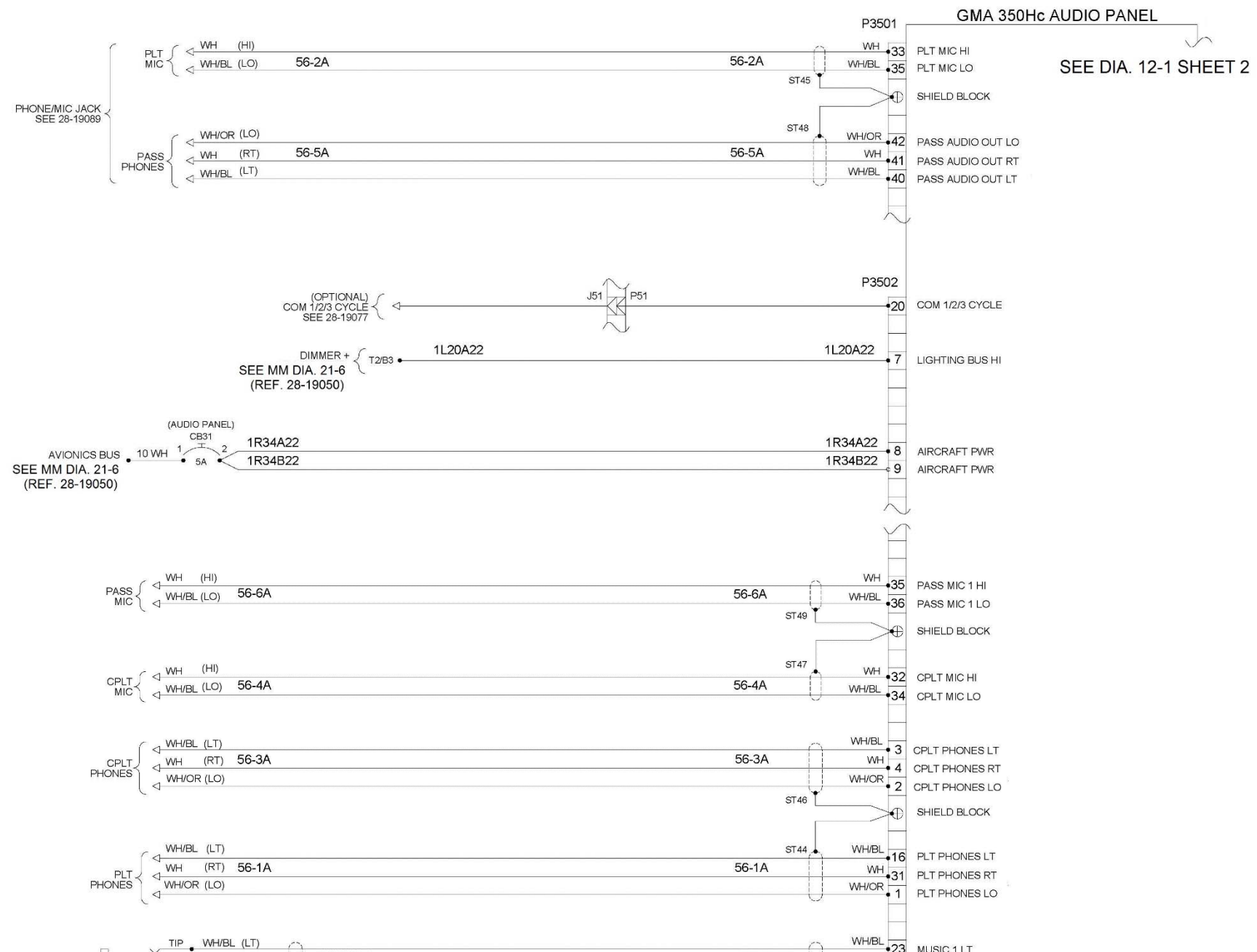



Diagram 12-1. GMA 350Hc Interface (Ref. 28-19090-13 Rev. D)
(Sheet 1 of 2) Rev. 8, Jan 15/19

