ELECTRICAL POWER - GENERAL

1. Electrical System - General

A. **Electrical Power System** - The electrical system in this aircraft consists of two independent buses, which are referred to as the left bus and right bus. Two alternators provide charging power for the batteries, as well as system power. The batteries will also provide additional power in the event of an over-demand situation where the requirements on the system are greater than what can be provided by the alternator. The left and right buses in turn feed the avionics and essential buses. A summary of the busses, equipment powered by each bus, and circuit breaker protection is shown as follows:

(1) Table 1 (Avidyne).

(2) Table 2 (Garmin G1000).

(3) Table 3 (Garmin G2000).

B. A functional diagram of the electrical system is shown as follows:

(1) Figure 1 (Avidyne).

(2) Figure 2 (Garmin G1000).

(3) Figure 3 (Garmin G2000).

C. Five current limiters protect the alternators and bus outputs. In addition, the left and right buses are physically isolated inside the aft avionics bay. Left and right bus controls, grounds, and outputs are routed through separate holes, connectors, and cable runs so any failure on one bus does not affect the operation of the other bus.

D. Control of the buses is with the master switch panel located on the lower left portion of the instrument panel (Avidyne) or in the cockpit overhead (Garmin G1000) and (G2000). There is also a CROSS TIE switch on this panel, which will restore power in the event of failure of the right or left systems. For example, if the alternator or some other component on the left side should fail, the CROSS TIE switch will restore power to the electrical items on the left bus by connecting the left bus to the right bus.

E. The essential bus is never affected, provided power from at least one bus (left or right) is available. The essential bus is diode fed that allows current to flow only in one direction, from both the right bus and the left bus that allows the essential equipment to have two sources of power.

(1) Airplanes -2096 and On and airplanes incorporating SEB-24-04, the essential bus is further protected by two 20amp in-line fuses between the left and the right bus.

F. **Avionics Bus**

(1) **Avidyne Option** - The avionics bus provides power to the Audio/Voice, GPS 1, GPS 2, Nav/Com 1, Com 2, and Transponder/Encoder/Equipment Fan. These devices are protected by their own circuit breakers. The circuit breaker ratings are: Audio/Voice, GPS 1, GPS 2, Nav/Com 1, Com 2, Transponder/Encoder/Equipment Fan, Traffic, Autopilot, MFD, and Weather .

(2) **Garmin G1000 Option** - The avionics bus provides power to the Audio/MKR, Integrated Avionics No. 2, Com No. 2, Transponder, Avionics Fan, Traffic, Autopilot, MFD, and Weather.

(3) **Garmin G2000 Installation** - The avionics bus provides power to the Audio, ADF/DME, Transponder, Avionics Fans, Traffic, Iridium DL, A/P Controller, MFD, AHRS NO. 2, XM DL, and Lightning Detection.

G. **Left Bus**

(1) **Avidyne Option** - The left bus provides power for the Aileron Trim, Pitot Heat, Engine Instruments, Rudder Hold, Position Lights, Landing Light, Left Voltage Regulator, Clock, Cabin Fan, and PFD Power.

(2) **Garmin G1000 Option** - The left bus provides power for the Aileron Trim, Pitot Heat, SpeedBrakes, Rudder Hold, Position Lights, Landing Light, Left Voltage Regulator, and Fan.

(3) **Garmin G2000 Installation** - The left bus provides power for the Anti-Ice (Inadvertent), W/S Anti-Ice (FIKI), Anti-Ice Pump 1 (FIKI), Wing Inspection Lights(FIKI), CO Detector, 12 Volt power, Oxygen System, ADC, Com No. 1, Nav No. 1, Flaps, PFD, PFD Controller, Pitot Heat, Panel lights, NAV Lights, Landing Light, Left Alt Controller, and AHRS No.1.

H. **Right Bus**

(1) **Avidyne Option** - The right bus provides power for the Strobe Lights, Taxi Light, Right Voltage Regulator, Door Seal/Power Point, PFD Power, and Elevator Trim.

(2) **Garmin G1000 Option** - The right bus provides power for the Strobe Lights, Taxi Light, Right Voltage Regulator, Door Seal/Power Point, Carbon Monoxide Detector, Oxygen, Display Keypad, and Air Conditioning.

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(3) **Garmin G2000 Installation** - The right bus provides power for the Anti-Ice Pump 2 (FIKI), Stall Heat, Com No. 2, Nav No. 2, Standby Instrument, Strobe Lights, Taxi Light, Right Alt Controller, ECS CTRL/Door Seal, GTC, Air Conditioning, and ECS Fan.

I. **Essential Bus**

(1) **Avidyne Option** - The essential bus is diode fed from either the right or the left bus and provides power for the Attitude Horizon, Turn Coordinator, Panel Lights, Annunciators, Left Bus Relays, Fuel Pump, Stall Warning, Flaps, and the Right Bus Relays.

(2) **Garmin G1000 Option** - The essential bus is diode fed from either the right or the left bus and provides power for the PFD, Elevator Trim, Panel Lights, AHRS, Air Data Computer, Engine Airframe, Integrated Avionics No. 1, Com No. 1, Left Bus Relays, Fuel Pump, Stall Warning, Flaps, Standby ADI, and the Right Bus Relays.

(3) **X-Feed Bus, Garmin G2000 Installation** - The X-Feed bus is diode fed from either the right or the left bus and provides power for the Roll Trim/RDR Hold, Pitch Trim, Engine Airframe, Auto Pilot Servos, Fuel Pump, Stall Warning, and Speed Brakes.

(4) Airplanes -2096 and On and airplanes incorporating SEB-24-04, the essential/X-Feed bus is further protected by two 20amp in-line fuses between the left and the right bus.

J. **Battery Bus**

CAUTION: For extended service life, disconnect the batteries to prevent them from being continuously charged by external power when the aircraft is in maintenance.

CAUTION: Do not replace the sealed lead acid batteries with wet lead acid batteries.

CAUTION: Never "jump-start" an aircraft that has a "dead" or discharged battery. It takes approximately three hours to recharge a fully discharged battery with the aircraft generating system or external power.

(1) **Avidyne Option** - Four items are connected to the battery bus. These items will operate even if the left and right buses are turned off since they are directly connected to the either the left or right battery. The Nav/Com bypass switch, Hobbs Meter, and ELT, are connected to the right battery and the courtesy lights/flip lights are connected to the left battery. The Hobbs Meter, ELT, and courtesy lights/flip lights are each protected by a 3 amp fuse which is not accessible from the cockpit.

(2) **Garmin G1000 Option and G2000 Installation** - Four items are connected to the battery bus. These items are directly wired to the battery shunts located on the Power Grid Assembly in the Aft Avionics Bay, but the term battery bus is used for consistency. These items will operate even if the left and right buses are turned off since they are directly connected to the right or left battery. The items directly wired to the right battery shunt include the Hobbs Meter, and ELT. The courtesy lights/flip lights are directly wired to the left battery shunt. A 3-amp fuse protects each component and is not accessible from the cockpit. The Prop Heat is directly wired to the left battery shunt for the G1000 Option and directly wired to the right battery shunt for the G2000 Option. A 20-amp fuse protects the Prop Heat components and is not accessible from the cockpit.

K. **Avidyne Option Nav/Com Bypass Circuit** - The Nav/Com bypass switch is an alternate action device that activates when depressed and needs to be depressed again to cycle off. Activation of the Nav/Com bypass switch turns on the GPS 1, Com No. 1 , and Nav No. 1 by connecting them directly to the right battery, bypassing the power grid, circuit breaker panel, and associated wiring. The Nav/Com bypass switch is protected by two 5 amp fuses.

Table 1. Summary of Buses and Equipment (Avidyne Option)

SUMMARY OF BUSES, AVIDYNE OPTION		
Bus	**Bus Component**	**Circuit Breaker**
Avionics Bus	Audio/Voice	5 amp
	GPS 1	5 amp
	GPS 2	5 amp
	Nav/Com No. 1	10 amp
	Com No. 2	10 amp
	Transponder/Encoder and Equipment Fan	5 amp
	Traffic	4 amp

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	Autopilot	5 amp
	MFD	10 amp
	Weather	5 amp
Left Bus	Aileron Trim	1 amp
	Pitot Heat	10 amp
	SpeedBrakes™	3 amp
	Engine Instruments	3 amp
	Carbon Monoxide Detector	2 amp
	Oxygen	3 amp
	Position Lights	10 amp
	Landing Light	4 amp
	Left Voltage Regulator	5 amp
	Cabin Fan	7.5 amp
	PFD L Power	10 amp
	Air Conditioning	20 amp
Right Bus	Strobe Lights	10 amp
	Taxi Light	4 amp
	Right Voltage Regulator	5 amp
	Door Seal/Power Point	5 amp
	PFD R Power	10 amp
	Elevator Trim	1 amp
	Air Conditioning	15 amp
Essential Bus	Attitude Horizon	3 amp
	Turn Coordinator	3 amp
	Panel Lights	3 amp
	Annunciators	3 amp
	Left Bus Relays	5 amp
	Fuel Pump	10 amp
	Stall Warning	5 amp
	Flaps	10 amp
	Right Bus Relays	5 amp
Battery Bus	Nav/Com Bypass Switch	Two 5 amp
	Hobbs Meter	3 amp
	ELT	3 amp
	Courtesy Lights	3 amp

Table 2. Summary of Buses and Equipment (Garmin G1000 Option)

SUMMARY OF BUSES FOR GARMIN G1000		
Bus	**Bus Component**	**Circuit Breaker**
Avionics Bus	Audio/MKR	5 amp
	Integrated Avionics No. 2	5 amp

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	Com No. 2	5 amp
	Transponder	5 amp
	Avionics Fan	3 amp
	Traffic	3 amp
	Autopilot	5 amp
	MFD	5 amp
	Weather	3 amp
Left Bus	Aileron Trim or Rudder Hold/Aileron Trim	2 amp
	Pitot Heat	7.5 amp
	SpeedBrakes™	3 amp
	Position Lights	5 amp
	Landing Light	5 amp
	Left Voltage Regulator	5 amp
	Fan	5 amp
Right Bus	Strobe Lights	5 amp
	Taxi Light	5 amp
	Right Voltage Regulator	5 amp
	Door Seal/Power Point	5 amp
	Carbon Monoxide Detector	2 amp
	Oxygen	3 amp
	Display Keypad	2 amp
	Air Conditioning	15 amp
Essential bus	AHRS	5 amp
	Elevator Trim	2 amp
	Panel Lights	7.5 amp
	Air Data Computer	5 amp
	PFD	5 amp
	Engine Airframe	5 amp
	Integrated Avionics No. 1	5 amp
	Com No. 1	5 amp
	Left Bus Relays	1 amp
	Fuel Pump	5 amp
	Stall Warning	2 amp
	Flaps	10 amp
	Standby ADI	3 amp
	Right Bus Relays	1 amp
Battery Bus	Hobbs Meter (Right Bus)	3 fuse
	ELT (Right Bus)	3 fuse
	Courtesy Lights (Left Bus)	3 fuse
	Prop Heat (Left Bus)	20 fuse

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Table 3. Summary of Buses and Equipment (Garmin G2000 Installation)

SUMMARY OF BUSES FOR GARMIN G2000		
Bus	**Bus Component**	**Circuit Breaker**
Avionics Bus	MFD	5 amp
	A/P Controller	5 amp
	Audio	5 amp
	Transponder	5 amp
	AHRS No. 2	5 amp
	ADF/DME	5amp
	Traffic	5 amp
	XM DL	3 amp
	Iridium DL	5 amp
	Lightning Detect	2 amp
	Avionics Fans	5 amp
Left Bus	Flaps	7.5 amp
	ADC	5 amp
	Oxygen	3 amp
	AHRS No. 1	5 amp
	Com No. 1	5 amp
	Nav No. 1	5 amp
	PFD CTRL	5 amp
	PFD	5 amp
	12 V Power	2 amp
	CO Detect	2 amp
	Panel Lights	5 amp
	Nav Lights	5 amp
	Landing Light	5 amp
	L Alt Controller	5 amp
	Anti-Ice (Inadvertent)	5 amp
	Anti-Ice Pump 1 (FIKI)	5 amp
	W/S Anti-Ice (FIKI)	5 amp
	Wing Insp Lights(FIKI)	2 amp
	Pitot Heat	7.5 amp **NOTE 1**
Right Bus	Stby Instr	3 amp
	GTC	3 amp
	Nav No. 2	5 amp
	Com No. 2	5 amp
	Strobe Lights	5 amp
	Taxi Light	5 amp
	R Alt Controller	5 amp

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	Air Cond	15 amp
	ECS Fan	7.5 amp
	Anti-Ice Pump 2 (FIKI)	5 amp
	Stall Heat	10 amp
	ECS CTRL/Door Seal	5 amp
X-Feed Bus	Engine Airframe	5 amp
	Fuel Pump	5 amp
	Stall Warning	2 amp
	Speed Brakes	3 amp
	A/P Servos	5 amp
	Roll Trim/RDR Hold	2 amp
	Pitch Trim	2 amp
Battery Bus	Hobbs Meter (Right Bus)	3 fuse
	ELT (Right Bus)	3 fuse
	Prop Heat (Right Bus)	20 fuse
	Courtesy Lights (Left Bus)	3 fuse

NOTE 1:

15 amp for Pitot Heat, for Airplanes 02049 and On.

2. Troubleshooting Procedures For The Electrical System

A. **Symptom** - System does not charge or discharge showing on ammeter.

B. **Probable Cause** - Bad alternator, voltage regulator, or system short.

C. **Action** - Charging system problems associated with an alternator should be analyzed in the manner of: Pre-Voltage Regulator Checks, Voltage Regulator Checks, and Post Voltage Regulator Checks.

D. **Pre-Voltage Regulator Checks** - Check the affected alternator switch, voltage regulator circuit breaker, wires, and terminals for contact resistance build-up. Resistance should be less than 0.1 ohms.

E. **Voltage Regulator Check** - Check that there is power coming into and going out of the voltage regulator. The fault/function indicator on the unit is designed to alert the user to the condition of the alternator/voltage regulator.

(1) A red light on the unit, with the affected master switch on means there is a ground short in the alternator field circuit or the voltage regulator’s field control transistor is shorted.

(2) A green steady light on the unit with the engine running means there is power coming out of the voltage regulator, but the alternator field or field wire to the voltage regulator is open.

(3) A green fast flickering light on the unit with the engine running means power input devices (like circuit breaker, switch, etc.), and the field systems are functioning correctly.

(4) A green slow flickering light on the unit with the engine running means the power input devices (like switch, etc.) are defective or have higher than normal resistance.

(5) No light on the unit with the affected master switch on means that one power input device (like switch, circuit breaker, or wiring) or the voltage regulator is defective.

F. **Post-Voltage Regulator Checks**

(1) Check the affected alternator by measuring the resistance of the field. Resistance from field to ground on the alternator should be from 3.5 to 5.0 ohms. Check the resistance of the meter leads before measuring field.

(2) Check for "flying" short and other intermittent problems by slowly rotating the affected alternator while measuring the field resistance. A drop below 3.0 ohms could indicate a bad alternator that might damage the voltage regulator.

(3) Check the condition of the alternator’s field, terminals, and wires connecting it to the voltage regulator and the aircraft charging system.

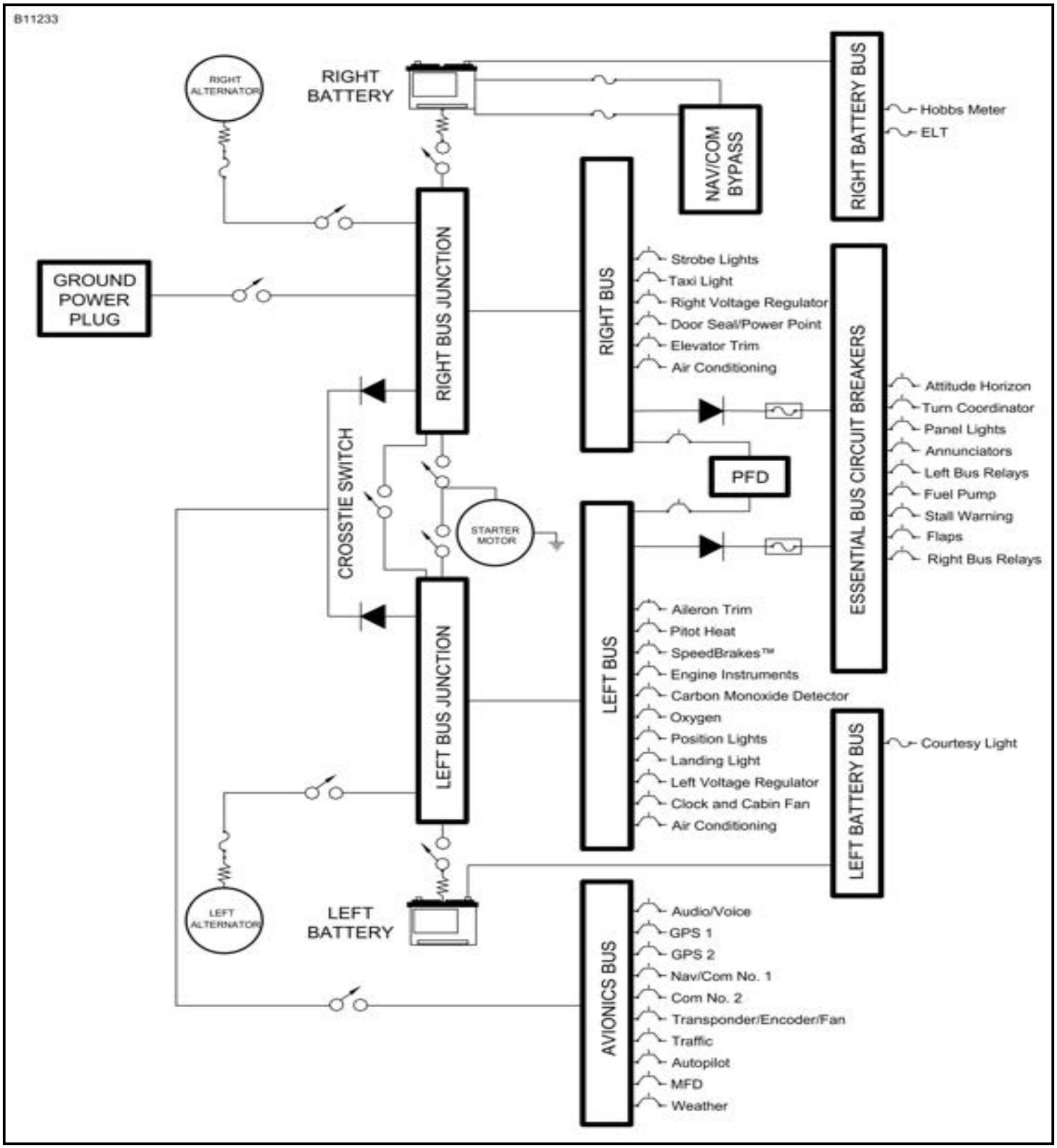
(4) Check the batteries’ relays for proper operation and connections.

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(5) Check the affected alternator relay for proper operation and connections.

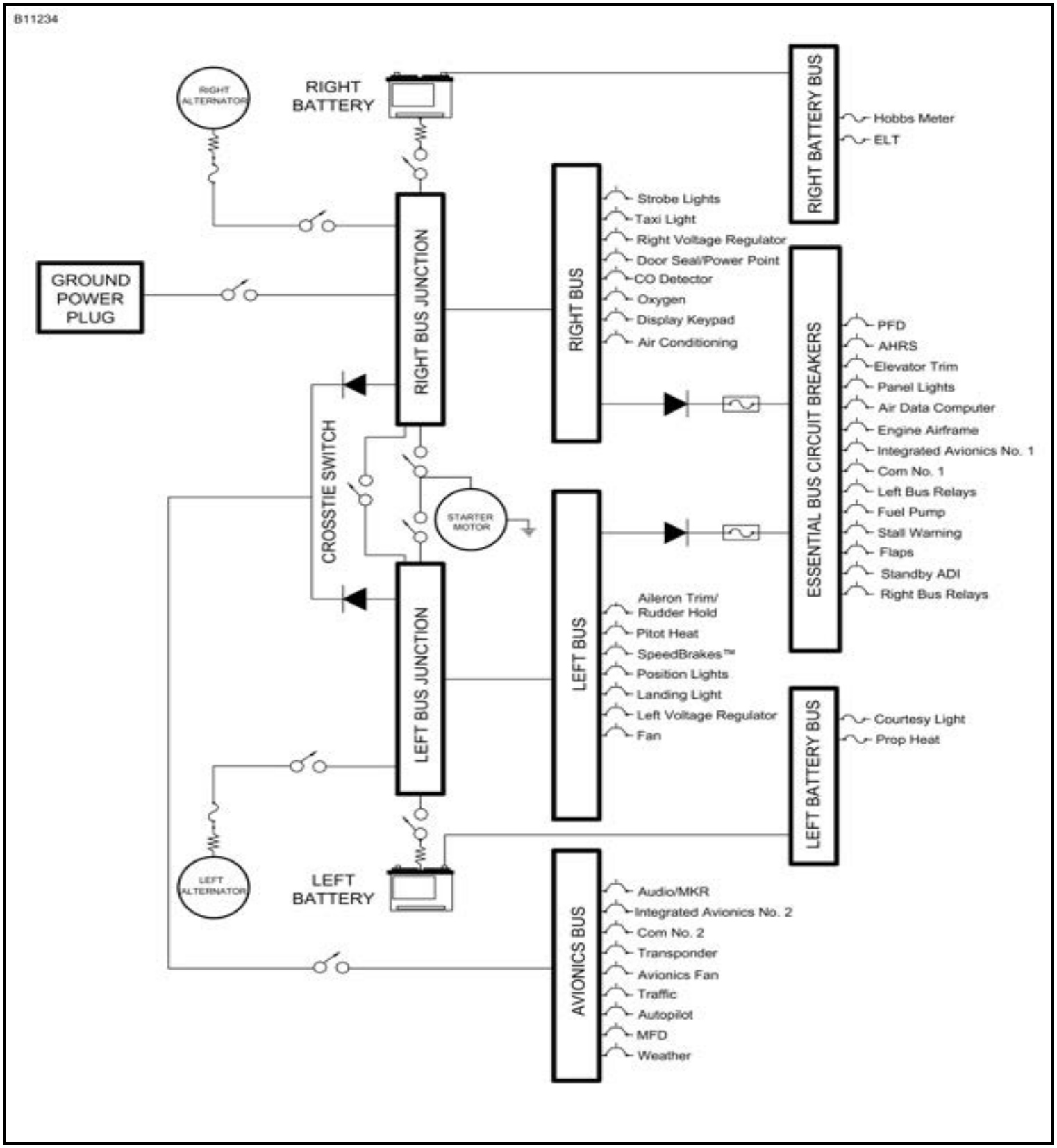
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Figure 1 : Sheet 1 : Electrical System (Avidyne Option)



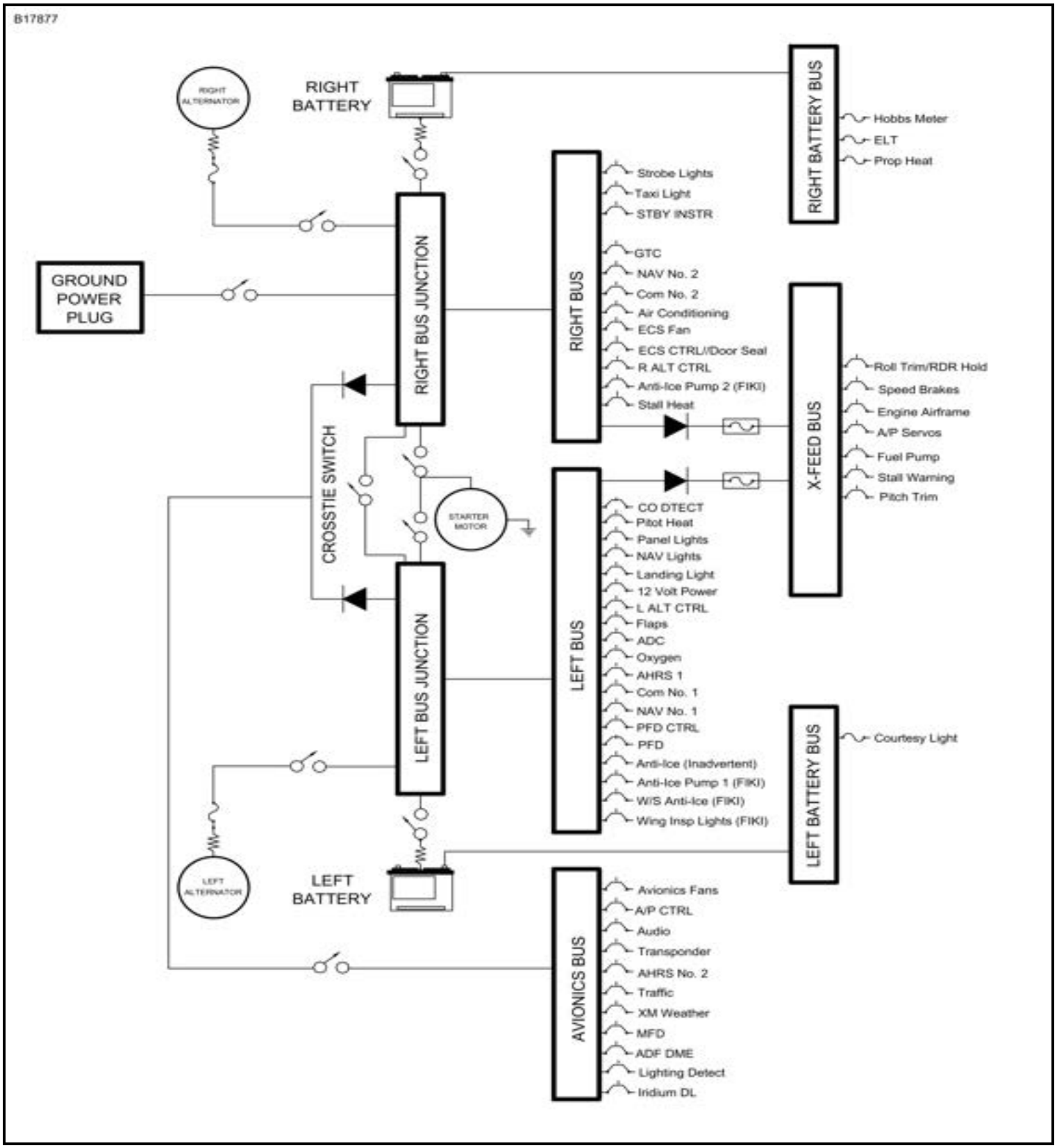
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Figure 2 : Sheet 1 : Electrical System (Garmin G1000 Option)



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Figure 3 : Sheet 1 : Electrical System (Garmin G2000 Installation)



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DC GENERATION - MAINTENANCE PRACTICES

1. DC Generation

A. The Cessna 400 electrical system requires two alternators for the operation of electrical equipment. The No. 1 alternator comes with the engine, is located at the front, right of the engine, and runs the right bus. The No. 2 alternator, the added alternator, is located on the front, left of the engine, and runs the left bus. A third alternator may be installed on the aircraft, as required, for optional equipment. This alternator is located at the right, rear of the engine. Some airplanes have the TWX670 Lightning Detect System option installed. The TWX670 alternator filter support bracket assembly uses two of the right alternator mounting studs for its installation. You must remove the filter support bracket assembly to remove the right alternator.

B. No. 1 (Right) Alternator (Airplanes with the TWX670 option) - Refer to Figure 201.

(1) No. 1 Alternator Removal (Airplanes with the TWX670 option)

(a) Disconnect both aircraft batteries.

(b) Disconnect each of the two ring terminals from the alternator.

(c) Remove the alternator filter assembly support bracket assembly as follows:

1 Disconnect the left and right battery ring terminals from their related filter.

2 Identify the electrical wires and their installation point on the terminal board, found on the top of the support bracket assembly.

3 Disconnect the electrical wiring from the terminal board.

4 Remove the screws that attach the terminal board to the support bracket.

5 Remove the terminal board.

6 Remove each of the applicable stud nuts, plain washers, and lock washers from the right alternator mounting studs that attach the support bracket assembly.

7 Remove the bolt on the top of the support bracket assembly that also has a cable clamp installed.

8 Remove the support bracket assembly from the airplane.

(d) Remove the plain washer, lock washer, and stud nut from the two remaining alternator mounting studs.

(e) Discard the lock washers removed from each of the four mounting studs.

(f) Remove the alternator from the mounting studs.

(g) Remove the gasket from the mounting studs.

(2) No. 1 Alternator Installation (Airplanes with the TWX670 option)

(a) Install the plain washers, new lock washers, new gasket, and plain nuts on the alternator mounting studs that are not used to install the support bracket assembly.

1 Tighten the stud nuts with your hand.

(b) Put the support bracket in its correct position on the alternator mounting studs.

(c) Install the plain washers, new lock washers, and plain nuts on the alternator mounting studs that are used to install the support bracket assembly.

1 Tighten the nuts with your hand.

(d) Install the bolt with the cable clamp that attaches the support bracket assembly to the top of the engine.

(e) Torque the alternator mounting stud nuts between 180 to 220 in-lbs.

(f) Connect each of the two cable connectors to the alternator.

(g) Connect the left and right battery cable connectors to their related alternator filter.

(h) Put the terminal board in its correct position on the sport bracket.

1 Install the screws that attach the terminal board to the support bracket.

(i) Identify and connect the electrical wiring to their correct installation point on the terminal board.

(j) Connect both aircraft batteries, start the aircraft, and check the alternator for proper operation.

C. No. 1 (Right) Alternator (Airplanes that do not have the TWX670 option) - Refer to Figure 201.

(1) No. 1 Alternator Removal (Airplanes that do not have the TWX670 option)

(a) Disconnect both aircraft batteries.

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(b) Disconnect the two connectors attached to the alternator.
(c) Remove the plain washer, lock washer, and nut from the four mounting studs.
(d) Discard the lock washers.
(e) Remove the alternator from the mounting studs.
(f) Remove the gasket from the mounting studs.

(2) No. 1 Alternator Installation (Airplanes that do not have the TWX670 option)
(a) Install a new gasket on the alternator.
(b) Install the alternator assembly on the mounting studs with four plain washers, four new lock washers, new gasket, and four plain nuts.
(c) Torque nuts 180 to 220 in-lbs.
(d) Connect two connectors to the alternator.
(e) Reconnect both aircraft batteries, start the aircraft, and check the alternator for proper operation.

(3) No. 1 Alternator Maintenance Procedures
(a) The torque required to slip a new elastomer coupling must be a minimum of 180 in-lbs. (15 ft-lbs.) torque measured after 45 degrees of revolution at a rate of 1 to 2 degrees per second. If you can hand-turn the gear relative to the black housing, it is below the requirements, and the coupling assembly must be replaced. Refer to Figure 202.
(b) Slippage must occur at the outside diameter of the elastomer with no damage to the elastomer.
(c) On couplings that have been in service for more than 25 hours, slippage torque must not be less than 140 in-lbs. (11.7 ft-lbs.) torque. If you can hand-turn the gear relative to the black housing, it is below the requirements, and the drive hub assembly must be replaced. (Refer to Figure 202.)

(4) Alternator Brushes - Every 1000 hours inspect the alternator brushes. The alternator must be replaced if the brushes are worn more than 75 percent.
(a) Disconnect both aircraft batteries.
(b) Disconnect the battery wires connected to the alternator.
(c) Remove the alternator.
(d) Remove the brush assembly per the latest revision of Teledyne Continental Motors, Inc. Form No. X30531-3.
(e) Inspect the brushes.
(f) Reinstall the brush assembly and reassemble the alternator per Teledyne Continental Motors, Inc. Form No. X30531-3.
(g) Install the alternator
(h) Connect the battery wires. Reconnect both aircraft batteries, start the aircraft, and check the alternator for proper operation.

D. No. 2 (Left) Alternator - Refer to Figure 203.

(1) No. 2 Alternator Removal
(a) Disconnect both aircraft batteries.
(b) Disconnect the wires attached to the alternator.
(c) Remove the two bolts (one bolt with Plane Power alternator), washers, and alternator tension plate attaching the alternator to the banana bracket.
(d) Remove the belt from the alternator pulley.
(e) Remove the self locking nut, bolt, washers, and pivot spacer connecting the alternator to the mounting bracket. Note the position of the washers for reinstallation.
(f) Remove the alternator.
(g) Retain all hardware for use in reinstallation.

(2) No. 2 Alternator Installation
(a) Attach the alternator to the mounting bracket. Ensure the washers are installed so that the edge of the belt is parallel to the face of the drive pulley by ±1.0 degree.

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(b) Install the alternator belt.

(c) Insert the alternator tension plate into the banana bracket and hand tighten the hardware attaching the assembly to the alternator.

(d) Connect a torque wrench to the alternator pulley retention nut. With an assistant holding the propeller, to prevent the engine crank shaft from rotating, tighten the alternator tension plate until the belt no longer slips on the alternator pulley and force applied to the torque wrench is 13 to 17 ft.-lbs. Do not over tighten the belt. Torque the alternator tension plate bolt(s) 12 to 15 ft.-lbs. (Kelly alternator) or 165 to 180 in-lbs (Plane Power alternator); ensure that a minimum of two threads extend past the Kelly alternator body, or the bolt does not bottom out in the Plane Power alternator (McMaster-Carr 90108A415 washers as required). Safety wire the Plane Power alternator tension plate bolt to the bracket.

NOTE: To help achieve required belt alignment, install banana bracket spacer (P/N LB71844007-1 or LB71844007-2). Use washers NAS1149F0616P, NAS1149F0632P or NAS1149F0663P or a combination of all three to achieve correct pulley alignment. Install washers between lower bracket and spacer.

(e) After the belt tension has been fully adjusted, torque the nut attaching the banana bracket to the propeller governor bracket and the nut attaching the alternator to the mounting bracket 15 to 20 ft.-lbs.

(f) Wiring Connections

1 Kelly Alternator

a Connect the wires to the alternator and torque the attachment nuts 10 to 12 in-lbs.

2 Plane Power Alternator

a Install the battery wire with the MS25171-2S terminal nipple onto the 6 mm output terminal and torque to 50 in-lbs.

b Install the ground wire to any of the three 5 mm studs on the rear of the alternator and torque to 35 in-lbs.

c Install the field wire with the MS25171-1S terminal nipple to the F1 terminal on the rear of the alternator and torque to 20 in-lbs.

NOTE: NOTE: The F2 terminal is to remain grounded with the ground strap UNLESS the aircraft voltage regulator is a type "A" regulator using a 2- wire field circuit. In this case, remove and discard the ground strap from the F2 terminal, connect wiring from the voltage regulator to the F1 and F2 terminals, and torque to 20 in-lbs.

d If the aircraft is equipped with an "alternator out light" circuit, connect that wire to the AUX terminal and torque to 20 in-lbs. Otherwise leave the AUX terminal open.

(g) Reconnect both aircraft batteries, start the aircraft, and check the alternator output for proper operation.

WARNING: Ensure that there is a minimum clearance of .50 inch between the upper cowling skin and the alternator case, fan, belt, and pulley after final assembly.

(3) Alternator Pulley

(a) Alternator Pulley Removal

1 Disconnect both aircraft batteries.

2 Disconnect the battery wires attached to the alternator.

3 Remove the bolts attaching the alternator tension plate to the banana bracket and remove the belt from the alternator pulley.

4 Remove the pulley retention nut and washer from the alternator drive shaft.

5 Remove the pulley.

(b) Alternator Pulley Installation

1 Kelly Alternator

a Installation of the pulley is the reverse of removal.

b Torque the pulley retention nut 35 to 45 ft-lbs.

2 Plane Power Alternator

a Apply Loctite 272 to the threads and shaft.

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b Install the pulley retention nut and washer, and torque to 55 ±4 ft-lbs.

3 Reinstall and tension the alternator belt as described in the Left Alternator Installation section above.

4 Connect the battery wires to the alternator.

5 Reconnect both aircraft batteries, start the aircraft, and check the alternator output for proper operation.

(4) Drive Pulley Removal and Installation

(a) Drive pulley removal and installation as described in Chapter 61.

E. Accessories Alternator (Refer to Figure 204.)

(1) Accessories Alternator Removal

(a) Disconnect both aircraft batteries

(b) Disconnect the wires attached to the alternator.

(c) Loosen the adjustment rod and remove the belt from the alternator pulley. The adjustment rod ends are threaded such that rotating the rod itself will loosen or tighten the ends equally.

(d) Remove the bolt and washer connecting the adjustment rod to the alternator.

(e) Remove the nut, bolt, and washer connecting the alternator to the mounting bracket. Remove the belt cutter.

(f) Retain all hardware for use in reinstallation.

(2) Accessories Alternator Installation

(a) Ensure the alternator cooling fan kit, spacer, and alternator drive pulley are installed on the alternator. Verify the nut is torqued 350 to 400 in-lbs.

(b) Place the alternator into the alternator bracket on the rear of the engine. Insert the bolt through the alternator pivot. Place the belt cutter, washer, and nut onto the pivot bolt. Do not tighten at this time.

(c) Align the belt onto drive pulley and alternator pulley.

(d) Ensuring that the adjustment rod ends are assembled into the rod equal distance, attach the adjustment rod to the alternator. Tighten the bolts. For the bolt attaching the alternator to the adjustment rod, protrusion of two bolt threads is not required and no visible female threads on the alternator are allowed; lockwire the bolt.

NOTE: Alternator drive and driven pulleys must be aligned by installing steel washers of various thickness forward or behind alternator pivot boss. Use washers NAS1149F0616P, NAS1149F0632P or NAS1149F0663P or a combination of all three to achieve correct pully alignment. Correct alignment is achieved when the large pulleys grooves are lined up with the alternators pulley grooves within +0.05 or -0.05 inch (+1.27 or -1.27 mm).

CAUTION: Do not use the alternator drive nut to check belt tension. Use Kelly Aerospace tool to check alternator belt breakaway torque.

(e) Tighten, or loosen, the adjustment rod until the breakaway (slip) torque at the alternator drive pulley is 440 to 480 in-lbs. on a new belt. After the belt has been run for a few hours the minimum belt tension should not be below 300 in-lbs. After final belt adjustment has been made the torque jam nuts on the adjustment rod to hold the proper adjustment.

(f) Connect the wires to the alternator.

(g) Reconnect both aircraft batteries, start the aircraft, and check the alternator output for proper operation.

(3) Alternator Pulley

(a) Alternator Pulley Removal

1 Disconnect the battery wires attached to the alternator.

2 Loosen the adjustment bracket and remove the belt from the alternator pulley.

3 Remove the pulley retention nut and washer from the alternator drive shaft.

4 Remove the pulley.

(b) Alternator Pulley Installation

1 Installation of the pulley is the reverse of removal.

2 Torque the pulley retention nut 350 to 400 in.-lbs.

3 Connect the battery wires to the alternator.

4 Reinstall and tension the alternator belt per the Left Alternator Installation instructions above.

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5 Reconnect both aircraft batteries, start the aircraft, and check the alternator output for proper operation.

(4) Drive Pulley Removal and Installation

(a) Remove the nut and lock washer from the starter adaptor drive shaft.

(b) Remove the alternator drive pulley.

(c) Installation is the reverse of removal. Torque the nut 700 to 720 in-lbs. Ensure a minimum clearance of 0.050 in. between the drive pulley and the end of the starter adapter stud.

F. Pulley Maintenance Procedures

(1) The pulleys should be free from large nicks, scratches and excessive warpage. If warping exceeds 0.050 in. the pulley must be replaced. No shimming is permissible. Small scratches and nicks are acceptable as long as they do not present a hazard to the belt. Blending and burnishing of small scratches and nicks is permissible.

(2) The drive pulley for the No. 2 alternator must be replaced if elongated screw holes are present. The maximum elongation permissible is 1/4 diameter where run out is within 0.050 in. maximum (0.025 in. either way).

(3) If there is excessive black, sooty residue on the pulleys or surrounding area, immediately remove the belt from service and assure that the pulleys are properly aligned.

(4) The belt must be replaced if there is any evidence of fraying or dryrot.

(5) Do not apply "belt treatments" spray or otherwise to the belt. Any spillage of ester based oils, turbine oils or MIL-H-5606 hydraulic fluid on the belt must be immediately removed with hot soapy water (household dishwashing soap or equivalent).

G. Alternator Brushes - Every 1000 hours inspect the alternator brushes. The Kelly alternator must be replaced if the brushes are worn more than 75 percent. Replace the Plane Power alternator brush assembly if the brushes extend less than 0.250 in. from the edge of the brush holder case.

(1) Disconnect the battery wires connected to the alternator.

(2) Remove the bolts attaching the alternator tension plate to the banana bracket and remove the belt from the alternator pulley.

(3) Loosen the self locking nut connecting the alternator to the mounting bracket and rotate the alternator upward allowing access to the alternator brush block.

(4) Remove the two brush block retainer screws and washers.

(5) Remove the brush block. The brushes are spring loaded and may fly out of the brush block.

(6) Inspect the brushes.

(7) Reinsert the brushes into the brush block. Depress the brushes, thus loading the springs, and insert a rod or wire through the hole above the brush seats to hold the brushes in place.

(8) Install the brush block into the alternator.

(9) Withdraw the rod or wire and listen for a "click" to indicate the brush has properly seated. There should be one click per brush.

(10) Repeat the following until the brushes seat properly:

(a) Reinsert the brushes into the brush block. Depress the brushes, thus loading the springs, and insert a rod or wire through the hole above the brush seats to hold the brushes in place.

(b) Install the brush block into the alternator.

(c) Withdraw the rod or wire and listen for a "click" to indicate the brush has properly seated. There should be one click per brush.

(11) Replace the retaining screws and washers and torque per alternator manufacturer's specifications.

(12) Connect the battery wires to the alternator.

(13) Reinstall and tension the alternator belt per the Left Alternator Installation instructions above.

2. DC Indicating Instruments

A. The following information applies to aircraft equipped with the Avidyne avionics option only. DC monitoring for aircraft equipped with the Garmin G1000 option is displayed on the MFD.

B. Dual Ammeter/Loadmeter Description of Operation - The ammeter is in the engine instrument panel in the center-left position. The ammeter is a dual presentation gauge that measures the condition of both batteries and alternators in terms of charging or discharging.The ammeter is selectable to show either the condition of the batteries or the alternators. When power is first

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applied, the indicator defaults to the "BATT" indicator. When the button on the lower left side of the instrument is pressed, the indicator switches to the "ALT" indicator. Pressing the button will toggle between each indication. When the battery mode is selected, "BATT" is illuminated by a white light. When the alternator mode is selected, "ALT" is illuminated by a white light. The range of the indications runs from +60 amps to -100 amps in 30 amp increments. While there is no placarded operating range, under most conditions the instrument should indicate a positive charging state. The master switches for the left and right bus systems must be on for the ammeter to operate.

(1) Removal of Dual Ammeter/Loadmeter

(a) Remove the engine instrument panel per instructions in Chapter 25.

(b) Unplug the cable going into the back of the ammeter.

(c) Unscrew the four screws surrounding the ammeter.

(2) Installation of Dual Ammeter/Loadmeter

(a) Put the ammeter in its slot, and screw in the four screws attaching the instrument to the engine instrument panel.

(b) Plug the cable into the back of the ammeter.

(c) Install the engine panel per instructions in Chapter 25.

C. Voltmeter Description of Operation (S/N 41002 to 41500) - The voltmeter is located in the top left corner of the flight instrument panel. This instrument contains three separate indications: a voltage reading, an outside air temperature provided by the top window, and a multi function timepiece in the lower window. The voltmeter displays the left system's bus voltage only, and under normal conditions should indicate about 14.2 volts. At 16 volts, the voltage regulator will take the left alternator off-line, and at approximately 8 volts, electrical equipment connected to the left bus will cease to operate or will operate erratically. The voltmeter is electrically powered and will not operate if the left master switch is turned off. Refer to Chapter 31 for a drawing of the voltmeter. This voltmeter is not present on aircraft S/N 41501 and On.

(1) Removal of Voltmeter

(a) Remove the glare shield, and remove the connector installed into the back of the unit.

(b) Unscrew the four screws surrounding the voltmeter, and remove it.

(c) Slide the unit out of the flight instrument panel.

(2) Installation of Voltmeter

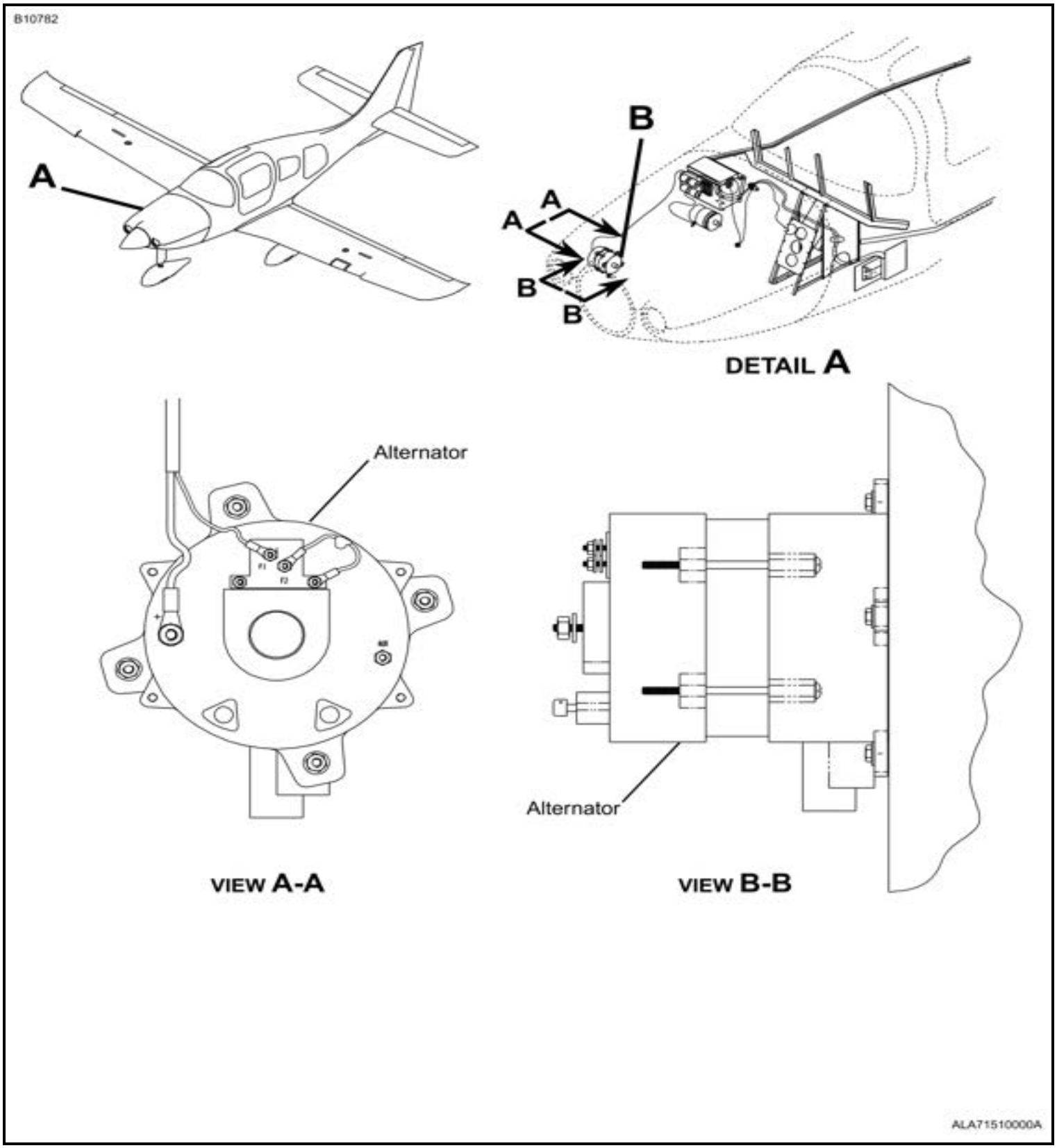
(a) Install the connector into the back of the voltmeter.

(b) Slide the unit into its slot in the flight instrument panel, and screw in the four screws.

(c) Install the glare shield.

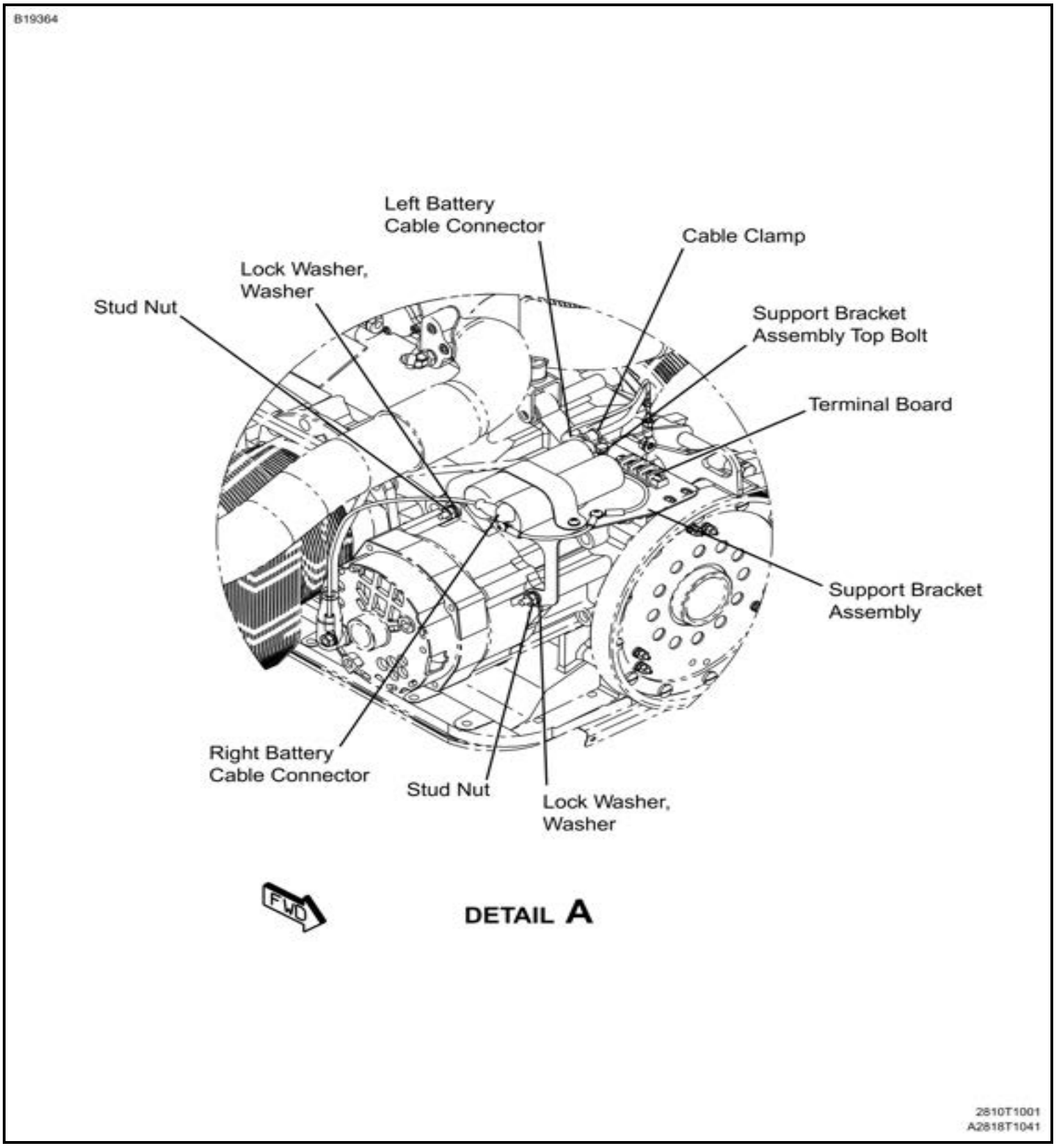
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Figure 201 : Sheet 1 : No. 1 (Right) Alternator



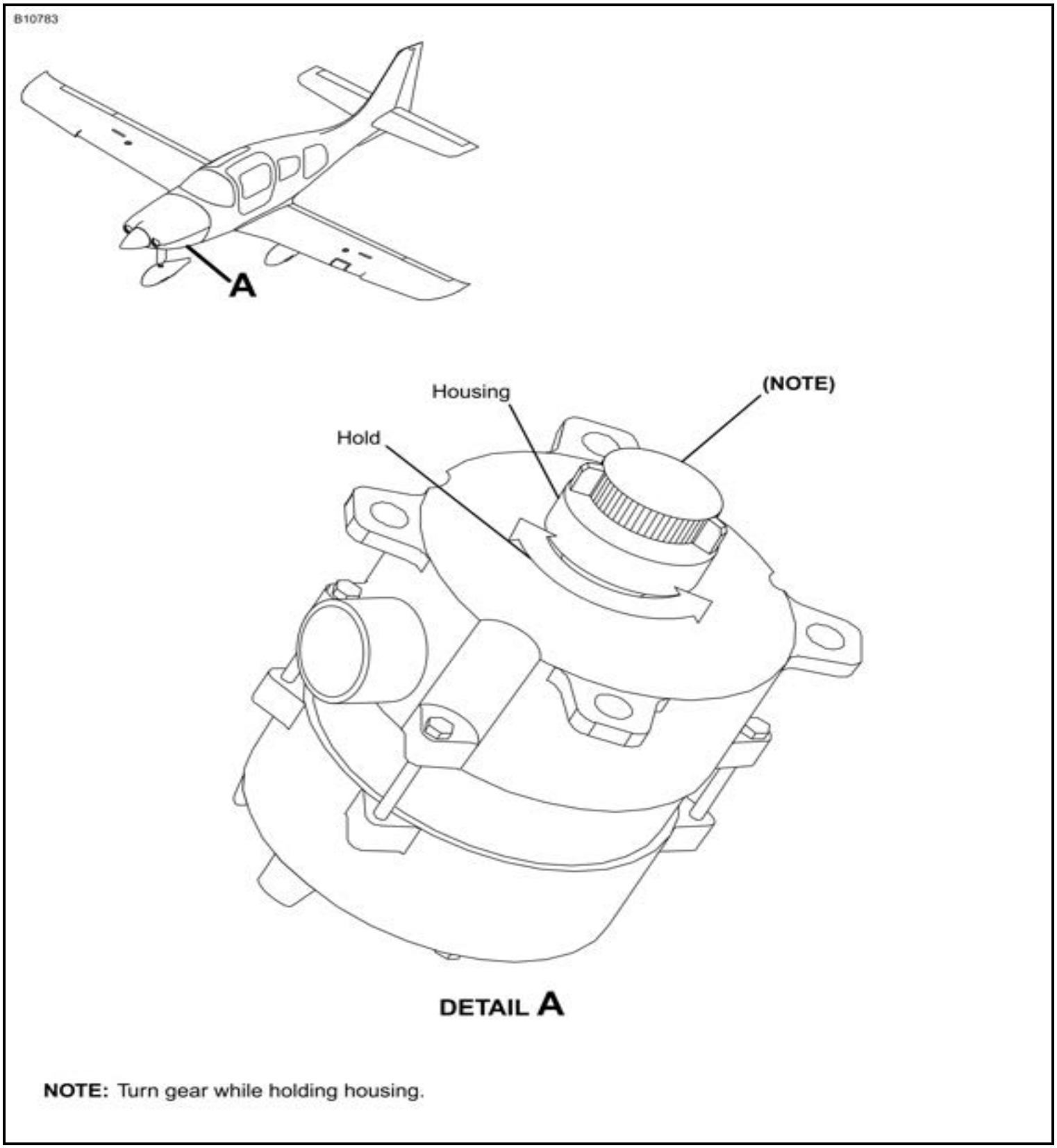
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Figure 201 : Sheet 2 : No. 1 (Right) Alternator



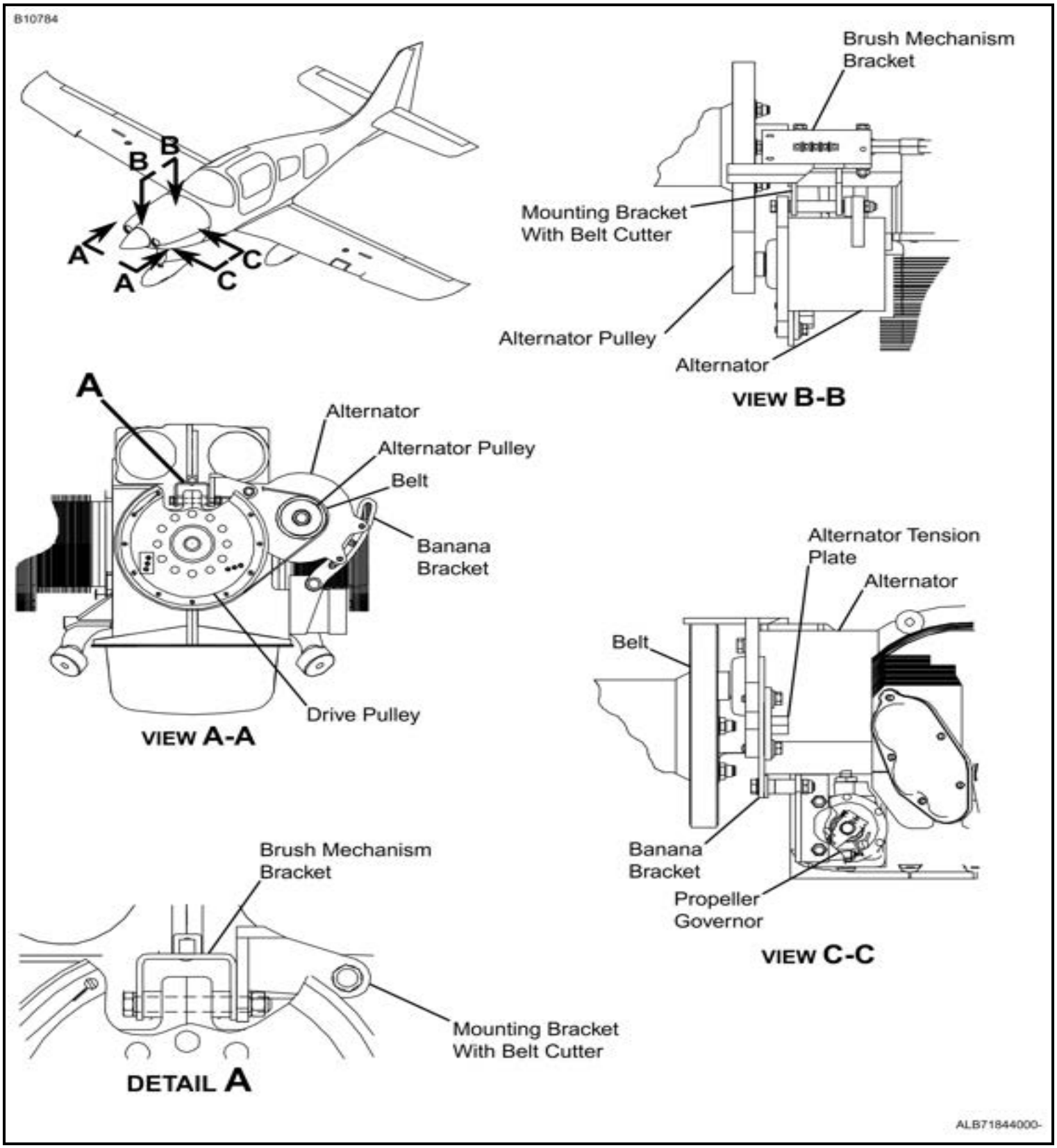
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Figure 202 : Sheet 1 : Alternator Drive Hub



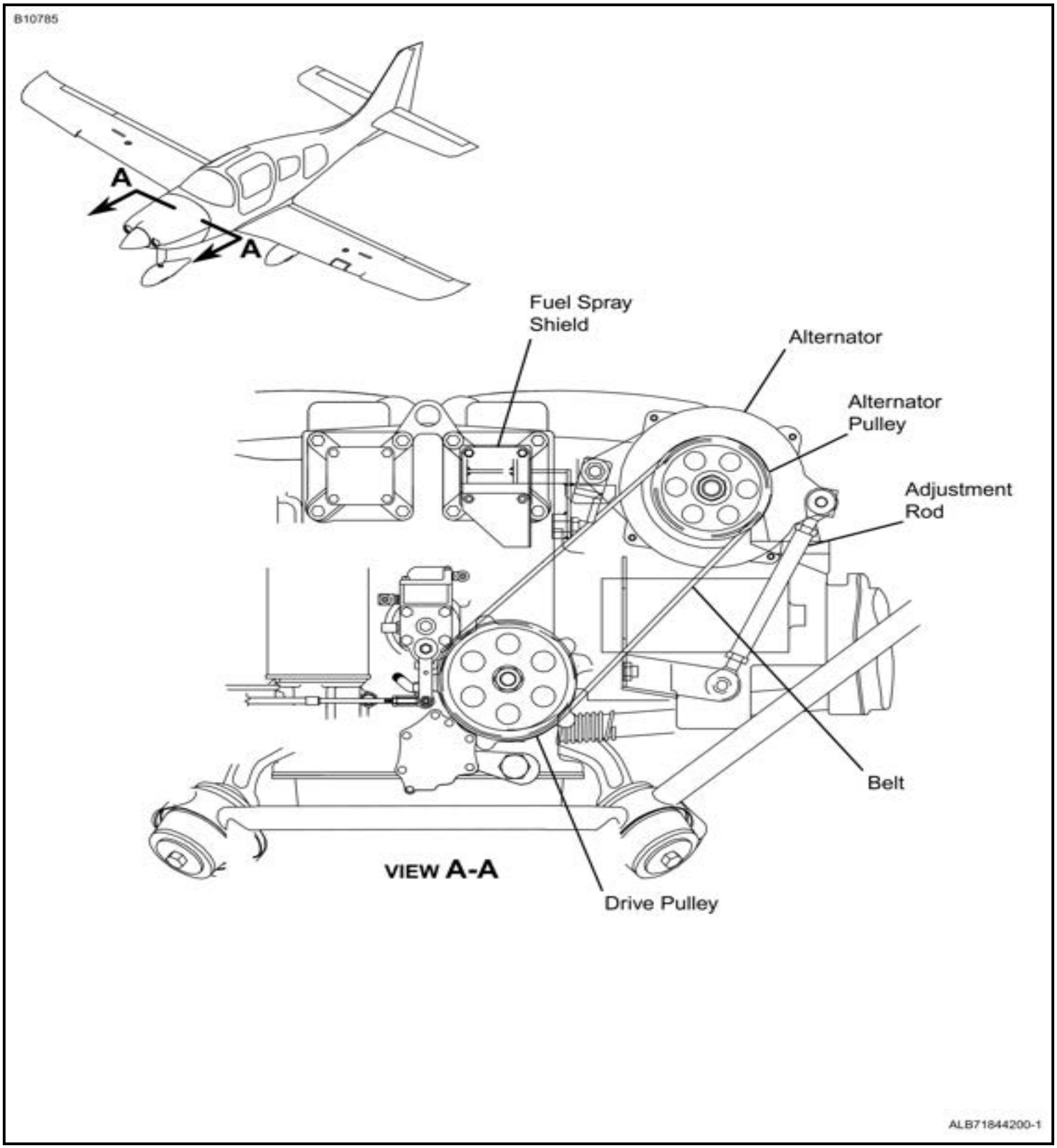
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Figure 203 : Sheet 1 : No. 2 (Left) Alternator



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Figure 204 : Sheet 1 : Accessories Alternator



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ALTERNATOR CONTROLLER (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation for the Model T240 left and right Alternator Controllers. The controllers are installed on the bottom of the avionics shelf, below the right side of the instrument panel. The controllers each supply several functions that include, a voltage regulator, an over-voltage protection relay, a low and over voltage sensors, and an alternator field-to-ground short protection circuit. There is a small difference on the location where the alternator controllers are installed on the airplane between Model T240 airplanes that can be configured for the FIKI option and those airplanes that can not.

B. For the maintenance procedures for the other electrical load distribution components and airplanes that have the Avidyne option or the Garmin G1000 option installed alternator controller (voltage regulator) refer to, Electrical Load Distribution - Maintenance Practices.

2. Alternator Controller Removal/Installation

A. Remove the Alternator Controller (ACU) (UI001) right, (UI002) left (UC305) (Refer to Figure 401).

NOTE: The removal procedures for the right and left alternator controllers are similar.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the L ALT CTRL or R ALT CTRL circuit breaker as applicable, found on the cockpit circuit breaker panel.

(5) Remove the screws that attach the ACU to the bottom of the avionics shelf.

(a) If necessary, remove the copilot seat to get access to the ACU. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Disconnect the electrical connectors as follows:

(a) For the right ACU, disconnect the electrical connector (J65) from electrical connector (P65)

(b) For the left ACU, disconnect the electrical connector (J64) from electrical connector (P64)

(7) Remove the ACU from the airplane.

B. Install the Alternator Controller (UI001) right, (UI002) left (UC305) (Refer to Figure 401).

(1) Put the ACU in its correct position below the avionics shelf.

(2) Install the screws that attach the ACU to the avionics shelf.

(3) Visually inspect the connectors to make sure there are no bent or damaged pins.

(a) Repair any damage.

(4) Connect the electrical connectors as follows:

(a) For the right ACU, connect the electrical connector (J65) to electrical connector (P65)

(b) For the left ACU, connect the electrical connector (J64) to electrical connector (P64)

(5) If removed, install the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Engage the L ALT CTRL or R ALT CTRL circuit breaker as applicable, found on the cockpit circuit breaker panel.

(7) Do a test of the Alternator Controller. Refer to Alternator Controller - Operational Test.

C. Alternator Controller Operational Test

NOTE: You must do the Alternator Controller Operational Test with the airplane outside and engine operating.

(1) Start the engine. Refer to the Model T240 POH.

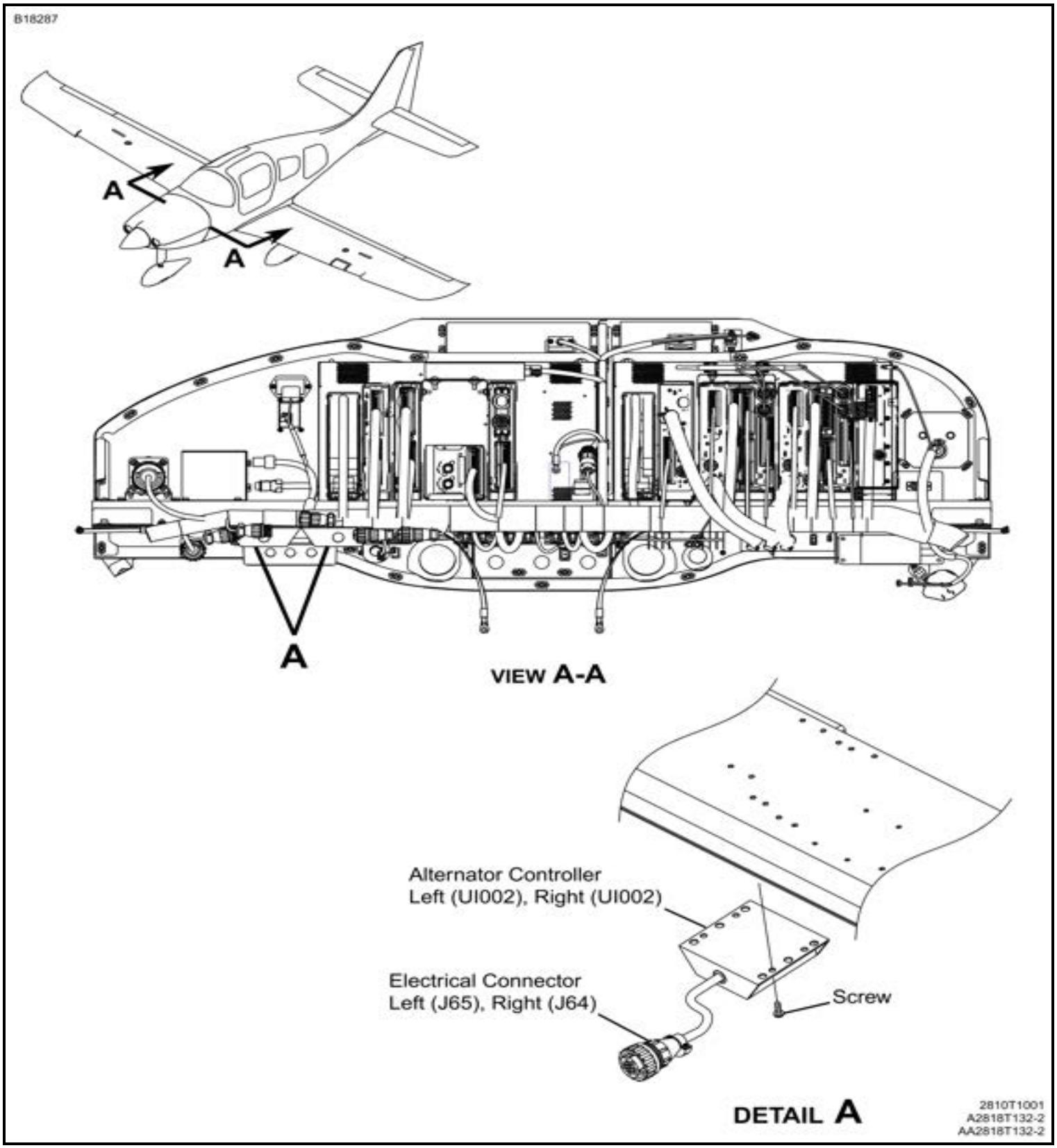
(2) Make sure the L ALT CTRL and R ALT CTRL found on the cockpit circuit breaker panel, are engaged.

(3) Set the master ALT/BATT switches (left SW01 and right SW02) to the ON position.

(4) When the Multifunctional Display is in normal mode, make sure that on the MFD, the left and right voltage reads approximately 28 Vdc.

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Figure 401 : Sheet 1 : Alternator Controller Installation



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BATTERY - MAINTENANCE PRACTICES

1. Normal Battery System (S/N 41002 to 41500)

A. **Applicability** - This procedure is based on the Concorde™ RG-1215 batteries. Refer to battery manufacturer's instructions for batteries other than the one specified.

B. **Removing Battery** - Refer to Figure 201.

CAUTION: To reduce the chance of personal injury and possible equipment damage, remove the negative wires before removing the positive wires.

(1) Remove the hat rack carpet per instructions in Chapter 25.

(2) Remove the screws securing the battery box access panel and remove the panel.

(3) Disconnect the negative connector, then the positive connector for each battery. Refer to detail of battery cable attachment in Figure 202.

(4) Remove the battery.

C. **Installing Battery**

(1) Place the battery in the battery box.

WARNING: Failure to reconnect the battery connectors properly could result in reversing the polarity of the battery.

CAUTION: Do not replace the sealed lead acid batteries with wet lead acid batteries

(2) Reconnect positive connector, then connect the negative connector for each battery. Refer to detail of battery cable attachment in Figure 202.

(3) Replace the battery box access panel and secure with screws.

(4) Replace the hat rack carpet per instructions in Chapter 25.

NOTE: Do not use any type of material or sealant to seal the open area formed where battery wiring passes through a grommet. This space must remain clear to ensure ventilation of the batteries.

D. **Test Procedure for Reserve or Emergency Capacity**

(1) Make sure the battery is charged.

(2) With the battery temperature above 59 °F, discharge the battery at the 80-85 percent test rate (refer to FAR 23.1309, 23.1351, 23.1353(h)).

(3) The minimum end point after one hour of the time established for the airframe essential power requirement of discharge must be 9 volts. If the battery fails to deliver the above rated ampere-hour capacity, it has reached its end of life. The battery is no longer considered airworthy and must be replaced.

(4) Allow the battery to cool to room temperature before recharging.

E. **Maintenance Procedures for Battery**

(1) The batteries must be boost charged every 90 days when in storage.

(2) Batteries that have not been recharged every 90 days are to be conditioned. First discharge the battery at the test rate. Recharge with a constant current charge at the C/10 rate (.10 of the C rate amperes) for eighteen hours or until the battery voltage reaches 2.5 volts per cell. Allow the battery to rest for at least one hour and re-test per the Test Procedure for Reserve or Emergency Capacity.

(3) The battery should be recharged when the open circuit voltage is below 2.08 volts per cell.

(4) The battery should be recharged at .50 of the C rate with a constant potential (CP) or constant voltage charger regulated at 2.35 volts per cell. The battery is charged when the charge current stabilizes for one hour.

(5) It is recommended the emergency capacity test procedure be performed after twelve months or six hundred hours of operation, whichever comes first. To ensure continued airworthiness, another emergency capacity test should be performed every twelve months or every two hundred hours.

2. Normal Battery System (S/N 41501 and On)

A. **Applicability** - This procedure is based on batteries approved by Cessna. Refer to battery manufacturer's instructions for batteries other than those approved by Cessna. A battery charging circuit has been added to the power grid on aircraft built mid 2007, or is available for retrofit (S/N 41563 and on), that will energize the battery relays and allow ground power charging of flat or discharged batteries without removing the battery(ies) from the aircraft. Batteries will start charging when the ground power

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unit is connected and the master and crosstie switches are ON. The master and crosstie switches must be turned off before removing the ground power plug; if the switches are on, the cables to the plug will stay energized. Flat or discharged batteries on aircraft without the battery charging circuit must be removed from the aircraft before charging. The circuit does not affect the operation of the master and crosstie switches.

NOTE: Batteries that are suspected to be unserviceable must be removed from the aircraft and serviced or replaced.

B. **Removing Battery** - Refer to Figure 203.

CAUTION: To reduce the chance of personal injury and possible equipment damage, remove the negative wires before removing the positive wires.

(1) Remove the hat rack carpet per instructions in Chapter 25.

(2) Remove the screws securing the battery box access panel and remove the panel.

(3) Disconnect the negative connector, then the positive connector for each battery. Refer to detail of battery cable attachment in Figure 204.

(4) Remove the battery.

C. Installing Battery

(1) Place the battery in the battery box.

WARNING: Failure to reconnect the battery connectors properly could result in reversing the polarity of the battery.

CAUTION: Do not replace the sealed lead acid batteries with wet lead acid batteries

(2) Reconnect positive connector, then connect the negative connector for each battery. Torque nut or bolt, as applicable, 36 to 40 in.-lbs. Refer to detail of battery cable attachment in Figure 204.

(3) Replace the battery box access panel and secure with screws.

(4) Replace the hat rack carpet per instructions in Chapter 25.

NOTE: Do not use any type of material or sealant to seal the open area formed where battery wiring passes through a grommet. This space must remain clear to ensure ventilation of the batteries.

D. **Battery Charging** - Use this procedure if the aircraft is not equipped with the battery charging circuit, is equipped with the circuit but ground power is not available, or the battery requires bench charging.

(1) Remove the battery from the aircraft.

(2) Using an AA Portable Power Corp. Smart Charger 24V 1.5 Amp. constant current/constant voltage 3 stage battery charger Model No. CH-LA2415, or equivalent, connect the charger to the battery ensuring correct polarity.

(3) Connect the charger to AC power. The following will result:

- The green LED will turn orange.
- When the LED is orange the battery is charging.

CAUTION: Ensure the battery does not overheat. The battery temperature, measured at the case surface, should not exceed 100 °F.

(4) When the LED turns green the battery is fully charged.

(5) The Smart Charger may be left on the battery after the battery is full charged.

(6) After the battery is fully charged, turn off the Smart Charger by removing the AC power plug.

(7) Disconnect the battery.

(8) Allow the battery to cool down to room temperature.

E. **Battery Discharge Test**

(1) Fully bench charge the battery.

(2) Prior to connecting to the battery, ensure that the load tester is off.

(3) The battery should be discharged at the 1 hour rate (check the battery amphour rating) to an end voltage of 1.67 volts per cell or 20 volts. Measure the time. The battery must achieve at least 80 percent of the rated time (or 48 minutes at the 1 hour rate). If the first discharge time is less than 48 minutes, repeat the cycle one more time.

(4) If the second discharge fails to deliver at least 48 minutes, the battery should be rejected. Return the battery to the vendor

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for servicing or replacement, if the warranty is still valid. If not, scrap the battery.

(5) Once the battery has passed all required inspections and after it is fully recharged, the battery is ready for installation.

F. **Battery Maintenance**

WARNING: The battery must be removed from the installation and serviced in a well ventilated designated area. During servicing, the battery will generate oxygen and hydrogen gases, which can be explosive under the right conditions.

(1) After initial installation, a capacity check of the battery is required at 800 hours, or 11 ±1 months, whichever comes first, with subsequent capacity checks performed every 400 hours or 6 ± 1 months.

(2) Visually inspect the battery for any signs of cracks, corrosion, unusual terminal pin wear or discoloration on the pins.

WARNING: These batteries contain sulfuric acid, which is highly corrosive and which can cause serious physical injury if it comes in contact with skin or if inhaled. It can also cause serious eye injury or blindness if it comes into contact with the eyes. Caution must be exercised to avoid damage to the exterior case which could allow the contents to escape or come in physical contact with external materials or personnel. If a battery case is found to be damaged, handle the battery with care and avoid contact with the skin. Inspect all areas adjacent to the battery for evidence of corrosion.

(3) Before reconnecting to the aircraft, ensure the terminals have not worn or become loose.

G. **Battery Reconditioning** - Delaying the recharge of even a partially discharged battery can make it resist the charger for some time. When put on a charger, the displays may indicate that the battery is fully charged, but when you attempt to use it again, it acts as if completely discharged. Recharging immediately after use will significantly increase the service life of the battery. It is recommended that the battery be recharged within 24 hours of being discharged, the amount of capacity regained with each cycle will eventually level out, and this stabilization is an accurate indication of the battery's useful capacity,

(1) Constant Current (CI) Charge the battery for 16-24 hours at the C/10 rate to ensure that it has gone through a complete charging cycle.

(2) Perform a discharge test.

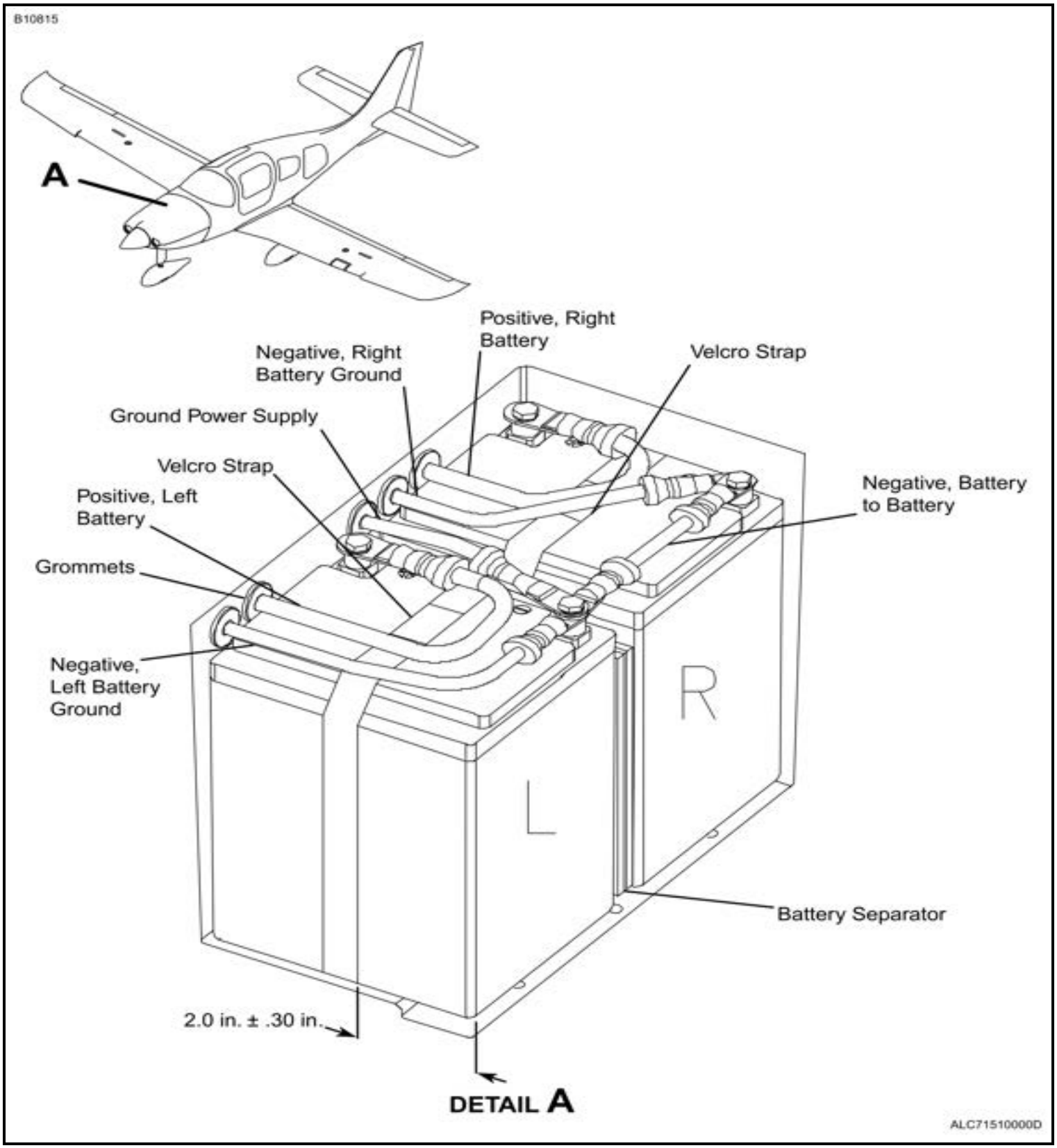
(3) If the battery fails the discharge test, CI condition charge the battery again for 16-24 hours.

(4) Perform a discharge test.

(5) Repeat this charge/discharge process up to 3 times. The capacity of the battery should increase appreciably with 1-3 CI conditioning charge/discharge cycles. If the battery still fails to measure up to capacity, return the battery to the vendor for replacement if the warranty is still valid. If not, scrap the battery.

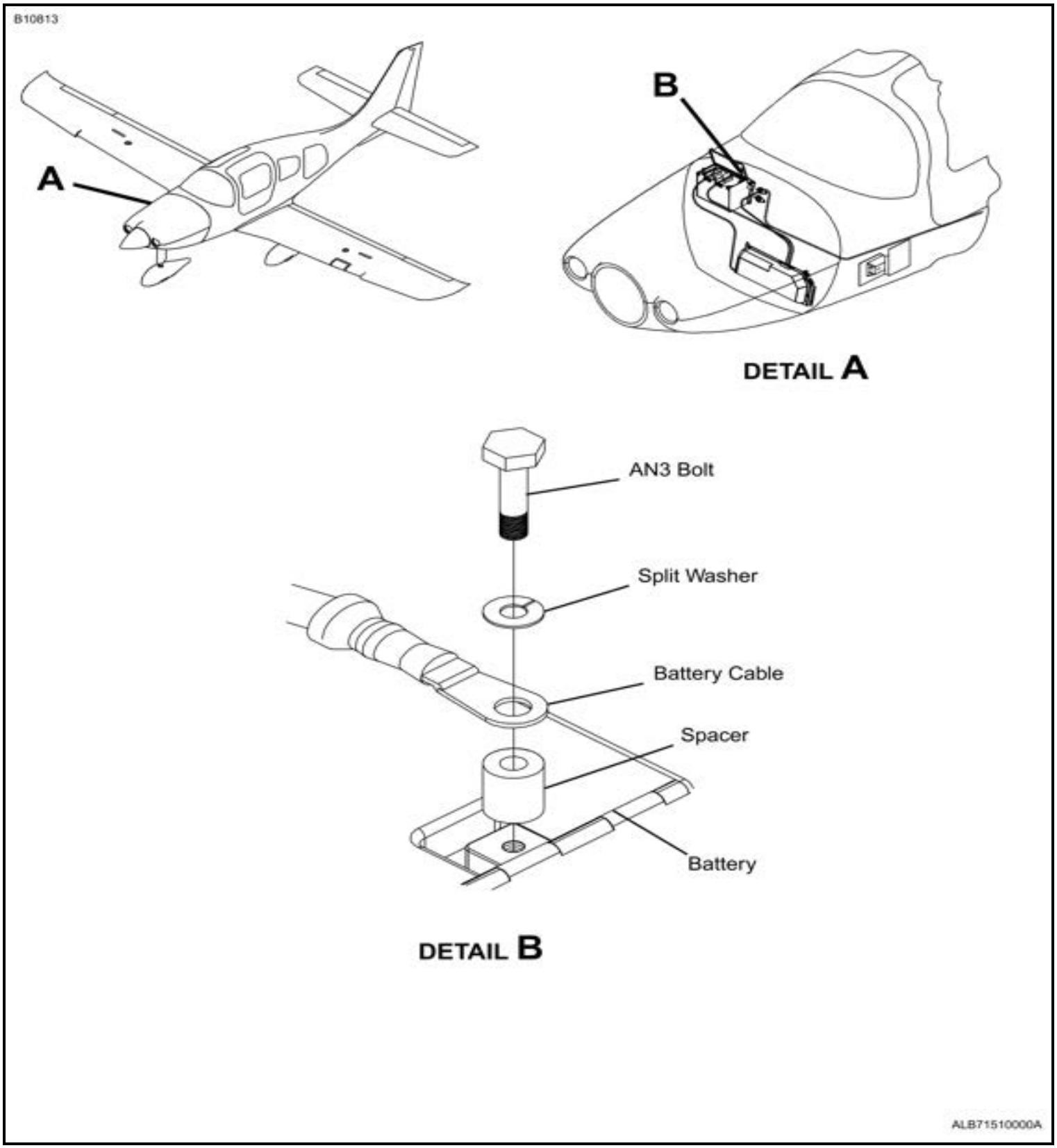
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Figure 201 : Sheet 1 : Battery Installation (S/N 41002 to 41500)



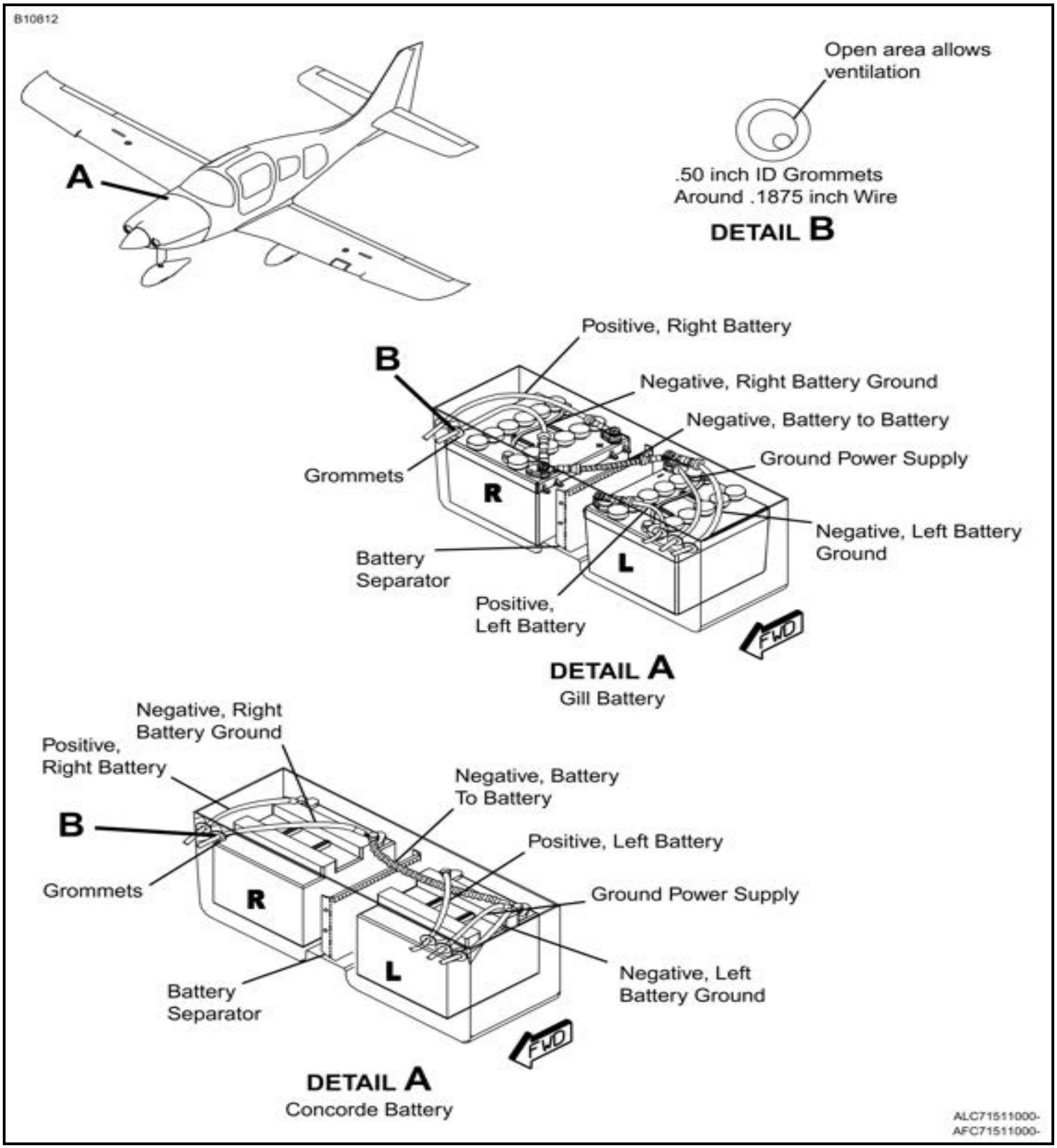
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Figure 202 : Sheet 1 : Battery Cable Attachment (S/N 41002 to 41500)



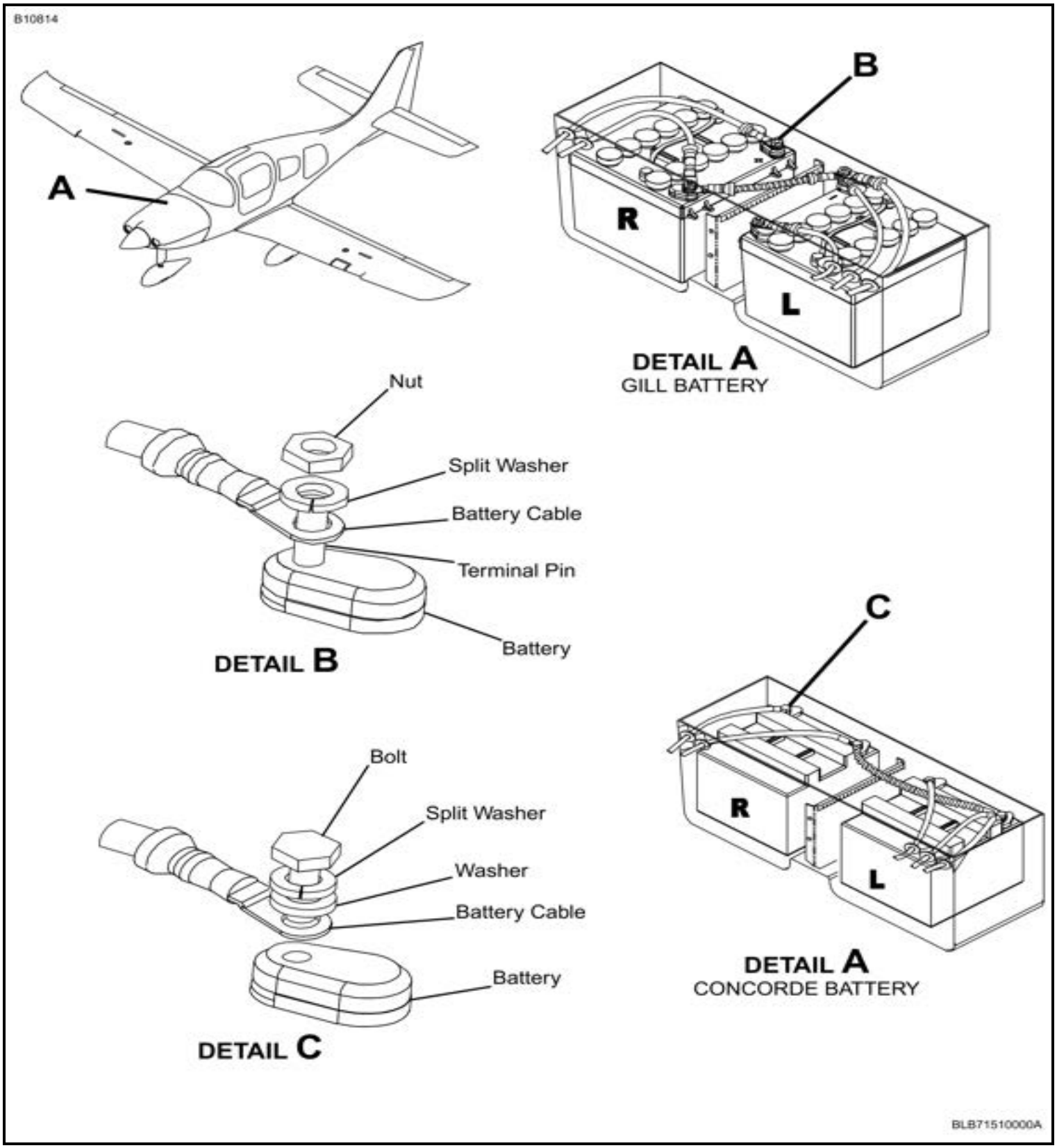
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Figure 203 : Sheet 1 : Battery Installation (S/N 41501 and on)



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Figure 204 : Sheet 1 : Battery Cable Attachments



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GROUND POWER - MAINTENANCE PRACTICES

1. Ground Power Plug

A. Removal and Replacement of the Ground Plug Relay

(1) Remove the cover from the power grid by removing the two 8-32 pan head screws and washers.
(2) Verify that the aircraft power is off.
(3) Remove the large power cables and mark the location.
(4) Remove the relay.
(5) Install a new transorb (surge suppressor) on the new relay.
(6) Move the reverse current diode to the new relay.
(7) Reassemble in the reverse order.

B. Removal and Replacement of the Power Plug Receptacle (S/N 41002 to 41500)

(1) Turn the aircraft master switch on and fully extend the flaps.
(2) Turn the aircraft master switch off and placard "Do Not Turn On Power".
(3) Remove the four 8-32 screws attaching the step cover, and remove the cover.
(4) Remove two 1/4 -28 screws, washers, and self-locking nuts attaching the receptacle. Refer to Figure 201.
(5) Pull the power plug receptacle down to gain access to the solder joint.
(6) Unsolder with a propane torch adjusted to low.
(7) Re-solder a new plug, and slide the boot over the solder joint.
(8) Reassemble in reverse order. Torque attachment screws 140 to 180 in.-lbs.

C. Removal and Replacement of the Power Plug Receptacle (S/N 41501 and On)

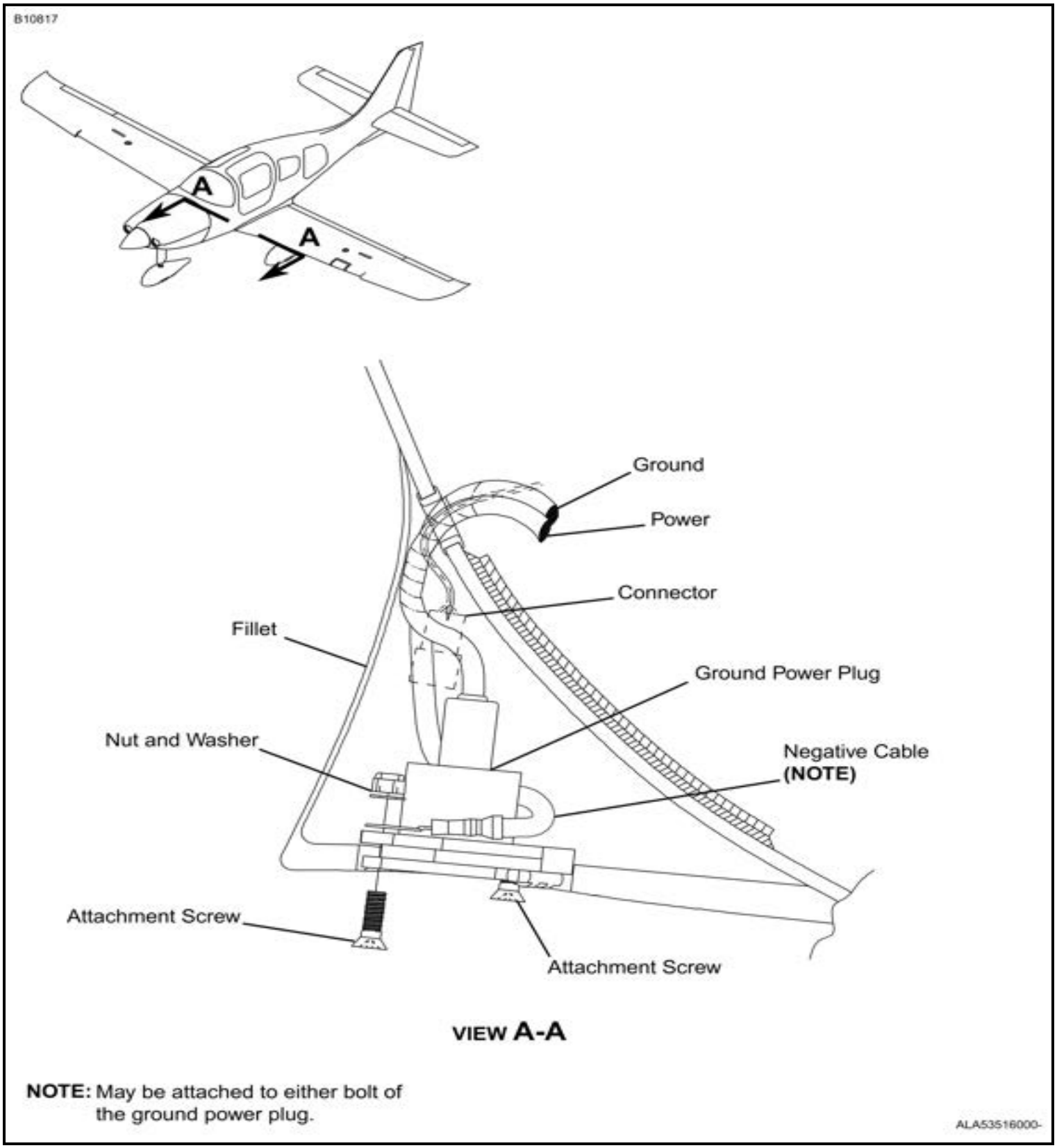
(1) Turn the aircraft master switch off and placard "Do Not Turn On Power".
(2) Remove the hat rack carpet per instructions in Chapter 25.
(3) Remove the screws securing the baggage bulkhead access panel and remove the panel.
(4) Remove the nuts, lock washers, and washers attaching the cables to the receptacle. Refer to Figure 202.
(5) Remove the four 6-32 pan head screws and washers, attaching the receptacle. Refer to Figure 202. Note the location of the washers for reinstallation. The purpose of the washers is to align the receptacle outer door flush with the fuselage.
(6) Reassemble in reverse order. Torque 6-32 screws 10 in.-lbs.

D. Ground Power Plug Troubleshooting

(1) If the ground power plug relay will not engage:
    (a) The reverse current diode mounted on the relay may be open or have loose connections. Replace the relay or tighten the connections.
    (b) The transorb (surge suppressor) is shorted. Replace transorb.
    (c) Ground at the power plug or at the engine block is disconnected or loose. Reconnect or tighten the ground.
    (d) Contamination in the ground power plug does not allow the connector to go in all the way. Replace plug.
    (e) Ground Power relay windings are open. Replace relay.
(2) Ground power relay will not disengage.
    (a) Relay contacts are welded together internally. Replace relay.
    (b) BATT switches are turned on. Turn off BATT switches.

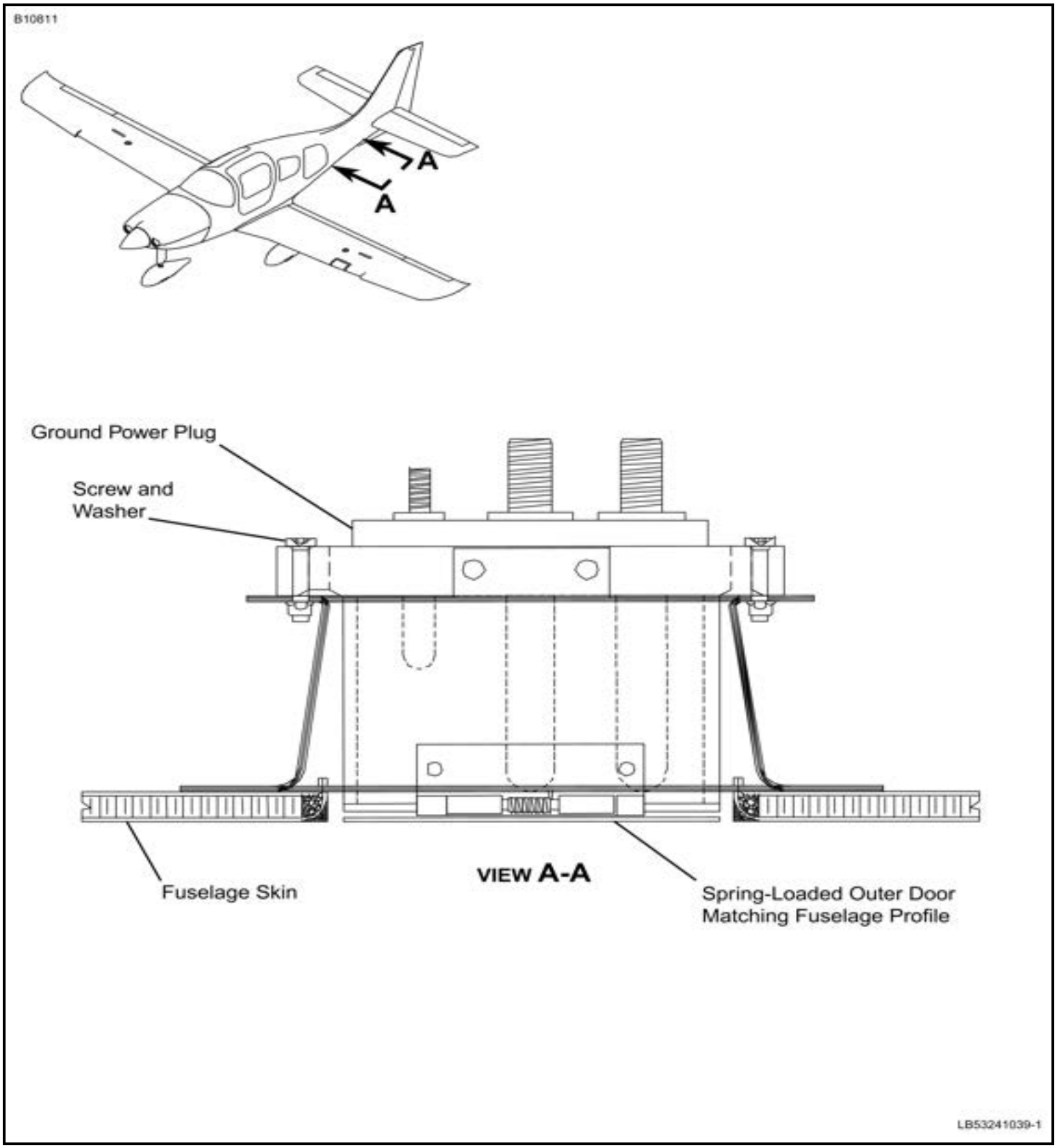
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Figure 201 : Sheet 1 : Ground Power Plug Installation (S/N 41002 to 41500)



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Figure 202 : Sheet 1 : Ground Power Plug Installation (S/N 41501 and On)



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ELECTRICAL LOAD DISTRIBUTION - MAINTENANCE PRACTICES

1. General

A. The voltage controllers (alternator controllers) each supply several functions that include, a voltage regulator, an over-voltage protection relay, a low and over voltage sensors, and an alternator field-to-ground short protection circuit.

B. On airplanes with the Avidyne option installed, the voltage regulators are attached to each other and a metal plate connected to the inside firewall on the copilot's side. On airplanes with the Garmin G1000 option installed, the voltage regulators are installed below the right side of the instrument panel. For the Model T240/G2000 installation removal and installation maintenance procedures refer to, Alternator Controller (T240) - Removal/Installation.

2. Electrical Load Distribution

A. **Removal of Voltage Regulator**

(1) To access the voltage regulator, remove the glare shield.

(2) Unhook the wires connected to the voltage regulators.

(3) Remove the three pan-head screws attaching the top voltage regulator to the bottom voltage regulator, and remove the top voltage regulator.

(4) Remove the three standoffs securing the bottom voltage regulator to the metal plate, and remove the voltage regulator from its mounting. Refer to Figure 201 and Figure 202.

B. **Installation of Voltage Regulator**

(1) Place the bottom voltage regulator in its mounting.

(2) Install the three standoffs to secure the bottom voltage regulator to the plate. The standoffs must protrude through the nutplate flush or better.

(3) Place the top voltage regulator over the standoffs and install the three pan-head screws and six washers.

(4) Reconnect the wires to the voltage regulator.

C. **Removal of Rocker and Master Switch Panels** - Steps for the removal of the rocker and master switch panels can be found in Chapter 25.

D. **Installation of Rocker and Master Switch Panels** - Steps for the installation of the rocker and master switch panels can be found in Chapter 25.

3. Circuit Breaker Panel

A. Steps for the removal and installation of the circuit breaker panel can be found in Chapter 25.

4. Power Grid

A. The power grid is locate directly aft of the avionics shelf under the baggage compartment floor. To gain access to the power grid remove the carpet and access panel from the baggage compartment floor. The power grid does not require any service or maintenance. However, it should be visually inspected every 1000 hours for frayed or chafed wiring and for evidence of corrosion and/or overheating,

5. Electric A/C Interlock Assembly

A. The Electric A/C Interlock Assembly, located under the left side of the baggage shelf, is a component of the air conditioning system (ACCS); when the system has the optional electrically driven compressor. Refer to Figure 203 or Figure 204. Refer to Chapter 21 for description of the ACCS.

(1) **Removal of the Electric A/C Interlock Assembly**

(a) Remove the baggage shelf carpet per instructions in Section 25-301-00, Interior Panels.

(b) Remove the Elevator Interconnect Access Panel and/or the Electronics Bay Access Panel per instructions in Section 25-31-00, Access Panels.

(c) Disconnect all electrical connections to the interlock assembly.

(d) Disconnect the .75 inch interlock cooling SCAT tube attached to the interlock assembly.

(e) Remove 4 screws and washers attaching the interlock assembly bracket to the shelf.

(f) Remove the interlock assembly.

(2) **Installation of the Electric A/C Interlock Assembly** - Installation is the reverse of removal.

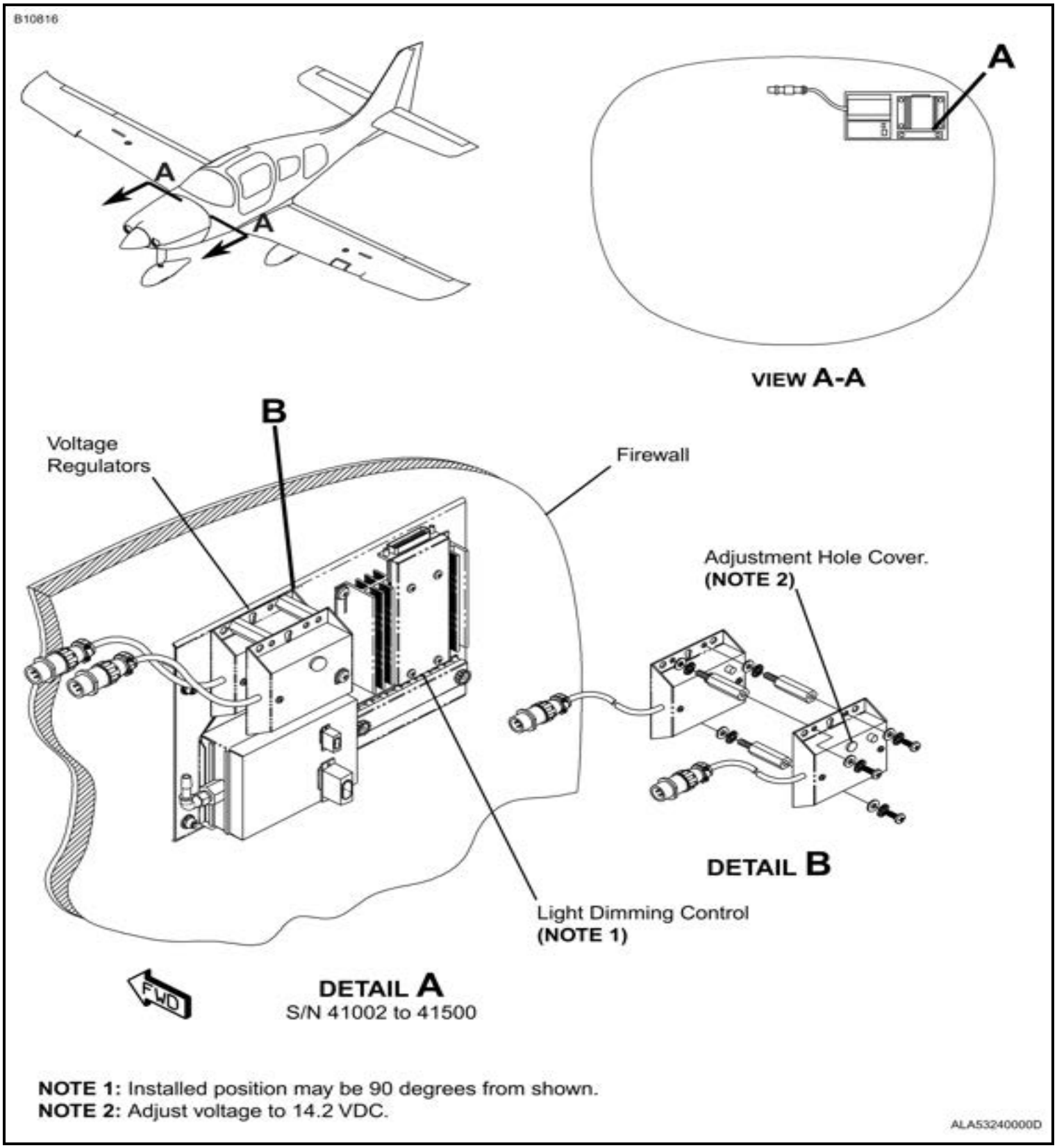
(3) **Maintenance of the Electric A/C Interlock Assembly** - The Electric A/C Interlock Assembly does not require

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maintenance.

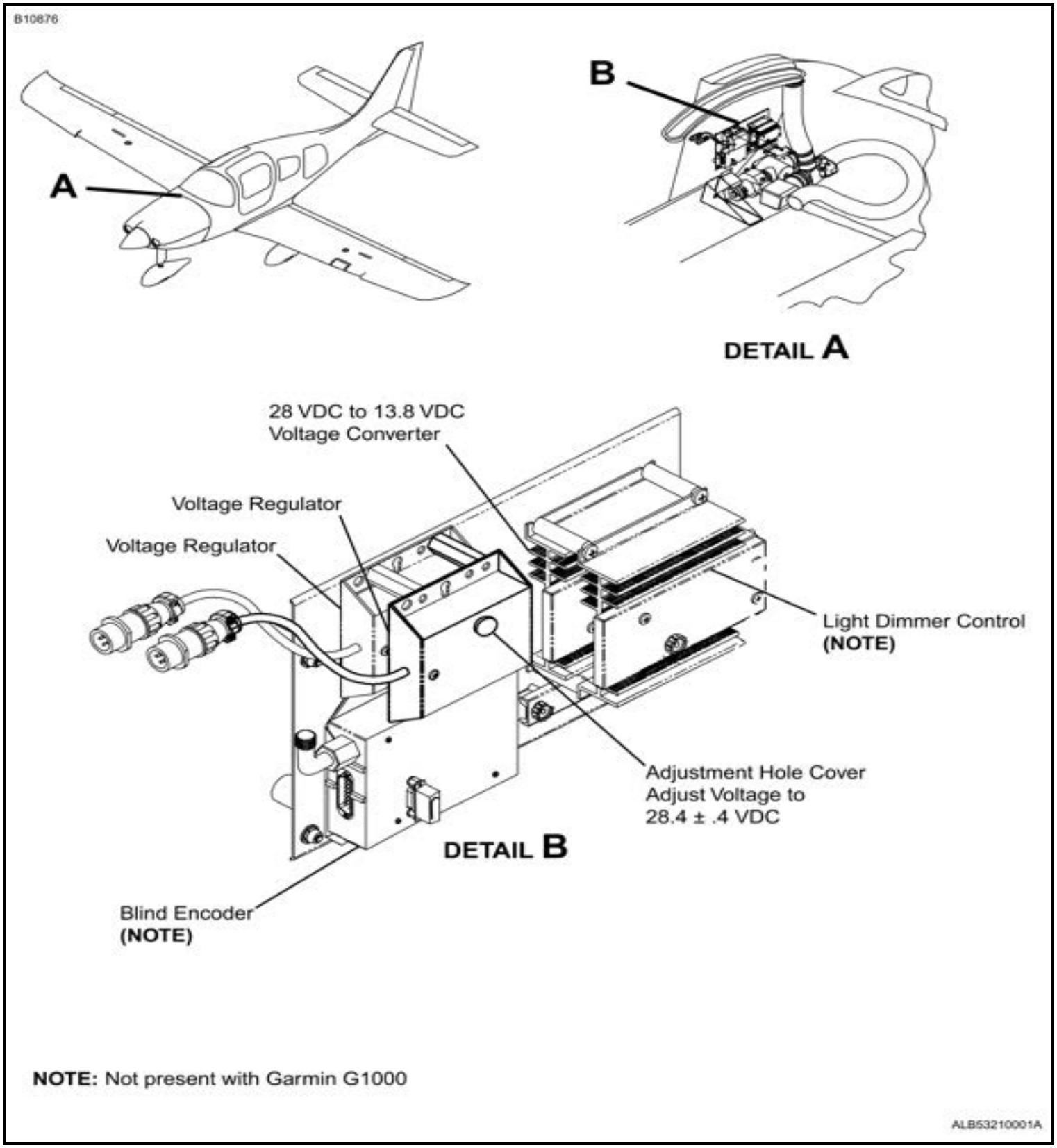
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Figure 201 : Sheet 1 : Voltage Regulator Installation (S/N 41002 to 41500)



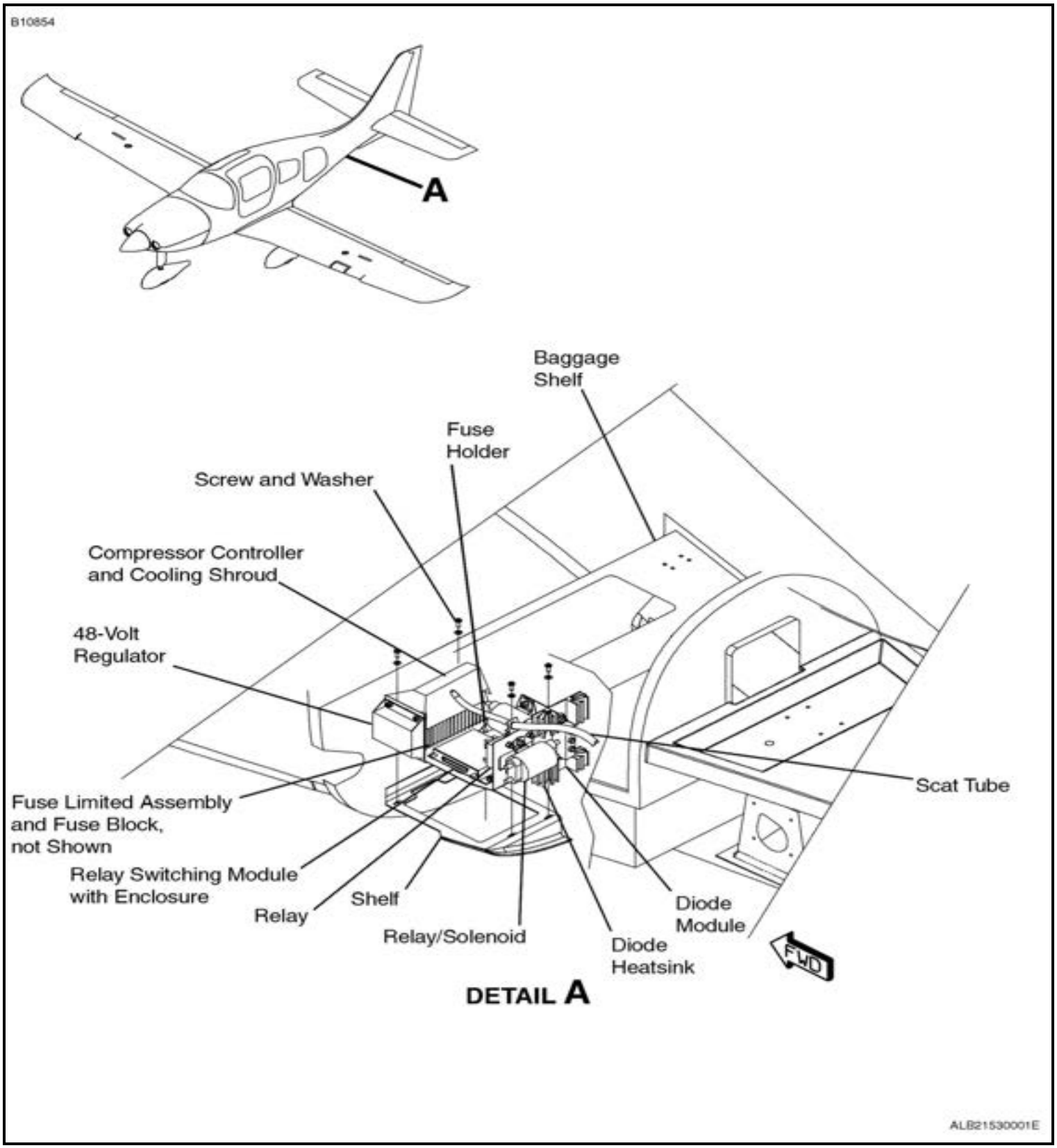
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Figure 202 : Sheet 1 : Voltage Regulator Installation (S/N 41501 and On)



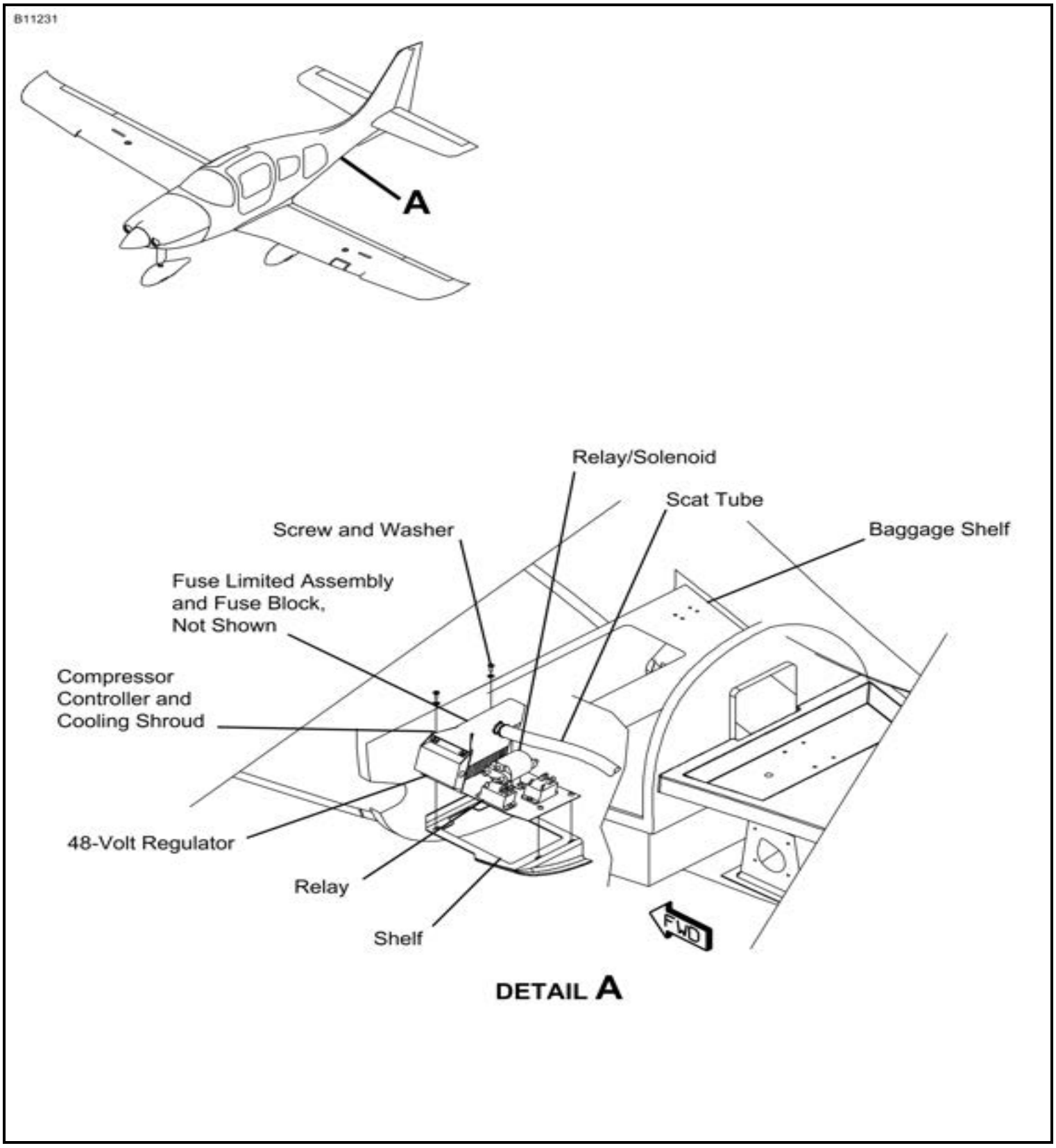
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Figure 203 : Sheet 1 : Electric A/C Interlock Assembly, 28 V



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Figure 204 : Sheet 1 : Electric A/C Interlock Assembly, 14 V



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VOLTAGE CONVERTOR (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation for the Model T240 Voltage Convertor. The convertor is installed on the bottom of the avionics shelf, below the left side of the instrument panel. The convertor decreases 28 Vdc to 14 Vdc. The 14 Vdc is supplied to the Aux Relay Assembly (UI009) that operates with the environmental control system.

2. Voltage Convertor Removal/Installation

A. Remove the Voltage Convertor (UF903) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the 12V PWR circuit breaker, found on the cockpit circuit breaker panel.

(5) Disconnect the electrical connector (P68) from the convertor's electrical connector (P401).

(6) Remove the screws that attach the convertor to the bottom of the avionics shelf.

(a) If necessary, remove the pilot's seat to get access to the trim adapter. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(7) Remove the convertor from the airplane.

B. Install the Voltage Convertor (UF903) (Refer to Figure 401).

(1) Put the convertor in its correct position below the avionics shelf.

(2) Install the screws that attach the convertor to the avionics shelf.

(3) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(4) Connect the electrical connector (P68) to the convertor's electrical connector (P401).

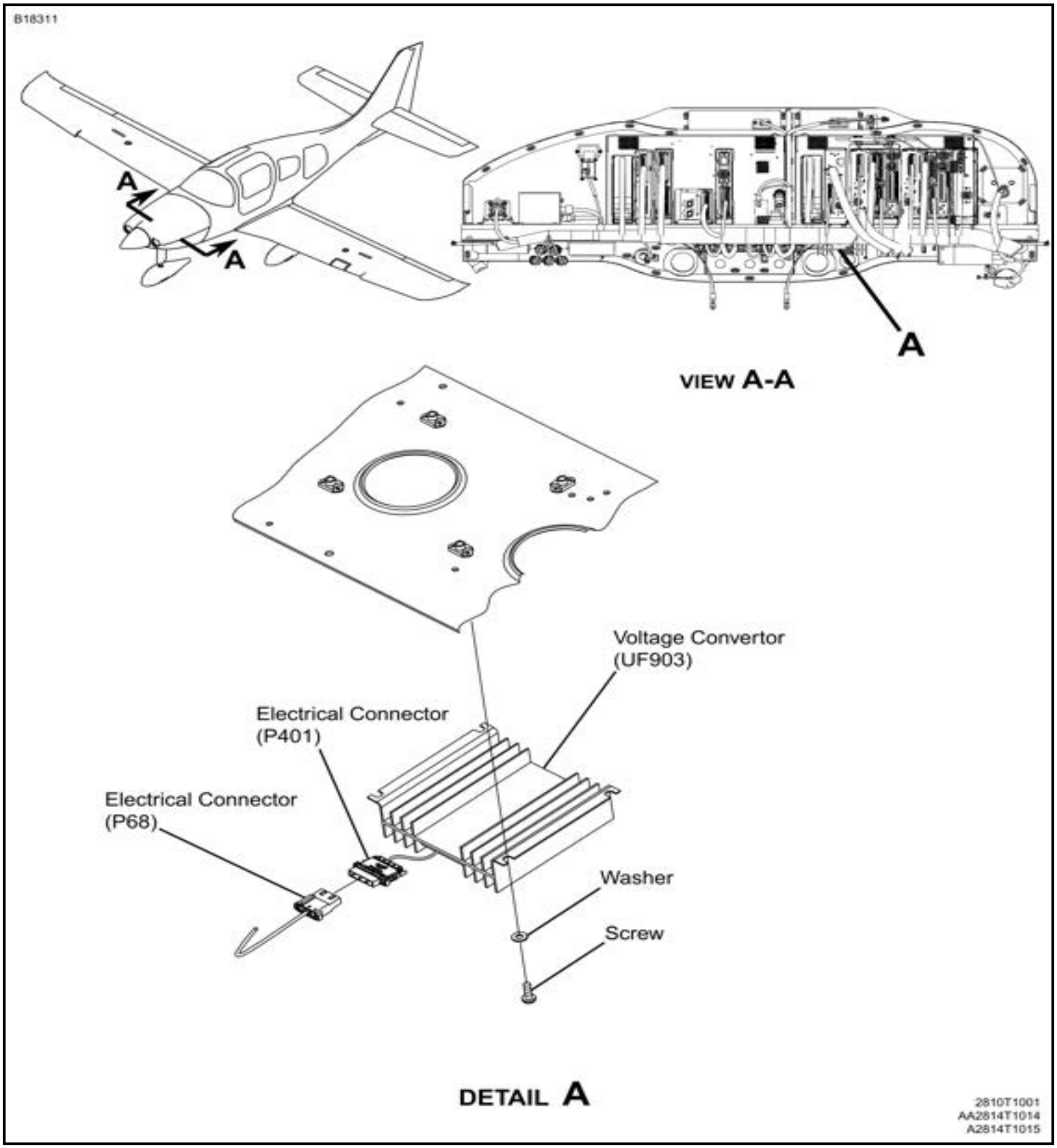
(5) If removed, install the pilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Engage the 12V PWR circuit breaker, found on the cockpit circuit breaker panel.

(7) Do a test of the environmental control system as necessary. Refer to Chapter 21, Environmental Control System Components- Adjustment/Test, Rigging and Adjustment.

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Figure 401 : Sheet 1 : Voltage Convertor Installation



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POWER RELAY PANEL - MAINTENANCE PRACTICES

1. General

A. This section gives the removal and installation procedures for the components on the power relay panel. The power relay panel is found in the aft avionics bay below the baggage compartment floor.

B. Use the Model T240 Wiring Diagram Manual with the procedures in this section.

2. Preliminary Procedures

A. Do the component removal preliminary procedures.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disconnect the battery connections. Refer to the applicable steps in Battery - Maintenance Practices.

(a) Attach maintenance warning tags to the battery and external power receptacle that have "DO NOT CONNECT ELECTRICAL POWER - MAINTENANCE IN PROGRESS" written on them.

(5) Get access to the relay power panel through the Aft Cabin Floor Access Panel in the baggage compartment floor.

(a) Remove the access panel. Refer to Chapter 25, Access Panels - Maintenance Practices.

3. Relay Removal/Installation

NOTE: The removal procedures for the relays is typical.

A. Remove the relay from the power relay panel (refer to Figure 201).

(1) Do the component removal Preliminary Procedures in this section.

(2) Remove the nuts and washers that attach the wires to the relay.

(a) Identify and mark the wires.

(b) Remove the wires from the relay.

(3) If the relay is to be replaced remove the diode assembly.

(a) Make a note of the diode orientation.

(b) Remove the diode assembly.

(c) Visually examine the diode for any damage, broken leads, or obvious signs of failure.

1 Replace the diode if it is not serviceable.

(d) Keep the diode assembly for installation.

(4) Remove the nuts that attach the strap(s) to the relay.

(a) Remove the strap(s) from the relay.

(5) Remove the screws and washers that attach the relay to the panel.

(6) Remove the relay from the airplane.

B. Install the relay on the power relay panel (refer to Figure 201).

NOTE: The installation procedures for the relays is typical.

(1) Put the relay in its correct position on the panel.

(a) Install the screws and washers that attach the relay to the panel.

(2) If necessary install the diode assembly on the relay.

(a) Put the diode assembly in position on the relay.

1 Make sure that the diode is in the correct orientation.

(3) Identify and put the wires in position on the relay.

(a) Install the nuts and washers that attach the wires to the relay.

(4) Put the strap(s) in position on the relay.

(a) Install the nuts that attach the strap(s) to the relay.

(5) Connect the battery connections. Refer to the applicable steps in Battery - Maintenance Practices.

(6) Do an operational test on the system related to replaced component. Refer to the applicable section of this manual.

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(7) If no more procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane in this section.

4. Block Fuse Removal/Installation

NOTE: The removal procedures for the block fuses is typical.

A. Remove the block fuse from the power relay panel (refer to Figure 201).

(1) Do the component removal Preliminary Procedures in this section.

(2) Remove the nuts and washers that attach the wires to the block fuse.

(a) Identify and mark the wires.

(b) Remove the wires from the block fuse.

(3) Remove the nuts that attach the strap(s) to the block fuse.

(a) Remove the strap(s) from the block fuse.

(4) Remove the nuts and washers that attach the block fuse to the fuse block (mounting block).

(5) Remove the block fuse from the airplane.

B. Install the block fuse on the power relay panel (refer to Figure 201).

NOTE: The installation procedures for the block fuse is typical.

(1) Put the block fuse in its correct position on the fuse block (mounting block).

(a) Install the nuts and washers that attach the block fuse to the fuse block (mounting block).

(2) Identify and put the wires in position on the block fuse.

(a) Install the nuts and washers that attach the wires to the block fuse.

(3) Put the strap(s) in position on the block fuse.

(a) Install the nuts that attach the strap(s) to the block fuse.

(4) Connect the battery connections. Refer to the applicable steps in Battery - Maintenance Practices.

(5) Do an operational test on the system related to replaced component. Refer to the applicable section of this manual.

(6) If no more procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane in this section.

5. Shunt Removal/Installation

NOTE: The removal procedures for the shunts is typical.

A. Remove the shunt from the power relay panel (refer to Figure 201).

(1) Do the component removal Preliminary Procedures in this section.

(2) Remove the nuts and washers that attach the wires to the shunt.

(a) Identify and mark the wires.

(b) Remove the wires from the shunt.

(3) Remove the nuts that attach the strap(s) to the shunt.

(a) Remove the strap(s) from the shunt.

(4) Remove the screws that attach the shunt to the panel.

(5) Remove the shunt from the airplane.

B. Install the shunt on the power relay panel (refer to Figure 201).

NOTE: The installation procedures for the shunts is typical.

(1) Put the shunt in its correct position on the panel.

(a) Install the screws that attach the shunt to the panel.

(2) Identify and put the wires in position on the shunt.

(a) Install the nuts and washers that attach the wires to the shunt.

(3) Put the strap(s) in position on the shunt.

(a) Install the nuts that attach the strap(s) to the shunt.

(4) Connect the battery connections. Refer to the applicable steps in Battery - Maintenance Practices.

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(5) Do an operational test on the system related to replaced component. Refer to the applicable section of this manual.

(6) If no more procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane in this section.

6. Restore the Airplane

A. Put the airplane back to its original condition.

(1) Install the access panel. Refer to Chapter 25, Access Panels - Maintenance Practices.

(2) Remove external electrical power from the airplane.

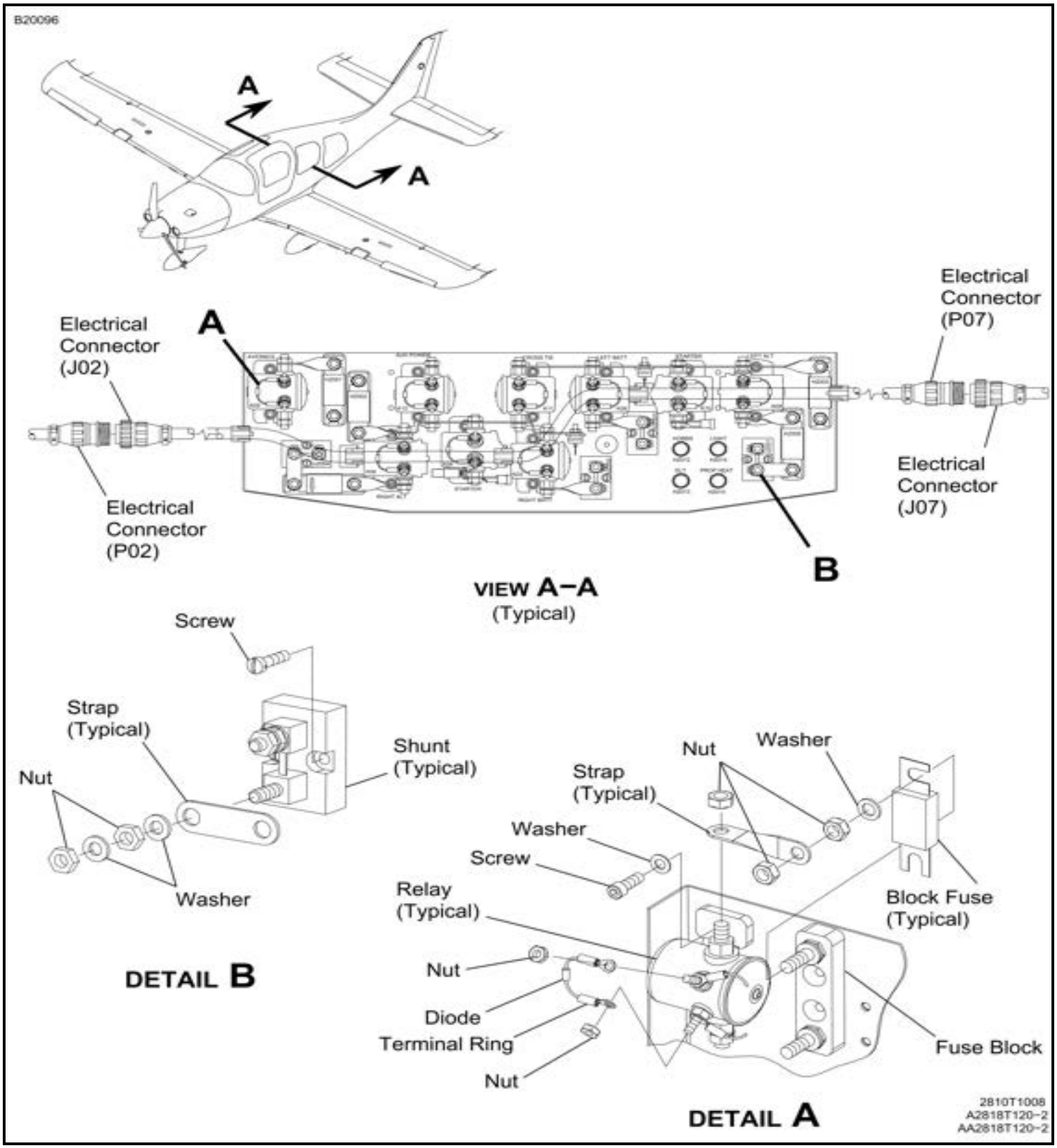
(3) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(4) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(5) Remove the maintenance warning tags from the battery and external power receptacle.

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Figure 201 : Sheet 1 : Component Installation



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AUX RELAY ASSEMBLY (T240) - MAINTENANCE PRACTICES

1. General

A. This section gives the removal and installation procedures for the AUX Relay Assembly and the relays. The AUX Relay Assembly is installed on the right side of the avionics shelf forward of the instrument panel. Stall heat, pitot heat and oxygen system relays are installed on the assembly for airplanes with the FIKI option available and oxygen system relays only on airplanes the FIKI option is not available.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Aux Relay Assembly Removal and Installation

A. Remove the AUX Relay Assembly (UI009) (Refer to Figure 201).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Remove the glare shield. Refer to Glareshield (T240) - Removal/Installation.

(5) Disconnect the electrical connector (PI009) from the assembly electrical connector (JI009).

(6) Remove the screws that attach the assembly to the avionics shelf.

(7) Remove the assembly from the airplane.

B. Install the AUX Relay Assembly (UI009) (Refer to Figure 201).

(1) Visually inspect the PI009 electrical connector and pins for signs of damage.

(a) Repair any damage.

(2) Put the assembly in its correct position on the avionics shelf.

(a) Install the screws that attach the assembly to the avionics shelf.

(3) Connect the electrical connector (JI009) to the assembly electrical connector (PI009).

(4) Install the glare shield. Refer to Glareshield (T240) - Removal/Installation.

(5) Supply external electrical power to the airplane.

(6) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(7) Set the AVIONICS MASTER switch (SW04) to the ON position.

(8) Make sure that the relays operate correctly. Refer to the applicable systems that follow:

(a) Chapter 28, Fuel Distribution - Maintenance Practices

(b) Chapter 35, Oxygen- Maintenance Practices

(c) Chapter 34, Pitot/Static Systems (T240) - Adjustment/Test Pitot and Stall Vane Heat Test.

(9) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(10) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(11) Remove external electrical power from the airplane.

4. Aux Relay Assembly Relays Removal and Installation

A. Remove the AUX Relay Assembly Relay (Refer to Figure 201).

NOTE: The removal procedure for each of the relays are identical.

(1) Remove the AUX Relay Assembly (UI009). Refer to Remove the Aux Relay Assembly (UI009).

(2) Identify and remove the electrical wires from the relay's electrical terminals.

(3) Remove the screws that attach the relay to the aux relay assembly.

(a) Remove the relay from the assembly.

B. Install the Aux Relay Assembly Relay (Refer to Figure 201).

NOTE: The installation procedure for each of the relays are identical.

(1) Put the relay in its correct position on the aux relay assembly.

(a) Install the screws that attach the relay to the assembly.

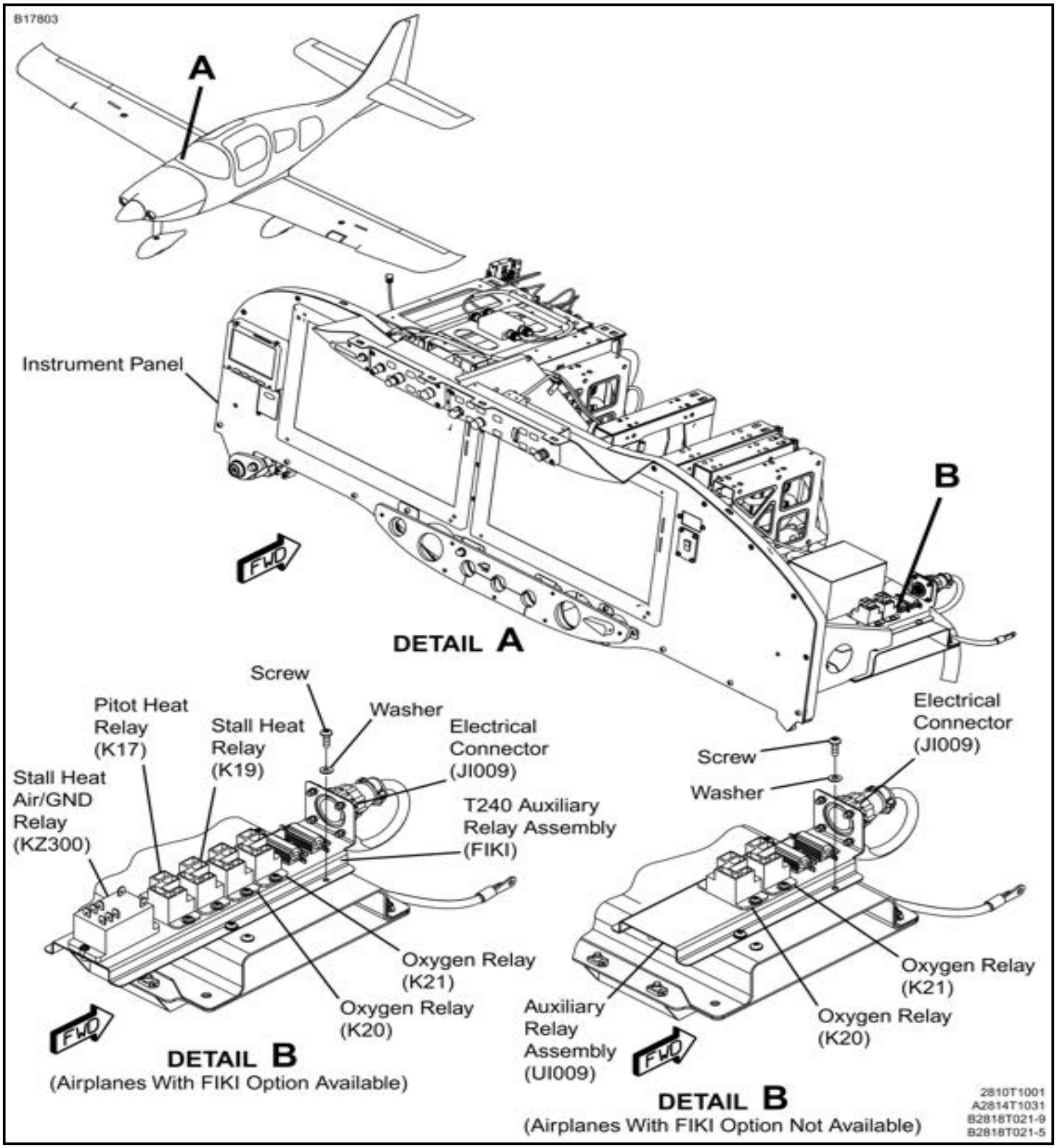
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(2) Connect the electrical connector wires to the relay electrical terminals.

(3) Install the AUX Relay Assembly (UI009). Refer to Remove the Aux Relay Assembly (UI009).

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Figure 201 : Sheet 1 : Aux Relay Assembly Installation



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SMALL PARTS MODULE (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Small Parts Module. The Small Parts Module is installed on the right side of the avionics shelf forward of the instrument panel. Oxygen, fuel, audio, air distribution, and rudder hold system relays are installed on the assembly. The Avionics Shelf Cooling Fan (UZ102) is installed on a bracket assembly that is above the Small Parts Module.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Small Parts Module Removal and Installation

NOTE: You must remove the Avionics Shelf Cooling Fan (UZ102) and bracket assembly before the Small Parts Module is removed. The cooling fan and the bracket assembly can be removed as one assembly.

A. Remove the Small Parts Module (UI008) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Remove the glare shield. Refer to Chapter 25, Glareshield (T240) - Removal/Installation.

(5) Disconnect the avionics shelf cooling fan electrical connector from the airplane wiring bundle electrical connector. Refer to Chapter 21, Equipment Cooling Fans (T240) - Removal/Installation, Avionics Shelf Cooling Fan - Removal/Installation.

(6) Disconnect the electrical connector (PI008) from the assembly electrical connector (J1).

(7) Disconnect the electrical connector (P610) from the assembly electrical connector (J2).

(8) Remove the screws that attach the small parts module and the avionics shelf cooling fan bracket assembly to the avionics shelf.

(9) Remove the small parts module and the avionics shelf cooling fan assembly from the airplane.

B. Install the Small Parts Module (UI008) (Refer to Figure 401).

(1) Visually inspect the PI008 electrical connector and pins for signs of damage.

(a) Repair any damage.

(2) Put the small parts module and the avionics shelf cooling fan assembly in their correct position on the avionics shelf.

(a) Install the screws that attach the assembly to the avionics shelf.

(3) Visually inspect the PI009 and P610 electrical connectors and pins for signs of damage.

(a) Repair any damage.

(4) Connect the electrical connector (PI008) to the assembly electrical connector (J1).

(5) Connect the electrical connector (P610) to the assembly electrical connector (J2).

(6) Connect the avionics shelf cooling fan electrical connector to the airplane wiring bundle electrical connector. Refer to Chapter 21, Equipment Cooling Fans (T240) - Removal/Installation, Avionics Shelf Cooling Fan - Removal/Installation.

(7) Install the glare shield. Refer to Glareshield (T240) - Removal/Installation.

(8) Supply external electrical power to the airplane.

(9) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(10) Set the AVIONICS MASTER switch (SW04) to the ON position.

(11) Set the CROSS TIE switch (SW03) to the ON position.

(12) Make sure that the Small Parts Module operates correctly. Refer to the applicable systems that follow:

(a) Chapter 21, Temperature and Air Control - Maintenance Practices.

(b) Chapter 22, Garmin GFC 700 Auto Pilot (G2000) - Adjustment/Test Trim Operational Test.

(c) Chapter 23, Garmin GMA 36 Remote Audio Panel (G2000) - Adjustment/Test

(d) Chapter 27, Rudder Hold System (G2000) - Adjustment/Test.

(e) Chapter 28, Fuel Indicating System - Maintenance Practices.

(13) Do an test of the avionics shelf fan. Refer to Chapter 21, Equipment Cooling Fans (T240) - Removal/Installation,

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Equipment Cooling Fans Operational Test.

(14) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

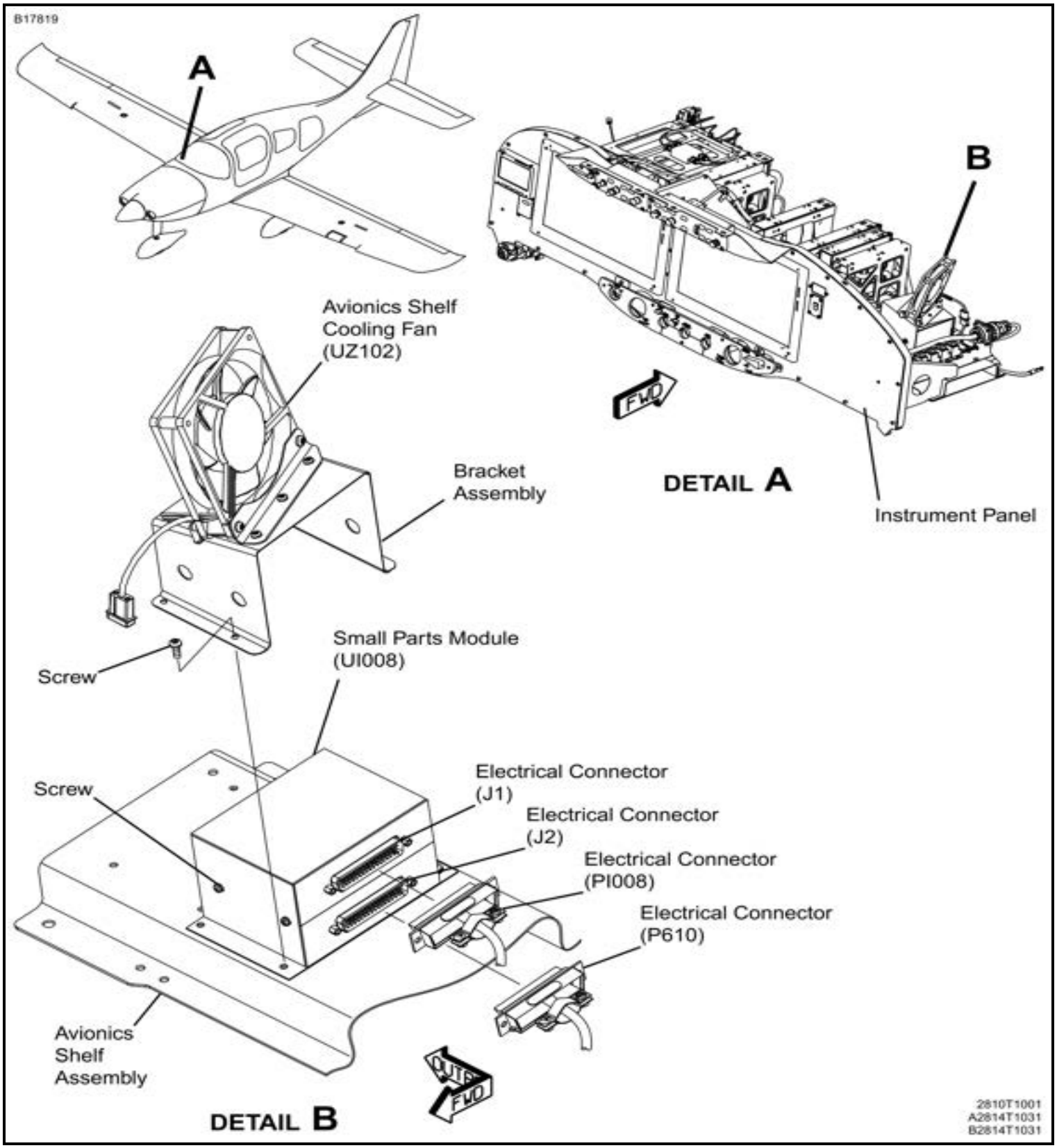
(15) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(16) Set the CROSS TIE switch (SW03) to the OFF position.

(17) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : Small Parts Module Installation



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EQUIPMENT/FURNISHINGS - GENERAL

1. General

WARNING: Do not remove seats from the airplane with the seat belts buckled or the AMSAFE Aviation Inflatable Restraint electronic module assembly connected to the cable interface assembly. Damage can occur to the system and an accidental deployment of the system can cause injury.

WARNING: Seat cushions are designed to crush to absorb loads in a crash situation. In the event of any incident or accident with a downward force component that results in damage to the aircraft, the seat cushions should be replaced.

WARNING: Do not place anything under the seat pans. The hollow area under the seat is designed for the crush of the seat to absorb energy in the event of a crash. Placing items in this area will prevent the proper operation of the seats.

A. **Front Seats** - Two individual, adjustable, tubular frame seats provide the front seating for the pilot and passenger. The base of the tubular seat frame is covered with sheet aluminum, and the seat cushions are attached to the aluminum through a series of Velcro strips. The seat backs on the front seats fold forward to permit access to the aft seating area. The seat cushions and seat backs are foam-filled and covered with natural leather and ultra-leather. For added protection, both the front and rear seats incorporate a special rigid, energy absorbing foam near the bottom of the cushion. The cushion is designed for the loads applied by a seated passenger, and it is possible to damage the seat if concentrated loads are applied. Care must be taken to avoid stepping on the seats or placing heavy objects on the seat. For care and maintenance of the seats refer to Chapter 25, Airplane Seats.The front seats are adjustable fore and aft through a range of approximately 7 inches.

   (1) The seat adjustment control for the non-Oregon Areo front seats is located below the seat cushion on the left side. To adjust the position of either seat, move the control lever towards the middle until the seat unlocks from the seat track, and adjust the seat to the desired position.

   (2) The Oregon Areo front seats are adjusted using the adjustment lever, found on the left side of the seat. To adjust the position of one of the two seats, move the applicable adjustment lever up that allows the seatback to move. When in the necessary position, release the lever.

B. **Rear Seats** - The rear seats are a split bench-type design and are nonadjustable. The bench seat frame is composite construction and bolted to the interior of the fuselage. The foam-filled seat and seat back cushions are covered with natural leather and ultra-leather and attached to the seat bench with Velcro fasteners. There are two non-locking headrests inserted into the top of the seat back. The headrest can be removed by grasping it on each side and pushing up.

C. **Seat Belts and Shoulder Harnesses** - The seat belts and shoulder harnesses are an integrated three-point restraint type of design. With this type of restraint, the lap belt and diagonal harness are one continuous piece of belt webbing. The webbing is anchored on each side of the seat for the lap belt restraint and then on the side of the fuselage for the harness restraint.

D. **Inflatable Restraint System** - The Model T240 has an inflatable restraint system installed for the front seats and can have an optional system installed for the rear seats. The seat belts and shoulder harnesses for the inflatable restraint system are installed in the airplane identical to the non-inflatable seat belts and restraints. If an inflatable restraint system is installed the system must be disarmed before you do maintenance on the seats.

E. **Interior Panels** - Most of the interior panels are covered with ultra-leather and are secured with screws, PEM (Penn Engineering and Manufacturing) studs, Shuler clips, Velcro, or standard clips. When all the fasteners are removed, care must be taken when removing the panel so as not to damage the finish. Care and maintenance of the panels is discussed in Chapter 12. The panels are classified according to their location, i.e., forward, middle, aft, center, upper, lower, etc. The following is a brief discussion of each panel and the accompanying abbreviation. Refer to Figure 1.

   (1) **Forward and Aft Center Overhead Light Panel (FCOLP and ACOLP)** - This panel is located in the center portion of the main cabin area and contains the electrical lights and speaker.

   (2) **Forward Overhead Side Panels Left and Right (FOSPL and FOSPR)** - The forward panels to the left and right of the COLP are referred to as the left and right overhead side panels.

   (3) **Aft Overhead Side Panels Left and Right (AOSPL and AOSPR)** - These side panels are just aft of the FOSPL and FOSPR.

   (4) **Forward Lower Side Panels Left and Right (FLSPL and FLSPR)** - These panels are located on the left and right side of the airplane and cover each side of the airplane from about the rudder pedals aft to a location near the backrests of the front seats.

   (5) **Middle Lower Side Panels Left and Right (MLSPL and MLSPR)** - These panels are located on each side of the

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airplane, between the front and rear seat backs.

(6) **Baggage Lower Side Panels Left and Right (BLSPL and BLSPR)** - These panels are located on the left and right side of the baggage compartment, near the floor, and are also referred to as the left and right push-pull tube channel covers.

F. **Engine, Flight Instrument, and Electrical Panels**

(1) **Model T240** - The instrument panel is installed forward of the pilot. Many of the switch panels have LED light panels installed. The lower section of the instrument panel has a bolster assembly installed. Refer to Table 1 and Figure 4 for a list of the instrument panel components. The circuit breaker panel is larger with more capacity for added circuit breakers than installed with the Avidyne and Garmin G1000 options. The circuit breaker panel has LED light panels installed for each of the circuit breaker sections of the panel. The circuit breaker panel also has surge suppressors and current sensors installed as part of the assembly.

Table 1. Instrument Panel Components

L-3 Standby Indicator	Carbon Monoxide Detector
Primary Flight Display (PFD)	Flaps Switch
DISPLAY REVERSION Switch Panel	Air Vent
GCU 275 Controller Unit	Engine Controls Panel
GMC 720 AFCS Mode Controller	SPD BRK Switch
Multifunctional Display (MDF)	GO AROUND Switch
Hourmeter	ALT STATIC
ELT Switch	Ignition Switch Panel

(2) **Avidyne Option** - The flight instrument panel is located directly in front of the pilot, and the engine instrument panel is to the left of the flight instrument panel and is canted at about 30 degrees. On the right side of the airplane there is a kidney panel located in an approximate mirrored location in relation to the engine instrument panel. Below the instrument panel are a series of electrical panels, which contain the master switch, rocker switch, trim, flap, and ECS panels. Below the electrical panels are the left and right knee bolsters. Above the instrument panels is the glare shield. Figure 2 shows the location of each panel.

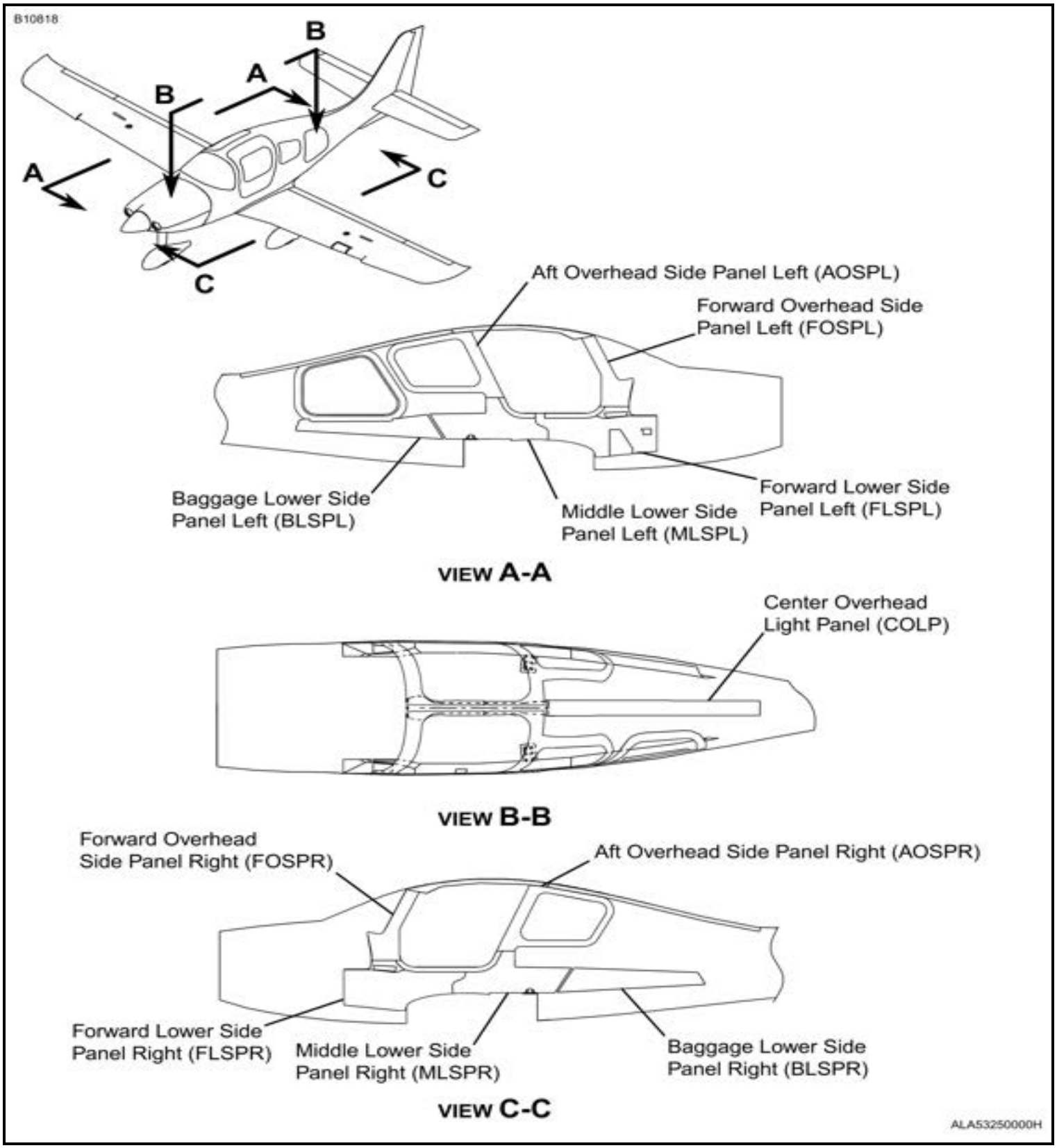
(3) **Garmin G1000 Option** - The instrument panel is located directly in front of the pilot. Integral to the instrument panel are the 5 Pack switches, backup airspeed indicator, backup attitude indicator, backup altimeter, PFD, audio panel, and MFD. Below the instrument panel are the flap panel, engine controls, and ECS or ACCS panels. Above the instrument panel is the glare shield. Refer to Figure 3.

2. General Maintenance

A. Performing maintenance on the various components and systems in the airplane will frequently involve the removal of interior panels. Special tools are not needed. Most work can be performed with screw drivers, wrenches, sockets, torque wrenches, and adapters. To avoid over-torquing when using an adapter on a torque wrench, refer to Chapter 20, Torque Data - Maintenance Practices.

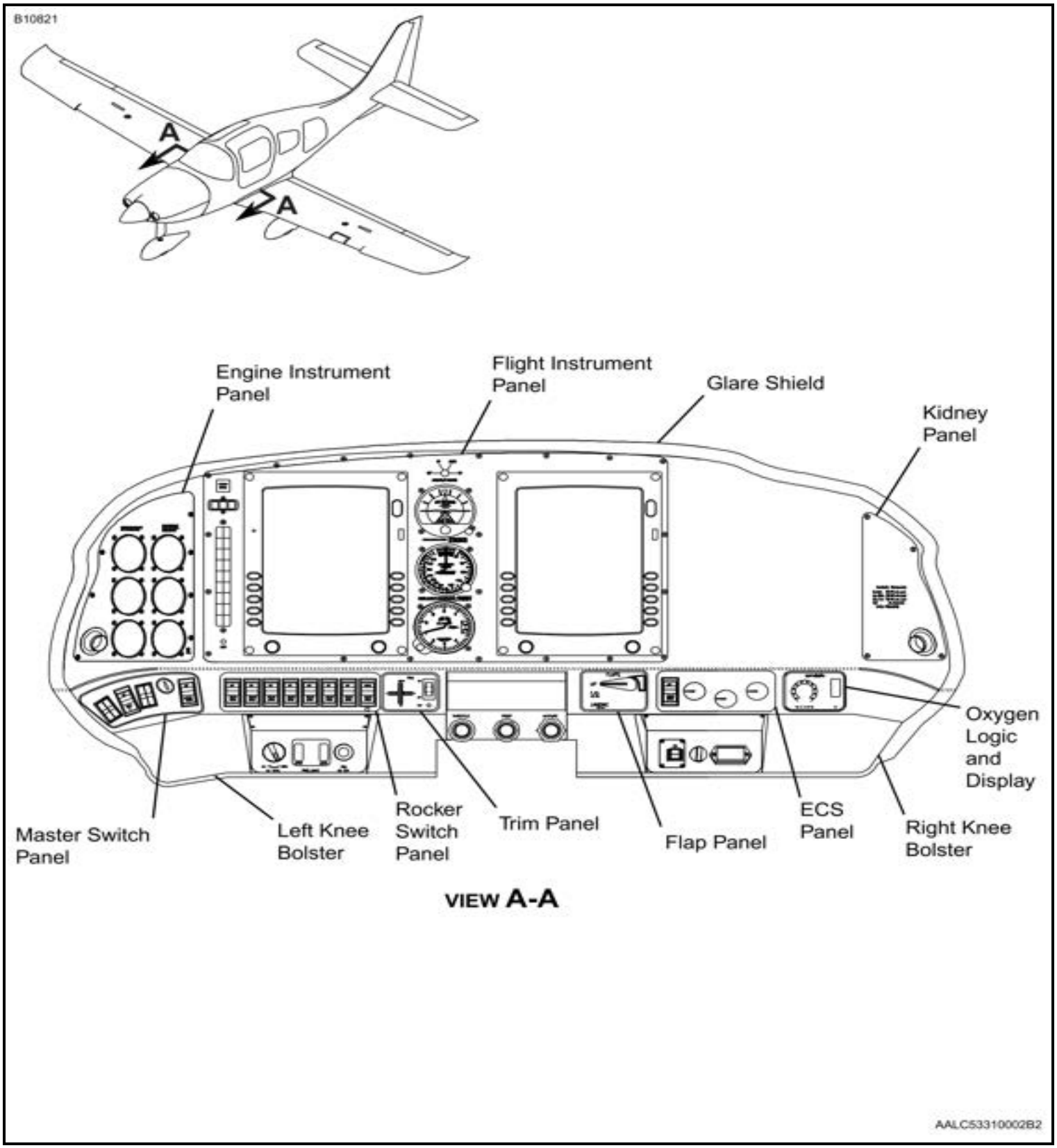
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Figure 1 : Sheet 1 : Interior Panel Locations



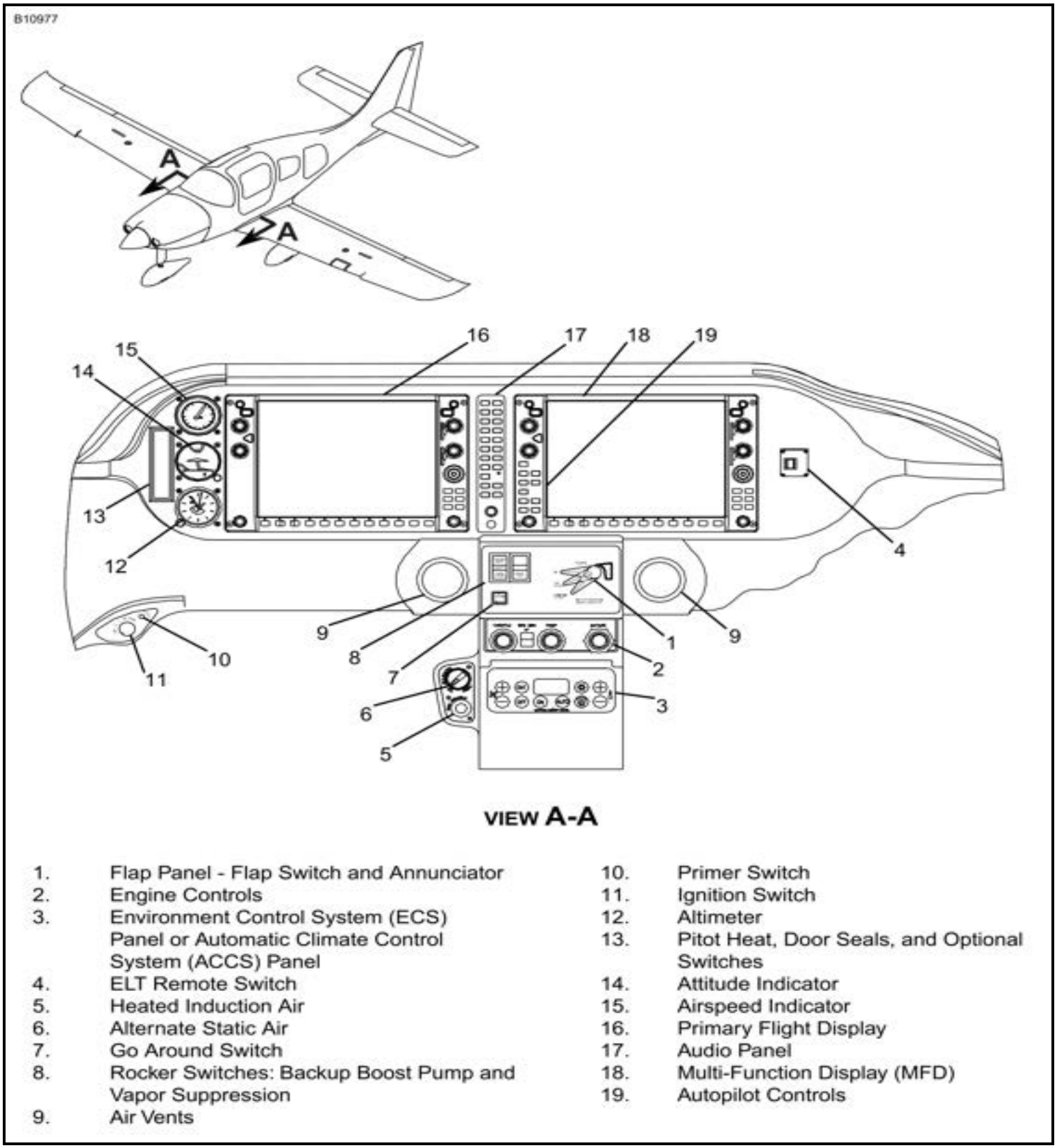
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Figure 2 : Sheet 1 : Panel Locations (Avidyne Option)



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Figure 3 : Sheet 1 : Panel Locations (Garmin G1000 Option)

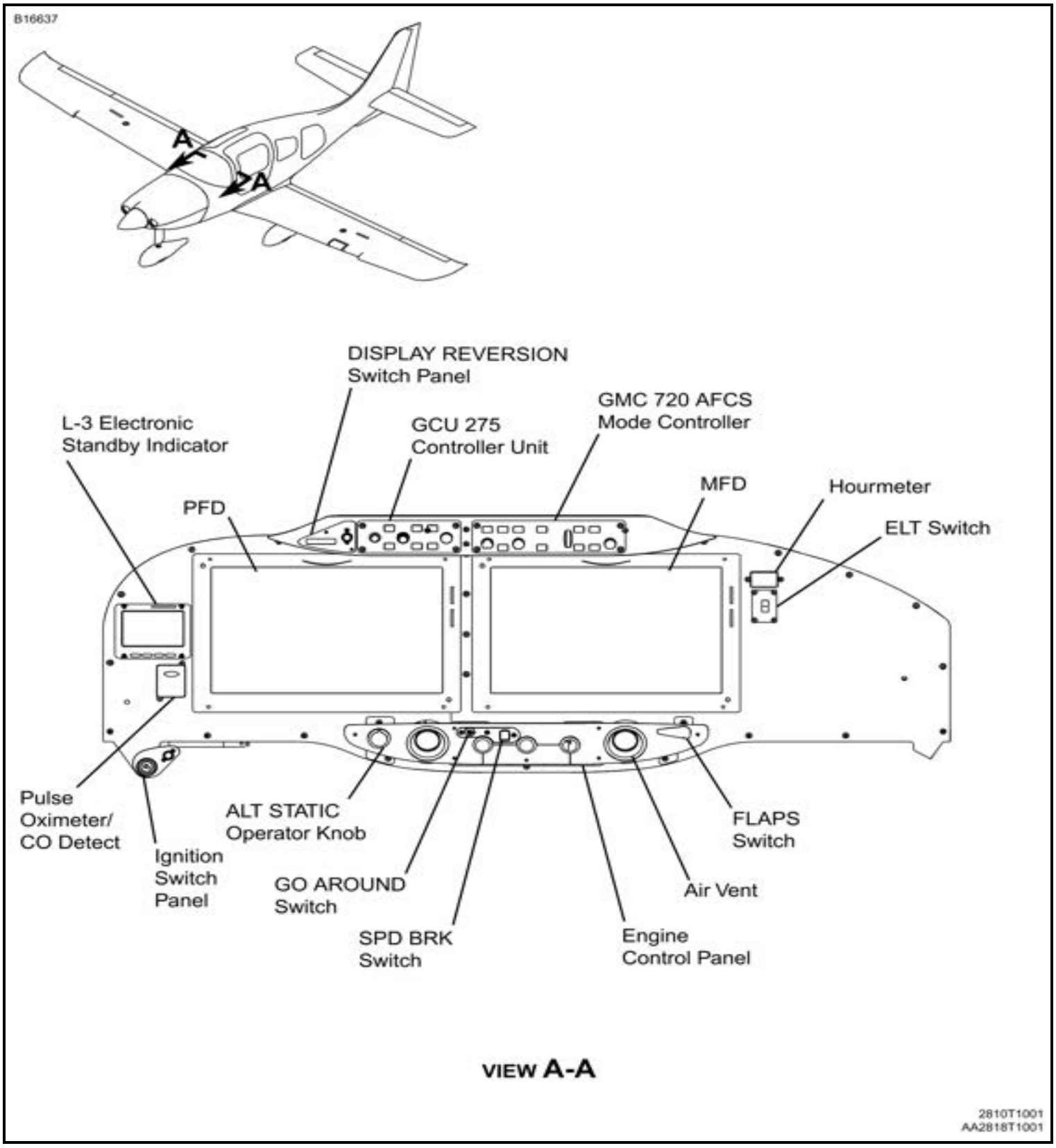


VIEW A-A

1. Flap Panel - Flap Switch and Annunciator
2. Engine Controls
3. Environment Control System (ECS) Panel or Automatic Climate Control System (ACCS) Panel
4. ELT Remote Switch
5. Heated Induction Air
6. Alternate Static Air
7. Go Around Switch
8. Rocker Switches: Backup Boost Pump and Vapor Suppression
9. Air Vents
10. Primer Switch
11. Ignition Switch
12. Altimeter
13. Pitot Heat, Door Seals, and Optional Switches
14. Attitude Indicator
15. Airspeed Indicator
16. Primary Flight Display
17. Audio Panel
18. Multi-Function Display (MFD)
19. Autopilot Controls

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Figure 4 : Sheet 1 : Model T240 Panel Locations



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AIRPLANE SEATS - MAINTENANCE PRACTICES

1. General

A. This section gives the maintenance procedures for the front seats, rear seats and related components.

B. If your airplane has the AMSAFE inflatable restraint system, do not do maintenance on the seats or the seat restraint system unless you first obey all applicable precautions and instructions in the E508804 Supplemental Amsafe Maintenance Manual and this Maintenance Manual. Refer to Inflatable Restraint System - Maintenance Practices.

2. Removal, Installation and Adjustment of the Front Seats (Non-Oregon Aero Seats)

WARNING: If the airplane has AMSAFE inflatable restraints, do not do maintenance on the crew seats, seat rails, seat belts, or shoulder harnesses until you first look at and obey all applicable precautions and instructions supplied in AMSAFE publications and this maintenance manual. If you do not obey these instructions and safety precautions, damage to equipment and harm to personnel can occur.

A. **Removal of the Front Seats** - The front seat cushions and seatbacks are interchangeable, i.e., the cushions or seatbacks are identical on the pilot's and copilot's side. The following procedure is used to remove the front seats. (Refer to Figure 201).

WARNING: If the airplane has AMSAFE inflatable restraints, do not remove seats with the seat belts buckled or the Electronics Module Assembly (EMA) connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

(1) If the airplane has AMSAFE inflatable restraint system installed, disarm the AMSAFE inflatable restraints. Refer to Inflatable Restraint System - Maintenance Practices, AMSAFE Inflatable Restraint Disarm/Arm.

(2) **Cushion** - The front seat bottom cushions are attached to the seat pan with Velcro and are removed by grasping the cushion near its forward base and pulling up on it.

(3) **Seatback** - Removal of the front seatback is accomplished by removing the cotter pin and washer on each side of the seat pan. The clevis pin is captured inside the seat pan and cannot be removed; however, it can be rotated. Use the following steps for removal of the seatback:

(a) Move the seat to the forward position. This is necessary to access the outboard cotter pins.

(b) Remove the left and right cotter pins from their clevises.

(c) Simultaneously, apply an outward pressure (away from the seat pan) on each seatback attachment bracket until the hole in each bracket is free of the clevis.

(d) When each bracket's holes are free from their clevis, gently pull up on the seatback until both brackets are clear of the clevis pins.

NOTE: Once a cotter pin is removed, it must be discarded. Do not reuse a cotter pin on the seat mechanism or on any other part in the airplane.

(4) **Seat Pan** - The seat pan is removed using the following steps.

(a) Slide the seat fully back, and remove the two socket head screws holding the rails to the cabin floor.

(b) Slide the seat fully forward, and remove the two socket head screws by inserting an Allen wrench through each of two small holes in the seat pan.

(5) **Alternate Seatback Removal Technique** - It is also permissible to remove the seatback by first removing the four bolts on the seat pan and then removing the seat assembly from the airplane. When the seatback is attached to the seat pan, it is a bit more awkward to maneuver, and care must be take not to damage the interior. However, access to the outboard cotter pins is facilitated.

CAUTION: When the seat cushions are installed, they limit the forward travel of the seatback. However, with the cushion removed, the seatback will fold forward until its headrest touches the instrument panel or glare shield. When moving the seatback with the seat cushion removed, hold on to the seatback until it is touching the instrument panel. Do not move the seatback past its center of balance and then release it, because this can cause damage to the seat, glare shield, flight instruments, or flight instrument panel. In addition, when the seatback is resting on the instrument panel or glare shield, ensure no additional pressures are applied to the seatback.

(6) **Adjusting the Seatback** - The tilt of the seatbacks can be adjusted fore and aft, depending on the position of two course-threaded 3/8 inch bolts located in the aft portion of the seat pan. The bolts are held in place by two jam nuts. To adjust the seat, use the following procedure:

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WARNING: There is a limitation on the forward tilt of the seat. When adjusting the tilt of the seatback, at least 6 1/2 threads of the course-threaded 3/8 inch bolts must be inserted into the seat pan.

(a) Remove the seat cushion, and move the seatback to the full forward position.

(b) Loosen both jam nuts enough to allow for the anticipated adjustment.

(c) Raise or lower both course-threaded 3/8 inch bolts, depending on whether the seatback is to be adjusted fore or aft. Ensure that the bolts on each side are adjusted an equal number of turns.

(d) At this point the seat cushion can be installed, and the person for whom the adjustment is being made can test the position of the seatback.

(e) When the seatback is in the desired position, tighten the jam nuts against the base of the seat pan and torque 72 to 84 in.-lbs.

B. **Installation of the Front Seats** - Installation of the front seats and their related parts is performed by reversing steps (1) and (4) of the Front Seat Removal procedure above. During the installation process, remember the following points:

(1) The seatback attachment brackets must be temporarily flexed outward (widened slightly) by applying an outward pressure as they are slipped on to the clevis.

(2) There are four washers for each seatback, two for each seatback attachment bracket. The washers should be positioned on each side of the bracket. To make the bracket sandwich, use the following steps.

(a) Insert one washer over each clevis.

(b) Install the seatback.

(c) Install the second washer over each clevis.

(d) Install the cotter pin.

(e) The bolt on the seat pan should be torqued 30 to 36 in.-lbs.

(3) If necessary, arm the AMSAFE inflatable restraints. Refer to Inflatable Restraint System - Maintenance Practices AMSAFE Inflatable Restraint Disarm/Arm.

C. **Seat Slide Rails** - The slide rails, under normal conditions, should last for many years, and the likelihood of replacement is remote. Moreover, access to the removal hardware is difficult and requires significant disassembly. If problems do occur with the slide rails that necessitate removal, contact Cessna Aircraft Company for specific instructions.

3. Removal, Installation and Adjustment of the Front Seats (Oregon Aero Seats)

WARNING: If the airplane has AMSAFE inflatable restraints, do not do maintenance on the crew seats, seat rails, seat belts, or shoulder harnesses until you first look at and obey all applicable precautions and instructions supplied in AMSAFE publications and this maintenance manual. If you do not obey these instructions and safety precautions, damage to equipment and harm to personnel can occur.

A. **Remove the Front Seats** (Refer to Figure 201).

WARNING: If the airplane has AMSAFE inflatable restraints, do not remove seats with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

(1) If the airplane has AMSAFE inflatable restraint system installed, disarm the AMSAFE inflatable restraints. Refer to Inflatable Restraint System - Maintenance Practices, AMSAFE Inflatable Restraint Disarm/Arm.

(2) Remove the front seat as follows:

(a) Remove the front seat cushion by grasping the cushion near its forward base and pulling up on it

(b) Remove the bolts from the front of the seat that attach it to the floor nutplates

(c) Move the seat as necessary to get access to the screws that attach the rear of the seat to the floor

(d) Remove the screws from the rear of the seat that attach it to the floor nutplates.

(3) Remove the seat from the airplane.

B. **Installation of the Front Seats** (Refer to Figure 201).

(1) Install the front seats as follows:

(a) Put the seat in it correct position on the floor and forward on the seat rails, to get access to the rear seat nutplates.

(b) Install the screws that attach the rear of the seat to the floor nutplates.

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(c) Move the seat to the rear position on the seat rails to get access to the front bolt nutplates.

(d) Install the bolts that attach the front of the seat to the floor nutplates.

(2) Arm the AMSAFE inflatable restraints. Refer to Inflatable Restraint System - Maintenance Practices AMSAFE Inflatable Restraint Disarm/Arm.

(3) **Adjusting the Seatback** - Pull up on the seatback adjustment lever to move the seatback to the necessary position. When in necessary position, release the adjustment lever to lock the seat back in position.

C. **Seat Slide Rails** - The slide rails, under normal conditions, should last for many years, and the likelihood of replacement is remote. Moreover, access to the removal hardware is difficult and requires significant disassembly. If problems do occur with the slide rails that necessitate removal, contact Cessna Aircraft Company for specific instructions.

4. Removal and Installation of the Rear Seats and Crossbar

NOTE: The installation and removal of the non-Oregon Aero and the Oregon Aero rear seats is identical.

A. **Removal of the Rear Seats and Crossbar** - The rear seat cushions are not interchangeable because of the outboard cutout in each seat. Technically, the rear seatbacks are interchangeable; however, the holes for the quick-release pins may not match perfectly from left to right, and it is recommended that the location of each seatback be tagged before removal. To remove the seats, use the following steps. Refer to Figure 202.

WARNING: If the airplane has AMSAFE inflatable restraints, do not remove seats with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

(1) If the airplane has AMSAFE inflatable restraint system installed, disarm the AMSAFE inflatable restraints. Refer to Inflatable restraint System - Maintenance Practices, AMSAFE Inflatable Restraint Disarm/Arm.

(2) The rear seat bottom cushions are attached to the composite seat bench with Velcro and are removed by grasping the cushion near its forward base and pulling up.

(3) Remove the four quick-release pins from the seatbacks.

(4) Pull the seat forward until the seatback pin bracket is clear of the crossbar, and lift the seatback out of the composite sockets in the floor.

(5) To remove the crossbar, remove the two outboard quick-release pins. If the retention clip affixed to the pin bracket becomes dislodged, reinstall it with the smaller hole on the bottom side of the bracket, the open end of the clip facing outboard, and the body of the clip facing inboard.

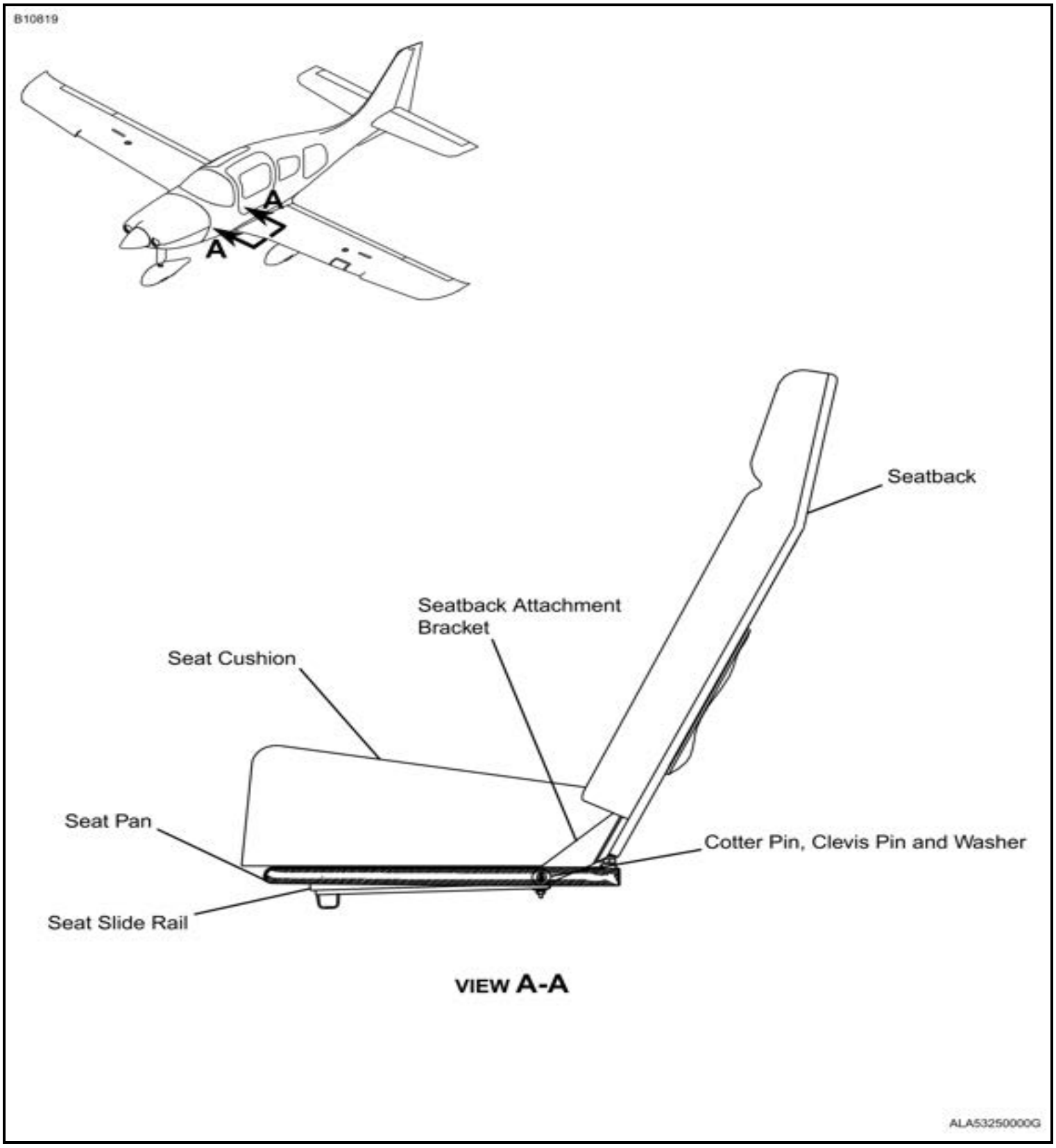
B. **Installation** - Reverse the Rear Seat Removal procedure above for reinstallation of the rear seat seatbacks, cushions, and crossbar.

NOTE: Make sure the flanged bushing is installed from the bottom of the seatback flange.

(1) Arm the AMSAFE inflatable restraints. Refer to Inflatable restraint System - Maintenance Practices, AMSAFE Inflatable Restraint Disarm/Arm.

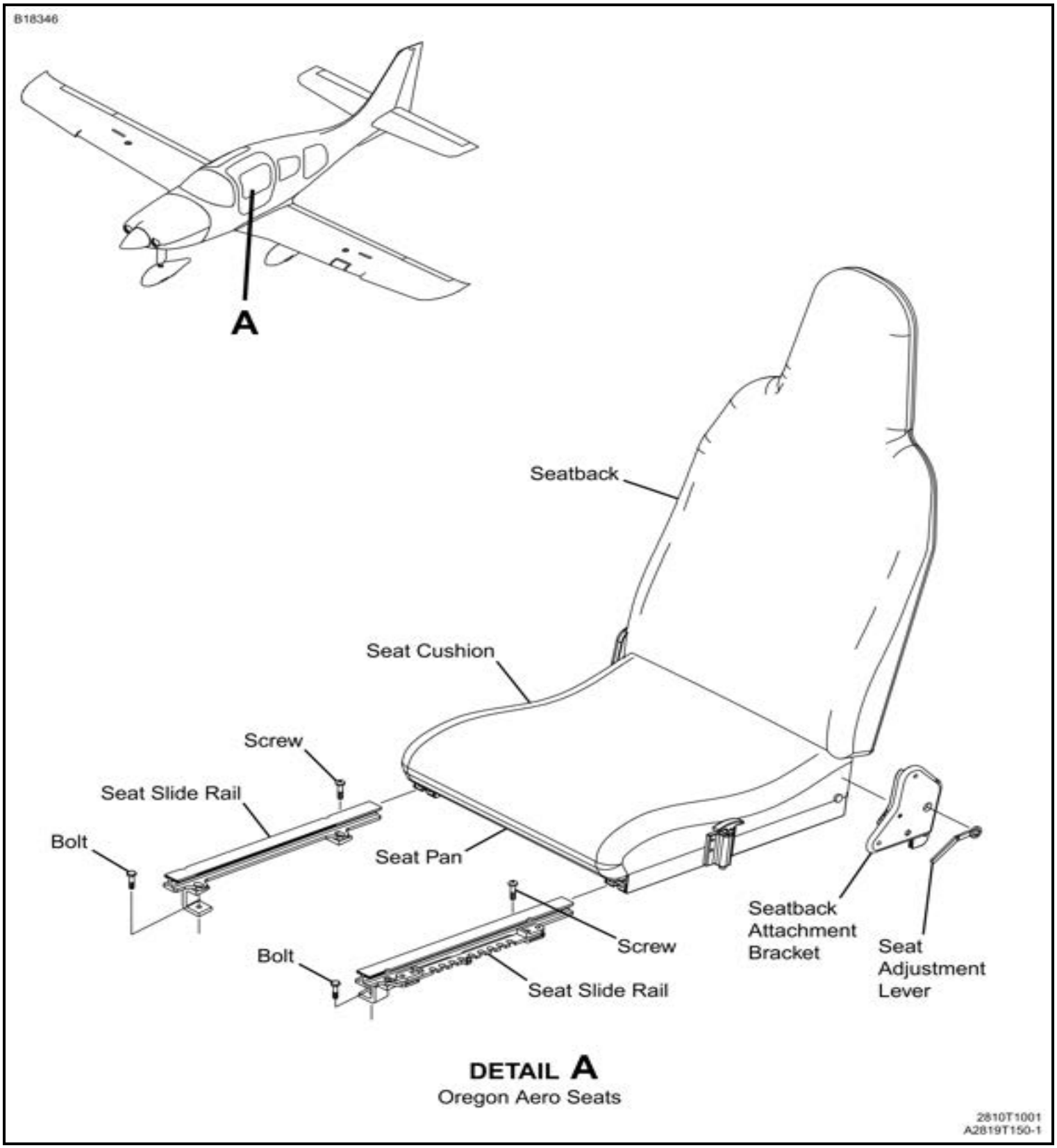
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Figure 201 : Sheet 1 : Front Seat



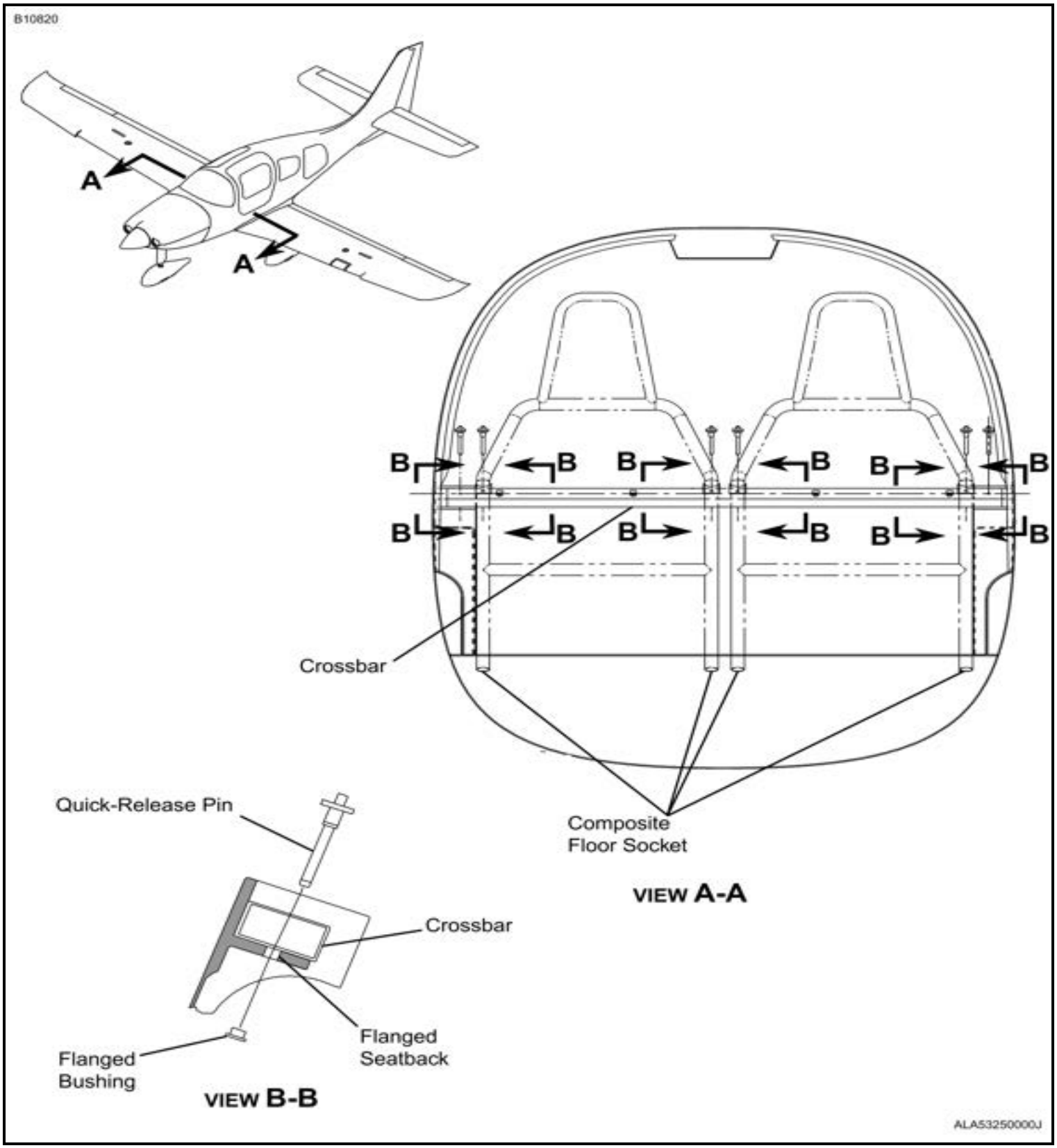
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Figure 201 : Sheet 2 : Front Seat



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Figure 202 : Sheet 1 : Rear Seats



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INSTRUMENT PANELS AND ELECTRICAL PANELS - MAINTENANCE PRACTICES

1. Instrument Panels and Electrical Panels

A. **Flight Items** - This section includes the procedures for the removal and installation of the line replaceable units (LRU's) that follow. Refer to, Equipment Furnishings.

(1) Glare shield and glare shield extension

(2) Engine instrument panel

(3) Flight instrument panel

(4) Left and right knee bolsters

(5) Kidney panel

B. **Electrical Panels** - In addition, removal procedures of related electrical panels LRU's are in this section. These include:

(1) Circuit breaker panel

(2) Master switch panel

(3) Rocker switch panel

(4) Trim panel

(5) ECS Panel

(6) Flap Panel

(7) Oxygen Logic and Display Panel

CAUTION: Use a non-magnetic screwdriver when working on or around the instrument or electrical panels including the glare shield.

C. **Model T240** - For applicable Model T240 instrument panel and electrical panels maintenance procedures, refer to the sections that follow:

(1) Glareshield (T240) - Removal/Installation.

(2) Circuit Breaker Panel (T240/FIKI) - Removal/Installation

(3) Instrument Panel (T240) - Removal/Installation.

(4) Pulse Oximeter/CO Detect (T240) - Maintenance Practices.

2. Glare Shield

A. **Avidyne Option**

(1) **Glare Shield Extension** - The removal of the glare shield extension is accomplished by pulling aft on the curved lip of the extension shield until it stops. Using both hands, simultaneously bend the outer edges down on both sides to clear the stops, and then pull free. Installation is the reverse of the above.

(2) **Glare Shield Removal and Installation** - Use the following steps to remove and install the glare shield.

(a) Remove the three flat head, 8-32 screws and washers from the underside of the panel.

(b) Tilt the glare shield up to gain access to the wiring for light. Disconnect this wiring.

(c) Slide the glare shield aft out of the clips bonded in the defrost channels at the base of the windshield.

(d) Installation is the reverse of the above. Tighten glare shield screws until snug.

B. **Garmin G1000 Option**

(1) **Glare Shield Removal**

(a) Remove the Garmin GDU 1040 PFD and GDU 1042/GDU 1044 MFD per Chapter 34.

(b) Remove the six washer head, 8-32 screws from the underside of the panel.

(c) Tilt the glare shield up to gain access to the wiring for light. Disconnect this wiring.

(d) Slide the glare shield aft out of the clips bonded in the defrost channels at the base of the windshield.

(2) **Glare Shield Installation** - Installation is the reverse of removal. Tighten glare shield screws until snug.

3. Instrument Panel

A. **Removal and Installation of the Instrument Panel (Avidyne Option)** - Removal of the instrument panel is a major task and is not likely to ever be needed as access to areas behind the instrument panel can be gained from removing the panels within

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the instrument panel. The instructions for removal are only for removing the instrument panel when the same panel is to be replaced. If a new instrument panel is required, contact Cessna Aircraft Company for further instructions. The instrument panel and radio rack should be removed and installed as a unit.

(1) Remove or disconnect all instruments in the instrument panel.

(2) Remove the center console, center overhead console, upper and lower forward side panels, and glare shield per instructions in Chapter 25. Disconnect the ventilation tubing to the eyeball vents and main heater control valve per instructions in Chapter 21.

(3) Disconnect the control cables at the throttle quadrant per instructions in Chapter 76.

(4) Remove the hex head bolt, washer, and self-locking nut that attaches the center brace at the top of the instrument panel to the firewall shown in Figure 201 and Figure 202.

(5) Remove the 8-32 pan head bolt and washer from the threaded insert that attaches the left side brace of the instrument panel to the fuselage as shown in Figure 201 and Figure 203.

(6) Remove the 8-32 pan head bolt and washer from the threaded insert that attaches the right side brace of the instrument panel to the fuselage as shown in Figure 201 and Figure 204.

(7) Remove the two 8-32 pan head screws, washers, and nuts attaching the instrument panel to the fuselage mount on both the left and right side. One screw on each side goes through an additional grounding strap and washer. Refer to Figure 205.

(8) Remove the 10, 10-32 hex head bolts and washers attaching the radio rack to the floor, and remove the instrument panel and radio rack from the airplane.

(9) Installation is a direct reversal of removal. Torque fasteners per Section 20-00-00, Torque Data - Maintenance Practices.

B. **Removal and Installation of the Instrument Panel (Garmin G1000 Option)** - Removal of the instrument panel is a major task and is not likely to ever be needed as access to areas behind the instrument panel can be gained by removing the Garmin GDU 1040 PFD, GDU 1042/GDU 1044 MFD, and the LRUs within the instrument panel. The instructions for removal are only for removing the instrument panel when the same panel is to be replaced. If a new instrument panel is required, contact Cessna Aircraft Company for further instructions.

(1) Remove or disconnect all instruments in the instrument panel.

(2) Remove the glare shield, lower instrument panel closeout, left and right instrument panels, and upper and lower forward side panels per instructions in Chapter 25.

(3) Remove the flap panel per instructions in Chapter 25.

(4) Disconnect the ventilation tubing to the eyeball vents per instructions in Chapter 21.

(5) Disconnect the control cables at the throttle quadrant per instructions in Chapter 76.

(6) Remove the four screws and washers at the top of the tower attaching it to the instrument panel. Refer to Figure 206.

(7) Remove the two bolts, washers, and nuts attaching the instrument panel to the fuselage mount on both the left and right side. Refer to Figure 206. One bolt on each side goes through an additional grounding strap and washer.

(8) Installation is a direct reversal of removal. Torque fasteners per Section 20-00-00, Torque Data - Maintenance Practices.

4. Engine Instrument Panel (Avidyne Option)

A. **Removal and Installation of the Engine Instrument Panel** - The engine instrument panel assembly is secured to the instrument panel with six flat head 6-32 screws along the perimeter of the panel. Removal of these screws allows the panel to be tilted forward for access to the instruments. Refer to the appropriate chapter for removal and installation of a specific instrument, control, switch, or light. When installing the engine instrument panel screws, torque 10 to 12 in.-lbs.

5. Flight Instrument Panel (Avidyne Option)

A. **Removal and Installation of the Flight Instrument Panel** - The flight instrument panel is secured to the instrument panel with 14 flat head 6-32 screws along the perimeter of the panel. Removal of these screws allows the panel to be tilted forward for access to the instruments. Refer to the appropriate chapter for removal and installation of a specific instrument, control, switch, or light. When installing the flight instrument panel screws, tighten until the metal panel is tight against the fabric.

6. Left and Right Knee Bolster (Avidyne Option)

A. **Removal and Installation of the Knee Bolsters** - The knee bolsters are attached to the instrument panel at the top of the bolster by two screws and at the side with either two self-locking nuts and washers or two nuts with integral toothed washer that attach to the studs. Refer to Figure 207. Torque hardware per Section 20-05-00, Torque Data - Maintenance Practices.

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7. Kidney Panel (Avidyne Option)

A. **Removal and Installation** - The kidney panel is secured to the instrument panel with four flat head 6-32 screws along the perimeter of the panel. Removal of these screws allows the panel to be tilted forward for access behind it. When installing the kidney panel screws, torque 10 to 12 in.-lbs.

8. Circuit Breaker Panel

A. **Removal and Installation of the Circuit Breaker Panel (Avidyne Option)** - The circuit breaker panel assembly is secured by five pan head 6-32 screws around the perimeter of the panel. Refer to Figure 208. To gain access to these screws, remove the left forward lower side panel first. Refer to Section 25-30-00, Removal of FCOLP. Removal of these screws allows the panel to be rotated out for access to the circuit breakers and wiring. Refer to the appropriate chapter for removal and installation of a specific circuit breaker, switch, or light. When installing the circuit breaker panel screws, torque 12 to 15 in.-lbs.

B. **Removal and Installation of the Circuit Breaker Panel (Garmin G1000 Option)** - The master switch panel faceplate has four threaded 6-32 studs that protrude through mating holes into the backside of the FCOLP. Four self-locking 6-32 nuts with washers (or nuts with integral toothed washer), screw onto these studs to secure the master switch panel to the FCOLP. Remove the FCOLP per Section 25-30-00, Removal of FCOLP. Removal of the nuts with washers allows the master switch panel to slide out for access to the switches. Refer to the appropriate chapter for removal and installation of a specific switch or light.

9. Master Switch Panel

A. **Removal and Installation of the Master Switch** - The master switch panel faceplate has four threaded 6-32 studs that protrude through mating holes into the backside of the instrument panel. Refer to Figure 207. Four self-locking 6-32 nuts with washers (or nuts with integral toothed washer), accessible from the backside of the instrument panel, screw onto these studs to secure the master switch panel to the instrument panel. Removal of the nuts with washers allows the master switch panel to slide out for access to the switches. Refer to the appropriate chapter for removal and installation of a specific switch or light. Removal of the left knee bolster (refer to Knee Bolster Removal and Installation) makes accessing the nuts securing the master switch panel easier. When installing the master switch panel nuts, torque 7 to 10 in-lbs.

10. Rocker Switch Panel (Avidyne Option)

A. **Removal and Installation of the Rocker Switch Panel** - The rocker switch panel faceplate has four threaded 6-32 studs that protrude through mating holes into the backside of the instrument panel. Refer to Figure 209. Four self-locking 6-32 nuts with washers (or nuts with integral toothed washer), accessible from the backside of the instrument panel, screw onto these studs to secure the rocker switch panel to the instrument panel. Removal of the nuts with washers allows the rocker switch panel to slide out for access to the switches. Refer to the appropriate chapter for removal and installation of a specific switch or light. Removal of the left knee bolster (refer to Knee Bolster Removal and Installation) makes accessing the nuts securing the rocker switch panel easier. When installing the rocker switch panel nuts, torque 7 to 10 in.-lbs.

11. Trim Panel (Avidyne Option)

A. **Removal and Installation of the Trim Panel** - The trim panel faceplate has four threaded 6-32 studs that protrude through mating holes into the backside of the instrument panel. Refer to Figure 209. Four self-locking 6-32 nuts with washers (or nuts with integral toothed washer), accessible from the backside of the instrument panel, screw onto these studs to secure the trim panel to the instrument panel. Removal of the nuts with washers allows the trim panel to slide out for access to the trim controls and indicator. Refer to the appropriate chapter for removal, service, and installation of the trim control and indicator. Removal of the left knee bolster (refer to Knee Bolster Removal and Installation) makes accessing the nuts securing the trim panel easier. When installing the trim panel nuts, torque 7 to 10 in.-lbs.

12. ECS Panel

A. **Removal and Installation of the ECS Panel** - Refer to Chapter 21 for removal and installation instructions.

13. Flap Panel

A. **Removal and Installation of the Flap Panel (Avidyne Option)** - The flap panel faceplate has four threaded 6-32 studs that protrude through mating holes into the backside of the instrument panel. Refer to Figure 209. Four self-locking 6-32 nuts with washers (or nuts with integral toothed washer), accessible from the backside of the instrument panel, screw onto these studs to secure the flap panel to the instrument panel. Removal of the nuts with washers allows the flap panel to slide out for access to the flap controls and indicator. Refer to the appropriate chapter for removal, service, and installation of the flap control and indicator. Removal of the right knee bolster (refer to Knee Bolster Removal and Installation) makes accessing the nuts securing the flap panel easier. When installing the flap panel nuts, torque 7 to 10 in.-lbs.

B. **Removal and Installation of the Flap Panel (Garmin G1000 Option)** - The flap panel faceplate has three 6-32 ball studs that

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fit into mating ball stud speed clips mounted on the instrument panel. To remove the flap panel firmly grasp the edges of the panel and pull aft. Removal of the flap panel allows access to the flap controls and indicator, backup pump switch, vapor suppression switch, and go around switch. Refer to the appropriate chapter for removal, service, and installation of the flap control and indicator, backup pump switch, vapor suppression switch, and go around switch. Installation of the flap panel is the reverse of removal.

14. Oxygen Logic and Display Panel

A. **Removal and Installation** - Refer to Chapter 35 for removal and installation instructions.

15. Annunciator Panel (Avidyne Option)

A. **Removal and Installation of the Annunciator Panel** - The annunciator panel is secured by two flat head 6-32 screws. Two washers and self-locking nuts, accessible from the backside of the instrument panel, attach onto the screws. To remove the panel, disconnect the electrical connector from the backside of the panel, remove the screws, nuts, and washers, and slide out the panel. Installation is the reverse of removal. Tighten screws snug.

16. Aural Warning System (Avidyne Option)

A. **Removal and Installation of the Acknowledge Switch or Acknowledge/Traffic Switch (with Ryan TCAD)** - The acknowledge switch is located directly below the annunciator panel.

(1) Acknowledge Switch without Ryan TCAD

(a) Remove the Primary Flight Display per instructions in Chapter 34.

(b) Disconnect the two-pin plug at the back of the switch.

(c) Loosen the nut around the switch in front of the flight instrument panel, and remove the nut, washer, and placard. The nut on the rear of the flight instrument panel around the switch does not need to be removed in order to remove the switch.

(d) Remove the switch.

(e) Replace with the new switch, and reassemble in reverse order.

(2) Acknowledge/Traffic Switch with Ryan TCAD

(a) Remove the Avidyne Primary Flight Display per instructions in Chapter 34.

(b) Disconnect the two plugs at the back of the switch.

(c) Pull the press-fit switch out of its housing at the back of the instrument panel.

(d) Remove the switch.

(e) Replace with the new switch, and reassemble in reverse order.

B. **Removal and Installation of the Aural Warning Box** (Refer to Figure 210.)

(1) Remove the center console side panels per instructions in Section 25-12-00.

(2) Remove the four 6-32 pan head screws, then remove the box.

(3) Replace the aural warning box, and reassemble in reverse order. Torque per Section 20-00-00, Torque Data - Maintenance Practices.

C. **Aural Warning Troubleshooting**

(1) No Audio Output

(a) Check that the audio panel and the avionics master switch is turned on.

(b) Check that the speaker is connected and is not defective.

(c) Check that the audio panel circuit breaker is not defective.

(d) Check that the connector on the remote aural warning box is not loose.

(e) Check that the ground for the aural warning box is being activated by the oil pressure switch on the engine.

(f) Check that the audio adjustment is turned up high enough on the aural warning box.

(2) No Audio Output from One of the Seven Warnings (Except "Door is Open")

(a) Check for a broken wire or a pushed-back pin.

(b) Temporarily ground the input pin for the inoperative channel, and test the aural warning box. You should hear the audio if the oil pressure switch is activated or jumpered.

(3) No Audio Output from the "Door is Open" Warning

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(a) If the tachometer is working, check that the wire going to the rear of the tachometer is not broken. Check that the connector does not have a pushed-back pin.

(b) If the tachometer is not working, check the tachometer system. Refer to Section 77-10-00, Tachometer.

(c) Check that the RPM adjustment is within tolerance.

(d) Check for a broken wire or pushed back pin on the aural warning box.

(4) Alarm Will Not Cancel

(a) Check that the acknowledge switch is connected.

(b) The acknowledge switch may be defective.

(c) Check for a broken wire or pushed back pin at the connector.

17. Carbon Monoxide Detector (Optional)

A. The carbon monoxide detector is designed to detect, measure, and provide a visual and audible alert before the level of carbon monoxide (CO) reaches a critical level. The CO detector installation consists of the CO detector, a test/reset button (Avidyne option only), an annunciator panel light (Avidyne option only) and an interface to the aural warning system.

B. **Removal and Installation of the CO Detector Test/Reset Switch** - The test/reset switch is located on the left side of the engine instrument panel.

(1) Remove the engine instrument panel. Refer to Removal and Installation of the Engine Instrument Panel.

(2) Disconnect the two-pin plug at the back of the switch.

(3) Loosen the nut around the switch in front of the flight instrument panel, and remove the nut, and washer. The nut on the rear of the flight instrument panel around the switch does not need to be removed in order to remove the switch.

(4) Remove the switch.

(5) Replace with the new switch, and reassemble in reverse order.

C. **Removal and Installation of the CO Detector** - The carbon monoxide detector is mounted to a bracket affixed to a gusset on the firewall behind the instrument panel. Refer to Figure 211. On some Garmin G1000 aircraft, the CO detector is mounted on a shelf inside the tower.

(1) For the Avidyne option remove the Primary Flight Display per instructions in Chapter 34. For the Garmin G1000 option access the CO detector from under the instrument panel or remove the tower (refer to Tower Removal and Installation), as applicable.

(2) Disconnect the plug at the back of the detector.

(3) Remove the two screws and washers holding the detector to the mounting bracket.

(4) Remove the detector.

(5) Replace the detector, and reassemble in reverse order. Torque per section 20-00-00, Torque Data - Maintenance Practices.

(6) For the Avidyne option reinstall the Primary Flight Display per instructions in Chapter 34.

D. **CO Detector Testing**

(1) **Avidyne Option** - When power is applied to the CO detector, a self-test routine begins. The test checks for functionality of the CO sensor, temperature sensor, and the integrity of the total CO detector system.

WARNING: If the CO detect light in the annunciator panel flashes every four seconds, there is a failure of the CO sensor, temperature sensor or the microcontroller. If the failure condition continues after resetting of the CO detector, the detector must be removed and returned to CO Guardian LLC for repair or replacement. No field repair or service is allowable other than to the wiring harness, test/reset switch, and circuit breaker.

(2) **Garmin G1000 Option** - Refer to Garmin G1000 Cockpit Reference Guide.

18. Tower

A. The tower is a component of the Garmin G1000 System interior and houses the Fuel Mixture Control Panel, Alternate Static control, and the ECS or ACCS Control Head.

B. **Tower Removal and Installation**

(1) Remove the eight 8-32 screws attaching the tower to the instrument panel and the cabin floor. Refer to Figure 212.

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(2) Tilt and slide the tower out from underneath the instrument panel.

(3) Disconnect the ECS or the ACCS Control Head, as applicable, per the instructions in Section 21-65-00, Removal of the Control Head.

(4) Disconnect any hoses.

(5) Remove the tower.

(6) Installation is the reverse of removal.

19. Floor Duct

A. The floor duct is a component of the Garmin G1000 System. It serves as both hot air duct and electrical wiring race.

B. **Removal and Installation of the Floor Duct**

(1) Remove the center console per Section 25-12-00, Center Console.

(2) Remove the tower per the Tower Removal and Installation procedures.

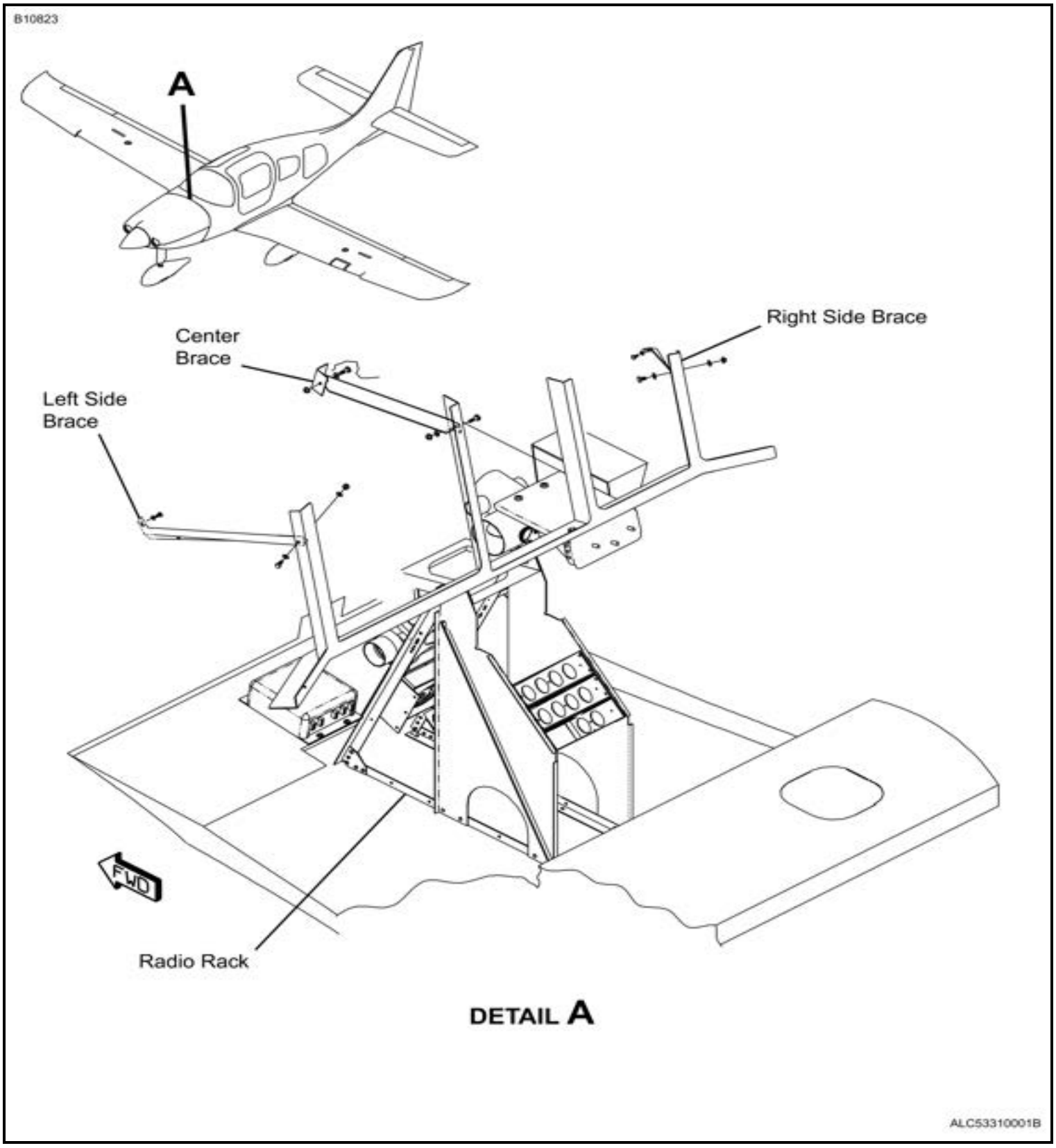
(3) Remove the six bolts and washers attaching the duct to the cabin floor. Refer to Figure 212.

(4) Remove the floor duct.

(5) Installation is the reverse of removal.

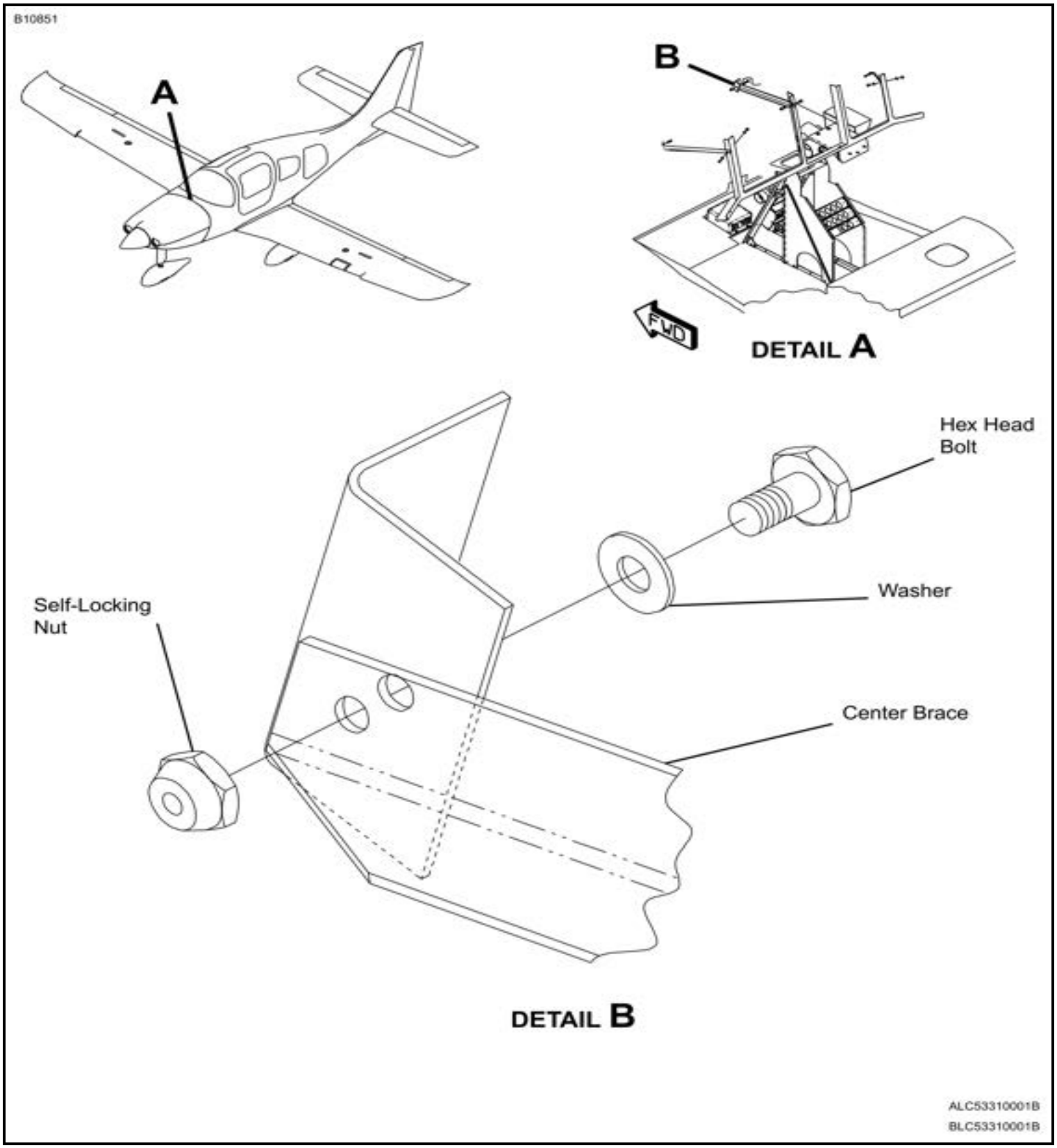
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Figure 201 : Sheet 1 : Instrument Panel Brace Locations



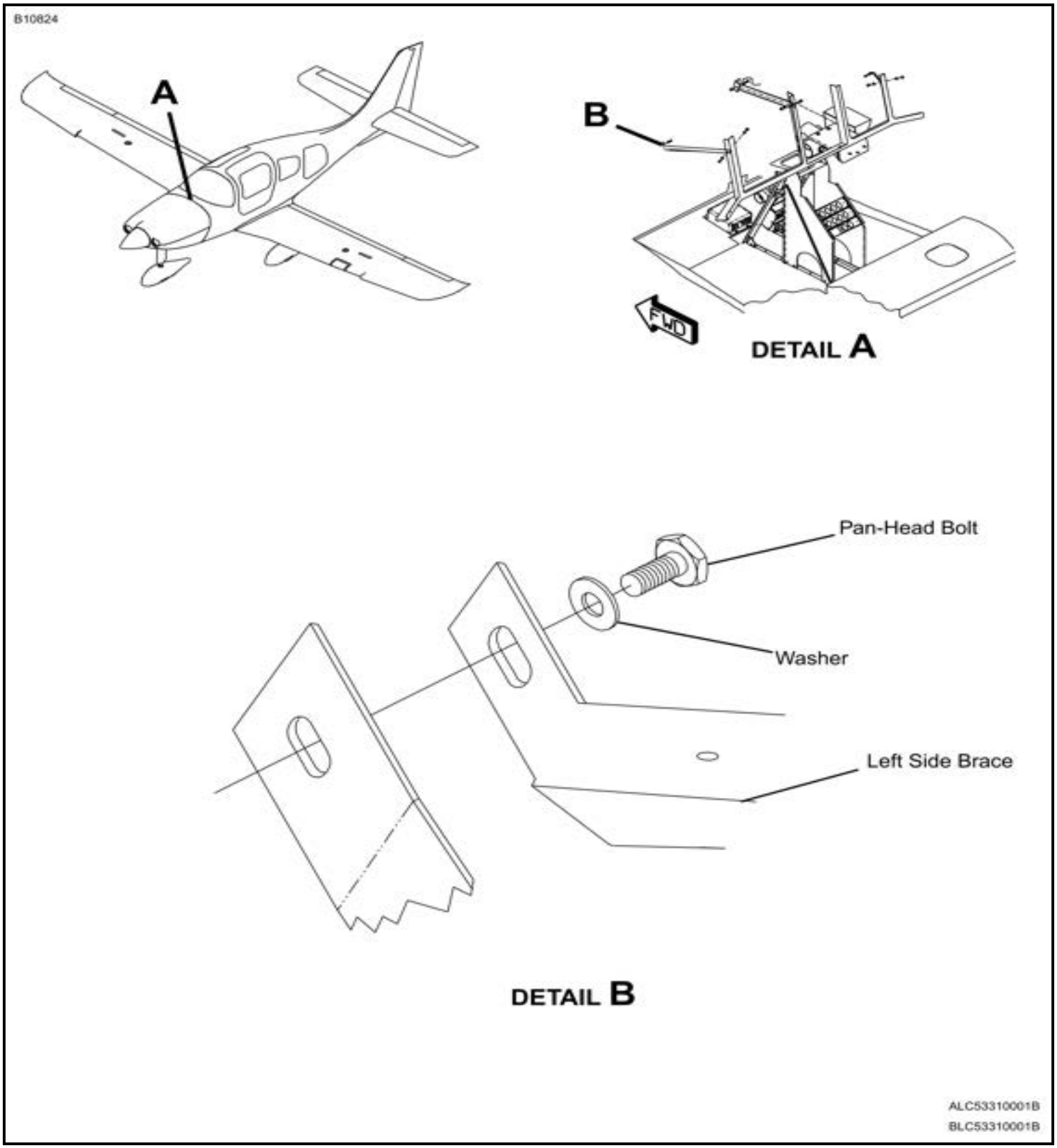
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Figure 202 : Sheet 1 : Instrument Panel Center Brace



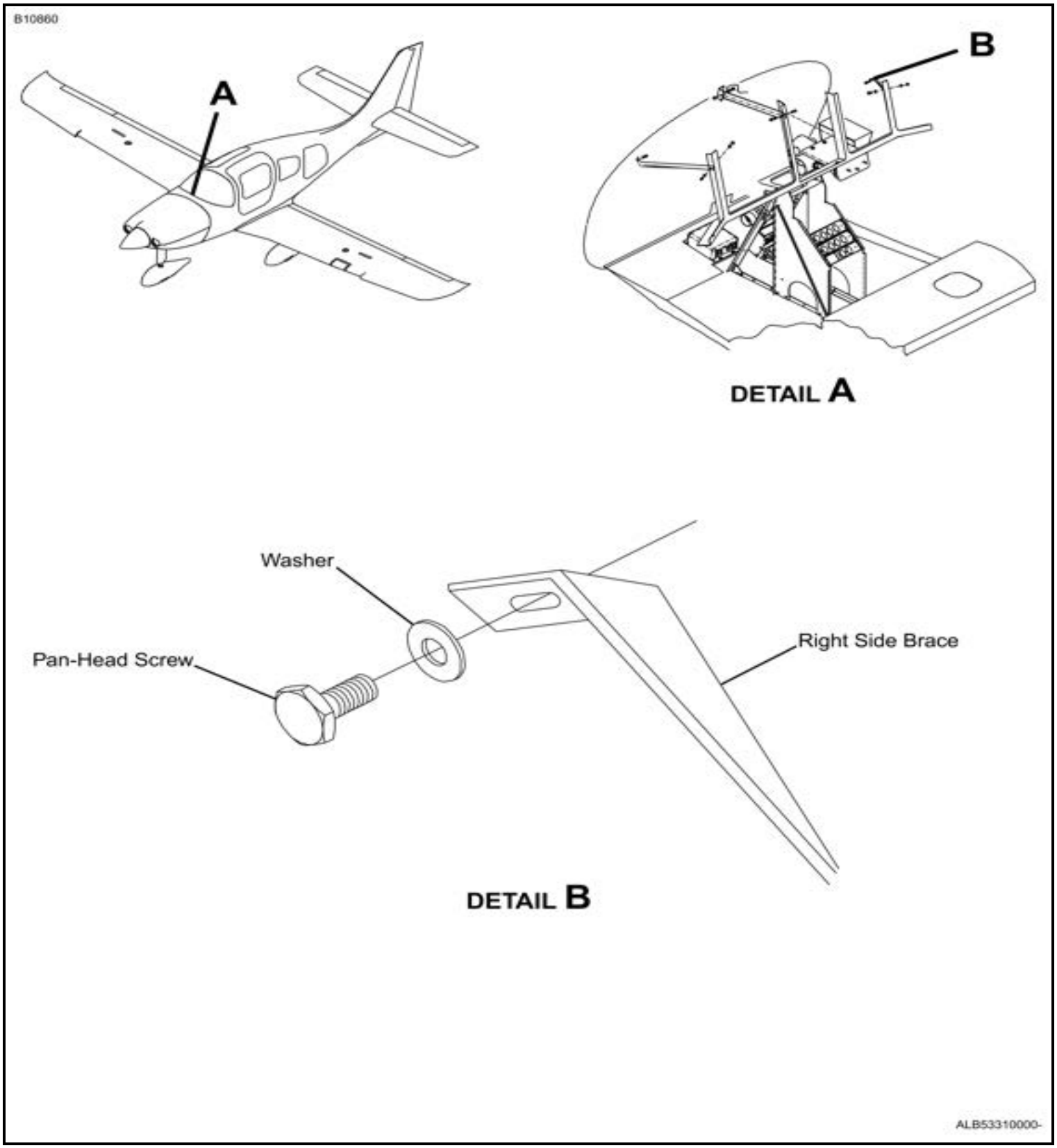
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Figure 203 : Sheet 1 : View of Left Side Brace



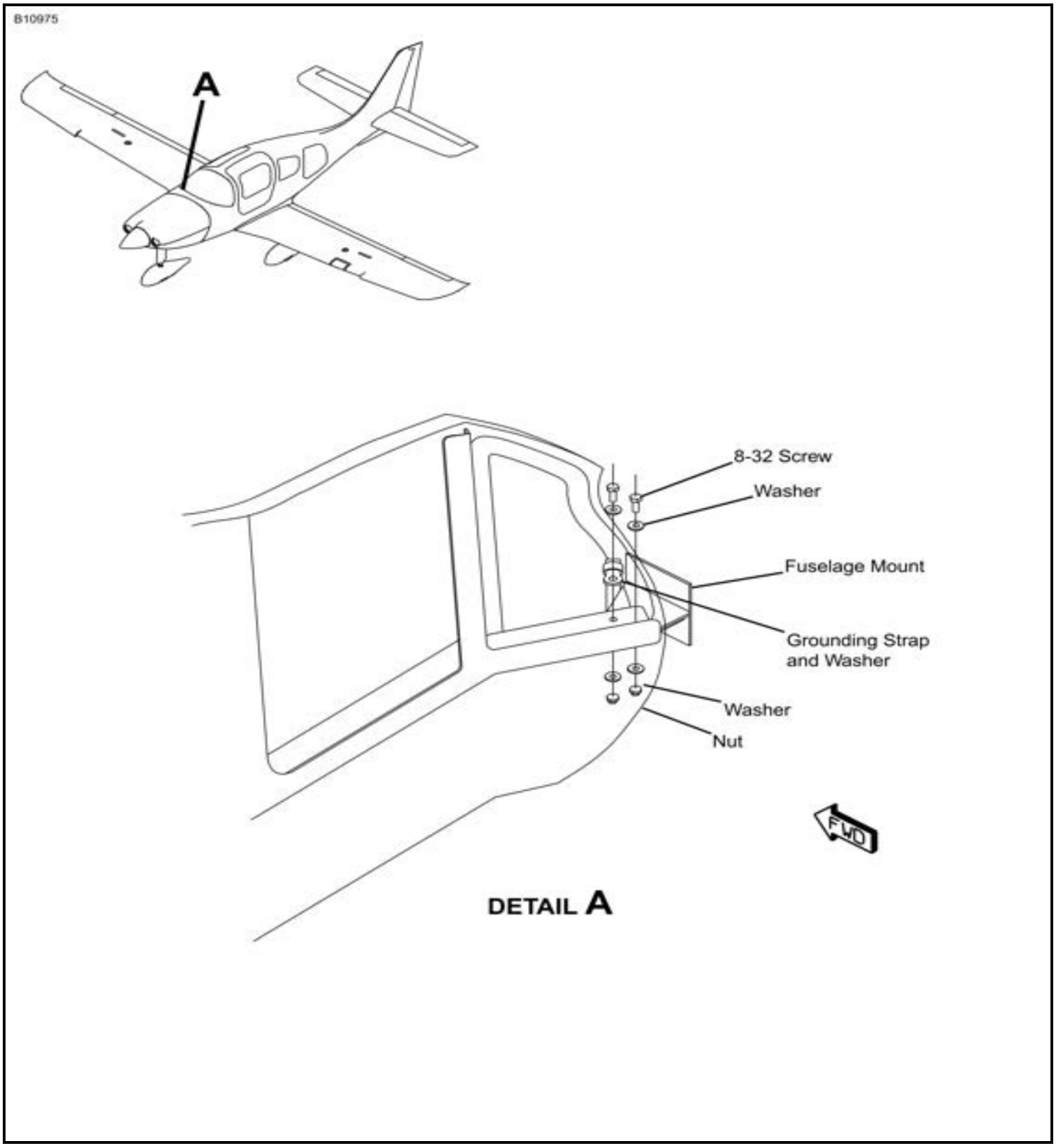
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Figure 204 : Sheet 1 : View of Right Side Brace



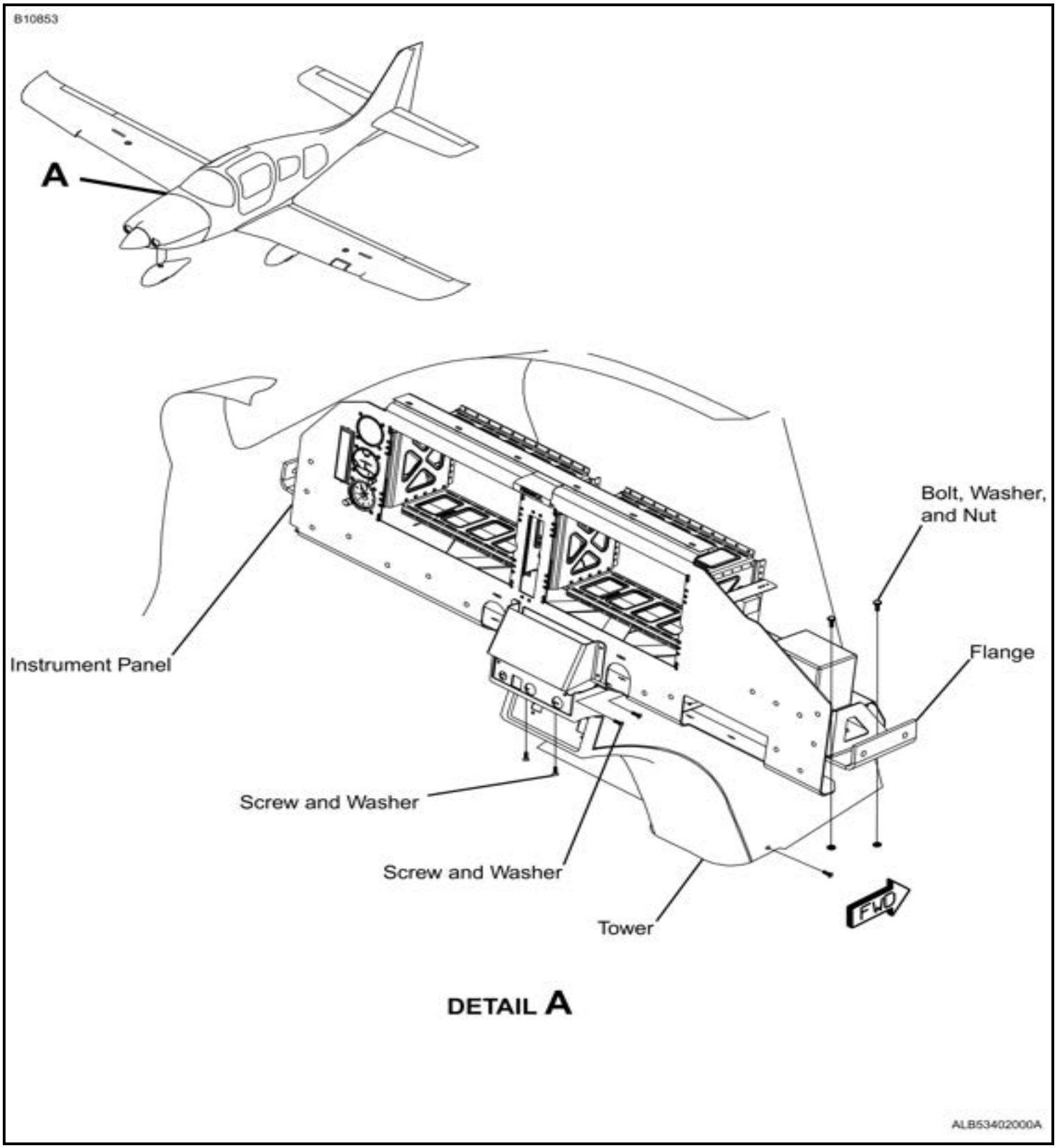
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Figure 205 : Sheet 1 : Instrument Panel Fuselage Mount



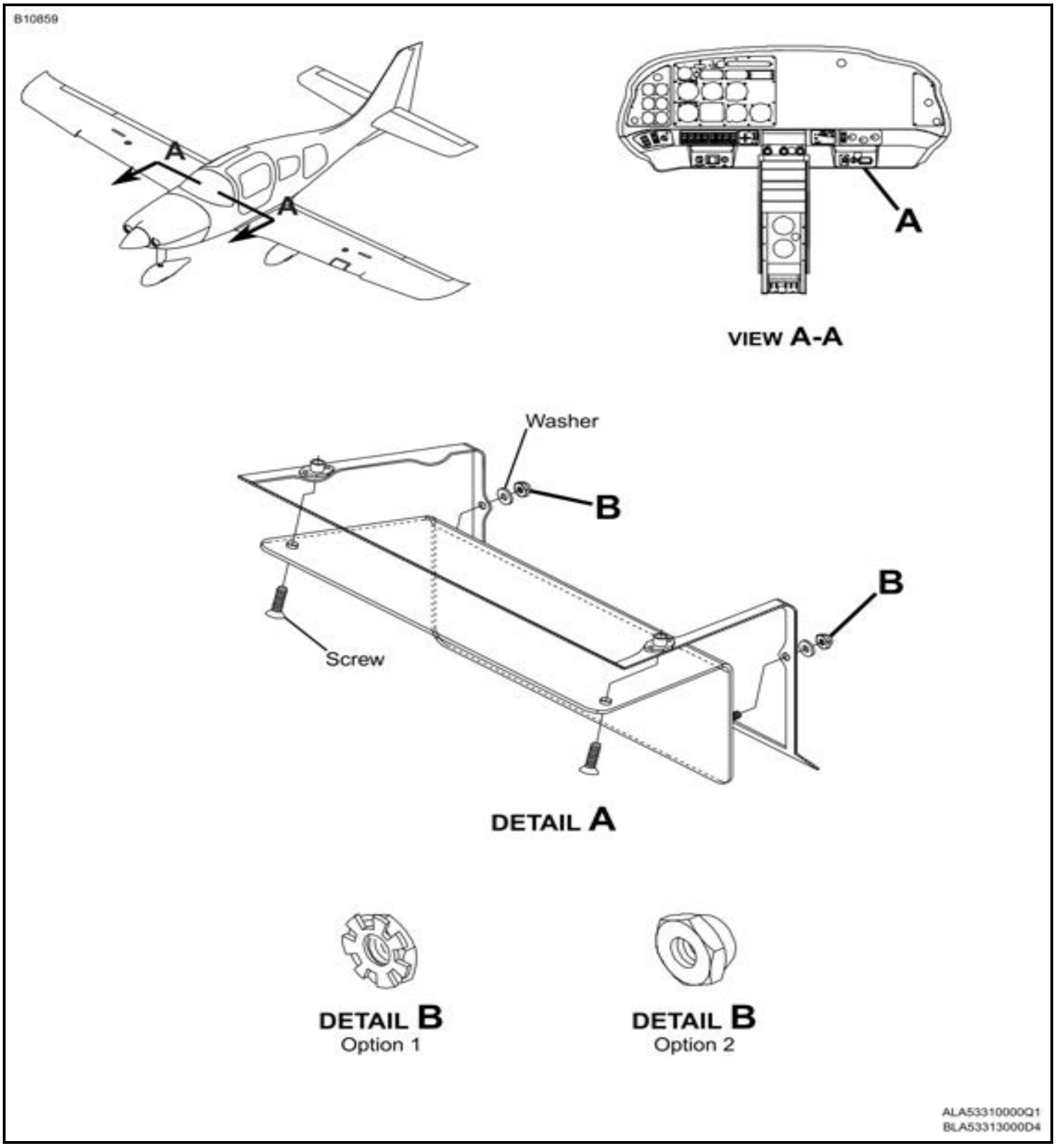
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Figure 206 : Sheet 1 : Instrument Panel Fuselage Mount



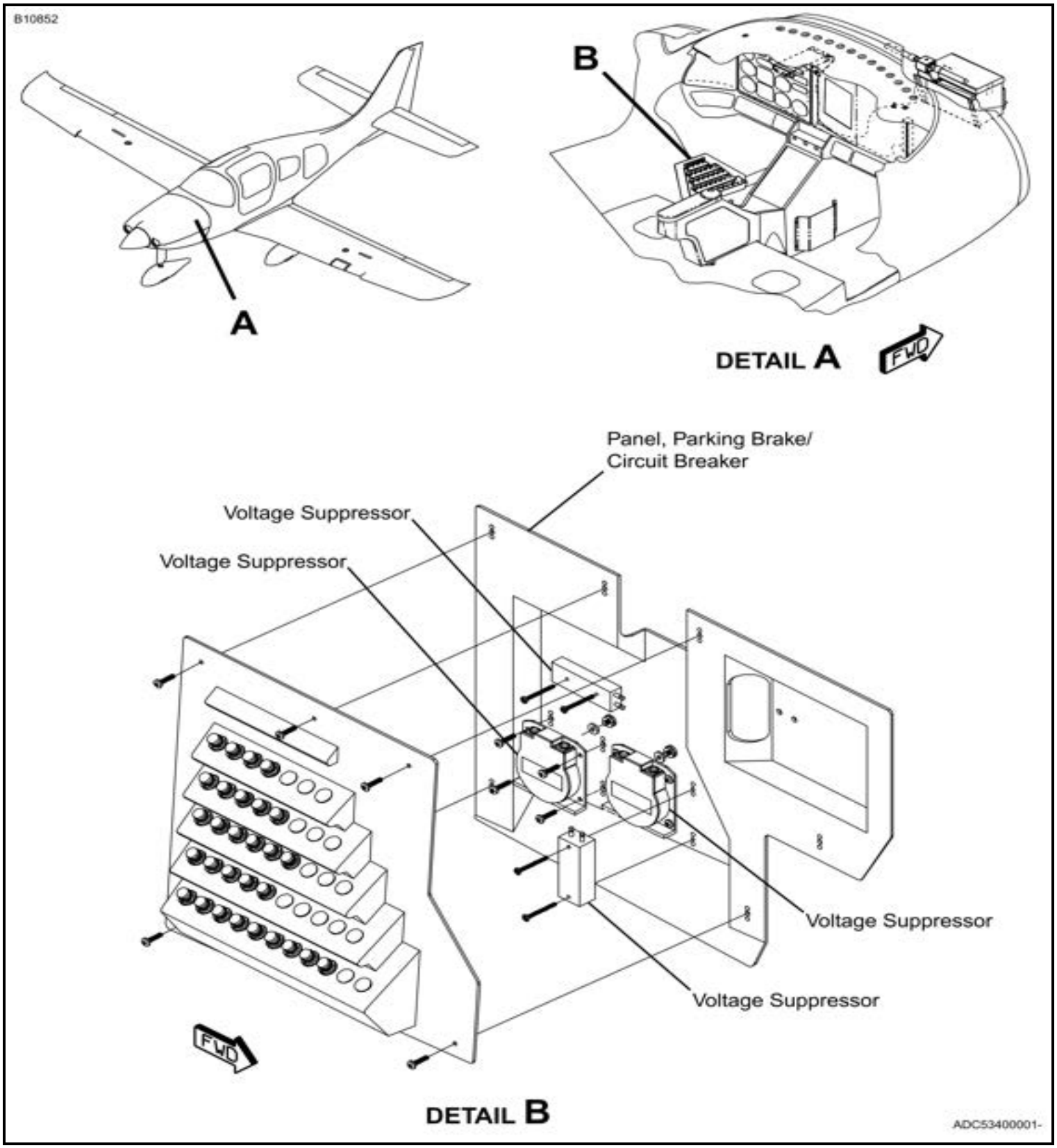
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Figure 207 : Sheet 1 : Knee Bolster to Instrument Panel Attachment



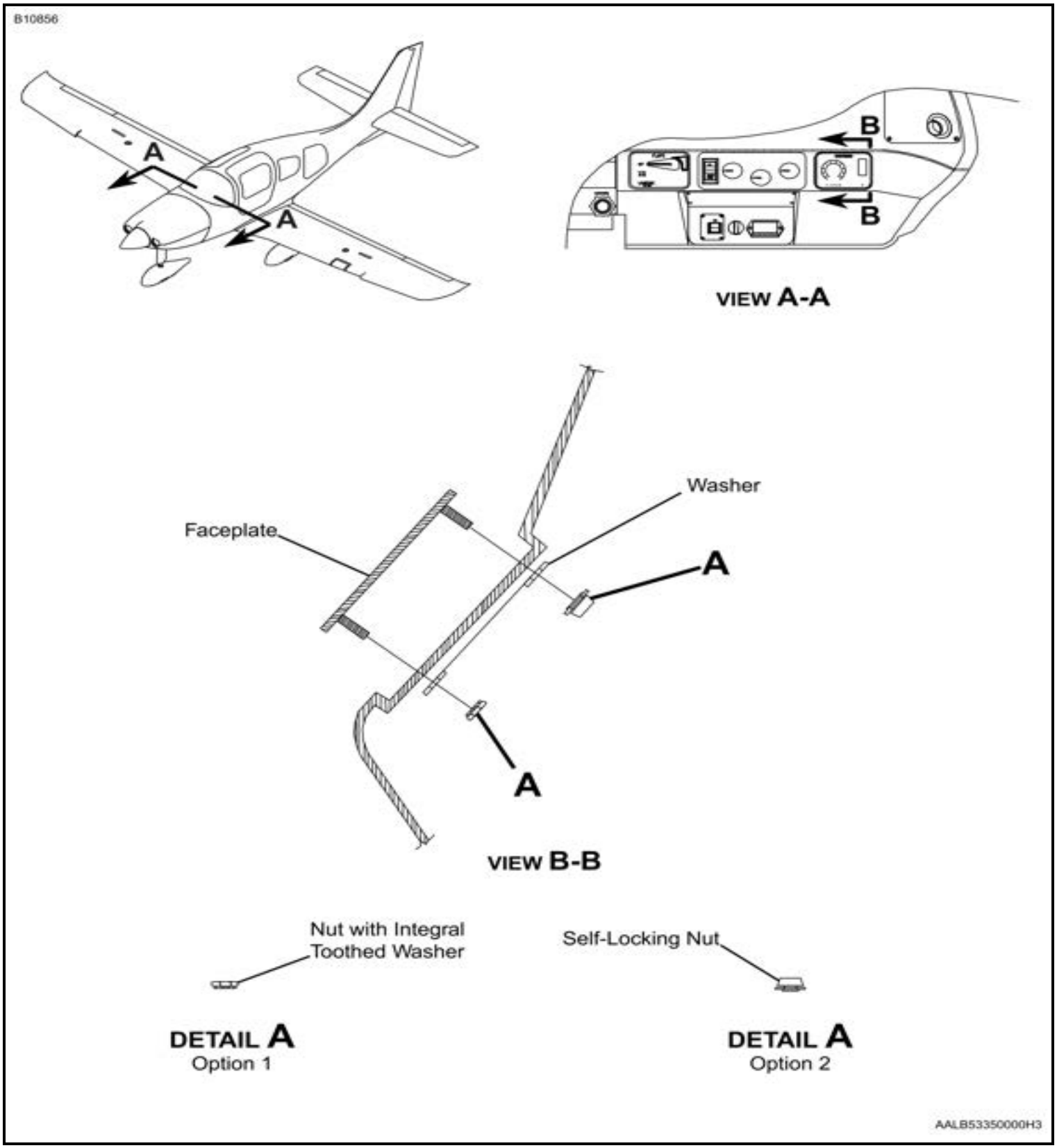
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Figure 208 : Sheet 1 : Circuit Breaker Panel



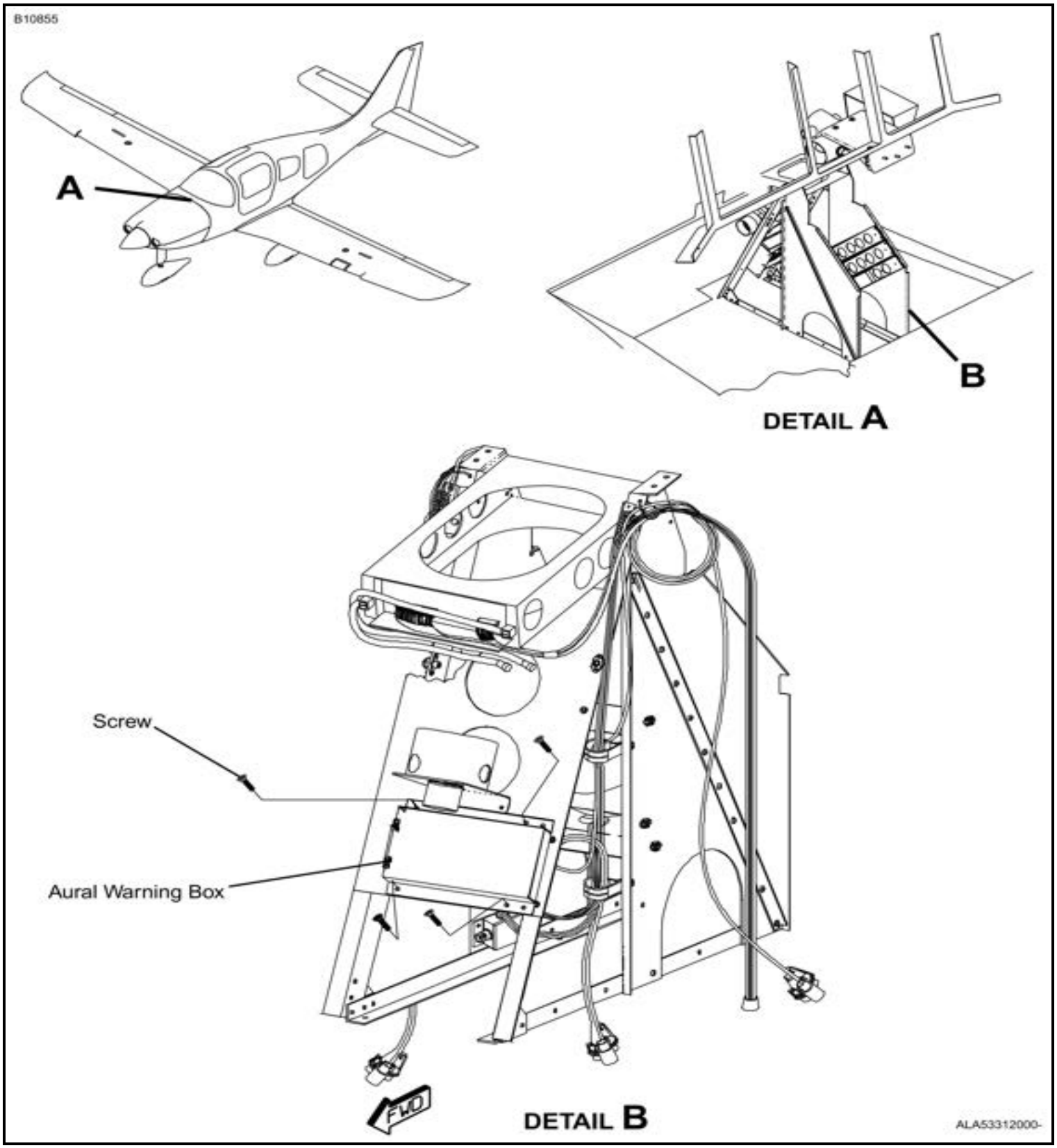
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Figure 209 : Sheet 1 : Panel and Faceplate



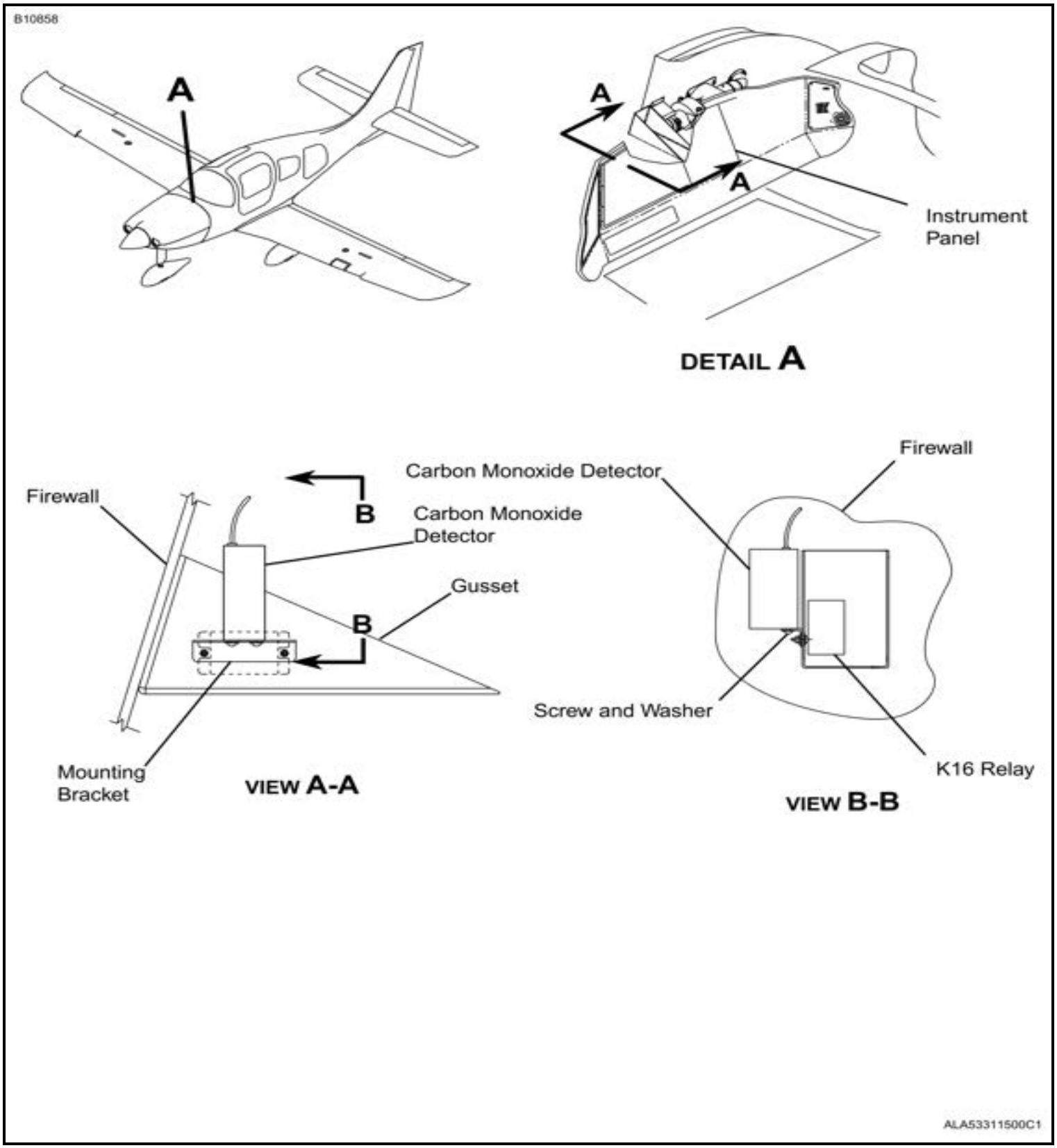
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Figure 210 : Sheet 1 : Aural Warning Installation



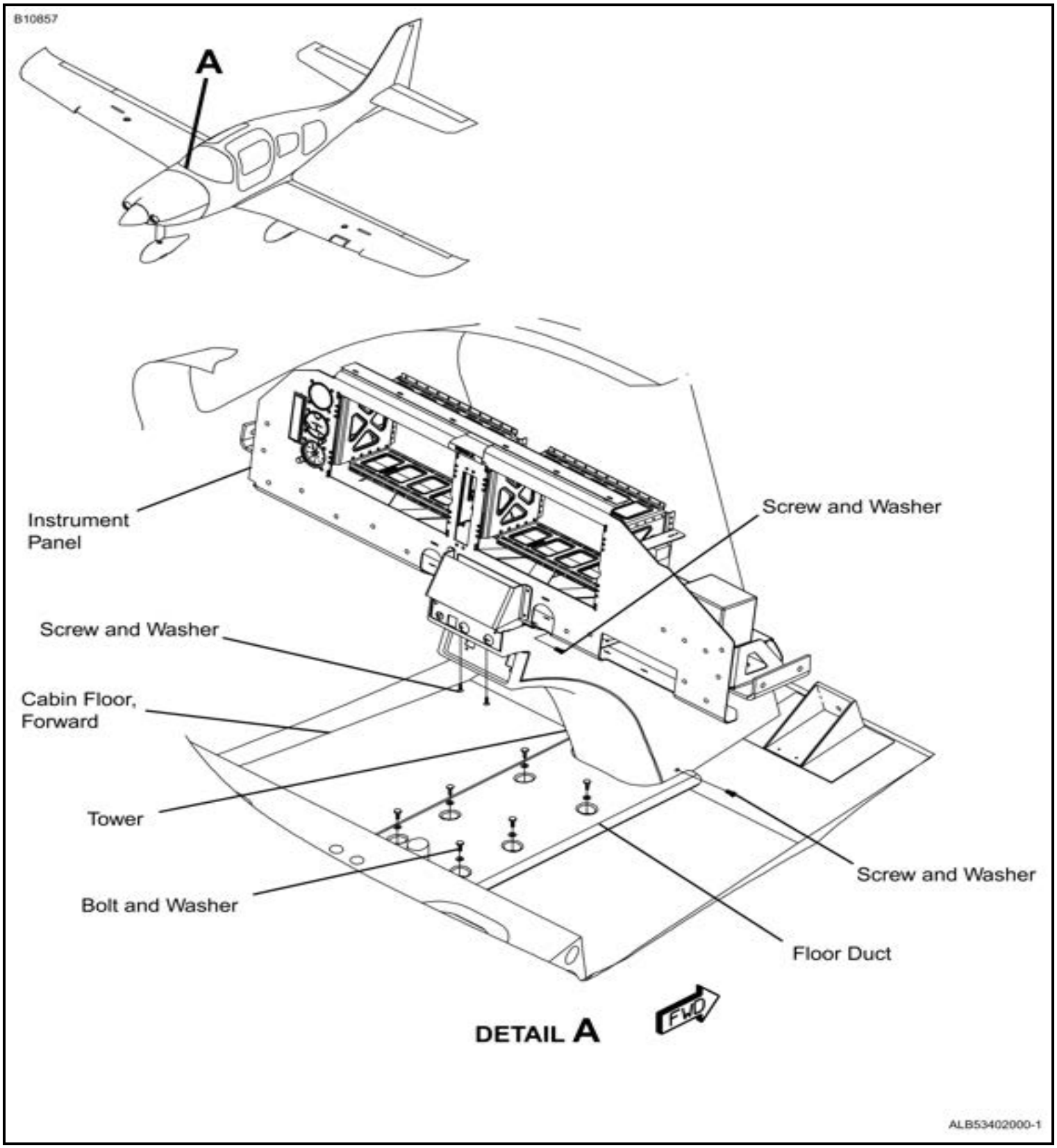
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Figure 211 : Sheet 1 : Carbon Monoxide Detector



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Figure 212 : Sheet 1 : Tower and Floor Duct



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GLARESHIELD (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 glareshield installation. For a general description of the Glareshield refer to Equipment/Furnishings - General.

B. For the Avidyne and Garmin G1000 options glareshield maintenance procedures, refer to Instrument Panels and Electrical Panels - Maintenance Practices.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Glare Shield

A. Remove the Glareshield (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the PANEL LIGHTS circuit breaker found on the cockpit circuit breaker panel.

(4) Remove the four screws and washers from the glareshield found above the GCU 275 Controller Unit (UI404) and the GMC 720 AFCS Mode Controller (UI302) on the instrument panel.

(5) Remove the Primary Flight Display (PFD) (UI407) and the Multifunction Display (MFD) (UI406) GDU 1400 displays, refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Get access to the screw and washer behind the instrument panel through the PFD instrument panel location.

CAUTION: Use care when you do work behind the instrument panel so that you do not disturb components, drop tools or hardware that could damage the electrical components.

(7) Remove the two screws and washers behind the instrument panel that secure the glareshield to the airplane structure.

(8) Find the wiring connector for the glareshield light strip behind the instrument panel on the pilot's side.

(a) Disconnect electrical connector P154 from electrical connector J154 for the glareshield light strip (FI004).

CAUTION: Carefully feed the wiring connector harness through the instrument panel when you remove the glareshield so that you do not damage the harness or glareshield light strip.

(9) Slide the glareshield aft out of the clips bonded in the defrost channels at the base of the windshield.

(10) Remove the glareshield from the airplane.

B. Install the Glare Shield (Refer to Figure 401).

(1) Put the glareshield in position above the instrument panel and carefully feed the wire harness for the glareshield light strip through the instrument panel.

(2) Connect electrical connector P154 to electrical connector J154 for the glareshield light strip (FI004).

(3) Push the glareshield forward and make sure that the glareshield is installed in the defrost channel bonded clips.

(4) Install the four screws and washers above the GCU 275 Controller Unit and the GMC 720 AFCS Mode Controller.

CAUTION: Use care when you do work behind the instrument panel so that you do not disturb components, drop tools or hardware that could damage the electrical components.

(5) Install the two screws and washers behind the instrument panel.

(6) Install the PFD and the MFD GDU 1400 displays, refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(7) Engage the PANEL LIGHTS circuit breaker found on the cockpit circuit breaker panel.

(8) Apply external electrical power to the airplane.

(9) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(10) Set the AVIONICS MASTER switch (SW04) to the ON position.

(11) Set the CROSS TIE switch (SW03) to the ON position.

(12) Set the slide FLOOD DIMMER switch (SW18) in the center of the overhead panel to the full ON position.

(a) Make sure that the glareshield flood light comes on.

(13) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

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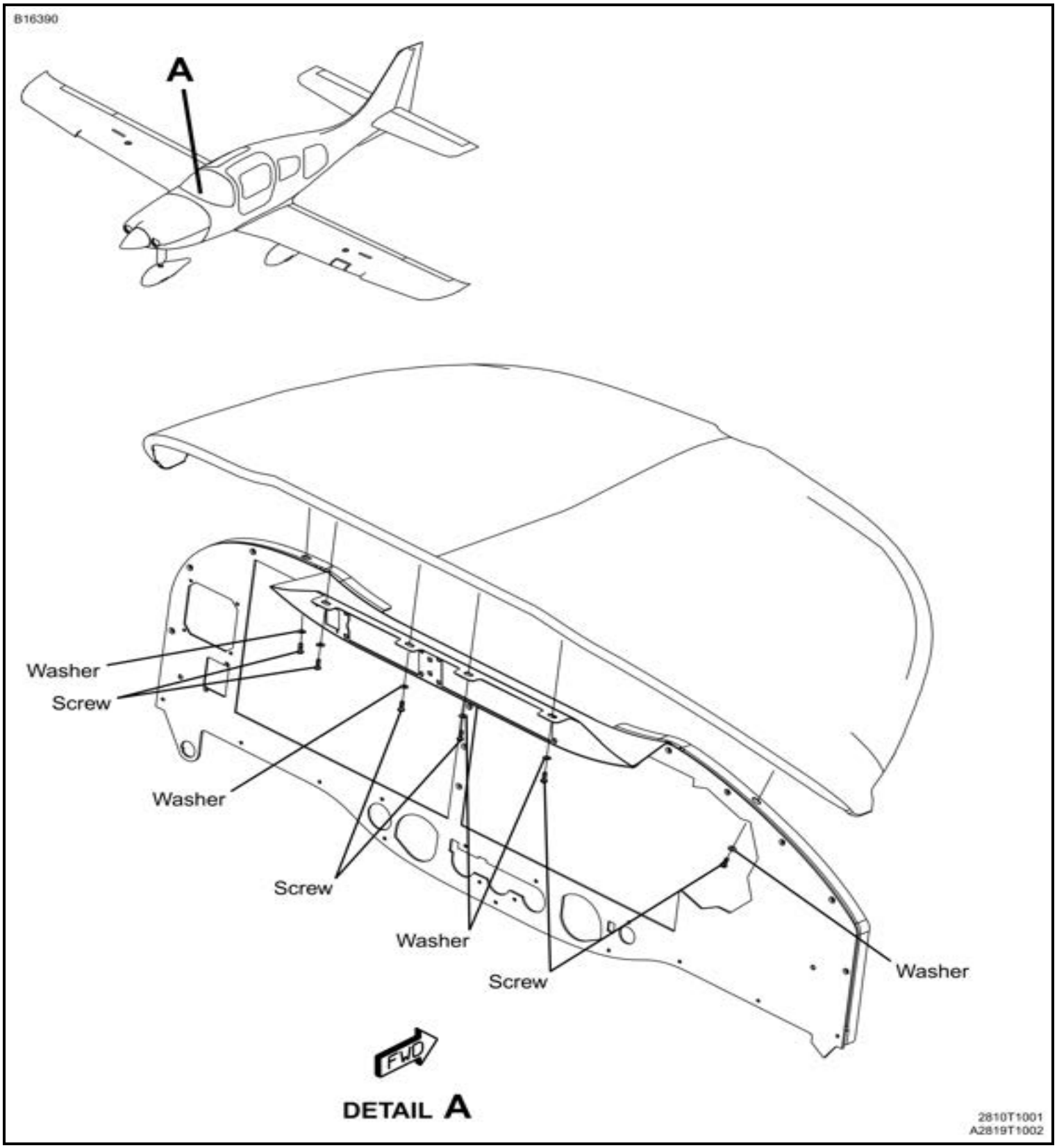
(14) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(15) Set the CROSS TIE switch (SW03) to the OFF position.

(16) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : Glareshield Removal/Installation



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CIRCUIT BREAKER PANEL (T240) - MAINTENANCE PRACTICES

1. General

A. This section gives the removal and installation procedures for the Model T240 Circuit Breaker Panel and the current sensors. This circuit breaker panel and the two current sensors are installed on airplanes configured with the FIKI option is available. For a general description of the Circuit Breaker Panel, refer to Equipment/Furnishings - General.

B. The circuit breaker panel is install on the pilot side of the forward outboard side panel. There are two current sensors mounted on the back of the forward area of the circuit breaker panel assembly, the Stall Heat Current Sensor and the Pitot Heat Current Sensor.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Circuit Breaker Panel Removal/Installation

A. Remove the Circuit Breaker Panel. For Airplanes 2049 and On refer to Figure 201. For Airplanes 2001 thru 2048 refer to Figure 202.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Disconnect the battery electrical terminals. Refer to Chapter 24, Battery - Maintenance Practices.

(5) Remove the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(6) Remove the screws that attach the circuit breaker panel to the bracket.

(7) Carefully move the switch panel out from the bracket sufficiently to get access to the panel's electrical connectors.

(a) Disconnect each of the three the electrical connectors (J61, J62, and J63), from the circuit breaker panel.

(8) Remove the circuit breaker panel from the airplane.

B. Install the Circuit Breaker Panel. For Airplanes 2049 and On (Refer to Figure 201). For Airplanes 2001 thru 2048 (Refer to Figure 202).

(1) Visually inspect the electrical connectors to make sure there are no bent or damaged pins.

(a) Repair any damage.

(2) Set the circuit breaker panel near its correct position sufficiently to get access to the airplane wiring bundles.

(a) Connect each of the three the electrical connectors (J61, J62, and J63), to the circuit breaker panel.

(3) Carefully put the circuit breaker panel in its correct position on the bracket.

(4) Install the screws that attach the circuit breaker panel to the bracket.

(5) Install the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(6) Connect the battery electrical terminals. Refer to Chapter 24, Battery - Maintenance Practices.

(7) Refer to the applicable chapter/section to make sure the systems and functions the circuit breaker panel supplies electrical power to operate correctly.

4. Circuit Breaker Panel Crossfeed Fuse Removal/Installation

A. Remove the Circuit Breaker Panel Crossfeed Fuse. For Airplanes 2049 and On refer to Figure 201. For Airplanes 2001 thru 2048 refer to Figure 202.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Disconnect the battery electrical terminals. Refer to Chapter 24, Battery - Maintenance Practices.

(5) Remove the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(6) Remove the screws that attach the circuit breaker panel to the bracket.

(7) Carefully move the circuit breaker panel out from the bracket sufficiently to get access to the panel's electrical connectors.

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(8) Remove the cover from the fuse holder (HC 901 or HC 902).

(9) Remove the fuse (HC 901 or HC 902) from the fuse holder.

B. Install the Circuit Breaker Panel Crossfeed Fuse. For Airplanes 2049 and On refer to Figure 201. For Airplanes 2001 thru 2048 refer to Figure 202.

(1) Install the fuse (HC 901 or HC 902) into the fuse holder.

(2) Install the cover for the fuse holder (HC 901 or HC 902).

(3) Set the circuit breaker panel near its correct position sufficiently to get access to the airplane wiring bundles.

(4) Carefully put the circuit breaker panel in its correct position on the bracket.

(5) Install the screws that attach the circuit breaker panel to the bracket.

(6) Install the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(7) Connect the battery electrical terminals. Refer to Chapter 24, Battery - Maintenance Practices.

(8) Refer to the applicable chapter/section to make sure the systems and functions the circuit breaker panel supplies electrical power to operate correctly.

5. Current Sensor Removal and Installation (FIKI Option)

NOTE: The removal and installation of each of the two current sensors is identical. The two current sensors are the Stall Heat (KC301) and the Pitot Heat (KC300).

A. Remove the Current Sensor (Refer to Figure 201).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Disconnect the battery electrical terminals. Refer to Chapter 24, Battery - Maintenance Practices.

(5) Remove the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(6) Remove the screws that attach the circuit breaker panel to the bracket.

(7) Carefully tilt the circuit breaker inboard to get access to the current sensors.

(a) If necessary to get access to the current sensors, remove the circuit breaker panel from the airplane. Refer to Circuit Breaker Panel Removal/Installation in this section.

(8) Identify and remove the wires from the current sensor terminal block.

(9) Remove the screws, washers and nuts that attach the current sensor to the circuit breaker panel assembly.

(a) Remove the current sensor from the circuit breaker panel assembly.

B. Install the current sensor.

(1) Put the current sensor in its correct position on the circuit breaker panel assembly.

(2) Install the screws, washers and nuts that attach the current sensor to the circuit breaker panel assembly.

(3) Identify and connect the wires to the current sensor terminal block.

(4) If necessary, install the circuit breaker panel in the airplane. Refer to Circuit Breaker Panel Removal/Installation in this section.

(5) If the circuit breaker panel was not removed, carefully put it in its correct position on the bracket.

(6) Install the screws that attach the circuit breaker panel to the bracket.

(7) Install the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(8) Connect the battery electrical terminals. Refer to Chapter 24, Battery - Maintenance Practices.

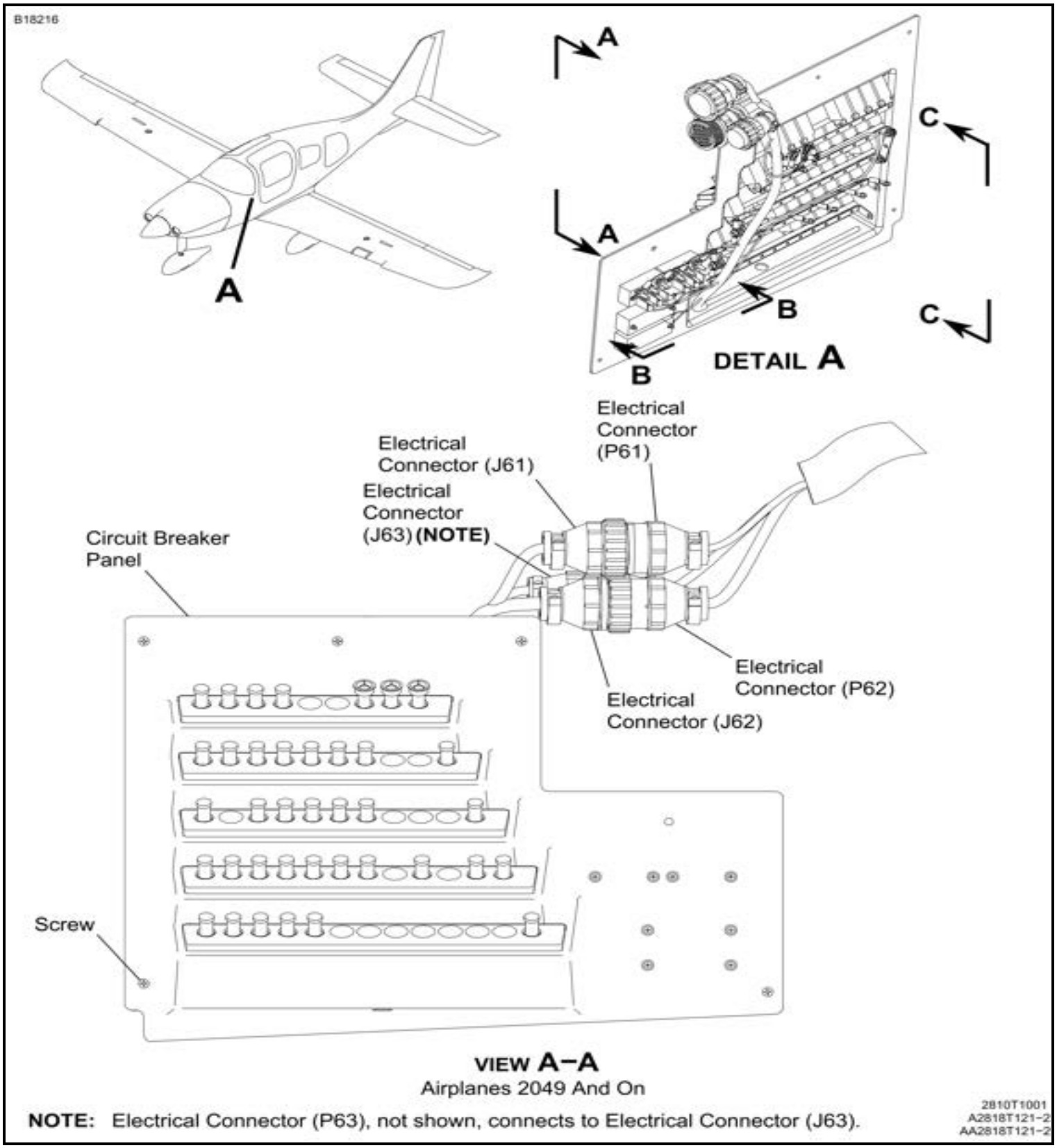
(9) Do the test of the applicable system that follows:

(a) Do a check of the Stall Warning System. Refer to Chapter 34, Stall Warning System (Airplanes 2049 and On) - Adjustment/Test.

(b) Do a check of the pitot heat . Refer to Chapter 34 Pitot-Static System (T240) - Adjustment/Test, Do the Pitot Heat Test.

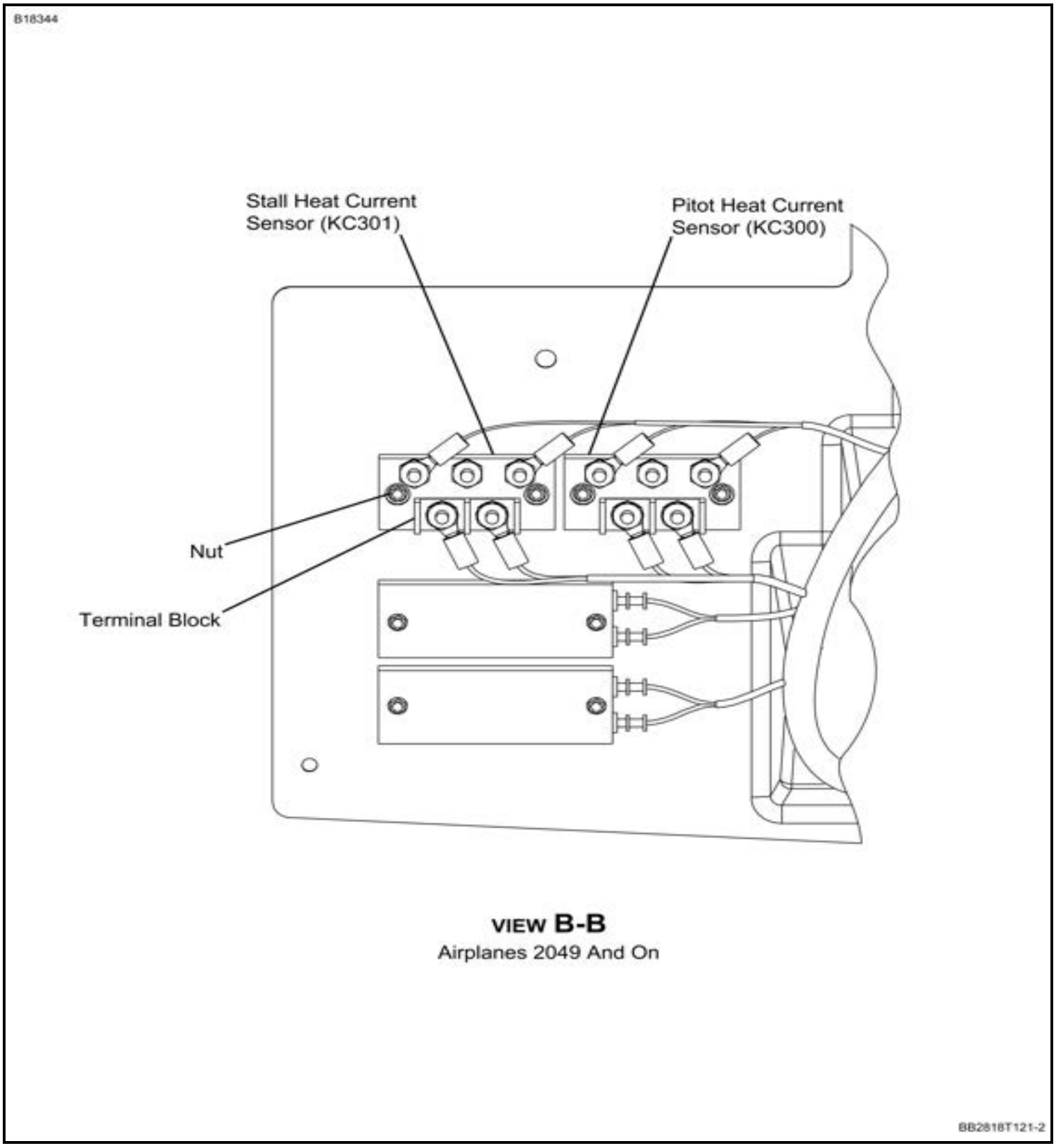
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Figure 201 : Sheet 1 : Circuit Breaker Panel Installation (Airplanes 2049 and On)



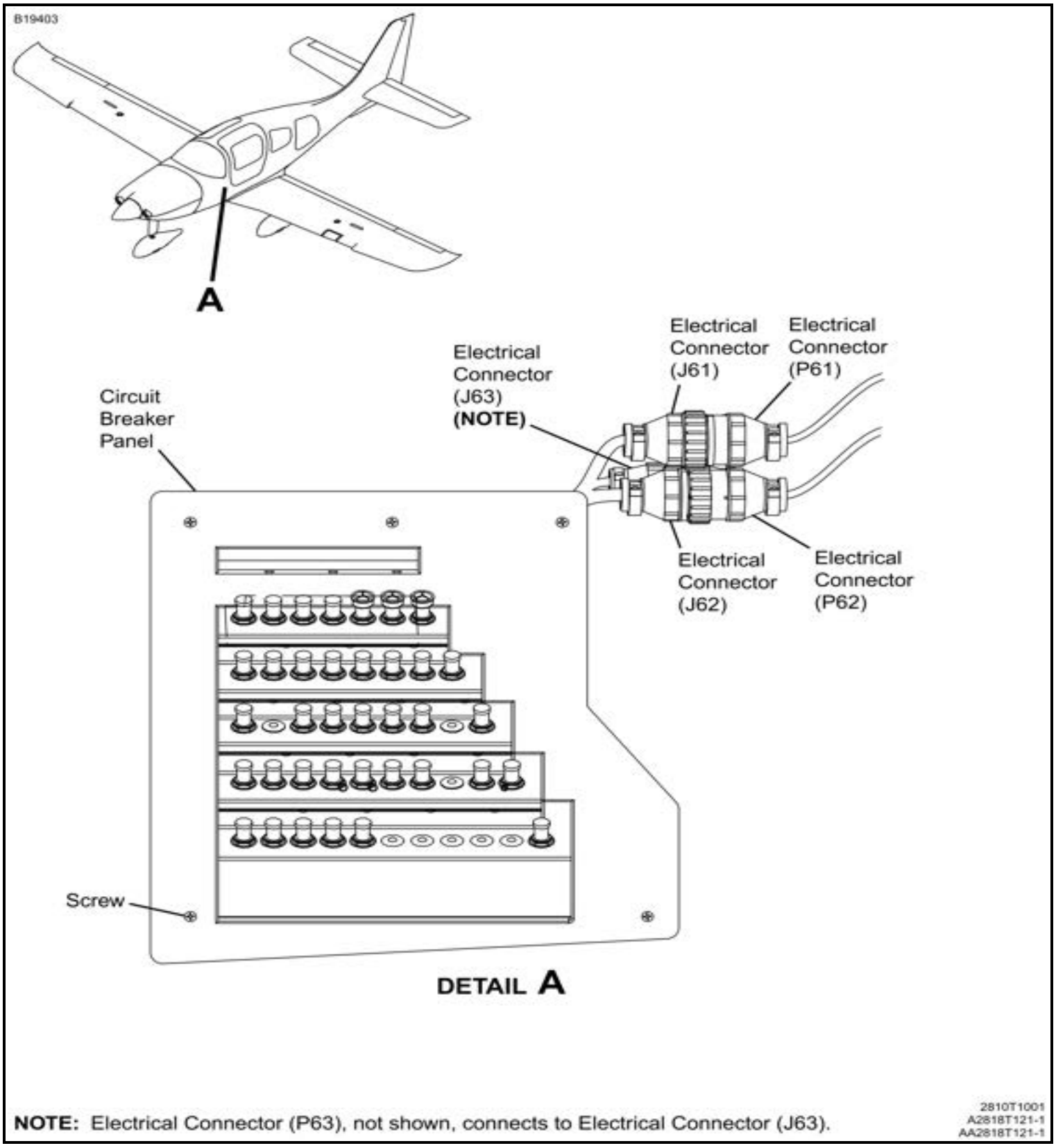
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Figure 201 : Sheet 2 : Circuit Breaker Panel Installation (Airplanes 2049 and On)



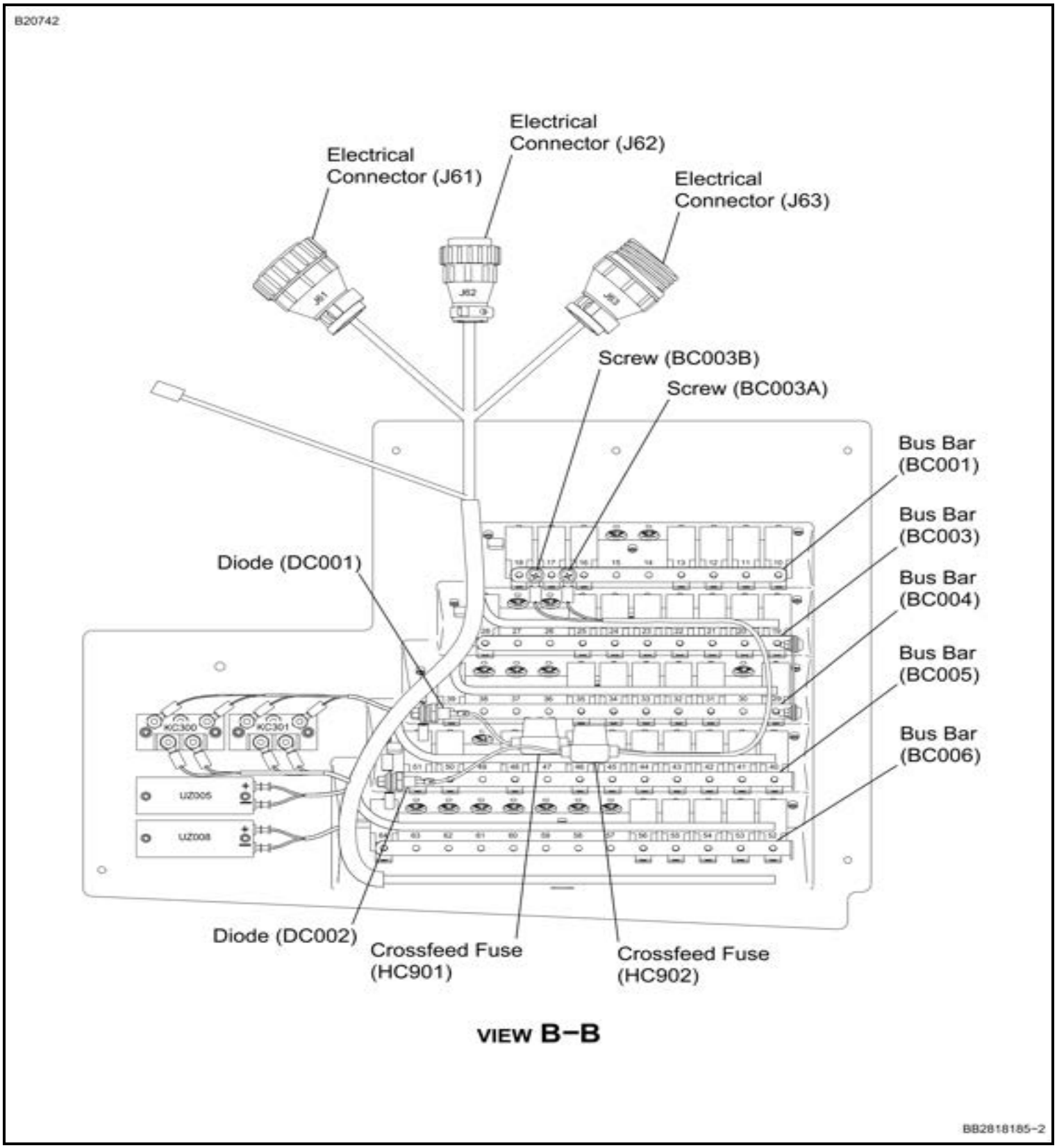
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Figure 202 : Sheet 1 : Circuit Breaker Panel Installation (Airplanes 2001 thru 2048)



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Figure 202 : Sheet 2 : Circuit Breaker Panel Installation (Airplanes 2001 thru 2048)



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CENTER CONSOLE - MAINTENANCE PRACTICES

1. General

A. This section gives the maintenance procedures for the center console installations that follow:

(1) The Avidyne Option installation

(2) The Garmin G1000 Option

B. For the Model T240 center console maintenance procedures, refer to Center Console (T240) - Removal/installation.

2. Center Console

A. Avidyne Option

(1) **Removal and Installation of the Center Console** - The center console does not normally have to be removed. An access panel on the right side below the fuel selector is provided for routine inspection and maintenance. In addition, the left and right panels in the footwell may be removed independently of the rest of the console. Refer to Figure 201.

(a) **Armrest Assembly** - The armrest assembly, including pencil box, is attached to the center console with one truss head screw. This screw is visible after the cushion in the bottom of the pencil box is removed. An optional stereo audio input jack may be installed within the pencil box and must be disconnected before removal of the armrest or the console. The armrest assembly does not have to be removed to remove the center console.

(b) **Drink Holder** - The drink holder is located on the aft end of the center console, flush with the top of the console and below the armrest. It is attached with four AAP43 rivets. The rivets may be accessed once the armrest assembly has been removed. The drink holder does not have to be removed to remove the center console. Should the drink holder need to be replaced, carefully drill out the four attachment rivets to remove the drink holder. Obtain a new drink holder, part number 588220-1, from the manufacturer and reinstall with four new rivets of the same type and size. Take care when drilling out rivets so as not to enlarge holes. Refer to Figure 202.

(c) **Left Side Panel** - The left side panel is attached to the center console by two flat head screws and washers. The panel is attached to the floor with a flat head screw and washer through a bracket and J-nut near the firewall. Removing the screws allows the panel to be removed. Removal of the left knee bolster may be necessary for added clearance to remove the left side panel on the center console.

(d) **Right Forward and Aft Side Panel** - The right forward and aft side panels are attached to the center console by two flat-head screws and washers, and a velcro strip. The panels are attached to the floor with a flat-head screw and washer through a bracket and J-nut near the firewall. Removing the screws allows the panels to be removed. Removal of the right knee bolster may be necessary for added clearance to remove the right side panel on the center console.

(e) **Access Panel** - The access panel is secured with Velcro and can be removed by lifting at one corner and continuing to lift around the panel. Removal of the right seat cushion (refer to Section 25-10-00, Removal, Installation, and Adjustment of the Front Seats) allows better visibility of the access panel and the inside of the center console.

(f) **Heater Ventilation Tubing** - The heater ventilation can be removed by clipping the tie wraps that hold the tubing to the eyeball vent and sliding the tubing off the eyeball vent. Since the tie wrap is cut (destroyed) during removal, a new tie wrap must be used when reassembling the heater ventilation tubing.

(g) **Fuel Selector** - Refer to Chapter 28.

(h) **Fuel Selector Knob** - Refer to Chapter 28.

(i) **Console** - After completing steps (c) through (h) above, use the following steps to remove the console. Refer to Figure 201.

1 Remove the two flat head 10-32 screws located at the aft of the center console under the carpet on each side.

2 Disconnect the headphone/intercom jacks, microphone plugs, and optional stereo audio input jack (if present). Refer to Chapter 23.

3 Take precaution to ensure that the splined rod connecting the fuel tank selector to the fuel selector knob is protected from damage. This is especially important if the center console is to be removed without removing the fuel tank selector.

(2) **Assembly and Installation of the Center Console** - To assemble and install the center console, reverse the above procedure.

B. Garmin G1000 Option

(1) **Removal and Installation of the Center Console** - The center console does not normally have to be removed. An

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access panel on the right side below the fuel selector is provided for routine inspection and maintenance. Refer to Figure 203.

(a) **Armrest Assembly** - The armrest assembly, including pencil box, is attached to the center console with one screw. The armrest assembly does not have to be removed to remove the center console.

(b) **Access Panel** - The access panel is secured with Velcro and can be removed by lifting at one corner and continuing to lift around the panel. Removal of the right seat cushion (refer to Section 25-10-00, Removal, Installation, and Adjustment of the Front Seats) allows better visibility of the access panel and the inside of the center console.

(c) **Heater Ventilation Tubing** - The heater ventilation can be removed by clipping the tie wraps that hold the tubing to the eyeball vent and sliding the tubing off the eyeball vent. Since the tie wrap is cut (destroyed) during removal, a new tie wrap must be used when reassembling the heater ventilation tubing.

(d) **Fuel Tank Selector** - Refer to Chapter 28.

(e) **Fuel Selector Knob** - Refer to Chapter 28.

(f) **Console Wiring** - Disconnect the wiring harness connectors P603 and P604. Refer to Figure 204.

(g) **Console** - After completing the previous five steps above, use the following steps to remove the console (refer to Figure 203):

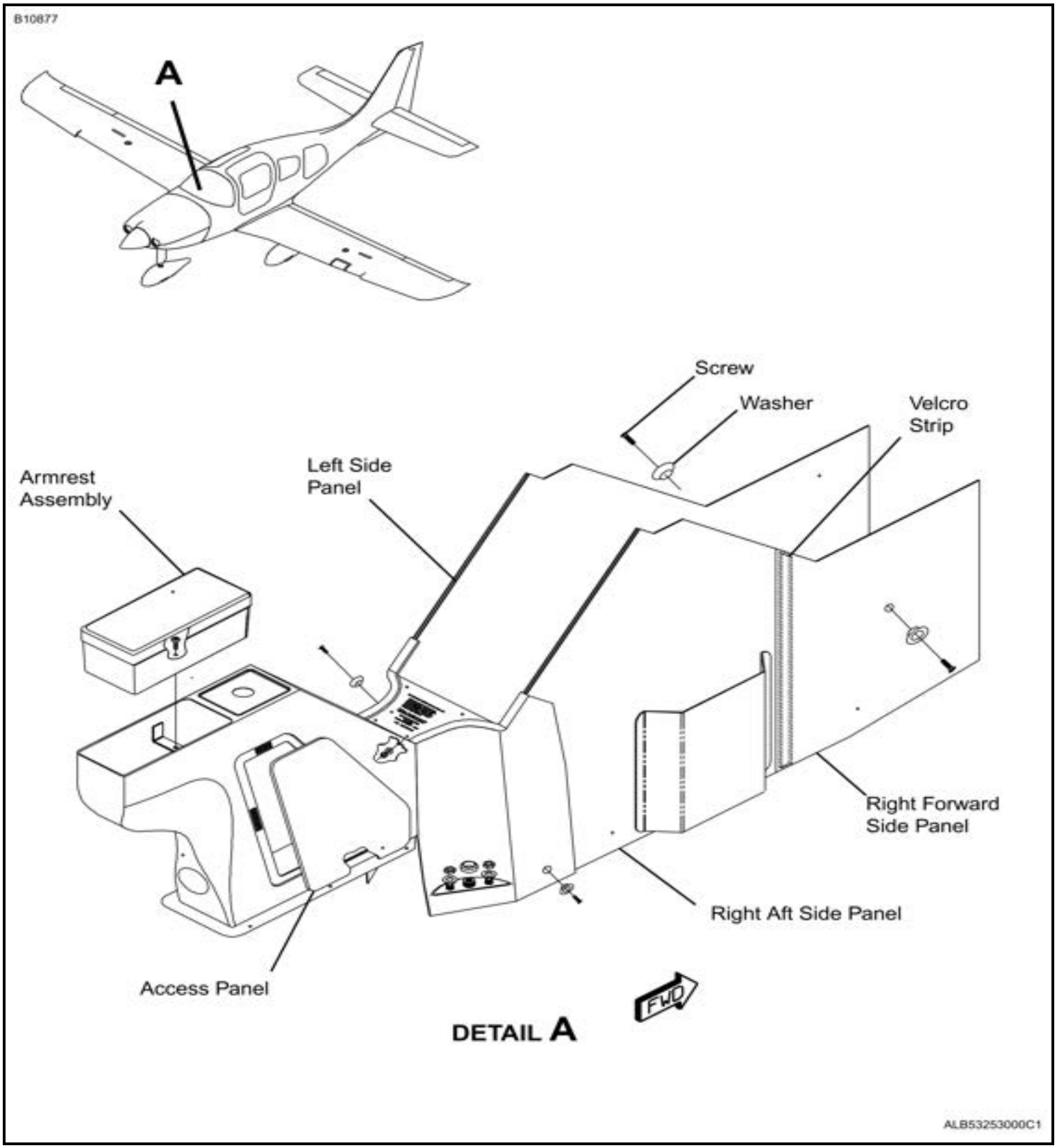
1 Remove the three flat head 10-32 screws and countersunk finishing washers located at the aft of the center console under the carpet on each side.

2 Take precaution to ensure that the splined rod connecting the fuel tank selector to the fuel selector knob is protected from damage. This is especially important if the center console is to be removed without removing the fuel tank selector.

(2) **Assembly and Installation of the Center Console** - To assemble and install the center console, reverse the above procedure. Torque the six console-to-floor installation screws to 31 in-lbs.

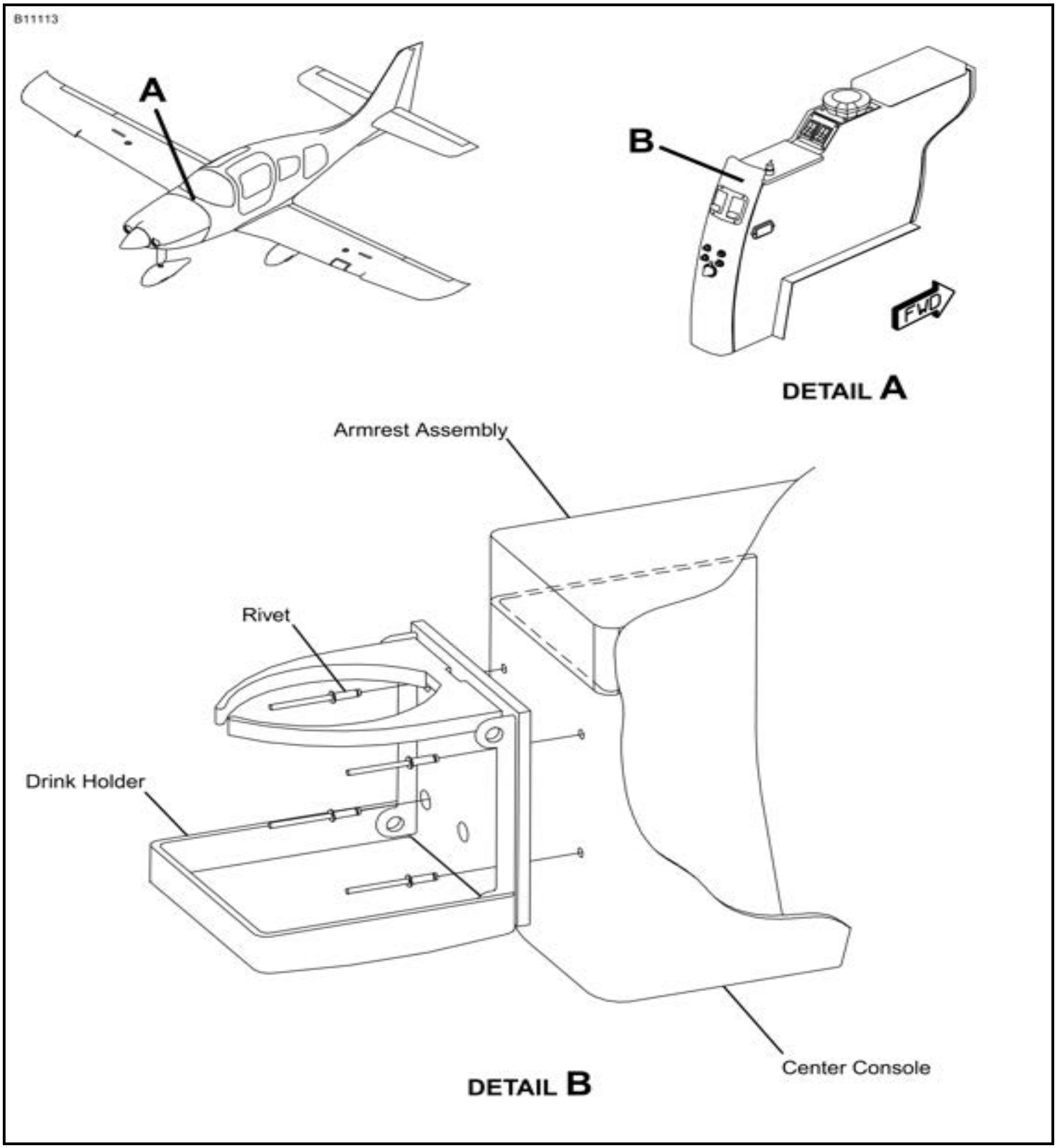
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Figure 201 : Sheet 1 : Center Console



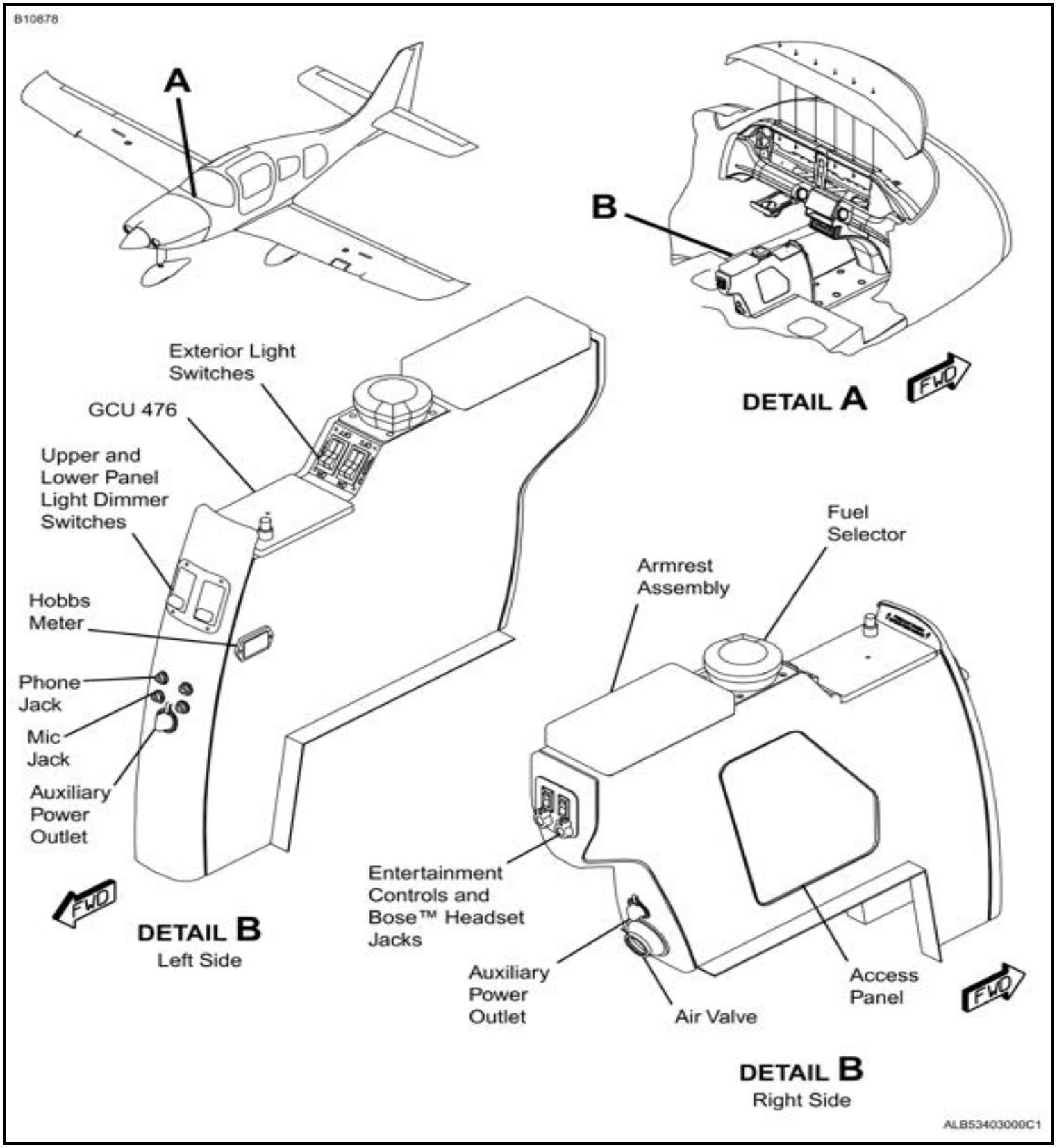
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Figure 202 : Sheet 1 : Drink Holder



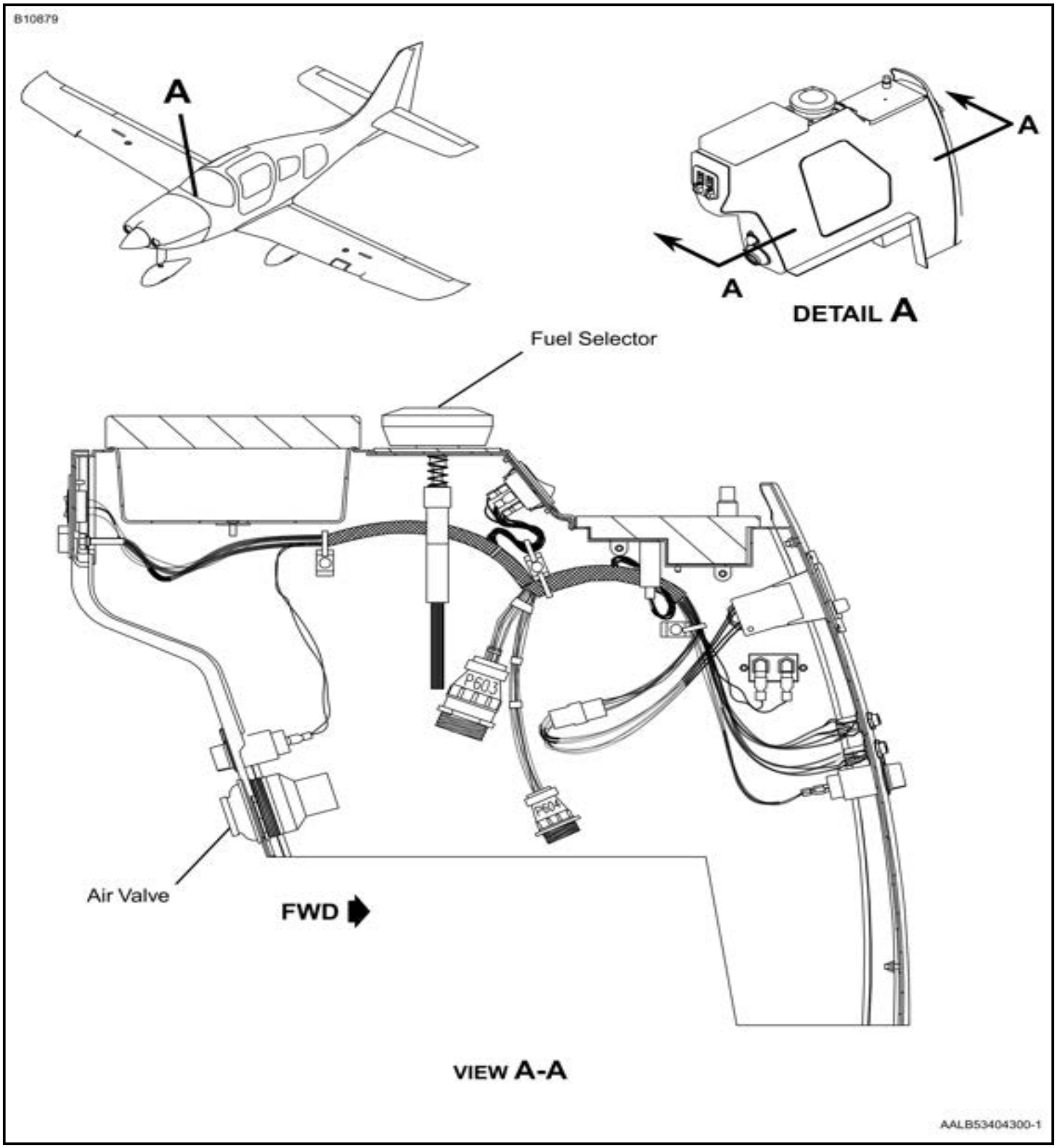
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Figure 203 : Sheet 1 : Center Console (Garmin G1000 Option)



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Figure 204 : Sheet 1 : Center Console Wiring (Garmin G1000 Option)



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SEAT BELTS AND RESTRAINTS - MAINTENANCE PRACTICES

1. Seat Belts and Restraints

CAUTION: The seat belts are not interchangeable front to rear or left to right. Properly identify seat belts and shoulder harnesses when removing for correct installation later.

CAUTION: Do not remove the bolts that hold the seat belt bracket (located at the front side panel) to the floor, as these bolts are also used for wing attachment.

NOTE: Once a cotter pin is removed, it must be discarded. Do not reuse a cotter pin on the seat belt retaining bolts or on any other part in the airplane.

A. Removal of the Front Seat Belt and Shoulder Harness

(1) Detach the lower seat belt mounts, buckle, and lap belt that are attached with 5/16-24 bolts, castellated nuts, cotter pins, and cap plug (on the right side of the center bracket). Removal of the front seat bottom cushions will make accessing these mounts easier. Refer to Section 25-10-00, Removal, Installation, And Adjustment Of The Front Seats.

(2) Remove the front shoulder belt guide by unsnapping the guide cover, and remove the 1/4-28 bolt and washer.

(3) After removal of the middle lower side panel. Refer to Section 25-30-00, Middle Lower Side Panels, detach the shoulder belt retractors that are located behind the lower side panels just aft of the front seats. The retractors are attached with four screws, washers, and 10-32 nuts.

B. Installation of the Front Seat Belt and Shoulder Harness - Installation is the reverse of the above with the following additions:

(1) Torque the 10-32 screws attaching the shoulder belt retractors 30 to 36 in.-lbs.

(2) Torque the 1/4-28 bolts securing the shoulder belt guides to 72 to 84 in.-lbs.

(3) When securing the lower seat belt mount located at aircraft centerline, assemble the 5/16-24 bolts and castellated nuts hand tight until all side play is eliminated. If the notch in the castellated nut does not align with the hole in the 5/16-24 bolt, preventing the cotter pin from being installed, tighten the castellated nut until the next available notch aligns with the hole in the 5/16-24 bolt, then install a new cotter pin. Fill a new MS-3 cap plug half full with Wacker SWS-951 sealant, and install over the nut with the cotter pin.

(4) When securing the lower seat belt mount located at the front side panel, assemble the 5/16-24 bolts and castellated nuts hand tight until all side play is eliminated. If the notch in the castellated nut does not align with the hole in the 5/16-24 bolt, preventing the cotter pin from being installed, back off the castellated nut until the next available notch aligns with the hole in the 5/16-24 bolt. Install a new cotter pin as shown in Figure 201.

C. Removal of the Rear Seat Belt and Shoulder Harness

(1) Detach the lower seat belt mounts, buckle, and lap belt that are attached with 5/16-24 bolts, castellated nuts, and cotter pins. Removal of the rear seat bottom cushions will make accessing these mounts easier. Refer to Section 25-10-00, Removal, Installation, and Adjustment of the Rear Seats and Crossbar.

(2) The rear seat shoulder belt retractor is mounted on a stud protruding from the fuselage and held in place with a 3/8-24 self-locking nut and two special washers. Refer to Figure 202. The stud has a recess for a 5/32 Allen wrench so that the stud can be prevented from rotating when removing or installing the self-locking nut.

CAUTION: The stud must be prevented from rotating. Failure to prevent rotation may result in cracked or chipped paint on the exterior of the fuselage at the rear shoulder belt retractor location.

D. Installation of the Rear Seat Belt and Shoulder Harness - Installation is the reverse of the above with the following additions:

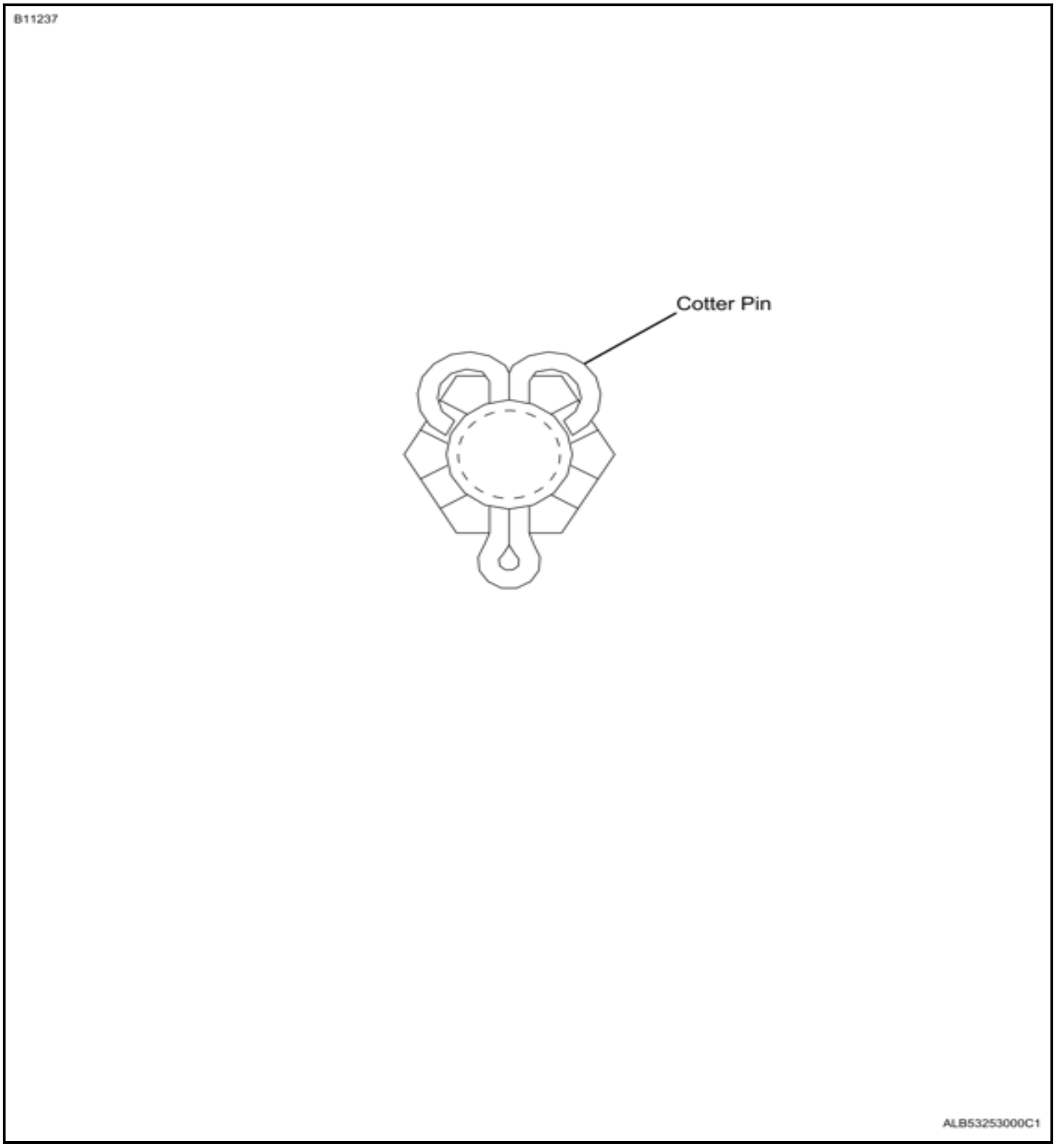
(1) Install the special washers as shown in Figure 202.

(2) Torque the self-locking nut 140 to 180 in.-lbs. **As previously stated, the stud must be prevented from rotating. Failure to prevent rotation may result in cracked or chipped paint on the exterior of the fuselage at the rear shoulder belt retractor location.**

(3) When securing the lower seat belt mounts, assemble the 5/16-24 bolts and castellated nuts hand tight until all side play is eliminated. If the notch in the castellated nut does not align with the hole in the 5/16-24 bolt, preventing the cotter pin from being installed, tighten the castellated nut until the next available notch aligns with the hole in the 5/16-24 bolt, then install a new cotter pin.

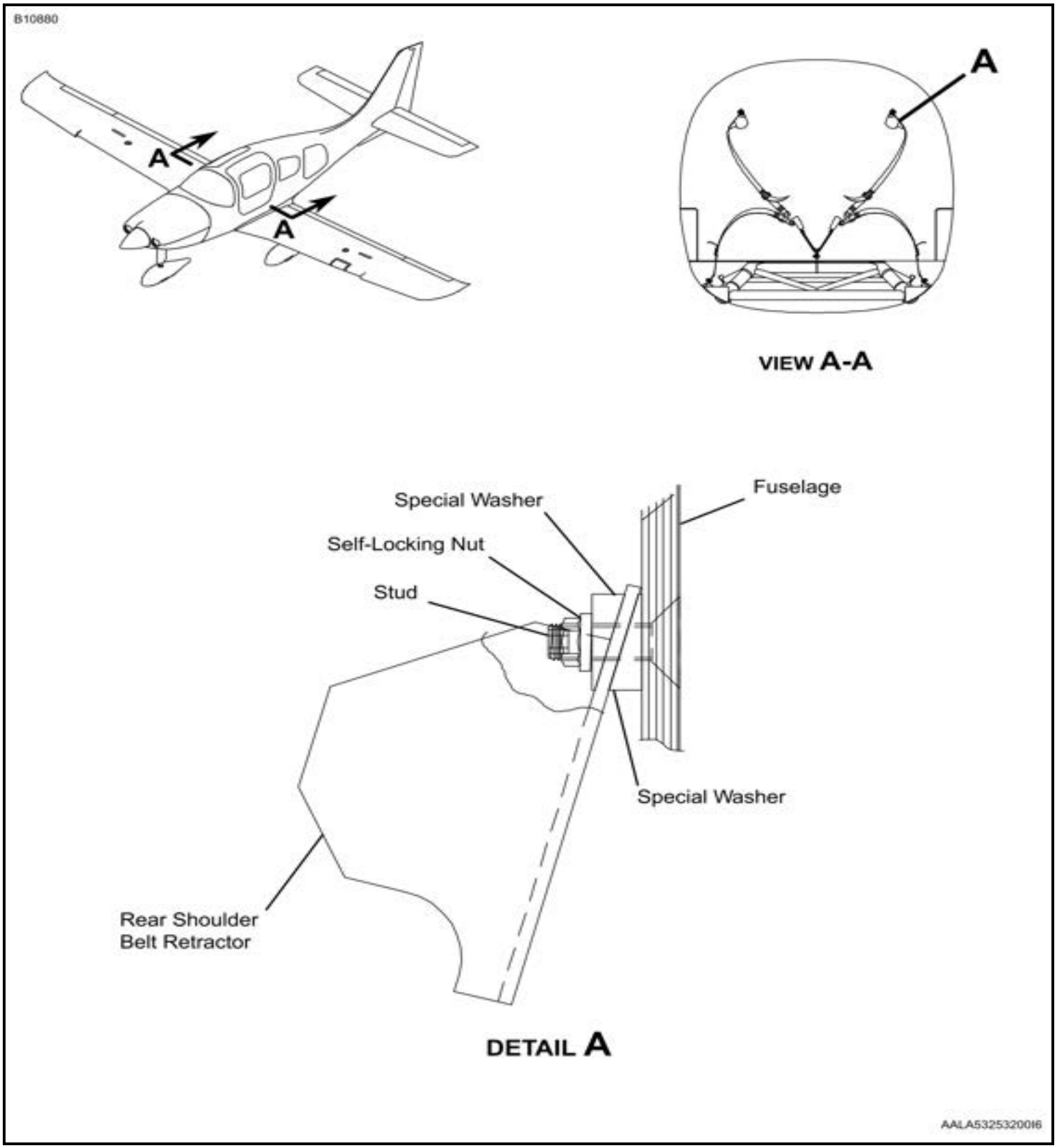
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Figure 201 : Sheet 1 : Cotter Pin Installation



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Figure 202 : Sheet 1 : Rear Seat Belt Attachment



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INFLATABLE RESTRAINT SYSTEM - DESCRIPTION AND OPERATION

1. General

A. This section gives the general description and operation of the AMSAFE Aviation Inflatable Restraint (AAIR) system. The AAIR is a self-contained, modular, three-point restraint system that will help to protect occupants from head-impact injury during an accident. The AAIR system has four core components: the air bag assembly, the inflation assembly, the electronics module assembly (EMA), and the cable interface assembly. The forward AAIR is standard on the Model T240. The aft AAIR is optional. The forward seat AAIR has one EMA that controls the system operation The aft seat has its own independent EMA that controls the aft seat AAIR system operation. Refer to, Figure 1 and Figure 2.

WARNING: Do not try to open the inflator assembly. Do not apply an electric current to the electronics connection. The inflator assembly is a stored, gas/energetic material device and can cause injury if accidentally deployed.

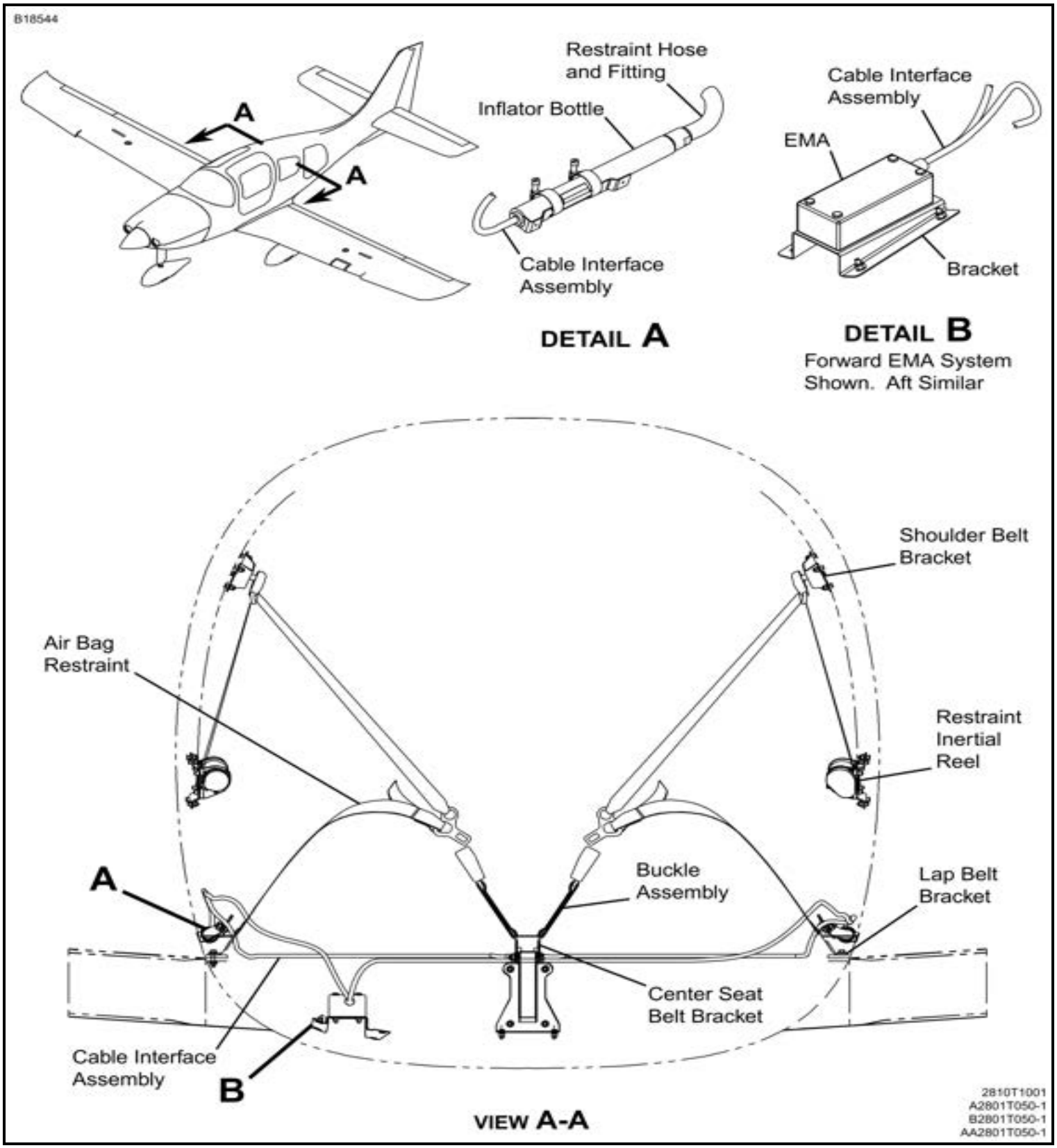
B. The cable interface assembly connects the seat belt assembly electrically to the EMA and inflator bottle. The cable interface assembly supplies a diagnostic tool connector for system functional tests. The EMA(s) are installed on a bracket behind the left middle side panel. When only the standard forward AAIR system is installed there is only one EMA. When the optional aft AAIR system is installed there are two EMA's installed on the airplane. The aft EMA is installed on top of the forward EMA. The forward AAIR system inflator bottles are installed behind the forward left and right side panels. The aft AAIR system inflator bottles are installed behind the baggage compartment left and right side panels. The aft center seat belt bracket assembly includes two buckles for the aft AAIR system and two buckles to install a child seat. The aft AAIR system is not serviceable when the child seat buckles are used to install a child seat on the aft seat.

2. Operation

A. When an airplane accident occurs, the EMA does an analysis of the crash pulse in milliseconds. The EMA then supplies a crash pulse to the gas inflator bottle. The air bags inflate rapidly and get in a position between the forward airplane movement and the seat occupant. The air deflates after deployment to prevent an obstruction to egress from the airplane. The parameters of the crash sensors prevents inadvertent deployment of the AAIR system for normal operations such as: hard landings, vibration, or turbulence. When the seat belts are not buckled they are in the safe condition. When the seat buckle is connected, the system is serviceable.

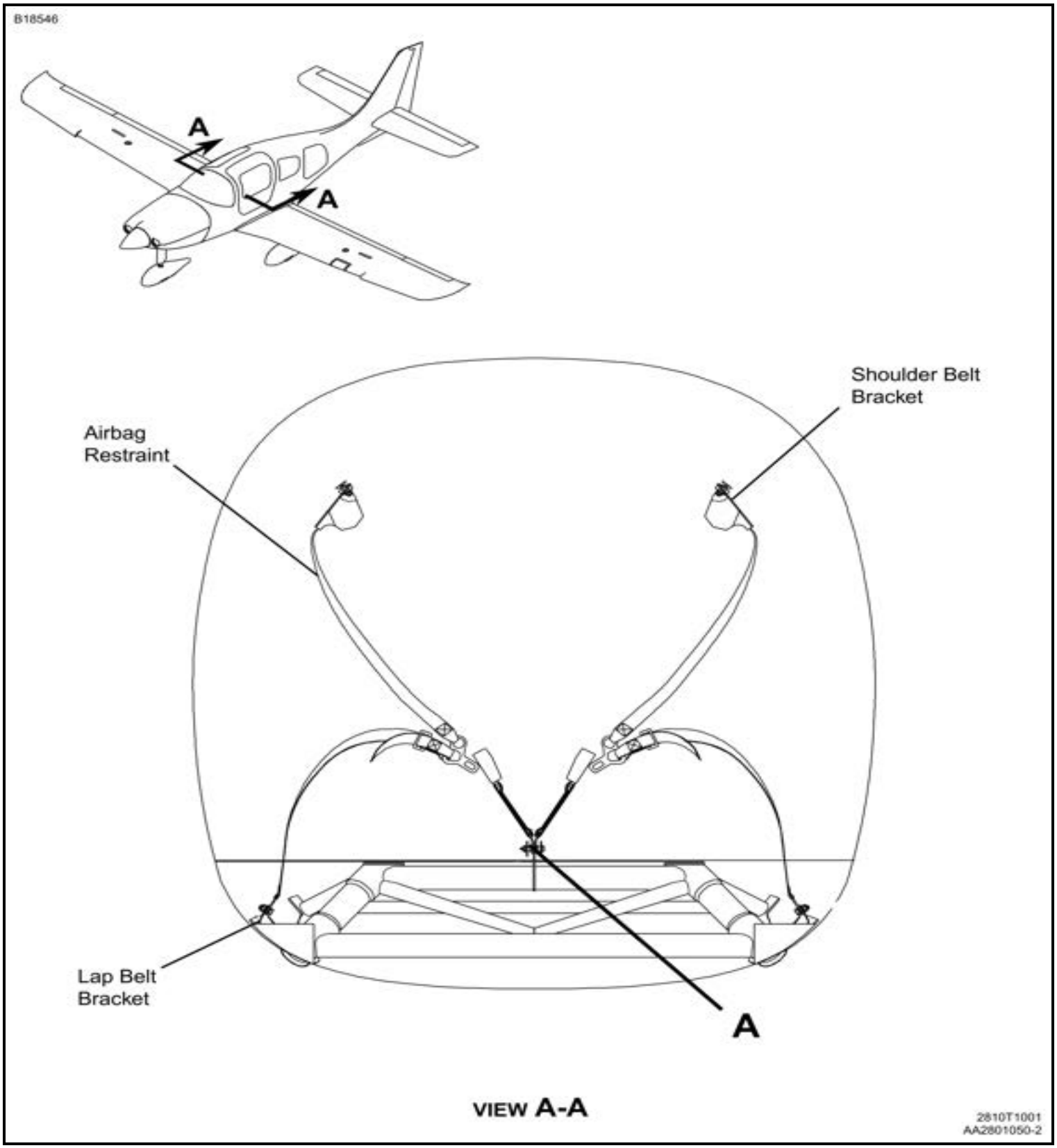
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Figure 1 : Sheet 1 : AAIR Forward Restraint System Installation



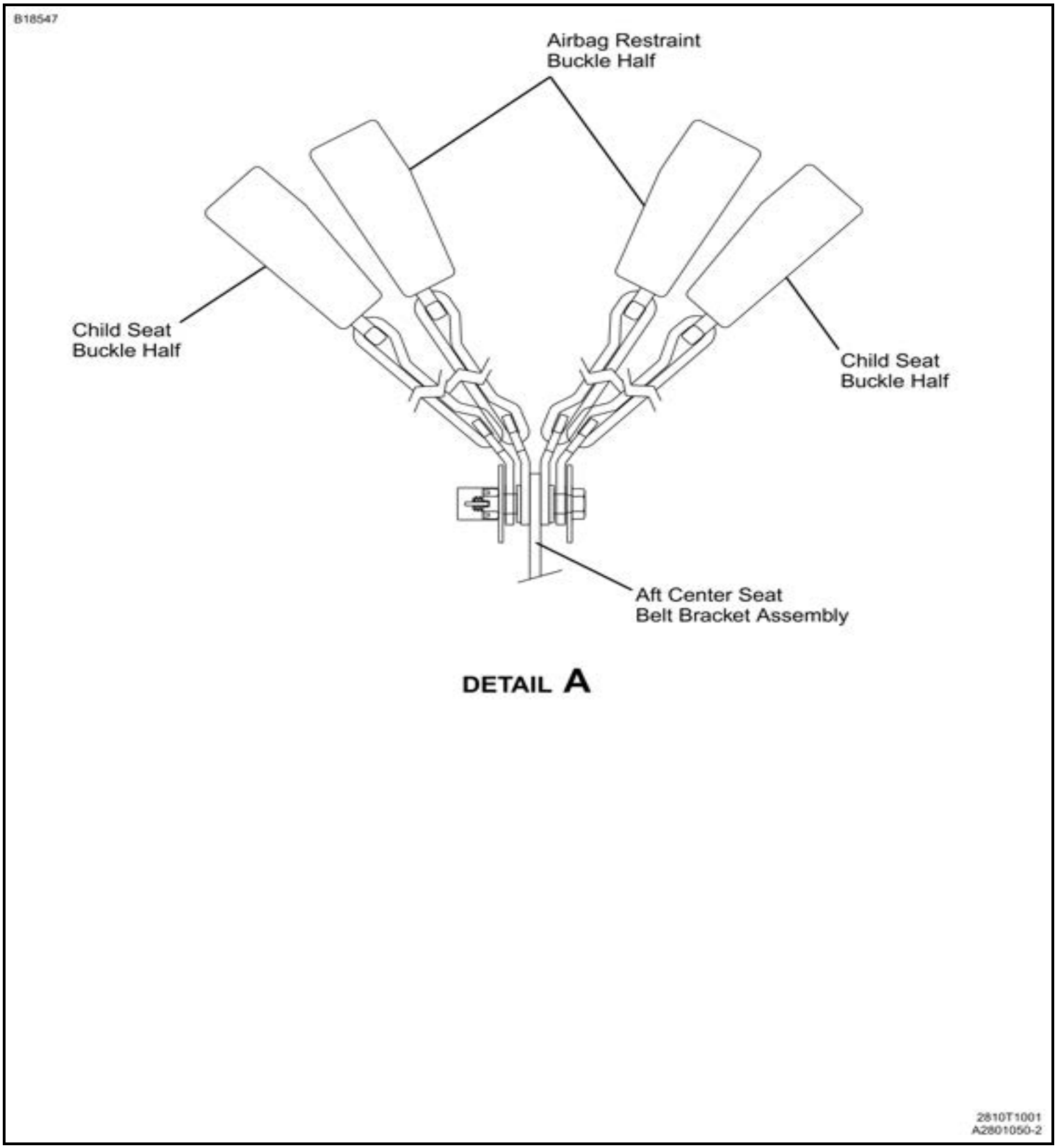
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Figure 2 : Sheet 1 : AAIR Aft Restraint System Installation



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Figure 2 : Sheet 2 : AAIR Aft Restraint System Installation



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INFLATABLE RESTRAINT SYSTEM - MAINTENANCE PRACTICES

1. General

A. This section gives the maintenance data for the AMSAFE Aviation Inflatable Restraint (AAIR). The AAIR system has four core components: the air bag assembly, the inflation assembly, the electronics module assembly (EMA), and the cable interface assembly. The forward AAIR is standard on the Model T240. The aft AAIR is optional. The forward seat AAIR has one EMA that controls the system operation. For a general description of the AAIR system refer to Inflatable Restraint System - Description and Operation

WARNING: Do not try to open the inflator assembly. Do not apply an electric current to the electronics connection. The inflator assembly is a stored, gas/energetic material device and can cause injury if accidentally deployed.

2. Tools and Equipment

A. Table 1 gives a list of tools and equipment used to complete some of the inflatable restraint system maintenance procedures in this section.

Table 201. Table 201 Tools and equipment

Name	Number	Manufacturer	Use
V23 System Diagnostic Tool	8668-201	AmSafe Aviation	Testing Inflatable Restraints
Torque Wrench	inch-pound type	Commercially Available	To the install the Inflatable Restraint System components
Tie Wrap Tool	GS2B or similar	Panduit Corporation	To install tie wraps

3. Inflatable Restraint System Component Cleaning

A. AMSAFE recommends that the AAIR components be cleaned on a regular (annual) basis. Buildup of dirt and unwanted material can cause problems with system operation, decrease the life of the system, and help cause corrosion of the metal parts in the system. Clean the belt assembly, hoses, cables, inflation device/cap assembly, and the EMA.

CAUTION: Use care to keep contamination and cleaning agents away from the hardware assemblies.

CAUTION: Do not let any part of the AAIR soak in any solution. This can cause damage to the AAIR system. Do not use too much water when you clean the AAIR parts. Too much water can cause damage to the internal components and cause them to be unserviceable.

CAUTION: Only use sufficient cleaning agent to make minimal suds. Excess soap must be removed before the part is installed in the system. Do not dry the belt assembly in sunlight or near any source of heat. Do not dry clean the belt assembly. Do not put the belt assembly fully into water.

CAUTION: Keep the isopropyl alcohol away from the webbing, air bag cover, and the gas hose material.

CAUTION: Do not use soap or water on metal parts.

(1) Clean non-metallic parts with warm water and a household soap/laundry detergent and a moist cloth.

(2) Flush the parts with clear water on a clean cloth.

(3) Use a soft brush, and cold soap solution to clean the webbing, air bag cover, and gas hose by hand. Use a household liquid soap or detergent.

(4) Let the belt assembly dry by air.

(5) Clean any spacers, washers, nuts, or bolts with a lint-free cloth and isopropyl alcohol.

(6) Cover the cable opening into the EMA with pieces of cloth. Clean the inflator and cables by hand with a lint-free cloth and a cold water and mild soap solution.

4. Storage of Spares

A. Inflator Assembly.

NOTE: The maximum continuous storage time for the inflator assembly is seven years from the date of manufacture. After seven years, send the inflator assembly to AMSAFE Aviation for inspection and repair.

(1) Keep the inflator assembly in a cool and dry area. The permitted temperature range is -30° C to +55° C.

(2) Keep the inflator assembly away from sunlight, dust, moisture, and other contamination.

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(3) Keep the inflator assembly away from high electromagnetic, radio frequency, and electrostatic environments.

(4) Obey all local storage regulations.

B. Electronics Module Assembly (EMA).

NOTE: The maximum continuous storage time for the EMA is seven years from the date of manufacture. After seven years, send the EMA to AMSAFE Aviation for inspection and repair.

(1) Keep the EMA assembly in a cool and dry area. The permitted temperature range is -30° C to +55° C.

(2) Make sure that the EMA is kept away from sunlight, dust, moisture, and other contamination.

(3) Keep the inflator away from EMI/RFI/ESD environments.

(4) Obey all local storage regulations.

C. Air Bag Assembly.

(1) Keep the air bag assembly in a cool and dry area. The permitted temperature range is -30° C to +55° C.

(2) Make sure that the air bag assembly is kept away from sunlight, dust, moisture, and other contamination.

5. AMSAFE Inflatable Restraint Disarm/Arm

A. Disarm the AMSAFE Inflatable Restraints.

(1) Make sure that each seat belt is unbuckled.

(2) Find the end-release connector at the seat base.

(3) Remove the tie straps that attach the cable and end-release connector.

(4) Disconnect the end-release connector to disable the inflatable restraint.

B. Arm the AMSAFE Inflatable Restraints.

(1) Connect the end-release connector.

(2) Attach the cable and end-release connector to the seat frame with tie wraps.

(a) Use an approved tool to install the tie wraps.

6. Inflatable Restraint Assembly Removal and Installation

A. Remove the Inflatable Restraint assembly.

NOTE: The Inflatable Restraint assembly includes the air bag restraint and the buckle assembly.

(1) Disarm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(2) Remove the air bag belt and buckle assembly. Refer to Seat Belts and Restraints - Maintenance Practices.

B. Install the Inflatable Restraint and Buckle Assembly.

(1) Install the air bag belt and buckle assembly. Refer to Seat Belts and Restraints - Maintenance Practices.

(2) Remove and discard the end cap plug (if new) from the three-point air bag belt hose.

(a) Do not remove the safety cable tie for the air bag connector tongue.

NOTE: If the three-point air bag belt is not new and the inflator is new, apply a thin layer of Loctite 242 thread locking compound on the hose barb threads before you attach the inflator assembly.

(3) Make sure that the three-point seat belt air bag belt is correctly aligned.

NOTE: When the seat belt air bag belt is aligned correctly, the gas hose is on top of the seat belt attachment hardware. The label shows on the aft side of the belt.

(4) If the pilot's and/or the copilot's air bag belt was replaced do a seat operation test on the pilot's and/or copilot's seat as follows:

(a) Move the seat-back aft and forward to its maximum travel.

(b) Move the seat-base up an down to its maximum travel.

(c) Move the seat-base aft and forward to its maximum travel.

(5) Arm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(6) Do a functional test of the AAIR system. Refer to Inflatable Restraint System Adjustment/Test.

7. Cable Interface Assembly Removal and Installation

A. Remove the Cable Interface Assembly.

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NOTE: Removal of the forward and/or aft AAIR system interface cable is typical.

(1) Disarm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(2) Remove the forward or aft left side panels as necessary to get access to the inflator bottle(s). Refer to, Removal of the FLSPL and FLSPR , Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR) Removal of the BLSPL and BLSPR.

(3) Disconnect the squib connector from the inflator assembly.

(4) Disconnect the applicable EMA cable interface assembly electrical connector.

(a) Push down on the locking clip on the EMA connector and pull on the connector.

(5) Remove the cable interface assembly from the airplane.

B. Remove the Cable Interface Assembly.

NOTE: Installation of the forward and/or aft AAIR system interface cable is typical.

(1) Connect the applicable EMA cable interface assembly electrical connector.

(a) Align the cable interface assembly EMA connector key correctly with the EMA electrical connector.

(b) Push the connectors together until the connectors lock.

(2) Attach the squib connector to the inflator assembly.

(3) Arm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(4) Attach the cable where applicable with tie wraps.

(a) Use an approved tool to install the tie wraps.

(5) Do a functional test of the AAIR system. Refer to Inflatable Restraint System Adjustment/Test.

8. Inflator Bottle Removal and Installation

A. Remove the Inflator Bottle (Refer to, Figure 201).

NOTE: There are two bottles installed for the forward AAIR system. There are two bottles installed for the optional aft AAIR system. The removal of each of the four the bottles are typical.

(1) Disarm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(2) Remove the forward or aft left side panels as necessary to get access to the inflator bottle(s). Refer to, Removal of the FLSPL and FLSPR , Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR) Removal of the BLSPL and BLSPR.

(3) Disconnect the squib connector from the inflator assembly.

(4) Disconnect the gas hose from the inflator assembly.

NOTE: The gas hose barb has a layer of Loctite and is tightly attached to the fitting. Use soft-grip channel locks to hold the barb while you disconnect the hose.

(5) Loosen the clamps on the inflator-assembly mounting bracket.

(6) Remove the inflator assembly from the mounting bracket.

(7) Put shipping caps on the inflator-hose connector fitting. Refer to Table 201.

B. Install the Inflatable Bottle

NOTE: There are two bottles installed for the forward AAIR system. There are two bottles installed for the optional aft AAIR system. The installation of each of the four of the bottles are typical.

(1) Remove the shipping caps from the inflator-hose connector fitting.

NOTE: The shipping caps can be used again.

(2) Put the Inflator bottle in its correct position on the bracket.

(a) Make sure that the forward end of the bottle is correctly installed in the bracket.

(b) Do not tighten the clamps on the mounting bracket clamps at this time.

(3) Put the gas hose in its correct position on the inflater assembly.

(a) Torque the inflator hose connector fitting between 100 and 130 inch-pounds.

(4) Connect the gas hose from the three-point air bag belt to the inflator assembly with the correct torque.

NOTE: The inflator hose connector fitting is a pressure fitting which must be fully extended onto the gas hose barb to make an airtight connection.

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(5) Attach the squib connector to the inflator assembly.

(6) Tighten the clamps on the mounting bracket to between 21 and 25 inch-pounds of torque.

(7) As necessary install the forward or aft left side panels. Refer to, Removal of the FLSPL and FLSPR , Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR) Removal of the BLSPL and BLSPR.

(8) Remove the safety cable tie from the air bag buckle tongue.

(9) Arm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(10) Do a seat operation test on the pilot's and copilot's seat.

(a) Move the seat-back aft and forward to its maximum travel.

(b) Move the seat-base up an down to its maximum travel.

(c) Move the seat-base aft and forward to its maximum travel.

(11) Do a functional test of the AAIR system. Refer to Inflatable Restraint System Adjustment/Test.

9. EMA Removal/Installation

WARNING: Keep all magnetic fields away from the electronics module assembly (EMA) during the removal and installation procedure. Accidental deployment of the system can cause injury.

WARNING: Do not remove seats from the airplane with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

WARNING: Do not connect the EMA to the cable interface assembly unless the EMA is first mounted to the airplane structure. Accidental deployment can cause injury.

A. Remove the EMA (Refer to, Figure 202).

NOTE: When only the standard (forward) AAIR system is installed there is only one EMA installed on the airplane. When the optional aft seat AAIR system is installed there are two EMA's installed on the airplane. The forward EMA is installed on a bracket behind the left middle side panel. The optional aft EMA is installed on the top of the forward EMA. The removal of each of the two EMA's is similar.

(1) Disarm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(2) Remove the left middle side panel (MLSPL). Refer to, Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR).

(3) If the forward EMA is to be removed, disconnect each of the two EMA's cable interface assembly electrical connectors.

(a) Push down on the locking clip on the EMA connector and pull on the connector.

(4) If the aft EMA is to be removed disconnect the aft (top) EMA electrical cable interface assembly connector only.

(5) Remove the bolts that connect the EMA's to the bracket assembly.

(6) If the only the aft EMA is to be removed, remove it from the airplane.

(7) To remove the forward EMA (bottom), you must remove the aft EMA (top) first and then the forward EMA.

B. Install the EMA (Refer to, Figure 202).

(1) Put the EMA's, as applicable, in the correct position on the bracket.

(2) Install the bolts that attach the EMA(s) to the bracket assembly.

(3) Connect the cable interface assembly electrical connectors to the EMA(s), as applicable.

(4) Make sure that the cables and hoses of the AAIR are clear of the height-adjustment crank, the seat lock handle, and the seat-back adjustment lever.

(5) Install the left middle side panel (MLSPL). Refer to, Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR).

(6) Arm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.

(7) Do a functional test of the AAIR system. Refer to Inflatable Restraint System Adjustment/Test.

10. Inflatable Restraint System Adjustment/Test

A. The AAIR diagnostic check gives a system functional test of the AAIR circuits. To find problems in system components, use a replace-and-test procedure. There are two seats in each AAIR system. The 1 LED light will show an indication for the first seat on the AAIR system circuit. The 2 LED light will show an indication for the second seat on the AAIR system circuit. Once the V23 system diagnostic tool (SDT) is connected to the airplane, a check of the system is done one seat at a time. For more data applicable to the V23 system functional test, refer to the AMSAFE Aviation AAIR Supplemental Maintenance Manual, V23 System Diagnostic Tool - Operation and Maintenance Manual.

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B. The V23 system diagnostic tool uses a 9-volt battery that can be replaced. A check of the diagnostic tool must be done yearly. The label on the back of the diagnostic tool will show when a check of the tool needs to be done. The diagnostic tool must only be sent to AMSAFE to be calibrated.

CAUTION: Calibrate the V23 system diagnostic tool again before use if it is hit, shaken, or if it falls to the floor.

C. Before the V23 system diagnostic tool is connected to the airplane, do the steps that follow:

(1) Set the SDT ON/OFF Switch to the ON position.

(2) Look at the Tool Battery Indicator LED light.

(a) If the LED light is green, the battery condition is satisfactory.

(b) If the LED light is red, replace the 9-volt battery on the back of the SDT.

D. Do the System Functional Test.

NOTE: There are two seats in each AAIR system. This functional test must be completed for each AAIR system on the airplane.

(1) Make sure that the safety cable tie from the air bag buckle tongue is removed.

(2) Make sure that the seat belt safety buckles are not attached.

(3) Remove the protective cap from the cable interface assembly.

(4) Connect the V23 system diagnostic tool to the diagnostic connector.

(5) Set the SDT ON/OFF Switch to the ON position.

(6) Look at the Seat Position PASS/FAIL LED light.

(7) If the 1 and 2 LED lights are amber, do the steps that follow:

(a) Connect the air bag safety buckle on the seat.

(b) If the 1 LED light is green, the AAIR system for that seat is satisfactory.

(c) If there is an amber LED light indication, a red indication, or no indication, troubleshoot the system. Refer to Inflatable Restraint System Troubleshooting.

(d) Disconnect the air bag safety buckle.

(e) Do the system functional test again for the second seat location.

NOTE: For the second seat location, the 2 LED light will be used to give an indication.

(8) Set the SDT ON/OFF Switch to the OFF position.

(9) Disconnect the V23 system diagnostic tool from the diagnostic connector.

(10) Put the protective cap on the cable interface assembly.

11. Inflatable Restraint System Troubleshooting

A. The procedures in this section must be done if the V23 system diagnostic tool gives an unserviceable indication for the seats in the AAIR System Adjustment/Test. An unserviceable indication by the seat LED light can be an amber indication, red indication, or no indication. If the V23 system diagnostic tool gives a serviceable indication after the replacement of the individual components, stop the troubleshooting procedure.

(1) If an unserviceable indication is given before the safety buckle is connected, do the steps that follow:

(a) Do a check of all connections and tighten loose connections that are found. Do the Adjustment/Test procedure again if there are loose connections found.

(b) Replace the cable interface assembly. Do the Adjustment/Test procedure again.

(c) Replace the EMA. Do the Adjustment/Test procedure again.

(d) Replace the inflator. Do the Adjustment/Test procedure again.

(2) If an unserviceable indication is given after the safety buckle is connected, do the steps that follow:

(a) Replace the cable interface assembly. Do the Adjustment/Test procedure again.

(b) Replace the air bag safety buckle. Do the Adjustment/Test procedure again.

(c) Replace the EMA. Do the Adjustment/Test procedure again.

(d) Replace the inflator. Do the Adjustment/Test procedure again.

12. Inflatable Restraint System Inspection

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NOTE: The AMSAFE Aviation Inflatable Restraint (AAIR) must be examined in accordance with the time intervals in Chapter 5, Time Limits and Inspections. The AMSAFE Aviation Inflatable Restraint (AAIR) assemblies have a time life associated with them. Refer to Chapter 5, Time Limits and Inspections.

A. Do an inspection of the AAIR system parts.

(1) Air bag assembly.

(a) Make sure that the attachments are tightly connected.

(b) Do a visual inspection for dirt, oil, grease or other unwanted material.

(c) Do a check for wear on the edges of the belt.

(d) Do a check for damage on stitching or fabric threads.

(e) Do a check for holes or rub marks on the air bag cover.

(f) Do a check of the end fittings, buckle and connector for cracks, dents, or corrosion.

(2) Inflator hose.

(a) Do a check for fraying, wear, or tears.

(3) Cable interface assembly.

(a) Make sure all attachments are tightly connected.

(4) Inflator assembly.

(a) Do a check for loose mounting hardware.

(b) Do a check of the hose connection.

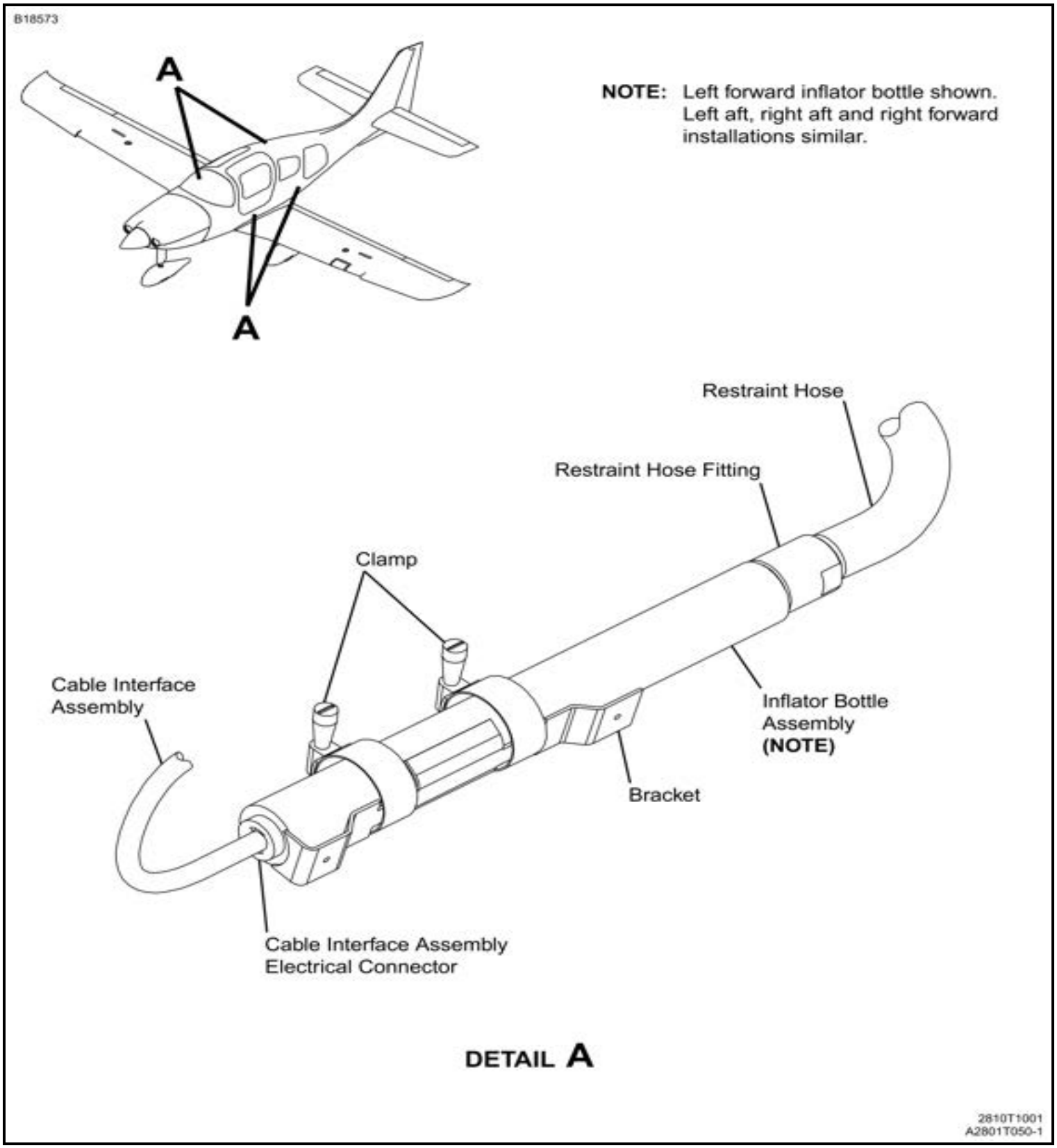
(c) Do a check of the electrical connection.

(5) Electronics module assembly (EMA).

(a) Do a check for loose connections and mounting hardware.

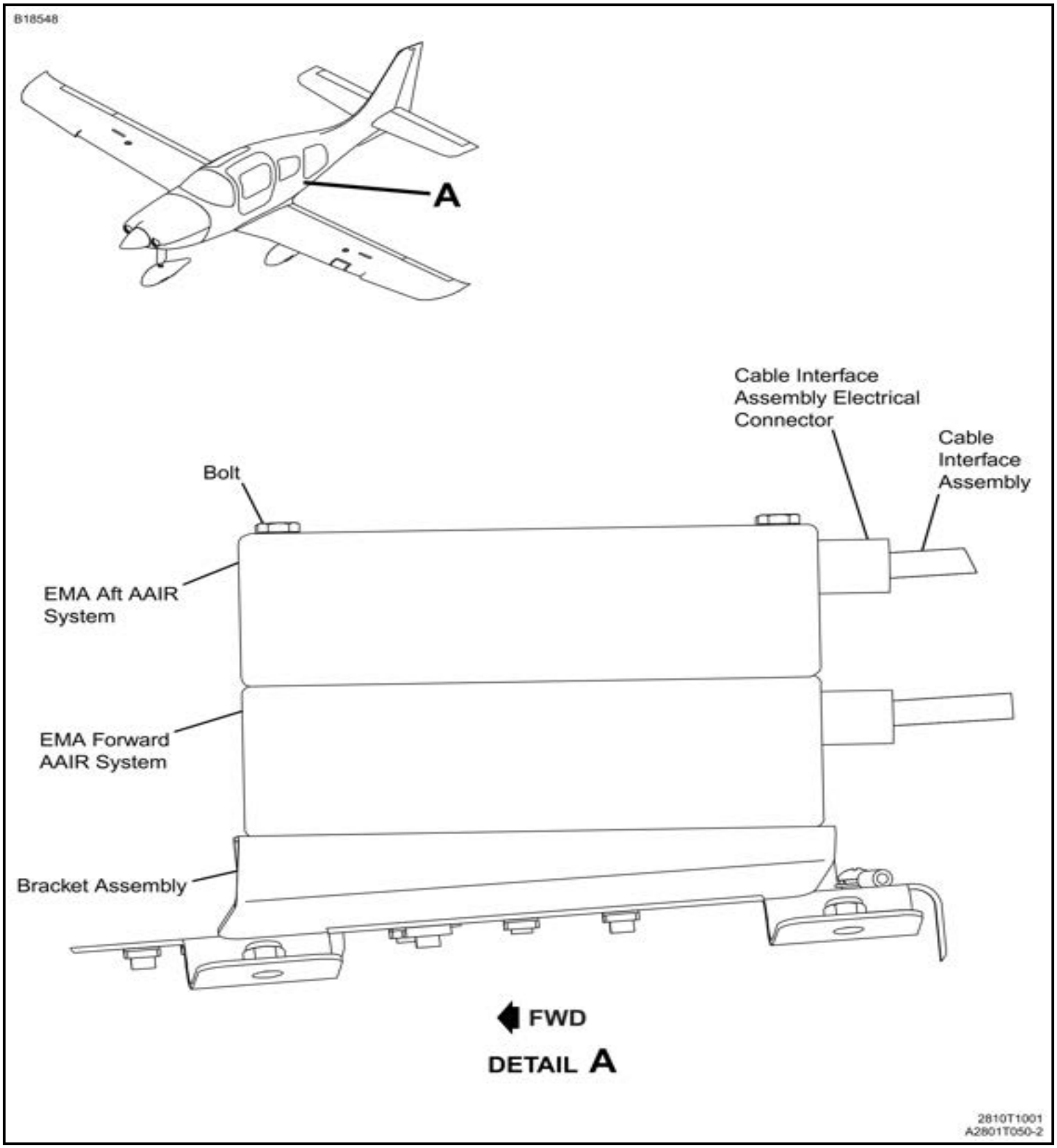
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Figure 201 : Sheet 1 : Inflator Bottle Installation



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Figure 202 : Sheet 1 : EMA Installation



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INSTRUMENT PANEL (T240) - REMOVAL/INSTALLATION

1. General

A. Removal of the instrument panel for the Model T240 with the Garmin G2000 system installed is a major task and is not likely to ever be needed. Access to areas behind the instrument panel is done by the removal of the Garmin GDU 1400 Primary Flight Display (PFD), GDU 1400 Multifunction Display (MFD), and the LRUs within the instrument panel. The instructions for removal are only for removing the instrument panel when the same panel is to be replaced. If a new instrument panel is required, contact Cessna for further instructions.

B. This section includes the procedures to remove and replace the instrument panel and the components that follow:

(1) Components removed and replaced in this section:

(a) The Instrument panel

(b) The Hourmeter

(c) The ELT Switch.

(2) Components removed and replaced in referenced sections:

(a) The L-3 Electronic Standby Indicator

(b) The GDU 1400 Primary Flight Display (PFD)

(c) The GDU 1400 Multi-Functional Display (MFD)

(d) The GCU 275 Controller Unit

(e) The GMC 720 AFCS Mode Controller

(f) The Carbon Monoxide Detector

(g) The DISPLAY REVERSION LED Panel

(h) The Engine Controls LED Panel

(i) The Ignition Switch LED Panel

(j) The instrument Panel Bolster Upholstery Assembly.

(k) The Glare Shield

C. For Avidyne and G1000 options instrument and electrical panel maintenance practices refer to Instrument Panels and Electrical Panels - Maintenance Practices.

2. Instrument Panel Removal/Replacement

A. Remove the Instrument Panel (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Remove the components that follow:

(a) The Glareshield. Refer to Chapter 25, Glareshield (T240) - Removal/Installation.

(b) The Display Reversion LED Panel. Refer to Chapter 33, Interior LED Panels (T240) - Maintenance Practices.

(c) The L-3 Electronic Standby Indicator. Refer to Chapter 34, L-3 Electronic Standby Indicator - Removal/Installation.

(d) The GDU 1400 Primary Flight Display (PFD). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(e) The GDU 1400 Multi-Functional Display (MFD). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(f) The GCU 275 Controller Unit. Refer to Chapter 34, Garmin GCU 275 Controller Unit (G2000) - Removal/Installation.

(g) The GMC 720 AFCS Mode Controller. Refer to Chapter 22, Garmin GMC 720 AFCS Mode Controller (G2000) - Removal/Installation.

(h) The Hourmeter. Refer to Hourmeter Removal/Installation in this section.

(i) The ELT switch. Refer to Garmin ELT Switch Removal/Installation in this section.

(j) The Carbon Monoxide Detector. Refer to Pulse Oximeter/CO Detect (T240) - Maintenance Practices, Pulse Oximeter/CO Detect Removal/Installation.

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(k) The Engine Controls LED Panel. Refer to Chapter 33, Interior LED Panels (T240) - Maintenance Practices.

(l) The Ignition Switch LED Panel. Refer to Chapter 33, Interior LED Panels (T240) - Maintenance Practices.

(m) The instrument panel bolster upholstery assembly. Refer to Bolster Upholstery Assembly (T240) - Removal/Installation.

(5) Remove the screws from the shelf assembly, the gusset assembly and the frame assembly that attaches the instrument panel to the aircraft structure.

(6) Remove the instrument panel from the airplane.

B. Install the Instrument Panel (Refer to Figure 401).

(1) Put the instrument panel in its correct position on the airplane structure.

(2) Install the screws that attaches the instrument panel to the aircraft structure in the shelf assembly, the gusset assembly and the frame assembly.

(3) Install the components that follow:

(a) The Display Reversion LED Panel. Refer to Chapter 33, Interior LED Panels (T240) - Maintenance Practices.

(b) The L-3 Electronic Standby Indicator. Refer to Chapter 34, L-3 Electronic Standby Indicator (T240) - Removal/Installation.

(c) The GDU 1400 PFD. Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(d) The GDU 1400 MFD. Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(e) The GCU 275 Controller Unit. Refer to Chapter 22, Garmin GCU 275 Controller Unit (G2000) - Removal/Installation.

(f) The GMC 720 AFCS Mode Controller. Refer to Chapter 22, Garmin GMC 720 AFCS Mode Controller (G2000) - Removal/Installation.

(g) The Hourmeter. Refer to Hourmeter Removal/Installation in this section.

(h) The ELT switch. Refer to Garmin ELT Switch Removal/Installation in this section.

(i) The Carbon Monoxide Detector. Refer to Pulse Oximeter/CO Detect (T240) - Maintenance Practices, Pulse Oximeter/CO Detect Removal/Installation.

(j) The instrument panel bolster upholstery assembly. Refer to Bolster Upholstery Assembly (T240) - Removal/Installation.

(k) The Engine Controls LED Panel. Refer to Chapter 33, Interior LED Panels (T240) - Maintenance Practices.

(l) The Ignition Switch LED Panel. Refer to Chapter 33, Interior LED Panels (T240) - Maintenance Practices.

(m) The Glareshield. Refer to Glareshield (T240) - Removal/Installation.

3. Instrument Panel Components Removal/Installation

A. Hourmeter Removal/Installation

(1) Remove the Hourmeter (UI004) (Refer to Figure 402).

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Remove the screws and nuts that attach the Hourmeter to the instrument panel.

(d) Remove the Hourmeter from the instrument panel and move it aft sufficiently to get access to the rear of the unit.

(e) If you cannot move the Hourmeter aft sufficiently to get access to the rear of the unit, remove the GDU 1400 MFD. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(2) Install the Hourmeter (UI004) (Refer to Figure 402).

(a) Put the Hourmeter near its correct position in the instrument panel.

(b) Connect the electrical connector (PI004) to the rear of the Hourmeter.

(c) Put the Hourmeter in its correct position in the instrument panel.

(d) Install the screws and nuts that attach the Hourmeter to the instrument panel.

(e) If necessary, install the GDU 1400 MFD. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

B. Garmin ELT Switch Removal/Installation.

(1) Remove the ELT switch (SI500) (Refer to Figure 402).

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(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.
(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.
(c) Remove the screws and nuts that attach the ELT switch to the instrument panel.
(d) Remove the ELT switch from the instrument panel and move it aft sufficiently to get access to the rear of the unit.
(e) If you cannot move the ELT switch aft sufficiently to get access to the rear of the unit, remove the GDU 1400 MFD. Refer to Garmin G2000 Displays - Removal/Installation.
(f) Disconnect the electrical connector (P31) from the rear of the ELT switch.

(2) Install the ELT switch (SI500) (Refer to Figure 402).
(a) Put the ELT switch near its correct position in the instrument panel.
(b) Connect the electrical connector (P31) to the rear of the ELT switch.
(c) Install the screws and nuts that attach the ELT switch to the instrument panel. Refer to Chapter 20 Standard Practices - Airframe Torque Data - Maintenance Practices.
(d) If necessary, install the GDU 1400 MFD. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

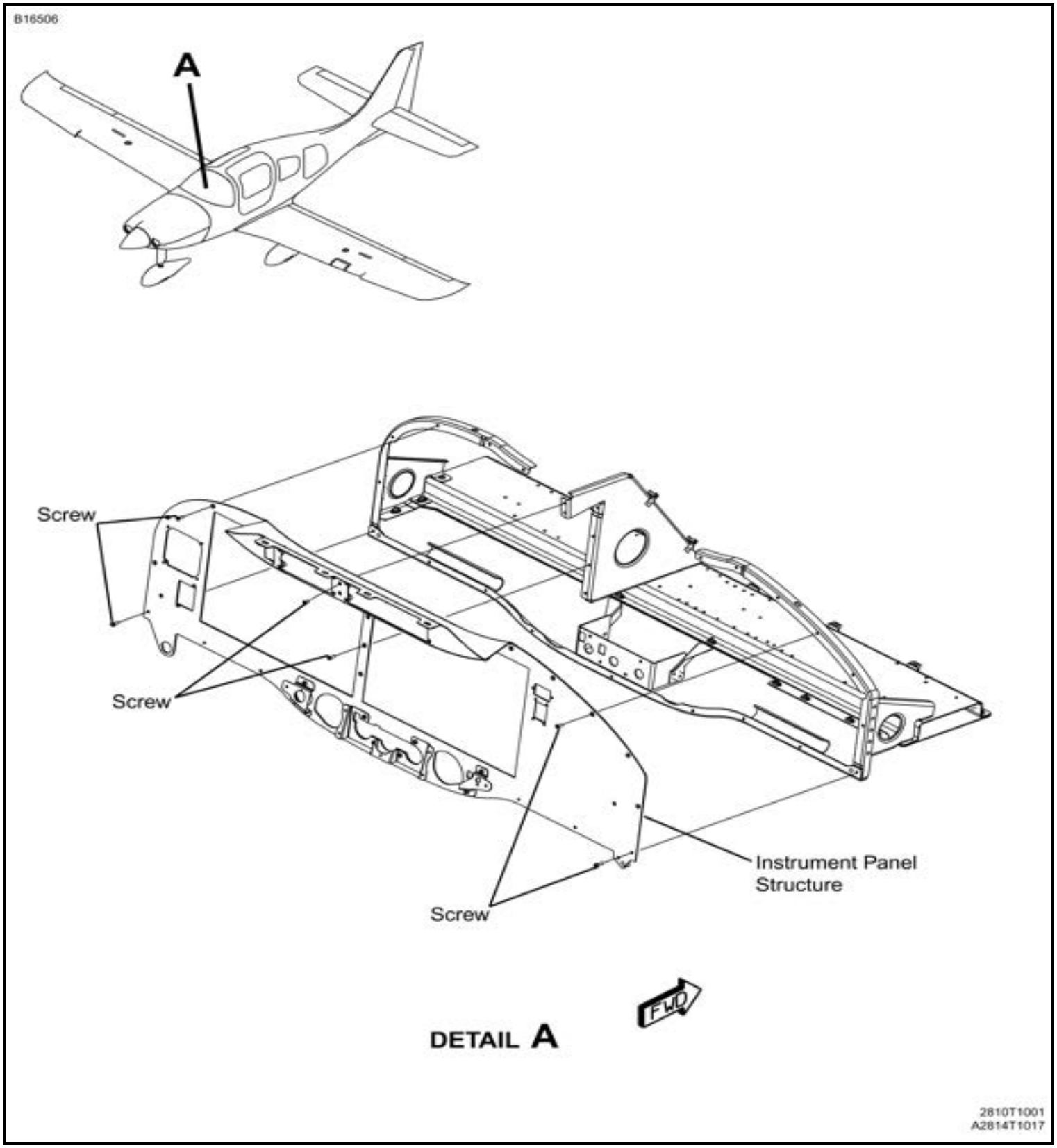
(3) After the switch installation do the steps that follow:
(a) Apply external power on the airplane
(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.
(c) Set the AVIONICS MASTER switch (SW04) to the ON position.
(d) Set the CROSS TIE switch (SW03) to the ON position.
(e) Make sure that the ELT is not transmitting.

(4) If the ELT is transmitting do the applicable step that follows:
(a) Reset the Artex 200 by turning the unit OFF, then back to ARM. If the ELT does not reset, turn the unit OFF, remove, and service
(b) Reset the Artex ME406 by turning the unit ON, then back to ARM.

(5) Set the master BATT switches (left and right) to the OFF position.
(6) Set the AVIONICS MASTER switch to the OFF position.
(7) Set the CROSS TIE switch (SW03) to the OFF position.
(8) Remove external electrical power from the airplane.

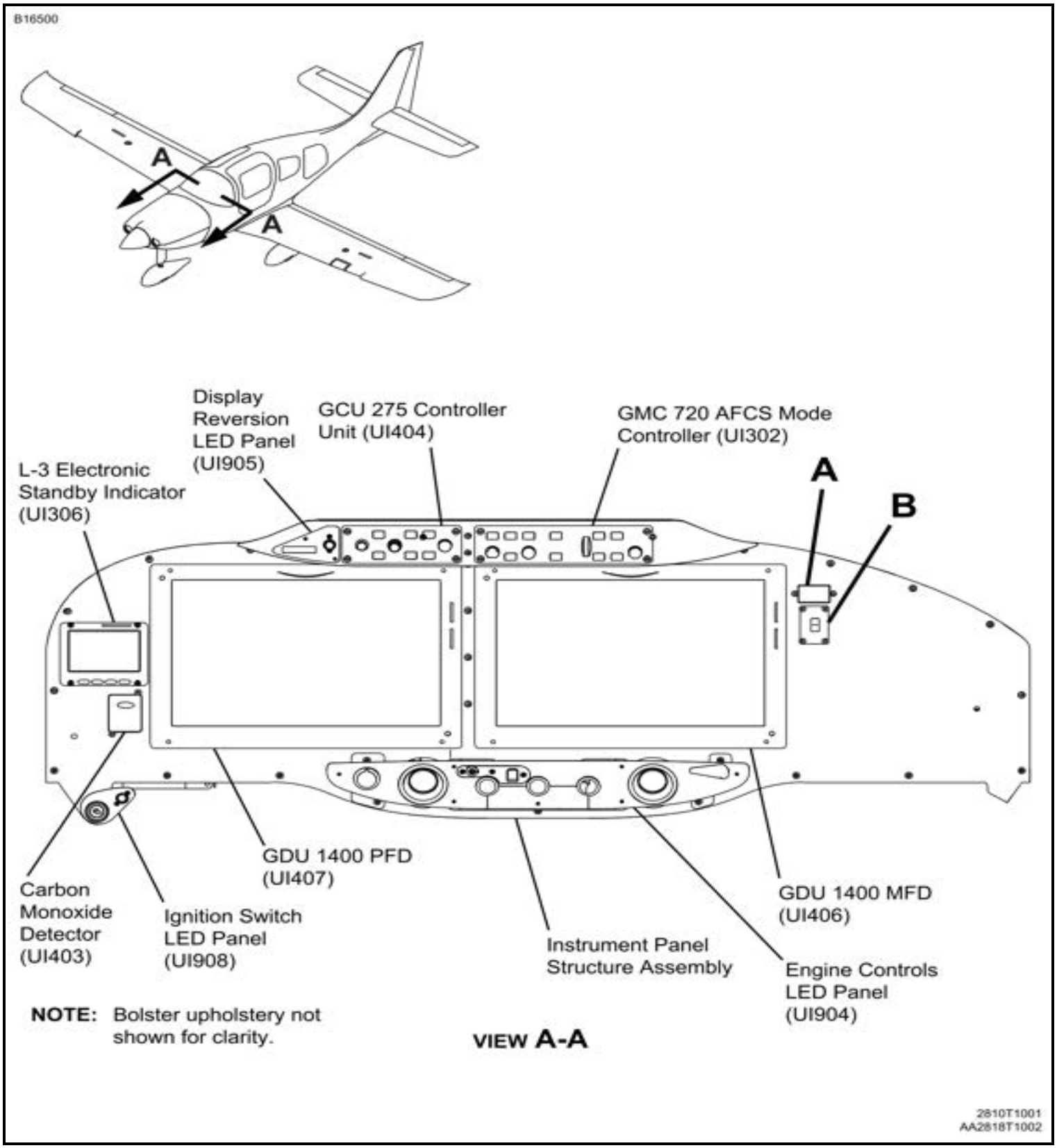
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Figure 401 : Sheet 1 : Instrument Panel Installation



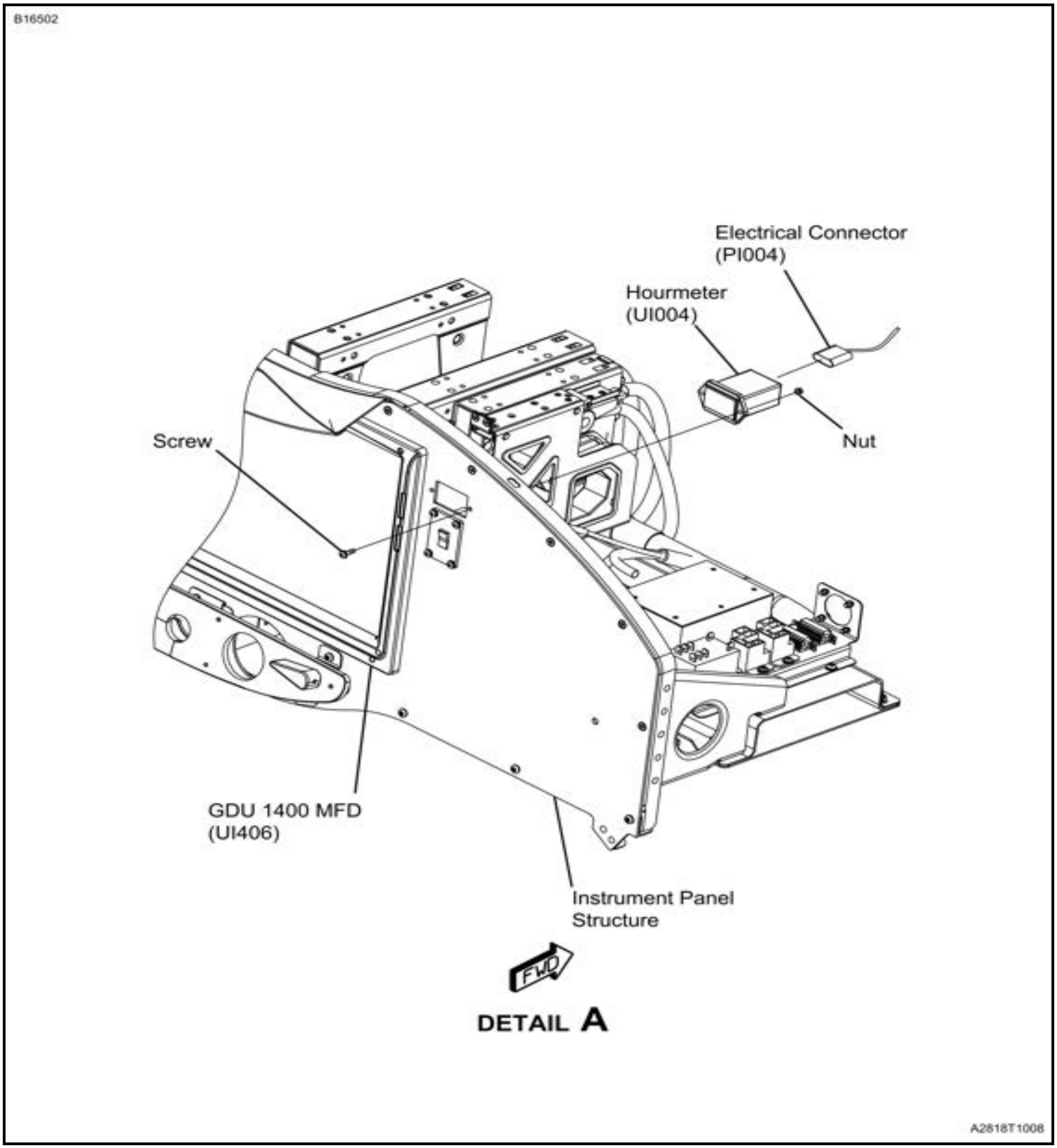
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Figure 402 : Sheet 1 : Instrument Panel Components Installation



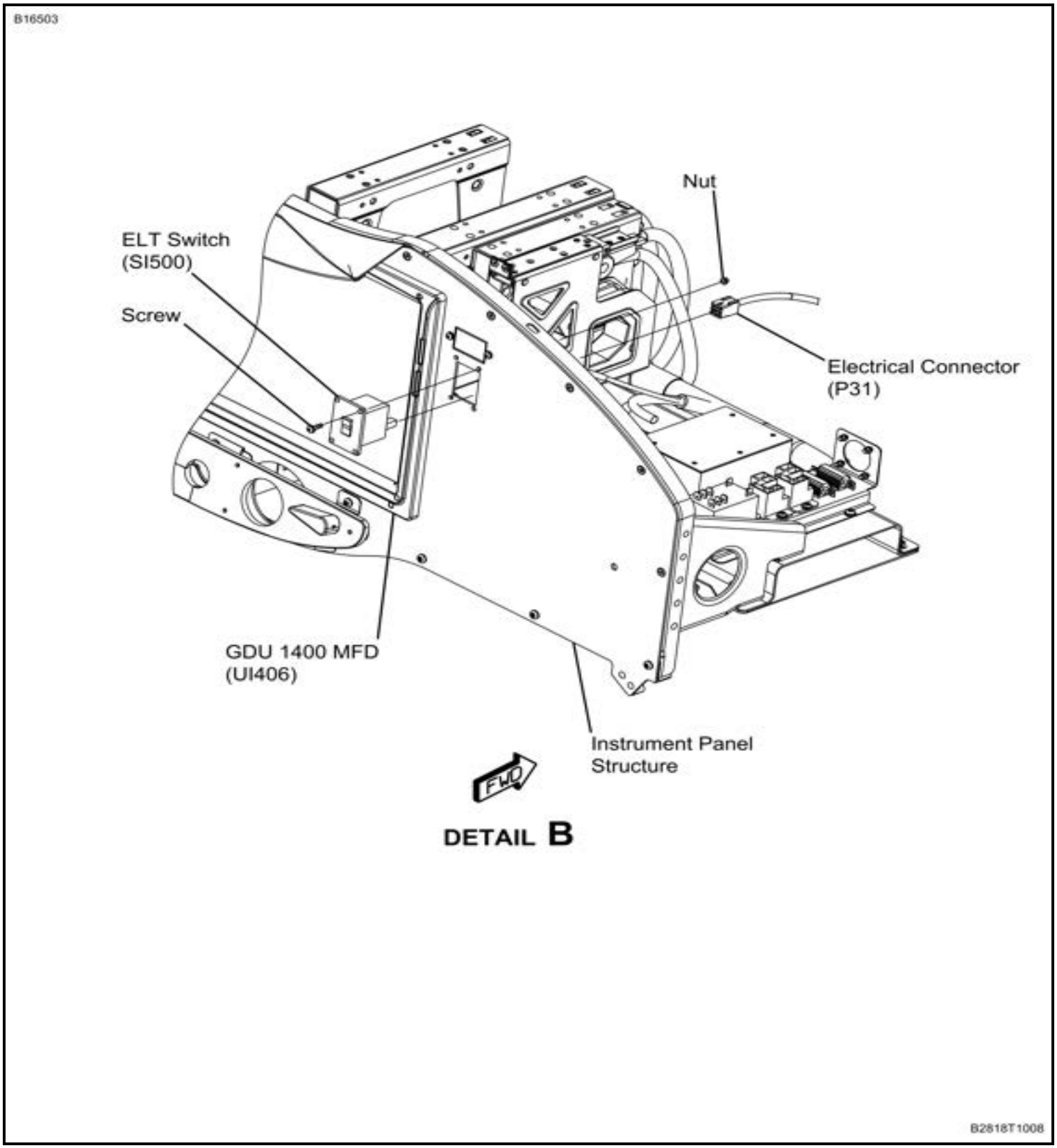
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Figure 402 : Sheet 2 : Instrument Panel Components Installation



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Figure 402 : Sheet 3 : Instrument Panel Components Installation



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BOLSTER UPHOLSTERY ASSEMBLY (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the procedures for the removal and installation of the instrument panel Bolster Upholstery Assembly for airplanes that have the Garmin G2000 system installed.

2. Bolster Upholstery Assembly Removal/Installation

A. Remove the Bolster Upholstery Assembly (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the off position.

(4) If necessary, remove the Multifunction Display (MFD). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

NOTE: When the MFD is removed from the instrument panel there is easier access to the electrical connectors that must be disconnected/connected as applicable, to remove and/or install the bolster assembly.

(5) Remove the Ignition Switch LED Panel. Refer to Interior LED Panels (T240) - Removal/Installation, Ignition Switch LED Panel - Removal/Installation.

(6) Remove the Engine Control LED Panel. Refer to Interior LED Panels (T240) - Removal/Installation - Removal/Installation, Engine Control LED Panel - Removal/Installation.

(7) On the left and right outboard sides of the bolster panel, remove the nuts, and washers that attach the Bolster Upholstery Assembly to the instrument panel, frame assembly, and bolster bracket.

(8) Remove the Bolster Upholstery Assembly from the airplane.

B. Install the Bolster Upholstery Assembly (Refer to Figure 401).

(1) Put the Bolster Upholstery Assembly in its correct position on the instrument panel, frame assembly and bolster bracket.

(2) Install the nuts, and washers that attach the Bolster Upholstery Assembly to the instrument panel, frame assembly, and bolster bracket.

NOTE: If necessary, use tie straps to hold wire bundles and air ducts in their correct position.

(3) Install the Ignition Switch LED Panel. Refer to Interior LED Panels (T240) - Removal/Installation, Ignition Switch LED Panel - Removal/Installation.

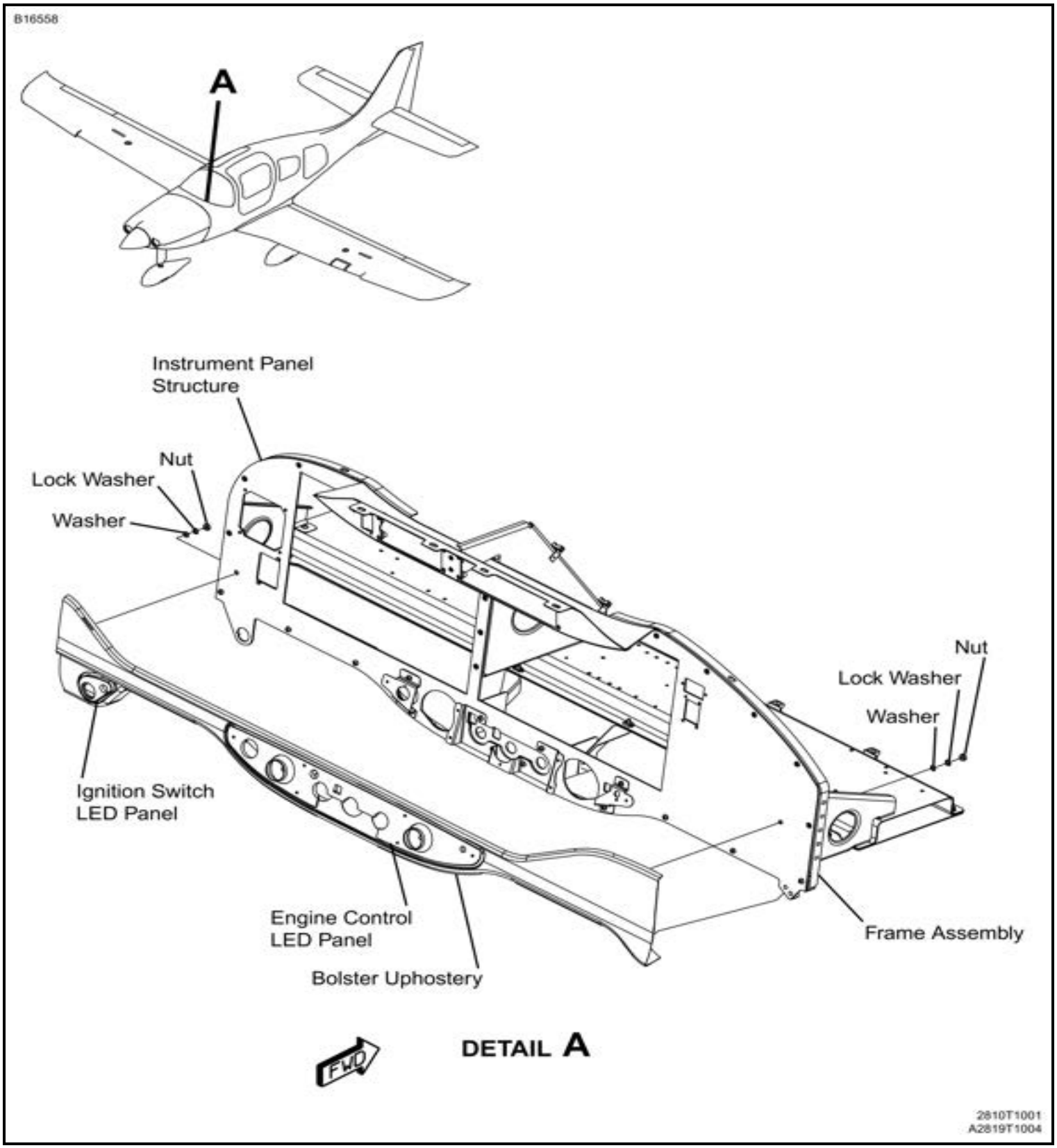
(4) Install the Engine Control LED Panel. Refer to Interior LED Panels (T240) - Removal/Installation - Removal/Installation, Engine Control LED Panel - Removal/Installation.

(5) If necessary, install the Multifunction Display (MFD). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) If necessary, install instrument panel components. Refer to Instrument and Electrical Panels (G2000) - Removal/Installation.

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Figure 401 : Sheet 1 : Bolster Upholstery Assembly Installation



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CENTER CONSOLE (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the center console. For a general description of the center console, refer to Equipment/Furnishings - General.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Center Console

A. Remove the Center Console (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Remove the touchscreen controller. Refer to Chapter 34, Garmin G2000 Touchscreen Controller - Removal/Installation.

(4) Remove the right GDU 1400. Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(5) Remove the pilot and copilot seats.

(6) Remove the carpet around the center console.

(7) Remove the center console access panel.

NOTE: The access panel is attached to the console with fabric fasteners. To remove, lift at one corner and continue to lift around the panel.

(8) Remove the tie straps from the duct that is attached to the plenum on the upper center console.

(a) Pull the duct away from the plenum.

(9) Disconnect electrical connectors JI508, JI507, J307, and PC006.

(10) Remove the cotter pin, washer, and pin from the bottom of the fuel selector shaft.

(11) Remove the screws and washers that attach the upper center console to the instrument panel.

(12) Remove the screws that attach the upper center console to the lower console.

(13) Remove the screws and washers that attach the upper console to the Attitude Heading Reference System (AHRS) shelf.

(14) Remove the screws and washers that attach the upper center console to the floor.

(15) Carefully remove the upper center console from the airplane.

(16) Remove the screws and washers that attach the lower console to the Attitude Heading Reference System (AHRS) shelf.

(17) Remove the screws and washers that attach the lower center console to the floor.

(18) Carefully remove the lower center console from the airplane.

B. Install the Center Console (Refer to Figure 401).

(1) Carefully put the lower center console in position.

(2) Carefully put the upper center console in position while you align the fuel selector shaft with the fuel selector valve.

(3) Install the screws that attach the upper center console to the lower console.

(4) Install the screws and washers that attach the lower center console to the floor.

(5) Install the screws and washers that attach the lower center console to the AHRS shelf.

(6) Install the screws and washers that attach the upper center console to the floor.

(7) Install the screws and washers that attach the upper center console to the instrument panel.

(8) Install the screws and washers that attach the upper center console to the AHRS shelf.

(9) Install the pin, washer, and cotter pin in the bottom of the fuel selector shaft. Refer to Chapter 20, Safetying - Maintenance Practices.

(10) Visually inspect the connectors to make sure there are no bent or damaged pins.

(a) Repair any damage.

(11) Connect electrical connectors JI508, JI507, J307, and PC006.

(12) Install the duct on the plenum.

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(a) Install the tie straps that attach the duct to the plenum on the upper center console.

(13) Install the center console access panel.

(14) Install the carpet around the center console.

(15) Install the pilot and copilot seats.

(16) Install the touchscreen controller. Refer to Chapter 34, Garmin G2000 Touchscreen Controller - Removal/Installation.

(17) Install the right GDU 1400. Refer to Chapter 34, Garmin G2000 Displays - Removal/Installation.

(18) Apply external electrical power on the airplane.

(19) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(20) Set the AVIONICS MASTER switch (SW04) to the ON position.

(21) Set the CROSS TIE switch (SW03) to the ON position.

(22) Make sure that all components operate correctly.

(23) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

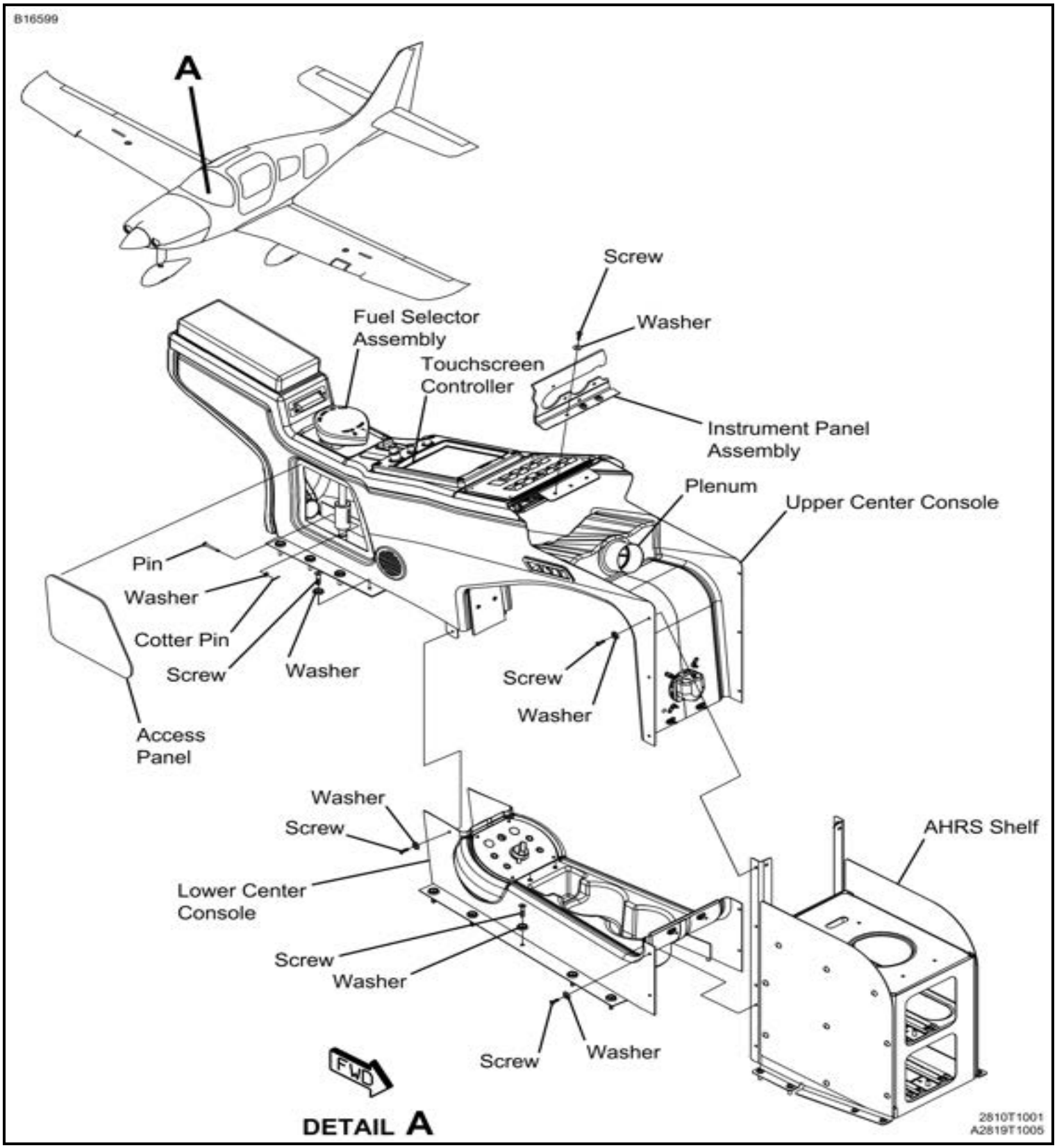
(24) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(25) Set the CROSS TIE switch (SW03) to the OFF position.

(26) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : Center Console Installation



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CENTER CONSOLE DIMMER SWITCH (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the each of the two center console dimmer switches, CB/SW (SW24) and FLT INST (SW23). The CB/SW dimmer controls the interior LED panels lighting intensity. The FLT INST dimmer controls the Primary Flight Display, Multifunctional Display and the GTC 570 Touchscreen Controller displays light intensity. The switches are found aft of the GTC 570 Touchscreen controller on the center console. For a general description of the center console dimmer switches refer to Lighting - General. To troubleshoot LED panel or flight display lighting problems refer to Interior LED Panel and Display Lighting (T240) - Troubleshooting.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Center Console Dimmer Switch Removal/Installation

A. Remove the Center Console Dimmer Switch (Refer to Figure 401).

NOTE: The removal procedures for each of the two center console dimmer switches are typical.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Remove the access panel on the copilot's side of the center console.

(a) If necessary, remove the copilot's seat or seat cushion. Refer to Airplane Seats - Maintenance Practices.

(5) Disconnect the applicable electrical connector as follows:

(a) For the CB/SW (SW24) dimmer (left) disconnect the dimmer electrical connector JI007 from the dimmer electrical connector PI007.

(b) For the FLT INST (SW23) dimmer (right) disconnect the wiring bundle electrical connector JI006 from the dimmer electrical connector PI006.

(6) On the applicable dimmer assembly, carefully push in on each of the assemblies retaining clips at the same time, and pull the switch dimmer from the center console.

(7) Remove the dimmer switch from the airplane.

B. Install the Center Console Dimmer Switch (Refer to Figure 401).

NOTE: The installation procedures for each of the two center console dimmer switches are typical.

(1) Visually inspect the connectors to make sure there are no bent or damaged pins.

(a) Repair any damage.

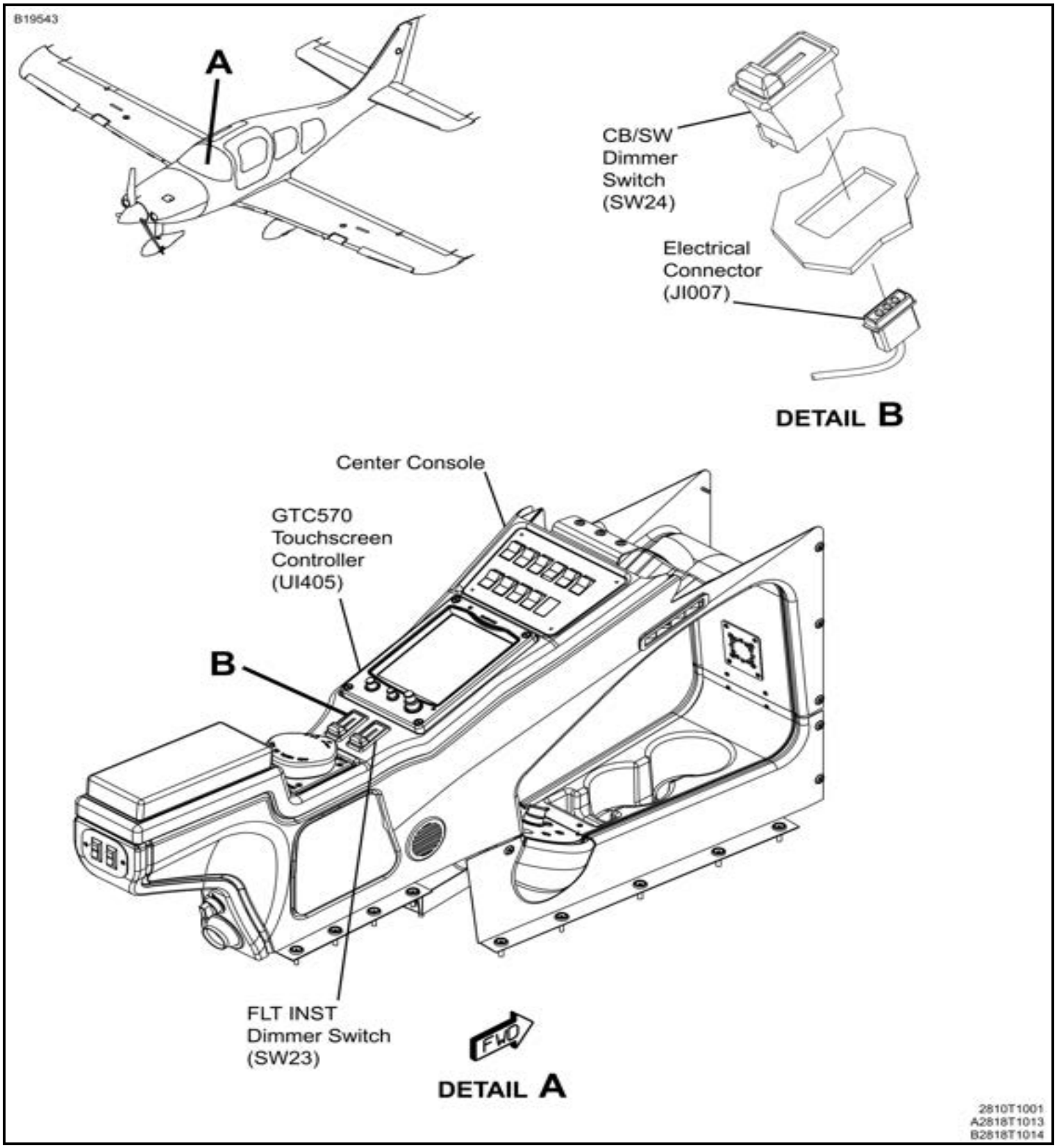
(2) Put the switch dimmer in its correct position on the center console and carefully push it in the console dimmer opening until the retaining clips are locked in place.

(3) Connect the applicable wiring bundle electrical connector to the dimmer switch electrical connector.

(4) Do a check of the dimmer operation. Refer to Interior LED Panel and Flight Displays Lighting (T240) - Adjustment/Test.

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Figure 401 : Sheet 1 : Center Console Dimmer Switch Installation



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CENTER CONSOLE SWITCH PANEL (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the center console switch panel. For a general description of the Center Console Switch Panel, refer to Equipment/Furnishings - General.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Center Console Switch Panel Removal/Installation

A. Remove the Center Console Switch Panel (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(3) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(4) Remove the screws that attach the switch panel to the center console.

(5) Carefully pull the switch panel away from the console.

(6) Disconnect the electrical connector from the switch panel.

NOTE: PC006 for Airplane 01159 and Airplanes 02001 thru 02048; PC001 and PC006 for Airplanes 02049 and On.

(7) Remove the switch panel from the airplane.

B. Install the Center Console Switch Panel (Refer to Figure 401).

(1) Visually inspect the connector to make sure there are no bent or damaged pins.

(a) Repair any damage.

(2) Connect the electrical connector to the switch panel.

NOTE: PC006 for Airplane 01159 and Airplanes 02001 thru 02048; PC001 and PC006 for Airplanes 02049 and On.

(3) Carefully put the switch panel in position on the center console.

(4) Install the screws that attach the switch panel to the center console.

(5) Apply external electrical power on the airplane.

(6) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(7) Set the AVIONICS MASTER switch (SW04) to the ON position.

(8) Set the CROSS TIE switch (SW03) to the ON position.

(9) Make sure that all switches operate correctly. Refer to the applicable systems for a check of the switches.

(10) Set the AVIONICS MASTER switch (SW04) to the OFF position.

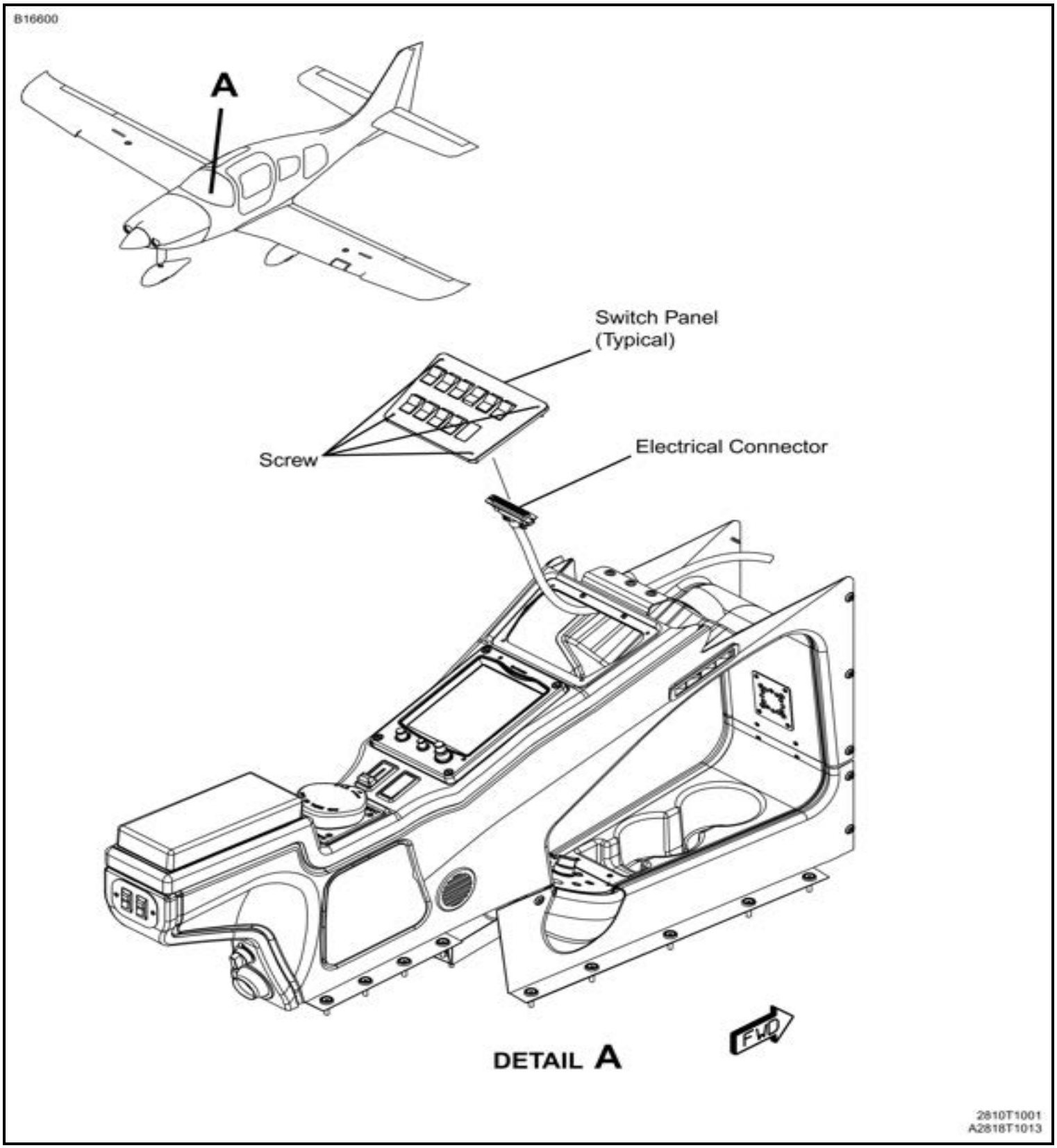
(11) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(12) Set the CROSS TIE switch (SW03) to the OFF position.

(13) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : Center Console Switch Panel Installation



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SWITCH PANEL ROCKER SWITCH (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the center console switch panel rocker switches. The switches are installed in the center console switch panel. If an optional system or systems are installed in the airplane, the configuration of the panel and number of switches installed will be different. The removal and installation procedures for the switches is identical. For a general description of the Center Console Switch Panel, refer to Equipment/Furnishings - General.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Switch Panel Rocker Switch Removal and Installation

A. Remove the Switch Panel Rocker Switch (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are set to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Remove the center console switch panel. Refer to Center Console Switch Panel (T240) - Removal/Installation.

(5) Identify the electrical wires connected to the rocker switch assembly electrical terminals.

(a) Remove the wires from the switch assembly.

(6) Remove the screws that attach the switch assembly to the rear of the switch panel backplate.

(a) Remove the switch from the switch panel backplate.

NOTE: The switch is removed from the rear of the backplate.

B. Install the Switch Panel Rocker Switch (Refer to Figure 401).

(1) Before you install the switch, use best shop practices at the rear of the assembly to mark the electrical terminals 1 through 4. Use the removed switch as a reference.

(2) Put the switch in its correct position in the switch panel backplate.

NOTE: The switch is installed from the rear of the backplate.

(a) Make sure that the switch is aligned in the backplate for the applicable system correct on and off operation.

(b) Install the screws that connect the switch assembly to the backplate.

(3) Identify and connect the electrical wires to the switch assembly electrical terminals.

(4) Install the center console switch panel. Refer to Center Console Switch Panel (T240) - Removal/Installation .

(5) Supply external electrical power to the airplane.

(6) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(7) Set the AVIONICS MASTER switch (SW04) to the ON position.

(8) Set the CROSS TIE switch (SW03) to the ON position.

(9) Make sure that the switch operates correctly. Refer to the applicable system for a check of the switch.

