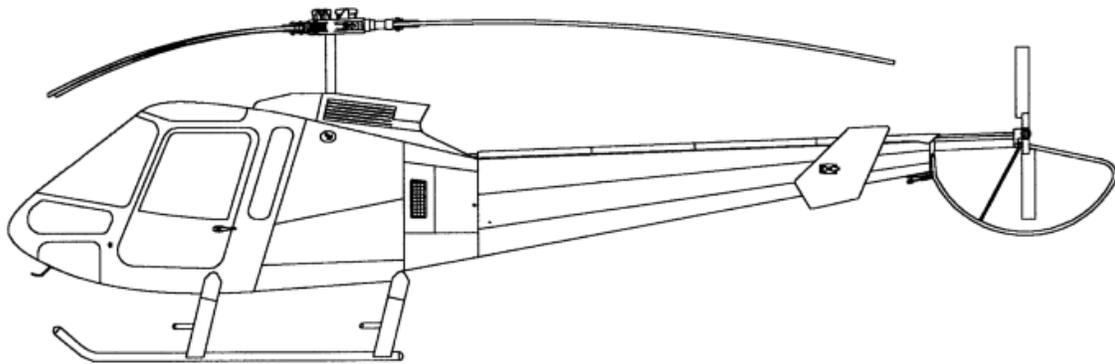


**ENSTROM TH-28/480 SERIES MAINTENANCE MANUAL
SUPPLEMENT 4
CHELTON FLIGHT SYSTEMS FLIGHTLOGIC
ELECTRONIC FLIGHT INSTRUMENT SYSTEM (EFIS)
P/N 4220500-()**



The Airworthiness Limitations section is FAA approved and specifies maintenance required under 14 CFR §§ 43.16 and 91.403 unless an alternative program has been FAA approved.

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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 TH-28, 480, and 480B 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 49858-3595

ATTN: Technical Publications

Manual Identification: Enstrom TH-28/480 Series Maintenance Manual Supplement 4

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SECTION 1

INTRODUCTION

1-1. Aircraft Effectivity

A. The data presented in this TH-28/480 Series Maintenance Manual Supplement is applicable to all Enstrom 480 and 480B model helicopters equipped with the optional Chelton Flight Systems FlightLogic EFIS, P/N 4220500-().

1-2. Supplemental Changes and Revisions

A. Subsequent to the publication of the initial issue of this supplement, changes in the EFIS 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 Information Letters (SIL) - Service Information Letters are used to transmit information, recommendations, and general service instructions to the aircraft owner/operator and maintenance personnel.
4. Service Directive Bulletins (SDB) - Service Directive Bulletins are used to the owner/operator and/or maintenance personnel to make mandatory inspections, changes, or modifications to the aircraft.

1-3. 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.

SECTION 2

GENERAL INFORMATION

2-1. System Description

A. The Chelton Flight Systems FlightLogic EFIS configuration consists of two integrated display units (IDU), an Air Data Attitude Heading Reference System (ADAHRS), and a Wide Area Augmentation System-Global Positioning System (WAAS-GPS). The IDUs are configured as a Primary Flight Display (PFD) and a Multi-Function Display (MFD). The installation includes an EFIS mute switch, which is located on either the cyclic control or on the instrument panel. The installation may also include a Chelton Analog Interface Unit (AIU).

B. The entire EFIS system power is provided via the "EFIS MSTR" circuit breaker switch (CB) (15 Amp) located on the upper portion of the center pedestal or in the upper instrument panel. Individual component power is supplied via dedicated circuit breakers as described in further detail below.

C. The PFD receives input from the WAAS-GPS, ADAHRS, and optional auxiliary inputs (refer to paragraph 2-1. I). The PFD is a perspective view display that provides forward-looking terrain, attitude, altitude, airspeed, vertical speed, direction, and Highway-in-the-Sky navigation. The PFD is located in the instrument panel. The PFD can also receive data from optional equipment such as a radar altimeter, an ADF receiver, marker beacon, and VOR/LOC/GS/Traffic/Weather receivers for processing in the EFIS. PFD power is provided via the "PFD" circuit breaker (CB) (3 Amp) located on the left side of the center pedestal or along the top of the center pedestal.

D. The MFD receives input from the PFD. The MFD provides a map view that can display waypoints, fixes, and airfields, terrain, HSI or a combination thereof. The MFD is located in the instrument panel below the PFD. MFD power is provided via the "MFD" circuit breaker (CB) (3 Amp) located on the left side of the center pedestal or along the top of the center pedestal.

E. The IDUs are cooled by a blower fan remotely located in the keel. Vented air is supplied from the blower via hoses to the back side of each IDU. The cooling fan power is supplied by the "BATT" circuit breaker switch adjacent to the "EFIS MSTR" switch.

F. The ADAHRS unit provides attitude and heading reference and air data to the EFIS. The unit is mounted to the A-frame behind the instrument panel. It receives magnetic reference data from a magnetic sensor unit (MSU) mounted in the tail cone. The air data computer (ADC) portion provides airspeed, altitude, and outside air temperature (OAT) for processing in the EFIS. The ADC receives input from the aircraft's pitot-static system and an OAT probe mounted on the fuselage bottom. ADAHRS power is provided via the "ADAHRS MSU" circuit breaker (CB) (5 Amp) located on the left side of the center pedestal or along the top of the center pedestal.

G. The WAAS-GPS provides GPS data for aircraft, navigation, obstruction, and terrain data. The WAAS-GPS consists of an antenna mounted on top of the airframe, and a sensor located remotely in the floor frame assembly (keel). WAAS-GPS power is

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provided via the “WAAS GPS” circuit breaker (CB) (1 Amp) located on the left side of the center pedestal or along the top of the center pedestal.

H. The Chelton Analog Interface Unit (AIU) provides a data conversion function for the EFIS system. The unit receives inputs from navigation receivers, radar altimeters, and marker beacon receivers and translates them into digital data that is sent to the EFIS. The AIU is located remotely in the floor frame assembly (keel). The standard configuration locates the AIU in the keel assembly below the pilot’s seat. The optional configuration locates the AIU through inserts in the cabin floor below the copilot’s seat. AIU power is provided via the “AIU” circuit breaker (CB) (5 Amp) located on the center pedestal.

I. Optional auxiliary inputs include the following installations:

System	Electrical Schematic Reference
GMA340 Marker Beacon with PMA8000B Audio Selector Panel	Diagram 5-3
GMX200 Display	Diagram 5-4
GNS430W/530W GPS/NAV/COM	Diagram 5-4
GTX330 Transponder	Diagram 5-4
KR22 Marker Beacon Receiver	Diagram 5-5
KR87 Automatic Direction Finder	Diagram 5-5
Shadin Fuel Flow Indicator	Diagram 5-4
SL30 NAV/COM (Single)	Diagram 5-4
SL30 NAV/COM (Dual)	Diagram 5-5
TAS600/610 Traffic Advisory System	Diagram 5-4

J. The Chelton EFIS installation includes manual inhibit switches located on the annunciation panel. The annunciation panel is located below the IDUs. Power is provided via the “ANN” circuit breaker (CB) (1 Amp) located on the left side of the center pedestal or along the top of the center pedestal.

K. The “ADAHRS FAST SLAVE” switch, located adjacent to the fuse panel, is used for system alignment. The system alignment can only be performed by an authorized Chelton Dealer.

L. The wiring harness and static and pitot plumbing are “hard installed” into the aircraft and are not intended for removal.

M. Refer to the appropriate 480 or 480B Rotorcraft Flight Manual Supplement and the current vendor operating manuals/instructions for operation of the EFIS system.

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2-2. Vendor Publications

A. The following components listed in Table 2-1 are to be operated and maintained I/A/W the current vendor's instructions to ensure the continued airworthiness of the aircraft:

Table 2-1. Vendor Manuals

Component	Publication	Vendor
FlightLogic EFIS	Pilot's Operating Guide and Reference, Document 150-045240	Chelton Flight Systems 1109 Main St., Suite 560 Boise, Idaho 83702

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SECTION 3

AIRWORTHINESS LIMITATIONS

3-1. Airworthiness Limitations

A. The Airworthiness Limitations section is FAA approved and specifies maintenance required under 14 CFR §§ 43.16 and 91.403 unless an alternative program has been FAA approved.