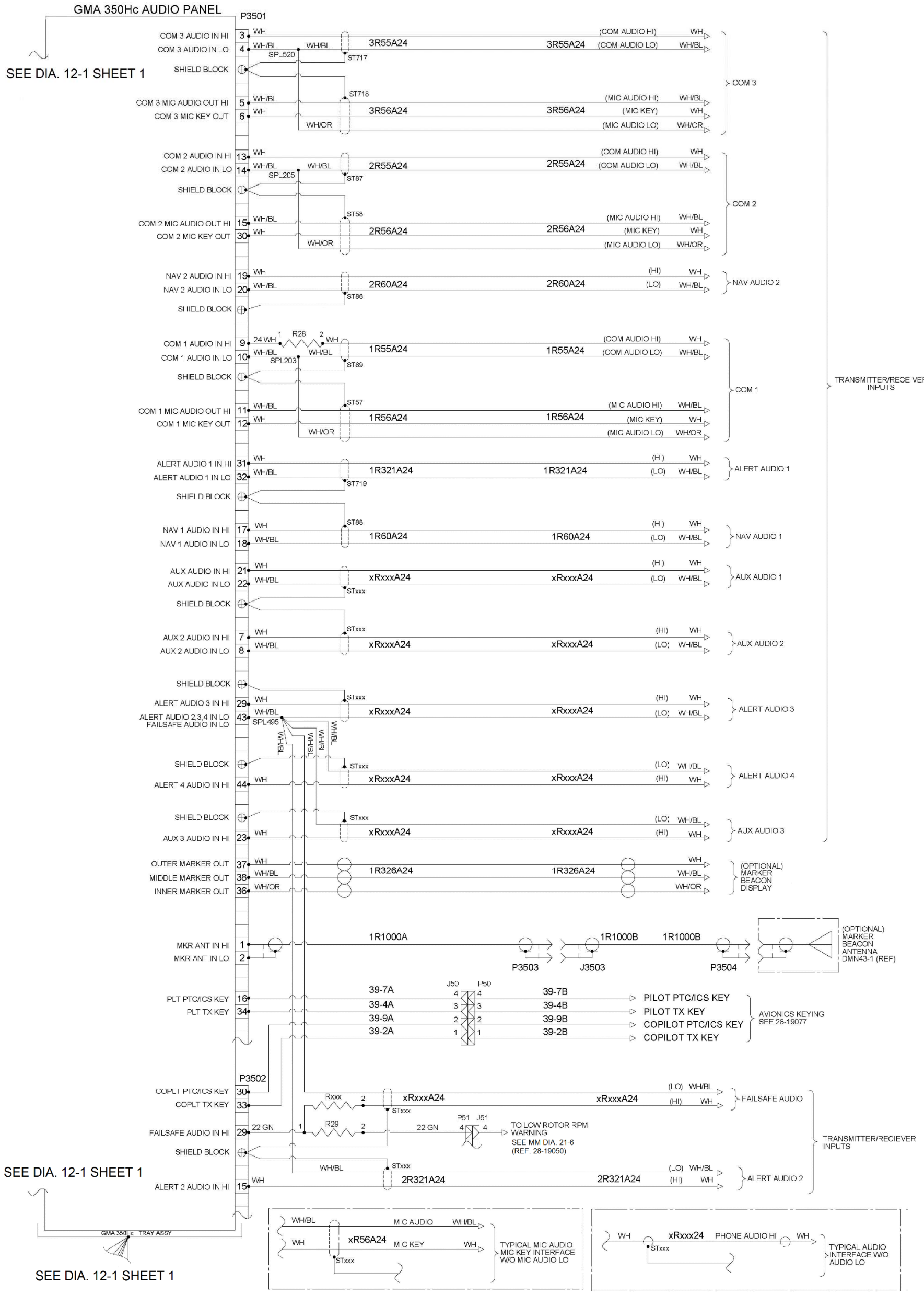



Diagram 12-1. GMA 350Hc Interface (Ref. 28-19090-13 Rev. D)
(Sheet 2 of 2) Rev. 8, Jan 15/19
12-11/12-12 Blank

# CHAPTER 13

# GTX 345 ADS-B TRANSPONDER

## SECTION 1

## SYSTEM DESCRIPTION

### 1-1. System Description

A. The GTX 345 ADS-B Transponder is installed as part number 28-22028-3. The components of the GTX 345 installation include the GTX 345 unit installed in the avionics console, altitude encoder, and a bottom-mounted antenna.