(10) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

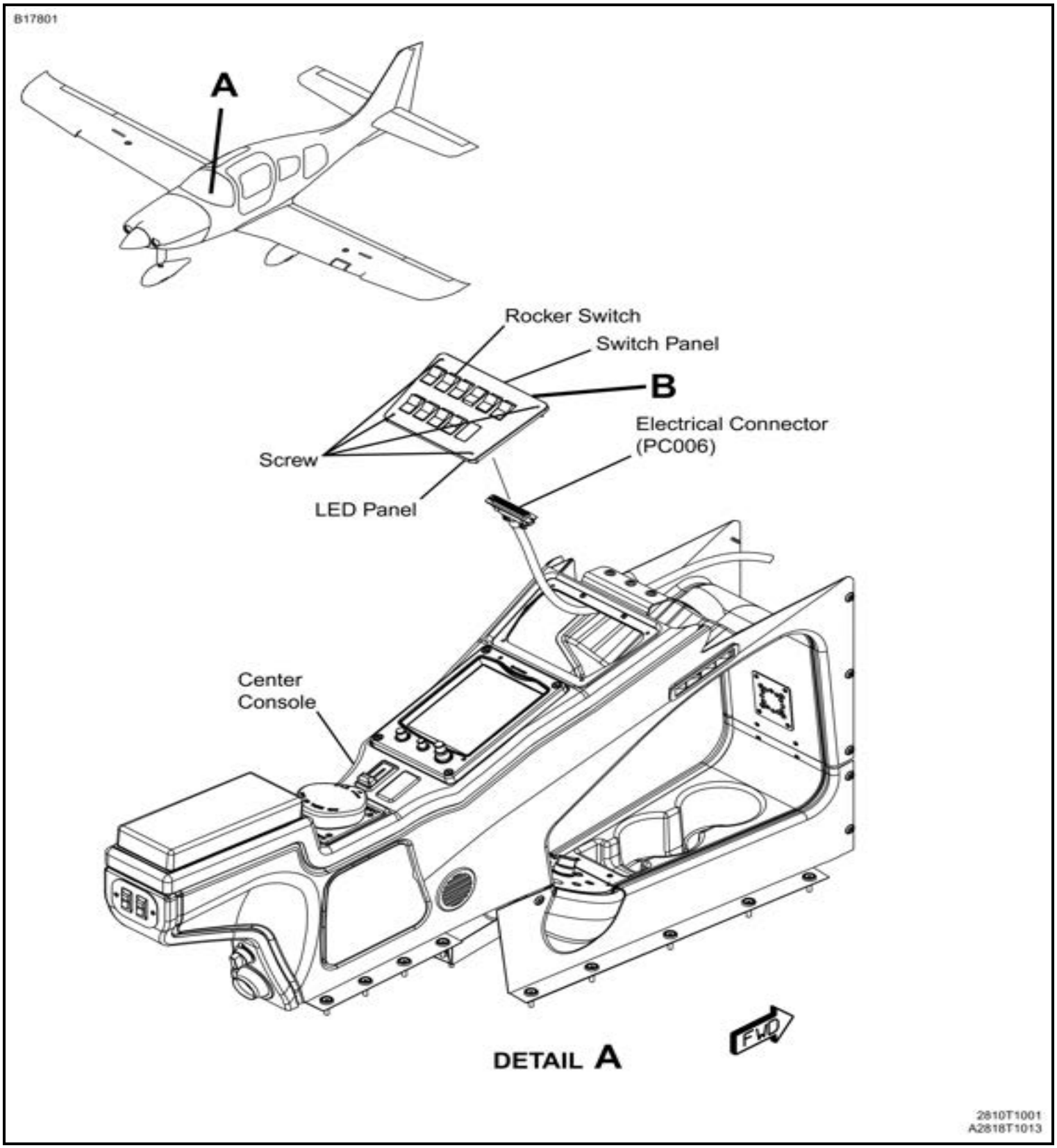
(11) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(12) Set the CROSS TIE switch (SW03) to the OFF position.

(13) Remove external electrical power from the airplane.

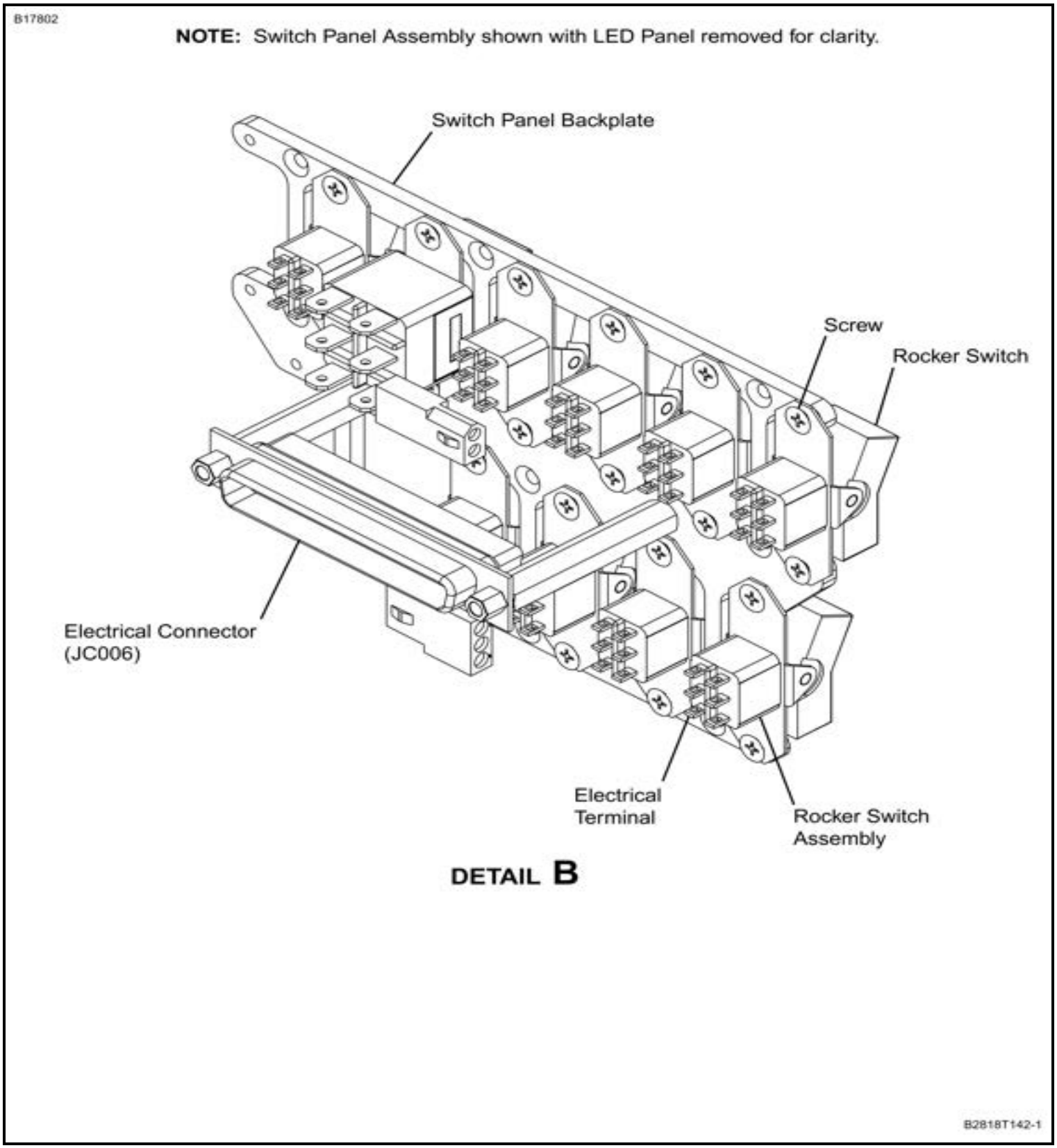
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Figure 401 : Sheet 1 : Switch Panel Rocker Switch Installation



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Figure 401 : Sheet 2 : Switch Panel Rocker Switch Installation



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DOORS AND SIDE PANELS - DESCRIPTION AND OPERATION

1. Doors and Side Panels

A. The cabin doors and baggage door removal and installation are covered in Section 52-10-00, Cabin and Baggage Doors.

B. **Cabin Door Armrest** - The door armrest is attached to the door with three 8-32 screws and washers accessible through the bottom of the door. Torque these nuts 20 to 25 in.-lbs. when reinstalling.

C. **Baggage Door Surround** - Removal of the baggage door surround panel is covered in Section 52-10-00, Cabin and Baggage Doors.

D. **Baggage Door Interior Panel** - Removal and installation of the baggage door interior panel is covered in Section 52-10-00, Cabin and Baggage Doors.

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INTERIOR PANELS - MAINTENANCE PRACTICES

1. General

A. This section gives the maintenance practices for the Forward Center Overhead Light Panel, Aft Center Overhead Light Panel, Left and Right Instrument Upholstered Panel (Garmin G1000 Option), Lower Upholstered Instrument Panel, Door Tread, Forward Lower Side Panels, Middle Lower Side Panels, and Forward and Aft Overhead Side Panels. The section also gives maintenance practices for the left and right Baggage Lower Side Panels, Aileron Torque Arm Cover, Hat Rack Cushion, Hat Rack Carpet, and Baggage Floor Carpet. Cargo Compartment components include the cargo net and the forward cargo net.

B. For the T240 Instrument panel upholstered panel procedures, refer to Bolster Upholstery Assembly (T240) - Removal/Installation.

2. Forward Center Overhead Light Panel (FCOLP)

A. Removal of the FCOLP

(1) Removal of the FCOLP - Airplanes -41002 thru -41039

(a) Remove the four overhead swivel lights and courtesy light. Refer to Chapter 33, Interior Lighting - Maintenance Practices.

(b) Remove the nut and washer attaching the low pressure oxygen shut off valve switch guard to the overhead panel and remove the guard.

(c) Remove the two pan head Phillips screws adjacent to the oxygen system cabin manifold.

(d) While supporting the forward center overhead light panel, remove the flat head 6-32 screw behind each overhead swivel light and the two flat head screws behind the courtesy light. Refer to Figure 201, Sheet 1.

(e) Lower the forward center overhead light panel, and disconnect the wiring.

(2) Removal of the FCOLP - Airplanes -41040 and On

(a) Remove the four overhead swivel lights and courtesy light. Refer to Chapter 33, Interior Lighting - Maintenance Practices.

(b) While supporting the forward center overhead light panel, remove the flat head 6-32 screw behind each overhead swivel light and the two flat head screws behind the courtesy light. Refer to Figure 201, Sheet 2.

(c) Carefully lower the forward center overhead light panel, and disconnect the wiring and the flexible oxygen hose (if built-in oxygen system is present). Immediately plug or cap both ends of the flexible oxygen hose quick disconnect fitting. Do not kink, stretch or damage the flexible oxygen hose. Refer to Chapter 35 for specific procedures.

CAUTION: Do not disconnect the flexible oxygen hose connecting the cabin distribution manifold and the low-pressure oxygen manual shutoff valve to the quick disconnect fitting without first consulting the procedures and requirements in Chapter 35.

B. Installation of the FCOLP - Installation is the reverse of the above. Torque the screws behind the lights 30 to 36 in.-lbs. Torque the screws near the oxygen system cabin manifold 10 to 12 in.-lbs.

3. Aft Center Overhead Light Panel (ACOLP)

NOTE: The removal and installation of the ACOLP for airplanes that are non-air conditioning ready, that are air conditioning ready and airplanes with the air conditioning option installed are similar.

A. Removal of the ACOLP (Refer to Figure 201).

(1) Remove the forward center overhead light panel. Refer to Removal of FCOLP above.

(2) Remove the hat rack cushion.

(3) Remove the courtesy light per instructions in Chapter 33.

(4) While supporting the aft center overhead light panel, remove the two pan head 10-32 screws at the forward bracket and the pan head 10-32 screw behind the courtesy light.

(5) Slide the panel forward off the clip located on the rear bulkhead behind the hat rack cushion.

B. Installation of the ACOLP - Installation is the reverse of the above. Torque the screws 30 to 36 in.-lbs.

4. Left Instrument Upholstered Panel (Garmin G1000 Option)

A. Removal of the Left Instrument Upholstered Panel (Refer to Figure 202).

(1) Remove the glareshield as follows:

(a) For the Garmin G1000 glareshield maintenance procedures, refer to Instrument Panels and Electrical Panels -

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Maintenance Practices.

(2) Remove the lower instrument panel per the Lower Upholstered Instrument Panel removal instructions below.

(3) Remove the two 8-32 pan head screws, three 8-32 flat head screws and washers, and remove the left instrument panel.

B. Installation of the Left Upholstered Instrument Panel - Installation is the reverse of removal.

5. Right Instrument Upholstered Panel (Garmin G1000 Option)

A. Removal of the Right Instrument Upholstered Panel (Refer to Figure 202).

(1) Remove the glare shield as follows:

(a) For the Garmin G1000 glareshield maintenance procedures, refer to Instrument Panels and Electrical Panels - Maintenance Practices.

(2) Remove the lower instrument upholstered panel per the Lower Instrument Upholstered Panel removal in this section.

(3) Remove the two 8-32 pan head screws, three 8-32 flat head screws and washers, and remove the right instrument panel.

B. Installation of the Right Upholstered Instrument Panel - Installation is the reverse of removal.

6. Lower Instrument Upholstered Panel (Garmin G1000 Option)

A. Removal of the Lower Instrument Upholstered Panel (Refer to Figure 202).

(1) Remove the two air valves (eyeball vents) as follows:

(a) For the Garmin G1000 air valves refer to Chapter 21, Air Distribution - Maintenance Practices.

(2) Slide out and remove the lower instrument upholstered panel.

B. Installation of the Lower Upholstered Instrument Panel - Installation is the reverse of removal.

7. Door Tread

A. Removal of the Door Tread

(1) Remove the five pan head 6-32 screws and washers located on the exterior side of the door joggle. Refer to Figure 204.

(2) Lift off the door tread that rests on the MLSPL and FLSPL. Refer to Figure 203.

B. Installation of the Door Tread - Installation is the reverse of above.

(1) Torque fasteners snug.

8. Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR)

A. Removal of the FLSPL and FLSPR

(1) Remove the door tread per the Removal of the Door Tread procedure.

(2) Remove the two flat head 6-32 screws at the top of the panel that were previously covered by the door tread. Refer to Figure 204.

(3) Remove the flat head 10-32 screw and finishing washer located at the lower aft end of the panel.

(4) Detach the control stick boot from the FLSP. The boot is attached to the panel with Velcro.

B. Installation of the FLSPL and FLSPR - Installation is basically the reverse of the above with the following exception to attach the control stick boot to the panel:

(1) Slide the FLSP part-way down over the control stick.

(2) With the top of the panel as far inboard as possible against the control stick, reach behind the panel, from the top, and attach the outboard portion of the control stick boot to the panel.

(3) Tilt the lower edge of the panel as far inboard as possible, and reach up under the panel to finish attaching the control stick boot (forward, inboard, and aft) to the panel.

(4) Assure that the panel is not preloaded (the panel should not move out after the attachment screws are removed) so if the screw were to loosen, there would be no interference with the rudder controls.

(5) Torque fasteners snug.

9. Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR)

A. Removal of the MLSPL and MLSPR

(1) Remove the door tread per the Removal of the Door Tread procedure.

(2) Remove the two flat head 6-32 screws at the top of the panel that were previously covered by the door tread. Refer to Figure 204.

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(3) Remove the flat head 10-32 screw and finishing washer located at the lower forward end of the panel.

(4) Disconnect the vent by clipping the tie wrap that holds the tubing to the eyeball vent and sliding the tubing off the eyeball vent. Since the tie wrap is cut (destroyed) during removal, a new tie wrap must be used when reassembling the heater ventilation tubing.

(5) Disconnect the headphone/intercom jacks and microphone plugs per instructions in Chapter 23.

B. Installation of the MLSPL and MLSPR - Installation is the reverse of the above. Torque fasteners snug.

10. Forward Overhead Side Panels, Left (FOSPL) and Right (FOSPR)

A. Removal of the FOSPL and FOSPR

(1) Remove the FCOLP per the Removal of the FCOLP instructions.

(2) Remove the door tread per the Removal of the Door Tread procedure.

(3) Remove the six flat head 6-32 screws attaching the FOSP to the door joggle. Refer to Figure 205.

B. Installation of the FOSPL and FOSPR - Installation is the reverse of the above. Torque screws snug.

11. Aft Overhead Side Panels, Left (AOSPL) and Right (AOSPR)

A. Removal of the AOSPL and AOSPR

(1) Remove the FCOLP per the Removal of FCOLP instructions.

(2) Remove the front shoulder belt guide per removal instructions in Section 25-13-00, Seat Belts and Restraints.

(3) Remove the rear seat shoulder belt retractor per removal instructions in Section 25-13-00, Seat Belts and Restraints.

(4) Remove the door tread per the Removal of Door Tread procedure.

(5) Remove the five flat head 6-32 screws attaching the AOSP to the door joggle.

B. Installation of the AOSPL and AOSPR - Installation is the reverse of above. Torque the flat head screws snug.

12. Baggage Lower Side Panel, Left (BLSPL) and Right (BLSPR)

A. **Removal of the BLSPL and BLSPR**

(1) Remove the two flat head 10-32 screws located on the topside of the baggage lower side panel at the forward and aft end.

(2) Lift the baggage lower side panel straight up off the four locating brackets bonded to the floor.

B. Installation of the BLSPL and BLSPR- Installation is the reverse of the above. Torque the flat head screws snug.

13. Aileron Torque Arm Cover

A. Removal of the Aileron Torque Arm Cover (Refer to Figure 206).

(1) Remove the left or right rear seat bottom cushion as required per instructions in Section 25-10-00, Removal And Installation Of The Rear Seats And Crossbar.

(2) Remove the two flat head 6-32 screws.

B. Installation of the Aileron Torque Arm Cover - Installation is the reverse of the above. Torque the flat head screws snug.

14. Hat Rack Cushion

A. The hat rack cushion is a friction fit against the rear bulkhead. Slip fingers between the cushion and the carpet and pull on the cushion to remove. Push into position to replace. The ELT label must face forward.

15. Hat Rack Carpet

A. Removal of the Hat Rack Carpet - The hat rack carpet is secured to the hat rack floor by the hat rack baggage net. Remove the hat rack baggage net (refer to the Hat Rack Baggage Net item) to lift out the hat rack carpet.

B. Installation of the Hat Rack Carpet - Installation is the reverse of the above.

16. Baggage Floor Carpet

A. On some aircraft, the baggage floor carpet contains a flap allowing removal of the access panel beneath, without having to remove the carpet. Use the following procedures if baggage floor carpet removal is required.

B. Removal of the Baggage Floor Carpet

(1) Remove the two baggage net cinch strap loops per the Baggage Net Cinch Strap Loop item.

(2) Remove the four baggage net anchor plates per the Baggage Net Anchor Plate item.

(3) Remove the left and right baggage lower side panels per the Removal of BLSPL and BLSPR procedure.

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(4) Remove the hat rack carpet per the Removal of Hat Rack Carpet procedure .

(5) Remove the rear seat backs per instructions in Section 25-10-00, Removal and Installation of the Rear Seats and Crossbar.

(6) Pull up on the carpet to remove.

C. Installation of the Baggage Floor Carpet - Installation is the reverse of the above.

17. Cargo Compartment

A. Upper Hat Rack Baggage Net Tie Down Bracket - The upper hat rack baggage net tie down bracket is attached to the fuselage with a hex head 1/4-28 bolt and washer. Apply Permatex Form-A-Gasket No. 2 to the first two threads on the bolt prior to installation. Torque the hex head bolt 72 to 84 in.-lbs. Locate the bracket with the bent ears forward.

B. Hat Rack Baggage Net - The hat rack baggage net is attached to the hat rack shelf with two hex head 1/4-28 bolts and washers. The bolt goes through a spacer to prevent crushing of the carpet foam. Torque the hex head bolt 72 to 84 in.-lbs. Locate the permanently attached baggage net brackets with the bent ears forward.

C. Baggage Net Cinch Strap Loop - Each baggage net cinch strap loop is attached to the baggage floor with two pan head 10-32 screws and washers. Torque the pan head screws 30 to 36 in.-lbs. when installing.

D. Baggage Net - The baggage net is attached to the floor at each corner with quick release fittings. Lift the locking block, and slide the post and locking block inward to detach.

E. Baggage Net Anchor Plate - The four baggage net anchor plates, located in the corners of the cargo compartment, are attached to the floor with two each flat head 10-32 screws. Torque the flat head screws 30 to 36 in.-lbs.

F. The cargo barrier net is attached to seven floor and fuselage with quick release end fittings. The cargo barrier net is removed and stored when not needed. To remove the net push in on the locking lever and remove each end fitting from the related net anchor. Refer to Figure 207.

18. Control Sticks

A. **Removal of the Control Stick**

(1) Lift the control stick handle up far enough to gain access to the metal collar inside. If necessary, cut the tie-wraps at the base of the stick to release the attaching wires. If difficulty is still encountered, apply a light to moderate amount of heat (such as from a heat gun) to help in the handle removal.

(2) Clean the adhesive from the mating surfaces.

(3) Surface prep the mating surfaces with alcohol, acetone, or equivalent.

(4) Apply a new adhesive (Hysol 9321 or equivalent) to the top and sides of the shaft collar and to the inside wall of the grip, taking care not to allow adhesive to overlap threaded hole

(5) The set screw for the control stick grip should face generally forward to hide the screw hole from view, but minor adjustments can be made to suit individual pilots.

(6) After functionally testing the grip switches, install a new tie wrap at the base of the stick for continued security of wires.

B. Control Stick Clearance Inspections - The following inspections should be done when any maintenance is done to the control stick or if interior panels around the control stick are removed and replaced.

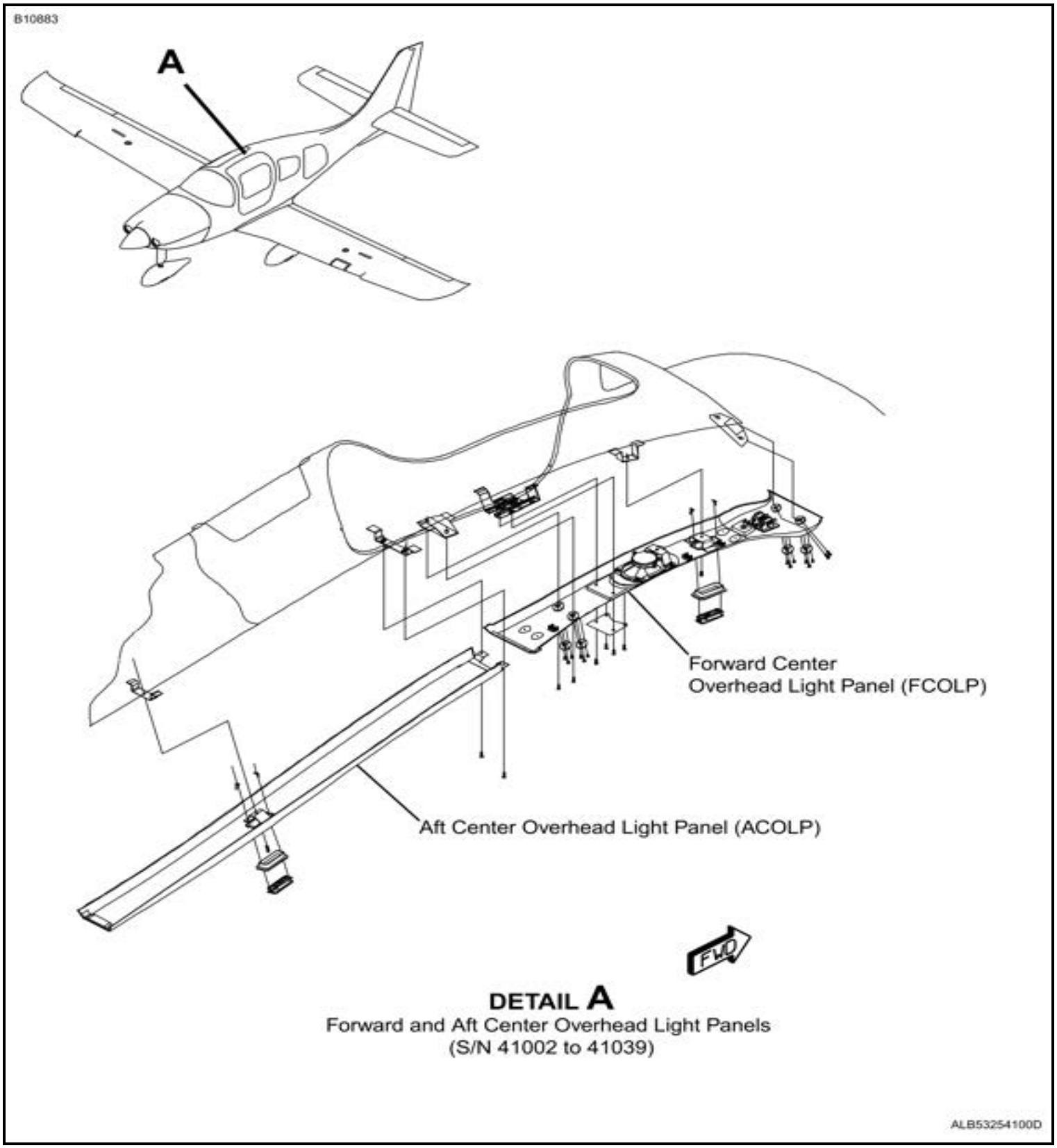
(1) Inspection No. 1 - While sitting in the left seat, grasp the control stick below the grip, and move it throughout its entire range of travel, i.e., control stop to control stop. Ensure that neither the left of right stick grips make any contact with either of the side panels. If interference is noted, contact Cessna Aircraft Company immediately.

(2) Inspection No. 2 - While sitting in the left seat, grasp the left control stick grip normally, and move it to the full left aileron position. Next, while maintaining the full left aileron position, move the stick to the full aft elevator position. Ensure that the left hand does not interfere with the full aft travel of the stick. The left hand may brush the side panel; however, if the left aileron does not move, the clearance is adequate. If interference is noted, contact Cessna Aircraft Company immediately.

(3) Inspection No. 3 - While sitting in the right seat, grasp the right control stick grip normally, and move it to the full right aileron position. Next, while maintaining the full right aileron position, move the stick to the full aft elevator position. Ensure that the right hand does not interfere with the full aft travel. The right hand may brush the side panel; however, if the right aileron does not move, the clearance is adequate. If interference is noted, contact Cessna Aircraft Company immediately.

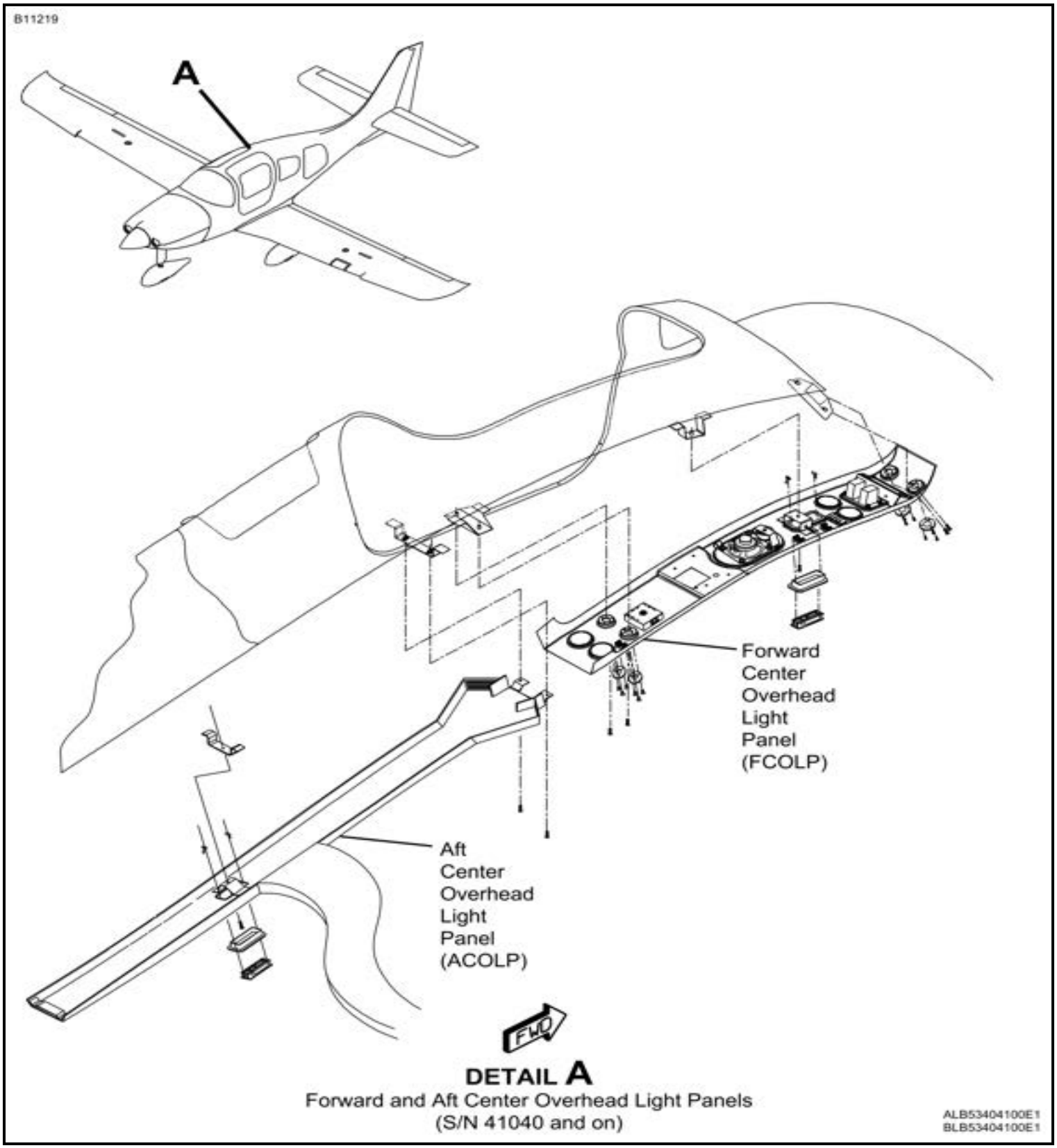
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Figure 201 : Sheet 1 : FCOLP & ACOLP



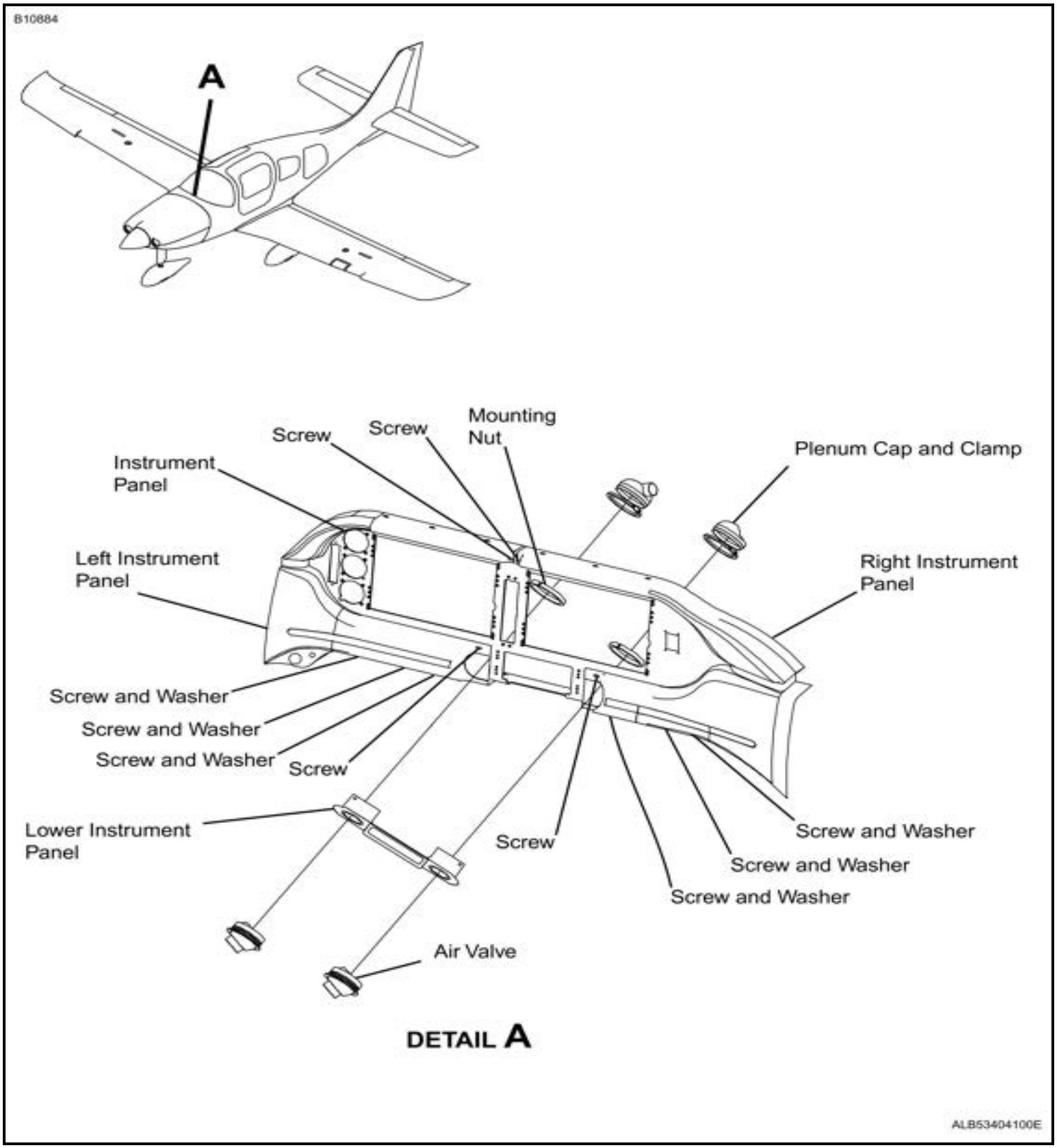
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Figure 201 : Sheet 2 : FCOLP & ACOLP



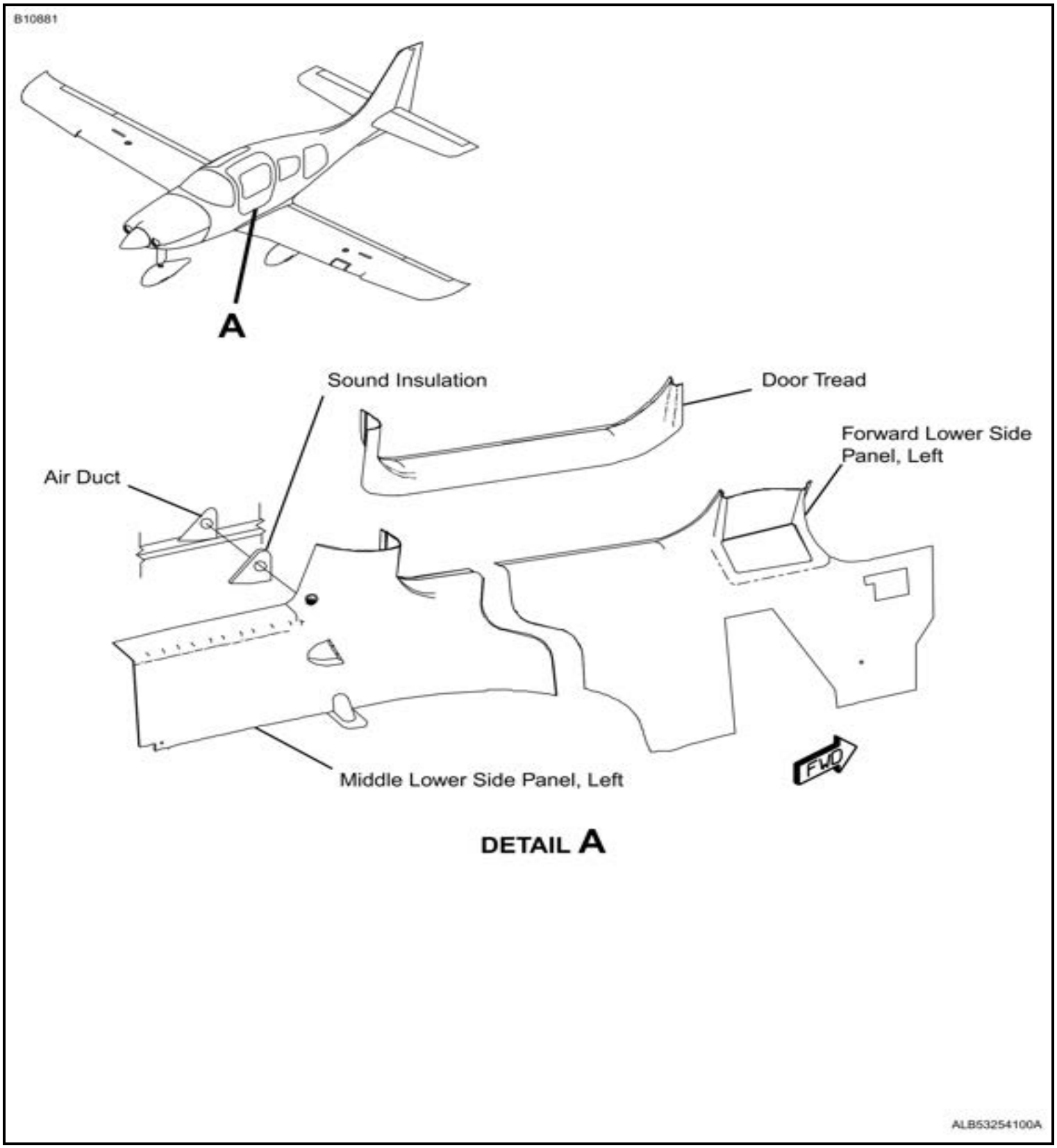
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Figure 202 : Sheet 1 : Upholstered Instrument Panels (Garmin G1000 Option)



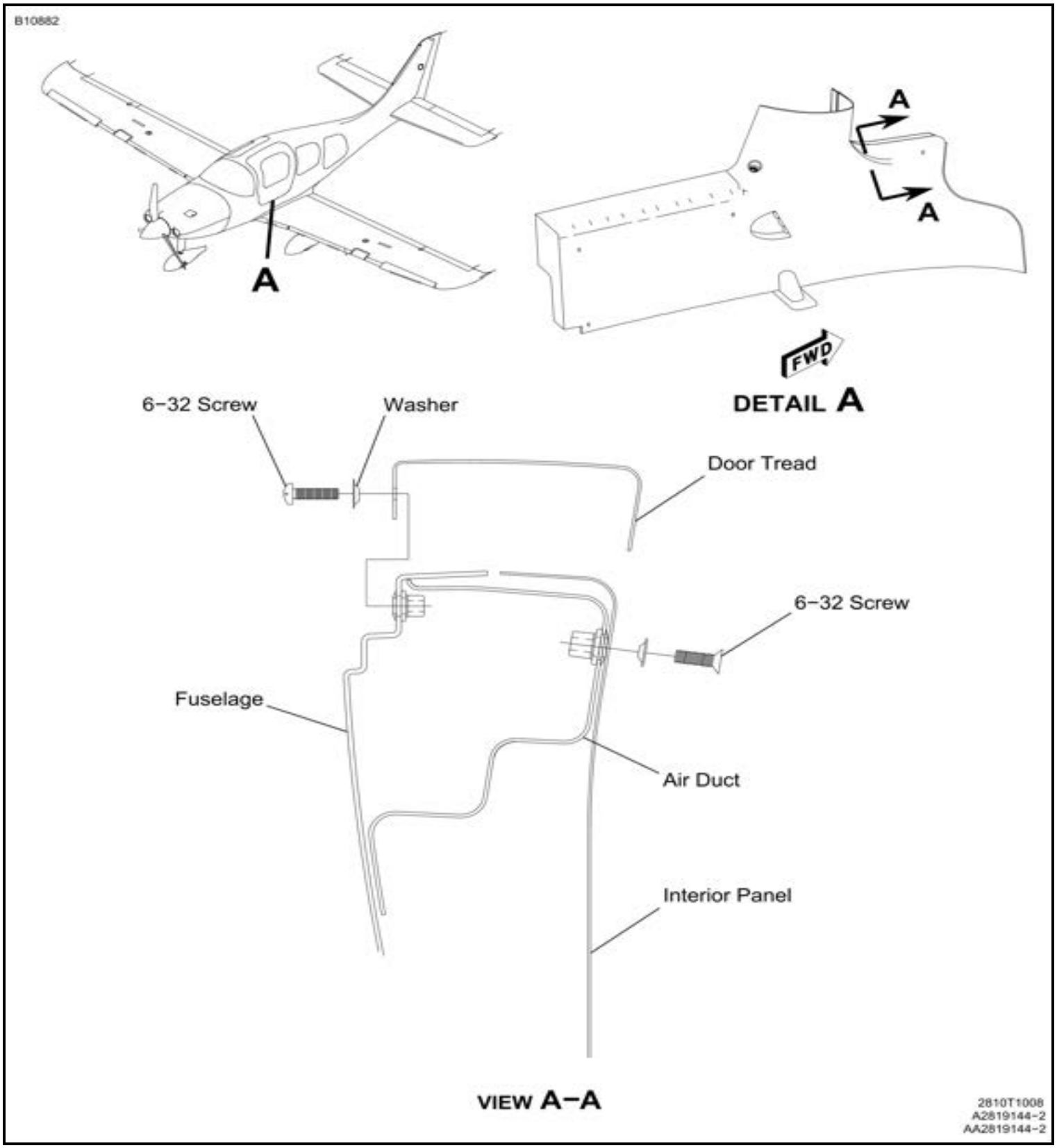
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Figure 203 : Sheet 1 : Door Tread, FLSPL, and MLSPL



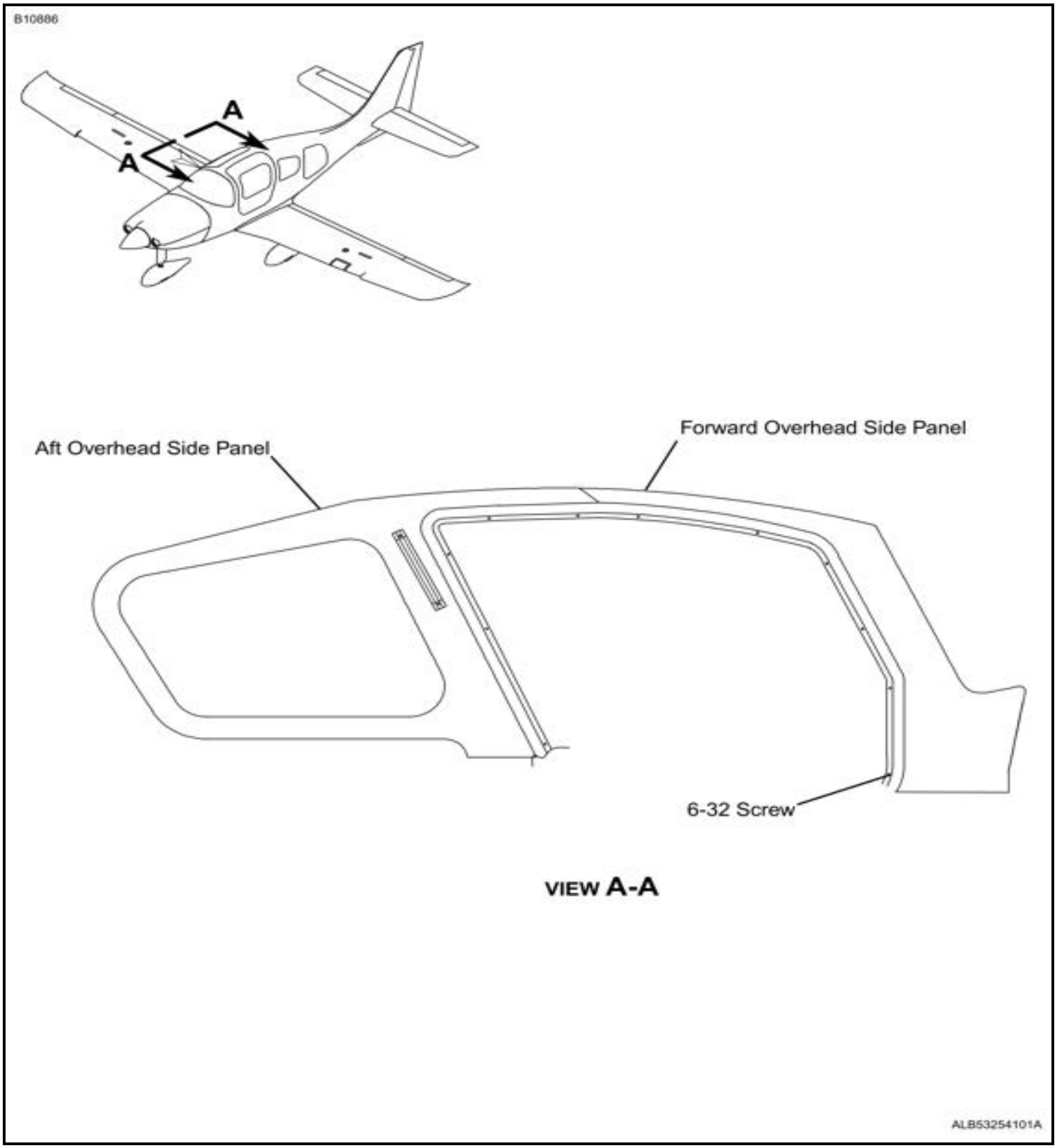
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Figure 204 : Sheet 1 : Side Detail of Door Tread Installation



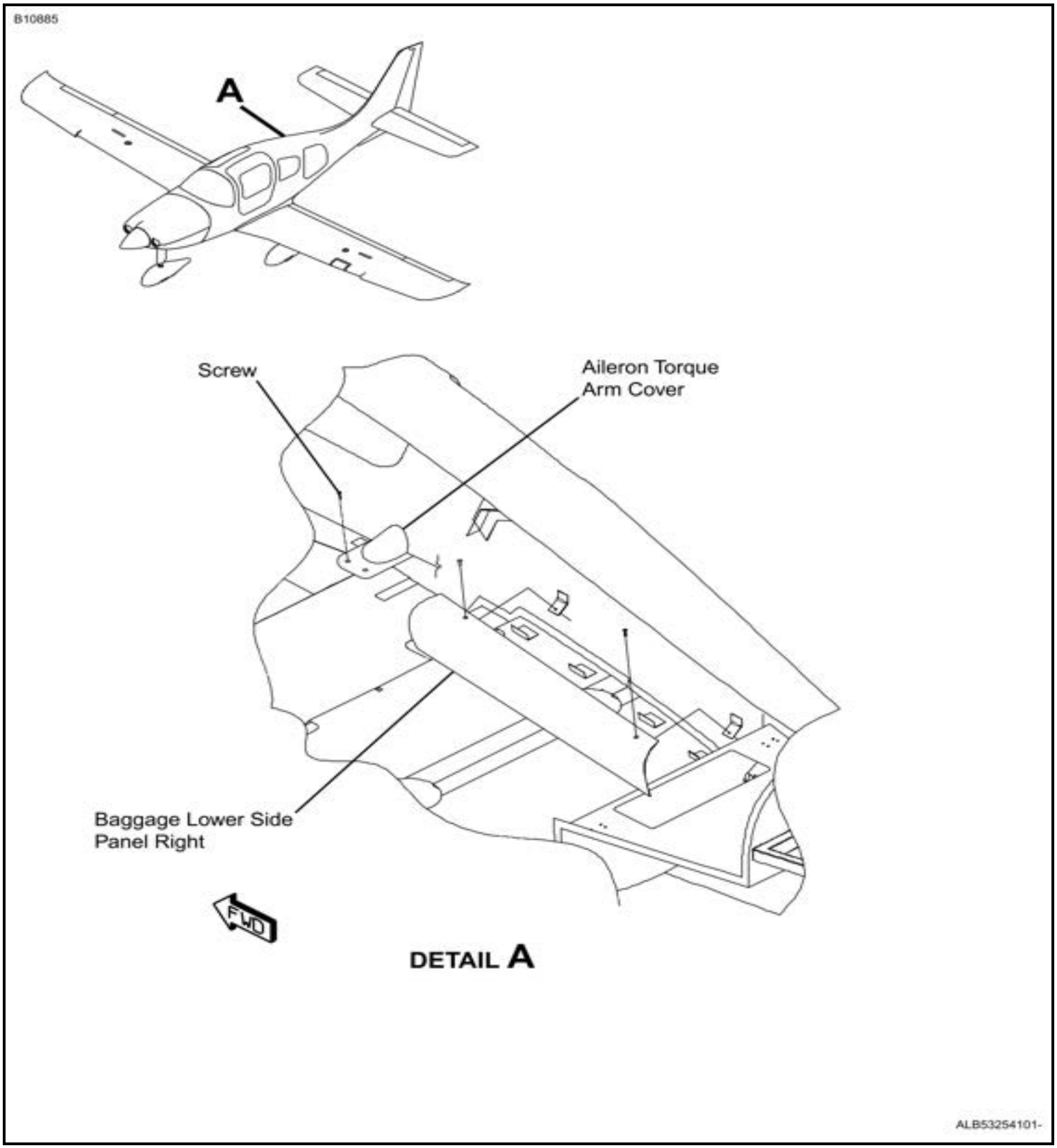
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Figure 205 : Sheet 1 : FOSPL/FOSPR and AOSPL/AOSPR Installation



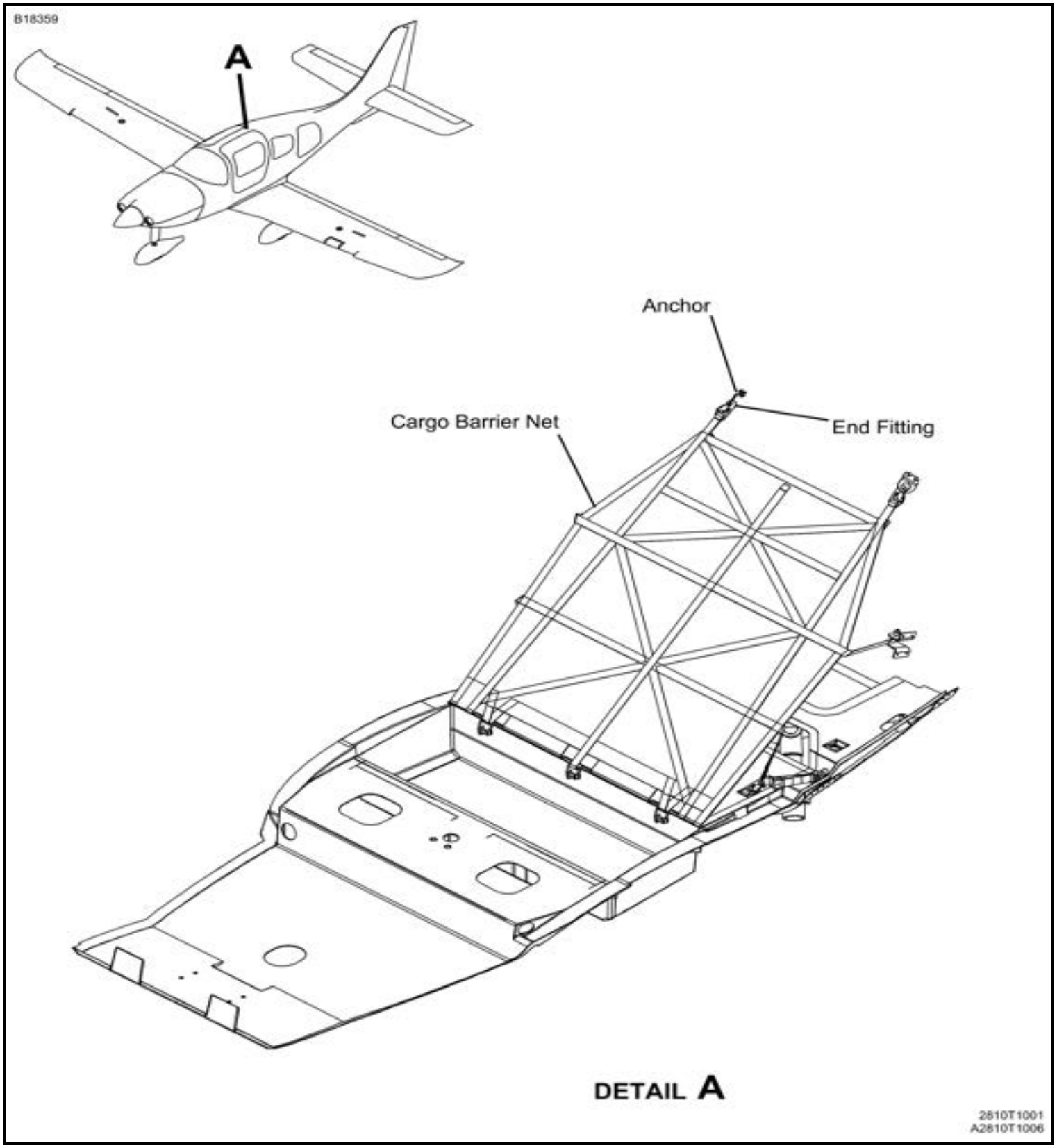
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Figure 206 : Sheet 1 : BLSPR and Aileron Torque Arm Cover



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Figure 207 : Sheet 1 : Cargo Barrier Net



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ACCESS PANELS - MAINTENANCE PRACTICES

1. Forward Wing Saddle Access Panel, Left and Right

A. Removal of the Wing Saddle Access Panels

(1) Remove the left or right front seat pan as required per instructions in Section 25-10-00, Removal and Installation of the Front Seats.

(2) Remove the four truss head 8-32 screws securing the panel to the floor. Refer to Figure 201.

B. **Installation of the Wing Saddle Access Panels** - Installation is the reverse of the removal procedure. Torque the truss head screws 30 to 36 in.-lbs.

2. Forward Gearbox Access Panel, Left And Right

A. Removal of the Forward Gearbox Access Panel

(1) Remove the rear seats per the instructions in Section 25-10-00, Removal and Installation of the Rear Seats and Crossbar.

(2) Remove the baggage floor carpet per the instructions in Section 25-00-00, Removal of the Baggage Floor Carpet.

(3) Remove the four truss head 8-32 screws securing the panel to the floor. Refer to Figure 201.

B. **Installation of Forward Gearbox Access Panel** - Installation is the reverse of the removal procedure. Torque the truss head screws 30 to 36 in.-lbs.

3. Aft Cabin Floor Access Panel

A. Removal of the Aft Cabin Floor Access Panel

(1) Remove the baggage floor carpet per the instructions in Section 25-00-00, Removal of the Baggage Floor Carpet.

(2) Remove the 13 truss head 8-32 screws securing the panel to the floor. Refer to Figure 201.

B. **Installation of the Aft Cabin Floor Access Panel** - Installation is the reverse of the removal procedure. Torque the truss head screws 30 to 36 in.-lbs.

4. Elevator Interconnect Access Panel

A. Removal of the Elevator Interconnect Access Panel

(1) Remove the hat rack carpet per the instructions in Section 25-30-00, Removal of the Hat Rack Carpet.

(2) Remove the 6 truss head 8-32 screws securing the panel to the floor. Refer to Figure 201.

B. **Installation of the Elevator Interconnect Access Panel** - Installation is the reverse of the removal procedure. Torque the truss head screws 30 to 36 in.-lbs.

5. Antenna Bulkhead Panel

A. Removal of the Antenna Bulkhead Panel

(1) Remove the hat rack cushion per the instructions in Section 25-30-00, Removal of the Hat Rack Cushion.

(2) Remove the hat rack carpet per the instructions in Section 25-30-00, Removal of the Hat Rack Carpet.

(3) Remove the four truss head 8-32 screws securing the panel to the aft bulkhead.

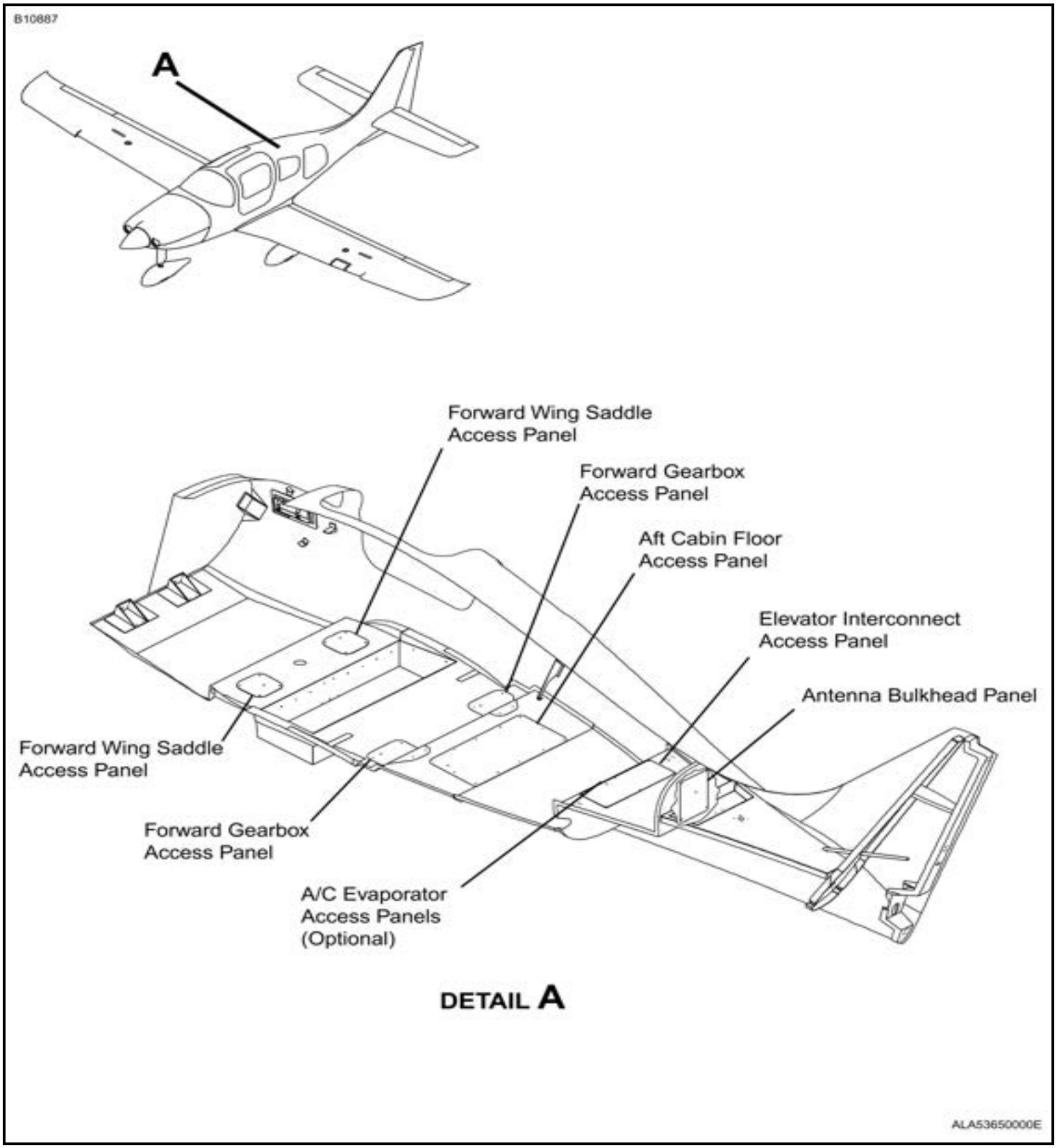
B. **Installation of the Antenna Bulkhead Panel** - Installation is the reverse of the removal procedure. Torque the truss head screws 30 to 36 in.-lbs.

6. A/C Evaporator Access Panel

A. **Removal and Installation** - Refer to Chapter 53 for removal and installation instructions.

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Figure 201 : Sheet 1 : Access Panel Locations



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EMERGENCY LOCATOR TRANSMITTER (ELT) - MAINTENANCE PRACTICES

1. Emergency Locator Transmitter (ELT)

A. Removal of the ELT

(1) Remove the electronics bay access panel per the instructions in Chapter 25,Antenna Bulkhead Panel.

(2) For the Artex 200 move the ELT switch from the ARM position to the OFF position. The Artex ME406 ELT switch does not have an OFF position.

(3) Disconnect the ELT antenna cable from the ELT.

(4) Disconnect the ELT remote switch cable from the ELT.

(5) Release the ELT retaining buckle, or Velcro strap as applicable, to free the transmitter from the mounting bracket.

B. Installation of the ELT - Installation is the reverse of above with the following exceptions:

(1) After ensuring that the switch in the ARM position, make sure the ELT is not transmitting. If the ELT is transmitting:

(a) Reset the Artex 200 by turning the unit OFF, then back to ARM. If the ELT does not reset, turn the unit OFF, remove, and service.

(b) Reset the Artex ME406 by turning the unit ON, then back to ARM.

(c) For additional information concerning the emergency locator transmitter, refer to the Artex ME406 Description, Operation, Installation and Maintenance Manual in the Supplier Publication List.

(2) Do a check of the ELT system. Refer to Artex ME406 Emergency Locator Transmitter System - Adjustment/Test.

2. Emergency Locator Transmitter Antenna

A. Removal of the ELT Antenna

(1) Remove the electronics bay access panel per the instructions in Chapter 25, Removal of Antenna Bulkhead Panel.

(2) For the Artex 200 move the ELT switch from the ARM position to the OFF position. The Artex ME406 ELT switch does not have an OFF position.

(3) Disconnect the antenna cable from the ELT antenna.

(4) Unscrew the antenna mounting nut and washer from the antenna mounting stud (lower part of antenna).

B. Installation of the ELT Antenna - Installation is the reverse of above with the following exceptions:

(1) After ensuring that the switch in the ARM position (Artex ME406) or OFF position (Artex 200), make sure the ELT is not transmitting. If the ELT is transmitting:

(a) Reset the Artex 200 by turning the unit OFF, then back to ARM. If the ELT does not reset, turn the unit OFF, remove, and service.

(b) Reset the Artex ME406 by turning the unit ON, then back to ARM.

(c) For additional information concerning the ELT antenna, consult the ELT manufacturer's manual that came with the aircraft, or call the factory.

(2) Do a check of the ELT system. Refer to Artex ME406 Emergency Locator Transmitter System - Adjustment/Test.

3. Emergency Locator Transmitter Remote Switch

A. The Emergency Locator Transmitter Remote switch is installed as follows:

(1) For the Avidyne avionics option the switch is found in the right knee bolster

(2) For the Garmin G1000 avionics option is found to the right of the MFD.

(3) For the Garmin Model T240 remote switch installation, refer to Instrument Panel (T240) - Removal/Installation

B. Removal of the ELT Remote Switch

(1) Remove the right knee bolster. Refer to, Left and Right Knee Bolster, or reach under the instrument panel, as applicable.

(2) Disconnect the wiring from the remote switch.

(3) Remove the remote switch by removing the four pan head 4-40 screws that attach through the switch faceplate. The screws are secured with nuts and washers.

C. Installation of the ELT Remote Switch - Installation is the reverse of the above with the following exceptions:

(1) After switch installation, make sure the ELT is not transmitting. If the ELT is transmitting:

(a) Reset the Artex 200 by turning the unit OFF, then back to ARM. If the ELT does not reset, turn the unit OFF, remove,

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and service.

(b) Reset the Artex ME406 by turning the unit ON, then back to ARM.

(2) Do a check of the ME406 ELT system. Refer to Artex ME406 Emergency Locator Transmitter System - Adjustment/Test.

D. For additional information concerning the ELT remote switch, consult the ELT manufacturer's manual that came with the aircraft, or call the factory.

4. Emergency Locator Transmitter Battery

A. **Artex 200 ELT**

(1) **Removal of the ELT Battery**

(a) Remove the ELT per the instructions in the Removal of ELT procedure.

(b) Remove the eight screws from the top ELT cover using a 3/32 Allen wrench.

(c) Gently pull the circuit board up until the slot with the battery pack wires is above the top of the ELT case.

(d) Unplug the battery from the circuit board.

(e) Lift the battery pack (the large rectangular box with the wires protruding from it as shown in Figure 201) out of the ELT case.

(2) **Inspection and Testing of the ELT Battery**

(a) Inspect the battery pack for leakage or corrosion. Replace with a new battery pack if any is found.

(b) Check the battery pack voltage under load. Replace if the voltage under load is less than 9.0 VDC.

(c) Measure the current drain. The ELT will need to be armed and not transmitting. Measured current should be less than 10 microamps.

(d) Further inspection and testing procedures, if needed, can be found by consulting the ELT manufacturer's manual that came with the aircraft or by calling the factory.

(3) **Installation of the ELT Battery**

(a) Plug the battery into the circuit board.

(b) Route the battery pack wires through the circuit board slot, and push the circuit board back into place.

(c) Route the battery pack wires into the notch in the center divider between the circuit board and the battery pack compartment.

(d) When installing the top cover screws, do not exceed 5 in.-lbs. of torque.

(e) Enter pertinent battery replacement information in the aircraft log book and fill out any other documentation required by local authority.

(f) Reinstall the emergency locator transmitter.

(g) Make sure the ELT is not transmitting. If the ELT is transmitting, reset by turning the switch OFF, then back to ARM. If the ELT does not reset, turn the unit OFF, remove, and service.

B. **Artex ME406 ELT**

(1) **Removal of the ELT Battery**

NOTE: The battery pack contains static sensitive parts; take electrostatic discharge precautions before handling.

(a) Remove the ELT per the instructions in the Removal of ELT procedure.

(b) Remove the eight screws from the battery-side cover. Refer to Figure 202. Battery pack is identified by the embossed text: "BATTERY ACCESS ON THIS SIDE".

(c) Carefully lift the battery cover (battery pack) away from the ELT and unplug the flex-cable connected to the pack. Do not pull on the flexible portion of the cable - use the rigid section of the flex circuit at the connector as a handle.

(d) Inspect the battery pack and ELT chassis. The battery cells, components and connectors should be free of corrosion. Inspect flex-circuit for broken connections or damage. Ensure the battery housing is free of cracks or other visible damage.

(2) **Installation of the ELT Battery**

(a) Lay the battery pack on the work surface with the batteries facing up.

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(b) Install a replacement seal in the slot along the perimeter of the housing.

(c) Leaving the battery as it is, position the ELT over the battery pack with one hand and plug the flex-cable connector into the battery assembly using the other. The cable should not be twisted and the connector should 'click' into place. The battery connector is keyed to prevent incorrect installation.

(d) Mate the ELT to the battery, making sure that the seal is positioned correctly during the process.

(e) Replace the 8 securing screws and torque to 10-12 inch-lbs.

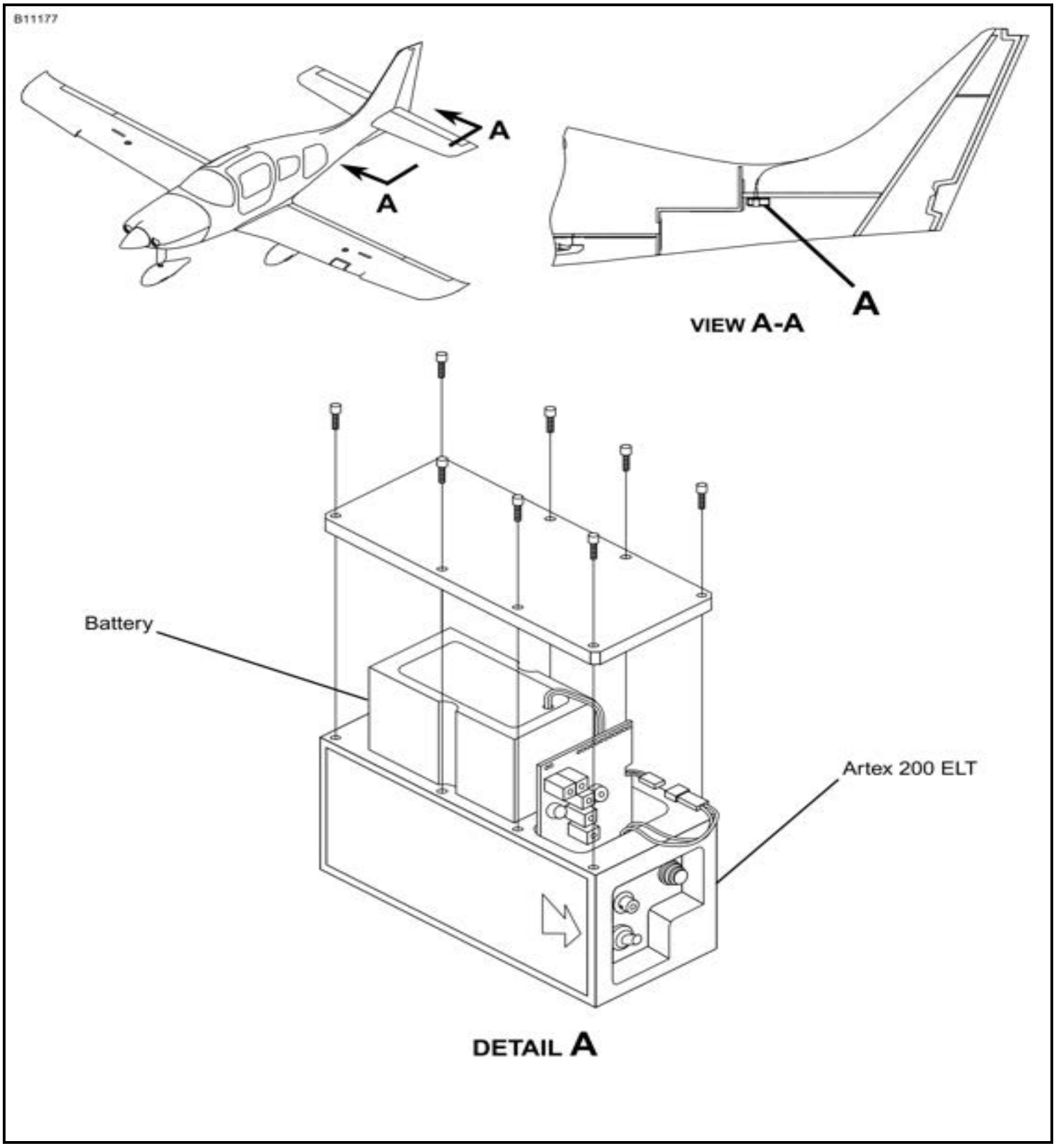
(f) Enter pertinent battery replacement information in the aircraft log book and fill out any other documentation required by local authority.

(g) Reinstall the emergency locator transmitter.

(h) Make sure the ELT is not transmitting. If the ELT is transmitting, reset by turning the switch ON, then back to ARM.

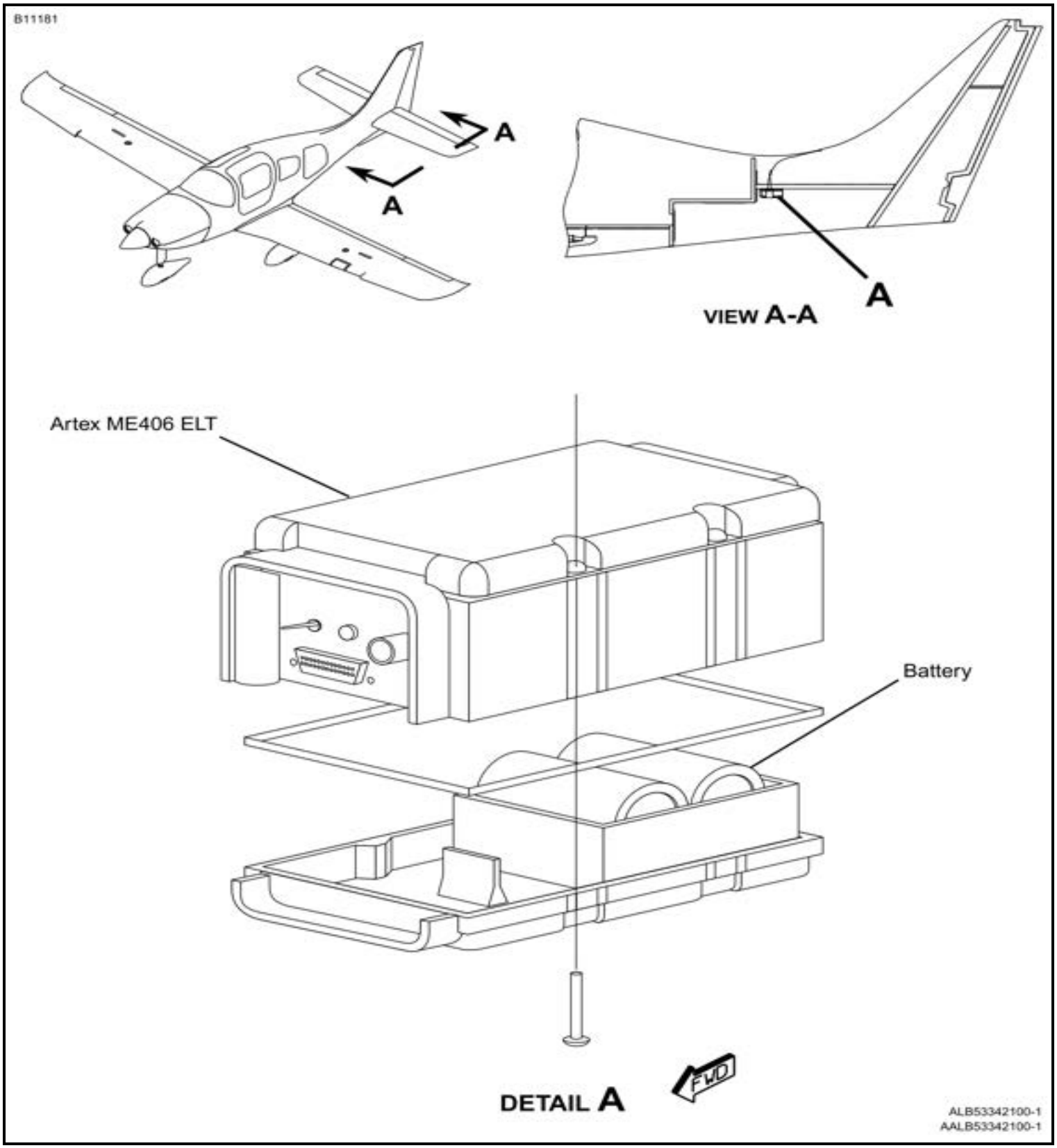
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Figure 201 : Sheet 1 : Artex 200 ELT Battery



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Figure 202 : Sheet 1 : Artex ME406 ELT Battery



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ARTEX ME406 EMERGENCY LOCATOR TRANSMITTER SYSTEM - TROUBLESHOOTING

1. General

A. This section gives the procedures to complete the self test for the ARTEX ME406 Emergency Locator Transmitter (ELT) system. The system transmits on two frequencies at the same time.

2. Tools and Equipment

A. NAV/COMM/ELT Ramp Test Set - Aeroflex IFR 4000 or equivalent.

3. ME406 Emergency Locator Transmitter Troubleshooting

CAUTION: Operate the emergency locator transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the emergency locator transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz signal after the ELT is active for approximately 50 seconds. This signal is identified as a distress signal.

A. Prepare the ME406 Emergency Locator Transmitter for Troubleshooting.

(1) Complete the ME406 transmitter test. Refer to Artex ME406 Emergency Locator Transmitter Test.

(2) Use the troubleshooting chart to determine the maintenance procedures necessary to correct the unserviceable ELT system. Refer to the ME406 Troubleshooting Chart Table 101

Table 101. ME406 Troubleshooting Chart

LED Flash Indication	Corrective Action
One Flash	System is Operational
Three Flashes	Shows an open or short condition on the antenna output or cable. Do the steps that follow: 1. Make sure that the coaxial cable is connected and in good condition 2. Do a continuity check of the center conductor and shield 3. Make sure that the cable is not shorted. 4. Make sure that the cable does not have an intermittent connection 5. Make sure that the antenna is installed correctly. If this error code persists, use a VSWR meter to examine the antenna for opens, shorts, and a resistive ground plane connection.
Four Flashes	Shows that there is a low power condition. Check for the conditions that follow: 1. The output power is below approximately 33 dBm (2 watts) for the 406.028 MHz signal, or 17 dBm (50mW) for the 121.5 MHz signal 2. The 406.028 MHz signal is off frequency. For this error code the ELT must be sent back for repair or replacement. Follow the manufacturers instructions to replace it.
Five Flashes	The ELT has not been programmed, however this does not show erroneous or corrupted programmed data.

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Six Flashes	The G-switch loop between pins 5 and 12 at the D-sub connector is not installed. and the ELT will not activate during a crash. Do the steps that follows: 1. Do a resistance test of the harness to make sure the D-sub jumper is installed 2. There must be less than 1 ohm of resistance between pins 5 and 12.
Seven Flashes	The ELT battery has too much accumulated operation time and must be replaced to meet FAA specifications. If the battery must be replaced, follow the manufacturers instructions to replace it.

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ARTEX ME406 EMERGENCY LOCATOR TRANSMITTER SYSTEM - ADJUSTMENT/TEST

1. General

A. This section gives the procedures that are necessary to do the inspection and operational checks necessary to comply with 14 CFR 91.207, for the Artex ME406 Emergency Locator Transmitter (ELT) System. The system transmits on two frequencies. The 121.5 MHz frequency has the standard swept tone that rescue personnel can follow to the source. The other frequency is 406.028 MHz and is used to activate a satellite tracking system. The 406.028 MHz frequency includes other information such as the country code of the airplane, the aircraft identification beacon serial number, the 24-bit address, the tail number, or other identification.

2. Tools and Equipment

A. NAV/COMM/ELT Ramp Test Set - Aeroflex IFR 4000 or equivalent.

3. Artex ME406 Emergency Locator G-Switch Functional Test

NOTE: If possible, do the test procedure for the emergency locator transmitter inside a metal hangar with the doors closed to decrease the signal transmission from the ELT unit during the test.

A. Do a G-Switch Operational Test (Refer to Figure 501).

CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the Emergency Locator Transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz distress signal after it is activated for approximately 50 seconds.

(1) Remove the ELT from the airplane. Refer to Emergency Locator Transmitter (ELT) - Maintenance Practices, Removal of the ELT.

(2) Install a jumper wire between pins 5 and 12 on the electrical connector of the ELT.

CAUTION: It is recommended that an experienced technician do this procedure because of the potential physical damage that can occur if the jumper wire is not installed correctly.

NOTE: The ELT will not activate with the G-switch unless electrical pins 5 and 12 have a jumper wire installed between them (this happens automatically when the ELT is locked into the mount tray with the electrical connector in position).

(3) Supply external electrical power to the airplane.

(4) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(5) Set the AVIONICS MASTER switch (SW04) to the ON position.

(6) Make sure the ELT switch is in the ARM position.

(7) On the GTC 570 Touchscreen Controller (UI405) found in the center console, do the steps that follow:

(a) Tune COMM 1 to 121.5 MHz

(b) Push the COMM 1 and SPKR buttons

(c) Make sure that the aural sweep tone is heard on the overhead speaker.

(8) Hold the ELT transmitter tightly in one hand and make a throwing movement followed by an opposite movement of the ELT transmitter.

(9) Make sure that the G-switch operates and that the aural warning sweep tone is heard on the overhead speaker.

(10) Set the ELT switch to the ON position and then back to the ARM position to reset the G-switch.

(11) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(12) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(13) Remove external electrical power to the airplane.

(14) Remove the jumper wire from electrical pins 5 and 12 on the electrical connector of the ELT.

(15) Install the emergency locator transmitter in the airplane. Refer to Emergency Locator Transmitter (ELT) - Maintenance Practices, Removal of the ELT.

4. Artex ME406 Emergency Locator Transmitter Test

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A. Do a Transmitter Test of the Artex ME406 Emergency Locator Transmitter (ELT) System.

CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the Emergency Locator Transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz distress signal after it is activated for approximately 50 seconds.

(1) Make sure the BATTERY switch and the AVIONICS switches are in the OFF position.

(2) Supply external electrical power to the airplane.

(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(4) set the AVIONICS MASTER switch (SW04) to the ON position.

(5) Set the CROSS TIE switch (SW03) to the ON position.

(6) Make sure that the ELT remote switch found on the right side of the instrument panel, is in the ARM position.

(7) On the GTC 570 Touchscreen Controller (UI405) found in the center console, do the steps that follow:

(a) Tune COMM 1 to 121.5 MHz

(b) Push the COMM 1 and SPKR buttons

(c) Make sure that the aural sweep tone is heard on the overhead speaker.

(8) Set the communication unit to the airplane speakers at an audio level loud enough to be heard.

NOTE: The IFR 4000 tester must have a line-of-sight to the ELT antenna.

NOTE: If it is necessary to do the transmitter test after the first five minutes of the hour, the IFR 4000 is connected directly to the ELT with a coaxial cable and a 30 dB attenuator. You will not hear the sweep tone from the ELT on the airplane speakers with the attenuator installed.

(9) Turn on the IFR 4000 and connect the 75 MHz antenna (black) to the test set.

(10) Push the SETUP key on the test set .

(a) Select the PORT: ANT option.

(11) Push the MODE key until the 406 BCN screen shows.

(12) Set the ELT remote switch on the right panel to the ON position.

(a) The ELT LED immediately starts to flash two times per second.

(b) The sweep tone is heard on the overhead speaker.

(13) Let the ELT make three to six sweeps on the overhead speaker.

NOTE: This will take one to two seconds.

(14) Set ELT switch to ARM and monitor the LED.

(15) Set the ELT remote switch back to the ARM position and monitor the LED.

(a) Make sure that the LED shows only one flash.

NOTE: If the IFR 4000 tester did not receive a 406.028 MHz signal and the ELT remote switch LED does not show a transmitter problem, do the test again.

(16) If the LED continues to flash, record the number of flashes and refer to Artex ME406 Emergency Locator Transmitter System - Troubleshooting.

(17) Set the ELT switch to the ON position.

(a) Make sure that the warning buzzer in the tail is heard outside the airplane.

(18) Set the ELT switch to the ARM position.

(19) Make sure the that the data on the ELT placard agrees with the data shown on the IFR 4000 tester screen.

- FREQ - 406.028 MHz + 2 kHz to - 5 kHz (between 406.023 and 406.030 MHz)
- BEACON ID - 15 digit hexadecimal series (must match the identification number on the ELT product label)
- COUNTRY - 3 digit code of registration country
- USER PROTOCOL - (must match protocol used in configuration procedures)

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- BCH-1 - 6 digit "Valid" hexadecimal series
- MSG - 22 digit hexadecimal series
- RADIO-LOCATING - 121.5 MHz.

NOTE: When ownership of an aircraft is transferred within the same country, the ME406 ELT should be reregistered with the applicable authority. When an aircraft with a ME406 ELT changes tail number or country registration, the ELT will need to have the new identification data entered. The ELT will also need to be registered with the applicable authority.

(20) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

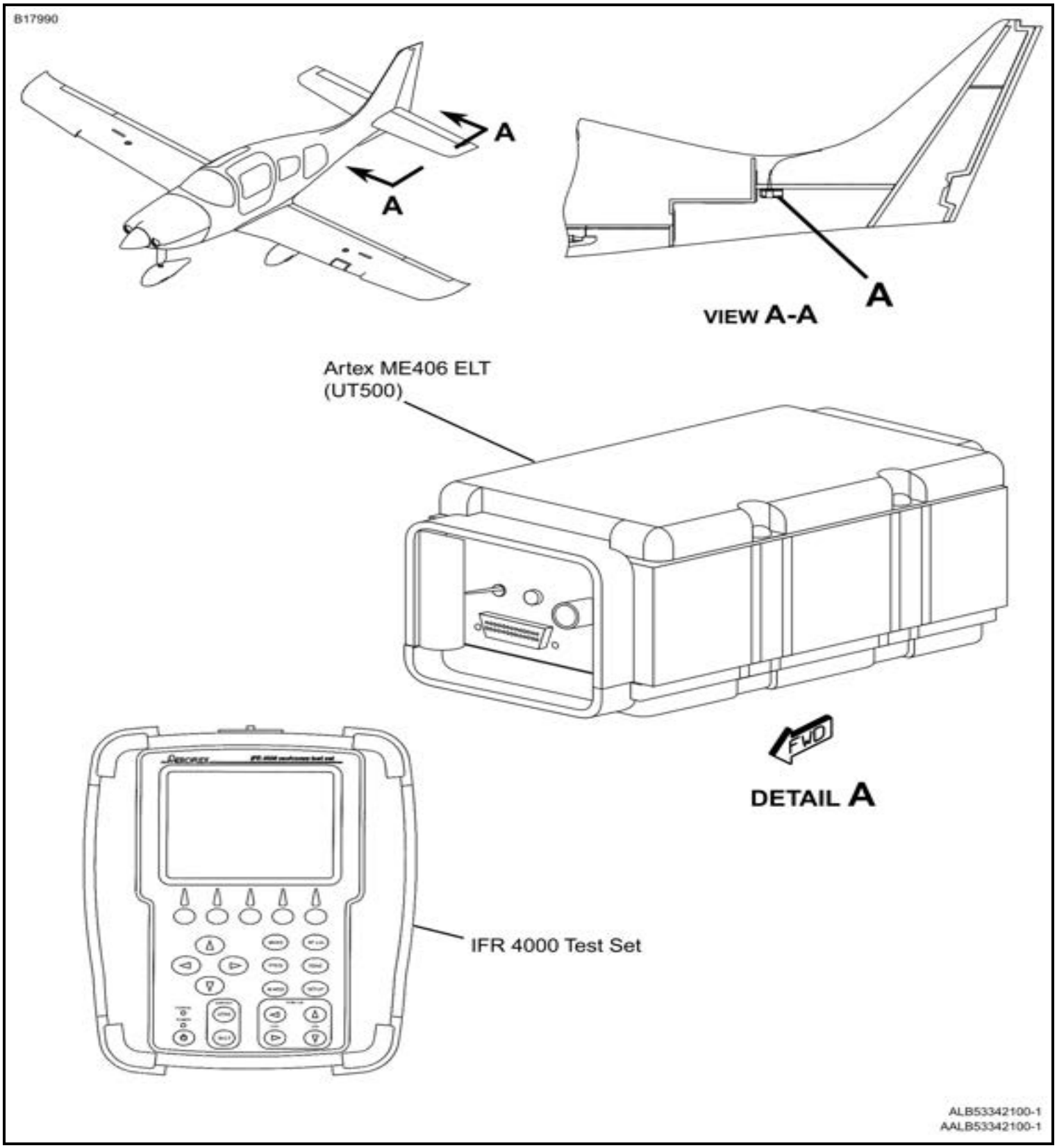
(21) set the AVIONICS MASTER switch (SW04) to the OFF position.

(22) Set the CROSS TIE switch (SW03) to the OFF position.

(23) Remove external electrical power to the airplane.

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Figure 501 : Sheet 1 : Artex ME406 Emergency Locator Installation



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PULSE OXIMETER/CO DETECT (T240) - DESCRIPTION AND OPERATION

1. General

A. The Aero-455 Carbon Monoxide Detection system consists of an instrument panel mounted SPO2/CO sensor, Audio Panel and the CO DETECT 2 Amp circuit breaker. The Aero-455 Pulse Oximeter and Carbon Monoxide Detector is a compact instrument panel mounted on the left side of the instrument panel. The carbon monoxide (CO) detector constantly monitors the cabin air for CO and gives a visual and aural alert to the crew before the CO reaches a critical level. As a Pulse Oximeter, the unit monitors pilot's blood oxygen levels (SPO2), heart rate statistics, CO Level, Cabin temperature and Cabin Altitude. For more maintenance data applicable to the CO Detector refer to the CO Guardian Owners Manual Pulse Oximeter and Carbon Monoxide Detector Model Aero-455 Rev A in the Supplier Publication List.

B. The CO Guardian Owners Manual Pulse Oximeter and Carbon Monoxide Detector Model Aero-455 must be returned to CO Guardian at the end of the 5 year service life for replacement.

2. Description

A. Pulse Oximeter/CO Detect (Reference Figure 1).

(1) As a Pulse Oximeter, the pilot inserts an index finger into the front of the sensor and receives readouts that determine general physical and environmental conditions. The Aero-455 transmits the pilot's blood oxygen levels (SPO2) and heart rate statistics to the No.2 GIA (UF300). The signal is then sent to the MFD display through a RS-232 bus. The MFD sends the signal by HSDB to the PFD to show on the CAS window display.

(2) As a Carbon Monoxide Detector, the sensor samples cabin air continuously and initiates a visual and audible alarm of the CO content should it rise above 50 ppm. During an alarm cycle the Test/Reset button monitors system integrity and the alarm will repeat as long as CO is present. The Aero-455 reminds the pilot when he/she passes 10K and every 30 minutes above 10K to check pilot's blood oxygen levels and heart rates. The unit transmits cabin CO level, cabin temperature and cabin altitude to the MFD display unit through an RS-232 output.

B. Audio Panel

(1) The audio panel receives a 500 ohm audio tone from the Aero-455 sensor to provide the pilot with an aural warning when CO content rises above 50 ppm. The alarm level is calibrated to give a visual alert on the PFD in or less than 5 minutes when the 50 ppm is reached. The PFD CAS alert will remain until the CO level drops below the 50 ppm.

C. 2 Amp Circuit Breaker

(1) The 2 amp CO DETECT circuit breaker is dedicated only for use by the Aero-455 Pulse Oximeter and Carbon Monoxide Detector system.

3. Operation

A. Aero-455 Pulse Oximeter/CO Detect Sensor

(1) When the airplane master battery switch is selected ON, the Aero-455 Pulse Oximeter and Carbon Monoxide Detector system goes through a self-test routine. The self-test checks for functionality of critical components including CO sensor, temperature sensor, pressure sensor, and the general integrity of the system. When the CO Detector is energized there is a three-minute delay to stabilize the sensor before the unit accurately senses CO levels.

(2) When the CO Detector is energized, the detector goes through a self-test. The self-test checks for the functionality of critical components that follow:

(a) CO Detector

(b) Temperature Sensor

(c) Pulse Oximeter.

(3) When the test sequence is initiated the CO LVL HIGH (red) message flashes twice on the PFD and then remains OFF except if there is a CO LVL HIGH, a failure of the unit, or until another self-test is done by the unit.

(4) If the CO level reaches a critical level the CO LVL HIGH CAS alert will show on the PFDCAS window.

(5) If the GTC MSG flashes on the PFD, the GTC 570 will also show a GTC MSG that flashes. Touch the GTC 570 MSG button and the applicable message that follows will show on the GTC display:

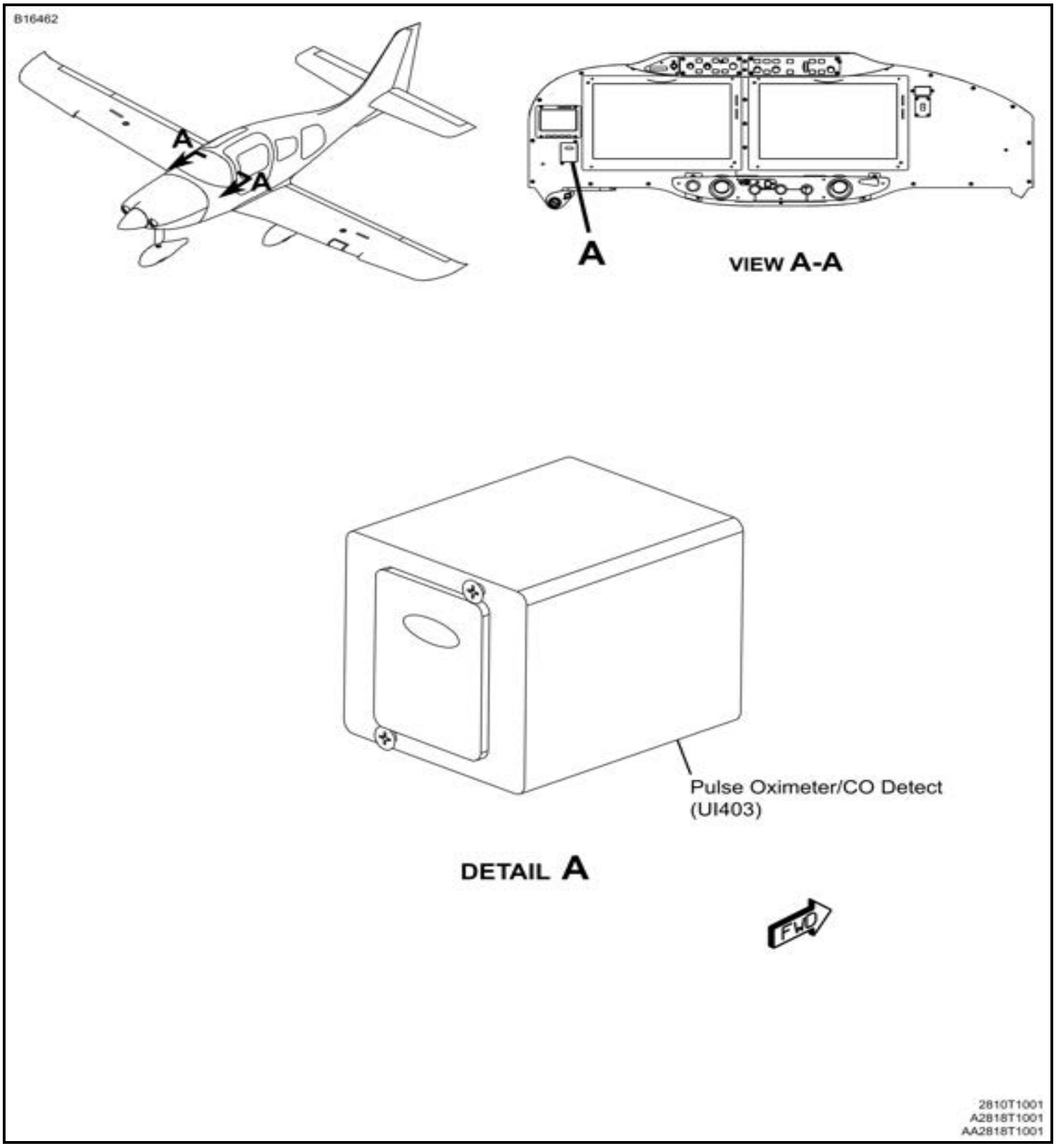
(a) CO DET SRVC

(b) CO DET FAIL.

(6) If the Aero-455 has an alert and does not reset it must be returned to CO Guardian for servicing.

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Figure 1 : Sheet 1 : Carbon Monoxide Detector



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PULSE OXIMETER/CO DETECT (T240) - MAINTENANCE PRACTICES

1. General

A. This section gives the removal and installation, self-test and troubleshooting procedures for the Aero-455 Pulse Oximeter and Carbon Monoxide Detector Sensor (UI403). For a general description of the Pulse Oximeter/CO Detect, refer to Pulse Oximeter/CO Detect (T240) - Description and Operation.

2. Pulse Oximeter/CO Detect Removal/Installation

A. Remove the Pulse Oximeter/CO Detect (UI403) (Refer to Figure 201).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the CO DETECT circuit breaker found on the cockpit circuit breaker panel.

(5) Remove the GDU 1400 Primary Flight Display (PFD) (UI407). Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation, to get access to the Pulse Oximeter/CO Detect electrical connector (P190).

(6) Disconnect the electrical connector (P190) at the rear of the detector.

(7) Support the detector and remove the screws that attach it to the instrument panel.

(8) Remove the detector from the airplane.

B. Install the Pulse Oximeter/CO Detect (UI403) (Refer to Figure 201).

(1) Visually inspect the connector to make sure there are no bent or damaged pins.

(a) Repair any damage.

(2) Put the detector in its correct position in the instrument panel.

(3) Support the detector and install the screws that attach it to the instrument panel.

(4) Connect the electrical connector (P190) at the rear of the detector.

(5) Install the GDU 1400 PFD (UI407). Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Engage the CO DETECT circuit breaker found on the cockpit circuit breaker panel.

(7) Do a test of the Pulse Oximeter/CO Detect. Refer to Pulse Oximeter/CO Detect Self-Test.

C. Pulse Oximeter/CO Detect Self-Test

(1) Apply external electrical power on the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Make sure that the PFD does not show a CO LVL HIGH CAS message.

(5) Make sure that the GTC 570 Touch Screen Controller message advisory text does not show:

(a) A CO DET FAIL message

(b) A CO DET SRVC message.

D. Pulse Oximeter/CO Detect Operational Test

(1) Apply external electrical power on the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Disengage the CO DETECT circuit breaker found on the cockpit circuit breaker panel.

(5) Make sure that the CO DET FAIL message shows on the GTC 570.

(6) Engage the CO DETECT circuit breaker.

(7) Cycle the GTC 570 message screen.

(a) Make sure that the CO DET FAIL message no longer shows on the display.

(8) Put your index finger in the correct position in the CO Detector.

(a) Make sure that the pulse and percent oxygen data shows in the Multifunction Display (MFD) EIS display.

3. Pulse Oximeter/CO Detect Troubleshooting

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A. Do the Pulse Oximeter/CO Detect Troubleshooting.

NOTE: If can be necessary for you to remove some of the G2000 components to complete the procedures that follow. Refer to the applicable Chapter/Section for the removal and installation procedures.

(1) If the CO LVL HIGH alert shows on the PFD, the CO ppm level at a critical level.

(a) Do the applicable emergency procedures. Refer to the Model T240 POH.

(2) If the CO DET SRVC message shows on the GTC 570, the Pulse Oximeter/CO Detect sensor needs servicing.

(a) Return the Pulse Oximeter/CO Detect unit to CO Guardian for servicing.

(3) If the CO DET FAIL message shows on the GTC 570 do the steps that follow:

(a) Make sure that the CO DETECT circuit breaker, found on the cockpit circuit breaker panel, is engaged.

1 If necessary, engage the CO DETECT circuit breaker and check the Pulse Oximeter/CO Detect self-test again. Refer to, Pulse Oximeter/CO Detect Self-Test in this section.

(b) Make sure that a CAS PFD and/or GIA No.2 alert does not show on the PFD.

1 If a CAS PFD and/or the GIA No.2 alert show(s) on the PFD refer to Chapter 34, Garmin (G2000) - Troubleshooting.

(c) If the MFD and/or the GIA No.2 do not have a unit fault but have a communication fault, check the components that follow and repair any damage as necessary:

1 The HSDB wiring bundle between the Pulse Oximeter/CO Detect unit and the MFD

2 The HSDB wiring bundle between the GIA No.2 and the MFD

3 The CO Detect unit electrical connector and the wiring bundle electrical connector (P190)

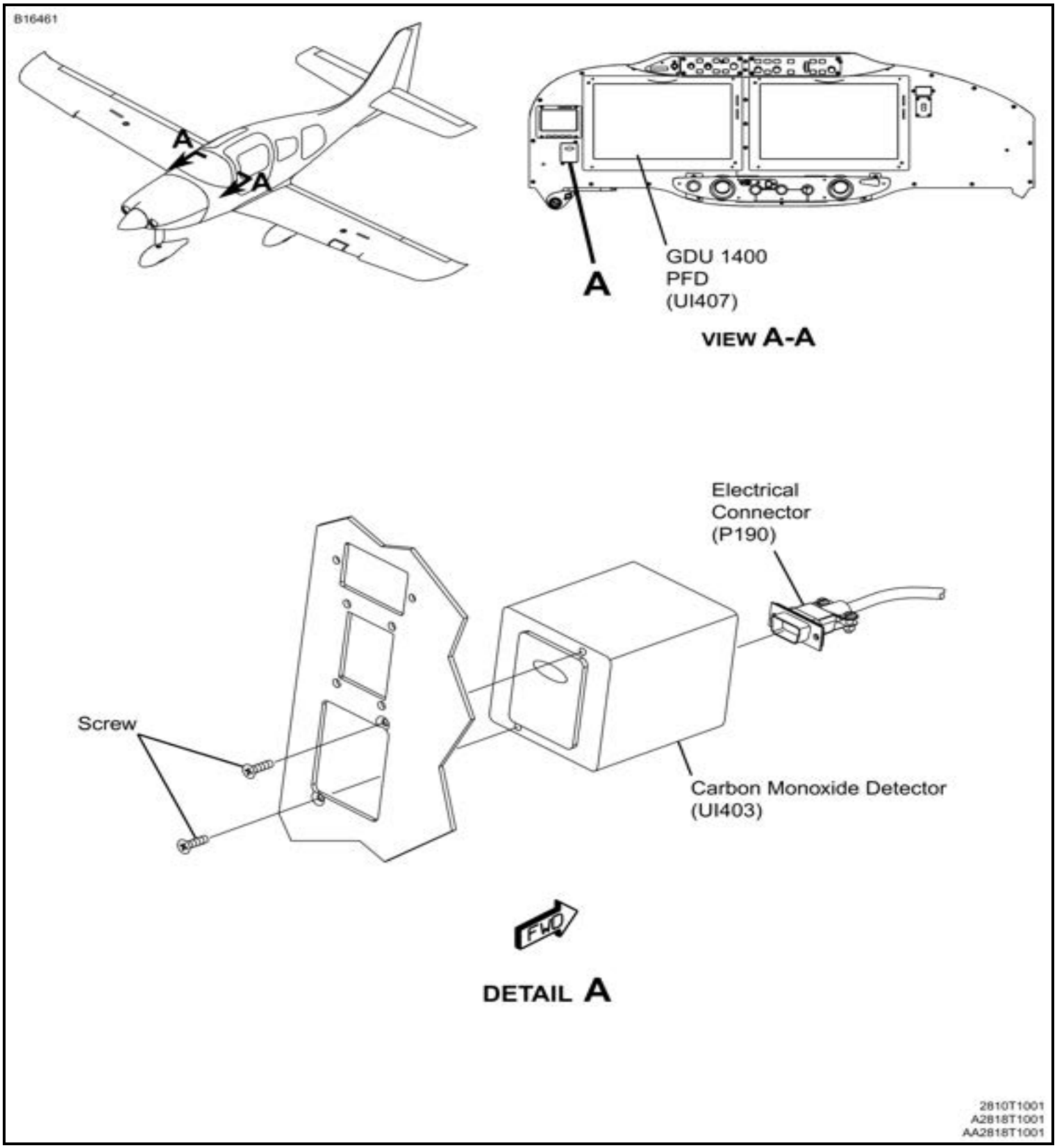
4 The MFD electrical connector (PI2001) and the wiring bundle electrical connector (PI401)

5 The GIA No.2 electrical connector (P603) and the wiring bundle electrical connector (P662).

(d) If the wiring bundle and electrical connectors check good, replace the Pulse Oximeter/CO Detect unit. Refer to Pulse Oximeter/CO Detect Removal/Installation in this section.

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Figure 201 : Sheet 1 : Pulse Oximeter/CO Detect Installation



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SOUNDPROOFING AND INSULATION - DESCRIPTION AND OPERATION

1. Soundproofing and Insulation

A. Firewall and Footwell

(1) The soundproofing material on the firewall and in the footwells is constructed of fire-resistant foam with a permanent adhesive backing. The adhesive backing results in destruction of the material if removed; therefore, the material cannot be repaired, but must be replaced if damaged. However, the entire panel does not have to be replaced. Only the damaged section has to be replaced, provided it can be cleanly removed without damaging the surrounding area. The adhering surfaces must be cleaned with an approved cleaner and method for composite materials before applying a new part. Large areas to be covered may be cut into smaller pieces for easier installation. Each panel must be trimmed to fit prior to installation. The precision of installation is critical, as the adhesive is so tenacious it is not possible to reposition afterwards. Avoid adhesive contacting skin. Avoid covering the mountings of maintenance items. Consult Cessna Aircraft Company if needed.

B. Aft of Doors

(1) The soundproofing material aft of the doors and in the cargo area (headliner and sides) is a one piece, cloth covered, fire-resistant foam with a permanent adhesive backing. The adhesive backing results in destruction of the material if removed; therefore, the material cannot be repaired, but must be replaced if damaged. The one-piece design necessitates the removal or partial removal of all of the following interior components prior to stripping off of the old material:

NOTE: After stripping the old material off, the adhering surfaces must be cleaned with an approved cleaner and method for composite materials before applying the replacement part. The precision of installation is critical, as the adhesive is so tenacious it is not possible to reposition afterwards. Avoid adhesive contacting skin. Avoid covering the mountings of maintenance items. Consult Cessna Aircraft Company if needed.

(a) Rear seats. Refer to Section 25-10-00, Removal and Installation of the Rear Seats and Crossbar.

(b) Front seat belts. Refer to Section 25-13-00, Seat Belts and Restraints.

(c) Rear seat belts. Refer to Section 25-13-00, Seat Belts and Restraints.

(d) Baggage door surround. Refer to Chapter 52.

(e) Forward center overhead light panel. Refer to Section 25-30-00, Forward Center Overhead Light Panel (FCOLP).

(f) Aft center overhead light panel. Refer to Section 25-30-00, Aft Center Overhead Light Panel (ACOLP).

(g) Middle lower side panels, left and right. Refer to Section 25-30-00, Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR).

(h) Aft overhead side panels, left and right. Refer to Section 25-30-00, Aft Overhead Side Panels, Left (AOSPL) and Right (AOSPR).

(i) Baggage lower side panel, left and right. Refer to Section 25-30-00, Baggage Lower Side Panel, Left (BLSPL) and Right (BLSPR).

(j) Hat rack cushion. Refer to Section 25-30-00, Hat Rack Cushion.

(k) Hat rack carpet. Refer to Section 25-30-00, Hat Rack Carpet.

(l) Upper hat rack baggage net tie down bracket. Refer to Section 25-30-00, Upper Hat Rack Baggage Net Tie Down Bracket.

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EMERGENCY EXIT HATCHET - MAINTENANCE PRACTICES

1. Emergency Exit Hatchet

A. The emergency exit hatchet is located on the vertical face of the floor under the pilot's seat. The blade of the hatchet points down and is inserted in an aluminum sheath, and the unit is secured with Velcro strips.

B. **Removal of Hatchet and Brackets**

(1) Remove the Velcro strips, and remove the hatchet.

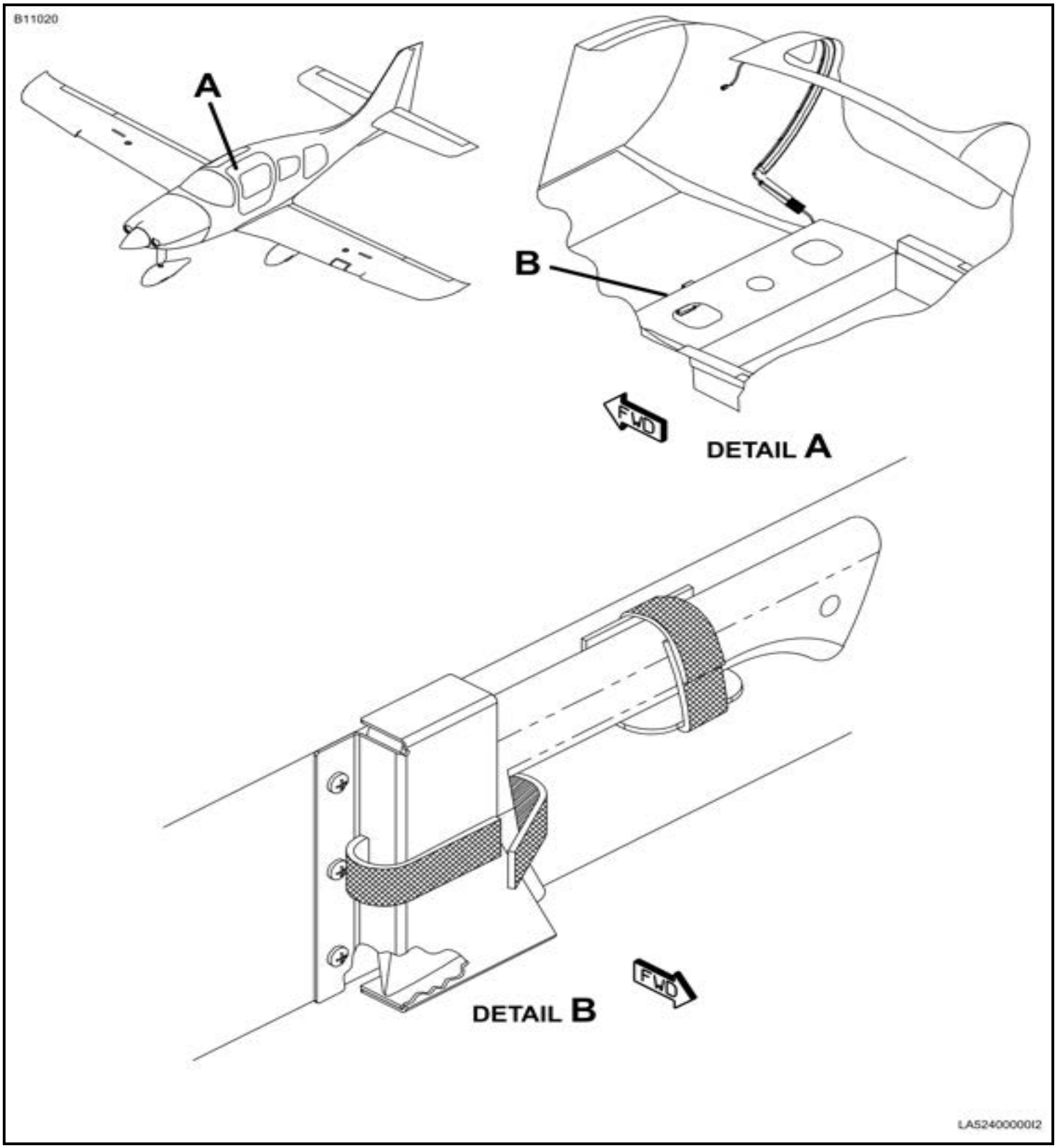
(2) If removal of the brackets is required, remove the two 8-32 flat head screws, washers, and self-locking nuts on the handle bracket.

(3) Remove the three 8-32 flat head screws, washers, and self-locking nuts on the blade bracket.

C. **Installation of Hatchet and Bracket** - Installation is the direct reversal of removal. Torque all screws 20 to 25 in.-lbs. Route the handle Velcro strap behind the bracket and around the handle as shown in Figure 201. Route the blade Velcro strap through the slot and under the blade as shown in Figure 201.

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Figure 201 : Sheet 1 : Emergency Exit Hatchet



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CUPHOLDER (GARMIN G1000 OPTION) - MAINTENANCE PRACTICES

1. Cupholder (Garmin G1000 Option)

A. On aircraft equipped with the Garmin G1000, two retractable cupholders may be installed underneath the instrument panel - one left of the tower and one right of the tower. For the cupholder installed for Avidyne aircraft, refer to Section 25-12-00, Center Console.

B. **Removal and Installation of the Cupholder**

(1) Remove the two 8-32 x 1 inch MS51957-49 pan head screws and NAS1149FN832P washers affixing the cupholder to the bottom flange of the instrument panel. Refer to Figure 201.

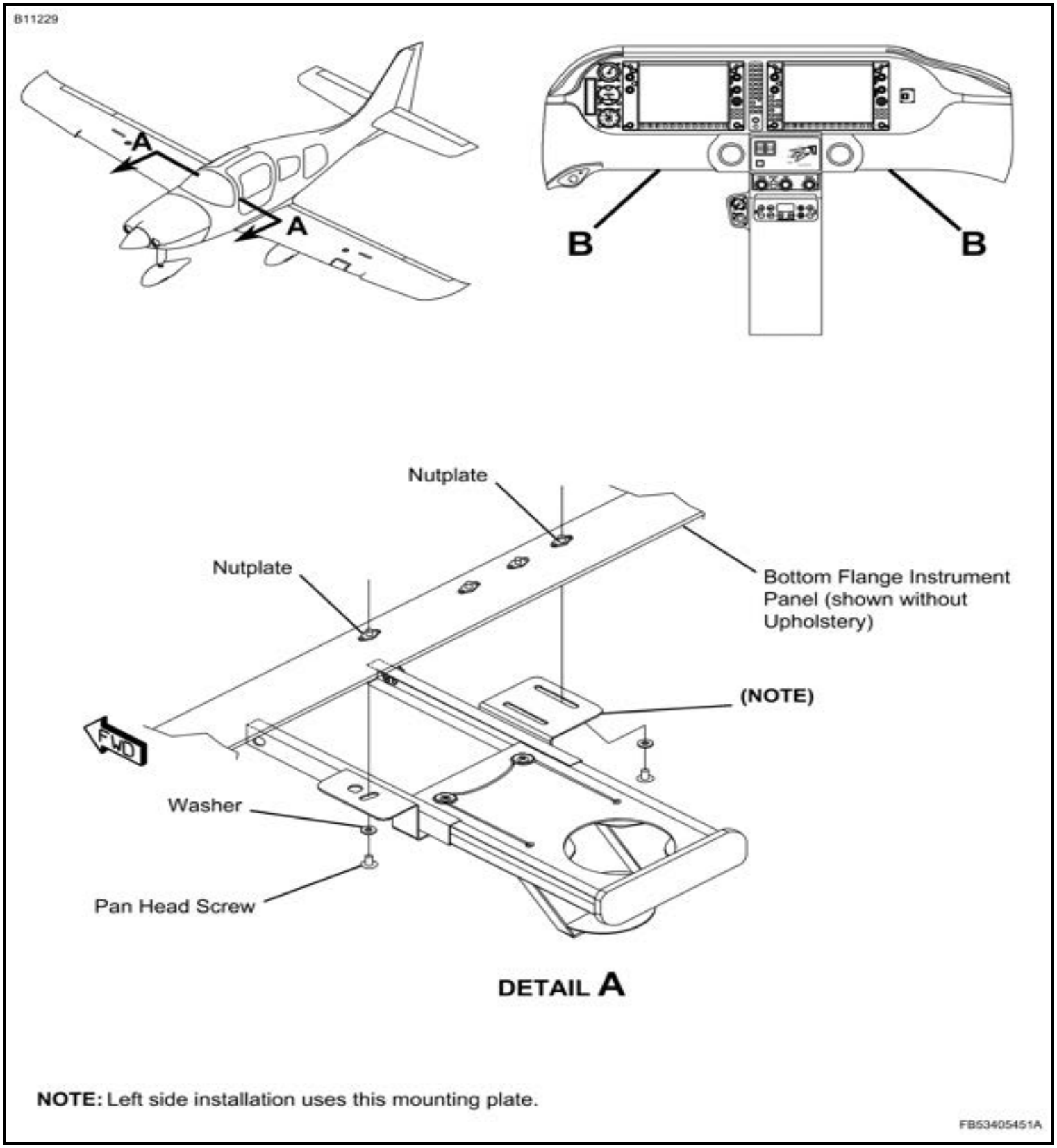
(2) Remove the cupholder.

(3) Installation is the reverse of removal. Dry torque the screws 17 to 21 in.-lbs.

C. **Service and Maintenance** – The cupholders do not require any service or maintenance.

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Figure 201 : Sheet 1 : Cupholder



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FOOTWELL - MAINTENANCE PRACTICES

1. Footwell

A. The footwell is a structural member of the fuselage and contains the front seat belt attachment bracket. It is installed with AN526C1032R10 screws and NAS1149F0363P washers (AN960-10). The length of these screws should be appropriate for the attachment.

B. **Removal**

(1) Remove all four seats.

(2) Lift the carpet in the footwell, and remove the screws and washers connecting the footwell to the flanges.

(3) Remove the footwell from the plane.

C. **Installation**

(1) Place the footwell within the flanges and install the screws and washers. Torque the screws 30 to 36 in.-lbs.

(2) Install the carpet.

(3) Install the four seats.

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ROSEN SUNVISOR - MAINTENANCE PRACTICES

1. Rosen Sunvisor

A. Rosen sunvisor assemblies are of optical quality lens material that provides protection from 99.9 percent of UV rays (A/B) mounted on a pivoting slide. The assemblies provide stable and easy adjustment of the sunvisor with a secure stowing position.

B. **Sunvisor Removal and Installation**

(1) Remove the No. 8-32 x .625 hex socket cap screw and lock washer that attaches the sunvisor assembly to the mounting bracket on the aircraft cabin overhead.

(2) Remove the sunvisor assembly.

(3) To disassemble the sunvisor and slide from the mounting block, remove the No. 8-32 x .750 hex socket cap screw and lock washer.

(4) Remove the mounting block.

(5) Retain all hardware for reinstallation.

(6) Installation is the reverse of removal. Tighten the hex screws at the pivot points so that the sunvisor moves freely but not loosely.

C. **Sunvisor Maintenance** – Maintenance for continued airworthiness should only be performed when the aircraft is on the ground and is as follows:

(1) Periodically clean the lenses with Rosen Plastic Cleaner, Polisher and Protectant, a soft cloth, mild soap and water, or an approved aviation grade windscreen cleaner. Do not use abrasives on the lens.

(2) Periodically adjust the pivot tensions on the visor assemblies.

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ICE AND RAIN PROTECTION - GENERAL

1. Anti-Ice/De-Ice - General

A. This chapter provides information on systems and components that prevent ice formation and/or remove ice on different external areas of the airplane. The systems and components that prevent ice formation are identified in this chapter as anti-ice systems or components. The systems and components that remove ice from different external areas of the airplane are identified as de-ice systems or components.

B. The propeller is electrically heated for de-icing (for airplanes without the TKS FIKI system option) or protected with TKS fluid (for airplanes with the TKS FIKI system option). The two optional TKS anti-ice systems (Inadvertent and FIKI) protect the flight surfaces leading edges from ice formation.

2. Tools, Equipment, and Materials

NOTE: Equivalent substitutes can be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
ScotchBrite	7440, Heavy Duty	3M	To remove sealant for TKS porous panel installation, or polish porous panel
ScotchBrite	7445, Very Fine	3M	To remove sealant for TKS porous panel installation, or polish porous panel
ScotchBrite	7448, Ultra Fine	3M	To remove sealant for TKS porous panel installation, or polish porous panel
Plastic scraper		Commercially Available	To remove sealant for TKS porous panel installation
Thin putty knife (sharpened)		Commercially Available	To remove TKS porous panels
Multimeter	Model 260 or equivalent	Simpson Electric Co. 853 Dundee Ave. Elgin, IL 60120	To check voltage and continuity in electrical circuits
Measuring Tape		Commercially Available	For TKS panel installation
Sharp Knives		Commercially Available	
Cleaning cloths (Lint-free)		Commercially Available	Cleaning
Rymple cloth	301 purified	International Paper Veratec Division 100 Elm Street Walpole, MA 02081	Cleaning
Clenching Tool (3/16 Inch)	T300-112A	CAV Aerospace Inc. 30 Leawood Drive New Century, KS 66031	To repair and replace TKS tubing
Clenching Tool (5/16 Inch)	T300-120A	CAV Aerospace Inc.	To repair and replace TKS tubing
Clenching Tool (1/2 Inch)	T300-144A	CAV Aerospace Inc.	To repair and replace TKS tubing
TKS System Test Cart	09301-01	CAV Aerospace Inc.	To do the TKS porous panel purge and test procedures
Blank Olive with MN4856 Nut (3/16-Inch Tube)	P075	CAV Aerospace Inc.	To cap the TKS tubing during tests

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Seal 1/2 inch	100-013-8810	CAV Aerospace Inc.	To replace when TKS fittings are disconnected then connected again
Olive 1/2 inch	MN101-32	CAV Aerospace Inc.	To replace when TKS fittings are disconnected then connected again
Olive 5/16 inch	MN101-20	CAV Aerospace Inc.	To replace when TKS fittings are disconnected then connected again
Seal 5/16 inch	S1201-20	CAV Aerospace Inc.	To replace when TKS fittings are disconnected then connected again
Nylon Ball	03-151-07	Commercially Available	To cap the TKS tubing during tests
Nut 5/16	MN4855	Commercially Available	To cap TKS lines
Nylon Ball 1/2 inch	03-151-10	CAV Aerospace Inc.	To cap the TKS tubing during tests
Nut 1/2 inch	MN6201	Commercially Available	To cap TKS lines and fabricate test lines
Nylon Ball 3/16 inch	03-151-X10	Commercially Available	To cap the TKS tubing during tests
Nut	MN4856 or ZN4856	Commercially Available	To cap TKS lines and fabricate test line
5/16 Straight Couplings MN4852		Commercially Available	For use during TKS test procedures.
1/2 inch to 5/16 inch Reducing Couplings		Commercially Available	For use during TKS test procedures.
Plugs 1/2 inch	MN6870	Commercially Available	For use during TKS test procedures.
Plugs 5/16 inch	MN6227	Commercially Available	For use during TKS test procedures.
Manual shutoff valve	V520P-8	Commercially Available	For use during TKS test procedures with test lines.
Male connectors	W68PLP-8-8	Commercially Available	For use during TKS test procedures with test line shut off valve.
Low-Adhesive Plastic Tape	PC 628	Shurtape Technologies	To install the TKS porous panels
Velcro Straps		Commercially Available	To install the TKS porous panels
Sealant	Type I, Class B-2	Cessna Aircraft Company	To install TKS porous panels to the leading edges
Sealant	Type I, Class B-1/2	Cessna Aircraft Company	To seal TKS porous panel fluid supply fittings.
Fluorosilicone Sealant	Type IX (Type V, Class F)	Cessna Aircraft Company	To seal TKS fluid tank components.

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Sealant	Type XII, Class B	Cessna Aircraft Company	To seal gap between Devcon wedge and trailing edge of TKS porous panel.
Sealant	Type XV, Class B	Cessna Aircaft Company	To fay seal around rivet holes on the back of the TKS porous panel.
Plastic Welder I	14320 (47 ml cartridge) or 14385 (400 ml cartridge)	ITW Devcon 30 Endicott St. Danvers, MA 01923	To form the Devcon wegde on the leading edge of the wing for porus panel installation.
Plastic Welder II	14340 (47 ml cartridge) or 14390 (400 ml cartridge)	ITW Devcon	To form the Devcon wegde on the leading edge of the wing for porus panel installation.
Jeffco Epoxy	1307LV	Jeffco Epoxy Products 5252 Kearny Villa Way San Diego, CA 92123	To form the Devcon wegde on the leading edge of the wing for porus panel installation.
Plastic Sheeting		Commercially Available	To catch deice fluid from the TKS panel purge procedure, or when you do a test of the TKS system
Plastic Guttering		Commercially Available	To catch deice fluid from the TKS panel purge procedure, or when you do a test of the TKS system
Aluminum Tape		Commercially Available	To attach guttering and tubes to catch deice fluid from the TKS panel purge procedure, or when you do a test of the TKS system
Plastic Tubes		Commercially Available	To catch deice fluid from the TKS panel purge procedure, or when you do a test of the TKS system
Stop Watch		Commercially Available	To test the NORM function of the TKS operation.
3 to 5 gallon bucket (6 ea)		Commercially Available	For use during TKS test procedures.
1 gallon bucket (1 ea)		Commercially Available	For use during TKS test procedures.
Fluid Measuring Container (graduations in gallons or liters)		Commercially Available	To test the level function of the TKS operation.
Fluid Measuring Container (graduations in ounces or milliliters)		Commercially Available	To test the level function of the TKS operation.
Nitrogen Bottle (Regulated to supply a minimum of 125 PSI to a maximum of 150 psi)		Commercially Available	To use with TKS test cart for porous panel purging procedure.
Hand or electric pump.		Commercially Available	To remove TKS fluid from TKS fluid tank.
Sealing Ring		Commercially Available	To replace TKS fitting sealing rings when the fittings are loosened during maintenance.

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30 to 50 gallons of approved TKS fluid	Commercially Available	For TKS tests and panel purge procedures.
TKS fluid filtration system with 0.5 micron filter(s)	CAV Aerospace Inc	To filter TKS fluid before it is used to purge panels (must be discarded after 5 cycles).

3. TKS Systems

A. The TKS options that can be installed on the airplane apply a fluid that prevents ice formation on the leading edges of the flight surfaces and propeller (FIKI) at different rates. The pilot sets the TKS mode that gives the rate at which the TKS anti-ice system operates.

B. The TKS FIKI Anti-Ice system components include two metering pumps, a windshield pump, control switches, proportioning units, windshield solenoid valve, prop slinger, filter, timer box, high pressure switch, low pressure switches, the fluid tank, wiring harness, and the porous panels. Refer to Figure 1.

(1) The pilot controls the TKS anti-ice system with the following ANTI-ICE FLUID CTRL switches: PRIMARY (HIGH/NORM) switch, MAX FLOW (AIRFRAME/WINDSHIELD) switch (three-position momentary switch), and the BACKUP switch.

(a) In the PRIMARY NORM mode both metering pumps operate for 30 seconds and then stop for 90 seconds on a continuous cycle.

(b) In the PRIMARY HIGH mode one metering pump operates continuously.

(c) In the MAX FLOW for AIRFRAME mode (top, momentary selection) both metering pumps operate for 120 seconds and then the system returns to the previously selected PRIMARY mode.

(d) In the MAX FLOW for WINDSHIELD mode (bottom, momentary selection) the windshield pump will operate for four seconds or until the switch is released

(e) The BACKUP mode is an independent electrical system (circuit breaker, wire bundle, and switch) used to run the backup pump continuously.

C. The TKS Inadvertent Anti-Ice system components include the equipment pack, the fluid tank, control switch, wiring harness, and the porous panels. Refer to Figure 2.

(1) The equipment pack assembly includes the metering pump, filter, control relays, and the timer.

(2) The system is not intended for flight into known icing conditions. The system gives aid for inadvertent flights in icing conditions.

(3) The pilot controls the TKS anti-ice system with the ANTI-ICE MAX/NORM switch. The rocker type switch gives positions for NORM and MAX modes of system operation. When the switch is in the NORM position, the metering pump operates for 30 seconds and then stops for 30 seconds on a continuous cycle. When the switch is set to the MAX mode, the metering pump operates continuously.

4. Propeller System

A. For airplanes that have the TKS FIKI system option, the propeller has a slinger ring anti-ice system. The anti-ice system is intended to prevent ice formation on the propeller blades of the aircraft. The system is intended for flight into known icing conditions. Refer to Figure 3.

(1) The Propeller Anti-Ice system includes feed shoes, slinger ring, slinger nozzle, and supply tube and hose.

(2) The pilot controls the system by the ANTI-ICE FLUID CTRL switches. In the PRIMARY NORM/HIGH, MAX FLOW for AIRFRAME, or BACKUP mode the metering pumps supply fluid to the propeller slinger ring.

B. For airplanes that do not have the TKS FIKI system option, the Propeller De-Ice system is installed and intended to remove ice from the propeller blades of the aircraft. The system gives aid for inadvertent flights in icing conditions. The system is not intended for flight into known icing conditions. Refer to Figure 4.

(1) The Propeller De-Ice system includes propeller blade electric heater boots, slip ring assembly, propeller heat control module, brush block and bracket assembly, control switch with integral annunciator, 30 amp fuse on the power grid, and miscellaneous covers, hardware, and wire.

(2) The pilot controls the system by the Prop De-Ice Control Switch. After setting the Control Switch to the ON position the controller does a self test and then gives the indications that follow:

(a) On airplanes with the Garmin G2000 installed, PROP HEAT (amber) shows on the MFD display.

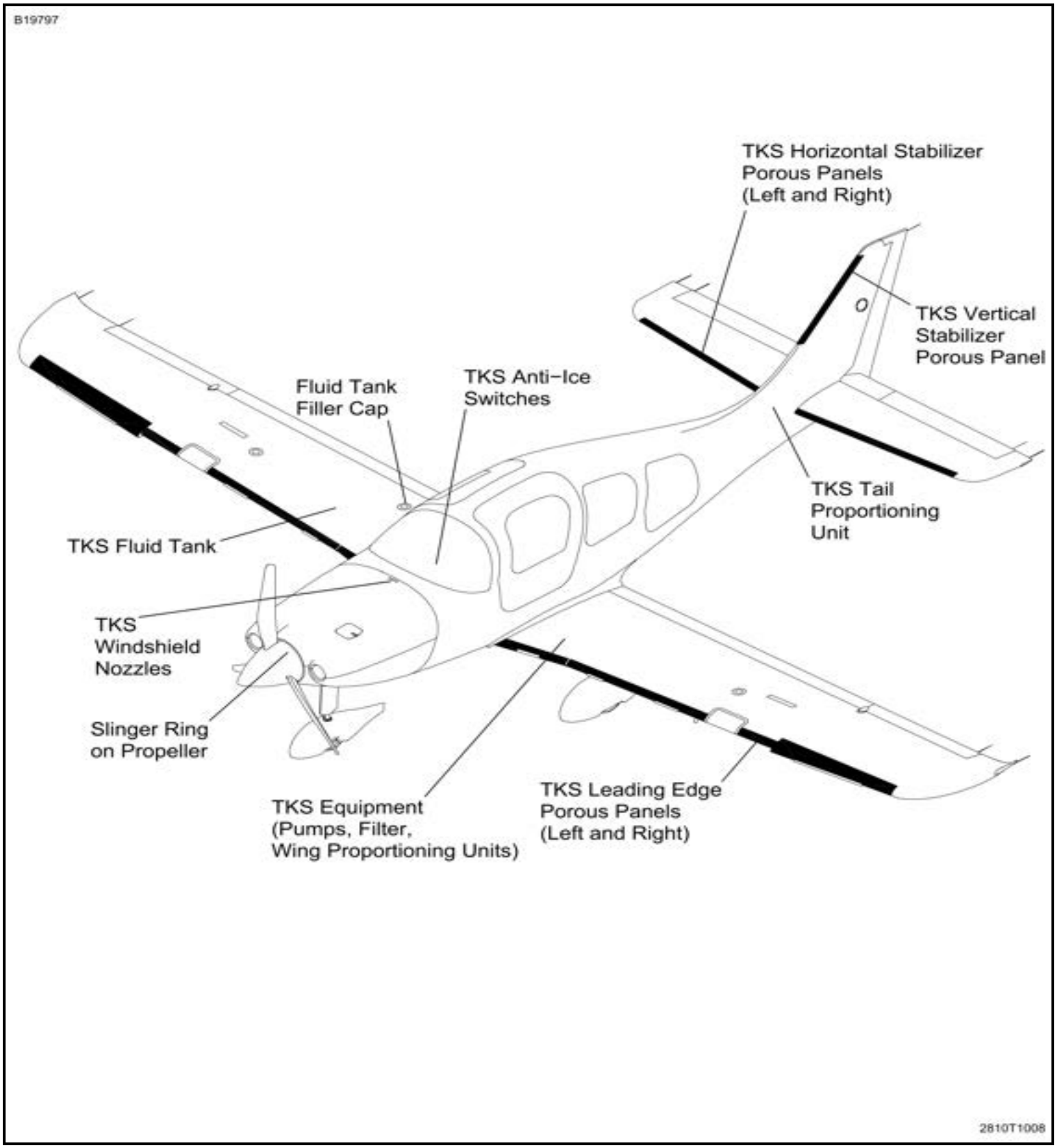
(b) On airplanes that do not have the Garmin G2000 installed, the annunciators ON (green) and PROP (green) come on.

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(3) The system operates on a 90-second on, 90-second off, electrical cycle controlled by the control module (UF002).

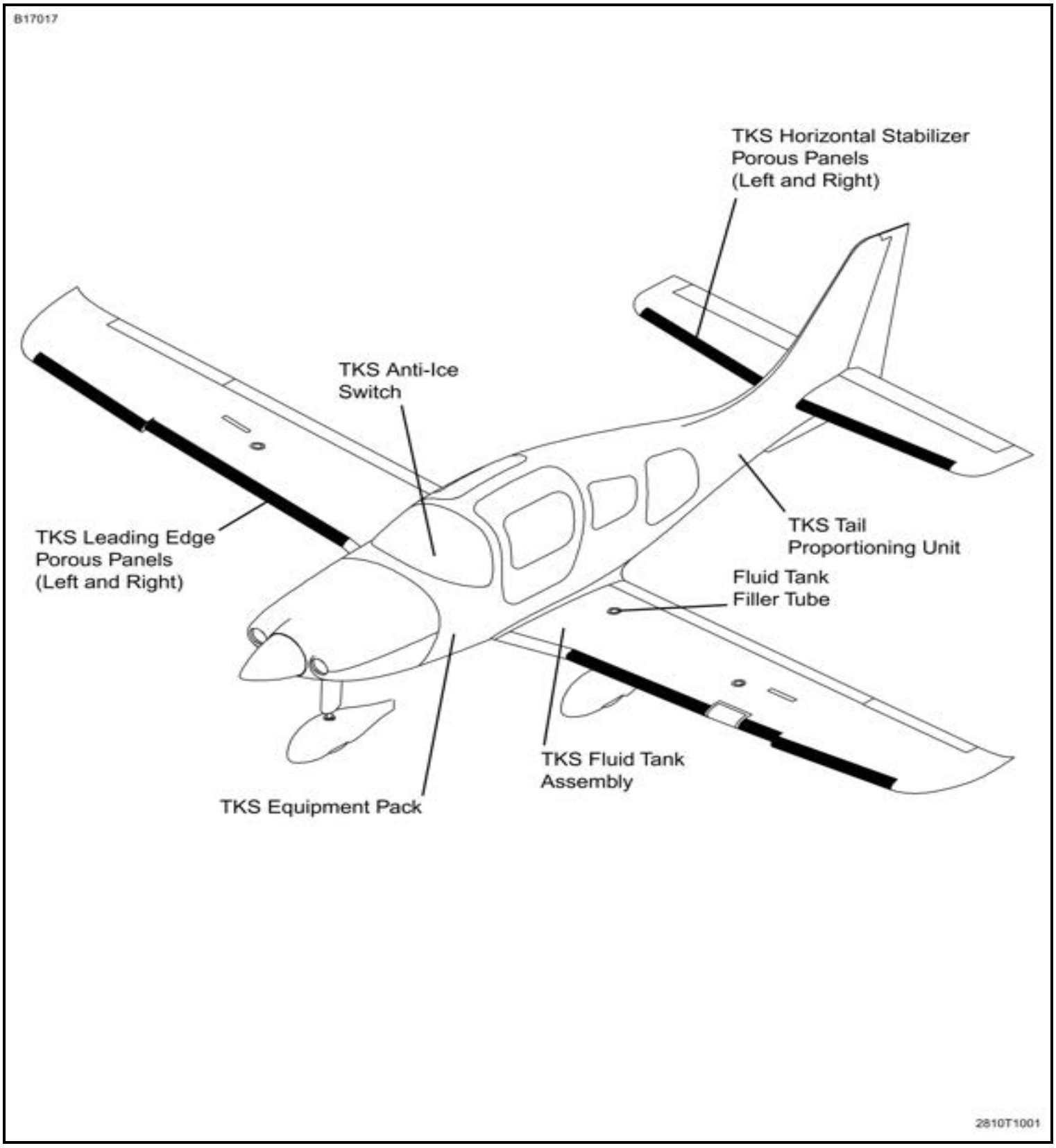
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Figure 1 : Sheet 1 : TKS Anti-Ice System (FIKI)



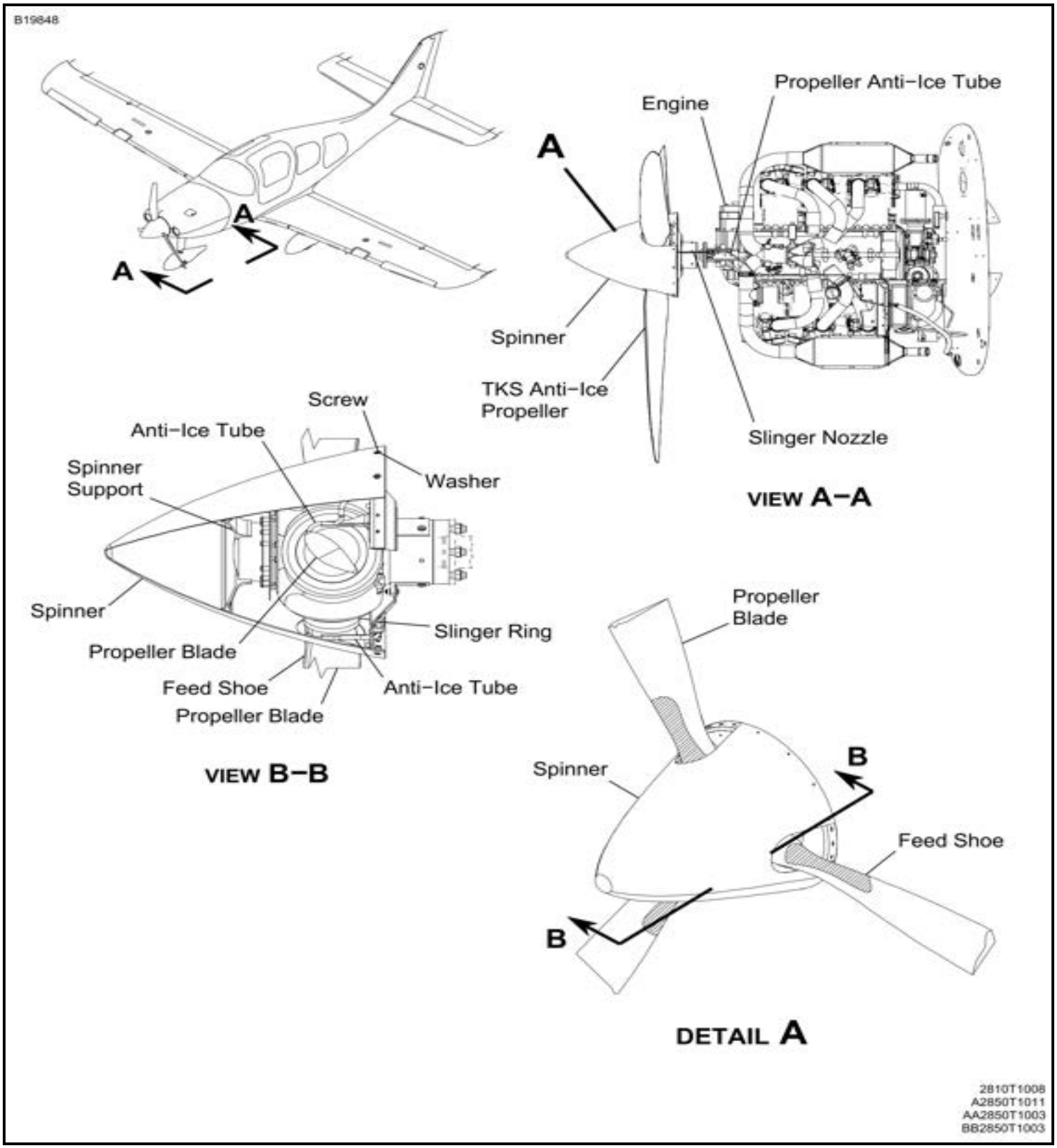
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Figure 2 : Sheet 1 : TKS Anti-Ice System (Inadvertent)



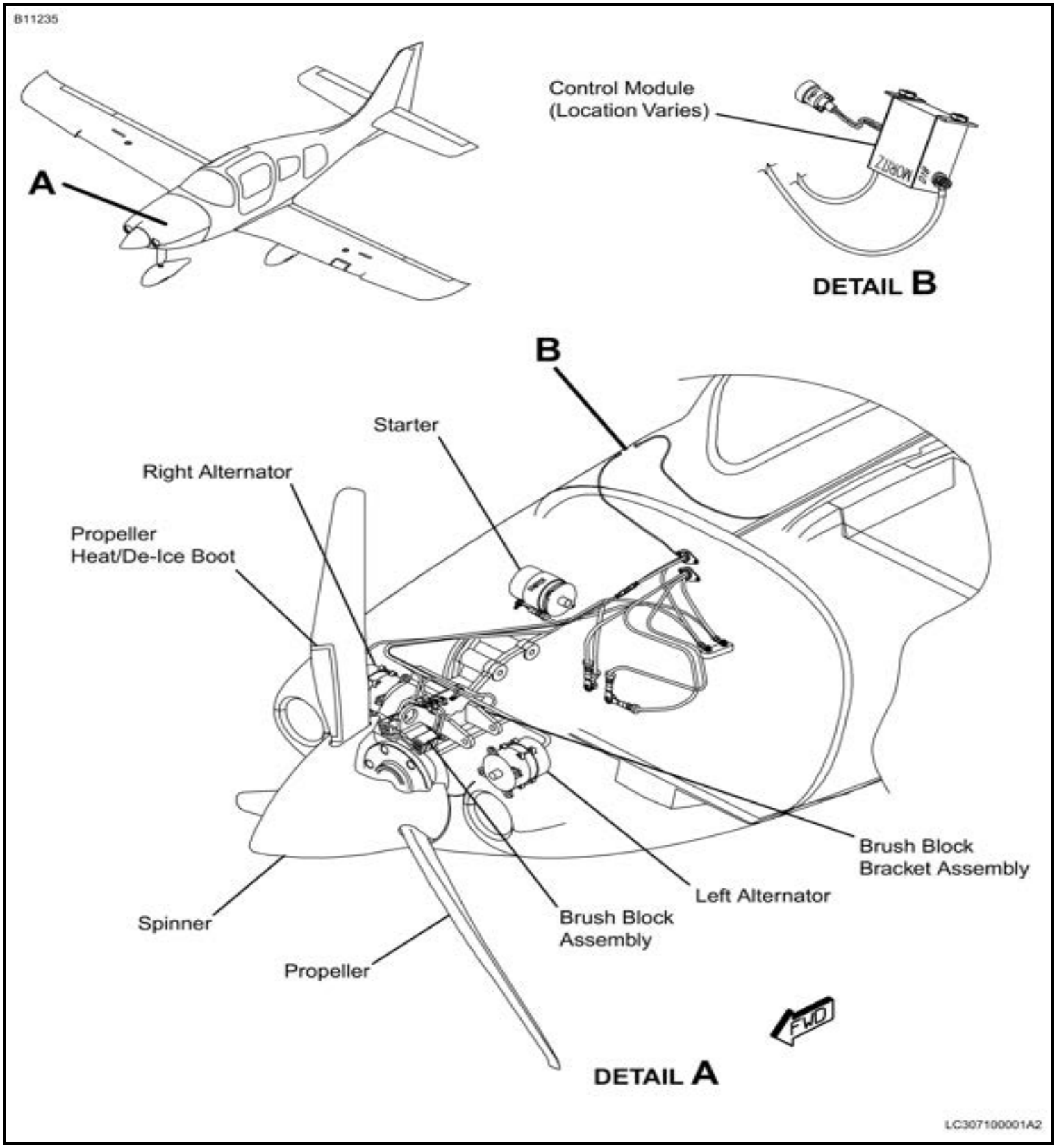
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Figure 3 : Sheet 1 : Propeller Anti-Ice System



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Figure 4 : Sheet 1 : Propeller Heat/De-Ice System



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TKS ANTI-ICE SYSTEM (INADVERTENT) - DESCRIPTION AND OPERATION

1. General

A. This section gives a description and operation of the TKS Anti-Ice System (Inadvertent). The TKS anti-ice system is a fluid anti-ice system to prevent ice formation on the leading edges of the wings and horizontal stabilizers. The TKS anti-ice system includes the TKS ANTI-ICE switch, the equipment pack, the tail proportioning unit, the fluid tank, the left and right wing porous panels, and the left and right horizontal stabilizers porous panels. Refer to Figure 1 for a general view of the TKS anti-ice system.

B. The TKS system uses a monoethylene glycol/isopropyl alcohol/deionized water solution for the anti-ice solution for the airframe surfaces in flight. The fluid solution is a freezing point depressant that is swept rearward over the surfaces and prevents ice buildup. For a list of approved TKS anti-icing fluids refer to Chapter 12, Replenishing - Servicing.

2. Description

A. The TKS equipment pack is located in the fuselage under the copilot seat. To access the equipment pack, remove the fuel system access panel and/or the footwell panels as needed. The equipment pack consists of a pump, filter, and the wing proportioning unit. Refer to Figure 2.

(1) A filter is installed downstream of the metering pump. The filter contains a replaceable element. The filter ports are marked IN and OUT for correct plumbing connection.

B. Proportioning units are installed in two different locations on the airplane. A six place proportioning unit is found on the equipment pack. Only five places are used in this installation. A two-place proportioning unit is found in the tail aft of the baggage compartment. The proportioning units are metering units which supply anti-icing fluid at a predetermined flow rate for each individual porous leading edge panel. The proportioning units incorporate a manifold with calibrated capillary tubes which meter the fluid through the outlet ports. The equipment pack proportioning unit outlets are marked 1, 2, 3, 4, 5, and 6. The tail proportioning unit outlets are marked 1 and 2. Plumbing to the outlet ports must be connected as specified for proper operation. Refer to Figure 2 and Figure 3.

C. The system is configured with a metering pump. The pump gives the delivery mechanism for all modes of operation of the system. The modes of operation are NORM and MAX.

(1) The MAX mode is a flow rate that is used for maximum icing condition, and occurs when the pump is run continuously.

(a) The MAX flow rate is 6.2 gal/hr (392 ml/min).

(2) NORM mode is a flow rate for intermittent icing conditions.

(a) The NORM flow rate is 3.1 gal/hr (196 ml/min).

D. The fluid tank assembly is installed in the left inboard wing. Refer to Figure 1.

(1) The tank anti-ice fluid level is monitored with an indication on the MFD. The fluid level monitor device shows the total fluid available for operation of the anti-ice system. The tank fluid level monitor devices are electrically operated and receive inputs from a level sender probe in the fluid tank. Refer to Figure 5.

(2) There is a strainer installed between the fluid tank and the input to the metering pump.

E. Laser-drilled titanium panels are mounted to the leading edges of the wings, and horizontal stabilizers that give TKS ice protection for the airplane. Refer to Figure 1 and Figure 3.

(1) Anti-ice fluid solution comes out of the airframe anti-ice system through laser drilled titanium leading edge panels on the wings and horizontal stabilizers. The airframe anti-ice system applies anti-icing fluid to the wing leading edges and the horizontal stabilizer leading edges. The system provides full coverage of the leading edge of the wings and horizontal stabilizer.

(a) The outer skin of the ice protection panels are manufactured with titanium, 0.9 mm thick. Titanium provides excellent strength, durability, light weight, and corrosion resistance.

(b) The panel skin is perforated by laser drilled holes, 0.0025 inches in diameter, 800 per square inch. The porous area of the titanium panels is designed to cover the stagnation point travel on the appropriate leading edge over a normal operating environment.

(c) The back plates of the porous panels are manufactured with 0.7 mm thick titanium. They are formed to create reservoirs for the ice protection fluid to supply the entire porous area. A porous membrane between the outer skin and the reservoir gives even flow and distribution through the entire porous area of the panel.

(d) The porous panels are bonded as a cuff over a leading edge. Panels are bonded to the airframe with a two-part flexible adhesive.

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F. Fluid is supplied to the panels by a positive displacement, constant volume metering pump. The pump give various flow rates to the panels. The pump gives a timed pumping operation or a MAX rate for applicable icing conditions.

G. The fluid passes through a microfilter before it gets to the porous panels. The filter removes contaminants from the fluid which helps to prevent panel blockage. A system of nylon tubing carries the fluid from the fluid tank to the proportioning units that divide the flow into the volumetric requirements of each panel or device supplied through the unit. The proportioning units are located at the equipment pack and the tail of the aircraft and feed the panels through nylon tubing.

H. The system has a fluid tank that gives a minimum ice protection endurance when filled. The tank assembly is installed in the left inboard wing. Refer to Figure 1 and Figure 3.

(1) The fluid tank has a fluid level sender that gives a fluid quantity level that shows on the MFD.

(2) The filler port for the fluid tank is on the top inboard of the left wing. Refer to Chapter 12, Replenishing - Description and Operation.

I. The system is operated by a three-position rocker type switch. All modes of operation and selection for the metering pump are controlled with this switch. Refer to Figure 1.

J. The operational state can be monitored with CAS messages on the PFD and fluid quantity indication on the MFD.

3. Operation

A. Operation of the TKS anti-ice system is controlled by a three-position ANTI-ICE (SI018) rocker switch on the center console switch panel. The switch positions are MAX, NORM and OFF. Refer to Figure 4. When the TKS anti-ice system is in operation, the PFD shows CAS messages on its display and the MFD shows TKS anti-ice fluid quantity on its display. Refer to Figure 5.

(1) When the switch is in the MAX position, the metering pump operates continuously.

(a) The PFD will show the CAS message A-ICE MAX (white).

(2) When the switch is in the NORM position the metering pump operates for 30 seconds and then stops for 30 seconds on a continuous cycle.

(a) The PFD will show the CAS message A-ICE NORM (white).

(b) The anti-ice fluid quantity shows on the MFD display.

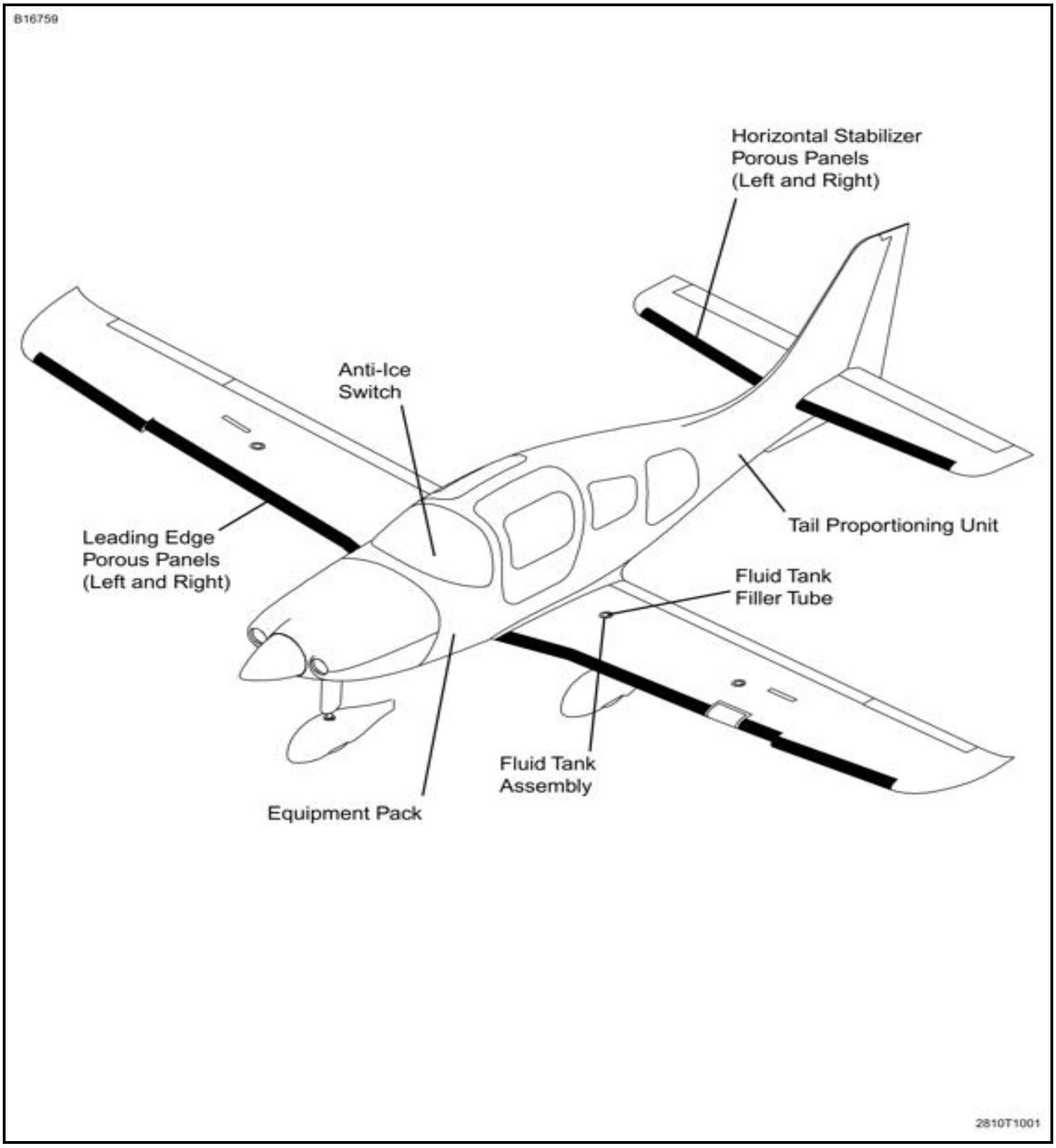
(3) When the system is operating the metering pump provides the anti-ice fluid to the filter assembly. The filter assembly removes contaminants from the fluid to prevent the porous panels from blockage.

(4) The anti-ice fluid flows from the filter assembly to the wing and tail proportioning units.

(5) The system of nylon tubing supplies the anti-ice fluid to the left and right wing porous panels and the left and right horizontal stabilizers.

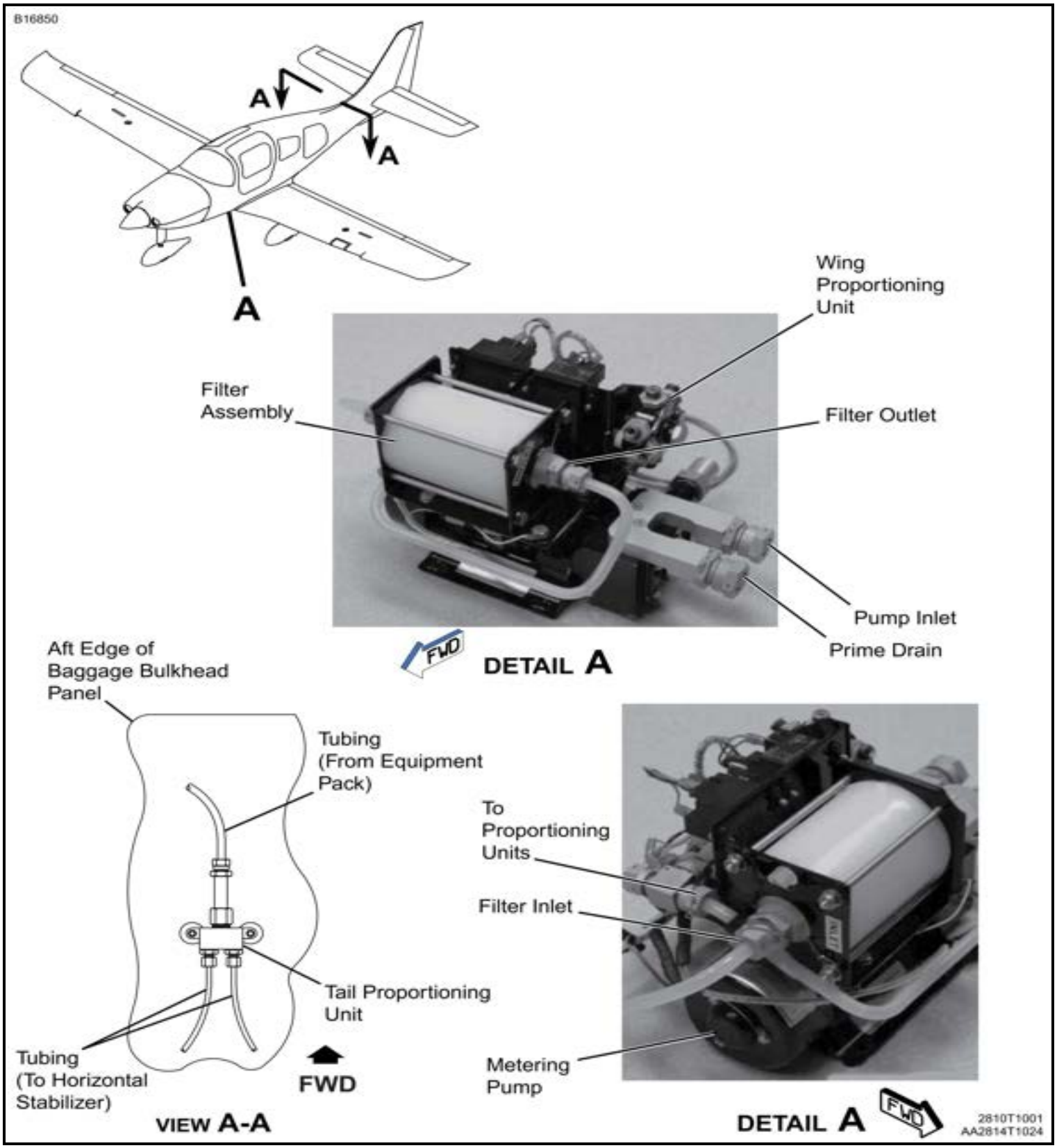
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Figure 1 : Sheet 1 : TKS System Installation



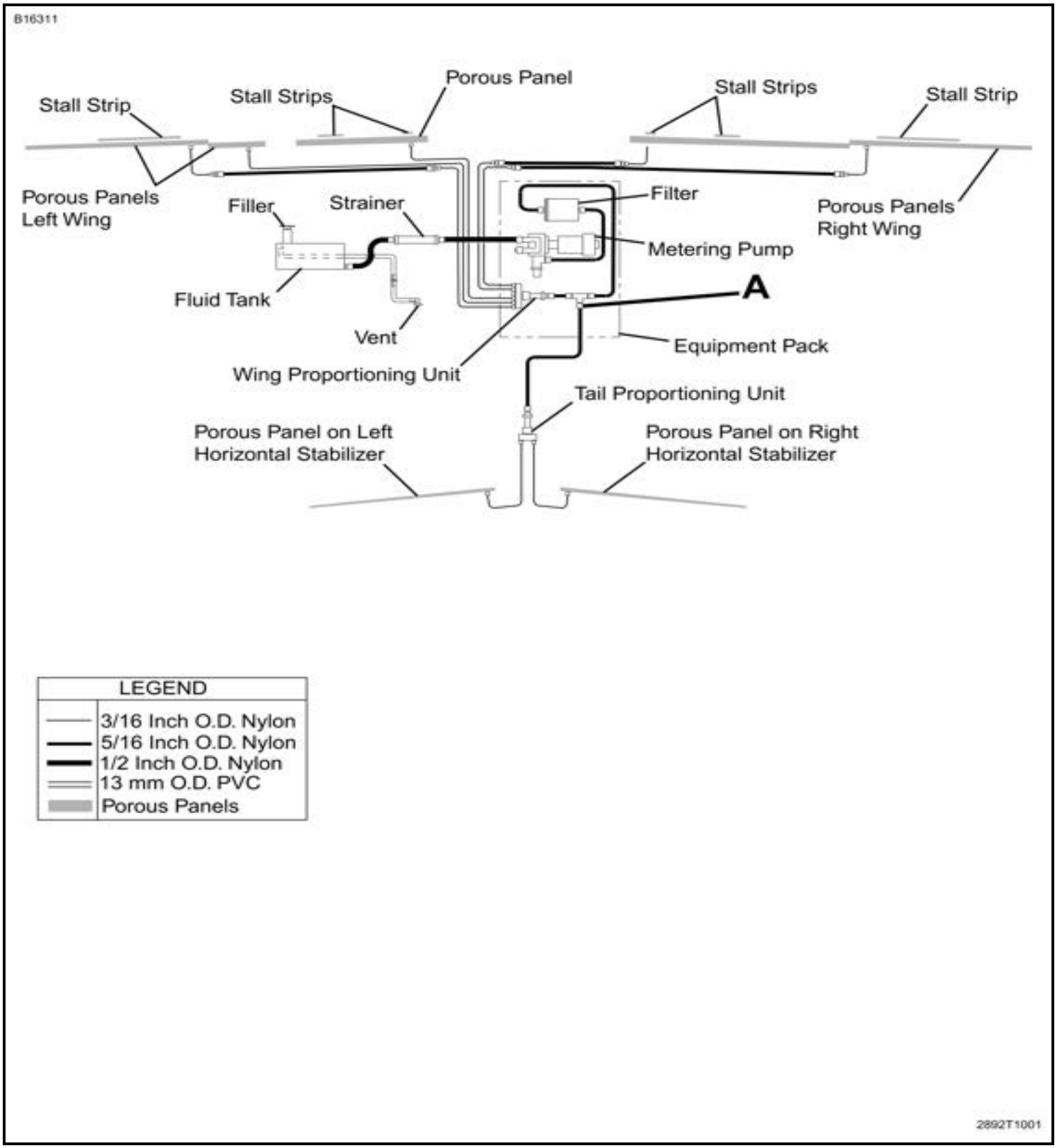
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Figure 2 : Sheet 1 : TKS Equipment Pack



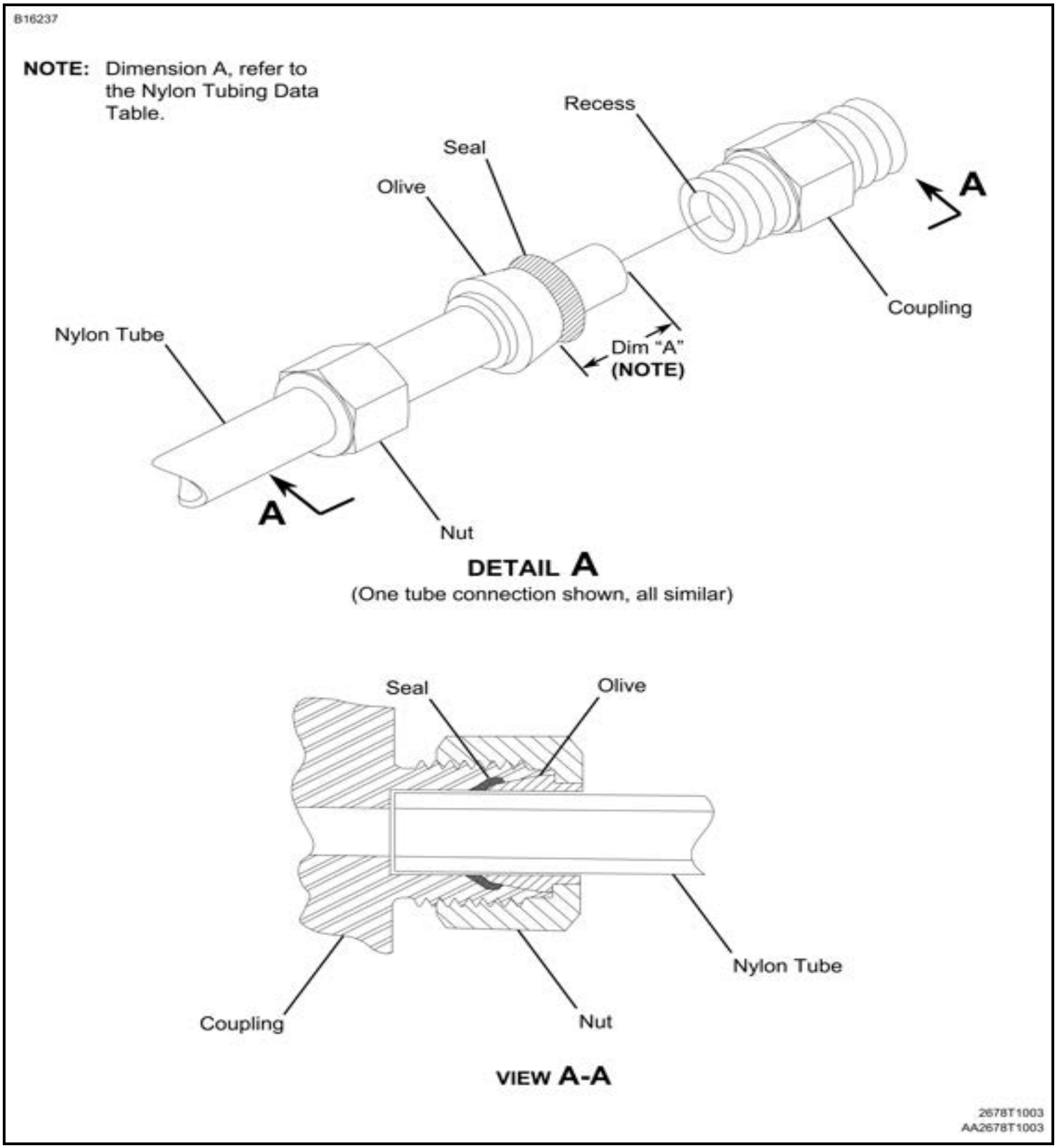
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Figure 3 : Sheet 1 : TKS System Flow Diagram



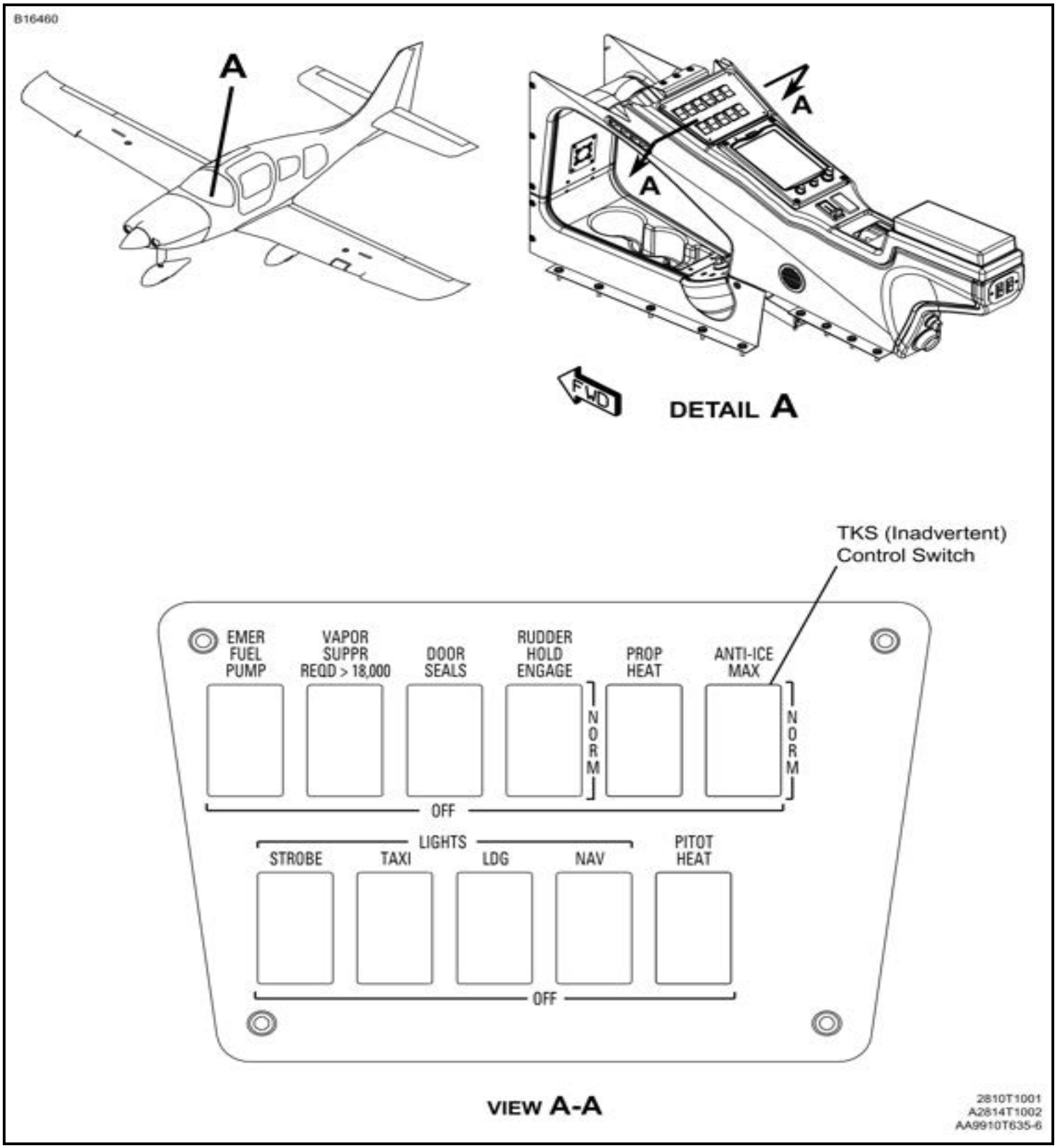
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Figure 3 : Sheet 2 : TKS System Flow Diagram



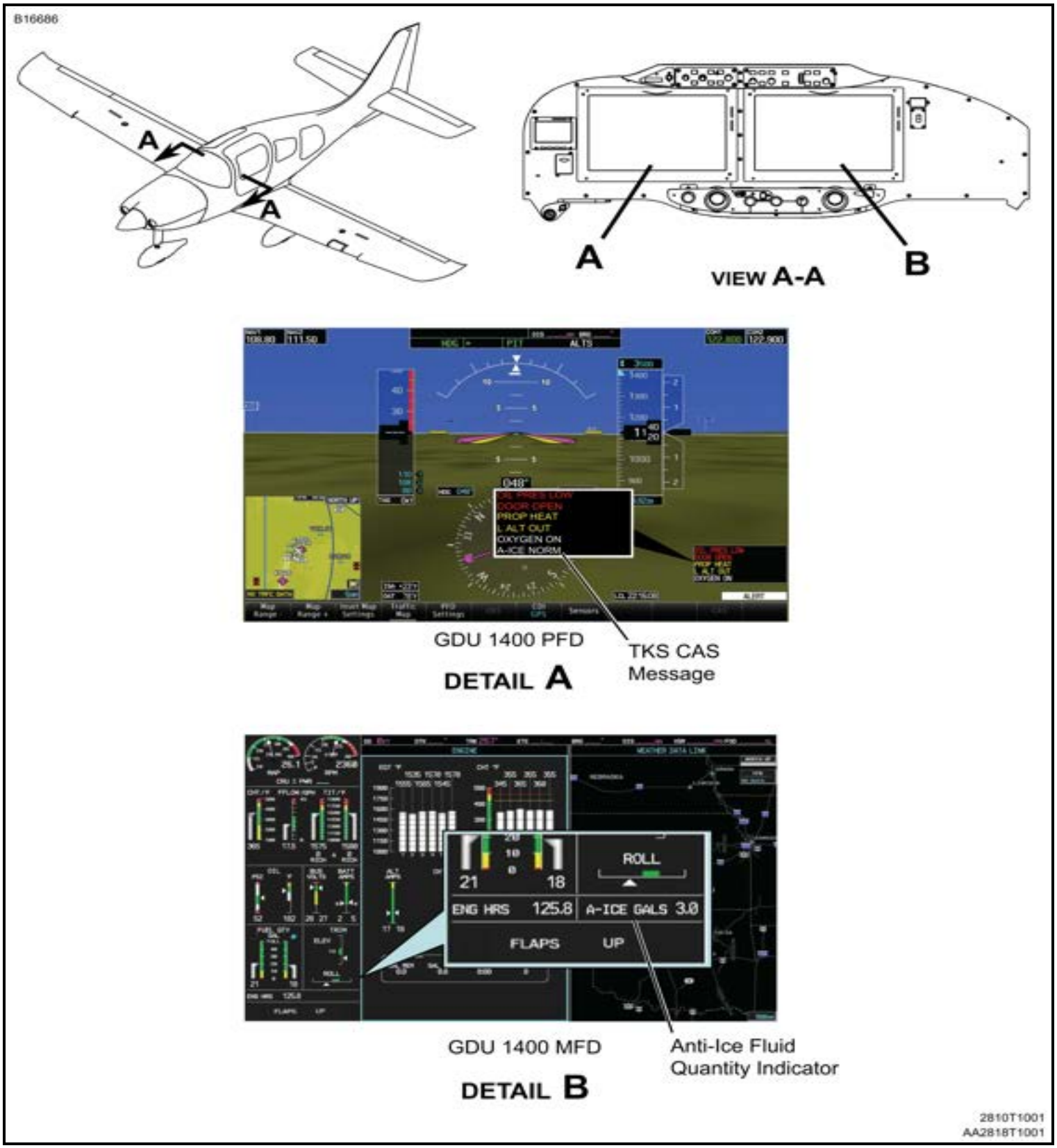
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Figure 4 : Sheet 1 : ANTI-ICE Switch Installation



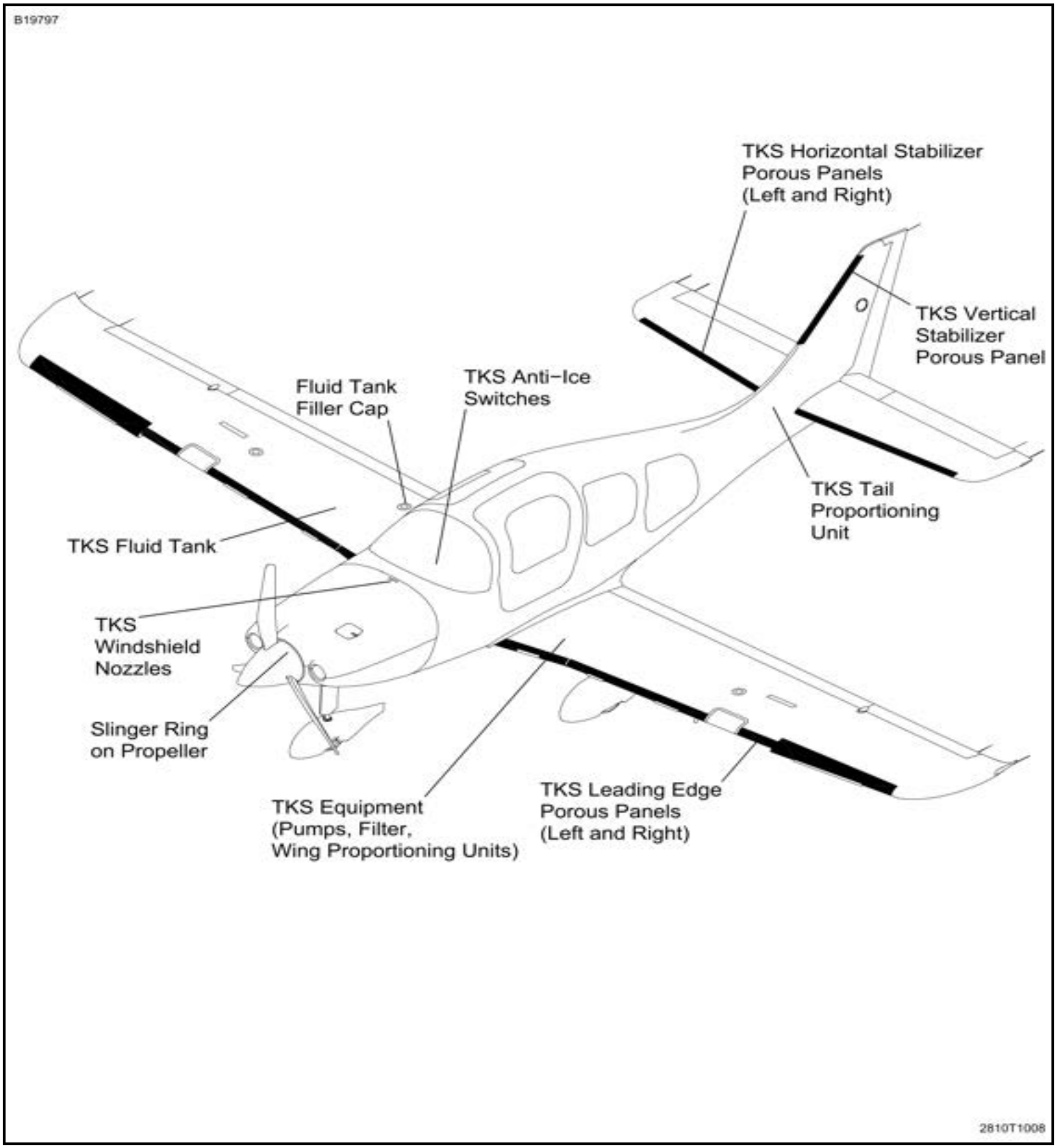
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Figure 5 : Sheet 1 : GDU 1400 PFD/MFD Monitoring



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Figure 1 : Sheet 1 : TKS Anti-Ice System (FIKI)



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TKS ANTI-ICE SYSTEM (INADVERTENT) - TROUBLESHOOTING

1. General

A. This section gives to troubleshoot procedures for the TKS Anti-Ice System (Inadvertent). Logic troubleshooting charts in this section will guide you to the most likely cause and to some recommended actions for repair.

2. Troubleshooting Description

A. The TKS system is controlled by a three position rocker switch on the center console switch panel. The switch positions are MAX, NORM and OFF. The Garmin G2000 system Multifunction Display (MFD) and the Primary Flight Display (PFD) Crew Alerting System (CAS) shows the TKS system status, warnings, cautions, and fluid quantity information.

B. A good understanding of the TKS system is important. To get more detailed information about the TKS system refer to TKS Anti-Ice System - Description and Operation in this chapter.

C. A good understanding of the discrepancy is also very helpful. There are three different categories of TKS discrepancies. This section has an extensive set of troubleshooting procedures to use. You can begin your troubleshooting at any procedure that is appropriate.

(1) The first category is the display category. This is any display that shows on the G2000 display units that was not expected, or an unexpected anti-ice quantity indication.

(a) If the anti-ice quantity is incorrect, you can test the system using the appropriate test procedure. Refer to TKS Anti-Ice System (G2000), TKS Fluid Level Sender Operational Test.

(b) If there is a message shown on one of the G2000 display units, you can troubleshoot each one individually using the correct procedure from this section.

(2) The second category is the fluid flow category. This section has the procedures to correct the distribution and flow of the fluid across the porous panels.

(3) The third category is the pump category. This means that there is an incorrect operation of the anti-ice pump.

(a) The check procedures for these discrepancies are found in this section of the troubleshooting.

(b) If the pump is not operating correctly, it is recommended that you begin your troubleshooting at the pump section procedures first.

3. Troubleshooting Preliminary

A. Visual Inspections.

NOTE: It is recommended that you do a visual inspection of the anti-ice components before you do the troubleshooting procedures. The visual inspections in this section do not need to be done in a specific order. You can look at the most likely parts and components as necessary. It is recommended that you do all of these inspections when possible.

(1) Look at all of the nylon tube connections. Examine the condition of the nut, olive, and seal or O-ring. If you must replace a part, refer to the Model 400 Illustrated Parts Catalog.

CAUTION: The length of the nylon tube is important. Refer to the Model 400 Illustrated Parts Catalog for the correct part number. A tube with an incorrect length can make the anti-ice system operate incorrectly.

(2) Inspect the nylon tubing for fluid leaks or evidence of obstructions. Make sure there are no cuts, holes, or kinks in the tubing.

B. Preliminary Set Up.

(1) Make sure that the TKS, MFD, PFD, and PFD CTRL circuit breakers found on the cockpit circuit breaker panel are engaged.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Set the ANTI-ICE MAX/NORM switch (SI018) to the OFF position.

(5) Make sure the G2000 is operating correctly. Make sure that the display units are operating. You can cycle the power to individual equipment until all of the equipment is operating correctly.

(6) Make sure that no TKS fault messages are displayed on the PFD. If a TKS fault message is shown on the PFD refer to the troubleshooting charts for the procedure to correct the problem. Refer to Table 101 to find the message or condition and the related troubleshooting chart.

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4. Troubleshooting Charts

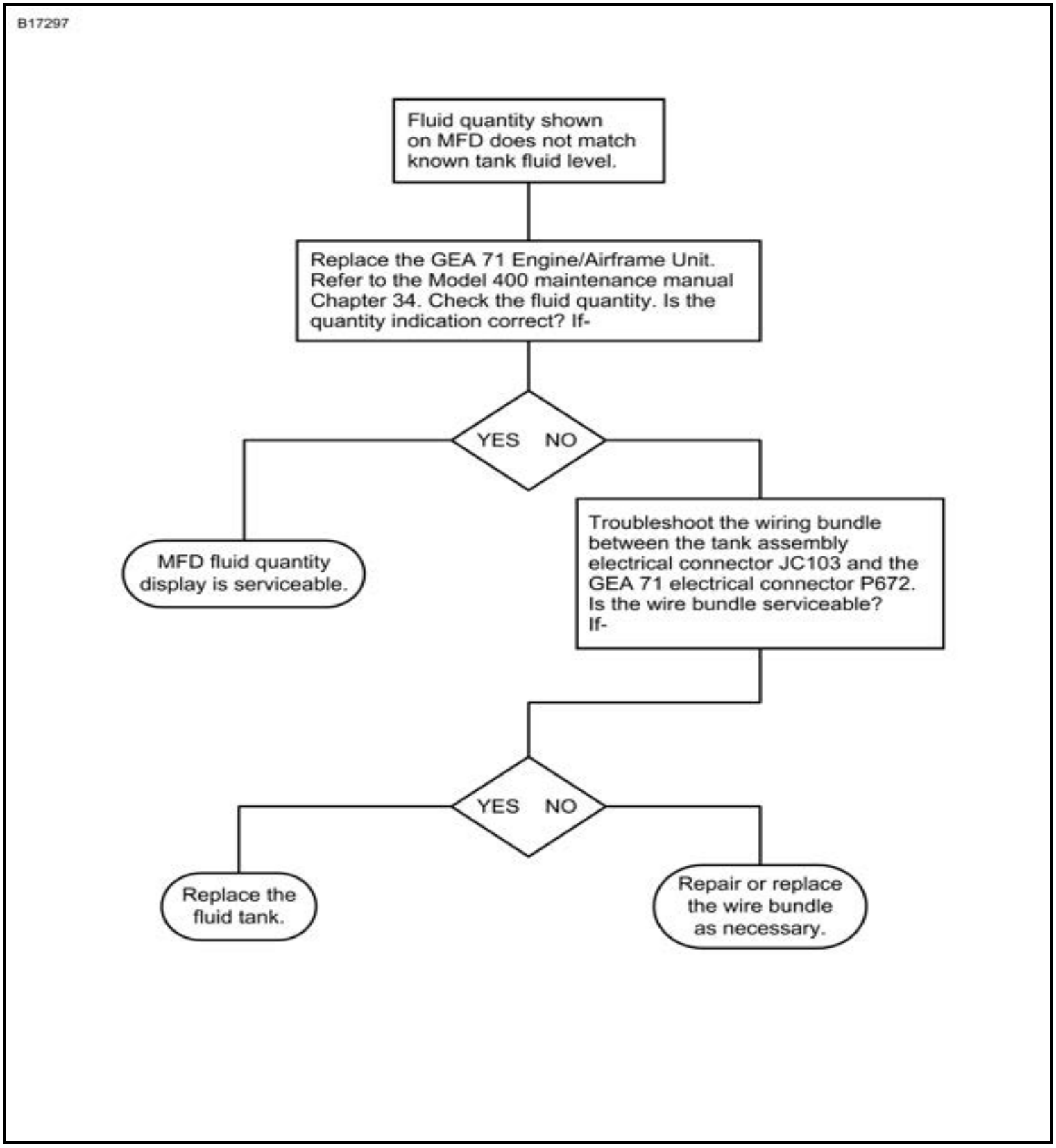
A. There is an extensive set of troubleshooting charts for some of the most common problems for the anti-ice system. The table below is an index between the suspected trouble and the corresponding troubleshooting chart.

Table 101. TKS Anti-Ice System Troubleshooting and G2000 Messages Index

TROUBLE	REFER TO:
The TKS fluid level does not show or is incorrectly shown on the G2000 MFD.	Figure 101
The A-ICE MAX message does not show or is incorrectly shown on the G2000 PFD.	Figure 102
The A-ICE NORM message does not show or is incorrectly shown on the G2000 PFD.	Figure 103
No or little fluid flow on the horizontal stabilizers leading edge.	Figure 104
No or little fluid flow on an individual horizontal stabilizer porous panel.	Figure 105
No or little fluid flow on the wing leading edges.	Figure 106
No or little fluid flow on an individual wing porous panel.	Figure 107
There is an uneven distribution of the anti-ice fluid at the porous panels.	Figure 108
The TKS pump does not operate when the ANTI-ICE MAX/NORM switch is set to the NORM or MAX positions.	Figure 109
The TKS pump does not operate when the ANTI-ICE MAX/NORM switch is set to the NORM position.	Figure 110
The TKS pump does not operate when the ANTI-ICE MAX/NORM switch is set to the MAX position.	Figure 111
TKS pump does not operate on for 30 seconds and then off for 30 seconds in a continuous cycle when the ANTI-ICE MAX/NORM switch is set to the NORM position.	Figure 112

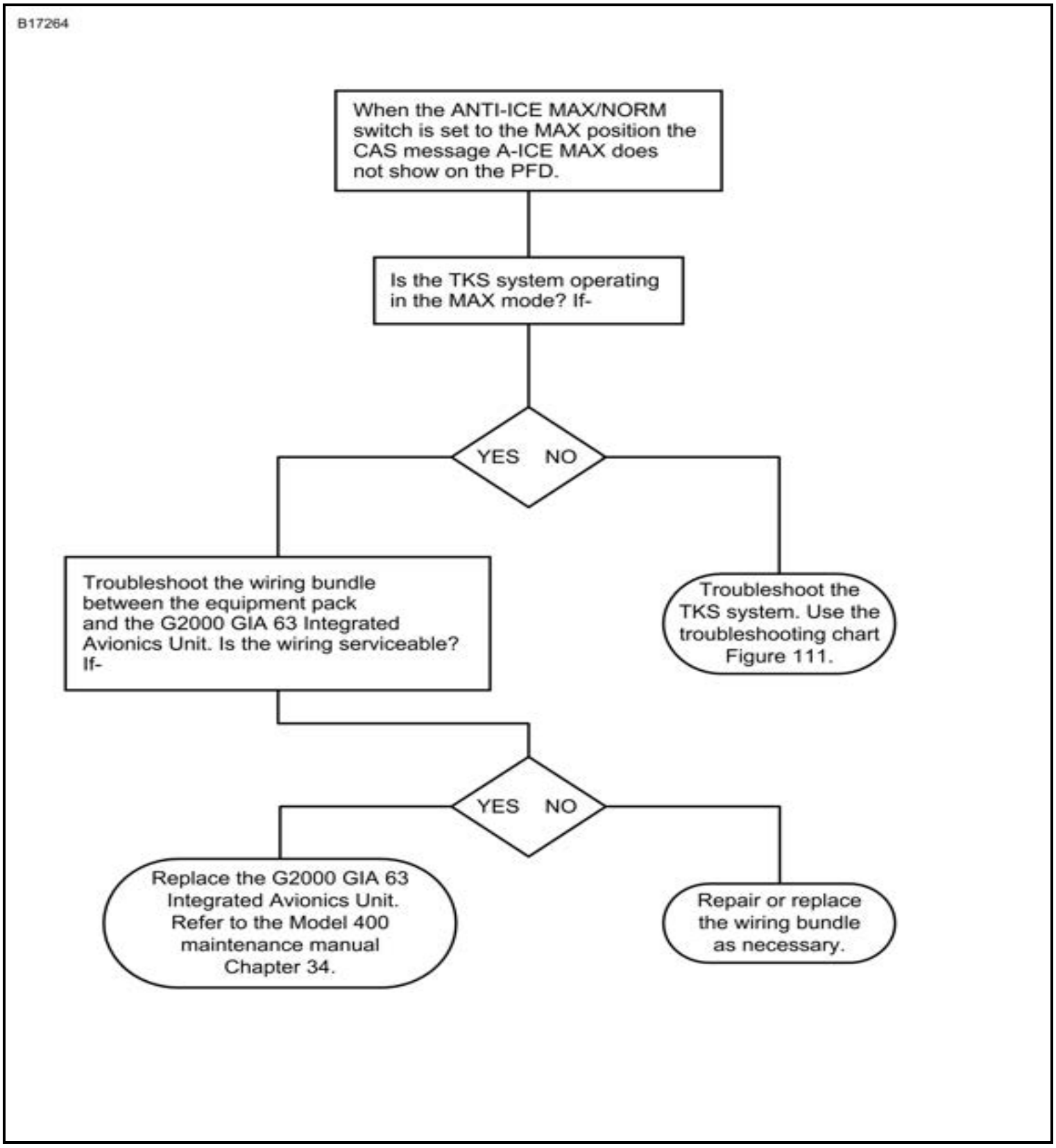
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Figure 101 : Sheet 1 : TKS Anti-Ice System Troubleshooting



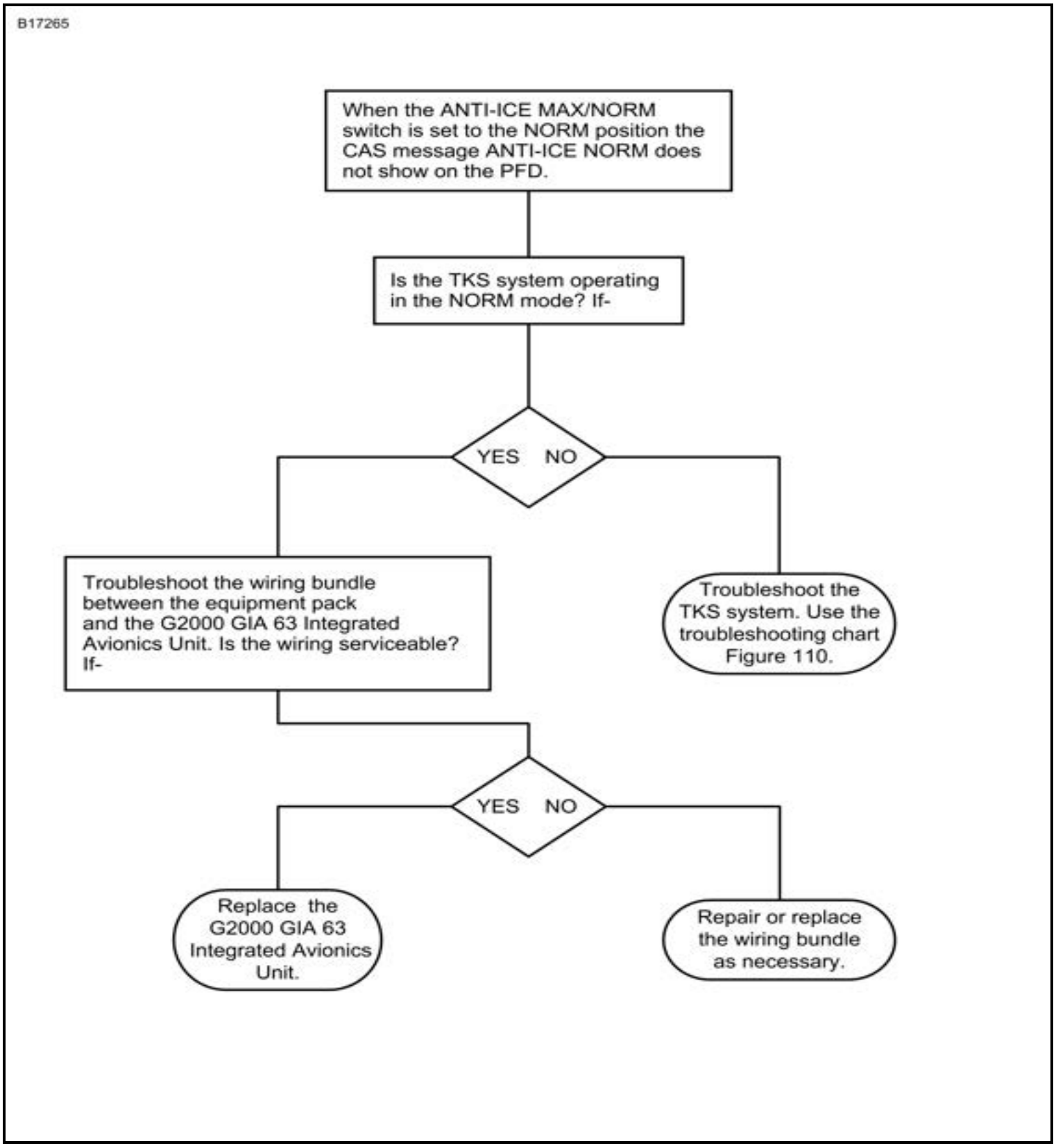
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Figure 102 : Sheet 1 : TKS Anti-Ice System Troubleshooting



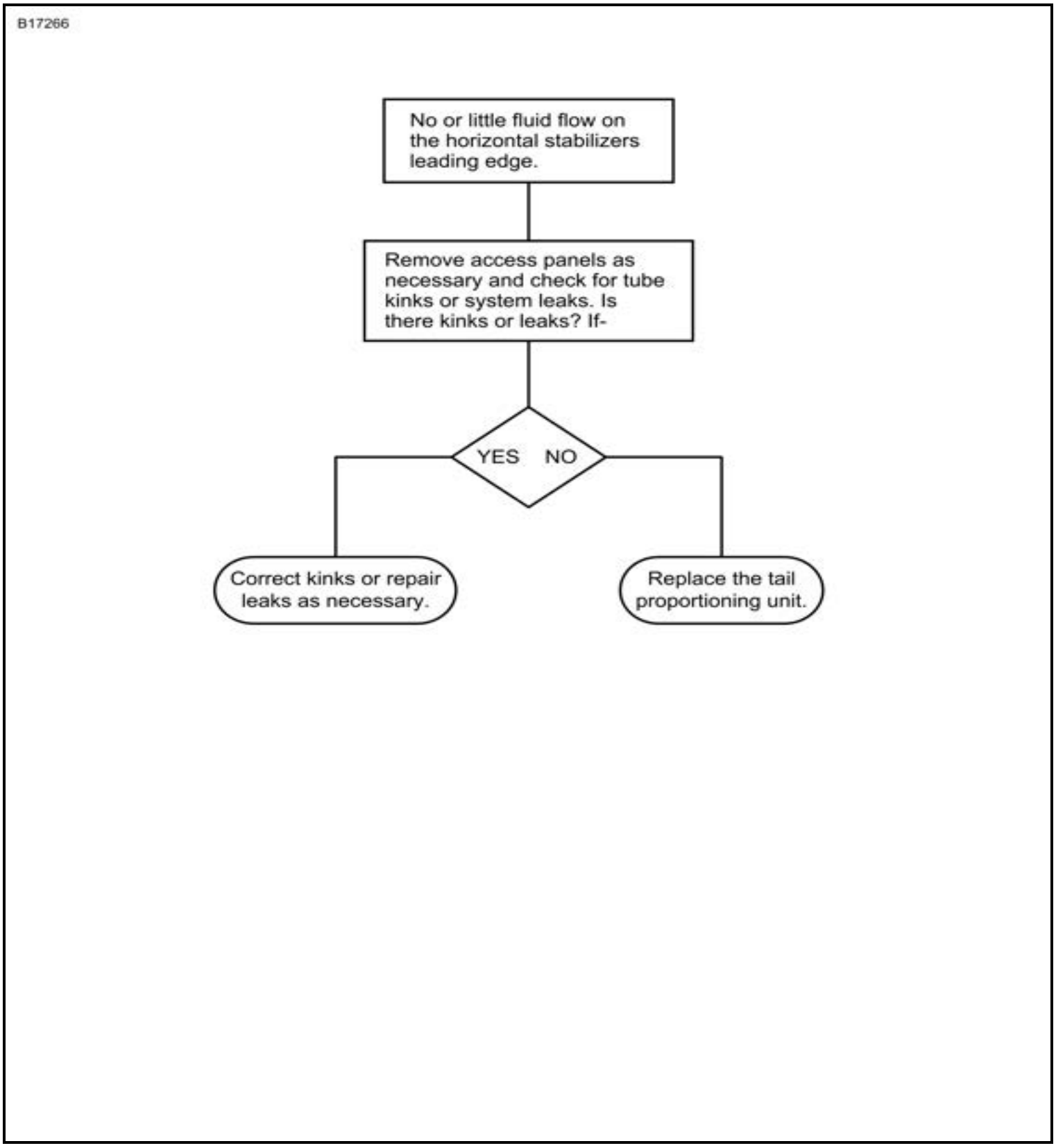
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Figure 103 : Sheet 1 : TKS Anti-Ice System Troubleshooting



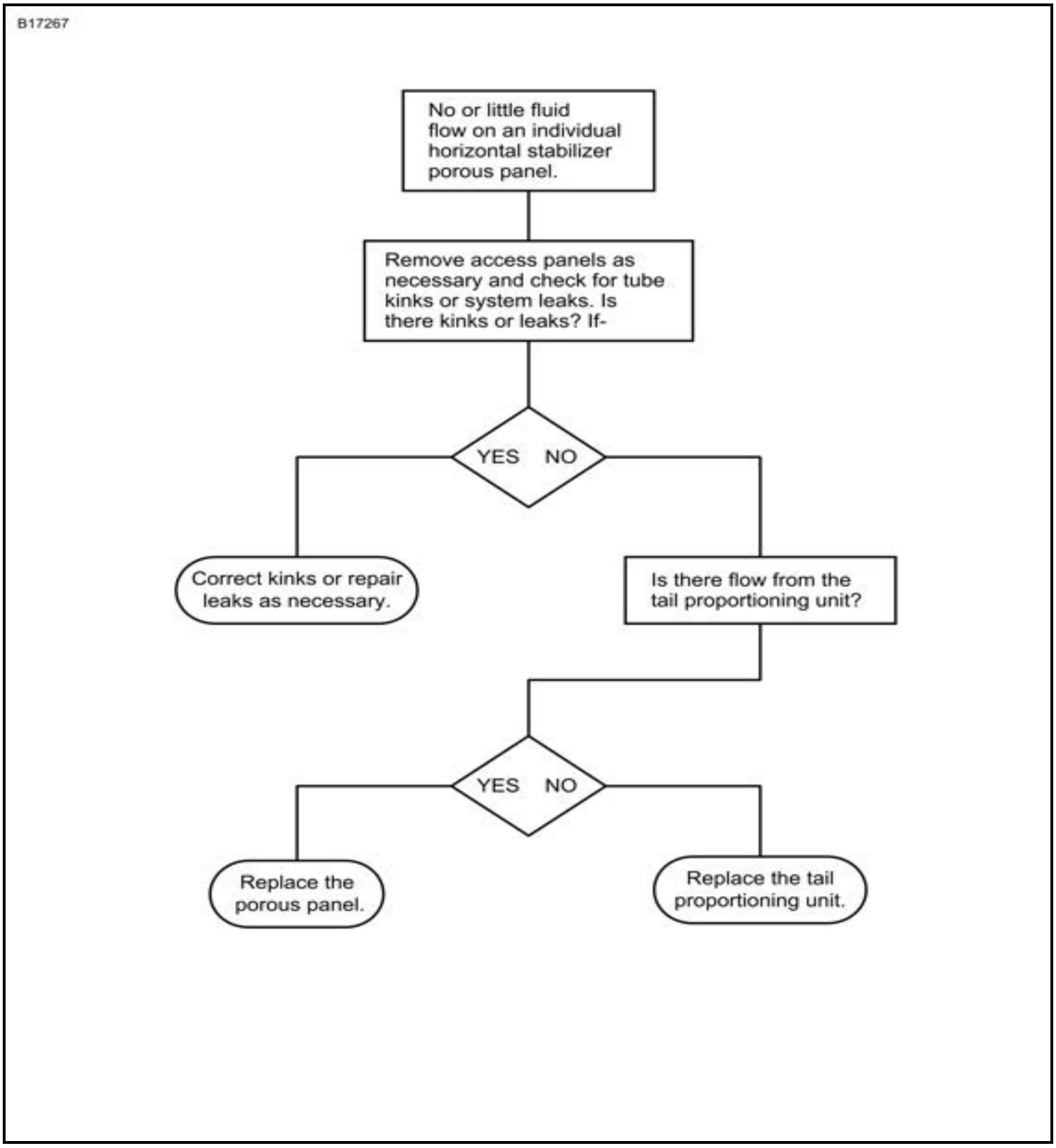
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Figure 104 : Sheet 1 : TKS Anti-Ice System Troubleshooting



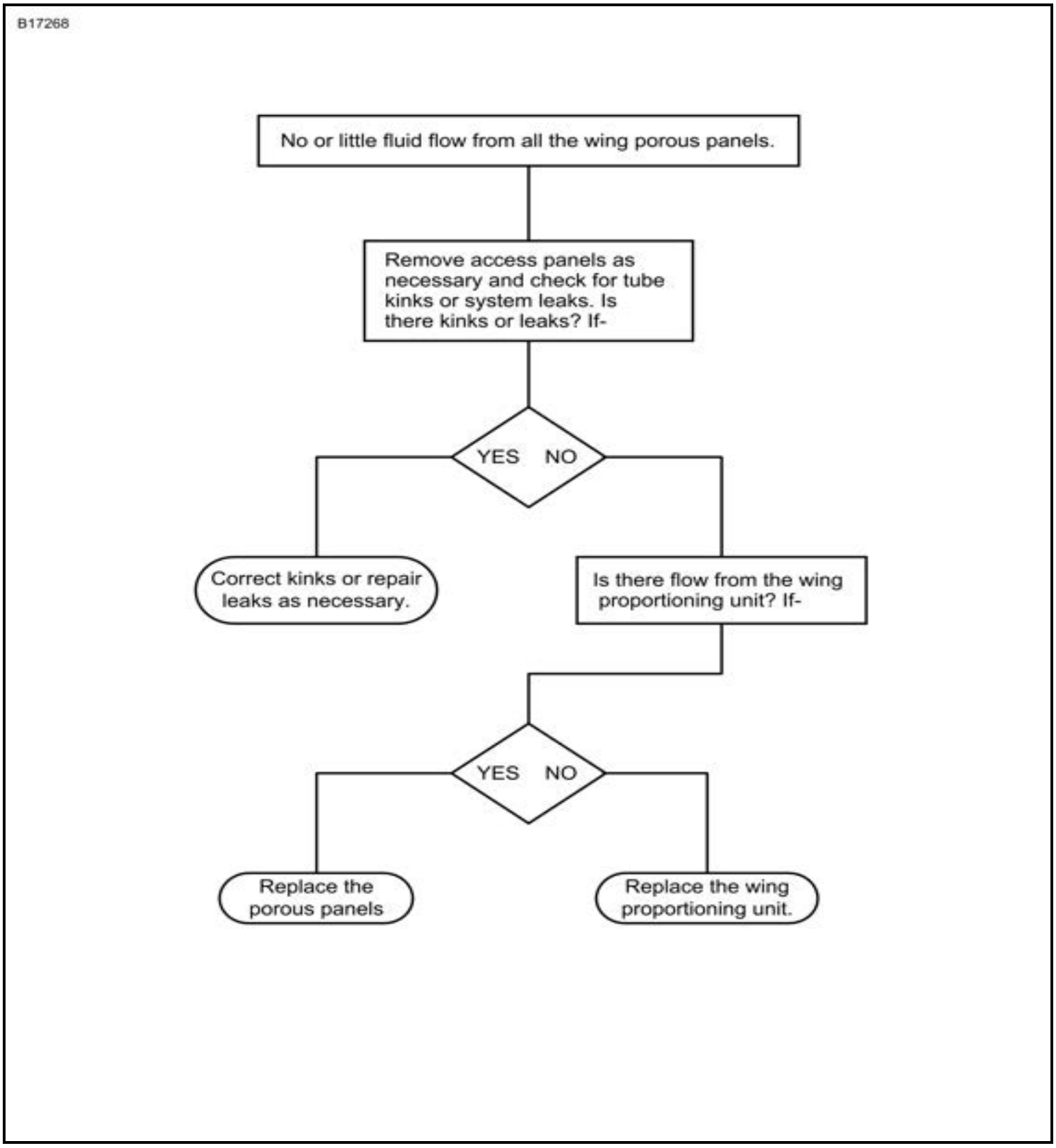
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Figure 105 : Sheet 1 : TKS Anti-Ice System Troubleshooting



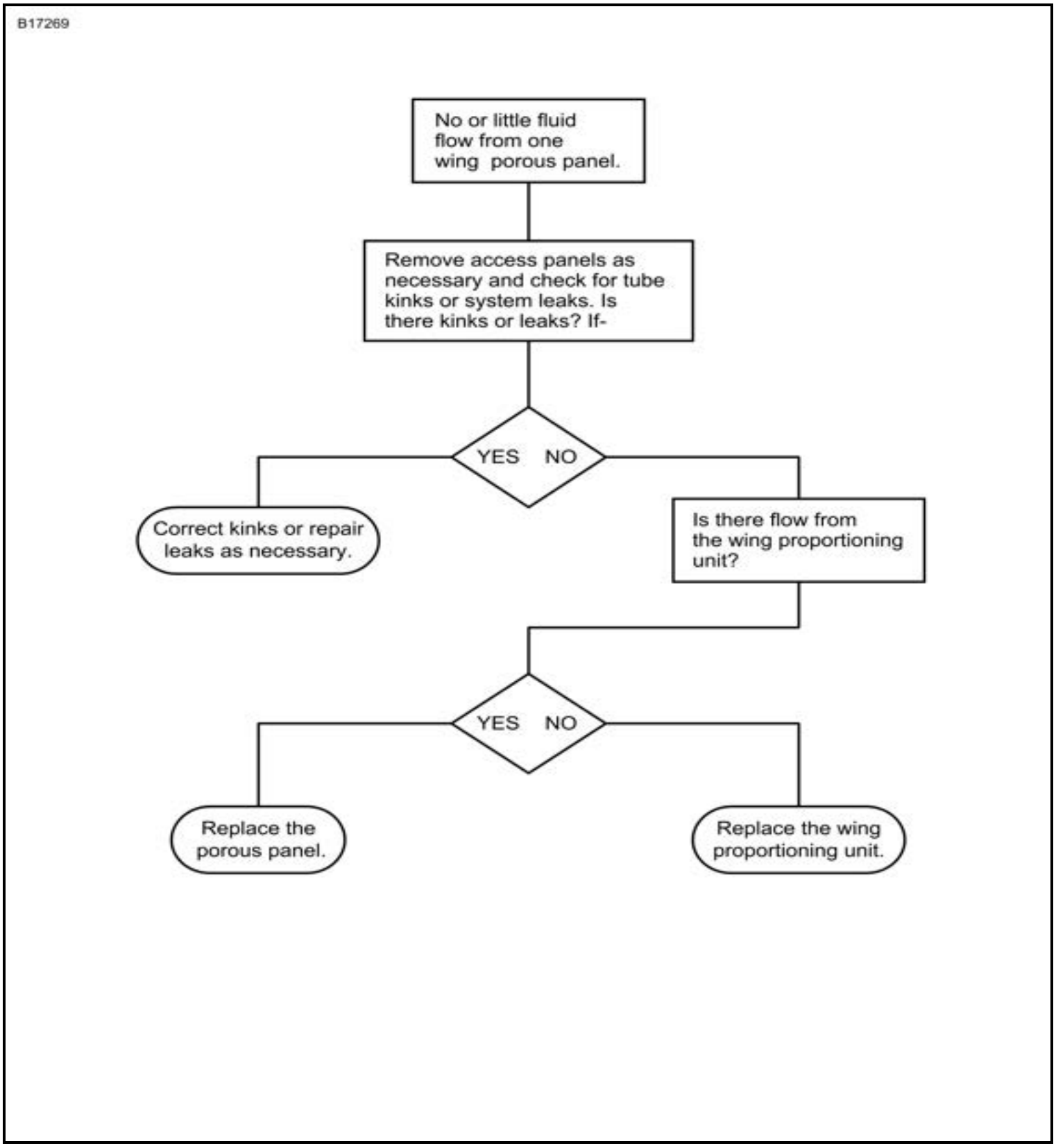
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Figure 106 : Sheet 1 : TKS Anti-Ice System Troubleshooting



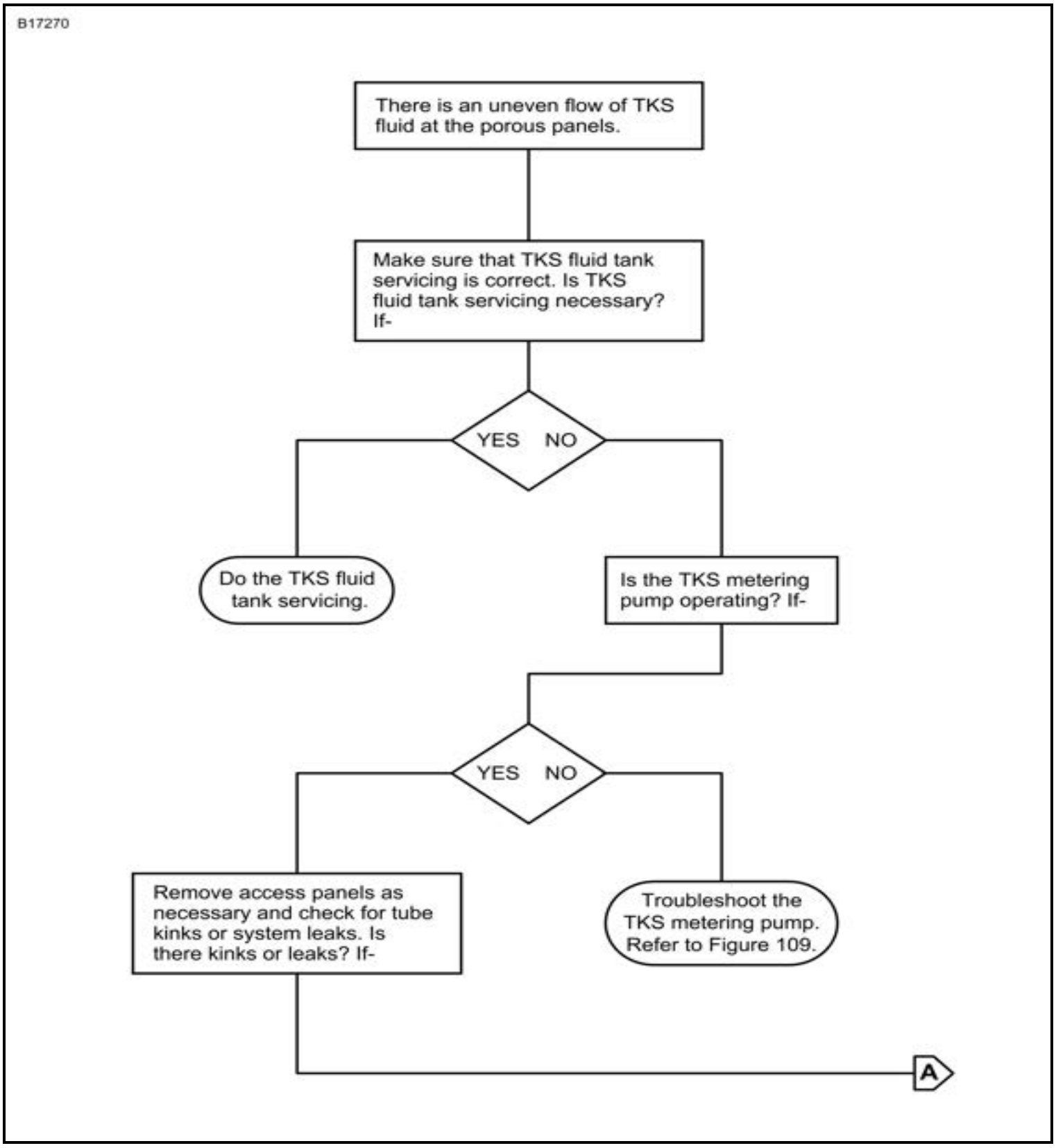
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Figure 107 : Sheet 1 : TKS Anti-Ice System Troubleshooting



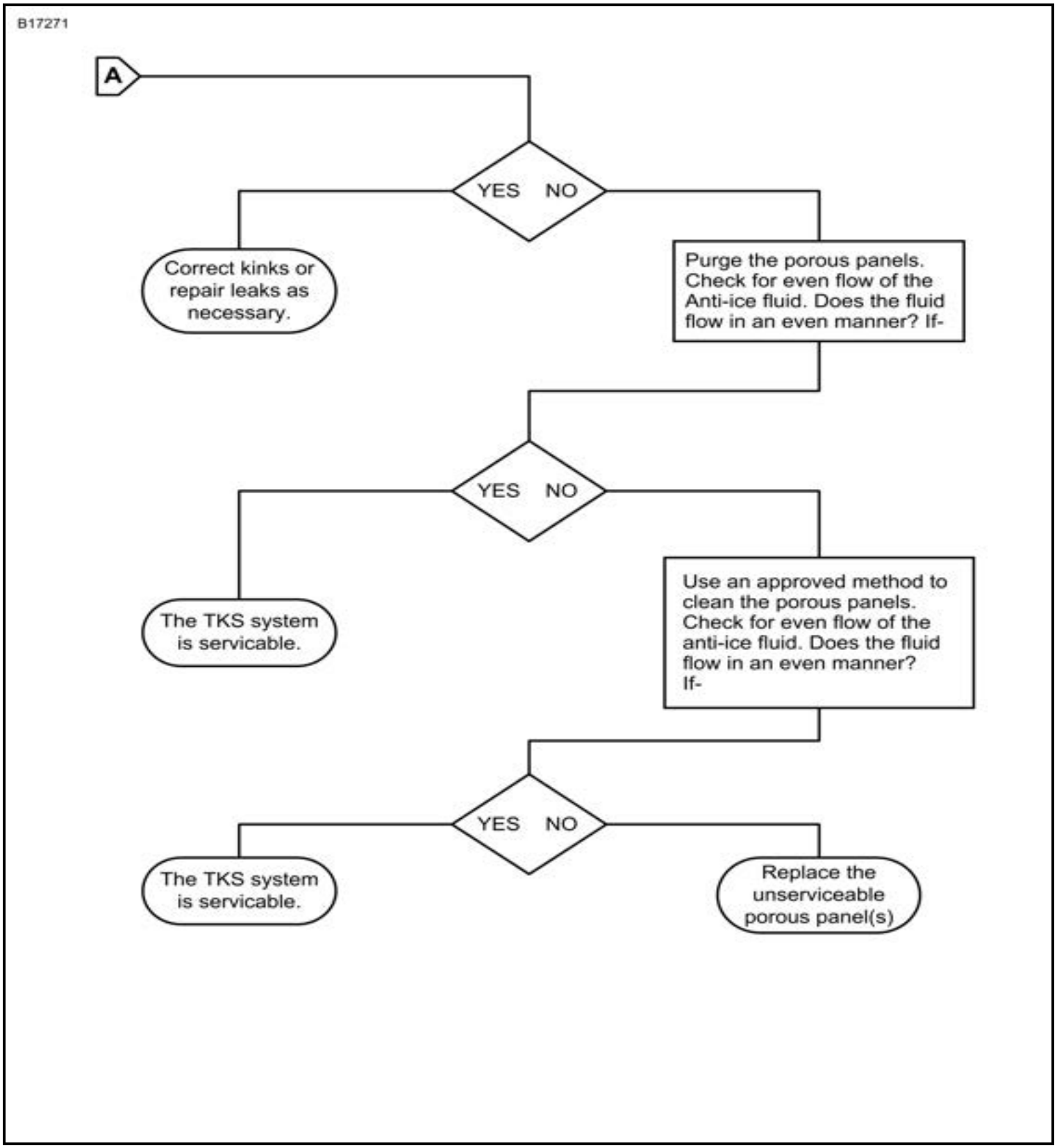
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Figure 108 : Sheet 1 : TKS Anti-Ice System Troubleshooting



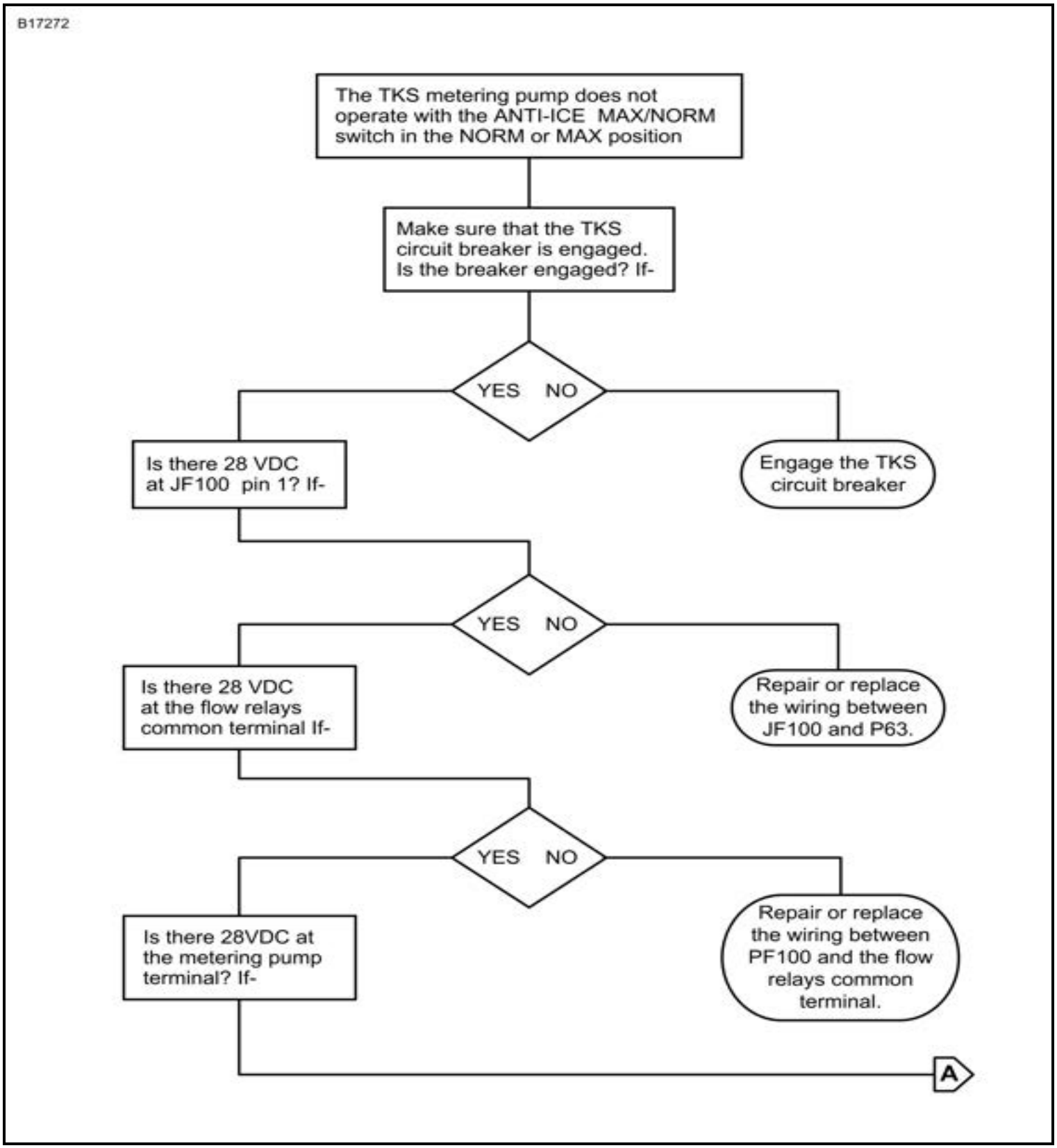
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Figure 108 : Sheet 2 : TKS Anti-Ice System Troubleshooting



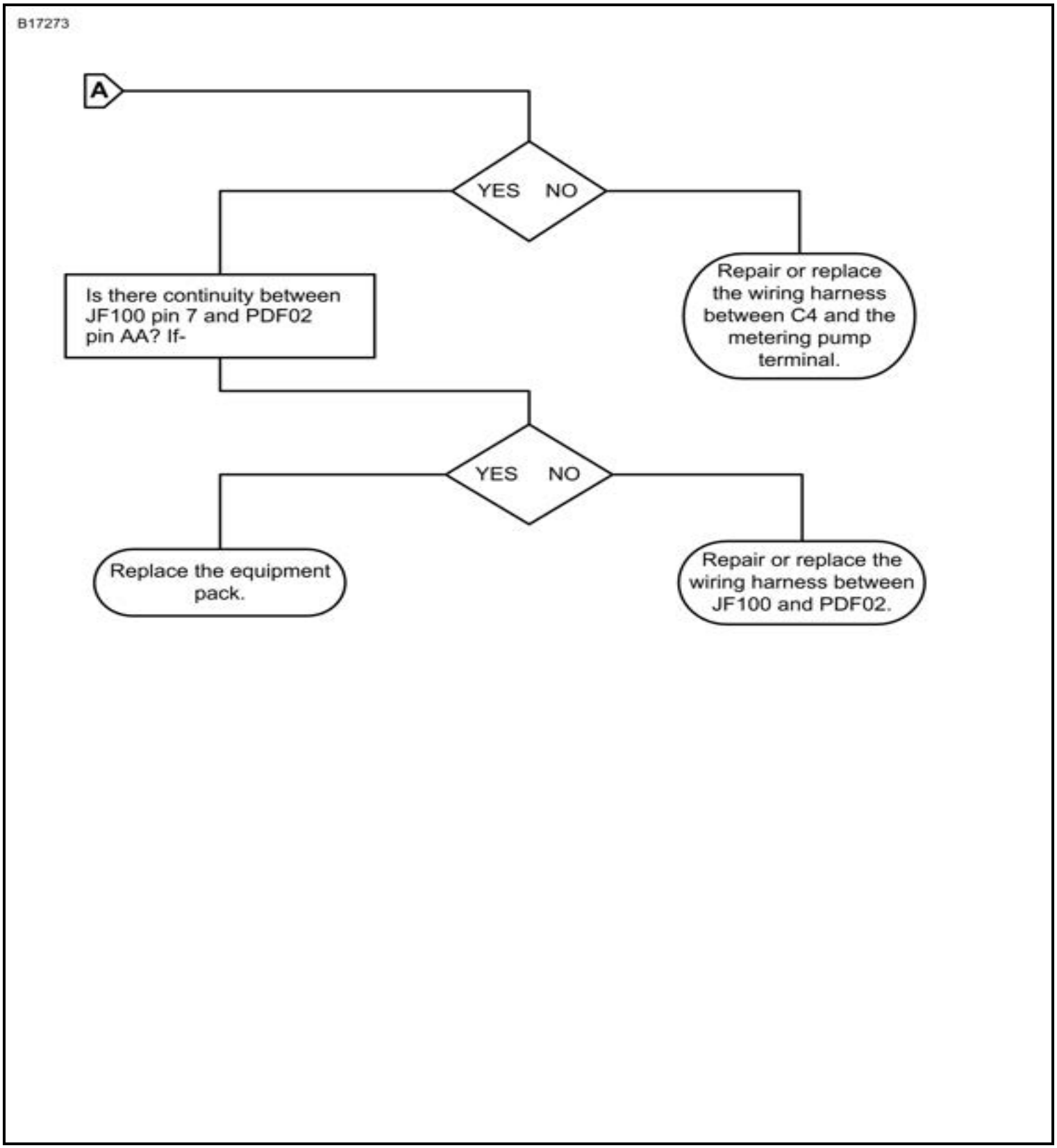
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Figure 109 : Sheet 1 : TKS Anti-Ice System Troubleshooting



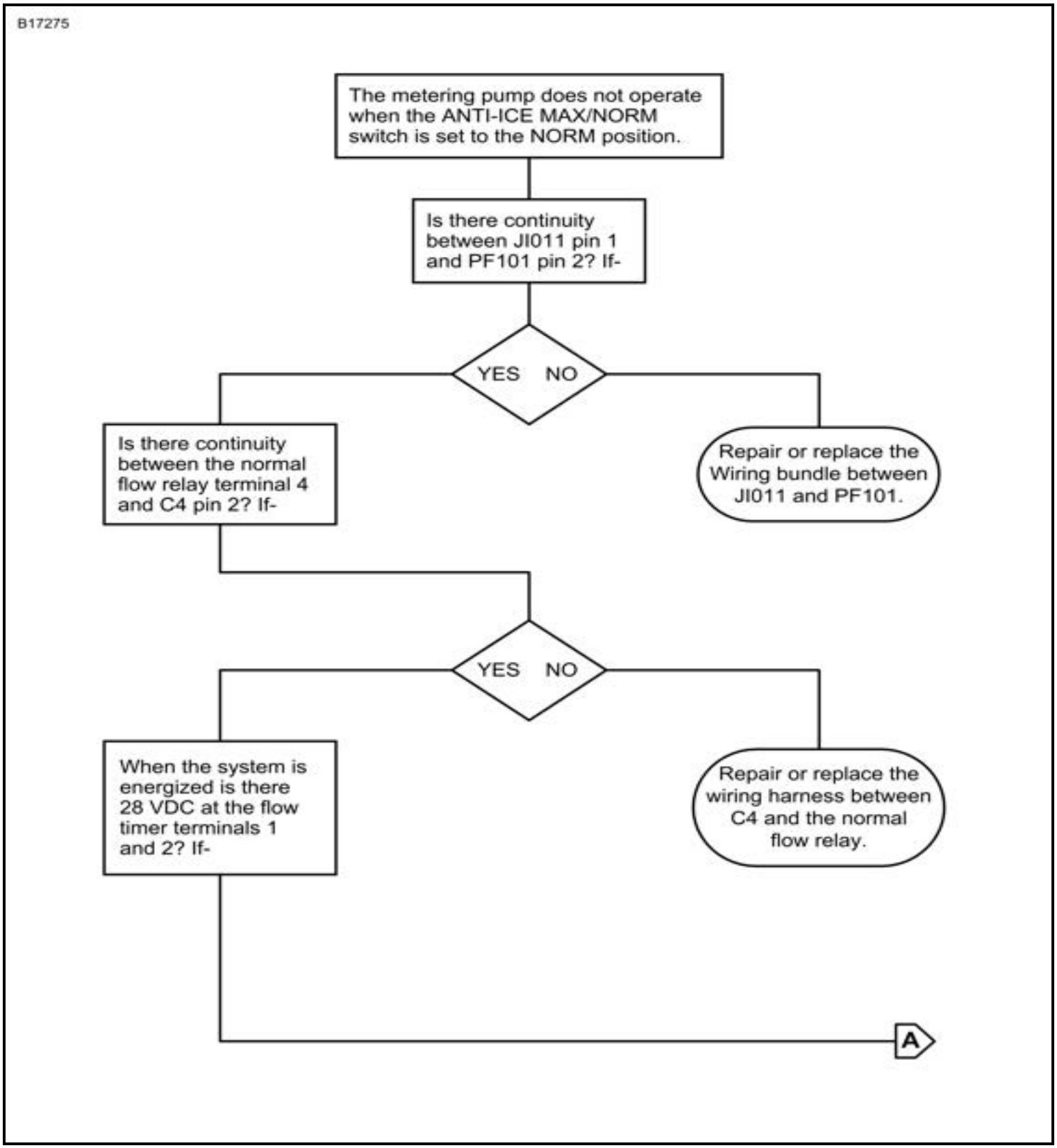
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Figure 109 : Sheet 2 : TKS Anti-Ice System Troubleshooting



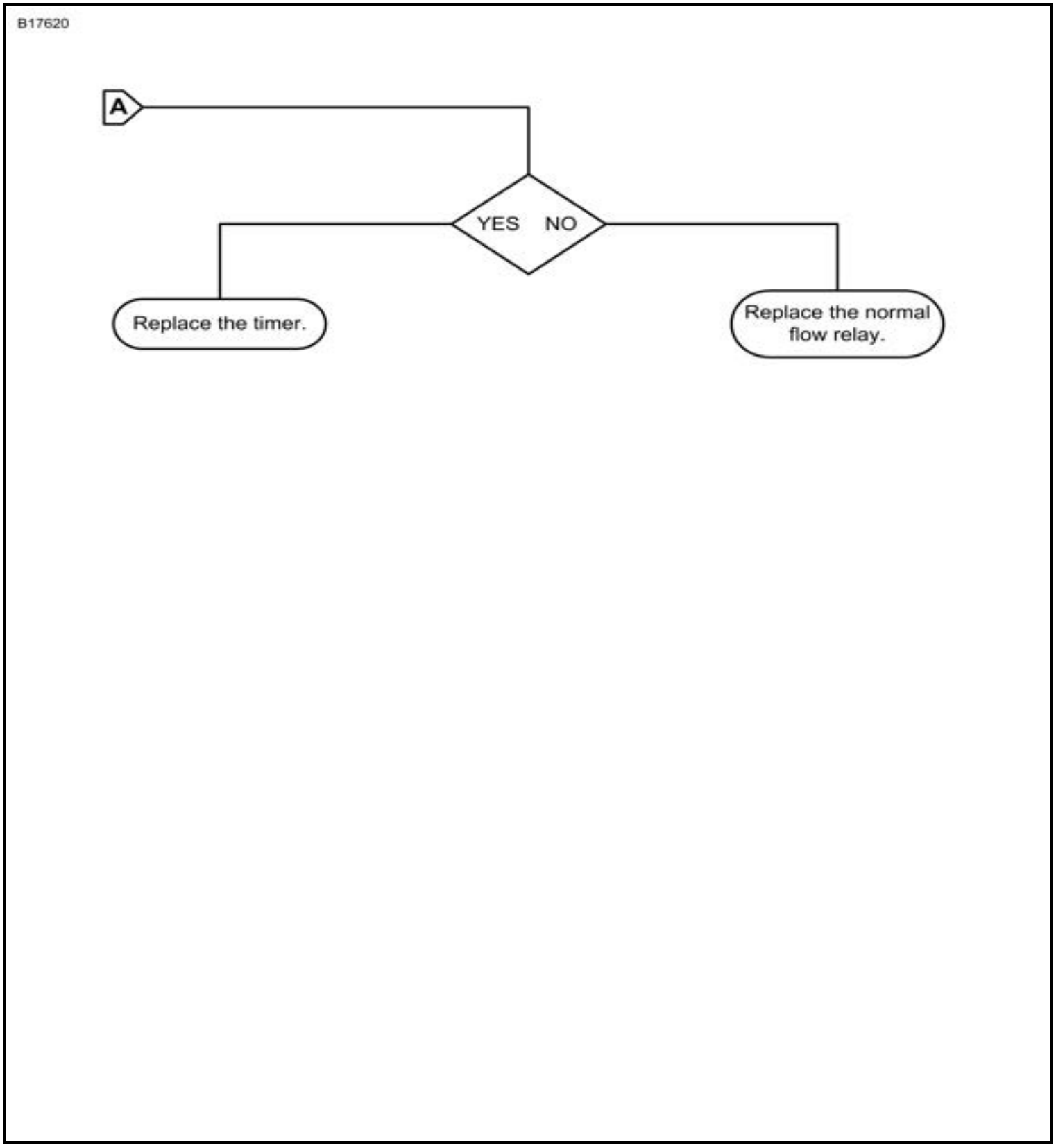
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Figure 110 : Sheet 1 : TKS Anti-Ice System Troubleshooting



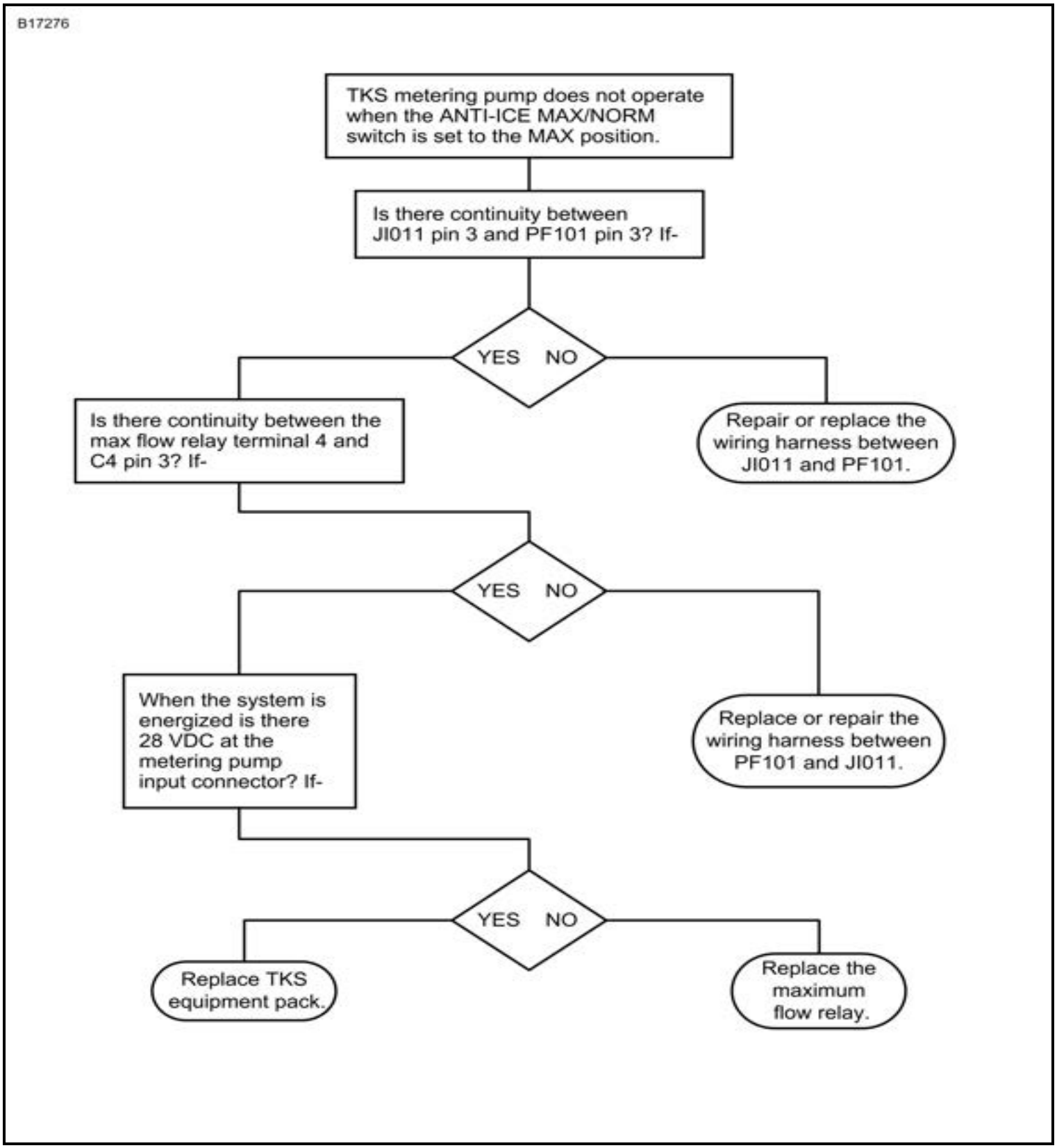
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Figure 110 : Sheet 2 : TKS Anti-Ice System Troubleshooting



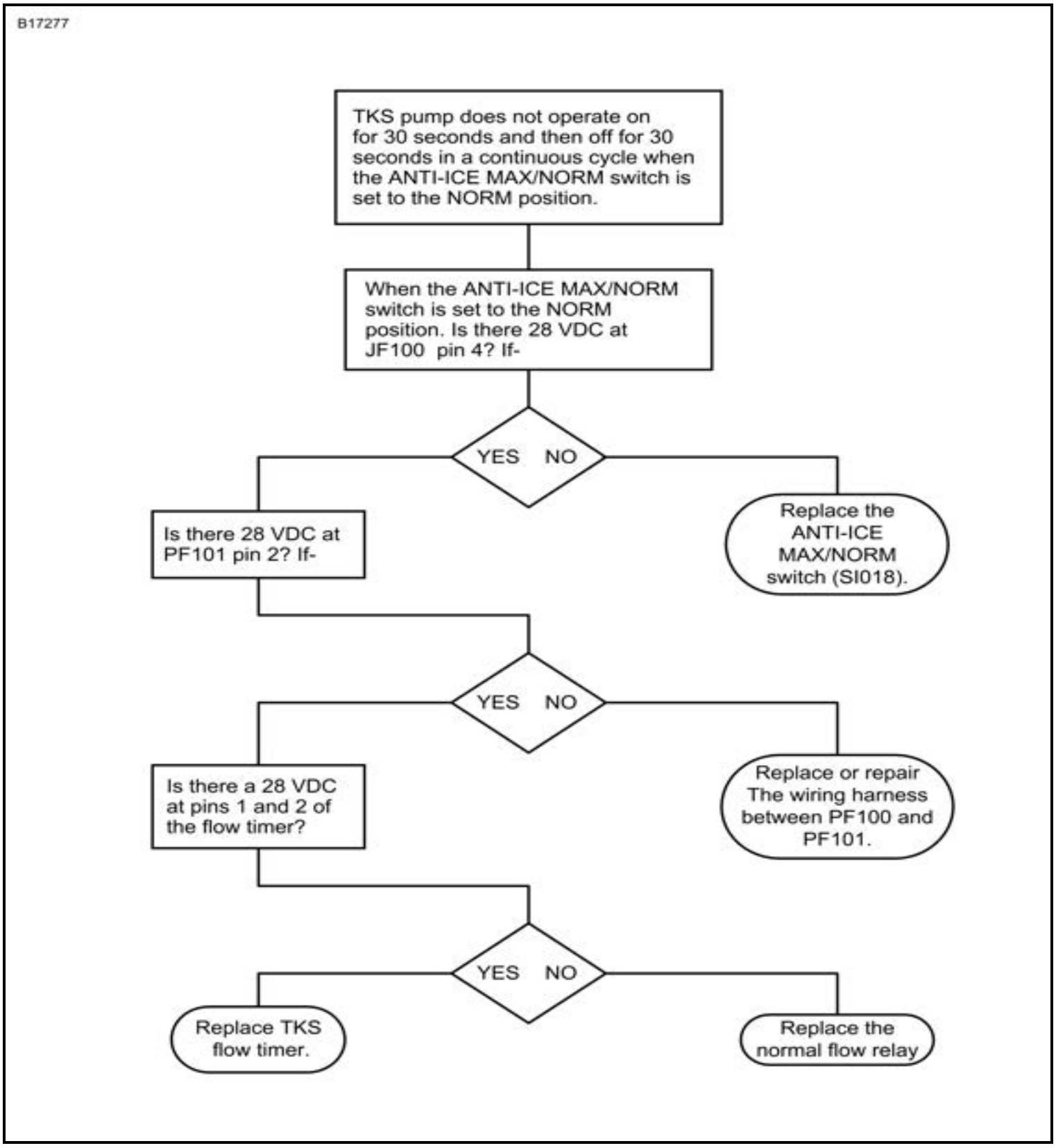
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Figure 111 : Sheet 1 : TKS Anti-Ice System Troubleshooting



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Figure 112 : Sheet 1 : TKS Anti-Ice System Troubleshooting



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TKS ANTI-ICE SYSTEM (INADVERTENT) - MAINTENANCE PRACTICES

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) fluid distribution system and the removal of TKS anti-ice system fluid contamination.

B. Recommended maintenance for the TKS system is as follows:

- Operate the pumps monthly, or as necessary, in the NORM mode until the air is removed from the fluid system.
- Keep the TKS system operational at all times to keep air pockets out of the system.
- If the fluid tank is removed and installed or replaced, do the porous panel purge and test procedures.

2. Tools, Equipment, and Materials

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Nylon Tubing Repair/Replacement

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to, Figure 201. This will help to prevent fluid leakage from the coupling.

A. All plumbing used in the fluid anti-ice system is flexible nylon tubing connected with special compression-type couplings. Three different sizes of tubing are used.

B. The couplings used to connect sections of nylon tubing are metallic compression-type couplings, which include a machined coupling end, an olive (ferrule), a nut, and an elastomeric sealing ring (refer to Figure 201). The couplings used to connect the tubing to all the anti-ice porous panels are stainless steel. All other couplings used to connect the fluid anti-ice system components are made of aluminum. To help prevent electrolytic corrosion, aluminum couplings must be assembled only to aluminum couplings and stainless steel couplings must be assembled only to stainless steel or titanium couplings. The compression-type couplings used in the fluid anti-ice system are not interchangeable with standard-type couplings (AN or MS). To make sure that the correct couplings are used, refer to the Model 400 Illustrated Parts Catalog to find the correct coupling.

C. When you do maintenance of the fluid distribution system, examine all tubing for kinks, cuts, abrasion, crushing, or other indications of damage. The nylon tubing can discolor to a light straw color with age. Discoloration of the tubing is normally not a cause for rejection. Any damaged or deteriorated tubing found must be replaced with tubing and couplings of the correct size and type (aluminum or stainless steel). Additionally, when the tube couplings are disconnected from components or other couplings, it is recommended to install a new seal in the coupling.

D. Minimum bend radii for fluid tubing at ambient temperature is shown in Table 201. In some areas of the airplane, tighter bend radii is necessary. In these areas, you can use a heat gun to bend the tubing as follows:

Table 201. Minimum Bend Radii for Fluid Tubing (At Ambient Temperature)

TUBING OUTSIDE DIAMETER	MINIMUM BEND RADII
1/2 Inch	3.0 Inches

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5/16 Inch	2.0 Inches
3/16 Inch	1.5 Inches

(1) Put the tubing in position to find the necessary bend radius.

NOTE: You can use a piece of soft wire as a pattern.

CAUTION: Be careful not to overheat, burn, or collapse the tubing, which can prevent the correct flow of fluid and/or fluid leakage.

(2) Hold the tubing and carefully apply heat to the area where the bend will be.

NOTE: The tube will become flexible at approximately 300°F.

(3) After the radius is correct, hold the tube in that position and let it become cool (ambient temperature).

(4) When the tube is at ambient temperature, carefully examine it to make sure that it has not been heated too much (burned) and that there is no restriction of fluid flow through the tubing.

CAUTION: Do not use the coupling to clench the olive to the fluid tubing. Use only specified clenching tools to do the clenching operation. Also, do not torque the couplings too much during the repair or replacement procedure. If the couplings leak, install new seals as necessary.

E. When tubing repair or replacement is necessary, the olive must always be clenched (swaged) to the tubing as a separate operation. Use approved clenching tools before you assemble the coupling. For clenching tools, refer to Ice and Rain Protection - General.

F. When installing a new olive and/or fitting, refer to Table 202, Nylon Tubing Data and Figure 201.

Table 202. Nylon Tubing Data

Aluminum Alloy/Stainless Steel Fittings on Nylon Tubes				
Tube Outside Diameter (OD) in Inches	**Olive Distance (Dimension A) (+0.05 inch or - 0.05 inch)**	**Olive Clenching Torque with Aluminum Fittings (+10% or -10%) (inch pounds)**	**Olive Clenching Torque with Steel Fittings (+10% or -10%) (inch pounds)**	**Tightening Torque (Reference) (+10% or -10%) (inch pounds)**
3/16	0.22	70	90	28
5/16	0.22	120	200	48
1/2	0.38	250	N/A	63

G. The recommended procedure for replacement of damaged or deteriorated fluid tubing is to replace the full length of tubing from coupling to coupling. However, in areas of the airplane where this type of replacement is not possible, it is permitted to do a tube repair as an alternative to complete tubing replacement. Repair tubing as follows:

(1) Remove access panels as necessary to repair the damaged tubing.

(2) Cut out the damaged area.

(3) Put a strong adhesive tape on the ends of the tube.

NOTE: This will limit fluid leakage.

(4) Connect the new tubing to the other tube ends with straight couplings.

(5) Attach tubing with tie wraps or equivalent method.

(6) All new connections used in the repair must be tested for leaks. Operate the system before you install the access panels.

NOTE: If bulk tubing is installed, it is necessary to attach an identification tag to each end of the tube with the tube part number labeled on it for tube identification.

4. TKS Anti-Ice Fluid Removal

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip

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hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the TKS Anti-Ice Fluid (Refer to Figure 202).

(1) Remove external electrical power from the airplane.
(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.
(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.
(4) Make sure that the CROSS TIE switch (SW03) is in the OFF position.
(5) Remove the fuel system access panel.
(6) Put a container with a capacity of approximately 3 to 5 gallons below the metering pump drain outlet.
(7) Remove the safety wire from the metering pump drain outlet fitting.
(8) Remove the fitting and blanking ball.
(9) Drain the fluid into the container.
(10) Install the blanking ball and fitting and safety with wire. Refer to Safetying - Maintenance Practices.
(11) Check the MFD TKS fluid quantity indicator.
  (a) The MFD TKS fluid quantity indicator must show zero when the TKS fluid tank is empty.
(12) Fill the TKS fluid tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).
(13) If the system ran dry or was drained, refer to TKS System Priming in this section.

5. TKS System Priming

A. Prime the TKS System (Refer to Figure 202).

(1) Open the fuel system access panel.
(2) Put a container with a capacity of approximately 3 to 5 gallons below the metering pump drain outlet.
(3) Remove the safety wire from the metering pump drain outlet fitting.
(4) Remove the fitting and blanking ball.
(5) Supply external electrical power to the airplane.
(6) Engage the TKS circuit breaker.
(7) Make sure that the master BATT switches (left SW01 and right SW02) are set to the ON position.
(8) Make sure that the AVIONICS MASTER switch (SW04) is set to the ON position.
(9) Put the ANTI-ICE MAX/NORM switch (SI018) to the NORM position.
(10) Operate the system until there is no evidence of air bubbles for a minimum of three seconds.
(11) Put the ANTI-ICE MAX/NORM switch to the OFF position.
(12) Disengage the TKS circuit breaker.
(13) Set the master BATT switches (left and right) and AVIONICS MASTER switch to the OFF position.
(14) Remove external electrical power from the airplane.
(15) Install the blanking ball and fitting and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(16) Service the TKS system as needed. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

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6. TKS Fluid Contamination Removal

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting as shown in Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the TKS Fluid Contamination (Fuel).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER (SW04) is in the OFF position.

(4) Disengage the TKS circuit breaker.

(5) Remove the fluid tank. Refer to TKS Anti-Ice System Fluid Tank and Components (Inadvertent) - Removal/Installation, TKS Anti-Ice Fluid Tank Removal/Installation.

(6) Fill the fluid tank with a water and mild detergent mixture.

(7) Drain the water and mild detergent mixture from the fluid tank.

(8) Fill the fluid tank with water.

(9) Drain the water from the fluid tank.

(10) Remove the strainer assembly. Refer to TKS Anti-Ice System Fluid Tank and Components (Inadvertent) - Removal/Installation, Fluid Strainer Assembly Removal/Installation.

(11) Examine the strainer assembly. Refer to TKS Anti-Ice System Fluid Tank and Components (Inadvertent) - Removal/Installation, Inspect/Clean Fluid Strainer Assembly.

(12) Install the fluid tank. Refer to TKS Anti-Ice System Fluid Tank and Components (Inadvertent) - Removal/Installation.

(13) If the TKS system was operated with fluid contamination, remove the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

NOTE: If there was fuel contamination in the fluid, but system was not operated, it is not necessary to replace the filter pack.

(14) Remove the filter assembly. Refer to TKS Anti-Ice System Filter (Inadvertent) - Removal/Installation.

(15) Install new filter assembly. Refer to TKS Anti-Ice System Filter (Inadvertent) - Removal/Installation.

(16) Install the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(17) Install the fluid tank. Refer to TKS Anti-Ice system Fluid Tank and Components (Inadvertent) - Removal/Installation.

(18) Install the strainer assembly. Refer to TKS Anti-Ice system Fluid Tank and Components (Inadvertent) - Removal/Installation Fluid Strainer Assembly Removal/Installation.

(19) Add 1 gallon (3.78 liters) of TKS fluid to the fluid tank.

(20) Supply external electrical power to the airplane.

(21) Set the master BATT switches (left and right) and the AVIONICS MASTER switch the ON position.

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(22) Engage the TKS circuit breaker.

(23) Disconnect the output tube of the metering pump.

(24) Remove the seal from the input tube and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(25) Connect a temporary tube to the metering pump outlet fitting and put the end in a container with a capacity of approximately 3 to 5 gallons. Refer to Figure 202.

(26) Put the ANTI-ICE MAX/NORM switch to the NORM position to start the metering pump operation.

(a) Let the TKS fluid flow in the container at the metering pump outlet for one full cycle of approximately 2 minutes of metering pump operation.

(27) Put the ANTI-ICE MAX/NORM switch to the OFF position.

(28) Set the master BATT switches (left and right) and the AVIONICS MASTER switch the OFF position.

(29) Disengage the TKS circuit breaker.

(30) Remove external electrical power from the airplane.

(31) Install a new seal in the input tube. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(a) Make sure that the seal touches the tube fitting olive.

(32) Put the outlet tube in the outlet fitting of the metering pump. Refer to Figure 202.

(33) Tighten the nut and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.

(34) Supply external electrical power to the airplane.

(35) Set the master BATT switches (left and right) and the AVIONICS MASTER switch the ON position.

(36) Engage the TKS circuit breaker.

(37) Put the ANTI-ICE MAX/NORM switch (SI018) to the NORM position to start the metering pump.

(a) Let the system operate for approximately 5 minutes until there are no air bubbles in the TKS fluid flow from the porous panels on the wing and horizontal stabilizer leading edges.

NOTE: If necessary, you can let the system operate for more than 5 minutes until the fluid flow is normal across all porous panels.

(b) If the fluid flow at any of the porous panels does not become normal, do the porous panel purge and test procedure for the applicable porous panel(s). Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.

(38) Put the ANTI-ICE MAX/NORM switch to the MAX position.

(a) Let the TKS fluid flow from the porous panels on the wing and horizontal stabilizer leading edges for one full cycle of approximately 2 minutes.

NOTE: If necessary, you can do more MAX FLOW cycles until the fluid flow is normal across all porous panels.

(b) If fluid flow at any of the porous panels does not become normal, do the porous panel purge and test procedure for the applicable porous panel(s). Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.

(39) Put the ANTI-ICE MAX/NORM switch to the OFF position.

(40) Set the master BATT switches (left and right) and the AVIONICS MASTER switch the OFF position.

(41) Remove external electrical power from the airplane.

(42) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

(43) Make sure that the floor and the airplane surfaces are clean.

7. TKS Fluid Contamination (Water) Removal

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

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WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

A. Remove the TKS Fluid Contamination (Water).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER (SW04) switch is in the OFF position.

(4) Disengage the TKS circuit breaker.

(5) Drain the TKS fluid from the fluid tank. Refer to TKS Anti-Ice system Fluid Tank and Components (Inadvertent) - Removal/Installation.

(6) Do the fluid tank servicing. Refer to Chapter 12, TKS Anti-Ice System - Servicing.

(7) Supply external electrical power to the airplane.

(8) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the ON position.

(9) Engage the TKS circuit breaker.

(10) Put the ANTI-ICE MAX/NORM switch to the MAX position to start the metering pump.

(a) Let the TKS fluid flow from the porous panels on the wing and horizontal stabilizer leading edges for one full cycle of approximately 2 minutes.

(11) If fluid flow at any of the porous panels is not normal, do the porous panel purge and test procedure for the applicable porous panel(s). Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.

(12) Put the ANTI-ICE MAX/NORM switch to the OFF position.

(13) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the OFF position.

(14) Remove external electrical power from the airplane.

(15) Make sure that the fluid tank servicing is correct. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

(16) Make sure that the floor and the airplane surfaces are clean.

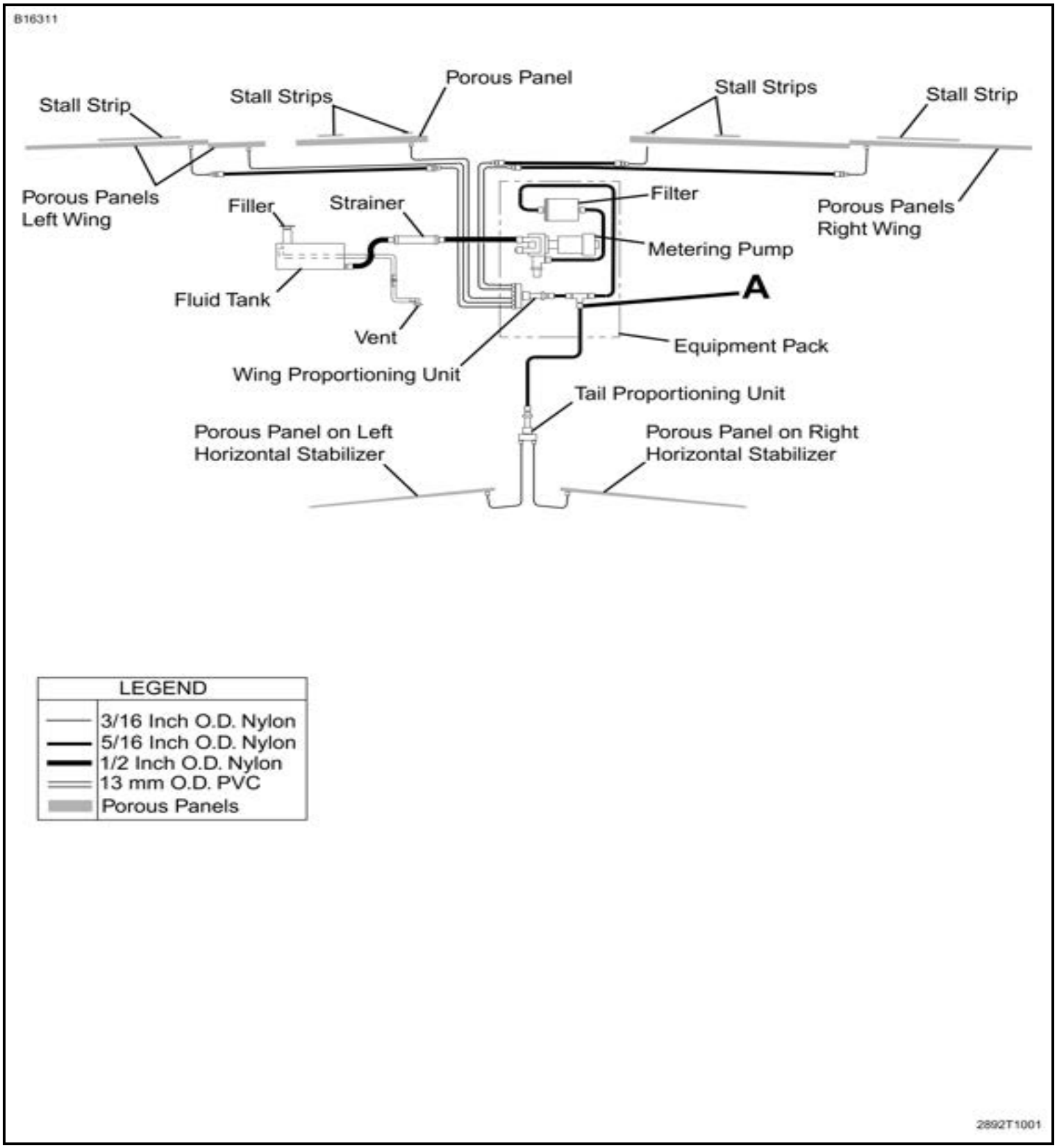
8. TKS Fluid Contamination (Solids) Removal

A. TKS Fluid Contamination (Solids) Removal

(1) If the TKS fluid contamination is a solid material, contact Cessna Aircraft Company.

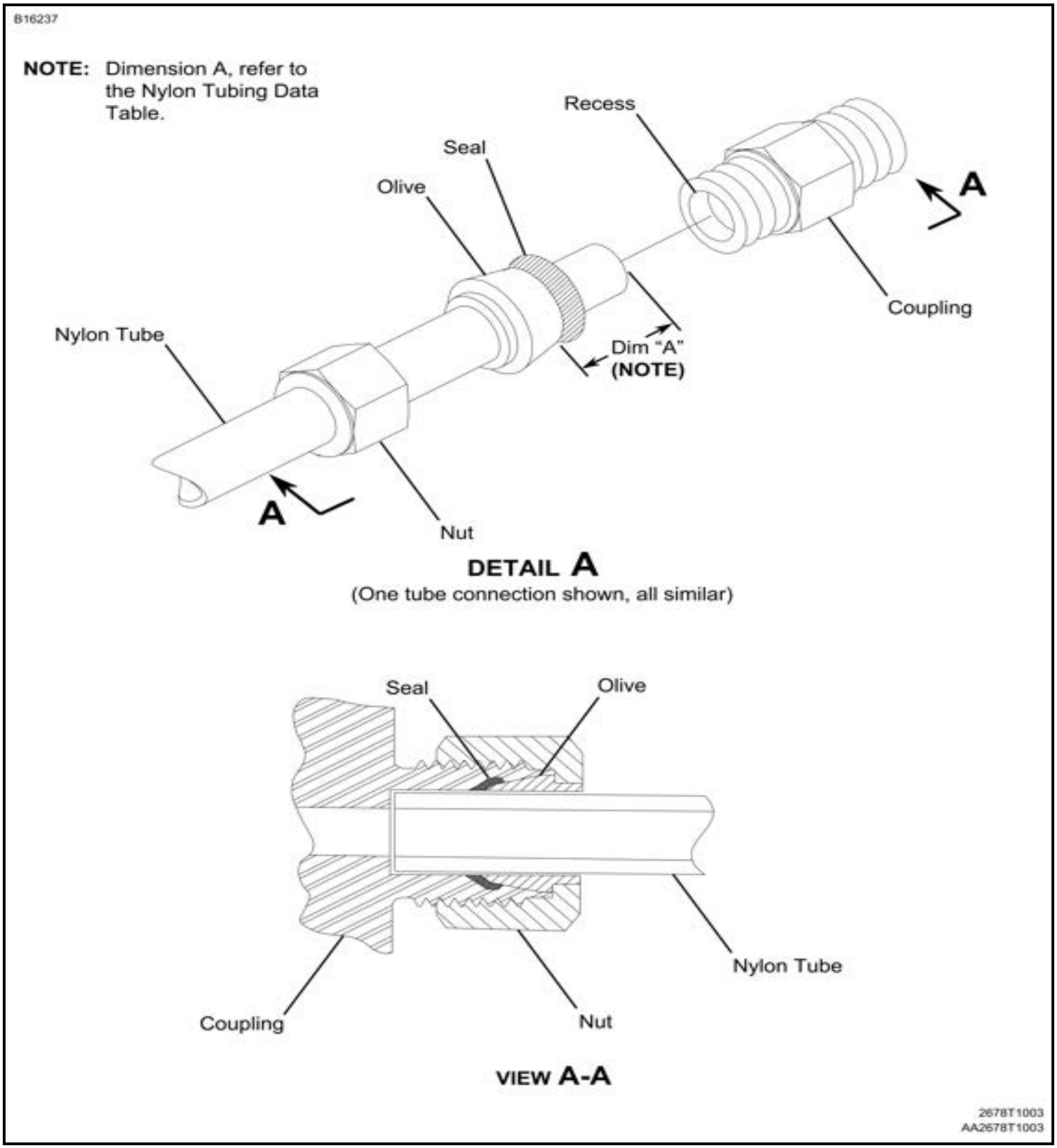
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



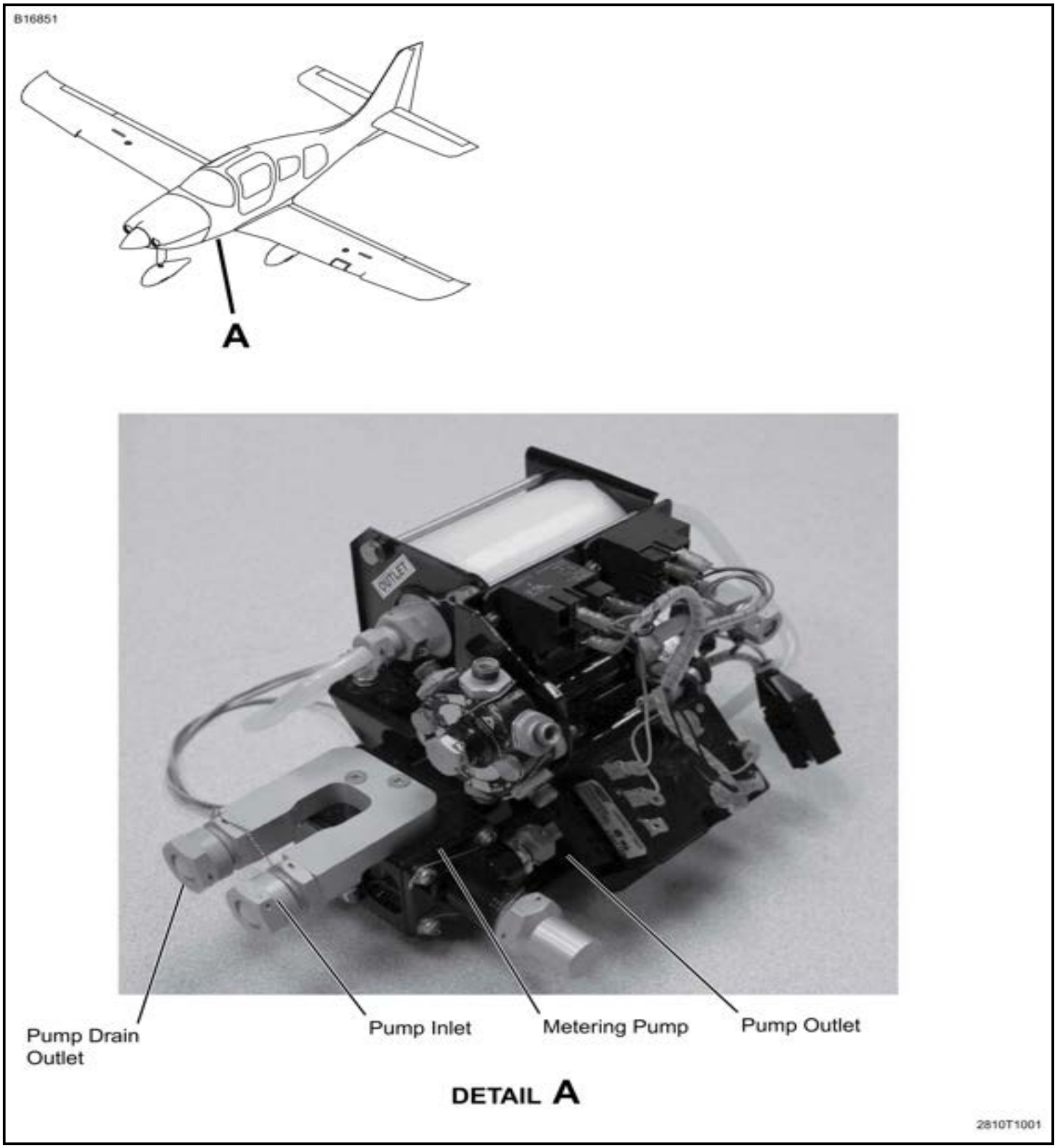
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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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Figure 202 : Sheet 1 : Metering Pump Outlet/Inlet Ports



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TKS ANTI-ICE SYSTEM (INADVERTENT) - ADJUSTMENT/TEST

1. General

A. This section contains the test procedures that are necessary to do after the replacement of TKS Anti-Ice System (Inadvertent) fluid tank, timer box, and/or metering pump.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Anti-Ice System Operational Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

NOTE: You can fabricate a fluid collector system and install it on and below the porous panels, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

NOTE: It is easier for two persons to do this test. One to monitor the cockpit and one to monitor the equipment pack.

A. Do the TKS System Operational Test.

(1) Remove the panels that follow:

(a) Remove rear cabin access panels as necessary. Refer to Chapter 25, Access Panels - Maintenance Practices.

(b) Remove the fuel line access panels below each wing to get access to TKS panels input line connections.

(c) Open the fuel access panel.

(d) Open tail panels as necessary to get access to the horizontal TKS panels input line connections.

(2) Install a fluid collector system on the airplane.

(3) Apply external electrical power to the airplane.

(4) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(5) Set the AVIONICS MASTER switch (SW04) to the ON position.

(6) Set the CROSS TIE Switch (SW03) to the ON position.

(7) Make sure that the TKS, MFD and PFD circuit breakers are engaged.

(a) Record the TKS fluid level shown on the MFD display.

(b) Make sure that there is enough fluid in the tank to keep the pump from running dry during the test procedure.

(8) Put the ANTI-ICE MAX/NORM switch (SI018) to the MAX position.

(a) Make sure that the A-ICE MAX (white) CAS message shows on the PFD.

(9) When you operate the TKS make sure that the TKS porous panel input connections and the equipment pack line

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connections do not leak.

(a) If there are TKS leaks, repair the leaks as necessary. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices.

(10) Make sure that there is consistent flow at each of the porous panels. If the flow is not correct do the porous panel purge procedure. Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.

NOTE: It can be necessary to operate the TKS a minimum of 5 minutes for TKS fluid flow to show at one or all of the porous panels.

(11) Put the ANTI-ICE MAX/NORM switch to the NORM position.

(a) Make sure that the A-ICE NORM (white) CAS message shows on the PFD.

(12) Operate the system for 3 cycles.

(a) Make sure that the system operates for 30 seconds on and is off for 30 seconds.

(b) At the third cycle, make sure that fluid flows correctly across each of the panels. If the flow is not correct do the porous panel purge procedure. Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.

(13) Put the ANTI-ICE MAX/NORM switch to the OFF position.

(a) Make sure that the A-ICE NORM (white) CAS message no longer shows on the PFD.

(b) Make sure that the TKS fluid level shown on the MFD decreases from the level recorded at the start of TKS system operation.

(14) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(15) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(16) Set the CROSS TIE Switch (SW03) to the OFF position.

(17) Remove external electrical power from the airplane.

(18) Install the panels as necessary that follow:

(a) Install rear cabin access panels. Refer to Chapter 25, Access Panels - Maintenance Practices.

(b) Install the panels below each wing.

(c) Install the fuel line access panel.

(d) Install tail panels as necessary .

(19) If necessary, remove the fluid collector system from the airplane.

(20) Clean the floor and the airplane surfaces as necessary.

4. TKS Fluid Delivery Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

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NOTE: You can fabricate a fluid collector system and install it on and below the porous panels, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

NOTE: It is easier for two persons to do this test. One to monitor the cockpit and one to monitor the equipment pack.

A. Do the TKS System Fluid Delivery Test.

(1) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(2) Install a fluid collector system on the airplane.

(3) Apply external electrical power to the airplane.

(4) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(5) Set the AVIONICS MASTER switch (SW04) to the ON position.

(6) Set the CROSS TIE Switch (SW03) to the ON position.

(7) Make sure that the TKS, MFD and PFD circuit breakers are engaged.

(8) Set the ANTI-ICE MAX/NORM switch (SI018) to the MAX position for a timed period not to exceed 20 minutes.

(a) Make sure that the A-ICE MAX (white) CAS message shows on the PFD.

(b) Record the TKS fluid level shown on the MFD display.

(9) Put the ANTI-ICE MAX/NORM switch to the OFF position.

(a) Make sure that the A-ICE NORM (white) CAS message no longer shows on the PFD.

(b) Make sure that the TKS fluid level shown on the MFD decreases from the level recorded at the start of TKS system operation.

(10) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(11) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(12) Set the CROSS TIE Switch (SW03) to the OFF position.

(13) Remove external electrical power from the airplane.

(14) Do the fluid tank servicing and record the quantity of fluid necessary to fill tank to equal the level at the start of the check. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(15) Calculate the flow rate.

NOTE: The permitted flow rate is 13.26 ounces/min, +0.34 or -0.0 ounces/min (392 ml/min, +10.0ml or -0.0 ml/min).

(16) If necessary, remove the fluid collector system from the airplane.

(17) Clean the floor and the airplane surfaces as necessary.

5. TKS Fluid Level Sender Functional Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

A. Do a Test of the Fluid Level Sender.

(1) Level the airplane. Refer to Chapter 8, Leveling and Weighing - General.

(2) Apply external electrical power to the airplane.

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(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.
(4) Set the AVIONICS MASTER switch (SW04) to the ON position.
(5) Set the CROSS TIE Switch (SW03) to the ON position.
(6) Make sure that the TKS, MFD and PFD circuit breakers are engaged.
(7) Drain the tank. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices
  (a) Make sure that a fluid quantity indication of A-ICE GAL 0.0 shows on the MFD display as applicable.
(8) Add 1 gallon, +10 or -10 fluid ounces, to the tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.
  (a) Let the fluid stabilize for I minute.
  (b) Make sure that a fluid quantity indication of A-ICE GAL 1.0 shows on the MFD display as applicable.
  (c) If the fluid quantity indication does not change, do the steps that follow:
    1 Carefully move the float inside the TKS tank up and down.
    2 Let the fluid stabilize for I minute.
    3 Make sure that a fluid quantity indication of A-ICE GAL 1.0 shows on the MFD display as applicable.
(9) Add 2 gallons, +10 or -10 fluid ounces, to the tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.
  (a) Let the fluid stabilize for 1 minute.
  (b) Make sure that a fluid quantity indication of A-ICE GAL 3.0 shows on the MFD display as applicable.
(10) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(11) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(12) Set the CROSS TIE Switch (SW03) to the OFF position.
(13) Remove external electrical power from the airplane.

6. Metering Pump Functional Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

NOTE: You can fabricate a fluid collector system and install it on and below the porous panels, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

NOTE: It is easier for two persons to do this test. One to monitor the cockpit and one to monitor the equipment pack.

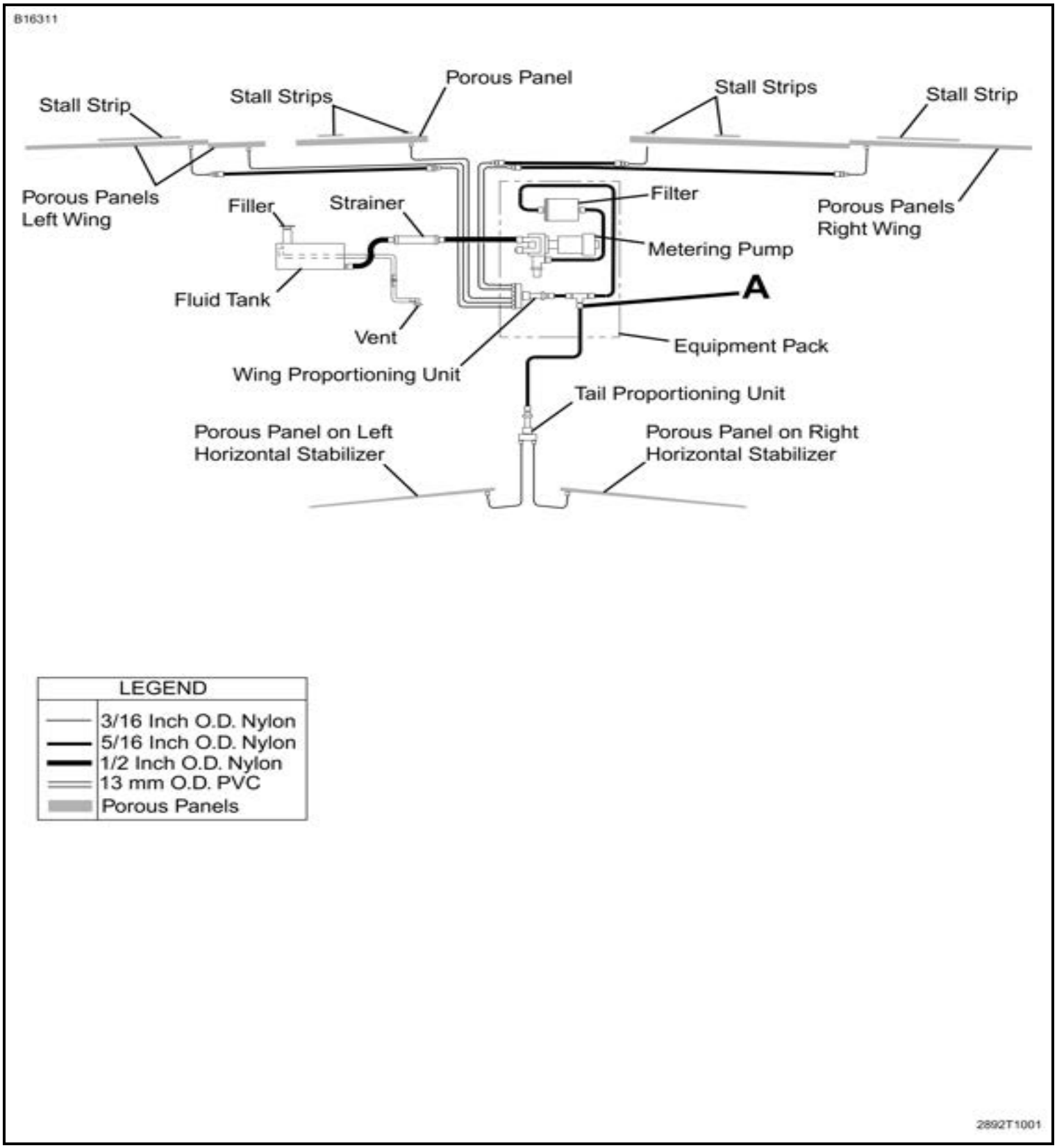
A. Do the Metering Pump Functional Test.
  (1) Make sure that the fluid tank serviced correctly. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

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(2) Put a container with a capacity of approximately 3 to 5 gallons below the metering pump outlet fitting.
(3) Remove the safety wire from the metering pump outlet fitting.
(4) Connect a test line to the metering pump outlet fitting and put the free end in the collection bucket or appropriate container.
(5) Apply external electrical power to the airplane.
(6) Set the master BATT switches (left SW01 and right SW02) to the ON position.
(7) Set the AVIONICS MASTER switch (SW04) to the ON position.
(8) Set the CROSS TIE Switch (SW03) to the ON position.
(9) Make sure that the TKS, MFD and PFD circuit breakers are engaged.
(10) Set the ANTI-ICE MAX/NORM switch (SI018) to the NORM position.
    (a) Make sure that the A-ICE (white) CAS message shows on the PFD.
    (b) Make sure that the system operates for 30 seconds on and is off for 30 seconds.
(11) Disengage the ANTI-ICE circuit breaker found on the cockpit circuit breaker panel.
    (a) Make sure that the A-ICE NORM (white) CAS message no longer shows on the PFD.
    (b) Make sure that the operation stops.
(12) Set the ANTI-ICE MAX/NORM switch (SI018) to the OFF position.
(13) Engage the ANTI-ICE circuit breaker.
(14) Set the ANTI-ICE MAX/NORM switch (SI018) to the MAX position.
    (a) Make sure that the A-ICE MAX (white) CAS message shows on the PFD.
    (b) Make sure that the pump operates for two minutes continuously.
(15) Set the ANTI-ICE MAX/NORM switch to the OFF position.
    (a) A-ICE MAX (white) CAS message no longer shows on the PFD.
(16) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(17) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(18) Set the CROSS TIE Switch (SW03) to the OFF position.
(19) Remove external electrical power from the airplane.
(20) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).
(21) Remove the test line from the metering pump outlet fitting.
(22) Install a new seal in the outlet tube. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
    (a) Make sure that the seal touches the tube fitting olive.
(23) Put the outlet tube in the outlet fitting of the metering pump. Refer to Figure 202.
(24) Tighten the nut and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(25) Clean the floor and the airplane surfaces as necessary.

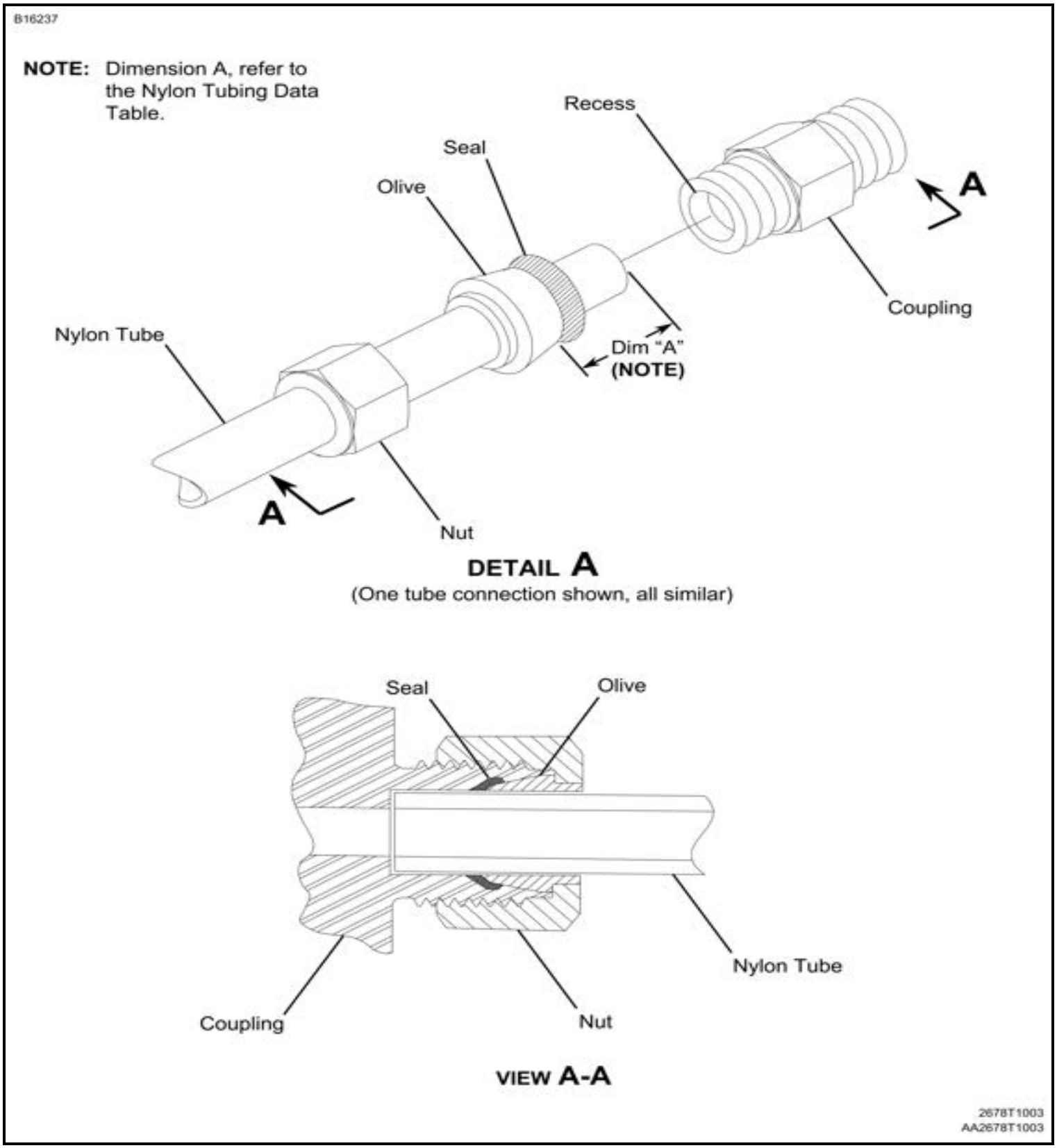
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



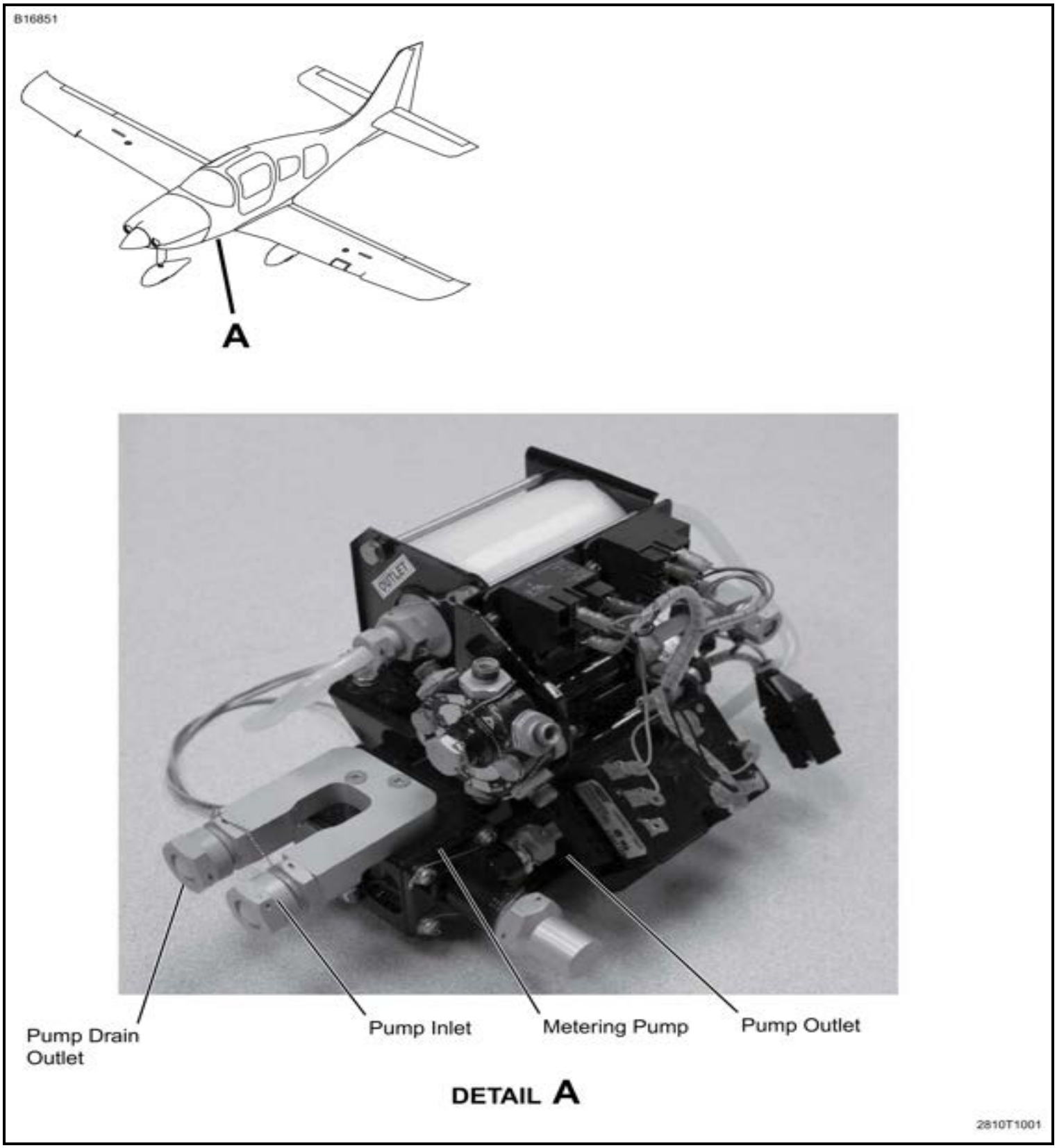
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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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Figure 202 : Sheet 1 : Metering Pump Outlet/Inlet Ports



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TKS ANTI-ICE SYSTEM (INADVERTENT) - INSPECTION/CHECK

1. General

A. This section contains the inspections and checks necessary to keep the TKS Anti-Ice System (Inadvertent) in a serviceable condition.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Anti-Ice System 100 Hour Inspection/Check

A. Do the TKS Anti-Ice System Operational Test. Refer to TKS Anti-Ice System (Inadvertent) - Adjustment/Test, TKS Anti-Ice System Operational Test.

B. TKS Component Check

(1) Remove internal and external panels as necessary to examine the TKS Anti-Ice System components. Refer to Chapter 25, Interior Panels - Maintenance Panels, and Footwell - Maintenance Panels.

(2) Do a visual inspection of TKS Anti-Ice System components:

(a) Examine electrical wire harnesses for correct routing and installation.

1 Examine the wire harnesses for an indication of chafing, wear, arching or interference with other components or airplane airframe.

(b) Examine the fluid tubes for correct routing and installation at the fluid tank, equipment pack and tail proportioning unit.

1 Examine the fluid tubes for an indication of chafing, wear, kinking or leaks.

(c) Examine the fluid tube fittings for leaks at the fluid tank, equipment pack and tail proportioning unit.

(d) Examine the equipment pack components for serviceable condition and correct installation.

(e) Examine the equipment pack for serviceability of attachment bushings and hardware.

(f) Examine the equipment pack for deformation and its fuselage mount area for serviceability of lamination.

(g) Examine the porous panels for serviceability.

1 Examine the porous panels for a tight fit to the applicable leading edge.

2 Examine the porous panels edge seal for serviceability.

3 Examine the porous panels for dents or other damage.

(h) Examine the fluid tank filler.

1 Examine the filler cap seal for serviceability.

2 Examine the filler cap for free operation.

(3) Install the internal and external panels removed to examine the TKS Anti-Ice System components. Refer to Chapter 25, Interior Panels - Maintenance Panels, and Footwell - Maintenance Panels.

4. TKS Anti-Ice System Annual Inspection/Check

A. Do the TKS System 100 Hour Inspection/Check. Refer to TKS Anti-Ice System 100 Hour Inspection/Check in this section.

B. Do the TKS System Fluid Delivery Test. Refer to TKS Anti-Ice System (Inadvertent) - Adjustment/Test, TKS Fluid Delivery Check.

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TKS ANTI-ICE SYSTEM FLUID TANK AND COMPONENTS (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS anti-ice fluid tank, filler tube assembly, and strainer assembly. This section also gives the procedures to inspect and clean the strainer assembly.

B. After you remove and install or replace the fluid tank, it is necessary to do the panel purge and test procedures. Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Anti-Ice Fluid Tank Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Anti-Ice Fluid Tank (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the TKS circuit breaker.

(5) Remove the anti-ice fluid from the fluid tank. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices TKS Anti-Ice Fluid Removal.

(6) Open the fuel system access panel on the lower surface of the wing.

(7) Remove the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.

(8) Identify and disconnect the level sender electrical connector (C6) from the equipment pack electrical connector (JF100).

(9) Remove the fluid filler tube.

(a) Carefully remove sealant from the edge filler tube flange.

(b) Remove the six screws from the filler tube flange.

(c) Unscrew the filler tube from the fluid tank assembly.

(10) Remove the vent tube.

(a) On the bottom of the wing under the fluid tank, remove the nut from the vent tube outlet fitting.

(b) Loosen the vent line coupling.

(c) Carefully disconnect the two sections of the vent tube.

(11) Remove the outlet tube.

(a) Remove the safety wire on the outlet fitting nut.

(b) Loosen the nut on the outlet fitting.

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(c) Carefully remove the tube from the tank.

(d) Put caps on all openings and tube ends to keep FOD out of the fluid system.

(e) Remove the seal from the outlet tube and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(12) Carefully move the fluid tank from the wing and out of the false rib.

B. Install the Anti-Ice Fluid Tank (Refer to Figure 401).

CAUTION: When you install the fluid tank in its position make sure that the vent line, and the fluid quantity harness stay in the tank indent area. If this is not done damage to the components can occur.

(1) Put the fluid tank assembly through the false rib and into position in the lower inboard wing.

(2) Identify and connect the tank fluid level sender electrical connector (C6) to the equipment pack electrical connector (JC103).

(3) Install the fluid tank filer tube.

(a) Screw the filler tube flange in the filler tube assembly.

(b) Install the six filler tube flange screws.

(c) Seal the edge of the filler tube flange with U064042 sealant.

(4) Install the outlet tube.

(a) Remove the caps from the tubing.

(b) Install new seals at the tank outlet fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

1 Make sure that the seal touches the connector olive.

(c) Carefully tighten the outlet fitting nut.

(d) Safety all the tube nuts. Refer to Chapter 20, Safetying - Maintenance Practices.

(5) Install the vent tube.

(a) Remove the caps from the vent tube and the airplane vent tube fitting.

(b) Insert the outlet section of the vent tube in the vent tube coupling.

(c) Put the vent line stud fitting through the airplane skin.

(d) Carefully tighten the vent tube coupling.

(e) Install the nut on the vent tube outlet stud.

(f) Where necessary, attach vent tube with a tie-wrap.

(6) Install the fuel system access panel.

(7) Install the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.

(8) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

(9) Do a test of the TKS system. Refer to TKS Anti-Ice System (Inadvertent) - Adjustment/Test.

(10) Do the panel purge and test procedures. Refer to TKS Anti-Ice Leading Edge Porous Panel - Adjustment/Test.

(11) Remove external electrical power from the airplane.

4. Strainer Assembly Removal/Installation

A. Remove the Strainer Assembly (Refer to Figure 402).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the TKS circuit breaker.

(5) Remove the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.

(6) Identify the correct strainer assembly and flow direction arrow installation and record the direction of the arrow.

(7) Remove the tubing from each end of the strainer assembly.

(a) Remove the safety wire from each of the two strainer assembly tube fitting nuts.

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(b) Loosen the tube fitting nuts.
(c) Remove the tubes from each end of the strainer assembly.
(d) Remove the seal from each tube and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
(e) Put caps on the openings and tube ends to keep FOD out of the fluid system.
(8) Remove the strainer assembly from the airplane.
(9) If necessary, inspect the strainer. Refer to Inspect/Clean Strainer Assembly in this section.

B. Install the Strainer Assembly (Refer to Figure 402).
(1) Put the strainer assembly in its correct position.
(a) Make sure the flow direction arrow is installed as recorded when it was removed.
(b) Make sure that the strainer assembly is installed so the footwell can be installed again and the fluid tank vent tube is not damaged.
(2) Install the tubing to each end the strainer assembly.
(a) Remove caps on the openings and tube ends.
(b) Install new seals on the tubes. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
(c) Install the tubes in the ends of the strainer assembly.
(d) Tighten the fitting nuts at each end of the strainer assembly and safety with wire. Refer to Safetying - Maintenance Practices.
(3) Use tie wraps to install the strainer assembly to prevent chaffing.
(4) Install the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.
(5) Engage the TKS circuit breaker.
(6) If necessary to do the strainer inspection, refer to Inspect/Clean Strainer Assembly in this section.

5. Inspect/Clean Strainer Assembly

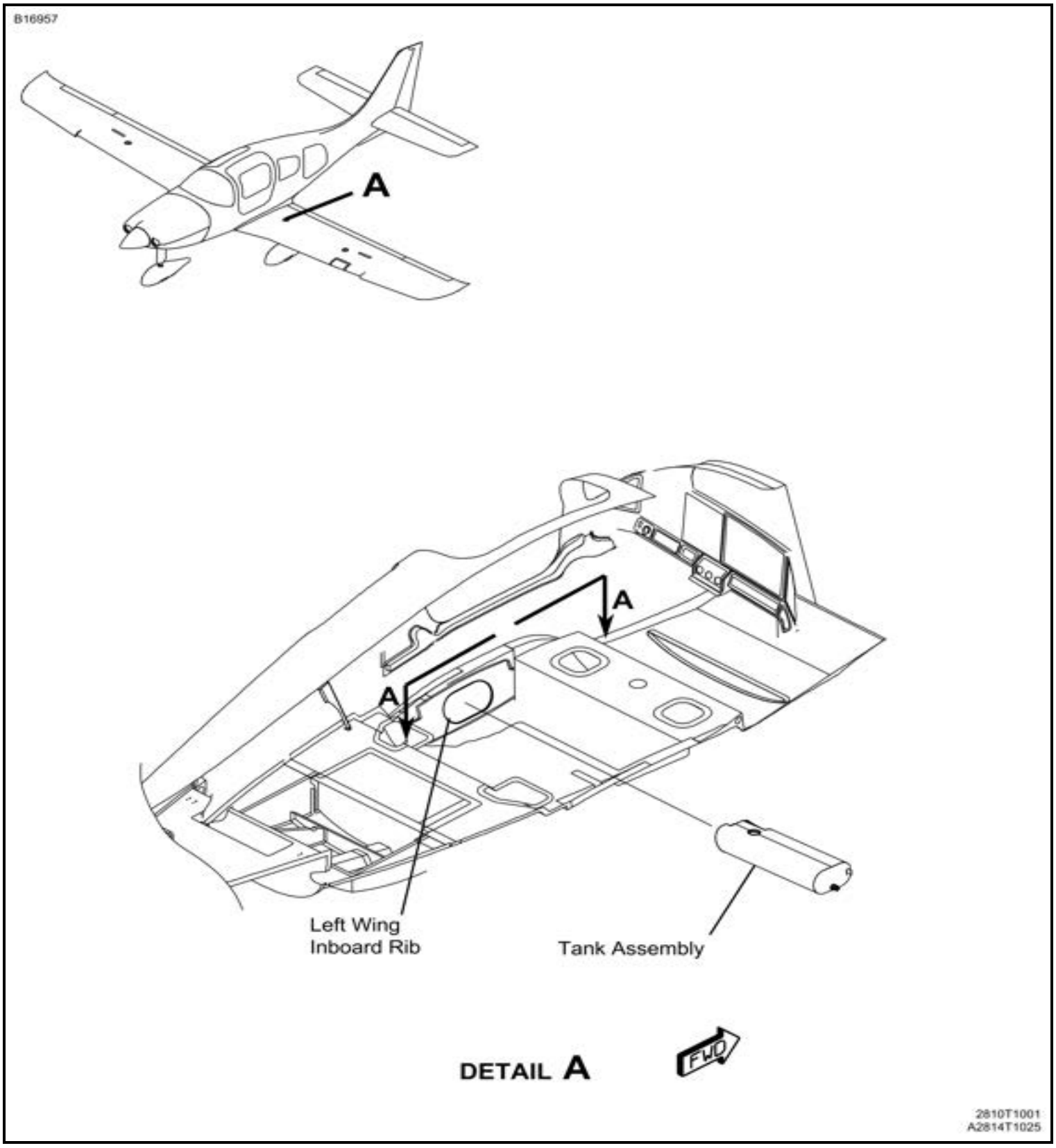
A. Disassemble the Strainer Assembly (Refer to Figure 402).
(1) Remove the strainer assembly from the airplane. Refer to Strainer Assembly Removal/Installation in this section.
(2) Remove the strainer from the housing.
(a) Remove the safety wire from strainer fitting.
(b) Loosen the strainer fitting.
(c) Remove the strainer from the housing.
(d) Remove the old O-ring from the strainer and discard.

B. Inspect and Clean the Strainer Assembly (Refer to Figure 402).
(1) Examine the screen for unwanted materials.
(a) Clean the screen thoroughly with water to remove all unwanted materials.
(b) Air dry the strainer.
(2) Examine the interior of the housing for unwanted materials.
(a) Flush the housing thoroughly with water to remove all unwanted materials.
(b) Air dry the strainer assembly.

C. Assemble the Strainer Assembly (Refer to Figure 402).
(1) Install a new O-ring on the strainer.
(2) Screw the strainer into the housing and tighten with your fingers.
(3) Tighten the strainer and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(4) Install the strainer assembly in the airplane. Refer to Strainer Assembly Removal/Installation in this section.

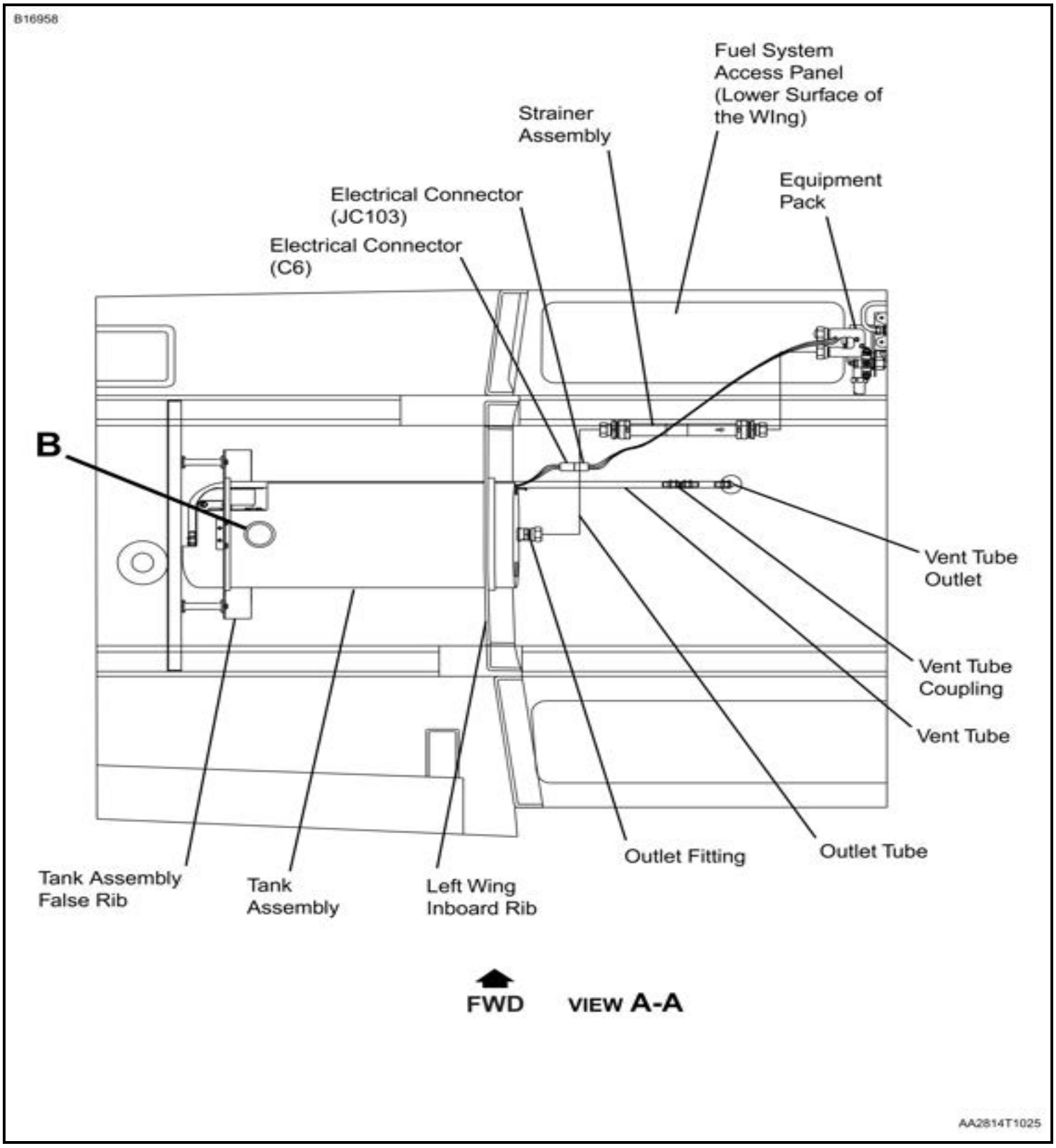
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Figure 401 : Sheet 1 : Fluid Tank Installation



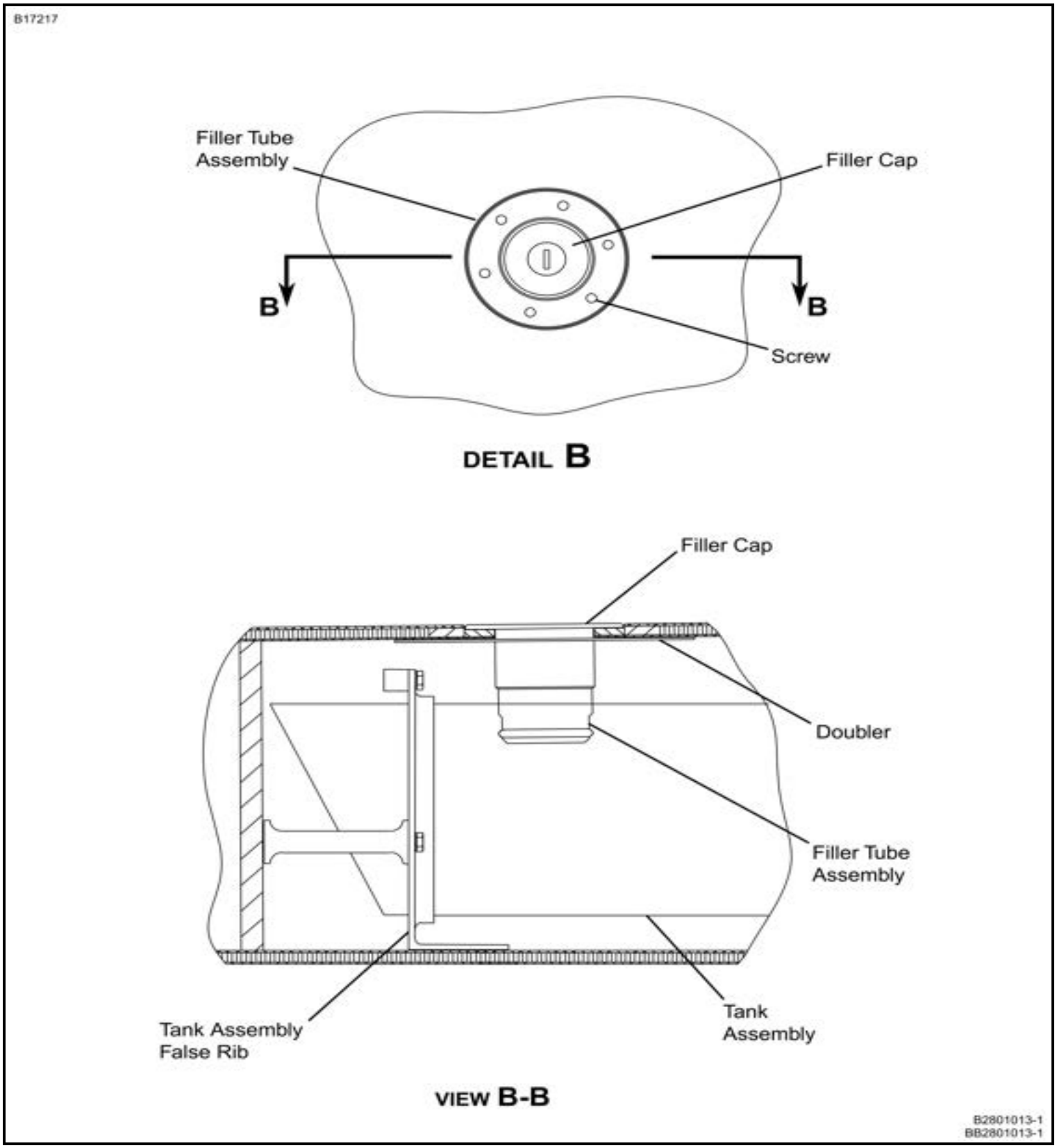
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Figure 401 : Sheet 2 : Fluid Tank Installation



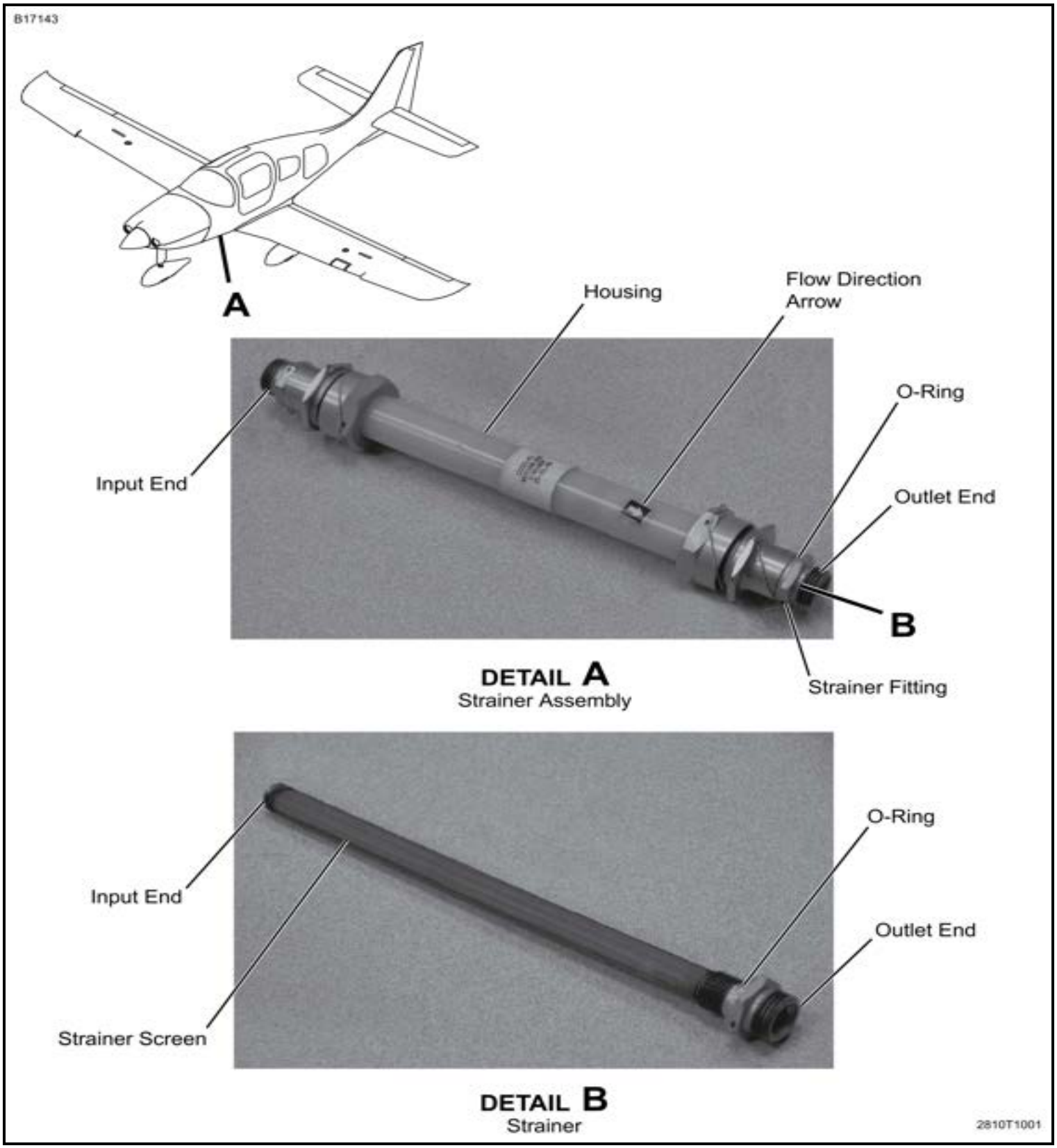
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Figure 401 : Sheet 3 : Fluid Tank Installation



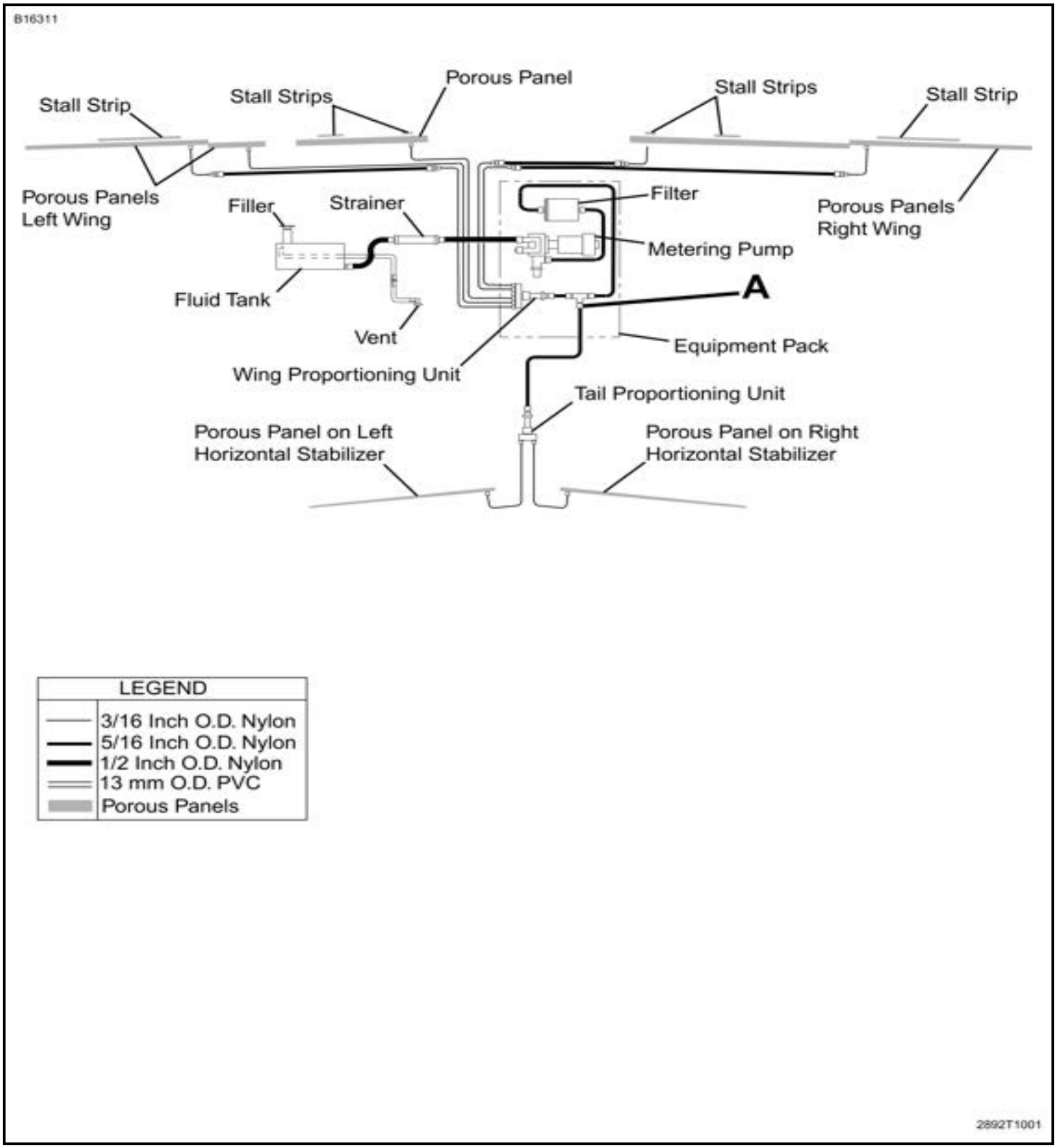
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Figure 402 : Sheet 1 : Fluid Strainer Installation



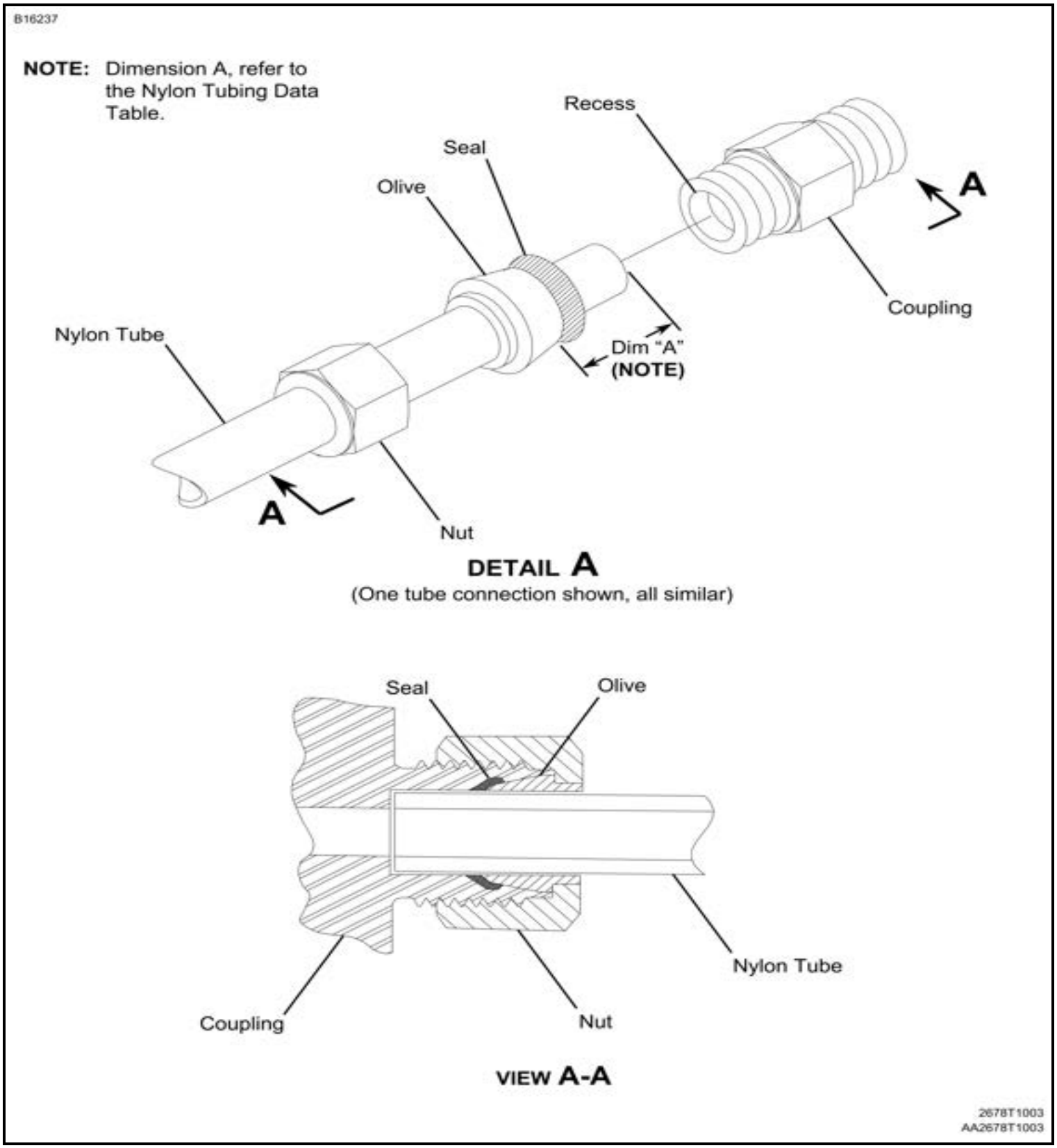
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM EQUIPMENT PACK (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) equipment pack. The equipment pack is installed in the lower forward fuselage area. To get access to the equipment pack, remove the fuel system access panel. The equipment pack includes the wing proportioning unit, filter pack, and metering pump.

B. Operate the metering pump each month, or when necessary, in the NORM mode to remove the air from the fluid system.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Anti-Ice System Equipment Pack Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the TKS Equipment Pack (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Disengage the TKS circuit breaker.

(5) Remove the fuel system access panel on the lower surface of the wing.

(6) Disconnect the equipment pack electrical connector (C4) from the airplane wiring electrical connector (PF101).

(7) Remove the wing proportioning unit outlet tubes.

(a) Identify the five outlet tubes connected to the wing proportioning unit.

NOTE: Outlet number 4 of the wing proportioning unit is not used and is capped.

(b) Remove the safety wire from each nut of the proportioning units outlet tube fittings.

(c) Loosen the tube fitting nut.

(d) Disconnect the tubes from the proportioning unit.

(e) Remove and discard the old seals from the proportioning unit outlet tubes.

(f) Put caps on all openings and tube ends to keep FOD out of the fluid system.

(8) Remove the tail proportioning unit supply tube.

(a) Remove the safety wire from the tail proportioning unit supply fitting nut.

(b) Disconnect the tail proportioning supply tube from the supply fitting.

(c) Remove and discard the old seal from the tail proportioning supply tube.

(d) Put caps on all openings and tube ends to keep FOD out of the fluid system.

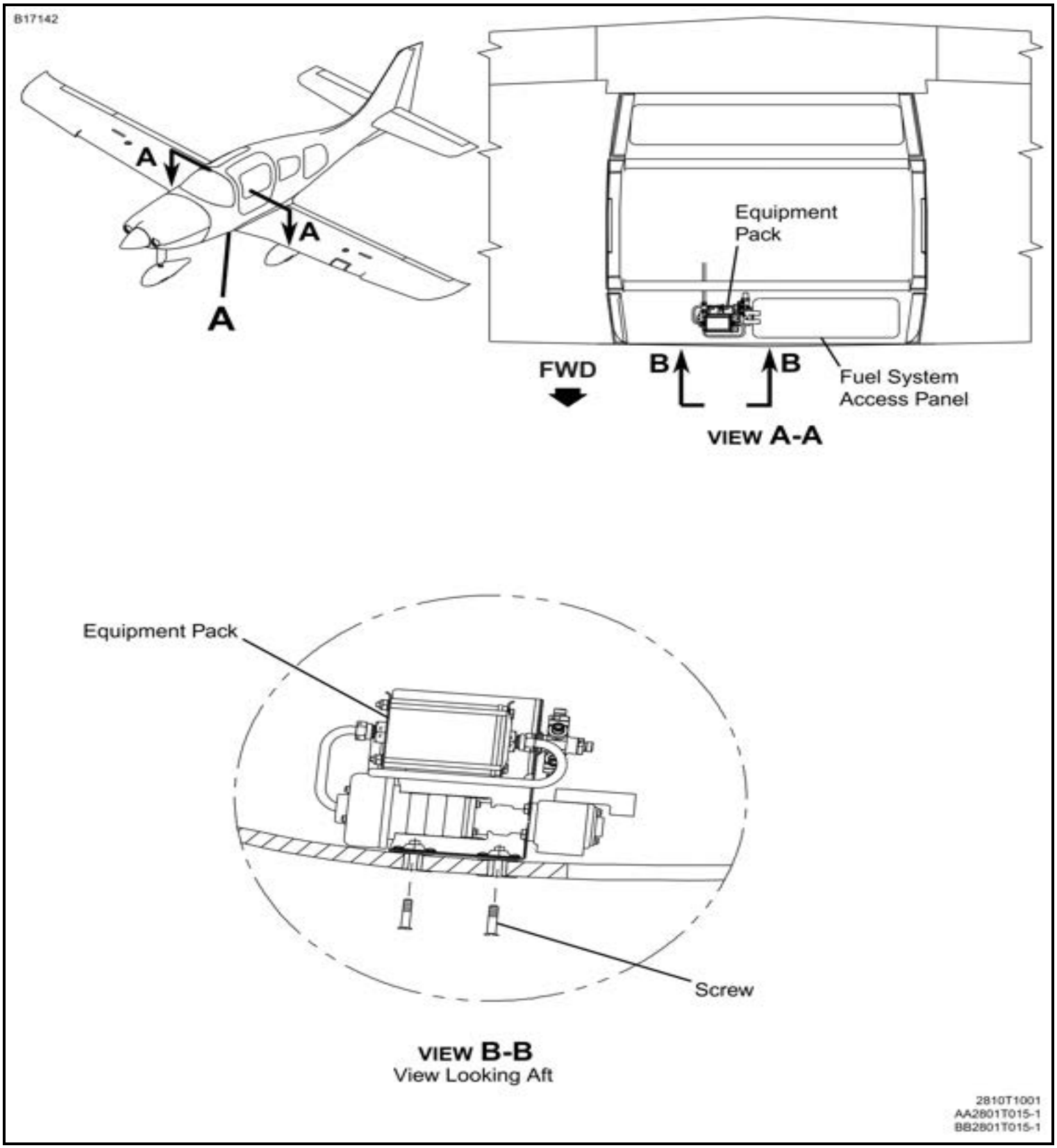
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(9) Remove the metering pump inlet tube.
  (a) Remove the safety wire from the metering pump inlet tube fitting nut.
  (b) Loosen the inlet tube fitting nut and remove the inlet tube from the metering pump.
  (c) Remove and discard the old seal from the metering pump inlet tube.
  (d) Put caps on all openings and tube ends to keep FOD out of the fluid system.
(10) Remove the four screws that attach the equipment pack to the lower fuselage.
(11) Remove the equipment pack from the airplane.

B. Install the TKS Equipment Pack (Refer to Figure 401).
(1) Put the equipment pack in its correct position in the lower fuselage.
  (a) Install the four screws that attach the equipment pack to the fuselage.
(2) Install the metering pump inlet tube.
  (a) Remove the cap from the metering pump inlet tube.
  (b) Install a new seal on the metering pump input tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.
  (c) Put the metering pump input tube in its correct position on the metering pump fitting.
  (d) Tighten the metering pump inlet tube fitting nut and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(3) Install the tail proportioning unit supply tube.
  (a) Remove the cap from the tail proportioning unit supply tube.
  (b) Install a new seal on the tail proportioning unit supply tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.
  (c) Put the tail proportioning supply tube in its correct position on the supply fitting.
  (d) Tighten the supply fitting nut and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(4) Install the wing proportioning unit output tubes.
  (a) Remove the caps from the wing proportioning unit output tubes.
  (b) Install new seals on the proportioning unit output tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.
  (c) Identify and put the tubes in their correct position on the proportioning units tube fittings.
    NOTE: Outlet number 4 of the wing proportioning unit is not used and is capped.
  (d) Tighten each of the proportioning units outlet tube fitting nuts and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(5) Connect the equipment pack electrical connector (C4) to the airplane wiring electrical connector (PF101).
(6) Install the fuel system access panel.
(7) Do a check of the TKS Anti-Ice System. Refer to TKS Anti-Ice System - Adjustment/Test.

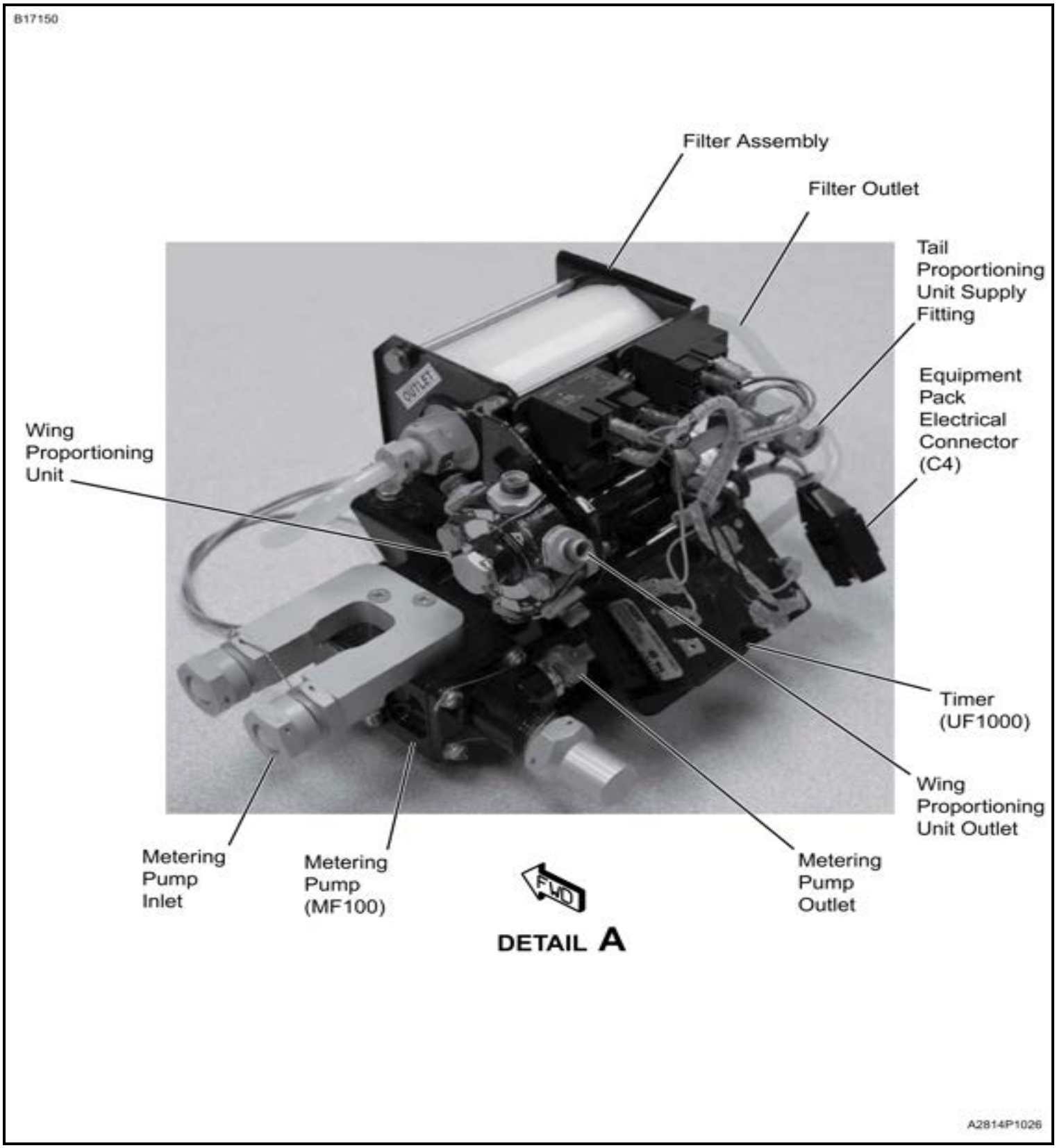
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Figure 401 : Sheet 1 : TKS Anti-Ice System Equipment Pack Installation



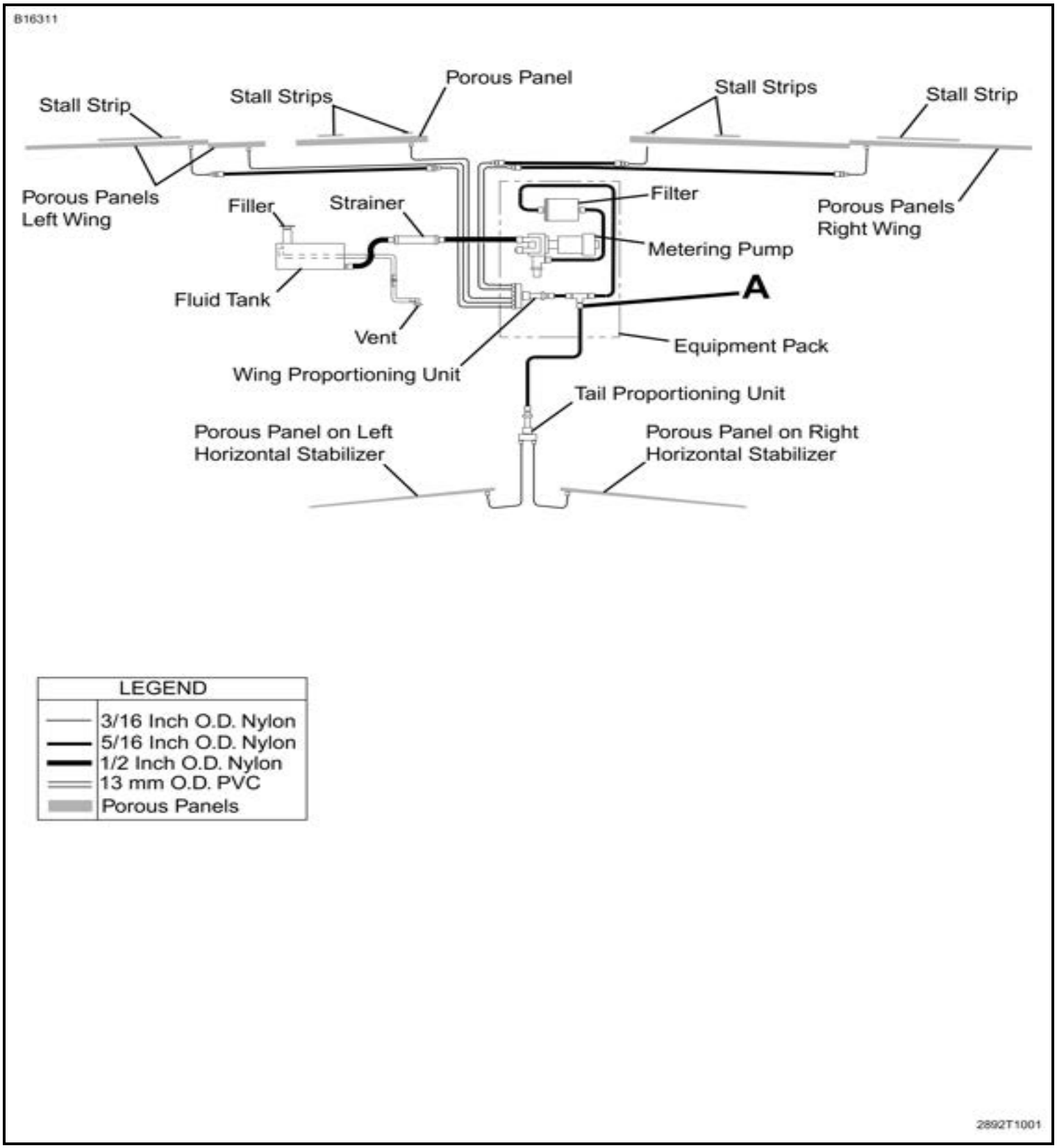
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Figure 401 : Sheet 2 : TKS Anti-Ice System Equipment Pack Installation



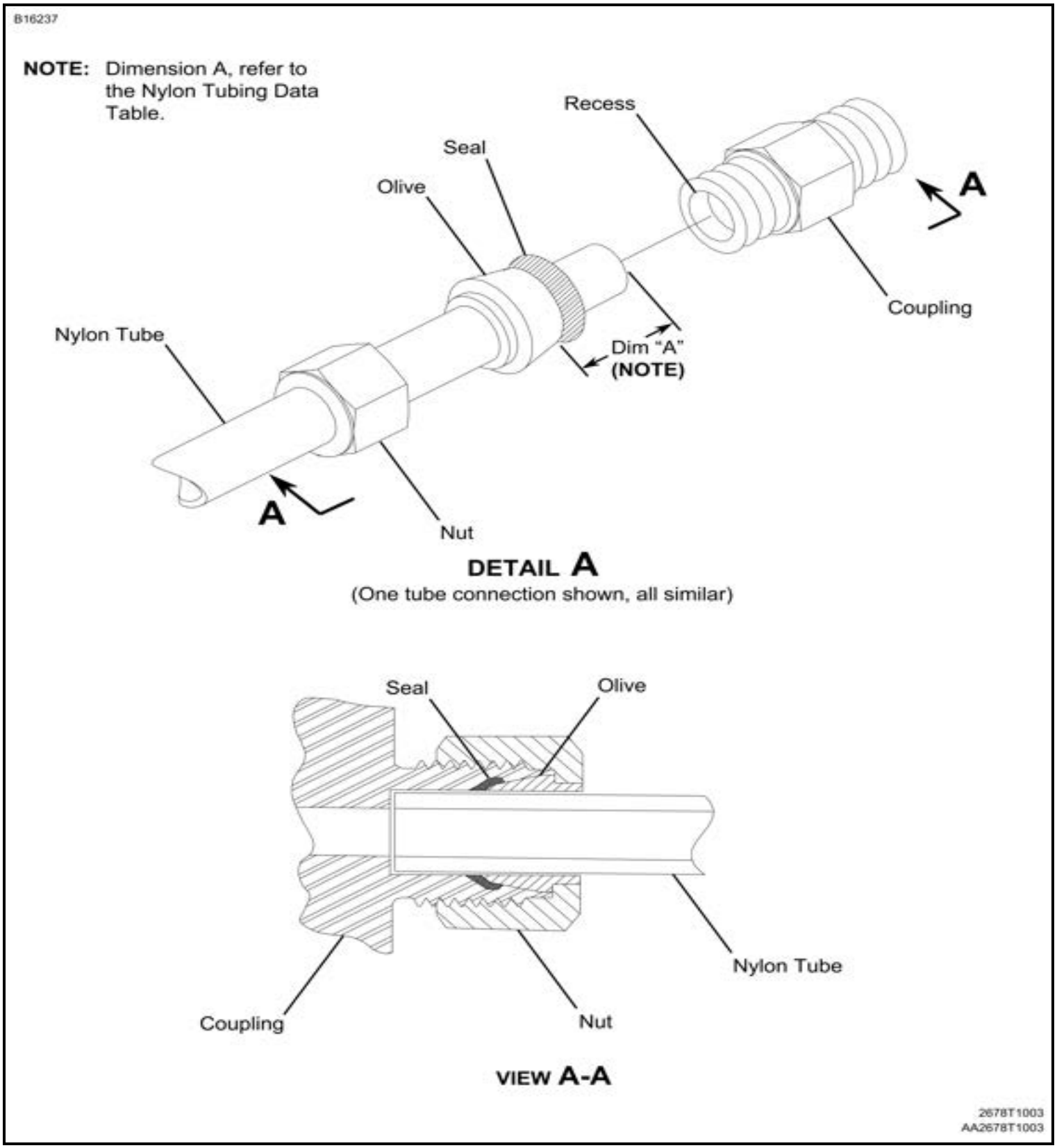
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM METERING PUMP (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) Metering Pump.

B. The equipment pack must be removed from the airplane to remove and replace the metering pump.

C. Operate the metering pump each month, or when necessary, in the NORM mode to remove the air from the fluid system.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Metering Pump Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Metering Pump (MF100) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the TKS circuit breaker.

(4) Remove the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(5) Identify and disconnect the electrical wiring connectors from the metering pump.

(6) Remove outlet tube from metering pump.

(a) Remove the safety wire from the outlet tube nut.

(b) Slowly loosen the nut and remove the outlet tube from the fitting.

(c) Remove and discard the old seal from the outlet tube.

(d) Put caps on all openings and tube ends to keep FOD out of the fluid system.

(7) Loosen the screws on the pump mounting clamps that attach the pump to the equipment pack bracket.

(8) Remove the pump from the equipment pack.

B. Install the Metering Pump (MF100) (Refer to Figure 401).

(1) Put the pump in its correct position in the pump bracket.

(2) Tighten the mounting clamp screws that attach the pump to the equipment pack bracket.

(3) Install the outlet tube to the metering pump.

(a) Remove the caps from the tube end.

(b) Install new seals on the outlet tube. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(c) Put the outlet tube in its correct position on the metering pump inlet fitting.

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(d) Carefully tighten the outlet tube fitting nut.

(e) Safety the outlet tube fitting nut. Refer to Chapter 20, Safetying - Maintenance Practices.

(4) Identify and connect the electrical wiring connectors to the metering pump.

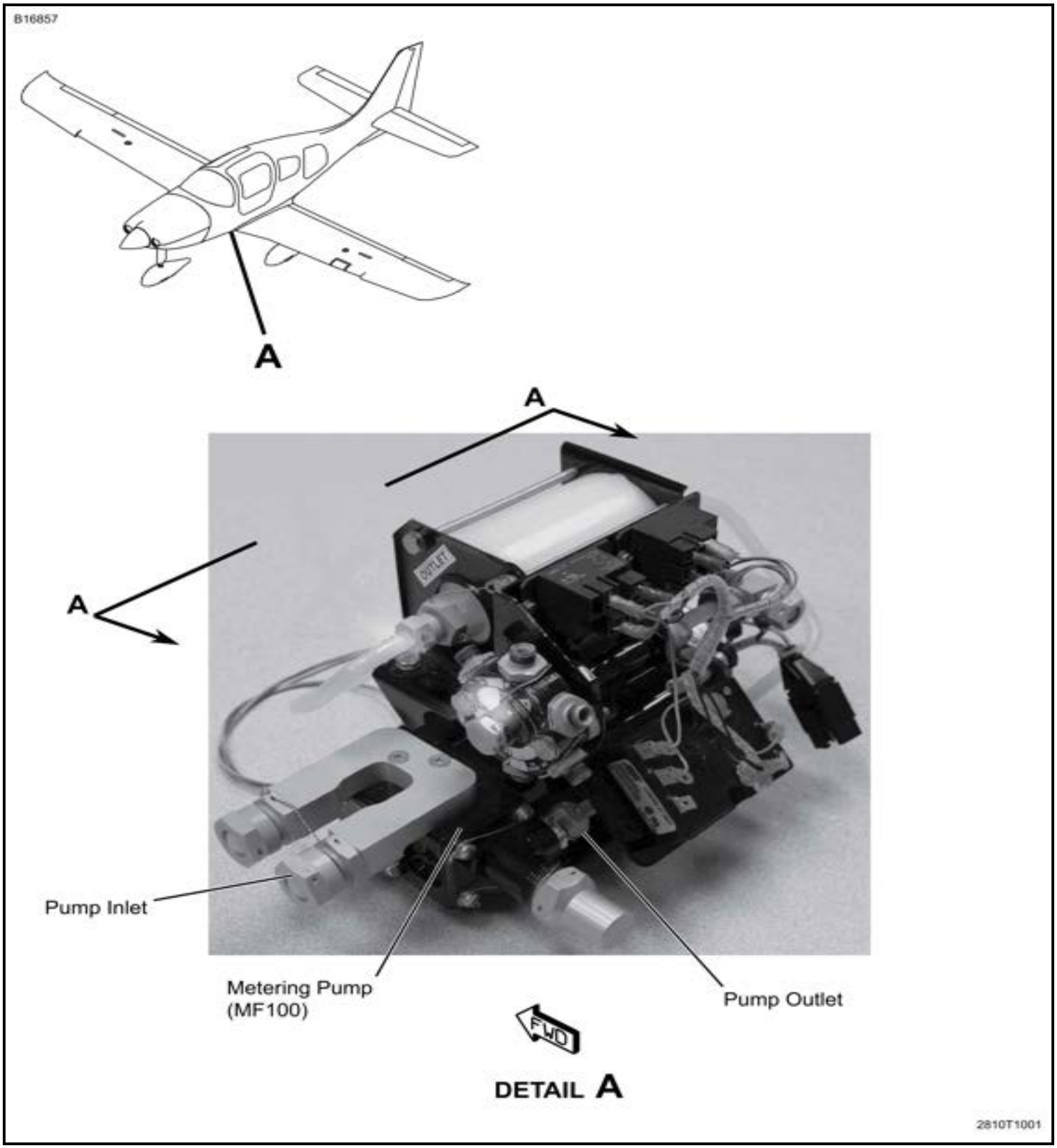
(5) Install the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(6) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(7) Do a check of the TKS system. Refer to the, TKS Anti-Ice System (Inadvertent) - Adjustment/Test.

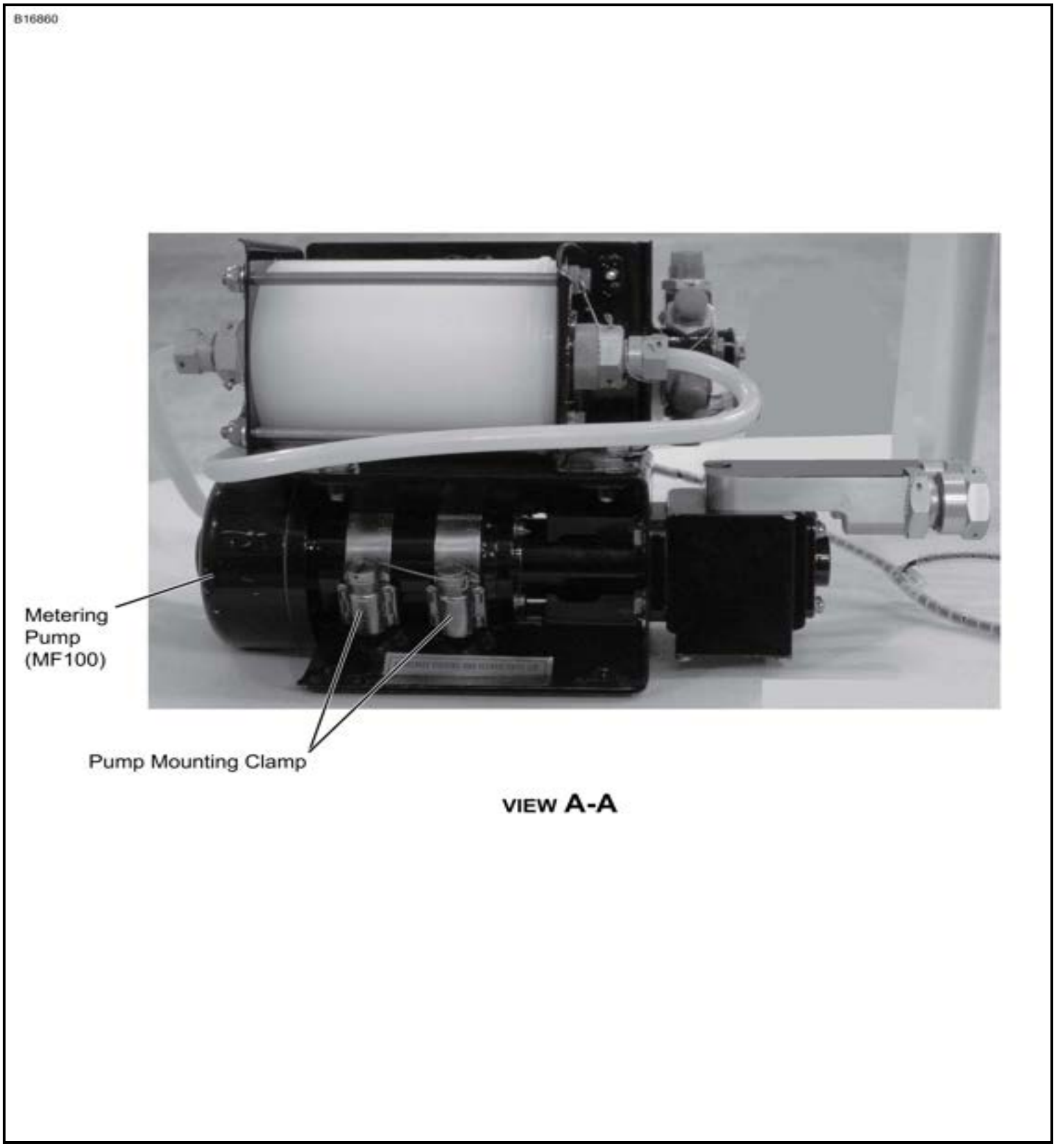
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Figure 401 : Sheet 1 : Metering Pump Installation



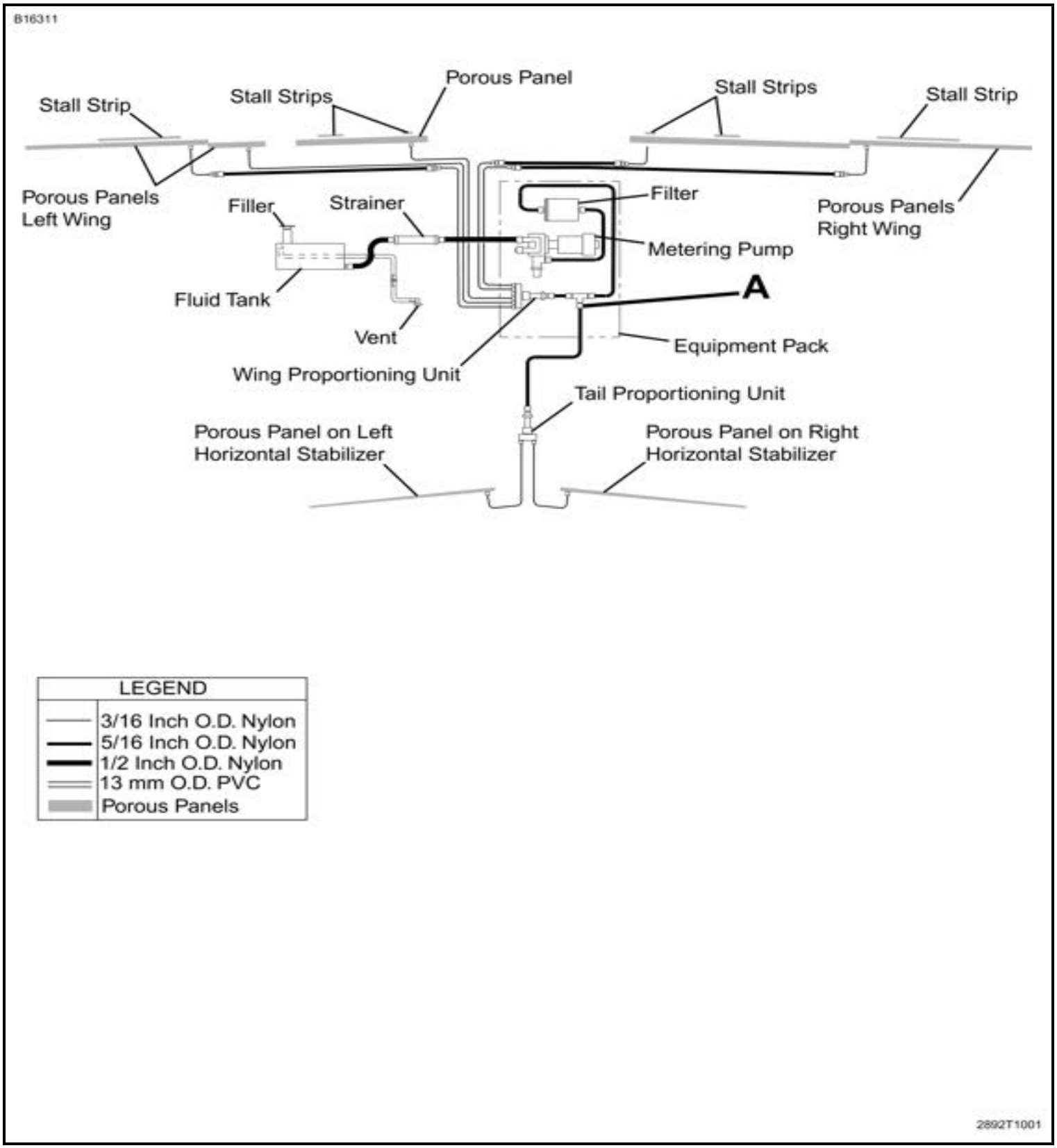
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Figure 401 : Sheet 2 : Metering Pump Installation



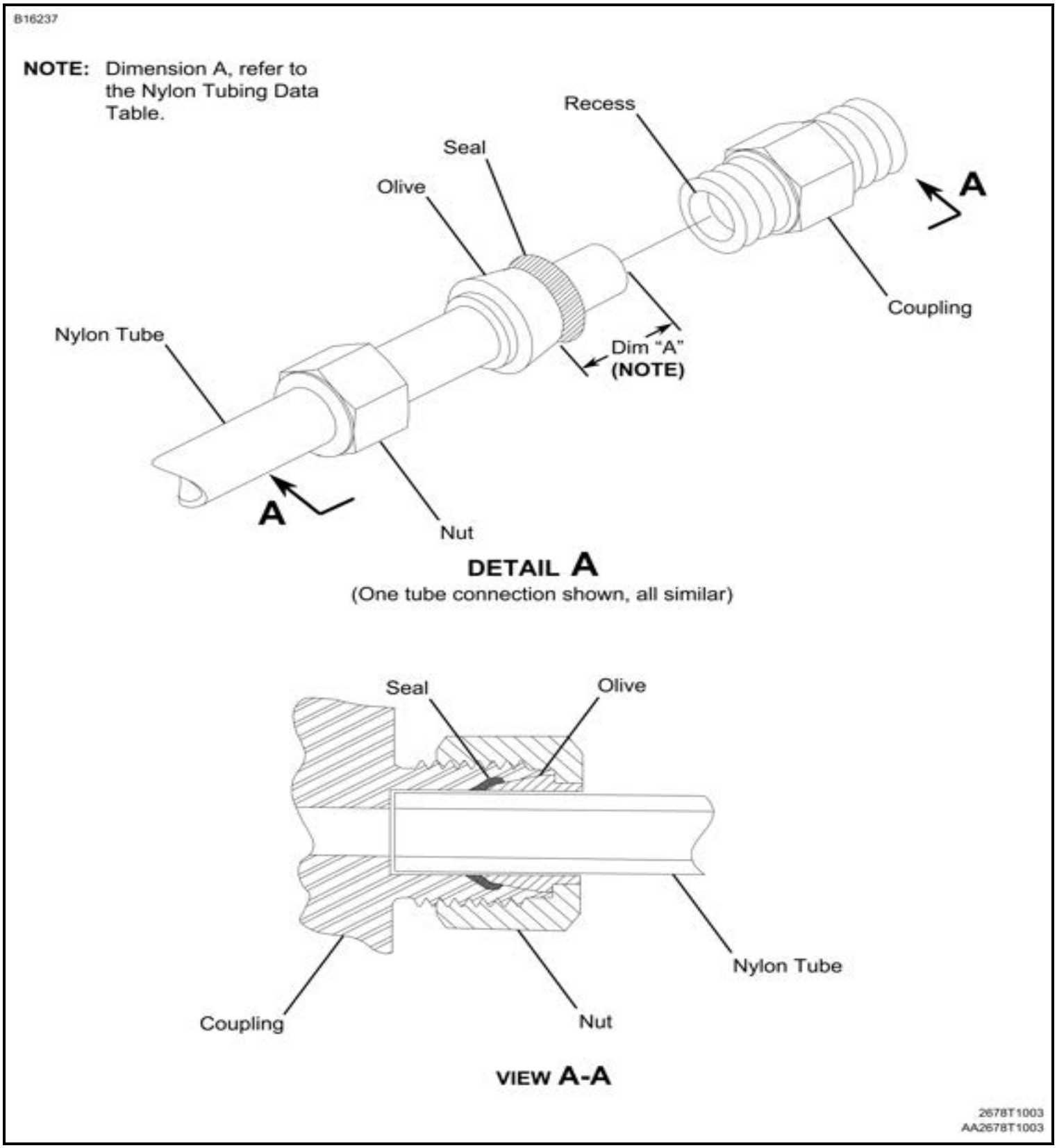
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM PROPORTIONING UNITS (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) proportioning units.

B. The wing proportioning unit is installed on the equipment pack. The tail proportioning unit is installed aft of the baggage compartment aft bulkhead panel.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Wing Proportioning Unit Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

A. Remove the Wing Proportioning Unit (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the TKS circuit breaker.

(4) Remove the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(5) Remove the inlet tube from the proportioning unit.

(a) Remove the safety wire from the inlet tube fitting.

(b) Slowly loosen the inlet tube fitting and remove the inlet tube.

(c) Put a cap on the tube end to keep FOD out of the fluid system.

(d) Remove the seal from the inlet tube and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(6) Remove the outlet tubes from the proportioning unit.

(a) Identify the each of the five outlet tubes and the fittings they attach to.

(b) Remove the safety wire from each of the outlet tube fittings.

(c) Slowly loosen and disconnect each of the outlet tubes.

(d) Remove each of the outlet tubes from the proportioning unit.

(e) Put caps on the outlet tube ends to keep FOD out of the fluid system.

(f) Remove the seals from the outlet tubes and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(7) Remove the two bolts and washers that attach the proportioning unit to the bracket on the equipment pack.

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(8) Remove the grounding jumper from the bolt.
(9) Remove the proportioning unit from the equipment pack.
(10) Remove the nut and nylon ball from port four of the removed proportioning unit.

B. Install the Wing Proportioning Unit (Refer to Figure 401).
(1) Install the nylon ball and nut from the removed proportioning unit on port four of the new unit.
(2) Put the proportioning unit in its correct position on the bracket.
(3) Put the grounding jumper on the correct bolt to attach it to the bracket.
(4) Install the two bolts and washers that attach the proportioning unit to the bracket on the equipment pack.
(5) Attach the inlet tube to the proportioning unit.
(a) Remove the cap from the inlet tube.
(b) Install new seal on the inlet tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.
1 Make sure that the seal touches the inlet tube olive.
(c) Put the inlet tube in its correct position on the proportioning unit inlet fitting.
(d) Carefully tighten the nut on the inlet tube fitting and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(6) Attach the outlet tubes to the proportioning unit.
(a) Install new seals on the outlet tubes. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
1 Make sure on each of the outlet tubes that the seal touches the outlet tube olive.
(b) Identify each of the five outlet tubes and put them in their correct position on the outlet fittings of the proportioning unit.
(c) Carefully tighten the nuts on the outlet tube fittings and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(7) Install the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation
(8) Engage the TKS circuit breaker.
(9) Apply external electrical power on the airplane.
(10) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the ON position.
(11) Put the ANTI-ICE MAX/NORM switch (SI018) to the NORM position.
(a) Make sure that there is no fluid leakage from the proportioning unit fittings.
(12) Put the ANTI-ICE MAX/NORM switch to the OFF position.
(13) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the OFF position.
(14) Remove external electrical power from the airplane.
(15) Do a test of the wing porous panels. Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.
(16) If necessary, do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

4. Tail Proportioning Unit Removal/Installation

A. Remove the Tail Proportioning Unit (Refer to Figure 401).
(1) Remove external electrical power from the airplane.
(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.
(3) Disengage the TKS circuit breaker.
(4) Remove rear cabin access panels as necessary. Refer to Chapter 25, Access Panels - Maintenance Practices.
(5) Remove the inlet tube from the proportioning unit.
(a) Remove the safety wire from the inlet tube fitting.
(b) Slowly loosen and disconnect the inlet tube fitting.
(c) Put a cap on the tube end to keep FOD out of the fluid system.
(d) Remove the seal from the inlet tube and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices,

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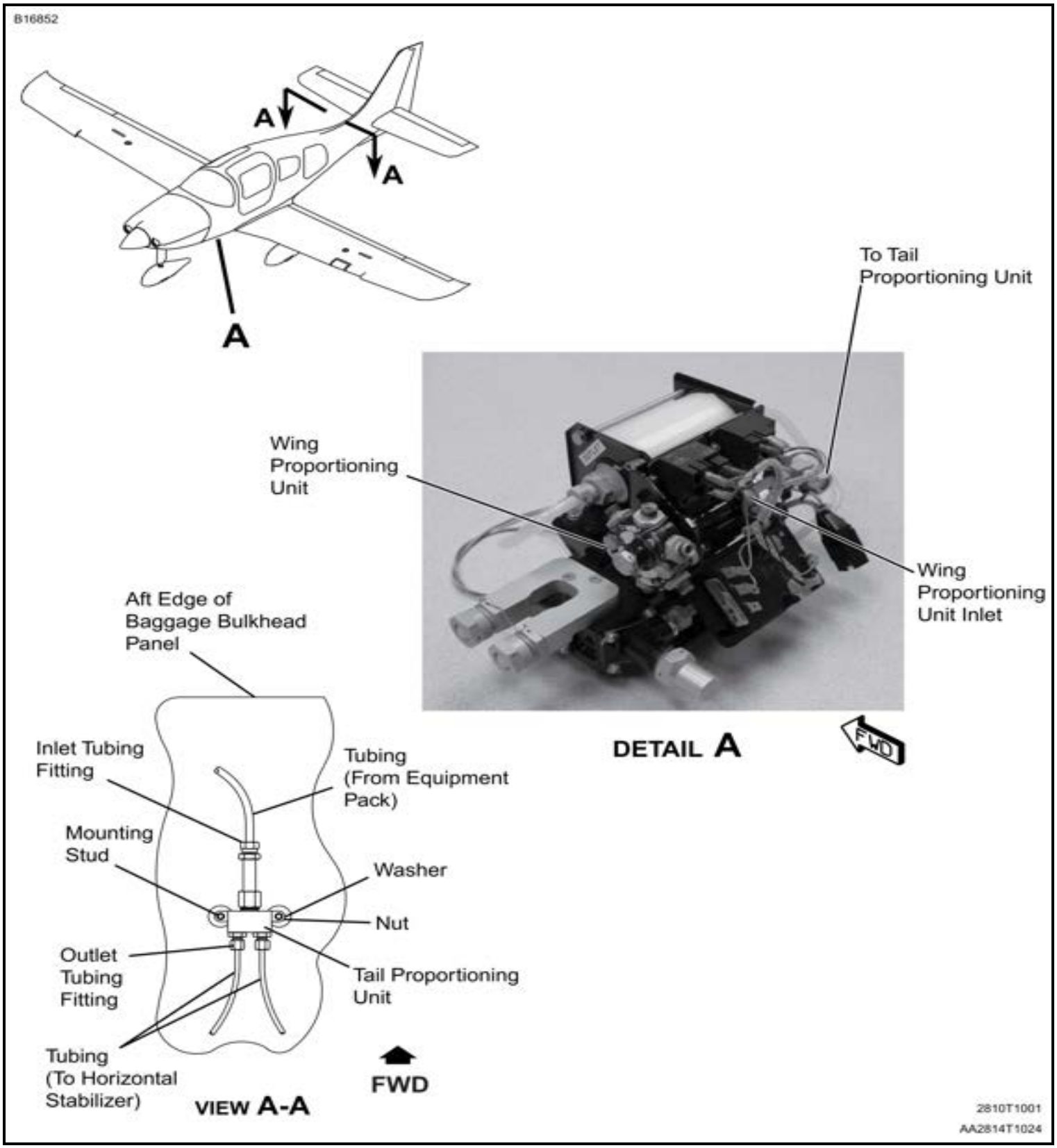
Figure 201.

(6) Remove the outlet tubes from the proportioning unit.
  (a) Identify each of the two outlet tubes and the fittings they attach to.
  (b) Slowly loosen and disconnect the outlet tubes.
  (c) Remove the outlet tubes from the proportioning unit.
  (d) Put caps on the outlet tubes ends to keep FOD out of the fluid system.
  (e) Remove the seals from the outlet tube and discard. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
(7) Remove the two nuts and washers that attach the proportioning unit to the mounting studs.
(8) Remove the proportioning unit from the airplane.

B. Install the Tail Proportioning Unit (Refer to Figure 401).
(1) Put the proportioning unit in its correct position on the mounting studs.
  (a) Install the two nuts and washers that attach the proportioning unit to the mounting studs.
(2) Attach the outlet tubes to the proportioning unit.
  (a) Remove the caps from the outlet tubes.
  (b) Install new seals on each of the two outlet tubes. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
    1 Make sure on each of the outlet tubes that the seal touches the outlet tube olive.
  (c) Identify each of the two the outlet tubes and put them in their correct position on the outlet fittings of the proportioning unit.
  (d) Tighten the nuts on the outlet tube fittings and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(3) Attach the inlet tube to the proportioning unit.
  (a) Install a new seal on the inlet tube. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
    1 Make sure that the seal touches the inlet tube olive.
  (b) Put the inlet tube in its correct position on the proportioning unit inlet fitting.
  (c) Tighten the nut on the inlet tube fitting and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.
(4) Engage the TKS circuit breaker.
(5) Put external electrical power on the airplane.
(6) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the ON position.
(7) Put the ANTI-ICE MAX/NORM switch to the NORM position.
  (a) Make sure that there is no fluid leakage from the proportioning unit fittings.
(8) Installed removed rear cabin access panels as necessary. Refer to Chapter 25, Access Panels - Maintenance Practices.
(9) Put the ANTI-ICE MAX/NORM switch to the OFF position.
(10) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the OFF position.
(11) Remove external electrical power from the airplane.
(12) Do a test of the horizontal stabilizer porous panels. Refer to TKS Anti-Ice System Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.
(13) If necessary, do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

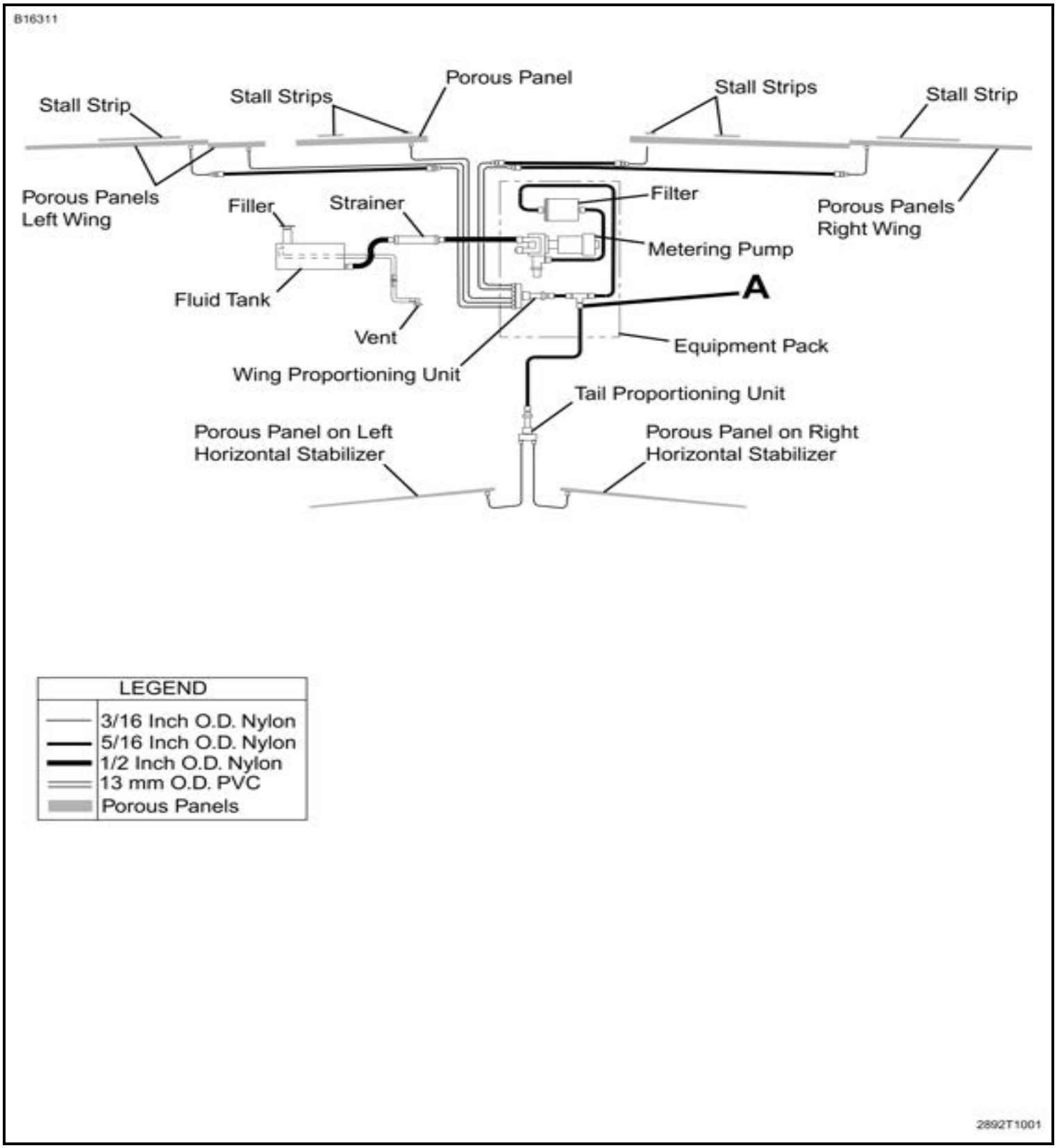
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Figure 401 : Sheet 1 : Proportioning Unit Installation



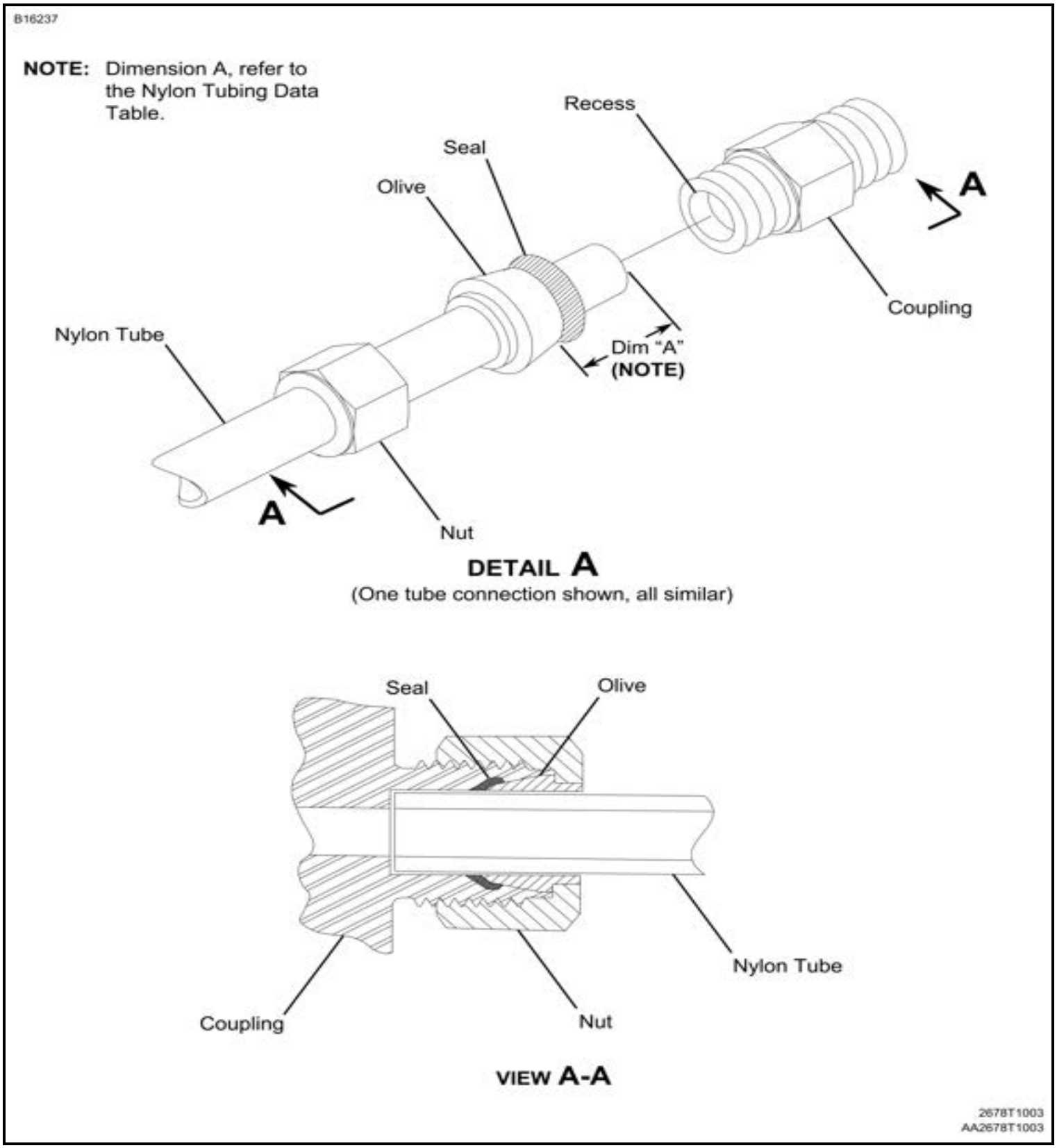
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM FILTER ELEMENT (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) Filter Element.

B. The TKS Anti-Ice System Equipment Pack must be removed to remove and replace the filter.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Filter Element Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

NOTE: You can fabricate a fluid collector system and install it on and below the porous panels, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

A. Remove the Filter Element (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the TKS circuit breaker.

(5) Remove the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(6) Remove the filter outlet tube.

(a) Remove the safety wire from the outlet tube nut.

(b) Loosen the outlet tube nut and remove the tube.

(c) Remove and discard the old seal from the outlet tube.

(d) Put caps on all openings and tube ends to keep FOD out of the fluid system.

(7) Remove the filter inlet tube.

(a) Remove the safety wire from the input tube nut.

(b) Loosen the inlet tube nut and remove the tube.

(c) Remove and discard the old seal from the inlet tube.

(d) Put caps on all openings and tube ends to keep FOD out of the fluid system.

(8) Remove the nut and washer that attaches the hose clamp to the inlet bracket.

(9) Remove the four bolts, washers, two lock wire tabs, and remaining three nuts from the filter brackets.

(10) Remove the two bolts, and washers that attach the outlet bracket to the equipment pack.

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NOTE: For correct installation later identify and record the flow direction of the filter.

(11) Remove the filter from the input filter bracket.

(12) Use the correct procedure to discard the old filter element.

B. Install the Filter Element (Refer to Figure 401).

(1) Put the filter in its correct position in the inlet filter bracket.

(a) Make sure the filter bleed valve is installed in the upper hole on the inlet side of the bracket.

(2) Put the outlet filter bracket in its correct position on the equipment pack.

(3) Make sure the bonding strap is on the correct bolt.

(4) Install the two bolts and washers that attach the outlet filter bracket to the equipment pack.

(5) Install the four bolts and washers in the outlet bracket.

(6) Put the hose clamp on the correct bracket bolt.

(7) Install the washers, nuts, and the two lock wire tabs on the filter bracket bolts.

(8) Attach the filter inlet tube.

(a) Remove the cap from the inlet tube.

(b) Install a new seal on the input tube. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(c) Put the inlet tube on the filter inlet fitting.

(d) Carefully tighten the inlet tube nut and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.

(9) Attach the filter outlet tube.

(a) Remove the cap from the outlet tube.

(b) Install a new seal on the outlet tube. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(c) Put the outlet tube on the filter outlet fitting.

(d) Carefully tighten the outlet tube nut and safety with wire. Refer to Chapter 20, Safetying - Maintenance Practices.

(10) Install the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(11) Do the fluid tank servicing as necessary. Refer to Chapter 12, TKS Anti-Ice System - Servicing.

(12) Install a fluid collector system on the airplane.

(13) Apply external electrical power on the airplane.

(14) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the ON position.

(15) Engage the TKS circuit breaker.

(16) Put the ANTI-ICE MAX/NORM switch (SI018) to the NORM position.

(a) Make sure that there is no fluid leakage from the filter fittings.

(17) Do the fluid tank servicing as necessary. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

(18) Put the ANTI-ICE MAX/NORM switch to the OFF position.

(19) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the OFF position.

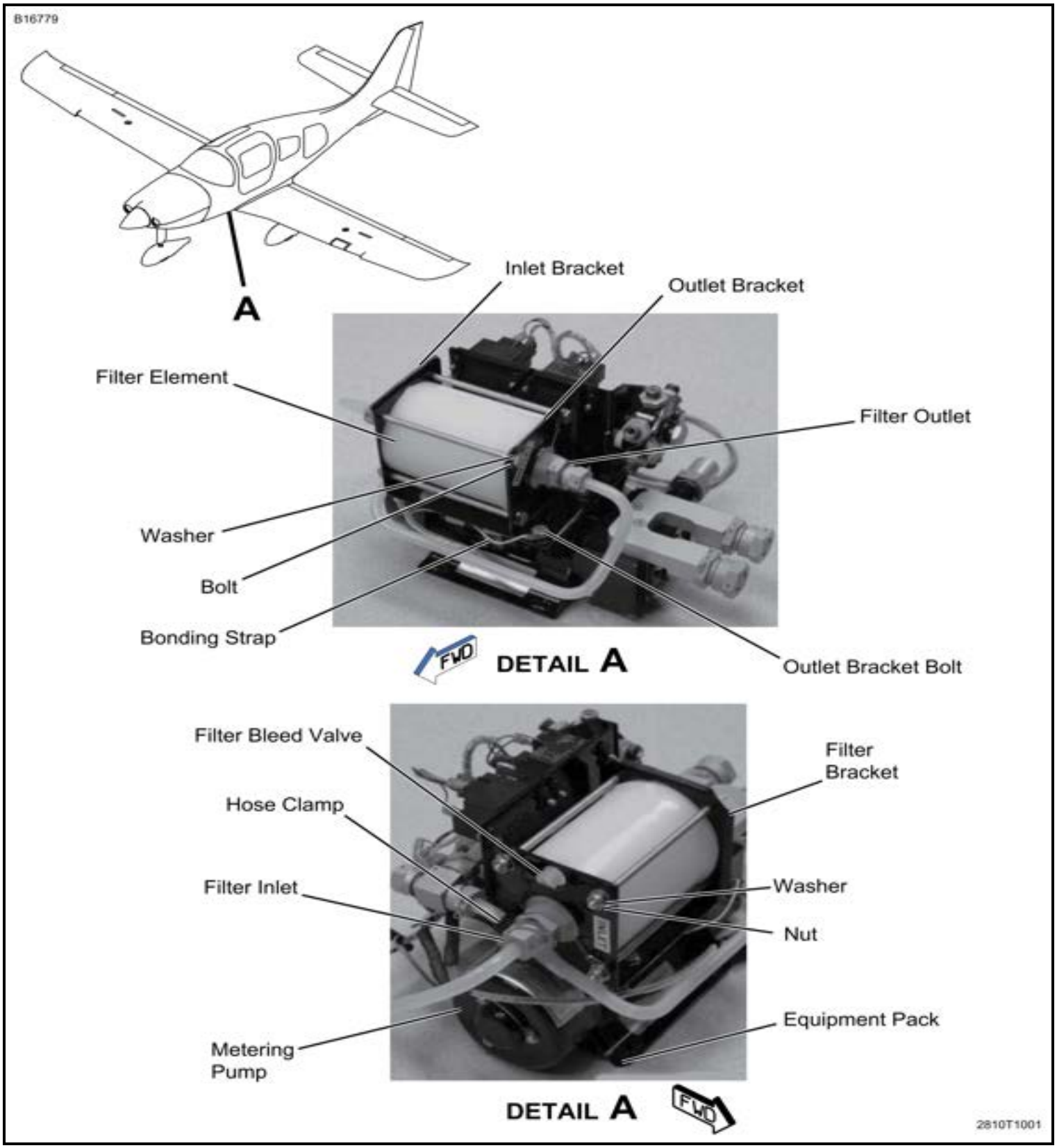
(20) Remove external electrical power from the airplane.

(21) If necessary, remove the fluid collector system from the airplane.

(22) Clean the floor and the airplane surfaces as necessary.

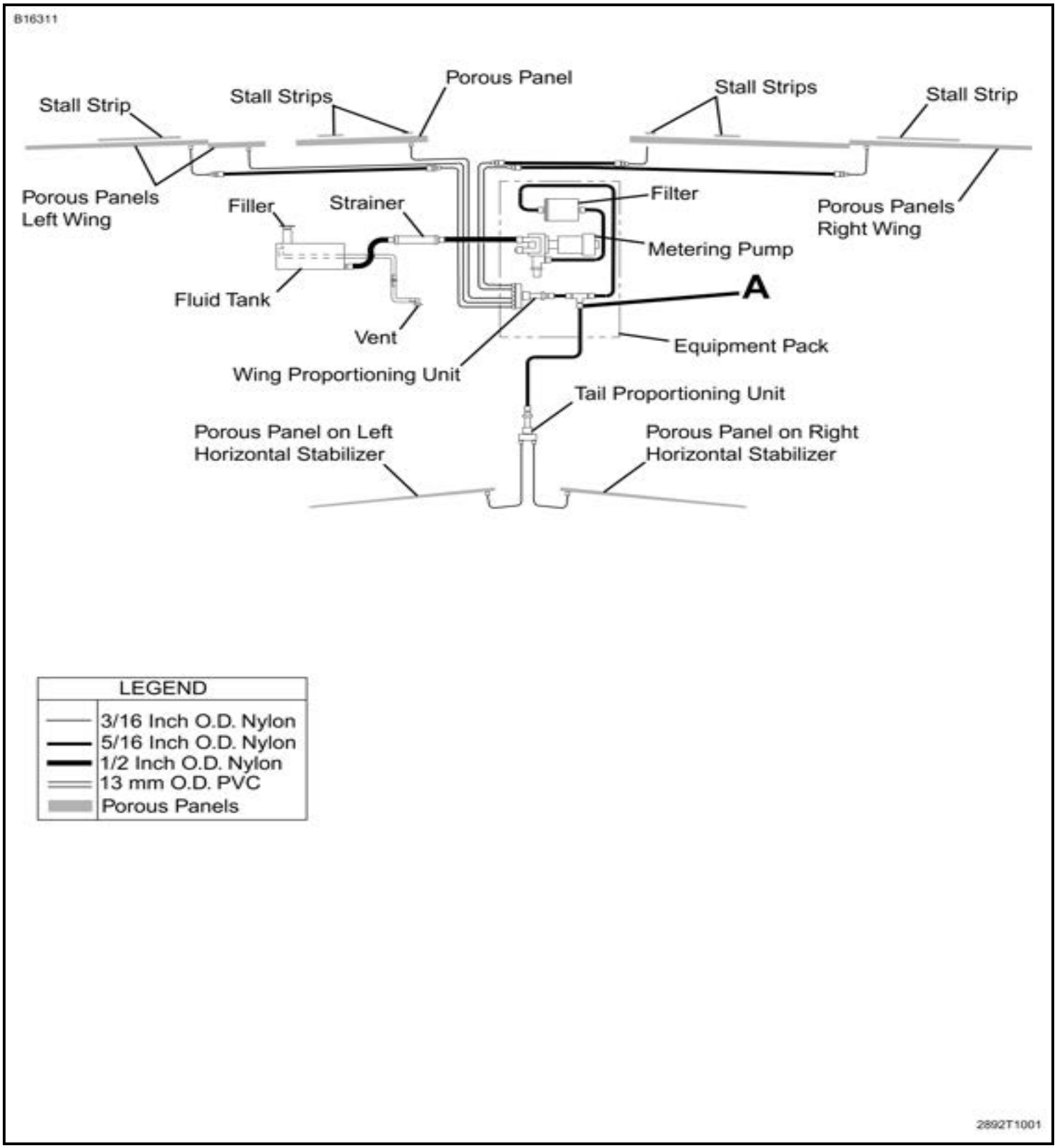
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Figure 401 : Sheet 1 : Filter Element Installation



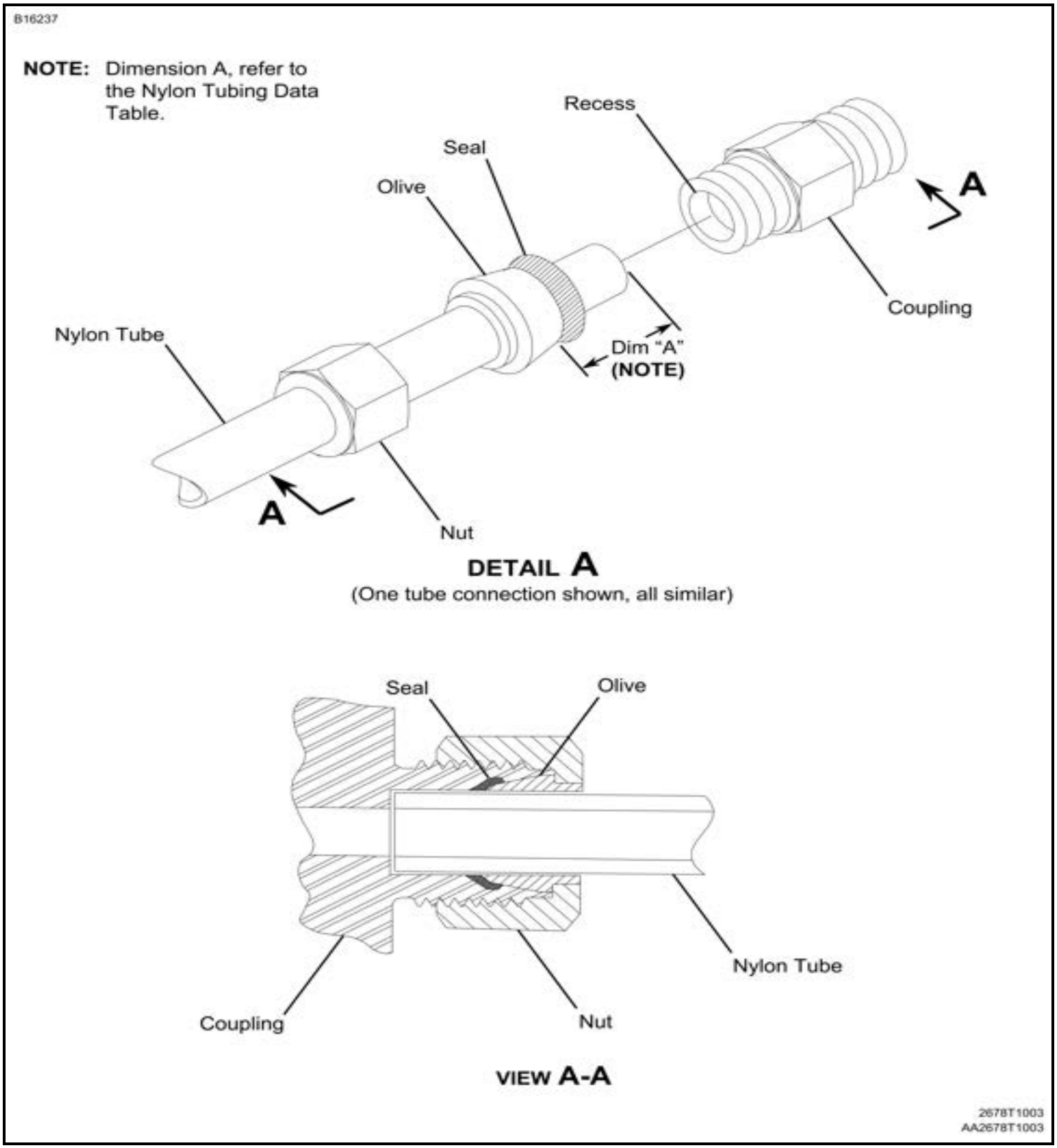
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM TIMER (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) timer.

B. The TKS anti-ice system equipment pack must be removed from the airplane to remove and replace the timer.

2. Tools and Equipment

A. None.

3. TKS Timer Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the TKS Timer (UF100) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the TKS circuit breaker.

(4) Remove the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(5) Identify and disconnect the electrical wiring connectors from the timer.

(6) Remove the bolts, nuts and washers that attaches the timer to the equipment pack.

(7) Remove the grounding jumper from the bolt.

(8) Remove the timer from the equipment pack.

B. Install the TKS Timer (UF100) (Refer to Figure 401).

(1) Put the timer in its correct position on the equipment pack.

(2) Put the grounding jumper on the correct bolt to attach it to the bracket.

(3) Install the bolts, nuts, and washers that attach the timer to the equipment pack.

(a) Make sure that there is a good electrical bond.

(4) Identify and connect the electrical wiring connectors to the timer.

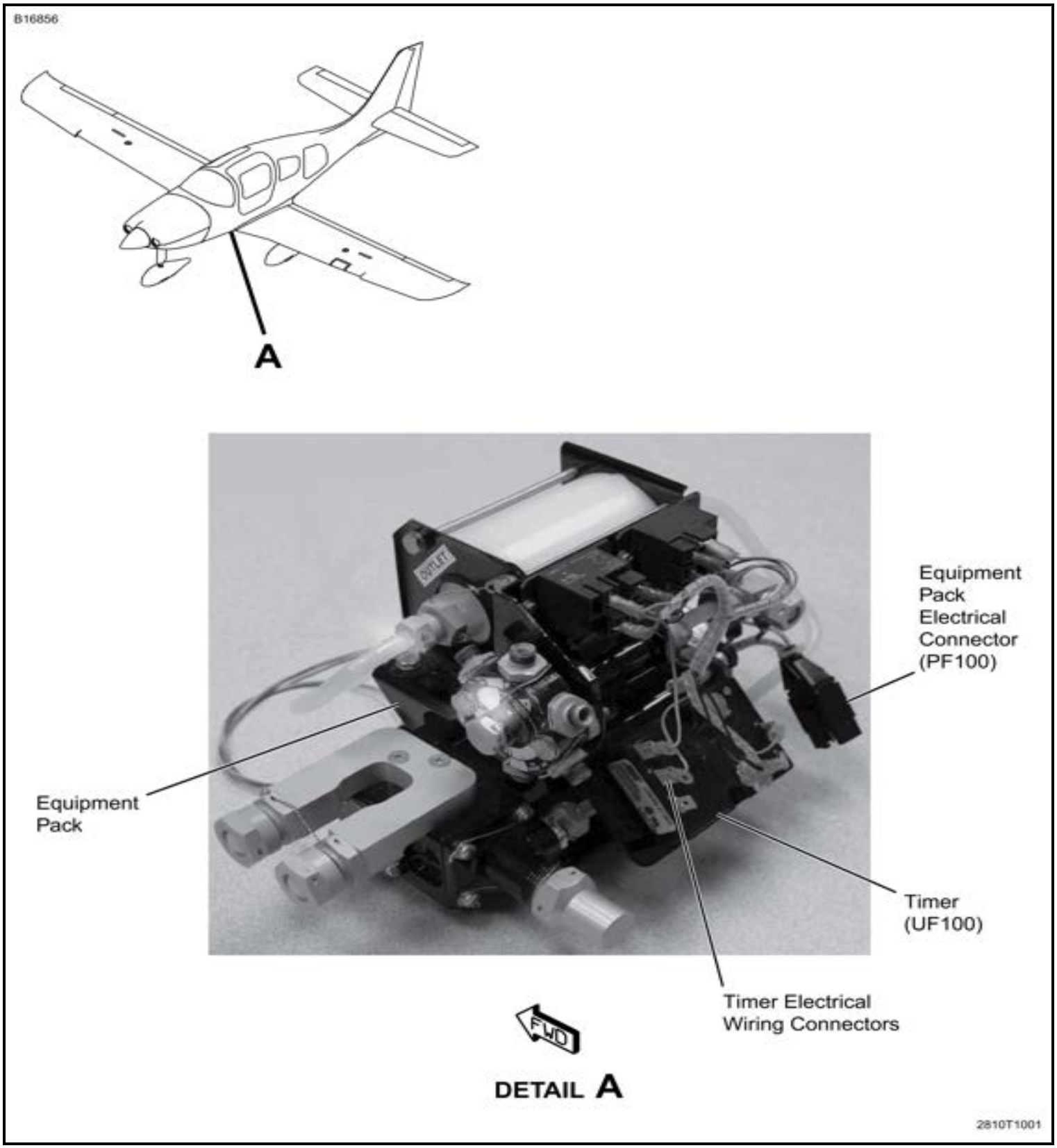
(5) Install the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(6) Engage the TKS circuit breaker.

(7) Do a test of the timer. Refer to TKS Anti-Ice System (Inadvertent) - Adjustment/Test, TKS Anti-Ice System Operational Test.

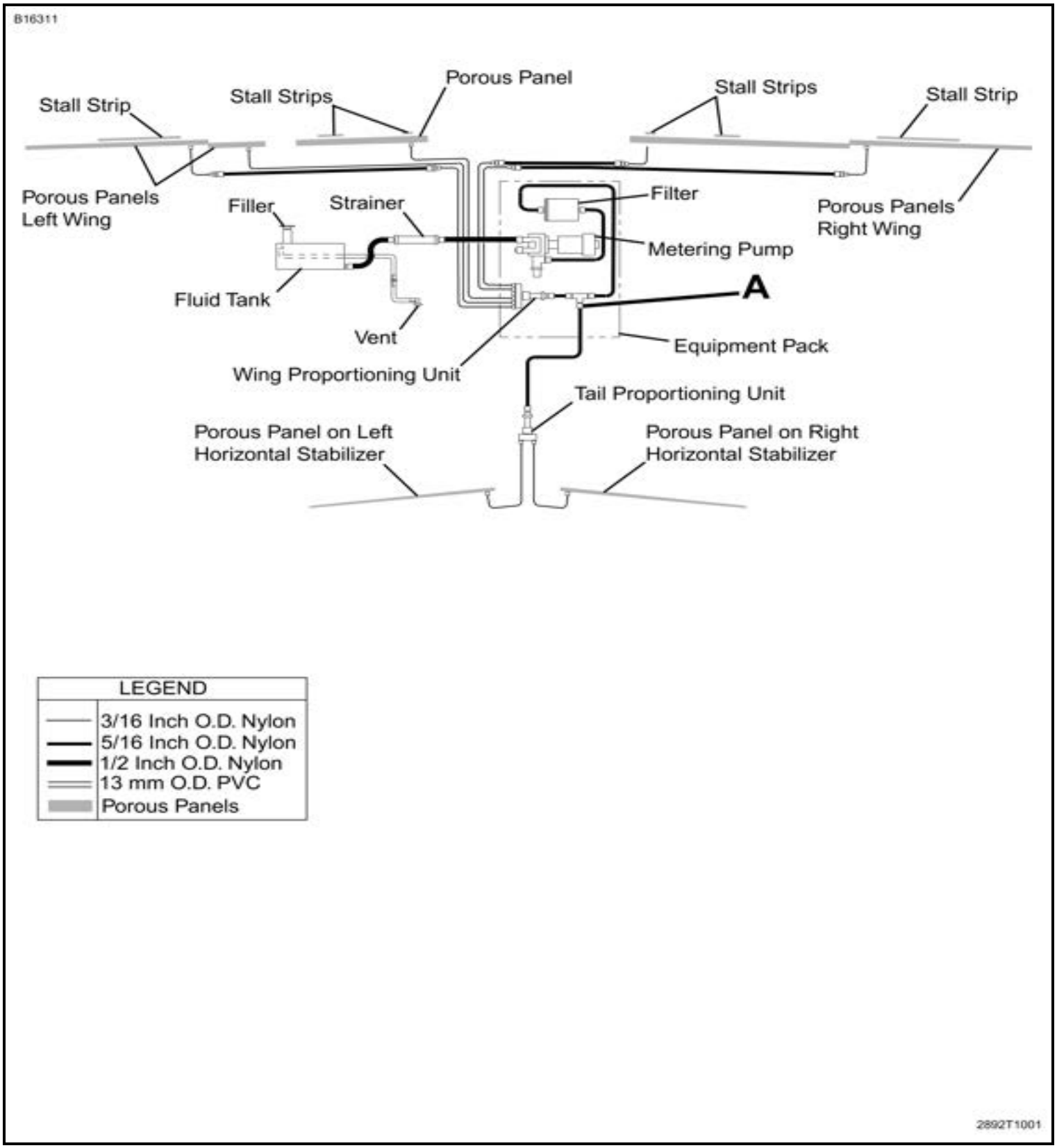
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Figure 401 : Sheet 1 : TKS Timer Installation



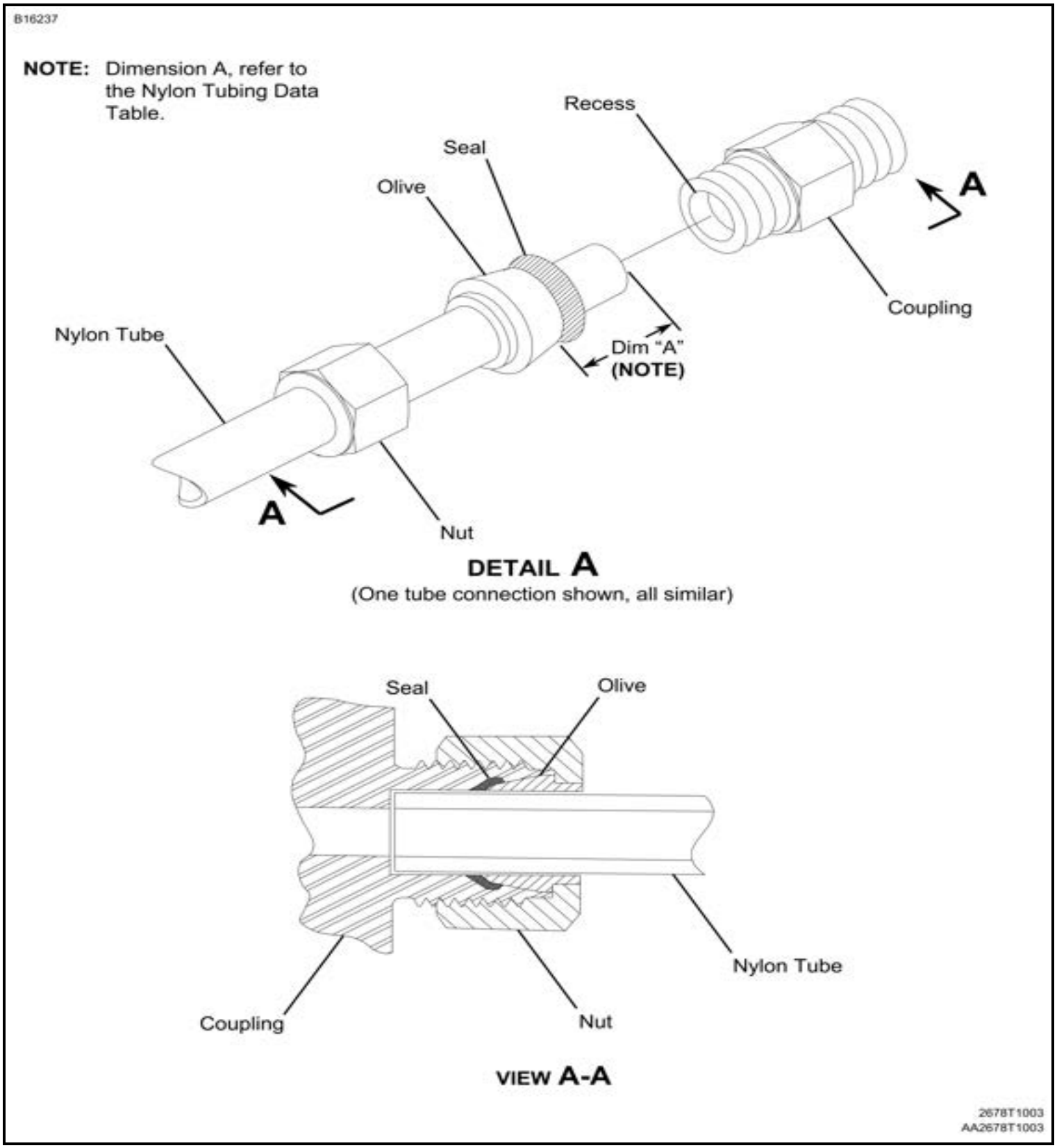
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS RELAYS (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent), Maximum Flow Relay (KF101) and Normal Flow Relay (KF100).

B. The TKS anti-ice system equipment pack must be removed from the airplane to remove and replace the each of the two relays.

2. Tools and Equipment

A. None.

3. TKS Relay Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the TKS Relay (Refer to Figure 401).

NOTE: Removal procedures for each of the two relays is similar.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the TKS circuit breaker.

(4) Remove the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(5) Identify and disconnect the electrical wiring from the relay terminals.

(6) Remove the screws and washers that attach the relay to the equipment pack.

(7) Remove the relay from the equipment pack.

B. Install the TKS Relay (Refer to Figure 401).

NOTE: Installation procedures for each of the two relays is similar.

(1) Put the relay in its correct position on the equipment pack.

(2) Install the screws and washers that attach the relay to the equipment pack.

(3) Identify and connect the electrical wiring to the relay terminals.

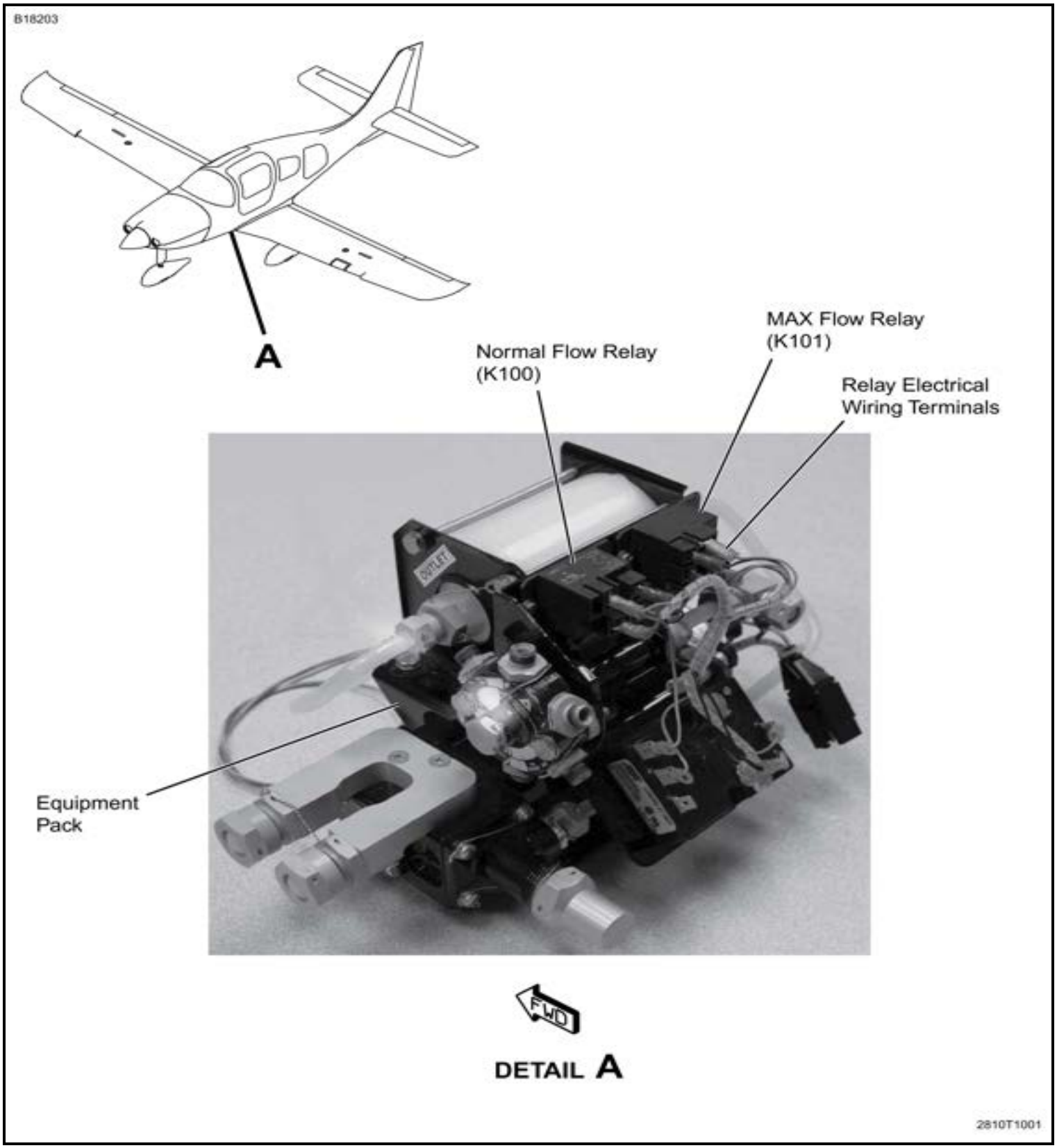
(4) Install the equipment pack. Refer to TKS Anti-Ice System Equipment Pack (Inadvertent) - Removal/Installation.

(5) Engage the TKS circuit breaker.

(6) Do a test of the ANTI-ICE MAX and/or NORM mode of operation. Refer to TKS Anti-Ice System (Inadvertent) - Adjustment/Test, TKS Anti-Ice System Operational Test.

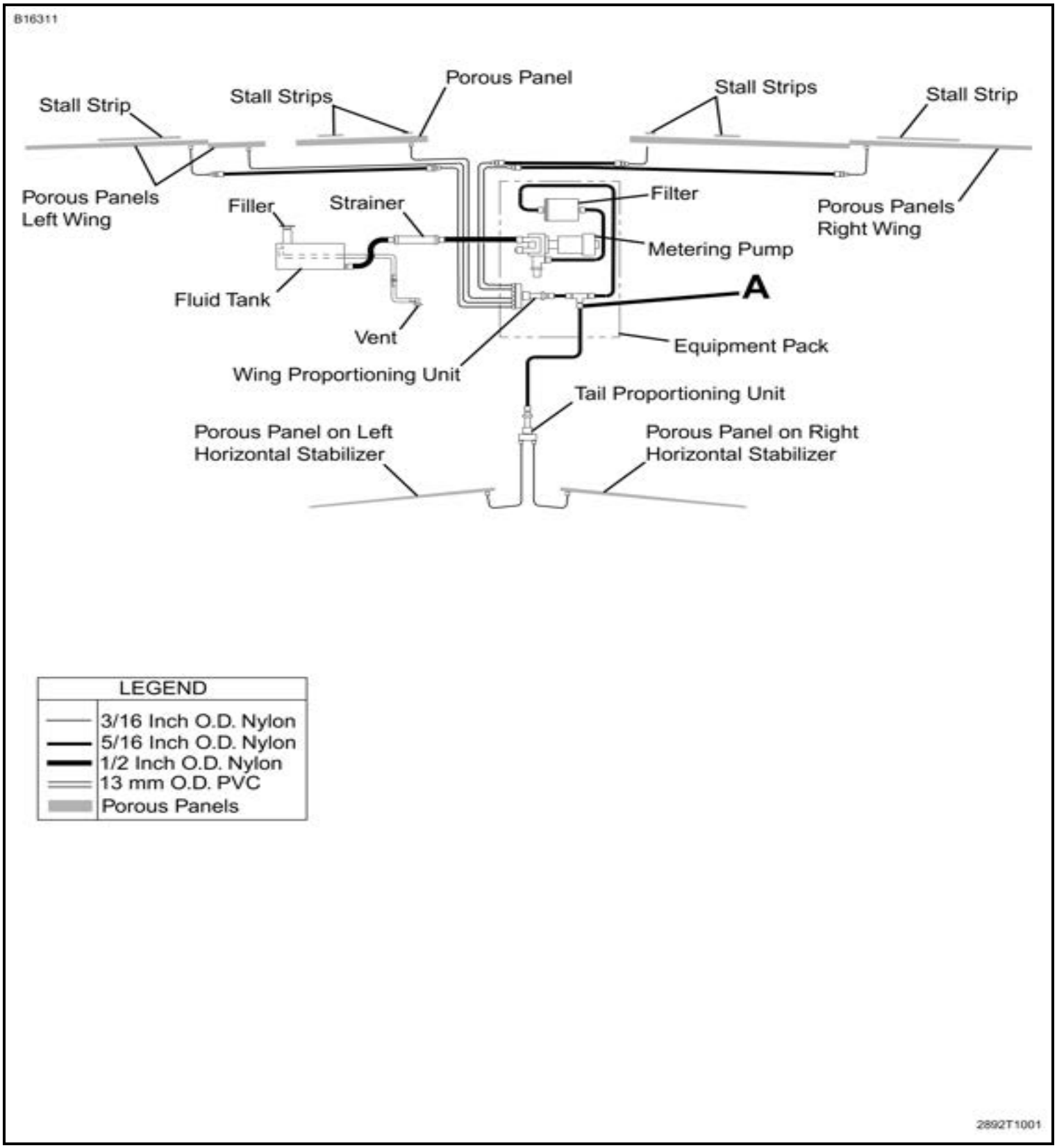
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Figure 401 : Sheet 1 : TKS Relay Installation



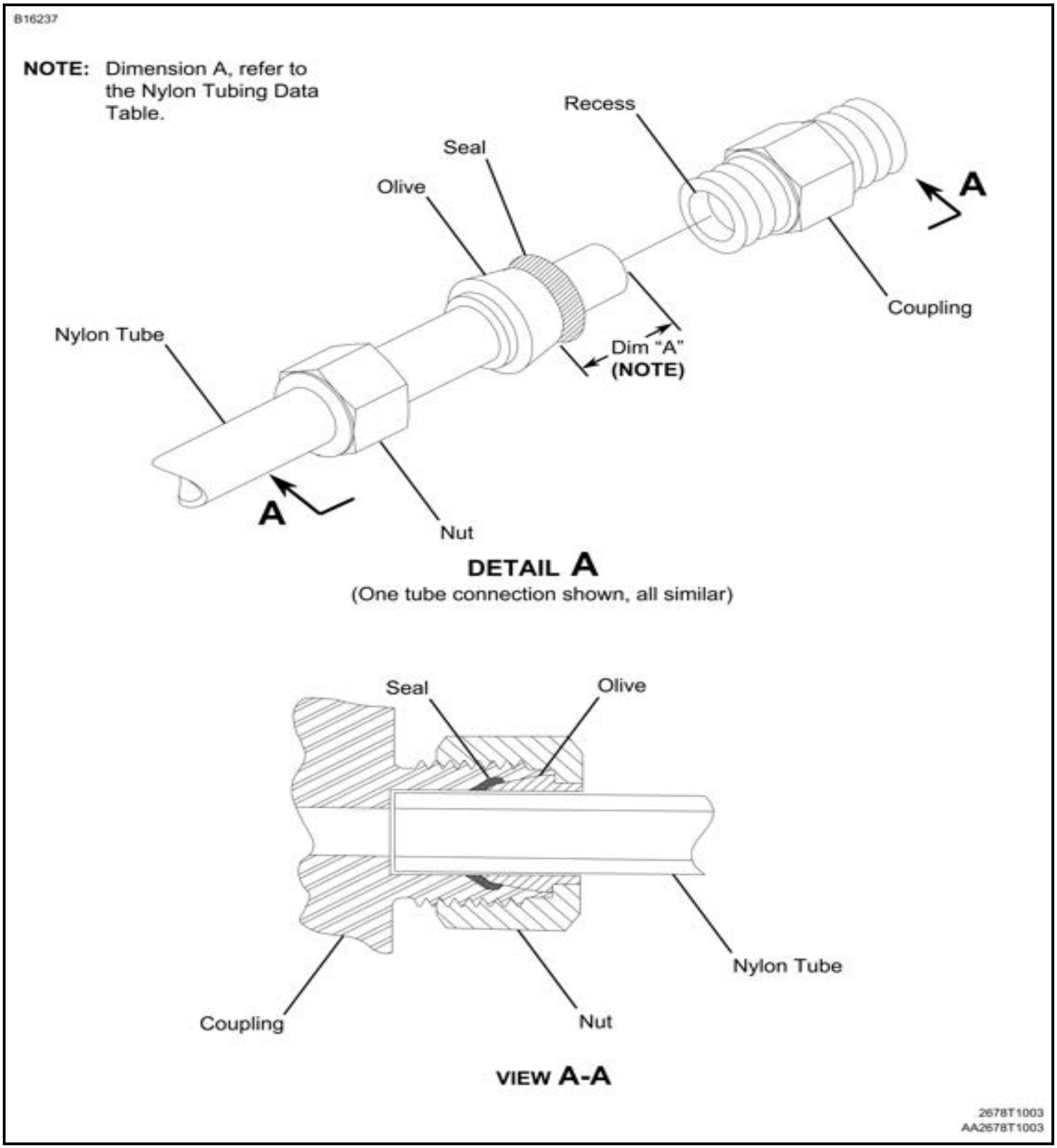
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM LEADING EDGE POROUS PANEL (INADVERTENT) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (Inadvertent) porous panels, which include the wing and horizontal stabilizer leading edges. The sealing procedures for the porous panels are also included in this section.