B. All components of the EFIS system are “on condition”.

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SECTION 4

SERVICING, CLEANING, TROUBLESHOOTING, AND PERIODIC INSPECTIONS

4-1. Servicing

A. The Chelton Flight Systems FlightLogic EFIS system contains no user serviceable components or assemblies. Operations involving the removal of an IDU or any other line-replaceable unit (LRU) installed as a part of the EFIS system must be done by authorized maintenance technicians.

B. Database updates may be performed by the operator as described in the Chelton Flight Systems FlightLogic EFIS Pilot's Operating Guide and Reference.

4-2. Cleaning

4-3. IDU – Cleaning

A. Clean display screens with absorbent soft cloth or a "screen prep" pad available at electronic stores. Avoid rubbing with a hard or sharp object. Wipe water off immediately. Long contact with water may cause discoloration or spots.

4-4. Troubleshooting

A. Refer to the Chelton Flight Systems FlightLogic EFIS Pilot's Operating Guide and Reference when troubleshooting problems with the EFIS system.

4-5. 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.

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4-6. Periodic Inspection Checklist

Date		
Signature		
Aircraft Registration Number		
Aircraft Serial Number		
CHELTON FLIGHTLOGIC EFIS SYSTEM PERIODIC INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT		
Inspect the following items every 100 hours or annually		INITIAL
1. Inspect the IDUs and mount for security, damage, and obvious defects.		
2. Inspect the ADAHRS and mount for security, damage, and obvious defects.		
3. Inspect the OAT probe and mount for security, damage, and obvious defects.		
4. Inspect the MSU and mount for security, damage, and obvious defects.		
5. Inspect the GPS/WAAS sensor and mount for security, damage, and obvious defects.		
6. Inspect the GPS antenna and mount for security, damage, and obvious defects.		
7. If installed, inspect the AIU and mounting bracket (if applicable) for security, damage, and obvious defects.		
8. Inspect the system connectors, wiring harness, cable assemblies, blower unit and hoses, and static and pitot plumbing for security, damage, chafing, and obvious defects.		

SECTION 5

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 TH-28/480 Series Maintenance Manual).

5-1. IDU

5-2. Removal – IDU

A. Turn the EFIS and aircraft power off. If removing the PFD, pull the PFD circuit breaker out. If removing the MFD, pull the MFD circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. The IDUs slide into trays that connect to the aircraft's electrical system. Removal of the IDUs is accomplished using a 3/32" hex driver inserted into the hole immediately to the left of the data card slot. The hex driver turns a jack screw that ensures engagement or disengagement of the display with the connectors in the tray. This requires about 14 revolutions of the jack screw; the IDU stops moving away from the instrument panel (Figure 5-1).

C. Take the IDU by its sides and slide the IDU completely out of the tray.

5-3. Inspection/Repair – IDU Tray

A. Inspect the condition and security of the tray attachment to the airframe.

B. Inspect the condition and security of cooling line attachments to the tray.

C. Repair procedures are not available for the PFD or MFD IDUs.

5-4. Installation – IDU

A. Carefully side the IDU into the appropriate tray.

B. Using a 3/32" hex driver, make about 14 revolutions of the jack screw to engage the IDU to the tray connectors. Do not over tighten.

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

5-5. ADAHRS

5-6. Removal – ADAHRS

A. Turn the EFIS and aircraft power off. Pull the ADAHRS MSU circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. Gain access to the ADAHRS located in the instrument panel (reference TH-28/480 Maintenance Manual, Section 7).

C. Disconnect the static and pitot plumbing lines from the ADAHRS (Figure 5-2).

D. Disconnect the electrical cables from the ADAHRS.

E. Disconnect the pitot and static plumbing lines.

E. Remove hardware securing the ADAHRS to the mounting bracket.

5-7. Inspection/Repair – ADAHRS

A. Inspect the condition and security of the mounting bracket to the aircraft frame. Replace hardware as required.

B. Inspect the condition and security of the pitot and static plumbing lines. Replace tubing and connectors as required.

C. Repair procedures are not available for the ADAHRS.

5-8. Installation – ADAHRS

A. Install the ADAHRS onto the mounting bracket with mounting hardware.

B. Connect the electrical cables to the ADAHRS.

C. Install the static and pitot plumbing lines to the ADAHRS.

D. Perform a leak check. Reference Paragraph 5-30.

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

5-9. MSU

5-10. Removal – MSU

NOTE

If the MSU is removed, the system requires realignment when the MSU is reinstalled. The realignment must be performed by an authorized Chelton Dealer.

A. Turn the EFIS and aircraft power off. Pull the ADAHRS MSU circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. Gain access to the MSU located in the tailcone (reference TH-28/480 Maintenance Manual, Section 7).

C. Disconnect electrical cables from the MSU (Figure 5-3).

D. Remove hardware securing the MSU to the mounting bracket.

5-11. Inspection/Repair – MSU

A. Inspect the condition and security of the mounting bracket to the aircraft frame.

B. Repair procedures are not available for the MSU.

5-12. Installation – MSU

A. Install the MSU onto the mounting bracket with mounting hardware. The angle of the MSU (attachment interface) must be 6° horizontal from waterline.

B. Connect electrical cables to the MSU.

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

D. Perform system realignment. This must be performed by an authorized Chelton Dealer.

5-13. WAAS/GPS Sensor

5-14. Removal – WAAS/GPS Sensor

A. Turn the EFIS and aircraft power off. Pull the WAAS GPS circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

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B. Gain access to the WAAS/GPS sensor located in the keel (reference TH-28/480 Maintenance Manual, Section 8).

C. Disconnect electrical cables from the WAAS/GPS sensor (Figure 5-4).

D. Remove hardware securing the WAAS/GPS sensor to the mounting bracket.

5-15. Inspection/Repair – WAAS/GPS Sensor

A. Inspect the condition and security of the mounting bracket to the aircraft frame.

B. Repair procedures are not available for the WAAS/GPS sensor.

5-16. Installation – WAAS/GPS Sensor

A. Install the WAAS/GPS onto the mounting bracket with mounting hardware.

B. Connect electrical cables to the WAAS/GPS sensor.

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

5-17. GPS Antenna

5-18. Removal – GPS Antenna

A. Turn the EFIS and aircraft power off. Pull the WAAS GPS circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.

B. Gain access to the antenna located in the tailcone (reference TH-28/480 Maintenance Manual, Section 8).

C. Disconnect electrical cable from the antenna (Figure 5-5).

D. Remove hardware securing the antenna to the mounting bracket.

5-19. Inspection/Repair – GPS Antenna

A. Inspect the condition and security of the mounting bracket to the aircraft frame.

B. Inspect the condition of the conductive gasket.

C. Repair procedures are not available for the antenna.

5-20. Installation – GPS Antenna

A. Install the antenna onto the mounting bracket with the mounting hardware.

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B. Connect electrical cables to the antenna.

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

5-21. OAT Probe

5-22. Removal – OAT Probe

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

B. Gain access to the OAT probe located in the keel (reference TH-28/480 Maintenance Manual, Section 8).

C. Disconnect cable from the OAT probe mount (Figure 5-6).

D. Remove nut, washers, OAT probe, and O-ring.

5-23. Inspection/Repair – OAT Probe

A. Inspect the condition and security.

B. Inspect O-ring. Replace O-ring, if necessary.

C. Repair procedures are not available for the OAT probe.

5-24. Installation – OAT Probe

A. Install the OAT probe with O-ring through mounting hole. Ensure O-ring is against the OAT probe flange.

B. Place flat washer, star washer over the OAT probe threads. Thread the nut loosely on OAT probe threads.

C. Rotate the OAT probe so the long axis of the probe is parallel to the slip stream. Tighten the mounting nut. Torque to 30-60 in-lb. (Hold the position of the probe with a wrench while tightening the nut.)

D. Connect cable to the OAT probe.

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

5-25. Cooling Fan

5-26. Removal – Cooling Fan

- A. Turn the EFIS and aircraft power off. Remove the EFIS COOL fuse located on the left side of the pedestal (Figure 5-8).
- B. Gain access to the blower located in the keel (reference TH-28/480 Maintenance Manual, Section 8).
- C. Disconnect the blower hoses and power (Figure 5-7).
- D. Remove hardware securing the blower to the mounting bracket.

5-27. Inspection/Repair – Cooling Fan

- A. Inspect the condition and security of the mounting bracket to the aircraft frame.
- B. Inspect the condition and security of the hoses and clamps.
- C. Repair procedures are not available for the blower.