**NOTE**

**When combined, the Garmin GTX 345 with Extended Squitter (ES) and the Garmin GTN 650 GPS/NAV/COM have been shown to fully comply with AC 20-165A and 14 CFR 91.227 when installed in accordance with Garmin's installation instructions. This configuration will be compliant with the 2020 ADS-B Out mandate defined in 14 CFR 91.225.**

B. For ADS-B Out system functionality, the GTX 345 is configured with the extended squitter (ES) feature and is interfaced with the GTN series navigator for position input and an altitude encoder for barometric altitude input. The GTX 345 performs the following ADS-B Out functions: Transmission of ADS-B Out data on 1090 extended squitter (1090ES) (1090 MHz), Integration of data from internal and external sources to transmit data as required per 14 CFR 91.227, and Pressure Altitude Broadcast Inhibit.

C. For ADS-B In system functionality, the GTX receives ADS-B In data on 1090 MHz and UAT (978 MHz) and provides ADS-B traffic information and alerting to the pilot via an optional interfaced display.

D. The GTX 345 may also be interfaced to other equipment such as an audio panel or VOX ICS and an OAT probe.

E. Power to the GTX 345 installation is provided via the **XPNDR** circuit breaker (CB33) (3 Amp) located on the switch/circuit breaker panel.

F. Refer to the F-28F/280FX Rotorcraft Flight Manual Supplement 28-AC-081 for GTX 345 limitations and basic operation instructions.

G. The following component listed in Table 13-1 is to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft.

**Table 13-1. Vendor Manuals**

| Component | Publication | Vendor |
|---|---|---|
| GTX 345 Transponder | GTX 3X5 Part 27 AML Maintenance Manual, Document No. 190-00734-21, latest revision | Garmin International, Inc.<br>1200 East 151st Street<br>Olathe, KS 66062<br>Tele: (913) 397-8200<br>Fax: (913) 397-8282<br>www.garmin.com |
| | GTX 335/345 Series Pilot's Guide, Document No. 190-01499-00, latest revision | |
| | GTX 3X5 Installation Manual, Document No 190-01499-02, latest revision | |

## SECTION 2

## AIRWORTHINESS LIMITATIONS

### 2-1. Airworthiness Limitations

A. For FAA approval, this Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. For EASA approval, this Airworthiness Limitations Section is approved and variations must also be approved.

C. All components of the GTX 345 are “on condition”.

## SECTION 3

## SERVICING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

### 3-1. Servicing

A. Performing maintenance on the GTX 345 is limited to identifying, troubleshooting, and replacing components according to the parts list in Figure 13-2. Replacement and/or servicing should occur when an item fails to operate only after the authorized maintenance technician troubleshoots the system.

### 3-2. Troubleshooting

A. Refer to *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Section 5 and the electrical schematic, Diagram 16-1, when troubleshooting the GTX 345 installation.

### 3-3. Periodic Inspections

A. Refer to *GTX 345 Part 27 AML Maintenance Manual*, Doc. No. 190-00734-21, Table 4-1.

B. The following inspection checklist is intended as a guide for 100 hour/annual inspections for aircraft operating under normal conditions.

| | |
|---|---|
| Date | |
| Signature | |
| Aircraft Registration Number | |
| Aircraft Serial Number | |
| **GTX 345 ADS-B Transponder** | |
| **INITIAL EACH ITEM AFTER ACCOMPLISHMENT** | |
| **Inspect the following items every 100 hours or annually** | **INITIAL** |
| 1. Inspect the GTX 345 and antenna for condition and security (Refer to *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Section 4.5.1 and Section 4.5.3) | |

# SECTION 4

# SYSTEM MAINTENANCE

**NOTE**

**Removal or installation of equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on the Basic Weight and Balance Record, as required.**

## 4-1. GTX 345

**NOTE**

**All work must be accomplished in accordance with the Enstrom F-28/280F Series Maintenance Manual.**

**NOTE**

**Replacement of the GPS position source requires that the GTX 345 be tested and shown to comply with 14 CFR Part 91.225 and 91.227.**

### 4-1-1. Cleaning

A. The front bezel, keypad, and display can be cleaned with a microfiber cloth or with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

### 4-1-2. GTX 345 Removal

A. Remove power to the GTX 345 unit. Pull the **XPNDR** circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker stem.