B. After a porous panel is replaced, it is necessary to do the purge and test procedures. Those procedures are in TKS Anti-Ice System Leading Edge Porous Panel - Adjustment/Test.

2. Tools, Equipment, and Materials

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Porous Panel Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

CAUTION: After you remove and before you install a porous panel, apply low-adhesive tape on the panel to give it protection.

CAUTION: Before you remove or install a porous panel, apply low-adhesive tape on the skin adjacent to the panel to give the skin protection.

CAUTION: Be careful when you remove and install the porous panels. The panels are easily damaged. Use nonmetallic tools, if possible, to prevent tears, gouges, scratches, and other damage.

A. Remove the Porous Panel (Refer to Figure 401).

NOTE: The panel purge and test procedures are only necessary after you install a replacement porous panel.

NOTE: The removal and installation of the porous panels on the wing and horizontal stabilizer leading edges are typical.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the TKS circuit breaker.

CAUTION: Before you remove or install a porous panel, apply low-adhesive tape on the skin adjacent to the panel to give the skin protection.

(5) Remove the porous panel from the wing.

(a) Apply tape on the leading edge next to the sealant along the panel edges.

NOTE: The tape is used as a guide to where the new sealant needs to be applied.

(b) Remove the rivets that attach the panel to the leading edge.

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(c) Carefully remove the sealant along the panel edges.

NOTE: If necessary use a sharpened putty knife to remove the sealant. Be careful to not damage the paint or wing surface.

(d) Carefully use a flexible-blade knife (putty knife) and your hands to pull the panel away from the leading edge.

CAUTION: While pulling the panel away from the leading edge, be careful not to damage the leading edge by prying against it.

(e) Carefully remove the panel from the leading edge sufficiently to access the fluid tubing fitting.

(6) Disconnect the TKS fluid tube.

(a) Remove safety wire from the tube fitting nut.

(b) Loosen the tube fitting nut.

(c) Remove the TKS fluid tubes from the porous panel fittings.

(d) Remove and discard the seals from the porous panel inlet tubes. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(e) Install caps on all tube ends to keep FOD out of the TKS system.

(7) Remove the porous panel form the airplane.

(8) Remove all remaining sealant from the leading edge.

(a) Use a plastic or phenolic scraper to remove cured sealant from the leading edge surface.

(b) Use medium or finer ScotchBrite scuff pad to remove the sealant not removed with the scraper.

(c) Clean the leading edge with isopropyl alcohol or other approved cleaner.

(9) If necessary, paint the leading edge. Refer to Chapter 51, Paint Repair and Painting - Maintenance Practices.

B. Install the Porous Panel (Refer to Figure 401).

NOTE: For some airplanes the left wing inboard panel can have the panel installed over (around) the lift detector. To fit the panel around the lift detector, it is necessary to cut an opening in the outboard part of the porous panel that is not TKS functional. You must trim the panel to make sure that there is a flush fit around the lift detector. Use the removed panel as a pattern for the opening. For airplanes where the lift detector is installed more outboard on the wing (closer to the landing light installation), the porous panel is not installed with this procedure. For this installation you must trim the entire outboard edge of the panel to make sure that it does not touch the lift detector.

(1) To prepare the panel bonding surfaces for installation do the steps that follow:

(a) Use isopropyl alcohol to clean and degrease the bonding surfaces of the panels and leading edges.

(b) In areas where the TKS panels will be installed, use a ScotchBrite scuff pad to lightly abrade the airplane leading edges.

(c) Use isopropyl alcohol and a sponge, or a short-bristle brush, to scrub the area of the leading edge where the panel will be installed.

1 Use a clean, lint-free cloth to dry the area before the cleaning solution evaporates.

2 Use a clean, lint-free cloth wet with isopropyl alcohol to do this step again.

(d) Use a clean, lint-free cloth wet with isopropyl alcohol and a ScotchBrite scuff pad to clean the aft surface of the TKS panel.

1 Use a clean, lint-free cloth to remove the debris and contaminants from the surface of the panel.

(e) Use a clean, lint-free cloth wet with isopropyl alcohol to clean the panel in approximately 12 to 15 inch sections again.

1 Immediately use a clean, lint-free cloth to dry each section before the isopropyl alcohol evaporates.

(f) Use a clean, white, lint-free cloth to wipe the surface of the panel.

1 Examine the cloth for indications of debris or contaminants.

2 If the cloths shows indications of debris or contaminants, do again the panel cleaning steps above.

(2) Put the panel in its correct position on the leading edge.

(3) Use your hand to install the panel in its correct position on the leading edge.

(a) If necessary, close or open the panel to get the correct installation of the leading edge.

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(4) Drill the rivet holes at the lower surface corners of the porous panel to match the existing hole locations on the leading edge.
  (a) Remove panel and deburr the holes.
(5) Install the fluid tubing to the porous panel.
  (a) Remove the caps from the tube ends.
  (b) Install new seals in the tubing ends. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.
  (c) Hold the panel in position near the leading edge and put the tubing on the panel fitting.
    1 Turn the nut with your fingers until it is tight.
    2 Continue to tighten the nut with a wrench approximately 180 degrees more and safety with wire.
  (d) Apply U470592 Type I B-2 sealant to each tube connection hole and air bleed check valve.
  (e) Apply sealant to the fluid tube fitting threads, nut and tubing for a minimum of 0.50 inch past the fitting nut.
(6) Install the porous panel to the wing.
  (a) Apply a 0.375 inch bead of U470592 Type I B-2 adhesive to the back surface edges of the panel.
  (b) Align the panel to the correct position.
  (c) Push the panel against the leading edge with enough pressure to cause the sealant to squeeze out along the edges.
  (d) Make sure that the panels fit closely around the leading edge with the top and bottom of the panel in light contact with the skin.

    NOTE: Panels can be squeezed closed or opened slightly for best fit.

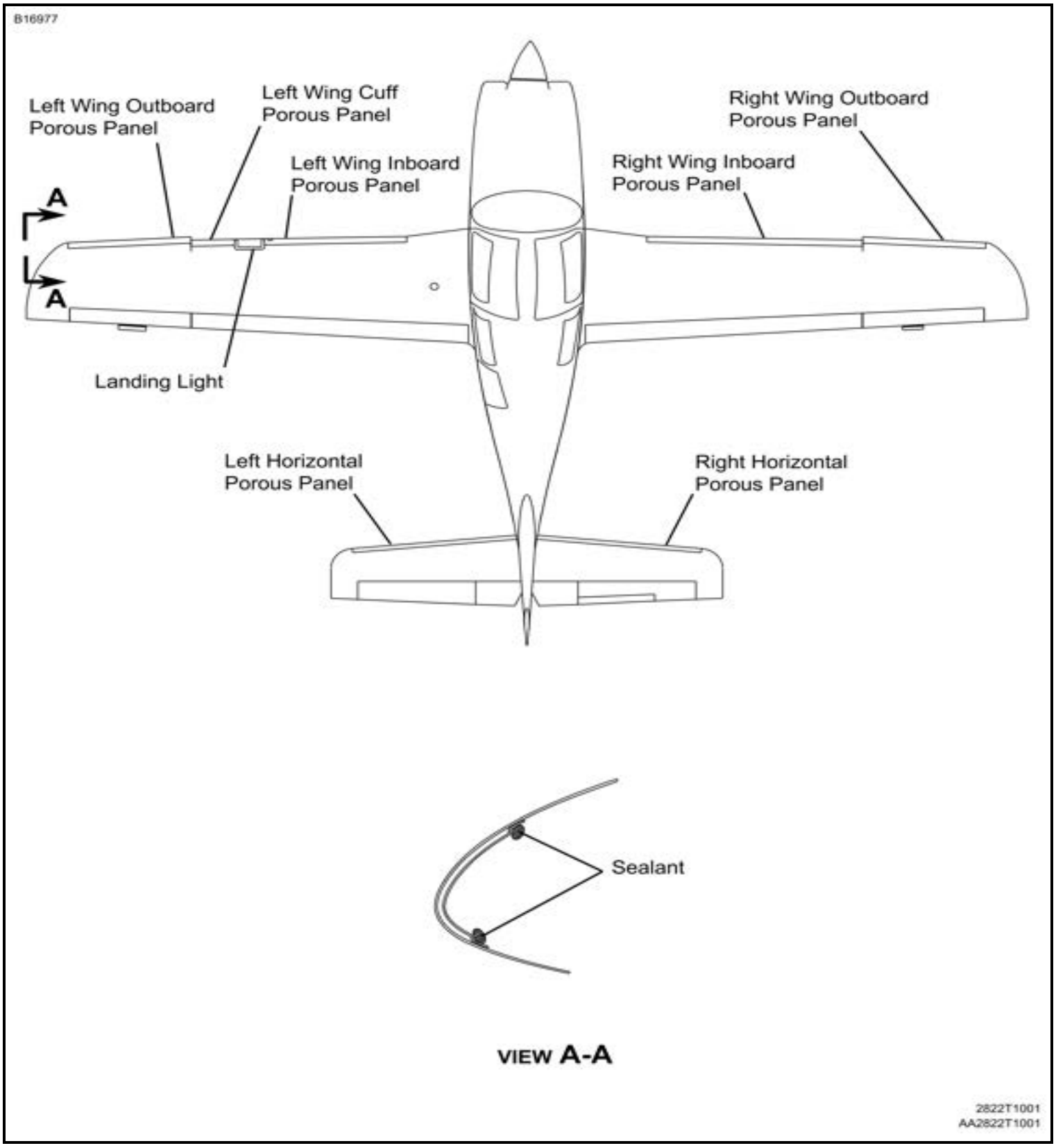
  (e) Install temporary fasteners to hold the panel in position.

CAUTION: To spread the load where ratcheting straps are used, use metal angles to protect the trailing edge. Place blankets or foam between the metal angles and the trailing edge. Do not use too much force when you tighten the straps.

  (f) Keep applying pressure until the tape strips or ratcheting straps are applied to hold the panel in position.
    1 Make sure that the panel edges are against the leading edge skin.
  (g) After the sealant is cured, remove all tape and ratcheting straps.
  (h) Install the rivets that attach the panel to the leading edge.
    1 Examine the rivet heads for correct installation.
  (i) Use U470638 Type I, Class B 1/2 sealant to fillet seal and fair around all panel edges.
(7) Do a leak check of the porous panels. Do the procedures that follow:
  (a) Apply external electrical power to the airplane.
  (b) Set the master BATT switches (left SW01 and right SW02) switches and AVIONICS MASTER switch (SW04) to the ON position.
  (c) Engage the TKS circuit breaker.
  (d) Put the ANTI-ICE MAX/NORM switch to the NORM position.
    1 Make sure that there is no fluid leakage from the couplings.
  (e) Set the ANTI-ICE MAX/NORM switch to the OFF position.
  (f) Set the master BATT (left and right) switches and AVIONICS MASTER switch to the OFF position.
(8) Remove external electrical power from the airplane.
(9) Do the panel purge and test procedures. Refer to TKS Anti-Ice Leading Edge Porous Panel (Inadvertent) - Adjustment/Test.
(10) Clean the floor and the airplane surfaces as necessary.

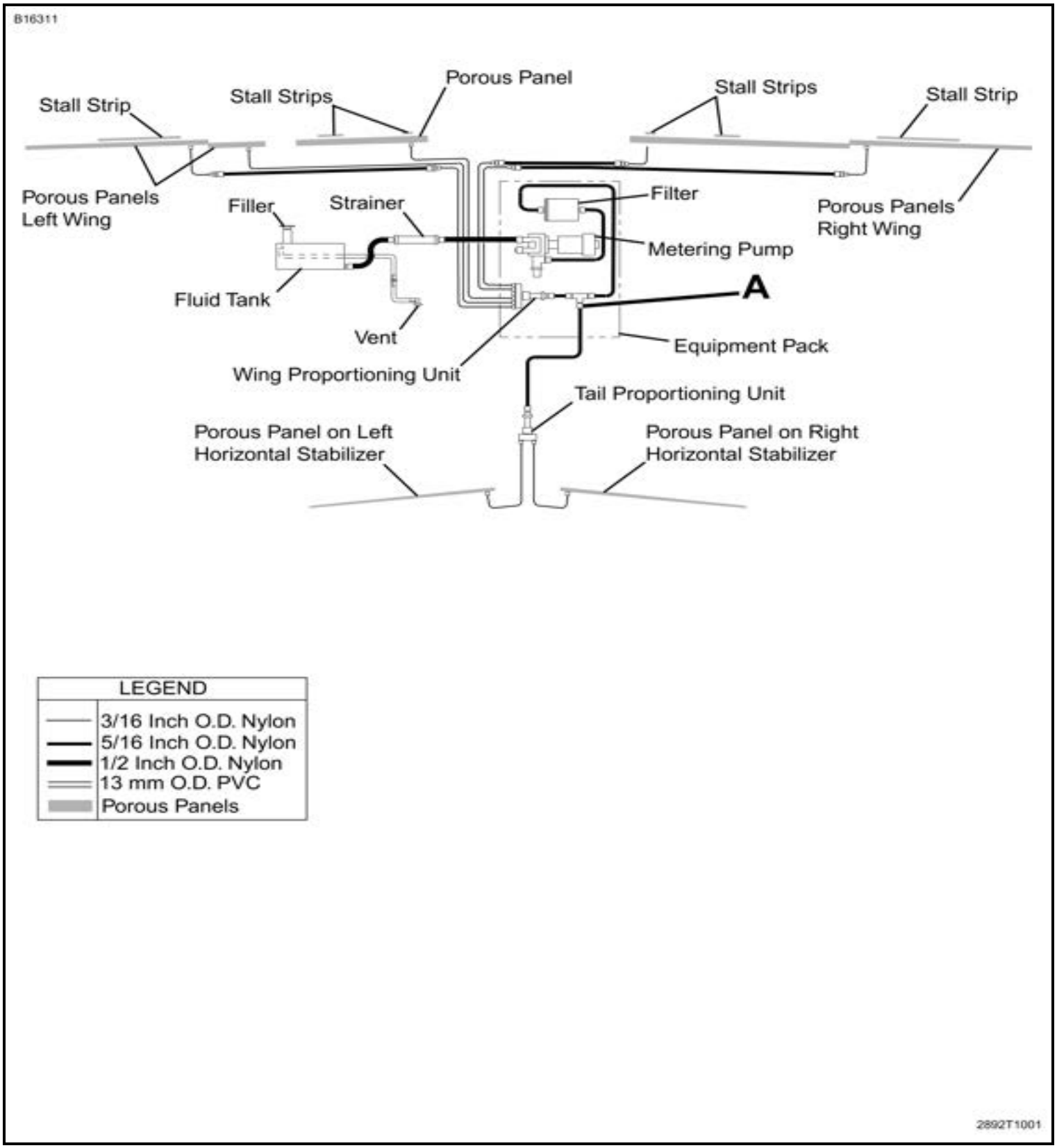
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Figure 401 : Sheet 1 : TKS Porous Panel Installation



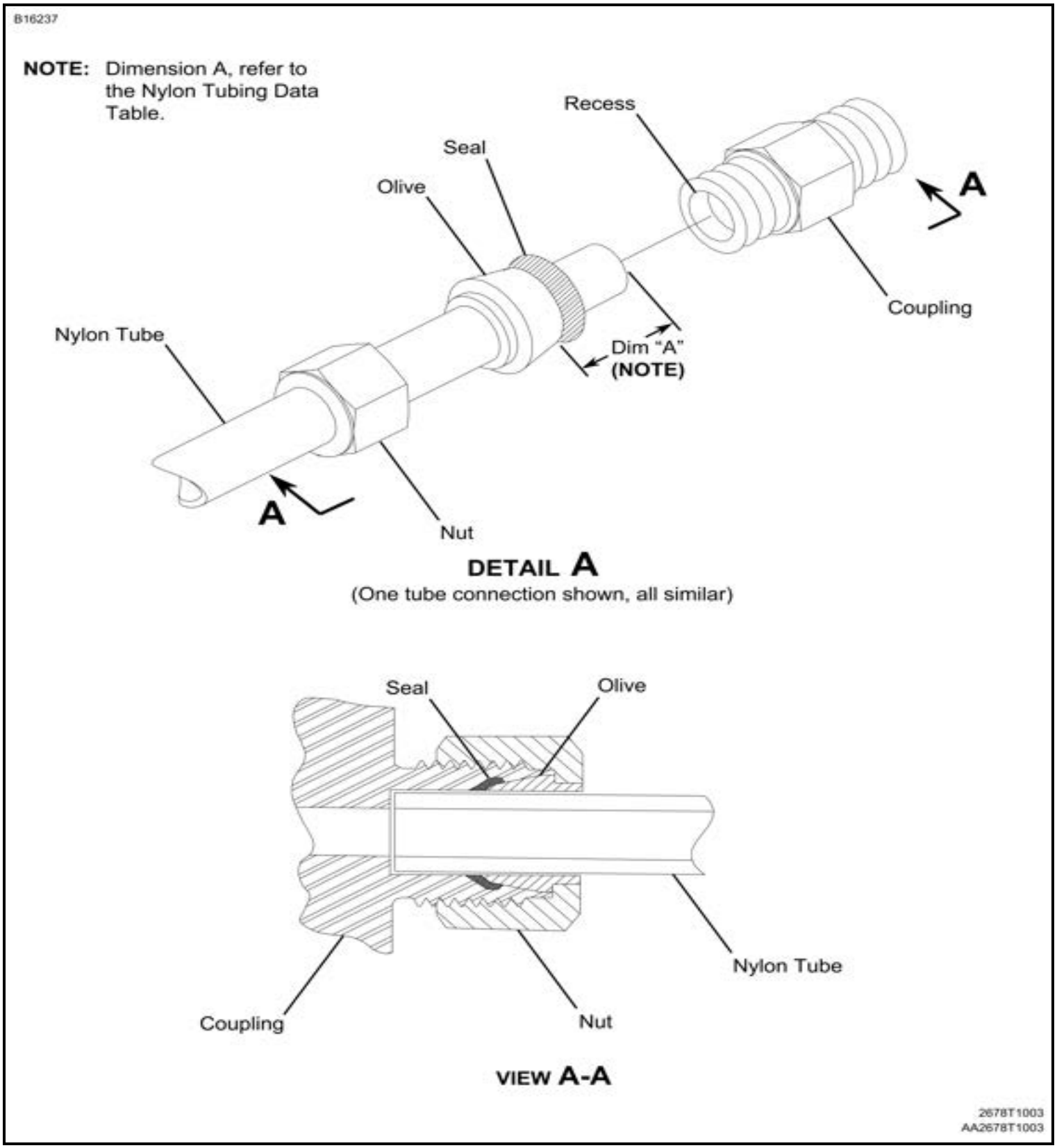
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM LEADING EDGE POROUS PANEL (INADVERTENT) - ADJUSTMENT/TEST

1. General

A. This section contains the procedures to remove (purge) the air from the TKS Anti-Ice System (Inadvertent) porous panels on the wing and horizontal stabilizer leading edges.

B. The panel purge and test procedures are only necessary after you install a replacement porous panel, or if you remove and install or replace the fluid tank.

C. The function of the panel purge and test procedures is to remove most of the air and make the membrane in the panel completely wet. Also, to make sure that there is no leakage from the panel and its connections to the tubing.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Porous Panel Purge and Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: You must loosen fluid line connections of the TKS anti-ice system slowly. It is possible that high pressure is still in the system. System pressure of 120 psi-gage is possible.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This helps to prevent fluid leakage from the coupling.

NOTE: It is necessary that you have access to clean dry cloths, a sufficient quantity of approved TKS fluid, a TKS system test cart with connection hardware, 75 psi filtered shop air or nitrogen bottle (to use with a test cart), and a container with a capacity of three to five gallons. It will be necessary to fill the test cart with TKS fluid at intervals during the test.

NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

A. Do the Wing Panel Purge and Test (Refer to Figure 501 and Figure 502 and Table 501).

NOTE: The purge procedure for each of the porous panels is typical.

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) is set to the to the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Make sure that the Cross Tie switch (SW03) is set to the OFF position.

(5) Disengage the TKS circuit breaker.

(6) Remove the applicable panel to get access to the porous panel feed line coupling. Refer to Figure 503 and Table 501

Table 501. Table 501

Porous Panel	Feed Line Coupling Location	Feed Line Coupling Size
Left Wing	Left Wing Fuel Line Access Panel	3/16 inch

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Right Wing	Right Wing Fuel Line Access Panel	3/16 inch
Left and Right Horizontal Stabilizers	Aft Fuselage Access Panel (right side only)	3/16 inch

(7) Identify the porous panel feed line necessary to purge.

(8) Disconnect the inlet line from the feed line coupling.

(9) Connect the 3/16 inch outline from the test cart to a panel feed line coupling.

(10) Attach a filtered shop air supply or nitrogen bottle to the inlet port of test cart.

(11) Follow the operation and safety instructions that are supplied with the test cart.

(a) Use the Panels Installed on Aircraft TKS Panel Test section of the TKS Ice Protection Panel Flow Check Procedure Using TKS System Test Cart publication.

(12) Monitor the fluid level in the test cart during the test.

(a) Make sure that there is sufficient fluid available in the test cart so that it is not completely depleted during the test.

NOTE: It is necessary for you to fill the cart at intervals during the panel purge procedure to prevent air from entering the TKS porous panel. Only fill the cart to 3/4 of its capacity.

(13) Slowly start the fluid flow through the panel at 20 psi.

(14) Monitor the system fittings for leaks.

(a) Correct any leaks as necessary. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices

(15) Increase the fluid pressure 10 psi every 15 seconds until the TKS test cart pressure gage indicates 65 psi.

(16) When fluid starts to flow from the panel pores along the entire length of the panel, inspect the flow distribution along the panel. Refer to Figure 502.

(17) Make sure that the fluid flows from the porous panels as follows:

(a) The fluid flows from the porous panels without any dry spots.

(b) The fluid flows evenly and not in streams.

(c) There are no areas with clusters of bubbles.

NOTE: The bubbles will be very small and continue to flow even after you wipe fluid across the area.

(18) Operate the TKS test cart for a maximum of 30 minutes.

(19) Stop the fluid supply.

(20) Wait until the fluid pressure is released.

(21) Slowly disconnect the test cart fluid supply tube from the porous panel coupling.

(22) Install a new sealing rings in the tube fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201.

(23) Connect the panel feed line to the porous panel coupling.

(24) Continue the test on each of the TKS porous panels until all the porous panels have been tested.

(25) Monitor the fluid level in the test cart during the test.

(a) Make sure that there is sufficient fluid available in the test cart so that it is not completely depleted during the test.

NOTE: It is necessary for you to fill the cart at intervals during the panel purge procedure to prevent air from entering the TKS porous panel. Only fill the cart to 3/4 of its capacity.

(26) Monitor the system fittings for leaks.

(a) Correct any leaks as necessary. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices

(27) If necessary, remove the fluid collector system from the airplane.

(28) Disconnect the filtered shop air supply from the inlet port of the test cart.

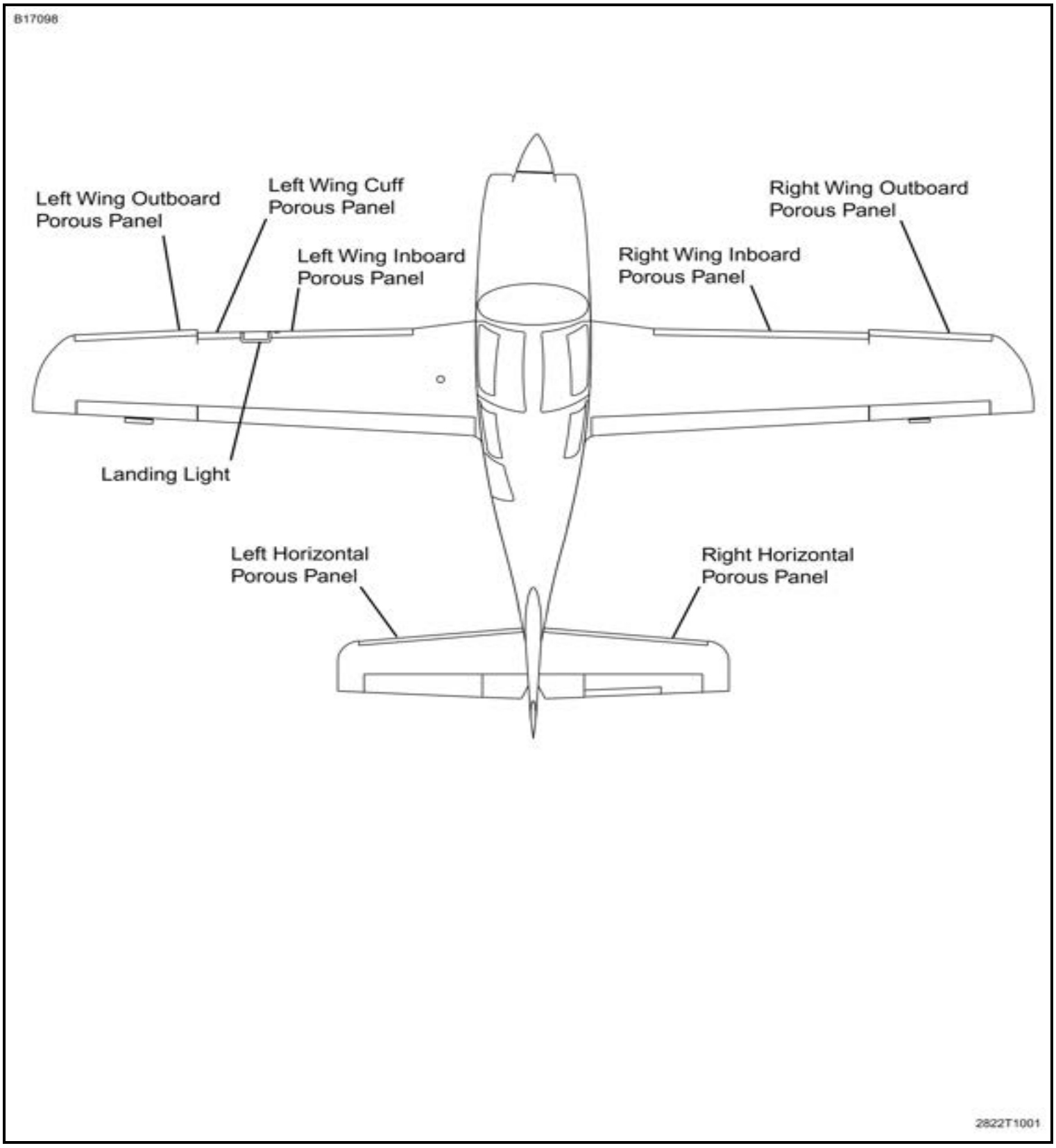
(29) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid (Inadvertent).

(30) Clean the floor and the airplane surfaces as necessary.

(31) Engage the TKS circuit breaker.

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Figure 501 : Sheet 1 : Leading Edge Porous Panel Installation



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Figure 502 : Sheet 1 : Leading Edge Porous Panel Purge

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Wing Leading Edge Porous Panel Before Purging



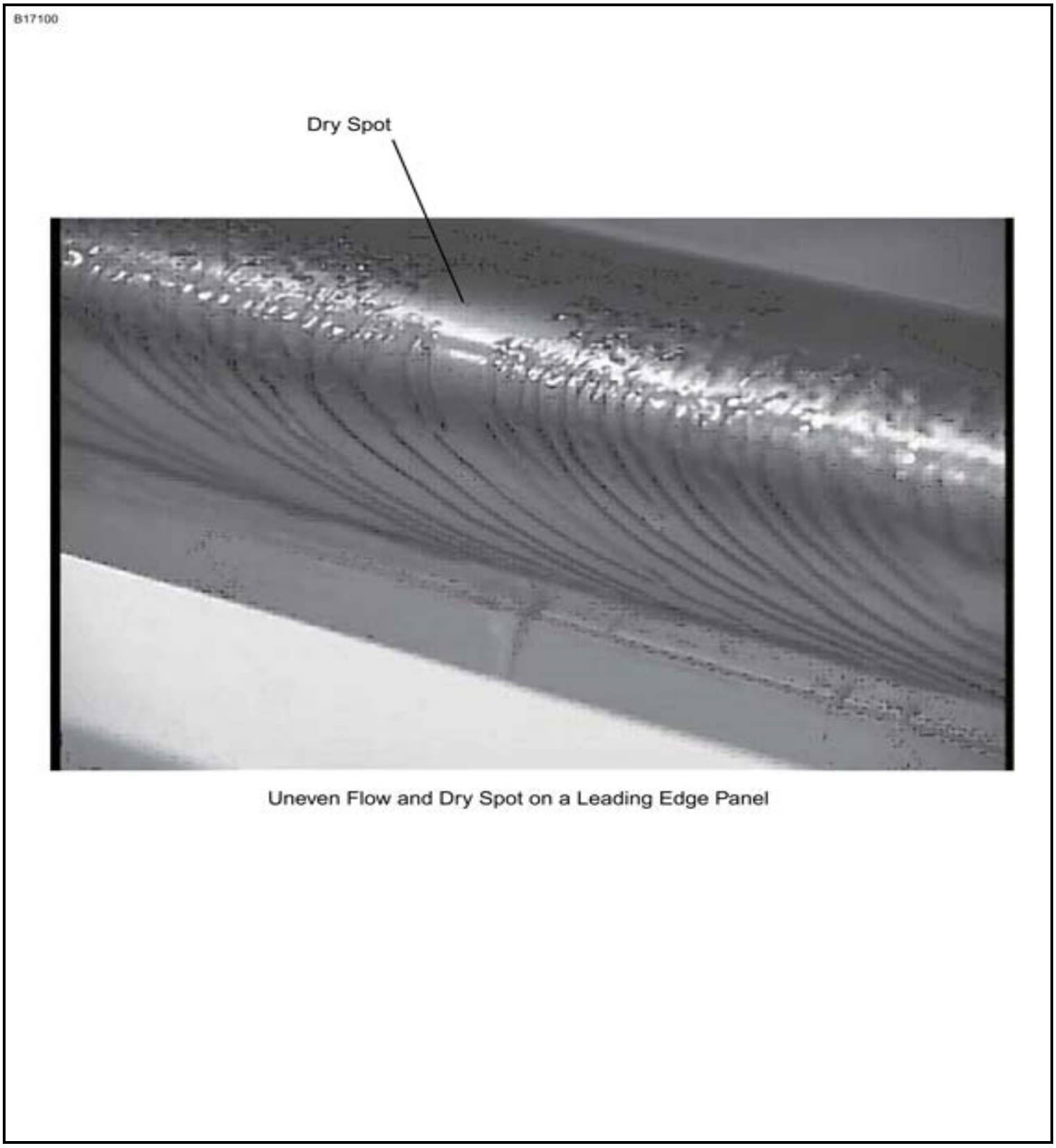
Wing Leading Edge Porous Panel After Purging

NOTE 1: The porous panels have been purged correctly when the purge pressure has been applied and the statements that follow are true:

A. The fluid flows evenly and forms a continuous surface across the entire porous portion of the panel instead of flowing in streams, as shown.
B. There are no dry spots in the porous portion of the panel where fluid does not flow even after wiping fluid across the dry spot, as shown.
C. There are no areas in the porous portion of the panel where clusters of bubbles continue to come out while the rest of the panel is flowing evenly. These bubbles will be very small and will continue to come out even after you wipe fluid across the area.

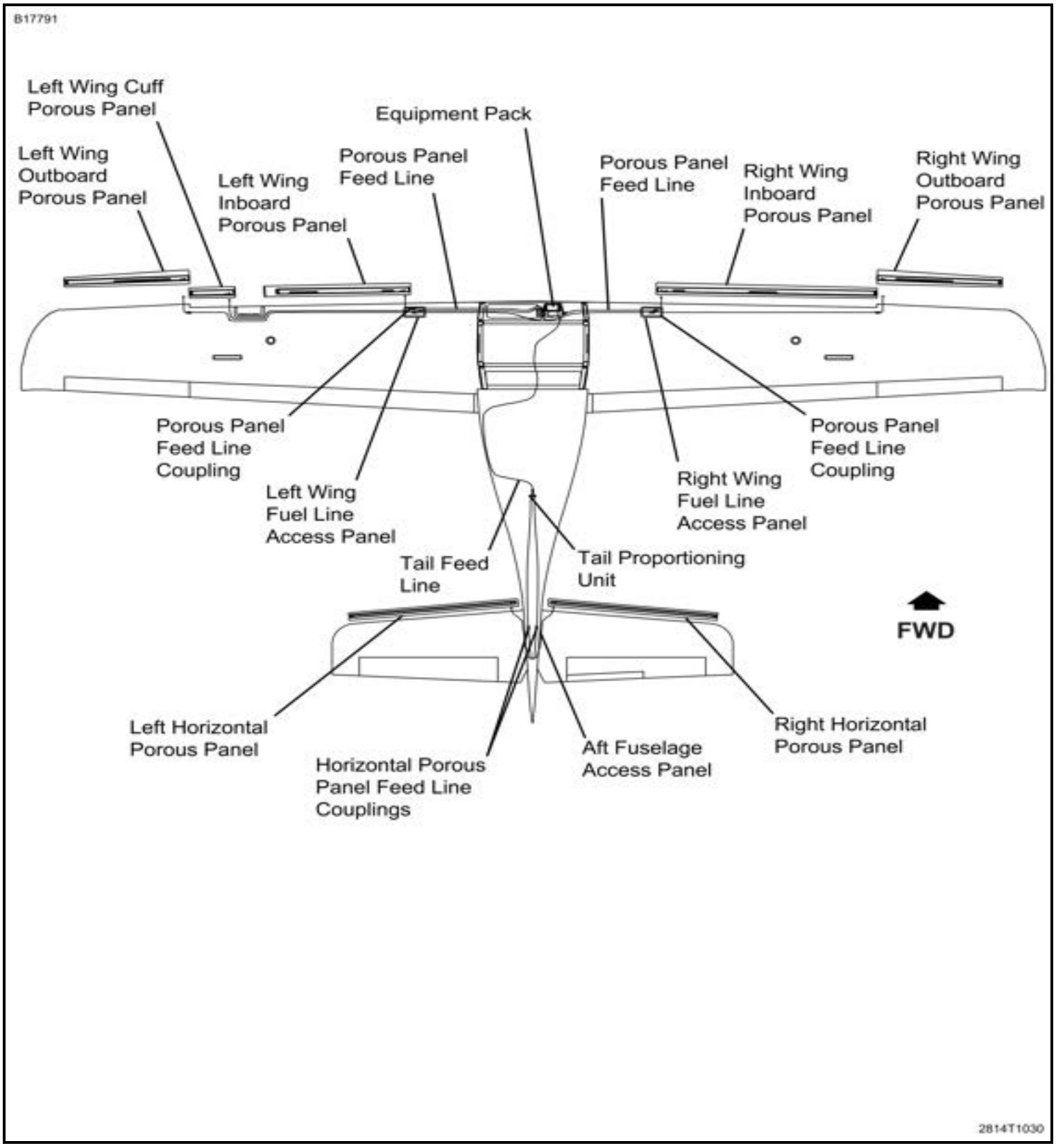
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Figure 502 : Sheet 2 : Leading Edge Porous Panel Purge



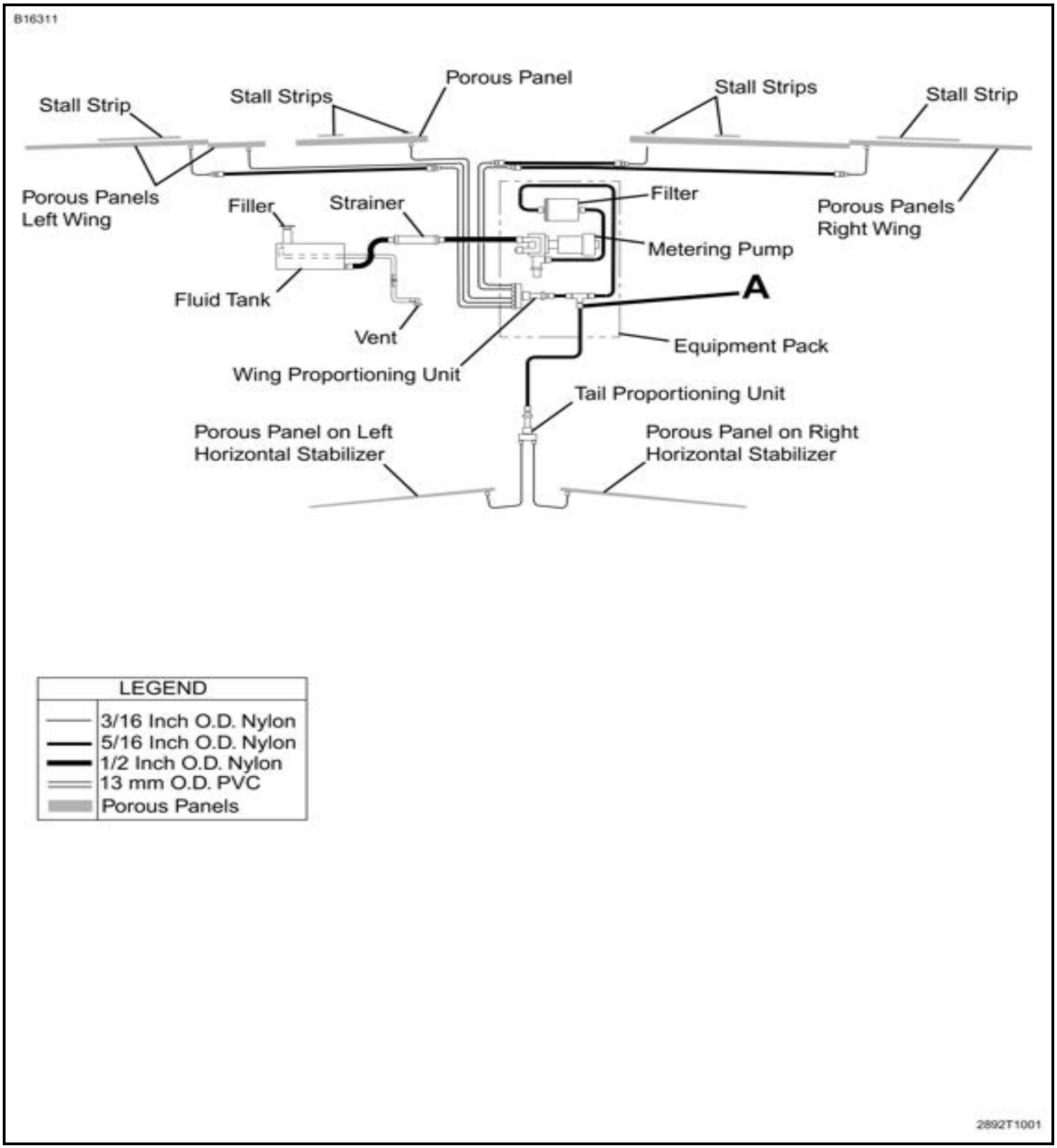
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Figure 503 : Sheet 1 : Porous Panel Couplings Locations



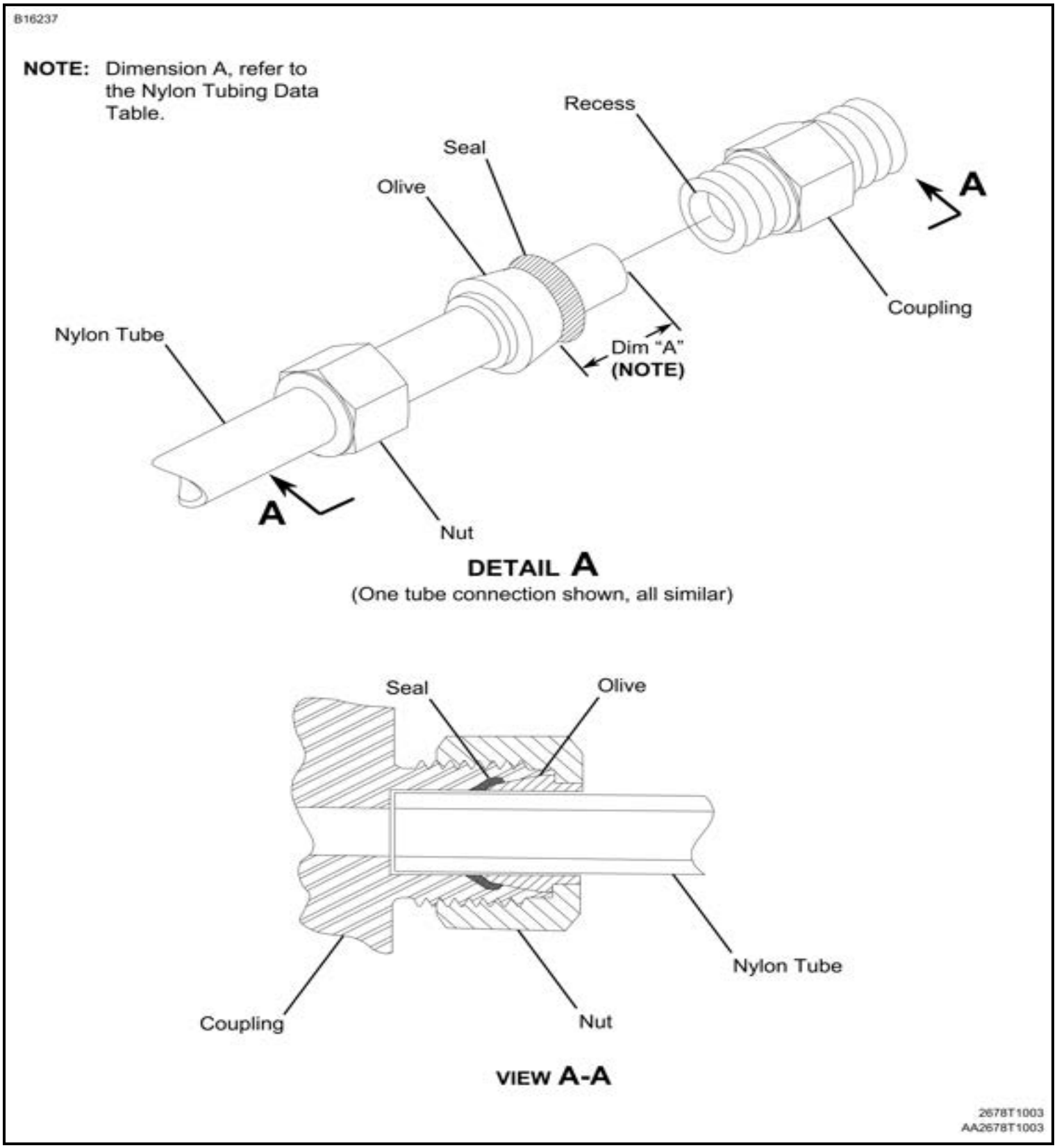
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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TKS ANTI-ICE SYSTEM (FIKI) - DESCRIPTION AND OPERATION

1. General

A. This section gives a description and operation of the TKS Anti-Ice System (FIKI). The TKS Anti-Ice System is a fluid anti-ice system to prevent ice formation on the leading edges of the wings, vertical stabilizer, horizontal stabilizers, propeller, and windshield. The TKS anti-ice system includes the integral wing TKS fluid reservoir, TKS filler neck assembly, TKS fluid level sender, TKS low fluid level switch, finger strainer, pumps (two main metering pumps for redundancy and independently operated windshield pump), timer box, TKS System control switches, windshield solenoid valve, high pressure switch, filter, flow transducer, left, right, and tail proportioning units, left and right wing, left and right horizontal stabilizer, and vertical stabilizer porous panels, and five low pressure switches. The operational condition can be monitored with CAS messages on the Primary Flight Display (PFD) and fluid quantity indication on the Multi-Function Display (MFD). When the TKS Anti-Ice System (FIKI) option is installed on the airplane, a left and right wing inspection light is also installed. For wing inspection light maintenance data, refer to Chapter 33, LED Wing Inspection Light - Removal/Installation. For a general view of the TKS Anti-Ice System, refer to Figure 1.

B. The TKS system uses a monoethylene glycol/isopropyl alcohol/deionized water solution for anti-icing the airframe surfaces in flight. The fluid solution is a freezing point depressant that is swept rearward over the surfaces and prevents ice buildup. For a list of approved TKS anti-icing fluids refer to Chapter 12, Replenishing - Servicing.

2. Description

A. The TKS equipment found in the left wing at WS 46.00 and inboard and between FS 107.70 and FS 126.62 includes the line replaceable units that follow:

- Metering Pump 1 (UC101)
- Metering Pump 2 (UC102)
- Windshield Pump (WC103)
- High Pressure switch (SC100)
- Flow Transducer (UC100)
- Windshield Solenoid Valve (WC100)
- Filter.

(1) To get access to the equipment, remove the TKS equipment access panel, on the lower surface of the left wing, and/or the footwell panels as necessary. Refer to Chapter 57, Wing - Maintenance Practices, Location of Inspection Covers (Access Panels) and Chapter 25, Footwell - Maintenance Practices.

(2) There are two metering pumps installed on brackets attached to the lower wing skin. The pumps have common input and outlet TKS tubing. Metering Pump 1 has the Windshield Pump mounted on the top. The metering pump 1 and windshield pump are usually removed and installed as an assembly. The pumps give the delivery mechanism for all modes of operation of the system. There are three basic modes of TKS system operation: NORM, HIGH and MAX. The system is operated by three-position rocker type switches found on the center console switch panel under the ANTI-ICE FLUID CTRL label, the PRIMARY HIGH/NORM switch (SI011), and MAX FLOW AIRFRAME/WINDSHIELD switch (SI012).

(3) The high pressure switch is installed on the outlet side of the metering pumps and on a bracket on the inlet side of the filter. The high pressure switch monitors the fluid flow pressure of the TKS system and sends a discrete to cause a CAS message to show on the PFD if pressure is higher than normal operation.

(4) The filter assembly is installed on brackets downstream of the metering pumps and the high pressure switch. The filter contains a replaceable element. The filter head is marked with an arrow for correct plumbing connection.

(5) The flow transducer is installed on a bracket near the filter at FS 128.82. The flow transducer monitors the fluid flow of the TKS system and sends a discrete to cause a CAS message to show on the PFD if the fluid flow is not above the appropriate threshold for normal operation.

(6) The windshield solenoid is installed on the left inboard wing rib at BL 23.25. The windshield pump and solenoid valve operate when the WINDSHIELD (SI012) switch found on the center console switch panel, is selected in the ON position.

B. The TKS fluid tank is a wet wing installation found in the right inboard wing. The tank has a capacity of 10 gallons (37.8 l). The tank has a level sender and low level switch installed and an access panel for maintenance. The level sender is installed at FS 119.08, WL 82.85, and BL 23.25. The low level switch is installed at FS 110.67, WL 80.92, and BL 23.25. Refer to Figure 1.

(1) The tank must be drained, the footwell removed, and the TKS fluid access panel removed to replace the level sender and low level switch. Refer to Chapter 25, Footwell - Maintenance Practices and Chapter 57, Wing - Maintenance Practices, Location of Inspection Covers (Access Panels).

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(2) The filler port for the fluid tank is on the top inboard of the right wing. Refer to Chapter 12, Replenishing - Servicing.

(3) There is a strainer assembly installed in the output of the fluid tank. The strainer helps protects the TKS system from contamination.

(4) The fuel switch access panel is installed on the outboard side of the fluid tank. This panel gives access for the removal and installation of the low fuel level switch. When you install the fuel switch access panel, use Type IX, fluorosilicone sealant to apply a fay seal to the panel. (Silastic 730, Dow or equivalent)

C. There are three proportioning units. The two wing proportioning units are installed near WS 0.00, FS 105.70 of the wing. The tail proportioning unit is installed in the vertical stabilizer near the aft fuselage access panels. Refer to Figure 2.

(1) The proportioning units are metering units that supply anti-icing fluid at a predetermined flow rate for each individual porous leading edge panel and the propeller slinger ring. The proportioning units incorporate a manifold with calibrated capillary tubes which meter the fluid through the outlet ports. The left wing proportioning unit uses five of the outlets and the right wing proportioning unit uses four of the outlets. The tail proportioning unit uses five of the outlets. The propeller slinger ring is fed fluid by the left wing proportioning unit. Plumbing to the outlet ports must be connected as specified for proper operation.

D. Laser-drilled titanium panels mounted to the leading edges of the wings, vertical stabilizers, and horizontal stabilizers give TKS ice protection for the airplane. Refer to Figure 1 and Figure 2.

(1) The airframe anti-ice system applies anti-icing fluid to the wing leading edges, vertical stabilizer and the horizontal stabilizer leading edges. Anti-ice fluid solution flows out of the airframe anti-ice system through flush-fitting laser drilled titanium leading edge panels on the wings and stabilizers.

(a) The outer skin of the ice protection panels are manufactured using 0.9-mm thick titanium. Titanium provides excellent strength, durability, light weight, and corrosion resistance.

(b) The panel skin is perforated by laser drilled holes, 0.0025 inches in diameter, 800 per square inch. The porous area of the titanium panels is designed to cover the stagnation point travel on the appropriate leading edge over a normal operating environment.

(c) The back plates of the porous panels are manufactured using 0.7-mm thick titanium. They are formed to create reservoirs for the ice protection fluid to supply the entire porous area. A porous membrane between the outer skin and the reservoir gives even flow and distribution through the entire porous area of the panel.

(d) The porous panels are bonded as a cuff over a leading edge. Panels are bonded to the airframe with a two-part flexible adhesive.

(2) A system of nylon tubing carries the fluid from the fluid tank to the metering pumps and associated equipment and then to the proportioning units that divide the flow into the volumetric requirements of each panel or device supplied through the unit.

(3) The fluid passes through a microfilter before it gets to the proportioning units and porous panels. The filter removes contaminants from the fluid which helps to prevent panel blockage.

E. TKS Mode Flow Rate

(1) The maximum fluid tank capacity is 10 gallons (37.83 l). This quantity will last 2.5 hours in the normal mode (NORM).

(2) The minimum dispatch fluid quantity is 6.0 gallons (22.70 l). With this quantity the fluid will last with the applicable switch set to the position as follows:

(a) NORM - 212ml/min for 90 minutes

(b) PRIMARY HIGH - 424ml/min for 45 minutes

(c) MAX FLOW AIRFRAME - 848ml/min when MAX FLOW AIRFRAME/WINDSHIELD switch is set to the MAX FLOW AIRFRAME position. No endurance time is specified for this flow rate because this mode is not intended for continuous operation

NOTE: The two metering pumps operate simultaneously for two minutes after the MAX FLOW AIRFRAME switch is pressed. After the two minute cycle is over, the pumps return to the previously selected PRIMARY operation mode: NORM or HIGH.

F. There are five low pressure switches found in the empennage section. These switches monitor the fluid flow pressure of the TKS system and send a discrete to cause a CAS message to show on the PFD if pressure is lower than normal operation.

3. Operation

A. Operation of the TKS Anti-Ice system is controlled by three-position rocker switches on the center console switch panel. The

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switches are under the ANTI-ICE FLUID CTRL label, PRIMARY HIGH/NORM switch (SI011), and MAX FLOW AIRFRAME/WINDSHIELD switch (SI012). Refer to Figure 3. When the TKS anti-ice system is in operation, the PFD shows TKS system status with CAS messages on its display. The MFD shows TKS anti-ice fluid quantity on its display. Refer to Figure 4.

(1) When you select the switch in the MAX FLOW AIRFRAME position, the two metering pumps operate continuously for two minutes.

NOTE: The MAX FLOW AIRFRAME/ WINDSHIELD switch is a momentary switch, returning to the OFF position when released. The time the pumps are on in this mode is not affected by holding the switch in the MAX FLOW AIRFRAME position--the pumps cycle off two minutes after the MAX FLOW position is initially selected. After the two minute MAX mode has timed out, MAX FLOW can be selected again by the selecting MAX FLOW AIRFRAME/WINDSHIELD again.

(a) There is no CAS message status message for MAX Mode; the status message displayed will correspond to the PRIMARY mode that is selected for the system: NORM or HIGH. Refer to Figure 4.

(2) When the switch is in the NORM position the metering pumps operate for 30 seconds and then stop for 90 seconds on a continuous cycle.

(a) The PFD will show the CAS message A-ICE NORM (white).

(3) When the PRIMARY HIGH switch is set to the HIGH position metering pump 1 operates continuously.

(4) When the MAX FLOW AIRFRAME/WINDSHIELD switch (SI012) is selected in the WINDSHIELD position, fluid flows to the windshield nozzles.

(5) If the system fails to operate, you can set the BACKUP switch (SI013) to the BACKUP position. When in this position, metering pump 2 operates continuously.

(6) When the system is operating the metering pump(s) provide the anti-ice fluid to the filter assembly. The filter assembly removes contaminants from the fluid to prevent the porous panels from blockage.

(7) The high pressure switch is installed on the outlet side of the metering pumps and on the inlet side of the filter. The switch sends a discrete to the GEA 71 Engine/Airframe Unit when the system pressure is higher than normal operating parameters. The GEA 71 sends the discrete to the GIA 63 to create a CAS message to show on the PDF.

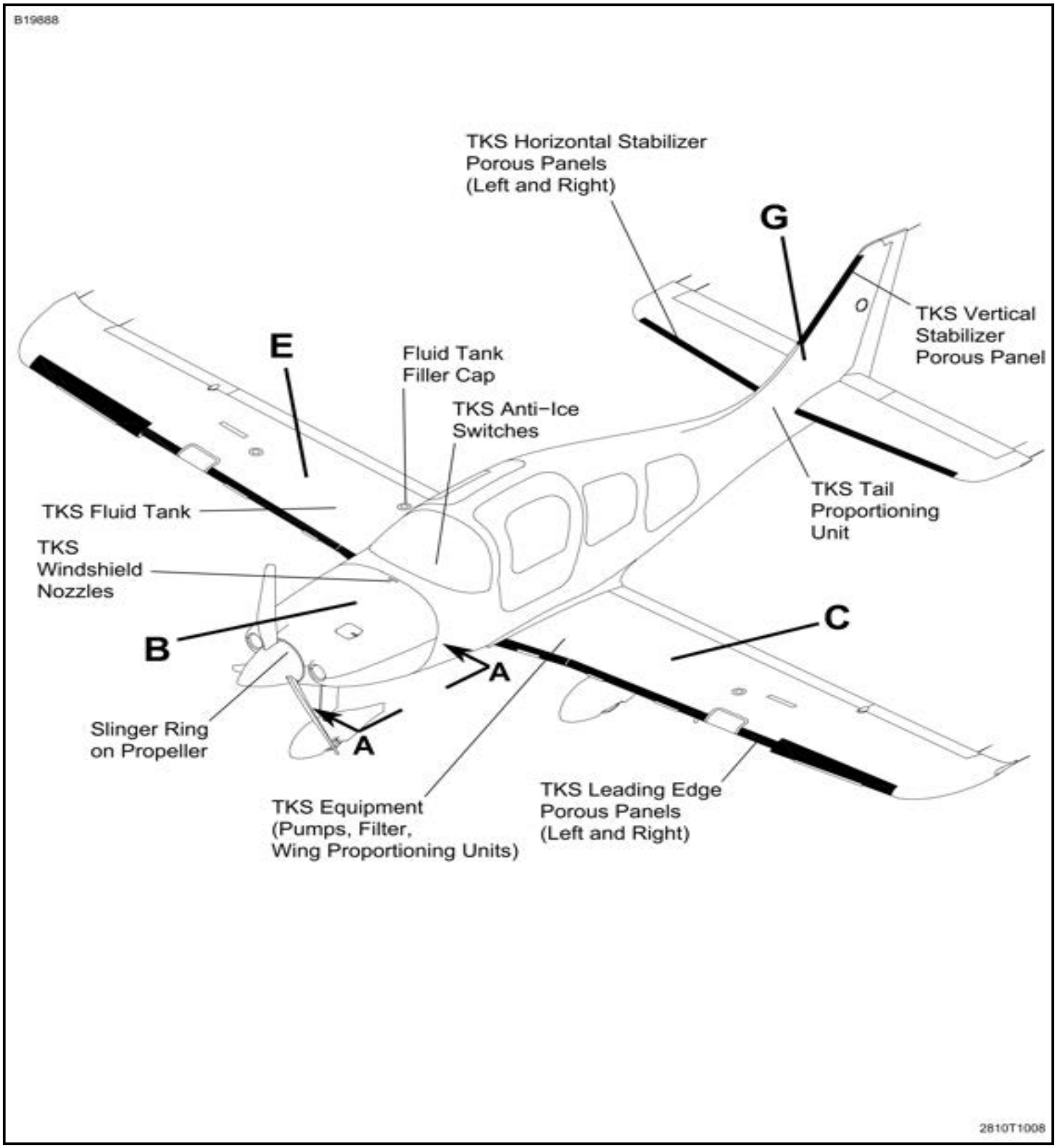
(8) The flow transducer monitors the fluid flow and sends a constant output to the GEA 71 Engine/Airframe Unit which translates it to a flow rate. The G2000 will post a CAS message when the flow rate is found to be too low for the selected mode of system operation (NORM or HIGH).

(9) The anti-ice fluid flows from the filter assembly to the left and right wing and tail proportioning units.

(10) The system of nylon tubing supplies the anti-ice fluid to the porous panels.

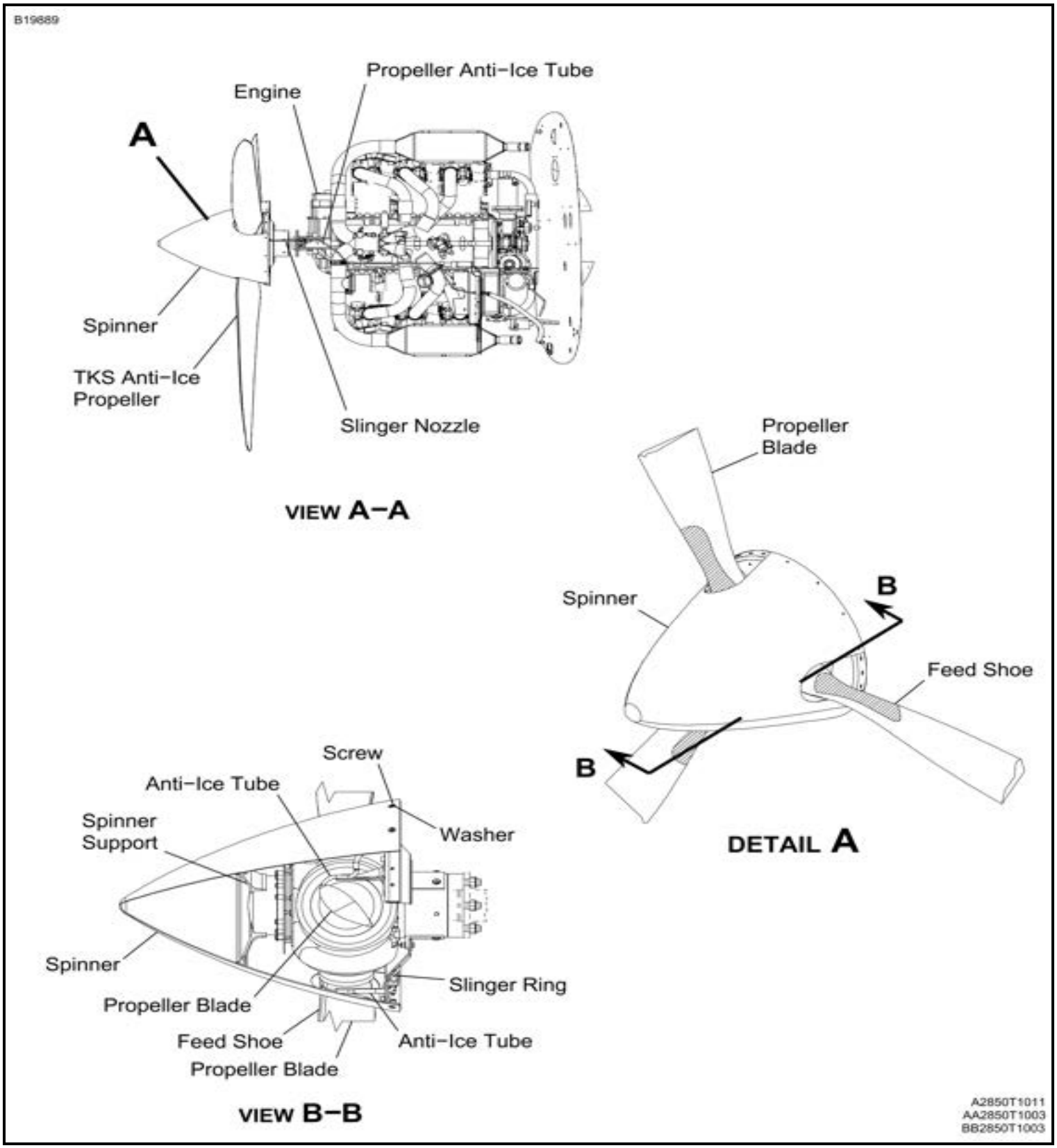
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Figure 1 : Sheet 1 : TKS System Installation



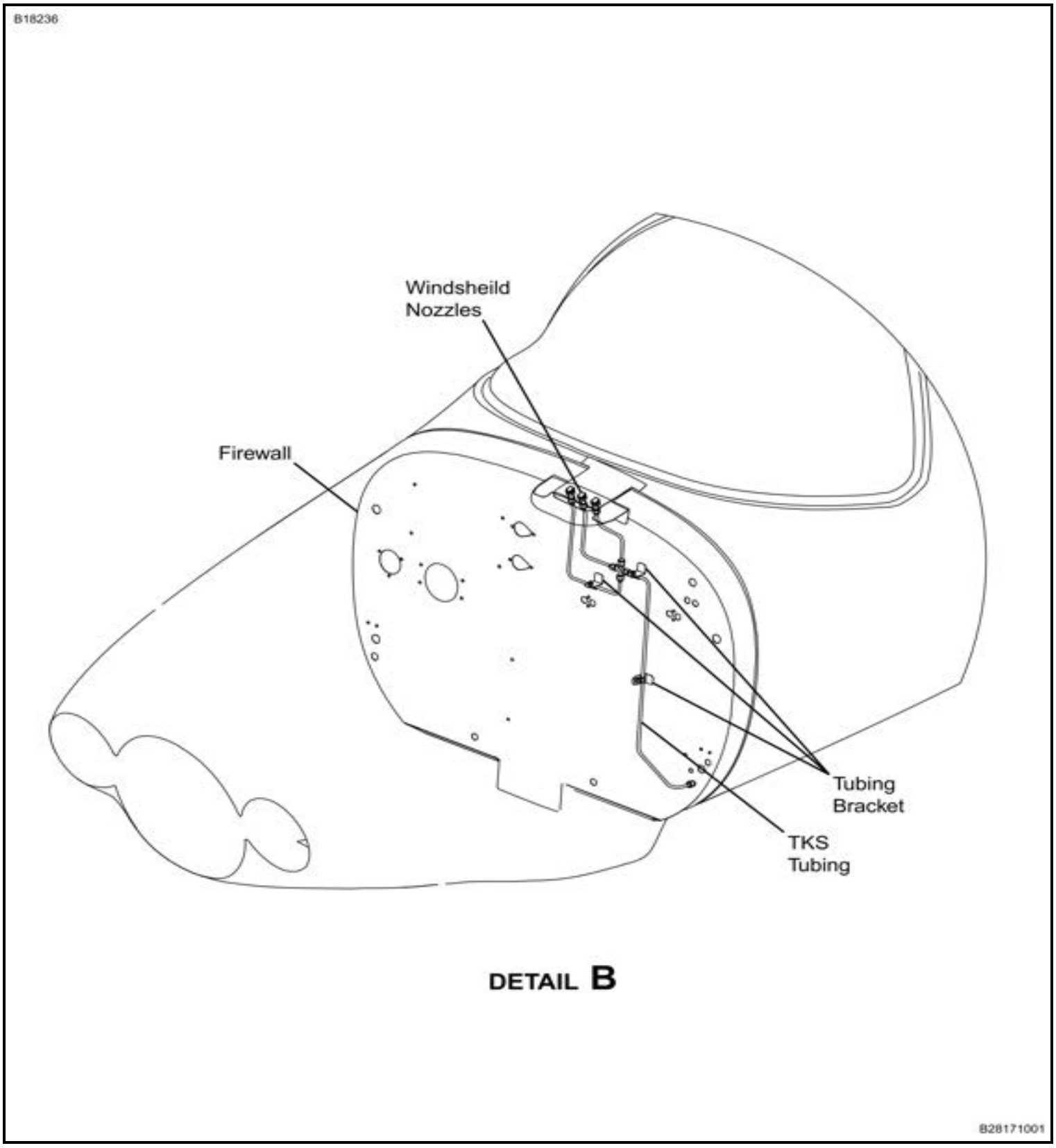
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Figure 1 : Sheet 2 : TKS System Installation



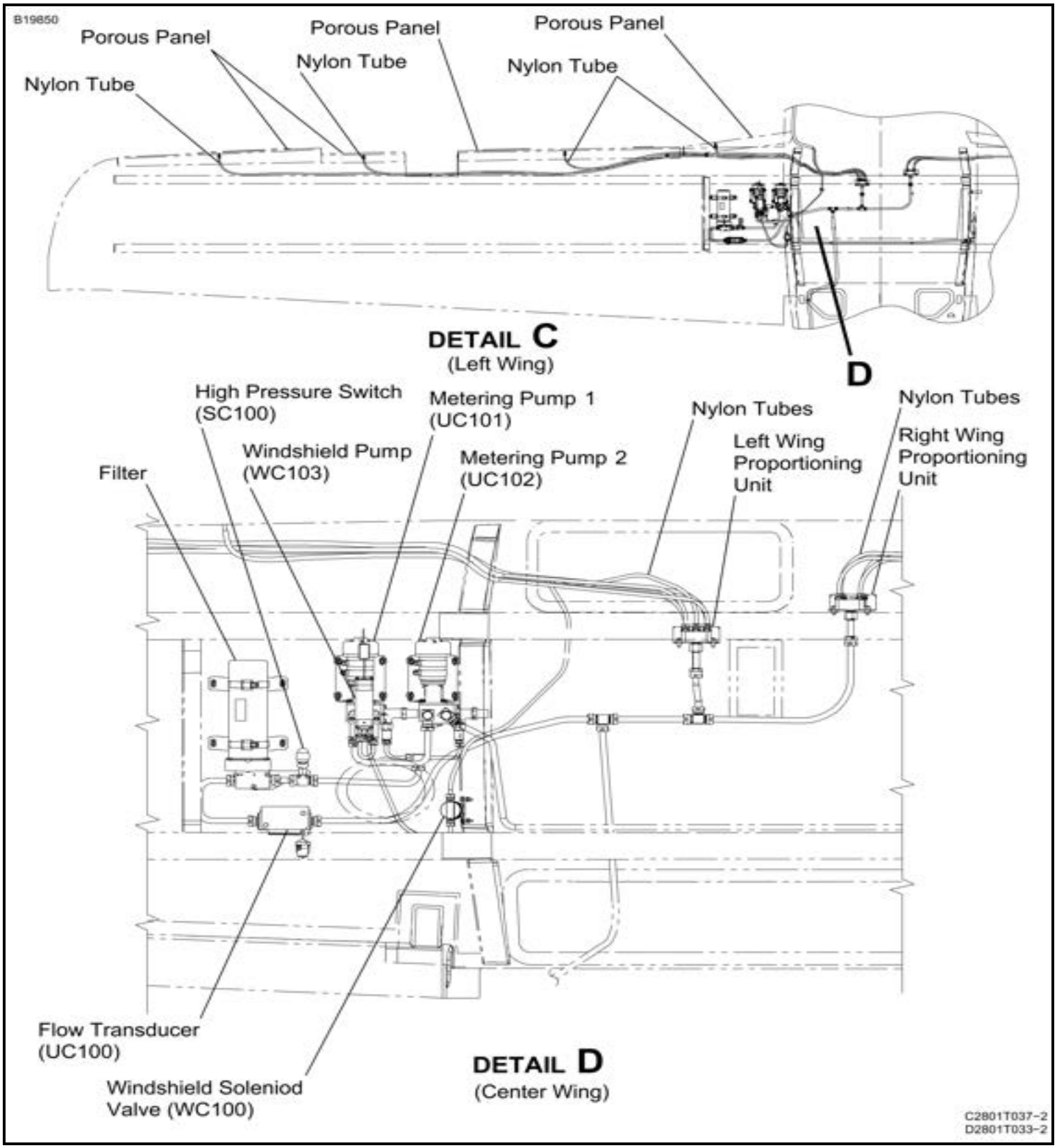
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Figure 1 : Sheet 3 : TKS System Installation



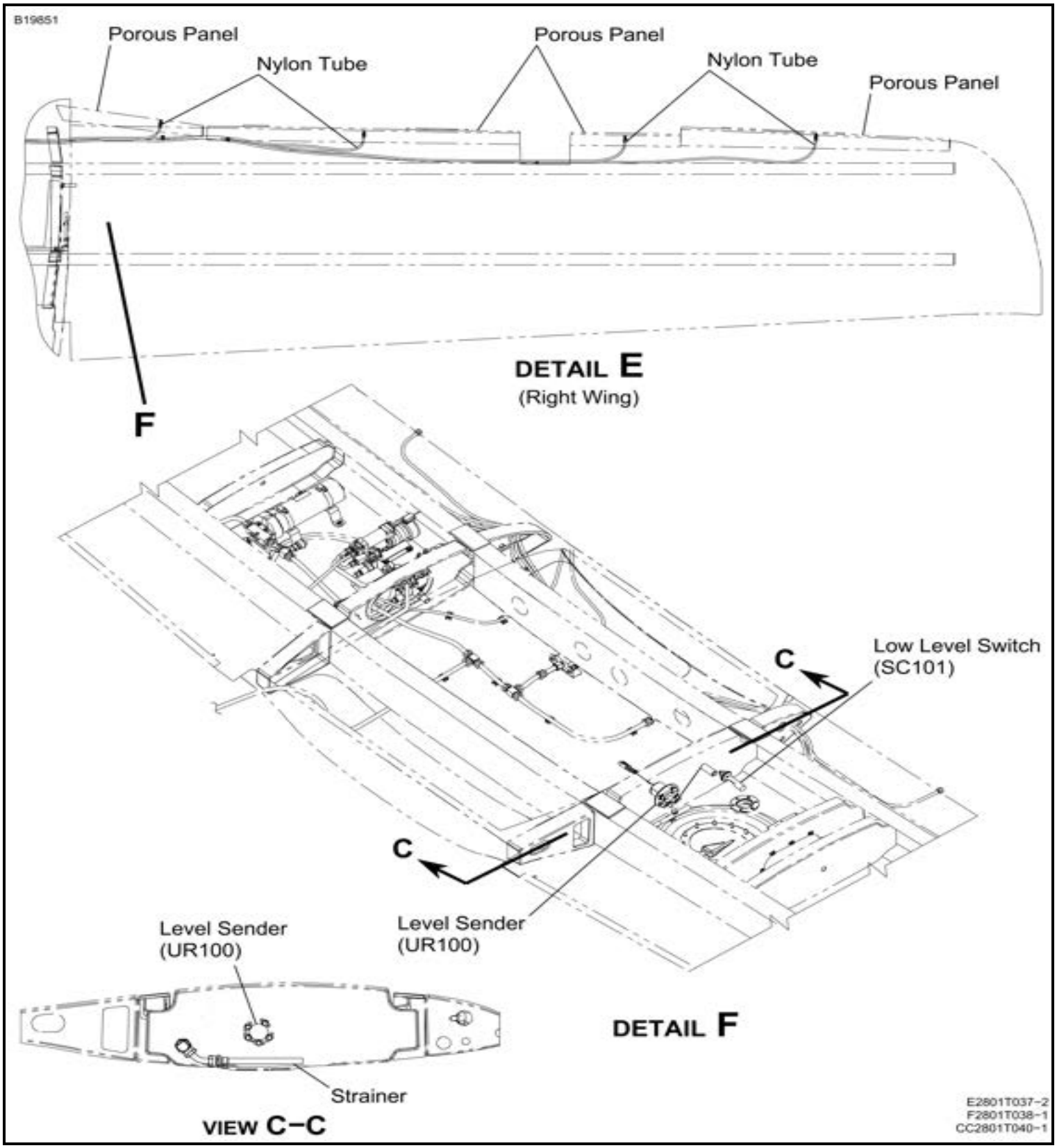
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Figure 1 : Sheet 4 : TKS System Installation



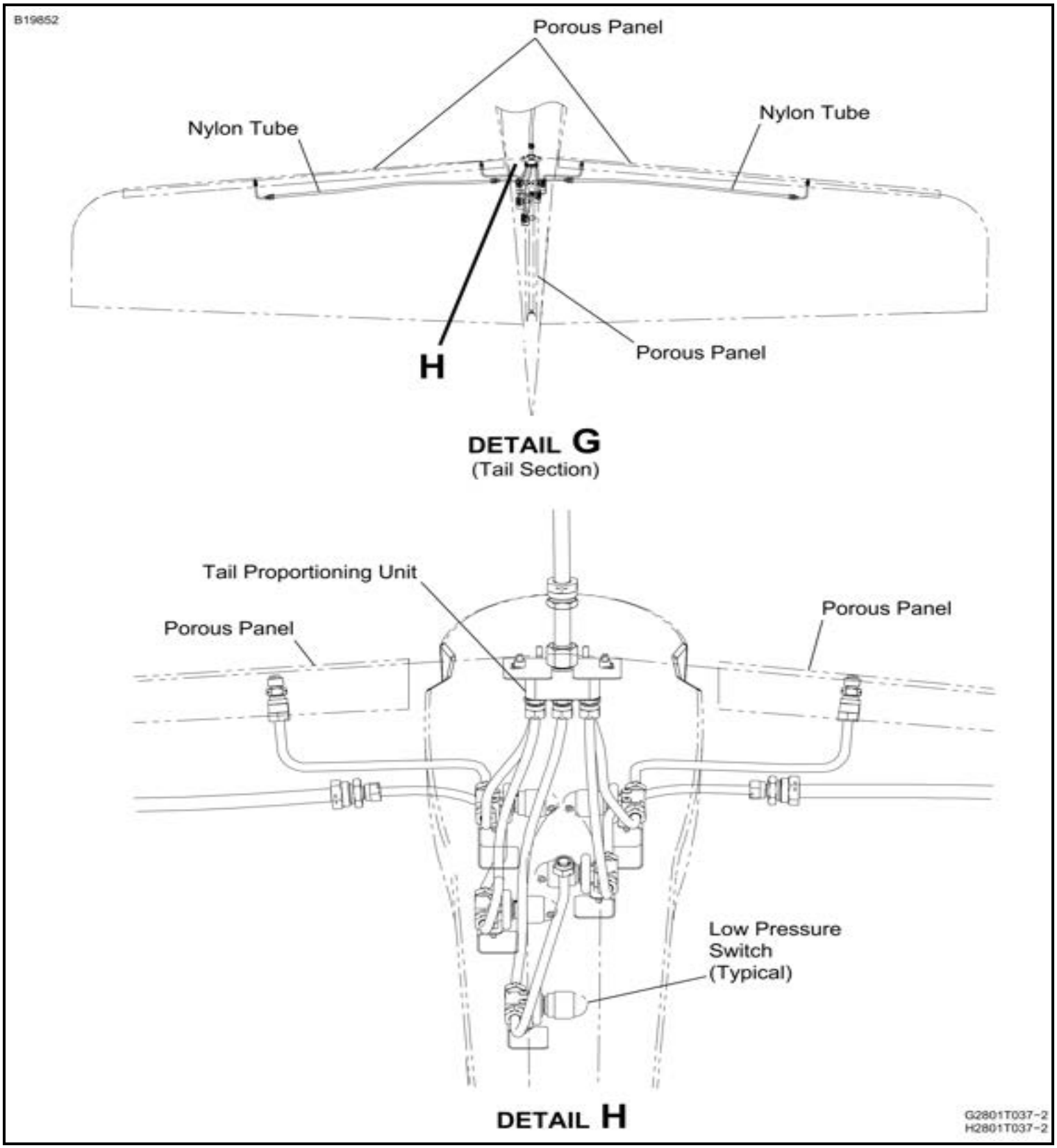
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Figure 1 : Sheet 5 : TKS System Installation



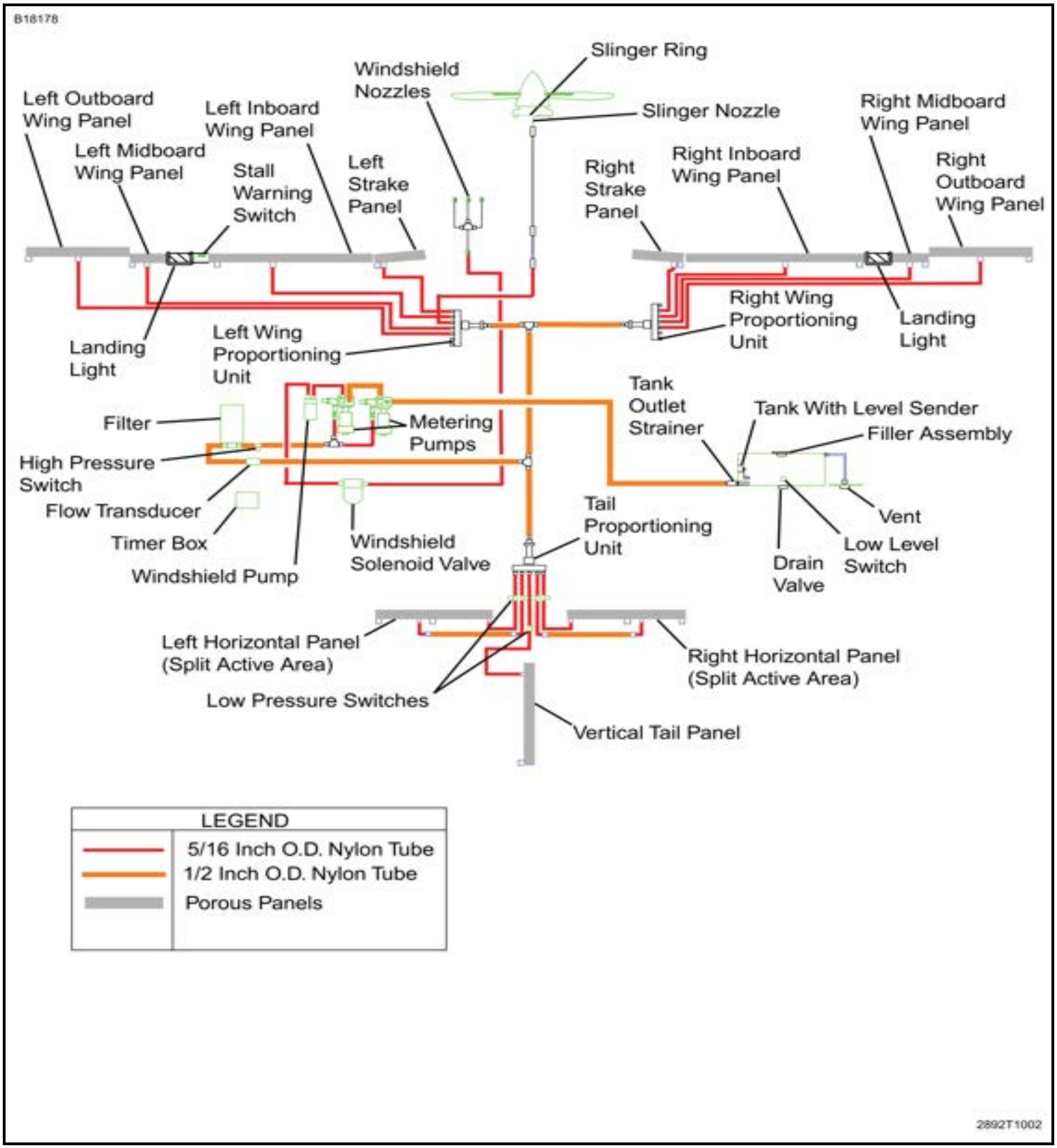
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Figure 1 : Sheet 6 : TKS System Installation



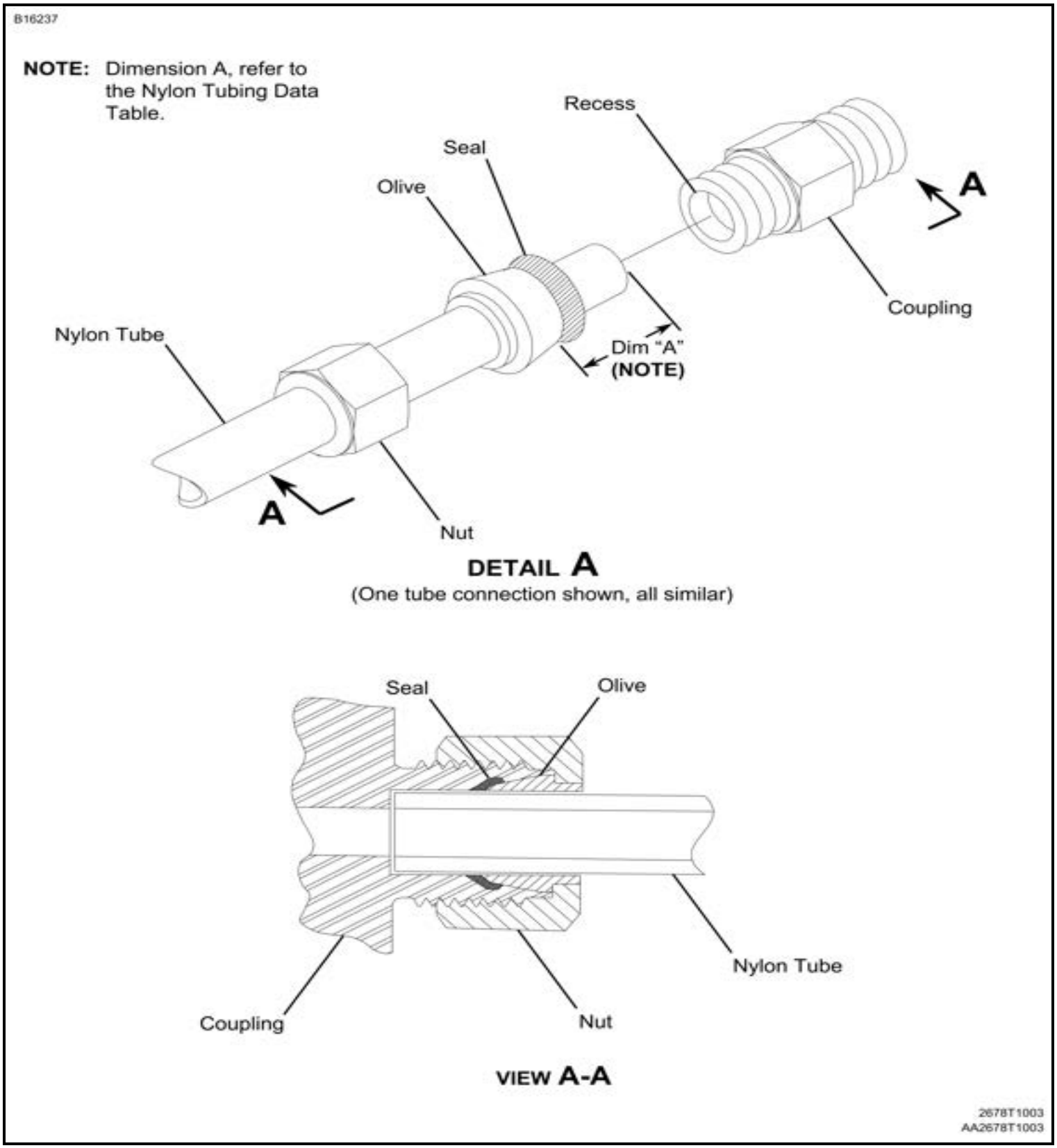
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Figure 2 : Sheet 1 : TKS System Flow Diagram



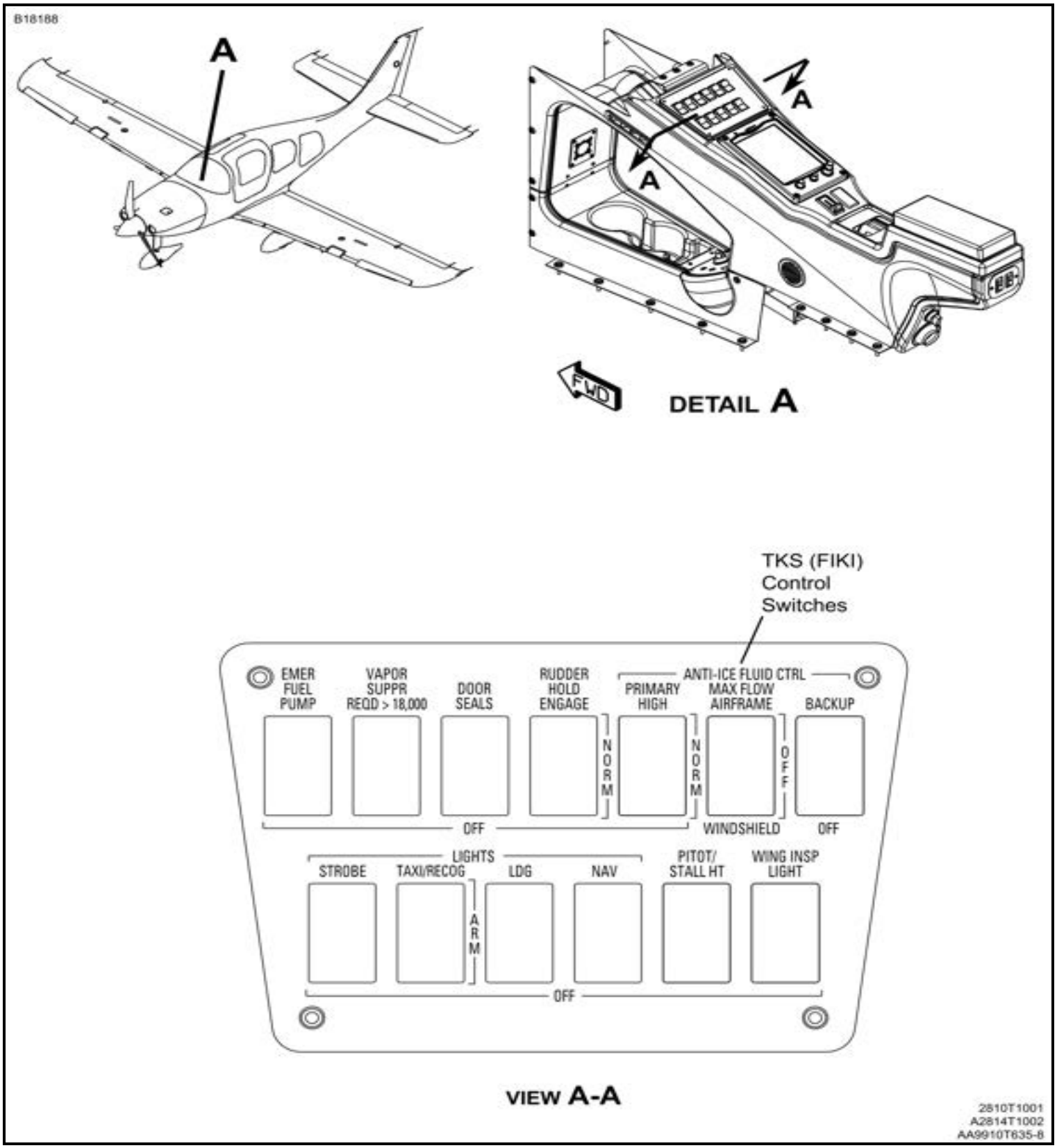
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Figure 2 : Sheet 2 : TKS System Flow Diagram



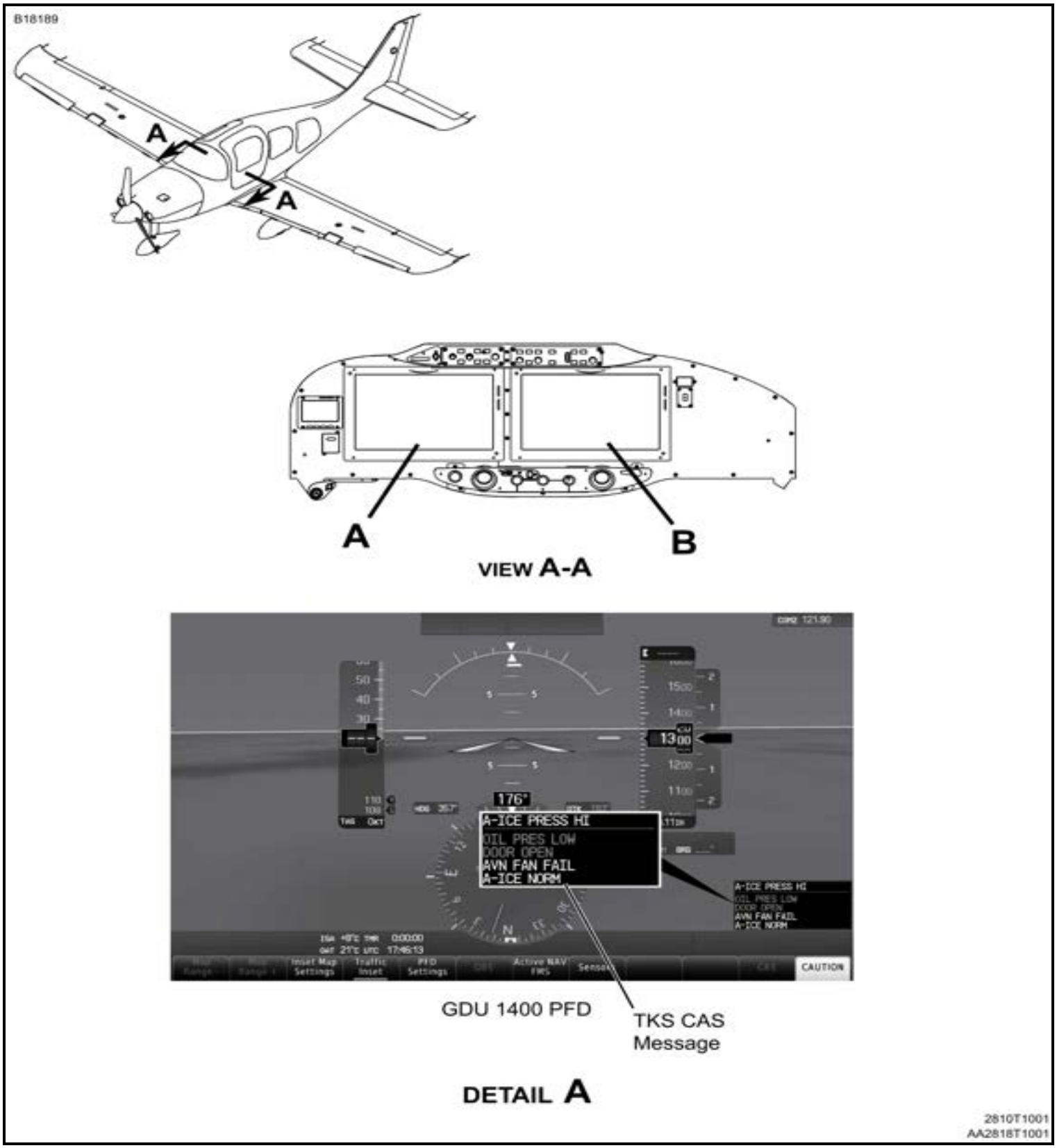
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Figure 3 : Sheet 1 : ANTI-ICE FLUID CTRL Switch Installation



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Figure 4 : Sheet 1 : GDU 1400 PFD/MFD Monitoring



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Figure 4 : Sheet 2 : GDU 1400 PFD/MFD Monitoring

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GDU 1400 MFD

Anti-Ice Fluid Quantity Indicator

DETAIL B



Anti-Ice Time Remaining Indicator

GDU 1400 MFD

DETAIL B

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TKS ANTI-ICE SYSTEM (FIKI) - TROUBLESHOOTING

1. General

A. This section gives troubleshooting procedures for the FIKI TKS anti-ice system. There are logic troubleshooting charts in this section to guide you to the most likely cause and to recommended actions to return the TKS system to a serviceable condition.

B. The TKS system has control switches found on the center console switch panel. The fluid level indication is shown on the multifunction display (MFD) EIS strip. Warning and caution crew alert system (CAS) messages are shown on the primary flight display (PFD) CAS window.

2. Troubleshooting Preliminary

A. Visual Inspections.

NOTE: It is recommended that you do a visual inspection of the anti-ice components before you do the troubleshooting procedures. The visual inspections in this section do not need to be done in order; you may look at the most likely parts and components as necessary. It is recommended that you do all of these inspections when possible.

(1) Look at all of the nylon tube connections. Look at the condition of the nut, olive, and seal or O-ring. If you must replace a part, refer to the Model T240 Illustrated Parts Catalog.

CAUTION: The length of the nylon tube is important. Refer to the Model T240 Illustrated Parts Catalog for the correct part number. A tube with an incorrect length can make the anti-ice system not operate properly.

(2) Inspect the nylon tubing for fluid leaks or evidence of obstructions. Make that sure there are no cuts, holes, or kinks in any of the tubing.

(3) Do an inspection of the windshield nozzles. Examine the system for unserviceable or damaged components.

B. Preliminary Set Up.

(1) Make sure that the TKS test cart is serviceable.

(a) Make sure the test cart filters are clear.

1 If necessary, replace the filters.

(b) Make sure there is sufficient TKS fluid for the test procedures you are going to complete.

1 If necessary, add fluid to the cart.

(c) Make sure that there is sufficient shop air supplied to the test cart.

(2) Make sure that the circuit breakers ANTI-ICE PUMP 1, ANTI-ICE PUMP 2 and W/S ANTI-ICE are engaged.

(3) Make sure the G2000 is operating correctly and is powered up. Make sure the display units are operating. You can cycle the power to individual equipment until proper operation of all the equipment is operating correctly.

(4) Make sure that the anti-ice messages are not displayed on PFD CAS window. If an anti-ice message is shown on the PFD, refer to Table 104. From this table you can find the message and the troubleshooting chart that matches your trouble.

3. Troubleshooting Chart Index

A. There is an extensive set of troubleshooting charts for some of the most common problems for the anti-ice system. Refer to the tables that follow for troubleshooting procedures. When you troubleshoot the FIKI system, refer to the Model T240 Wiring Diagram Manual.

B. Refer to the tables that follow to troubleshoot specific TKS system fault conditions:

- TKS Airframe Pump Fault Conditions
- TKS Windshield Pump Fault Conditions
- TKS Fluid Flow Fault Conditions
- TKS G2000 Indication Fault Conditions

Table 101. TKS Airframe Pump Fault Conditions

FAULT CONDITION	REFER TO:
One of the two metering pumps (pump 1 or pump 2) does not operate when the PRIMARY switch is in the NORM position.	Figure 101
Metering pump 2 does not operate when the BACKUP switch is in the BACKUP position.	Figure 102

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The two metering pumps (pump 1 or pump 2) do not operate when the PRIMARY switch is in the NORM or HIGH position and the MAX FLOW switch is in the AIRFRAME position.	Figure 103
One of the two metering pumps (pump 1 and pump 2) do not operate when the PRIMARY switch is in the NORM position.	Figure 104
The metering pumps (pump 1 and pump 2) do not operate when the PRIMARY switch is in the NORM position.	Figure 105
Metering pump 1 does not operate when the PRIMARY switch is in the HIGH position.	Figure 106
The metering pumps (pump 1 and pump 2) do not operate in the 30 second on and 90 second off sequence when the PRIMARY switch is in the NORM position.	Figure 107
When the MAX FLOW switch has the AIRFRAME position selected, each of the two metering pumps do not revert to the selected PRIMARY mode after operating for 120 seconds.	Figure 108
When the ANTI-ICE PUMP 1 circuit breaker is disengaged, the metering pump 1 operates in the NORM, HIGH, or MAX mode.	Figure 109
When the ANTI-ICE PUMP 2 circuit breaker is disengaged, the metering pump 2 operates in the NORM, BACKUP or MAX mode.	Figure 110

Table 102. TKS Windshield Pump Fault Conditions

FAULT CONDITION	REFER TO:
The windshield pump does not operate when the MAX FLOW switch is in the WINDSHIELD position.	Figure 111
The windshield pump does not stop operating 4 seconds after the MAX FLOW switch is released from the WINDSHIELD position.	Figure 112
When the W/S ANTI-ICE circuit breaker is disengaged, the windshield pump operates when the MAX FLOW switch is in the WINDSHIELD position.	Figure 113

Table 103. TKS Fluid Flow Fault Conditions

FAULT CONDITION	REFER TO:
No fluid comes out of the nylon tubing.	Figure 114
No fluid or uneven flow coming out of porous panels during panel purge.	Figure 115
No fluid comes out of panels during a full TKS operational test.	Figure 116
No fluid comes out of the windshield nozzles.	Figure 117

Table 104. TKS G2000 Indication Fault Conditions

FAULT CONDITION	REFER TO:
The TKS fluid indication is incorrect on the MFD TKS fluid quantity gage.	Figure 118
With the PRIMARY switch in the NORM position, the A-ICE NORM message does not show on the PFD CAS window.	Figure 119
With the PRIMARY switch in the HIGH position, the A-ICE HIGH message does not show on the PFD CAS window	Figure 120
With the BACKUP switch in the BACKUP position, the A-ICE BACKUP message does not show on the PFD CAS window	Figure 121
With the system operating correctly, the A-ICE HIGH fail message shows on the PFD CAS window.	Figure 122
With the PRIMARY switch in the HIGH position, there is A-ICE PRESS HI CAS message, but the pressure is not high.	Figure 123
When the fluid quantity gage on the MFD shows 1 gallon or less the A-ICE FLUID LO message does not show on the PFD CAS window.	Figure 124

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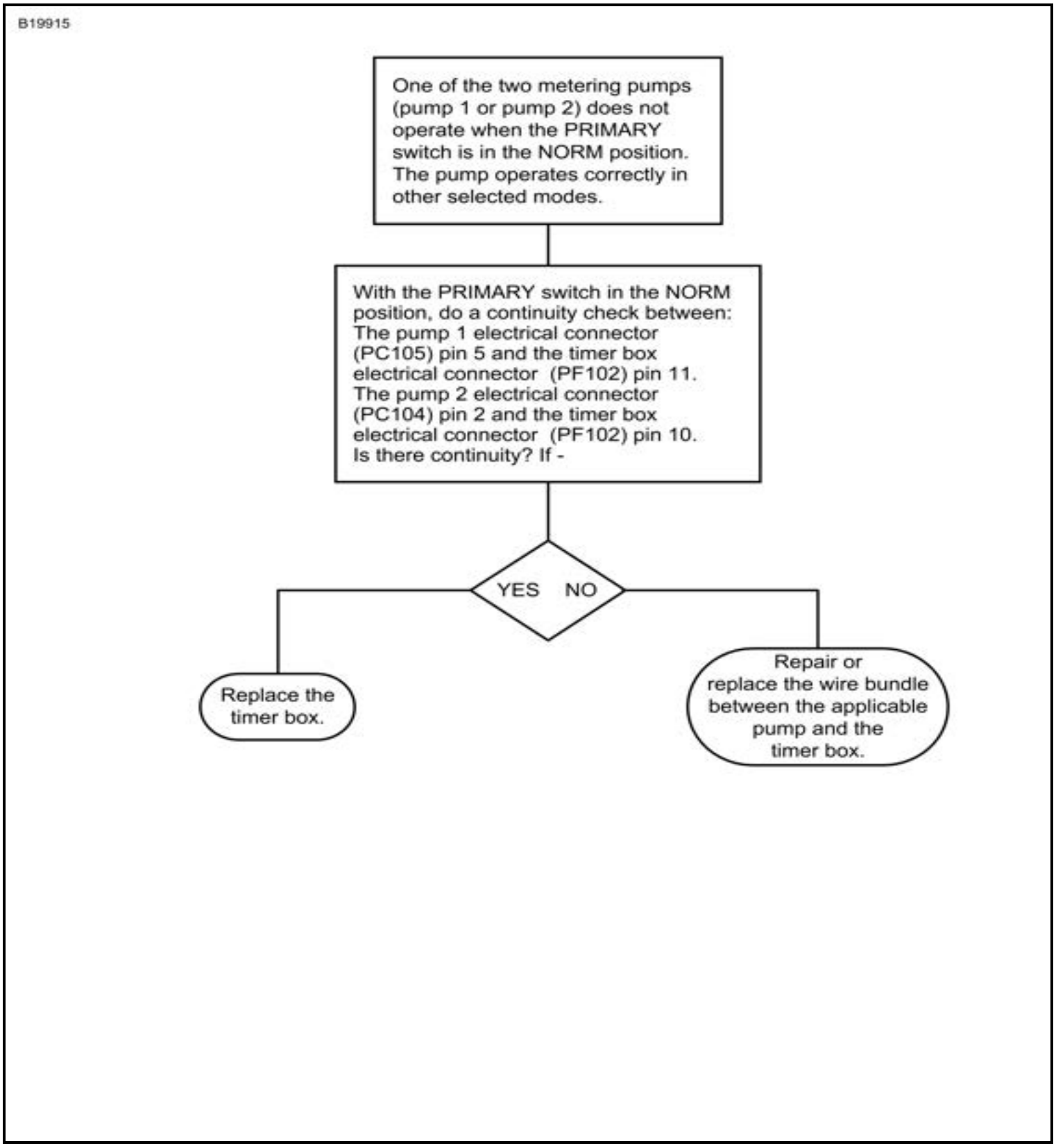
Table 105. Fluid Quantity Voltage

Voltage (+ 0.16 or - 0.16V)	Fluid (+ 0.5 or - 0.5 gal)
2.34	0.0
2.39	0.5
2.44	1.0
2.48	1.5
2.63	3.0
2.92	6.0
3.32	10.0

4. Troubleshooting Charts

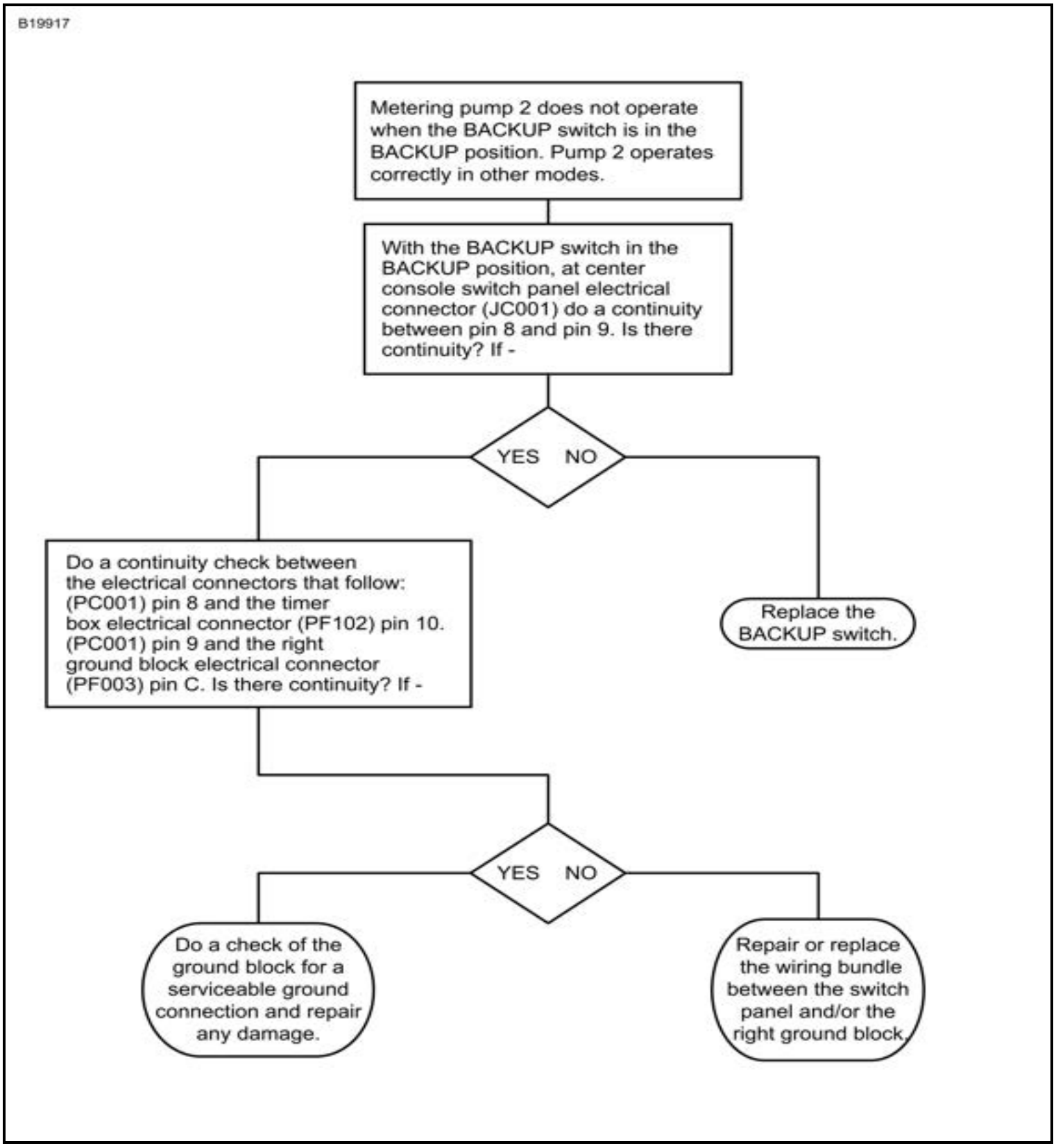
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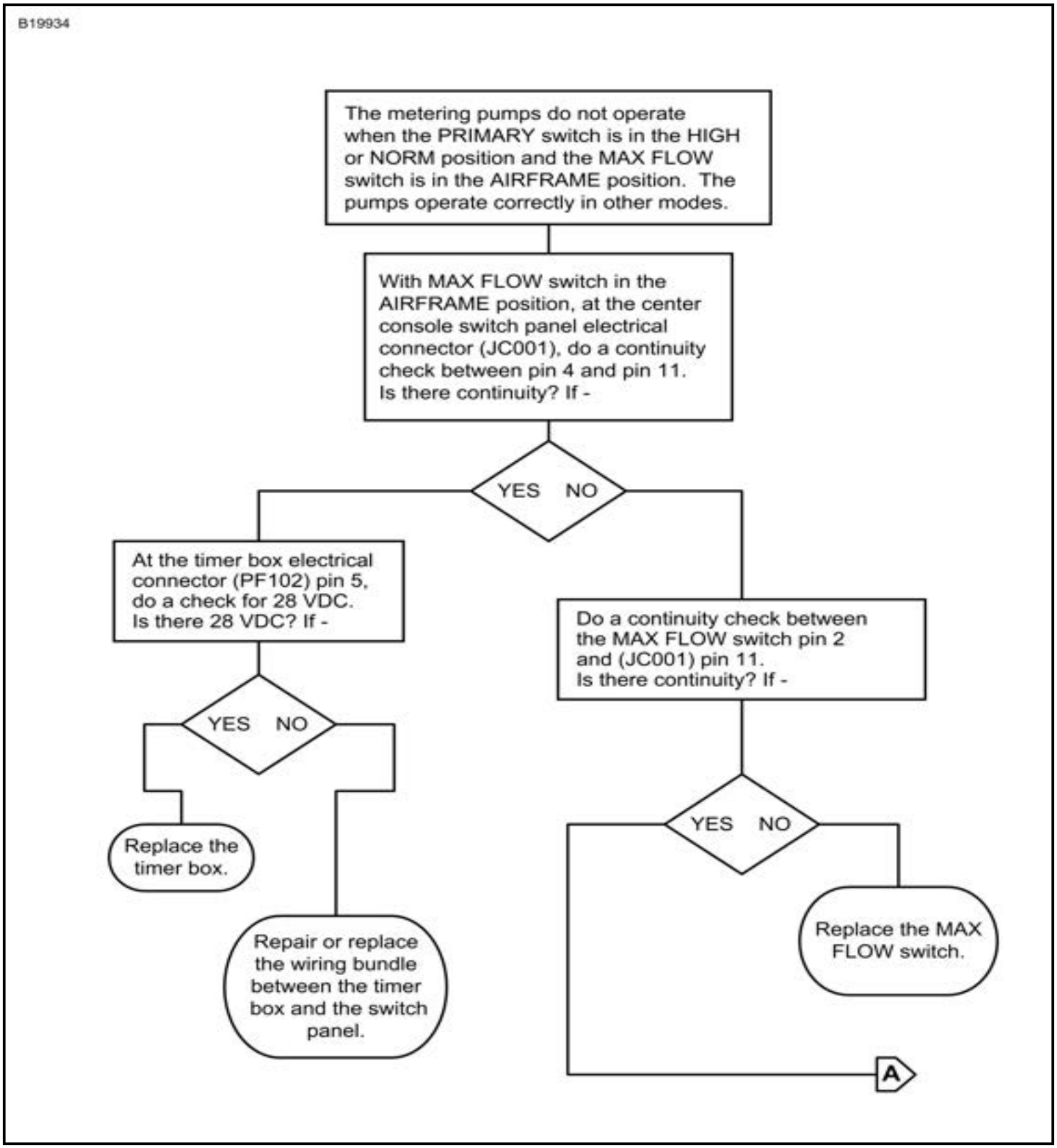
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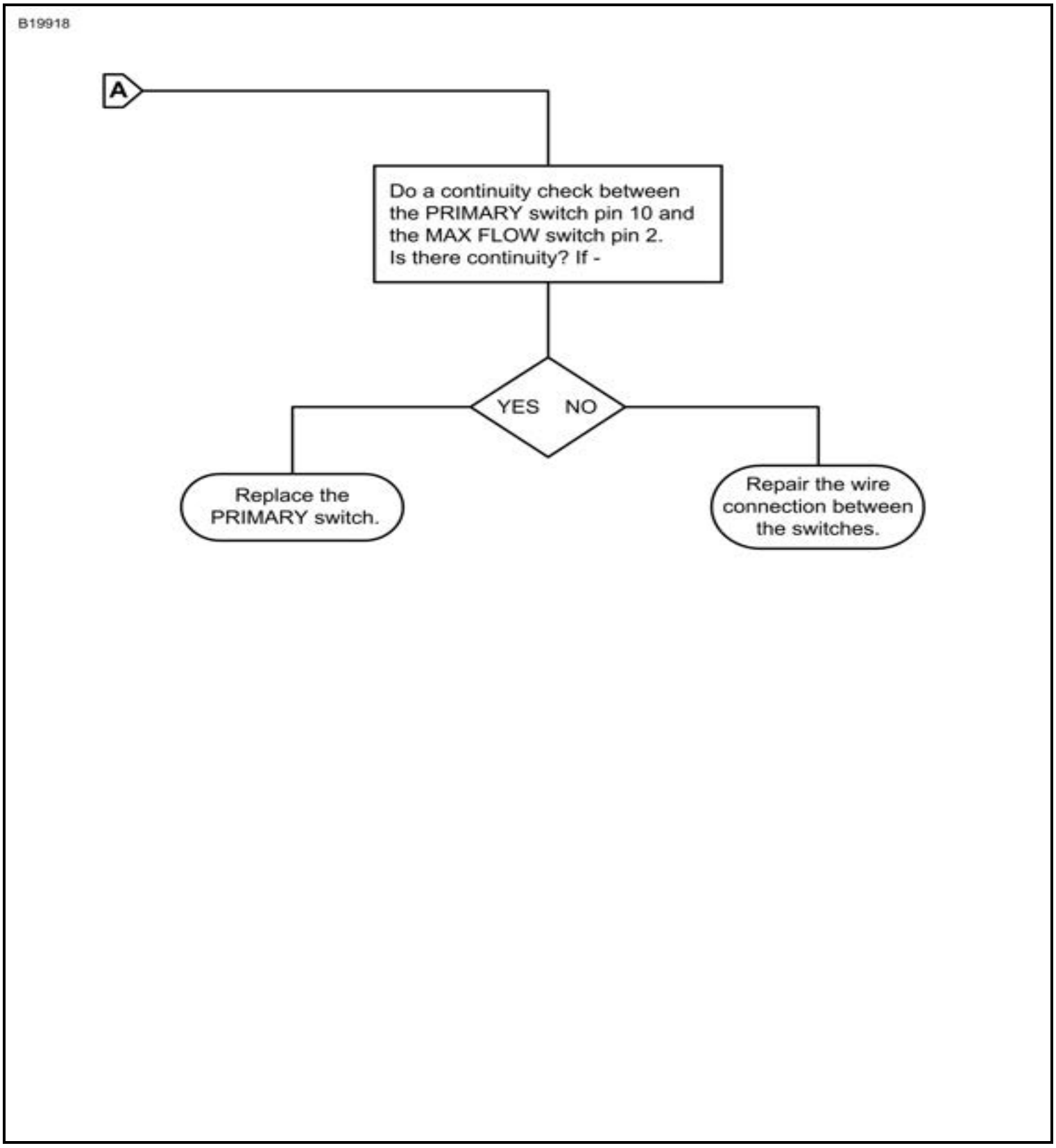
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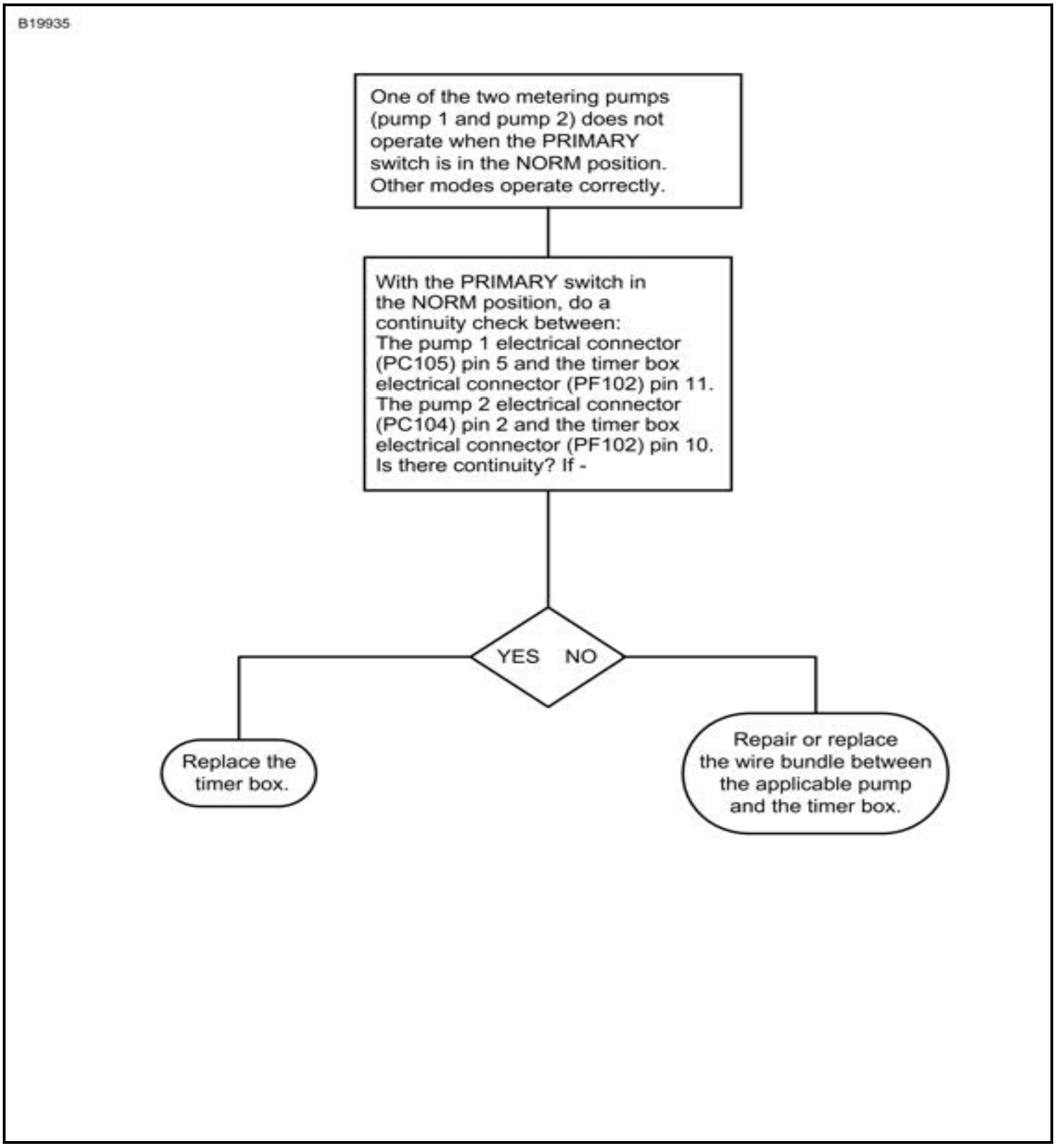
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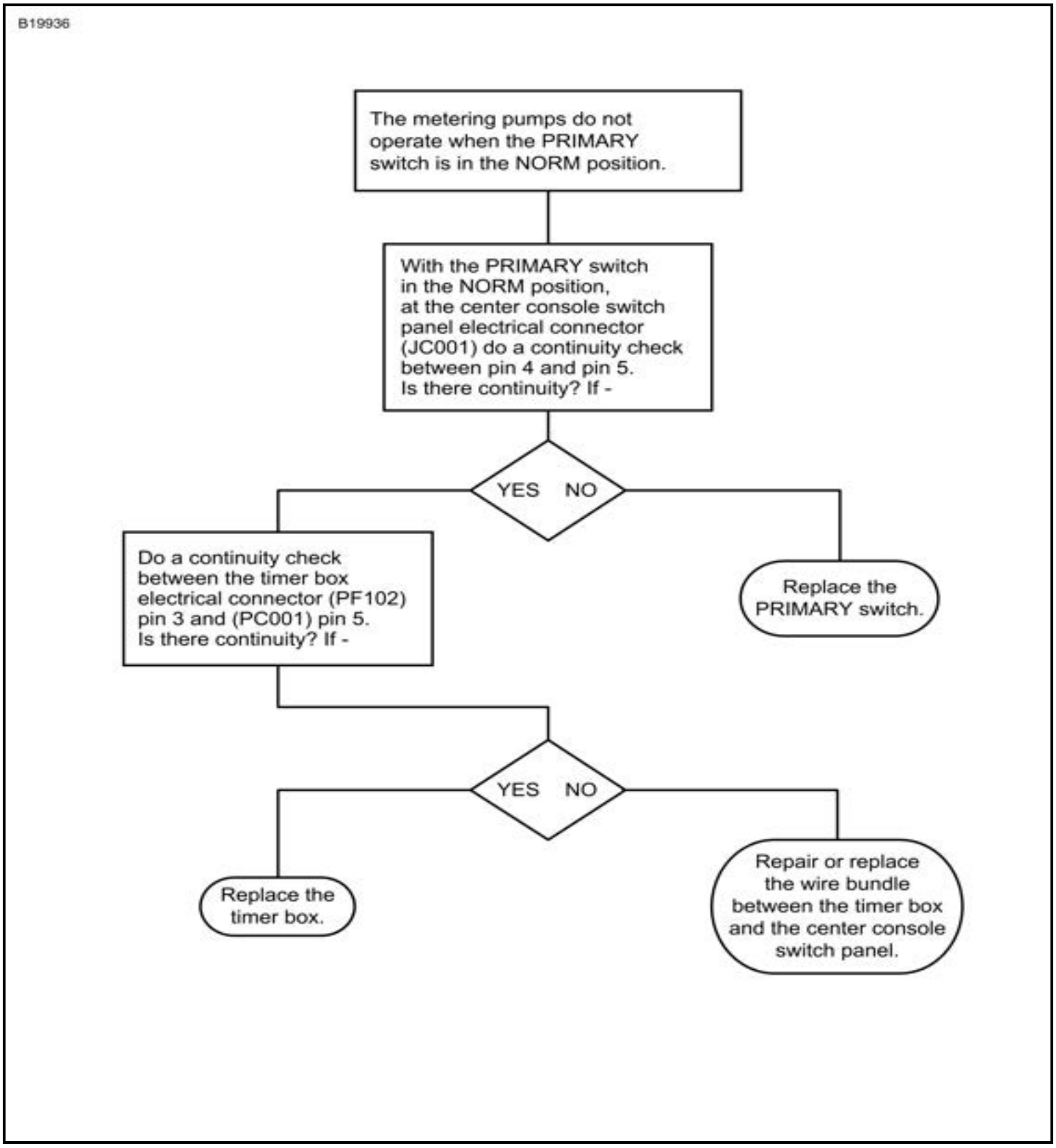
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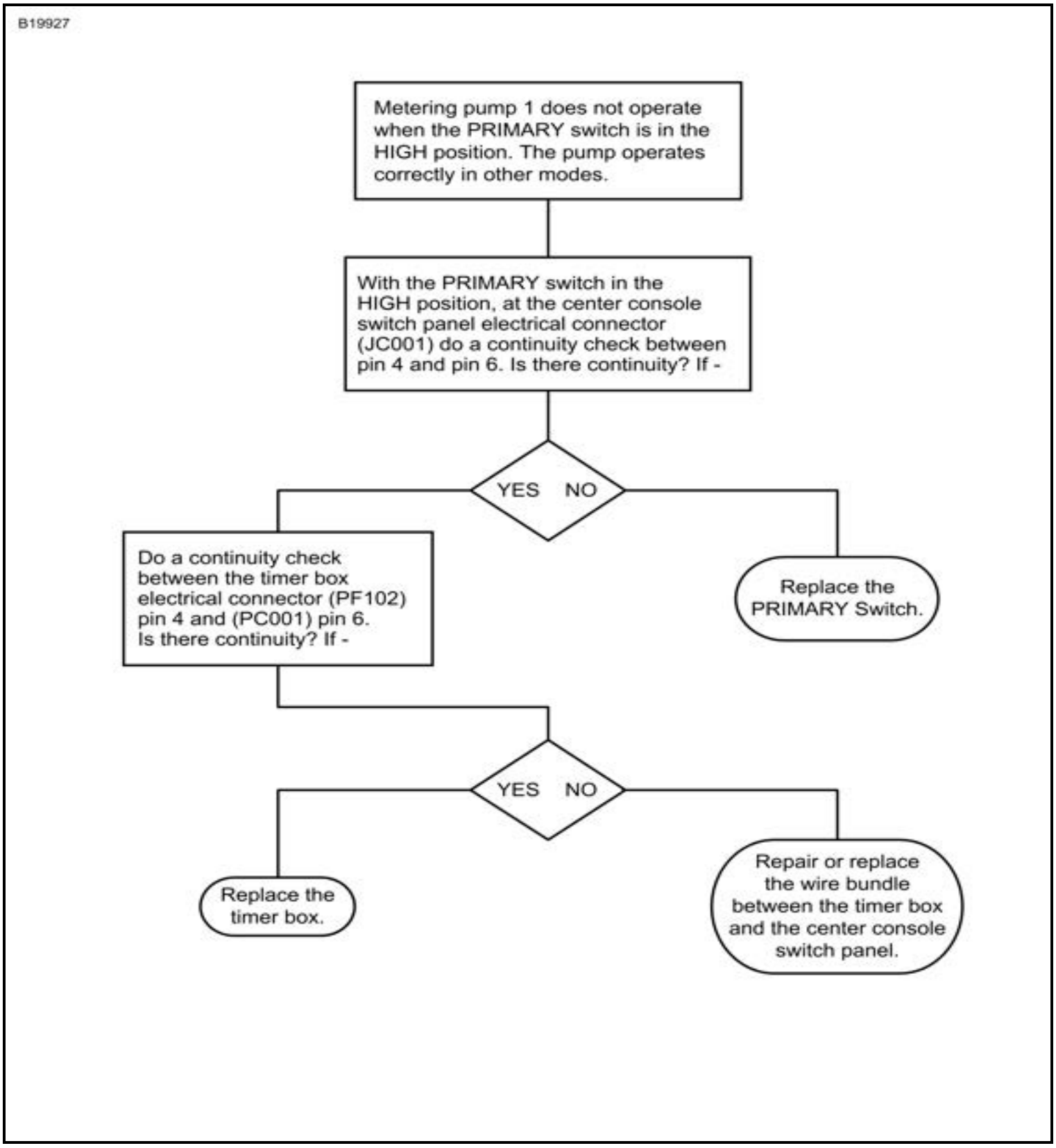
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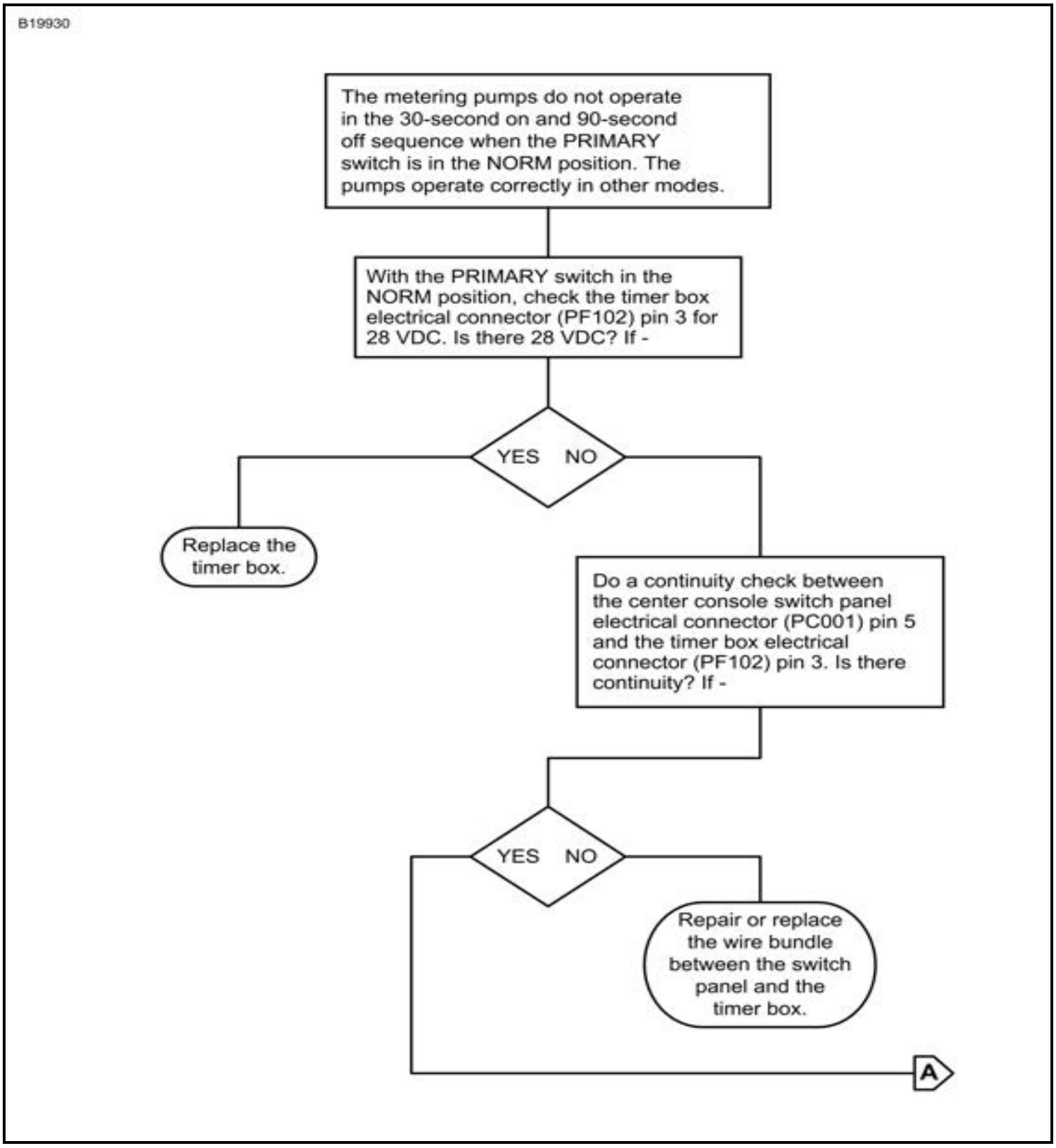
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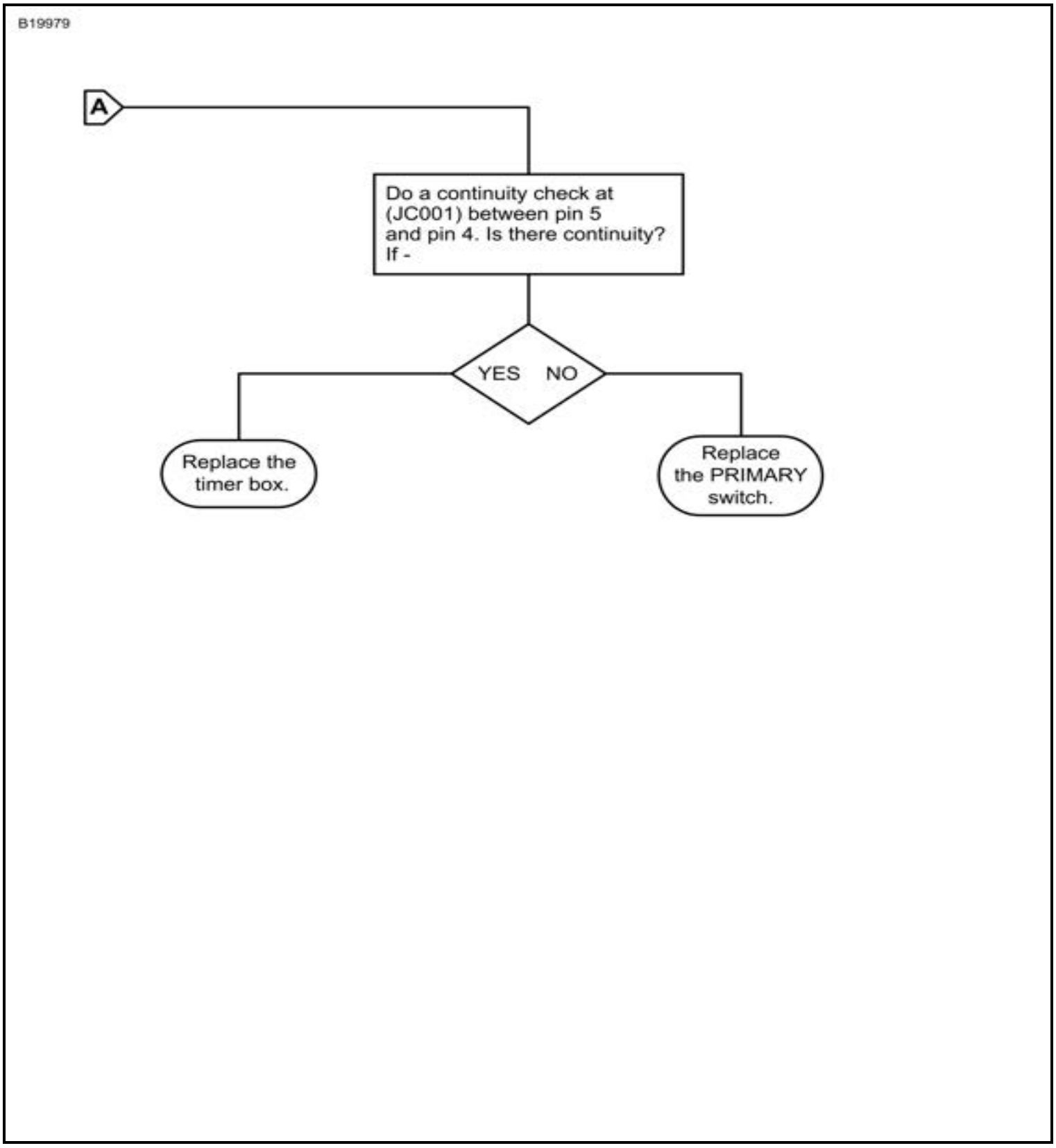
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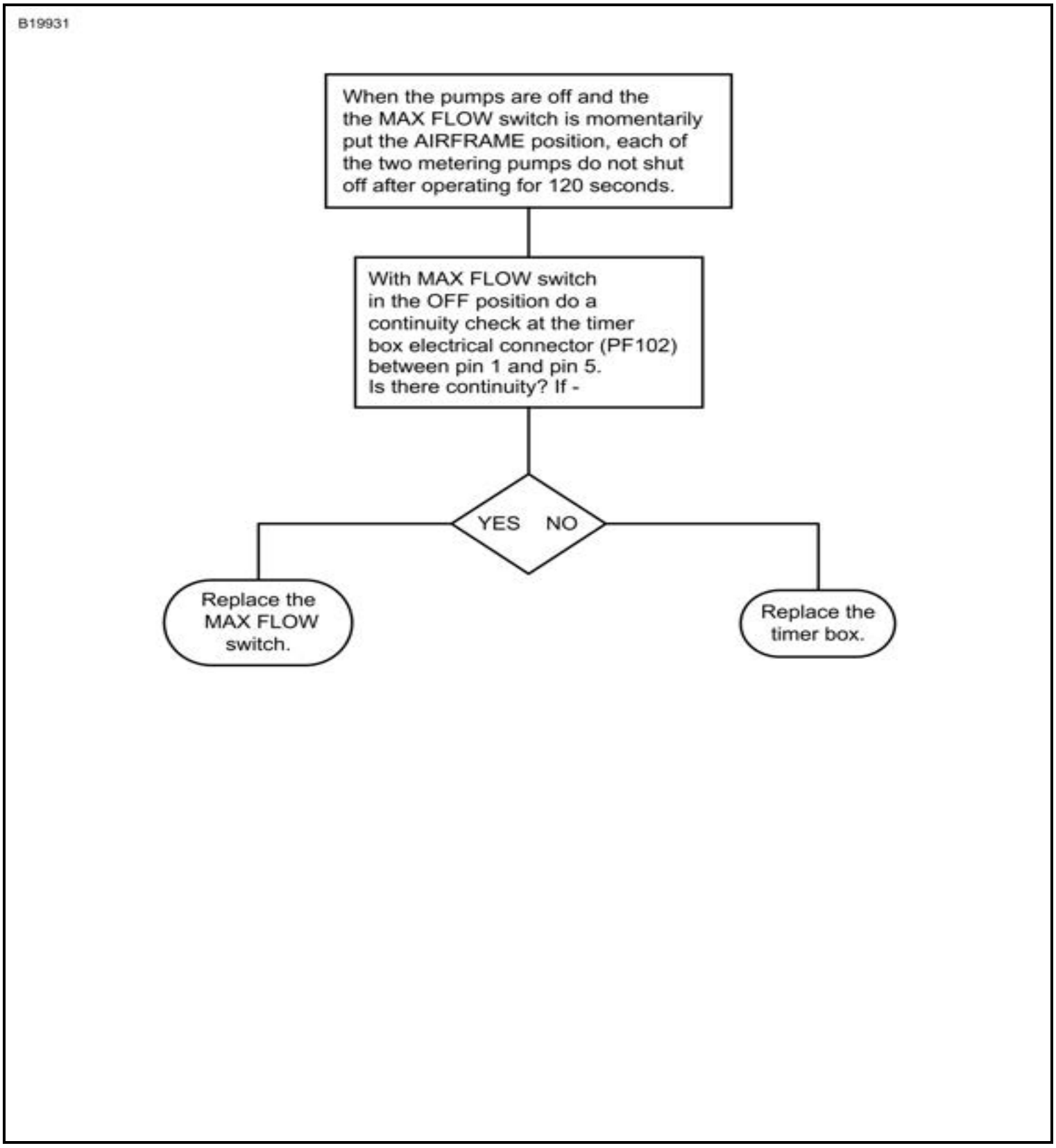
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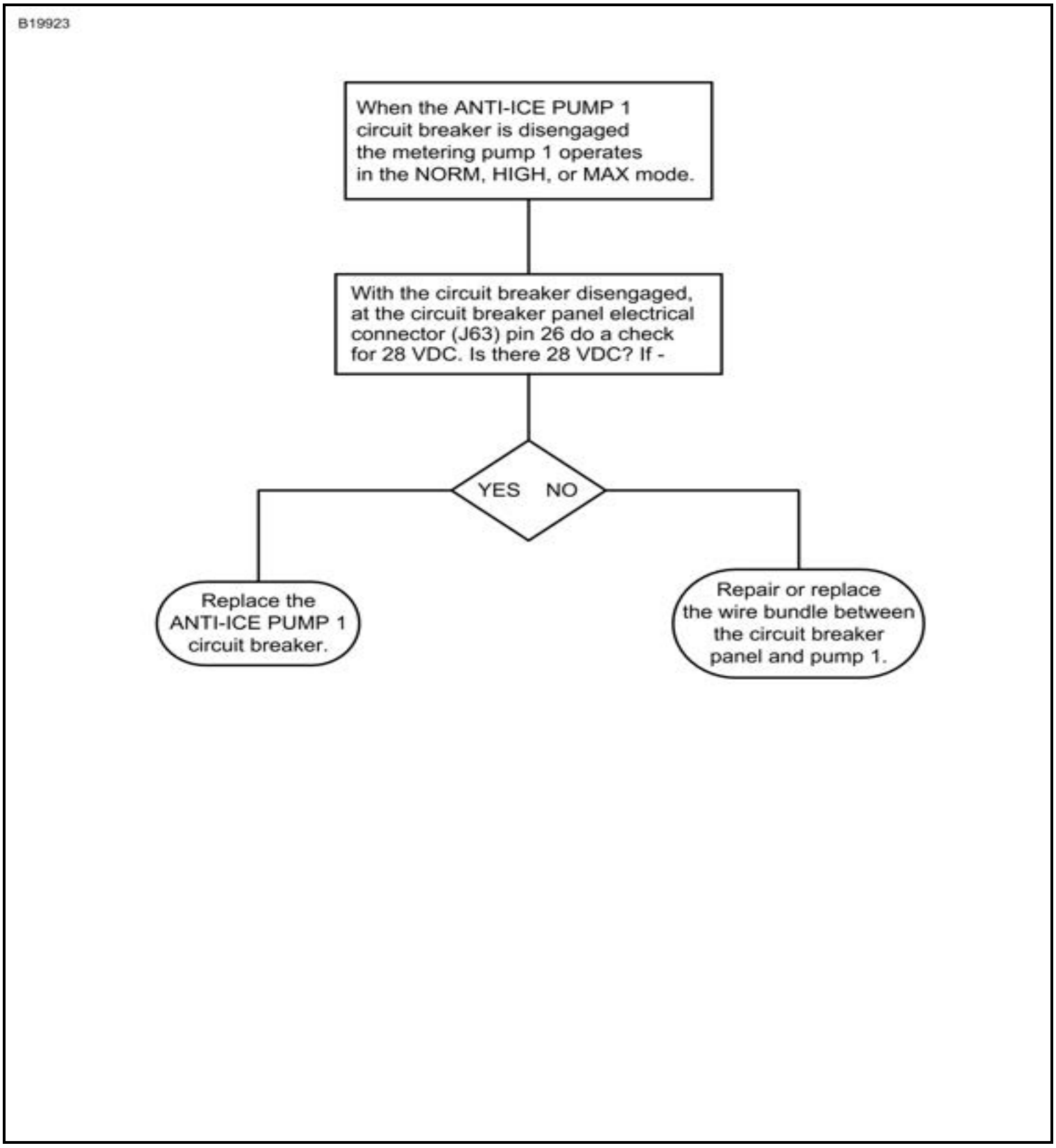
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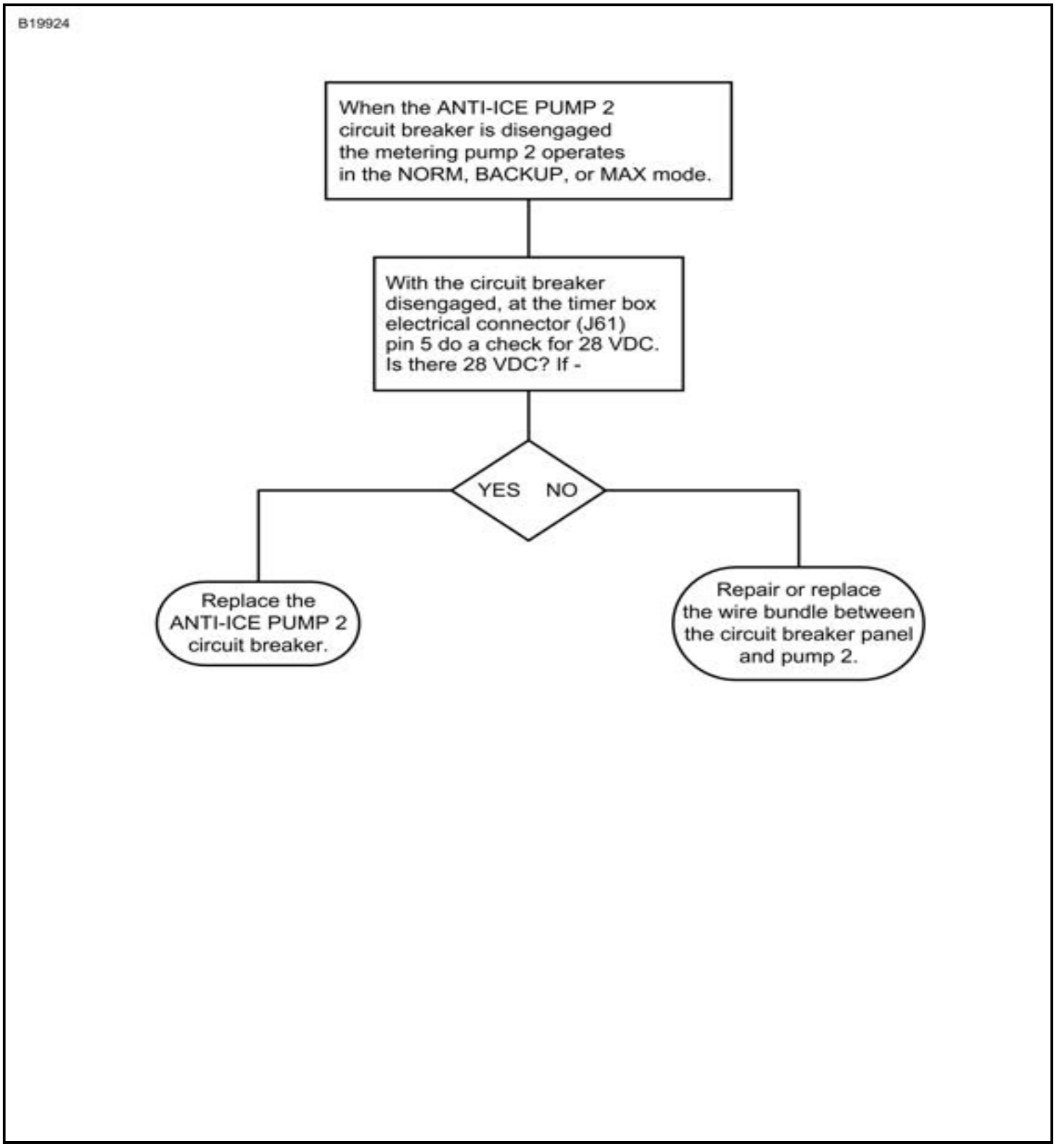
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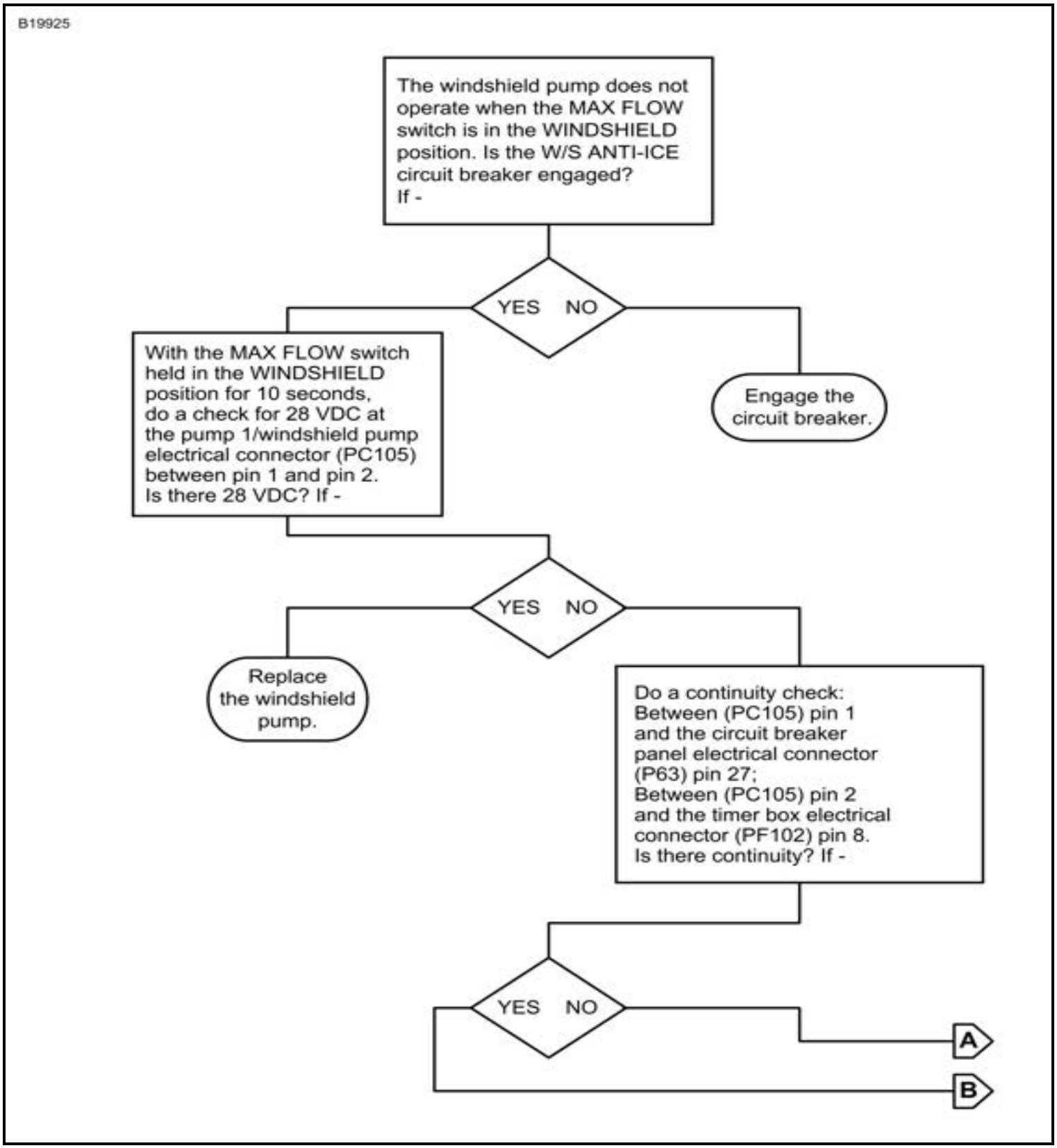
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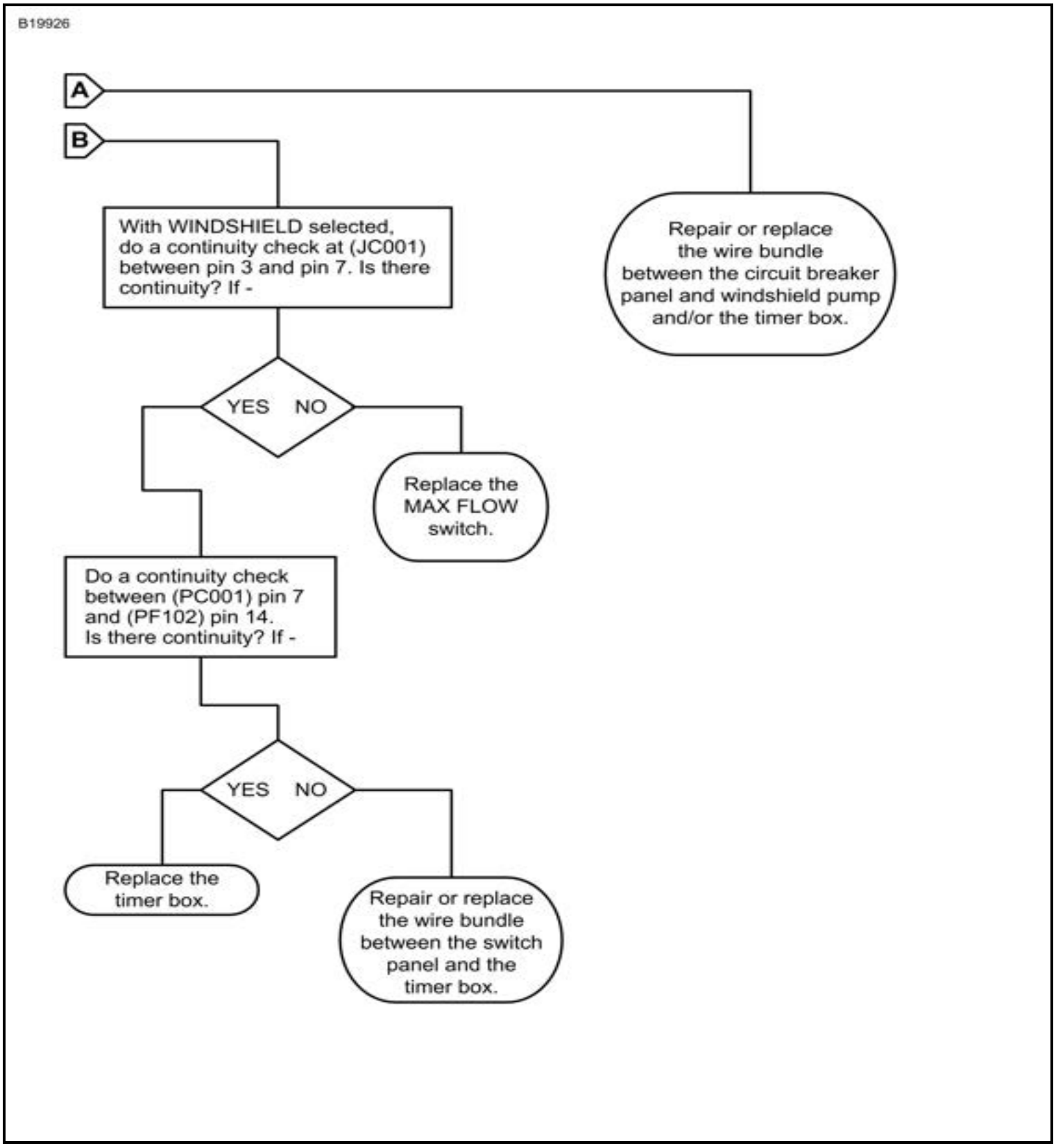
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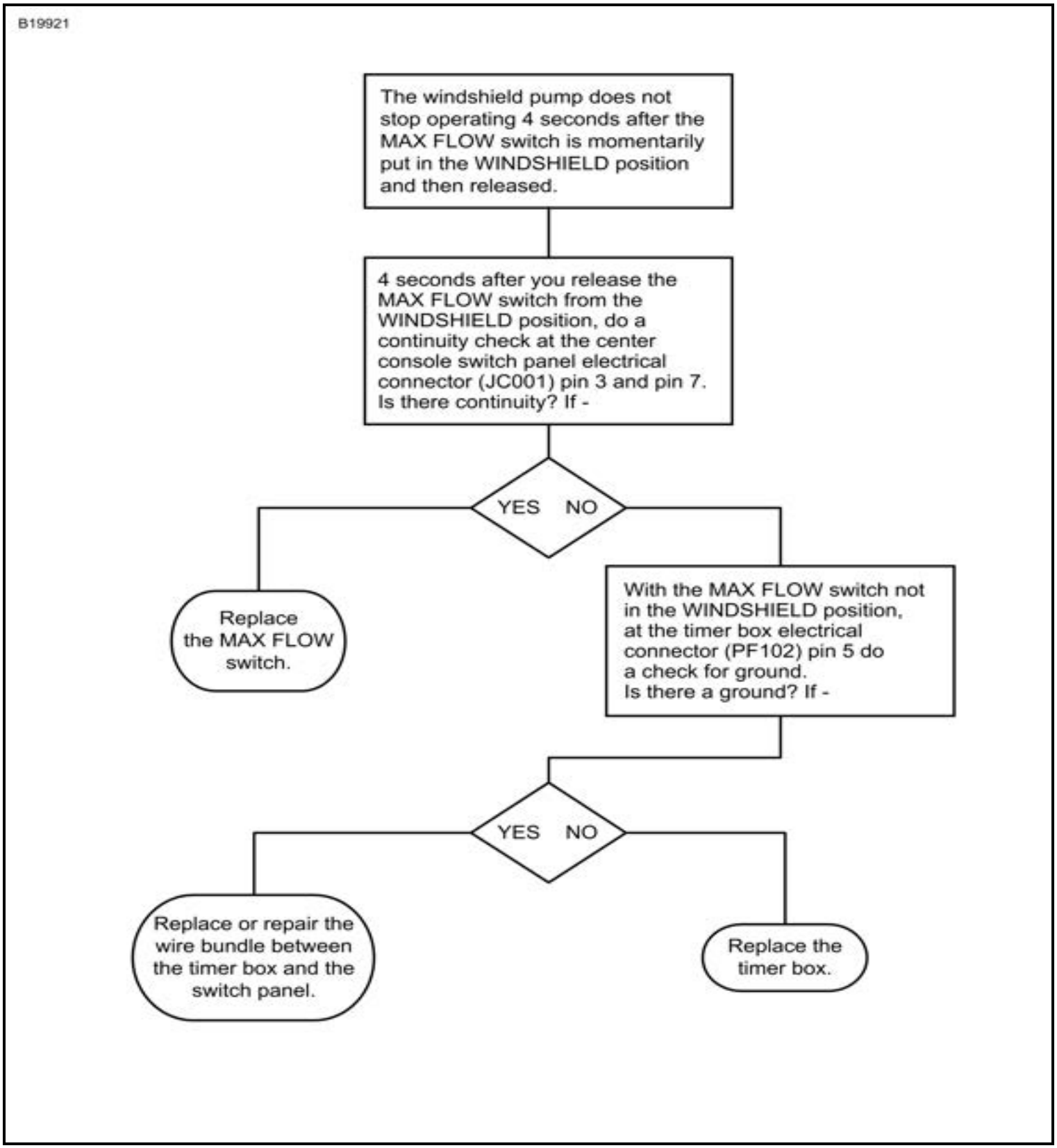
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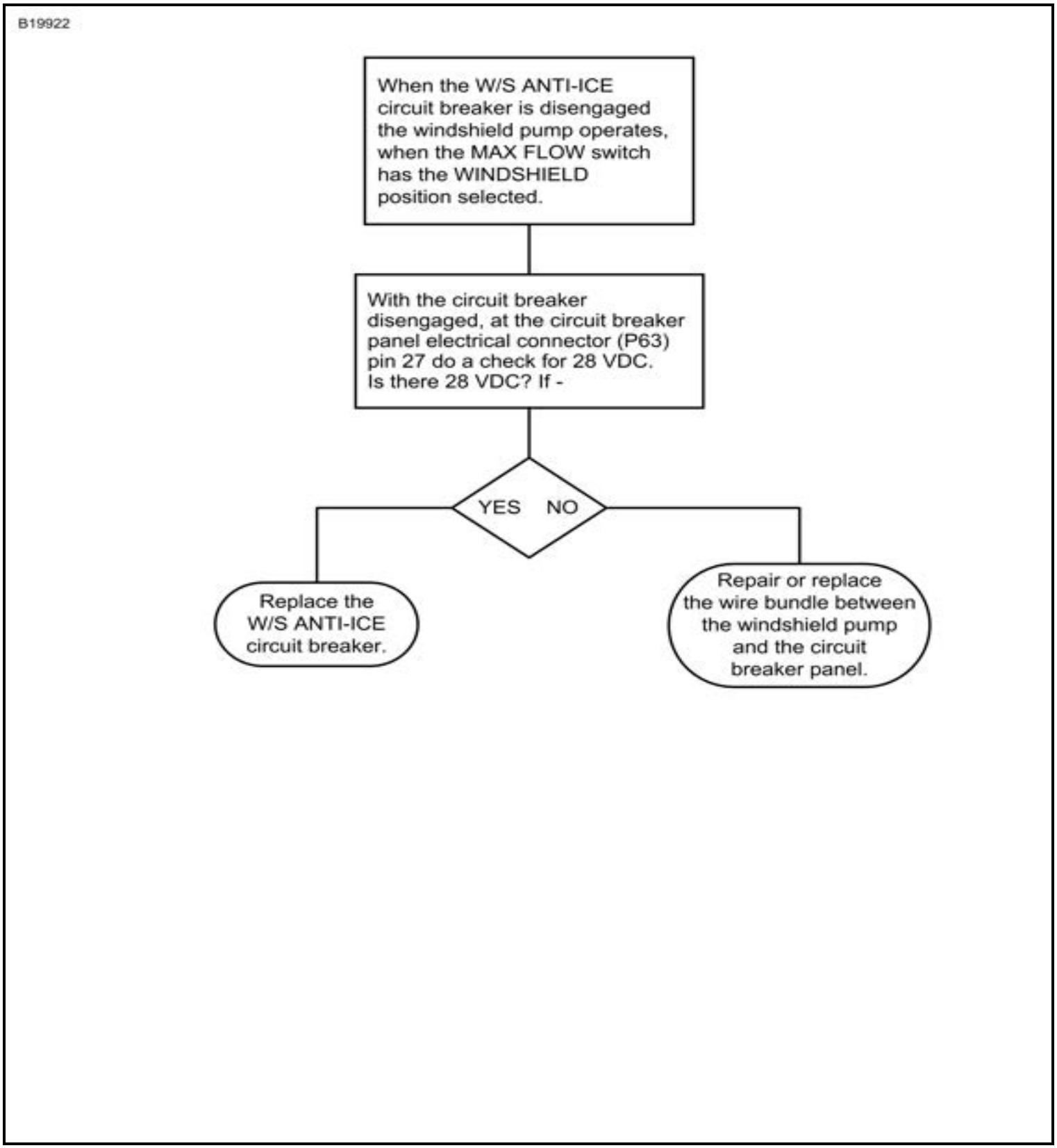
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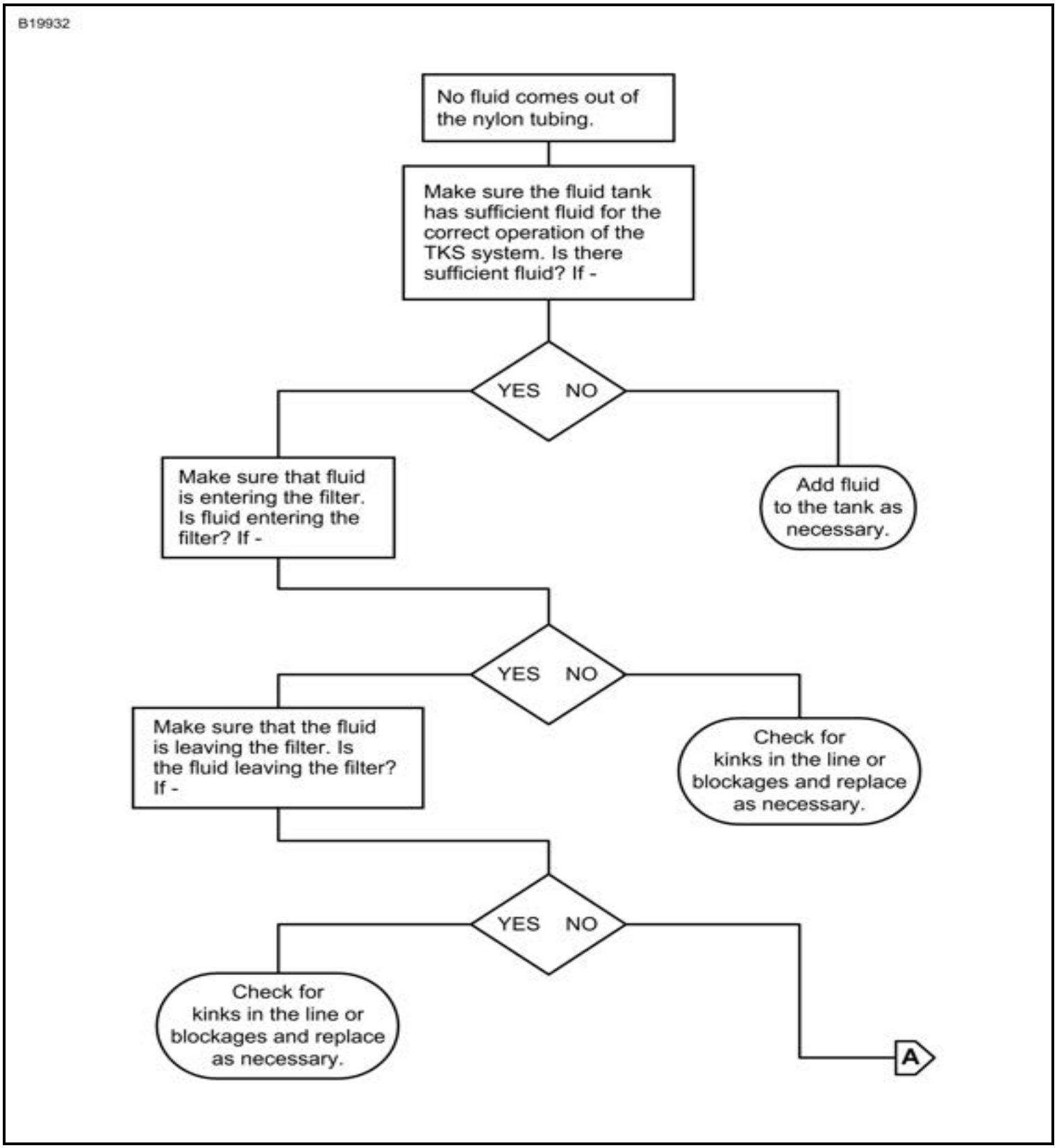
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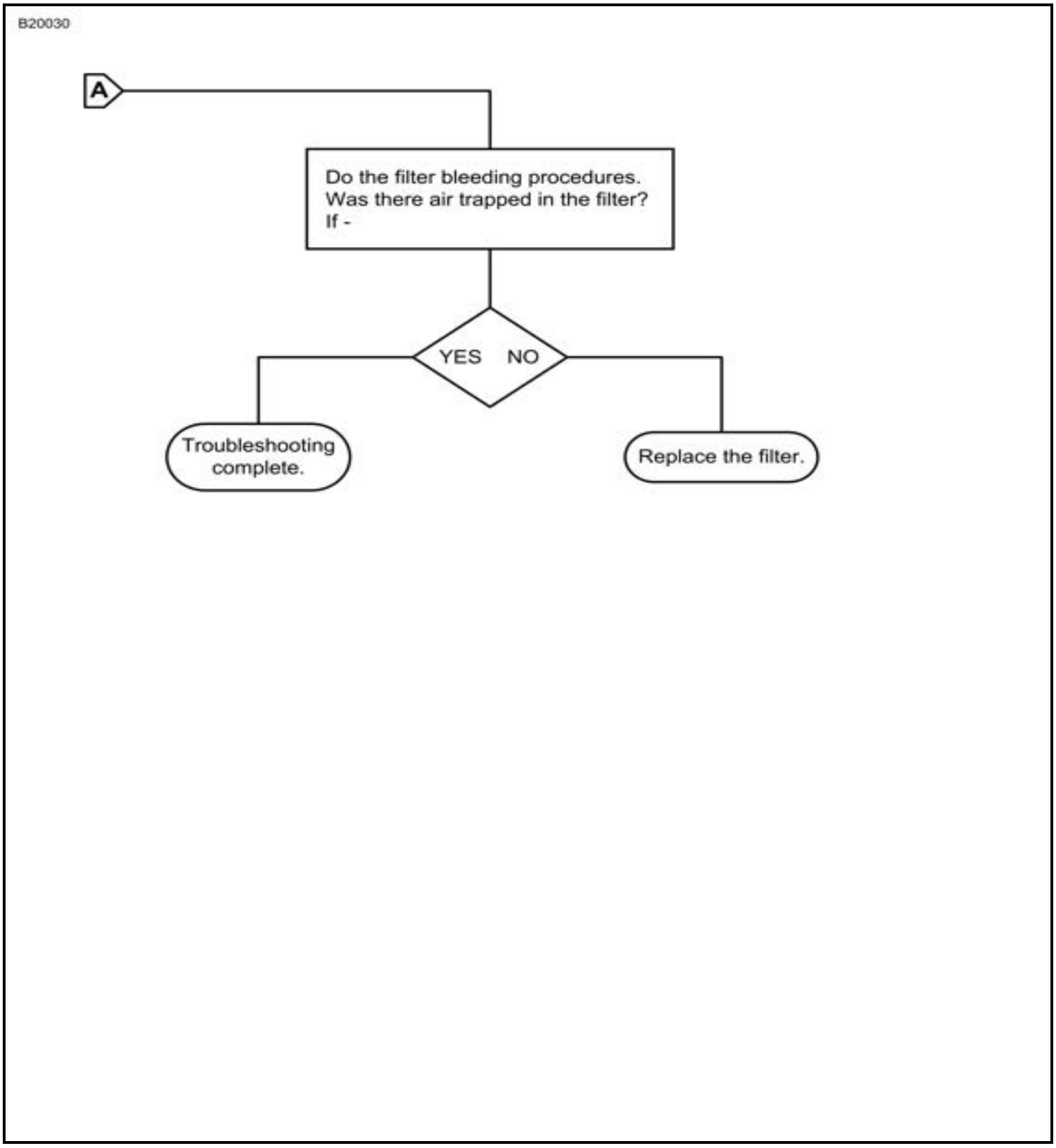
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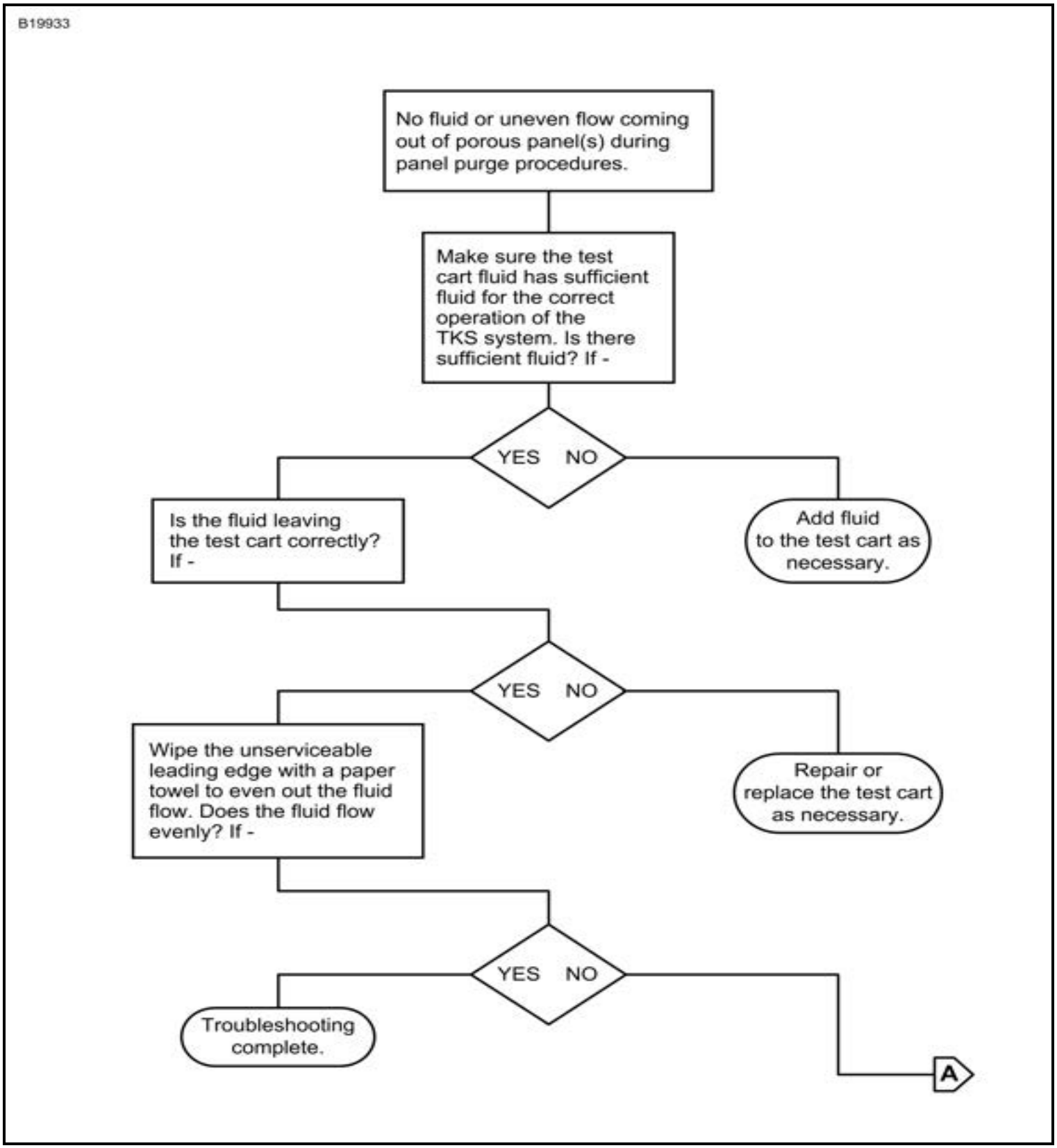
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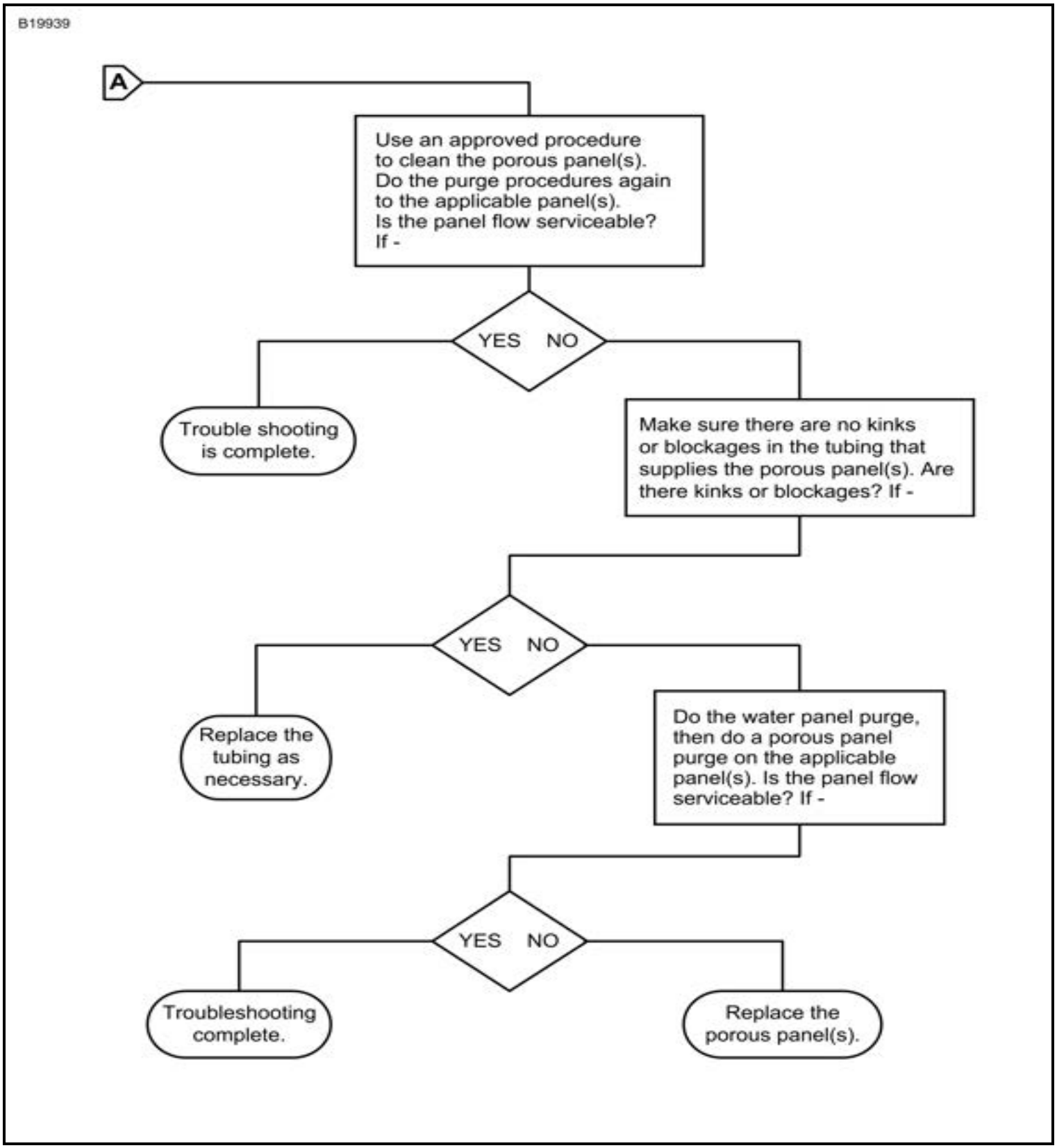
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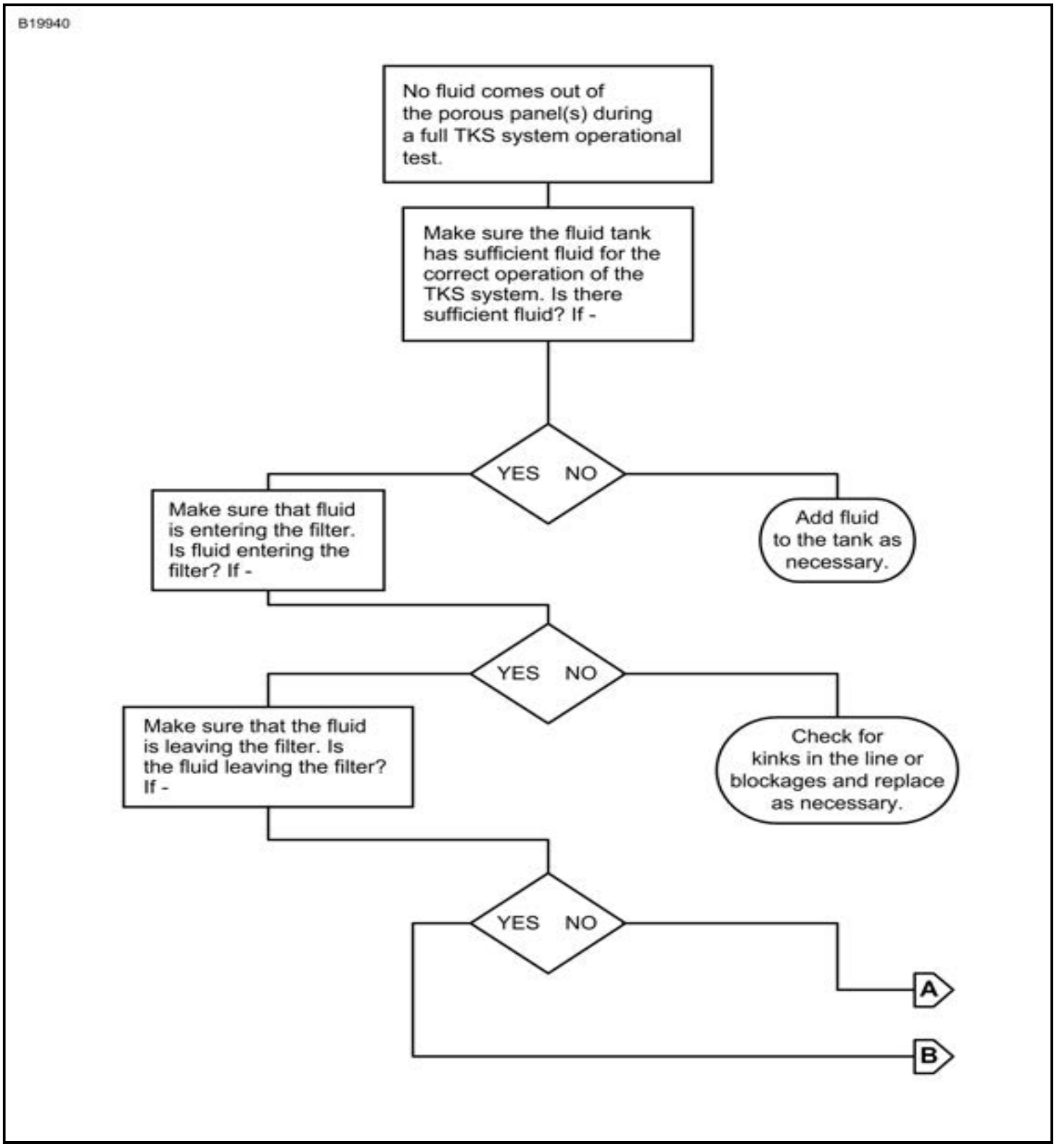
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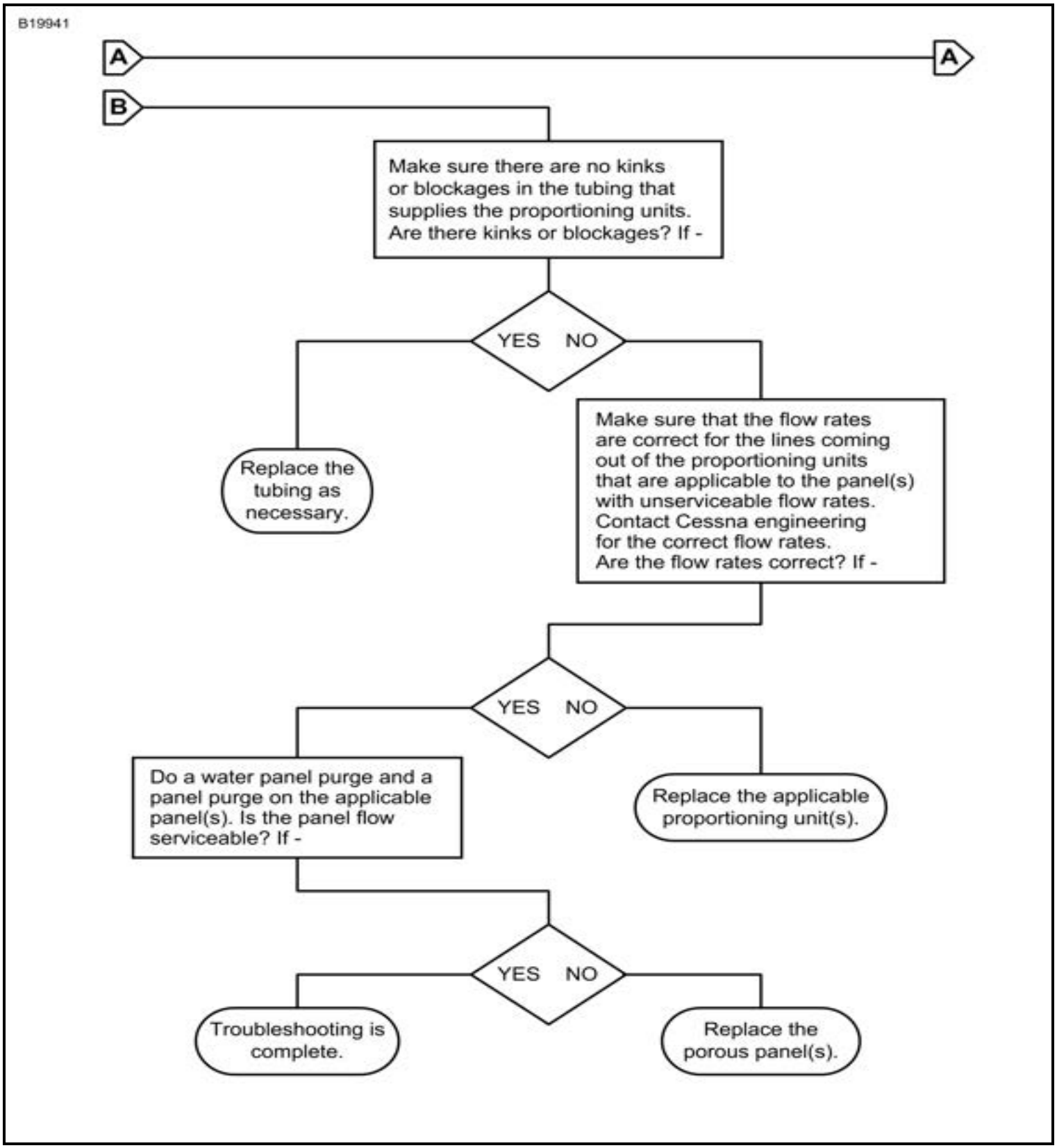
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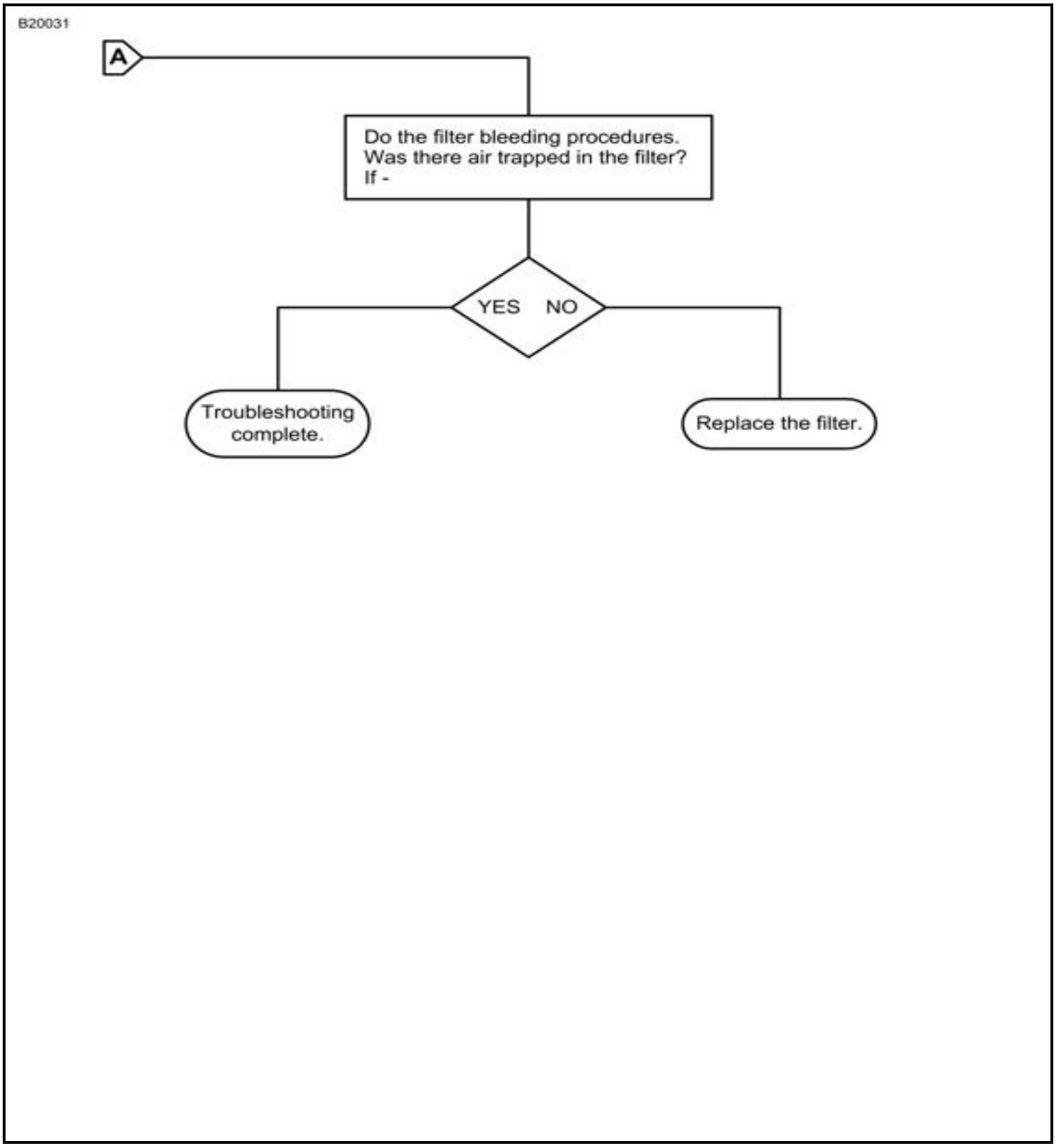
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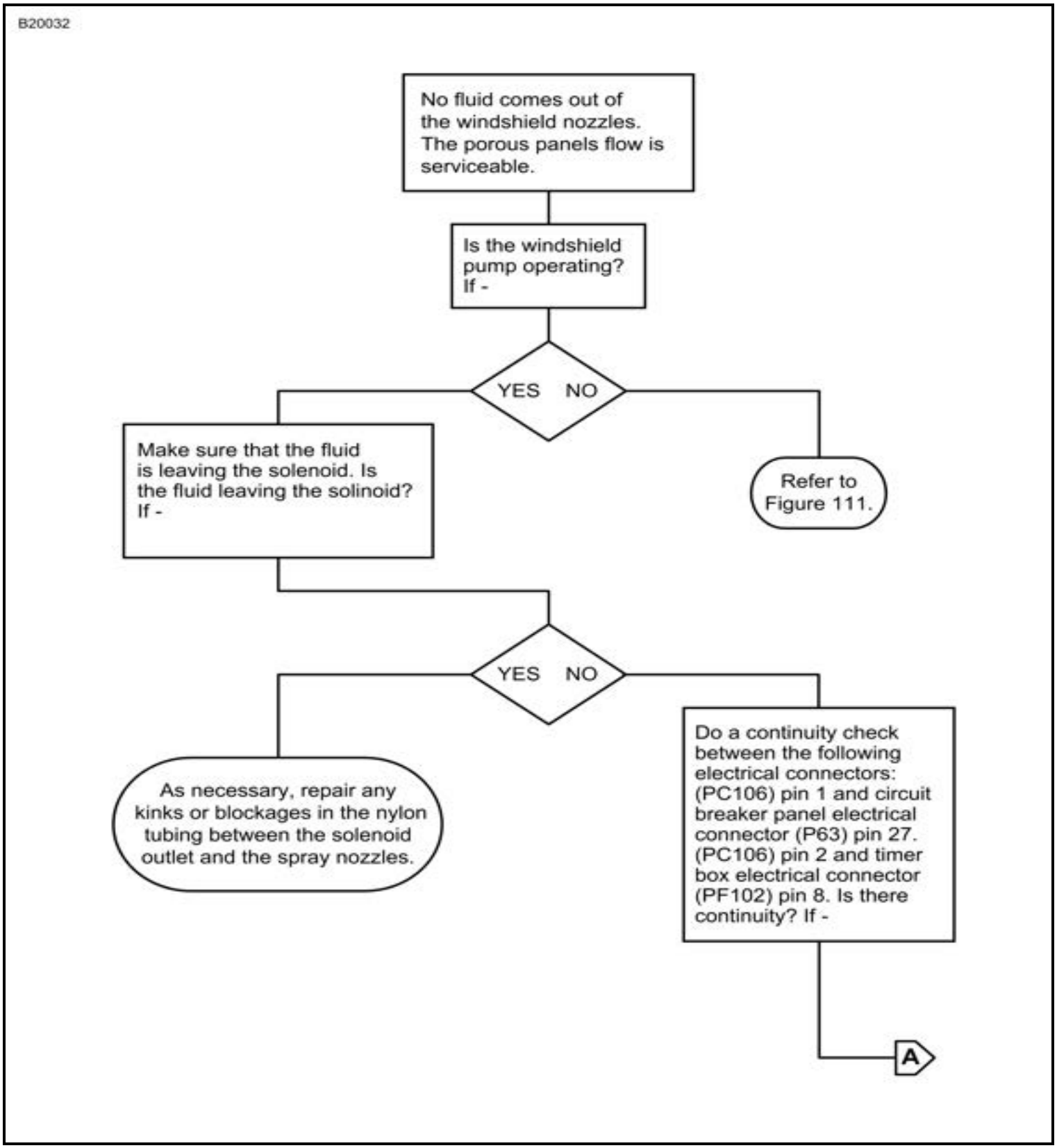
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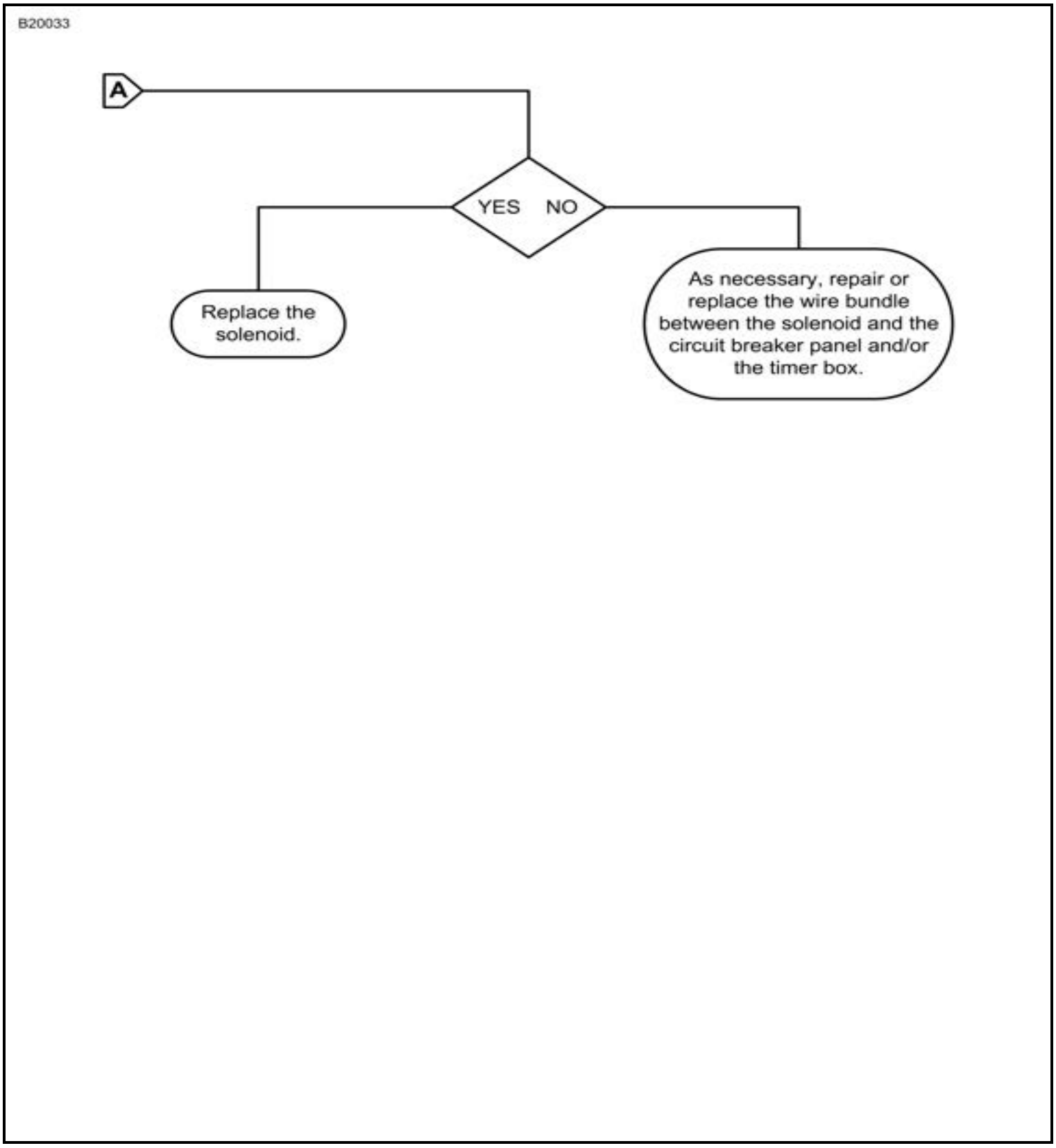
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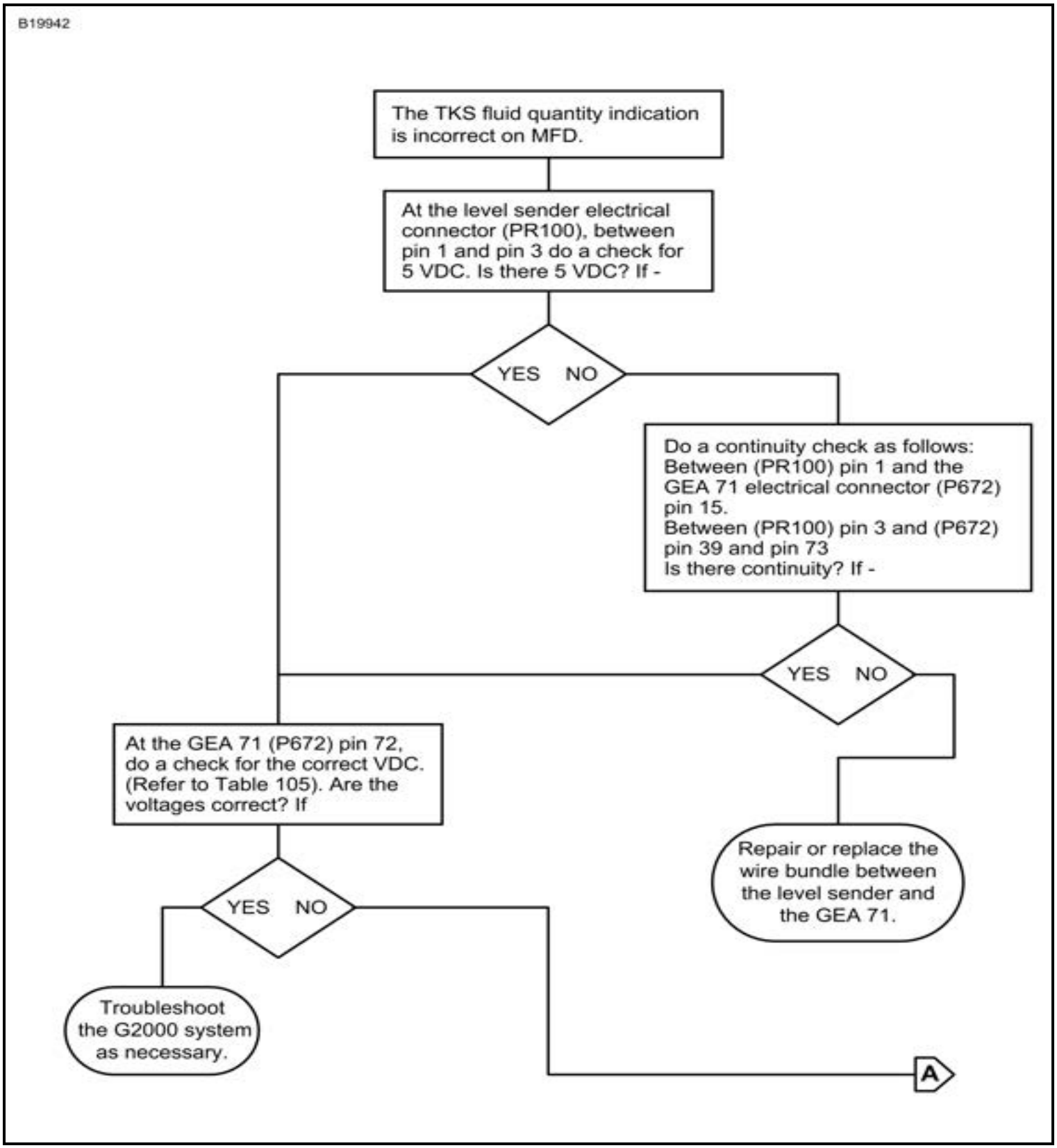
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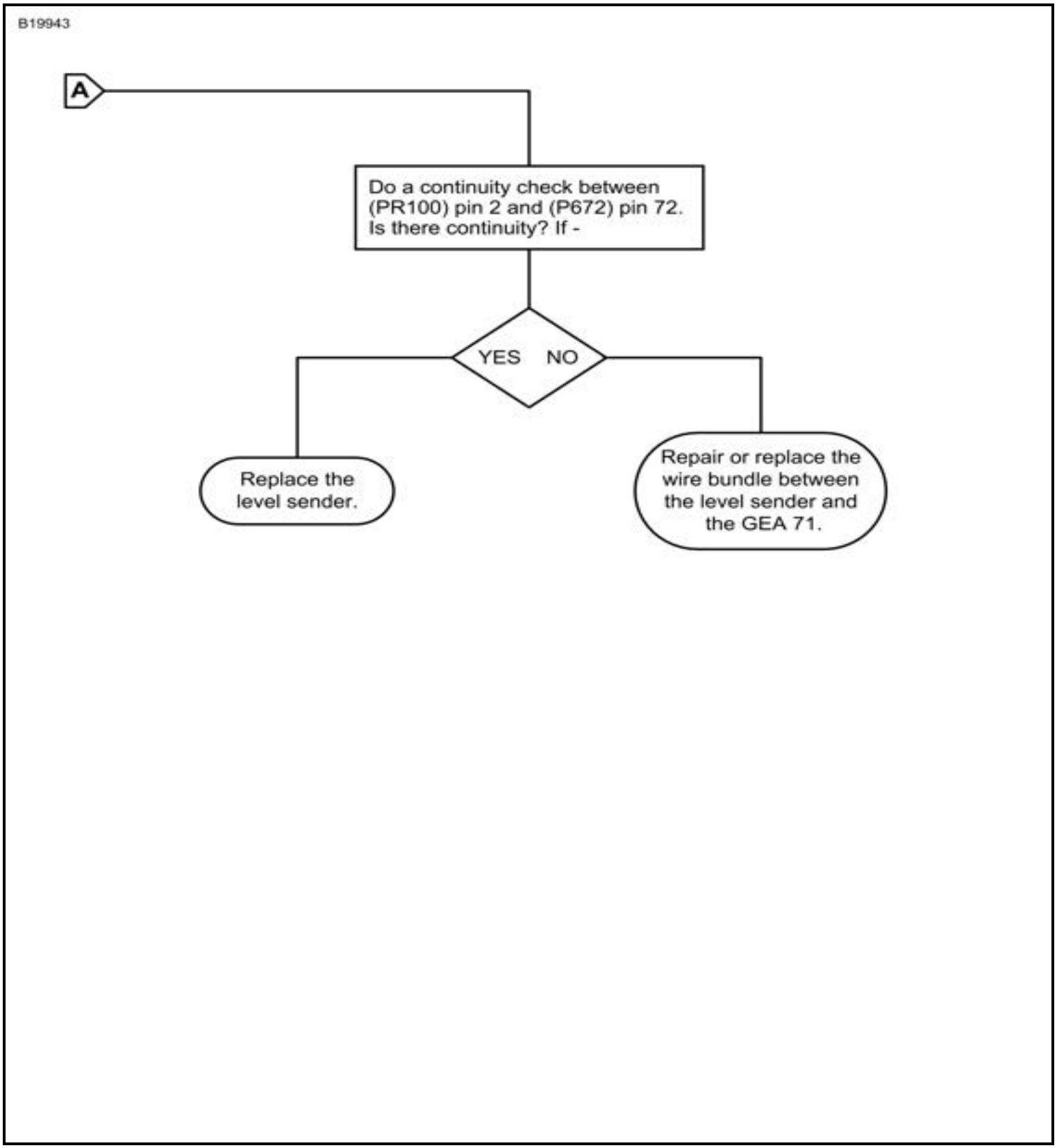
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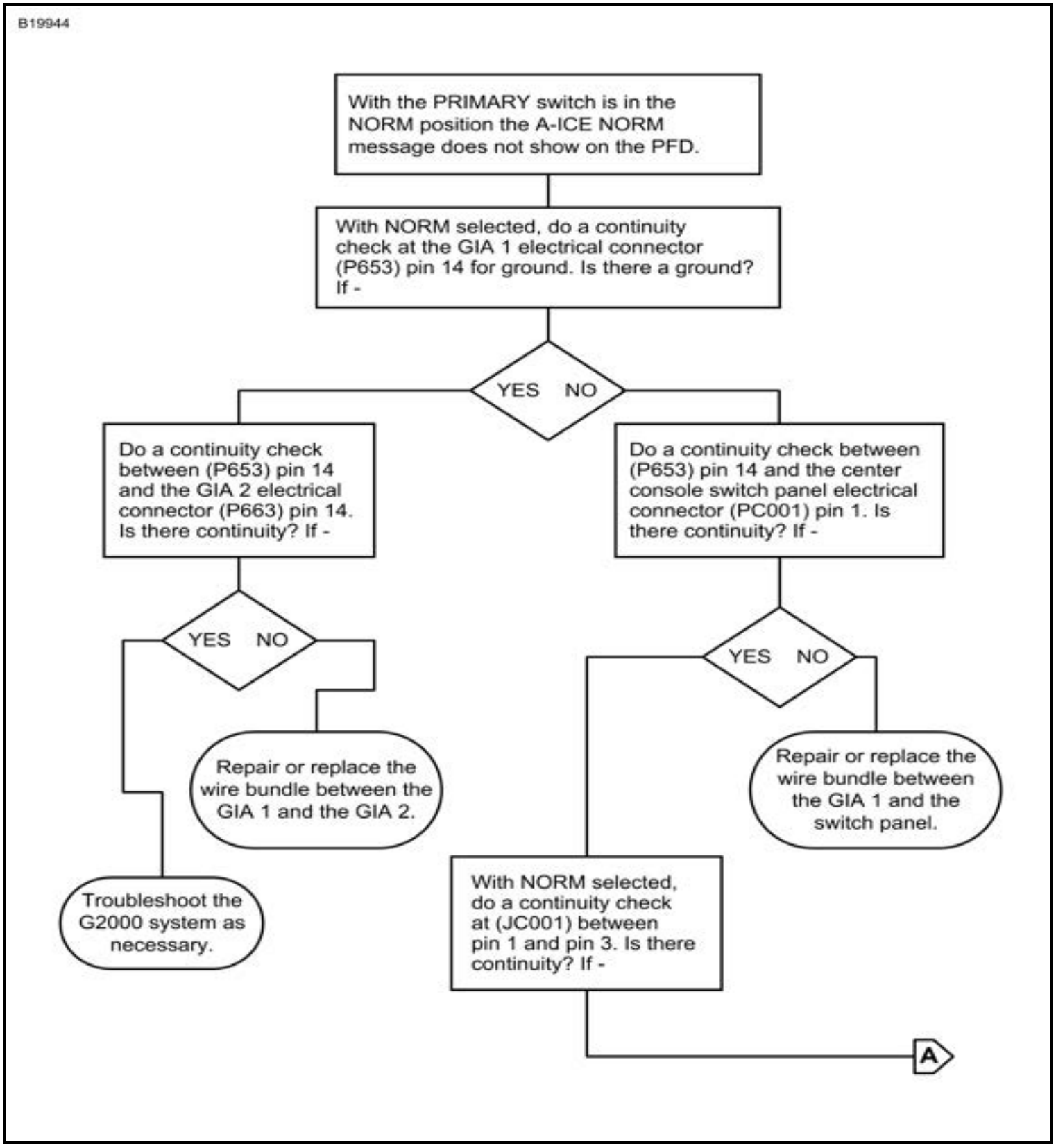
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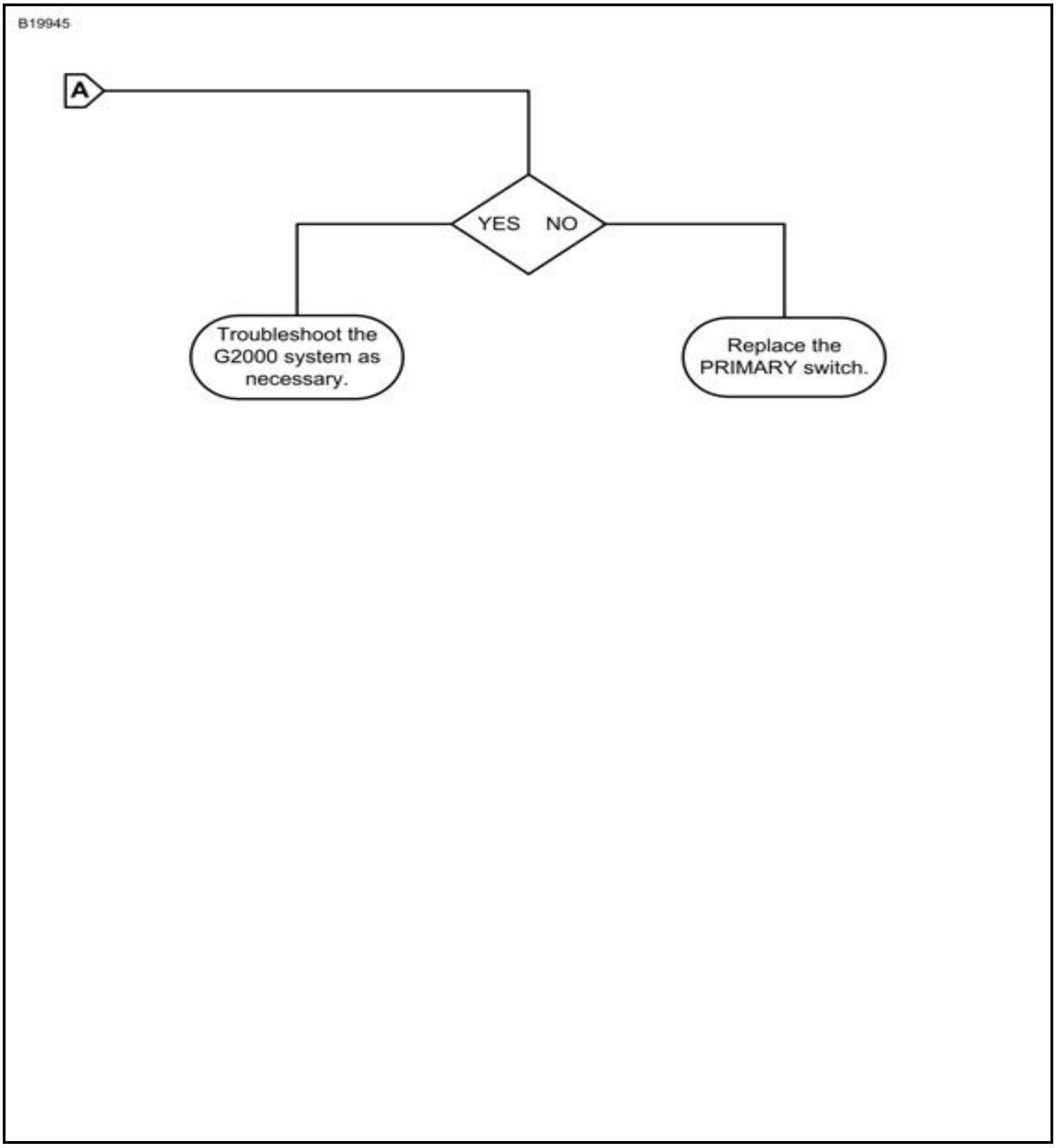
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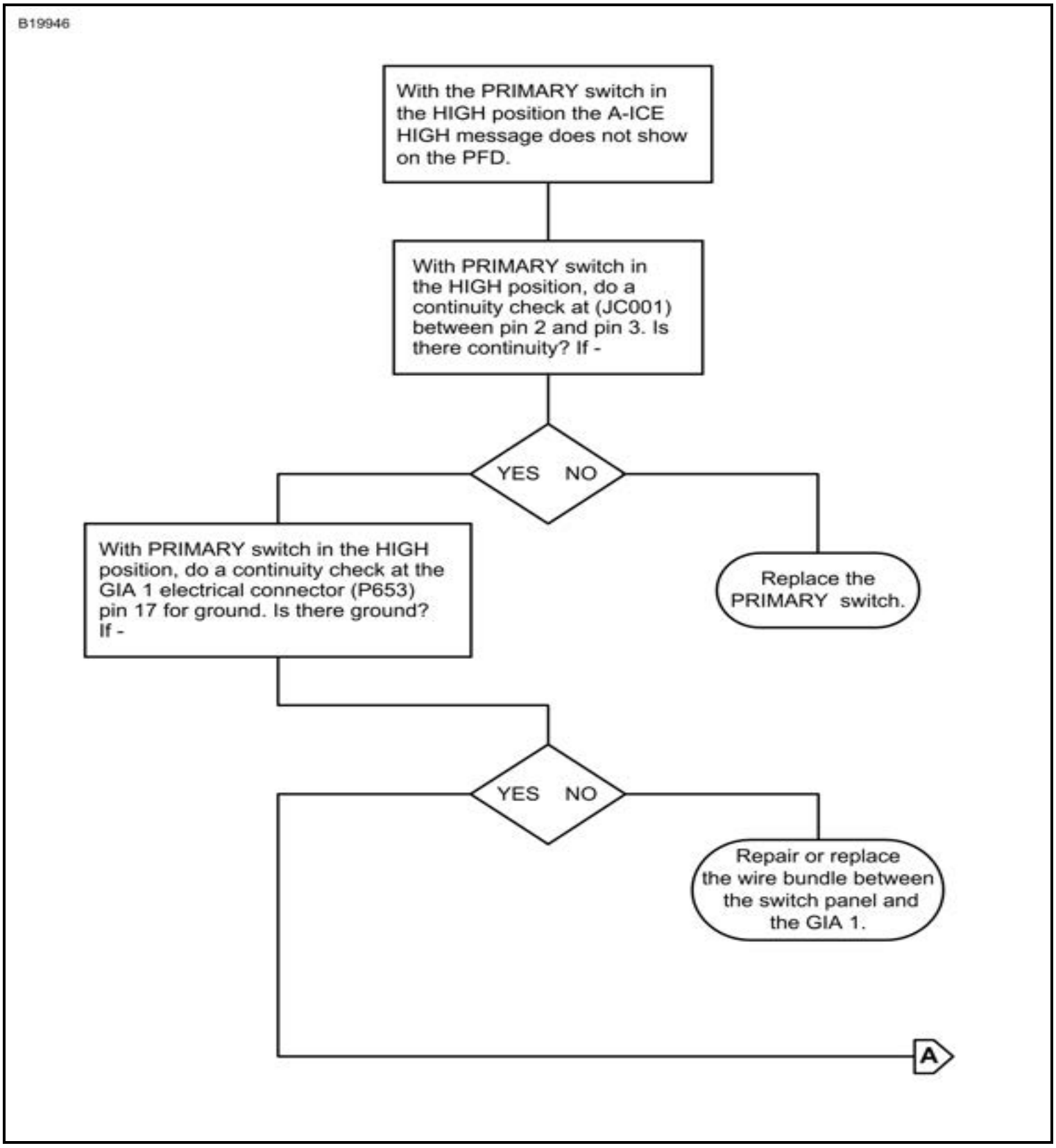
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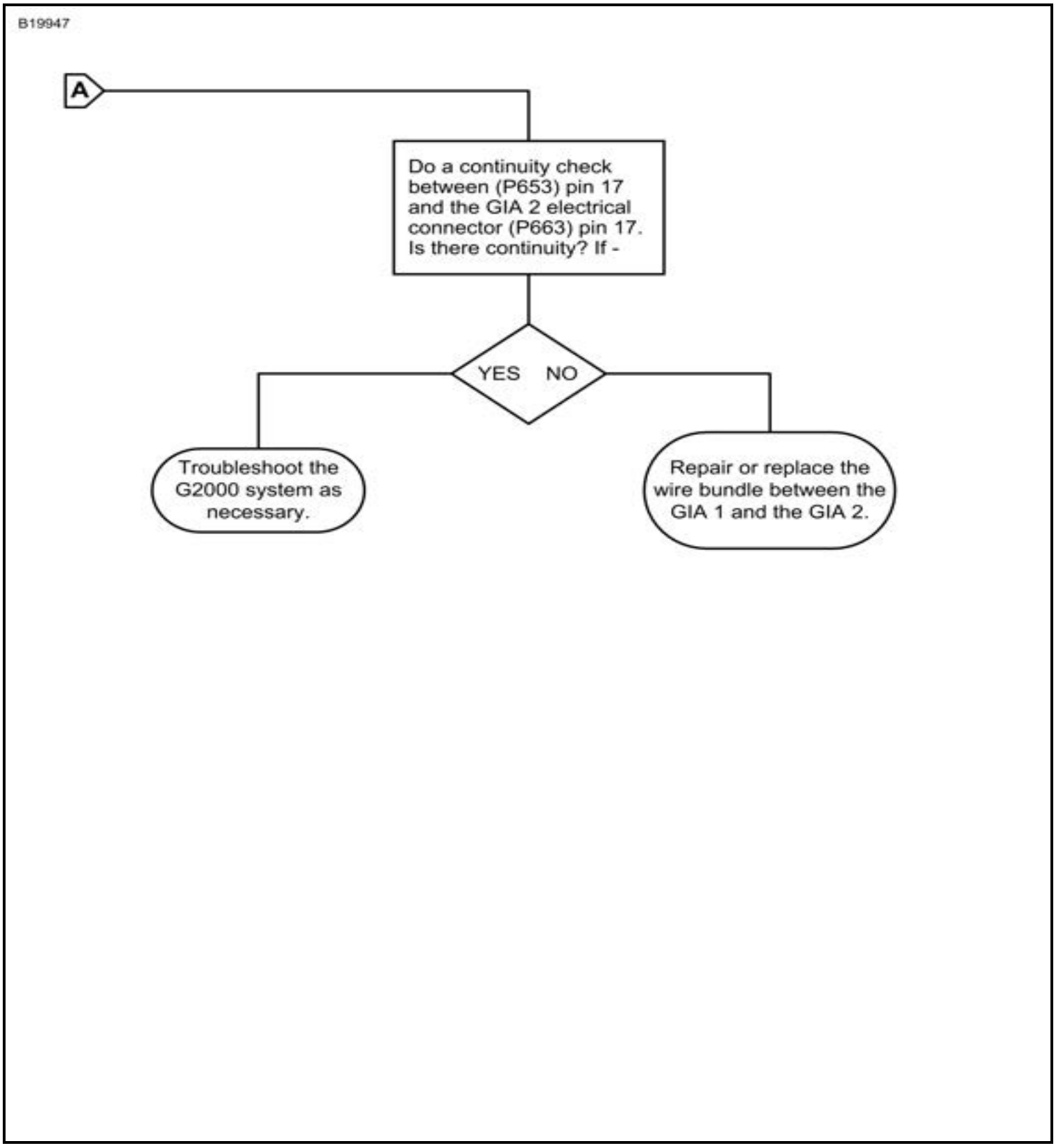
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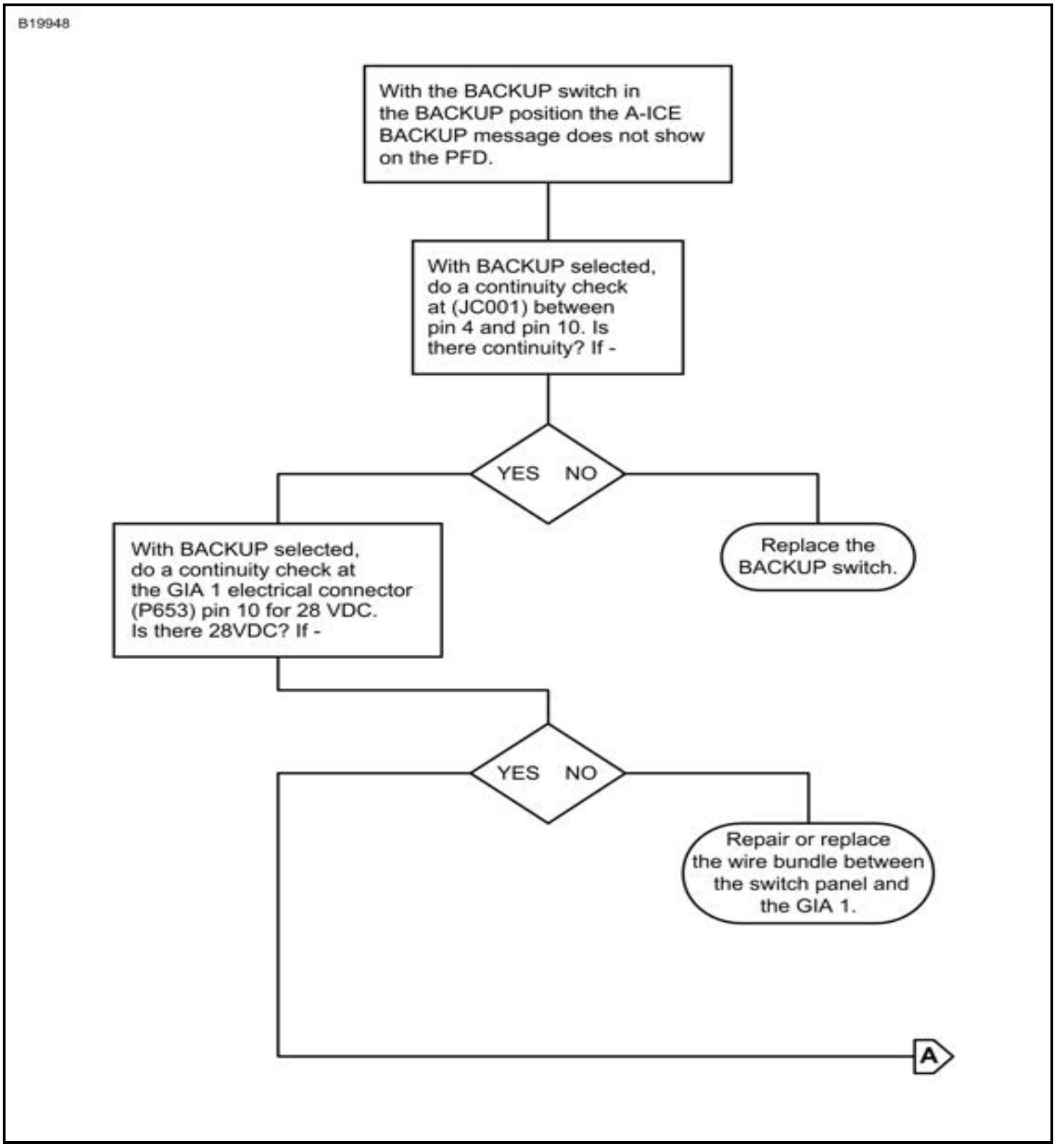
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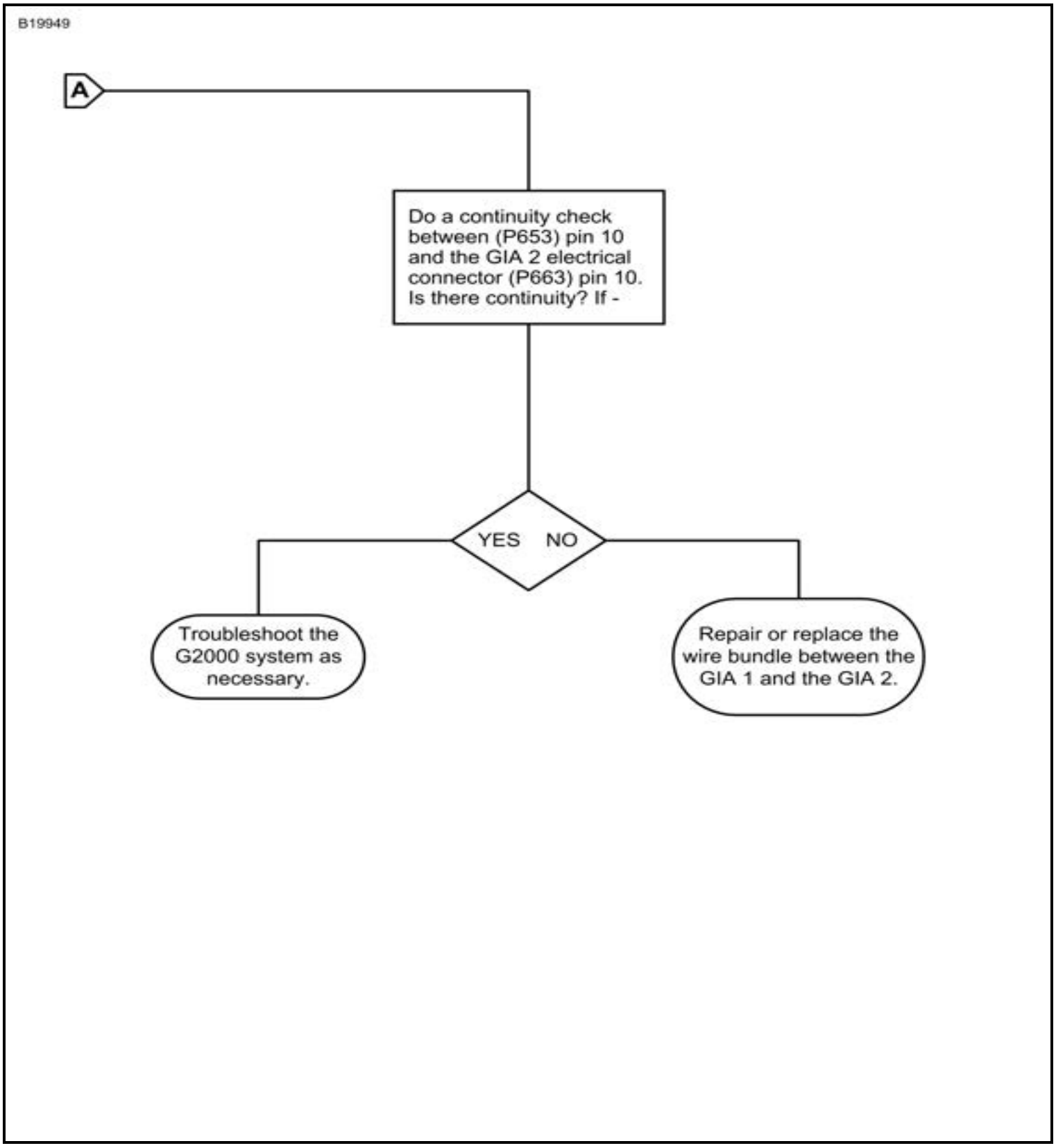
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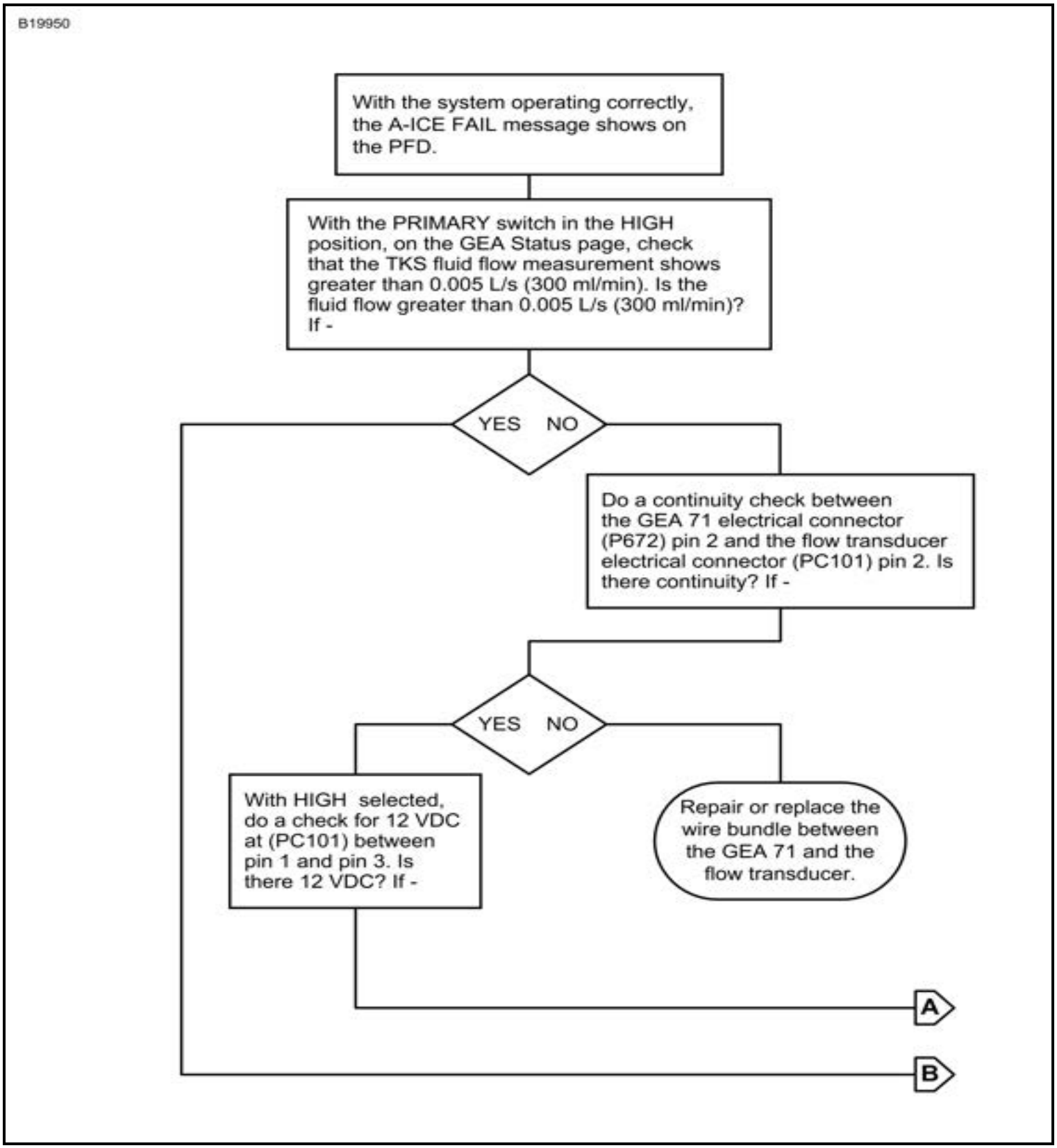
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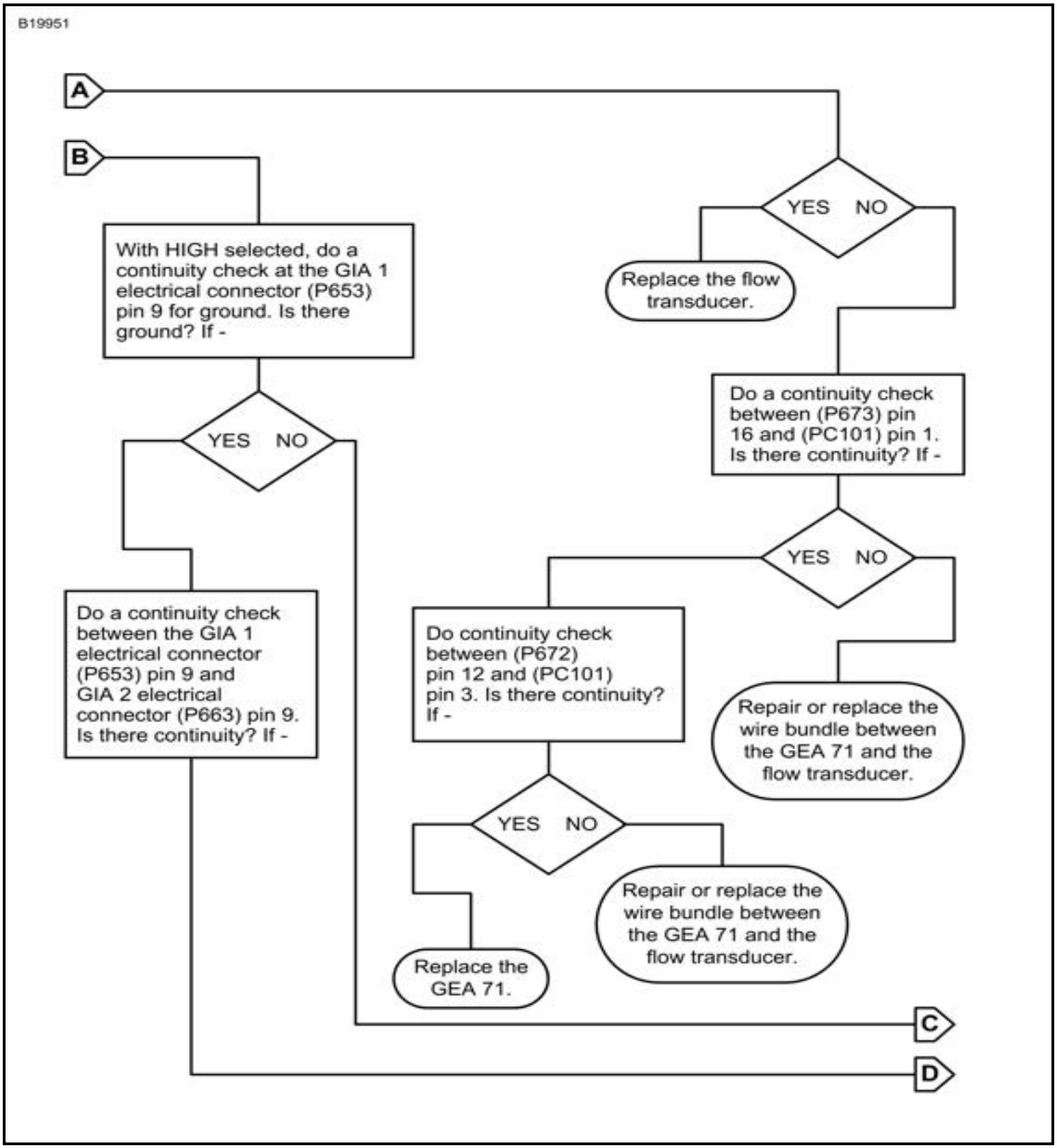
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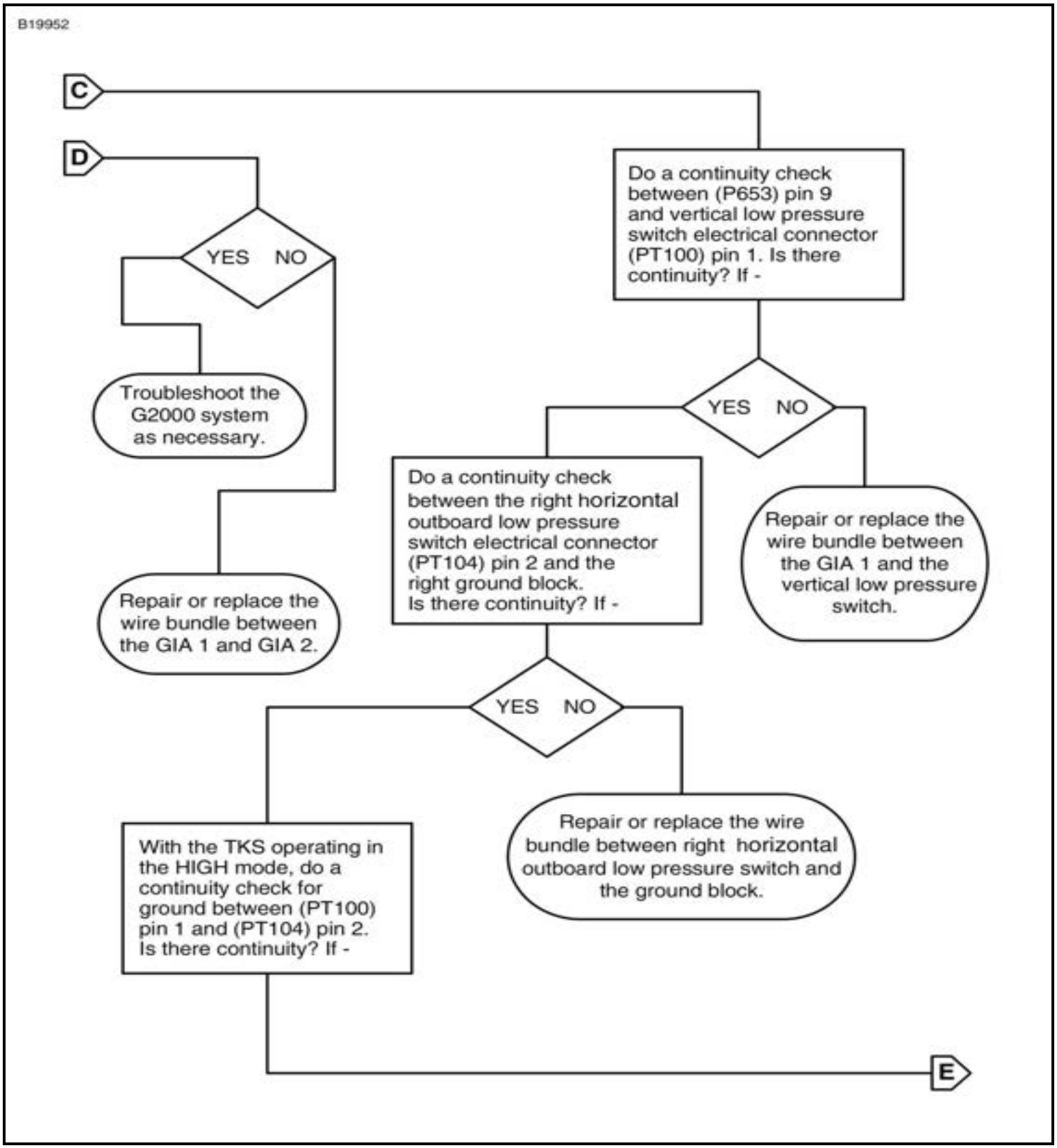
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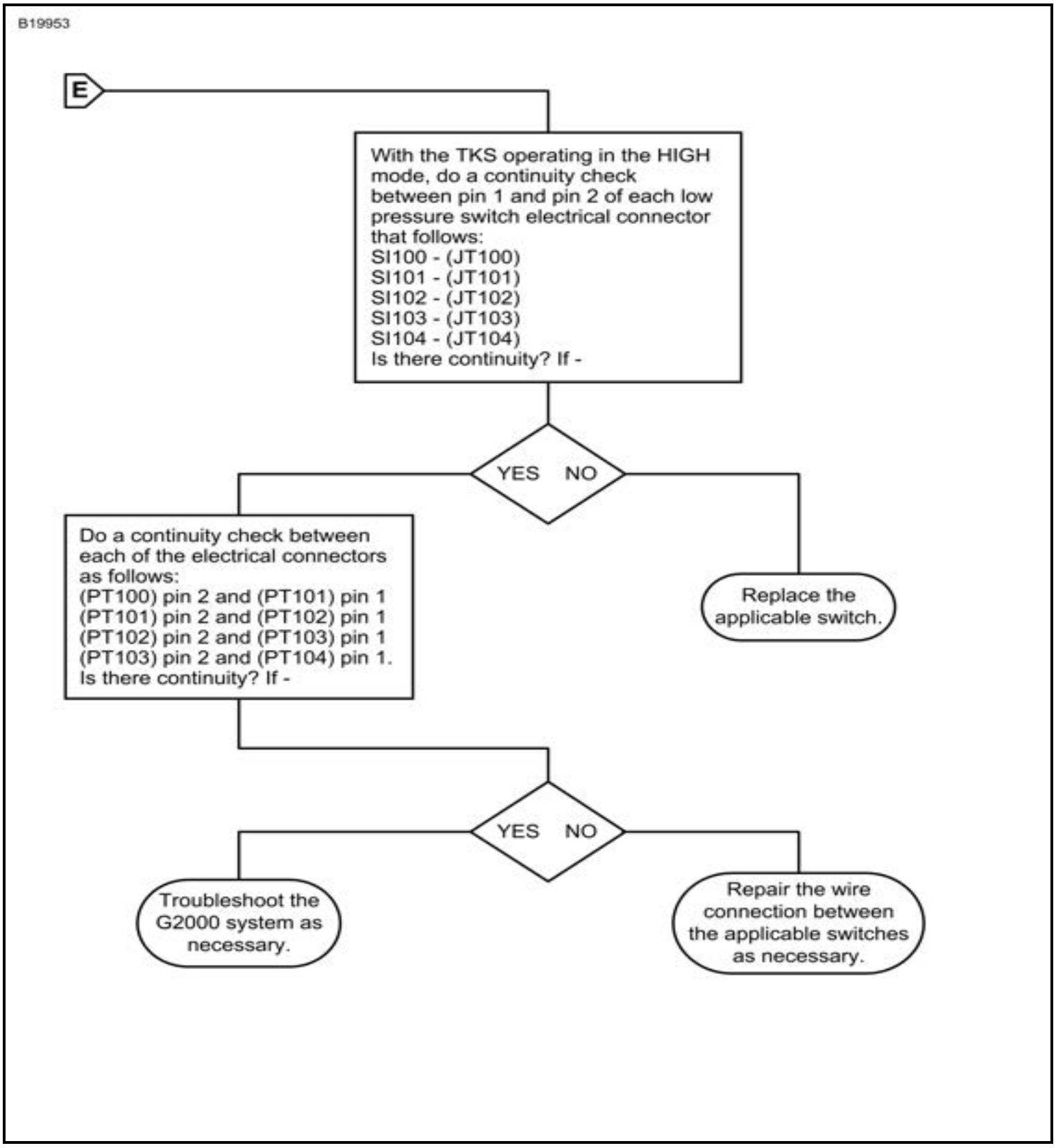
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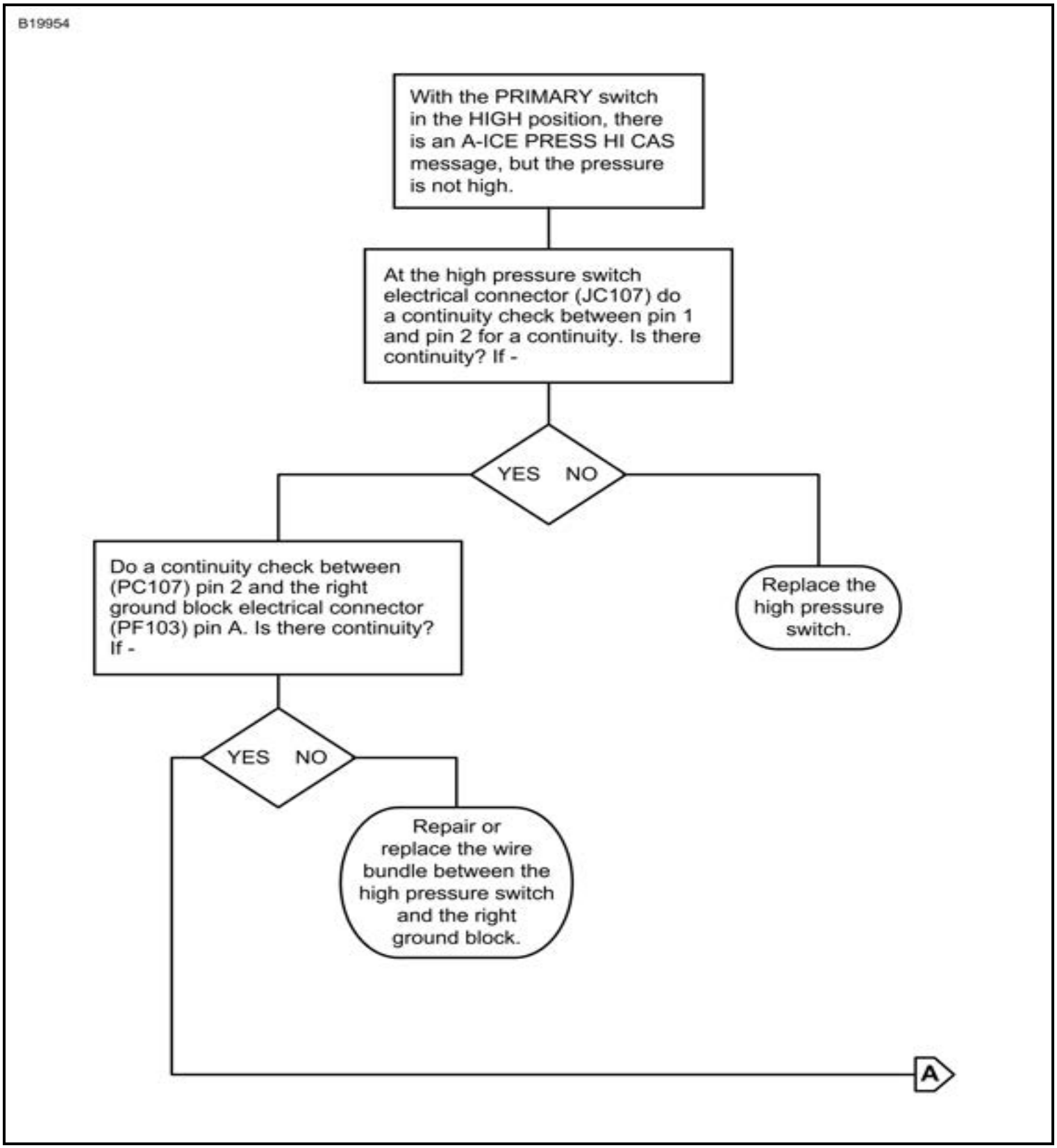
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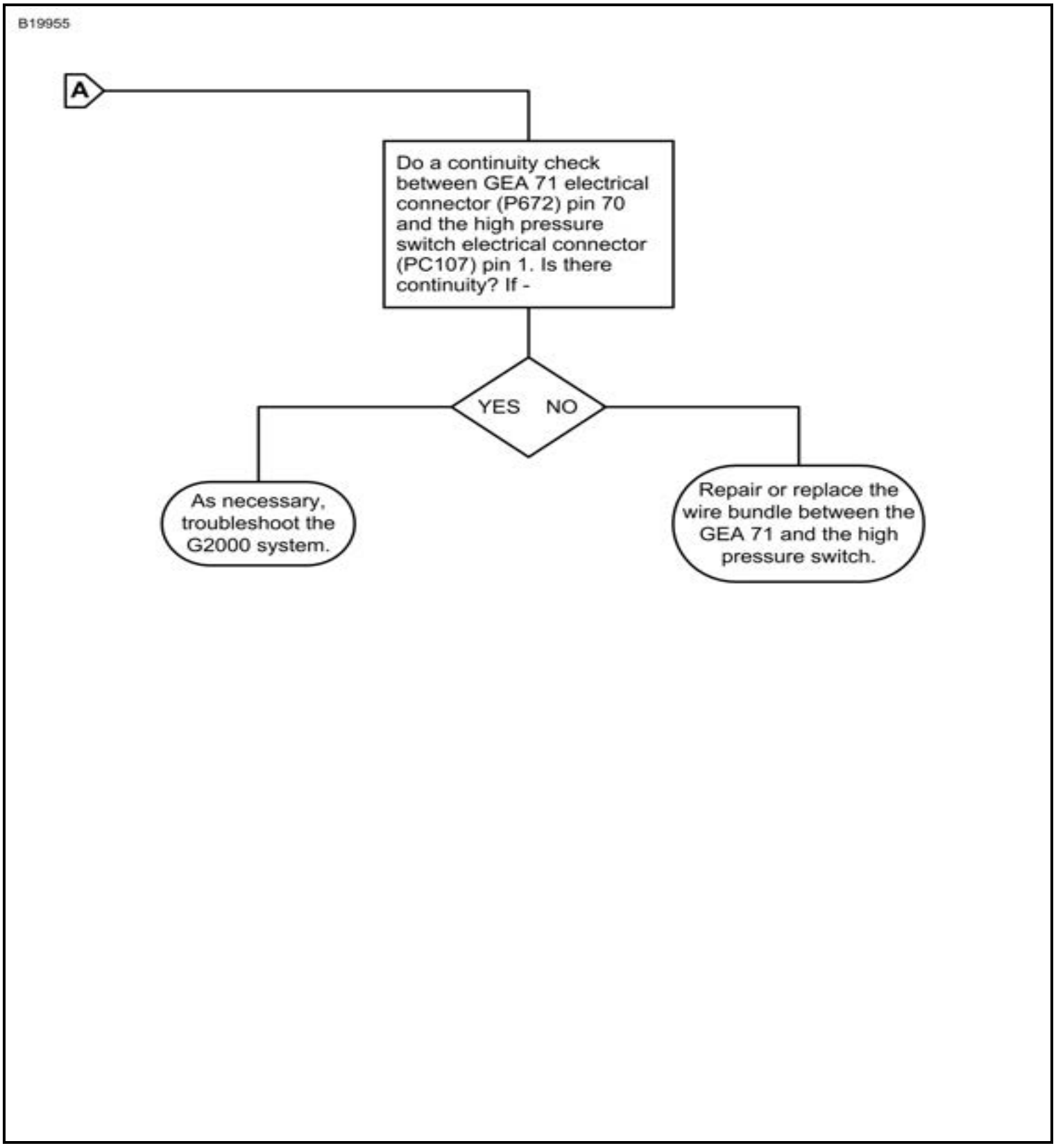
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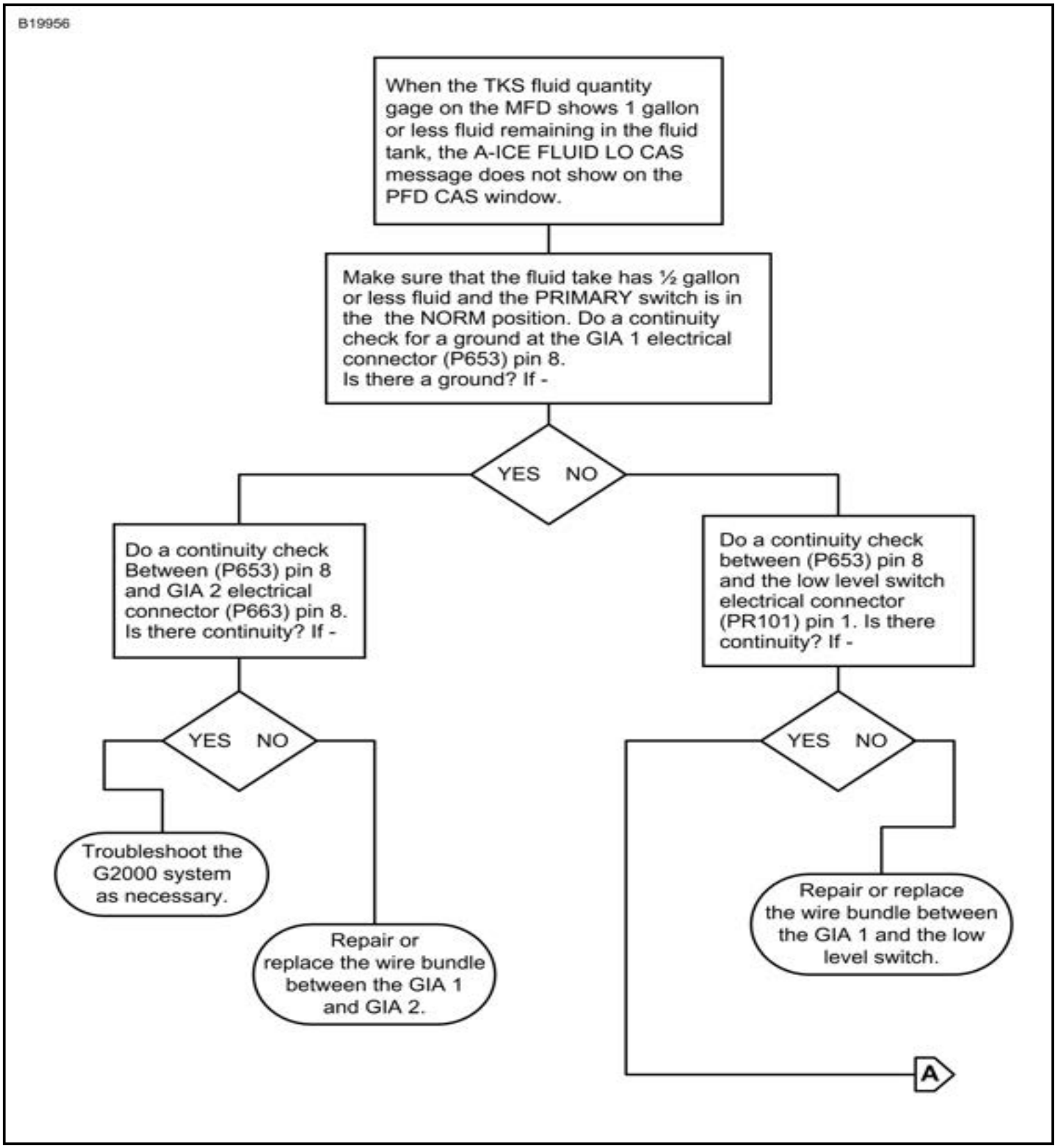
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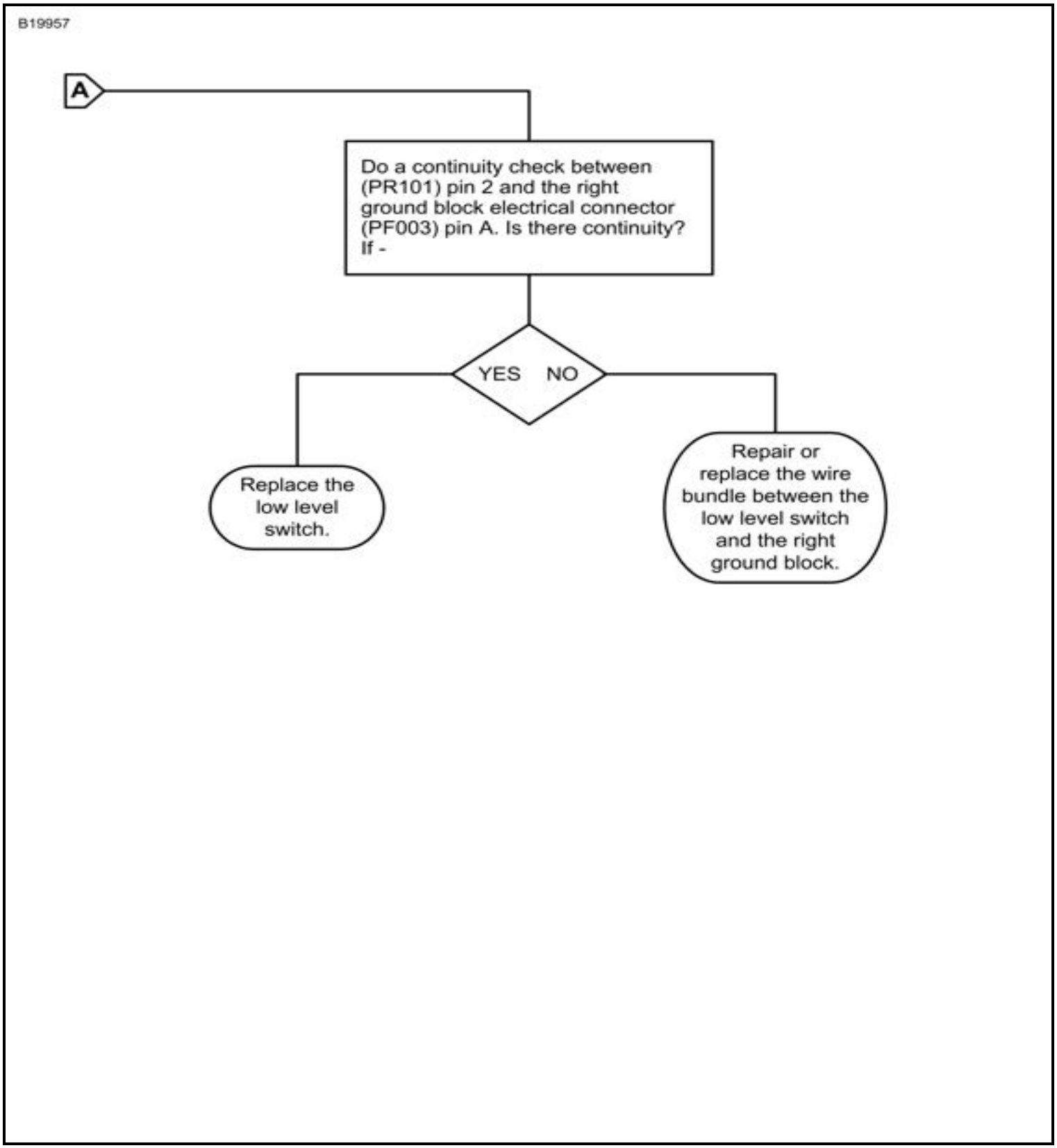
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TKS ANTI-ICE SYSTEM (FIKI) - MAINTENANCE PRACTICES

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (FIKI) fluid distribution system and the removal of TKS Anti-Ice System fluid contamination.

B. Recommended maintenance for the TKS system is as follows:

- Operate the pumps monthly, or as necessary, in the NORM mode until the air is removed from the fluid system.
- Keep the TKS system operational at all times to keep air pockets out of the system.
- If the fluid tank is drained completely and the system was operated, do the porous panel purge and test procedures.

2. Warnings and Cautions

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed. It is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to, Figure 201. This will help to prevent fluid leakage from the coupling.

3. Tools, Equipment, and Materials

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

4. Nylon Tubing Repair/Replacement

A. Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

B. All plumbing used in the fluid anti-ice system is flexible nylon tubing connected with special compression-type couplings. Two different sizes of tubing are used.

C. The couplings used to connect sections of nylon tubing are metallic compression-type couplings, which include a machined coupling end, an olive (ferrule), a nut, and an elastomeric sealing ring (refer to Figure 201). The couplings used to connect the tubing to all the anti-ice porous panels are stainless steel. All other couplings used to connect the fluid anti-ice system components are made of aluminum. To help prevent electrolytic corrosion, aluminum couplings must be assembled only to aluminum couplings and stainless steel couplings must be assembled only to stainless steel or titanium couplings. The compression-type couplings used in the fluid anti-ice system are not interchangeable with standard-type couplings (AN or MS). To make sure that the correct couplings are used, refer to the Model T240 Illustrated Parts Catalog to find the correct coupling.

D. When you do maintenance of the fluid distribution system, examine all tubing for kinks, cuts, abrasion, crushing, or other indications of damage. The nylon tubing can discolor to a light straw color with age. Discoloration of the tubing is normally not a cause for rejection. Any damaged or deteriorated tubing found must be replaced with tubing and couplings of the correct size and type (aluminum or stainless steel). Additionally, when the tube couplings are disconnected from components or other couplings, it is recommended to install a new seal in the coupling.

E. Minimum bend radii for fluid tubing at ambient temperature are shown in Table 201. In some areas of the airplane, tighter bend radii are necessary. In these areas, you can use a heat gun to bend the tubing as follows:

Table 201. Minimum Bend Radii for Fluid Tubing (At Ambient Temperature)

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TUBING OUTSIDE DIAMETER	MINIMUM BEND RADII
1/2 Inch	3.0 Inches
5/16 Inch	2.0 Inches

(1) Put the tubing in position to find the necessary bend radius.

NOTE: You can use a piece of soft wire as a pattern.

CAUTION: Be careful not to overheat, burn, or collapse the tubing, which can prevent the correct flow of fluid and/or fluid leakage.

(2) Hold the tubing and carefully apply heat to the area where the bend will be.

NOTE: The tube will become flexible at approximately 300°F.

(a) Make sure to heat the tube along the entire bend radius.

NOTE: This will help to prevent kinking in the tube.

(3) After the radius is correct, hold the tube in that position and let it become cool (ambient temperature).

(4) When the tube is at ambient temperature, carefully examine it to make sure that it has not been heated too much (burned) and that there is no restriction of fluid flow through the tubing.

CAUTION: Do not use the coupling to clench the olive to the fluid tubing. Use only specified clenching tools to do the clenching operation. Also, do not torque the couplings too much during the repair or replacement procedure. If the couplings leak, install new seals as necessary.

F. When tubing repair or replacement is necessary, the olive must always be clenched (swaged) to the tubing as a separate operation. Use approved clenching tools before you assemble the coupling. For clenching tools, refer to Ice and Rain Protection - General.

G. When installing a new olive and/or fitting, refer to Table 202, Nylon Tubing Data and Figure 201.

Table 202. Nylon Tubing Data

Aluminum Alloy/Stainless Steel Fittings on Nylon Tubes				
Tube Outside Diameter (OD) in Inches	**Olive Distance (Dimension A) (+0.05 inch or - 0.05 inch)**	**Olive Clenching Torque with Aluminum Fittings (+10% or -10%) (inch pounds)**	**Olive Clenching Torque with Steel Fittings (+10% or -10%) (inch pounds)**	**Tightening Torque (Reference) (+10% or -10%) (inch pounds)**
5/16	0.22	120	200	48
1/2	0.38	250	N/A	63

H. The recommended procedure for replacement of damaged or deteriorated fluid tubing is to replace the full length of tubing from coupling to coupling. However, in areas of the airplane where this type of replacement is not possible, it is permitted to do a tube repair splice as an alternative to complete tubing replacement. Repair tubing as follows:

(1) Remove access panels as necessary to repair the damaged tubing.

(2) Cut out the damaged area.

(3) Put a strong adhesive tape on the ends of the tube.

NOTE: This will limit fluid leakage.

(4) When you are ready to install the splice tubing, remove the adhesive tape from one end at a time.

(5) Connect the new tubing to the tubing ends to be repaired with straight couplings. Refer to Table 203.

Table 203. Couplings

TUBING OUTSIDE DIAMETER	Coupling Part Number
1/2 Inch	MN6827
5/16 Inch	MN4852

(6) Attach the tubing to the airframe with tie wraps or an equivalent method.

(7) All new connections used in the repair must be tested for leaks. Operate the system before you install the access panels.

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NOTE: If bulk tubing is installed, it is necessary to attach an identification tag to each end of the tube with the tube part number labeled on it for tube identification.

5. TKS Anti-Ice Fluid Removal

A. Remove the TKS Anti-Ice Fluid.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Make sure that the CROSS TIE switch (SW03) is in the OFF position.

(6) Use a container with a capacity of approximately 10 to 15 gallons to collect the fluid.

(7) Use one of the following methods to remove the TKS fluid from the tank.

NOTE: There are two ways to remove the fluid from the tank: use a hand pump and clean hose through the filler neck or use the drain in the tank access panel on the lower surface of the right wing.

CAUTION: Make sure that the hose does not touch the level sender arm. This will help prevent damage to the level sender unit.

(a) Use a hand pump and clean hose to pump the fluid from tank.

NOTE: The hose and optional hand pump should be used only with TKS fluid. You should not use a hose and pump that have been used to pump other fluids.

1 Put the hose straight down into the wing tank through the filler neck.

a Make sure that the hose does not touch the internal tank level sender arm.

2 Pump the fluid into the container.

(b) Open the drain in the tank access panel.

1 Collect the fluid in the container.

(8) Check the MFD TKS fluid quantity indicator.

(a) The MFD TKS fluid quantity indicator must show zero when the TKS fluid tank is empty.

6. TKS Metering and Windshield Pumps Priming

A. Prime the TKS System Metering and Windshield Pumps. Refer to Figure 202.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Supply electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(3) Check the TKS fluid quantity gage on the multifunctional display (MFD) EIS strip and make sure there is a minimum of one gallon of TKS fluid in the TKS fluid tank.

(4) If the wing tank is completely full of TKS fluid, first do the steps that follow:

NOTE: The procedures that follow use the TKS system head pressure to prime the TKS system pumps.

CAUTION: Do not run the windshield pump for more than 10 seconds at a time. Wait at least 10 seconds with the pump off before you operate it again.

(a) On the center console switch panel, put the MAX FLOW switch to the WINDSHIELD position and hold. Refer to TKS Anti-Ice System (FIKI) - Description and Operation.

1 Listen and make sure the pump operates correctly and is not cavitating.

2 Release the switch.

CAUTION: Do not run pump 1 or pump 2 for longer than 120 seconds at a time. Wait at least 60 seconds with

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the pump off before you operate it again.

(b) Put the PRIMARY switch to the NORM position, to operate metering pump 1.

1 Listen and make sure the pump operates correctly and is not cavitating.

2 Put the PRIMARY switch to the OFF position.

(c) Put the BACKUP switch to the BACKUP position, to operate metering pump 2.

1 Listen and make sure the pump operates correctly and is not cavitating.

2 Put the BACKUP switch to the OFF position.

(5) If this method does not prime the system do the steps that follow:

(a) Remove the TKS equipment access panel on the lower surface of the left wing.

(b) Put absorbent shop rags below the tubing fitting of pump 2.

(c) Loosen the pump 2 inlet fitting to allow TKS fluid to fill the inlet tubing.

(d) Put the BACKUP switch to the BACKUP position, to operate metering pump 2.

1 If necessary, loosen the pump 2 outlet fitting to allow trapped air to exit the plumbing while the pump is operating.

2 When fluid drains from the loosened inlet fitting, listen and make sure the pump operates correctly and stops cavitating.

(e) Put the BACKUP switch to the OFF position.

(f) If necessary, tighten the pump 2 inlet and outlet fittings. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(6) Bleed trapped air from the filter as follows:

(a) Loosen the filter bleed screw. Refer to TKS Filter/High Pressure Switch (FIKI) - Removal/Installation, Figure 402.

(b) Put the applicable TKS ANTI-ICE FLUID CTRL switch in the correct position to operate pump 1 or pump 2.

(c) When fluid shows at the filter, tighten the filter bleed screw.

(d) Put the applicable TKS ANTI-ICE FLUID CTRL switch in the OFF position.

(7) If this method does not prime the system, use pump 1 to do the above procedures to prime the pumps.

(8) Set the ANTI-ICE FLUID CTRL switches to the OFF position.

(9) Remove electrical power on the airplane as follows:

(a) Set the AVIONICS MASTER switch to the OFF position.

(b) Set the master BATT switches (left and right) to the OFF position.

(c) Set the CROSS TIE Switch to the OFF position.

(d) Remove external electrical power to the airplane.

(10) Safety with wire any items where safety wire was removed above. Refer to Chapter 20, Safetying - Maintenance Practices.

(11) Make sure that the TKS equipment bay is clear of foreign object debris (FOD).

(12) Install the TKS equipment access panel on the lower surface of the left wing.

(13) Service the TKS system as needed. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

7. TKS Fluid Contamination (Fuel) Removal

A. Remove the TKS Fluid Contamination (Fuel).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the ANTI-ICE PUMP 1, W/S ANTI-ICE, and ANTI-ICE PUMP 2 circuit breakers.

(6) Drain the TKS fluid from the fluid tank. Refer to the applicable steps in TKS Anti-Ice Fluid Removal in this section.

(7) Fill the fluid tank with a water and mild detergent mixture.

(8) Drain the water and mild detergent mixture from the fluid tank.

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(a) To drain the fluid from the tank use a clean hose inserted through the filler neck. Refer to the applicable steps in TKS Anti-Ice Fluid Removal found in this section.

(9) Fill the fluid tank with water.

(10) Drain the water from the fluid tank.

(a) To drain the fluid from the tank use a clean hose inserted through the filler neck. Refer to the applicable steps in TKS Anti-Ice Fluid Removal found in this section.

(11) Remove the filter assembly. Refer to TKS Filter/High Pressure Switch (FIKI) - Removal/Installation.

NOTE: If there was fuel contamination in the fluid, but the system was not operated, it is not necessary to replace the filter assembly.

(12) Install a new filter assembly. Refer to TKS Anti-Ice System Filter (FIKI) - Removal/Installation.

(13) Add 5 gallons (18.9 liters) of TKS fluid to the fluid tank.

(14) Supply external electrical power to the airplane.

(15) Set the master BATT switches (left and right) and the AVIONICS MASTER switch in the ON position.

(16) Engage the ANTI-ICE PUMP 1, W/S ANTI-ICE, and ANTI-ICE PUMP 2 circuit breakers.

(17) Remove the outlet tube from the transducer. Refer to the applicable steps in TKS Flow Transducer (FIKI) - Removal/Installation, TKS Flow Transducer Removal procedures.

(18) Connect a temporary tube to the transducer outlet fitting and put the end in a container with a capacity of approximately 10 to 15 gallons.

(19) Remove the outlet tube from the windshield pump. Refer to the applicable steps in TKS Anti-Ice System Metering Pumps (FIKI) - Removal/Installation, Metering Pump 1/Windshield Pump Assembly Removal procedures.

(20) Connect a temporary tube to the windshield pump outlet fitting and put the end in a container with a capacity of approximately 10 to 15 gallons.

(21) Put the PRIMARY switch in the HIGH position to start the metering pump 1 operation.

(22) Put the MAX FLOW switch in the AIRFRAME position, then release the switch, to start both the metering pumps operation.

(a) Let the TKS fluid flow in the container at the transducer outlet for one full cycle of approximately 2 minutes of metering pump operation.

(23) Put the MAX FLOW switch in the WINDSHIELD position, then release the switch, to start the windshield pump operation.

(a) Let the TKS fluid flow in the container at the windshield pump outlet for one full cycle of approximately 4 seconds of windshield pump operation.

(24) Set the AVIONICS MASTER switch to the OFF position.

(25) Set the master BATT switches (left and right) to the OFF position.

(26) Disengage the ANTI-ICE PUMP 1, W/S ANTI-ICE, and ANTI-ICE PUMP 2 circuit breakers.

(27) Remove external electrical power from the airplane.

(28) Remove the temporary tube from the transducer outlet fitting.

(29) Install the outlet tube on the transducer. Refer to the applicable steps in TKS Flow Transducer (FIKI) - Removal/Installation, TKS Flow Transducer Installation procedures.

(30) Remove the temporary tube from the windshield pump outlet fitting.

(31) Install the outlet tube on the windshield pump. Refer to the applicable steps in TKS Anti-Ice System Metering Pumps (FIKI) - Removal/Installation, Metering Pump 1/Windshield Pump Assembly Installation procedures.

(32) Supply external electrical power to the airplane.

(33) Engage the ANTI-ICE PUMP 1, W/S ANTI-ICE, and ANTI-ICE PUMP 2 circuit breakers.

(34) Put the master BATT switches (left and right) and the AVIONICS MASTER switch the ON position.

(35) Put the PRIMARY switch in the HIGH position to start the metering pump 1 operation.

(36) If the filter assembly was replaced, put the BACKUP switch in the BACKUP position to start the metering pump 2 operation.

NOTE: This will let both pumps operate continuously.

(a) Let the system operate for approximately 5 minutes until there are no air bubbles in the TKS fluid flow from the porous

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panels on the leading edges.

NOTE: If necessary, you can let the system operate for more than 5 minutes until the fluid flow is normal across all porous panels.

(b) Monitor the level of fluid in the tank.

(c) If necessary, add more fluid to the tank so that it will not go below the usable fluid level during the procedure.

(d) Put the BACKUP switch in the OFF position.

(e) If the fluid flow at any of the porous panels does not become normal, do the porous panel purge and test procedure for the applicable porous panel(s). Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test.

(37) If the filter assembly was not replaced, put the MAX FLOW switch in the AIRFRAME position, then release the switch, to start both the metering pumps operation.

(a) Let the TKS fluid flow from the leading edge porous panels for one full cycle of approximately 2 minutes.

NOTE: If necessary, you can do more MAX FLOW AIRFRAME cycles until the fluid flow is normal across all porous panels.

(b) Monitor the level of fluid in the tank.

(c) If necessary, add more fluid to the tank so that it will not go below the usable fluid level during the procedure.

(d) If the fluid flow at any of the porous panels does not become normal, do the porous panel purge and test procedure for the applicable porous panel(s). Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test.

(38) Put the PRIMARY switch in the OFF position.

(39) Put the MAX FLOW switch in the WINDSHIELD position, then release the switch, to start the windshield pump operation.

NOTE: The windshield pump will start and operate when you put the spring-loaded MAX FLOW switch in the WINDSHIELD position.

(a) Do three full cycles of approximately 4 seconds each to let the TKS fluid flow from the windshield spray nozzles.

NOTE: If necessary, you can do more cycles until the fluid flow is normal from the spray nozzles.

(40) Set the AVIONICS MASTER switch to the OFF position.

(41) Set the master BATT switches (left and right) to the OFF position.

(42) Remove external electrical power from the airplane.

(43) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(44) Make sure that the floor and the airplane surfaces are clean.

8. TKS Fluid Contamination (Water) Removal

A. Remove the TKS Fluid Contamination (Water).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER (SW04) switch is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the ANTI-ICE PUMP 1, W/S ANTI-ICE, and ANTI-ICE PUMP 2 circuit breakers.

(6) Drain the TKS fluid from the fluid tank. Refer to TKS Anti-Ice Fluid Removal found in this section.

(7) Do the fluid tank servicing. Refer to Chapter 12, TKS Anti-Ice System - Servicing.

(8) Supply external electrical power to the airplane.

(9) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the ON position.

(10) Engage the ANTI-ICE PUMP 1, W/S ANTI-ICE, and ANTI-ICE PUMP 2 circuit breakers.

(11) Put the MAX FLOW switch in the AIRFRAME position, then release the switch, to start both the metering pumps operation.

(a) Let the TKS fluid flow from the leading edge porous panels for one full cycle of approximately 2 minutes.

NOTE: If necessary, you can do more MAX FLOW AIRFRAME cycles until the fluid flow is normal across all porous panels.

(b) Monitor the level of fluid in the tank.

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(c) If necessary, add more fluid to the tank so that it will not go below the usable fluid level during the procedure.

(12) If fluid flow at any of the porous panels is not normal, do the porous panel purge and test procedure for the applicable porous panel(s). Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test.

(13) Set the AVIONICS MASTER switch to the OFF position.

(14) Set the master BATT switches (left and right) to the OFF position.

(15) Remove external electrical power from the airplane.

(16) Make sure that the fluid tank servicing is correct. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(17) Make sure that the floor and the airplane surfaces are clean.

9. TKS Fluid Contamination (Solids) Removal

A. TKS Fluid Contamination (Solids) Removal

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) If the TKS fluid contamination is a solid material, contact Cessna Customer Service, P.O. Box 7706, Wichita, Kansas 67209 USA Tele: 316-517-5800 Fax: 316-517-5802.

10. Windshield Anti-Ice Nozzle Removal

A. Remove the Windshield Anti-Ice Nozzle (Refer to Figure 203).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Make sure that the TKS fluid tank and the tubings are drained completely.

(3) Remove the external power supply to the airplane.

(4) Disengage the circuit breakers on the left circuit breaker panel that follow:

(a) W/S ANTI ICE

(b) ANTI-ICE PUMP 1

(c) ANTI-ICE PUMP 2

(5) Open the engine cowl door.

(6) Loosen the nut that attaches the nozzle to the windshield tube assembly.

(7) Remove the nozzle along with the nut and the washers from the windshield tube assembly.

(8) Remove the nut and the washers from the nozzle.

(9) Install caps on the windshield tube assembly ends to keep FOD out of the TKS system.

B. Install the Windshield Anti-Ice Nozzle (Refer to Figure 203).

(1) Remove the caps from the windshield tube assembly ends.

(2) Install the nut and the washers to the nozzle.

(3) Put the nozzle in its position on the windshield tube assembly.

(4) Connect the nozzle to the windshield tube assembly.

(5) Tighten the nut that attaches the nozzle to the windshield tube assembly.

(6) Engage the circuit breakers on the left circuit breaker panel that follow:

(a) W/S ANTI ICE

(b) ANTI-ICE PUMP 1

(c) ANTI-ICE PUMP 2

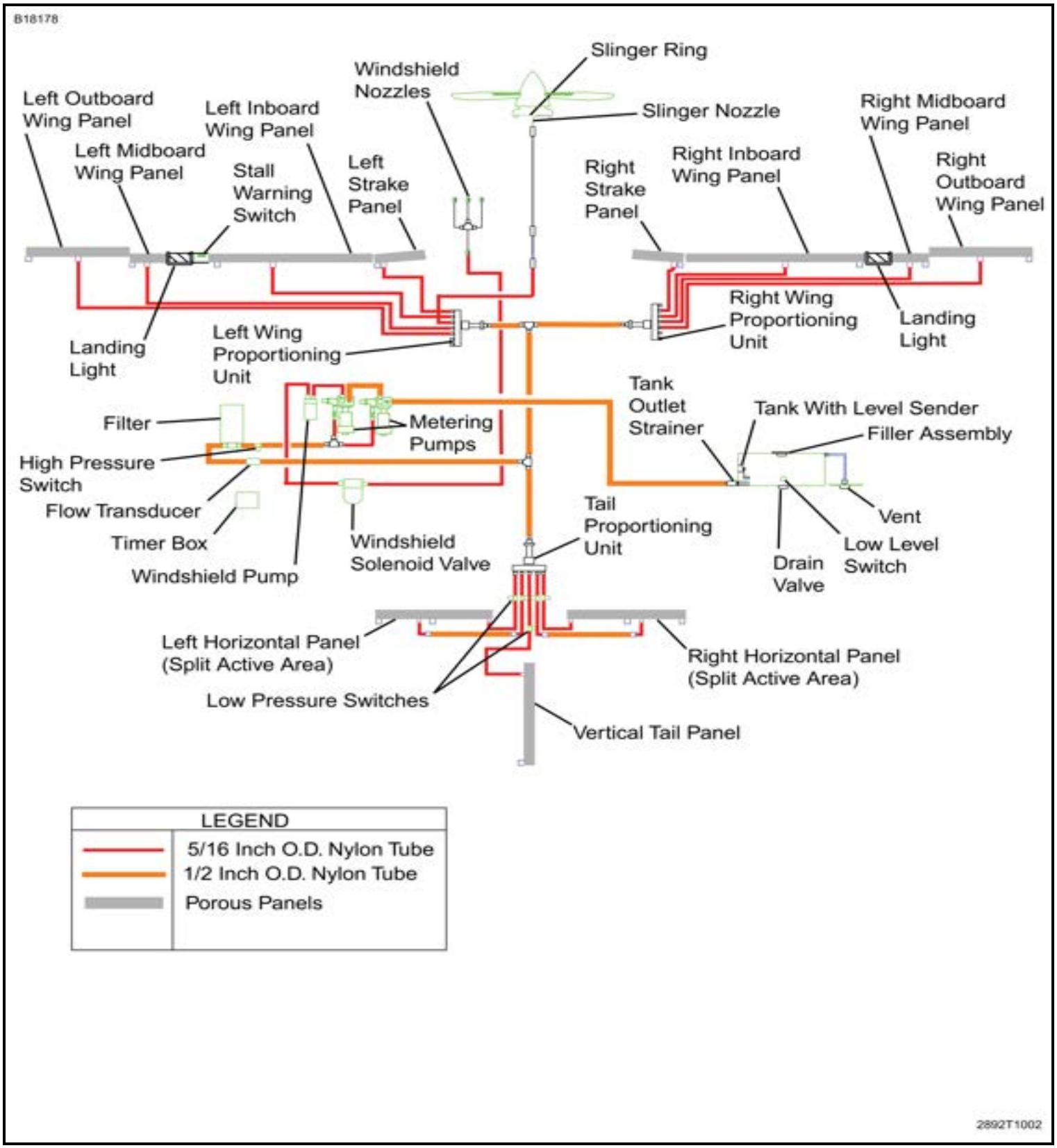
(7) Supply the external power to the aircraft.

(8) Clean the floor and the airplane surfaces as necessary.

(9) Close the engine cowl door.

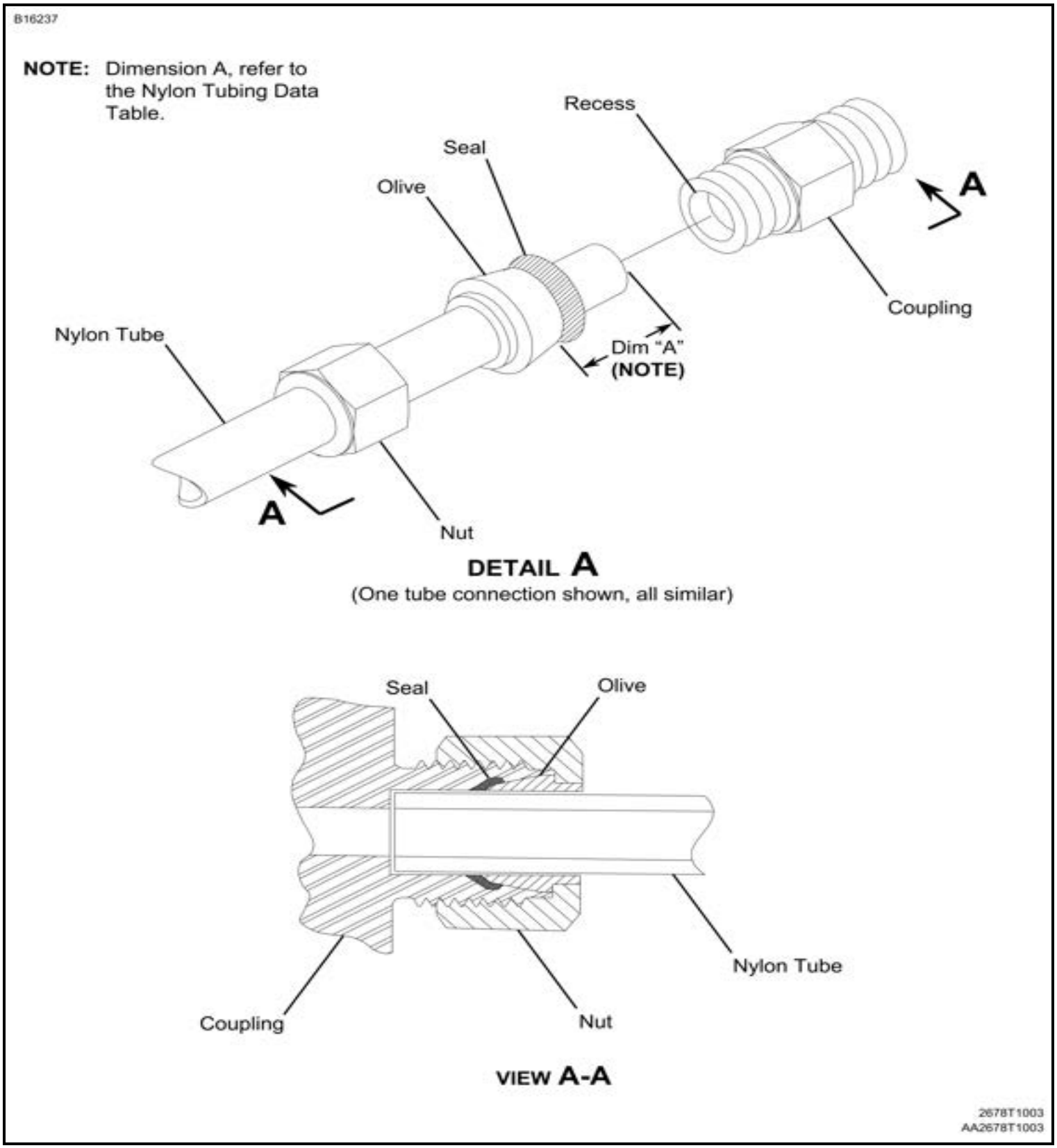
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Figure 201 : Sheet 1 : TKS Tubing Installation



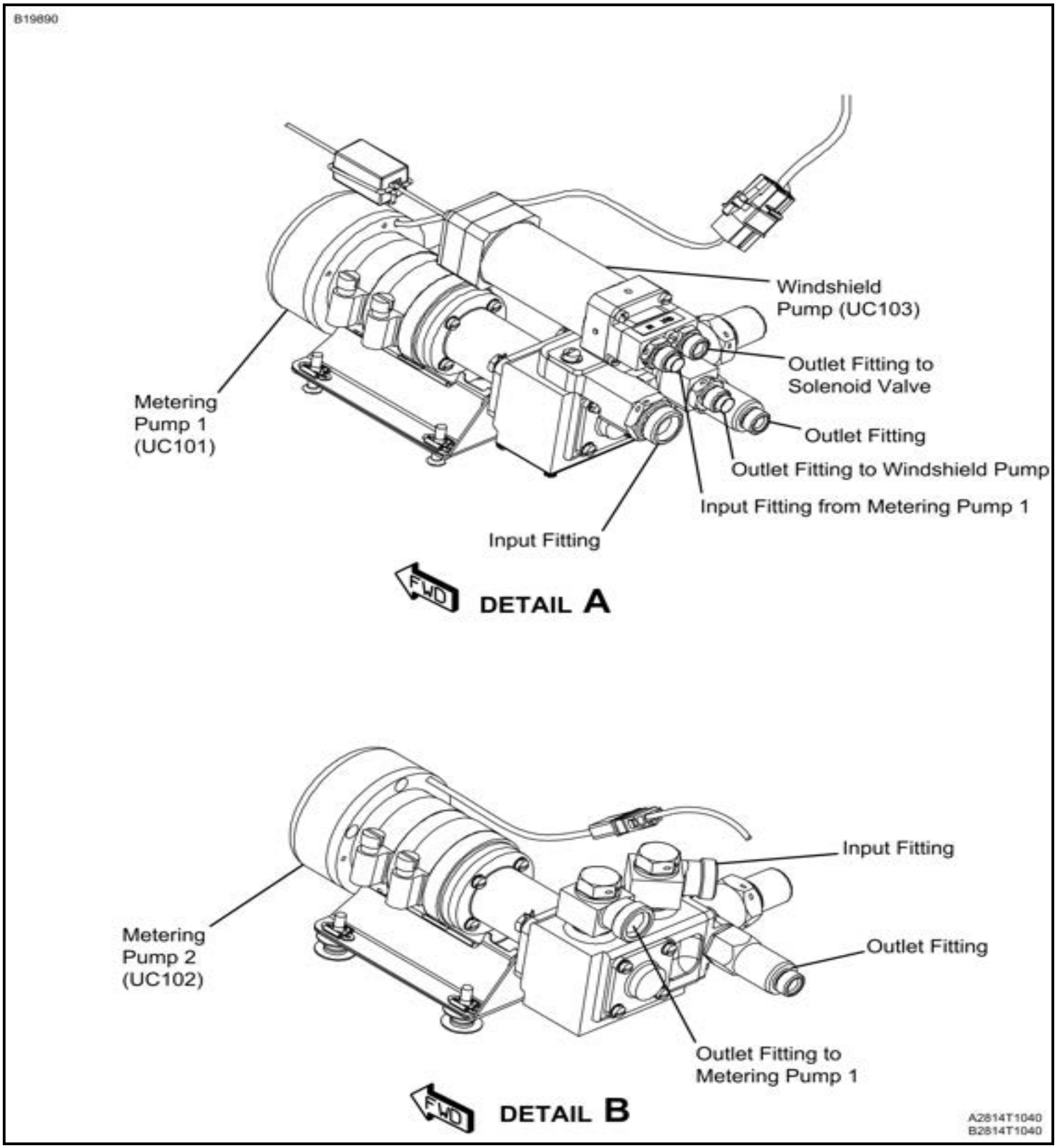
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Figure 201 : Sheet 2 : TKS Tubing Installation



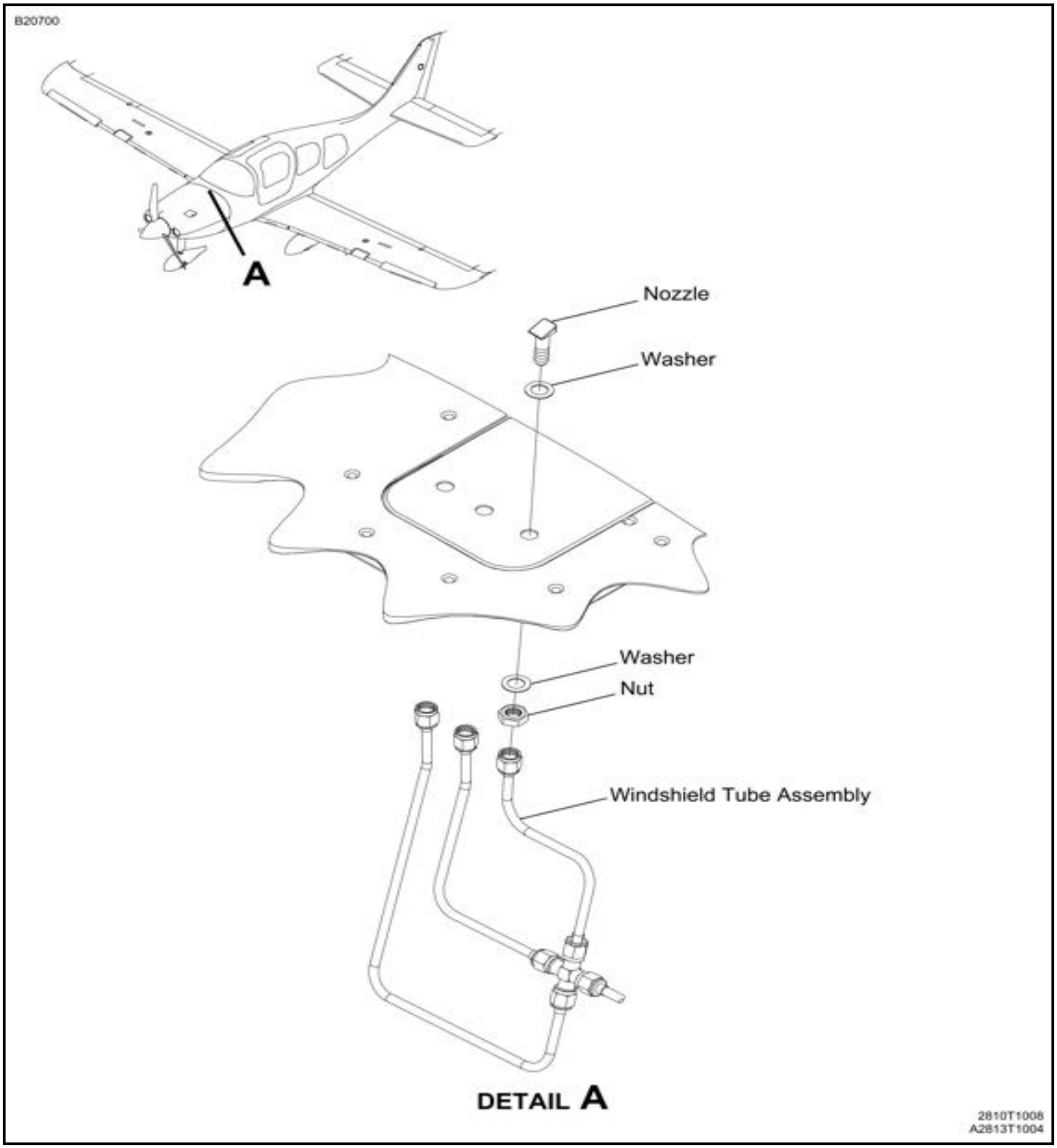
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Figure 202 : Sheet 1 : TKS Metering and Windshield Pumps



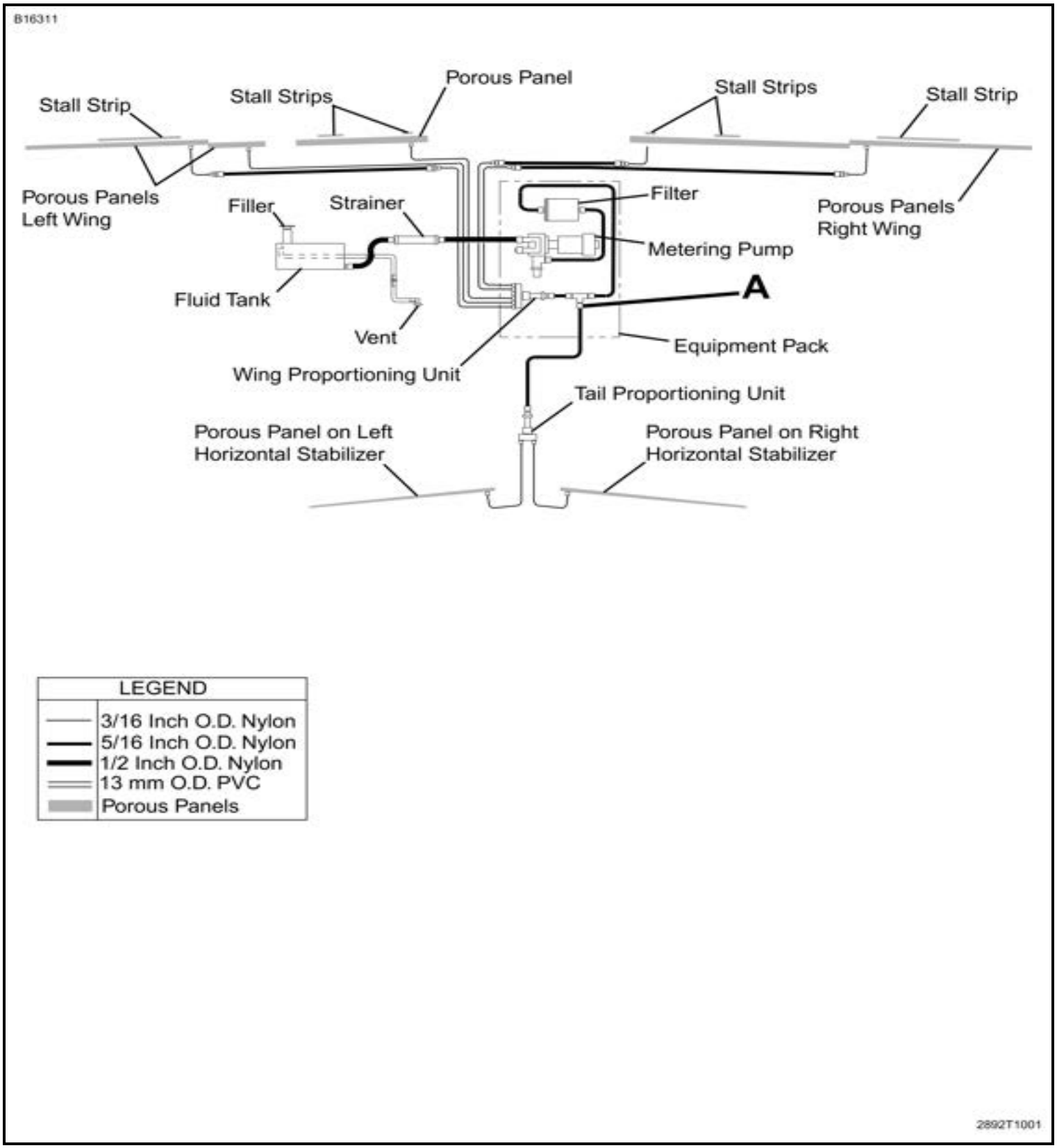
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Figure 203 : Sheet 1 : Windshield Anti-Ice Nozzle Installation



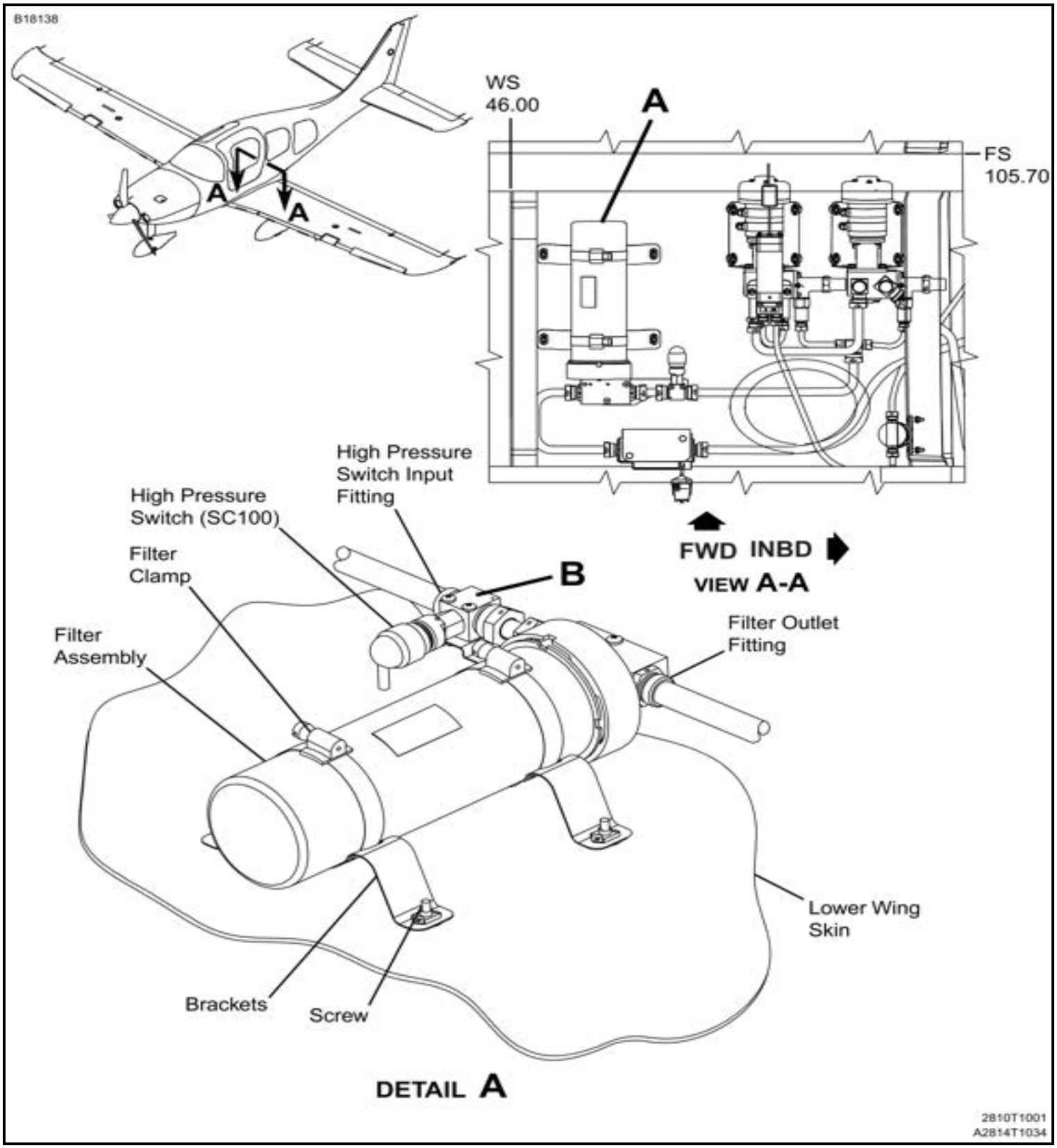
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



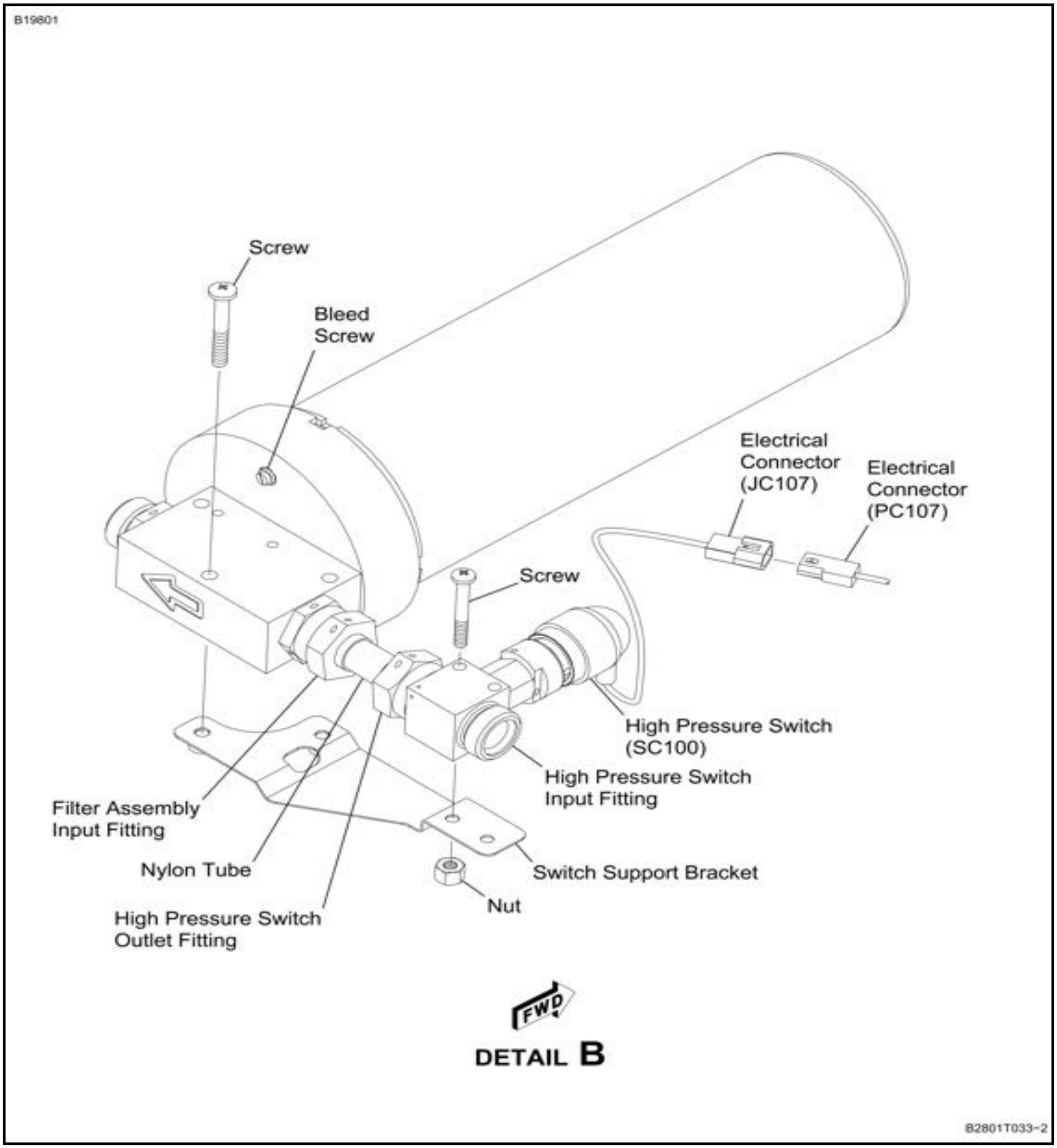
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Figure 401 : Sheet 1 : TKS Filter Assembly Installation



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Figure 401 : Sheet 2 : TKS Filter Assembly Installation



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TKS ANTI-ICE SYSTEM (FIKI) - ADJUSTMENT/TEST

1. General

A. This section contains the test procedures of TKS Anti-Ice System (FIKI). The procedures include complete system operational test and functional tests and calibration procedures for the level sender, TKS fluid quantity test, metering pumps 1 and 2 during all modes of operation, and a check of the fluid flow rates. The test also does a check of the windshield pump flow rate and CAS messages. A check for the applicable CAS messages is also included in the test procedures for the different TKS system functions and system condition.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Warnings and Cautions

WARNING: TKS system operation pressure can reach up to 200 PSI. Misting can occur at system connections. Refer to Safety Data Sheet (SDS) for exposure to misting of mono ethylene glycol.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: If TKS fluid is leaking at fluid connections internal to the aircraft, turn the TKS anti-ice system off and correct connections. Use the correct procedures to remove leaked fluid.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

4. TKS Functional and Operational Test Preliminary Procedures

A. Electrical power preliminary procedures.

(1) On the cockpit circuit breaker panel, disengage the circuit breakers that follow:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2
- W/S ANTI-ICE.

(2) Make sure that the G2000 system circuit breakers are engaged.

B. TKS component access preliminary procedures.

(1) As necessary, remove the panels and components that follow to get access to the TKS pumps and plumbing:

- Remove the pilot's and/or copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.
- Remove the left and/or right forward cabin floor panel. Refer to Chapter 53, Fuselage Access - Description and Operation.
- Remove the footwell. Refer to Chapter 25, Footwell - Maintenance Practices

(2) Level the airplane. Refer to Chapter 8, Leveling and Weighing - General.

C. Test line-1 preliminary procedures (refer to Figure 501).

(1) If necessary fabricate a test line-1. Refer to Section 30-15-02, TKS Test Lines - Maintenance Practices.

(2) Connect test line-1.

(a) Disconnect the aft tail supply tube from the aft port of the first Tee downstream of the flow transducer.

(b) Put a cap on the aft tail supply tube to keep FOD out and prevent excessive leakage of TKS fluid from the system.

(c) Connect the test line-1 nylon tube assembly to the Tee aft port.

1 Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(d) Put the open end in a 3 to 5 gallon collection bucket.

(e) Make sure that the shutoff valve is in the closed position.

(3) Disconnect the proportioning units supply side tube from the port of the Tee.

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(a) Put a cap on the proportioning units supply tube to keep FOD out and prevent excessive leakage of TKS fluid from the system.

(b) Put a cap on the proportioning units supply port of the Tee.

5. Level Sender Calibration Procedure, Flow Transducer and Low Level Switch Signal Checks

A. Do the level sender calibration (Refer to Figure 502).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Do the TKS Functional and Operational Test Preliminary Procedures found in this section.

(a) Make sure that test line-1 is connected (refer to Test line-1 preliminary procedure in this section).

(3) Remove the TKS access panel on the lower surface of the left wing.

(4) If necessary, put electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(5) Make sure that the Garmin G2000 system is serviceable.

(a) There are no CAS messages that show the G2000 is not serviceable.

(b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

(c) Make sure that the applicable TKS CAS messages show on the PFD CAS window.

(d) If the G2000 system shows an indicated unserviceable condition, troubleshoot and repair the problem. Refer to Chapter 34, Garmin G2000 - Troubleshooting.

(6) Make sure that the TKS fluid quantity indicator on the MFD EIS strip is serviceable (shows a fluid quantity).

NOTE: TKS fluid quantity indication on the MFD EIS strip may not be accurate at some fluid levels. The TKS fluid quantity indicated will be equal to or less than the amount of TKS fluid added (+0.0 or -1.5 gallons).

(7) If the tank is nearly full, remove the fluid to a level that is just below the minimum dispatch sight gauge. Refer to Figure 503 and the applicable procedures in TKS Anti-Ice System (FIKI) - Maintenance Practices, TKS Anti-Ice Fluid Removal.

(8) If the tank is empty or almost empty, add 1 gallon, +10 or -10 fluid ounces, (3.8 liters, +296 or -296ml), to the tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(9) Make sure that the open end of the test line-1 is in a collection bucket.

(10) Open the test line-1 shutoff valve.

(11) Do the procedures to put the G2000 in the configuration mode as follows:

(a) On the cockpit circuit breaker panel disengage the circuit breakers that follow:

- PFD
- MFD
- GTC.

(b) While you push and hold the far right MFD softkey (12), engage the MFD circuit breaker.

1 Release the softkey when the "INITIALIZING SYSTEM" message shows on the MFD.

(c) While you push and hold the far right PFD softkey (12), engage the PFD circuit breaker.

1 Release the softkey when the "INITIALIZING SYSTEM" message shows on the PFD.

(d) While you push and hold the GTC small right knob, engage the GTC circuit breaker.

1 Release the small right knob when the "INITIALIZING SYSTEM" message shows on the GTC.

(12) Set the GTC 570 to control the PFD as follows:

(a) When the "Config Mode" page shows on the GTC, push the "GDU Controls" button.

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(b) When the "GDU Controls" page shows on the GTC, make sure the green bar shows on the bottom section of the "PFD" button.

1 If not push the "PFD" button.

(13) Select the GEA STATUS page on the PFD and then push “DIGITAL” softkey.

(14) On the cockpit circuit breaker panel, engage the ANTI-ICE PUMP 1 circuit breaker.

(15) Put the PRIMARY switch to the HIGH position.

(a) TKS fluid is pumped from the tank through test line-1 into the bucket.

(16) Make sure that the DEICE FLUID FLOW RATE value is not zero on the GEA Status page. Refer to Figure 502.

NOTE: Flow rate above zero indicates the flow transducer is serviceable.

NOTE: You can create back pressure on the system by slowly closing and opening the test line-1 shutoff valve. This can help to remove air from the system and start the flow rate indication.

(17) Continue pumping TKS fluid until fluid flow stops or pump starts to cavitate.

NOTE: This decreases fluid in the tank to the “unusable” 0.0 gallons (liters) level.

NOTE: The "ANTI-ICE SYSTEM FAIL" will sound two minutes after the pump starts. This happens because the low pressure switches have been disconnected from the fluid flow. To cancel the alert, cycle the PRIMARY switch from the HIGH position to the OFF position and then back to the HIGH position.

(a) Put the PRIMARY switch to the OFF position and immediately close the test line-1 shutoff valve.

(18) Remove the TKS filler cap and make sure the TKS fluid is at an unusable level.

(19) Install the filler cap and allow tank to stabilize for 2 minutes.

(20) On the cockpit circuit panel, disengage the ANTI-ICE PUMP 1 circuit breaker.

(21) Make sure that the ANTI-ICE PUMP 2 circuit breaker is disengaged.

(22) On the PFD, select the DAT CALIBRATION page. Refer to Figure 502.

(a) Use the PFD 275 controller large outer PFD knob to select the "CAL" tab.

(b) Use the PFD 275 controller smaller knob to select the DAT CALIBRATION page.

1 Push the small knob to acknowledge the selection.

(c) Use the PFD 275 controller large outer PFD knob to move the cursor to the “RAW POINTS” field adjacent to 0.000 (“CAL PNTS”) in DAT CAL TBL 0.

(d) On the PFD, push the CAL softkey and then push the GTC 570 controller Enter button to acknowledge the selection.

NOTE: This sets the 0.0 gallon calibration point.

(23) Measure and add 10 gallons, +8 or -8 fluid ounces, (37.9 liters, +237 or -237ml) of approved TKS fluid to the tank through the filler port.

NOTE: It is important to follow the sequence of steps as written when setting the calibration points.

(24) Tighten TKS fluid tank filler cap and allow the tank to stabilize for 2 minutes.

(25) Use the PFD 275 controller large outer PFD knob to move the cursor to “RAW POINTS” field adjacent to 36.718 (“CAL PNTS”) in DAT CAL TBL 0.

(a) On the PFD, push the CAL softkey and then push the GTC 570 controller Enter button to acknowledge the selection.

NOTE: This sets the 10.0 gallon calibration point.

(26) Use one of the following methods to remove a measured quantity of TKS fluid from the tank.

NOTE: It is important to follow the sequence of steps as written when setting the calibration points.

NOTE: There are two ways to remove the fluid from the tank: use a hand pump and clean hose through the filler neck or use the drain in the tank access panel on the lower surface of the right wing.

CAUTION: Insert siphon hose straight down into wing tank to avoid contact with the internal tank level sender arm.

(a) Use a portable hand or electric pump to remove a measured quantity of 4 gallons, +8 or -8 fluid ounces, (15.1 liters, +237 or -237ml) of TKS fluid from the tank through the filler port into a fluid measuring container.

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1 Tighten the TKS fluid tank filler cap and allow tank to stabilize for 2 minutes.

(b) Open the drain in the tank access panel and remove a measured quantity of 4 gallons, +8 or -8 fluid ounces, (15.1 liters, +237 or -237ml) of TKS fluid from the tank into a fluid measuring container.

1 Tighten the drain in the tank access panel and allow tank to stabilize for 2 minutes.

(27) Use the PFD 275 controller large outer PFD knob to move the cursor to “RAW POINTS” field adjacent to 22.712 (“CAL PNTS”) in DAT CAL TBL 0.

(a) On the PFD, push the CAL softkey and then push the GTC 570 controller Enter button to acknowledge the selection.

NOTE: This sets the 6.0 gallon calibration point.

(28) Open the TKS fluid tank filler cap and visually inspect the filler cap sight gauge to make sure that the gap between the top of the TKS fluid and the bottom of the 6 gallon filler level gauge (found inside the filler port) is between 0 and 0.15 inch. Refer to Figure 503.

NOTE: It is permissible to have more TKS fluid in the tank but not less than the 0.15 inch mark.

(a) If the gap is more than 0.15 inch, add fluid to the tank until it is between 0 and 0.15 inch.

(b) Tighten TKS fluid tank filler cap and allow tank to stabilize for 2 minutes.

(c) If you added fluid to the tank do the steps that follow:

1 Do the step above again to set the 6.0 gallon calibration point.

(29) Use one of the following methods to remove a measured quantity of TKS fluid from the tank.

(a) Use a portable hand or electric pump to remove a measured quantity of 4 gallons, +8 or -8 fluid ounces, (15.1 liters, +237 or -237ml) of TKS fluid from the tank through the filler port into a fluid measuring container.

(b) Open the drain in the tank access panel and remove a measured quantity of 4 gallons, +8 or -8 fluid ounces, (15.1 liters, +237 or -237ml) of TKS fluid from the tank into a fluid measuring container.

1 Tighten the drain in the tank access panel.

(30) Select GIA I/O CONFIGURATION page on the PFD.

(a) Use the PFD 275 controller large outer PFD knob to select the "GIA" tab.

(b) Use the PFD 275 controller smaller knob to select the GIA I/O CONFIGURATION page.

1 Push the small knob to acknowledge the selection.

(c) Make sure that there is a boxed “F” (with black background) in the DATA column next to LOW DEICE FLUID (line 2).

(31) Use one of the following methods and slowly continue to remove a measured quantity of TKS fluid from the tank.

NOTE: It is important to follow the sequence of steps as written when setting the calibration points.

(a) Use a portable hand or electric pump and slowly continue to pump out a measured quantity of 1 gallon, +8 or -8 fluid ounces, (3.8 liters, +237 or -237ml) with a portable hand or electric pump into a fluid measuring container.

1 Make sure that on the GIA I/O CONFIGURATION page on PFD, that the boxed “F” changes to boxed “T” (with green background) in the DATA column next to LOW DEICE FLUID (line 2) before the full 1 gallon has been pumped out. Refer to Figure 502.

2 Tighten the TKS fluid tank filler cap and allow tank to stabilize for 2 minutes.

(b) Open the drain in the tank access panel and slowly continue to remove a measured quantity of 1 gallon, +8 or -8 fluid ounces, (3.8 liters, +237 or -237ml) of TKS fluid from the tank into a fluid measuring container.

1 Make sure that on the GIA I/O CONFIGURATION page on PFD, that the boxed “F” changes to boxed “T” (with green background) in the DATA column next to LOW DEICE FLUID (line 2) before the full 1 gallon has been pumped out. Refer to Figure 502.

2 Tighten the drain in the tank access panel and allow tank to stabilize for 2 minutes.

(32) Use the PFD 275 controller large outer PFD knob to move the cursor to “RAW POINTS” field adjacent to 3.785 (“CAL PNTS”) in DAT CAL TBL 0.

(a) On the PFD, push the CAL softkey and then push the GTC 570 controller Enter button to acknowledge the selection.

NOTE: This sets the 1.0 gallon calibration point.

(33) Do the steps that follow to bleed air out of the TKS filter. Refer to TKS Filter/High Pressure Switch (FIKI) - Removal/Installation, Figure 401.

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(a) Operate pump 1 or pump 2.

(b) Loosen the filter bleed screw.

(c) When fluid shows, tighten the filter bleed screw.

(34) Put the TKS switches in the OFF position to stop pump operation.

(35) On the cockpit circuit breaker panel, make sure that the circuit breakers that follow are disengaged:

- PFD
- MFD
- GTC.

(36) Do the TKS Fluid Quantity and Low Level Switch CAS Message (A-ICE FLUID LO) Functional Test. Refer to the applicable steps in TKS Fluid Quantity, Low Level Switch and A-ICE FAIL CAS Message Functional Test.

(37) If no more test procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane found in this section.

6. TKS Fluid Quantity, Low Level Switch and A-ICE FAIL CAS Message Functional Test

A. Do the TKS fluid quantity and low level switch CAS message functional test.

NOTE: You must do the TKS level sender calibration before you do the procedures that follow. Refer to Level Sender Calibration Procedure, Flow Transducer and Low Level Switch Signal Checks.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) If necessary, put electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(3) Allow the G2000 system to power on and stabilize (approximately 1 minute).

(4) Make sure that the Garmin G2000 system is serviceable.

(a) There are no CAS messages that show the G2000 is not serviceable.

(b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

(c) Make sure that the TKS fluid quantity indicator on the MFD EIS strip is serviceable (shows a fluid quantity).

(5) Make sure that each of the TKS switches on the center console switch panel, are in the OFF position.

(6) Make sure that the CAS messages that follow do not show on the PFD CAS window:

- A-ICE NORM (white)
- A-ICE HIGH (white)
- A-ICE BACKUP (white)
- A-ICE FLUID LO (amber)
- A-ICE PRESS HI (amber).

(7) On the cockpit circuit breaker panel, make sure that the circuit breakers that follow are disengaged:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2
- W/S ANTI-ICE.

NOTE: In the steps that follow no TKS anti-ice fluid is pumped.

(8) On the MFD EIS display make sure that:

(a) The message 'A-ICE GALS' (white) is on.

(b) The digital quantity value (white) of 1.0 gallons shows.

NOTE: Reference only, the time value should be approximately 0:16.

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1 As necessary, remove or add approved TKS fluid to the tank. Refer to the applicable procedures in TKS Anti-Ice System (FIKI) - Maintenance Practices, TKS Anti-Ice Fluid Removal and/or Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(9) At the same time you put the PRIMARY switch, found on the center console switch panel, to the NORM position, start the stopwatch.

(a) Make sure that the indications that follow happen:

1 Immediately, the white A-ICE NORM CAS message appears on the PFD.

2 After approximately three seconds:

a The amber A-ICE FLUID LO CAS message shows on the PFD.

b A single aural chime is heard.

c The 'A-ICE GALS' and quantity indication on the MFD EIS Display change to amber.

d The 'A-ICE TIME REM' and digital value of time on the Engine/Systems Page change to amber.

3 After 2 minutes, the red A-ICE FAIL CAS message shows on the PFD.

4 A repeated aural chime is heard.

(10) On the PFD, push the far right softkey:

(a) The flashing 'A-ICE FAIL' (red) CAS message is acknowledged.

(b) The aural chime is silenced.

(11) Put the PRIMARY switch to the OFF position.

(12) Remove the TKS fluid tank filler cap and add approximately 9 gallons (34.1 liters) of approved TKS fluid to the TKS fluid tank.

(a) Make sure the tank is filled up to the fill port.

(13) Tighten the TKS fluid tank filler cap.

(a) Allow the fluid to stabilize for 2 minutes.

(14) On the MFD EIS display make sure that the digital value (white) of the TKS fluid quantity is 10.0 gallons, + 0.0 or - 0.5 gallons.

(a) On the ENGINE/Systems page, the approximate digital value (white) of time should show 2:40.

(15) Check the TKS fluid integral wing tank for fluid leaks.

(16) If no more test procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane found in this section.

7. Metering Pumps, Windshield Pump and High Pressure Switch Functional Test

A. Do the functional test of the metering pumps.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) If necessary prime the metering pumps, refer to TKS Metering and Windshield Pumps Priming Procedures.

(3) Do the TKS Functional and Operational Test Preliminary Procedures found in this section.

(a) Make sure that test line-1 is connected (refer to Test line-1 preliminary procedure in this section).

(4) Connect test line-2 (refer to Figure 501).

(a) If necessary fabricate a test line-2. Refer to Section 30-15-02, TKS Test Lines - Maintenance Practices.

(b) Disconnect the windshield spray supply tube from the firewall fitting.

1 Put a cap on the windshield spray supply tube to keep FOD out and prevent excessive leakage of TKS fluid from the system.

2 Put the test line-2 tube fitting in its correct position on the firewall fitting.

a Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

3 Put the test line-2 open end in a one gallon bucket.

4 Make sure that the shutoff valve is in the closed position.

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(5) If necessary, put electrical power on the airplane as follows:
  (a) Apply external electrical power to the airplane.
  (b) Set the master BATT switches (left SW01 and right SW02) to the ON position.
  (c) Set the AVIONICS MASTER switch (SW04) to the ON position.
  (d) Set the CROSS TIE Switch (SW03) to the ON position.

(6) Make sure that the Garmin G2000 system is serviceable.
  (a) There are no CAS messages that show the G2000 is not serviceable.
  (b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

  (c) Make sure that the TKS fluid quantity indicator on the MFD EIS strip is serviceable (shows a fluid quantity).

(7) If the G2000 system shows an indicated unserviceable condition, troubleshoot and repair the problem. Refer to Chapter 34, Garmin G2000 - Troubleshooting.

(8) Make sure that the TKS calibration and test preliminary procedures are complete. Refer to TKS Calibration and Test Preliminary Procedures found in this section.

(9) Make sure that:
  (a) Test line-1 open end is in a collection bucket.
  (b) Test line-1 shutoff valve is in the open position.

(10) On the cockpit circuit breaker panel engage the circuit breakers that follow:
- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2

(11) On the center console switch panel, put the BACKUP switch to the BACKUP position and start the stopwatch.
  (a) Make sure that on the PFD that the CAS message “A-ICE BACKUP” (white) comes on.

NOTE: During the test procedures, since there is no pressure supplied at the low pressure switches, after 2 minutes of pump operation the red “A-ICE FAIL” message will be displayed on the PFD with a repeating aural chime. To silence the repeating associated aural chime, push the lower right soft key on PFD.

(12) Make sure that metering Pump 2 pumps fluid continuously.

(13) After 3 minutes, put the BACKUP switch to the OFF position.
  (a) Make sure that fluid quantity collected is 1.34 quarts, +0.14 or -0.14 quart. (1272 ml +128 or -128 ml).
    1 Use correct procedures to discard the collected TKS fluid.
  (b) Reset the stopwatch.

(14) Select PRIMARY switch to the HIGH position and start the stopwatch.
  (a) Make sure that on the PFD that the CAS message “A-ICE HIGH” (white) comes on.

(15) Make sure that metering Pump 1 pumps fluid continuously.

(16) After 3 minutes, put the PRIMARY switch to the OFF position.
  (a) Make sure that fluid quantity collected is 1.34 quarts, +0.14 or -0.14 quart. (1272 ml +128 or -128 ml).
    1 Use correct procedures to discard the collected TKS fluid.
  (b) Reset the stopwatch.

(17) Make sure that:
  (a) Test line-2 open end is in a collection bucket.
  (b) Test line-2 shutoff valve is in the open position.

(18) On the cockpit circuit breaker panel, engage the W/S ANTI-ICE circuit breaker.

CAUTION: Do not operate the windshield pump for more than 10 seconds at a time. Make sure that you wait a minimum of 10 seconds with the pump off before you operate it again.

(19) Push and momentarily hold the MAX FLOW switch to the WINDSHIELD position and start the stopwatch.

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(a) Make sure that the windshield TKS fluid flow stops after 4 seconds, +2 or -2 seconds.

CAUTION: Do not operate the windshield pump for more than 10 seconds at a time. Make sure that you wait a minimum of 10 seconds with the pump off before you operate it again.

(20) Push and hold down the MAX FLOW switch to the WINDSHIELD position switch in WINDSHIELD position for approximately 10 seconds.

(a) Make sure that the windshield TKS fluid is pumped continuously while switch is held down, and stops after switch is released.

(b) Use correct procedures to discard the collected TKS fluid.

(c) Reset the stopwatch.

(21) Put the PRIMARY switch to the NORM position and start the stopwatch.

(a) Make sure that the CAS message “A-ICE NORM” (white) comes on.

(b) Make sure that each of the two metering pumps (1 and 2), pump fluid for 30 to 50 seconds, then stop pumping fluid for 90 seconds, +2 or -2 seconds, then pump for 30 seconds.

(c) After two cycles are completed and the pumps are stopped, put the PRIMARY switch to the OFF position.

(d) Use correct procedures to discard the fluid.

(e) Reset the stopwatch.

(22) Put the PRIMARY switch to the HIGH position and start the stopwatch.

(23) Allow the pump to run for approximately 10 seconds.

(a) Slowly close the Test Line-1 shutoff valve to raise the system pressure until the CAS message “A-ICE PRESS HI” (amber) is flashing on PFD.

NOTE: With the valve completely closed, the fluid pressure will reach approximately 200 psi which is 50 psi above the pressure that a CAS message “A-ICE PRESS HIGH” would come on.

(24) While you continue to pump fluid with the switch in the HIGH position, slowly open the test line-1 shutoff valve.

(a) Make sure that the CAS message “A-ICE PRESS HI” (amber) goes off.

(25) Put the PRIMARY switch to the NORM position.

(26) Put the MAX FLOW switch to the AIRFRAME position and start the stopwatch.

(a) Make sure that the TKS metering pumps (1 and 2), pump fluid continuously, and stop after 2 minutes, +2 or -2 seconds.

(27) Put the MAX FLOW switch to the OFF position.

(28) Use correct procedures to discard the collected TKS fluid.

(29) Put the airplane back to its original condition. Refer to Restore the Airplane found in this section.

NOTE: Before the TKS System Operational Test procedures are done test line-1 and test line-2 must be removed and the TKS tubing put back in its original condition.

8. TKS System Operational Test

A. TKS system operational test preliminary procedures.

NOTE: Before the TKS System Operational Test procedures are done test line-1 and test line-2 must be removed and the TKS system tubing put back in its original condition.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) If porous panels have been replaced you must do a porous panel purge on porous panel(s) that have been replaced before you do the operational test procedures of the TKS system. Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test.

(3) Make sure that the circuit breakers that follow, found on the cockpit circuit breaker panel, are engaged:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2
- W/S ANTI-ICE.

(4) Make sure that the TKS fluid tank is full.

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(a) If the tank is not full add fluid until the fluid reaches the fill port.

(b) Tighten the TKS fluid tank filler cap.

(5) Attach fluid collection system to airplane as follows:

(a) A gutter and bucket system for the wing and tail porous panels.

(b) A windshield spray collection method.

(c) For the prop slinger, point one blade of the prop down toward the ground so that fluid will stream into a bucket placed on the ground below it.

NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

B. Do the TKS system operational test (Refer to Figure 504).

NOTE: If fluid leaking is observed at any fluid connections (including TKS supply lines located in the engine compartment) turn the anti-Ice system off, correct the connections and use the correct procedures to remove leaked fluid.

(1) If necessary, put electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(2) Make sure that the Garmin G2000 system is serviceable.

(a) There are no CAS messages that show the G2000 is not serviceable.

(b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

(c) Make sure that the TKS fluid quantity indicator on the MFD EIS strip is serviceable (shows a fluid quantity).

(3) On the center console switch panel, put the PRIMARY switch to the HIGH position and start the stopwatch.

(4) After at least 2 minutes, +5 or -5 seconds, of operation, make sure that the “A-ICE FAIL” (red) CAS message is not on the PFD.

NOTE: This step makes sure of the wiring and functionality of the flow transducer. The step also makes sure that each of the five low pressure switches are in “closed” (pressurized) positions.

(5) Make sure that after approximately 5 minutes TKS fluid starts to show at a minimum of one porous panel.

(6) Continue to operate the TKS system in the HIGH mode until complete flow shows at each of the porous panels.

(a) Make sure the fluid flows from all of the porous panels correctly and shows no air bubbles. Refer to Figure 504.

NOTE: The full length of the vertical stabilizer porous panel may not be flowing due to gravity and warm temperatures.

(7) Put the PRIMARY switch to the OFF position.

(a) Reset the stopwatch.

(8) Empty the TKS fluid collection buckets and use the correct procedures to discard of the TKS fluid.

(9) Put the PRIMARY switch to the HIGH position and start the stopwatch.

(a) Operate the TKS system for 5 minutes.

(10) Put the PRIMARY switch to the OFF position.

(11) Record the data that follows:

(a) The TKS system operation time.

(b) The quantity of the propeller slinger TKS fluid collected.

(c) The ambient temperature.

(12) Do a check of the TKS fluid collected for the left and right wing porous panels and make sure that for each side:

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(a) The fluid collected is 23.7 fluid ounces, +7.1 or -4.7 fluid ounces, (700 ml, +210 or -140 ml).

(13) Do a check of the TKS fluid collected for the left and right horizontal stabilizer porous panels and make sure that for each side:

(a) The fluid collected is 6.4 fluid ounces, +2.0 or -1.4 fluid ounces, (190 ml, +60 or -40 ml).

CAUTION: Do not operate the windshield pump for more than 10 seconds at a time. Make sure that you wait a minimum of 10 seconds with the pump off before you operate it again.

(14) Push and hold the MAX FLOW switch in the WINDSHIELD switch position.

(a) Make sure that each of the 9 spray holes have steady flow streams in a correct manner.

(b) Make sure that TKS supply lines forward of the firewall are not leaking TKS fluid.

NOTE: To get fluid flowing to the windshield nozzles the MAX FLOW switch may need to be cycled to the WINDSHIELD position several times.

(15) If no more test procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane in this section.

9. Restore the Airplane

A. Put the airplane back to its original condition.

NOTE: It can be necessary to complete some or all of the procedures that follow to put the airplane back to its original condition.

(1) If you cannot continue the TKS test procedures at this time or the necessary test procedures are complete, do the procedures that follow:

(a) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(c) Set the CROSS TIE Switch (SW03) to the OFF position.

(d) Remove external electrical power from the airplane.

(2) Disconnect the test line-1 nylon tube assembly from the Tee.

(3) Remove the cap from the aft tail supply tube.

(a) Install a new seal in the aft Tee port outlet tube fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(b) Put the aft tail supply tube in its correct position on the aft Tee outlet fitting.

(c) Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(4) Remove the cap from the proportioning units supply tube.

(a) Install a new seal in the proportioning units supply tube fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(b) Put the proportioning units supply tube fitting in its correct position on the TEE proportioning units supply outlet port.

(c) Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Disconnect the test line-2 nylon tube assembly from the firewall fitting.

(6) Remove the cap from the windshield spray supply tube.

(a) Install a new seal in the windshield spray supply tube fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(b) Put the windshield spray supply tube fitting in its correct position on the firewall fitting.

(c) Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(7) If a fluid collection system was fabricated and installed on the airplane, remove it.

(a) Use the correct procedures to discard the TKS fluid that remains in the collection system components.

(8) Use the correct procedures to discard the TKS fluid in the collection bucket(s).

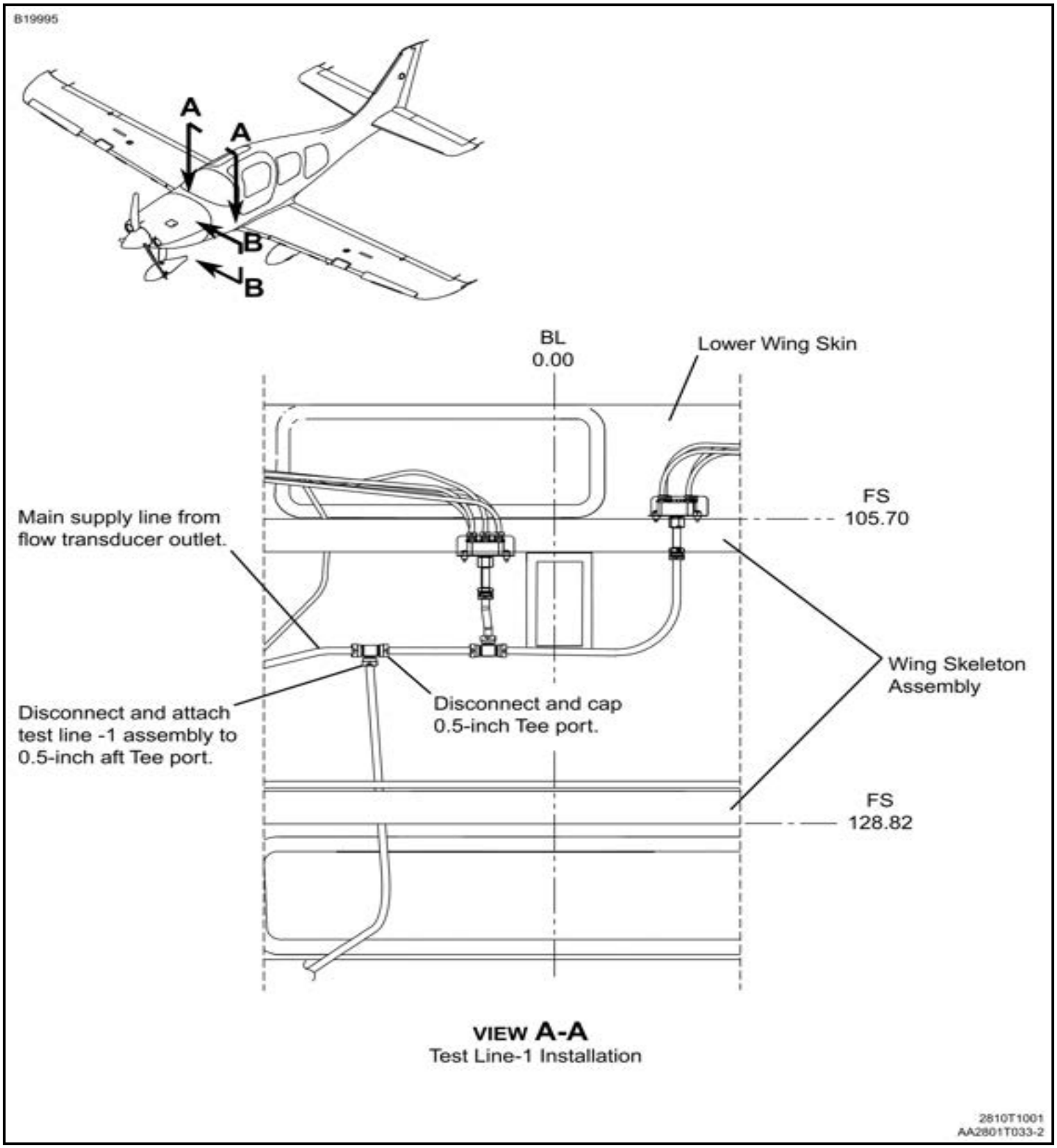
(9) As necessary, install the panels and components that follow:

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- The left and/or right forward cabin floor panel. Refer to Chapter 53, Fuselage Access - Description and Operation.
- The TKS access panel on the lower surface of the left wing.
- Install the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.
- The pilot's and/or copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

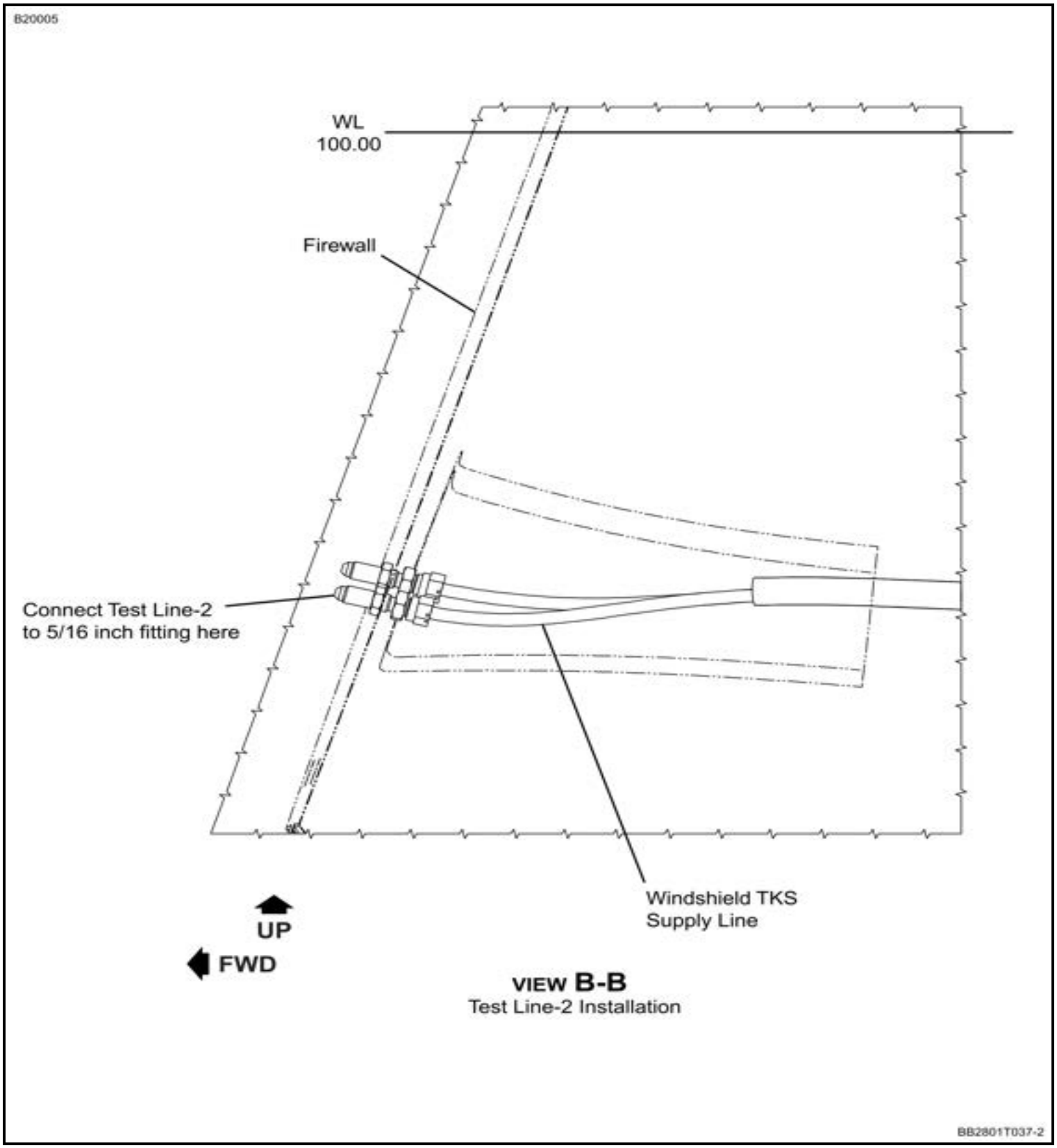
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Figure 501 : Sheet 1 : Test Line Installation



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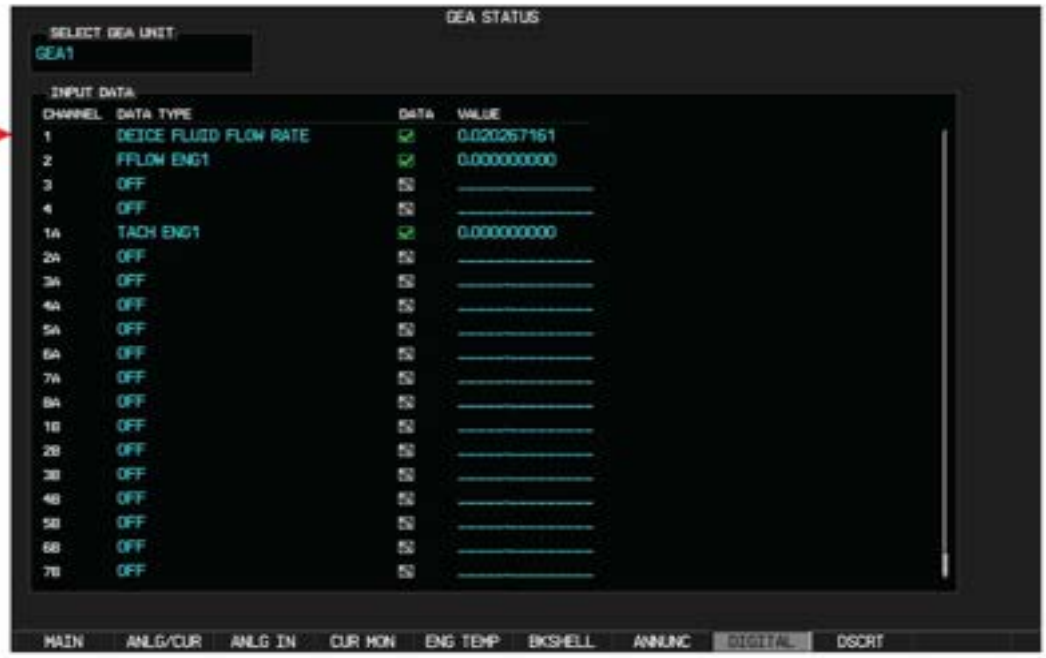
Figure 501 : Sheet 2 : Test Line Installation



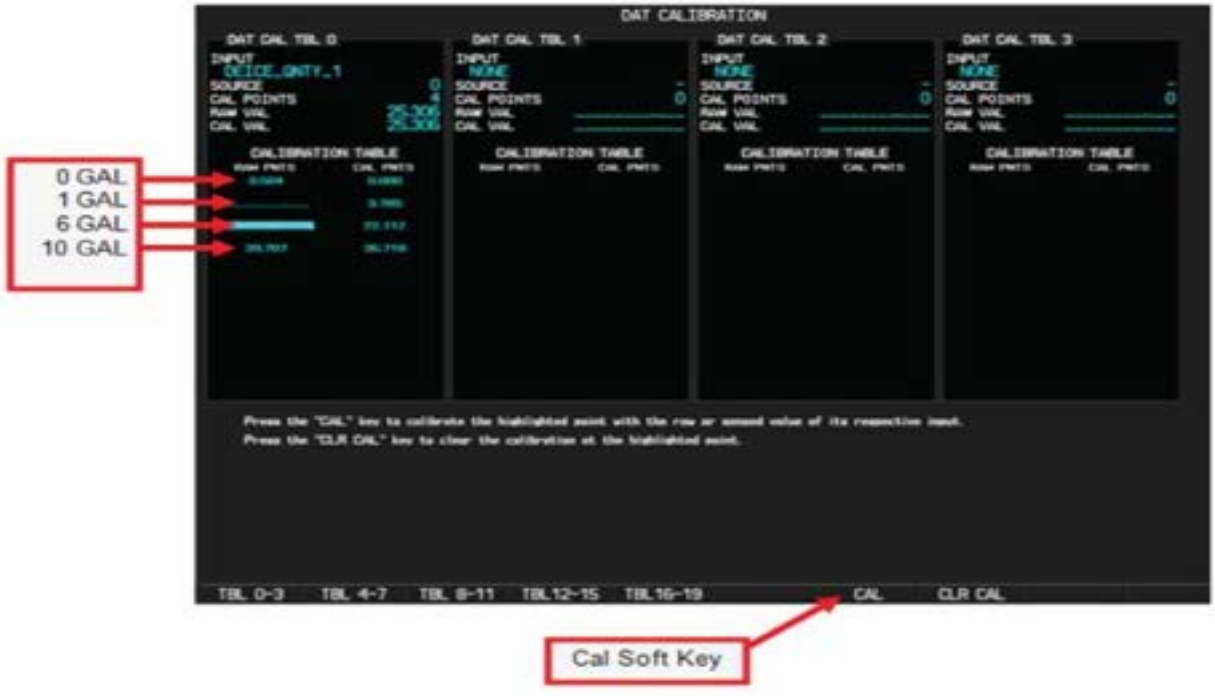
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Figure 502 : Sheet 1 : TKS Tank Calibration Screen Shots

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GEA STATUS Page
DEICE FLUID FLOW
RATE Indication
(shown in liters/sec)

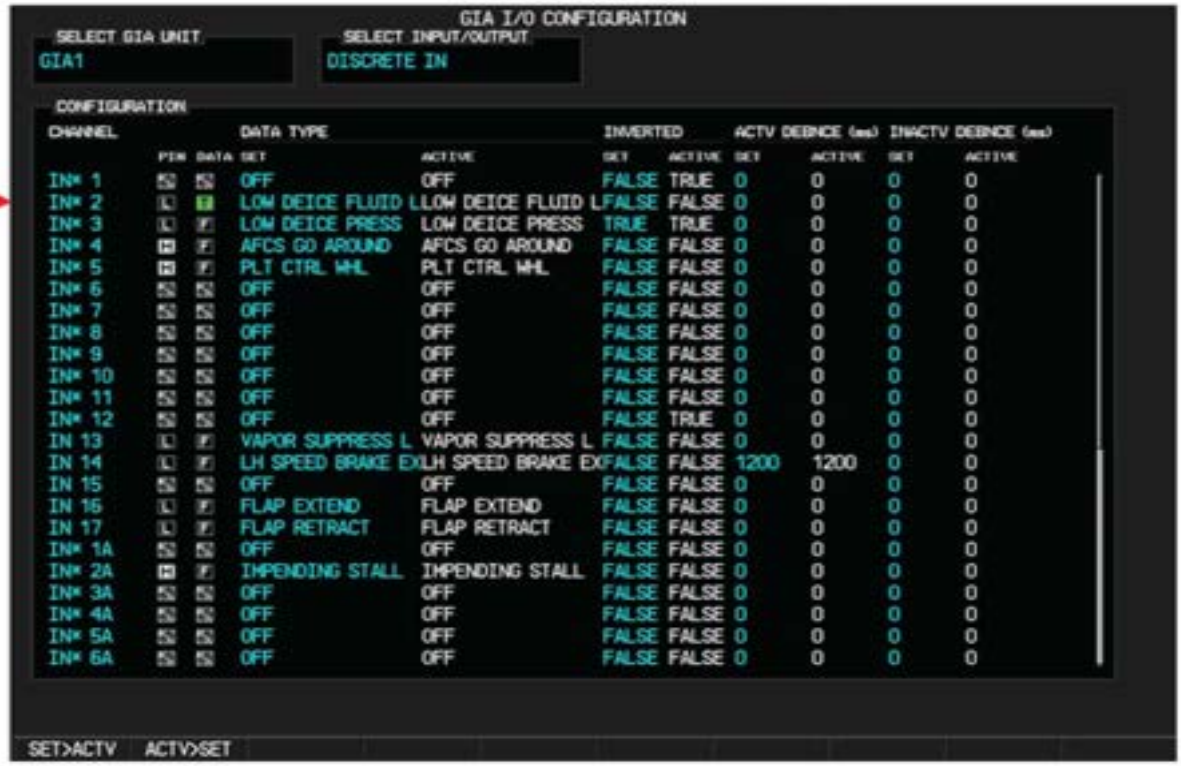


PFD DAT CALIBRATION Page

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Figure 502 : Sheet 2 : TKS Tank Calibration Screen Shots

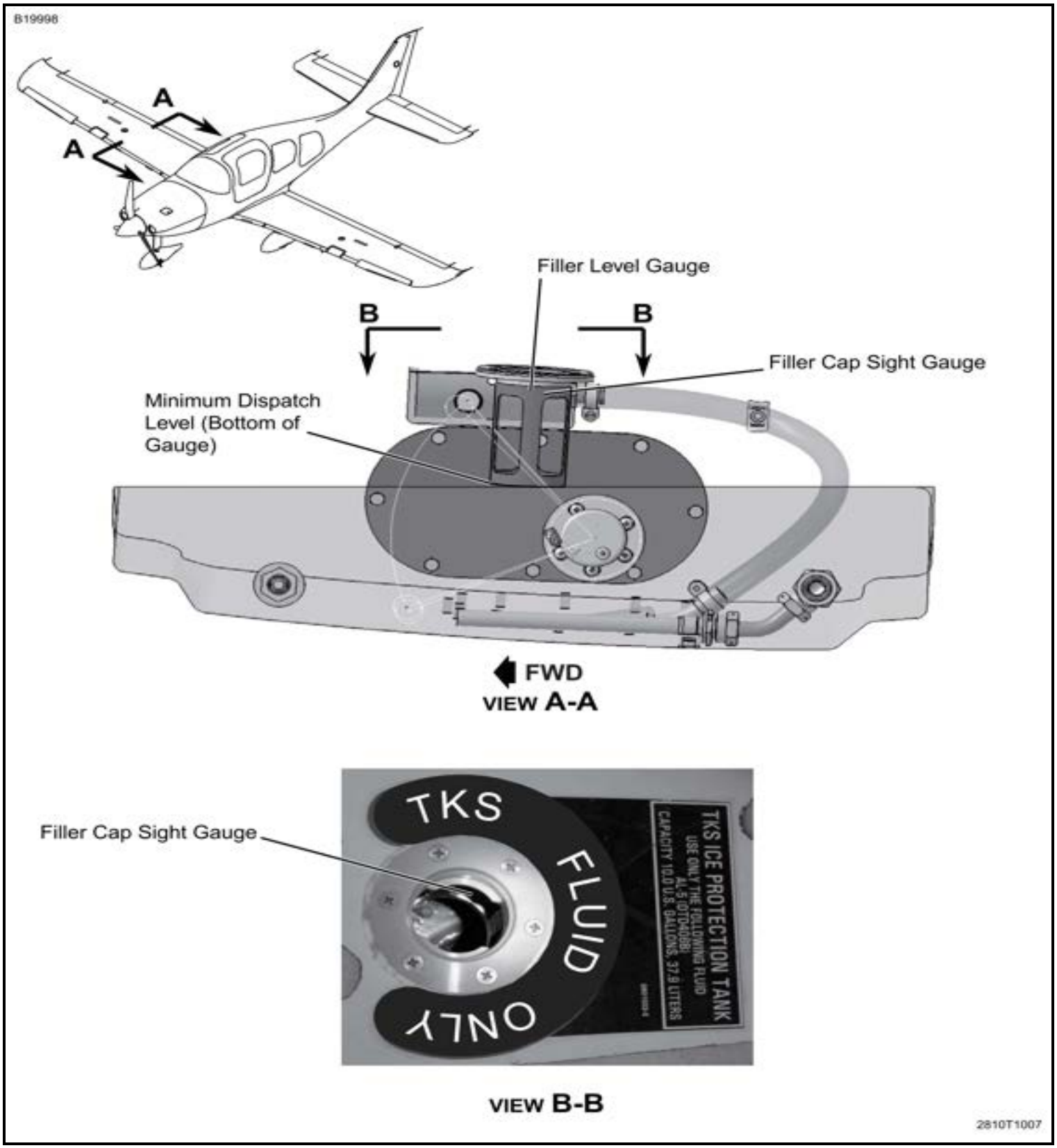
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Figure 503 : Sheet 1 : TKS Tank Fluid Filler Level gauge



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Figure 504 : Sheet 1 : Porous Panel Flow

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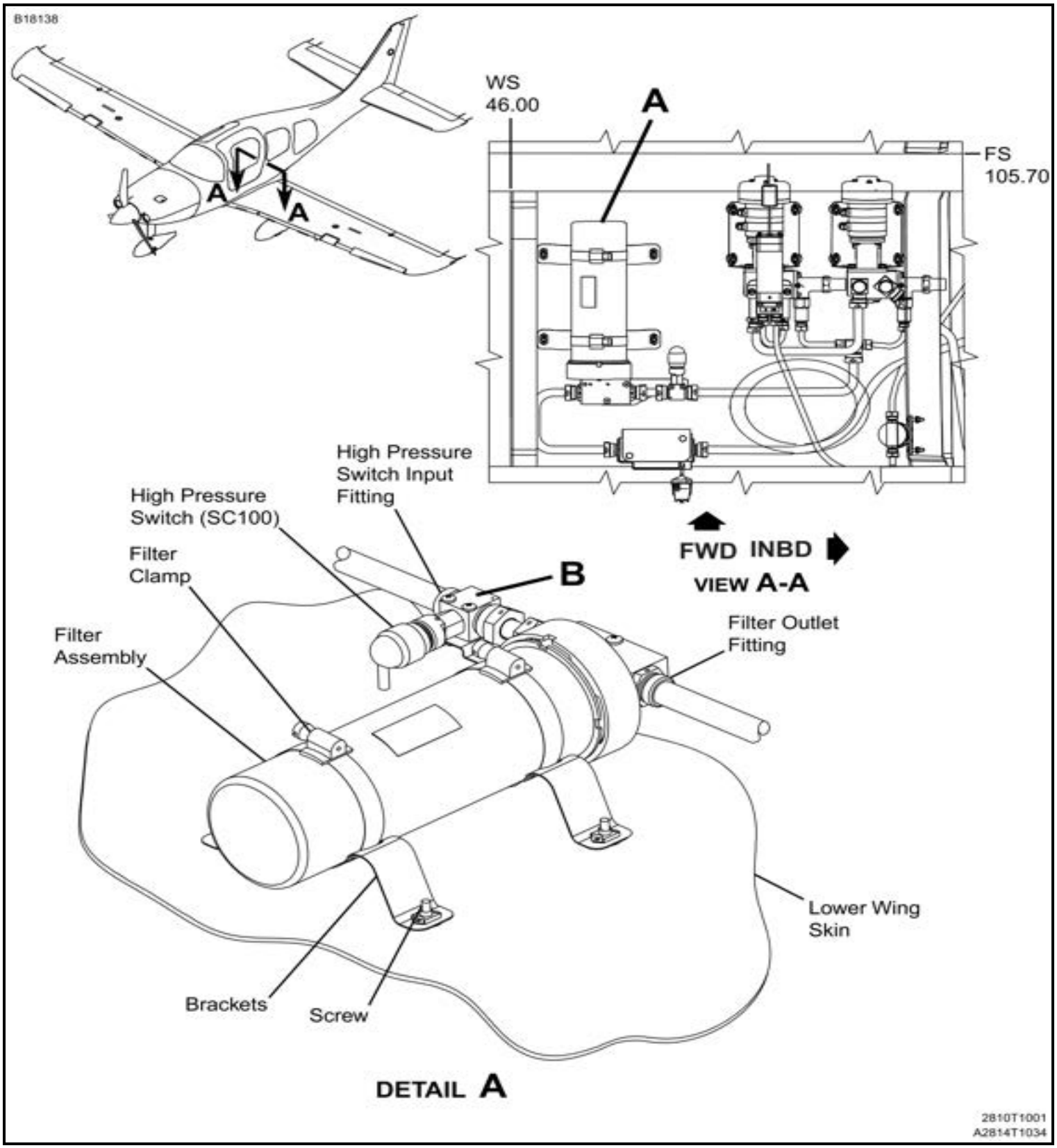
Porous Panel Incorrect TKS Fluid Flow



Porous Panel Correct TKS Fluid Flow

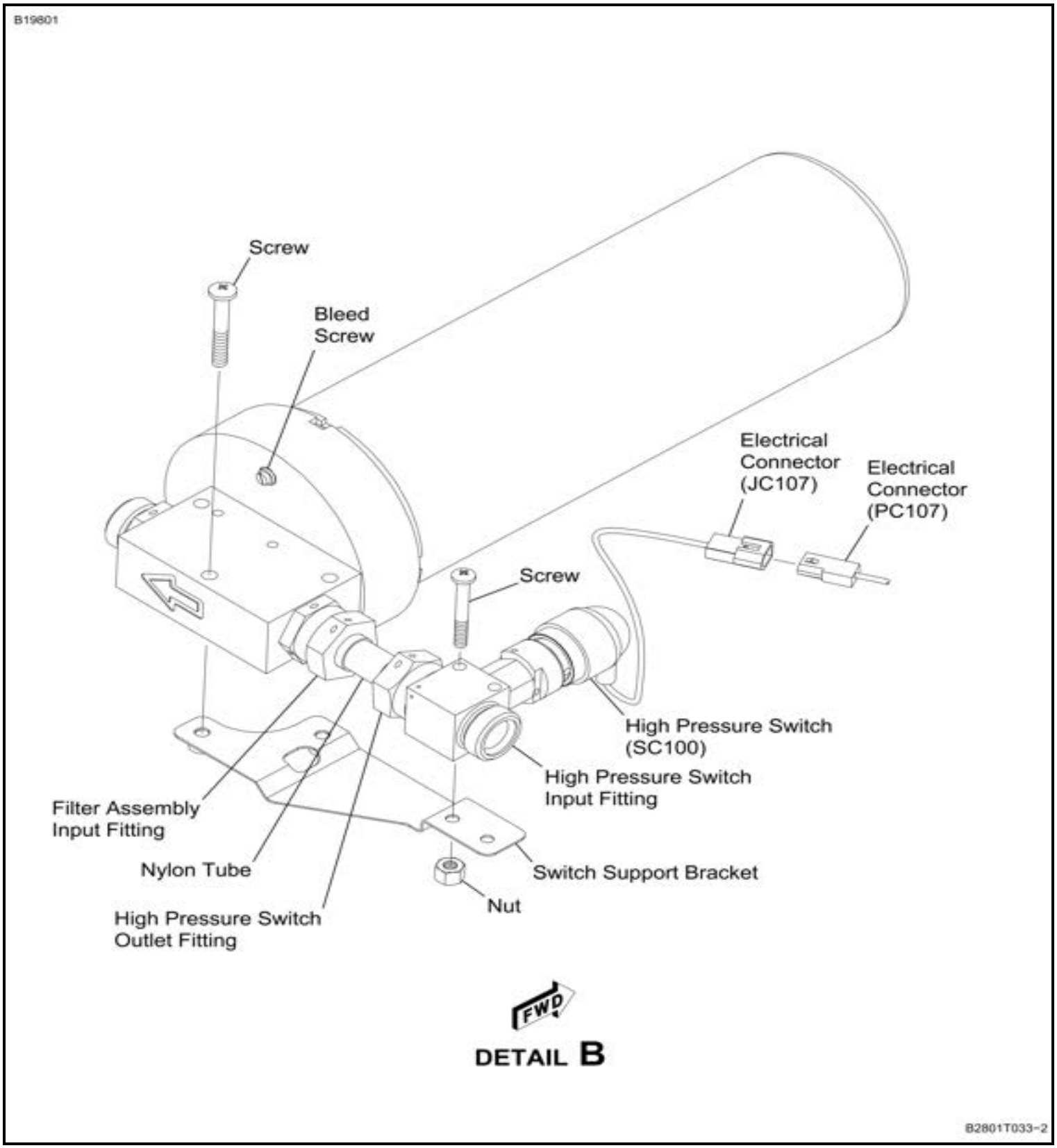
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Figure 401 : Sheet 1 : TKS Filter Assembly Installation



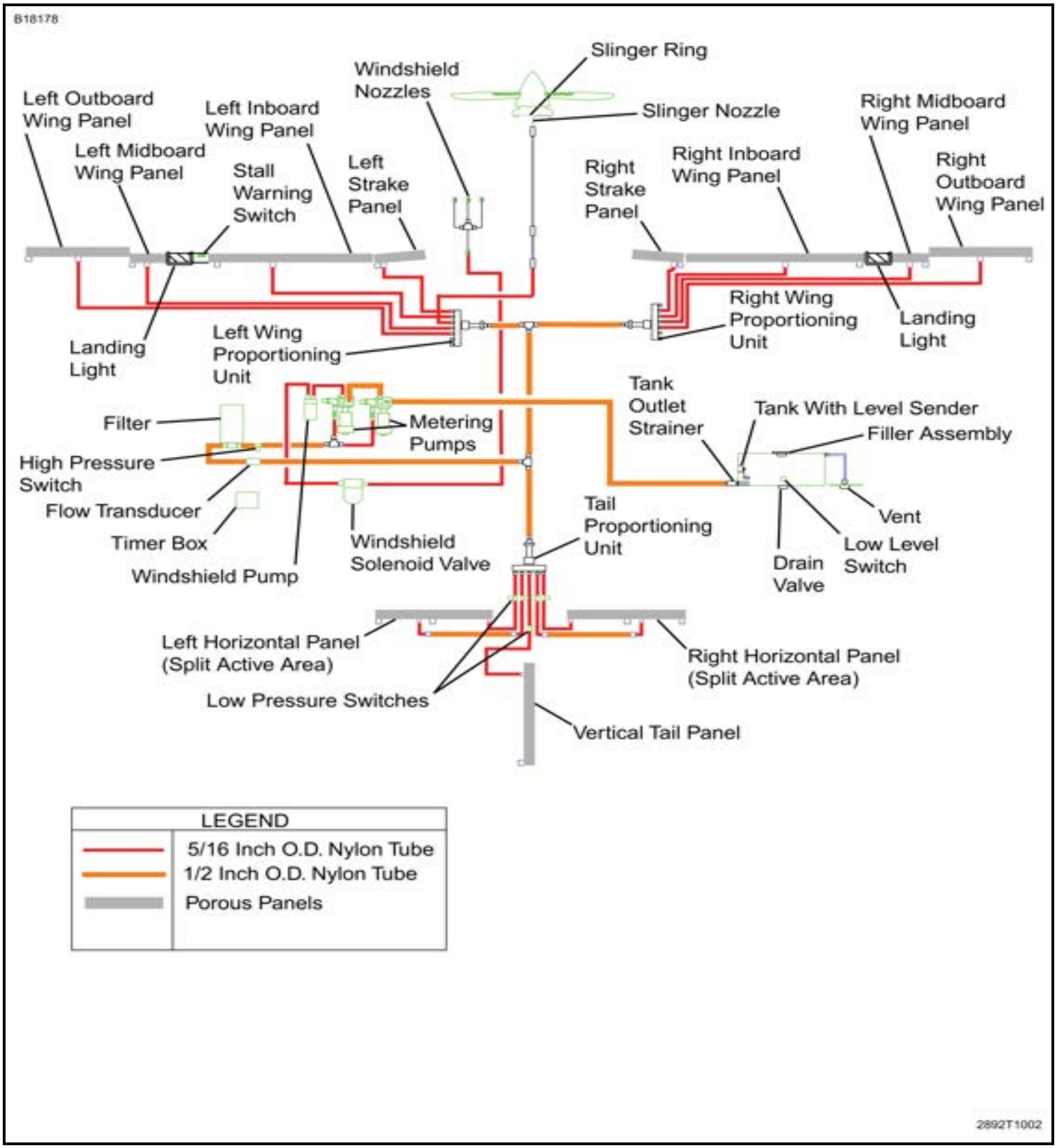
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Figure 401 : Sheet 2 : TKS Filter Assembly Installation



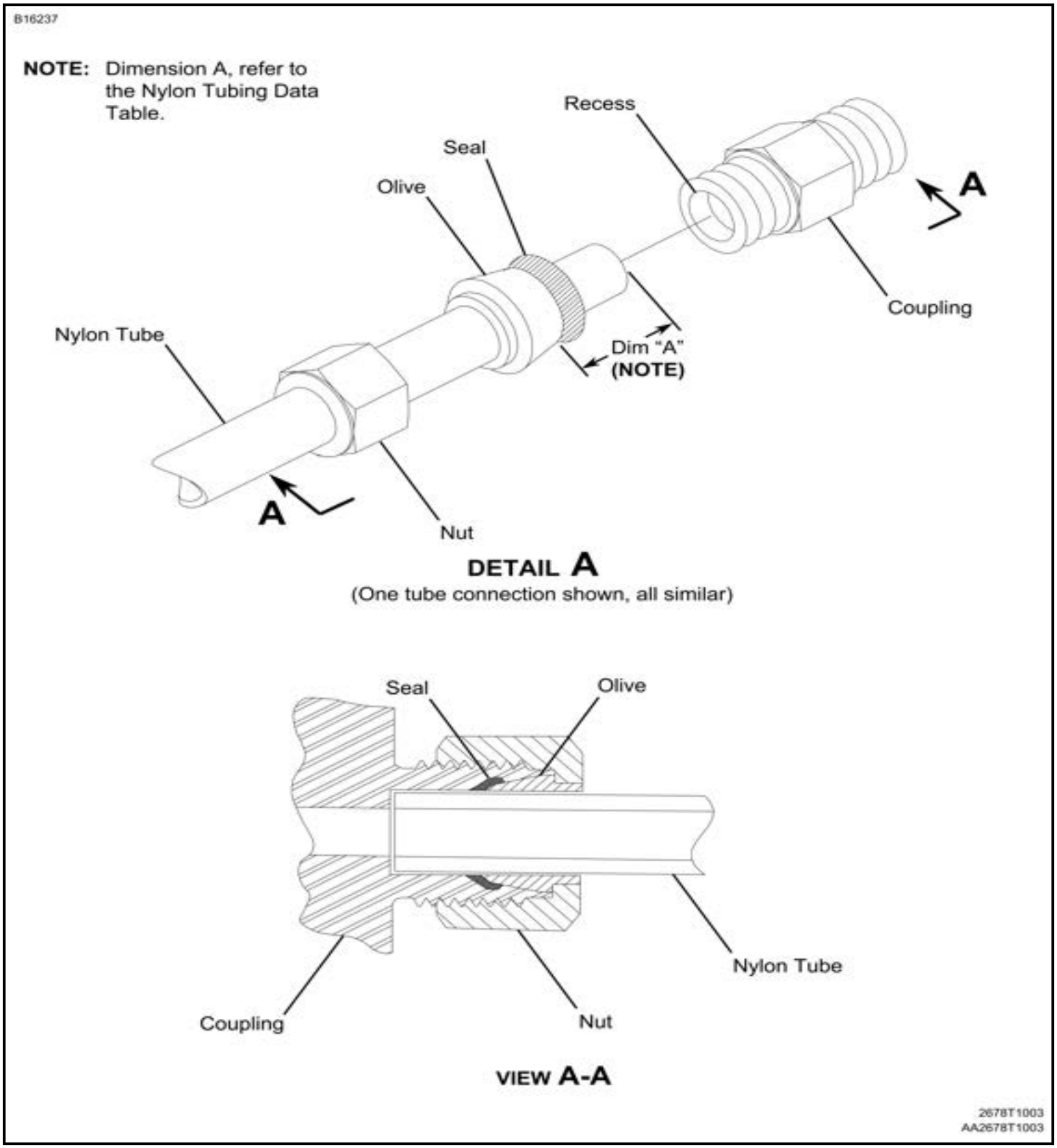
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS ANTI-ICE SYSTEM (FIKI) - INSPECTION/CHECK

1. General

A. This section contains the inspections and checks necessary to keep the TKS Anti-Ice System (FIKI) in a serviceable condition.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Warnings and Cautions

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed. It is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

4. TKS Inspection/Check Preliminary Procedures

A. Electrical power preliminary procedures.

(1) On the cockpit circuit breaker panel, disengage the circuit breakers that follow:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2
- W/S ANTI-ICE.

(2) Make sure that the G2000 system circuit breakers are engaged.

B. TKS component access preliminary procedures.

(1) As necessary, remove the panels and components that follow to get access to the TKS pumps and plumbing:

- Remove the pilot's and/or copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.
- Remove the left and/or right forward cabin floor panel. Refer to Chapter 53, Fuselage Access - Description and Operation.
- Remove the footwell. Refer to Chapter 25, Footwell - Maintenance Practices

(2) Level the airplane. Refer to Chapter 8, Leveling and Weighing - General.

C. Test line-1 preliminary procedures (refer to Figure 601).

(1) If necessary fabricate a test line-1. Refer to Section 30-15-02, TKS Test Lines - Maintenance Practices.

(2) Connect test line-1.

NOTE: If necessary, a TKS collection system can be fabricated and installed on the porous panels and at the propeller slinger ring as an alternative to the test line-1.

(a) Disconnect the aft tail supply tube from the aft port of the first Tee downstream of the flow transducer.

(b) Put a cap on the aft tail supply tube to keep FOD out and prevent excessive leakage of TKS fluid from the system.

(c) Connect the test line-1 nylon tube assembly to the Tee aft port.

1 Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202,

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Nylon Tubing Data.

(d) Put the open end in a 3 to 5 gallon collection bucket.

(e) Make sure that the shutoff valve is in the closed position.

(3) Disconnect the proportioning units supply side tube from the port of the Tee.

(a) Put a cap on the proportioning units supply tube to keep FOD out and prevent excessive leakage of TKS fluid from the system.

(b) Put a cap on the proportioning units supply port of the Tee.

5. Flow Transducer Check

A. Do the flow transducer check procedures.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Do the TKS Inspection/Check Preliminary Procedures found in this section.

NOTE: If necessary, a TKS collection system can be fabricated and installed on the porous panels and at the propeller slinger ring as an alternative to the test line-1 that is connected in the preliminary procedures.

NOTE: The flow transducer check procedures should be completed before the low pressure discrete wiring check procedures are done.

(a) Make sure that test line-1 is connected (refer to Test line-1 preliminary procedure in this section).

(3) On the cockpit circuit breaker panel engage the circuit breakers that follow:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2.

(4) If necessary, put electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(5) Make sure that the Garmin G2000 system is serviceable.

(a) There are no CAS messages that show the G2000 is not serviceable.

(b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

(c) If the G2000 system shows an indicated unserviceable condition, troubleshoot and repair the problem. Refer to Chapter 34, Garmin G2000 - Troubleshooting.

(6) Make sure that the TKS fluid quantity indicator on the MFD EIS strip shows a fluid quantity of a minimum of 0.5 gallons.

(a) If there is less than 0.5 gallons of TKS fluid shown on the EIS strip, add 1.0 gallon (3.8 liter) of approved TKS fluid to the TKS fluid tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(7) Make sure that the open end of the test line-1 is in a collection bucket and the shutoff valve is open.

(8) Do the procedures to put the G2000 in the configuration mode as follows:

(a) On the cockpit circuit breaker panel disengage the circuit breakers that follow:

- PFD
- MFD
- GTC.

(b) While you push and hold the far right MFD softkey (12), engage the MFD circuit breaker.

1 Release the softkey when the "INITIALIZING SYSTEM" message shows on the MFD.

(c) While you push and hold the far right PFD softkey (12), engage the PFD circuit breaker.

1 Release the softkey when the "INITIALIZING SYSTEM" message shows on the PFD.

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(d) While you push and hold the GTC small right knob, engage the GTC circuit breaker.

1 Release the small right knob when the "INITIALIZING SYSTEM" message shows on the GTC.

(9) Set the GTC 570 to control the PFD as follows:

(a) When the "Config Mode" page shows on the GTC, push the "GDU Controls" button.

(b) When the "GDU Controls" page shows on the GTC, make sure the green bar shows on the bottom section of the "PFD" button.

1 If not push the "PFD" button.

(10) Select the GEA STATUS page on the PFD and then push “DIGITAL” softkey.

(11) On the center console switch panel, put the PRIMARY switch to the NORM position.

(12) Make sure that the DEICE FLUID FLOW RATE value is not zero on the GEA Status page. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test, Figure 502.

NOTE: Flow rate above zero indicates the flow transducer is serviceable.

NOTE: You can create back pressure on the system by slowly closing and opening the test line-1 shutoff valve. This can help to remove air from the system and start the flow rate indication.

(13) On the center console switch panel, put the PRIMARY switch to the OFF position.

(14) On the cockpit circuit breaker panel, make sure that the circuit breakers that follow are disengaged:

- PFD
- MFD
- GTC.

(15) If no more test procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane found in this section.

6. High Pressure Switch Check

A. Do the high pressure switch check procedure.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Do the TKS Inspection/Check Preliminary Procedures found in this section.

NOTE: If necessary, a TKS collection system can be fabricated and installed on the porous panels and at the propeller slinger ring as an alternative to the test line-1 that installed in the preliminary procedures.

(a) Make sure that test line-1 is connected (refer to Test line-1 preliminary procedure in this section).

(3) On the cockpit circuit breaker panel engage the circuit breakers that follow:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2
- W/S ANTI-ICE.

(4) If necessary, put electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(5) Make sure that the Garmin G2000 system is serviceable.

(a) There are no CAS messages that show system show that the G2000 is not serviceable.

(b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

(c) If the G2000 system shows an indicated unserviceable condition, troubleshoot and repair the problem. Refer to Chapter 34, Garmin G2000 - Troubleshooting.

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(6) If there is less than 0.5 gallons of TKS fluid shown on the EIS strip, add 1.0 gallon and 8 ounces (3.8 liter and 235 ml) of approved TKS fluid to the TKS fluid tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(7) Make sure that the open end of the test line-1 is in a collection bucket and the shutoff valve is open.

(8) On the center console switch panel, put the PRIMARY switch to the HIGH position.

CAUTION: Slowly and cautiously close the shutoff valve. This is very important if new TKS components (nylon tube lines, olives, etc.) were installed. This will help prevent damage to the TKS components.

(9) Operate the pump for approximately 10 seconds, then slowly close the test line-1 shutoff valve until the valve is fully closed.

NOTE: Closing the valve increases the TKS system pressure. If new components were not installed correctly, they can come apart under pressure.

(a) Make sure that the CAS message A-ICE PRESS HI (amber) shows on the PFD and a single aural chime is heard.

(10) Fully open the test line-1 shutoff valve.

(a) Make sure that the CAS message A-ICE PRESS HI (amber) on the PFD goes away.

(11) Put the PRIMARY switch to the OFF position.

(12) If no more test procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane found in this section.

7. Low Pressure Discrete Wiring Check

A. Do the low pressure discrete wiring check procedure.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Warnings and Cautions found in this section.

(2) Do the TKS Inspection/Check Preliminary Procedures found in this section.

NOTE: The flow transducer check procedures should be completed before the low pressure discrete wiring check procedures are done.

(a) Make sure that test line-1 is connected (refer to Test line-1 preliminary procedure in this section).

(3) On the cockpit circuit breaker panel engage the circuit breakers that follow:

- ANTI-ICE PUMP 1
- ANTI-ICE PUMP 2.

(4) If necessary, put electrical power on the airplane as follows:

(a) Apply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE Switch (SW03) to the ON position.

(5) Make sure that the Garmin G2000 system is serviceable.

(a) There are no CAS messages that show system show that the G2000 is not serviceable.

(b) The primary flight display (PFD) and/or the multifunction display (MFD) do not show an 'X' (red or amber) on system function displays.

NOTE: This is an indication of a G2000 or a related integrated system failure.

(c) If the G2000 system shows an indicated unserviceable condition, troubleshoot and repair the problem. Refer to Chapter 34, Garmin G2000 - Troubleshooting.

(6) Make sure that the TKS fluid quantity indicator on the MFD EIS strip shows a fluid quantity of a minimum of 0.5 gallons.

(a) If there is less than 0.5 gallons of TKS fluid shown on the EIS strip, add 1.0 gallon and 8 ounces (3.8 liter and 235 ml) of approved TKS fluid to the TKS fluid tank. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(7) Make sure that the open end of the test line-1 is in a collection bucket and the shutoff valve is open.

(8) On the center console switch panel, put the PRIMARY switch to the HIGH position.

(9) Operate the pump for approximately 2 minutes.

(a) Make sure that the CAS message A-ICE FAIL (red) shows on the PFD and a continuos aural chime is heard.

(10) Put the PRIMARY switch to the OFF position.

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(11) If no more test procedures are to be done at this time, return the airplane to its original condition. Refer to Restore the Airplane found in this section.

8. Restore the Airplane

A. Put the airplane back to its original condition.

NOTE: It can be necessary to complete some or all of the procedures that follow to put the airplane back to its original condition.

(1) If you cannot continue the TKS test procedures at this time or the necessary test procedures are complete, do the procedures that follow:

(a) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(c) Set the CROSS TIE Switch (SW03) to the OFF position.

(d) Remove external electrical power from the airplane.

(2) Disconnect the test line-1 nylon tube assembly from the Tee.

(3) Remove the cap from the aft tail supply tube.

(a) Install a new seal in the aft Tee port outlet tube fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(b) Put the aft tail supply tube in its correct position on the aft Tee outlet fitting.

(c) Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(4) Remove the cap from the proportioning units supply tube.

(a) Install a new seal in the proportioning units supply tube fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(b) Put the proportioning units supply tube fitting in its correct position on the TEE proportioning units supply outlet port.

(c) Carefully tighten the tube fitting nut. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

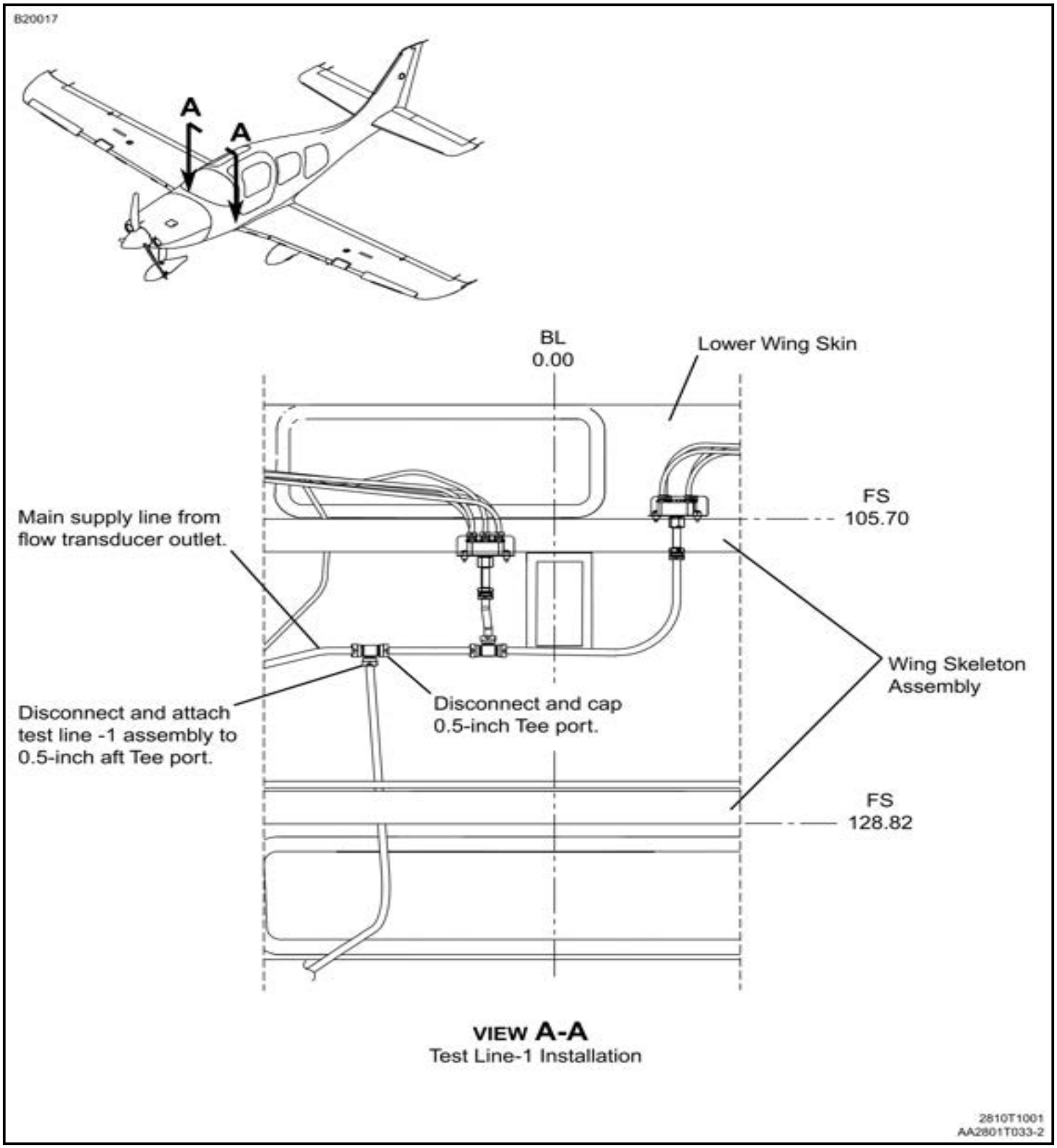
(5) Use the correct procedures to dispose of the TKS fluid in the collection bucket(s).

(6) As necessary, install the panels and components that follow:

- The left and/or right forward cabin floor panel. Refer to Chapter 53, Fuselage Access - Description and Operation.
- Install the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.
- The pilot's and/or copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

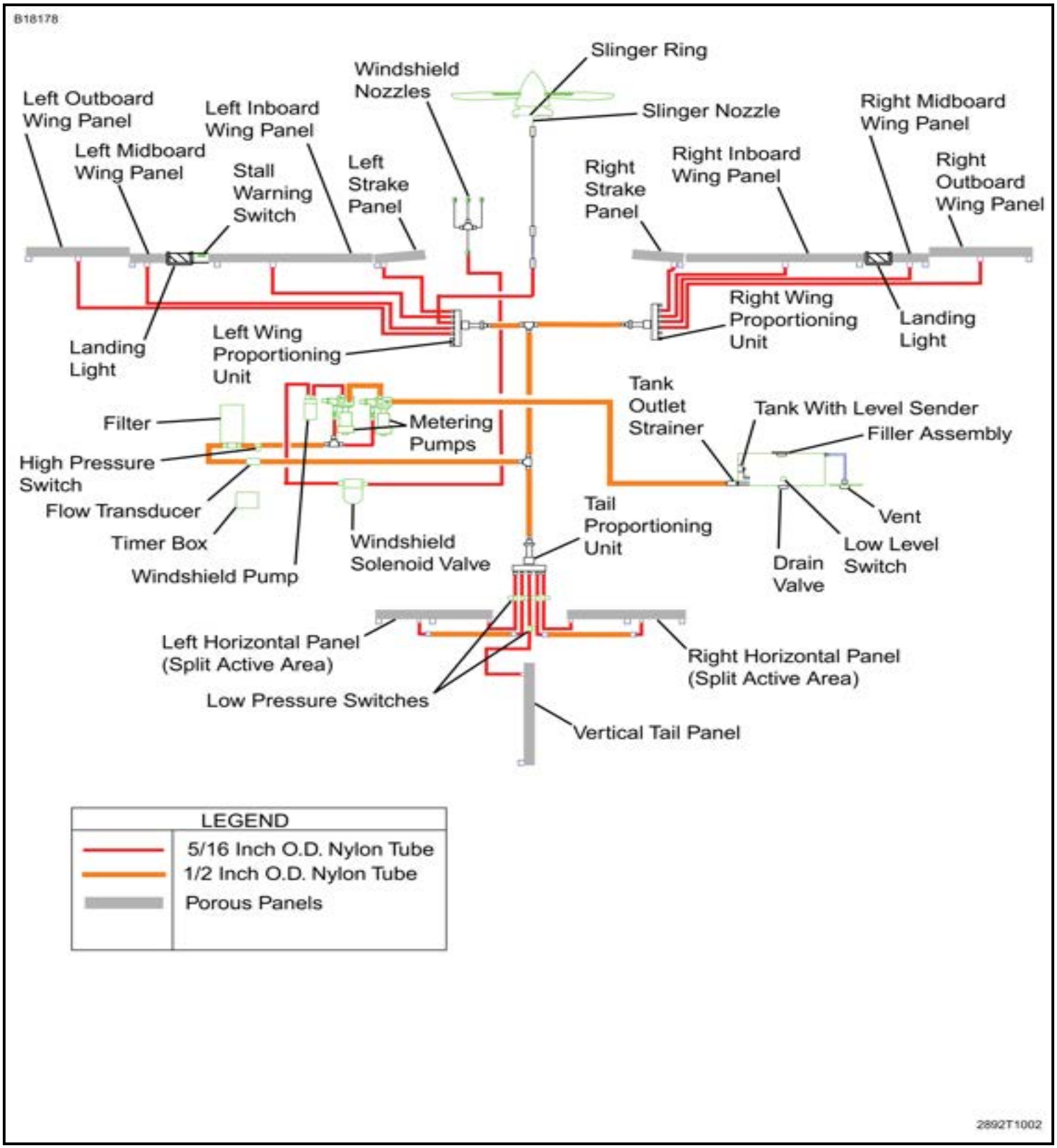
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Figure 601 : Sheet 1 : Test Line-1 Installation



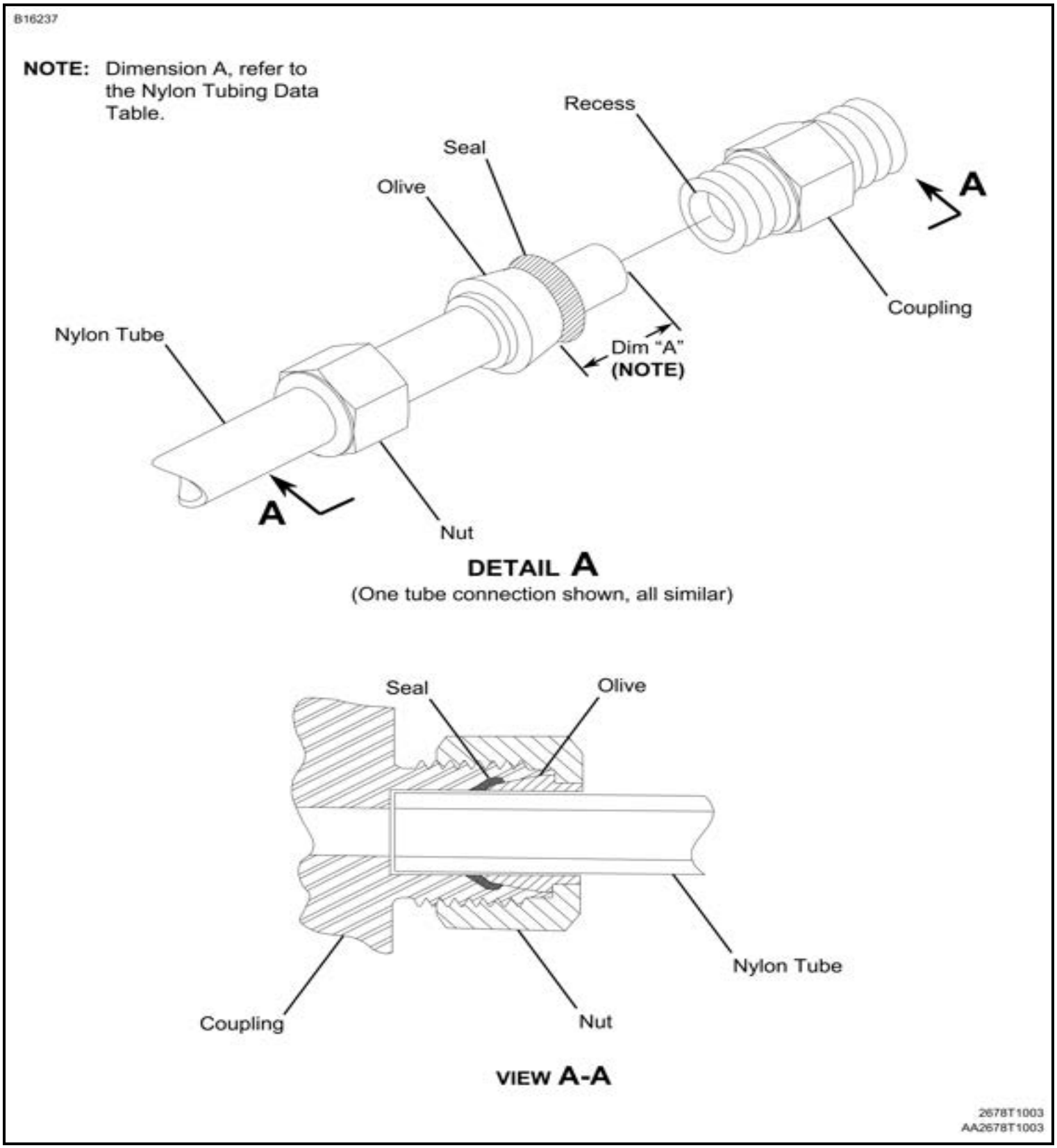
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Figure 201 : Sheet 1 : TKS Tubing Installation



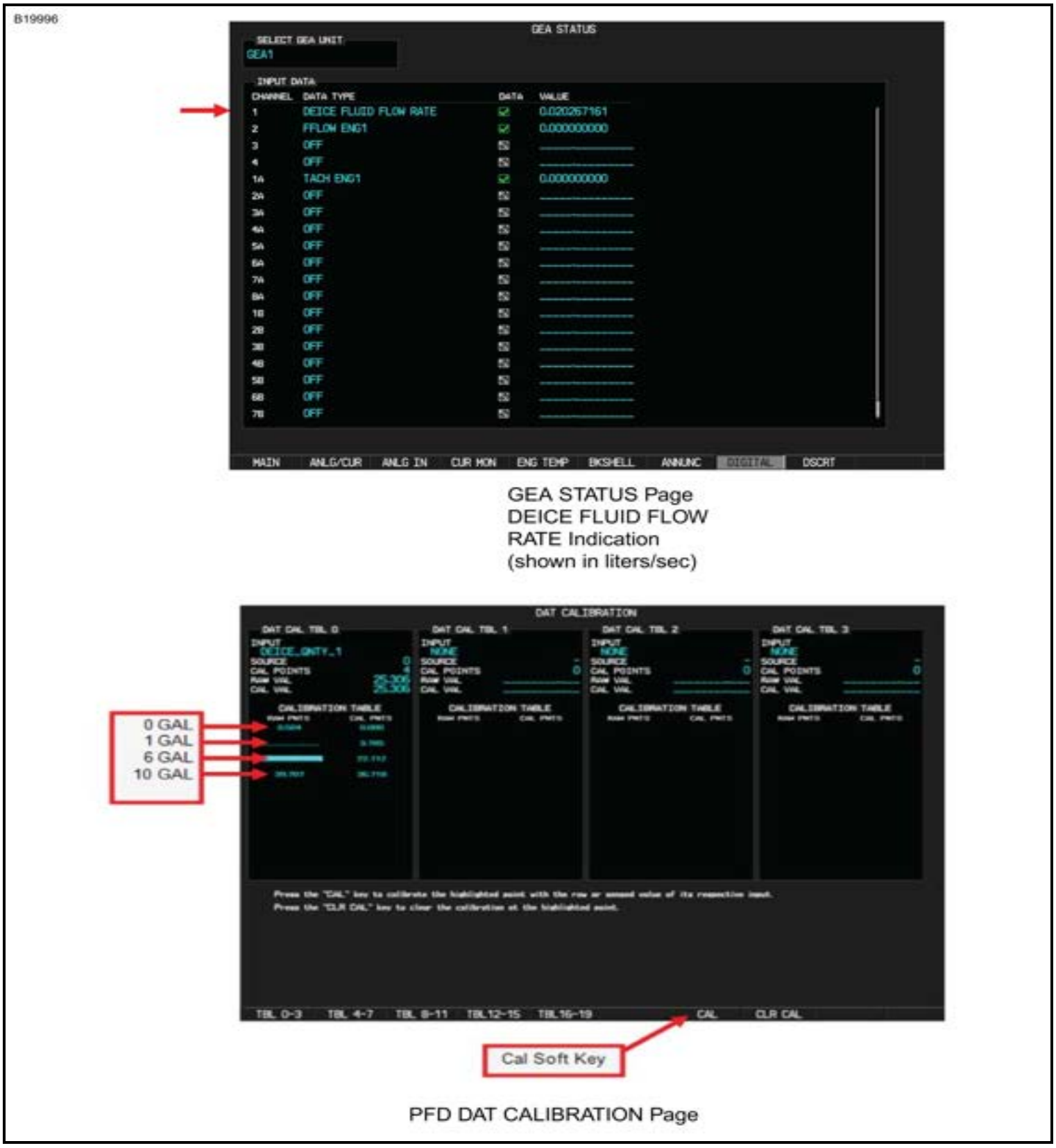
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Figure 201 : Sheet 2 : TKS Tubing Installation



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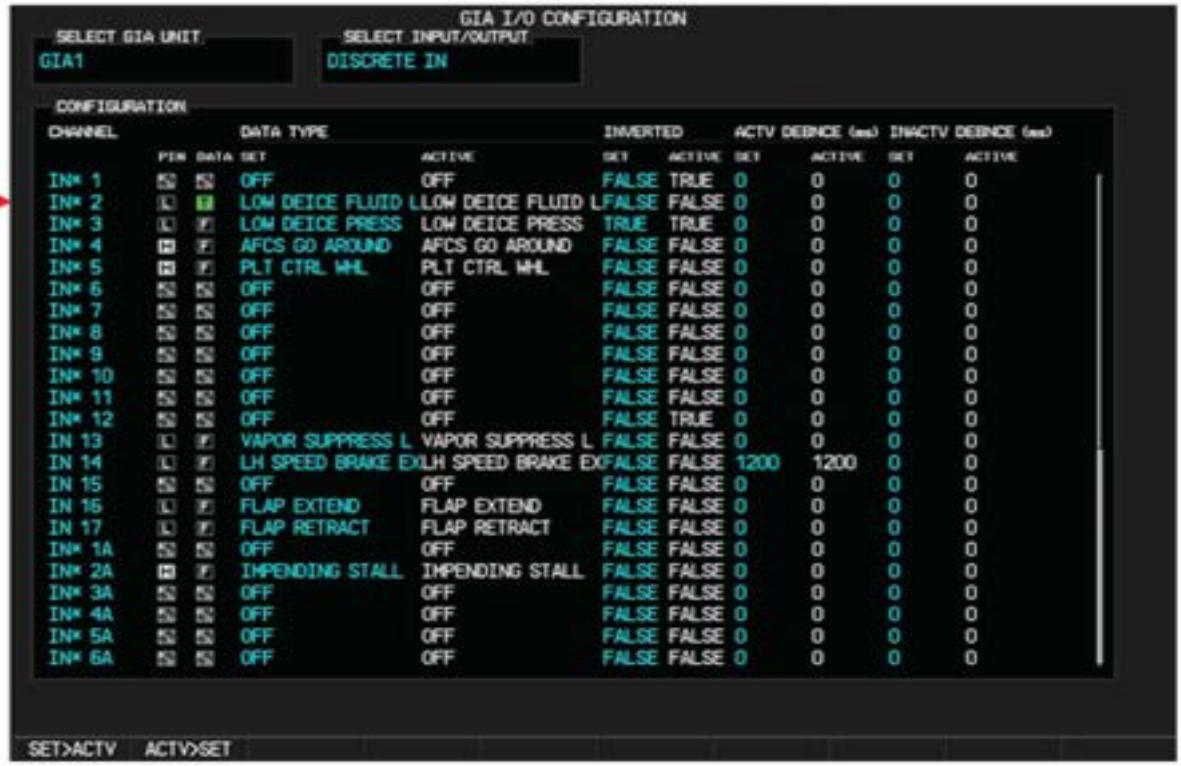
Figure 502 : Sheet 1 : TKS Tank Calibration Screen Shots



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Figure 502 : Sheet 2 : TKS Tank Calibration Screen Shots

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TKS TEST LINES - MAINTENANCE PRACTICES

1. General

A. This section contains the fabrication information for the TKS test lines. These lines are used in accordance with related TKS adjustment, test, inspection, and check procedures.

2. TKS Test Line-1 Fabrication

NOTE: Test Line-1 for attaching to the 1/2 inch main supply tees.

A. Fabricate the test line-1 nylon tube assembly (refer to Figure 201).

(1) For test line-1 fabrication parts refer to Table 201.

(2) For additional nylon tubing repair and torque information refer to section 30-15-00, TKS Anti-Ice System (FIKI) - Maintenance Practices, Nylon Tubing Repair/Replacement.

Table 201. Test Line-1 Fabrication Parts

Name	Part Number	Part Quantity
1/2 OD nylon tube	TTF135226	8 feet
Nut	MN6201	1
Olive	MN101-32	1
Seal	100-013-8810	1
Manual shutoff valve	V520P-8	1
Male connectors	W68PLP-8-8	2

3. TKS Test Line-2 Fabrication

NOTE: Test Line-2 is for attaching to the windshield fitting forward of the firewall.

A. Fabricate the test line-2 hose assembly (refer to Figure 202).

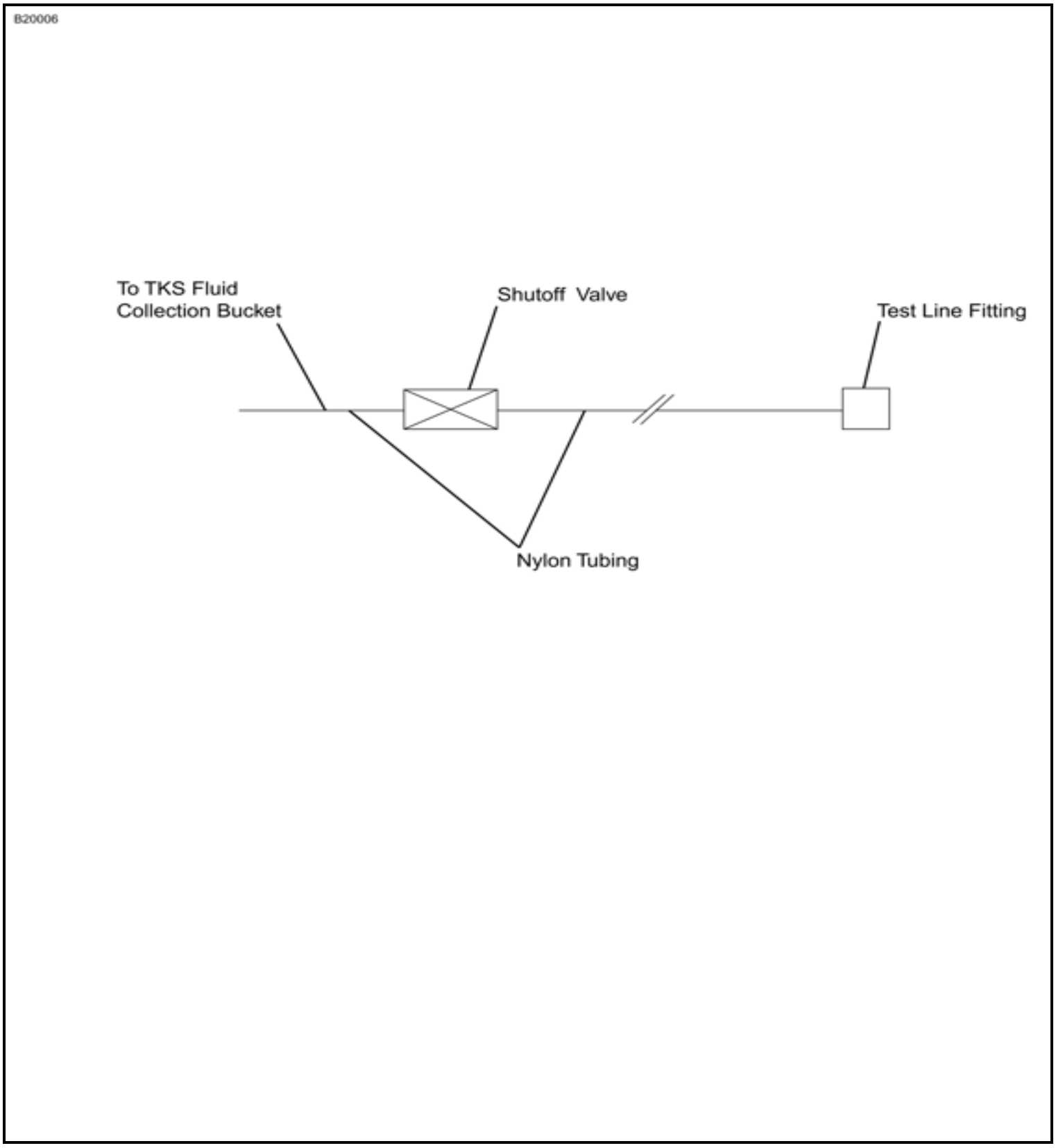
(1) For test line-2 fabrication parts refer to Table 202.

Table 202. Test Line-2 Fabrication Parts

Name	Part Number	Part Quantity
Hose	R221486	3 feet
Hose Clamp	S2357-3	1

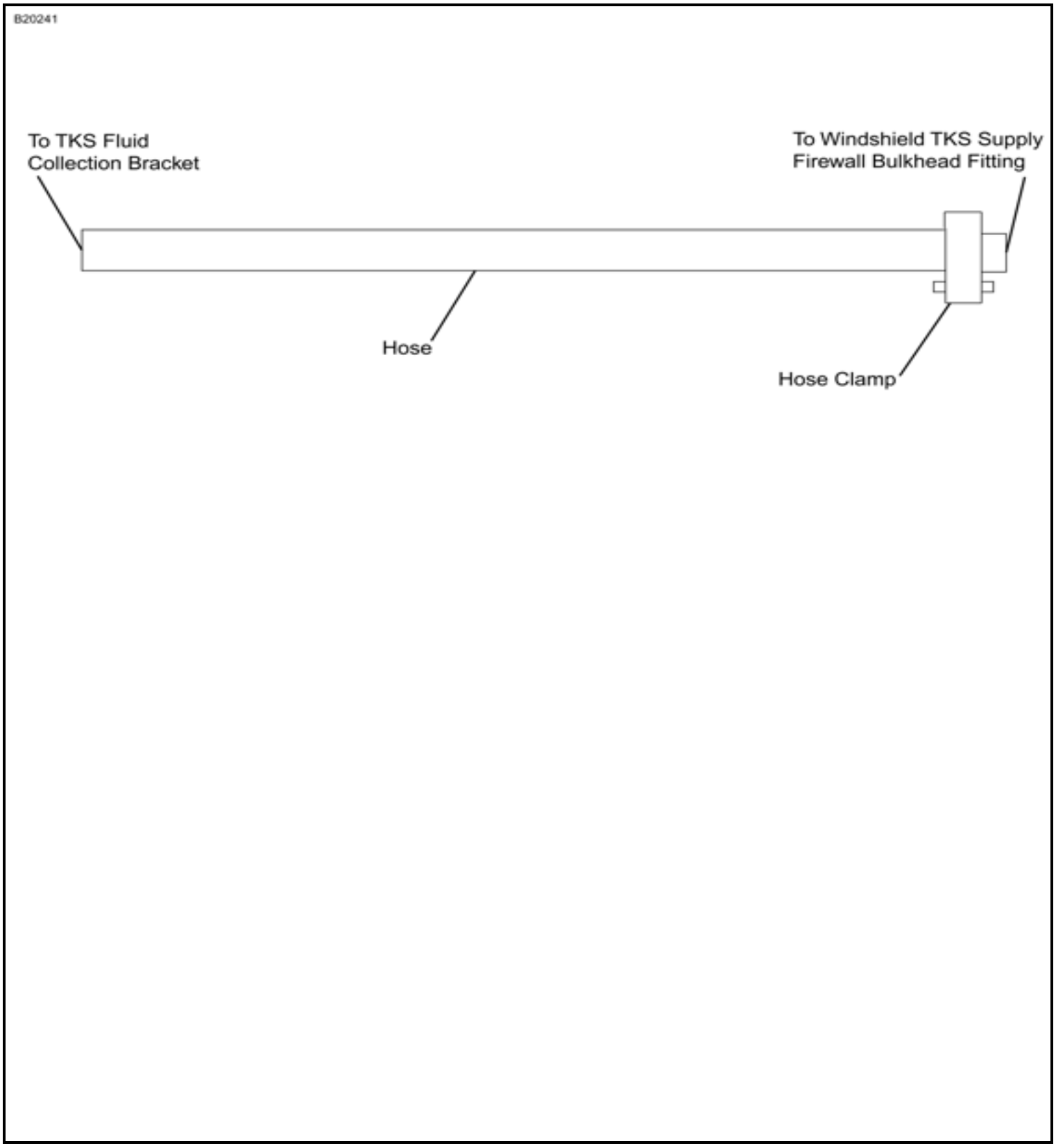
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Figure 201 : Sheet 1 : Test Line-1 Fabrication Schematic



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Figure 202 : Sheet 1 : Test Line-2 Fabrication



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TKS TIMER BOX (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Timer Box. The Timer Box is installed on the avionics shelf below the right side of the instrument panel at RBL 10.22, FS 200.53.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Timer Box Removal/Installation

A. Remove the Timer Box (UF101) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(3) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(4) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(5) Disconnect the electrical connector PF102 from the Timer Box electrical connector J1.

(6) While you support the timer box, remove the screws that attach it to the bottom of the avionics shelf.

(7) Remove the timer box assembly from the airplane.

B. Install the Timer Box (UF101) (Refer to Figure 401).

(1) Put the timer box in its correct position on the bottom of the avionics shelf.

(a) Install the screws that attach the timer box to the avionics shelf.

(2) Connect the electrical connector PF102 to the timer box electrical connector J1.

(3) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

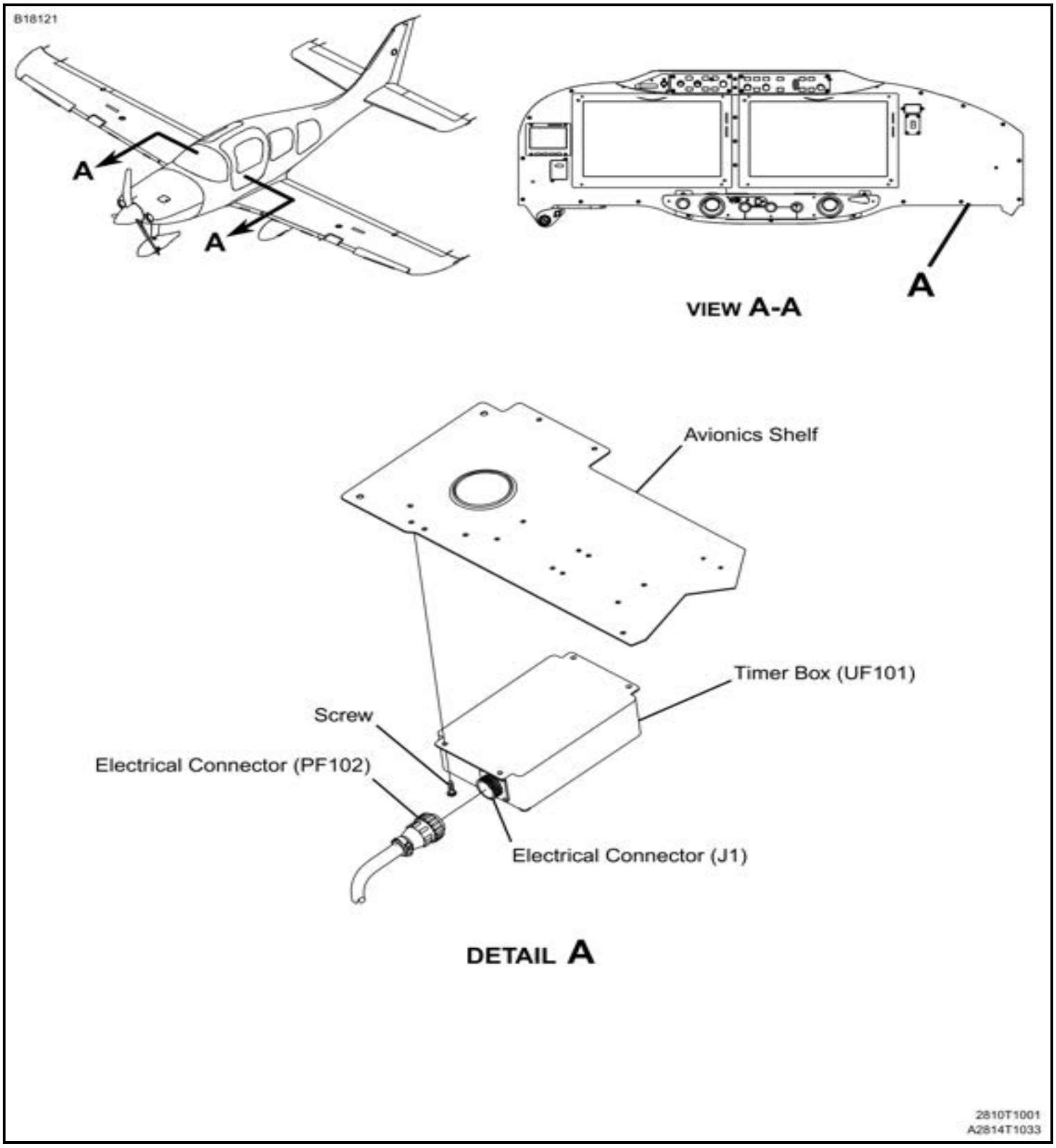
(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(4) Do a check of the timer box operation. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

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Figure 401 : Sheet 1 : Timer Box Installation



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TKS ANTI-ICE SYSTEM METERING PUMPS (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for each of the two TKS Anti-Ice System (FIKI) Metering Pumps and the Windshield Pump. The Metering Pump 1/Windshield Pump Assembly has the windshield pump mounted on the top. To replace the Windshield or Metering Pump 1, it is necessary to remove the windshield pump from the metering pump.