5-28. Installation – Cooling Fan

- A. Install the blower onto the mounting bracket with mounting hardware.
- B. Connect hoses and power.
- C. Insert EFIS COOL fuse into fuse panel.

5-29. AIU

5-30. Removal – AIU

- A. Turn the EFIS and aircraft power off. Pull the AIU circuit breaker out. Disable the circuit breaker by installing a cable tie or other similar device around the circuit breaker system.
- B. Gain access to the AIU located in the keel (reference TH-28/480 Maintenance Manual, Section 8).
- C. Disconnect cables from the AIU mount (Figure 5-9 or Figure 5-10).
- D. Remove hardware securing the AIU.

5-31. Inspection/Repair – AIU

- A. For the standard configuration, inspect the condition and security of the mounting bracket to the aircraft frame.
- B. Repair procedures are not available for the AIU.

5-32. Installation – AIU

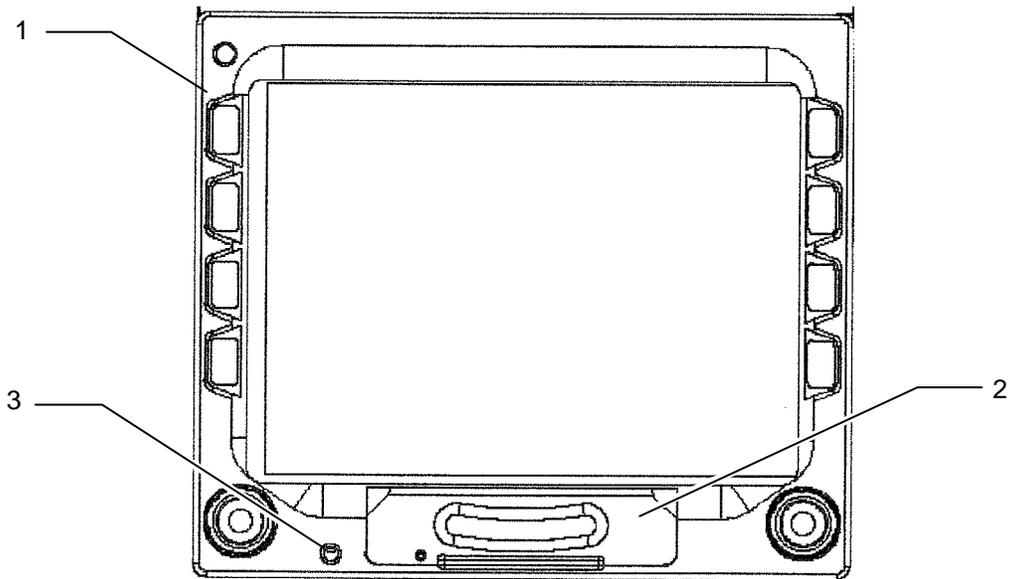
- A. For the standard configuration, install the AIU onto the mounting bracket with the mounting hardware (Figure 5-9). For the optional configuration, install the AIU onto the floor assembly by securing the unit in the threaded inserts using the mounting hardware (Figure 5-10).
- B. Connect electrical cables to the AIU.
- C. Remove the cable tie or other similar device from the AIU circuit breaker stem and push the stem in to set the circuit breaker.

5-33. Wiring Harnesses/Connectors and Air Lines

- A. Remove, inspect/repair, and install the EFIS system airframe mounted wiring harnesses/connectors and air lines in accordance with the TH-28/480 Series Maintenance Manual, Section 6, Paragraphs 6-10 through 6-21. Refer to Diagram 5-1 and Diagram 5-2 for the EFIS wiring interface.

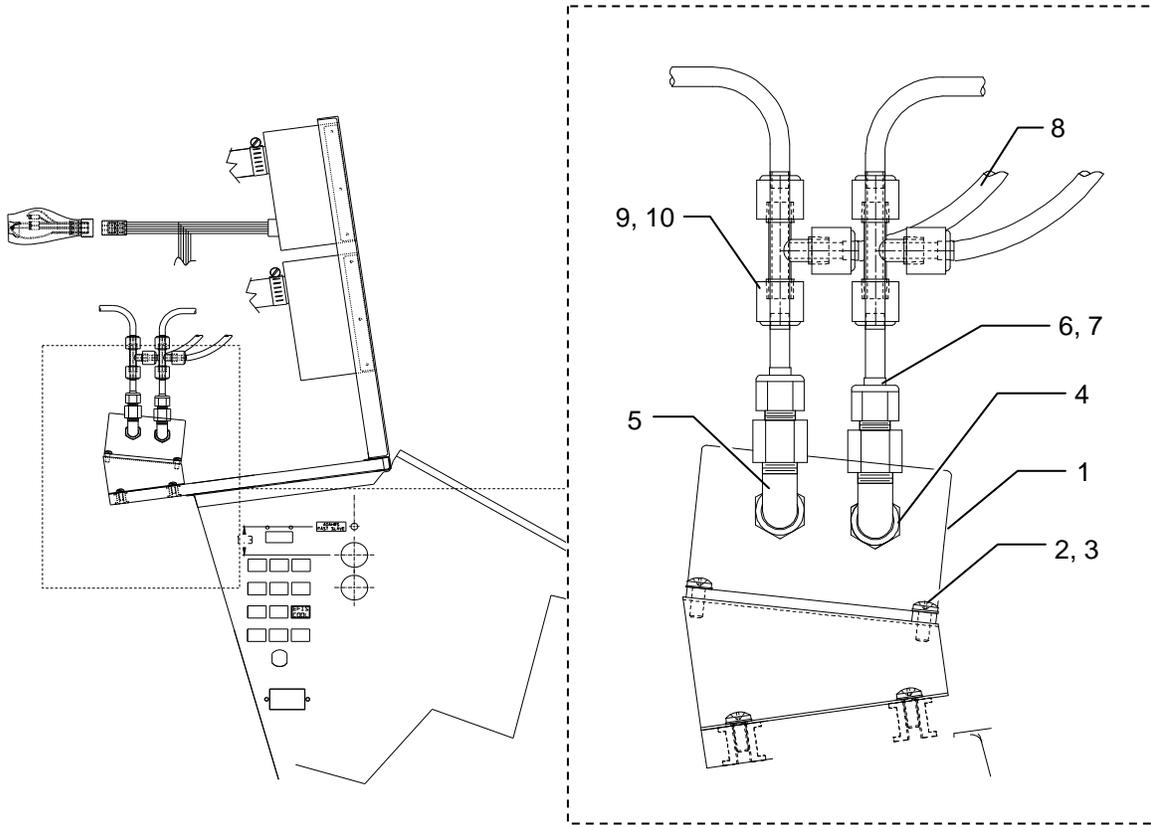
5-34. System Leak Check

- A. Test the ADAHRS static system for leaks in accordance with the TH-28/480 Series Maintenance Manual, Section 7, Paragraph 7-68, or by performing the test in Paragraph B, below.
- B. Set the Pitot/Static test set to a static altitude of 1000 feet above field elevation and monitor the static leak. Without additional pumping for a period of one minute, the loss of indicated altitude must not exceed 100 feet on the EFIS.
- C. Test the ADAHRS pitot system for leaks in accordance with the TH-28/480 Series Maintenance Manual Section 7, Paragraph 7-68.
- D. Additional detail pertaining to the alignment procedures is provided the Chelton Flight Systems ADAHRS Installation Manual.