B. Insert the 3/32-inch hex drive tool into access hole on the unit face. Turn the hex tool counterclockwise until the unit is forced out about 3/8 inch.

C. Pull the unit straight out of the rack.

### 4-1-3. GTX 345 Installation

**CAUTION**

**Do not use excessive force when inserting the GTX 345 into the rack. This may damage the connectors, unit, and/or unit rack. Be sure not to over-tighten the unit into the rack. Torque exceeding 8 in-lb can damage the locking mechanism.**

A. Slide the GTX 345 straight into the rack until it stops, about one inch short of the final position.

B. Insert the 3/32-inch hex drive tool into access hole at the bottom of the unit face.

C. Turn the hex tool clockwise while pressing on the left side of the bezel until the unit is firmly seated in the rack.

D. Count the number of complete revolutions the hex screw can be turned, not exceeding 8 in-lb of torque. Be careful not overtighten. Three turns is the minimum for proper installation. If fewer than three turns are possible, ensure there are no obstructions to the unit fully seating in the rack.

E. Remove the cable tie or other similar device from the **XPNDR** circuit breaker stem and push the stem in to set the circuit breaker.

F. Continue to paragraph 4-1-6 for system checkout.

### 4-1-4. GAE Altitude Encoder Removal

A. Remove power to the GTX 345 unit. Pull the **XPNDR** circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker stem.

B. Remove the transponder (para. 4-1-1).

C. Remove the static line attached to the altitude encoder.

D. Disconnect the wiring harness at the altitude encoder.

E. Remove the two screws securing the unit to the backplate.

### 4-1-5. GAE Altitude Encoder Installation

A. Secure the altitude encoder to the backplate assembly with two screws, torque to 8 in-lb.

B. Connect the wiring harness to the altitude encoder.

C. Secure the static line to the altitude encoder using standard practice.

D. Install the transponder (para. 4-1-3).

E. Remove the cable tie or other similar device from the **XPNDR** circuit breaker stem and push the stem in to set the circuit breaker.

F. Perform static system and transponder checks in accordance with *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Section 8.4.2.

### 4-1-6. System Checkout

A. No software or configuration loading is required if the removed GTX is reinstalled.

1) Verify configuration parameters in accordance with Figure 13-3.

B. If a new or repaired or exchange GTX is installed:

**NOTE**

**A computer or laptop connection to the GTX via the USB-B connection may be required for software updates, configuration set-ups, and checkout. Access the USB-B connector via the console side panel. Refer to Figure 13-1.**

1) Verify the software version number matches the approved software version listed in the Enstrom Rotorcraft Flight Manual 28-AC-081. Refer to *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Section 7.1 for the software version check and Section 7.2 for software update instructions.

2) Set configuration parameters per Figure 13-3 (refer to *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Section 8.3.1, Section 8.3.2, or refer to *GTX 3X5 Installation Tool Guide*, Document No. 190-01499-30, Section 2.3).

C. Perform GTX Test in accordance with *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Section 8.4.

D. When checkout procedures have been completed, record the following information in appropriate aircraft maintenance logs.

1) Part number and version number of any software updates performed during maintenance.

2) Record part and serial number of any LRU which was replaced.

## 4-2. Figures and Diagrams

A. GTX 345 installation is shown in Figure 13-1 and Figure 13-2.

B. Refer to *GTX 345 Part 27 AML Maintenance Manual*, Document No. 190-00734-21, Figure 6-7, for GTX 345 unit, rack, backplate, altitude encoder, and connector kit illustration.