B. Operate the metering pumps each month, or when necessary, in the NORM mode to maintain proper operation of the system.

C. Use the Model T240 Wiring Diagram Manual with the procedures in this section.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Metering Pump 1/Windshield Pump Assembly Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible there is still pressure in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Metering Pump 1 (UC101)/Windshield Pump (UC103) Assembly, (Refer to Figure 401).

NOTE: The Metering Pump 1, Metering Pump Bracket, and the Windshield Pump are usually removed and installed as an assembly.

NOTE: If you are to replace Metering Pump 1, you must remove the windshield pump that is installed on the metering pump. Then install the windshield pump on the new metering pump. Refer to Windshield Pump Removal/Installation.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Metering Pump 1/Windshield Pump Assembly Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the TKS access panel on the lower surface of the left wing.

(7) Disconnect the electrical connector PC105 from the metering pump electrical connector JC105.

(8) Remove the tubes from the metering pump input and outlet fittings as follows:

(a) Slowly loosen the nuts and remove the input and outlet tubes from the metering pump fittings.

(b) Slowly loosen the nut and remove the outlet tube from the windshield outlet fitting.

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(c) Remove and discard the old seals from the input and outlet tube.

(d) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the metering pump immediately.

(9) Remove the pump bracket screws found on the bottom of the wing that attach the pump bracket to the lower wing skin.

(10) Carefully remove the pump assembly from the airplane.

(11) If you are to replace only the Windshield Pump or the Metering Pump 1, remove the windshield pump from the metering pump. Refer to Remove the Windshield Pump.

(12) If you are to replace the metering pump, loosen the screws on the pump clamps.

(a) Remove the pump from the bracket.

B. Install Metering Pump 1 (UC101)/Windshield Pump (UC103) Assembly, (Refer to Figure 401).

NOTE: The Metering Pump 1, Metering Pump Bracket, and the Windshield Pump are usually removed and installed as an assembly.

NOTE: If you are to replace Metering Pump 1, you must remove the windshield pump that is installed on the metering pump. Then install the windshield pump on the new metering pump. Refer to Install the Windshield Pump.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Metering Pump 1/Windshield Pump Assembly Removal/Installation.

(2) If removed, install the Windshield Pump (UC103) on Metering Pump 1. Refer to, TKS Windshield Pump (FIKI) - Removal/Installation.

(3) Put the pump in its correct position on the bracket.

(a) Tighten the screws on the clamp to attach the pump to the bracket.

(4) Put the pump assembly in its correct position on the lower skin.

(a) Install the screws that attach the pump bracket to the lower wing skin.

(5) Install the outlet and input tubes to the metering pump as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Put the tubes in their correct position on the metering pump fittings and windshield pump outlet fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(6) Connect electrical connector PC105 to the metering pump electrical connector JC105.

(7) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(8) Do a check of metering pump 1 and the windshield pump. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(9) Install the TKS access panel on the lower surface of the left wing.

4. Metering Pump 2 Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible there is still pressure in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

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CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Metering Pump 2 (UC102) (Refer to Figure 401).

NOTE: The Metering Pump 2 and the metering pump bracket are usually removed and installed as an assembly.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Metering Pump 2 Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the TKS access panel on the lower surface of the left wing.

(7) Disconnect electrical connector PC104 from the metering pump electrical connector JC104.

(8) Remove the tubes from the metering pump input and outlet fittings as follows:

(a) Slowly loosen the nuts and remove the input and outlet tubes from the metering pump fittings.

(b) Remove and discard the old seal from the outlet tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the metering pump immediately.

(9) Remove the metring pump bracket screws found on the bottom of the wing that attach the pump bracket to the lower wing skin.

(10) Carefully remove the metering pump assembly from the airplane.

(11) If you are to replace the metering pump, loosen the screws on the pump clamps.

(a) Remove the metering pump from the bracket.

B. Install Metering Pump 2 (UC102) (Refer to Figure 401).

NOTE: The Metering Pump 2 and the metering pump bracket are usually removed and installed as an assembly.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Metering Pump 2 Removal/Installation.

(2) Put the metering pump in its correct position on the bracket.

(a) Tighten the screws on the clamp to attach the pump to the bracket.

(3) Put the metering pump assembly through the TKS access panel opening and in its correct position on the lower skin.

(a) Install the screws that attach the pump bracket to the lower wing skin.

(4) Install the outlet and input tubes to the metering pump as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Put the tubes in their correct position on the metering pump outlet fittings.

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(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Connect electrical connector PC104 to the metering pump electrical connector JC104.

(6) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(7) Do a check of metering pump 2. Refer to the, TKS Anti-Ice System (FIKI) - Adjustment/Test.

(8) Install the TKS access panel on the lower surface of the left wing.

5. Windshield Pump Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible there is still pressure in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Windshield Pump (UC103) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Windshield Pump Removal/Installation.

(2) Remove Metering Pump 1 (UC101) from the airplane. Refer to Remove the Metering Pump 1 (UC101)/Windshield Pump (UC103) Assembly.

(3) Slowly loosen the nuts and remove the input and outlet tubes from the windshield pump fittings.

(a) Remove and discard the old seals.

(b) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system..

(4) Disconnect the windshield pump electrical wiring as follows:

(a) Identify the wires at the splice at pin 3 of the electrical connector JC105.

NOTE: The ground wire from metering pump 1 and the windshield pump ground wire are spliced together with a wire installed in pin 3 of electrical connector JC105.

(b) Remove the splice at pin 3 of electrical connector JC105.

(c) Identify and remove pins 1 and 2 from the electrical connector JC105.

(5) Remove the screws that attach the windshield pump to Metering Pump 1.

(6) Remove the windshield pump from metering pump 1.

B. Install the Windshield Pump (UC103) (Refer to Figure 401).

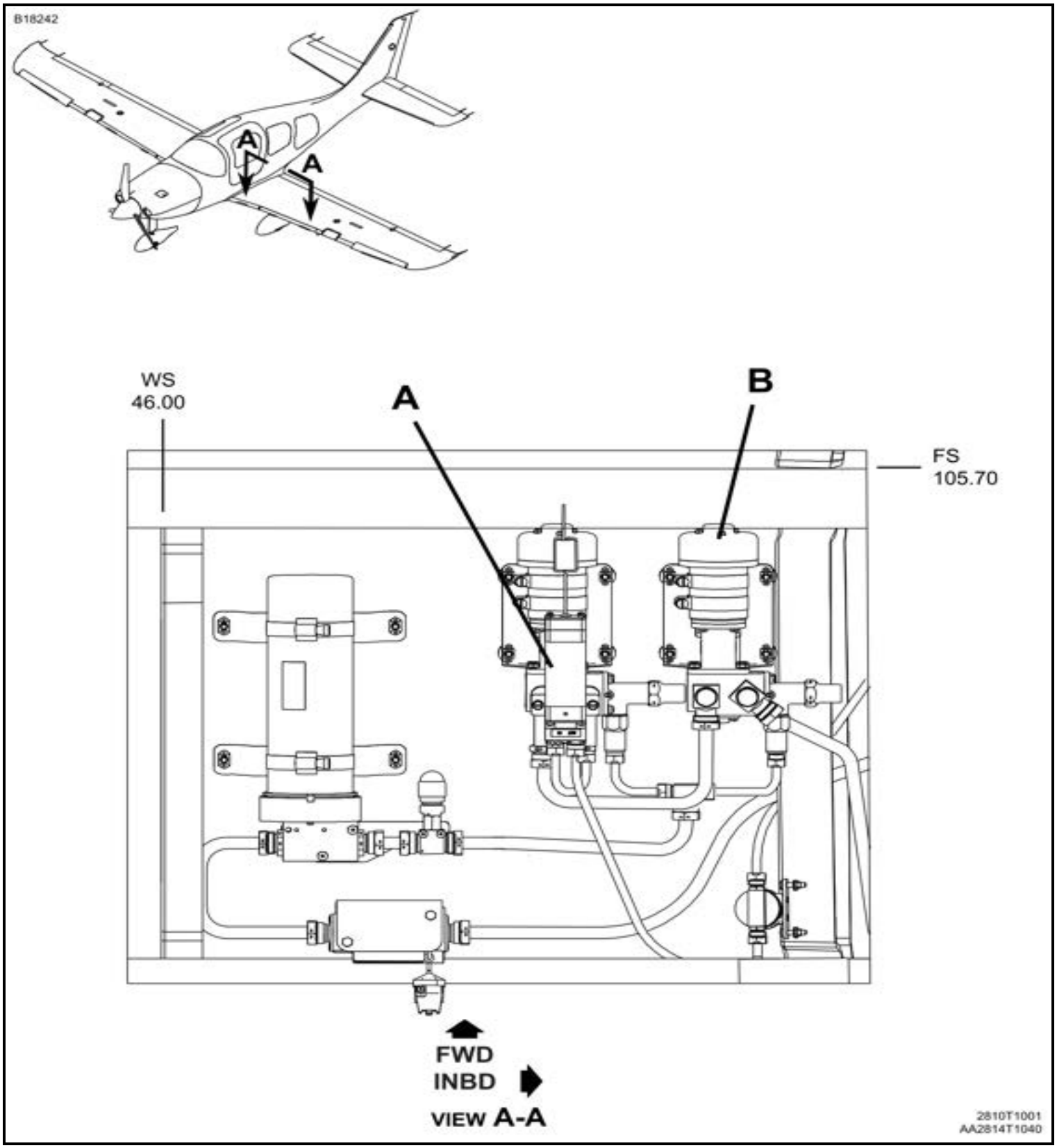
(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Windshield Pump Removal/Installation.

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(2) Put the windshield pump in its correct position on Metering Pump 1.
   (a) Install the screws that attach the windshield pump to Metering Pump 1.
(3) Connect the wiring as follows:
   (a) Identify and splice together the ground wire from metering pump 1 and the windshield pump ground wire with the wire installed in pin 3 of electrical connector JC105.
   (b) Identify and install pins 1 and 2 in electrical connector JC105.
(4) Install the input and outlet tubes to the windshield pump as follows:
   (a) If necessary, remove the caps from the open ends.
   (b) Install a new seal on the tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.
   (c) Put the tubes in their correct positions on the windshield pump fittings.
   (d) Carefully tighten the tube fitting nuts.
(5) Install Metering Pump 1 (UC101) in the airplane. Refer to Install the Metering Pump 1 (UC101)/Windshield Pump (UC103) Assembly.
(6) Do a check of windshield pump. Refer to the, TKS Anti-Ice System (FIKI) - Adjustment/Test.

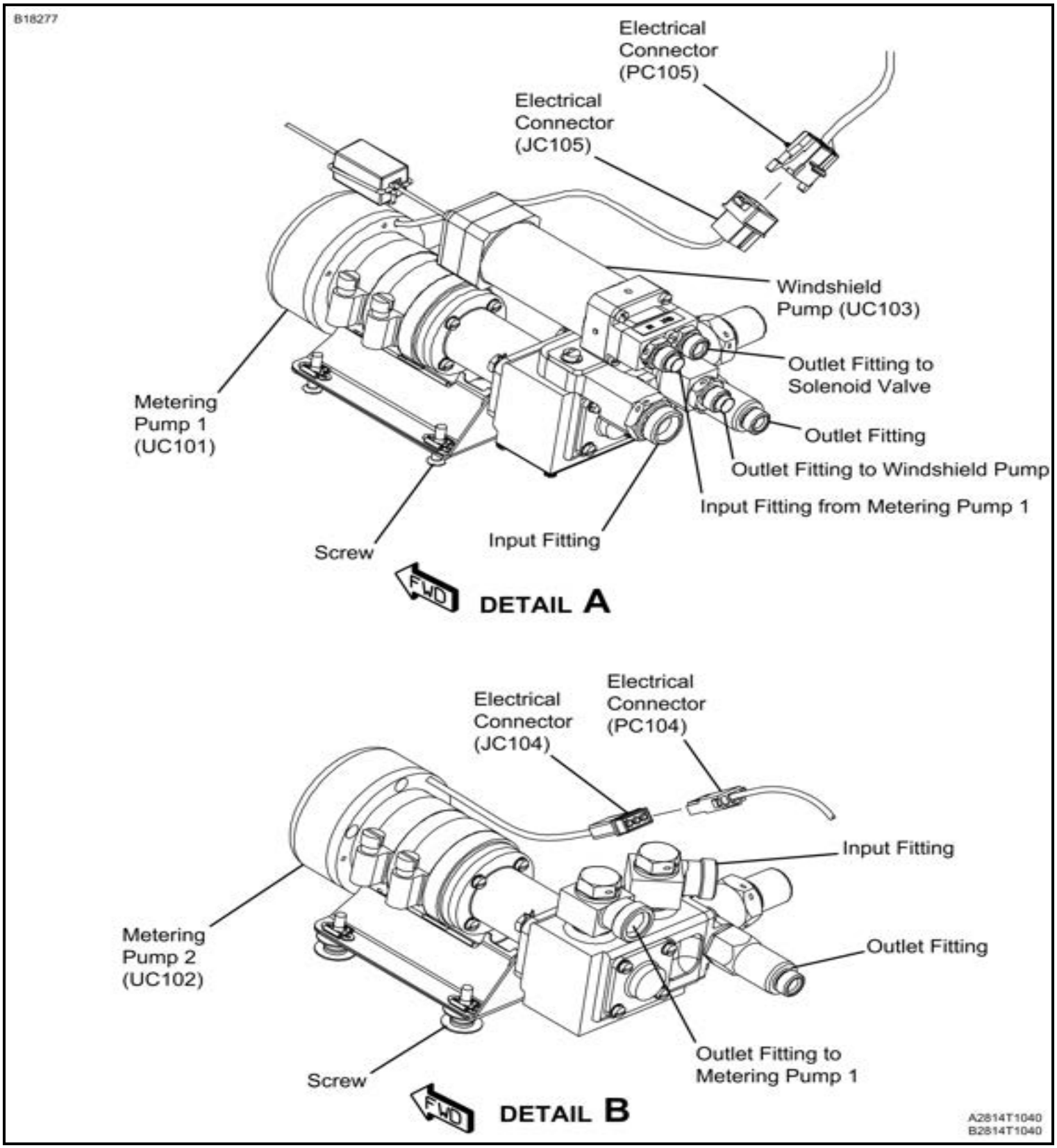
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Figure 401 : Sheet 1 : Metering Pump Installation



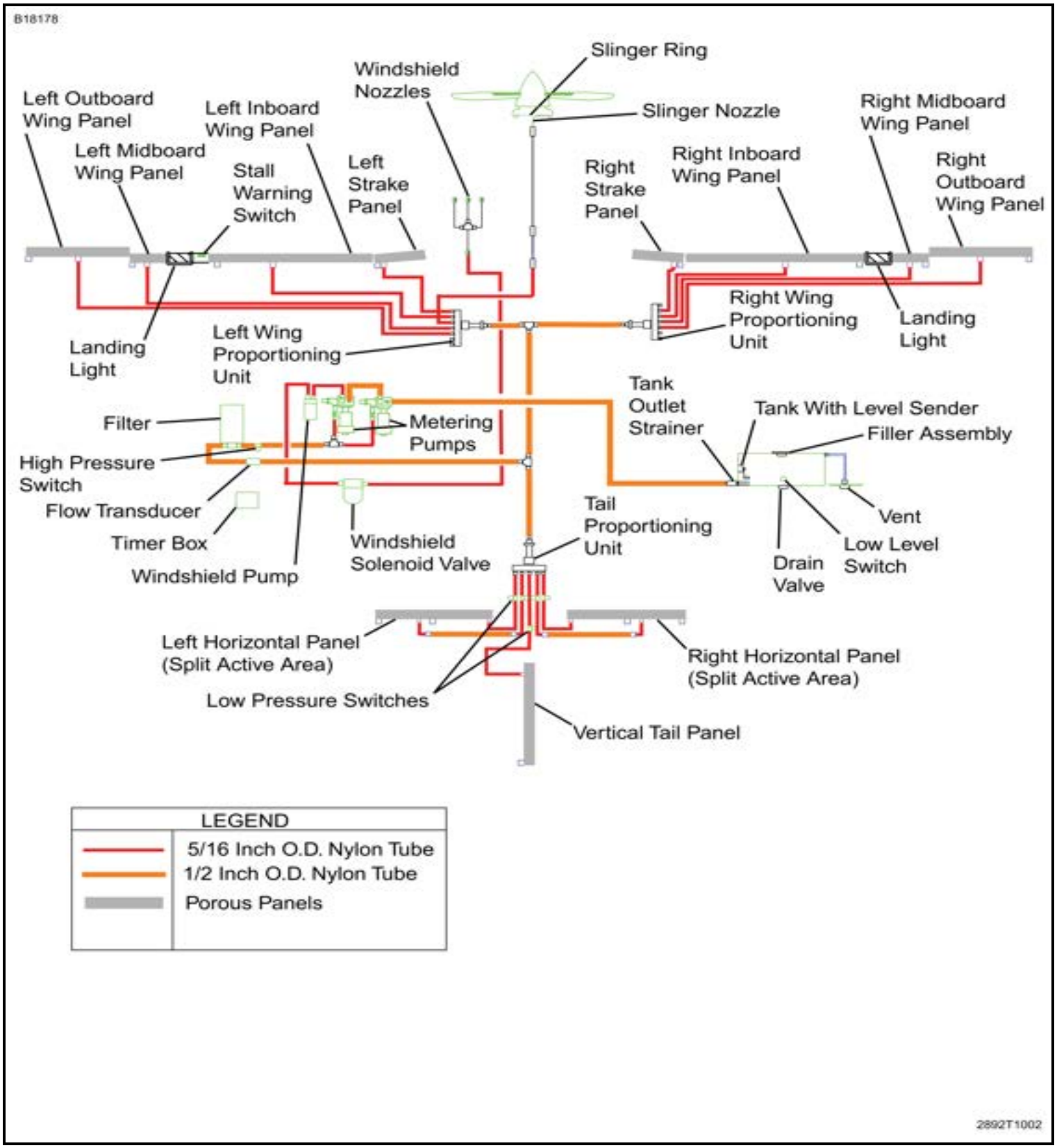
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Figure 401 : Sheet 2 : Metering Pump Installation



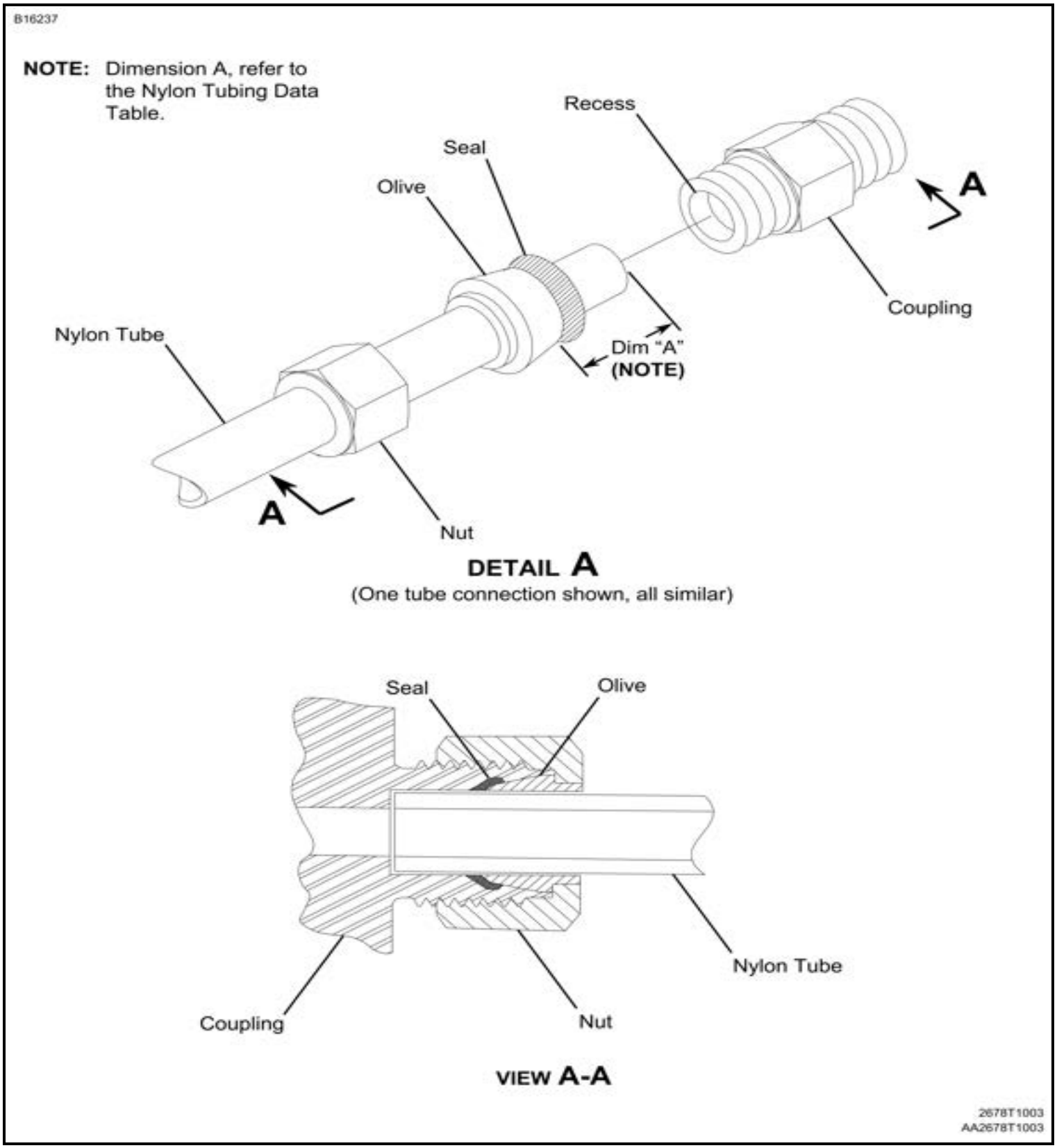
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS FLOW TRANSDUCER (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Flow Transducer.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Flow Transducer Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible there is still pressure in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Flow Transducer (UC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Flow Transducer Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the TKS access panel on the lower surface of the left wing.

(7) Disconnect the electrical connector (PC101) from electrical connector (JC101).

(8) Remove the input and outlet tube from the transducer as follows:

(a) Loosen each of the fitting nuts.

(b) Remove the tubes from the fittings.

(c) Remove the seal from each of the inlet tubes and discard. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(d) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the transducer immediately.

(9) Remove the bolts that attach the transducer to the flow transducer bracket.

(10) Remove the transducer from the airplane.

(a) Record the flow arrow marking on the transducer.

(b) Record the orientation of the transducer for installation.

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B. Install the Flow Transducer (UC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Flow Transducer Removal/Installation.

(2) Put the flow transducer in its correct position on the flow transducer bracket.

(a) Make sure the flow arrow marking on the transducer and the orientation is in the correct direction.

(b) Install the bolts that attach the transducer to the bracket.

(3) Connect the electrical connector (JC101) to the electrical connector (PC101).

(4) Install the input and outlet tubes as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Install each of the tubes in the applicable fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

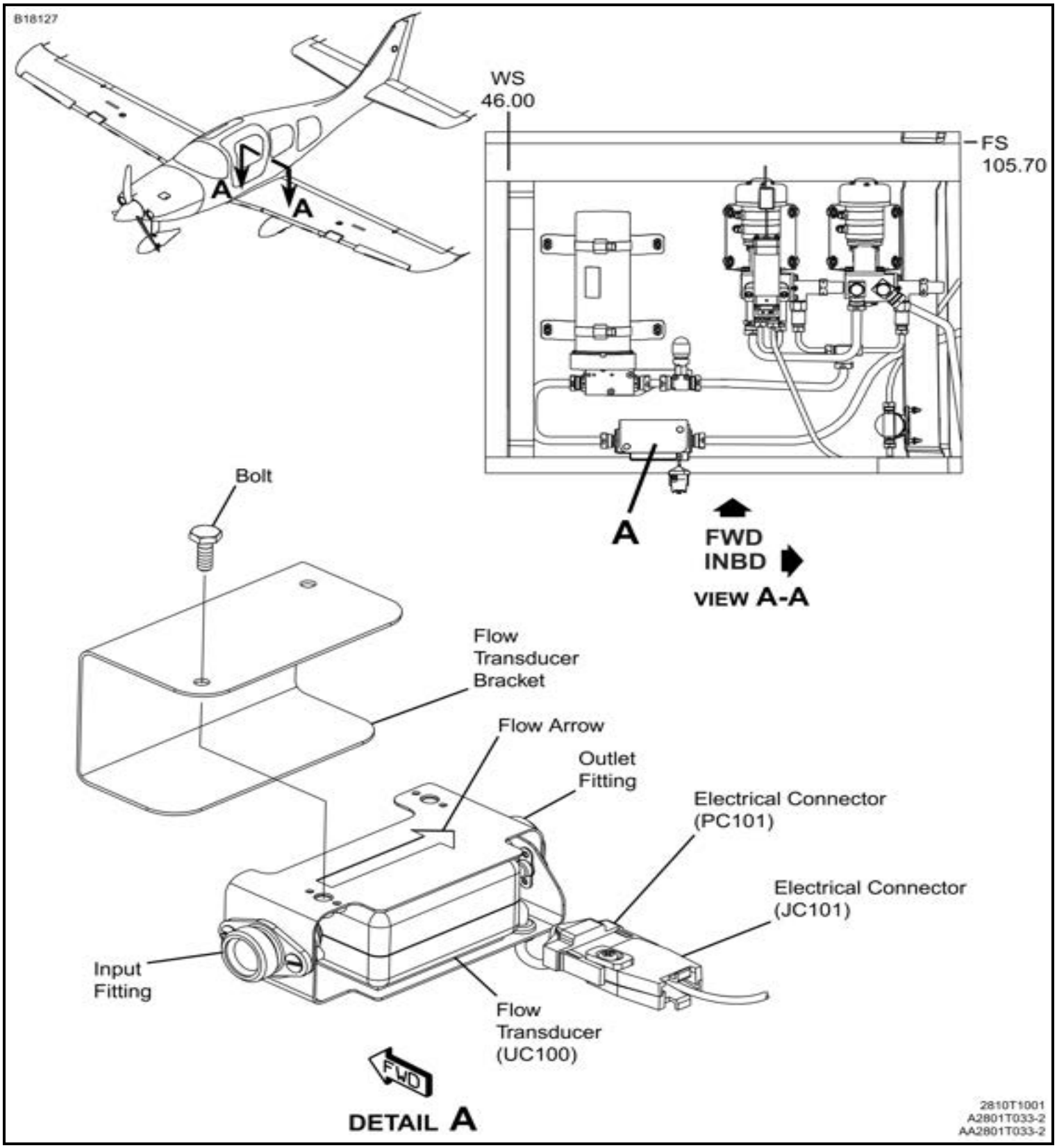
(c) W/S ANTI-ICE.

(6) Do a check of the TKS flow indication. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(7) Install the TKS access panel on the lower surface of the left wing.

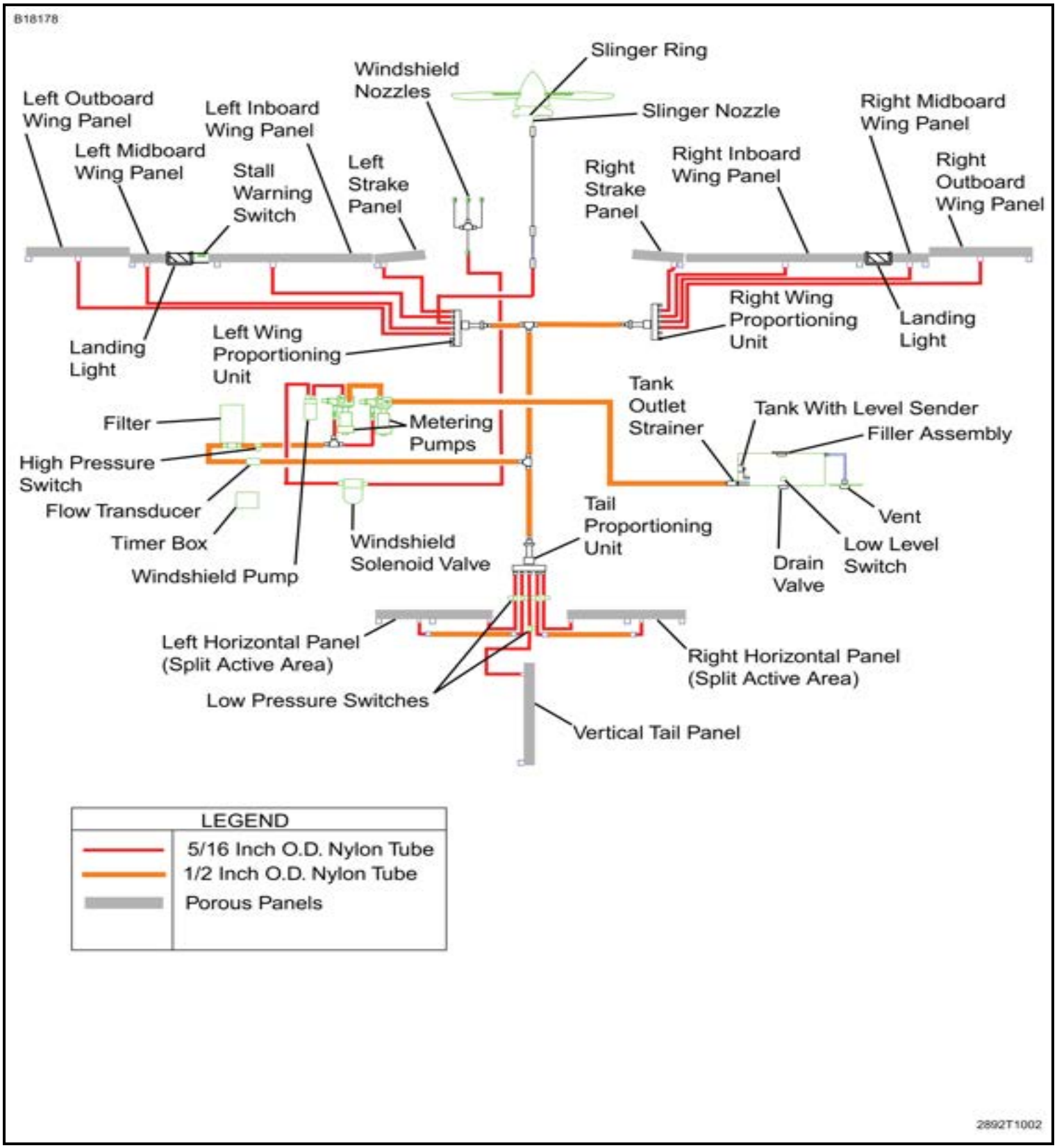
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Figure 401 : Sheet 1 : Flow Transducer Installation



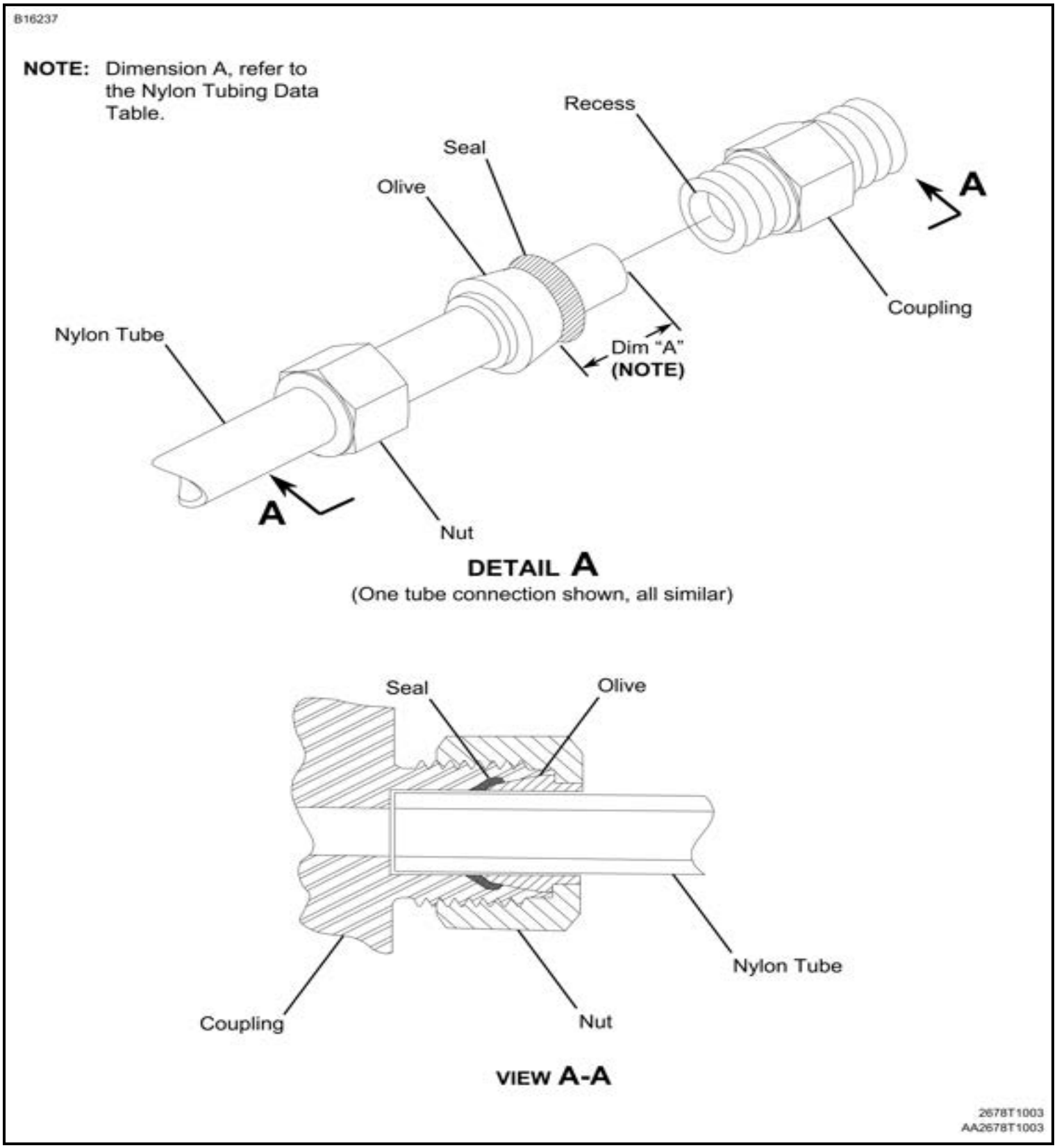
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS FILTER ASSEMBLY ELEMENT (FIKI) - MAINTENANCE PRACTICES

1. General

A. This section contains the replacement procedures for the TKS Filter Assembly element. To replace the filter assembly element, you must first remove the filter assembly from the airplane.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Filter Assembly Element Removal and Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible that pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Filter Element (Refer to Figure 201).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Filter Assembly Element Removal and Installation.

(2) If necessary remove the filter assembly/high pressure switch from the airplane. Refer to TKS Filter Assembly Removal/Installation.

(3) Remove the filter element from the filter bowl as follows:

(a) Remove the safety wire from the clip screws.

(b) Remove the screws and washers that attach the clip to the filter head.

1 Remove the clip from the filter assembly.

(c) Push on the filter head and turn.

1 Remove the filter head from the filter bowl.

(d) Remove the filter element from the bowl.

B. Install The Filter Element (Refer to Figure 201).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Filter Assembly Element Removal and Installation.

(2) Install the filter element in the filter bowl.

(3) Assemble the filter assembly as follows:

(a) Put the filter head in its correct position on the filter bowl.

(b) Push and turn the filter head on the bowl to lock it in place.

(c) Put the clip in its correct position on the filter head.

1 Make sure that the clip engages with the slot in the filter head.

(d) Install the screws and washers in the clip.

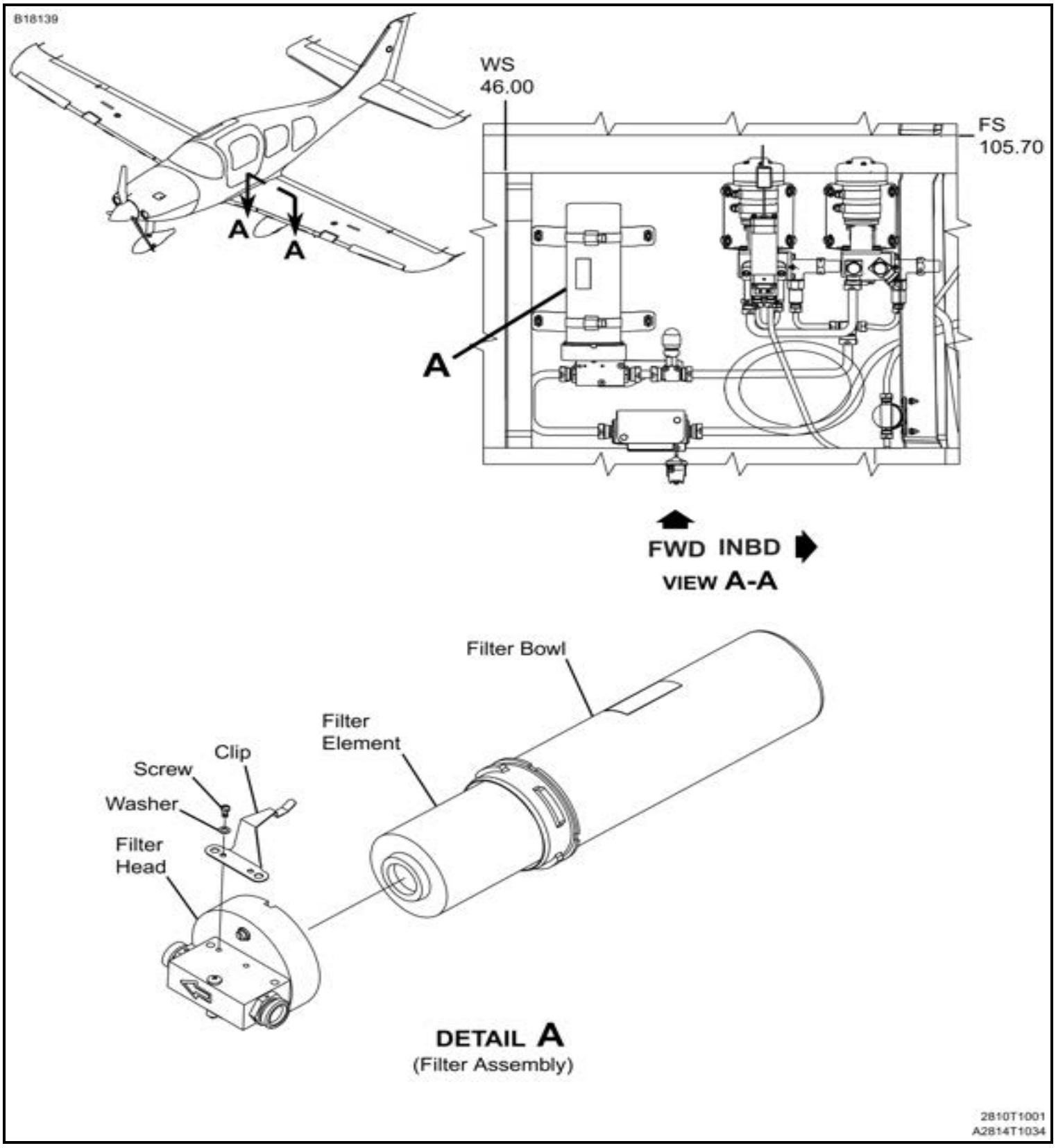
1 Safety the screws with wire. Refer to Chapter 20, Refer to Safetying - Maintenance Practices.

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C. If applicable install the filter assembly/high pressure switch in the airplane. Refer to TKS Filter Assembly Removal/Installation.

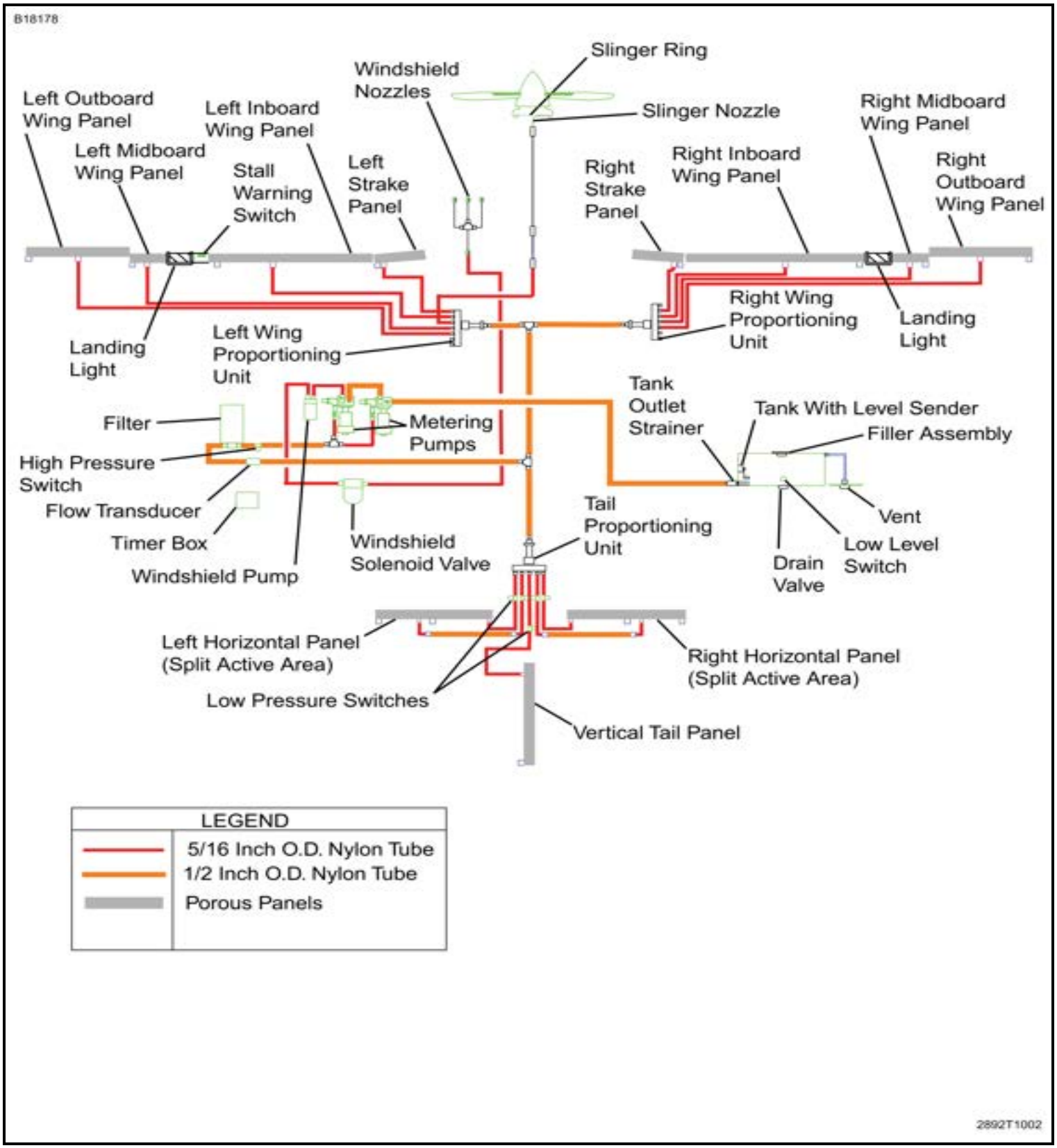
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Figure 201 : Sheet 1 : TKS Filter Assembly Element Assembly



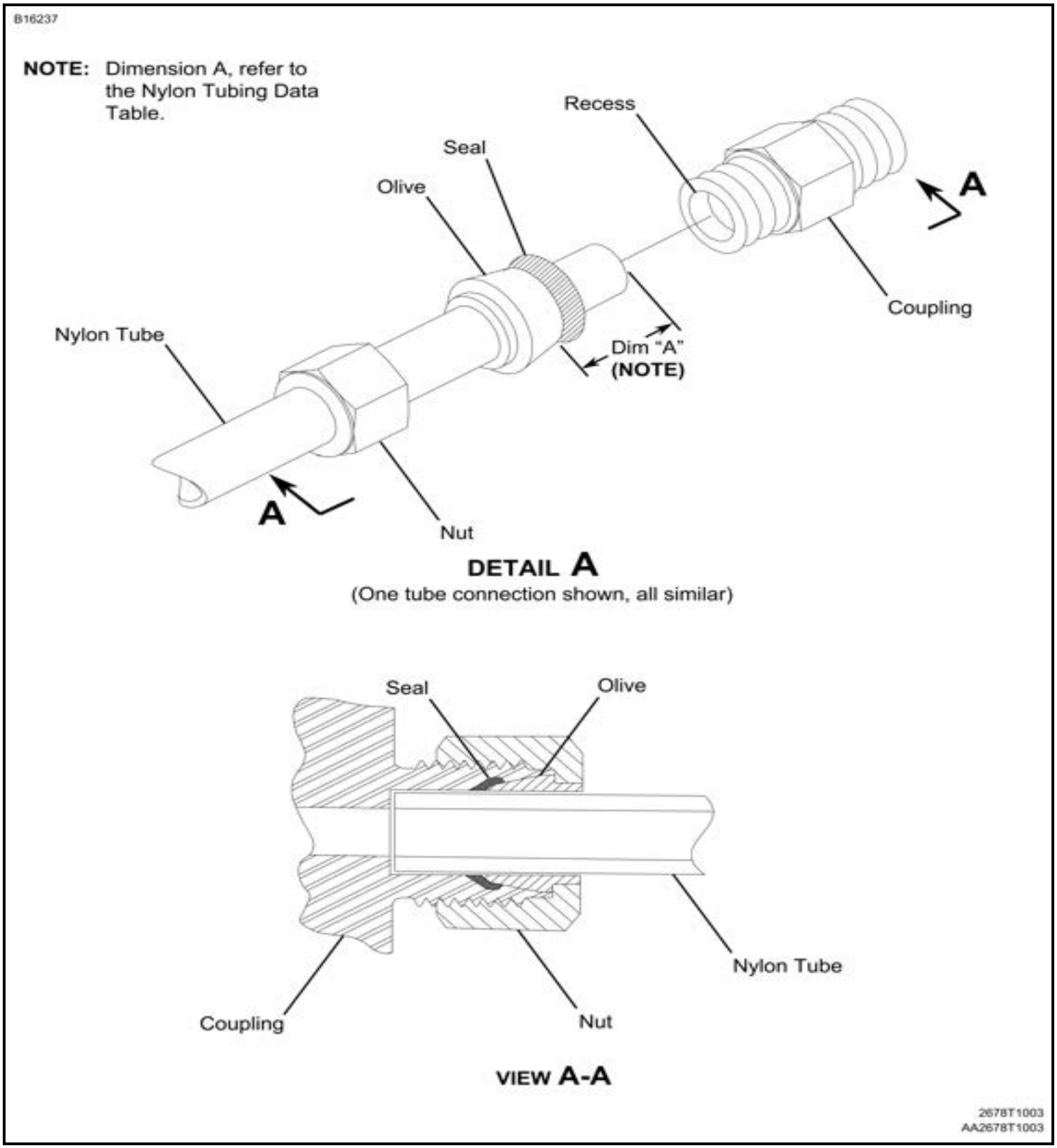
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS FILTER/HIGH PRESSURE SWITCH (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Filter Assembly and High Pressure Switch. The filter assembly and high pressure switch are usually removed and installed as an assembly. To replace the Filter Assembly or the High Pressure switch you must disassemble the removed assembly. To replace the Filter Assembly element, you must first remove the Filter Assembly from the airplane. Refer to TKS Filter Assembly Element - Maintenance Practices.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Filter Assembly Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible that pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Filter Assembly/High Pressure Switch (SC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Filter Assembly Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the TKS access panel on the lower surface of the left wing.

(7) Remove the tube from the High Pressure switch (SC100) input fitting as follows:

(a) Slowly loosen the nuts and remove the input tube from the high pressure switch input fitting.

(b) Remove and discard the old seal from the input tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the filter assembly and switch immediately.

(8) Remove the tube from the filter assembly outlet fitting as follows:

(a) Slowly loosen the nut and remove the outlet tube from the filter assembly outlet fitting.

(b) Remove and discard the old seal from the input and outlet tube.

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(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the filter assembly and switch immediately.

(9) Remove the screws found on the bottom of the wing, from each of the two filter assembly brackets.

(10) Carefully remove the filter assembly/high pressure switch from the airplane.

(11) Record the direction of the flow arrow marking on the filter head.

(12) Record the position and orientation of the brackets on the filter assembly.

(13) Loosen the filter clamp screws that attach the filter to the brackets.

(a) Remove the filter assembly/high pressure switch from the brackets.

(14) If you must replace the filter assembly element, the filter assembly must be disassembled. Refer to TKS Filter Assembly Element (FIKI) - Maintenance Practices.

(15) If you must replace the filter assembly or high pressure switch, you must remove the high pressure switch from the filter assembly. Refer to TKS High Pressure Switch Removal/Installation.

B. Install the Filter Assembly/High Pressure Switch (SC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Filter Assembly Removal/Installation.

(2) If necessary install the high pressure switch on the filter assembly. Refer to TKS High Pressure Switch Removal/Installation in this section.

(3) Put the filter assembly in its correct position as recorded before, on each of the two the brackets.

(a) Tighten the screws on the clamps to attach the filter to the brackets.

(4) Put the filter assembly in its correct position on the lower skin.

(5) Install the screws that attach the filter brackets to the lower wing skin.

(6) Install the outlet and input tubes to the filter assembly/high pressure switch as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Put the tubes in their correct positions on the filter assembly/high pressure switch fittings.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(7) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(8) Do a check of the Filter Assembly and/or the High Pressure Switch as applicable. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(9) Install the TKS access panel on the lower surface of the left wing.

4. TKS High Pressure Switch Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible that pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2

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lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the High Pressure switch (SC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS High Pressure Switch Removal/Installation.

(2) If necessary remove the filter assembly/high pressure switch from the airplane. Refer to TKS Filter Assembly Removal/Installation in this section.

(3) Disconnect electrical connector PC107 from electrical connector JC107.

(4) Remove the screws and nuts that attach the high pressure switch to the switch support bracket.

(a) Remove the switch from the bracket.

(5) Remove the tube from the High Pressure switch (SC100) outlet fitting as follows:

(a) Slowly loosen the nuts and remove the tube from the high pressure switch outlet fitting.

(b) Remove and discard the old seal from the input tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the high pressure switch immediately.

B. Install the High Pressure switch (SC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS High Pressure Switch Removal/Installation.

(2) Install the high pressure switch as follows:

(a) If necessary, remove the cap from the filter input open end.

(b) Install new seal on the tube. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Put the tube in its correct position in the high pressure switch outlet fitting.

(d) Put the high pressure switch in its correct position on the switch support bracket.

1 Install the screws and nuts that attach the high pressure switch to the switch support bracket.

(e) Tighten the high pressure switch outlet fitting nut.

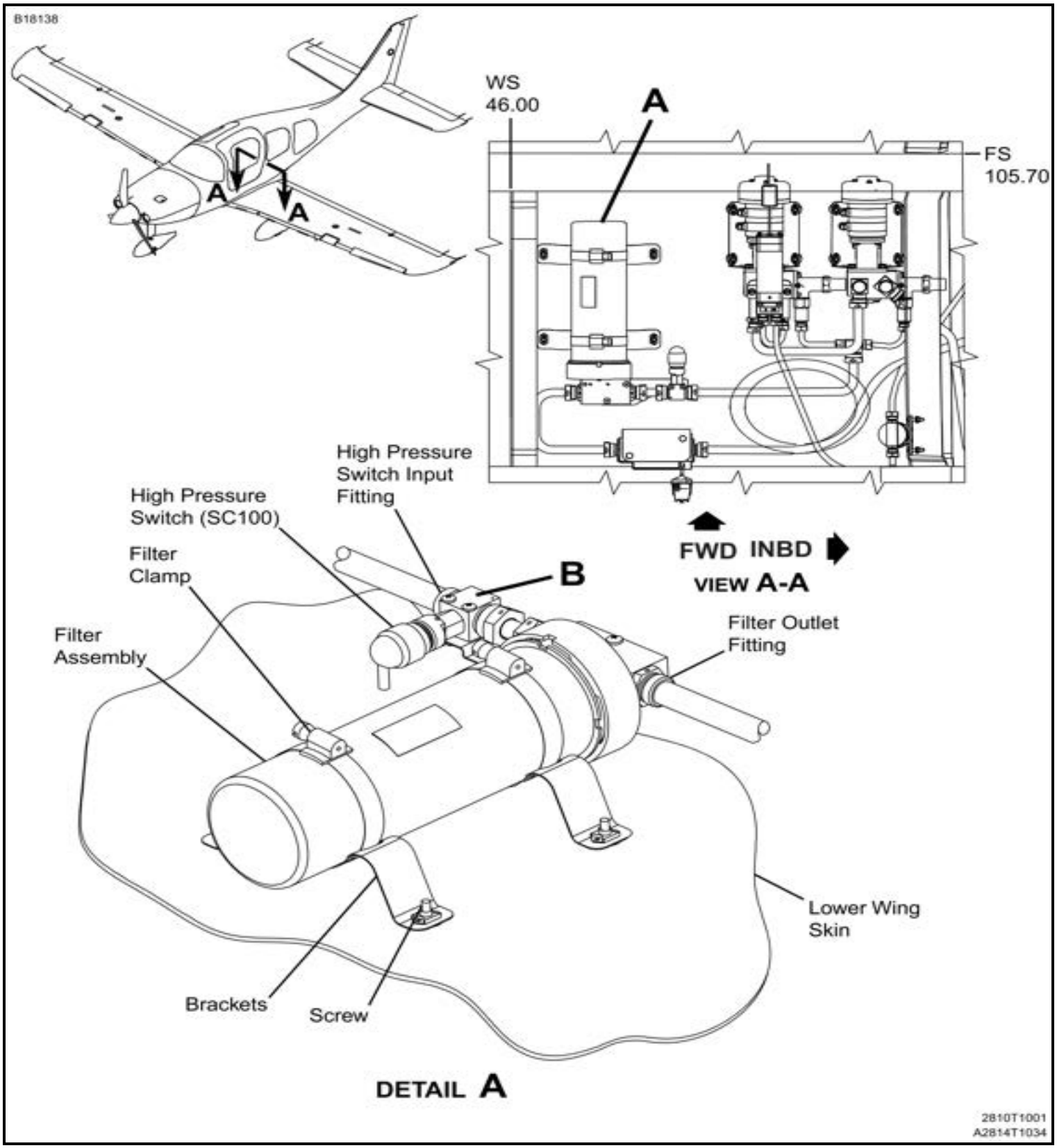
(f) Connect electrical connector PC107 to electrical connector JC107.

1 Make sure there is an appropriate clearance between the electrical connector and the TKS lines.

(3) If applicable install the filter assembly/high pressure switch in the airplane. Refer to TKS Filter Assembly Removal/Installation in this section.

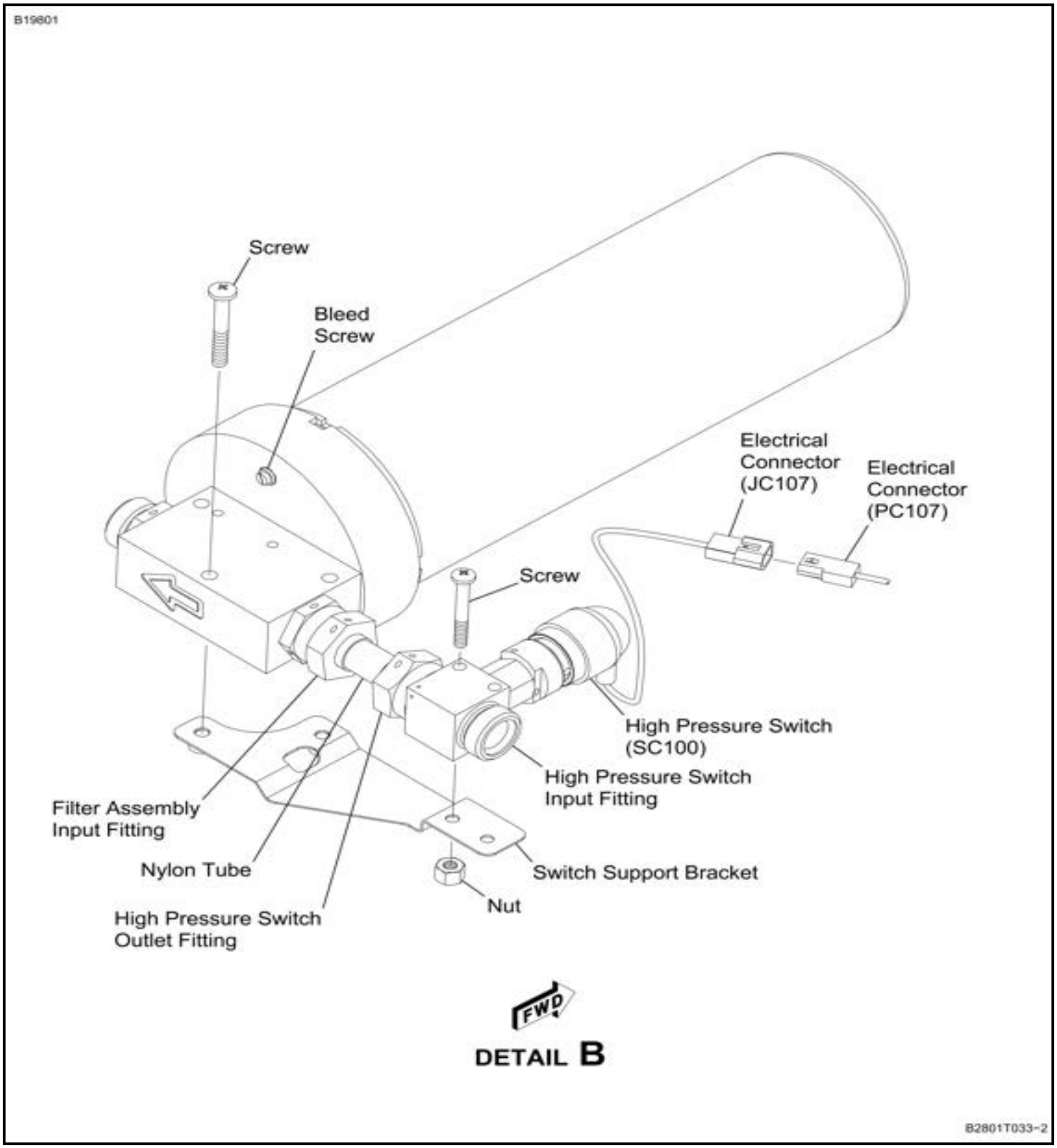
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Figure 401 : Sheet 1 : TKS Filter Assembly Installation



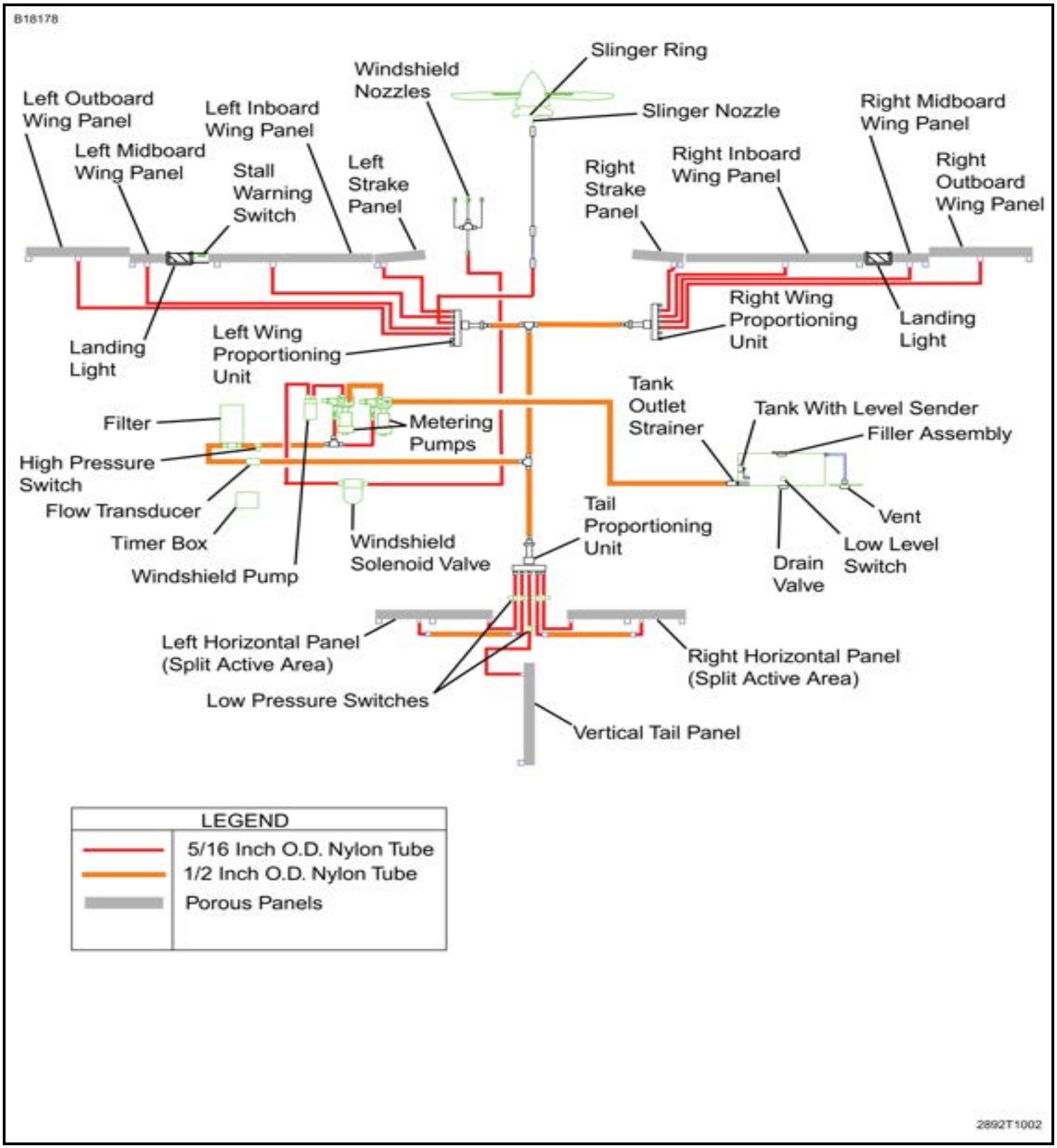
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Figure 401 : Sheet 2 : TKS Filter Assembly Installation



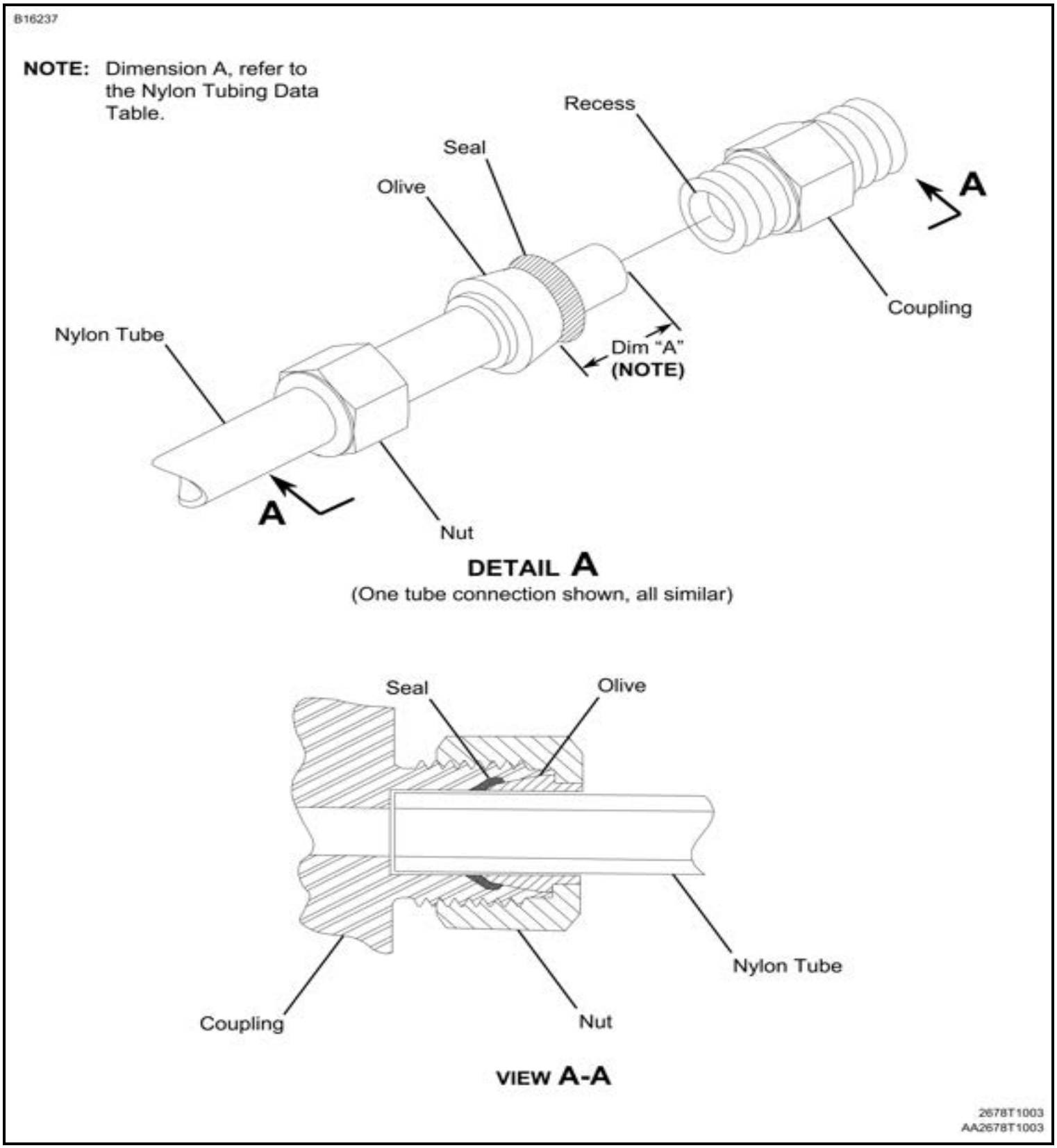
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS WING PROPORTIONING UNITS (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS (FIKI) Wing Proportioning Units. There is a separate wing proportioning unit installed for the left wing and one for the right wing.

B. The wing proportioning units are installed in the wing near WS 0.00. The left proportioning unit is installed at WS 2.60 and the right proportioning unit at WS 6.35, and each of the units at approximately FS 105.70.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Wing Proportioning Unit Removal/Installation

A. Remove the Wing Proportioning Unit (Refer to Figure 401).

NOTE: The removal of the left and right proportioning units are similar.

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed. It is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after Warnings and Cautions you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Wing Proportioning Unit Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the pilot's or copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(7) Remove the left or right forward cabin floor panel. Refer to Chapter 53, Fuselage Access - Description and Operation.

(8) Remove the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.

(9) Remove the tube from the proportioning unit input fitting as follows:

(a) Slowly loosen the nut and remove the input tube from the proportioning unit input fitting.

(b) Remove and discard the old seal from the input tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

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NOTE: It is not necessary to install caps if you are to replace the proportioning unit immediately.

(10) Remove the tubes from the proportioning unit outlet fittings as follows:

(a) Identify each of the outlet tubes and the fittings they attach to.

(b) Slowly loosen and disconnect each of the outlet tubes.

(c) Remove each of the outlet tubes from the proportioning unit.

(d) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the proportioning unit immediately.

(e) Remove and discard the old seal from the outlet tubes.

(11) Remove the two screws that attach the proportioning unit to the bracket.

(12) Remove the proportioning unit from the airplane.

B. Install the Wing Proportioning Unit (Refer to Figure 401).

NOTE: The installation of the left and right proportioning units are similar.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Wing Proportioning Unit Removal/Installation.

(2) Put the proportioning unit in its correct position on the bracket.

(3) Install the two screws that attach the proportioning unit to the bracket.

(4) Attach the input tube to the proportioning unit as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seal on the inlet tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.

(c) Put the input tube in its correct position on the proportioning unit input fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Attach the outlet tubes to the proportioning unit as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the outlet tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Identify each of the outlet tubes and put them in their correct position on the outlet fittings of the proportioning unit.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(6) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(7) Do a test of the applicable porous panels and make sure that the proportioning unit fittings do not leak. Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test.

(8) If necessary, do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing, TKS Anti-Ice Fluid.

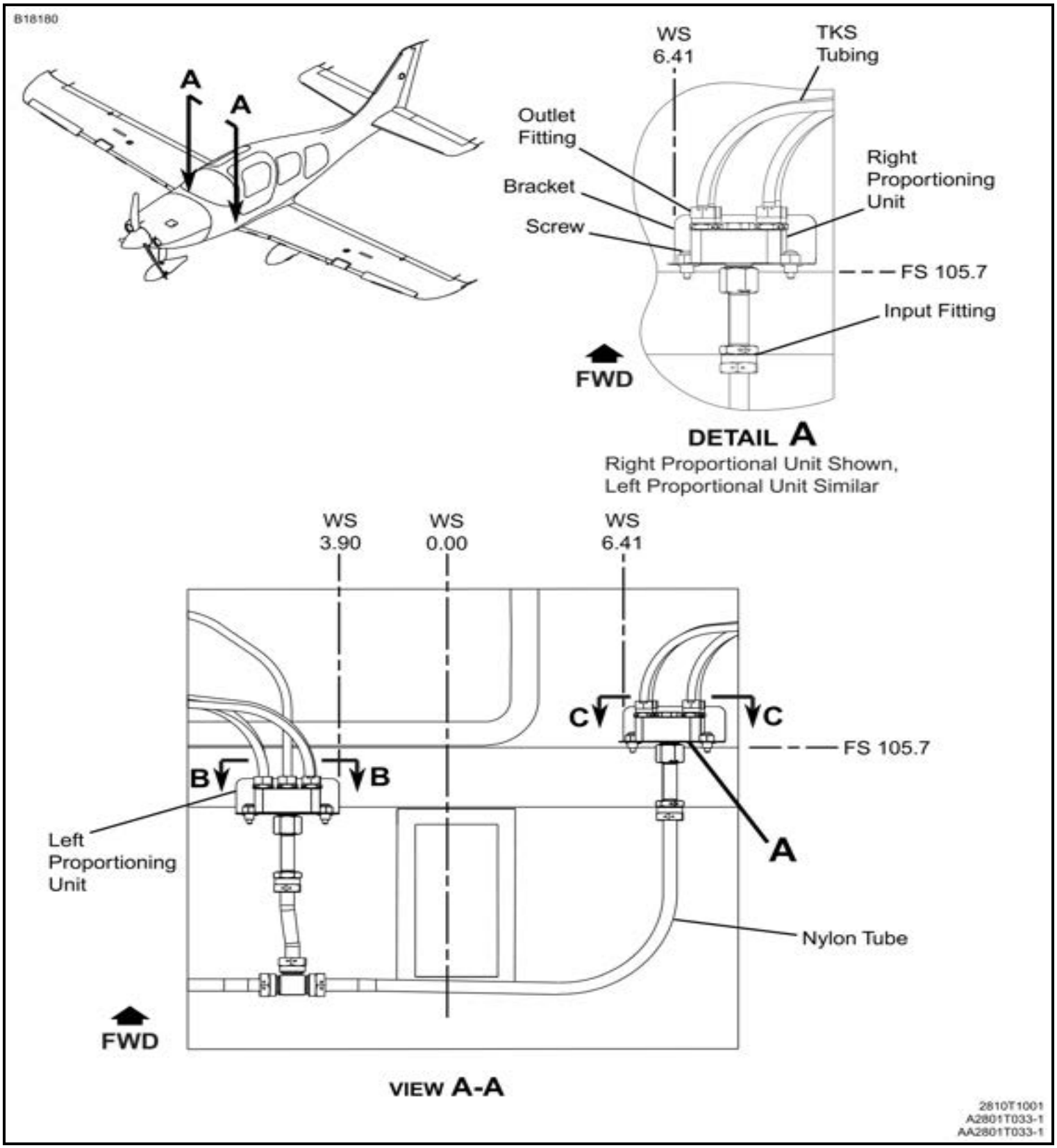
(9) Install the left or right forward cabin floor panel. Refer to Chapter 53, Fuselage Access - Description and Operation.

(10) Install the footwell. Refer to Chapter 25, Footwell - Maintenance Practices.

(11) Install the pilot's or copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

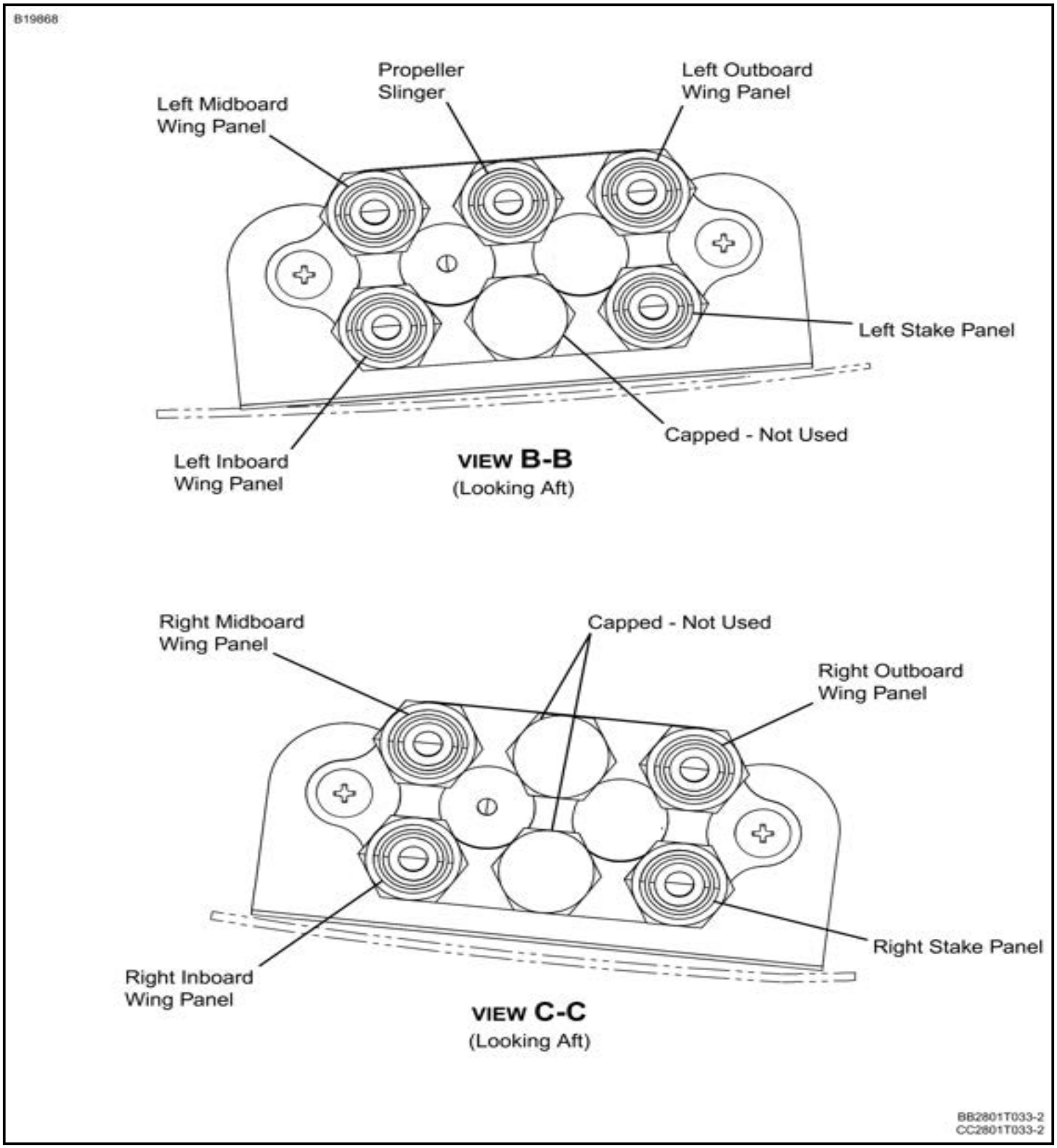
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Figure 401 : Sheet 1 : Wing Proportioning Unit Installation



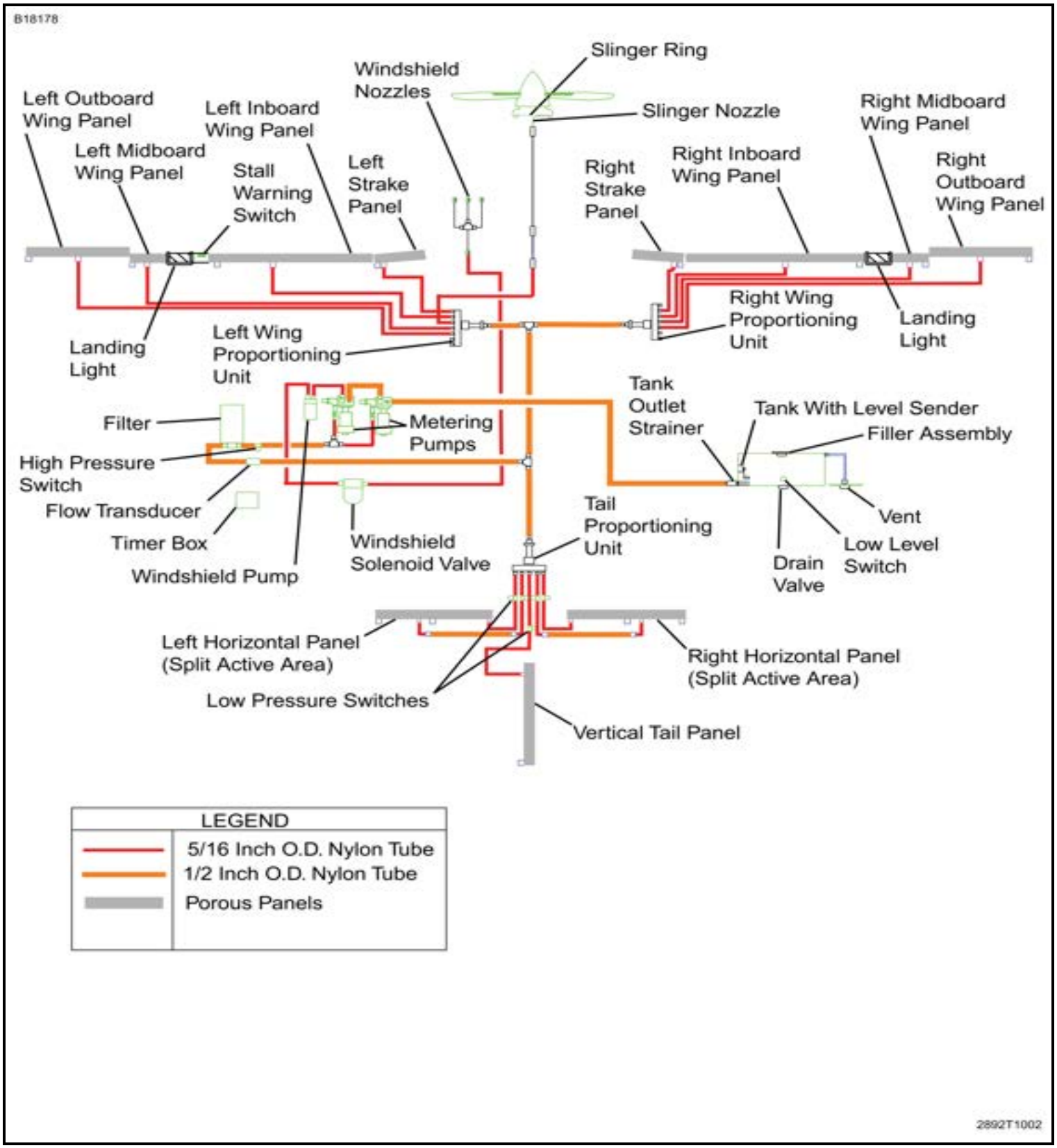
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Figure 401 : Sheet 2 : Wing Proportioning Unit Installation



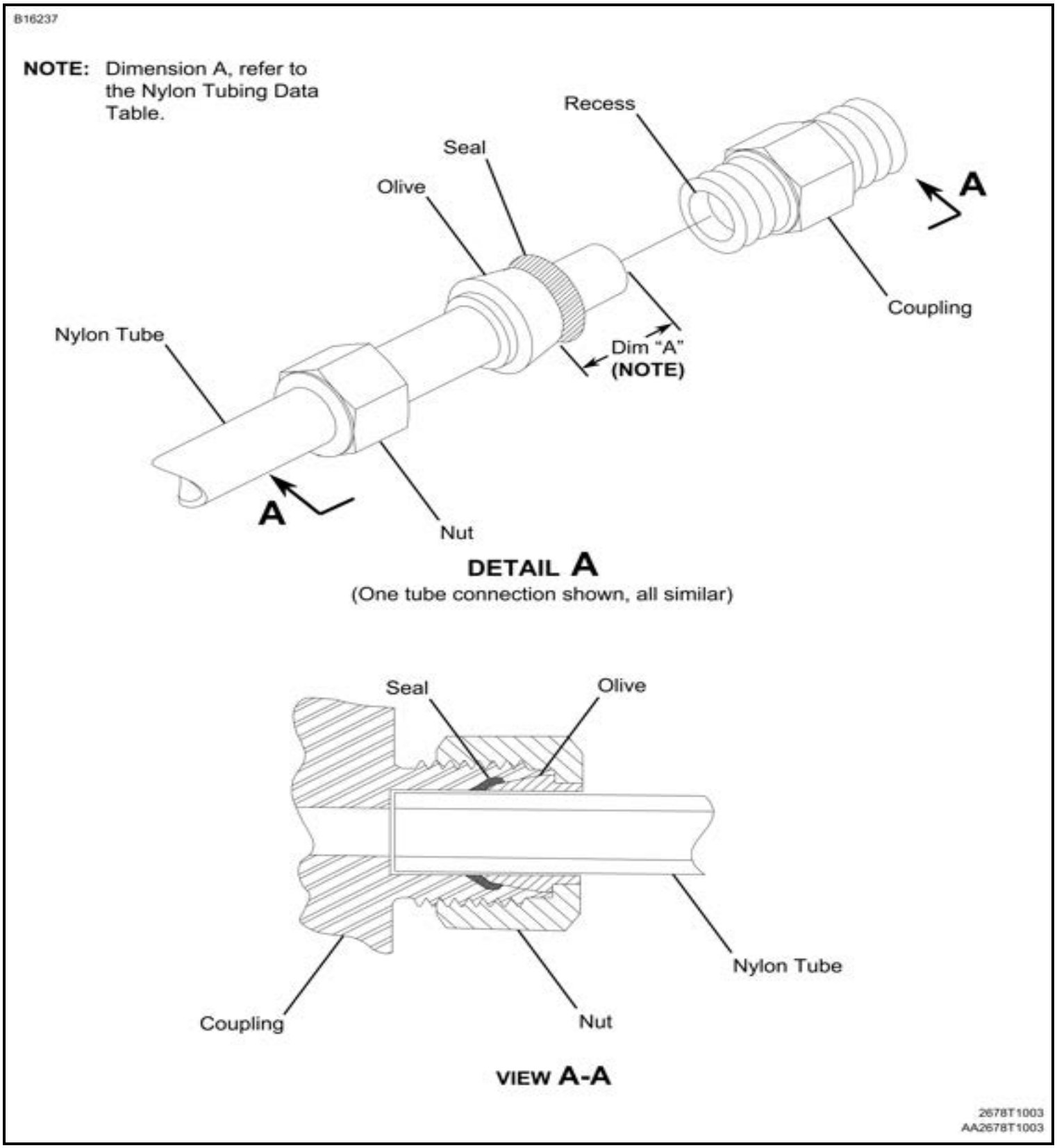
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS TAIL PROPORTIONING UNIT (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Tail Proportioning Unit. The Tail Proportioning Unit is installed in the vertical stabilizer. You can get access to the Tail Proportioning Unit by removing the right aft fuselage access panel.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Tail Proportioning Unit Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible that pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Tail Proportioning Unit (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Tail Proportioning Unit Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the right aft fuselage access panel found on the vertical stabilizer to get access to the proportioning unit.

(7) Remove the tube from the proportioning unit input fitting as follows:

(a) Slowly loosen the nut and remove the input tube from the proportioning unit input fitting.

(b) Remove and discard the old seal from the input tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the proportioning unit immediately.

(8) Remove the tubes from the proportioning unit outlet fittings as follows:

(a) Identify each of the outlet tubes and the fittings they attach to.

(b) Slowly loosen and disconnect each of the outlet tubes.

(c) Remove each of the outlet tubes from the proportioning unit.

(d) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the

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system.

NOTE: It is not necessary to install caps if you are to replace the proportioning unit immediately.

(e) Remove and discard the old seal from the outlet tubes.

(9) Remove the bolts that attach the tail proportioning unit to the bracket.

(10) Carefully remove the tail proportioning unit from the airplane.

B. Install the Tail Proportioning Unit (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS Tail Proportioning Unit procedures. Refer to Tail Proportioning Unit Removal/Installation.

(2) Put the tail proportioning unit in its correct position on the bracket.

(a) Install the bolts that attach the tail proportioning unit to the bracket.

(3) Attach the inlet tube to the proportioning unit.

(a) If necessary, remove the caps from the open ends.

(b) Install new seal on the inlet tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.

(c) Put the inlet tube in its correct position on the proportioning unit inlet fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(4) Attach the outlet tubes to the proportioning unit.

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the outlet tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Identify each of the outlet tubes and put them in their correct position on the outlet fittings of the proportioning unit.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

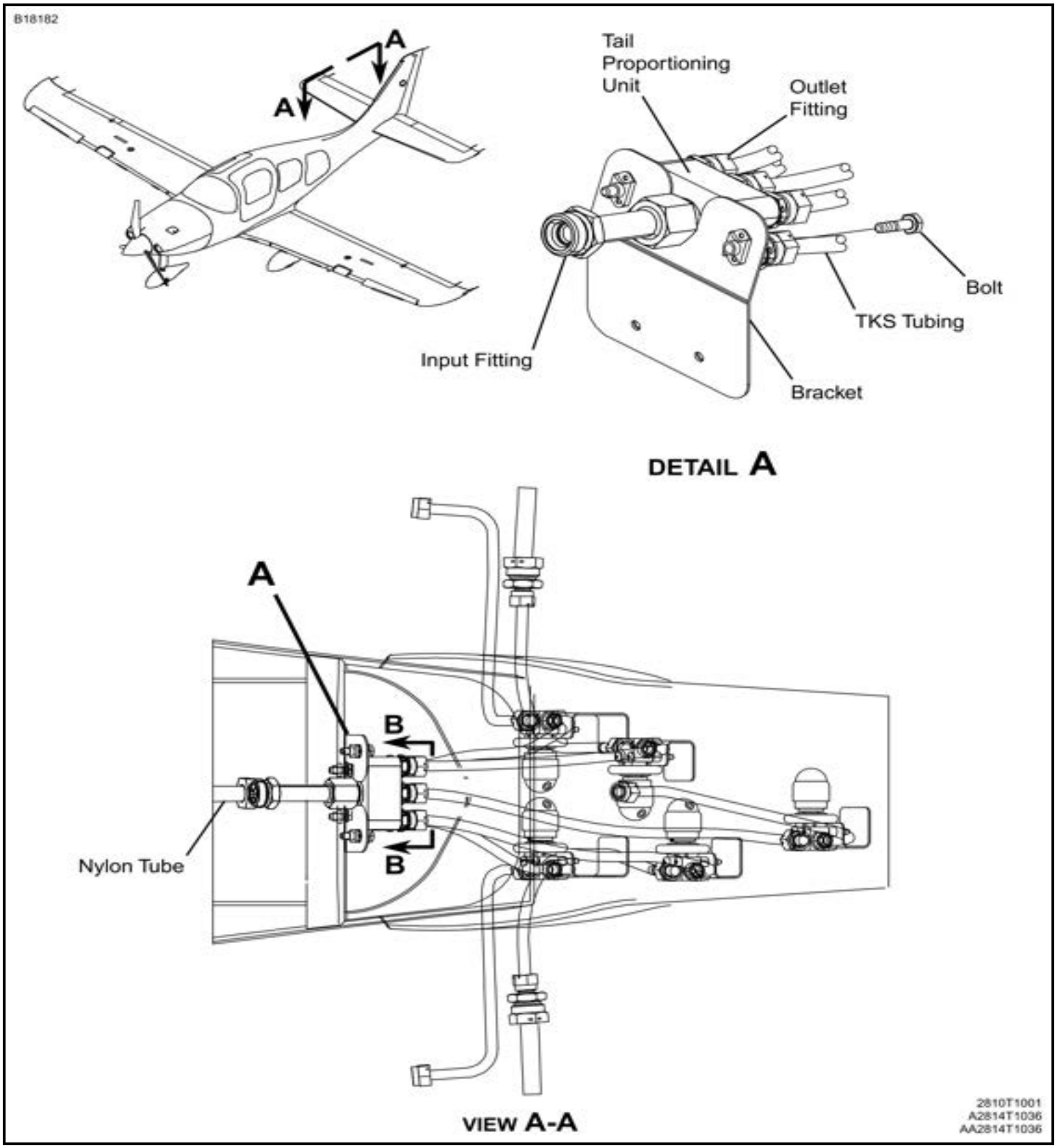
(c) W/S ANTI-ICE.

(6) Do a check of the Tail Proportioning Unit. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(7) Install the right aft fuselage access panel found on the vertical stabilizer.

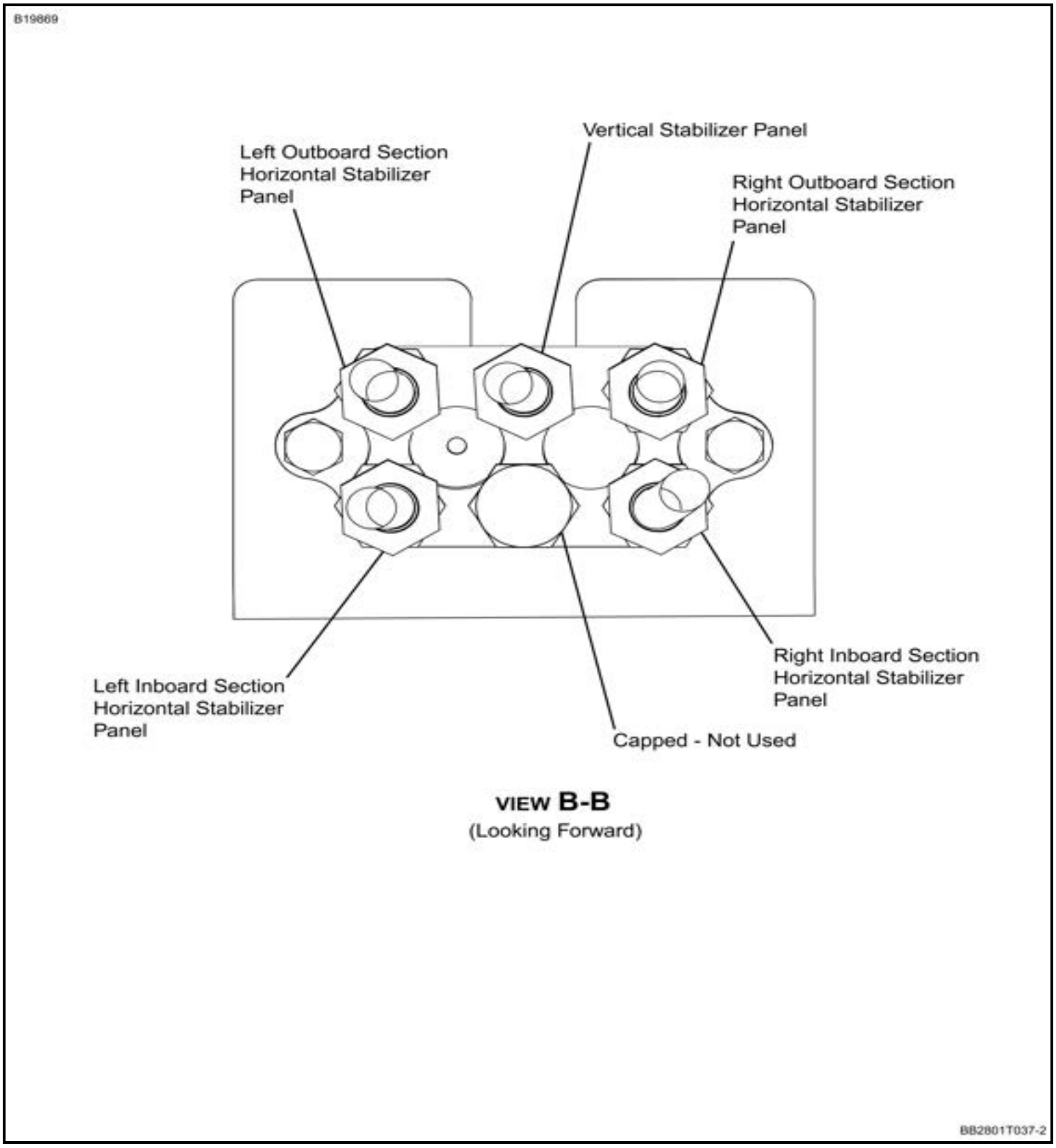
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Figure 401 : Sheet 1 : Tail Proportioning Unit Installation



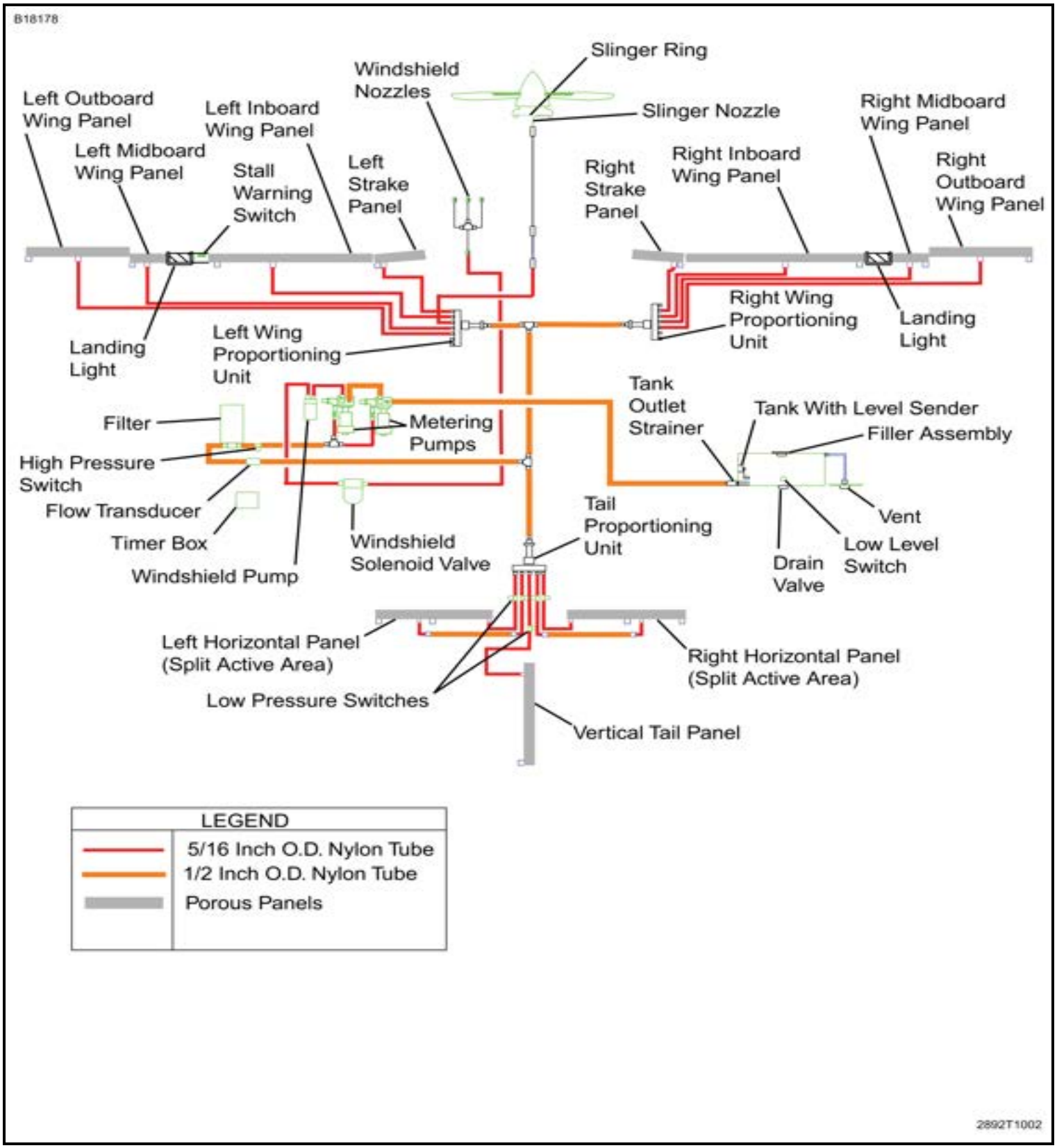
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Figure 401 : Sheet 2 : Tail Proportioning Unit Installation



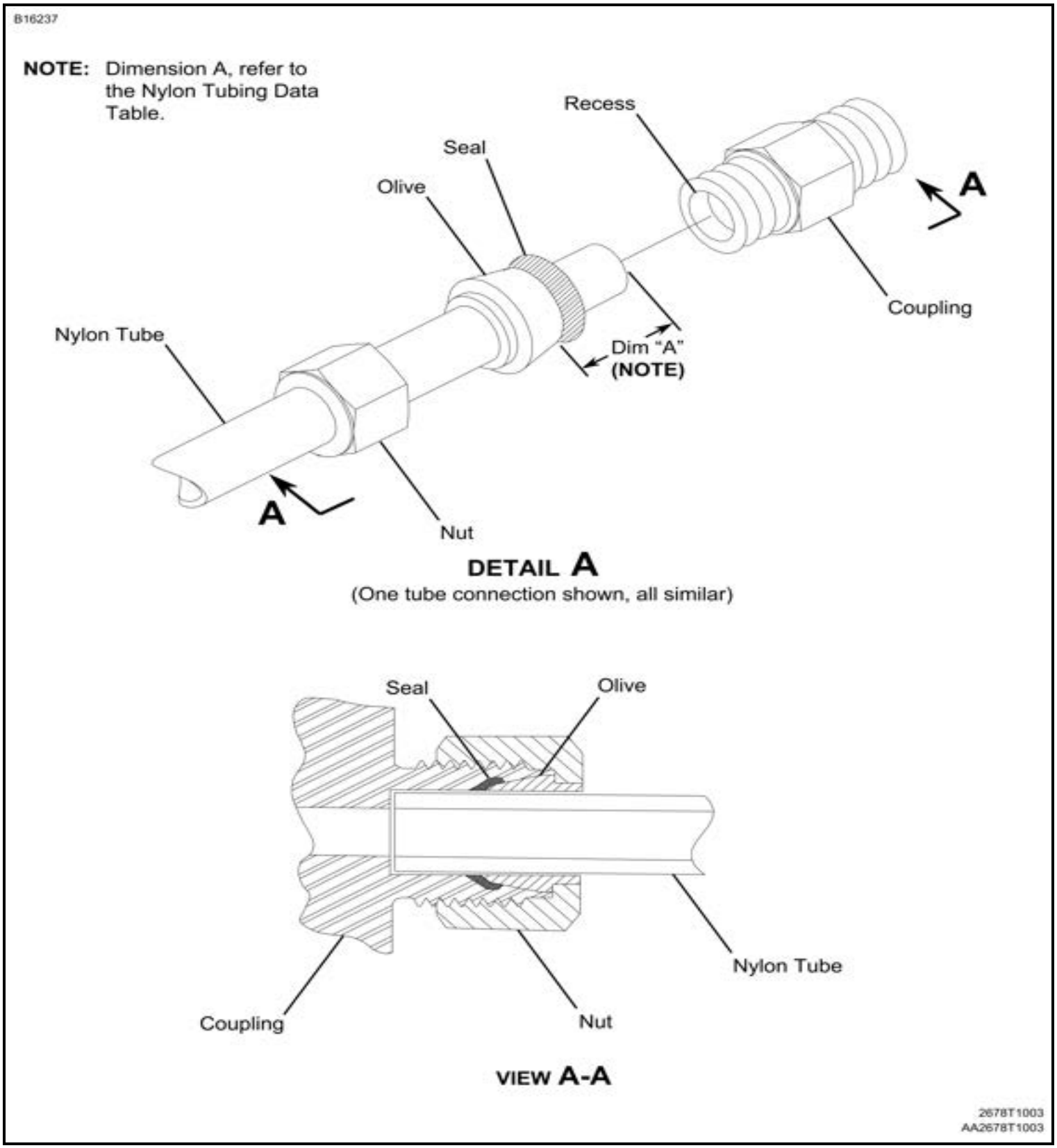
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS LEVEL SENDER (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Level Sender. The level sender is installed in the TKS fluid tank in the right wing at FS 119.08, WS 82.85, and RBL 23.16.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Level Sender Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed. It is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

A. Remove the Level Sender (UR100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Level Sender Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Drain the TKS fluid tank. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, TKS Anti-Ice Fluid Removal.

(7) Remove the screws that attach the FIKI tank access panel to the wing.

(a) Carefully pull the panel from the wing skin.

(b) Hold the panel and remove the clamp that attaches the hose to the vent tube.

1 Remove the hose from the vent tube.

(c) Remove the access panel from the airplane.

(8) Use a nonmetallic scraper to carefully remove unwanted sealant from the tank and level sender (on the tank side).

(9) Remove the footwell. Refer to Footwell - Maintenance Practices.

(a) Disconnect the electrical connector JR100 from electrical connector PR100.

(b) Remove the screws that attach the level sender to the wing rib.

(10) Carefully remove the level sender from the airplane as follows:

(a) Carefully remove the arm of the level sender from the TKS tank through the mount hole of the sender.

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(b) If the removed switch is to be installed again, use a nonmetallic scraper to carefully remove unwanted sealant from the level sender.

(11) Use a nonmetallic scraper to carefully remove unwanted sealant from the wing rib.

B. Install the Level Sender (UR100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Level Sender Removal/Installation.

(2) Apply Type IX, fluorosilicone sealant around the perimeter of the level sender installation area (hole) before you install the level sender. (Silastic 730, Dow or equivalent).

(3) While the sealant is wet, install the level sender as follows:

(a) Carefully put the arm of the level sender into the TKS tank through the mount hole of the level sender.

(b) Put the level sender in its correct position on the wing rib.

(c) Install the screws that attach the level sender to the wing rib.

(4) Use Type IX, fluorosilicone sealant to apply a fillet seal around the level sender on the tank side. (Silastic 730, Dow or equivalent).

(a) Make sure to let the fillet seal cure.

(5) Connect the electrical connector JR100 to electrical connector PR100.

(6) Install the FIKI tank access panel to the wing as follows:

(a) Use a nonmetallic scraper to carefully remove unwanted sealant from the access panel and the wing skin.

(b) Hold the access panel near its correct position and connect the hose to the vent tube.

1 Install the clamp that attaches the hose to the vent tube.

(c) To seal the access panel, apply Type IX, fluorosilicone sealant to the recessed wing skin installation area. (Silastic 730, Dow or equivalent).

(d) Put the access panel in its correct position to the wing.

(e) Install the screws that attach the access panel to the wing.

(f) Use a nonmetallic scraper to carefully remove unwanted sealant from the wing skin.

(7) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

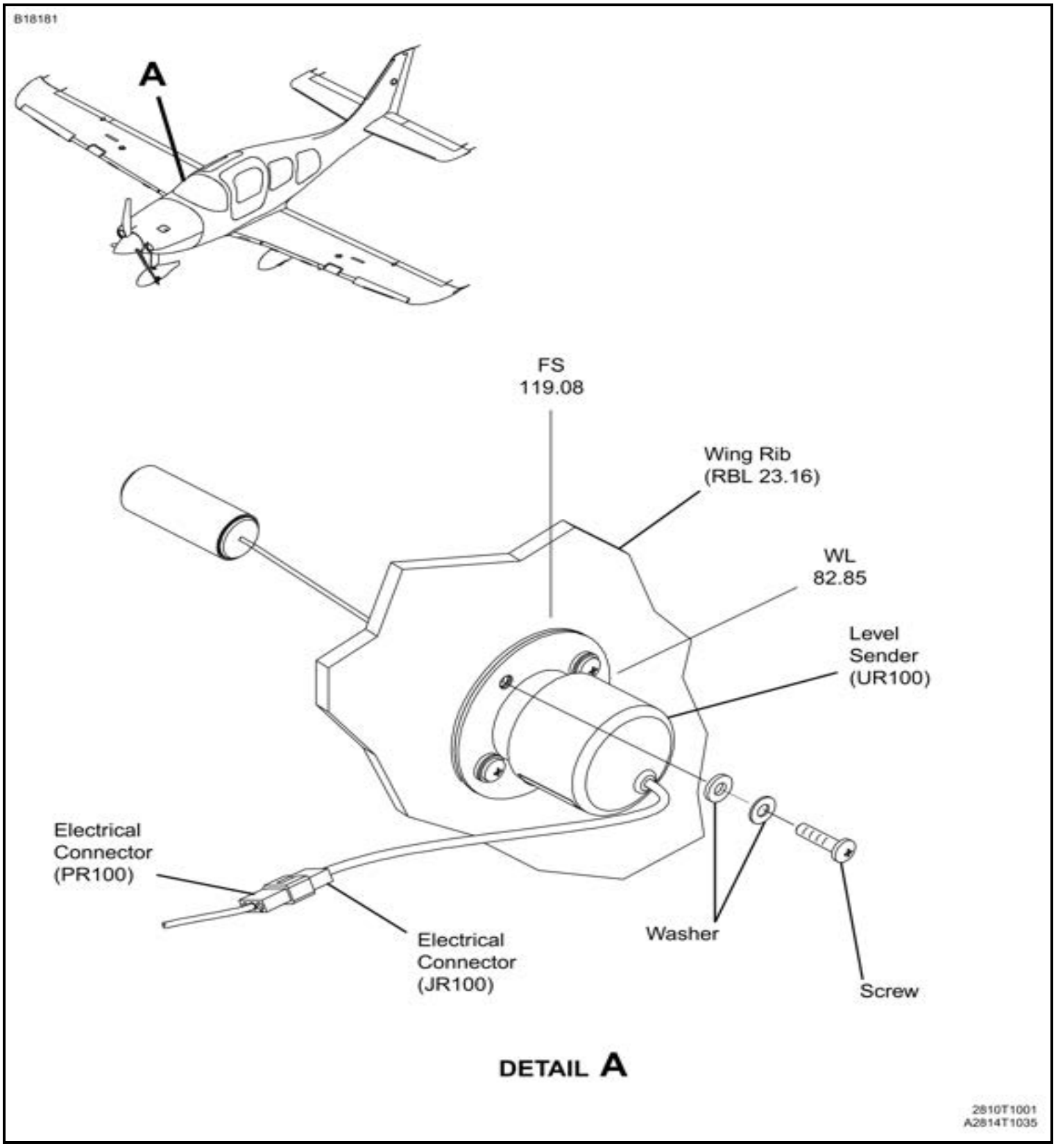
(8) Do a test of the level sender. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(9) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(10) Install the footwell. Refer to Footwell - Maintenance Practices.

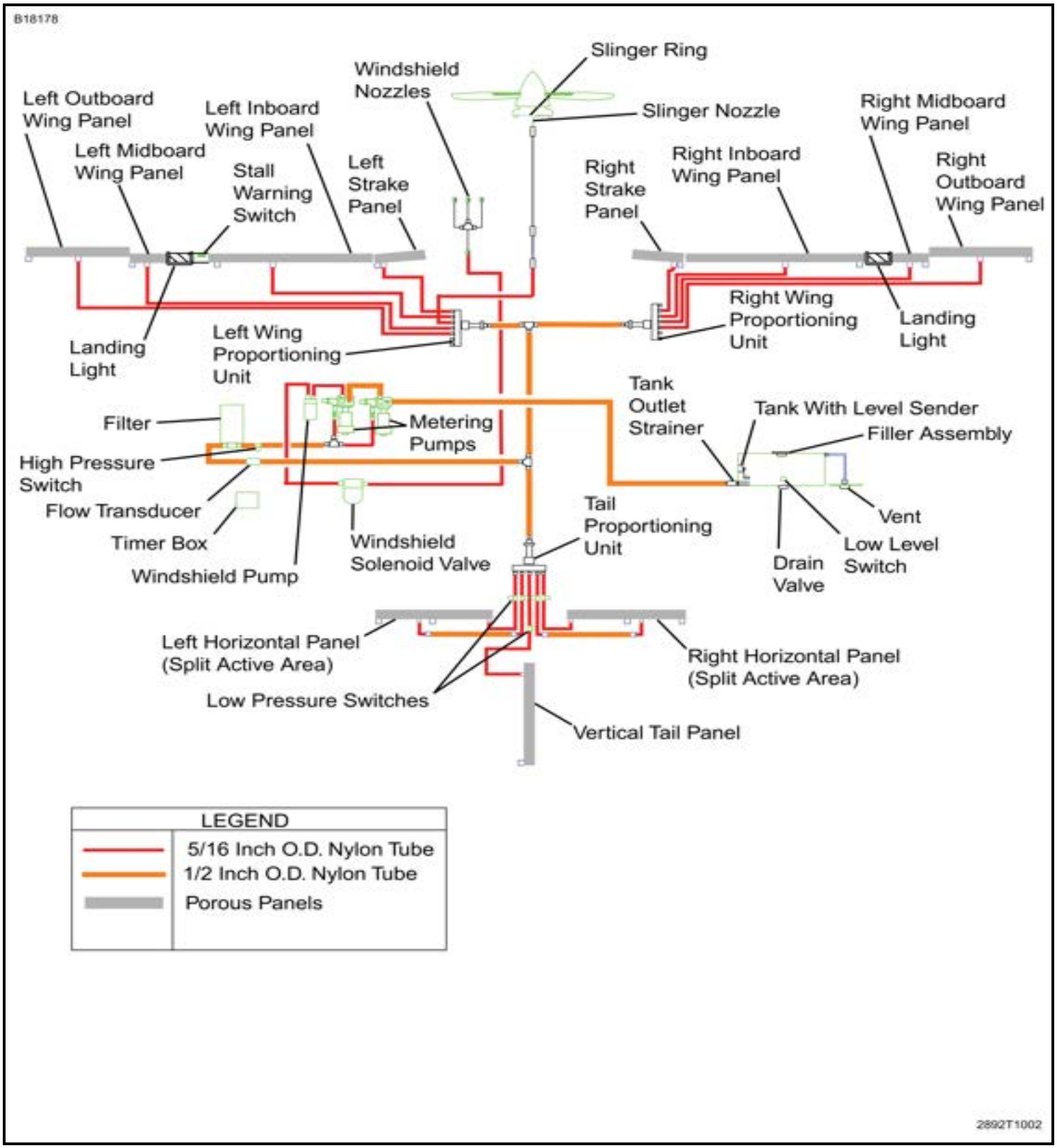
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Figure 401 : Sheet 1 : Level Sender Installation



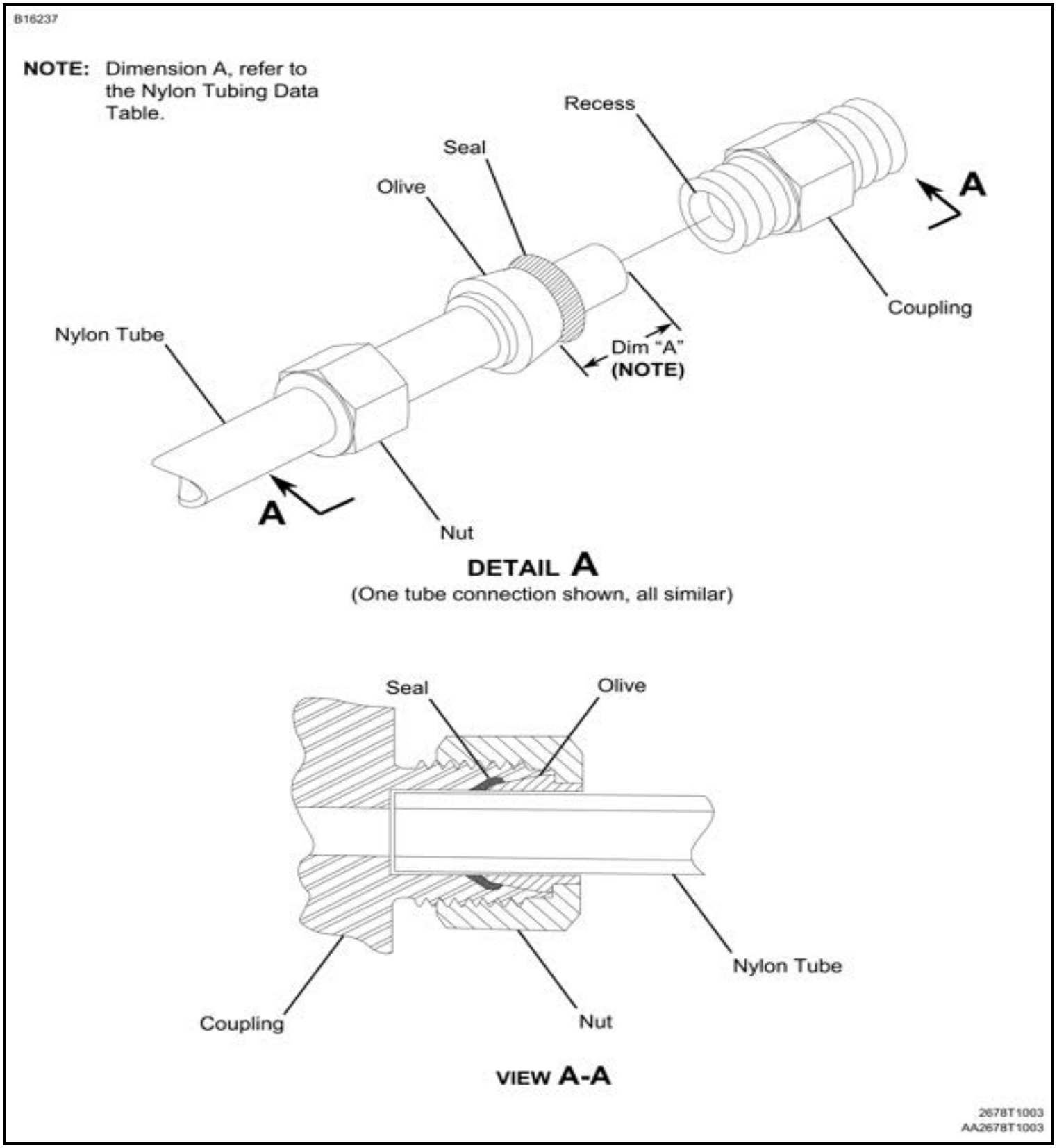
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS LOW LEVEL SWITCH (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Low Level Switch. The low level switch is installed in the TKS fluid tank in the right wing at FS 110.67, WL 80.92, and RBL 23.25.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Low Level Switch Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed. It is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

A. Remove the Low Level Switch (SC101) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Low Level Switch Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Drain the TKS fluid tank. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, TKS Anti-Ice Fluid Removal.

(7) Remove the screws that attach the FIKI tank access panel to the wing.

(a) Carefully pull the panel from the wing skin.

(b) Hold the panel and remove the clamp that attaches the hose to the vent tube.

1 Remove the hose from the vent tube.

(c) Remove the access panel from the airplane.

(8) Use a nonmetallic scraper to carefully remove unwanted sealant from the tank and low level switch (on the tank side).

(9) Remove the footwell. Refer to Footwell - Maintenance Practices.

(a) Disconnect the electrical connector JR101 from electrical connector PR101.

(b) Remove the nut that attaches the low level switch to the wing rib.

(10) From the inside of the TKS fluid tank, carefully remove the low level switch and washer from the airplane.

(a) If the removed switch is to be installed again, use a nonmetallic scraper to carefully remove unwanted sealant from the

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low level switch.

(11) Use a nonmetallic scraper to carefully remove unwanted sealant from the tank.

B. Install the Low Level Switch (SC101) (Refer to Figure 401).

NOTE: To install the low level switch it is necessary to have two technicians available to complete the procedures.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to TKS Low Level Switch Removal/Installation.

(2) Apply Type IX, fluorosilicone sealant around the perimeter of the low level switch installation area (hole) before you install the low level switch. (Silastic 730, Dow or equivalent)

(3) While the sealant is wet, install the low level switch as follows:

(a) Put the low level switch and washer in its correct position on the wing rib.

(b) Install the nut that attach the low level switch to the wing rib.

(4) Use Type IX, fluorosilicone sealant to apply a fillet seal around the low level switch on the tank side. (Silastic 730, Dow or equivalent)

(a) Make sure to let the fillet seal cure.

(5) Connect the electrical connector JR101 to electrical connector PR101.

(6) Install the FIKI tank access panel to the wing as follows:

(a) Use a nonmetallic scraper to carefully remove unwanted sealant from the access panel and the wing skin.

(b) Hold the access panel near its correct position and connect the hose to the vent tube.

1 Install the clamp that attaches the hose to the vent tube.

(c) To seal the access panel, apply Type IX, fluorosilicone sealant to the recessed wing skin installation area. (Silastic 730, Dow or equivalent)

(d) Put the access panel in its correct position to the wing.

(e) Install the screws that attach the access panel to the wing.

(f) Use a nonmetallic scraper to carefully remove unwanted sealant from the wing skin.

(7) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

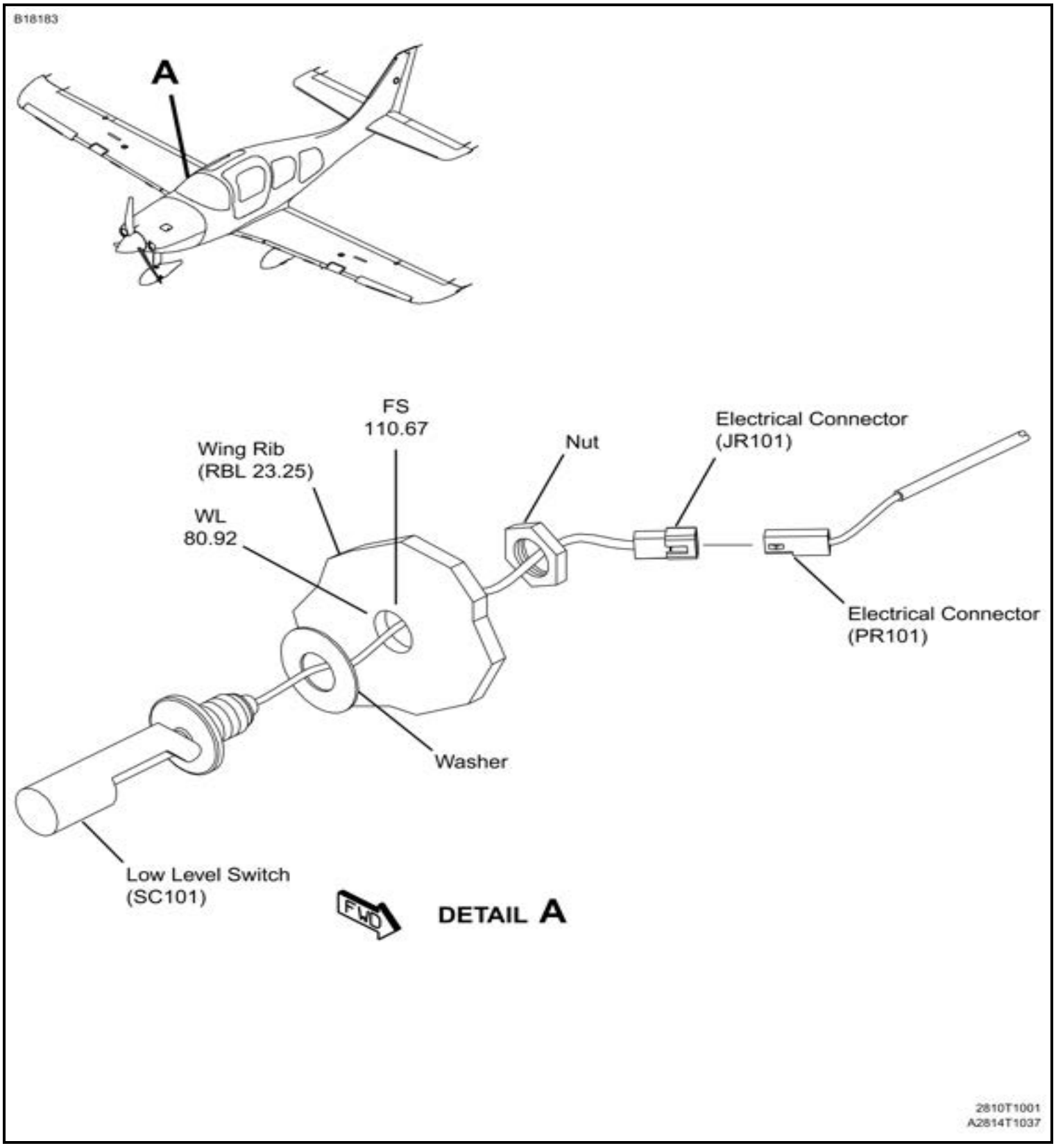
(8) Do a test of the Low Level Switch. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(9) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(10) Install the footwell. Refer to Footwell - Maintenance Practices.

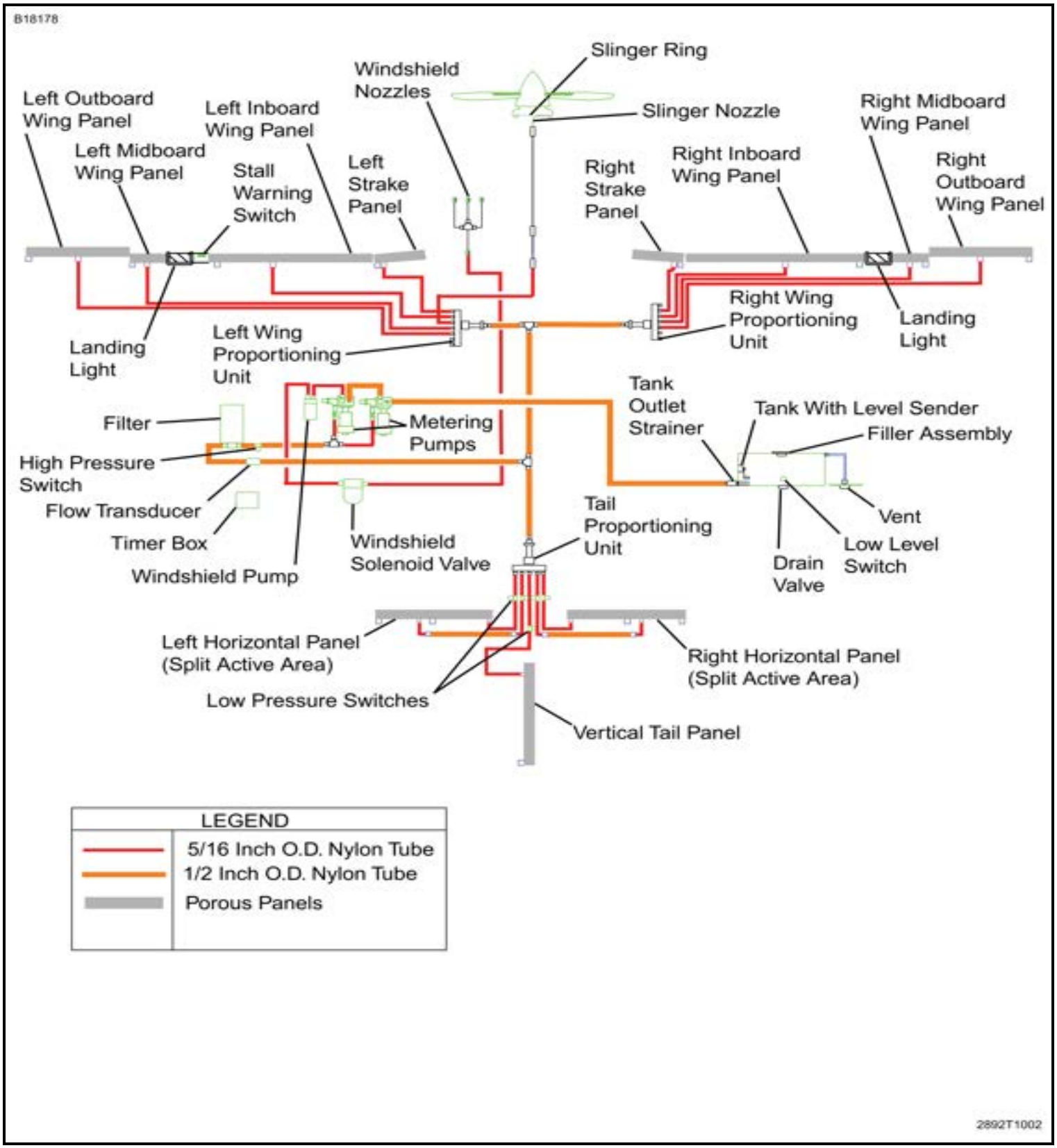
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Figure 401 : Sheet 1 : Low Level Switch Installation



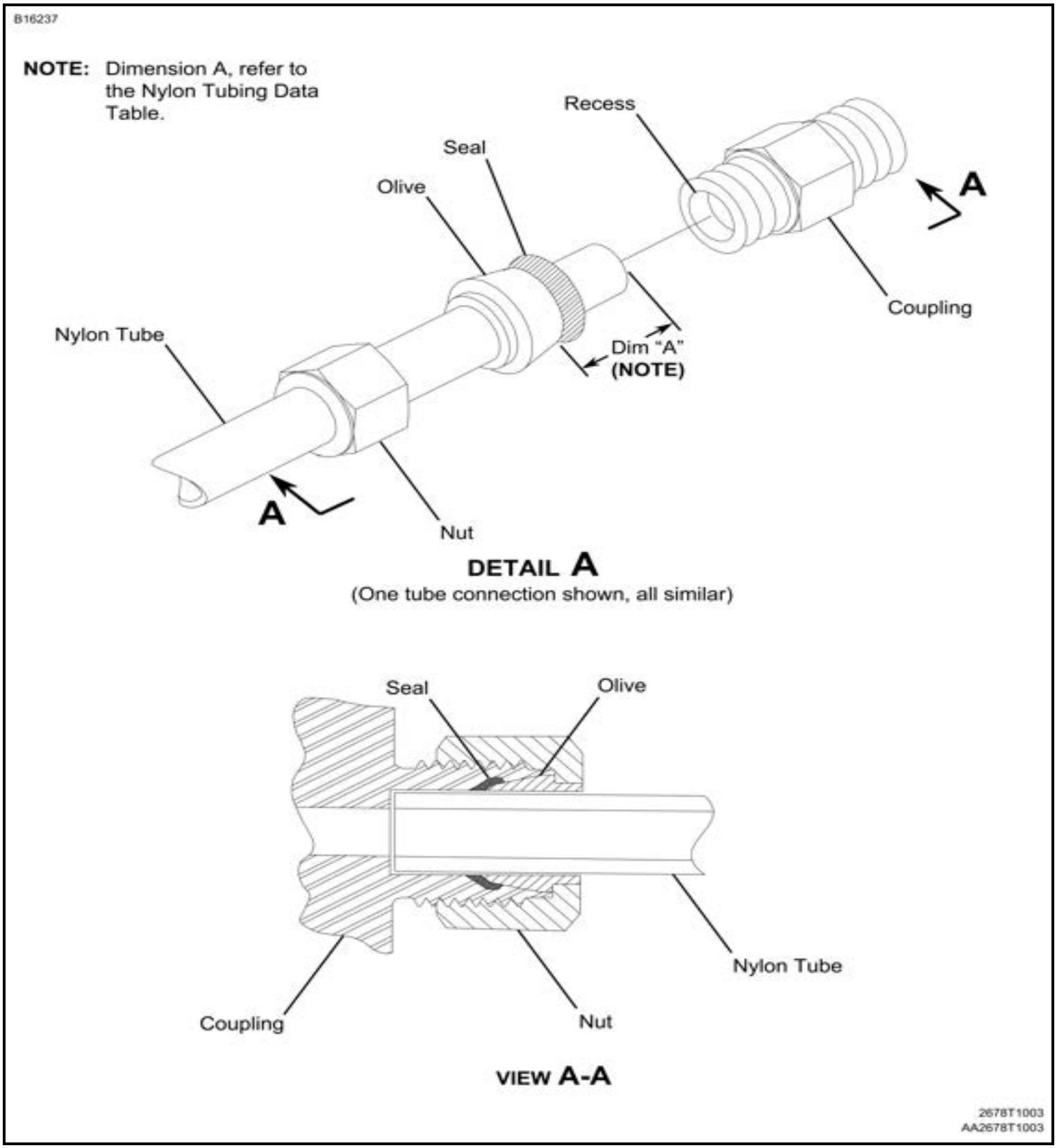
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS LOW PRESSURE SWITCH (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for each of the five TKS Low Pressure Switches. The low pressure switches are for each of the following porous panels: left horizontal outboard and inboard, right horizontal outboard and inboard, and the vertical. The switches are installed in the vertical stabilizer. You can get access to the switches by removing the left and/or right aft fuselage access panels.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Low Pressure Switch Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed because it is possible that pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Low Pressure Switch (SC100) (Refer to Figure 401).

NOTE: The removal procedures for each of the five low pressure switches are similar.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Low Pressure Switch Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the left and/or right aft fuselage access panel found on the vertical stabilizer to get access to the applicable low pressure switch.

(7) Disconnect the applicable electrical connectors as follows:

(a) Vertical low pressure switch, electrical connector PT100 from electrical connector JT100.

(b) Left horizontal outboard low pressure switch, electrical connector PT101 from electrical connector JT101.

(c) Left horizontal inboard low pressure switch, electrical connector PT102 from electrical connector JT102.

(d) Right horizontal inboard low pressure switch, electrical connector PT103 from electrical connector JT103.

(e) Right horizontal outboard low pressure switch, electrical connector PT104 from electrical connector JT104.

(8) Remove the tube from the applicable low pressure switch input fitting as follows:

(a) Slowly loosen the nut and remove the input tube from the switch input fitting.

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(b) Remove and discard the old seal from the input tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the low pressure switch immediately.

(9) Remove the tube from the applicable low pressure switch outlet fittings as follows:

(a) Slowly loosen and disconnect the outlet tube.

(b) Remove the outlet tube from the switch.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the low pressure switch immediately.

(d) Remove and discard the old seal from the outlet tubes.

(10) Remove the screws that attach the low pressure switch to the bracket.

(11) Carefully remove the low pressure switch from the airplane.

B. Install the Low Pressure Switch, (Refer to Figure 401).

NOTE: The installation of each of the low pressure switches is similar.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Low Pressure Switch Removal/Installation.

(2) Put the applicable low pressure switch in its correct position on the bracket.

(a) Install the screws that attach the switch to the bracket.

(3) Attach the applicable input tube to the low pressure switch as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seal on the input tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.

(c) Put the input tube in its correct position on the switch input fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(4) Attach the applicable outlet tube to the low pressure switch as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seals on the outlet tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Put the outlet tube in its correct position on the switch outlet fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Connect the applicable electrical connectors as follows:

(a) Vertical low pressure switch, electrical connector PT100 to electrical connector JT100.

(b) Left horizontal outboard low pressure switch, electrical connector PT101 to electrical connector JT101.

(c) Left horizontal inboard low pressure switch, electrical connector PT102 to electrical connector JT102.

(d) Right horizontal inboard low pressure switch, electrical connector PT103 to electrical connector JT103.

(e) Right horizontal outboard low pressure switch, electrical connector PT104 to electrical connector JT104.

(6) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

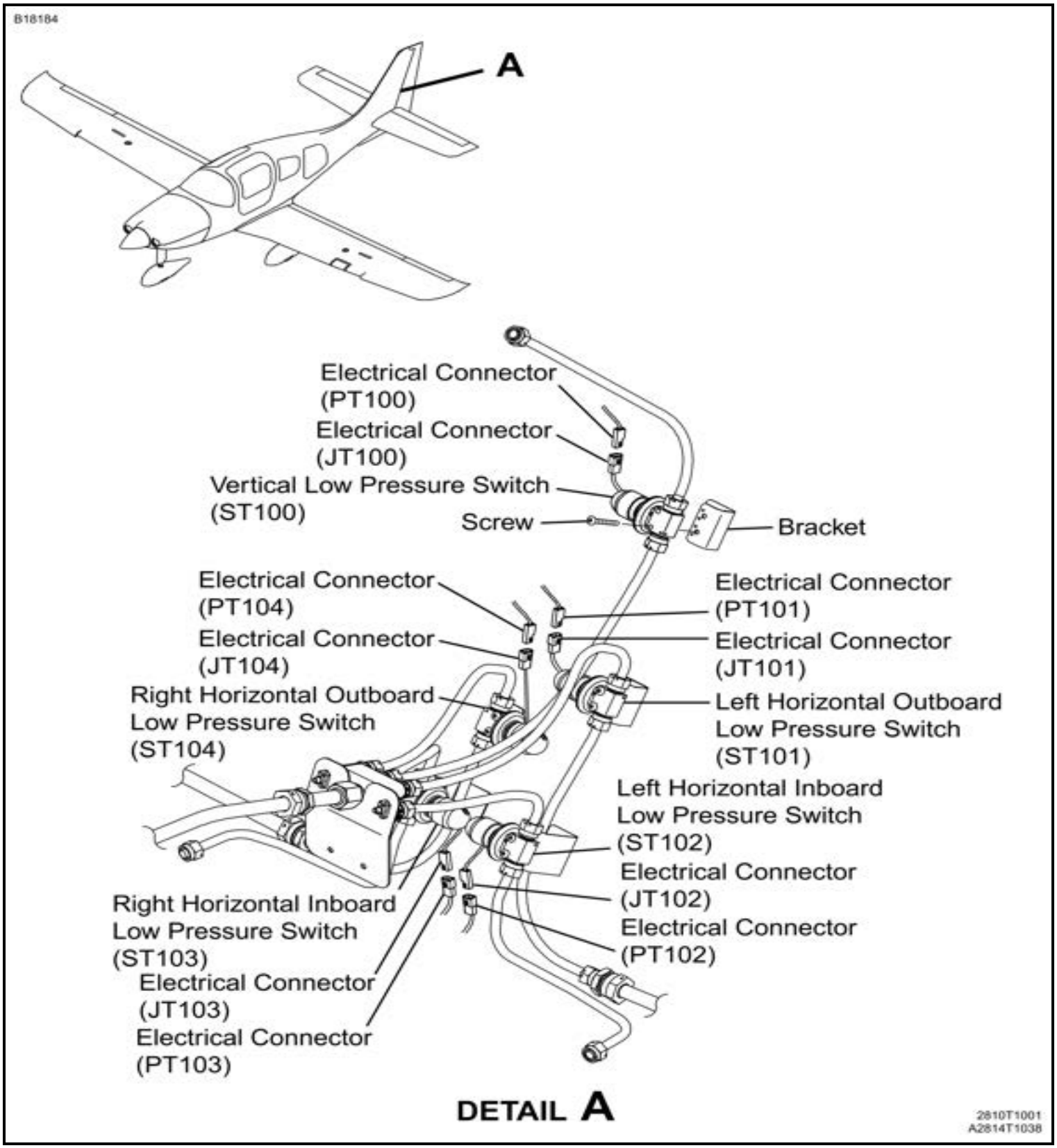
(c) W/S ANTI-ICE.

(7) Do a check of the applicable low pressure switch. Refer to the, TKS Anti-Ice System (FIKI) - Adjustment/Test.

(8) Install the left and/or right aft fuselage access panel found on the vertical stabilizer.

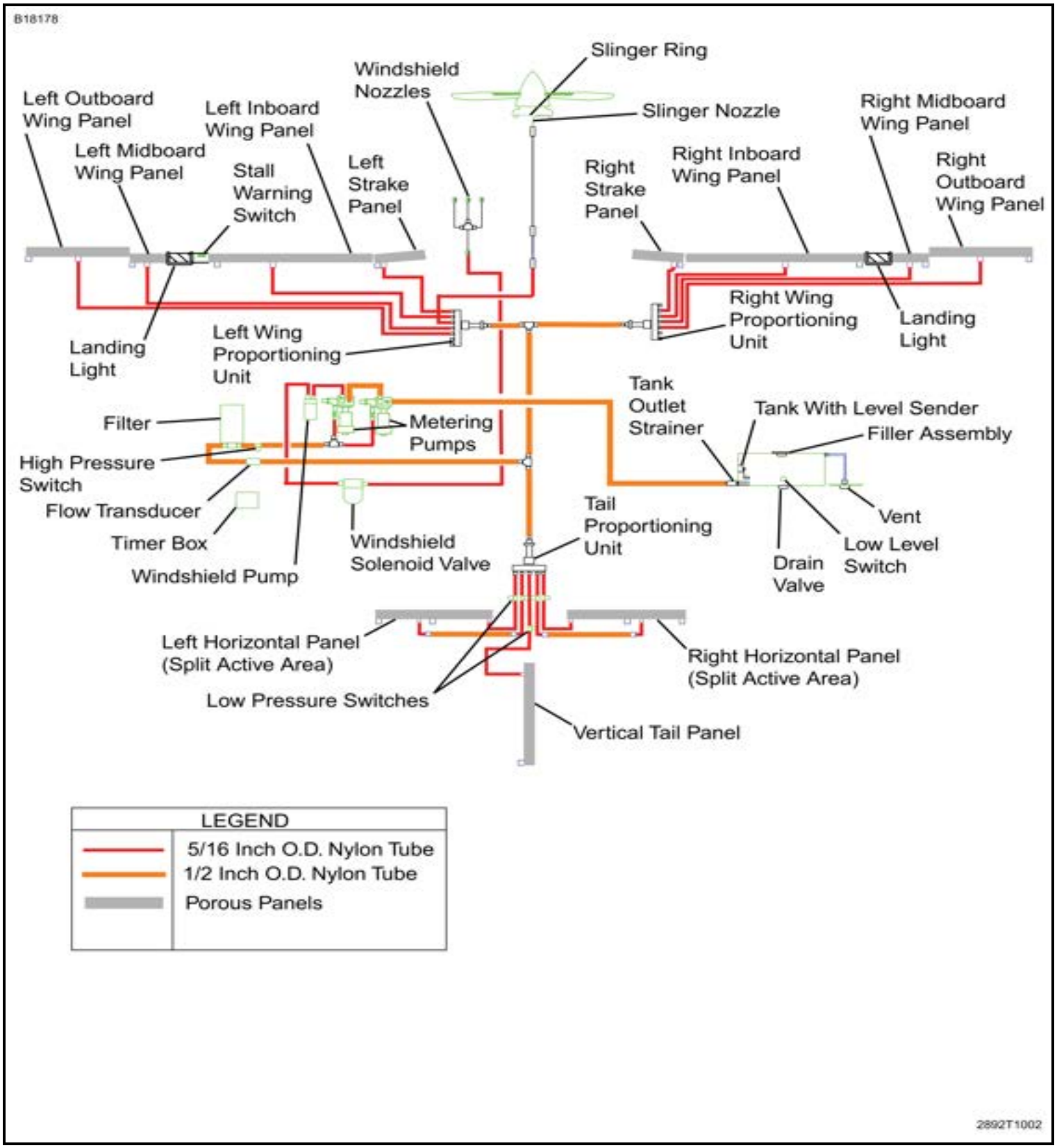
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Figure 401 : Sheet 1 : Low Pressure Switch Installation



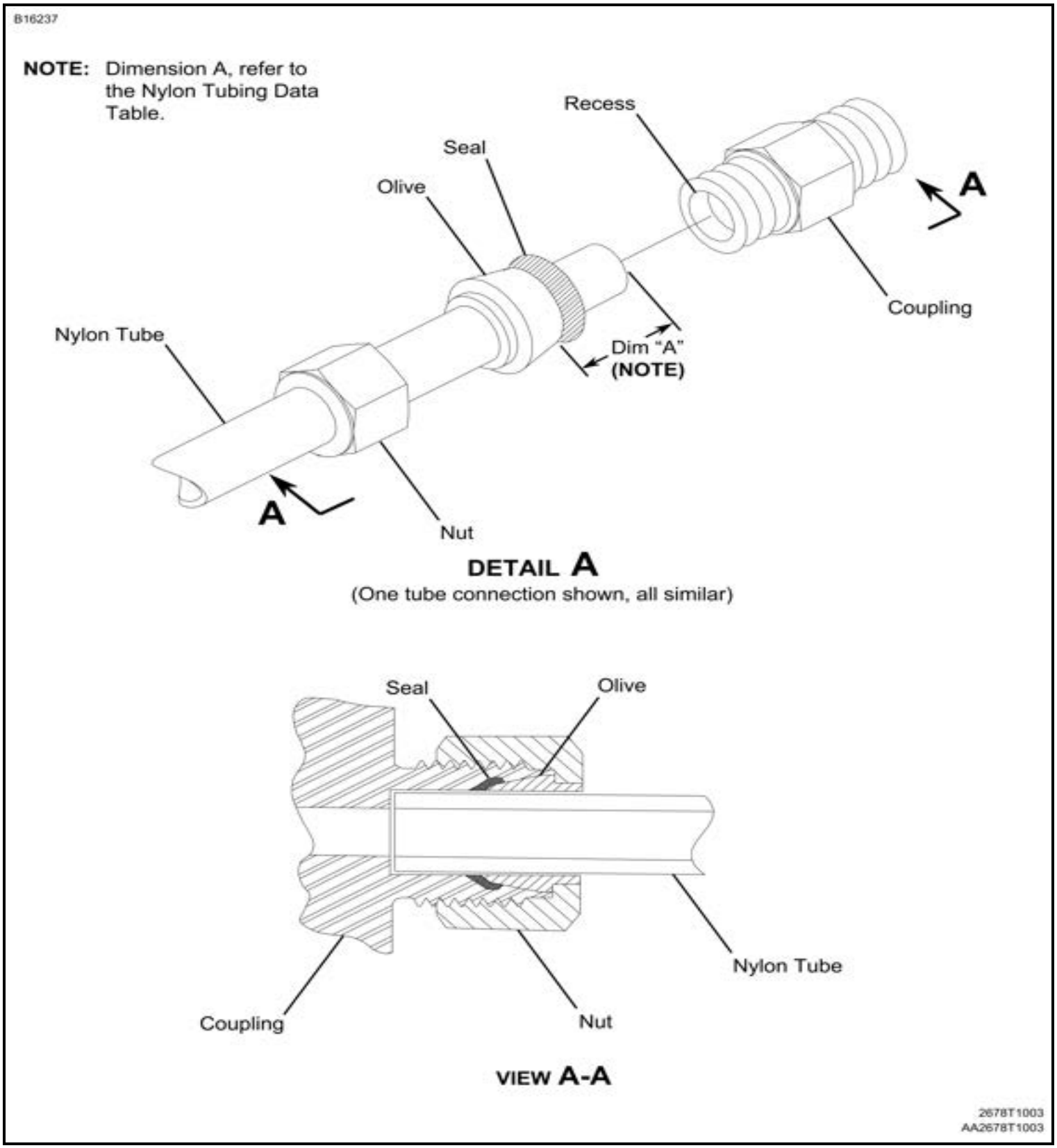
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS LEADING EDGE POROUS PANEL (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Anti-Ice System (FIKI) porous panels, which include the wing, horizontal stabilizer and vertical stabilizer leading edges. The sealing procedures for the porous panels are also included in this section.

B. After a porous panel is replaced, it is necessary to do the purge and test procedures. Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test, Porous Panel Purge and Test.

2. Tools, Equipment, and Materials

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Porous Panel Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed because it is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the coupling.

CAUTION: After you remove and before you install a porous panel, apply low-adhesive tape on the panel to give it protection.

CAUTION: Before you remove or install a porous panel, apply low-adhesive tape on the skin adjacent to the panel to give the skin protection.

CAUTION: Be careful when you remove and install the porous panels. The panels are easily damaged. Use nonmetallic tools, if possible, to prevent tears, gouges, scratches, and other damage.

A. Remove the Porous Panel (Refer to Figure 401).

NOTE: The panel purge and test procedures are only necessary after you install a replacement porous panel.

NOTE: The removal and installation of the porous panels on the wing and horizontal stabilizer leading edges are typical.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Porous Panel Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

CAUTION: Before you remove or install a porous panel, apply low-adhesive tape on the skin adjacent to the panel

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to give the skin protection.

(6) Remove the porous panel as follows:

(a) Apply low-adhesive tape on the skin around the panel.

NOTE: The tape will help to protect painted surfaces.

(b) Remove the rivets that attach the panel to the leading edge.

(c) Carefully remove the sealant along the panel edges.

NOTE: If necessary use a sharpened putty knife to remove the sealant. Be careful to not damage the paint or wing surface.

(d) Carefully use a flexible-blade knife (putty knife) and your hands to pull the panel away from the leading edge.

CAUTION: While pulling the panel away from the leading edge, be careful not to damage the leading edge by prying against it.

(e) Carefully remove the panel from the leading edge sufficiently to access the fluid tubing fitting.

(7) Disconnect the TKS fluid tube as follows:

(a) Loosen the tube fitting nut.

(b) Remove the TKS fluid tubes from the porous panel fittings.

(c) Remove and discard the seals from the porous panel inlet tubes. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(d) Install caps on all tube ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

(8) Remove the porous panel form the airplane.

(9) Remove all remaining sealant from the leading edge.

(a) Use a plastic or phenolic scraper to remove cured sealant from the leading edge surface.

(b) Use medium or finer ScotchBrite scuff pad to remove the sealant not removed with the scraper.

(c) Clean the bonding surfaces and leading edge with isopropyl alcohol or other approved cleaner.

(10) If necessary, paint the leading edge. Refer to Chapter 51, Paint Repair and Painting - Maintenance Practices.

B. Install the Porous Panel (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Porous Panel Removal/Installation.

(2) If necessary, use Plastic Welder I or II or Jeffco epoxy to build up the leading edge joggle area and form a Devcon wedge to match the loft contour. Refer to Chapter 20, Solvents, Sealants and Adhesives - Description and Operation, Table 1, Engine and General Purpose Materials.

(a) If necessary, paint the leading edge. Refer to Chapter 51, Paint Repair and Painting - Maintenance Practices.

(3) Prepare the bonding surfaces of the panels and leading edges as follows:

(a) Clean the bonding surfaces and leading edge with isopropyl alcohol or other approved cleaner.

(b) In areas where the TKS panels will be installed, lightly abrade the airplane leading edges with a ScotchBrite scuff pad.

(c) With isopropyl alcohol and a sponge or short-bristle brush, clean the area of the leading edge where the panel will be installed.

1 Use a clean lint-free cloth to dry the area before the cleaning solution evaporates.

(d) With a clean lint-free cloth wet with isopropyl alcohol, clean the area of the leading edge where the panel will be installed.

1 Use a clean lint-free cloth to dry the area before the cleaning solution evaporates.

(e) Use a clean lint-free cloth wet with isopropyl alcohol and a ScotchBrite scuff pad to clean the aft surface of the TKS panel.

1 Use a clean lint-free cloth to remove debris and contaminants from the surface of the panel.

(f) Clean the panel again, in approximately 12 to 15 inch sections, with clean lint-free cloths wet with isopropyl alcohol.

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1 Immediately use clean lint-free cloths to dry each section before the alcohol evaporates.

(g) Clean the surface of the panel with a clean white lint-free cloth.

1 Examine the cloth for evidence of debris or contaminates.

2 If the cloth shows debris or contaminates, do again the TKS panel cleaning steps above.

(4) Put the panel in its correct position on the leading edge.

(a) Use your hand to install the panel in its correct position on the leading edge.

1 If necessary, close or open the panel to get the correct installation of the leading edge.

(b) Make sure to leave a 0.1 inch gap between the panel and the Devcon wedge.

(5) Drill the rivet holes at the corners of the porous panel to match the existing hole locations on the leading edge.

(a) Remove the panel and deburr the holes.

(6) Install the fluid tubing to the porous panel as follows:

(a) Remove the caps from the tube ends.

(b) Install new seals in the tubing ends. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Hold the panel in position near the leading edge and put the tubing on the panel fitting.

1 Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(d) Use Type I, Class B sealant to apply a 0.38 inch bead around each hole for tube connections and air bleed check valves. (P/S 890, PR-1440 from PRC-Desoto, or equivalent)

1 Apply the sealant to the fluid tube fitting threads, nut and tubing for a minimum of 0.50 inch past the fitting nut.

(7) Install the porous panel as follows:

(a) Use Type XV, Class B sealant to apply a 1 inch diameter fay seal near the end of the panel (by the rivet holes) on the back surface of the panel. (Chem Seal 3209 from Flamemaster Corporation, or equivalent)

1 Make sure that after the panel is installed the sealant is located on the area with the multiple/additional layers of mesh (expanded copper/aluminum foil) on the wing skin.

NOTE: This is an electrically conductive type sealant.

(b) Use Type I, Class B-2 sealant to apply a 1 inch wide fay seal along the entire trailing edges of the back surface of the panel. (P/S 890, PR-1440 from PRC-Desoto, or equivalent)

(c) Align the panel to the correct position.

1 Push the panel against the leading edge with enough pressure to align the rivet holes at the corners of the porous panel.

a Make sure that the trailing edge of the panel is flush with the Devcon wedge/airplane skin within the tolerance listed below.

- For the wings and horizontal stabilizers +0.040 or -0.040 inch.
- For the vertical stabilizer +0.060 or -0.060 inch.

NOTE: Any steps along the joint between the panel edge and Devcon wedge/airplane skin must face aft.

2 Install temporary fasteners to hold the panel in position.

CAUTION: To spread the load where ratcheting straps are used, use metal angles to protect the trailing edge. Place blankets or foam between the metal angles and the trailing edge. Do not use too much force when you tighten the straps.

3 Keep applying pressure until the tape strips or ratcheting straps are applied to hold the panel in position.

4 Make sure that the panel edges are in the correct position.

(d) Install the rivets that attach the panel to the leading edge.

1 Examine the rivet heads for correct installation.

(e) After the sealant is cured, remove all tape and ratcheting straps.

(f) Use Type XII, Class B sealant to fill the gap between the Devcon wedge and the trailing edge of the panel. (PR-1425 or PR-1829, PPG Industries, PRC-Desoto, or equivalent)

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1 Make sure sealant matches the loft contour.

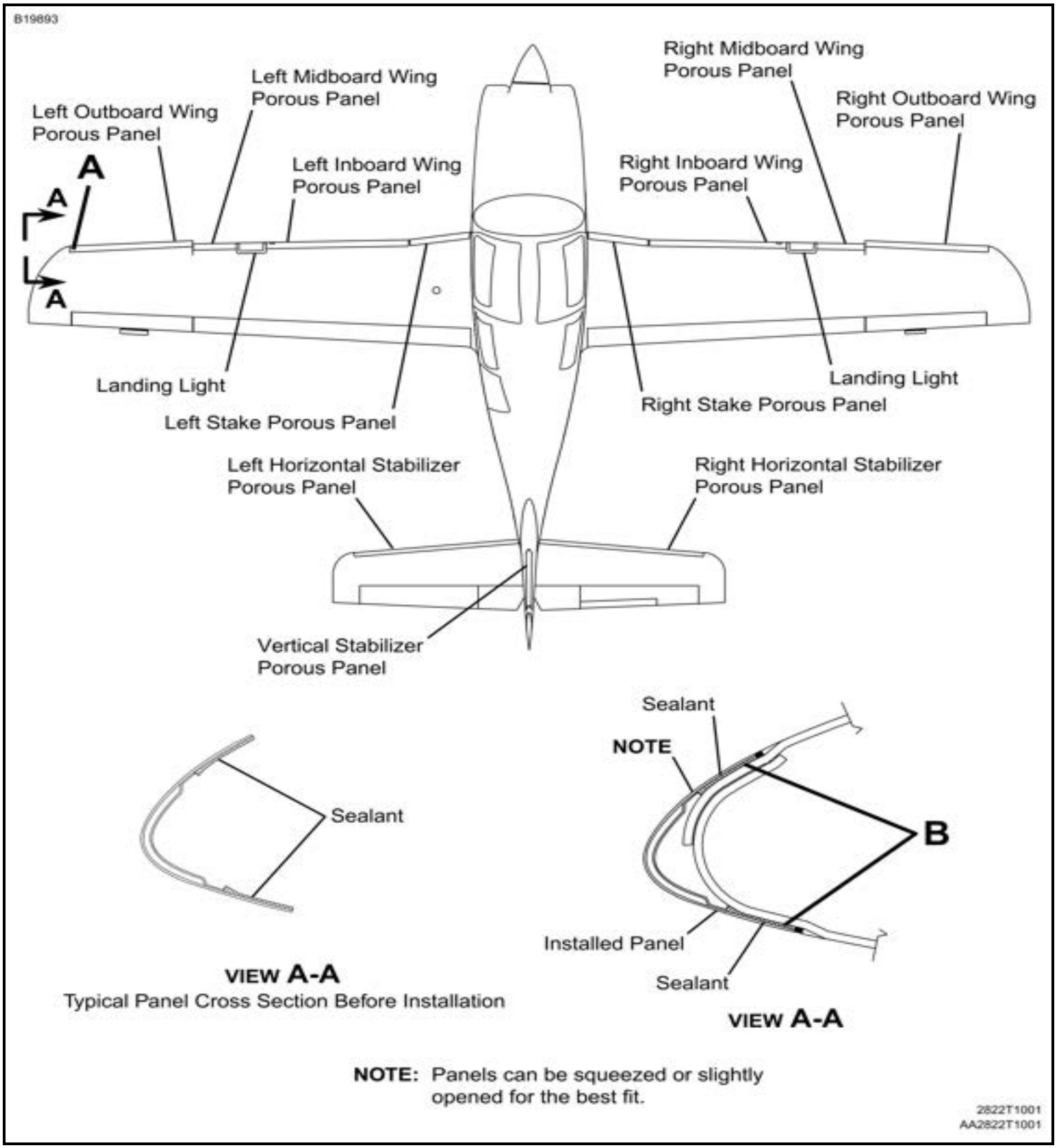
(8) After the sealant is cured, do the panel purge and test procedures. Refer to TKS Leading Edge Porous Panel (FIKI) - Adjustment/Test,Porous Panel Purge and Test.

(9) Do a TKS System Operational Test. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(10) Clean the floor and the airplane surfaces as necessary.

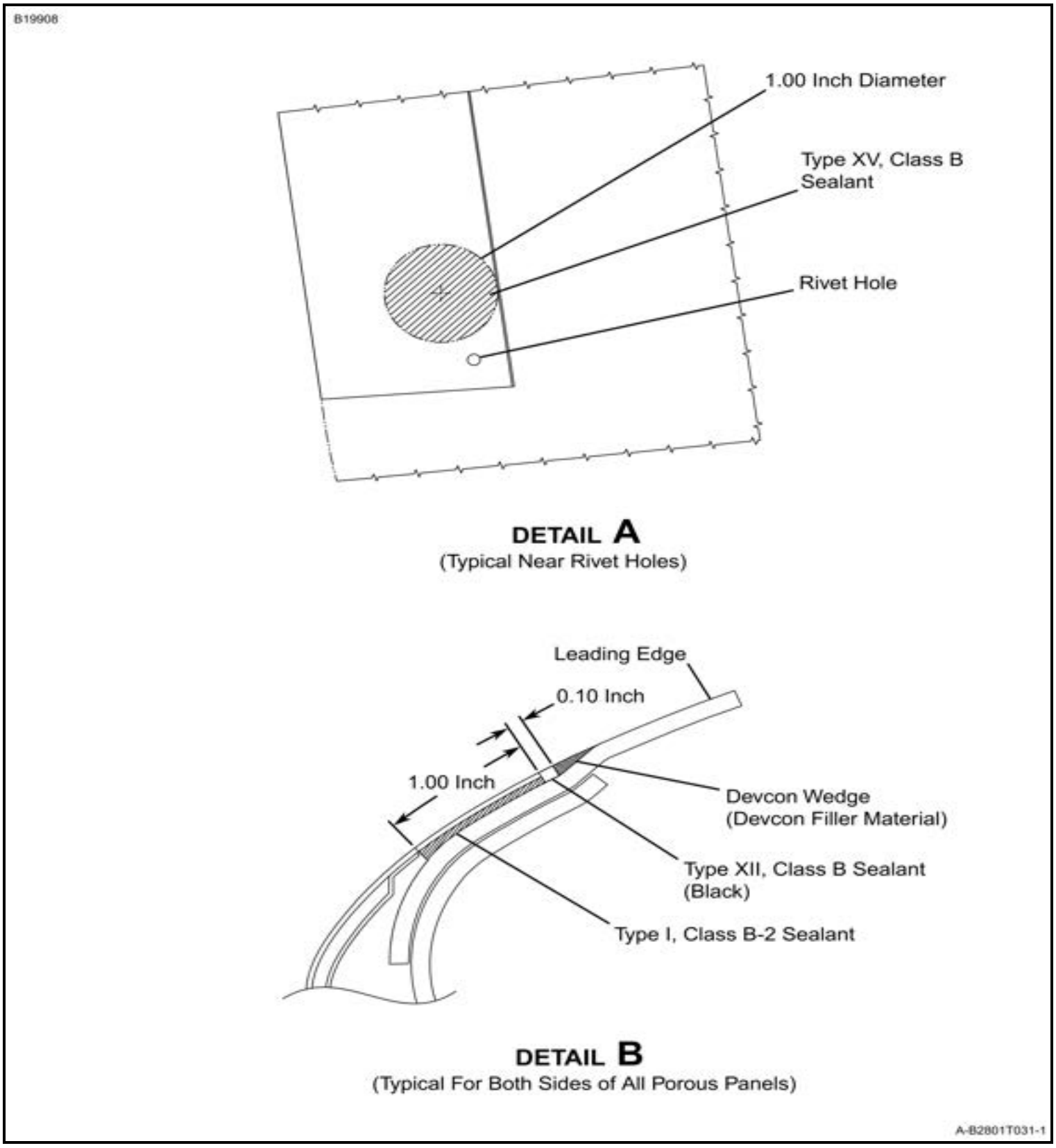
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Figure 401 : Sheet 1 : TKS Porous Panel Installation



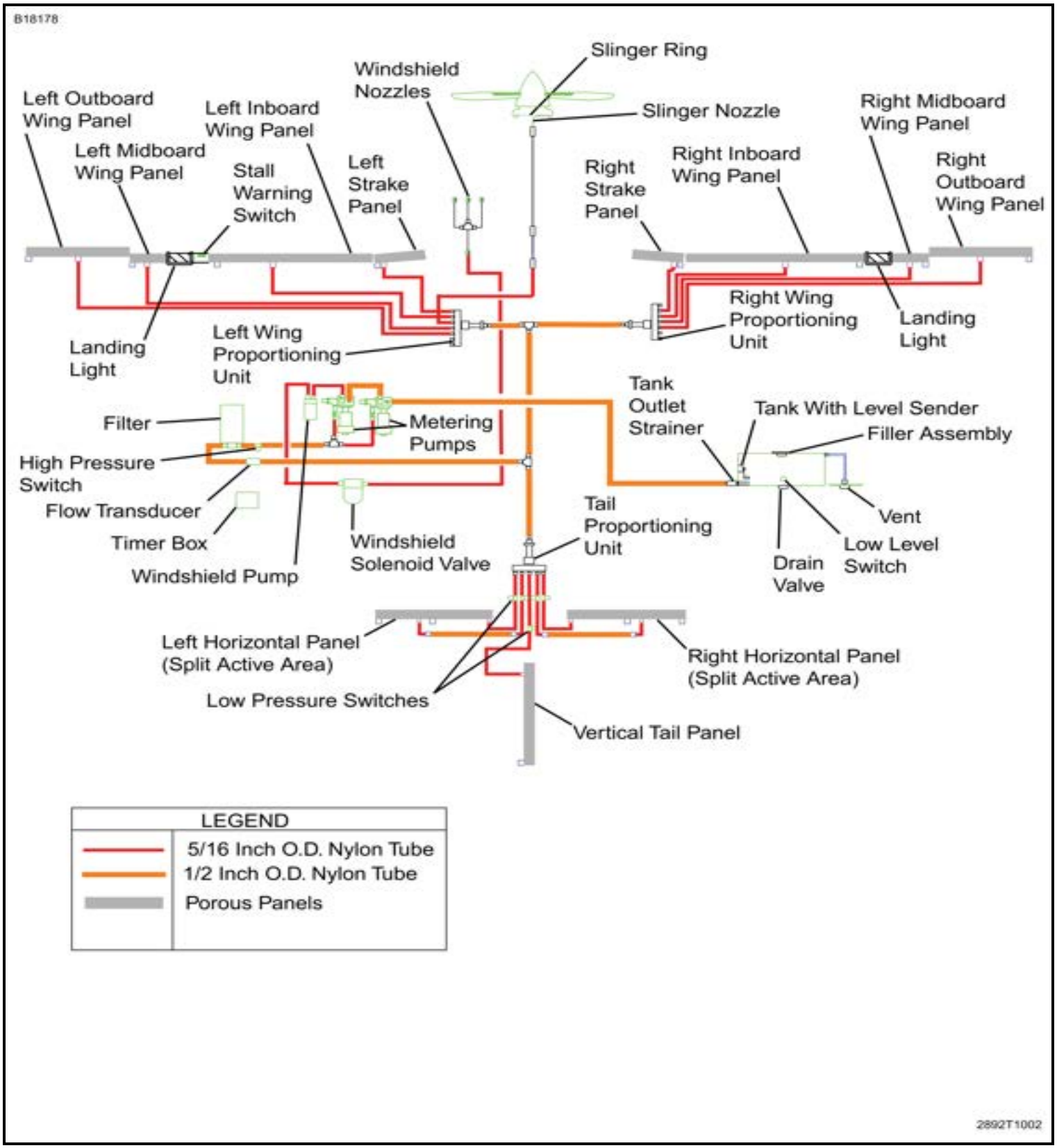
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Figure 401 : Sheet 2 : TKS Porous Panel Installation



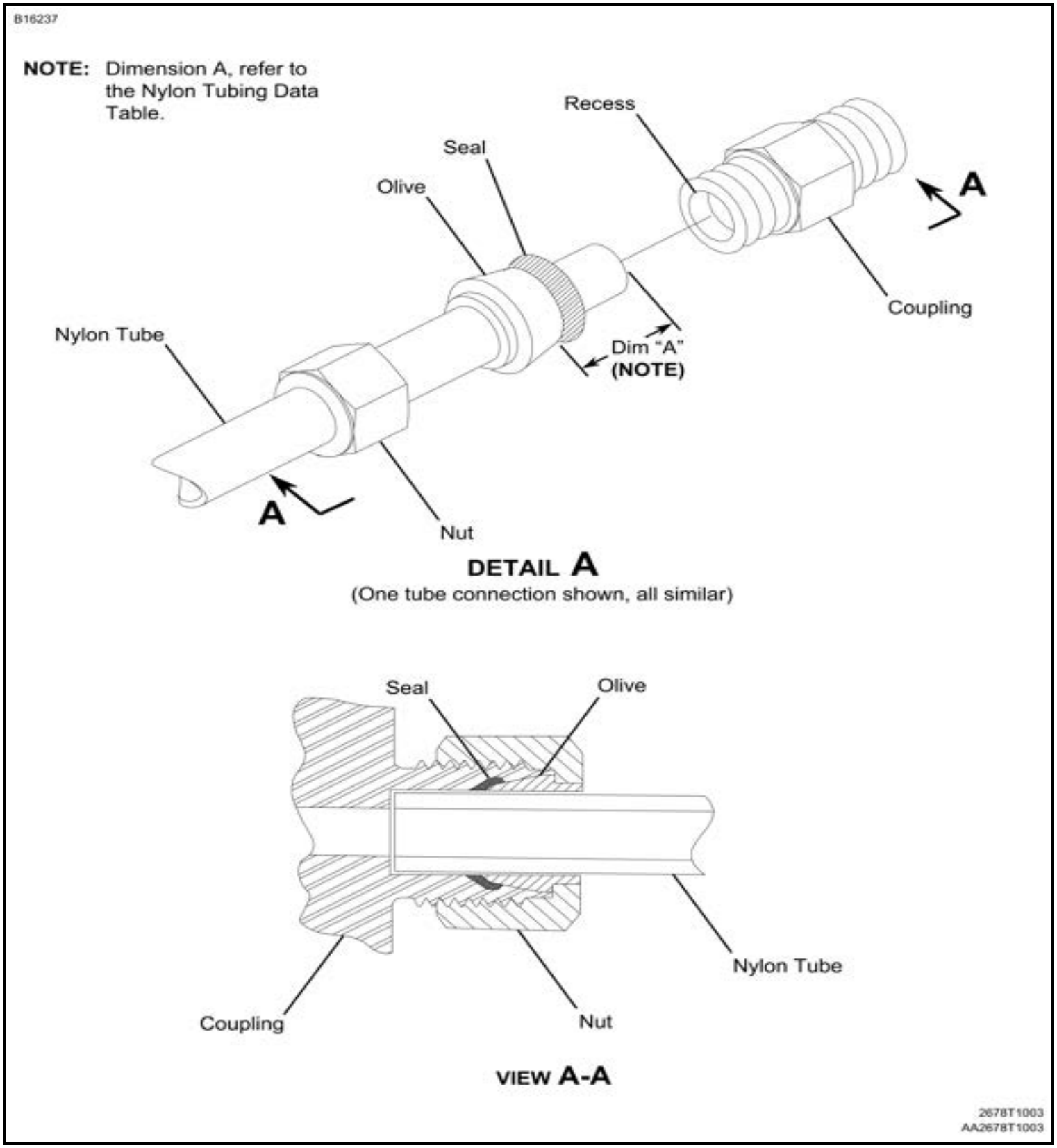
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Figure 201 : Sheet 1 : TKS Tubing Installation



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Figure 201 : Sheet 2 : TKS Tubing Installation



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TKS LEADING EDGE POROUS PANEL (FIKI) - ADJUSTMENT/TEST

1. General

A. This section contains the procedures to remove (purge) the air from the TKS Anti-Ice System (FIKI) porous panels on the wing, horizontal and vertical stabilizer leading edges.

B. The panel purge and test procedures are only necessary after you install a replacement porous panel.

C. The function of the panel purge and test procedures is to remove most of the air and make the membrane in the panel completely wet.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Porous Panel Purge and Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed. It is possible that high pressure is still in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201. This helps to prevent fluid leakage from the coupling.

NOTE: It is necessary that you have access to clean dry cloths, a sufficient quantity of approved TKS fluid, a TKS system test cart with connection hardware, 90 psi filtered shop air or nitrogen bottle (to use with a test cart), and a container with a capacity of ten to fifteen gallons. It will be necessary to fill the test cart with TKS fluid at intervals during the test.

NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

A. Do the Panel Purge and Test (Refer to Figure 501, Figure 502, Figure 503, and Table 501).

NOTE: The purge procedure for each of the porous panels is typical.

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Porous Panel Purge and Test.

(2) Remove external electrical power from the airplane.

(3) Make sure that the AVIONICS MASTER switch (SW04) is set to the OFF position.

(4) Make sure that the master BATT switches (left SW01 and right SW02) are set to the to the OFF position.

(5) Make sure that the Cross Tie switch (SW03) is set to the OFF position.

(6) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(7) Attach a fluid collection system to the applicable panels on the airplane as follows:

(a) A gutter and bucket system for the wing and tail porous panels.

(b) A windshield spray collection method.

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(c) For the prop slinger, put one blade of the prop vertical and down with a bucket below.

NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

(8) Remove the applicable panel(s) to get access to the porous panel supply line connected at the proportioning unit. Refer to Figure 503, Table 501, TKS Wing Proportioning Units (FIKI) - Removal/Installation, and TKS Tail Proportioning Unit (FIKI) - Removal/Installation.

Table 501. Proportioning Units

Porous Panel	Feed Line Proportioning Unit Location	Supply Line Size
Left Wing	Left Forward Cabin Floor Panel and/or Footwell	5/16 inch
Right Wing	Right Forward Cabin Floor Panel and/or Footwell	5/16 inch
Left and Right Horizontal Stabilizers	Aft Fuselage Access Panels (right and left)	5/16 inch
Vertical Stabilizer	Aft Fuselage Access Panels (right and left)	5/16 inch

(9) Identify the applicable porous panel supply line necessary to purge.

(a) Disconnect the applicable supply line from the proportioning unit.

(10) Connect the 5/16 inch outline from the test cart to the supply line tube.

(11) Attach a filtered shop air supply or nitrogen bottle to the inlet port of test cart.

(12) Follow the operation and safety instructions that are supplied with the test cart.

(a) Use the Panels Installed on Aircraft TKS Panel Test section of the TKS Ice Protection Panel Flow Check Procedure Using TKS System Test Cart publication.

(13) Monitor the fluid level in the test cart during the test.

(a) Make sure that there is sufficient fluid available in the test cart so that it is not completely depleted during the test.

NOTE: It is necessary for you to fill the cart at intervals during the panel purge procedure. Only fill the cart to 3/4 of its capacity to prevent air from entering the TKS porous panel.

(14) Slowly start the fluid flow through the panel at 10 psi.

(a) Monitor the system fittings for leaks.

1 Correct any leaks as necessary. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices.

(15) Set the supply pressure to 25 psi.

(16) As the fluid starts to come through the panel pores, increase the supply pressure 10 psi every 15 seconds until the TKS test cart pressure gage indicates 65 psi.

NOTE: It may not be necessary to reach 65 psi if the panel appears thoroughly purged. Refer to Figure 502.

(17) When fluid starts to flow from the panel pores along the entire length of the panel, inspect the flow distribution along the panel. Refer to Figure 502.

(18) Make sure that the fluid flows from the porous panels as follows:

(a) The fluid flows from the porous panels without any dry spots.

(b) The fluid flows evenly and not in streams.

(c) There are no areas with clusters of bubbles.

NOTE: The bubbles will be very small and continue to flow even after you wipe fluid across the area.

(19) Operate the TKS test cart for a maximum of 30 minutes.

(20) Monitor the fluid level in the test cart during the test.

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(a) Make sure that there is sufficient fluid available in the test cart so that it is not completely depleted during the test.

NOTE: It is necessary for you to fill the cart at intervals during the panel purge procedure. Only fill the cart to 3/4 of its capacity to prevent air from entering the TKS porous panel.

(21) Monitor the system fittings for leaks.

(a) Correct any leaks as necessary. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices.

(22) Stop the fluid supply.

(23) Wait until the fluid pressure is released.

(24) Slowly disconnect the test cart fluid supply tube from the panel supply line.

(25) Install a new sealing rings in the tube fitting. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(26) Connect the panel supply line to the proportioning unit.

(a) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(27) Continue the test on each of the TKS porous panels until all necessary porous panels have been tested.

(28) If necessary, remove the fluid collector system from the airplane.

(29) Disconnect the filtered shop air supply from the inlet port of the test cart.

(30) Do the fluid tank servicing. Refer to Chapter 12, Replenishing - Servicing TKS Anti-Ice Fluid.

(31) Clean the floor and the airplane surfaces as necessary.

(32) Engage the circuit breakers that follow:

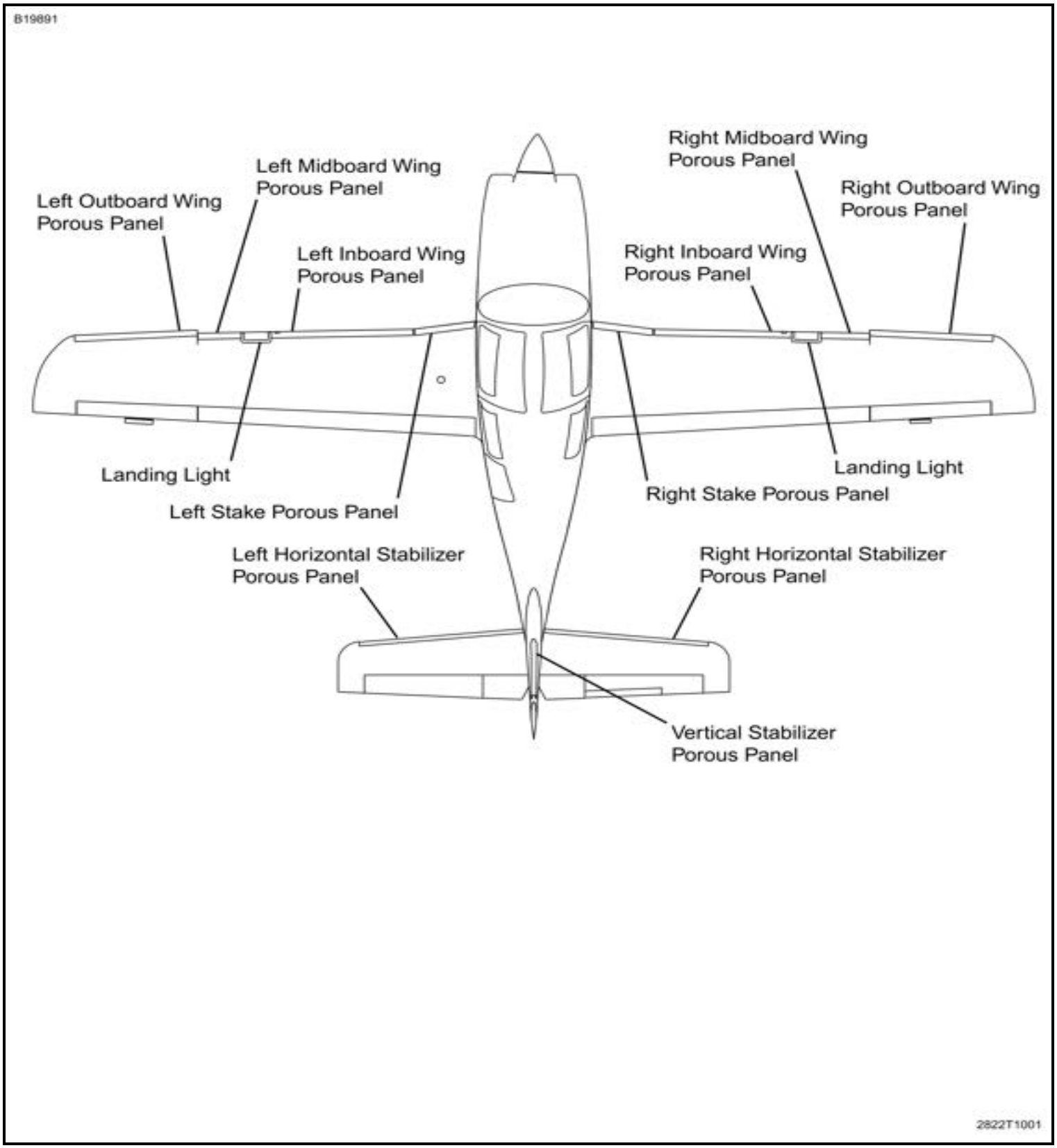
(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

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Figure 501 : Sheet 1 : Porous Panel Installation



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Figure 502 : Sheet 1 : Leading Edge Porous Panel Purge

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Porous Panel Before Purging



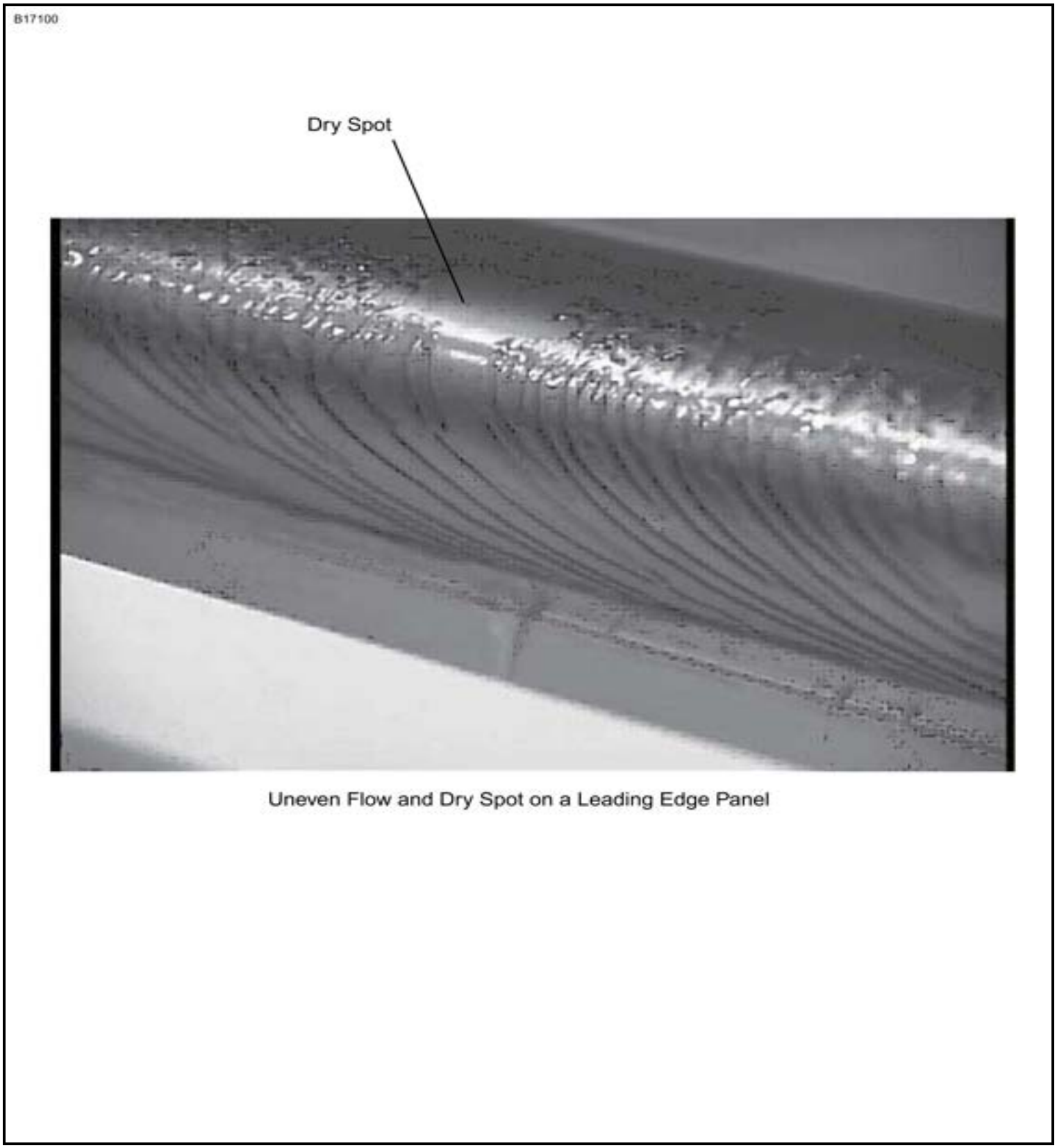
Porous Panel After Purging

NOTE 1: The porous panels have been purged correctly when the purge pressure has been applied and the statements that follow are true:

A. The fluid flows evenly and forms a continuous surface across the entire porous portion of the panel instead of flowing in streams, as shown.
B. There are no dry spots in the porous portion of the panel where fluid does not flow even after wiping fluid across the dry spot, as shown.
C. There are no areas in the porous portion of the panel where clusters of bubbles continue to come out while the rest of the panel is flowing evenly. These bubbles will be very small and will continue to come out even after you wipe fluid across the area.

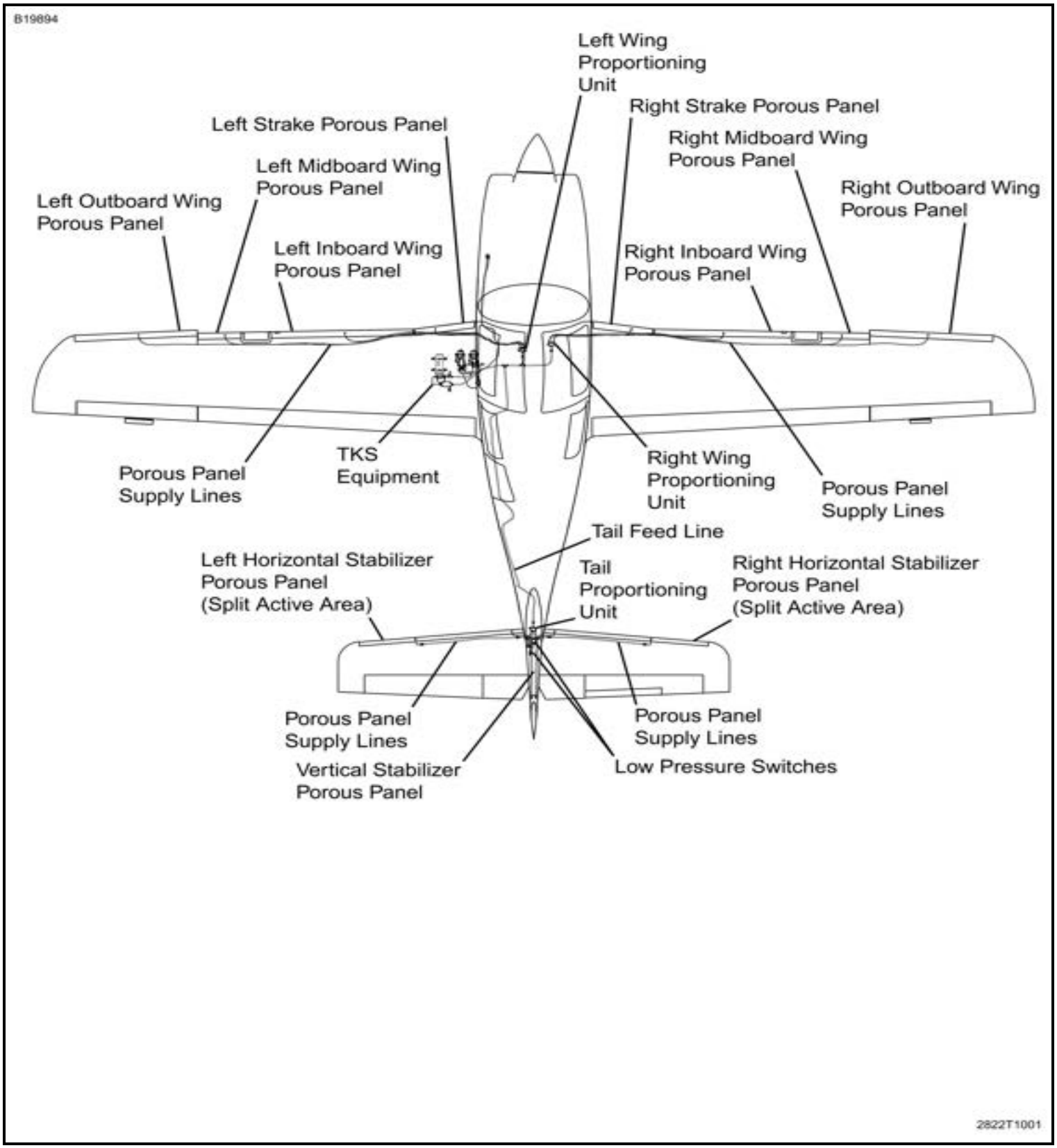
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Figure 502 : Sheet 2 : Leading Edge Porous Panel Purge



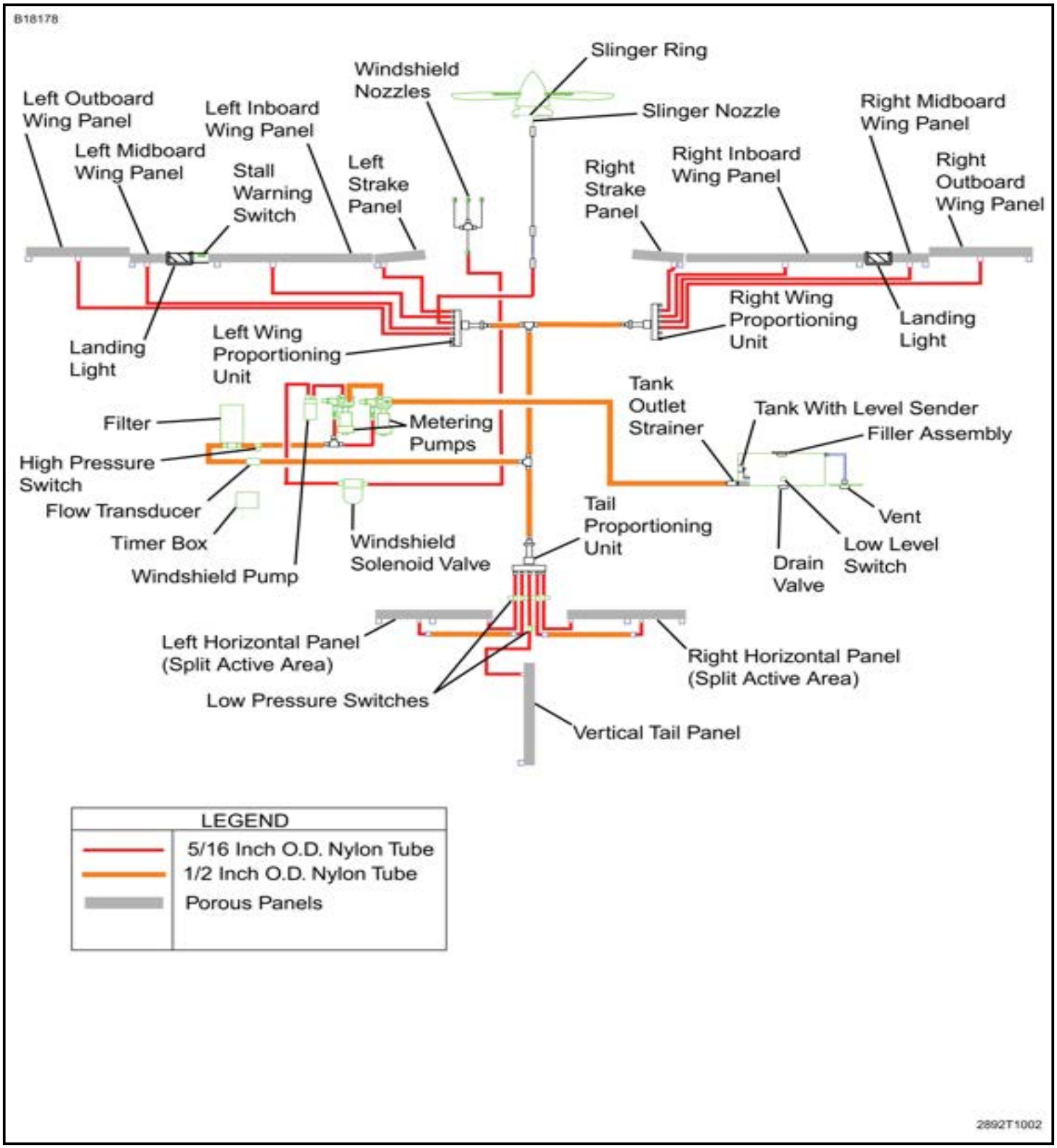
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Figure 503 : Sheet 1 : Porous Panel Plumbing



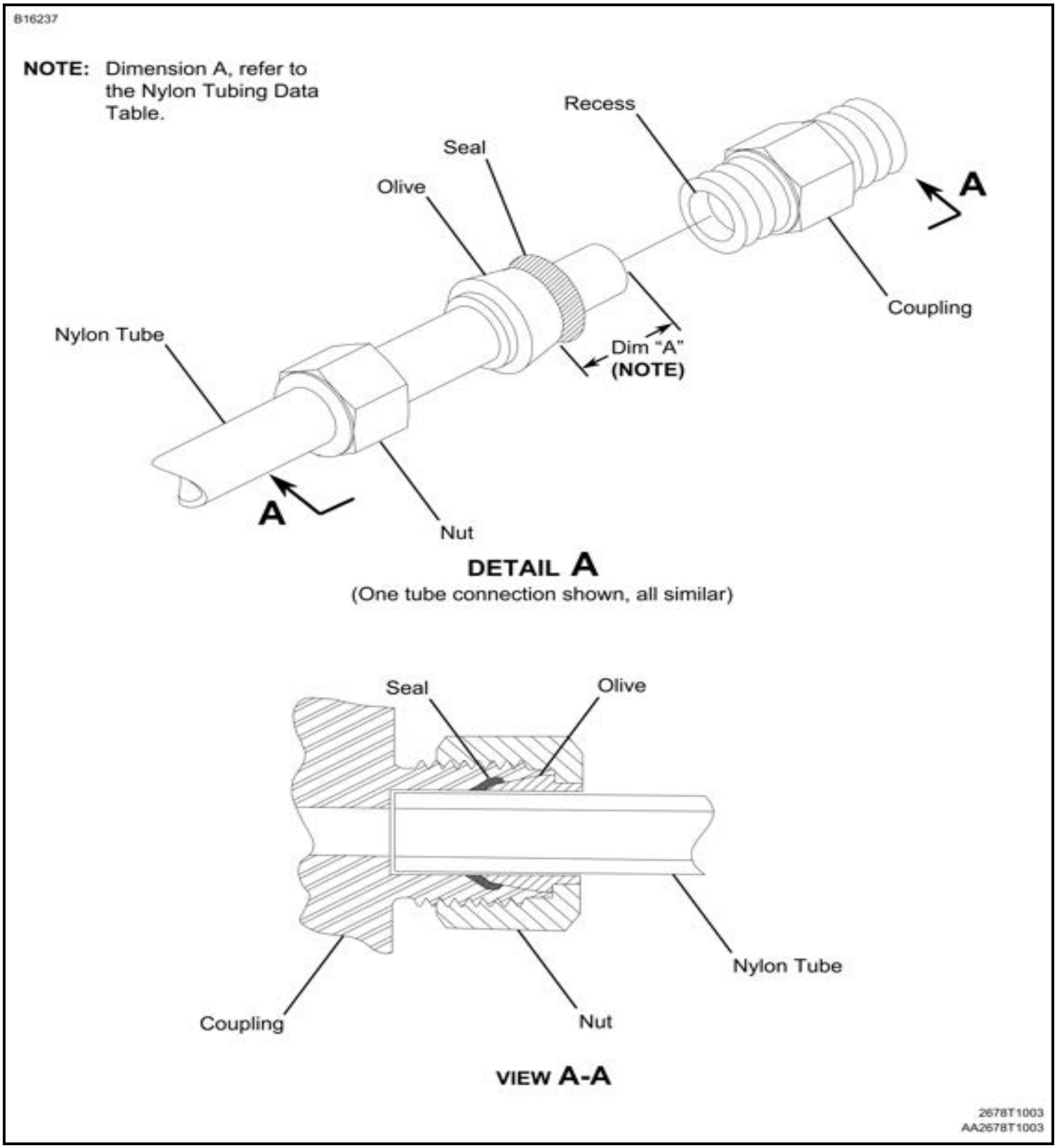
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Figure 201 : Sheet 1 : TKS Tubing Installation



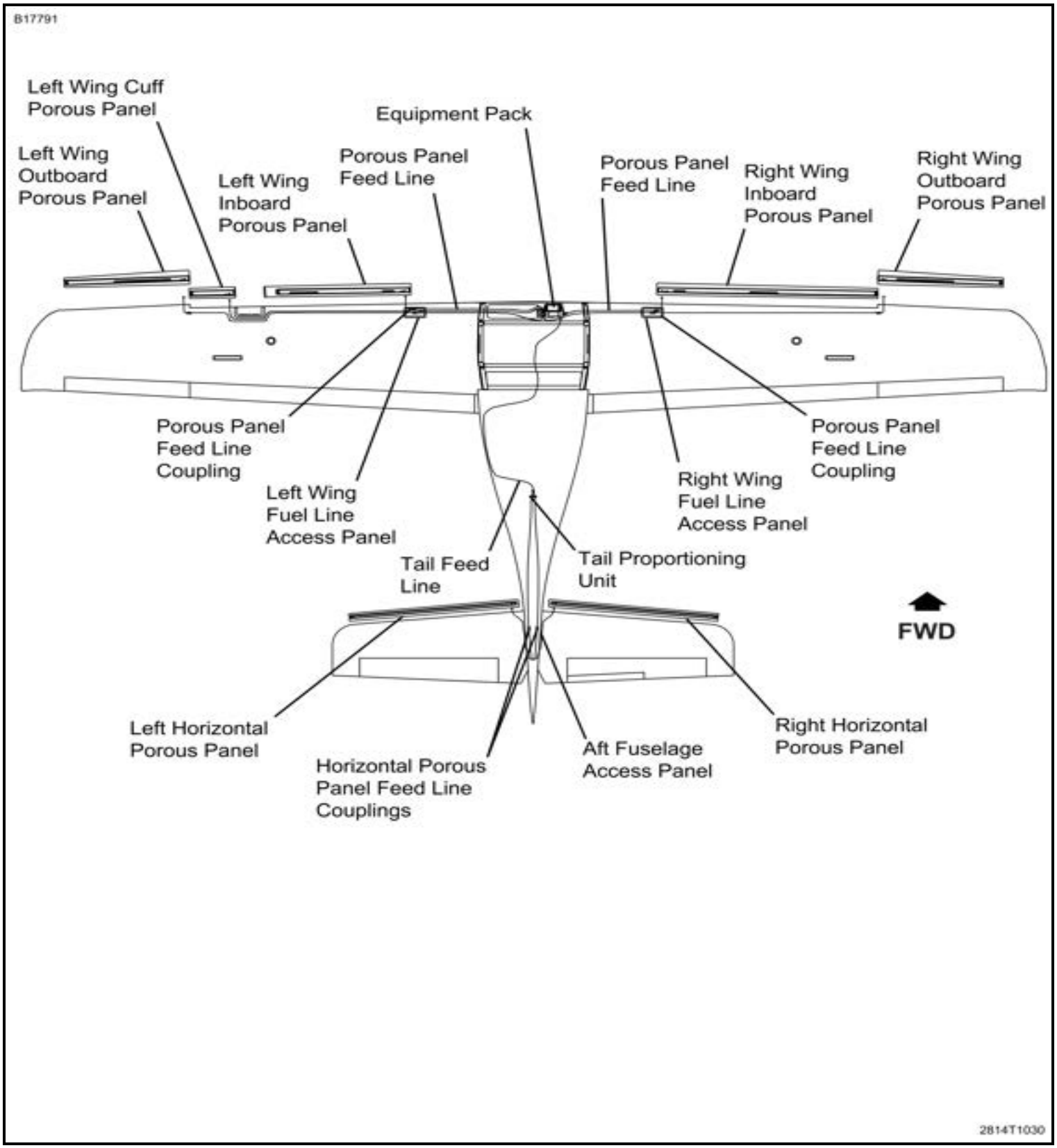
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Figure 201 : Sheet 2 : TKS Tubing Installation



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Figure 503 : Sheet 1 : Porous Panel Couplings Locations



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TKS WINDSHIELD PUMP (FIKI) - REMOVAL/INSTALLATION

1. General

A. The Windshield Pump (UC103) is installed on the top of the Metering Pump 1 (UC101). The Metering Pump 1, Windshield Pump and metering pump bracket are usually removed from the airplane as an assembly. The procedures for the removal and installation of the windshield pump and Metering Pump 1 are very similar. Because the Windshield Pump maintenance procedures are similar, they are found in the same section as the Metering Pump 1 removal and installation procedures. Refer to TKS Anti-Ice System Metering Pump (FIKI) - Removal/Installation.

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TKS WINDSHIELD SOLENOID VALVE (FIKI) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the TKS Windshield Solenoid Valve.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Windshield Solenoid Valve Removal/Installation

WARNING: For health and environmental data, review the applicable Material Safety Data Sheet (MSDS).

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the nut that is connected to the component to be removed. It is possible there is still pressure in the system.

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Before you operate the TKS system during this procedure put plastic sheets or absorbent cloths under the porous panels to keep the TKS fluid off the floor. This will help to prevent injury to personnel.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

CAUTION: Do not use the seals again after you loosen or disconnect a tube nut. Replace the 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube fitting. Examine the seal for damage and make sure that it is in the correct position in the fitting. Refer to TKS Anti-Ice System (Inadvertent) - Maintenance Practices, Figure 201. This will help to prevent fluid leakage from the fitting.

A. Remove the Windshield Solenoid Valve (WC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Windshield Solenoid Valve Removal/Installation.

(2) Remove external electrical power from the airplane.

(3) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(4) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(5) Disengage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

(c) W/S ANTI-ICE.

(6) Remove the TKS access panel on the lower surface of the left wing.

(7) Disconnect the electrical connector (JC106) from electrical connector (PC106).

(8) Remove the tube from the windshield solenoid valve input fitting as follows:

(a) Slowly loosen the nut and remove the input tube from the valve input fitting.

(b) Remove and discard the old seal from the input tube.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

NOTE: It is not necessary to install caps if you are to replace the windshield solenoid valve immediately.

(9) Remove the tubes from the windshield solenoid valve outlet fitting as follows:

(a) Slowly loosen and disconnect the outlet tube.

(b) Remove the outlet tube from the valve.

(c) Put caps on the open ends to keep FOD out of the fluid system and prevent excessive leakage of TKS fluid from the system.

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NOTE: It is not necessary to install caps if you are to replace the windshield solenoid valve immediately.

(d) Remove and discard the old seal from the outlet tubes.

(10) Remove the screws and washers that attach the valve to the wing rib.

(11) Remove the windshield solenoid valve from the airplane.

(12) Record the direction of the flow arrow marking on the valve.

B. Install the Windshield Solenoid Valve (WC100) (Refer to Figure 401).

(1) Make sure that you obey the Warnings and Cautions for TKS maintenance procedures. Refer to Windshield Solenoid Valve Removal/Installation.

(2) Put the solenoid valve in its correct position as recorded before on the wing rib.

(a) Make sure that the flow arrow marking on the valve is in the correct position.

(3) Install the screws and washers that attach the solenoid to the wing rib.

(4) Attach the input tube to the windshield solenoid valve as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seal on the inlet tube. Refer to TKS Anti-Ice System - Maintenance Practices, Figure 201.

(c) Put the input tube in its correct position on the valve input fitting.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(5) Attach the outlet tubes to the windshield solenoid valve as follows:

(a) If necessary, remove the caps from the open ends.

(b) Install new seal on the outlet tube. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Figure 201.

(c) Put the outlet tube in the correct position on the outlet fitting of the valve.

(d) Carefully tighten the tube fitting nuts. Refer to TKS Anti-Ice System (FIKI) - Maintenance Practices, Table 202, Nylon Tubing Data.

(6) Connect the electrical connector (JC106) to the electrical connector (PC106).

(7) Engage the circuit breakers that follow:

(a) ANTI-ICE PUMP 1

(b) ANTI-ICE PUMP 2

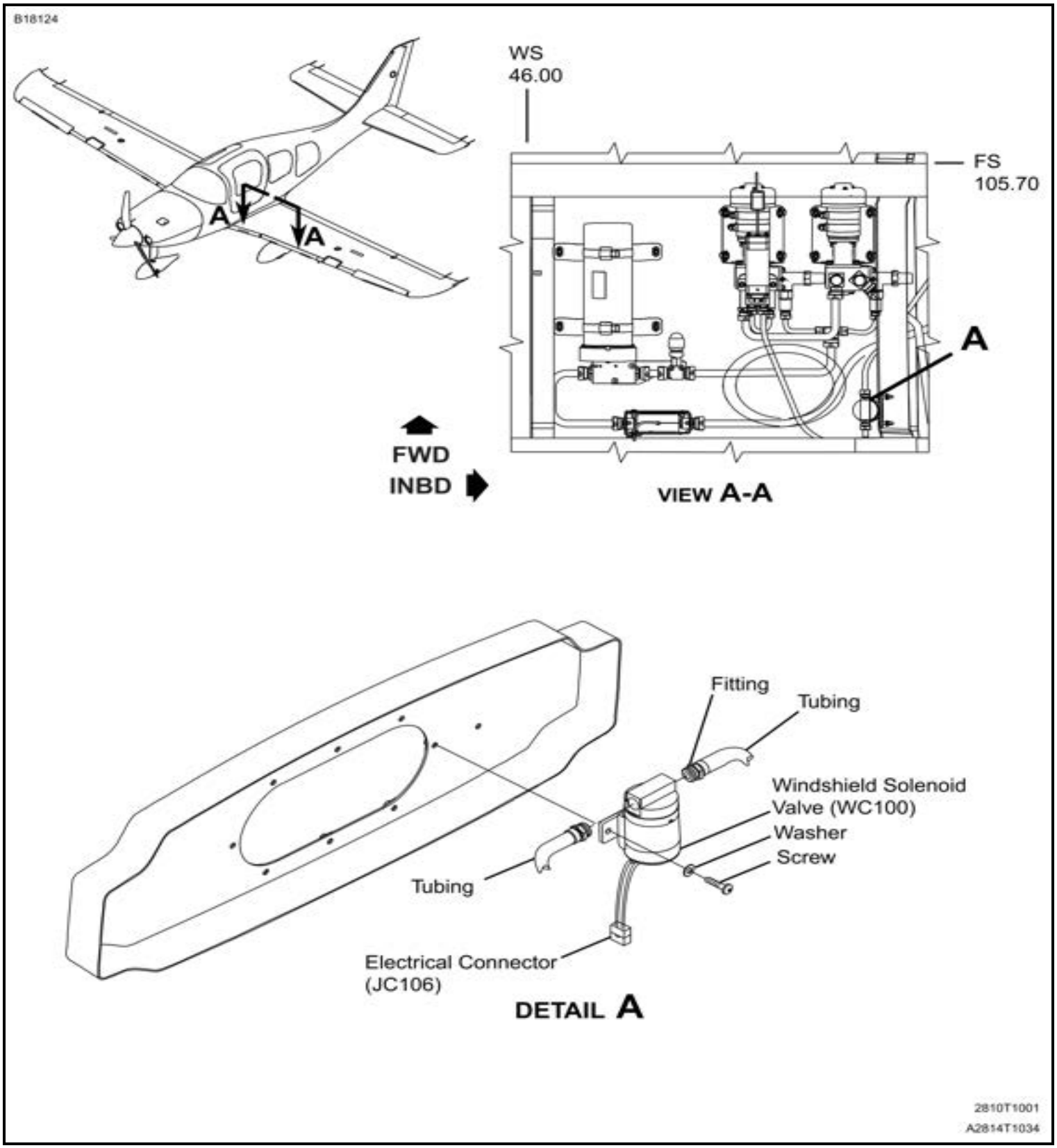
(c) W/S ANTI-ICE.

(8) Do a test of the TKS windshield spray function. Refer to TKS Anti-Ice System (FIKI) - Adjustment/Test.

(9) Install the TKS access panel on the lower surface of the left wing.

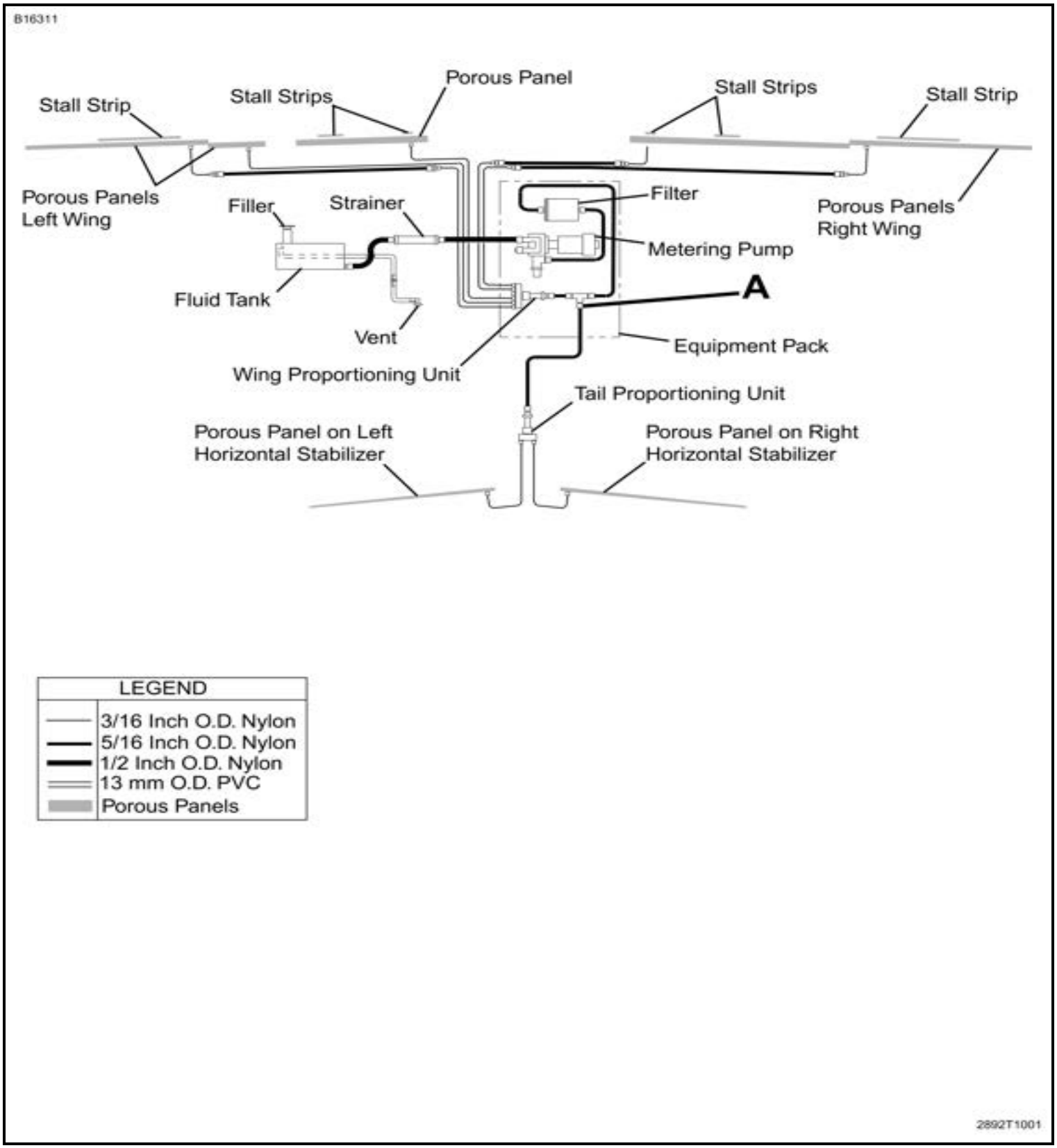
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Figure 401 : Sheet 1 : Windshield Solenoid Valve Installation



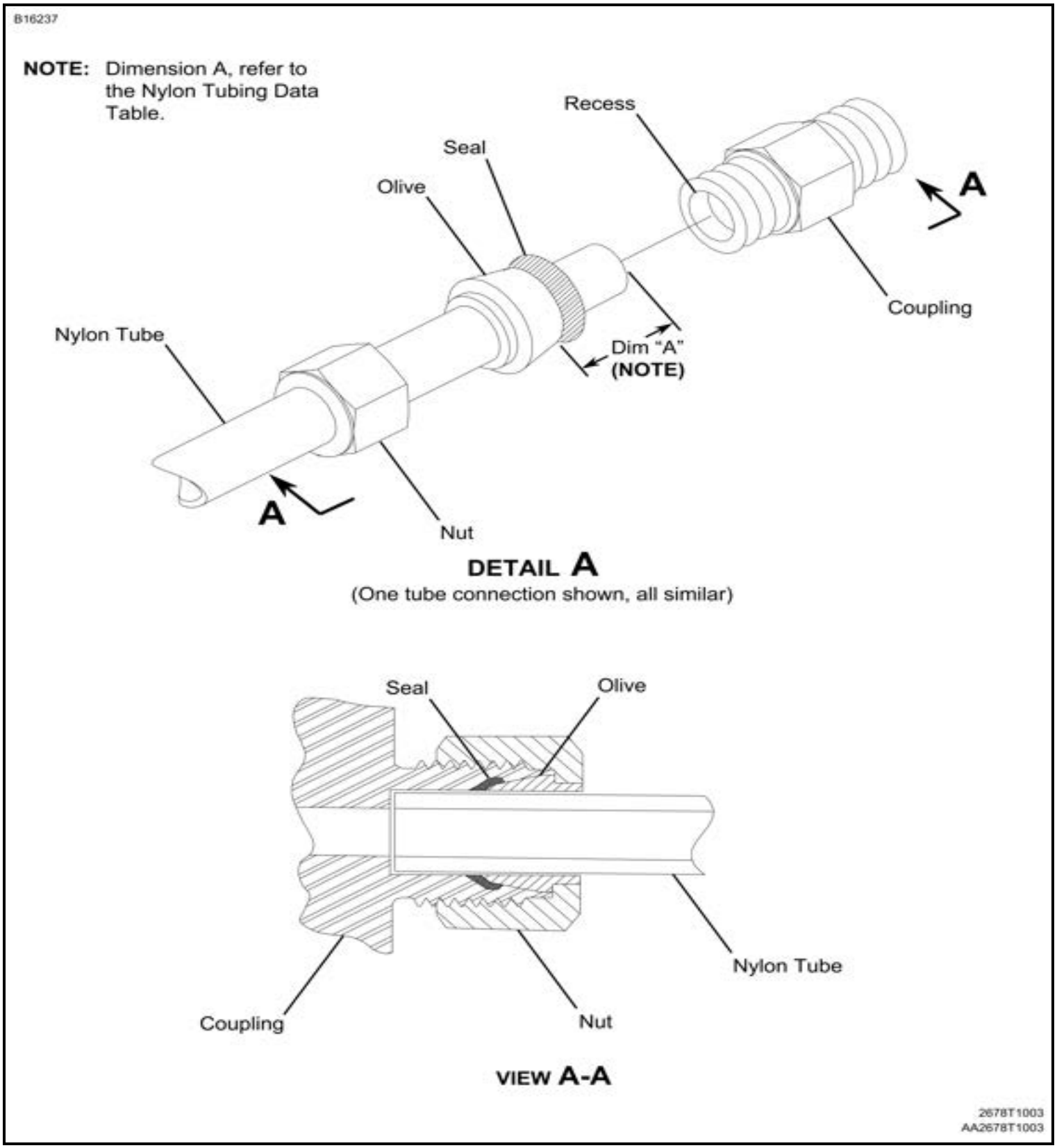
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Figure 201 : Sheet 1 : TKS Nylon Tubing Installation



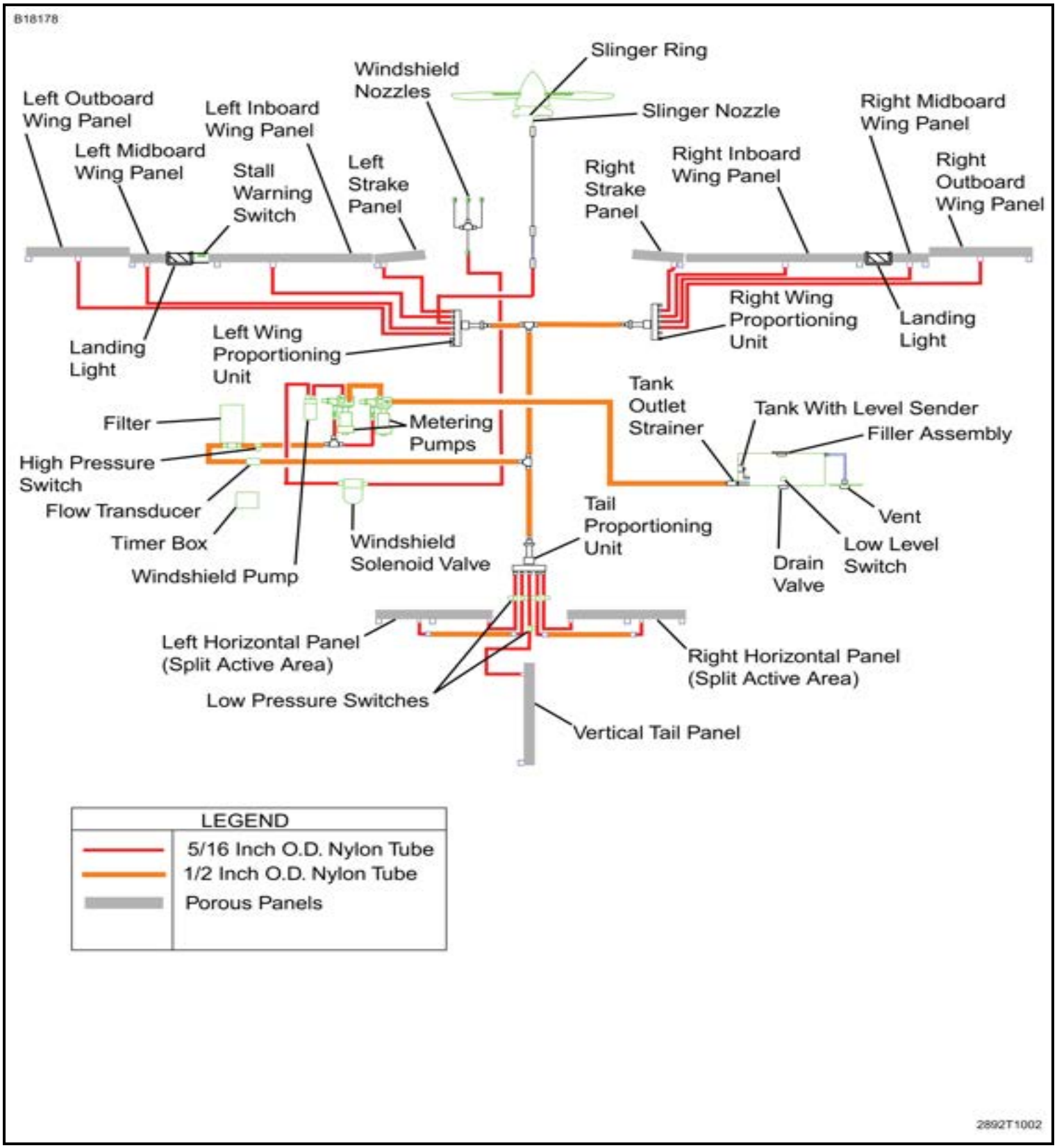
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Figure 201 : Sheet 2 : TKS Nylon Tubing Installation



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Figure 201 : Sheet 1 : TKS Tubing Installation



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PROPELLER HEAT - MAINTENANCE PRACTICES

1. Brush Block

A. Brush Block Removal (Refer to Figure 201)

(1) Remove the top engine cowling. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

(2) Remove two insulated terminal screws and star washers, and disconnect the brush leads from the insulated terminal of the brush block bracket.

(3) While holding the brush block, remove the two screws, washers, and spacers attaching the brush block to the brush block bracket.

(4) Slowly pull the brush block away from the slip ring to relieve pressure on the brushes.

(5) Remove the brush block, taking care not to damage the brushes.

B. Brush Block Installation (Refer to Figure 201)

(1) Press the brushes into the brush block.

CAUTION: Use care when handling the brushes. Skin oils may contaminate the brush material and reduce brush service life.

(2) With the brushes compressed into the brush block, wrap small tie straps around the brush block to hold the brushes in place. Refer to Figure 202.

(3) Attach the brush block to the brush block bracket using two AN-503-10-20 screws, AN960-10 or NAS1149F0363P washers, and Northcoast DI0029 spacers. Leave the attachment screws just loose enough to allow movement of the brush block assembly fore and aft with minimal effort.

(4) Attach the wire terminal ends for the top brushes to the forward insulated terminal screw and for the middle brushes to the middle insulated terminal screw. Refer to Figure 203. Place star washers under the head of the screws and tighten snug. The bottom brush leads are not used and should be coiled and secured using tie straps.

(5) Clean the slip rings using MPK, acetone, or spray degreaser.

(6) View the alignment of the brushes and the slip ring from the side. The brush should ride in the center of the slip ring. Refer to Figure 204. If alignment is necessary, install NAS1149F0316, NAS1149F0332, or NAS1149F0363 washers between the spacer and brush block to achieve correct alignment. Different thickness washers may be stacked together.

(7) Cut and discard the tie straps holding the brushes into the brush block to allow the brushes to contact the slip ring. Press the brush block up to the slip ring and tighten the mounting screws to allow the brush block to be adjusted with moderate force. Adjust the brush block so the left side has approximately 0.06 inch clearance and the right side has approximately 0.09 inch clearance when viewed from the front of the engine looking down. Refer to Figure 205. Tighten the mounting screws snug and secure with 0.032 safety wire per MS33540.

C. Brush Block Maintenance - Inspect the brush block during the 100 hour and/or annual inspections. There are no servicing requirements for the propeller de-ice system outside normal inspection intervals or during routine maintenance.

(1) Inspect for grease, fuel, oil, or carbon deposits on the brushes and brush block. Clean with methyl n-propyl ketone (MPK) or replace components if unable to be cleaned.

(2) Measure brush wear. Replace the brushes if wear exceeds 50 percent or if less than 5/16 inch of brush material remains.

(3) Inspect for uneven wear, chipping, or broken brushes. Replace components as necessary.

(4) Verify brush to slip ring alignment per the Brush Block Installation procedure above.

D. Brush Block Repair - The brushes are non-repairable and should be replaced if found to be defective.

2. Slip Ring

A. Slip Ring Removal

(1) Remove the upper and lower cowlings per Section 71-10-00, Engine Cowling.

(2) Remove the brush block per the Brush Block Removal procedure above.

(3) Remove the spinner, propeller, and left alternator drive pulley per Chapter 61.

(4) Remove the slip ring.

B. Slip Ring Installation

(1) Place the slip ring on the engine crankshaft flange.

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(2) Install the left alternator drive pulley, propeller and spinner per Chapter 61.

C. Slip Ring Maintenance

(1) Clean the slip ring with MPK or other suitable solvent.

(2) Visually inspect the slip ring for excessive wear, grooves, rough surfaces, cracks, burned or discolored areas, and oil or dirt deposits. Inspect for any debonding of the copper rings from the slip ring plate.

(a) If uneven wear or wobble is noted, verify that slip ring run-out is less than 0.005 inches.

(b) Grooves should be less than 0.007 inches deep.

(c) Small defects can be removed with crocus cloth. The rings should have a minimum 32-microinch finish.

D. Slip Ring Repair - The slip ring can be machined to achieve run out and surface finish requirements. The minimum slip ring total thickness is 0.437 in. The maximum allowable slip ring run out is 0.005 inches. Surface finish should be 32 microinches or less.

CAUTION: Excessive heat build-up during machining can cause the copper ring to delaminate from the epoxy. Use appropriate cutting fluid and feed rates to minimize heat build-up during any machining operation on the slip rings.

3. Brush Block Bracket

A. Brush Block Bracket Removal (Refer to Figure 201.)

(1) Remove the top engine cowling per Section 71-10-00, Engine Cowling.

(2) Remove the No. 2 (left) alternator per the instructions in Section 24-30-00, No. 2 Alternator Removal.

(3) Remove the brush block per the Brush Block Removal procedure above.

(4) Remove the two AN5-24 bolts, two MS21042L-5 nuts, four AN960-516 washers, and four Northcoast DI-00030 spacers attaching the No. 2 (left) alternator bracket and brush block bracket to the crankcase. Refer to Figure 201.

(5) Remove the bracket.

B. Brush Block Bracket Installation (Refer to Figure 201.)

(1) Install the brush block bracket and No. 2 (left) alternator bracket using two AN5-24 bolts, two MS21042L-5 nuts, four AN960-516 washers, and four Northcoast DI-00030 spacers

(2) Torque nuts 180 to 220 in.-lbs.

(3) Install the brush block per the Brush Block Installation procedure.

(4) Install the No. 2 (left) alternator per instructions in Section 24-30-00, No. 2 Alternator Installation.

(5) Install the top engine cowling per Section 71-10-00, Engine Cowling.

C. Brush Block Bracket Maintenance - Inspect the brush block bracket for cracks during the 100 hr and/or annual inspections. If cracks are present, replace the bracket. There are no servicing requirements for the propeller de-ice system outside normal inspection intervals or during routine maintenance.

4. Propeller Heater Boot (Hartzell Propeller)

A. Propeller heater boots installed on the aircraft are manufactured by SMR Technologies Inc. or Hartzell Propeller Inc. If you are uncertain of the manufacturer of the propeller heater boots installed, contact Cessna Aircraft Company for guidance.
Remove and install propeller heater boots per instructions in the latest revision of SMR Technologies Report SMR-97-33-013, *Propeller De-Icer Installation and Maintenance Manual*, or Hartzell Propeller Manual 182 (61-12-82), *Propeller Electrical De-ice Boot Removal and Installation Manual*, as applicable.
Repair or service propeller heater boots per instructions in the latest revision of SMR Technologies Report SMR-97-33-013, *Propeller De-Icer Installation and Maintenance Manual*, or Hartzell Propeller Manual 181 (30-60-81), *Propeller Ice Protection System Component Maintenance Manual*, as applicable.
Copies of these documents can be obtained or downloaded from the sources that follow:

SMR Technologies Inc.
93 Nettie Fenwick Rd.
Fenwick, WV 26202
Phone: 304.846.6636
Phone: 800.767.6899 (Toll Free)
Fax: 304.846.6268
Web: www.Iceshield.com

Hartzell Propeller Inc.Attn: Product Support
Administrative Assistant
One Propeller Place
Piqua, OH 45356-2634
Phone: 937.778.4200
Fax: 937.778.4391
Web: www.hartzellprop.com

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(1) Heater Boot Removal (Refer to Figure 206 or Figure 207)

(a) Remove the propeller spinner per instructions in Chapter 61.

(b) Remove the cowling per instructions per Section 71-10-00, Engine Cowling.

(c) Remove the propeller heater boots per the latest revision of SMR Technologies Report SMR-97-33-013 or Hartzell Propeller Manual 182 (61-12-82), as applicable. Make a record of lead wire routing and attachment hardware for reinstallation.

(2) Heater Boot Installation (Refer to Figure 206 or Figure 207)

(a) Inspect the heater boot leads for proper resistance. Resistance must measure 1.56 to 1.72 ohms (14 V) or 4.7 to 4.9 ohms (28 V) at 77±5° F.

(b) Inspect the individual components for damage prior to installation.

(c) Install the propeller heater boots per the latest revision of SMR Technologies Report SMR-97-33-013 or Hartzell Propeller Manual 182 (61-12-82), as applicable.

(d) Ensure the SMR boots are positioned so the heat zone is located 1.7±0.06 inches from the edge of the propeller hub; this will place the edge of the boot approximately 1.25 inches from the edge of the propeller hub. Ensure the Hartzell boots are positioned so the edge of the boot is 1.25 inches from the edge of the propeller hub.

(e) Route and attach the heater boot leads.

1 SMR Boots

a Route the heater boot leads between the propeller hub and the inside diameter edge of the spinner bulkhead.

b Loosely install the lead clamps using screws, washers, and nuts over the heater boot leads and onto the forward side of the spinner bulkhead.

c To relieve tension caused by centrifugal force, gently pull the heater boot leads up thought the lead clamps far enough that the lead rests against the inside surface of the spinner dome. Tighten the clamp hardware 20 to 25 in.-lb. to secure the leads.

2 Hartzell Boots

a Route the heater boot leads between the propeller hub and the spinner bulkhead. Do not twist the boot lead wires or allow them to be twisted.

b Loosely install the loop clamps using screws, washers, and self-locking nuts.

c To relieve tension caused by centrifugal force, gently pull the heater boot leads up thought the loop clamps far enough that the lead rests against the inside surface of the spinner dome. Tighten the clamp hardware 22 to 25 in.-lbs. to secure the leads.

d Attach the slip ring wire harness to the spinner bulkhead using bushings, washers, screws, and self-locking nuts. If a self-locking nut configuration is not already present for attaching the boot leads to the spinner bulkhead, replace the top terminal nut with an MS21083C06 self-locking nut; replace the screw with a Hartzell screw (P/N B7035-14) as necessary to provide two thread protrusion through the self-locking nut. Orient wire terminals at the spinner bulkhead at a normal (perpendicular) angle to the spinner dome. Refer to Figure 207. Torque nut 10 to 12 in-lbs.

CAUTION: Do not bend or damage the heater leads.

(f) Connect the terminal ends of the propeller boot leads to the slip ring terminals with 6-32 washers and nuts. Refer to Figure 208. For each heater lead use the two outer terminals only. The inner terminal is not used. Torque the retaining nuts 10 to 12 in.-lb.

(g) Verify that propeller pitch change over the allowable range will not cause binding or stress on the heater leads.

(h) Install large tie straps over the three heater boot leads and around the propeller hub. Refer to Figure 209. Tighten the straps snug. Forward tie strap should be as far forward as possible. Offset the ends of the tie straps 180 degrees to minimize any imbalance.

(i) Install the cowling per Section 71-10-00, Engine Cowling.

(j) Install the propeller spinner per Chapter 61.

(3) Heater Boot Maintenance - Inspect the heater boots during the 100 hour and/or annual inspections. There are no servicing requirements for the propeller de-ice system outside normal inspection intervals or during routine maintenance.

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(a) Visually inspect the heater boots for wrinkles, loose or torn areas, and/or abrasions or cuts along the leading edge and on the thrust face (flat) of the propeller blades.

(b) Inspect the boot leads for signs of abrasion or damage. Inspect the lead clamps for tightness.

(c) Test the resistance of the heater boot elements. Disconnect the boot leads from the slip ring terminals. Place an ohmmeter across the boot leads. The ohmmeter should indicate 1.56 to 1.72 ohms (14 V) or 4.7 to 4.9 ohms (28 V) of resistance at 77±5° F. If the reading is not in this range replace the heater boot.

(4) Heater Boot Repair - The heater boots should be serviced and repaired per SMR Technologies Report No. 97-33-013 or Hartzell Propeller Manual 181 (30-60-81), as applicable.

5. Deice Boot Removal/Installation (McCauley Propeller)

A. Remove the deice boot.

(1) Remove external electrical power from the airplane.

(2) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(3) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(4) Remove the propeller spinner in accordance with the applicable steps in Chapter 61, Spinner and Propeller Removal and Installation.

(5) Remove the cowling in accordance with the applicable steps in Section 71-10-00, Engine Cowling - Maintenance Practices.

(6) Identify and attach tags to the wire harness electrical leads (I) and (G) on the slip ring. Refer to Figure 210.

(a) Disconnect the electrical leads.

(7) Remove the deice boot. Refer to the McCauley Electrothermal De-Ice Systems, Service, Parts, and Installation Manual found in the Supplier Publication List.

B. Install the deice boot. Refer to Figure 210.

CAUTION: The condition of the propeller blades and the deice boot installation must comply with applicable FAA regulations. Inspect each propeller blade prior to deice boot installation for any delamination, cracks, dents, or nicks. If any defects are found, the blade must be repaired by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components prior to the installation of the deice boot. Check resistance of each heating element before installation of the deice boot. Refer to Table 202 for deice boot resistance values.

(1) Install the deice boot. Refer to the McCauley Electrothermal De-Ice Systems, Service, Parts, and Installation Manual, found in the Supplier Publication List.

(a) All deice boots on a single propeller must be located the same distance from the center line of the propeller for rotational balance. The ("Y") dimension for the location of the deice boot is given in Table 201 and shown in Figure 211.

(b) The integral strap deice boots uses a separate rubber restrainer strap at the inboard end of the boot to prevent loosening of the deice boot bond when centrifugal force acts on the lead strap. The procedure for installing the restrainer strap is given in Figure 211. The ("X") dimension for locating the restrainer strap is given in Table 201. The ("Y") dimension for location of integral strap type deice boots is given in Table 201 and shown in Figure 211.

Table 201. Aircraft and System Identification and Information

Aircraft Make and Model No.	Normal Total Nominal Power (Watts)*	Dim "Y" See Note 1	Dim "X" See Note 1	McCauley Propeller Model No.	Notes

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T240 Corvalis	120	0.562 to 0.688 Inch (14.27 to 17.48 mm)	0.375 Inch (9.53 mm) minimum.	D3A34C447	3 blade prop, integral leads, single engine, single element.
* Based on 24 to 28 VDC at deice boot leads.					
NOTE 1: Deice Boot Restrainer Strap Location Dimension "X" (Inches) and Deice Boot Location "Y" (Inches). See Figure 211.					
NOTE 2: Many McCauley propellers are provided to the aircraft manufacturer without the deice boots installed. In cases where the aircraft manufacturer installs the deice boots, or where non-McCauley deice boots are used, the appropriate aircraft manufacturer's service manual must be consulted for all installation information.					

(2) Check the electrical resistance between the boot electrical leads. Refer to Table 202 for deice boot resistance values.

Table 202. Deice Boot Resistance Values

McCauley Deice Boot Part No.	RESISTANCE VALUES (ohms)	
	Boot Ea. Element (Note 1)	
	Max.	Min.
B-40245-60	1.26	1.14
If the propeller is installed on an aircraft, the propeller deice circuits must be electrically isolated from the rest of the aircraft wiring when making the above resistance check.		
NOTE 1: Remove the deice boot leads from the slip ring terminals.		
Compare with the above table for minimum and maximum values in ohms between the common ground and the other terminal of the deice boot lead. Reinstall the deice boot leads in accordance with the airplane service or maintenance manual instructions.		

(3) Check for intermittent open circuits by tensioning the deice boot leads and/or strap slightly while measuring resistance.

(a) Press lightly on the entire deice boot heating element surface and in the area adjacent to leads.

1 The resistance must not fluctuate.

NOTE: This check is important because an intermittent open circuit may not show up until the propeller is rotating.

(4) Install the wire harness (lead straps) (Integral Lead Type Boot).

(a) Route the lead straps taking care not to twist the strap.

(b) Use the provided clamps to attach the lead straps to the spinner bulkhead.

NOTE: All excess strap length should fall between this clamp and the deice boot. Refer to Figure 210.

(c) Route the lead straps through the spinner bulkhead.

NOTE: A rubber grommet is to be used where the strap is routed through the spinner bulkhead.

CAUTION: Do not bend or damage the heater leads.

(5) Identify and connect the wire harness electrical leads (I) and (G) to the slip ring. Refer to Figure 210.

NOTE: The leads attach to the outer two slip ring terminals. The inner terminal is not used.

(a) Torque the nuts from 10 to 12 inch pounds.

(6) After the installation of the wire harness is complete, make sure that the length is sufficient so as not to be placed in tension when the propeller is moved through full pitch range.

(7) Install two large tie straps around the propeller hub. Refer to Figure 210.

(a) Offset the ends of the tie straps 180 degrees to minimize any imbalance.

(8) Install the propeller spinner in accordance with the applicable steps in Chapter 61, Spinner and Propeller - Maintenance

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Practices, Spinner and Propeller Removal and Installation.

(9) Install the cowling in accordance with the applicable steps in Section 71-10-00, Engine Cowling - Maintenance Practices.

6. Control Module

A. The control module is located in one of four places. If Avidyne avionics are installed the control module is attached to the standby battery bracket or to the right side instrument panel brace. If the Garmin G1000 system is installed, the control module is located behind the instrument panel on the right hand side.

(1) Control Module Maintenance - Inspect the control module during the 100 hr and/or annual inspections. There are no servicing requirements for the propeller de-ice system outside normal inspection intervals or during routine maintenance. The propeller de-ice system has a high current draw; use ground power or start the engine.

(a) With aircraft power on, actuate the propeller de-ice system by pressing the de-ice control switch. Verify the power on self test performs correctly.

1 When the Propeller de-ice control switch is powered on, the 'ON' and 'FAIL' annunciators will illuminate for one second and extinguish for one second. The on-off cycle will repeat during the six second self test. After the self test is completed the 'PROP' and 'ON' annunciators will illuminate steady for 30 seconds, indicating the DEICE is in the ON cycle. The 'Prop' annunciator will remain illuminated whenever the Propeller De-Ice Control Switch is powered on.

(b) Inspect attachment of the control module to the support bracket for loose hardware.

(c) Inspect the wiring for damage or abrasion.

(2) Control Module Repair - The control module is non-repairable and should be replaced if found to be defective.

B. For the Model T240 prop timer (control module) maintenance procedures refer to Prop Heater Timer (T240).

C. Control Module (Avidyne Option) (Refer to Figure 212 or Figure 213).

(1) Removal of the Control Module.

(a) Remove the co-pilot's side kidney panel per Chapter 25.

(b) Disconnect the cabling to the control module.

(c) Remove two screws, washers, and nuts attaching the control module to the mounting bracket.

(2) Installation of the Control Module.

(a) Installation is the direct reverse of removal.

D. Removal of the Control Module (Garmin G1000 Option). (Refer to Figure 214).

(1) Remove the glare shield per Chapter 25.

(2) Disconnect the cabling to the control module.

(3) Remove two 8-32 pan head screws attaching the control module to the mounting bracket.

(4) Installation of the Control Module (Garmin G1000 Option).

(a) Installation is the direct reverse of removal.

7. Testing

A. Before testing, assure that all electrical connections are secure and the propeller has been reinstalled.
When the Prop De-Ice Control Switch is powered on, the Prop De-Ice Control Module will perform a self-test. The 'ON' and 'FAIL' annunciators will illuminate for one second and extinguish for one second during a six second cycle. The 'PROP DE-ICE' annunciator will remain illuminated whenever the Prop De-Ice Control Switch is powered on.
Cycle testing should be performed with the cowling and spinner installed and the engine running.

CAUTION: Do not run the engine with the spinner removed. Damage to the propeller boot leads will occur.

(1) Ground Test - The ground test is best accomplished with two persons. One person actuates the system from the cockpit and the second person verifies heater output at the propeller.

(a) Basic Operation Test - The Basic Operation Test verifies the general electrical connections.

1 Connect a source of external power to the aircraft.

2 Power the right bus

3 Actuate the prop de-ice switch, and wait for the controller set test to complete.

4 Assure the 'ON' annunciator is illuminated.

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CAUTION: The propeller boot heaters will become extremely hot during operation. Exercise care when touching the propeller boots or adjacent areas.

5 Verify the three propeller de-icers are generating heat by carefully touching the boots.

6 After the system is verified to be heating, deactivate the prop de-ice switch.

CAUTION: Do not operate the Propeller De-Ice system for longer than 60 seconds without the propeller rotation. It will overheat and cause damage to the de-icing boots.

(b) Cycle Time Test - Perform the Ground Cycle Test with the engine running to allow for proper cooling of the propeller boots. When the pilot presses the propeller de-ice switch, the prop de-ice system will perform a self-test for six seconds. After the self-test is completed the 'PROP' and 'ON' annunciators will illuminate steady for 30 seconds, indicating the propeller deice system is in the ON cycle. After 30 seconds the propeller de-ice 'ON' annunciator well flash, indicating the propeller de-ice is in the OFF cycle. Propeller de-ice 'ON' will continue to cycle 30 seconds steady state, and 30 seconds flashing until the pilot de-selects the propeller de-ice switch.

1 Actuate the propeller de-ice switch and wait for the controller self test to complete.

2 The 'ON' annunciator should remain steady for 30 seconds. Time the ON portion of the cycle with a stopwatch.

CAUTION: The propeller boot heaters will become extremely hot during operation. Exercise care when touching the propeller boots or adjacent areas.

3 When the 'ON' annunciator begins to flash, the system is in the OFF portion of the cycle. Time this portion of the cycle with a stopwatch. The time should be 30 seconds. Verify the three propeller boots are cooling off by carefully touching the boots.

4 Repeat the cycle time test to verify consistent cycle times.

(c) Fault Indications - The Troubleshooting paragraph of this chapter charts the fault indications along with probable causes and remedies.

1 The 'FAIL' light and the 'ON' light illuminate at the same time during the test - This situation indicates the Propeller De-Ice system is drawing less than 18 amps. Check for loose or open circuits, or heater or brush failure.

2 The 'FAIL' light illuminates and the 'ON' light extinguishes during the test - This situation indicates the current draw is too high, above 30 amps. If this condition occurs, check for a short to ground in or around the brushes or power leads. Another cause could be a faulty propeller de-ice system control module, or no or low power at the bus terminal of the control module.

NOTE: The propeller heaters will be hotter at the root than at the outboard section; this is normal due to varying watt density in the heating element and is not cause for concern.

(2) In-Flight Testing - It is recommended that the propeller de-ice system be operated during flight periodically to test the system. It is suggested that the system be turned off when not needed or when clearing the runway after landing. The propeller de-ice system may be activated prior to take off. Assure that the current draw is between 19 and 25 amps.

(a) Actuate the propeller de-ice switch and wait for the controller self test to complete.

(b) The 'ON' annunciator should remain steady for 90 seconds. Time the ON portion of the cycle with a stopwatch.

CAUTION: The propeller boot heaters will become extremely hot during operation. Exercise care when touching the propeller boots or adjacent areas.

(c) When the 'ON' annunciator begins to flash, the system is in the OFF portion of the cycle. Time this portion of the cycle with a stopwatch. The time should be 90 seconds. Verify the three propeller boots are cooling off by carefully touching the boots.

(d) Repeat the cycle time test several times to verify consistent cycle times.

8. Propeller Heat/De-Ice - Troubleshooting

Table 203. Propeller Heat/De-Ice - Troubleshooting Chart

Annunciator Lights	Trouble Indication	Probable Cause	Inspection	Remedy
		Heater boot open.	Electrically isolate each boot and check for	Replace boot if internal open.

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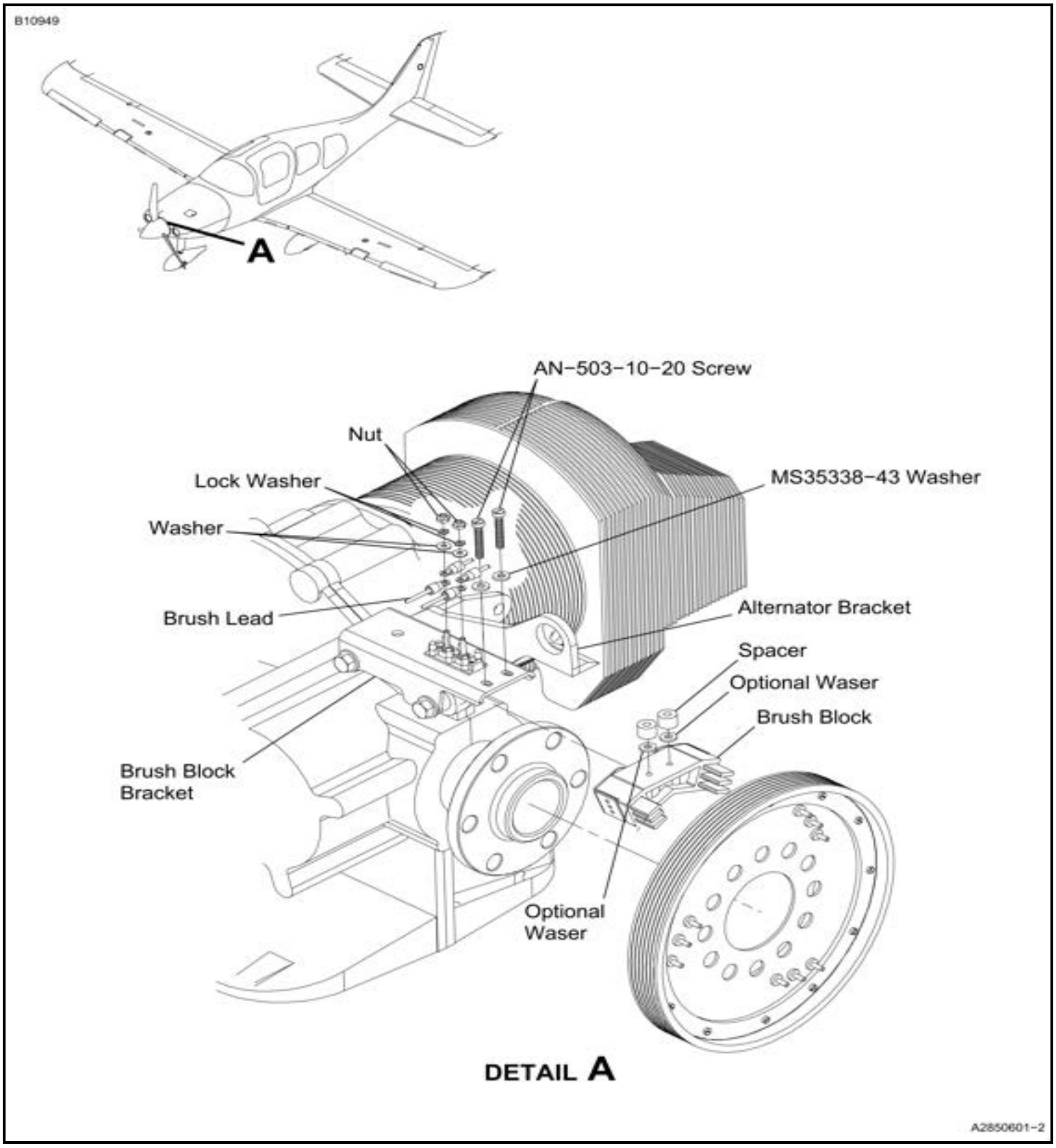
ON - Steady On FAIL - Steady On	Low Current Draw (Under 18 A)		continuity.	Tighten boot electrical connection at slip ring terminal.
		Brush failure.	Inspect brushes for condition and proper contact with slip ring.	Replace brushes.
				Align brushes.
		Open in power wiring.	Inspect wiring to verify condition. Inspect all connections for tightness.	Repair wiring as necessary. Tighten all connections.
ON - Off FAIL - Steady On	High Current Draw (Over 30 A)	Short to ground in power wiring.	Inspect wiring for shorts. Inspect all connections for tightness.	Repair wiring as necessary. Tighten all connections.
		Short to ground at brush block.	Inspect brushes for condition and short to ground	Replace brushes.
				Align brushes.
		Short between slip ring commutators.	Inspect slip ring assembly to verify electrical isolation	Replace slip ring assembly
	Low Voltage at Control Module	Loose connection at fuse or Control Module	Inspect wiring to verify condition. Inspect all connections for tightness.	Repair wiring as necessary. Tighten all connections.
		Faulty control module.	Test control module.	Replace control module.
ON - Off FAIL - Steady On (continued)	Radio Noise or interference when the De-Ice system is ON	Brushes arcing.	Inspect brushes for evidence of burning.	Replace brushes.
				Align brushes.
		Loose connection.	Inspect wiring to verify condition. Inspect all connections for tightness.	Repair wiring as necessary. Tighten all connections.
		Wire too close to radio equipment	Inspect wiring to verify location.	Reroute wiring to at least 8 in. from radio equipment and antenna leads.
		Defective fuse.	Place jumper across fuse.	If radio noise disappears, replace the fuse.
		Defective control switch.	Place jumper across pins 1 and 8 and pins 4 and 10 on the control switch.	If radio noise disappears, replace the control switch.
	Rapid or uneven brush wear or brush chipping	Brush assembly out of alignment.	Inspect brushes for condition and proper contact with slip ring.	Align brushes.
		Slip Ring run-out.	Verify slip ring runout is less than 0.005 in.	Replace slip ring.
		Slip Ring surface defects	Visually inspect surface condition.	Resurface slip ring if within limits.
				Replace slip ring.
		Oil leak at propeller hub or engine.	Visually inspect slip ring for oil.	Correct oil leak condition.

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	System does not actuate when control switch is selected	Faulty control switch.	Bypass control switch and verify system operation.	Repair wiring as necessary. Tighten all connections.
		Faulty or blown fuse.	Replace fuse. If fuse blows again inspect wiring for shorts.	Replace fuse.

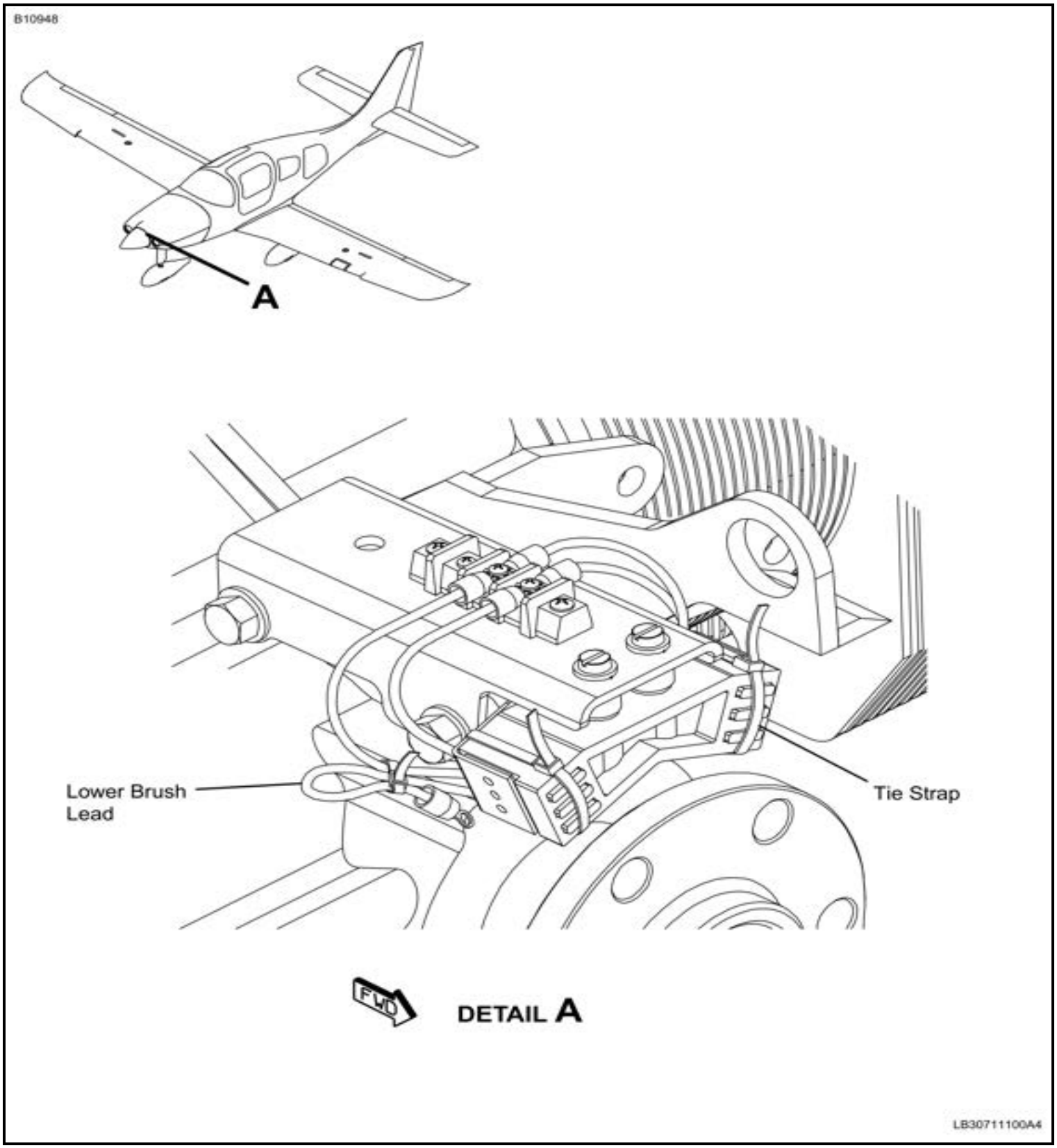
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Figure 201 : Sheet 1 : Brush Block



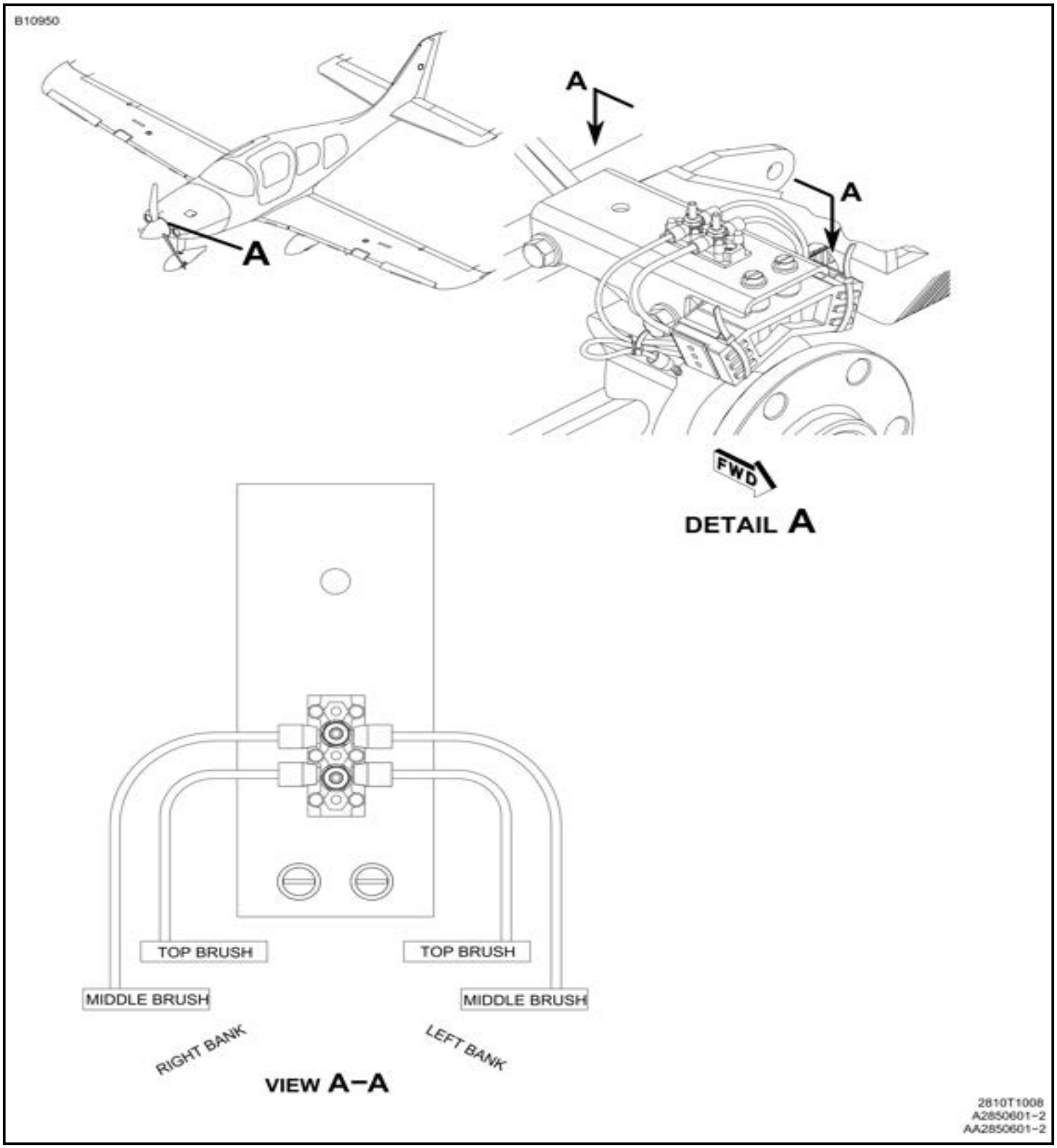
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Figure 202 : Sheet 1 : Brush Block Tie



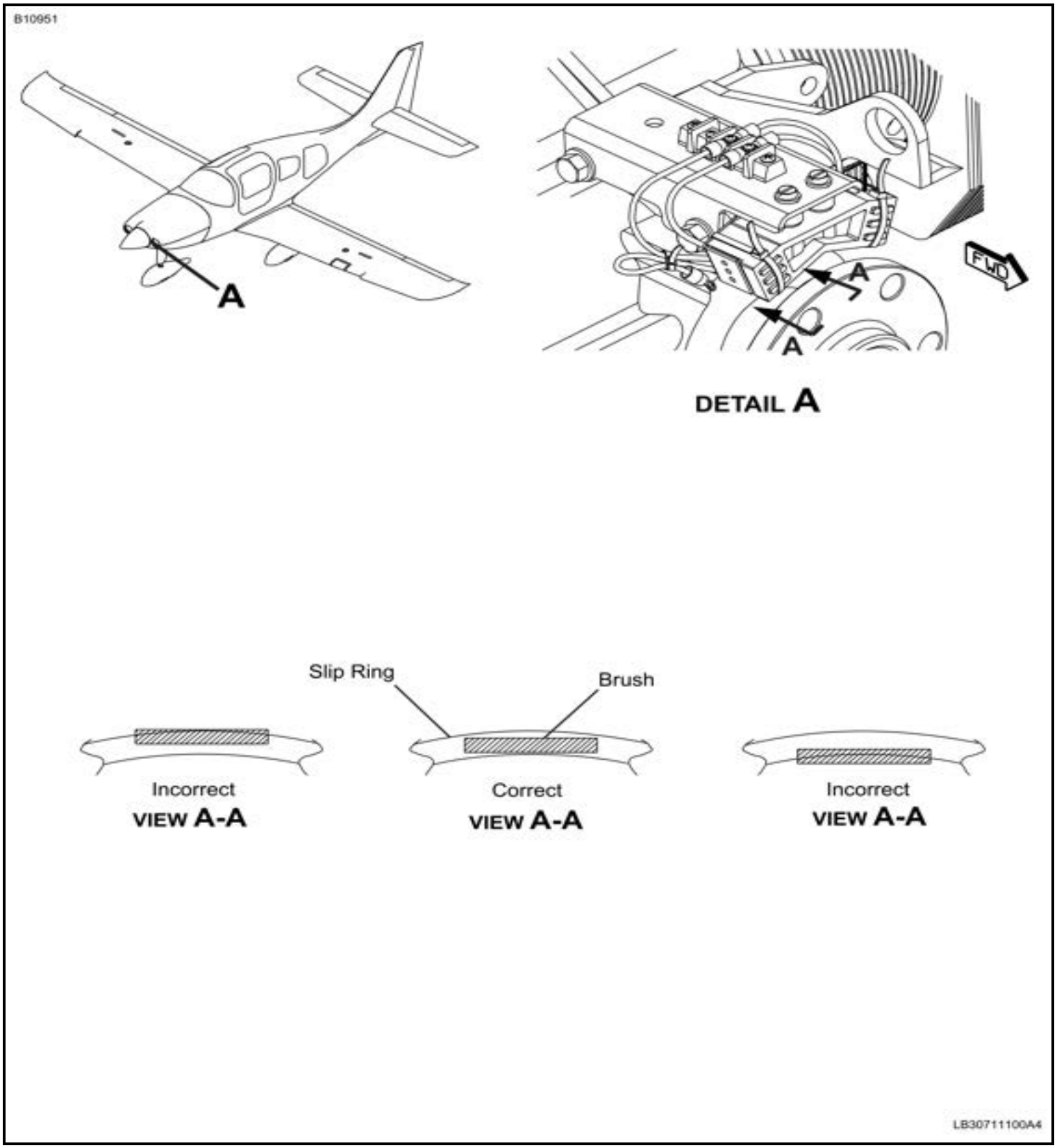
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Figure 203 : Sheet 1 : Brush Wire Routing



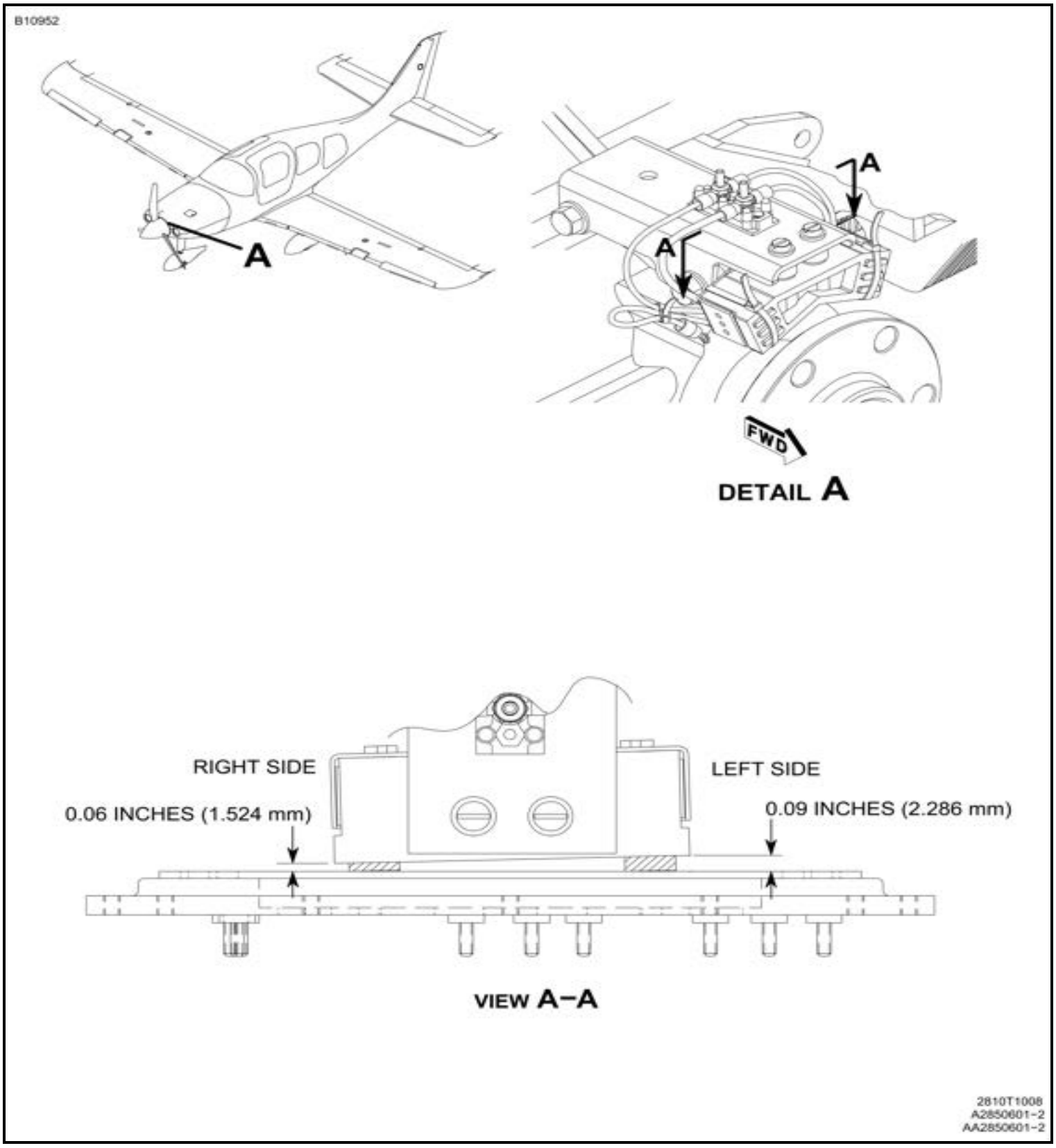
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Figure 204 : Sheet 1 : Brush Alignment on Slip Ring



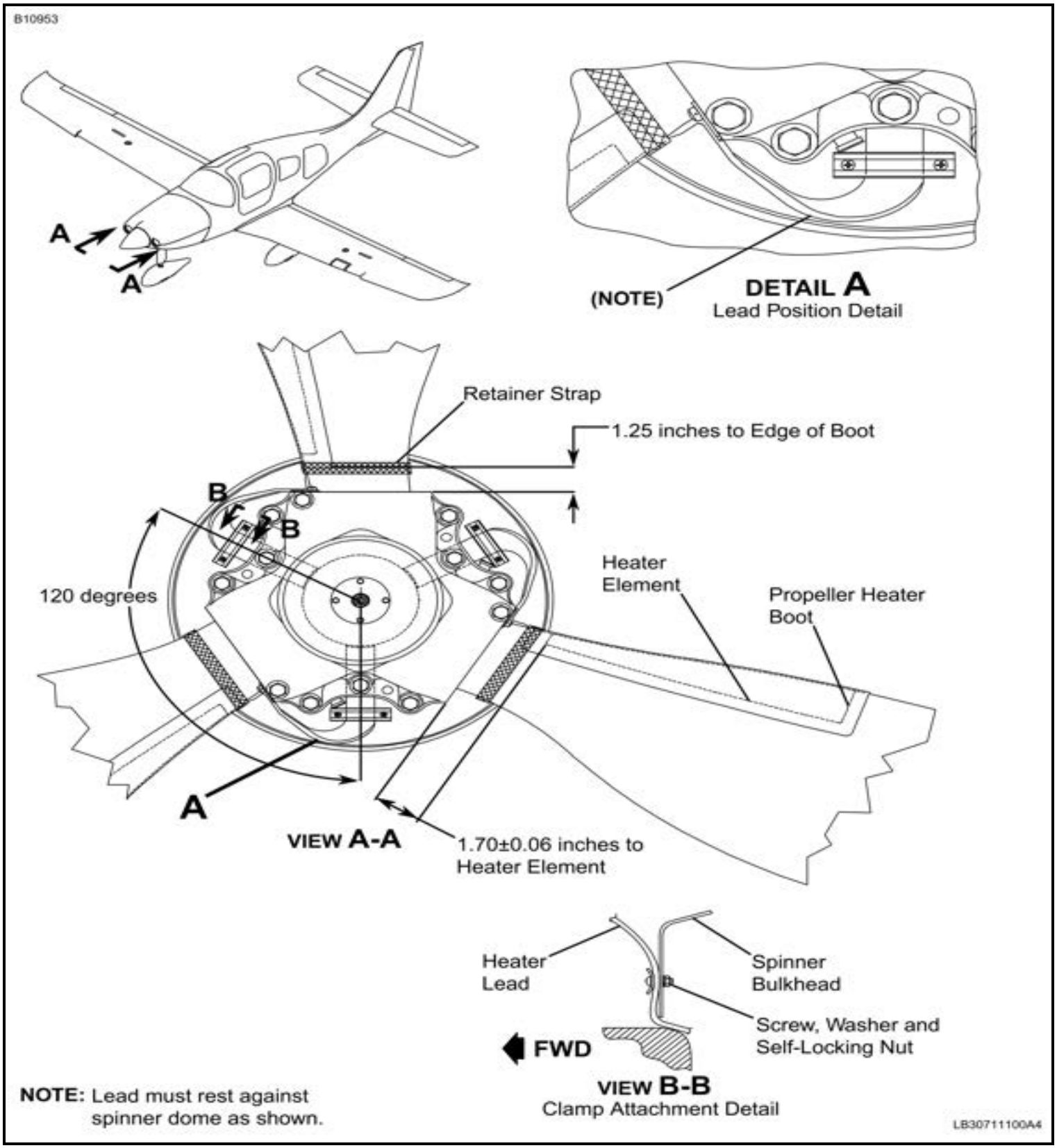
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Figure 205 : Sheet 1 : Brush Block Alignment



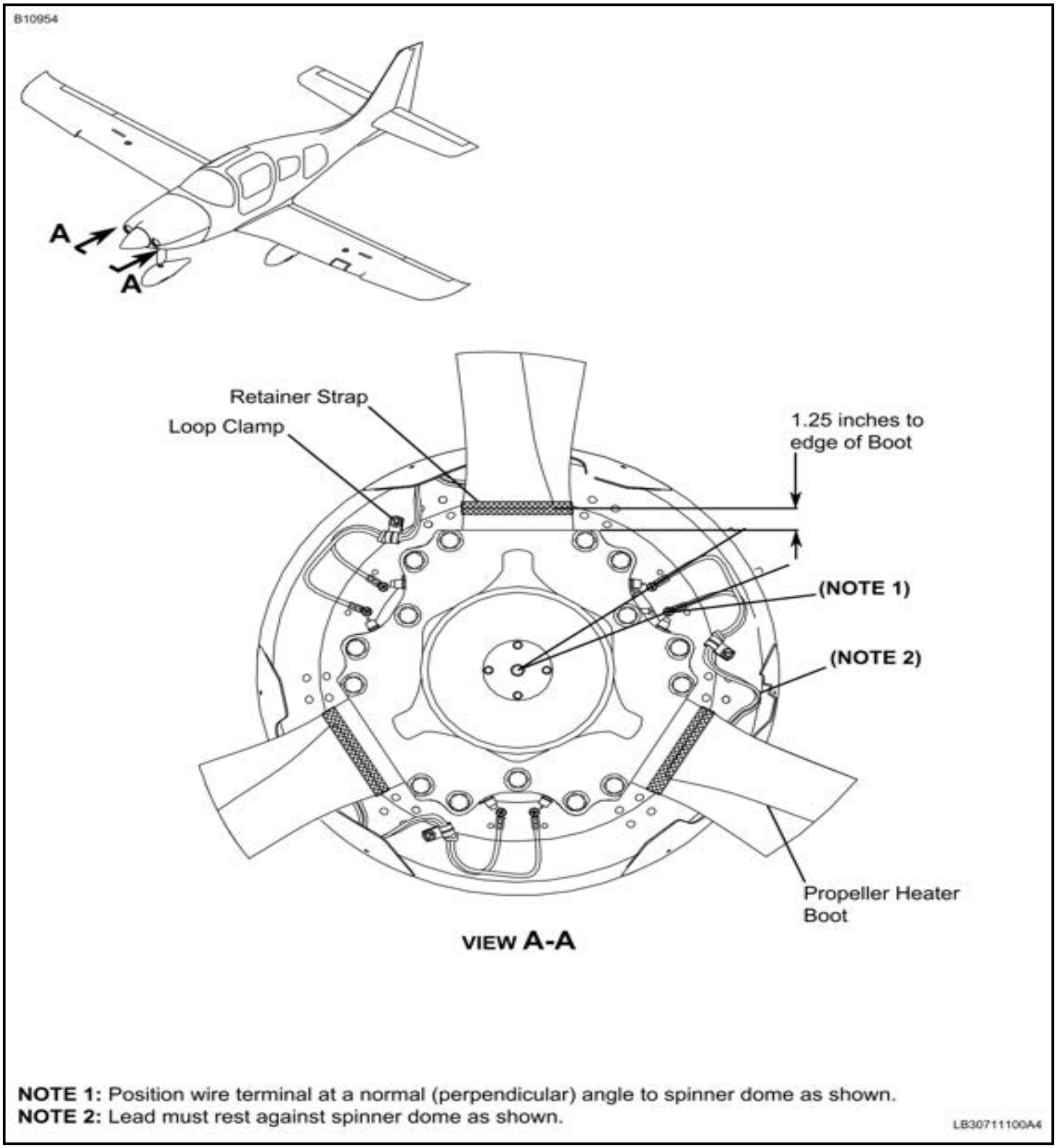
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Figure 206 : Sheet 1 : SMR Technologies Inc. Propeller Heater Boot



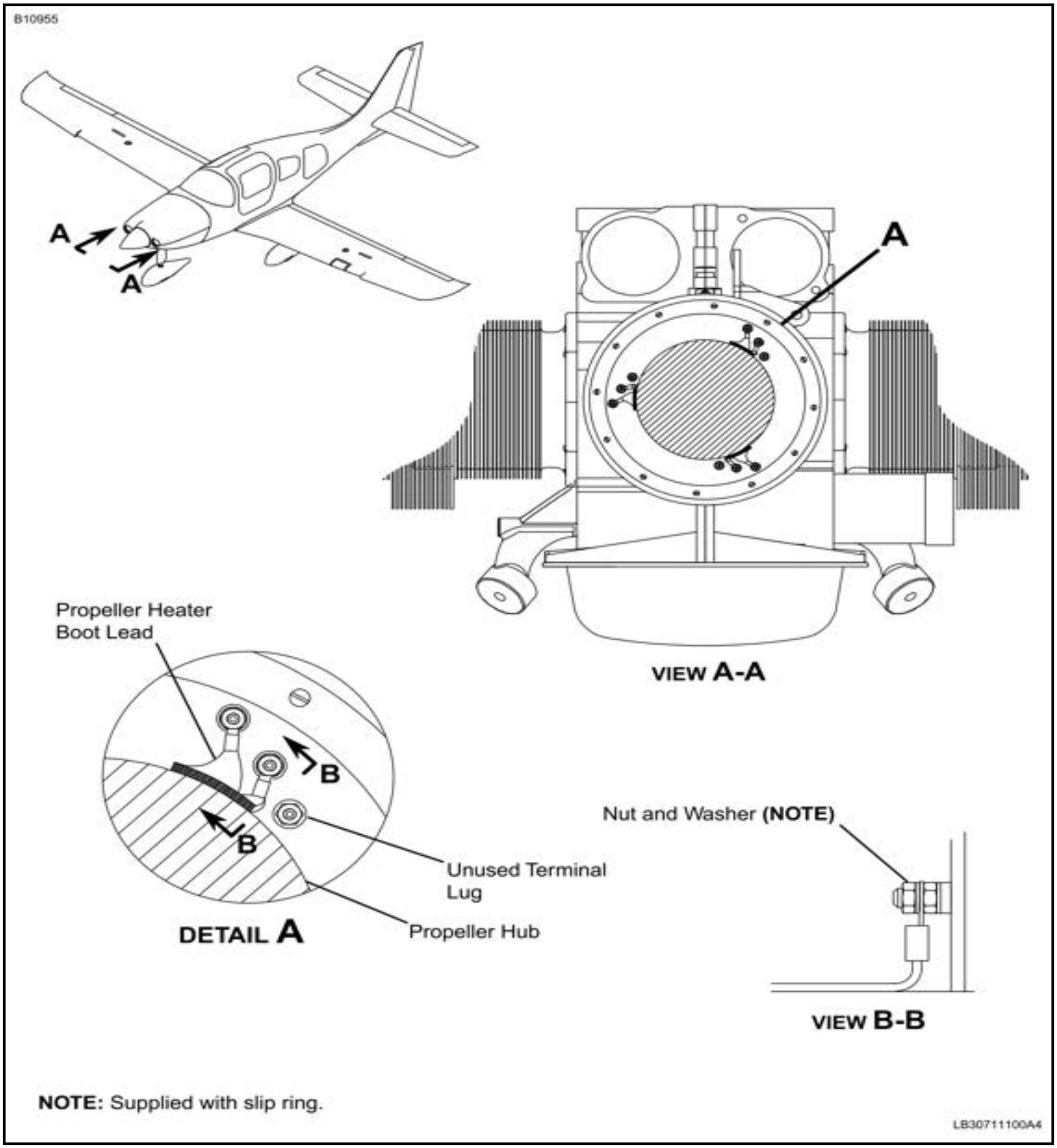
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Figure 207 : Sheet 1 : Hartzell Propeller Inc. Propeller Heater Boot



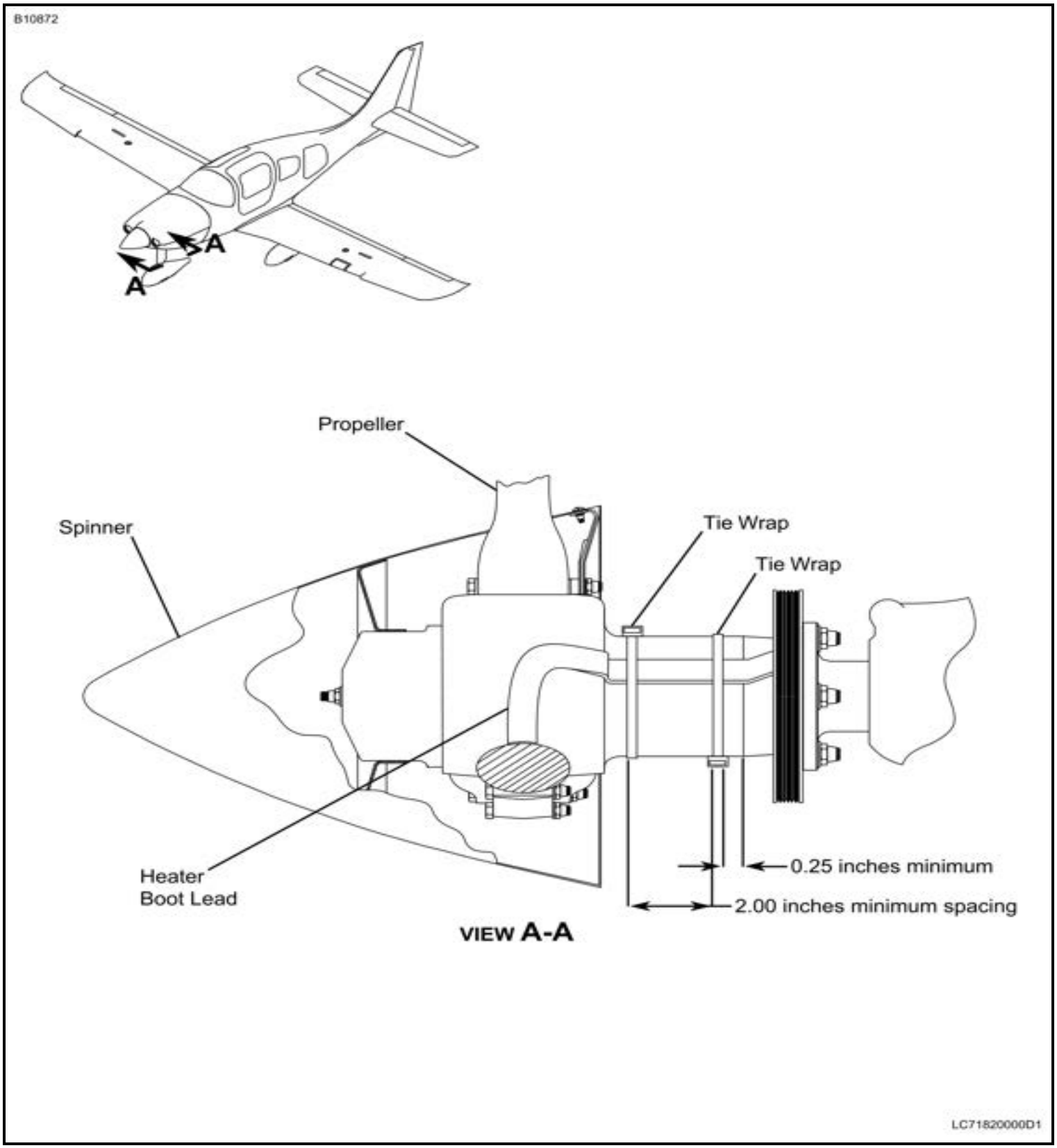
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Figure 208 : Sheet 1 : Heater Boot Lead Terminal Attachment



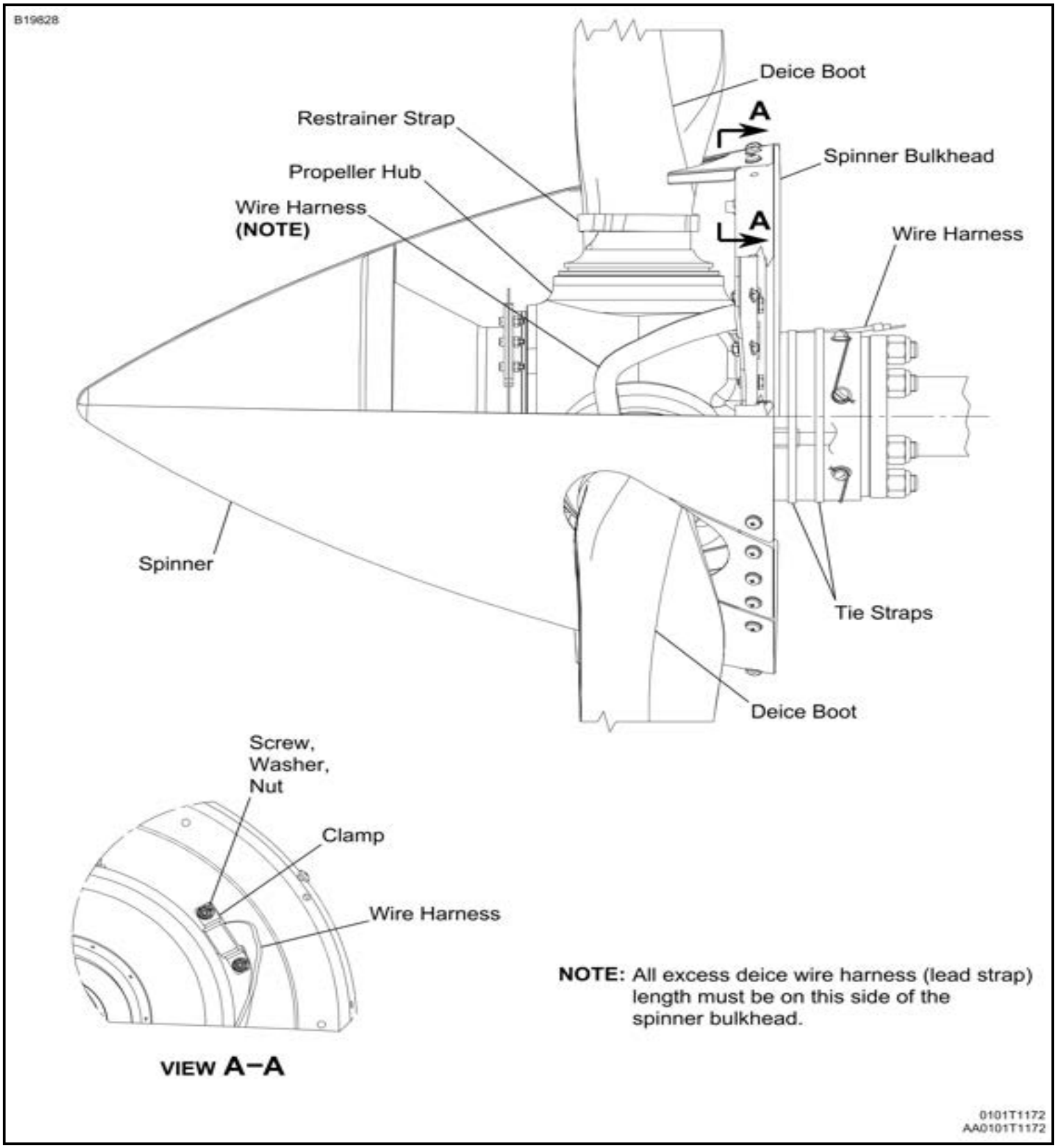
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Figure 209 : Sheet 1 : Heater Boot Lead Attachment



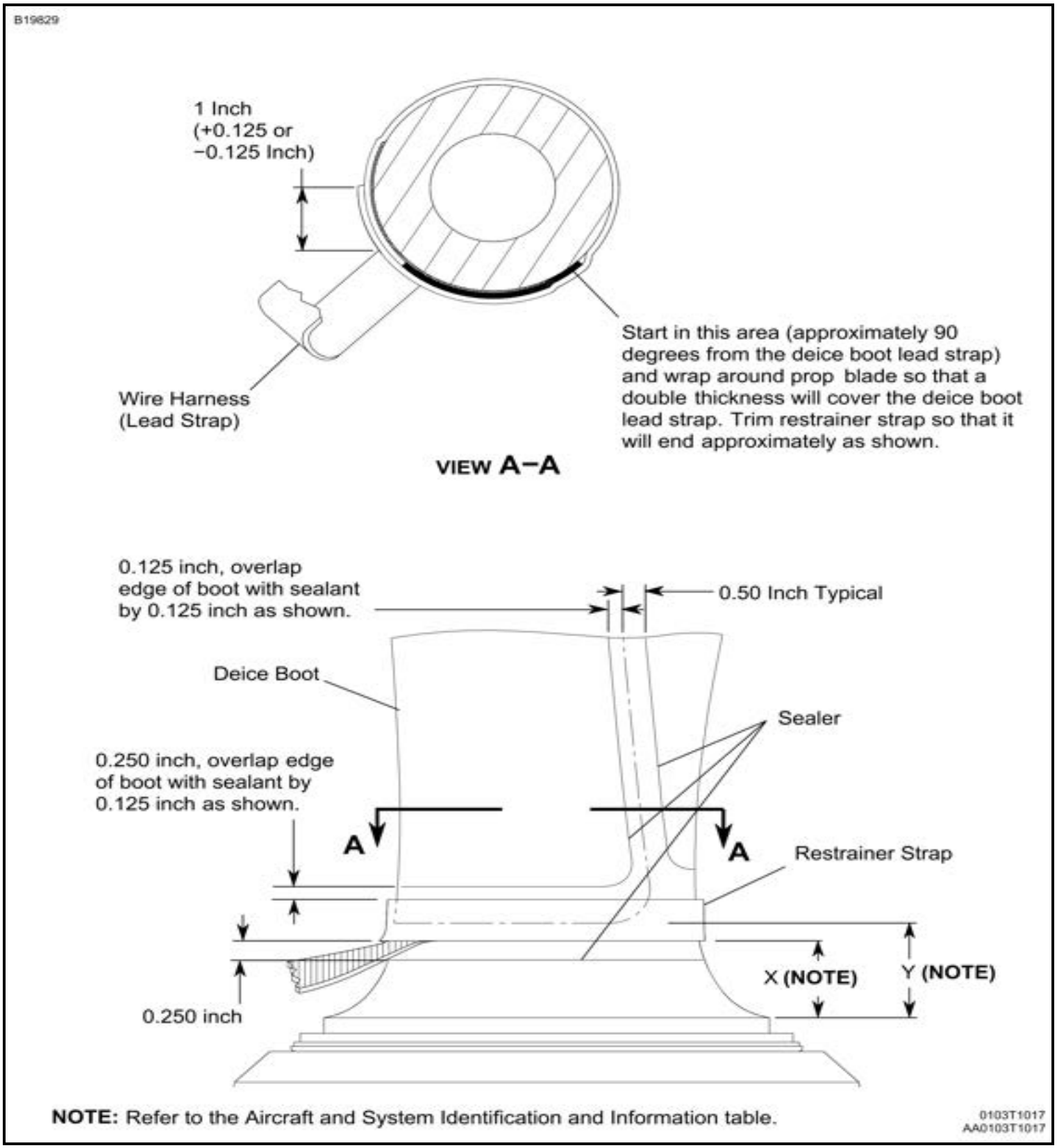
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Figure 210 : Sheet 1 : Deice Installation (McCauley)



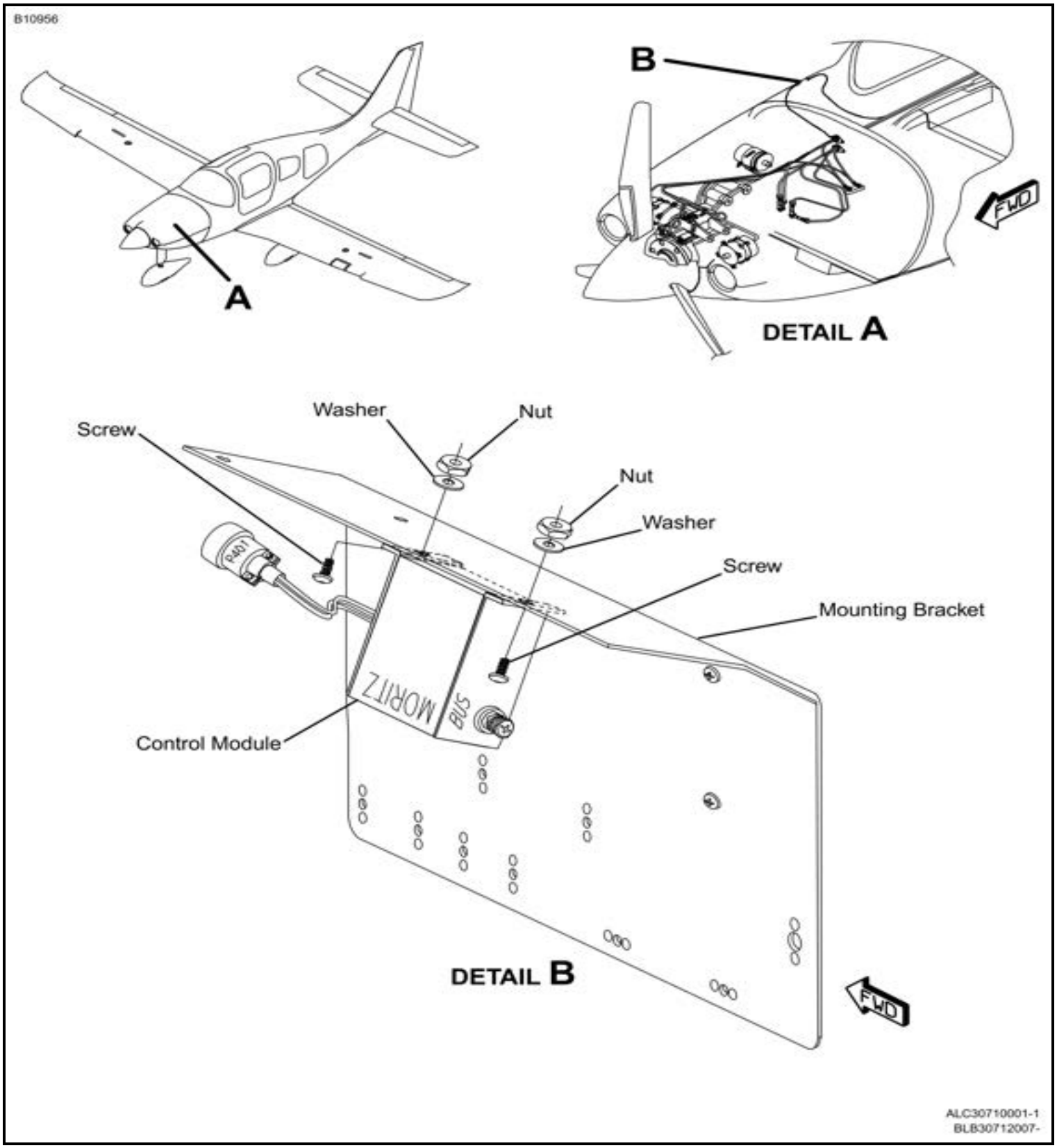
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Figure 211 : Sheet 1 : Restrainer Strap Installation (Used Only On Integral Lead Type Deice Boots)



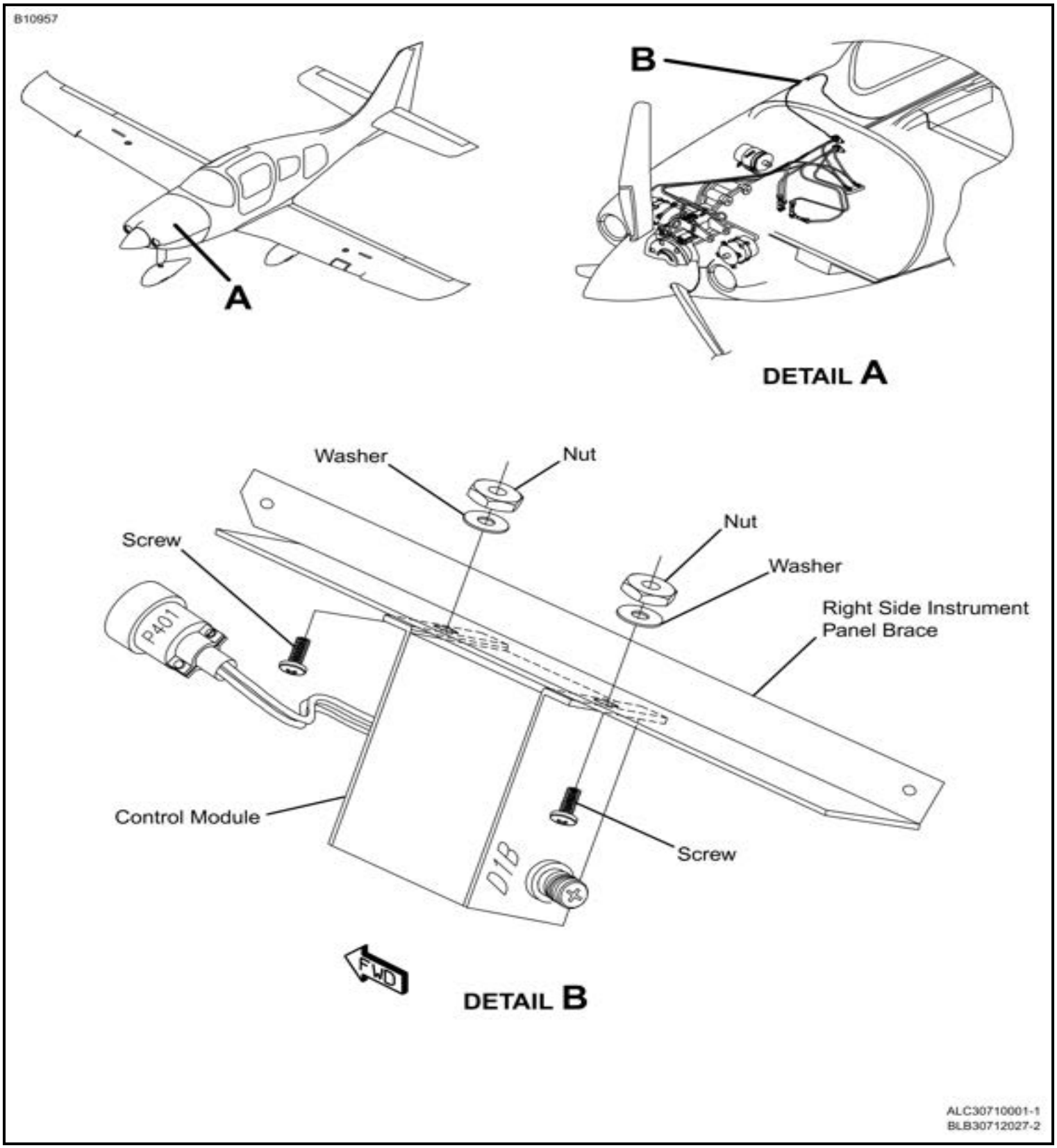
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Figure 212 : Sheet 1 : Control Module (Avidyne Option, Battery Bracket)



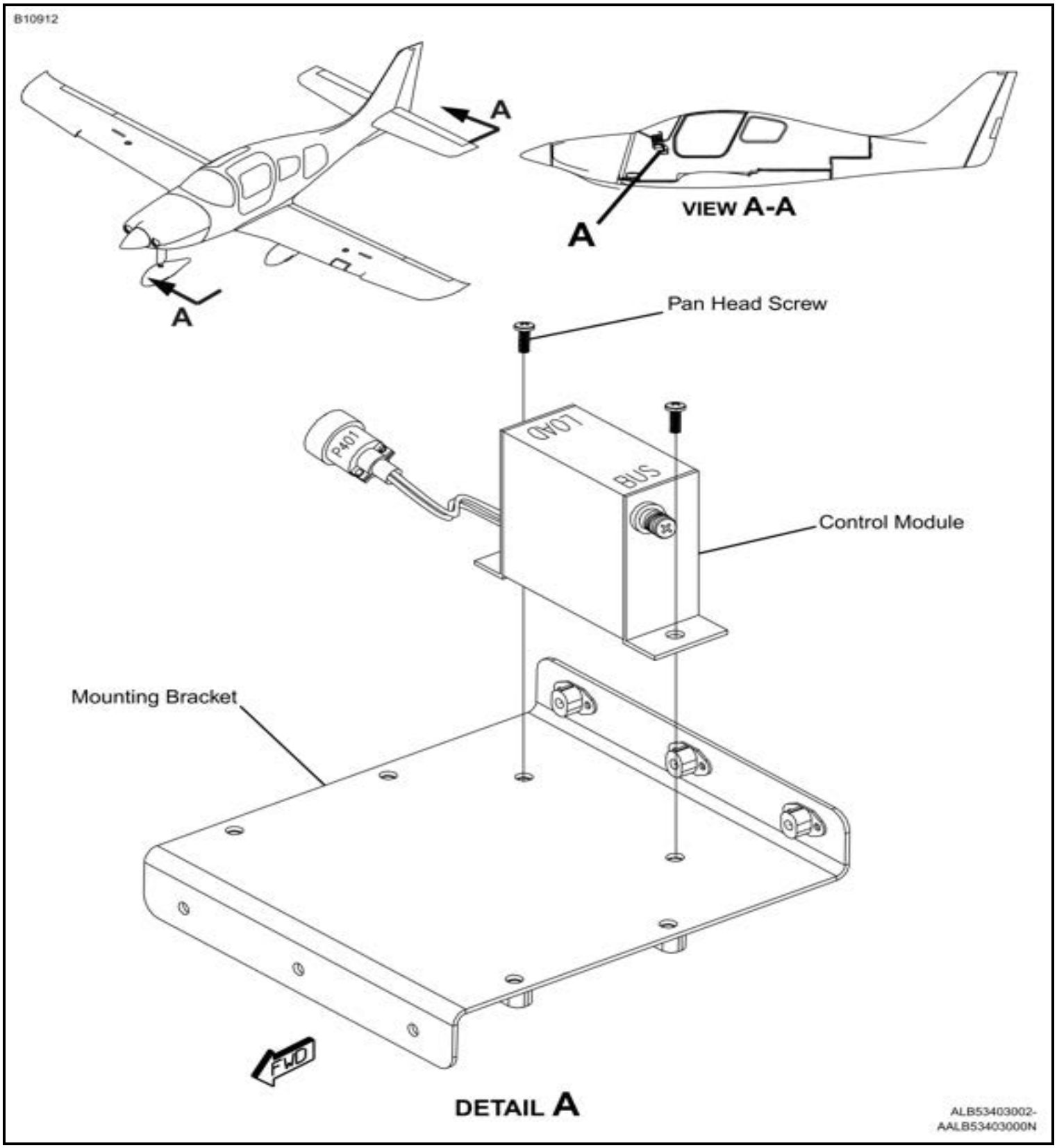
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Figure 213 : Sheet 1 : Control Module (Avidyne Option, Right Side Instrument Panel Brace)



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Figure 214 : Sheet 1 : Control Module (Garmin G1000 Option)



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PROP HEATER TIMER (T240) - REMOVAL/INSTALLATION

1. General

A. This section contains the removal and installation procedures for the Model T240 Prop Heater Timer. The Prop Heat Timer is installed behind of the Multifunctional Display (MFD) on the shelf assembly. For a general description of the Prop Heat Timer, refer to Ice and Rain Protection - General.

B. After you remove and install or replace the Prop Heater Timer, it is necessary to do a test of the timer. Refer to Prop Heat Timer Self-Test.

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. Remove and Replace Prop Heat Timer

A. Remove the Prop Heat Timer (UF002) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Remove the left GDU 1400 Multifunctional Display (MFD) (UI406). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(5) Disconnect the electrical connector (P401) from the rear of the timer.

(6) Remove the screws that attach the timer to the shelf assembly.

(7) Remove the timer from the airplane.

B. Install the Prop Heater Timer (UF002) (Refer to Figure 401).

(1) Put the timer in its correct position on the shelf assembly.

(2) Install the screws that attach the timer to the shelf assembly.

(3) Connect the electrical connector (P401) to the rear of the timer.

(4) Install the MFD (UI406). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(5) Do a test of the timer. Refer to Prop Heat Timer Test.

4. Prop Heat Timer Test

A. General

(1) Before testing make sure that:

- The prop heat electrical connections are tight and correct
- The propeller is installed.

B. Prop Heat Timer Self-Test

CAUTION: The propeller boot heaters will become extremely hot during operation. Be careful when touching the propeller boots or adjacent areas.

(1) Connect external electrical power to the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the ON position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the ON position.

(4) Set the PROP HEAT switch to the ON position.

(5) Make sure that the PROP HEAT CAS message comes on for one second on the Primary Flight Display (PFD) and goes out for one second during a six second cycle.

(6) Carefully touch the three propeller de-icers and make sure that they are generating heat.

(7) Set the PROP HEAT switch to the OFF position.

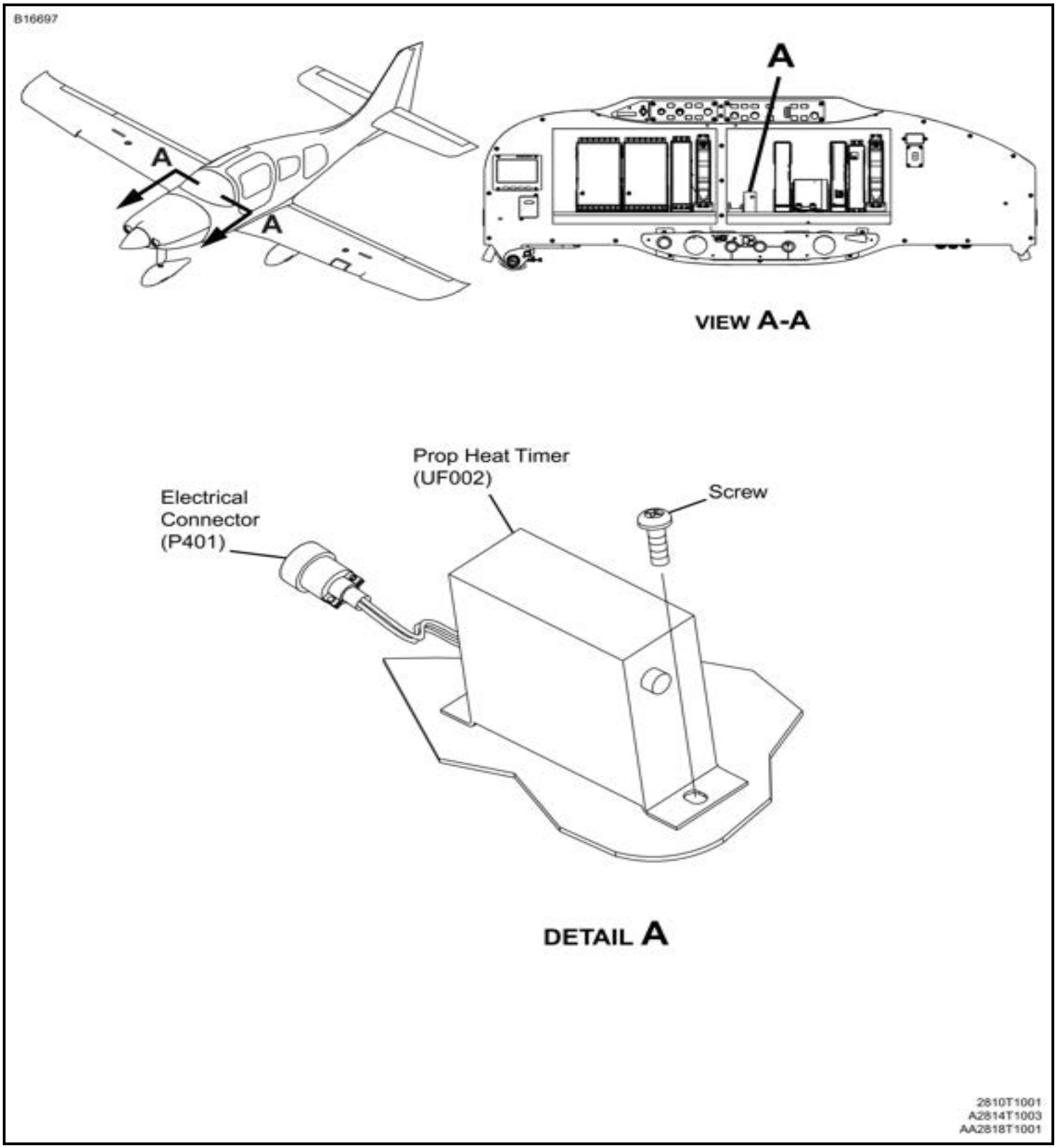
(8) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(9) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(10) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : Prop Heater Timer Installation



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PROPELLER (TKS) - MAINTENANCE PRACTICES

1. General

A. The McCauley propeller can be used with TKS anti-ice boots or electric deice boots.

NOTE: For airplanes that have the McCauley deice boots or a Hartzell propeller installed, refer to Propeller Heat - Maintenance Practices.

B. The TKS anti-ice propeller maintenance practices consist of propeller anti-ice feed shoe removal and installation procedures, and the spinner bulkhead anti-ice components removal, installation and adjustments procedures.

2. Propeller TKS Anti-Ice Feed Shoes Removal/Installation

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed because it is possible that high pressure is still in the system.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

A. Remove the propeller anti-ice feed shoes (Refer to Figure 201).

WARNING: Cement and solvent vapors are toxic and extremely flammable. Use these chemicals only in a well ventilated area away from sparks and vapors. Excess exposure could cause injury or death. If dizziness or nausea occur, get to fresh air immediately. Avoid contact with skin or eyes. Use solvent-resistant gloves to minimize skin exposure. Use safety glasses to protect your eyes from chemicals. If you get chemicals in your eyes, flush your eyes with water for 15 minutes and see a physician immediately. If you get chemicals on your skin, wash thoroughly with soap and water. If you swallow chemicals, do not induce vomiting. See a physician immediately.

CAUTION: The jaws of any tool (vise grips, pliers, etc.) that you use to pull on the feed shoe must be cushioned to prevent damage to the feed shoe, unless the feed shoe is to be scrapped.

(1) Remove external electrical power from the airplane.

(2) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(3) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(4) Remove spinner from the spinner bulkhead. Refer to the applicable steps in Chapter 61, Spinner and Propeller Removal and Installation.

(5) If the feed shoe is to be discarded, remove it from the propeller blade without solvent.

NOTE: The feed shoe can tear or come off in pieces.

CAUTION: When you remove feed shoes from a propeller assembly, be careful not to let solvent leak into the propeller hub and cause damage to the seals. The blade that is being worked on must be pointed down so all excess solvent will run to the outboard tip of the blade. As an extra precautionary measure, the hub and blade area must be masked. Do not use any sharp objects which might scratch the blade when you remove the feed shoe.

(6) Make sure that the blade that is being worked on is pointed down so all excess solvent will run to the outboard tip of the blade.

(7) Use methyl n-propyl ketone or toluene to soften the adhesion line between the anti-ice feed shoe and the propeller blade.

(a) Start at one corner and loosen enough of the feed shoe to grasp it with vise grip pliers, or similar tools.

(8) Apply a steady pull to remove the feed shoe; pull the feed shoe from the blade slowly and carefully while you continue to use methyl n-propyl ketone or toluene to soften the adhesion line.

(9) Remove all residual cement from the blade.

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(a) Use solvents with caution as mentioned above.

(10) Visually do an inspection of the propeller blade for damage or deterioration.

(a) Look for corrosion, cracks, dents or nicks.

(b) If defects are found, the propeller must be repaired by an authorized propeller repair station.

B. Install the propeller anti-ice feed shoes (Refer to Figure 201).

CAUTION: When you install feed shoes on a propeller assembly, be careful not to let solvent leak into the propeller hub and cause damage to the seals. The blade that is being worked on must be pointed down so all excess solvent will run to the outboard tip of the blade. As an extra precautionary measure, the hub and blade area must be masked. Do not use any sharp objects which might scratch the blade when you install the feed shoe.

(1) Make sure that the blade that is being worked on is pointed down so all excess solvent will run to the outboard tip of the blade.

(2) Prepare the propeller blades for the feed shoe installation.

(a) Trim each propeller blade feed shoe if necessary.

(b) Mark the inboard center line on the leading edge of the propeller blades.

(c) Use a template or hand fit the anti-ice feed shoe to the blades so that the feed shoe center line is on the leading edge center line of the propeller blade. Refer to Figure 201.

(d) Mark an area 1/2 inch outside the feed shoe perimeter on the propeller blade with a red pencil. Refer to Figure 201.

(e) Use the red pencil line as the perimeter of the area on each propeller blade to be masked.

(f) Install masking tape around the outline.

CAUTION: It is necessary that the masking steps described be followed so the sealer will be applied to both the cement and 1/8 inch of bare metal. If the cement line and sealer line start at the same point, water will seep under the cement line and cause an unserviceable seal. Refer to Figure 201.

(g) Remove all paint inside of the masked off area on propeller blades painted with lacquer.

1 On propeller blades painted with polyurethane, lightly sand inside the masked off area with 400 grit sandpaper.

(h) Clean all of the masked area on the propeller blades thoroughly with methyl n-propyl ketone or acetone.

1 Quickly clean the solvent from the propeller blades with a clean, dry, lint-free cloth so that you do not leave a film.

(i) Apply a second layer of masking tape on the propeller blades to cover an additional 1/8 inch of bare metal area inside of the previously masked area. Refer to Figure 201.

CAUTION: The metal and rubber parts must be clean. Only very clean surfaces will cause a maximum bond of the cement.

(3) Apply cement to the feed shoes and the propeller blades.

(a) Lightly sand the bond surface of the feed shoe with sandpaper to cause a maximum bond.

(b) Moisten a clean cloth with methyl n-propyl ketone or acetone.

1 Clean the bond surface of the anti-ice feed shoe.

2 Change the cloth frequently to avoid contamination of the clean area.

NOTE: You can use masking tape to prevent any curl of the anti-ice feed shoe edges when you apply cement to the back side of the feed shoe.

(c) Apply masking tape to the breeze side of the feed shoe edges.

1 Let approximately 1/4 inch of the tape overhang the edge of the feed shoe.

(d) Lay the feed shoe on a piece of cardboard with the bond side up.

1 Tape the feed shoe onto the cardboard with the 1/4 inch overlap of masking tape.

(e) Make sure to thoroughly mix the cement.

(f) Apply one even brush coat of 1300L or EC1403 cement to the clean, masked surface of the propeller blade and to the fabric impression side of the anti-ice feed shoe.

1 Apply cement at the room temperature of 60°- 75°F.

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(g) Allow the cement to air dry for a minimum of one hour at 40°F or above, when the relative humidity is less than 75%.

1 If the humidity is 75% to 90%, additional drying time will be necessary to cure the cement.

2 Do not apply cement if the relative humidity is higher than 90%.

(h) After the cement is dry (not tacky), apply a second even brush coat to the anti-ice feed shoe.

1 Then immediately apply an even brush coat of cement to the clean masked off area of the propeller.

NOTE: Timing is important because the cement on both surfaces must reach the tacky stage at the same time.

(4) Install the feed shoes to the propeller blades.

(a) Remove the anti-ice feed shoe from the cardboard, and the masking tape from the anti-ice feed shoe before you start the installation.

(b) When the cement is tacky on both the propeller blade and feed shoe surfaces, put the anti-ice feed shoe center line to the center line on leading edge of the blade. Start with the inboard end of the blade and work toward the tip.

1 If the cement dries, use methyl n-propyl ketone or toluene as necessary until the cement is tacky.

2 If the feed shoe is off center, pull it up with a quick motion and install it again.

3 Use methyl n-propyl ketone or toluene as necessary when you have to install the feed shoe again.

(c) When the feed shoe is correctly in place, use a rubber or wooden hand roller and press firmly on the full length of the leading edge to form a tight bond.

(d) Gradually push the roller over each side of the leading edge contour to avoid trapping air.

1 Roll from the leading edge of the propeller blade toward the tip.

2 Work all excess feed shoe material out to the perimeter before you move to the next section.

3 If there is excess material at the feed shoe edges that tends to pucker, use your fingers and carefully work puckers smooth.

(e) Remove the masking tape from the propeller blades.

(5) Apply sealer to the feed shoes and propeller blades (Refer to Figure 201.)

(a) Mix two parts of Sunbrite 78-U-1003 brushable black enamel with one part of enamel catalyst U-1001-C.

CAUTION: It is necessary that the masking steps described be followed so the sealer will be applied to both the cement and 1/8 inch of bare metal. If the cement line and sealer line start at the same point, water will seep under the cement line and cause an unserviceable seal. (Refer to Figure 201.)

(b) Apply one, even, brush coat of sealer to the area around the feed shoe and make sure you cover the 1/8 inch of bare metal and adhesive along with the masked off area of 1/8 inch of the anti-ice feed shoe.

1 Remove the masking tape as the sealer is brushed on, otherwise, the sealer will pull up along with the tape.

2 Let the sealer dry.

3. Slinger Ring and Slinger Nozzle Alignment Check

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed because it is possible that high pressure is still in the system.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

A. Examine the TKS slinger nozzle to slinger ring alignment (Refer to Figure 202).

(1) Adjust the slinger nozzle to direct the fluid stream to land in the slinger ring channel as necessary.

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(a) Bend and rotate the slinger nozzle at the fitting to align the nozzle with the slinger ring channel.

(b) Extend the slinger nozzle into the slinger ring channel with and edge distance as shown In Figure 202.

(2) Rotate the propeller slowly by hand and make sure the distance between the slinger ring and the feeder tube is in alignment tolerance.

(a) Adjust the slinger nozzle as necessary to get good alignment.

4. Anti-Ice Tube to Propeller Blade Alignment Check

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed because it is possible that high pressure is still in the system.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

A. Adjust each propeller anti-ice tube so the center of the tube end is centered approximately over the second groove from the leading edge toward the camber side of the blade when the blade is at low pitch. (Refer to Figure 203).

NOTE: Note that the grooves are identified as Leading Edge Groove, First Groove, Second Groove, and Third Groove. The Leading Edge Groove is a short groove located on the leading edge of the propeller boot.

NOTE: A small punch with a blunt end that will fit into the anti-ice tube can be used to carefully position the tube as necessary.

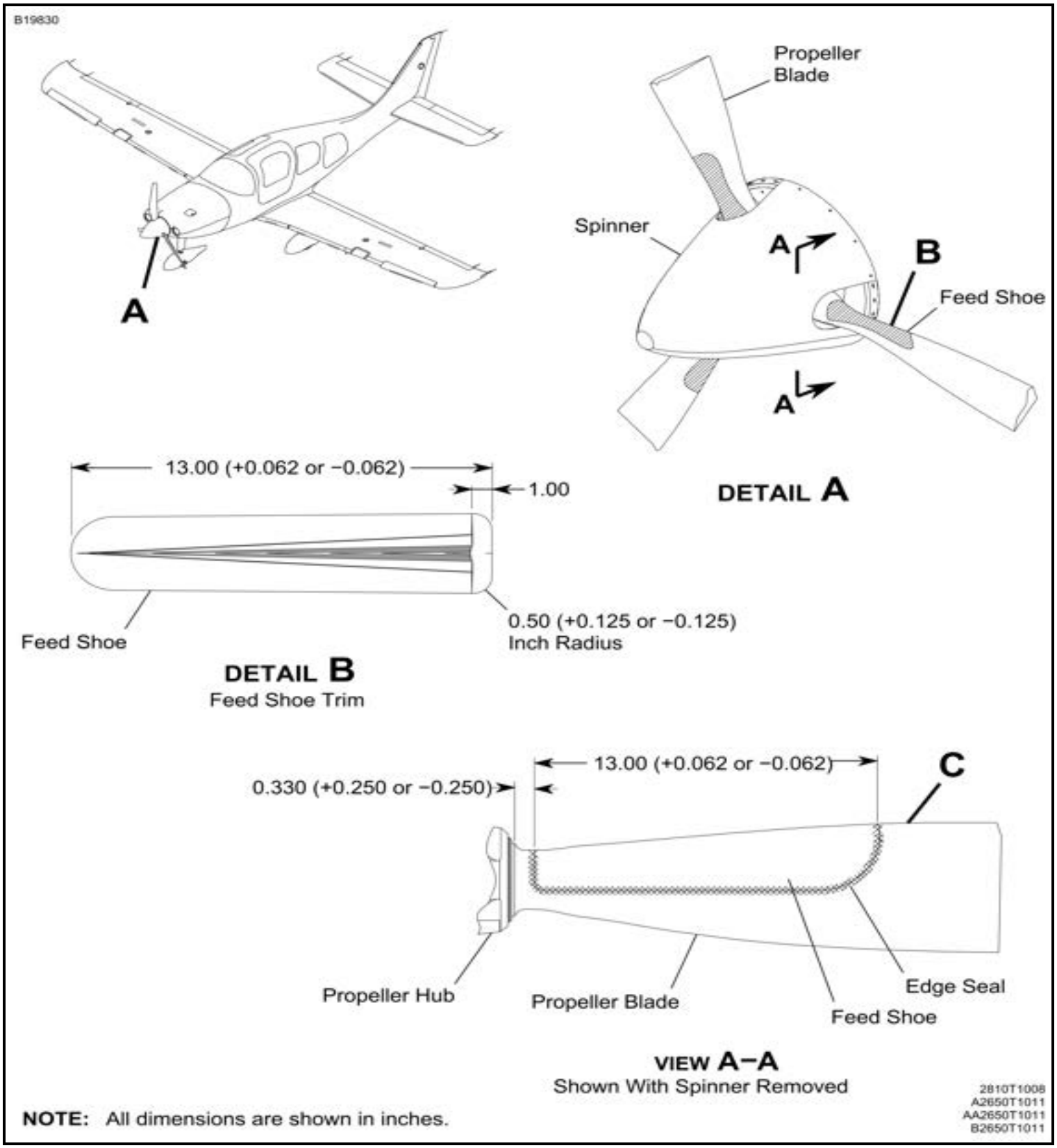
(1) Adjust the anti-ice tube so the clearance between the blade surface and the anti-ice tube is between 0.075 Inch minimum and 0.100 Inch maximum.

(2) Make sure the anti-ice tube does not contact the feed shoe contour.

(3) Make sure the anti-ice tube is contained within the contour of the spinner shell.

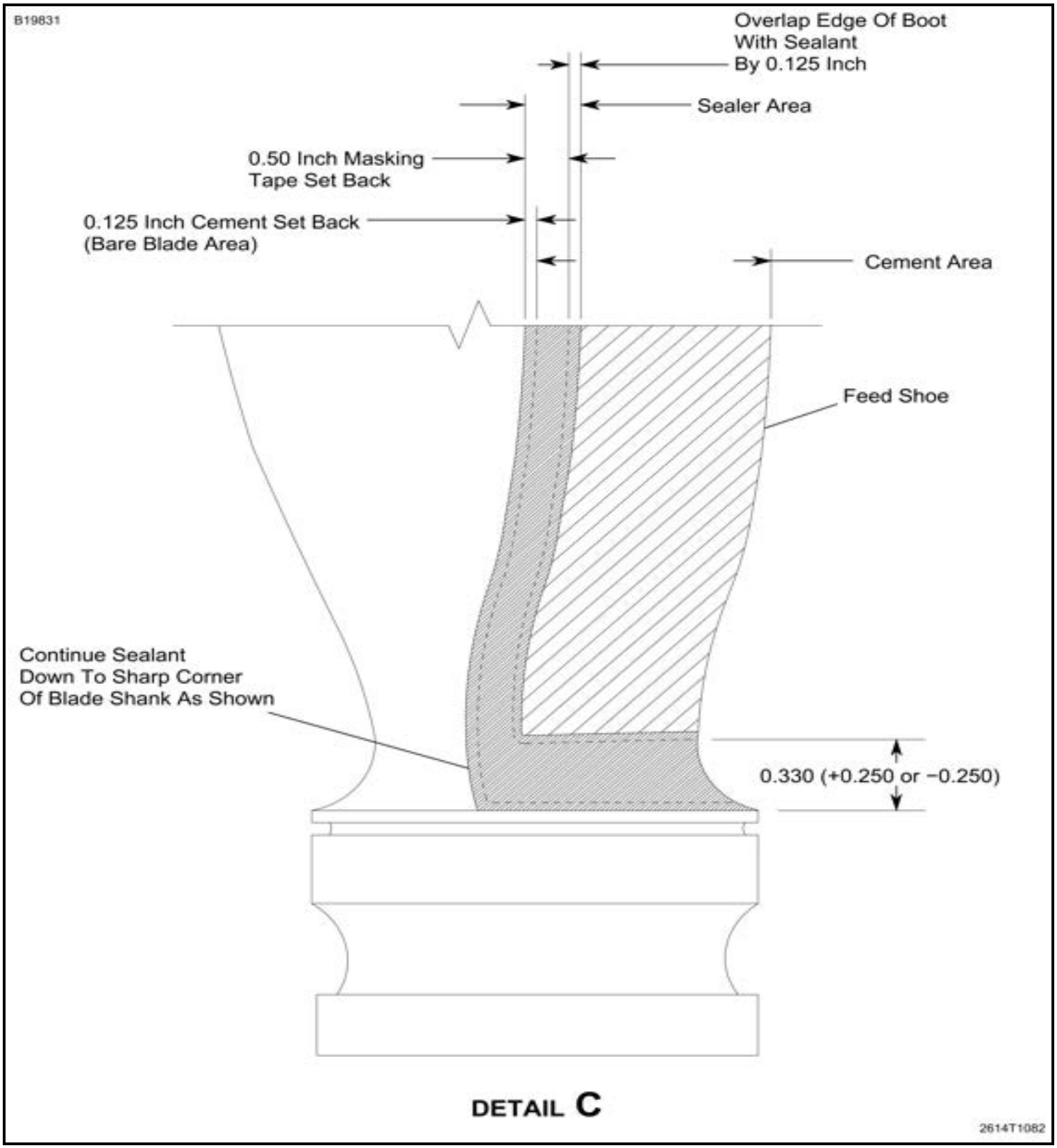
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Figure 201 : Sheet 1 : TKS Propeller Anti-Ice Feed Shoe Installation



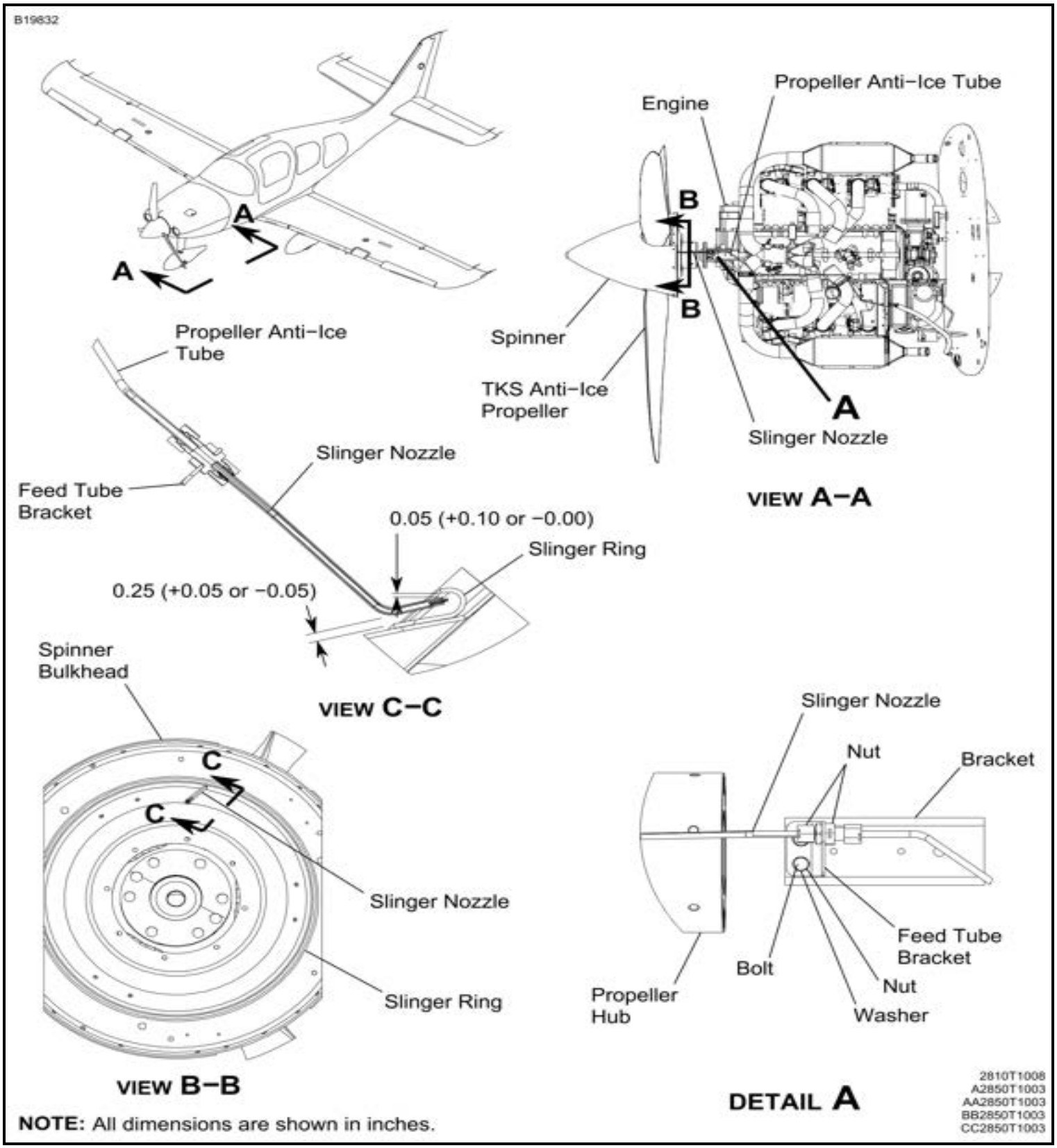
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Figure 201 : Sheet 2 : TKS Propeller Anti-Ice Feed Shoe Installation



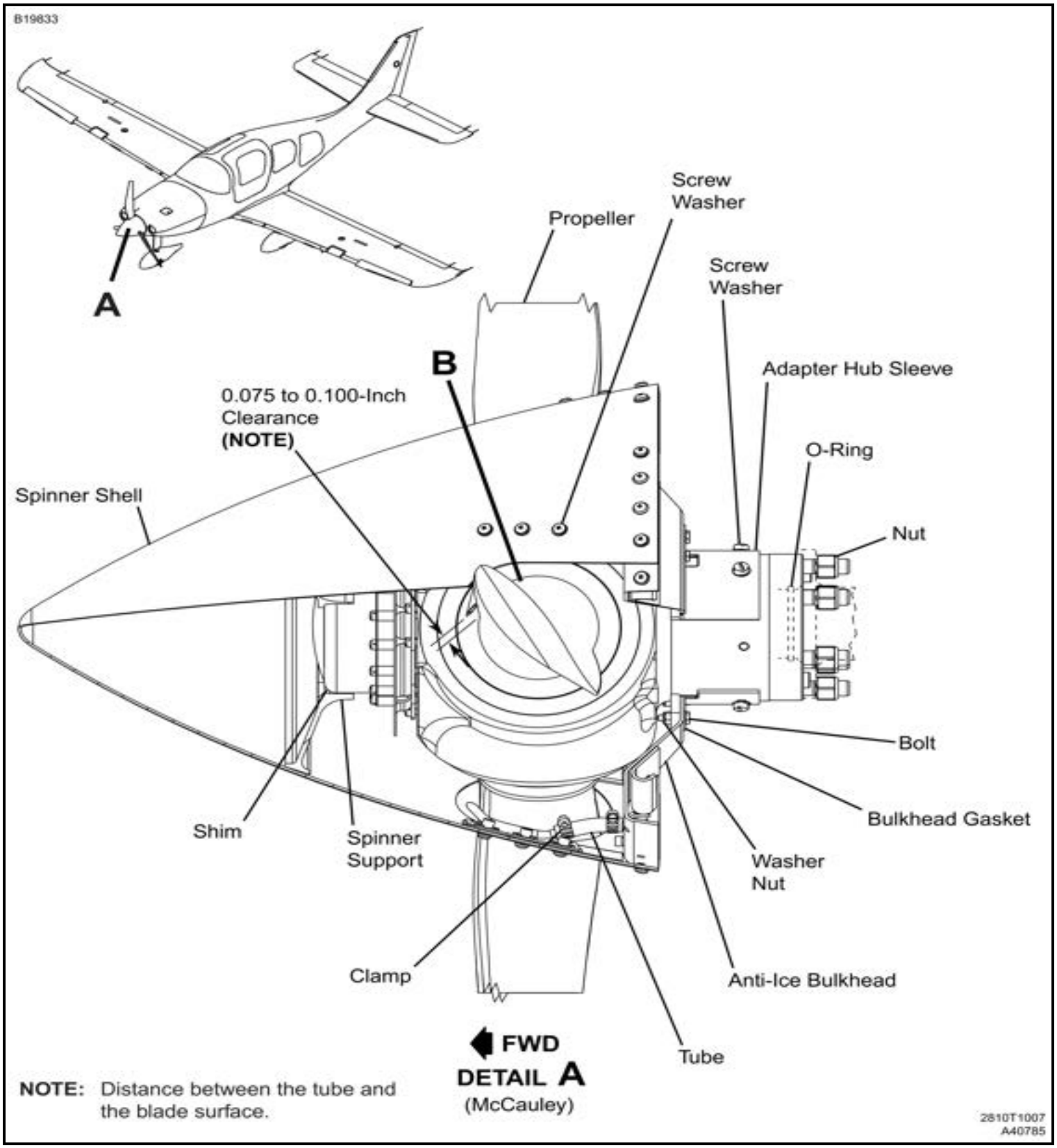
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Figure 202 : Sheet 1 : Slinger Ring and Slinger Nozzle Alignment Check



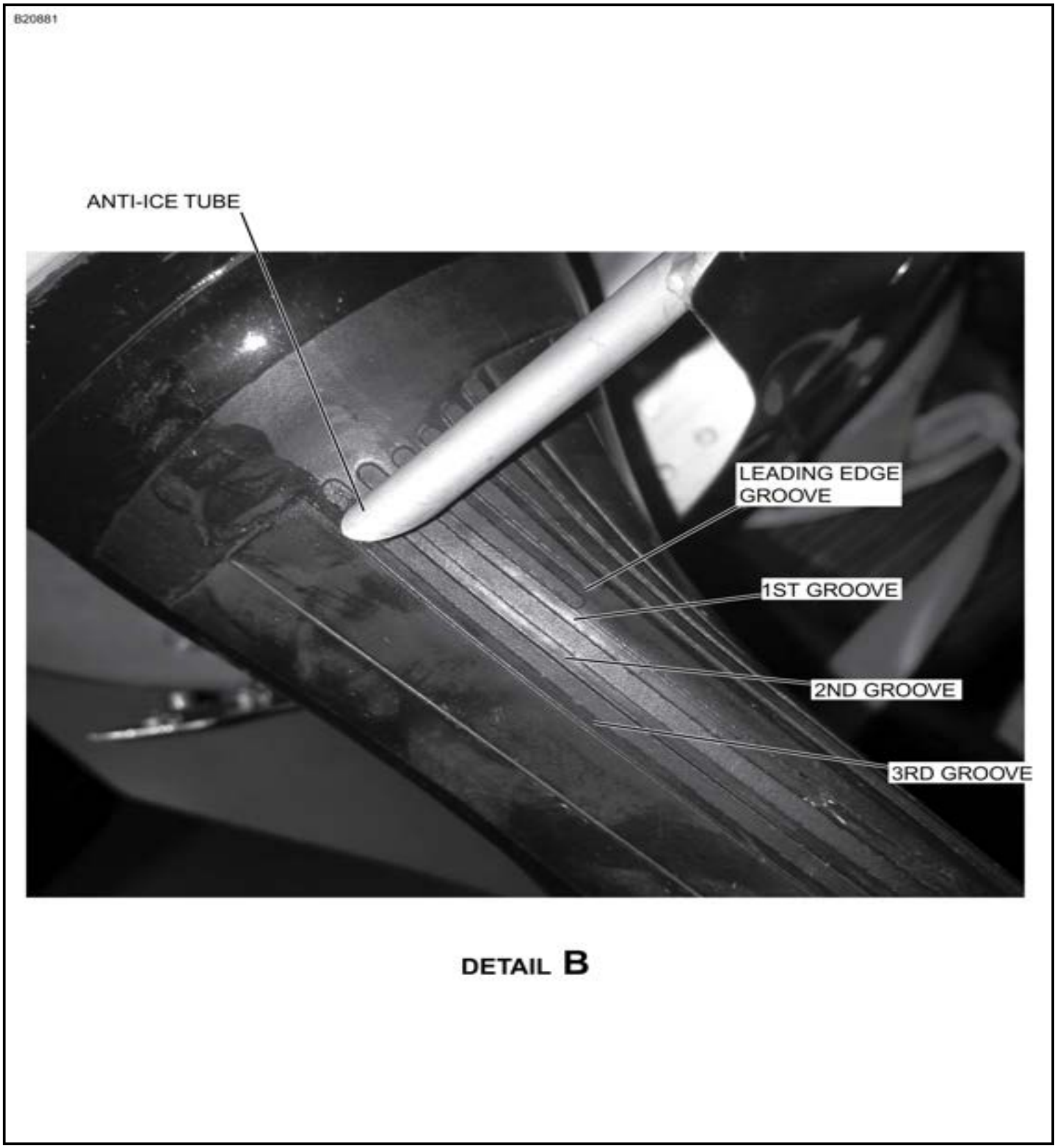
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Figure 203 : Sheet 1 : Anti-Ice Tube to Propeller Blade Alignment Check



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Figure 203 : Sheet 2 : Anti-Ice Tube to Propeller Blade Alignment Check



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AIRWORTHINESS LIMITATIONS

1. General

A. The Airworthiness Limitations section (Chapter 4) is FAA approved and specifies maintenance required under Sections 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

B. **Inspections** - This chapter contains mandatory maintenance tasks including inspections (refer to the Airframe Service Cycle Inspection section) and life-limited item replacement requirements (refer to the Life-Limited Parts section). An airframe inspection in accordance with the Airframe Service Cycle Inspection section is required every 3000 hours. This 3000-hour period is known as an Airframe Service Cycle (ASC). The tables below identify and describe the required maintenance tasks for each ASC.

NOTE: These items are in addition to the items required to maintain the continued airworthiness of the airplane. After 25,200 TIS hours, the FAA requires a Major Airframe Inspection (MAI). The Major Airframe Inspection Checklist found in Section 04-10-00 contains the MAI items.

C. **Grace Period** - The required inspections listed above must be performed within 100 hours of the specified interval or at the next annual inspection, whichever occurs first.

D. **Airframe Service Cycle Consistency** - If work is accomplished during the grace period, then the next inspection/part replacement is due at the time in service determined by adding the required interval to the BEGINNING of the grace period. For example, if the first ASC is accomplished during the grace period at 3099 hours TIS, then the next ASC is due at 6000 hours TIS (or within the grace period following 6000 hours). If work is accomplished early, then the next inspection/part replacement is due at the time in service determined by adding the required interval to the TIS at which the work was last accomplished. For example, if the first MAI was accomplished at 24,000 hours TIS, then the next MAI is due at 49,200 hours TIS (or within the grace period following 49,200 hours).

2. Airframe Service Cycle Inspection (Every 3000 Hours)

Table 1. Fuselage and Vertical Stabilizer

INSPECTION AREA	MAINTENANCE TASK	CHAPTER NUMBER
Bonding of the two fuselage halves	**Visual inspection of the bonding seams:** Tap test seam area around fuselage halves in accordance with instructions in Section 20-90-00, Tap Testing. This test detects unbonded areas by the change in audible response when the surface is systematically tapped.	53
Aft Fuselage	Complete the Aft Fuselage Inspection in accordance with the instructions given in Chapter 53, Fuselage Components - Adjustment/Test. **NOTE:** **This inspection must be completed by a composite technician that has been trained in accordance with the requirements found in the LC-550FG Series Structural Repair Manual, Chapter 51-00-01.**	53
Ventral Fin	Visually inspect the ventral fin for visible damage and evidence of latent damage.	53
Wing Attachment	Replace the wing attachment bolts and nuts with new bolts and nuts. There are a total of 30 bolts, 15 on each side of the wing saddle, that connect the fuselage to the wing as shown in Figure 2, Section 57-10-00. The bolts vary in size from AN4-16 to AN4-20. When a bolt is removed, replace it with one that is the same size. The bolts must be replaced one at a time using a systematic process. It is recommended that the left forward bolt be removed and replaced first, and then continuing aft on the left side of the wing saddle. When the left side is complete, start on the right forward position and move aft.	53 & 57
CAUTION: **The right aft wing bolt is reversed from the other bolts. That is, the nut is on top rather than the bolt head. This is the correct method of installation and ensures clearance of the bolt from the flap actuating system.**		

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Wing Attachment (continued)	Use the following steps to remove and install the wing bolts 1. Remove carpeting and footwell panel in rear seat area, exposing area between front and rear spars. 2. Remove flap assembly panel plate under the aft wing area in the fuselage saddle, exposing area aft of rear spar. 3. Remove inspection cover in the fuel assembly panel, which is located in the left forward saddle area, exposing area forward of main spar. 4. Replace all bolts and nuts. The bolts must be removed and replaced one at a time to prevent misalignment of the wing. Refer to Chapter 57 for torque values. 5. When a bolt is removed, visually inspect the area adjacent to the bolt hole for evidence of damage, failure, and cracking. Refer to Chapter 57 regarding bolt length and torque requirements. 6. The bolts and nuts cannot be reused for any purpose. All bolts and nuts that are removed must be permanently discarded or destroyed, regardless of the time in service.	
Cockpit Frame	Leave rear seat footwell exposed for this inspection. 1. Remove front and rear seats and front floor carpeting. 2. Remove carpeting from baggage floor and shelf. 3. Inspect the exposed area for signs of cracks, delamination, and fatigue.	25
Airframe Paint	Perform a detailed inspection of the airplane's clear-coat and paint. All paint must conform to the latest FAA approved revision of Cessna Document SX512701. Contact the manufacturer for information if paint repair is necessary. **NOTE:** **The airplane paint has a clear-coat cover that provides protection from UV rays. If the clear-coat is damaged, degradation of the paint and underlying surface is possible. The airframe paint does not have a specific life-limit. Its serviceability depends on the proper care of the airplane as discussed in Section 8 of the AFM/POH and the operating environment. For example, if the airplane is washed and waxed infrequently or the airframe is subject to a hail or dust storm, erosion and/or damage to the clear-coat is possible.**	51
Transparencies	Check all transparencies for excessive crazing, UV yellowing, and evidence of cracking. Replace as required.	56
Doors	Remove left and right doors with door hinge blocks and inspect hinge block attachment holes for evidence of damage. Inspect attachment screws of dynamic hinge to the door for tightness.	52
Door Openings	Check door openings, particularly the corner of the door openings, (including baggage compartment door) for evidence of cracking. **NOTE:** **Sometimes the paint may crack around a door opening without the underlying fiberglass surface being affected. If paint cracks are observed, the painted surface must be removed by sanding to verify there are no cracks in the fiberglass.**	52

Table 2. Wings

INSPECTION AREA	MAINTENANCE TASK	CHAPTER NUMBER

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Bonding of the Top and Bottom Wing	Visually inspect the bonding seams. Tap test seam area around leading and trailing edges in accordance with Chapter 20-90-00. The tap test detects unbonded areas by the change in audible response when the surface is systematically tapped.	57
Bonding of Wing Skin to Ribs and Spars	Tap test areas where the top and bottom of the skin are bonded to the spars and ribs in accordance with Chapter 20-90-00, Tap Testing. If the skin is separated, a sponginess will be felt or a dullness in tone will be heard when tapped.	57

Table 3. Flight Control Systems & Systems

INSPECTION AREA	MAINTENANCE TASK	CHAPTER NUMBER
Wing Flaps	Visually inspect bonding seams. Tap test seam area around leading and trailing edges in accordance with Chapter 20-90-00. The tap test detects unbonded areas by the change in audible response when the surface is systematically tapped. Check for cracks on drive rib.	27
Ailerons	Visually inspect bonding seams. Tap test seam area around leading and trailing edges in accordance with Chapter 20-90-00. The tap test detects unbonded areas by the change in audible response when the surface is systematically tapped. Check for cracks and buckling in area of drive rib.	27
Rudder	Remove rudder and perform visual inspection of the bonding seams. Tap test seam area around leading and trailing edges in accordance with Chapter 20-90-00, Tap Testing. The tap test detects unbonded areas by the change in audible response when the surface is systematically tapped. Check condition of hardware for cracks, corrosion, and wear.	27
Wing Flap Actuator	Disassemble flap assembly and grease motor and gear train in accordance with the Flaps section of Chapter 27-50-00. Check hardware for cracks, corrosion, and wear.	27
Aileron Push Tubes and Hardware	Check for wear and cracks. Inspect tubes for signs of corrosion. Check bell cranks and attachment hardware for signs of cracks and corrosion.	27
Elevator Push Tubes and Hardware	Check for wear and cracks. Inspect tubes for signs of corrosion. Check bell cranks and attachment hardware for signs of cracks and corrosion.	27
Elevator Trim Tab	Remove elevator trim tab and repack servo motor in accordance with Section 27-30-00 , Elevator Trim Tab and Elevator Trim Tab Servo. Inspect hardware for cracks, corrosion, and wear.	27
Elevator	Remove elevator and inspect piano hinge for wear and corrosion.	27
Horizontal Stabilizer	Remove horizontal stabilizer and check stabilizer tube and bolts for cracks, corrosion, and wear. Replace as required.	27

Table 4. Fuel System

INSPECTION AREA	MAINTENANCE TASK	CHAPTER NUMBER
Boost Pump	Overhaul per Duke Inc. instructions included in overhaul kit, or replace the boost pump.	28

Table 5. Landing Gear

INSPECTION AREA	MAINTENANCE TASK	CHAPTER NUMBER
Teflon Bushings In Gear Box	Remove landing gear and check Teflon bushings in gear box for each main gear leg for condition and wear. Refer to Chapter 32 for specific details about the landing gear.	32

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Gear Box Attachment Bolts	Remove one attachment bolt from each side of the gear box and check for corrosion. If corrosion is noted, replace all attachment bolts in the gear box. If no corrosion is noted, replace bolts that were removed and check the torque on all bolts in the gear box in accordance with Section 32-10-00, Main Gear Assembly. Refer to Chapter 32 for specific details about the landing gear.	32
Landing Gear Alignment	Once landing gear is reinstalled, check camber and toe-in. Refer to Chapter 32 for specific details about the landing gear.	32

3. Life-Limited Parts

A. The items listed below are to be replaced with new items at the times/intervals shown.

Table 6. Life-Limited Parts

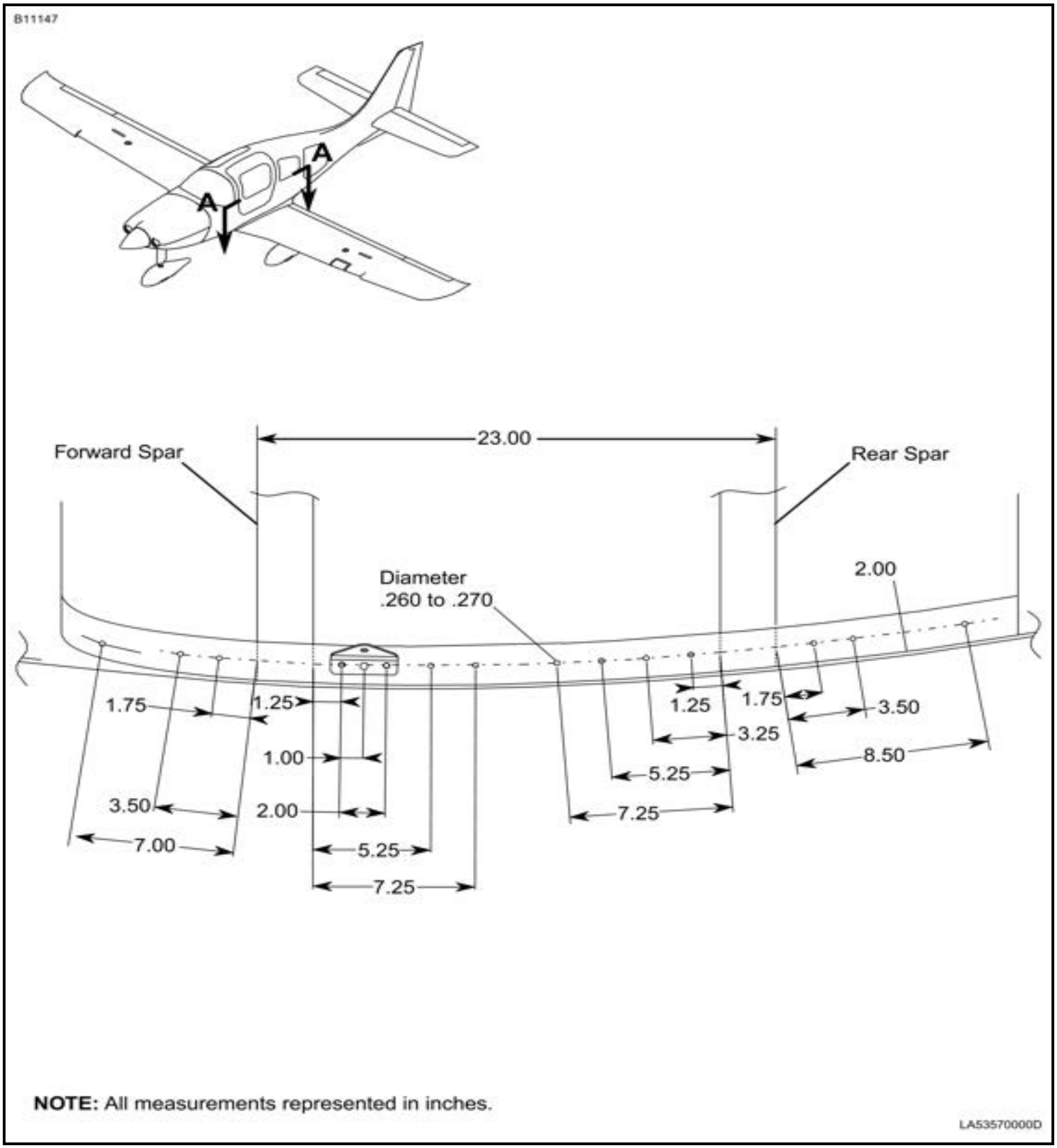
Item	Location	Replacement Time/Interval
Emergency Locator Transmitter (ELT) Battery	Aft of the baggage compartment hat rack - Refer to Chapter 25 for more information.	Every two years (Artex 200), every five years (Artex ME406), or when the battery has been used for more than one hour or 50 percent of its life.
3-volt Lithium Battery in Avidyne Multi-Function Display (MFD)	On an internal processor board inside the MFD - Refer to Chapter 34 for more information.	Every ten years or when the CMOS memory of the MFD fails to retain configuration data.
System - Dry Sealed Lead- Acid Type Battery (Two)	Underneath the hat rack on the pilot's side.	Alternate replacement every two years - First replace the left battery, after two more years replace the right battery. Alternate replacement every two years. However, if the battery fails to hold a charge, it must be replaced.
No. 1 (Right) Alternator	Just rear of the propeller on the copilot's side.	Overhaul or replace alternator every 2000 hours.
No. 2 (Left) Alternator	Just rear of the propeller on the pilot's side.	Overhaul or replace alternator every 2000 hours. Check belt condition and tension every 100 hours or annually. Belt tension range is 13 to 17 lbs.-ft. measured as described in Chapter 24. Replace the belt whenever there is cracking, fraying, or signs of excessive wear, every 5 years, or 2000 hours whichever comes first.
Front and Rear Seat Restraint Devices	At front and rear seats.	Every 3000 hours or 10 years, whichever occurs first.
Wing Attachment Bolts	Wing saddle	Every 3000 hours
SpeedBrakes	Outboard top of wing, each side.	Every 1000 hours return SpeedBrake cartridges to Precise Flight Inc. for clutch lubrication and spring replacement.
SpeedBrakes	Outboard top of wing, each side.	Every 5000 hours return SpeedBrake cartridges to Precise Flight Inc. for drive assembly replacement.
Carbon Monoxide Detector	Mounted to the gusset on the firewall behind the Primary Flight Display (PFD).	Every 7 calendar years return to CO Guardian LLC for CO Sensor replacement and calibration.

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Elevator Torque Tube, LC55273200E, installed by Mandatory Service Bulletin SB-05-005A	Attached to aft edge of the horizontal stabilizer and to the left and right halves of the elevator.	300 hours or 18 months, whichever occurs first. Additionally, this elevator torque tube can be replaced by Elevator Torque Tube, LC55273200, Rev. G or later approved revision, per Mandatory Service Bulletin SB-06-002B or SB-06-002C. Aircraft equipped with Elevator Torque Tube, LC55273200, Rev. G or later approved revision, have no required replacement interval.
Airplane		25,200 flight hours

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Figure 202 : Sheet 1 : Wing to Fuselage Attachment Bolt Locations



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INSPECTION TIME LIMITS

1. Major Airframe Inspection Checklist (Every 25,200 Hours)

This section will contain a description of all the inspection items that must be performed on the Major Airframe Inspection. This checklist will be added to the manual as part of a revision level. There is currently a life limit on the airplane of 25,200 hours until Section 04-10-00 is completed and approved by the FAA.

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GENERAL - TIME LIMITS AND MAINTENANCE CHECKS

1. General

A. This chapter sets forth recommended scheduled maintenance checks and component overhaul/replacement time periods. These requirements are in addition to those stipulated in Chapter 4. An inspection checklist is included which should be photocopied and utilized during each scheduled inspection. The checklist includes the minimum items recommended by the manufacturer to be inspected and/or serviced. Also included is a list of special inspections and service items, which must be complied with in order to ensure the continued safe operation of this airplane.

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TIME LIMITS AND INSPECTIONS

1. Time Limits

A. The information in Time Limits and Special Inspection Items identifies either component time limits and/or required special inspections. These inspections must be incorporated into a 100 hour or annual inspection as applicable. If it is anticipated that the component time limit and/or special inspection will occur before the next applicable required inspection, it must be incorporated in the current required inspection.

2. Time Limits and Special Inspection Items

A. First 5 hours and every 100 hours thereafter

(1) Chapter 21

(a) Air Conditioning Compressor - Inspect belt and adjust as required to 50 to 70 lbs. tension. Refer to Chapter 21, Automatic Climate Control System (ACCS) - Maintenance Practices.

B. Every 50 hours and 100 hours or annually

(1) Chapter 78

(a) Inspect exhaust system, turbochargers, and tailpipes. Visual inspection required at 50 hours. Comprehensive inspection required at 100 hours or annually. Refer to Chapter 78, Turbocharger and Exhaust System - Maintenance Practices.

C. At first 100 hour inspection and every 300 hours thereafter

(1) Chapter 73

(a) Remove, inspect, clean, and reinstall fuel nozzles. If ultrasonic cleaning is available, it is the preferred method to use. **Do not** insert anything into fuel nozzle orifice. If cleaning will not remove internal deposits, fuel nozzle must be replaced. Refer to Chapter 73, Engine Fuel System - General.

D. Every 100 hours or annually

(1) Chapter 20

(a) Check resistance of all static wicks between the wick base and the tip. The test requires use of a megohmmeter, sometimes referred to as a Megger. A properly functioning static wick should indicate 1 to 100 megohms of resistance. Refer to Chapter 20, Lighting Protection and Static Dissipation - Maintenance Practices.

(2) Chapter 27

(a) Inspect aileron linear bearing for foreign object debris. Ensure there is no debris or adhesive attached to the aileron control rod, bearing housing, bearing race, or ball bearings. Refer to Chapter 27, Aileron Control System - Maintenance Practices.

E. Every 100 hours and at overhaul

(1) Chapter 78

(a) Conduct exhaust system pressure test. Refer to Chapter 78, Turbocharger and Exhaust System - Maintenance Practices.

F. Every 200 hours or annually

(1) Chapter 12

(a) Service nose strut. Refer to Chapter 12, Filter, Strut, Brake, and Battery - Servicing.

(2) Chapter 27

(a) Inspect elevator torque tube. Refer to Chapter 27, Elevator Control System - Maintenance Practices.

G. Every 400 hours

(1) Chapter 32

(a) Repack new wheel bearings (nose and main landing gear) after first 100 hours, then every 400 hours thereafter. This should be done more frequently if experience indicates the need based on the type of operations conducted. Refer to Chapter 32, Wheel, Tires, and Brake System - Maintenance Practices.

H. Every 500 hours

(1) Chapter 28

(a) Check fuel gauge accuracy. Refer to Chapter 28, Fuel Indicating System - Maintenance Practices.

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(2) Chapter 30

(a) Remove the power. Do a continuity check on each one of the FIKI low pressure switches individually. Make sure they show an open circuit. Refer to the applicable procedures in Chapter 30, TKS Low Pressure Switch (FIKI) - Removal/Installation, Low Pressure Switch Removal/Installation for the switch/connector location and identification.

(b) Do the Flow Transducer Check. Refer to the applicable procedures in Chapter 30, TKS Anti-Ice System (FIKI) - Inspection/Check, Flow Transducer Check.

(c) Do a High Pressure Switch Check and Low Pressure Discrete Wiring Check. Make sure that the Flow Transducer Check is completed before the Low Pressure Discrete Wiring Check is started. Refer to the applicable procedures in Chapter 30, TKS Anti-Ice System (FIKI) - Inspection/Check, High Pressure Switch Check and Low Pressure Discrete Wiring Check.

(3) Chapter 34

(a) Check the resistance of the lift transducer heaters. Examine the wing skin under the lift transducer to make sure it is serviceable. Refer to the applicable procedures in Chapter 34, Lift Transducer (Airplanes 2049 and ON) - Removal/Installation, Lift Transducer Removal/Installation.

(b) Do the Ice Mode Check. Refer to the Chapter 34, Stall Warning System (Airplanes 2049 and On) - Inspection/Check, Ice Mode Check.

(c) Do the Stall Warning Heat Mode Check. Refer to the Chapter 34, Stall Warning System (Airplanes 2049 and On) - Inspection/Check, Stall Warning Heat Mode Check.

(4) Chapter 71

(a) Disassemble magnetos and inspect in accordance with TCM Manual X42002-1. Refer to Chapter 71, Powerplant - General.

(b) Remove and inspect oil pressure relief valve in accordance with the TCM Overhaul Manual. Check plunger for scraping and nicks. Check the conical face for roughing. Check limits in accordance with TCM specifications. Replace or reface parts as required. See Chapter 18 of the *TCM Overhaul Manual*. Refer to Chapter 71, Powerplant - General.

I. **Every 500 hours or biennially**

(1) Chapter 27

(a) Inspect aileron control rods for cracking. Refer to Chapter 27, Aileron Control System - Maintenance Practices.

(b) Inspect aileron trim tab friction device for proper sliding friction. Assure device is free from oils, grease, dirt, etc.. Refer to Chapter 27, Aileron Control System - Maintenance Practices.

(c) Inspect the aileron hinges and middle hinge bonding jumper for corrosion. Refer to Chapter 20, General Aircraft Conductivity Check.

J. **At first 500 hour inspection and every 1000 hours thereafter**

(1) Chapter 28

(a) Inspect fuel selector valve. Refer to Chapter 28, Fuel Distribution - Maintenance Practices.

K. **Every 1000 hours**

(1) Chapter 20

(a) Remove front and rear seats, carpeting, and interior side panels. Inspect the four SAFE strips in the lower fuselage interior for wear, tearing, adhesion, and overall general integrity. Refer to Chapter 20, Lightning Protection and Static Dissipation - Maintenance Practices.

(2) Chapter 24

(a) Inspect the alternators to ensure the bearings operate smoothly. If the bearings do not operate smoothly replace the alternator. If the No.1 (right) alternator brushes or the Kelly alternator brushes are more than 75 percent worn, replace the alternator. If the Plane Power alternator brushes extend less than 0.25 inches from the edge of the brush holder case, replace the brush assembly. For alternator No. 1 (right), ensure the clutch resistance is 140 in-lbs or greater of torque. Refer to Chapter 24, DC Generation - Maintenance Practices.

(b) Inspect power grid. Refer to Chapter 24, Electrical Load Distribution - Maintenance Practices.

(3) Chapter 27

(a) Check and record the control deflections on the ailerons, flaps, elevator, and rudder. Refer to Chapter 27, Flight

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Controls - General.

(b) Remove rudder and check hinges. Refer to Chapter 27, Rudder Control System - Maintenance Practices.

(4) Chapter 32

(a) On each main gear, remove the wheel pants, wheels, axles, strut fairings, and underside gearbox access panels. Perform detailed inspection of the landing gear legs. Look for evidence of metal fatigue, corrosion, cracks, and deformation. Pay particular attention to the area where the strut is inserted into the gearbox. Refer to Chapter 32, Main Landing Gear and Brakes - Maintenance Practices.

(5) Chapter 52

(a) Clean door seal system pump filter. Refer to Chapter 52, Door Seal System - Maintenance Practices.

L. **Every 1000 hours, 12 months, or 3 years, as applicable**

(1) Chapter 22

(a) If the Garmin GFC 700 autopilot system is installed, visually inspect the GSA 81 servos every 1000 hours or 12 months (whichever occurs first), clean and apply grease to the output gear every 1000 hours or 3 years (whichever occurs first), and inspect the GTA 82 trim adapter. Refer to Chapter 22, Garmin GFC 700 Autopilot (G1000) - Maintenance Practices.

M. **Every 1000 hours or every 5 years, whichever occurs first**

(1) Chapter 52

(a) Inspect exterior emergency door release system. Activate exterior hinge release mechanism to ensure proper operation. Inspect hinge wires for corrosion, kinks, and wear. Replace as required. Move cable up and down to ensure ease of movement. Inspect overhead cabling for chaffing, binding, and frayed cables. To rearm the system, reinsert door hinge wires, and pull both the actuating cables back to their stops. Store the few inches of excess cable in a manner that prevents kinking or binding. Refer to Chapter 52, Cabin and Baggage Door - Maintenance Practices.

N. **Every 1500 hours or every 3 years, whichever occurs first**

(1) Chapter 30

(a) Replace the TKS Anti-Ice System Filter Element. Refer to Chapter 30, TKS Anti-Ice System Filter Element (Inadvertent) - Removal and Installation.

O. **Every 3000 hours**

(1) Chapter 27

(a) Inspect and service elevator trim motor. Refer to Chapter 27, Elevator Control System - Maintenance Practices.

P. **Every 12 months**

(1) Chapter 22

(a) If Garmin GFC 700 autopilot system is installed, visually inspect each Garmin GSM 85 servo mount and verify slip clutch settings. Refer to Chapter 22, Garmin GFC 700 Autopilot (G1000) - Maintenance Practices.

Q. **Every 2 years**

(1) Chapter 34

(a) Garmin GDC 74A - The static system and altimeter must be verified in accordance with 14 CFR Section 91.411 and Appendix E of 14 CFR Part 43. Test procedure per the latest revision of the *Garmin G1000 System Maintenance Manual*, P/N 190-00577-03. Refer to Chapter 34, Pitot Static System - Maintenance Practices.

R. **Every 24 calendar months**

(1) Chapter 34

(a) Altimeter and Static System Inspection - Refer to AC 43-6B, Appendix E of 14 CFR Part 43, and 14 CFR Part 91. Refer to Chapter 34, Pitot Static System - Maintenance Practices.

(b) Automatic Pressure Altitude encoding System and Transponder inspection and test - Refer to AC 43-6B, Appendix F of 14 CFR Part 43, and 14 CFR Part 91. Refer to Chapter 34, Pitot Static System - Maintenance Practices.

(c) Perform a compass swing. Refer to Chapter 34, Attitude and Directional System - Maintenance Practices.

S. **Every 2 years (Artex 200) or every 5 years (Artex ME406)**

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(1) Chapter 35

(a) Emergency Locator Transmitter (ELT) Battery. Refer to Chapter 35, Emergency Locator Transmitter (ELT) - Maintenance Practices.

T. **Every 4 years or at engine overhaul, whichever occurs first.**

(1) Chapter 71

(a) Overhaul magnetos in accordance with TCM Manual X42002-1. Refer to Chapter 71, Powerplant - General.

U. **Every 5 years**

(1) Chapter 25

(a) Remove and send the Model 455 Carbon Monoxide Detector to CO Guardian for the CO sensor replacement and recalibration. Refer to Chapter 25, Pulse Oximeter/CO Detect (T240) - Maintenance Practices.

(2) Chapter 35

(a) Purge the oxygen system. Inspect the oxygen lines and fitting for cracks, leaks, and damage. Overhaul the regulator/valve assembly, replace O-rings, and verify the regulator pressure setting. Replace the flexible oxygen lines on the breathing stations. Overhaul the A4/A5 flowmeters. Refer to Chapter 35, Oxygen - General.

V. **Every 5 years. Every 3 years for cylinder P/N 06N2001-3SCI.**

(1) Chapter 35

(a) Oxygen Cylinder(s) – Hydrostatically test 5 years after the date stamped on each metal cylinder or on the neck of the non-metallic cylinder, and every 5 years thereafter, except oxygen cylinder P/N 026N2001-3SCI must be hydrostatically tested 3 years after the date stamped on the cylinder neck, and every 3 years thereafter. Refer to Chapter 35, Oxygen System - Maintenance Practices.

W. **After Hard Landing**

(1) Chapter 32

(a) Hard Landing Inspection - In the event of a hard landing, the aircraft should be inspected in accordance with Chapter 32-20-00, Hard Landing Inspection.

X. **After Lightning Strike**

(1) Chapter 20

(a) Lightning Strike - In the event of a lightning strike, follow inspection and repair procedures in Chapter 20-70-00, Inspection and Repair After Lightning Strike.

Y. **Periodically**

(1) Chapter 25

(a) Rosen Sunvisors - Clean the lenses and adjust the pivot tensions on the visor assemblies. Refer to Chapter 25, Rosen Sunvisor - Maintenance Practices.

3. Recommended Replacements

A. **Every 200 hours of use or every 3 years, whichever occurs first**

(1) Chapter 35

(a) Replace oxygen cannulas and/or non microphone oxygen masks. Refer to Chapter 35, Oxygen System - Maintenance Practices.

B. **Every 500 hours of use**

(1) Chapter 35

(a) Replace microphone oxygen masks. Refer to Chapter 35, Oxygen System - Maintenance Practices.

C. **Every 1200 hours**

(1) Chapter 34.

(a) Replace or rebuild the gyroscopic attitude indicator (artificial horizon). Refer to Chapter 34, Attitude and Directional System - Maintenance Practices.

D. **Every 1800 hours**

(1) Chapter 34

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(a) Replace or rebuild the turn coordinator. The turn coordinator is located on the avionics shelf and provides data to the Avidyne FlightMax Primary Flight Display (PFD). Refer to Chapter 34, Attitude and Directional System - Maintenance Practices.

E. **Every 2000 hours**

(1) Chapter 61

NOTE: The propeller governor requires a complete overhaul every 2000 hours of time in service by an authorized propeller repair facility.

(a) Overhaul the propeller governor. Refer to Chapter 61, Propeller Governor - Maintenance Practices.

(2) Chapter 71

NOTE: The TSIO-550-C engine requires a complete overhaul every 2000 hours of time in service by an authorized engine repair facility. There are also overhaul limitations on the magnetos, which is discussed in Time Limits and Special Inspection Items. Inspect the engine mount bushings for corrosion; replace the bushing(s) if corroded.

(a) Overhaul the engine. Refer to Chapter 71, Powerplant - General.

F. **Every 2400 hours**

(1) Chapter 61

NOTE: The propeller must be overhauled at 2400 hours of time in service or 72 calender months, whichever occurs first by an authorized propeller overhaul facility.

(a) Overhaul the propeller. Refer to Chapter 61, Propeller - General.

G. **Every 14,000 hours**

(1) Chapter 33

(a) Replace the Left and Right LED Position Lights (p/n 01-0790340-03, -04, -09, -10) at 14,000 hours of airframe time in service. Refer to Chapter 33, Exterior Lighting - Maintenance Practices.

H. **Every 3 years**

(1) Chapter 35

(a) Replace the O-rings in the CPC connector assembly identified on the breathing stations. Refer to Chapter 35, Oxygen System - Maintenance Practices.

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INSPECTION REQUIREMENTS

1. Inspection Requirements

A. **Annual Inspection** - Part 91.409 of the Federal Aviation Regulations (FARs) requires that an airplane must receive an annual inspection each 12 calendar months in accordance with part 43 of the FARs and be approved for return to service by a person authorized by the requirements of 43.7. For the purpose of the FARs, 12 calendar months extend from the particular day within the month the inspection is performed to midnight of the last day of the same month, one year later.

B. **100-Hour Inspection** - Part 91.409 of the FARs require that if an airplane is used to carry passengers for hire or give flight instruction for hire, the airplane must receive an inspection after 100 hours of time in service as specified in part 43 of the FARs The 100-hour limitation may be exceeded by not more than 10 hours while en route to reach a place where the inspection can be done. The excess time used to reach a place where the inspection can be done must be included in computing the next 100 hours of time in service.

C. **50-Hour Inspection** - It is recommended that at each 50 hours of time in service the airplane receive a 50-Hour Inspection.

D. **Unscheduled Inspections** - If the limitations of the engine or airframe are exceeded such as a hard or overweight landing, the likely affected components and systems must be inspected as indicated in this chapter. Refer to Chapter 32 for hard landing inspection details. If a situation occurs which is not covered in this chapter, consult Cessna for technical support and recommendations.

E. **Progressive Inspection** - At some point in the future the outline for a progressive maintenance program will be published and included as a revision to the Cessna Maintenance Manual.

F. **Component Inspections** - Time limits and special inspection requirements may exist for equipment manufactured by other suppliers and installed on Cessna Aircraft. These inspections and recommendations are determined by that manufacturer and should be followed to ensure continued airworthiness of that equipment and the aircraft as a whole.

2. Cessna LC41/T240 Inspection Checklists

A. The following tables list the inspection items for the required and recommended inspections described in each 50 hour, 100 hour, or annual inspection. Prior to these inspections, an engine run-up should be performed using the checklist in Figure 1. Depending on the specific types of operations, the owner or operator may need to modify and/or increase the frequency of some inspection and/or servicing items.

NOTE: All inspections and maintenance procedures must be in accordance with applicable Federal Aviation Regulations. Please refer to FAR parts 91.403, 91.207, 91.409, 91.411, and 91.413.

Table 1. Post-Runup Checks

POST-RUNUP CHECKS	Each 50 hours	Each 100 hours	Annually
1. **Engine Cowling** - Remove engine cowling.	[ ]	[ ]	[ ]
2. **Engine Oil** - Drain within 30 minutes of engine shutdown. Oil sample should be collected within 15 minutes of engine shutdown. Replenish with appropriate grade of oil. This step may be deleted from the annual inspection, if desired, to keep oil changes on regular 50-hour intervals. However, regulations require that the oil filter still be cut open for inspection.	[ ]	[ ]	[ ]
3. **Engine** - Conduct engine differential compression check. Record on checklist coversheet. (Refer to latest TCM Service Bulletin for permissible drop and differential).		[ ]	[ ]
4. **Oil Filter** - Replace and torque 16 to 18 ft-lbs. Cut open and inspect old oil filter.	[ ]	[ ]	[ ]
5. **Exterior Lights** - Check operation of taxi and landing lights, position lights, and strobe lights.	[ ]	[ ]	[ ]
6. **Pitot Mast Heater** - Check operation. **WARNING: Heater gets extremely hot!** Check within 60 seconds after switching on. Do not operate longer than 2 minutes on the ground.		[ ]	[ ]
7. **Stall Warning System** - Check operation.		[ ]	[ ]
8. **Auxiliary Lights** - Check operation of courtesy entry lights, entry step lights, and baggage compartment light by opening one door at a time. Leave one door open to check operation of 10-minute lights-off timer.		[ ]	[ ]

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9. **Interior Lights** - Check operation of instrument flood bar, panel lights, instrument lights, overhead lights, electro luminescent panels, and all dimming rheostats.		[ ]	[ ]
10. **Annunciator Lights** - Check operation.		[ ]	[ ]
11. **Aural Warning** - Check operation.		[ ]	[ ]
12. **Flight Controls** - Check for smooth operation of all flight controls with flaps in retracted and extended positions. Leave flaps in extended position when checks are completed.		[ ]	[ ]
13. **Door Seals** - Check operation of door seal air pump and inspect for air leaks in seals. **NOTE:** **Both doors must be latched for system to operate.**		[ ]	[ ]
14. **ECS Ventilation Fan** - Check operation.		[ ]	[ ]
15. **Trim Actuators** - Check operation of all actuators and accuracy of position indicators. Check switches on trim panel (Avidyne only), right of the master switches in the overhead (Garmin G1000 only), and on pilot's control stick.		[ ]	[ ]
16. **Emergency Locator Transmitter (ELT)** - Check operation of remote switch. **NOTE:** **ELT may be tested only within the first 5 minutes after each hour and should be limited to 3 aural tone sweeps.**		[ ]	[ ]
17. **Flight Controls** - Operate controls through full range of motion feeling for binding, ratcheting and sloppiness, and listening for unusual noises.		[ ]	[ ]
18. **Brakes** - Check for sponginess.	[ ]	[ ]	[ ]
19. **Aircraft Batteries** - Fully charge, clean battery exterior surfaces, and clean battery cables. Check battery box for evidence of leakage.		[ ]	[ ]
20. **Access Panels, Fairings, Seats, Carpets, Covers, Side Panels, Overhead Panel (100 Hour and annual inspection) and Spinner** - Remove for complete access for inspection. Check for missing or stripped screws. Do not remove nose wheel fairing at this point. Refer to Section 05-22-00, Table 1, for listing of the various access covers in the airplane. **WARNING: Do not remove fuel tank cover plates.**		[ ]	[ ]

Table 2. Aircraft Records

AIRCRAFT RECORDS	Each 50 hours	Each 100 hours	Annually
1. **Aircraft Logbooks** - Determine total times, times since overhaul and times since last required or recommended maintenance checks and record on Inspection Coversheet.		[ ]	[ ]
2. **Inoperative Items** - If any authorized inoperative items have been listed per FAR 91.213, inspect and maintain per FAR 91.405. Verify placard is installed per FAR 43.11. See the equipment list of required items in Section 6, Appendix A, of the AFM/POH.		[ ]	[ ]
3. **Airworthiness Directives (AD's) and Service Bulletins** - Check for new and recurring AD's which may need to be complied with during this inspection. Also, check for applicable manufacturer's Service Bulletins.		[ ]	[ ]
4. **Aircraft Records** - Check for presence and condition of aircraft federal registration form and airworthiness certificate.		[ ]	[ ]
5. **Approved Flight Manual / Pilot's Operating Handbook (AFM/POH)** - Verify that all revisions have been installed and that the Equipment List and Weight and Balance forms are current and correct.		[ ]	[ ]

Table 3. Engine and Propeller

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ENGINE AND PROPELLER (See Chapters 30, 61, and 71 for Specific Details)	Each 50 hours	Each 100 hours	Annually
1. **Cleaning** - Clean engine. Protect magneto vents and cabin fresh air intakes.		[ ]	[ ]
2. **Engine** - Inspect for obvious signs of damage, oil or fuel leakage, loose components, and chafing or deterioration of hoses, lines, and wires.	[ ]	[ ]	[ ]
3. **Cylinders, Rocker Box Covers, and Pushrod Tubes** - Inspect for cracks, broken fins, oil, fuel or exhaust leakage, and discoloration of cylinder head. Check hardware for signs of loss of torque.		[ ]	[ ]
4. **Crankcase and Sump** - Inspect for cracks, oil leakage, corrosion and signs of loss of torque of hardware. Inspect engine mount supports for condition.		[ ]	[ ]
5. **Induction System** - Inspect the induction tubes for security and condition and loose or leaking couplers. Inspect manifold pressure transducer for security of installation and condition of wires. Check operation and positions of alternate air butterfly valves.		[ ]	[ ]
6. **Induction Air Filter** - Inspect for cleanliness and condition of sealing surfaces. Service per instructions in Chapter 12.	[ ]	[ ]	[ ]
7. **Exhaust System** - Inspect entire system including turbochargers and tailpipes for damage, leaks, cracks, and security. Visual inspection required at 50 hours. Comprehensive inspection required at 100 hour or annual. Refer to Chapter 78.	[ ]	[ ]	[ ]
8. **Fuel Metering Unit** - Inspect for security and presence of fuel leakage. Check operation of throttle and mixture controls. Ensure levers hit stops before cables reach end of travel. Lube throttle lever with LPS-2.		[ ]	[ ]
9. **Fuel Manifold Valve and Distribution Lines** - Inspect for security, presence of factory seal installed on safety wire, and evidence of fuel leakage. Inspect distribution lines for security, cracks, and signs of leakage.		[ ]	[ ]
10. **Engine-Driven Fuel Pump** - Inspect for security, general condition, and evidence of fuel or oil leakage.		[ ]	[ ]
11. **Fuel Hoses** - Inspect all flexible fuel hoses for routing, chafing, security, and signs of leakage.		[ ]	[ ]
12. **Magnetos** - Inspect for security and condition. Check timing to engine and record: L ____ degrees BTDC, R ____ degrees BTDC. Timing must be within 24±1 degrees BTDC. If either magneto must be adjusted, check logbooks for previous magneto adjustments. If the same magneto has already been "bumped up" twice without being removed to check internal timing, that magneto must be removed for internal timing check.		[ ]	[ ]
13. **Spark Plugs** - Inspect firing end for condition. Clean, gap, reinspect, and test spark plugs following appropriate plug manufacturer's service manual. Reinstall with **new** gaskets and torque to specifications.		[ ]	[ ]
14. **Ignition Harness** - Inspect for routing, broken shielding, chafing, and security. Inspect spark plug ends for condition and evidence of electrical arcing.		[ ]	[ ]
15. **Left Alternator** - Inspect for security and general condition. Inspect electrical connections for security. Inspect belt for tension, fraying, and dryrot. Inspect pulleys for nicks, scratches, warpage, and alignment. Remove drive belt and turn alternator rotor to check bearings for abnormal noise or roughness.		[ ]	[ ]
16. **Right Alternator** - Inspect for security, general condition and signs of oil leakage. Inspect electrical connections for security. Check air blast tube for obstructions. Any evidence of alternator malfunction requires removal to conduct drive gear hub slippage inspection.		[ ]	[ ]
17. **Electrical Cables, Wires, and Connectors** - Inspect for security, routing, chafing, signs of arcing, and proper termination.		[ ]	[ ]
18. **Starter and Starter Solenoid** - Inspect for security, general condition, and signs of oil leakage.		[ ]	[ ]

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19. **Oil Cooler** - Inspect for security of mounting, cracks, straightness of fins, and evidence of oil leakage around base and fin area. Clean debris from fins. Inspect condition and security of oil pressure switch and temperature bulb and associated wiring.		[ ]	[ ]
20. **Engine Accessory Case** - Inspect accessory case and any additional accessories for security, condition, and evidence of leakage or loss of torque of hardware.		[ ]	[ ]
21. **Crankshaft** - Inspect for evidence of oil leakage, corrosion, pitting, cracks, discoloration, or signs of overstressing.		[ ]	[ ]
22. **Propeller Governor** - Inspect for security, evidence of oil leakage, and tightness of lever on governor shaft. Check operation of propeller control cable. Ensure high-RPM stop is hit before cable reaches end of travel.		[ ]	[ ]
23. **Spinner and Spinner Bulkhead** - Inspect for cracks, security to propeller, and security of any dynamic balance weights. Clean inside of spinner.		[ ]	[ ]
24. **Propeller Hub** - Inspect for cracks, corrosion, leakage of oil, excessive loss of grease, security of static balance weights, and security of mounting to crankshaft. Re-torque all mounting nuts if loss of torque is suspected on any nut in accordance with the instructions in Section 61-10-00,Installation of Spinner and Propeller. Service with appropriate grease.		[ ]	[ ]
25. **Propeller Blades** - Inspect for play, cracks, nicks, dents, pitting, corrosion, and leading edge erosion. Dress propeller and paint back of blade. In operational areas of high humidity, wipe the metal surface with an oily rag.	[ ]	[ ]	[ ]
26. **Propeller Heat/De-Ice System** - Inspect the propeller de-ice boots, slip ring, brushes and brush block, control switch/annunciator, control module, and wiring.		[ ]	[ ]
27. **Cooling Baffles and Seals** - Inspect for cracks, excessive gaps, and security of mounting to engine. Check intercylinder baffles for security.		[ ]	[ ]
28. **Engine Cowls** - Inspect for cracks, chafing, heat damage, delamination, evidence of exhaust leakage, condition of fastening system, presence of oil filler door placard, and condition of paint.		[ ]	[ ]
29. **ECS Air Inlet Scoop** - Inspect for obstruction of inlets and condition of scoop and screen.		[ ]	[ ]
30. **Firewall** - Inspect for cracks, buckling, unsealed holes, and other signs of damage. Although the firewall is not structural, problems here may indicate damage to the composite bulkhead underneath and should be closely checked out. Inspect all firewall-mounted accessories for security of mounting.		[ ]	[ ]
31. **Engine Mount/NLG support** - Raise NLG off of the ground and inspect for cracks, corrosion, loss of torque of mounting hardware, chafing by cables, wires, hoses, etc., and make sure that any flexing item is secured to the mount.		[ ]	[ ]
32. **Engine Isolation Mounts** - Inspect for general condition signs of loss of torque of engine mount bolts. If necessary, torque bolts in accordance with Section 71-00-00, Engine Removal, Cleaning, and Installation. Check safety wiring and security.		[ ]	[ ]
33. **Drain and Vents Lines** - Inspect for security, condition, and obstructions.		[ ]	[ ]
34. **Brake Fluid Reservoir** - Inspect for condition, security, and fluid level. Service as necessary.	[ ]	[ ]	[ ]
35. **Bonding Ground Straps** - Inspect for condition.		[ ]	[ ]
36. **Foreign Objects** - Check engine compartment for foreign objects.	[ ]	[ ]	[ ]
37. **Fuselage Exterior Surface** - Inspect for obvious signs of damage, including cracks, holes, buckling, and rippling. Check condition of paint and cleanliness. Check drain holes for obstructions.	[ ]	[ ]	[ ]
38. **Exterior Placards** - Inspect for presence and condition. Refer to the Model T240 Illustrated Parts Catalog for the necessary exterior placards.			[ ]
39. **Windows** - Inspect for cleanliness, condition, and sealing.	[ ]	[ ]	[ ]

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40. **Cabin Doors** - Inspect for security and fit. Inspect skin, hinges, gas struts, latching mechanisms, door seals, and upholstery. Lubricate hinges and all moving parts with a quality petroleum or silicone-based oil. Check that door seals inflate properly.		[ ]	[ ]
41. **Baggage Door** - Inspect for security and fit. Inspect door skin, upholstery, seal, hinge, and latching mechanism. Inspect door strut for condition and security. Lubricate hinge and all moving parts.		[ ]	[ ]
42. **Entry Assist Step** - Inspect for security and condition.		[ ]	[ ]
43. **Pitot Mast** - Check pitot heat relay for proper operation. Inspect for obstruction of pitot, signs of damage which may affect proper airflow, and security of attachment. Clear any obstructions, making sure the mast is not enlarged or damaged in any way. Do not apply compressed air to the mast. Test for proper operation after reinstallation.		[ ]	[ ]
44. **Static Port Drain** - Check static port drain for evidence of water. Remove cap from drain line and allow any water within the system to drain. Leak check after reinstallation. **CAUTION:** Do not apply compressed air to the system, since this will result in damage to the static air flight instruments.			[ ]
45. **Antennas** - Inspect for security and condition.		[ ]	[ ]
46. **Aircraft Identification Plate** - Inspect for security and legibility.			[ ]
47. **Fuselage Skin** - Perform generalized inspection of fuselage for visible damage and evidence of latent damage.		[ ]	[ ]
48. **Aft Fuselage** - Perform a visual inspection and tap test of the exterior aft fuselage skin and a visual inspection of the interior aft fuselage skin in accordance with Section 53-70-00, Aft Fuselage Inspection.		[ ]	[ ]
49. **Exterior Emergency Door Release** - Inspect exterior emergency door release system. Inspect hinge wires for corrosion, kinks, and wear. Replace as required. Inspect overhead cabling for chaffing, binding, and frayed cables. Store the few inches of excess cable in a manner that prevents kinking or binding. Inspect attachment screws of dynamic door hinge to door for tightness. See Chapter 52.		[ ]	[ ]
50. **Vertical Stabilizer** - Perform generalized inspection of vertical stabilizer for visible damage and evidence of latent damage. Inspect hinge attach points for security and condition. Ensure leading edge tape is secure.		[ ]	[ ]
51. **Rudder** - Inspect for signs of damage, looseness, play in bearings, and condition of hinge attachments and rudder cable horns. Check security of static balance weight. Check for obstruction of drain holes. Inspect bonding strap and static wicks for condition. Lubricate hinges and cable-attach points. Ensure rudder makes full contact with left and right rudder stops.		[ ]	[ ]
52. **Horizontal Stabilizer** - Perform generalized inspection of horizontal stabilizer for visible damage and evidence of latent damage. Inspect hinge attach points for security and condition. Ensure leading edge tape is secure.		[ ]	[ ]
53. **Elevators** - Inspect for signs of surface damage, looseness or play in bearings, and condition of hinges and elevator horn. Check security of static balance weights. Inspect bonding straps and static wicks for condition. Check for obstruction of drain holes. Lubricate piano hinges only in accordance with Section 27-30-00, Elevator Servicing and Maintenance section. Ensure elevator makes full contact with up and down elevator stops.		[ ]	[ ]
54. **Elevator Trim Tab and Actuator** - Inspect for condition, corrosion, and security. If the drive rods show any signs of corrosion, replace with new rods. Lubricate hinge and clevis bolt in accordance with Section 27-30-00, Elevator Trim Tab Servicing and Maintenance section. Check trim servo for smoothness of operation; free from binding. Measure and record total trim tab play: _____ inches. **CAUTION:** Use special care to ensure trim tab friction devices are not lubricated.		[ ]	[ ]
55. **Rudder Trim** - Check for proper security.		[ ]	[ ]

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56. **Ventral Fin** - Perform generalized inspection of ventral fin for visible damage and evidence of latent damage. Inspect ventral fin pad for condition and proper security.		[ ]	[ ]

Table 4. Wings

WINGS (See Chapters 22, 27, 33, 34, and 57 for Specific Details)	Each 50 hours	Each 100 hours	Annually
1. **Wing Saddle Area** - Inspect wing spar for cracks, debonding, and attachment to airframe. Check visible attaching hardware for loss of torque. If necessary, torque hardware in accordance with Chapter 57-10-00, Wing Removal section. Inspect aileron bellcranks for cracks and corrosion.		[ ]	[ ]
2. **Fuel Tanks** - Check that the airplane's fuel filler neck is grounded. Run a continuity check between each fuel filler neck and one of the exhaust stacks. Fuel cap resistance must be within 0 to 500 ohm. Also, check continuity of all static wicks or static wick attachment points to test the integrity of the lightning protection system.		[ ]	[ ]
3. **Wing Skins and Exterior** - Inspect for obvious signs of damage, including cracks, holes, buckling, and rippling. Check condition of paint and placards. Check drain holes for obstructions. Check fuel tank vents for obstructions. Ensure leading edge tape is secure.		[ ]	[ ]
4. **Landing and Taxi Light Assembly** - Inspect for cracks, security of mounting, and cleanliness and condition of lens cover. Operate taxi and landing lights in a dark area and ensure that both lights are properly aimed. If lights are not properly aimed, adjust as required. Refer to Section 33-40-00, Taxi and Landing Light Adjustment, for detailed instructions.		[ ]	[ ]
5. **Stall Warning Lift Transducer** - Inspect the wing skin around the lift transducer for indications of overheating, including discoloration, bubbled paint, or softness in the composite. Check for the correct installation (security) of the lift transducer.		[ ]	[ ]
6. **Aileron and Flap Attach Points** - Inspect for security of attachment to wing.		[ ]	[ ]
7. **Aileron (left) Servo Tab and Servo Tab Clevis** - Inspect for damage, looseness, or play in attach bearings and Belleville washers, and condition of rod end attachment. Check security of static balance weights. Inspect bonding straps and static wicks for condition. Check for obstruction of drain holes. Inspect servo tab for proper operation and condition of push-pull rod, bearings, and hinge. If the rods show any signs of corrosion, replace with new rods. Lubricate only servo tab hinge and clevis bolt in accordance with Section 27-20-00, Rudder System section. Measure and record total servo tab play: _____inches. Refer to Section 27-00-00, Table 1.		[ ]	[ ]
8. **Aileron, Right** - Inspect for damage, looseness, or play in attach bearings and Belleville washers, and condition of rod end attachment. Check security of static balance weights. Inspect bonding straps and static wicks for condition. Check for obstruction of drain holes. Inspect trim tab and actuator for condition and security. Lubricate only trim tab hinge and clevis bolt in accordance with Section 27-20-00, Rudder System section. Record total trim tab play: _____ inches. **CAUTION:** Use special care to ensure trim tab friction devices are not lubricated.		[ ]	[ ]
9. **Aileron Trim Tab Clevis** - Inspect trim clevis and related hardware for evidence of corrosion and pitting. Check for proper security.		[ ]	[ ]
10. **Aileron Deflections** - Ensure that both ailerons seat properly on their up and down stops.		[ ]	[ ]
11. **Flaps** - Inspect skins for condition and signs of debonding. Check hinges for play and attachment to wing and flap. Check hinges for corrosion. Check flap push-pull rods and rod end bearings for condition. Inspect condition of spring.		[ ]	[ ]
12. **Flap Motor and Flap Actuators** - Clean and cycle flaps up and down to check for smooth operation.		[ ]	[ ]
13. **Flap Deflections** - Ensure that flaps extend equally on each side of the airplane in both the takeoff and landing configurations. Measure the down deflection on each side using neutral ailerons as a reference point. The difference in static deflection should not be greater than 1/4 in.			[ ]

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14. **SpeedBrakes™** - Check cap strip cover screws for security; if loose, remove screws and apply Loctite 242, retorque to 8 in-lbs. Check SpeedBrake™ top attachment screws for security, if loose, remove screws and apply Loctite 242, retorque to 8 in-lbs. Check drain tubes for debris.	[ ]		
15. **SpeedBrakes™** - Remove cover plate. Clean and inspect unit for damage, corrosion, looseness & proper operation. Lubricate worm and worm gear with LUBRIPLATE. Install cover plate.			[ ]
16. **Fuel Leaks** - Check the security of the fuel tanks by inspecting the outer skin tank areas for evidence of fuel stains. Be sure to open the gascolator access panel and inspect all fuel line and fittings in this area.		[ ]	[ ]
17. **Fuel Filler and Caps** - Inspect for proper locking, condition of o-ring and receptacle, and presence and legibility of placards.		[ ]	[ ]
18. **Wing Interior** - Inspect wing spar through outer access panel for signs of cracking or debonding. Inspect visible bonded areas of ribs and other structures.		[ ]	[ ]
19. **Fuel Vent Hose** - Check for proper connection of the fuel vent hoses to the outboard inspection panels. Check the condition of the hoses.		[ ]	[ ]
20. **Flight Controls** - Inspect all push-pull rods, rod end bearings, and bellcranks for condition, play, and security of attachment. Ensure all rod end jamnuts are tight.		[ ]	[ ]
21. **Contamination Test** - Take fuel samples from both wings and fuel strainer. Inspect for contamination and proper grade of fuel. Clean strainer screen each 100 hours or annually, whichever occurs first.	[ ]	[ ]	[ ]
22. **Garmin GFC 700 Autopilot System** - Inspect for condition and function. Refer to Chapter 22.			[ ]

Table 5. Landing Gear

LANDING GEAR (See Chapter 32 for Specific Details)	Each 50 hours	Each 100 hours	Annually
1. **Nose Gear and Shimmy Dampener** - Place nose gear on a rotating table (shallow height - sometimes referred to a “Grease Plate”) with the normal static weight of the airplane applied to the table. A firm and consistent resistance to the steering rotation should be felt through the full ±60 degrees of wheel movement.		[ ]	[ ]
2. **Lifting The Airplane** - Install jacking pads and jack aircraft until all tires clear the floor. (Refer to Chapter 7 for jacking instructions.)		[ ]	[ ]
3. **NLG** - Remove nose gear wheel cover and strut fairing. Note that the four bolts attached to the nose gear fork must be removed to remove the nose wheel fairing.		[ ]	[ ]
4. **NLG Strut** - Inspect from top to bottom for scratches, cracks, corrosion, and signs of overstress. Check for play in strut attaching brackets. Visually inspect for straightness along length of each strut.		[ ]	[ ]
5. **MLG** - Remove main landing gear wheel fairings.		[ ]	[ ]
6. **Hydraulic Brake Lines** - Inspect brake lines that are tie wrapped to the main gear strut. Check for security and evidence of chaffing. Check for leaks as evidenced by the presence of hydraulic fluid stains.		[ ]	[ ]
7. **Brake Calipers and Brake Lines** - Clean and inspect for condition, fluid leakage, and security of components. Check caliper for small amount of free-floating motion in torque plate. Clean anchor bolts and torque plate if caliper does not free-float. Do not lubricate.		[ ]	[ ]
8. **Brake Linings** - Inspect brake linings, and replace if the wear lines are not visible.		[ ]	[ ]
9. **Wheels and Brake Discs** - Inspect for cracks and corrosion. Inspect brake discs for cracks, pitting, and signs of overheating. Inspect all hardware for signs of loss of torque in accordance with Cleveland Maintenance Manual AWBCMM0001- 2/USA. Measure and record brake disc thickness: Left - _____inches, Right - _____inches.		[ ]	[ ]

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10. **MLG Tires** - Inspect for flat spots, wear, splitting, and dry-rotting. Check tire pressure, and service as necessary.	[ ]	[ ]	[ ]
11. **MLG Wheel Assemblies** - Rotate and check for binding, unusual noises, excessive friction, play in bearings, and security of attachment of axles.		[ ]	[ ]
12. **NLG Assembly** - Verify operation of NLG centering lock with strut fully extended. Remove four attaching bolts from bottom of NLG strut, remove wheel and fork assembly, and remove wheel pant. Remove fairing from strut assembly.		[ ]	[ ]
13. **NLG Strut and Fairing** - Inspect for cracks, corrosion, scratches on piston, fluid leakage, and signs of overstress. Check for security of attachment of strut to engine mount. Check for presence of steering limit markings and condition of strut fairing.		[ ]	[ ]
14. **NLG Fork Assembly** - Inspect for cracks, corrosion, signs of overstress, and sideloading. Inspect towing lug assemblies for cracks, distortion, and security of attachment.		[ ]	[ ]
15. **Service Nose Strut** - Check inflation pressure of nose gear, and service as required. See Chapter 12 for servicing instructions.		[ ]	[ ]
16. **NLG Wheel Assembly** - Inspect for cracks and corrosion. Check all hardware for signs of loss of torque in accordance with Chapter 32-20-00, Nose Gear, and Nose Gear Wheel Pant and Fairing sections.		[ ]	[ ]
17. **NLG Tire** - Inspect for flat spots, wear, splitting, and dry-rotting. Check tire pressure, and service as necessary.	[ ]	[ ]	[ ]
18. **NLG Wheel Pant** - Inspect for condition. Clean interior.		[ ]	[ ]
19. **Wheel Bearings (all)** - Clean and inspect for damage, wear, and corrosion. Inspect bearing races for wear and damage. Repack with appropriate grease in accordance with Cleveland Maintenance Manual AWBCMM0001-2/USA. **NOTE:** **Always wear rubber gloves when handling dry or repacked bearings!**		[ ]	[ ]
20. **NLG Assembly** - Reinstall strut fairing and wheel pant, then reinstall wheel and fork assembly on strut. Torque four attaching bolts 140 to 180 in-lbs., and apply torque seal.		[ ]	[ ]
21. **MLG** - Reinstall outer and inner main gear wheel covers on each wheel.		[ ]	[ ]
22. **Lowering Airplane** - Ensure all obstructions are clear from under aircraft and landing gear is ready for aircraft weight, then lower aircraft and remove jacking pads.		[ ]	[ ]

Table 6. Fuselage Interior

FUSELAGE INTERIOR (See Chapter 21, 23, 25, 27, 28, 31, 34, 35, 37, 56, 57 for Specific Details)	Each 50 hours	Each 100 hours	Annually
1. **Portable Fire Extinguisher** - Inspect portable fire extinguisher and mounting bracket. Refer to Chapter 26 for instructions.		[ ]	[ ]
2. **Oxygen System** - Inspect flexible lines for security of connections, kinks, or tube discoloration. Reattach or replace lines as necessary. If the Garmin G1000 system is installed see additional procedures in Chapter 35.	[ ]		[ ]
3. **Inspection Covers** - Remove rear seat, rear seat inspection plates, ELT access cover, right and left console covers, and glare shield.		[ ]	[ ]
4. **Flight Controls** - Inspect for nicks, scratches and dents in push-pull rods, play in rod end and linear bearings, security of linear bearing mounts and rudder cable guide tubes to fuselage.		[ ]	[ ]
5. **Seats** - Inspect all seat structures for cracks, corrosion, and general condition. Check seat controls for positive locking. Inspect cushions and upholstery for condition.		[ ]	[ ]

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6. **Seat Tracks and Stops** - Inspect for cracks, wear of latching holes and tracks, and security of tracks and stops.		[ ]	[ ]
7. **Restraint Systems** - Inspect belts for cuts, fraying, broken stitching, and presence of TSO tags. Check all buckles for proper locking and release. Check inertia reels for proper operation. Check attach points to structure for all belts.		[ ]	[ ]
8. **Upholstery and Trim** - Inspect for general condition, attachment, and cleanliness.		[ ]	[ ]
9. **Placards** - Inspect for presence and condition of all required interior placards. See Chapter 11 for required placards.		[ ]	[ ]
10. **Instruments** - Check security of instruments in panel and legibility of markings. Ensure that no magnetic tools are used during this procedure.		[ ]	[ ]
11. **Avionics** - Check security of radios, GPS display, indicators and controls on panel and center console, legibility of markings and operation of knobs. Ensure that no magnetic tools are used during this procedure.		[ ]	[ ]
12. **Instrument Panel, Radio Rack and Center Console** - Inspect for general condition, security of attachment, and cleanliness. Ensure that no magnetic tools are used during this procedure.		[ ]	[ ]
13. **Nav/Com Bypass (Avidyne option only)** - Check operation. Check operation of light.		[ ]	[ ]
14. **Garmin G1000 System** - Verify operation. See Chapter 34 for annual inspection procedure.			[ ]
15. **Garmin G2000 System** - Verify operation. See Chapter 34 for annual inspection procedure.			[ ]
16. **Magnetic Compass** - Inspect for security, clarity of glass, and signs of oil leakage. Inspect compass correction card for presence and legibility of all headings. Ensure that no magnetic tools are used during this procedure.		[ ]	[ ]
17. **Fuel Selector Valve** - Operate through full range and verify that valve locks into each detent. Ensure that green LED's in fuel gauge (Basic or Avidyne option) or blue lights in the fuel gauge on the MFD (Garmin G1000 option) illuminate.		[ ]	[ ]
18. **Fuel Selector Valve** - Inspect fuel valve for evidence of fuel leakage.		[ ]	[ ]
19. **Environmental Control System (ECS) controls** - Check operation of manual controls.		[ ]	[ ]
20. **ECS Vents** - Check all vents for proper operation of manual controls.		[ ]	[ ]
21. **Instrument Panel Backside** - Remove glare shield and inspect all wires, lines, hoses, control cables, instruments, etc., for any interference, chafing, and loose or stressed connections. Inspect structure of forward bulkhead, engine mount support structures, etc., for cracks, debonding, and general condition. Inspect soundproofing material for condition and adhesion to forward bulkhead.		[ ]	[ ]
22. **Reinstall Glare Shield** - Check security of attachment and condition. The glare shield for the Garmin G1000 option has foil attached and must be grounded correctly with a"U" clip. Check pull-out shield (Avidyne option only) for freedom of movement, condition, and security.		[ ]	[ ]
23. **ECS Ducts** - Inspect for cracks, holes, routing, and chafing.		[ ]	[ ]
24. **Grounding Rails** - Inspect for cracks and security along forward length. Pay special attention to bonding straps connecting sections of rails at formers and to engine mount bolts.		[ ]	[ ]
25. **Rudder Pedals** - Inspect for security, cracks, and play. Check for leakage from brake cylinders. Lubricate rudder cable clevis bolt and brake cylinder attach points. Do not lubricate rudder pedal torque tube pillow blocks.		[ ]	[ ]
26. **Rudder Hold System** - Verify that the rudder hold system is successfully deactivated by each of the following: pulling the rudder hold circuit breaker, setting flaps down, autopilot disconnect, trim master switch, and application of force to a rudder pedal.		[ ]	[ ]
27. **Parking Brake Valve** - Inspect for security of mounting and signs of leakage.		[ ]	[ ]
28. **Seat Box Structure** - Inspect for cracks, debonding, and any signs of obvious damage.		[ ]	[ ]
29. **Wing Spar** - Inspect for cracks, debonding, and security of attachment to fuselage.		[ ]	[ ]

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30. **Wing Attach Bolts** - Inspect for the correct torque of the nuts on the wing attach bolts; no threads of the wing attach bolts are below the edge of the composite structure; and no threads of the nuts contact the un-threaded shanks of the bolts. Refer to Section 57-10-00.			[ ]
31. **MLG Box Support Structure** - Inspect for cracks, debonding, and security of hardware. If paint has been removed, metal is exposed, or corrosion is present, clean the surface and apply paint as needed.		[ ]	[ ]
32. **Floor and Supporting Structure** - Inspect for cracks, holes, and security of attachment.		[ ]	[ ]
33. **Flight Controls (forward fuselage through baggage compartment)** - Inspect for nicks, scratches, and dents in push-pull rods, play in rod end and linear bearings, security of linear bearing mounts, and attachment of rudder cable guide tubes to fuselage.		[ ]	[ ]
34. **Baggage Compartment Floor** - Inspect for cracks, holes, and security.		[ ]	[ ]
35. **Hat Shelf** - Inspect for cracks, holes, and security.		[ ]	[ ]
36. **Emergency Locator Transmitter (ELT)** - Remove from tray and remove battery cover. Inspect for battery corrosion and any obvious internal or external damage to housing. Verify replacement date on battery matches date on housing placard. Reinstall battery cover. Test operation of G-switch in strict accordance with instructions in Chapter 25. Record battery replacement due date:		[ ]	[ ]
37. **ELT Installation and Support Shelf** - Inspect ELT wiring and antenna cable for security, routing, and chafing. Check connectors for security of pins and proper connection. Inspect ELT tray and support shelf for cracks and security. Replace tray if any cracks are found.		[ ]	[ ]
38. **Empennage Interior Structure** - Inspect for cracks, debonding, or other signs of damage. Verify that all drain holes are clear of debris.		[ ]	[ ]
39. **Access Panels and Fairings** - Inspect for condition. Check fasteners and receptacles for condition.		[ ]	[ ]
40. **Air Conditioning Seals** - Inspect air conditioning system bay, two evaporator bay access panels, condenser attachment, air conditioning system bay access cover, gear member, and gear box seals for condition and integrity.		[ ]	[ ]

Table 7. Inspection Wrap-Up

INSPECTION WRAP-UP	Each 50 hours	Each 100 hours	Annually
1. **Fuselage and Wings** - Verify aircraft is free of any tools, parts, and debris, and reinstall all access fairings, panels, carpeting, seats, etc. removed for this inspection.	[ ]	[ ]	[ ]
2. **Engine** - Verify oil sump is properly serviced with oil and engine compartment is free of tools, rags, and debris, and install lower cowl.	[ ]	[ ]	[ ]
3. **Engine** - Run engine for no more than two minutes at 1000 to 1200 RPM. After shutdown, check for leaks at oil filter base, fuel nozzles, and any other components removed during this inspection. If no leaks are noted, install top cowling.	[ ]	[ ]	[ ]
4. **Aircraft** - Operate engine at 1000 to 1500 RPM to warm engine. Operate all aircraft systems to verify proper operation. As engine warms, operate engine systems at appropriate engine speeds and complete all checks listed on Inspection Coversheet.	[ ]	[ ]	[ ]
5. **Aircraft Records** - Complete entries in logbooks, AD compliance lists, and any other required records and work orders.	[ ]	[ ]	[ ]

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Figure 1 : Sheet 1 : Inspection and Run-up Checklist

B11216

Reg. number	Serial number:	Owner's name:	
Date started	Date completed	Work Order #	**Inspection** 50-hr ☐ 100-hr ☐ Annual ☐
Hobbs	Eng TSN	Prop TSN	Mechanic's Name
TT	Eng TSO	Prop TSO	

ELT battery due:
Left Battery due:
Right Battery due:
Altimeter/Transponder test due:
O2 bottle hydro. test due:
Fire extinguisher insp. due:
Magneto 500-hr insp. due:
Flexible hose rplcmt. due:
Misc.:
Misc.:

Oil sample?	Yes ☐ No ☐
Comments	

Differential compression check: Taken: Hot ☐ Cold ☐			
6 -	/80	5 -	/80
4 -	/80	3 -	/80
2-	/80	1 -	/80

Discrepancies Noted During Runup
(Additional space available on last page)

☐ See last page for additional comments.

RUNUP CHECKS

☐ - check boxes if okay. For all others, write actual indication.

System	Pre-inspection	Post-inspection
Boost/primer pump	☐	☐
High/Lo boost pump cut-off	☐	☐
Starter	☐	☐
Oil pressure (cool)	psi	psi
Charging system, Left (1200 RPM)	Amps volts	Amps volts
Charging system, Right (1200 RPM)	Amps volts	Amps volts
Left brake	☐	☐
Right brake	☐	☐
Parking brake	☐	☐
Comm/Nav	☐	☐
Ignition ground test (idle)	☐	☐
L. Mag drop (1700 RPM)	RPM Drop	RPM Drop
R. Mag drop (1700 RPM)	RPM Drop	RPM Drop
Prop response (1200 RPM)	☐	☐
Oil temperature	°F	°F
CAUTION: Ensure CHT and oil temp. are in the green range.		
Static RPM	RPM	RPM
Fuel flow at static RPM	gph	gph
Induct. Heat (1700 RPM)	☐	☐
Defrost	☐	☐
Cabin heat	☐	☐
Oil pressure	psi	psi
Idle RPM	RPM	RPM
CAUTION: Allow engine to cool to 300°F (CHT) before shutdown.		
All annunciator lights are off	☐	☐
Check for fuel odors in cabin	☐	☐
Check for fuel stains on underside of aircraft	☐	☐
Check fuel valve off function	☐	☐
Idle cutoff RPM rise	RPM Rise	RPM Rise

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LIST OF INSPECTION AREAS

1. List of Inspection Areas

Table 1. INSPECTION ACCESS AREAS

Area	Type of Access	Location	Inspection & Maintenance Items
Left Wing	Access Panel	Underside, inboard, below fuel tank	Fuel tank, two fuel sending units, slosh box, fuel low annunciator switch, vapor return lines
	Access Panel	Underside, middle, below fuel tank	Fuel tank, one fuel sending unit
	Access Panel	Underside, outboard	Fuel vent
	Access Panel	Underside trailing edge, near right side of aileron	Final aileron drive, mounting bolts to aileron, bellcrank assembly
	Access Panel	Underside towards leading edge, forward of inboard fuel tank access panel	Fuel lines and fuel lines to fuel tank connection fittings
	Access Panel	Aft of inboard fuel tank cover	Final drive for flap bellcranks
	Access Panel	Underside trailing edge, near middle of flaps	Aileron control rod linear bearing
Right Wing	Access Panel	Underside, inboard, below fuel tank	Fuel tank, two fuel sending units, slosh box, fuel low annunciator switch, vapor return lines
	Access Panel	Underside, middle, below fuel tank	Fuel tank, one fuel sending unit
	Access Panel	Underside, outboard	Fuel vent
	Access Panel	Underside trailing edge, near left side of aileron	Final aileron drive, mounting bolts to aileron, bell crank assembly
	Access Panel	Underside towards leading edge, forward of inboard fuel tank access panel	Fuel lines and fuel lines/fuel tank connection fittings, outside air temperature probe
	Access Panel	Aft of inboard fuel tank cover	Final drive for flap bellcranks
	Access Panel	Underside trailing edge, near middle of flaps	Aileron control rod linear bearings
Fuselage Exterior	Access Panel	Underside center near trailing edge of the flaps	Aileron bellcranks and crossover assembly, flap motor, marker beacon tuning slug
	Access Panel	Underside near left wing root	Auxiliary fuel pump, gascolator, pitot drain, wires and plugs for wing electrical (position/strobe lights, landing/taxi lights, stall horn, fuel quantity, and fuel low annunciator)
	Access Panel	Tail cone right side	Air vent, elevator push-pull rods
	Access Panel	Vertical stabilizer, left side	Antenna connection junction
	Engine Cowling – Top and Bottom	Forward of fuselage firewall	All engine and propeller parts and components.
Fuselage Interior	Access Panel	Under front seat bench	Fuel and fuel vent lines
	Access Panels (2)	Right side of center console (arm rests)	Fuel selector valve, environmental control system (ECS) heated air ducts

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	Cover Panel	Rear seat footwell	Wing attachment bolts
	Access Panels (2)	Under rear seat back	Gear box
	Access Panels (2)	Baggage compartment floor	Gear box
	Access Panel	Floor area of baggage compartment (Avionics Bay)	Special optional avionics equipment (DME, HSI slaving transmitter, remote stormscope sensor, altitude hold computer for system 30 autopilot)
	Access Panel	Floor area of baggage compartment hat rack	Power plug, pitch servo
	Access Panel	Aft bulkhead of baggage shelf	ELT, elevator push-pull rods
	Cabin, Side-Trim Panels	Pilot's side – runs from control stick to rear seat back	Aileron and elevator push-pull rods, circuit breaker panel, control stick switches wiring, fuel lines, ECS fresh air ducts
	Cabin, Side-Trim Panels	Copilot's side – runs from control stick to rear seat back	Aileron and elevator push-pull tubes, communication wiring, control stick switches wiring, common wire bundle, ECS fresh air ducts
	Passenger Footwell	Floor area aft of the pilot and copilots seats	Oxygen system cylinders, regulator/valve, over-fill/overpressure burst valve, and tubing
	Baggage Compartment Trim Panels (2)	Left and right sides of baggage compartment	Elevator push-pull rods
Controls	Access Panel	Right elevator, underside, middle CONTROLS Access Panel	Trim tab servo motor
	Access Panel	Underside, right aileron	Trim tab servo motor

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UNSCHEDULED MAINTENANCE CHECKS

1. General

A. During operation, the airplane can have forces put on it that make completion of unscheduled maintenance necessary. This section describes the conditions or events that will result in the need to complete an unscheduled maintenance procedure.

B. When the flight or maintenance crew reports that they have experienced of any conditions listed below, you must complete the unscheduled maintenance check requirements for that condition or event.

2. Unscheduled Maintenance Checks Defined and Areas of Inspection

A. Severe vibration or oscillatory yawing motion due to excessive braking or tire skidding.

(1) If the pilot reports that the airplane experienced severe vibration or oscillatory yawing motion due to excessive braking or tire skidding, complete the Aft Fuselage Inspection procedure found in Section 53-70-00, Fuselage Components - Adjustment/Test.