Item	Component	Part Number	Quantity
1	IDU (PFD or MFD)	401-045500-0101	2
2	Slip Indicator (PFD only)	310-045600-01	1
3	(Insert 3/32" hex driver at this location to install or remove IDU)		

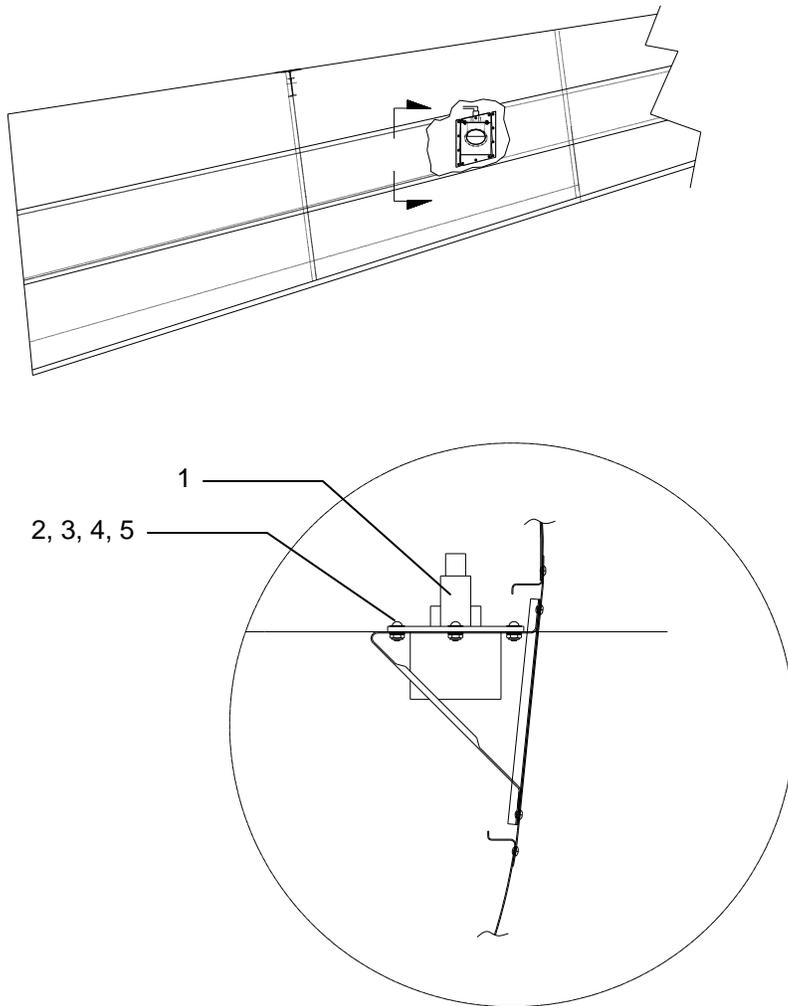
Figure 5-1. IDU Installation



Item	Component	Part Number	Quantity
1	ADAHRS	42-005001-0001	1
2	Screw	MS27039-106	4
3	Washer	AN960-10L	4
4	Swivel Connector	4F650X-S	2
5	Elbow	MS20822-40	2
6	Connector	266N04X02	2
7	Insert	259-N-4	2
8	Tubing	520-006	A/R
9	Tee	264-N-4	6
10	Insert	259-N-4	6

Figure 5-2. ADAHRS Installation

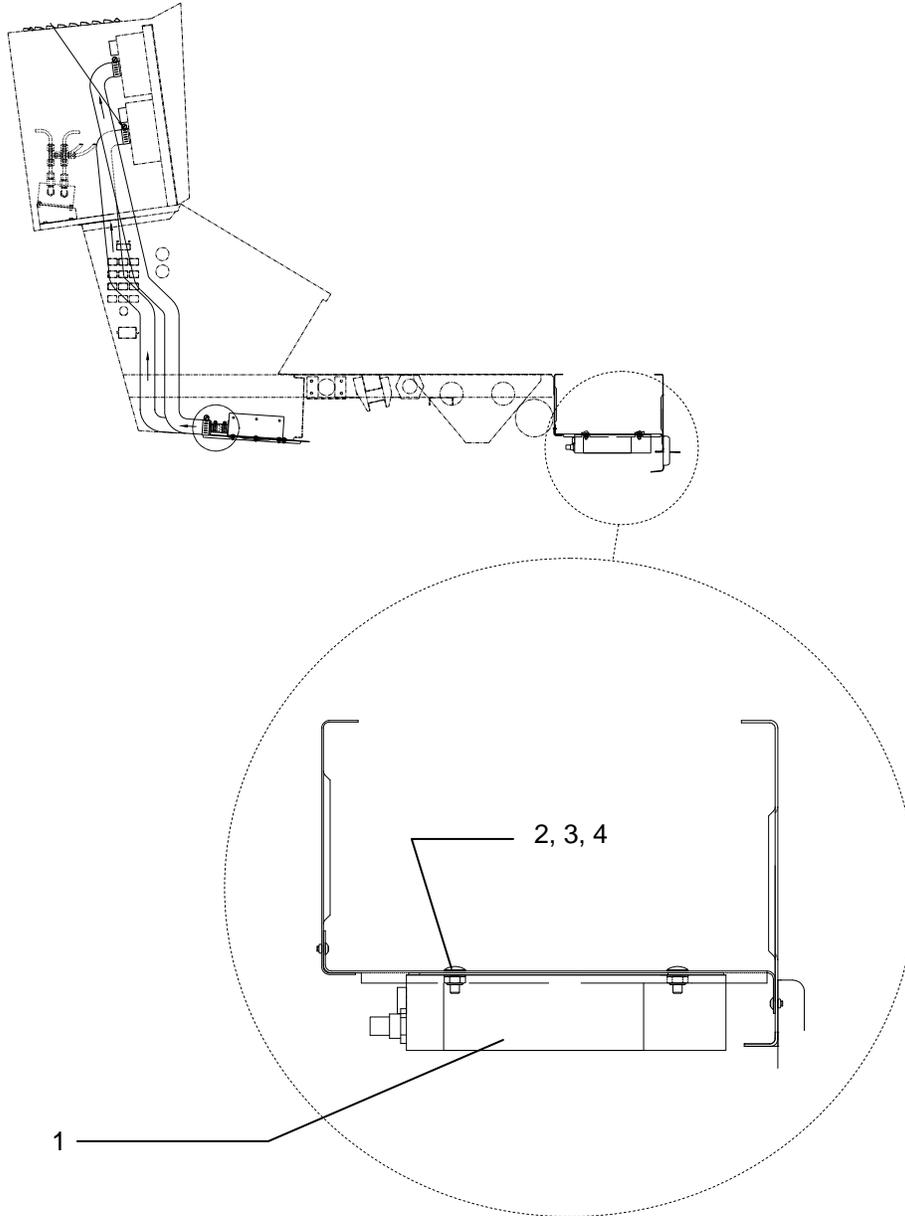
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Item	Component	Part Number	Quantity
1	MSU	42-004001-0001	1
2	Screw	AN515B8R8	3
3	Nut	AN240B8	3
4	Washer (both sides)	AN960B8	6
5	Split Washer (under nut)	AN935B8	3