C. The GTX 345 electrical schematic is shown in Diagram 13-1.

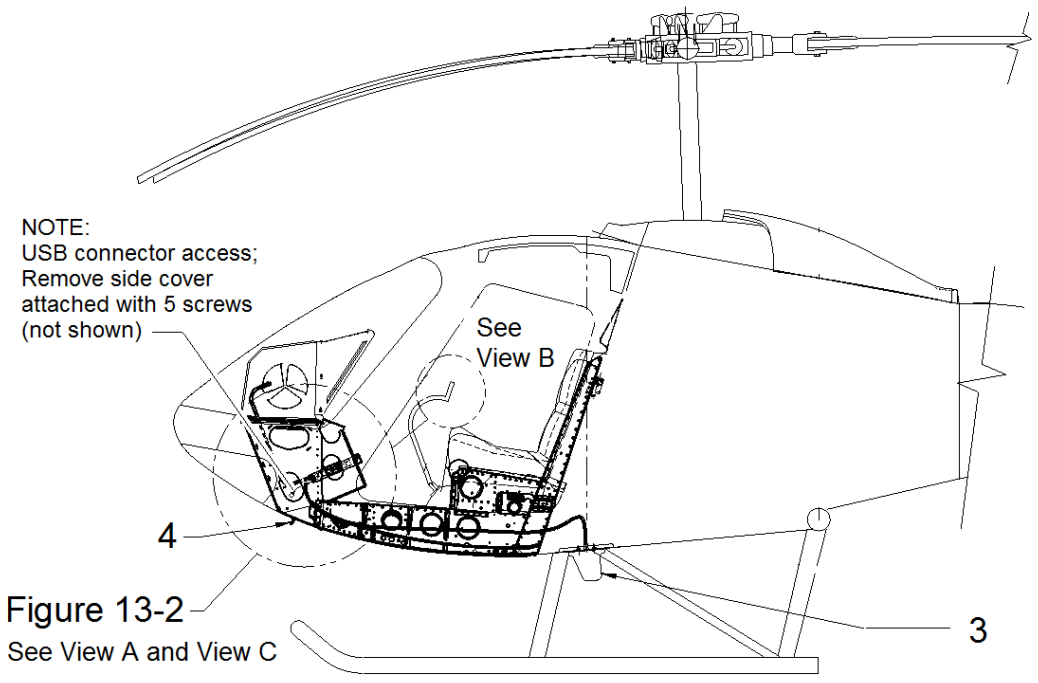
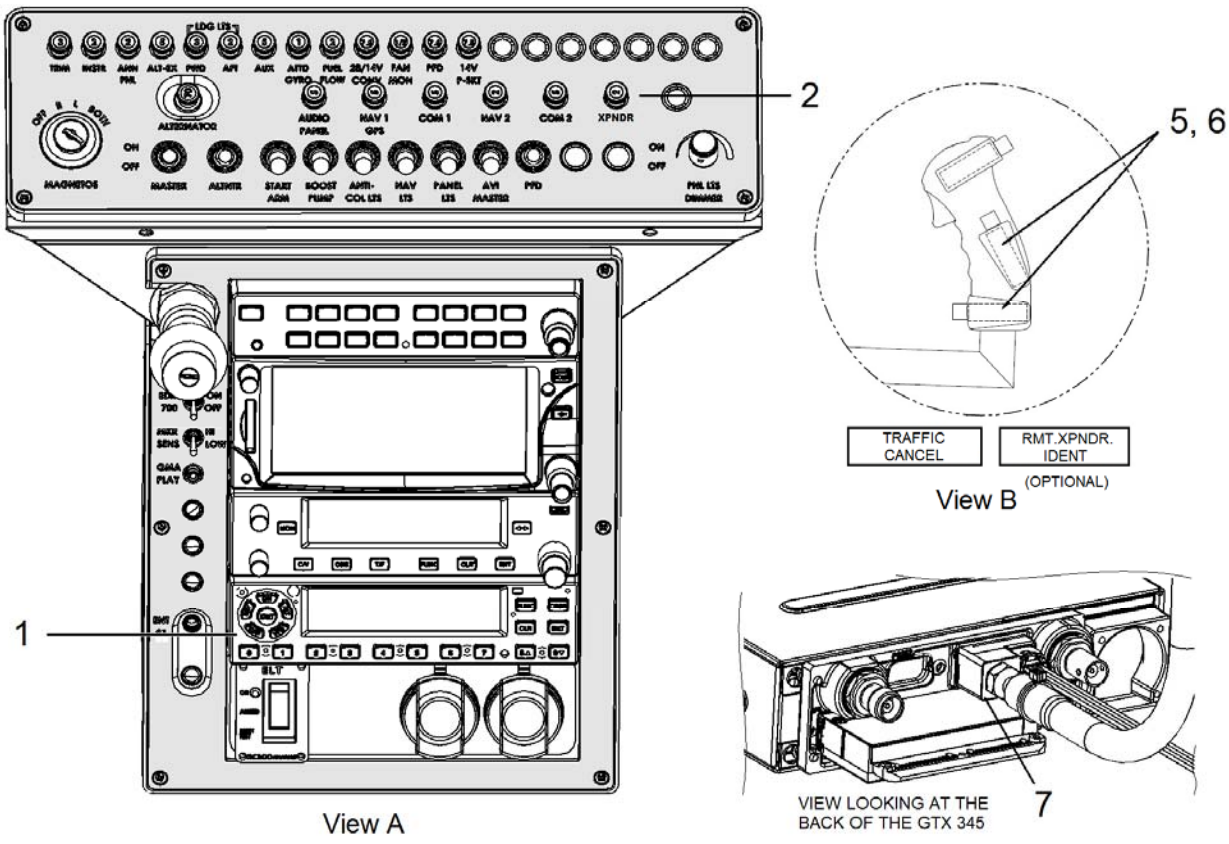