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DIMENSIONS AND AREAS - GENERAL

1. Powerplant Limitations

A. Number of Engines: One (1)
B. Number of Cylinders: Six (6)
C. Engine Manufacturer: Teledyne Continental
D. Engine Model Number: TSIO-550-C
E. Maximum Power: 310 BHP at 2600 RPM
F. Maximum Manifold Pressure: 35.5 inches of Hg
G. Maximum Manifold Pressure for Idle: 15 inches of Hg
H. Maximum Cylinder Head Temperature: 460° F (238 °C)

2. Powerplant Fuel and Oil Data

A. Oil Grades Recommended for Various Average Air Temperature Ranges
   (1) Below 40° F: SAE 30, 10W-30, 15W-50, or 20W-50
   (2) Above 40° F: SAE 50, 15W-50, 20W-50
B. Oil Temperature
   (1) Maximum Allowable: 240° F (116° C)
   (2) Recommended takeoff minimum: 100° F (38° C)
   (3) Recommended flight operations: 170° F to 200° F (76.7° C to 93.3° C)
C. Oil Pressure
   (1) Normal Operations: 30-60 psi (pounds per square inch)
   (2) Idle, minimum: 10 psi
   (3) Maximum allowable (cold oil): 100 psi
D. Approved Fuel Grades
   (1) 100LL Grade Aviation Fuel (Blue)
   (2) 100 Grade Aviation Fuel (Green)
E. Fuel Flow
   (1) Normal Operations: 13 to 25 GPH (49 to 95 LPH)
   (2) Idle, minimum: 2 to 3 GPH (7 to 11 LPH)
   (3) Maximum allowable: 38.5 GPH (146 LPH)

3. Propeller Data and Limitations

A. McCauley Propeller
   (1) Number of Propellers: One
   (2) Propeller Hub and Blade Model Numbers: E-7838/C447 and D3A34C447/78MLB-0
   (3) Propeller Diameters:
      (a) Minimum: 76.5 inches (194 cm)
      (b) Maximum: 78 inches (198 cm)
   (4) Propeller Blade Angle at 30 inch Station:
      (a) Low: 14.9 degrees, +0.2 or -0.2 degrees
      (b) High: 36.5 degrees, +0.5 or -0.5 degrees

B. Hartzell Propeller
   (1) Number of Propellers: One
   (2) Propeller Hub and Blade Model Numbers: HC-H3YF-IRF and F7693DF
   (3) Propeller Diameters:
      (a) Minimum: 77 inches (196 cm)

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(b) Maximum: 78 inches (198 cm)

(4) Propeller Blade Angle at 30 inch Station:

(a) Low: 16.5 degrees, +0.2 or -0.2 degrees

(b) High: 42.0 degrees, +2.0 or -2.0 degrees

4. Powerplant Instrument Markings

A. Table 1 shows applicable color-coded ranges for the various powerplant instruments within the aircraft.

Table 1. Powerplant Instrument Markings

INSTRUMENT	RED LINE Minimum Limit	GREEN ARC Normal Operating	RED LINE Maximum Limit
Tachometer	Minimum for idle 600 RPM	2000 - 2500 RPM	3000 RPM
Manifold Pressure	N/A	15-33.5 Inches Hg. (No Placard)	35.5 inches of Hg
Oil Temperature	Minimum for takeoff 100°F (38°C)	170 – 220° F (77° C – 104° C)	250° F (121° C)
Oil Pressure	Minimum for idle 10 psi	30 - 60 psi	100 psi (Cold Oil)
Fuel Quantity	A red line below "E" or "zero" in level flight indicates the remaining four gallons (S/N 41001 to 41799), or two gallons (S/N 41800 and on), in each tank cannot be used safely in flight.	N/A	N/A
Fuel Flow	N/A	10 - 22 GPH (38 – 83 LPH)	25 GPH (106 LPH)
Cylinder Head Temperature	N/A	240 – 420°F (116° C – 216° C)	500°F (260° C)
Turbine Inlet Temperature	N/A	1000°F – 1650° F (538°C – 899° C)	1800°F (982° C) 30 sec. limit

5. Weight Limits

A. Utility Category

Maximum Ramp Weight:	3600 lbs. (1633 kg)
Maximum Empty Weight:	2708 lbs. (1228 kg)
Maximum Takeoff Weight:	3600 lbs. (1633 kg)
Maximum Landing Weight:	3420 lbs. (1551 kg)
Maximum Baggage Weight:	120 lbs. (54.4 kg)

B. Other Weight Limits (Refer to Table 2)

Table 2. Other Weight Limits

TYPE OF WEIGHT LIMITATION	FORWARD DATUM POINT AND WEIGHT	AFT DATUM POINT AND WEIGHT	VARIATION
Minimum Flying Weight	105 inches and 2600 lbs.	112 inches and 2900 lbs.	Straight Line
Maximum Zero Fuel Weight	107.2 inches and 3300 lbs.	112 inches and 3300 lbs.	Straight Line
Reference Datum: The reference datum is located at the tip of the propeller spinner. As distance from the datum increases, there is an increase in weight for each of the two limitation categories. The variation is linear or straight line from the fore to the aft positions.			

6. Center Of Gravity Limits

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A. Table 3 specifies the center of gravity limits for utility category operations. The variation along the arm between the forward and aft datum points is linear (straight line). The straight-line variation means that at any given point along the arm, an increase in moments (expressed as inch-pounds) changes directly according to the variations in weight and distance from the datum.

Table 3. Center of Gravity Limits

CATEGORY	FORWARD DATUM POINT AND WEIGHT	AFT DATUM POINT AND WEIGHT	VARIATION
Utility Category	105 inches2600 to 2900 lbs.	112 inches2900 to 3600 lbs.	Straight Line
Reference Datum: The reference datum is located at the tip of the propeller spinner. This location causes all arm distances and moments (the product of arm and weight) to be positive values.			

7. Cabin and Entry Dimensions

A. Maximum Cabin Width: 48.17 inches (122 cm)
B. Maximum Cabin Length: (Firewall to aft limit of baggage compartment): 139.6 inches (354.6 cm)
C. Maximum Cabin Height: 49 inches (124.5 cm)
D. Minimum Entry Width: 33 inches (83.8 cm)
E. Minimum Entry Height: 33 inches (83.8 cm)
F. Maximum Entry Clearance: 46 inches (116.8 cm)

8. Space and Entry Dimensions Of Baggage Compartment

A. Maximum Baggage Compartment Width: 38.5 inches (97.8 cm)
B. Maximum Baggage Compartment Length: 52 inches (132 cm) (Including Shelf)
C. Maximum Baggage Compartment Height: 34.5 inches (87.6 cm)
D. Maximum Baggage Entry Width: 28 inches (71.1 cm) (Diagonal Measurement)

9. Specific Loadings

A. Wing Loading: 25.50 lbs./sq. ft.
B. Power Loading: 11.61 lbs./hp

10. Other Specifications

A. Wing Area: 141.2 sq. ft. (13.1 m²)
B. Wing Span: 35.8 ft. (10.9 m)
C. Angle of Incidence Wing: 0 degrees
D. Angle of Incidence Horizontal Stabilizer: -2.0 degrees
E. Dihedral: 4.5 degrees
F. Aspect Ratio: 9.18
G. Mean Aerodynamic Chord: 48.582 inches
H. Fuselage Length: 25.7 ft.
I. Height of Vertical Stabilizer: 9 ft.
J. Total Horizontal Stabilizer Area: 36.4 sq. ft.
K. Stabilizer Span: 14.1 ft.
L. Vertical Stabilizer Area: 18.24 sq. ft.
M. Total Aileron Area: 5.75 sq. ft.
N. Rudder Area: 7.34 sq. ft.
O. Total Flap Area: 20.36 sq. ft.
P. Total Elevator Area: 7.88 sq. ft.

11. Landing Gear

A. Nose Strut Pressure: 250 psi (Nitrogen)
B. Landing Gear Type: Fixed (Steel)
C. Landing Gear Track Width: 89.5 inches

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D. Nose Tire Size: 5.00-5 (10 Ply)

E. Nose Tire Pressure: 88 psi

F. Main Gear Tire Size: 15x6.00-6 (6 Ply)

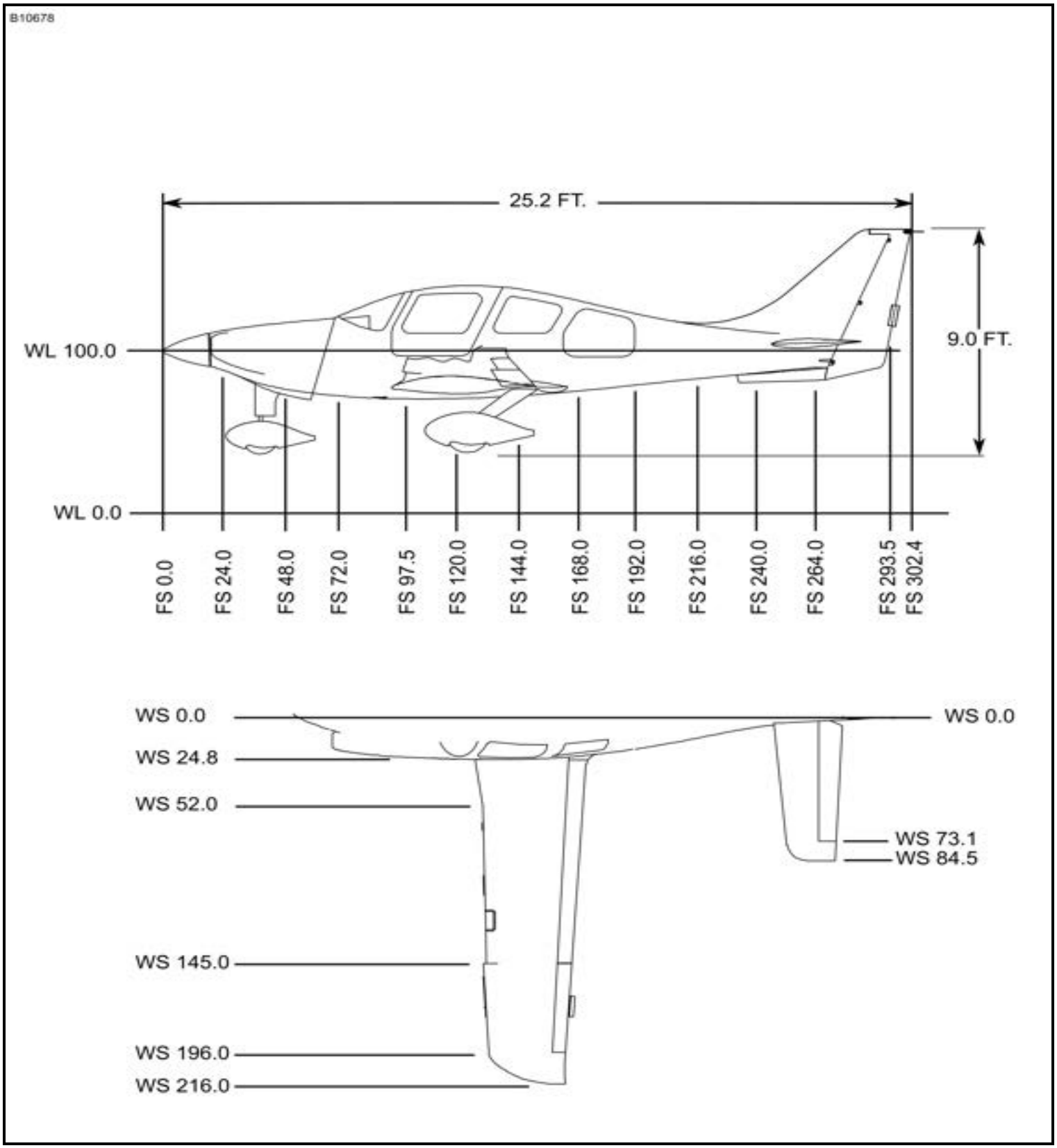
G. Main Gear Tire Pressure: 55 psi

12. Fuselage Stations

A. For Fuselage Stations, refer to Figure 1.

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Figure 1 : Sheet 1 : Fuselage and Wing Stations



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LIFTING AND SHORING - GENERAL

1. Jacking the Airplane

A. **Lifting Points** - There are two jack points under each wing proximate to the wing saddle. The points are near the center of mass of the longitudinal axis and may also be identified by the 5/16-inch holes in those areas; great care must be used when jacking the airplane. The tailskid is used as a third point of stabilization. Refer to Figure 1.

B. **Raising One Wing Only** - If only one wing is raised, as when changing a single tire, the airplane can be safely jacked by one person using the following steps:

(1) Perform operation in a level area, such as an airplane hangar.

(2) Set the parking brake and chock the nose tire and the main gear tire that is not raised.

(3) Place 50 pounds of ballast (usually sandbags) on the engine cowling, near the propeller.

(4) Place a jack under the jack point of the wing to be lifted and raise the jack up to the wing jack point. Take extra precaution to ensure the jack is properly stabilized, the base is locked in position, and the jack is lifting vertically. Be sure the raising point of the jack is properly inserted into the jack point on the wing.

(5) Slowly raise the jack until the desired ground clearance is achieved. The clearance between the bottom of the tire and lifting surface (ground or hangar floor) must not exceed three inches.

C. **Raising Both Wings** - If the airplane is simultaneously lifted by both jacks, then the procedures established below should be followed:

(1) Perform operation in a level area, such as an airplane hangar.

(2) Use a minimum of three trained individuals when jacking the airplane, one person for each jack and one observer.

(3) Because the jack points are near the airplane's center of gravity, 50 pounds of ballast must be placed on the horizontal stabilizer. Sandbags are perfect for this operation since they distribute pressure evenly and will not mar the surface.

(4) Attach the tail to a stabilizing stand.

(5) Place the sandbags or other ballast on the horizontal stabilizer as close as possible to the longitudinal axis.

(6) Place a jack under each jack point of the wing. Raise the jacks up to the wing jack point. Take extra precaution to ensure the jacks are properly stabilized, the bases are locked in position, and the jacks are lifting vertically. Be sure the raising point of the jacks are properly inserted into the jack points on the wing.

(7) Slowly raise the jacks until the desired ground clearance is achieved. The observer must ensure the jacks are lifting vertically and there is no tail wobble. As the airplane is lifted off the surface, the observer must connect the stabilizing stand to the tail.

D. **Raising with Two Jacks**

CAUTION: Several points must be considered when raising the airplane with two jacks:

(1) It is best to jack the airplane in an enclosed area. Wind gusts will destabilize the airplane and cause it to fall off the jacks.

(2) The airplane must be jacked in a level area on a concrete surface.

(3) Raise the jacks simultaneously in short increments to ensure the airplane stays as level as possible.

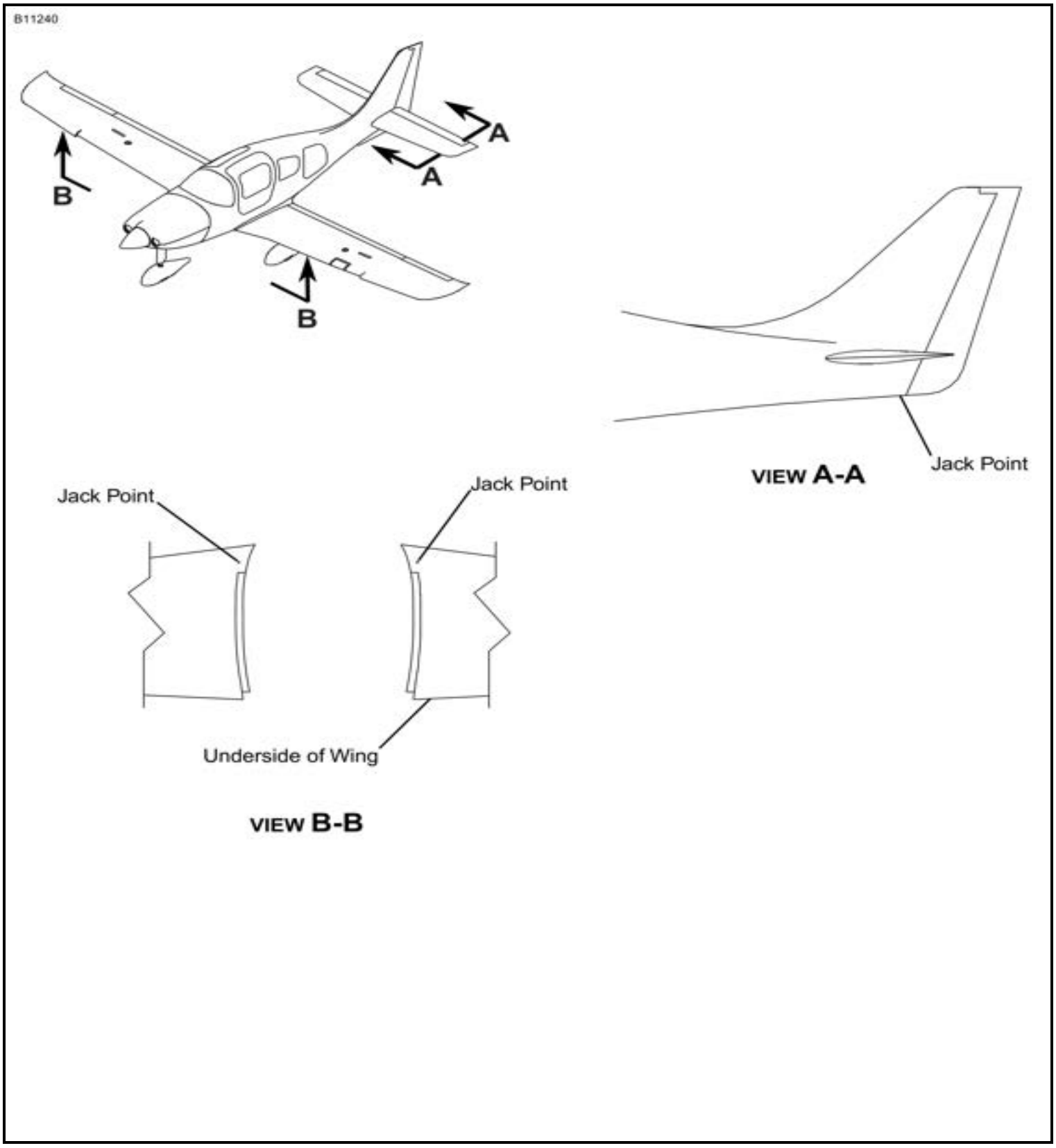
(4) If the jacks have locking pins, they must be inserted once the desired jacking height is achieved. Otherwise, the airplane must be continuously observed to ensure the jacks do not bleed off pressure. If the jack loses pressure while the tail is attached to the tail stand, damage to the tail will result.

(5) Once the airplane is on jacks, do not attempt to enter the airplane.

(6) When lowering the airplane, remove the tail stand support and bleed pressure evenly from jacks in short increments.

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Figure 1 : Sheet 1 : Jack Point Locations



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LEVELING AND WEIGHING - GENERAL

1. Scope

A. For data on airplane leveling procedures, refer to section 6 of the applicable Pilot's Operating Handbook.

B. For data on airplane weighing procedures, refer to section 6 of the applicable Pilot's Operating Handbook.

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TOWING AND TAXIING - GENERAL

1. General

A. The following pages contain instructions for towing and taxiing the airplane. It is important to remember that the airplane has a free castoring nose wheel with stops at the 60 degrees left and right positions. Personnel unfamiliar with the techniques required when taxiing an airplane with a free castoring nose wheel should be given appropriate instruction or a taxi checkout.

2. Ground Handling

CAUTION: Do not attempt to move the airplane by pushing or pulling on the propeller. This a common practice for airplanes with fixed pitch propellers, however, it is not recommended for constant speed propellers, since pressures applied to the propeller blades are transmitted to moving parts within the propeller hub. Over time, these forces could cause damage to the propeller.

A. Towing - A locking, hand-held tow bar is provided with the airplane and stored in the baggage compartment. The tow bar is inserted into two small holes in the nose wheel fairing, forward of the nose wheel axle. The tow bar must be locked in place before attempting to move the airplane. The tow bar is collapsible for storage by removing the locking pin. With the pin removed, slide the handle in and reinsert the locking pin. It is recommended that the airplane only be maneuvered during towing by use of the handheld tow bar. If it is necessary to tow with a vehicle, extreme care is required to ensure the rotation limits of the nose wheel (60 degrees left and right) are not exceeded. Since the rotation of the nose gear is limited by physical stops, rotating the gear beyond 60 degrees will damage the airplane.

B. It is a good idea to have another person serve as a spotter when towing the airplane, particularly if a vehicle is used. Remember that the airplane has vertical limitations as well as horizontal restrictions. The vertical stabilizer is frequently overlooked as an airplane is being pushed into a hanger with most of the attention directed towards the wingtips. When moving the airplane over uneven surfaces, remember that small up and down oscillations of the nose strut result in amplified movement of the vertical stabilizer. Finally, keep in mind that the height of the vertical stabilizer is affected by inflation levels of both the nose tire and strut. A flat tire or low nose strut will increase the height of the vertical stabilizer.

3. Taxiing

A. When taxiing, minimize the use of the brakes. Since the airplane has a free-castoring nose wheel, steering is accomplished with light breaking. Avoid the tendency to ride the brakes by making light steering corrections as required and then allowing the feet to slide off the brakes and the heels to touch the floor.

B. Avoid taxiing in areas of loose gravel, small rocks, etc., since it can cause abrasion and damage to the propeller. If it is necessary to taxi in these areas, maintain low propeller speeds. If taxiing from a hard surface through a small area of gravel, obtain momentum before reaching the gravel.

C. The airplane is stable on the ground. The low wing design minimizes the tipping tendency from strong winds while taxiing. Still, the proper positioning of control surfaces during taxiing will improve ground stability in high wind conditions. The following table summarizes control positions that should be maintained for a given wind component.

Table 1. Control Positions for Wind Components

Wind Component	Aileron Position	Elevator Position
Left Quartering Headwind	Left Wing Aileron Up(Move Aileron Control to the Left)	Neutral(Hold Elevator Control in Neutral Position)
Right Quartering Headwind	Right Wing Aileron Up(Move Ailero Control to the Right)	Neutral (Hold Elevator Control in Neutral Position)
Left Quartering Tailwind	Left Wing Aileron Down(Move Aileron Control to the Right)	Down Elevator(Move Elevator Control Forward)
Right Quartering Tailwind	Right Wing Aileron Down(Move Aileron Control to the Left)	Down Elevator (Move Elevator Control Forward)

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PLACARDS AND MARKINGS

1. General

A. The various airplane placards on the interior and exterior of the airplane are required items for the continued airworthiness of the airplane. The placards must be inspected at the required inspection intervals for cleanliness, legibility, and security. The following pages contain the text and location of all required interior and exterior placards. In addition, procedures for removal, replacement, and care are included.

2. Replacing Worn, Damaged, Or Missing Placards

A. If necessary, refer to Chapter 11 in *The Cessna 400 (LC41-550FG/T240) Parts Catalog* to determine the part number for the affected placard.

B. Use the following steps to remove and replace a placard:

(1) Apply the placard in a relatively warm area. It is best if the ambient air temperature and the temperature of the surface to which the placard is applied is above 70º F

(2) Make a few reference marks around the old placard to aid in positioning the new one. If the placard is missing, refer to Chapter 11 in *The Cessna 400 (LC41-550FG/T240) Parts Catalog* for the location, and then apply reference marks.

(3) Carefully remove the existing placard by raising one corner and slowly peeling it back. **Do not pull out on the placard!** Pull in a manner that keeps the peeled portion near or parallel to the surface. It helps to apply primer remover between the glue on the back of the placard and the attachment surface.

(4) Do not remove the placard too quickly. A slow steady pull works best. Discard the placard once it is removed.

(5) Clean excess adhesive off of the attachment surface with PPG D837 spirit wipe.

(6) When the attachment surface is clean and dry, remove the paper backing on the new placard, and apply it using the reference marks outlining the position of the old placard.

(7) Attach one end of the placard to the attachment surface, and slowly roll it on in a manner that avoids air bubbles. Because the airplane's surface has no rivets, air bubbles are infrequent.

(8) If the placard has a protective covering remove it at this point.

(9) If an air bubble does occur, prick the bubble with a small diameter needle. The number of holes depends on the size of the bubble. Five to ten needle holes are usually sufficient. Slowly work the placard until all air is removed.

3. Placard Care

A. Wash the placard with mild soap and water. Do not use petroleum based, caustic, or abrasive products. Avoid applying wax to placards because it may contain certain amounts of petroleum-based substances.

B. If there is any question about the composition of the cleaner being used, apply a small amount to a test corner of the placard, and wait a few minutes to see if it produces adverse results.

C. If aviation fuel accidentally comes in contact with a placard, immediately rinse with water.

D. Never apply paint to, or paint over, a placard.

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ENVIRONMENTAL CONTROL SYSTEM - GENERAL

1. GENERAL-SCOPE AND DEFINITION

A. Environmental control in the Cessna 400 is accomplished with either an Environmental Control System (ECS) or the optional air conditioning system also known as the Automatic Climate Control System (ACCS). For maintenance data applicable to the ACCS, refer to Automatic Climate Control System (ACCS). The ECS controls temperature throughout the front and rear cabin area. For the Avidyne and Garmin G1000 ECS installations refer to, Figure 1. For the Avidyne and Garmin G1000 ECS electrical system refer to Figure 3. For the Garmin G2000 ECS installation refer to, Figure 2.

B. The ECS incorporates the use of an air bleed nozzle off each intercooler, ram intake air, and an electric fan to distribute heated and outside air to various outlets within the cabin. The ECS consists of two subsystems, heated air and fresh air. Heated air is sent to the floor vent system and the defroster, and fresh air is ducted through the eyeball vents. Ram air enters through a duct on the right side of the engine cowling and flows through the fresh air manifold to the ECS control valve and to the front and rear eyeball vents. Air from the intercooler air bleed nozzles, depending on the control settings, is mixed with outside air in the ECS control valve. The air next passes through a fan unit before entering the distribution system. Operating the single speed fan will increase the airflow through the system (not including the eyeball vents).

C. At the windshield area, there is a defrost plenum directly built into the fuselage. This will allow the pilot or copilot to defrost the windshield during cold weather conditions and supply fresh air to that location during periods of high ambient temperature.

D. Located in the instrument panel are adjustable eyeball vents, one each for the pilot and copilot. These vents supply only fresh air to the front seat positions and may be manually directed to a desired location.

E. Near the pilot and copilot’s feet is a floor vent tube. Like the defrost plenum, this tube can direct hot, fresh, or mixed air to the lower front cabin area.

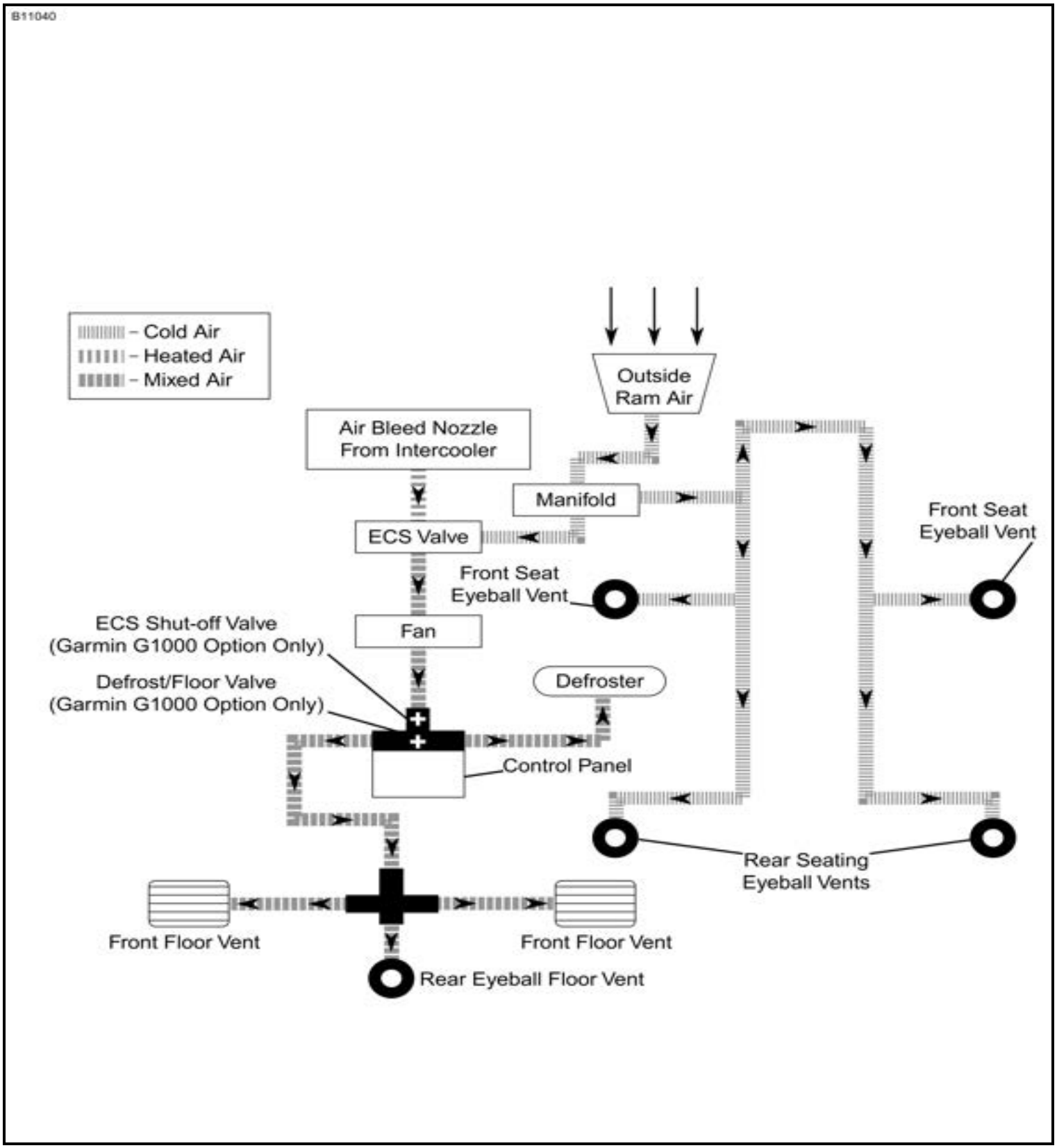
F. Directly tied into the floor vent tube and located at the aft end of the center console is an adjustable eyeball vent. This vent supplies the rear passengers the same air temperature as the floor and defrost vents but with the ability to be manually turned off independently or directed to a desired location.

G. Just to the outside of each rear passenger and located on the interior side panel is a fresh air eyeball vent. These vents supply only fresh air and may be manually adjusted or directed to a desired location.

H. An electrically controlled fan can be turned on while on the ground or during flight to supply cooler fresh air through the defrost plenum, floor tube, and rear passenger center console eyeball vent during the summer or aid in deicing the windshield before and after takeoff during the winter months.

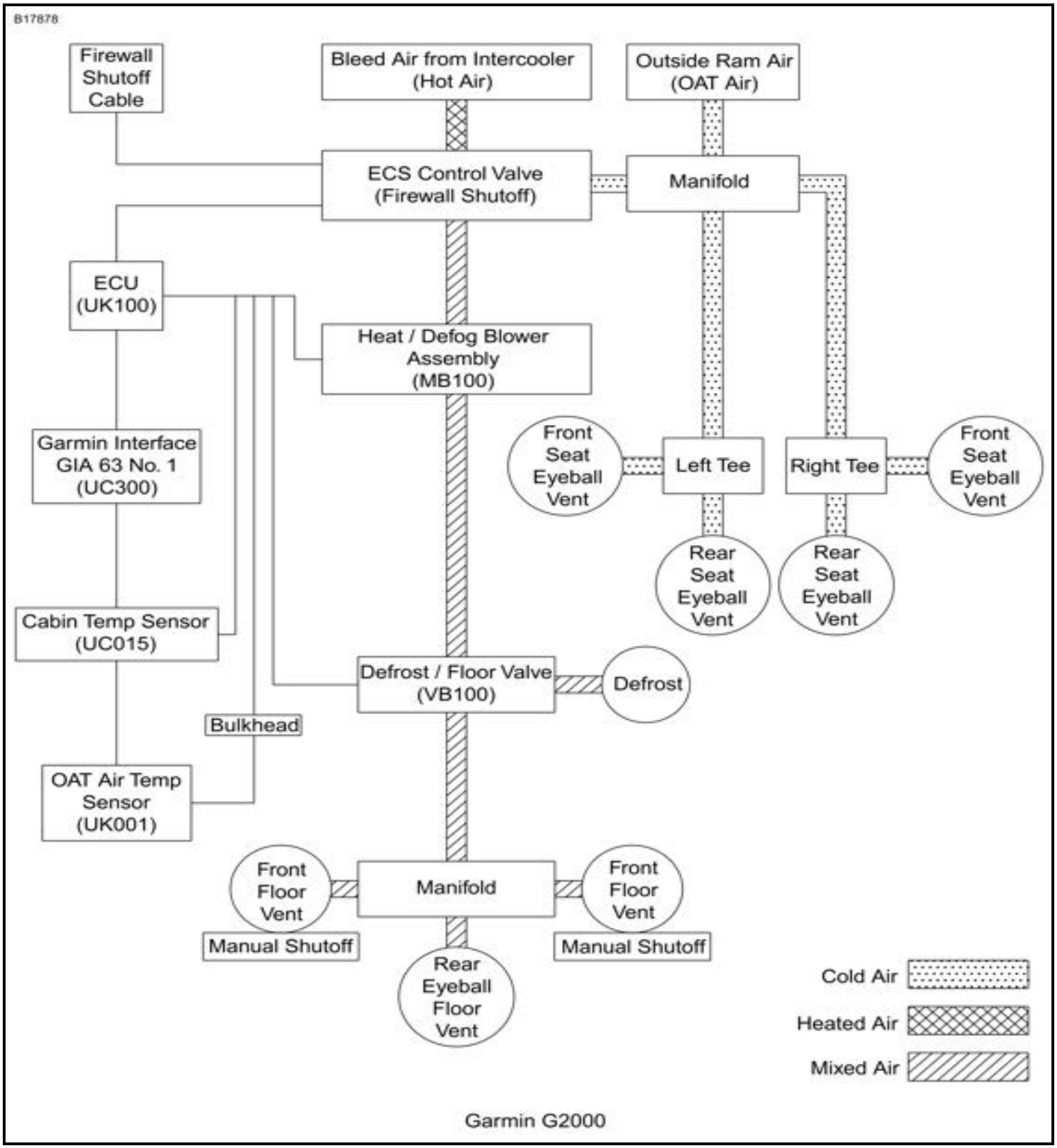
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Figure 1 : Sheet 1 : Avidyne and Garmin G1000 ECS Diagram



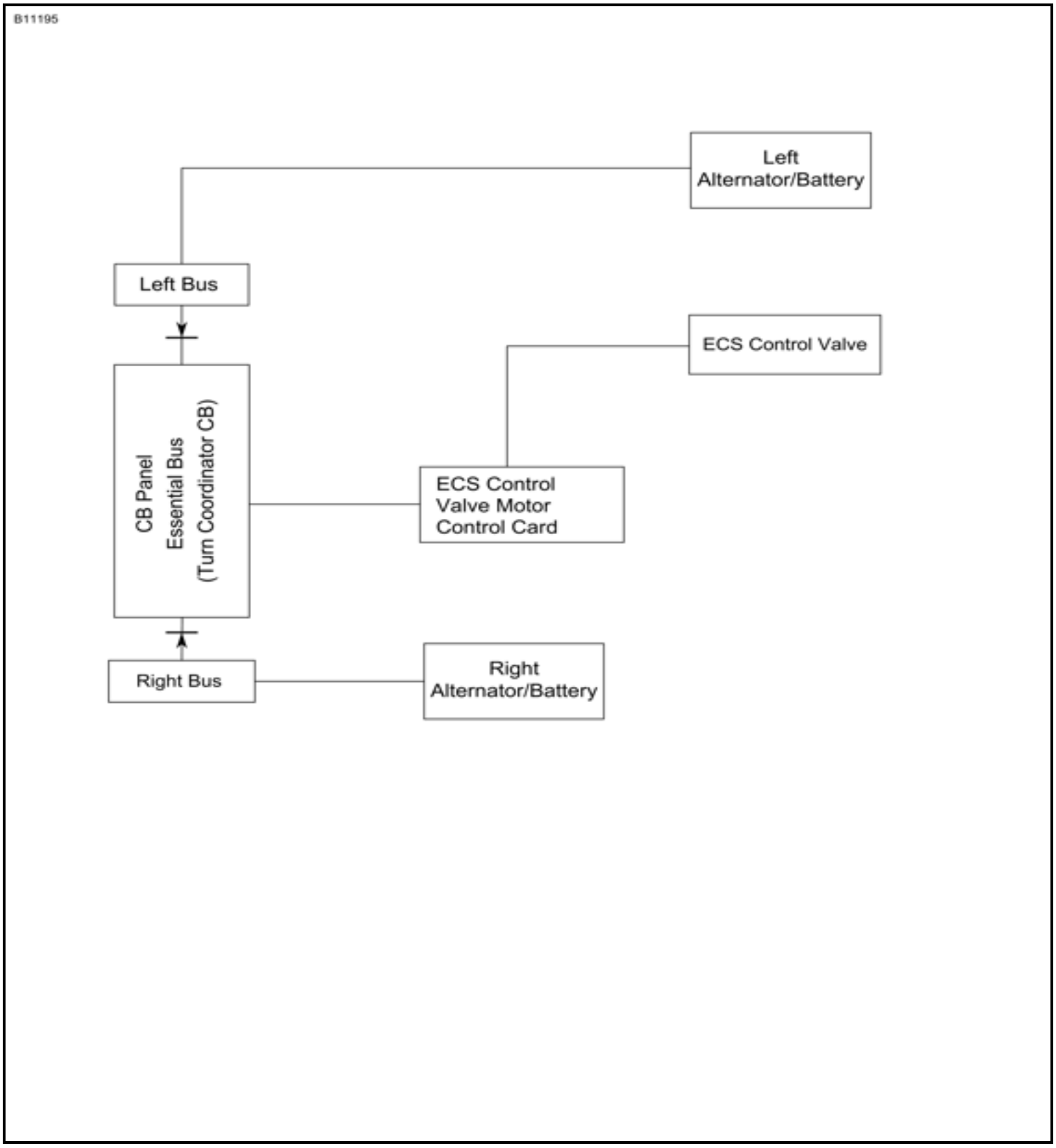
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Figure 2 : Sheet 1 : Garmin G2000 ECS Diagram



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Figure 3 : Sheet 1 : Schematic of ECS Electrical System Connection



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ENVIRONMENTAL CONTROL SYSTEM COMPONENTS (T240) - TROUBLESHOOTING

1. General

A. This section gives the troubleshooting procedures for the Environmental Control System (ECS), cabin fan, servo motor, defrost floor valve, firewall shutoff valve, cabin temperature sensor, air temperature sensor, and evaporator temperature sensor. For a general description of the Model T240 Garmin G2000 ECS control system, refer to Temperature and Air Control (T240) - Description and Operation.

B. Use the Model T240 Wiring Diagram Manual with the procedures in this section.

2. Tools and Equipment

A. No special tools or equipment are necessary to do the procedures in this section.

3. Servo Motor and Firewall Shutoff Valve Troubleshooting

A. The Firewall Shutoff Valve does not change position when the Touch Screen Controller 570 (UI405) (GTC 570) touchkeys are operated in each of the two settings, to increase or decrease temperature. Do the steps that follow:

(1) Make sure that the ECS and the ECS CTRL DOOR SEAL circuit breakers found on the cockpit circuit breaker panel, are engaged, .

(a) If one or each of the two circuit breakers are not engaged, engage the circuit breaker(s) and check the firewall shutoff valve operation again.

(2) If the fault continues:

(a) Select the GTC 570 ECS diagnostic page and record the fault text message(s) and the firewall shutoff valve (mixing valve) position. Refer to Temperature and Air Control (T240) - Description and Operation.

(3) If a fault(s) show on the diagnostic page not applicable to the servo motor:

(a) Troubleshoot and repair the fault. Refer to the applicable chapter/section of the maintenance manual.

(4) If the fault continues do the steps that follow:

(a) If a faults show on the diagnostic page that is applicable to the servo motor, or no faults show, operate the firewall shutoff valve cable.

1 Make sure that the firewall shut off valve moves freely.

(5) If the firewall shutoff valve does not operate freely:

(a) Check the route and installation of the firewall shut off cable.

1 If necessary, correct the cable installation. Refer to Firewall Shutoff Valve - Removal/Installation

(b) Replace the valve. Refer to Firewall Shutoff Valve - Removal/Installation

(c) Check the operation again.

(6) If the fault continues do the steps that follow:

(a) Set the firewall shutoff valve cable to its initial position

(b) Remove external electrical power from the airplane

(c) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(d) Remove the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats

(e) Disconnect the electrical connector (P56) from electrical connector (J320) at the firewall shutoff valve assembly (UB100)

(f) Visually inspect the connectors to make sure that there are no bent or damaged pins.

1 Repair any damage.

(7) Check the wiring for continuity between electrical connector (J320) to electrical connector (J310) at the ECU/Blower module assembly (UK100) and the electrical connector (P610) at the small parts module (UI006).

(a) Repair any wiring faults

(b) Check the operation again.

(8) If the fault continues, replace the servo motor (UB100). Refer to Servo Motor - Removal/Installation.

(a) Check the operation again.

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(9) If necessary, install the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

B. The Firewall Shutoff Valve does not change position when the Touch Screen Controller 570 (UI405) (GTC 570) touchkeys are operated for one of the two settings, an increase or a decrease in temperature. Do the steps that follow:

(1) Select the GTC 570 ECS diagnostic page and record fault text messages and the firewall shutoff valve (mixing valve) position. Refer to Temperature and Air Control (T240) - Description and Operation.

(a) If a fault(s) show on the diagnostic page not applicable to the servo motor:

1 Troubleshoot and repair the fault. Refer to the applicable chapter/section of the maintenance manual.

(2) If the fault continues do the steps that follow:

(a) If a faults show on the diagnostic page that is applicable to the servo motor, or no faults show, operate the firewall shutoff valve cable.

1 Make sure that the firewall shut off valve moves freely.

(3) If the firewall shutoff valve does not operate freely:

(a) Check the route and installation of the firewall shut off cable.

1 If necessary, correct the cable installation. Refer to Firewall Shutoff Valve - Removal/Installation

(b) Replace the valve. Refer to Firewall Shutoff Valve - Removal/Installation

(c) Check the operation again.

(4) If the fault continues:

(a) Remove external electrical power from the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the OFF position.

(c) Remove the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(5) Disconnect the electrical connector (J320) from electrical connector (P56) at the firewall shutoff valve assembly (UB100).

(6) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage

(b) Check the operation again.

(7) Check the wiring for continuity from electrical connector (J320) to electrical connector (J310) at the ECU/Blower module assembly (UK100) and the electrical connector (P610) at the small parts module (UI006).

(a) Repair any wiring faults

(b) Check the operation again.

(8) If the fault continues:

(a) Replace the small parts module (UI006). Refer to Servo Motor - Removal/Installation

(b) Check the operation again.

(9) If necessary, install the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

4. Cabin Fan Troubleshooting

A. The Cabin Fan (MB100) does not operate in AUTO and/or Manual mode. Do the steps that follow:

(1) Make sure that the ECS, AIR COND, and ECS CTRL DOOR SEAL circuit breakers are engaged, found on the cockpit circuit breaker panel.

(a) If one or each of the three circuit breakers are not engaged, engage the circuit breaker(s) and check the cabin fan operation again.

(2) If the fault continues, select the GTC 570 ECS diagnostic page and record fault text messages that show on the page. Refer to Temperature and Air Control (T240) - Description and Operation.

(3) Select the GTC 570 ECS diagnostic page and record fault text messages that show on the page. Refer to Temperature and Air Control (T240) - Description and Operation.

(a) If a fault(s) show on the diagnostic page not applicable to the cabin fan:

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1 Troubleshoot and repair the fault. Refer to the applicable chapter/section of the maintenance manual.

(4) If a fault shows on the diagnostic page applicable to the cabin fan or no fault shows:
(a) Remove external electrical power from the airplane
(b) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the OFF position.
(5) Remove the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.
(6) Disconnect electrical connector (J50) from electrical connector (P50) at the fan assembly (MB100).
(7) Visually inspect the connectors to make sure that there are no bent or damaged pins.
(a) Repair any damage
(b) Check the operation again.
(8) If the fault continues:
(a) Check the wiring for continuity between electrical connector (P50) and electrical connector (J301) at the relay module (UK101) and electrical connector (J310) at the ECU/Blower module assembly (UK100).
1 Repair any wiring faults
2 Check the operation again.
(9) If the fault continues, replace the cabin fan. Refer to Cabin Fan - Removal/Installation.
(a) Check the operation again.
(10) If necessary, install the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

5. Defrost Floor Valve Troubleshooting

A. The Defrost Floor Valve (VB100) does not operate or operates incorrectly. Do the steps that follow:
(1) Select the GTC 570 ECS diagnostic page and record fault text messages that show on the page. Refer to Temperature and Air Control (T240) - Description and Operation.
(a) If a fault shows on the diagnostic page not applicable to the defrost floor valve (VB100):
1 Troubleshoot and repair the fault. Refer to applicable chapter/section of maintenance manual.
(2) If fault shows on the diagnostic page applicable to the cabin fan or no fault shows:
(a) Remove external electrical power from the airplane
(b) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the OFF position.
(3) Remove the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.
(4) Disconnect electrical connector (J308) from electrical connector (P308) at the floor valve (VB100).
(5) Visually inspect the connectors to make sure that there are no bent or damaged pins.
(a) Repair any damage
(b) Check the operation again.
(6) Check the wiring for continuity between electrical connector (J308) and electrical connector (J310) at the ECU/Blower module assembly (UK100), and electrical connector (PFD02) at the RH GND Block.
(a) Repair any wiring faults
(b) Check the operation again.
(7) If the fault continues, replace the Defrost Floor Valve. Refer to Defrost Floor Valve - Removal/Installation.
(a) Check the operation again.
(8) If necessary, install the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

6. Cabin Temperature Sensor Troubleshooting

A. ECS not operating correctly. Do the steps that follow:
(1) Select the GTC 570 ECS diagnostic page and record fault text messages that show on the page. Refer to Temperature and Air Control (T240) - Description and Operation.

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(a) If a fault shows on the diagnostic page not applicable to the cabin temperature sensor (UC015):

1 Troubleshoot and repair the fault. Refer to the applicable chapter/section of the maintenance manual.

(2) If a fault shows on the diagnostic page applicable to the cabin temperature sensor or no fault shows:

(a) Remove external electrical power from the airplane

(b) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the OFF position.

(3) At the forward center console, disconnect electrical connector (P307) from electrical connector (J307).

(4) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage

(b) Check the operation again.

(5) If the fault continues:

(6) Check the wiring for continuity:

(a) Between electrical connector (J307) at the cabin temperature sensor and electrical connector (J310) at the ECU/Blower module assembly (UK100)

(b) Between electrical connector (J307) at the cabin temperature sensor and electrical connector (PFD02) at the RH GND Block

(c) Between electrical connector (J307) at the cabin temperature sensor and electrical connector (P61) at the cockpit circuit breaker panel.

1 Repair any wiring faults.

2 Check the operation again.

7. Air Temperature Sensor Troubleshooting

A. ECS not operating correctly. Do the steps that follow:

(1) Select the GTC 570 ECS diagnostic page and record fault text messages that show on the page. Refer to Temperature and Air Control (T240) - Description and Operation.

(a) If a fault shows on the diagnostic page not applicable to the air temperature sensor (UC001):

1 Troubleshoot and repair the fault. Refer to the applicable chapter/section of the maintenance manual.

(2) If a fault shows on the diagnostic page applicable to the air temperature sensor or no fault shows:

(a) Remove external electrical power from the airplane

(b) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the OFF position.

(3) Remove the air temperature sensor. Refer to Garmin GTP 59 Outside Air temperature Probe (T240) - Removal/Installation.

(4) Disconnect the electrical connector (P319) from electrical connector (J319).

(5) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage

(b) Check the operation again.

(6) Check the wiring for continuity between electrical connector (J319) and electrical connector (J310) at the ECU/Blower module assembly (UK100).

(a) Repair any wiring faults.

(7) Install the air temperature sensor. Refer to Garmin GTP 59 Outside Air temperature Probe (T240) - Removal/Installation.

(a) Check the operation again.

8. Evaporator Temperature Sensor Troubleshooting

A. ECS not operating correctly. Do the steps that follow:

(1) Select the GTC 570 ECS diagnostic page and record fault text messages that show on the page. Refer to Temperature and Air Control (T240) - Description and Operation.

(a) If a fault shows on the diagnostic page not applicable to the evaporator temperature sensor (UK102):

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1 Troubleshoot and repair the fault. Refer to the applicable chapter/section in the maintenance manual.

(2) If a fault shows on the diagnostic page applicable to the evaporator temperature sensor or no fault shows:
   (a) Remove external electrical power from the airplane
   (b) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the OFF position.

(3) Get access to the sensor. Remove the baggage shelf carpet. Refer to Chapter 25, Interior Panels - Maintenance Practices Removal of the Baggage Floor Carpet.

(4) Remove the screws that attach the Evaporator/Blower Assembly cover and the elevator interconnect cover to the floor structure. Refer to, Automatic Climate Control System (ACCS) - Maintenance Practices Figure 210.

(5) Disconnect the electrical connector (J313) from electrical connector (P313) at the evaporator blower assembly (MK100).

(6) Visually inspect the connectors to make sure that there are no bent or damaged pins.
   (a) Repair any damage
   (b) Check the operation again.

(7) If the fault continues:
   (a) Check the wiring for continuity between electrical connector (J313) and electrical connector (J310) at the ECU/Blower module assembly (UK100).
      1 Repair any wiring faults.
      2 Check the operation again.

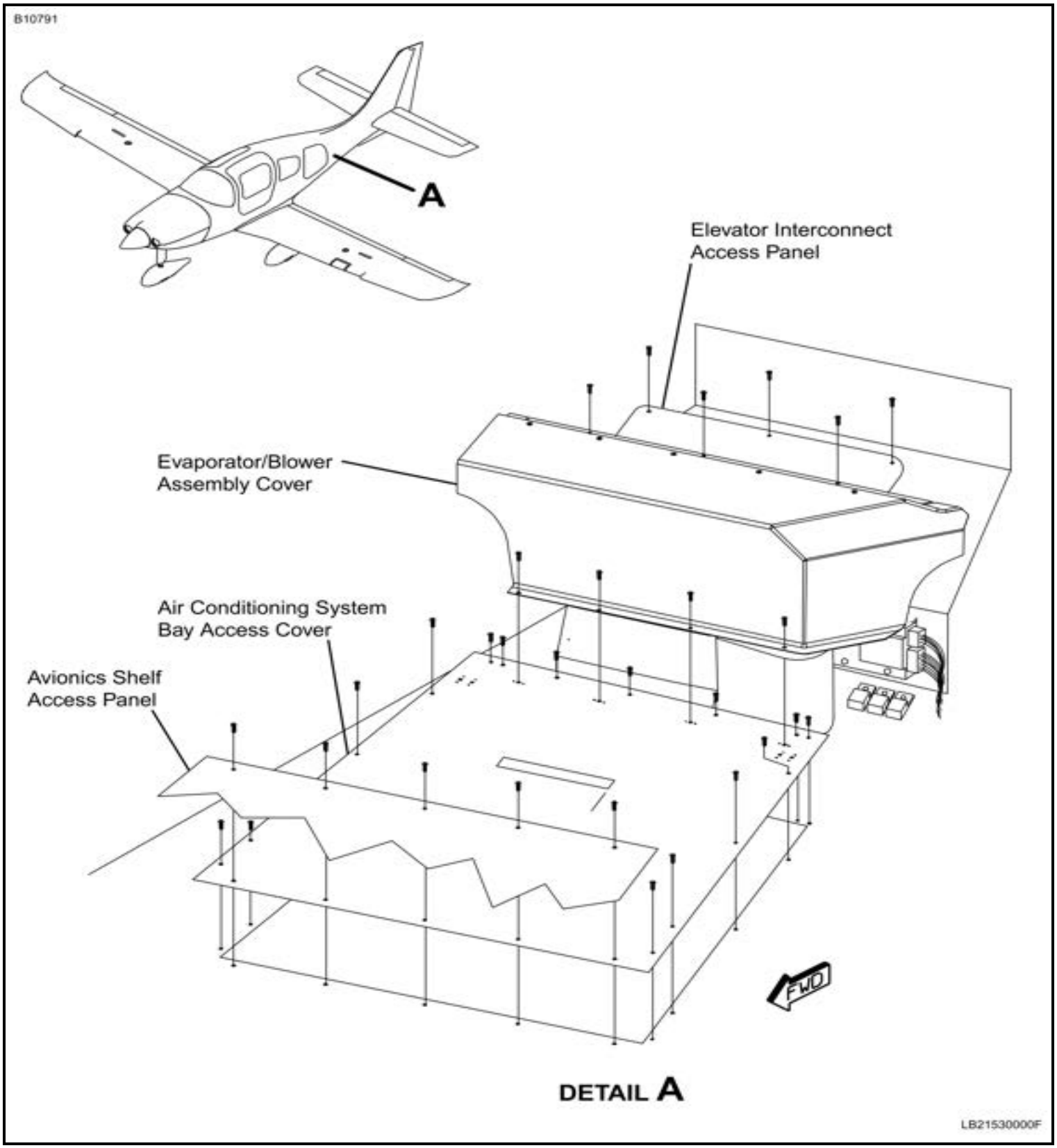
(8) If fault continues, replace the evaporator assembly. Refer to Chapter 21, Automatic Climate Control System (ACCS) - Maintenance Practices Evaporator/Blower Assembly.

(9) If necessary, install the evaporator/blower assembly cover and the elevator interconnect cover to the floor structure. Refer to, Automatic Climate Control System (ACCS) - Maintenance Practices Figure 210.
   (a) Put the evaporator/blower assembly cover and the elevator interconnect cover in its correct position on the floor structure.
      1 Install the screws that attach the cover to the floor structure.

(10) Install the baggage shelf carpet. Refer to Chapter 25, Interior Panels - Maintenance Practices Removal of the Baggage Floor Carpet

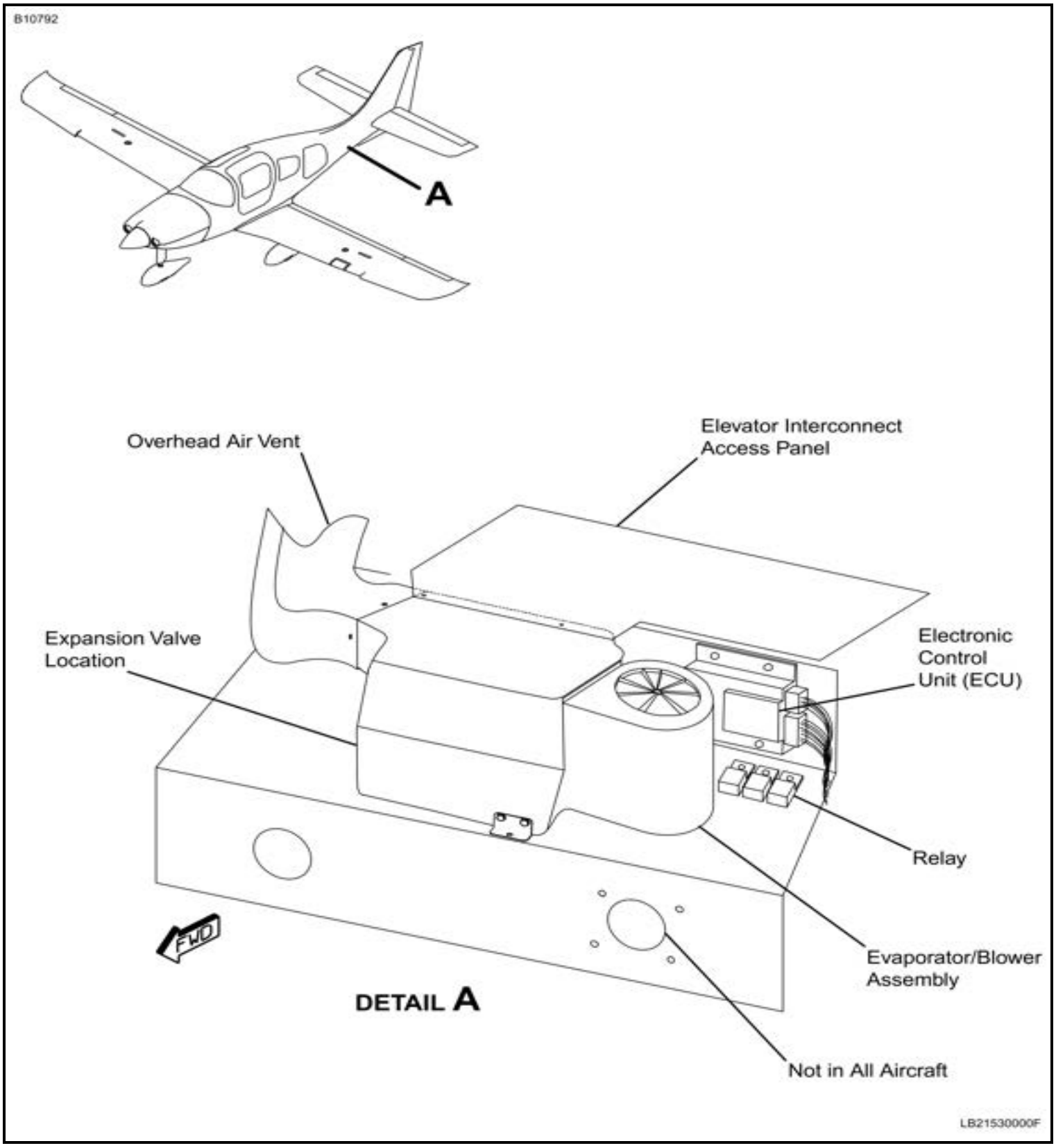
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Figure 210 : Sheet 1 : Access Panels and Covers and Evaporator/Blower Assembly Installation



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Figure 210 : Sheet 2 : Access Panels and Covers and Evaporator/Blower Assembly Installation



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ENVIRONMENTAL CONTROL SYSTEM COMPONENTS (T240) - ADJUSTMENT/TEST

1. General

A. This section gives the test procedures for the Environmental Control System (ECS). The Model T240 ECS is controlled with the Garmin G2000 GTC 570 Touchscreen Controller (UI405). The GTC 570 is found in the center console. For a general description applicable to the GTC 570 refer to Chapter 34, Garmin G2000 - Description and Operation.

2. A. Do the ECS Test

(1) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(2) Supply external power to the airplane.

(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(4) Set the AVIONICS MASTER switch (SW04) to the ON position.

(5) Set the CROSS TIE switch (SW03) to the ON position.

(6) When the initial startup sequence is complete, push the Multifunction Display (MFD) ENT soft key.

(a) The startup screen clears.

(7) On the GTC 570 Touchscreen Controller Home page do as follows:

(a) Push the Aircraft Systems touchkey.

1 The ECS page shows

2 The Actual and Selected temperature fields populate.

(b) Make sure that the Actual temperature that shows is between 65°F and 85°F.

(c) Touch the black area of the ECS page for approximately 5 seconds.

1 The DIAG touchkey shows on the display.

(d) Push the DIAG touchkey.

1 Make sure that not faults show in the FAULTS field.

(8) Select the fan Manual mode touchkey.

(a) Select the "-" and then the "+" Fan Control touchkey.

1 Make sure that the fan speed decreases and then increases in 10% increments.

2 Make sure that air blows out from the eyeball vents near the engine control panel.

(b) Select the Slider control and set it to decrease and increase fan speed.

1 Make sure that the fan speed decreases and then increases.

(c) Select the DEFOG touchkey.

1 Make sure that a high airflow rate is present at the windshield.

2 Make sure that air no longer blows out from the eyeball vents near the engine control panel.

(d) Select the DEFOG touchkey again.

1 Make sure that a high airflow rate is no longer present at the windshield.

2 Make sure that air blows out from the eyeball vents near the engine control panel.

(9) Set the Fan Speed to LO.

(10) Set the selected temperature to 95°F.

(11) Pull the ECS firewall shutoff cable knob aft (to extended position).

(12) Decrease the selected temperature in one degree increments at five second intervals and make sure that:

(a) Incremental movement of the heater temperature actuator (ECS control valve) is heard

(b) The firewall shutoff knob moves smoothly forward in increments.

(c) Make sure that the firewall shutoff valve position shows the valve movement on the ECS component reading field.

(13) Set the selected temperature to 55°F.

(14) Increase the selected temperature in one degree increments at five second intervals and make sure that:

(a) Incremental movement of the heater temperature actuator (ECS control valve) is heard

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(b) The firewall shutoff knob can be pulled smoothly to the extended position.

(c) Make sure that the firewall shutoff valve position shows the valve movement on the ECS component reading field.

(15) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(16) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(17) Set the CROSS TIE switch (SW03) to the OFF position.

(18) Disconnect external power from the airplane.

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AIR DISTRIBUTION - MAINTENANCE PRACTICES

1. DISTRIBUTION SYSTEM

A. The components in the distribution system depend upon whether Avidyne avionics, the Garmin G1000 or the Garmin 2000 system is installed in the aircraft.

(1) **Avidyne Option without Air Conditioning** - The distribution system includes the fan, ECS control valve, servo motor, defrost plenum, control panel, and eyeball and floor vents.

(2) **Avidyne Option with Air Conditioning** - The distribution system includes the fan, ECS control valve, servo motor, ECS shut-off valve assembly, defrost/floor valve assembly, defrost plenum, control head, and eyeball and floor vents

(3) **Garmin G1000 Option with or without Air Conditioning** - The distribution system includes the fan, ECS control valve, servo motor, ECS shut-off valve assembly, defrost/floor valve assembly, defrost plenum, control head, and eyeball and floor vents.

(4) **NOTE: The ECS shut-off valve is not a component of the Model T240 Garmin G2000 ECS installation.**
Model T240 with or without Air Conditioning - For maintenance procedures refer to the sections that follow:

- Cabin Fan - Removal/Installation
- Servo Motor - Removal/Installation
- Defrost Floor Valve - Removal/Installation
- Eyeball Vents - Removal/Installation
- Firewall Shutoff Valve - Removal/Installation
- Firewall Shutoff Cable - Removal/Installation
- Equipment Cooling Fans (T240) - Removal/Installation

2. ECS Fan

A. Avidyne Option without Air Conditioning

(1) Fan Removal

(a) Unplug the electrical connector plug, then cut and remove the plastic tie straps located at the inlet and outlet ports of the fan.

(b) Pull the flexible ducting away from the fan.

(c) Loosen and disconnect the main mounting clamp until the fan can be freed from the cradle housing.

(d) Remove the fan by pulling it out from underneath the instrument panel. (Refer to Figure 203.)

(2) Fan Installation

(a) Position the fan in the cradle leaving enough room between the heater control box and the fan inlet port for flexible ducting.

(b) Connect and tighten the main mounting clamp around the fan motor housing.

(c) Slide the flexible ducting over the inlet and outlet ports of the fan, and secure using plastic tie straps.

(d) Reconnect the ELC connector.

(e) Turn on the power, and test the fan for proper operation.

B. Garmin G1000 Option or Avidyne Option with Air Conditioning

(1) Fan Removal

(a) Unplug the electrical connector plug, then cut and remove the plastic tie straps at the inlet port and remove the hose clamp at the outlet port of the fan.

(b) Pull the ECS shut-off valve assembly away from the outlet port of the fan. (Refer to Figure 203 and Figure 204.)

(c) Pull the flexible ducting away from the fan.

(d) Loosen and disconnect the main mounting clamp until the fan can be freed from the cradle housing.

(e) Remove the fan by pulling it out from underneath the instrument panel.

(2) Fan Installation

(a) Position the fan in the cradle.

(b) Connect and tighten the main mounting clamp around the fan motor housing.

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(c) Slide the flexible ducting over the inlet port of the fan, and secure using plastic tie straps.

(d) Slide the end of the ECS shut-off valve assembly over the outlet port of the fan. Apply RTV5818 silicone all around and secure with a hose clamp. (Refer to Figure 204.)

(e) Reconnect the ELC connector.

(f) Turn on the power, and test the fan for proper operation.

C. **Fan Maintenance** - The electrically controlled ECS fan is a self-contained unit and requires only a periodic check for proper operation.

3. Servo Motor

A. **Servo Motor Removal**

(1) With power on, adjust the temperature knob in the instrument panel to the full cold position, then turn power off.

(2) Remove the ECS control valve per Section 21-40-00, Heating and Heater Control Valve, of this manual.

(3) Remove the servo motor to ECS control valve attachment screws, washers, and nuts.

(4) Pull the servo motor back and away from the ECS control valve until the servo motor drive arm to linear drive rod clevis is exposed.

(5) Remove the cotter pin, washer, and clevis pin, and remove the servo motor from the ECS control valve.

B. **Servo Motor Installation**

(1) With the servo motor arm in the fully extended position, install the servo motor drive arm into the linear actuator clevis, and reinstall the clevis pin, washer, and a new cotter pin.

(2) Align the mounting holes in the servo motor with the mounting holes in the ECS control valve. Install screws, washers, and nuts only tight enough so that servo motor can be pushed forward by hand.

(3) With the ECS control valve secured, hand push the servo motor forward until the silicone sealing cushion inside of ECS control valve is fully seated against metal sealing ring. Tighten the servo mounting hardware.

C. **Servo Motor Maintenance** - The ECS servo motor is a self-contained unit and requires only a periodic check for proper operation.

4. ECS Shut-Off Valve Assembly (Avidyne and Garmin G1000)

A. The ECS shut-off valve assembly is only present with the Garmin G1000 option or the Avidyne option with air conditioning.

B. **ECS Shut-Off Valve Removal**

(1) Unplug the electrical connector plug.

(2) Remove the hose clamps at the inlet and outlet ports of the ECS shut-off valve. (Refer to Figure 203 and Figure 204.)

(3) Pull the flexible ducting away from the outlet port.

(4) Pull the ECS shut-off valve assembly away from the outlet port of the ECS fan.

C. **ECS Shut-Off Valve Installation**

(1) Apply RTV5818 silicone all around the outlet port of the ECS fan and the outlet port of the ECS shut-off valve.

(2) Slide the inlet port of the ECS shut-off valve over the outlet port of the ECS fan. Rotate the valve as required to clear the rudder pedal tubes and ECS servo motor actuator screw and secure with a hose clamp.

(3) Slide the flexible ducting over the outlet port of the ECS shut-off valve, and secure with a hose clamp.

(4) Reconnect the electrical connector.

(5) Turn on the power, and test the ECS shut-off valve for proper operation.

D. **ECS Shut-Off Valve Maintenance** - The ECS shut-off valve assembly is a self-contained unit and requires only a periodic check for proper operation.

5. Defrost/Floor Valve Assembly

A. The defrost/floor valve assembly is only present with the Garmin G1000 option or the Avidyne option with air conditioning.

B. **Defrost/Floor Valve Removal**

(1) Unplug the electrical connector plug.

(2) Remove the hose clamps at the inlet and outlet ports of the defrost/floor valve. (Refer to Figure 203 and Figure 204.)

(a) On Garmin G1000 aircraft, the defrost/floor valve assembly may be attached directly to the defrost channel. With this

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condition, remove the hose clamp and an MS51861-25C screw. There is a length of silicone sheeting between the defrost/floor valve and the defrost channel.

(3) Pull the flexible ducting away from the inlet and outlet ports.

(4) Remove the defrost/floor valve.

C. **Defrost/Floor Valve Installation**

(1) Defrost/floor valve attached directly to the defrost channel.

(a) Fill the gap between the inner diameter of the valve flange and the outer diameter of the defrost channel flange with .062-inch or .093-inch AMS3320 silicone sheet.

(b) When installing a new defrost/floor valve, match drill a 0.166-inch diameter (No. 32) hole in the valve flange.

(c) Install a MS51861-25C screw through the valve flange, the defrost channel flange, and the silicone sheet. Dry torque hand tight plus quarter turn.

(d) Apply RTV5818 silicone all around the inlet port, install flexible ducting, and secure with a hose clamp.

(e) Reconnect the electrical connector.

(f) Turn on the power, and test the defrost/floor valve for proper operation.

(2) Defrost/floor valve not attached directly to the defrost channel.

(a) Apply RTV5818 silicone all around the inlet and outlet ports of the defrost/floor valve.

(b) Slide the flexible ducting over the inlet and outlet ports of the defrost/floor valve. Rotate the valve as required to clear the rudder pedal tubes and ECS servo motor actuator screw, and secure with hose clamp.

(c) Reconnect the electrical connector.

(d) Turn on the power, and test the defrost/floor valve for proper operation.

D. **Defrost/Floor Valve Maintenance** – The defrost/floor valve assembly is a self-contained unit and requires only a periodic check for proper operation.

6. Defrost Plenum

A. **Defrost Plenum Removal/Installation** – The defrost plenum is an integral part of the fuselage and contains no moving parts; therefore, no removal is required.

B. **Defrost Plenum Maintenance** – The defrost plenum is an integral part of the fuselage, therefore, no maintenance is required.

7. Eyeball Vents (Instrument Panel)

A. **Eyeball Vent Removal** – To remove the left and/or right eyeball vent(s) from the instrument panel use the following instructions. Steps 1 and 2 do not apply for the Garmin G1000 system instrument panel.

(1) Remove the left side instrument panel and/or the right side kidney panel screws.

(2) Gently pull the left side instrument panel and/or the right side kidney panel away from the main panel until the eyeball vent flexible ducting can be seen.

(3) Remove the cable tie securing the tubing to the back of the plenum cap. For the Garmin G1000 system, the back of the vent may be accessed from underneath the instrument panel.

(4) Loosen the clamp securing the plenum cap to the backside of the eyeball vent, and gently pull away from the vent.

(5) Loosen and remove the threaded eyeball vent retaining collar from the backside of the panel.

(6) Pull the eyeball vent out from the front of the panel. Refer to Figure 201 for a schematic of the eyeball vent.

B. **Eyeball Vent Installation** - To install the left and/or right eyeball vent(s) into the instrument panel use the following instructions. Step 5 does not apply to the Garmin G1000 system instrument panel.

(1) Insert the eyeball vent(s) into the front of the side instrument panel, into the front of the right kidney panel, or into the lower instrument panel (Garmin G1000 system), as applicable.

(2) Install the threaded eyeball vent retaining collar to the backside of eyeball vent.

(3) Press the plastic plenum cap onto the backside of the eyeball vent, and secure with clamp. When the clamp is secured, the screw housing must remain at the 10 to 12 o'clock position for the left eyeball vent and at the 12 to 3 o'clock position for the right eyeball vent, as viewed from the rear.

(4) Slide the tubing over the back of the plenum cap and secure with a new cable tie.

(5) Install the instrument panel and/or the kidney panel to the main panel with screws.

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8. Eyeball Vents (Rear Interior Side Panels)

A. **RISP Eyeball Vent Removal** – To remove the rear interior side panel eyeball vents use the following instructions.

(1) Remove the rear interior panel attachment screws, then gently pull the interior side panel up and away from the fuselage until access is gained to the rear of the eyeball vent.

(2) Loosen and remove the threaded eyeball vent retaining collar from the backside of the panel.

(3) Pull the eyeball vent out from the front of the panel.

B. **RISP Eyeball Vent Installation** - To install eyeball vents into the rear interior side panel use the following instructions.

(1) Insert the eyeball vent into the side panel hole.

(2) Install the threaded eyeball vent retaining ring to the backside of the eyeball vent.

(3) Press the panel back into place ensuring the vent is seated in the ducting channel.

(4) Install the rear interior panel to the fuselage, and attach it with screws.

C. **RISP Eyeball Vent Maintenance** - The rear interior side panel eyeball vents are self-contained, therefore, no maintenance is required.

9. Floor Vent (Front)

A. **Front Floor Vent Removal/Installation** – The front floor vent is an integral part of the radio rack frame with no moving parts; therefore, no removal is required.

B. **Front Floor Vent Maintenance** – The front floor vent is self-contained; therefore, no maintenance is required.

10. Floor Vent (Rear)

A. **Rear Floor Vent Removal** – To remove the rear floor vent use the following instructions. (Refer to Figure 202.)

(1) Gently pull the center console panel out and away from the main console.

(2) With the rear heat vent flexible ducting exposed, loosen the clamp securing the plastic plenum cap to the backside of the eyeball vent, and gently pull the plastic housing away from vent.

(3) Loosen and remove the threaded eyeball vent retaining collar from the backside of the panel.

(4) Pull the eyeball vent out from the front of the panel.

B. **Rear Floor Vent Installation** – To install eyeball vents onto the center console, use the following instructions.

(1) Insert the eyeball vent into the side panel hole.

(2) Install the threaded eyeball vent retaining collar to the backside of the eyeball vent.

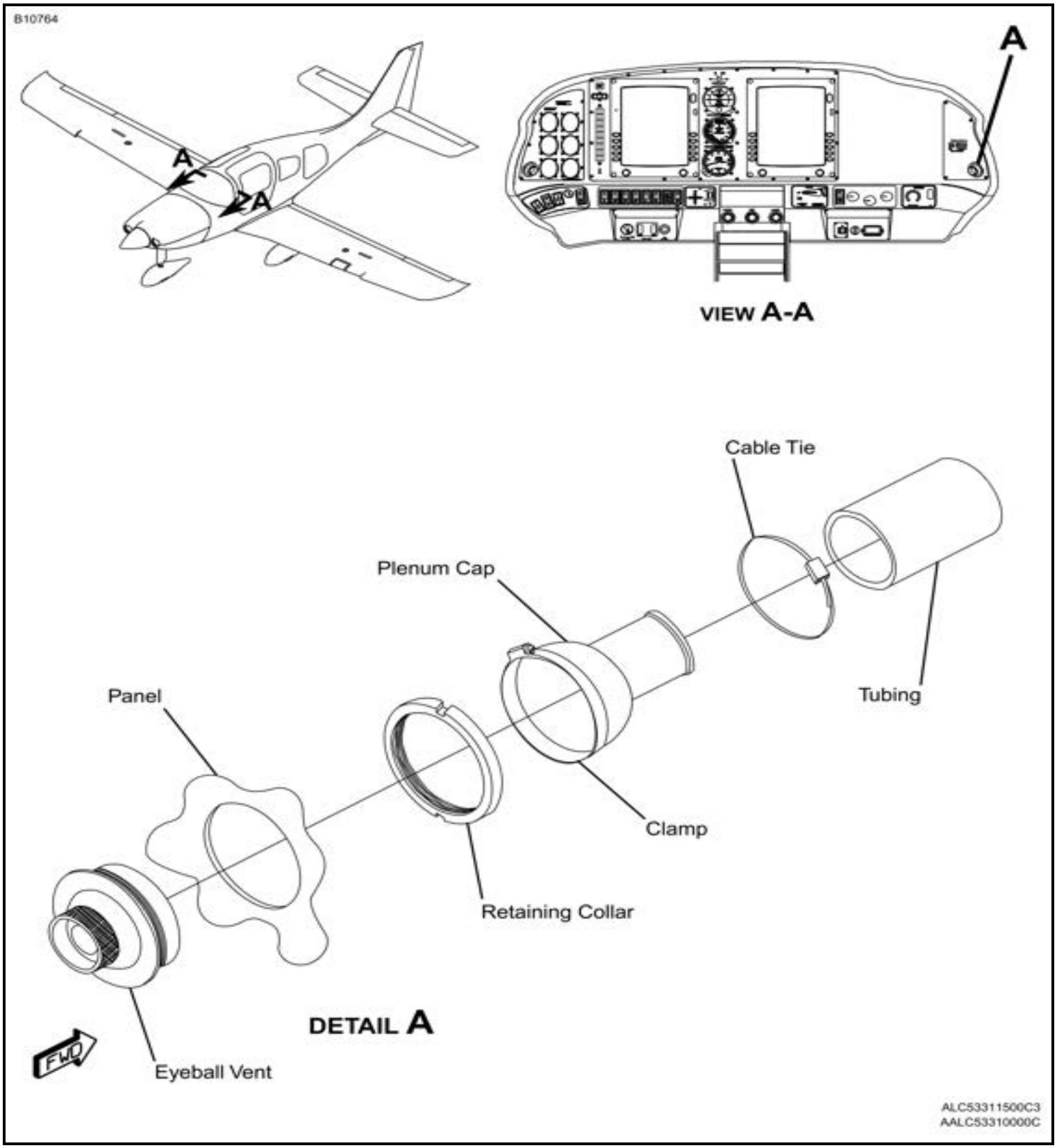
(3) Press the plastic plenum cap onto the backside of the eyeball vent, and secure with a clamp.

(4) Install the center console panel onto the main panel until the duel lock stripping is fully engaged.

C. **Rear Floor Vent Maintenance** – The rear floor vent is self-contained; therefore, no maintenance is required.

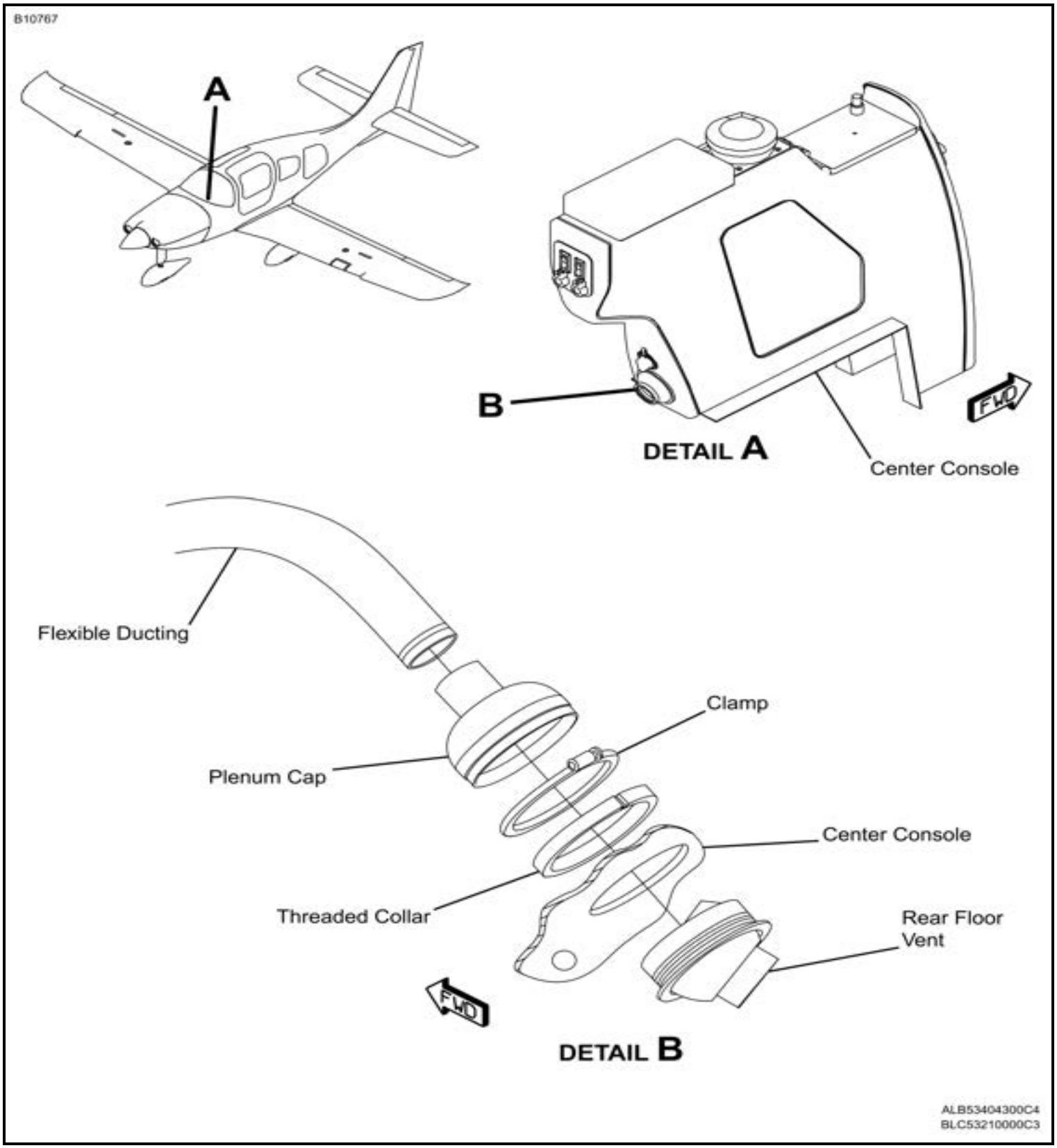
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Figure 201 : Sheet 1 : Eyeball Vent Installation



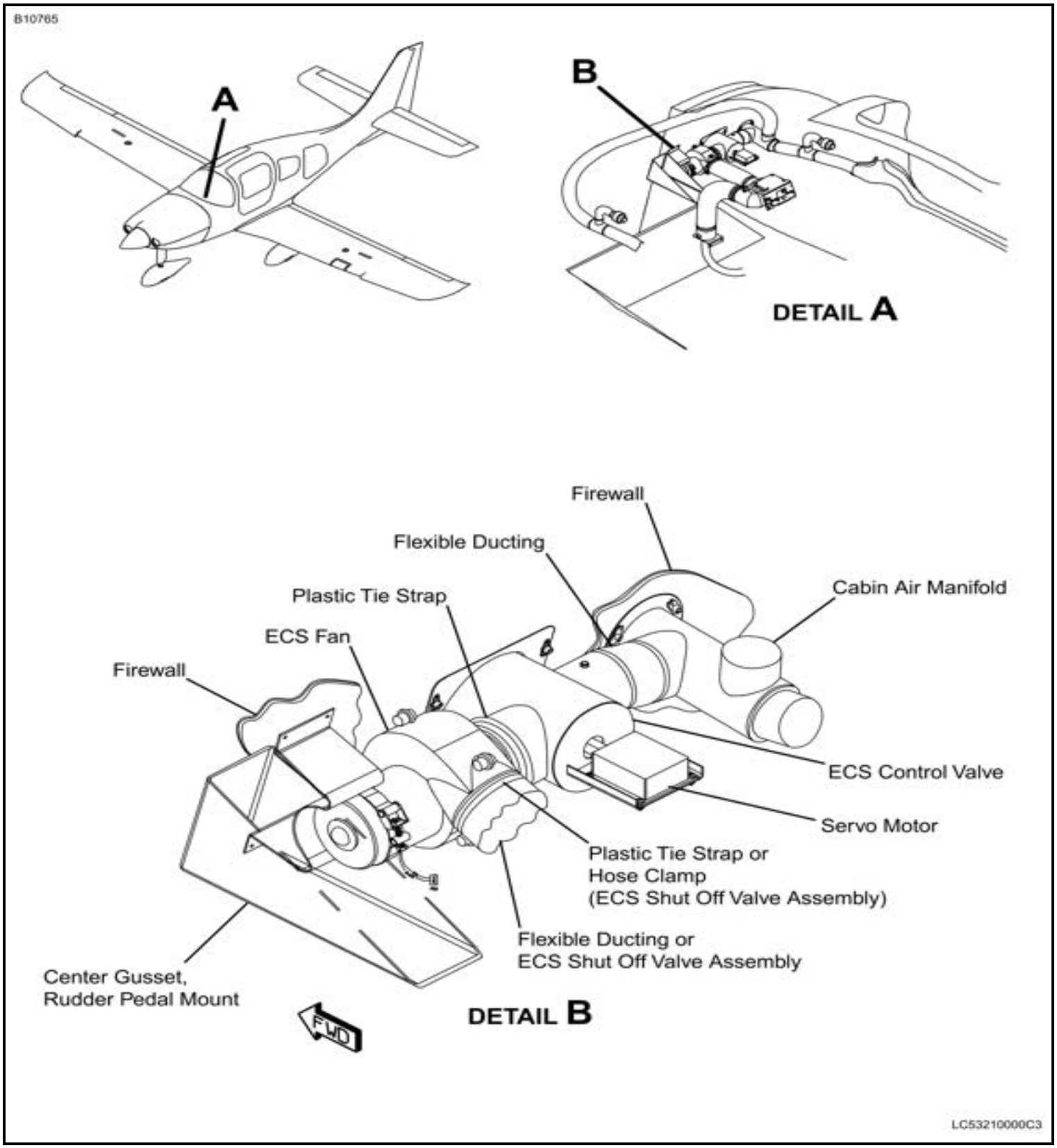
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Figure 202 : Sheet 1 : Rear Floor Vent



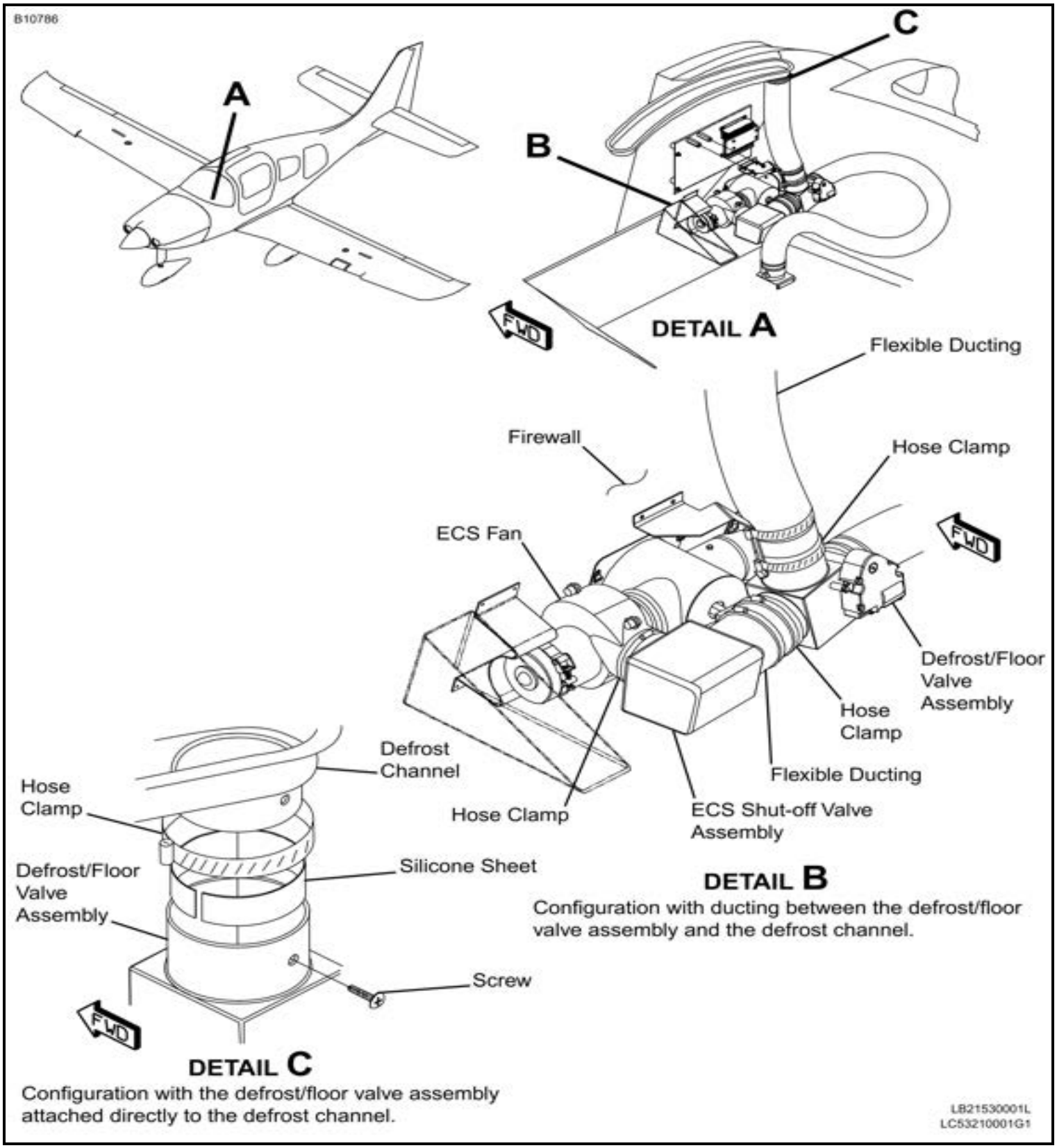
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Figure 203 : Sheet 1 : ECS System Attachment (Avidyne and Garmin G1000)



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Figure 204 : Sheet 1 : ECS Shut-Off Valve and Defrost/Floor Valve Assemblies (Avidyne and G1000)



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CABIN FAN (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Cabin Fan.

B. For the Avidyne and Garmin G1000 options cabin fan maintenance procedures, refer to Air Distribution - Maintenance Practices ECS Fan.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Cabin Fan Removal/Installation

A. Remove the Cabin Fan (MB100) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the ECS circuit breaker found on the cockpit circuit breaker panel.

(5) Remove the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Disconnect electrical connector P50 from electrical connector J50.

NOTE: Get access to the fan from below the copilot side of the instrument panel.

(7) Remove the tie straps at the inlet port of the fan.

(8) Remove the hose clamp at the outlet port of the fan.

(9) Pull the flexible ducts away from the fan.

(10) Loosen and disconnect the mounting clamp.

(11) Remove the fan from the airplane.

B. Install the Cabin Fan (MB100) (Refer to Figure 401).

(1) Put the fan in its correct position.

(2) Install the mounting clamp around the fan motor housing but do not tighten it.

(3) Slide the flexible ducts over the inlet and outlet ports of the fan.

(4) Tighten the mounting clamp around the fan.

(5) Apply a bead of RTV-81409 around the end of the duct and the outlet port to create a leak proof seal.

(6) Install the hose clamp at the outlet port of the fan.

(7) Install the tie straps at the inlet port of the fan.

(8) Connect electrical connector P50 to electrical connector J50.

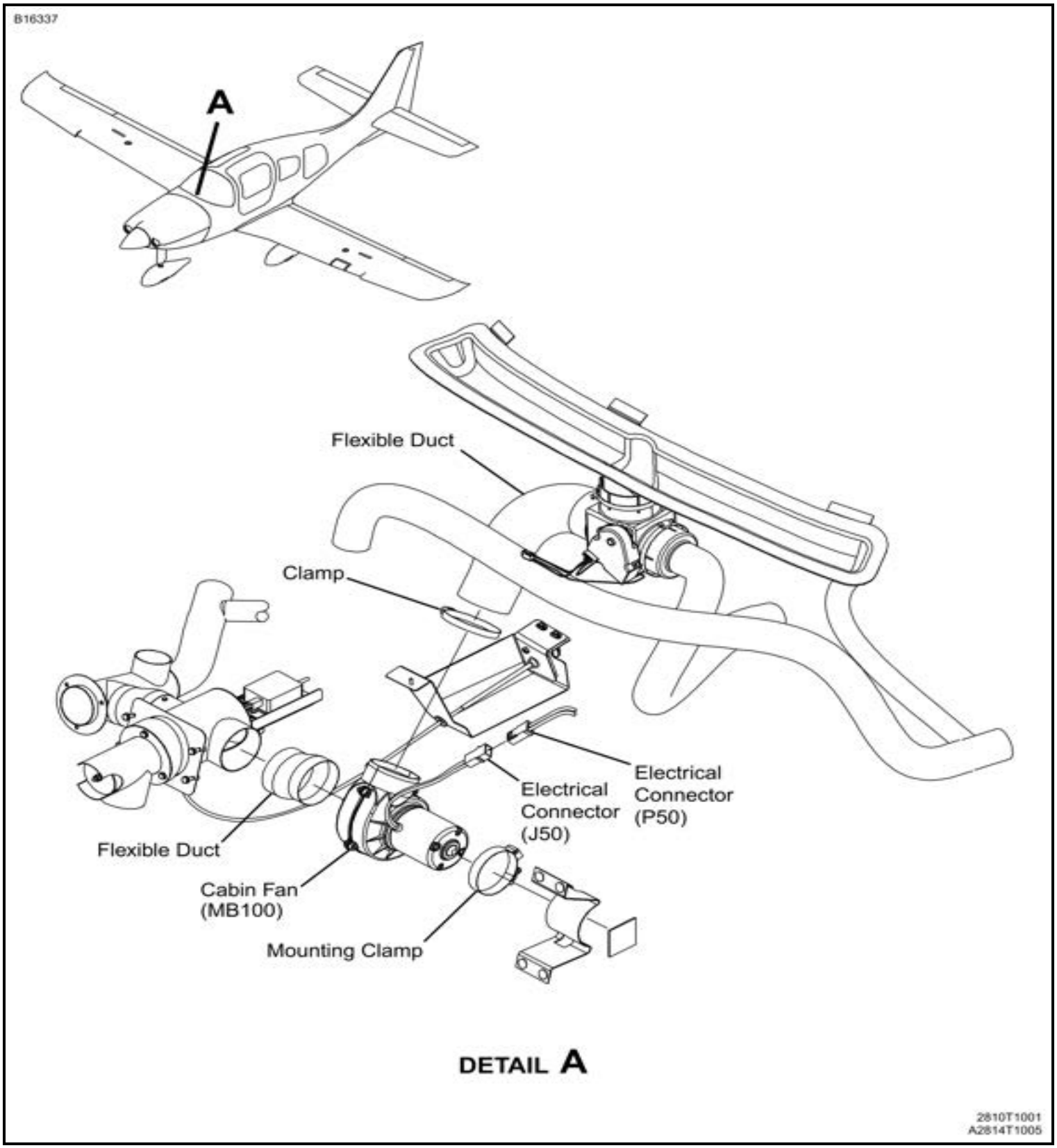
(9) Engage the ECS circuit breaker found on the cockpit circuit breaker panel.

(10) Do a check of the fan operation. Refer to Environmental Control System Components - Adjustment/Test.

(11) Install the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

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Figure 401 : Sheet 1 : Cabin Fan Installation



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SERVO MOTOR (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Servo Motor (UB100).

B. For the Avidyne and Garmin G1000 options servo motor maintenance procedures, refer to Air Distribution - Maintenance Practices Servo Motor.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Servo Motor Removal/Installation

A. Remove the Servo Motor (UB100) (Refer to Figure 401).

(1) Apply external electrical power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Set the CROSS TIE switch (SW03) to the ON position.

(5) On the GTC 570 Touchscreen Controller Home page do as follows:

(a) Push the Aircraft Systems button.

(b) Push the ECS button.

(c) Push the ECS On button.

1 The valve is in the full cold position.

(6) Remove external electrical power from the airplane.

(7) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(8) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(9) Set the CROSS TIE switch (SW03) to the OFF position.

(10) Remove the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(11) If necessary, cut tie wraps and carefully move wire bundles away from the servo motor to get access to the electrical connector.

(12) Disconnect the electrical connector (J320) from the servo motor electrical connector (P56).

(13) Remove and discard the cotter pin from the pin that connects the servo motor to the firewall shutoff valve.

(a) Remove the washer and pin.

(14) Remove the screws and washers that connect the servo motor to the tray.

(15) Remove the servo motor from the airplane.

B. Install the Servo Motor (UB100) (Refer to Figure 401).

(1) Align the mounting holes in the servo motor with the mounting holes in the tray.

(a) Install the screws and washers that connect the servo motor to the tray.

(b) Tighten the screws until the servo motor slides smoothly on the tray with no free play.

(2) Install the washer, pin, and a new cotter pin to connect the servo motor to the firewall shutoff valve.

(3) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(4) Connect the electrical connector (J320) to the servo motor electrical connector (P56).

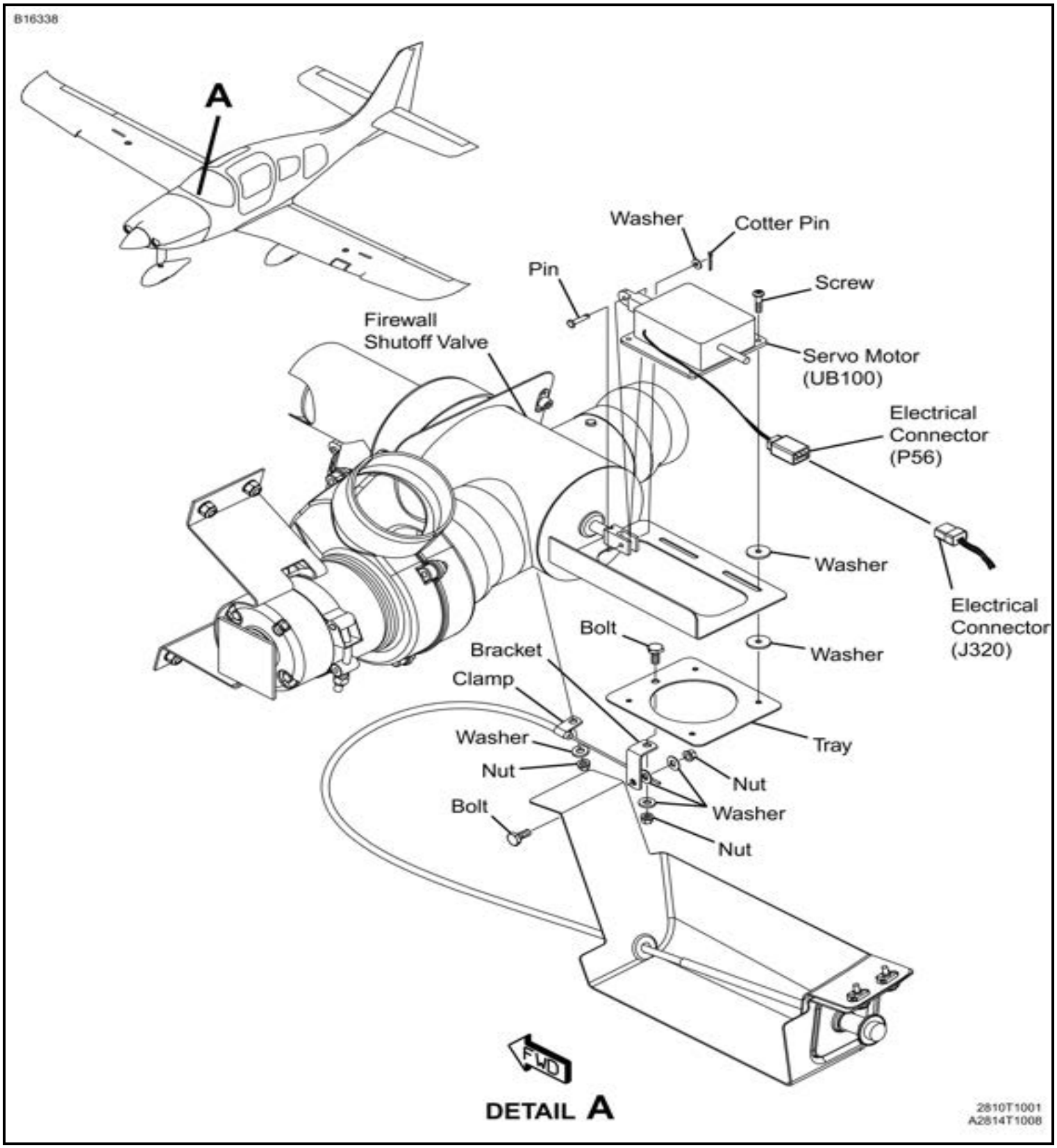
(5) If necessary, carefully move wire bundles to their correct position and install tie wraps.

(6) Install the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(7) Do a check of the servo motor. Refer to Environmental Control System Components - Adjustment/Test.

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Figure 401 : Sheet 1 : Servo Motor Installation



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DEFROST/FLOOR VALVE (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Defrost/Floor Valve.

B. For the Avidyne and Garmin G1000 options Defrost/Floor Valve maintenance procedures, refer to Air Distribution - Maintenance Practices Defrost/Floor Valve.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Defrost/Floor Valve

A. Remove the Defrost/Floor Valve (VB100) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the PP/DR SL ECS CTRL ECS circuit breaker found on the cockpit circuit breaker panel.

(5) Remove the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Disconnect electrical connector J308 from electrical connector P308.

(7) Remove the hose clamps at the inlet and outlet ports of the defrost/floor valve.

(8) Pull the ducts away from the inlet and outlet ports.

(9) Remove the defrost/floor valve.

B. Install the Defrost/Floor Valve (VB100) (Refer to Figure 401).

(1) Put the defrost/floor valve in its correct position on the defrost duct.

(a) Apply a bead of RTV-81409 around the end of the defrost duct and the defrost/floor valve to create a leak proof seal.

(b) Install the hose clamp on the defrost/floor valve.

(2) Install the ducts on the inlet and outlet ports of the defrost/floor valve.

(a) Apply a bead of RTV-81409 around the end of the ducts and the inlet and outlet ports to create a leak proof seal.

(b) Install the hose clamps on the ducts.

(3) Connect electrical connector J308 to electrical connector P308.

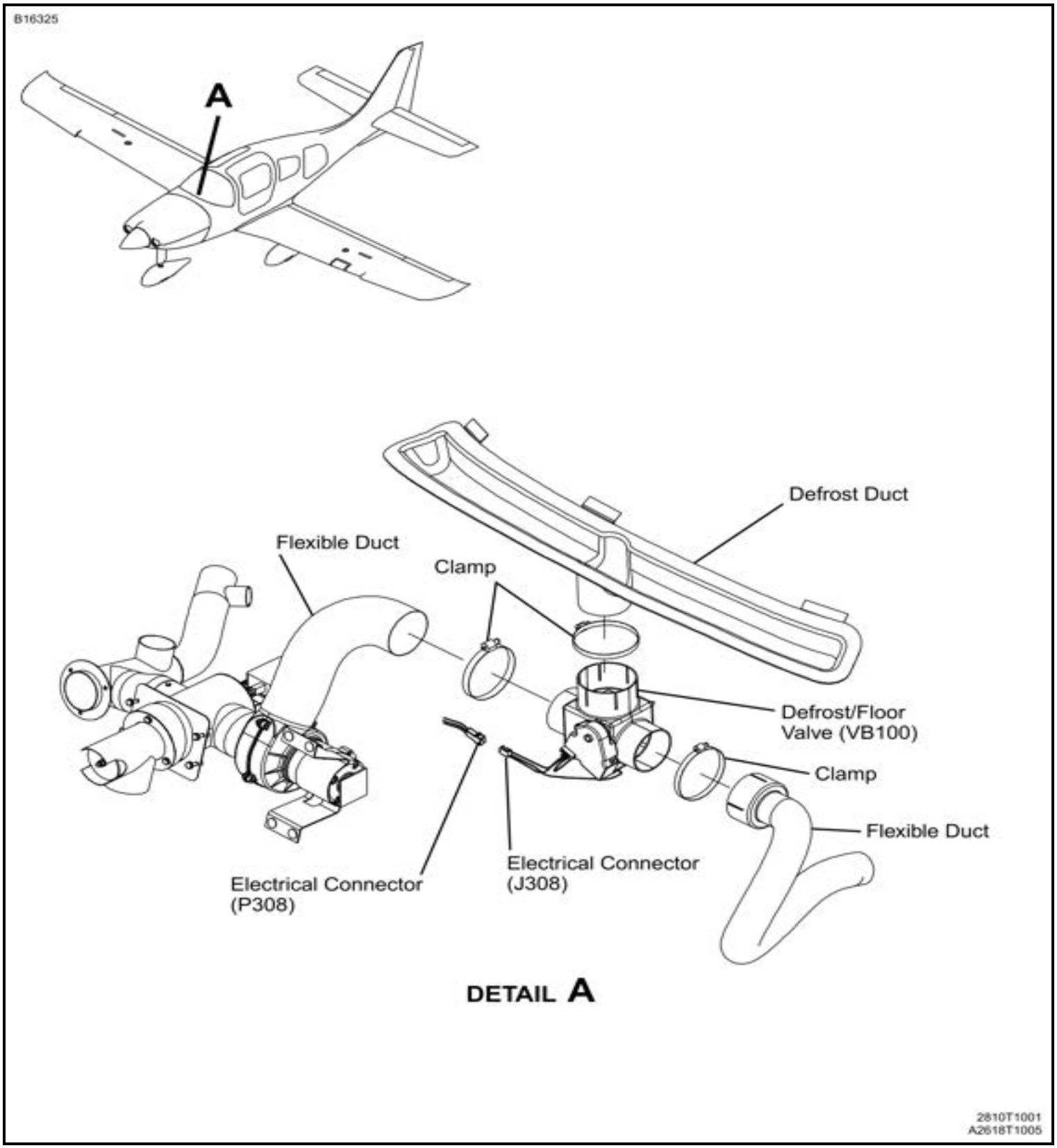
(4) Engage the PP/DR SL ECS CTRL circuit breaker found on the cockpit circuit breaker panel.

(5) Do a check of the defrost/floor valve. Refer to Environmental Control System Components - Adjustment/Test.

(6) Install the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

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Figure 401 : Sheet 1 : Defrost/Floor Valve Installation



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EYEBALL VENTS (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Eyeball Vents.

B. For the Avidyne and Garmin G1000 options Eyeball Vents maintenance procedures, refer to Air Distribution - Maintenance Practices Eyeball Vents.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Instrument Panel Vents

A. Remove the Instrument Panel Vents (Refer to Figure 401).

(1) Remove the tie strap that secures the duct to the back of the plenum cap.

(2) Loosen the clamp that secures the plenum cap to the backside of the vent, and gently pull away from the vent.

(3) Loosen and remove the threaded vent retaining collar from the backside of the panel.

(4) Pull the vent out from the front of the panel.

B. Install the Instrument Panel Vents (Refer to Figure 401).

(1) Insert the vent(s) into the front of the instrument panel.

(2) Install the threaded vent retaining collar to the backside of vent.

(3) Press the plastic plenum cap onto the backside of the vent, and secure with clamp.

NOTE: When the clamp is secured, the screw housing must remain at the 10 to 12 o'clock position for the left vent and at the 12 to 3 o'clock position for the right vent, as viewed from the rear.

(4) Slide the duct over the back of the plenum cap and secure it with a tie strap.

4. Side Panel Vents

A. Remove the Side Panel Vents (Refer to Figure 402).

(1) Remove the rear interior panel attachment screws, then gently pull the interior side panel up and away from the fuselage until access is gained to the rear of the vent.

(2) Remove the threaded vent retaining collar from the backside of the side panel.

(3) Pull the vent out from the front of the side panel.

B. Install the Side Panel Vents (Refer to Figure 402).

(1) Insert the vent into the side panel hole.

(2) Install the threaded vent retaining collar to the backside of the vent.

(3) Put the side panel in position.

(4) Make sure that the vent is seated in the duct channel.

(5) Install the rear interior panel to the fuselage, and attach it with the screws.

5. Floor Vent

A. Remove the Floor Vent (Refer to Figure 403).

(1) Gently pull the center console access panel out and away from the main console.

(2) With the rear heat vent flexible ducts exposed, loosen the clamp that secures the plastic plenum cap to the backside of the vent.

(3) Gently pull the plastic plenum cap away from the vent.

(4) Remove the threaded vent retaining collar from the backside of the vent.

(5) Pull the vent out from the front of the panel.

B. Install the Floor Vent (Refer to Figure 403).

(1) Insert the vent into the center console.

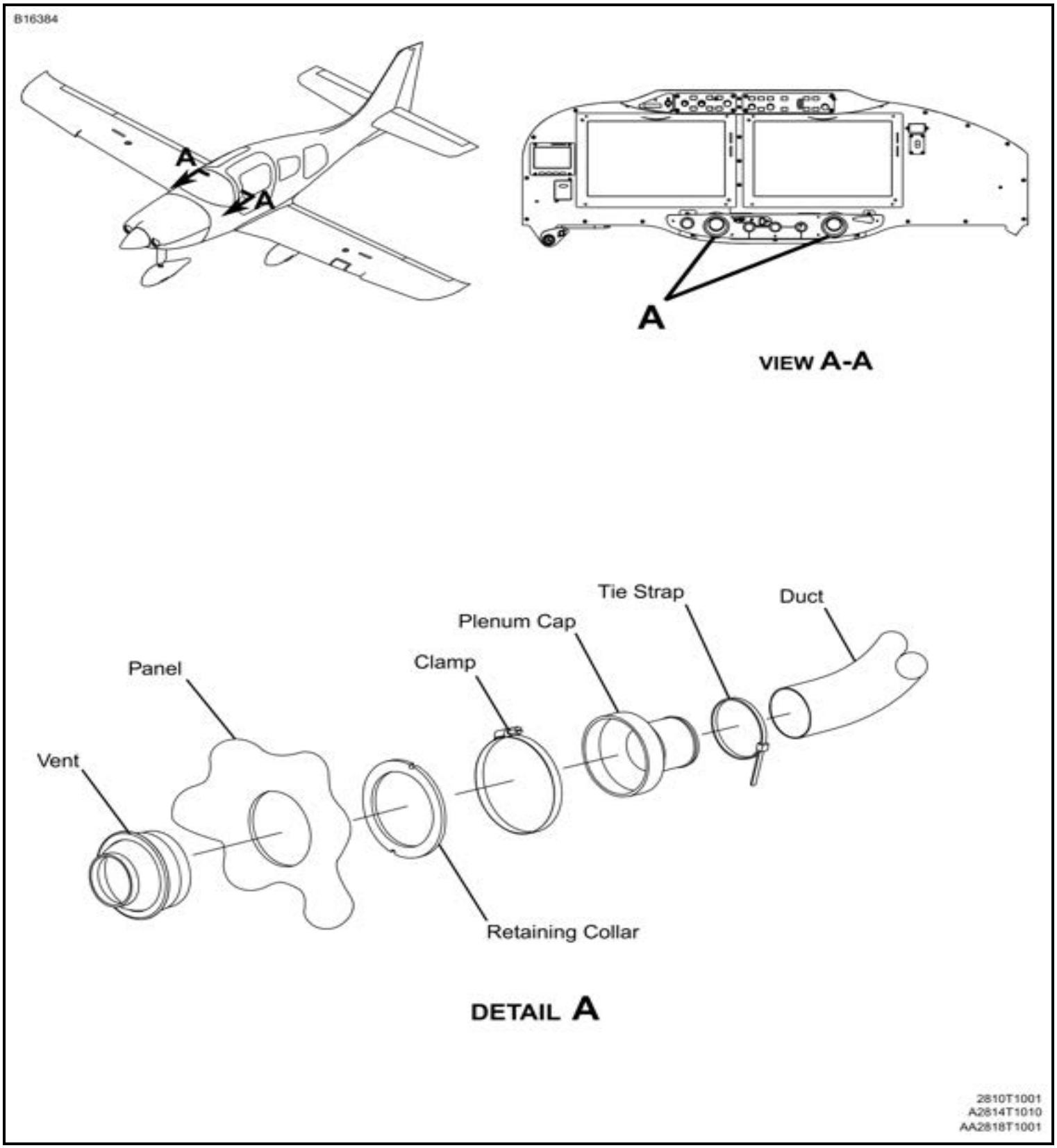
(2) Install the threaded vent retaining collar to the backside of the vent.

(3) Press the plastic plenum cap onto the backside of the vent, and secure it with a clamp.

(4) Install the center console access panel.

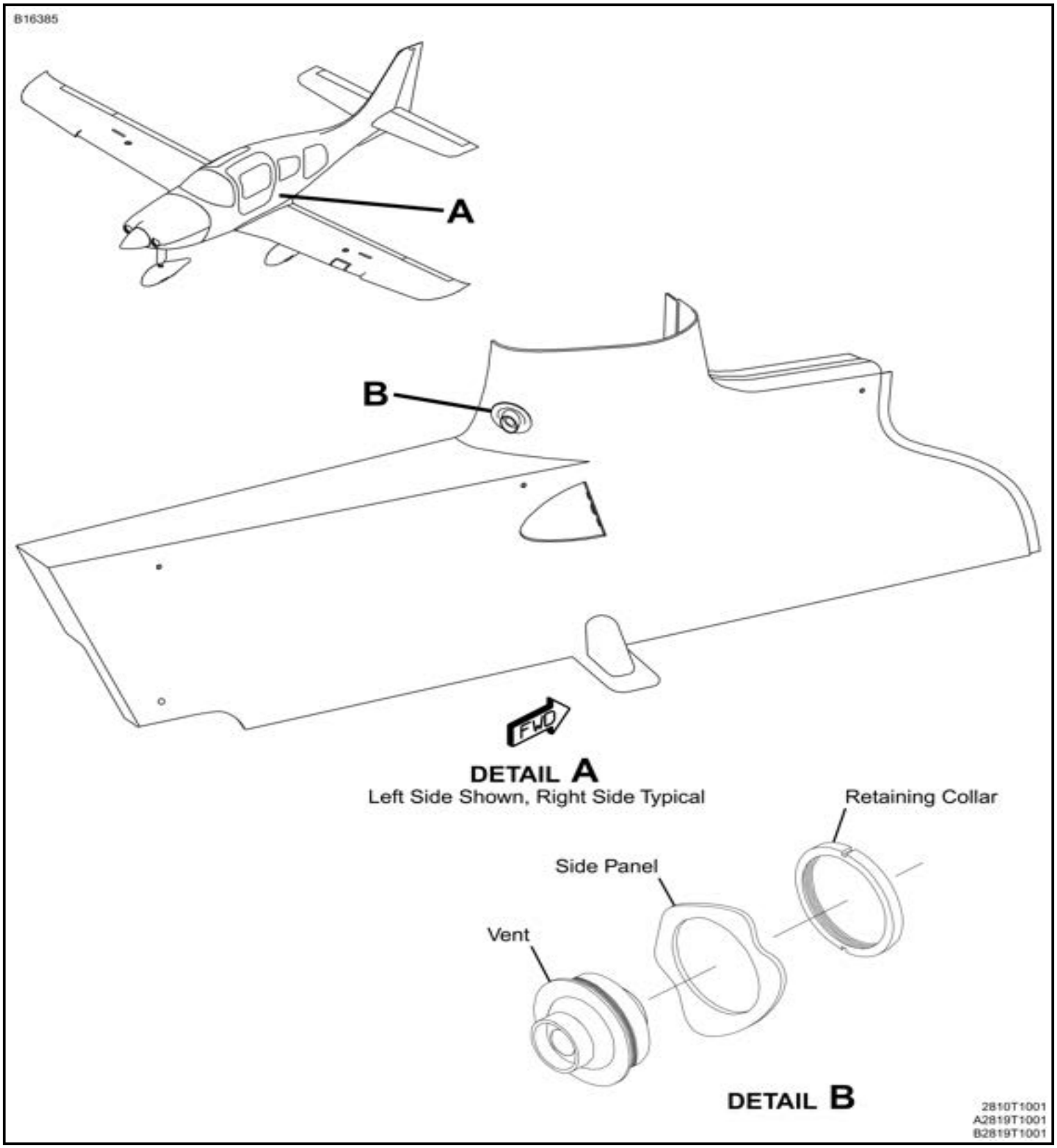
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Figure 401 : Sheet 1 : Instrument Panel Vents Installation



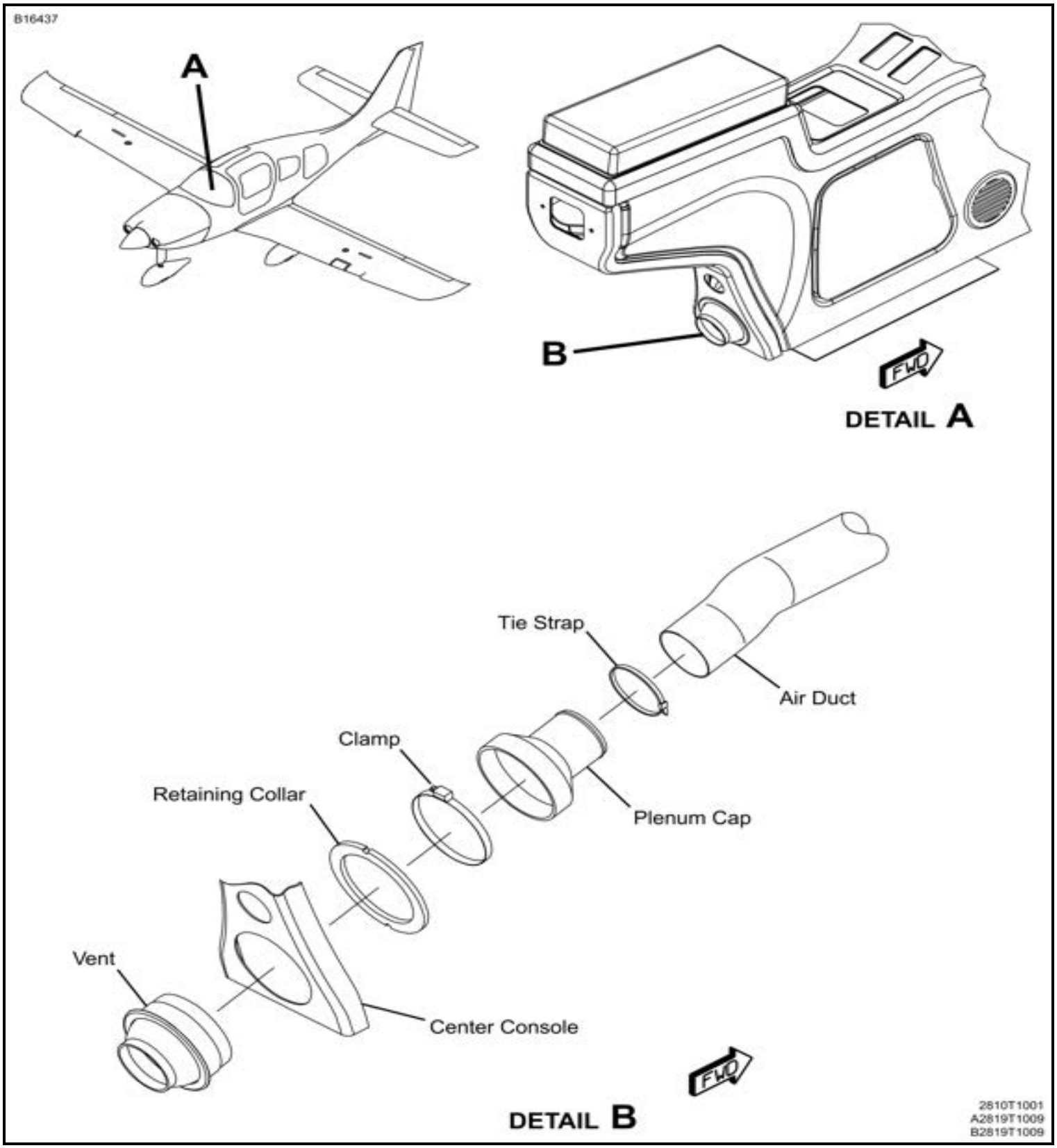
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Figure 402 : Sheet 1 : Side Panel Vents Installation



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Figure 403 : Sheet 1 : Floor Vent Installation



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FIREWALL SHUTOFF VALVE (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the T240 Firewall Shutoff Valve.

B. For the Avidyne and Garmin G1000 options ECS Valve Assembly maintenance procedures refer to, Heating and Heater control Valve - Maintenance Practices.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Firewall Shutoff Valve Removal/Installation

A. Remove the Firewall Shutoff Valve (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) If necessary, remove the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(4) Remove the engine cowlings. Refer to Engine Cowling - Maintenance Practices.

(5) Remove the cabin fan and duct. Refer to Cabin Fan (T240) - Removal/Installation.

(6) Disconnect the electrical connector (P56) from the servo motor.

(7) Remove the tie straps from the inlet and outlet ducts of the valve.

(8) Pull the ducts away from the inlet and outlet ports of the valve.

(9) Remove the firewall shutoff cable. Refer to Firewall Shutoff Cable (T240) - Removal/Installation.

(10) Remove the bolts that connect the forward body weldment to the valve.

(11) Remove the bolts that connect the valve to the firewall.

(12) Remove the valve from the airplane.

B. Install the Firewall Shutoff Valve (Refer to Figure 401).

(1) Place the valve on a bench or other suitable work surface and do as follows:

(a) Connect the firewall shutoff cable to the valve.

(b) Operate the valve to the open and closed position.

(c) Make sure that the valve operates smoothly.

(d) If the valve does not operate smoothly do as follows:

1 Lubricate the servo motor tray with Molykote 321R dry film lubricant.

2 Loosen the screws on the servo motor tray until the washers spin freely. Refer to Servo Motor (T240) - Removal/Installation.

(2) Put the valve in position.

(3) Install the bolts that connect the valve to the firewall.

(4) Install the bolts that connect the forward body weldment to the valve.

(5) Install the firewall shutoff cable. Refer to Firewall Shutoff Cable (T240) - Removal/Installation.

(6) Install the cabin fan and duct. Refer to Cabin Fan (T240) - Removal/Installation.

(7) Slide the flexible ducts over the inlet and outlet ports of the valve.

(8) Install the tie straps on the inlet and outlet ducts of the valve.

(9) Connect the electrical connector (P56) to the servo motor.

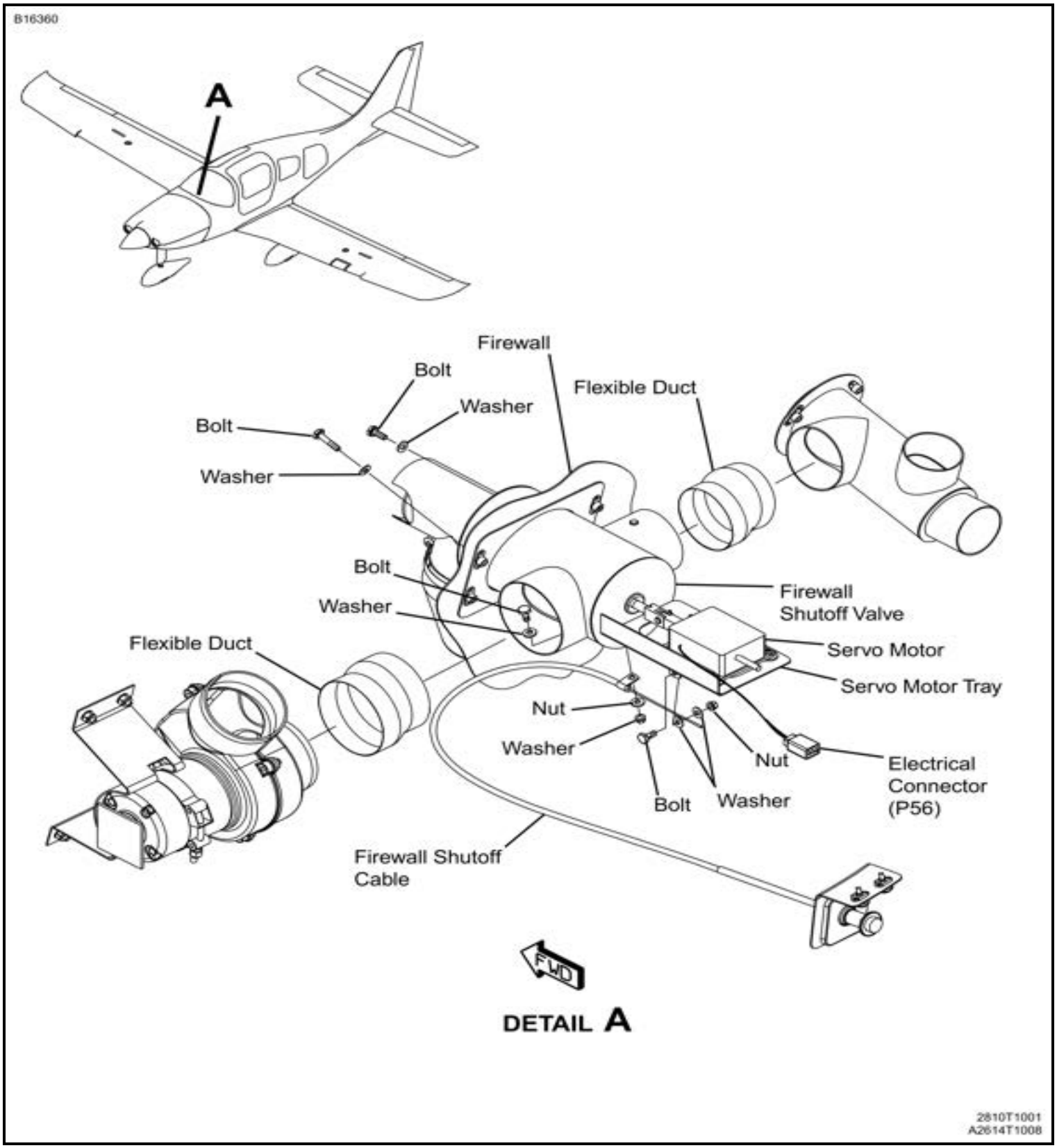
(10) If necessary, install the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(11) Install the engine cowlings. Refer to Engine Cowling - Maintenance Practices.

(12) Do a check of the Firewall Shutoff Valve. Refer to Environmental Control System Components - Adjustment/Test.

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Figure 401 : Sheet 1 : Firewall Shutoff Valve Installation



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FIREWALL SHUTOFF CABLE (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Firewall Shutoff Cable.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Firewall Shutoff Cable Removal/Installation

A. Remove the Firewall Shutoff Cable (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the AIR COND (if installed) ECS, and ECS CTRL DOOR SEAL circuit breakers found on the cockpit circuit breaker panel.

(5) Remove the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Remove the cabin fan and duct to get access to the bolt. Refer to Cabin Fan (T240) - Removal/Installation.

(7) Remove the nut, washers, and bolt that attach the cable to the servo motor tray bracket.

(8) Remove the nut, washers, and bolt that attach the cable clamp to the firewall shutoff valve.

(9) Remove the screws and washers that attach the firewall shutoff bracket to the instrument panel.

(10) Remove the nut that attaches the cable to the firewall shutoff bracket.

(11) Remove the cable from the firewall shutoff bracket.

(12) Remove the cable from the airplane.

B. Install the Firewall Shutoff Cable (Refer to Figure 401).

(1) Install the cable through the firewall shutoff bracket, and nut.

(2) Install the nut that attaches the cable to the firewall shutoff bracket.

(3) Put the cable and firewall shutoff bracket in position under the instrument panel.

(4) Install the screws and washers that attach the firewall shutoff bracket to the instrument panel.

(5) Make sure that the cable is in the stowed position.

(6) Install the nut, washers, and bolt that attach the cable to the servo motor tray bracket.

(7) Install the nut, washers, and bolt that attach the cable clamp to the firewall shutoff valve.

(8) Install the cabin fan and duct. Refer to Cabin Fan (T240) - Removal/Installation.

C. Firewall Shutoff Cable Operational Check

(1) Apply external power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Engage the AIR COND (if installed) ECS, and ECS CTRL DOOR SEAL circuit breakers found on the cockpit circuit breaker panel.

(5) On the GTC 570 Touchscreen Controller Home page do as follows:

(a) Push the Aircraft Systems button.

(b) Push the ECS button.

(c) Push the ECS On button.

(d) Push the right arrow button to drive the valve to the full hot position.

(e) Push the left arrow button to drive the valve to the full cold position.

(6) Make sure that the firewall shutoff valve opens and closes smoothly.

(7) Push the right arrow button to drive the valve to the full hot position.

(8) Pull the firewall shutoff cable to manually move the valve to the full cold position.

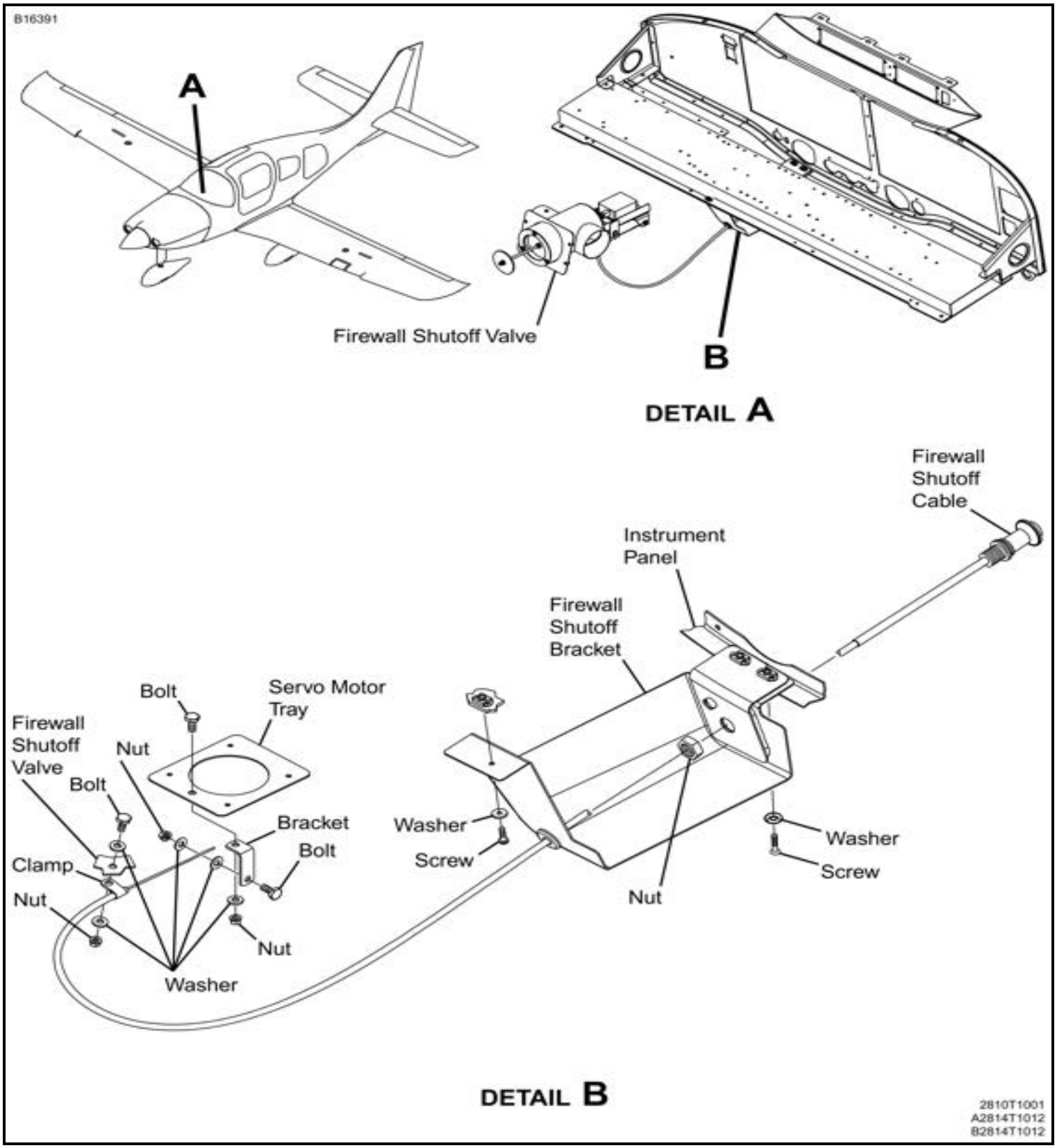
(9) Make sure that the firewall shutoff valve operates smoothly.

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(10) If the valve does not operate smoothly do as follows:
  (a) Check the firewall shutoff cable for sharp bends.
  (b) Lubricate the servo motor tray with Molykote 321R dry film lubricant.
  (c) Loosen the screws on the servo motor tray until the washers spin freely. Refer to Servo Motor (T240) - Removal/Installation.
(11) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(12) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(13) Disconnect external power from the airplane.
(14) Install the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

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Figure 401 : Sheet 1 : Firewall Shutoff Cable Installation



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EQUIPMENT COOLING FANS (T240) - TROUBLESHOOTING

1. General

A. This section gives the troubleshooting procedures for the Avionics Cooling Fan, the Center Console Cooling Fan, and the Avionics Shelf Cooling Fan.

B. Use the Model T240 Wiring Diagram Manual with the procedures in this section.

2. Tools and Equipment

A. No special tools or equipment are necessary to do the procedures in this section.

3. Avionics Cooling Fan Troubleshooting

A. The avionics cooling fan (UC903) does not operate when power is applied to the avionics bus. A crew alert system (CAS) message shows a fan fault on the Multi-Function Display (MFD). Do the steps that follow:

(1) Make sure that the AVIONICS FANS circuit breaker, found on the cockpit circuit breaker panel, is engaged,

(a) If the circuit breaker is not engaged, engage the circuit breaker and check the instrument panel fan operation again.

(2) If the fan does not operate:

(a) Remove external electrical power from the airplane

(b) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) At the instrument panel cooling fan, disconnect electrical connector (P687) from electrical connector (J1).

(4) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(5) If the connectors are good, check the wiring continuity as follows:

(a) Between pin 1 on electrical connector (P687) and pin 16 on electrical connector (P62) at the cockpit circuit breaker panel

(b) Between pin 2 on electrical connector (P687) and pin F on electrical connector PCD02 at the LH GND BLK

(c) Repair any wiring faults

(d) Check the fan operation again.

(6) If the fan does not operate, replace the instrument panel cooling fan. Refer to Equipment Cooling Fans (T240) - Removal/Installation.

(a) Check the fan operation again.

4. Center Console Cooling Fan Troubleshooting

A. The center console cooling fan (UZ100) does not operate when power is applied to the avionics bus. A crew alert system (CAS) message shows a fan fault on the Multi-Function Display (MFD). Do the steps that follow:

(1) Make sure that the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel, is engaged,

(a) If the circuit breaker is not engaged, engage the circuit breaker and check the instrument panel fan operation again.

(2) If the fan does not operate:

(a) Remove external electrical power from the airplane.

(b) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) At the center console cooling fan, disconnect electrical connector (PC100) from electrical connector (JC100).

(4) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(5) If the connectors are good, check the wiring as follows:

(a) Between pin 1 on electrical connector (P687) and pin 16 on electrical connector (P62) at the cockpit circuit breaker panel

(b) Between pin 2 on electrical connector (P687) and pin NN on electrical connector PCD02 at the LH GND BLK

(c) Repair any wiring faults

(d) Check the fan operation again.

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(6) If the does not operate, replace the center console cooling fan. Refer to Equipment Cooling Fans (T240) - Removal/Installation.

(a) Check the fan operation again.

5. Avionics Shelf Cooling Fan Troubleshooting

A. The avionics shelf cooling fan (UZ102) does not operate when power is applied to the avionics bus. A crew alert system (CAS) message shows a fan fault on the Multi-Function Display (MFD). Do the steps that follow:

(1) Make sure that the AVIONICS FANS circuit breaker, found on the cockpit circuit breaker panel, is engaged,

(a) If the circuit breaker is not engaged, engage the circuit breaker and check the avionics shelf cooling fan operation again.

(2) If the fan does not operate:

(a) Remove external electrical power from the airplane.

(b) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) At the avionics shelf cooling fan, disconnect the fan electrical connector (JI102) from the wiring bundle electrical connector (PI012).

(4) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(5) If the connectors are good, check the wiring as follows:

(a) Between pin 1 on electrical connector (JI012) and pin 16 on electrical connector (P62) at the cockpit circuit breaker panel

(b) Between pin 2 on electrical connector (JI012) and pin F on electrical connector PCD02 at the LH GND BLK

(c) Repair any wiring faults.

(d) Check the fan operation again.

(6) If the the avionics shelf cooling fan does not operate replace it. Refer to Equipment Cooling Fans (T240) - Removal/Installation.

(a) Check the fan operation again.

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EQUIPMENT COOLING FANS (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Equipment Cooling Fans.

B. For the Avidyne and Garmin G1000 options equipment cooling fan maintenance procedures (Refer to Chapter 34, GPS and Transponder - Maintenance Practices Avionics Cooling Fan).

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Avionics Cooling Fan

A. Remove the Avionics Cooling Fan (UC903) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel.

(4) If necessary, remove the pilot's seat. Refer to Chapter 25 Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(5) Disconnect electrical connector P687 from the fan electrical connector (J1).

(6) Loosen the clamps that connect the ducts to the fan.

(a) Remove the ducts from the fan.

(7) Remove the screws that attach the fan to the avionics shelf.

(8) Remove the fan from the airplane.

B. Install the Avionics Cooling Fan (UC903) (Refer to Figure 401).

(1) Put the fan in its correct position to the bottom of the avionics shelf.

(2) Install the screws that attach the fan to the avionics shelf.

(3) Attach the ducts to the fan.

(a) Tighten the clamps that connect the ducts to the fan.

(4) Connect electrical connector P687 to the fan electrical connector (J1).

(5) Engage the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel.

(6) Do a test of the Avionics Cooling Fan. Refer to Equipment Cooling Fans Operational Test.

(7) If necessary, install the pilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

4. Center Console Cooling Fan

A. Remove the Center Console Cooling Fan (UZ100) (Refer to Figure 402).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel.

(4) Remove the Touchscreen Controller. Refer to Chapter 34 Garmin GTC 570 Touchscreen Controller (G2000) - Removal/Installation.

(5) Disconnect the fan electrical connector PC100 from electrical connector JC100.

(6) Remove the screws that attach the fan to the fan bracket.

(7) Remove the fan from the airplane.

B. Install the Center Console Cooling Fan (UZ100) (Refer to Figure 402).

(1) Put the fan in its correct position on the fan bracket.

(2) Install the screws that attach the fan to the fan bracket.

(3) Connect the fan electrical connector PC100 to electrical connector JC100.

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(4) Install the Touchscreen Controller. Refer to Chapter 34 Garmin GTC 570 Touchscreen Controller (G2000) - Removal/Installation.

(5) Engage the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel.

(6) Do a test of the Equipment Cooling Fans. Refer to Equipment Cooling Fans Operational Test.

5. Avionics Shelf Cooling Fan Removal and Installation

A. Remove the Avionics Shelf Cooling Fan (UZ102) (Refer to Figure 403).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel.

(4) Remove the glare shield. Refer to Chapter 25 Glareshield (T240) - Removal/Installation.

(5) If necessary to get access to the fan electrical connectors, remove the copilot's seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

(6) Disconnect the airplane wiring bundle electrical connector (JI012) from the fan electrical connector (PI012).

(7) Remove the screws that attach the fan to the fan bracket.

(a) Remove the fan from the airplane.

B. Install the Avionics Shelf Cooling Fan (UZ102) (Refer to Figure 403).

(1) Put the fan in its correct position on the fan bracket.

(2) Install the screws that attach the fan to the bracket.

(3) Connect the airplane wiring bundle electrical connector to the fan electrical connector.

(4) Engage the AVIONICS FANS circuit breaker found on the cockpit circuit breaker panel.

(5) Do a test of the Equipment Cooling Fans. Refer to Equipment Cooling Fans Operational Test.

(6) Install the glare shield. Refer to Chapter 25 Glareshield (T240) - Removal/Installation.

(7) If necessary, install the copilot's seat. Refer to Chapter 25 Airplane Seats - Maintenance Practices, Removal, Installation and Adjustment of the Front Seats.

6. Equipment Cooling Fans Operational Test

A. Do the Equipment Cooling Fans Operational Test.

(1) Apply external electrical power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) to the ON position.

(3) Set the CROSS TIE switch (SW03) to the ON position.

(4) Make sure that the fans that follow operate correctly:

- Avionics Cooling Fan
- Center Console Cooling Fan
- Avionics Shelf Cooling Fan.

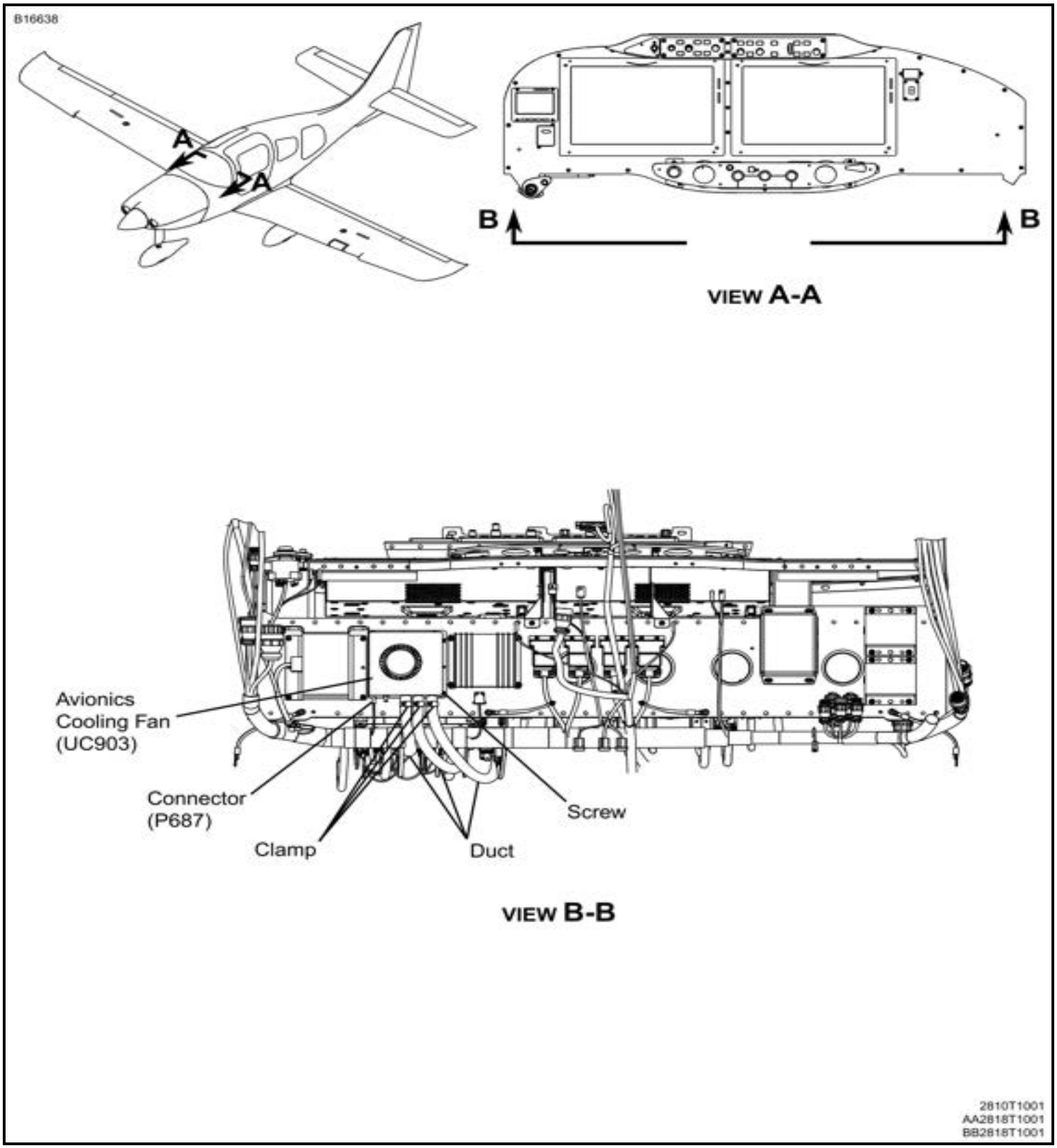
(5) Set the master BATT switches (left and right) and the AVIONICS MASTER switch to the OFF position.

(6) Set the CROSS TIE switch to the OFF position.

(7) Remove external electrical power from the airplane.

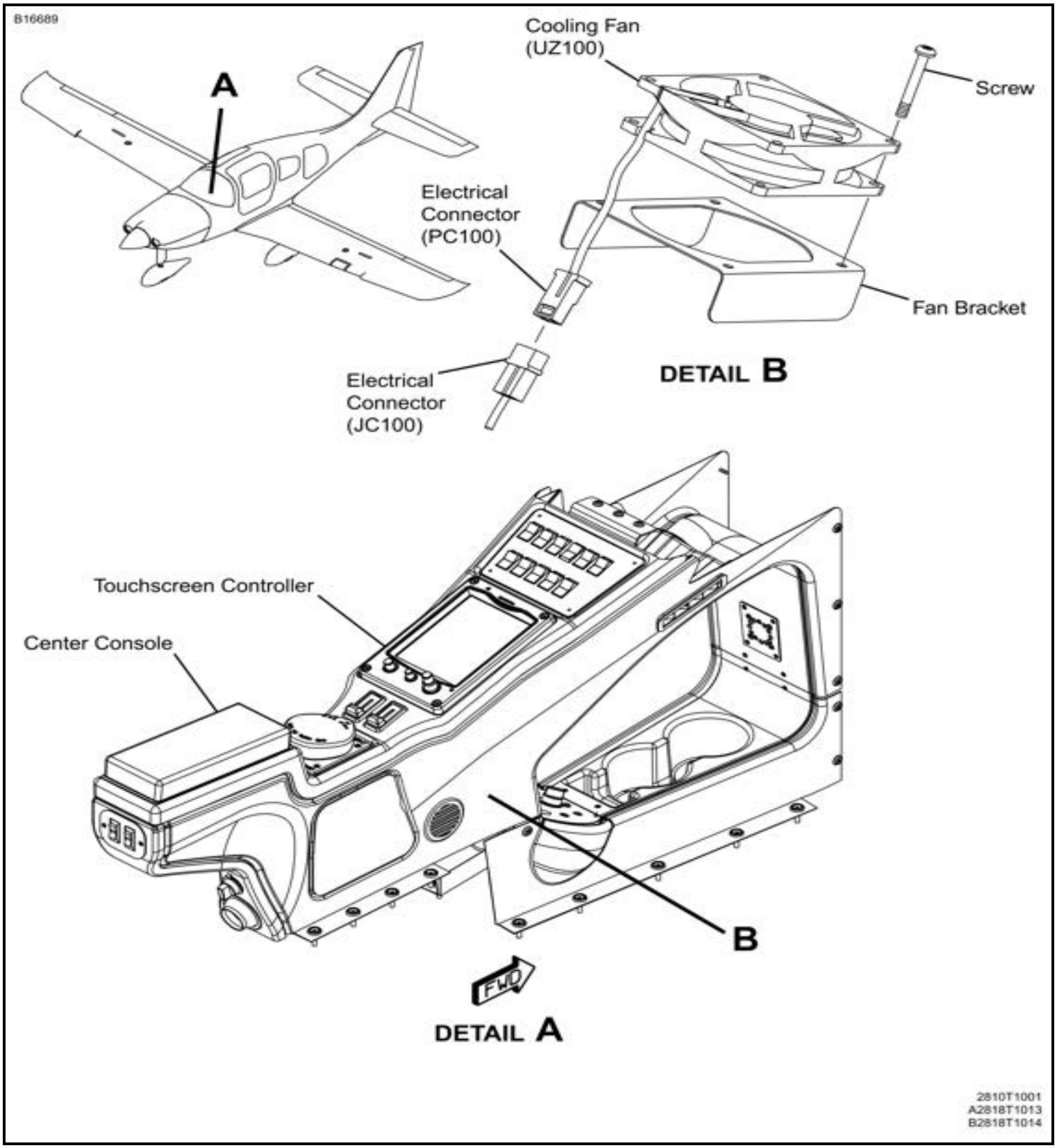
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Figure 401 : Sheet 1 : Avionics Cooling Fan Removal/Installation



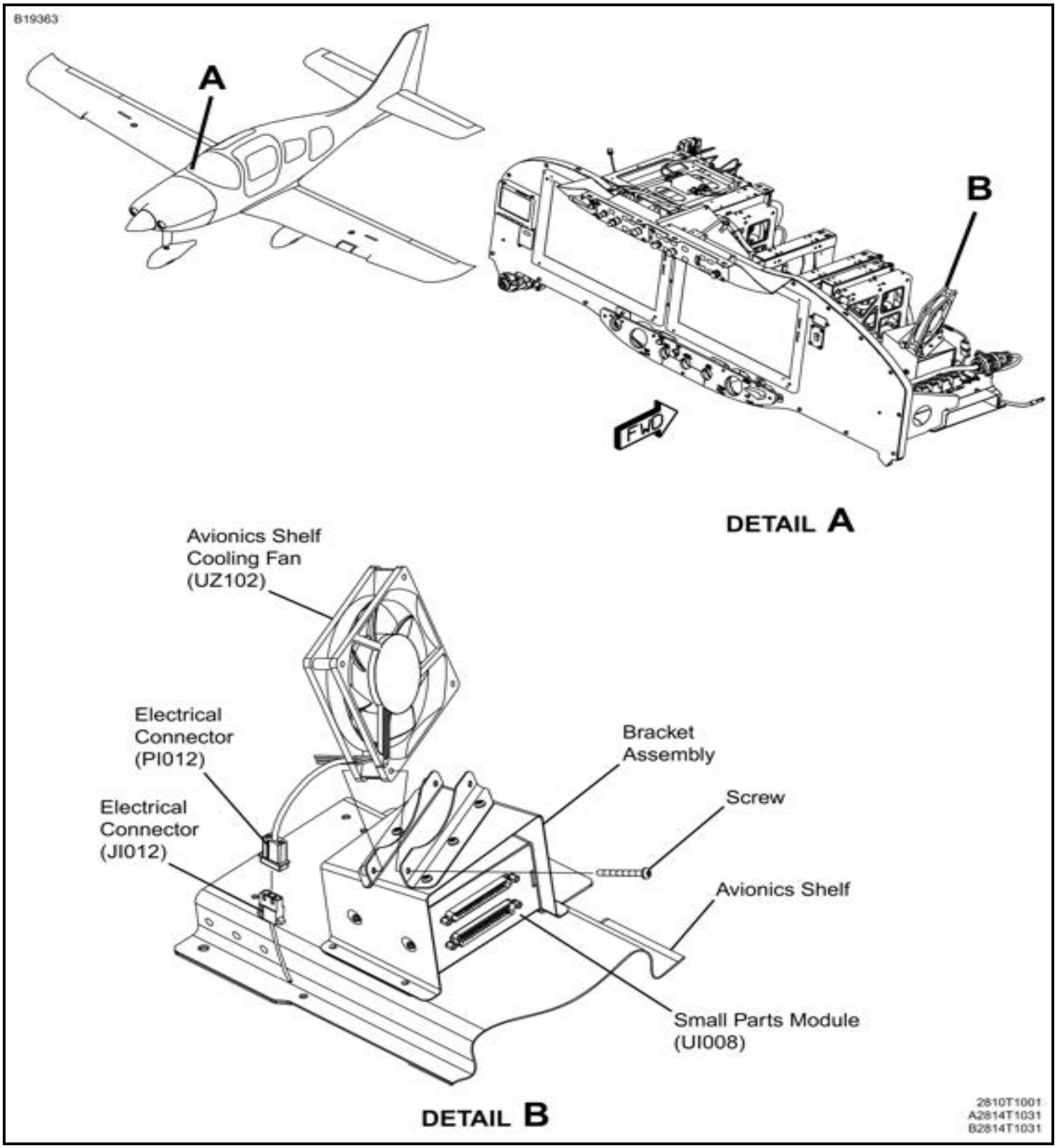
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Figure 402 : Sheet 1 : Center Console Cooling Fan Removal/Installation



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Figure 403 : Sheet 1 : Avionics Shelf Cooling Fan Removal/Installation



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HEATING AND HEATER CONTROL VALVE - MAINTENANCE PRACTICES

1. Heating And ECS Control Valve

A. The following procedures are applicable to the heater and ECS control valve.

B. For the Model T240 control valve installation maintenance procedures refer to Firewall Shutoff Valve (T240) - Removal/Installation.

2. ECS Control Valve

A. **ECS Control Valve Removal** - To remove the ECS control valve from the airplane, use the following instructions.

(1) Loosen the steel clamp securing the ECS adapter to the ECS control valve inlet tube located in the engine compartment. The ECS adapter may now be pulled away from the tube. The ECS adapter may have to be worked free because it was installed with a thin application of high temperature silicone. Refer to Figure 201.

(2) Cut and remove the plastic tie straps from the inlet and outlet tubes of the ECS control valve, and pull the flexible ducting away from the tubes. Refer to Section 21-20-00, Figure 204.

(3) Disconnect the heater control valve servo motor ELC plug.

(4) Remove the faceplate screws and washers, and pull the faceplate outward until the inner plunger seal can be seen.

(5) Remove the control box bolts and washers. Pull the control box out from under the instrument panel (refer to Figure 202).

B. **ECS Control Valve Installation** - To install the heater control box use the following instructions:

(1) Insert the control box into the opening in the firewall from inside of the cabin area with the servo motor facing up.

(2) Install the control valve mounting bolts and washers from the engine compartment side of the firewall.

(3) Install the faceplate onto the front of the control box, then install the faceplate mounting screws and washers.

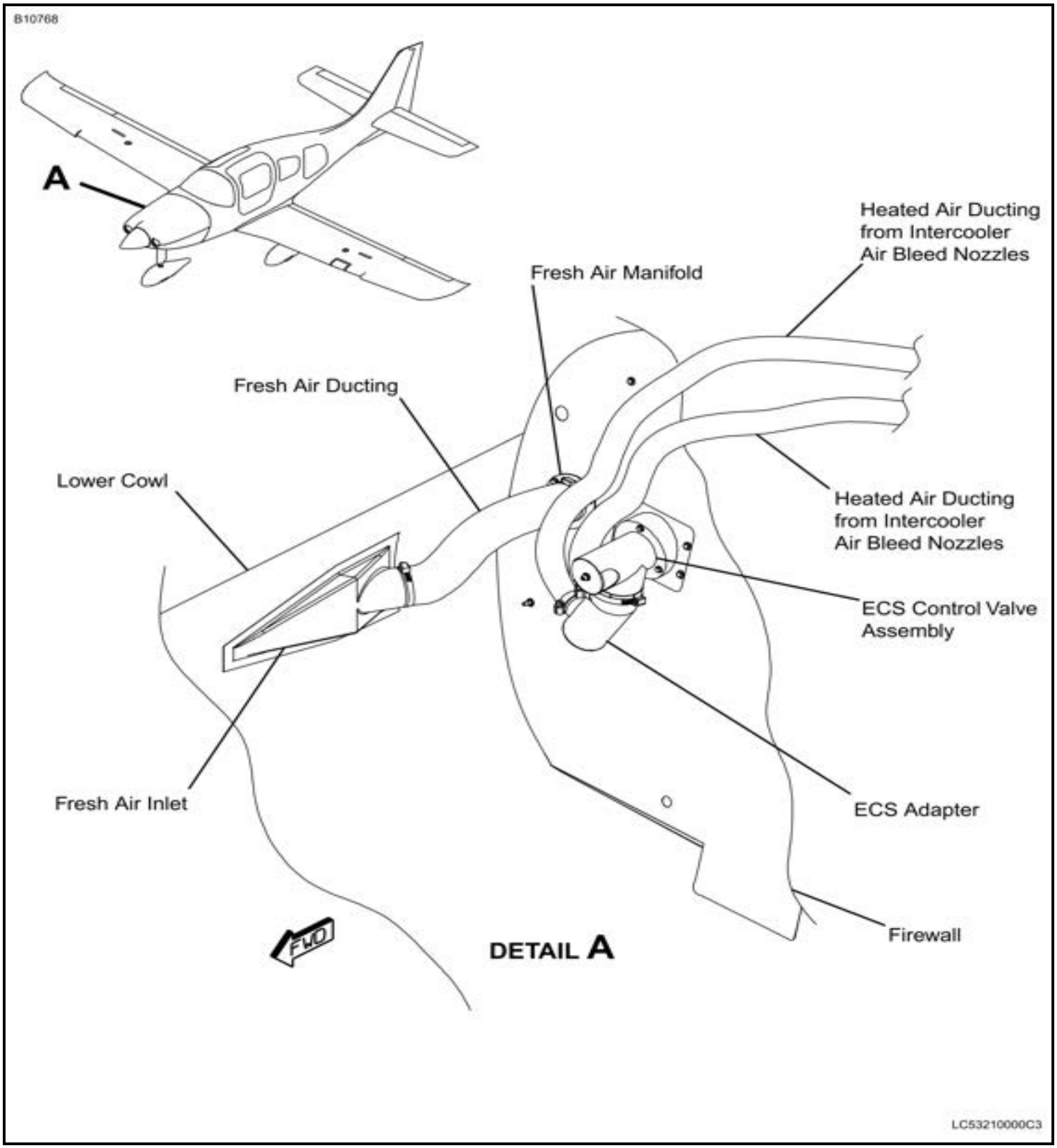
(4) Apply a bead of high temperature silicone to the inside rim of the ECS adapter and reattach it to the faceplate inlet tube with a steel clamp.

(5) Turn on the power and test the heater control box for proper valve operation and adjust the servo motor per the Servo Motor section, if necessary.

C. **ECS Control Valve Maintenance** - The heater control box is a self-contained unit. Only a periodic check for proper valve operation is required.

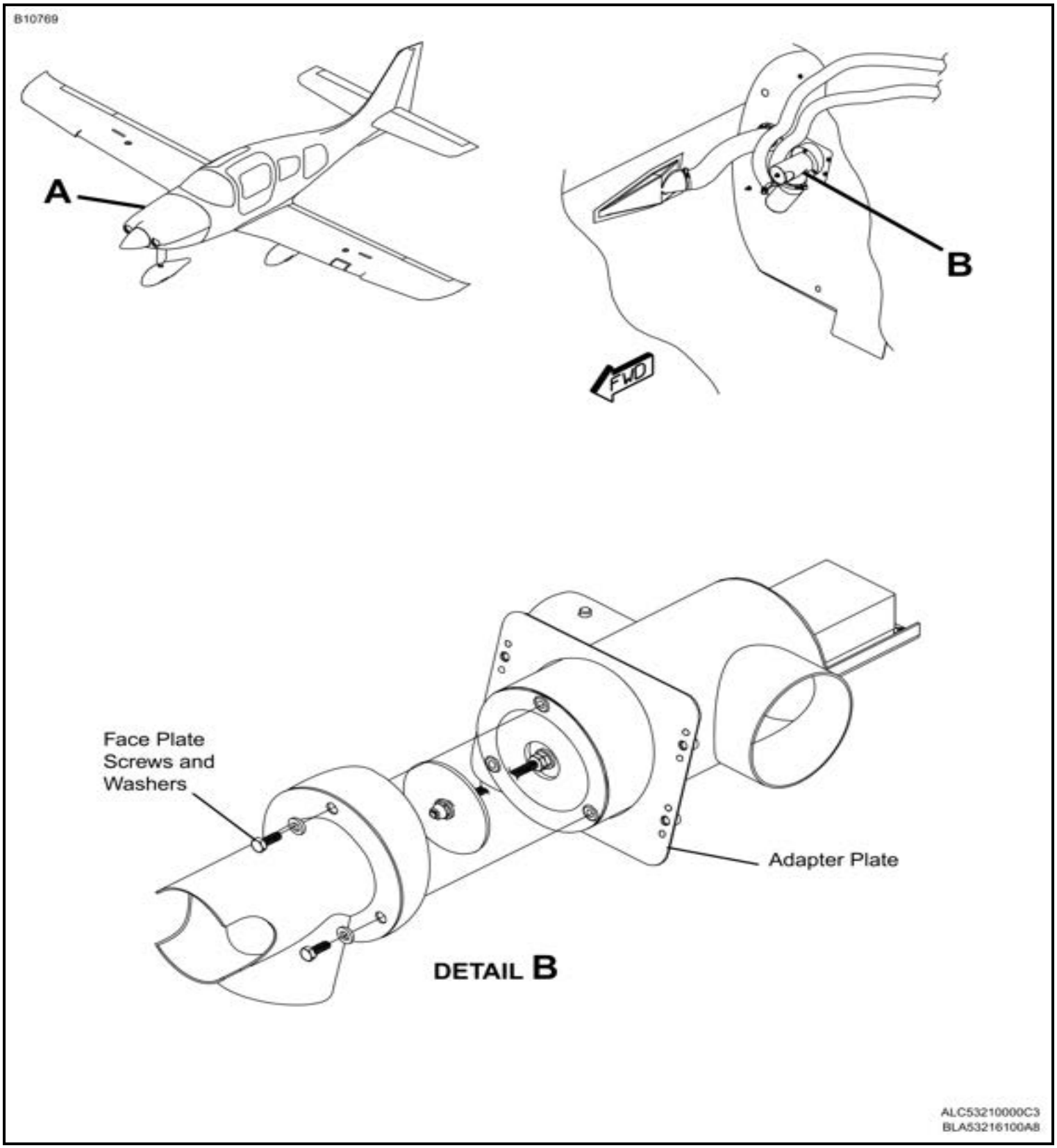
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Figure 201 : Sheet 1 : ECS Assembly in Engine Compartment



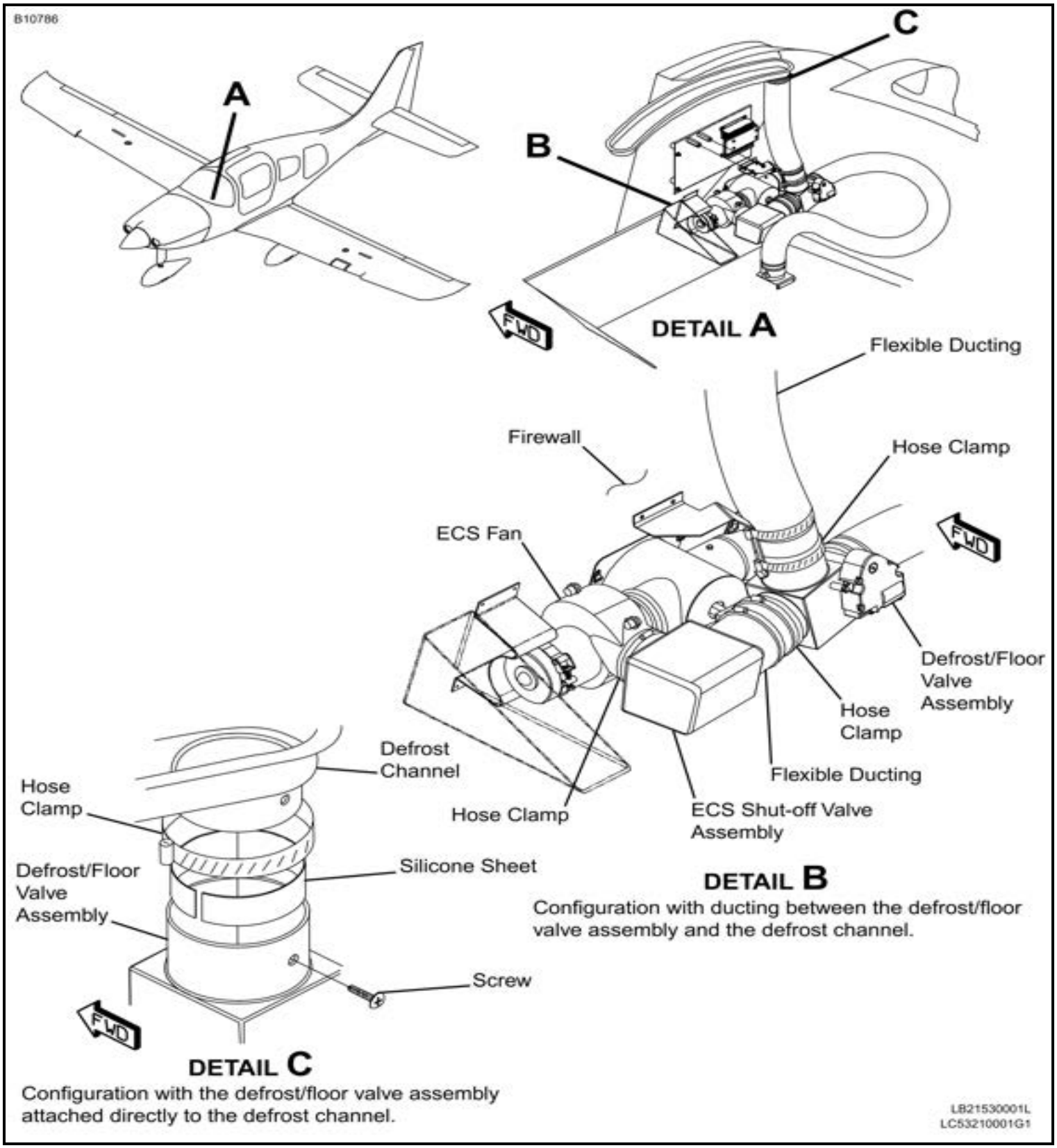
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Figure 202 : Sheet 1 : ECS Control Valve and Faceplate Attachment



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Figure 204 : Sheet 1 : ECS Shut-Off Valve and Defrost/Floor Valve Assemblies (Avidyne and G1000)



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AIR CONDITIONING SYSTEM (T240) - ADJUSTMENT/TEST

1. General

A. This section gives the test procedures for the Model T240 air conditioning system. The Model T240 air conditioning system is controlled with the Garmin G2000 GTC 570 Touchscreen Controller (UI405). The GTC 570 is found in the center console. For a description of the Model T240 GTC 570 temperature control functions refer to, Temperature and Air Control (T240) - Description and Operation. For a general description applicable to the GTC 570 refer to Chapter 34, Garmin G2000 - Description and Operation.

2.

A. Do the Air Conditioning Test

(1) Start the engine. Refer to the Model T240 POH.

(2) Make sure that the circuit breakers that follow are engaged:

(a) AIR COND

(b) ECS FAN

(c) ECS CTRL DOOR SEAL

(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(4) Set the AVIONICS MASTER switch (SW04) to the ON position.

(5) Set the CROSS TIE switch (SW03) to the ON position.

(6) When the initial startup sequence is complete, push the Multifunction Display (MFD) ENT softkey.

(a) The startup screen clears.

(7) On the GTC 570 Touchscreen Controller Home page do as follows:

(a) Push the Aircraft Systems touchkey.

1 The ECS page shows

2 The Actual and Selected temperature fields populate.

(b) Push the ECS touchkey.

(c) Make sure that the Actual temperature that shows is between 65°F and 85°F.

(d) Touch the black area of the ECS page for approximately 5 seconds.

1 The DIAG touchkey shows on the display.

(e) Push the DIAG touchkey.

1 Make sure that not faults show in the FAULTS field.

(8) On the GTC 570 Home page do as follows:

(a) Push the Aircraft Systems touchkey.

(b) Push the ECS touchkey

(c) Push the A/C touchkey.

(9) Push the Fan Mode touchkey.

(a) Make sure that Auto mode is selected.

(10) On the GTC 570 move the temperature fully to the left (Cold).

(a) Make sure that cold air blows out of the eyeball vents near the engine control panel.

(11) Push the Fan Mode touchkey.

(a) Make sure that the Manual fan mode is selected.

(12) On the GTC 570 move the fan speed control.

(a) Make sure that the fan speed changes with the manual control movement.

(13) On the GTC 570 push the DEFOG touchkey.

(a) Make sure that air blows out from the windshield vents.

(b) Make sure that air no longer blows out from the eyeball vents near the engine control panel.

(14) On the GTC 570 push the DEFOG touchkey again.

(a) Make sure that air no longer blows out of the windshield vents.

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(b) Make sure that air blows out from the eyeball vents near the engine control panel.

(15) Do the engine shutdown. Refer to the Model T240 POH.

(16) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(17) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(18) Set the CROSS TIE switch (SW03) to the OFF position.

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TEMPERATURE AND AIR CONTROL - MAINTENANCE PRACTICES

1. General

A. One of three types of temperature and air control units will be present in the aircraft depending upon avionics installed (basic and Avidyne, Garmin G1000 or Garmin G2000, when the optional Automatic Climate Control System (ACCS) is installed on the airplane). For airplanes with Garmin G1000 avionics and without ACCS, the temperature and air control unit is similar to the control head of the ACCS with identical removal and installation procedures.

(1) The Model T240 ACCS system utilizes the Garmin Touchscreen Controller (GTC) 570 to operate the ACCS system. For more data applicable to the touch screen controller refer to Chapter 34, Garmin G2000 - Description and Operation.

(2) For aircraft with optional ACCS, refer to Automatic Climate Control System (ACCS) - Maintenance Practices.

(3) For aircraft with basic instruments only or Avidyne avionics, and without ACCS, see below.

2. Air Control Unit Removal and Installation (Basic Instruments and Avidyne Installations)

A. **Removal of Air Control Unit** - To remove the temperature and air control unit use the following instructions.

(1) Turn the power off and remove the temperature and air control knobs from the control unit faceplate located on the instrument panel by removing the set screws at the bottom of each knob. Refer to Figure 201.

(2) Remove the fan rocker switch by gently squeezing together the locking tabs located on the outer perimeter of the switch from behind the instrument panel.

(3) Carefully pull the rocker switch away from the instrument panel until wiring is exposed.

(4) Disconnect the wiring from the back side of the rocker switch, and remove the switch.

(5) Disconnect the ELC plug between the motor control card and the heater control box servo motor.

(6) Cut the plastic tie straps located at the air control unit inlet and outlet tube locations.

(7) Pull the flexible ducting away from the air control unit.

(8) Remove the four 6-32 self-locking nuts and washers attached to the Pem studs on the face of the air control unit. Refer to Figure 202.

(9) From the back side of the instrument panel, remove the nuts and washers securing the air control unit tray to the back side of the instrument panel as shown in Figure 202 and Figure 203.

(10) Pull the air control unit forward (toward the firewall) and away from the instrument panel until the knob shafts are behind the instrument panel.

(11) Remove the air control unit by pulling it out from underneath the instrument panel.

B. **Installation of the Air Control Unit** - To install the air control unit, use the following instructions.

(1) Place the unit onto the cover panel studs from the backside of the instrument panel, and secure with nuts and washers.

(2) Slide the flexible ducting onto the air control unit inlet and outlet tubes, and secure using plastic tie straps.

(3) Reconnect the motor control card to the servomotor ELC connector.

(4) Reconnect wiring to the backside of the fan rocker switch, and gently press the switch into the opening until the switch locking tabs are fully engaged.

(5) Install the temperature and air control knobs to the control shafts, checking for free knob rotation. Install set screws at bottom of knobs as shown in Figure 201.

(6) Turn the power on, and check for proper fan and heater control valve operation.

C. **Air Control Unit Maintenance** - The temperature and air control unit is self-contained. A periodic check for fan, air control unit butterfly valve, and heater control valve operation is required. A functional check should be completed at each 100 hour or annual inspection using the following procedure. Refer to Section 21-00-00 for a description of control operation.

(1) With cabin fan off, check adequacy of airflow for the front floor vents, rear floor vent, and defroster.

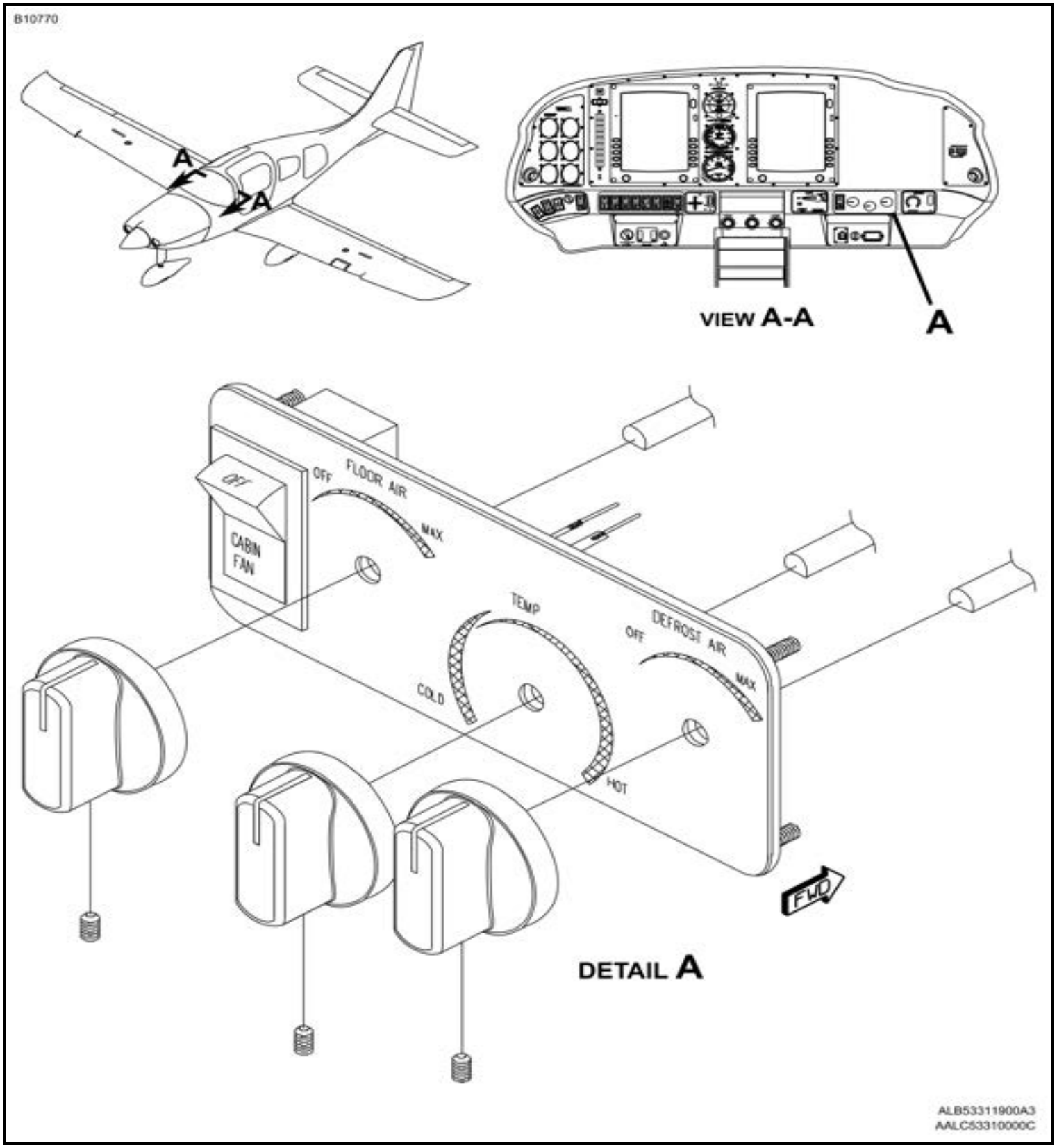
(2) Check for proper operation of the air volume control, temperature control, and air output control.

(3) Evaluate eyeball fresh air vents for proper operation.

(4) Evaluate the adequacy of the system in terms of crew and passenger comfort, as well as the defroster’s ability to control fogging of the windscreen.

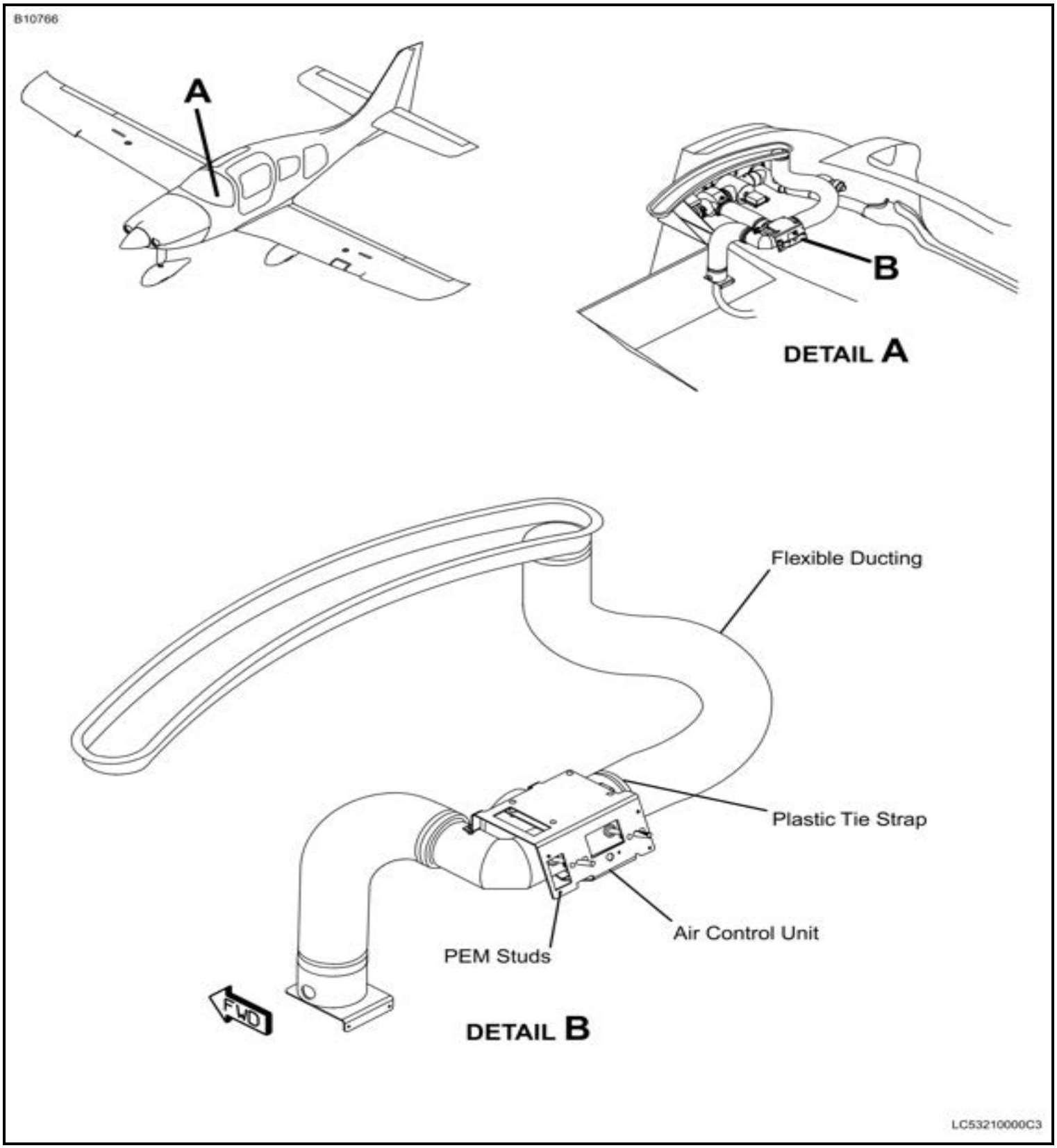
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Figure 201 : Sheet 1 : ECS Faceplate



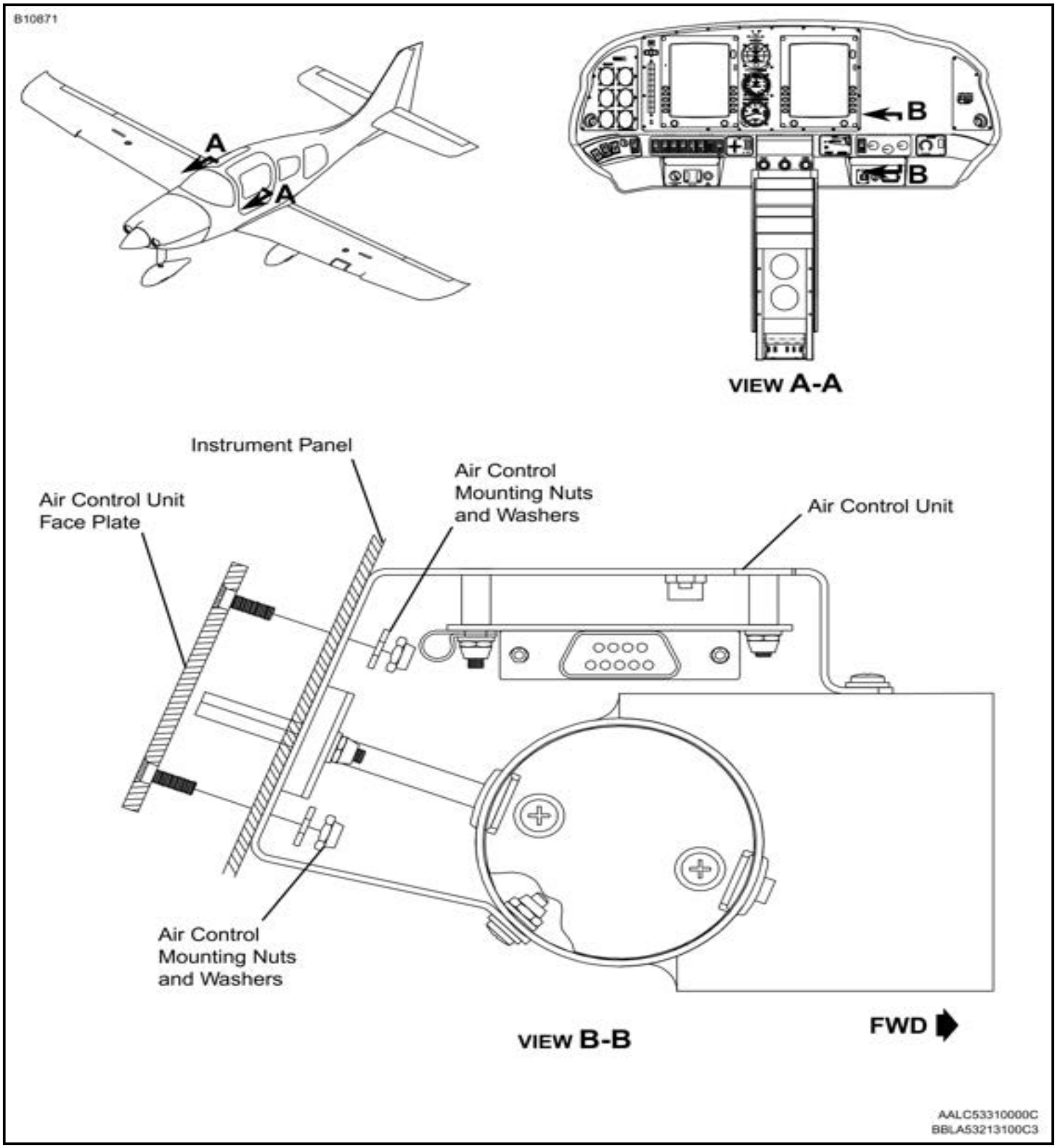
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Figure 202 : Sheet 1 : Air Control Unit Attachment



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Figure 203 : Sheet 1 : Air Control Unit Attachment



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AUTOMATIC CLIMATE CONTROL SYSTEM (ACCS) - MAINTENANCE PRACTICES

1. General

A. Description

(1) The Automatic Climate Control System (ACCS) is a fully automatic system than can be operated manually. The system has the components that follow: a control head or touchscreen controller, Electronic Control Unit (ECU), temperature sensors, a Vapor Cycle System (VCS) air conditioning system, valves, hoses, and tubing. The air conditioning system has the components that follow: a compressor, a condenser with fans, a receiver-dryer with a trinary pressure switch and an evaporator with an expansion valve and an evaporator coil temperature sensor. Barrier hoses connect the components. A mix of steel and aluminum type fittings are used. Refer to Figure 201.

(a) The Avidyne and G1000 ACCS installations utilizes a control head to operate the system. For more data applicable to the refer to, Control Head.

(b) The Model T240 ACCS system utilizes the Garmin G2000 Touchscreen Controller (GTC) 570 (UI405) to operate the ACCS system. For data applicable to the GTC 570 control of the ACCS, refer to Temperature and Air Control (T240) - Description and Operation.

(2) In manual or automatic operation, the system manual or auto choices for heater and air conditioning blower speed.

B. Ground Power Operation of the ACCS

(1) On 28 VDC aircraft with ACCS equipped with the optional electric compressor, pre-cooling of the aircraft cabin is possible using a ground power supply. For ground power operation of the air conditioning a ground power source that can deliver 100 amps during use is necessary.

(2) After connecting a ground power source and switching the unit on, the ACCS can be operated by pushing the external switch found near the ground power receptacle. When operated the aircraft power grid is disabled and the electric compressor and evaporator blower will run continuously while the condenser fans automatically cycle as needed. The external ACCS switch does not function when a battery master is on. The ACCS control panel is disabled during external power air conditioning operation and the ACCS cools at max capability. External power ACCS operation can be deactivated by pushing the external switch, removing the ground power source, or turning on either battery master switch. With a battery master on, the ACCS will be fully functional with the exception of the electric compressor, which will be off. An Electric A/C Interlock Assembly allows this integration of the ACCS with the airplane's electrical system. Refer to Chapter 24 for removal and installation of the interlock assembly.

(3) The Avidyne and G1000 ACCS installations have self-diagnostic capabilities that show on the control head display. Refer to Table 201.

(4) The Model T240 ACCS installation uses the GTC 570 Touchscreen Controller for its self-diagnostic function. For more data applicable to the GTC 570 ACCS diagnostic function, refer to Temperature and Air Control (T240) - Description and Operation.

2. Tools and Equipment

A. The tools and equipment that follow are necessary for leak testing, evacuating, and charging the refrigerant system:

- Gaseous dry nitrogen, regulated source (0-500 psig or 0-35 bar)
- R-134a refrigerant
- Refrigerant oil, Ester RL-500S
- R-134a refrigerant charging manifold with gauges and hoses with quick-disconnect couplers. The coupler has a knob on top which is used to engage and disengage the Schrader valve in the aircraft service ports.
- R-134a charging station and recovery/recycling station (SAE standard J2210)
- Air conditioning vacuum pump
- Hose adapter, for nitrogen bottle (.50 inch male acme to .25 inch SAE female flare)
- Hose adapter for vacuum pump (.50 inch male acme to .25 inch SAE female flare)
- Electronic leak detector
- Burroughs tool No. BT-33-73F (or equivalent) belt tension gauge
- Torque wrench capable of reading inch-pounds or N-m
- Small hand tools and socket set.
- Thermometer, 0-150° F
- Thermometer, 0-150° F
- Service light or flashlight
- Service light or flashlight

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- Weight scale, 0-50 lbs (0-25 kg) capable of 0.1 lb (5 gram) precision.

3. Air Distribution

A. For the Avidyne or Garmin G1000 installations air distribution are controlled by the ACCS with pilot, or co-pilot, input through the control head (Refer to Figure 202).

B. The Model T240 G2000 ACCS installation uses a touch screen controller for air distribution operation (Refer to Figure 202). For more data applicable to the touch screen controller refer to Garmin G2000 - Description and Operation.

C. Air Distribution Operation

(1) Air Conditioning - When air conditioned air is necessary, the evaporator blower is actuated and air is distributed through the overhead ceiling console vents and associated flood ducts.

(2) Heat - When heat is necessary, the ACCS shuts off the compressor and evaporator blower and regulates the heater/defog blower in the forward cabin. Heated air is distributed approximately 90 percent to the floor ducts with the remaining air being diverted to the windscreen defog ducts.

(3) Defog - When the Defog mode is selected on the control head /touchscreen controller, the heater/defog blower is activated at maximum speed and all air is distributed to the windscreen. Temperature selection on the control head/touchscreen controller regulates the temperature of the defog air.

4. Diagnostics

A. For the Avidyne and G1000 installations, to show the Diagnostics Fault Code on the display, turn on the ACCS (or ECS on Garmin G1000 equipped aircraft) and depress the ON button three times in succession. The digital display shows all active fault codes. When you push the ON button again and again the digital display scrolls through the active codes. Each code displayed should be addressed in turn until the "No Faults" code E00 is displayed. (Refer to Table 201). For the Model T240 Garmin G2000 installation diagnostic data, refer to Garmin G2000 - Description and Operation.

(1) With the Garmin G1000 option and no ACCS, fault codes E04 and E08 always displays due to the absence of an evaporator temperature sensor or OAT sensor in the system. In this case ignore the E04 and E08 codes.

Table 201. Fault Display Codes

Fault Code	Information	Correction
E00	No Faults	-
E01	Cabin Temp Sensor - Shorted	Check cabin temp sensor wiring and sensor for correct operation. Refer to Figure 203.
E02	Cabin Temp Sensor - Open	Check cabin temp sensor wiring and sensor for correct operation. Refer to Figure 203.
E03	Evap Temp Sensor - Shorted	Check evaporator coil temp sensor wiring and sensor for correct operation. Refer to Figure 205.
E04	Evap Temp Sensor - Open	Check evaporator coil temp sensor wiring and sensor for correct operation. Refer to Figure 205.
E05	Not Currently Used	-
E06	Not Currently Used	-
E07	OAT Sensor - Shorted	Check OAT sensor wiring and sensor for correct operation. Refer to Figure 204.
E08	OAT Sensor - Open	Check OAT sensor wiring and sensor for correct operation. Refer to Figure 204.
E09	Not Currently Used	-
E10	Heater Blend Air Actuator-Open	Check actuator sensor wiring and sensor for correct operation.
E17	No Communication with ECU	Check ECU wiring and system circuit breakers for correct operation.

B. The Advanced Diagnostics display mode is activated by pressing and holding the "ON" button for five seconds while the Fault Code display is active.

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Press the "ON" button to cycle through the following displays:

"CAb" Cabin Temperature Sensor temperature reading

"EUAP" Evaporator Coil Temperature Sensor temperature reading

"HEAt" ECS mixing valve position (percentage open)

"A-C" VCS compressor command (ON or OFF)

"FAn" Blower Speed-Evaporator or Heater/Defog (percentage of max)

Press the "OFF" button to return to the normal display mode.

C. The Firmware Version display mode is activated by pressing and holding the "ON" button for five seconds while the Advanced Diagnostics display is active.

Press the "ON" button to cycle through the following displays:

"ECU" ECU Module Firmware Version

"CtrL" Firmware Version

Press the "OFF" button to return to the normal display mode.

D. The parameter function is activated by pressing and holding the "OFF" button for five seconds while the advanced diagnostics display mode is active.

(1) Press the FAN "+" or the FAN "-" buttons to select configuration (config) setting: "Pf-x" ("x" can be displayed as 0,1, or 2 depending on setting).

(2) Press the TEMP "+" or the TEMP "-" buttons to change the selected config setting to : "Pf-1".

(3) Exit and save the settings in the programming mode by pressing the "OFF" button.

NOTE: Do not change any other settings within the configuration screen or damage to the system can occur.

5. Safety and System Service Precautions

A. Cabin Sealing

(1) You must seal the items that follow to make sure carbon monoxide does not enter the cabin of the aircraft. Use McMaster-Carr foam tape P/N 8512K24 or LP Aero Plastic foam tape P/N SP-FT114, 3M 425 foil tape, and PR 1428 B1/2 or RTV5818 sealant as indicated.

(a) Make sure that the foam tape is intact around the edges of the two clear access panels. When reinstalling the panels apply foam tape to form an airtight seal. When reinstalling the plug, apply Wacker Elastosil 952, Dow Corning 732, or GE RTV-108 sealant.

(b) Components penetrating the forward condenser bay bulkhead, and hollow shank rivets in the condenser compartment - Apply sealant as necessary.

(c) Lower corners of condenser compartment and gear member seals - Apply sealant as necessary.

(d) Between gearbox and fuselage on exterior near forward side of gear leg attachment - Apply sealant as necessary.

(e) At the air conditioning system bay perimeter, make sure that the foam tape is intact and installed on both sides of the attachment holes. Apply foam tape as necessary.

(f) At the air conditioning system bay access cover make sure that you seal the air conditioning system bay access cover to the floor using foil tape to create a leak proof seal.

B. Warnings and Cautions for R134a Refrigerant

WARNING: Eye contact with refrigerant can cause serious eye injury. If eye contact is made, get medical attention immediately.

(1) Avoid breathing R-134a refrigerant, lubricant vapor, or mist. Exposure can irritate eyes, nose, and throat. Wear eye protection when servicing the air conditioning system.

WARNING: Large amounts of R-134a refrigerant displaces oxygen and can cause suffocation.

(2) If accidental system discharge occurs, ventilate the work area before you start the servicing again. Do the servicing only in well ventilated areas.

WARNING: Do not heat refrigerant containers above 125°F or expose refrigerant to open flame. Do not use open

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flame to heat refrigerant containers.

WARNING: Do not intentionally drop, puncture, or incinerate refrigerant containers.

WARNING: If R-134a refrigerant comes in contact with any part of the body, severe frostbite and personal injury can result. Flush exposed zone immediately with cold water and obtain prompt medical assistance.

(3) The evaporation rate of R-134a refrigerant at average temperature and altitude is extremely high. As a result, anything that comes in contact with the refrigerant will freeze. Always protect skin or delicate objects from direct contact with refrigerant. For personal protection, you must wear, goggles and protective gloves. When you do work that includes opening the refrigerant system wrap clean cloth around fittings, valves and connections.

WARNING: R-134a service equipment or aircraft air conditioning system should not be pressure tested or leak tested with compressed shop air. Though R-134a is considered non-flammable, some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures are potentially dangerous and can result in fire or explosion.

WARNING: Never add R-134a refrigerant to a system that has not been evacuated to 29 in. Hg. vacuum pressure.

CAUTION: Liquid refrigerant is corrosive to metal surfaces. Follow the operation instructions supplied with equipment being used.

CAUTION: Never add R-12 refrigerant to an air conditioning system designed to use R-134a. Damage to the system can result.

CAUTION: R-12 compressor oil must not be mixed with the R-134a compressor oil. They are NOT compatible

CAUTION: Do NOT use R-12 servicing equipment or parts on an R-134a air conditioning system.

C. System Service Precautions

(1) Never open or loosen a connection before discharging the system refrigerant.

(2) Do not open a refrigerant system or uncap a replacement component unless its temperature is as close as possible to room temperature. This will prevent condensation from forming inside of a component which is cooler than the surrounding air.

(3) Before disconnecting a component from the system, clean the outside of the fittings thoroughly.

(4) Immediately after disconnecting a component from the system, seal the open fittings with a cap or plug.

(5) Before connecting an open fitting always install a new seal or gasket designed for the specific component. Coat the fitting and seal with clean refrigerant oil before connecting.

(6) Do not remove the sealing caps from a replacement component until ready to install.

(7) When installing a refrigerant line avoid bends which produce radii smaller than specified in Table 202 for the hose being installed.

Table 202. Minimum Bend Radii For Specified Hose Sizes

Hose Size	Minimum Bend Radius
1/2 in 13 mm (No. 10)	3.0 inches
13/32 in 10 mm (No. 8)	2.5 inches
5/16 in 8 mm (No. 6)	2.0 inches

(8) Position refrigerant lines to avoid exhaust components, flight controls, or items which can chafe the line. Refer to A.C. 43-13, *Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair* for compliant methods of installation.

(9) Apply a light coat of Ester RL-500S (engine driven compressor) or FVC68D (PVE) (electric compressor) refrigerant oil to the o-rings of all fittings. Tighten fittings only to the specified torque listed in Table 203. Use an anti-torque back-up wrench on each of the component fittings. The refrigerant fittings must not be tighten too much.

Table 203. Torque Values For Specified Fitting Sizes

Tube O.D.	Thread Size	Torque foot-pounds. (N-m)
0.375 inch	5/8-18	11-13 (14.9-17.6)
0.500 inch	3/4-16	15-20 (20.3-23.0)
0.625 inch	7/8-14	21-27 (28.4-36.6)

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NOTE: Trinary Switch Torque: 7 foot-pounds (9.4 N-m).

(10) When you disconnect a fitting, you must use a wrench on each of the two halves. This prevents twisting of the refrigerant lines or tubes.

(11) Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do NOT open an oil container until ready to use and install the cap immediately after using. Store the oil only in a clean moisture-free container.

(12) Keep service tools and the work area clean. You must avoid careless work habits to prevent Contamination of the VCS air conditioning system.

(13) Plumbing systems in aircraft are subject to vibration and extreme temperature and atmospheric pressure changes. Thus, you must obey procedures and use the correct material.

(14) There is either POE or PVE refrigerant oil used in the air conditioning system depending upon the type of compressor installed on the airplane. POE refrigerant oil is used with the engine driven compressor and PVE refrigerant oil is used with the electrically driven compressor. It is important to have the correct amount of oil in the air conditioning system. This makes sure that the compressor is lubricated correctly.. Too little oil will result in damage to the compressor. Too much oil will reduce the cooling capacity of the system.

(15) The oil used in the system is either Ester RL-500S (POE) which is wax-free synthetic ester refrigerant oil or FVC68D (PVE) which is a polyvinylether refrigerant oil. Do NOT use any other oil when servicing or repairing the system. The oil container should be kept tightly capped until it is ready for use and then capped immediately after use to prevent contamination. Refrigerant oil will quickly absorb any moisture it comes in contact with.

(16) When an air conditioning system is assembled at the factory all components except the compressor are refrigerant oil-free. After the system has been charged and operated, the oil in the compressor is dispersed through the system. The evaporator, condenser, receiver/dryer, and compressor keeps a significant amount of oil.

(17) When a receiver/dryer, condenser, or evaporator core is replaced, you must add 1 fluid oz. (29 cc) of refrigerant oil.

(18) When the compressor is replaced, the new compressor is factory filled with the correct amount of oil. It is not necessary to check the oil level in the compressor or to add oil unless there has been an oil loss. This can be due to a rupture or leak from a line, shaft seal, evaporator, or condenser. Oil loss at a leak point will be evident by the presence of a wet shiny surface around the leak.

(19) The VCS air conditioning compressor will be either engine driven or electrical, depending upon the configuration of the aircraft.

6. Engine Driven Compressor

A. The engine driven compressor is a swash or wobble plate axial compressor with a displacement of 147 cubic centimeters. The compressor cycles to regulate cabin temperature and to avoid evaporator coil freeze-up. The compressor is engaged by a magnetic clutch driven by a V-Belt off the accessory drive at the back of the engine. The magnetic clutch is switched off during air conditioning operation when the refrigerant system pressure drops below 29 psi (2 bar) at the trinary switch or anytime the high-pressure side of the refrigerant system rises above 397 psi (27 bar). Refer to Figure 206, Sheet 1 (rear view) and Sheet 2 (top view).

B. Remove the Engine Driven Compressor

(1) Remove the upper and lower engine cowling. Refer to Chapter 71.

(2) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

(3) Remove the evaporator/blower assembly cover. Refer to Figure 210.

(4) Evacuate the air conditioning system. Refer to System Evacuation Procedure.

(5) Remove the belt guard.

(6) Loosen the V-belt idler sheave and remove the V-belt.

(7) Disconnect the two refrigerant hoses from the compressor and seal all open fittings with a cap or plug.

(8) Remove 3 AN6-16A bolts, washers, and self-locking nuts attaching the compressor to the engine.

(9) Remove the compressor.

C. Install the Engine Driven Compressor

(1) Attach the compressor to the engine using 3 AN6-16A bolts, washers, and self-locking nuts. Torque 20 to 25 foot-pounds., (27.1 to 33.8 N-m).

(2) Place the V-belt onto the compressor pulley.

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(3) Install the belt guard using AN6H-10A and AN6H-14A bolts, and washers. Torque 275 to 325 inch-pounds, (31.0 to 36.7 N-m). Safety wire the bolts.

(4) Loosen the jam nut on the adjusting bolt, the adjusting bolt, and the idler pulley. The idler pulley slide nut should be loosened only enough to allow the slide to move freely. The adjusting bolt should be turned out far enough to allow installation of the belt.

CAUTION: Do Not tighten the belt too much. After approximately 5 hours of initial operation, recheck the belt tension and adjust as necessary.

(5) Install the belt.

(6) Slide the idler pulley snugly against the belt and tighten the adjusting bolt finger tight into its socket. The idler pulley should be rotatable by hand under the belt.

(7) Tighten the adjusting bolt two full turns, secure the adjusting bolt jam nut. Torque 275 to 325 inch-pounds, (31.0 to 36.7 N-m), and attach the idler pulley slide nut. Torque 300 to 350 inch-pounds, (33.8 to 39.5 N-m).

(8) Tighten the adjusting bolt two full turns, secure the adjusting bolt jam nut. Torque 275 to 325 inch-pounds, (31.0 to 36.7 N-m), and attach the idler pulley slide nut. Torque 300 to 350 inch-pounds, (33.8 to 39.5 N-m).

(9) Use the methods that follow to make sure that the belt tension is 50 to 70 lbs. (222.4 to 311.3 N):

(a) Use a direct reading belt tension gage such as Burroughs Tool No. BT-33-73F.

(b) Measure belt deflection under a 5 lb. load at the center of the longest belt span. Belt deflection should be 0.3 to 0.4 inch.

(10) If belt tension is not within the above tolerance, loosen the adjusting bolt jam nut and the idler pulley slide nut, and readjust the tension. One full turn of the adjusting bolt results in approximately a 10 lbs. (44.4 N) change in belt tension.

(11) Connect the two refrigerant hoses to the compressor.

(12) Replace the receiver/dryer, if necessary. Refer to Removal of the Receiver/Dryer and/or the Trinary Switch procedure.

(13) Evacuate and charge the system. Refer to System Evacuation Procedure and the System Charging Procedure

(14) Replace the evaporator/blower assembly cover.

(15) Replace the upper and lower engine cowling. Refer to Chapter 71.

(16) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

D. Compressor Maintenance.

(1) The compressor is self-contained and maintenance is not necessary. Inspection of the drive belts and pulleys should be completed at each 100 hour or annual inspection.

E. Engine Drive Compressor Inspection

CAUTION: Do NOT tighten the belt too much. After approximately 5 hours of initial operation, recheck the belt tension and adjust as necessary.

(1) Inspect the compressor drive belt for chafing and/or wear. You must replace the belt if there is an indication of fraying or dry rot. Check the belt tension and adjust as necessary to maintain 50 to 70 lbs (222.4 to 311.3 N) of belt tension.

(2) Inspect the compressor drive belt pulleys for security, tightness, rotational smoothness, and freedom.

7. Electrical Compressor

A. The electric compressor is a brushless, hermetic DC variable speed compressor. The compressor operates at a fixed high speed determined by an electronic motor controller which cycles the compressor between high speed and idle speed, depending on requirements of the system. Electric power to operate the compressor is supplied by an accessories alternator mounted on the aft of the engine. The compressor is protected by the trinary switch which senses out of limit system pressures. When the system pressure drops below 29 psi or rises above 397 psi, the compressor is shut down. Refer to Figure 207.

B. Remove the Electrical Compressor

(1) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25, Removal of the Baggage Floor Carpet.

(2) Remove the Elevator Interconnect Access Panel. Refer to Chapter 25, Removal of the Elevator Interconnect Access Panel.

(3) Remove the Evaporator/Blower Assembly cover. Refer to Figure 210.

(4) Evacuate the air conditioning system. Refer to System Evacuation Procedure.

(5) Disconnect the electrical connections to the compressor.

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(6) Disconnect each of the two refrigerant hoses from the compressor.

(a) Seal open fittings with a cap or plug.

(7) Remove the AN4-10 bolts, washers, isolation ring, isolation bushing, and bolt sleeve spacer that attach the compressor to the shelf.

(8) Remove the compressor.

C. Install the Electrical Compressor

(1) Make sure that the wet weight of the compressor is 14.68 lbs. when installed in a dry system. Add refrigerant oil as necessary.

(2) Install the AN4-10 bolt, washers, isolation ring, isolation bushing, and bolt sleeve spacer that attach the compressor to the shelf .

(3) Connect the two refrigerant hoses to the compressor.

(4) Connect all electrical connections to the compressor.

(5) Replace the receiver/dryer, if necessary. Refer to Removal of the Receiver/Dryer and/or the Trinary Switch procedure.

(6) Evacuate and charge the system. Refer to System Charging Procedure and the System Evacuation Procedure.

(7) Replace the Evaporator/Blower Assembly cover.

(8) Replace the Elevator Interconnect Access Panel. Refer to Chapter 25.

(9) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

D. Electrical Compressor Maintenance.

(1) The VCS Compressor is self-contained and maintenance is not necessary.

8. Condenser/Fan Assembly

A. The condenser receives high-temperature, high-pressure vapor from the compressor. The vapor enters at the upper fitting of the condenser. As the vapor flows through the condenser, it releases heat to the cooler ambient air flowing over the condenser. As the vapor releases heat it changes to a liquid. Under average load, two-thirds of the condenser contains refrigerant vapor and the other third contains liquid refrigerant. The liquid refrigerant in the condenser has lost much of its heat, but still remains at a relatively high temperature and pressure. The assembly is located beneath the baggage compartment floor with vents for inlet and outlet directly below, through the belly of the aircraft. Refer to Figure 208.

B. Remove the Condenser/Fan Assembly

(1) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

(2) Remove the evaporator/blower assembly cover, the avionics shelf access panel and the air conditioning system bay access cover. Refer to Figure 210.

(3) Evacuate the air conditioning system. Refer to System Evacuation Procedure.

(4) Disconnect the wiring harness.

(5) Disconnect the two refrigerant hoses from the Condenser/Fan assembly and seal all open fittings with a cap or plug.

(6) Remove 5 screws and 3 bolts mounting the Condenser/Fan assembly to the fuselage bulkheads.

(7) Remove 5 screws and 3 bolts mounting the Condenser/Fan assembly to the fuselage bulkheads

(8) Remove the Condenser/Fan assembly.

C. Install the Condenser/Fan Assembly.

(1) Install PR1428 B1/2 or RTV5818 sealant, as necessary, at all openings between the air conditioning bay and the cabin area (including underlying floors) to completely seal off the cabin area from the air conditioning bay.

(2) Install McMaster-Carr foam tape P/N 8512K24, as necessary, around the perimeter of the air conditioning system bay.

(3) Replace the Condenser/Fan assembly in the compartment.

(4) Reinsert the 5 screws and 3 bolts mounting the Condenser/Fan assembly to the fuselage bulkheads.

(5) Reconnect the wiring harness.

(6) Remove caps and plugs from any openings that were sealed and reconnect the two refrigerant hoses from the Condenser/Fan assembly.

(7) Install a .25 in +/- bead of PR1428 B1/2 or RTV5818 sealant between the baggage floor and the aft condenser attachment.

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(8) Replace the receiver/dryer, if necessary, per the Removal of the Receiver/Dryer and/or the Trinary Switch procedure.

(9) Evacuate and charge the system per the System Evacuation Procedure and the System Charging Procedure. Add 1 fluid oz (29 cc) of refrigerant oil when installing a new Condenser/Fan assembly.

(10) Replace the air conditioning system bay access cover. Seal the air conditioning system bay access cover to the floor using 3M 425 adhesive foil tape to create a leak-proof seal.

(11) Replace the avionics shelf access panel, and the Evaporator/Blower Assembly cover.

(12) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

D. Condenser/Fan Assembly Maintenance.

(1) The condenser/fan a is self-contained and maintenance is not necessary.

9. Expansion Valve

A. The expansion valve is located at the inlet to the evaporator. It is the connection point between the high-pressure and low-pressure side of the refrigeration system. The expansion valve determines the flow rate of the refrigerant and provides a pressure drop, reducing pressure on the liquid refrigerant before it enters the evaporator. Refer to Figure 209.

B. Remove the expansion Valve

(1) Remove the baggage floor and the baggage shelf carpet per instructions in Chapter 25.

(2) Remove the Evaporator/Blower Assembly cover. Refer to Figure 210.

(3) Evacuate the air conditioning system per instructions in the System Evacuation Procedure.

(4) Disconnect the refrigerant hose from the Expansion Valve and the Expansion Valve from the Evaporator/Blower Assembly, and seal all open fittings with a cap or plug.

(5) Remove the expansion valve.

C. Install the Expansion Valve

(1) Put the expansion valve in its correct position in the airplane.

(2) Connect the Expansion Valve to the Evaporator/Blower Assembly and connect the refrigerant hose to the Expansion Valve. Torque the fittings. Refer to Table 203 .

(3) Replace the receiver/dryer, if necessary. Refer to Receiver/Dryer with Trinary Switch procedure.

(4) Evacuate and charge the system. Refer to System Evacuation Procedure and the System Charging Procedure.

(5) Replace the Evaporator/Blower Assembly cover.

(6) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

D. Expansion Valve Maintenance.

(1) The Expansion Valve is a self-contained unit and maintenance is not necessary.

10. Evaporator/Blower Assembly

A. The evaporator uses a plate and fin evaporator coil. The tubing is hydraulically expanded into the fins to make sure that there is good thermal conductivity. The evaporator removes heat and moisture from air entering the aircraft cabin. Low-pressure liquid refrigerant from the expansion valve enters the evaporator. Due to the reduced pressure, the refrigerant boils into a vapor. The boiling refrigerant absorbs the heat from the incoming air as it changes from a liquid to a vapor. The unit is located under a cover against the aft wall of the baggage compartment. Refer to Figure 210

B. Remove the Evaporator/Blower Assembly

(1) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

(2) Remove the Evaporator/Blower Assembly cover and the elevator interconnect cover. Refer to Figure 210.

(3) Evacuate the air conditioning system. Refer to System Evacuation Procedure.

(4) Disconnect all electrical connections to the Evaporator/Blower Assembly.

(5) Remove the Expansion Valve. Refer to Removal of the Expansion Valve procedure.

(6) Disconnect the low-pressure refrigerant hose from the Evaporator/Blower Assembly and seal all open fittings with a cap or plug.

(7) Remove 2 screws and washers connecting the overhead air duct to the Evaporator/Blower Assembly.

(8) Remove 3 screws attaching the evaporator/blower assembly to the aircraft.

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(9) Remove the Evaporator/Blower Assembly.

C. Install the Evaporator/Blower Assembly

(1) Slide the evaporator/blower assembly outlet into the overhead air duct.

(2) Install 3 screws attaching the evaporator/blower assembly to the aircraft.

(3) With 2 screws and washers, attach the overhead air duct to the evaporator/blower assembly.

(4) Install the Expansion Valve. Refer to Installation of the Expansion Valve procedure.

(5) Attach the low-pressure refrigerant hose to the Evaporator/Blower.

(6) Reconnect all electrical connections to the evaporator/blower assembly.

(7) Replace the receiver/dryer, if necessary. Refer to Removal of the Receiver/Dryer and/or the Trinary Switch procedure.

(8) Evacuate and charge the system. Add 1 fluid oz. (29 cc) of refrigerant oil when installing a new Evaporator/Blower Assembly.

(9) Evacuate the system. Refer to System Evacuation Procedure

(10) Charge the system. Refer to System Charging Procedure

(11) Replace the elevator interconnect cover and evaporator/blower assembly cover.

(12) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

D. Evaporator/Blower Assembly Maintenance.

(1) The evaporator/blower assembly is a self-contained unit and maintenance is not necessary.

11. Receiver/Dryer with Trinary Switch

A. The receiver/dryer acts as a storage and filter unit for refrigerant oil. The trinary switch serves two functions. One portion of the switch cycles the condenser fans once the refrigerant pressure reaches 235 psi (16 bar) and turns off the fans at 190 psi (13 bar). The other portion of the switch protects the system from damage due to low refrigerant or excessive pressures by turning off the compressor. Power to the compressor is interrupted once the refrigerant pressure drops below 29 psi (2 bar) or exceeds 397 psi (27 bar) at the trinary switch. The trinary switch automatically resets once pressures are restored to a safe level.

(1) The receiver/dryer must be replaced on the conditions that follow:

(a) Compressor replaced due to failure or contamination.

(b) Evaporator module replaced due to contamination.

(c) Condenser replaced due to contamination.

(d) Any hose or line replaced due to contamination.

(e) Expansion valve replaced due to contamination.

(f) The system has been opened to the ambient environment for more than 24 hours, e.g., components were not capped or plugged to preclude moisture contamination during service Generally, replace the receiver/dryer whenever a contamination event occurs or if the system has been opened and exposed to ambient environment for more than 24 hours.

(2) The trinary switch is considered an LRU (Line Replaceable Unit) which allows it to be replaced independently of the receiver/dryer assembly. The switch is sealed with an O-ring on the receiver/dryer and releases a Schrader valve upon removal thus allowing replacement without evacuating the refrigeration system. It is important to note that the 14VDC switch and the 28VDC switch, although identical electrically, have different electrical interface connectors. The correct switch must be ordered based on the configuration (14VDC or 28VDC) of the aircraft being serviced.

(3) The receiver/dryer assembly is attached to the landing gear tab located beneath the baggage compartment, forward of the condenser bay on the co-pilot's side. Refer to Figure 211.

B. Remove the Trinary Switch (Refer to Figure 211).

(1) Remove the Evaporator/Blower Assembly cover and the avionics shelf access panel. Refer to Figure 208.

(2) Disconnect the electrical connections from the trinary switch.

(3) Turn the trinary switch to remove it and O-ring from the receiver/dryer assembly.

(4) Remove the trinary switch.

NOTE: You can remove the Trinary Switch without evacuating the system.

C. Install the Trinity Switch (Refer to Figure 211).

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(1) Put the trinary switch and O-ring in their correct position on the receiver/dryer assemble.

NOTE: Inspect and replace the O-ring if necessary.

(2) Turn in the trinary switch in the receiver/dryer assembly.

(a) Torque to 7 foot-pounds (9.4 N-m).

(3) Connect the electrical connections to the Trinary Switch.

(4) Replace the avionics shelf access panel and the Evaporator/Blower Assembly cover.

(5) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

D. Remove the Receiver/Dryer Assembly (Refer to Figure 211).

(1) Evacuate the air conditioning system. Refer to System Evacuation Procedure.

(2) Disconnect the refrigerant hoses from the receiver/dryer and seal all open fittings with a cap or plug.

(3) Remove the 2 bolts, washers, and self locking nuts that attach the receiver/dryer to the landing gear tab.

(a) Remove the receiver/dryer.

E. Install the Receiver/Dryer Assembly (Refer to Figure 211).

(1) Put the receiver/dryer in its correct position on the landing gear tab.

(a) Install the two bolts, washers, and self-locking nuts that attach the receiver/dryer to the landing gear tab.

(2) Attach the refrigerant hoses to the receiver/dryer.

(3) Connect the electrical connections to the trinary switch.

(4) Evacuate the system. Refer to System Evacuation Procedure

(5) Charge the system. Refer to System Charging Procedure.

NOTE: Add 1 fluid oz. (29 cc) of refrigerant oil when installing a new receiver/dryer.

(6) Replace the avionics shelf access panel and the evaporator/blower assembly cover.

(7) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

F. Receiver/Dryer and Trinity Switch Maintenance.

(1) The receiver/dryer with trinary switch assembly is a self-contained unit and maintenance is not necessary.

12. Cabin Temperature Sensor

A. The cabin temperature sensor assembly contains a calibrated thermistor and fan used to draw cabin air over the thermistor. The sensor assembly is controlled by the ECU. Cabin temperature is determined by comparing the inside temperature of the aircraft with the desired cabin temperature setting. The temperature is regulated by cycling the compressor and regulating the evaporator blower speed during cooling requirements and by regulating the heater temperature door and heater/defogger blower speed during heating requirements. If the sensor fails, a fault will be noted in the ACCS and manual temperature control is necessary utilizing the control head/touchscreen controller.

(1) For the Avidyne installation the sensor assembly is located behind the copilot's knee bolster. Refer to Figure 212.

(2) For S/N 41001 thru 41033, 41035 thru 41533, 41651 Incorporating SEB-21-01, the Avidyne sensor assembly is located in the centre console assembly. Refer to Figure 212.

(3) For the Garmin G1000 system installation is installed, the sensor assembly is at the bottom of the instrument panel below the MFD or mounted behind the headset holder at the front face of the Tower. Refer to Figure 213.

(4) For the Model T240 maintenance data , refer to Cabin Temperature Sensor (T240) - Removal/Installation.

B. Remove the Cabin Temperature Sensor (Refer to Figure 213).

(1) For the Avidyne installation, remove the right knee bolster per instructions in Chapter 25.

(2) For the G1000 installation, get access to the sensor from underneath the instrument panel or by removing the tower per Chapter 25, as necessary.

(3) Disconnect the electrical connection from the cabin temperature sensor.

(4) Remove 4 screws attaching the cabin temperature sensor to the top of the Right Knee Bolster, to the sensor mounting plate, or to the headset holder, as applicable.

(5) Remove the cabin temperature sensor, spacer, and screen.

C. Install the Temperature Sensor (Refer to Figure 213).

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(1) Put the cabin temperature sensor, spacer, and screen in their correct position, as applicable.

(2) Install the 4 screws that attach the cabin temperature sensor to the top of the Right Knee Bolster, to the sensor mounting plate, or to the headset holder, as applicable.

(3) Connect the electrical connection to the cabin temperature sensor.

D. Cabin Temperature Maintenance.

(1) The cabin temperature sensor is a self-contained unit and maintenance is not necessary.

13. Outside Air Temperature (OAT) Sensor

A. The OAT temperature sensor continuously measures the temperature of the air passing by the outside of the aircraft. The sensor is used as a basic variable for temperature regulation. The ECU also uses the signal from this sensor to calculate the temperature for the OAT indication on the display. For the Avidyne and G1000 installations, the temperature sensor is located in the condenser bay on the forward bulkhead. Refer to Figure 214.

B. For the Model T240 OAT sensor installation data, refer to Garmin GTP 59 Outside Air Temperature Probe (G2000) - Removal/Installation.

C. Remove the OAT Sensor (Refer to Figure 214).

(1) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

(2) Remove the Evaporator/Blower Assembly cover, the avionics shelf access panel and the air conditioning system bay access cover. Refer to Figure 210.

(3) Disconnect the electrical connection to the OAT.

(4) Remove the "C" clip attaching the OAT sensor to the bulkhead and remove the sensor.

(5) Remove the OAT.

D. Install the OAT Sensor (Refer to Figure 214).

(1) Install PR1428 B1/2 or RTV5818 sealant, as necessary, at all openings between the air conditioning bay and the cabin area (including underlying floors) to completely seal off the cabin area from the air conditioning bay

(2) Install McMaster-Carr foam tape P/N 8512K24, as necessary, around the perimeter of the air conditioning system bay.

(3) Replace the air conditioning system bay access cover. Seal the air conditioning system bay access cover to the floor using 3M 425 adhesive foil tape to create a leak proof seal

(4) Replace the avionics shelf access panel, and the Evaporator/Blower Assembly cover.

(5) Replace the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

E. OAT Sensor Maintenance.

(1) The OAT Sensor is a self-contained unit and maintenance is not necessary.

14. Electronic Control Unit (ECU)

A. The ECU is the control unit of the ACCS incorporating all the electronic circuitry and utilizing digital processing logic. The ECU also contains the blower control unit which regulates the evaporator and the 11 heater blower speeds.

B. For airplanes with the Avidyne or G1000 installations, the ECU receives signals from the and supplies outputs accordingly. Voltage at the blowers is reported back to the . For Airplane serials 41002 to 41562, the ECU is located on the pilot's side, beneath the evaporator cover, in the baggage compartment. Refer to Figure 210. For Airplane serials 41563 and on, and Model T240, the ECU is mounted on the fuselage skin under the baggage bulkhead access panel.

C. The Model T240 Garmin G2000 ACCS installation is controlled by the GTC 570 Touchscreen Controller found on the center console. For more data applicable to the touchscreen controller, refer to Garmin G2000 - Description and Operation.

D. Remove the Electronic Control Unit (Refer to Figure 210).

(1) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

(2) Remove the applicable panels to get access to the ECU as follows:

(a) For Airplane serials 41002 to 41562, remove the Evaporator/Blower Assembly cover. Refer to Figure 210.

(b) For Airplane serials 41563 and On, and Model T240, remove the baggage bulkhead access panel.

(3) Disconnect all electrical connections to the ECU.

(4) Remove the ECU attach hardware as follows:

(a) For Airplane serials 41002 to 41562, remove the 3 screws.

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(b) For Airplane serials 41563 and on and Model T240, remove the 4 self-locking nuts and washers.

E. Install the Electronic Control Unit (Refer to Figure 210).

(1) Put the ECU in its correct position in the air conditioning system bay.

(2) Install the ECU attach hardware as follows:

(a) For Airplane serials 41002 to 41562, install the 3 screws.

(b) For Airplane serials 41563 and on and Model T240, install the 4 self-locking nuts and washers.

(3) Connect all electrical connections to the ECU.

(4) Install the applicable panels as follows:

(a) For Airplane serials 41002 to 41562, install the Evaporator/Blower Assembly cover. Refer to Figure 210.

(b) For Airplane serials 41563 and On, and Model T240 install the baggage bulkhead access panel.

(5) Install the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

F. ECU Maintenance.

(1) The ECU is a self-contained unit and maintenance is not necessary.

15. Control Head

A. For the Avidyne option, the control head is located to the right of the flap panel. For the Garmin G1000 option the control head is located in the tower assembly. The control head receives inputs from the pilot, or co-pilot, and the ACCS components. It is the user interface for the ACCS. Fault codes generated by the ACCS are displayed on the control head LED screen for troubleshooting.

B. The Model T240 ACCS installation is controlled by the Touchscreen Control Panel found on the center console. For more data applicable to the Touchscreen Control Panel, refer to Garmin G2000 - Description and Operation.

C. Remove the Control Head (Refer to Figure 215).

(1) Remove electrical power from the airplane.

(2) Disconnect the wiring harness from the back of the Control Head.

(3) From the rear of the instrument panel remove the four nuts and keeper clamp that attach the Control Head to the instrument panel.

(4) Carefully pull the control head aft from the instrument panel.

D. Install the Control Head (Refer to Figure 215).

(1) Carefully put the control head in its control head in the instrument panel.

(2) Install the four nuts and keeper clamp that attach the Control Head to the instrument panel.

(3) Disconnect the wiring harness from the back of the Control Head.

E. Control Head Maintenance.

(1) The Control Head is a self-contained unit. A periodic check for defog/floor vent assembly, ECS shut-off valve assembly, and heater temperature actuator operation is necessary. A functional check should be completed at each 100 hour or annual inspection.

F. Control Head Inspection

(1) Evaluate the adequacy of the system in terms of crew and passenger comfort, as well as the defroster's ability to control fogging of the windscreen.

(2) Inspect the compressor drive belt pulleys for security, tightness, rotational smoothness, and freedom.

(3) Check for proper operation of the fresh air, air conditioning, heat, defog, air volume control, temperature control, and air output control.

(4) Evaluate the eyeball vents for proper operation.

16. System Leak Check Procedure.

A. System leak check is necessary whenever the air conditioning system is not cooling properly, there is a system component replacement or a loss of R-134a refrigerant charge.

B. Make sure that you obey all safety precautions. Refer to Safety and System Service Precautions.

C. Tools and Equipment.

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(1) For tools and equipment necessary for the leak check procedure, refer to Tools and equipment .

D. Do the Leak Check Procedure

(1) Determine if the system is fully charged. Refer to Figure 216.

(2) If the system is empty do the steps that follow:

(a) Evacuate the system. Refer to System Evacuation Procedure.

(b) Charge the system with 0.6 lbs (296 grams) of R-134a refrigerant. Refer to System Charging Procedure.

(3) Position the aircraft in a wind free work area.

(4) Remove the engine cowling per instructions in Chapter 71.

(5) Remove the baggage floor and the baggage shelf carpet. Refer to Chapter 25.

(6) Remove the evaporator/blower assembly cover, the avionics shelf access panel and the air conditioning system bay panel.

(7) Operate the aircraft engine with the air conditioning on for 5 to 10 minutes until the operating temperature and pressures are achieved based on the existing refrigerant charge.

(8) You must keep the airplane cabin doors and the baggage compartment door open during the test operation.

(9) Shutdown the aircraft engine.

(10) Examine for leaks utilizing a R-134a electronic leak detector and as follows:

(a) Move the probe slowly along the bottom side of lines and fittings.

NOTE: R-134a is heavier than air

(b) Examine fittings, lines, or components that appear to be oily.

NOTE: Oily areas usually are the site of a refrigerant leak.

(11) Examine the evaporator core for leaks as follows:

(a) Make sure that the airplane engine is not operating.

(b) Set the ACCS temperature to 55° F (13° C)

(c) Set the blower speed to the "LO" position.

(d) Examine the air conditioning outlet vents for leaks.

(e) Examine the evaporator drain tube outlet for the presence of refrigerant oil.

CAUTION: Do not tighten the plumbing connections too much. Stripped threads or cracked flanges can result.

(12) Tighten or repair joints as necessary to stop leaks.

17. Tools and Equipment

A. The tools and equipment that follow are necessary for leak testing, evacuating, and charging the refrigerant system:

- Gaseous dry nitrogen, regulated source (0-500 psig or 0-35 bar)
- R-134a refrigerant
- Refrigerant oil, Ester RL-500S
- R-134a refrigerant charging manifold with gauges and hoses with quick-disconnect couplers. The coupler has a knob on top which is used to engage and disengage the Schrader valve in the aircraft service ports.
- R-134a charging station and recovery/recycling station (SAE standard J2210)
- Air conditioning vacuum pump
- Hose adapter, for nitrogen bottle (.50 inch male acme to .25 inch SAE female flare)
- Hose adapter for vacuum pump (.50 inch male acme to .25 inch SAE female flare)
- Electronic leak detector
- Burroughs tool No. BT-33-73F (or equivalent) belt tension gauge
- Torque wrench capable of reading in.-lbs or N-m.
- Small hand tools and socket set.
- Thermometer, 0-150° F
- Thermometer, 0-150° F
- Service light or flashlight
- Service light or flashlight
- Weight scale, 0-50 lbs (0-25 kg) capable of 0.1 lb (5 gram) precision.

18. System Evacuation Procedure

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A. If the air conditioning system has been open to the atmosphere, it must be evacuated before the system can be charged. Moisture and air mixed with refrigerant will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the air conditioning system and damage the compressor. Moisture will also boil at near room temperature when exposed to vacuum.R-134a refrigerant is a hydro fluorocarbon (HFC) that does not contain chlorine. An R-134a refrigerant Recovery/Recycling Station that meets SAE standard J2210 must be used to evacuate the refrigerant system. Refer to the operating instructions provided with the equipment for proper operation.

B. Make sure that you obey all safety precautions. Refer to Safety and System Service Precautions.

C. Tools and Equipment.

(1) For tools and equipment necessary for the evacuation procedure, refer to Tools and equipment .

D. Do the Evacuation Procedure.

CAUTION: Any change in vacuum pressure, or failure to achieve a system pressure of 25 to 27 in. Hg (635 to 685 mm Hg) vacuum indicates the presence of a plumbing leak. Repeat the leak check procedure. Locate and repair all leaks.

(1) Connect the charging manifold to the service ports.

(2) Connect the manifold charging (yellow) hose to the vacuum pump and turn on the pump.

(3) Open both valves of the charging manifold gauge set.

(4) Open both valves of the charging hose quick connect fittings.

(5) Observe the charging manifold gauges to verify vacuum.

(6) Evacuate the system until 25 to 27 in. Hg (635 to 685 mm Hg) or greater vacuum is obtained.

(7) Close all valves and turn off the vacuum pump.

(8) If the system maintains the specified vacuum for 30 minutes, start the vacuum pump, open the suction and discharge valves, and evacuate the system for an additional 40 minutes, minimum.

(9) If the specified vacuum is not maintained, locate and repair the refrigeration system leak before continuing.

(10) Close all valves and turn off the vacuum pump.

(11) Disconnect the manifold service hose from the vacuum pump. The system is now ready for refrigerant charging.

19. System Charging Procedure

A. There are various methods of charging refrigerant into the air conditioning system. These include using a refrigerant recovery/recycle unit (refer to the manufacturer's instruction manual). The use of manifold pressure gauges, R-134a cylinder, and a weight scale is outlined in this section. Only R-134a refrigerant is to be used. Other refrigerants will damage the system. Overcharging of the system will result in reduced performance, reduced service life, and/or damage to the system components.

B. Make sure that you obey all safety precautions. Refer to Safety and System Service Precautions.

C. Do the Charging Procedure.

(1) Leak check and evacuate the system. Refer to Leak Check Procedure and the System Evacuation Procedure.

(2) Connect the yellow manifold charging hose to the R-134a cylinder and open the valve.

(3) Crack open the charge hose fitting at the manifold gauge set and vent air from the hose until refrigerant is evidently escaping.

(4) Place the refrigerant bottle on a 0-50 lb. (0-25 kg) scale and record the weight.

(5) Open both manifold gauge set valves. Add refrigerant to the system until pressure stabilizes.

(6) Close the manifold valves and verify that system pressure is 50 psig (3.4 bar) or greater.

NOTE: The system pressure must be above 50 psig (3.4 bar) to close the low-pressure cutoff switch. Otherwise the compressor will not turn on.

CAUTION: Do not use open flame to warm the refrigerant bottle. Do not heat the bottle above 125° F (51° C).

(7) If necessary, warm the refrigerant bottle by immersion in warm water.

(8) Move the aircraft to a run-up area.

(9) Start the aircraft engine. Select "AUTO" on the ACCS and set the temperature to 55° F (13° C). Idle the aircraft engine at 1200 to 1800 RPM.

CAUTION: Do not open the high-pressure (red) valve on the manifold gauge set.

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(10) With the system operating, observe the system discharge and suction pressures.

(11) With the R-134a cylinder connected to the charging hose, charging container shutoff valve open and hose purged of air, slowly open the suction (blue) manifold valve. The suction pressure will increase to 60 to 70 psig (4.1 to 4.8 bar).

NOTE: As refrigerant enters the compressor, a slight increase in compressor discharge pressure will be noticed.

(12) Continue to add refrigerant until 24 oz. (680 grams) of refrigerant has been added.

(13) Close the suction manifold valve (blue) and let the system operate for 5 to 10 minutes to evaluate performance.

CAUTION: Do NOT overcharge the air conditioning system. Overcharging will cause excessive compressor head pressure, loss of cooling, noise and system failure.

NOTE: Letting the system stabilize is necessary until the expansion valve can stabilize the system pressure.

NOTE: System charge is approximately 24 oz. (680 grams) of R-134a refrigerant.

(14) With the system fully charged and operating, observe the suction and discharge pressures. Typical values at various ambient temperatures, with hot cabins, are shown below. These values should be used as a reference for troubleshooting, not as a sole source. Refer to Table 204 and Figure 216 for pressure values at various temperatures. Table 205 lists possible performance issues and methods for correcting them.

Table 204. Typical Suction and Discharge Pressure

Ambient Temperature	21° C(70° F)	27° C(80° F)	32° C(90° F)	38° C(100° F)	43° C (110° F)
Air Temperature At Evaporator Outlet	7-9° C(45-48° F)	8-13° C(46-55° F)	11-16° C(52-61° F)	14-20° C (57-68° F)	17-25° C(63-77° F)
Low Side Service Port Pressure	18	20	22	25	26
	psi	psi	psi	psi	psi
	30	35	39	43	47
High Side Service Port Pressure	150	160	220	250	280
	psi	psi	psi	psi	psi
	220	235	310	320	340

(15) Allow the system to operate for 10 minutes, then shut down.

NOTE: After shutdown, both suction and discharge pressures will begin to equalize.

(16) Close the refrigerant container shutoff valve. Record the refrigerant container final weight and calculate the system refrigerant charge.

(17) Turn the knob on the suction and discharge charging hose quick coupler to closed position and disconnect the hoses from the service ports.

(18) Remove the yellow charging hose from the refrigerant container and store the manifold gauge set.

(19) Install the service port caps.

20. System Flushing

A. System flushing can be successfully done to systems where there is insignificant or no evidence of debris or FOD in the system. Failure to follow the actions and direction below will void all Seamech warranty considerations.

B. You must not do system flushing to the complete system where a compressor has overheated and failed. The industry term for this type of failure is "Black Death" and is usually the result of low amounts of compressor lubricating oil in the system. This type of failure burns the remaining oil in the system and, combined with the polymers in the compressor forms a hard, carbonized and not possible to remove buildup. The buildup is primarily in the receiver dryer and condenser. In this case, the hoses between the compressor and evaporator module, as well as the receiver dryer and condenser must be replaced. The expansion valve and evaporator module should be removed and inspected for evidence of black carbonized buildup. If black buildup exists, the expansion valve and/or evaporator module must also be replaced. If no evidence of black carbonized buildup exists, the expansion valve and evaporator module can be flushed using the techniques below.

C. If a contamination event is the result of an internal compressor mechanical failure or other debris in the system, and there is evidence of metal or debris in the VCS components, then all of the VCS hoses and components must be disconnected and

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inspected. High efficiency condenser and evaporator coils are difficult to clean of all debris. These coils are parallel flow devices with deep wells on the manifolds where debris can and flushing material can pool making debris removal by flushing impossible. If there is evidence of debris in these devices, it is recommended that they be replaced to make sure that the system can operate debris free when reassembled and serviced. In the event of a compressor mechanical failure, it is likely that the receiver/dryer, condenser and perhaps the evaporator module can require replacement. Hoses and other components of the system should be able to be flushed with success.

D. Make sure that you obey all safety precautions. Refer to Safety and System Service Precautions.

E. Do the System flushing.

(1) If flushing can be done, only DuPont(TM) Mobile AC Flush Fluid is authorized on Seamech systems. For additional data about the fluid and where it can be obtained is available refer to, http://refrigerants.dupont.com/Suva/en_US/products/suva_mobile_flush.html . High-pressure and flow-flushing equipment is necessary. Traditional flush guns, aerosol flushes and pour in flush methods do not produce the velocity necessary to force contaminates out of the affected component.

CAUTION: It is very important that all of the flush be removed from the condenser. Flush remaining in the condenser can cause the compressor to fail after an unusually short time. If there is any doubt as to whether there is flush in the condenser, it is strongly advised that the condenser be replaced. Evidence of flush in a failed compressor will void any compressor warranties.

CAUTION: You must do the flushing in the reverse flow direction (low side to high side) to push contaminates back out of the affected components on a component by component basis. This means when an evaporator coil is flushed, the thermal expansion valve (TXV) must be removed and flushing material must enter into the down stream or suction side fitting of the evaporator coil. In a similar way, flushing material must be applied to the bottom or discharge fitting of the condenser. Use gravity to assist in the cleaning.

CAUTION: Compressors must not be flushed. Flushing materials damage the compressor and displace any oil in the unit. Do not flush compressors.

(2) You must remove the thermal expansion valve from the evaporator module and thoroughly clean it. Any contaminates in the expansion valve can cause the valve to operate incorrectly.

(3) The receiver/dryer can never be flushed because it is not possible to remove all of the flushing compounds. The receiver/dryer contains desiccant, which will absorb the flushing compound. You must replace the receiver/dryer if there was any type of contamination event.

(4) All system hoses should be disconnected and flushed independently, opposite the direction of normal system refrigerant flow.

(5) Once all of the affected components of the system have been flushed, all components must be blown dry with clean and very dry filtered shop air or nitrogen. VERY IMPORTANT - using air or nitrogen that is not dry will introduce moisture into the system components. This will cause internal corrosion over time.

(6) It is vitally important to remove all of the flushing chemicals from all of the components. This can mean the components have to be rotated, shaken, or tilted to make sure that all of the flushing material has been removed. Residual flushing material can absorb the compressor oils and can lead to premature failure of the compressor and degraded cooling performance. Repeat the "blow out" and removal of the flushing compounds until you are confident that all contamination debris and flushing chemicals have been removed.

(7) Hose O-rings must be replaced and the system reassembled per this maintenance manual.

(8) Follow the correct procedures for servicing the system with oil. Only Ester RL-500S system oil can be used. If a new compressor is used, they usually contain the necessary amount of oil internal to the compressor. The VCS can then be serviced again using the maintenance manual procedures.

F. Pressure and Performance Diagnosis

Table 205. Pressure and Performance Diagnosis

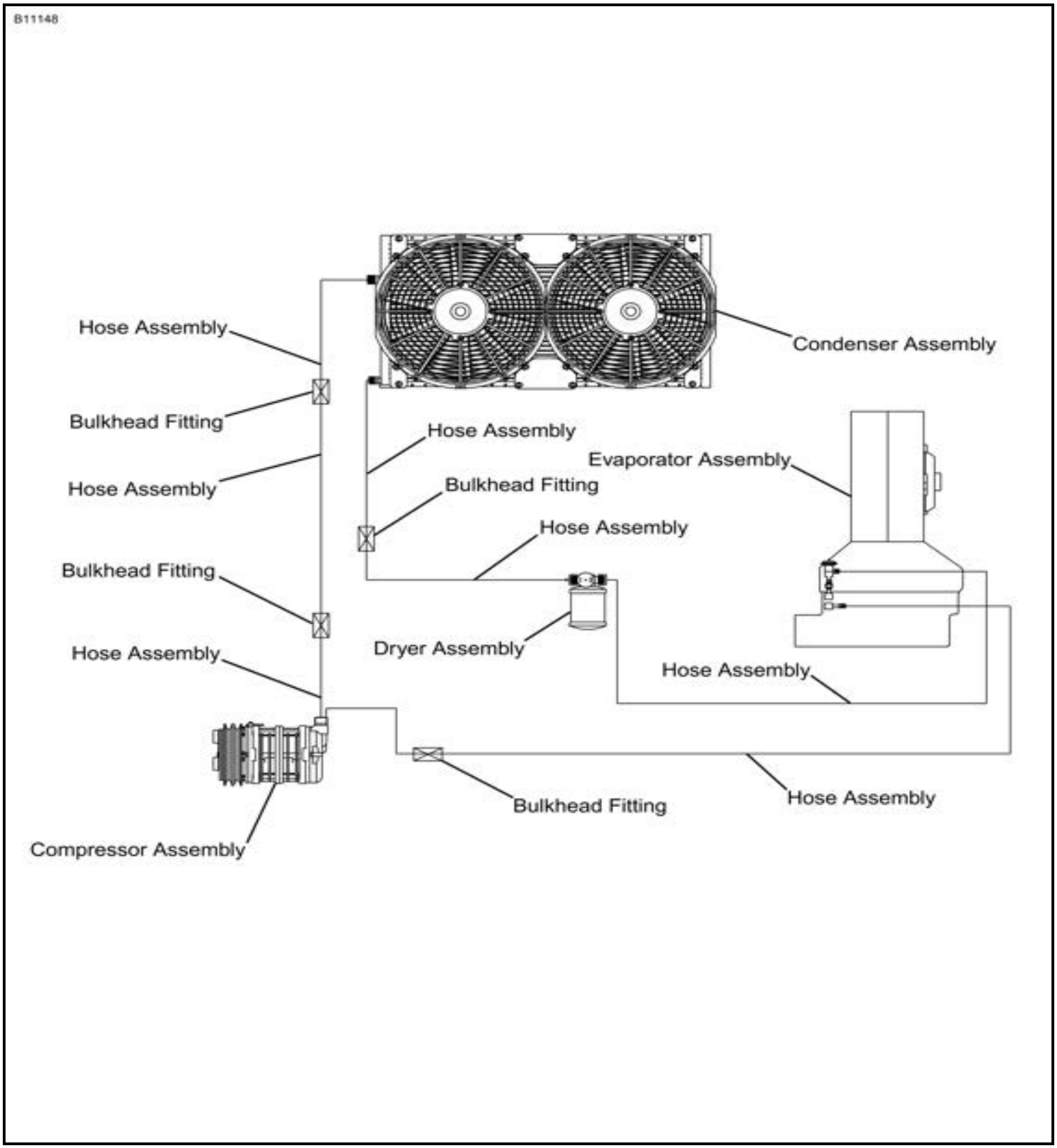
Condition	Possible Cause	Correction
Low side and high side pressure low	1. System refrigerant is low	1. Discharge, evacuate, leak test charge system.

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Low side pressure high and high side pressure low	1. Internal leak in compressor2. Drive belt slipping	1. Replace compressor.2. Tension or replace belt.
Low side and high side pressure high	1. Condenser fins obstructed2. Air in refrigeration system3. Condenser fans inoperative. Refrigerant system overcharged	1. Clean condenser fins. 2. Evacuate, leak test and charge system.3. Troubleshoot condenser fans. 4. Recover refrigerant and recharge.
Low side pressure low and high side pressure high	1. Restriction in refrigerant hose2. Restriction in receiver-dryer3. Restriction in condenser4. Expansion valve is defective	1. Check hoses for kinks and replace if necessary.2. Replace receiver/dryer.3. Replace condenser.4. Replace expansion valve.
Low side and high side pressures normal (inadequate cooling)	1. Check for correct cooling at evaporator assembly outlet	1. If temperature is correct, check for obstruction or leak in cabin ducting.
Compressor noise	1. Internal compressor damage2. Refrigerant system overcharged3. Loose compressor mounting4. Loose or worn compressor drive belt	1. Replace compressor.2. Recover refrigerant and recharge.3. Tighten compressor mounting bolts to correct torque values.4. Tension or replace belt.
Excessive vibration	1. Incorrect belt tension2. Compressor loose3. Refrigerant system overcharged4. Drive or idler pulley worn	1. Tension or replace belt.2. Tighten compressor mounting bolts to correct torque values.3. Recover refrigerant and recharge.4. Replace defective pulley.
Condensation leaking inside aircraft	1. Evaporator drain plugged or kinked	1. Clean drain hose and check for proper installation.
Frozen evaporator coil	1. Faulty evap. temp sensor2. Obstructed evaporator coil	1. Replace evap. temp sensor. 2. Remove obstruction.

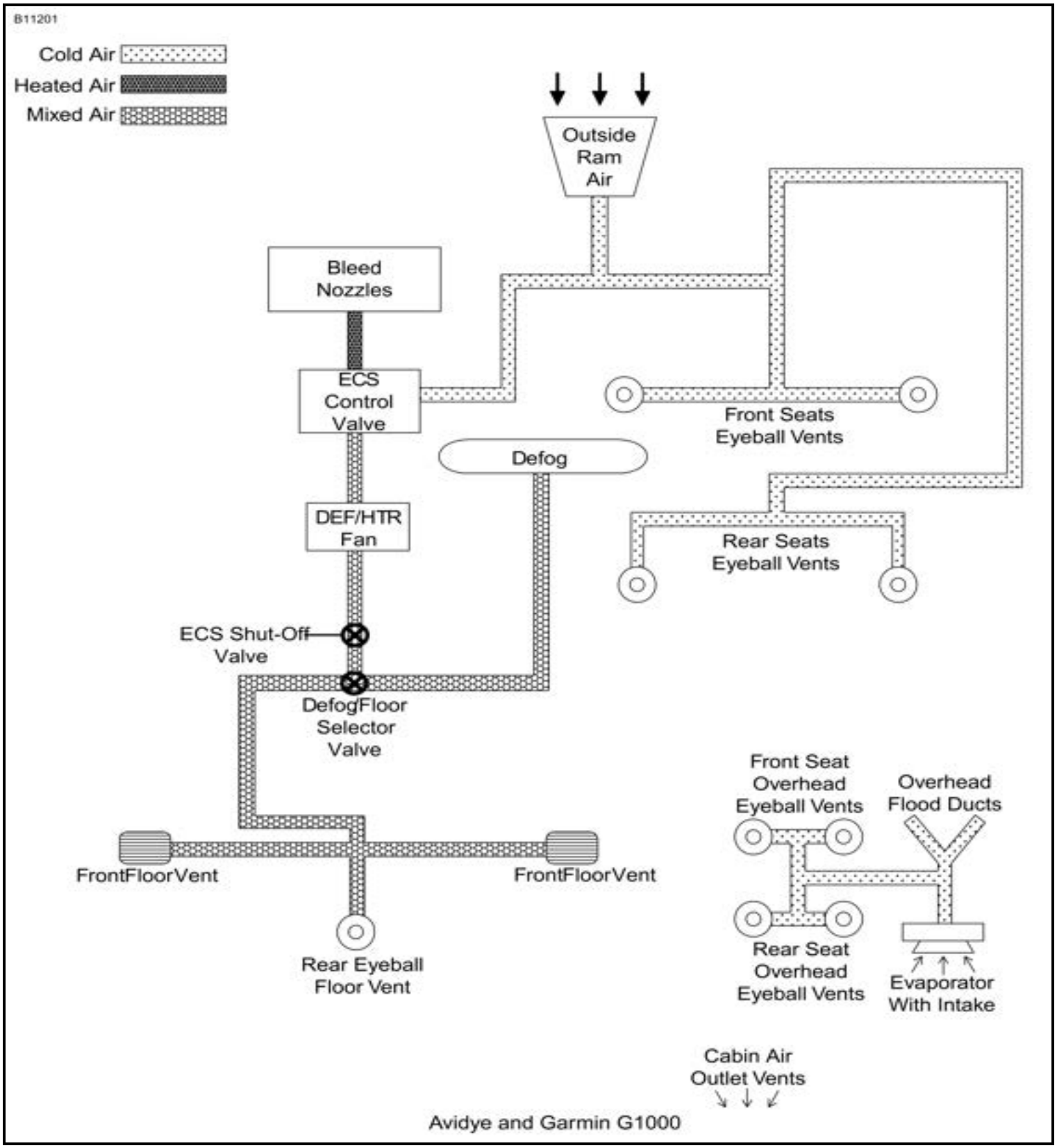
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Figure 201 : Sheet 1 : Vapor Cycle System (VCS) Air Conditioning



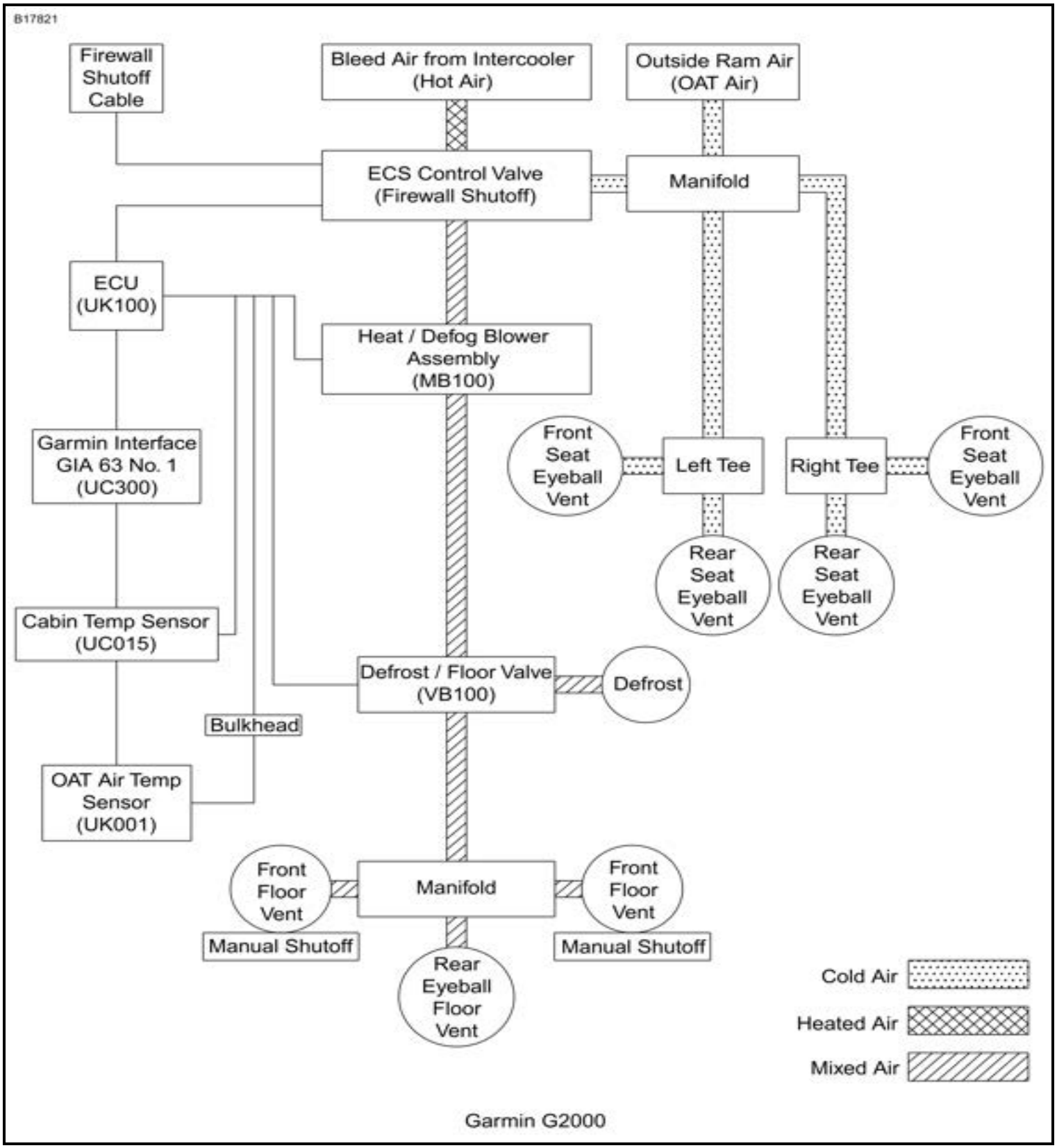
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Figure 202 : Sheet 1 : Airflow Diagram



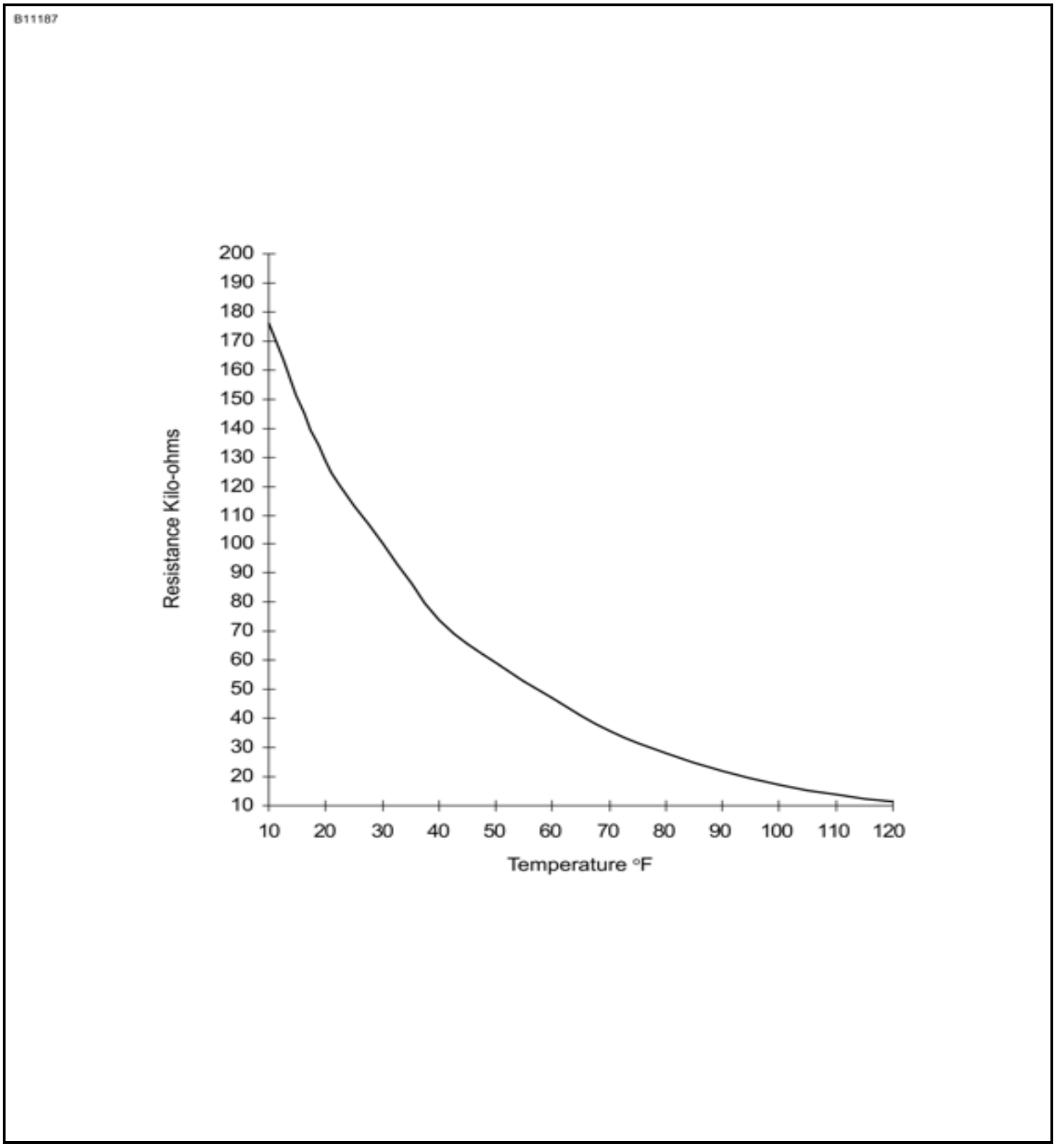
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Figure 202 : Sheet 2 : Airflow Diagram



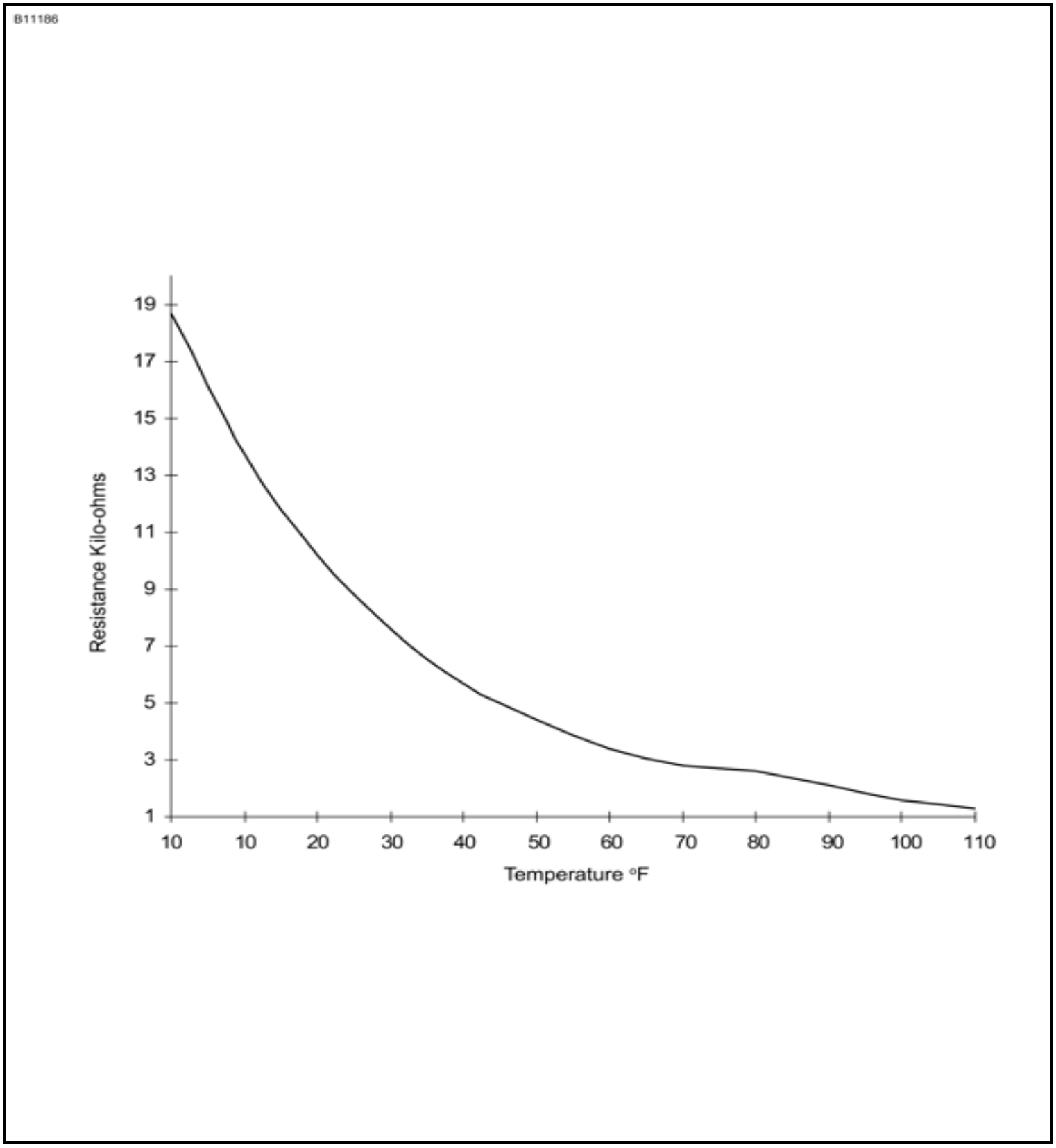
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Figure 203 : Sheet 1 : Cabin Temperature Sensor Resistance vs. Temperature Curve



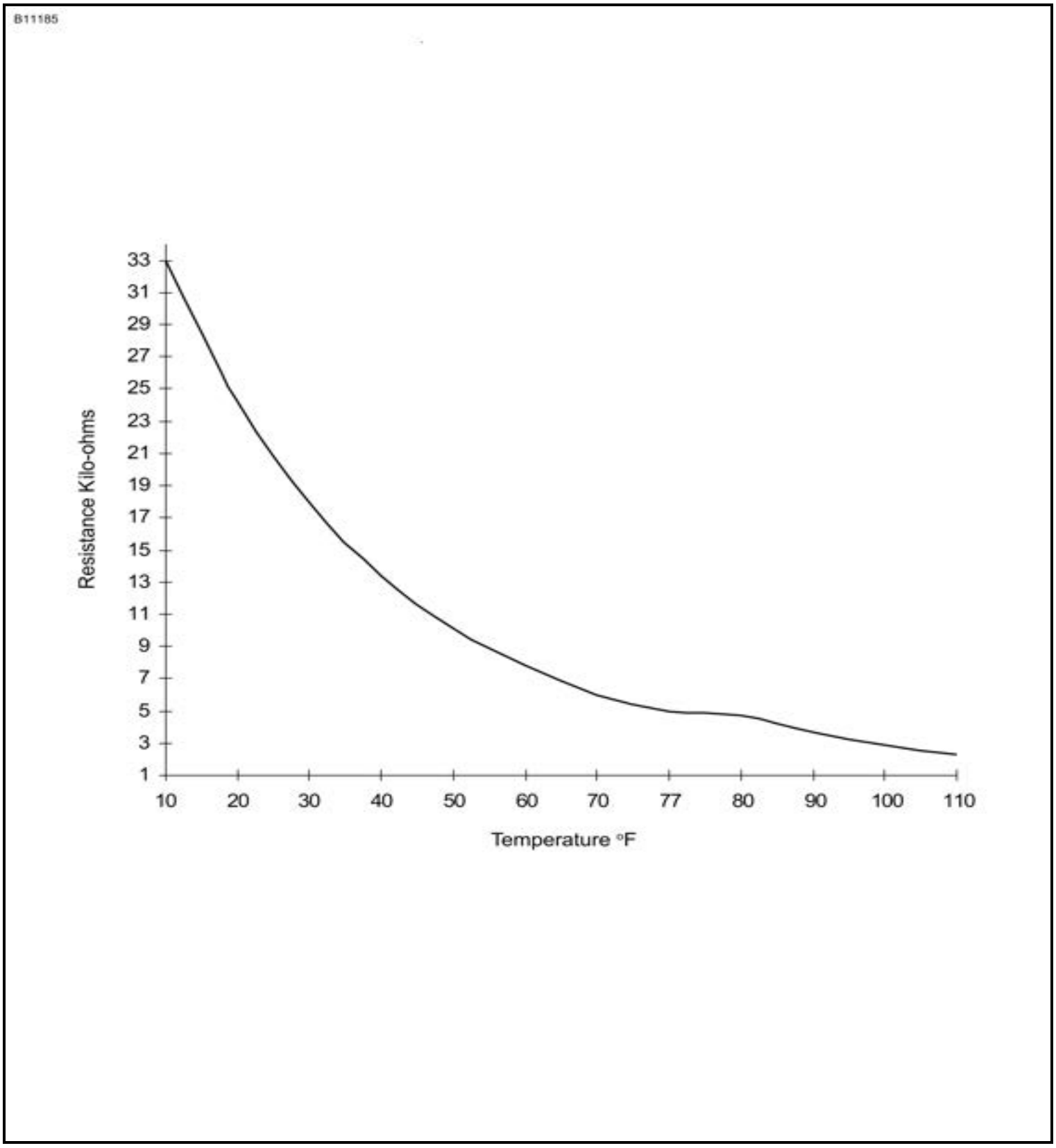
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Figure 204 : Sheet 1 : OAT Sensor Resistance vs. Temperature Curve



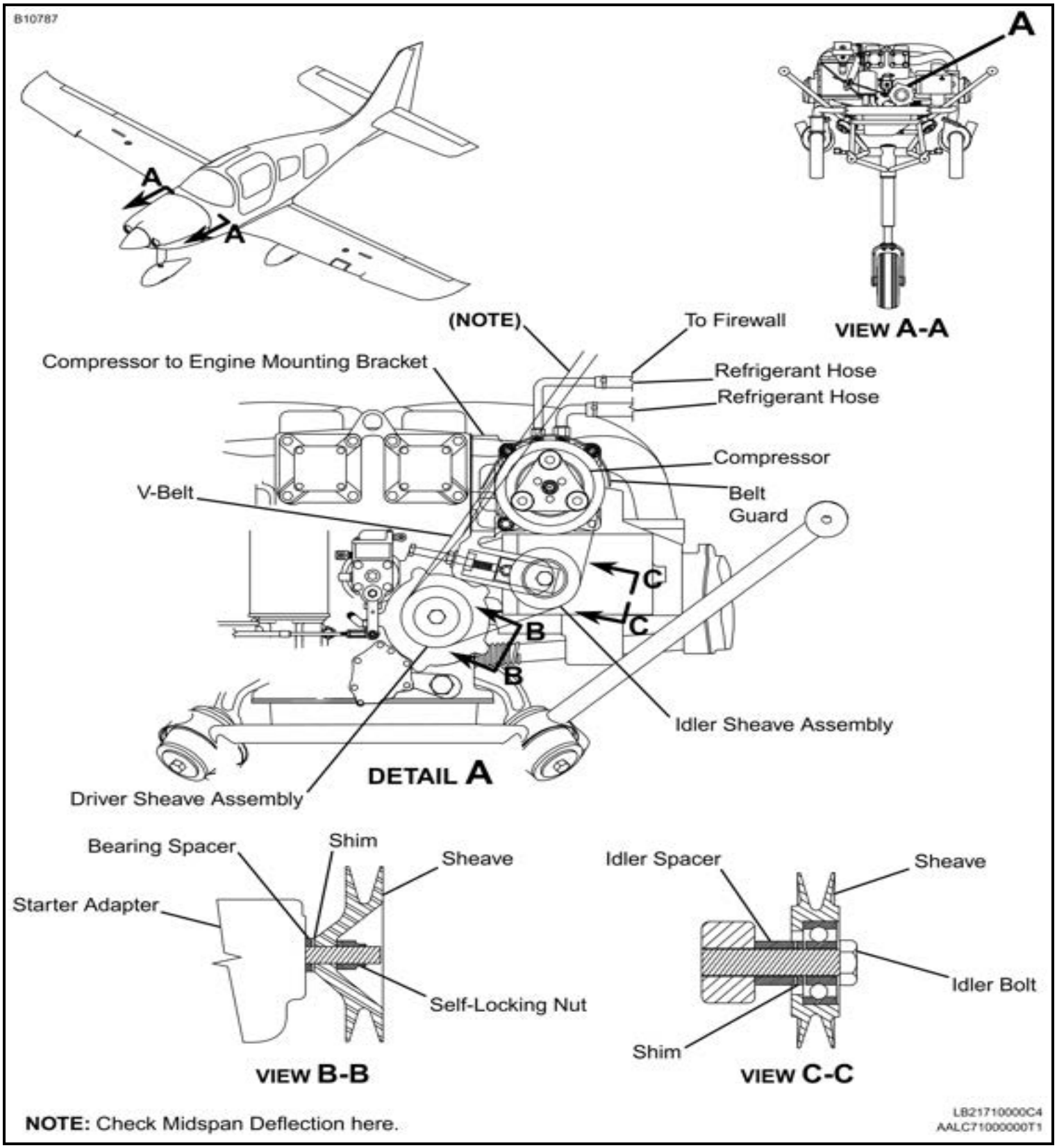
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Figure 205 : Sheet 1 : Evaporator Coil Temperature Sensor Resistance vs. Temperature Curve



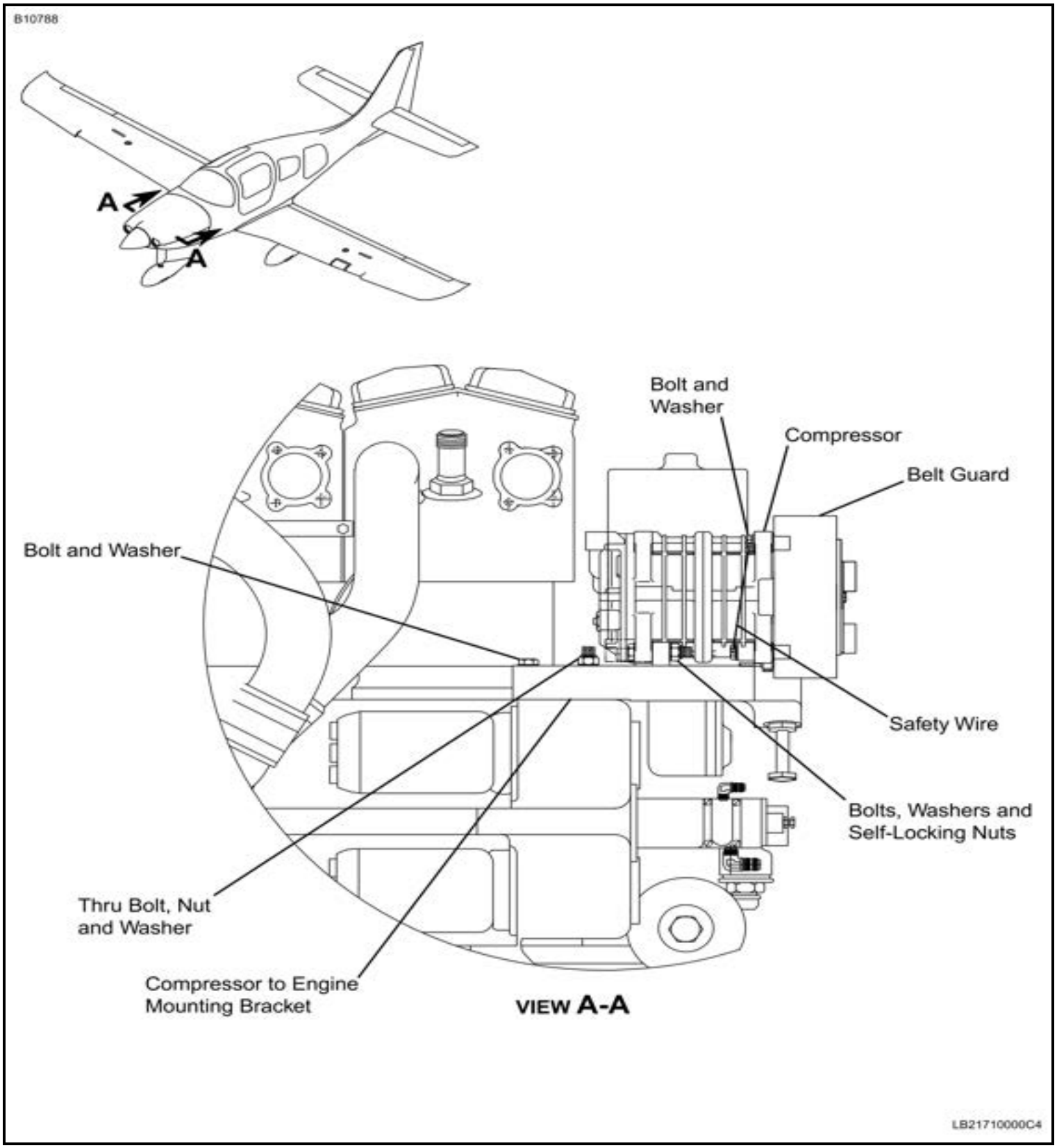
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Figure 206 : Sheet 1 : Engine Driven Compressor



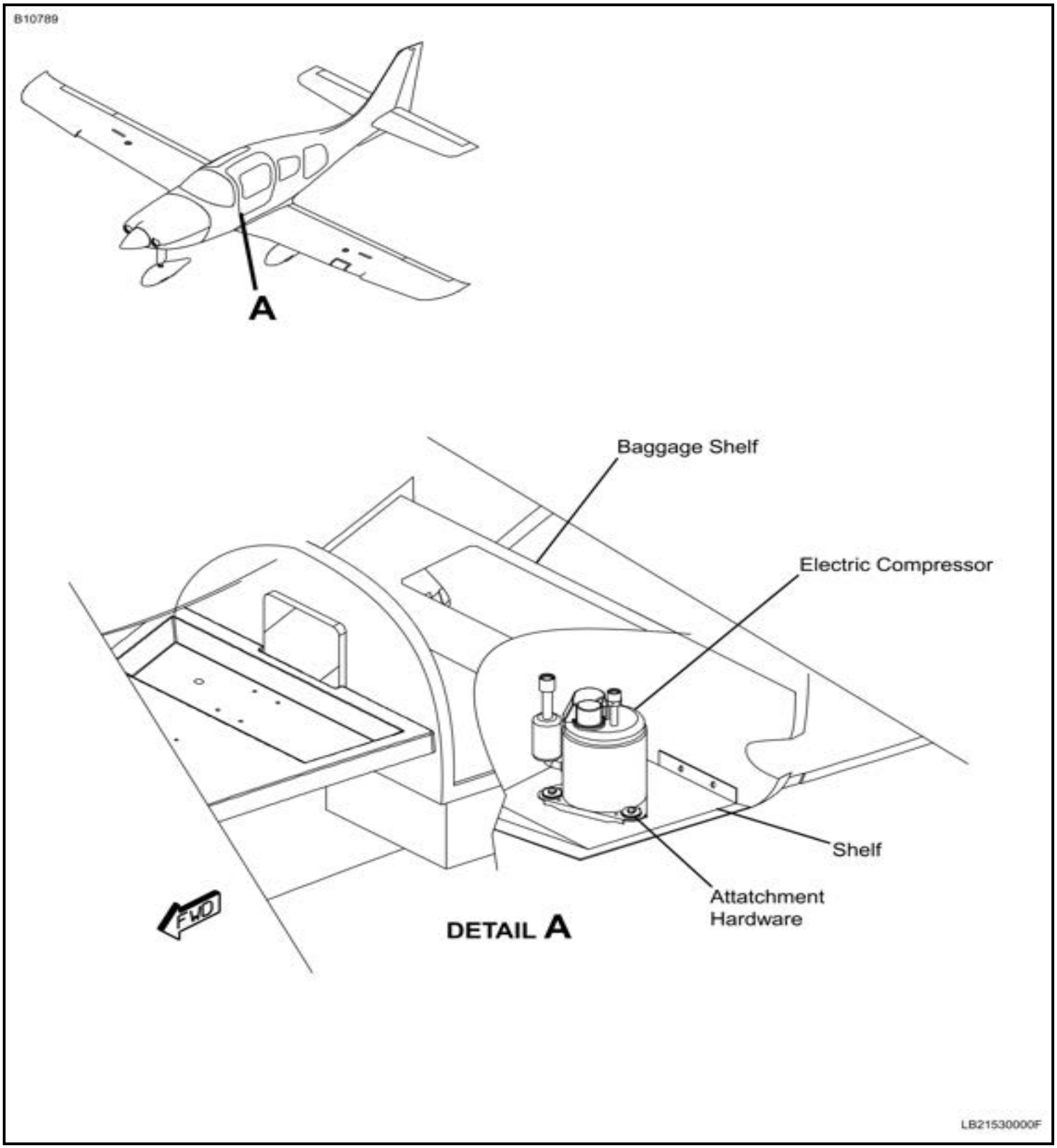
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Figure 206 : Sheet 2 : Engine Driven Compressor



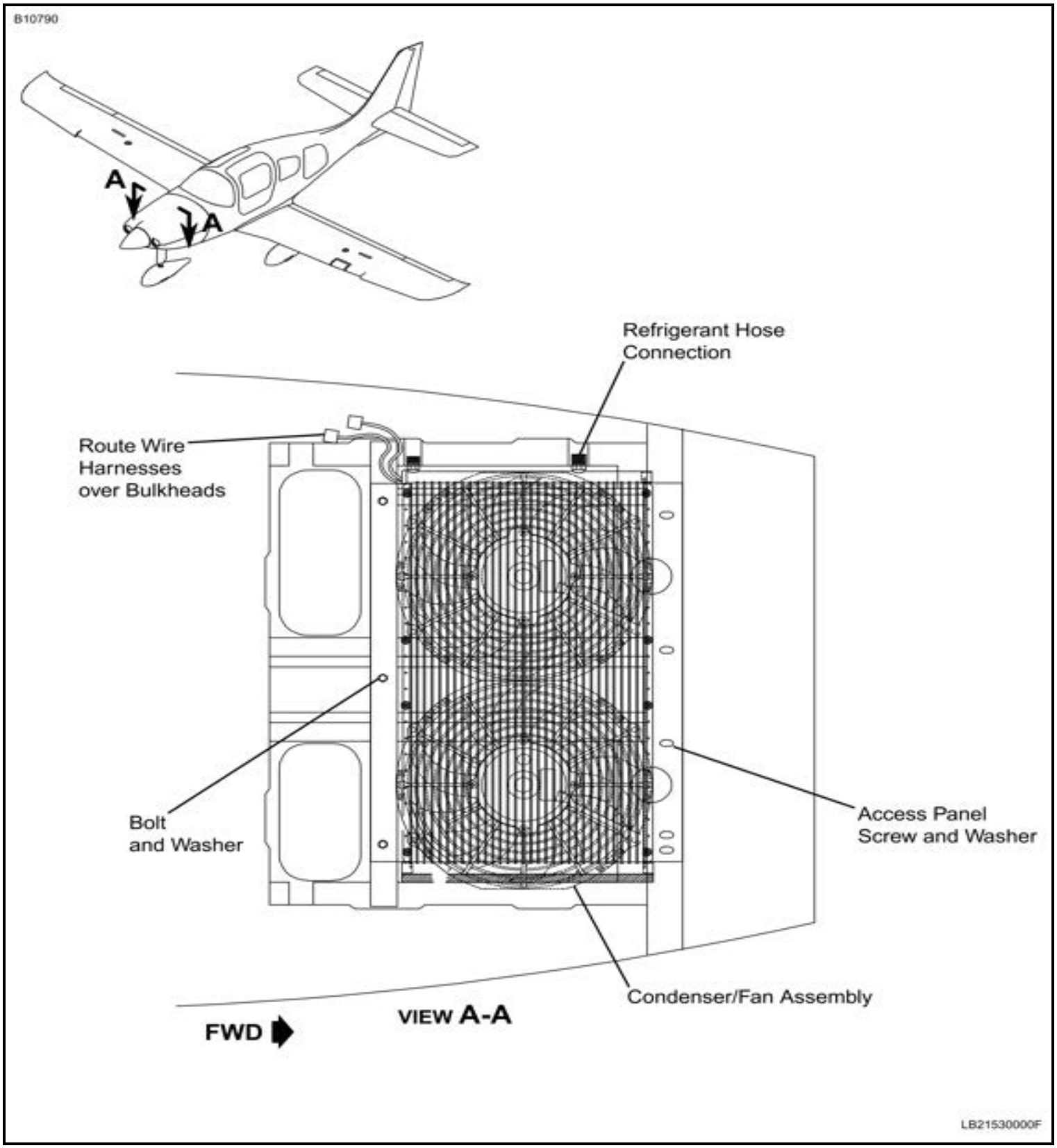
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Figure 207 : Sheet 1 : Electrical Compressor



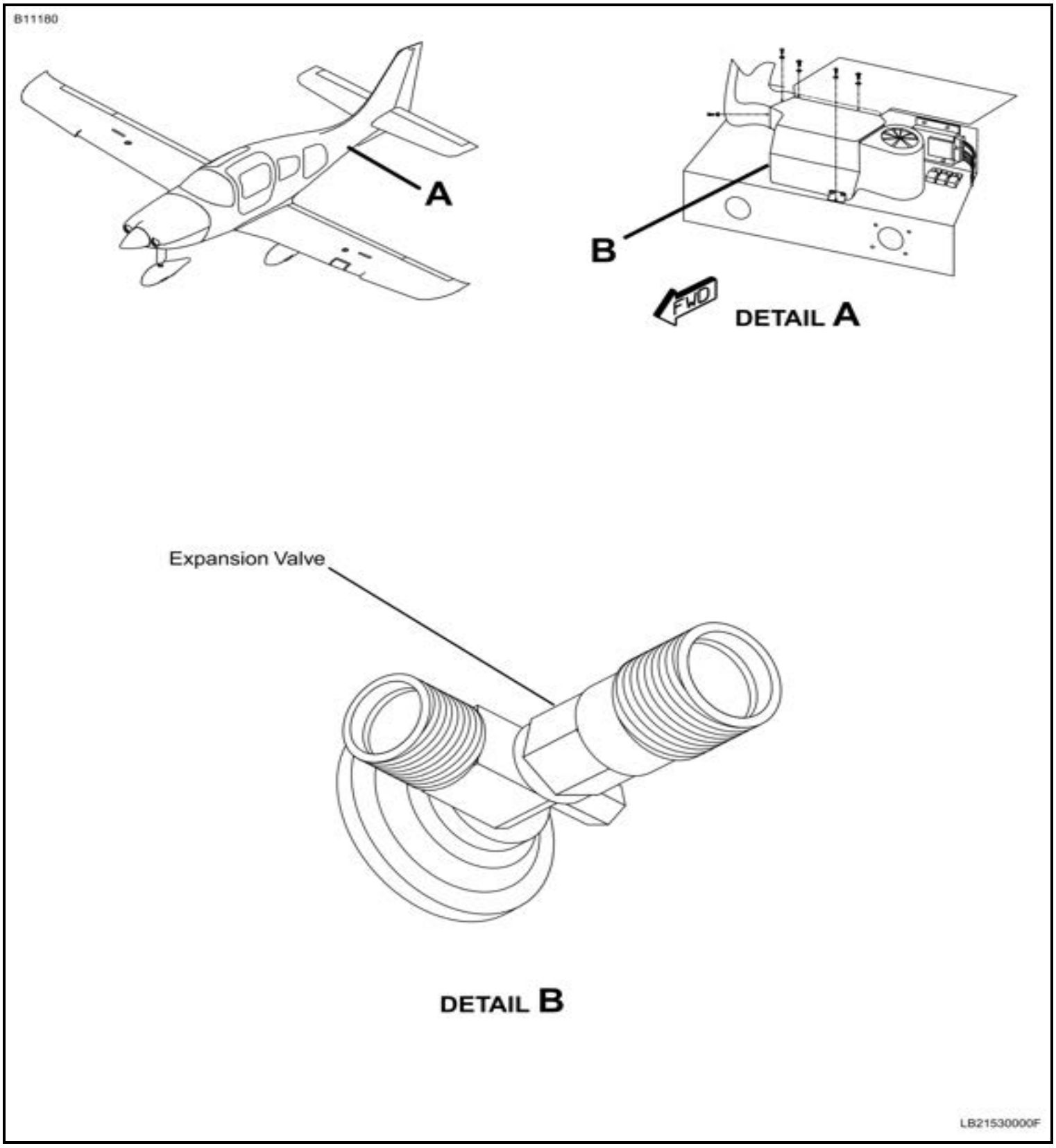
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Figure 208 : Sheet 1 : Condenser/Fan Assembly



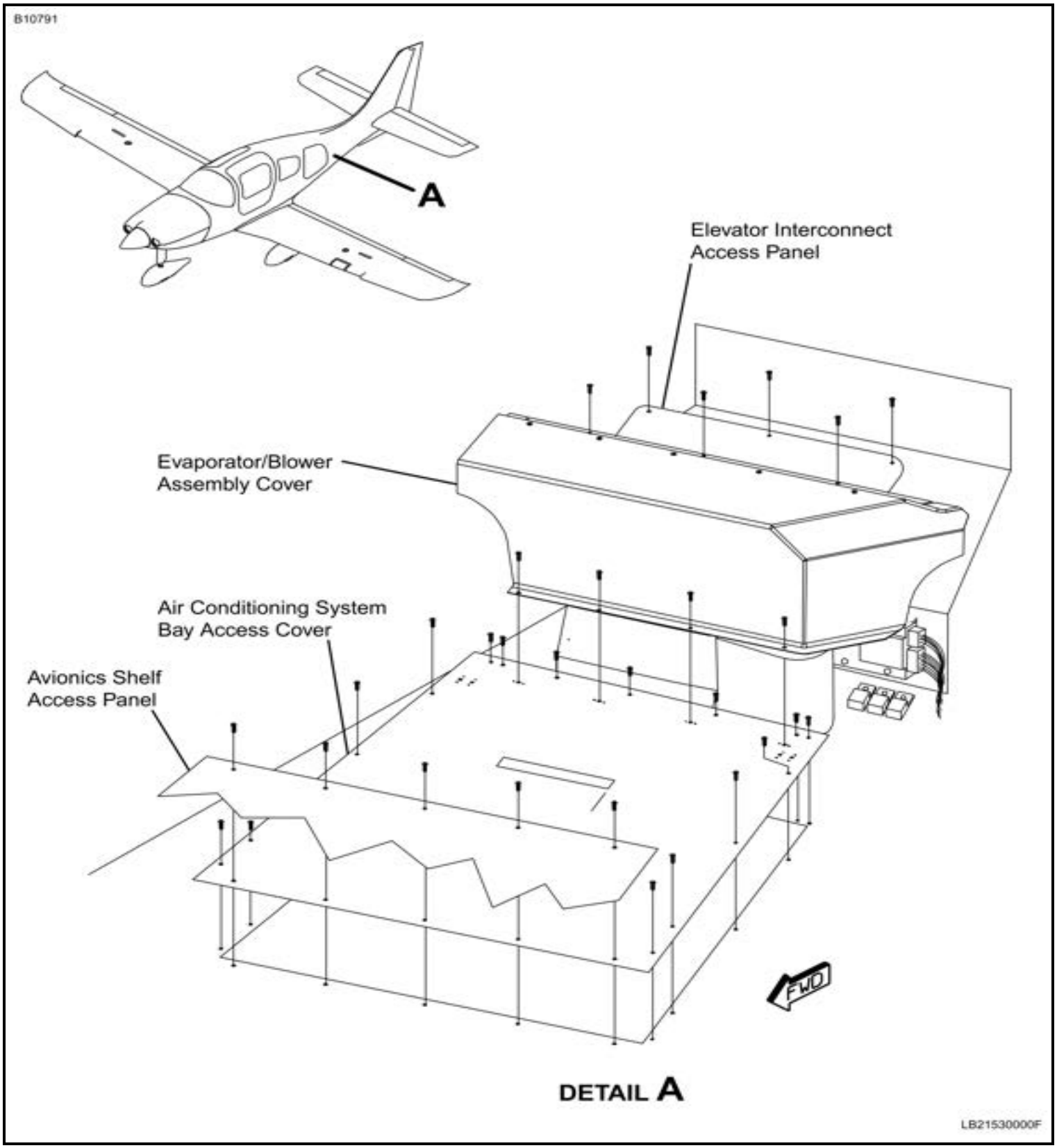
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Figure 209 : Sheet 1 : Expansion Valve



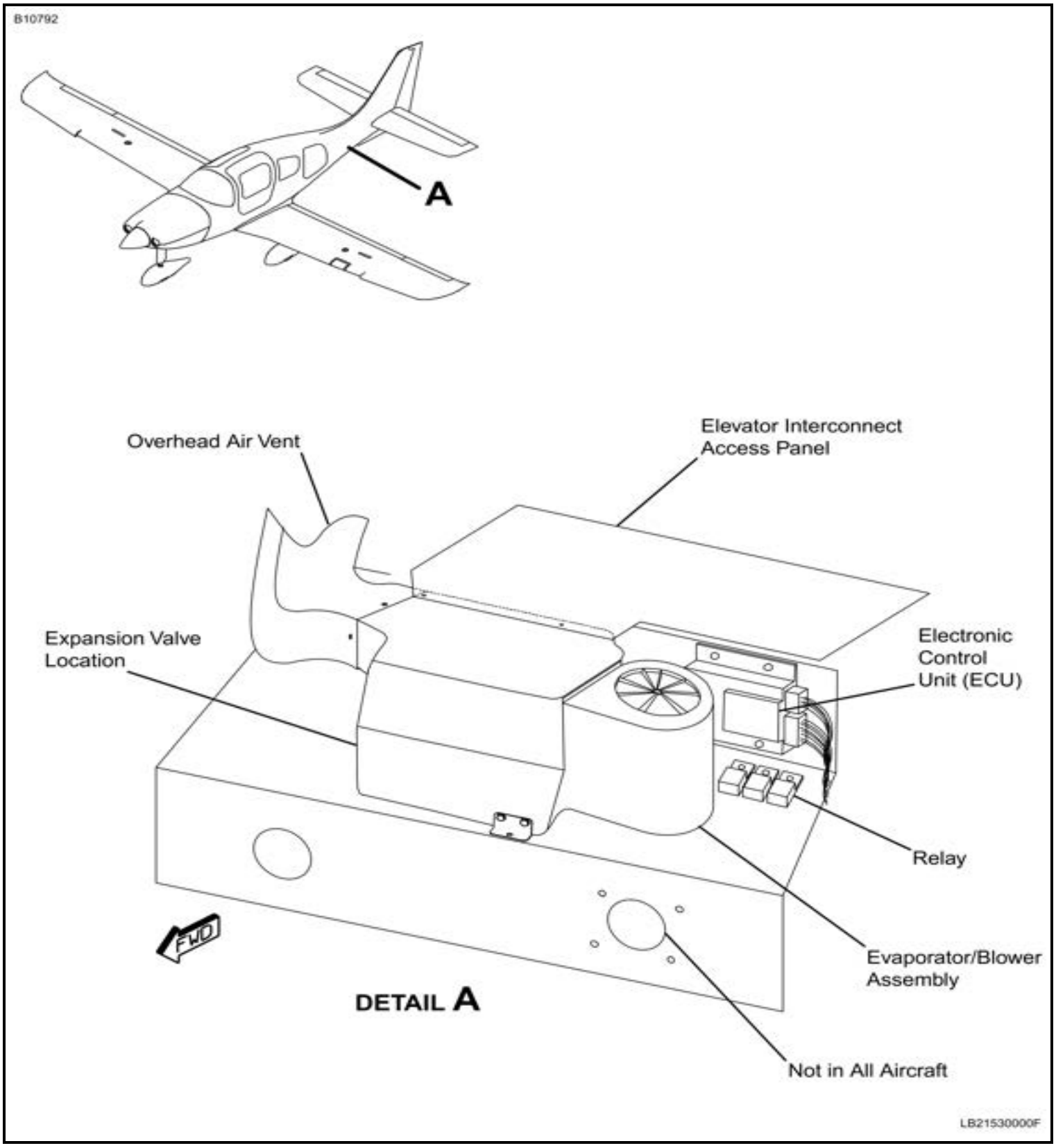
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Figure 210 : Sheet 1 : Access Panels and Covers and Evaporator/Blower Assembly Installation



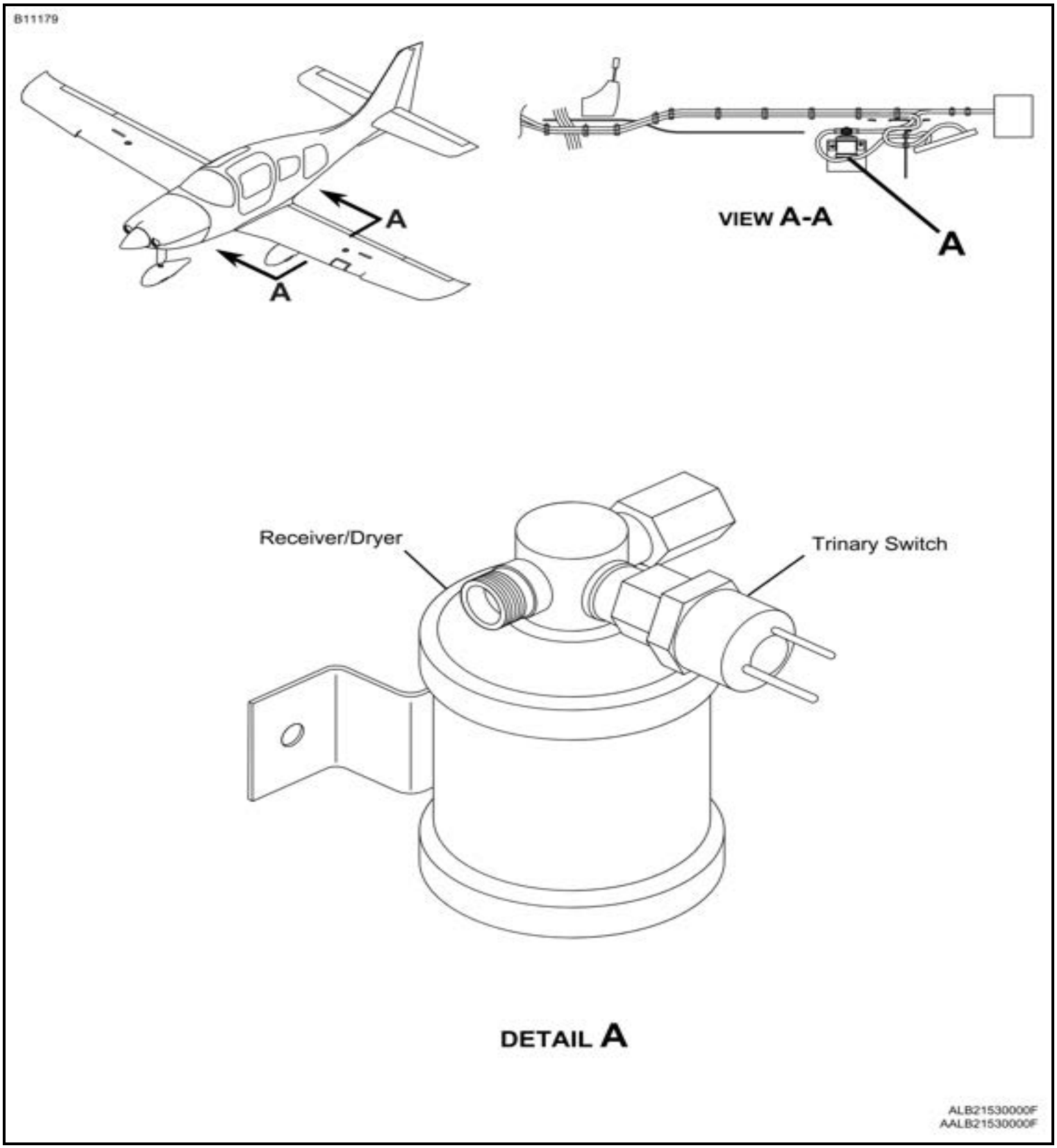
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Figure 210 : Sheet 2 : Access Panels and Covers and Evaporator/Blower Assembly Installation



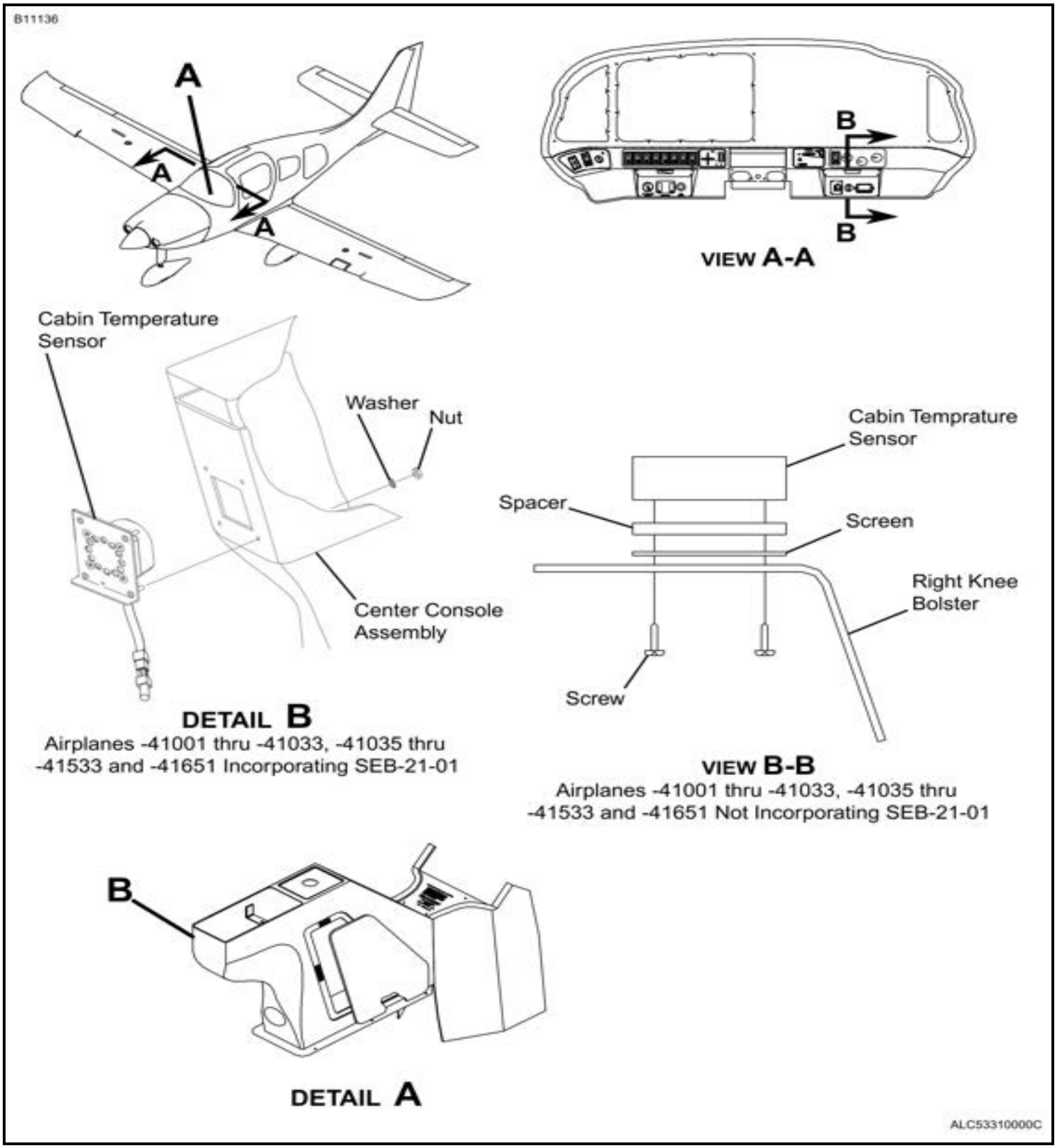
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Figure 211 : Sheet 1 : Receiver/Dryer with Trinary Switch



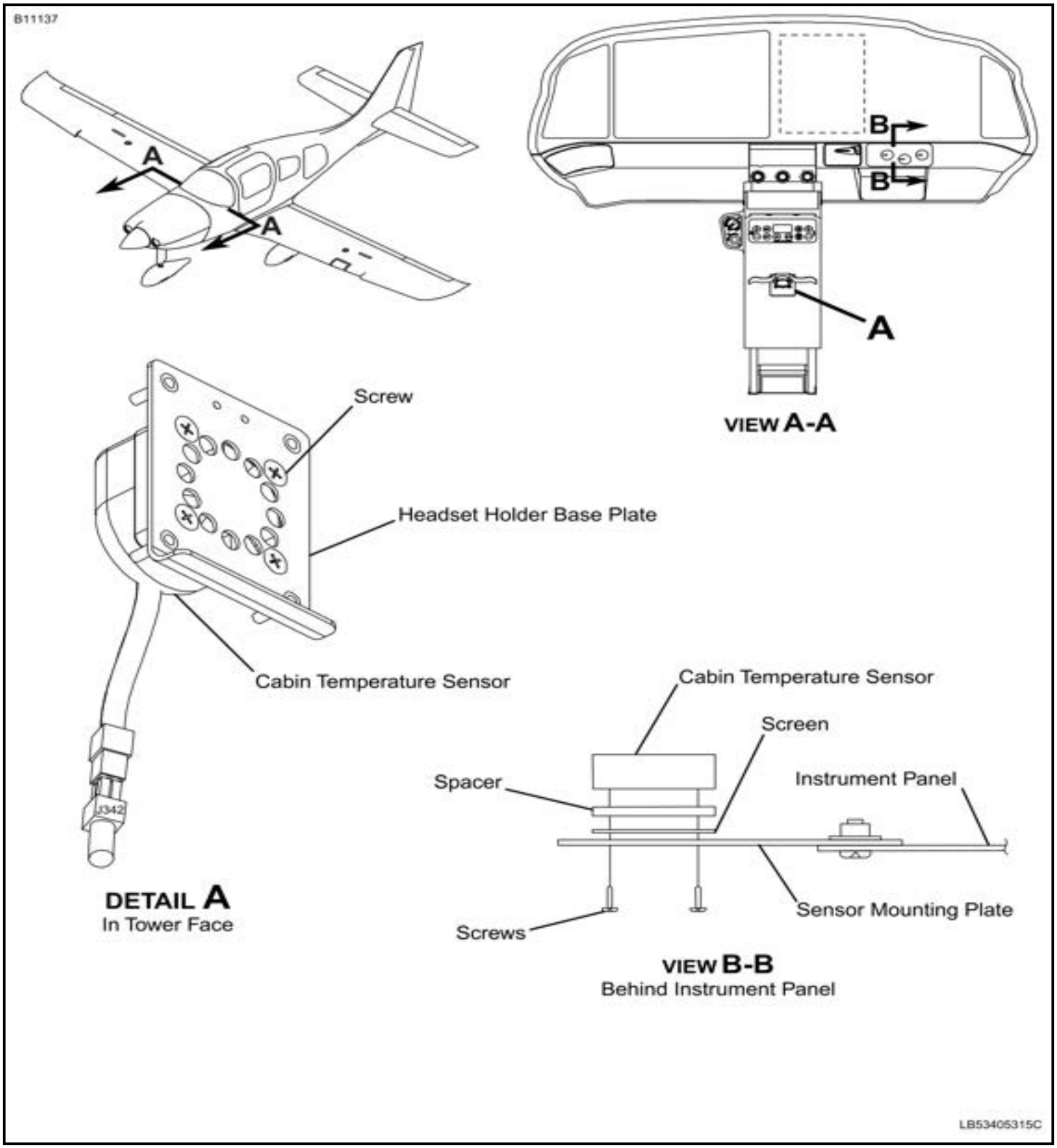
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Figure 212 : Sheet 1 : Cabin Temperature Sensor (Avidyne Option)



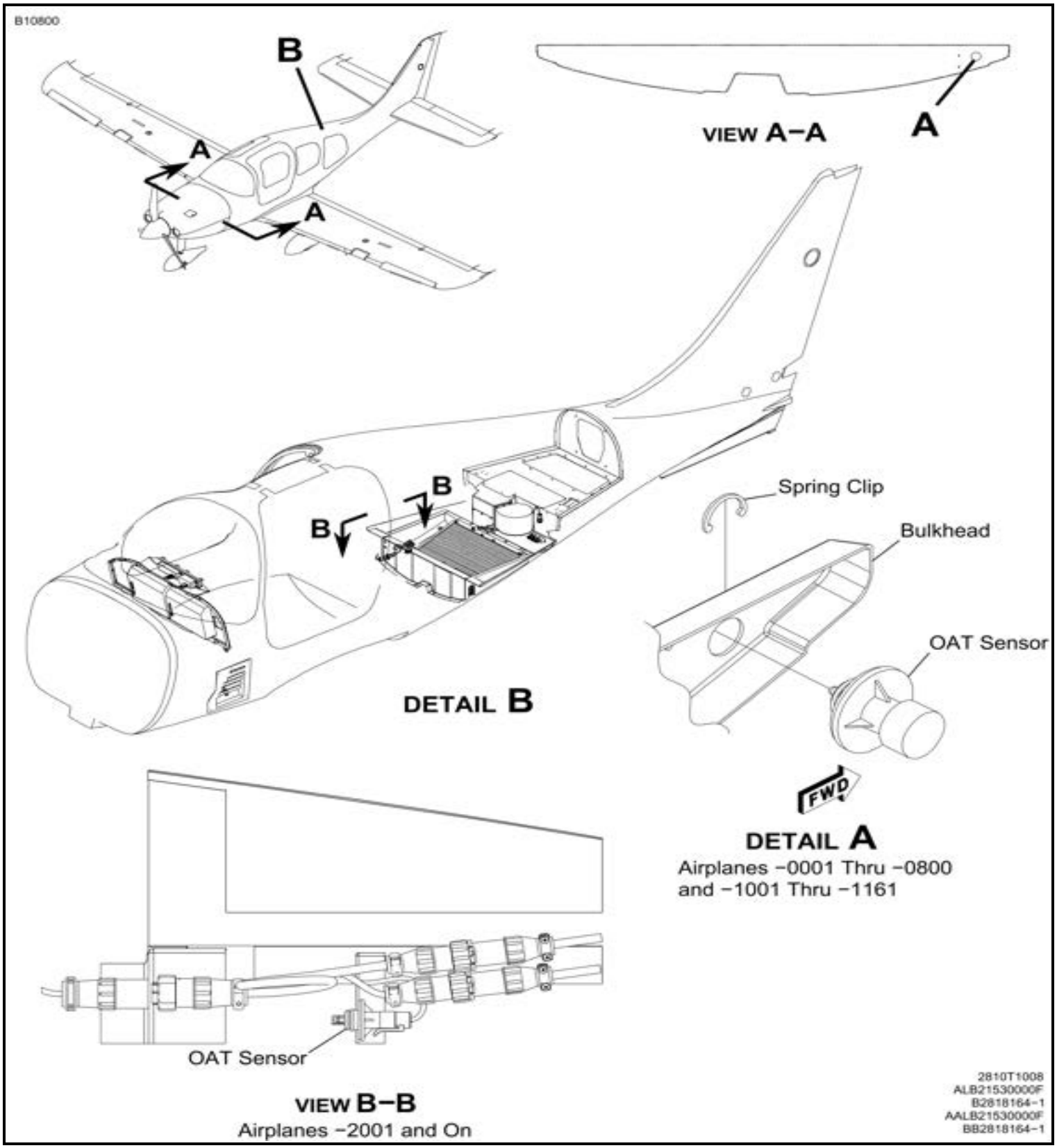
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Figure 213 : Sheet 1 : Cabin Temperature Sensor (Garmin G1000 Option)



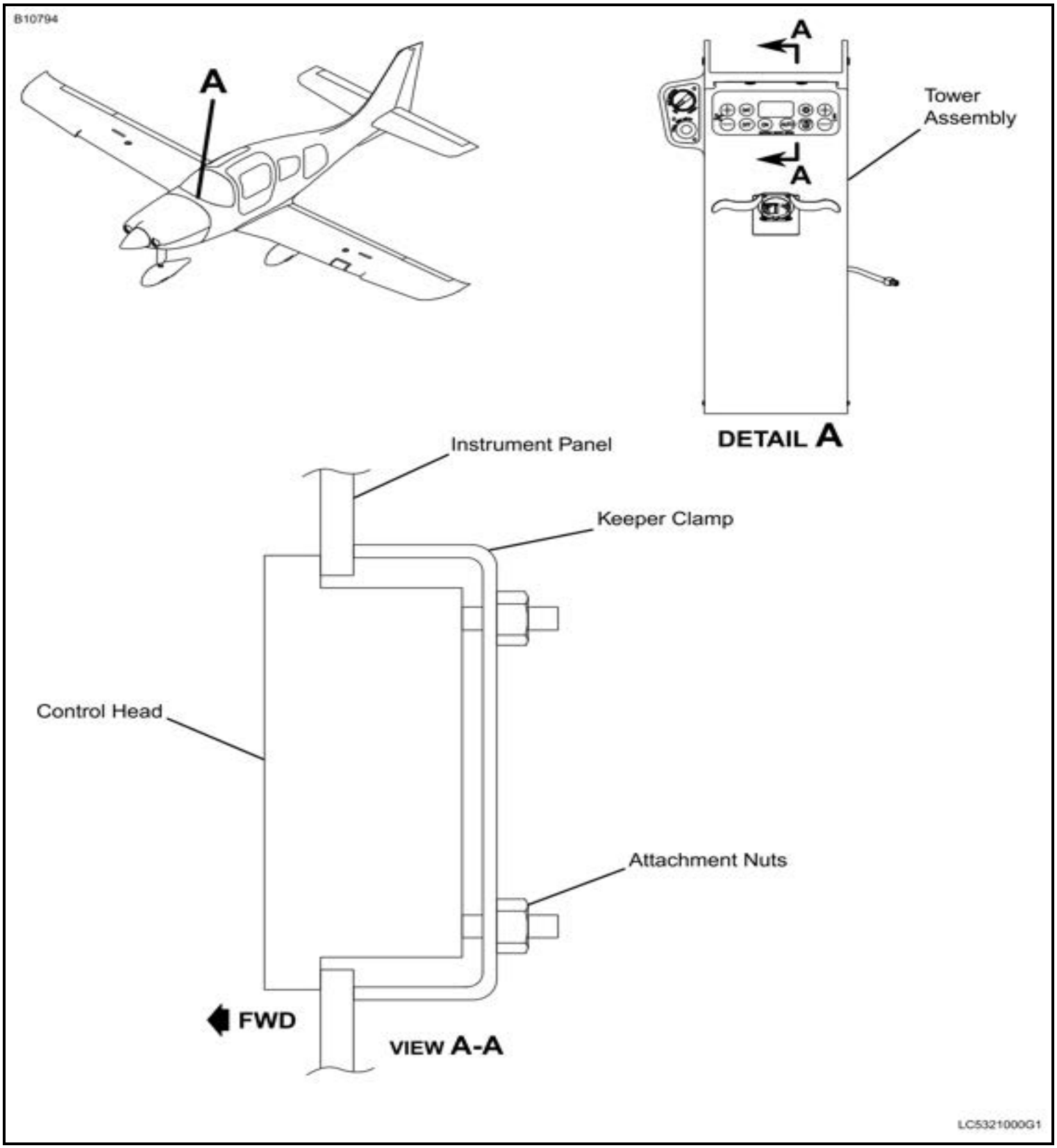
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Figure 214 : Sheet 1 : OAT Sensor



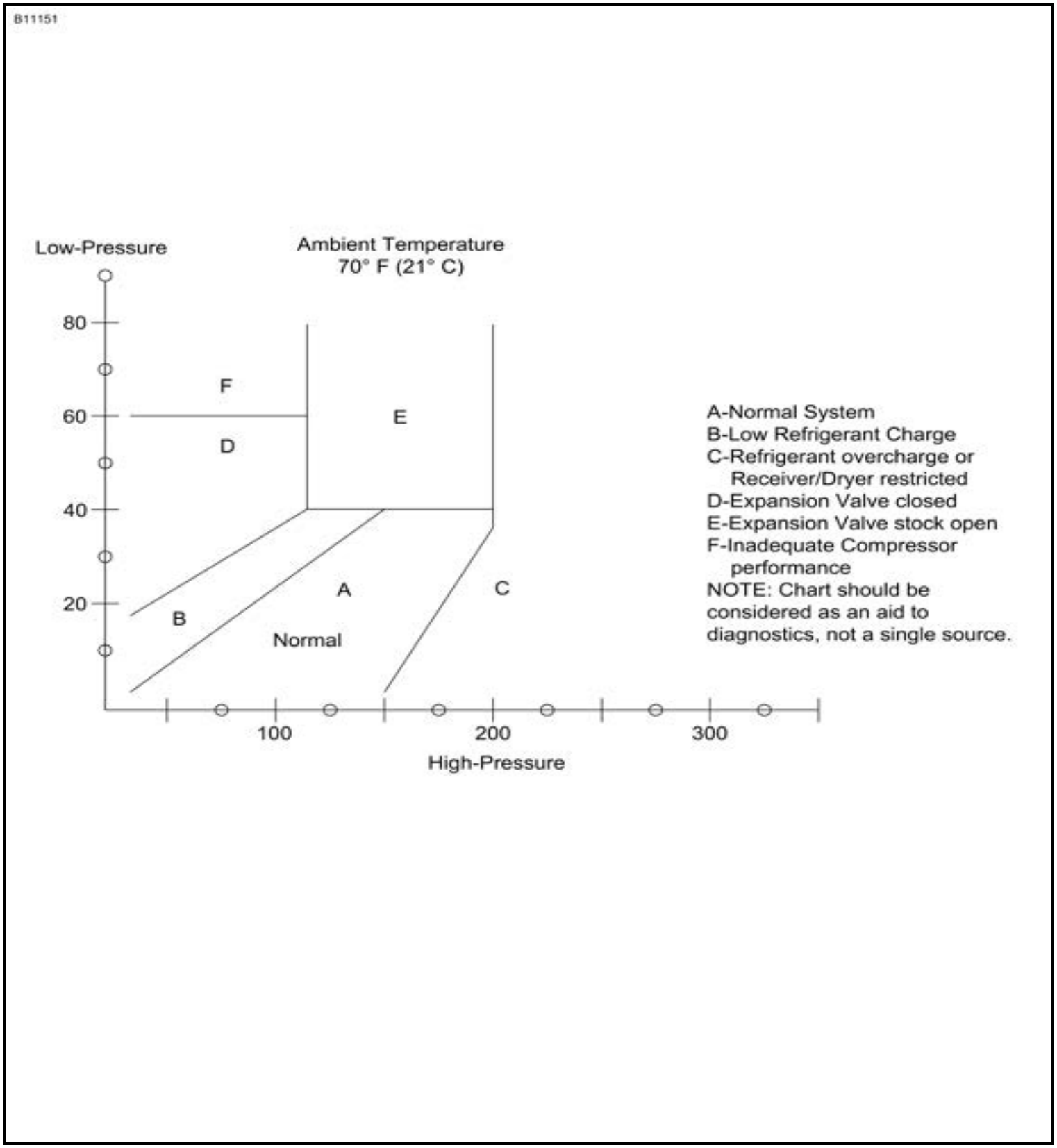
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Figure 215 : Sheet 1 : Control Head Attachment



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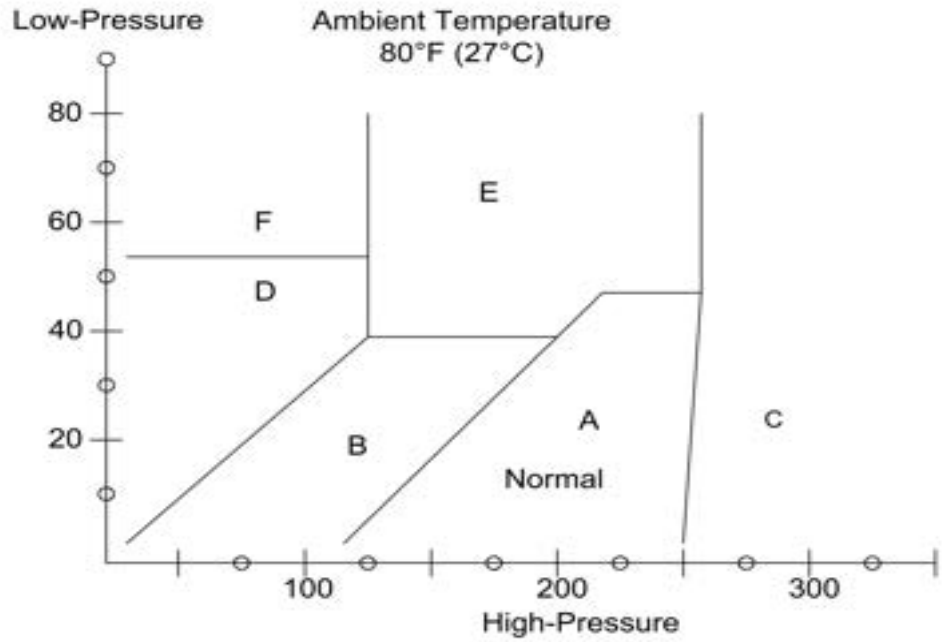
Figure 216 : Sheet 1 : Pressure and Performance



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Figure 216 : Sheet 2 : Pressure and Performance

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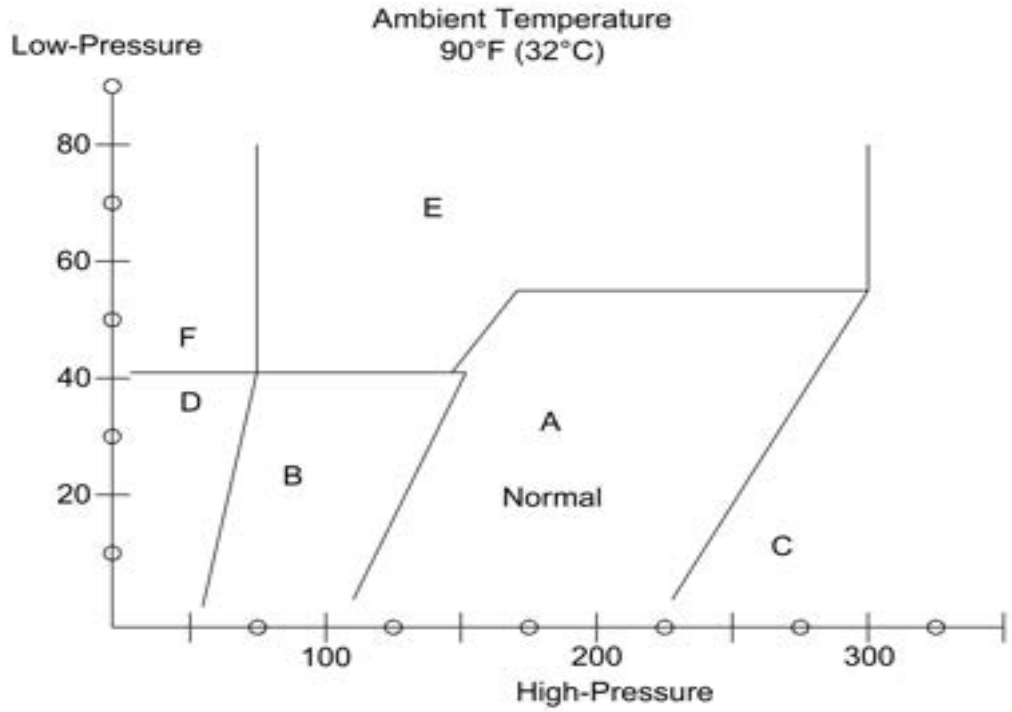
A-Normal System
B-Low Refrigerant Charge
C-Refrigerant overcharge or Receiver/Dryer restricted
D-Expansion Valve closed
E-Expansion Valve stuck open
F-Inadequate Compressor performance

NOTE: Chart should be considered as an aid to diagnostics, not a single source.

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Figure 216 : Sheet 3 : Pressure and Performance

B11153

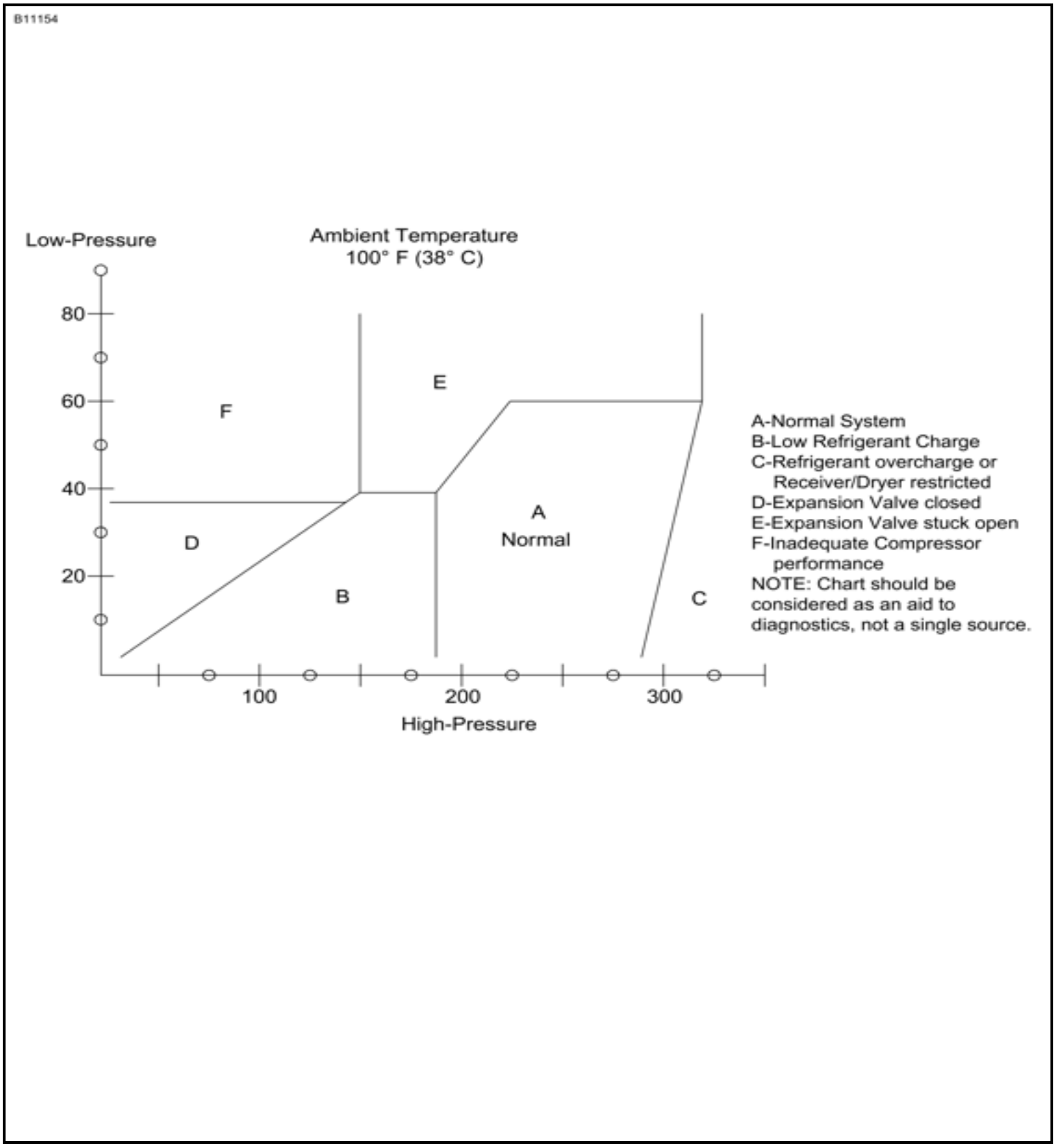


A-Normal System
B-Low Refrigerant Charge
C-Refrigerant overcharge or Receiver/Dryer restricted
D-Expansion Valve closed
E-Expansion Valve stuck open
F-Inadequate Compressor performance

NOTE: Chart should be considered as an aid to diagnostics, not a single source.

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Figure 216 : Sheet 4 : Pressure and Performance



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TEMPERATURE AND AIR CONTROL (T240) - DESCRIPTION AND OPERATION

1. Description

A. The Cessna Model T240 Environmental Control System (ECS) and the optional air conditioning system (also known as the Automatic Climate Control System (ACCS) are controlled with the Garmin G2000 GTC 570 Touchscreen Controller (UI405). The GTC 570 is found in the center console. The GTC 570 uses infrared sensor activated touchkeys to control the system. Alternate action (on/off) touchkeys have a vertical light bar that comes on when the key is selected on. The GTC 570 gives an ECS diagnostic function to help with necessary maintenance actions. For a general description applicable to the GTC 570 refer to Chapter 34, Garmin G2000 - Description and Operation. For maintenance data applicable to the ACCS, refer to Automatic Climate Control System (ACCS). For a description of the ECS refer to Environmental Control System - General.

2. Operation

A. The ECS control page is used to control the interior cockpit temperature and airflow. The airplane can have two possible ECS configurations, one with the optional air conditioning system and one without air conditioning. The ECS control page is accessed by selecting the Systems touchkey on the Home page of the GTC 570 controller. The configuration page for airplanes that do not have the air conditioning system installed does not show the A/C touchkey. Refer to Figure 1.

B. When the AUTO mode is not selected the ECS continues temperature regulation (except for the fan control). When the air conditioning option is not installed, the ECS only circulates outside ram air for the cooling function in the auto or manual mode. When AUTO mode is cancelled, the fan control mode is then manual (MAN) and the fan speed is the previously set manual speed value. When AUTO mode is on, the MAN fan control is selected by touching the - or + keys the initial fan speed is one increment higher or lower (depending on key used) than the previously manual speed value. When AUTO mode is on, the MAN fan control is selected by touching the Fan Speed Bar Graph, the initial fan speed equals the value touched on the Bar Graph. For the GTC 570 controller touchkey controls and functions refer to Table 1, Table 2 and Table 3.

Table 1. Alternate Action Touchkeys (On/Off)

Touchkey Label	Function
ECS	Sets the ECS on or off. When set to on, starts the previously used mode and selected temperature. Except for the ECS touchkey, when the ECS is selected off, all the page imagery shows grayed-out.
MODE	Selects between Auto and Fan modes. All functions are controlled automatically. When Auto is selected all previously selected manual settings are cancelled.
DEFOG	Sets the DEFOG mode on or off. Directs the majority of airflow (at maximum fan speed) to the windscreen defog outlets. The Set temperature is regulated but the AC compressor (optional) operation is prevented.
AC MODE	Sets the AC Compressor mode on and off. When on, the AC compressor system is available to operate if commanded by the ECU (it does not indicate the AC compressor is on). If the air conditioning system option is not installed on the airplane, the A/C mode touchkey does not show on the GTC 570 controller.

Table 2. Momentary Action Touchkeys

Touchkey Label	Function
-1°	Decreases the SET temperature in 1° increments for each key selection.
+1°	Increases the SET temperature in 1° increments for each key selection.
-	Decreases fan speed in single increments for each key selection. The selections are: LO, 10, 20, 30, 40, 50, 60, 70, 80, 90, and HI. If previously on, selection of this touchkey overrides AUTO mode. The numerical values show asa percentage.
+	Increases fan speed in single increments for each key selection. The selections are: LO, 10, 20, 30, 40, 50, 60, 70, 80, 90, and HI. If previously on, selection of this touchkey overrides AUTO mode. The numerical values show as a percentage.

Table 3. Digital and Graphical Displays

Touchkey Label	Function
Actual	Shows actual cabin temperature on the GTC 570 controller display. (°F or °C as selected)

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Selected	Shows the desired cabin temperature (°F or °C as selected). The temperature can be selected from 55°F to - 55°F (13°C to - 35°C). Use the TEMP Bar Graph and/or the -1° or +1° touchkeys.
Temperature	Temperature Bar Graph. Lets you use touch selection to set the desired temperature. The selected value shows on the display as an Actual value.
Fan	Fan Speed Bar Graph. Shows fan speed (manual only) and mode (Auto or Manual). Lets you use touch selection for the desired manual fan speed. If you us the Bar Graph or the - or + touchkeys to select fan speed, it commands the manual fan speed and if selected, prevents Auto mode operation. Refer to Table 2 for fan speed range values.

3. Diagnostic Function

A. When electrical power is initially supplied and the GTC 570 controller ECS configuration page is first accessed, the DIAG touchkey does not show on the page. To show the DIAG touchkey the lower left area of the page must be touched for a period of approximately five seconds. When the DIAG touchkey shows, you must push it again to access the diagnostic page. The page shows until the avionics power is reset. The ECS Diagnostic page shows the data that follows: ECS component readings, ESC module firmware version, and active ECS fault text messages. The Fault Text Message area lets you view many messages simultaneously. You can scroll through the page to get access to each message. Refer to Figure 1.

B. The Diagnostic page shows the ECU Module Firmware as: Firmware Version (with the installed firmware digital value).

C. For the ECS Components Readings refer to Table 4.

Table 4. ECS Component Readings

Component Reading	Function
Cabin Temp Sensor	Shows temperature value as °F or °C
Evap Coil Temp Sensor	Shows temperature value as °F or °C (Note)
ECS Mixing Valve Position	Shows valve position in a percentage of open
VCS Compressor Command	Shows ON or OFF (Note)
Blower speed	Shows the speed as a percentage of maximum

NOTE: On the ECS page, the A/C touchkey area is grayed-out or does no show on non-air conditioning configuration airplanes. Refer to Figure 1.

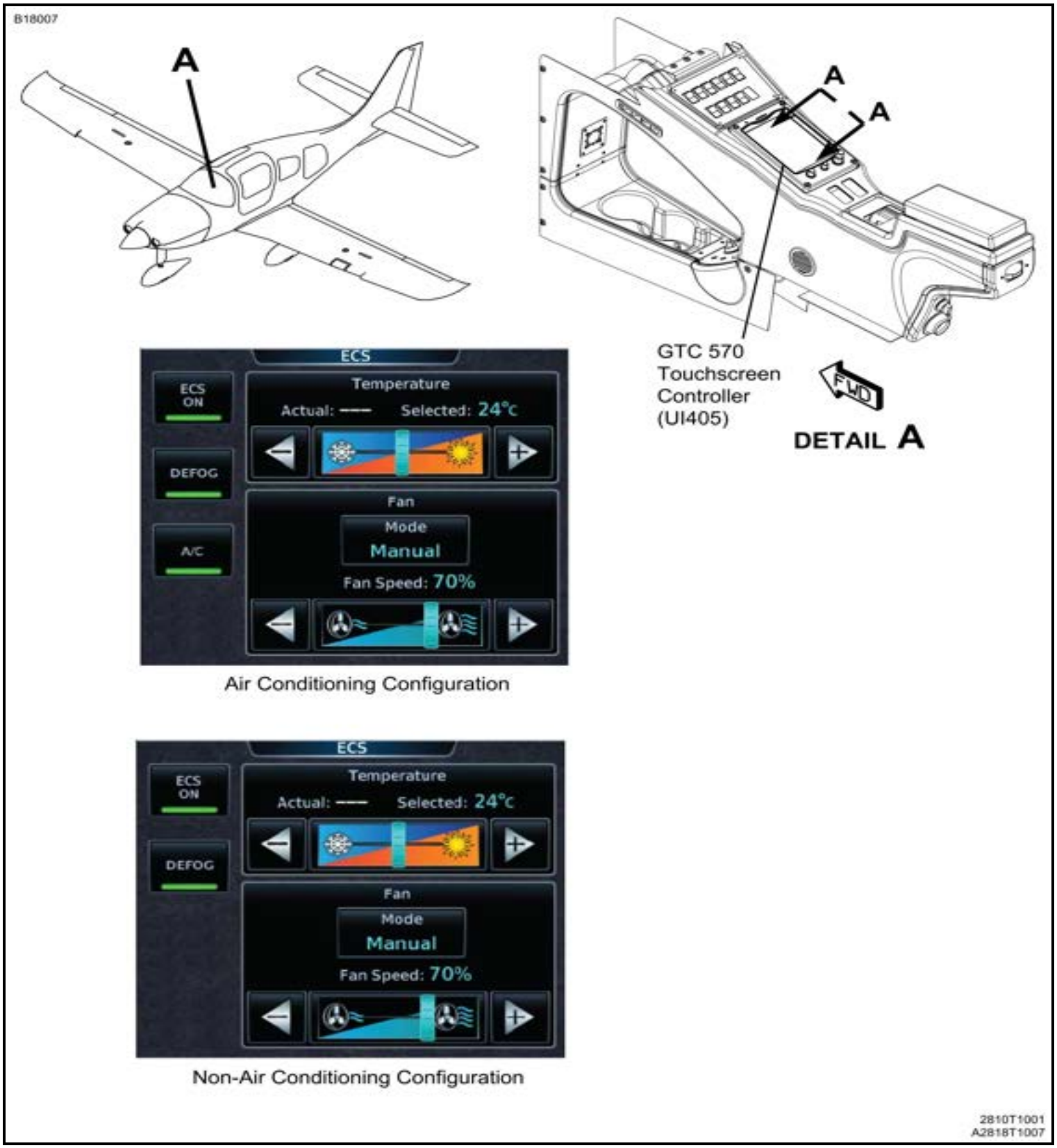
D. The Fault Text Messages show on the page as follows:

- No Faults
- Cabin Temp Sensor-Shorted
- Cabin Temp Sensor-Open
- Evap Temp Sensor-Shorted (Note)
- Evap Temp Sensor-Open (Note)
- OAT Sensor-Shorted
- OAT Sensor-Open
- Heater Blend Air Actuator-Open
- No Communication with ECU.

NOTE: Ignore for non-air conditioning configuration.

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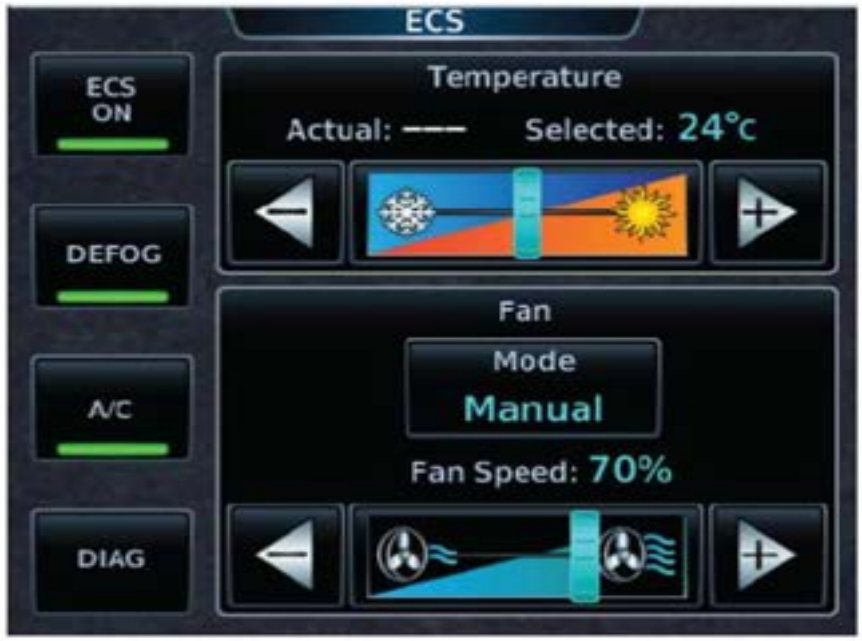
Figure 1 : Sheet 1 : ECS Touchscreen Controller Pages



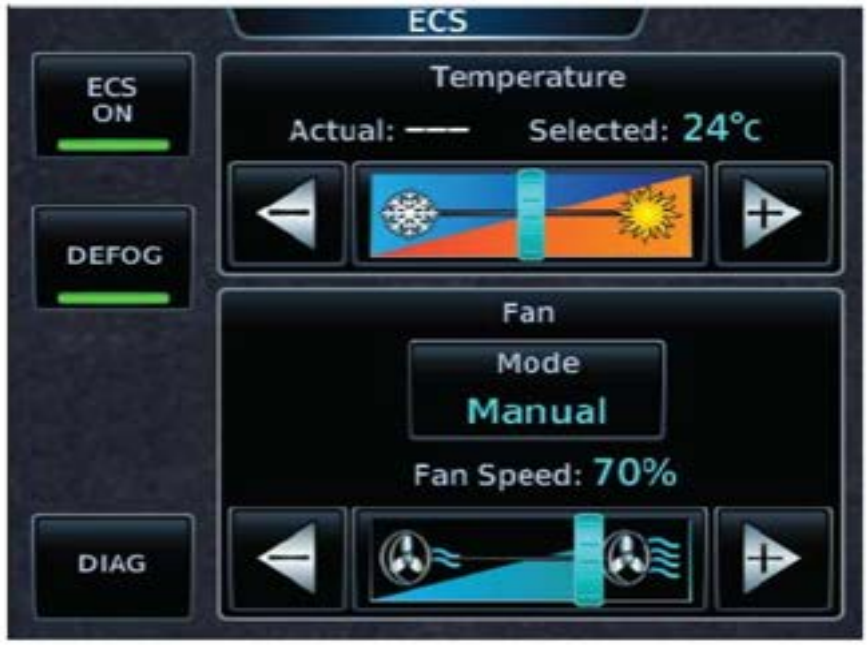
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Figure 1 : Sheet 2 : ECS Touchscreen Controller Pages

B18008



Air Conditioning Configuration



Non-Air Conditioning Configuration

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CABIN TEMPERATURE SENSOR (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Model T240 Cabin Temperature Sensor.

B. The Cabin Temperature Sensor contains a calibrated thermistor and fan used to draw cabin air over the thermistor. The sensor provides inputs to the ECU/Blower Module Assembly. The cabin temperature is determined by comparing the inside temperature of the aircraft with the desired cabin temperature setting entered into the GTC 570 Touchscreen Controller. If the sensor fails, a fault will be noted on the diagnostic page of the touchscreen controller. The sensor is found in the forward section of the center console. Refer to Figure 401.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Cabin Temperature Sensor

A. Remove the Cabin Temperature Sensor (UC015) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the ECS CTRL DOOR SEAL circuit breaker found on the cockpit circuit breaker panel.

(4) Remove the screws that attach the temperature sensor plate to the center console.

(5) Carefully pull the plate and sensor from the center console.

(6) Disconnect electrical connector P307 from electrical connector J307.

(7) If necessary, remove the sensor from the plate.

(a) Remove the screws that attach the sensor to the plate.

(8) Remove the sensor from the airplane.

B. Install the Cabin Temperature Sensor (UC015) (Refer to Figure 401).

(1) If necessary, attach the sensor to the temperature sensor plate.

(a) Install the screws that attach the sensor to the plate.

(2) Connect electrical connector P307 to electrical connector J307.

(3) Carefully put the plate in its correct position to the center console.

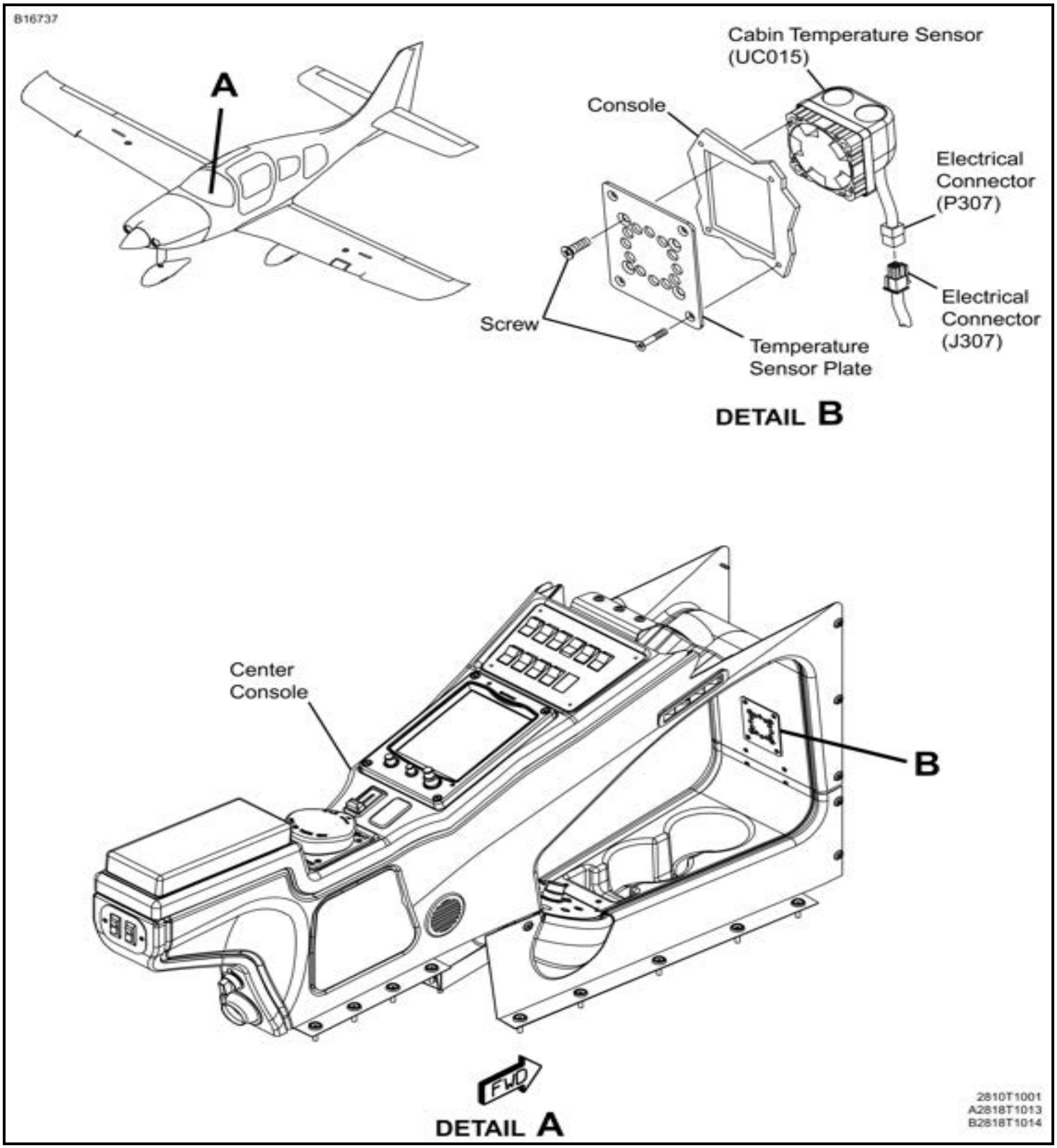
(4) Install the screws that attach the plate to the center console.

(5) Engage the ECS CTRL DOOR SEAL circuit breaker found on the cockpit circuit breaker panel.

(6) Do a check of the defrost/floor valve. Refer to Air Conditioning (T240) - Adjustment/Test.

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Figure 401 : Sheet 1 : Cabin Temperature Sensor Installation



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S-TEC 55X AUTOPILOT WITH AUTOTRIM - GENERAL

1. General

A. **System Overview** – The S-Tec 55X autopilot is a two axis system that controls movement around the pitch and roll axes. Information for movement around the roll axis is obtained from the turn coordinator of the airplane. The roll axis of the System 55X has heading select, VOR/Localizer front and back course intercept and tracking. It is also interfaced with the GPS and Nav system that provides standard autopilot outputs.

B. The System 55X derives pitch axis information from a solid-state absolute pressure transducer and an internal, sensitive accelerometer that provide precise pitch axis altitude hold, automatic/manual glideslope intercept and capture, and vertical speed commands totally independent of the aircraft's artificial horizon gyro. The System 55X autopilot delivers accurate altitude, vertical speed, and vertical acceleration data to the system's pitch computer, regardless of aircraft flight attitude.

2. The System 55 Flight Guidance Programmer/Computer

A. The System 55X Flight Guidance Programmer/Computer serves the function of converting pilot commands to logic signals for the roll and pitch computer functions. As the pilot enters the desired mode by pressing the appropriate mode selector switch, the computer acknowledges the mode, causing the appropriate annunciator to illuminate.

B. The roll computer receives signal inputs from the Directional Gyro or HSI, VOR/LOC and GPS deviation indicators, and the turn coordinator. The roll computer computes roll servo commands for stabilization, turns, radial intercepts, and tracking.

C. The pitch computer receives signal inputs from the altitude pressure transducer; accelerometer; glideslope deviation indicator; and vertical speed modifier control, optional altitude selector/alerter, or altitude/vertical speed selector if installed. The pitch computer computes pitch servo commands for vertical speed, altitude hold, and glide slope intercept and tracking. Sensing for trim annunciation or automatic elevator trim (STec 55X) is provided by the pitch servo. Drive for the elevator trim servo is provided by the pitch computer. Refer to Figure 2 for a diagram of the autopilot system.

3. Preflight Self-Test Procedure (S-Tec 55X Autopilot)

A. The System 55X incorporates a self-test that must pass before the autopilot can be engaged. To perform the test, aircraft DC electrical power must be on and the avionics master on. Place the Autopilot Master switch to the on position, and observe that all annunciators of the Programmer/Computer and remote display illuminate for approximately five seconds, then extinguish. When the system is first turned on, the Flight Guidance Programmer/Computer and Annunciator will display all functions as shown in Figure 1. When the self-test is complete, a RDY (ready) annunciation is displayed. Should a fault be detected, the FAIL annunciator will remain on and the auto pilot will not operate.

4. Checking The Autotrim System (S-Tec 55X)

A. Place the Trim Master Switch in the on position.

B. Press and release the HDG and VS switches and make sure that HDG and VS illuminate on the annunciator.

C. Press the VS button. The control stick will move slowly aft.

D. Rotate the VS knob. The control stick will move slowly forward.

E. Press the autopilot disconnect switch (APD) on the control stick (refer to Figure 3) and make sure that the autopilot disconnects.

F. Engage HDG mode and move the DG or HSI HDG bug left and right. The control stick will follow the HDG bug.

(1) If HSI equipped, center the course arrow under the lubber line and push the NAV button. Move the course arrow on the HSI left then right. The control stick will follow the course arrow. Channel a valid VOR signal and move course arrow just enough to deflect the left/right needle 1 or 2 dots. The control stick will follow the Course Deviation Indicator (CDI) left/right needle during the test. (This test is only valid if the left/right needle is centered with the course arrow under the lubber line.)

(2) If DG equipped, center the HDG bug under the lubber line. Channel a valid VOR signal. Move the OBS to cause left/right CDI needle deflection. The control stick will follow the left / right needle movement.

G. Press the REV mode switch. The control stick will respond opposite to the course arrow and CDI left/right needle inputs.

H. Press the ALT (Altitude Hold) switch. Slowly pull aft (nose up) on the control stick. Autotrim will run nose down with TRIM flashing on the remote annunciator and the autopilot computer/programmer after approximately 3 seconds. Slowly move the control stick forward (nose down). After 3 seconds, Autotrim will move nose up with TRIM flashing on the remote annunciator and the autopilot computer/programmer after approximately 3 seconds.

I. Place the Trim Master Switch in the off position.

5. Manual Electric Trim Test

A. Place the Trim Master switch in the on position.

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B. Move the elevator trim switch (hat switch on the control stick) up and down. The autopilot will disengage. The RDY (ready) annunciation will flash, then display a steady indication, and the trim will operate in the commanded direction. (The elevator trim switch will disengage the autopilot only when a pitch mode is engaged.) Re-engage the heading and VS modes, and press the Autopilot disconnect switch (APD). The autopilot will disengage. As before, the RDY indication will flash, then annunciate steady. An audible tone will be heard when the autopilot is disconnected.

6. Flight Director Equipped

A. Place the Autopilot Master Switch in SELECT FD position. Verify the roll, pitch, and trim servos are disengaged. The steering bar will be in view on the attitude indicator.

B. Engage HDG mode. Move the HDG bug 45 degrees left. The roll steering bar will slowly indicate a left steering command. Repeat the same test for the right side.

C. Engage VS mode. Select 1500 FPM rate of climb. Verify the pitch steering bar moves slowly up. Repeat the same test for the down direction.

D. Place the Autopilot Master Switch in SELECT FD/AP. The servos will re-engage.

E. Place the Trim Master switch in the on position.

F. Place the Manual Electric Trim Command switch to MOVE FWD or AFT. The autopilot will disconnect.

G. The Manual Electric Trim Command switch will disconnect the autopilot only if there is a Pitch Mode engaged.

7. Autopilot Disconnect Switch

A. The autopilot disconnect switch is a spring loaded rocker switch on the top left side of the pilot's control stick and is normally operated with the thumb of the left hand. Pressing either the top or the bottom portion of the rocker switch will disengage the autopilot. (Note: Operating the elevator trim switch will also disconnect the autopilot.)

8. S-Tec Autopilot Integration With Avidyne Flightmax Entegra Primary Flight Display (PFD)

A. Whenever the S-Tec System 55X Autopilot or the Avidyne PFD are replaced, perform setup procedures indicated in Chapter 34.

9. Instructions For Continued Airworthiness (S-Tec Corp.)

A. **Description** - The S-Tec flight control system includes the following items:

(1) Roll servo

(2) Pitch servo

(3) Trim servo (elevator)

B. **Installed Equipment** - Panel or remotely mounted pitch/roll/yaw computers include the following:

(1) Panel mounted controllers, indicators, switches, and breakers

(2) Barometric pressure transducer/static source

C. **Servos** - Servo installations utilize aluminum brackets to secure the servos to the airframe. Attachment to the aircraft primary flight controls and trim systems is accomplished through cable and push rod assemblies.

D. **Controls Operation Information** - Operation of the autopilot and other systems is described in FAA Approved S-TEC Flight Manual Supplement P/N 891830S. Specialized controls, annunciation, operation and interpretation are covered in this required document and in S-TEC Pilot's Operating Handbook S-TEC P/N 87109 that supplements the approved AFMS. This information is also contained in the POH/AFM.

E. **Servicing Information** - Approved S-TEC dealers holding the appropriate FAA certification must accomplish all servicing of items. Locations and access to the components installed are described and depicted in the installation drawings and Installation Instructions ST- 852. Removal and replacement of components should be determined by functional checks indicated in S-TEC AFM Supplement 891830S, Pilot's Operating Handbook document number, 87109 (55X) and the Post Installation Ground Checks document number 05110.

F. **Maintenance Instructions** - Condition and/or airworthiness inspections required under FAR Part 43, or other FAA approved programs, should include several items regarding the S-TEC autopilot system installed in the aircraft.

(1) Visual Inspections

(a) Flight Control Components - Check control cables, pulleys, servos, and associated equipment for condition, attachment, clearance, and proper operation. Replace cables that have broken strands or evidence of corrosion. Check cables for proper tension.

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(b) Electrical Wiring and Components - Check for security, chafing, damage and attachment. For replacement of any of the autopilot wiring, cables or associated components, refer to the Master Drawing List 921139 for the appropriate drawing or document associated with the action to be performed.

(2) System Operation Check after Maintenance - Refer to the following procedures:

(a) Preflight Self-Test Procedure (S-Tec 55X Autopilot)

(b) Checking The Autotrim System (S-Tec 55X)

(c) Manual Electric Trim Test

(d) Flight Director Equipped

10. Troubleshooting Information

A. Troubleshooting this equipment should only be accomplished by FAA approved repair facilities, holding the appropriate FAA certifications, with required test equipment and service data. System function should be determined through functional checks indicated in the AFM Supplement 891830S, Pilot's Operating Handbook document number 87109, and the Post Installation Ground Checks document number 05110.

11. Special Issues

A. **Removal and Replacement Information** - All components can be removed with common tools and practices.

B. **Diagrams/Special Inspections** - Refer to Master Drawing List 921139 for all diagrams. There are no special inspection requirements.

C. **Application of Protective Treatments** - Servos and transducers should be removed prior to application of corrosion (or other) treatments. Panel mounted components should not be exposed to these treatments.

D. **Structural Fasteners** - Refer to S-Tec document No. 761017, Installation, S-Tec System 55/55X Autopilot

E. **Special Tools**

(1) **Crimp Tools** - A crimp tool and positioner/locator meeting MIL Specification M22520/1-01 or equivalent are required to ensure consistent, reliable crimp contact connections for the rear d-sub connectors. These tools are available from ITT Cannon or other vendors:

Insertion Tool:	ITT Part Number 274-7048-000 (Desc. CIET-22D-01)
Crimp Tool (HD):	ITT Part Number 995-0001-584 (Desc. M22520/2-01)
Locator Tool:	ITT Part Number 995-0001-244 (Desc. M22520/2-07)
Locator Tool (HD)	ITT Part Number 995-0001-739 (Desc. M22520/2-06)
Locator Tool (HD)	Desc. M22520/2-09

(2) **S-TEC Special Tool**

Clutch Adjustment Spanner	Part Number 6622	Drawing No. 6622 and 1
Clutch Adjustment Spanner	Part Number 66228	Drawing No. 66228 and 1 N/A

F. **Normal Category Aircraft** - Electrical load must be maintained within 80 percent of generator capacity for systems installed (AC 43.13-1B). Electrical loads are described in the Component Weights and Current Drain section of the S-Tec Installation Instructions ST-852.

G. **Overhaul Time Limitations** - N/A

H. **Airworthiness Limitations** - Limitations are listed in the Limitations Section of AFM /POH.

I. **Revisions** - The S-Tec Service Letter program will be utilized to inform aircraft operators of significant changes to this ICA. Contact S-Tec Corporation at 1-800-USA-STEC.

12. Autopilot Roll Servo

A. **General** - The autopilot roll servo is located under the flap drive bracket. It is accessed through the wing controls access panel located under the fuselage at the aft end of the wing saddle, near the wing trailing edge. The servo is attached to the bracket at an angle. This angle aligns the servo drive capstan grooves with the bridle cable. The bridle cable is attached to the aileron interconnect pushrod with two saddle assemblies. Refer to Chapter 27 for a discussion of the aileron system. Refer to Figure 4 for a diagram of the aileron roll servo.

B. **Removal** – The roll servo bridle cable must be detached to remove the roll servo. Remove the MS-21256-1 locking clips from

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the barrel of the turnbuckle. Detach this cable from both ends by loosening the turnbuckle and removing the clevis pins. Retain the MS20392-2C-11 clevis pin and NAS1149F0363P washer for reuse. A new MS24665- 134 cotter pin will be required for reinstallation.

(1) **Bridle Cable Removal and Inspection** – The bridle cable does not have to be removed from the servo drive capstan for most maintenance procedures. Check cable for signs of wear or corrosion. Replace cable assembly if required. Autopilot installation bulletins must be followed for this process.

(2) **Unplug Roll Servo** – Cut the nylon tie used to secure the electrical wiring. Unplug the autopilot roll servo electrical connection at the connector.

(3) **Servo Removal** – The servo is attached to the bracket with four AN3-4A bolts and MS20365-1032 nuts with NAS1149F036P washers. These are located on the corners of the servo attach flange and can be seen in Figure 4. When the four AN3-4A bolts and AN365-1032 nuts with NAS1149F036P washers are removed, the servo can be removed.

C. **Servo Installation** – Installation is the reverse of removal.

(1) Adjust Roll Servo clutch torque to 18 inch pounds +3 inch pounds or -3 inch pounds (2.03 N-m + 0.339 N-m or -.0.339 N-m). Refer to Chapter 20, Control Cables and Pulleys - Maintenance Practices.

(2) Adjust bridle cable tension to 30 pounds + 2 pounds or - 2 pounds (133.4 N-m + 8.89 N-m or -8.89 N-m). Refer to Chapter 20, Control Cables and Pulleys - Maintenance Practices.

(3) The four AN3-4A bolts and MS20365-1032 nuts are torqued 30 to 36 inch pounds (3.38 N-m to 4.06 N-m). Refer to Chapter 20, Torque Data - Maintenance practices.

(4) Be sure to check cable tension and installation per autopilot installation requirements

13. Autopilot Pitch Servo

A. **General** – The autopilot pitch servo is located under the baggage bulkhead. It is accessed through the baggage bulkhead access panel located under the upholstery on the hat rack. The servo is attached to a composite bracket mounted at an angle to the fuselage centerline. This angle aligns the servo drive capstan grooves with the bridle cable. The bridle cable is attached to the elevator final drive pushrod with two saddle assemblies. Refer to Figure 5.

B. **Removal** – The pitch servo bridle cable must be detached to remove the roll servo. Remove the MS-21256-1 locking clips from the barrel of the turnbuckle. Detach this cable from both ends by loosening the turnbuckle and removing the clevis pins. Retain the MS20392-2C-11 clevis pin and NAS1149F0363P washer for reuse. A new MS24665-134 cotter pin will be required for reinstallation.

(1) **Bridle Cable Removal and Inspection** - The bridle cable does not have to be removed from the servo drive capstan for most work. Check cable for signs of wear or corrosion. Replace cable assembly if required. Autopilot installation bulletins must be followed for this process.

(2) **Unplug Pitch Servo** - Cut the nylon tie used to secure the electrical wiring. Unplug the autopilot pitch servo electrical connection at the connector.

(3) **Servo Removal** - The servo is attached to the bracket with two MS24694-C50 flat head screw on the upper two mounting locations and two AN3-4A bolts with NAS1149F036P washers on the lower two mounting locations. Each screw and bolt is installed into a clip nut (ESNA RM52LHA4972-8-02) attached to the servo mounting flange. These mounting bolts are located on the corners of the servo attach flange, and the bolts can be seen in Figure 6. Remove the servo.

C. **Servo Installation** - Installation is the reverse of the removal.

(1) Adjust Pitch Servo clutch torque to 22 inch pounds +3 inch pounds or -3 inch pounds (2.48 N-m + 0.339 N-m or -.0.339 N-m). Refer to Chapter 20, Control Cables and Pulleys - Maintenance Practices.

(2) Adjust bridle cable tension to 30 pounds + 2 pounds or - 2 pounds (133.4 N-m + 8.89 N-m or -8.89 N-m). Refer to Chapter 20, Control Cables and Pulleys - Maintenance Practices.

(3) Torque all bolts 30 to 36 inch pounds (3.38 N-m to 4.06 N-m). Refer to Chapter 20, Torque Data - Maintenance practices.

(4) Be sure to check cable tension and installation per autopilot installation requirements.

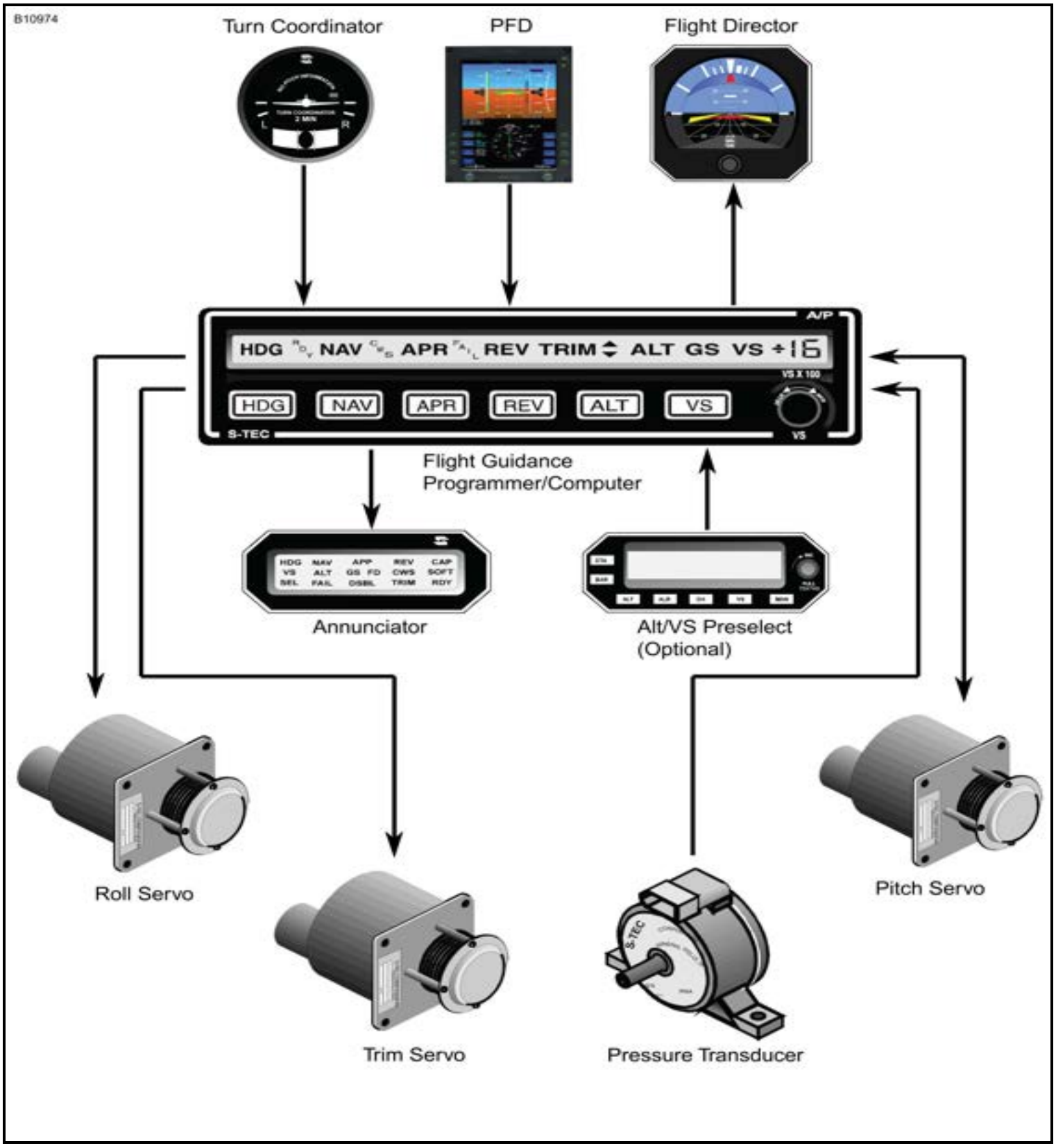
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Figure 1 : Sheet 1 : S-Tec 55X Control Panel



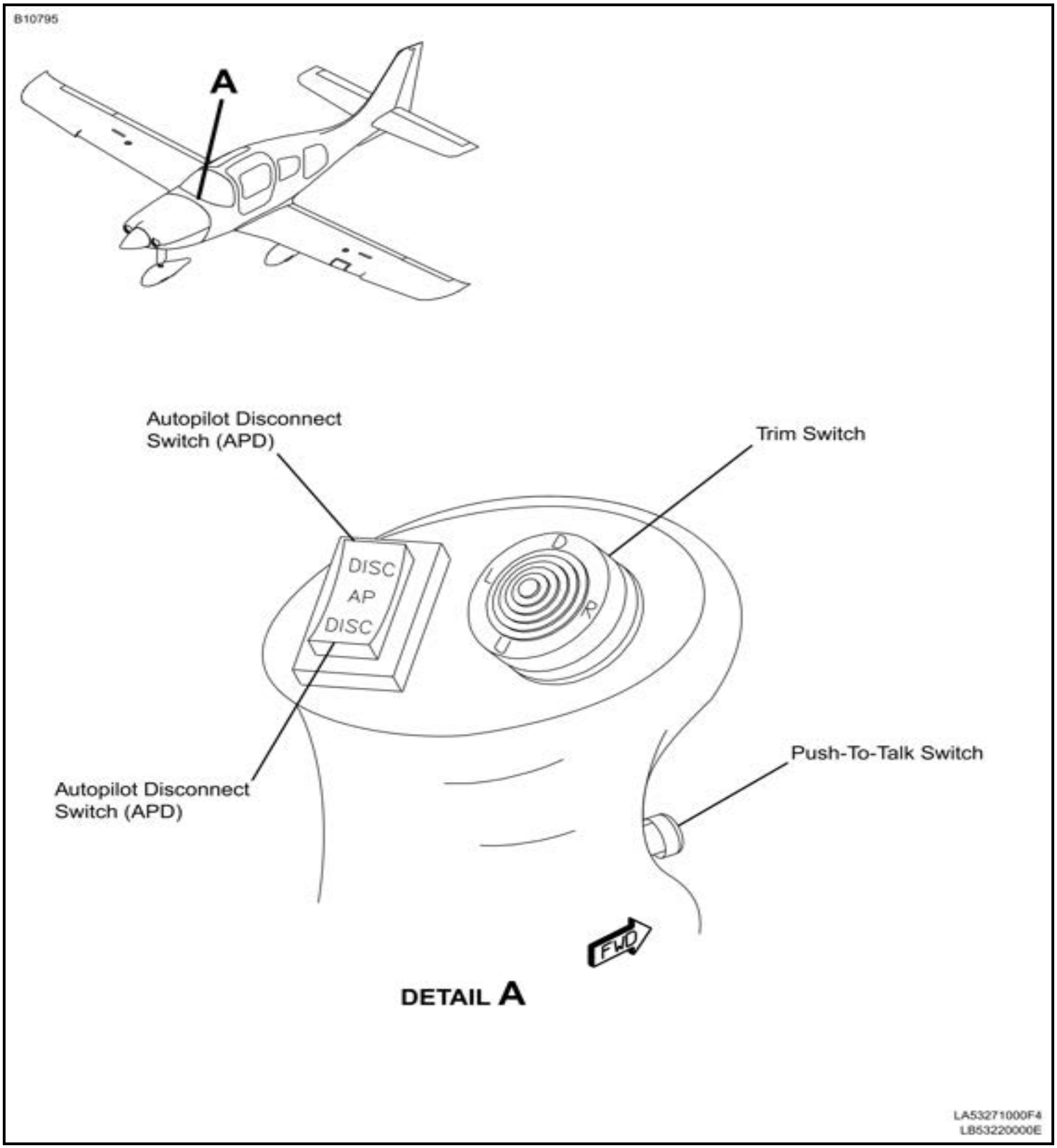
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Figure 2 : Sheet 1 : S-Tec 55X Autopilot System



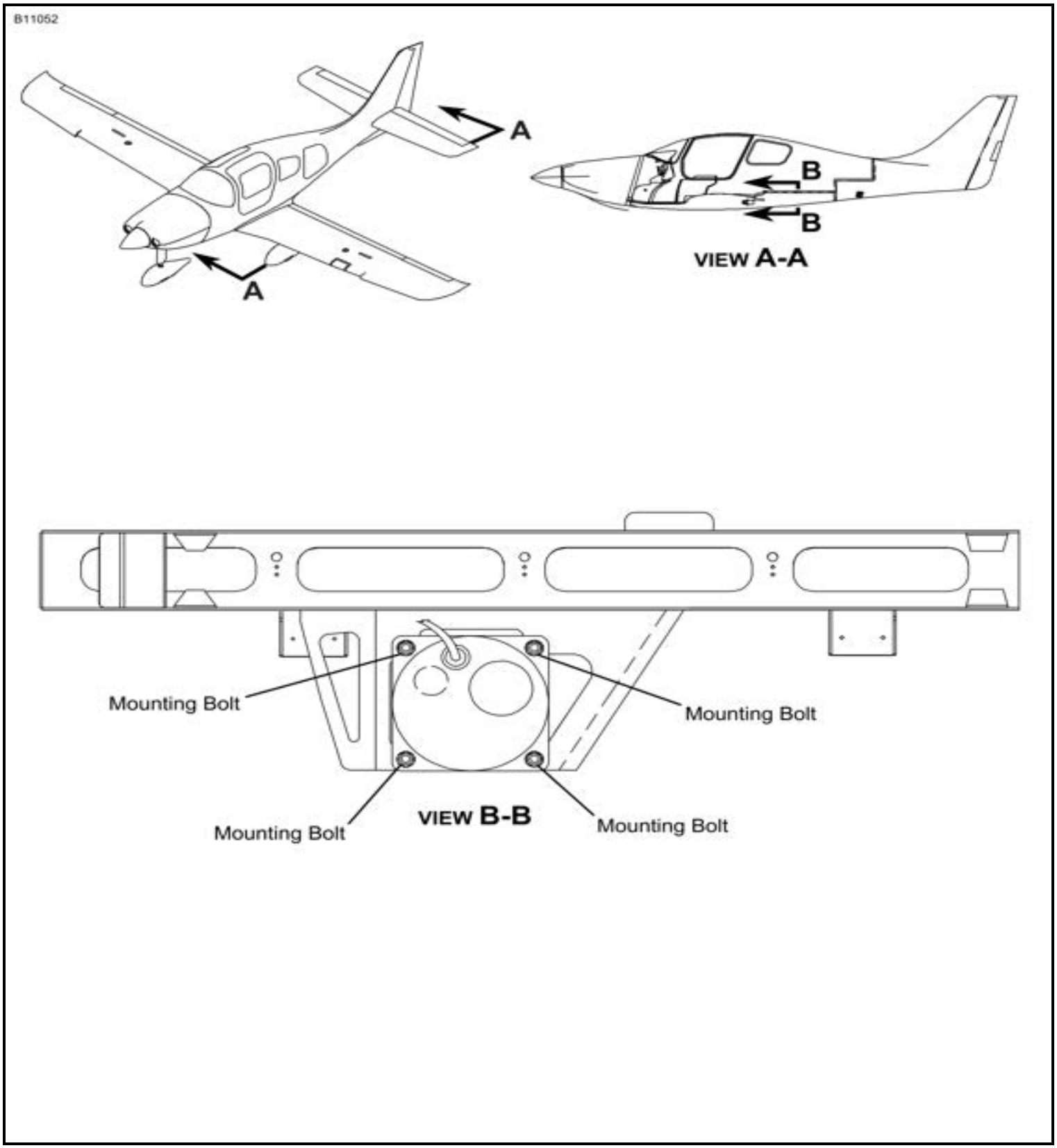
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Figure 3 : Sheet 1 : Autopilot Switches on the Control Stick



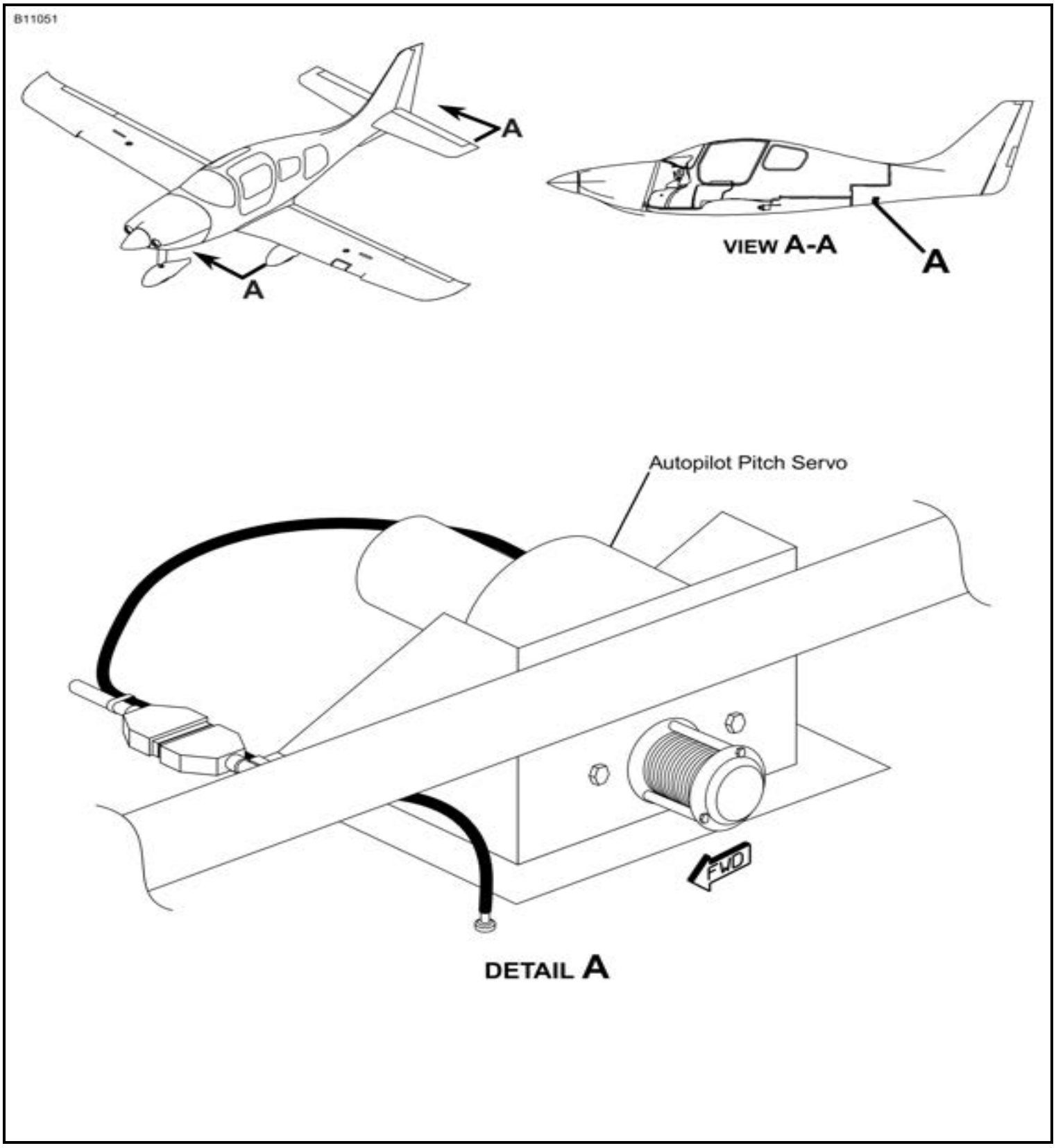
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Figure 4 : Sheet 1 : Autopilot Roll Servo (View looking forward)



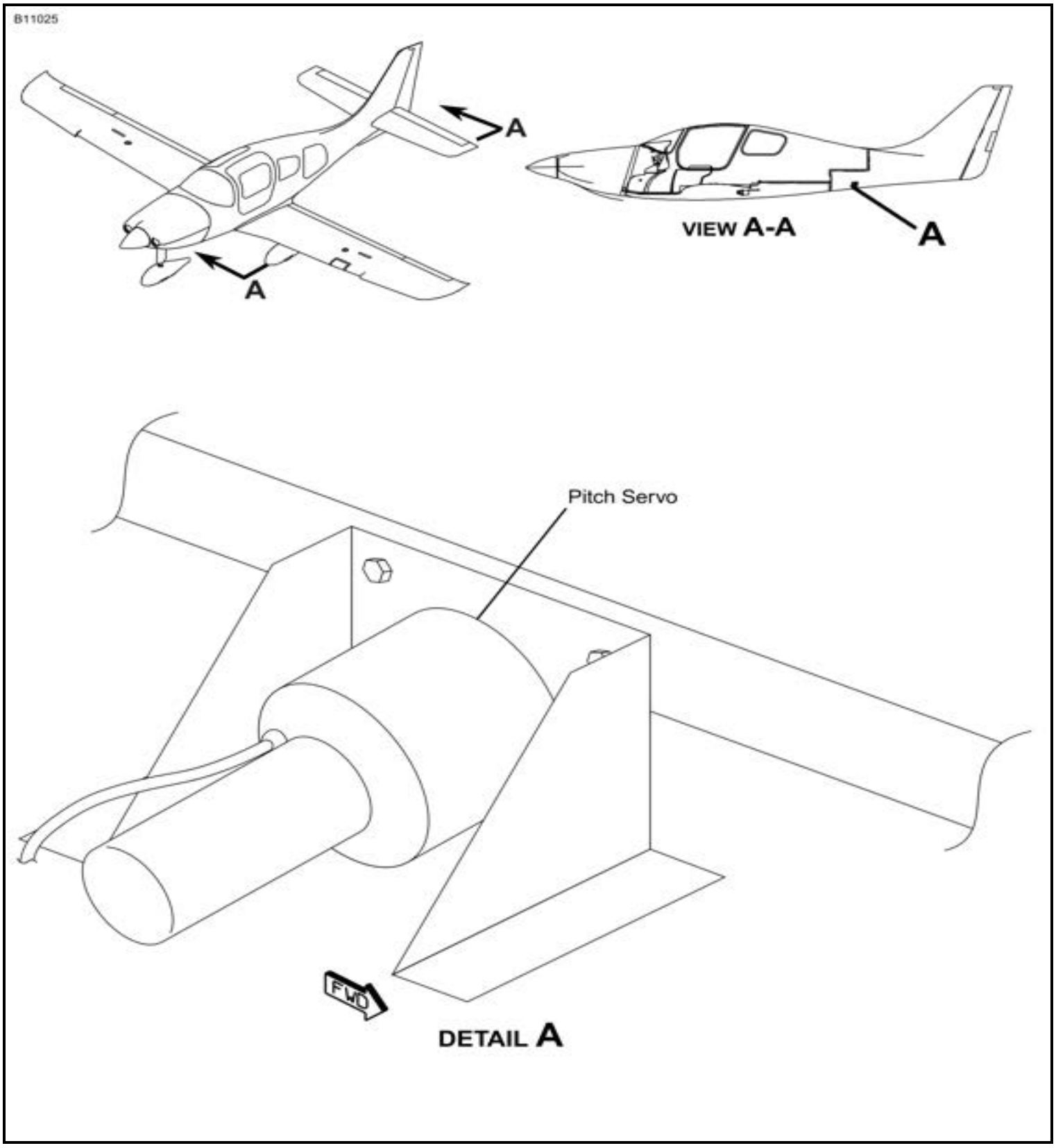
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Figure 5 : Sheet 1 : Autopilot Pitch Servo



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Figure 6 : Sheet 1 : Autopilot Pitch Servo



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GARMIN GFC 700 AUTOPILOT (G1000) - MAINTENANCE PRACTICES

1. General

A. The GFC 700 is a two-axis fail-safe digital flight control system. There is no single LRU with the name "GFC 700"; rather, "GFC 700" refers to an integrated autopilot and flight director system, with functions provided by multiple G1000 LRUs and servos. Refer to Figure 201. The following functions are provided by the GFC 700 in this installation:

- Flight Director
- Autopilot
- Manual Electric Trim

B. **Flight Director** - The Flight Director operates within the No. 1 GIA 63/GIA 63W and uses data from the G1000 system, including air data, attitude, and navigation data, to calculate commands for display to the pilot and for the Autopilot. Flight Director command bars and mode annunciations are sent to the PFD through a high-speed Ethernet connection for display to the pilot. The Flight Director operates independently of the Autopilot, and allows the pilot to hand-fly the command bars, if desired.

C. **Autopilot** - The Autopilot operates within the two GSA 81 servos. Flight Director data is processed within the two servos and turned into aircraft flight control surface commands. The autopilot cannot operate unless the Flight Director is engaged.The following is a summary of the autopilot functions provided by each LRU:

- GDU 1040 PFD - Displays the Flight Director command bars and the autopilot mode annunciations.
- GDU 1042/GDU 1044 MFD - Provides controls for the autopilot functions.
- GIA 63/GIA 63W - Performs the calculations to display the Flight Director command bars on the PFD and sends control movement commands to the GSA 81 autopilot servos.
- GSA 81 - Actuates the control surfaces based on commands received from the GIA 63/GIA 63W.
- GSA 82 Trim Adapter - Operates the elevator trim tab.

D. **Configuration and Testing** - After removal and replacement, LRUs must be configured and tested per the *Garmin G1000 System Maintenance Manual*, P/N 190-00577-03.

CAUTION: When removing and/or replacing any G1000 component, always ensure that aircraft power is off. Unplug any auxiliary power supplies.Before removing any G1000 LRU, it is required that the technician verify the LRU software part number and version against the Required Equipment List RB011002.

2. Autopilot Disconnect Switch

A. The autopilot disconnect switch is a push button switch on the top left side of the pilot's control stick and the top right side of the co-pilot's control stick, and is normally operated with the thumb. Refer to Figure 202. Pressing the switch will disengage the autopilot and the trim system. (Note: Operating the elevator trim switch in the overhead will also disconnect the autopilot.)

3. Troubleshooting

A. Troubleshoot the GFC 700 system per the Garmin *G1000 System Maintenance Manual*, P/N 190-00577-03.

4. GSA 81 Autopilot Roll Servo

A. The GSA 81 is mated to the GSM 85 Servo Mount to form a single servo unit. Refer to Figure 203.The design of the servo assembly allows the servo portion (GSA 81) to be removed from the capstan (GSM 85) without the need to de-rig the aircraft control cables. The roll servo is located beneath the rear passenger seats.

B. **Removal of the GSA 81 Autopilot Roll Servo**

(1) Ensure aircraft power is off. Unplug any auxiliary power supplies.

(2) On the underside of the wings at the fuselage remove the Flap and Aileron Push-Rod Access Panel.

(3) Disconnect servo connector P680.

(4) Remove the two bolts holding the servo to the servo mount. Refer to Figure 204.

(5) Remove the unit.

CAUTION: Do not use solvents to clean the output gear!

(6) Remove excess grease build-up from the single servo output gear using a lint-free cloth.

NOTE: It is not necessary to remove all of the grease from the output gear, only the excess grease.

(7) Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 33 MS (preferred) or Aeroshell 17 grease.

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C. **Installation of the GSA 81 Autopilot Roll Servo**

(1) Set unit in place.

(2) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.

(3) Install the two bolts holding the servo to the servo mount.

(4) Connect servo connector P680.

(5) Configure and test the GSA 81 per the *Garmin G1000 System Maintenance Manual*, P/N 190- 00577-03.

(6) Operate all controls through full travel and ensure that no binding or restriction occurs.

(7) Reinstall the Flap and Aileron Push-Rod Access Panel.

5. GSM 85 Autopilot Roll Servo Mount

A. **Removal of the GSM 85 Autopilot Roll Servo Mount**

(1) Remove the GSA 81 servo per the GSA 81 Roll Servo Removal procedure above.

(2) Loosen the bridle cable turnbuckle and remove the clevis pins.

(3) Remove the four screws holding the mount to the servo bracket.

(4) Remove the unit with the bridle cable.

B. **Installation of the GSM 85 Autopilot Roll Servo Mount**

(1) Prior to installation, adjust and verify the slip clutch torque is set to 24±4 in-lb.

(a) Place the servo mount onto the Garmin Servo Adjustment Fixture (011-01085-XX) and secure with toggle clamps. Refer to Figure 205.

(b) Install the cable, supplied with the fixture, between the capstan under test and the fixture capstan.

(c) Remove slack in the cable with the tension adjust knob.

(d) Tighten the thumbscrews on the fixture capstan.

(e) Attach a socket to a calibrated torque wrench of the appropriate range and place the assembly on top of the fixture capstan. Adjust the wrench support as required to support the torque wrench in a level, horizontal position. Ensure the torque wrench is set to "ZERO" while the motor and solenoid are "OFF".

(f) Connect a 24 VDC power supply to the fixture.

(g) Place the solenoid switch to "ON" and move the direction switch to the "CW" or "CCW" position. Allow the capstan to rotate about 1 revolution in each direction. Adjust the castle nut on the servo mount until the torque value indicates 24±4 in-lb.

(h) Switch the motor direction back and forth as necessary to allow adjustment until the required torque range is achieved in both directions. Ensure the castle nut aligns with one of the holes in the shaft.

(i) Observe the slip clutch torque reading for at least two full revolutions in each direction.

(j) Ensure the minimum and maximum torque readings are within tolerance of 24±4 in-lbs.

(k) When finished, remove the servo mount from the servo adjustment fixture.

(l) Install a new cotter pin through the capstan nut and servo mount shaft.

(2) Set the unit in place.

(3) Install the four screws holding the mount to the servo bracket.

(4) Install the bridle cable. Wrap the turnbuckle end approximately 270 degrees over the capstan. Wrap the fork end approximately 450 degrees over the capstan. Set the cable tension to 25 to 60 lbs. The bridle cable should make two complete revolutions around the capstan and the lock ball should be mated in its seat. System rigging to be accomplished with controls neutral.

(5) Safety wire the turnbuckle using a single wrap method with .040 safety wire or a double wrap method using .030 safety wire.

(6) Install the GSA 81 servo per the GSA 81 Roll Servo Installation procedure above.

6. GSA 81 Autopilot Pitch Servo

A. The GSA 81 is mated to the GSM 85 Servo Mount to form a single servo unit. Refer to Figure 206.The design of the servo assembly allows the servo portion (GSA 81) to be removed from the capstan (GSM 85) without the need to de-rig the aircraft control cables. The pitch servo is located beneath the aft baggage area. Refer to Figure 206.

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B. **Removal of the GSA 81 Autopilot Pitch Servo**

(1) Ensure aircraft power is off. Unplug any auxiliary power supplies.

(2) Remove the baggage bulkhead access panel located under the hat rack per Chapter 25, Access Panels.

(3) Disconnect servo connector P681.

(4) Remove the two bolts holding the servo to the servo mount. Refer to Figure 204.

(5) Remove the unit.

(6) Remove excess grease build-up from the single servo output gear using a lint-free cloth.

NOTE: It is not necessary to remove all of the grease from the output gear, only the excess grease. DO NOT USE SOLVENTS TO CLEAN THE OUTPUT GEAR!

(7) Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 33 MS (preferred) or Aeroshell 17 grease.

C. **Installation of the GSA 81 Autopilot Pitch Servo**

(1) Set unit in place.

(2) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.

(3) Install the two bolts holding the servo to the servo mount.

(4) Connect servo connector P681.

(5) Configure and test the GSA 81 per the *Garmin G1000 System Maintenance Manual*, P/N 190- 00577-03.

(6) Operate all controls through full travel and ensure that no binding or restriction occurs.

(7) Reinstall the baggage bulkhead access panel and the hat rack per Chapter 25.

7. GSM 85 Autopilot Pitch Servo Mount

A. **Removal of the GSM 85 Autopilot Pitch Mount**

(1) Remove the GSA 81 servo per the GSA 81 Pitch Servo Removal procedure above.

(2) Remove the two clamps holding the bridle cable to the main control cable.

(3) Remove the four screws, two washers, and two self locking nuts holding the mount to the servo bracket.

(4) Remove the unit with the bridle cable.

(5) A tapered shim is attached to the face of the servo mount by two 10-32 x 17/32 screws and two 10-32 x 25/32 screws. Remove shim and retain for installation.

B. **Installation of the GSM 85 Autopilot Pitch Mount**

(1) Prior to installation, adjust and verify the slip clutch torque is set to 24±4 in-lb. per the GSM 85 Roll Servo Mount Installation procedure above.

(2) Install tapered shim.

(3) Set the unit in place.

(4) Install the four screws, two washers, and two self locking nuts holding the mount to the servo bracket. Apply Loctite 242 to the two screws without washers and nuts.

(5) Install the bridle cable. Wrap the turnbuckle end approximately 270 degrees over the capstan. Wrap the fork end approximately 450 degrees over the capstan. Set the cable tension to 25 to 60 lbs. The bridle cable should make two complete revolutions around the capstan and the lock ball should be mated in its seat. System rigging to be accomplished with controls neutral.

(6) Install the GSA 81 servo per GSA 81 Pitch Servo Installation procedure above.

8. GTA 82 Trim Adapter

A. The Garmin GTA 82 Trim Adapter is a remote mounted device that is used to allow the GFC 700 to drive a pitch trim actuator provided by the airframe manufacturer. The GTA 82 adapter is located under the instrument panel on the pilot side beneath the standby instruments. The trim adapter is powered by the Essential Bus and interfaces with two GIA 63/GIA 63W Integrated Avionics units through serial communication on separate RS-485 ports. Refer to Figure 207.

B. **Removal of the GTA 82 Trim Adapter**

(1) Remove four screws securing the GTA 82 to the panel. The GTA 82 is located under the instrument panel on the pilot side

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beneath the standby instruments.

(2) Disconnect connector.

(3) Remove unit.

C. **Replacement of the GTA 82 Trim Adapter**

(1) Set unit in place.

(2) Install four screws to secure unit to panel.

(3) Connect connector.

(4) After installation of unit, reload the software and the autopilot gain files.

9. Inspections for the GTA 82 Trim Adapter

A. **Annual Inspection of the GTA 82 Trim Adapter**

(1) Move the flight controls through their full range of motion. Check for any signs of binding or resistance.

(2) Engage the A/P, check the Pitch, Roll, and Trim servos for normal operation.

(3) Press the A/P disconnect switch on the pilot control stick and verify that the A/P disengages and a disconnect tone is played through the aircraft speaker. Repeat for the copilot stick.

(4) Visually inspect each Servo Mount (GSM 85), moving the control surface through its full range of motion. Ensure there is no binding in the control or bridle cables. Check the cables for fraying or corrosion, and check the mount brackets for cracks or wear.

(5) Check that bridle cable tension is 25 to 60 lbs., and slip clutch settings are 24±4 in- lb. for each capstan in accordance with the GSM 85 Autopilot Roll Servo Mount and GSM 85 Autopilot Pitch Mount sections.

(6) Perform servo checks per the *Garmin G1000 System Maintenance Manual*, P/N 190-00577-03.

B. **1000 Hour Inspection of the GTA 82 Trim Adapter** - Perform a visual inspection every 1000 airframe hours or 12 months, whichever occurs first, in conjunction with the next scheduled inspection and check for corrosion, damage, or other defects for each of the items listed below. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors.

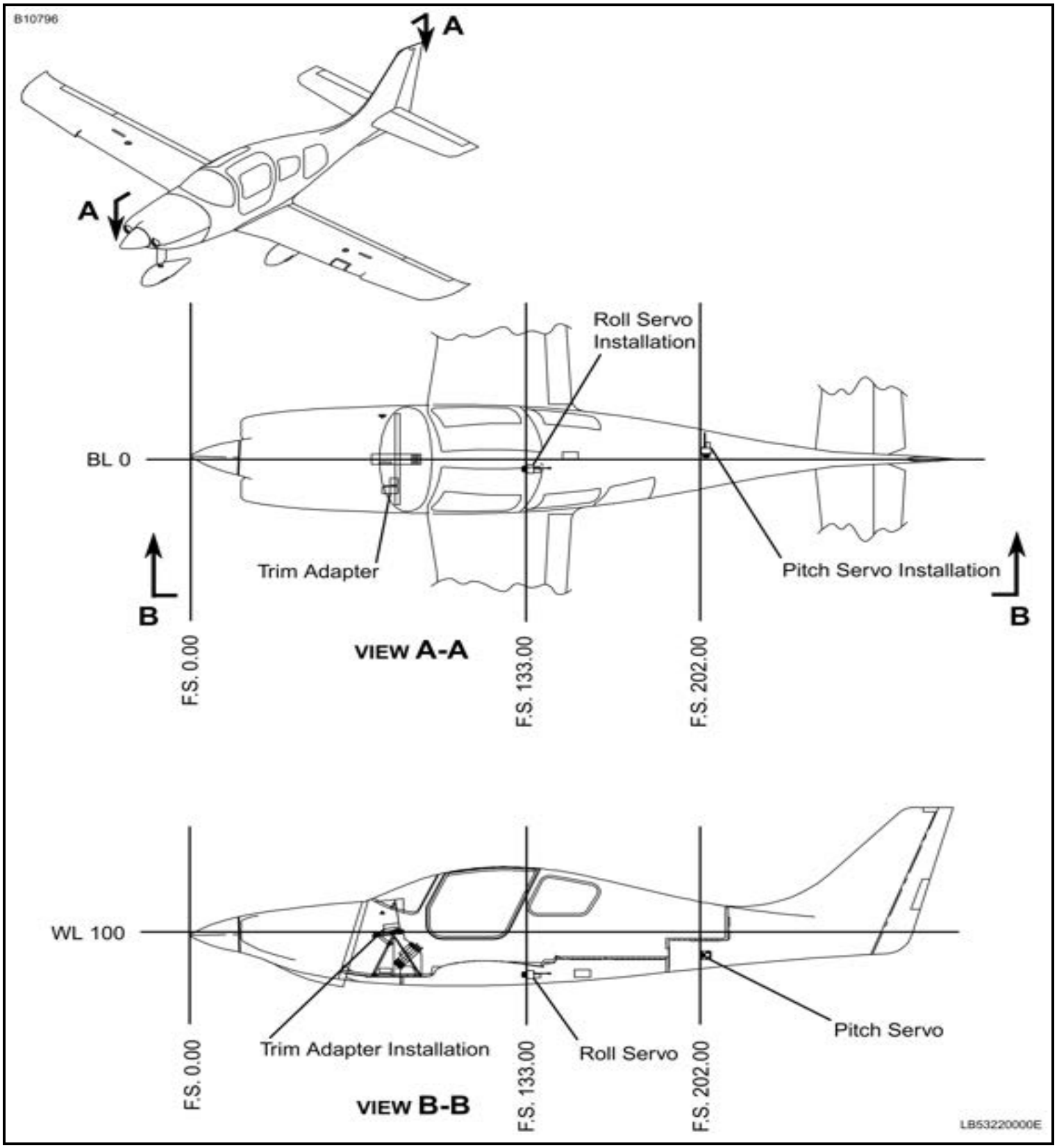
(1) **GSA 81 Servo Actuator** - Separate each GSA 81 from the GSM 85 Servo Mount (pitch, roll). Clean and re-grease the output gear every 1000 hours or 3 years, whichever occurs first, in accordance with the *Garmin G1000 System Maintenance Manual*, P/N 190-00577-03. Check connector and wiring.

(2) **GSM 85 Servo Mount** - Inspect the GSM 85 Mounts. Look for excessive wear in the capstan, and bridle cables.

(3) **GTA 82 Trim Adapter** - Inspect the GTA 82 unit and connector for corrosion or other defects.

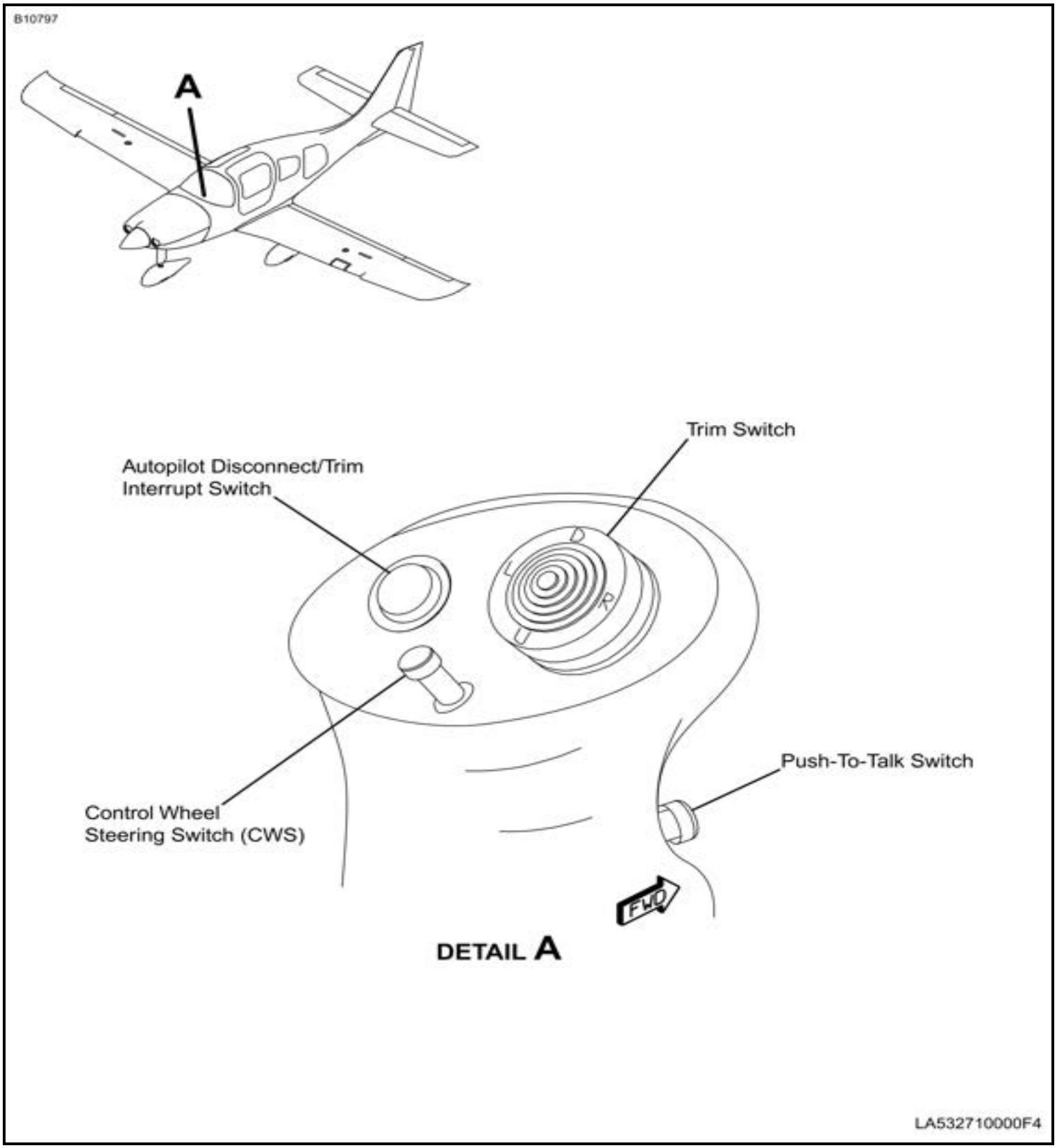
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Figure 201 : Sheet 1 : GFC 700 Autopilot



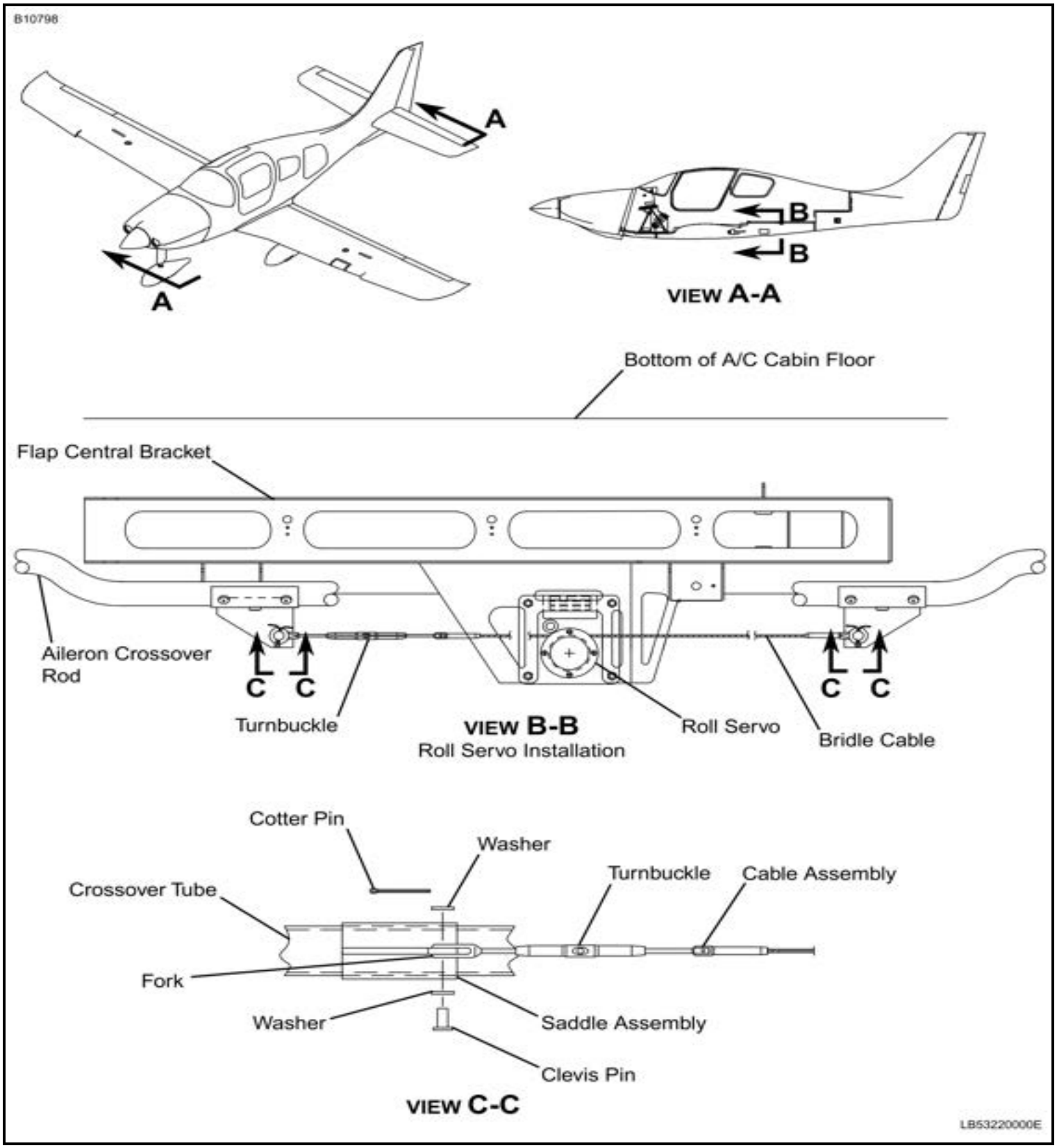
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Figure 202 : Sheet 1 : Autopilot Switch on the Control Stick



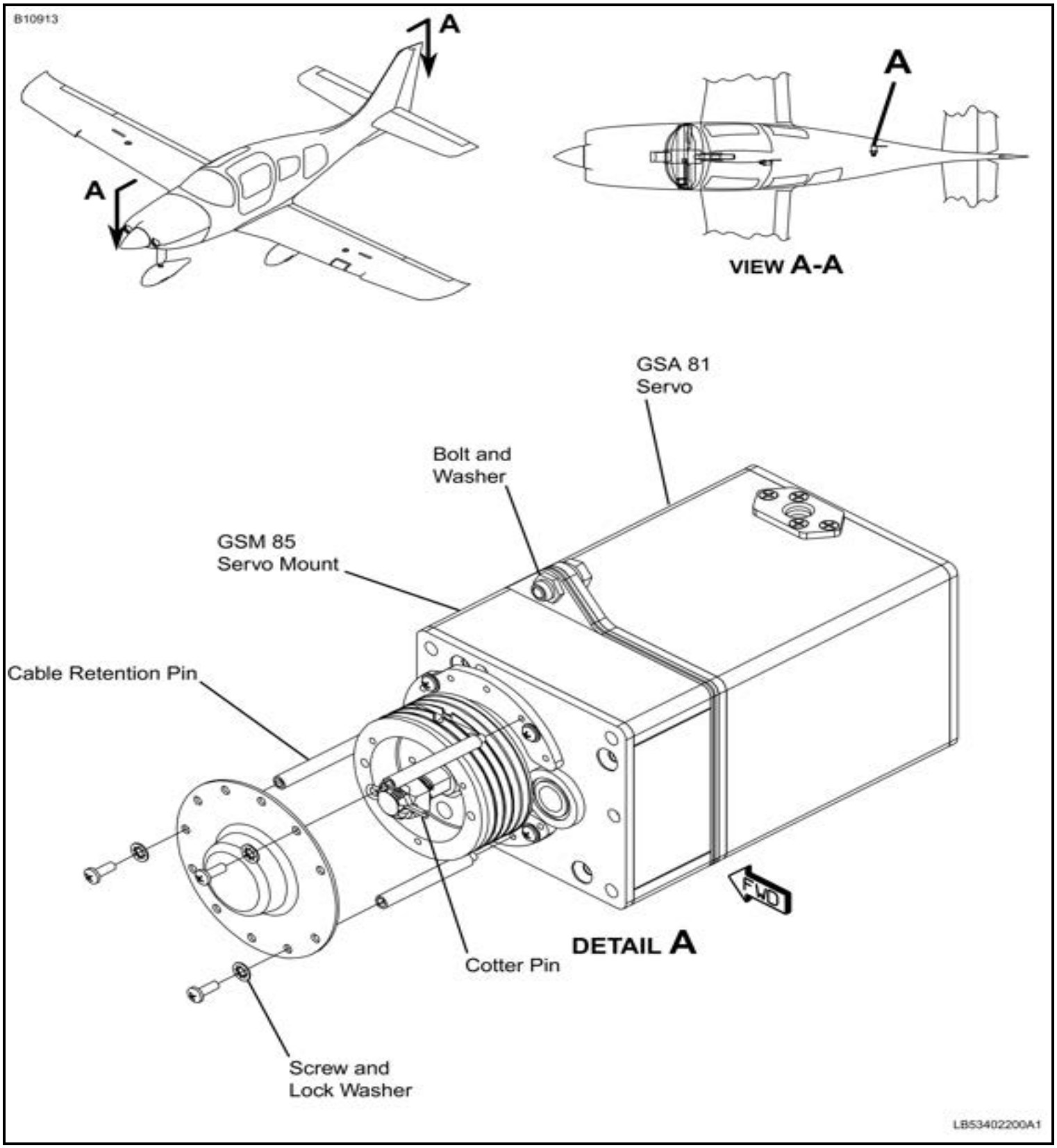
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Figure 203 : Sheet 1 : Roll Servo



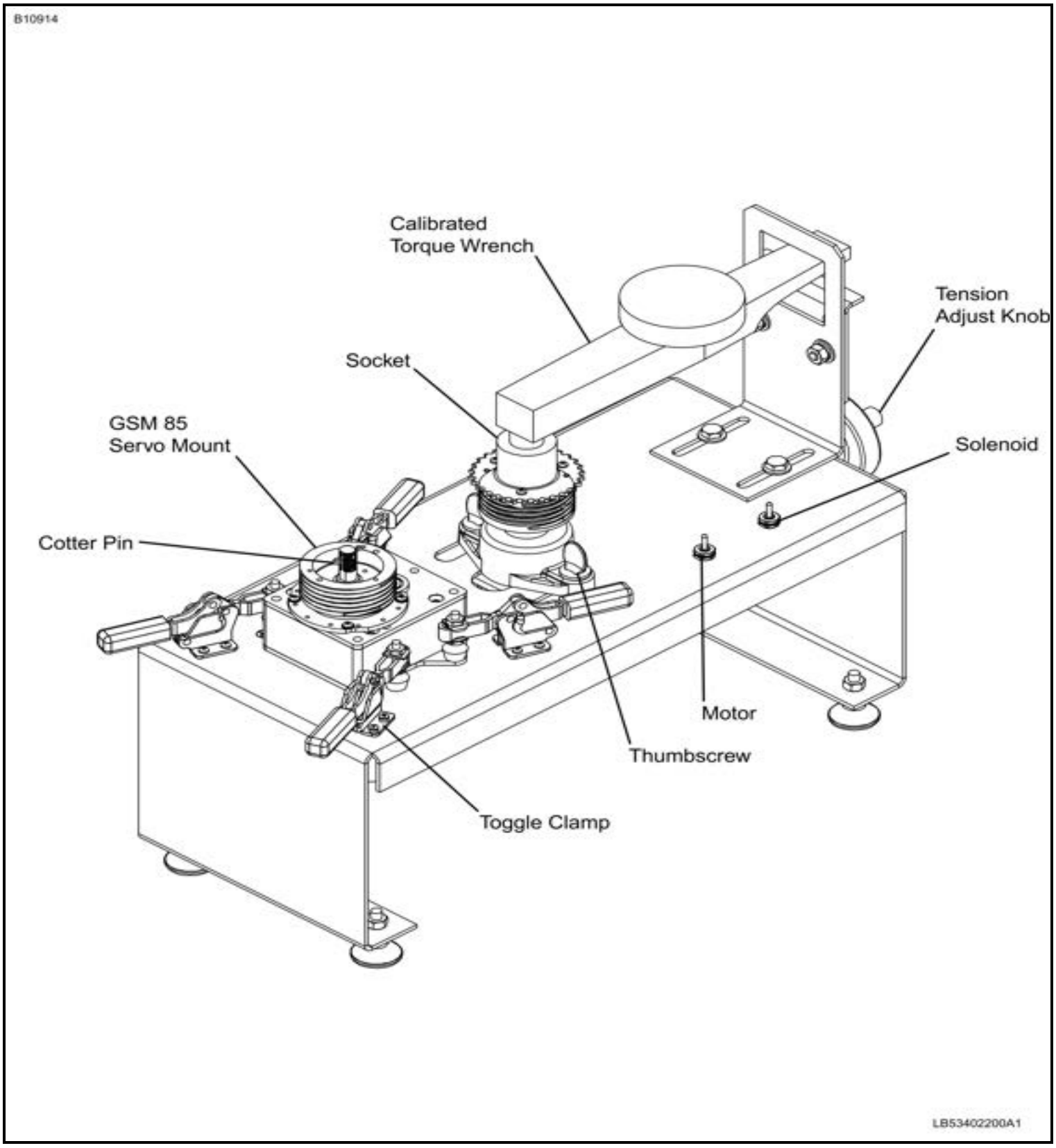
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Figure 204 : Sheet 1 : Servo Assembly



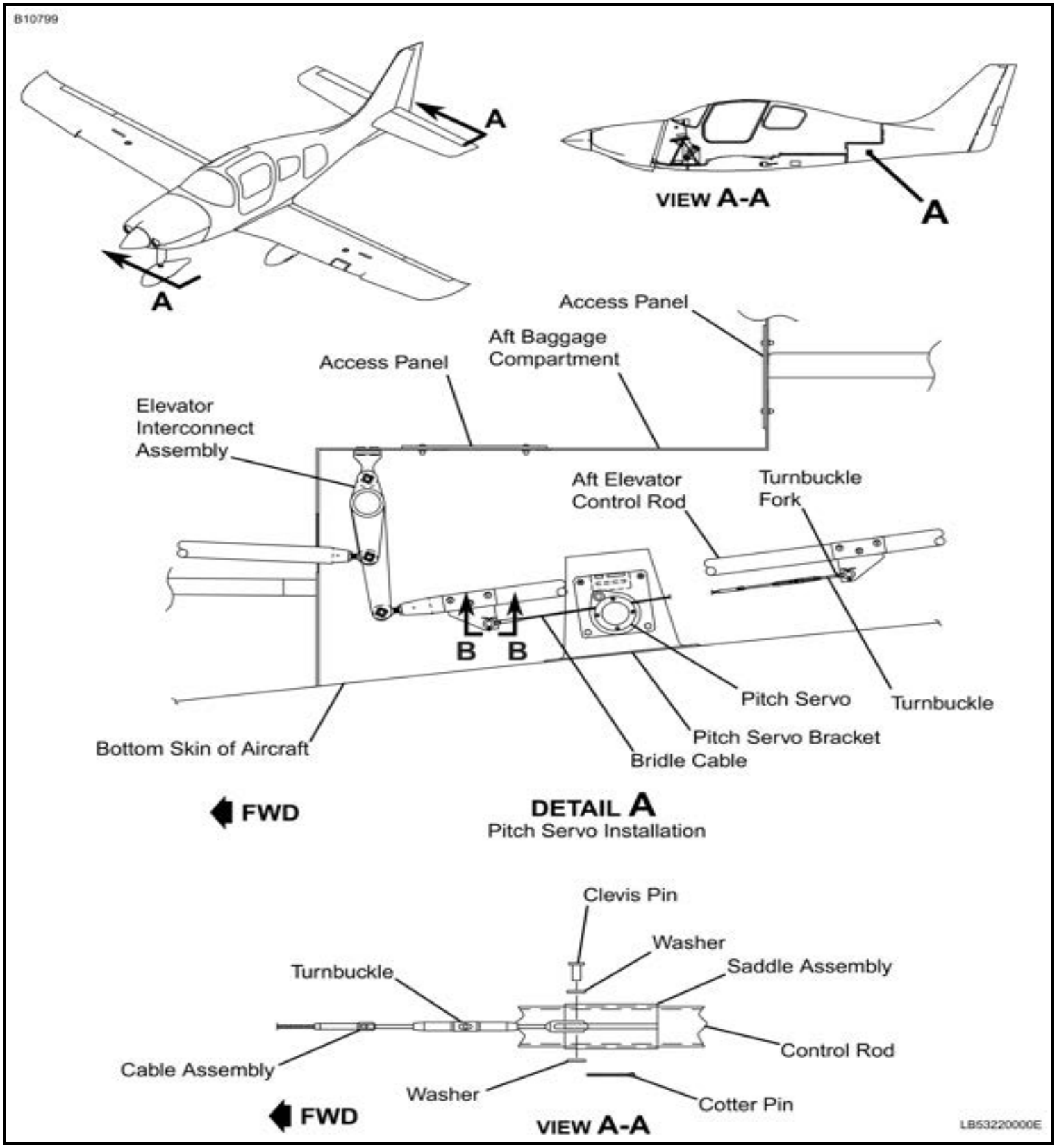
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Figure 205 : Sheet 1 : Garmin Servo Adjustment Fixture



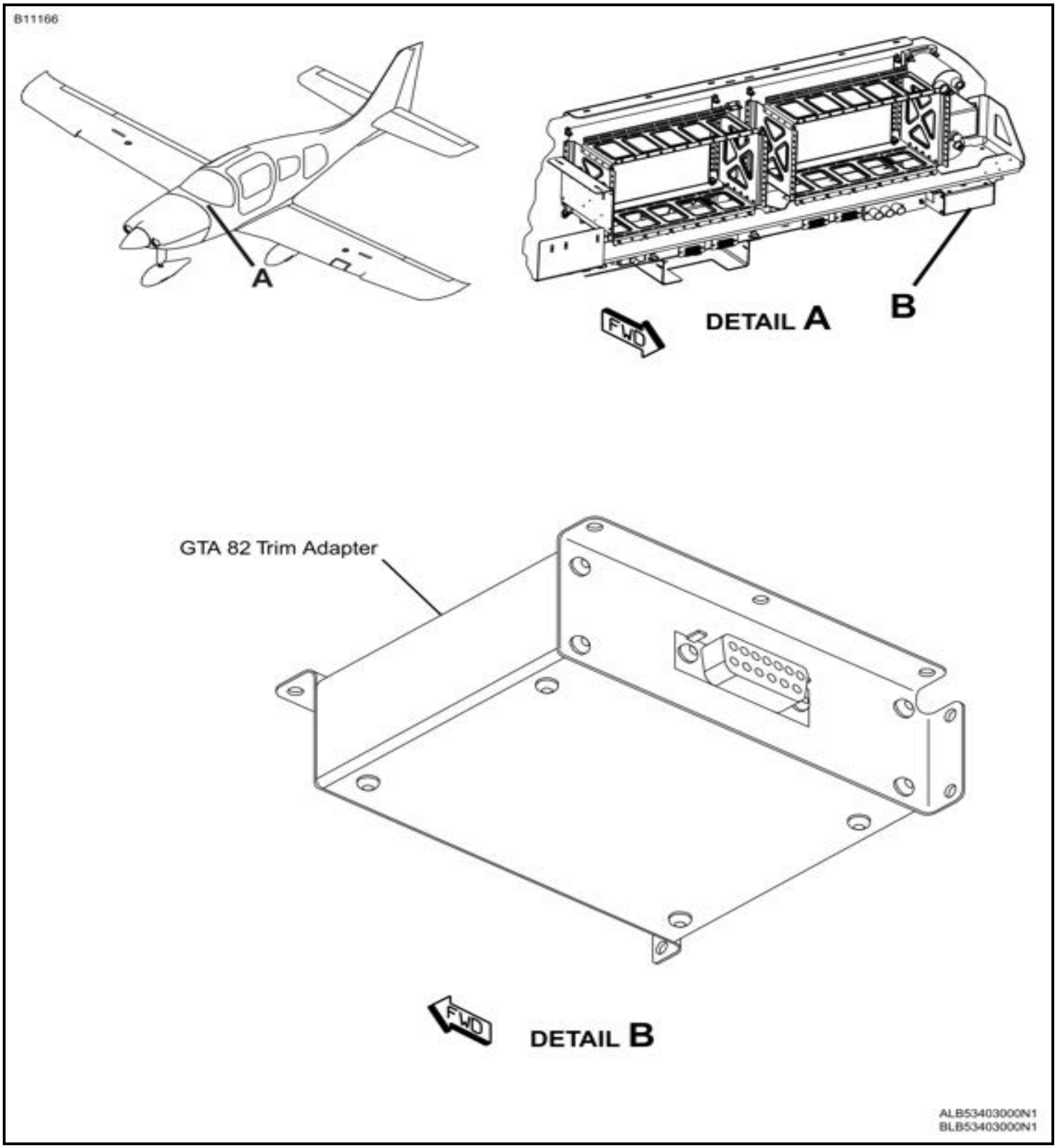
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Figure 206 : Sheet 1 : Pitch Servo



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Figure 207 : Sheet 1 : GTA 82 Trim Adapter



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GARMIN AUTOPILOT (G2000) - DESCRIPTION AND OPERATION
Garmin GFC 700

1. General

A. The Garmin G2000 Autopilot GFC 700 is a two-axis fail-safe digital flight control system. The GFC 700 refers to a fully integrated autopilot and flight director system, with functions provided by multiple G2000 LRUs. The LRU's include, the GRU 1400 Primary Flight Display (PFD), GRU 1400 Multifunctional Display (MFD), GIA 63W Integrated Avionics Units No. 1 and No. 2, two GSA 81 AFCS Servos, GTA 81 Pitch Trim Adapter, and two GSM 86 Servo mounts. Refer to Figure 1.