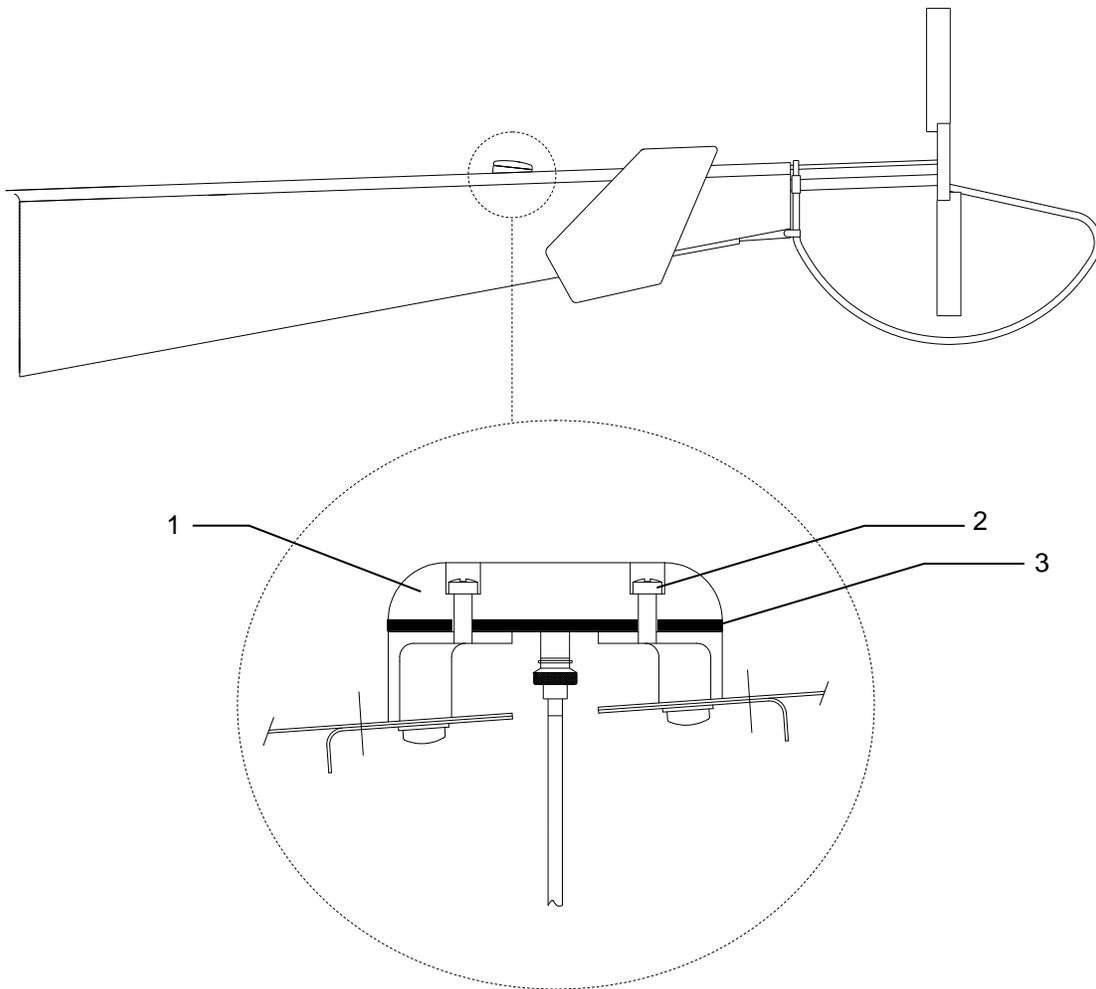
Figure 5-3. MSU Installation

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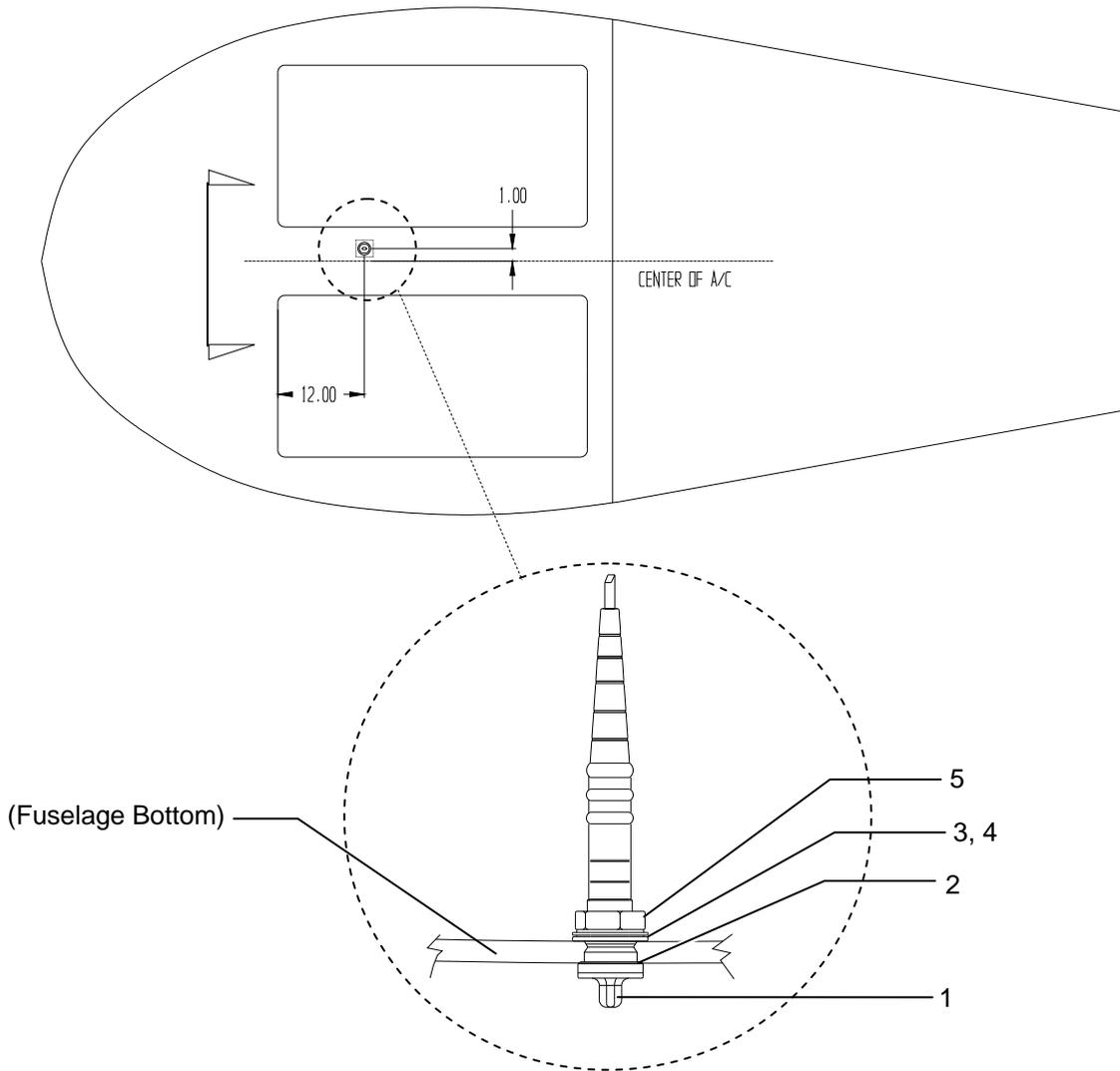
Item	Component	Part Number	Quantity
1	GPS WAAS Sensor	401-04640-04	1
2	Screw	AN525-1032R8	4
3	Washer	AN960-10	4
4	Nut	AN364-1032A	4

Figure 5-4. GPS WAAS Sensor Installation



Item	Component	Part Number	Quantity
1	GPS Antenna	81194	1
2	Screw	MS51959-67	4
3	Conductive Gasket	(supplied with antenna)	1