**Figure 13-1. GTX 345 Installation**




| Item | Part Number | Component | Quantity |
|---|---|---|---|
| - | 28-22028-3 | GTX 345 Installation | REF |
| - | 010-01216-01 | GTX 345 Kit | REF |
| 1 | 011-03302-00 | . GTX 345 unit | 1 |
| 2 | 7277-5-3 (3 amp) | . Circuit Breaker | 1 |
| - | 28-22183-129 | Antenna Installation | REF |
| 3 | AV-74 | . Antenna | 1 |
| - | #8 | . . Split Washer | 2 |
| - | #8-32 | . . Hex Nut | 2 |
| - | No number | . . Rubber pad | 1 |
| 4 | C307PS | . OAT Probe | 1 |
| - | 28-19064-1 | . Placard (ADS-B IN/OUT INSTALLED) | 1 |
| 5* | 4119835-33 | . Placard (RMT.XPNDR.IDENT) | 1 |
| 6* | 4119835-47 | . Placard (TRAFFIC CANCEL) | 1 |
| 7 | 011-03080-00 | . GAE Altitude Encoder | 1 |

\- Item not illustrated

* Location per customer requirements

**Figure 13-2. GTX 345 Installation**

Aircraft Configuration

| | |
|---|---|
| Aircraft Registration: | Enter tail # per customer requirement |
| ICAO Address Format: | Hex |
| ICAO Address: | Enter ICAO address per customer requirement |

Flight ID

| | |
|---|---|
| Allow Pilot Entry: | No, Typical default setting<br>Yes, Per customer requirement |
| Default Selection: | Same as Tail |
| Default: | Tail # |
| Prefix Selection | Disabled, Typical default setting<br>Enabled, Per customer requirement |
| Prefix: | If Enabled, enter prefix per customer requirement |

Airframe Configuration

| | |
|---|---|
| Max Airspeed: | <= 150 knots |
| Length: | <= 15.0 meters |
| Width: | <= 23.0 meters |
| Category: | A: Rotorcraft |

Operational Options

| | |
|---|---|
| 1090 ES In Capable: | Yes |
| UAT In Capable: | Yes |
| 1090 ES Out Capable: | Pilot Controlled |
| UAT Out Remote Control: | Disabled |
| ADS-B In Processing: | Enabled |
| Enhanced Surveillance: | Disabled |