B. The following functions are provided by the GFC 700 in this installation:

- Flight Director
- Autopilot
- Manual Electric Trim

C. The flight crew controls the G2000 Autopilot system functions with Garmin GMC 720 AFCS Mode Controller, found on the top near right-center of the instrument panel. For more data applicable to the GMC 720, refer to Chapter 34, Garmin G2000 - Description and Operation.

D. The AFCS mode annunciations are sown on the upper-center area of the PFD whenever the flight director or the autopilot is active. Roll modes are shown on the left side, and pitch modes on the right. Armed modes are shown (white) on the outer edge of the AFCS annunciation field of the PFD. Active modes are shown (green) next to the armed modes.

2. Operation

A. After power is applied to the aircraft, each part of the GMC 720 AFCS will begin a basic self test to ensure that the system is functioning properly. Before, during, and after this process is being performed, there are visual and aural cues to associate with this test.

B. Before the preflight test (PFT) begins, the red AFCS message is shown in the upper center area of the PFD. The red AFCS is shown while the main system is still not fully energized. When the AFCS begins its PFT, the red AFCS message is replaced by a white PFT message. When the test is complete, the white PFT message is removed. If the system fails the PFT, then the white PFT is replaced by a red PFT or AFCS message. If the test is successfully completed, no additional messages are shown in the place of the white PFT. Also at the successful completion of the test, a two-tone aural message, repeated three times, is heard.

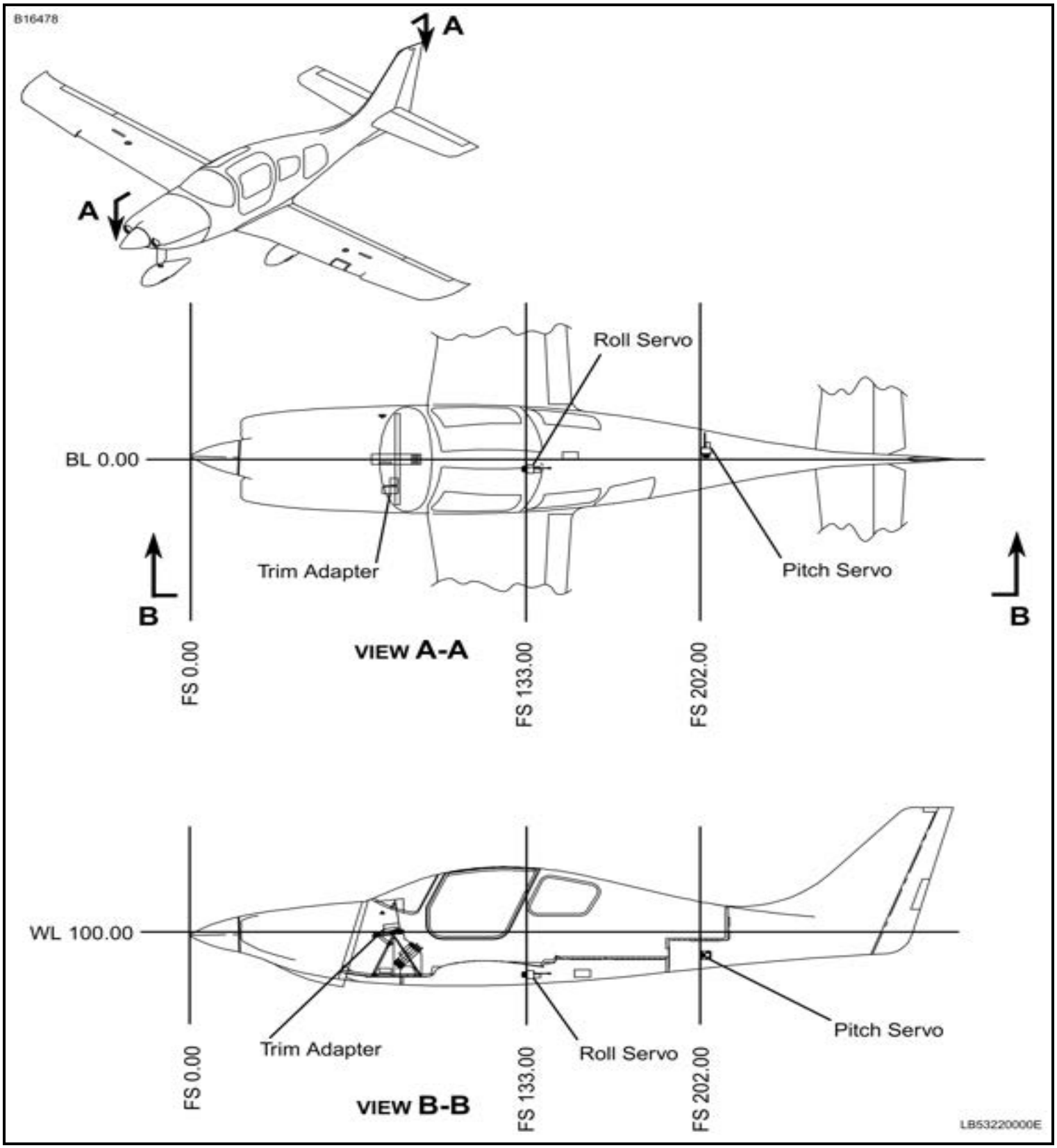
C. The Garmin GFC 700 Flight Director functions are accomplished by the No.1 GIA 63W that uses data from the G2000 system, including air data, attitude, and navigation data, to calculate commands for display to the pilot and for the Autopilot. Flight Director command bars and mode annunciations are sent to the PFD through a high-speed Ethernet connection for display to the pilot. The Flight Director operates independently of the Autopilot, and allows the pilot to hand-fly the command bars, if necessary.

D. The Garmin GFC 700 command data is given to the two GSA 81 servos. Flight Director data is processed by the two servos for aircraft flight control surface commands. The autopilot cannot operate unless the Flight Director is engaged. The following is a summary of the autopilot functions provided by each LRU:

- GDU 1400 Primary Flight Display - Displays the Flight Director command bars and the autopilot mode annunciations.
- GMC 720 AFCS Controller- Supplies controls for the autopilot functions.
- GIA 63W No.1 - Does the calculations to display the Flight Director command bars on the PFD and supplies the control movement commands to the GSA 81 autopilot servos.
- GSA 81 - Actuates the control surfaces based on commands received from the GIA 63W.
- GSA 82 Trim Adapter - Operates the elevator trim tab.

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Figure 1 : Sheet 1 : G2000 Autopilot Installation



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GARMIN AUTOPILOT (G2000) - ADJUSTMENT/TEST
GFC 700

1. General

A. This section has the inspections and checks necessary to keep the Garmin G2000 GFC 700 autopilot system pitch and roll servos and the Garmin GMC 720 AFCS Mode Controller (G2000) and associated switches in a serviceable condition. For additional maintenance data for the GFC 700 autopilot system components, refer to the Garmin G2000 Integrated Avionics Line Maintenance Manual 190-01263-01, found in the Supplier Publication List. For more data on the functions of the GMC 720 AFCS Mode Controller refer to, Garmin G2000 - Description and Operation.

2. Garmin GFC 700 AFCS Operational Check

A. Do the Garmin GFC 700 AFCS Self-Test

(1) Supply electrical power to the airplane as follows:

(a) Supply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE switch (SW03) to the ON position.

(2) Make sure that when electrical power is initially supplied, the AFCS (red) message shows on the primary flight display (PFD).

(a) The AFCS message shows system failure.

(3) When the self-test starts the AFCS (red) message is replaced by the PFT (white) on the PFD.

(a) The PFT message shows that the preflight test is operating.

(4) When the test is complete the steps that follow occur:

(a) The A/P (white) no longer shows on the PFD.

(b) A two-tone aural tone operates.

(5) Push the AP button on the AFCS mode controller.

(a) The AP (green) message shows on the PFD.

(6) If no more tests are to be done, remove electrical power as follows:

(a) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(c) Set the CROSS TIE switch (SW03) to the OFF position.

(d) Remove external power from the airplane.

B. Do the GMC 720 AFCS Mode Controller Operational Check.

(1) If necessary, supply electrical power to the airplane as follows:

(a) Supply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE switch (SW03) to the ON position.

(2) On the GMC 720 push the AP button to engage the autopilot.

(a) Make sure that the AP (green) shows on the Primary Flight Display (UI407) PFD.

(3) On the pilot's control stick, momentarily push the AP DISC switch (SW31).

(a) Make sure that the AP (green) no longer shows on the PFD.

(b) Make sure that the AP (yellow) flashes on the PFD for approximately five seconds.

(c) Make sure that the autopilot disengage tone is heard in the overhead speaker.

(4) On the GMC 720 push the AP button to engage the autopilot.

(a) Make sure that the AP (green) shows on the PFD.

(5) On the copilot's control stick, momentarily push the AP DISC switch (SW32).

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(a) Make sure that the AP (green) no longer shows on the PFD.
(b) Make sure that the AP (yellow) flashes on the PFD for approximately five seconds.
(c) Make sure that the autopilot disengage tone is heard in the overhead speaker.

(6) On the GMC 720 push the AP button to engage the autopilot.
(a) Make sure that the AP (green) shows on the PFD.

(7) Momentarily push the GA switch (SI003) located near the throttle.
(a) Make sure that the GA (green) indicator shows on the PFD
(b) Make sure that the flight director bars show a 5 to 10 degree pitch up command.

(8) On the pilot's control stick, push the CWS switch (SW33).
(a) Make sure that the CWS (white) shows on the PFD.
(b) Make sure that the AP (green) no longer shows on the PFD.

(9) On the pilot's control stick, release the CWS switch.
(a) Make sure that the AP (green) shows on the PFD.
(b) Make sure that the CWS (white) no longer shows on the PFD.

(10) If no more tests are to be done, remove electrical power as follows:
(a) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(c) Set the CROSS TIE switch (SW03) to the OFF position.
(d) Remove external power from the airplane.

C. Slip Clutch Override Test

NOTE: The slip clutch override test is typical for the pitch and roll clutch assembles.

(1) With no electrical power supplied to the airplane, make sure that there is freedom of movement in all control axes.

(2) Supply electrical power to the airplane as follows:
(a) Supply external electrical power to the airplane.
(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.
(c) Set the AVIONICS MASTER switch (SW04) to the ON position.
(d) Set the CROSS TIE switch (SW03) to the ON position.

(3) Use the GCU 275 controller PFD large knob to navigate to the configuration mode on the PFD.

(4) Use the GCU 275 controller PFD inner knob to navigate to the GFC page group second page.

(5) Push the pitch or roll ENG CLCH soft key.
(a) The internal engage clutch is turned on.

(6) Push the DRV SRVO soft key.

NOTE: This holds the servo actuator at zero speed for the check.

(7) Move the pilot's control stick forward and aft for pitch or side to side for roll as applicable, through its full range of motion.
(a) Make sure that the controls move through the full range of motion with some resistance.
(b) When you override the slip clutch, monitor the SPEED (servo speed) on the PFD GFC page SERVO DATA area.
1 Make sure that the servo does not turn.

(8) Push the DIS CLCH and STP SRVO soft keys.

(9) Move the pilot's control stick forward and aft through its full range of motion.
(a) Make sure that the controls move through the full range of motion no resistance.

(10) If no more tests are to be done, remove electrical power as follows:
(a) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(c) Set the CROSS TIE switch (SW03) to the OFF position.

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(d) Remove external power from the airplane.

D. Trim Operational Test

(1) If necessary, supply electrical power to the airplane as follows:

(a) Supply external electrical power to the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(c) Set the AVIONICS MASTER switch (SW04) to the ON position.

(d) Set the CROSS TIE switch (SW03) to the ON position.

(2) Move the trim switch (SW27) on the pilot's control stick down (D).

(a) Make sure that the elevator trim indicator on the Multifunction Display (MFD) (UI406), moves up.

(b) Make sure that the right elevator trim panel moves down.

(3) Move the trim switch on the pilot's control stick up (U).

(a) Make sure that the elevator trim indicator on the MFD, moves down.

(b) Make sure that the right elevator trim panel moves up.

(4) Move the trim switch on the pilot's control stick right (R).

(a) Make sure that the elevator trim indicator on the MFD, moves right.

(b) Make sure that the right elevator trim panel moves down.

(5) Move the trim switch on the pilot's control stick left (L).

(a) Make sure that the elevator trim indicator on the MFD, moves left.

(b) Make sure that the right elevator trim panel moves up.

(6) Use the trim switch (SW28) on the copilot's control stick and do the test again.

(7) If no more tests are to be done, remove electrical power as follows:

(a) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(c) Set the CROSS TIE switch (SW03) to the OFF position.

(d) Remove external power from the airplane.

3. Garmin GFC 700 Annual Inspection

NOTE: The inspection of the roll and pitch components are identical.

A. Do the GFC 700 Annual Inspection.

(1) Remove the antenna bulkhead panel, located under the hat rack to get access to the pitch servo. Refer to Chapter 25 Equipment/Furnishings Access Panels - Maintenance Practices.

(2) Remove the flap and aileron pushrod access panel, located under aft/center of the wing to get access to the roll servo.

(3) Visually inspect each of the two GSM 86 Servo Mounts as follows:

(a) Check the cables for fraying or corrosion.

(b) Check the mount brackets for cracks or wear.

(c) If necessary, replace cables or mount brackets as applicable.

(4) Check system wiring bundles for chaffing or other damage.

(a) If necessary, repair or replace wire bundles.

(5) Have a second certified technician manually move the control surfaces through their full range of motion.

(a) Monitor the components that follow:

- Servos
- Connectors
- Support structures
- Control cables.

(b) Make sure that:

- The control cables are not binding

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- The capstan pulleys turn freely.

(6) Check that bridle cable tension is 25 to 60 pounds.

(7) Do the servo slip clutch override check. Refer to Garmin GFC 700 AFCS Operational Check

(8) Do the autopilot operation check. Refer to Garmin GFC 700 AFCS Operational Check.

(9) Install the antenna bulkhead panel. Refer to Chapter 25 Equipment/Furnishings Access Panels - Maintenance Practices.

(10) Install the flap and aileron pushrod access panel.

4. Garmin GFC 700 Three Year or 1000 Hour Inspection

A. Garmin GFC 700 1000 Hour Inspection

B. GSA Servo Actuator Inspection

NOTE: The inspection of the roll and pitch components are identical.

(1) Remove the antenna bulkhead panel, located under the hat rack to get access to the pitch servo. Refer to Chapter 25 Equipment/Furnishings Access Panels - Maintenance Practices.

(2) Remove the flap and aileron pushrod access panel, located under aft/center of the wing to get access to the roll servo.

(3) Visually inspect each of the two GSM 86 Servo Mounts cables for fraying or corrosion and the mount brackets for cracks or wear.

(a) If necessary, replace cables or mount brackets as applicable.

(4) Check system wiring bundles for chaffing or other damage.

(a) If necessary, repair or replace wire bundles.

(5) Manually move the control surfaces through their full range of motion.

(a) Make sure that:

- The control cables are not binding
- The capstan pulleys turn freely.

(6) Remove the pitch and roll GSA 81 servos from their related GSA 86 mounts. Refer to Garmin G2000 Roll Servo Unit, GSA 81 Autopilot Roll Servo Removal/Installation or to Refer to Garmin G2000 Pitch Servo Unit GSA 81 Autopilot Pitch Servo Removal/Installation, as applicable.

(a) Clean and grease each of the two servos output gears every 1000 hours or 3 years, whichever occurs first, Refer to the Garmin Corvalis G2000 Line Maintenance Manual 190-01185-00, found in the Supplier Publication List.

(7) Remove the pitch and roll GSA 86 mounts from the airplane. Refer to Garmin G2000 Roll Servo Unit, GSM 86 Autopilot Roll Servo Mount Removal/Installation or to Refer to Garmin G2000 Pitch Servo Unit GSM 86 Autopilot Pitch Servo Mount Removal/Installation, as applicable.

(8) Do a check of the GSM 86 slip clutch torque. Refer to GSM 86 Slip Clutch Torque Check.

(9) When the inspection is complete install the pitch and roll GSA 81 servos. Refer to Garmin G2000 Roll Servo Unit, GSA 81 Autopilot Roll Servo Removal/Installation or to Refer to Garmin G2000 Pitch Servo Unit GSA 81 Autopilot Pitch Servo Removal/Installation, as applicable.

(10) Install the pitch and roll GSA 86 mounts in the airplane. Refer to Garmin G2000 Roll Servo Unit, GSM 86 Autopilot Roll Servo Mount Removal/Installation or to Refer to Garmin G2000 Pitch Servo Unit GSM 86 Autopilot Roll Servo Mount Removal/Installation, as applicable.

C. GSM 86 Slip Clutch Torque Check (Refer to Figure 501).

NOTE: The GSM 86 slip clutches are not adjustable once manufactured. Refer to the Slip-Clutch Setting Procedure found in the GSA 8X/GSM 85(A) Installation Manual, Garmin part number 190-00303-72, found in the Supplier Publication List.

(1) Put the servo in its correct position on the Garmin Servo Adjustment Fixture (011-01085-XX).

(a) Attach the servo to the fixture with the fixture toggle clamps.

(2) Install the cable, supplied with the fixture, between the capstan under test and the fixture capstan.

(3) Remove slack in the cable with the tension adjust knob.

(4) Tighten the thumbscrews on the fixture capstan.

(5) Attach a socket to a calibrated torque wrench of the appropriate range and place the assembly on top of the fixture

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capstan. Adjust the wrench support as required to support the torque wrench in a level, horizontal position.

(a) Make sure that the torque wrench is set to "ZERO" while the motor and solenoid are "OFF".

(6) Connect a 24 Vdc power supply to the fixture.

(7) Place the solenoid switch to "ON" and move the direction switch to the "CW" or "CCW" position.

(a) Allow the capstan to rotate at least two full revolutions revolution in each direction.

(8) Use the torque wrench to check the slip clutch torque value.

(a) Make sure the torque value the torque wrench shows is equal to the torque value stamped on the servo mount + 4 inch pounds to - 4 inch pounds.

(b) If the servo mount torque value does not agree with the torque setting stamped on the servo mount, the servo mount must be replaced. The torque setting is not adjustable at the field level.

D. GTA 82 Trim Adapter Inspection

(1) Check the GTA 82 Trim Adapter connector and wiring for damage.

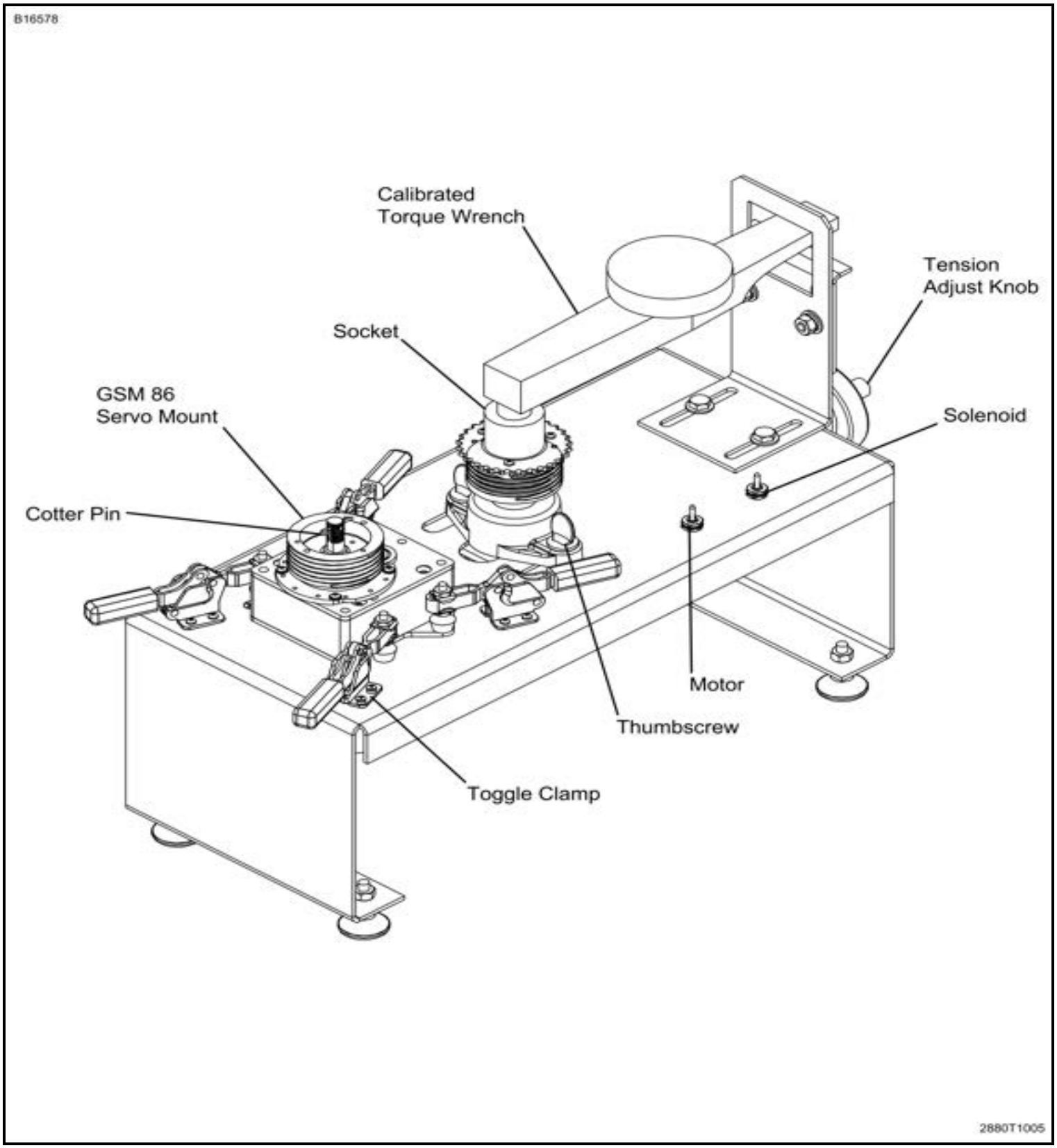
(a) Repair or replace unserviceable wiring components as necessary.

(2) Check the GTA 82 Trim Adapter for corrosion or other damage.

(a) Repair or replace the as GTA 82 Trim Adapter necessary. Refer to, Garmin Trim Adapter (G2000) - Removal/Installation.

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Figure 501 : Sheet 1 : Garmin Servo Adjustment Fixture



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GARMIN ROLL SERVO UNIT (G2000) - REMOVAL/INSTALLATION

1. General

A. The GSA 81 and the GSM 86 are components of the Garmin G2000 Auto Pilot System (GFC700). The GSA 81 is mated to the GSM 86 Servo Mount to form a single servo unit. Refer to Figure 402. Because of the design of the servo unit the servo portion (GSA 81) can be removed from the capstan (GSM 86) without the need to de-rig the aircraft control cables. The roll servo is located beneath the rear passenger seats.

CAUTION: When removing and/or replacing a G2000 component, make sure that the aircraft power is off. Disconnect auxiliary power supplies.

2. GSA 81 Autopilot Roll Servo Removal/Installation

A. Remove the GSA 81 Autopilot Roll Servo (MF300) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the AUTOPILOT and A/P CTRL circuit breakers found on the cockpit circuit breaker panel.

(5) Remove the flap and aileron push-rod access panel found on the underside of the wings near the fuselage.

(6) Remove the servo. Refer to Figure 402.

(a) Disconnect electrical connector P680 from electrical connector P801.

(b) Remove the bolts that attach the servo to the servo mount.

(c) Remove the servo from the servo mount.

CAUTION: Do not use solvents to clean the output gear.

(7) Remove excess grease buildup from the single servo output gear using a lint-free cloth.

NOTE: It is not necessary to remove all of the grease from the output gear, only the excess grease.

(8) Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 33 MS (preferred) or Aeroshell 17 grease.

B. Install the GSA 81 Autopilot Roll Servo (MF300) (Refer to Figure 401).

(1) Put the GSA 81 in its correct position on the GSM 86 servo mount. Refer to Figure 402.

(a) Make sure that you align the servo mount gears and the servo gears correctly.

(2) Install the bolts that attach the servo to the servo mount.

(3) Torque the bolts 25 to 40 inch pounds (2.82 to 4.51 N-m).

(4) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(5) Connect electrical connector P680 to electrical connector P801.

(6) Engage the AUTOPILOT and A/P CTRL circuit breakers found on the cockpit circuit breaker panel.

(7) Configure and test the GSA 81. Refer to the Garmin Corvalis G2000 Line Maintenance Manual 190-01185-00, found in the Supplier Publication List

(8) Operate the controls through full travel and make sure that no binding or restriction occurs.

(9) Install the Flap and Aileron Push-Rod Access Panel.

3. GSM 86 Autopilot Roll Servo Mount Removal/Installation

A. Remove the GSM 86 Autopilot Roll Servo Mount (Refer to Figure 402).

(1) Remove the servo. Refer to the GSA 81 Roll Servo Removal procedure in this section.

(2) Remove the servo mount.

(a) Disconnect the turnbuckle end of the cable.

1 Remove the clip from the turnbuckle.

2 Loosen and separate the turnbuckle.

(b) Disconnect the fork end of the cable from the left saddle assembly.

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1 Remove the cotter pin from the clevis pin.

2 Remove the washers and clevis pin.

3 Remove the fork end of the cable from the left saddle assembly.

(c) If necessary, remove the cable from the capstan.

1 Remove the capstan cover and cable retention pins.

2 Record how the cable is installed on the capstan.

3 Remove the cable from the capstan.

(d) Remove the four bolts that attach the mount to the servo mount bracket.

(e) Remove the servo mount with the bridle cable.

NOTE: If the servo mount is removed for an extended time, a cover can be installed on the servo mount to prevent contamination of the unit.

B. Install the GSM 86 Autopilot Roll Servo Mount (Refer to Figure 402).

(1) Install the servo mount.

(a) Put the servo mount in its correct position on the servo mount bracket.

1 Install the four bolts that attach the servo mount to the servo mount bracket.

2 Torque the bolts 25 to 40 inch pounds (2.82 to 4.51 N-m).

(2) Install the bridle cable. as follows:

(a) If necessary, install the cable on the capstan

1 If necessary, remove the capstan cover and cable retention pins from the capstan

2 Put the cable in position on the capstan

a Wrap the fork end approximately 450 degrees over the capstan

b Make sure the lock ball is correctly mated in its seat

c Wrap the turnbuckle end approximately 270 degrees over the capstan.

NOTE: When installed correctly, the bridle cable will make two complete revolutions around the capstan.

3 Instal the capstan cover and cable retention pins on the capstan.

(b) Connect the two halves of the turnbuckle.

NOTE: Do not tighten the turnbuckle at this point.

(c) Install the fork end of the cable.

1 Put the fork end of the cable in position in the left saddle assembly

2 Install the clevis pin and washers

3 Install the cotter pin in the clevis pin.

(d) Do the system rigging with the controls at neutral.

(e) Set the cable tension to 25 to 60 pounds.

(f) Install new clips on the turnbuckle.

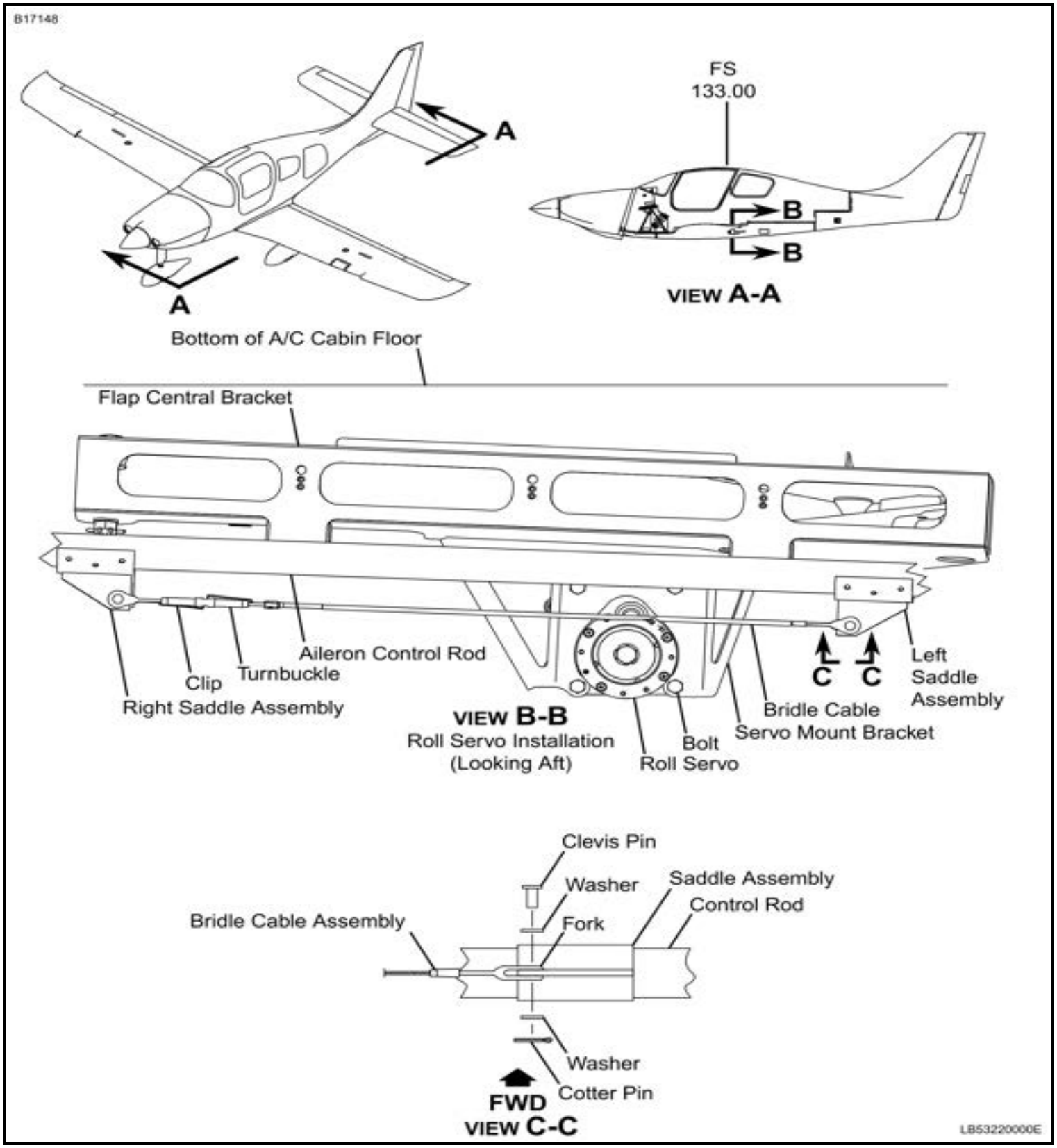
(3) Install the servo. Refer to the GSA 81 Roll Servo Installation procedure in this section.

(4) If you installed a new GSA 81 Roll Servo you must upload the G2000 system baseline software and configuration files to the unit. Refer to Garmin G2000 - Adjustment/TestG2000 System Baseline Software and Configuration File Upload. For more data applicable to the upload of software and configuration files, refer to the Loading and Testing LRU Software section of the most current revision of the Garmin G2000 Integrated Avionics System Line Maintenance Manual, P/N 190-01185-00, found on the Supplier Publication List.

(5) To test and troubleshoot the Garmin G2000 Roll Servo Unit. Refer to the Garmin Corvalis G2000 Line Maintenance Manual 190-01185-00, found in the Supplier Publication List.

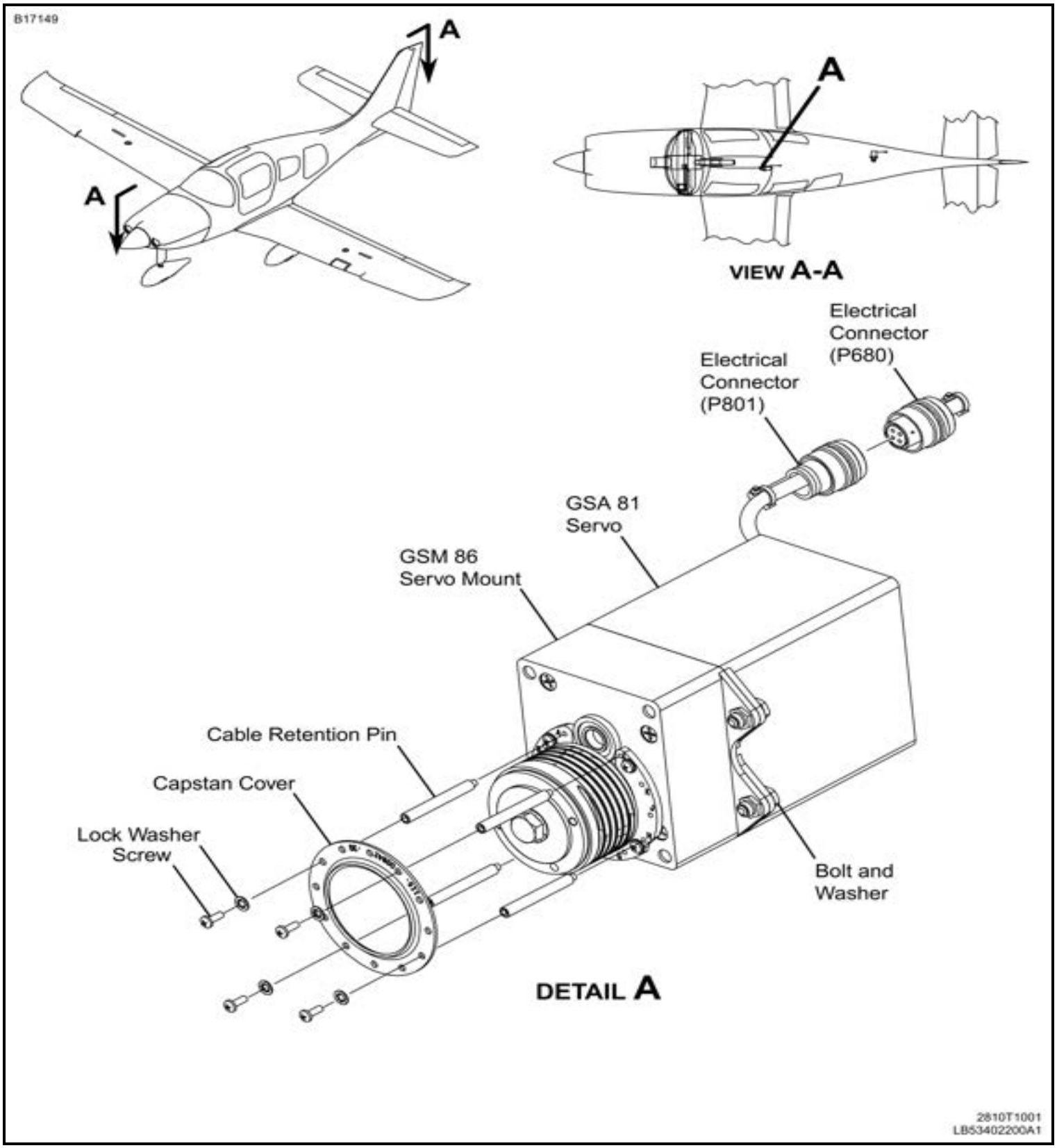
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Figure 401 : Sheet 1 : Roll Servo Installation



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Figure 402 : Sheet 1 : Servo Assembly



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GARMIN PITCH SERVO UNIT (G2000) - REMOVAL/INSTALLATION

1. General

A. The GSA 81 and the GSM 86 are components of the G2000 Garmin Auto Pilot system (GFC 700). The GSA 81 is mated to the GSM 86 Servo Mount to form a single servo unit. Refer to Figure 402. Because of the design of the servo unit the servo portion (GSA 81) can be removed from the capstan (GSM 86) without the need to de-rig the aircraft control cables. The pitch servo is found below the aft baggage compartment.

CAUTION: When removing and/or replacing a G2000 component, make sure that the aircraft power is off. Disconnect auxiliary power supplies.

2. GSA 81 Autopilot Pitch Servo Removal/Installation

A. Remove the GSA 81 Autopilot Pitch Servo (MF301) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the AUTOPILOT and A/P CTRL circuit breakers found on the cockpit circuit breaker panel.

(4) Remove the baggage bulkhead access panel found under the hat rack in accordance with Chapter 25, Access Panels.

(5) Remove the servo. Refer to Figure 402.

(a) Disconnect electrical connector P681 from electrical connector P801.

(b) Remove the four bolts and washers that attach the servo to the servo mount.

(c) Remove the servo from the servo mount.

CAUTION: Do not use solvents to clean the output gear.

(6) Remove excess grease buildup from the single servo output gear using a lint-free cloth.

NOTE: It is not necessary to remove all of the grease from the output gear, only the excess grease.

(7) Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 33 MS (preferred) or Aeroshell 17 grease.

B. Install the GSA 81 Autopilot Pitch Servo (MF301) (Refer to Figure 401).

(1) Put the servo in its correct position on the servo mount. Refer to Figure 402.

(a) Make sure that you align the servo mount gears and the servo gears correctly.

(2) Install the four bolts and washers that attach the servo to the servo mount.

(3) Torque the bolts 25 to 40 inch pounds (2.82 to 4.51 N-m).

(4) Visually inspect the electrical connector to make sure there are no bent or damaged pins.

(a) Repair any damage.

(5) Connect electrical connector P681 to electrical connector P801.

(6) Engage the AUTOPILOT and A/P CTRL circuit breakers found on the cockpit circuit breaker panel.

(7) Configure and test the GSA 81. Refer to the Garmin Corvalis G2000 Line Maintenance Manual 190-01185-00, found in the Supplier Publication List.

(8) Operate all controls through full travel and make sure that no binding or restriction occurs.

(9) Install the baggage bulkhead access panel and the hat rack in accordance with Chapter 25.

3. GSM 86 Autopilot Pitch Servo Mount Removal/Installation

A. Remove the GSM 86 Autopilot Pitch Servo Mount (Refer to Figure 402).

(1) Remove the servo. Refer to the GSA 81 Pitch Servo Removal procedure in this section.

(2) Remove the servo mount.

(a) Disconnect the turnbuckle end of the cable.

1 Remove the clip from the bridle cable turnbuckle.

2 Loosen and separate the turnbuckle.

(b) Disconnect the fork end of the cable from the aft saddle assembly.

1 Remove the cotter pin from the clevis pin.

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2 Remove the clevis pin and washers.

3 Remove the fork end of the cable from the aft saddle assembly.

(c) If necessary, remove the cable from the capstan.

1 Remove the capstan cover and cable retention pins.

2 Record how the cable is installed on the capstan.

3 Remove the cable from the capstan.

(d) Remove the four bolts that attach the mount to the pitch servo bracket.

(e) Remove the servo mount with the bridle cable.

NOTE: If the servo mount is removed for an extended time, a cover can be installed on the servo mount to prevent contamination of the unit.

(f) If installed, remove the tapered shim attached to the face of the servo mount by removing the two 10-32 x 17/32 screws and two 10-32 x 25/32 screws.

1 Remove shim and retain for installation.

B. Install the GSM 86 Autopilot Pitch Servo Mount (Refer to Figure 402).

(1) Install the servo mount.

(a) If removed, install the tapered shim on the mount with two 10-32 x 17/32 screws and two 10-32 x 25/32 screws.

(b) Put the servo mount in its correct position on the pitch servo bracket.

1 Install the four bolts that attach the mount to the pitch servo bracket.

2 Torque the bolts 25 to 40 inch pounds (2.82 to 4.51 N-m).

(2) Install the bridle cable as follows:

(a) If necessary, install the cable on the capstan

1 If necessary, remove the capstan cover and cable retention pins from the capstan

2 Put the cable in position on the capstan

a Wrap the fork end approximately 450 degrees over the capstan

b Make sure the lock ball is correctly mated in its seat

c Wrap the turnbuckle end approximately 270 degrees over the capstan.

NOTE: When installed correctly, the bridle cable will make two complete revolutions around the capstan.

3 Instal the capstan cover and cable retention pins on the capstan.

(b) Connect the two halves of the turnbuckle.

NOTE: Do not tighten the turnbuckle at this point.

(c) Install the fork end of the cable.

1 Put the fork end of the cable in position in the aft saddle assembly.

2 Install the clevis pin and washers.

3 Install the cotter pin in the clevis pin.

(d) Do the system rigging with the controls at neutral.

(e) Set the cable tension to 25 to 60 pounds.

(f) Install new clips on the turnbuckle.

(g) Make sure that there is a minimum clearance of 0.125 inches (3.175 mm) between the aft elevator control rod and the pitch servo bracket.

(3) Install the servo. Refer to the GSA 81 Pitch Servo Installation procedure in this section.

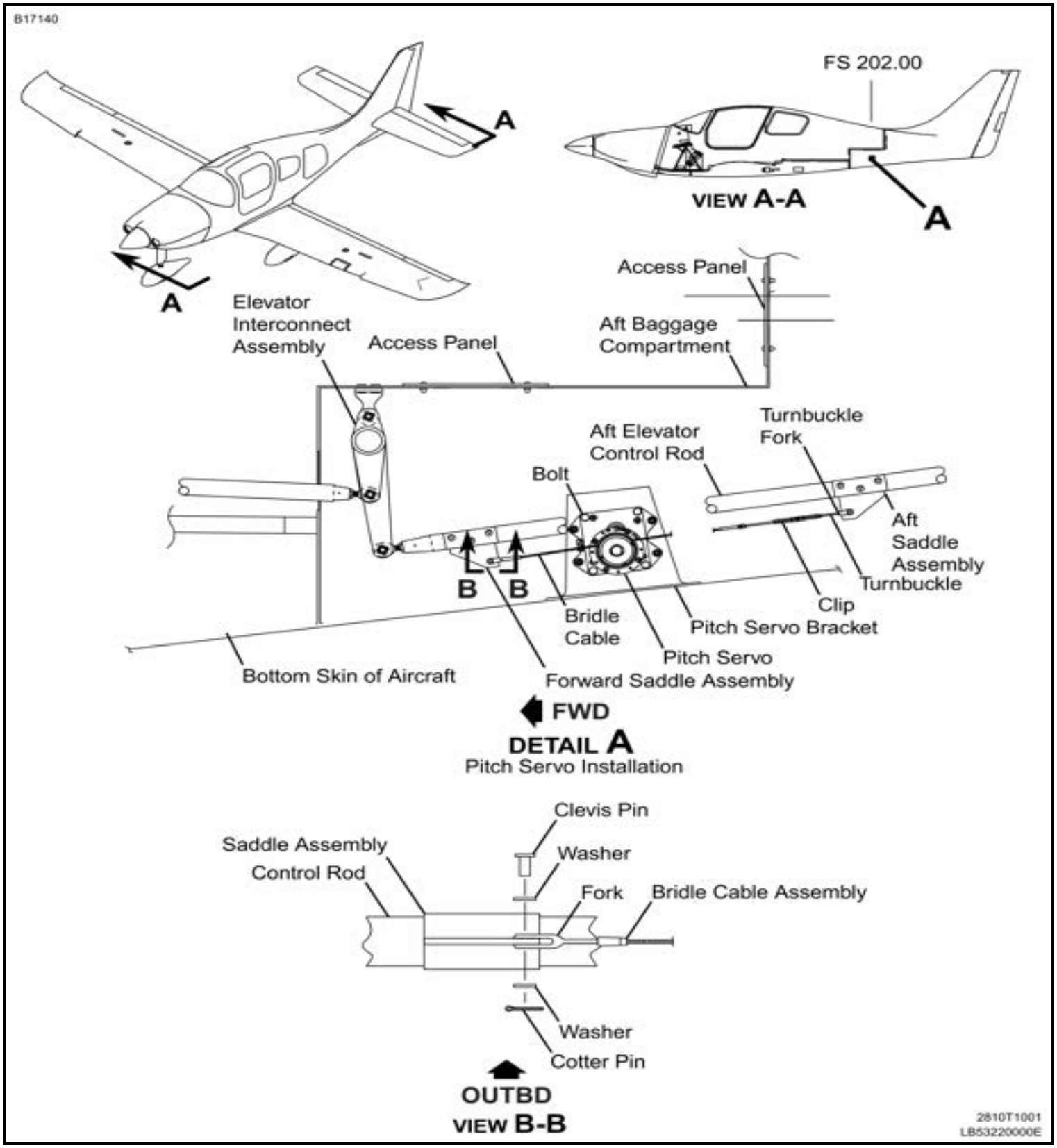
(4) If you installed a new GSA 81 Roll Servo you must upload the G2000 system baseline software and configuration files to the unit. Refer to Garmin G2000 - Adjustment/TestG2000 System Baseline Software and Configuration File Upload. For more data applicable to the upload of software and configuration files, refer to the Loading and Testing LRU Software section of the most current revision of the Garmin G2000 Integrated Avionics System Line Maintenance Manual, P/N 190-01185-00, found on the Supplier Publication List.

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(5) To test and troubleshoot the Garmin G2000 Roll Servo Unit. Refer to the Garmin Corvalis G2000 Line Maintenance Manual 190-01185-00, found in the Supplier Publication List.

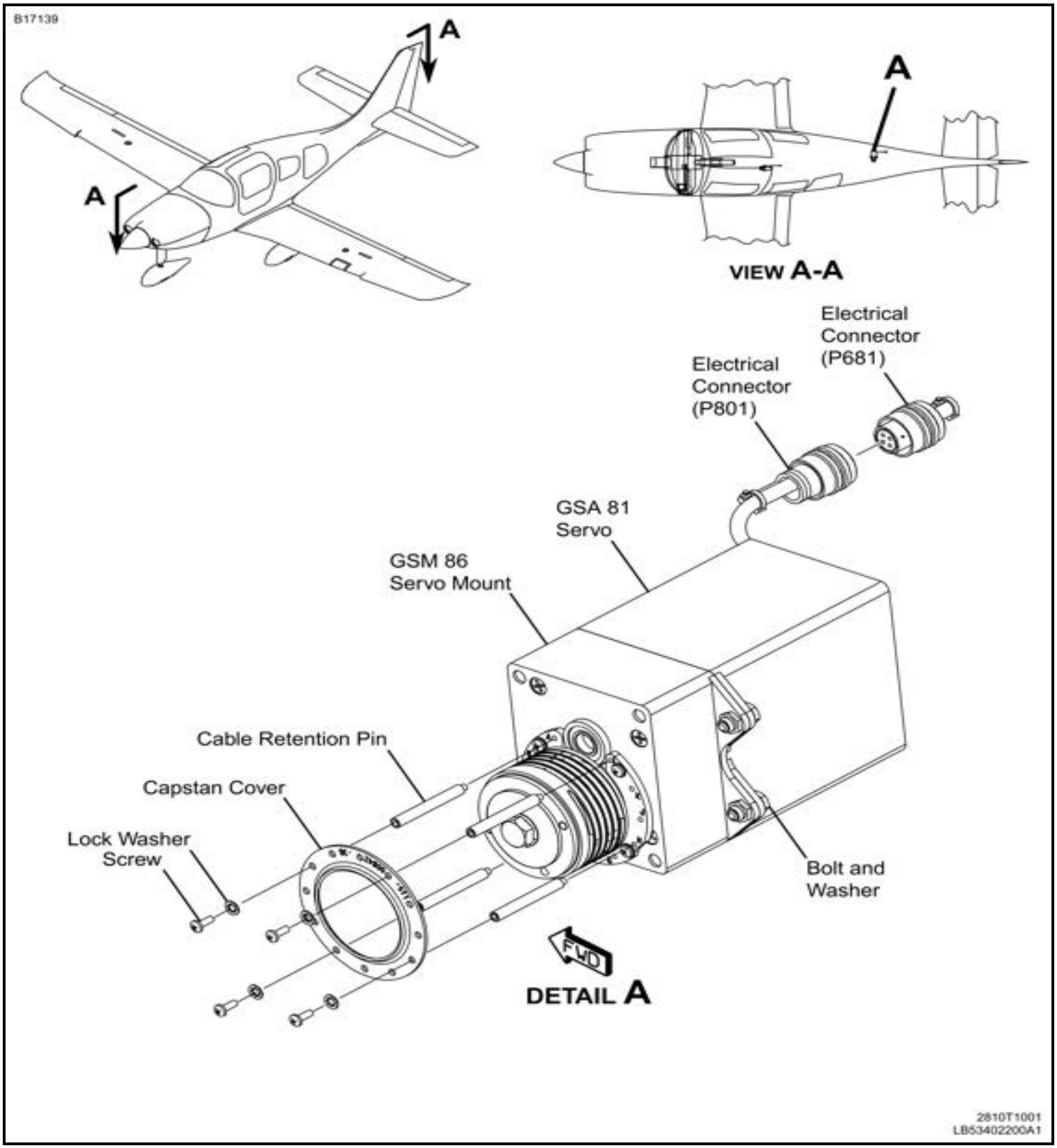
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Figure 401 : Sheet 1 : Pitch Servo



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Figure 402 : Sheet 1 : Pitch Servo Unit Installation



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GARMIN GMC 720 AFCS MODE CONTROLLER (G2000) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the G2000 Garmin GMC 720 AFCS Mode Controller (GMC 720). For a general description of the GMC 720, refer to Chapter 34, Garmin G2000 - Description and Operation.

2. Tools and Equipment

A. None.

3. Garmin GMC 720 AFCS Mode Controller Removal/Installation

CAUTION: When removing and/or replacing a G2000 component, make sure that the airplane power is off. Disconnect auxiliary power supplies.

A. Remove the GMC 720 Mode Controller (UI302) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the A/P CTRL circuit breaker found on the cockpit circuit breaker panel.

(5) Use a 3/32 hex tool to rotate each of the GMC 720 quarter-turn fasteners counter-clockwise until they reach their stops.

(6) Carefully remove the GMC 720 from the panel sufficiently to get access to the electrical connector (PI302).

(7) While supporting the GMC 720, disconnect the electrical connector (PI302).

B. Install the GMC 720 Mode Controller (UI302) (Refer to Figure 401).

(1) Visually inspect the GMC 720 electrical connector and pins for signs of damage.

(a) Repair any damage.

(2) While supporting the GMC 720, connect the electrical connector (PI302) to the unit.

CAUTION: Do not use excessive force while inserting the control unit. Excessive force could damage the controller or panel.

(3) Carefully put the GMC 720 in the instrument panel and make sure that all four quarter-turn fasteners align with the corresponding holes.

(4) Use a 3/32 hex tool to rotate each of the GMC 720 quarter-turn fasteners clockwise until they reach their stops.

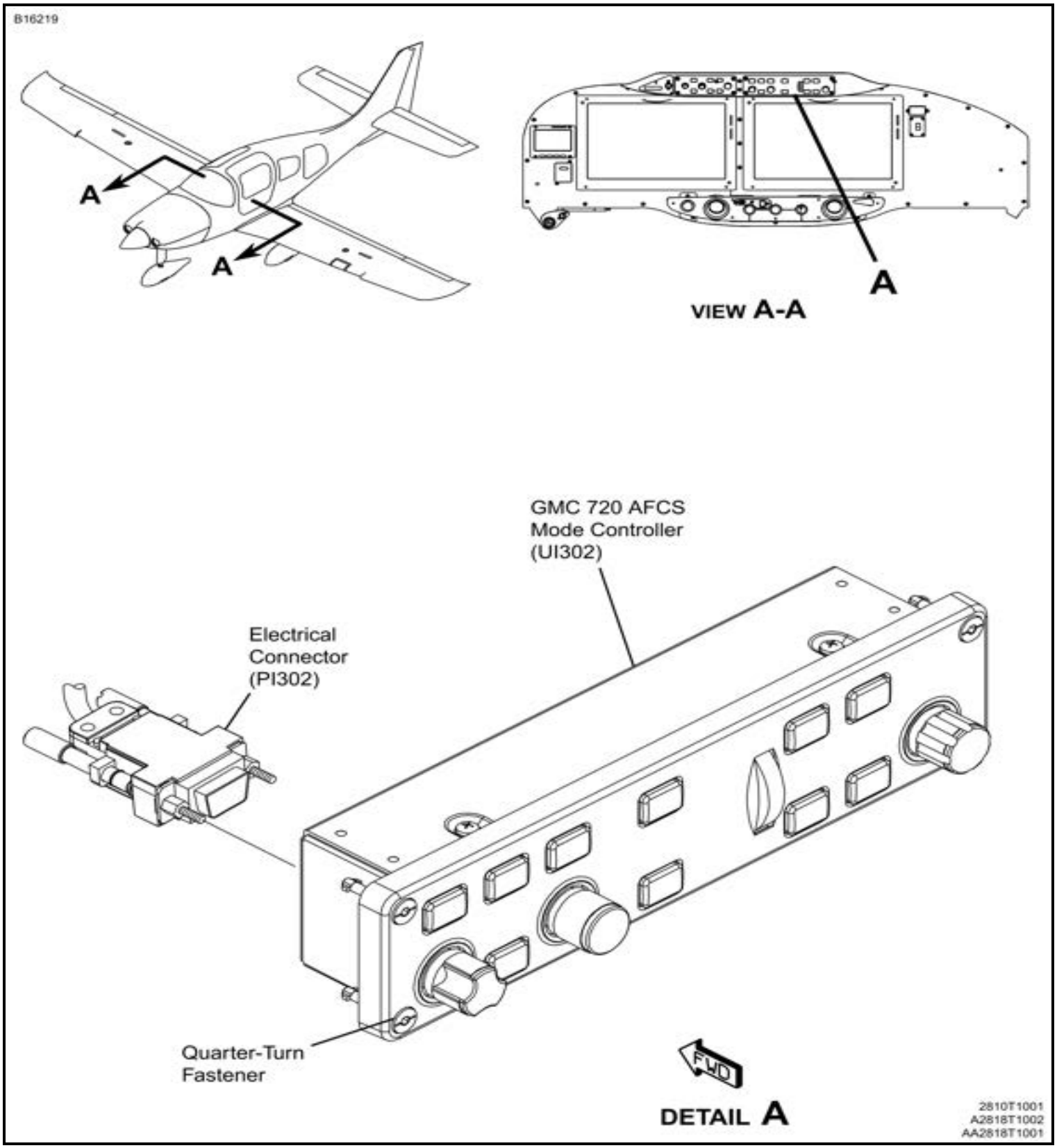
(5) Engage the A/P CTRL circuit breaker found on the cockpit circuit breaker panel.

(6) Configure the GMC 720. Refer to the most recent revision of the Garmin Corvalis G2000 Line Maintenance Manual, P/N 190-01185-00 and Garmin GMC 720 Installation manual P/N 190-00303-70. Refer to the Supplier Publication List.

(7) Do a check of the GMC 720. Refer to Garmin GFC 700 Auto Pilot (G2000) - Adjustment/Test,Garmin GFC 700 AFCS Operational Check.

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Figure 401 : Sheet 1 : GMC 720 AFCS Mode Controller Installation



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COMMUNICATIONS - GENERAL

1. General

A. The Cessna 400 (LC41-550FG/T240) utilizes the Garmin GMA 340, the Garmin GMA 1347 or the Garmin Remote Audio Panel (GMA) 36 and Garmin Touchscreen Controller (GTC) 570 . There are variations of the aircraft communications and navigation systems (refer to Chapter 34 for navigation system description). Refer to Chapter 34 and the Garmin manuals for specific information on the actual Nav/Comm hardware. Airplanes can also have optional satellite data link system(s) installed. Refer to Chapter 23 for maintenance data applicable to for each satellite system. This chapter describes the system of providing communications output to the occupants and protection from precipitation static and lightning. For a specific listing of installed equipment, refer to Section 6, Appendix A, of the POH/AFM.

B. **The Audio Panels are Installed as Follows** -

(1) The Avidyne option has the Garmin GMA 340 audio panel installed.

(2) The Garmin G1000 option has the Garmin GMA 1347 audio panel installed.

(3) The Model T240 G2000 and airplanes with the G2000 option installed, have the Garmin Remote Audio Panel GMA 36 and Garmin Touchscreen Controller (GTC) 570 installed. For more data applicable to the GTC and the GMA refer to Chapter 34, Garmin G2000 - Description and Operation.

C. **Description of Audio Panel** -

(1) The Garmin GMA 340 audio panel is installed in airplanes with the Avidyne Option. The primary purpose of the panel is to control communication and navigation audio selections, intercom functions, and the marker beacons. In addition, the unit has provisions for a stereo entertainment input. The audio panel is located in the top of the radio rack panel assembly.

(2) The Garmin GMA 1347 audio panel is installed in airplanes with the Garmin G1000 Option. For description and maintenance procedures, refer to Chapter 34, GMA 1347 Audio Panel,

D. **Description of Static Discharge System** - During use, the airplane is susceptible to a build-up of static electricity. An accumulated static electrical charge can render radio navigation and communication inoperative. The purpose of the static discharge system is to transfer the electrical charge off the airplane's surface and quietly discharge it into the air.

E. **Description of Lightning Protection System** - The composite construction of the Cessna 400 has a very high resistance to electricity and very little conductivity. Having a high conductivity is critical to lightning protection because it is important that all parts of the airplane have the same electrical potential. To achieve high conductivity, aluminum and copper mesh was integrated with the composite construction of the airplane. The mesh varies from being 10 to 30 thousandths of an inch below the surface of the paint and encompasses most surfaces of the airplane. Various parts of the airplane are interconnected through use of metal fasteners inserted through several plies of mesh, mesh overlaps, and bonding straps. Refer to Section 20-70-00, Lightning Protection and Static Dissipation, for other lightning protection information.

CAUTION: Before any maintenance, removal, or installation of equipment is done, make sure that the master and avionics switches are in the off position. Failure to do so could result in damage to these instruments.

2. Audio Communications

A. All communication radios (except for satellite data link systems) are integrated with some form of navigational receiver, and it is impracticable to segregate the discussion of each function in two separate chapters. Accordingly, air-to-ground speech communications are found in Chapter 34 and satellite data link voice and data systems are found in Chapter 23. The satellite data link systems normally communicate with the GIA 63A units through a RS 232 bus and also provide a discrete of operational status of the system.

B. The Garmin G2000 audio (radio) components are part of the GIA 63A Integrated Avionics Units. The GIA 63A units also have navigation components as part of the integrated functions. For ease of maintenance, the audio systems operational tests are found in Chapter 34, Garmin GIA 63W Integrated Avionics Units (G2000) - Adjustment/Test.

C. The Model T240 G2000 and airplanes with an optional G2000 system installed can also have satellite data link system(s) installed. The satellite systems that follow can installed:

(1) Garmin GDL 69A Data Link (G2000)

(2) Garmin GSR 56 Iridium Data Link (G2000).

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GARMIN GSR 56 IRIDIUM DATA LINK SYSTEM (G2000) - DESCRIPTION AND OPERATION

1. General

A. The Garmin GSR 56 Iridium Data link System consists of the Iridium GSR 56 Data Link (UC503) satellite transceiver unit, and the Iridium Antenna (YC504). The IRIDIUM DL 5 Amp circuit breaker found on the cockpit circuit breaker panel, supplies electrical power to the GSR 56 system. The Iridium GSR 56 is installed on the avionics shelf forward the of the instrument pane on the left side. The Iridium Antenna is installed on the forward oxygen bracket in the aft fuselage at FS 222.7, WL 1067.9, and LBL 4.6. (Reference Figure 1).

B. For more maintenance data applicable to the Garmin GSR 56 Iridium Data Link System refer to the latest revision of the Garmin GSR 56 Satellite Receiver Installation Manual, P/N 190-00836-00 found in the Supplier Publication List.

2. Description

A. Iridium Data Link System Installation provides worldwide weather, voice and data transmission capability.

(1) The Iridium is an airborne data link system that provides low speed data link communication. The Iridium GSR 56 Data Link System has worldwide weather capability. The system informs the pilot of Metrological Aviation Reports (METAR)s, Terminal Aerodrome Forecasts (TAF)s, and winds aloft around the globe. Radar and satellite imagery are available in the United States, southern Canada, and western Europe.

(2) The Iridium GSR 56 system has data service available that lets pilots and passengers make worldwide Iridium-based text messages. The calls can be completed in the air or the ground. The receiver supports one data transmission (SMS text messaging) at a time. The interface is controlled by the pilot with the Garmin Touchscreen Controller (GTC) 570. A service subscription is necessary for this service to be provided.

3. Operation

A. The Iridium GSR 56 Data Link System is operated with the GTC 570 controller.

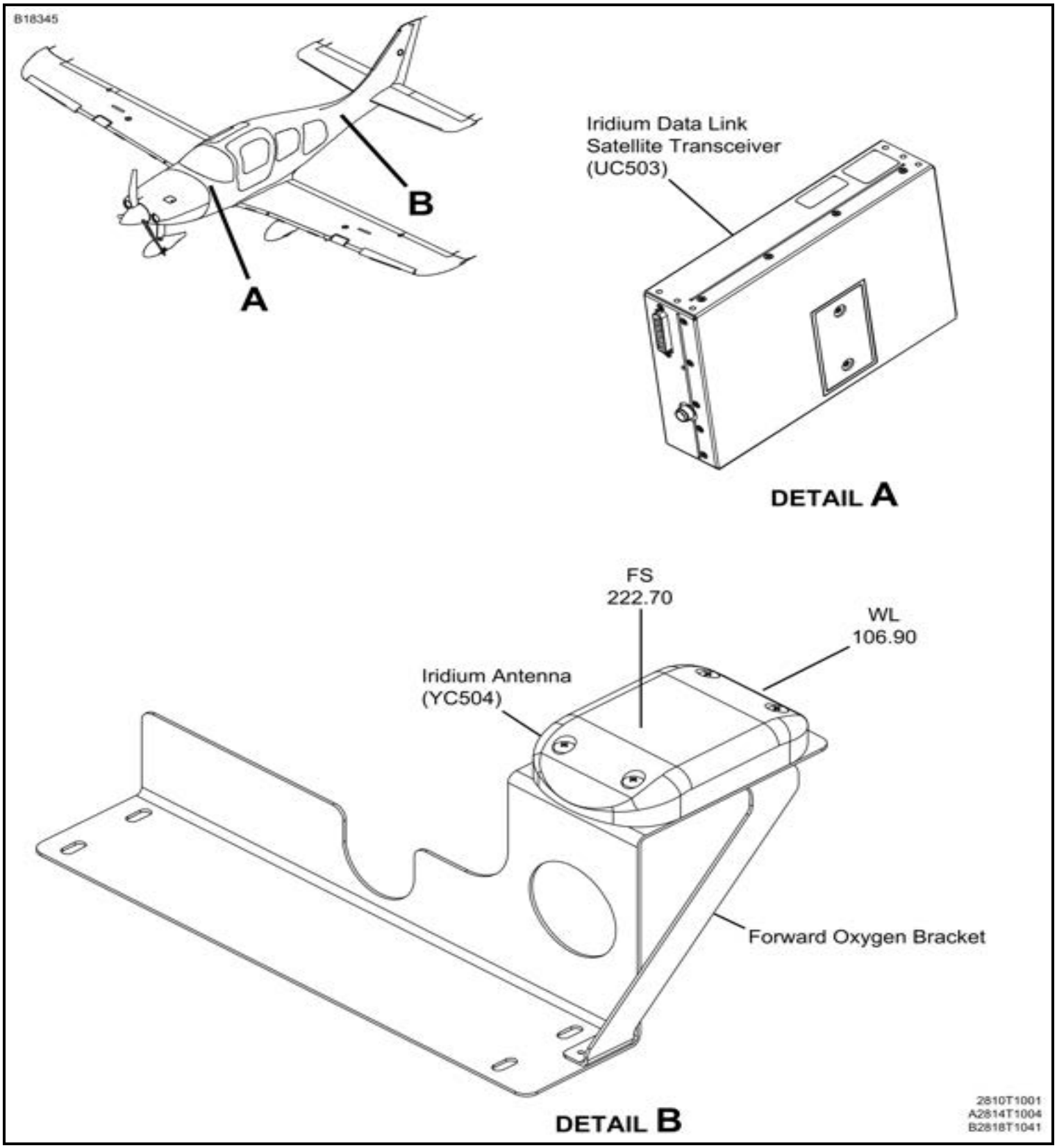
(1) When the GSR 56 system is energized a discrete signal is sent to the Integrated Avionics (GIA) 63 No. 2. The GSR 56 also sends a status discrete to the GIA No. 1. The GSR 56 has one RS-232 port that is used to communicate with the GIA No. 2.

(2) The GTC 570 is used to operate the GSR 56 system. The GTC 570 is for the text messaging and to check the operational status of the system on the system status page.

(3) If the GSR 56 has a system failure an advisory message shows on the GTC 570.

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Figure 1 : Sheet 1 : Garmin GSR 56 Iridium Data Link System



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GARMIN GSR 56 IRIDIUM ANTENNA (G2000) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Garmin GSR 56 Iridium Antenna. The antenna is installed on a bracket in the aft fuselage at FS 222.7, WL 106.9, and LBL 4.6. The antenna is used for the Iridium Data System for worldwide weather to inform pilots of METARs, TAFs, and winds aloft (subscription required).

2. Tools and equipment

A. None.

3. Garmin GSR 56 Iridium Antenna Removal/Installation

A. Remove the GSR 56 Iridium Antenna (YC504) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the IRIDIUM DL circuit breaker found on the cockpit circuit breaker panel.

(4) Remove the antenna bulkhead panel. Refer to Chapter 25 Access Panels - Maintenance Practices.

(5) Remove the screws that attach the antenna to the bracket.

(6) Carefully pull the antenna away from the bracket sufficiently to get access to the Iridium antenna coaxial connector.

(7) Disconnect the antenna coaxial cable connector (PC512) from the Iridium antenna.

(8) Remove the antenna from the airplane.

(9) Examine the bracket to make sure that there are no cracks or damage.

B. Install the GSR 56 Iridium Antenna (YC504) (Refer to Figure 401).

(1) Make sure that the bracket mounting surface of the Iridium antenna is clean.

(2) Connect the antenna coaxial cable connector (PC512) to the Iridium antenna.

(3) Put the Iridium antenna in its correct position on the bracket.

(a) Install the screws that attach the Iridium antenna to the bracket.

(4) Engage the IRIDIUM DL circuit breaker found on the cockpit circuit breaker panel.

(5) Apply external electrical power on the airplane.

(6) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(7) Set the AVIONICS MASTER switch (SW04) to the ON position.

(8) Set the CROSS TIE switch (SW03) to the ON position.

(9) Make sure that no Iridium Data Link System Crew Advisory System (CAS) or advisory messages that indicate the system is unserviceable, show on the PFD or on the GTC 570 Touchscreen Controller (UI405).

(10) Set the master BATT switches to the OFF position.

(11) Set the AVIONICS MASTER switch to the OFF position.

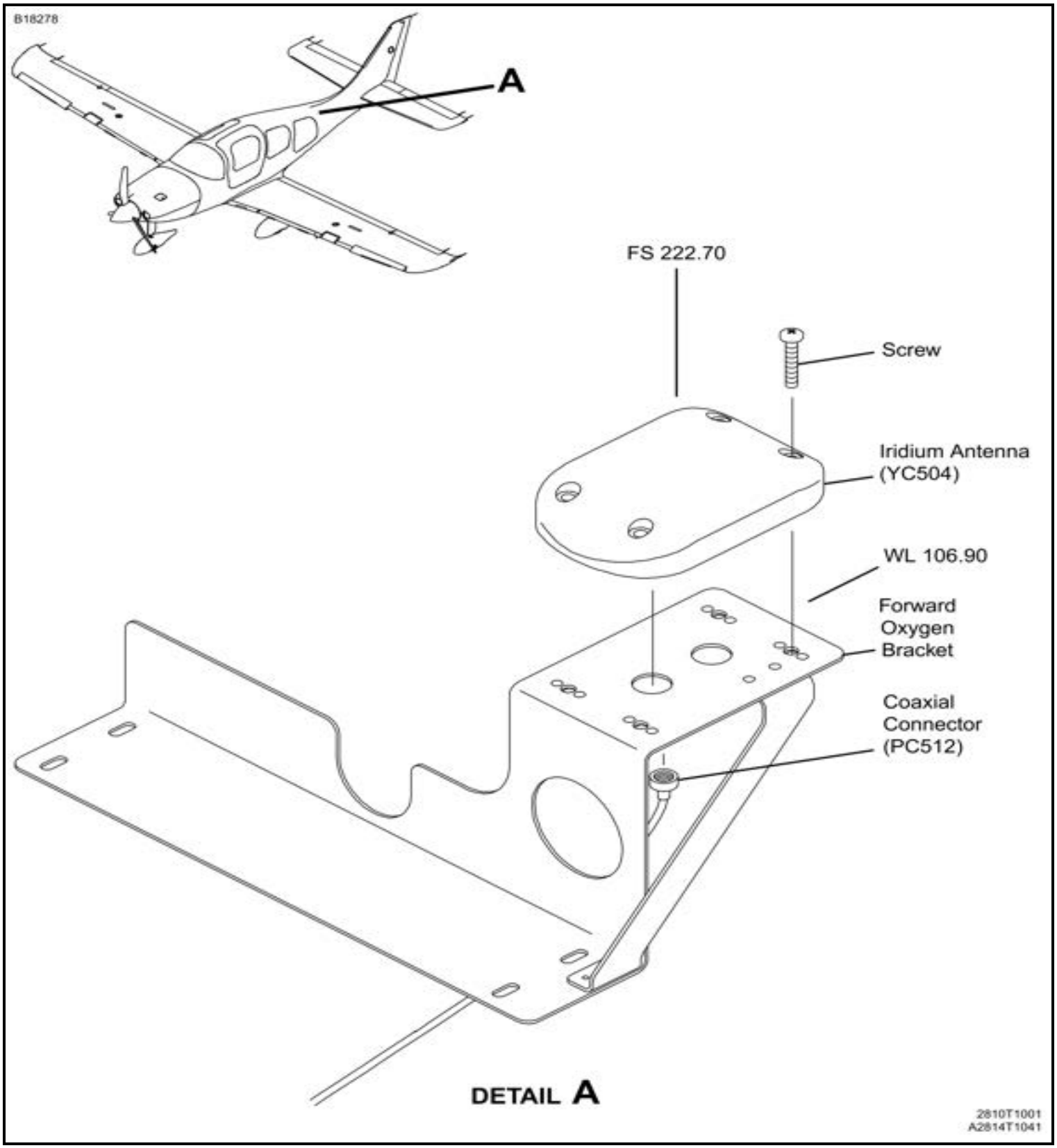
(12) Set the CROSS TIE switch to the OFF position.

(13) Remove external electrical power from the airplane.

(14) Install the antenna bulkhead panel. Refer to Chapter 25Access Panels - Maintenance Practices.

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Figure 401 : Sheet 1 : Iridium Antenna Installation



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GARMIN GSR 56 IRIDIUM DATA LINK RECEIVER (G2000) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the Garmin GSR 56 Data Link Receiver unit. For a general description of the GSR 56 Iridium system refer to Garmin Iridium Data Link System (G2000) - Description and Operation.

B. The Garmin GSR 56 Data Link is installed forward of the instrument panel on the avionics shelf.

2. Tools and Equipment

A. None.

3. Garmin GSR 56 Data Link Removal/Installation

CAUTION: When removing and/or replacing a Garmin component, make sure that the airplane power is off. Disconnect auxiliary power supplies.

A. Remove the GSR 56 Data Link (UC503) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the IRIDIUM DL circuit breaker found on the cockpit circuit breaker panel.

(5) Remove the GDU 1400 Primary Flight Display (PFD) (UI407). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Loosen the ratcheting knurled nut.

(7) Remove the knurled nut from the mounting bracket.

(8) Carefully remove the unit from the rack.

B. Install the GSR 56 Data Link (UC503) (Refer to Figure 401)

(1) Visually inspect the connectors to ensure there are no bent or damaged pins.

(a) Repair any damage.

(2) Carefully insert the GSR 56 into the rack.

(3) Set the knurled nut in its correct position on the mounting bracket.

(4) Tighten the knurled nut on the mounting bracket.

(5) Install the right GDU 1400 PFD (UI407). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) You must establish service for the new receiver. Contact Garmin International Incorporated, or Iridium Communications Incorporated.

(7) Engage the IRIDIUM DL circuit breaker found on the cockpit circuit breaker panel.

(8) Apply external electrical power on the airplane.

(9) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(10) Set the AVIONICS MASTER switch (SW04) to the ON position.

(11) Set the CROSS TIE switch (SW03) to the ON position.

(12) Make sure that no Iridium Data Link System Crew Advisory System (CAS) or advisory messages that indicate the system is unserviceable, show on the PFD or on the GTC 570 Touchscreen Controller (UI405).

(13) Set the master BATT switches to the OFF position.

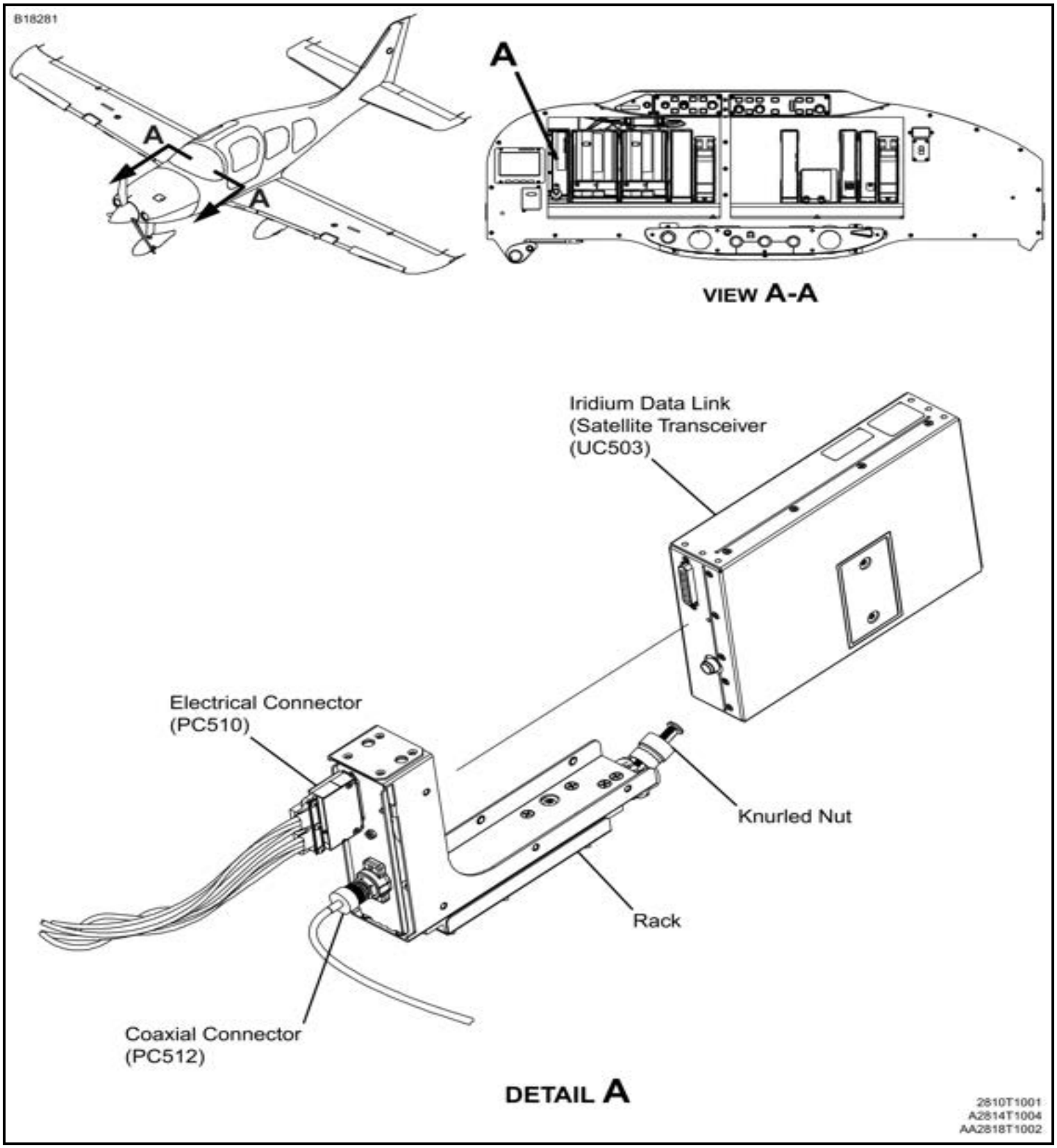
(14) Set the AVIONICS MASTER switch to the OFF position.

(15) Set the CROSS TIE switch to the OFF position.

(16) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : GSR 56 Data Link Installation



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GARMIN GDL 69A DATA LINK (G2000) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the G2000 Garmin GDL 69A Data Link. For a general description of the GDL 69A, refer to Chapter 34, Garmin Iridium Dat Link System - Description and Operation. For maintenance procedures for the GPS2/XM antenna refer to Chapter 34, Garmin GPS2/WAAS/XM Antenna (G2000) - Removal/Installation.

2. Tools and Equipment

A. None.

3. Garmin GDL 69A Data Link Removal/Installation

CAUTION: When removing and/or replacing a G2000 component, make sure that the airplane power is off. Disconnect auxiliary power supplies.

A. Remove the GDL 69A Data Link (UC502) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the XM DL circuit breaker found on the cockpit circuit breaker panel.

(5) Remove the right GDU 1400 Multifunctional Display (MFD) (UI406). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Unlock the GDL 69A handle by unscrewing the Phillips screw.

(7) Pull the handle upwards to unlock the GDL 69A.

(8) Carefully remove the unit from the rack.

B. Install the GDL 69A Data Link (UC502) (Refer to Figure 401).

(1) Visually inspect the connectors to ensure there are no bent or damaged pins.

(a) Repair any damage.

(2) Carefully insert the GDL 69A into the rack. The handle should engage the dogleg track.

(3) Press down on the handle to lock the unit into place.

(4) Lock the handle to the GDL 69A body using the Phillips screw.

(5) Install the MFD (UI406). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Engage the XM DL circuit breaker found on the cockpit circuit breaker panel.

(7) Apply external electrical power on the airplane.

(8) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(9) Set the AVIONICS MASTER switch (SW04) to the ON position.

(10) Set the CROSS TIE switch (SW03) to the ON position.

(11) If you installed a new GDL 69A unit you must upload the units software and configuration files. Refer to Garmin G2000 - Adjustment/Test G2000 Cessna Options Software and Configuration Upload. For more data applicable to software and configuration file uploading refer to the Loading and Testing LRU Software section of the most current revision of the Garmin G2000 Integrated Avionics System Line Maintenance Manual, P/N 190-01185-00, found on the Supplier Publication List.

(12) If a new GDL A unit was install you must activate a XM radio subscription for the new radio Id number.

(13) On the GTC 570 go the the XM INFORMATION page and make sure that the GDL 69A is operating correctly and no there are no system errors.

(14) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

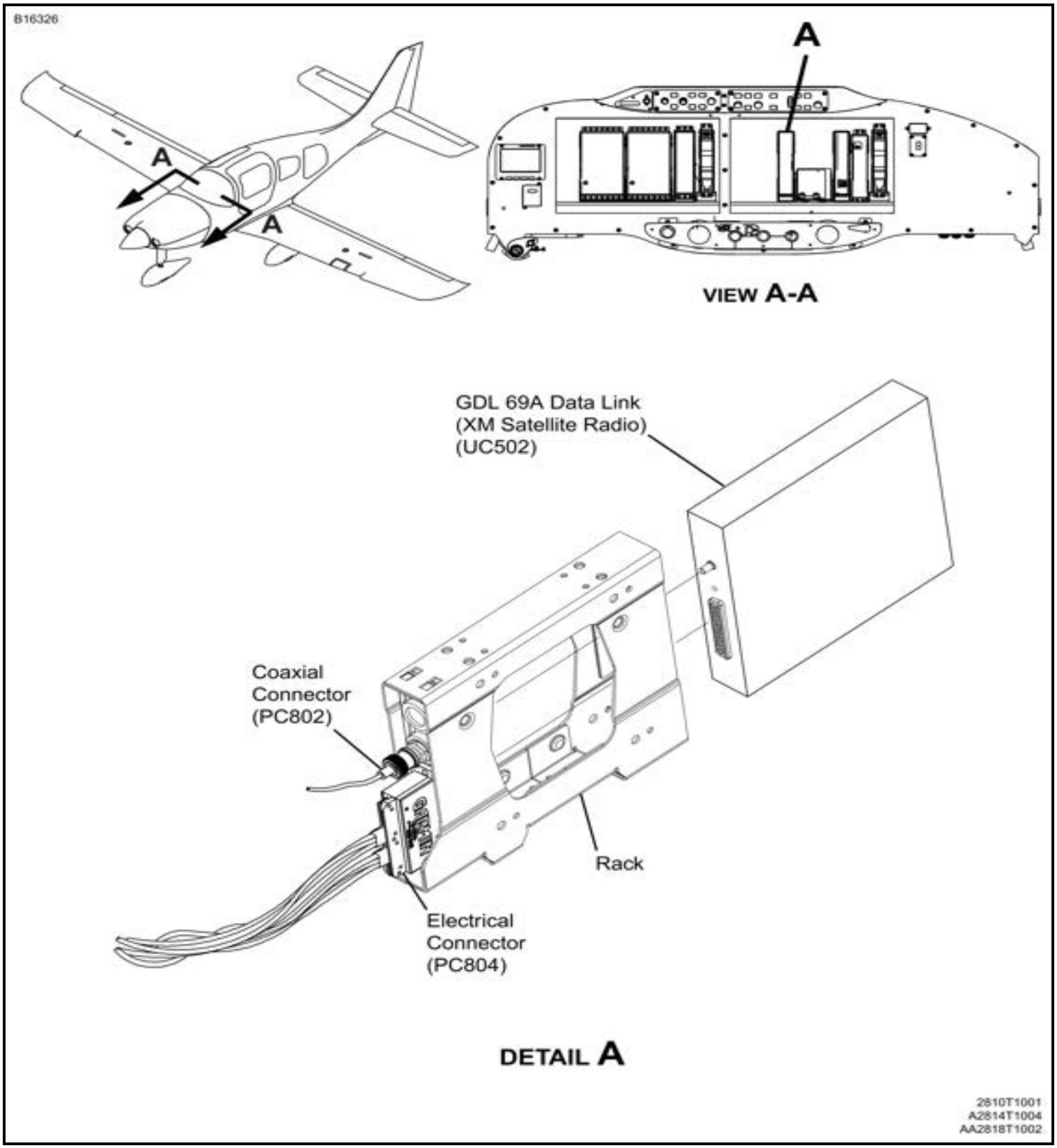
(15) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(16) Set the CROSS TIE switch (SW03) to the OFF position.

(17) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : GDL 69A Data Link Installation



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GARMIN GMA 340 AUDIO PANEL AND AUDIO COMPONENTS - MAINTENANCE PRACTICES

1. General

A. This sections gives the maintenance procedures for the Garmin GMA 340 Audio Panel, audio and stereo jacks, speaker and audio function/control switch installations.

B. For the Model T240 Audio Jack Panel maintenance procedures refer to, Audio Jack Panel (T240) - Removal/Installation.

2. Garmin GMA 340 Audio Panel

A. The GMA 340 Audio Panel acts as the audio selector for the airplane. The GMA 340 is a VHF Communication Transceiver/VOR/ILS Receiver/GPS Receiver. The system is a fully integrated panel-mounted instrument which contains audio and microphone switching and amplification, a marker beacon receiver, and an intercom system. The GMA 340 also contains a voice activated intercom system, which allows the pilot, copilot, and passengers of the airplane to communicate among themselves. Refer to Figure 201. The intercom select switch can be set to three modes.

(1) In the "All" mode, the intercom is linked to all four-seat positions; everyone hears radio communications, and everyone hears music from input Music 1.

(2) In the "Crew" mode, the pilot and front seat passenger are linked together and can receive radio communications. The rear seat passengers are linked together but cannot hear radio communications or the pilot or front passenger.

(3) In the "Pilot" mode, the pilot hears the radios, but is not connected to the intercom, while the front and rear passengers are on the same intercom loop but cannot hear radio communications or communicate with the pilot.

B. All four headsets are hooked up to the intercom system. There is a volume knob for the pilot and copilot’s sides.

C. **Removal of GMA 340 Audio Panel**

(1) Insert a 3/32 inch Allen wrench into the jack screw on the faceplate.

(2) Turn the wrench counterclockwise until loose.

(3) Slide out the GMA 340 unit, and disconnect the connectors.

D. **Installation of GMA 340 Audio Panel**

(1) Install fittings into the back of the GMA 340.

(2) Slide the unit into the rack until the jack screw makes contact with the receptacle located in the back plate.

(3) Insert a 3/32 inch Allen wrench into the jackscrew access hole on the faceplate.

(4) Turn the Allen wrench clockwise until the unit is secured in the rack. Continue turning until tight, but do not over-tighten.

3. Speaker

A. **Removal of the Speaker**

(1) Remove the overhead center panel per instructions in Section 25-30-00, Interior Panels.

(2) For Type A, remove the four screws connecting the stall warning buzzer mounting, speaker, loop clamp, and speaker mounting. For Type B, remove the four screws connecting the speaker to the adapter plate. Refer to Figure 202.

(3) Remove the stall warning buzzer mounting, as required.

(4) Disconnect the wires.

(5) Pull the speaker from the mounting.

B. **Installation of the Speaker**

(1) Put the speaker on the speaker mounting.

(2) Connect the wires.

(3) Place the stall warning buzzer mounting on top of the speaker, as required.

(4) For Type A, tighten the four nuts connecting the stall warning buzzer mounting, speaker, loop clamp, and speaker mounting. For Type B, tighten the four nuts connecting the speaker to the adapter plate. Refer to Figure 202.

(5) Install the overhead center panel per instructions in Chapter 25.

4. Push-To-Talk Switch

A. **Location** - Each control stick has a push-to-talk switch located on the forward part of the stick where it is easily accessed by the index finger. Refer to Figure 203. The switch is press-fit into the stick and connected by wire on the inside of the stick assembly.

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B. **Description** - The push-to-talk switch is a single-button switch that when pressed, makes a connection required to energize the Comm unit by way of the Audio Panel.

5. Troubleshooting Push-To-Talk Function

A. **Symptom** - Push-to-talk function not working properly.

(1) Locate the defective connection:

(a) Remove the interior panel covering the control stick

(b) Locate P-46 (pilots side) and P-47 (copilot's side), and disconnect the plug.

(2) Using a digital volt ohmmeter (DVOM), check for operation of the push-to-talk function switch. Place one probe on Pin 1 and ground the other. The DVOM should show a closed circuit with the switch depressed (less than 2 ohms).

(3) Check the jack side of the connection. Pin 2 should be ground and Pin 1 should be for the audio panel.

(4) If the switch needs to be replaced, cut the tie-wraps at the base of the control stick to allow the switch to be gently pulled out of the wooden handle.

(5) Solder in a new switch, and pull the wires tight at the base of the control stick tube.

(6) Secure the wires with tie-wraps, and check for freedom of movement.

6. Nav/Com Bypass Switch

A. **Description** - With the Garmin G1000 system the Nav/Com bypass switch is not installed. With the Avidyne option the aircraft is equipped with a Nav/Com bypass switch located above the annunciator panel. The switch is designed to be used in situations where the engine is not running. The switch is an alternate action device that activates when depressed and needs to be depressed again to cycle off. When activated, the switch turns on the No. 1 GPS, No. 1 Com, and No. 1 Nav by connecting them directly to the right battery, bypassing the power grid, circuit breaker panel, and associated wiring. Communications is only through the pilot's headset and activated with the pilot's PTT switch.

B. **Removal of Switch**

(1) Remove the glare shield per instructions in Chapter 25 to gain access to the back side of the instrument panel.

(2) Disconnect the connector at the back of the switch.

(3) Pull the press-fit switch out of its housing at the back of the instrument panel.

C. **Installation of Switch** - Installation is a direct reversal of removal.

7. Headphone Jacks/Microphone Plugs

A. **Description** - The Cessna 400 (LC41-550FG) is designed to handle both standard headphone/microphone jacks as well as Bose™ Stereo headphone jacks

B. **Location** - Each seat has a jack plug receptacle.

(1) **Front Seats** - The location of the front seat receptacles are at the lower part of the center console for the Avidyne option and at the front of the center console for the Garmin G1000 option. Refer to Figure 204 for Avidyne option and refer to Chapter 25 for Garmin G1000 option.

(2) **Rear Seats** - The location of the rear seat receptacles are on the rear seat side panels. Refer to Figure 205.

CAUTION: Bose™ headphones require power, which is supplied by the Bose™ jack. Before removing the intercom jack, ensure the system master switch is in the off position.

C. **Removal of Rear Passenger Intercom Jacks**

(1) To gain access to the backside of the jacks, remove the interior sidewall panel per instructions in Chapter 25.

(2) Unscrew and remove the Bose™ jack cover. Loosen and remove the jam nuts securing the jacks to the interior panel. Refer to Figure 206.

(3) Label all wires according to where they were connected.

(4) Cut wire near the solder point at each jack.

D. **Installation of Rear Passenger Intercom Jacks**

(1) Remove all traces of old solder from the jacks.

(2) Reconnect and solder the wires to the jacks. Ensure all wires are soldered to the correct pins on the jacks.

(3) Secure the jacks to the sidewall panel using jam nuts.

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(4) Install the Bose jack cover.

(5) Install the sidewall panel.

CAUTION: Bose™ headphones require power, which is supplied by the Bose™ jack. Before removing the intercom jack ensure the system master switch is in the off position.

E. **Removal of Pilot/Front Passenger Intercom Jacks/Microphone Plug**

(1) To gain access to the jacks, remove both sides of the center console panels. Only one panel in Garmin G1000 option.

(2) Unscrew and remove the Bose™ jack cover. Loosen and remove the jam nuts securing the jacks to the interior panel. Refer to Figure 206.

(3) Label all wires according to where they were connected.

(4) Cut wire near the solder point at each jack.

F. **Installation of Pilot/Front Passenger Intercom Jacks/Microphone Plug**

(1) Remove all traces of old solder from jacks.

(2) Reconnect and solder wires to the jacks. Ensure all wires are soldered to the correct pins on the jacks.

(3) Secure the jacks to the sidewall panel using jam nuts.

(4) Install the Bose™ jack cover.

(5) Install the sidewall panel.

8. Stereo Audio Input Jack, Optional

A. **Avidyne Option**

(1) **Removal of Stereo Audio Input Jack**

(a) To gain access to the jack, remove the center console access panel.

(b) Lift up the armrest and locate the jack at the forward end of the pencil box.

(c) Loosen and remove the jam nut securing the jack to the pencil box. Refer to Figure 207.

(d) Label all wires according to where they were connected.

(e) Cut the wire near the solder point at each jack.

(2) **Installation of Stereo Audio Input Jack**

(a) Remove all traces of old solder from the jack.

(b) Reconnect and solder wires to the jack. Ensure all wires are soldered to the correct pins on the jack.

(c) Secure the jack to the pencil box using the jam nut.

(d) Install the center console access panel.

B. **Garmin G1000 Option** - The stereo audio input jack is located under the instrument panel to the right of the tower on the co-pilot's side.

(1) **Removal of Stereo Audio Input Jack**

(a) Loosen and remove the jam nut securing the jack to the instrument panel.

(b) Reach up behind the instrument panel and remove the jack.

(c) Label all wires according to where they were connected.

(d) Cut the wire near the solder point at each jack.

(2) **Installation of Stereo Audio Input Jack**

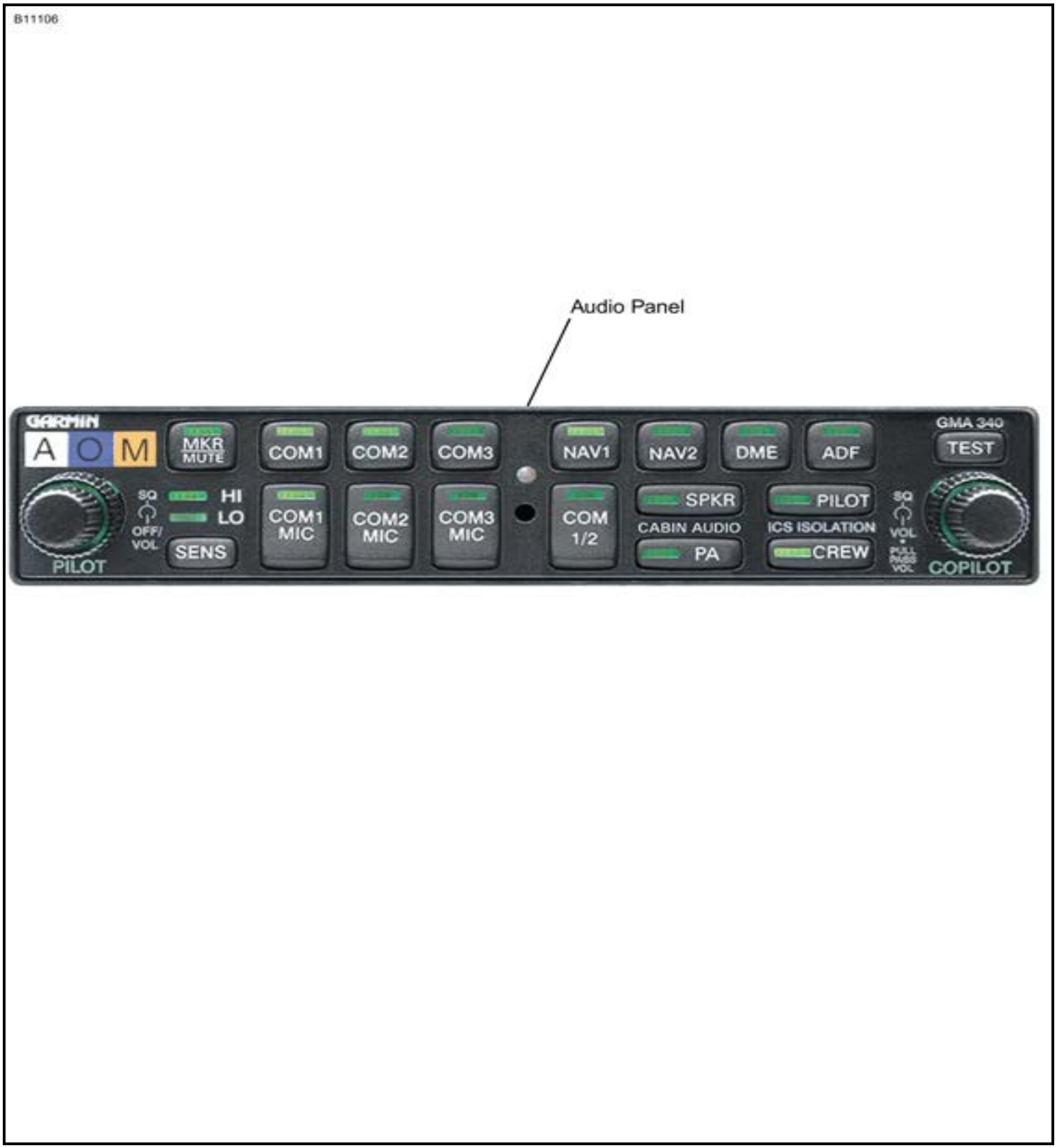
(a) Remove all traces of old solder from the jack.

(b) Reconnect and solder wires to the jack. Ensure all wires are soldered to the correct pins on the jack.

(c) Secure the jack to the instrument panel using the jam nut. Apply one drop of Loctite 243 to the threads and tighten snug (no looseness plus 1/4 turn).

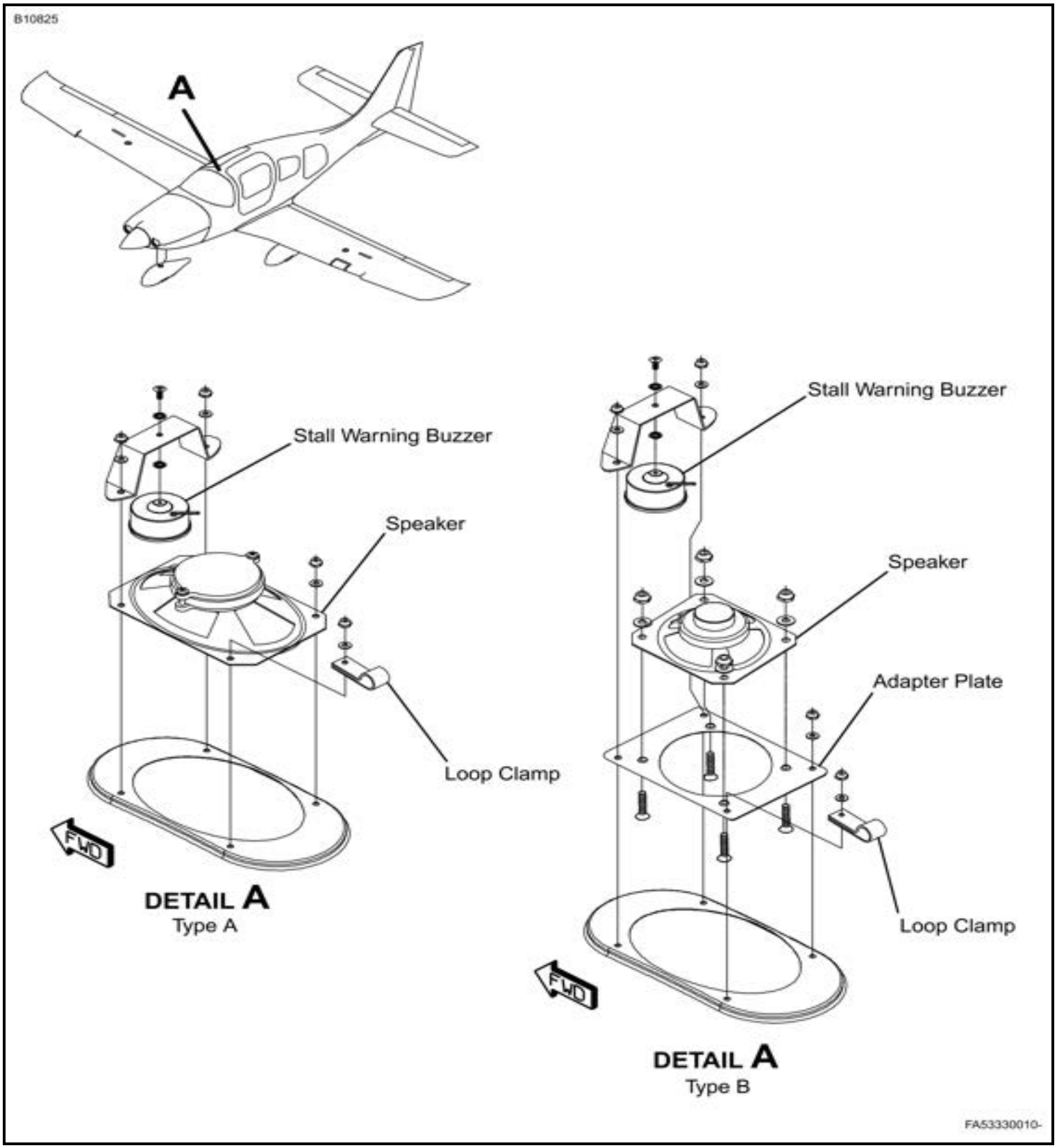
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Figure 201 : Sheet 1 : Garmin GMA 340 Audio Panel



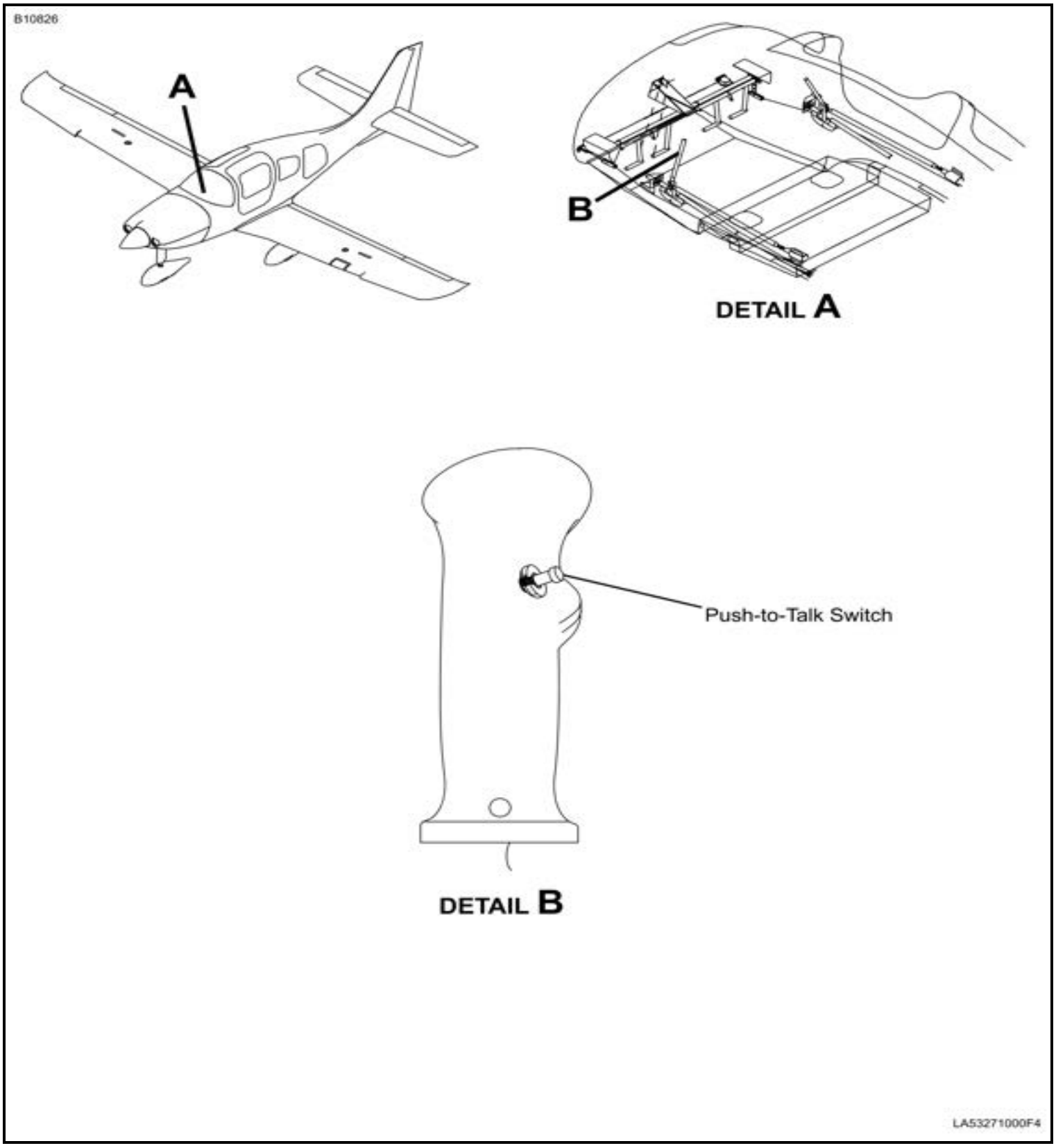
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Figure 202 : Sheet 1 : Overhead Speaker Installation



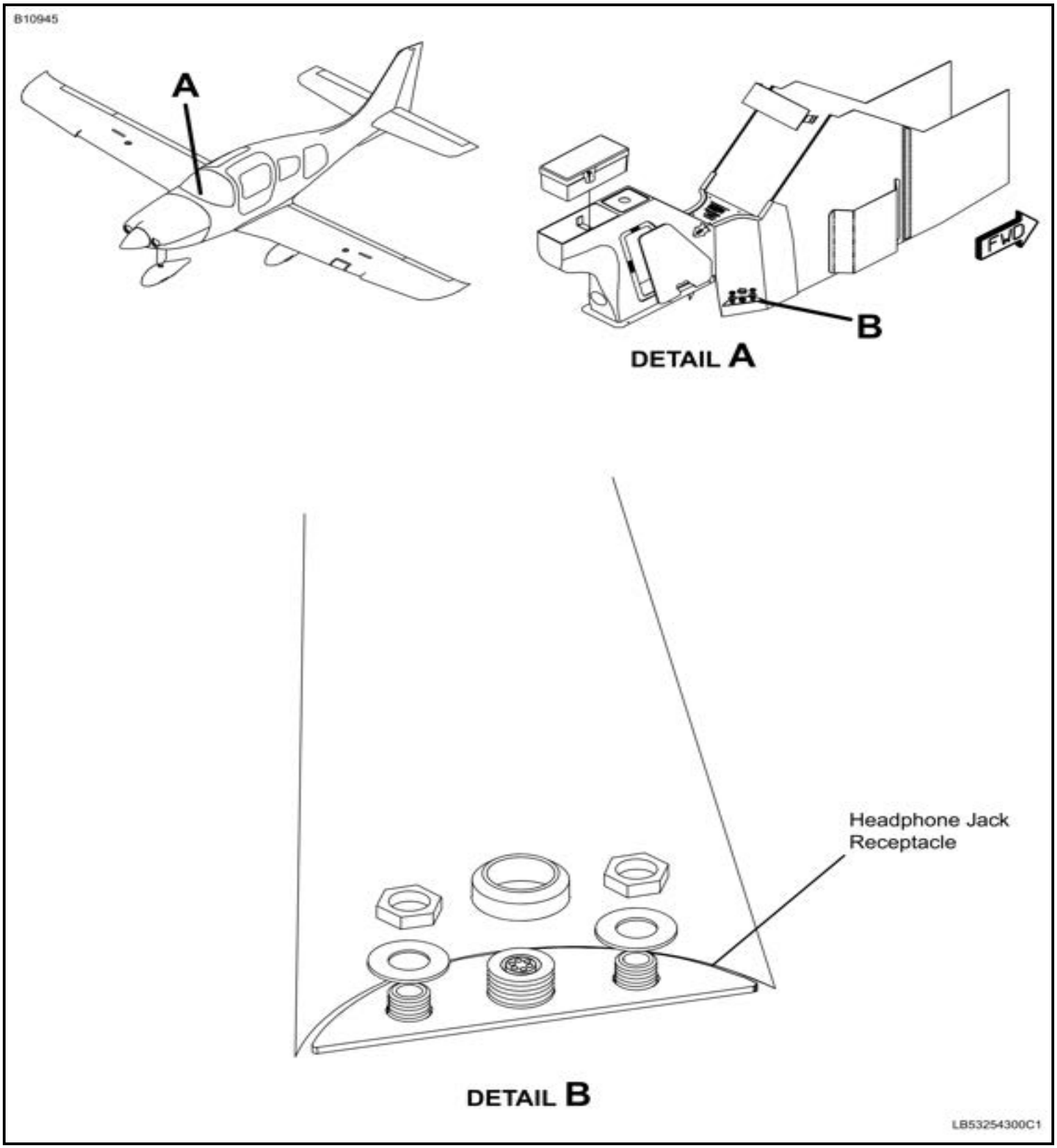
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Figure 203 : Sheet 1 : Push-To-Talk Switch Location



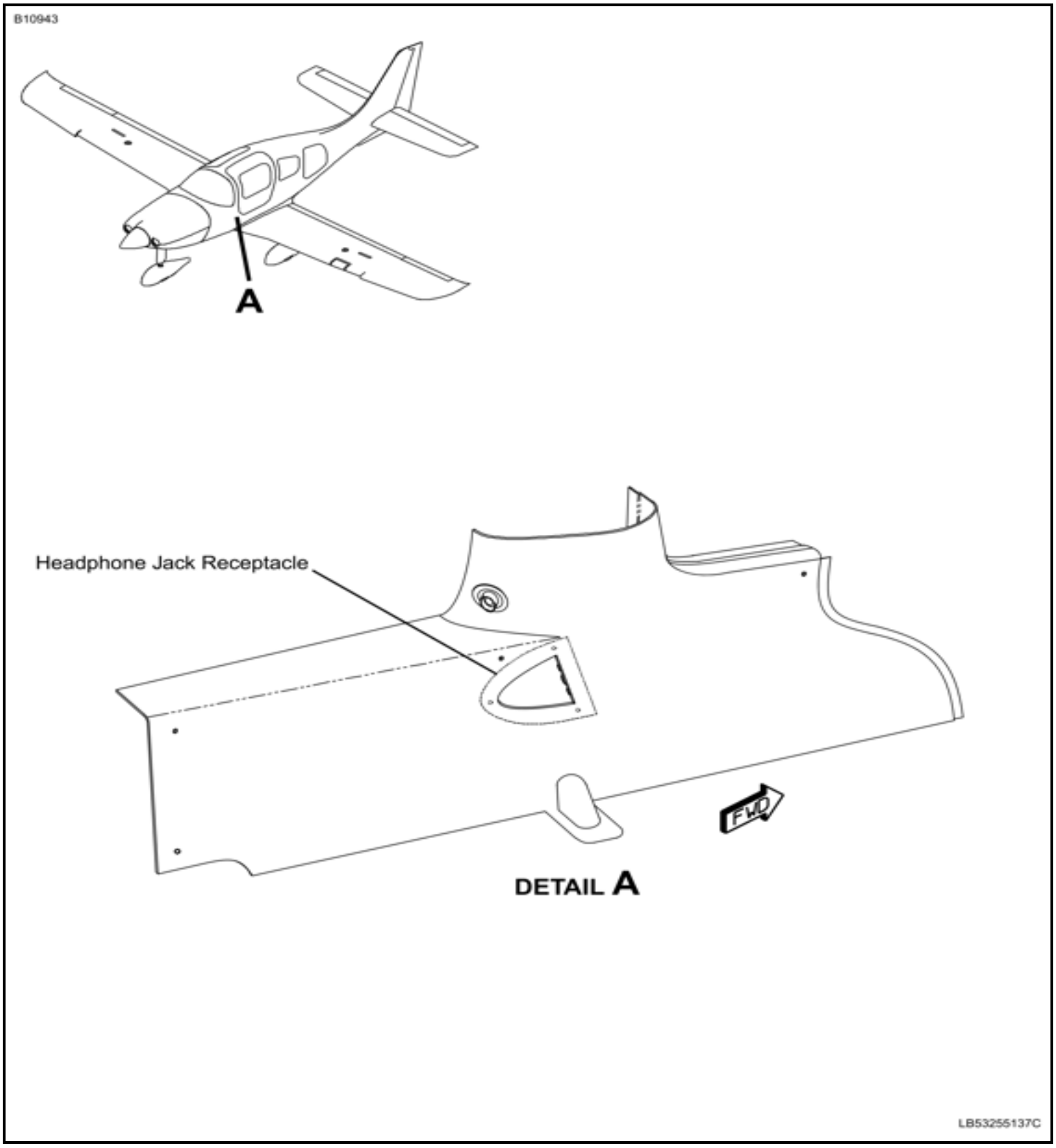
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Figure 204 : Sheet 1 : Front Seat Headphone Jack Receptacle



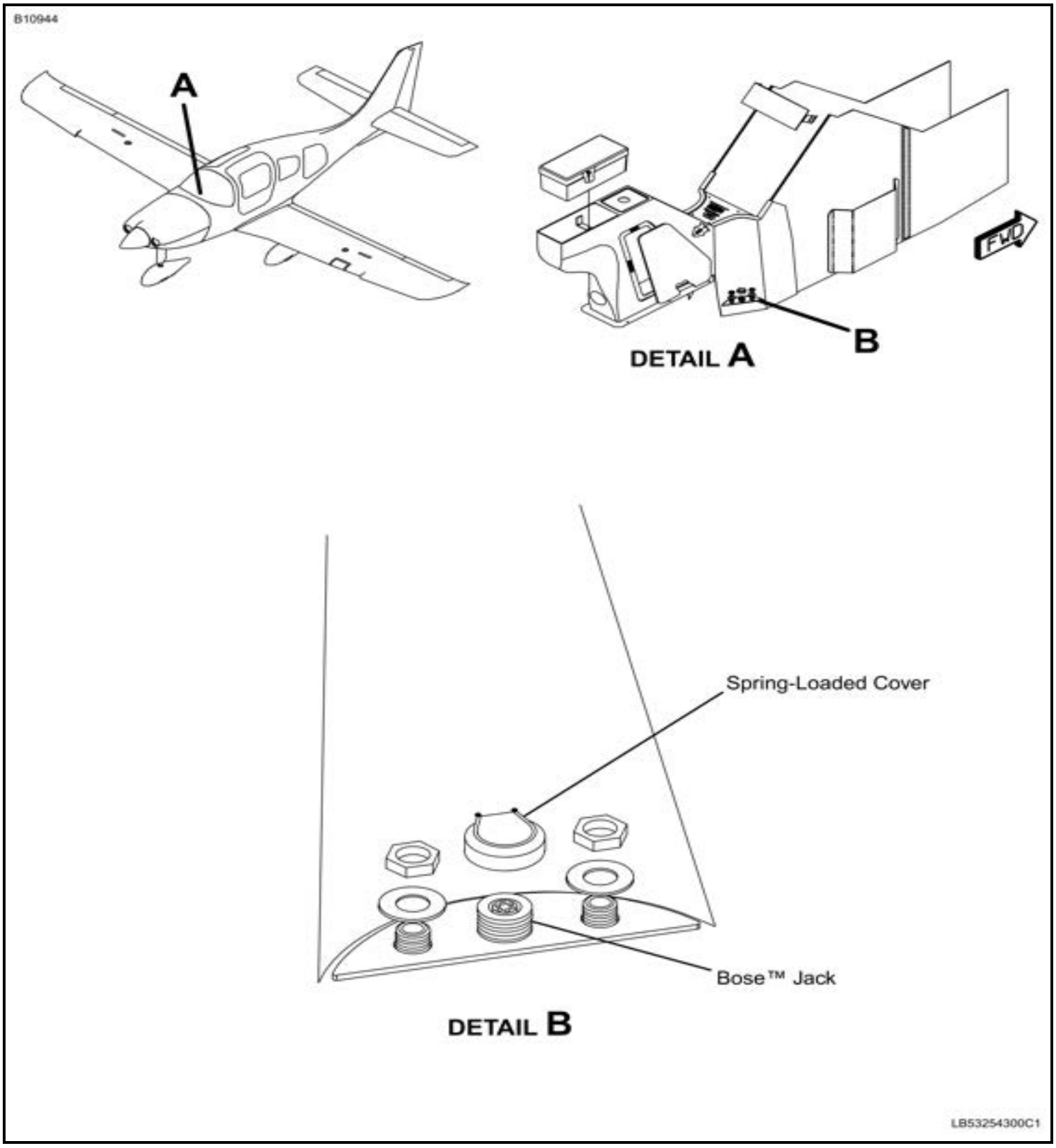
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Figure 205 : Sheet 1 : Rear Seat Headphone Jack Receptacle



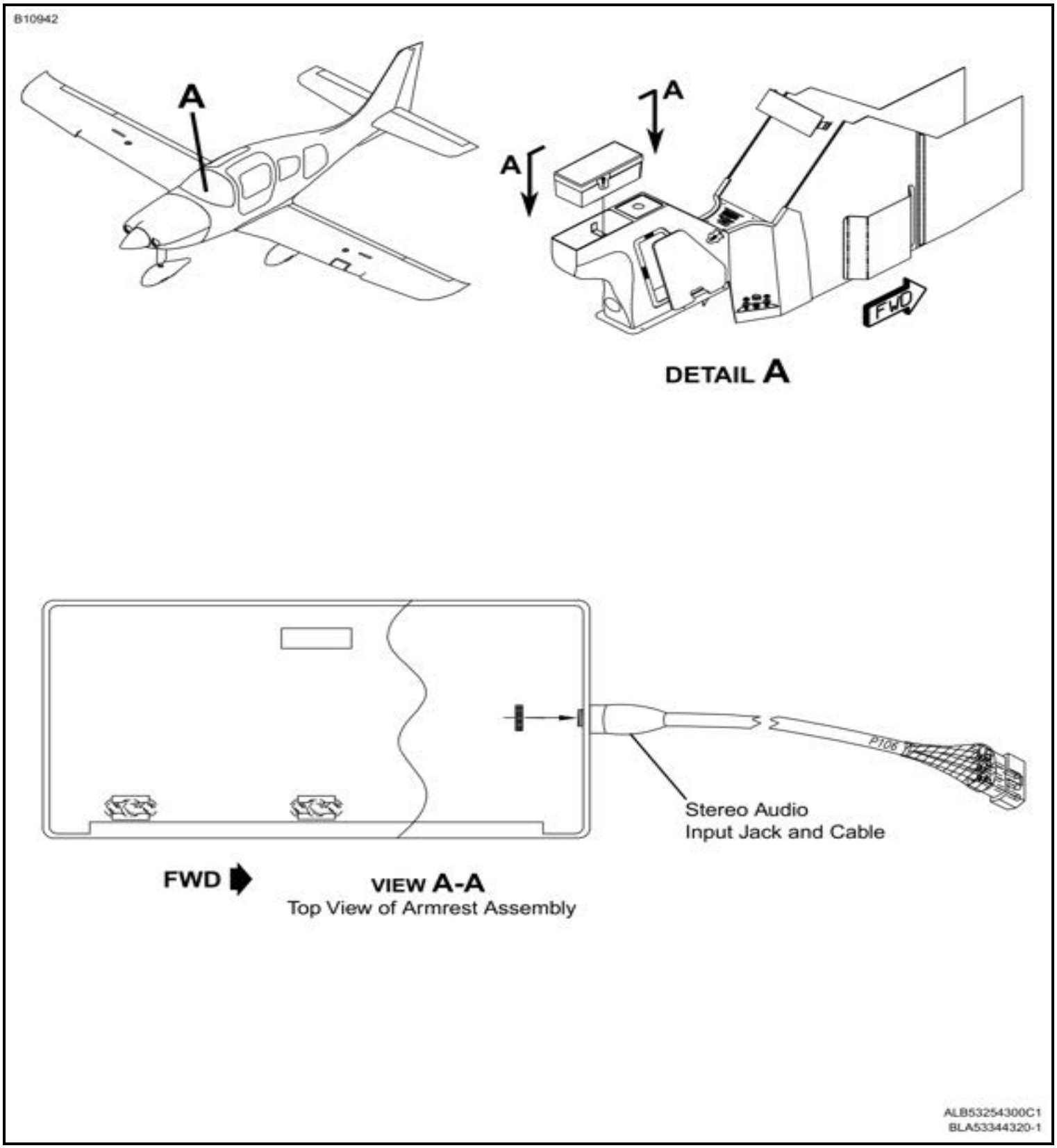
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Figure 206 : Sheet 1 : Headphone/Microphone Jack Installation



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Figure 207 : Sheet 1 : Stereo Audio Input Jack



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GARMIN GMA 36 REMOTE AUDIO PANEL AND AUDIO COMPONENTS - ADJUSTMENT/TEST

1. General

A. This sections gives the adjustment test for the Garmin GMA 36 Remote Audio Panel, audio jacks, GTC 570 Touchscreen Controller audio function/control operation and the Marker Beacon function operational test.

B. The Garmin G2000 audio (radio) components are part of the GIA 63W Integrated Avionics Units. The GIA 63W units also have navigation components as part of the integrated functions. For ease of maintenance, the audio systems operational tests are found in Chapter 34, Garmin GIA 63W Integrated Avionics Units (G2000) - Adjustment/Test.

2. Tools and Equipment

A. Three or more aviation headsets that have separate microphone and headphone plugs are needed to complete this audio system test. Commercially available .

B. NAV/COMM/ELT Ramp Test Set - Aeroflex IFR 4000 or equivalent.

3. Headset Microphone and Isolation Operational Test

A. Test the Headset Microphone and Audio Isolation Function

(1) Supply external electrical power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Set the CROSS TIE switch (SW03) to the ON position.

(5) Plug the headsets in the pilot's, copilot's and a passenger's headset jacks.

(6) On the GTC 570 homepage, push the Intercom button.

(a) The intercom screen shows on the GTC 570 display.

(7) Make sure that each of the isolation arrow buttons on the screen are on (green).

(a) If one or more isolation arrow button is not on (grey), push the button(s) that are not on.

(8) Speak in the pilot's headset microphone and make sure that:

(a) The audio is crisp and clear

(b) This no distortion in each of the headsets.

(9) On the GTC 570, push the isolation arrows between the PILOT and COPILOT and PILOT and PASSENGER labels.

(a) The isolation arrow buttons change to grey.

(b) Make sure that the pilot position cannot hear the copilot's or passenger's audio in the headset.

(10) On the GTC 570, push the isolation arrow between the COPILOT and PASSENGER labels.

(a) The isolation arrow button changes to grey.

(b) Make sure that the copilot position cannot hear the pilot's or passenger's audio in the headset.

(11) On the GTC 570, push the isolation arrow between the PILOT and COPILOT labels.

(a) The isolation arrow button changes to grey.

(b) Make sure that the pilot and copilot positions cannot hear the passenger's audio in the headset.

(c) Make sure that the pilot and copilot positions can hear each others audio in the headset.

(12) On the GTC 570, push the isolation arrows between the PILOT and COPILOT and PASSENGER labels.

(a) The isolation arrow buttons change to green.

(b) The audio system goes back to the initial configuration.

(13) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(14) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(15) Set the CROSS TIE switch (SW03) to the OFF position.

(16) Remove external electrical power from the airplane.

4. Marker Beacon Operational Test

A. Do a check of the Marker Beacon.

NOTE: The Marker Beacon annunciations are shown on the PFD to the left of the Selected Altitude. Outer

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marker reception is indicated in blue, middle in yellow, and inner in white.

(1) Supply external electrical power to the airplane.
(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.
(3) Set the AVIONICS MASTER switch (SW04) to the ON position.
(4) Set the CROSS TIE switch (SW03) to the ON position.
(5) On the ramp test set select the settings that follow:
    (a) Push the power button (green) to set the test set to on.
    (b) Select MARKER BEACON mode
    (c) Select a frequency of 75.000 MHz
    (d) Set the RF LVL to dBm
    (e) Select a tone of 400 Hz
(6) On the GTC 570 Touchscreen controller push the Audio & Radios button.
    (a) Make sure the MKR MUTE annunciator is on.
    (b) Set the speaker to on.
(7) On the Audio & Radios screen, push the High Sense button.
    (a) The High Sense button, the bar (green) comes on.
(8) Make sure that:
    (a) The flashing O (blue) shows on the PFD.
    (b) A 400 Hz tone is heard through the cockpit overhead speaker.
(9) On the Audio & Radios screen, push the Marker button.
    (a) The High Sense button bar goes off.
    (b) On the Marker button, the bar (green) comes on.
(10) On the ramp test set, select a tone of 1300 Hz and make sure that:
    (a) The flashing middle marker M (amber) shows on the PFD.
    (b) A 1300 Hz tone is heard through the cockpit overhead speaker.
(11) On the ramp test set, select a tone of 3000 Hz and make sure that:
    (a) The flashing inner marker I (white) shows on the PFD.
    (b) A 3000 Hz tone is heard through the cockpit overhead speaker.
(12) Push the power button to set the test set power to off.
(13) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(14) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(15) Set the CROSS TIE switch (SW03) to the OFF position.
(16) Remove external electrical power from the airplane.

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GARMIN GMA 36 REMOTE AUDIO PANEL (G2000) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the G2000 Garmin GMA 36 Remote Audio Panel. For a general description of the GMA 36, refer to Chapter 34, Garmin G2000 - Description and Operation.

2. Tools and Equipment

A. None.

3. Garmin GMA 36 Remote Audio Panel Removal/Installation

CAUTION: When removing and/or replacing a G2000 component, make sure that the airplane power is off. Disconnect auxiliary power supplies.

A. Remove the GMA 36 Remote Audio Panel (UI501) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the AUDIO circuit breaker found on the cockpit circuit breaker panel.

(5) Remove the right GDU 1400 Multifunctional Display (MFD) (UI406). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Unlock the GMA 36 handle by unscrewing the Phillips screw.

(7) Pull the handle upwards to unlock the GMA 36.

(8) Carefully remove the unit from the rack.

B. Install the GMA 36 Remote Audio Panel (UI501) (Refer to Figure 401).

(1) Visually inspect the connectors to make sure there are no bent or damaged pins.

(a) Repair any damage.

(2) Carefully insert the GMA 36 into the rack.

(a) Make sure that the handle engages the dogleg track.

(3) Press down on the handle to lock the unit into place.

(4) Lock the handle to the GMA 36 body using the Phillips screw.

(5) Install the MFD (UI406). Refer to Chapter 34, Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(6) Engage the AUDIO circuit breaker found on the cockpit circuit breaker panel.

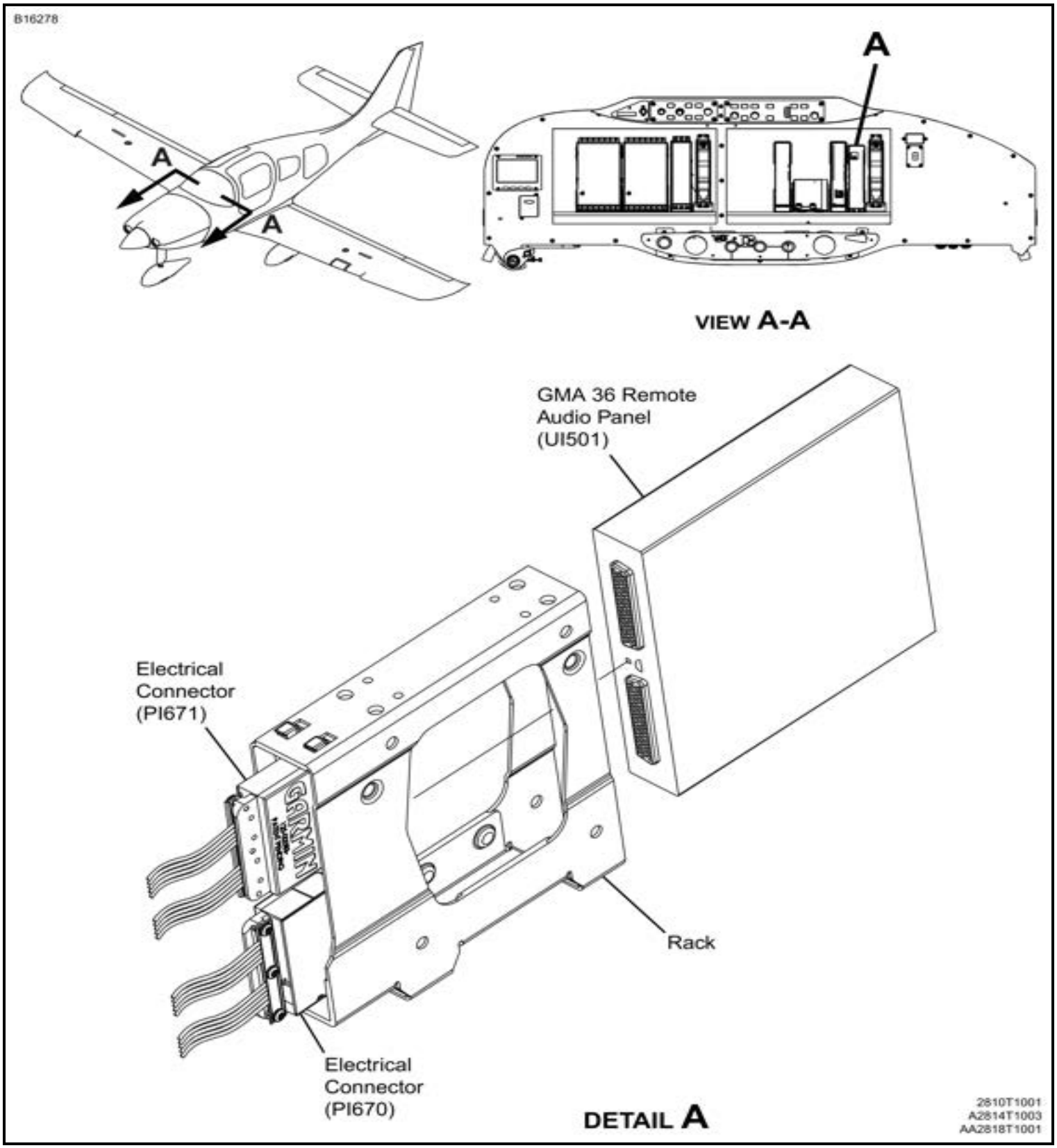
(7) If you installed a new GMA 36 you must upload the software and configuration files. Refer to Garmin G2000 - Adjustment/Test. For more data applicable to the upload of software and configuration files, refer to the Loading and Testing LRU Software section of the most current revision of the Garmin G2000 Integrated Avionics System Line Maintenance Manual, P/N 190-01185-00, found on theSupplier Publication List.

(8) Do a check of the GMA 36 Remote Audio Panel. Refer to GMA 36 Remote Audio Panel and Audio Components (G2000) - Adjustment/Test.

(9) For GMA 36 troubleshooting procedures refer to the Troubleshooting section of the most current revision of the Garmin G2000 Integrated Avionics System Line Maintenance Manual, P/N 190-01185-00, found on theSupplier Publication List

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Figure 401 : Sheet 1 : GMA 36 Remote Audio Panel Installation



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AUDIO JACK PANEL (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation procedures for the audio jack panel. For a general description of the audio jack panel, refer to Equipment/Furnishings - General.

2. Tools and Equipment

A. No special tools or equipment are required for this procedure.

3. Audio Jack Panel

A. Remove the Audio Jack Panel (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) and the AVIONICS MASTER switch (SW04) are in the OFF position.

(3) Disengage the AUDIO/MKR circuit breaker found on the cockpit circuit breaker panel.

(4) Loosen the captive screws that attach the audio jack panel to the center console.

(5) Carefully pull the audio jack panel away from the console.

(6) Disconnect electrical connector PJ507 from electrical connector JJ507.

(7) Remove the audio jack panel from the airplane.

B. Install the Audio Jack Panel (Refer to Figure 401).

(1) Connect electrical connector PJ507 to electrical connector JJ507.

(2) Carefully put the audio jack panel in position on the center console.

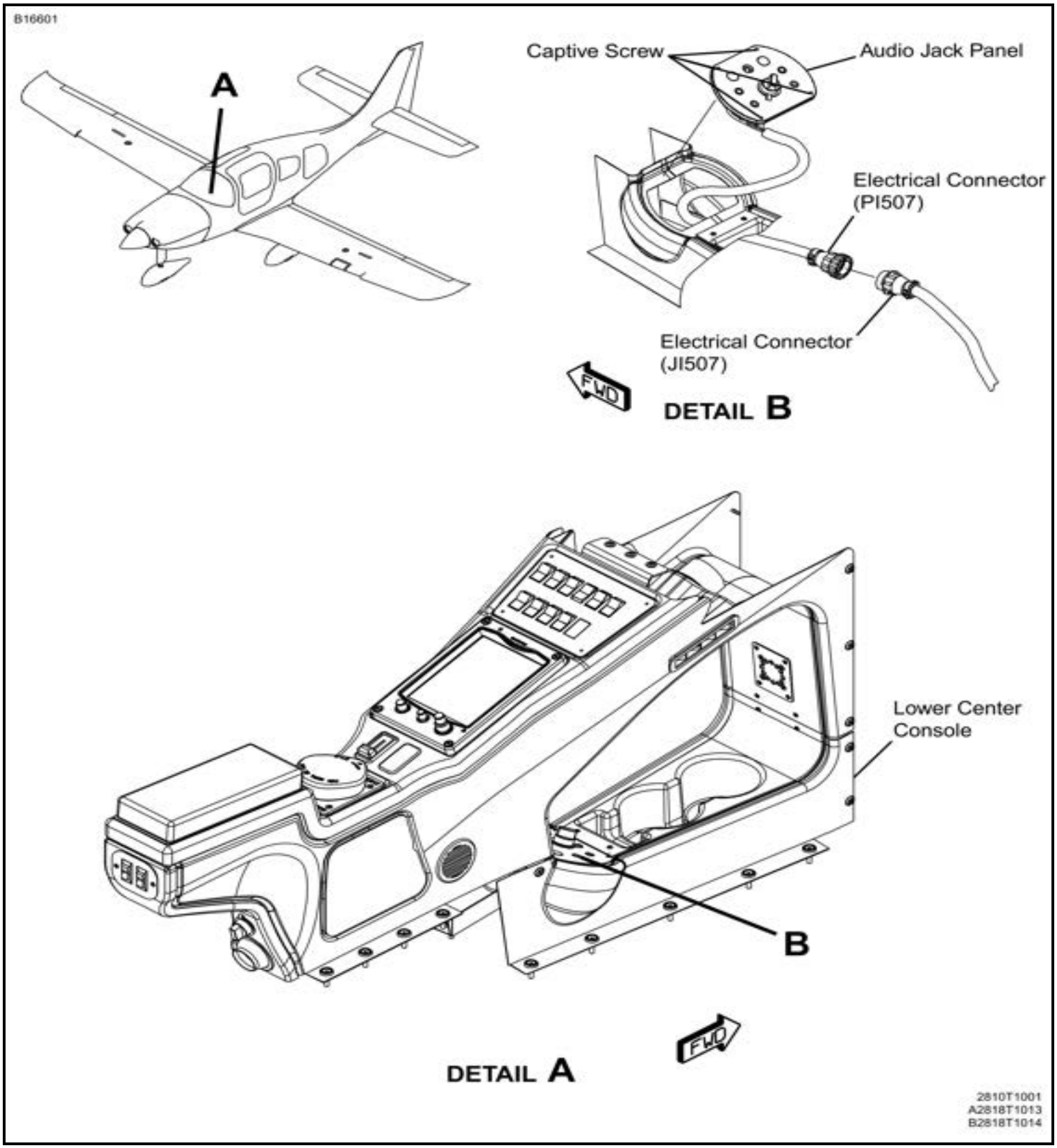
(3) Tighten the captive screws that attach the audio jack panel to the center console.

(4) Engage the AUDIO/MKR circuit breaker found on the cockpit circuit breaker panel.

(5) Do a check of the audio jack panel. Refer to Garmin GMA 36 Remote Audio Panel and Audio Components (G2000) - Adjustment/Test, Headset Microphone and Isolation Operational Test.

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Figure 401 : Sheet 1 : Audio Jack Panel Installation



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STATIC DISCHARGE WICKS - MAINTENANCE PRACTICES

1. Static Discharge Wicks

A. **Detection of a Broken Static Wick** - To check the wick's integrity, hold the trailing edge between the thumb and forefinger, and gently move it left and right approximately 2 in. If the unit flexes at point A, as shown in Figure 201, the wick is broken and should be replaced.

B. **Removal of Static Wick** - Refer to Chapter 20, Repair of Static Wicks, for repair details.

CAUTION: When removing and handling a good static wick, do not bend it. The static wick can be broken without obvious exterior indications.

WARNING: If the wicks are removed and not reinstalled before flight, problems with navigation and communication equipment can occur.

(1) Unscrew the screw connecting the static wick to its housing.

(2) Remove the static wick from the housing.

NOTE: If the static wick does not slide out after removing the screw, use a pair of pliers and gently pull the static wick from its housing.

C. **Installation of Static Wick** - Refer to Chapter 20, Repair of Static Wicks, for repair details.

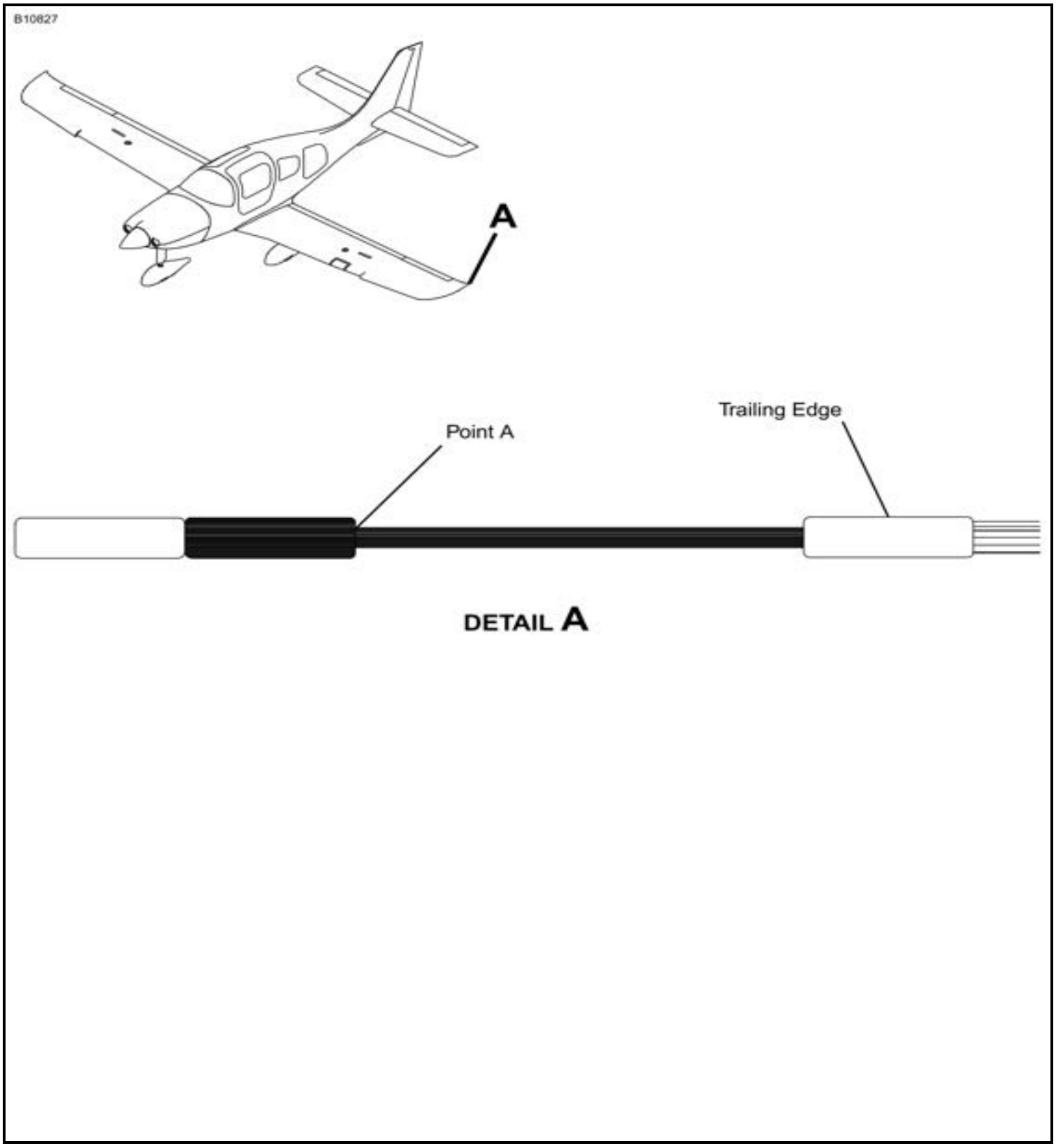
CAUTION: Before installing the static wick, perform the broken static wick test described below. A static wick can be broken without any obvious exterior indications.

(1) To install a static wick place the wick in its housing.

(2) Screw the static wick and its housing together.

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Figure 201 : Sheet 1 : Static Wick



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FIRE PROTECTION - DESCRIPTION AND OPERATION

1. General - Fire Extinguisher Description and Limitations

A. The airplane fire extinguisher is located below the copilot's seat in a metal bracket and is mounted horizontally. The extinguisher is stored with the top of the unit near the middle of the airplane so that it is accessible from the pilot's seat. Refer to Figure 1

B. Airplanes with a 2.5 lbs. portable fire extinguisher will have one of the below types:

NOTE: The label on the fire extinguisher provides the most accurate description.

(1) The extinguisher is filled with a 1211/1301 Halon mixture (commonly called Halonaire) that chemically interrupts the combustion chain reaction rather than physically smothering the fire. The hand extinguisher is intended for use on Class B (flammable liquids, oil, grease, etc.) and Class C (energized electrical equipment) type fires.

(2) The installed fire extinguisher is an H3R, Inc. Halon blend model RTA1200. The unit has a 5B:C U/L rating and contains 2.5 lbs.of recycled Halon with a 14-16 second discharge time. It has been demonstrated that 2.5 lbs. of extinguishing agent, when totally discharged at one time within the cabin of the airplane during flight, can be safely ventilated from the cabin within an FAA prescribed time period. The ventilation time period is important since Halon has some levels of toxicity. For this reason, using other types of fire extinguishers, with different extinguishing agents, or greater weights of Halon is not approved.

C. Airplanes with a 1.25 lbs. portable fire extinguisher will have one of the below types:

NOTE: The label on the fire extinguisher provides the most accurate description.

(1) The extinguisher is filled with a 1211 Halon that chemically interrupts the combustion chain reaction rather than physically smothering the fire. The hand extinguisher is intended for use on Class B (flammable liquids, oil, grease, etc.) and Class C (energized electrical equipment) type fires.

(2) The installed fire extinguisher is an Amerex Corp. Halon 1211 model A3447. The unit has a 2B:C U/L rating and contains 1.25 lbs. of recycled Halon with a 10 second discharge time. It has been demonstrated that 1.25 lbs. of extinguishing agent, when totally discharged at one time within the cabin of the airplane during flight, can be safely ventilated from the cabin within an FAA prescribed time period. The ventilation time period is important since Halon has some levels of toxicity. For this reason, using other types of fire extinguishers, with lower U/L ratings, different extinguishing agents is not approved.

D. **Temperature Limitations** - The fire extinguisher has temperature storage limitations that may need to be considered depending on the operating environment of the airplane. If it is anticipated that the cabin temperature will exceed the extremes shown in the table below, Table 1, the extinguisher must be removed and stored in a more temperate location.

Table 1. Cabin Temperature Extremes

Temperature Extremes	Maximum/Minimum Temperatures
Lowest Cabin Temperature	2.5 lbs. portable fire extinguisher -40 °F (-40 °C)
	1.25 lbs. portable fire extinguisher -65 °F (-54 °C)
Highest Cabin Temperature	120 °F (49 °C)

2. Portable Fire Extinguisher Inspection

A. Complete a Portable Fire Extinguisher (Weight) Functional Check.

NOTE: Since the fire extinguisher does not have a pressure gage to indicate its charge, it must be weighed at the annual or 100 hour inspection intervals to ensure there is an adequate amount of extinguishing agent.

NOTE: All portable fire extinguishers have a permanent placard with the NFPA or UL specifications of the bottle.

(1) Remove the portable fire extinguisher from the airplane.

(2) Make sure that the portable fire extinguisher has a correctly installed permanent placard with the information that follows:

NOTE: The specifications for the weight and pressure of the portable fire extinguishers can be different because the extinguishers are from different manufacturers.

(a) Make sure that the NFPA or UL specifications are put on the placard on the portable fire extinguisher.

(b) Make sure that you can read the placard on the portable fire extinguisher.

(3) Weigh the portable fire extinguisher.

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NOTE: The portable fire extinguisher is weighed to make sure that the fill gage is correct. The fill gage can show that the portable fire extinguisher is full when some of the agent is missing.

(a) Make sure that the measured weight agrees with the NFPA or UL specification placard.

1 Make sure that the fill gage shows the correct indication and is within the tolerance given on the placard.

(4) If the measured weight and the placard weight do not agree with the tolerance on the placard, fill or replace the portable fire extinguisher, as necessary.

(5) Install the portable fire extinguisher in the airplane.

B. Fire Extinguisher General Visual Inspection

(1) Check the following items on the fire extinguisher and then reinstall in the airplane.

(a) Check condition of tamper seal for security.

(b) Check for damage to the discharge lever.

(c) Check condition of the valve nozzle.

(d) Check legibility and security of instructions decal.

(e) Ensure there are no dents or deformation to the cylinder.

(f) Note the extinguisher's gross weight on the 100 hour or annual inspection form.

C. Fire Extinguisher Mounting Bracket Inspection

(1) Inspect the bracket mounting screw holes for evidence of fatigue and pull-through.

(2) Inspect the clamp mechanism for evidence of fatigue, and look for bends or crimps in the circular band. Install the extinguisher.

(3) Ensure the latching mechanism functions properly. Tug on the extinguisher a few times. The extinguisher should remain in place even when a moderate force is applied. If the extinguisher has a tendency to break out of the bracket when a moderate force is applied to the unit, replacement of the bracket is required.

3. Removal and Installation of the Fire Extinguisher Bracket

A. The fire extinguisher bracket is mounted to the aft side of the footwell on the copilot's side of the airplane. It is attached with two 1/4 - 28 screws, two flat head washers, and two 1/4 - 28 self-locking nuts. Refer to Figure 1.

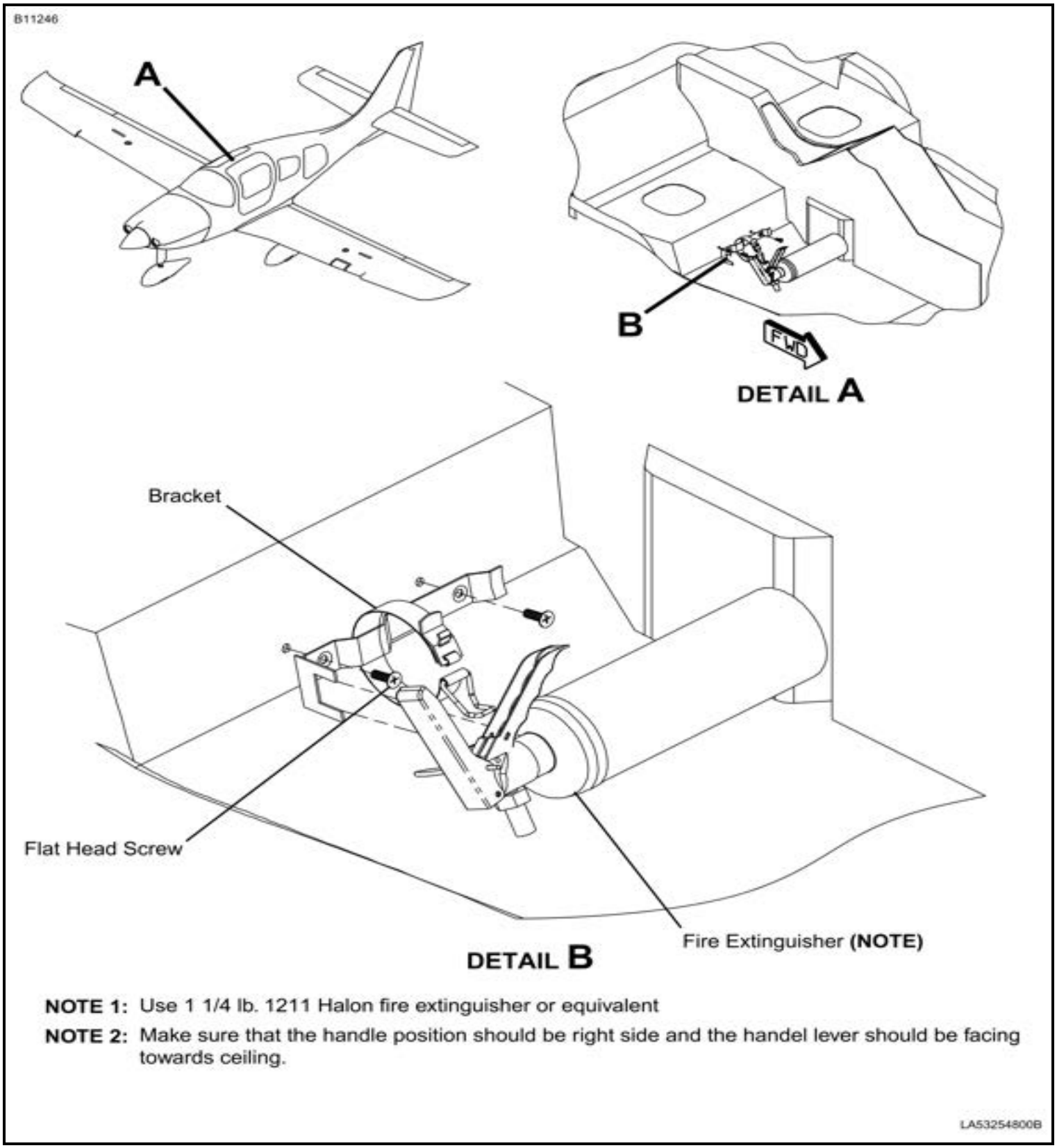
(1) The bracket is mounted by inserting the screws into the countersunk portion of the bracket and then inserting it through the pre-drilled holes in the panel of the footwell. The washer and self-locking nut are applied to the back side of the panel and torqued to 72 in.-lbs.

(2) The bracket is uninstalled by removing the two 1/4 - 28 self-locking nuts and flat head washers on the backside of the mounting panel.

B. Access to the back side of the mounting panel is available from two locations. There is an access panel under the copilot's seat, which requires removal of the seat (refer to Section 25-10-00, Removal of the Front Seats) and an access panel on the underside of the airplane below the copilot's seat. While access is more convenient using the panel under the airplane, the removal and installation of the bracket requires two people.

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Figure 1 : Sheet 1 : Fire Extinguisher



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FLIGHT CONTROLS - GENERAL

1. General - Scope And Definition

A. **General Description of System** - The Cessna 400 (LC41-550FG/T240) has dual flight controls and can be flown the pilot's or copilot's position. Dual pairs of foot pedals mechanically-actuate the rudder and control the brakes, which are also used for steering (differential braking). Push-pull tubes mechanically-actuate the ailerons and elevator. The rudder is mechanically-actuated with foot pedals and control cables. The electrically operated drive motor connected to push-pull tubes operate the flaps. Rod end bearings are used throughout the control system. It is not necessary for you to do maintenance to the bearings.

B. **General Description of Trim System** - An electrically operated trim tabs located in the elevator, and the right aileron give longitudinal pitch trim and lateral trim, respectively. A fixed trim tab located the rudder gives directional trim.

C. **Tolerances and Play** - Table 1 lists the allowable control and trim tab deflections, free play limits, and tolerances.

Table 1. Control Surface Deflections, Tolerances, and Free Play Limitations

		Deflection	Tolerance	Free Play Limits (NOTE 1)
Wing Flaps	Cruise	0 degrees	±1 degree	---
	Takeoff	12 degrees		
	Landing	40 degrees		
Ailerons	Up	21.6 degrees	±1 degree	---
	Down	17.7 degrees		
Aileron Trim Tab	Up	22.4 degrees	±1 degree	0.050 inch (2.5 percent c)
	Down	19.6 degrees		
Aileron Servo Tab	Up	13 degrees at 17.7 degrees ail. deflection	±2 degrees	0.063 inch (2.5 percent c)
	Down	19 degrees at 21.6 degrees ail. deflection		
Elevator	Up	23 degrees	±1 degree	---
	Down	14 degrees		
Elevator and Elevator Fairings **(NOTE 2)**	Left	---	±1 degree	---
	Right	---		
Elevator Trim Tab	Up	21 degrees	±2 degrees	0.075 inch (2.5 percent c)
	Down	30 degrees		
Rudder	Left	30 degrees	±1 degree	---
	Right	30 degrees		
Rudder Trim Tab	---	±30 degrees	N/A	---

NOTE 1:

The tab free play at the tab trailing edge should be less than 2.5 percent of the tab chord aft of the hinge line, measured at the station where the free play is measured.

NOTE 2:

Elevator and elevator fairing top surfaces must be in line with the outboard, trailing top surface of the left hand horizontal.

D. **Rigging and Flight Controls** - Rigging and adjustment of the control system and surfaces are covered in their respective sections.

2. Trim System - General

A. The Cessna 400 (LC41-550FG/T240) has a two-axis electric trimming system. The elevator trim tab is located on the right side of the elevator, and the aileron trim tab is on the right aileron. Both tabs are electrically controlled by a hat switch on each control stick, and the trim position is annunciated on the trim panel located to the right of the rocker switch panel for the Avidyne option or the Engine Indication System (EIS) page of the MFD for the Garmin G1000 or G2000 systems. The trim servos are protected

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by one-amp circuit breakers. Refer to Figure 1 or Figure 2 for an illustration of the system.
The trim surfaces are moved by push rods connected between each tab and a servomotor. The aileron tab has one actuating rod and the elevator tab has two. The second actuating rod on the elevator is a redundant system and is provided for the more critical tab in the system. The frictional device installed on the aileron tab should never be lubricated.

B. **Hat Switches** - The trim tabs are controlled through the use of a hat switch on the top portion of the pilot's and copilot's control stick at the three and nine o'clock positions, respectively. Moving the switch forward will correct a tail heavy condition, and moving it back will correct a nose heavy condition. Moving the hat switch left or right will correct right wing heavy and left wing heavy conditions, respectively.

C. **Simultaneous Trim Application** - If both switches, pilot's and copilot's, are moved in the same direction at the same time, the trim will operate in the direction selected. If the switches are simultaneously moved in opposite directions, e.g., pilot's is nose down and copilot's is nose up, the pilot's selection overrides the copilot's, and the trim will move to a nose down position (trim will not move with the Garmin G1000 option in this case). Finally, if the switches are simultaneously selected in different directions, e.g., elevator trim is input by one pilot and aileron trim is input by the other, each trim tab will move in the direction selected.

D. **Trim Position Indicator**

(1) **Avidyne Option** - The trim position is displayed on two light bars using a series of blue LED's and two green LED's that are arranged on the trim panel in the shape of a plus sign. The vertical lights indicate the position of the elevator trim, and the horizontal lights show the position of the aileron trim. The middle green lights in each bar indicate the approximate neutral position.
The blue lights are sequentially lit and extinguished as the trim tab moves through its range of travel. If the two green LED's in the middle of the "+" are lit and no blue lights are illuminated, both tabs are in the approximate neutral position. The LED's level of brightness is controlled by the position lights switch. When the position lights are on, the trim lights are in the dim mode, and when the position lights are off, the trim lights are in the bright mode.
Should one or all of the trim indicator LED's stop functioning, remove the trim panel, and have it serviced by a qualified avionics repair technician.

(2) **Garmin G1000 Option and Model T240/G2000 Installation** - The trim position is displayed in the Trim Group on the Engine Indication System (EIS) page of the MFD. The vertical mark indicates the position of the elevator trim and the horizontal mark shows the position of the aileron trim. The blue band for each axis indicates the approved takeoff ranges.

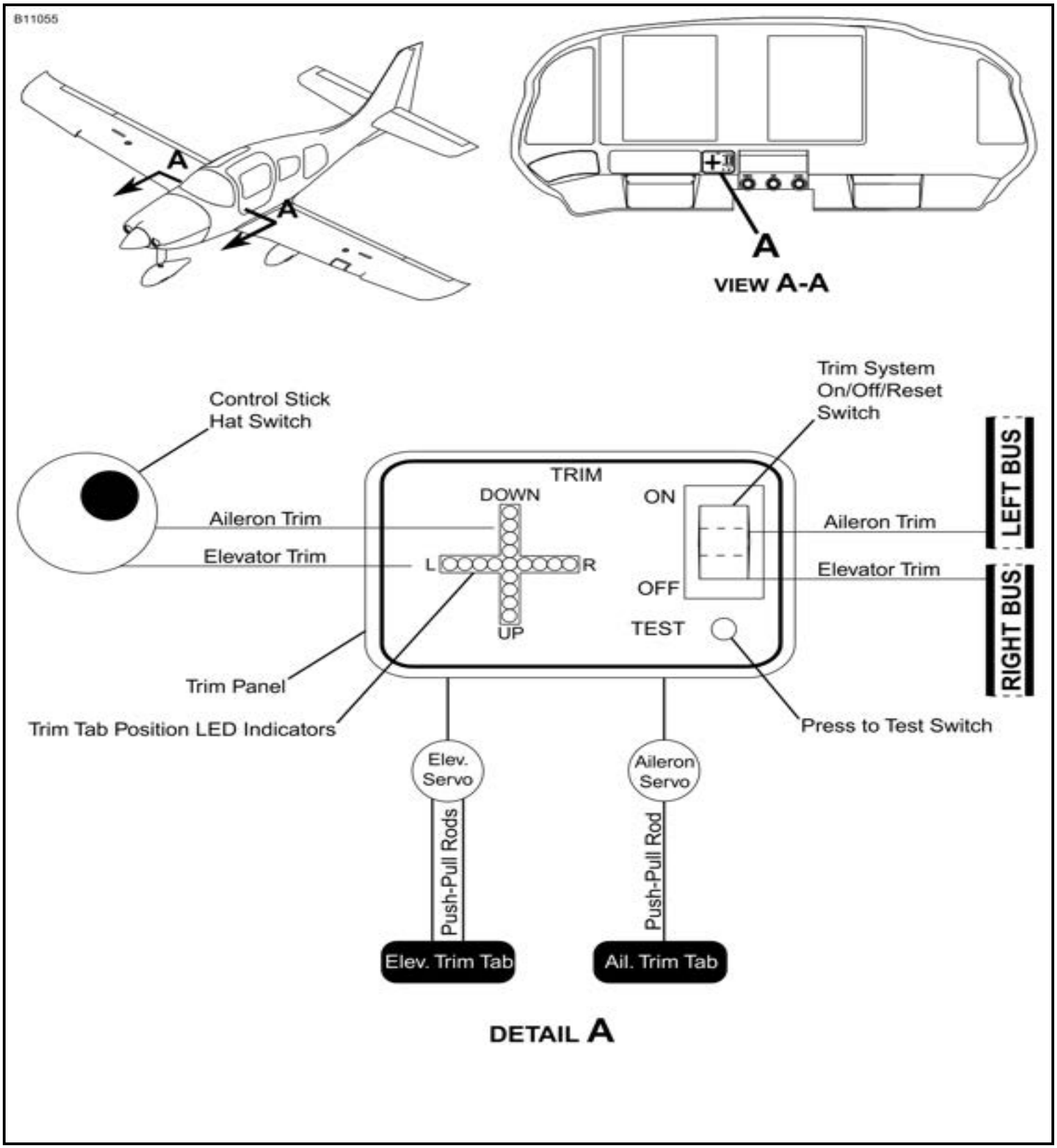
E. **Trim Switch**

(1) **Trim On/Off/Reset Switch (Avidyne Option)** - The trim system on/off/reset switch on the right side of the panel turns off power on all the trim tabs. This switch is used if a runaway trim condition is encountered. Refer to the POH for an expanded discussion of this issue. The press-to-test switch verifies the operation of all the LED's associated with the trim, flaps, fuel tank position, and annunciator panel. When the test position is selected, all related LED's illuminate in the bright mode. A light that fails to illuminate should be replaced.

(2) **Autopilot/Trim Master Switch** - The autopilot/trim master switch, to the right of the avionics master switch in the overhead console, turns off power on all the trim tabs. This switch is used if a runaway trim condition is encountered. The switch can be cycled to reset or restore normal trim operations. Refer to the POH for an expanded discussion of this issue. The press-to-test switch is discussed in chapter 7 of the POH under the heading *Flaps, and 5 Pack Switch Annunciation (Press-to-Test)*.

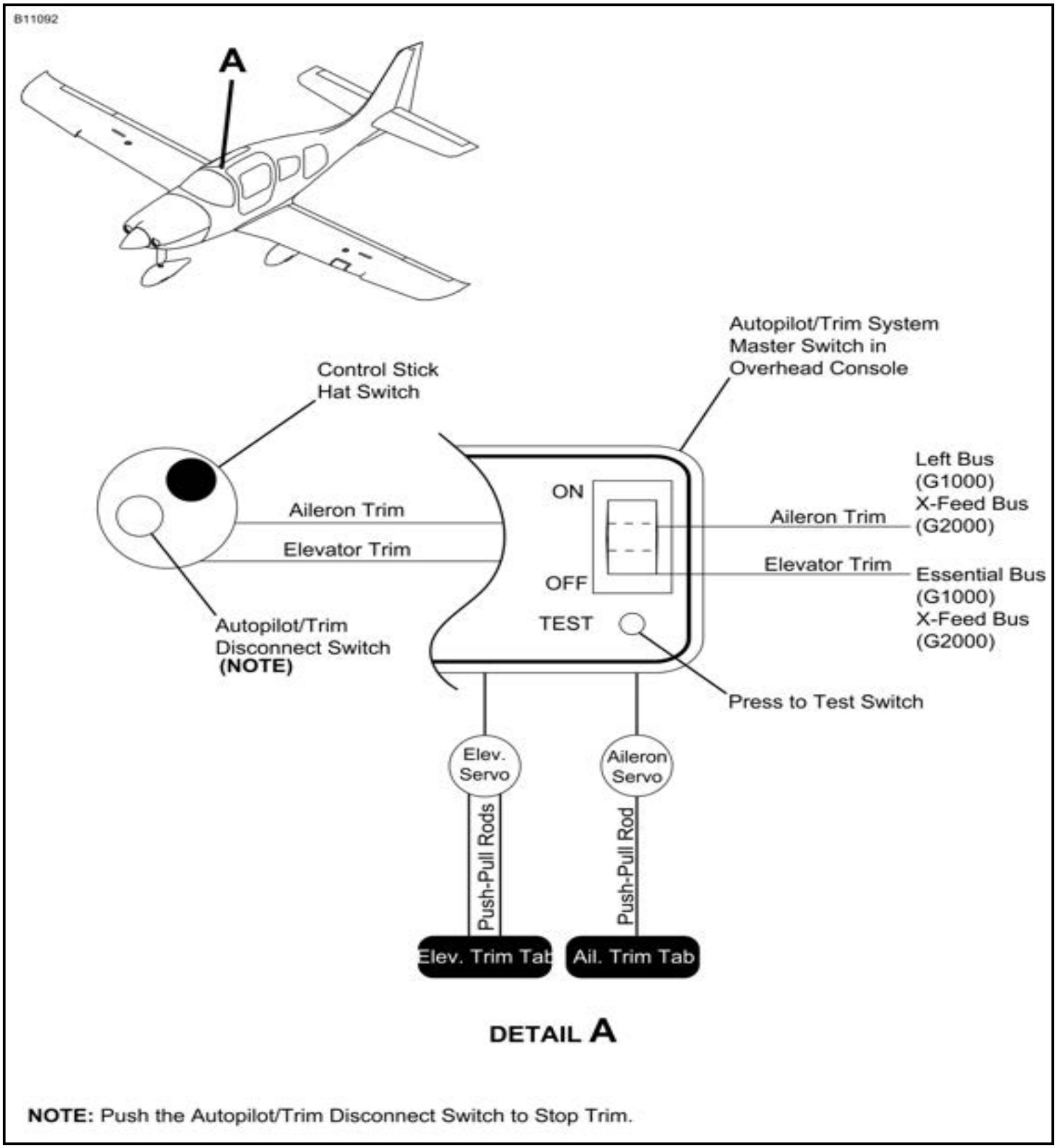
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Figure 1 : Sheet 1 : Trim System Layout (Avidyne Option)



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Figure 2 : Sheet 1 : Trim System Layout (Garmin G1000 Option or G2000 Installation)



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CONTROL SURFACE STATIC BALANCING - MAINTENANCE PRACTICES

1. Control Surface Static Balancing - General

A. Control surface balance must be checked when control surfaces are repaired, altered, or repainted. All control surfaces must be repainted in accordance with Chapter 51. The control surface balance limits shown in Table 201 apply to a complete painted control surface only. Complete control surfaces include (as applicable) balance weight, all attachment hinges and hardware, trim tabs, access panels, grounding straps, and static wicks.

Table 201. Control Surface Static Balance Limits

		Maximum Total Weight (lbs.)	TE Hinge Moment (in.-lbs.) (see Note 1)
Aileron	Left	6.8 to 8.6	-4.4 to +0.9
	Right	6.8 to 8.6	-4.4 to +0.9
Elevator (see Note 2)	Left	8.9 Ref.	-1.0 Ref.
	Right	12.4 Ref.	+6.5 Ref.
	Tube	2.7	+2.6
	Assembly	19.8 to 26.9	-3.54 to +3.54
Rudder	---	14.1 to 19.8	+8.9 to +15.4.

NOTE 1:

A positive value indicates trailing edge heavy.

NOTE 2:

Elevator moment is the sum of the left, right, and tube moments. Left and right individual weights and moments may vary from values shown but the assembly values must fall within ranges indicated.

NOTE: If specified moments cannot be met, heavier balance weights may be obtained from the manufacturer. This approach should be considered before reworking any repair or restripping and repainting the affected control surface. A lighter weight can be produced by shaving existing balance weight per the instructions outlined in the sections below.

2. Required Equipment For Balancing

A. Obtain or otherwise fabricate two knife-edges (refer to Figure 201) and supports approximately 6 - 12 inches in height such that they may be placed on a table and stabilized to prevent tipping. The knife-edge hinge supports must be level and perpendicular to the control surface hinge axis. The knife-edges should have attached a 1.5 to 2.0 inch section of MS20001P5 piano hinge to match the elevator attachment hinge. The knife-edges should also be small enough in height to fit within the rudder at the hinge pin locations.

B. A calibrated scale accurate to ±0.01 lbs.

C. Calculator.

D. Calibrated leveling device (digital inclinometer, bubble level, etc) accurate to ±0.2 degrees.

3. Balancing Procedures - Aileron

A. **Aileron static balancing** - Use the following procedure for static balancing the ailerons.

(1) Mount the two knife-edges horizontally such that a line drawn through the hinge line support points is level and perpendicular to the supporting knife-edges.

(2) Set the aileron trim tab to the neutral position.

(3) Remove the ailerons per the instructions in Section 27-10-00, Ailerons.

(4) On the left aileron, tape the servo tab in the neutral position with a small piece of masking tape. Tape the two drive rods to the servo tab hinge. Include all attachment hardware for the control rods.

(5) Install the attachment hardware into each of the three hinges.

(6) Place either aileron on the knife-edges such that the inboard and outboard attachment bolts are resting on the knife-edges. Swing the aileron up and down to ensure that the knife-edges do not interfere with the aileron and hinges.

(7) Position the aileron such that the chord line is level, and accurately measure the control surface load at the inboard end of trailing edge. To check that the chord line is level, measure the angle of the top surface of the aileron at the inboard end,

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and confirm that it is 10.9 degrees ±0.2 degrees from horizontal. Refer to Figure 202.

(8) Calculate the moment by multiplying the control surface load by 6.72 inches (moment arm). Compare this value with that in Table 201.

WARNING: Do not remove material from the forward or lower edge of the balancing weights. It is important that the contour of the forward and lower edge and the width of the balancing weights be maintained.

(9) If the moment is too light, material may be removed from the balancing weight to achieve the correct moment. Remove material from the aft face of the balancing weight first. If further weight reduction is needed, remove material from between the two fastener holes. The cross-hatched areas in Figure 203 indicate the areas where material may be removed from the aileron balancing weights. The width may be adjusted as long as a minimum clearance of 0.125 inches is maintained between the counterweight and the aileron cove in the wing.

(10) If the moment is too heavy, a heavier balancing weight may be obtained from the manufacturer.

(11) Use new MS20365-1032A self-locking nuts at final installation of the aileron balancing weights to the aileron. Dry torque the nuts 28 to 34 in.-lbs.

4. Balancing Procedures - Elevator

A. **Elevator Static Balancing** - The elevator shells must be balanced individually and the total weight and trailing edge moment calculated by adding the component values (elevators and torque tube).

(1) Remove the rudder per the instructions in Section 27-20-00, Rudder Removal and Installation.

(2) Remove the elevator per the instructions in Section 27-30-00, Elevator Removal and Installation.

(3) Place each of the elevators upside-down on the test fixture and attach them to the hinge sections on the fixture with a length of hinge pin in each hinge section. Alternatively, the elevators may be balanced on knife edges placed perpendicular to the axis of the hinge. If this method is used, make certain the elevator shell does not interfere with the knife edge supporting the elevator hinge. Also, use care to ensure the elevator does not fall off the knife edge, as the hinge must be place very near the edge of the edge.

NOTE: You must weigh and balance each elevator half with their metal end caps removed from the elevator. Refer to Chapter 27-30-00, Elevator Control System - Maintenance Practices. The weight and moment of the metal end caps is included in the weight and moment of the torque tube assembly.

(4) Set the elevator trim tab in the right-hand shell to the neutral position.

NOTE: Position the knife-edges such that they are equally distant from each end of the elevator.

(5) With the elevator chord line level, accurately measure the control surface load at the trailing edge a distance of 20.00±0.13 inches from the outboard end of the elevator. The elevator chord line is level when the angle of the upper or lower surface is 6.0±0.2 degrees, measured perpendicular to the hinge line. Add a measured amount of tare weight to the trailing edge of the left-hand elevator if required to give it a positive trailing edge weight. Refer to Figure 204.

(6) Calculate the total moment by multiplying the combined left-hand and right-hand elevator weights by 10.00 inches (moment arm) and adding 2.6 in.-lbs. for the torque tube. Compare this value with that in Table 201.

WARNING: Do not remove material from the forward or lower edge of the balancing weights and do not reduce the overall width of the balancing weights. It is important that the contour of the forward and lower edge and the width of the balancing weights be maintained.

(7) If the moment is too light, material may be removed equally from the balancing weights on both elevators to achieve the correct moment. Refer to Figure 205; crosshatched areas indicate where material can be removed. Remove material from the aft hole first.

(8) Use new MS20365-428A self locking nuts at final installation of the elevator balancing weights to the elevator. Dry torque the nuts 45 to 50 in.-lbs.

5. Balancing Procedures - Rudder

A. **Rudder Static Balancing** - Use the following procedure for static balancing the rudder.

(1) Remove the rudder per the instructions in Section 27-20-00, Rudder Removal and Installation.

(2) Mount both knife-edges horizontally and parallel to each other.

(3) Place the rudder on the knife-edges such that there is one knife-edge on the top and one on the bottom hinge pins. A line drawn through the hinge line support points must be level and perpendicular to the supporting knife-edges. Move the

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rudder up and down to ensure that the knife-edges do not interfere with the rudder and cause friction that could affect the surface load.

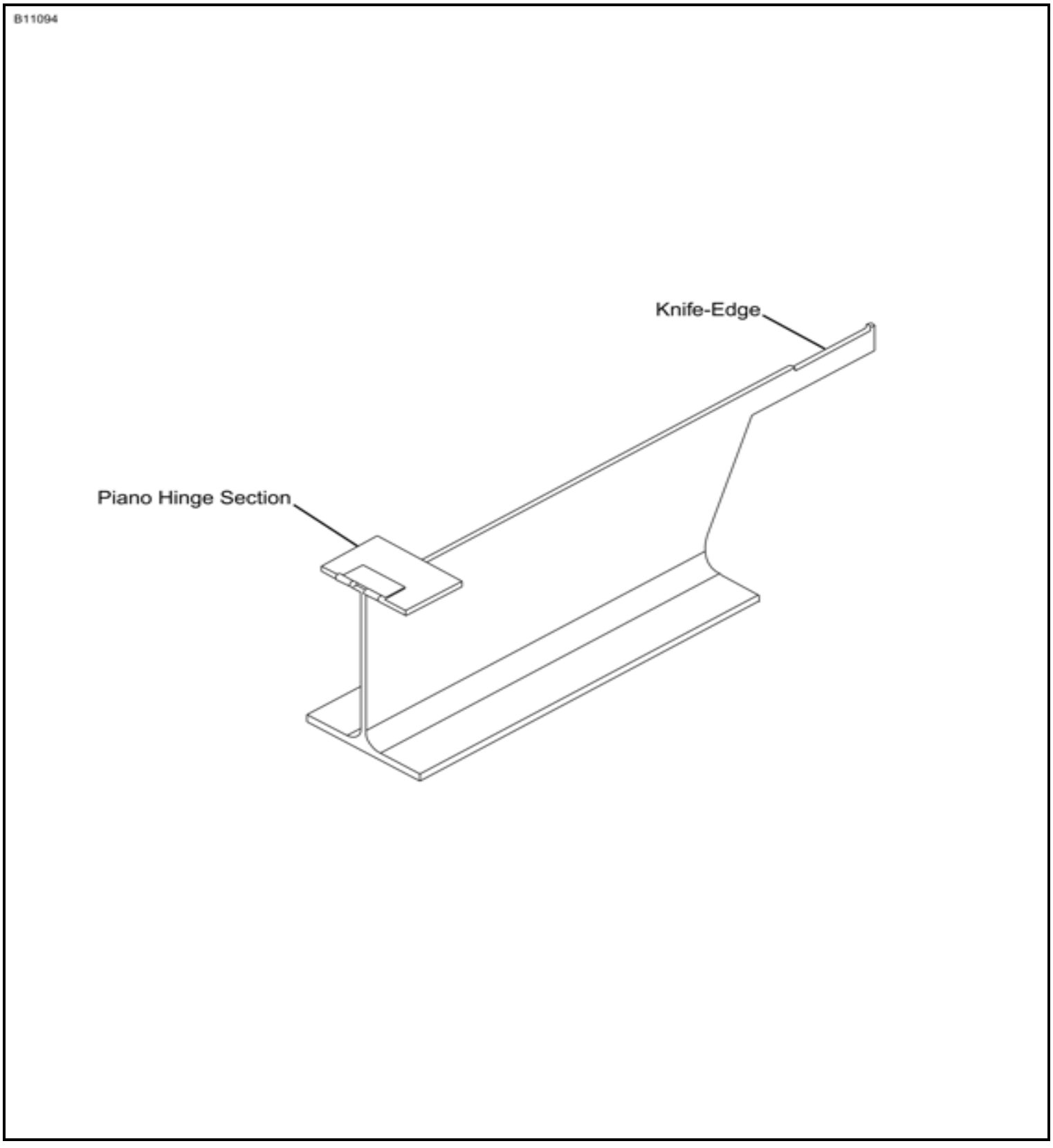
(4) With the rudder chord line level, accurately measure the control surface load at the trailing edge at the lower edge of the trim tab. Refer to Figure 206. The rudder has a symmetrical cross section and thus the chord line is level when the center of the leading edge is at the same height as the center of the trailing edge.

(5) Calculate the moment by multiplying the control surface load by 17.3 inches (moment arm). Compare this value with that in Table 201.

(6) If the moment is too light, the balancing weight may be reduced by drilling into the bottom edge of the balancing weight. Holes are to be 3/8 inch diameter. Drill hole "A" first. If more removal of material is necessary, drill hole "B". Holes should be a maximum depth of 1.3 inches. Refer to Figure 207.

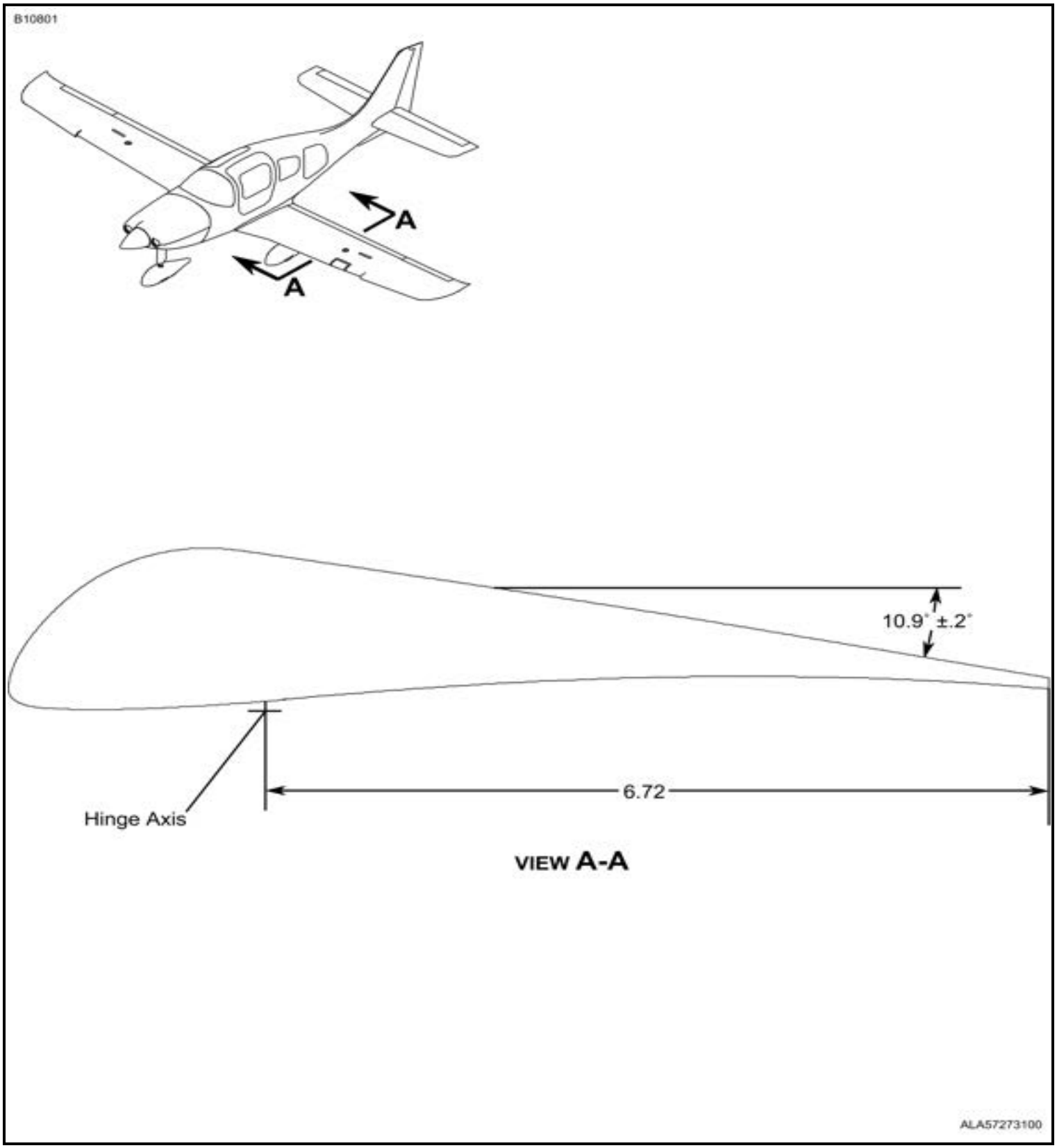
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Figure 201 : Sheet 1 : Typical Knife-Edge



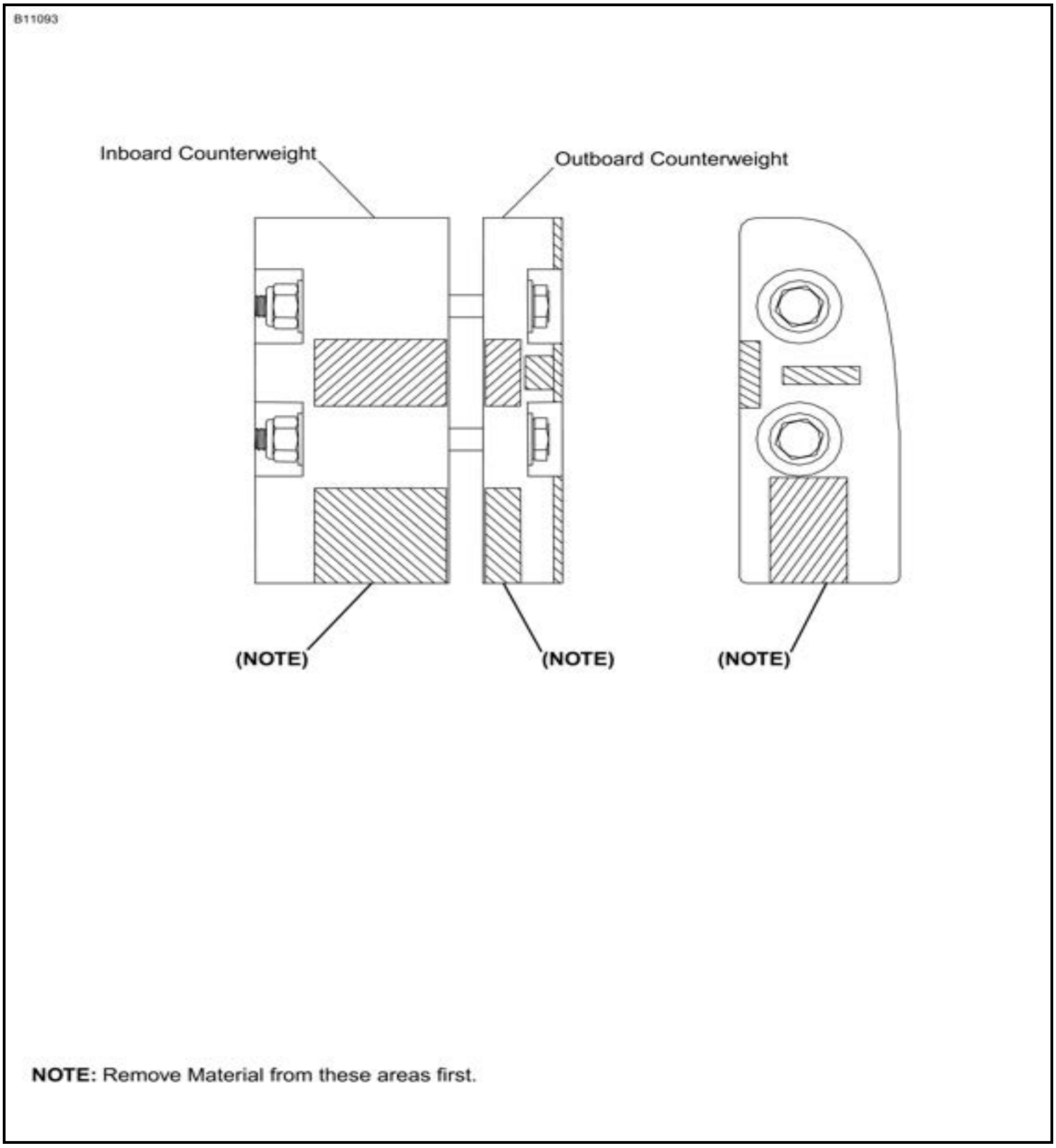
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Figure 202 : Sheet 1 : Level Aileron Chord Line and Moment Arm



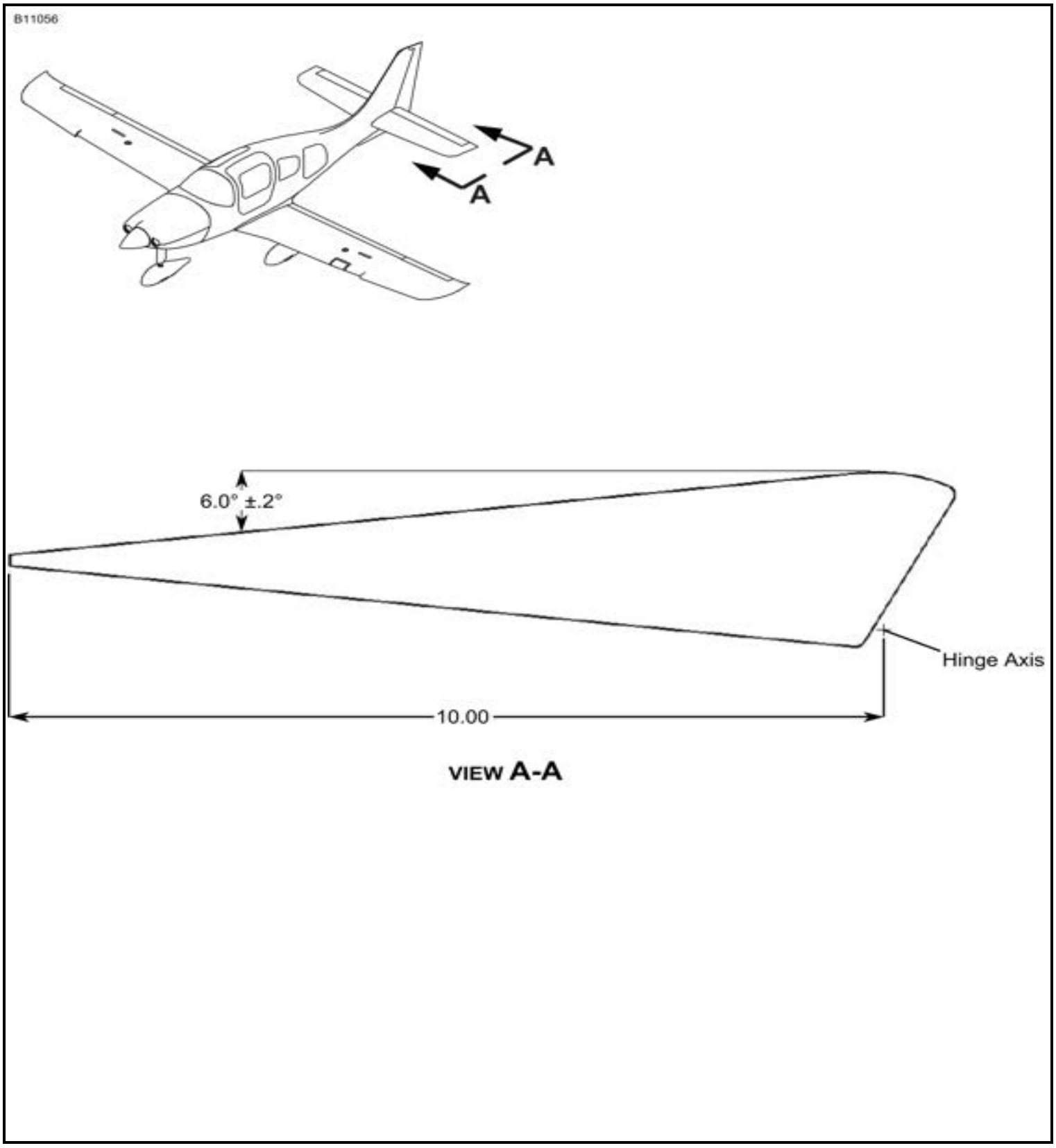
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Figure 203 : Sheet 1 : Allowable Areas of Material Removal, Aileron Balancing Weight



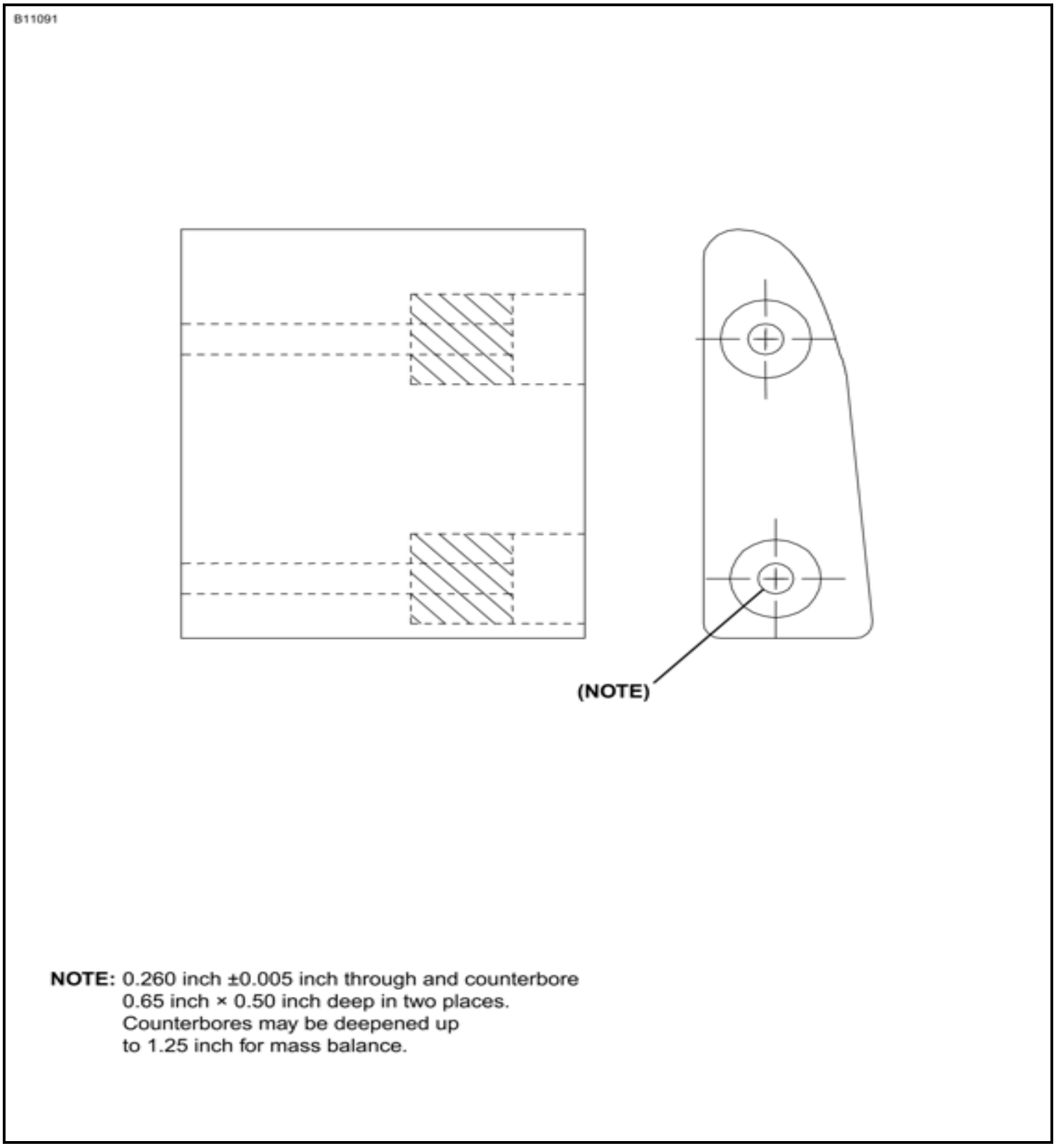
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Figure 204 : Sheet 1 : Level Elevator Chord Line and Moment Arm



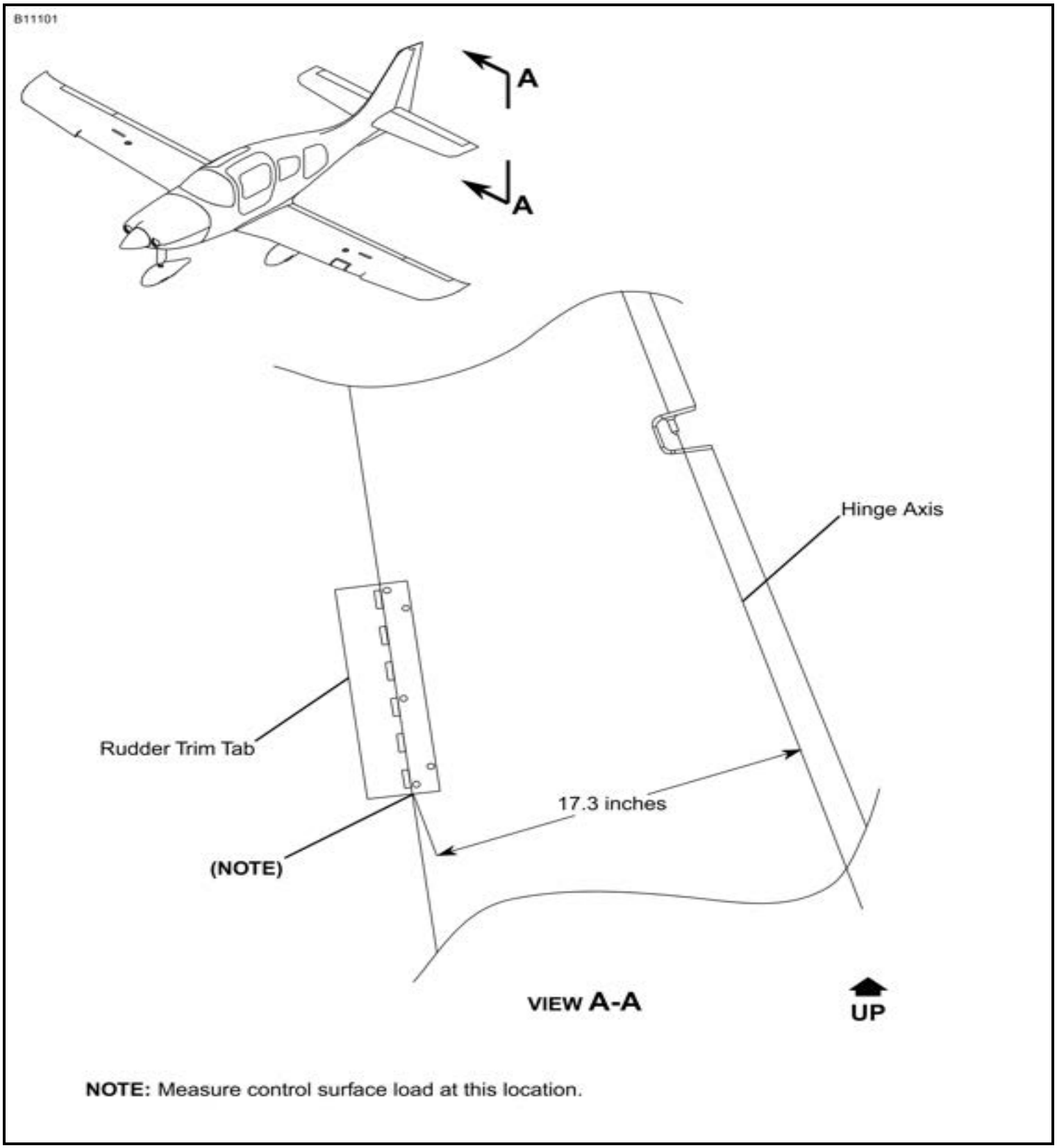
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Figure 205 : Sheet 1 : Allowable Areas of Material Removal, Elevator Balancing Weight



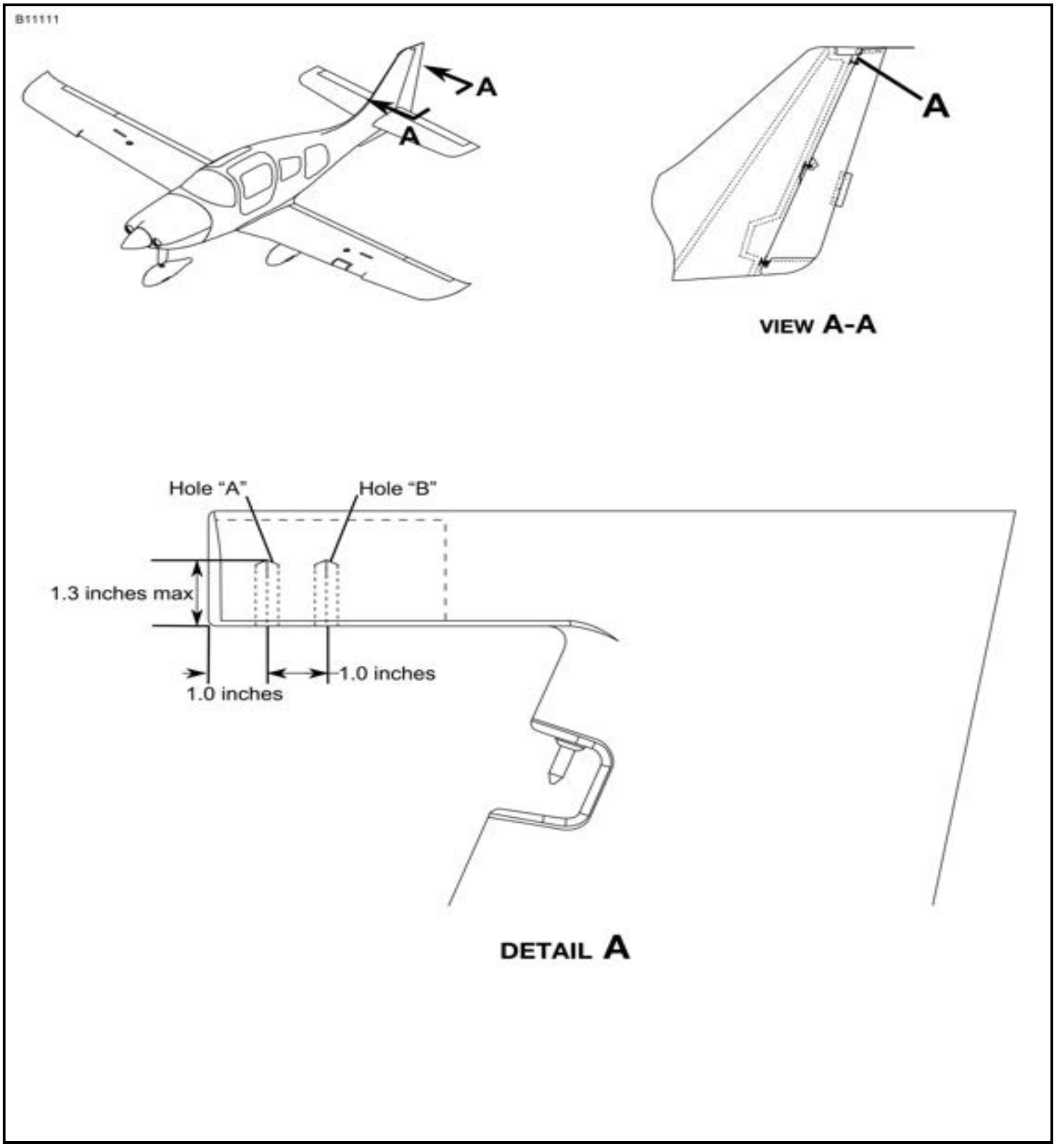
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Figure 206 : Sheet 1 : Location for Measuring the Rudder Surface Load



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Figure 207 : Sheet 1 : Material Removal From Rudder Balancing Weight



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GARMIN G2000 AILERON AND ELEVATOR CALIBRATION - ADJUSTMENT/TEST

1. General

A. This section gives the instructions for the Garmin G2000 aileron and elevator trim calibration procedures. This procedure gives flight neutral system rigging instructions for the cockpit Multifunction Display (MFD). This procedure is applicable for aileron and rudder trim tab pointer flight neutral indications. You must only do the calibration in this section, after the adjustment and test procedures of a new trim tab actuator have been completed.

2. Aileron and Elevator Trim Calibration Procedures

A. Do the Aileron and Elevator Trim Calibration Procedures. (Refer to Figure 501).

(1) Before this adjustment is started, make sure that all applicable flight control adjustment and test procedures are complete. Refer to Chapter 27, Flight Controls for the applicable return to service tests for the applicable flight control system.

(2) On the cockpit circuit breaker panel, disengage the circuit breakers that follow:

(a) PFD

(b) MFD

(c) GTC.

(3) Apply external power to the airplane.

(4) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(5) Set the AVIONICS MASTER switch (SW04) to the ON position.

(6) Set the CROSS TIE switch (SW03) to the ON position.

(7) Set the PFD to the configuration mode as follows:

(a) On the PFD, push and hold the number 12 softkey (the far right softkey).

(b) Engage the PFD circuit breaker.

(c) Release the softkey, when the "INITIALIZING SYSTEM" message shows on the PFD.

(8) Set the MFD to the configuration mode as follows:

(a) On the MFD push and hold the number 11 softkey (the far right softkey).

(b) Engage the MFD circuit breaker.

(c) Release the softkey, when the "INITIALIZING SYSTEM" message shows on the MFD.

(9) Set the GTC 570 to the configuration mode as follows:

(a) Push down and hold the small right knob on the GTC.

(b) Engage the GTC circuit breaker on the cockpit circuit breaker.

(c) Release the small right knob, when the "INITIALIZING SYSTEM" message shows on the GTC.

(10) On the GTC, push the GDU button.

(11) On the GTC, turn the large right knob to select the CAL page group.

(12) On the GTC, turn the small right knob to select the "FLAPS AND TRIM CALIBRATION" page.

(13) This page is protected and requires a keystroke password to do the calibration. Press the softkeys that follow in sequence:

(a) Softkey 1 (Far left softkey)

(b) Softkey 2

(c) Softkey 3

(d) Softkey 4.

(14) On the PFD, push the elevator trim RESET softkey number 6 (sixth key from the left).

(a) A window opens on the PFD and gives the message that follows: WARNING ! Pressing OK will cause the calibration to revert to default settings.

(b) On the GTC push the Enter key, to acknowledge the message.

(15) On the pilot's control stick, use the hat switch (SW27) to set the elevator trim to the FULL UP position.

(16) On the PFD, push the elevator trim UP softkey number 4 (forth from the left).

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(17) On the pilot's control stick, use the hat switch to set the elevator trim to the FULL DOWN position.

(18) On the PFD, push the elevator trim DN softkey number 5 (fifth from the left).

(19) On the pilot's control stick, use the hat switch to set the elevator trim to the FULL UP position.

(a) Make sure that the CAL VAL in the ELEVATOR TRIM window shows 1.00000 +0.2000 or - 0.2000.

(20) On the PFD, push the aileron trim RESET softkey number 12 (the far right key).

(21) A window opens on the PFD and gives the message that follows, "WARNING! Pressing OK will cause the calibration to revert to default settings".

(a) On the GTC push the Enter key, to acknowledge the message.

(22) On the pilot's control stick, use the hat switch to set the aileron trim to the FULL RIGHT position.

(23) On the PFD, push the aileron trim RIGHT softkey number 11 (second key from the right).

(24) On the pilot's control stick, use the hat switch to set the aileron trim to the FULL LEFT position.

(25) On the PFD, push the aileron trim LEFT softkey number 10 (third key from the right).

(26) On the pilot's control stick, use the hat switch to set the aileron trim to the FULL RIGHT position.

(a) Make sure that the CAL VAL in the AILERON TRIM window shows 1.00000 +0.2000 or - 0.2000.

(27) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(28) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(29) Set the CROSS TIE switch (SW03) to the OFF position.

(30) Remove external electrical power from the airplane.

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Figure 501 : Sheet 1 : Aileron and Elevator Trim Calibration Screen



Flaps and Trim Calibration Screen



Message Window

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AILERON CONTROL SYSTEM - MAINTENANCE PRACTICES

1. Aileron System - General

A. The ailerons are of a carbon fiber composite construction. The left aileron has a servo tab for reducing pilot forces during flight. The right aileron has an electrically actuated trim tab that is used for lateral trim during flight. Lead counterweights static balance the ailerons.

2. Ailerons

A. Aileron Removal and Installation

(1) Disconnect the aileron final drive from the aileron drive horn by removing the cotter pin, castellated nut, and bolt.

(2) Disconnect the grounding strap at the middle aileron hinge from the aileron by removing the AN526-832R8 screw.

(3) On the right wing, disconnect the aileron trim servo wire, accessed through the outer wing-bay access panel.

(4) On the left aileron, disconnect the servo tab drive rods from the wing aileron hinge by removing the cotter pins and clevis pins.

(5) Remove the aileron from the wing aileron hinges by removing the cotter pin, castellated nut, and bolt at each of the three hinge locations.

(6) Slide the aileron straight aft. Take care not to move the right aileron too far aft and break the wiring connector for the trim system.

(7) Gently pull the wiring harness for the aileron servo from out of the wing, and disconnect the wiring connector.

(8) Reinstall the ailerons in the reverse order.

(9) Measure the resistance from the static wicks to the nose gear or engine bonding strap. Make sure the resistance is less than 10 ohms.

(10) After installing the ailerons, check that the deflections (per Section 27-00-00, Table 1) are correct.

B. Aileron Hinge Element Removal and Installation

NOTE: If there is high electrical resistance it may be necessary remove the hinges and inspect for corrosion.

(1) Remove the aileron hinge element from the wing.

(a) Inspect the condition of the ground strap for corrosion and make note of the installed position.

(b) Remove the bolts, washers and aileron grounding strap from the wing aileron hinge.

NOTE: Shims maybe installed between hinge and wing. Make note of number of shims and location.

(c) Remove hinge half and retain the shims for installation.

(2) Install the aileron hinge element to the wing.

(a) Inspect for signs of corrosion and clean the aileron hinge elements and the mating wing surface.

(b) Replace any shims, hardware or ground straps that are corroded.

NOTE: No more than three shims can be used in one location with a maximum shim thickness of 0.130 inches.

(c) Install the bolts, washers and the shims as required in the aileron hinge element.

(d) Install the aileron hinge elements to the wing and torque the bolts. Refer to Chapter 20, Torque Data - Maintenance Practices.

(3) Remove the aileron hinge element from the aileron.

(a) For the middle and outboard aileron hinge elements, remove the two screws from each of the aileron hinge elements.

1 Remove the aileron hinge elements from the aileron.

(b) For the inboard aileron hinge elements, remove the 4 bolts from the aileron actuator hinge.

1 Remove the aileron actuator hinge from the aileron.

(4) Install the aileron hinge element to the aileron.

NOTE: The aileron surface under the aileron hinge elements and shims must be painted prior to the installation of the hinges to the aileron.

(a) For the middle and outboard aileron hinge elements, put the aileron hinge elements in place on the aileron.

1 Install the two screws on each of the aileron hinge elements.

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(b) For the inboard aileron hinge elements, aileron actuator hinge from the aileron.

1 Install the 4 bolts from the aileron actuator hinge.

C. **Aileron Rigging and Adjustment**

(1) The aileron control system is rigged at the factory and should not need any further adjustments. For new ailerons, or ailerons requiring significant readjustment in order to achieve the correct deflection limits, use the following procedure.

NOTE: Keep the flaps in the fully-retracted position (0 degrees) during the rigging process.

(a) With the aileron final drives disconnected, verify smooth operation throughout the full range of travel for each aileron.

(b) Place the flap/aileron deflection template, part number TA57270000, on the upper surface of the wing between the outboard end of the flaps and the inboard end of the aileron.

(c) The downward deflection of an aileron should be approximately 17.7 degrees. If the deflection of an aileron is not enough, carefully sand material from its down-stop to achieve this deflection. If the deflection is too great, contact Cessna Aircraft Company for new aileron down-stops.

(d) Level the aircraft about the roll axis before proceeding.

(e) Disconnect the aileron crossover control rod in the center section of the wing from the aileron torque tubes. Set both control sticks in the cockpit to a position of 88±2 degrees as shown in Figure 201. Adjust the rod ends on the crossover tube so the assembly may be installed between the torque tubes and tighten the jam nuts. Reinstall the torque tube.

(f) With the aileron control rods disconnected, lock both the left-hand and right-hand aileron bellcranks in the neutral position within the bellcrank brackets by placing a 1/4 inch diameter pin through the rigging hole. An AN4 bolt works well for this.

(g) With the control sticks still at 88±2 degrees, adjust the rod ends on the aileron control rods as required to allow them to fit between the aileron torque tubes and the bellcranks. Finger-tighten the control rod connections.

(h) Clamp the ailerons in the neutral position (0 degree deflection on the rigging template). Adjust the length of the final drive to fit between the bellcrank and the aileron hinge and finger-tighten the connections.

(i) Remove the pins from the bellcranks and release the control sticks. Unclamp the ailerons and rotate them until they reach the up-stop (which is controlled by the down-stop on the opposite aileron). The up-stop on one aileron and the down-stop on the opposite aileron should make contact at the same time while ensuring the trailing edge is inside the template up-travel window. Both right-hand and left-hand sides are set in this manner. If more travel is needed, a combination of up-stop adjustment and/or careful sanding of material from the down-stop on the opposite aileron may be required. Continue this procedure until both ailerons meet all of the deflection requirements of Section 27-00-00, Table 1.

(j) Ensure that the gap at the outboard edge of the aileron between the wing and the aileron is 0.123 to 0.309 inch.

(k) Ensure that the gap at the inboard edge of the aileron between the flap and the aileron (when the flaps are retracted) is 0.125 to 0.375 inch. Ensure minimum 0.125 inch clearance when the flaps are extended.

(l) While the aileron is in neutral position, ensure that the gap between the wing trailing edge and the aileron is 0.150 to 0.350 inch along the entire span of the aileron.

(m) Verify there is sufficient thread engagement on all rod ends by checking that the threads are visible within the witness hole on each.

(n) Once the correct aileron deflections and proper gaps are achieved, retighten all jam nuts and torque 90 to 120 in.-lbs.

(o) Ensure the aileron bellcrank, final drive, and all associated hardware has a minimum of 0.040 inch clearance from the wing skins through full range of travel after the aileron is properly rigged.

D. **Ailerons Requiring Only Minor Adjustment**

(1) With the aileron final drives disconnected, verify smooth operation throughout the full range of travel for each aileron.

(2) Place the flap/aileron deflection template, part number TA57270000, on the upper surface of the wing between the outboard end of the flaps and the inboard end of the aileron.

(3) The downward deflection of an aileron should be approximately 17.7 degrees. If the deflection of an aileron is not enough, carefully sand material from its down-stop to achieve this deflection. If the deflection is too great, contact Cessna Aircraft Company for new aileron down-stops.

(4) Level the aircraft about the roll axis before proceeding.

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(5) Remove the pins from the bellcranks and release the control sticks. Unclamp the ailerons and rotate them until they reach the up-stop (which is controlled by the down-stop on the opposite aileron). The up-stop on one aileron and the down-stop on the opposite aileron should make contact at the same time while ensuring the trailing edge is inside the template up-travel window. Both right-hand and left-hand sides are set in this manner. If more travel is needed, a combination of up-stop adjustment and/or careful sanding of material from the down-stop on the opposite aileron may be required. Continue this procedure until both ailerons meet all of the deflection requirements of Section 27-00-00, Table 1.

(6) Ensure that the gap at the outboard edge of the aileron between the wing and the aileron is 0.123 to 0.309 inch.

(7) Ensure that the gap at the inboard edge of the aileron between the flap and the aileron (when the flaps are retracted) is 0.125 to 0.375 inch. Ensure minimum 0.125 inch clearance when the flaps are extended.

(8) While the aileron is in neutral position, ensure that the gap between the wing trailing edge and the aileron is 0.150 to 0.350 inch along the entire span of the aileron.

(9) Verify there is sufficient thread engagement on all rod ends by checking that the threads are visible within the witness hole on each.

(10) Once the correct aileron deflections and proper gaps are achieved, retighten all jam nuts and torque 90 to 120 in.-lbs.

(11) Ensure the aileron bellcrank, final drive, and all associated hardware has a minimum of 0.040 inch clearance from the wing skins through full range of travel after the aileron is properly rigged.

E. **Aileron Service and Maintenance**

(1) The ailerons do not require any service or maintenance. The ailerons should be visually inspected annually for cracking at all hinge attachment locations. A tap test should be conducted on the aileron at the outboard end cap to aid in detection of any latent damage, delaminations, or disbonds. The rod end bearings used throughout the aileron control system do not require maintenance other than cleaning during routine inspections to remove any accumulation of dust or grime. Liquid lubricants should not be used on the rod end bearings as this may cause the Teflon liner to swell, creating excess friction in the bearing. Should the rod end need to be replaced, please contact Cessna Aircraft Company. The aileron linear bearing should be inspected every 100 hours or annually. Inspect each side of the bearing for foreign object debris. Ensure there is no debris or adhesive attached to the control rod, bearing housing, bearing race, ball bearings or rollers, as applicable. Move the aileron controls through their full range of motion and ensure there is no scarring or damage to the control rod, especially in the vicinity of the linear bearing. Normal wear at the linear bearing is indicated by a slightly darker color on the control rod. If damage is noted contact Cessna Aircraft Company. The aileron control rods should be visually inspected every 500 hours or biennially. To remove the push-pull tubes for inspection:

CAUTION: Never lubricate the bearings that support the aileron torque tube.

(a) Remove the aileron bellcrank access panel located on the lower surface of the wing directly in front of the inboard aileron hinge.

(b) Disconnect the aileron push-pull tube from the aileron bellcrank.

(c) Remove the aft wing belly access panel to gain access to the aileron crossover tube.

(d) Disconnect the aileron push-pull tube from the aileron torque tube bellcrank.

(e) Slide the push-pull tube out and down to clear the wing belly.

NOTE: It may be necessary to loosen or reposition the roll servo mount to give enough clearance to prevent damage to the rod during removal and installation. Refer to Chapter 22, Garmin GFC 700 Autopilot - Maintenance Practices for additional information on the installation of the roll servo mount.

(f) Reinstall the push-pull tubes in the reverse order.

(g) Reinstall all access panels and check the aileron controls for binding and friction.

3. Aileron Trim Tab

A. **Aileron Trim Tab Removal and Installation** - Refer to Figure 203.

(1) To remove the trim tab do the steps that follow:

(a) Remove the four MS24693-C28 countersunk screws from the aileron trim servo access panel located on the lower surface of the right aileron.

1 Remove the access panel from the right aileron.

(b) Disconnect the aileron trim tab drive rod and friction device clevis from the trim tab drive horn by removing the cotter

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pins and the clevis pins.

(c) Remove the MS24665-151 cotter pins on either end of the piano hinge, and remove the hinge wire.

(d) Remove the trim tab from the airplane.

(2) To install the trim tab do the steps that follow:

(a) Connect the aileron trim tab drive rod and friction device clevis from the trim tab drive horn by removing the cotter pins and the clevis pins.

(b) Put the the trim tab in its correct position on the aileron.

(c) Install the piano hinge wire in the piano hinge.

1 Install new MS24665-151 cotter pins on either end of the piano hinge.

(d) Put the access panel in its correct position on the right aileron.

1 Install the four MS24693-C28 countersunk screws that attach the aileron trim servo access panel to the aileron.

(3) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

B. **Aileron Trim Tab Rigging and Adjustment**

The aileron trim tab and servo are preset at the factory, and further adjustment should not be necessary. Should the trim tab servo motor need to be replaced, contact Cessna Aircraft Company for a replacement part and for detailed rigging instructions. The trim tab deflections should be checked periodically to ensure that the trim system is functioning properly. Use the following procedure for checking the trim tab deflections.

(1) Set the aileron to the neutral (0 degree) position.

(2) Using a digital inclinometer or other calibrated angle-measuring device, check the deflections shown in Figure 202.

(3) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

C. **Aileron Trim Tab Service and Maintenance**

The aileron trim tab is a flat aluminum plate. The trim tab does not require any maintenance. The trim tab hinge should be inspected annually for wear and corrosion. The hinge may be lubricated with MIL-L-7870 general purpose lubricating oil to help reduce wear and friction. The aileron trim tab friction device should be inspected every 500 hours, or biennially, and adjusted as necessary to 13.4 to 19.0 lbs. sliding friction. The friction device should be free from oils, grease, dirt, etc. If excessive wear is noted or smooth operation is not possible, the friction device should be replaced. A replacement, part number LA57273240, may be obtained from the manufacturer. The attachment bracket should be inspected every 500 hours or biennially for wear and replaced as necessary. The trim tab motor is a sealed unit and does not require service or maintenance.

4. Aileron Trim Tab Servo

A. **Aileron Trim Tab Servo Removal and Installation**

(1) Remove the four MS24693-C28 countersunk screws from the aileron trim servo access panel.

(2) Disconnect the aileron trim tab drive rod and friction device clevis from the trim tab drive horn by removing the cotter pins and clevis pins.

(3) Remove the four MS24693-C28 countersunk screws from the upper surface of the right aileron.

(4) Carefully remove the trim tab motor from within the aileron.

(5) Once the trim motor is clear of the aileron, disconnect the wiring harness.

(6) Reinstall the trim tab motor in the reverse order. Torque all screws 10 to 12 in.-lbs.

B. **Aileron Trim Tab Servo Rigging and Adjustment**

The trim tab motor is preset at the factory and should not need further adjustment. Should adjustment be necessary, use the following procedure.

(1) Disconnect the friction device drive rod from the trim tab drive horn.

(2) Extend the trim motor drive arm all the way out.

(3) Set the trim tab at the up deflection limit, and adjust the drive rod as necessary to line up with the trim tab drive horn.

(4) Retract the trim motor drive arm, and check that the trim tab deflection angle is correct. Adjust the clevis on the drive rod as necessary to achieve the correct deflection. Maintain proper thread engagement (threads must be visible through the inspection hole located in the clevis).

(5) With the trim tab connected to the motor, retract the tab to the neutral position.

(6) Adjust the friction device drive rod, and connect it to the trim tab drive horn.

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(7) Reinstall all clevis pins and cotter pins.

(8) Recheck deflection angles, and repeat above procedure if necessary.

(9) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

C. **Aileron Trim Tab Servo Service and Maintenance**

The aileron trim tab servo is a sealed unit and does not require service or maintenance. Should the motor begin to slip or stop functioning properly, contact Cessna Aircraft Company for a replacement.

5. Aileron Servo Tab

A. **Aileron Servo Tab Removal and Installation**

(1) Remove the cotter pins and clevis pins that attach the threaded drive rods to the servo tab bracket.

(2) Remove the MS24665-151 cotter pins from both ends of the piano hinge.

(3) Remove the hinge wire from the hinge, and remove the servo tab from the aileron.

(4) Reinstall the servo tab in the reverse order. Apply zinc oxide to the threaded push rod where the clevis attaches. Recheck deflections.

B. **Aileron Servo Tab Rigging and Adjustment**

The aileron servo tab is preset at the factory and further adjustment should not be necessary. The servo tab deflections should be checked periodically to ensure that the system is functioning properly. Use the following procedure for checking the servo tab deflections.

(1) Place the aileron/flap deflection template, part number TA57270000, on the upper wing surface between the outboard end of the flap and the inboard end of the aileron.

(2) Set the aileron to the neutral, 0 degree, position.

(3) Set the servo tab to the neutral, 2 degrees trailing edge down, position (refer to Figure 204) by adjusting the drive rod clevises as necessary. Maintain proper thread engagement (threads must be visible through the inspection hole located in the clevis).

(4) Cycle the aileron to the up and down deflection limits, and check the servo tab deflection angles as shown in Figure 204.

(5) Adjust the drive rods as necessary to achieve the correct deflections. Maintain proper thread engagement (threads must be visible through the inspection hole located in the clevis). Torque all jam nuts 30 to 36 in.-lbs.

NOTE: Aileron servo tab deflection angles are measured with respect to a nominal horizontal reference plane.

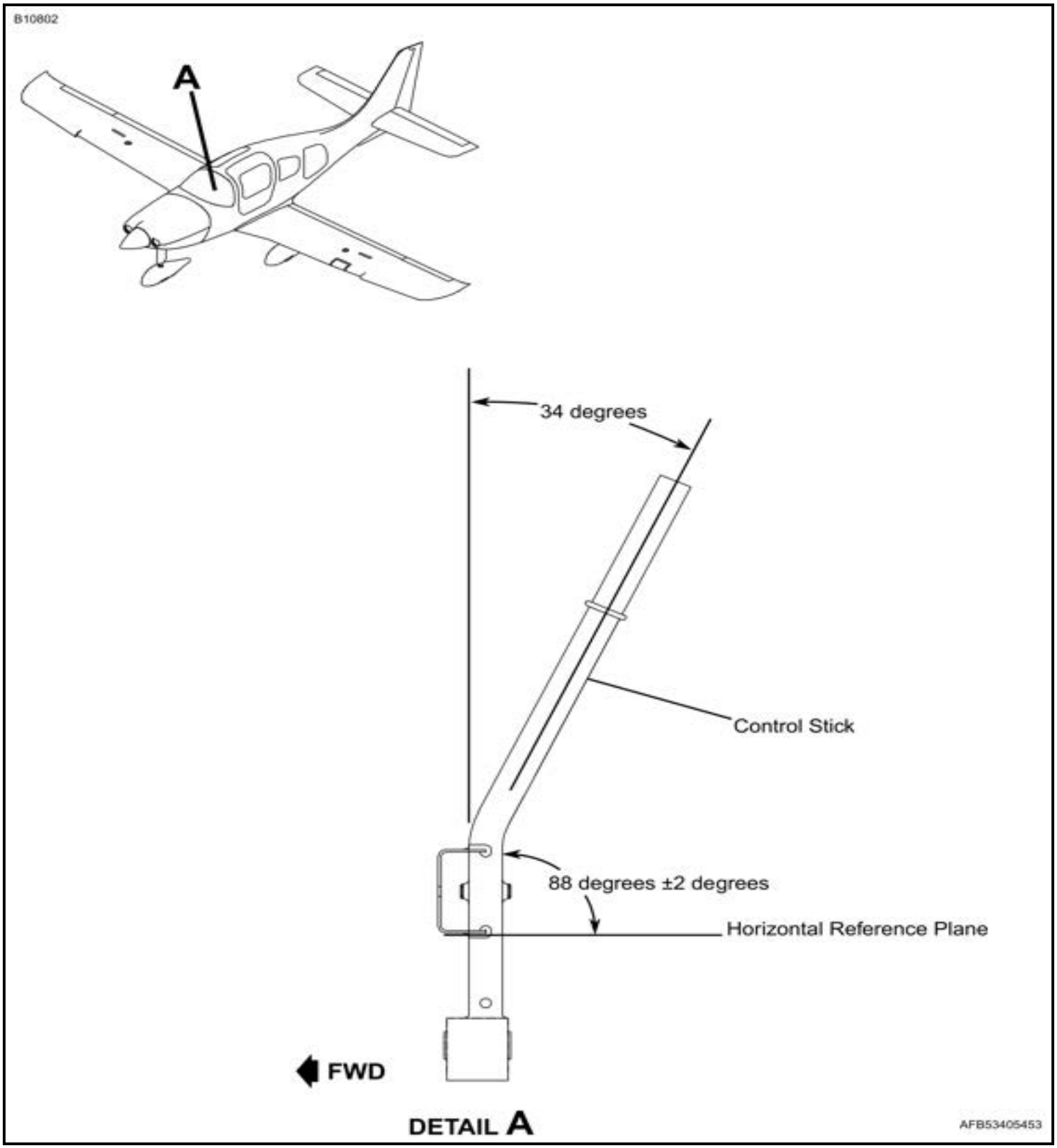
(6) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

C. **Aileron Servo Tab Servicing and Maintenance**

The aileron servo tab does not require any service or maintenance. The attachment hinge should be inspected every 500 hours or biennially for wear and replaced if necessary. The hinge may be lubricated with MIL-L-7870 general purpose lubricating oil to help reduce friction and wear.

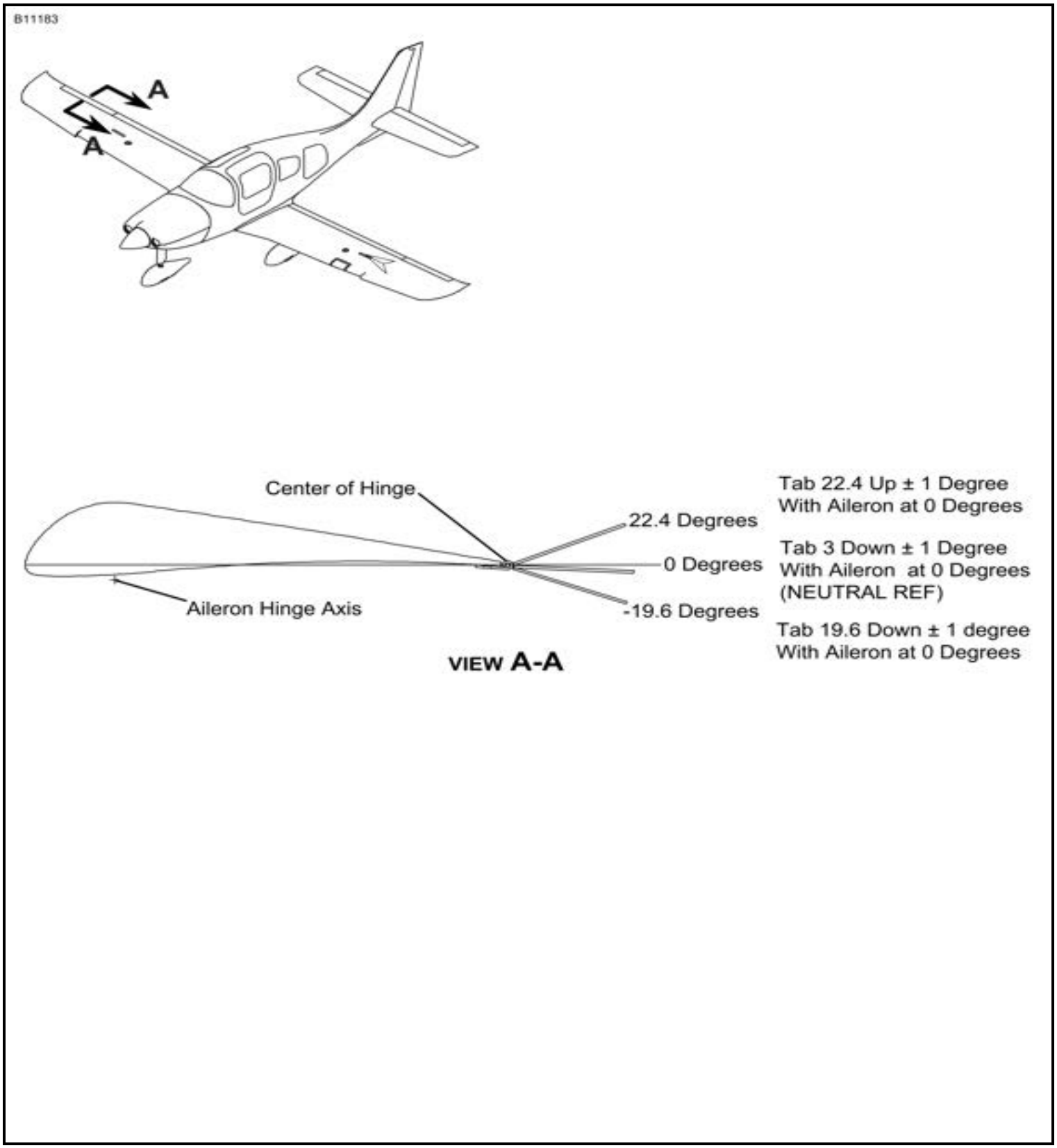
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Figure 201 : Sheet 1 : Control Stick Neutral Position for Aileron Rigging



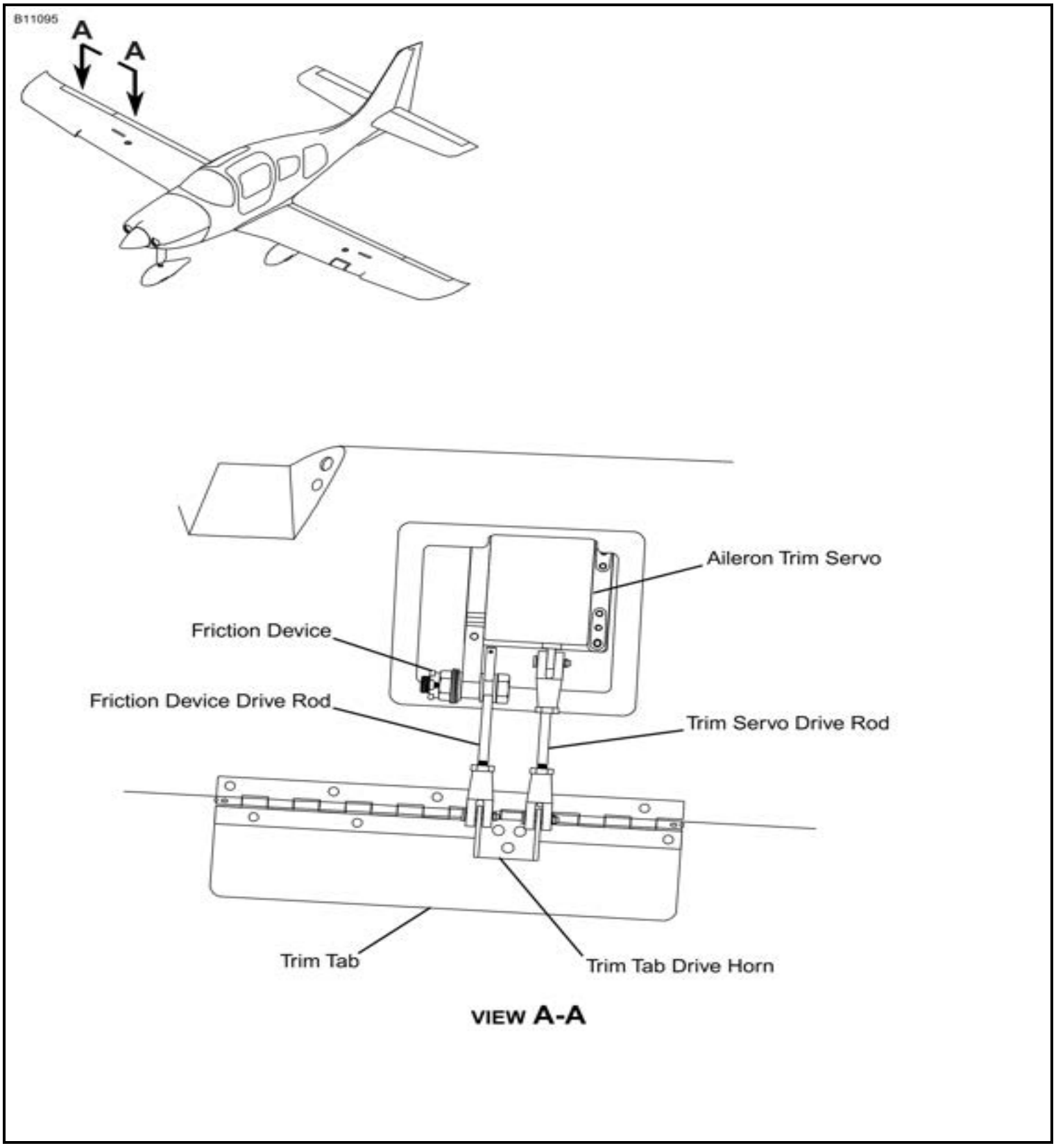
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Figure 202 : Sheet 1 : Aileron Trim Tab Deflection Angles



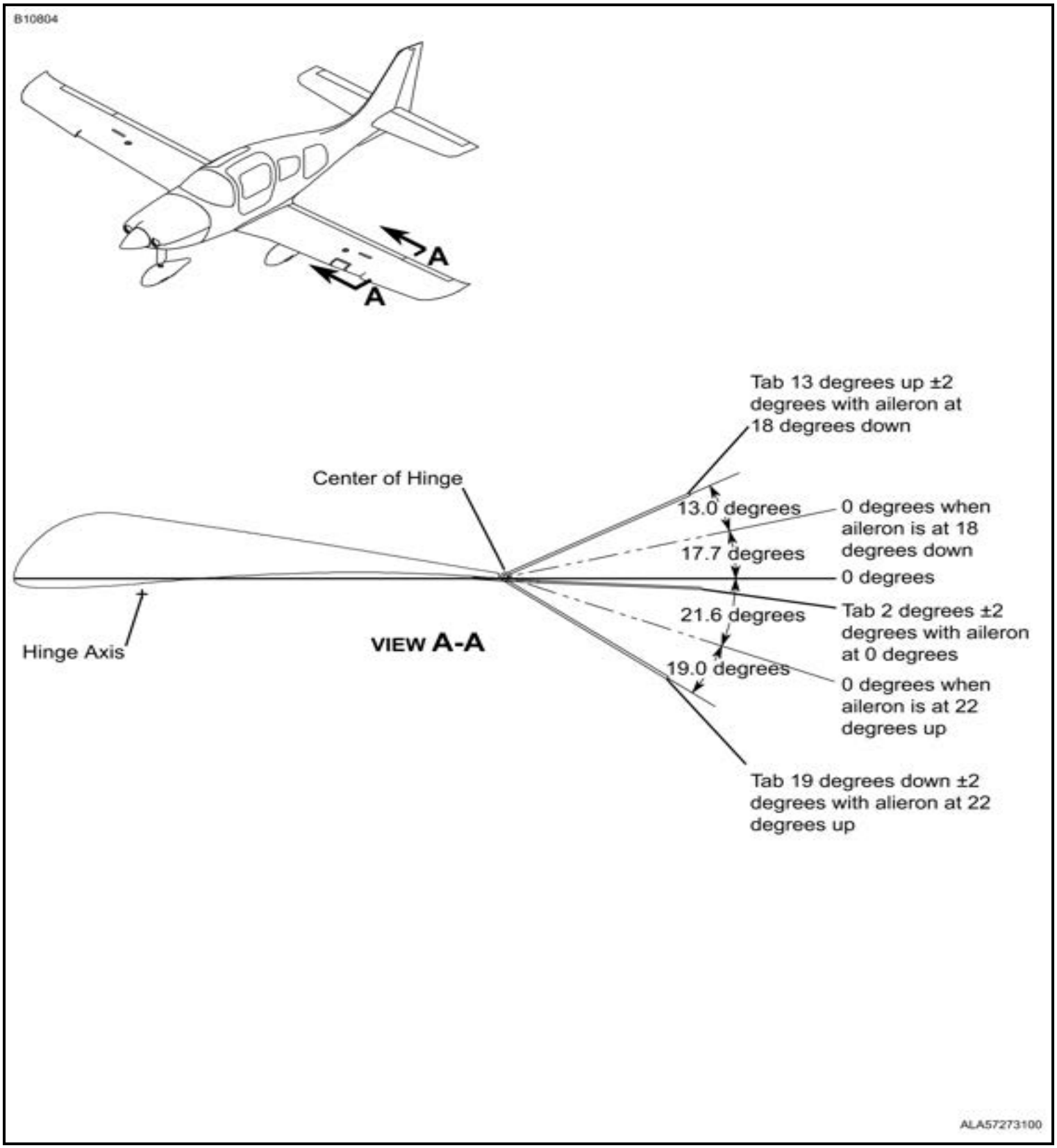
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Figure 203 : Sheet 1 : Aileron Trim System



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Figure 204 : Sheet 1 : Aileron Servo Tab Deflection Angles



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RUDDER CONTROL SYSTEM - MAINTENANCE PRACTICES

1. Rudder System - General

A. The rudder attaches to the aft vertical closeout rib at three hinge points. Rudder cables attached to the rudder drive horn link the rudder to the rudder pedals. For S/N 41501 and On, a rudder cable connector allowing optional pedal positioning may be installed. A fixed rudder trim tab is attached to the rudder. The trim tab is ground adjustable for pilot comfort during cruise or takeoff power settings. A lead counterweight is used to static balance the rudder.

2. Rudder

A. Rudder Removal and Installation (Refer to Figure 201).

(1) Detach the two rudder cables from the drive horn by removing the cotter pin from each nut, and then removing the bolt.

(2) Remove and discard the cotter pin from the lower hinge, and remove the castellated nut and washer.

NOTE: If the washer between the nut and the lower bracket is an NAS1149F0463P, (approximately 0.500 inch diameter) then you must discard it and replace it with an MS15795-853 (approximately 0.688 inch diameter).

(3) Remove the rudder by lifting it up and aft. Take care not to pull too far aft and break the metal braid that is still attached to the rudder leading edge.

(4) Once the rudder is removed, detach the metal braid by removing the attachment screw.

(5) Put the rudder in its position on the vertical stabilizer.

NOTE: Before you install the castellated nut at the lower hinge bolt, it is necessary to examine the clearance between the rudder counterweight and the vertical stabilizer.

(6) Make sure that there is a 0.13 inch, +0.25 or -0.00 inch clearance between the forward edge and the bottom edge of the rudder counterweight and the vertical stabilizer

(a) If the clearance is less than the specified limit, do the steps that follow:

1 Remove the rudder by lifting it up and aft.

2 Remove the bolts, washers, spacers, and rudder horn from the rudder.

3 Install a 2831100-9 shim between the rudder horn and the rudder.

4 Install the bolts, washers, spacers, and rudder horn to the rudder.

(7) Install the rudder in the reverse order and make sure that you use a MS15795-853 washer under the castellated nut.

(8) Use a maximum of one NAS1149F0416P or NAS1149F0432P or NAS1149F0463P washer to make sure that there is a minimum clearance of 0.062 to 0.125 inches (1.58 to 3.17 mm) between the rudder actuator and the rudder attachment assembly.

(9) Recheck all attachments for security and safety.

B. Upper Rudder Hinge Removal and Installation

NOTE: The Instructions are the same for both the middle and upper hinge.

(1) Remove the Upper Rudder Hinges. Refer to Figure 201.

(a) Remove the rudder. Refer to Rudder Removal and Installation.

(b) Remove the bolts and washers that attach the hinge to the vertical stabilizer.

(c) Remove the hinge from the airplane.

(2) Install the Upper Rudder Hinges. Refer to Figure 201.

(a) Put the hinge in place on the airplane.

(b) Attach the hinge with bolts and washers.

(c) Install the rudder. Refer to Rudder Removal and Installation.

C. Lower Rudder Hinge Removal and Installation

(1) Remove the Lower Rudder Hinge. Refer to Figure 201.

(a) Remove the rudder. Refer to Rudder Removal and Installation.

(b) Remove the screws that attach the hinge to the vertical stabilizer.

(c) Remove the hinge from the airplane.

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(2) Install the Lower Rudder Hinge. Refer to Figure 201.

(a) Put the hinge in place on the airplane.

(b) Attach the hinge with screws.

(c) Install the rudder. Refer to Rudder Removal and Installation.

D. Rudder Rigging and Adjustment

NOTE: The rudder deflections are preset at the factory and should not need any further adjustment. If the rudder cable is replaced, the deflections will need to be rechecked and adjusted as necessary. Should this need to be done, use the rigging procedure as outlined below.

CAUTION: If the inner rudder cable tube is removed, make sure that when the tube is installed again the barbed insert is installed in the forward end of the tube. If the inner and outer tube clamp bolt and nut were loosened, the nut must be torqued between 20 inch pounds and 25 inch pounds. Reference Figure 204.

(1) Remove the locking clips from the left and right turnbuckles at the forward end of the rudder cable near the rudder pedals. Remove the locking clips from the rudder pedal interconnect turnbuckle (located behind the instrument panel near the firewall), and loosen the interconnect cable.

(2) Ensure that the rudder cables are not attached to the rudder pedal crossover arms.

(3) Thread the left rudder cable, right rudder cable and rudder pedal interconnect turnbuckles so that the clevis threads are just visible. Apply three turns to each clevis to put the threads inside the turnbuckle.

(4) Clamp the elevator in the neutral position such that the trailing edge is in alignment with the trailing edge of the horizontal stabilizer.

(5) Adjust the rudder to the neutral position by moving it left and right until it is centered about the vertical tail.

(6) Position the rudder deflection template, part number TC53550000, on the rudder such that the radius portion is located along the trailing edge of the rudder at WL 104.74 ±0.50 (approximately the bottom edge of the rudder trim tab) and the middle portion is perpendicular to the rudder hinge axis. Rotate the template about the rudder hinge axis until there is equal distance between the forward inside corners of the template and the vertical stabilizer. The use of shims on either side of the vertical stabilizer is permissible.

(7) Confirm that the trailing edge of the rudder is within the two outer slots on the template. If the deflection limits are greater than the allowed tolerance, select a larger diameter stop bushing, LC53553000-1 through -5, to achieve the correct deflection. Each successively larger bushing decreases the rudder deflection by 1 degree. If the limits are less than the allowed tolerance, select a smaller diameter bushing. Rudder stop bushings, part nos. LC53443000-1 through -5, may be obtained from the manufacturer.

(8) Attach the rudder cables to the rudder pedal crossover rods. Depending upon the rudder cable connector installed on aircraft S/N 41501 and on, the rudder pedal position may be set standard (aft) or forward. Left side and right side must be set the same. Refer to Figure 202. Contact Cessna Aircraft Company to obtain this part, only available on S/N 41501 and On, if required or desired.

(9) Pedal Positioning - Refer to Figure 203.

(a) Standard Pedal Position (Aft) - Position the left rudder pedal so that the vertical portion of the corresponding crossover tube is 83±2 degrees for the left pedal and 87±2 degrees for the right pedal, measured from the horizontal surface of the floor.

(b) Optional Pedal Position (Forward) - Position the left rudder pedal so that the vertical portion of the corresponding crossover tube is 94±2 degrees for the left pedal and 76±2 degrees for the right pedal, measured from the horizontal surface of the floor.

(10) Two methods, as follows, may be used for attaching the rudder cables to the rudder drive horn. The first method employs a cable thimble, compression sleeve, and shackle. The second method utilizes a fork end cable terminal. Whichever method is used, contact Cessna Aircraft Company for parts and instructions.

(a) Cable Thimble, Compression Sleeve and Shackle - Refer to Figure 204.

1 At the aft of the plane pull the left side rudder cable taut and mark the cable with an indelible marker where it intersects with the forward edge of the connection hole in the rudder drive horn.

2 Using a cable thimble, sleeve, and temporary clamp form a loop at the end of the rudder cable with the indelible mark at the apex of the loop. DO NOT remove excess cable.

3 Align the right rudder pedal with the left rudder pedal.

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4 At the aft of the plane pull the right side rudder cable taut and mark the cable, with an indelible marker, where it intersects with the forward edge of the connection hole in the rudder drive horn.

5 Using a cable thimble, sleeve, and temporary clamp, form a loop at the end of the rudder cable with the indelible mark at the apex of the loop. DO NOT remove excess cable.

6 Temporarily connect the rudder drive cables to the rudder drive horn. Insert excess cable into the fuselage. Ensure that the temporary clamp does not catch on the fuselage as the rudder deflections are adjusted.

7 Adjust the left and right rudder cable turnbuckles until the rudder cables are tight.

8 With the rudder at 0 degrees deflection, adjust the rudder pedal interconnect turnbuckle until a reading of 37 lbs. is attained on a tensiometer, except as follows:

a If autopilot is installed, but not rudder hold, refer to Chapter 22.

b If rudder hold is installed, tighten until 72 lbs +8 lbs./ -7 lbs. is attained.

9 Recheck all movement, alignment, and deflections, and repeat the rigging procedure as necessary.

10 Without disturbing the turnbuckles, disconnect the rudder cables from the rudder pedal crossover rods.

11 Disconnect the rudder cables from the rudder drive horn.

12 Using an indelible marker, make three marks on the rudder cable and cable thimble to facilitate alignment of the cable onto the thimble after the temporary clamp has been removed.

13 Remove the temporary clamp.

14 Insert the cable end into a compression sleeve and form a loop.

15 Align the cable onto the thimble using the three indelible marks as a guide.

16 Snug the compression sleeve up against the thimble and compress the fitting.

17 Reattach the rudder cables to the rudder horn and to the pedal crossover rods and recheck all deflections. Repeat the rigging procedure as necessary until the proper movement, alignment, and deflections are achieved.

18 Cut off excess rudder cable at the compression fitting.

(b) Fork End Cable Terminal - Refer to Figure 205.

1 Temporarily attach fork end cable terminals to the left and right side of the rudder drive horn.

2 Insert the rudder cable into one of the fork end cable terminals and pull it taut. Mark the cable, with an indelible marker, where it intersects with the inner edge of the terminal sleeve just behind the fork of the terminal. Repeat this procedure for the other terminal.

3 Disconnect the rudder cables from the pedal crossover rods.

4 Remove the terminals and cut the rudder cables 1/8 inch behind the mark toward the fore of the aircraft.

5 Insert the rudder cable into the left cable terminal so that the cable is 1/8 inch inside the terminal sleeve at the fork end.

6 Swage the fork end cable terminal.

NOTE: The swaging tool required to swage the fork end cable terminal is a special tool not available in most repair shops. Contact Cessna Aircraft Company for instructions.

7 Repeat the following steps for the right cable terminal.

a Insert the rudder cable into the left cable terminal so that the cable is 1/8 inch inside the terminal sleeve at the fork end.

b Swage the fork end cable terminal.

8 Reattach the rudder cables to the rudder horn and to the pedal crossover rods and recheck all deflections.

9 With the rudder at 0 degrees deflection, adjust the rudder pedal interconnect turnbuckle until a reading of 37 lbs. is attained on a tensiometer, except as follows:

a If autopilot is installed, but not rudder hold, refer to Chapter 22

b If rudder hold is installed, tighten until 72 + 8 lbs./- 7 lbs. is attained.

10 Repeat the rigging procedure as necessary until the proper movement, alignment, and deflections are achieved.

11 Reinstall the locking clips into all turnbuckles.

12 Cycle the rudder from left to right to ensure that there is no binding or excessive friction in the system.

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E. Rudder Service and Maintenance

The rudder does not require any service or maintenance. However, due to its composite construction, the rudder should be visually inspected annually for cracking at all hinge attachment locations and the trim tab attachment location. A tap test should be conducted on the rudder at the drive horn location to aid in detection of any latent damage or disbonds along the lower rudder rib. The rudder may also be inspected via the holes at the middle and top rudder hinge pin locations. Common inspection tools that may be used or needed are mirrors, bore scopes, etc.

The rudder should be removed and inspected for wear or corrosion of the hinge pins. If wear or corrosion results in a hinge pin diameter of less than 0.238 inch (upper and middle hinge pins) or 0.243 inch (lower hinge pin) it must be replaced. For additional information on the replacement procedure for the hinge pins refer to the Model LC-550FG Series Structural Repair Manual, 55-40-01, Rudder Repair - Upper and Middle Rudder Hinge Pins. You can apply lubricant or a corrosion preventative compound to the hinge pins on the assembly to help minimize corrosion. The spherical bearings used in the attachment brackets on the vertical closeout rib do not require any maintenance and should not be lubricated. The hinge brackets should be inspected for corrosion or other damage and replaced if necessary.

F. Rudder Cable Removal

The rudder cable should be inspected thoroughly and replaced if any excessive wear or damage is observed. To remove the rudder cable use the following steps.

(1) Contact Cessna Aircraft Company for a replacement.

(2) Detach the rudder cable from the rudder drive horn per the rudder installation and removal instructions in this section.

(3) Cut the rudder cable to remove the turnbuckle, and slide the cable aft through the aft end of the fuselage.

(4) Install the new rudder cable by inserting the end without turnbuckle into the fore end of the rudder cable tube and sliding it aft to exit at the rudder drive horn.

(5) Follow the procedures in the section on Rudder Rigging and Adjustment above for connection, rigging, and adjustment. make sure that that the requirements listed in Flight Controls - General, , Table 1 are met.

3. Rudder Trim Tab

A. Rudder Trim Tab Removal and Installation

Should the trim tab need to be replaced, carefully drill out the five CCR264CS-4-02 attachment rivets to remove the trim tab. Obtain a new trim tab, part number LC53553003-1, from the manufacturer. Match drill to rudder holes and reinstall with five new rivets of the same type and size. Take care when drilling out rivets so as not to enlarge holes.

CAUTION: Due to the carbon fiber composite construction of the rudder, do not use aluminum rivets. The new rivets must be of a corrosion resistant material (i.e. stainless steel) in order to prevent galvanic corrosion.

B. Rudder Trim Tab Adjustment

The rudder trim tab is a flat aluminum plate that is riveted to the trailing edge of the rudder. The trim tab is attached with five CCR264CS-4-02 countersunk rivets. The trim tab may be adjusted for pilot comfort during cruise or takeoff power settings. The trim tab is not adjustable during flight and must be adjusted while on the ground. To adjust the rudder trim tab use the following instructions.

(1) Clamp two pieces of wood or other rigid material to either side of the trim tab. The wood blocks should be equal in length to the trim tab.

(2) Align the edges of the wood block with the slots in the trim tab.

(3) Once the wood blocks are positioned correctly, simply bend the trim tab in the desired direction. Do not exceed the deflection angles described in Flight Controls - General, Table 1.

C. Rudder Trim Tab Service and Maintenance

The rudder trim tab should be inspected for wear and cracking of the slots that run the length of the tab (bend line). If excessive wear or cracking is observed, the trim tab should be replaced.

4. Rudder Hold System (Optional)

A. Description of the Rudder Hold System - The rudder hold system allows the pilot to hold the rudder at a set deflection. Initially, the pilot provides rudder pedal force required for proper trim, and then activates the rudder hold system. Once active, the pilot can remove pedal pressure, and the system will hold the rudder at the set deflection. When inactive, the rudder hold device will be undetectable by the pilot.

With the system active the pilot can manually control the rudder by exerting pressure on the rudder pedals, as the clutch in the rudder hold assembly will supply only a limited torque before slipping. In the unlikely event of a rudder hold assembly brake

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seizure, a shear pin will fracture, thus disengaging the capstan from the brake, and allowing free movement of rudder. The capstan will be contained on the brake shaft, and prevent the rudder pedal interconnect cable from falling from the spool.
The rudder hold system uses an electrically actuated rotary brake, affixed to a capstan winch drum. There is an intermediate friction clutch to allow the rotary brake to be overridden if necessary. When activated by the rudder hold switch, the brake will engage and the clutch will provide a limited torque resistance to the capstan, which is linked to the rudder control cables via the rudder-pedal interconnect cable.

(1) For the Avidyne and Garmin G1000 options, the system is operated when electrical current is supplied through the push-button switch found on the flaps panel. The RUDDER HOLD ENGAGE switch (SI005), can only operate when the trim system is set to on. When the RUDDER HOLD ENGAGE switch is pushed to on, a blue indicator light comes on to show that the system is engaged. The system is turned off by either pushing the autopilot disconnect button on the control stick or by pushing the rudder hold engage switch again. The system is automatically disengaged if the circuit breaker is opened, the master trim switch is turned off, or the stall warning signal is activated.

(2) For the Garmin G2000 installation, the system is operated when electrical current is supplied through the rocker switch found on the Center Console Switch Panel. Electrical power is supplied to the rudder hold system from the AIL TRIM/RDR HOLD circuit breaker. When the A/P TRIM switch (SW19) found in the overhead panel, is set to the ON position the electrical power is supplied to the RUDDER HOLD switch (SI010), When the RUDDER HOLD switch (SI010) is set to the ON position, the Crew Alert System (CAS) message RUDER HOLD shows on the Primary Flight Display (UI407) display, found on the left side of the instrument panel. The system is turned off by either pushing the autopilot disconnect button on the control stick or setting the RUDDER HOLD switch to the OFF position. The system is automatically disengaged if the circuit breaker is opened, the master trim switch is turned off, or the stall warning signal is activated.

B. Rudder Hold Assembly Removal

(1) Disconnect the electrical connector to the rudder hold assembly.

(2) Disassemble the left and right pulleys by removing the AN3-7 10-32 x 7/8 hex head bolt, MS24665-151 cotter pin, AN310-3 10-32 castle nut, and four NAS1149F0332P washers. Refer to Figure 206.

NOTE: Only Airplane 41012 incorporating SB-04-016A has the O3FBO4 bushings installed.

(3) Remove the rudder pedal interconnect cable from the rudder hold assembly.

(4) . Refer to Figure 207.

(a) For Aircraft 41012 incorporating Service Bulletin SB-04-016A, remove the four 8-32 MS51957-47 pan head machine screws, NAS1149FN832P No. 8 flat washers and the O3FBO4 bushings attaching the rudder hold assembly to the rudder hold bracket.

(5) Remove the rudder hold assembly.

C. Rudder Hold Assembly Installation

(1) Installation is the reverse of removal. Dry torque the 10-32 nuts 28 to 34 in.-lbs, and the 8-32 screws 17 to 21 in.-lbs. Install new cotter pins.

(2) Make sure that the rudder deflection requirements listed in Flight Controls - General, Table 1, are met. Follow the procedures in the section on Rudder Rigging and Adjustment above if necessary.

NOTE: Ensure the brake surface is clean and free from lubrication of any kind. Lubrication on the brake surface will reduce the brake force and adversely effect the performance of the rudder hold assembly.

(3) For the Model T240 Garmin G2000 installation, do a rudder hold system check. Refer to Rudder Hold System (G2000) - Adjustment/Test.

D. Rudder Hold Assembly Maintenance - The rudder hold assembly does not require maintenance.

E. Rudder Pedal Bushing Removal. Refer to Figure 206 and Figure 207.

(1) Remove the forward seat bottom cushions. Refer to the Chapter 25, Airplane Seats - Maintenance Practices.

(2) Remove the turnbuckle clips and disconnect the rudder interconnect cable at the turnbuckle.

NOTE: The rudder interconnect cable is located down and forward of the instrument panel.

(3) Remove the left and right pulley holder from the firewall bracket by removing the attaching bolt.

(4) Remove the cotter pins, nuts and bushings from the AN3-26 bolts.

NOTE: Discard the cotter pins.

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F. Rudder Pedal Bushing Installation. Refer to Figure 206 and Figure 207.

(1) Put one bushing into each end of each pulley holder (four total)

NOTE: For Airplane LC41-550FG -41012 incorporating SB-04-016A, install bushing P/N 03FB04.

(2) Install the pulley holder to the firewall bracket.

(3) Install the nuts and new cotter pins P/N MS24655-151 on the bolts.

(4) Connect the rudder interconnect cable.

(5) Put the rudder at 0° deflection.

(6) Adjust the rudder interconnect turnbuckle until it takes a weight of 5.00 lbs. (2.27 kg) to deflect the cable 1.00 inch + 0.25 or - 0.25 inch (25.40 mm +6.35 or - 6.35 mm).

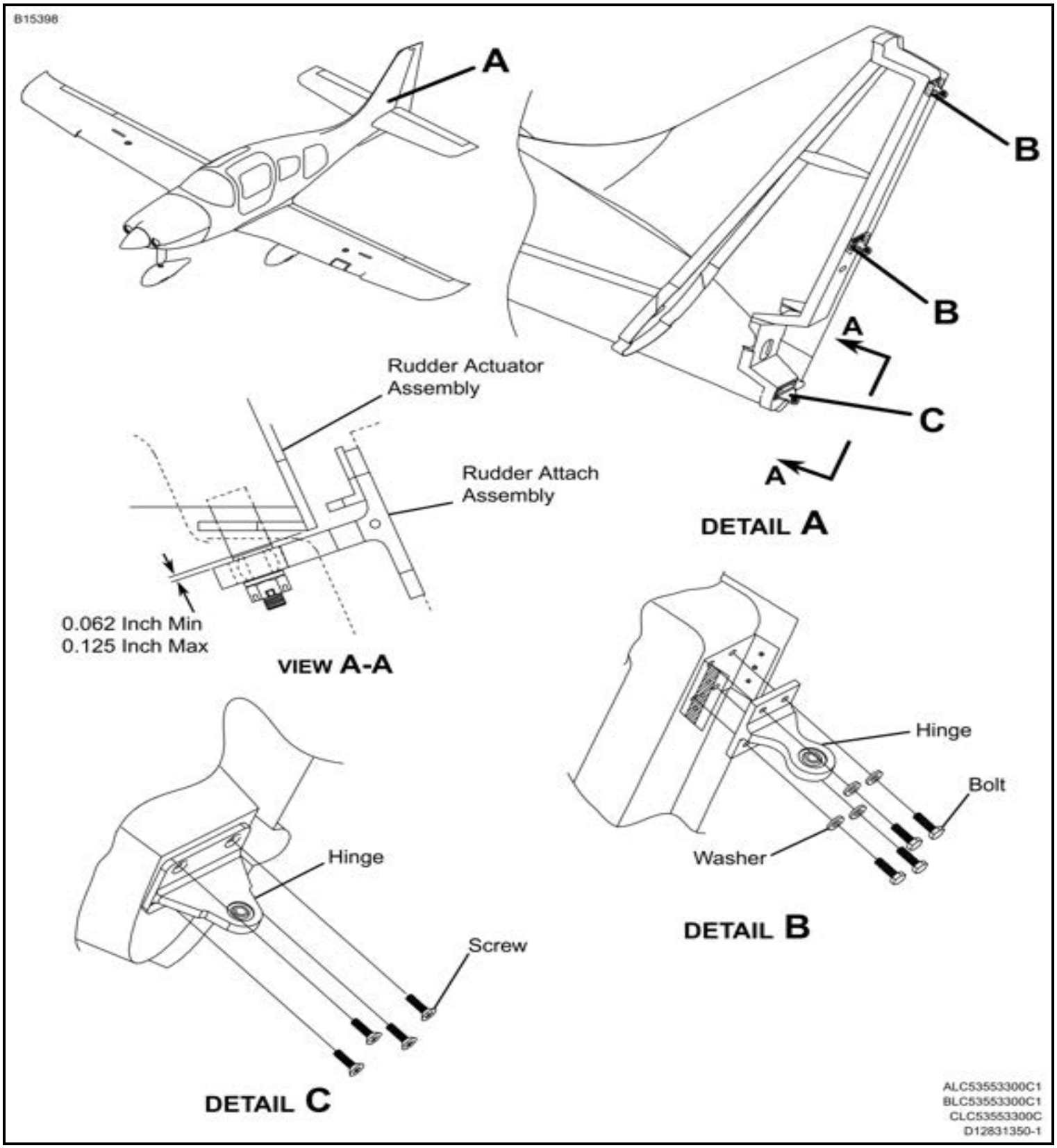
(7) After adjusting the turnbuckle, install the turnbuckle clips.

(8) Install the seat bottom cushions.

(9) Do an operational check of the rudder controls to make sure there is freedom of movement and full rudder deflection.

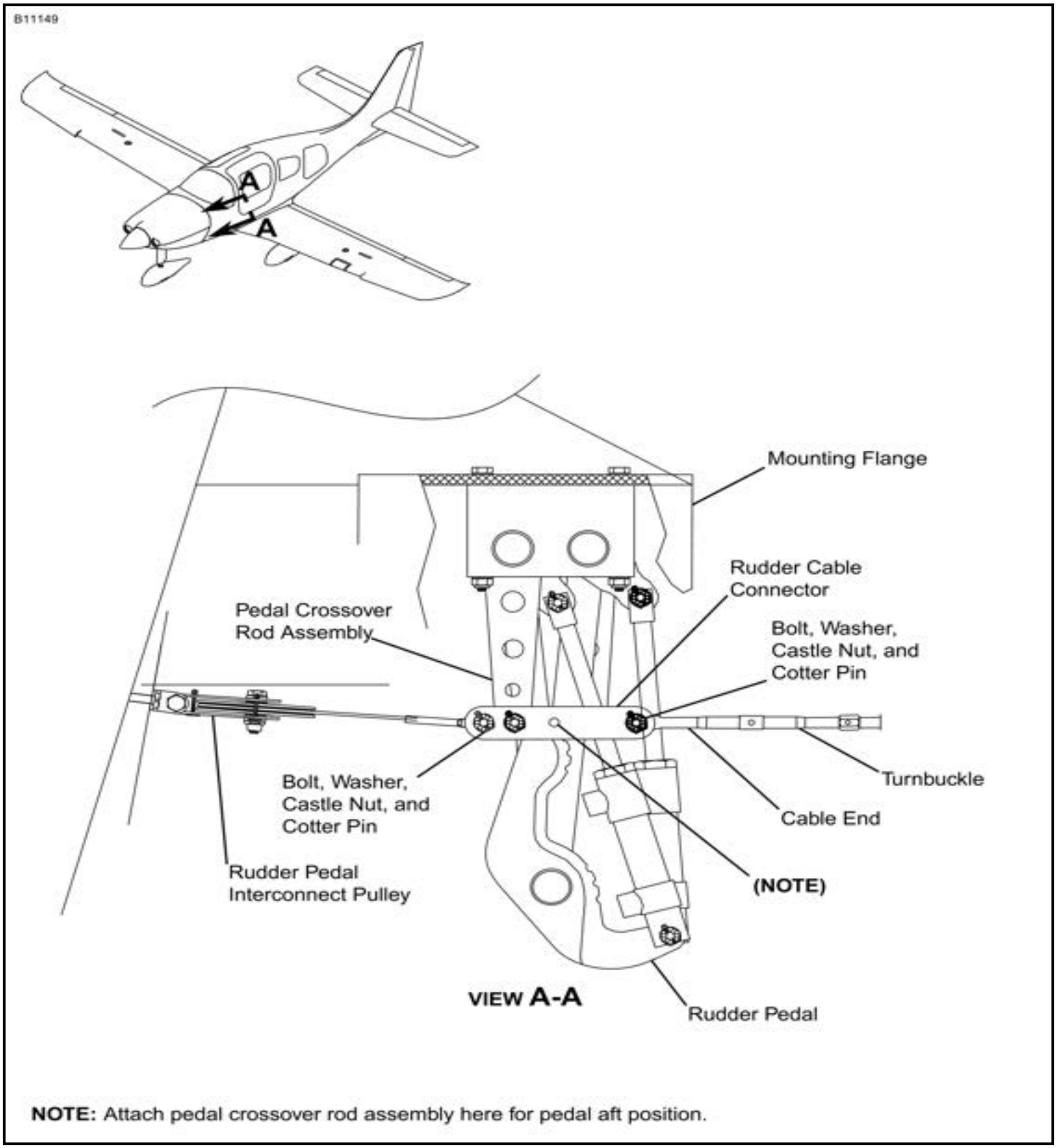
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Figure 201 : Sheet 1 : Rudder Installation



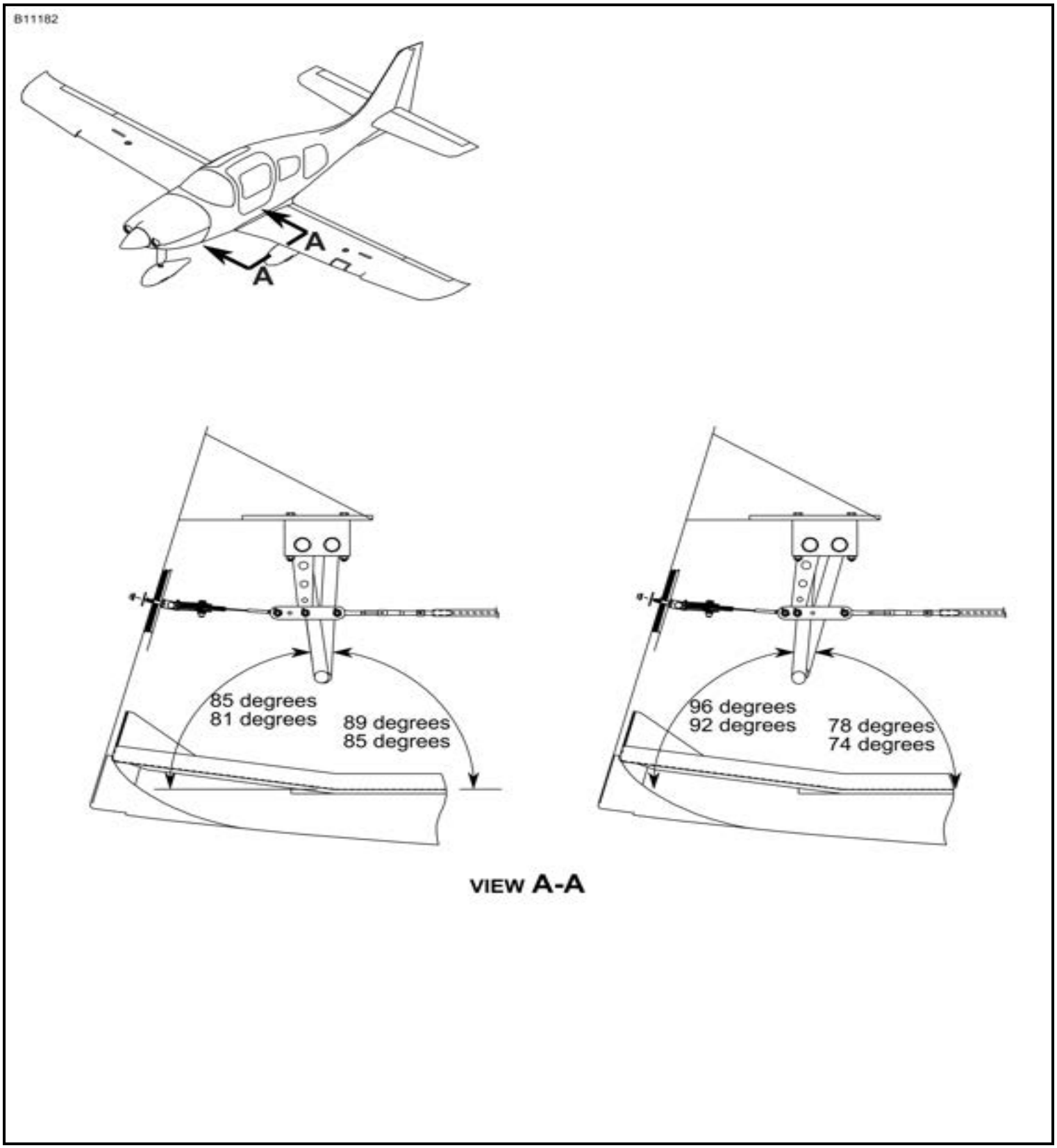
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Figure 202 : Sheet 1 : Left Rudder Cable to Rudder Pedal Attachment (Right Side Similar)



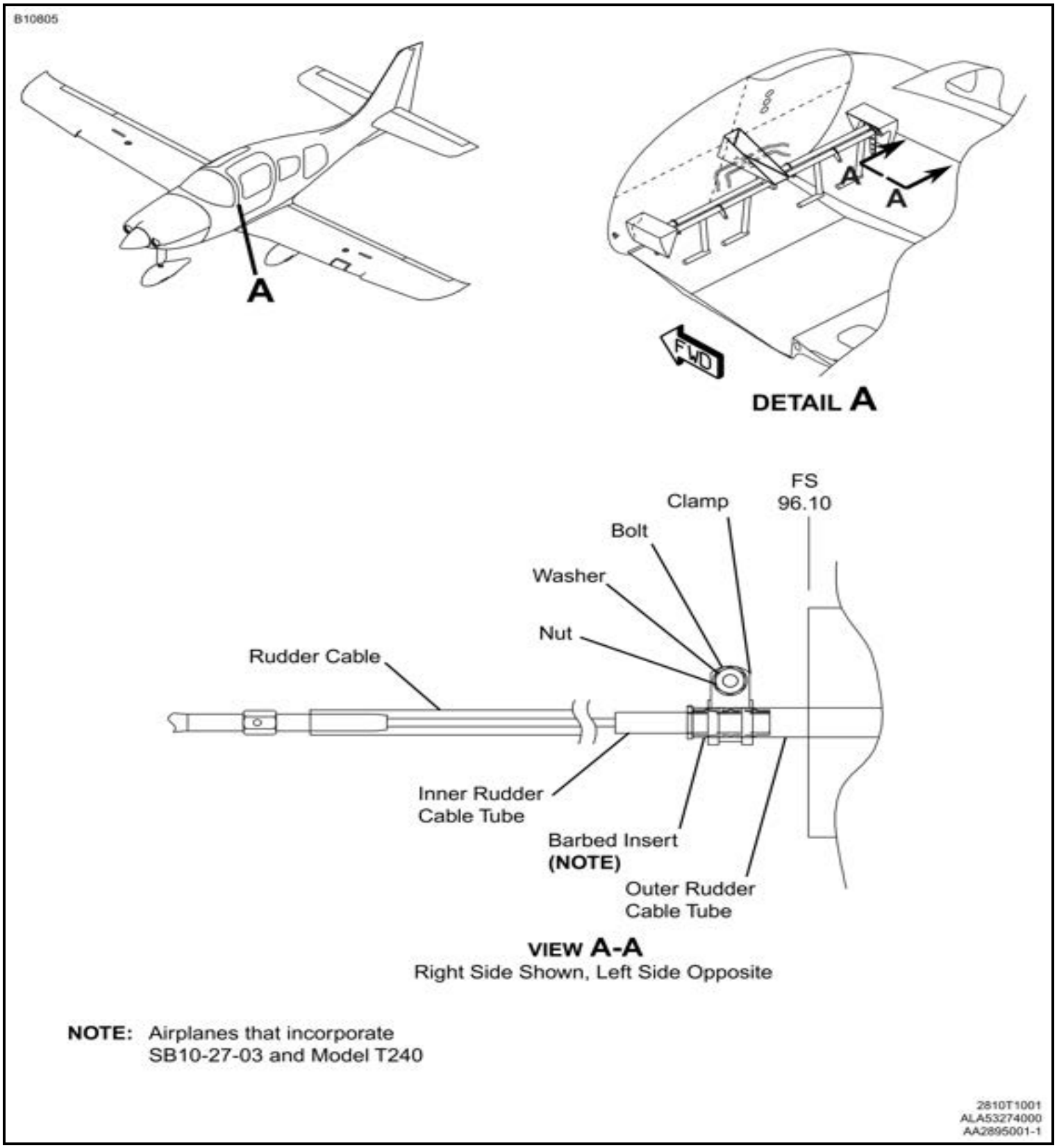
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Figure 203 : Sheet 1 : Rudder Control System Rigging



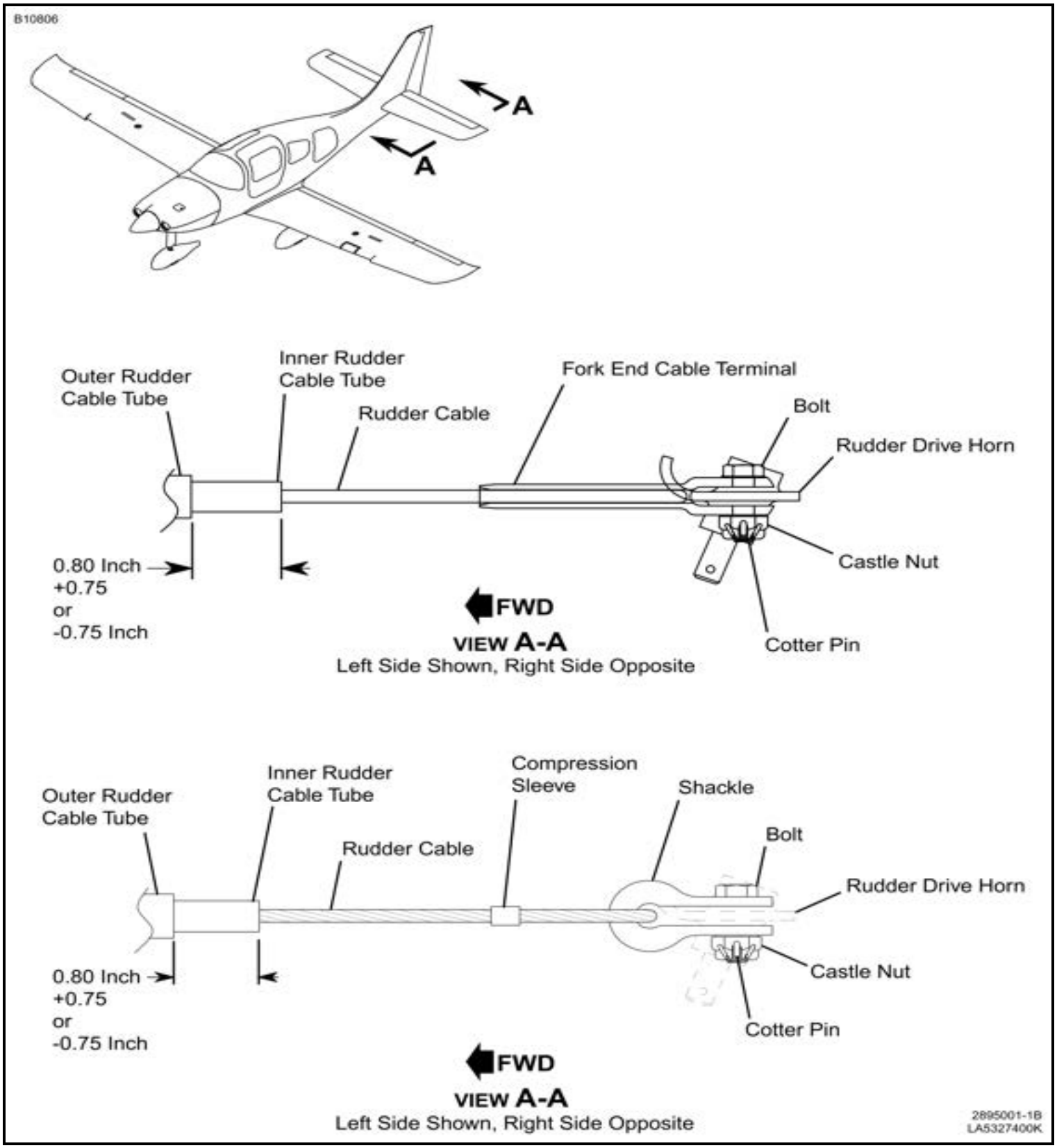
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Figure 204 : Sheet 1 : Cable Thimble, Compression Sleeve and Shackle



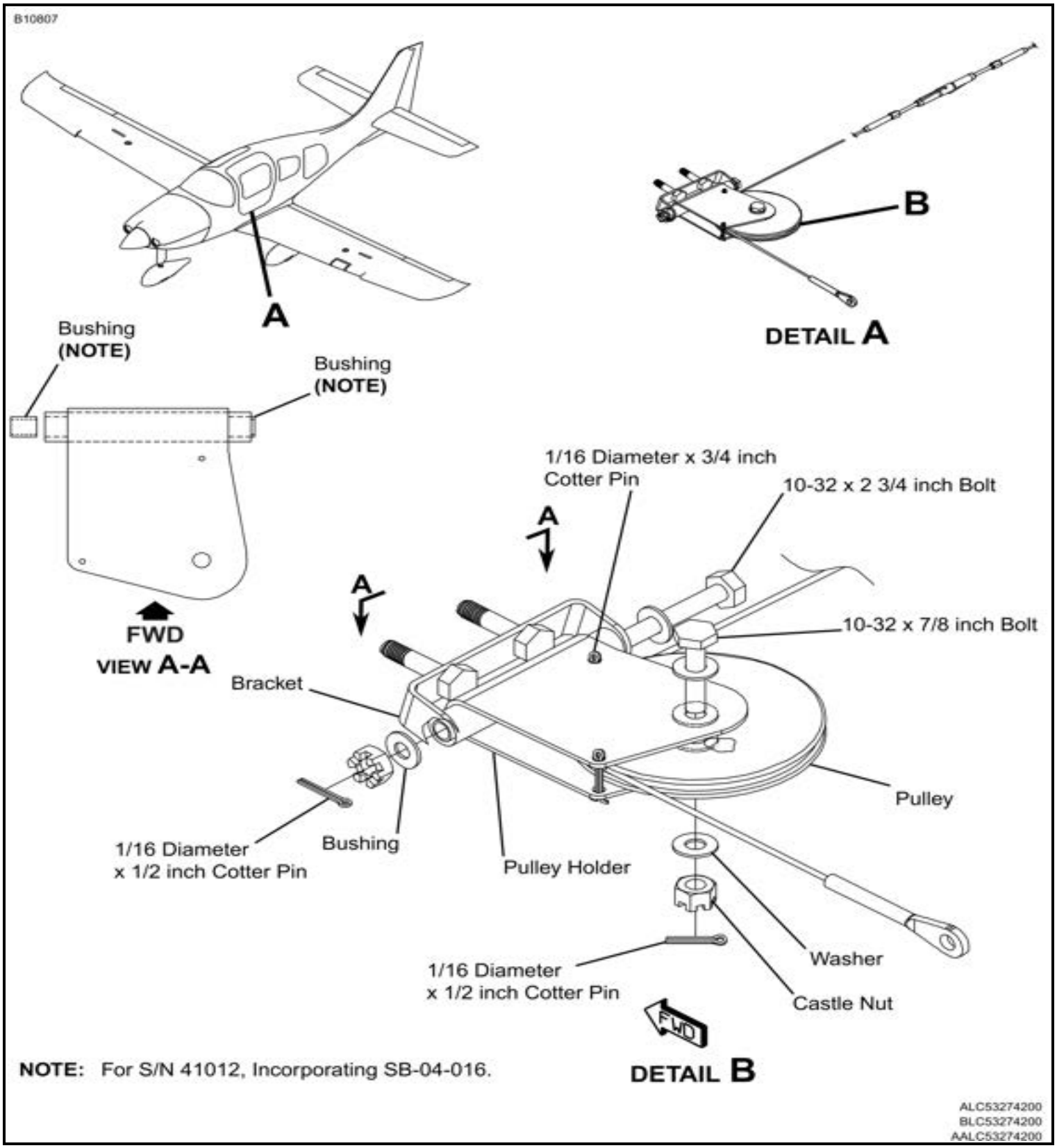
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Figure 205 : Sheet 1 : Fork End Cable Terminal



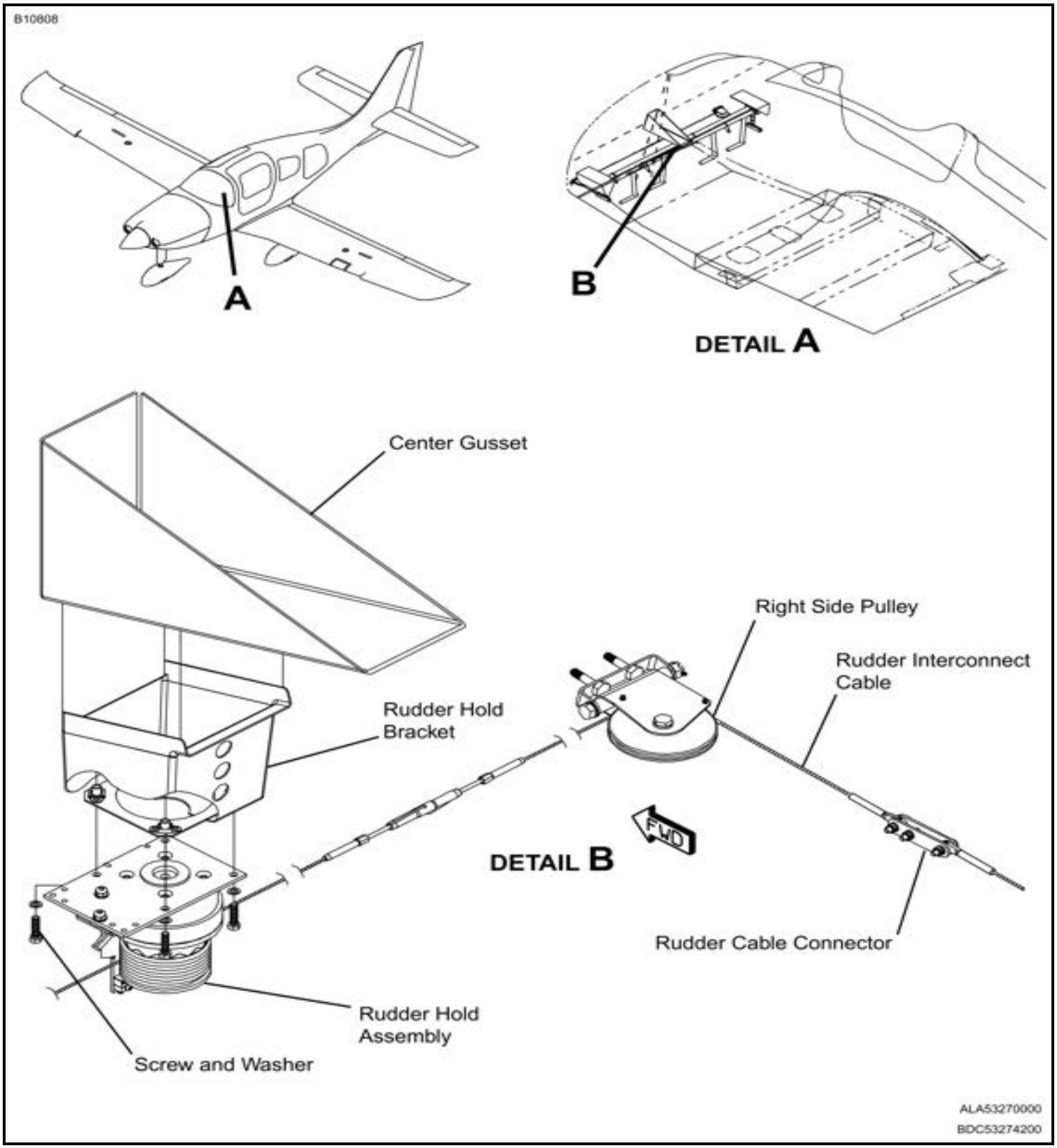
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Figure 206 : Sheet 1 : Left Rudder Interconnect Pulley (Right Pulley Similar)



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Figure 207 : Sheet 1 : Rudder Hold Assembly



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RUDDER HOLD SYSTEM (G2000) - ADJUSTMENT/TEST

1. General

A. This section gives the procedures to do a check of the rudder hold system. For rudder hold system maintenance procedures refer to, Rudder Control System - Maintenance Practices.

2. Rudder Hold Operational Check

A. Do the Rudder Hold Operational Check.

(1) Supply external electrical power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Set the CROSS TIE switch (SW03) to the ON position.

(5) Make sure that the RUDR HOLD CAS message does not show on the Primary Flight Display (PFD) (UI407).

(6) Set the A/P TRIM switch (SW19) found on the overhead panel, to the ON position.

(7) Make sure that the flaps are in the up position

(8) Make sure that rudder pedal is free to move.

(9) Push the RUDDER HOLD ENGAGE switch (SI010), found on the center console, to the on position and release.

(a) Make sure that the RUDR HOLD CAS message shows on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they do not move freely.

(10) Push the RUDDER HOLD ENGAGE switch, to the OFF position and release.

(a) Make sure that the RUDR HOLD CAS message does not show on the PFD

(b) Make sure that when the rudder pedals are pushed gently they move freely.

(11) Push the RUDDER HOLD ENGAGE switch to the on position and release.

(a) Make sure that the RUDR HOLD CAS message shows on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they do not move freely.

(12) Apply 40 to 50 pounds of force to the left or right rudder pedal.

(a) Make sure that the RUDR HOLD CAS message does not show on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they move freely.

(13) Push the RUDDER HOLD ENGAGE switch to the on position and release.

(a) Make sure that the RUDR HOLD CAS message shows on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they do not move freely.

(14) On the pilot control stick push and then release the autopilot disconnect push button switch (SW31).

(a) Make sure that the RUDR HOLD CAS message does not show on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they move freely.

(15) Push the RUDDER HOLD ENGAGE switch to the on position and release.

(a) Make sure that the RUDR HOLD CAS message shows on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they do not move freely.

(16) On the copilot control stick push and release the autopilot disconnect push button switch.

(a) Make sure that the RUDR HOLD CAS message does not show on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they move freely.

(17) Push the RUDDER HOLD ENGAGE switch to the on position and release.

(a) Make sure that the RUDR HOLD CAS message shows on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they do not move freely.

(18) On the overhead panel set the A/P TRIM MASTER (SW19) switch to the OFF position.

(a) Make sure that the RUDR HOLD CAS message does not show on the PFD.

(b) Make sure that when the rudder pedals are pushed gently they move freely.

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(19) Set the A/P TRIM MASTER switch to the ON position.
(20) Push the RUDDER HOLD ENGAGE switch to the on position and release.
  (a) Make sure that the RUDR HOLD CAS message shows on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they do not move freely.
(21) Set the FLAPS switch (SI005) to the TO position.
  (a) Make sure that the RUDR HOLD CAS message does not show on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they move freely.
(22) Set the FLAPS switch to the UP position.
(23) Push the RUDDER HOLD ENGAGE switch to the on position and release.
  (a) Make sure that the RUDR HOLD CAS message shows on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they do not move freely.
(24) Disengage the AIL TRIM/RDR HOLD circuit breaker found on the cockpit circuit breaker panel.
  (a) Make sure that the RUDR HOLD CAS message does not show on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they move freely.
(25) Engage the AIL TRIM/RDR HOLD circuit breaker.
(26) Push the RUDDER HOLD ENGAGE switch to the on position and release.
(27) Push the RUDDER HOLD ENGAGE switch to the on position and release.
  (a) Make sure that the RUDR HOLD CAS message shows on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they do not move freely.
(28) Push the RUDDER HOLD ENGAGE switch to the on position and release.
  (a) Make sure that the RUDR HOLD CAS message does not show on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they move freely.
(29) On the left wing, move the stall warning vane up until the stall warning horn is heard.
  (a) Make sure that the RUDR HOLD CAS message does not show on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they move freely.
(30) Connect the air data test set pitot line to the pitot probe on the right wing. Refer to the applicable manufacturers test set operation manual.
(31) Connect the air data test set static line to the static port on the right fuselage. Refer to the applicable manufacturers test set operation manual.
(32) Move the stall warning vane up until the warning horn sounds.
  (a) Make sure that the RUDR HOLD CAS message does not show on the PFD.
  (b) Make sure that when the rudder pedals are pushed gently they move freely.
(33) Release the stall warning vane.
(34) Remove the air data test set. Refer to the applicable manufacturers test set operation manual.
(35) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(36) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(37) Remove external electrical power from the airplane.

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ELEVATOR CONTROL SYSTEM - MAINTENANCE PRACTICES

1. Elevator System - General

A. The elevator is a two-part control surface split in the center at the vertical tail with each half connected by a torque tube The elevator is attached to the horizontal stabilizer with two piano hinges. A series of push-pull tubes connects the elevator to the left and right control sticks. Simple rod end bearings are used throughout the elevator control system. Lead counterweights balance the elevator.

CAUTION: Do not remove, install, or carry the elevator assembly in one piece. Damage may occur to the torque tube.

2. Elevator

A. Elevator Removal and Installation

(1) Remove the rudder per the instructions in Section 27-20-00, Rudder Installation and Removal.

(2) Remove the cotter pin and retaining hardware from the aft elevator control rod and the elevator drive horn. Refer to Figure 203.

(3) Remove the MS24694-C50 or AN526C1032R9 screws and washers that attach the left and right elevator fairings to the horizontal stabilizer. Refer to Figure 203. Screws are located on the top and bottom of the fairing. Note: Two MS24694-C50 or MS24694-C51 screws in each side of the stabilizer appear to attach the fairing; they actually attach the forward hinges of the elevator torque tube to the stabilizer and should not be removed until after the wiring connector has been disconnected.

(4) Remove the MS24963-C270 or AN526C1032R9 screws and washers that attach the elevator torque tube to the metal end caps on the left and right halves of the elevator.

(a) Remove the MS51957-46 screws that attach the elevator torque tube to the both left and right elevator torque tube cap.

(5) Remove the hardware that attaches the end caps to the left and right elevators; then remove the end caps prior to balancing the elevators.

(6) Disconnect the wiring connector for the elevator trim servo and the two grounding straps at the elevator horn. The grounding straps are connected to the elevator horn by an AN3C-10A bolt, one washer, self-locking nut and aluminum spacer.

(7) Remove the MS24694-C50, -C51, -C52, or -C54 screws, washers, self-locking nuts (if present), and shim (if present) that attach the torque tube hinges to the horizontal stabilizer. Remove grounding straps and note location for reinstallation.

(8) By gently sliding the ends of the torque tube within the elevator halves, there is enough play to remove the torque tube from the assembly.

(9) Remove the MS24694-C50, -C51, -C52, or -C54 screws and washers that attach the elevator hinges to the horizontal stabilizer.

(10) Remove the elevator halves.

(11) Install the elevator in the reverse order. Recheck all attachment hardware for security and safety. Torque all attachment screws 30 to 36 in.-lbs. Torque grounding strap attachment hardware 20 to 25 in.-lbs. and apply zinc chromate primer.

B. Elevator Rigging and Adjustment

(1) Remove the following interior panels per the instructions in Chapter 25: FLSPL, FLSPR, MLSPL, MLSPR, right and left door tread.

(2) Remove the baggage bulkhead access panel per the instructions in Chapter 53.

(3) With the elevator securely fastened to the horizontal stabilizer, clamp the elevator such that its trailing edge is aligned with the trailing edge of the horizontal stabilizer. With the elevator fairings loosely attached to the horizontal stabilizer, clamp the fairings to the elevator and secure the fairings to the horizontal stabilizer. When the clamp is removed, confirm that angular tolerance between the horizontal stabilizer and the elevator fairing is per Section 27-00-00, Table 1.

(4) With the aircraft leveled about its lateral axis (pitch), Set the control stick to the vertical position (0 degrees, 7 degrees forward/ 2 degrees aft) as shown in Figure 201.

(5) Loosen the jam nuts on the rod end bearings on all elevator push-pull tubes as shown in Figure 202.

(6) Place template TC55270000 between the left-hand elevator shell and the elevator fairing. Seat it firmly against the leading edge and upper surface of the horizontal stabilizer and parallel with the longitudinal axis of the aircraft.

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(7) Starting with the elevator in the neutral position rotate the elevator upward until it just contacts the stop. Check that deflection conforms to Section 27-00-00, Table 1.

CAUTION: Do not press too hard on the elevator against the elevator up stop, as this will cause a false indication of the elevator deflection.

(8) Rotate the elevator to the down position, and allow the elevator to rest freely against the down stops. Check that deflection conforms to Section 27-00-00, Table 1.

(9) Adjust the elevator up and down stops as necessary to achieve deflection per Section 27-00-00, Table 1.

(a) To adjust the elevator up stop, loosen the jam nut, turn the hex head cap screw in the desired direction until the proper up deflection is met, then re-tighten the jam nut to 100 in.-lbs.

(b) To adjust the elevator down stops and increase the amount of down deflection, sand on the surface of the stop located in the counterweight pockets until the proper down deflection is achieved. If the down deflection is too much, contact Cessna Aircraft Company for new elevator stops.

(10) Adjust the rod end bearings in the elevator push-pull tubes such that the following criteria are met:

(a) The elevator deflections per Section 27-00-00, Table 1 are achieved.

(b) The control stick is in the vertical position (0 degrees, 7 degrees forward/ 2 degrees aft) when the elevator is at neutral deflection. Refer to Figure 201.

(c) The elevator interconnect weldment has adequate clearance (0.125 inch minimum) with the adjacent aircraft structure.

(d) Control stick is free from interference with adjacent side interior panels and the instrument panel.

(e) All rod ends have a minimum 0.5 inch thread engagement (threads should be visible through inspection hole in ends of push-pull tubes).

(11) Ensure that the gap between the outboard end of the elevator and the horizontal stabilizer is 0.125 to 0.500 inch

(12) Ensure that the gap between the inboard end of the elevator and the horizontal stabilizer fairing is 0.125 to 0.500 inch

(13) Torque all AN316-6 jam nuts at control rod ends to 95 to 110 in.-lbs. and all AN316-5 jam nuts to 70 to 85 in.-lbs.

(14) Cycle the control stick fore and aft to ensure that there is no binding in the system.

C. **Elevator Servicing and Maintenance**

(1) Hinges - The elevator is attached to the horizontal stabilizer with two piano hinges. Each hinge should be inspected annually for excessive wear and cracks. The hinge may be lubricated with MIL-L-7870 general purpose lubricating oil to help reduce wear and friction.

(2) Rod End Bearings - The rod end bearings used throughout the elevator control system do not require maintenance other than cleaning during routine inspections to remove any accumulation of dust or grime. Liquid lubricants should not be used on the rod end bearings as this may cause the Teflon liner to swell, creating excessive friction in the bearing. Should the rod end need to be replaced, contact Cessna Aircraft Company.

(3) Torque Tube - The torque tube should be visually inspected every 200 hours or annually. Elevator attachment to the torque tube should be inspected for integrity, excessive wear, and cracks. Inspect welds for cracks. Remove the elevator fairings for access to the torque tube.

3. Elevator Trim Tab

A. **Elevator Trim Tab Removal and Installation**

(1) Gain access to the elevator trim motor by removing the access panel located on the lower surface of the elevator.

(2) Disconnect the trim motor drive rods from the trim tab drive horn by removing the cotter pins and clevis pins.

(3) Rotate the trim tab upward to gain access to the screws attaching the trim tab hinge to the elevator.

(4) Remove the nine AN526C632R screws attaching the hinge to the elevator.

(5) Reinstall the trim tab in the reverse order, and torque all screws 10 to 12 in.-lbs.

(6) Run the trim tab to the up and down deflection positions to ensure that there is no binding of the system.

(7) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

B. **Elevator Trim Tab Rigging and Adjustment**

The elevator trim tab deflections are preset at the factory and should not require any further adjustment. The trim tab deflections should be checked periodically to ensure that the system is functioning properly. If the trim tab deflections are checked and found to be outside the acceptable limits per Section 27-00-00, Table 1, contact Cessna Aircraft Company for further

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instructions.

C. **Elevator Trim Tab Servicing and Maintenance**

The trim tab is attached to the elevator with one piano hinge. The hinge should be visually inspected annually for excessive wear and cracking and replaced as necessary. The hinge should be replaced if the hinge becomes worn to the point that the trim tab free play limits per Section 27-00-00, Table 1 are exceeded. The hinge may be lubricated with MIL-L-7870 general purpose lubricating oil. Should the nutplates located on the nutplate assembly, part number LA55273818, inside the elevator become worn or stripped, contact Cessna Aircraft Company for a replacement.

4. Elevator Trim Tab Servo

A. **Removal and Installation**

CAUTION: Take care when removing the trim motor so as not to damage the wiring and connectors located on the outside of the trim motor housing. Should any of the wiring or connectors become damaged or break, contact Cessna Aircraft Company for a replacement.

(1) Gain access to the elevator trim motor by removing the access panel located on the lower surface of the elevator.

(2) Disconnect the trim motor drive rods from the trim tab drive horn by removing the cotter pins and clevis pins.

(3) Remove the six AN526C632R10 screws that attach the trim motor hinge to the elevator hinge.

(4) Carefully remove the trim motor from within the elevator.

(5) After removing the trim motor, disconnect the wiring harness.

(6) Reinstall the trim motor in the reverse order. Torque all screws 10 to 12 in.-lbs.

(7) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

B. **Rigging and Adjustment**

The elevator trim motor is an integral part of the elevator trim tab. The trim tab deflections are preset at the factory. Therefore, the trim tab and motor should not require any further adjustment unless they need to be removed and replaced. If the trim tab deflections are checked and found to be outside the acceptable limits per Section 27-00-00, Table 1, the following procedure should be used.

(1) Using a digital inclinometer to determine deflection, have an assistant drive the elevator trim tab to the full down position (trim tab up).

NOTE: Actuation of the elevator trim system may have to be stopped before the 'DOWN' microswitch is activated. If the microswitch is activated before full down travel is achieved, back off the screw on the potentiometer drive bracket so that the full throw of the trim tab can be accomplished.

(2) With the trim tab in the full down position (trim tab up), adjust the down screw on the potentiometer drive bracket (refer to Figure 204) so that the screw just closes the microswitch, deactivating the motor. Tighten the jam nut on the adjusting screw.

(3) Using a digital inclinometer to determine deflection, have an assistant drive the elevator trim system to the full up position (trim tab down).

NOTE: Actuation of the elevator trim system may have to be stopped before the 'UP' microswitch is activated. If the microswitch is activated before full up travel is achieved, back off the up-screw on the potentiometer drive bracket so that the trim tab can be moved to match the required template markings.

(4) With the trim tab in the full up position (trim tab down) adjust the up screw on the potentiometer drive bracket so that the screw just closes the microswitch deactivating the motor. Tighten the jam nut on the adjusting screw.

(5) Drive the elevator trim system to the full down position using the control stick trim button while an assistant watches the actuator and trim tab linkage for clearances and smooth operation.

CAUTION: If the microswitch is severely misadjusted, damage to the aircraft and/or components may occur while trimming to either stop. Watch carefully during this phase of operation for clearances and any indication of binding.

(6) Using a digital inclinometer, check position of the trim tab. Check trim panel position indications. If necessary, repeat as follows:

(a) With the trim tab in the full down position (trim tab up), adjust the down screw on the potentiometer drive bracket (refer to Figure 204) so that the screw just closes the microswitch, deactivating the motor. Tighten the jam nut on the adjusting screw.

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(7) Drive the elevator trim system to the full up position while an assistant checks actuator and trim tab linkage for clearances and smooth operation.

CAUTION: If the microswitch is severely misadjusted, damage to the aircraft and/or components may occur while trimming to either stop. Watch carefully during this phase of operation for clearances and any indication of binding.

(8) Using a digital inclinometer to determine deflection, check position of trim tab. Check the position of the trim tab per instructions above if necessary. Check trim panel position indication.

(9) Cycle the elevator trim system through full deflections, checking for security, proper travel, and indications.

NOTE: When the trim tab is in the neutral position (faired evenly with elevator), the trim panel should indicate one green light above center.

(10) Install the elevator trim actuator cover panel.

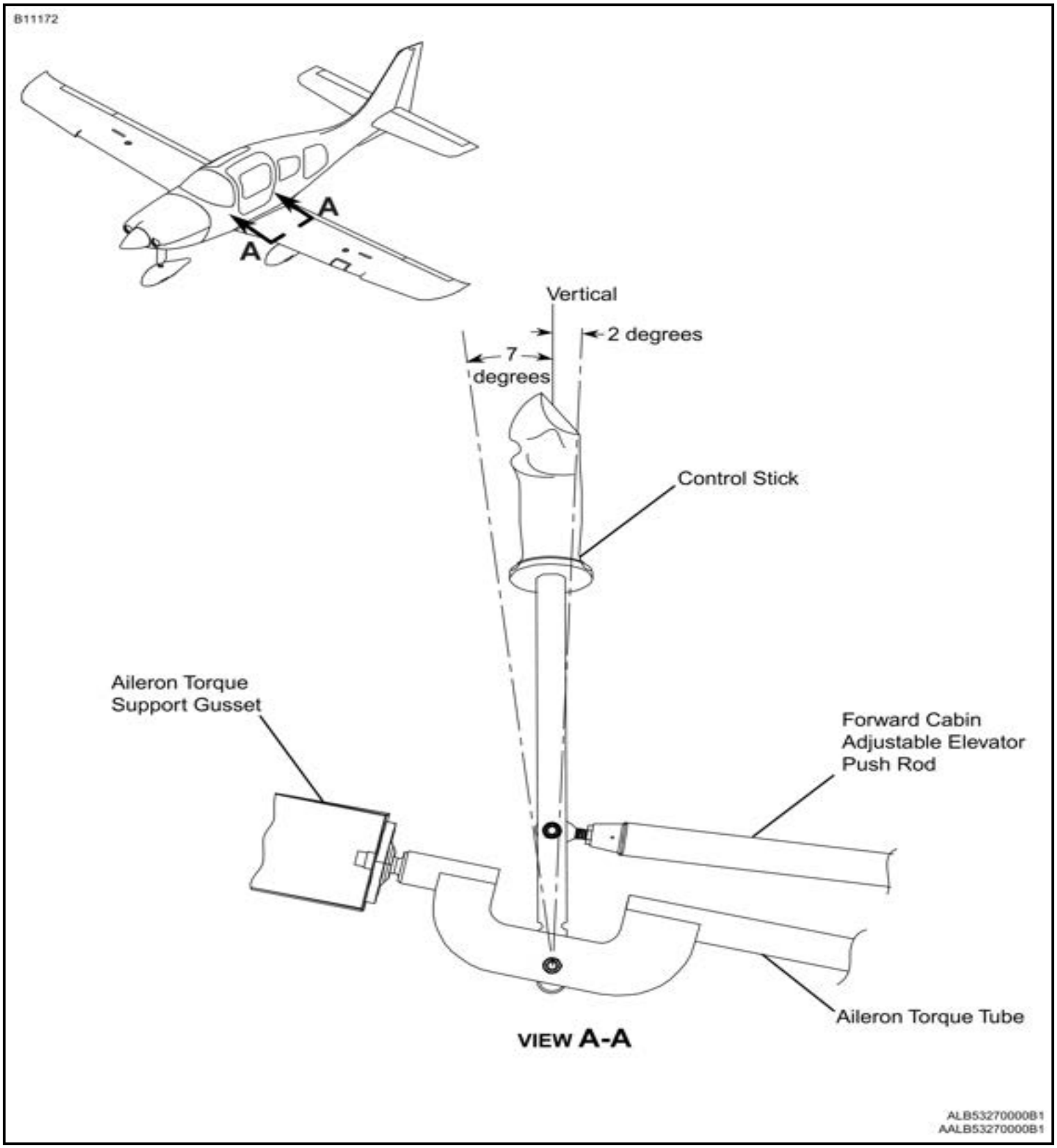
(11) Do the elevator trim calibration. Refer to Garmin G2000 Aileron and Elevator Trim Calibration - Adjustment/Test.

C. **Servicing and Maintenance**

The elevator trim motor should be removed for inspection and service every 3000 hours. The trim motor drive rod gears should be inspected for wear and lubricated with heavy-duty gear grease. The worm gears attached to the drive motor shaft do not need to be lubricated but should be inspected for wear. If any of the gears are worn, they should be replaced. Replacements may be obtained from Cessna Aircraft Company.

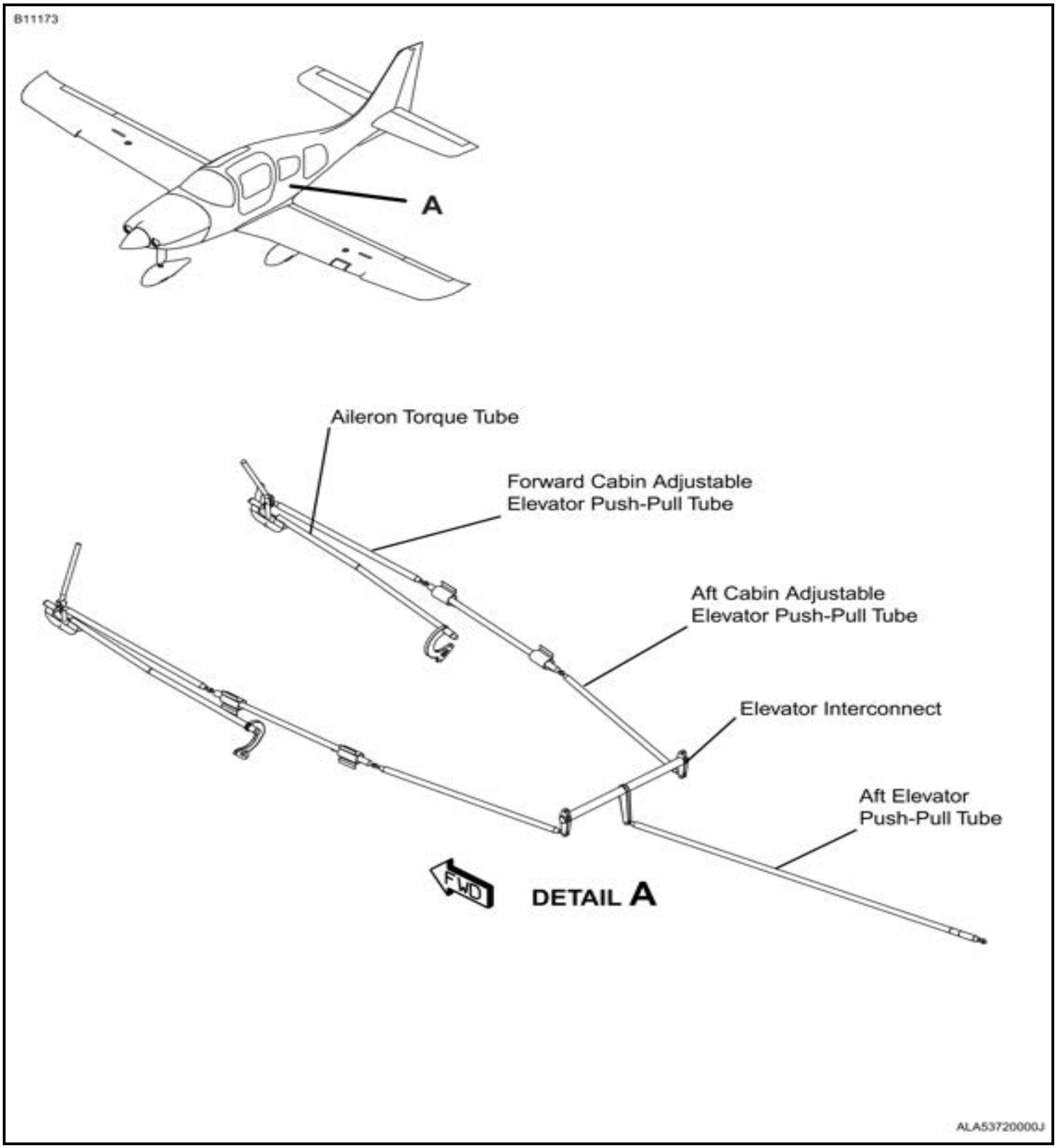
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Figure 201 : Sheet 1 : Control Stick Neutral Position



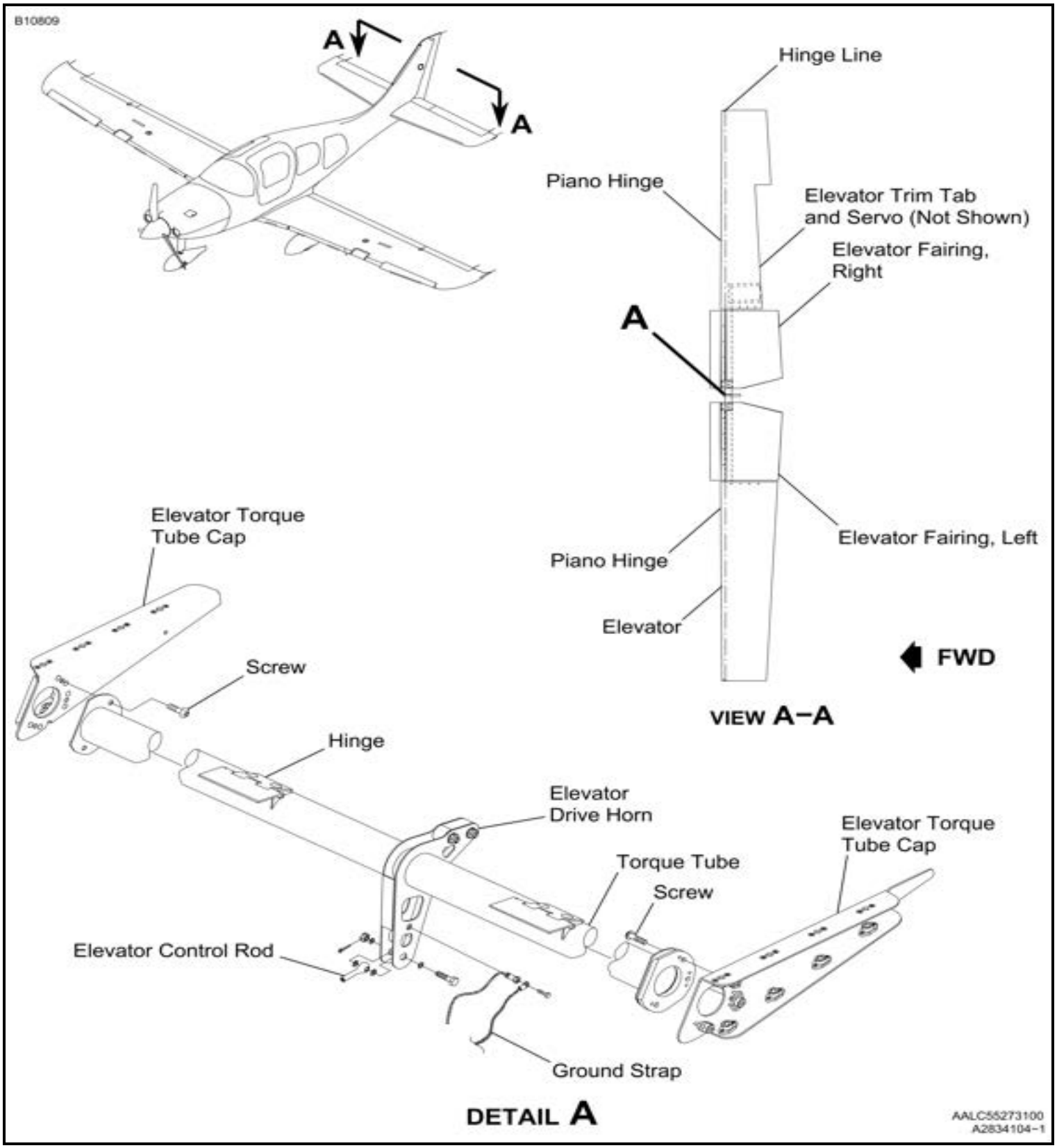
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Figure 202 : Sheet 1 : Fuselage Control System Layout



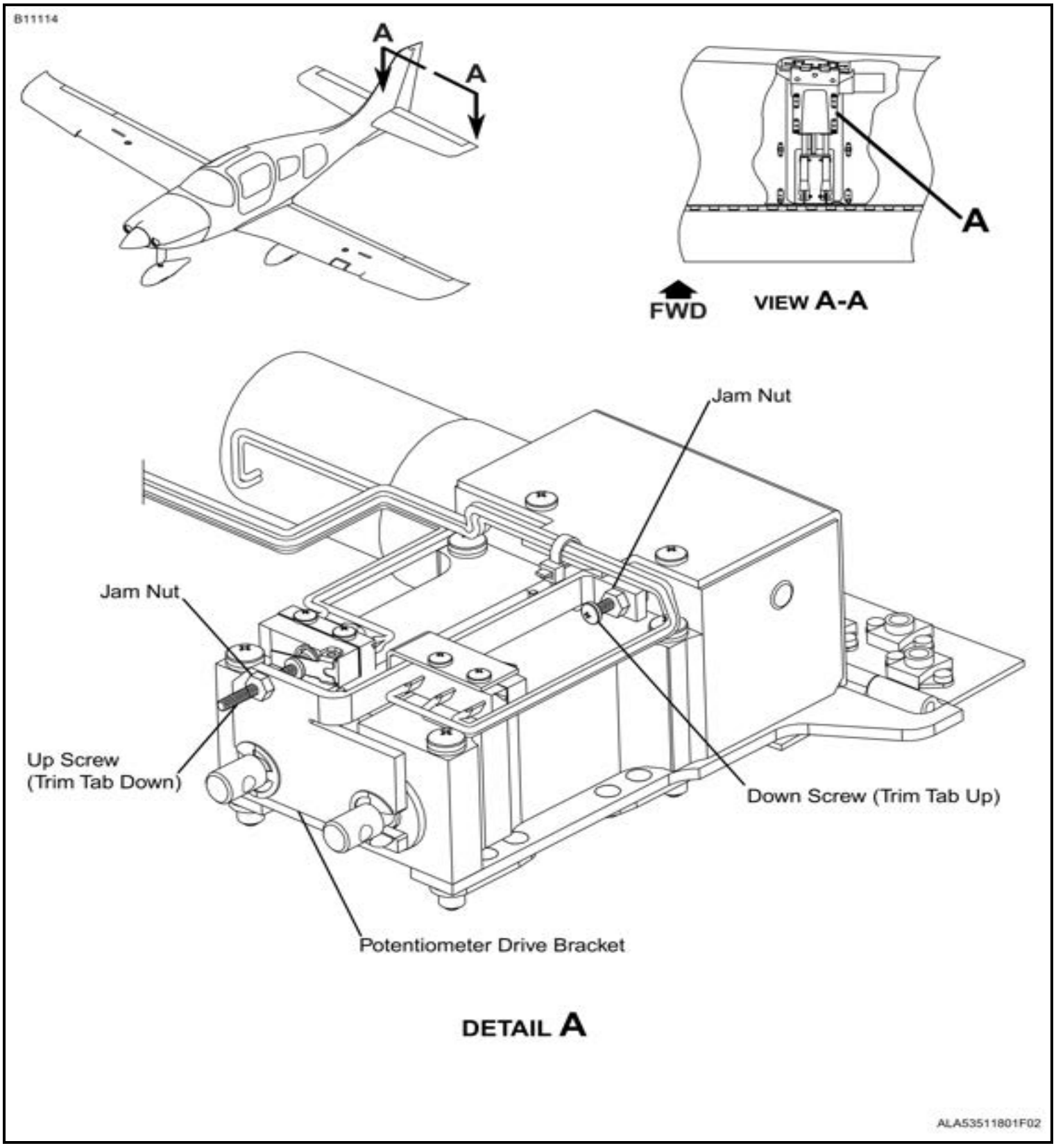
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Figure 203 : Sheet 1 : Elevator Fairing and Drive Horn



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Figure 204 : Sheet 1 : Elevator Trim Actuator



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GARMIN PITCH TRIM ADAPTER (G2000) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation for the G2000 Garmin GTA 82 Trim Adapter. The GTA 82 is installed below the instrument panel below on the bottom of the avionics shelf.

B. The Garmin GTA 82 Trim Adapter is a remote mounted device that is used to allow the GFC 700 Auto Pilot to drive a pitch trim actuator. The trim adapter is powered by the Essential Bus and interfaces with each of the two GIA 63W Integrated Avionics units through serial communication on separate RS-485 ports.

CAUTION: When removing and/or replacing a component, make sure that the airplane power is off. Disconnect auxiliary power supplies.

2. Garmin GTA 82 Trim Adapter Removal/Installation

A. Remove the GTA 82 Trim Adapter (UC304) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the PITCH TRIM circuit breaker, found on the cockpit circuit breaker panel.

(5) Remove the screws that attach the trim adapter to the avionics shelf.

(a) If necessary, remove the pilot seat to get access to the trim adapter. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Disconnect the electrical connector (P682) from the trim adapter electrical connector (P821).

(7) Remove the trim adapter from the airplane.

B. Install the GTA 82 Trim Adapter (UC304) (Refer to Figure 401).

(1) Put the trim adapter in its correct position on the bottom of the avionics shelf.

(2) Install the screws that attach the trim adapter to the avionics shelf.

(3) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(4) Connect the electrical connector (P682) to the trim adapter electrical connector (P821).

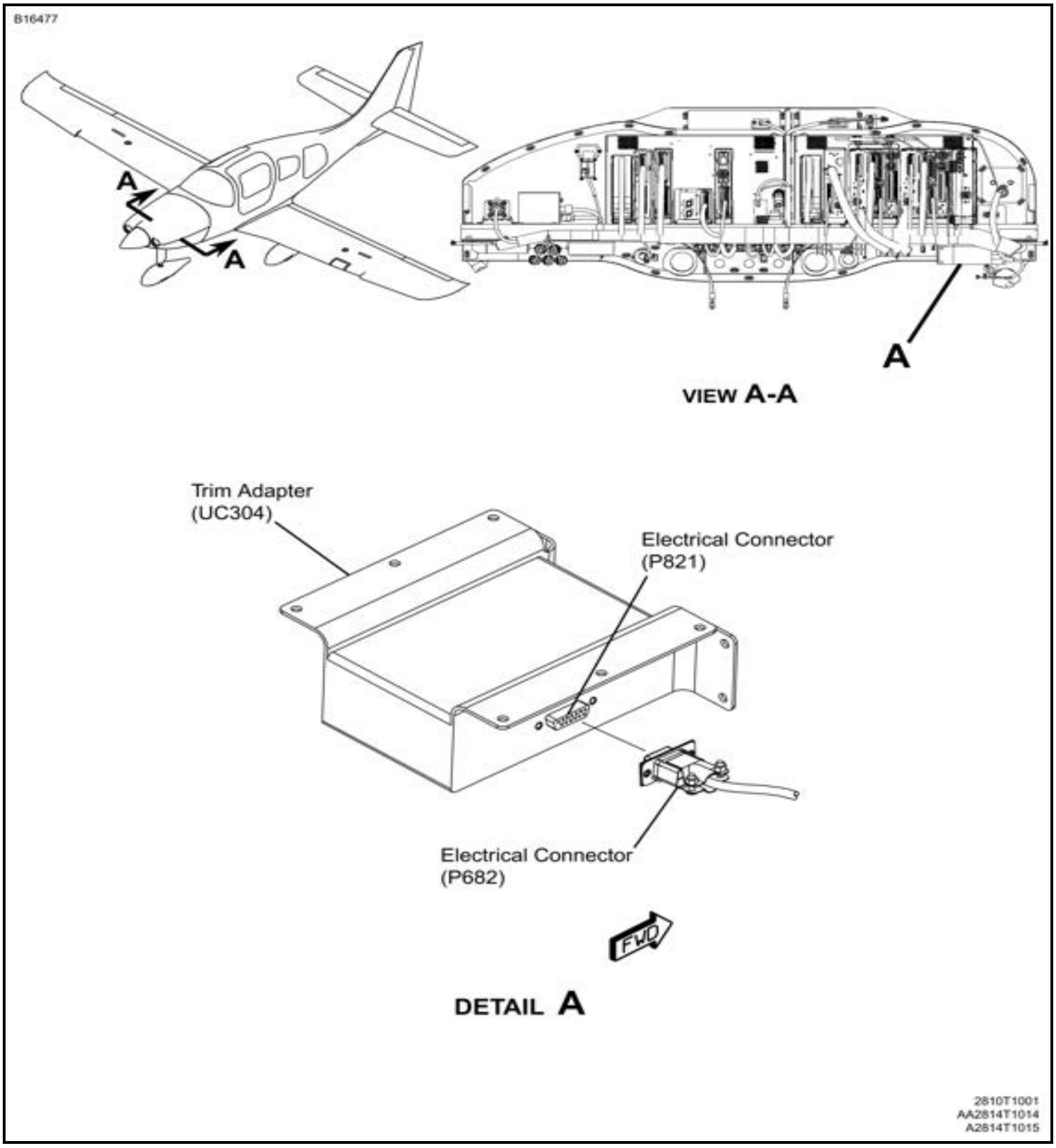
(5) If removed, install the pilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Engage the PITCH TRIM circuit breaker, found on the cockpit circuit breaker panel.

(7) To troubleshoot the trim adapter, refer to the Garmin Corvalis G2000 Line Maintenance Manual 190-01185-00, found in the Supplier Publication List.

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Figure 401 : Sheet 1 : GTA 82 Trim Adapter Installation



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FLAP CONTROL SYSTEM - MAINTENANCE PRACTICES

1. Flap System - General

A. The flap system is located in the wing, aft of the rear spar, with the exception of the electrical system linking the flap switch to the electric flap actuator. The system uses four control rods with rod ends mounted on each threaded control rod. Refer to Figure 201. The rod ends use a Teflon liner which requires no lubrication.

B. Primary flap stops are electric, provided by the limit switch assembly. The flap system secondary stops are mechanical with up stops provided by the flap hinges and the flap central bellcrank assembly. Down stops are provided by the flap actuator. Refer to Figure 204. Refer to Chapter 33 for additional information regarding the electrical connections and flap switch.

2. Flaps

A. Flap Removal and Installation

(1) Lower flaps to the landing position.

(2) Remove the cotter pin, castellated nut, bolt, and washers from the flap drive control rod to the flap. Note that small washers may be installed between the flap drive hinge and the control rod end. These washers are used to increase the misalignment capability of the rod ends, and each aircraft may have a different number of washers, or none at all.

(3) Remove the cotter pins, castellated nuts, washers, and bolts from the flap hinge pivots.

(4) Remove the flap by pulling the flap aft and away from the wing

(5) Reinstall in the reverse order. When installing a new flap or reinstalling an existing flap, ensure positive clearance between the flap upper surface and the flap cove. Also ensure that all four flap hinges align with no binding. Flap position may be adjusted, if necessary, by removing or installing shims to the flap hinges as follows:

(a) No more than 3 shims (P/N LA57265125) are allowed per hinge element of each hinge.

(b) When removing the hinge, note the location and type of all fasteners and washers.

(c) Due to the addition or removal of shims, replace any bolts or screws as required so that their length maintains two threads minimum projection (including the chamfer on the end of the bolt) through the nut, nutplate, or rivnut. The bolt must also have sufficient threads to prevent bottoming out before the part is secured.

(d) Dry torque 10-32 fasteners 28-34 in-lbs.

(e) Dry torque 6-32 fasteners 6-11 in-lbs.

(6) Torque all castellated nuts 72 to 84 in.-lbs., and install cotter pins.

B. Flap Rigging and Adjustment

Once the flap system is properly rigged, only minor adjustments are required unless components such as control rods, actuator, or limit switches are replaced. It is important to start the rigging with the flap actuator and the flap central bellcrank. Refer to Figure 202. To rig the flap system, use the following steps.

(1) With the flap control rods disconnected from the outboard bellcranks, extend the actuator (flap switch up/cruise position).

(2) By adjusting the limit switch rod (refer to Figure 204) and the actuator rod end if necessary, adjust the flap up position so a 0.063-inch spacer fits between the flap central bellcrank and the web on the central bellcrank bracket as shown in Figure 203. Adjustments can easily be made with the actuator retracted (landing position). Torque the limit switch jam nuts 72 to 84 in.-lbs. and the flap actuator rod end jam nut 30 to 36 ft.-lbs. A minimum of 1.5 diameter thread engagement is required on the actuator rod end.

(3) Pin the outboard bellcranks with a 0.25 inch diameter bolt, (AN4) or equivalent, and adjust the flap control rods with the actuator set in the up position (refer to Figure 204).

(4) Adjust the left and right control rod assemblies to length between the flap central bellcrank in the up position and the pinned outboard bellcranks. After adjusting the control rod assemblies, torque the jam nuts 140 to 180 in.-lbs., and verify that the minimum thread engagement is achieved by checking that the threads extend past the inspection hole in the control rods. Torque bolts through the bellcrank and control rods 72 to 84 in.-lbs., and install the cotter pin in the castellated nut (refer to Figure 204). Note the use of washers between the bellcrank and both sides of the rod end. If replacement of these washers is necessary, they may be replaced with AN960-416 washers.

(5) After adjusting the left and right control rod assemblies, adjust the final drive length to achieve a 0±1 degrees deflection with the flaps in the up position. After adjusting the correct length, torque the jam nuts 140 to 180 in.-lbs., and verify that the minimum thread engagement is achieved by checking that the threads extend past the inspection hole in the control rods. Refer to Figure 205. Torque bolts through the bellcrank and control rods 72 to 84 in.-lbs., and install the cotter pin in the castellated nut. Note the use of washers between the bellcrank and both sides of the rod end. If replacement of these

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washers is necessary, they may be replaced with AN960-416 washers.

(6) Using the flap/aileron template, part number TA57270000, lower the flaps to the takeoff position, and adjust the takeoff micro-switches to achieve 12±1 degrees deflection on both flaps. With the extension micro-switch adjusted, move the retraction microswitch as close as possible to the extension switch without interference. Note when adjusting the switches, always check deflection when the flaps are extended from the up position to the takeoff position. Refer to Figure 206.

(7) Lower the flaps to the landing position, and adjust the landing micro-switch to achieve 40±1 degrees deflection on both flaps using the rigging template.

(8) Ensure that the gap at the inboard edge of the aileron between the flap and the aileron (when the flaps are retracted) is 0.125 to 0.375 in. Ensure positive clearance when the flaps are extended.

(9) Actuate the flap system, and check for binding or rubbing of components. If problems are noted, re-check the rigging.

C. **Flap Servicing and Maintenance**

The flaps do not require any service or maintenance. The flaps should be visually inspected annually for cracking at all hinge attachment locations. A tap test should be conducted on the flap at the inboard and outboard end caps to aid in detection of latent damage or disbonds. Liquid lubricants should not be used on the rod end bearings as this may cause the Teflon liner to swell, creating excessive friction in the bearing. Should a rod end need to be replaced, contact Cessna Aircraft Company.

3. Flap Actuator

A. The flap system is actuated by an electric linear actuator mounted to a bracket on the aft spar in the belly-section of the aircraft wing. This actuator assembly includes a motor, clutch, ball-screw, and limit switch assembly. The limit switch assembly provides the electronic flap stops for the three positions: cruise, takeoff, and landing.

(1) **Flap Actuator Removal and Installation**

(a) Flaps must be in the cruise or landing position to remove the actuator. It is recommended to place the flaps in the cruise (up) position.

(b) Access the flap actuator through the flap and aileron pushrod access panel.

(c) Disconnect the power wire bundle to the actuator assembly. Refer to Figure 207.

(d) Tape or block the flaps to prevent them from moving when the flap actuator is disconnected from the central flap bellcrank.

(e) Through the holes in the flap central bellcrank bracket, disconnect the flap actuator from the bellcrank as shown in Figure 207.

(f) Remove the bolt holding the actuator to the bracket. Note the spacers and washers as shown in Figure 208 and Figure 209.

(g) Remove the actuator from the airplane.

(h) Reinstall in the reverse order.

(i) If the limit switches have been moved, a recheck of the flap rigging is required and adjustments required as necessary.

(j) Torque all 0.250 inch diameter bolts 72 to 84 in.-lbs. and all 0.375 in. diameter bolts 240 to 260 in.-lbs., and install the cotter pin.

(2) **Flap Actuator Maintenance**

(a) During normal inspections and maintenance, there should be checks for binding, fretting, chafed wires, and slop in the actuator mounting. Check the groove for the limit switch assembly and the limit switch rod. Refer to Figure 204.

(b) If there is excessive play in the actuator mounting, inspection and possible replacement of the spacers is required. To replace the spacers, follow the instructions for actuator removal and installation. Install new spacers, bolts, and washers as necessary.

(c) Reinstall in the reverse order.

(d) If the limit switches have not been moved, a recheck of the flap rigging is required and adjustments required as necessary.

(e) Torque all 0.250 inch diameter bolts 72 to 84 in.-lbs. and all 0.375 inch diameter bolts 240 to 260 in.-lbs., and install the cotter pin.

(f) If problems are found with the micro-switches, replacement is required. Contact Cessna Aircraft Company for replacement micro-switches. Replace the micro-switch by removing wires and unscrewing the micro-switch.

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Replacement is a direct reversal of the removal. Re-rigging is required for the replaced micro-switch.

(g) If the internal clutch requires replacement, contact Cessna Aircraft Company for a replacement actuator.

(h) All the bearings and rod ends used in the flap system are Teflon ball bearings that require little maintenance other than cleaning during routine inspections. Do not use liquid lubricants as they cause the Teflon to swell, creating excessive friction in the bearing. If bearings or rod ends require replacement, contact Cessna Aircraft Company for replacement parts.

(i) During normal inspections, check control rods, bellcranks, hinges, and brackets for excessive wear, cracks, scratches, and corrosion. Replace worn or damaged components as necessary.

(j) Refer to Chapter 33 of this manual for detailed maintenance procedures of the flap electrical system.

(3) **Wing Flap Actuator Inspection and Lubrication**

(a) Remove the flap actuator. Refer to Flap Actuator Removal and Installation.

(b) Carefully place the flap actuator on a clean surface.

(c) Make sure that the limit switch assembly is not moved or disturbed.

(d) Use a 5/32 Allen wrench to remove the hex head cap screws that attach the plastic cover on gear housing. Refer to Figure 210.

(e) Remove the plastic cover from the gear housing.

(f) Remove the motor drive assembly with the worm gear.

(g) Carefully remove the seals from the plastic cover and motor drive assembly.

(h) Use a clean lint-free cloth to remove the old grease from inside the gear housing, worm gear and seals.

(i) Inspect the Bakelite gear inside of the gear housing, the worm gear, and the seals for cracks, corrosion, and wear.

(j) If necessary, you can remove the gland nut from the gear housing to remove the worm screw and gear. Refer to Figure 211.

1 Use a clean lint-free cloth to remove the old grease from worm screw and gear.

(k) Use Aeroshell 7 grease to pack the gear housing and lubricate the gears.

(l) Make sure that the Bakelite gear in the gear housing and the worm gear on the drive gear assembly are completely covered with grease.

(m) Put the seal on the motor drive assembly side of the gear housing.

NOTE: There is a recessed groove in the gear housing for the seal.

(n) Install the motor drive assembly with the worm gear to the gear housing.

(o) On the plastic cover side of the gear housing, put the remaining seal on gear housing.

NOTE: There is a recessed groove in the gear housing for the seal.

(p) Put the plastic cover in place on the gear housing.

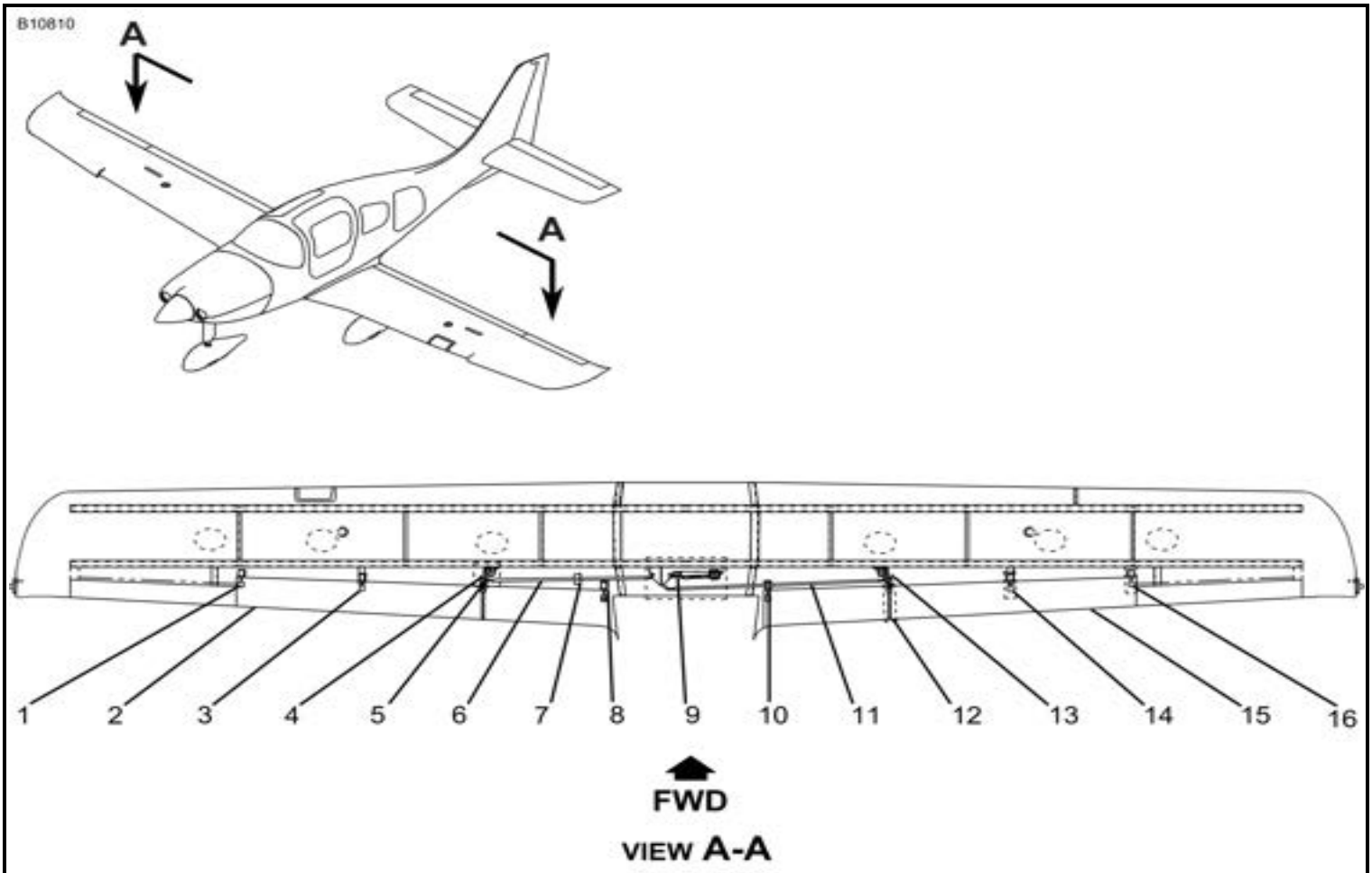
(q) Put Loctite Thread locker 242 on the threads of the hex head cap screws. Refer to Chapter 20, Solvents, Sealants and Adhesives – Description and Operation.

(r) Install the hex head cap screws through the plastic cover, the gear housing and into the motor drive assembly.

(s) Torque the hex head cap screws. Refer to Chapter 20, Torque Data – Maintenance Practices.

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Figure 201 : Sheet 1 : Flap System Overview



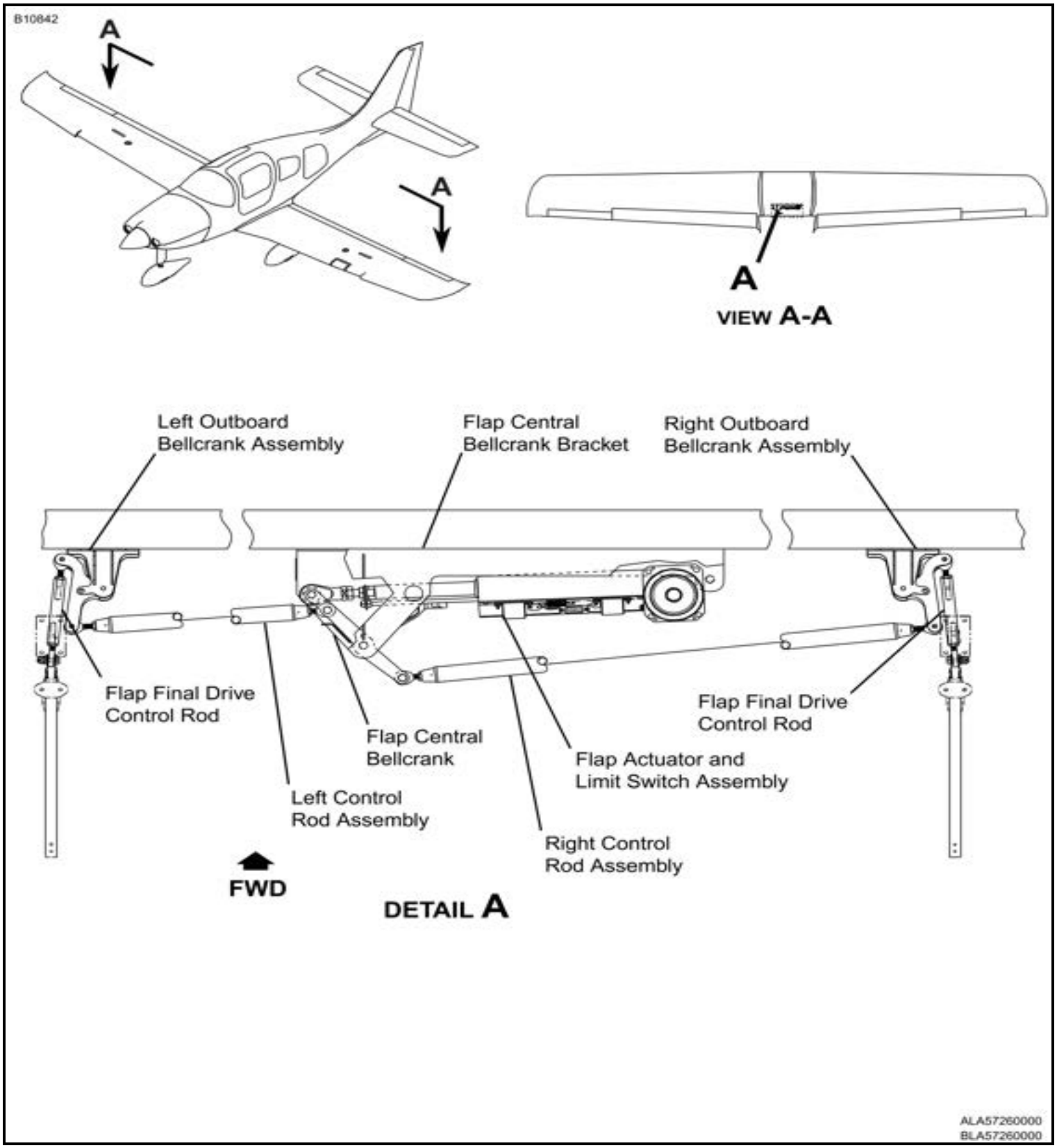
#	ITEM	#	ITEM
1.	WS 143.5 flap hinge assembly	9.	Flap central bellcrank and actuator assembly
2.	Left flap control surface	10.	WS 26.5 flap hinge assembly
3.	WS 104.5 flap hinge assembly	11.	Right flap control rod
4.	Flap drive bellcrank and final drive - left wing	12.	WS 65.5 flap hinge assembly (drive hinge)
5.	WS 65.5 flap hinge assembly (drive hinge)	13.	Flap drive bellcrank and final drive - right wing
6.	Left flap control rod	14.	WS 104.5 flap hinge assembly
7.	Left flap control rod guide*	15.	Right flap control surface
8.	WS 26.5 flap hinge assembly	16.	WS 144 flap hinge assembly

* The control rod guide is not present on all aircraft

ALA57260000

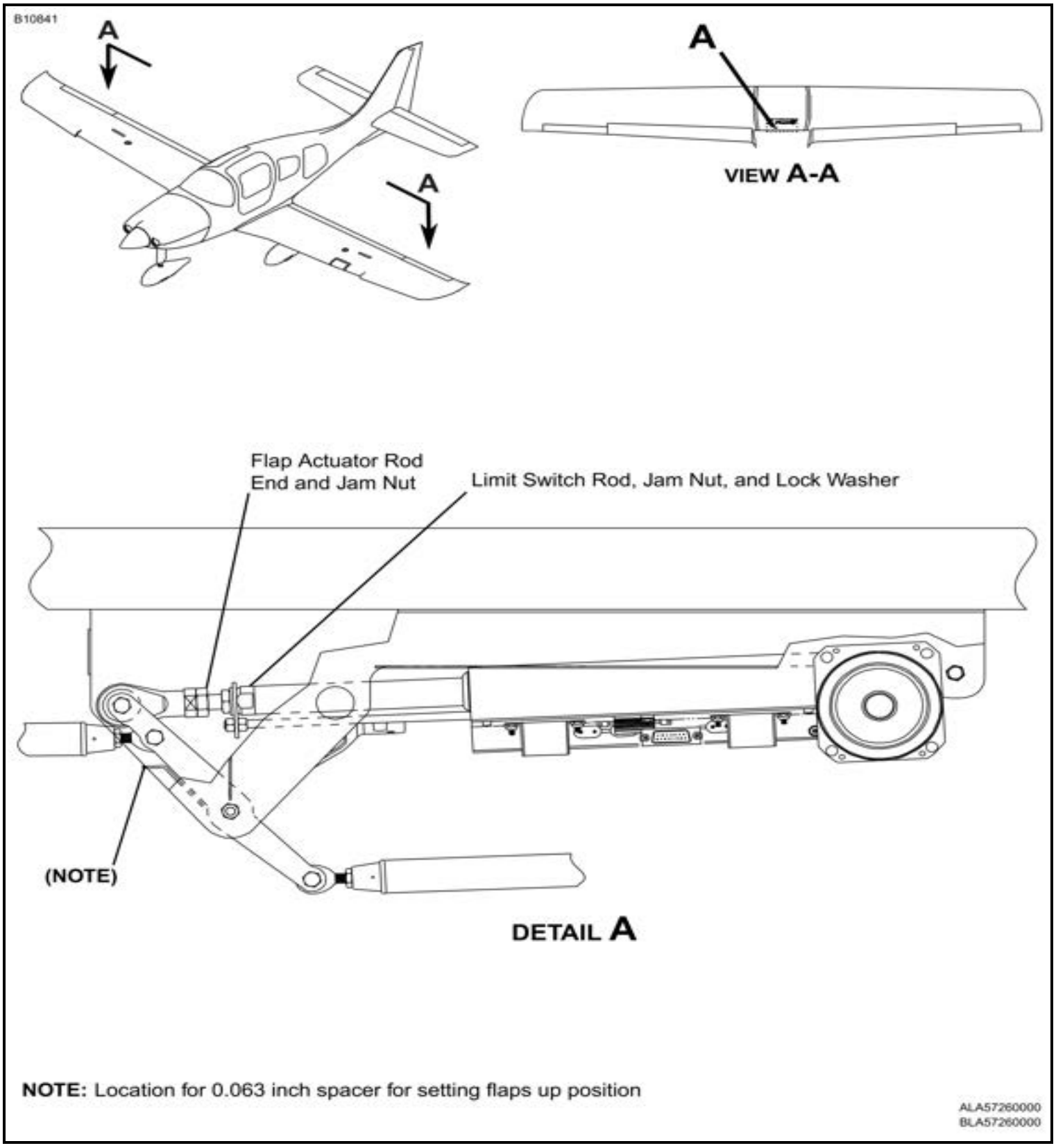
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Figure 202 : Sheet 1 : Flap Rigging Overview



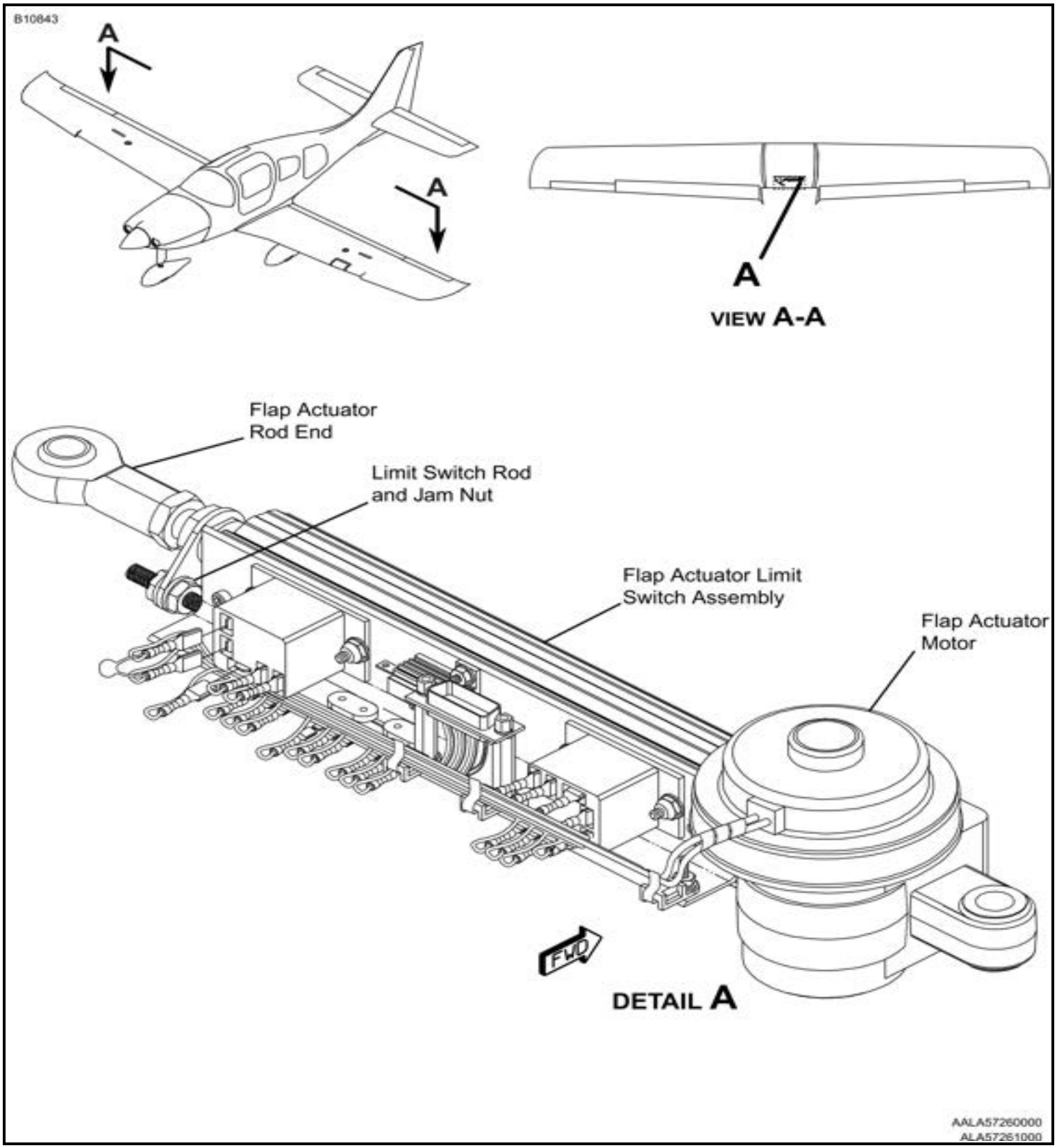
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Figure 203 : Sheet 1 : Flap Central Bellcrank and Flap Actuator



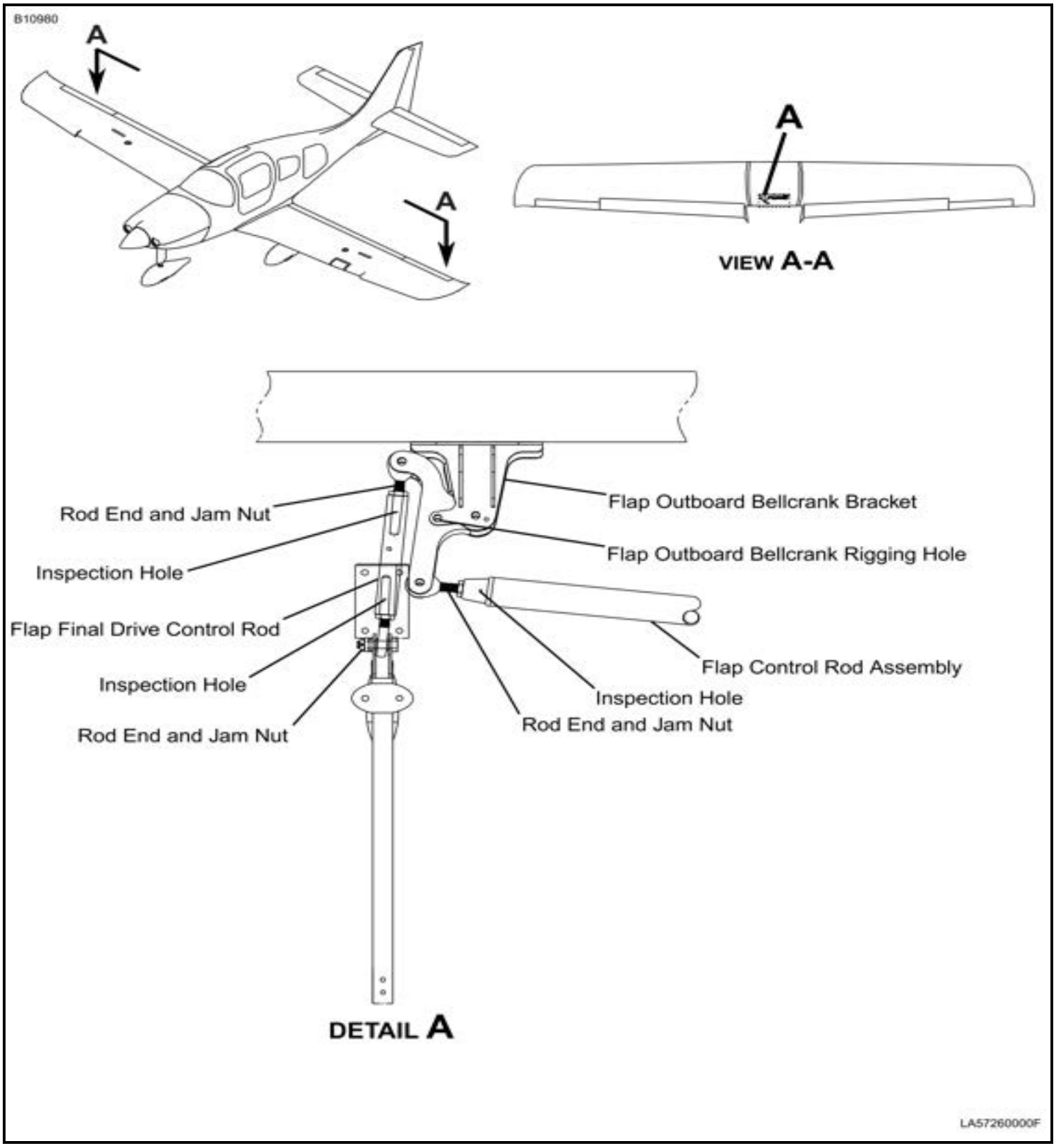
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Figure 204 : Sheet 1 : Flap Actuator Detail - Top View



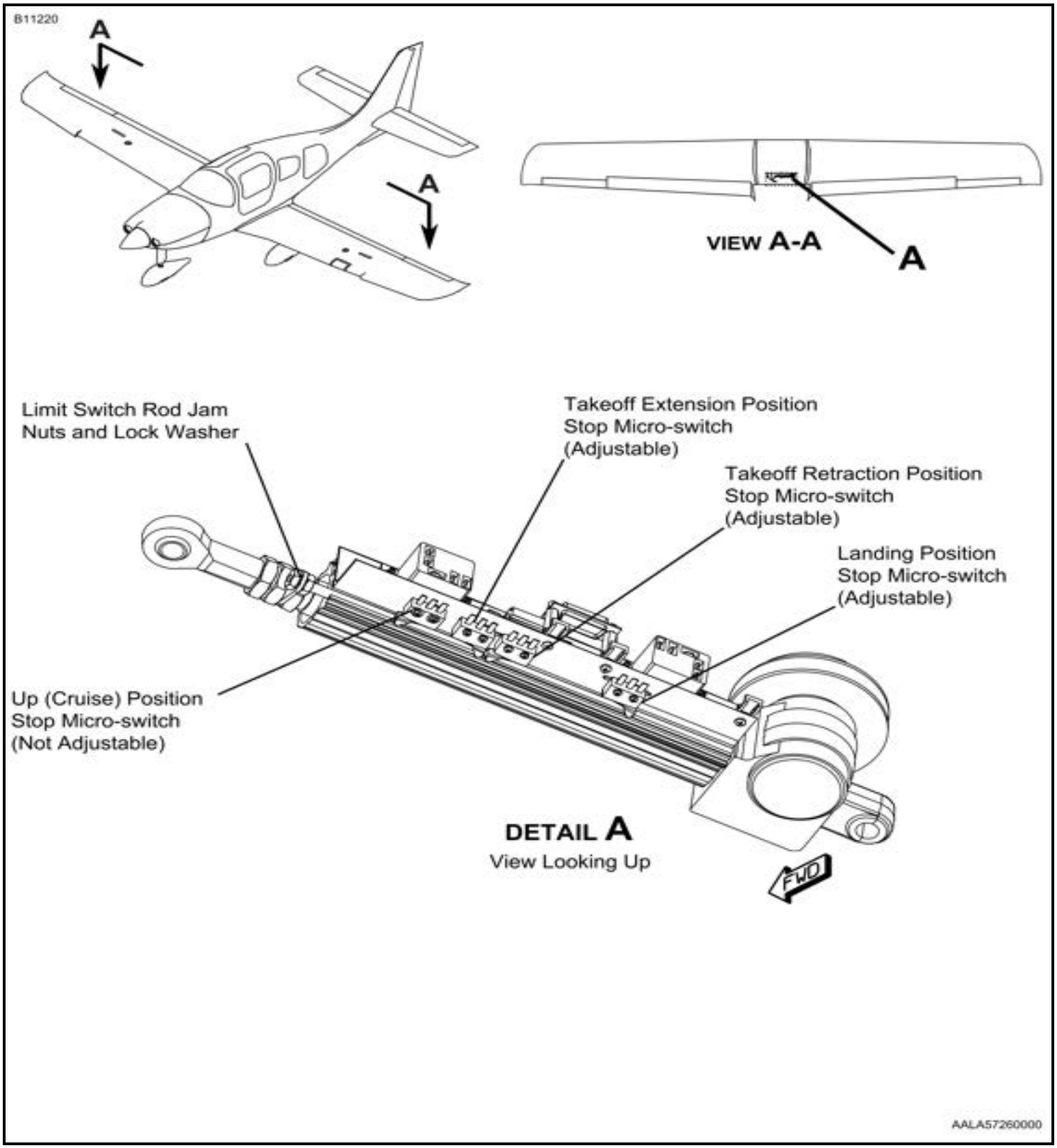
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Figure 205 : Sheet 1 : Flap Outboard Bellcrank and Final Drive



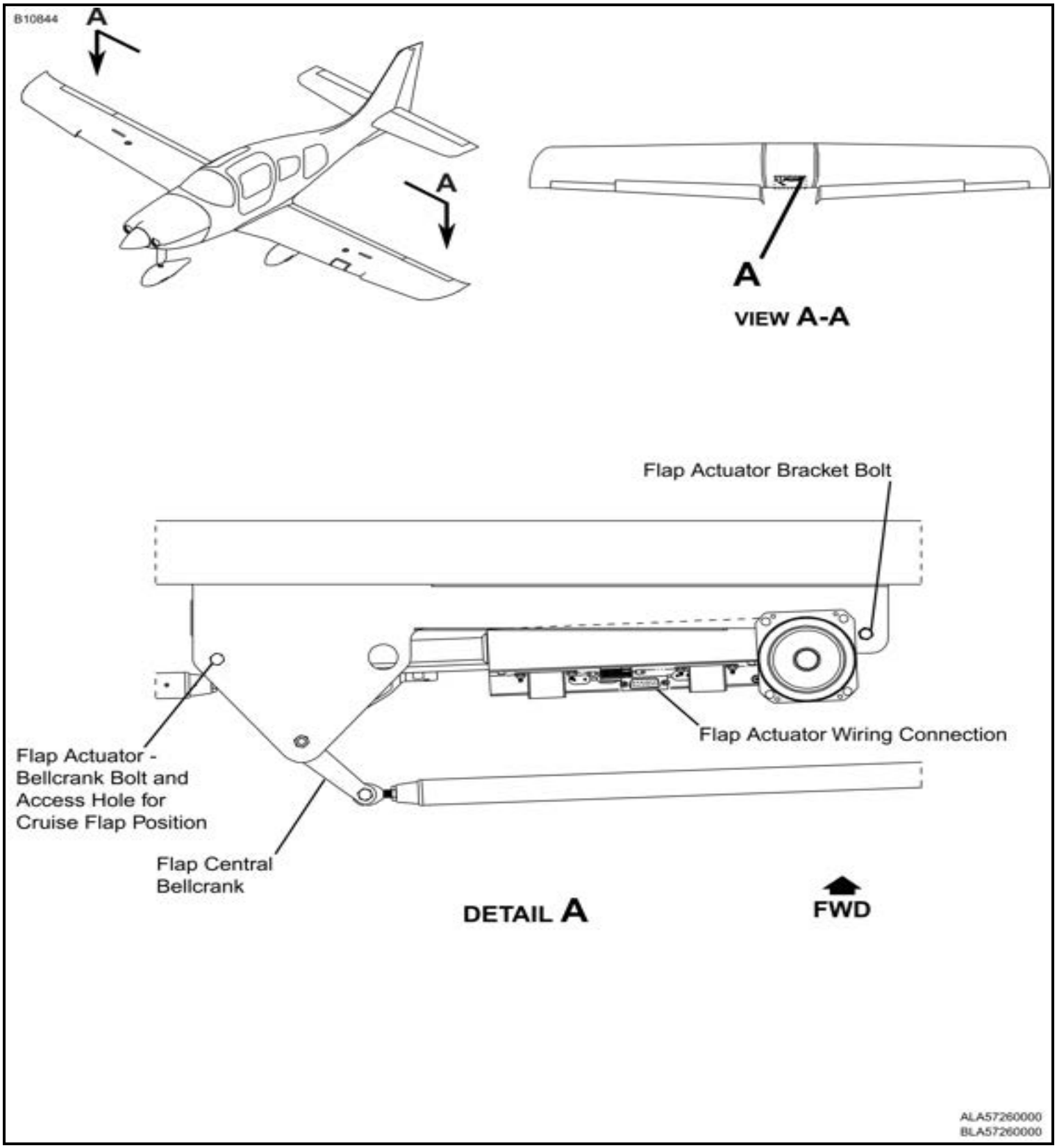
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Figure 206 : Sheet 1 : Flap Actuator and Limit Switch Detail



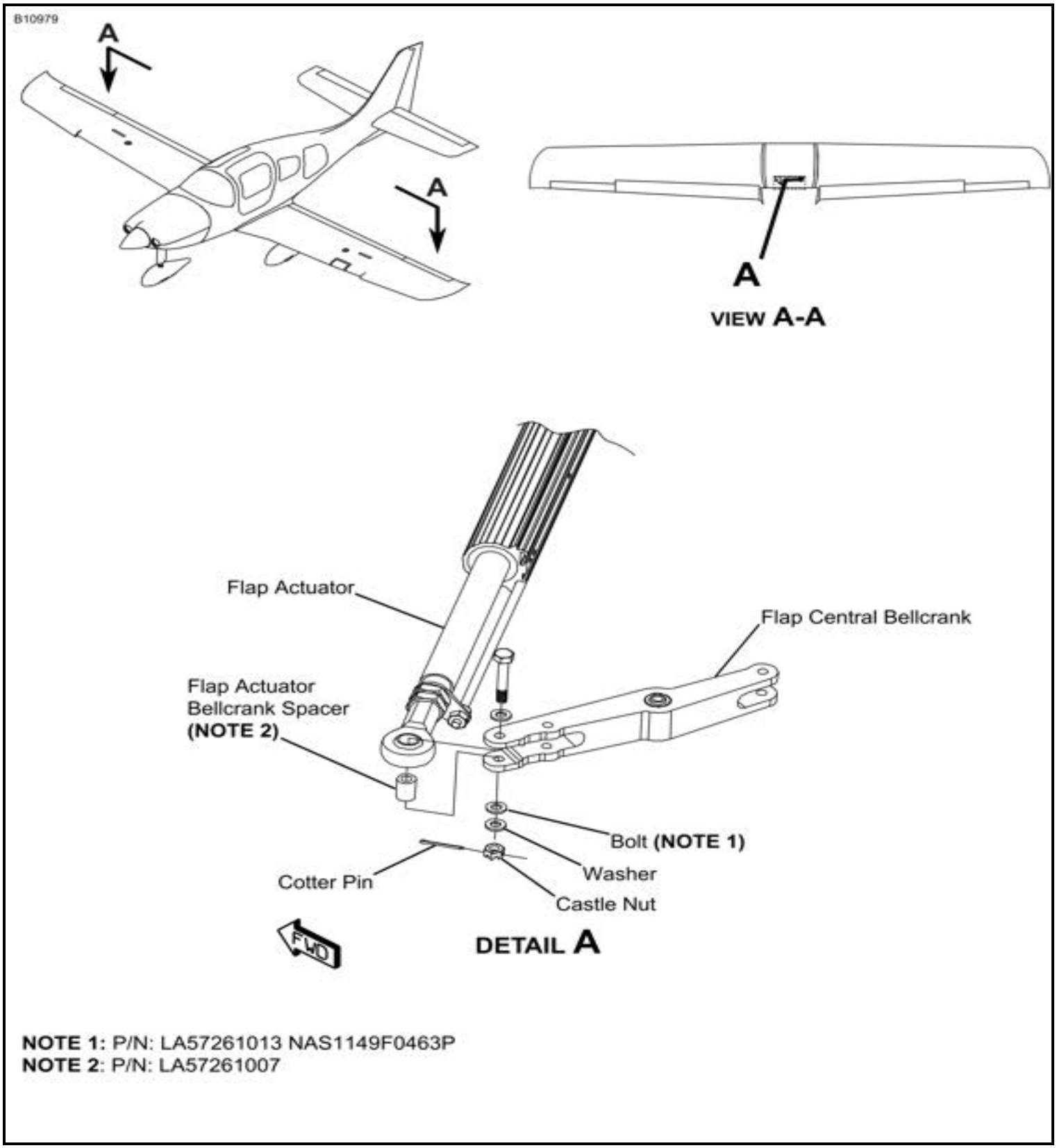
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Figure 207 : Sheet 1 : Flap Central Bellcrank and Actuator Assembly



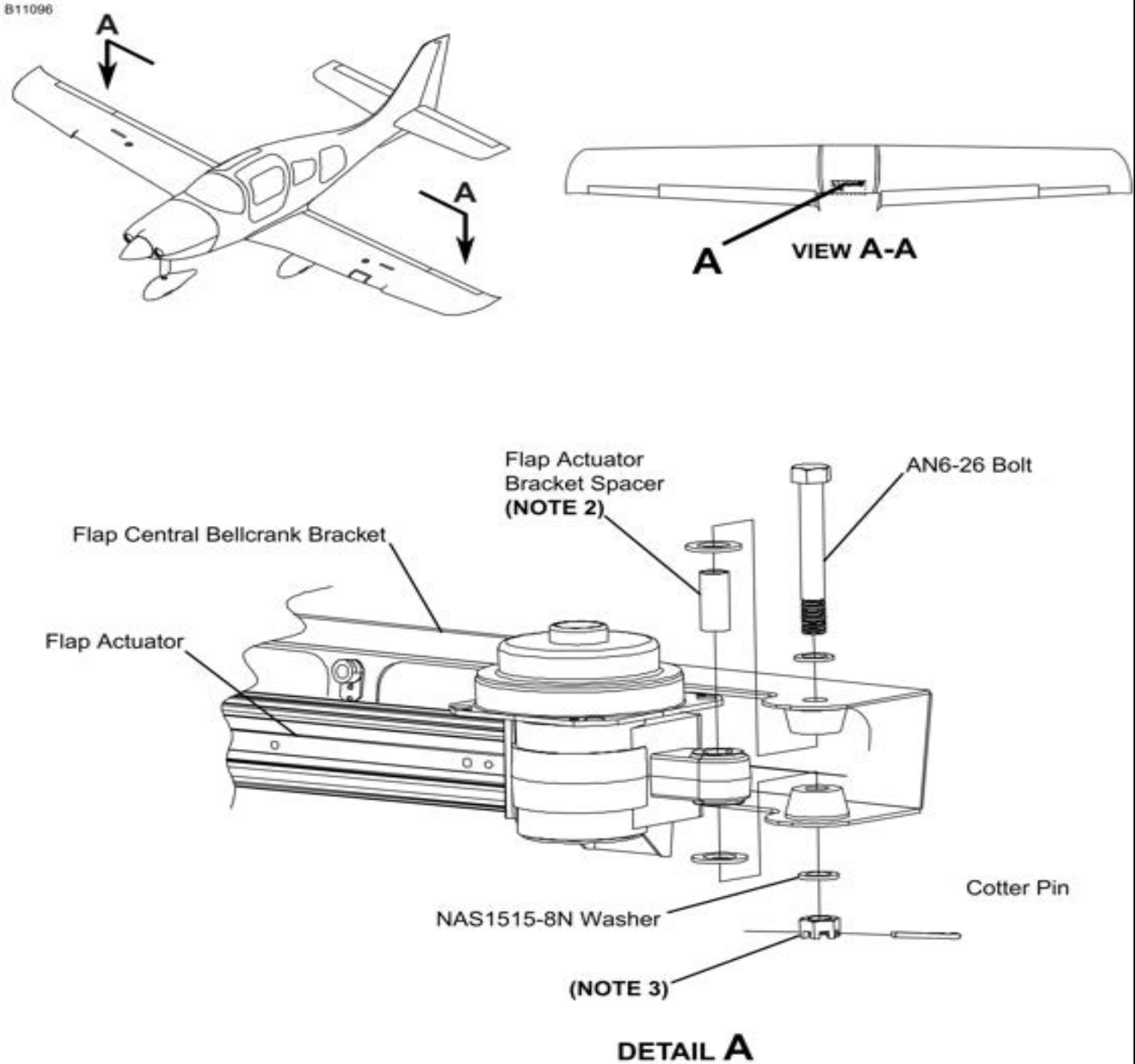
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Figure 208 : Sheet 1 : Flap Actuator to Bellcrank Bolt and Spacer Detail



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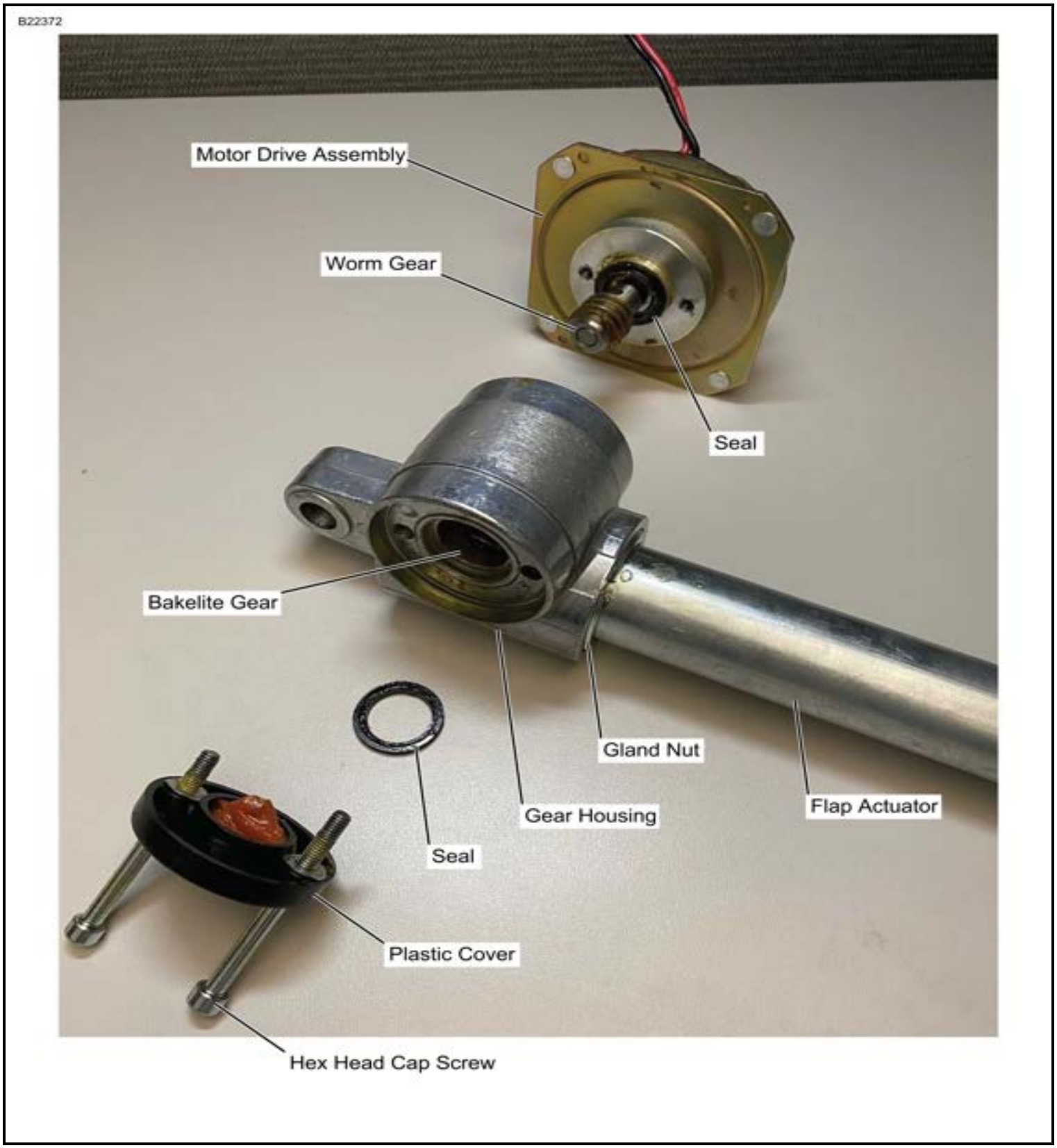
Figure 209 : Sheet 1 : Flap Actuator to Bracket Bolt and Spacer Detail



NOTE 1: Limit Switches not shown.
NOTE 2: P/N: LA57261011
NOTE 3: NAS1149F0663P Washer and AN310-6 Nut

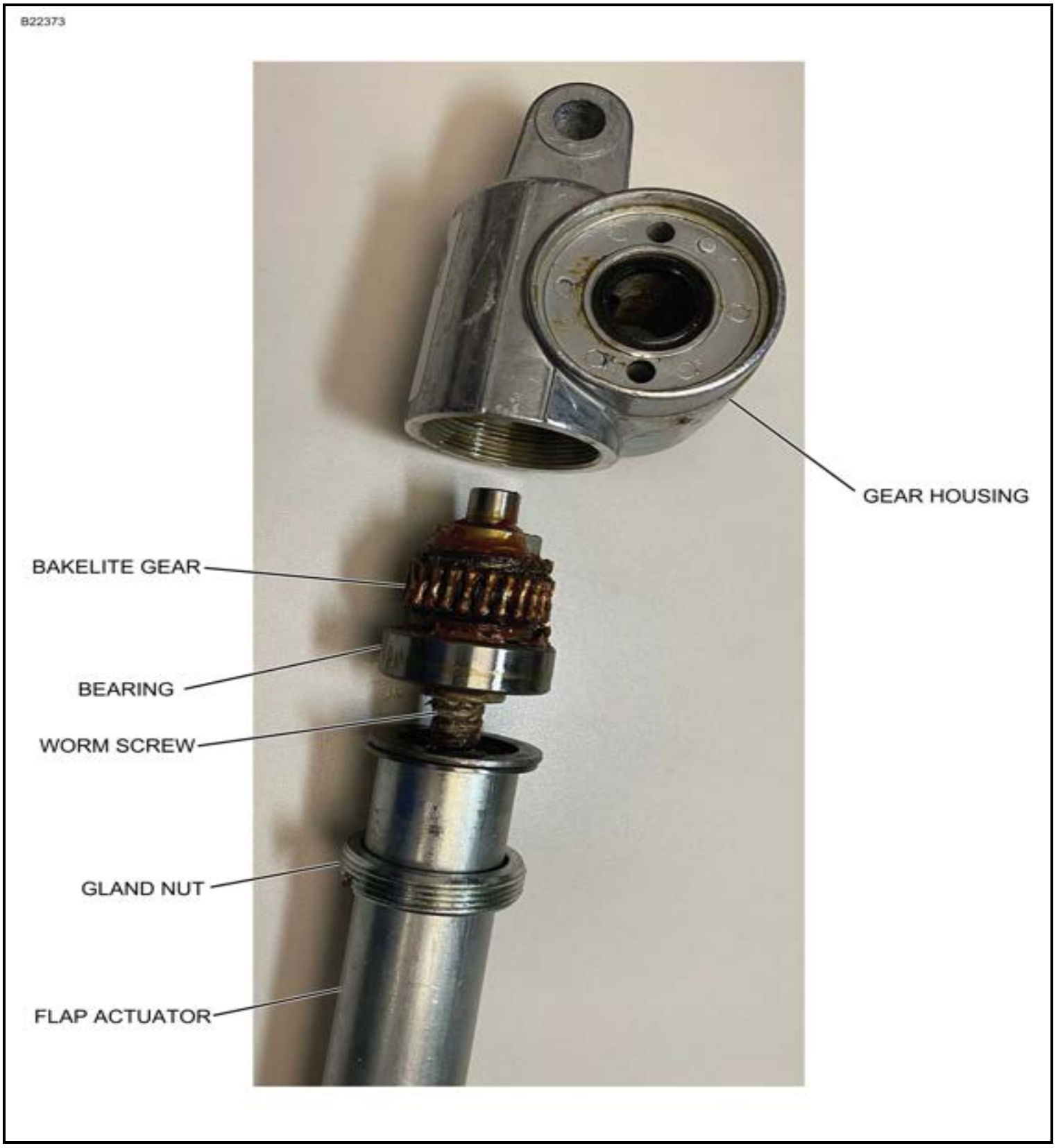
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Figure 210 : Sheet 1 : Flap Actuator Gear Housing



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Figure 211 : Sheet 1 : Flap Actuator Gear and Worm Drive



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SPEED BRAKE SYSTEM - MAINTENANCE PRACTICES

1. SpeedBrake™ System - General

A. **SpeedBrake™ System** - The Precise Flight SpeedBrake™ 2000 System is an option on Avidyne option and Garmin G1000 option airplanes. On the Model T24/G2000 installations the Precise Flight SpeedBrake™ 2000 System is standard. The installation of the system is similar except for the Asymmetric Logic Control that is installed on the of the right side on the bottom of the avionics shelf. For the Model T240/G2000 Asymmetric Logic Control Assembly removal and installation procedures refer to, , Asymmetric Logic Control Assembly (T240) - Removal/Installation.

B. **SpeedBrake™ System** - The Precise Flight SpeedBrake™ 2000 System provides expedited descents at low cruise power, glide path control on final approach, airspeed reduction, and an aid to the prevention of excessive engine cooling in descent. The SpeedBrakes™ will retract, will not automatically re-extend, and the activation rocker switch must be cycled OFF and then ON after the following conditions:

(1) Circuit breaker pull.

(2) Automatic stowage due to asymmetric deployment or low voltage.

C. **SpeedBrake™ Components** - Refer to Figure 201. The Series 2000 SpeedBrake™ consists of wing-mounted electric SpeedBrake™ Cartridges. A central logic-switching unit interconnects each SpeedBrake™ Cartridge electronically and a panel mounted SpeedBrake™ actuator switch controls SpeedBrake™ deployment. The SpeedBrake™ Cartridges receive electrical power from the aircraft electrical bus through a disconnect-type circuit breaker.

(1) Speed Brake Switch (SI004)

(a) Garmin G1000 Option and Avidyne Option - The SpeedBrake™ rocker switch is found next to the throttle in the center of the instrument panel. The switch is positioned UP/ON to fully deploy and is positioned DOWN/OFF to retract the SpeedBrakes™.

(b) Model T240/G2000 installation - The speed brake switch is found a small distance above the throttle controls, on the engine control panel.

(2) The speed brake annunciator is found as follows:

(a) Avidyne option - The SpeedBrake™ Annunciator is located above and to the right of the airspeed indicator on the pilot instrument panel. The Annunciator will fully light after the SpeedBrake™ Switch is toggled ON and both brakes are in the up position. If one or both lights in the annunciator do not come on and both brakes do not extend after the switch is set to on, it indicates a failure of one or both SpeedBrake™ cartridge(s). The SpeedBrake™ switch should be set to OFF. When the SpeedBrake™ Switch is set to OFF, both brakes stow in the wing and the annunciator goes out.

(b) Model T240/G2000 - The SPEED BRAKE message shows on the Crew Alert System (CAS) window on the MFD when the speed brakes are active. When the speed brake switch is set to OFF, both brakes stow in the wing and the CAS message goes out. If the CAS message does not come and both brakes do not extend after the switch is set to on, it indicates a failure of one or both SpeedBrake™ cartridge(s). The SpeedBrake™ switch should be set to OFF.

NOTE: The SpeedBrake™ Cartridges and/or the Asymmetric Logic Control Unit must be returned to the manufacturer should repair or replacement be required. Even though only one cartridge may require repair or replacement, both cartridges must be returned to the manufacturer.

2. SpeedBrake™

A. **SpeedBrake™ Cartridge Removal** - The SpeedBrake™ cartridges are located within the upper side of the wing and approximately 1/3 of the wing length from the tip of the wing. One SpeedBrake™ cartridge is installed in each wing. Refer to Figure 202 and Figure 203.

(1) Remove the access panel on the underside of the left or right outboard wing.

(2) Disconnect the electrical connection.

(3) Remove the two 8-32 screws and remove the cartridge. Note the screw length and the hole from which it was removed. The screws may be of differing lengths and must be reinstalled in the holes from which they were removed.

(4) A bottom mount bar is attached to the bottom of the SpeedBrake™ cartridge by two 8-32 round head screws. The bottom mount bar may be removed by removal of these screws.

B. **SpeedBrake™ Cartridge Installation** - Refer to Figure 202 and Figure 203.

(1) Attach the bottom mount bar to the bottom of the SpeedBrake™ cartridge with two 8-32 round head screws. Torque the screws 6 to 8 in.-lbs.

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(2) Insert the speed brake cartridge into the wing.

(3) Connect the electrical connection.

(4) Install the 8-32 screws. Screws may be of differing lengths and must be reinstalled in the holes from which they were removed. Torque 15 to 18 in-lbs. Installed SpeedBrake™ cartridge should be flush with the wing surface within ±0.020 inches. Bottom wing skin should have no more than 0.003 inches distortion after torquing.

(5) Replace the access panel.

C. **Asymmetric Logic Control Unit Removal (Avidyne Option and G1000 Option)** - The asymmetric logic control unit is located in the avionics shelf under the baggage compartment floor. Refer to Figure 201.

NOTE: The Model T240/G2000 Asymmetric Logic Control Assembly removal/Installation procedures are found at, Asymmetric Logic Control Assembly (T240) - Removal/Installation.

(1) Remove the carpet and access panel from the baggage compartment floor per instructions in Chapter 25.

(2) Loosen the mounting screws that hold the unit to the avionics shelf.

(3) Disconnect all connectors to the unit.

(4) Remove the unit.

D. **Asymmetric Logic Control Unit Installation** - Refer to Figure 201.

(1) Connect the connectors.

(2) Place the unit in its place on the avionics shelf.

(3) Install screws to connect the unit to the shelf and torque screws 15 in.-lbs.

(4) Install the access panel.

(5) Replace the carpet.

E. **Servicing and Maintenance**

(1) Check SpeedBrake™ Cartridge cap strip cover screws and top attachment screws for security. If loose, remove screws and apply Loctite 242 and retorque to 8 in-lbs.

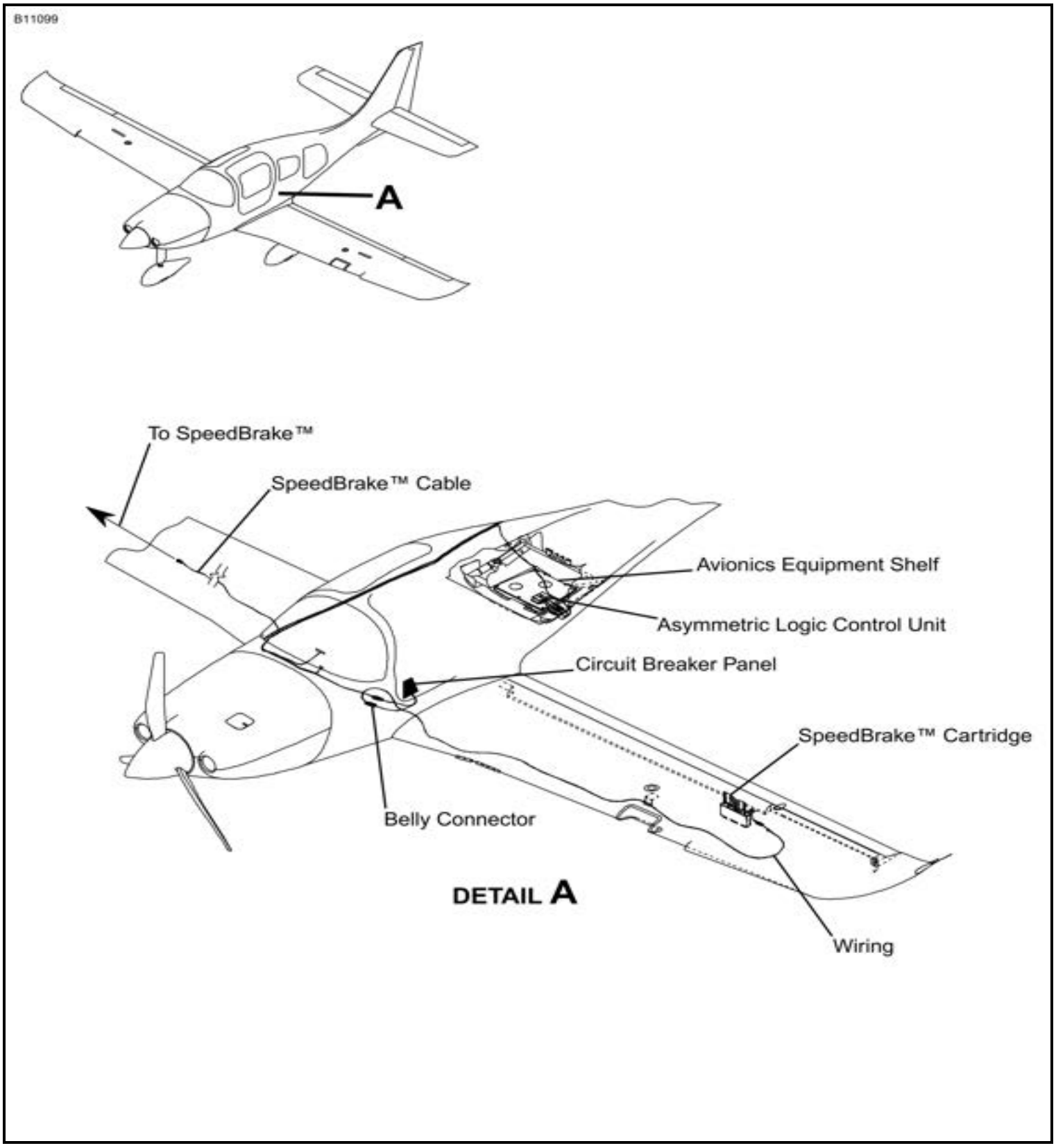
(2) Annually remove the SpeedBrake™ Cartridge cover plate, clean and inspect for damage, corrosion, looseness and proper operation. Lubricate worm and worm gear with LUBRIPLATE. Reinstall the cover plate by applying Loctite 242 to the screw threads and torque to 8 in-lbs.

(3) Return the SpeedBrake™ Cartridge to the manufacturer every 1000 hours for clutch lubrication and spring replacement.

(4) Return the SpeedBrake™ Cartridge to the manufacturer every 5000 hours for drive assembly replacement.

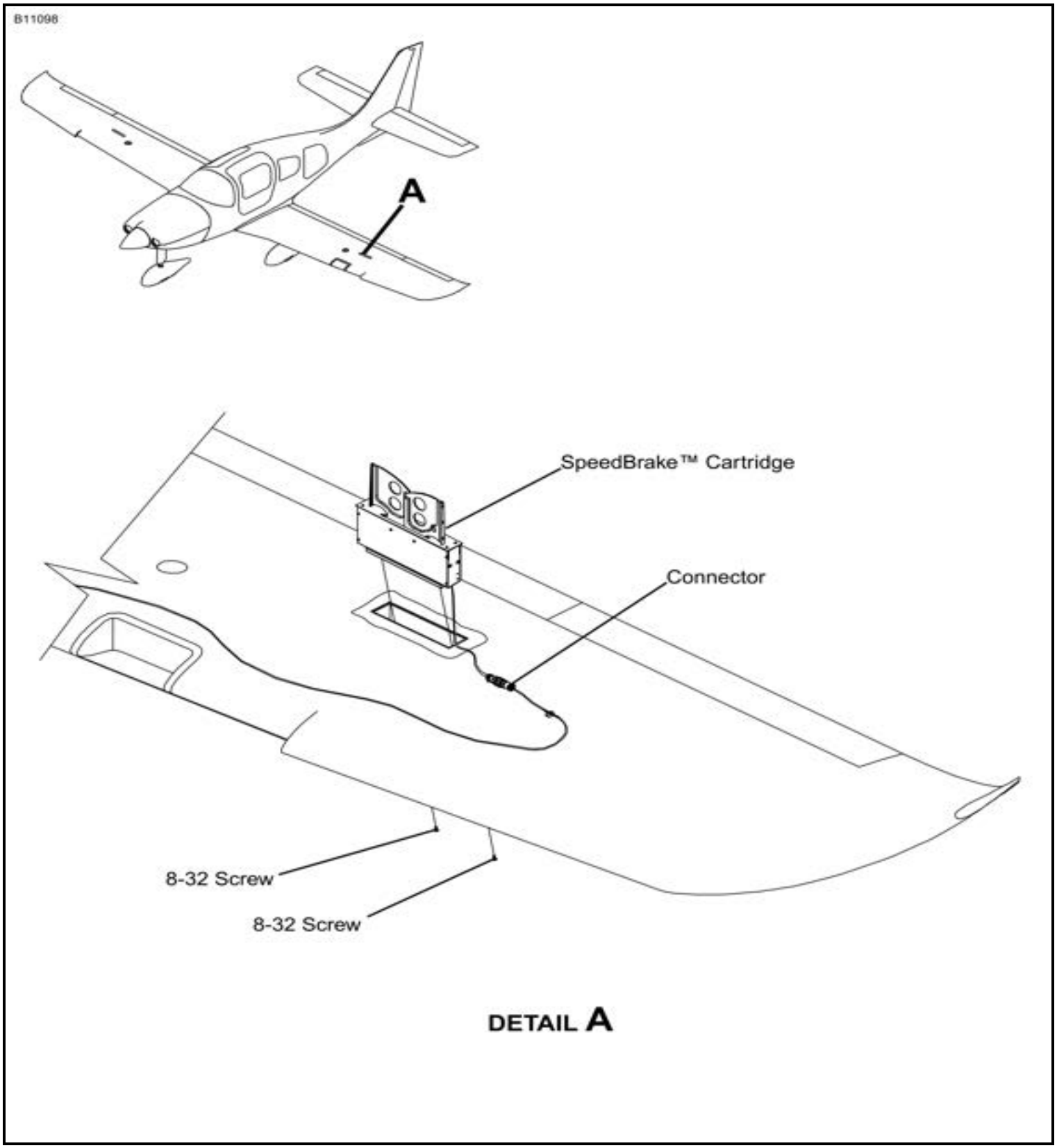
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Figure 201 : Sheet 1 : SpeedBrake™ System



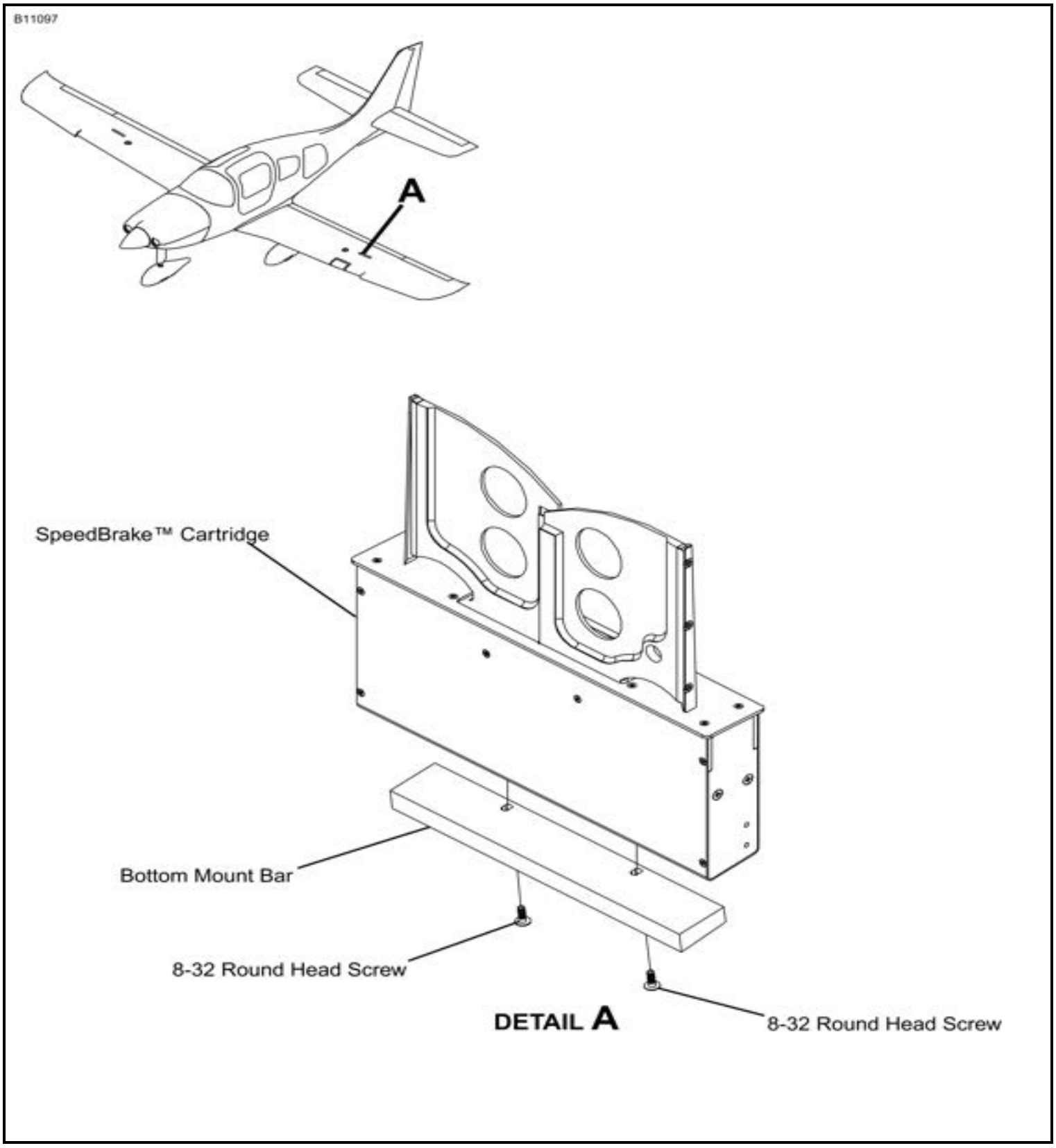
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Figure 202 : Sheet 1 : SpeedBrake™ Cartridge



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Figure 203 : Sheet 1 : SpeedBrake™ Cartridge Detail



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ASYMMETRIC LOGIC CONTROL ASSEMBLY (T240) - REMOVAL/INSTALLATION

1. General

A. This section gives the removal and installation for the Model T240 Asymmetric Logic Control Assembly (ALC). The ALC is installed on the bottom of the avionics shelf, below the right side of the instrument panel. The ALC is a asymmetric logic control-switching unit that controls the speed brakes. The ALC connects the left and right wing speed brake components electronically. For the maintenance procedures of the other components of the speed brake system and airplanes that have the Avidyne option or the Garmin G1000 option installed refer to, Speed Brake System - Maintenance Practices.

2. ALC Removal/Installation

A. Remove the ALC (UC305) (Refer to Figure 401).

(1) Remove external electrical power from the airplane.

(2) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(3) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(4) Disengage the SPEED BRAKES circuit breaker, found on the cockpit circuit breaker panel.

(5) Remove the screws that attach the ALC to the bottom of the avionics shelf.

(a) If necessary, remove the copilot seat to get access to the ALC. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Disconnect the electrical connectors as follows:

(a) Disconnect the electrical connector (J161) from electrical connector (P1)

(b) Disconnect the electrical connector (P162) from electrical connector (P2)

(c) Disconnect the electrical connector (P163) from electrical connector (P3).

(7) Remove the ALC from the airplane.

B. Install the ALC (UC305) (Refer to Figure 401).

(1) Put the ALC in its correct position below the avionics shelf.

(2) Install the screws that attach the trim ALC to the avionics shelf.

(3) Visually inspect the connectors to make sure that there are no bent or damaged pins.

(a) Repair any damage.

(4) Connect the electrical connectors as follows:

(a) Connect the electrical connector (J161) to electrical connector (P1)

(b) Connect the electrical connector (P162) to electrical connector (P2)

(c) Connect the electrical connector (P163) to electrical connector (P3).

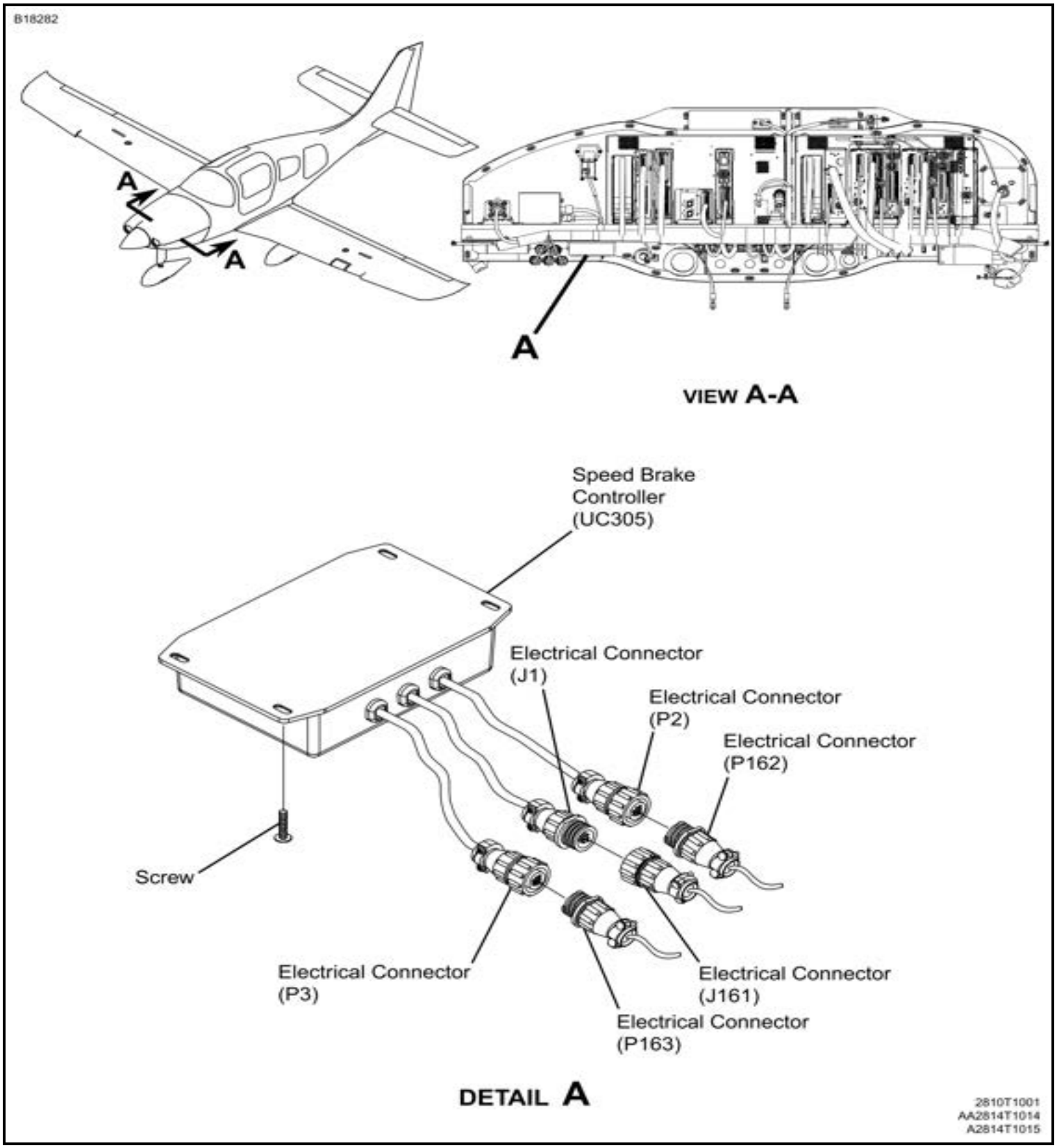
(5) If removed, install the copilot seat. Refer to Chapter 25, Airplane Seats - Maintenance Practices.

(6) Engage the SPEED BRAKES circuit breaker, found on the cockpit circuit breaker panel.

(7) Do a test of the speed brake and adjustment as necessary. Refer to Chapter 20, Lightning Protection And Static Dissipation - Maintenance Practices, Speed Brake Operational Checks.

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Figure 401 : Sheet 1 : ALC Installation



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FUEL - GENERAL

1. General - Fuel System

A. **Overview** - The fuel system has two tanks that gravity feed to a three position (Left, Right, and Off) fuel selector valve located in the wing and actuated from the selector knob in the forward part of the arm rest between the pilot and copilot seats. The fuel flows from the selected tank to the auxiliary fuel pump and then to the strainer. From this point, the fuel goes to the engine-driven pump where, under pressure, it is sent through a fuel flow transducer to the throttle/mixture control unit and then on to the fuel manifold valve for distribution to the cylinders. Unused fuel from the continuous flow fuel injector system is returned to the selected fuel tank. Refer to Figure 1 or Figure 2 for a general layout of the fuel system.
Each fuel tank contains a slosh box near the fuel supply lines. A partial rib near the inboard section of the fuel tank creates a small containment area with a check valve that permits fuel flow into the box but restricts outflow. The slosh box is like a mini-fuel tank that is always full. The slosh box's function, in conjunction with the flapper valves, is to ensure short-term positive fuel flow during adverse flight attitudes, such as when the airplane is in an extended sideslip or subject to the bouncing of heavy turbulence.

B. **Fuel Quantity Indication** - The airplane has integral fuel tanks, commonly referred to as a "wet wing". Each wing has two internal, interconnected compartments that hold fuel. The wing's slope or dihedral produces different fuel levels in each compartment and requires two floats in each tank to accurately measure total quantity. The floats move up and down on a pivot point between the top and bottom of the compartment, and the position of each float is summed into a single indication for the left and right tanks. The positions of the floats depends on the fuel level; changes in the float position increases or decreases resistance in the sending circuit, and the change in resistance shows as a fuel quantity indication on either the gauge (Avidyne option) or the MFD System Page (Garmin G1000 option or G2000 installation). The indicators are powered by the airplane's electrical system, protected by a two-amp circuit breaker and will not operate with the master switch turned off.

NOTE: The fuel calculation group of the Garmin G1000 or G2000 systems MFD's System Page provides approximate indications and are never substitutes for proper planning and pilot technique. Always verify the fuel onboard through a visual inspection, and compute the fuel used through time and established fuel flows.

C. **Fuel Selector** - The fuel tank selector handle is between the two front seats, at the forward part of the arm rest. The selector is movable to one of three positions: Left, Right, and Off. The fuel tank selector handle is connected to a drive shaft that moves the actual fuel valve assembly located in the wing saddle. Moving the fuel tank selector handle applies a twisting force to move the fuel selector valve.