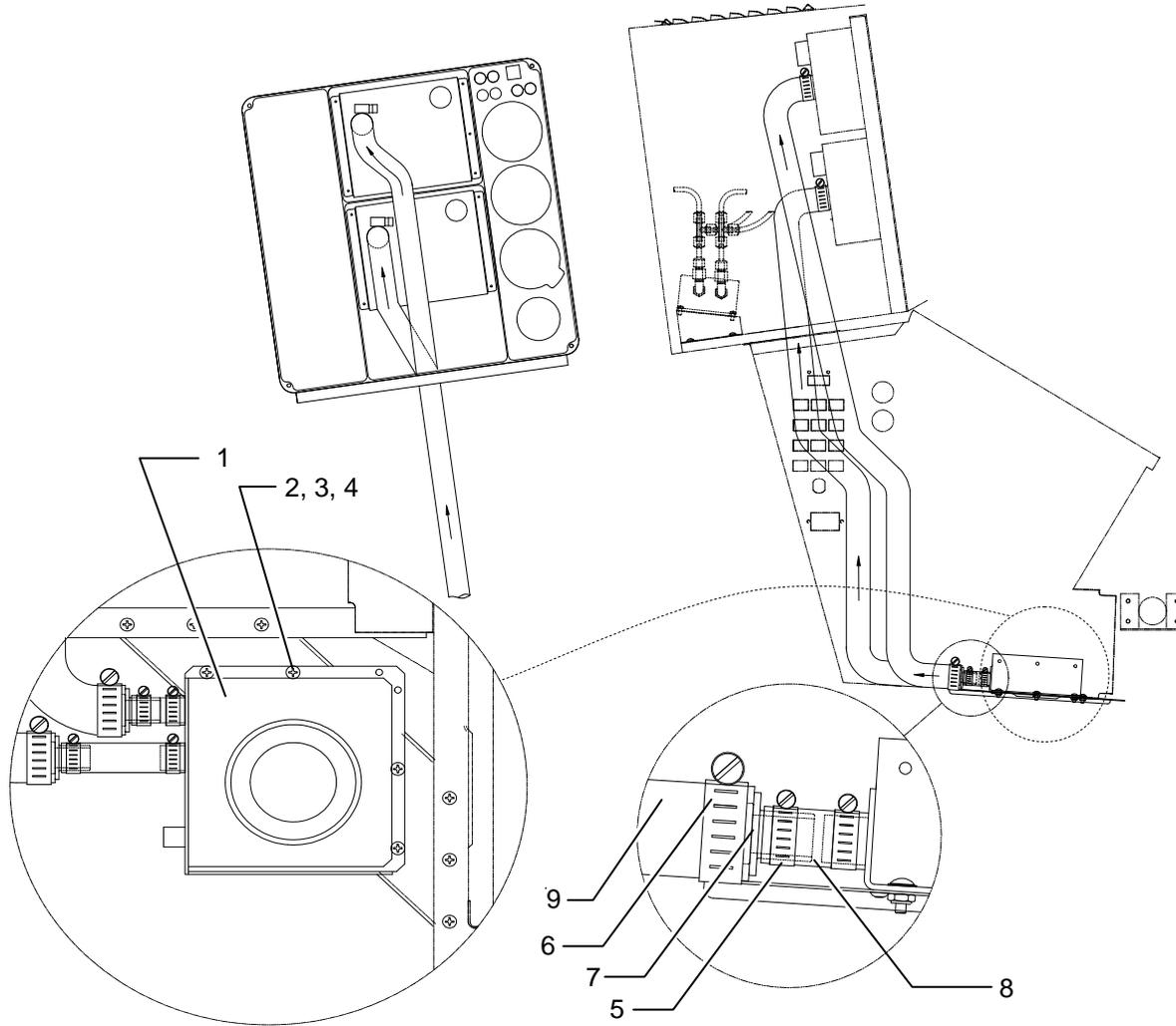
Figure 5-5. GPS Antenna Installation



Item	Component	Part Number	Quantity
1	OAT Probe	42-002001-0001	1
2	O-ring	Included in OAT probe part number kit.	1
3	Flat Washer		1
4	Star Washer		1
5	Nut		1

Figure 5-6. OAT Probe Installation

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Item	Component	Part Number	Quantity
1	Cooling Fan	AK-950-F2-28V	1
2	Screw	AN526-632R6	4
3	Washer	AN960-6L	4
4	Nut	AN364-632A	4
5	Clamp	20010S	4
6	Clamp	20020S	6
7	Hose Reducer	4118857-15	2
8	5/8" ID Hose	--	2" and 3" length
9	1" ID Hose	400-04	50" length

Figure 5-7. Cooling Fan/Blower Installation

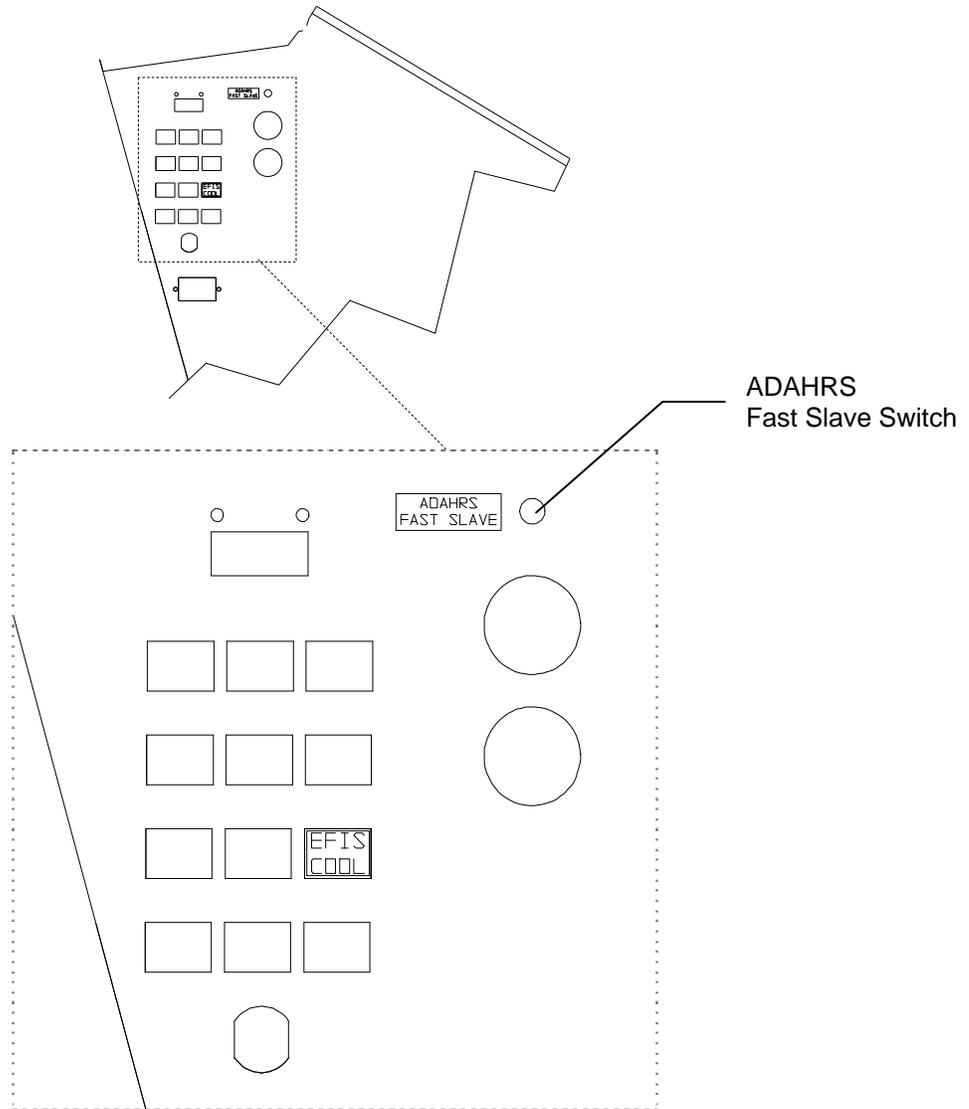
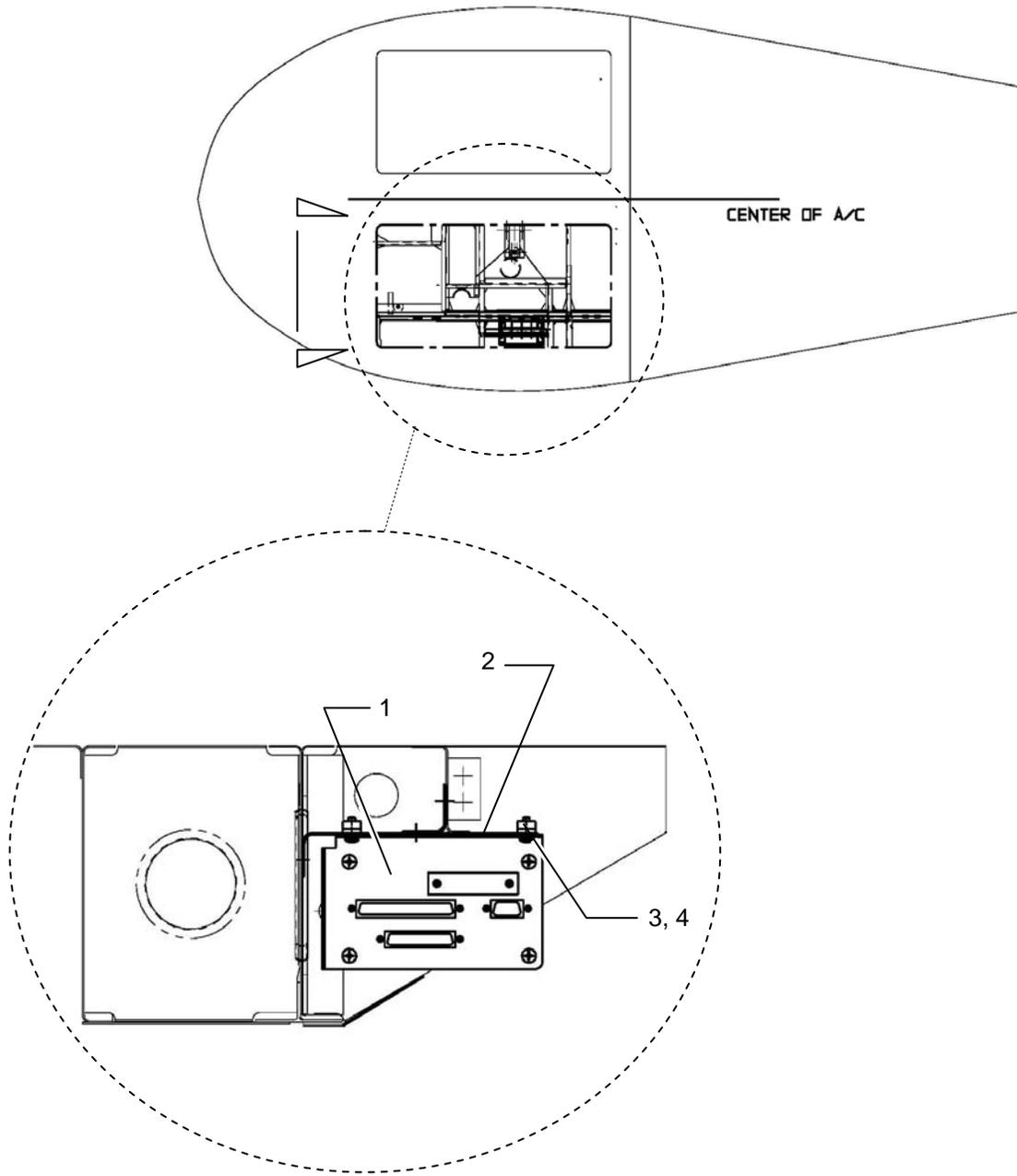
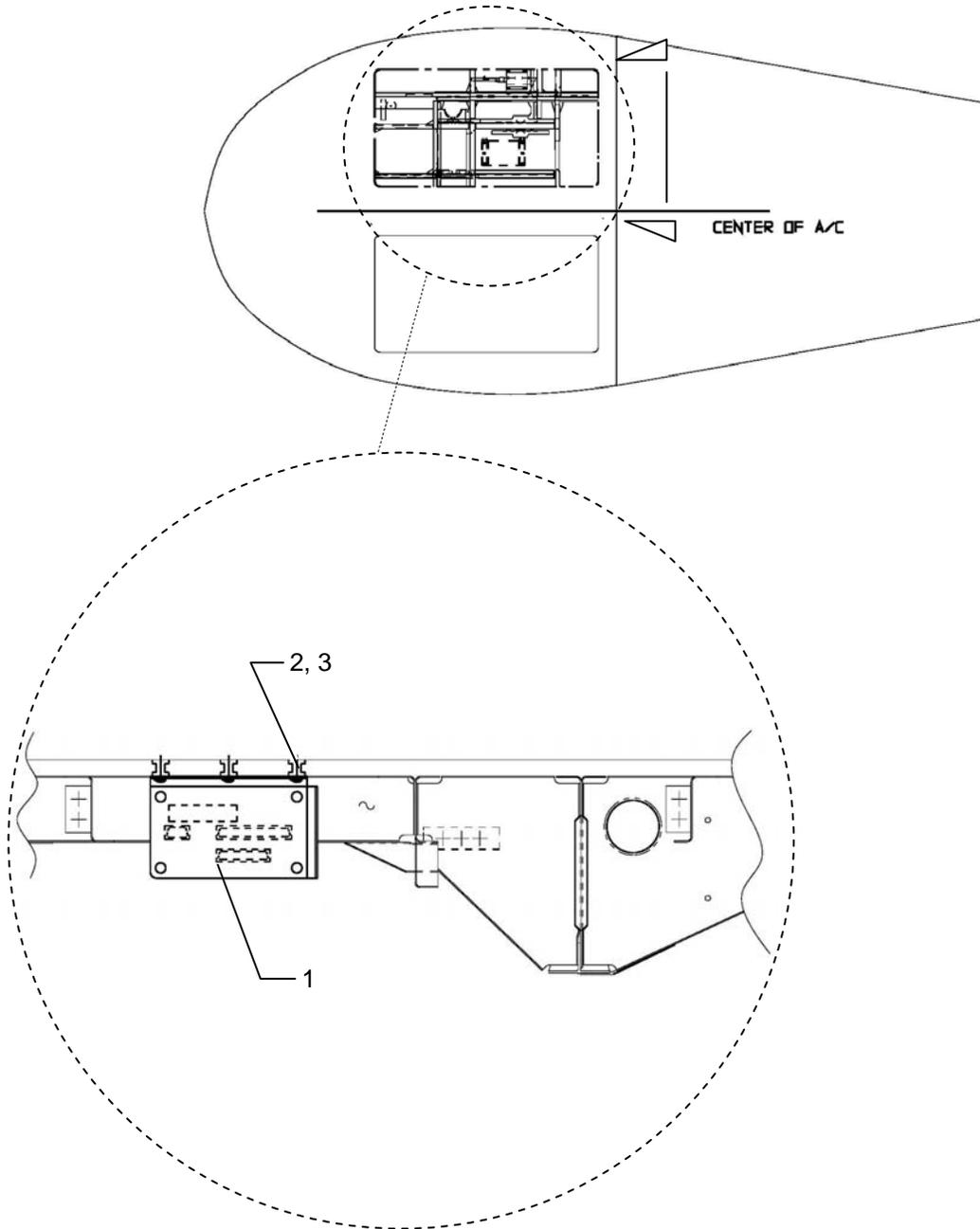