Identification

| | |
|---|---|
| VFR Squawk Code: | 1200 |
| Installation ID: | GTX #1 |

Unit Options

| | |
|---|---|
| FIS-B: | Enabled |
| Bluetooth: | Enabled |

Display Options

| | |
|---|---|
| Altitude Units: | Feet |
| Temperature Units: | °C |
| Restore Pages on Power-Up: | No |
| Flash Message Indicator: | Yes |

Serial

| | |
|---|---|
| RS-232 Channel 1 Input: | Off |
| RS-232 Channel 1 Output: | Off |
| RS-232 Channel 2 Input: | Off |
| RS-232 Channel 2 Output: | Off |
| RS-232 Channel 3 Input: | Remote Format 1 |
| RS-232 Channel 3 Output: | Remote Format 1 |
| RS-232 Channel 4 Input: | Off |
| RS-232 Channel 4 Output: | Off |
| RS-422 Output: | Off |

A429

| | |
|---|---|
| Input Channel 1 Speed: | Low |
| Input Channel 1 Format: | Off |
| Input Channel 2 Speed: | Low |
| Input Channel 2 Format: | Off |
| Output Channel 1 Speed: | High |
| Output Channel 1 Format: | Off |

Discrete Inputs

| | |
|---|---|
| Audio Mute: | J3251-15 |
| Audio Cancel: | J3251-37 |
| Ident: | J3251-36 |
| Standby: | Unassigned |
| Squat: | J3251-57 |
| Altitude Source Select: | Unassigned |
| Air Data Source Select: | Unassigned |
| Install ID Select: | Unassigned |
| Squat (A/C On Ground State): | Ground (0V) |
| Gillham Altitude: | Disabled |

Discrete Outputs

No action taken

HSDB

| | |
|---|---|
| G500/600: | Not Present |
| GTN: | Present |
| GTS: | Not Present |
| GX000: | Not Present |
| Indirect A429 TCAS: | Not Present |

Garmin Altitude Encoder

| | |
|---|---|
| Installed: | GAE-12 |
| Ceiling: | 12000 ft |
| Point Count: | 3 is typical. Adjust as needed. |

GPS 1

| | |
|---|---|
| Source: | GTN #1 |
| Source Integrity Level (Errors/Hour): | (3) 10^-7 |
| Lateral Antenna Offset: | 0 m |
| Longitudinal Antenna Offset: | 8 m |
| System Design Assurance Level: | (2) Level C (<=10^-5) |

GPS 2

| | |
|---|---|
| Source: | None |
| Source Integrity Level (Errors/Hour): | (0) Unknown |
| Lateral Antenna Offset: | Unknown |
| Longitudinal Antenna Offset: | Unknown |
| System Design Assurance Level: | (3) Level B (<=10^-7) |

AHRS Orientation

No action taken

Additional Sensors

| | |
|---|---|
| Primary Altitude Source: | None |
| Secondary Altitude Source: | None |
| OAT Probe Installed: | Yes |

Audio Options

| | |
|---|---|
| Output: | Transponder |
| Volume: | 50 is typical. Adjust per customer requirement. |
| Voice: | Female |

Audio Alerts

| | |
|---|---|
| Timer Expired: | Message with Chime |
| Traffic: | Message |
| Altitude Monitor: | Message with Chime |
| Alert Deviation: | 200 ft |

Backlight

| | |
|---|---|
| Display Backlight Source: | Lighting Bus |
| Display Backlight Minimum: | 0 |
| Keypad Backlight Source: | Lighting Bus |
| Keypad Backlight Minimum: | 1 |

(Adjust to match/sync with other installed equipment)

Display Defaults

| | |
|---|---|
| Brightness Offset: | 0 |
| Contrast Offset: | 0 |

(Adjust to match/sync with other installed equipment)

Photocell Curve

| | |
|---|---|
| Slope: | 37 |
| Offset: | 37 |
| Transition: | 10 |

(Adjust to match/sync with other installed equipment)

Lighting Bus Curve

| | |
|---|---|
| Slope: | 25 |
| Offset: | 0 |
| Bus Type: | 28V DC |

(Adjust to match/sync with other installed equipment)

(TYPICAL GTX 345 CONFIGURATION WITH A GTN 650)