D. When the fuel tank selector handle is moved to a particular position, positive engagement occurs when the fuel selector valve rests in one of the three available detents: Left, Right, and Off. The left and right tanks are changed by rotating the handle to the desired tank position; initially, a small amount of additional pressure is required to move the valve out of its detent. A spring-loaded release knob in the selector handle prevents inadvertent movement beyond the right and left tank positions. To move to the off position, pull up on the fuel tank selector and rotate the handle until the pointer is in the off position and the fuel valve is seated in the detent. To move the handle from the off position to the left or right tank, pull up on the selector, and rotate the handle to the desired tank.

E. When a tank is selected and the selector is properly seated in its detent, one of two green lights on the left and right side of the fuel gauge (Avidyne option) or one of two blue lights on the fuel calculation group on the MFD System Page (Garmin G1000 option or G2000 installation) will illuminate to indicate which tank is selected. If a tank is selected, and a light is not illuminated, then the selector handle is not properly seated in the detent. In addition, if the fuel selector is not positively seated in either the left or right detent, or is in the off position, a red FUEL VALVE light indication shows on the annunciator panel (Avidyne option) or the PFD Annunciation window (Garmin G1000 option or G2000 installation).

F. **Fuel Low Annunciators** - There is a separate system, independent of the fuel quantity indicators, that shows a low fuel state. A fuel level switch in each tank operates a L LOW FUEL or R LOW FUEL light on the annunciator panel (Avidyne option) or shows on the PFD Annunciation window (Garmin G1000 option or Model T240/G2000 installation) when there is less than 8 gallons (S/N 41501 to 41799), or 10 gallons (S/N 41800 and On and Model T240) of usable fuel remaining in that tank. The fuel warning light has a 30 second delay switch, that limits false indications during flight in turbulent air conditions.

G. **Fuel Vents** - There is a ventilation source for the fuel tank in each wing. The vents are wedge-shaped recesses built into the access panel. They are located under the wing approximately five feet inboard from the wing tip and positioned to provide positive pressure to each tank. The vents should be open and free of dirt, mud and other types of clogging substances. When fuel expands beyond a tank's capacity, it is sent out the fuel vent if both tanks are full. An internal tank pressure of more than two to three psi will allow fuel to drain from the vents.

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H. **Fuel Drains and Strainer** - The inboard section of each tank contains a fuel drain near the lowest point in each tank. The fuel drain can be opened intermittently for a small sample, or it can be locked open to remove a large quantity of fuel. The gascolator, or fuel strainer, is located under the fuselage, on the left side, near the wing saddle. Open the accessory door in this area for access to the gascolator. The gascolator is a conventional drain device that operates by pushing up on the valve stem. There is an internal bypass in the strainer that routes fuel around the filter if it becomes clogged.

2. Servicing

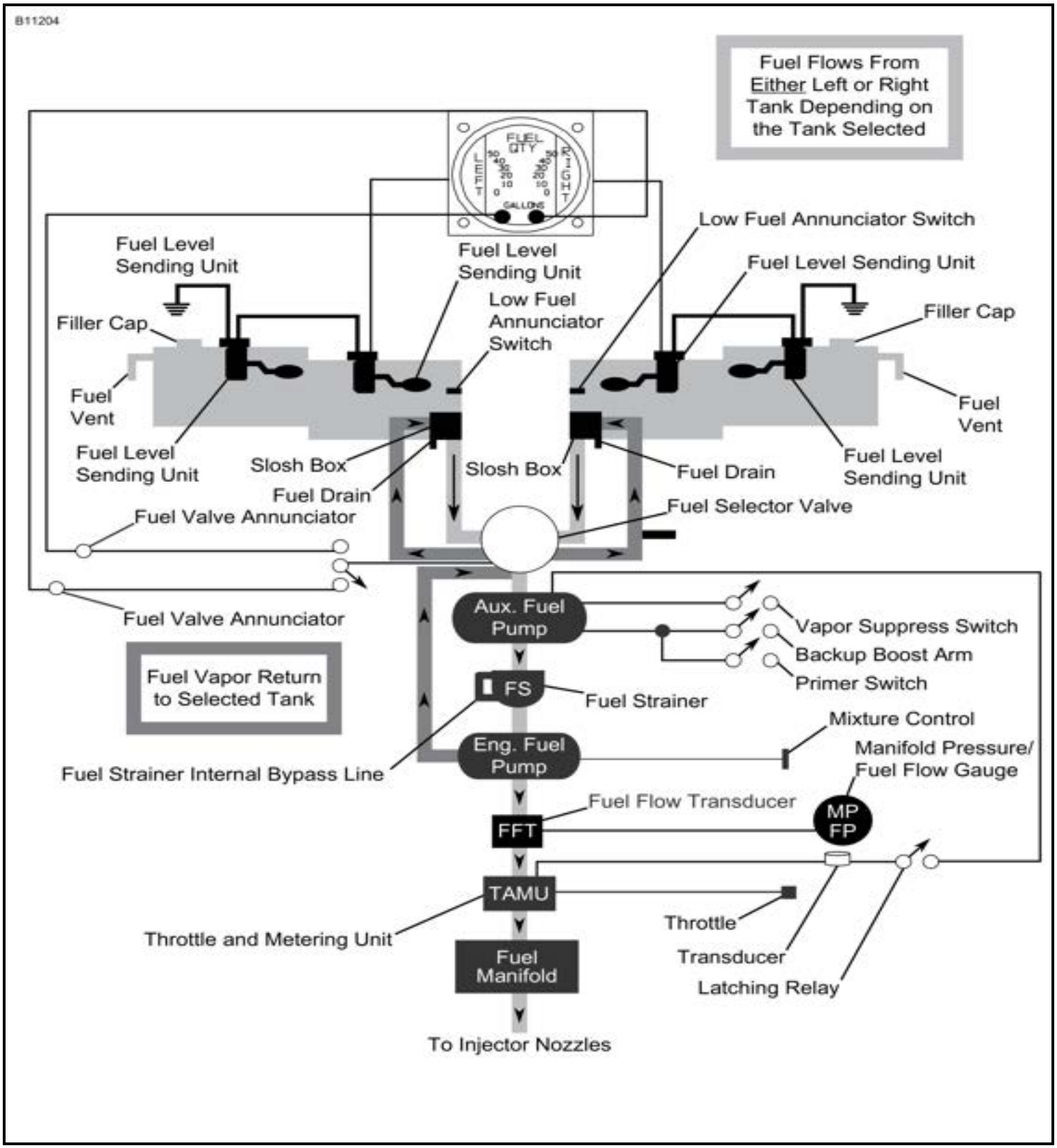
A. Refer to Chapter 12 of this manual for detailed instructions.

3. Fuel Additives

A. Refer to Chapter 12 of this manual for detailed instructions.

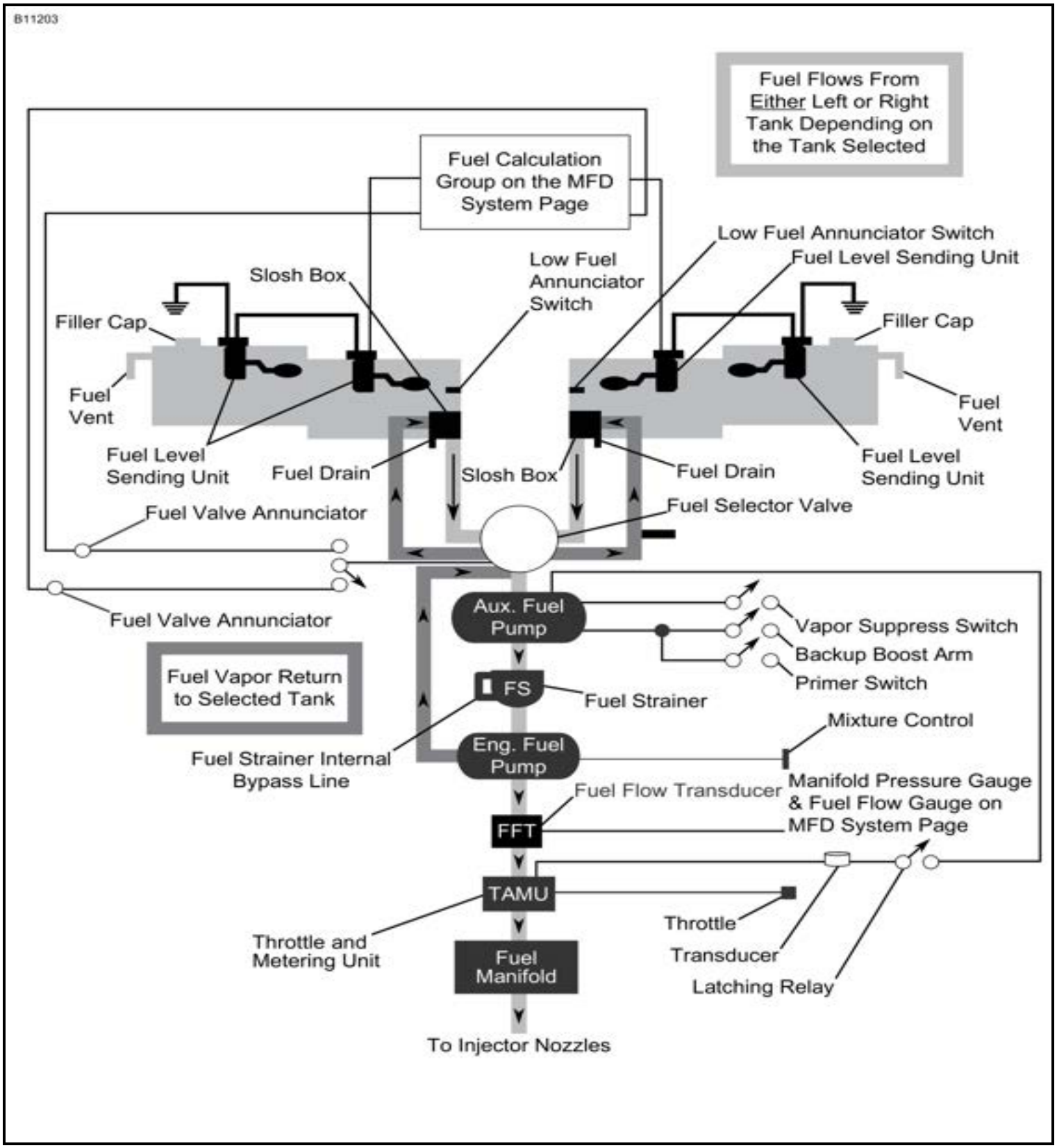
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Figure 1 : Sheet 1 : Fuel System Diagram (Avidyne Option)



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Figure 2 : Sheet 1 : Fuel System Diagram (Garmin G1000 Option and Model T240/G2000)



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STORAGE - MAINTENANCE PRACTICES

1. Storage - Venting

A. The fuel tank vents are located in the outboard access panels. These panels have a molded scoop mounted flush with the lower surface of the wing with a bonded aluminum tube for the attachment of the fuel vent hose from the expansion area of the fuel tank. The fuel vent hose connects to the fuel vent near the top of the rib at WS 145.00. The hose is installed such that the lowest point in the line is the vent opening.

B. **Vent Removal** - Refer to Figure 201.

(1) De-fuel the fuel tanks and open the outboard access panel/fuel vent and the outboard fuel bay access panel.

(2) Remove the hose clamp around the vent hose, and slide the hose off the vent tube in the rib.

(3) If required for hose replacement, remove the hose clamp around the access panel vent tube, and slide off the tube.

C. **Vent Installation** - Refer to Figure 201.

(1) Slide the vent hose over the vent tube in the rib, and install the clamp. Torque 17 to 18 in.-lbs.

(2) Slide the vent hose over the access panel vent tube, and install the clamp. Torque 17 to 18 in.-lbs.

(3) Re-install access panels. Apply Loctite 222 or Permatex No. 2 and torque 12 to 15 in.-lbs.

2. Fuel Level Sensors

A. **General Description** - Each wing tank has two fuel level float sensors that indicate the quantity of fuel in the tank; the combined resistance of both sensors is 185±5 ohms (at empty tank) and 0 - 10 ohms (at full tank). Refer to Figure 202.

B. **Removal of the Fuel Level Sensors**

(1) Remove the 15, 6-32 flat head screws from the fuel tank access panel nearest the fuel level sensor that requires access. (There are four fuel tank access panels, two on each wing. The access panel locations are shown in Chapter 57.) Slowly peel the panel away from the wing (the panel is also attached with sealant).

(2) Remove four, 10-32 hex head bolts attaching the sensor to the bracket, noting the position of the grounding strap.

(3) Remove the nut from the center fuel sensor bolt, noting the attachment of the grounding strap. Refer to Figure 203.

(4) Remove the sensor.

C. **Installation of the Fuel Level Sensors**

(1) Set the sensor on the bracket and align the four bolt holes, ensuring that the float on the sensor is pointed inboard. Refer to Figure 202.

(2) Install four, 10-32 hex head bolts with the bolt heads away from the bracket (only four of the five sensor holes will be bolted through) while reattaching the ground strap under the bolt it was initially removed from. Torque the bolts 30 to 36 in.-lbs.

(3) Reattach the grounding strap under the center sensor bolt, and replace the nut. Refer to Figure 203.

(4) Replace the access panel by applying PR-1428 sealant to the side of the access panel that will contact the wing skin joggle. Replace the screws in the access panel. Torque the screws 12 to 20 in.-lbs.

(5) Do the fuel calibration test of the fuel level sensors on the fuel tank. Refer to the chapter 28, Fuel Indicating System - Adjustment/Test.

3. Slosh Boxes, Fuel Pickup, and Vapor Return

A. **General Description** - The slosh box is an internal sub-compartment mounted in the inboard section of the fuel tank. Refer to Figure 204 and Figure 205. The purpose of the slosh box is to provide a compartment around the fuel pickup to hold fuel during low fuel level operation.

B. **Replacing Vapor Return Lines**

(1) Contact the manufacturer when replacing the in-tank vapor return lines.

C. **Removal - Fuel Tank Strainer**

(1) Defuel the aircraft, then open the inboard fuel bay panel.

(2) Remove the slosh box lid to gain access to the fuel tank finger strainer. Refer to Figure 207.

(3) Loosen the hose clamp, and remove the finger strainer.

D. **Installation - Fuel Tank Strainer**

(1) Installation is a direct reversal of the removal.

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(a) Torque nut 17 to 18 in.-lbs.

E. **Replacing the Slosh Door**

(1) During normal operation, the slosh door should not wear. During tank inspections verify smooth operation of the door without binding.

(2) **Removing the Slosh Door**

(a) Access the slosh door through the inboard fuel bay access panel.

(b) Unbolt and remove the four mounting bolts that attach the slosh door to the slosh box. Refer to Figure 208.

(3) **Installing the Slosh Door**

(a) Installation is a direct reversal of removal.

4. Testing Fuel System

CAUTION: When testing the fuel system, DO NOT over-pressurize the wing tanks. Doing so could result in structural damage to the wings.

A. **Procedures for Pressure Testing of Fuel Tank**

(1) Two people are required to perform this test. One person is needed to observe the manometer, and one person is needed to pressurize the tanks.

(2) Place the fuel selector in the off position.

(3) Connect a 4 foot length of plastic hose such as Tygon (OD 3/8 inch and ID 1/4 inch) to the left wing static air vent. Use sealant tape at the connection points to ensure a tight seal.

(4) Connect a digital manometer that reads between 0 and 5 psi (in 1/100 of an inch) with a T-fitting to the vent hose.

(5) Pressurize the wing from the manometer until the manometer reads 1.2 ±0.1 psi. Measurements can be taken with a low-pressure, hand-held pump, however, great care must be taken not to over-pressurize the tanks. The observer should call out manometer readings at each tenth of an inch.

(6) Crimp or cap off the hose and wait for 20 minutes. The pressure cannot drop more than 0.10 of an inch.

(7) While the fuel tank is still under pressure, apply a soapy solution to the following items to check for leak: All fittings and connectors on the fuel system from the spar to the fuel selector, around the left and right flap outboard bellcrank brackets, and the left and right fuel vent line fitting and attachment to the WS 145 rib.

(8) Repeat the procedure for the right wing.

5. Fuel Tank Drains

CAUTION: It is recommended to operate the drain in a well-ventilated area away from structures when working with fuel or fuel vapors.

CAUTION: When operating the fuel sump drain, care must be taken not to force the internal poppet into the drain, as damage to the drain may occur, and the drain may be stuck in the open position.

A. Each of the two integral fuel tanks are equipped with a sump drain for the sampling of fuel and removal of moisture and residual fuel from the tanks. Refer to Figure 206. The fuel tank sump is located inside the slosh box as described in the Slosh Boxes, Fuel Pickup, and Vapor Return paragraph above. Each drain is mounted to the wing skin with a castellated nut. An O-ring and sealant seal the drain to the wing skin. Some features of the drains used on the Cessna 400 include a replaceable primary O-ring seal that can be replaced without draining the tanks and a locking position to aid in the defueling of the aircraft.

NOTE: The primary O-ring seal on the fuel tank sump drain is replaceable when the drain is installed without defueling the aircraft. Refer to 'Replacement of Primary O-Ring Seal' below for detailed instructions on primary O-ring seal replacement.

NOTE: Contact the factory for replacement drains and access panels if required.

B. **Removal of Fuel Tank Sump Drain**

(1) Defuel the fuel tank that will have the drain removed. It is recommended to at least partially defuel the other wing tank to prevent a large fuel imbalance.

(2) Remove the inboard fuel tank access panel taking special care in the removal of the panel.

(3) Remove the slosh box lid as shown in Figure 209 by removing the eight bolts (S/N 41001 to 41786) or 5 bolts (S/N 41787 and on) to gain access to the drain.

(4) Remove the castellated nut from the drain; use a two-prong spanner on the outside of the drain to prevent spinning during

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removal. Remove the drain valve. Refer to Figure 210.

C. **Installation of the Fuel Tank Sump Drain**

(1) Add a film of the fuel tank sealant discussed in the Sealants For Panels, Valves, Fittings, And Switches section, to the upper surface of the valve assembly flange. Do not allow the sealant into the O-ring groove in the flange.

(2) Slip a new O-Ring, MS29513-021 or equivalent, over the drain, and insert in the wing.

(3) Torque castellated nut 48 to 60 in.-lbs.

NOTE: The final position of the nut must allow the inlet port of the drain to be centered in an opening between two of the castellations.

D. **Maintenance Practices**

(1) Cleaning - Periodic cleaning of the bottom of the drain and primary O-ring seal is recommended.

(a) To open the drain to access the primary O-ring seal, turn the white poppet 55 degrees clockwise using a Phillips screwdriver and let the poppet drop down as shown in Figure 211. An internal seal will stop the flow of fuel so defueling of the tank is not necessary.

(b) Clean the O-ring and area surrounding the primary seal.

(c) Push gently up and rotate 55 degrees counterclockwise to re-seal.

(2) Replacement of Primary O-Ring Seal

(a) To open the drain to access the primary O-ring seal, turn the white poppet 55 degrees clockwise using a Phillips screwdriver and let the poppet drop down. An internal seal will stop the flow of fuel so defueling of the tank is not necessary.

(b) Remove the worn seal; clean the O-ring groove and surrounding area.

(c) Replace the primary O-Ring seal, available through the manufacturer.

(d) Push gently up and rotate 55 degrees counterclockwise to re-seal.

E. **Fuel Testing**

The fuel should be tested for contaminants before each flight by taking a fuel sample from the fuel drains. The operation of the fuel drain is similar to other aircraft. To operate, gently push up on the white poppet, and drain the required amount of fuel. Do not force the poppet past the initial stop or damage may occur to the drain, and the poppet may not return to the closed position.

F. **Fuel Tank Draining**

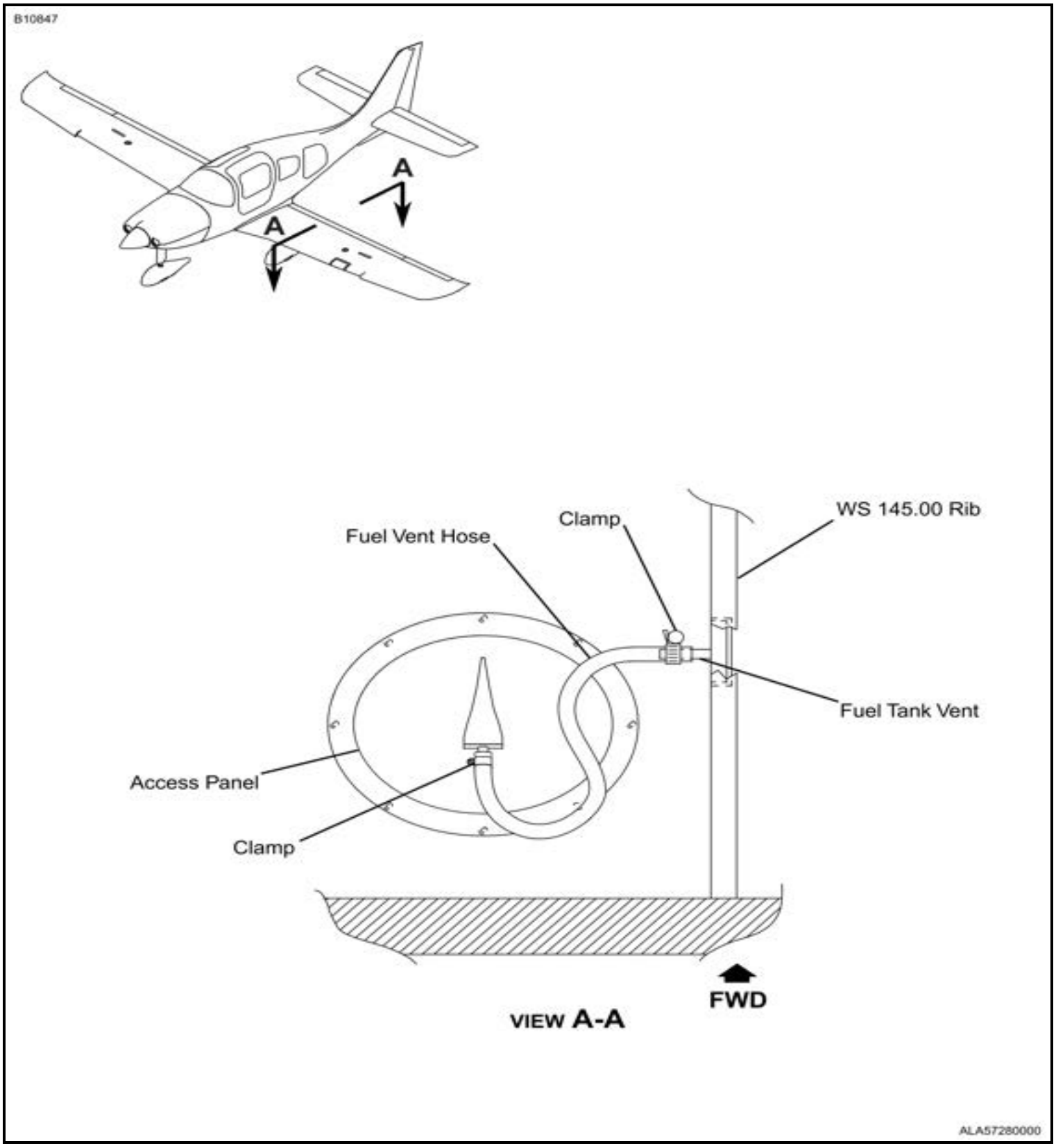
(1) To drain the fuel tanks, use a Phillips head screwdriver, push gently up on the internal poppet of the valve to open the primary seal, and rotate counterclockwise approximately 15 degrees.

(2) Close the drain by reversing the process.

NOTE: Fuel will start flowing once the internal poppet is pushed up. Have a suitable container placed below the drain prior to opening the valve.

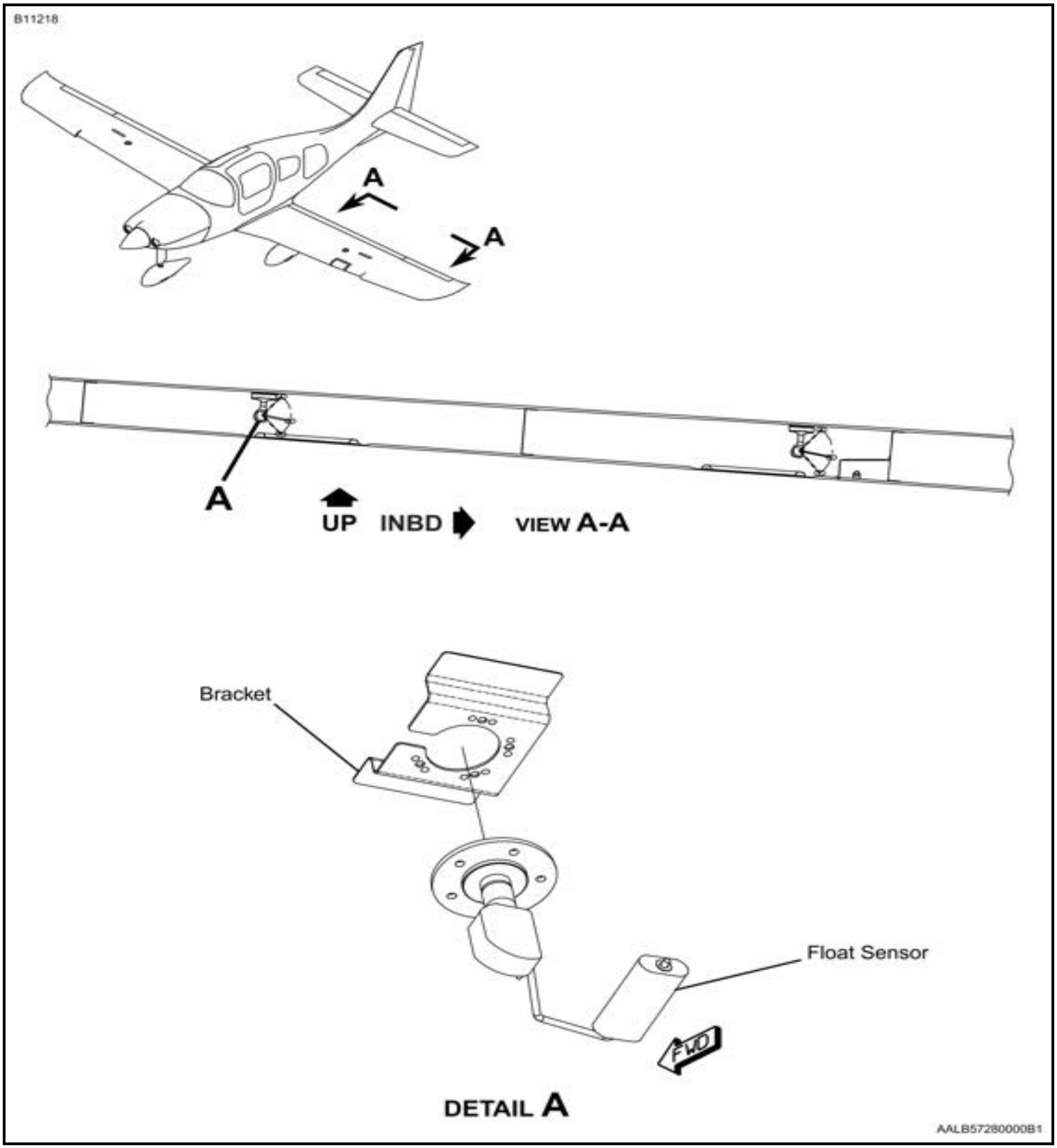
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Figure 201 : Sheet 1 : Fuel Tank Vent (Left Side Shown)



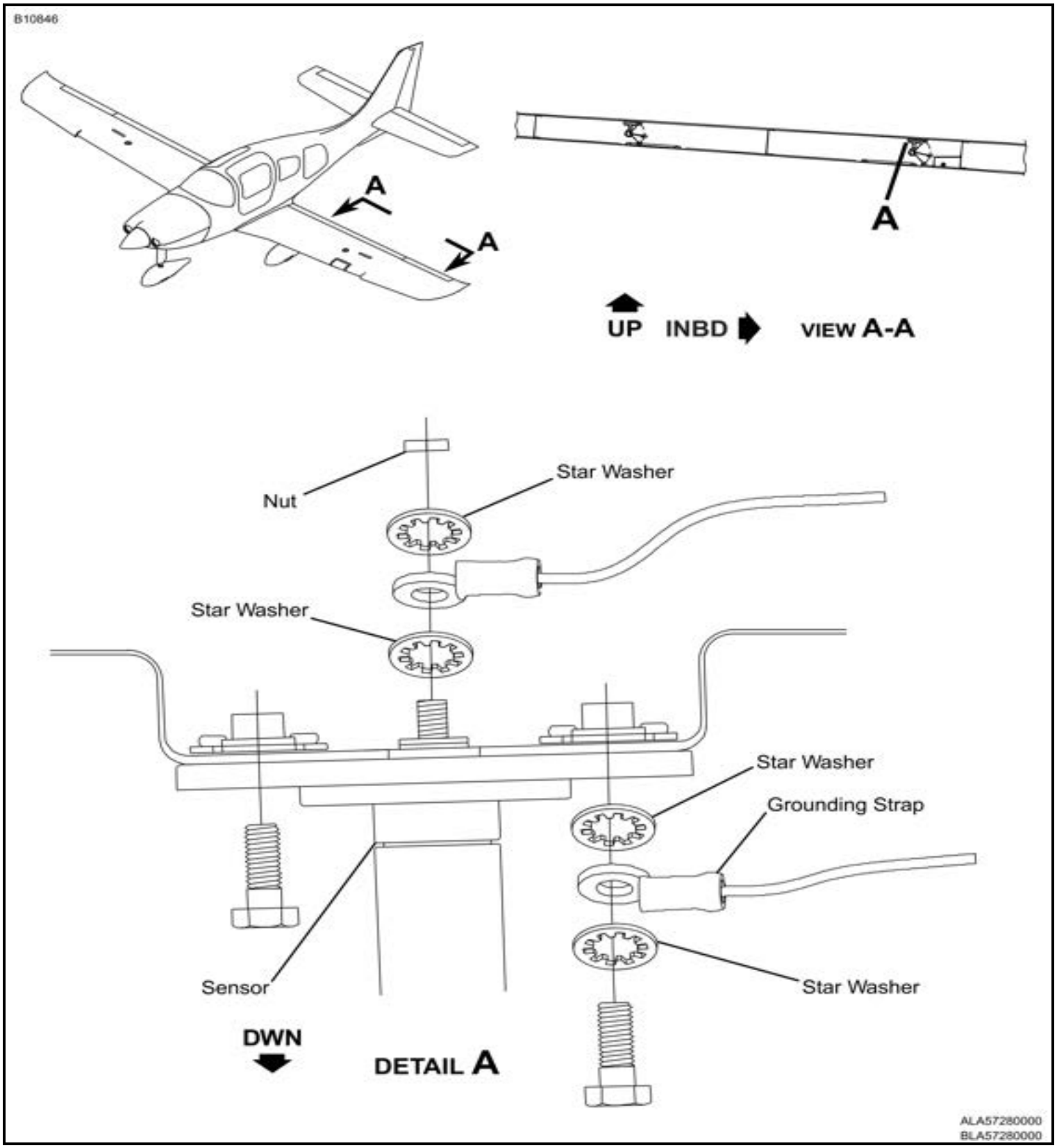
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Figure 202 : Sheet 1 : Outboard Fuel Level Sensor



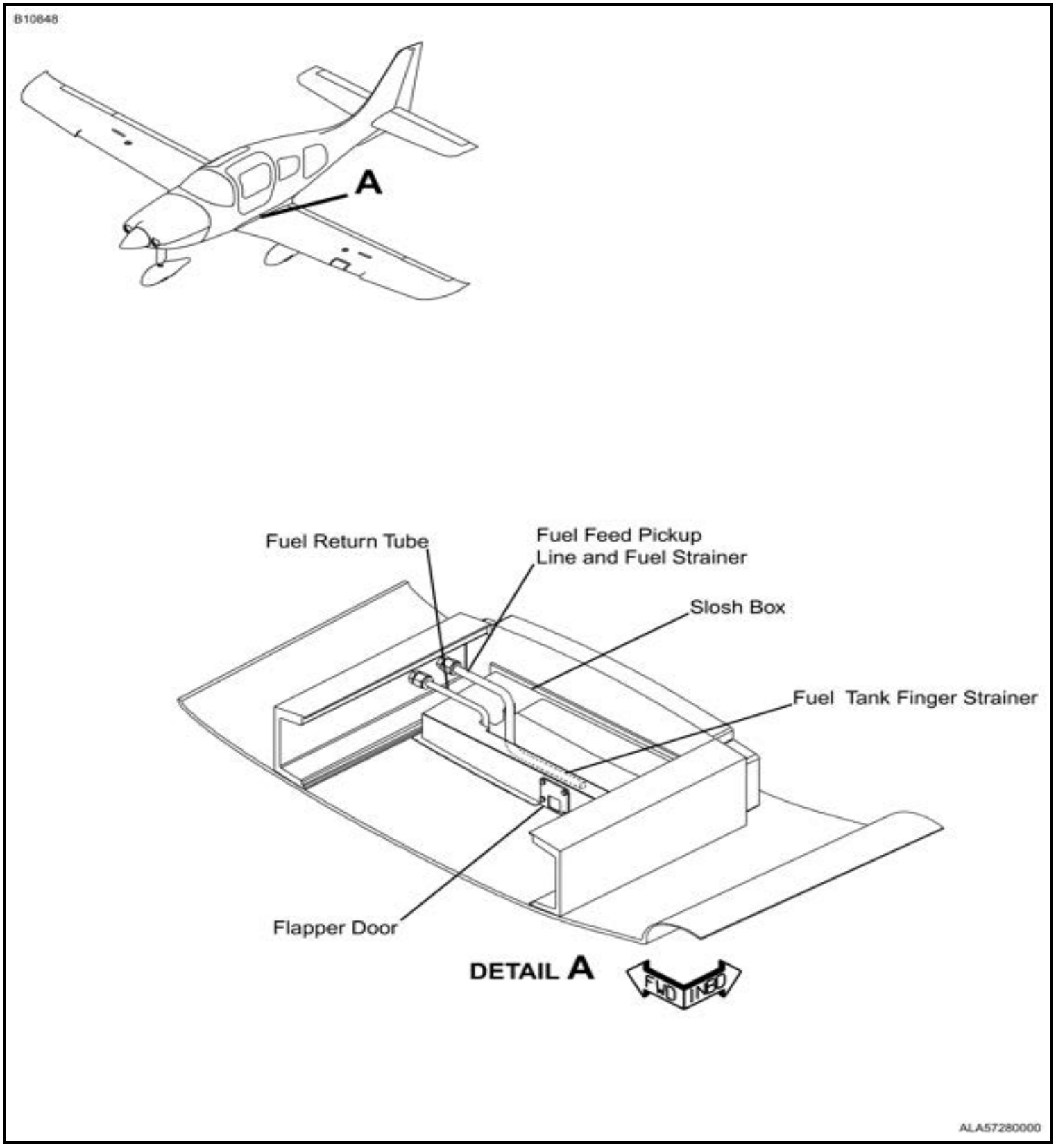
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Figure 203 : Sheet 1 : Grounding Strap Locations for Fuel Level Sensor



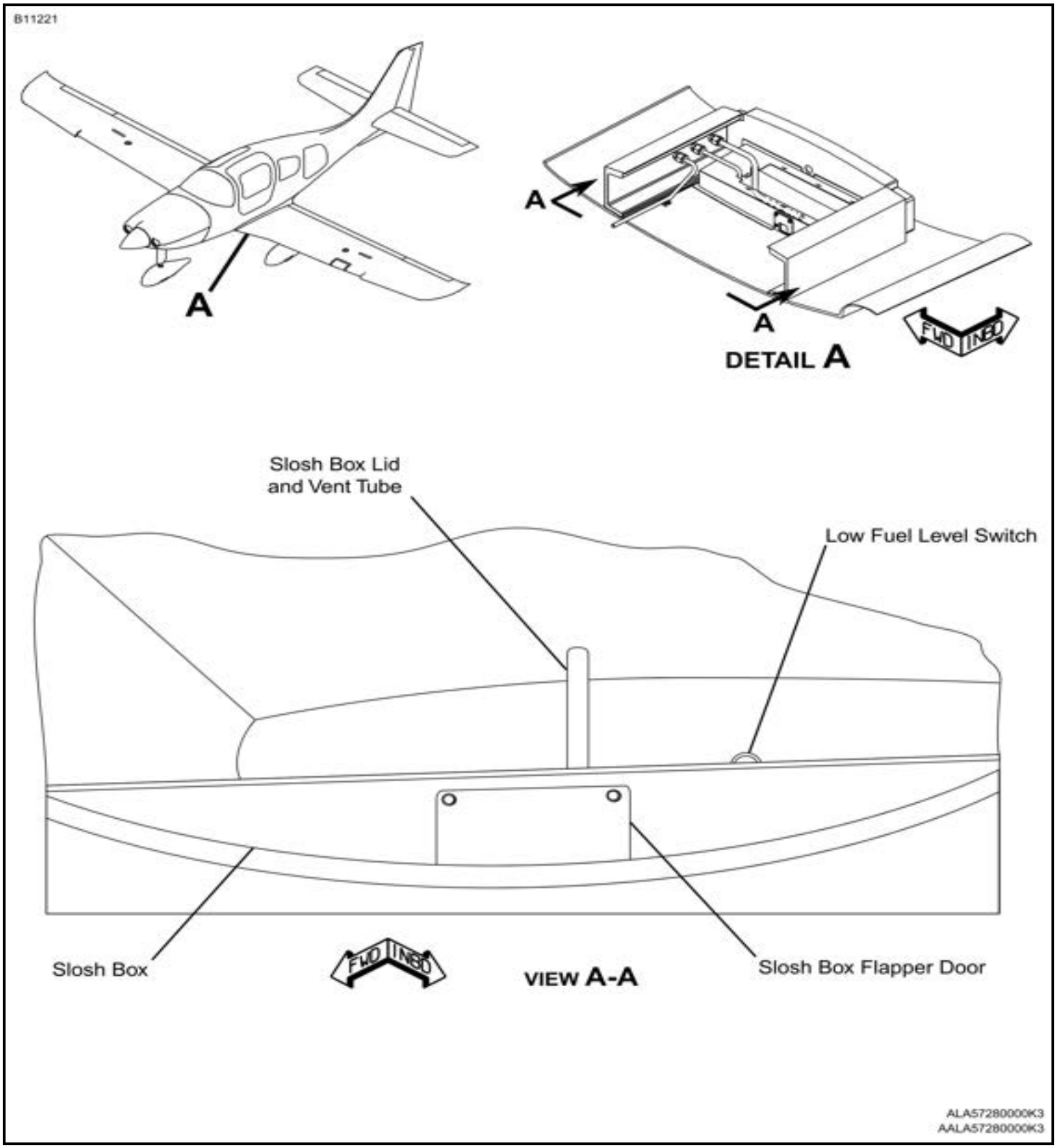
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Figure 204 : Sheet 1 : Slosh Box, Fuel Pickup, Fuel Return



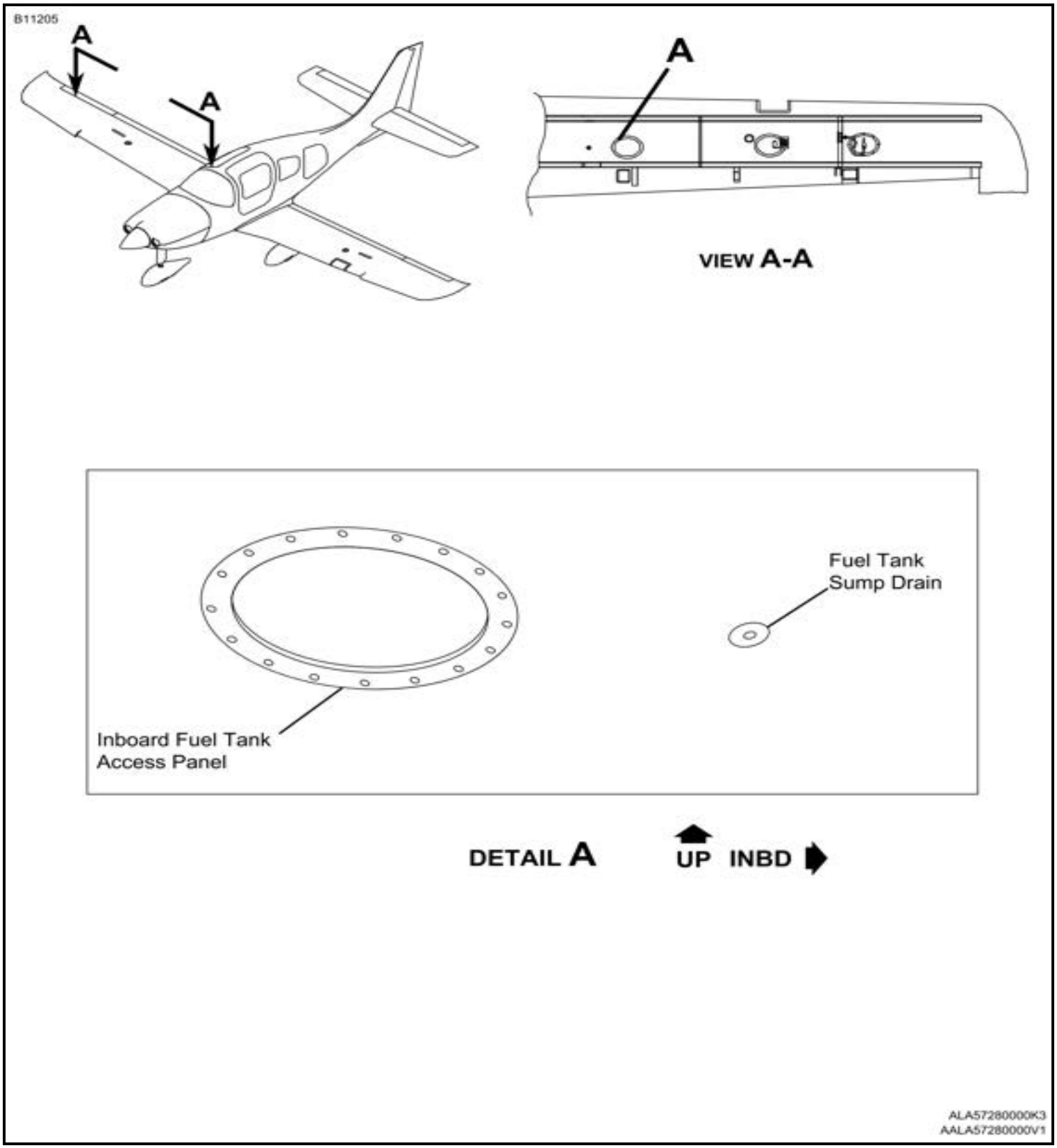
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Figure 205 : Sheet 1 : Slosh Box, Slosh Door, Low Level Float Switch (Facing Inboard)



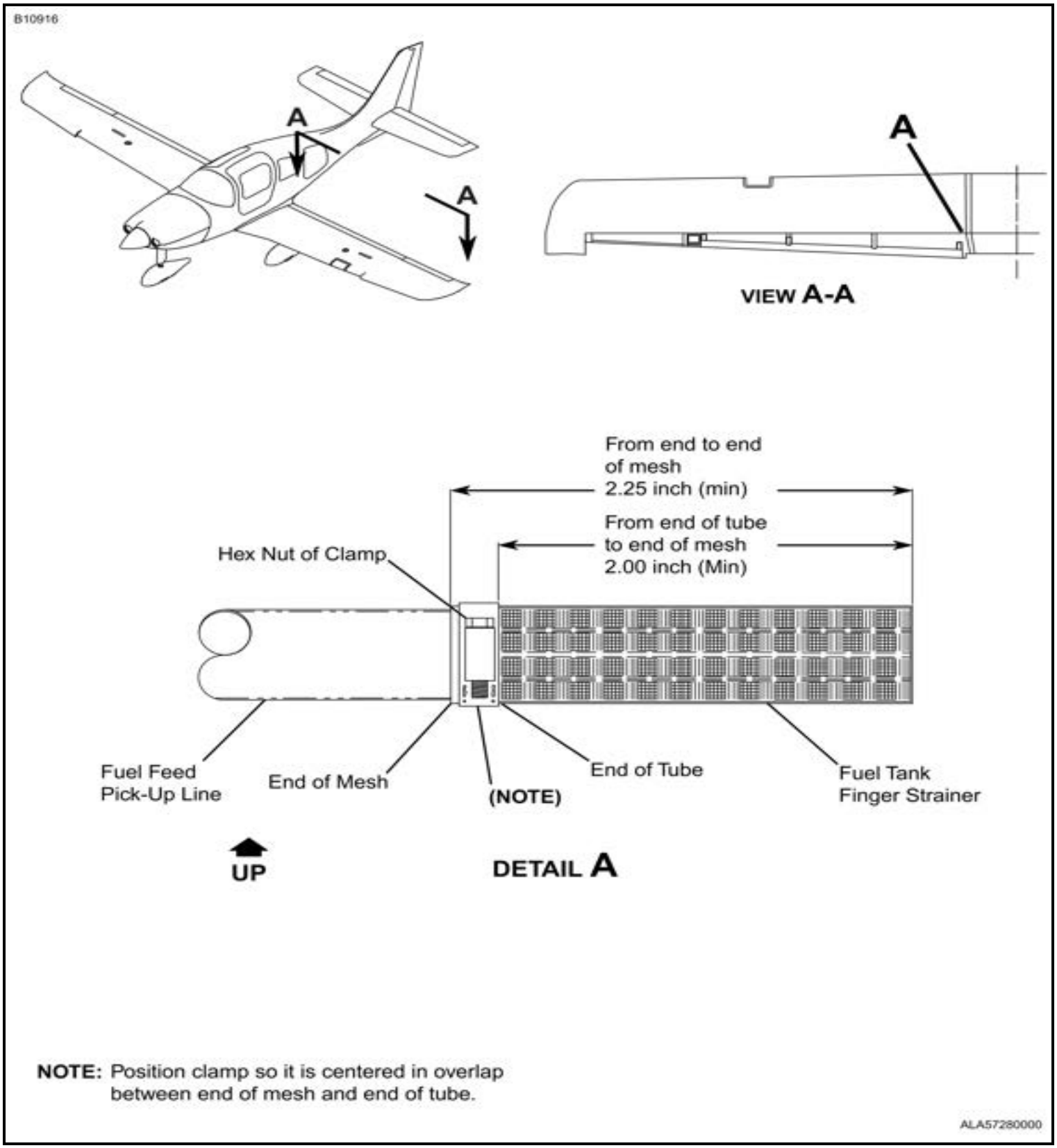
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Figure 206 : Sheet 1 : Inner Fuel Tank Access Panel and Fuel Drain



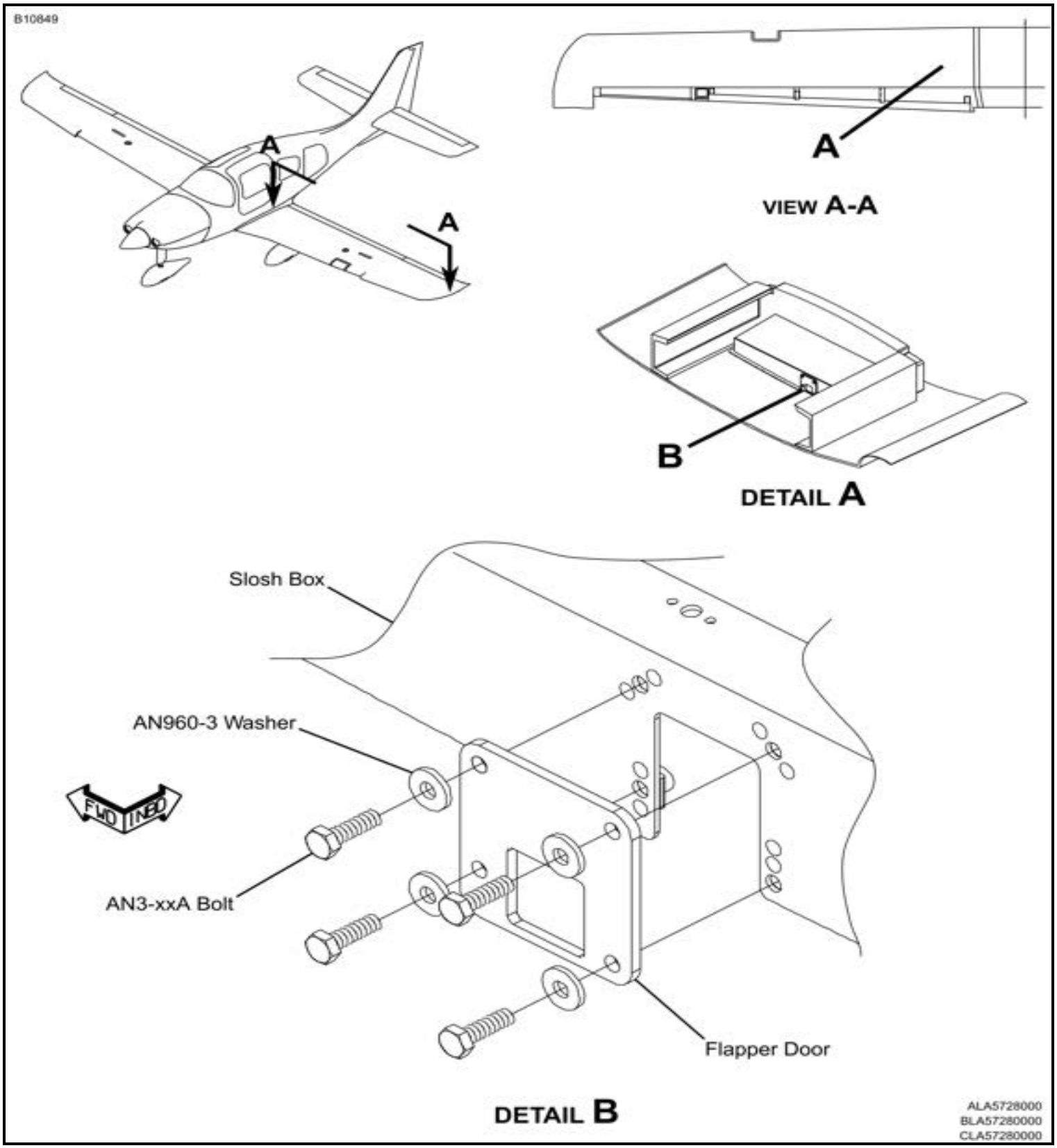
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Figure 207 : Sheet 1 : Finger Strainer Attachment Detail



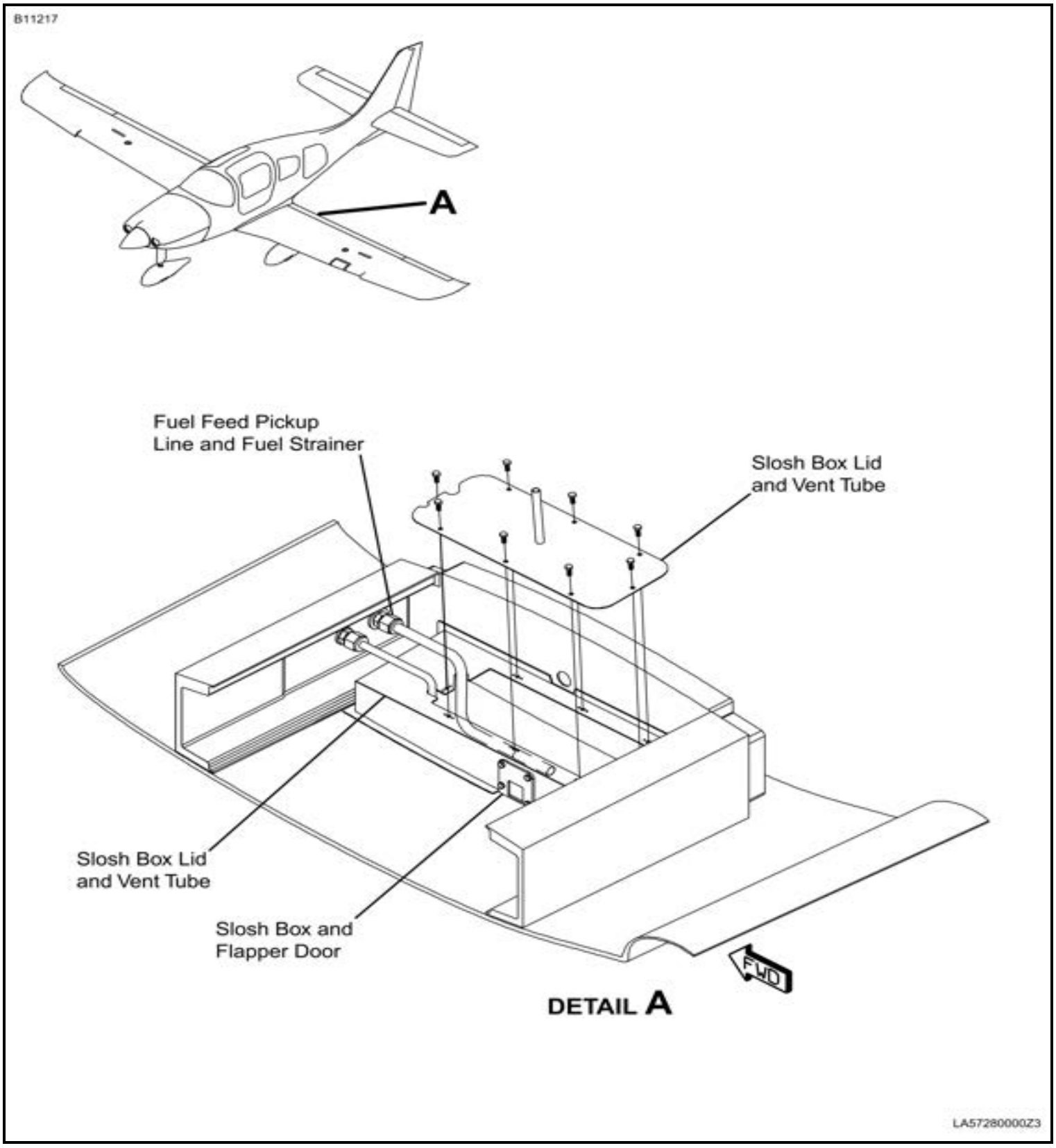
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Figure 208 : Sheet 1 : Slosh Door Installation/Removal



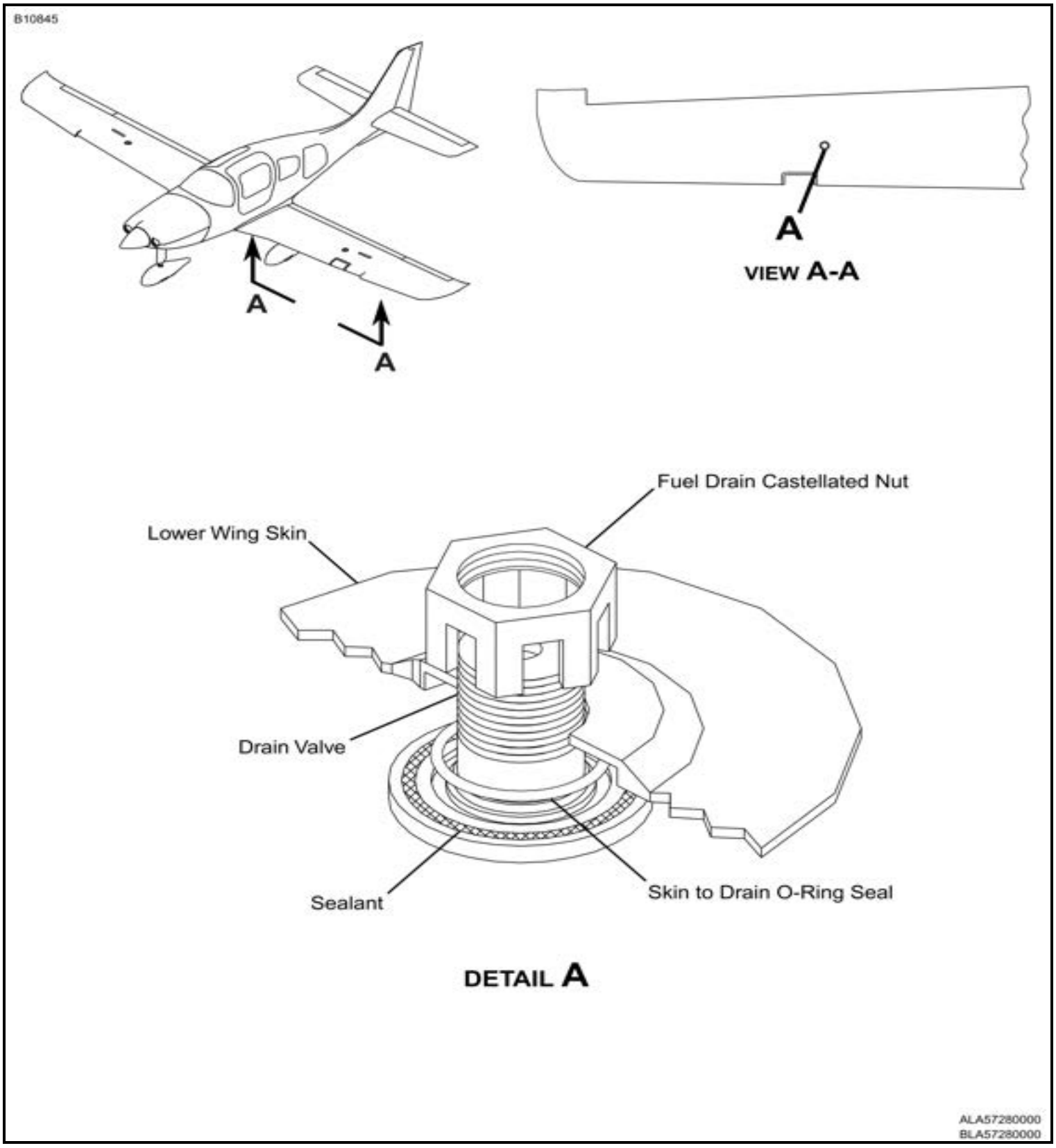
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Figure 209 : Sheet 1 : Slosh Box Lid Removal



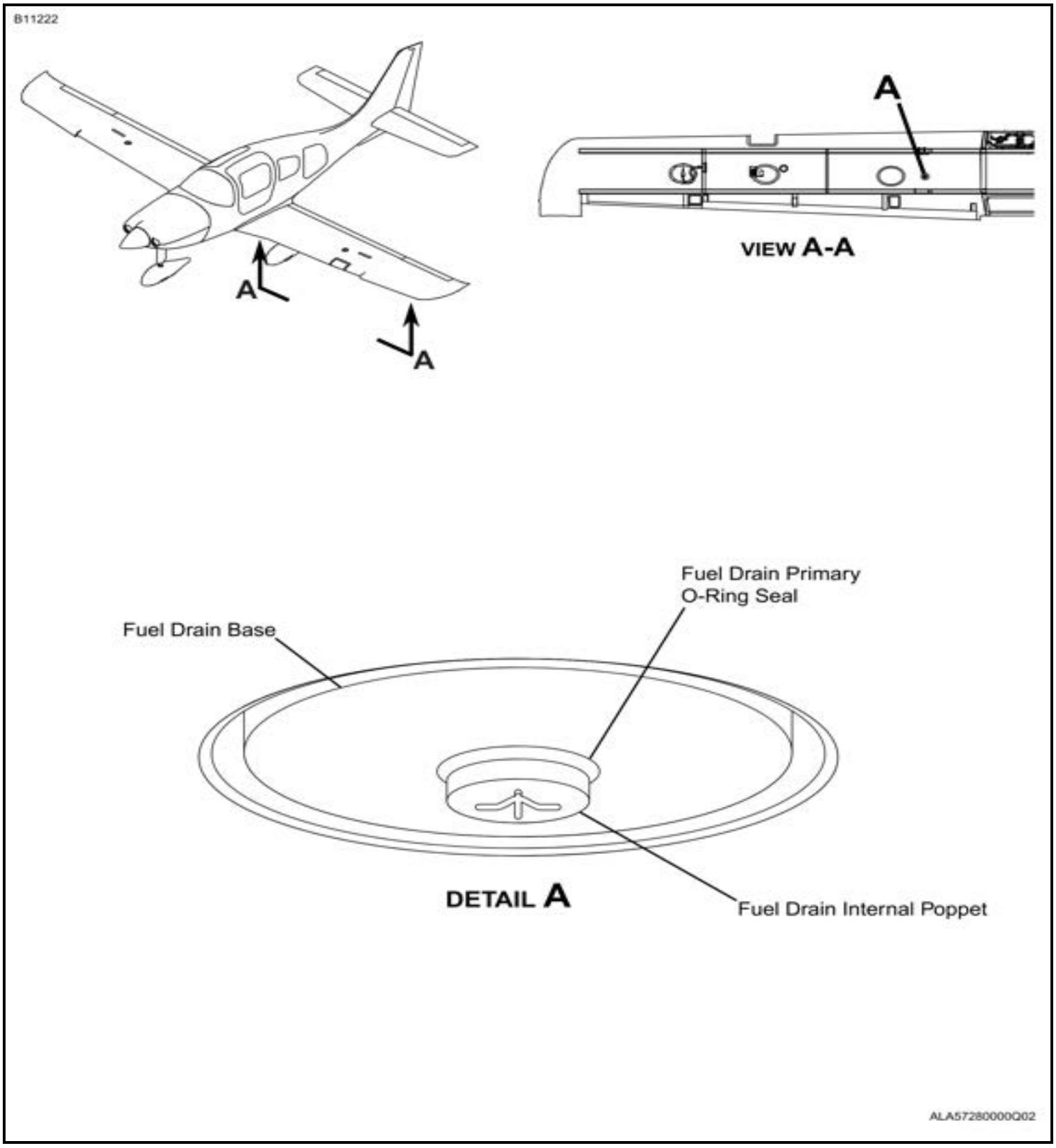
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Figure 210 : Sheet 1 : Fuel Tank Sump Drain Installation



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Figure 211 : Sheet 1 : Fuel Drain Primary Seal Replacement



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FUEL TANK SEALING - MAINTENANCE PRACTICES

1. Fuel Tank Sealing Maintenance Practices

A. This section discusses the general procedures and special tools and equipment for repairing leaks in the fuel tanks.

WARNING: The use of sealant is safe provided reasonable care and protective equipment is used. When working with fuel tank sealant, avoid ingestion, direct contact with skin, eyes, open breaks in the skin, etc. A well-ventilated area is required when working with sealant. Wash hands before eating or smoking. If sealant contacts skin, flush area with warm water.

NOTE: Approved fuel system materials may be obtained from the manufacturer.

(1) **General Procedures**

(a) When working with fuel tanks and the fuel system, take all applicable safety precautions, and perform work in a well-ventilated area.

(b) The materials used for the Cessna 400 are selected for long life under normal conditions expected in the life of the aircraft. This section covers minor maintenance of the fuel tanks and fuel tank sealing. If a problem is outside the scope of this section, contact Cessna Aircraft Company.

(2) **Special Tools and Equipment**

(a) Gloves - Polyethylene

(b) Cheese cloth

(c) Brush - if brushable sealants are used.

(d) Soft plastic spatula

(e) Mixing cup or container

(f) Mixing sticks

(g) MPK and/or Acetone for surface preparation

2. Discussion Of Terms And Techniques

A. Application Life: Refer to Pot-Life.

B. Pot-Life: Time after mixing a material until it becomes difficult to work with and apply.

C. MPK: Methyl n-Propyl Ketone

D. MSDS: Material Safety Data Sheet

3. Classification of Leaks

A. It is required to inspect for leaks both inside and outside the aircraft on a periodic basis. Note that leaks can form inside the wing away from the slipstream and can be inspected for through the access panels and holes on the wing. Refer to Section 57-10-00, Location Of Inspection Covers (Access Panels), for access panel locations.

B. Fuel Leak Classification - Refer to Figure 201.

(1) Stain - A slow fuel leak that evaporates soon after it is exposed to the air, leaving a blue or green stain (blue for 100 LL, green for 100).

(2) Seep - A slow fuel leak that reappears shortly after the area is cleaned.

(3) Slow to Heavy Seeps - A seeping occurring in open and closed areas that do not constitute a flight hazard.

(4) Running Leaks - A leak occurring in open areas, and must be repaired prior to flight. This is usually an indication of other damage, and Cessna Aircraft Company should be contacted.

4. Sealants for Panels, Valves, Fittings, and Switches

A. The same sealant is used on the fuel bay access panels, float valve, fittings through the forward spar, and low level float switches.

(1) **Approved Sealants:**

(a) PRC PR-1428 Class B

1 PR-1428 Class B is a two-part, manganese cured, polysulfide-based sealant. When mixed, it can be applied by spatula or extrusion gun.

2 The sealant is available from the manufacturer or directly from the sealant manufacturer.

3 Manufacturer:

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PRC Aerospace Sealants, PRC-DeSoto International, Inc.
5454 San Fernando Road, PO Box 1800
Glendale, CA 91209
USA
Phone: (818) 240-2060
Fax: (818) 549-7771

4 Health Precautions:

a Refer to sealant manufacturer's warnings and MSDS.

b Uncured PR-1428 may produce irritation following contact with skin. When handling PR-1428 Class B, avoid contact with the body, especially contact with open breaks in the skin and ingestion. Wash hands before eating or smoking after working with any sealants or chemicals. Obtain medical attention in case of extreme exposure or ingestion. For further information, see the MSDS for the product.

5 Cure rates available:

Table 201. PR-1428 Available Cure Rates

Sealant Number	Tack Free Time at 77° F (25° C)	Cure Time at 77° F (25° C)
PR-1428 B-1/2	4 Hours	8 Hours
PR-1428 B-2	8 Hours	20 Hours

NOTE: PRC PR-1428 B1/2 is recommended because of its workability and potlife.

6 Mixing Instructions:

a Mix per manufacturer's instructions.

7 Storage Life:

a The storage life of PR-1428 Class B is approximately nine months when stored at temperatures below 80° F (27° C) in original unopened containers. Check date of sealant prior to use.

5. Sealant Repair

A. Minor Sealant Repairs:

(1) Clean around the damaged area to remove any fuel residue.

(2) Clean around the damaged area, scuffing the sealant, and cleaning with MPK and Acetone.

(3) Dry the area prior to applying fuel tank sealant.

(4) Apply fuel tank sealant with a brush or spatula avoiding blobs, stalactites, or stalagmites. Any flakes or splashes also must be removed to prevent blockage of the fuel strainers and filters.

(5) Allow sealant to completely cure prior to closing tanks and returning aircraft to service.

B. Major Sealant Repairs:

(1) Contact Cessna Aircraft Company for repair procedures.

C. Approved Sealants:

(1) AC-236

(a) AC-236 is a two-component, liquid polysulfide polymer system for fuel tank sealing. When mixed it can be applied by brush, spatula, extrusion, injection gun, or roller depending on class of sealant.

(b) The sealant is available from the manufacturer or directly from the sealant manufacturer.

(c) Manufacturer:

Advanced Chemistry and Technology (AC-Tech)
7341 Anaconda Avenue
Garden Grove, CA 92841
USA
Phone: (714) 373-2837
Fax: (714) 373-1913

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(d) Health Precautions:

1 Refer to sealant manufacturer's warnings and MSDS

2 The sealant is considered safe when handled with reasonable care. Avoid contact with the body, especially contact with open breaks in the skin and ingestion.

3 Wash hands before eating or smoking after working with any sealants or chemicals. Obtain medical attention in case of extreme exposure or ingestion. If accelerator contacts the skin, immediately wipe off and wash with waterless hand cleaner followed by soap and water. For further information, see the sealant manufacturer's MSDS for the product.

(e) Cure rates available:

Table 202. AC-236 Available Cure Rates

Sealant Number	Application Life at 77° F (25° C) and 50 percent RH	Tack Free Time at 77° F (25° C) and 50 percent RH	Cure Time at 77° F (25° C) and 50 percent RH
AC-236 A-1/2	0.5 Hour	7 Hours	24 Hours
AC-236 A-1	1 Hour	16 Hours	30 Hours
AC-236 A-2	2 Hours	24 Hours	48 Hours
AC-236 B-1/2	1/2 Hour	8 Hours	24 Hours
AC-236 B-1	1 Hour	16 Hours	40 Hours
AC-236 B-2	2 Hours	24 Hours	48 Hours
AC-236 B-4	4 Hours	30 Hours	90 Hours
AC-236 B-6	6 Hours	48 Hours	120 Hours
AC-236 C-20	20 Hours	48 Hours	Not Available
AC-236 C-80	80 Hours	96 Hours	Not Available

NOTE: AC-Tech AC-236 A-1/2 and B-1/2 is recommended because of its workability and pot-life. The longer pot life and cure times are not recommended for field repair.

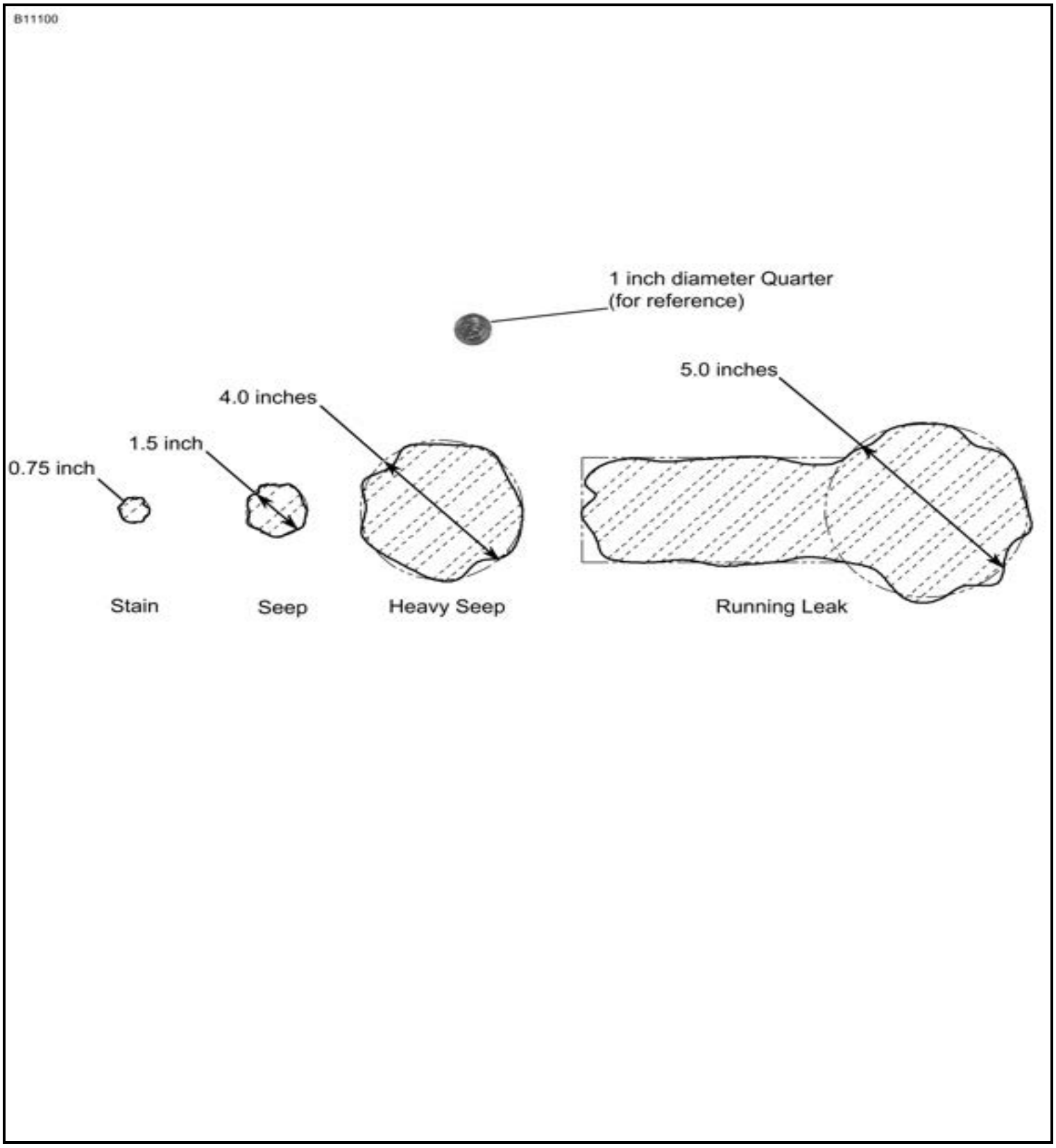
(f) Mixing Instructions: Mix per manufacturer's instructions.

(g) Curing of Sealant: Cure sealant per sealant manufacturer's recommendations prior to fueling the aircraft.

(h) Storage Life: The storage life of AC-236 is nine months after the date of shipment when stored at temperatures below 80° F (27° C) in original unopened containers. Storage at lower temperatures increases shelf life. Contact sealant manufacturer for more information. Check date of sealant prior to use.

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Figure 201 : Sheet 1 : Fuel Leak Classification



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FUEL DISTRIBUTION - MAINTENANCE PRACTICES

1. Fuel Lines

A. General Practices for Fuel Line Assembly

(1) Re-bending, unbending, or tweaking tube assemblies to accomplish proper thread alignment and engagement is permissible on assembly with all established clearances, tie-downs, high points, and/or low points maintained. Prior to assembly, blow tubes clean and make sure that the ends are not damaged prior to installation. If the tube is not going to be installed after cleaning, cap ends to prevent contamination. As an aid for assembly and to prevent galling of mating surfaces, lubricants (e.g. petroleum based) or anti-seize products may be used on the threaded portions of fittings, connectors, etc. Such lubrication is required for stainless steel-to-stainless steel fitting connections.

(2) **AN Fittings** - When required or specified, standard AN flare (i.e. 37 degrees) shall be added to the end(s) of tubing. In forming flares, cut the tube ends square per the cutting procedures in this section, and deburr the ends per the deburring procedures in this section. The tubing is then flared using the correct 37-degree aviation flare forming tool for the size of tubing and type of fitting. A double flare is used on soft aluminum tubing 3/8 (O.D.) and under, and a single flare on all other tubing sizes. Use appropriate caution when tightening; tighten per the Installation of Fuel Return and Fuel Feed Fuel/Fuel Pickup Line at WS 48.0 and 50.25 instructions below. Overtightening will damage the tube or fitting, which may cause a failure. Under-tightening may cause leakage which could result in system failure. After flaring, tubes formed with the "Standard AN flare" (i.e. 37 degrees) will conform to the angles shown in Figure 202 and dimensions shown in Table 201. In addition, the flares must meet the following requirements:

(a) The flare shall be square with the center line of the tube within 0.5 inch for the distance covered by the length of the sleeve.

(b) The circular runout between the inner and outer surfaces of the flare shall not exceed 0.005 full indicator movement (F.I.M.) with the tubing O.D

(c) The sealing surface shall be free of pit marks, radial or longitudinal scratches and indentations. Flare sealing surface shall not exceed 32 micro inches.

(d) If necessary, it is recommended that the flared end of the tube be burnished during installation.

Table 201. AN Flared Tube Dimensions

TUBE SIZE NOMINAL O.D. (inches)	"A" DIAMETER (inches)		"B" RADIUS ±0.010 (inches)
0.125	0.200	+0.000-0.010	0.032
0.188	0.302		
0.250	0.359		
0.313	0.421		
0.375	0.484		0.048
0.500	0.656		0.062
0.625	0.781		
0.750	0.937		0.078
1.000	1.187	+0.000-0.015	0.093
1.250	1.500		
1.500	1.721		0.109
1.750	2.106		
2.000	2.356		
2.500	2.856		
3.000	3.356		

(3) **Tube Cutting** - This section is provided as a guideline for tube cutting prior to installation of fuel lines. It is assumed that personnel performing this have had basic training on the use of the tools involved in correctly cutting tubing and preparing the tubing for installation.

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NOTE: For a good quality cut, do not rush the process, always use a sharp cutting wheel, and replace the wheel when it becomes dull.

(a) Measure and mark the tubing in the correct location for cutting/trimming. Note that based on the method of deburring, the user may have to compensate for the removal of material after cutting.

(b) Maintain pressure on the cutter wheel by gradually tightening the handle as you rotate the cutter around the tube. Refer to Figure 203 and Figure 204.

(c) Cutting the tube can be accomplished by either rotating the tube, the cutter completely around the tube, or by rocking it back and forth as shown in Figure 204.

(d) To cut deeper, give a 1/8 turn of the knob for each two revolutions around the tube as shown in Figure 205.

(e) Deburr the ends of the tubing per the following procedure.

(4) **Tube Deburring** - To ensure proper sealing of tubing with the fittings outlined in this specification, the ends of the tubing must be free of burrs, scratches, etc. This section describes some methods of deburring the ends of the tubing to provide the best surface for sealing and for proper system operation. Tube cutters burr into the ID of the tube and this must be removed prior to installation of the tube. Cutting tubing with a hacksaw will burr both the OD and the ID of the tubing. These also must be removed prior to tube installation. Small burrs on the OD may prevent the tubing from being fully inserted into the fitting. ID burrs, or chips, may cause the fittings to leak or cause damage and contamination to the system. Small scratches in the outside surface of the tubing may be removed by carefully polishing out the defect using fine grit sandpaper, Scotch-Brite™, or other equivalent. Following any deburring or polishing, the tube must be cleaned inside and out to prevent introducing foreign material into the systems. Figure 206 shows the proper way to deburr the OD of a cut tube using a file. Note that the file is at a shallow angle to chamfer the end slightly. If there is a raised portion of the tube from cutting, remove this also while deburring. Be careful only to remove the least amount of material from the tube to remove the burr. Removing too much material during deburring at this point will weaken the tube when installed.
Figure 207, Sheet 1 shows the use of a deburring tool to deburr the ID. As in deburring the OD, be careful not to remove excessive material, and only remove the burrs from the tube. There should be a slight chamfer on the ID end of the tube, and it must be free of nicks, protrusions, etc., as these affect the system operation and the strength of the tube.
Figure 207, Sheet 2 shows the use of a tubing deburring tool that can deburr both the OD and ID of the tubing. As with the above noted methods, be careful not to remove excessive material from the tube as this will weaken the tube when installed.

(5) **Torque Values for Flared Tube Fittings** - The following torque values must be used when tightening flared tube fittings. Over-tightening will damage the tube or fitting, which may cause a failure. Under-tightening may cause leakage which could result in system failure.

Size	Tube O.D.	Material and Torque Specification			
		Tube Material	Fitting Material	* Inch Pounds	* Foot Pounds
-2	1/8	Steel	Steel	75 - 85	6.3 - 7.1
		Aluminum	Steel/Aluminum/Brass	20 - 30	1.7 - 2.5
		Plastic	Steel/Aluminum/Brass/Plastic	10 - 15	.8 - 1.3
-3	3/16	Steel	Steel	95 - 105	7.9 - 8.8
		Aluminum	Steel/Aluminum/Brass	25 - 35	2.1 - 2.9
		Plastic	Steel/Aluminum/Brass/Plastic	15 - 20	1.3 - 1.7
-4	1/4	Steel	Steel	135 - 150	11.3 - 12.5
		Aluminum	Steel/Aluminum/Brass	50 - 65	4.2 - 5.4
		Plastic	Steel/Aluminum/Brass/Plastic	25 - 30	2.1 - 2.5
-5	5/16	Steel	Steel	170 - 200	14.2 - 16.7
		Aluminum	Steel/Aluminum/Brass	70 - 90	5.8 - 7.5
		Plastic	Steel/Aluminum/Brass/Plastic	35 - 45	2.9 - 3.8
-6	3/8	Steel	Steel	270 - 300	22.5 - 25
		Aluminum	Steel/Aluminum/Brass	110 - 130	9.2 - 10.8

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		Plastic	Steel/Aluminum/Brass/Plastic	55 - 65	4.6 - 5.4
-8	1/2	Steel	Steel	450 - 500	37.5 - 41.7
		Aluminum	Steel/Aluminum/Brass	230 - 260	19.2 - 21.7
		Plastic	Steel/Aluminum/Brass/Plastic	115 - 130	9.6 - 10.8
-10	5/8	Steel	Steel	650 - 700	54.2 - 58.3
		Aluminum	Steel/Aluminum/Brass	330 - 360	27.5 - 30
		Plastic	Steel/Aluminum/Brass/Plastic	165 - 180	13.8 - 15
-12	3/4	Steel	Steel	900 - 1000	75 - 83.3
		Aluminum	Steel/Aluminum/Brass	460 - 500	38.3 - 41.2
		Plastic	Steel/Aluminum/Brass/Plastic	230 - 250	19.2 - 20.8
* Dry torque values shown, except as noted in General Notes below					
General Notes					
Use a steel flare nut when using steel tubing. Either steel, brass or aluminum flare nut may be used with aluminum or plastic tubing. Plastic flare nuts to be used with plastic tubing only. Pre-Install tube flare fitting finger tight. If parts do not assemble finger tight, check for foreign material on threads and/or damaged threads. Do not force assemblies together. Maintain cleanliness of tube fittings. Protect all fitting threads from damage and dirt contamination. When attaching stainless steel to stainless steel or stainless steel to aluminum, use MIL-T-5544 Anti-seize/lubricant on fitting threads. To prevent contamination, do not apply Anti-seize to tapered seat. Use lower torque value when Anti-seize is used.					

B. **Removal of Fuel Return and Fuel Feed/Fuel Pickup Lines at WS 48.0 and 50.25** (Refer to Figure 208.)

(1) Loosen the B-nut on both sides of the bulkhead fittings, and slide the nuts onto the fuel lines. Slide off the fuel lines from both sides of the bulkhead fitting.

(2) Remove the nuts on both sides of the bulkhead fitting, and slide out the bulkhead fitting as shown in Figure 209 and Figure 210.

C. **Installation of Fuel Return and Fuel Feed/Fuel Pickup Lines at WS 48.0 and 50.25** (Refer to Figure 208.)

(1) Insert the bulkhead fitting through the O-ring and through the spar insert as shown in Figure 209 and Figure 210. Tighten the bulkhead nuts at WS 48.0, 18 to 20 ft.- lbs. and at WS 50.25, 10 to 12 ft- lbs.

(2) Slide the fuel line onto the bulkhead fitting, then slide the B-nut over the bulkhead fitting. Tighten the flared tube fittings at WS 48.0, 150 to 250 in.-lbs. and at WS 50.25, 75 to 125 in.-lbs.

D. **General Leak Check for Each Line, Tube, or Fitting** - After any maintenance on the fuel lines or fittings, check each system for leaks with 90 psi air or nitrogen, and apply a soapy solution at each junction for 30 seconds. After a successful no-bubbles leak check, clean and dry the junctions. Apply a sentry stripe at nut to tube, nut to fitting, and fitting to mounting surface.

2. Fuel Selector

A. **Removal and Installation of the Fuel Selector Knob**

(1) Remove the co-pilot's side seat per instructions in Chapter 25.

(2) Remove the center console access panels per instructions in Chapter 25.

(3) Insert a Phillips screwdriver up through the inside of the center console through the access hole in the fuel selector plate, and remove the three fuel selector knob retaining screws; rotating the knob to gain access to each screw. Remove the knob. Refer to Figure 214.

(4) Inspect the knob screw holes for evidence of stripping. If stripped, contact Cessna Aircraft Company for a replacement fuel selector knob.

(5) Installation is the direct reverse of removal.

(a) Apply Loctite 242 thread lock adhesive to the threads of the fuel selector plate retaining screw.

(b) Torque the fuel selector plate retaining screw between 8.5 lb.-in to 11 lb.-in, then apply torque putty.

(c) Tighten the knob retaining screw snug.

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(d) If the fuel selector knob is removed, repeat the installation steps above.

B. **Removal of the Fuel Selector Valve** (Refer to Figure 213).

(1) Remove the co-pilot's side seat per instructions in Chapter 25.

(2) Remove the carpet to gain access to the forward wing saddle access panel, and remove that panel per instructions in Chapter 25.

(3) Remove the center console access panels per instructions in Chapter 25.

(4) Disconnect all wiring to the selector, and mark and label connectors.

CAUTION: Alignment of the shaft assembly from the fuel selector knob to the fuel selector is critical to ensure full and proper valve operation and indication. Follow the next step in the procedure carefully.

(5) For the Model T240 installation do the steps that follow:

(a) Note and record the position of the fuel selector knob in relation to the left or right tank detents. If necessary, mark each shaft connection so that you can maintain the correct alignment during the reassembly.

(b) Remove the four countersunk 6-32 screws, self-locking nuts, and washers attaching the upper fuel selector plate to the center console.

(c) Remove the cotter pin, pin, and washer that attach the upper fuel selector shaft assembly to the spindle.

(d) Slide the upper portion of the fuel selector assembly out of the spindle.

(6) For Airplanes thru 02000 do the steps that follow:

(a) All the couplings and the spline shaft in this assembly have alignment markings comprised of either dimples or 1/8" tall letters. If the alignment markings are visible note and record their position. If the alignment markings are not visible mark each shaft connection so that you can maintain the correct alignment during the reassembly.

(b) Remove the four countersunk 6-32 screws, self-locking nuts, and washers that attach the upper fuel selector plate to the center console.

(c) Slide the upper portion of the fuel selector assembly off the spline shaft.

(d) Remove the two truss head screws and large area washers securing the vapor barrier and grommet to the floor. Slide the vapor barrier and grommet off of the spindle and spline shaft. Refer to Figure 212.

C. **Installation of the Fuel Selector Valve** (Refer to Figure 212 and Figure 213).

(1) Wire the fuel selector valve per instructions in the LC41-550FG Wiring Manual.

(2) Rotate the spindle selector to the left fuel tank detent, and adjust the micro-switch so that the roller face on the activated switch is 1.01+0.03/-0.05 from the face of the spindle (refer to Figure 211). Ensure the left fuel tank annunciator illuminates, and tighten the micro-switch attachment screws 3.8 to 4.5 in.-lbs.

(3) Rotate the spindle selector to the right tank position, and repeat the previous step.

(4) Rotate the selector back to the left tank position.

(5) Slide the vapor barrier plate and grommet over the top of the fuel selector spindle, and position the grommet so it is mounted in the vapor barrier plate and over the solid shaft of the selector. While sliding the grommet, it is acceptable to stretch the grommet over the lower universal joint. The vapor barrier plate should be flush with the top of the floor.

(6) Install two 10-32 truss head screws and two large area washers in the two rivnuts installed in the floor as shown in Figure 212.

(7) For the Model T240 installation do the steps that follow:

(a) Slide the upper fuel selector assembly shaft in the spindle.

1 Make sure that you align the shaft applicable to the shaft position recorded before it was removed.

(b) Install the pin, washer and cotter pin that attach the upper fuel selector assembly shaft to the spindle.

(8) For Airplanes thru 02000 do the steps that follow:

(a) Slide the upper portion of the fuel selector coupling over the spline shaft, as shown in Figure 213.

1 Make sure that the alignment marks (existing dimples, existing 1/8-inch letters, or marks applied during disassembly) are aligned with the mating part.

2 Make sure that the alignment marks are toward the same side of the aircraft they faced before disassembly.

(9) Attach the upper fuel selector plate to the center console by installing the four countersunk 6-32 screws, self-locking nuts,

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and washers in the upper fuel selector plate. Torque to 4 to 6 in.-lbs.

(10) Install the center console access panels per instructions in Chapter 25.

(11) Install the co-pilot's side wing saddle access panel, carpet, and co-pilot's seat per instructions in Chapter 25.

D. **General Leak Check for Each Line, Tube, or Fitting** - After any maintenance on the fuel lines or fittings, check each system for leaks with 90 psi air or nitrogen, and apply a soapy solution at each junction for 30 seconds. After a successful no-bubbles leak check, clean and dry the junctions. Apply a sentry stripe at nut to tube, nut to fitting, and fitting to mounting surface.

E. **System Check** - Follow the instructions in Section 28-10-00, Slosh Boxes, Fuel Pickup, and Vapor Return, to assure system integrity.

F. **Maintenance Practices**

(1) Periodic inspection of the fuel lines, hoses, fittings, etc., is required to check for leaks, chafing, or damage.

(2) Cleaning is required on top of and around the fuel selector linkage by vacuuming or wiping with a damp cloth to clean away dust and debris that may have worked into the area.

G. **First 500 Hour Inspection and Every 1000 Hours Thereafter**

(1) Ensure valve rotates freely to all positions.

(2) With power applied to the aircraft, ensure that annunciators on instrument panel indicate correct selector position.

(3) Remove upper knob and ensure socket-head, countersunk screw is tight. If not, remove screw, apply a drop of thread-locking compound (Loctite 242 or equivalent), and reinstall. Tighten until snug.

(4) Inspect interconnect shaft between upper detent plate and the valve body. Check that roll pins are securely in place and that there is no sign of chafing or excessive wear.

(5) Check lobed plate on valve body and make sure that it actuates micro switches as selector is moved to the various positions. Replace broken or worn microswitches.

(6) Inspect valve body for any signs of leaking. If leakage is evident, check security of fuel line connections. Correct any loose connections. If no loose connections are found, remove valve body and repair or replace.

3. Auxiliary Fuel Pump

A. The Cessna 400 is equipped with an electric auxiliary fuel pump to provide both vapor suppression and backup boost pump operation. The pump is located on the fuel module mounted to the forward spar below the front seats. Access is through the fuel system access panel located on the belly of the aircraft. Refer to Figure 201.

(1) **Removal of Auxiliary Fuel Pump**

(a) Make sure that aircraft power is turned off.

(b) Turn the fuel selector to the off position.

(c) Disconnect the auxiliary fuel pump wire connector.

(d) Disconnect the fuel lines.

(e) Loosen and move the hose clamps to release the fuel pump.

(2) **Installation of Auxiliary Fuel Pump**

(a) Installation is a direct reversal of the removal of the auxiliary fuel pump.

(b) Hand tighten the flared tube fittings connecting the fuel lines to the fuel pump until the assembly is complete and then tighten 150-250 in.-lbs.

(c) Prior to tightening the hose clamps around the fuel pump, ensure that the fuel lines are not pre-stressed. Tighten hose clamps 10-15 in.-lbs.

4. Primer Switch

A. **Primer Switch Removal and Installation**

(1) For the primer switch (SI010) removal and installation refer to applicable section:

(a) For the Avidyne and Garmin G1000 installations refer to, Chapter 25 Instrument Panels and Electrical panels - Maintenance Practices, Master Switch Panel.

(b) For the Model T240 installation refer to, Chapter 33 Interior LED Panels (T240) - Maintenance Practices, Ignition Switch LED Panel Removal/Installation.

5. Automatic Fuel Boost Pump System (Avidyne and Garmin G1000 Options)

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A. **General** - The Model 400 Airplanes with the Avidyne or Garmin G1000 options have an automatic fuel boost system installed. The Model T240 has a manually controlled emergency pump system installed.

B. For the Model T240 Garmin G2000 installation the VAPOR SUPPR and EMER FUEL PUMP switches are installed in the Center Console Switch Panel. Refer to Center Console Switch Panel (T240) - Removal/Installation. The Primer Switch (UI908) is located adjacent to the Ignition Switch (UI002). Refer to Interior LED Panels (T240) - Maintenance Practices.

C. The purpose of the automatic fuel boost pump system is to reduce pilot workload in case of a primary engine driven fuel pump failure during takeoff. The system is operated by arming the backup pump system prior to takeoff and during climb to cruise altitude. Once armed, the system will turn on the backup pump if it senses a pressure drop in the unmetered fuel line. The system provides at least 100 percent power, or 310 hp, within two seconds of an engine driven fuel pump failure as tested by Cessna. For an overview of the automatic boost pump system and the relationship of the primer switch, the vapor suppression switch, and the boost pump arm switch to the boost pump, refer to Figure 215. The system includes The fuel line is located between the T-fitting on the throttle metering unit valve and the fuel pressure switch. Refer to Figure 216.

(1) The Avidyne and G1000 options include the components that follow: a fuel line, boost pump pressure switch, a warning light, system-armed light, system-arming switch, and the wires and connectors to the auxiliary fuel pump. Refer to the Auxiliary Fuel Pump section above.

(2) For the Avidyne option, Figure 217 shows the location of the cockpit controls for the fuel pump and automatic fuel pump system.

(3) For the Garmin G1000 option the vapor suppression switch and backup pump arm switch are located in the flap panel. The primer button is located adjacent to the ignition switch.

D. **System Operation** - When backup pump switch is set to ARMED the backup pump system is activated and the system-armed light located directly below the switch comes on. The boost pump pressure switch senses unmetered fuel pressure coming from the engine's fuel injection system by means of a fuel line connected directly between the boost pump pressure switch and the fuel injection metering valve on the unmetered fuel pressure side. When the fuel pressure drops below 5.5±0.5 psi and the backup pump switch is in the armed position, the switch operates a latching relay, causing the on the boost pump to operate and the fuel pump annunciator to come on. If the system is off and the unmetered fuel pressure is less than 5 psig, the annunciator light comes on.

E. **Automatic Fuel Boost Pump System Maintenance Practices**

(1) System Check Out

WARNING: Testing of the backup boost pump system requires engine runs, running the fuel boost pump, and priming the engine. As with any work around aircraft, the engine must be assumed to be ready to run and able to turn over at any time. Precautions must be taken to prevent personnel injury and damage to aircraft and surroundings.

(a) Verification of Normal Operation

1 If the operation of the automatic boost pump system is in question, a ground test, at a minimum, should be conducted prior to the next flight. This includes an engine warm-up and run-up test to make sure that the system is operating correctly. If the system fails the ground test, or the system is still in question, further system checks must be performed.

(b) Ground Testing

1 For the ground tests, an indication different from what is defined as normal constitutes a test failure, and testing should be stopped. In case of a system failure, check the pressure switch, follow the electrical troubleshooting section, or contact Cessna Aircraft Company. This test requires starting the engine, and due to the nature of the testing, may cause flooding of the engine. Proper safety precautions must be taken to prevent fire and damage to personnel, the system, or the aircraft.

1 Turn the master switch on. With the engine not running, Make sure that the FUEL PUMP annunciator light (Avidyne option) comes on. Make sure that for the Garmin G1000 option, the FUEL PUMP CAS message in the PFD message window does not show. If fuel pressure is too low, it will only display when engine RPM is above 1000 RPM. The steps that follow apply to Avidyne option aircraft only:

a With the throttle partially open and the mixture full rich, press the primer button until an indication is registered on the manifold pressure/fuel flow gauge on the Avidyne Entegra PFD. When flow indicated is above 0 GPH, the FUEL PUMP annunciator light must be extinguished.

b Return the throttle and mixture to the full aft position, (mixture to idle cutoff and throttle to closed).

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c Turn the back-up pump switch to ARMED. The system armed light must be illuminated, the fuel pump must be running, and the FUEL PUMP annunciator light must be illuminated. Turn the switch to off after verification of the above items.

2 Start the engine and allow the engine to warm up prior to performing any engine run-up tests. During startup, the FUEL PUMP annunciator light (Avidyne option only) must extinguish once the engine starts.

CAUTION: At this point in the backup boost pump system testing, the engine should be well primed, if not flooded. Care must be taken to prevent damage to personnel, the engine, and the aircraft during starting. Refer to the Pilot's Operating Handbook for starting the engine with a flooded engine.

3 With the engine running mixture rich and with engine temperatures in the green, turn on the backup boost pump system. Only the system-armed light should illuminate, and the boost pump should not operate. If it operates, the engine will quit due to flooding.

4 With the system armed, prop set at full forward (max RPM), and engine running at 2000 RPM, slowly pull the mixture back to the aft stop. The boost pump system turns on the boost pump. If the pressure drops below 0 GPH and/or the engine quits, the system is not operating correctly. If the mixture is at idle cut-off, the system did not engage as indicated by the FUEL PUMP annunciator light or annunciation display, and the engine is still running, the engine fuel system must be re-calibrated per Chapter 73. Return the mixture to the previous setting when completed with this test point.

NOTE: If the mixture is pulled completely back to the idle cut-off position, the system may not be able to provide enough fuel pressure to run the engine.

5 With the system armed, perform a full power run-up with a quick retraction of the throttle to idle. The system should not operate as indicated by the illumination of the FUEL PUMP annunciator light, or Garmin G1000 PFD CAS message "FUEL PUMP", or engaging of the electric boost pump.

6 Turn off the system, and shutdown the engine. If no failures are noted, the system is considered safe for flight. If the system is in question, re-test, or contact Cessna Aircraft Company prior to flight. In case of a system failure, check the electrical system as documented in the following section.

CAUTION: Do not run the pump more than 2-3 seconds.

(2) Electrical Troubleshooting (T240).

(a) If the pump does not operate with the EMER FUEL PUMP switch (SI007) set to the ON position do the steps that follow:

1 Check the wiring between the switch and pump for damage and continuity.

2 If the wiring is unserviceable, repair or replace the wiring and check the pump operation again. Refer to the Model T240 Wiring Manual.

3 If the wiring checks good replace the EMER FUEL PUMP switch and check the pump operation again. Refer to Chapter 25, Switch Panel Rocker Switch (T240) - Removal/Installation.

4 If the switch is serviceable replace the pump and check the pump operation again. Auxiliary Fuel Pump.

(b) If the pump does not operate with the VAPOR SUPPR switch (SI008) set to the ON position do the steps that follow:

1 Check the wiring between the switch and pump for damage and continuity.

2 If the wiring is unserviceable, repair or replace the wiring and check the pump operation again. Refer to the Model T240 Wiring Manual.

3 If the wiring checks good replace the VAPOR SUPPR switch and check the pump operation again. Refer to Chapter 25, Switch Panel Rocker Switch (T240) - Removal/Installation.

4 If the switch is serviceable replace the pump and check the pump operation again. Auxiliary Fuel Pump.

(3) Electrical Troubleshooting (Avidyne and G1000)

CAUTION: Do not run the pump more than 2-3 seconds.

(a) Pump does not turn on with zero fuel pressure and the BACKUP PUMP (Avidyne and G1000) switch (SW11) switch is armed.

1 Backup Pump Rocker Switch

a With aircraft power on, move the rocker switch to the armed position.

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b If the light does not come on or CAS message does show, but the pump turns on, replace the "armed" light or troubleshoot the PFD as applicable.

c If the light does not come on or CAS message does show, and the pump does not turn on, depress the primed button briefly.

1. If the pump operates, replace the rocker switch. For Avidyne and G1000 options refer Chapter 33 Interior Lighting - Maintenance Practices, Rocker Switch Removal and Installation.
2. If the pump does not operate, replace the circuit breaker.

2 Find the K-7 Latching Relay as follows:

a For the Avidyne option, the relay is found on right side of fuselage behind the right kidney panel on the instrument panel.

b For the Garmin G1000 option, the relay is found forward of the instrument panel to the right of the PFD and LRU's.

3 With the fuel pressure sensor terminals jumpered, move the backup pump switch to the armed position. With your hand on the relay, you should feel the relay actuate. If not, replace the relay.

4 Boost Pump

a With an ohmmeter, make sure that the pump has a good ground at pin 3 of the disconnect plug (0-1 ohms).

b With a voltmeter, make sure that 12 volts (S/N 41002 to 41500) or 24 volts (S/N 41501 and on) is on pin 2 of the disconnect plug while the vapor suppress switch in on.

c Make sure that 12 volts (S/N 41002 to 41500) or 24 volts (S/N 41501 and on) is on pin 3 of the disconnect plug while the backup switch is in the armed position.

d If all three above checks are OK, replace the pump. Refer to the Auxiliary Fuel Pump section above for installation and removal instructions.

5 Vapor Suppression is Inoperative (Low Speed).

a Check for operation of pump's low-speed operation with the backup pump switch in the off and armed position.

1. If the low speed only works with the backup pump switch off, check for voltage (±12 volts for S/N 41002 to 41500 or ±24 volts for S/N 41501 and on) on both sides of the power diode (located on the instrument panel under the terminal junction block, Avidyne and Garmin G1000 installations). If there is only voltage on one side, replace the diode.
2. If the low speed only works with the backup pump in the armed position replace the backup pump switch.

F. **Removal and Installation of Automatic Fuel Boost Pump System**

(1) Boost Pump Pressure Switch Removal (Refer to Figure 216).

(a) Make sure that aircraft power is turned off.

(b) Make sure that the mixture is in the idle cutoff position and the engine is not primed.

(c) Turn the fuel selector to off.

(d) Remove the upper engine cowling.

(e) Remove the sealant from wire terminals.

(f) Disconnect the pressure line from the boost pump pressure switch.

(g) Remove the jam nut, lock washer, and pressure switch.

(2) Boost Pump Pressure Switch Installation (Refer to Figure 216).

(a) Installation is a direct reversal of the removal of the boost pump pressure switch.

(b) Torque the nut 240 to 280 in-lbs.

(c) Reconnect the unmetered pressure hose to the bottom of the switch. Torque the fitting 75 to 80 in.-lbs.

(d) Clean the terminals and the base of the switch with isopropyl alcohol or LPS Electro Contact Cleaner (MIL-PRF-29608 Class C).

1 Make sure that the terminals and the switch body are completely dry.

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(e) Reconnect the electrical connections to the top of the switch.

(f) Use Type V, Class E sealant (RTV162) to completely cover the wire terminals and the wire bundle assembly where it attaches to the switch. Refer to Chapter 20, Solvents, Sealants and Adhesives - Description and Operartion, Table 1, Engine and General Purpose Materials.

1 Make sure there are no voids in the sealant.

2 Make sure the sealant fully covers as follows:

- the terminals on the switch
- the entire top of the switch and extends approximately 1/8 inch down the sides of the switch
- the ring terminals and the full length of the plastic sleeves where they attach to the switch.

(3) Fuel Pump Removal and Installation.

(a) Refer to the Auxiliary Fuel Pump section above for removal and installation instructions.

(4) Electrical Components (Avidyne and Garmin G1000).

NOTE: For the Model T240 G2000 installation, the power diode is installed in the Small Parts Module. Refer to Chapter 24, Small Parts Module - Removal/Installation.

(a) Power Diode Removal (For the Avidyne option, refer to Figure 218; for the Garmin G1000 option, the diode is located in the wiring cluster near the boost pump switch).

1 For the Avidyne option, remove the glare shield and right side kidney panel. For the Garmin G1000 option, remove the flap panel.

2 Cut the wires from the diode, and mark the cut wires.

3 Remove the diode, and replace with a new diode.

(b) Power Diode Replacement

1 Install diode.

2 Slide heat shrink over the wire, and using good solder practices, solder and heat shrink the wires.

3 For the Avidyne option, install the right side kidney panel and glare shield. For the Garmin G1000 option, install the flap panel.

4 Test the system by turning on the vapor suppress (Low Speed). The pump should stay on when the backup pump is activated.

(c) Arm Light Removal

1 Remove the left side knee bolster.

2 Loosen the switch plate and pull out from the instrument panel 2-3 in.

3 Remove the old light after cutting the wires.

(d) Arm Light Installation

1 Install a new light and crimp the terminals on after inserting through the mounting hole.

2 Reinstall the switch plate and left knee bolster.

3 Test the arm light operation by momentarily arming the backup pump switch.

(e) K-7 Latching Relay Removal (Avidyne and Garmin G1000 installations).

1 For the Avidyne option, remove the glare shield and right side kidney panel. For the Garmin G1000 option, access the relay from underneath the instrument panel.

2 Carefully mark the wires to the relay.

3 Remove the relay.

(f) K-7 Latching Relay Installation

1 Replace the relay, paying close attention to the orientation of the relay.

2 Re-attach the wires to the terminals.

3 Replace removed items and glare shield, as applicable.

4 Do a functional test the entire backup pump system. Refer to Automatic Fuel Boost Pump System Maintenance Practices section.

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(g) Rocker Switches Removal Avidyne and Garmin 1000).

NOTE: For the Model T240 rocker switch removal and installation procedures refer to, Chapter 25 Switch Panel Rocker Switch (T240) - Removal/Installation.

1 Remove the left side knee bolster.

2 Loosen the switch plate and pull out from the instrument panel 2-3 inches.

3 Carefully identify the wires to the switch.

4 Remove the unserviceable switch from the metal plate.

(h) Rocker Switches Installation

1 Install the replacement switch, and connect the wires to the terminals.

2 Reinstall the switch plate and left side knee bolster.

3 Functional test the entire backup pump system per the Automatic Fuel Boost Pump System Maintenance Practices section.

6. Fuel Gascolator

A. Removal and Installation of Fuel Gascolator

(1) Normal use and maintenance does not require removal of the gascolator from its mounting. If removal and replacement of the whole gascolator is required, contact Cessna Aircraft Company.

(2) If maintenance practices do not maintain correct functioning of the gascolator, contact Cessna Aircraft Company for removal and replacement instructions.

B. Fuel Gascolator Maintenance Practices

(1) Periodic cleaning of the filter is required for proper operation of the fuel system as indicated in Chapter 5 of this manual.

C. Removal of the Gascolator Bowl and Filter (Refer to Figure 219 and Figure 220.)

(1) Turn the fuel selector to the off position.

(2) Drain any residual fuel from the gascolator.

(3) Remove the safety wire securing the gascolator bowl mounting ring. Refer to Figure 219.

(4) Turn the ring clockwise, as seen from the bottom, until the ring is unthreaded. Note the alignment of the arrow on the bowl to the line on the gascolator base. Refer to Figure 220.

(5) Pull gently straight down on the bowl to remove and access the filter/bypass element.

(6) Unscrew the filter/bypass element, and carefully clean the filter and bypass. Check for smooth operation of the bypass.

(7) Clean the gascolator bowl and inspect the O-ring seal. Replace the seal as necessary. Contact Cessna Aircraft Company for replacement O-rings.

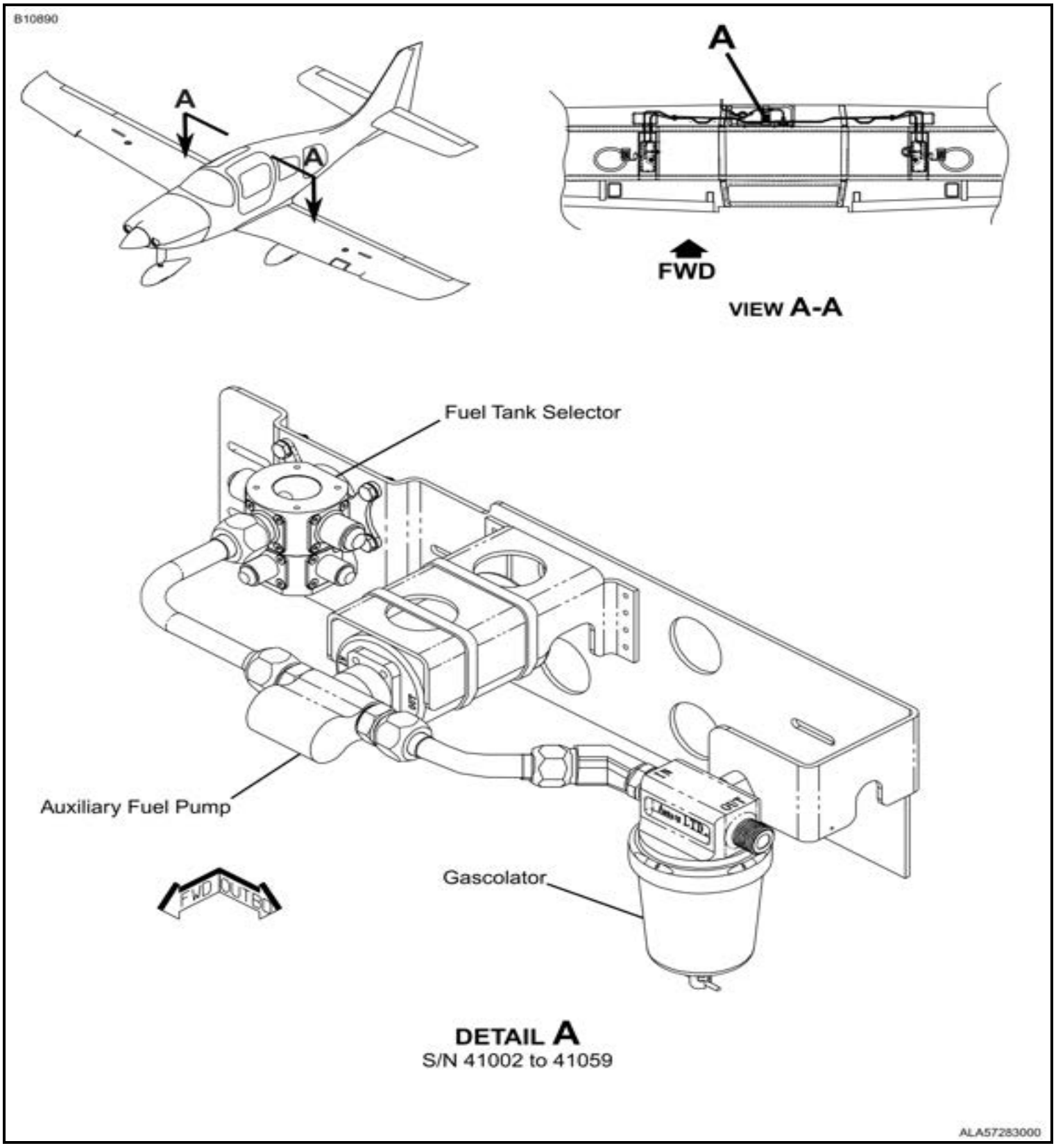
(8) Reassembly is a direct reversal of removal. Note the pin on the top of the gascolator bowl must fit into the groove of the gascolator base.

D. Fuel Strainer Internal Bypass and Filter Replacement

(1) If the internal bypass/filter requires replacement, contact Cessna Aircraft Company.

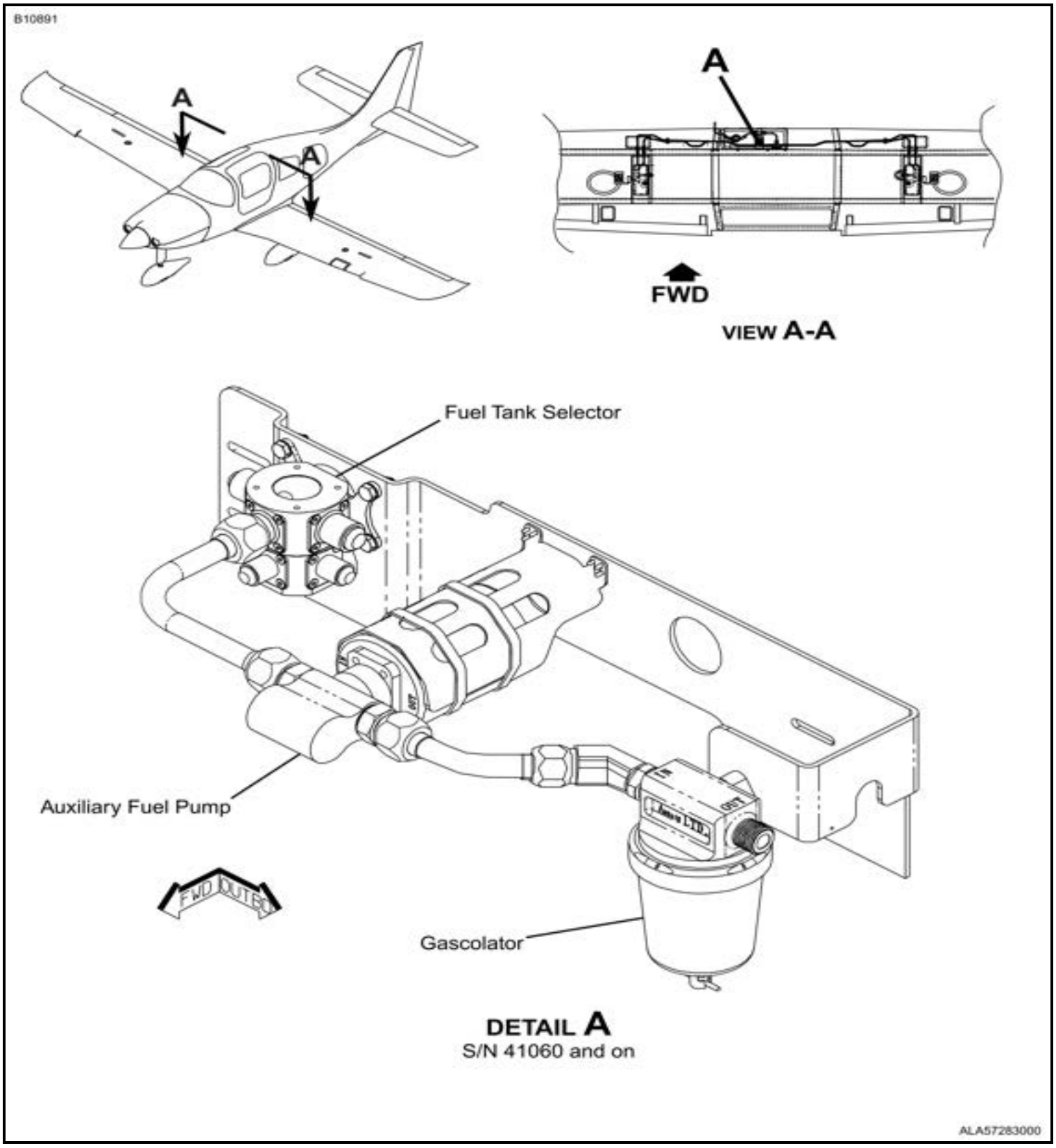
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Figure 201 : Sheet 1 : Fuel Selector, Pump, and Gascolator Module



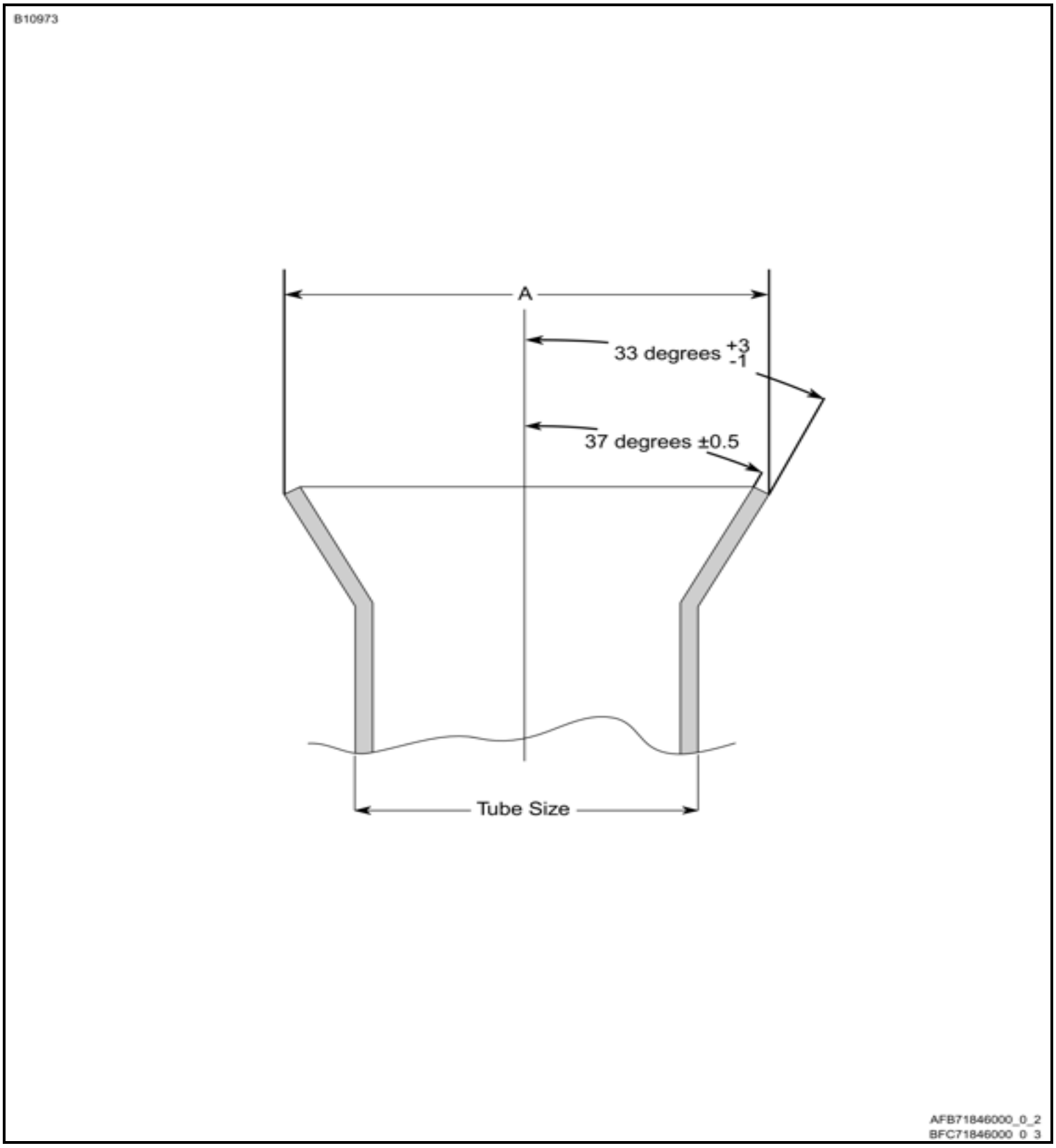
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Figure 201 : Sheet 2 : Fuel Selector, Pump, and Gascolator Module



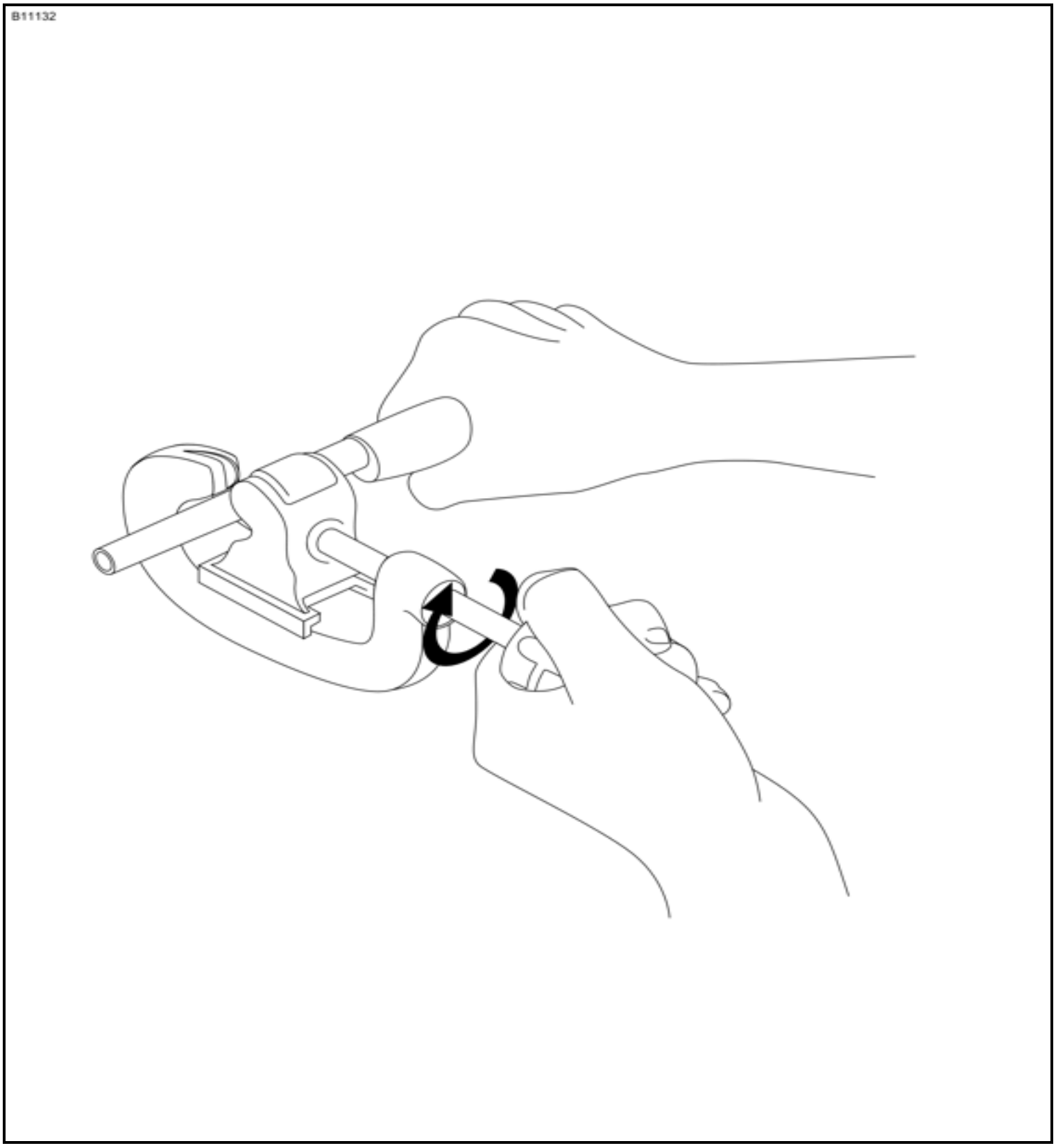
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Figure 202 : Sheet 1 : AN Flared Tube Angles



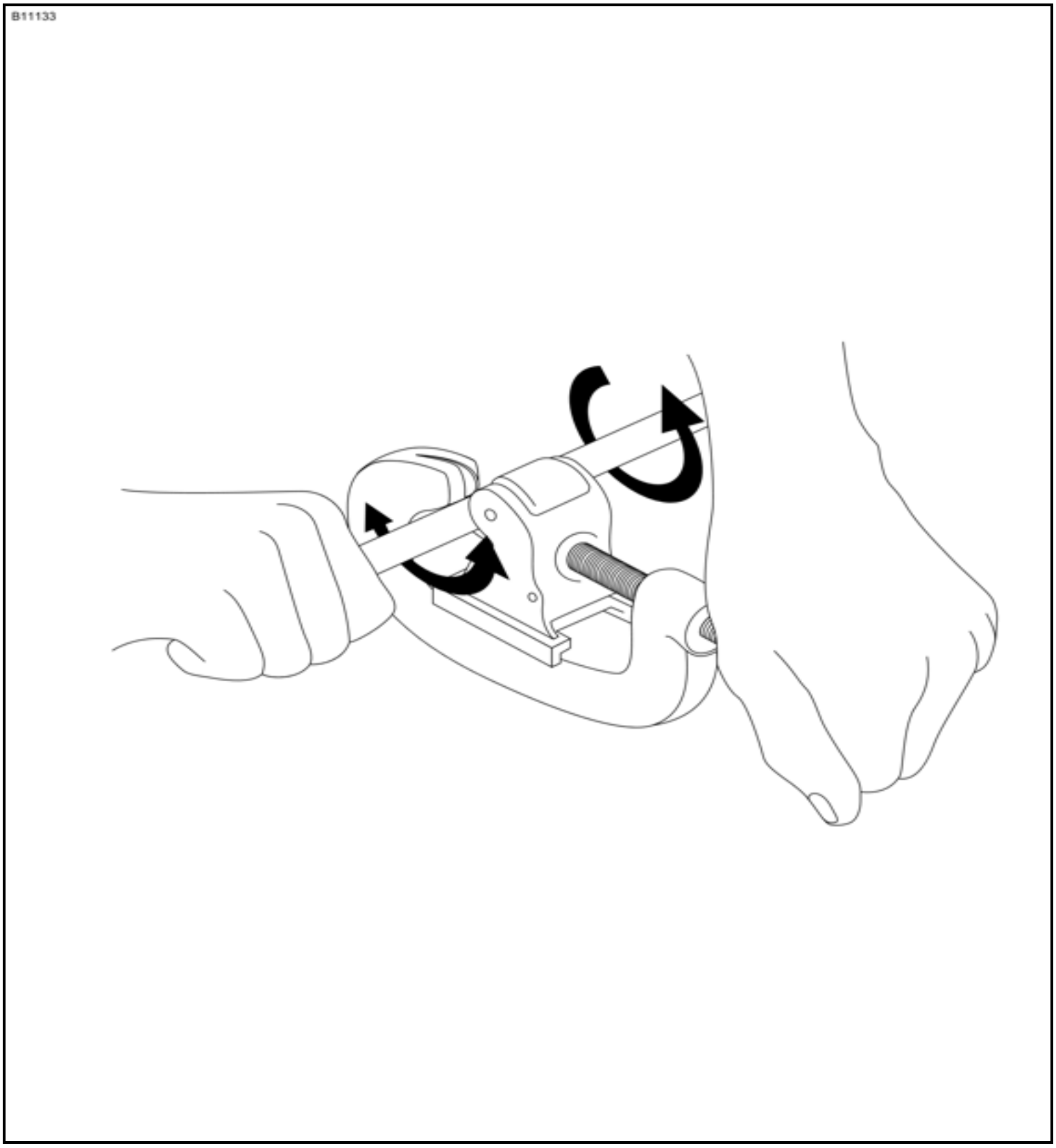
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Figure 203 : Sheet 1 : Inserting the Tubing into the Tube Cutter and Adjusting the Cutter



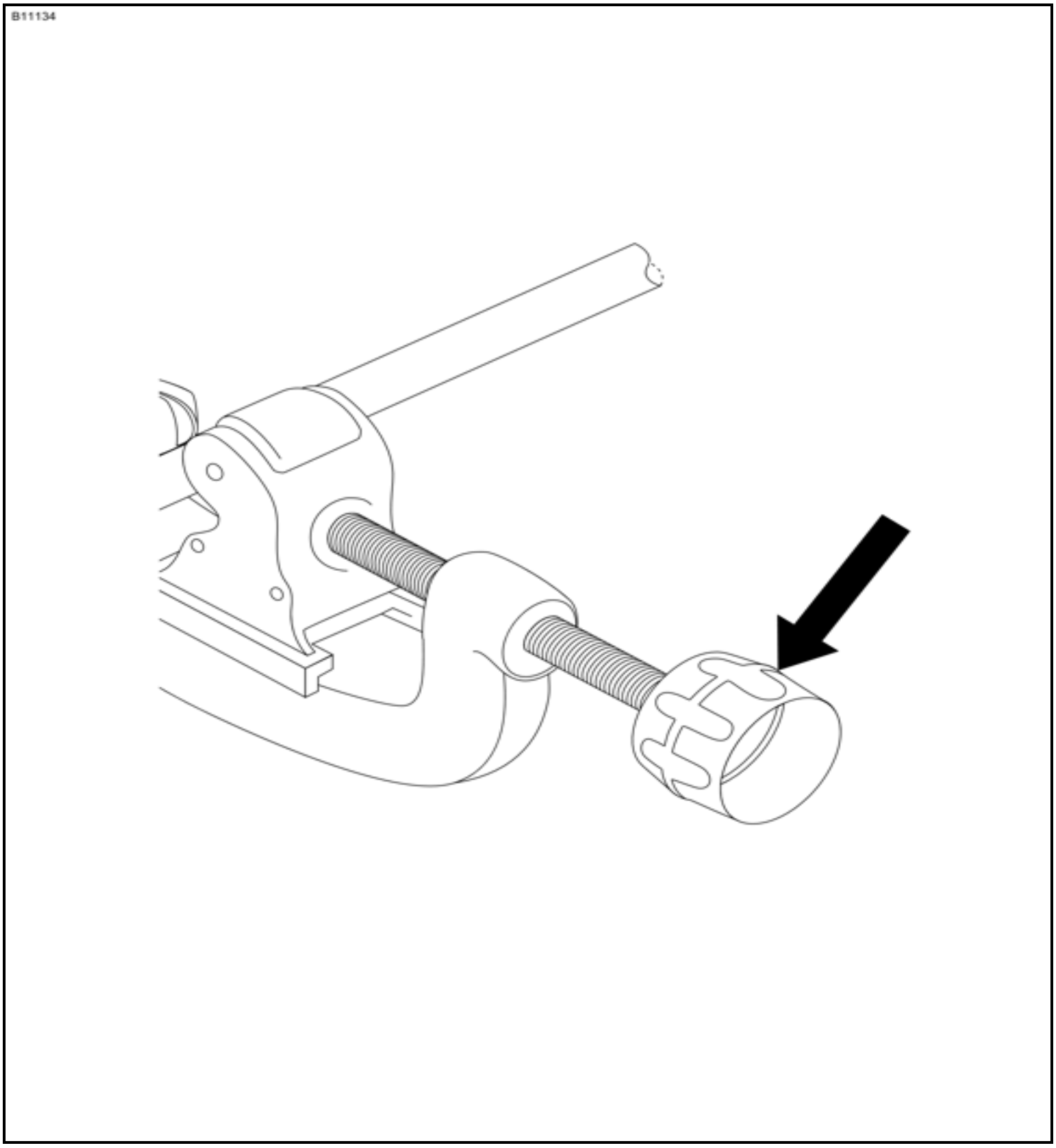
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Figure 204 : Sheet 1 : Cutting the Tube with Tube Cutter



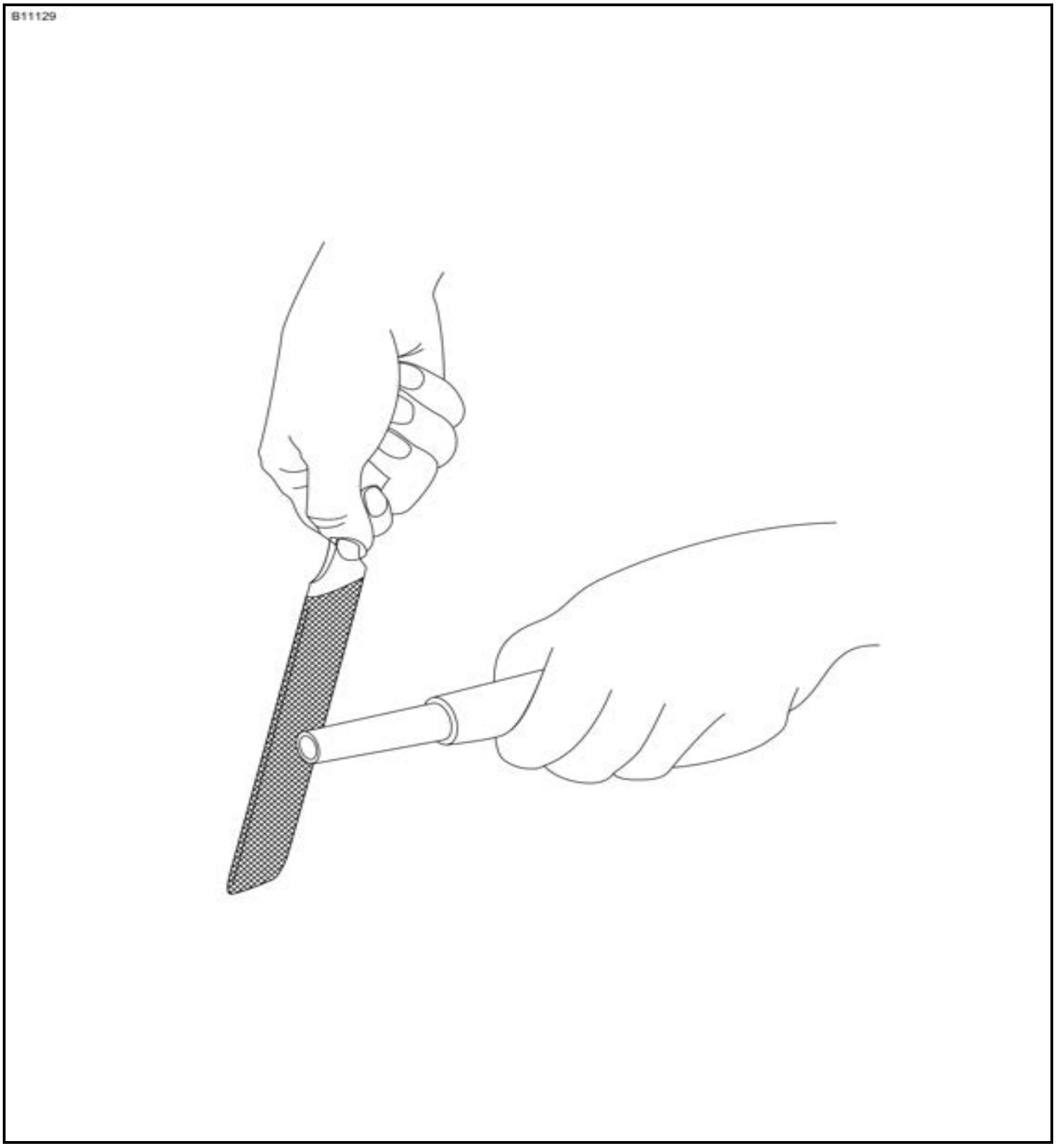
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Figure 205 : Sheet 1 : Adjusting the Tubing Cutter to Cut Deeper



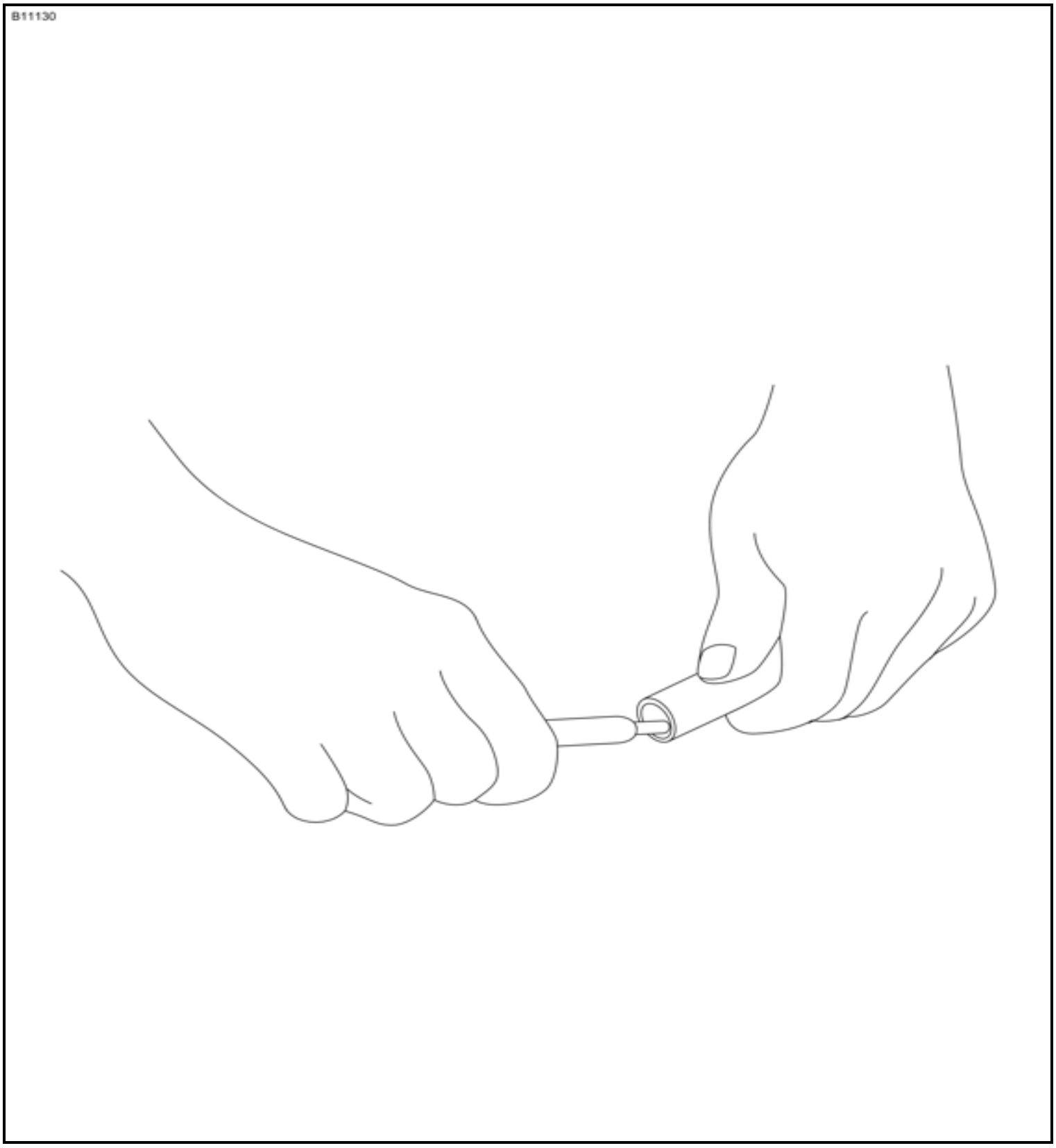
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Figure 206 : Sheet 1 : OD Deburring using a File



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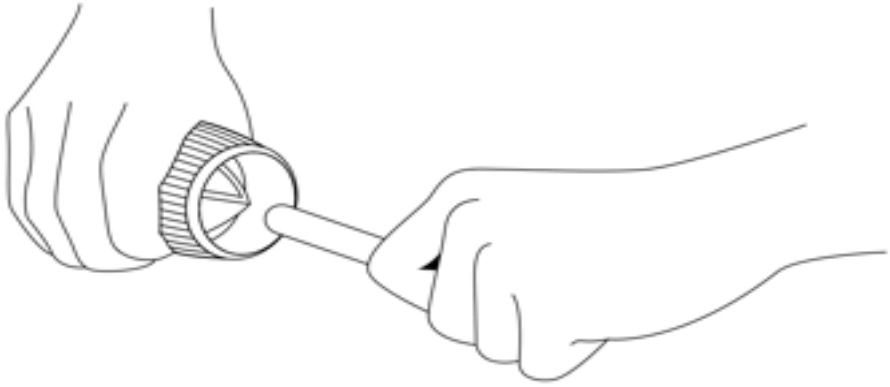
Figure 207 : Sheet 1 : ID Deburring Using a Deburring Tool



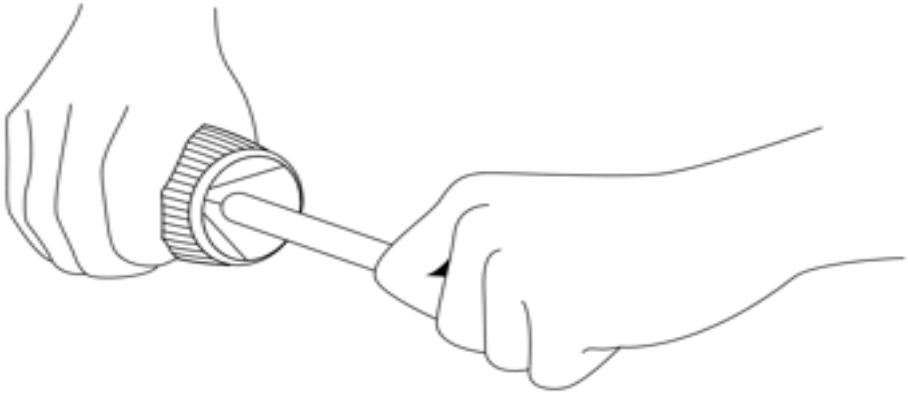
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Figure 207 : Sheet 2 : ID Deburring Using a Deburring Tool

B111 31



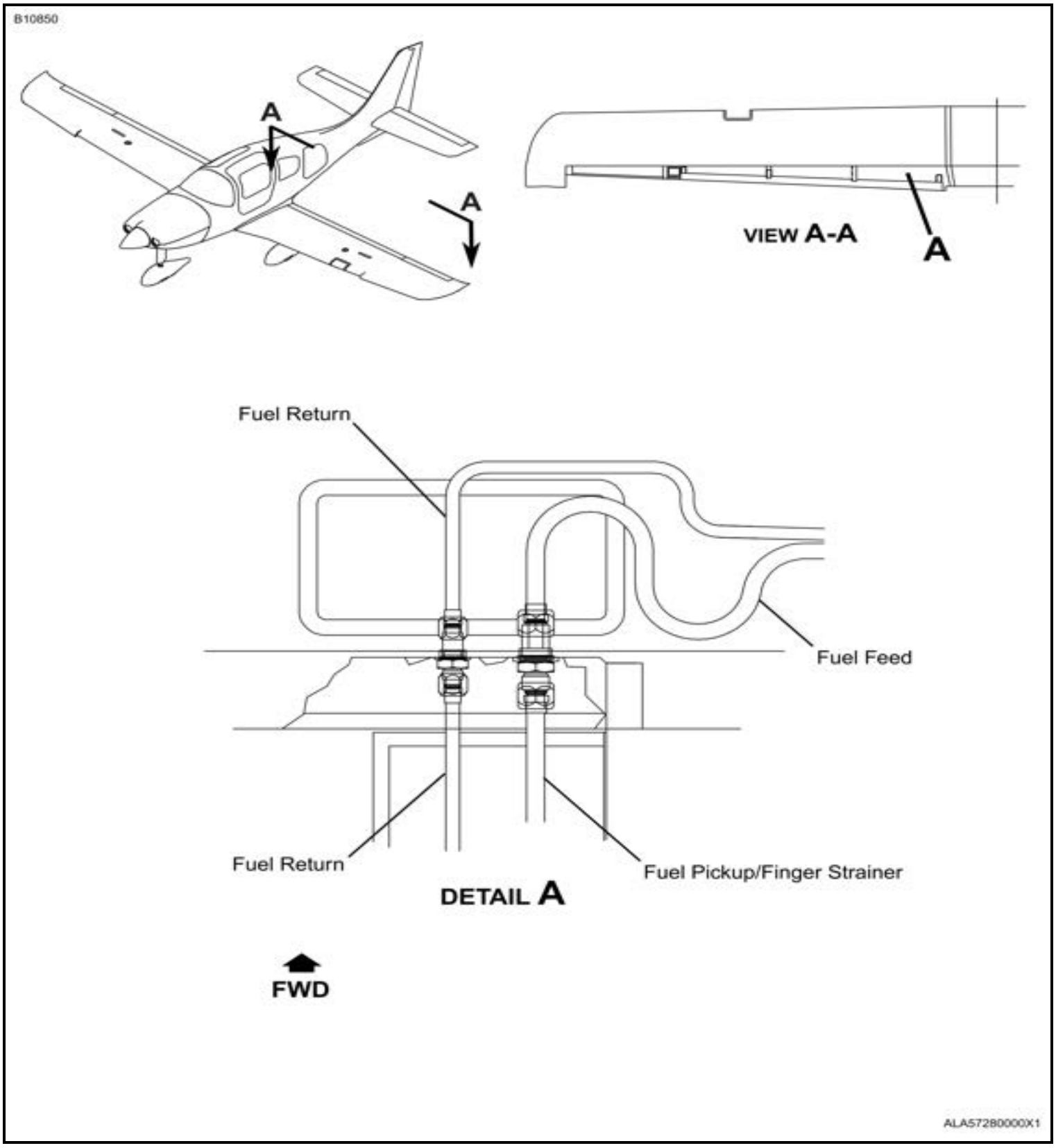
ID Deburring With Swagelok
Deburring Tools



OD Deburring With Swagelok
Deburring Tool

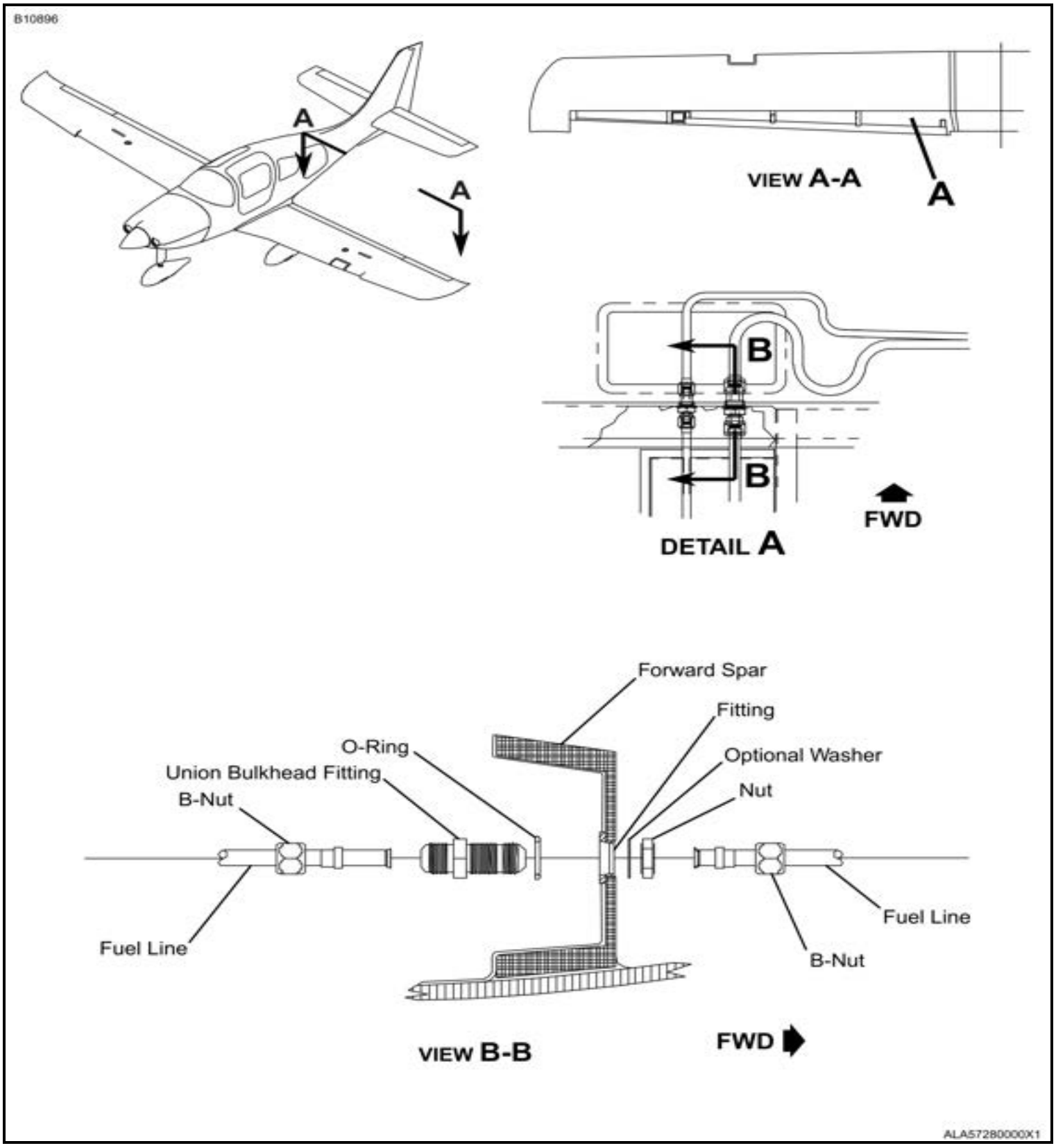
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Figure 208 : Sheet 1 : Fuel Return, Fuel Feed, and Fuel Pickup Lines (Left Wing Shown)



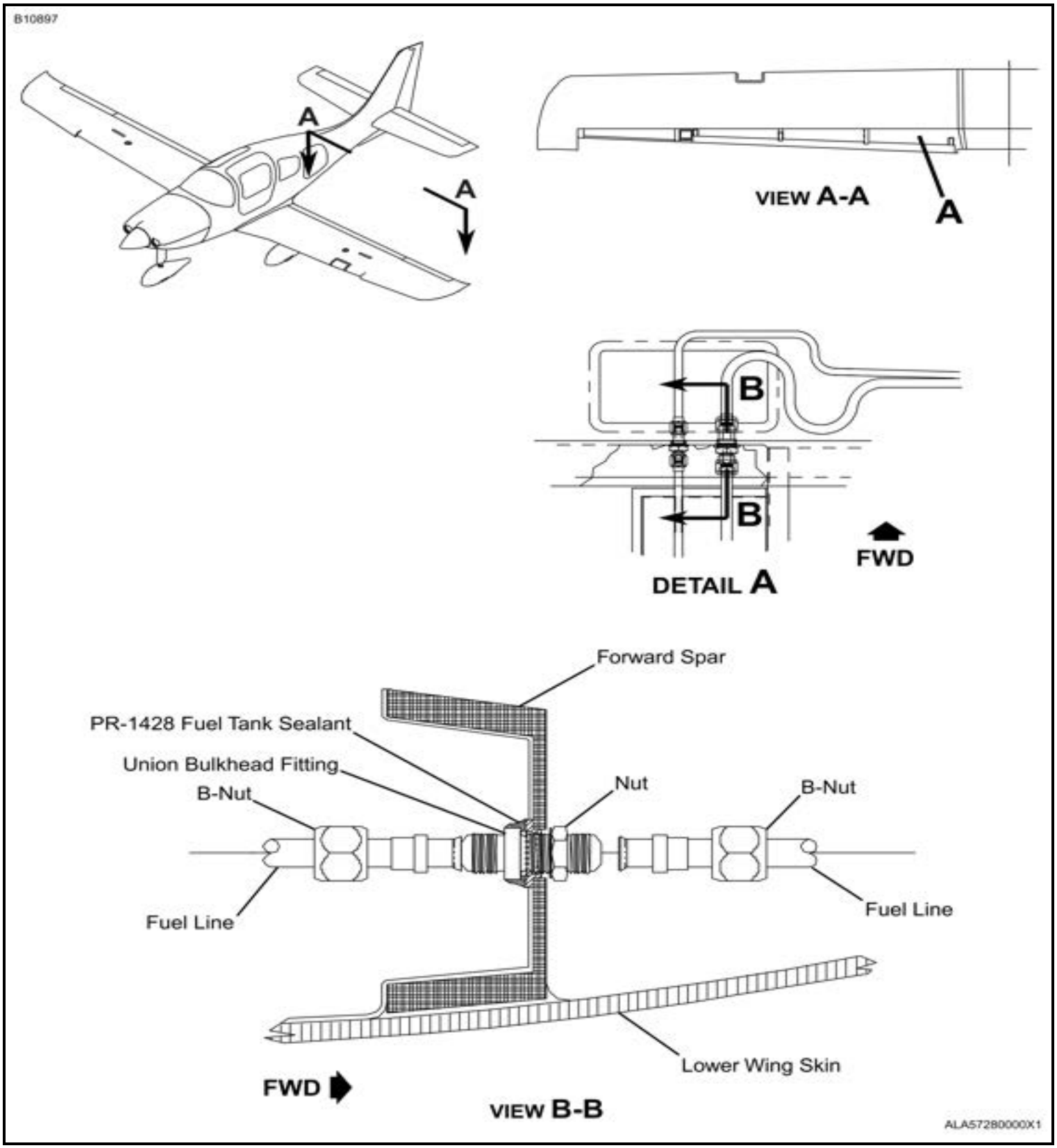
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Figure 209 : Sheet 1 : Installation of Fuel Line Fittings WS 48.0 and WS 50.25 (Section A-A)



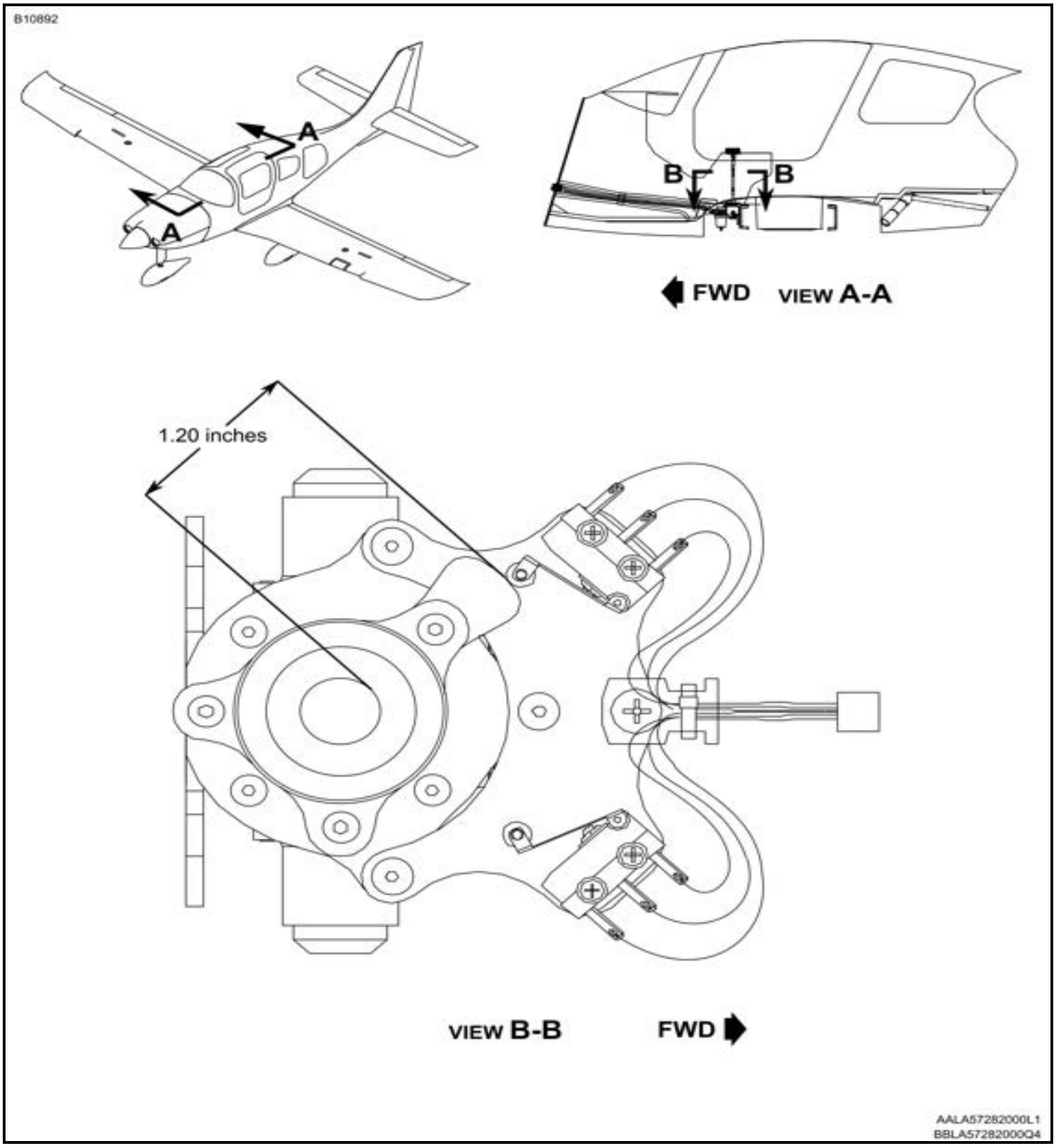
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Figure 210 : Sheet 1 : Installation of Fuel Line Fittings WS 48.0 and WS 50.25 (Section A-A)



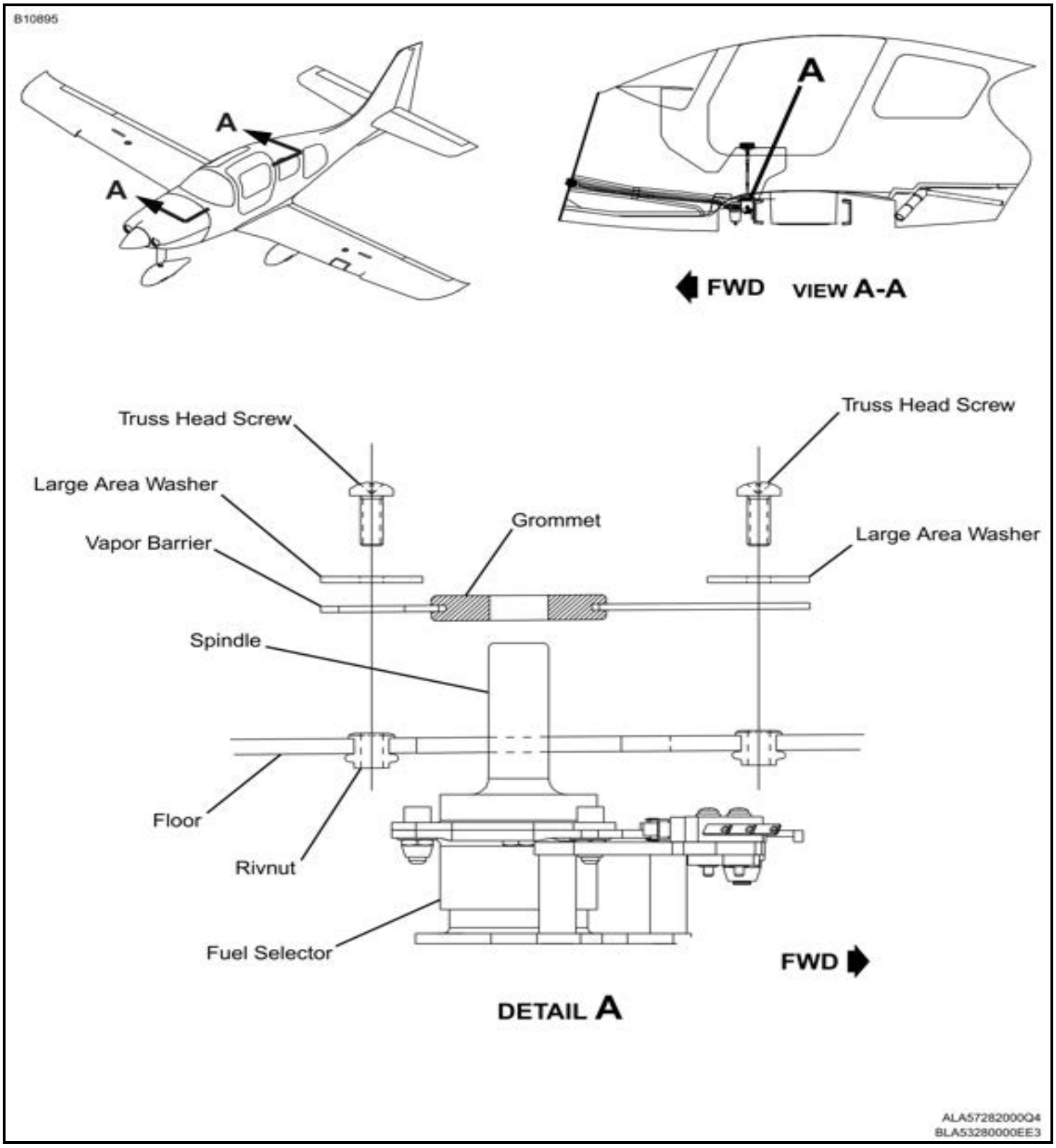
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Figure 211 : Sheet 1 : Fuel Selector Microswitch Position



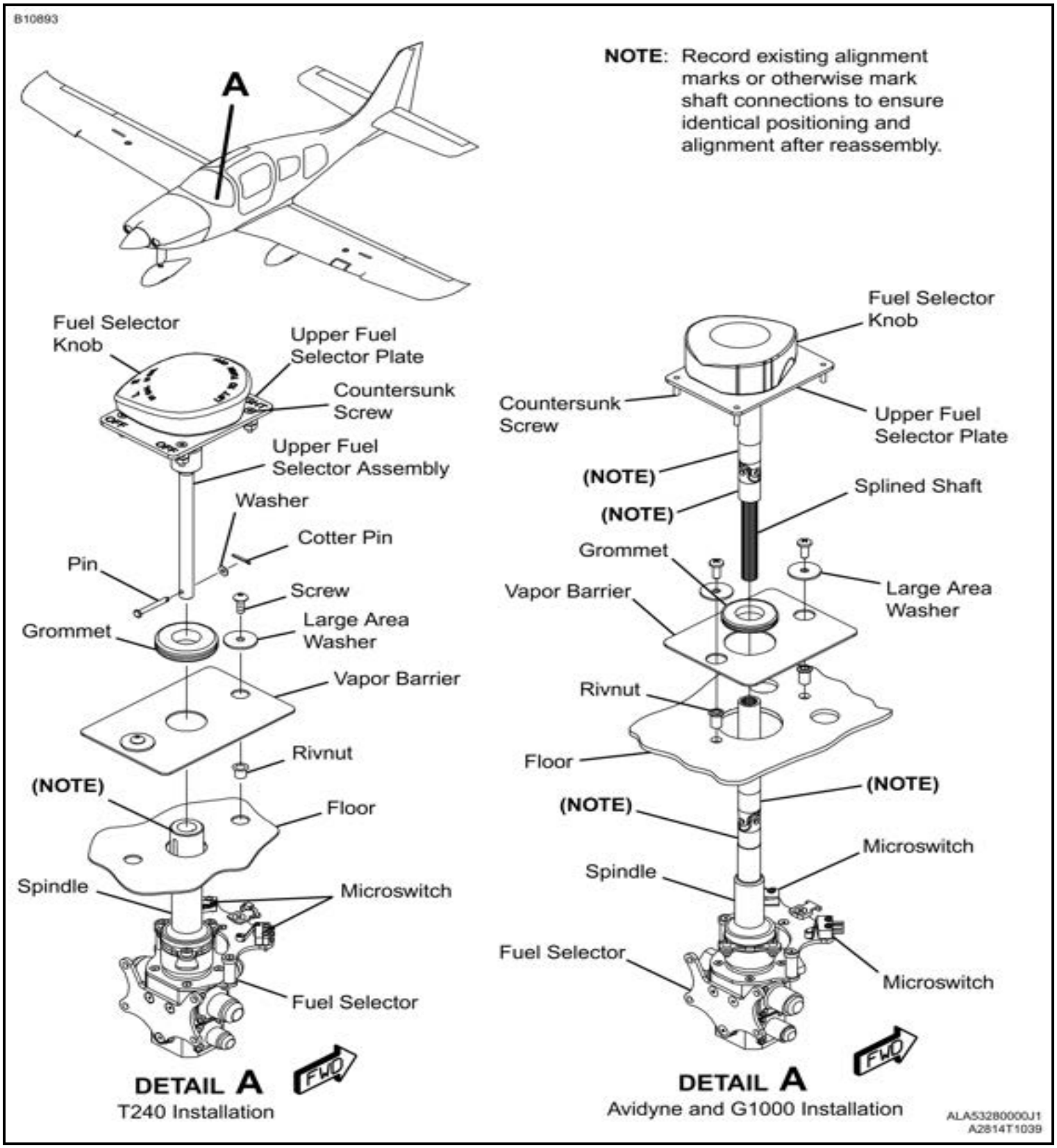
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Figure 212 : Sheet 1 : Fuel Selector Assembly Viewed from Passenger Seat



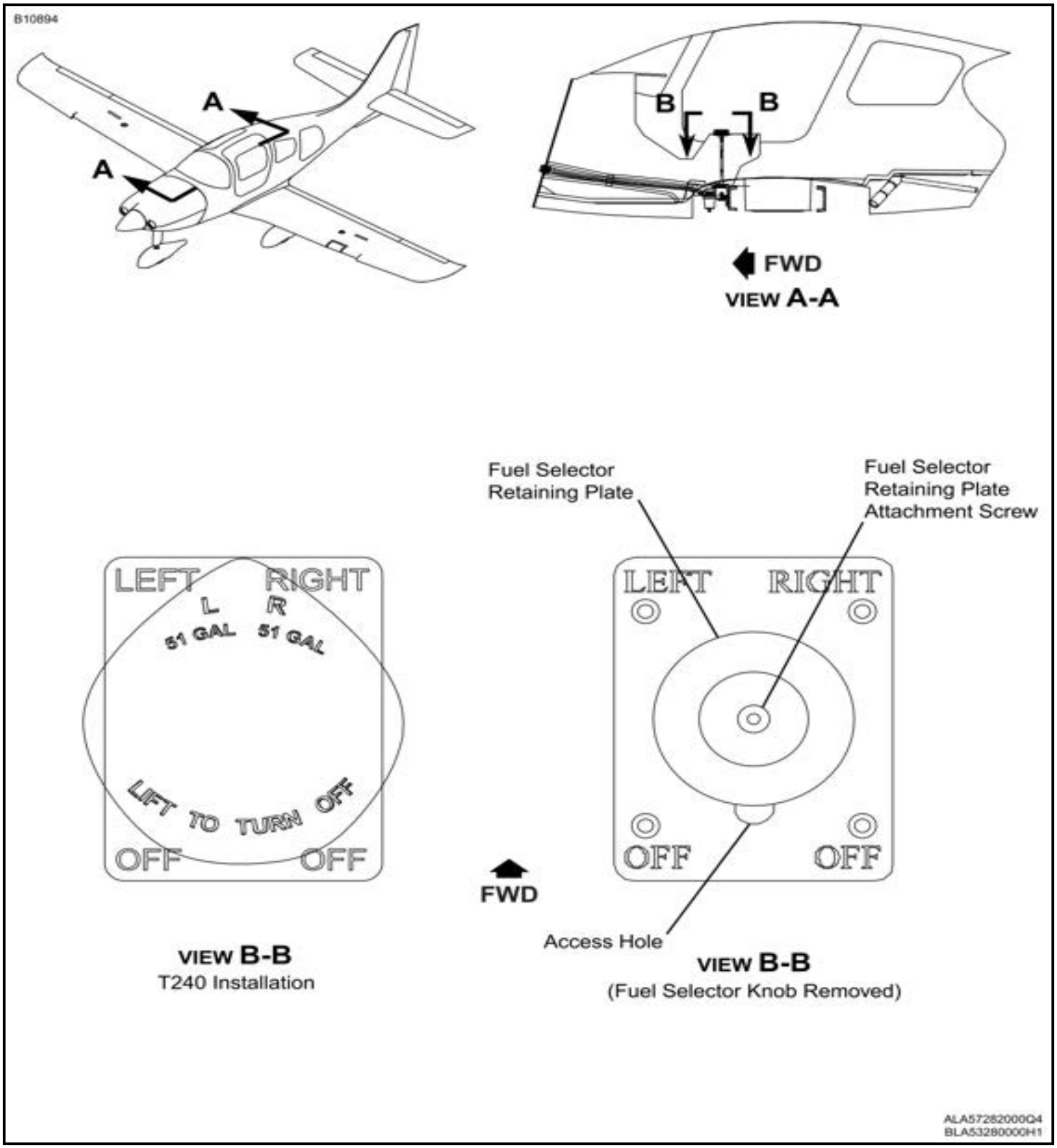
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Figure 213 : Sheet 1 : Fuel Selector Assembly



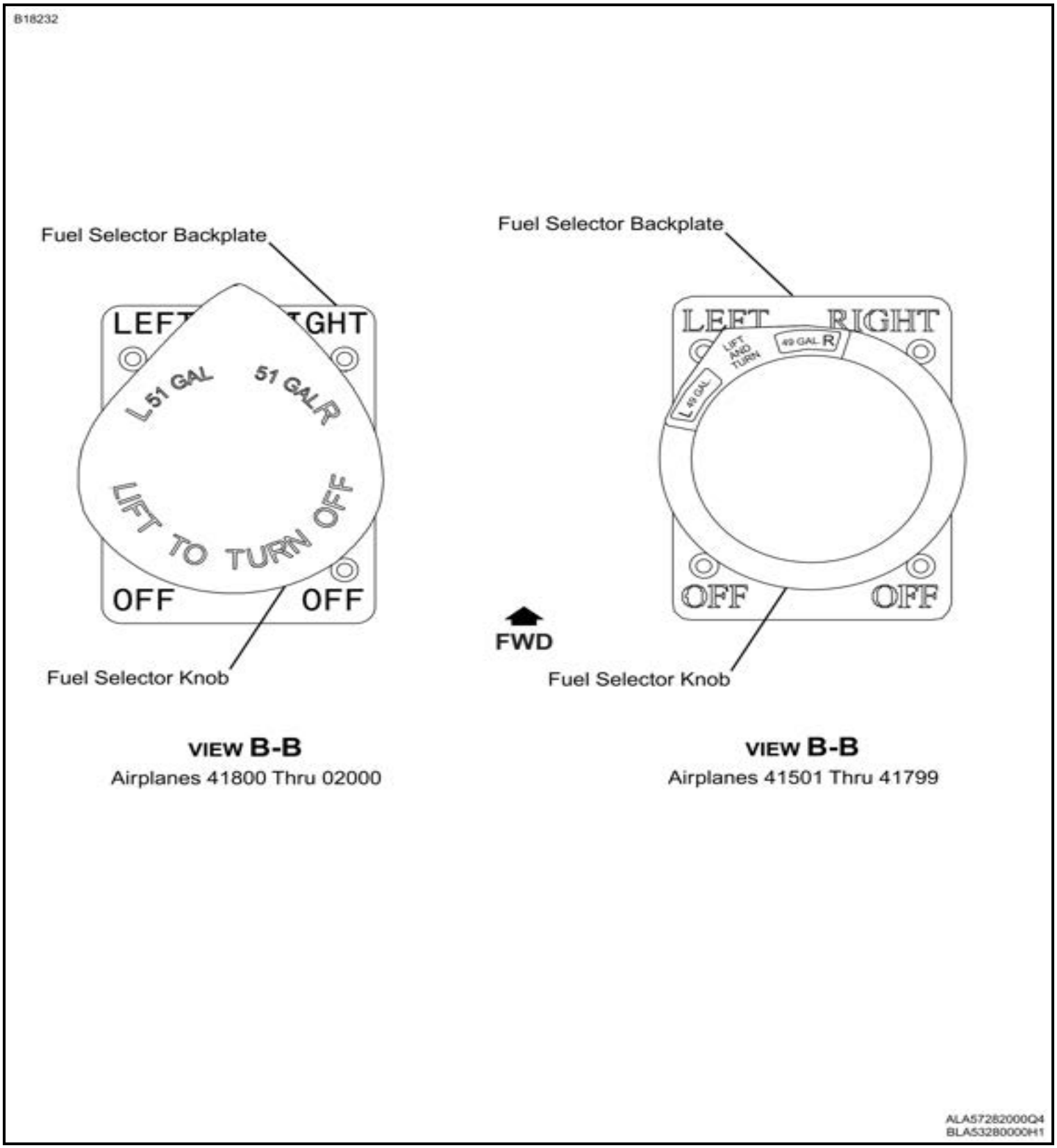
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Figure 214 : Sheet 1 : Fuel Selector Knob



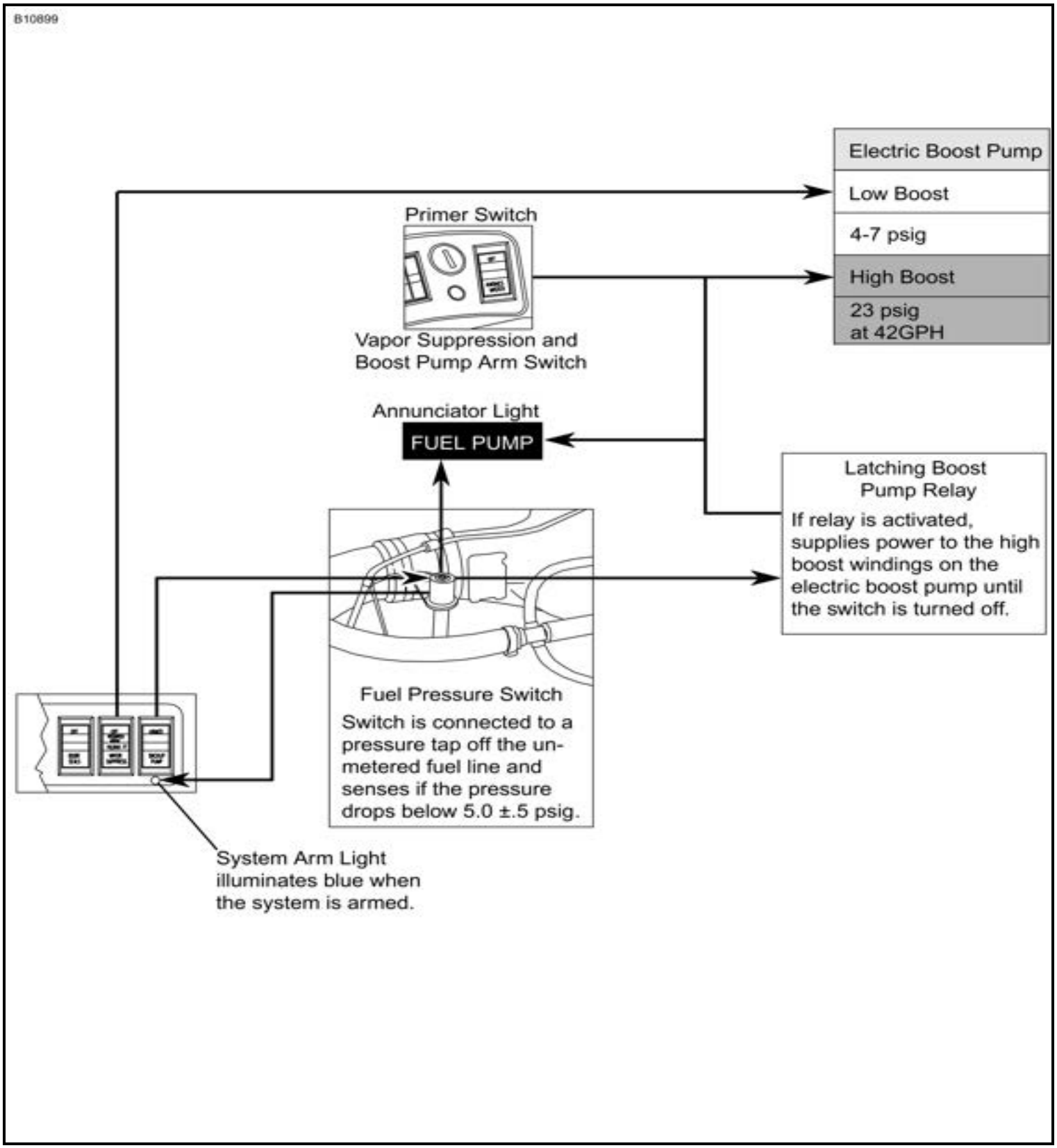
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Figure 214 : Sheet 2 : Fuel Selector Knob



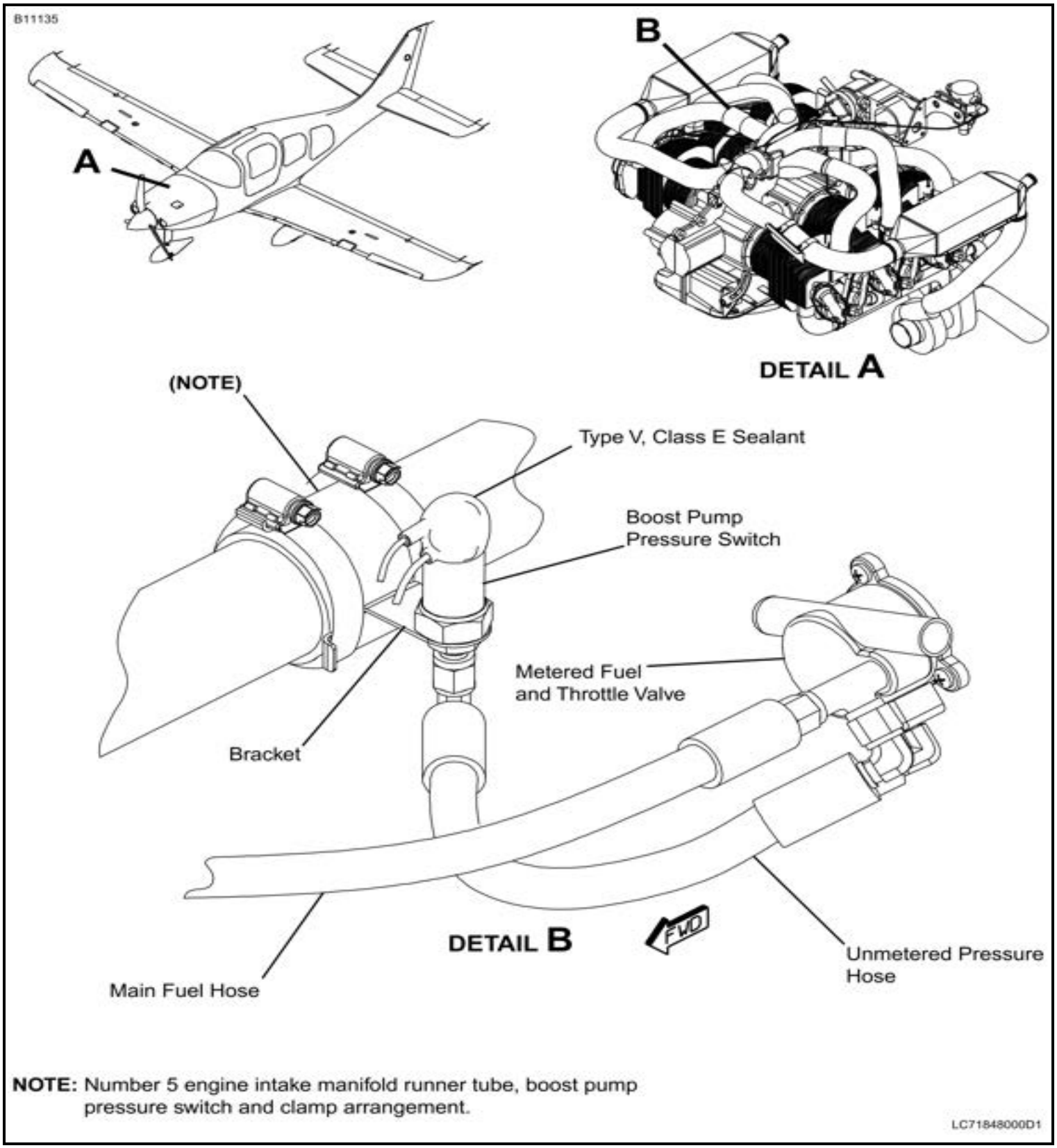
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Figure 215 : Sheet 1 : Automatic Fuel Boost Pump System (Avidyne and Garmin G1000)



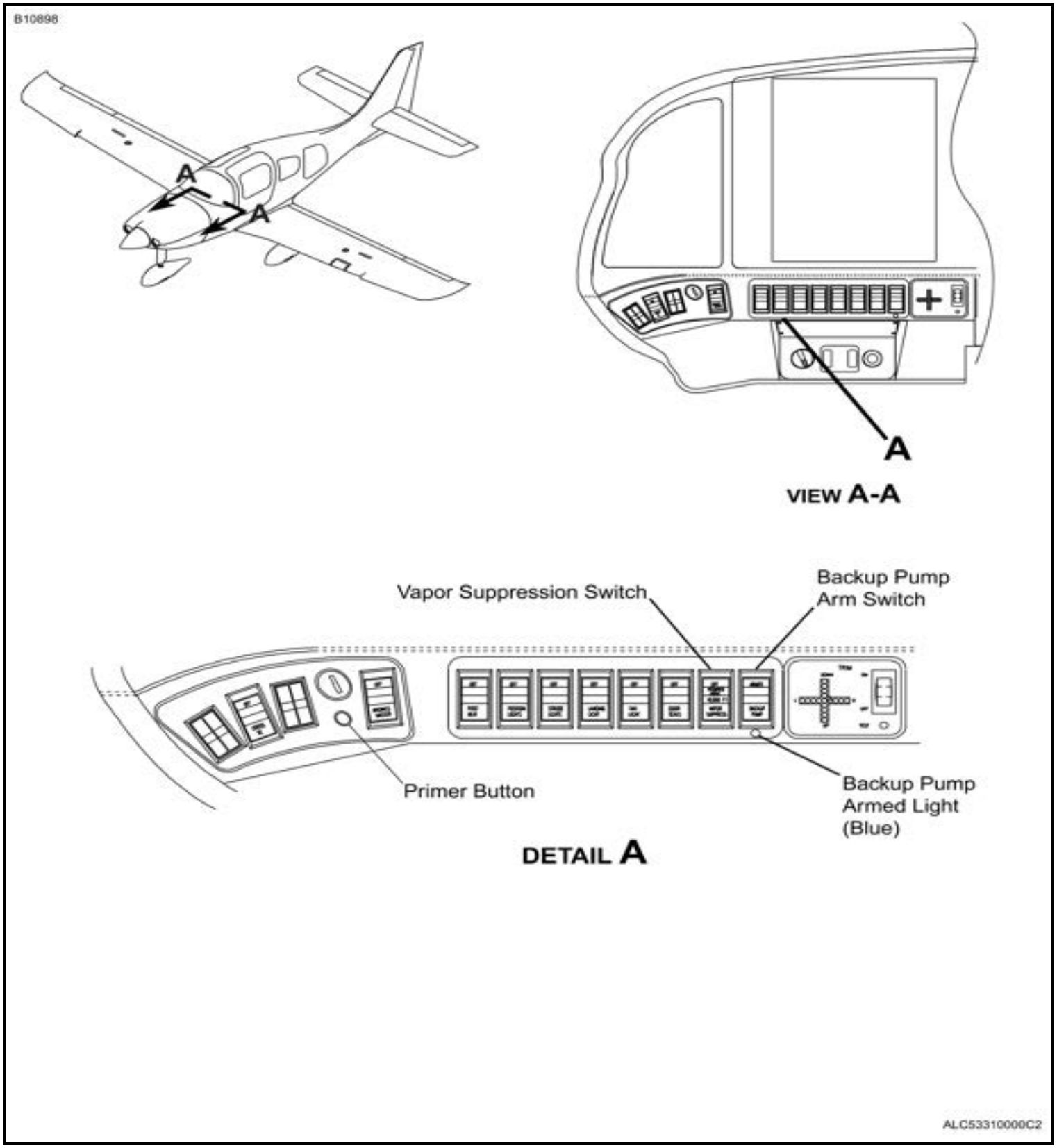
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Figure 216 : Sheet 1 : Boost Pump Pressure Switch Installation



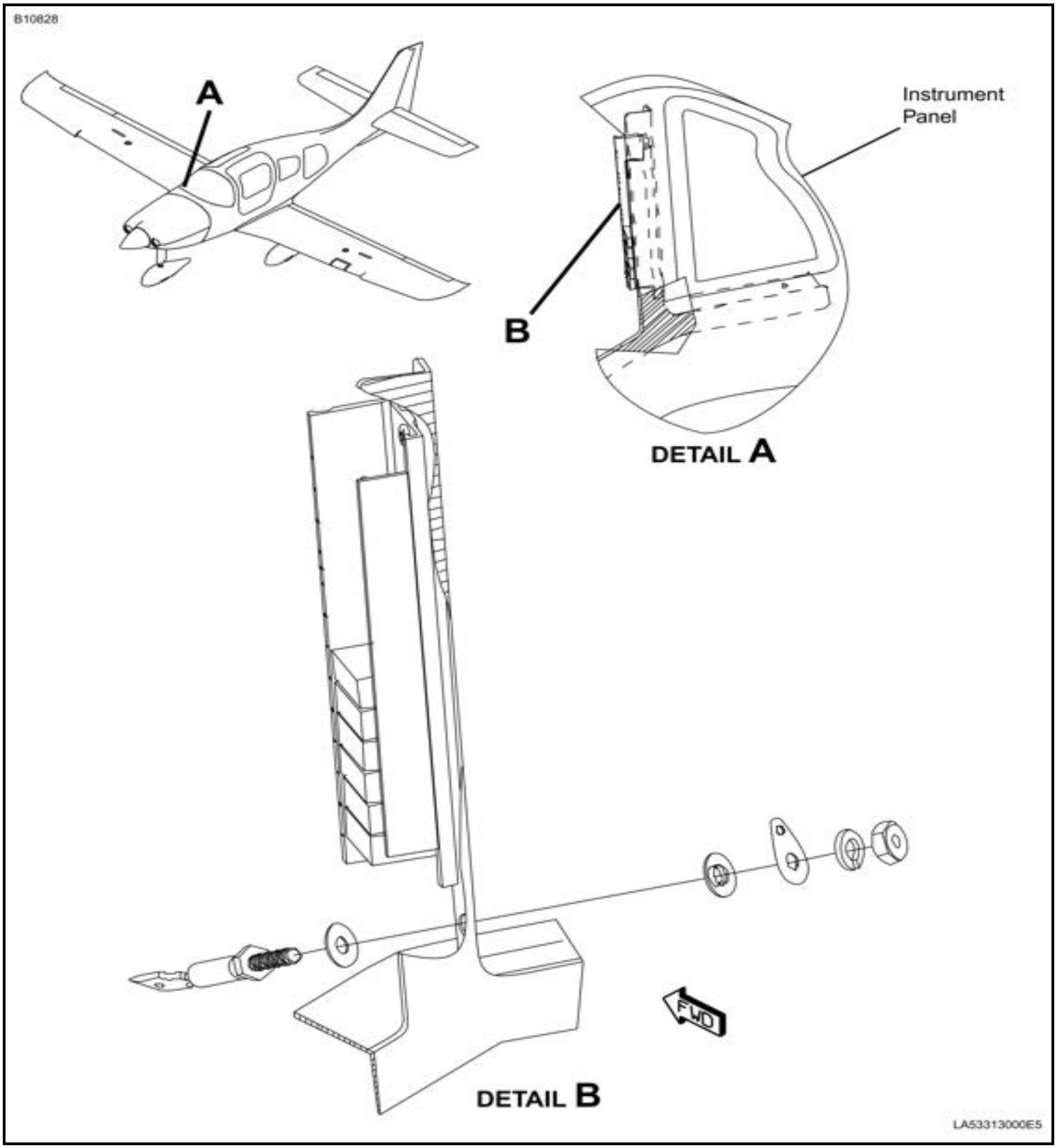
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Figure 217 : Sheet 1 : Fuel System Cockpit Switches (Avidyne Option Only)



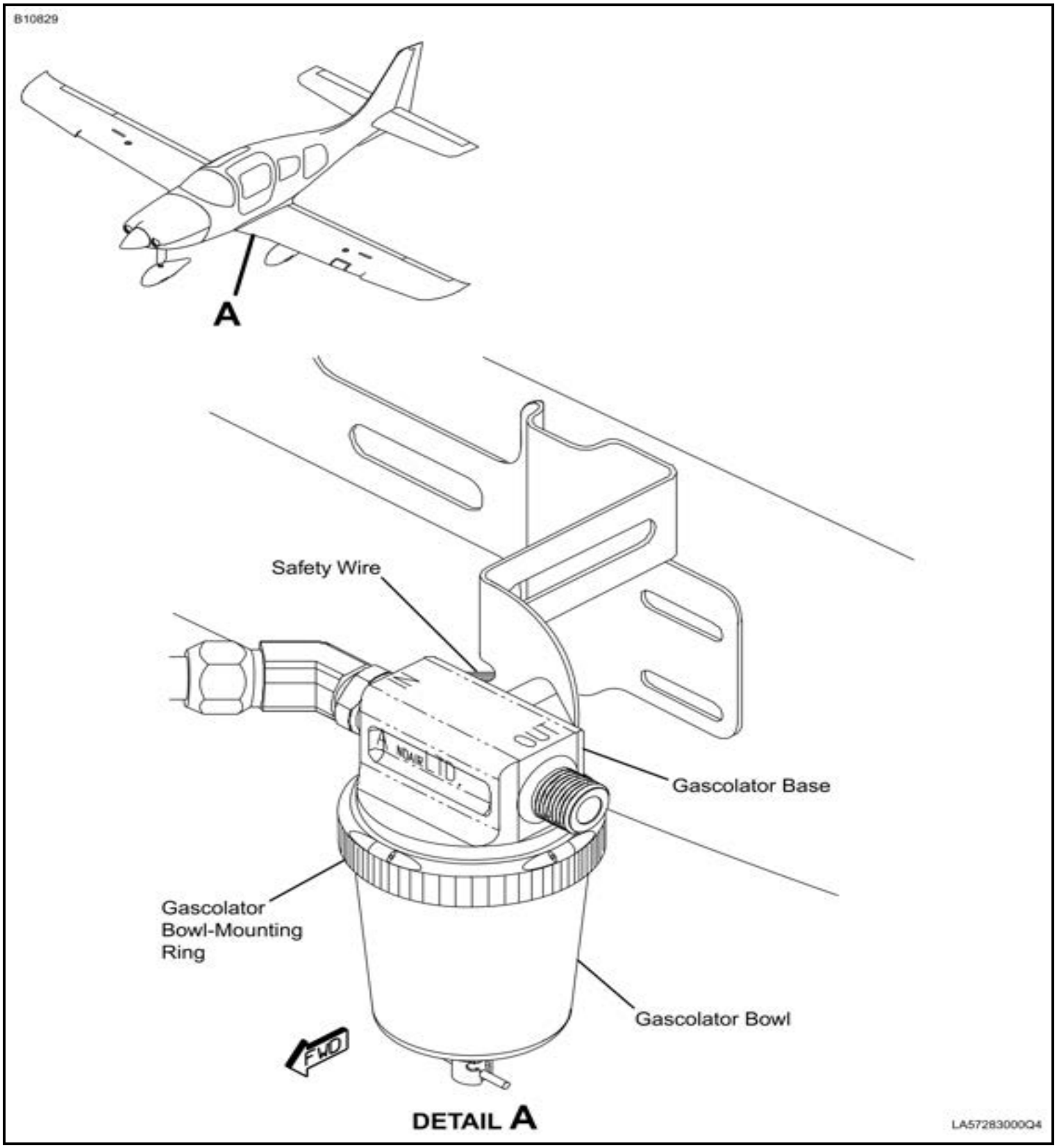
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Figure 218 : Sheet 1 : Power Diode Location and Installation



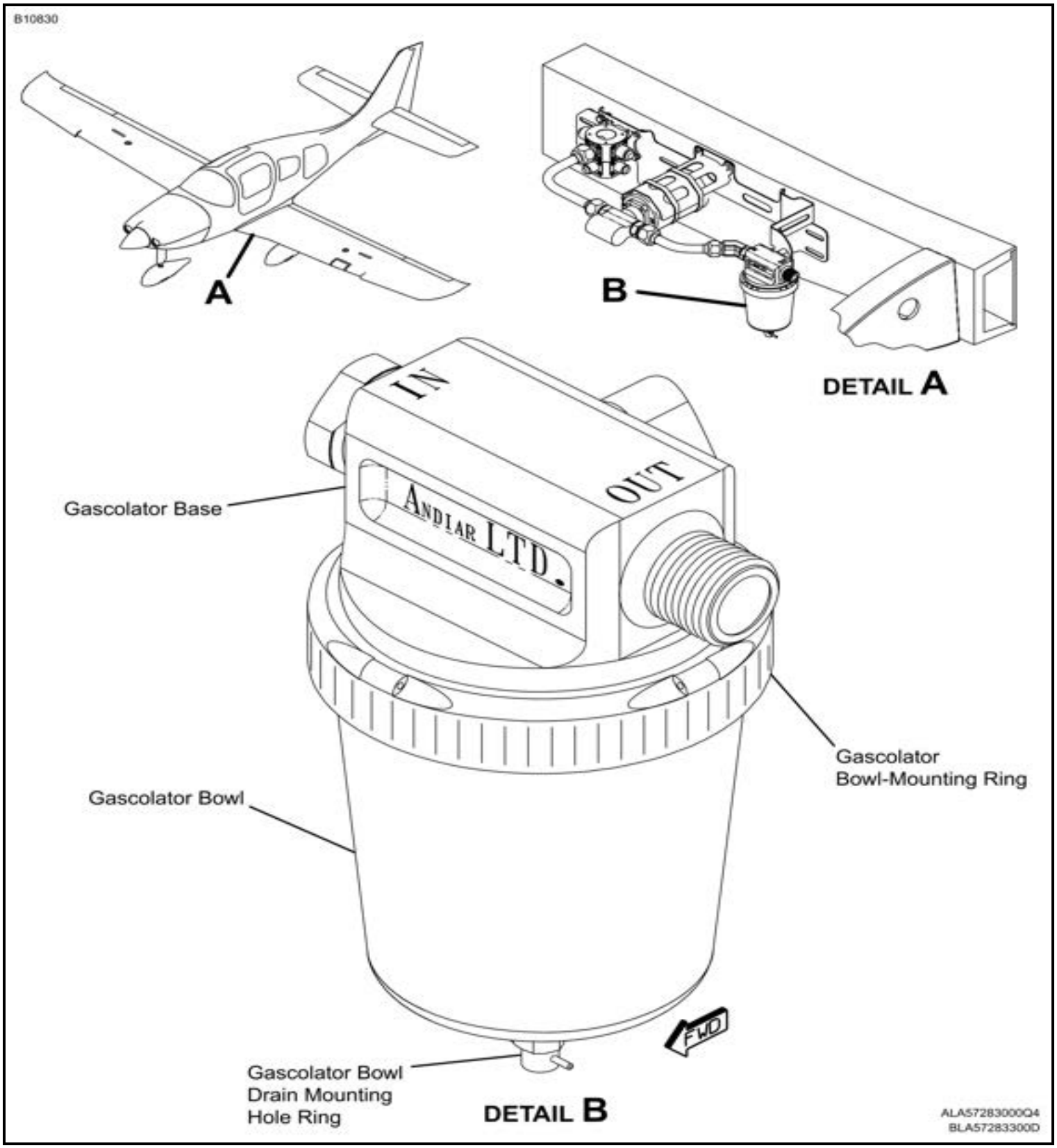
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Figure 219 : Sheet 1 : Gascolator Safety Wiring and Mounting



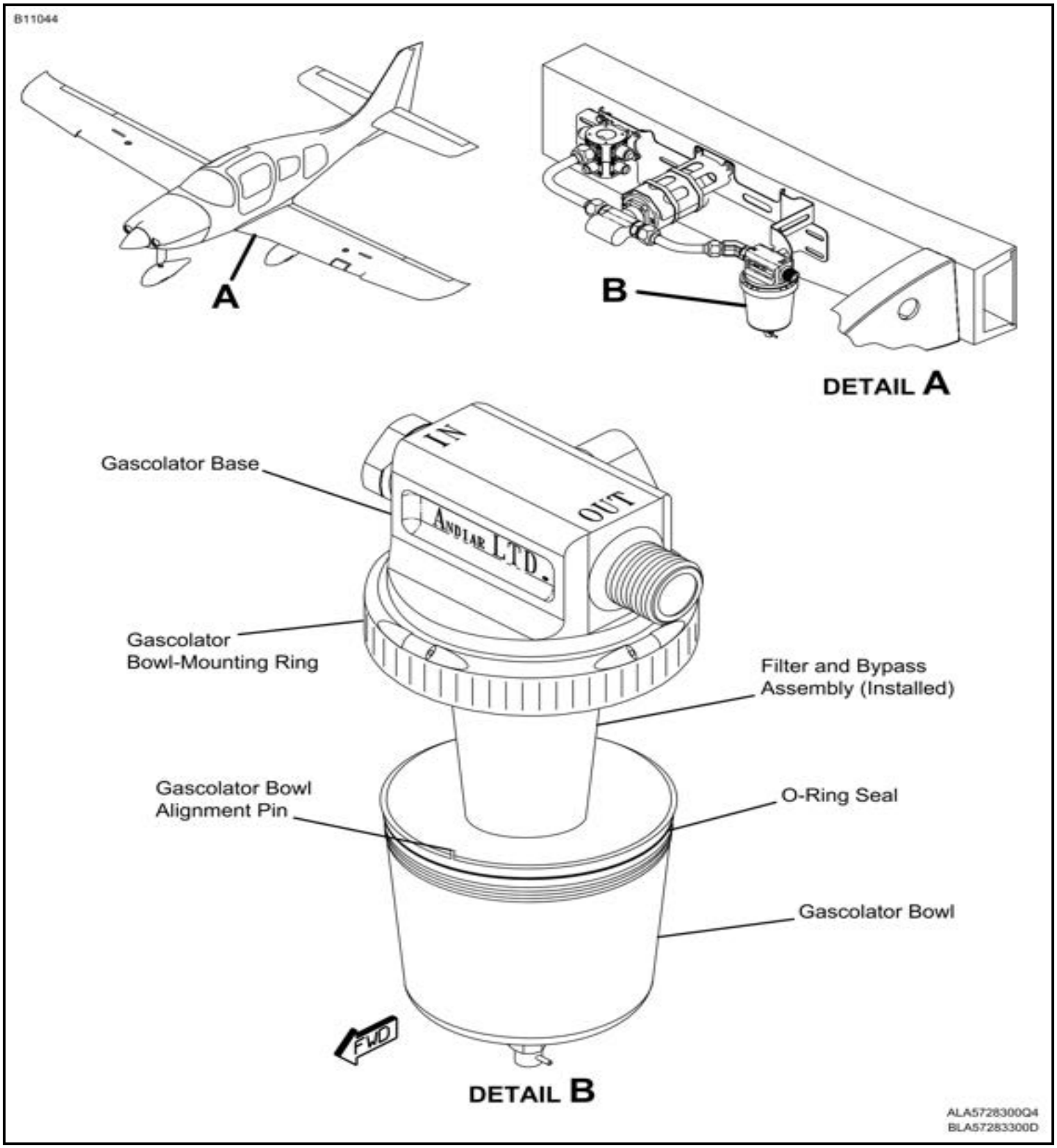
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Figure 220 : Sheet 1 : Gascolator Detail



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Figure 220 : Sheet 2 : Gascolator Detail



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FUEL INDICATING SYSTEM - MAINTENANCE PRACTICES
(Avidyne or Garmin G1000)

1. Indicating

A. **Avidyne Option** - The fuel system indicating system includes a fuel level gauge, low fuel level warning lights, fuel tank selector lights located in the fuel level gauge, a fuel selector warning light, and fuel system information display on the Avidyne Entegra EX5000 Multi-Function Display. The fuel level is measured using two tank-mounted float level sensors, one in the inboard fuel tank bay, and one in the outboard fuel tank bay. The low fuel level sensors are float switches mounted approximately through the middle of the inboard fuel tank rib at WS 46.0. The fuel selector valve indicator lights use microswitch sensors mounted on the top of the fuel selector.

B. **Garmin G1000 Option** - The fuel system indicating system displays on the Garmin G1000 MFD. The fuel level is measured using two tank-mounted float level sensors, one in the inboard fuel tank bay, and one in the outboard fuel tank bay. The low fuel level sensors are float switches mounted approximately through the middle of the inboard fuel tank rib at WS 46.0. The fuel selector valve indicator lights use microswitch sensors mounted on the top of the fuel selector.

2. Fuel Quantity Gauge Removal and Installation. (Avidyne Option)

A. Remove the Fuel Quantity Gauge.

(1) Remove electrical power from the airplane.

(2) Remove the screws that attach the instrument panel.

(3) Carefully pull the instrument panel out to get access to the back of the fuel quantity gauge.

(4) Disconnect the electrical connector from the fuel quantity gauge.

(5) Remove the screws that attach the gauge to the instrument panel.

(6) Remove the gauge from the airplane.

B. Install the Fuel Quantity Gauge.

(1) Put the gauge in position on instrument panel.

(2) Attach the gauge to the instrument panel with screws.

(3) Connect the electrical connector.

(4) Put the instrument panel into place.

(5) Use screws to attach the instrument panel.

(6) Make sure the gauge functions correctly.

(a) Put a known quantity of fuel greater than 10 gallons of fuel in each wing.

(b) Put the Master switch to the ON position.

(c) Make sure the fuel quantity gauge indicates the amount of fuel in each tank.

(d) Put the Master switch to the OFF position.

3. Fuel Valve Indicator Lights

A. Fuel Valve Indicator Lights Description and Operation

(1) The fuel valve is equipped with two micro-switches to sense the position of the fuel selector. The selected tank is displayed on the fuel level gauge with a green LED (Avidyne option) or displayed by a blue light on the MFD (Garmin G1000 option) showing the selected fuel tank. If no green LED or blue light, as applicable, is illuminated, the selector is off the tank, in-between tanks, or in the off position. During these conditions, a FUEL VALVE warning light illuminates (Avidyne option) or a warning annunciation displays (Garmin G1000 option).

B. Testing the Fuel Valve Indicator Lights

(1) Avidyne option

(a) With the master switches on (batteries only if the engine is not running) place the fuel selector in the left tank detent. The fuel warning light should be extinguished, and the green light on the fuel level gauge should be illuminated.

(b) Repeat for the right tank.

(c) Verify that both green lights, as applicable, are extinguished and the fuel warning light is illuminated when the valve is in between tanks or in the off position.

(d) Contact Cessna Aircraft Company if the indicator lights are not functioning properly.

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(2) Garmin G1000 option

(a) With the master switches on (batteries only if the engine is not running) place the fuel selector in the left tank detent. The fuel warning annunciation should clear, and the blue light on the MFD should be illuminated.

(b) Repeat for the right tank.

(c) Verify that both blue lights are extinguished and the fuel warning annunciation is displayed when the valve is in between tanks or in the off position.

(d) Contact Cessna Aircraft Company if the indicator lights are not functioning properly.

4. Low Fuel Annunciators (Left And Right Tanks)

A. **Low Fuel Annunciators Removal and Installation** - Fuel Tank Low Fuel Level Floats

(1) If removal of the low fuel level switch is required, contact Cessna Aircraft Company for further instructions.

NOTE: If the fuel switch access panel (installed on the outboard side of the FIKI TKS fluid tank) is removed to get access to the low fuel level switch, it must be correctly sealed when installed. Refer to Chapter 30, TKS Anti-Ice System (FIKI) - Description and Operation, Description.

B. **Testing Low Fuel Annunciator**

(1) With less than six gallons of usable fuel in the fuel tank and the aircraft level, the low fuel warning annunciator should be illuminated for the tank with the low fuel quantity.

(2) During fueling, the low fuel level warning should extinguish prior to 10 gallons usable fuel being in the tank.

(3) If a low fuel level sensor is suspected, replace per instructions in Section 28-10-00, Fuel Level Sensors.

(4) Visually inspect the low fuel level float switch or visible damage and freedom of movement.

(5) If a faulty switch is suspected, refer to Chapter 33 of detailed instructions.

C. **Replacing Low Fuel Annunciator Lights**

(1) Refer to Chapter 33 of this manual for detailed instructions.

5. Fuel Quantity Transducer Calibration (Garmin G1000)

NOTE: The G1000 system can be calibrated for 49 as well as 51 gallon fuel tanks. Ensure the appropriate option has been selected when performing fuel calibration. Incorrect calibration will lead to misleading displays and potential fuel starvation of the aircraft. Attention to detail is imperative.

NOTE: Use proper precautions when handling fuel. Ensure that the aircraft is grounded correctly and that there is adequate ventilation.

A. **Fuel Quantity Transducer Calibration Setup**

(1) Level the aircraft per Section 07-00-00.

(2) Drain all fuel from each fuel tank, and set the fuel selector switch to the 'OFF' position.

(3) Fill each fuel tank with unusable fuel level, 2 gallons (for 51 gallon option) or 4 gallons (for 49 gallon option).

(4) Start the G1000 system in Configuration mode. Reboot the MFD in normal mode for this procedure by pulling, then resetting, the MFD circuit breaker. On the MFD, press the SYSTEM softkey to display the full page engine instrumentation.

(5) Go to the CAL Page Group on the PFD. The FUEL TANK CALIBRATION page should be displayed as shown in Figure 201.

(6) This page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence:

(a) softkey 12 (Far Right softkey)

(b) softkey 11

(c) softkey 10

(d) softkey 9

(7) Press the TNK SEL softkey to activate the cursor in the CURRENT TANK field. Rotate the FMS knob as necessary throughout this procedure to select the RIGHT or LEFT tank.

B. **Fuel Quantity Transducer - Empty Calibration**

(1) Verify that unusable fuel has been added to both tanks per the calibration setup instructions above. Allow both fuel probes to stabilize for at least 2 minutes.

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(2) Select the LEFT tank on the PFD.

(3) Press the EMPTY softkey. The cursor will automatically activate and select the CALIBRATE? option. The calibrated value setting will default to 00.00.

(4) Press the ENT key. A prompt appears requesting overwrite acknowledgement. Select YES and press the ENT key. The G1000 system will 'zero' the actual fuel quantity value to be displayed.

(5) Select the RIGHT tank.

(6) Press the EMPTY softkey. The cursor will automatically activate and select the CALIBRATE? option. The calibrated value setting will default to 00.00.

(7) Press the ENT key. A prompt appears requesting overwrite acknowledgement. Select YES and press the ENT key. The G1000 system will 'zero' the actual fuel quantity value to be displayed.

(8) Observe the CALIBRATED TOTAL indication for the RIGHT tank. Verify that it remains at 0.00.

(9) Select the LEFT tank. Observe the CALIBRATED TOTAL indication for the LEFT tank. Verify that it remains at 0.00.

(10) On the MFD, verify the fuel quantity indicators correctly point to '0'.

C. **Fuel Quantity Transducer - 5 Gallon Calibration**

(1) Fill each fuel tank with 5±0.1 gallons usable fuel.

(2) Allow the fuel probes to stabilize at least 2 minutes before continuing.

(3) Validate the CALIBRATED TOTAL indication for the RIGHT tank is within the range specified using Table 201. This is the pre-calibrated value.

Table 201. 5-Gallon Calibration Table for the Right Fuel Tank

RIGHT 1 SUB-TANK				
Actual Usable Fuel	Calibration Value Range		Record Actual Indicated Fuel Quantity Here	Is Calibrated Total Within Specified Range?Yes/No
	Minimum Allowed Indication	Maximum Allowed Indication		
5	4.5	5		

(4) Select the LEFT tank. Validate the CALIBRATED TOTAL indication for the LEFT tank is within the range specified using Table 202. This is the pre-calibrated value.

Table 202. 5-Gallon Calibration Table for the Left Fuel Tank

LEFT 1 SUB-TANK				
Actual Usable Fuel	Calibration Value Range		Record Actual Indicated Fuel Quantity Here	Is Calibrated Total Within Specified Range?Yes/No
	Minimum Allowed Indication	Maximum Allowed Indication		
5	4.5	5		

(5) With the LEFT tank selected, highlight the ACTUAL FUEL QUANTITY field and enter 5.00 gallons.

(6) Press the ENT key. The cursor automatically selects the CALIBRATE? option.

(7) Press the ENT Key again to calibrate the 5 gallon point.

(8) Verify a 5.00 gallon point appears in the CALIBRATION TABLE.

(9) Verify that the CALIBRATED TOTAL value indicates 5.00.

(10) Select the RIGHT tank. Highlight the ACTUAL FUEL QUANTITY field and enter 5.00 gallons.

(11) Press the ENT key. The cursor automatically selects the CALIBRATE? option.

(12) Press the ENT key again to calibrate the 5 gallon point.

(13) Verify a 5.00 gallon point appears in the CALIBRATION TABLE.

(14) Verify that the CALIBRATED TOTAL value indicates 5.00.

D. **Low Fuel Level Check**

(1) Using the large FMS knob, select the GEA STATUS page (2nd page in the GEA page group). GEA 1 will be shown by default. Refer to Figure 202.

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(2) Press the DSCRT softkey to select the Discrete Inputs status page.

NOTE: Unless specified, the status of other discrete inputs may not match Figure 202 and does not matter for this portion of the test.

(3) Verify that the boxes beside the '1A LOW MAIN FUEL L' (low fuel quantity left) and '2A LOW MAIN FUEL R' (low fuel quantity right) are green.

(4) Continue to slowly add fuel to each tank one measured gallon at a time. Stop adding fuel when the associated LOW MAIN FUEL L or LOW MAIN FUEL R box changes from green to black.

(5) Using the large FMS knob, select the FUEL CALIBRATION page (first page in CAL page group).

(6) In Table 203, record the amount of usable fuel added to each tank. Also record the Calibration Value indications for both Right 1 and Left 1 Sub-Tanks. The Calibrated Total should be within ±2.0 gallons of the actual amount of usable fuel added.

Table 203. Usable Fuel Calibration Table - 4 Gallon Unusable Tank

4 Gallon Unusable Tank	Actual Usable Fuel Added (gal)	Allowable Range for Actual Fuel		Actual Indicated Calibrated Total (gal)	Tolerance on Calibrated Total (gal)
LEFT 1 SUB-TANK		6.0 gal	10.0 gal		±2.0
RIGHT 1 SUB-TANK		6.0 gal	10.0 gal		±2.0

Table 204. Usable Fuel Calibration Table - 2 Gallon Unusable Tank

2 Gallon Unusable Tank	Actual Usable Fuel Added (gal)	Allowable Range for Actual Fuel		Actual Indicated Calibrated Total (gal)	Tolerance on Calibrated Total (gal)
LEFT 1 SUB-TANK		8.0 gal	12.0 gal		±2.0
RIGHT 1 SUB-TANK		8.0 gal	12.0 gal		±2.0

E. Full Calibration

(1) Verify that both fuel tanks are full. Allow both fuel probes to stabilize for at least 2 minutes.

(2) Select the LEFT tank on the PFD.

(3) Press the FULL softkey. The cursor will automatically activate and select the CALIBRATE? option. The calibrated value setting will default to 49.00 or 51.00, as appropriate.

(4) Press the ENT key. A prompt appears requesting overwrite acknowledgement. Select YES and press the ENT key. The G1000 system will set the actual fuel quantity value to be full.

(5) Select the RIGHT tank.

(6) Press the FULL softkey. The cursor will automatically activate and select the CALIBRATE? option. The calibrated value setting will default to 49.00 or 51.00, as appropriate.

(7) Press the ENT key. A prompt appears requesting overwrite acknowledgement. Select YES and press the ENT Key. The G1000 system will set the actual fuel quantity value to be full.

(8) Observe the CALIBRATED TOTAL indication for the RIGHT tank. Verify that it remains at 49.00 or 51.00, as appropriate.

(9) Select the LEFT tank. Observe the CALIBRATED TOTAL indication for the LEFT tank. Verify that it remains at 49.00 or 51.00, as appropriate.

(10) On the MFD, verify the fuel quantity indicators correctly point to 'F'.

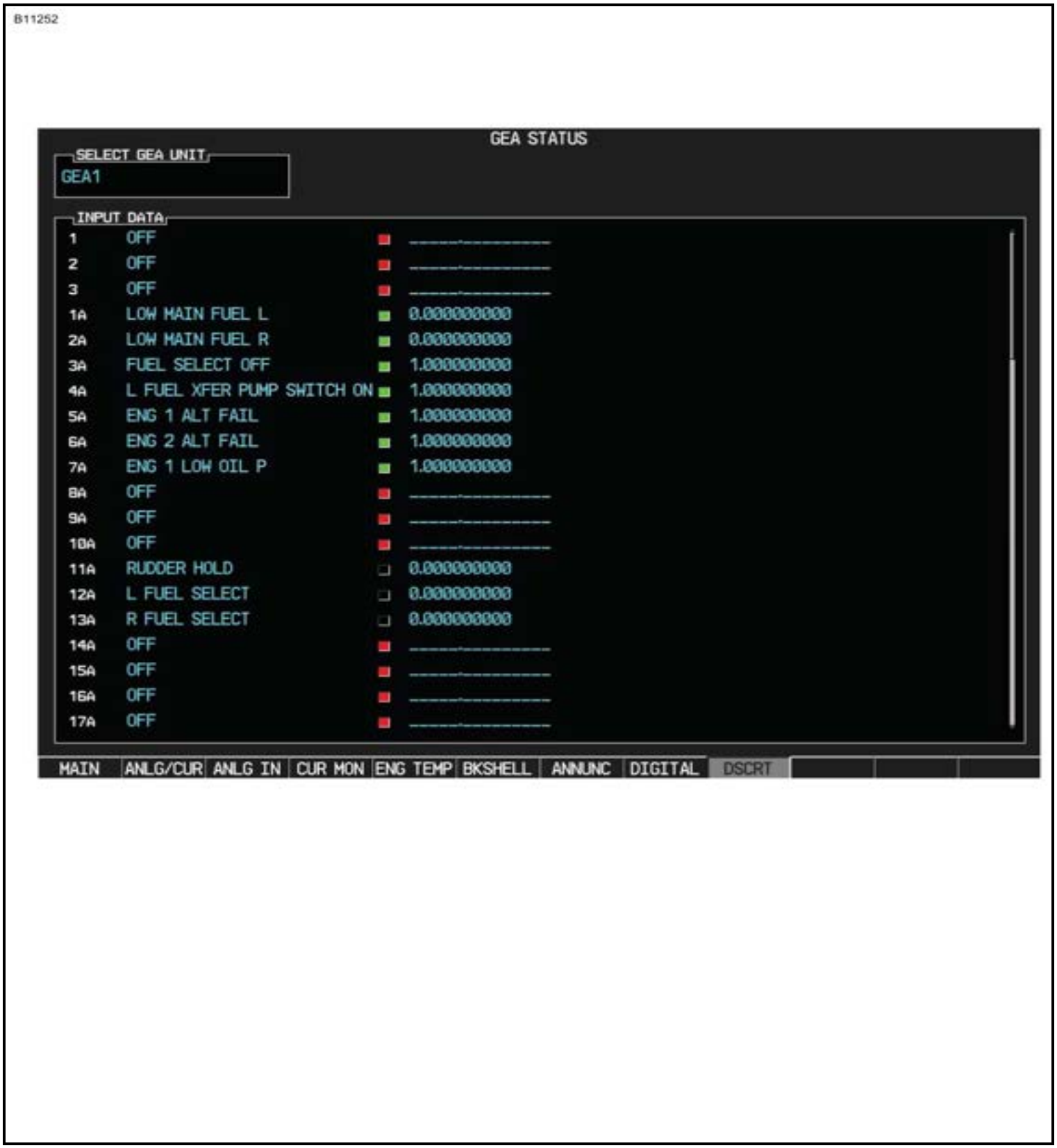
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Figure 201 : Sheet 1 : Fuel Tank Calibration Page



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Figure 202 : Sheet 1 : GEA Status Page



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FUEL INDICATING SYSTEM - ADJUSTMENT/TEST

1. General

A. This section gives the procedures for the Model T240/G2000 fuel calibration. The fuel system indicating system displays on the G2000 MFD. The fuel level is measured using two tank-mounted float level sensors, one in the inboard fuel tank bay, and one in the outboard fuel tank bay. The low fuel level sensors are float switches mounted approximately through the middle of the inboard fuel tank rib at WS 46.0. The fuel selector valve indicator lights (blue) use microswitch sensors mounted on the top of the fuel selector.

B. The fuel valve is equipped with two micro-switches to sense the position of the fuel selector. The selected tank is displayed on MFD by a blue light. If no blue light shows, the selector is off the tank, in-between tanks, or in the off position. During these conditions, a FUEL VALVE (red) CAS message shows on the PFD.

C. The G2000 Garmin Touch Screen Controller (GTC) 570 is used in the adjustment/test and fuel calibration procedures of the Model T240 fuel system. For more data applicable to the GTC refer to Chapter 34, Garmin G2000 - Description And Operation.

2. Fuel Valve Indicator

A. Test the Fuel Valve Indicator

(1) With the master switches on (batteries only if the engine is not running) place the fuel selector in the left tank detent and make sure that:

(a) The fuel warning message goes off.

(b) The blue light on the Multifunction Display (MFD) is on.

(2) With the master switches on (batteries only if the engine is not running) place the fuel selector in the right tank detent and make sure that:

(a) The fuel warning message goes off.

(b) The blue light on the MFD is on.

(3) Move the fuel selector between the tanks for a short time and make sure that:

(a) The blue lights are off.

(b) The FUEL VALVE CAS message shows on the PFD.

3. Fuel Quantity System Calibration

NOTE: Use proper precautions when handling fuel. Ensure that the aircraft is grounded correctly and that there is adequate ventilation.

A. Fuel Quantity SystemCalibration Setup

(1) Level the airplane. Refer to Chapter 7, Lifting and Shoring - General.

(2) Drain the fuel from each fuel tank.

(3) Set the fuel selector switch to the 'OFF' position.

(4) Fill each fuel tank with unusable fuel level, 2 gallons.

(5) Onthe cockpit circuit breaker panel, disengage the circuit breakers that follow:

(a) PFD

(b) MFD

(c) GTC

(6) Apply external power to the airplane.

(7) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(8) Set the AVIONICS MASTER switch (SW04) to the ON position.

(9) Set the CROSS TIE switch (SW03) to the ON position.

(10) Start the G2000 system in Configuration mode as follows:

(a) On the Primary Flight Display (PFD), push and hold the far right soft key.

(b) Engage the PFD circuit breaker.

(c) Push and hold the PFD soft key until the INITIALIZING SYSTEM message shows on the PFD.

(d) On the MFD, push and hold the far right soft key.

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(e) Engage the MFD circuit breaker.
(f) Push and hold the MFD soft key until the INITIALIZING SYSTEM message shows on the MFD.
(g) On the GTC, push and hold the small right knob.
(h) Engage the GTC circuit breaker.
(i) Push and hold the GTC small right knob until the INITIALIZING SYSTEM message shows on the PFD.
(11) Turn the GTC large right knob to select the CAL page group.
(12) Turn the GTC small right knob to select to select the FUEL TANK CALIBRATION page. Refer to Figure 501.
(13) This page is protected and requires a keystroke password to do the calibration. Press the softkeys that follow in sequence:
(a) Softkey 12 (far right softkey)
(b) Softkey 11
(c) Softkey 10
(d) Softkey 9
(14) Push the small right knob to show the cursor (hightlight) on the FUEL TANK CALIBRATION page.
(15) Turn the right small knob to move the cursor to the CURRENT TANK field.
(a) Push the GTC Enter soft key to select the CURRENT TANK field.
(16) Push the small right knob to show the tank select menu.
(17) Turn the small right knob to highlight the tank to calibrate.
(a) Push the GTC Enter soft key to select the tank to calibratefield.

NOTE: On the GTC, turn and push the small right knob as necessary throughout this procedure to select the RIGHT or LEFT tank.

B. Fuel Quantity - Empty Calibration
(1) Make sure that unusable fuel has been added to both tanks.
(a) Allow both fuel probes to stabilize for at least 2 minutes.
(2) On the GTC, use the small right knob to select the LEFT tank on the PFD.
(3) On the PFD, push the EMPTY softkey.
(a) The cursor activates and selects the CALIBRATE? option.
(b) The calibrated value setting defaults to 00.00.
(4) On the GTC, push the ENT key.
(a) The G2000 system will 'zero' the actual fuel quantity value to be displayed.
(5) On the GTC, use the small right knob to select the RIGHT tank.
(6) Push the EMPTY softkey.
(a) The cursor activates and automaticly selects the CALIBRATE? option.
(b) The calibrated value setting will default to 00.00.
(7) On the GTC, push the ENT key.
(a) The G2000 system will 'zero' the actual fuel quantity value to be displayed.
(8) Observe the CALIBRATED TOTAL indication for the RIGHT tank.
(a) Make sure that it stays at 0.00.
(9) On the GTC, use the small right knob to select the LEFT tank.
(a) Make sure that the CALIBRATED TOTAL indication for the LEFT tank stays at 0.00.
(10) On the MFD, make sure that the fuel quantity indicators show '0'.
(11) If you are to continue the fuel calibration leave the eletrical power on the airplane.
(12) If you are not to continue the fuel calibration:
(a) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(b) Set the AVIONICS MASTER switch (SW04) to the OFF position.

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(c) Set the CROSS TIE switch (SW03) to the OFF position.
(d) Remove external electrical pwer from the airplane.

C. Fuel Quantity - 5 Gallon Calibration
(1) Fill each fuel tank with 5 gallons +0.1 or -0.1 gallons of usable fuel.
(2) Move the wings for a few seconds.
(a) Allow the fuel probes to stabilize at least 3minutes before continuing.
(3) On the GTC, use the small right knob to select the LEFT tank.
(4) Highlight the ACTUAL FUEL QUANTITY field.
(a) Use the small and large right knobs to enter 5.00 gallons in the field.
(5) On the GTC, push the ENT key.
(a) The cursor automatically selects the CALIBRATE? option.
(6) On the GTC , push the ENT key again to calibrate the 5 gallon point.
(a) Make sure that a 5.00 gallon point appears in the CALIBRATION TABLE.
(b) Make sure that on the MFD the CALIBRATED TOTAL value shows 5.00 on the display.
(7) On the GTC, use the small right knob to select the LEFT tank.
(8) Highlight the ACTUAL FUEL QUANTITY field.
(a) Use the small and large right knobs to enter 5.00 gallons in the field.
(9) On the GTC 570, push the ENT key.
(a) The cursor automatically selects the CALIBRATE? option.
(10) On the GTC 570, push the ENT key again to calibrate the 5 gallon point.
(a) Make sure that a 5.00 gallon point appears in the CALIBRATION TABLE.
(b) Make sure that on the MFD the CALIBRATED TOTAL value shows 5.00 on the display.
(11) If you are to continue the fuel calibration leave the eletrical power on the airplane.
(12) If you are not to continue the fuel calibration:
(a) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(b) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(c) Set the CROSS TIE switch (SW03) to the OFF position.
(d) Remove external electrical pwer from the airplane.

D. Low Fuel Level Check
(1) On the GTC, move the small right knob to select the GEA STATUS page. GEA 1 is shown by default. Refer to Figure 502.
(2) On the GTC, push the DSCRT softkey to select the Discrete Inputs status page.
NOTE: Unless specified, the status of other discrete inputs may not match Figure 502 and does not matter for this portion of the test.
(3) Make sure that the boxes in the data column for the '1A LOW MAIN FUEL L' (low fuel quantity left) and '2A LOW MAIN FUEL R' (low fuel quantity right) are green.
(4) On the GTC, move the small right knob to select the FUEL CALIBRATION page (first page in CAL page group).
(5) If you are to continue the fuel calibration leave the eletrical power on the airplane.
(6) If you are not to continue the fuel calibration:
(a) Set the master BATT switches (left SW01 and right SW02) to the OFF position.
(b) Set the AVIONICS MASTER switch (SW04) to the OFF position.
(c) Set the CROSS TIE switch (SW03) to the OFF position.
(d) Remove external electrical pwer from the airplane.

E. Full Calibration
(1) Make sure that that both fuel tanks are full.
(2) Move the wings for a few seconds.

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(a) Allow both fuel probes to stabilize for at least 3 minutes.

(3) On the GTC use the small right knob, select the LEFT tank on the PFD.

(4) Push the FULL softkey.

(a) The cursor will automatically activate and select the CALIBRATE? option.

(b) The calibrated value setting defaults to 51.00.

(5) On the GTC, push the ENT key.

(a) A prompt appears requesting overwrite acknowledgement.

1 Select YES

2 Push the ENT key.

(6) The G2000 system sets the actual fuel quanity to full.

(7) On the PDF, select the RIGHT tank.

(8) Push the FULL softkey.

(a) The cursor will automatically activate and select the CALIBRATE? option.

(b) The calibrated value setting defaults to 51.00.

(9) Push the ENT key.

(a) A prompt appears requesting overwrite acknowledgement.

1 Select YES

2 On the GTC, push the ENT key.

(10) The G2000 system sets the actual fuel quanity to full.

(11) On the MFD, make sure that the fuel quantity indicators correctly point to 'F'.

(12) On the GTC, move the small right knob to select the GEA STATUS page. GEA 1 is shown by default. Refer to Figure 502.

(13) Push the DSCRT softkey to select the Discrete Inputs status page.

NOTE: Unless specified, the status of other discrete inputs may not match Figure 502 and does not matter for this portion of the test.

(14) Make sure that the boxes in the data column for the '1A LOW MAIN FUEL L' (low fuel quantity left) and '2A LOW MAIN FUEL R' (low fuel quantity right) are black.

(15) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(16) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(17) Set the CROSS TIE switch (SW03) to the OFF position.

(18) Remove external electrical pwer from the airplane.

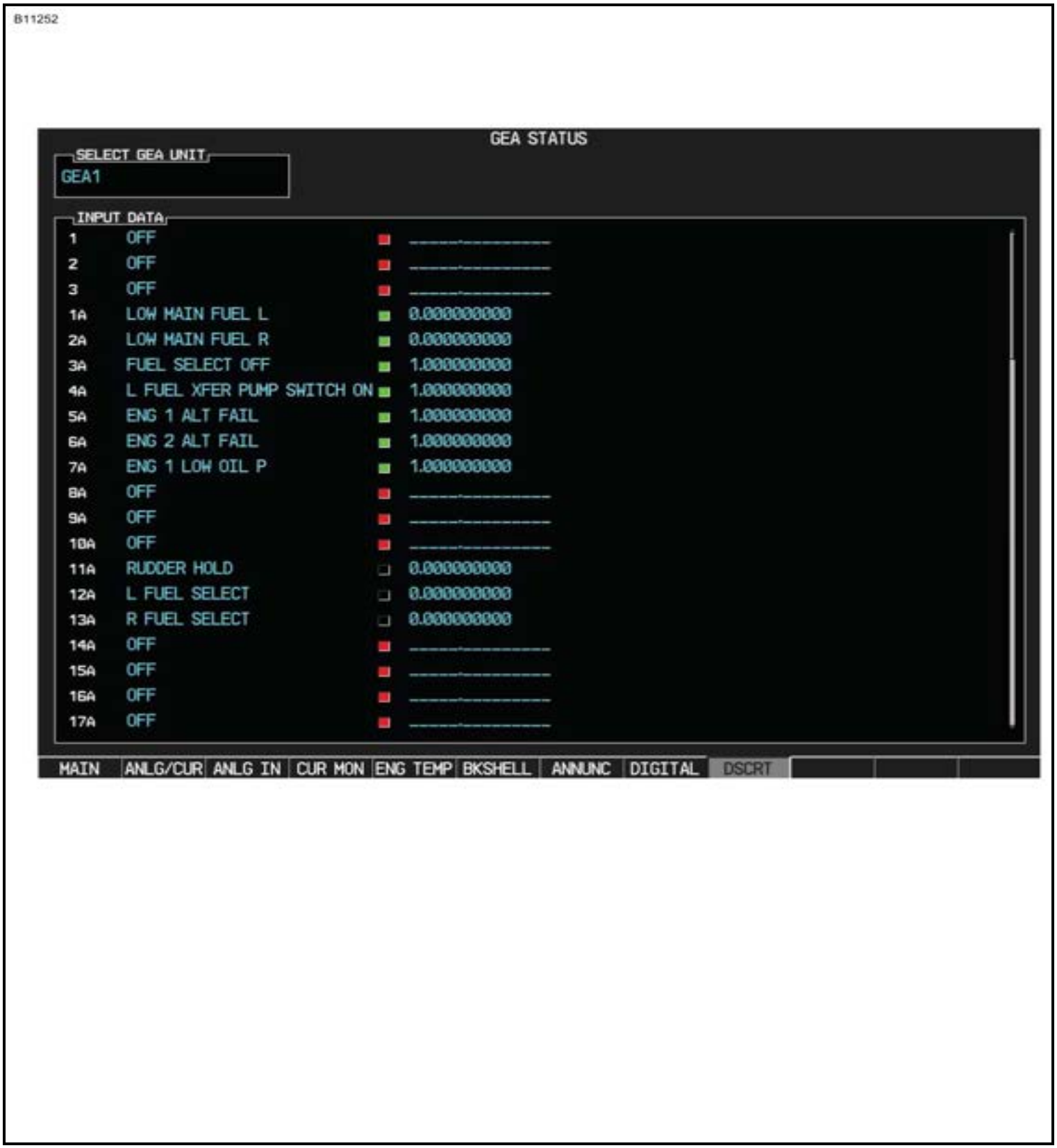
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Figure 501 : Sheet 1 : Fuel Tank Calibration Page



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Figure 502 : Sheet 1 : GEA Status Page



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INDICATING/RECORDING SYSTEMS - GENERAL

1. Hour Meter - General

A. **Indicating** - Flight time is recorded by an hour meter - most frequently referred to as the *Hobbs*. The Hobbs meter is installed as follows:

(1) For the Avidyne avionics option, the Hobbs is installed in the right knee bolster, next to the ELT remote switch.

(2) For the Garmin G1000 option, the Hobbs is installed on the left side of the center console.

(3) For the Model T240 Hobbs meter installation refer to, Instrument Panel (T240) - Removal/Installation

B. The instrument is DC powered. DC power for the hour meter bypasses the master switch and will operate with the master switch in the off position, provided sufficient battery power is available. The system is protected by a fuse located in a fuse block next to the battery. The meter is activated by an air switch and will record up to 9999.9 hours.

C. **Air Switch** - There is an air switch located behind the co-pilot's side of the instrument panel either on the fuselage or next to the terminal junction rail if Avidyne avionics are installed, or behind the instrument panel on the co-pilot's side if the Garmin G1000 system is installed, that activates at 2 inches of Hg or approximately 60 kts. This switch is plumbed into the pitot line for its activation.

NOTE: To disable the Hobbs during a pitot static check, remove the Hobbs fuse from the power grid. This will stop the accumulation of false time on the Hobbs. Replace the fuse after the test.

2. Documentation Of Hobbs Meter Replacement

A. **Placard** - If a Hobbs meter becomes inoperative, it must be replaced as soon as possible. The time shown on the defective meter plus the best estimate of the additional time in service must be placarded in an area near the Hobbs. For example, if the meter had 627.9 hours when it became inoperative and an additional 2.1 hours of time in service was flown before replacement, then the placarded time would be 630 hours. A statement like *630 hours must be the current Hobbs Meter reading* is an appropriate placard.

B. **Logbooks** - Statements like those in the Placard paragraph, along with the date and time of the discrepancy must be adequately documented in the airframe and engine logbooks.

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INDICATING/RECORDING SYSTEMS - MAINTENANCE PRACTICES

1. Removal, Installation, and Maintenance of the Hour Meter

A. General

(1) This section gives the Hour meter removal and installation procedures for the Avidyne and Garmin G1000 avionics options installations.

(2) For the Model T240 hour meter (Hobbs meter) removal and installation procedures, refer to Instrument Panel (T240) - Removal/Installation.

B. **Removal of the Hour Meter**

(1) If Avidyne avionics are installed in the aircraft, remove the right knee bolster per instructions in Section 25-11-00, Instrument Panels and Electrical Panels. If the Garmin G1000 system is installed, remove the access panel on the right side of the center console.

(2) Remove the connector installed in the back of the hour meter. Be sure to label the location of each wire.

(3) Unscrew the two screws on the back of the knee bolster, and slide the unit out.

C. **Installation of the Hour Meter**

(1) With the hour meter partially inserted through the hole in the knee bolster, install the connectors (per labeling) into the back of the hour meter.

(2) Slide the unit into its slot flush with the bolster, and install the two screws. The screws should be snug tight.

(3) Reinstall the knee bolster. Refer to Chapter 25, Instrument Panels and Electrical Panels - Maintenance Practices or replace the center console access panel, as applicable.

D. **Hour Meter Maintenance** - No special maintenance of the hour meter is required.

2. Removal and Installation of the Hobbs Oil Pressure Switch

A. The Hobbs oil pressure switch is located on the lower left side of the engine just forward of the firewall and below the engine oil filter. The switch serves a dual purpose to arm the aural warning system and to provide low oil pressure warning on the annunciator panel. The switch is closed when oil pressure is introduced to the system. If the battery is adequately charged, a ground is established for the Hobbs (the other side of the Hobbs is powered from the 3 amp fuse on the power grid), and the switch is activated. Refer to Figure 201.

(1) **Oil Pressure Switch Removal** - Use the following steps for removal of the Hobbs oil pressure switch.

(a) Remove the top engine cowling per instructions in Chapter 71.

(b) Remove the Packard electrical plug from the back of the switch.

(c) Use an open-end wrench to screw the 1/8 inch pipe-threaded switch out of the engine case.

(2) **Oil Pressure Switch Installation** - Use the following steps for installation of the oil pressure switch.

(a) Install the 1/8 inch pipe-thread pressure switch into the engine case. Torque switch 60 to 80 in.-lbs.

(b) Connect the Packard connector to the oil pressure switch. Ensure there is a red weather shield around the Packard switch.

(c) At an oil temperature reading of 75° F or higher, run the engine at about 1700 RPM to pressure test the system.

(d) Shut down the engine and check for oil leaks.

(e) Reinstall the engine cowl.

3. Removal and Installation of the Air Switch

A. **Removal of the Air Switch**

(1) If Avidyne avionics are installed in the aircraft, remove the glare shield and right side kidney panel per Section 25-11-00, Instrument Panels and Electrical Panels. If the Garmin G1000 system is installed, remove the glare shield per Chapter 25.

(2) Remove the mounting hardware, wires, and pitot line.

(3) Cap the pitot line, and connect the wires together if the aircraft is going to be operated with the switch removed.

B. **Installation of the Air Switch**

(1) Connect the pitot line, wires (to normally open and common), and mounting hardware.

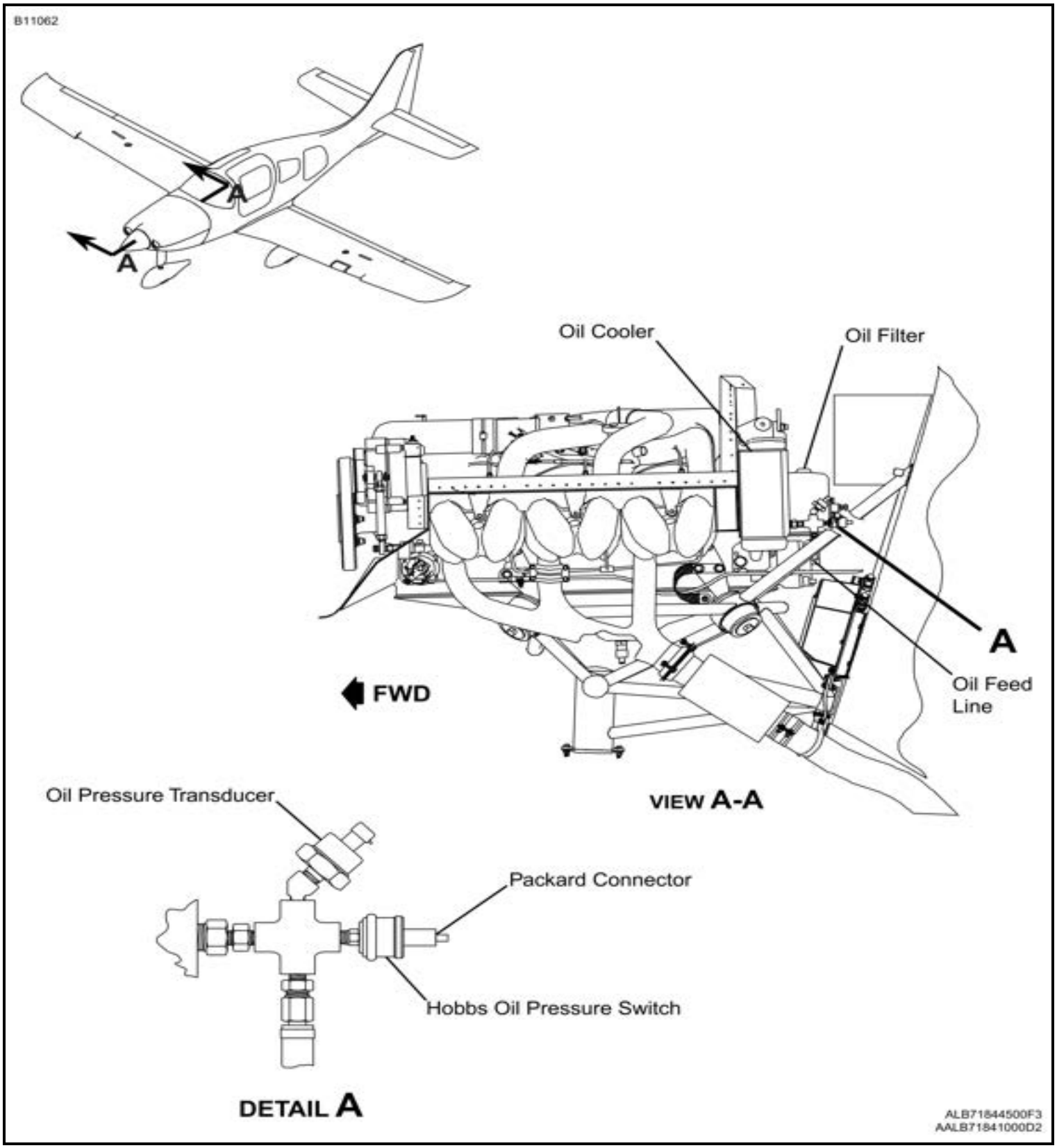
(2) Test the pitot system for leaks. The system cannot exceed 500 fpm at 1000 feet above field elevation.

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(3) Replace the glare shield and kidney panel, as applicable. Refer to Chapter 25, Instrument Panels and Electrical Panels - Maintenance Practices.

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Figure 201 : Sheet 1 : Hobbs Oil Pressure Switch



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LANDING GEAR AND BRAKES - GENERAL

1. General - Scope and Definition

A. The Cessna 400 (LC41-550FG) has a fixed tricycle landing gear configuration. The main gear is constructed of high strength tubular steel and mounted to the fuselage via a welded steel gearbox. The main gearbox is bolted directly to the fuselage structure. The airplane has brakes located on the main wheels. The brakes are used for steering the airplane via differential braking. The nose gear is an oleo strut which casters for steering purposes. The oleo strut has a self-centering device to lock the nose wheel in a fixed position during flight. Aerodynamic fairings are used on the airplane to cover the landing gear and help reduce drag during flight.
This chapter covers the removal and installation of the main gear, nose gear, wheel pants, and fairings. Standard maintenance procedures are also covered.

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MAIN LANDING GEAR AND BRAKES - MAINTENANCE PRACTICES

1. Main Landing Gear - General

A. The main landing gear consists of the gearbox (located inside the fuselage), the gear legs, the axle mounting foot, axle, wheel, tire and tube, upper fuselage fairing, gear leg fairing, wheel pant, and wheel pant access panel.

2. Main Gear Wheel Pants and Fairings

A. **Removal and Installation of Main Gear Wheel Pants and Fairings** - The removal and installation instructions below are for the left main gear. Removal and installation practices for the right side are typical unless otherwise noted.

(1) Remove the wheel pant access panel from the inside face of the wheel pant by removing the attachment screws.

(2) Remove the screws attaching the leg fairing to the wheel pant.

(3) Remove the two bolts attaching the wheel pant to the support bracket.

(4) Remove the bolt and washer attaching the wheel pant to the standoff shown in Figure 201 and Figure 202.

(5) Slide the wheel pant off by lifting and rotating it to clear the wheel and tire assembly.

(6) Remove the brake caliper per the instructions in Section 32-40-00, Brake System.

(7) Jack the left side of the airplane such that adequate clearance is achieved for removing the main gear wheels and leg fairings.

(8) Place a small pan or bucket under the brake caliper, and disconnect the brake line from the brake caliper. The pan will help catch any excess brake fluid that may leak from the brake line once it is removed. Once the brake line is removed, cap the end to prevent any excess brake fluid from draining out of the system.

(9) Remove the main gear axle foot from the gear leg by removing the two AN5-22A bolts and two MS20365-524C all-metal lock nuts (refer to Figure 203) and sliding it straight down along the axis of the gear leg.

(10) Slide the gear leg fairing straight down along the axis of the gear leg to remove it. Jack the airplane as necessary to remove the leg fairing from the leg.

(11) Remove the attachment screws holding the upper leg fairing to the fuselage belly.

(12) Slide the fairing straight down the gear leg to remove it.

(13) Reinstall in the reverse order. Torque all fairing attachment screws 10 to 12-inch pounds, and torque the MS20365 nuts 140 to 180-inch pounds.

(14) When installing the standoff and attaching hardware, seat the standoff in the end of the axle on the inside of the wheel pant as shown in Figure 201 and Figure 202.

(15) Make sure that when the wheel pant is installed, there is 0.5-inch + 0.125 or -0.125-inch clearance between the wheel pant and the tire.

(a) Up to two washers may be glued to the inside of the wheel pant where the pant attaches to the standoff to compensate for the variation in wheel pant size. The washer should not exceed a 1 inch diameter.

(b) Carefully torque the bolt to 23-foot pounds.

1 Make sure that you do not cause compression damage to the pant.

2 Apply Loctite 243 to the bolt.

(c) Torque two bolts that attach the pant to the support bracket 30 to 36-inch pounds.

B. **Servicing and Maintenance of Main Gear Wheel Pants and Fairings** - The main gear wheel pants and fairings are a glass fiber composite construction and do not require any servicing or maintenance. The wheel pants and fairings should be inspected periodically for cracking, chips, etc. and repaired or replaced as necessary. Refer to Chapter 57 for removal and installation of optional anti-chafe tape. Contact Cessna Aircraft Company for replacement parts. The interior of the wheel pant should be cleaned of all foreign debris.

3. Main Gear Assembly

A. **Main Gear Assembly Removal and Installation** - Use the following procedures for removal and installation of the main gear assembly.

(1) Remove the main gear wheel pant per the instructions in the Main Gear Wheel Pants and Fairings section.

(2) Raise the airplane on jacks such that adequate room is achieved for removing the main gear wheel assembly.

(3) For Airplanes 2001 thru 2087, remove the two AN5-22A bolts, two NAS1149F0563P washers and two MS21045L5 lock nuts from the main gear axle foot, and slide the wheel assembly straight down along the axis of the gear leg. Refer to

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Figure 203.

(4) For Airplanes 2088 and On, remove the two HL20PB-10-31 Hi-loks, 2841104-25 contour washers, two NAS1149F0563P washers and two MS21045L5 lock nuts from the main gear axle foot, and slide the wheel assembly straight down along the axis of the gear leg. Refer to Figure 203.

(a) When installing the wheel assembly, use Type I, Class B sealant to shank seal around the Hi-loks.

(5) Disassemble the main wheel assembly by removing the cotter pin and axle nut from the outboard end of the axle. Refer to Figure 204.

(6) Remove the wheel from the axle by sliding it straight off.

(7) Cut and remove the lockwire from the upper axle attachment bolts.

(8) Remove the upper and lower axle attachment bolts to disassemble the remaining parts. Note order of assembly for reinstallation.

(9) Remove the access panels from the aft cabin floor to gain access to the upper end of the gear legs.

(10) Remove the gear leg attachment bolt located at the top end of the gearbox.

(11) Remove the gear legs from the gearbox by pulling the leg straight out.

CAUTION: Take care when removing the gear legs so as not to cause nicks, scratches, or other damage to the surface of the leg.

(12) Installation is in the reverse order. Re-safety wire the upper axle attachment bolts prior to installing the wheel.

(13) Torque the gear leg attachment bolt 80 to 85 ft.-lbs. Torque the axle attachment bolts 240 to 280 in.-lbs., and torque the axle foot attach bolts 140 to 180 in.-lbs. Rotate the wheel while tightening the axle nut 150 to 200 in.-lbs. to seat the bearing, back off the axle nut to zero torque, tighten the axle nut to 30 to 40 in.-lbs. while rotating the wheel, rotate the axle nut to the nearest slot and cotter pin hole, and install the cotter pin.

(14) Assure that the wheel rotates freely without perceptible play.

B. **Wheel Toe-in and Camber** (Refer to Figure 205 and Figure 206) - During wheel installation it is important to determine the wheel toe-in/toe-out and camber. Wheel toe-in/toe-out and camber is established by inserting one or more shims between the axle block and spacer, if necessary, as shown in Figure 204. It is unlikely that the shims will need to be changed from what was initially manufactured; however, if the proper toe-in/toe-out and camber is not achieved, contact Cessna Aircraft Company for the required shim(s).

(1) **Toe-in/Toe-out** - Wheel toe-in/toe-out is the angle between the aircraft centerline and the wheel. Toe-out is set with all wheels on the ground, on a low-friction surface. Set toe-out to the value indicated in the toe-out vs. weight chart shown in Figure 206. No more than 4 shims may be used with a maximum total thickness of 0.254 inches.

(2) **Camber** - The camber is the angle from horizontal to the centerline of the axle. Camber is set with all wheels on the ground, on a low-friction surface. Refer to Figure 207. Set camber, to the value indicated in the camber vs. weight chart shown in Figure 208. No more than 4 shims may be used with a maximum total thickness of 0.254 inches.

C. **Main Gear Assembly Servicing and Maintenance** - The landing gear legs should be inspected every 100 hours or annually. Some of the items to inspect for are scratches, nicks, corrosion, and signs of overstress. Visually inspect the gear legs for straightness. The axles and other components should also be inspected for corrosion, cracks, signs of overstress, and wear. The main gear assembly should fit snugly together with very little, if any, free play.

4. Main Landing Gear Leg Abrasion Repair

A. The main landing gear legs may develop abrasions as a result of rubbing with the landing gear fairing upper rib. Typically, there are two abrasions opposite each other. The abrasions are located 16.0 inches from the upper tip of the gear leg; they are approximately 0.7 inches long and 0.020 inches deep.

(1) Clean the surface area surrounding the abrasions.

(2) Determine the depth and length of the abrasions. If the abrasion depth and length are greater than 0.020 inches and 1.0 inch, respectively, contact Cessna Aircraft Company for instructions.

(3) Use Scotch-Brite™ or other equivalent material to blend out nicks, scratches, or cuts at the abrasion area. The repair area must be blended over a distance at least 10 times the depth of the abrasion.

(4) After polishing or blending the abrasion, treat all bare metal with zinc chromate or zinc oxide.

(5) Before installing the repaired main landing gear on the aircraft, contact Cessna Aircraft Company for instructions on modifying the main landing gear fairing to prevent future rubbing.

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5. Gearbox

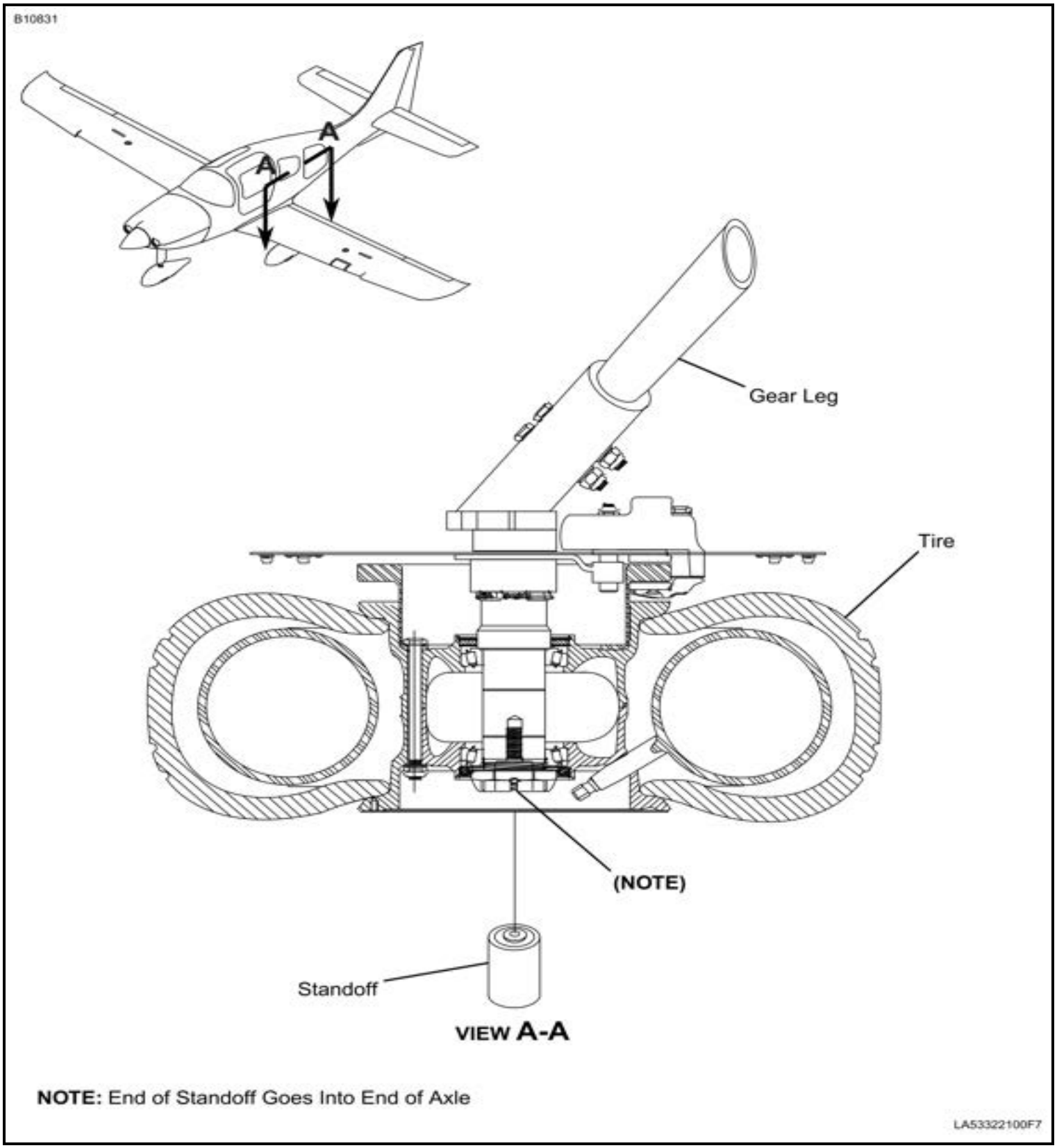
A. The main landing gear is attached to the fuselage structure via a welded steel gearbox. The gearbox is bolted directly to the fuselage structure.

(1) **Gearbox Removal and Installation** - The gearbox is not easily removable from the fuselage due to its location. Should the gearbox need to be removed or replaced, please contact Cessna Aircraft Company for further instructions.

(2) **Gearbox Servicing and Maintenance** - The gearbox is a major structural component and should be inspected every 100 hours or annually for wear and corrosion. Remove the wheel pants and fairings per the Main Gear Wheel Pants and Fairings section and remove the gear leg per the Main Gear Assembly section. Inspect the gear leg sockets of the gearbox for wear and corrosion. If surface corrosion is present, lightly hone the interior diameter of the socket using a cylinder bore hone and light machining oil. A Scotch-Brite™ pad may also be used. After the corrosion has been removed, apply a thin film of machine oil or other surface protectant to help prevent further corrosion. The bushing at the lower end of the socket should also be inspected for excessive wear and replaced if required. When replacing the bushing, P/N 32FS16, thoroughly clean the surface of the socket and install with Loctite 660 retaining compound. Allow the Loctite to fully cure prior to reinstalling the gear leg. Every 3000 hours, the gearbox bolts must be checked for evidence of corrosion. Remove one attachment bolt from each side of the gearbox and check for corrosion. If corrosion is noted, replace all attachment bolts in the gearbox. If no corrosion is noted, replace bolts that were removed and check the torque on all bolts. Torque bolts 40 to 50 in.-lbs.

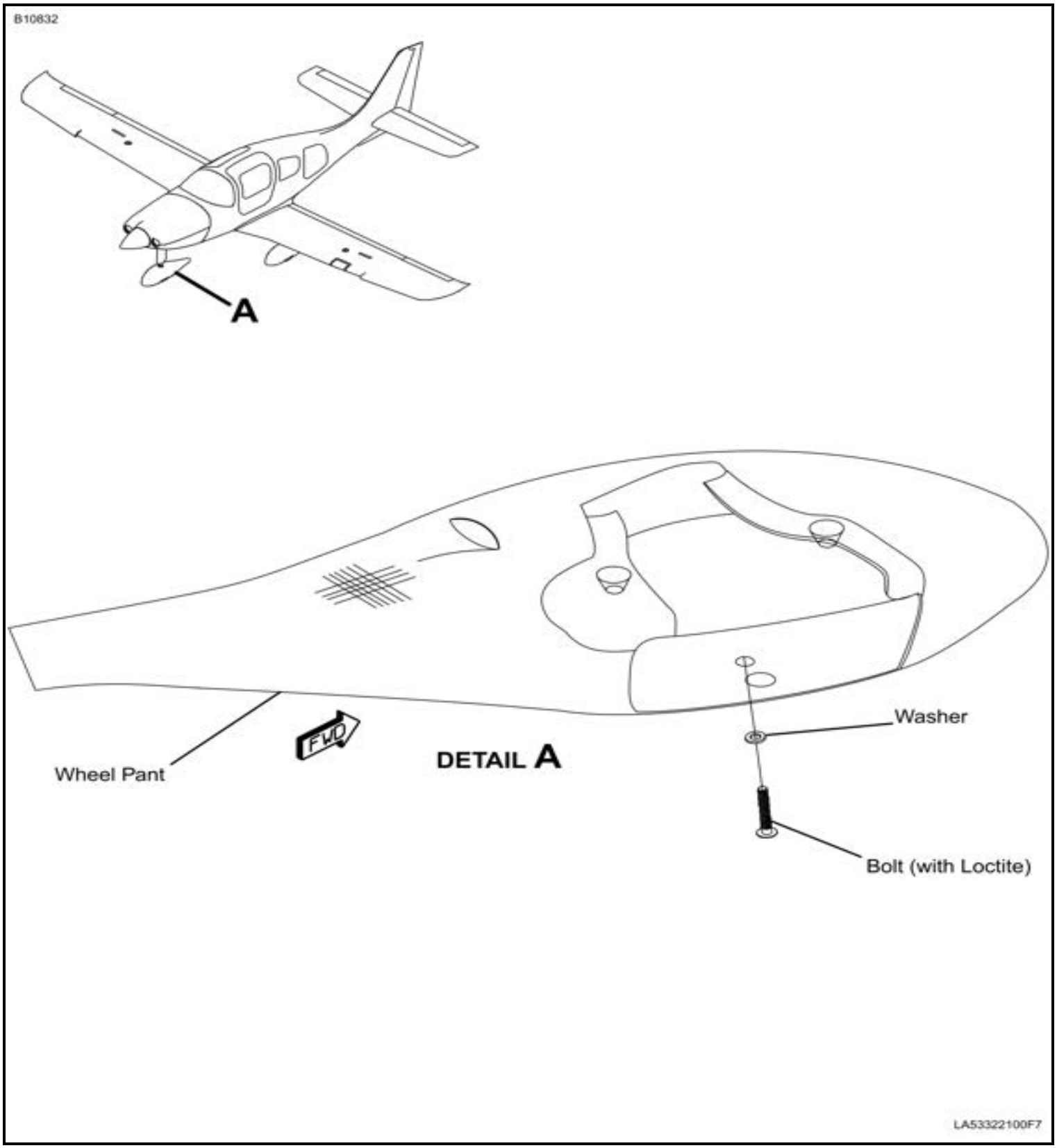
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Figure 201 : Sheet 1 : Wheel Pant Standoff Location



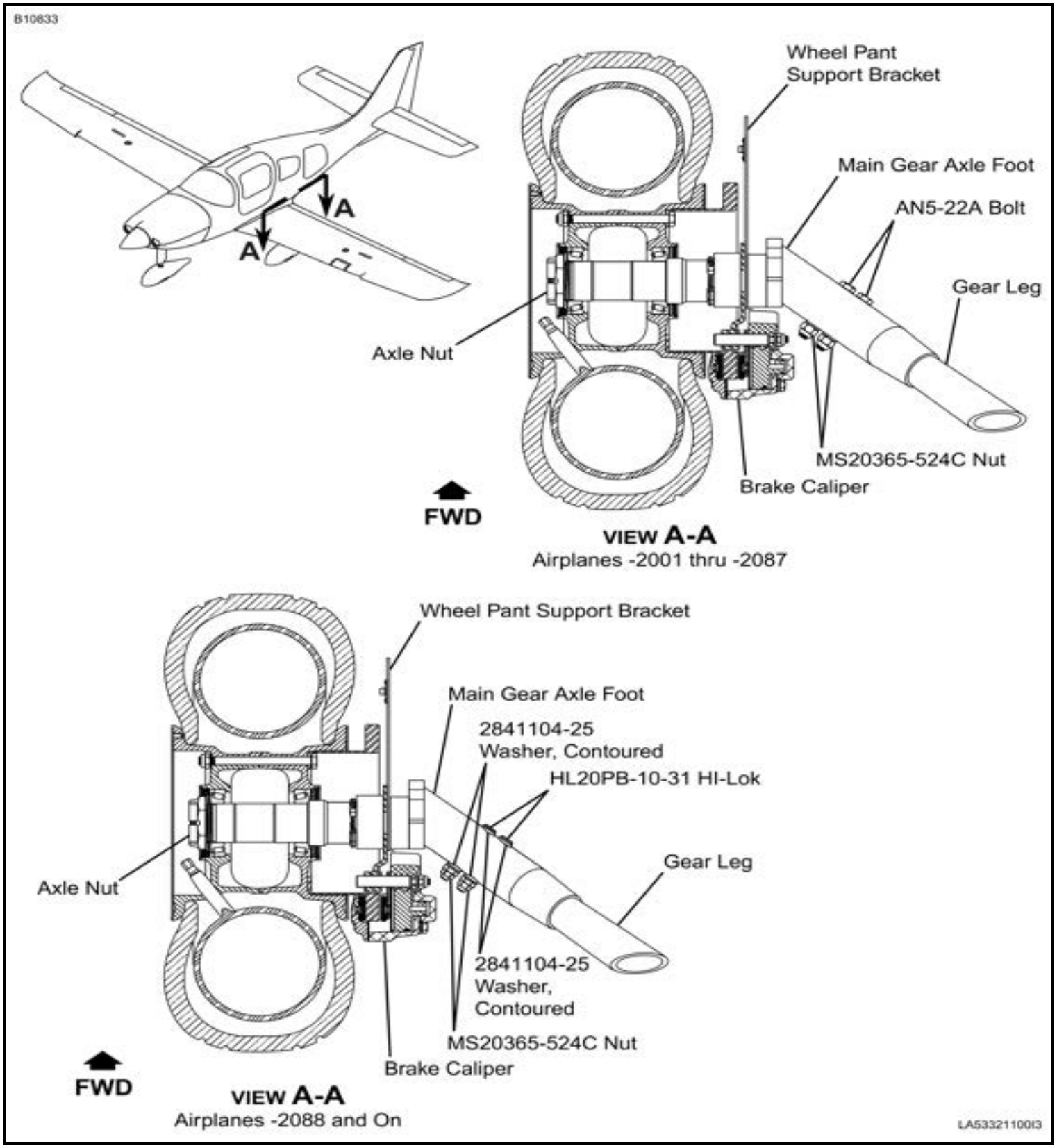
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Figure 202 : Sheet 1 : Hardware Attaching Wheel Pant to Standoff



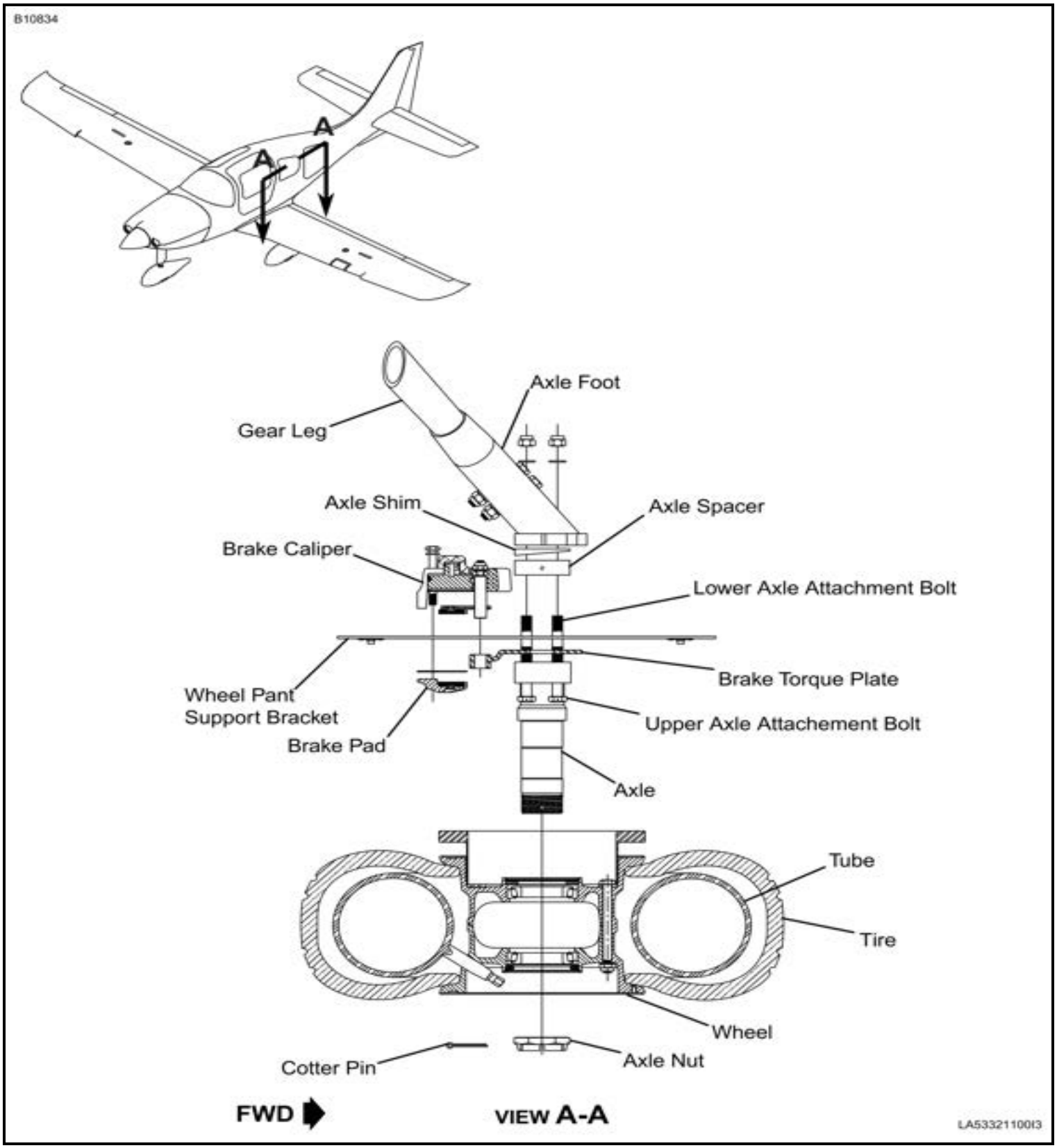
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Figure 203 : Sheet 1 : Main Gear Wheel Assembly



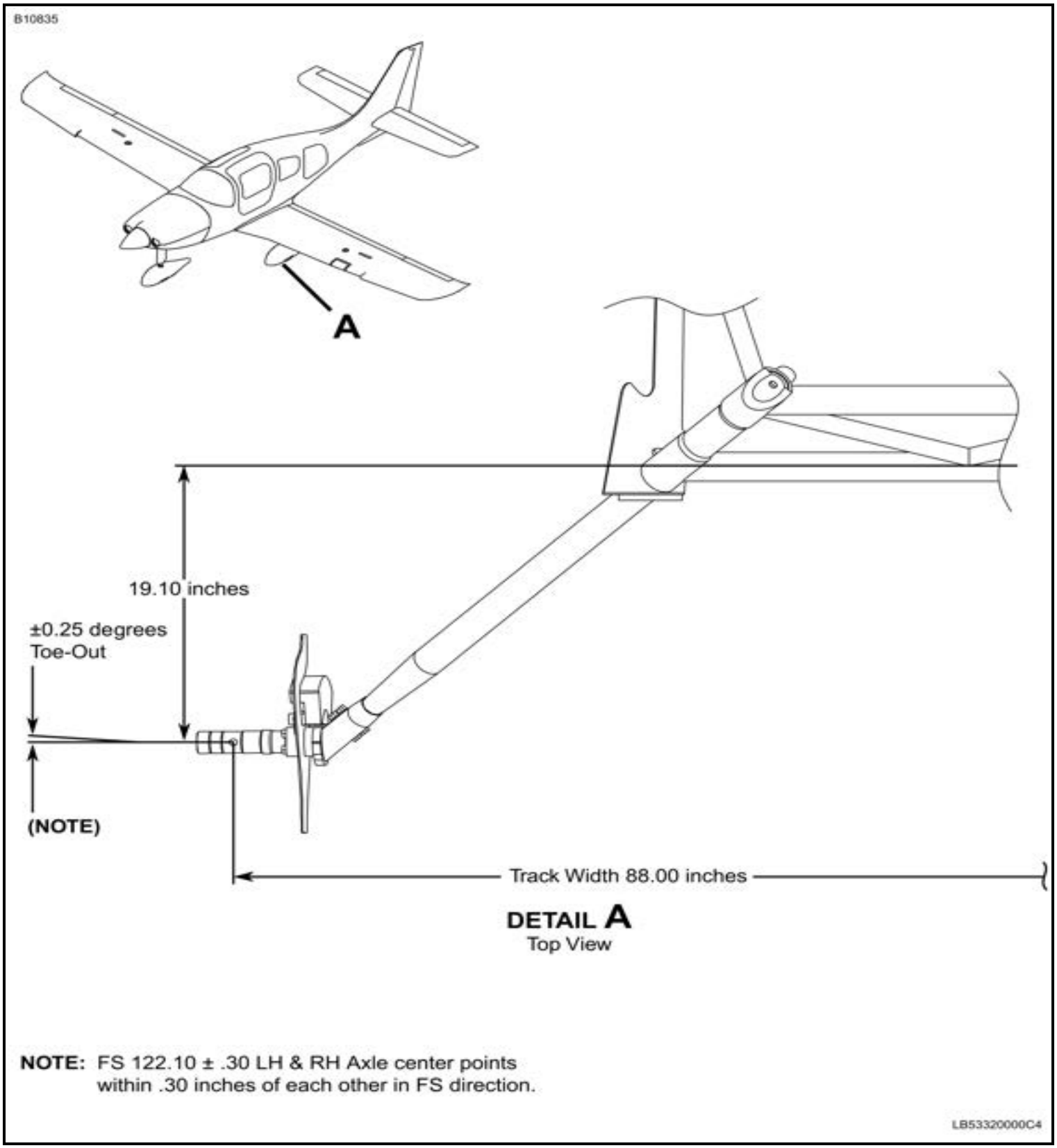
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Figure 204 : Sheet 1 : Main Gear Assembly, Exploded View



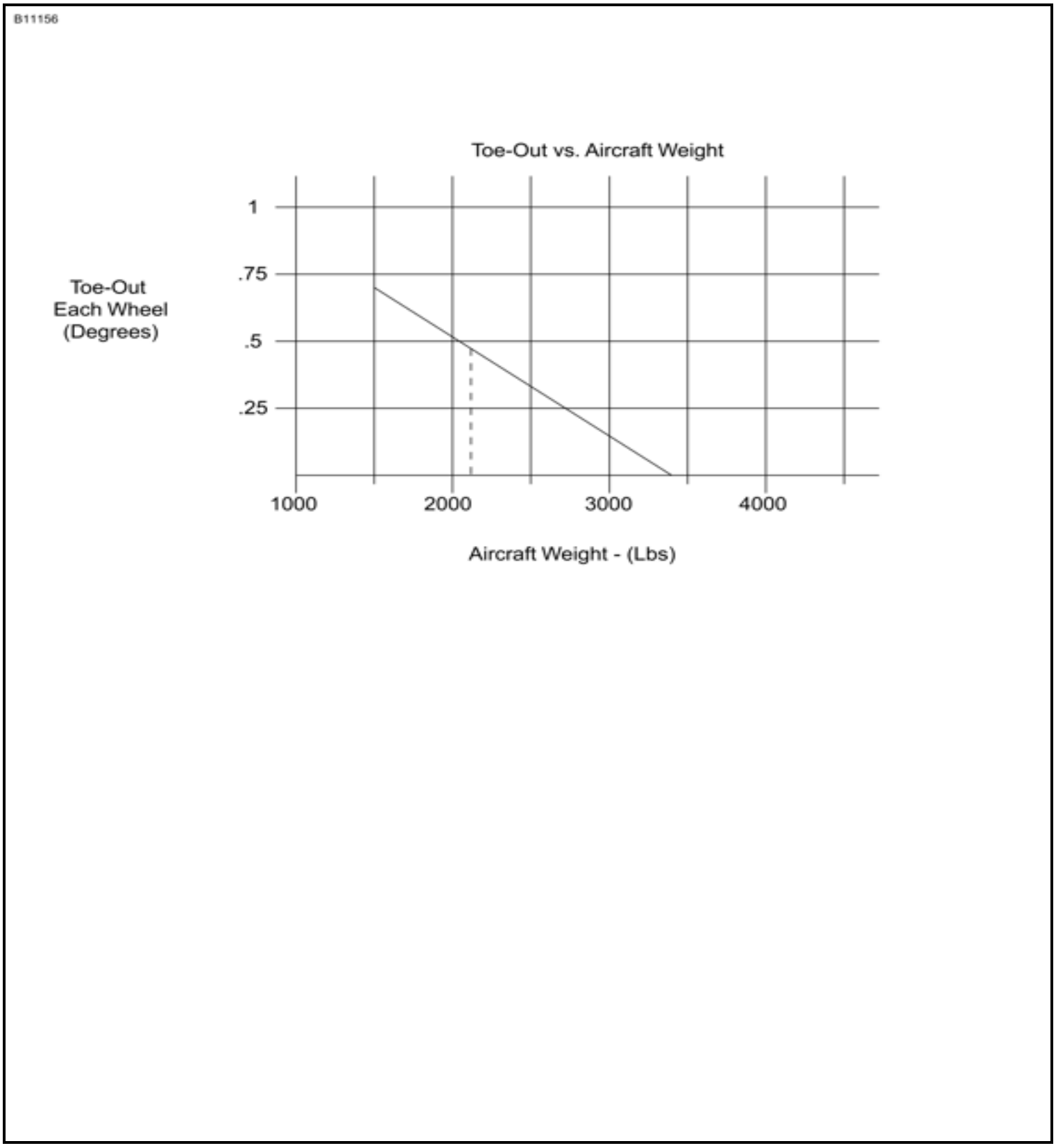
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Figure 205 : Sheet 1 : Toe in/Toe out



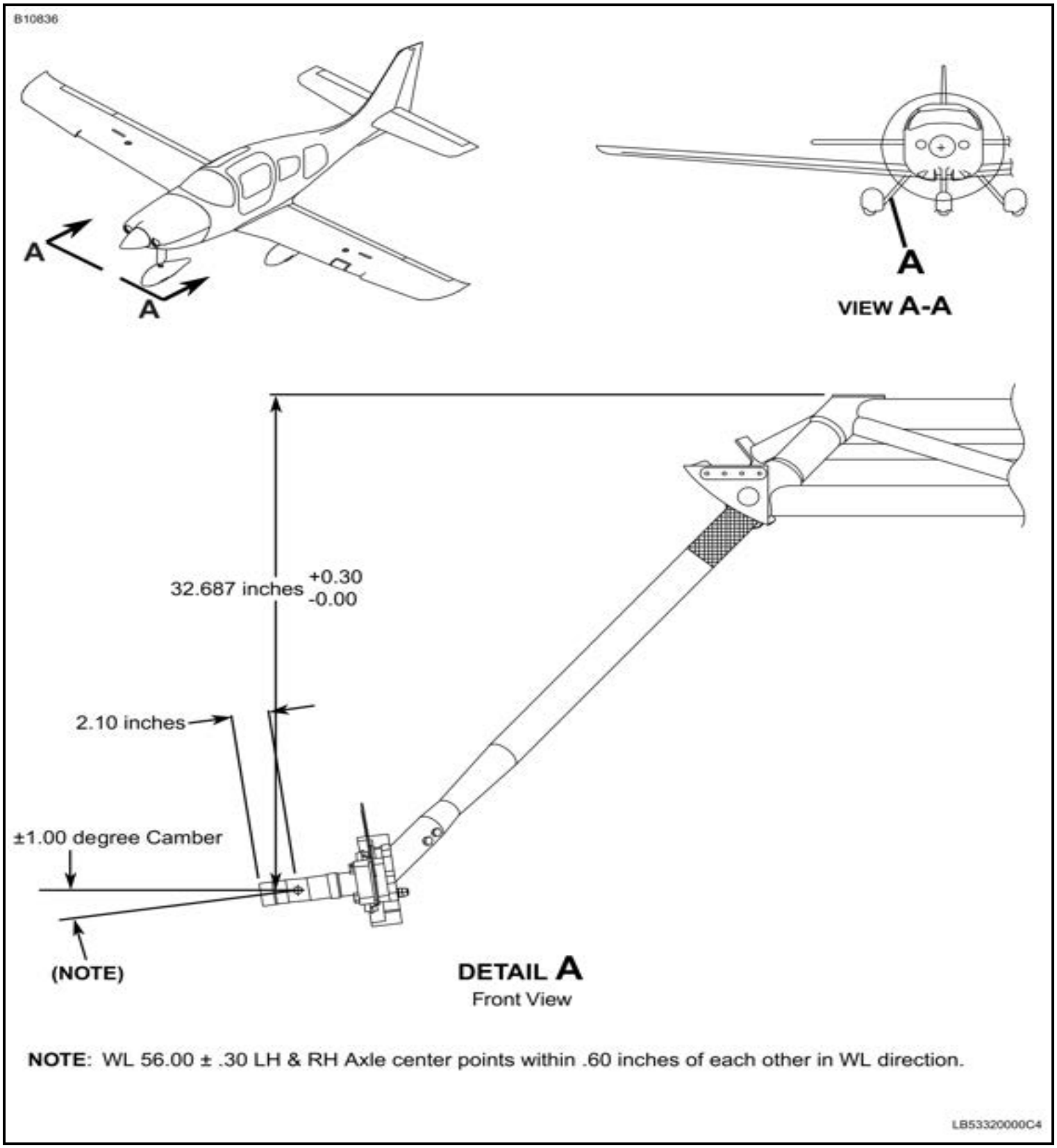
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Figure 206 : Sheet 1 : Toe-out vs. Aircraft (A/C) Weight



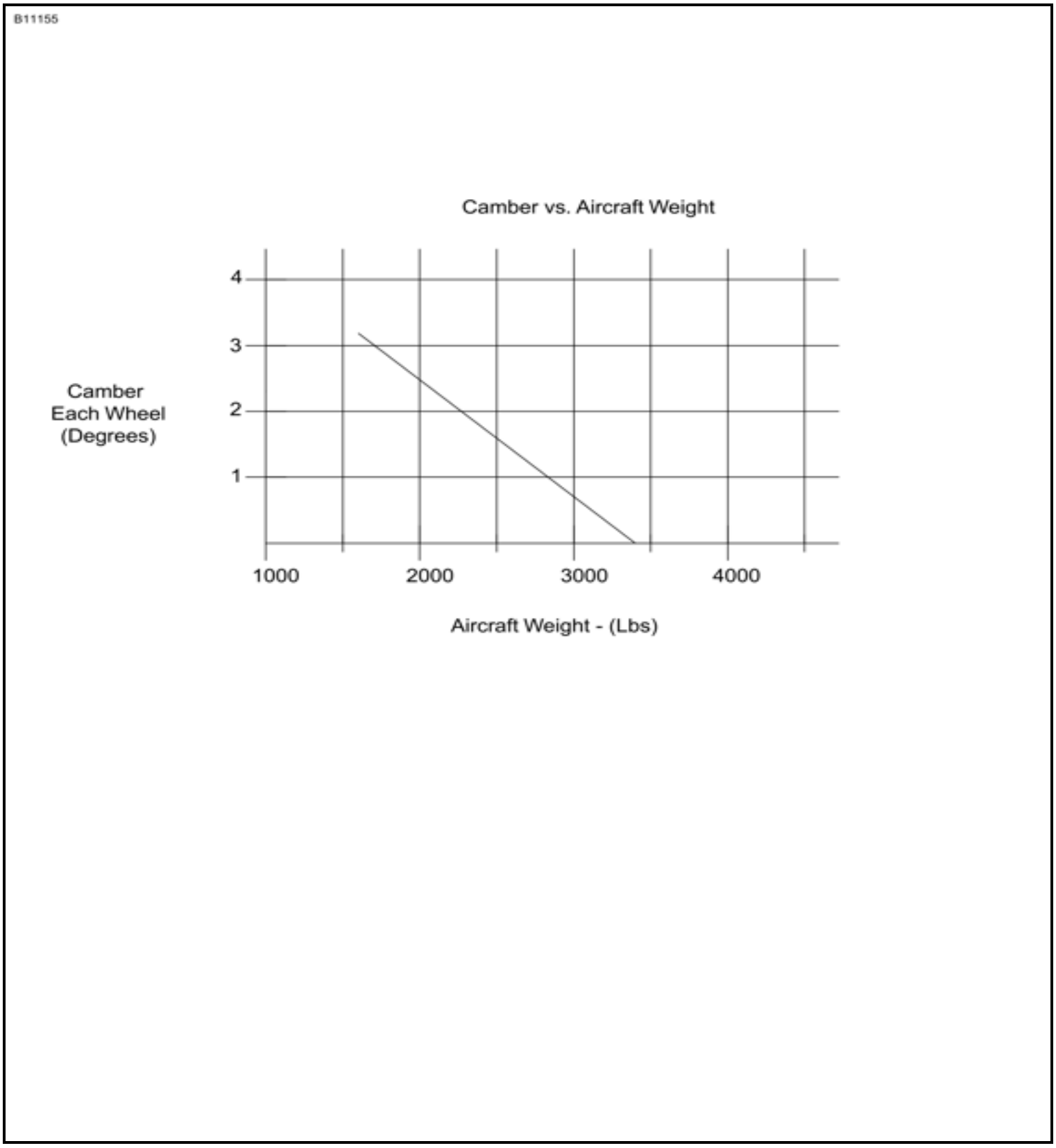
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Figure 207 : Sheet 1 : Camber



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Figure 208 : Sheet 1 : Camber vs. Aircraft (A/C) Weight



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NOSE LANDING GEAR - MAINTENANCE PRACTICES

1. Nose Gear - General

A. The nose gear is a fixed hydraulic unit that casters freely during taxiing. Turning is accomplished via differential braking and optional rudder assist. Landing loads and shimmy dampening are controlled using hydraulic oil within the strut. Nitrogen gas pressure controls the ride height of the strut and supplies the necessary pressure to lock in the centering cam mechanism.
On the ground with the weight of the aircraft bearing down on the nose strut, an internal keyway within the strut slides out from a locking cam making rotational movement possible. The moment the aircraft takes flight and all weight is off the nose gear, gas pressure moves the keyway into the locking cam eliminating any ability to caster during flight.
During landing the weight of the aircraft overpowers the gas pressure and slides the keyway out from the locking cam, allowing full rotational movement of the nose wheel.

2. Nose Gear Wheel Pant and Fairing

A. **Nose Gear Wheel Pant and Fairing Removal and Installation** - Use the following procedures for removal and installation of the nose gear wheel pant and fairing.

(1) Remove the upper and lower engine cowls per instructions in Chapter 71.

(2) Remove the aft screw attaching the nose strut fairing to the fuselage.

(3) Raise the front of the airplane such that the nose wheel is completely clear of the ground.

(4) Remove the four AN5-12A bolts and washers attaching the nose wheel assembly to the base of the nose strut. Refer to Figure 201.

(5) For S/N 41002 to 41111, remove the four MS21207-6-8 self-tapping screws from the base of the strut fairing, and slide the internal rib straight down and off of the nose strut.

(6) For S/N 41112 and On, remove the two AN526C1032 or MS51958 truss head screws and NAS1149FN832P washers from the rear of the base of the strut fairing, and remove the heel plate.

(7) Slide the nose strut fairing straight down and off the nose strut.

(8) Remove the two AN526C1032 or MS51958 truss head screws from the top of the wheel pant attaching the wheel pant to the attach bracket. Refer to Figure 202.

(9) Remove the two AN526C1032 or MS51958 truss head screws from either side of the wheel pant. Refer to Figure 202.

(10) Remove the nose gear wheel pant from the wheel and fork assembly.

(11) Installation is in the reverse order. Torque all AN526C1032 or MS51958 screws 30 to 36-inch pounds. Hand tighten the MS21207 screws holding the internal rib, or the AN526C1032 or MS51958 screws holding the heel plate, to the nose strut fairing snug. Torque the AN5-12A bolts 140 to 180-inch pounds.

(12) Trim the wheel pant to get a clearance from the tire a minimum of 1-inch.

B. **Nose Gear Wheel Pant and Fairing Servicing and Maintenance** - The nose gear wheel pant and fairing are a glass fiber composite construction and do not require any servicing or maintenance. The wheel pants and fairings should be inspected periodically for cracking, chips, etc. and repaired and replaced as necessary. Contact Cessna Aircraft Company for replacement parts. The interior of the wheel pant should also be cleaned of all foreign debris.
A few owners or operators have reported hairline paint cracking in the area adjacent to the nose wheel tow bar hole. While the paint cracking does not present a structural problem, the visual presentation of the wheel pant may degrade somewhat over several years. The onset of the cracking depends, in part, on the method used to tow the airplane and the frequency of towing. Enlarging the wheel pant hole may mitigate the onset of paint cracking since the tow bar will be less likely to apply a lateral force directly to the wheel pant. To enlarge the wheel pant hole, complete the following instructions.

(1) Remove the nose wheel pant per instructions in this section.

(2) Using a suitable tool (i.e. die grinder or drill with sanding barrel), carefully enlarge the size of the lugholes to 1.25 to 1.30-inch diameter. If necessary, the hole may be enlarged eccentrically to the current hole in the wheel pant to maintain a consistent gap between the tow lug and wheel pant.

(3) Re-install the nose wheel pant per instructions in this section.

3. Nose Gear Wheel And Fork Assembly

A. **Disassembly - Wheel and Fork Assembly**

(1) Raise the front of the airplane such that the nose wheel is completely clear of the ground.

(2) Remove the four AN5-12A bolts and washers attaching the nose wheel assembly to the base of the nose strut. Refer to

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Figure 201.

(3) If the aircraft has a wheel pant, remove the wheel pant per the instructions in the Nose Gear Wheel Pant and Fairing section and remove the four 10-32 screws securing the tow bar plates and blocks to the fork.

(4) If the aircraft does not have a wheel pant and tow bar, remove the four bolts and washers securing the blocks to the fork.

(5) Secure the nose wheel assembly in a soft jaw vise or equivalent fixture. Remove the nose wheel axle nut, bolt, and two washers. Using a plastic mallet, gently tap inward on the fork area around the axle bushing areas until the bushings become dislodged from the fork. Remove the bushings, wheel assembly, and axle spacer from the fork. Refer to Figure 203 or Figure 204.

B. **Reassembly - Wheel and Fork Assembly**

(1) Secure the nose wheel fork in a soft jaw vise or equivalent fixture with fork legs open and unobstructed.

(2) Insert the axle spacer into the wheel. Install the tire and wheel assembly into the nose wheel fork. Insert the axle bushings into the fork with the axle spacer inserted into the bushings. Refer to Figure 203 or Figure 204.

(3) Install the axle bolt, nut, and two washers in reverse order as disassembled, but do not tighten the axle nut. Refer to Figure 203 or Figure 204.

(4) With the axle bushings partially installed, check the clearance between the outside diameter of the tire and the edge of the nutplate on the fork. Refer to Figure 205. Clearance must not be less than 0.25 inches. If clearance is less than 0.25 inch, replace the 5.00-5, 10 ply tire with one that has an inflated outside diameter of 14.20 inches or less per TSO-C62C.

(5) Rotate the axle bushings so that the flat edges of the bushings are parallel with the edge of the blocks (blocks prevent axle bushings from rotating within the fork). If necessary, temporarily install the blocks to the fork to assist alignment of bushings during installation.

(6) Tighten the axle nut until the axle-bushing flanges are fully seated against the outside surface of the fork. If necessary, lightly tap the fork legs outward with a plastic or rubber mallet while tightening the axle bolt. Do not allow bushings to become cocked or jammed. If bushings become hard to install, stop and remove the bushings to check for any possible damage to the bushing or fork bushing holes. Replace all damaged parts. Do not file, grind, polish or sand bushings or fork bushing holes. Do not install a warm bushing into a cold fork. If necessary, place the axle bushings in a freezer for one hour and submerge fork in hot water for ten minutes prior to assembly. Anti-seize compound may be used to help install axle bushings into the fork.

(7) With axle bushings fully installed, tighten nut until all side play is eliminated from wheel bearings, then continue tightening an additional quarter turn. The wheel should have a slight drag when the bearings are properly preloaded. Verify that the wheel bearings are fully seated by attempting to rock the wheel from left to right. No movement or "play" should be felt.

(8) If the aircraft has a wheel pant, apply Loctite 242 to the threads, and torque the 10-32 screws securing the tow bar plates and blocks to the fork 30 to 36 in.-lbs. Refer to Figure 203.

(9) If the aircraft does not have a wheel pant and tow bars, install the AN3H13A bolts and NAS1149F0363P washers securing the blocks to the fork and tighten snug. Safety wire the bolts per MS33540. Refer to Figure 204.

(10) Install the wheel pant per the instructions in the Nose Gear Wheel Pant and Fairing section.

(11) Attach the nose wheel assembly to the base of the nose strut with the four AN5-12A bolts and washers. Refer to Figure 201. Torque the bolts 140 to 180 in.-lbs.

C. **Servicing and Maintenance**

The nose wheel assembly does not require any service or maintenance. The nose wheel assembly should be inspected for corrosion and other damage annually or every 100 hours. Damaged parts should be replaced as required. The nose wheel is to be serviced per the procedures outlined in Chapter 12.

4. Nose Strut

A. The nose gear will be equipped with either the Cessna nose strut or the ESCO nose strut. The Cessna strut nitrogen gas inlet Schrader valve is located at the bottom rear of the nose strut. The ESCO strut has "ESCO" clearly labeled and the nitrogen gas inlet Schrader valve is located at the upper front of the strut.

(1) **Cessna Nose Strut**

(a) **Removal of the Nose Strut**

1 Remove the nose strut fairing per the instructions in the Nose Gear Wheel Pant and Fairing section.

2 Relieve all load from the nose gear by pushing down on the tail of the aircraft.

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3 Remove the valve cap from the strut Schrader valve. Using a small flat bladed screwdriver covered by a rag, gently press in on the schrader valve core stem to slowly bleed off nitrogen gas pressure in the strut.

CAUTION: Always wear safety goggles when releasing gas pressure.

4 For engine mounts with a slot, use a felt tip marker and apply an aligning index mark between the engine mount and the strut housing. An aligning index mark is not required for engine mounts that are not slotted.

5 Remove the bolts, nuts (either castellated or self-locking) and washers connecting the nose strut to the engine mount. Refer to Figure 206.

6 Using a twisting motion, pull the nose strut straight down and out of the engine mount.

(b) **Installation of Nose Strut**

1 Using a twisting motion, slide the nose strut housing into the engine mount until the housing collar is seated flush against the engine mount tube and index marks are aligned.

2 Install the bolts, nuts, and washers connecting the nose strut to the engine mount in reverse order as disassembled. Refer to Figure 206. Torque nuts 72 to 84 in.-lbs. Install new cotter pin in the castellated nuts.

3 Service the nose strut per the instructions in Chapter 12.

4 Reinstall the nose strut fairing per the instructions in the Nose Gear Wheel Pant and Fairing section.

5 Reinstall the nose wheel assembly per the instructions in the Nose Gear Wheel Pant and Fairing section.

(c) **Servicing and Maintenance**

1 Inspection (every 100 hours or annually)

a The nose gear strut should be inspected for cracks, corrosion, scratches on the strut shaft, fluid leakage, and signs of overstress. The strut attachment to the engine mount should be checked for security. If oil leakage is present at any one of these locations, replacement of the strut is required.

b With the full weight of the aircraft on the nose and main gear inspect the ride height of the nose gear strut. There should be 3 to 4 inches of the chrome strut rod visible between the lower flange and the wiper seal. If ride height is low and no oil leakage is present, recharge the strut per Chapter 12. Recheck the filler valve and the filler valve gasket for signs of leakage.

c Remove weight off the nose gear to allow rotation of the nose wheel assembly left and right to its full range of rotation. A smooth resistance from the internal hydraulic shimmy damper device should be felt throughout its rotation. If binding is felt during rotation service the strut per Chapter 12. If the strut has been properly serviced and continues to bind, replacement of the strut is required.

d Rotate the nose gear wheel assembly to one side and remove just enough weight off the nose gear so the strut is fully extended and the wheel assembly is no longer in contact with the floor. If the wheel assembly does not center, in line with the direction of flight, service the strut per Chapter 12. If the strut has been properly serviced and does not center, replacement of the strut is required.

2 Servicing (every 200 hours or annually) - The strut should be serviced per the instructions in Chapter 12.

(2) **ESCO Nose Strut**

(a) **Removal of Nose Strut**

1 Remove the nose strut fairing per the instructions in the Nose Gear Wheel Pant and Fairing section.

2 Relieve all load from the nose gear by pushing down on the tail of the aircraft.

CAUTION: Always wear safety goggles when releasing gas pressure. Apply rags around the Schrader valve and a drip pan under the strut to catch any oil that may discharge with the nitrogen gas.

3 Remove the valve cap from the strut Schrader valve. Using a small flat bladed screwdriver covered by a rag, gently press in on the Schrader valve core stem to slowly bleed off nitrogen gas pressure in the strut.

4 Remove the Schrader valve from the strut housing.

5 For engine mounts with a slot, use a felt tip marker and apply an aligning index mark between the engine mount and the strut housing. An aligning index mark is not required for engine mounts that are not slotted.

6 Remove the bolts, nuts (either castellated of self-locking), and washers connecting the nose strut to the engine mount. Refer to Figure 207.

7 Using a twisting motion, pull the nose strut straight down and out of the engine mount.

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(b) **Installation of Nose Strut**

1 Using a twisting motion, slide the nose strut housing into the engine mount until the housing collar is seated flush against the engine mount tube and index marks are aligned.

2 Install bolts, nuts, and washers connecting the nose strut to the engine mount in reverse order as disassembled. Refer to Figure 207. Torque nuts 72 to 84 in.-lbs. Install new cotter pins in the castellated nuts.

3 Screw the schrader valve into the nose strut and torque the valve 150 to 200 in.-lbs.

4 Service the nose strut per the instructions in Chapter 12.

5 Reinstall the nose strut fairing per the instructions in the Nose Gear Wheel Pant and Fairing section.

6 Reinstall the nose wheel and wheel pant assembly per the instructions in the Nose Gear Wheel Pant and Fairing section.

(c) **Nose Strut Servicing and Maintenance**

1 Inspection (every 100 hours or annually)

a The nose gear strut should be inspected for cracks, corrosion, scratches on the strut shaft, fluid leakage, and signs of overstress. The strut attachment to the engine mount should be checked for security. If oil leakage is present at any one of these locations, replacement of the strut is required.

b With the full weight of the aircraft on the nose and main gear inspect the ride height of the nose gear strut. There should be 3 to 4 inches of the chrome strut rod visible between the lower flange and the wiper seal. If ride height is low and no oil leakage is present, recharge the strut per Chapter 12. Recheck the filler valve and the filler valve gasket for signs of leakage.

c Remove weight off the nose gear to allow rotation of the nose wheel assembly left and right to its full range of rotation. A smooth resistance from the internal hydraulic shimmy damper device should be felt throughout its rotation. If binding is felt during rotation service the strut per Chapter 12. If the strut has been properly serviced and continues to bind, replacement of the strut is required.

d Rotate the nose gear wheel assembly to one side and remove just enough weight off the nose gear so the strut is fully extended and the wheel assembly is no longer in contact with the floor. If the wheel assembly does not center, in line with the direction of flight, service the strut per Chapter 12. If the strut has been properly serviced and does not center, replacement of the strut is required.

2 Servicing (every 200 hours or annually) - The strut should be serviced per the instructions in Chapter 12.

5. Hard Landing Inspection

A. After a hard landing or a landing over maximum landing weight, the aircraft should be inspected for damage in accordance with this section. If any damage is found, it must be repaired prior to the next flight.

(1) Nose Gear - The nose gear strut should be inspected for cracks, scratches on the piston, fluid leakage, and signs of overstress. Check for proper nitrogen pressure in the strut. The strut attachment to the engine mount should be checked for security. If oil leakage is present at any one of these locations, replacement of the strut is required.
Inspect the ride height of the nose gear strut. There should be 3 to 4 inches of the chrome strut rod visible between the lower flange and the wiper seal. If ride height is low and no oil leakage is present, recharge the strut per Chapter 12. Recheck the filler valve and the filler valve gasket for signs of leakage.

(2) Main Gear - Inspect the wheel, axle, axle mounting bolts, wheel shims, gear leg, and gear leg attachment bolts to assure there are no broken, bent, or loose parts. The main gear assembly should fit snugly together with very little, if any, free play.

(3) Wheel Toe-in and Camber - Assure that wheel toe-in and camber meets the requirements of the Main Gear Assembly section.

(4) Fairings - Visually inspect the main and nose gear fairings for chips, cracks, or other damage.

(5) Gearbox - Determine if the gearbox is bent or broken. With equal pressure and wear on the tires, the aircraft evenly loaded (including fuel), and the aircraft on a level surface, the wings should be level. If a bent or broken gearbox is suspected, contact Cessna Aircraft Company, and do not fly the aircraft.

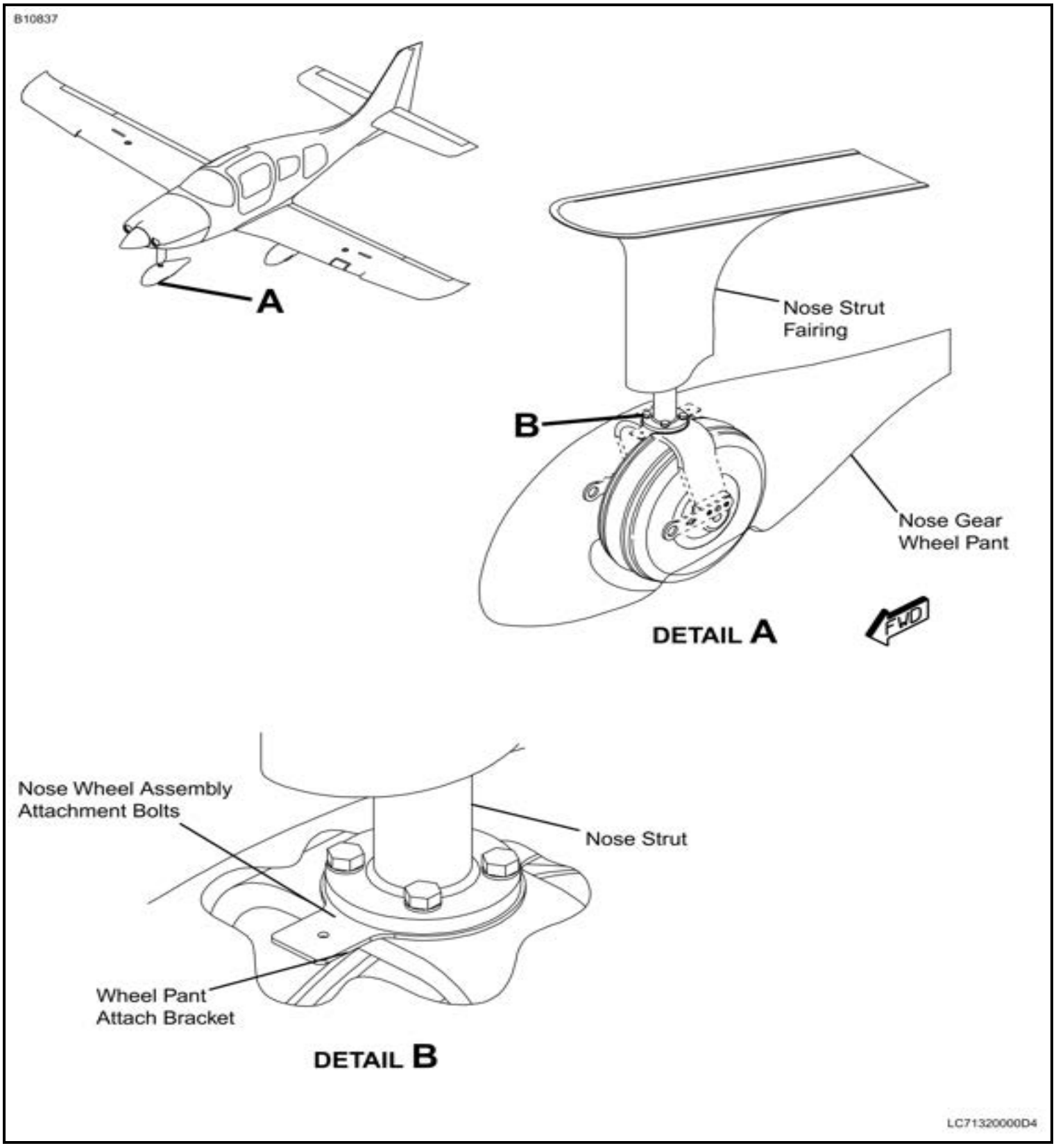
(6) Tires - Visually inspect the tires for cuts, wear, or broken belts.

(7) Engine Mount - Visually inspect the welds on the engine mount using a bright light and magnifying glass.

(8) Propeller - Visually inspect the propeller for nicks or chips.

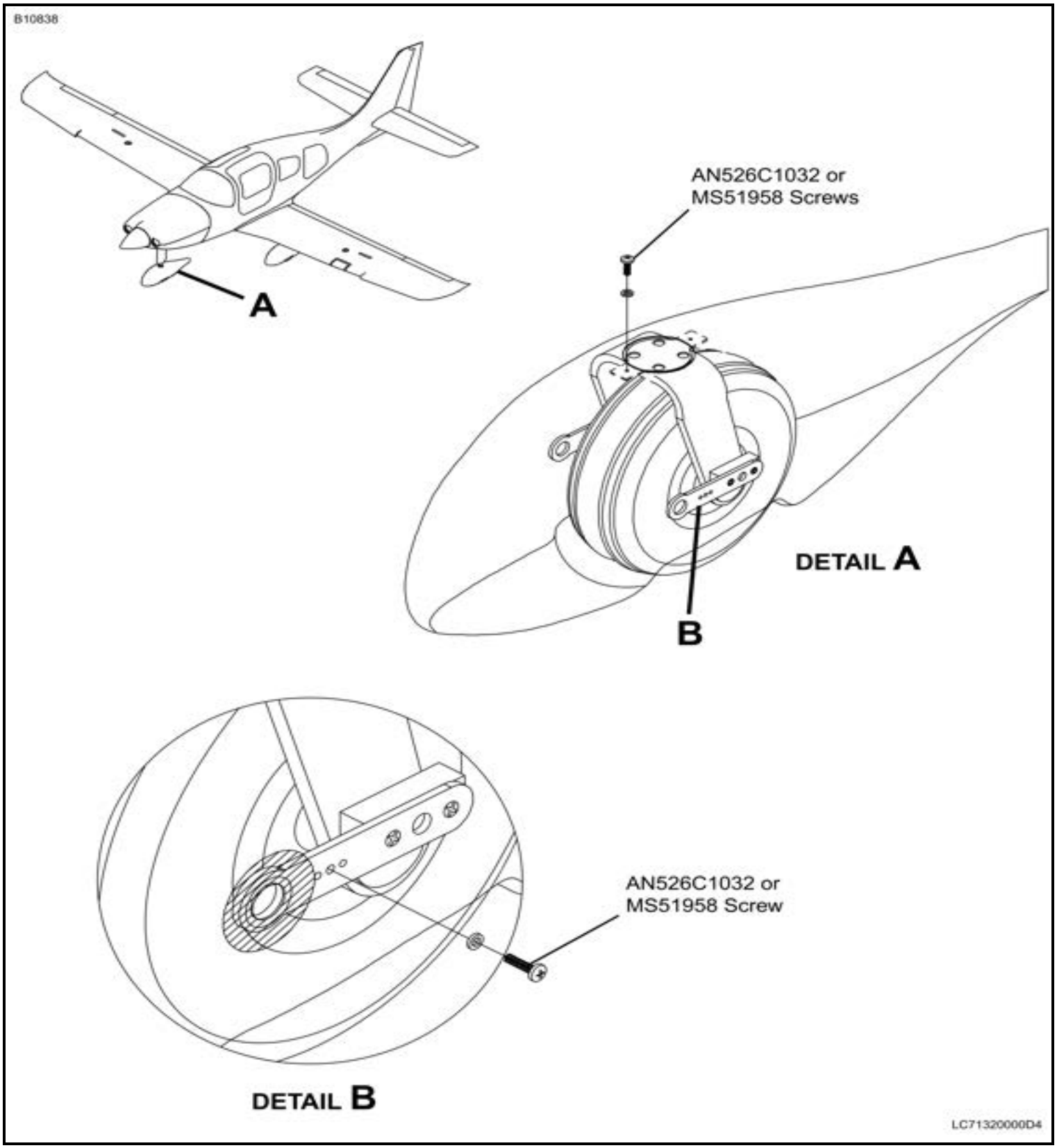
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Figure 201 : Sheet 1 : Nose Wheel Pant and Leg Fairing



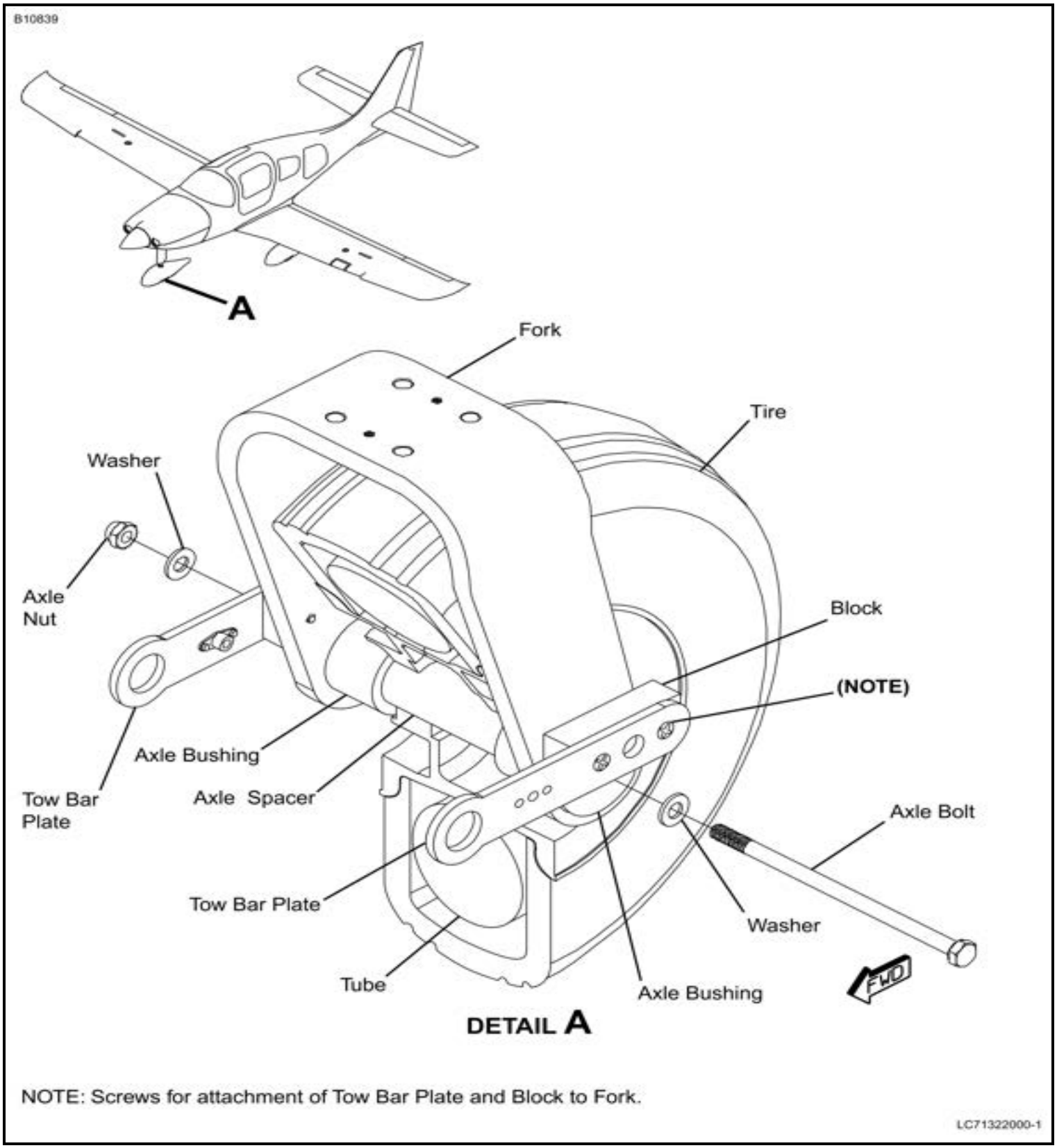
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Figure 202 : Sheet 1 : Wheel Pant Attachment Hardware



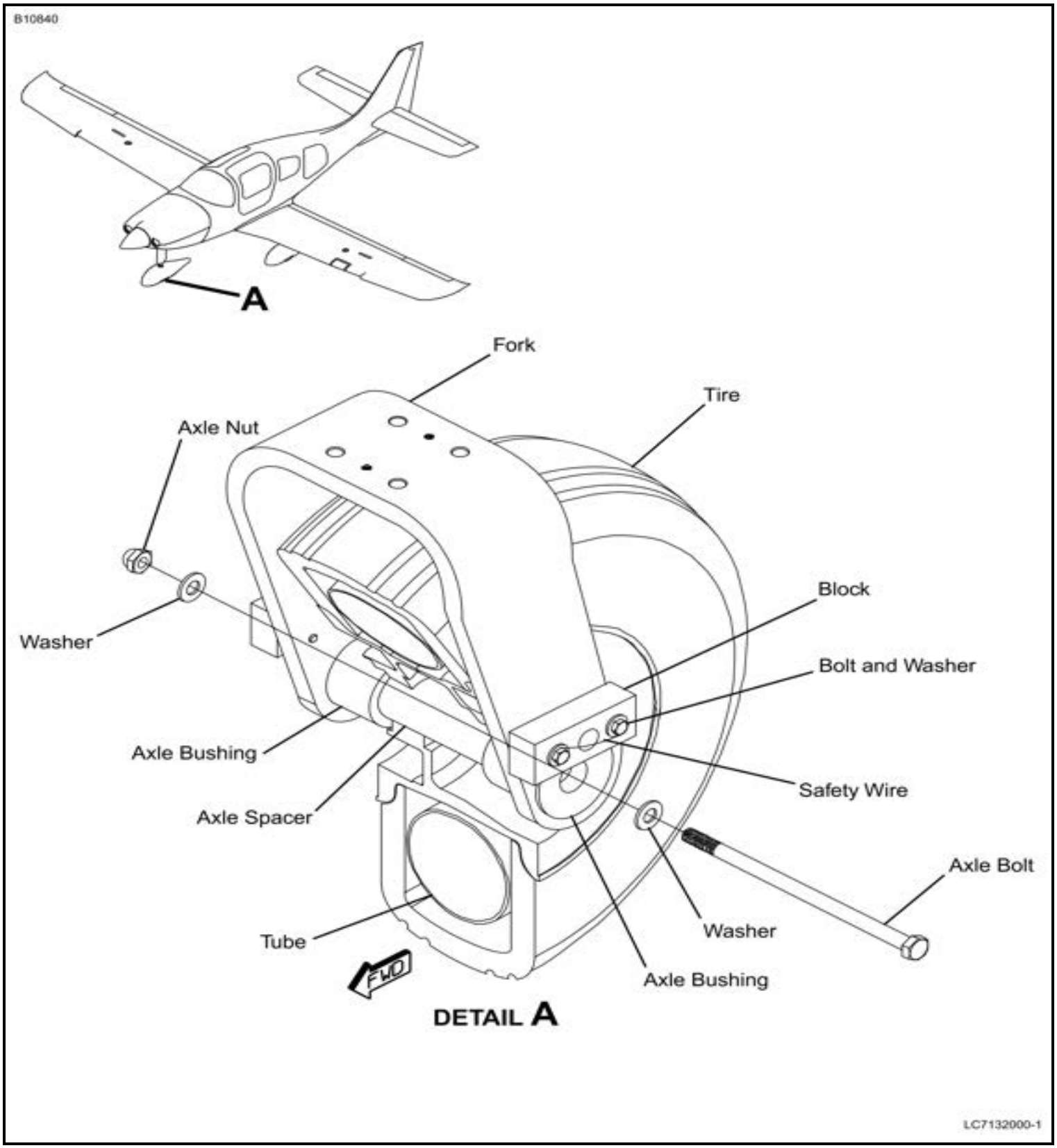
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Figure 203 : Sheet 1 : Nose Gear Wheel and Fork Assembly with Wheel Pant



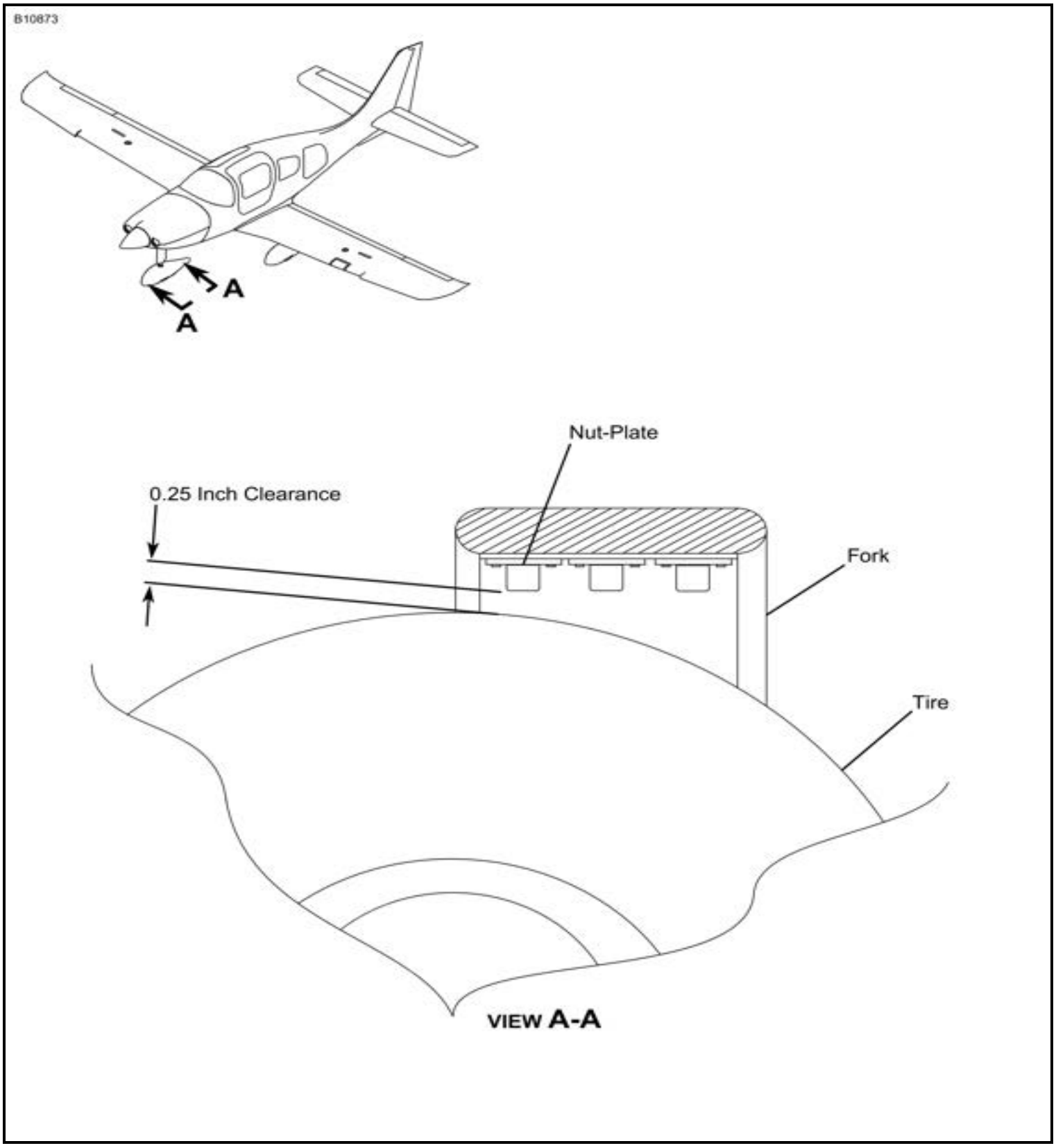
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Figure 204 : Sheet 1 : Nose Gear Wheel and Fork Assembly without Wheel Pant and Tow Bars



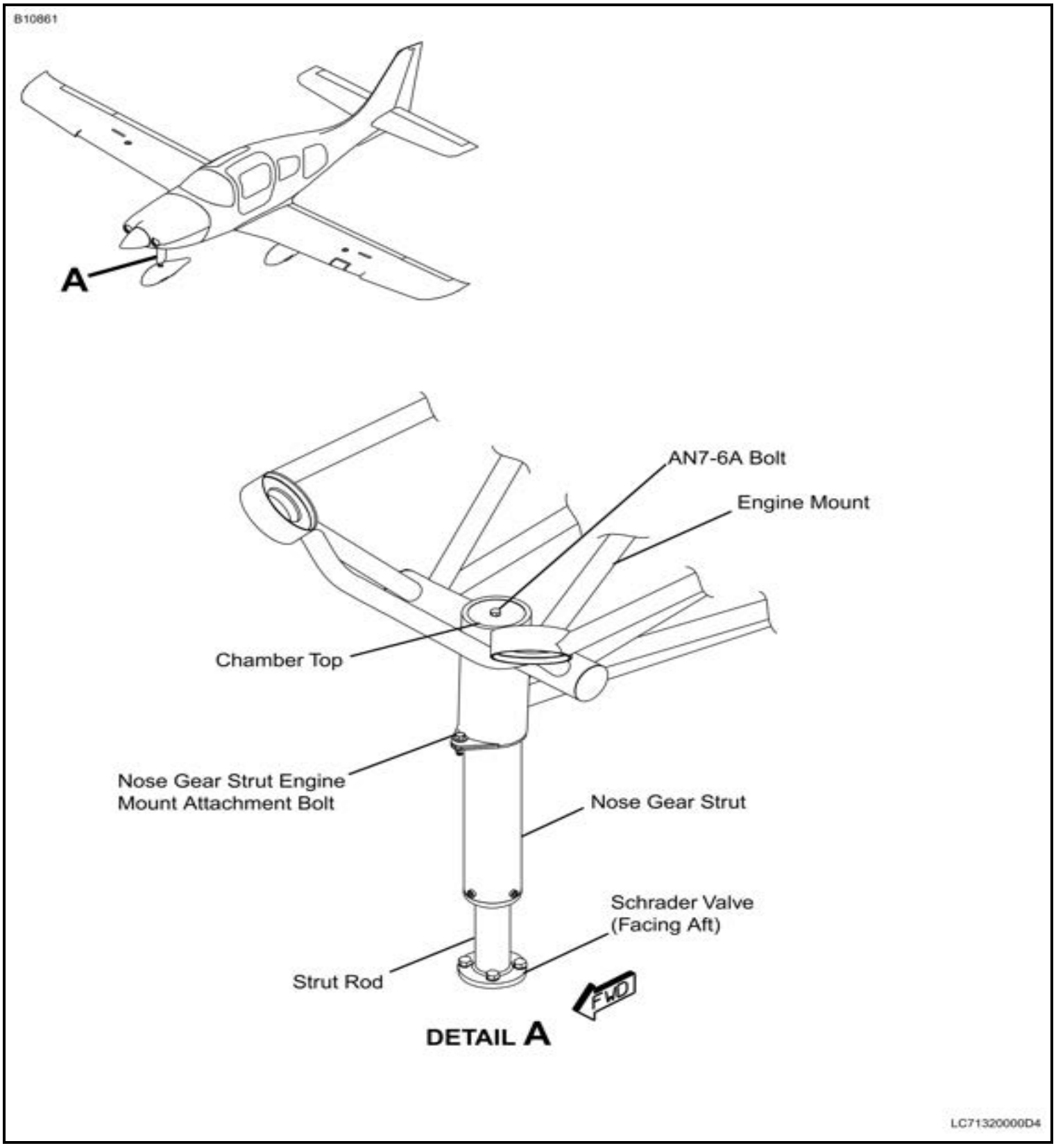
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Figure 205 : Sheet 1 : Minimum Tire Clearance



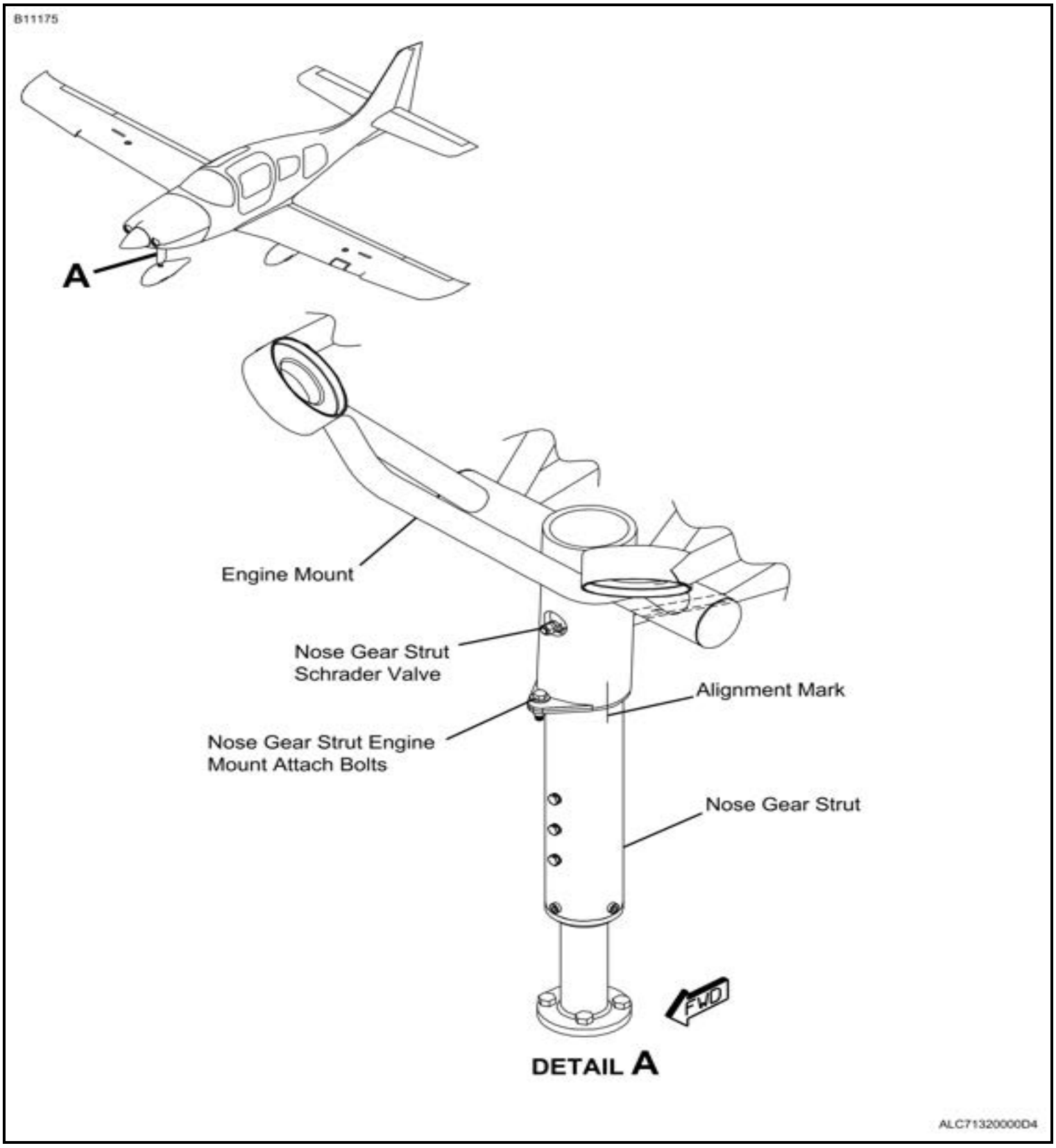
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Figure 206 : Sheet 1 : Nose Strut Assembly



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Figure 207 : Sheet 1 : ESCO Nose Strut Assembly



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WHEELS, TIRES, AND BRAKE SYSTEM - MAINTENANCE PRACTICES

1. General

A. The Cessna 400 (LC41-550FG) uses a 5.00-5 nose wheel and a 6.00-6 main wheel. The nose and main wheels are both tube type wheels. The nose wheel uses a 5.00-5 10-ply tire and the main wheel uses a 15x6.00-6 6-ply tire. Wheels and tires are certified under the requirements of TSO-C26c, and all replacement parts should be in accordance with the TSO.

B. All service and maintenance practices for the main wheels are in accordance with the latest issue of Cleveland Wheels and Brakes Maintenance Manual AWBCMM0001. The manual includes the disassembly and reassembly of the wheel and brake disk, the installation of tires and tubes, and the service and repair of wheel bearings and bearing races. Service and maintenance of the brake calipers and brake master cylinders are also covered in the Cleveland maintenance manual.

2. Brake System

A. The Cessna 400 (LC41 550FG) has dual brakes located on the main gear. The brakes are hydraulically actuated and used for steering (differential braking) as well as stopping.

B. **Removal and Installation of the Brake Calipers**

(1) Gain access to the brake calipers by removing the main gear wheel pant access panel.

(2) Remove the four bolts from the brake caliper that hold on the brake pads. Pads will drop away from behind the wheel disc.

(3) Slide the brake caliper straight out from the torque plate.

CAUTION: Depressing the brake pedals at this point will push the brake caliper pistons out of the calipers and release brake fluid.

(4) Disconnect the brake line from the brake caliper. Once the brake line is removed, use a plug or cap to seal the end of the brake line to minimize the amount of brake fluid that will drain from the line.

(5) Reinstall the brake calipers in the reverse order. Torque the brake pad attachment bolts per the latest issue of Cleveland Maintenance Manual AWBCMM0001.

(6) Service the brake system per the instruction in the Brake System - Servicing and Maintenance of the Brake System section.

C. **Removal and Installation of the Brake Master Cylinders** - The brake master cylinders are located in the cabin. There are four master cylinders, one at each rudder pedal. The brakes are actuated by depressing the rudder pedals, which in turn depresses the brake master cylinders. Use the following procedure for removing and installing the master cylinders:

NOTE: Place some rags or a small pan underneath the master cylinder and rudder pedal to catch any excess hydraulic fluid that may still be present in the line.

(1) Remove the main gear wheel pant access panel to gain access to the brake caliper.

(2) Place a small pan or bucket under the brake caliper, and remove the lower bleeder valve.

(3) Depress the rudder pedals several times to facilitate draining of the brake system.

(4) Once the brake system is drained of hydraulic fluid, disconnect the brake lines from the brake master cylinder.

(5) Remove the cap plug, cotter pins, nuts, washers, and bolts attaching the master cylinder to the rudder pedal and the rudder crossover tube. Refer to Figure 201 and Figure 202.

(6) Install the brake master cylinder in the reverse order. Check all fittings and attachments for security. Fill a new MS-3 cap plug half full with Wacker SWS-951 sealant, and install over the nut with the cotter pin.

(7) After the master cylinder is re-installed, refill the brake system with hydraulic fluid, MIL-H-5606, per the instructions in the Brake System - Servicing and Maintenance of the Brake System section.

D. **Servicing and Maintenance of the Brake System** - The brake system is a self-contained system and under normal operating conditions should not need any service or maintenance. The system will need to be serviced if the brake calipers or other components are replaced. If the brakes begin to feel soft, the brake system may have air in the lines and will need to be serviced. The brake system will also need to be serviced if any of the brake lines are disconnected. Servicing the brake system will require the use of a small garden sprayer with a modified nozzle or other similar device. The spray nozzle should be replaced with a small section of tubing that can be fitted to the brake caliper bleeder valve. Use the following procedure for bleeding and servicing the brake system:

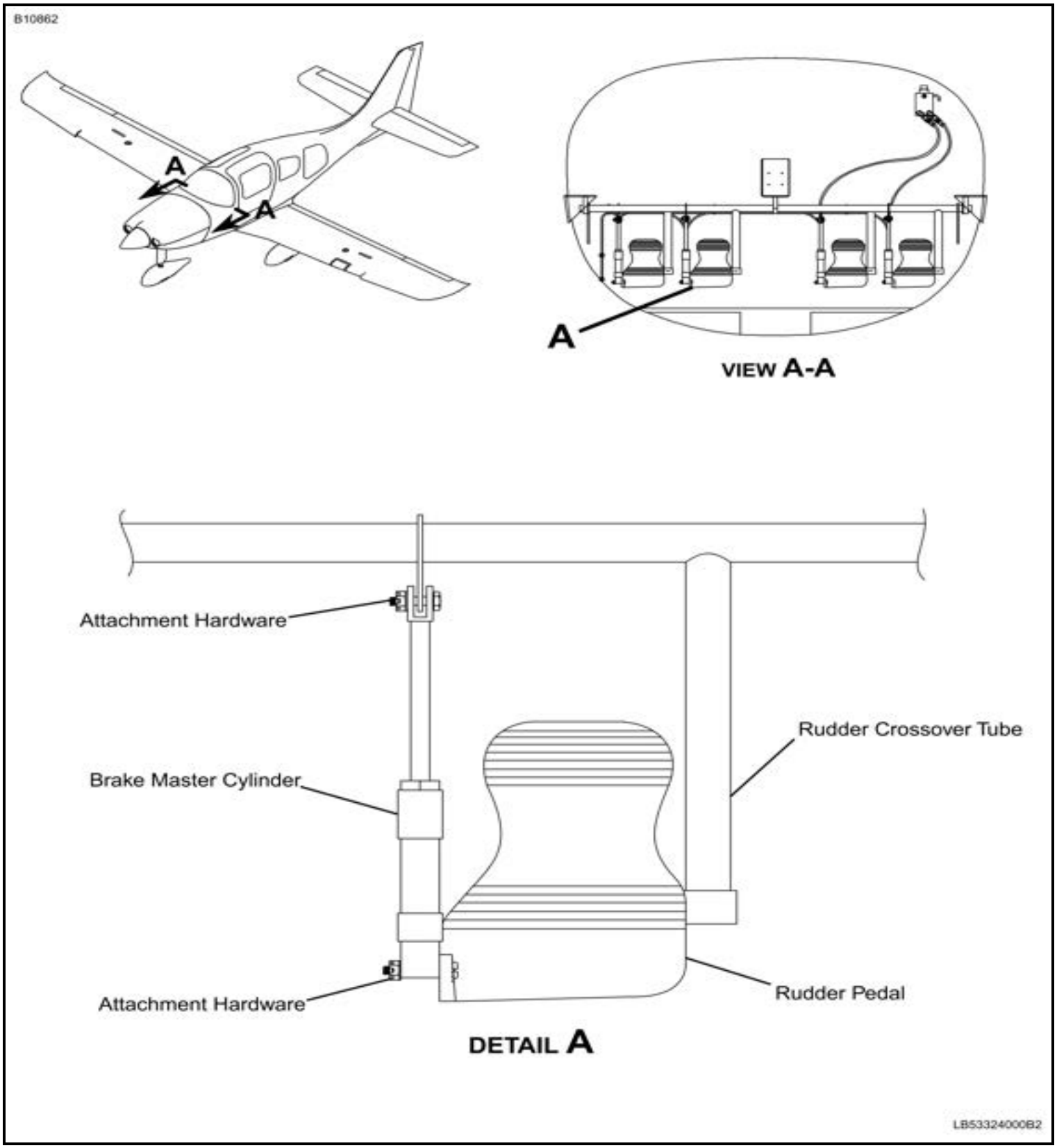
WARNING: Only service the brake system when the brake calipers are attached to the wheel and disc assembly. If the brake system is pressurized with the caliper unattached to the wheel and disc, the caliper pistons will be pushed out of the caliper.

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(1) Place a small bucket or pan under the drain valve located at the rear of the lower engine cowl.
(2) Gain access to the brake caliper by removing the inner wheel pant access panel.
(3) Loosen the bleeder valve located on the bottom of the brake caliper.
(4) Fill the garden sprayer with MIL-H-5606 hydraulic fluid, and connect the end to the bleeder valve. Pressurize the sprayer.
(5) Depress the handle to release hydraulic fluid into the brake system.
(6) Depress the brake pedal several times until all air is forced out of the system. When all the air is forced out of the system, the brakes will feel firm.
(7) Once the brake system has been serviced, tighten the bleeder valve prior to removing the sprayer.
(8) Clean any excess brake fluid that may have spilled on or near the brake caliper, wheel, and brake disc.
(9) Reinstall the wheel pant access panel.

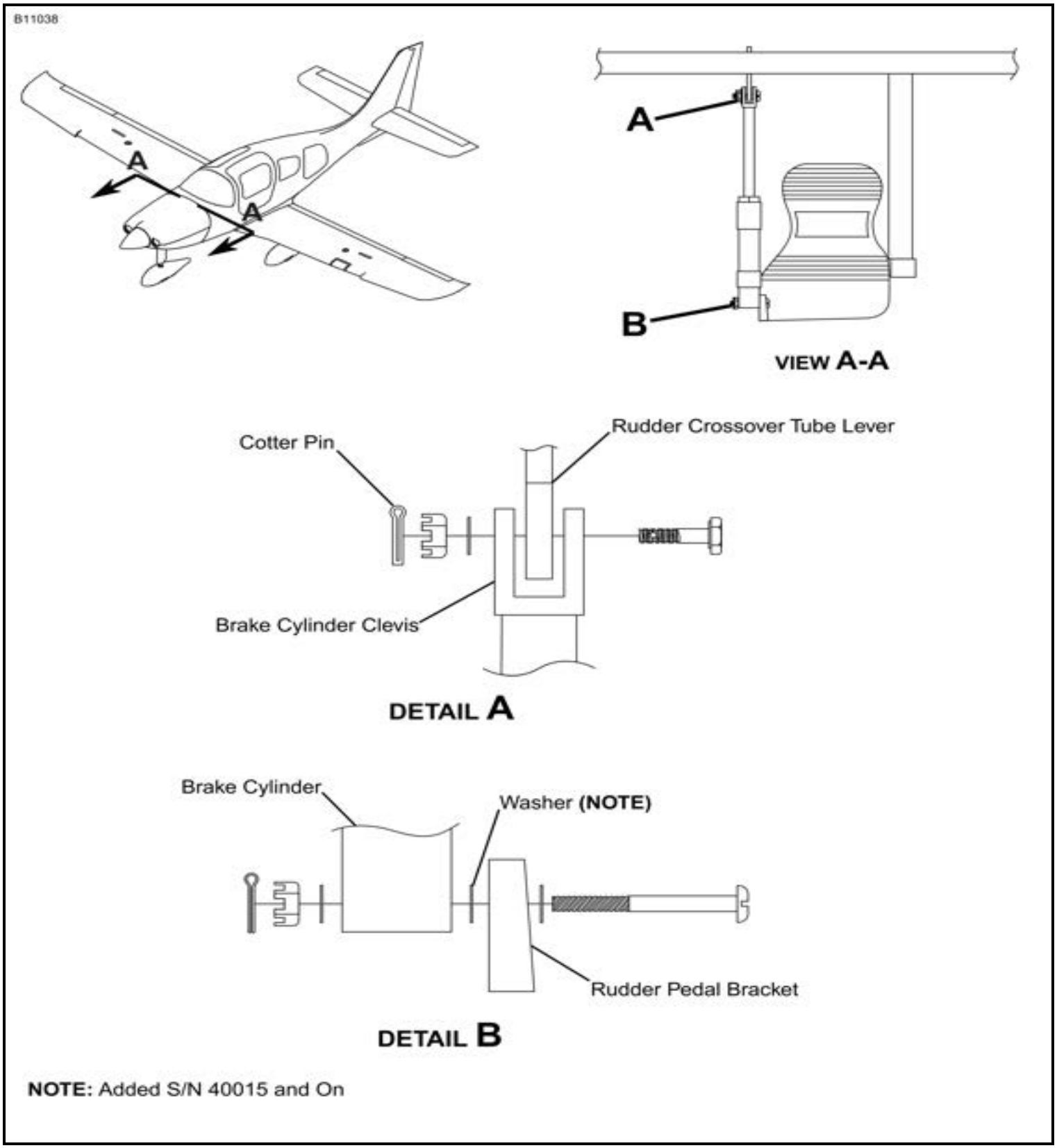
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Figure 201 : Sheet 1 : Rudder Pedal and Brake Master Cylinder Attachment



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Figure 202 : Sheet 1 : Rudder Pedal and Brake Master Cylinder Attachment Details



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PARKING BRAKE - MAINTENANCE PRACTICES

1. General

A. The Cessna 400 (LC41-550FG) uses a parking brake to lock the brakes and prevent the aircraft from rolling. The parking brake is located on the left side of the cabin just forward of the circuit breaker panel.

(1) **Parking Brake Removal and Installation**

(a) Remove the parking brake interior panel per the instructions in Chapter 25.

(b) Drain the hydraulic system per the instructions in the Brake System - Removal and Installation of the Brake Master Cylinders section.

(c) Disconnect the brake lines from the parking brake. Place a rag under the brake lines to prevent any excess brake fluid that may still be in the lines from leaking onto the carpet.

(d) Remove the two AN526C1032R24 truss head screws and two NAS1149F0363P washers that attach the parking brake (refer to Figure 201), and slide the brake and spacer straight out.

(e) Reinstall the parking brake in the reverse order. Torque the attachment screws 30 to 36 in.-lbs.

(f) Service the brake system per the instructions in the Brake System - Servicing and Maintenance of the Brake System section.

(2) **Parking Brake Service and Maintenance** - The parking brake is a sealed system and should not need any service or maintenance. The parking brake should be inspected periodically to ensure that it is still functioning properly. Use the following procedure to check if the parking brake is functioning properly.

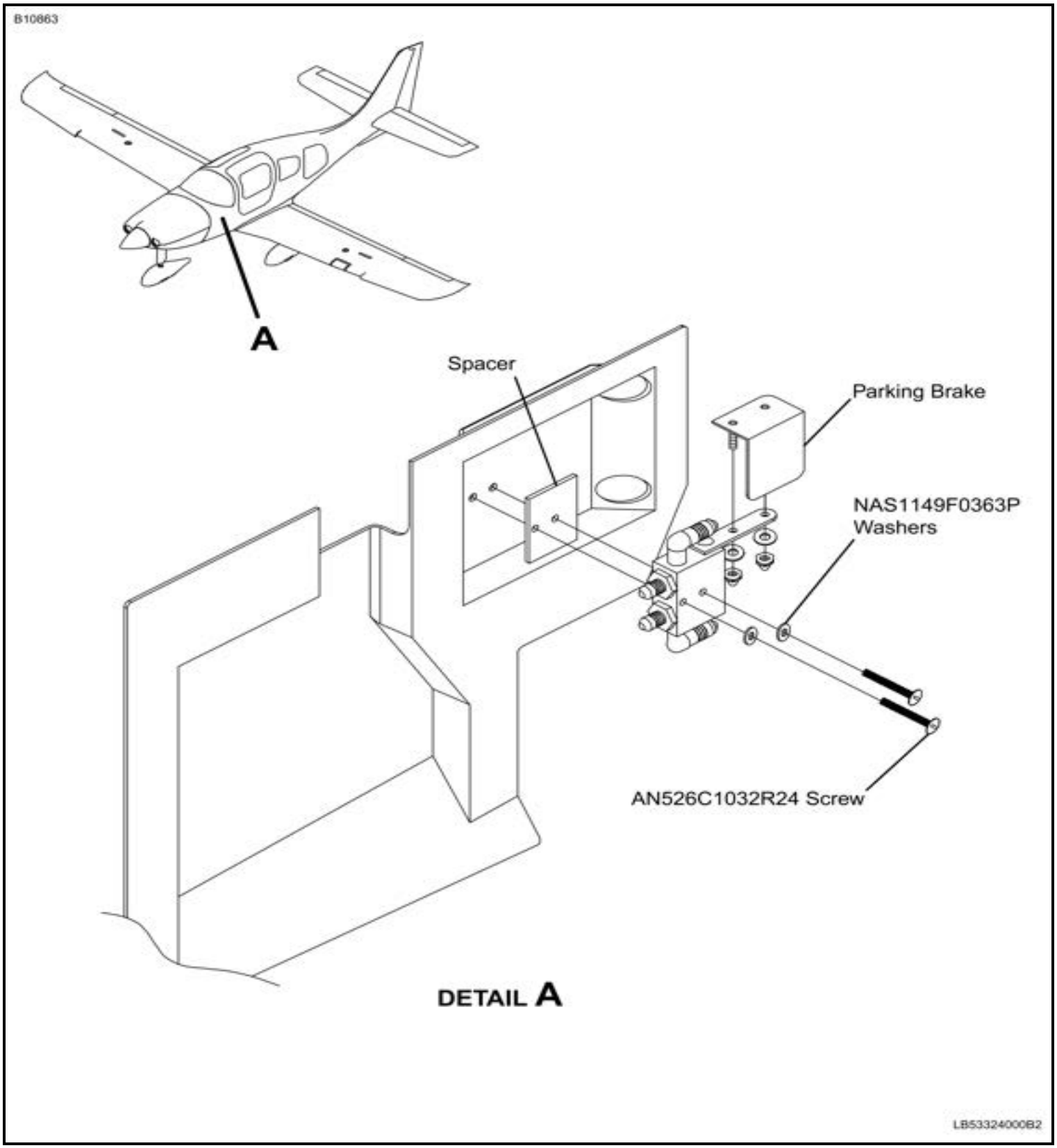
(a) Depress the rudder pedals to actuate the brakes.

(b) While pressing on the rudder pedals, pull the parking brake lever out and towards the pilot’s seat to engage the parking brake and lock the brakes.

(c) Using the tow bar, attempt to pull the airplane forward. If the airplane will not roll or the tires skid, the parking brake is functioning correctly. If the airplane does roll forward with little or no resistance the parking brake should be inspected for proper attachment of the brake lines (refer to Figure 202) and possible service of the parking brake itself. Service of the parking brake is in accordance with the latest issue of Cleveland Maintenance Manual AWBCMM0001.

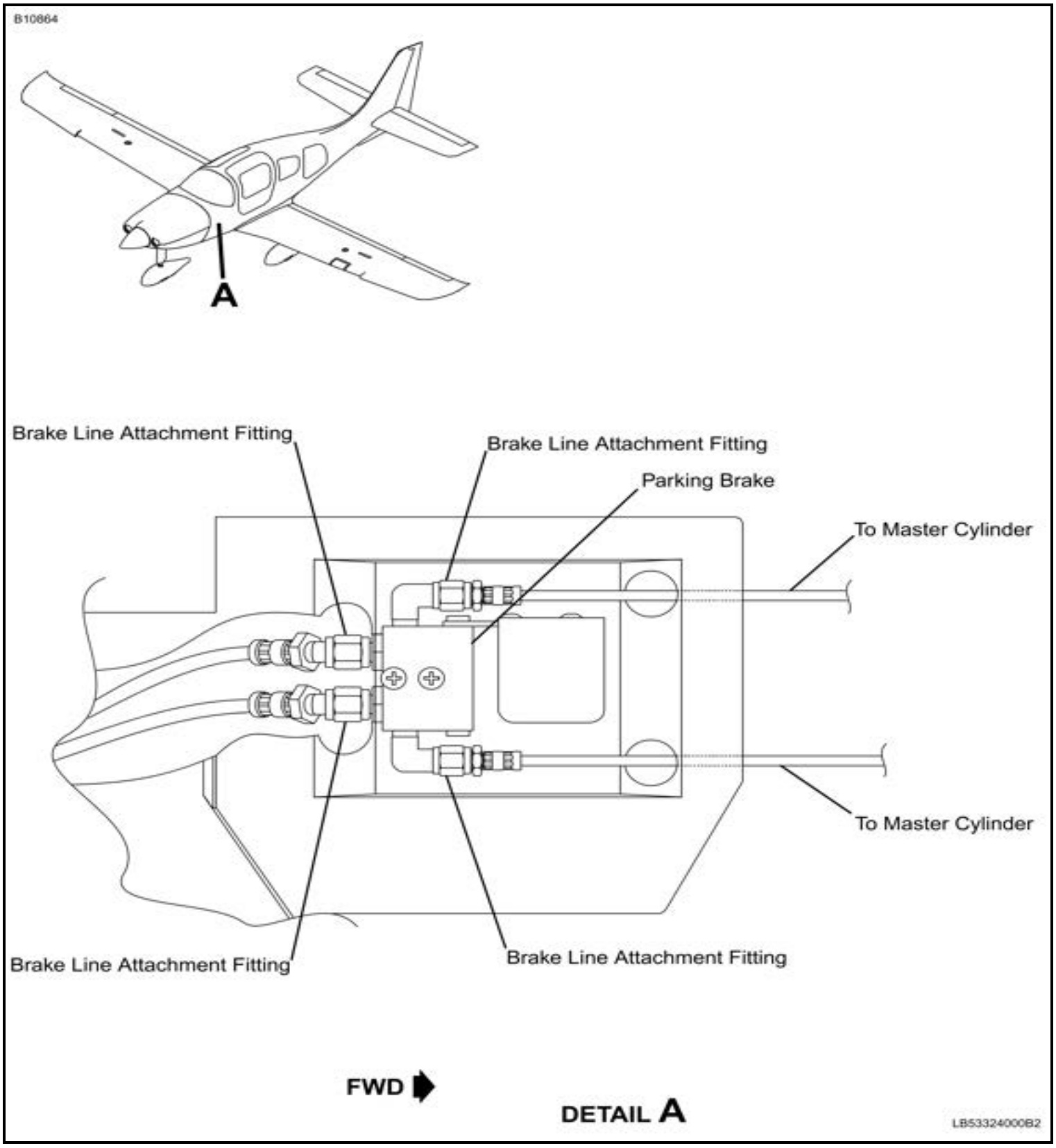
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Figure 201 : Sheet 1 : Parking Brake Installation



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Figure 202 : Sheet 1 : Parking Brake and Brake Line Attachment



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LIGHTING - GENERAL

1. Interior Lighting System - General

A. The interior lighting system of the Cessna Model LC41-550FG/T240 is one of the more sophisticated systems available for small airplanes. For a summary of the airplane lighting installations refer to the sections that follow:

(1) Garmin Model T240 LED Panels refer to Table 1.

(2) Avidyne Option lighting refer to Table 2.

(3) Garmin G1000 Option lighting refer to Table 3.

(4) For Avidyne and Garmin G1000 Options, trim, annunciators, and flap position LEDs refer to Chapter 25, Instrument Panels and Electrical Panels - Maintenance Practices.

(5) Fuel tank LEDs refer to Chapter 28, Fuel Indicating System - Maintenance Practices.

B. Flip & Access Lights - The flip-lights are rectangular shaped fixtures located in the middle of the overhead panel and in the baggage compartment. The lights bypass the system master switch and operate without turning on power to the system. The two fliplights are turned on by turning or flipping the lens right or left. In the center position, they are used as part of the airplane's access lighting system.

(1) When either main entrance door is unlatched, a switch in the door latching mechanism activates the two flip-lights and the two lights that illuminate each entrance step. The access lights are on a ten-minute timer and turn off automatically unless reset by activating both main door latching mechanisms when all the doors are closed.

(2) This design has two advantageous features. First, opening either of the main cabin doors provides an immediate light source for preflight operations, passenger access, and baggage loading. Second, the flip-lights, when turned to the left or right, operate as emergency lighting in situations which necessitate turning off the master switch. The only disadvantage is that the flip-lights can inadvertently be left on, depleting battery power. To prevent this from happening, make sure that the flip-lights are in the centered or flush position when securing the airplane at the end of a flight.

C. Overhead Reading Lights - There are four overhead reading lights, two in the forward overhead panel between the front seats and two in the aft overhead panel between the two backseats. Each light is on a swivel that can be adjusted to an infinite number of positions. The intensity of these lights is adjusted by moving the left thumb-wheel (Avidyne option) or slide-type dimmer switch (Garmin G1000 option or Model T240) in the center of the overhead panel, near the windshield. The dimmer has an on-off switch at the extreme aft position. Turn the thumb-wheel, or move the slide forward to increase the light intensity. You must have the airplane's position lights in the on position for the overhead reading lights to operate.

D. Glare Shield Flood Bar - There is a tube array of either color-corrected lights or LEDs inserted under the glare shield. This indirect light source complements the backlighting in each instrument and facilitates the use of adjustable instruments such as the true airspeed indicator, directional gyro, and navigational instruments. The intensity of the lights can be adjusted as follows:

(1) Model T240 and Garmin G1000 option.

(a) Move the slide-type dimmer switch found in the center of the overhead panel forward.

NOTE: The dimmer has an on-off switch at the extreme aft position.

(2) Avidyne option.

(a) Turn the right wheel-type dimmer switch found in the overhead panel.

E. Upper Instrument and Engine Panels

(1) Model T240 - The brightness of backlighting for the each of the two Garmin GDU 1400 displays (PFD (UI407), MFD (UI406)), the Garmin GCU 275 PFD Controller (UI404) and the Garmin GTC 570 Touch Screen Controller (UI405) are controlled by photo cells located on the devices. For each of the GDU 1400 displays and the GTC 570 Touchscren Controller you can brighten and dim the display within the baseline limits of the photo cells by the FLT INST dimmer switch (SW23) installed in the center console.

(2) Avidyne Option - The instruments in the flight and engine instrument panels have backlighting, that is, a small light within each instrument case that illuminates its dial. The right thumb-wheel switch between the pilot's legs on the knee bolster, controls the dimmer for these lights. The dimmer has an on-off switch at the extreme down position of its rotation. Turning the thumb-wheel up increases the light intensity. The airplane's position lights must be on for the upper instrument and engine panel lights to operate.

(3) Garmin G1000 Option - The brightness of backlighting for the PFD, MFD, audio panel, and keypad are controlled by photo cells located on the devices. The brightness of backlighting for the backup flight instruments is controlled by the left slide dimmer switch at the front of the center console. The dimmer has an on-off switch at the extreme up position, and moving

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the slide down increases the light intensity.

F. Lower Instrument Panel, Circuit Breaker Panel, and Rocker Switches

(1) Model T240 - The LED lighting panels found on the circuit breaker panel, instrument panel, center console panels, and overhead panels are controlled by the CB/SW dimmer switch (SW24) installed in the center console. The dimmer has an on-off switch at the extreme forward position, and moving the slide down increases the light intensity.

(2) Avidyne Option - The lower instrument, circuit breaker, and rocker switch panels contain switches and controls that have backlighting. The lighting illuminates the placards on or next to the breaker, switch, or control and the internally lighted engraved rocker switches. The dimmer for these lights is controlled by the left thumb wheel switch between the pilot's legs on the knee bolster. The dimmer has an on-off switch at the extreme down position of its rotation. Turning the thumb-wheel up increases the light intensity.

(3) Garmin G1000 Option - Backlighting of the 5 pack (pitot heat, door seals, and optional equipment) switches, flap panel, lighted position bar, slide dimmer labels, master switches and circuit breaker panel is controlled by the right slide switch at the front of the center console. Backlighting of the fuel pump armed light is controlled by the position lights switch. The backlighting illuminates the placards on or next to the breaker, switch or control, and the internally lighted switches. The dimmer has an on-off switch at the extreme up position, and moving the slide down increases the light intensity. Backlighting of the pitot heat, door seals, and optional items switches will dim down to a preset value while all other lighting controlled by this switch will dim to zero.

Table 1. Model T240 LED Panels

LED PANELS	LOCATION OF LED PANELS	CIRCUIT BREAKER
Switch Panel LED Panel	Center Console	PANEL LIGHTS
Audio Jacks LED Panel	Lower Center Console	PANEL LIGHTS
Ignition Switch LED Panel	Bottom Left Instrument Panel	PANEL LIGHTS
Display Reversion Switch LED Panel	Upper Left Instrument Panel	PANEL LIGHTS
Engine Control LED Panel	Lower Center Instrument Panel	PANEL LIGHTS
Circuit Breaker LED Panel	Circuit Breaker Panel	PANEL LIGHTS

Table 2. Lighting Systems (Avidyne Option)

LIGHT	LOCATION OF LIGHTS	LOCATION OF SWITCH	REMARKS
Courtesy Lights	Front and rear flip lights in overhead console	If all doors are latched, flip light is activated by flipping the lens from the neutral position.	Door switch activates timer that turns off access lights after 10 minutes.
	Exterior lights near the right and left entrance steps	If a door is unlatched, a switch activates flip lights when the lens is in the neutral position.	Operates with master switch on or off.
		Step lights are turned on with door switch.	
Overhead Swivel Lights	Two overhead swivel lights in the front seat area	The left thumb wheel dimmer switch is in the overhead panel.	Master switch and navigation lights must be on for the system to operate.
	Two overhead swivel lights in the rear seat area		
Glare Shield Flood Bar	Color corrected flood bar under the glare shield that lights the flight instruments and front panel areas	The right thumb wheel dimmer switch is in the overhead panel.	Master switch and navigation lights must be on for the system to operate.
			Part of the standby battery system.
Upper Instrument Panel	Provides backlighting for engine and flight instruments	The right thumb wheel dimmer switch is in the knee bolster on the pilot's side.	Master switch and navigation lights must be on for the system to operate.

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Lower Instrument and Circuit Breaker Panels	Provides backlighting for radios, switches, or placards next to switches, circuit breakers, and controls	Left thumb wheel dimmer switch is in the knee bolster on the pilot's side.	Master switch and navigation lights must be on for the system to operate.
Trim, Flaps, Fuel Tank and Annunciator Panel	The trim position LEDs are in the trim panel.	The day/night and test features for these items are located in the trim panel, just above the engine control.	Master switch and navigation lights must be on for the system to operate.
	The flap position LEDs are in the flap panel.		
	The fuel tank LEDs are on the fuel quantity gauge.		
	Annunciator LEDs are in the annunciator panel.		

Table 3. Lighting Systems (Garmin G1000 Option)

LIGHT	LOCATION OF LIGHTS	LOCATION OF SWITCH	REMARKS
Courtesy Lights	Front and rear flip lights in overhead console	If all doors are latched, fliplight is activated by flipping the lens from the neutral position.	Door switch activates timer that turns off access lights after 10 minutes.
	Exterior lights near the right and left entrance steps	If a door is unlatched, a switch activates flip-lights when the lens is in the neutral position.	Operates with master switch on or off.
Overhead Swivel Lights	Two overhead swivel lights in the front seat area	The left slide-type dimmer switch is in the overhead panel.	Master switch must be on for the system to operate.
	Two overhead swivel lights in the rear seat area		
Glare Shield Flood Bar	Flood bar under the glare shield which lights the flight instruments and front panel areas	The right slide-type dimmer switch is in the overhead panel.	Master switch must be on for the system to operate.
Upper Instrument Panel	Provides backlighting for the backup flight instruments.	The left slide-type dimmer switch is in the front of the center console.	Master switch must be on for the system to operate.
Lower Instrument and Circuit Breaker Panels	Provides backlighting for switches, or placards next to switches, circuit breakers, and controls	The right slide-type dimmer switch is in the front of the center console.	Master switch must be on for the system to operate.

2. Exterior Lighting System - General

A. Description of System - The exterior lighting system includes the position lights, the strobe or anticollision lights, the landing light(s), and the taxi light(s). These lights are activated through use of switches in the rocker switch panel. The light system is protected by circuit breakers in the circuit breaker panel.

B. Position and Anticollision Lights - The left and right position lights (red and green) are mounted on each wing tip. Each wing position light contains the required aft or rearward projecting white lights. The anticollision lights are on each wing tip and contained within the same light fixture as the position lights.

C. Taxi and Landing Lights -

(1) LED (Airplanes 02049 and On) - The LED taxi and landing lights are found in the leading edge of the wings. The LED light assembly supplies the landing, taxi and recognition lights all in one.

(2) Xenon and Incandescent (Airplane 01159 and Airplanes 02001 thru 02048) - The taxi and landing lights are found in the leading edge of the left wing. The outboard bulb in the light housing is the taxi light that provides a diffused light in the immediate area of the airplane. The inboard bulb is the landing light, which has a spot presentation with a slight downward focus. The taxi and landing lights are sized for continuous duty and can be left on for operations in high-density traffic

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areas.

D. LED Wing Inspection Light - The Model T240 with the TKS (FIKI) option installed have a wing inspection light installed on the left and right of the fuselage at WL 92.08, FS 98.71. The lights show the wing for icing inspection when the airplane is in flight.

3. Troubleshooting Light Problems

CAUTION: Before any maintenance, removal, or installation of equipment or light bulbs is performed, make sure both the master and avionics switches are in the off position. Before removing the light bulbs, be sure that they have not been in use for several minutes and have cooled sufficiently.

A. Light Bulbs - As a general rule, light bulbs that have a short life have good accessibility and can be exchanged easily. For example, most engine and flight instrument lights can be changed in 10 to 15 minutes depending on the location of the instrument. Light bulbs that have a long life require more time for access and replacement.

B. Glare Shield Flood Bar - If none of the lights in the flood bar work, it is unlikely that all 20 bulbs burned out at the same time. In this situation, there is clearly a problem with the supply to the flood bar, and the problem should be diagnosed from this perspective. Conversely, if the altimeter light is inoperative, but all other flight instrument lights are normal, the problem is probably a light bulb.

C. The Model T240 LED Panels - If a LED panel is not serviceable it must be replaced. Refer to Interior LED Panels (T240) - Maintenance Practices. To troubleshoot interior LED lighting problems refer to Interior LED Panels (T240) - Troubleshooting.

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INTERIOR LIGHTING - MAINTENANCE PRACTICES

1. Lighting - General

A. **Courtesy Lights** - There are four courtesy lights. Two courtesy lights are located in the airplane's interior on the overhead console, two are on the airplane's exterior, and are commonly referred to as step lights. The entrance step lights are located above and forward of the steps on both sides of the aircraft, on the underside of the wing-to-fuselage fairing. Each is easily accessible in the event of bulb burnout.

CAUTION: Before doing any work on a system, ensure that all power and light switches are in the off position and the light that is to be replaced has not been in use for a least five minutes.

B. **Exterior Courtesy/Step Lights Removal**

(1) Remove the light assembly by gently prying it with a flat-head screwdriver. It should slide out with very little effort. Refer to Figure 201.

(2) Gently pull the step light assembly out of the hole, and unplug it at the connector.

C. **Exterior Courtesy/Step Lights Installation or Replacement**

(1) Reconnect the connector and feed excess wire into the fuselage.

(2) Insert the light fixture into the hole, and push it in until it is flush with the surface.

(3) The exterior step light bulb is not replaceable. If a light fails, replacement of the whole assembly is required.

D. **Removing the Interior Courtesy Lights**

(1) The interior light housing can be removed by prying it off the panel with a screwdriver. Refer to Figure 202.

(2) Disconnect the three wires to the light housing.

(3) To remove the light bulb, push in the two tabs located to the left and right of the bulb.

(4) Push the bulb out of its slot to remove it.

E. **Installing the Interior Courtesy Lights**

(1) To install the interior light, place a new light bulb in the slot, and push it into place.

(2) Push the housing and the light cover together so that the two tabs click into place.

(3) Reconnect the three wires, and push the housing back into its slot in the panel. Refer to Figure 202.

F. **Troubleshooting the Interior Courtesy Lights**

(1) If the interior courtesy lights are not working, remove the housing from the panel, and make sure that all three wires are connected properly.

(2) Check each light bulb for a failure.

(3) Check the circuit protection for a blown fuse. The courtesy light system is connected directly to the battery (bypasses the master switch), and the fuse block is located next to the battery in the engine compartment. All fuses are labeled.

2. Overhead Swivel Lights

A. There are four overhead swivel lights. Two are located in the front section of the cabin in the center of the overhead console and two are located in the rear section of the cabin in the middle of the overhead console. These lights are also referred to as spot lights, map lights, or reading lights. The Model T240 has LED type lights installed. The removal and installation procedures for each of the two types of lights is identical. Refer to Figure 202 for the removal and installation of the overhead swivel lights.

CAUTION: Before doing any work on a system, ensure that all power and light switches are in the off position and the light that is to be replaced has not been in use for at least five minutes.

B. **Remove the Overhead Swivel Lights**

(1) Unscrew three screws holding the swivel light in place.

(2) Remove the swivel light from the panel.

(3) Unplug the connector.

C. **Install the Overhead Swivel Lights**

(1) Plug in the connector.

(2) Push the light into its mounting hole in the panel.

(3) Screw in three screws to hold the swivel light in place.

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(4) The overhead swivel light bulb or LED is not replaceable. If a light fails, replacement of the whole assembly is required.

D. **Troubleshooting the Overhead Swivel Lights**

(1) If the overhead swivel lights are not functioning properly, make sure the connector is plugged in correctly.

(2) Check the light bulb or LED to make sure that it is not burned out.

(3) Check the light dimmer assembly.

3. Glare Shield Flood Bar

A. The glare shield flood bar is located under the glare shield in the cabin. The flood bar is composed of light emitting diodes (LEDs) spaced at 0.5 inch intervals. If more than eight LEDs burn out, a new flood bar must be installed if the airplane is to be used for IFR operations. Refer to the *Illustrated Parts Catalog* for ordering a replacement flood bar assembly.

B. **Flood Bar Inspection/Airplane Restrictions** - With the flood bar turned on, use a mirror to count all the burned-out LEDs. If eight or more LEDs are burned out, then the flood bar must be replaced, or the airplane must be restricted to VFR operations. The flood bar is an integral component in the airplane's IFR certification. Refer to the Minimum Equipment List in Appendix A, Section 6, of the POH/AFM.

C. **Removing the Glare Shield Flood Bar**

(1) Remove the glare shield as follows

(a) For the Model T240 refer to Chapter 25, Glare Shield - Removal/Installation

(b) For the Avidyne and Garmin G1000 installations refer to Chapter 25, Instrument Panels and Electrical Panels - Maintenance Practices

(2) Put the glare shield inverted on a soft work bench.

(3) Pull the flood bar to remove it from attachment clips and to break the adhesive from the glare shield.

(4) Clean excess adhesive off the glare shield.

D. **Replacing the Glare Shield Flood Bar**

(1) Glare shield should be inverted on a work bench.

(2) Attach the flood bar to the underside of the glare shield at the front lip by snapping onto the attachment clips.

(3) Use several strips of RTV sealant along the wiring to secure it in place.

(4) Note that the wiring tail must hang from the left (pilot) side of the assembly.

(5) Install the glare shield as follows

(a) For the Model T240 refer to Chapter 25, Glare Shield - Removal/Installation.

(b) For the Avidyne and Garmin G1000 installations refer to Chapter 25, Instrument Panels and Electrical Panels - Maintenance Practices.

4. Upper Instrument Panel (Avidyne and Garmin G1000 installations)

A. **Field Repair Instrument Lights** - The field repair instrument lights are located in the engine and flight instruments. The upper instrument lights are broken into two groups, flight instruments and engine instruments. .

(1) Flight instruments include: the air speed indicator, altimeter, vertical speed indicator, turn coordinator, directional gyro, and artificial horizon.

(2) Engine instruments include: fuel quantity, manifold pressure/fuel flow, vacuum/ammeter, oil pressure/temperature, and cylinder head/exhaust gas temperature gauges. The magnetic compass is also included with the upper panel instruments.

B. **Factory Repair Instrument Lights** - There are a few flight, engine, and navigational instruments that have sealed lights, that cannot be accessed in the field. These instruments include the flight director, horizontal situation indicator (HSI), navigational indicator (OBS), and the tachometer. The lights in these instruments are designed to last several thousand hours and, under normal conditions, should never require replacement. If a light does become inoperable, and it is confirmed that there is power to the instrument, then the instrument must be removed and sent to an instrument shop for bulb replacement.

C. **Removal and Replacement of Flight Instrument Lights** - These instruments use a light tray for lighting. To change a bulb use the following steps:

(1) Remove the glare shield, and partially remove the instrument panel to gain access to the desired flight instrument. Refer to Chapter 25 for details.

(2) If necessary, remove the flight instrument panel by removing the screws in the instrument panel.

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(3) Unscrew the two screws holding the light tray to the top of the instrument. The whole light tray must be replaced since the bulb is soldered to it. Refer to Figure 203.

(4) Once the light tray is replaced, reverse the above steps for installation of the instrument. The screws holding the instrument to the instrument panel do not have torque values and should be snug tight.

D. **Removal and Replacement of Engine Instrument Lights (Avidyne Option Only)**

(1) Remove the engine instrument panel per instructions in Chapter 25.

(2) If necessary, remove the engine instrument by removing the screws in the instrument panel.

(3) To change the light bulb, unscrew the lights on top of the instrument 1/4 turn, and screw in a new light. Refer to Figure 204.

(4) Once the engine instrument light is replaced, reverse the above steps for reinstallation of the instrument. The screws holding the instrument to the instrument panel do not have torque values and should be snug tight.

E. **Magnetic Compass** - The compass light is an integral part of the compass and cannot be replaced. If the light is inoperative, replacement of the entire compass assembly is required.

5. Lower Instrument Panel (Avidyne and Garmin G1000 installations)

A. **Lower Instrument Lights** - The lower instrument panel lights include switches in the ignition panel, rocker panel, ECS panel, and circuit breaker panel.

B. **Ignition, Rocker, and ECS Panels** - There are two rocker switches in the ignition panel, eight switches in the rocker panel, and one switch in the ECS panel. The light bulb in these switches is soldered into the unit, which means you must replace the switch if the bulb in the switch burns out.

C. **Rocker Switch Removal and Installation** - Use the following steps to remove and install a switch. Refer to Figure 205.

(1) Remove the rocker switch panel. Refer to Chapter 25, Instrument Panel and Electrical Panel - Maintenance Practices .

(2) Identify the rocker switch that is to be removed, and label each wire in relationship to its spade connector.

(3) After each wire is labeled, remove it from the switch.

(4) To remove the switch, push it out from the back of the panel. To do this, simultaneously apply pressure to the top and bottom (usually the thumb and index finger) across the width of the switch to compress the four retaining clips.

(5) Install the switch by compressing the retaining clips and inserting it into the panel.

(6) Connect the wires to the spade connectors.

(7) With the master switch on, test the switch for proper operation.

D. **Circuit Breaker Panel Lights (Overview)** - The circuit breaker panel is located on the left side of the airplane, just forward of the pilot's seat. The panel contains five tiered rows. Above each row is a small overhang that spans the width of the row. Refer to Figure 206.

Within each overhang there are light elements, which are epoxied into holes in the overhead row. The number of lamps in each row depends on the length of the row. Rows 1-3 have three lamps, row 4 has four lamps, and row 5 has five. The bulbs are soldered into place in series, in pairs of two. This means that if one bulb in a pair burns out, the other bulb in series will not function.

E. **Removal and Replacement of Circuit Breaker Panel Lighting**

(1) Remove the circuit breaker panel per instructions in Chapter 25.

(2) Remove the two large bus cables, disconnect the three black connectors, and remove the circuit breaker panel. Be sure to label each cable and connector location before disconnecting it.

(3) To gain access to the bulbs in rows 2-5, remove the required circuit in the row one number lower than the row with the malfunctioning light. For example, if the lights in row three are inoperative, remove the required circuit breakers (for access to the lights) in row two.

(4) Break the burned out light bulb and the companion series bulb out of their epoxied holes, and remove excess epoxy and fragments.

(5) Solder replacement bulbs.

(6) Place each bulb in its hole and, while holding it in, place with a screwdriver, add a BB-sized drop of epoxy on to the bulb and panel, and hold in place for about 30 seconds.

(7) Reconnect all plugs to the circuit breaker panel and, before reinstallation of the panels, turn on the power to the system to check the bulbs for proper operation.

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6. Trim, Flaps, Fuel, And Annunciator LEDs

A. **14V Avidyne Avionics**

(1) The trim, flap, fuel, and annunciator panel LEDs are located in the trim and flap panels, the fuel quantity gauge, and the annunciator panel. These LEDs are not field repairable. Contact a Cessna Aircraft Company representative for referral to a qualified technician to replace the LEDs.

(2) **Electroluminescent Lamps (EL) Lighted Panels** - There are four EL panel overlays in the airplane. These include: the ignition panel, trim panel, flap panel, and ECS panel. The EL portion of each panel is AC powered, and through a so-called cool chemical reaction process, illuminates the letters on the panel. The inverter (AC power source) for the flap panel is located on the back of the flap assembly. The inverter for the ignition, trim, and ECS panel is located on the back of the trim assembly. Therefore, if the trim panel inverter fails, all three panels are affected.

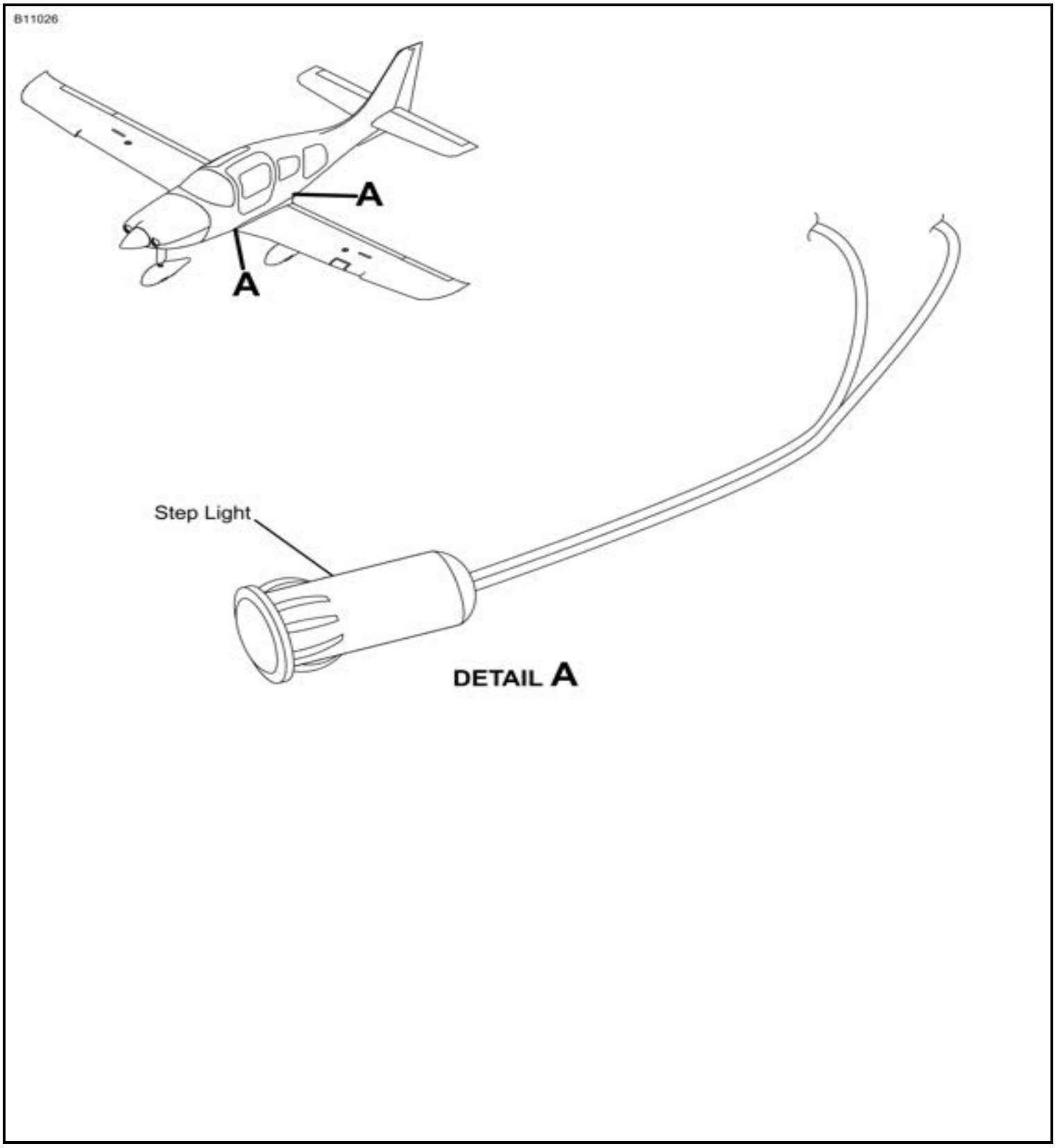
(3) **Panel Replacement** - The panel overlays are durable, and the light source has a very high mean failure cycle and should be serviceable through four airframe service cycles, or about 12,000 hours. Should a panel fail to function, contact a Cessna Aircraft Company representative for referral to a qualified technician that can replace the overlay or the inverter, depending on the problem. In some instances, particularly for airplanes with a high number of hours, it might be more cost effective to replace the entire panel assembly.

B. **28 V Avidyne Avionics and Garmin G1000 system** - All panels are LED surface lit. These LEDs are not field repairable. Contact a Cessna Aircraft Company representative for referral to a qualified technician to replace the LEDs.

C. **Model T240 Interior LED Panels** - For maintenance procedures for the T240 interior LED panels, refer to Interior LED Panels (T240) - Maintenance Practices.

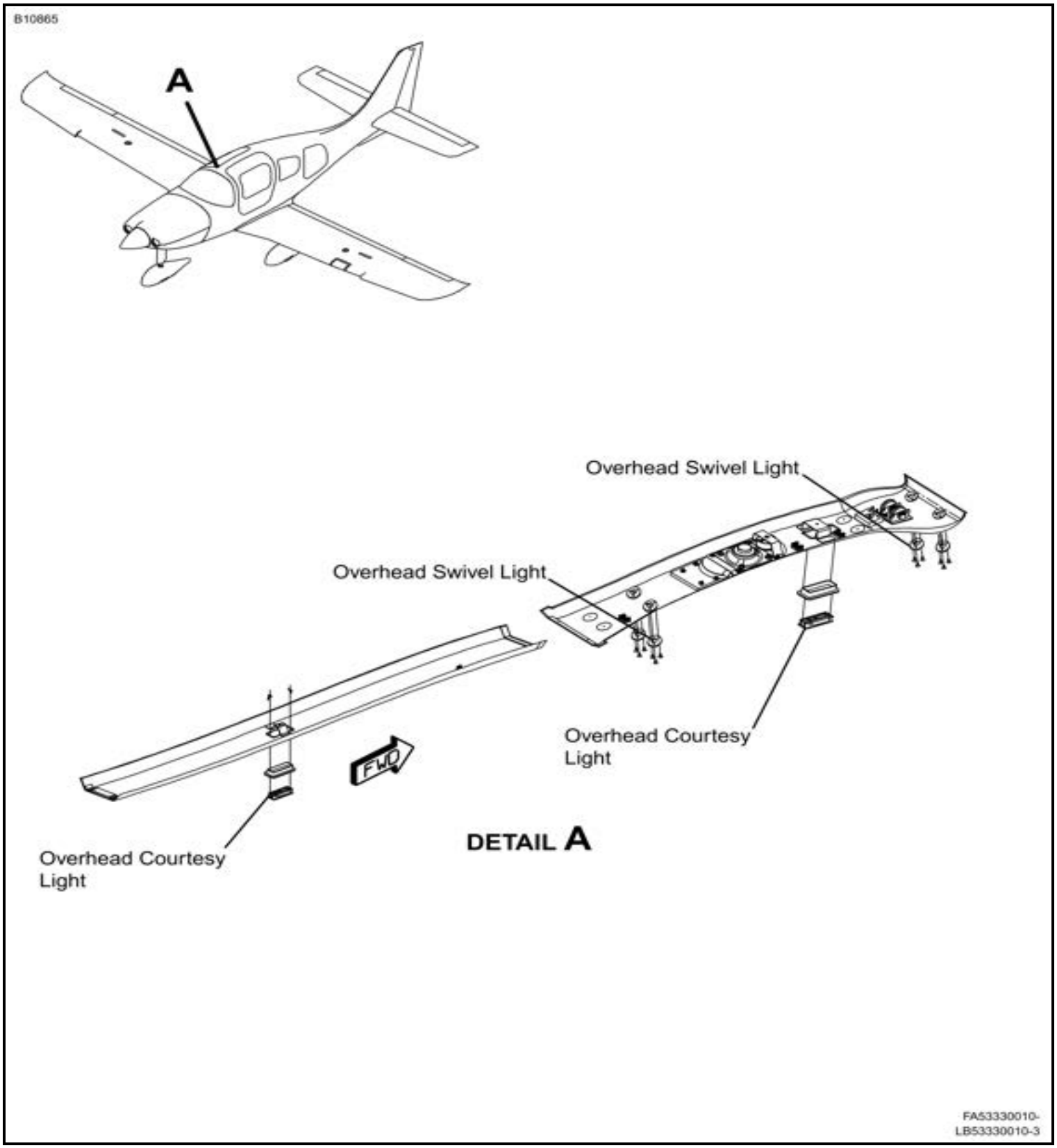
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Figure 201 : Sheet 1 : Step Light Assembly



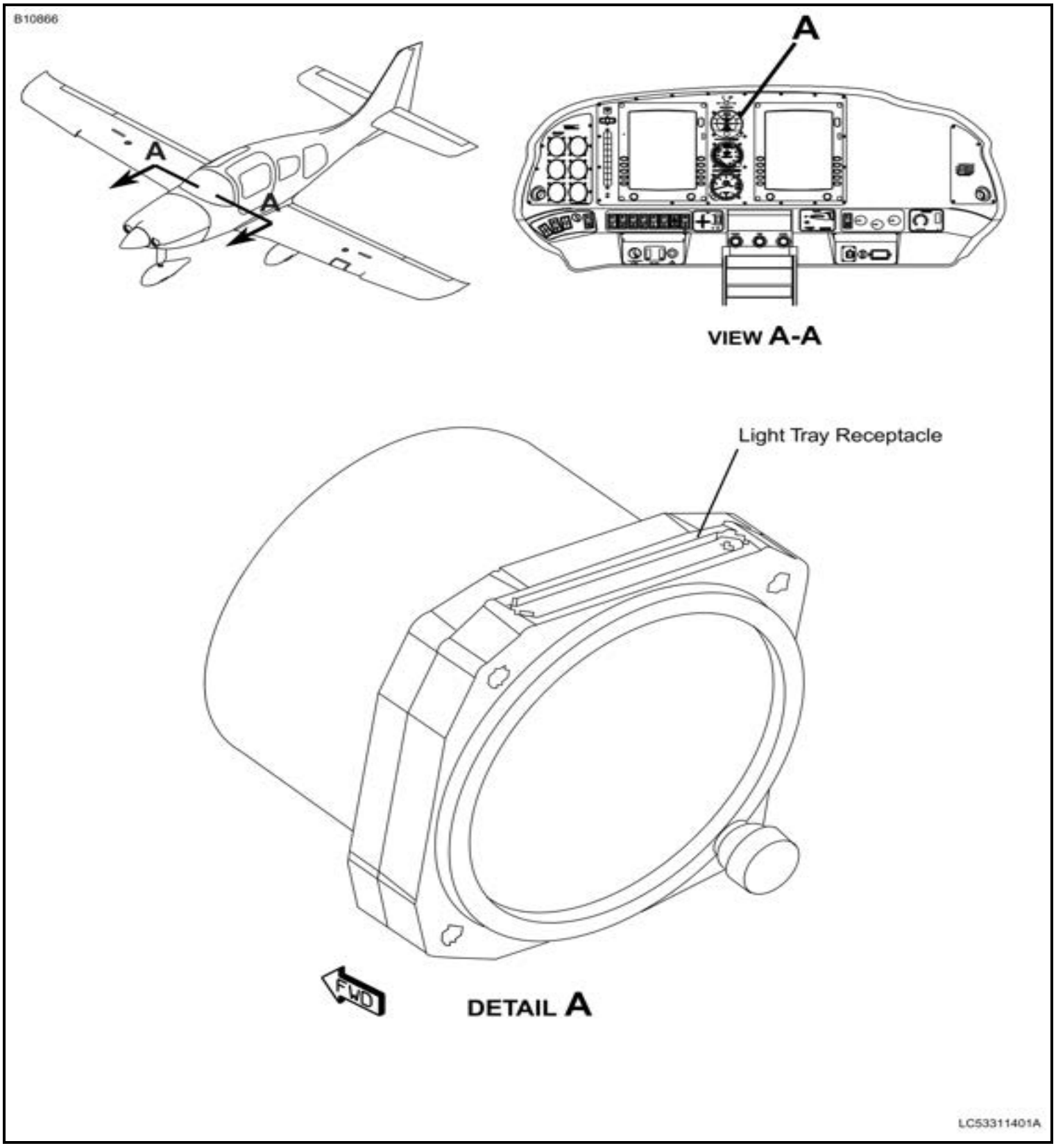
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Figure 202 : Sheet 1 : Overhead Lights



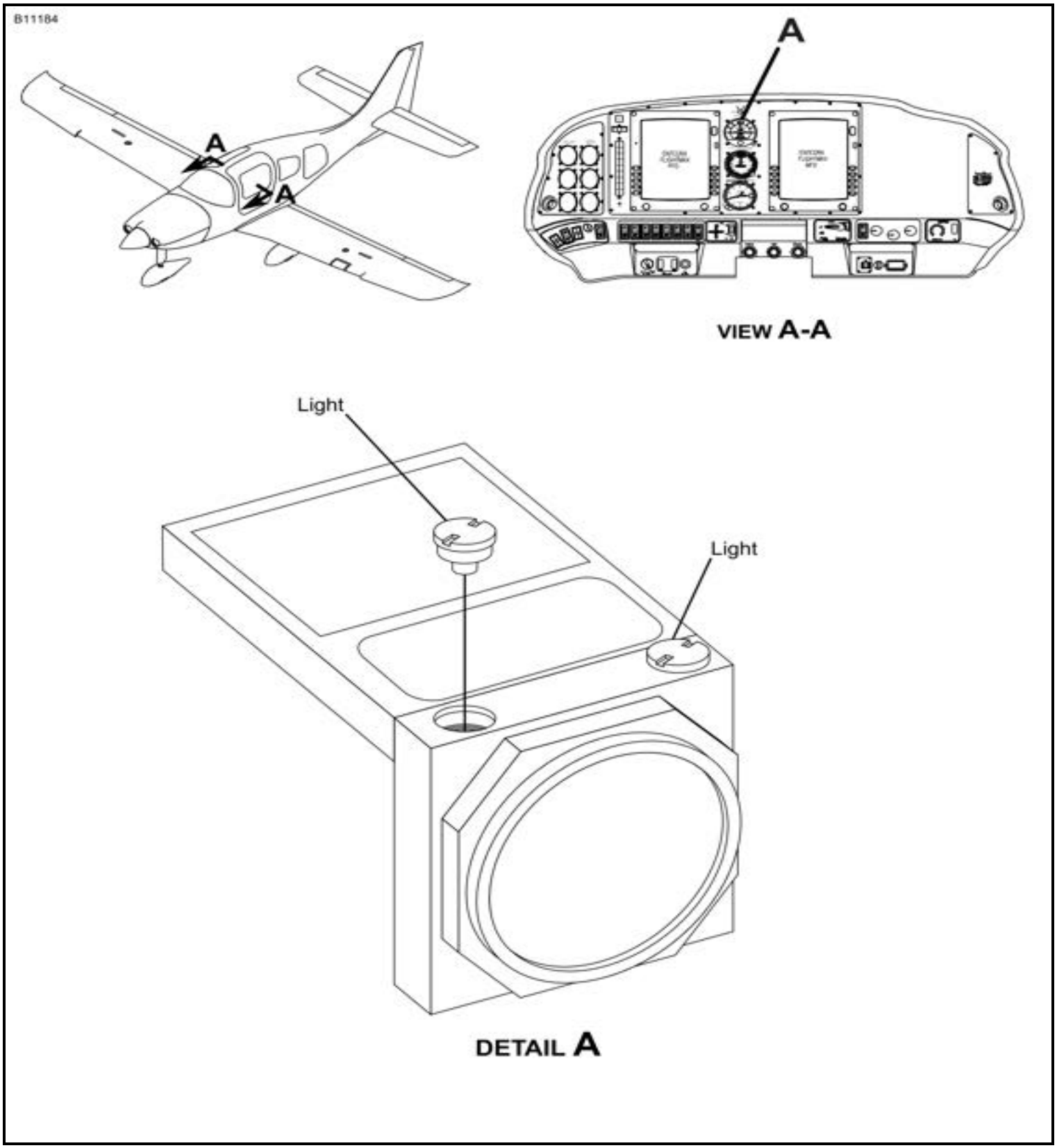
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Figure 203 : Sheet 1 : Light Tray-Type of Instrument



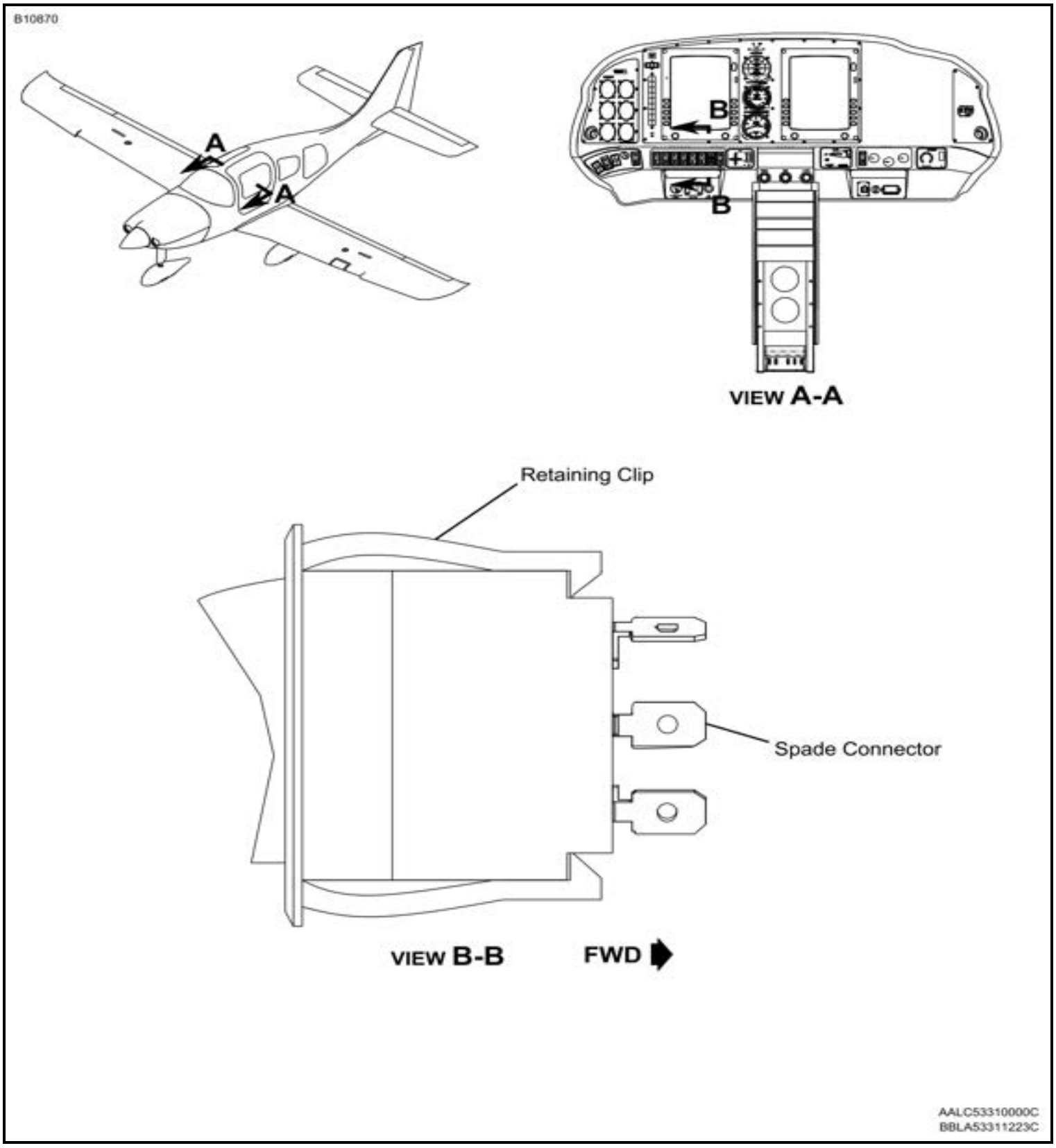
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Figure 204 : Sheet 1 : Engine Instrument



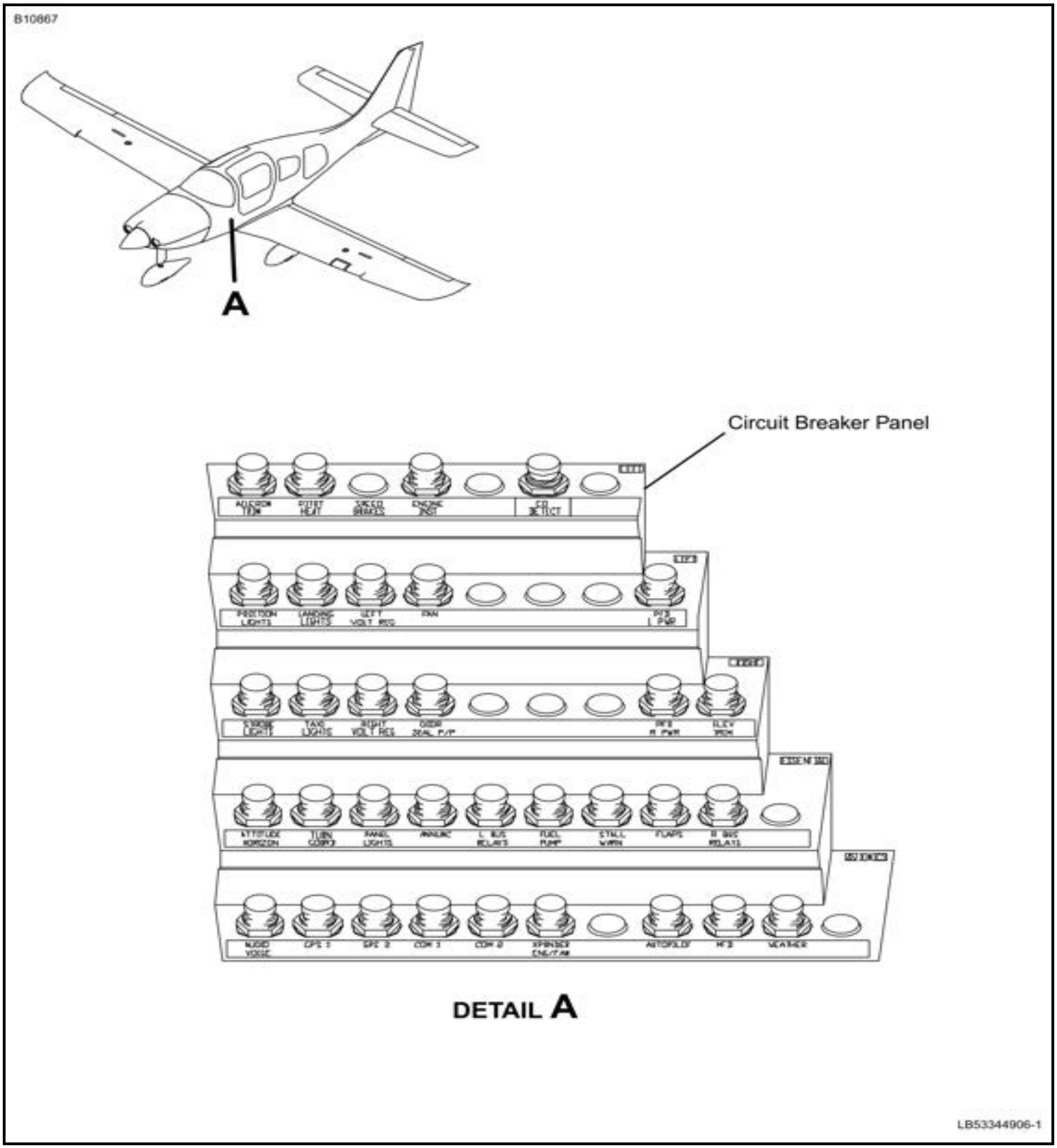
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Figure 205 : Sheet 1 : Rocker Switch



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Figure 206 : Sheet 1 : Circuit Breaker Panel



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INTERIOR LED PANELS (T240) - TROUBLESHOOTING

1. General

A. This section gives the troubleshooting procedures for the interior LED panels and flight display light operation and intensity control function. For a general description of the interior LED panels refer to Lighting - General. For a general description of the Primary Flight Display (PFD), the Multifunction Display (MFD) and the GTC 570 Touchscreen Controller (GTC 570) refer to Garmin G2000 - Description and Operation.

B. Use the Model T240 Wiring Diagram Manual with the procedures in this section.

2. Tools and Equipment

A. No special tools or equipment are necessary to do the procedures in this section.

3. LED Panel Troubleshooting

A. A LED Panel does not come on when the CB/SW dimmer switch (SW24) or the test switch (SW20) are operated. Do the steps that follow:

(1) Remove the applicable LED panel, refer to Interior LED Panels (T240) - Maintenance Practices.

(a) Visually inspect the connector and pins for signs of damage.

(b) Repair any damage.

(c) Troubleshoot the wiring bundle between the LED panel and other lighting system components.

(2) If the connector or wiring bundle was repaired check the LED panel light operation again.

(3) If LED panel does not operate correctly replace the LED panel. Refer to Interior LED Panels (T240) - Maintenance Practices.

(4) If connector is serviceable and wiring is serviceable replace the LED panel. Refer to Interior LED Panels (T240) - Maintenance Practices.

(a) Check the LED panel light operation.

B. The Switch Dimmer (SW24) does not operate correctly. No LED panels come on or change lighting intensity when the dimmer is operated.

(1) Make sure that the PANEL LIGHTS circuit breaker found on the cockpit circuit breaker panel is engaged.

(2) If the circuit breaker is engaged push the test switch (SW20) found on the overhead console.

(3) If the LED panels come on replace the dimmer. Refer to Center Console Dimmer Switch (T240) - Removal/installation.

(4) If the test switch does not cause the LED panels to come on do a check of the FLT INST dimmer switch operation.

(5) If the FLT INST dimmer does not cause the flight displays to change intensity do a check and if necessary repair the components that follow:

(a) The PANEL LIGHTS circuit breaker.

(b) The related components electrical connectors for bent, broken, or pushed back pins.

(c) The wiring between the PANEL LIGHTS circuit breaker and the lighting module for damage and continuity.

(6) If the FLT INST dimmer causes the flight displays to change intensity do a check of the related components electrical connectors for bent, broken, or pushed back pins.

(a) Repair or replace the wiring and /or electrical connectors as necessary.

(7) If the circuit breaker is not engaged, engage it and check the dimmer switch operation again.

(8) If the dimmer switch still does not operate, push the test switch (SW20) found on the overhead console.

(9) If the LED panel lights come on replace the dimmer switch. Refer to Center Console Dimmer Switch (T240) - Removal/installation.

(10) If the LED panels do not come on do the steps that follow:

(a) Remove the external electrical power from the airplane.

(b) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(11) Remove the dimmer switch from the center console. Refer to Center Console Dimmer Switch (T240) - Removal/installation.

(12) Do a check and if necessary repair the components that follow:

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(a) The related components electrical connectors for bent, broken, or pushed back pins.

(b) The wiring between the CB/SW dimmer and the lighting module for damage and continuity.

(c) The wiring between the lighting module and the LED Power Junction Module (XC911) for damage and continuity.

4. Flight Display Lighting Intensity Control Troubleshooting

A. One of the flight displays does not change intensity when the dimmer switch is operated.

(1) If one of the displays is not operating correctly swap the PFD or the MFD installation positions in the instrument panel. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(2) Operate the FLT INST dimmer switch.

(3) If the same display does not operate correctly in its new location replace it. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(4) If the display that previously operated correctly and now does not in its new position do the steps that follow:

(a) Do a check of the related components electrical connectors for bent, broken, or pushed back pins.

(b) Do a check of the wiring between the FLT INST dimmer switch and the applicable display for damage and continuity.

(5) Install the displays in their original positions in the instrument panel. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

NOTE: If the displays are not returned to their original locations in the instrument panel you must upload Garmin baseline and configuration software.

(6) If only the GTC 570 is still not operating correctly do the steps that follow:

(a) Do a check of the related components electrical connectors for bent, broken, or pushed back pins.

(b) Do a check of the wiring between the FLT INST dimmer switch and the GTC 570 for damage and continuity.

(7) Do a check the GTC 570 intensity control again.

(a) The GTC 570 is not operating correctly replace the GTC 570. Refer to Garmin GTC 570 Touchscreen Controller (G2000) - Removal/Installation.

B. The when the FLT INST dimmer switch (SW23) is operated none of the flight displays lighting intensity change.

(1) Do a check of the CB/SW dimmer switch operation.

(2) If the CB/SW dimmer switch does not operate make sure that the PANEL LIGHTS circuit breaker found on the cockpit circuit breaker panel is engaged.

(3) If the circuit breaker is engaged do a check and if necessary repair the components that follow:

(a) The PANEL LIGHTS circuit breaker.

(b) The wiring between the PANEL LIGHTS circuit breaker and the lighting module for damage, bent or pushed back pins and continuity.

(4) If the wiring and components check good replace the dimmer switch. Refer to Center Console Dimmer Switch (T240) - Removal/installation

(5) If the circuit breaker is not engaged, engage it and check the dimmer switch operation again.

(6) If the dimmer switch does not operate replace the dimmer switch. Refer to Center Console Dimmer Switch (T240) - Removal/installation.

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INTERIOR LED PANELS (T240) - MAINTENANCE PRACTICES

1. General

A. This section gives the maintenance practices for the Interior LED Panels. For a general description of the Interior Lighting LED Panels refer to Lighting - General.

B. The Model T240 interior LED panels include, Switch Panel LED Panel, Audio Jacks LED Panel, Ignition Switch LED Panel, Display Reversion Switch LED Panel, the Engine Control LED Panel, and the Circuit Breaker Panel LED Panels. The removal and installation procedures that follow are typical for all the LED panel removal and installations.

2. LED Panels Removal/Installation

A. Display Reversion LED Panel Removal/Installation.

(1) Remove the Display Reversion LED Panel (UI905). Refer to Figure 201.

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Remove the GDU 1400 PFD. Refer to Garmin GDU 1400 Displays (G2000) - Removal/Installation.

(d) Use a 3/32 inch hex tool to loosen and remove the screws that attach the panel to the instrument panel.

(e) Disconnect the electrical connector (JI905) from the Display Reversion LED Panel.

(f) Disconnect the electrical connector (JI406) from the DISPLAY REVERSION switch (SI006).

(g) Remove the Display Reversion LED Panel from the instrument panel.

(h) If it is necessary to replace the LED panel do the steps that follow:

1 Remove the screws that attach the reversion switch mounting plate to the LED panel.

2 Remove the switch assembly from the led panel.

(2) Install the Display Reversion LED Panel (UI905). Refer to Figure 201.

(a) If the switch was removed do the steps that follow:

1 Put the switch assembly in its correct position on the LED panel.

2 Install the screws that attach the switch assembly to the LED panel.

(b) Put the LED panel near its correct position on the instrument panel.

(c) Connect the electrical connector (JI905) to the Display Reversion LED Panel.

(d) Connect the electrical connector (JI406) to the DISPLAY REVERSION switch.

(e) Put the LED panel in its correct position on the instrument panel.

(f) Install the screws that attach the LED panel to the instrument panel.

1 Use a 3/32 inch hex tool to tighten the screws. Refer to Chapter 20, Torque Data - Maintenance Practices.

(3) Do a check of the Display Reversion LED Panel. Refer to Interior LED Panels and Flight Display Lighting (T240) - Adjustment/Test.

B. Engine Controls LED Panel Removal/Installation.

(1) Remove the Engine Controls LED Panel (UI904). Refer to Figure 201.

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Remove the instrument panel vents ducts from each of the two the vent duct plenums. Refer to Chapter 21, Eyeball Vents - Removal/Installation, Figure 401.

(d) Loosen the screw on then FLAPS switch knob.

1 Remove the knob from the FLAPS switch.

(e) Loosen the captive hex screw that attaches the filler panel to the instrument panel and Engine Controls LED Panel bracket assembly.

(f) Loosen the captive hex screws that attach the Engine Controls LED Panel to the instrument panel and Engine Controls LED Panel bracket assembly.

(g) Carefully move the Engine Controls LED Panel aft to get access to engine panel components.

(h) Disconnect the electrical connector (PC300) from the GO AROUND switch (SI003).

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(i) Disconnect the electrical connector (JI66) from the SPD BRK switch (SI004).

(j) Disconnect the electrical connector (PI005) from the FLAP SW (SI005).

(k) Disconnect the electrical connector (PI904) from the Engine Control LED panel (UI904).

(l) Loosen the nut at the rear of the ALT STATIC operator knob.

(m) Remove the nut and keyed-washer from the ALT STATIC operator knob and remove the control knob from the Engine Controls LED Panel.

(n) Remove the Engine Controls LED Panel from the airplane.

(o) If it is necessary to replace the LED panel do the steps that follow:

1 Remove the screws that attach the SPD BRK and GO AROUND switch mounting plate assembly to the LED panel.

2 Remove the switch assembly from the led panel.

(2) Install the engine control LED panel (UI904). Refer to Figure 201.

(a) If the SPD BRK and GO AROUND switch mounting plate assembly was removed do the steps that follow:

1 Put the switch assembly in its correct position on the LED panel.

2 Install the screws that attach the switch assembly to the LED panel.

(b) Put the engine controls panel near its position on the lower instrument panel.

(c) Connect the electrical connector (PC300) to the GO AROUND switch (SI003).

(d) Connect the electrical connector (PI66) to the SPD BRK switch (SI004).

(e) Connect the electrical connector (PI005) to the FLAP SW (SI005).

(f) Connect the electrical connector (PI904) to the Engine Controls LED Panel.

(g) Put the ALT STATIC operator knob in its correct position in the Engine Controls LED Panel LED panel and install the key-washer and nut.

NOTE: Do not tighten the nut at this time.

(h) Insert the rear of the ALT STATIC operator knob in the static tube valve receptacle and tighten the nut at the rear of the knob.

(i) Tighten the captive hex screws that attach the engine controls panel assembly to the instrument panel and Engine Controls LED Panel bracket assembly.

(j) Put the FLAPS switch knob in its correct position on the Flaps switch.

1 Tighten the screw on then FLAPS switch knob.

(k) Tighten the captive hex screws that attaches the filler panel to the instrument panel and Engine Controls LED Panel bracket assembly. Refer to Chapter 20, Torque Data - Maintenance Practices.

(3) Do a check of the Engine Controls LED Panel. Refer to Interior LED Panels and Flight Display Lighting (T240) - Adjustment/Test.

C. Ignition Switch LED Panel Removal/Installation.

CAUTION: With the ignition switch is removed or disconnected the magnetos are "hot" (operational). With impulse couplings on each of the magnetos, personal injury can result from turning the propeller with the spark plug wires loose. Additionally, the engine can "catch" (start) if the spark plugs are installed.

(1) Remove the Ignition Switch LED Panel (UI908). Refer to Figure 201.

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Remove the collar from the front side of the Ignition switch (SI002).

(d) Carefully move the LED panel aft sufficiently to get access to the rear of the panel.

(e) On the PRIMER switch (SI010), disconnect the electrical connector (JI010) from electrical connector (PI010).

(f) On the Ignition Switch LED Panel, disconnect the electrical connector (PI908) from electrical connector (JI908).

(g) Remove the Ignition Switch LED Panel from the airplane.

(h) If it is necessary to replace the LED panel do the steps that follow:

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1 Remove the screws from the rear of the PRIMER switch mounting plate that attach it to the Ignition Switch LED Panel.

2 Remove the PRIMER switch assembly from the rear of the panel.

(i) If it is necessary to remove the ignition switch (SI002) from the instrument panel structure do the steps that follow:

1 Remove the nut from the front of the ignition switch that attaches it to the instrument panel.

2 Remove the ignition switch from the rear of the instrument panel.

3 Carefully bag and stow the ignition switch.

(2) Install the Ignition Switch LED Panel (UI908). Refer to Figure 201.

(a) If the PRIMER switch mounting plate assembly was removed do the steps that follow:

1 Put the switch assembly in its correct position on the LED panel.

2 Install the screws that attach the switch assembly to the LED panel.

(b) If it is necessary to install the ignition switch in the instrument panel structure do the step that follows:

1 Put the ignition switch in its correct position trough the instrument panel from the forward side of the panel.

2 Install the nut on the front of the ignition switch that attaches it to the instrument panel and tighten.

(c) Put the LED panel near its correct position on the instrument panel.

(d) On the PRIMER switch, connect the electrical connector (PI010) to electrical connector (JI010).

(e) On the ignition switch LED Panel, connect the electrical connector (JI908) to electrical connector (PI908).

(f) Put the LED panel in its correct position on the instrument panel.

(g) Install the collar on the front side of the Ignition switch.

(3) Do a check of the Ignition Switch LED Panel. Refer to Interior LED Panels and Flight Display Lighting (T240) - Adjustment/Test.

D. Audio Jack LED Panel Removal/Installation.

(1) Remove the Audio Jack LED Panel (UI910). Refer to Figure 202.

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Loosen the screws that attach the audio jack panel to the lower center console.

1 Carefully move the audio jack panel up sufficiently to get access to the rear of the panel.

(d) If you cannot move the panel sufficiently to get access to the rear of the panel, remove the panel. Refer to Chapter 25, Center Console Audio Jack Panel (G2000) - Removal/Installation.

(e) Disconnect the LED panel electrical connector (PI910) from electrical connector (JI910).

(f) Remove the screws that attach the LED panel the audio jack panel backplate.

(g) Remove the LED Panel from the airplane.

(2) Install the Audio Jack LED Panel (UI910). Refer to Figure 202.

(a) Put the LED panel near its correct position on the audio jack panel.

(b) Connect the LED panel electrical connector (PI910) to the electrical connector (JI910).

(c) Put the LED panel in its correct position on the backplate. Install the screws that attach the LED panel to the backplate.

(d) If the audio jack panel was removed from the lower center console, do the panel installation. Refer to Chapter 25, Center Console Audio Jack Panel (G2000) - Removal/Installation.

(e) Put the audio jack panel in its correct position on the center lower console.

(f) Tighten the screws that attach the panel to the center lower console.

(3) Do a check of the Audio Jack LED Panel. Refer to Interior LED Panels and Flight Display Lighting (T240) - Adjustment/Test.

E. Switch Panel LED Panel Removal/Installation.

(1) Remove the Switch Panel LED Panel (UI909). Refer to Figure 203.

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NOTE: The LED panel can have different configurations if optional equipment is installed on the airplane.

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Loosen the screws that attach the switch panel to the center console.

1 Carefully move the switch up sufficiently to get access to the rear of the panel.

(d) If you cannot move the panel sufficiently to get access to the rear of the panel, remove the panel. Refer to Chapter 25, Center Console Switch Panel (T240) - Removal/Installation.

(e) Disconnect the LED panel electrical connector (PI909) from electrical connector (JI909).

(f) Remove the screws at the rear of the panel assembly that attach the LED panel the audio jack panel backplate.

(g) Remove the LED Panel from the backplate.

(2) Install the Switch Panel LED Panel (UI909). Refer to Figure 203.

(a) Put the LED panel near its correct position on the center console.

(b) Connect the LED panel electrical connector (PI909) to the electrical connector (JI909).

(c) Put the LED panel in its correct position on the backplate. Install the screws that attach the LED panel to the backplate.

(d) If necessary, install the switch panel. Refer to Chapter 25, Center Console Switch Panel (T240) - Removal/Installation.

(e) Put the switch panel in its correct position on the center console.

(f) Tighten the screws that attach the panel to the center console.

(3) Do a check of the Center Console Switch Panel. Refer to Interior LED Panels and Flight Display Lighting (T240) - Adjustment/Test.

F. Circuit Breaker Panel LED Panels Removal/Installation.

(1) Remove the Circuit Breaker Panel LED Panels. Refer to Figure 204.

NOTE: The LED panels can have different configurations if optional equipment is installed on the airplane.

NOTE: The removal procedures for each of the LED panels are typical.

(a) Make sure that the master BATT switches (left SW01 and right SW02) are in the OFF position.