Figure 5-8. Fuse Panel and Fast Slave Switch Location



Item	Component	Part Number	Quantity
1	AIU	453-7000	1
2	Mounting Bracket	4220564-1	1
3	Screw	MS51957-42	4
4	Washer	AN960D8L	4

Figure 5-9. AIU, Standard Configuration

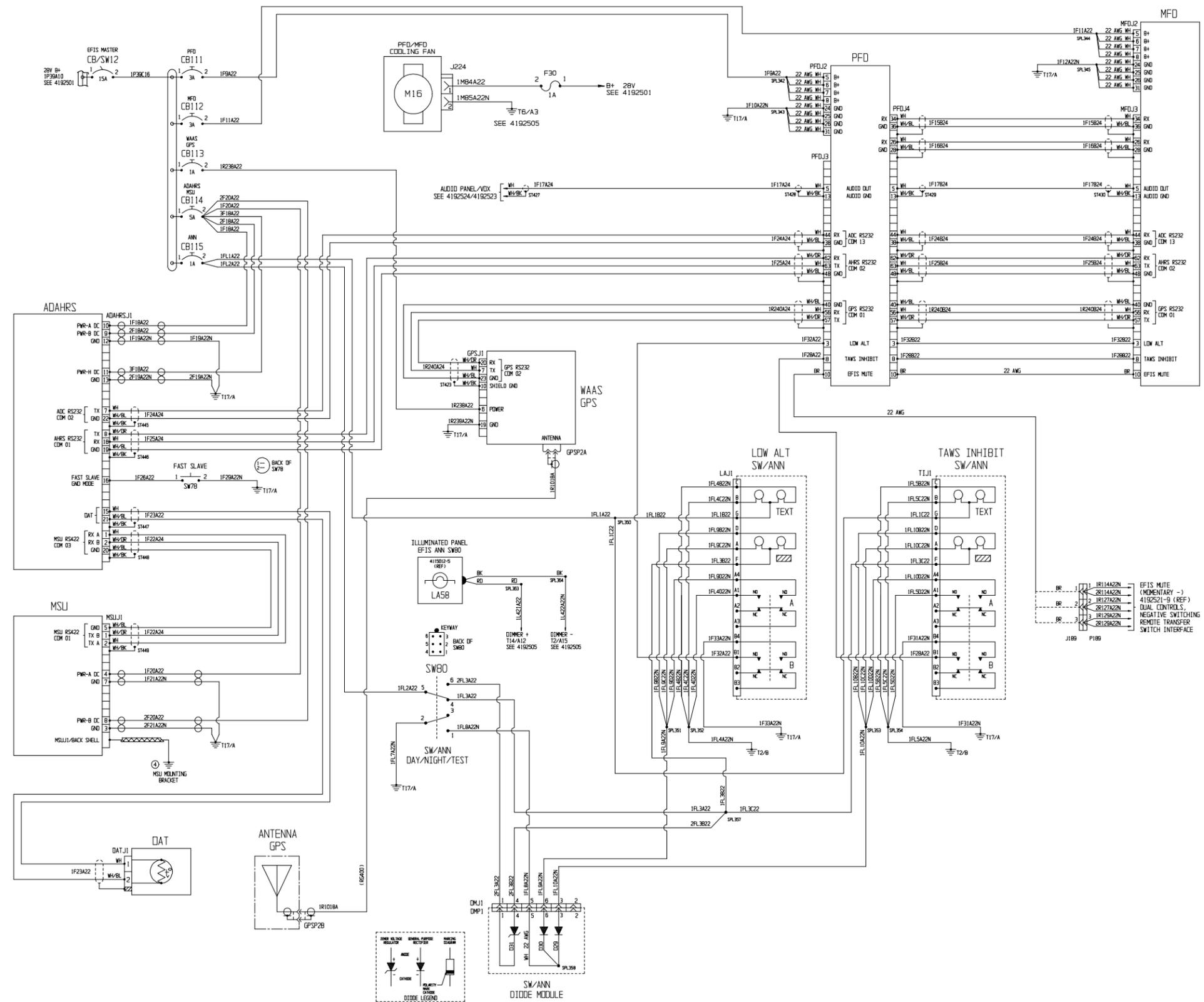


Item	Component	Part Number	Quantity
1	AIU	453-7000	1
2	Screw	MS51957-42	6
3	Washer	AN960D8L	6