Figure 13-3. GTX 345 Configuration (Ref. 28-19071-103 Rev. G)

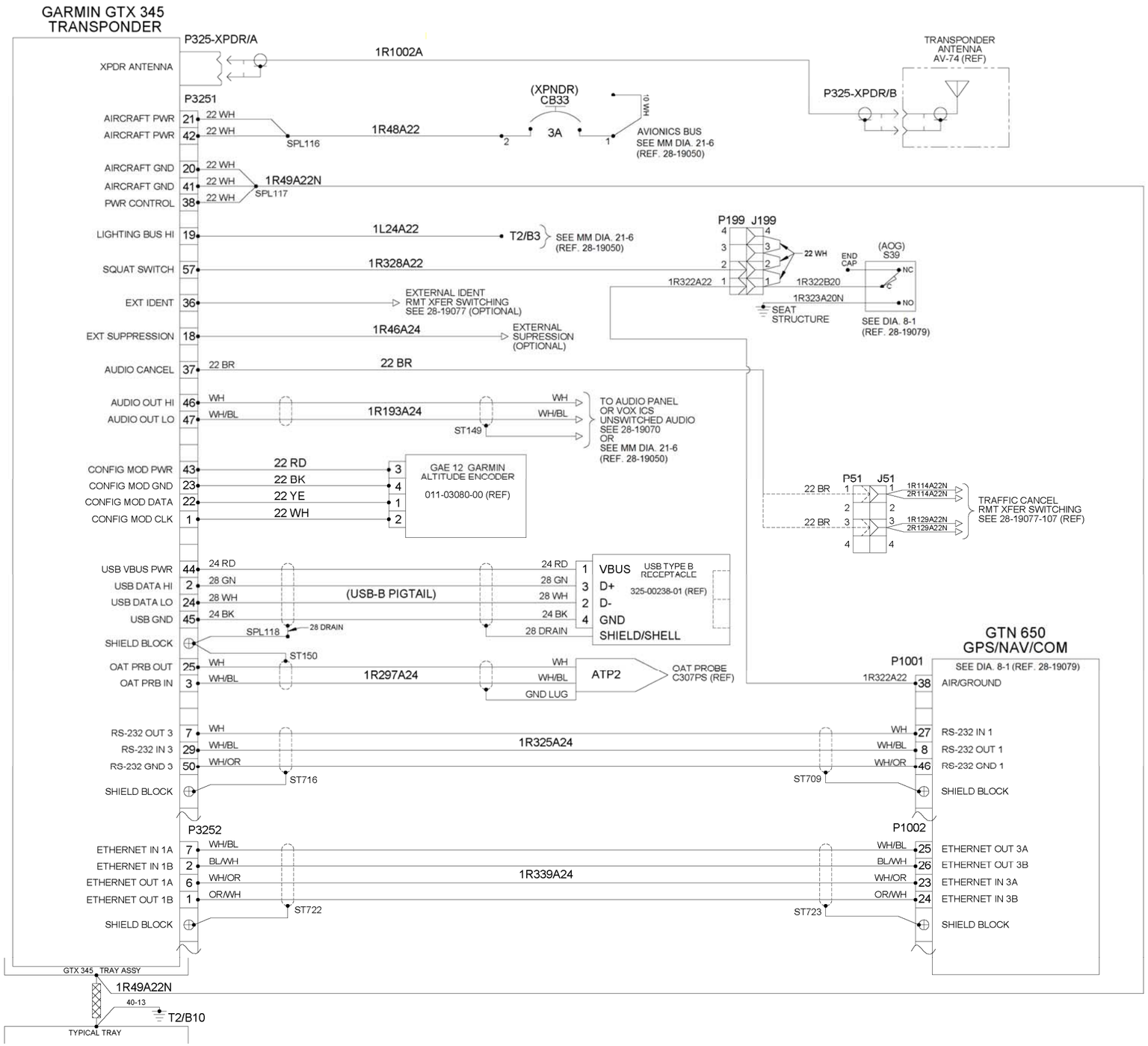



Diagram 13-1. GTX 345 Interface (Ref. 28-19071-103 Rev. G)