Figure 5-10. AIU, Optional Configuration

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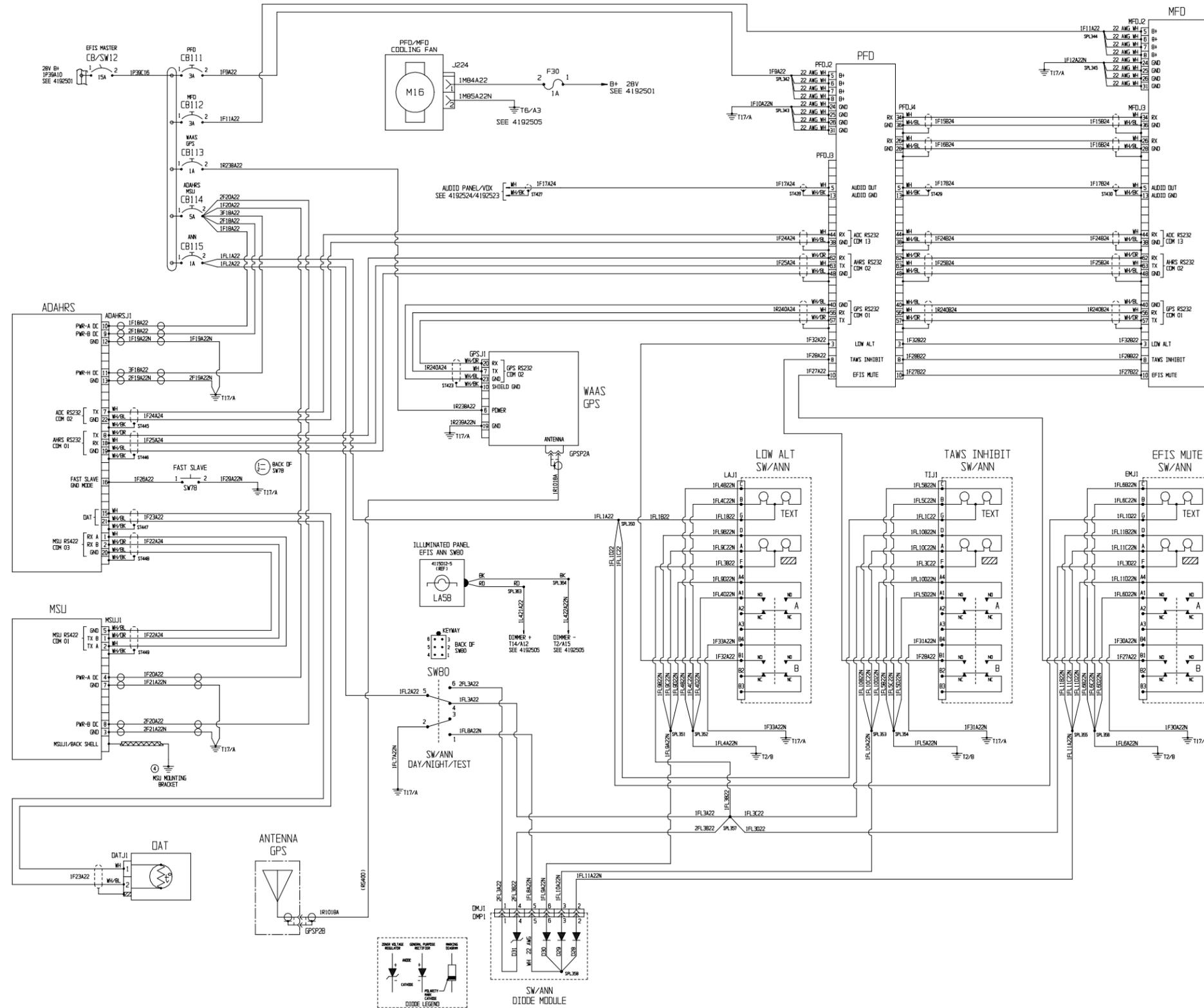


Diagram 5-2. Electrical Schematic (Panel Mounted EFIS Mute Switch)

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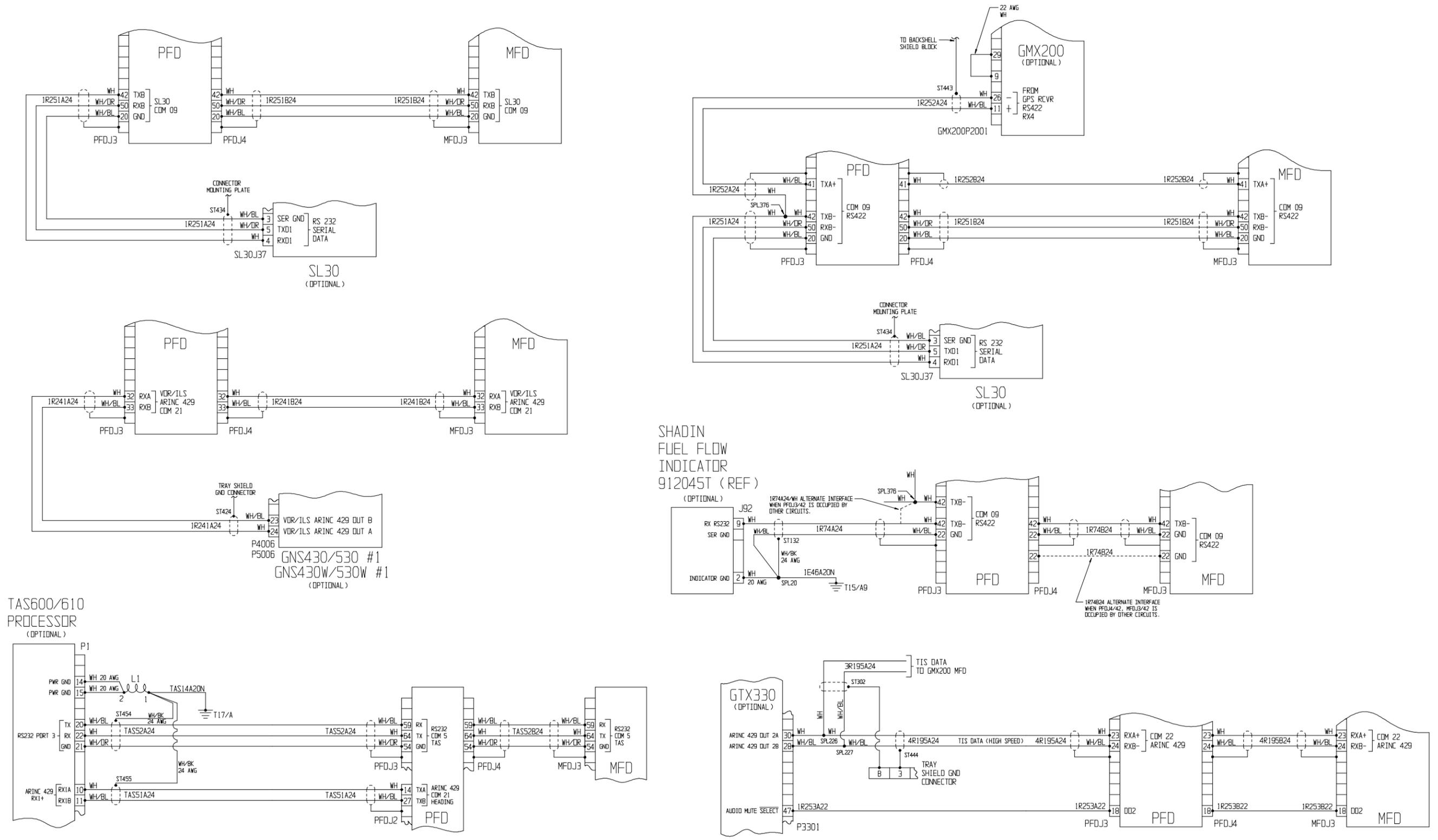


Diagram 5-4. Electrical Schematic - Optional System Interface

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