(b) Make sure that the AVIONICS MASTER switch (SW04) is in the OFF position.

(c) Remove the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(d) Remove the screws that attach the circuit breaker panel to the bracket.

(e) Carefully move the switch panel out from the bracket sufficiently to get access to the LED panel's electrical connectors and attachment screws.

(f) If you cannot move the panel sufficiently to get access to the rear of the circuit breaker panel, remove the panel. Refer to Chapter 25, Circuit Breaker Panel (T240) - Maintenance Practices.

(g) Disconnect the applicable electrical connectors. Refer to Table 201.

Table 201. LED Panel Electrical Connectors

LED Panel	LED Panel Electrical Connector	Airplane Wiring Electrical Connector
X-Feed LED Panel (UC017)	(PC017)	(JC017)
Left 1 LED Panel (UC018)	(PC018)	(JC018)
Left 2 LED Panel (UC019)	(PC019)	(JC019)
Right LED Panel (UC020)	(PC020)	(JC020)
Avionics LED Panel (UC021)	(PC021)	(JC021)

(h) Remove the screws that attach the applicable LED panel to the circuit breaker panel.

(i) Remove the LED panel from the airplane.

(2) Install the Circuit Breaker Panel LED Panels. Refer to Figure 204.

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NOTE: The installation procedures for each of the LED panels are typical.

(a) Put the LED panel in its correct position on the circuit breaker panel.

(b) Install the screws that attach the LED panel to the circuit breaker panel.

(c) Connect the applicable electrical connectors. Refer to Table 201.

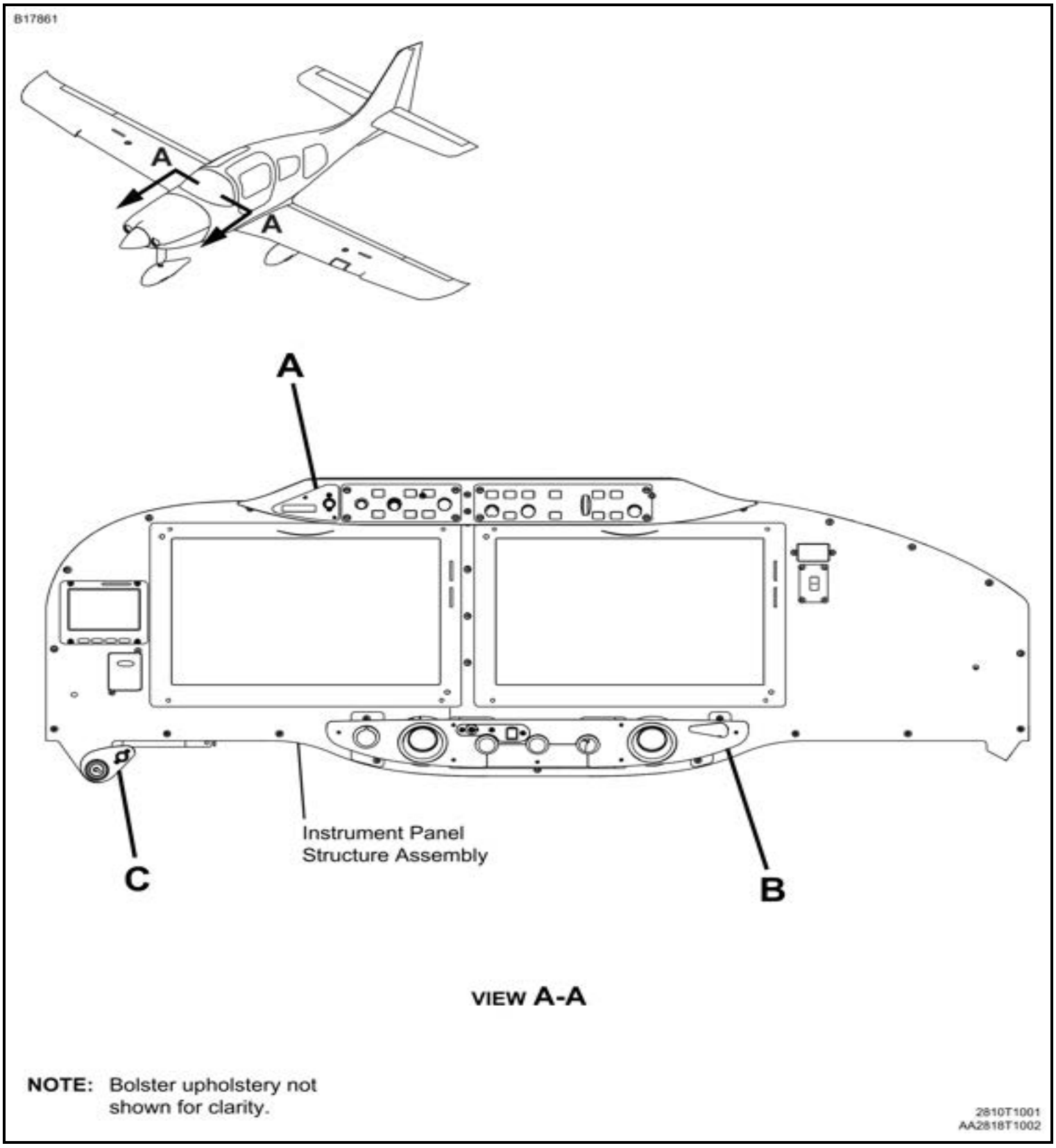
(d) If necessary, install the circuit breaker panel. Refer to Chapter 25, Circuit Breaker Panel (T240) - Maintenance Practices.

(e) Install the left forward lower side panel (FLSPL). Refer to Forward Lower Side Panels, Left (FLSPL) and Right (FLSPR).

(3) Do a check of the circuit breaker panel LED panel. Refer to Interior LED Panels and Flight Display Lighting (T240) - Adjustment/Test.

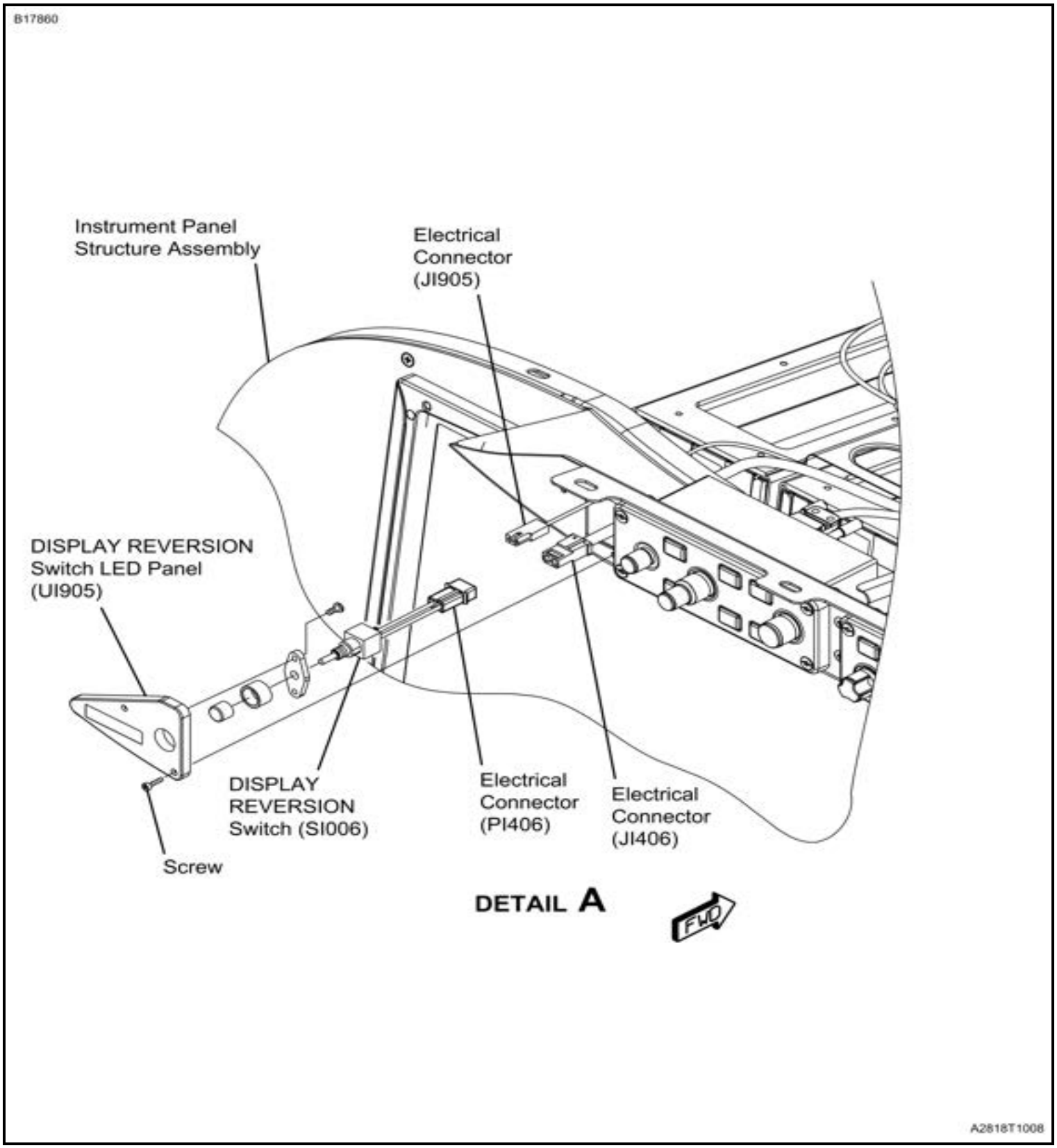
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Figure 201 : Sheet 1 : Instrument Panel Components Installation



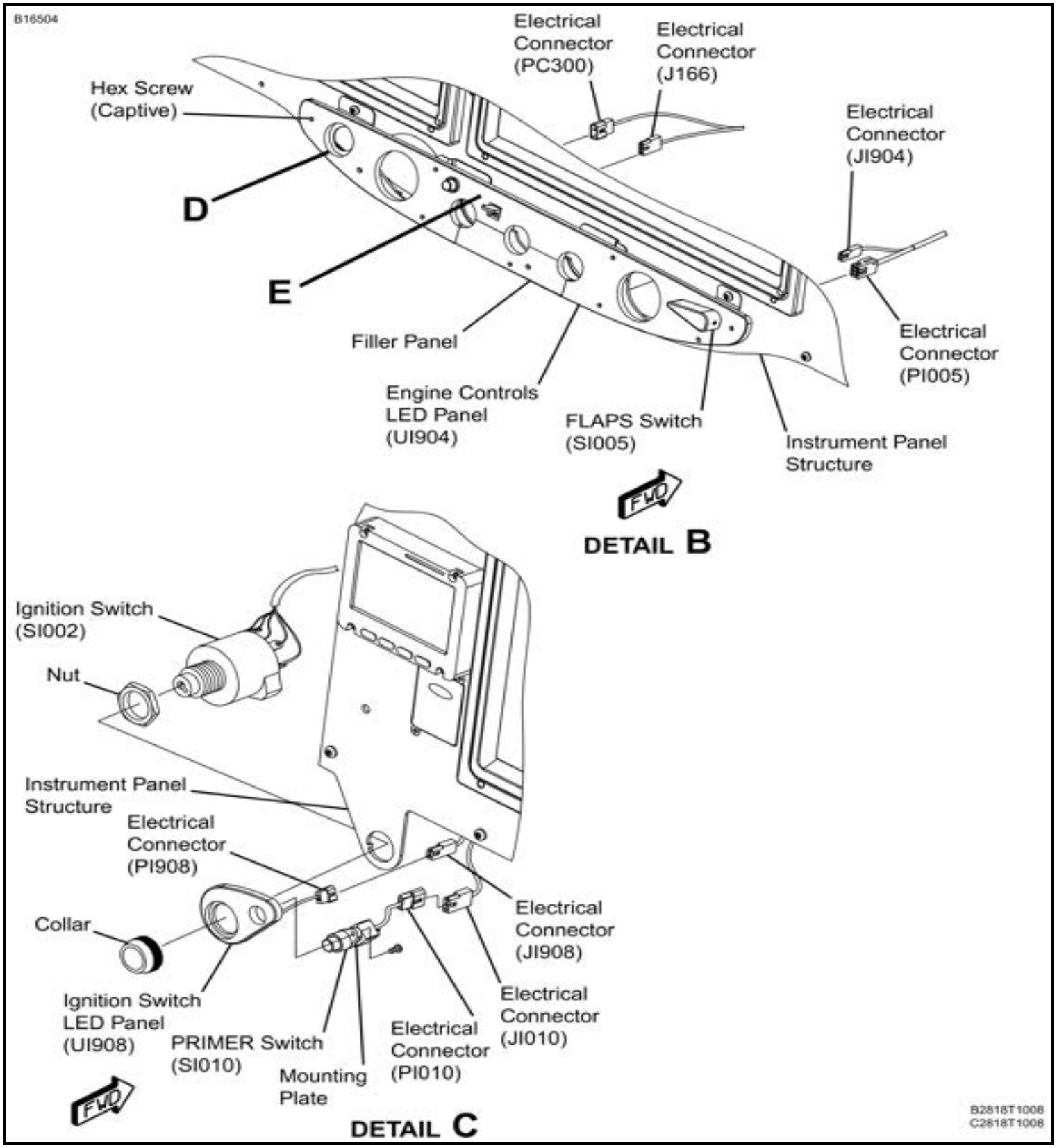
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Figure 201 : Sheet 2 : Instrument Panel Components Installation



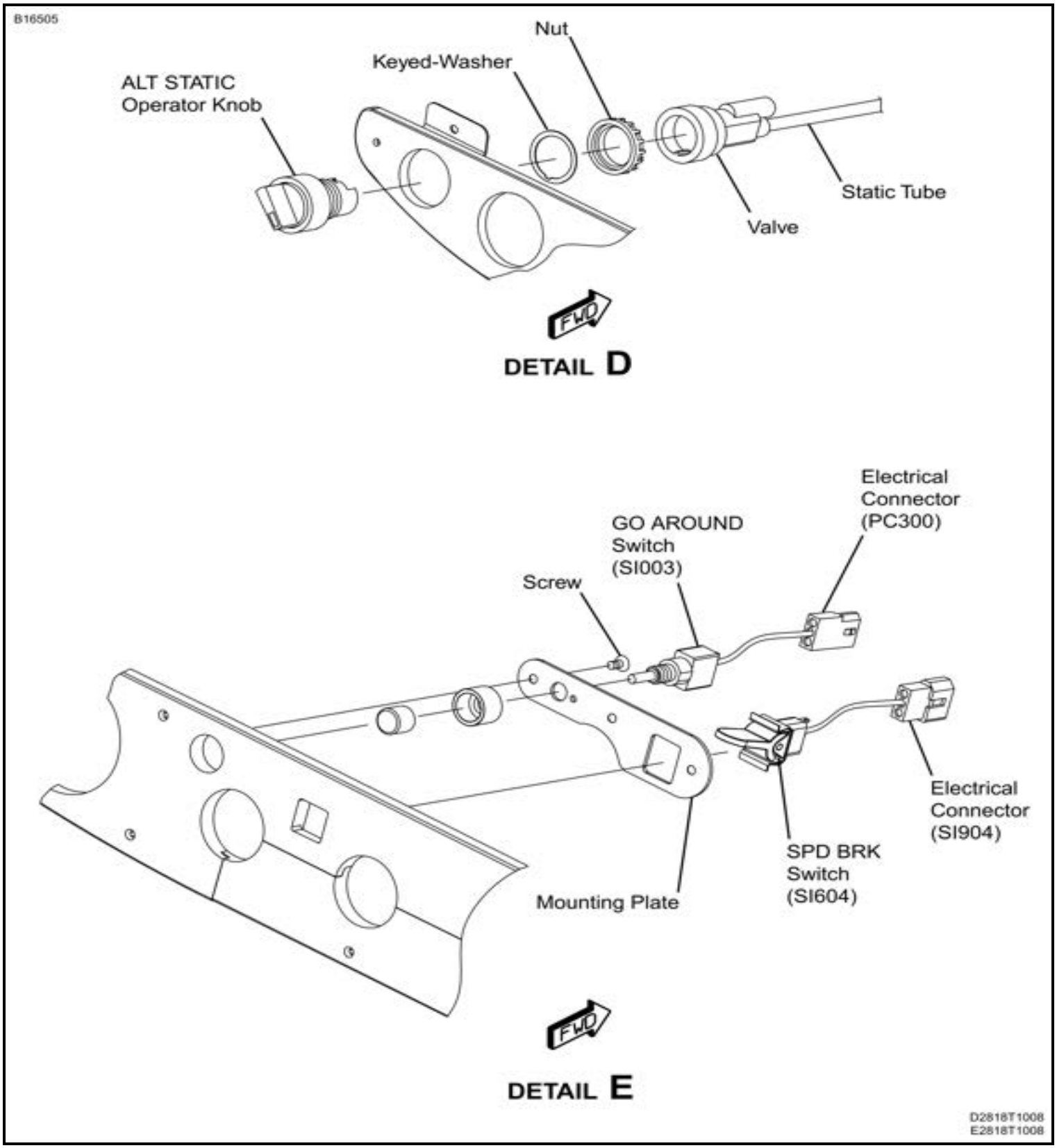
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Figure 201 : Sheet 3 : Instrument Panel Components Installation



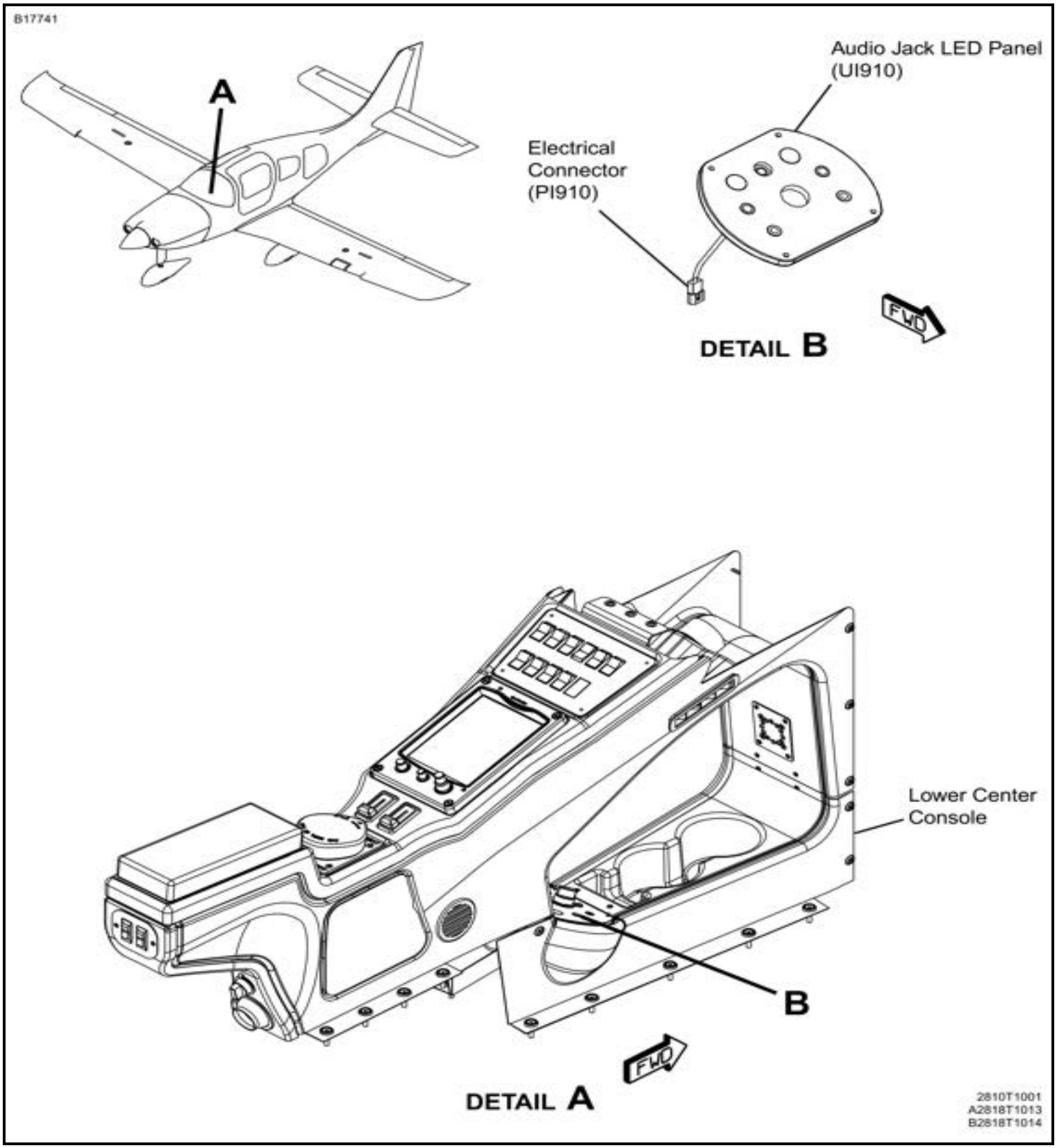
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Figure 201 : Sheet 4 : Instrument Panel Components Installation



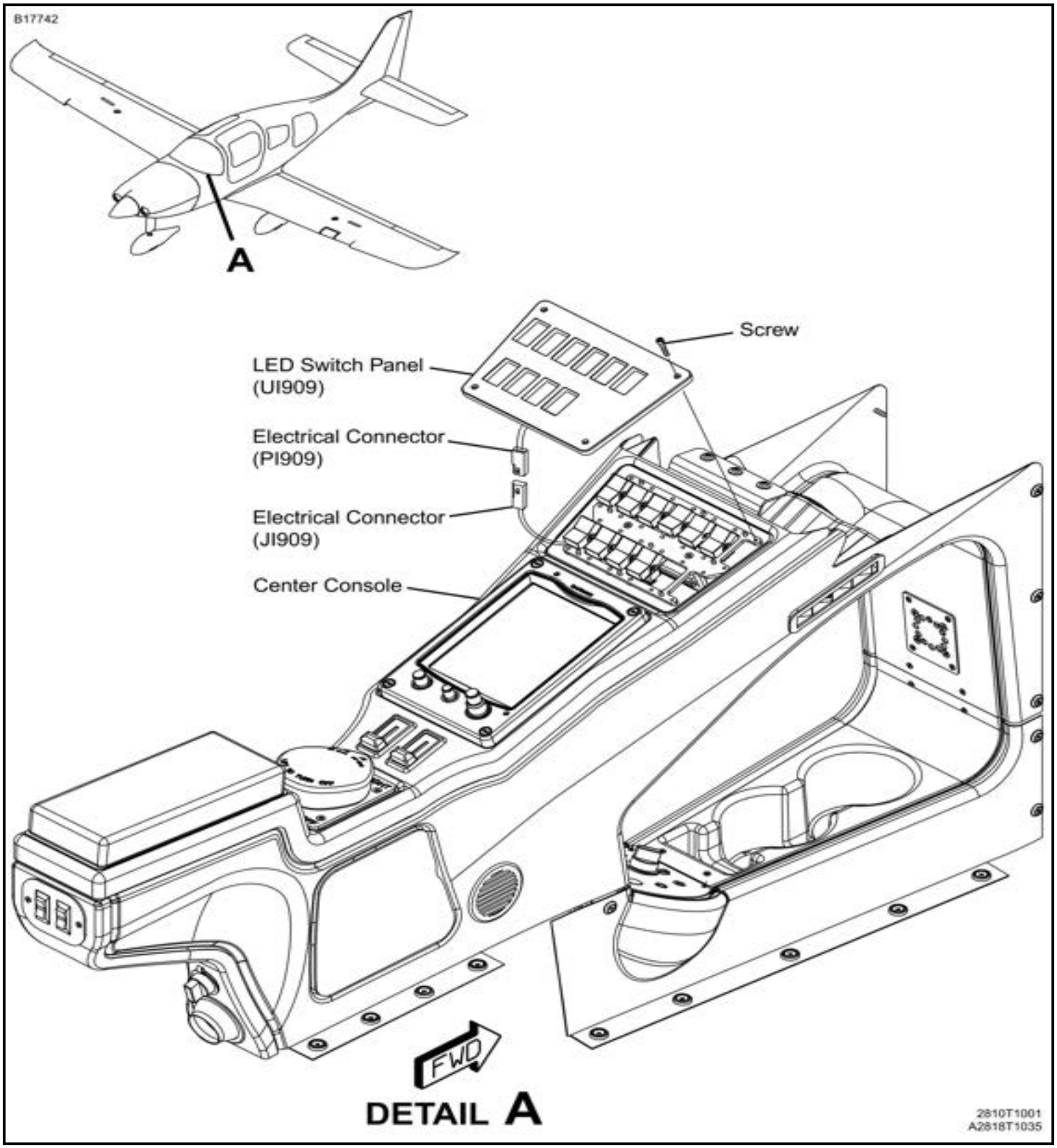
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Figure 202 : Sheet 1 : Audio Jack LED Panel Installation



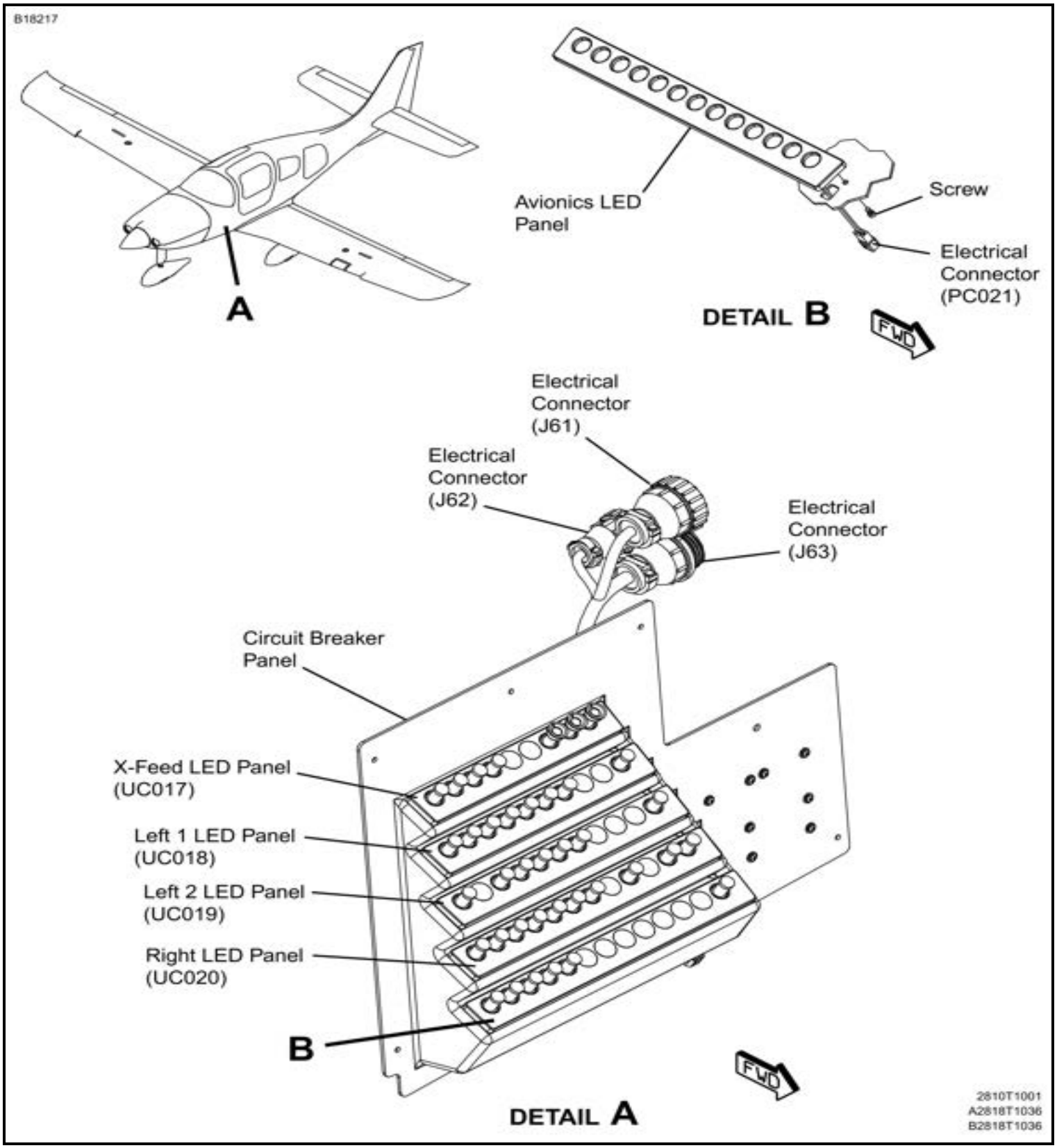
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Figure 203 : Sheet 1 : Switch Panel LED Panel Installation



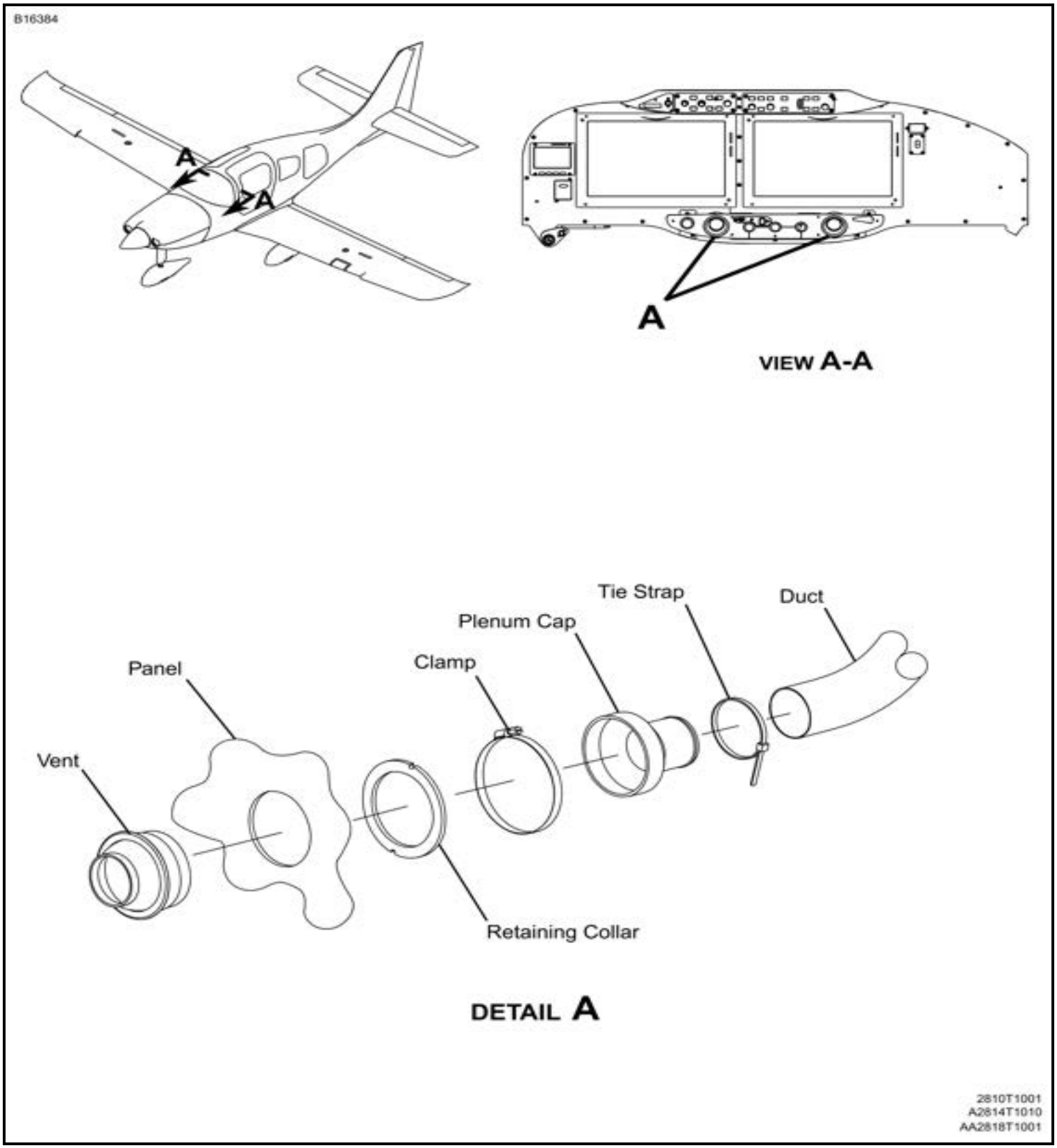
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Figure 204 : Sheet 1 : Circuit Breaker Panel LED Panel Installation



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Figure 401 : Sheet 1 : Instrument Panel Vents Installation



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INTERIOR LED PANELS (T240) - ADJUSTMENT/TEST

1. General

A. This section gives the procedures to check the interior LED panels and the flight displays back ground lighting. For more data on the interior LED panels and the flight display lighting refer to Lighting - General.

2. LED Panel Operational Test

A. Do the LED Panel Operational Check.

(1) Supply external electrical power from the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the CROSS TIE switch (SW03) to the ON position.

(4) Push the TEST button (SW20) found on the overhead console.

(5) While the TEST button is pushed, check that the LED panel and other lights that follow are on:

- AVN Master Switch
- Cross Tie Switch
- Compass
- Fuel Selector
- Audio Jacks Led Panel
- Pedestal Switch LED Panel
- Ignition Switch LED Panel
- Reversionary Switch LED Panel
- Engine Control LED Panel
- Master Switch Backlit Panel (in the overhead)
- The Circuit Breaker LED Panels (Airplanes -2040 and On).

(6) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(7) Set the CROSS TIE switch (SW03) to the OFF position.

(8) Remove external electrical power from the airplane.

3. LED Panel Functional Test

A. Do the LED Panel Functional Check.

(1) Supply external electrical power from the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the CROSS TIE switch (SW03) to the ON position.

(4) Slide the CB/SW dimmer switch (SW24) to the bright position and make sure that the LED panels and other lights that follow come on:

- AVN Master Switch
- Cross Tie Switch
- Compass
- Fuel Selector
- Audio Jacks Led Panel
- Pedestal Switch LED Panel
- Ignition Switch LED Panel
- Reversionary Switch LED Panel
- Engine Control LED Panel
- Master Switch Backlit Panel (in the overhead)
- The Circuit Breaker LED Panels (Airplanes -2040 and On).

(5) Slide the CB/SW dimmer switch to the full ON position.

(a) Make sure that each of the lights comes on bright.

(6) Slide the CB/SW dimmer switch toward the OFF position.

(a) Make sure that the light level decreases on each of the lights.

(7) Slide the MAP LIGHT DIMMER switch (SW17) to the full ON position.

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(a) Make sure that each of the map lights come on bright.

(8) Slide the MAP LIGHT DIMMER switch to the OFF position.

(a) Make sure that each of the map lights go off.

(9) Slide the FLOOD DIMMER switch (SW18) to the full ON position.

(a) Make sure that the glareshield flood light comes on bright.

(10) Slide the FLOOD DIMMER switch to the OFF position.

(a) Make sure that the glareshield flood light goes off.

(11) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(12) Set the CROSS TIE switch (SW03) to the OFF position.

(13) Remove external electrical power from the airplane.

4. Flight Displays Lighting Functional Test

A. Do the Flight Displays Lighting Functional Check.

NOTE: Each flight display's photo cell determines the parameters of the range the display's back ground lighting will change, depending on the ambient light in the area of the displays.

(1) Supply external electrical power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch to the ON position.

(4) Set the CROSS TIE switch (SW03) to the ON position.

(5) Slide the FLT INST dimmer switch (SW23) to the bright position and make sure that the background lighting comes on the flight displays that follow:

- Primary Flight Display (PFD)
- Multifunction Display (MFD)
- GTC 570 Touchscreen Controller (GTC 570).

(6) Slide the FLT INST dimmer switch to the full ON position.

(a) Make sure that each of the flight display lights comes on bright.

(7) Slide the FLT INST dimmer switch toward the OFF position.

(a) Make sure that the light level decreases on each of the flight display lights.

(8) Set the master BATT switches to the OFF position.

(9) Set the AVIONICS MASTER switch to the OFF position.

(10) Set the CROSS TIE switch to the OFF position.

(11) Remove external electrical power from the airplane.

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EXTERIOR LIGHTING - MAINTENANCE PRACTICES

1. Position Lights

A. There are a total of four position lights found on the airplane. The position light housings also contain the strobe lights.

(1) For airplanes with incandescent light bulbs. - Each wing tip contains a housing that holds a colored lens forward and a clear lens aft. All four bulbs are clear. The forward lens on the left side is red and the forward lens on the right side is green. Refer to Figure 201.

(2) For airplanes with LEDs. - Each wing tip contains a housing that holds clear lens forward and aft. The left position light assembly uses red LEDs and the right position light assembly uses green LEDs. Refer to Figure 201.

NOTE: Airplane 01159 and Airplanes 02001 and On have LED position lights installed as standard equipment.

CAUTION: If lights have been in use, use protective gloves when removing hot bulbs.

B. Removal of Position Light Lamp

NOTE: The removal procedures for incandescent and LED lights is similar.

(1) Remove the screws securing the lens shield to the wing tip.

(2) Remove the lens from the position light assembly.

(3) Grasp the lamp, depress slightly, and turn counterclockwise to release and remove the lamp from the bayonet mount.

C. Installation of Position Light Lamp

NOTE: The installation procedures for incandescent and LED lights is similar.

(1) Place the lamp in the bayonet socket, depress, and gently turn clockwise until the lamp seats in the socket.

(2) Position the lens and gasket in place.

(3) Secure the lens by installing the lens shield to the wing tip with screws.

(a) For LED installations torque the screws from 12 to 15 inch pounds.

D. Maintenance of Position Light - General maintenance is limited to lamp replacement and cleaning of ozone buildup inside the position light lenses. The lenses may be cleaned with dish soap and water using a soft cotton cloth.

2. Strobe Lights

A. The strobe lights are contained in the left and right wing tip in the same housing as the position lights. Refer to Figure 201. The strobe lights and lenses are both clear. Switching the strobe rocker switch to the on position activates the strobe lights. This position supplies power to the to the strobe power supply which alternates the power between the left and right strobe light.

B. Strobe Tube Assembly Removal (Left or Right)

(1) Remove the screws securing the lens shield to the wing tip.

CAUTION: If the same strobe tube assembly is to be reinstalled after removal, use protective gloves or a cotton wrap to ensure fingertip oil does not come into contact with the strobe tube assembly.

(2) Remove the lens from the front of the strobe tube assembly.

(3) Carefully pull the strobe light assembly wiring to retrieve the strobe connector (P17/P18) from inside the wing tip. Disconnect the strobe connector.

(4) Remove the strobe tube assembly from the base assembly, and remove from the wing tip.

C. Installation of Strobe Tube Assembly

CAUTION: Use protective gloves or a cotton wrap to ensure fingertip oil does not come into contact with the strobe tube assembly.

(1) Position the strobe tube assembly, and connect the strobe connector.

(2) Feed the strobe connector and the strobe light assembly wiring into the wing tip.

(3) Position the spacer, and install the strobe tube assembly to the base assembly.

(4) Position the lens at the strobe tube assembly, and place the ground wire inside of the lens.

(5) Place the lens on the strobe tube assembly.

(6) Secure the lens by installing the lens shield with screws.

D. Maintenance of Strobe Tube Assembly – General maintenance is limited to lamp/tube replacement, removal and installation of

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the strobe light power supply, and cleaning of ozone buildup inside the strobe lenses. The lenses may be cleaned with dish soap and water using a soft cotton cloth.

CAUTION: Use protective gloves or a cotton wrap to ensure fingertip oil does not come into contact with the strobe tube assembly.

E. Removal of Strobe Power Supply

(1) Ensure the system master and strobe rocker switches are in the off position.

(2) To access the strobe power supply, remove the center console access panels (Avidyne Options) or remove the tower (Garmin G1000 option). Refer to Chapter 25.

(3) Disconnect the strobe connector and strobe power supply connector. Be sure to label the location of each wire.

(4) Remove the screws securing the strobe power supply to the cabin floor, or to the tower, and disconnect the mode jumper.

(5) Remove the strobe power supply from the airplane.

F. Installation of Strobe Power Supply

(1) Position the strobe power supply to the nutplates in the cabin floor, or in the tower.

(2) Secure all required screws.

(3) Connect the ground wire with the screw used to secure the strobe power supply.

(4) Connect the strobe connectors, strobe power supply connector, and mode jumper.

(5) Install the left and right center console access panels, or the tower, as applicable.

(6) Set the system master and strobe rocker switches to the on position, and check strobes for proper operation.

3. Landing and Taxi Lights

NOTE: Airplanes 02049 and On have LED Landing, Taxi and Recognition (LTR) lights. For LED LTR maintenance information, refer to LED Landing, Taxi and Recognition Lights - Maintenance Practices.

A. The taxi and landing lights are contained in the leading edge of the left wing. The outboard bulb in the light housing is the taxi light that provides a diffused light in the immediate area of the airplane. The inboard bulb is the landing light, which has a spot presentation with a slight downward focus. Refer to Figure 202. Xenon taxi lights are only available on 28V aircraft.

CAUTION: The landing and taxi lights become extremely hot in a short period of time. Do not touch the lens or any part of the lights under any circumstances as they can cause serious burns.

CAUTION: Use protective gloves or a cotton wrap to ensure fingertip oil does not come into contact with the landing or taxi light lens.

B. Landing and Taxi Light Removal

(1) Remove four screws on top and four screws on bottom of the landing and taxi light shielding.

(2) Remove the mounting screws on each corner of the light.

(3) Pull the light out and disconnect.

C. Landing and Taxi Light Installation

(1) Install the light connector.

(2) Place the light in the slot and install the mounting screws.

(3) Reinstall the landing and taxi light shielding with four screws on top and four screws on bottom. As required, fill the gap between the edge of the joggle and the edge of the shielding with RTV 162 white silicone caulk; do not block the 0.25-inch relief channel in the gasket.

D. Xenon Landing and Taxi Light Ballast Removal and Installation (Refer to Figure 203.)

(1) Remove the nine 6-32 flat head screws from the outboard access panel on the left wing and remove the panel.

(2) Disconnect the electrical connections from the ballast.

(3) Remove the locknuts, washers, and rubber spacers (as applicable) holding the ballast to the wing and remove the ballast.

(4) Installation is the reverse of removal. Tighten the nuts hand tight plus 1/4 turn. Apply Permatex No.2 or Loctite 222 threadlocker to each screw and install the access panel. Torque the access panel screws 12 to 15 in.-lbs.

4. Taxi and Landing Light Adjustment

NOTE: Airplanes 02049 and On have LED Landing, Taxi and Recognition (LTR) lights. For LED LTR maintenance information, refer to LED Landing, Taxi and Recognition Lights - Maintenance Practices.

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CAUTION: The landing and taxi lights become extremely hot in a short period of time. Do not touch the lens or any part of the lights under any circumstances as they can cause serious burns.

A. The taxi and landing lights are aimed in a manner that maximizes coverage for each respective flight operation. Over time, hard landings and rough field operations, to mention a few reasons, may cause the lights to lose their optimum alignment. Since both lights have a 100 percent duty cycle (can be used 100 percent of the time), their luminosity is somewhat reduced. For this reason it is important that the lights be kept in proper alignment. The following paragraphs describe the method for checking the alignment of both the taxi and landing lights and, if necessary, procedures for adjusting each lens.

B. Reference Card - To determine how the taxi and landing lights are aimed, a simple reference card must be constructed. The card should be approximately four feet high and six feet wide; corrugated cardboard works quite well and is easy to handle. Draw two horizontal, parallel lines and one vertical line on the cardboard. The horizontal lines are drawn on the 6 ft. length up from the bottom of the card: one 25 inches for incandescent lights (or 29 inches for xenon lights), and the other 35 inches. The vertical line bisects the 6 ft. length. The horizontal line 35 inches from the bottom is the taxi light reference, and the horizontal line 25 inches or 29 inches from the bottom is the landing light reference. Please refer to Figure 204 Light Adjustment Reference Card for a drawing of the reference card.

C. Landing/Taxi Light Cover Removal - It is best to remove the outer light cover before performing the test to facilitate a more accurate measurement and allow easy access to the adjustment screws for re-aiming both of the lights. The acrylic plastic cover for the light assembly is secured with eight screws, four on the top and four on the bottom. Remove all eight screws, and pull forward on the cover to remove it. If the light lenses are dirty, they should be cleaned at this time.

D. Ambient Light - The test must be performed in an area of reduced ambient light such as a hanger with the doors closed and part of the overhead lighting off. Adequate lighting conditions are also available outside about one hour after sunset.

E. Placement of Reference Card - Place the reference card in front of the airplane so that the card is 9 feet forward of the landing/taxi lights, and the vertical line on the card is 10 feet 3 inches to the left (when facing forward) of the propeller spinner tip. Refer to Figure 205.

F. Checking the Alignment - Each light is operated and checked separately and should produce the displays discussed below. An approximate representation of the light dispersion patterns are shown in Figure 206.

(1) Taxi Light, and Precise Flight Landing and Taxi Lights - The brightest concentration of the taxi light should focus laterally on the line 35 inches from the bottom and the pattern should be equally dispersed on the left and right side of the vertical line. Towards the edges of the reference card, the concentration will be somewhat above the line on the left side and below the line on the right side.

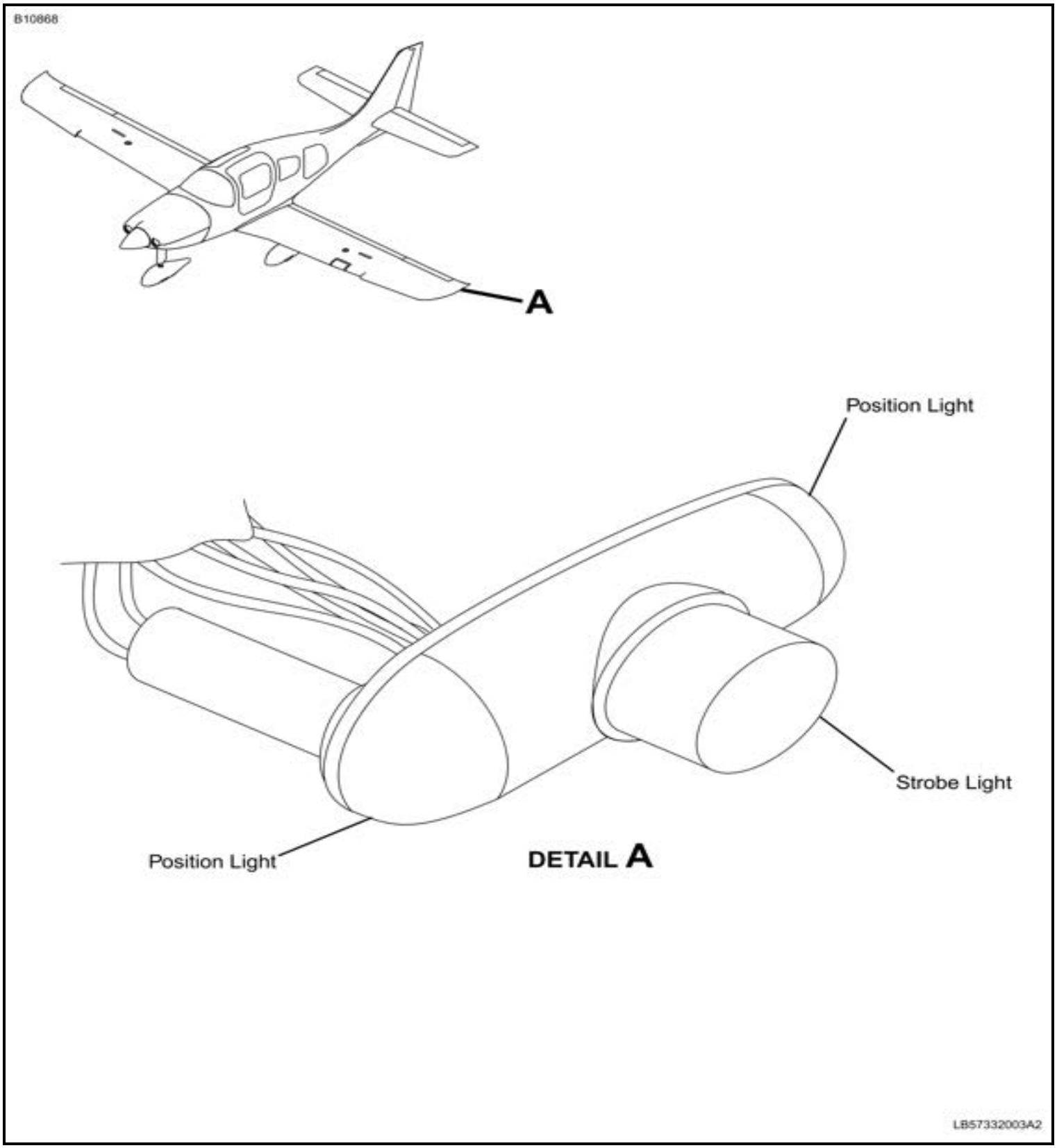
(2) Landing Light (except Precise Flight) - The center of this light should be focused on the intersection of the vertical line and the line from the bottom (25 inches for incandescent lights or 29 inches for xenon lights).

G. Aiming or Adjusting the Lights - If the lights are not properly aimed, there are adjustment screws on the face of each lens that can be turned so that each lens is properly aimed. Turning the screw on the face of the lens clockwise will cause the lens to move. The amount of adjustment to each screw is limited by physical stops, so it works best to adjust both sides of the lens in small increments. For example, a full clockwise turn on a right screw should be followed by a full counterclockwise turn on the left screw.

H. Lens Assembly - Once the lenses are properly aimed, ensure both lights and the master switches are off. Clean the acrylic plastic housing cover, and check the condition of the rubber gasket on the inside edge of the cover. Replace or re-glue the gasket as required. After the lights have cooled sufficiently, install the cover, and tighten the eight screws. Torque screws 10 to 12 in.-lbs.

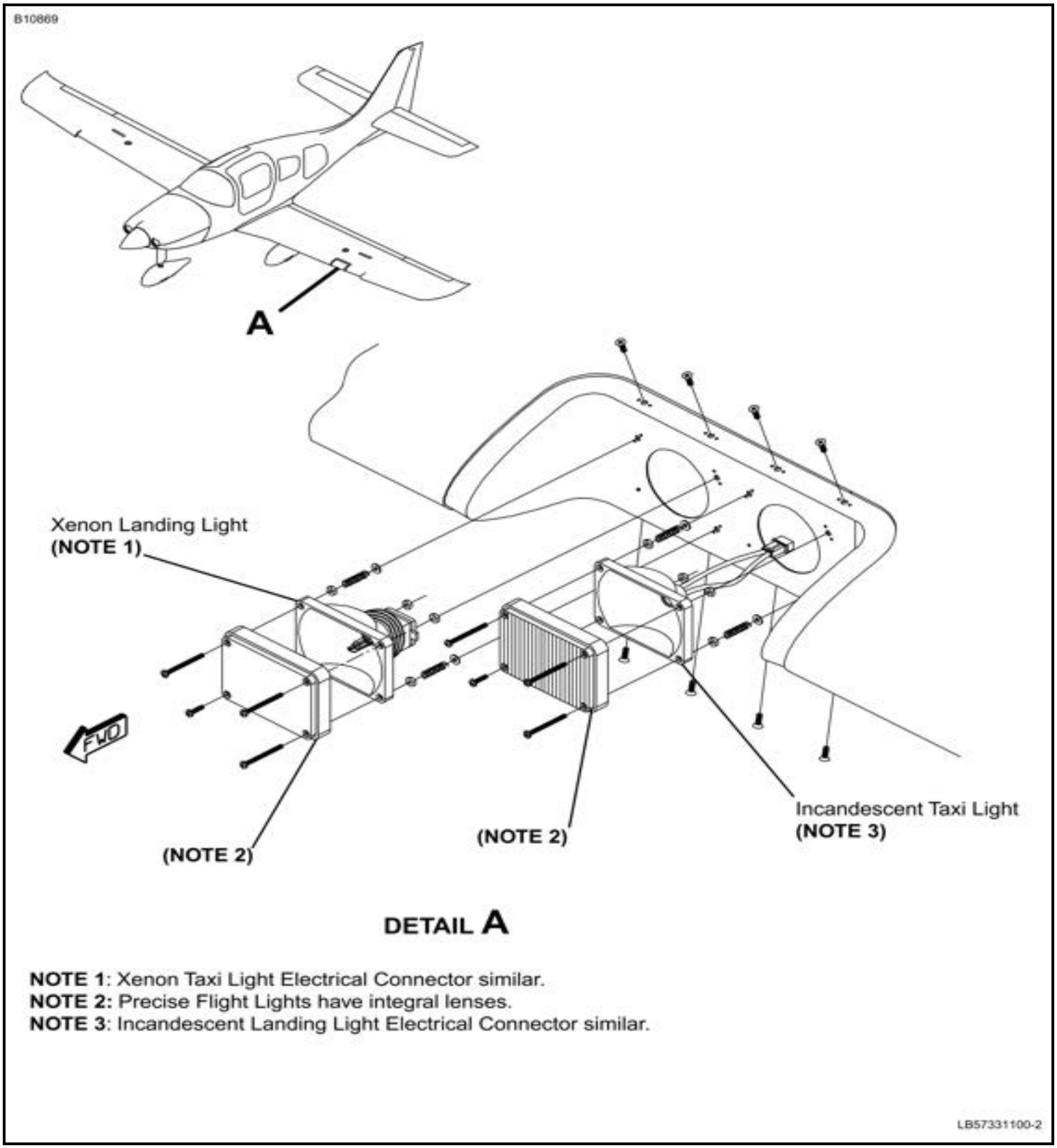
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Figure 201 : Sheet 1 : Position and Strobe Lights



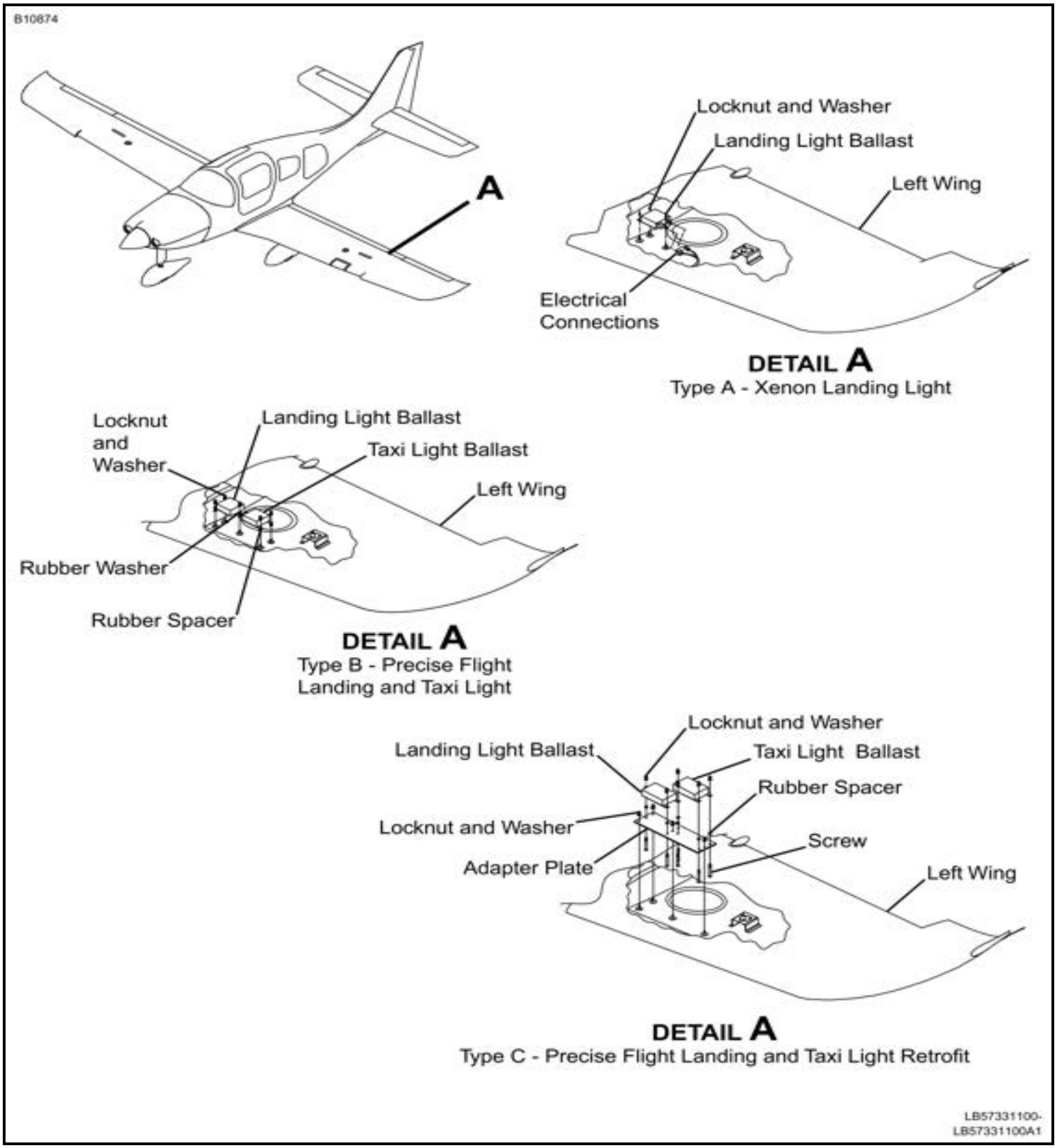
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Figure 202 : Sheet 1 : Landing and Taxi Light Assembly



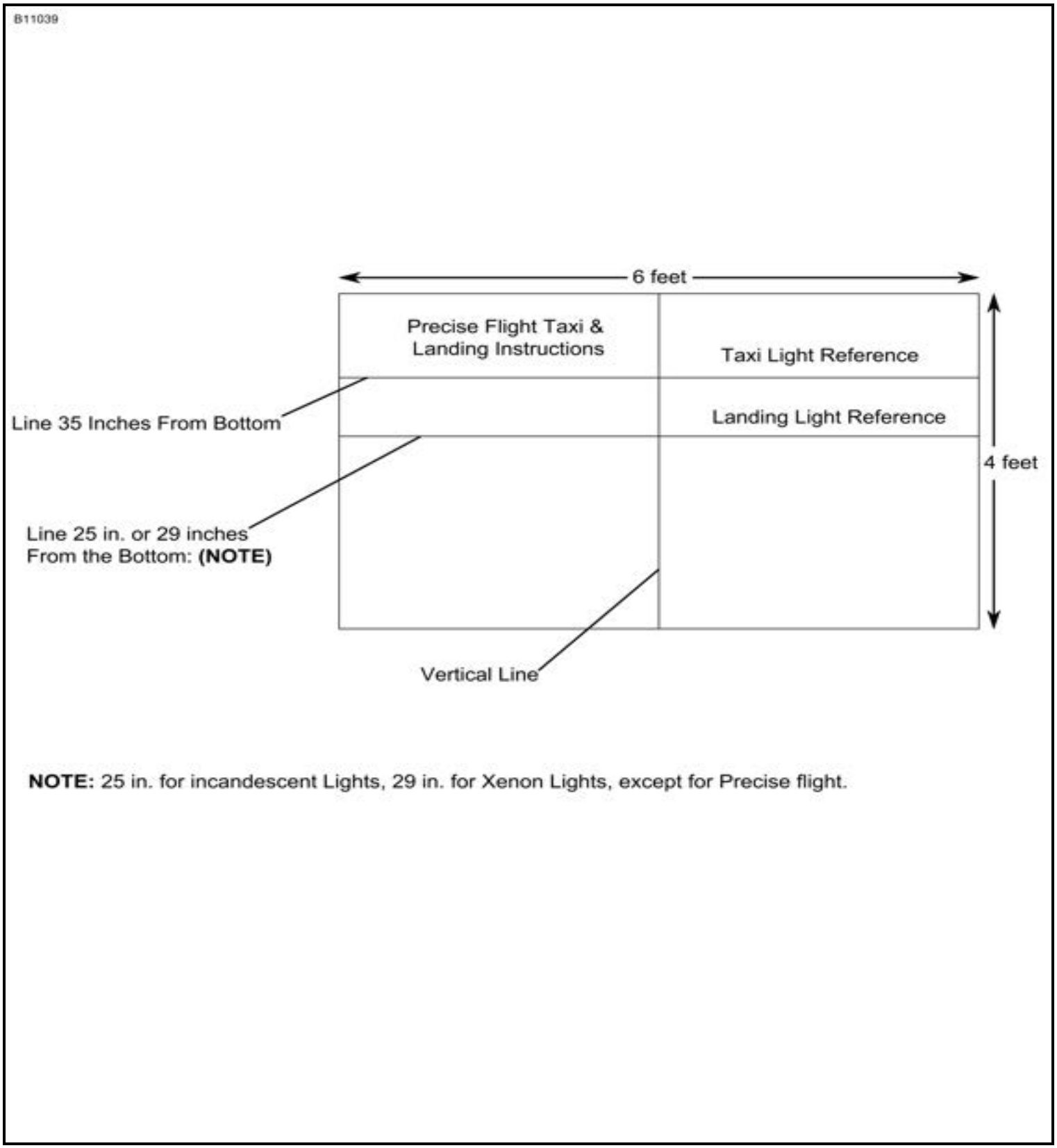
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Figure 203 : Sheet 1 : Xenon Landing and Taxi Light Ballast



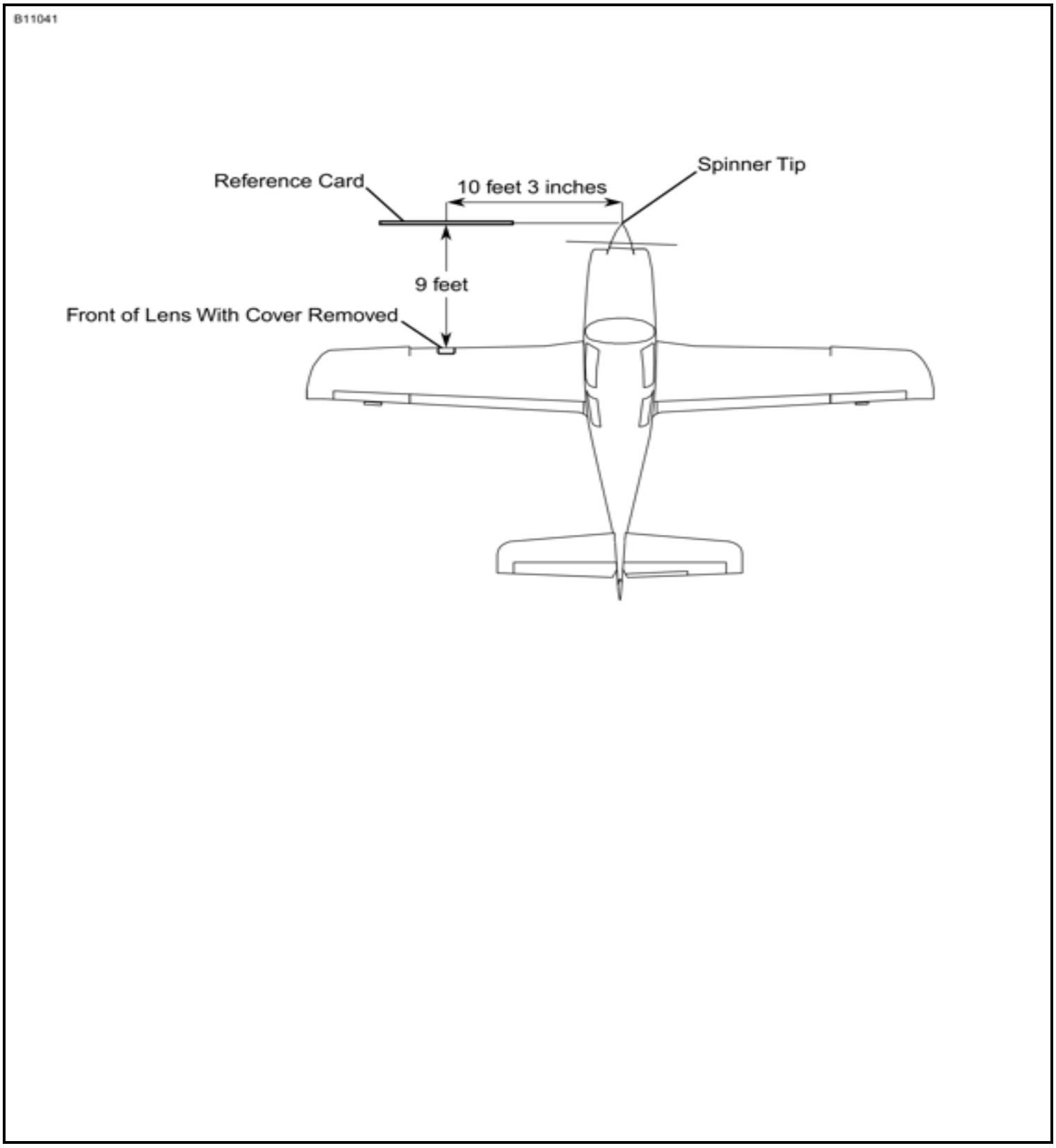
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Figure 204 : Sheet 1 : Light Adjustment Reference Card



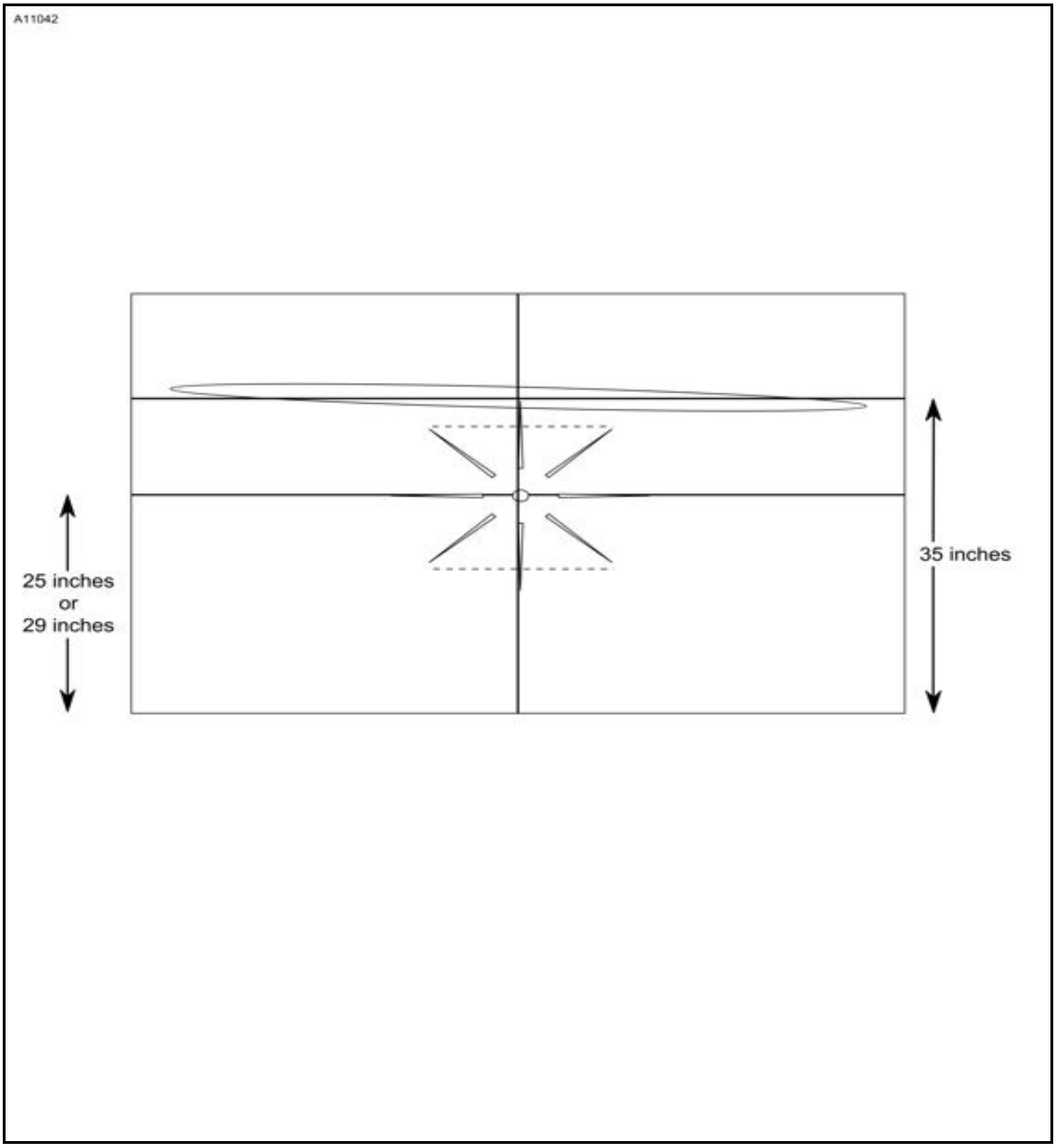
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Figure 205 : Sheet 1 : Placement of Light Adjustment Reference Card



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Figure 206 : Sheet 1 : Light Adjustment



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LED WING INSPECTION LIGHT - REMOVAL/INSTALLATION

1. General

A. This section gives the procedures to remove and replace the LED Wing Inspection Light.

2. LED Wing Inspection Light Removal/Installation

NOTE: The removal and installation of the wing inspection lights are typical.

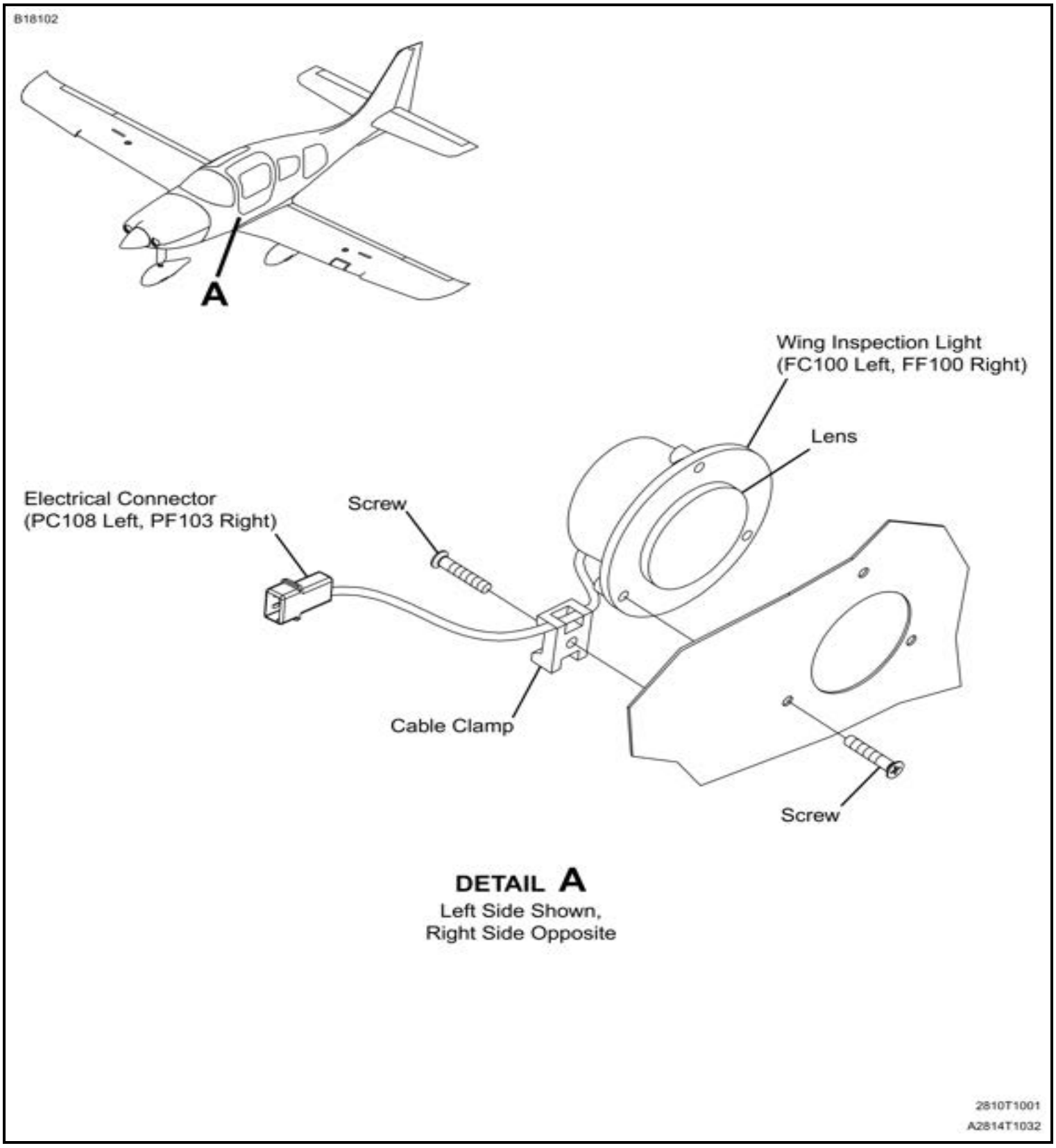
A. Remove the Wing Inspection Light (FC100 left, FF100 right) (Refer to Figure 401).
   (1) Remove external electrical power from the airplane.
   (2) Make sure that the BATTERY switch (SC005), found on the circuit breaker switch panel, is set to the OFF position.
   (3) Make sure that the WING INSP LIGHTS circuit breaker, found on the cockpit circuit breaker panel, is disengaged.
   (4) On the left or right side of cockpit (as applicable) remove the interior panel as necessary to get access to the light. Refer to Chapter 25 Interior Panels - Maintenance Panels, Middle Lower Side Panels, Left (MLSPL) and Right (MLSPR).
   (5) Remove the light assembly as follows:
      (a) Carefully remove the sealer from the edge of the light assembly lens and airplane skin
      (b) Remove the screws that attach the light to the airplane skin
      (c) Remove the screw that attaches the light electrical cable clamp to the nut plate
      (d) Disconnect the applicable electrical connectors, PC108 and JC108 (left), and PF103 and JF103 (right)
      (e) Carefully remove the light from the inside of the cockpit.
   (6) Carefully remove the used sealant from the fuselage skin.
   (7) Examine the fuselage skin to make sure that there are no cracks or damage.

B. Install the Wing Inspection Light (FC009) (Refer to Figure 401).
   (1) Make sure that the mounting surface of the airplane skin is clean and free from old sealant.
   (2) Insert the light from inside the cockpit with screw holes aligned correctly with the light nut plates.
      (a) Install the screws that attach the light to the airplane skin.
   (3) Visually inspect the electrical connectors to make sure that there are no bent or damaged pins.
      (a) Repair the found damage.
   (4) Connect the applicable electrical connectors, PC108 and JC108 (left), and PF103 and JF103 (right).
   (5) Put the electrical cable clamp in its correct position.
      (a) Install the screw that attaches the clamp to the nut plate.
   (6) Use Type XII, Class B-2 sealant to filet seal the light lens to the airplane skin.
   (7) Check the electrical bonding between the light housing and doubler.
   (8) Do an operation test of the wing inspection light. Refer to Wing Inspection Light Operational Test.

C. Wing Inspection Light Operational Test.
   (1) Make sure that the WING INSP LIGHTS circuit breaker, found on the cockpit circuit breaker panel, is engaged.
   (2) Apply external electrical power to the airplane.
   (3) Make sure that the BATTERY switch (SC005), found on the circuit breaker switch panel, is set to the ON position.
   (4) Set the CROSS TIE switch (SW03) to the ON position.
   (5) Set the WING INSP LIGHT switch (SI019), found on the center console switch panel switch panel, to the ON position.
      (a) Make sure that the Wing Inspection Lights are operational.
   (6) Set the WING INSP LIGHT switch to the off position.
   (7) Set the BATTERY switch to the OFF position.
   (8) Set the CROSS TIE switch (SW03) to the OFF position.
   (9) Remove external electrical power from the airplane.

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Figure 401 : Sheet 1 : Wing Inspection Light Installation



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LED LANDING/TAXI/RECOGNITION LIGHTS - TROUBLESHOOTING

1. Light Emitting Diode (LED) Landing, Taxi and Recognition (LTR) Lights Troubleshooting

A. The troubleshooting tables that follow are for airplanes that have the Light Emitting Diode (LED) Landing, Taxi and Recognition (LTR) light systems installed.

NOTE: The troubleshooting procedure is typical for the left and right LED LTR lights.

Table 101. Troubleshooting - Landing Light(s)

Aircraft Condition – Landing Light (LDG) Switch in the LDG position.	
Failure Condition	**Check or Action Items**
Individual or a group of 6 LEDs are inoperative on a light assembly.	Replace the light assembly that has the inoperative LEDs.
One light assembly is inoperative (no LEDs are illuminated on one assembly).	1. Check for 28 VDC at the inoperative light assembly connector (JW900) pin 1. If not, make sure there is continuity between the light assembly connector pin 1 and the switch panel disconnect (PC006) pin 16.
	2. Check for a ground at the inoperative light assembly connector (JW900) pin 4. If not, check for damaged wiring and/or connectors between the light assembly connector pin 4 and the ground (JF001).
	3. With an external 28 VDC power source, apply power to the suspect light assembly using connector pin 1 connected to +28 VDC and pin 4 connected to the power supply ground. Replace the light assembly if all the LEDs on the assembly are not illuminated.
Both light assemblies are Inoperative (no LEDs are illuminated).	1. Make sure that the LANDING LIGHT circuit breaker (HC034) is engaged and the bus voltage shows approximately 28 volts.
	2. Check for 28 VDC at the switch panel disconnect JC006 pin 16. If not 28 VDC, make sure there is continuity between the switch and circuit breaker panel wire bundles.
	3. Check for 28 VDC at each light assembly connector (JW900) pin 1. If not 28 VDC, make sure there is continuity between the light assembly connector pin 1 and the switch panel disconnect (PC006) pin 16.
One light assembly functions only as a Taxi light (on the ground) or Recognition light (in flight).	1. Check for 28 VDC at the inoperative light assembly connector (JW900) pin 1. If not 28 VDC, make sure there is continuity between the light assembly connector and the switch panel disconnect (PC006) pin 16.
	2. With an external 28 VDC power source, apply power to the suspect light assembly using connector pin 1 connected to +28 VDC and pin 4 connected to the power supply ground. Replace the light assembly if all the LEDs on the assembly are not illuminated.
Both light assemblies function as a Taxi light (on the ground) or Recognition light (in flight).	1. Make sure that the LANDING LIGHT circuit breaker (HC034) is engaged.
	2. Check for 28 VDC at the switch panel disconnect PC006 pin 15. If not 28 VDC, make sure there is continuity between the PC006 pin 15 and the LANDING LIGHT circuit breaker (HC034).
	3. Check for 28 VDC at each light assembly connector (JW900) pin 1. If not 28 VDC, make sure there is continuity between the light assembly connector pin 1 and the switch panel disconnect (PC006) pin 16.
	4. With an external 28 VDC power source, apply power to the suspect light assembly using connector pin 1 connected to +28 VDC and pin 4 connected to the power supply ground. Replace the light assembly if all the LEDs on the assembly are not illuminated.

Table 102. Troubleshooting - Taxi Light(s)

Aircraft Condition – Taxi and Recognition Light (TAXI/RECOG) Switch in the TAXI/RECOG position and the airplane on the ground	
Failure Condition	**Check or Action Items**

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One light assembly is inoperative (no LEDs are illuminated on one assembly).	1. Check for 28 VDC at the inoperative light assembly connector (JW900) pins 2 and 3. If not, make sure there is continuity between the light assembly connector and the switch panel disconnect (PC006).
	2. Check for a ground at the inoperative light assembly connector (JW900) pin 4. If not, check for damaged wiring and/or connectors between the light assembly connector pin 4 and the ground (JF001).
	3. With an external 28 VDC power source, apply power to the suspect light assembly using connector pins 2 and 3 connected to +28 VDC and pin 4 connected to the power supply ground. Replace the light assembly if the six center LEDs on the assembly are not illuminated.
Both light assemblies are Inoperative (no LEDs are illuminated).	1. Make sure that the TAXI LIGHT circuit breaker (HC045) is engaged.
	2. Check for 28 VDC at the switch panel disconnect PC006 pin 17. If not, make sure there is continuity between the system wiring in the switch and the circuit breaker panel wire bundles.
	3. Check for 28 VDC at each light assembly connector (JW900) pins 2 and 3. If not, make sure there is continuity between the light assembly connector and the switch panel disconnect (PC006).
One or both light assemblies function as a Recognition light (pulsing) on the ground.	1. Check for an open circuit (not a ground) at the right light assembly connector (JW900) pin 6. If there is a ground, disconnect the GEA71 connector P673 and check again for an open circuit at JW900 pin 6. If the ground remains, make sure there is continuity between JW900 pin 6 and GEA71 P673 pin 4. If there is an open circuit, check the Garmin G2000 system in accordance with Step 4 below.
	2. Check that there is no wire in the right light assembly connector (JR005) pin F.
	3. With an external 28 VDC power source, apply power to the suspect light assembly using connector pins 2 and 3 connected to +28 VDC and pin 4 connected to the power supply ground. Make sure pin 6 is not connected (open). Replace the light assembly if the six center LEDs on the assembly are not steadily illuminated.
	4. To make sure the Garmin G2000 System operates correctly, complete the following: - Make sure that GEA71 P673 pin 4 is open (not a ground). - Use the Pitot-Static Test Box and make sure of the status of pin 4 in the following conditions: Indicated TAS < 50 knots [GEA71 P673 pin 4, Open], Indicated TAS > 50 knots [GEA71 P673 pin 4, Ground]. Refer to the Operations section in LED Landing/Taxi/Recognition Lights - Maintenance Practices. - If the Indicated Airspeed does not display on the PFD, inspect, repair and replace in accordance with the G2000 Corvalis T240 Line Maintenance Manual 190-01185-00 Rev A (or later) found in the List of Manufacturers Technical Publications. - If the pin logic does not follow as provided above inspect, repair and replace the GEA in accordance with the G2000 Corvalis T240 Line Maintenance Manual 190-01185-00 Rev A (or later) found in the List of Manufacturers Technical Publications.

Table 103. Troubleshooting - Recognition Light(s)

Aircraft Condition – Taxi and Recognition Light (TAXI/RECOG) Switch in the TAXI/RECOG position and the airplane in flight (or simulated flight mode: pitot pressure set to indicate an airspeed of greater than 50 knots)	
Failure Condition	**Check or Action Items**
Left light assembly only does not pulse.	1. Disconnect the right and left light assembly connectors JW900. Check for continuity between pin 8 on the two connectors (JW900). Check for an open circuit (not a ground and not 28 VDC) on both pins. If there is no continuity and not an open circuit, troubleshoot the wiring between the two pins (8 on JW900).
	2. Interchange the left and right light assemblies on the airplane and do the system test again.

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Right light assembly only does not pulse.	With an external 28 VDC power source, apply power to the right light assembly using connector pins 2 and 3 connected to +28 VDC and pins 4 and 6 connected to the power supply ground. Replace the light assembly if all the LEDs on the assembly do not pulse.
Both light assemblies do not pulse.	1. Check for a ground at the right light assembly connector (JW900) pin 6. If there is no ground, disconnect the GEA71 connector P673 and check for a ground at P702 pin 4 on the GEA71. If there is a ground on P702 pin 4, make sure there is continuity between JW900 pin 6 and GEA71 P673 pin 4. If there is no ground, check the Garmin 2000 system in accordance with Step 3 below.
	2. With an external 28 VDC power source, apply power to the right light assembly using connector pins 2 and 3 connected to +28 VDC and pins 4 and 6 connected to the power supply ground. Replace the light assembly if all LEDs on the assembly do not pulse.
	3. To make sure the Garmin G2000 System operates correctly, complete the following: - Make sure that the GEA71 P673 pin 4 is grounded (not open). - Use the Pitot-Static Test Box and make sure of the status of pin 4 in the following conditions: Indicated TAS < 50 knots [GEA71 P673 pin 4, Open], Indicated TAS > 50 knots [GEA71 P673 pin 4, Ground]. Refer to the Operations section in LED Landing/Taxi/Recognition Lights - Maintenance Practices. - If the Indicated Airspeed does not display on the PFD, inspect, repair and replace in accordance with the G2000 Corvalis T240 Line Maintenance Manual 190-01185-00 Rev A (or later) found in the List of Manufacturers Technical Publications. - If the pin logic does not follow as provided above inspect, repair and replace the GEA in accordance with the G2000 Corvalis T240 Line Maintenance Manual 190-01185-00 Rev A (or later) found in the List of Manufacturers Technical Publications.
Both light assemblies pulse simultaneously (not alternately).	1. Make sure that there is no wire in pin 7 on each light assembly connector (JW900). Pin 7 must be an open circuit.
	2. Disconnect the right and left light assembly connectors JW900. Check for continuity between pin 8 on the two connectors (JW900). If there is no continuity, troubleshoot the wiring between the two pins (8 on JW900).
	3. With an external 28 VDC power source, apply power to the right light assembly using connector pins 2 and 3 connected to +28 VDC and pins 4 and 6 connected to the power supply ground. Make sure pin 7 is not connected (an open circuit). Replace the right light assembly if all LEDs on the assembly pulse at approximately 75 pulses per minute (the correct output should be approximately 37.5 pulses per minute). An alternative to the replacement of light assembly is to interchange the left and right light assemblies on the airplane and do the system test again.

Table 104. Troubleshooting - Traffic Alert Recognition Light(s)

Aircraft Condition – Taxi and Recognition Light (TAXI/RECOG) Switch in the ARM position and the airplane in flight (or simulated flight mode: pitot pressure set to indicate an airspeed of greater than 50 knots) and a traffic alert signal present (or simulated traffic alert signal: use a test set to simulate the traffic alert signal)	
Failure Condition	**Check or Action Items**
Both light assemblies do not pulse when a traffic alert is present.	1. Make sure that both light function correctly when the Taxi and Recognition Light (TAXI/RECOG) Switch in the TAXI/RECOG position. Refer to the Troubleshooting - Recognition Light(s) table above.
	2. Disconnect the left light assembly connector JW900. Make sure there is continuity between JW900 pin 5 and GTS 800 TAS PC819 pin 53. If there is no continuity, troubleshoot the wiring between the two pins
	3. If there is continuity inspect, repair and/or replace the GTS 1 in accordance with the G2000 Corvalis T240 Line Maintenance Manual 190-01185-00 Rev A (or later) found in the List of Manufacturers Technical Publications.

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LED LANDING/TAXI/RECOGNITION LIGHTS - MAINTENANCE PRACTICES

1. General

A. The multifunction Light Emitting Diode (LED) Landing, Taxi and Recognition (LTR) lights are installed on the left and right wing leading edges at WS 118.00. The LTR light consists of 18 high intensity LEDs whose light emitting angles are determined by three lenses. Each lens diffuses the light for a string of 6 LEDs. The two outboard lenses have a high intensity narrow beam spread while the center lens (known as the spreader lens) has a lower intensity but broader horizontal beam spread.

B. In addition to the light assemblies found in the wings, the system includes two switches and two circuit breakers. The two-position landing light (LDG) switch and the three-position taxi light (TAXI/RECOG) switch are found on the center panel switch panel. The circuit breakers (LANDING LIGHT and TAXI LIGHT) are found on the pilot's circuit breaker panel.

2. Operation

A. The LED LTR light system supplies 3 functions for the pilot: landing light, taxi light and pulsing recognition light. The landing function is selected by its own landing lights (LDG) switch. The taxi and recognition functions share a three-position (TAXI/RECOG, ARM, OFF) switch (TAXI/RECOG). The ARM position puts the lights in the recognition mode whenever a traffic alert is present and the airplane is in the airborne mode. Since taxi and recognition functions share the upper position on the rocker switch, the operation of the Recognition or Taxi function will depend on a discrete electrical input from Garmin G2000 system that defines when the airplane is in the Airborne Mode (“In-Air” pin grounded) or in the Ground Mode (“In-Air” pin open). With the rocker switch in the TAXI/RECOG position, the Airborne Mode activates the Recognition function and the Ground Mode activates the Taxi function. Airborne and Ground Mode logic is as follows:

- The airplane is in the Airborne Mode when a valid GPS groundspeed is greater than 30 knots or a valid True Airspeed is greater than 50 knots or both GPS and True Airspeed are invalid.
- The airplane is in the Ground Mode when it is not in the Airborne Mode.

(1) The landing function is usually used during the Landing and Takeoff operations. With the landing switch in the LDG position, all 18 LEDs on each left and right light assembly are illuminated continuously. Power for all LEDs is supplied through the LANDING LIGHT circuit breaker.

(2) The taxi function is usually used for taxiing or ground operations. With the switch in the TAXI/RECOG position and the airplane on the ground (“In-Air’ pin open) the 6 center LEDs on each assembly are on steady. Power for these 12 LEDs is supplied through the TAXI LIGHT circuit breaker.

(3) The recognition function is designed for use during flight operations (other than night landing or night takeoff) where there is a desire to increase the airplane visibility to other close proximity aircraft. With the switch in the top (TAXI/RECOG) position and the airplane in flight (“In-Air” pin grounded), all 18 LEDs on each light assembly pulse alternately between the left and right assemblies. A “Sync” function wire between each assembly controls the synchronization of the system pulsing. The left light assembly is the controlling “master” unit and the right light is the “slave”. The total system pulse frequency is 75 pulses per minute with a 75 percent duty cycle. Power for all pulsing LEDs is supplied through the TAXI LIGHT circuit breaker.

B. The LTR system is designed so that even with a complete single system function failure, the Landing function can be used as a backup for Taxi or Recognition functions, and the Recognition and Taxi functions can be used as a backup for Landing function. For the Landing and Taxi functions, both the left and right LTR assemblies function independently. This means that the loss of function of one assembly does not result in the functional loss of the other.

3. Troubleshooting

A. For troubleshooting of the LED landing and taxi light installation, refer to Chapter 33, LED Landing/Taxi/Recognition Lights - Troubleshooting.

4. LED Landing, Taxi and Recognition Light Removal/Installation

NOTE: The removal and installation is typical for the left and right LED LTR lights.

A. Remove the LED Landing, Taxi and Recognition (LTR) Light (Refer to Figure 201).

(1) Set the master BATT switches (left SW01 and right SW02) to the OFF position.

(2) Set the AVIONICS MASTER switch (SW04) to the OFF position.

(3) Set the LDG and TAXI/RECOG light switches to the OFF position.

(4) Disengage the LANDING LIGHT and TAXI LIGHT circuit breakers.

(5) Disconnect external power from the airplane.

(6) Disconnect the negative terminal from the battery. Refer to Battery - Maintenance Practices.

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(7) Remove the screws that attach the cover to the landing light closeout assembly (wing skin).
(a) Remove the cover from the airplane.
(8) Disconnect the electrical connector (JW900) from the LED Light connector (PW901).
(9) Remove the screws and washers from the brackets that attach the LED light assembly to the landing light closeout assembly (wing skin).
(a) Remove the light assembly from the airplane.
(b) Make sure to record which bracket is inboard and which is outboard.
NOTE: The brackets are not interchangeable.
(10) Remove the screws and lock washers that attach the brackets to the light.
(a) Remove the brackets from the light.

B. Install the LED Landing, Taxi and Recognition (LTR) Light (Refer to Figure 201).
(1) Put the brackets in position to the light.
NOTE: The light is symmetrical. There is not a defined top or bottom of the light.
(a) Install the screws and lock washers that attach the brackets to the light.
(2) Install the LED light assembly as follows:
(a) Identify the inboard and outboard brackets.
(b) Put the LED light assembly in position to the landing light closeout assembly (wing skin).
(c) Install the screws and washers through the brackets that attach the LED light assembly.
(d) Make sure that the electrical bond between the inboard bracket and airplane mesh is less than or equal to 0.0025 ohms.
(3) Connect the electrical connector (JW900) to the LED Light connector (PW901).
(4) Examine the tape (gasket) to make sure it is serviceable.
(a) If necessary, replace the tape that is not serviceable.
(5) Put the cover in position to the landing light closeout assembly (wing skin).
CAUTION: Do not over tighten the screws. This can cause damage to the cover.
(a) Install the screws that attach the cover.
1 Tighten the screws so the surface of the cover is flush with the landing light closeout assembly (wing skin).
(6) Connect the negative terminal to the battery. Refer to Battery - Maintenance Practices.
(7) Do the LED Landing, Taxi and Recognition Light Test. Refer to LED Landing, Taxi and Recognition Light System Test.
(8) Use Type XII, Class B sealant to fillet seal the gap between the cover and the landing light closeout assembly (wing skin). (PR-1425 or PR-1829, PPG Industries, PRC-Desoto, or equivalent)

5. LED Landing, Taxi and Recognition Light System Test

A. A controllable pitot pressure source is necessary for this Recognition Light function test to simulate the Garmin G2000 Airborne Mode. Refer to Chapter 34, Pitot and Static Systems – Maintenance Practices, Pitot System Leak Test/Inspection for a method of pressurizing the pitot system.

B. Do the LED Landing, Taxi and Recognition Light System Test.
CAUTION: LEDs are bright to the eye to look at. When you make sure that the LEDs are on, do not look directly into the light face. Look from at least a 45 degree angle.
(1) Connect external power to the airplane.
(2) Engage the LANDING LIGHT and TAXI LIGHT circuit breakers.
(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.
(4) Set the AVIONICS MASTER switch (SW04) to the ON position.
(5) Make sure that landing lights operate correctly.
(a) Set the landing light (LDG) switch to the LDG position.
(b) Make sure that the landing lights, all 18 LEDs on each light assembly, stay on continuously.

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(c) Set the landing light (LDG) switch to the OFF position.

(6) Make sure that taxi lights operate correctly.

(a) Set the taxi light (TAXI/RECOG) switch to the TAXI/RECOG position.

(b) Make sure that the taxi lights, center 6 LEDs on each light assembly, stay on continuously.

(7) Make sure that recognition lights operate correctly.

(a) Set the recognition light (TAXI/RECOG) switch to the OFF position.

(b) Apply pitot system pressure to simulate the airplane in the Airborne Mode.

1 Put a piece of air tight tape over the small hole in the lower aft end of the pitot tube.

2 Attach a controllable pressure source to the end of the pitot tube. Refer to Chapter 34, Pitot-Static System (T240) – Adjustment/Test, Pitot-Static System Test for a method of pressurizing the pitot system.

CAUTION: Always apply pressure or suction slowly to the system. This will help prevent damage to the equipment.

3 Slowly increase the pitot pressure to a minimum of 60 knots as shown on the Garmin primary flight display airspeed indicator.

a Make sure that the True Airspeed (TAS) is also more than 50 knots in the True Airspeed window.

(c) Set the recognition light (TAXI/RECOG) switch to the TAXI/RECOG position.

1 Make sure that the recognition lights, all 18 LEDs on each light assembly, pulse alternately between the left and right assemblies.

(d) Set the recognition light (TAXI/RECOG) switch to the ARM position.

1 Use a test set and simulate a traffic alert.

2 Make sure that the LED LTR lights operate in the recognition mode while the traffic alert signal is transmitted.

(e) Set the recognition light (TAXI/RECOG) switch to the OFF position.

CAUTION: Always remove pressure or suction slowly from the system. This will help prevent damage to the equipment.

(f) Remove the pitot system pressure as follows:

1 Slowly decrease the pitot pressure to 0 knots.

2 Remove the pressure source from the end of the pitot tube.

3 Remove the piece of tape from the small hole in the lower aft end of the pitot tube.

(8) Set the AVIONICS MASTER switch to the OFF position.

(9) Set the master BATT switches (left and right) to the OFF position.

(10) Disconnect external power from the airplane.

6. LED Landing, Taxi and Recognition Light Aiming Check and Adjustment

A. The LED Landing, Taxi and Recognition (LTR) Lights are set to specified positions at the factory, but you can make minor adjustments as necessary. The procedures that follow give checks for the approved aiming of the LED lights.

NOTE: The procedures that follow are typical for the left and right LED LTR lights.

B. Do the Vertical Aiming Check and Adjustment.

NOTE: A digital inclinometer that can measure to the nearest tenth of a degree is necessary for this procedure.

(1) Park the airplane on a flat, level surface.

(2) Connect external power to the airplane.

(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(4) Set the AVIONICS MASTER switch (SW04) to the ON position.

(5) Make sure that the LANDING LIGHT and TAXI LIGHT circuit breakers are engaged.

(6) Set the landing light (LDG) switch to the OFF position.

(7) Level the airplane to waterline 0 degrees, +0.1 or -0.1 degrees, and wings level 0 degrees, +2.0 or -2.0 degrees. Refer to Chapter 8, Leveling and Weighing - General.

(8) Remove the screws that attach the cover to the leading edge of the wing. Refer to Figure 201.

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(a) Remove the cover from the airplane.

(9) Use a digital inclinometer on the center of the light face to find the light vertical aiming angle.

NOTE: For this procedure, it is assumed that the light's center beam emits normal to the face of the light.

(a) Set the landing light (LDG) switch to the LDG position.

(b) Record the vertical aiming angle to the nearest tenth of a degree.

1 Record if the angle is with the light pointed up or down from water line zero.

(c) Is the light aimed within the approved range? Refer to Figure 202.

NOTE: The approved factory-set vertical aiming is with the light pointing 0.0 degrees, +0.5 or -0.5 degrees, from the waterline zero.

(10) If necessary, adjust the light vertical aiming to the approved position.

(a) Set the landing light (LDG) switch to the OFF position.

(b) To adjust the light add 0.016 or 0.032 inch flat washers to the upper or lower screws that attach the brackets to the landing light closeout assembly. Refer to Figure 201.

(11) As necessary, do again the steps above to check and adjust the light vertical aiming angle.

(12) Disconnect external power from the airplane.

C. Do the Horizontal Aiming Check and Adjustment.

NOTE: The horizontal aiming must be checked visually at night on a flat, level, and light colored surface.

(1) Park the airplane on a flat, level, and light colored surface.

(2) Connect external power to the airplane.

(3) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(4) Set the AVIONICS MASTER switch (SW04) to the ON position.

(5) Make sure that the LANDING LIGHT and TAXI LIGHT circuit breakers are engaged.

(6) Set the landing light (LDG) switch to the LDG position.

(7) Do a check of the horizontal aiming.

(a) Make sure that the left and right Landing Light Main Beams converge equally in front of the center of the aircraft. Refer to Figure 202.

(8) If necessary, adjust the light horizontal aiming to the approved position.

(a) Set the landing light (LDG) switch to the OFF position.

(b) To adjust the light add 0.016 or 0.032 inch flat washers between the bracket and the closeout assembly to the screws that attach the applicable bracket (inboard or outboard). Refer to Figure 201.

(9) As necessary, do again the steps above to check and adjust the light horizontal aiming angle.

(10) Install the cover on the airplane. Refer to the applicable steps in LED Landing, Taxi and Recognition Light Removal/Installation.

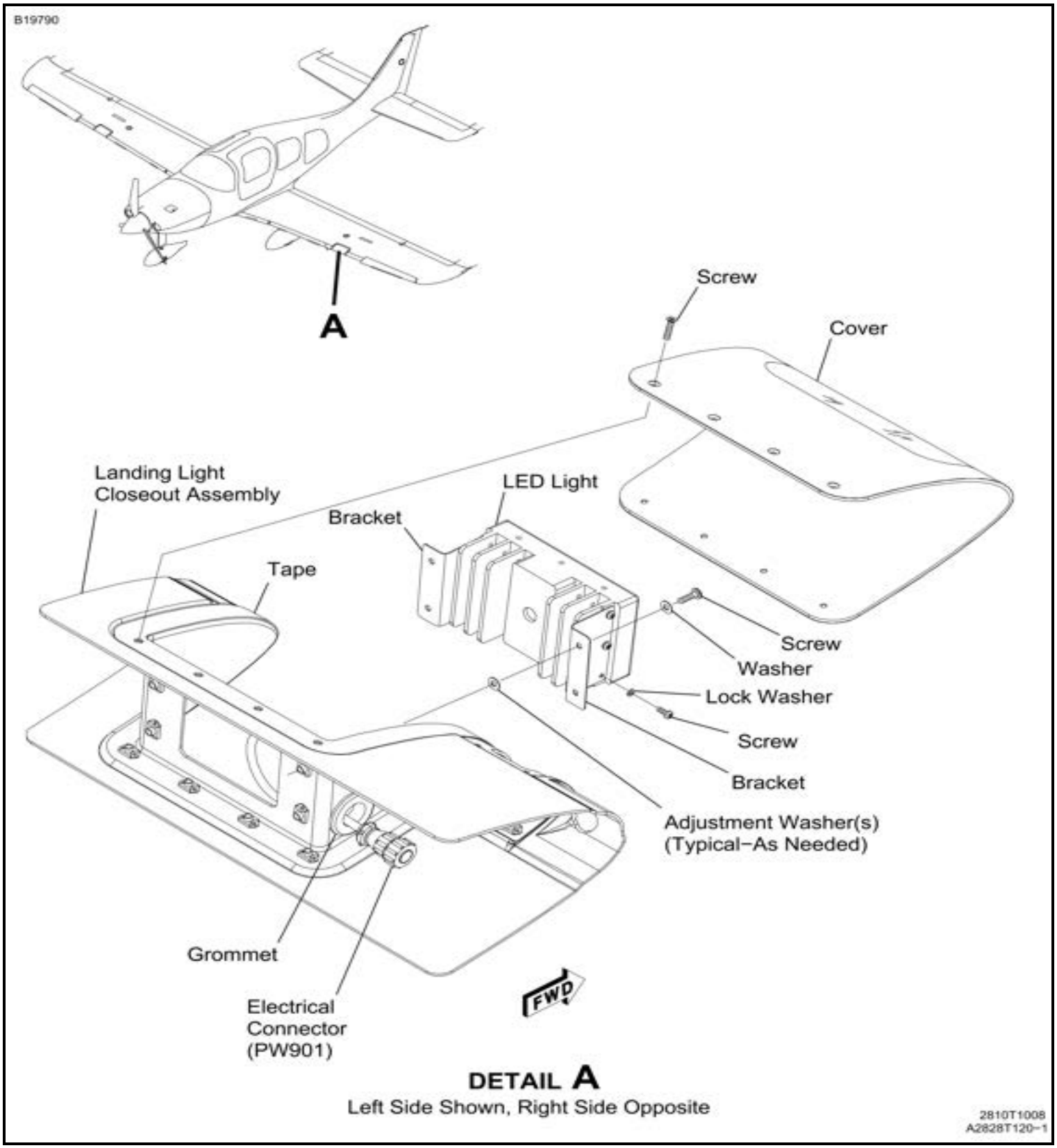
(11) Set the AVIONICS MASTER switch to the OFF position.

(12) Set the master BATT switches (left and right) to the OFF position.

(13) Disconnect external power from the airplane.

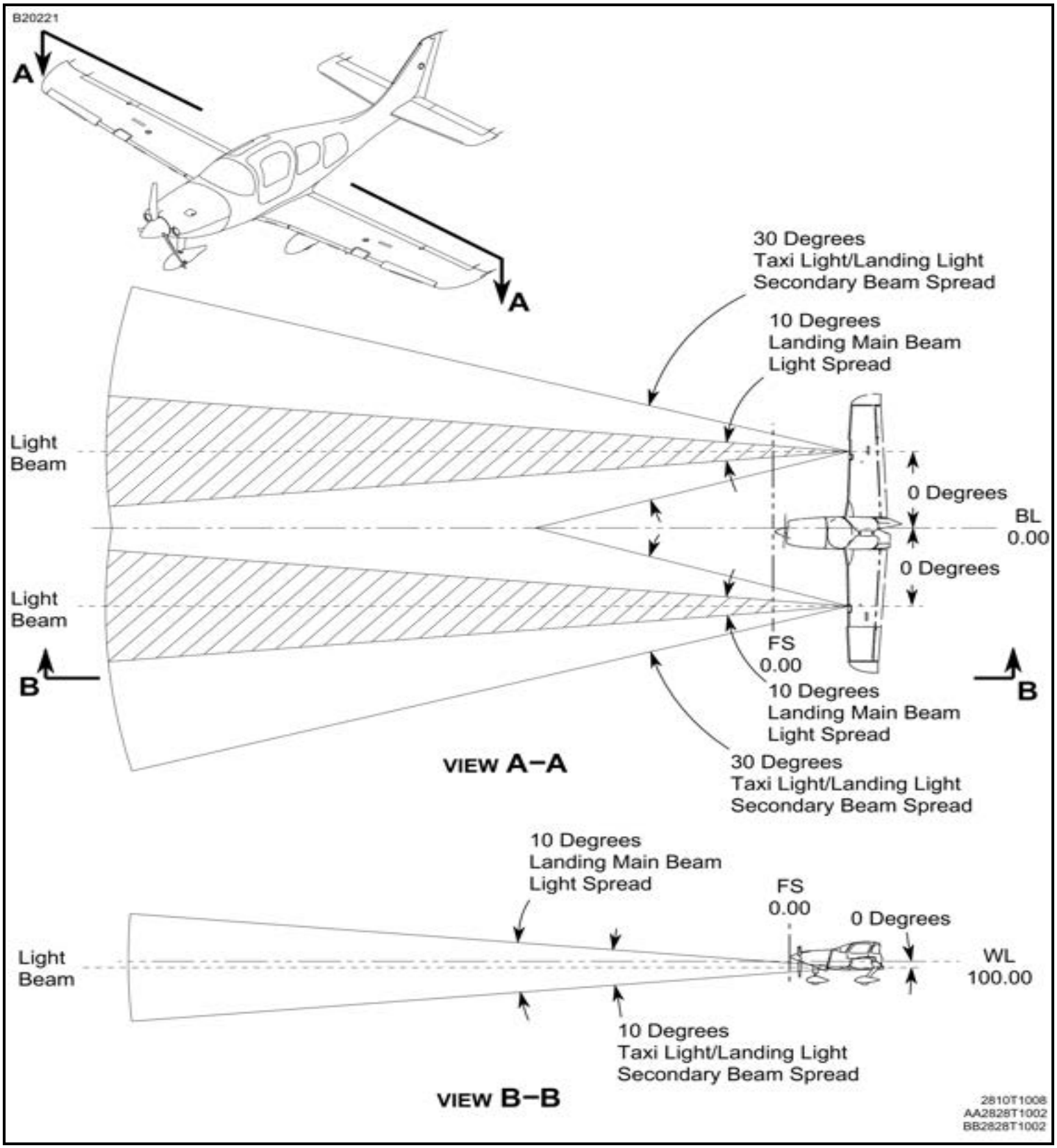
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Figure 201 : Sheet 1 : LED Landing, Taxi and Recognition Light Installation



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Figure 202 : Sheet 1 : LED Landing, Taxi and Recognition Light Aiming



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PARKING, MOORING, STORAGE, AND RETURN TO SERVICE - DESCRIPTION AND OPERATION

1. Scope

A. This chapter describes and provides maintenance instructions for parking, storing, and mooring.

2. Parking

A. During parking operations, it is best to head the airplane into the wind if possible. Normally, setting the parking brake is recommended, however, there are two situations where doing so is not a good idea.

(1) If the brakes are overheated, which might result from a short field landing or extensive taxiing, it is best to not set them until they have had a sufficient cooling period. A brake pad clamped to a hot chrome disk can cause uneven cooling of the brake disc, which could potentially warp it.

(2) It is also not a good idea to set the brakes in cold weather. Accumulations of freezing rain, ice, and snow can freeze-weld the brake pad to the disk. Landing or taxiing in standing water at near freezing temperatures can cause similar problems if the brakes are set when the airplane is parked.

3. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
Gust Lock		Design Research & Development Corp.	To prevent rudder movement in storage.
Pitot Tube Cover	15219	Aircraft Spruce and Speciality Co.	To prevent entry of moisture and/or foreign particles in pitot tubes.
Headset	308100-0280	Bose Corp.	For audio communication.
Fuel Sample Cup	391D	Avail Inc.	To collect fuel sample.
Tow Bar	4-Lance	Bogert Aviation	To tow airplane.

4. Securing The Airplane

A. In any event, whether the brakes are set or not set, the airplane should be chocked and the following items should be accomplished to secure the airplane.

(1) Chock the main gear tires with chocks on both sides of each tire.

(2) Attach a rope or chain to each tie-down point, and secure the rope or chain to a ramp tie-down point. There are three tie-down points, one on each wing and one on the tail. The ropes or chains should have a tensile strength of at least 750 lbs.

(3) Install the pitot tube cover.

5. Storage

A. **Overview** - The storage of an airplane mostly deals with engine related items. Very little needs to or can be done to preserve the airframe, particularly for flyable and temporary storage. The best protection for the exterior is, of course, to hangar the airplane. If the airplane cannot be hangared, then a coat of wax using the material and techniques described in Section 8 of the *Pilot's Operating Handbook* should be applied to all exterior surfaces. In addition, all typical items associated with securing the airplane should be done. These include:

(1) Installing the pitot tube cover

(2) Chocking all wheels and tying the airplane down with the parking brakes released

(3) Installing the control lock

(4) Topping off the fuel tanks

(5) Cleaning the bolts and nuts on the brakes and applying a non-stick preservative like graphite or silicone

(6) Installing other owner option protection devices

There are three types of storage categories: flyable, temporary, and indefinite. The time period and applicable storage procedure for each type is discussed below.

B. **Flyable Storage (5 to 30 days)** - If the airplane is to be maintained in flyable storage, then it should be flown for a minimum of 30 minutes every 30 days; ground running the engine is not a substitute for flying the airplane. During flyable storage, the propeller should be rotated by hand every seven days. This operation should include at least six complete revolutions of the

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engine. Stop the propeller 45 to 90 degrees from its original position. For maximum safety use the following procedures:

(1) Ensure that the ignition switch is set to the OFF position.

(2) Set the throttle to the CLOSED position.

(3) Set the mixture to IDLE CUT OFF.

(4) Set the parking brake and chock the wheels.

(5) Ensure that airplane tie-downs are secure.

(6) Open the cabin door on the pilot's side of the airplane.

(7) Always assume the propeller could start when moving it manually and use an appropriate technique for hand turning the propeller.

(8) Release the parking brake when the operation is completed.

C. **Temporary Storage (up to 90 days)** - Use the following procedures to preserve the engine for temporary storage. Refer to the Airframe Preservation for Temporary or Indefinite Storage section for airframe preservation items.

WARNING: Always assume that the engine could start when rotating the propeller by hand. Remain clear of the arc of the propeller blades at all times.

(1) Remove the top spark plug from each of the six cylinders, and apply an atomized injection of preservation oil, MIL-L-46002, Grade 1 at room temperature through the upper spark plug hole of each cylinder with the piston in approximately the bottom dead center position. Rotate the crankshaft as opposite cylinders are sprayed. Stop the crankshaft with none of the pistons at top dead center.

(2) After stopping the crankshaft with none of the pistons at dead center, re-spray each cylinder thoroughly making sure to cover all interior surfaces.

(3) Install spark plugs.

(4) Spray approximately two ounces of preservation oil through the oil filler tube.

(5) Seal all engine openings exposed to the atmosphere with suitable plugs or moisture resistant tape.

(6) Tag engine, cowling, and other appropriate areas with the statement, "Do not turn propeller, engine preserved."

D. **Indefinite Storage (Over 90 Days)** - If the airplane is to be stored for a long period, follow the procedures listed below to preserve the engine. Refer to the Airframe Preservation for Temporary or Indefinite Storage section for airframe preservation items.

(1) Drain the engine oil and refill with MIL-C-6529 Type II preservation oil. Start the engine and operate until normal temperature ranges are achieved. Fly the airplane for about 30 minutes and then allow the engine to cool to the ambient temperature.

(2) Remove the top spark plug from each of the six cylinders, and apply an atomized injection of preservation oil, MIL-L-46002, Grade 1 at room temperature through the upper spark plug hole of each cylinder with the piston in approximately the bottom dead center position. Rotate the crankshaft as opposite cylinders are sprayed. Stop the crankshaft with none of the pistons at top dead center.

(3) After stopping the crankshaft with none of the pistons at dead center, re-spray each cylinder thoroughly making sure to cover all interior surfaces.

(4) Spray approximately two ounces of preservation oil through the oil filler tube.

(5) Install dehydrator plugs MS27215-1 or -2, in each of the top spark plug holes. Ensure the dehydrator plug is blue when installed. Protect and support the spark plug leads with AN-4060 protectors.

(6) Place a bag of desiccant in the exhaust pipes and seal the openings with moisture resistant tape.

(7) Seal the induction system with moisture resistant tape.

(8) Seal the engine breather by taping a dehydrator plug, M527215-2, in the lower end. Seal the "whistle hole" vent in the breather tube with moisture resistant tape.

(9) Tag engine, cowling, and other appropriate areas with the statement, "Do not turn propeller, engine preserved."

(10) Install plugs in engine cowl inlets, wing leading edge air inlets, and all other openings. **Do not plug or seal tank vents on the bottom of each wing**.

NOTE: During the storage period, FAA Airworthiness Directives and manufacturer's service bulletins may apply which require action based on calendar dates, not operating hours. These items must still be

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complied with even though the airplane is in storage.

NOTE: The dehydrator plugs must be visually checked every 30 days to verify that the color has not changed. Bad dehydrator plugs should be replaced. If more than half of the plugs change color, the bad plugs and all the desiccant bags on the engine should be replaced. Every six months the dehydrator plugs should be replaced and the cylinders re-sprayed with preservation oil. When removing the plugs, check the cylinder interior. If rust stains are noted, spray the cylinder with preservation oil, turn the prop through six revolutions, and then re-spray all cylinders.

E. **Airframe Preservation for Temporary and Indefinite Storage** - If the airplane is to be stored for over 30 days, some or all the procedures below may be applicable, depending on the anticipated storage time period.

(1) Ensure the tires are free of grease, oil, tar, and gasoline. The presence of these items accelerates the aging process. Sunlight and static electricity convert oxygen to ozone, a substance that accelerates the aging process. Special tire covers can be installed which retard the erosion process.

(2) It is best if the weight of the airplane is removed from the tires to prevent flat spots. If the airplane cannot be blocked or set on jacks, then every 30 days each wheel should be rotated about 90° to expose a new tire pressure point.

(3) If the airplane does not have a recent coat of wax, a new coat should be applied as discussed in Chapter 12 of this manual.

(4) Lubricate exposed exterior metal fittings, hinges, push rods, etc. Use plugs or moisture resistant tape to seal all openings except fuel vent holes and drain holes.

(5) Remove the battery and store in a cool, dry location. The battery may need periodic servicing and recharging depending on the storage period.

(6) Prominently tag areas where tape and plugs are installed.

6. Inspections During Temporary Storage

A. The following inspections should be performed while the airplane is in temporary storage.

(1) Check the cleanliness of the airframe as frequently as possible and remove any dust that has collected.

(2) Check the condition and durability of the protective wax coat and renew as required.

(3) Every 30 days, check the interior of at least one cylinder for evidence of corrosion.

7. Inspections During Indefinite Storage

A. The following inspections should be performed while the airplane is in indefinite storage.

(1) Check the condition of the dehydrator plugs ever 30 days to verify that the color has not changed. Bad dehydrator plugs should be replaced. If more than half of the plugs change color, the bad plugs and all the desiccant bags on the engine should be replaced.

(2) Every six months the dehydrator plugs should be replaced and the cylinders re-sprayed with preservation oil. When removing the plugs, check the cylinder interior. If rust stains are noted, spray the cylinder with preservation oil, turn the prop through six revolutions, and then re-spray all cylinders.

NOTE: When an airplane has been in storage for a long period, the date of the required annual inspection may have passed. There is no requirement to perform this inspection during the temporary or indefinite storage period. However, the inspection must be completed before the airplane is returned to service.

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RESTORING - MAINTENANCE PRACTICES

1. Return to Service from Temporary Storage

A. To return an airplane that has been in temporary storage to active service, perform the following steps:

(1) Remove seal plugs, tape, and all methods of tagging the airplane, including items tagged on the airframe.

(2) Remove the bottom spark plug from each of the six cylinders and rotate the propeller several times to remove the preservation oil.

(3) Reinstall the spark plugs according to manufacturer's recommendations.

(4) Conduct a normal engine start, and idle the engine for several minutes until oil temperature is within normal limits. Monitor engine instruments to ensure they are within normal operating ranges.

(5) Stop the engine and inspect the entire airplane before test flying.

(6) Test fly the airplane.

2. Return to Service from Indefinite Storage

A. To return an airplane that has been in indefinite storage to active service, perform the following steps:

(1) Remove all dehydrator plugs, seal plugs, tape, and all methods of tagging the airplane including items tagged on the airframe.

(2) Drain the preservation oil, and service the airplane engine with the recommended lubricating oil.

(3) Remove the bottom spark plugs from each of the six cylinders, and rotate the propeller several times to remove the preservation oil.

(4) Re-install the spark plugs, and carefully rotate the propeller by hand several times to check for possible liquid lock.

(5) Conduct a normal engine start, and idle the airplane for several minutes until the oil temperature is within normal limits. Monitor all engine instruments to ensure they are within normal operating ranges.

(6) Stop the engine and inspect the entire airplane before test flying.

(7) Test fly the airplane.

3. Return to Service Airframe Items

A. To return the airframe portion of an airplane that has been in temporary or indefinite storage to active service, perform the following steps, as applicable:

(1) Remove all methods of tagging and sealing the airplane including any items on or in the engine area.

(2) Remove tire covers or other protective devices. Check the condition of the tires, and service to proper pressures. Cracked, deformed, and desiccated tires should be replaced.

(3) Thoroughly clean the exterior of the airplane, including the transparencies. If necessary, renew the protective wax coat. Refer to Chapter 12 for instructions on care of the airframe.

(4) Check the condition and charge of the battery. If the battery is still serviceable, reinstall it in the airplane; otherwise, install a new battery.

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SERVICING - GENERAL

1. Servicing

A. There are recommended and required servicing intervals specified in Section 05-20-00 of this maintenance manual. It is important to note that the servicing items for the recommended and required inspection intervals are based on typical operations. If the owner or operator of the airplane uses the airplane on an ongoing basis in an atypical environment, then the servicing procedures must be modified accordingly. These environmental conditions might include extremes in ambient temperature or humidity, operation in areas of high dust or sand, or unusual operating requirements, to mention a few.

B. In general, minimal servicing of the airplane is required between required maintenance inspection other than fuel, oil, and maintenance of proper tire pressures. In some instances, the nose strut may require unscheduled service, depending on how the airplane is used.

2. Refueling And Defueling the Airplane

A. The high-speed characteristics of the airplane make generation of static electricity more likely, so it is important for the airplane to be grounded to the fuel source during refueling and defueling operations. Place the fuel source grounding clamp on the right or left exhaust stack of the airplane before touching the filler neck of the fuel tanks with metal parts of the ground refueling/defueling equipment. Remember that refueling is often done at the conclusion of a flight, and the exhaust stacks may still be hot, so care must be used when attaching the clamp.

B. Some defueling is possible using the defueling feature on the delivery system of the Avgas fuel supplier. This procedure is usually adequate for removing fuel when gross takeoff weight is an issue. To completely defuel the airplane, use the following steps:

(1) Select a well-ventilated area for the defueling operation.

(2) Remove all fuel possible from the tank or tanks using the defueling feature on the Avgas delivery system.

(3) Disconnect the fuel line from the auxiliary fuel pump forward of the firewall.

(4) Connect a flexible hose to the fuel line, and direct the hose into a fuel receptacle.

(5) Set the fuel selector to either the left or right tank, depending on which tank is to be defueled.

(6) Operate the auxiliary boost in low until the tank is drained. When the pump first starts to cavitate, turn it off, and attempt no further defueling with the auxiliary boost pump.

3. Procedures For Draining The Fuel System

A. The following procedures will leave approximately three to four gallons in the fuel tank. If further draining is required to work on a fuel tank or to establish the empty weight with unusable fuel (refer to the Fuel Drains section), use the following procedure:

(1) Select a well-ventilated area for draining fuel from the tank.

(2) Create a small (2-inch diameter) dam around the wing tank drain with aluminum foil tape (sometime referred to as speed tape) or a similar substance.

(3) Place a container with a large opening under the fuel drain.

(4) Set the wing fuel drain to the locked-open position, and drain until fuel stops running.

(5) If all fuel is to be drained from the airplane, perform the above procedure for both tanks, and then drain the gascolator.

To establish the airplane's empty weight with unusable fuel, use the following procedure for each tank:

(1) Select a well-ventilated area for draining fuel from the tank.

(2) Create a small (2-inch diameter) dam around the wing tank drain with aluminum foil tape (sometime referred to as speed tape) or a similar substance.

(3) Place a container with a large opening under the fuel drain.

(4) Set the wing fuel drain to the locked-open position, and drain until fuel stops running.

(5) At this point, approximately 4 to 8 ounces of undrainable fuel will remain in each tank. and then

(a) Ensure the fuel drains are closed.

(b) Add two gallons of fuel to each tank.

4. Fuel Drains

A. The inboard section of each tank contains a fuel drain near the lowest point in each tank. The fuel drain can be opened intermittently for a small sample, or it can be locked open to remove a large quantity of fuel. The gascolator, or fuel strainer, is located under the fuselage, on the left side, near the wing saddle. The gascolator is a conventional drain device that operates by

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pushing up on the valve stem. There is an internal bypass in the strainer that routes fuel around the filter if it becomes clogged.

5. Fuel Contamination

A. To test for fuel contamination, fuel samples must be taken from each of the wing drains and from the gascolator before each flight and after the airplane is refueled. Wait approximately 10 minutes before taking a sample after refueling to allow water and other contaminates to settle to the bottom of the tank. There are three types of contaminates that can inadvertently be introduced to the fuel system:

(1) Sediment such as dirt and bacteria

(2) Water

(3) The improper grade of fuel

B. The accumulation of sediments is an inherent issue with most aircraft and can never be completely eliminated. Refueling the airplane at the conclusion of each flight and using fuel from a supplier who routinely maintains the filtration of the refueling equipment will lessen the problem somewhat. If specks are observed in the fuel sampler, continue the sampling operation until no debris is observed. Be sure the sampling device is clean before using it.

C. The two more common sources of water contamination are condensation of water from the air within a partially filled fuel tank and water-contaminated Avgas from a fuel supplier. Again, refueling after each flight and proper filtration of the fuel delivery system will mitigate water contamination. Water, which is heavier than Avgas, will collect near the bottom of the sampling device. If water is observed in the fuel sampler, take additional fuel samples until all the water is removed.

D. Aviation fuel is dyed according to its grade, and on new aircraft, like the Cessna 400 (LC41-550FG), the filler neck is sized to only accept fuel of the proper grade. Still, the color of the fuel must be verified according to the specifications listed in this paragraph, since the fuel truck might have been refilled improperly. If fuels of two different grades are mixed, the fuel sample will be clear. If an inferior, improper grade of fuel is noted, completely defuel and drain both tanks, and refuel with the proper grade of Avgas.

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REPLENISHING - SERVICING

1. General

A. This section gives maintenance personnel the service information to replenish fuel, oil, oxygen, and TKS anti-ice fluid.

2. Fuel Servicing and Recommended Fuel Grades

A. If possible and practicable, the airplane should be serviced at the conclusion of each flight. This procedure will significantly mitigate water accumulation in the fuel tanks. For the list of approved fuels refer to the applicable Model T240 POH.

3. Fuel Capacities

A. Total Capacity: 106 Gallons US (401 L)

B. Total Capacity Each Tank: 53 Gallons US (201 L)

C. Total Usable Fuel:

(1) S/N 41001 to 41799: 49 Gallons US (186 L)/tank, 98 Gallons US 371 L) Total

(2) S/N 41800 and on:

(a) Standard: 43 Gallons US (163 L)/tank, 86 Gallons US (326 L) Total

(b) Long Range: 51 Gallons US (193 L)/tank, 102 Gallons US (386 L) Total

4. Approved Fuel Additives

A. Under certain ambient conditions of temperature and humidity, water can be supported in the fuel in sufficient quantities to create restrictive ice formation along various segments of the fuel system. To alleviate the possibility of this occurring, it is permissible to add Isopropyl Alcohol to the fuel supply in quantities not to exceed 3 percent of the total. In addition, ethylene glycol monomethyl ether (EGME) and diethylene glycol monomethyl ether (DiEGME) compounds in accordance with military specification MIL-I-27686E may be added for this purpose. The EGME and DiEGME compounds must be carefully mixed with fuel concentrations not to exceed 0.15 percent by volume.

B. It is important that the approved fuel additives are mixed in correct proportions. Consideration is required to ensure the appropriate concentration levels are achieved when the tank is filled. For example, adding 40 gallons of fuel with a 0.15 percent concentration of EGME to a tank with 10 gallons of untreated fuel will produce a mixture of something less than 0.15 percent. Consideration must also be made for the unusable fuel in the tank since it will be combined with the total mixture.

C. The additives shall be added as the fuel is introduced to the fuel tank so that the mixture is properly combined. Alternatively, the additive can be mixed with a small amount of fuel in a separate container, such as a five-gallon can, and added to the fuel tank before normal fueling. Table 301 lists the number of ounces of each additive for a given fuel quantity.

WARNING: Proper mixing of EGME and DiEGME compounds is extremely important because concentrations more than 0.15 percent by volume can have a harmful effect on engine components.

Table 301. Fuel Additive Mixture Table

Fuel (Gallons)	Isopropyl Alcohol (3 percent) Fluid Ounces	EGME & Di- EGME (0.15 percent) Fluid Ounces	Fuel (Gallons)	Isopropyl Alcohol (3 percent) Fluid Ounces	EGME & DiEGME (0.15 percent) Fluid Ounces
1	3.8	0.2	27	103.7	5.2
2	7.7	0.4	28	107.5	5.4
3	11.5	0.6	29	111.4	5.6
4	15.4	0.8	30	115.2	5.8
5	19.2	1.0	31	119.0	6.0
6	23.0	1.2	32	122.9	6.1
7	26.9	1.3	33	126.7	6.3
8	30.7	1.5	34	130.6	6.5
9	34.6	1.7	35	134.4	6.7
10	38.4	1.9	36	138.2	6.9
11	42.2	2.1	37	142.1	7.1
12	46.1	2.3	38	145.9	7.3

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13	49.9	2.5	39	149.8	7.5
14	53.8	2.7	40	153.6	7.7
15	57.6	2.9	41	157.4	7.9
16	61.4	3.1	42	161.3	8.1
17	65.3	3.3	43	165.1	8.3
18	69.1	3.5	44	169.0	8.4
19	73.0	3.6	45	172.8	8.6
20	76.8	3.8	46	176.6	8.8
21	80.6	4.0	47	180.5	9.0
22	84.5	4.2	48	184.3	9.2
23	88.3	4.4	49	188.2	9.4
24	92.2	4.6	50	192.0	9.6
25	96.0	4.8	51	195.8	9.8
26	99.8	5.0	52	199.7	10.0

5. Engine Oil Capacity

A. The dipstick and oil filler cap access door are located on the top left engine cowl about two feet from the propeller hub. The engine must not be operated with less than six quarts of oil and must not be filled above eight quarts. For extended flights, the oil should be brought up to full capacity.

B. The engine drain-refill capacity is eight quarts of oil. The airplane engine holds approximately 11 quarts of oil; however, about 3 quarts are for the oil cooler, oil filter, and propeller governor and cannot be drained from the system. Before checking the oil on a hot engine, ensure sufficient time has elapsed to allow the oil to drain back into the sump.

6. Recommended Oil for Engine Break-In Period

A. During the engine break-in period, straight mineral oil must be used for the first 25 hours unless the oil consumption has not stabilized. If the oil consumption has stabilized after the first 25 hours of the airplane's time in service, the oil and oil filter must be changed and a new supply of Teledyne Continental Motors specification MHS-24 (latest revision) ashless dispersant oil must be used. At 50 hours of time in service, the oil and oil filter shall be changed and the filter and discarded oil checked for evidence of metal particles. Thereafter, the oil and oil filter must be changed at every 100 hours of time in service.

B. If after the initial 25 hour break-in period the oil consumption has not stabilized, use the following procedure.

(1) Inspect and replace the oil filter.

(2) Drain and inspect the engine oil.

(3) Install a fresh supply of approved mineral oil.

(4) Continue to monitor oil consumption.

(5) When oil consumption stabilizes, remove, inspect, and replace the oil filter. Drain and inspect the engine oil, and add a new supply of Teledyne Continental Motors (TCM) specification MHS-24 (latest revision) ashless dispersant oil.

C. In the extremely unlikely event the oil consumption has not stabilized at 50 hours of time in service, the cylinders may need deglazing or some other problem may exist. In either event the issue should be referred to TCM.

7. Oil Servicing

A. The oil grades shown below in Recommended Oil Grades are recommended after the initial engine break-in period. Only lubricant oils conforming to Teledyne Continental Motors Specification MHS-24D (latest revision) can be used. Note, the approval for use of MHS-25 synthetic oils has been removed. Each time the oil and the oil filter are changed, the discarded filter and oil must be checked for evidence of metal particles. The oil drain valve is located on the bottom of the engine oil sump.

8. Oil Filter Servicing

A. A full flow, spin-on type, 20-micron oil filter is used. As mentioned previously, the filter must be changed during the initial break-in period at 25 and 50 hours time in service. Thereafter, the filter must be replaced at every 50 hours time in service interval. If the airplane is predominately operated in conditions of high dust or other atmospheric debris, it is advisable to change the filter at 25 hour intervals. The oil filter is located on the back of the engine and inboard from the oil cooler. Use a TCM filter or

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approved equivalent.

9. Recommended Oil Grades

A. The following oil grades are recommended for the two ambient temperature ranges shown below.

(1) Below 40°F: SAE 30, 10W-30, 15W-50, or 20W-50

(2) Above 40°F: SAE 50, 15W-50, or 20W-50

10. Oxygen System Servicing

A. General safety guidelines and servicing procedures must be followed and are as indicated in Chapter 35. Use only MIL-O-27210 aviator's breathing oxygen for system recharging.

NOTE: This fixed oxygen system has a maximum bottle pressure of 2,000 psi.

WARNING: Refer to SAFETY GUIDELINES FOR SERVICING THE OXYGEN SYSTEM in Chapter 35 before attempting any servicing or maintenance of the oxygen system.

(1) Avidyne Option

(a) Open all aircraft doors to provide air circulation.

(b) Set the Left Bus switch to ON.

(c) Set the Oxygen Switch to DISP.

(d) Locate the Oxygen Fill Port in the baggage bulkhead.

(e) Remove the Oxygen Fill Port protective cap and connect the service line.

(f) Slowly fill the oxygen supply. By filling slowly, the temperature rise due to the compression of gas into the oxygen supply cylinders will be kept to a minimum.

(g) Fill the system until a pressure of 1950 ± 50 psig is achieved. This value is valid at a steady state condition after the system has cooled to 70°F from the recharging heat buildup. System pressure may be increased 3.5 psig for each degree of increase in temperature above 70°F and decreased 3.5 psig for each degree decrease in temperature below 70°F.

(h) Shut off the oxygen supply to the aircraft.

(i) Set the Oxygen Switch to ON.

(j) Ensure that the Outlet Pressure Display green indication is illuminated.

(k) Set the Oxygen Switch to OFF.

(l) Set the Left Bus switch to OFF.

(m) Disconnect the service line from the Fill Port and install the protective cap.

(2) Garmin G1000 Option

(a) Open all aircraft doors to provide air circulation.

(b) Set the Right Bus and Avionics Bus switches to ON.

(c) Turn on the MFD and access the Engine Indication System (EIS) page.

(d) Locate the Oxygen Fill Port in the baggage bulkhead.

(e) Remove the Oxygen Fill Port protective cap and connect the service line.

(f) Slowly fill the oxygen supply. By filling slowly, the temperature rise due to the compression of gas into the oxygen supply cylinders will be kept to a minimum.

(g) Fill the system until a pressure of 1950±50 psig is achieved. This value is valid at a steady state condition after the system has cooled to 70°F from the recharging heat buildup. System pressure may be increased 3.5 psig for each degree of increase in temperature above 70°F and decreased 3.5 psig for each degree decrease in temperature below 70°F.

(h) Shut off the oxygen supply to the aircraft.

(i) Set the Oxygen Switch to ON.

(j) Ensure that the Outlet Pressure and Oxygen Quantity gauges confirm oxygen supply.

(k) Set the Oxygen Switch to OFF.

(l) Turn off the MFD.

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(m) Set the Right Bus and Avionics Bus switches to OFF.

(n) Disconnect the service line from the Fill Port and install the protective cap.

11. TKS Anti-Ice Fluid

A. The Model T240 can have an inadvertent or a FIKI option anti-ice system installed. The TKS anti-ice fluid tank must be filled before takeoff for the system to be considered operational.

B. For the TKS inadvertent system installation, the fluid tank is serviced through a filler port located on the top of the left wing. (refer to Figure 301). A fluid level sensor supplies a signal to the fluid quantity gage that shows in the Muti-Function Display (MFD).

C. For the TKS FIKI system installation, the fluid tank is serviced through a filler port located on the top of the right wing (refer to Figure 301). A fluid level sensor supplies a signal to the fluid quantity gage that shows in the Muti-Function Display (MFD). A low level switch in the fluid tank supplies a discrete to the Integrated Avionics Unit 1 (UC300) that then sends a signal to the PFD that causes the CAS message A-ICE FLUID LO message to show on the display.

D. Designations and manufacturers of approved TKS anti-ice fluid are shown in the table that follows:

NOTE: Ice protection fluid must meet the AL5 (DTD406B) specifications. You can mix fluids that meet these specifications in the anti-ice fluid tank in any proportion.

WARNING: Do not use automobile anti-freeze fluids because they can contain additives that are harmful to the membranes in the porous panels or to other system components. Also, you are not permitted to use thickened deice fluid for runway or parked aircraft deicing.

Table 302. TKS Anti-Ice Fluid

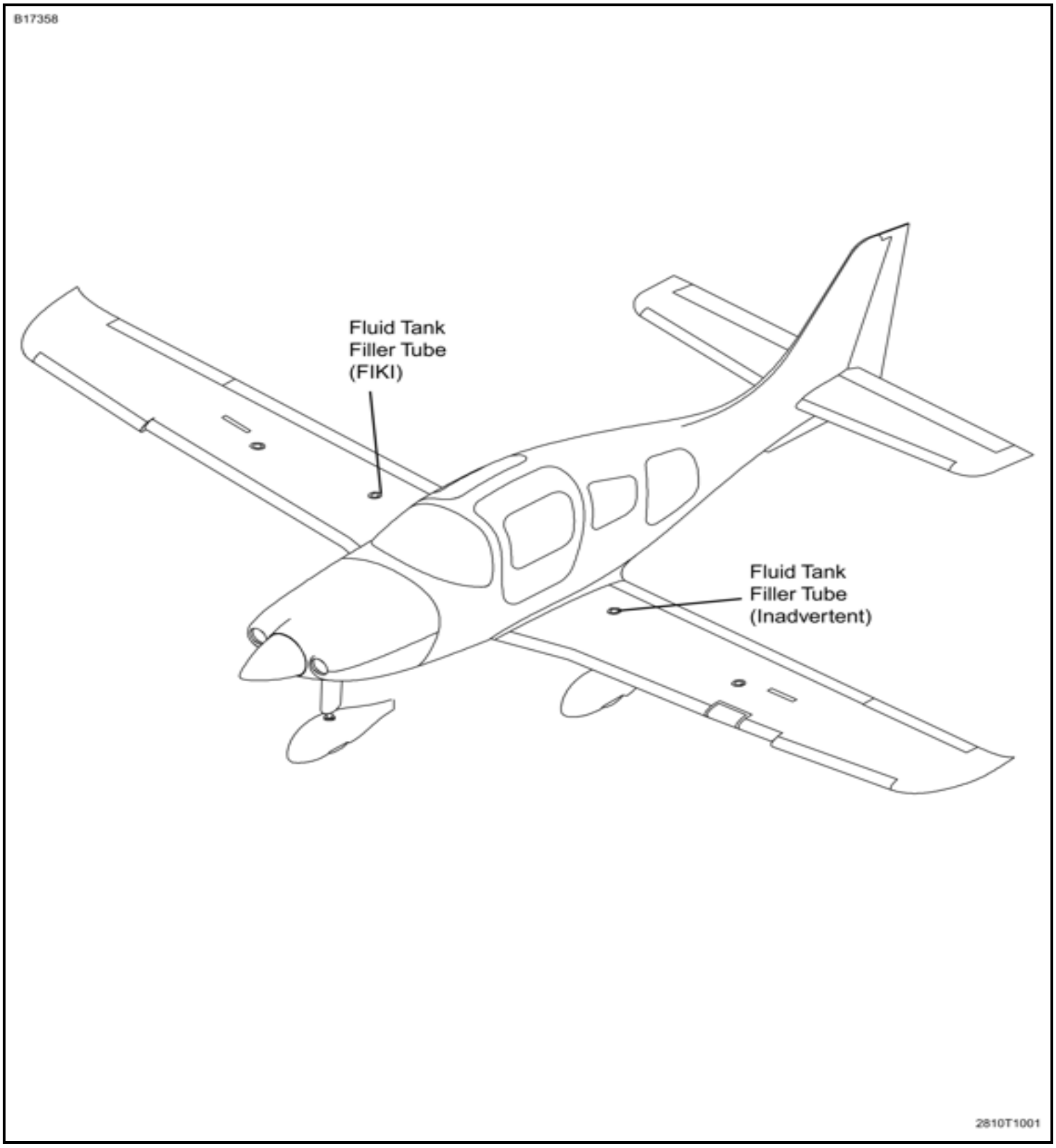
SYSTEM	U.S. GALLONS	IMPERIAL GALLONS	METRIC LITERS	NAME, NUMBER OR TYPE
Surface Reservoir (Inadvertent System)	3.1	2.58	11.731	AL 5 Canyon Industries P.O. Box 26447 Tempe, AZ 85282
				AEROSHELL COMPOUND 07 Shell Oil Company One Shell Plaza Houston, TX 77001
				BP AERO DEICING 2 BP Oil Limited BP House Victoria Street London SWIE 5NJ UK
				AVL-TKS Aviation Laboratories 5401 Mitchelldale B6 Houston, TX 77092
Windshield and Surface Reservoir (FIKI System)	10.0	8.32	37.83	AL 5
				AEROSHELL COMPOUND 07
				BP AERO DEICING 2
				AVL-TKS

NOTE 1:

All anti-icing fluids that are in accordance with British Deicing Fluid Specification DTD 406B (NATO Symbol S-745) are approved.

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Figure 301 : Sheet 1 : TKS Filler Port



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FILTER, STRUT, BRAKE AND BATTERY - SERVICING

1. Induction Filter Servicing

A. The airplane has a disposable air filter, Brackett Aircraft Company, Inc. Part No. BA-345E. The polygonal filter element is a wettant impregnated foam. The filter must be serviced annually, every 100 hours, or more frequently if operating in areas of high atmospheric debris. To service the filter, use the following procedure.

(1) Remove the air filter element from the engine per the instructions in Section 71-60-00, Engine Air Filter Removal and Replacement.

(2) Dispose of the old filter element.

B. Install a new filter element per the instructions in Section 71-60-00, Engine Air Filter Removal and Replacement.

2. Tires and Wheels Servicing

A. Ensure tires are serviced to their proper pressures. Refer to Section 06-00-00, Landing Gear. The following items must also be inspected.

CAUTION: The profile of replacement tires that are not a recommended brand should be measured precisely to ensure they are the same height and width. The use of tires that have slightly larger profiles can cause damage to the tire and to the wheel pant, particularly during landing operations.

(1) Check tires for flat spots, splitting, dry rot, cuts, and any other evidence of damage.

(2) Check valve stem slip marks for evidence of slippage.

(3) Check wheels for damage.

(4) Check wheel bearings for condition and lubrication.

B. Tire Considerations - The airplane is normally delivered with Goodyear tires. These tires have a profile that provides about 3/8 inches clearance between the tire and wheel pants. Other brands of tires with similar specifications and TSOs may have slightly larger profiles. Tires with larger profiles are not recommended since damage to the tire or wheel pant is possible, particularly during landing. If other brands of tires are used, the profile of the tire must be precisely measured and compared with the Goodyear tire.

3. Servicing the Nose Strut

A. The nose strut is normally serviced at required maintenance inspections. If less than three to four inches of chrome are visible on the nose strut or a low oil level is indicated, then unscheduled servicing is necessary. A low oil level in the nose wheel strut may be indicated by one or both of two symptoms. First, there will a general deterioration in shimmy damping of the nose strut. Second, the nose will have a tendency to bounce noticeably while taxiing. If either or both of these conditions are experienced, a low oil level in the nose strut is the most likely cause.

B. **Cessna Nose Strut** (Refer to Figure 301 and Figure 302)

CAUTION: Always wear safety goggles when releasing gas pressure.

WARNING: Removal of the AN7-6A bolt without de-pressurizing the strut could cause serious injury.

(1) Remove the nose strut from the nose gear per instructions in Chapter 32.

(2) Remove the valve cap from the strut Schrader valve. Using a small flat bladed screwdriver, gently press in on the Schrader valve core stem to slowly bleed off nitrogen gas pressure in the strut.

(3) Remove the AN7-6A bolt at the top of the strut.

(4) Pull the strut rod to its fully extended position.

(5) Inflate the strut with nitrogen gas to a pressure of 50 psi.

(6) With the strut standing vertically, add MIL-H-5606F hydraulic oil through the AN7- 6A bolt hole until the chamber is full.

(7) Create an oil bleed device composed of a flexible hose inserted into a reservoir filled with MIL-H-5606F hydraulic oil. Ensure the hose is filled with oil and attach the free end to the AN7-6A bolt hole using a sealed fitting. Cycle the strut rod up, down, left, and right through its full range of motion until all air is removed. Ensure that no air enters the strut through the bleed device.

(8) With the strut rod fully extended, remove the valve core from the Schrader valve and release the nitrogen gas pressure.

(9) Pinch shut the flexible hose on the oil bleed device and push the strut rod up 0.75 inch from its fully extended position to correctly position the internal piston.

(10) Un-pinch the flexible hose.

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(11) Ensure the valve core is free from contaminates and reinstall it into the Schrader valve. Tighten snug.

(12) Slowly pull the strut rod to its fully extended position.

(13) Remove the bleed device and add additional hydraulic oil until the chamber is filled to the top.

(14) Replace the AN7-6A bolt and tighten snug.

(15) Inflate the strut with nitrogen gas until pressure reaches 250±25 psi. Best results are obtained using the following two techniques:

(a) Apply enough physical force on the nitrogen hose chuck to ensure a tight seal on the filler valve. The volume of area being filled is small and requires a lot of physical pressure to hold the chuck on the valve.

(b) When the strut is filled, remove the air hose chuck from the filler valve as quickly as possible. A persistent low nose gear strut is frequently the result of losing 50 pounds or so of pressure when the air chuck is removed. Over-pressurization will prevent full castoring movements of the nose wheel.

(16) With the strut firmly placed on the ground, attempt to compress the strut by hand. If the strut can be compressed, repeat the above instructions until all air is removed and the strut cannot be compressed.

(17) Torque the AN7-6A bolt at the top of the strut 80 to 100 in.-lbs.

(18) Install the Schrader valve cap and torque 10 to 15 in.-lbs.

(19) Install the nose strut into the nose gear per instructions in Chapter 32.

NOTE: Persistent and frequent loss of oil is an indication of more serious problems. The oil seals may need replacement or there may be issues with the integrity of the cylinder. Refer to Chapter 32 for information.

C. **ESCO Nose Strut** (Refer to Figure 303)

(1) Remove the lower cowling, using procedures described in Chapter 71, to expose the filler valve (Schrader valve).

(2) Remove all the weight from the nose strut by placing ballast on the tail, and let the strut settle for one hour.

(3) Release the nitrogen gas from the strut by pressing on the stem of the filler valve until most of the nitrogen is released. Hold a rag over the valve stem and use the hand to release the pressure to prevent a small amount of oil from being scavenged from the main cylinder as the nitrogen is released.

(4) Partially remove the valve core to evacuate the remaining gas in the cylinder.

(5) Remove the Schrader valve.

(6) Fully extend the strut, then compress the strut until the strut rod can be freely rotated left and right.

(7) Hydraulic oil that meets MIL-H-5606F can now be added slowly with a pump action oil can. Add oil until the level in the cylinder reaches the bottom of the hole from which the Schrader valve was removed.

(8) Rotate the strut rod left and right throughout its full range of rotation (60 degrees each direction) to completely fill internal components of the strut with oil. When internal components are full of oil, resistance should be felt while rotating the strut rod. Keep adding oil while rotating until the oil drains back out of the filler valve hole and no more can be added.

(9) Refit the Schrader valve and torque 150 to 200 in.-lbs.

(10) Ensure that the strut is fully extended. Insert the air hose chuck onto the valve stem. Fill until pressure reaches 250 psi. Best results are obtained using the following two techniques.

(a) Apply enough physical force on the nitrogen hose chuck to ensure a tight seal on the filler valve. The volume of area being filled is small and requires a lot of physical pressure to hold the chuck on the valve.

(b) When the strut is filled to 250 psi, remove the air hose chuck from the filler valve as quickly as possible. A persistent low nose gear strut is frequently the result of losing 50 pounds or so of pressure when the air chuck is removed.

(11) Repeat steps (3) through (6) above and finish filling the strut with oil until oil drains back out the filler valve hole and no more can be added.

(12) Refit the Schrader valve and torque 150 to 200 in.-lbs. Service the strut with nitrogen per the above instructions , replace the Schrader valve cap and tighten snug. Over-pressurization will create a nose high attitude while taxiing and will prevent full castoring movements of the nose wheel.

(13) Lower the nose by progressively removing ballast from the tail. Pull down on the propeller to exert downward pressure on the nose gear. Verify that three to four inches of chrome are visible on the nose strut.

(14) Replace the lower cowling per instructions in Chapter 71.

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NOTE: Persistent and frequent loss of oil is an indication of more serious problems. The oil seals may need replacement or there may be issues with the integrity of the cylinder. Refer to Chapter 32 for information.

4. Brake Fluids

A. Under most conditions, the airplane will not require servicing of the hydraulic system. There is a small hydraulic reservoir mounted on the upper portion of the firewall (engine side). The reservoir contains a hex head bolt, however, this area is not normally used for servicing the airplane. If brake sponginess is experienced, this is an indication that there is air in the system. More important, it may be an indication of a hydraulic leak in the brake system, and the areas proximate to the hydraulic lines, master cylinders, and brake assembly must be inspected for evidence of hydraulic oil. If no leaking is detected, then the brakes should be bled. Chapter 32 contains instructions for bleeding the brakes. If hydraulic fluid is added, use MIL-H-5606F.

5. Battery Servicing

A. The installed batteries are Concorde RG-1215 for S/N 41002 to 41500; they are Teledyne Gill G230S, Teledyne Gill G248S, Concorde RG24-10, or Concorde RG24-16 for S/N 41501 and On. The batteries are of valve regulated lead-acid (VRLA) design. Since the batteries have no electrolyte, there is no required servicing of the unit. The posts and cables are serviced at 100-hour inspections if applicable, otherwise, they are maintained during the annual inspection. It is recommended that the batteries be replaced every four years or sooner if poor overall performance is experienced.

6. Cleaning Aircraft

A. **Exterior** - The exterior painted surfaces are cleaned by washing with mild soap and water and drying with a soft towel or chamois. When operating in salt air environments, you will need to wash the airplane more frequently. The seal coats that are applied to the painted surface, in most instances, will provide adequate protection from moisture and the sun. Some additional protection is provided by waxing the painted surface and facilitates washing the airplane since bugs and dirt will not adhere as tightly to a waxed surface. A wax with a high concentration of carnauba is recommended. There are several commercial boat waxes available that are ideal for this use. Be sure to read the label with an eye for the percentage of carnauba in the compound.

NOTE: The exterior of the airplane should not be waxed within the first 90 days of the date of delivery. This period will ensure the painted surface has adequate time to cure. The exterior paint color on the upper fuselage area and the top of the wings has a good heat reflection index. This good index is required to ensure the continued bonding and integrity of the composite material. Only approved Cessna paint colors are permitted in these areas. Care must be taken to not lay dark, heat absorbing material on the top area of the wings and fuselage.

B. **Windshield and Windows** - The proper care of the windshield and windows (sometimes referred to as transparencies) is one of the more important exterior care items on the airplane. Never do anything that will scratch the surface of the acrylic plastic. The following points for cleaning and caring for the transparencies should be observed. Refer to the Transparency Repair section of Chapter 51 for approved cleaning materials and expanded procedures.

CAUTION: Do not use anything containing ammonia, aromatic solvents like methyl n-propyl ketone, acetone, lacquer thinner, paint stripper, gasoline, benzene, alcohol, anti-ice fluid, hydraulic fluid, fire extinguisher solutions, or window cleaner on the acrylic window surfaces. The use of these substances may cause the surface to craze.

(1) First, when cleaning the windows, it is recommended that rings and watches be removed as they can cause deep scratches. Long-sleeved shirts should be turned up a few rolls to hide exposed buttons.

(2) When removing bugs and dirt, avoid touching the surface. If possible, remove most of the dirt by flushing the windows and windshield with water and a mild dish soap mixture. Allow the accumulation of dirt and/or bugs to soak for a few minutes. If rubbing is required, a bare hand is best. When all the debris on the surface of the window is loosened, apply a second water flush, and then dry with a 100 percent cotton cloth.

(3) Use a good quality, non-abrasive cleaner/polish specifically intended for acrylic windows, and apply per the manufacturer's instructions. Use up and down or side to side movements when polishing. Never use a circular movement as this can cause glare rings.

(4) The best polishing cloth is the softest cotton available. One hundred percent cotton flannel is ideal and available in yard goods stores. **Never** use any type of paper product or synthetic material. In particular, never use shop rags or shop towels. Be sure the polishing cloth is clean and dry. Reserve polishing cloths should be stored in a plastic bag to limit dirt accumulation.

(5) Small scratches, the type that can be seen but cannot be felt with a fingernail, should be filled with a polishing compound

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that has scratch-filling properties. A good quality, non-abrasive cleaner/polish specifically intended for acrylic windows frequently has scratch-filling properties and is satisfactory for regular use. Some scratches cannot be filled with a scratch-filling product. While the scratches cannot be felt, they are still visible, particularly when flying into the sun. In this instance, a mildly abrasive scratch removal cream can be used per manufacturer's recommendations. Scratches of greater magnitude require the use of high abrasives and removal of some of the window's surface around the greatest depth of the scratch. This procedure requires considerable expertise and frequently makes areas where the scratch was removed more objectionable than the original scratch.

NOTE: To remove difficult substance such as tape residue, oil, and grease, the safest solvents are 100 percent mineral spirits or kerosene. Some alcohols are safe, such as isopropyl alcohol.

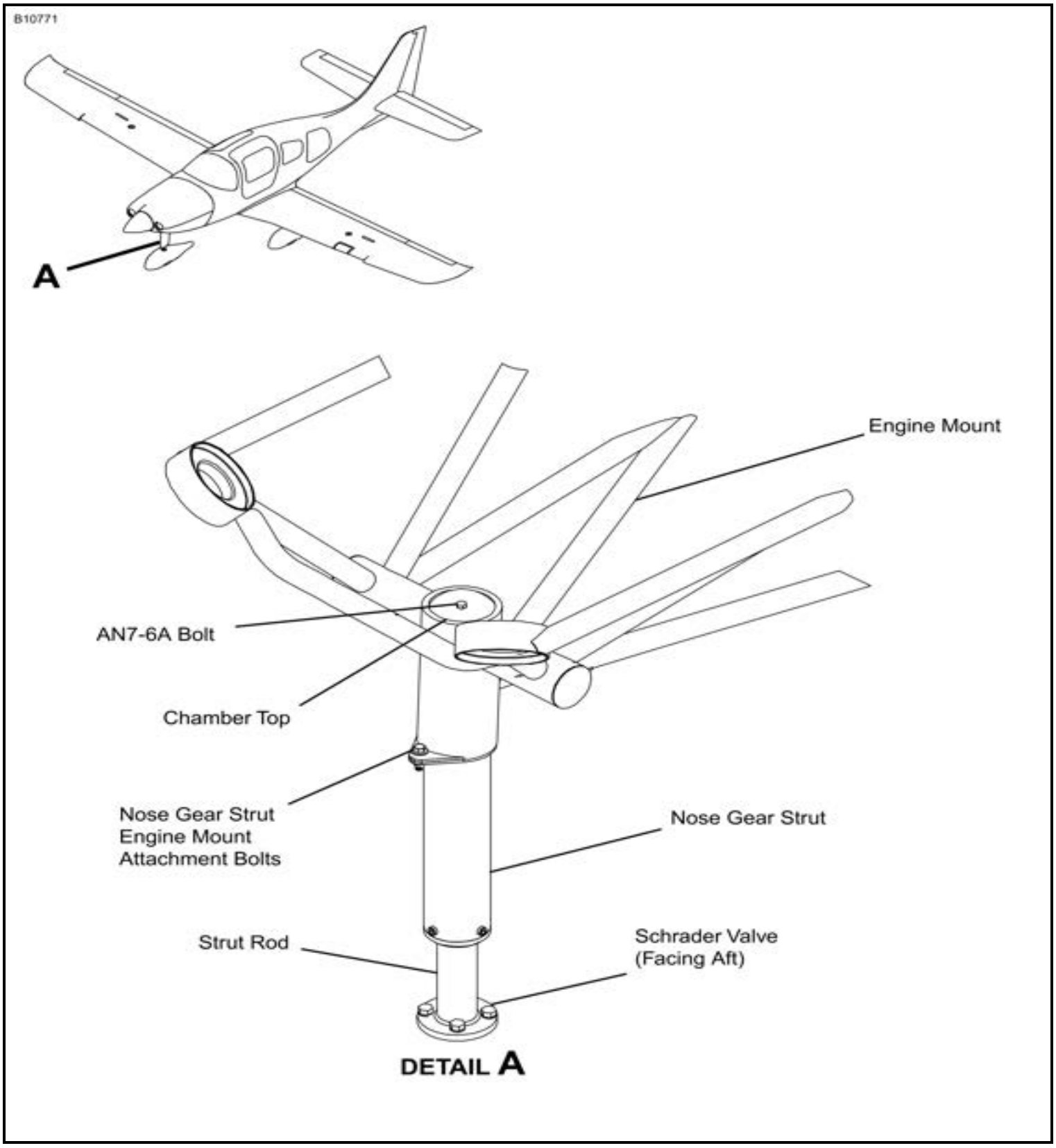
C. **Interior Cleaning and Care** - The useful life of the airplane's interior can be extended through proper care and cleaning. One of the major elements in the aging process is the interior's exposure to sunlight. If possible, the airplane should be hangared. Routine vacuuming is another item that helps extend the life of the airplane's interior, particularly the carpets. The leather seats, seatbacks, knee bolsters, glare shield and the like, should be routinely wiped with moist, soft cotton cloth. A general rule for spills is to blot the affected area with firm pressure for a few seconds. Never rub an area to remove a spill.

(1) Much of the airplane's interior is covered with high-quality leather. The leather is impregnated with polyvinyl chloride (PVC), and as treated, is impervious to most substances. The application of leather preservatives will provide little protection, and in some cases can cause problems. For difficult stains, such as an ink stain, remove with a mild soap and water. Do not use any type of chemical since these products tend to remove the impregnated PVC protection, and once removed it can never be reapplied.

(2) The carpet can be cleaned with a mild foam product, but care should be used not to over saturate the carpet. Follow the manufacturer's instructions regarding use of the foam cleaner. Small spots can be cleaned with a commercial spot remover; however, this must be done with care. Again, follow the recommended procedure of the manufacturer, and try a test application in an area of limited exposure.

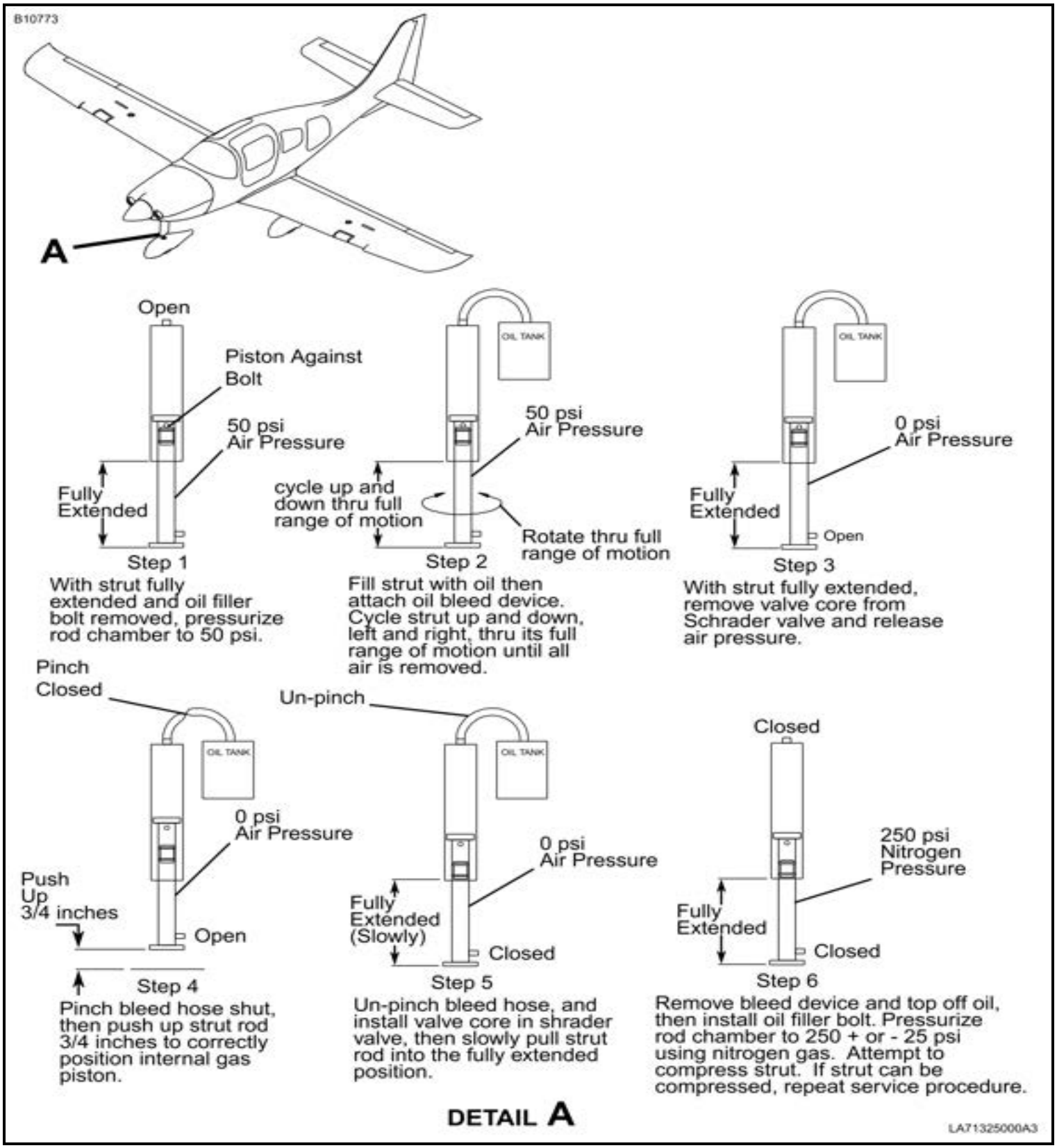
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Figure 301 : Sheet 1 : Cessna Nose Strut Assembly



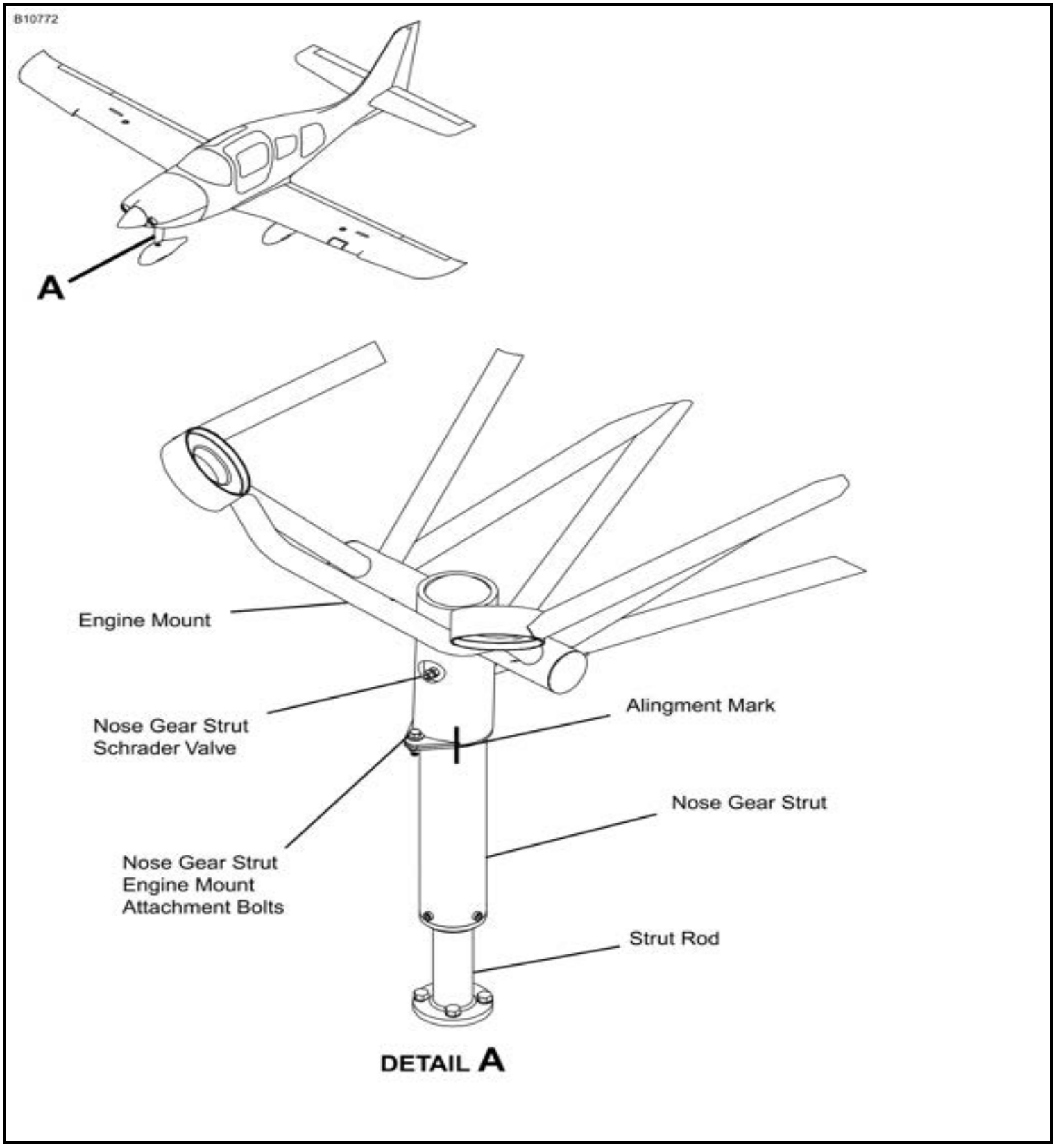
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Figure 302 : Sheet 1 : Cessna Nose Strut Service



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Figure 303 : Sheet 1 : ESCO Nose Strut Assembly



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TKS ANTI-ICE SYSTEM - SERVICING

1. General

A. The TKS anti-ice system fluid tank is serviced with approved anti-icing fluids only. The Model T240 can have a TKS Flight Into Known Icing (FIKI) or Inadvertent system option installed. For a list of approved TKS anti-icing fluids refer to Replenishing - Servicing, TKS Anti-Ice Fluid.

2. Tools and Equipment

A. For a list of tools and equipment refer to Ice and Rain Protection - General.

3. Servicing

WARNING: Keep anti-icing fluid away from heat, sparks, and open flame. Anti-icing fluid is classified as a combustible liquid. It is also harmful or fatal if swallowed. Avoid prolonged or repeated breathing of vapors. Avoid prolonged skin contact. Do not store in open or unlabeled containers. If swallowed, induce vomiting and get medical attention immediately. If fluid comes in contact with eyes, flush with large amounts of water and get medical attention immediately.

A. Cleanliness Precautions

(1) The TKS system has filtration to protect the components against damage and blockage from particulate matter, but they are not always effective for liquid contaminants. To extend the life of the filter element and strainer, the following precautions are recommended:

(a) Where possible minimize the number of containers that you use to store and fill the airplane anti-ice fluid tank. Purchase anti-ice fluid in small (2.5 gallon) containers that you can use to pour it directly in the airplanes fluid tank.

(b) Always clean the top of the containers before you remove the cap to pour from the container.

(c) Always replace the cap on the fluid containers that you use for the transfer of the fluid.

(d) If you transfer fluid from the original container to other containers for storage, make sure that these containers are clean and of correct materials.

NOTE: Tin plated steel or similar containers that can rust are not the correct type.

(e) Keep a set of containers and implements solely for use with approved TKS anti-ice fluid.

(f) Keep the area around the airplane TKS filler clean. Keep the filler cap clean.

(g) Always replace the filler cap on the airplane immediately after you fill the tank.

B. Service the TKS Fluid Tank (Refer to Figure 301).

(1) Supply external electrical power to the airplane.

(2) Set the master BATT switches (left SW01 and right SW02) to the ON position.

(3) Set the AVIONICS MASTER switch (SW04) to the ON position.

(4) Monitor the fluid level indications on the Multifunctional Display (MFD) in the cockpit. Refer to Chapter 30, TKS Anti-Ice System (Inadvertent) - Description and Operation or TKS Anti-Ice System (FIKI) - Description and Operation.

(5) Remove the fluid tank filler cap.

(6) Fill the fluid tank and continue to monitor fluid level indications.

(7) After you service the fluid tank, install the fluid tank filler cap.

(8) Check the fluid indication in the cockpit again the make sure the tank is full.

(9) Set the AVIONICS MASTER switch to the OFF position.

(10) Set the master BATT switches to the OFF position.

(11) Remove external electrical power from the airplane.

4. TKS Anti-Ice Porous Panel Care

A. General

(1) The TKS Anti-Ice system is a durable system that requires little attention for day to day care. The basic care is cosmetic and preventive in nature, and will maintain the appearance and promote proper system operation.

B. Porous Panel Cleaning

CAUTION: Do not use the materials that follow to clean the panels: methyl ethyl ketone (MEK), acetone, paint thinners, paint stripper, and other types of thinners and solvents. Porous panels contain a plastic

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membrane that can be damaged by certain solvents. Put tape on the panels with non-porous solvent resistant material if you use solvents of this type on adjacent parts of the airplane.

CAUTION: Do not paint the outer surface of the porous panels.

CAUTION: Do not polish the surface of the porous panels when you polish painted surfaces. Wax or silicone polishes decrease the wetting qualities of the de-icing fluids and can degrade the ice protection efficiency. Repeated or intensive porous panel polishing can also block some of the pores in the panels.

(1) Clean dirt and insect debris from the panels when you clean the exterior of the airplane.

NOTE: From the functional aspect porous panels are self cleaned by the back flushing action of the de-icing fluid when the system is operated. However, additional cleaning is recommended when you clean the airplane.

(2) Operate the ice protection system for a sufficient period of time to wet the leading edge of the TKS panels with fluid before you clean them. Approved ice protection fluid has a softening effect on insect debris.

(3) Spread the fluid over the insect encrusted area with a cloth or sponge while the ice protection system operates. Stop the system and let the fluid stand for about ten minutes before you clean the porous panels.

WARNING: Take appropriate precautions to prevent fire.

CAUTION: Only use the solvents that are listed below.

- **Water (Soaps and detergents are permitted)**
- **DTD 406B Ice Protection Fluid**
- **Isopropyl Alcohol**

(4) Clean deposits of oils, greases, adhesives, paint, etc.

NOTE: The removal of the deposit can be assisted by the use of "Scotch-Brite"™ and/or careful scraping.

C. Polishing of Porous Panels

CAUTION: Do not use liquid or wax polish on the TKS porous panels.

(1) Use "Scotch-Brite"™ to restore the panels to their initial condition. Refer to Chapter 30, Ice and Rain Protection - General.

NOTE: If you use "Scotch-Brite"™ and polish the panels again and again, it can cause a blockage of some of the pores in the panel.

(a) Put low-adhesive tape on the airplane skin adjacent to the panel, where necessary, to prevent damage to the paint.

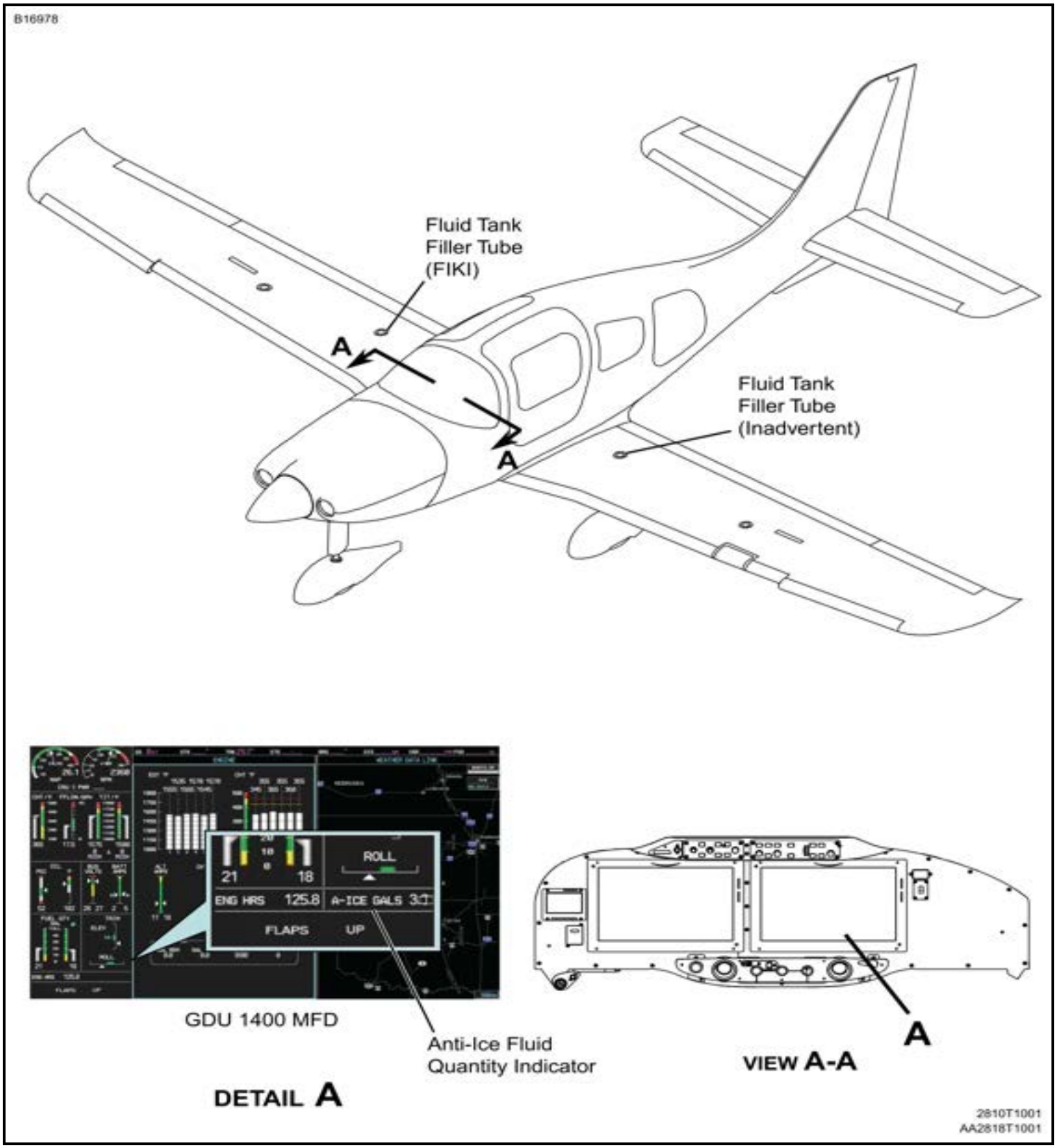
(b) Deep scores can be cleaned with heavy duty "Scotch-Brite"™ used very sparingly.

(c) Polish the porous panel with "Scotch-Brite"™ in a chordwise direction to get an initial surface texture.

(d) Clean and polish the porous panels with a very fine grade of "Scotch-Brite"™. Then clean and polish the panels with a ultra fine grade of "Scotch-Brite"™.

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Figure 301 : Sheet 1 : TKS Anti-Ice Fluid Tank Servicing



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STANDARD PRACTICES, AIRFRAME - GENERAL

1. General

A. This chapter describes the standard maintenance practices for the Cessna 400 (LC41-550FG) aircraft. The items covered are typical and apply to many areas or systems of the aircraft. Unique maintenance procedures are covered in the appropriate chapter in the maintenance manual.

NOTE: Most of this chapter is derived from FAA Advisory Circular (AC) 43.13-1B, which should be used (latest revision) as the resource for this information.

2. Material and Tool Cautions - General

A. Mercury

(1) Mercury can corrode and embrittle metallic structures by the amalgamation process. Complete destruction of the load carrying capability of the structure will result.

(2) No thermometers or equipment containing mercury can be used on the aircraft.

B. Epoxy Resins

(1) Epoxy resins, particularly the hardeners, are chemically active and can cause chemical burns, allergic reactions, and strong sensitization.

(2) Particular care should be taken to avoid contact with, or breathing, the vapors from epoxy resins.

C. Solvents

(1) General use solvents may include the following:

(a) Gasoline

(b) Oil

(c) Alcohol

(2) Many of these solvents are flammable.

(3) These solvents can cause injury if contact with the skin or eyes is made.

(4) Many of these solvents are poisonous.

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TORQUE DATA - MAINTENANCE PRACTICES

1. Torque Data - Maintenance Practices

WARNING: The torque values outlined in this chapter and other chapters must be used during installation and repair of components. Improper torque values may result in overstressing of components. Bolted joints in composite structures are sensitive to overload if improper over-torque is used.

A. **Torque Values** - Torque tables are listed in this section. If a component requires specific torque values, those values will be given in the applicable chapter and section of the maintenance manual. Refer to the following figures and tables for specific types of torque values:

(1) Figure 202 / Table 202 - Values for Tapped Holes and Clearance Holes

(2) Figure 203 / Table 203 - Values for Nutplates

(3) Figure 204 / Table 204 - Values for Hose and Tube Fittings

(4) Figure 205 / Table 205 - Values for Rivnuts

(5) Table 206 - Recommended Torque and Clamp Load Specifications (Applicable to Fasteners with a Minimum Tensile Strength Greater Than 74 ksi)

(6) Table 207 - Recommended Jam Nut Torque and Clamp Load Specifications (Applicable to Fasteners With a Minimum Tensile Strength Greater Than 74 ksi)

B. **Free Running Torque** - The torque values listed do not include free running torque. The free running torque is the torque value to rotate the nut on the threaded shaft before contact, pull-up, and tightening. Self-locking nuts are used in applications where they will not be removed often. Repeated removal and installation will cause the self-locking nut to lose its locking feature. They should be replaced when they are no longer capable of maintaining the minimum prevailing torque.

C. **General Torquing Notes**

(1) The values given do not apply to threaded adjustment devices such as rod ends or turnbuckles.

(2) Appropriate torque wrenches should be used. Adjustments should be made for the readings if adapters are required. Refer to specific instructions supplied with the torque wrench.

D. **Torque Adapters** - Using one or more extensions with a torque wrench can put large side loads on torqued fasteners or anything they are attached to (i.e., hoses or tubes); therefore, the operator must support the fastener assembly appropriately when needed.
When using an extended-length adapter on a torque wrench (i.e. crow's foot), apply the following equation:

Table 201. Torque Adapter Equation

$T_E = (T \times L) / (L + E)$ where,

T = Specified torque value to achieve L = Wrench length from grip center to turn center. Refer to Figure 201.E = Length, in axial direction of wrench, from wrench turn center to extension turn center. Refer to Figure 201.T_E = Torque wrench setting when using adapter

Table 202. Values for Tapped Holes and Clearance Holes

GENERAL DESIGN DATA FOR TAPPED HOLES, CLEARANCE HOLES, AND TORQUE AND LOAD VALUES										
NOTE: **Refer to diagram in Figure 202 when consulting this table.**										
		Thread Size								
Thread Size		6-32	8-32	10-32	1/4-20	1/4-28	5/16-24	3/8-24	7/16-20	1/2-20
Max. Diameter		.138	.164	.189	.249	.249	.312	.374	.437	.499
Bolt Clearance Hole Diameter and Tolerance	.005 Tol	.148	.174	.200	.260	.260	.323	.385	.448	.510
	.010Tol	.158	.184	.210	.270	.270	.333	.395	.458	.520
Tap Drill Diameter	Min.	.1040	.1300	.1560	.1960	.2110	.2670	.3300	.3830	.4460
	Max.	.1140	.1389	.1641	.2067	.2190	.2754	.3372	.3918	.4537
Tap Drill Point Max.		.0329	.0401	.0474	.0597	.0632	.0795	.0973	.1130	.1310

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2 Thread Depth		.0625	.0625	.0625	.1000	.0714	.0833	.0833	.1000	.1000
Chamfer Dia.	Min.	.138	.164	.190	.250	.250	.313	.375	.438	.500
	Max.	.158	.184	.210	.270	.270	.333	.395	.458	.520
Tensile StressArea		.00909	.0140	.0200	.0318	.0364	.0580	.0878	.1187	.1599
Non-Lubricated (Dry)Recommended Torque		10 to 12 lb.-in.	20 to 25 lb.-in.	30 to 36 lb.-in.	72 to 84 lb.-in.	72 to 84 lb.-in.	140 to 180 lb.-in.	240 to 280 lb.-in.	55 to 60 lb.-in.	80 to 85 lb.-ft.
LubircatedRecommended Torque		6 to 8 lb.-in.	12 to 15 lb.-in.	20 to 25 lb.-in.	50 to 58 lb.-in.	50 to 58 lb.-in.	95 to 125 lb.-in.	165 to 195 lb.-in.	38 to 42 lb.-in.	55 to 60 lb.-ft.
Thread Length in Aluminum	6061-T6	.145	.225	.320	.440	.440	.550	.690	.790	.930
	2024-T4	.109	.170	.240	.330	.330	.420	.530	.600	.710
Approx. Load in Pounds (Metal)		540	840	1200	2100	2100	3400	5200	7000	9600
100 DegreeChamfer	Dia. +.010/-.000	.279	.334	.387	.510	.510	.638	.755	.894	1.022
	Depth +.005/-.000	.057	.068	.080	.106	.106	.133	.159	.186	.213

Table 203. Values for Nutplates

GENERAL DESIGN DATA FOR BLIND INSTALLATION OF NUTPLATES WITH MINIMUM 2 THREAD PROJECTION PER MS33588

NOTE:

Refer to the diagram in Figure 203 when consulting this table.

For maximum possible thread use:Pre-install bolt without mounting part(s) until lightly bottomed.

CAUTION:

Do not damage threads.

Measure distance between bolt head and structure. Distance should be no more than .9 x thickness of mounting part(s). For floating-type nutplates, add .010 to bolt clearance holes.Do not use aluminum rivets through carbon materials. Use stainless pop- or pull-type rivets when passing through carbon materials.REF: Acceptable Methods, Techniques And Practices, Aircraft Inspection And Repair, AC43.13-1B

		Thread Size							
Thread Size		6-32	8-32	10-32	1/4-28	5/16-24	3/8-24	7/16-20	1/2-20
Max. Diameter of Thread		.138	.164	.189	.249	.312	.374	.437	.499
Bolt Clearance Hole Diameter and Tolerance	.005 Tol	.148	.174	.200	.260	.323	.385	.448	.510
	.010Tol	.158	.184	.210	.270	.333	.395	.458	.520
2 Thread Minimum Projection		.0625	.0625	.0625	.1000	.0714	.1111	.1250	.520
Thread Length of Nutplate Ref.		.171	.188	.188	.219	.266	.282	.328	.547
2 Thread Projection + Nutplate		.234	.251	.251	.291	.349	.365	.428	.647
Min. Number of Turns		7.5	8.0	8.0	8.25	8.5	8.75	8.75	13.0
Ref. Tensile Stress Area		.00909	.0140	.0200	.0384	.0580	.0878	.1187	.1599
Non-Lubricated (Dry)Recommended Torque(Metal)		10 to 12 lb.-in.	20 to 25 lb.-in.	30 to 36 lb.-in.	72 to 84 lb.-in.	140 to 180 lb.-in.	240 to 280 lb.-in.	55 to 60 lb.-in.	80 to 85 lb.-ft.

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LubircatedRecommended Torque (Metal)	6 to 8 lb.-in.	12 to 15 lb.-in.	20 to 25 lb.-in.	50 to 58 lb.-in.	95 to 125 lb.-in.	165 to 195 lb.-in.	38 to 42 lb.-in.	55 to 60 lb.-ft.
Approx. Load in Pounds (Metal)	540	840	1200	2100	3400	5200	7000	9600

Table 204. Values for Hose and Tube Fittings

NOTE:
Refer to the diagram in Figure 204 when consulting this table.

Size/Thread		Material and Torque Specification(Dry torque values shown, except as noted in General Notes.)		
		Hose and/or Fitting Combination(Refer to Note 1)	Inch-Pounds	Foot-Pounds
-2	5/16-24	Steel to Steel	75-120	6.3 - 10
		Brass/Aluminum/Steel	50-80	4.2 - 6.7
-3	3/8-24	Steel to Steel	95-140	7.9 - 11.7
		Brass/Aluminum/Steel	70-105	5.8 - 8.8
-4	7/16-20	Steel to Steel	135-190	11.3 - 15.8
		Brass/Aluminum/Steel	100-140	8.3 - 11.7
-5	1/2-20	Steel to Steel	170-240	14.2 - 20
		Brass/Aluminum/Steel	130-180	10.8 - 15
-6	9/16-18	Steel to Steel	215-280	17.9 - 23.3
		Brass/Aluminum/Steel	150-195	12.5 - 16.3
-8	3/4-16	Steel to Steel	470-550	39.2 - 45.8
		Brass/Aluminum/Steel	270-350	22.5 - 29.2
-10	7/8-14	Steel to Steel	620-745	51.7 - 62.1
		Brass/Aluminum/Steel	360-430	30 - 35.8
-12	1/16-12	Steel to Steel	855-1055	71.3 - 87.9
		Brass/Aluminum/Steel	460-550	38.3 - 45.8

General Notes: Pre-Install hose onto fitting finger tight. If parts do not assemble finger tight, check for foreign material on threads and/or damaged threads. Do not force assemblies together.Maintain cleanliness of hose and fittings. Protect all fitting threads from damage and dirt contamination. When attaching stainless steel to stainless steel or stainless steel to aluminum, use MIL-T-5544 Anti-seize/lubricant on fitting threads. To prevent contamination, do not apply Anti-seize to tapered seat. Use lower torque value when Anti-seize is used.

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NOTE 1:

Brass/Aluminum/Steel means any combination of brass to aluminum, brass to steel, or aluminum to steel.

Table 205. Values for Rivnuts

GENERAL DESIGN DATA FOR BLIND INSTALLATION OF RIVNUTS WITH MINIMUM 2 THREAD PROJECTION PER MS33588								
NOTE: **Refer to the diagram in Figure 205 when consulting this table.**								
For maximum possible thread use:Pre-install bolt without mounting part(s) until lightly bottomed. **CAUTION:** **Do not damage threads.** Measure distance between bolt head and structure. Distance should be no more than .9 x thickness of mounting part(s). Rivnuts are not self-locking. Do not use aluminum rivnuts through carbon materials. Use stainless rivnuts through carbon materials.REF: Acceptable Methods, Techniques And Practices, Aircraft Inspection And Repair, AC43.13-1B								
		Thread Size						
Thread Size		6-32	8-32	10-32	1/4-20	1/4-28	5/16-18	3/8-16
Max. Diameter of Thread		.138	.164	.189	.249	.249	.312	.374
Bolt Clearance Hole and Diameter	.005 Tol	.148	.174	.200	.260	.260	.323	.385
	.010Tol	.158	.184	.210	.270	.270	.333	.395
Recommended RivnutHole Dia.	Min.	.266	.266	.297	.391	.391	.531	.531
	Max.	.272	.272	.303	.397	.397	.538	.538
2 Thread Projection		.0625	.0625	.0625	.1000	.0714	.1111	.1250
Thread Length of Rivnut		.219	.188	.203			.278	
Min. Thread Projection		.281	.250	.266			.389	
Min. Number of Turns		9.0	7.0	8.5			7.0	
Head Height		0.30	.030	.030	.030	.030	.030	.030
Head Diameter Max.		.390	.390	.415	.515	.515	.685	.685
Non-Lubricated (Dry)Recommended Torque		10 to 12 lb.-in.	18 to 22 lb.-in.	30 to 36 lb.-in.	65 to 75 lb.-in.	70 to 80 lb.-in.	140 to 155 lb.-in.	230 to 270 lb.-in.
LubircatedRecommended Torque		6 to 8 lb.-in.	12 to 15 lb.-in.	20 to 25 lb.-in.	42 to 50 lb.-in.	50 to 58 lb.-in.	85 to 110 lb.-in.	160 to 190 lb.-in.
Approx. Load in Pounds		540	840	1200	2000	2100	3200	4900

Table 206. Recommended Torque and Clamp Load Specifications (Applicable to Fasteners with a Minimum Tensile Strength Greater Than 74 ksi)

Fastener Size	Nominal Diameter	Clamp Load	Torque Dry	Torque Wet
			(Maximum Error of ±10 percent)	
	[in]	[lbs]	[in-lbs]	[in-lbs]
2-56	.0860	150	2.5	2.0
4-40	.1120	250	5.5	4.0
6-32	.1380	370	10	8.0
8-32	.1640	580	19	14
10-32	.1900	830	31	24
1/4-20	.2500	1310	66	49
1/4-28	.2500	1500	75	56

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5/16-18	.3125	2160	140	100
5/16-24	.3125	2390	150	110
3/8-16	.3750	3200	20 (NOTE 1)	15 (NOTE 1)
3/8-24	.3750	3620	23 (NOTE 1)	17 (NOTE 1)
7/16-20	.4375	4900	36 (NOTE 1)	27 (NOTE 1)
1/2-20	.5000	6600	55 (NOTE 1)	41 (NOTE 1)

NOTE:

Applicable for standard or self-locking types of nuts

NOTE 1:

The torque values are given in [ft-lbs].

Table 207. Recommended Jam Nut Torque and Clamp Load Specifications (Applicable to Fasteners with a Minimum Tensile Strength Greater Than 74 ksi)

Fastener Size	Nominal Diameter	Clamp Load	Torque Dry	Torque Wet
			(Maximum Error of ±10 percent)	
	[in]	[lbs]	[in-lbs]	[in-lbs]
2-56	.0860	62	1.0	0.8
4-40	.1120	100	2.5	1.5
6-32	.1380	150	4.0	3.0
8-32	.1640	250	8.0	6.0
10-32	.1900	360	14	10
1/4-20	.2500	550	27	20
1/4-28	.2500	730	36	27
5/16-18	.3125	800	50	37
5/16-24	.3125	1240	77	58
3/8-16	.3750	1330	100	75
3/8-24	.3750	1330	100	75
7/16-20	.4375	3120	23 (NOTE 1)	17 (NOTE 1)
1/2-20	.5000	3730	31 (NOTE 1)	23 (NOTE 1)

NOTE:

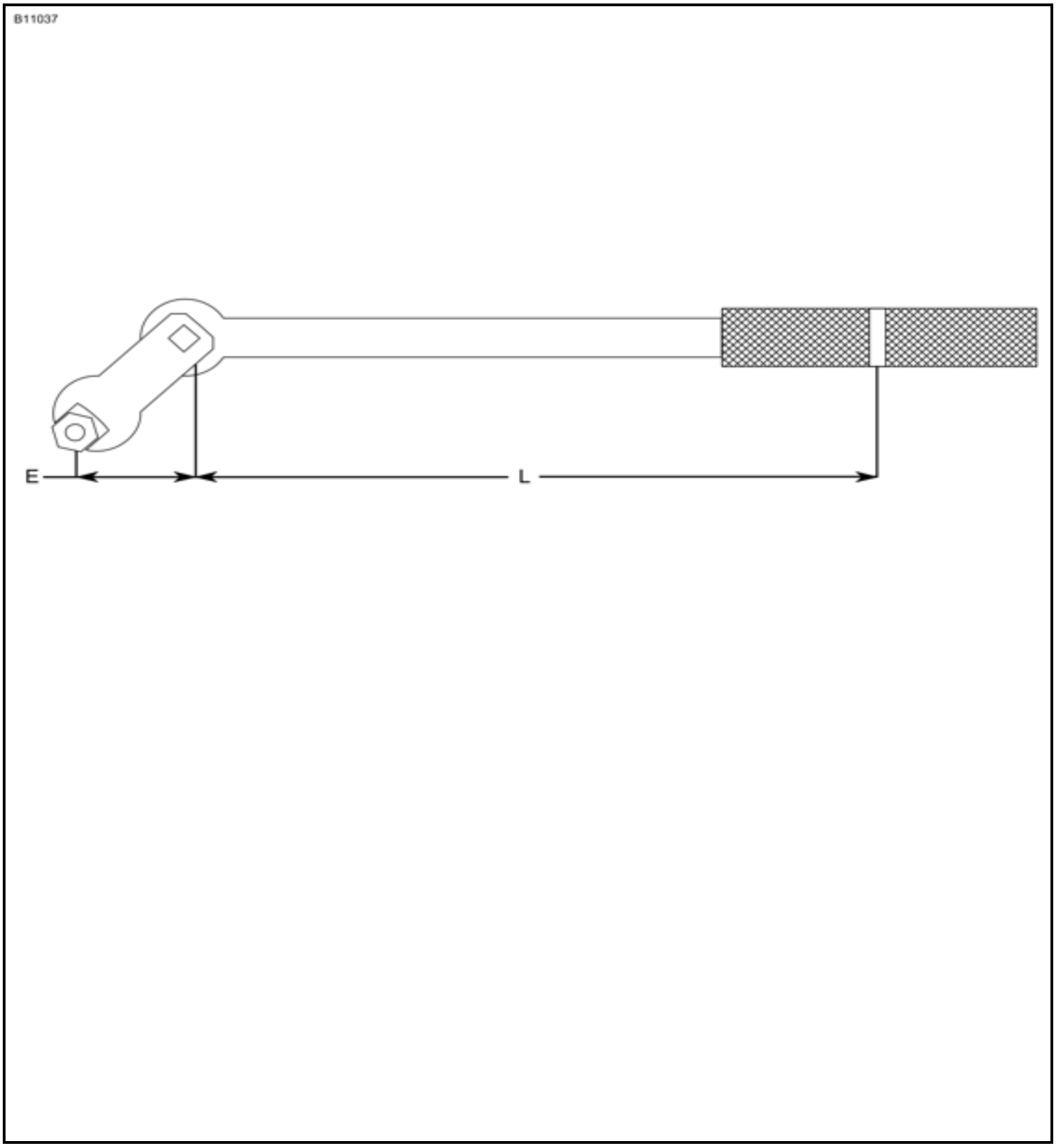
AN316 or equivalent

NOTE 1:

The torque values are given in [ft-lbs].

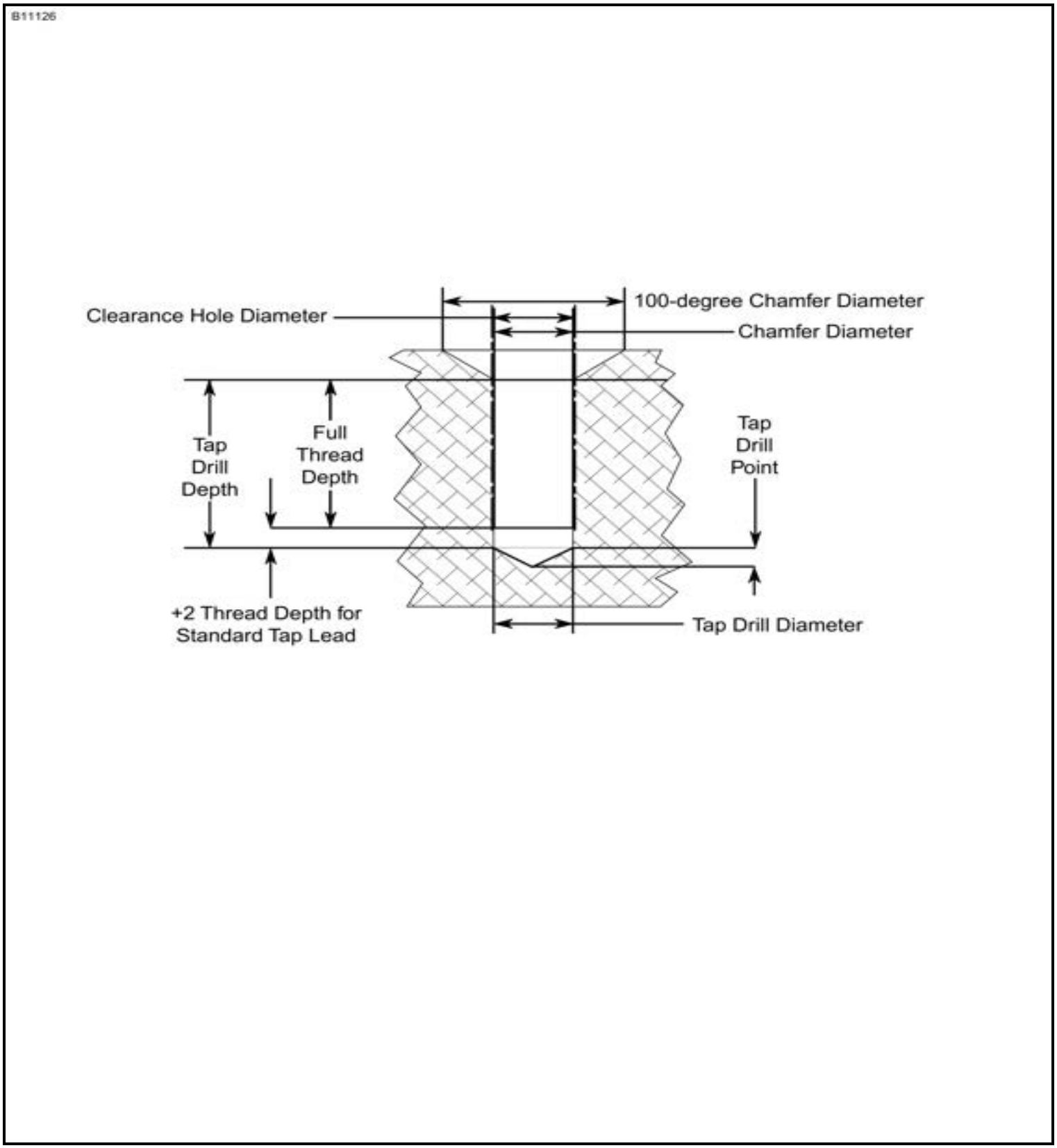
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Figure 201 : Sheet 1 : Length Variable for Torque Adapter Equation



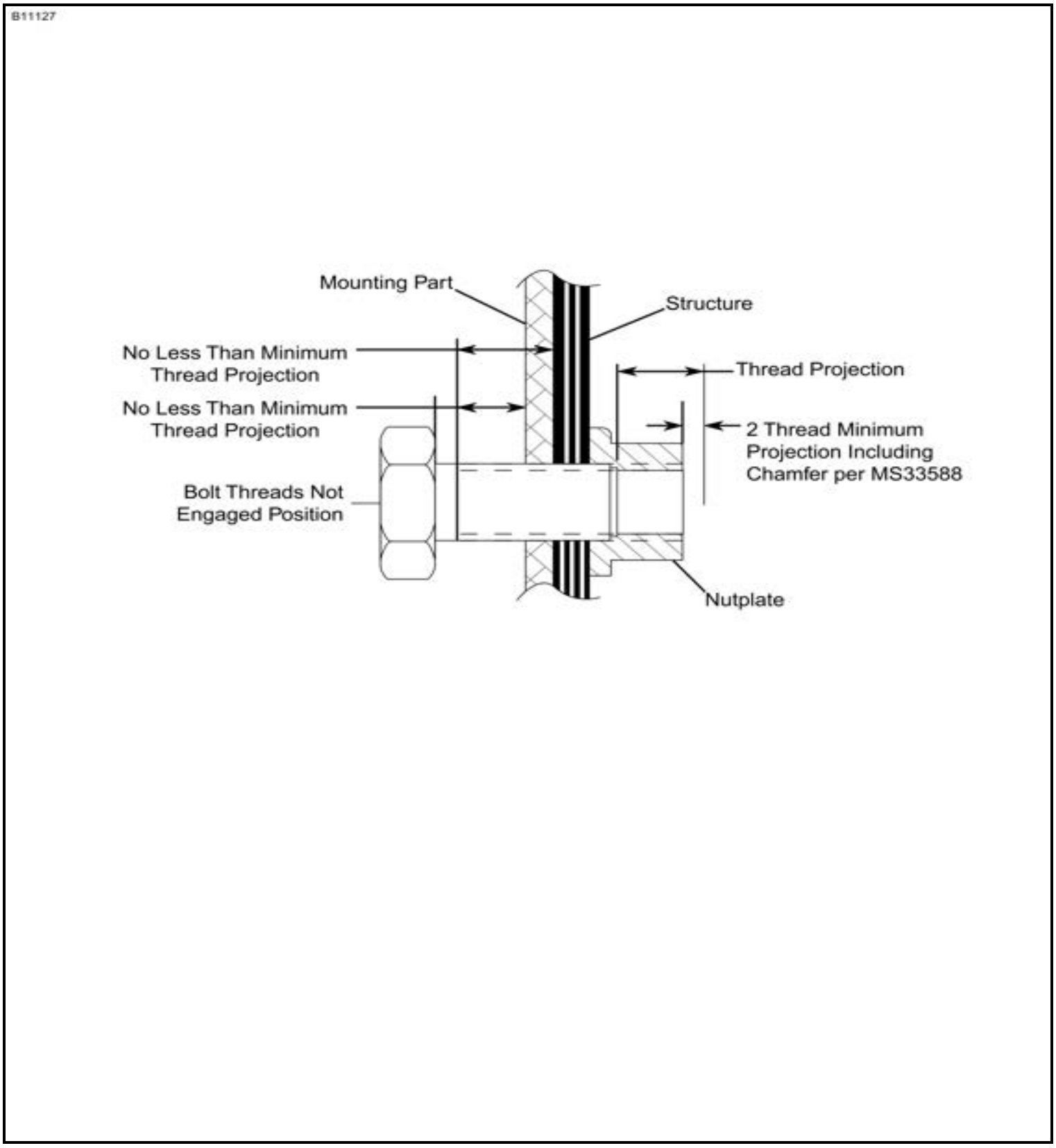
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Figure 202 : Sheet 1 : Values for Tapped Holes and Clearance Holes (Refer to Table 202)



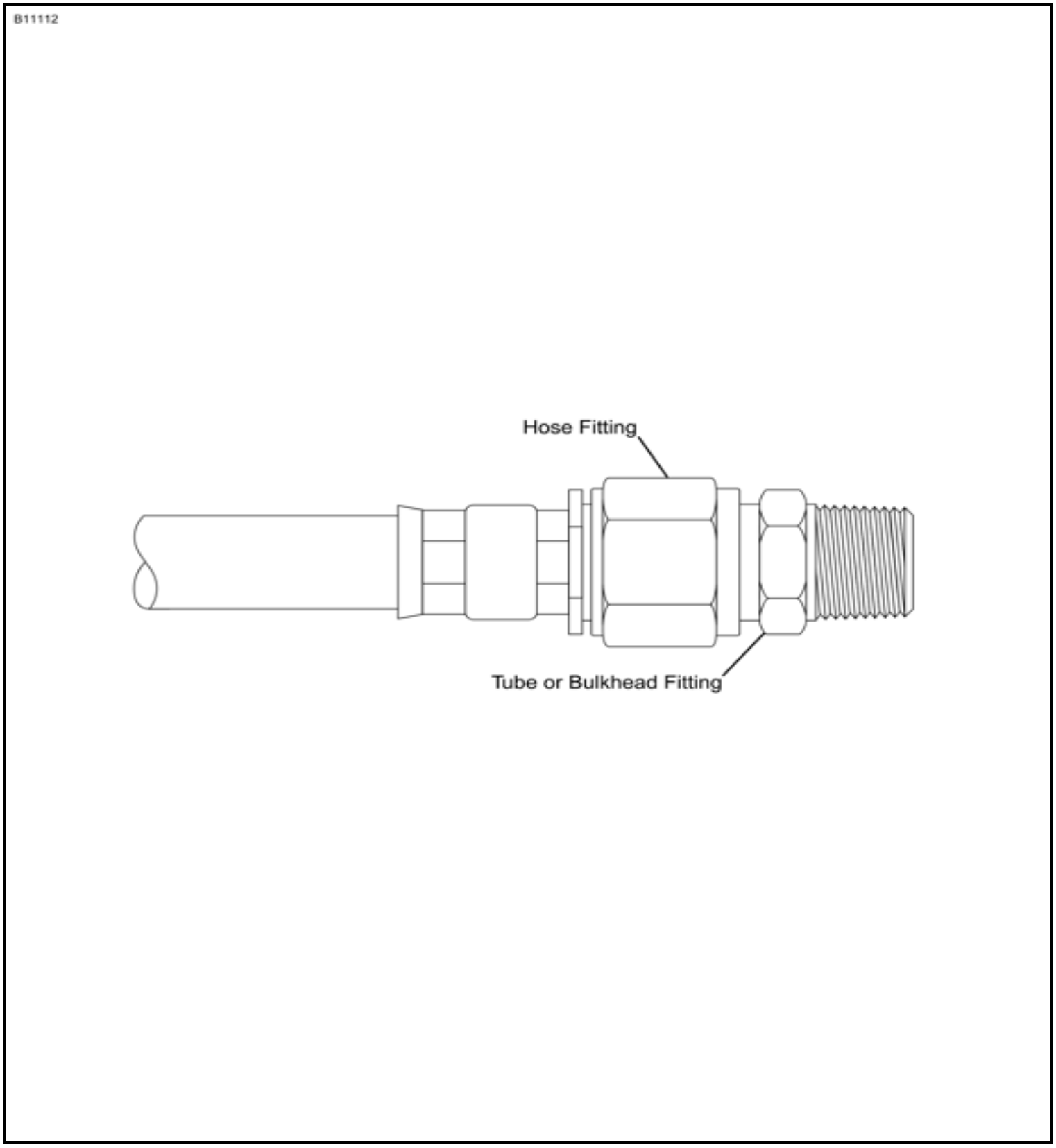
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Figure 203 : Sheet 1 : Values for Nutplates (Refer to Table 203)



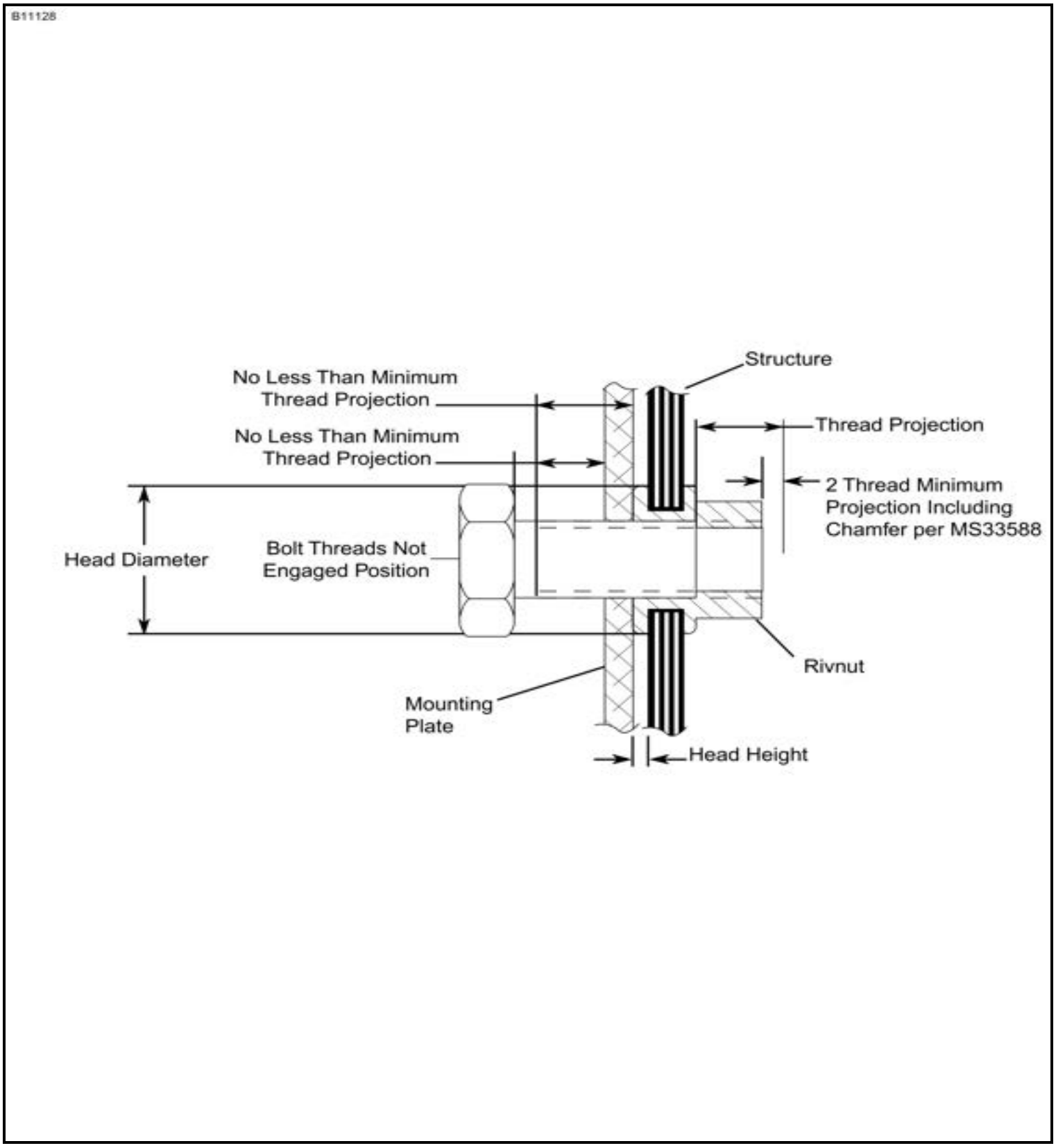
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Figure 204 : Sheet 1 : Values for Hose and Tube Fittings (Refer to Table 204)



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Figure 205 : Sheet 1 : Values for Rivnuts (Refer to Table 205)



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SAFETYING - MAINTENANCE PRACTICES

1. Safetying - Maintenance Practices

A. **General** - The word safetying is a term universally used in the aircraft industry. Briefly, safetying is defined as: "Securing by various means any nut, bolt, turnbuckle etc., on the aircraft so that vibration will not cause it to loosen during operation." These practices are not a means of obtaining or maintaining torque, rather a safety device to prevent the disengagement of screws, nuts, bolts, snap rings, oil caps, drain cocks, valves, and parts. Three basic methods are used in safetying: safety-wire, cotter pins, and self-locking nuts. Retainer washers and pal nuts are also sometimes used.

(1) Wire, either soft brass or steel, is used on cylinder studs, control cable turnbuckles, and engine accessory attaching bolts.

(2) Cotter pins are used on aircraft and engine controls, landing gear, or any other point where a turning or actuating movement takes place.

B. **Safety Wire**

WARNING: Do not use stainless steel, monel, carbon steel, or aluminum alloy safety wire to secure emergency mechanisms such as switch handles, guard covering handles used on exits, fire extinguishers, emergency gear releases, or other emergency equipment. Some existing structural equipment or safety-of-flight emergency devices require copper or brass safety wire (0.020-inch diameter only). Where successful emergency operation of this equipment is dependent on shearing or breaking of the safety wire, particular care should be used to ensure that safetying does not prevent emergency operation.

CAUTION: Care should be taken not to confuse steel with aluminum wire.

(1) There are two methods of safety wiring; the double-twist method that is most commonly used, and the single-wire method used on screws, bolts, and/or nuts in a closely-spaced or closed-geometrical pattern such as a triangle, square, rectangle, or circle. The single-wire method may also be used on parts in electrical systems and in places that are difficult to reach (Refer to Figure 201).

(2) When using the double-twist method of safety wiring, 0.032 in. minimum diameter wire should be used on parts that have a hole diameter larger than 0.045 in. Safety wire of 0.020 in. diameter (double strand) may be used on parts having a nominal hole diameter between 0.045 and 0.062 in. with a spacing between parts of less than 2 in. When using the single-wire method, the largest size wire that the hole will accommodate should be used. Copper wire (0.020 in. diameter), aluminum wire (0.031 in diameter), or other similar wire called for in specific technical orders, should be used as seals on equipment such as first-aid kits, portable fire extinguishers, emergency valves, or oxygen regulators. Refer to Figure 202.

(3) A secure seal indicates that the component has not been opened. Some emergency devices require installation of brass or soft copper shear safety wire. Particular care should be exercised to ensure that the use of safety wire will not prevent emergency operation of the devices.

2. Safety Wiring Procedures

A. There are many combinations of safety wiring with certain basic rules common to all applications. These rules are as follows:

(1) When bolts, screws, or other parts are closely grouped, it is more convenient to safety wire them in series. The number of bolts, nuts, screws, etc., that may be wired together depends on the application.

(2) Drilled bolt heads and screws need not be safety wired if installed with self-locking nuts.

(3) To prevent failure due to rubbing or vibration, safety wire must be tight after installation.

(4) Safety wire must be installed in a manner that will prevent the tendency of the part to loosen.

(5) Safety wire must never be over-stressed. Safety wire will break under vibrations if twisted too tightly. Safety wire must be pulled taut when being twisted and maintain a light tension when secured.

(6) Safety-wire ends must be bent under and inward toward the part to avoid sharp or projecting ends, which might present a safety hazard.

(7) Safety wire inside a duct or tube must not cross over or obstruct a flow passage when an alternate routing can be used.

B. Check the units to be safety wired to make sure that they have been correctly torqued and that the wiring holes are properly aligned to each other. When there are two or more units, it is desirable that the holes in the units be aligned to each other. Never over-torque or loosen to obtain proper alignment of the holes. It should be possible to align the wiring holes when the bolts are torqued within the specified limits. Washers may be used to establish proper alignment. However, if it is impossible to obtain a proper alignment of the holes without under-torquing or over-torquing, try another bolt that will permit proper alignment within the specified torque limits.

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C. To prevent mutilation of the twisted section of wire when using pliers, grasp the wires at the ends. Safety wire must not be nicked, kinked, or mutilated. Never twist the wire ends off with pliers. When cutting off ends, leave at least four to six complete turns (1/2 to 5/8 inch long) after the loop. When removing safety wire, never twist the wire off with pliers. Cut the safety wire close to the hole, exercising caution.

D. Install safety wire where practicable with the wire positioned around the head of the bolt, screw, or nut, and twisted in such a manner that the loop of the wire fits closely to the contour of the unit being safety wired.

3. Twisting With Special Tools

A. Twist the wire with a wire twister as follows:

CAUTION: When using wire twisters and the wire extends 3 inches beyond the jaws of the twisters, loosely wrap the wire around the pliers to prevent whipping and possible personal injury. Excessive twisting of the wire will weaken the wire.

(1) Grip the wire in the jaws of the wire twister, and slide the outer sleeve down with your thumb to lock the handles of the spring-loaded pin.

(2) Pull the knob to make the spiral rod spin and twist the wire.

(3) Squeeze handles together to release the wire.

4. Securing Oil Caps, Drain Cocks, and Valves

A. When securing oil caps and drain cocks, the safety wire should be anchored to an adjacent fillister-head screw. Refer to Figure 203. This method of safety wiring is applied to wing nuts, filler plugs, single-drilled head bolts, fillister-head screws, etc., that are safety wired individually. When securing valve handles in the vertical position, the wire is looped around the threads of the pipe leading into one side of the valve, double-twisted around the valve handle, and anchored around the threads of the pipe leading into the opposite side of the valve. When castle nuts are to be secured with safety wire, tighten the nut to the low side of the selected torque range, unless otherwise specified. If necessary, continue tightening until a slot lines with the hole. In blind tapped hole applications of bolts or castle nuts on studs, the safety wiring should be in accordance with the general instructions of this chapter. Hollow-head bolts are safetyed in the manner prescribed for regular bolts.

NOTE: Do not loosen or tighten properly tightened nuts to align safety-wire holes.

NOTE: Although there are numerous safety wiring techniques used to secure aircraft hardware, practically all are derived from the basic examples shown in this text.

5. Proper Securing of Fittings

A. There are several examples on how to secure fittings listed in this section.

(1) Examples 1, 2, 3, and 4 in Figure 204 apply to all types of bolts, fillister-head screws, square-head plugs, and other similar parts, which are wired so that tightening of the other part counteracts the loosening tendency of either part. The direction of twist from the second to the third unit is counterclockwise in Examples 1, 3, and 4 to keep the loop in position against the head of the bolt. The direction of twist from the second to the third unit in Example 2 is clockwise to keep the wire in position around the second unit. The wire entering the hole in the third unit will be the lower wire, except as in Example 2. By making a counterclockwise twist after it leaves the hole, the loop will be secured in place around the head of that bolt.

(2) Examples 5, 6, 7, and 8 in Figure 205 show methods for wiring various standard items. Note that wire may be wrapped over the unit rather than around it when wiring castle nuts or on other items when there is a clearance problem.

(3) Example 9 in Figure 206 shows the method for wiring bolts in different planes. Note that wire should always be applied so that tension is in the tightening direction. Hollow-head plugs shall be wired as shown with the tab bent inside the hole to avoid snags and possible injury to personnel working on the engine.

(4) Examples 12 and 13 in Figure 207 show methods for attaching lead seal to protect critical adjustments.

(5) Example 14 in Figure 208 shows bolt wired to a right-angle bracket with the wire wrapped around the bracket.

(6) Example 15 in Figure 208 shows the correct method for wiring adjustable connecting rods.

(7) Example 16 in Figure 208 shows the correct method for wiring the coupling nut on flexible line to the straight connector brazed on rigid tube.

B. Fittings incorporating wire lugs shall be wired as shown in Examples 17 and 18 in Figure 209. Where no lock-wire lug is provided, wire should be applied as shown in Examples 19 and 20 with caution being exerted to ensure that the wire is wrapped tightly around the fitting.

C. Small size coupling nuts shall be wired by wrapping the wire around the nut and inserting it through the holes as shown in Figure 209.

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D. Coupling nuts attached to straight connectors shall be wired as shown when the hex is an integral part of the connector. Coupling nuts on a tee shall be wired as shown in Figure 209 so that tension is always in the tightening direction.

6. Securing with Cotter Pins

A. Cotter pins are used to secure such items as bolts, screws, pins, and shafts. The use of cotter pins is favored because they can be removed and installed quickly. The diameter of the cotter pins selected for any application should be the largest size that will fit consistent with the diameter of the cotter pin hole and/or the slots in the nut. Cotter pins should not be re-used on aircraft.

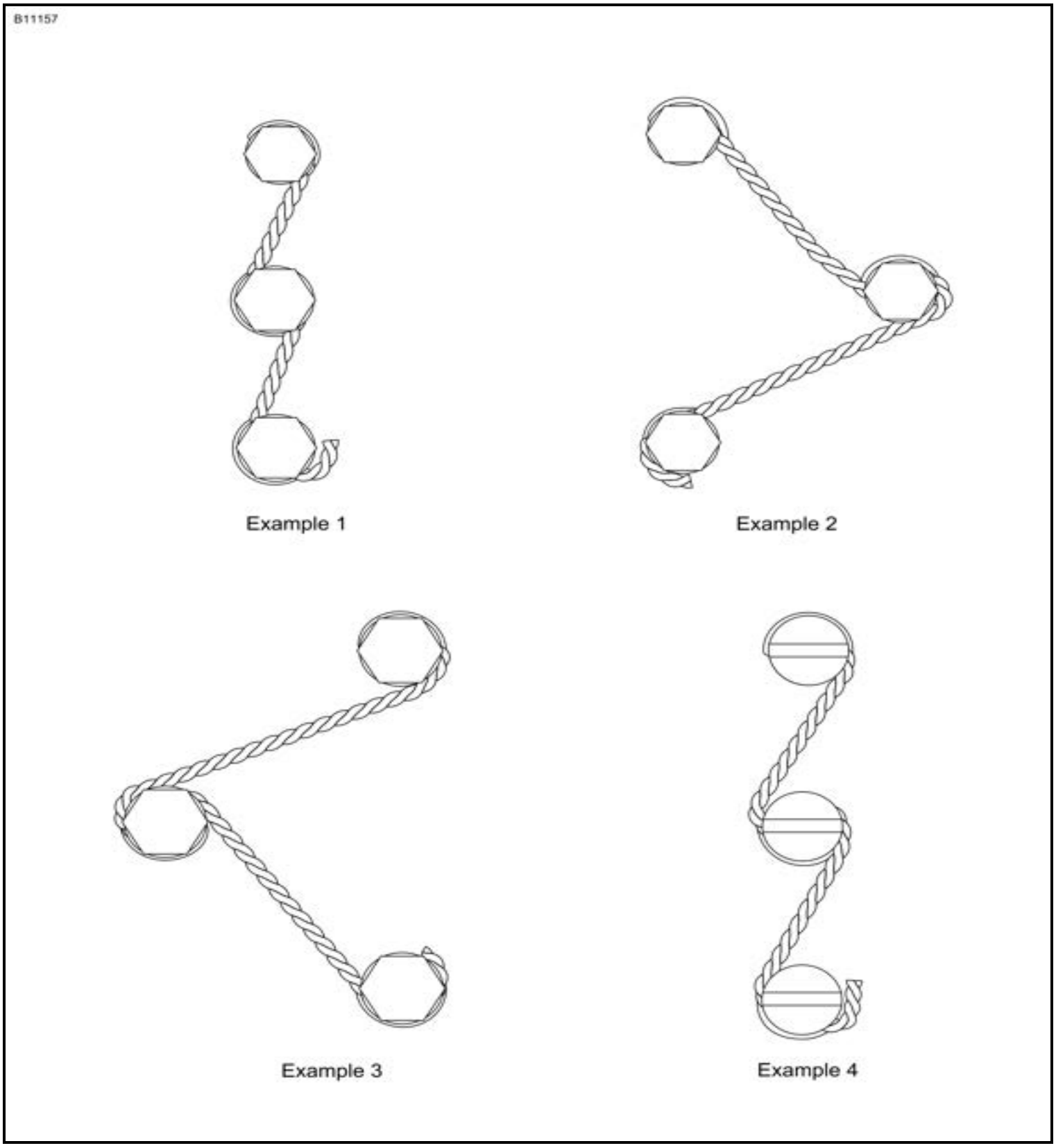
B. To prevent injury during and after pin installation, the end of the cotter pin can be rolled and tucked as shown in Figure 210 and Figure 211.

C. When tightening castellated nuts on bolts, begin by applying the minimum torque specified. If the cotter pin hole does not align with the slots in the nut, continue to tighten the nut until the next set of slots is aligned with the hole. In special cases where there is risk of the threads stripping or the bolt shearing, the maximum torque value specified may not be exceeded. For most installations, the nut may be over tightened to permit the slots to align with the hole.

NOTE: In using the method of cotter pin safetying ensure the prong, bent over the bolt, is seated firmly against the bolt shank and does not exceed bolt diameter. Also, when the prong is bent over the nut, ensure the bent prong is down and firmly flat against the nut and does not contact the surface of the washer.

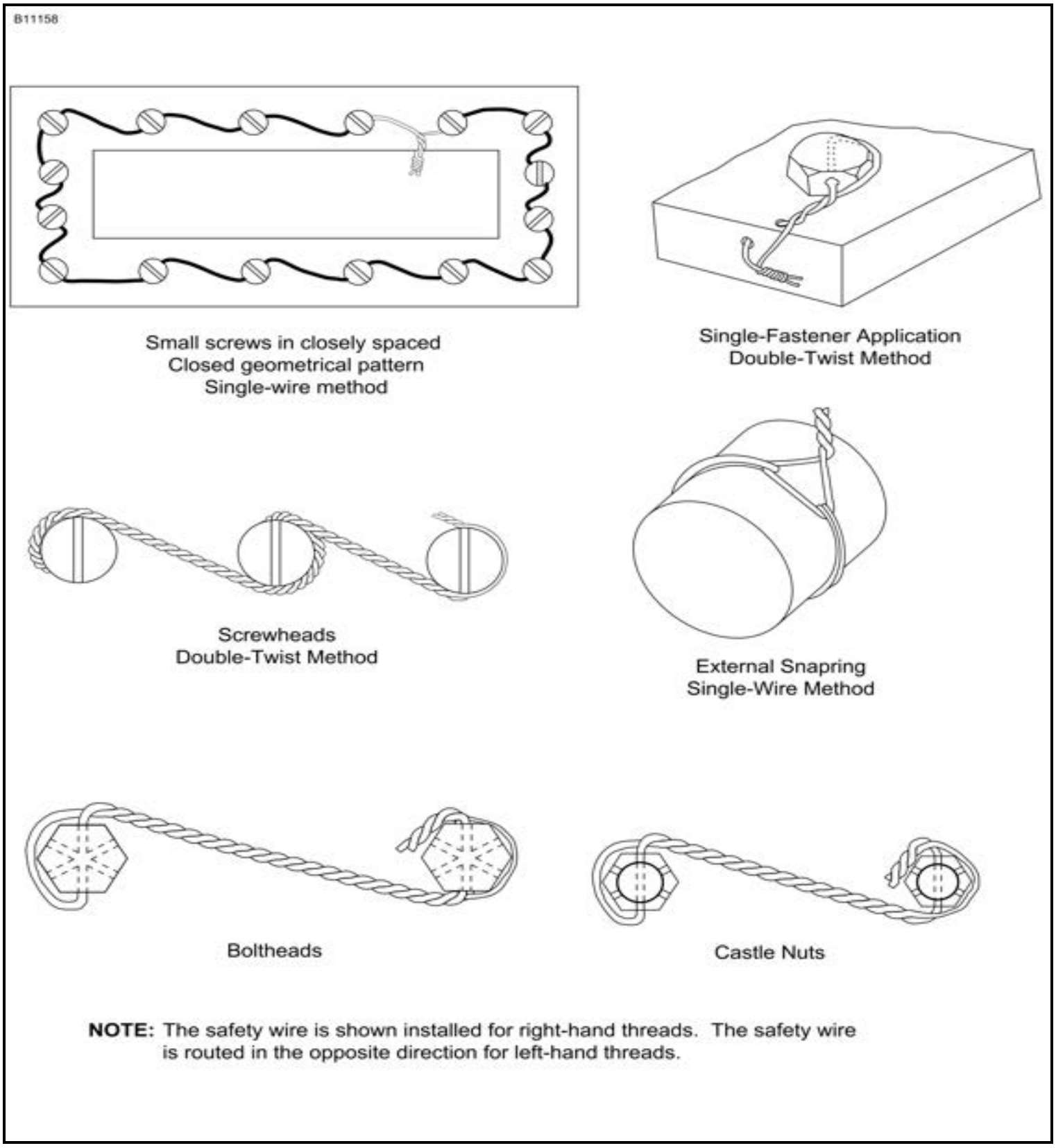
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Figure 201 : Sheet 1 : Examples of Safety Wiring "Safetying"



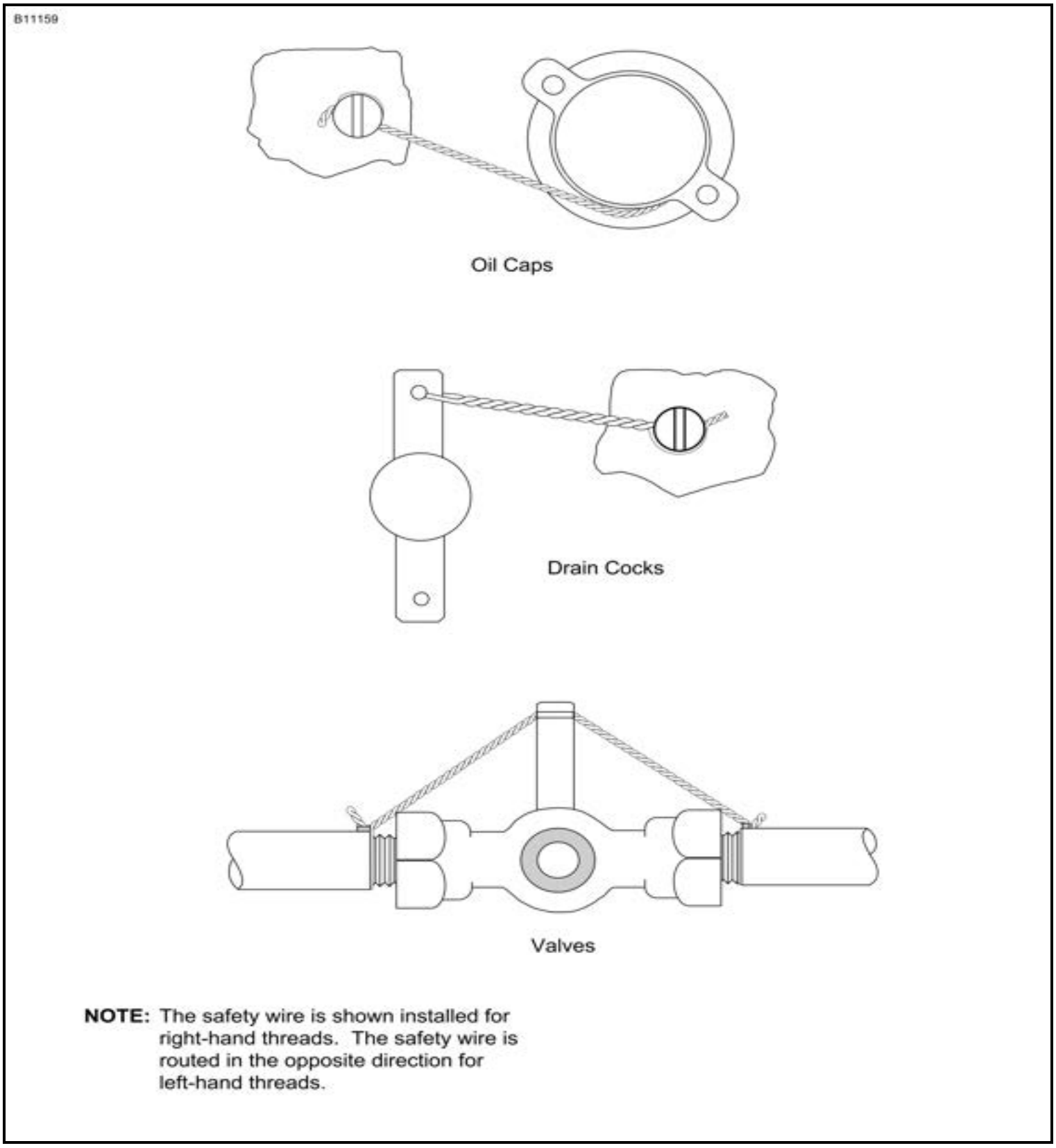
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Figure 202 : Sheet 1 : Securing Screws, Nuts, Bolts, and Snap Rings



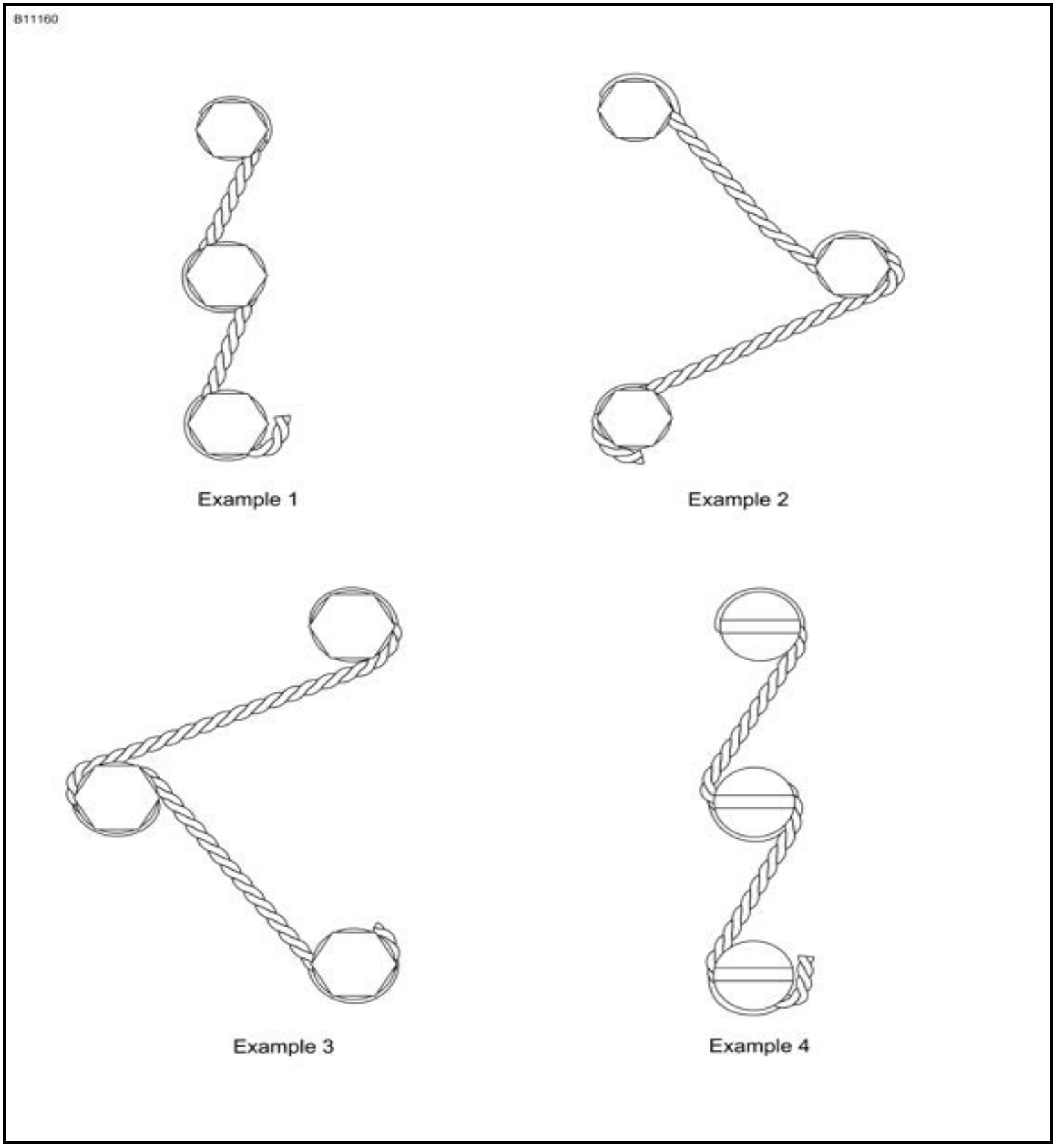
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Figure 203 : Sheet 1 : Securing Oil Caps, Drain Cocks, and Valves



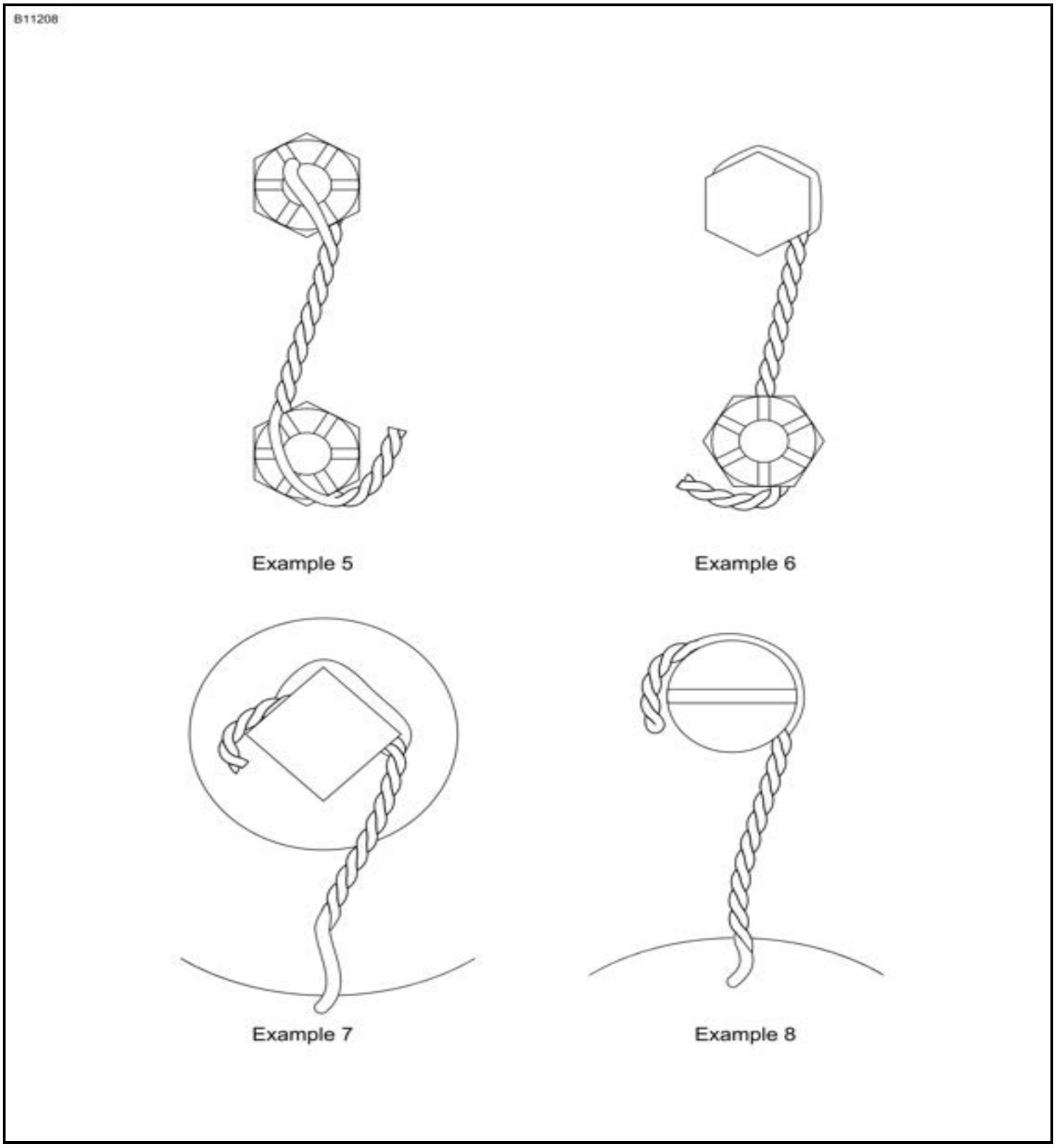
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Figure 204 : Sheet 1 : Securing Bolts, Screws, Plugs, etc.



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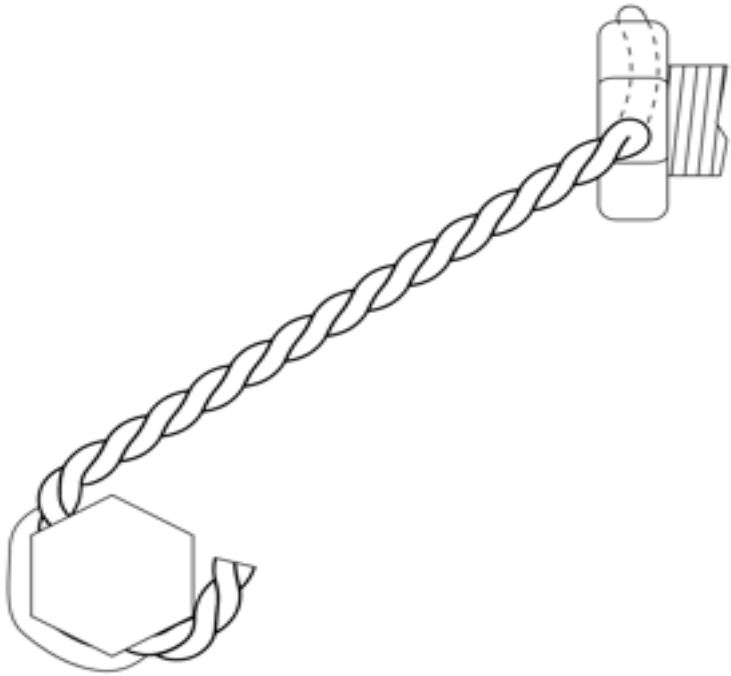
Figure 205 : Sheet 1 : Securing Various Standard Items



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Figure 206 : Sheet 1 : Wiring Bolts in Different Planes

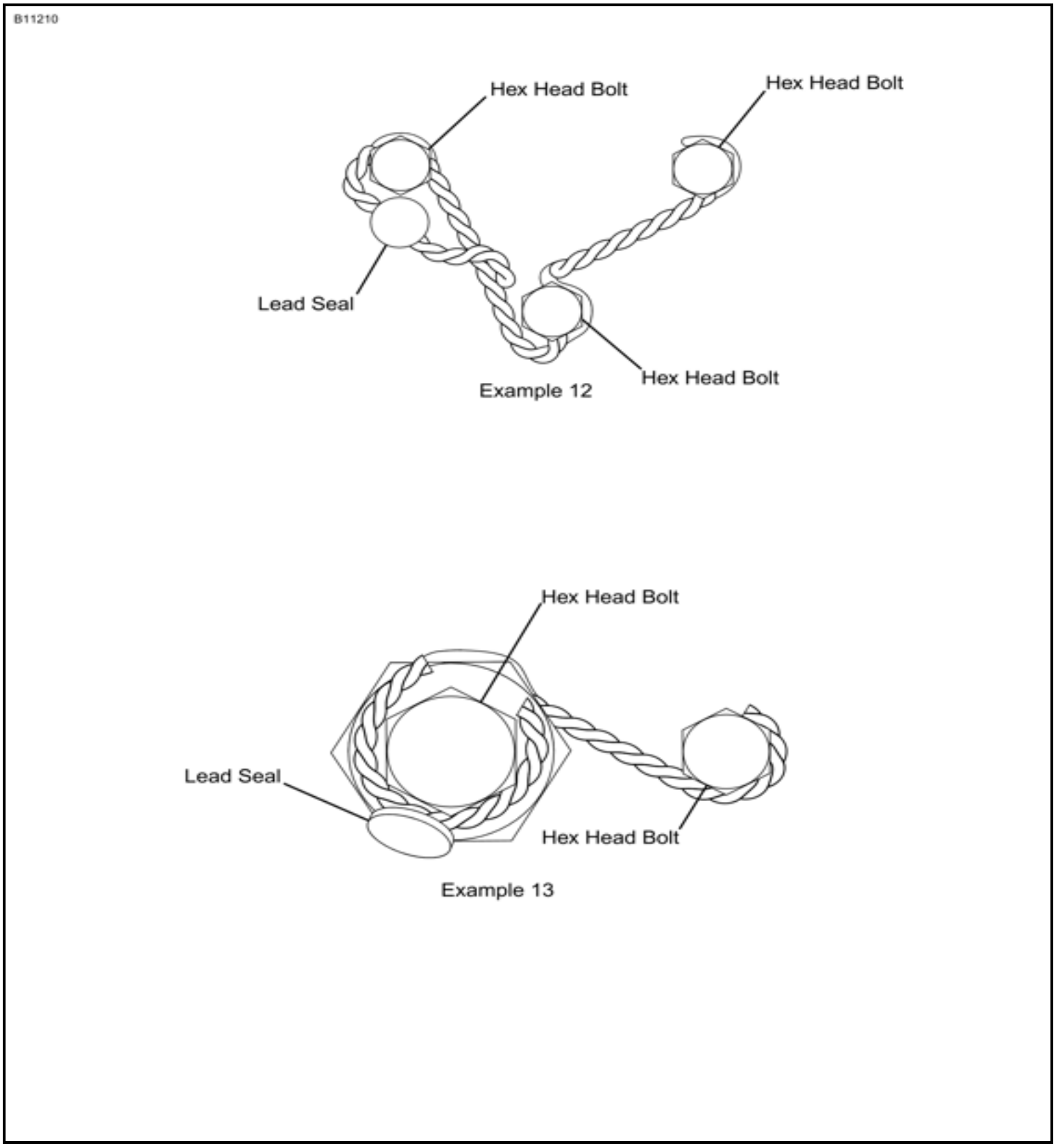
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Example 9

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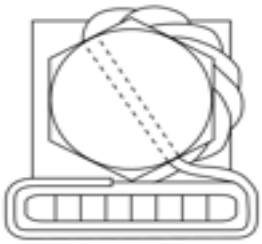
Figure 207 : Sheet 1 : Attaching Lead Seal



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Figure 208 : Sheet 1 : Wiring Brackets, Connecting Rods, Rigid Tubes

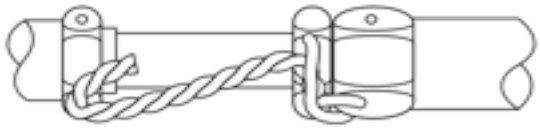
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Example 14



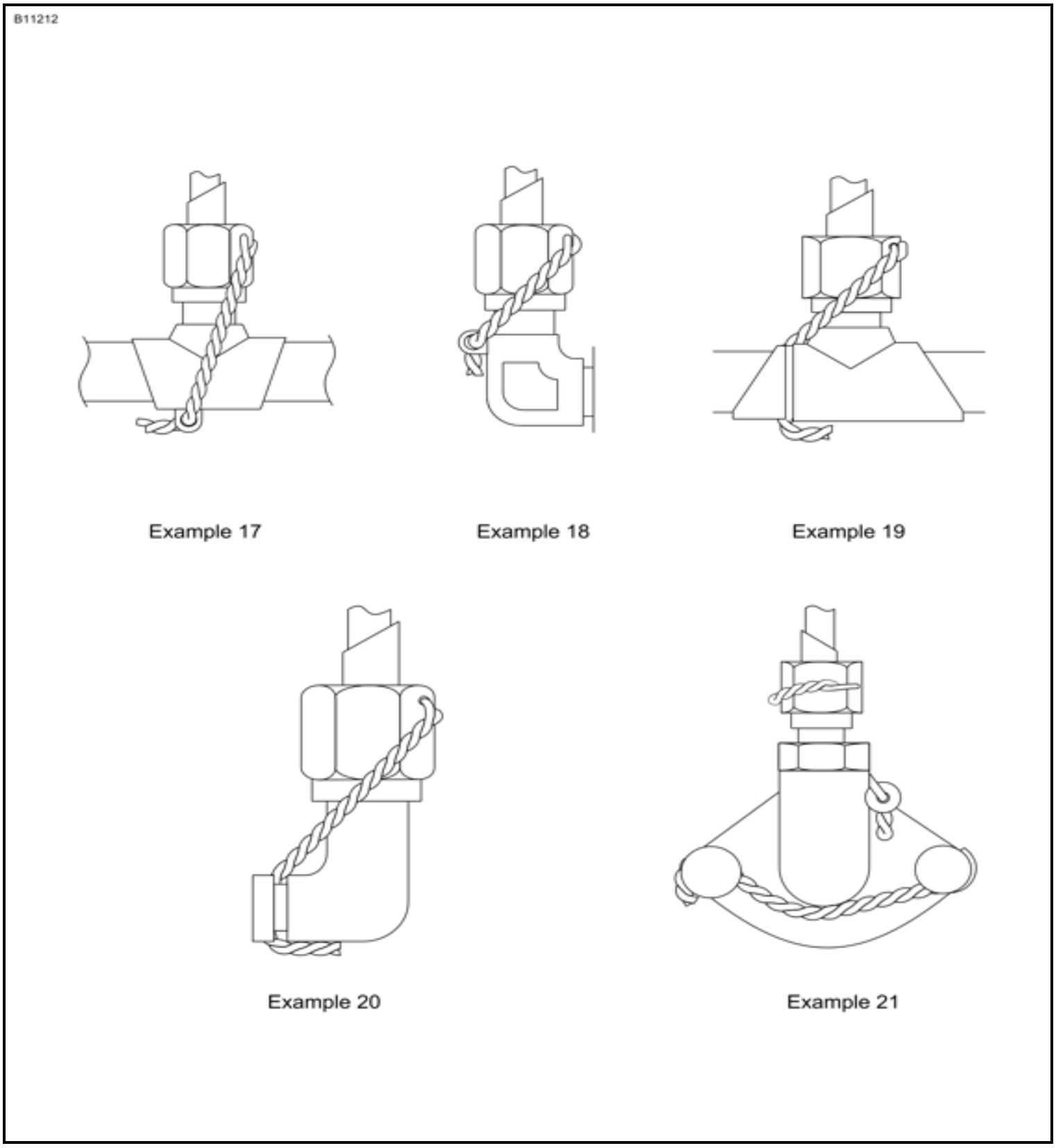
Example 16



Example 15

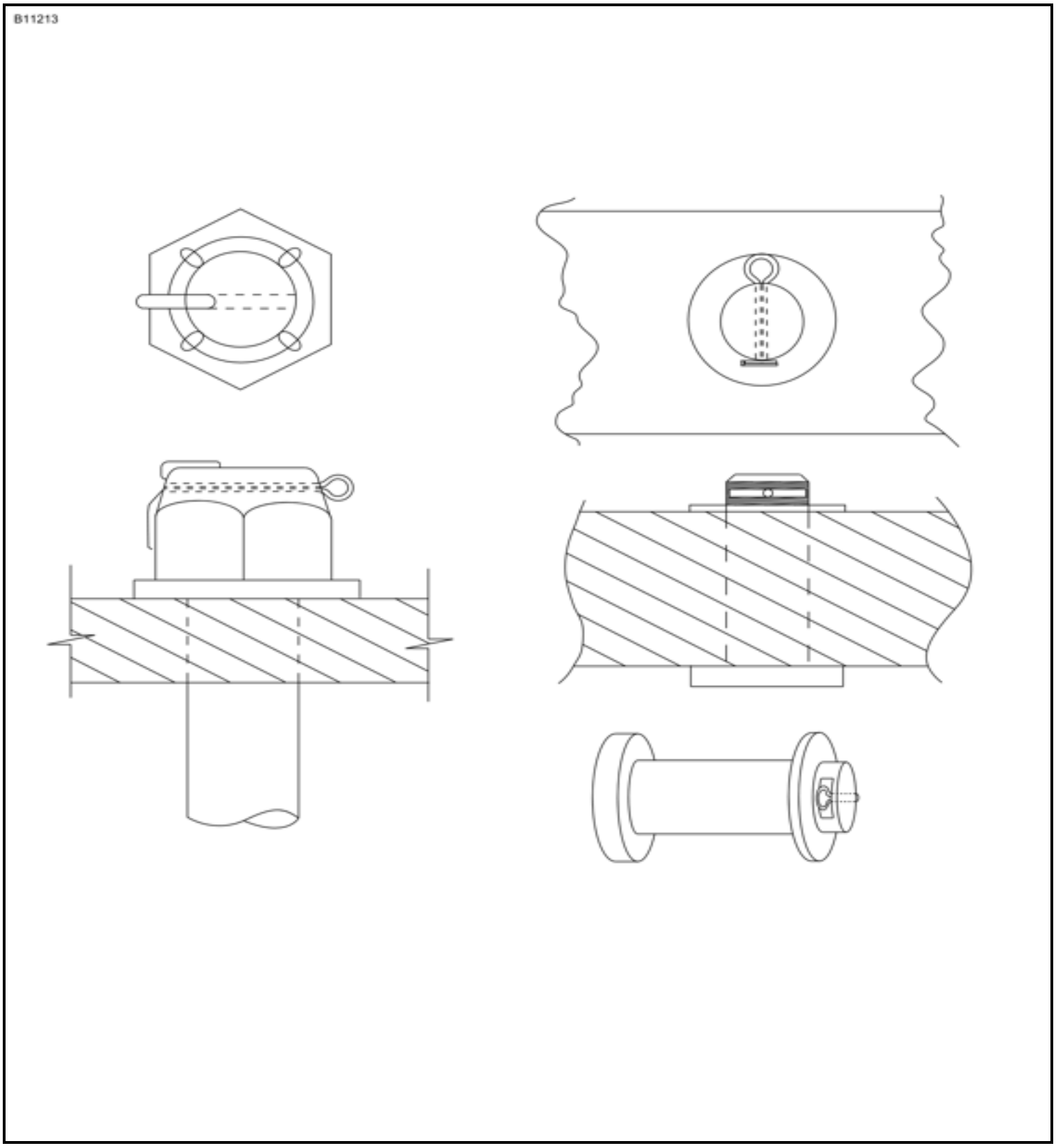
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Figure 209 : Sheet 1 : Fittings Incorporating Wire Lugs



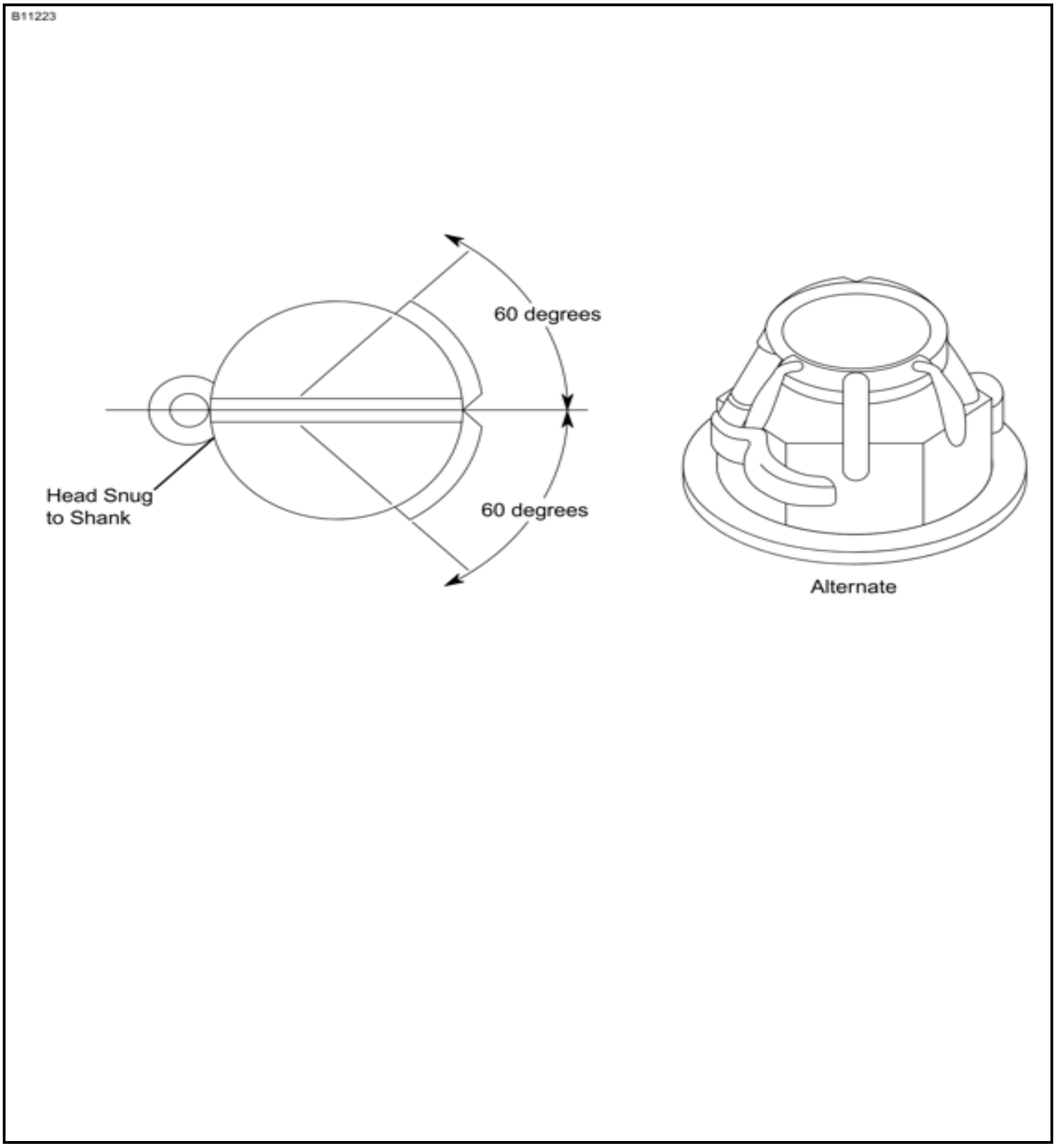
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Figure 210 : Sheet 1 : Securing with Cotter Pins



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Figure 211 : Sheet 1 : Alternate Method for Securing with Cotter Pins



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CONTROL CABLES AND PULLEYS - MAINTENANCE PRACTICES

1. Control Cable Wire Breakage and Corrosion Limitations

A. Aircraft control cables in the Cessna 400 (LC41-550FG) are fabricated from corrosion-resistant steel wire of flexible-type construction. For example, 1/16-inch 7 X 7 MIL-W-83420/2 and 1/8-inch 7 X 19 MIL-W-83420 cables are used in the rudder control circuit.

B. **Cable Definitions** - The following cable components are defined in accordance with Military Specifications MIL-W-83420, MIL-C-18375, and MIL-W-87161.

(1) Wire Center - The center of all strands shall be an individual wire and shall be designated as a wire center.

(2) Strand Center or Core - A strand center is a single, straight strand made of preformed wires, similar to the other strands comprising the cable in arrangement and number of wires.

(3) Independent Wire Rope Center (IWRC) 7 by 7 - A cable or wire rope of six strands of seven wires each, twisted or laid around a strand center or core consisting of seven wires.

C. **Flexible Cables** - Flexible, preformed, corrosion-resistant, Type I, composition B cables, MIL-W-87161, MIL-W-83420, and MIL-C-18375 are manufactured from steel made by the electric-furnace process. These cables are of the 3 by 7, 7 by 7, 7 by 19, or 6 by 19 IWRC construction, according to the diameter. The 3 by 7 cable consists of three strands of seven wires each. There is no core in this construction. The 7 by 7 cable consists of six strands, of seven wires each, laid around a center strand of seven wires. The wires are laid so as to develop a cable that has the greatest bending and wearing properties. The 7 by 7 cable has a length of lay of not more than eight times or less than six times the cable diameter. The 7 by 19 cable consists of six strands laid around a center strand in a clockwise direction. The wires composing the seven individual strands are laid around a center wire in two layers. The center core strand consists of a lay of six wires laid around the central wire in a clockwise direction and a layer of 12 wires laid around this in a clockwise direction. The six outer strands of the cable consist of a layer of six wires laid around the center wire in a counterclockwise direction and a layer of 12 wires laid around this in a counterclockwise direction.

D. **Cable Replacement** - Replace control cables when they become worn, distorted, corroded, or otherwise damaged. If spare cables are not available, prepare exact duplicates of the damaged cable. Use materials of the same size and quality as the original. Standard swaged cable terminals develop the full cable strength and may be substituted for the original terminals wherever practical.

E. **Mechanically Fabricated Cable Assemblies**

(1) **Swage-Type Terminals** - Swage-type terminals, manufactured in accordance with AN, are suitable for use in civil aircraft up to, and including, maximum cable loads. When swaging tools are used, it is important that all the manufacturers' instructions, including "go and no-go" dimensions, be followed in detail to avoid defective and inferior swaging. Observance of all instructions should result in a terminal developing the full-rated strength of the cable. Critical dimensions, both before and after swaging, must be checked.

(2) When swaging terminals onto cable ends, observe the following procedures:

(a) Cut the cable to the proper length allowing for growth during swaging. Apply a preservative compound to the cable ends before insertion into the terminal barrel.

NOTE: Never solder cable ends to prevent fraying because the presence of the solder will greatly increase the tendency of the cable to pull out of the terminal.

(b) Insert the cable into the terminal approximately 1 inch and bend toward the terminal. Push the cable end entirely into the terminal barrel. The bending actions puts a kink or bend in the cable end and provides enough friction to hold the terminal in place until the swaging operation can be performed. Bending also tends to separate the strands inside the barrel, thereby reducing the strain on them.

Table 201. Straight-Shank Terminal Dimensions

(Cross reference AN to MS: AN-666 to MS 21259, AN-667 to MS 20667, AN-668 to MS 20668, AN-669 to MS 21260.)							
Key: A = Cable size (inches) B = Wire strands C = Outside diameter before swaging D = Bore diameter before swaging E = Bore length before swaging F = Swaging length before swaging G = Minimum breaking strength (pounds) after swaging H = Shank diameter after swaging (Use gauges in kit for checking diameters.)							
A	B	C	D	E	F	G	H
1/16	7X7	0.160	0.078	1.042	0.969	480	0.138

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3/32	7X7	0.218	0.109	1.261	1.188	920	0.190
1/8	7X19	0.250	0.141	1.511	1.438	2,000	0.219
5/32	7X19	0.297	0.172	1.761	1.688	2,800	0.250
3/16	7X19	0.359	0.203	2.011	1.938	4,200	0.313
7/32	7X19	0.427	0.234	2.261	2.188	5,600	0.375
1/4	7X19	0.494	0.265	2.511	2.438	7,000	0.438
9/32	7X19	0.563	0.297	2.761	2.688	8,000	0.500
5/16	7X19	0.635	0.328	3.011	2.938	9,800	0.563
3/8	7X19	0.703	0.390	3.510	3.438	14,400	0.625

(c) Accomplish the swaging operation in accordance with the instructions furnished by the manufacturer of the swaging equipment.

(d) Inspect the terminal after swaging to determine that it is free from die marks and splits and is not out-of-round. Check for cable slippage in the terminal and for cut or broken wire strands.

(e) Using a "go no-go" gauge or a micrometer, check the terminal shank diameter.

(3) **Nicopress Process** - A patented process using copper sleeves may be used up to the full rated strength of the cable when the cable is looped around a thimble. Refer to Figure 202.

(a) Before undertaking a Nicopress splice, determine the proper tool and sleeve for the cable to be used. Refer to proper references for details on sleeves, tools, and the number of presses required for the various sizes of aircraft cable. The tool must be in good working condition and properly adjusted to ensure a satisfactory splice.

(b) To compress a sleeve, have it well-centered in the tool groove with the major axis of the sleeve at right angles to the tool. If the sleeve appears to be out of line after the press is started, open the tool, re-center the sleeve, and complete the press.

(4) **Lap Splice** - Lap or running splices may also be made with copper oval sleeves. When making such splices, it is usually necessary to use two sleeves to develop the full strength of the cable. The sleeves should be positioned as shown in (B) of Figure 201, and the compressions made in the order shown. As in the case of eye splices (refer to Figure 202), it is desirable to have the cable ends extend beyond the sleeves sufficiently to allow for the increased length of the compressed sleeves.

F. **Terminal Gauge** - To make a satisfactory copper sleeve installation, it is important that the amount of sleeve pressure be kept uniform. The completed sleeves should be checked periodically with the proper gauge. Hold the gauge so that it contacts the major axis of the sleeve. The compressed portion at the center of the sleeve should enter the gauge opening with very little clearance, as shown in Figure 203. If it does not, the tool must be adjusted accordingly.

2. Cable System Inspection

A. Aircraft cable systems are subject to a variety of environmental conditions and deterioration. Wire or strand breakage is easy to visually recognize. Other kinds of deterioration such as wear, corrosion, and/or distortion are not easily seen, therefore, control cables should be removed periodically for a more detailed inspection.

(1) At each annual or 100 hour inspection, all control cables must be inspected for broken wire strands. Any cable assembly that has one broken wire strand located in a critical fatigue area must be replaced.

(2) A critical fatigue area is defined as the working length of a cable where the cable runs over, under, or around a pulley, sleeve, or through a fair-lead; or any section where the cable is flexed, rubbed, or worked in any manner; or any point within 1 ft. of a swaged-on fitting.

(3) A swaged-on fitting can be an eye, fork, ball, ball and shank, ball and double shank, threaded stud, threaded stud and turnbuckle, compression sleeve, or any hardware used as a termination or end fitting on the cable. These fittings may be attached by various swaging methods such as rotary swaging, roll swaging, hydraulic pressing, and hand swaging tools (refer to MIL-T-781). The pressures exerted on the fittings during the swaging process sometimes pinch the small wires in the cable. This can cause premature failure of the pinched wires, resulting in broken wires.

(4) Close inspection in these critical fatigue areas must be made by passing a cloth over the area that will snag on broken wires. This will clean the cable for a visual inspection, and detect broken wires if the cloth snags on the cable. Also, a very

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careful visual inspection must be made since a broken wire will not always protrude or stick out, but may lie in the strand and remain in the position of the helix as it was manufactured. Broken wires of this type may show up as a hairline crack in the wire. If a broken wire of this type is suspected, further inspection with a magnifying glass of 7 power or greater, is recommended. Figure 204 shows a cable with broken wires that was not detected by wiping, but was found during a visual inspection. The damage became readily apparent when the cable was removed and bent as shown in the figure below.

(5) Kinking of wire cable can be avoided if properly handled and installed. A cable taking a spiral shape as the result of unnatural twist causes kinking. One of the most common causes for this twist is improper unreeling and uncoiling. In a kinked cable, strands and wires are out of position, which creates unequal tension and brings excessive wear at this part of the cable. Even though the kink may be straightened so that the damage appears to be slight, the relative adjustment between the strands has been disturbed so that the cable cannot give maximum service and should be replaced. Inspect cables for a popped core or loose strands. Replace any cable that has a popped core or loose strands regardless of wear or broken wires.

(6) External wear patterns will extend along the cable equal to the distance the cable moves at that location and may occur on one side of the cable or on its entire circumference. Replace flexible and non-flexible cables when the individual wires in each strand appear to blend together (outer wires worn 40 to 50 percent)

(7) As wear is taking place on the exterior surface of a cable, the same condition is taking place internally, particularly in the sections of the cable which pass over pulleys and quadrants. This condition is not easily detected unless the strands of the cable are separated. This type of wear is a result of the relative motion between inner wire surfaces. Under certain conditions, the rate of this type of wear can be greater than that occurring on the surface.

(8) Carefully examine any cable for corrosion, when it has a broken wire in a section that is not in contact with a wear-producing airframe component, such as a pulley, fair-lead, etc. If the surface of the cable is corroded, relieve cable tension and carefully force the cable open by reverse twisting, and visually inspect the interior. Corrosion on the interior strands of the cable constitutes failure, and the cable must be replaced. If no internal corrosion is detected, remove loose external rust and corrosion with a clean, dry, coarse-weave rag, or fiber brush. Do not use metallic wool or solvents to clean installed cables. Use of metallic wool will embed dissimilar metal particles in the cables and create further corrosion problems. Solvents will remove internal cable lubricant, allowing cable strands to abrade and further corrode. After thorough cleaning, sparingly apply specification MIL-C-16173, grade 4, corrosion-preventive compound to the cable. Do not apply the material so thick that it will interfere with the operation of cables at fair-leads, pulleys, or grooved bellcrank areas.

(9) Examine cable runs for incorrect routing, fraying, twisting, or wear at fair-leads, pulleys, anti-abrasion strips, and guards. Look for interference with adjacent structure, equipment, wiring, plumbing, and other controls. Inspect cable systems for binding, full travel, and security of attaching hardware. Check for slack in the cable system. Actuate the controls, and check for friction or hard movement that are indications that excessive cable tension exists.

NOTE: If the control movement is stiff after maintenance has been performed on the control surfaces, check for parallel cables twisted around each other or cables connected in reverse.

(10) Check swaged terminal reference marks for an indication of cable slippage within the fitting. Inspect the fitting assembly for distortion and/or broken strands at the terminal. Ensure that all bearings and swivel fittings (bolted or pinned) pivot freely to prevent binding and subsequent failure. Check turnbuckles for proper thread exposure and broken or missing safety wires/clips.

(11) Inspect pulleys for roughness, sharp edges, and presence of foreign material embedded in the grooves. Examine pulley bearings to ensure proper lubrication, smooth rotation, and freedom from flat spots, dirt, and paint spray. During the inspection, rotate the pulleys, which only turn through a small arc, to provide a new bearing surface for the cable. Maintain pulley alignment to prevent the cable from riding on the flanges and chafing against guards, covers, or adjacent structure. Check all pulley brackets and guards for damage, alignment, and security.

(12) Various cable system malfunctions may be detected by analyzing pulley conditions. These include such discrepancies as too much tension, misalignment, pulley bearing problems, and size mismatches between cables and pulleys. Examples of these conditions are shown in Figure 205.

(13) Inspect fair-leads for wear, breakage, alignment, cleanliness, and security. Examine cable routing at fair-leads to ensure that deflection angles are no greater than 3 degrees maximum. Determine that all guides and anti-abrasion strips are secure and in good condition.

(14) Examine pressure seals for wear and material deterioration. Seal guards should be positioned to prevent jamming of a pulley in case the pressure seal fails and pieces slide along the cable.

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3. Corrosion and Rust Prevention

A. To ensure a satisfactory service life for aircraft control cables, use a cable lubricant to reduce internal friction and prevent corrosion.

B. Coat the cable with rust-preventive oil, and wipe off any excess. Lubrication and corrosion preventive treatment of cables may be effected simultaneously by application of compound MIL-C-16173, grade 4. MIL-C-16173 compound should be brushed, sprayed, or wiped on the cable to the extent it penetrates into the strands and adequately covers the cable surfaces. It will dry "tack free" in 24 hours at 77° F.

4. Cable Maintenance

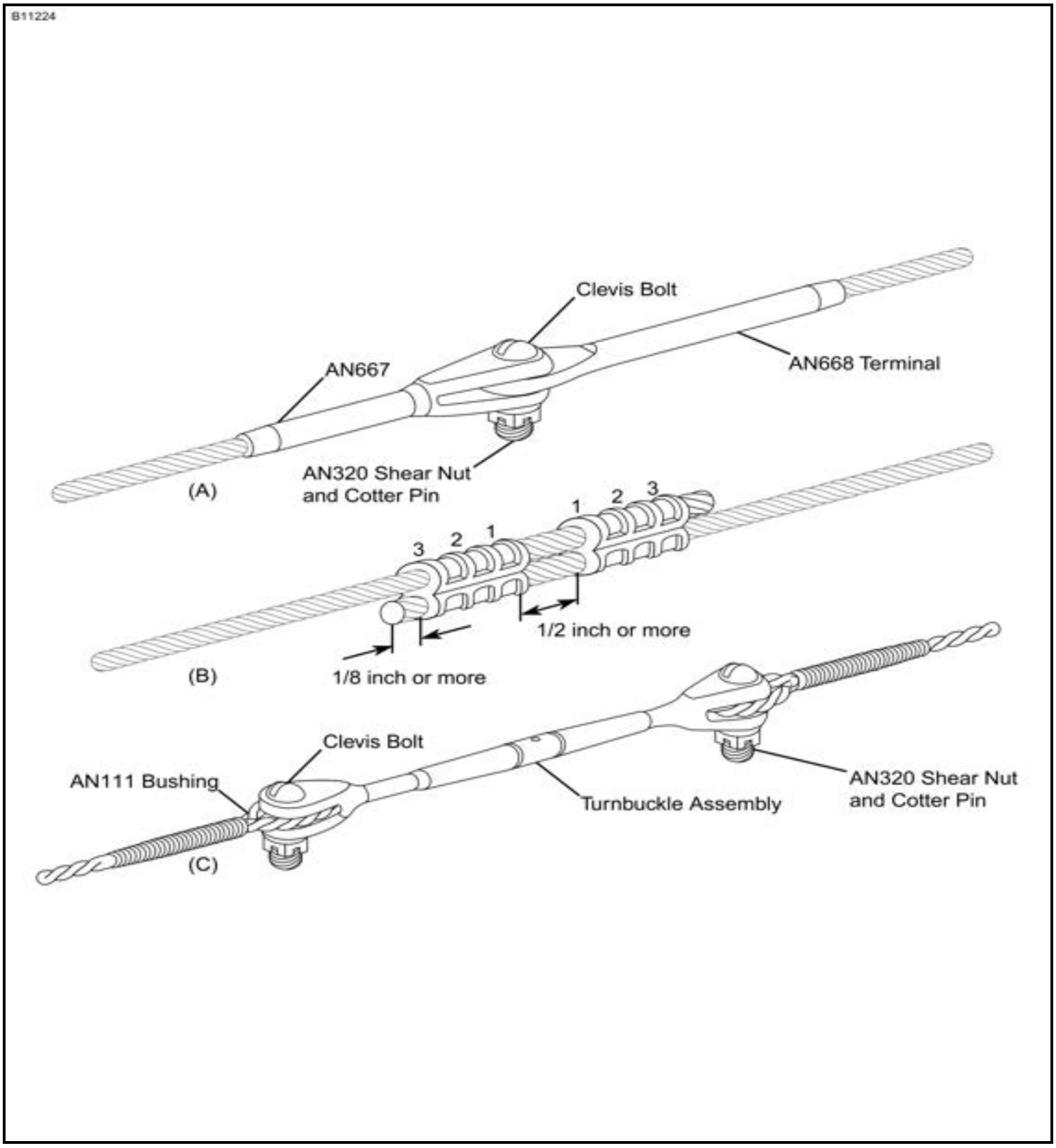
A. Frequent inspections and preservation measures such as rust-prevention treatments, will help to extend cable service life. Where cables pass through fair-leads or over pulleys, remove any accumulated heavy coatings of corrosion-prevention compound. Provide corrosion protection for these cable sections by lubricating with a light coat of grease or general-purpose, low-temperature oil.

5. Cable Tension Adjustment

A. Carefully adjust the control cable tension in accordance with the airframe requirements. If necessary, compensate for extreme surface temperature variations that may be encountered if the aircraft is operated primarily in unusual geographic or climatic conditions such as arctic, arid, or tropical locations. Use rigging pins and gust locks, as necessary, to ensure satisfactory results. At the completion of rigging operations, check turnbuckle adjustment and safetying in accordance with standard practices and information in this chapter.

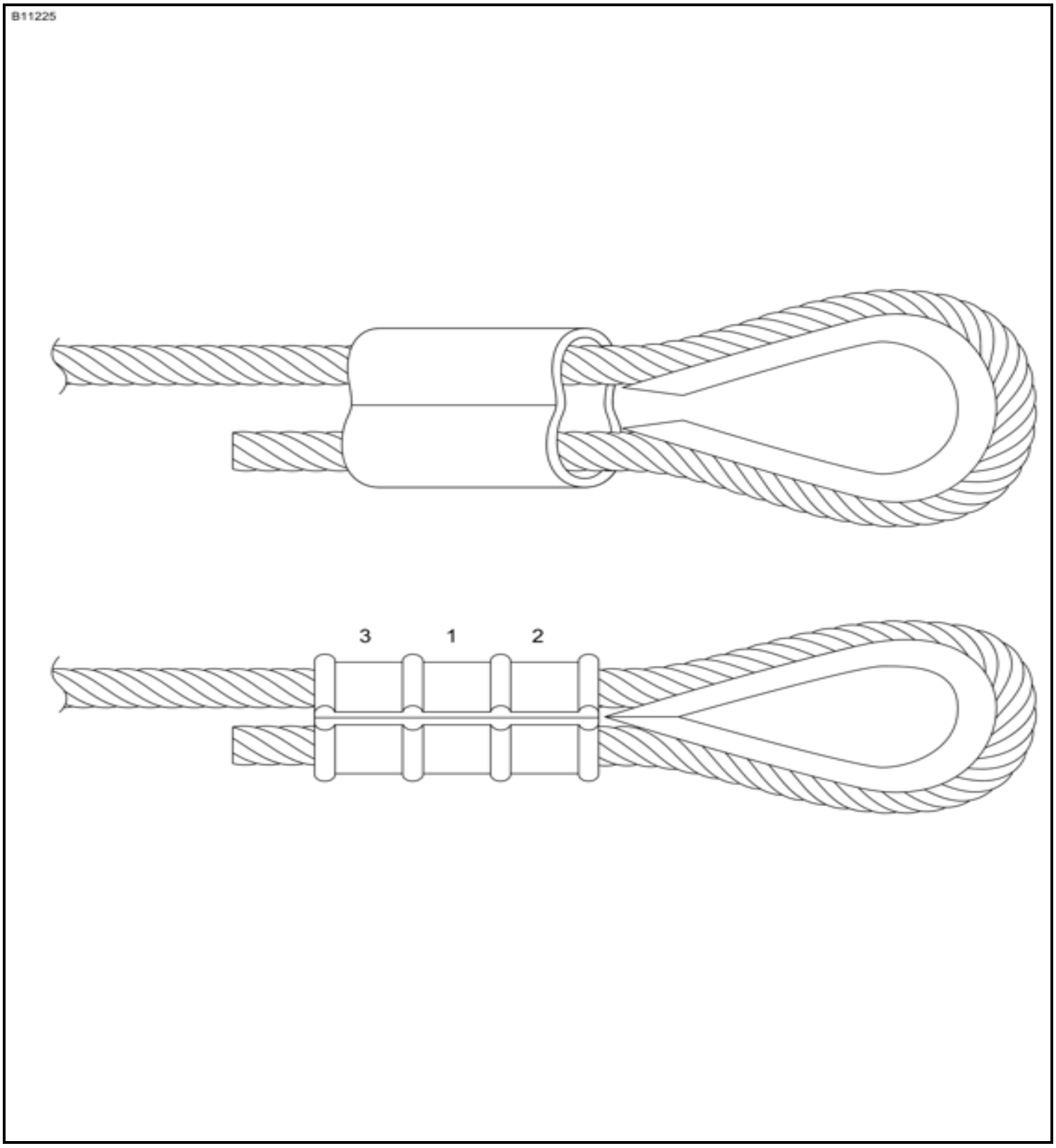
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Figure 201 : Sheet 1 : Lap Splices



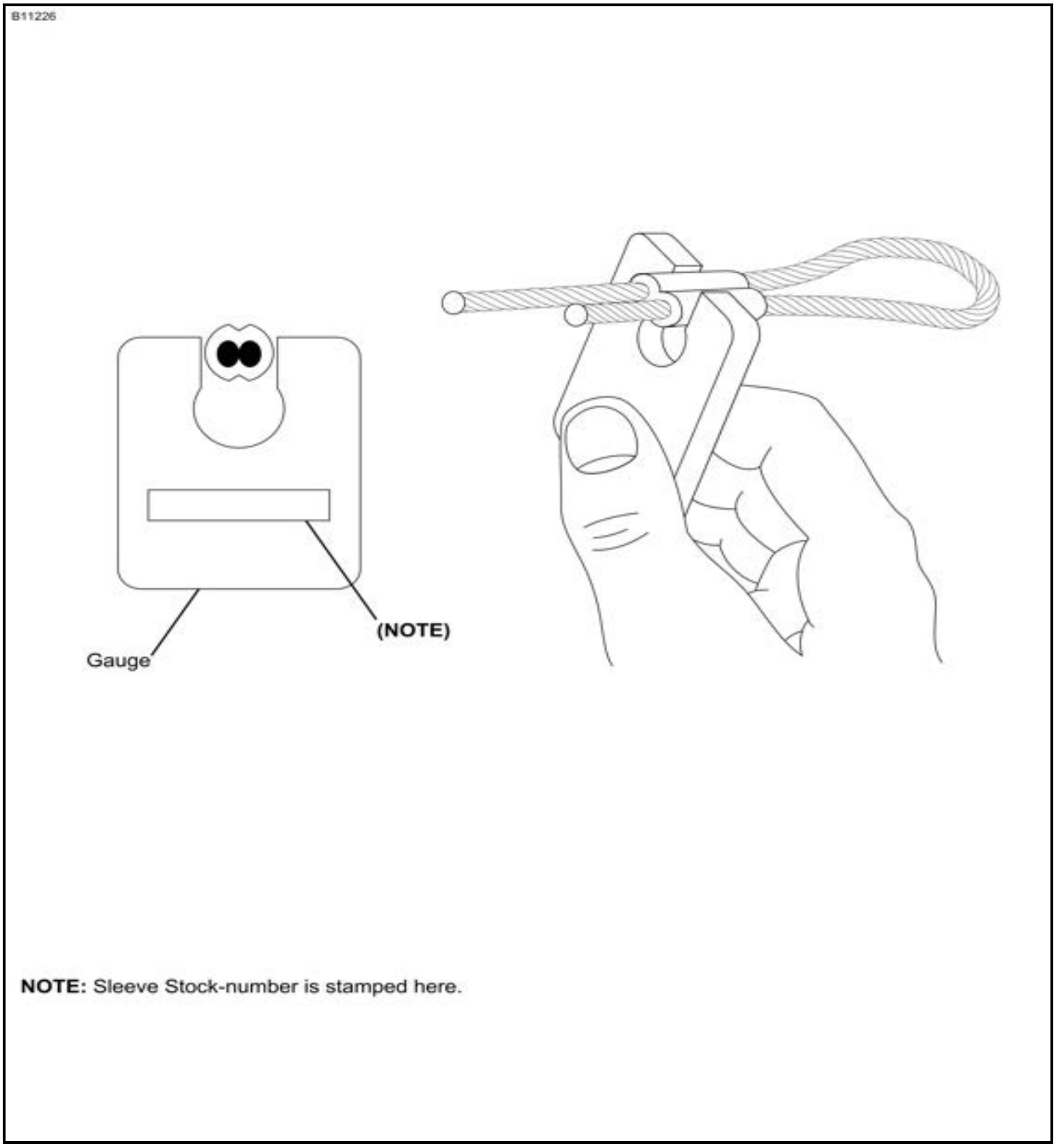
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Figure 202 : Sheet 1 : Typical Thimble-Eye Splice



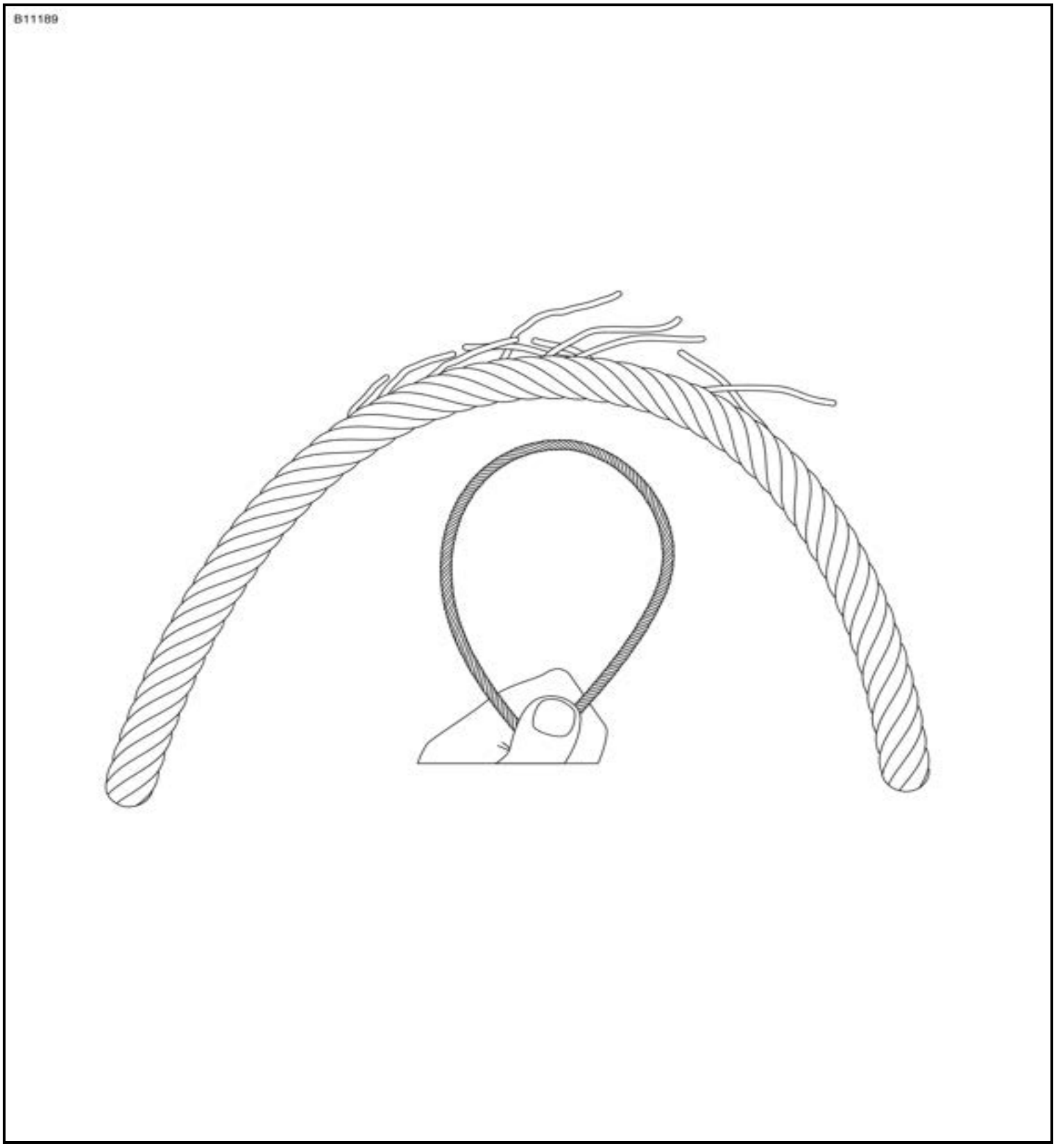
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Figure 203 : Sheet 1 : Typical Terminal Gauge



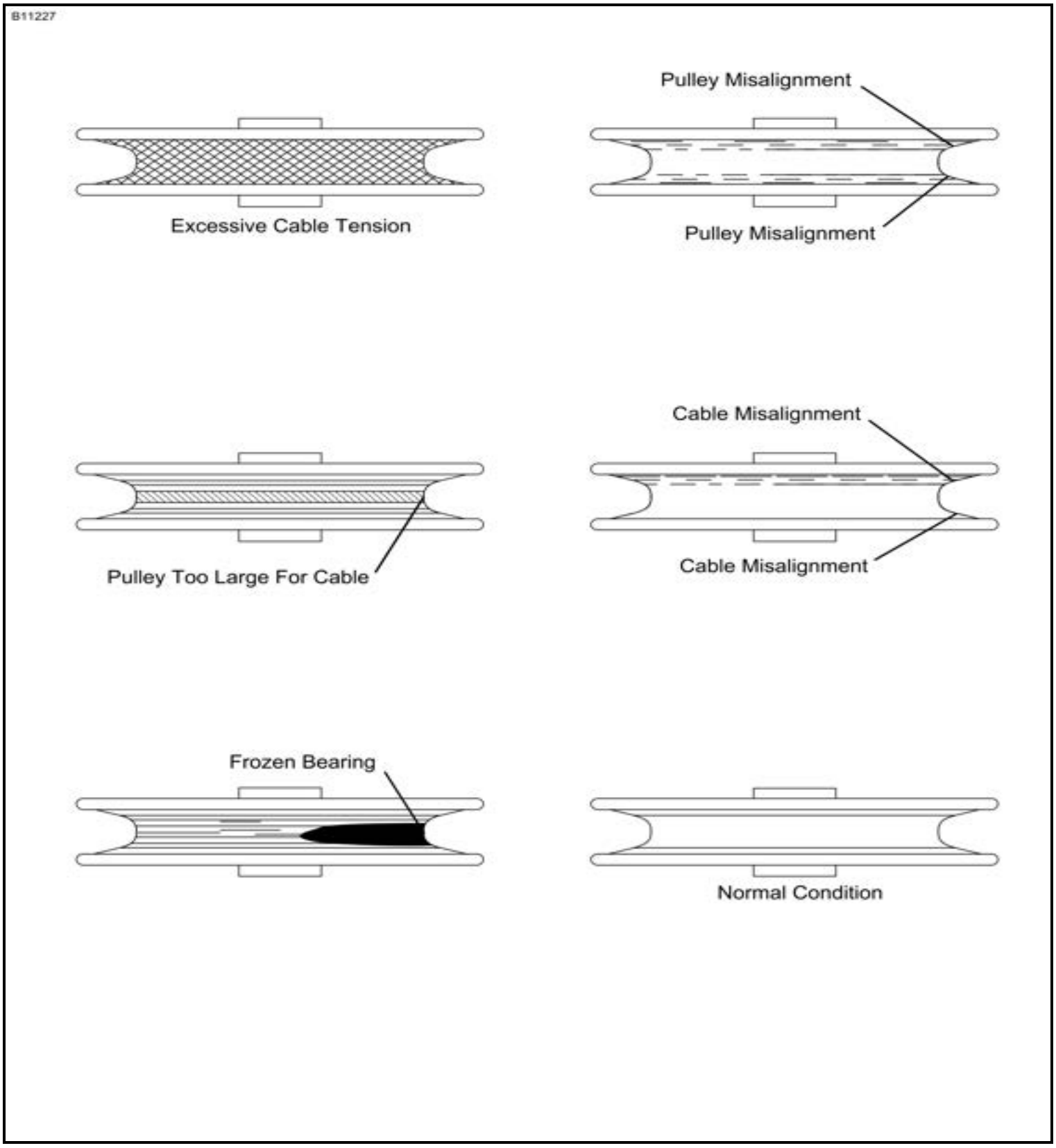
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Figure 204 : Sheet 1 : Cable Inspection Technique



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Figure 205 : Sheet 1 : Pulley Wear Patterns



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TURNBUCKLES - MAINTENANCE PRACTICES

1. Turnbuckles

A. A turnbuckle is a device used in cable systems to provide a means of adjusting tension. Turnbuckles have barrel-shaped sleeves with internal left- and right-hand threads at opposite ends. The cables, with terminals attached, are made to such a length that, when the turnbuckle is adjusted to give the specified cable tension, a sufficient number of threads on the terminal ends are screwed into the barrel to hold the load. The clip-locking turnbuckle and its associated parts are identical to standard AN and MS parts except for a slot grooved on the interior of the barrel and the shanks of the forks, eyes, etc. The clip-locking turnbuckle parts have the following drawing numbers:

(1) MS21251, turnbuckle body

(2) MS21252, turnbuckle clevis end

(3) MS21253, turnbuckle clevis end (for bearing)

(4) NAS649 and NAS651, turnbuckle clip

(5) MS21254 and NAS648, turnbuckle eye (for pin)

(6) MS21255 and NAS647, turnbuckle eye end (for wire rope)

(7) NAS645 and NAS646, turnbuckle fork

(8) MS21256, turnbuckle barrel locking clip

(9) AN130-170, turnbuckle assemblies

(10) MS21259 and MS21260, terminal, wire rope, stud

NOTE: Turnbuckles showing signs of thread distortion or bending should be replaced.

Turnbuckle ends are designed to provide the specified cable tension on a cable system. A bent turnbuckle would place undesirable stress on the cable, impairing the function of the turnbuckle.

2. Turnbuckle Installation

A. When installing cable system turnbuckles, it is necessary to screw both threaded terminals into the turnbuckle barrel an equal amount. It is essential that turnbuckle terminals be screwed into the barrel so that not more than three threads on the terminal are exposed. On initial installation, the turnbuckle terminals should not be screwed inside the turnbuckle barrel more than four threads.

3. Witness Hole

A. Some manufacturers of turnbuckles incorporate a "witness hole" in the turnbuckle barrel to ensure that the threaded cable terminals are screwed far enough into the barrel. The "witness hole" can be inspected visually or by using a piece of safety wire as a probe.

4. Safety Methods for Turnbuckles

A. Safety all turnbuckles with safety wire using either the double or single-wrap method or with any appropriately approved special safetying device complying with the requirements of FAA Technical Standard Order TSO-C21. The swaged and unswaged turnbuckle assemblies are covered by AN standard drawings. Do not reuse safety wire. Adjust the turnbuckle to the correct cable tension so that no more than three cable threads are exposed on either side of the turnbuckle barrel.

(1) **Double-Wrap Method** - Of the methods using safety wire for safetying turnbuckles, the method described here is preferred, although either of the other methods described is satisfactory. The method of double-wrap safetying is shown in Figure 201.

(a) Use two separate lengths of wire. Run one end of the wire through the hole in the barrel of the turnbuckle, and bend the ends of the wire toward opposite ends of the turnbuckle.

(b) Pass the second length of the wire into the hole in the barrel, and bend the ends along the barrel on the side opposite the first. Spiral the two wires in opposite directions around the barrel to cross each other twice between the center hole and the ends.

(c) Pass the wires at the end of the turnbuckle in opposite directions through the hole in the turnbuckle eyes or between the jaws of the turnbuckle fork, as applicable, laying one wire along the barrel and wrapping the other at least four times around the shank of the turnbuckle and binding the laid wires in place before cutting the wrapped wire off.

(d) Wrap the remaining length of safety wire at least four turns around the shank, and cut it off. Repeat the procedure at the opposite end of the turnbuckle.

(e) When a swaged terminal is being safety wired, pass the ends of both wires through the hole provided in the terminal

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for this purpose, and wrap both ends around the shank as previously described. If the hole is not large enough to allow passage of both wires, pass the wire through the hole, and loop it over the free end of the other wire, and then wrap both ends around the shank as previously described. Another satisfactory double-wrap method is similar to the previous method, except that the spiraling of the wires is omitted as shown in Figure 201.

(2) **Single-Wrap Method** - The single-wrap methods described in the following paragraphs and as illustrated in Figure 201 are acceptable but are not the equal of the double-wrap methods.

(a) **Single-Wrap (Spiral)** - Pass a single length of wire through the cable eye or fork or through the hole in the swaged terminal at either end of the turnbuckle assembly. Spiral each of the wire ends in opposite directions around the first half of the turnbuckle barrel, so as to cross each other twice. Thread both wire ends through the hole in the middle of the barrel so that the third crossing of wire ends is in the hole. Spiral the two wire ends in opposite directions around the remaining half of the turnbuckle, crossing them twice. Pass one wire end through the cable eye or fork or through the hole in the swaged terminals, in the manner previously described. Wrap both wire ends around the shank at least four turns each, cutting off excess wire. This method is shown in view (C), Figure 201.

(b) **Single-Wrap** - For the method shown in view (D), Figure 201, pass one length of wire through the center hole of the turnbuckle, and bend the wire ends toward opposite ends of the turnbuckle. Pass each wire end through the cable eye or fork or through the hole in the swaged terminal, and wrap each wire around the shank for at least four turns, cutting off excess wire. After safetying, no more than three threads of the turnbuckle threaded terminal should be exposed.

5. Secured Safety-Wired Turnbuckles

A. Before securing turnbuckles, threaded terminals should be screwed into the turnbuckle barrel until no more than three threads of either terminal are outside the barrel. After the turnbuckle has been adjusted for proper cable tension, two pieces of safety wire are inserted with half the wire length into the hole in the center of the turnbuckle barrel. The safety wires are bent so that each wire extends half the length of the turnbuckle on top and half on bottom. The ends of the wires are passed through the hole in the turnbuckle eyes or between the jaws of the turnbuckle fork, as applicable. The wires are then bent toward the center of the turnbuckle, and each wire is wrapped around the shank four times, binding the wrapping wires in place as shown in Figure 202.

B. When a swaged terminal is being secured, one wire is passed through the hole in the terminal and is looped over the free end of the other wire and both ends wrapped around the shank. All lock wire used in the safetying of turnbuckles should be carbon steel, corrosion-resistant steel, nickel-chromium iron alloy (Inconel), nickel-copper alloy (Monel), or aluminum alloy. For safety cable diameter of safety wire size and material, refer to Table 201.

C. Care should be exercised when safety wiring, particularly where corrosion will present a problem, because smaller wire sizes tend to crack when twisted.

Table 201. Turnbuckle Safetying Guide

Cable Size	Type of Wrap	Diameter of Safety Wire (inches)	Material (Annealed Condition)
1/16	Single	0.040	Copper, brass.*
3/32	Single	0.040	Copper, brass.*
1/8	Single	0.040	Stainless steel, Monel and "K" Monel.
1/8	Double	0.040	Copper, brass.*
1/8	Single	0.057 min.	Copper, brass.*
5/32 and greater	Double	0.040	Stainless steel, Monel and "K" Monel.
5/32 and greater	Single	0.057 min.	Stainless steel, Monel and "K" Monel.
5/32 and greater	Double	0.0512	Copper, brass.*
*** Galvanized or tinned steel, or soft iron wires are also acceptable.**			

6. Special Locking Devices

A. Several turnbuckle-locking devices are available for securing turnbuckle barrels such as wire-locking clips. Persons intending to use a special device must ensure that the turnbuckle assembly has been designed to accommodate such devices. A typical unit is shown in Figure 203. When special locking devices are not readily available, the use of safety wire is acceptable.

B. **Assembling and Securing Clip-Lock Turnbuckles** - Wire clip-locking turnbuckles are assembled and secured in the following ways (refer to Figure 204):

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(1) Engage the threads of the turnbuckle barrel with the threads of the cable terminal, and turn the barrel until proper cable tension is reached.

(2) Align the slot in the barrel with the slot in the cable terminal.

(3) Hold the lock clip between the thumb and forefinger at the loop end, and insert the straight end of the clip into the opening formed by the aligned slots. Refer to Table 202.

(4) Bring the hook end of the lock clip over the hole in the center of the turnbuckle barrel, and seat the hook loop into the hole.

(5) Apply pressure to the hook shoulder to engage the hook lip in the turnbuckle barrel and complete safety locking of one end of the turnbuckle.

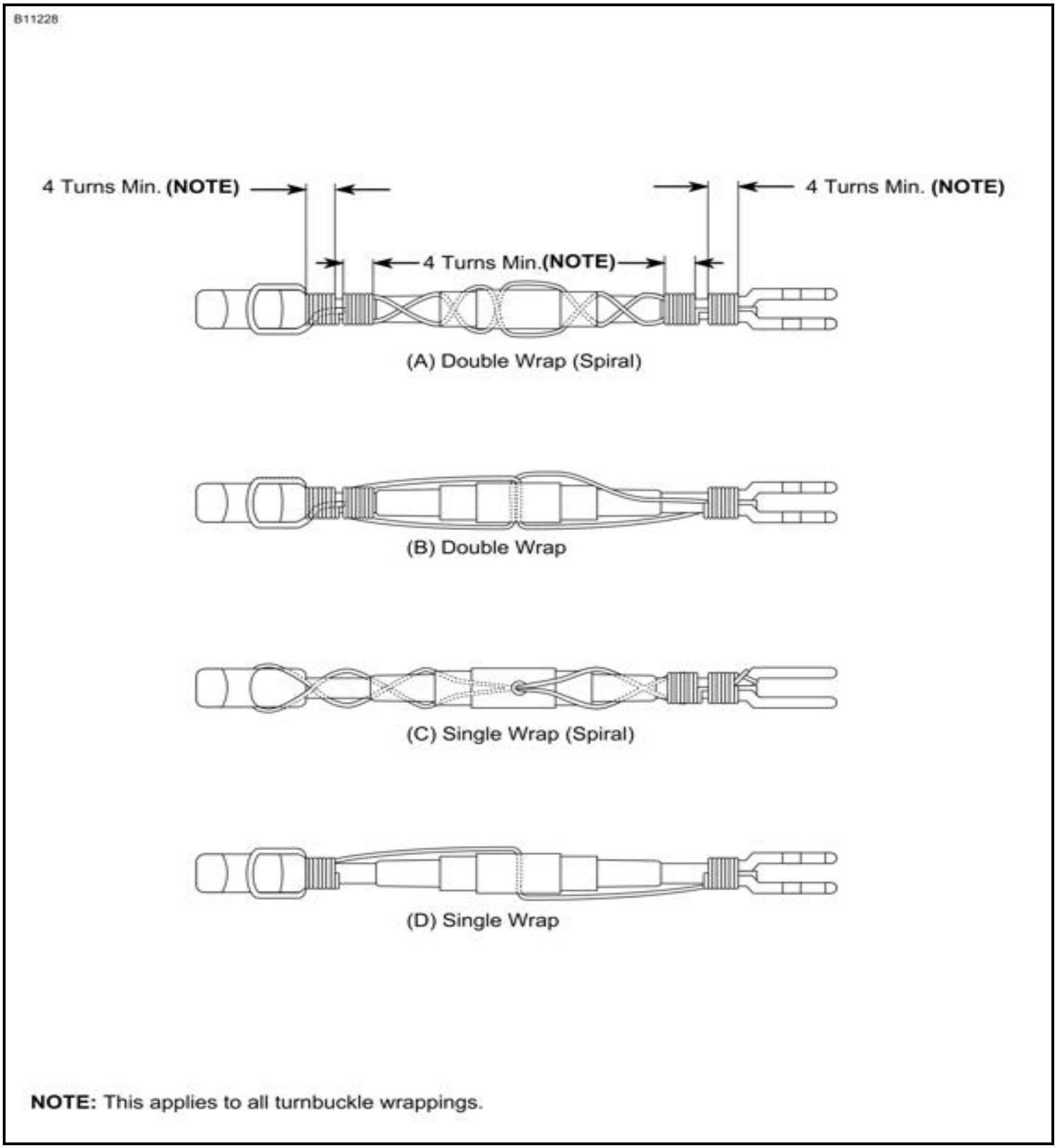
NOTE: Repeat the above steps to safety lock the opposite end of the turnbuckle. Either lock clips may be inserted in the same turnbuckle barrel hole or they may be inserted in opposite holes. However, do not reverse-wire locking clips.

Table 202. Locking-Clip Application

Nominal Cable Diameter	Thread Unf-3	Locking Clip MS21256	Turnbuckle Body MS21251
1/16	No. 6-40	-1	-2S
1/8	1/4-28	-1	-4S
1/8	1/4-28	-2	-4L

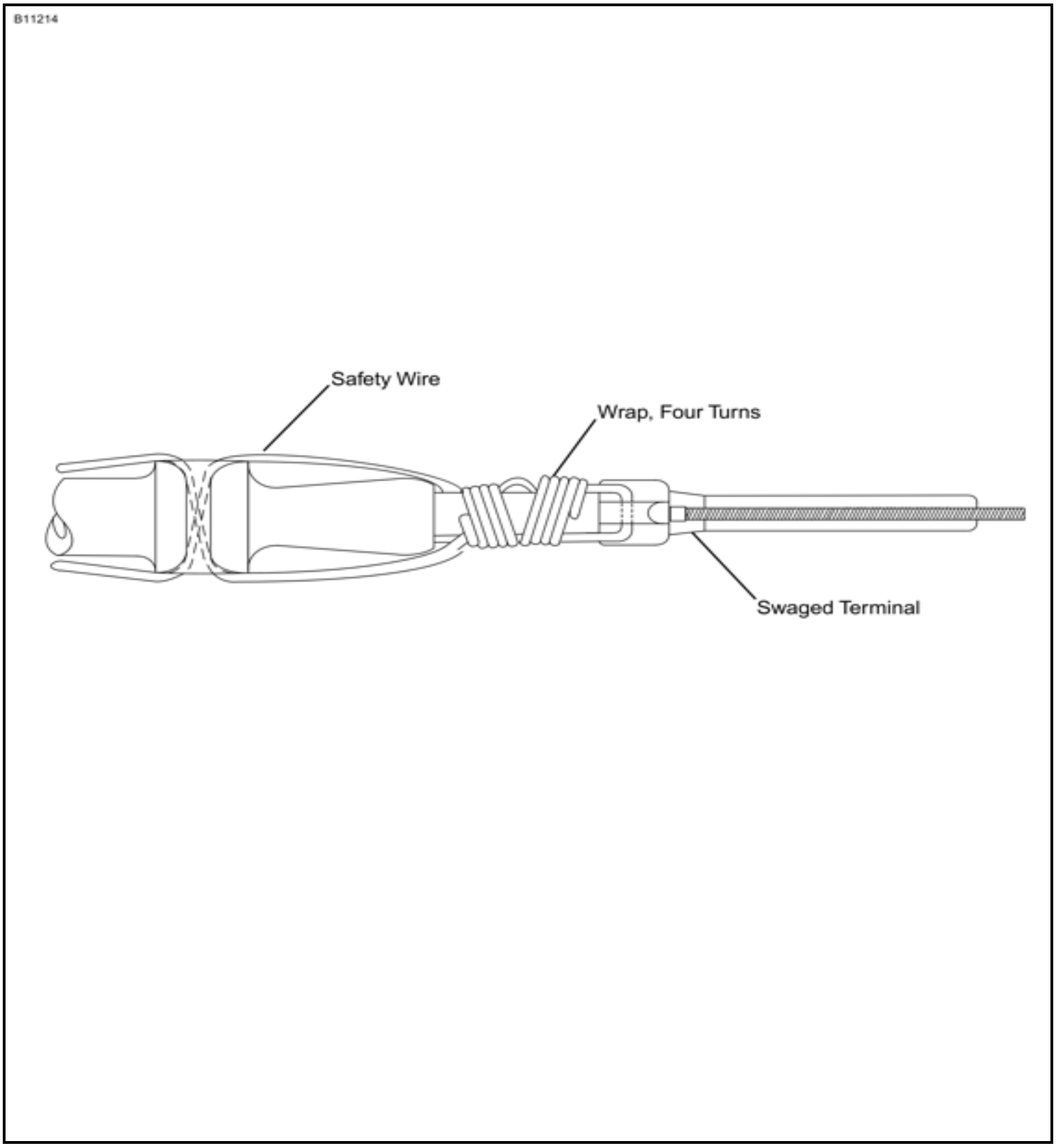
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Figure 201 : Sheet 1 : Safetying Turnbuckles



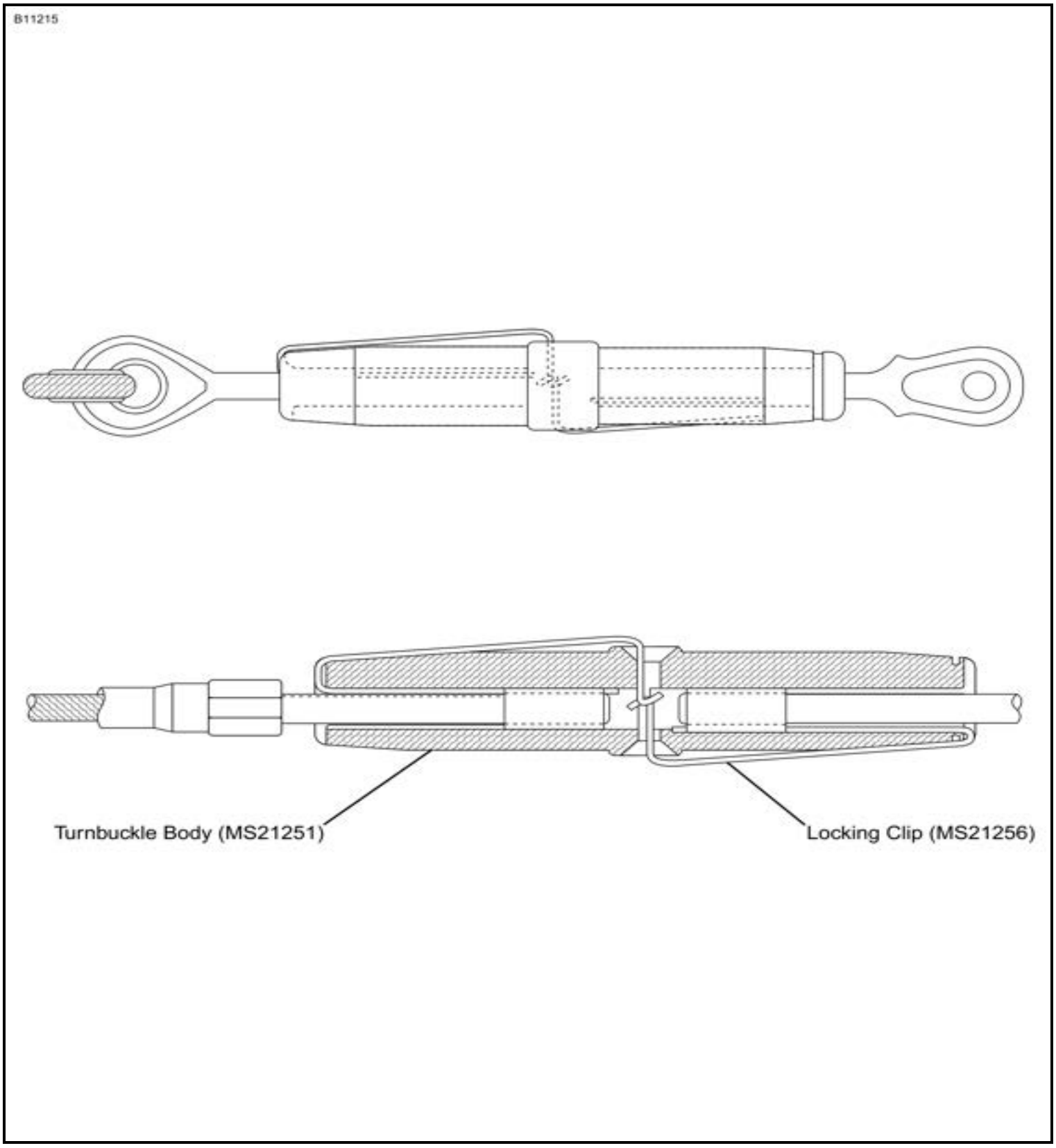
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Figure 202 : Sheet 1 : Securing Turnbuckles



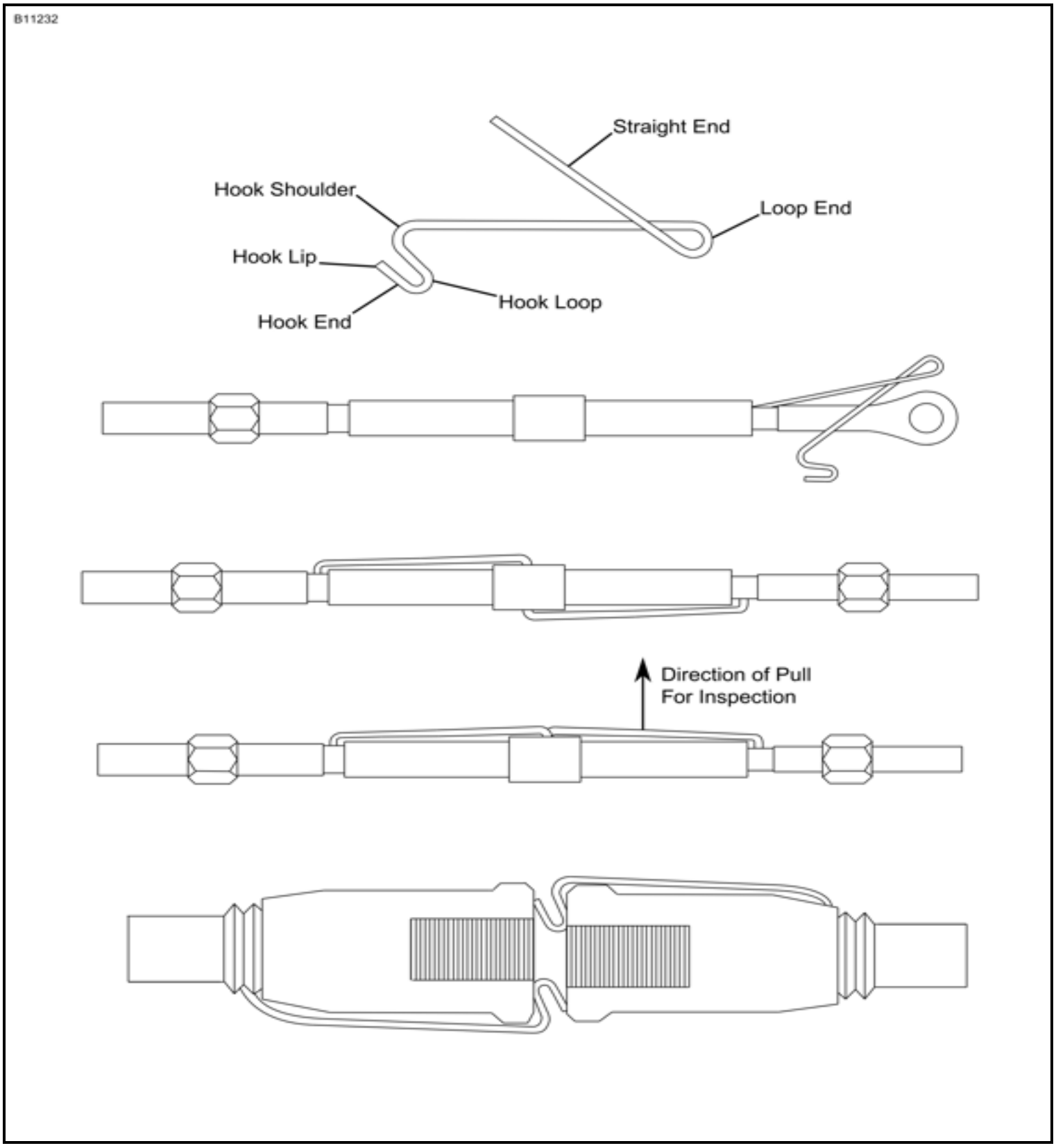
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Figure 203 : Sheet 1 : Clip-Type Locking Device



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Figure 204 : Sheet 1 : Assembling and Securing Clip-Locking Turnbuckles



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SOLVENTS, SEALANTS AND ADHESIVES - DESCRIPTION AND OPERATION

1. Solvents, Sealants, and Adhesives

A. Many general purpose solvents, sealants, and adhesives are used in the aircraft.

B. Solvents are used for thinning and cleaning. Use of solvents used for painting are covered in Chapter 51. MPK and alcohol are used for cleaning of composite parts before bonding and their specific use is described in Chapter 51.

C. Sealants are used for protection, sealing, and thread locking. These items will be specifically called out in specific maintenance manual chapters where their use is required.

D. Adhesives are used in repair and installation. Special purpose adhesives are used for composite repair, composite bonding, upholstery installation, static wick installation, and window installation. Refer to specific maintenance manual chapters for instructions, precautions, and use of these adhesives.

E. Many oils and lubricants are also used.

F. Special purpose cleaners are also listed.

G. Table 1 (Engine and General Purpose Materials) and Table 2 (Special Adhesives, Solvents, and Other Materials) list these items.

Table 1. Engine and General Purpose Materials

Part Number	Product Description of Material	Cessna Specification or Vendor
LI100	Avgas, Gasoline	
Aeroshell 2f	Break-In Oil, Engine, Mil-C-6529 Type II	Aeroshell
Aeroshell 15W50	Oil, Engine	Aeroshell
Z24E024	Oil, Red Hydraulic MIL-H-5606	Esco
	Oil, General Purpose, Lubricating MIL-L-7870	
Aeroshell 22Mobil 28	Grease, Wheel Bearing MIL-G-81322	AeroshellMobil
	Antiseize Compound MIL-T-5544	Lubtork
DC 7	Silicone Release Compound	Dow Corning
	SAE 10 Oil, Grease Seal Preparation	
Aeroshell 6	Propeller Grease	Aeroshell
	K&N Air Filter Cleaner and Solvent	K&N
	Windex, Glass Cleaner, Instruments And Moving Map Displays	
	P210 Plastic Cleaner, Windows	Sumner Labs
	Permatex #2	SX519040 or Loctite
RTV133	Silicone Rubber, Black	E.V. Roberts
RTV5818	Silicone Rubber Caulk, Clear 400° F	E.V. Roberts General Electric
440014	Sealant, High Pressure	ND Industries
PR 1428	Fuel Tank Access Panel and Fitting Sealant	PRC Courtalds
AC236	Fuel Tank Sealant	AC Tech
	Paint (Refer to Chapter 51)	SX512701
	Zinc Oxide Primer	SX513840
1522	Fire Resistant Paint (Refer to Chapter 51)	SX512701
	Zinc Chromate Primer	
	Acetone	
	Alcohol	
	MPK	

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325 Solvent UN1268	Cleaning Solvent	
RTV81409	Silicone Rubber, Red	Permatex
RTV162	Silicone Sealant, White, (Type V, Class E)	GE
14320 (47 ml cartridge) or 14385 (400 ml cartridge)	Plastic Welder I	SX513600 or ITW Devcon
14340 (47 ml cartridge) or 14390 (400 ml cartridge)	Plastic Welder II	SX513600 or ITW Devcon
1307LV	Jeffco Epoxy Resin with 3102 Hardener	SX513600 or Jeffco Epoxy Products

Table 2. Special Adhesives, Solvents and Other Materials

Part Number	Product Description of Material	Cessna Specification or Vendor
MGS418L MGS418H	Adhesive (Structural), Two Part Epoxy	SX513120
LP-89	Conductive Adhesive, Two Part Epoxy	SX518001lunar Products
EA9321	Hysol Adhesive, Two Part Epoxy	DEXTERE.V. Roberts
EA9339	Hysol Adhesive, Two Part Epoxy	DEXTERE.V. Roberts
1805	Adhesive, Window Adhesive, Two Part	SX535601Casco Than
1806	Curing Agent, Window Adhesive, Two Part	SX535601Casco Than
1821	Curing Agent, Window Adhesive, Two Part	SX535601casco Than
ADH105P	Adhesive, Upholstery	Keyston
242	Loctite Threadlocker Medium (Blue) Primer N Or T	Loctite
243	Loctite Threadlocker Medium (Blue) Primer N Or T	Loctite
262	Loctite Threadlocker (Red) Primer N or T	Loctite
542	Loctite Threadlocker (Brown) Primer N	Loctite
609	Loctite Retaining Compound (Green) Primer T	Loctite
620	Loctite Retaining Compound (Green) Primer N	Loctite
660	Loctite Retaining Compound (Silver) Primer N	Loctite
675	Loctite Retaining Compound (Green) Primer T	Loctite
N	Loctite Primer	Loctite
T	Loctite Primer	Loctite

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LIGHTNING PROTECTION AND STATIC DISSIPATION - MAINTENANCE PRACTICES

1. Lightning Protection and Static Dissipation Systems

A. The Cessna 400 (LC41-550FG/T240) airframe is protected during lightning strikes by a combination of electrical grounding and metallic mesh over the composite structure. The lightning strike event is very powerful (hundreds of thousands of amps), of short duration (acting like very high frequency electronics), and of a powerful inductive and magnetic nature that can deform very strong conductive elements. Deviations from the approved design may not provide crew or airframe protection.

B. The metallic mesh conducts the currents of a lightning strike from the attachment point to the arc exit point. The requirements of this mesh are dependent on aircraft location.

C. Chapter 51 defines mesh requirements and mesh repair procedures.

D. **SAFE Strips**

(1) The aircraft interior is specially grounded to avoid large potential differences from one point to another during a lightning strike. This protection is accomplished by grounding bars, grounding straps, and Special Aluminum Foil Edging (SAFE) strips.

(2) SAFE strips are thin self adhesive aluminum foil. They are strategically placed in the cockpit under the upholstery and seats on the composite structure. Refer to Figure 201. SAFE strips run across the fuselage from one grounding bar to the other.

(3) SAFE Strip Material Requirements:

(a) Adhesive Backed Aluminum Foil P/N 971023 from ALUMAT INC.

(b) MS20470AD4-4 Rivets

(c) AN960-4 Washers

(d) Squeegee for rubbing down SAFE strips

(e) Scissors for cutting SAFE strips

(f) Alcohol

(g) Oil-free Rags

(4) SAFE strips should be replaced or repaired when they are severed across more than one half of the existing width.

(5) SAFE strip repair foil must make contact with the existing foil. This is done by folding over the ends of the repair piece and securing the overlap area that is not secured with the self-adhesive backing of a new overlapping piece. This method is shown in Figure 202. Be sure to adhere to the overlap requirements of 1.0 inch foil-to-foil contact around the perimeter of the repair.

(6) Clean all surfaces to which SAFE strip material must be applied. Use alcohol and clean, oil-free rags. Wipe surface, turning rag to use a new surface with each wipe. Apply the self-adhesive SAFE strip material by carefully aligning material and rubbing it down with a squeegee. Work slowly and carefully to prevent wrinkles and bubbles. Small wrinkles and bubbles less than 1.0 inch across are acceptable. Large bubbles should be popped with a pin or knife prick and squeegeed down. Cutting out the offending material and replacing it with a suitable patch can repair large wrinkles or creases in the SAFE strip. Be sure to follow the repair guidelines from the previous section.

(7) SAFE strips are grounded to the grounding bars with rivets. Refer to Figure 203. This connection should be inspected. If electrical contact is not confirmed by visual inspection of contact between the washer and SAFE strip, the connection should be removed for replacement. The use of a voltmeter to check the connection will not work. If any connection exists from the SAFE strip and the grounding bar, conductivity will be indicated. The conductivity check does not substantiate the current carrying ability of the connections.

(8) Rivets are MS20470AD4-4 pop type and secure AN960-4 washers against the SAFE strips.

(9) If complete replacement of a SAFE strip is required, the material should be folded over at the ends where contact with the grounding bar is required. This procedure is shown in Figure 204. Installation of rivets and washers complete the electrical contact connection.

(10) SAFE strips run into the footwell. Inspect this SAFE strip connection by visual confirmation of aluminum foil integrity in the contact area. This detail is shown in Figure 205. Note that the SAFE strip material wraps over the edges of the footwell, from the inside surface to the outside, to make contact with the SAFE strip material on the fuselage floor.

E. **Grounding Straps** - Grounding straps and bars are more conventional conductors. They provide a high current carrying capability between major airframe elements. Grounding straps can be found between the engine mount and the fuselage

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grounding bars, flight control surfaces and wing or stabilizers, gearbox and grounding bar, instrument panel and grounding bar, engine and radio rack, and various avionics components and the radio rack and instrument panel.

(1) Braided Grounding Straps - These are located:

(a) Between the ailerons and wing (one each side)

(b) Between the rudder and vertical stabilizer

(c) Between the fuselage and elevator

(d) Between the gearbox and grounding bar (one each side)

(e) Between the instrument panel and grounding bar (one each side)

(2) Solid Strap Conductors - These are located between the grounding bars and the upper engine mount bolts, one each side.

F. **General Aircraft Conductivity Check**

(1) The aircraft has nine static wicks. These wicks dissipate the static charge the aircraft develops as it flies through the air. The static charge the aircraft develops is strongly dependent on the atmospheric conditions at the time. Snow is most likely the atmospheric condition that will create the largest static charge. Improper static wick function may show up as a crackling sound from the radio speakers.

(2) Check each static wick mounting pad (nine each) for low resistance to the nose gear or engine bonding strap. Each should measure less than 10 ohms.

NOTE: If the resistance is greater than 10 ohms, this could indicate corrosion at the hinge points.

(a) Check the aileron hinge to the nose gear or engine bonding strap for low resistance. This value should be less than 10 ohms. Refer to Chapter 27, Aileron Control System - Maintenance Practices.

(3) The aircraft fuel filler caps and mounting rings should also be grounded to the rest of the airframe. This is especially important to prevent static discharge during refueling.

(4) Check the fuel cap rings for low resistance to the nose gear or engine bonding strap. This value should be 0 to 500 ohms.

2. Inspection and Repair After Lightning Strike

A. In the event of a lightning strike, or suspected lightning strike, inspect the surface of the aircraft for evidence of damage such as bubbled or bumpy paint.

B. Remove paint and bodywork until mesh is exposed.

NOTE: If damage is noted to the composite material, evidenced by brown or darker fibers, contact Cessna Aircraft Company for further instructions.

C. Using a 10x magnifying glass isolate the entire damaged area of mesh and a 1 inch square area of damaged mesh within that, evidenced by deformed mesh strands - flat or bulbous in appearance.

D. Count the number of damaged strands in that 1 inch square area and calculate what percentage that is of the entire affected area. If it is less than 2 percent of the total area, no mesh repair is necessary; if greater than 2 percent of the total area, a mesh repair is necessary.

E. For mesh repairs, overlap affected area 1 inch beyond damaged area with replacement mesh and apply using Jeffco epoxy.

F. Upon completion of repairs or aircraft exterior inspection, bodywork and paint affected areas in accordance with Section 51-70-00, Paint Repair and Painting.

G. Inspect all hardware associated with damaged areas for magnetism. If no magnetism is noted, reuse hardware.

H. If hardware is found to be magnetized, inspection of respective hardware locations where hardware contacts mesh is required. Wing attachment hardware contacting mesh must have associated bolt holes inspected for damaged mesh. If mesh around the bolt holes is damaged, the affected holes and hardware must be increased one size to restore contact of mesh to hardware for proper lightning protection. Enlarge holes using a 5/16 tapered drill ream.

I. Actuate flight controls to ensure proper operation. If defects are noted, inspect for evidence of arcing on control surface attachments and associated hardware and replace as needed.

J. Remove the circuit breaker panel in accordance with Chapter 25. Remove and replace the avionics bus surge suppressor attached to the front side of the aft circuit breaker panel half.

K. Reinstall the circuit breaker panel and do the electrical/avionics checkout procedures that follow for the system installation that is applicable, Avidyne Avionics system or the Garmin G1000 or G2000 system, If the systems do not function correctly, contact Cessna Aircraft Company for further instructions for repair or replacement of the equipment.

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L. Verify compass card accuracy.

M. Compliance with Teledyne Continental Motors Service Bulletin No. M88-9, for power plant lightning strike inspection criteria is recommended.

3. Checkout Description

A. **Avidyne Avionics**

(1) 'Buzz Box'

(a) Connect 'Buzz Box' to aircraft MAGs connecting to:

1 Right MAG sensor wire to center post on right MAG

2 Left MAG sensor wire to center post on left MAG

3 Ground sensor wire to engine ground

NOTE: It may require the propeller to be turned clockwise until an audible click can be heard for the MAGs to work correctly.

(b) Verify ignition switch positions:

1 Left

2 Right

3 Both

4 Off

(c) Remove the Buzz Box.

WARNING: Clear the area around the propeller of personnel and equipment. To avoid the engine from starting, ensure that the spark plugs are not installed or have been disconnected.

(2) Energize the starter with only the left bus energized and verify operation and proper direction of rotation of the engine. Energize the starter with only the right bus energized and verify the operation of the starter motor. The propeller should rotate clockwise as viewed from the pilot's seat. The Starter Engaged light on the annunciator panel should be lit when the Starter relays are energized. Remove the keys from the ignition switch and stow in the proper location.

(3) Verify operation of the battery switches and essential bus feed. Turn on only the left bus and verify items on the left bus are energized. Also check that the essential bus is energized. Turn on only the right bus and verify items on the right bus are energized. Check again that the essential bus is energized.

NOTE: No ground power is applied for this test.

(4) Connect a 14 VDC (S/N 41002 to 41500) or 28 VDC (S/N 41501 and on) power supply to the ground power plug. (Maintain voltage between 13 VDC and 14 VDC (S/N 41002 to 41500) or between 26 VDC and 28 VDC (S/N 41501 and on) for this test.) Turn on the crosstie switch and verify that the left bus is energized when the crosstie switch was turned to 'ON' and that both the right and left buses are energized. Verify that the green lights on the left and right voltage regulators are illuminated when the 'ALT' switches are turned on. (Voltage regulators are located on the inside of the firewall, right hand side.) Verify the ammeter shows a charge on the corresponding battery when that battery switch is turned on and the ammeter is in the 'BATT' mode.

(5) With the right 'ALT' switch on, check for approximately 10-11 volts (S/N 41002 to 41500) or 24-26 volts (S/N 41501 and On) on the F-1 terminal of the right alternator. Terminal F-2 is grounded. With the left 'ALT' switch on check for approximately 10-11 volts (S/N 41002 to 41500) or 24-26 volts (S/N 41501 and On) on the field terminal of the left alternator. Measure the resistance from the left alternator case, to the engine block. The total resistance should be less than 1.0 ohm.

(6) With ground power turned off and using batteries, energize the avionics master switch and check for voltage on the avionics bus with only the left bus energized and also with only the right bus energized, crosstie open.

(7) Apply ground power and turn on the position lights switch. Check all 4 bulbs for illumination and proper color orientation (green right side, red left side).

(8) Turn on the strobe lights and verify 3-4 flashes per event. Ensure that the wing flashes alternate between the left and right sides.

(9) Turn on the landing light and verify the inboard light illuminates (the one without a diffuser).

(10) Turn on the taxi light and verify the outboard light (with the diffuser) illuminates.

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(11) Turn on the Vapor Suppress switch and verify low speed operation of the boost pump.

(12) Momentarily move the back-up pump switch to the arm position. Verify that the blue arm light illuminates and the boost pump operates in high speed. The fuel pump annunciator should also light.

(13) Press the primer button and verify high-speed operation of the boost pump.

(14) Verify operation of the engine gauges that can be checked without the engine running: a) fuel level gauge, b) man press, c) oil temp, and d) dual amp gauge. (Cycle the engine instrument circuit breaker to test needle movement).

(15) Door Operational Checkouts;

(a) Close and lock left, right and baggage doors.

(b) Door Open light on annunciator panel should be extinguished.

(c) Open any door and ensure that the flip lights and the step lights stays lit for approximately 10 minutes.

(d) Open the right and baggage doors and ensure that the flip lights and the step lights stays lit for approximately 10 minutes.

(e) With all doors closed and locked, turn on Door Seal Pump Switch and verify pump operation - door seals inflate and pump turns off when seals are full.

(f) Door seal pump should not cycle (on and off) for at least 30 seconds.

(g) Open left door slowly; dump valve should relieve all pressure and door opens.

(h) Again, door seal pump should not cycle (on and off) for at least 30 seconds.

(i) Open right door slowly; dump valve should relieve all pressure and door opens.

(j) Turn door seal system off, slowly open either door to verify dump valve operation.

(16) Check ELT remote switch function (leave the ELT Transmitter in the armed mode). Tune the VHF COM to 121.5 MHz, and listen through the cabin speaker or the headsets. Turn the ELT switch, located on the right hand knee bolster, to the 'ON' position.

NOTE: Per FCC regulations the ELT system should only be checked during the first five (5) minutes of the hour.

(17) Test the static and pitot systems for leak rate and for proper operation.

CAUTION: DO NOT EXCEED A RATE OF CLIMB >2000 FEET PER MINUTE.

Static system leak rate = fpm at 1000 feet above field elevation. (Maximum leak rate allowed is 100 fpm at 1000 feet above field elevation for the static system only.) Raise static system 100 feet above field elevation and hold open the alternate static valve, located on the left side knee bolster (turn to **ALT**), the system should immediately drop to field elevation. With switch still in **ALT** position, raise pitot system to 200 kts. Close the valves on the pitot static test pump, then time and observe the pitot system leak rate. Verify that the airspeed tape on the PFD and the mechanical airspeed operate correctly. Maximum leak rate allowed is 25 kts per minute. Pitot System leak rate = _____kpm. Note: Conduct the test for the next task concurrently with this test item.

(18) Verify that the PFD is properly configured. While testing the pitot system, run the PFD and mechanical airspeed indicator high enough to verify that the following airspeed limitation markings are correct:

(a) White Range, 60 - 117 kias

(b) Green Range, 73 - 181 kias

(c) Yellow Range, 181 - 230 kias

(d) Red Range, above 230 kias

(19) **Pitot Heat Test**

CAUTION: Use care when touching the hot pitot mast. Do not operate pitot heat for more than one minute.

(a) Turn on the pitot heat switch on the rocker switch panel. Note that the current draw on the amp meter increases. Carefully feel with the back of your hand for actual heating at the pitot tube.

(b) Turn off the pitot heat. **Only leave the pitot heat on long enough to verify the operation of the heating element.**

(20) Ensure the flags of the turn coordinator located on the avionics shelf, and attitude gyro located on the instrument panel, are not displayed. Listen for the rotor of the gyros to spin up.

(21) Operate the flap switch and verify that the LED in the knob flashes while the flaps are in transition. Check all three positions. Verify the flashing light goes out once the flaps reach the position indicated on the handle.

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(22) **Trim Panel Adjustment**

(a) Verify operation of trim servos (two axis) for travel, direction of travel, and run them from stop to stop. Verify the operation of the on/off switch.

(b) Verify that the pilot's trim switch on the control stick (left side) overrides the copilot trim switch on the control stick (right side). Test both the pitch and the aileron trim.

(c) Ensure the trim panel indications agree with the external position of the tabs for the aileron and elevator trim and that the display properly indicates stop to stop.

(d) If trim panel adjustment is required contact Cessna Aircraft Company for instructions. If adjustments are made, re-verify operation of trim servos (two axis) for travel, direction of travel, and run them from stop to stop. Re-verify the operation of the on/off switch as well.

(23) Turn on the Autopilot Computer with the audio panel on at the same time. Engage and then disconnect the autopilot, while listening for the audio level of the AP DISC through the aircraft speaker. Turn off the autopilot computer, and remove from its tray. Adjust the Autopilot Disconnect Volume adjustment pot, located on the right side of the computer, just forward of the bezel, until the AP DISC Volume is set to a comfortable audio level. Take care not to adjust the AP DISC volume too low. Test the computer once completed.

(24) Perform Initial Set-Up Procedures for the Cessna 400 Avionics, as equipped.

(25) **Avionics Tests**

(a) Turn on the Avionics Master Switch and verify the operation of:

1 Comm 1 and 2 - Refer to Table 201.

2 GPS 1 and 2 - Refer to Table 202.

3 PFD - Refer to Table 203.

4 MFD - Refer to Table 204.

5 Audio System - Refer to Table 205.

6 Marker Beacon (NAV-401AP) - Refer to Table 206.

7 NAV (NAV-401AP) - Refer to Table 207.

8 ILS (NAV-401AP) - Refer to Table 208.

9 Autopilot (NAV-401AP) - Refer to Table 209.

10 Flight Director - Refer to Table 210.

11 Auto Trim - Refer to Table 211.

Table 201. Avionics Test - Comm 1/2

Comm1/2:

[ ]	[ ]	TX/RX 123.225
[ ]	[ ]	T/R QUALITY
[ ]	[ ]	SIDE TONE
[ ]	[ ]	MAN SQUELCH
[ ]	[ ]	PILOT'S PTT
[ ]	[ ]	COPILOT'S PTT

Table 202. Avionics Test - GPS 1/2

GPS 1/2:

[ ]	[ ]	Self Test: PFD EHSI agrees with self test data:(Conduct AP GPSS testing during GPS self test)
[ ]	[ ]	Sat Lock
[ ]	[ ]	Setup per procedure
[ ]	[ ]	Encoder Altitude
[ ]	[ ]	TIS traffic data

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[ ] [ ] DX to PFD, MFD
[ ] [ ] DX from PFD
[ ] [ ] S/W and data cards revisions match
[ ] [ ] Cross fill
[ ] [ ] S/W and data cards revisions match
[ ] [ ] KRDM as WPT (10.1 nm)

Table 203. Avionics Test - PFD

PFD:

[ ] [ ] Proper Setup for Cessna 400
[ ] [ ] RX valid GPS position data from GPS 1,2
[ ] [ ] GPSS, Nav, HDG and ALT info to autopilot
[ ] [ ] Knob operation
[ ] [ ] Air Data operation
[ ] [ ] Autopilot Annunciator

Table 204. Avionics Test - MFD

MFD:

[ ] [ ] Proper setup for aircraft type
[ ] [ ] RX valid GPS position data from GPS 1,2
[ ] [ ] Receives HDG and OAT data from PFD
[ ] [ ] Receives Stormscope or WX data as installed
[ ] [ ] Engine instrumentation data present and valid
[ ] [ ] Oil temp turned on
[ ] [ ] Receives and displays traffic information, if installed

Table 205. Avionics Test - Audio System

Audio System:

[ ] [ ] Pilot's ICS
[ ] [ ] Co-Pilot's ICS
[ ] [ ] Pass 1,2 ICS
[ ] [ ] ISO/CREW functions
[ ] [ ] Pilots/Co-pilots side tone quality and level
[ ] [ ] Emergency TX on Comm 1 with audio panel off
[ ] [ ] Nav 1, 2 Audio
[ ] [ ] Bose Headsets**REPEAT ALL AUDIO SYSTEM CHECKS**

Conduct the following tests using the NAV-401AP test set.

Table 206. Avionics Test - Marker Beacon (NAV-401AP)

Marker Beacon:

[ ] [ ] Outer Marker - 400hz tone, Blue Light
[ ] [ ] Middle Marker - 1300 Hz tone, Amber light
[ ] [ ] Inner Marker - 3Khz tone, White Light
[ ] [ ] Remote Display
[ ] [ ] Hi/Lo sensitivity tests, Hi/ Lo Split

Table 207. Avionics Test - Navigation Systems 1,2 - NAV (NAV-401AP)

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Navigation Systems 1,2 :

NAV:

[ ] [ ] Receive 112.80
[ ] [ ] Flags Out of view
[ ] [ ] CDI (Left / Center / Right)
[ ] [ ] To/From operation
[ ] [ ] 30 degree accuracy checks

Table 208. Avionics Test - Navigation Systems 1,2 - ILS (NAV-401AP)

ILS:

[ ] [ ] Receive 108.1
[ ] [ ] Localizer (Left / Center / Right)
[ ] [ ] Localizer flag pulled
[ ] [ ] Glide slope bars (Up / Center / Down)
[ ] [ ] Glide slope valid
[ ] [ ] Autopilot coupling and tracking checks in Nav Mode, testing above functions
[ ] [ ] Nav Audio
[ ] [ ] ILS sensitivity

Table 209. Avionics Test - Navigation Systems 1,2 - Autopilot (NAV-401AP)

Autopilot:

[ ] Master switch operation
[ ] Turn Coord. Valid
[ ] HDG bug operation
[ ] NAV (Tracks D-BAR)
[ ] CRS (Tracks Course Datum Pointer, No signal applied)
[ ] APR mode engaged on ILS freq.
[ ] Localizer Left Right (Stick Tracks)
[ ] Glide Slope soft capture
[ ] G/S bars up/down, stick tracks to glide slope bars
[ ] ALT hold mode engages and holds
[ ] ALT PRESELECT engages and tracks from PFD
[ ] VS engages and tracks from PFD controls
[ ] AP Disconnect (Both positions on switch)
[ ] Disconnect sona-lert
[ ] Disconnect audio
[ ] Remote Annunciator on PFD

Table 210. Avionics Test - Navigation Systems 1,2 - Flight Director (NAV-401AP)

Flight Director:

[ ] Command Bars engage, and track in Autopilot pitch mode
[ ] AP FD mode, Command bars tracks with autopilot
[ ] FD mode; Command Bars track, Servo clutches disengage

Table 211. Avionics Test - Navigation Systems 1,2 - Auto Trim (NAV-401AP)

Auto Trim:

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[ ] Manual Pitch trim disconnects autopilot. (Pitch UP and DN, from both stick grips.)

[ ] Stick back - Trims DN

[ ] Stick Forward - Trims UP

[ ] Stick Back - Trim Annunciator on autopilot indicates DN

[ ] Stick Forward - Trim Annunciator on autopilot indicates UP

[ ] Trim Annunciator lights with Auto Trim off

(26) Physically verify the security of the BNC connections on the NAV signal splitter, and the back of the radios.

(27) Check the speaker for operation.

(28) Check ELT remote switch function (leave the ELT Transmitter in the armed mode). Tune the VHF COM to 121.5 MHz, and listen through the cabin speaker or the headsets. Turn the ELT switch, located on the right hand knee bolster, to the 'ON' position.

NOTE: Per FCC regulations the ELT system should only be checked during the first five (5) minutes of the hour.

(29) **Transponder Test** Perform the transponder test and checkout using the ATC 600A or ATC 601-2 test set. The ATC-600A Transponder/DME test set is to be used for testing Garmin AT model SL 70 or Garmin model GTX 327 Mode A/C transponders. The ATC 600A **is not to be used** for testing of the Garmin model GTX 330 mode S transponder. The ATC-601-2 Mode S Transponder test set is required for testing Garmin model GTX 330 Mode S transponder, and may also be used for testing Garmin model GTX 327 Mode C transponder.

NOTE: A DI or Q inspector must witness the transponder test.

Record the model and serial number of the transponder below. **Make/Model**_____/_____
Serial Number_____

(30) Insert the entertainment device test cable with a portable walkman-style stereo attached to the music input jack, located inside of the pencil box. Verify that both the left and right audio channels of the entertainment input can be heard through the headsets in the airplane. Verify that the music input mutes to a non-perceptible level when the aircraft comm radios are transmitting and receiving, or when the intercom audio is active.

(31) Activate the Nav/Com Bypass Switch with the aircraft power off and ground power disconnected. The switch should illuminate and the No. 1 GPS, Com, and Nav should turn on The pilot's headset should receive and transmit on the No. 1 Com. Turn off the Nav/Com Bypass Switch and the GPS, Com and Nav should turn off.

(32) Check the dual ammeter for proper operation. The ammeter should power up in the "BATT" mode, pressing the button in the lower right should change the mode to "ALT". It should show a corresponding discharge when a load is applied to the appropriate bus in the "BATT" mode.

CAUTION: Checking grounds with aircraft power, or ground power applied will distort resistance reading.

(33) Turn aircraft power OFF and check the fuel cap rings for low resistance to the nose gear or engine bonding strap (0 to 500 ohms).

(34) Remove all power from the aircraft. Check each static wick or mounting pad (9 each), for low resistance to the nose gear or engine bonding strap, (less than 10 ohms).

(35) Turn on the cabin fan and check for airflow through the selected vents, defroster and floor.

(36) Verify the bus labels on the circuit breaker panel are correct. The top 2 rows are left bus, row 3 is right bus, row 4 is essential bus and the bottom row is avionics.

(37) Activate the hot-cold control on the heater panel and verify the firewall shut-off servo works.

(38) Verify operation of the avionics fan.

(39) Check the annunciator and aural warning system for operation without ground power connected. To simulate the engine running disconnect oil pressure switch connector (aft left side of engine) and short pins A and B together on connector.

(a) The left Alt switch turned on, no light or aural warning heard over speakers or headset.

1 Turn left alt switch to off. L ALT OFF light is illuminated on annunciator panel. After 2 seconds, "alternator off" is heard over headsets and speaker.

2 Press ACK button and aural warning is canceled. The right alt switch turned on, no light or aural warning heard over speakers or headset.

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3 Turn right alt switch to off. R ALT OFF light is illuminated on annunciator panel. After 2 seconds "alternator off" is heard over headsets and speaker.

4 Press ACK button and aural warning is canceled.

(b) On the center console, select left fuel tank.

1 No light on annunciator panel or aural warning is heard over speakers or headset. Fuel level gage illuminates green LED for tank selected.

2 Turn fuel selector to off. FUEL VALVE light is illuminated on annunciator panel. After two seconds "fuel valve" is heard over headsets and speaker. No LED is lit on fuel level gauge.

3 Press ACK button and aural warning is canceled.

4 Repeat previous three steps for the right fuel tank selection.

(c) Check that L LOW FUEL, R LOW FUEL, and DOOR OPEN lights are illuminated on annunciator panel.

(d) Check that OIL light on annunciator panel is off.

(40) Adjust the volume adjustment on the back of the Aural warning unit, until the volume is at a sufficient and comfortable level.

(41) Remove the jumper on the oil pressure switch and reconnect the connector. The OIL light on the annunciator panel illuminates once the oil pressure switch is reconnected.

(42) **Speed Brake Operational Checks:**

WARNING: Clear the left and right wings of personnel and equipment.

(a) Ensure the rudder pedals are aligned evenly and external power is applied > 12.4 VDC (S/N 41002 to 41500), or 26 VDC (S/N 41501 and on).

(b) Deploy Speed Brake by pressing the SPDBRK switch located between the Throttle and Prop levers to the up position.

(c) Speed Brake should deploy, and SPDBRK light on annunciator panel illuminates.

(d) Reposition the SPDBRK switch to the down position.

(e) Redeploy the Speed Brakes and move the stall vane lift detector to the stall position full up. The Speed Brake should not retract.

(f) Reposition the SPDBRK switch to the down position.

(43) Check the test switch on the trim panel to operate the following:

(a) Annunciator panel, all LEDs light.

(b) All trim LEDs light.

(c) Flap switch LED blinks.

(d) Both fuel level gauge LEDs illuminate.

(e) Nav/Com Bypass Switch illuminates.

(44) Turn on the position lights and verify that the following devices dim: fuel level gauge LEDs, trim panel, flap switch LED.

(45) Operate the flip lights, front and rear, with the power off and verify correct operation.

(46) Verify all four (4) channels of the dimmer, one (1) channel at a time:

(a) **UPPER PNL** (panel) lights; Verify Engine and Flight instruments have (2) bulbs illuminated per instrument. MFD, PFD (or clock) lights and compass light are illuminated and no other lights are on.

(b) **LOWER PNL** (panel) lights; Verify Master switch panel, Heater control panel, Trim panel, and autopilot computer lights and the circuit breaker panel lights are illuminated and no other lights are on.

(c) **FLOOD** lights; Verify glare shield lights are illuminated and no other lights are on.

(d) **SPOT** lights; Verify overhead spotlights are illuminated and no other lights are on.

(e) With the position light switch on, the backlighting on the Flap panel should illuminate.

(47) Visually check the integrity of all fuses (4) on the power grid located in the aft avionics compartment.

(48) Pull all circuit breakers and ensure the labeling agrees with the circuit it supplies by pushing in the circuit breaker. Ensure positive latching of the circuit breaker.

(49) Check the power point for voltage and verify polarity.

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(50) Check for painted or plastic coated screws in the instruments panels, and clean instrument dials.

(51) Verify security and quality of the switches on the stick grip.

(52) Verify the cooling hose is securely fastened and in place behind the instrument panel and the radio rack.

(53) Perform IRU calibration on the PFD.

(54) Check wire runs and attachments of all wires and coax cables for abrasion potential support, and wire tying:

(a) Along sides of fuselage

(b) Behind the stick grips

(c) Behind the instrument panel

(d) All flight controls and fluid lines

(e) Behind the radio stack

(f) Ensure wiring bundles are free and clear of rudder cables on the right side and free and clear of the circuit breaker panel on the left side.

B. **Garmin G1000 or G2000 System**

(1) 'Buzz Box'

(a) Connect 'Buzz Box' to aircraft MAGs connecting to:

1 Right MAG sensor wire to center post on right MAG

2 Left MAG sensor wire to center post on left MAG

3 Ground sensor wire to engine ground

NOTE: It may require the propeller to be turned clockwise until an audible click can be heard for the MAGs to work correctly.

(b) Verify ignition switch positions:

1 Left

2 Right

3 Both

4 Off

(c) Remove the Buzz Box.

WARNING: Clear the area around the propeller of personnel and equipment. To avoid the engine from starting, ensure that the spark plugs are not installed or have been disconnected.

(2) Perform the following tests with the cross tie open: Energize the starter with only the left bus energized and verify the starter does not engage. Energize the starter with only the right bus energized and verify the operation of the starter motor. The propeller should rotate clockwise as viewed from the pilot's seat. The Starter Engaged annunciation on the PFD should illuminate when the Starter relays are energized. Remove the keys from the ignition switch and stow in the proper location.

(3) Verify operation of the battery switches and essential bus feed. Turn on only the left bus and verify items on the left bus are energized. Also check that the essential bus is energized. Turn on only the right bus and verify items on the right bus are energized. Check again that the essential bus is energized.

NOTE: No ground power is applied for this test.

(4) Connect a 28 VDC power supply to the ground power plug. (Maintain voltage between 26 VDC and 28 VDC for this test.) Turn on the crosstie switch and verify that the left bus is energized when the crosstie switch was turned to 'ON' and that both the right and left buses are energized. Verify that the green lights on the left and right voltage regulators are illuminated when the "ALT" switches are turned on. (Voltage regulators are located on the inside of the firewall, right hand side.) Verify the ammeter shows a charge on the corresponding battery when that battery switch is turned on.

(5) With the right 'ALT' switch on, check for approximately 24-26 volts on the F-1 terminal of the right alternator. Terminal F-2 is grounded. With the left 'ALT' switch on check for approximately 24-26 volts on the field terminal of the left alternator. Measure the resistance from the left alternator case, to the engine block. The total resistance should be less than 1.0 ohm.

(6) With ground power turned off and using batteries, energize the avionics master switch and check for voltage on the avionics bus with only the left bus energized and also with only the right bus energized, crosstie open.

(7) Apply ground power and turn on the position lights switch. Check all 4 bulbs for illumination and proper color orientation

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(green right side, red left side).

(8) Turn on the strobe lights and verify 3-4 flashes per event. Ensure that the wing flashes alternate between the left and right sides.

(9) Turn on the landing light and verify the inboard light illuminates (the one without a diffuser).

(10) Turn on the taxi light and verify the outboard light (with the diffuser) illuminates.

(11) Turn on the Vapor Suppress switch and verify low speed operation of the boost pump.

(12) Momentarily move the back-up pump switch to the arm position. Verify that the blue arm light illuminates and the boost pump operates in high speed.

(13) Press the primer button and verify high-speed operation of the boost pump.

(14) Verify operation of the engine gages that can be checked without the engine running: a) fuel level gage, b) man press, c) oil temp, d) dual amp gage, e) bus voltage gage, and f) engine temperatures. (Cycle the engine instrument circuit breaker to test needle movement).

(15) **Door Operational Checkouts**

(a) Close and lock left, right and baggage doors.

(b) Door Open annunciation on the PFD should be extinguished.

(c) Open any door and ensure that the flip lights and the step lights stay lit for approximately 10 minutes.

(d) Open the right and baggage doors and ensure that the flip lights and the step lights stay lit for approximately 10 minutes.

(e) With all doors closed and locked, turn on Door Seal Pump Switch, verify pump operation- door seals inflate and pump turns off when seals are full.

(f) Door seal pump should not cycle (on and off) for at least 30 seconds.

(g) Open left door slowly, dump value should relieve all pressure and door opens.

(h) Close door and repeat steps 6 & 7 above for the right side door.

(i) Turn door seal system off, and then slowly open either door to verify dump valve operation.

(16) Test the static and pitot systems for leak rate and for proper operation.

CAUTION: Do not exceed a rate of climb >2000 feet per minute.

Static system leak rate = _____fpm @ 1000' above field elevation. (Maximum leak rate allowed is 100 fpm @ 1000' above field elevation for the static system only.)Raise static system 100' above field elevation and hold open the alternate static valve, located on the left side knee bolster (turn to **ALT**), the system should immediately drop to field elevation.With switch still in **ALT** position, raise pitot system to 200 kts. Close the valves on the pitot static test pump, then time and observe the pitot system leak rate. Verify that the airspeed tape on the PFD and the mechanical airspeed operate correctly. Maximum leak rate allowed is 25 kts per minute.Pitot System leak rate = _____kpm.

NOTE: Conduct the test for the next task concurrently with this test item.

(17) Verify that the PFD is properly configured. While testing the pitot system, run the PFD and mechanical airspeed indicator high enough to verify that the following airspeed limitation markings are correct:

(a) White Range, 60 - 117 KIAS

(b) Green Range, 73 - 181 KIAS

(c) Yellow Range, 181 - 230 KIAS

(d) Red Range, above 230 KIAS

(18) Check the resistors on the autopilot 485 lines and verify their resistance per the manufacturer specifications.

(19) Replace the TVS diodes on the PFD, GIA, AHRS and standby ADI.

(20) Replace the zener diodes on the oxygen system.

(21) **Pitot Heat Test**

CAUTION: Use care when touching the hot pitot mast. Do not operate pitot heat for more than one minute.

(a) Turn on the pitot heat switch on the rocker switch panel. Note that the current draw on the amp meter increases. Carefully feel with the back of your hand for actual heating at the pitot tube.

(b) Turn off the pitot heat. **Only leave the pitot heat on long enough to verify the operation of the heating element.**

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(22) Ensure the flag of the standby attitude gyro located on the instrument panel, is not displayed. Listen for the rotor of the gyros to spin-up.

(23) Operate the flap switch and verify that the LED in the knob flashes while the flaps are in transition. Check all three positions. Verify the flashing light goes out once the flaps reach the position indicated on the handle.

(24) **Trim Indicators Adjustment**

(a) Verify operation of trim servos (two axis) for travel, direction of travel, and run them from stop to stop. Verify the operation of the on/off switch.

(b) Ensure the trim panel indications agree with the external position of the tabs for the aileron and elevator trim and that the display properly indicates stop to stop.

(c) If trim panel adjustment is required contact Cessna Aircraft Company for instructions. If adjustments are made, re-verify operation of trim servos (two axis) for travel, direction of travel, and run them from stop to stop. Re-verify the operation of the on/off switch as well.

(25) Engage the Autopilot with the audio panel on at the same time. Disconnect the autopilot while listening for the audio level of the AP DISC through the aircraft speaker.

(26) Do the initial configuration procedures for the Cessna 400/T240 Avionics systems that are installed.

NOTE: The avionics systems installed can be the Avidyne, Garmin G1000 or Garmin G2000 systems.

(27) **Avionics Tests**

(a) Turn on the Avionics Master Switch and verify the operation of:

1 Comm 1 and 2 - Refer to Table 212.

2 GPS 1 and 2 - Refer to Table 213.

3 PFD - Refer to Table 214.

4 MFD - Refer to Table 215.

5 Audio System - Refer to Table 216.

6 Marker Beacon (NAV-401AP) - Refer to Table 217.

7 MFD (NAV-401AP) - Refer to Table 218.

8 Audio System (NAV-401AP) - Refer to Table 219.

9 Navigation Systems 1 and 2 - NAV (NAV-401AP) - Refer to Table 220.

10 Navigation Systems 1 and 2 - ILS (NAV-401AP) - Refer to Table 221.

11 Navigation Systems 1 and 2 - Autopilot (NAV-401AP) - Refer to Table 222.

12 Navigation Systems 1 and 2 - Flight Director (NAV-401AP) - Refer to Table 223.

13 Navigation Systems 1 and 2 - Auto Trim (NAV-401AP) - Refer to Table 224.

Table 212. Avionics Test - Comm 1/2

Comm 1/2:

[ ]	[ ]	TX/RX 123.225
[ ]	[ ]	T/R QUALITY
[ ]	[ ]	SIDE TONE
[ ]	[ ]	MAN SQUELCH
[ ]	[ ]	PILOT'S PTT
[ ]	[ ]	COPILOT'S PTT

Table 213. Avionics Test - GPS 1/2

GPS 1/2:

[ ]	[ ]	Verify that GPS 1 and GPS 2 are receiving a signal
[ ]	[ ]	Sat Lock
[ ]	[ ]	Setup per procedure
[ ]	[ ]	TIS traffic data

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[ ] [ ] DX to PFD, MFD
[ ] [ ] DX from PFD
[ ] [ ] S/W and data cards revisions match
[ ] [ ] Select a waypoint and confirm distance

Table 214. Avionics Test - PFD

PFD:

[ ] [ ] Proper Setup for Cessna 400
[ ] [ ] RX valid GPS position data from GPS 1,2
[ ] [ ] Knob operation
[ ] [ ] Air Data operation
[ ] [ ] Autopilot Annunciator
[ ] [ ] Valid AHRS
[ ] [ ] Cross talk with MFD

Table 215. Avionics Test - MFD

MFD:

[ ] [ ] Proper setup for aircraft type
[ ] [ ] RX valid GPS position data from GPS 1,2
[ ] [ ] Cross talk with PFD
[ ] [ ] Receives Stormscope or WX data as installed
[ ] [ ] Engine instrumentation data present and valid
[ ] [ ] Receives and displays traffic information, if installed

Table 216. Avionics Test - Audio System

Audio Systems:

[ ] [ ] Pilot's ICS
[ ] [ ] Co-Pilot's ICS
[ ] [ ] Pass 1,2 ICS
[ ] [ ] ISO/CREW functions
[ ] [ ] Pilot's/Co-pilot's side tone quality and level
[ ] [ ] Emer. TX on Comm 1 with audio panel off
[ ] [ ] Nav 1, 2 Audio
[ ] [ ] Bose Headsets**REPEAT ALL AUDIO SYSTEM CHECKS**

Conduct the following tests using the NAV-401AP test set.

Table 217. Avionics Test - Marker Beacon (NAV-401AP)

Marker Beacon:

[ ] [ ] Outer Marker - 400 Hz tone, Blue Light
[ ] [ ] Middle Marker - 1300 Hz tone, Amber light
[ ] [ ] Inner Marker - 3 Khz tone, White Light
[ ] [ ] Remote Display
[ ] [ ] Hi/Lo sensitivity tests, Hi/Lo Split

Table 218. Avionics Test - MFD (NAV-401AP)

MFD:

[ ] [ ] Proper setup for aircraft type

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[ ] [ ] RX valid GPS position data from GPS 1,2
[ ] [ ] Cross talk with PFD
[ ] [ ] Receives Stormscope or WX data as installed
[ ] [ ] Engine instrumentation data present and valid
[ ] [ ] Receives and displays traffic information, if installed

Table 219. Avionics Test - Audio System (NAV-401AP)

Audio Systems:

[ ] [ ] Pilot's ICS
[ ] [ ] Co-Pilot's ICS
[ ] [ ] Pass 1,2 ICS
[ ] [ ] ISO/CREW functions
[ ] [ ] Pilot's/Co-pilot's side tone quality and level
[ ] [ ] Emergency TX on Comm 1 with audio panel off
[ ] [ ] Nav 1, 2 Audio
[ ] [ ] Bose Headsets**REPEAT ALL AUDIO SYSTEM CHECKS**

Table 220. Avionics Test - Navigation Systems 1/2 - NAV (NAV-401AP)

Navigation Systems 1,2 :

NAV:

[ ] [ ] Receive 112.80
[ ] [ ] Flags Out of view
[ ] [ ] CDI (Left / Center / Right)
[ ] [ ] To/From operation
[ ] [ ] 30 degree accuracy checks

Table 221. Avionics Test - Navigation Systems 1/2 - ILS (NAV-401AP)

ILS:

[ ] [ ] Receive 108.1
[ ] [ ] Localizer (Left / Center / Right)
[ ] [ ] Localizer flag pulled
[ ] [ ] Glide slope bars (Up / Center / Down)
[ ] [ ] Glide slope valid
[ ] [ ] Autopilot coupling and tracking checks in Nav Mode, testing above functions
[ ] [ ] Nav Audio
[ ] [ ] ILS sensitivity

Table 222. Avionics Test - Navigation Systems 1/2 - Autopilot (NAV-401AP)

Autopilot:

[ ] [ ] Master switch operation
[ ] [ ] HDG bug operation
[ ] [ ] NAV (Tracks D-BAR)
[ ] [ ] CRS (Tracks Course Datum Pointer, No signal applied)
[ ] [ ] APR mode engaged on ILS freq.
[ ] [ ] Localizer Left Right (Stick Tracks)
[ ] [ ] Glide Slope soft capture

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[ ] [ ] G/S bars up/down, stick tracks to glide slope bars
[ ] [ ] ALT hold mode engages and holds
[ ] [ ] ALT PRESELECT engages and tracks from PFD
[ ] [ ] VS engages and tracks from PFD controls
[ ] [ ] AP Disconnect (Both positions on switch)
[ ] [ ] Disconnect audio
[ ] [ ] Remote Annunciator on PFD

Table 223. Avionics Test - Navigation Systems 1/2 - Flight Director (NAV-401AP)

Flight Director:

[ ] [ ] Command Bars engage, and track in Autopilot pitch mode
[ ] [ ] AP FD mode, Command bars tracks with autopilot
[ ] [ ] FD mode; Command Bars track, Servo clutches disengage

Table 224. Avionics Test - Navigation Systems 1/2 - Auto Trim (NAV-401AP)

Auto Trim:

[ ] [ ] Manual Pitch trim disconnects autopilot. (Pitch UP and DN, from both stick grips.)
[ ] [ ] Stick back - Trims DN
[ ] [ ] Stick Forward - Trims UP
[ ] [ ] Stick Back - Trim Annunciator on autopilot indicates DN
[ ] [ ] Stick Forward - Trim Annunciator on autopilot indicates UP
[ ] [ ] Trim Annunciator lights with Auto trim off

(28) Physically verify the security of the BNC connections on the NAV signal splitter, and the back of the radios.

(29) Check the speaker for operation.

(30) Check ELT remote switch function (leave the ELT Transmitter in the armed mode). Tune the VHF COM to 121.5 MHz, and listen through the cabin speaker or the headsets. Turn the ELT switch, located on the right hand knee bolster, to the 'ON' position.

NOTE: Per FCC regulations the ELT system should only be checked during the first five (5) minutes of the hour.

(31) **Transponder Test** Perform the transponder test and checkout using the ATC 600A or ATC 601-2 test set. The ATC-600A Transponder/DME test set is to be used for testing Garmin AT model SL 70 or Garmin model GTX 327 Mode A/C transponders. The ATC 600A **Is not to be used** for testing of the Garmin model GTX 330 mode S transponder. The ATC-601-2 Mode S Transponder test set is required for testing Garmin model GTX 33 Mode S transponder, and may also be used for testing Garmin model GTX 327 Mode C transponder.

NOTE: A DI or Q inspector must witness the transponder test.

Record the model and serial number of the transponder below. **Make/Model**_____/_____
Serial Number_____

CAUTION: Checking grounds with aircraft power, or ground power applied will distort resistance reading.

(32) Turn aircraft power OFF and check the fuel cap rings for low resistance to the nose gear or engine bonding strap (0 to 500 ohms).

(33) Remove all power from the aircraft. Check each static wick or mounting pad (9 ea.), for low resistance to the nose gear or engine bonding strap (less than 10 ohms).

(34) Turn on the cabin fan and check for airflow through the selected vents, defroster and floor.

(35) Verify the bus labels on the circuit breaker panel are correct. The top 2 rows are essential bus, row 3 is left bus, row 4 is right bus and the bottom row is avionics.

(36) Activate the hot-cold control on the heater panel and verify the firewall shut-off servo works.

(37) Verify operation of the avionics fan.

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(38) Check the annunciator and aural warning system for operation without ground power connected. Start the engine.

(a) The left Alt switch turned on, no light or aural warning heard over speakers or headset.

1 Turn left alt switch to off, L ALT OUT annunciation on the PFD. After 2 seconds, "alternator off" is heard over headsets and speaker.

2 Press Alert button and aural warning is canceled. The left alt switch turned on, no light or aural warning heard over speakers or headset.

3 Turn right alt switch to off, R ALT OUT annunciation on the PFD. After 2 seconds "right alternator out" is heard over headsets and speaker.

4 Press Alert button and aural warning is canceled.

5 Turn the right alt switch to ON.

6 Shut down the engine.

(b) On the center console, select left fuel tank.

1 No annunciations or aural warning is heard over speakers or headset. Fuel level gage illuminates blue indication for tank selected.

2 Turn fuel selector to off, FUEL VALVE annunciation on the PFD.

a After two seconds "fuel valve" is heard over headsets and speaker.

b No indication next to the fuel level gauge.

3 Press Alert button and aural warning is canceled.

4 Repeat the previous three steps for the right fuel tank.

(c) Check that DOOR OPEN annunciates on the PFD when one of the three doors are open.

(39) **Speed Brake Operational Checks:**

WARNING: CLEAR THE LEFT AND RIGHT WINGS OF PERSONNEL AND EQUIPMENT.

(a) Apply external power > 26 VDC.

(b) Deploy Speed Brake by pressing the **SPDBRK** switch located between the Throttle and Prop levers to the up position.

(c) Speed Brake should deploy, and "SPEED BRAKES" annunciates on the PFD..

(d) Reposition the **SPDBRK** switch to the down position.

(e) Redeploy the Speed Brakes and move the stall vane lift detector to the stall position full up, the S/B should not retract.

(f) Reposition the **SPDBRK** switch to the down position.

(40) Check the test switch on the trim panel to operate the following:

(a) 5 pack switches on instrument panel illuminate.

(b) Flap panel switches illuminate.

(c) Flap switch LED blinks.

(41) Turn on the position lights and verify that the following devices dim: fuel level gauge LEDs, trim panel, flap switch LED.

(42) Operate the flip lights, front and rear, with the power off and verify correct operation.

(43) Verify all four (4) channels of the dimmer, one (1) channel at a time:

(a) **UPPER PNL** (panel) lights; Verify Engine and Flight instruments have (2) bulbs illuminated per instrument. MFD, PFD (or clock) lights and compass light are illuminated and no other lights are on.

(b) **LOWER PNL** (panel) lights; Verify Master switch panel, Heater control panel, Trim panel, and autopilot computer lights and the circuit breaker panel lights are illuminated and no other lights are on.

(c) **FLOOD** lights; Verify glare shield lights are illuminated and no other lights are on.

(d) **SPOT** lights; Verify overhead spotlights are illuminated and no other lights are on.

(e) With the position light switch on, the backlighting on the Flap panel should illuminate.

(44) Visually check the integrity of all fuses (4) on the power grid located in the aft avionics compartment.

(45) Pull all circuit breakers and ensure the labeling agrees with the circuit it supplies by pushing in the circuit breaker. Ensure positive latching of the circuit breaker.

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(46) Check the power point for voltage and verify polarity.

(47) Check for painted or plastic coated screws in the instruments panels, and clean instrument dials.

(48) Verify security and quality of the switches on the stick grip.

(49) Verify the cooling hose is securely fastened and in place behind the instrument panel and the radio rack.

(50) Verify AHRS calibration and perform AHRS calibration on the PFD if necessary.

(51) Check wire runs and attachments of all wires and coax cables for abrasion potential support, and wire tying:

[ ] Along sides of fuselage

[ ] Behind the stick grips

[ ] Behind the instrument panel

[ ] All flight controls and fluid lines

[ ] Behind the radio stack

[ ] Ensure wiring bundles are free and clear of rudder cables on the right side and free and clear of the circuit breaker panel on the left side

4. Repair Of Static Wicks

A. The nine static wicks on the aircraft are located at the tips of the wings, horizontal, outboard trailing edge of the ailerons, outboard trailing edge of the elevator, and the top of the rudder. The rudder static wick is mounted on a threaded stud and bonded electrically and mechanically to the aluminum counterweight at the top of the rudder. The other static wicks are mounted on static wick pads. These pads are bonded electrically and mechanically to the structure, and the static wick is attached with screws to this pad.

B. If the required conductivity is not achieved, these components must be replaced or re-bonded with conductive adhesive.

(1) Conductive Adhesive Material Requirements

(a) Equipment:

1 Respirator mask - Commercial

2 Rubber gloves - Commercial

3 Sandpaper, 120 and 400 grit - Commercial

4 Applicator spatula - Commercial

5 18 oz. mixing container - Commercial

6 Shop towel - Commercial

(b) Materials:

1 Conductive Adhesive - SX518001

2 Acetone, MPK, or Ethyl Acetates - Commercial

C. **Bonding Process** - The following process describes mounting pad and thread rod styles of the static wick mount installations. Follow the steps in the order presented:

(1) Mounting Pad Static Wick Procedure

(a) Mark the location of retainers on the aircraft skin per the corresponding drawing. Do not exceed 1/8 in. between the aft end of the mounting pad and the trailing edge of the appropriate control surface.

(b) Remove paint and primer, if any, from area to be bonded using 120 grit sandpaper. Expose the lightning protection mesh without sanding through the mesh material.

(c) Degrease the aircraft surface and bottom of the retainer with a grease free solvent, such as acetone, MPK, or ethyl acetate. Do not contaminate the cleaned area.

(d) Use either approved conductive adhesive per SX518001:

1 Mix one part LP-89 Part A Resin with one equal part LP-89 Part B Paste Catalyst. Mix thoroughly until a smooth, creamy consistency is reached. Pot life is 30 minutes at 70° F after mixing.

2 Take a premixed cartridge of Eccobond 64C A/B from the freezer. Allow it to thaw at room temperature. Work life is approximately 30 minutes from when the adhesive is removed from the freezer.

(e) Abrade the clean, dry aircraft surface and the bonding surface of the static wick retainer with 200 to 600 grit paper.

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Do not abrade through the lightning protection mesh of the aircraft. Remove all oxide from the retainer. Dry thoroughly and wipe the surface with a clean towel to remove loose particles.

(f) After removing the oxide, immediately apply a coat of adhesive to the retainer. The time between completion of the sanding process and the application must not exceed 5 minutes.

(g) Upon completion of the previous step, immediately apply the retainer to the aircraft surface. Slightly twist the retainer while applying light pressure, to ensure thorough wetting and to squeeze out excessive adhesive. Once the retainer is in place, do not disturb the bond further. Movement will increase the bond resistance and may weaken the mechanical strength.

(h) Remove excessive adhesive, leaving a fillet of adhesive around the entire edge of the retainer.

(i) Use masking tape to temporarily secure the mounting pad during curing.

(j) Cure the adhesive for a minimum of 24 hours at 70° F. Cure may be accelerated by applying 150° F for one hour.

(k) Ensure that all retainers are secure, with no evidence of cracks in the adhesive fillet between the retainer and the aircraft surface.

(l) After the mounting pad has cured, check the electrical resistance to the lightning mesh with a digital voltmeter as close to the mount pad as possible. The resistance should be 0 to 2.0 ohms.

(2) Rudder Threaded Rod Static Wick Procedure

(a) Locate the static wick installation position in the vertical stabilizer counterweight.

(b) Degrease the threaded rod, receptor threads in the rudder counterweight, and the receptor treads in the static wick with a grease-free solvent such as acetone, MPK, or ethyl acetate. Do not contaminate the cleaned area.

(c) Use either approved conductive adhesive per SX518001:

1 Mix one part LP-89 Part A Resin with one equal part LP-89 Part B Paste Catalyst. Mix thoroughly until a smooth, creamy consistency is reached. Pot life is 30 minutes at 70° F after mixing.

2 Take a premixed cartridge of Eccobond 64C A/B from the freezer. Allow it to thaw at room temperature. Work life is approximately 30 minutes from when the adhesive is removed from the freezer.

(d) Place a small amount of adhesive on 0.5 in. of one end of the threaded rod. Install the threaded rod into the stabilizer counterweight, adhesive end first, to a depth of approximately 0.5 in. to the mechanical stop.

(e) After the threaded rod has cured, check the electrical resistance to the counterweight material as close to the threaded rod as possible. Resistance should be 0 to 2.0 ohms.

(f) After the aircraft has been painted, install the static wick as described below. Ensure that the threaded rod is masked for the aircraft paint process.

(g) With a wooden applicator, place adhesive on the first 0.1 inch of the threaded rod above its base, to allow a removable bond to the tip of the static wick.

(h) Insert the static wick onto the threaded rod, and ensure that it threads on the full length to its mechanical stop, allowing contact with the 0.1 inch of adhesive.

(i) Cure the adhesive for a minimum of 24 hours at 70° F. Cure may be accelerated by applying 150° F for 1 hour.

(j) Ensure that the static wick is secure.

D. **Inspection Procedures** - Visually inspect all retainer installations thoroughly. Ensure that the retainer has no evidence of cracks in the adhesive fillet between the retainer and the aircraft surface. Ensure that all static wicks are secure.

E. **Rework** - If a mounting pad has evidence of cracks in the adhesive fillet that exceed the maximum length criteria, the static wick mounting pad must be removed and re-installed. If the threaded rod-style static wick is not secure, remove, clean, and re-install the static wick threaded rod as per procedure.

F. **Acceptance Criteria**

(1) ADHESIVE - The adhesive application shall be acceptable if there is a smooth surface fillet between the retainer and the aircraft surface, with no evidence of cracks or unbonded areas in the adhesive of over 0.1 inch in length.

(2) IMPROPER CURE - The adhesive application shall be acceptable if there is no evidence of tackiness in the adhesive after the proper cure time.

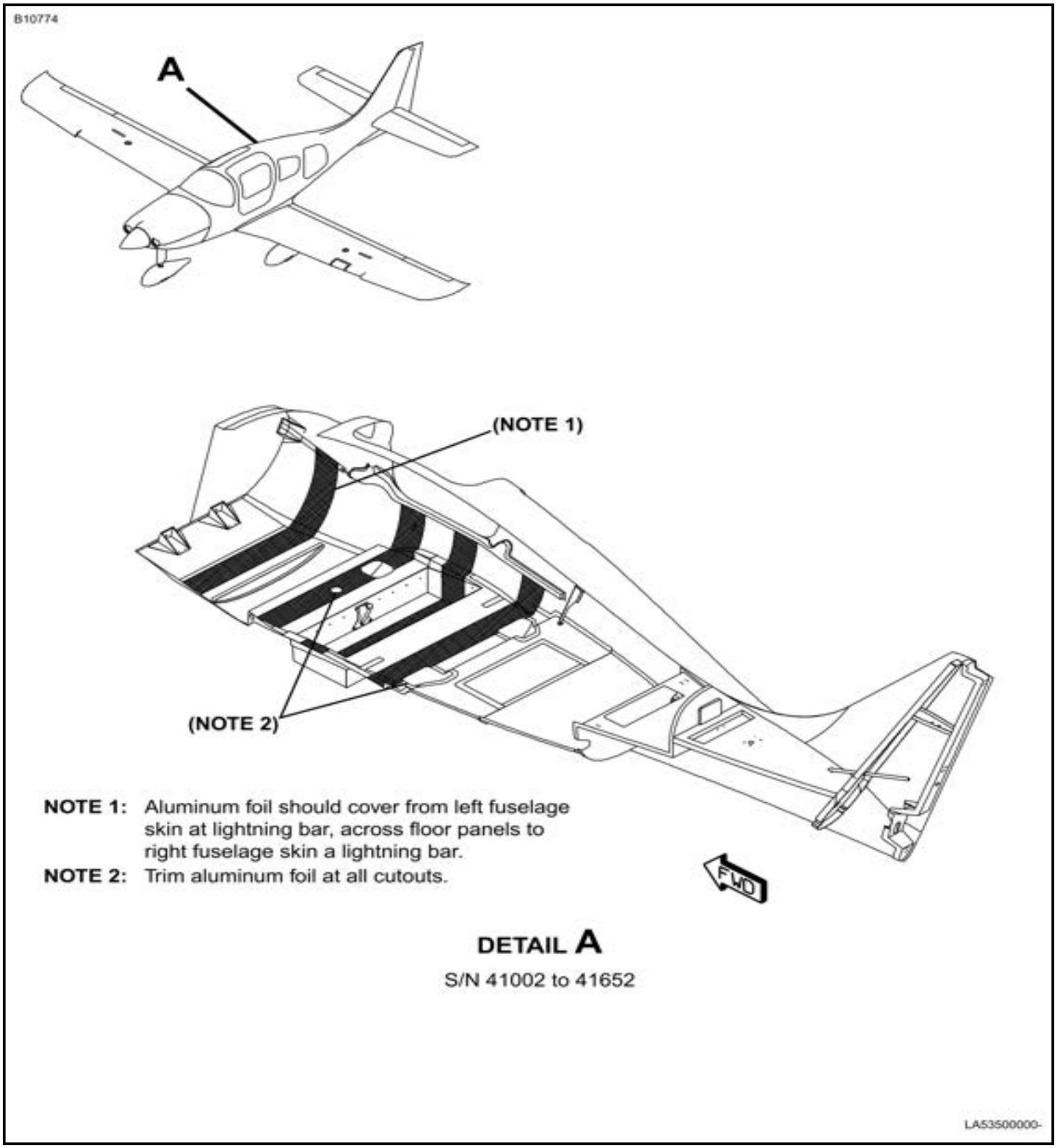
(3) SECURE INSTALLATION - The static wick mount installation shall be acceptable if there is no evidence of improper bonding of the static wick pad or threaded rod allowing any movement of the static wick or evidence of cracking and tackiness of the adhesive.

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(4) ELECTRICAL RESISTANCE - The static wick mount installation shall be acceptable if the electrical resistance of the mounting connection is no more than 2.0 ohms, as measured from the mount to the lightning mesh or counterweight.

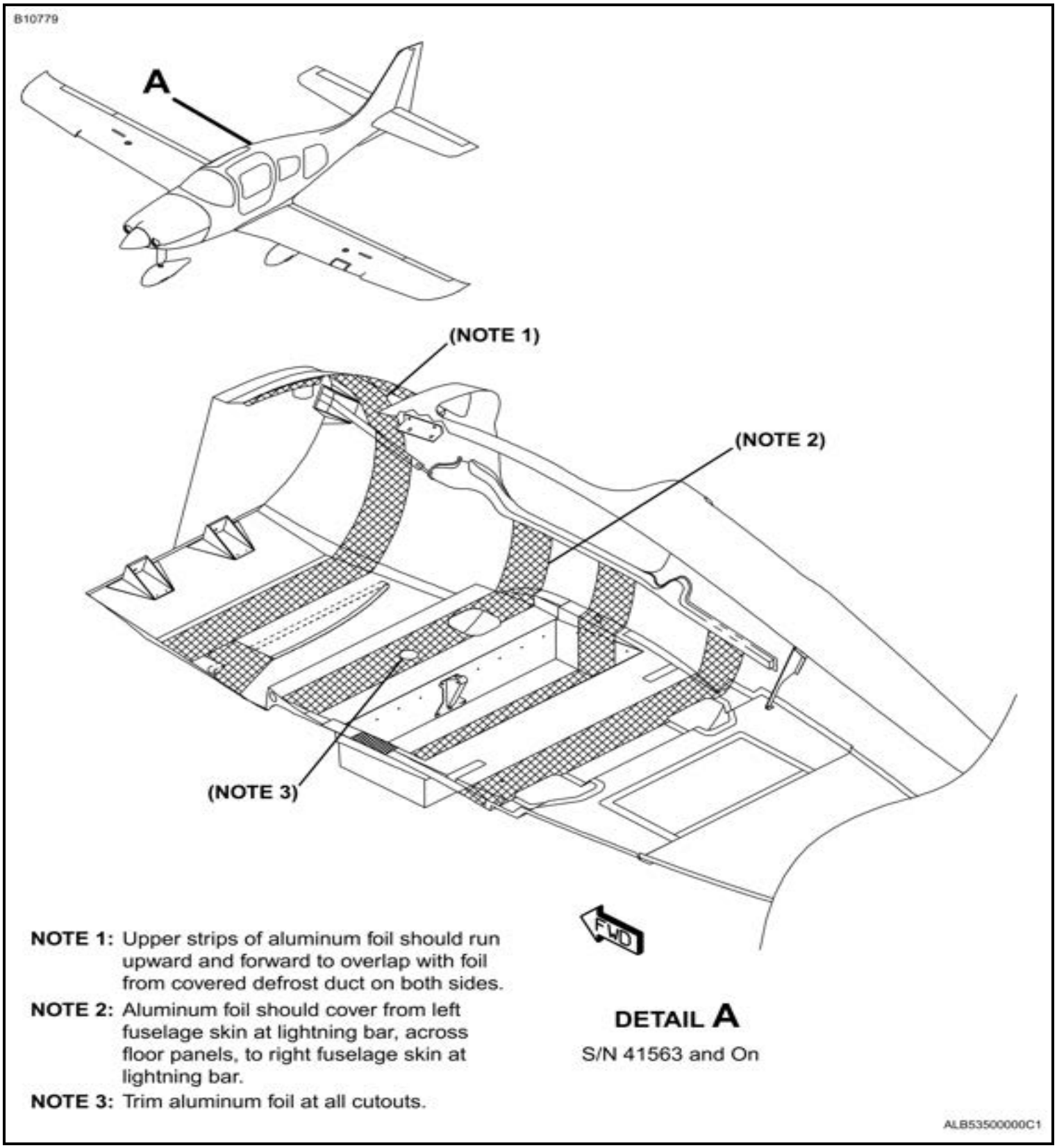
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Figure 201 : Sheet 1 : Placement of SAFE Strips



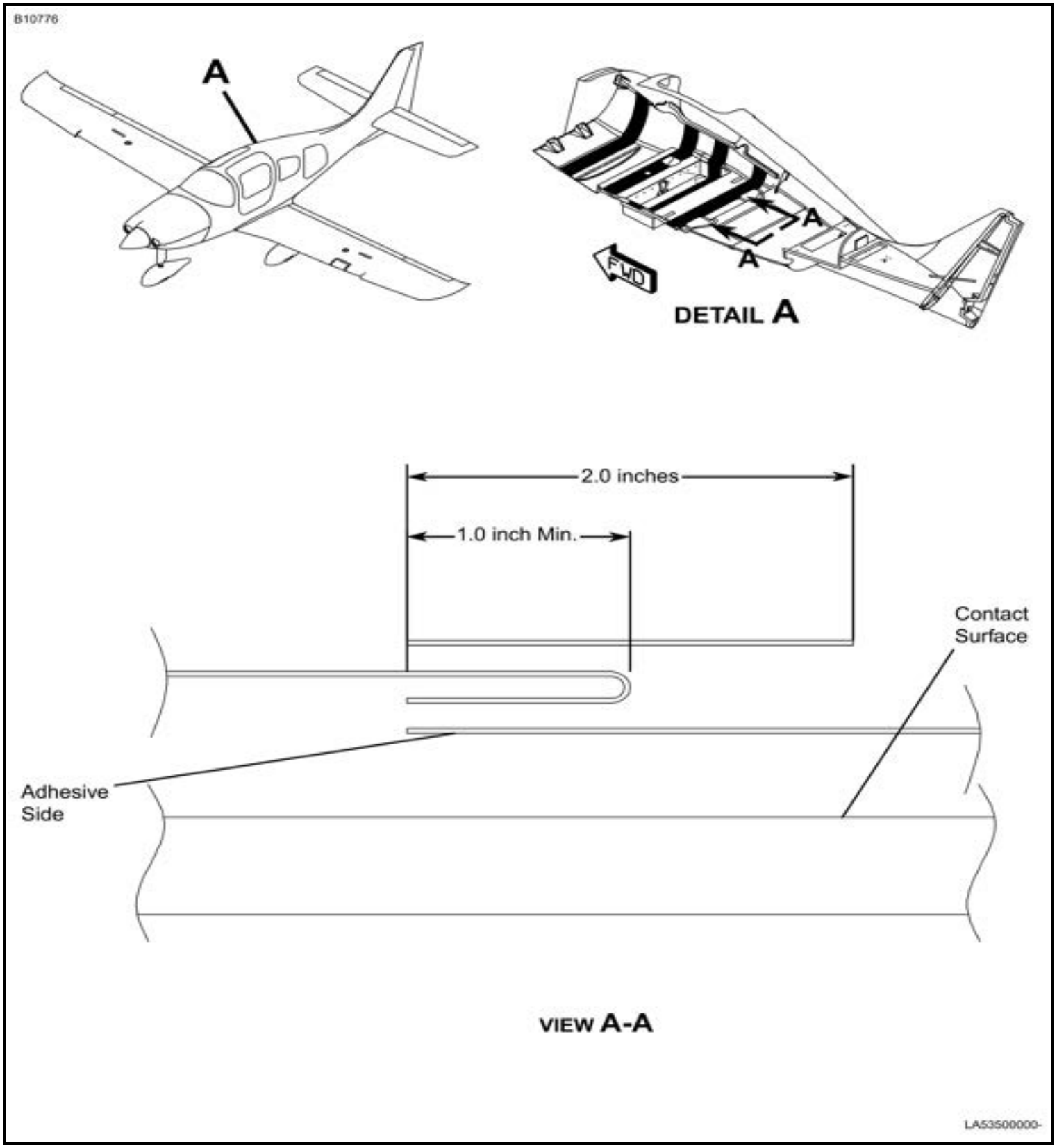
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Figure 201 : Sheet 2 : Placement of SAFE Strips



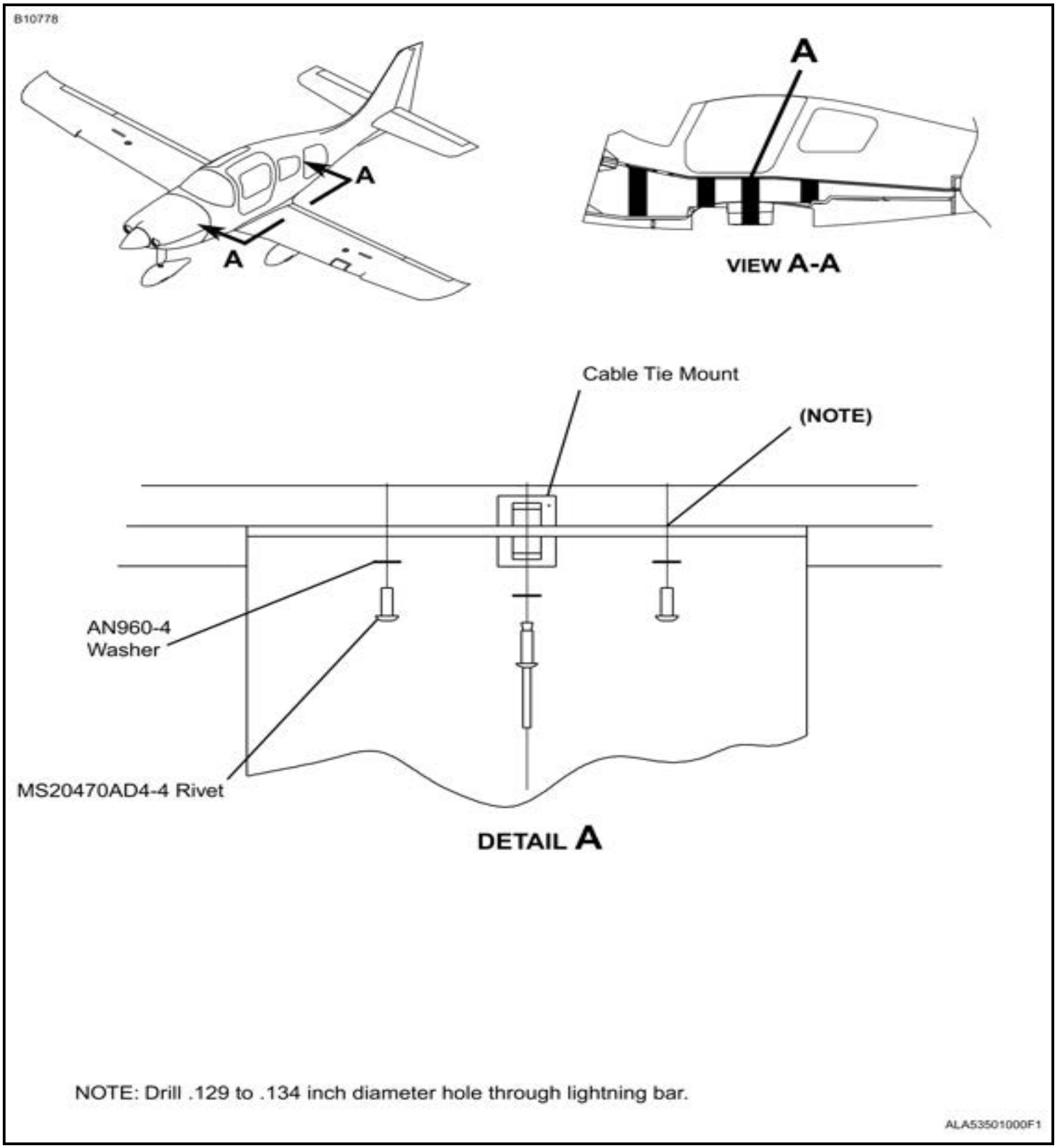
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Figure 202 : Sheet 1 : Folding SAFE Strip



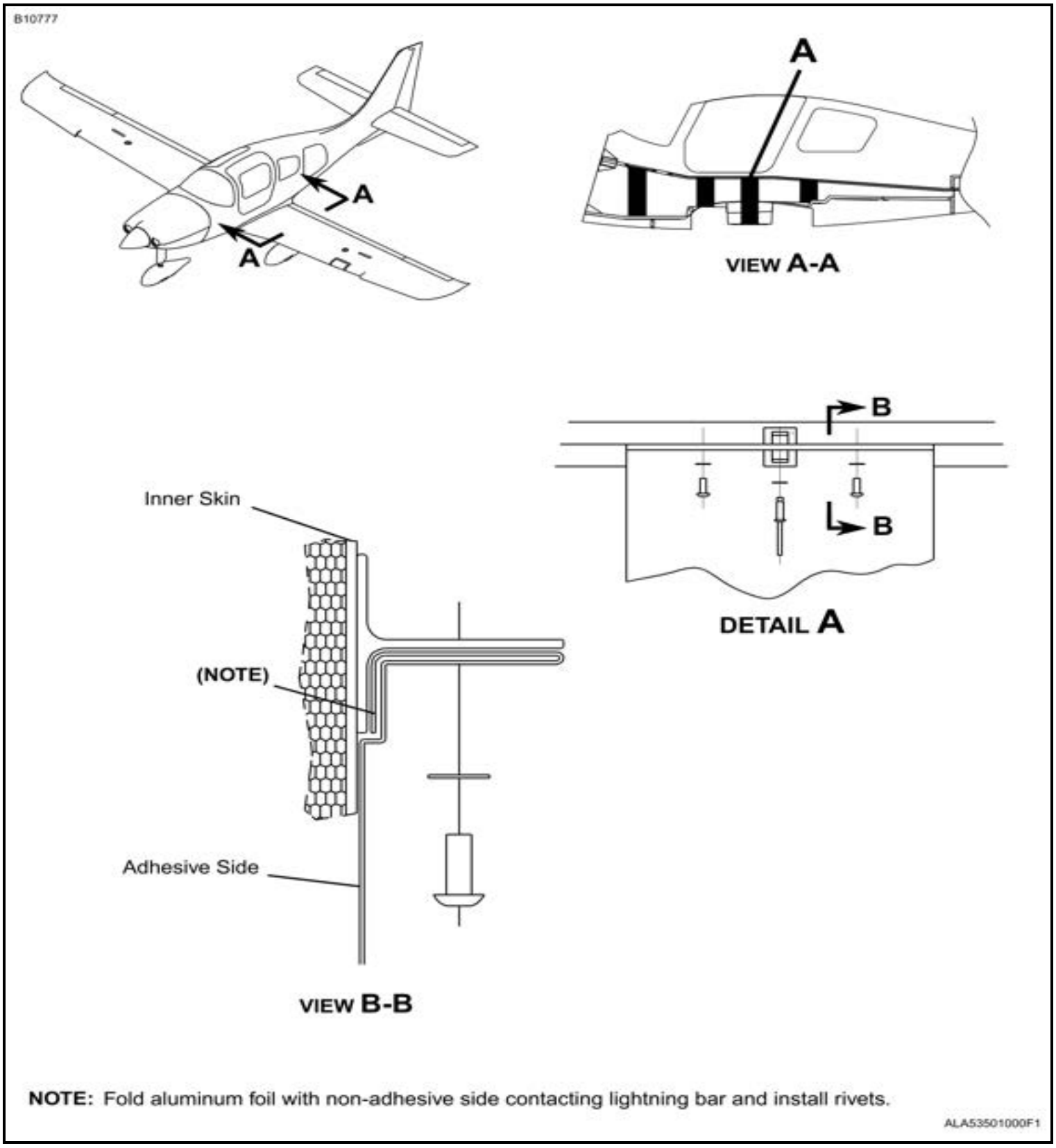
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Figure 203 : Sheet 1 : Grounding SAFE Strip to Grounding Bar



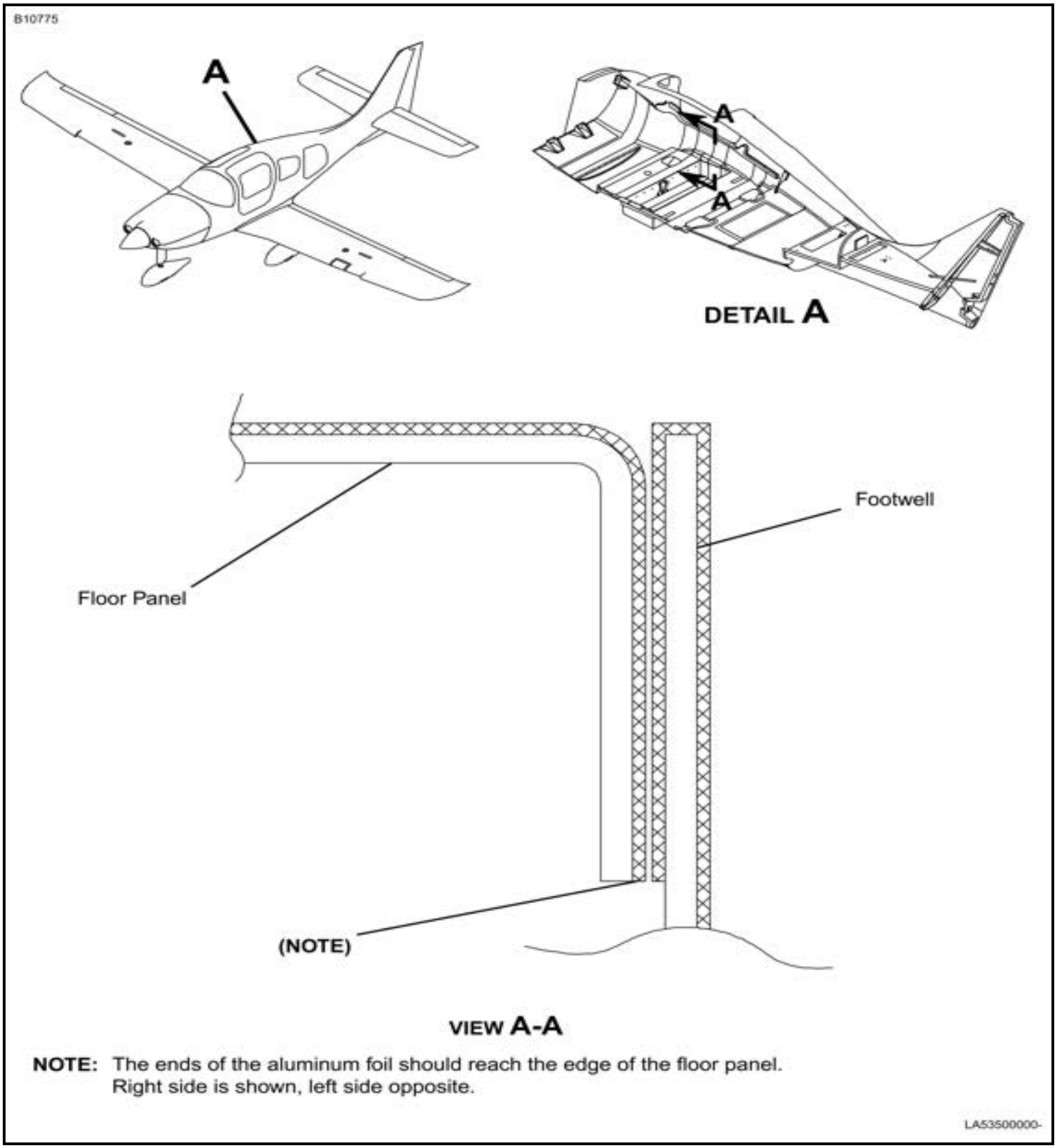
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Figure 204 : Sheet 1 : Complete Replacement of SAFE Strip



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Figure 205 : Sheet 1 : Installing SAFE Strip in Footwell



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REPAIR OF CLICKBOND NUTPLATES - MAINTENANCE PRACTICES

1. Repair of Clickbond Nutplates

A. Clickbond nutplates are a special type of nutplate that is bonded to the surface rather than being riveted to the structure. If a Clickbond nutplate should fail, it can be replaced with another Clickbond nutplate or a riveted nutplate under certain conditions as specified in Table 201. This repair procedure can be used in lieu of specific factory instructions.

Table 201. Permitted Areas of Clickbond or Riveted Nutplate Repair

Clickbond Part Number	Application	Assembly Drawing Number
CB6009CR4-1P	Baggage Net Installation	LB53255000
CB6014CR3-1P	Baggage Net Installation	LB53255000
	Cowling	LA53600000
	Instrument Panel Installation	LB53310000
CB6014CR08-1P	Access Panel Installation, Fuselage	LB53650000

B. **Defect Scenarios**

(1) The nut in the Clickbond nutplate is stripped or damaged.

(2) The bonding of the Clickbond to the surface has failed.

C. **Repair Procedure No. 1** - Bond a new Clickbond of the same type as a replacement for the one that failed.

(1) Remove the old Clickbond nutplate by prying it off.

(2) Sand the substrate to prepare a smooth surface using 150 grit sandpaper.

(3) Clean the surface with a dry-wipe or clean, pressurized air.

(4) Bond on a new nutplate. Use Clickbond adhesive kit CB92 or adhesive Hysol 9321. Follow manufacturer's instructions.

D. **Repair Procedure No. 2** - Replace the Clickbond with riveted nutplate.

(1) Sand the adhesive residue down to create an even surface for the nutplate. Take care not to damage the structural material below.

(2) Use a nutplate from Table 202 to determine the proper riveted nutplate replacement.

Table 202. MS Nutplate Replacements for Clickbonds

Clickbond Nutplate	MS Nutplate	Drill Diameter Rivet Holes (inches)	Rivet Hole Spacing From Center Hole (inches)
CB6009CR4-1P	MS21075-4	0.098	0.281
CB6014CR3-1P	MS21075-3	0.098	0.250
CB6014CR08-1P	MS21075-08	0.098	0.234

NOTE: The old Clickbond nutplate can be reused if the nut still has sufficient self-locking friction. Clean and sand the surface on the Clickbond nutplate for good adhesion, and follow the procedures discussed in Repair Procedure No. 1.

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TAP TESTING - DESCRIPTION AND OPERATION

1. General

A. This section contains information needed to complete tap testing procedures on the airplane. Information required to complete inspections of specific locations on the airplane can be found in the applicable section for that area of structure.

2. Inspection Requirements

A. Before the tap test inspection is started, you must comply with the following requirements:

(1) You must have a blunt-ended tap hammer (or equivalent) that weighs 1.0 ounce, +0.3 or -0.3 ounce.

(2) The inspector must be capable of distinguishing and differentiating audible pitch changes produced during the tap test.

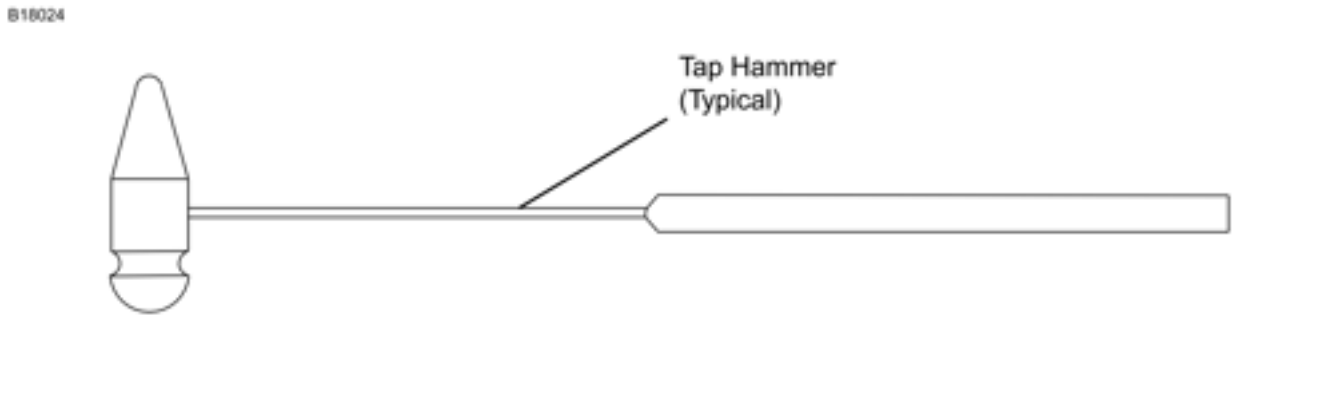
(3) The airplane must be moved to an area free from loud noise produced by traffic, power equipment, aircraft or any other source that would require raised voices for normal conversation.

3. Tap Testing

A. Complete a Tap Test of the applicable structure.

(1) Thoroughly clean and dry the inspection surface to remove any loose dirt, contaminates and grease.

(2) Complete the tap test with the use of a blunt-ended tap hammer or equivalent with a head that weighs 1.0 ounce, +0.3 or -0.3 ounce.



CAUTION: Do not use excessive or aggressive force or a hammer with a sharp edge to strike the surface of the airplane. Structural damage will occur if too much force or a sharp-edged hammer is used to complete the tap test.

(3) Use gentle and consistent force with the tap hammer to lightly tap the surface in each 1-inch^2 area throughout the inspection zone.

(4) Compare similar structures within the inspection zone for changes in the acoustic response pitch.

NOTE: Areas of the fuselage that have structure behind them will have a higher response pitch than areas that do not have structure behind them.

(5) A "flat" or "dead" response pitch is considered unacceptable.

(6) Larger areas that are disbonded or delaminated can cause the tap hammer to rebound to a lower height than it would on intact structure.

(7) Use moderate pressure from your hand or several fingers to push on an area of structure.

(a) A faint "crackling" sound can often be heard if the area has core damage.

(8) Put a mark on damaged areas to indicate the location and size of the area where the damage is found.

(9) Put a mark on any areas where you are uncertain whether damage exists to indicate that the area is suspect. Additional Nondestructive Inspection (NDI) procedures must be completed to evaluate the area more closely.

(10) Cessna recommends that maintenance personnel that complete tap tests be composite repair technicians trained in accordance with SRM standards or certified NDI technicians.

4. Required Chapter 4 Inspection Areas

A. The inspections listed in Chapter 4 require that tap testing be completed in some areas.

(1) Complete tap testing in the following areas:

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(a) **Fuselage bonding seams** - The fuselage halves are split into left and right symmetrical sides and include the areas from the firewall back to and including the vertical stabilizer. The seam extends from centerline to 2 inches on the right side of centerline. The seam tapers to 1.75 inches at approximately FS 240 and tapers again to 1.5 inches at approximately FS 261.5. The upper fuselage bond seam from the top of the windshield to a point 48 inches aft of the top of the windshield is an area of extremely thick ply buildup and can not be effectively tap tested. This area is only to be visually inspected.

(b) **Wing skin leading edge and trailing edge seams** - The wing skin seams are at the leading and trailing edges of the wing. The leading edge seam is 2 in. wide and centered about the leading edge. The trailing edge should be tap tested on the top and bottom of the edge from the edge to 2 inches inboard.

(c) **Wing skin to ribs and spars** - The location of each rib and spar is shown in Section 57-10-00, Main Wing Structure. The top and bottom wing skin at the areas of the ribs and spars should be tap tested.

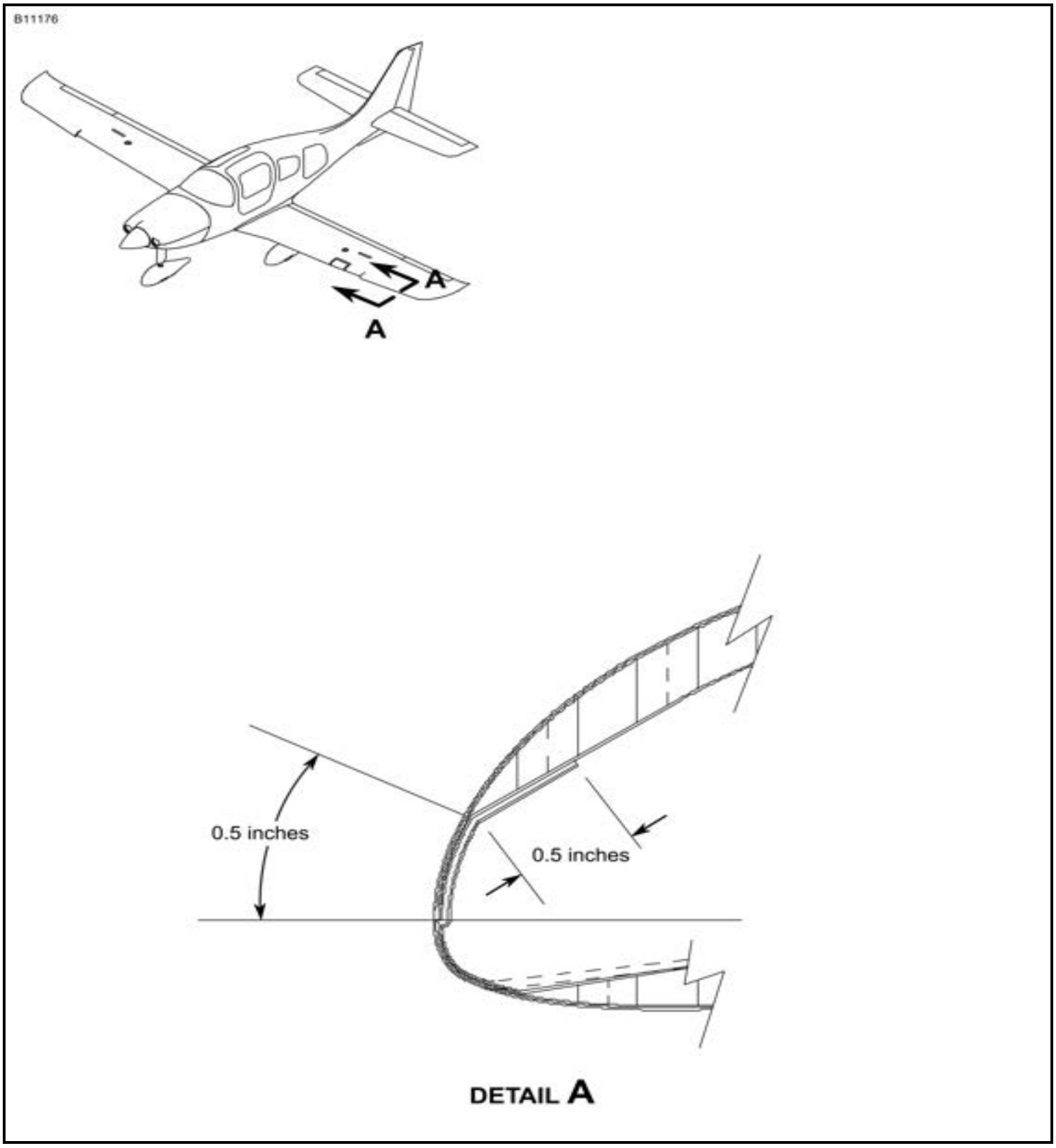
(d) **Wing flaps leading and trailing edge seams** - The flap seams are at the leading and trailing edges of the flap. The leading edge is 1 inch wide and extends 1 inch up from the leading edge chord plane of the flap. Because the bond extends onto core, as shown in Figure 1, tap testing is only valid for the first 0.5 inches of the bond. The trailing edge should be tap tested on the top and bottom of the edge from the edge to 1.5 inches forward.

(e) **Aileron leading and trailing edge seams** - The aileron seams are at the leading and trailing edges of the ailerons. The leading edge seam is 1.0 inch wide starting 1 inch along the surface from the leading edge of the aileron. In the area around the drive hinge attachment pocket, tap test approximately 1.0 inch from the edge of the part to verify the bonding surface. The trailing edge should be tap tested on the top and bottom of the trailing edge from approximately 0.90 inches from the edge to approximately 2.0 inches from the trailing edge as shown in Figure 2

(f) **Rudder leading and trailing edge seams** - The rudder seams are at the leading and trailing edges of the rudder. The leading edge seam is 0.50 inches wide starting centerline at the edge of the rudder. The trailing edge should be tap tested on the left and right side of the trailing edge from the edge to approximately 1 inch from the trailing edge. Refer to Figure 3 for areas of tap testing.

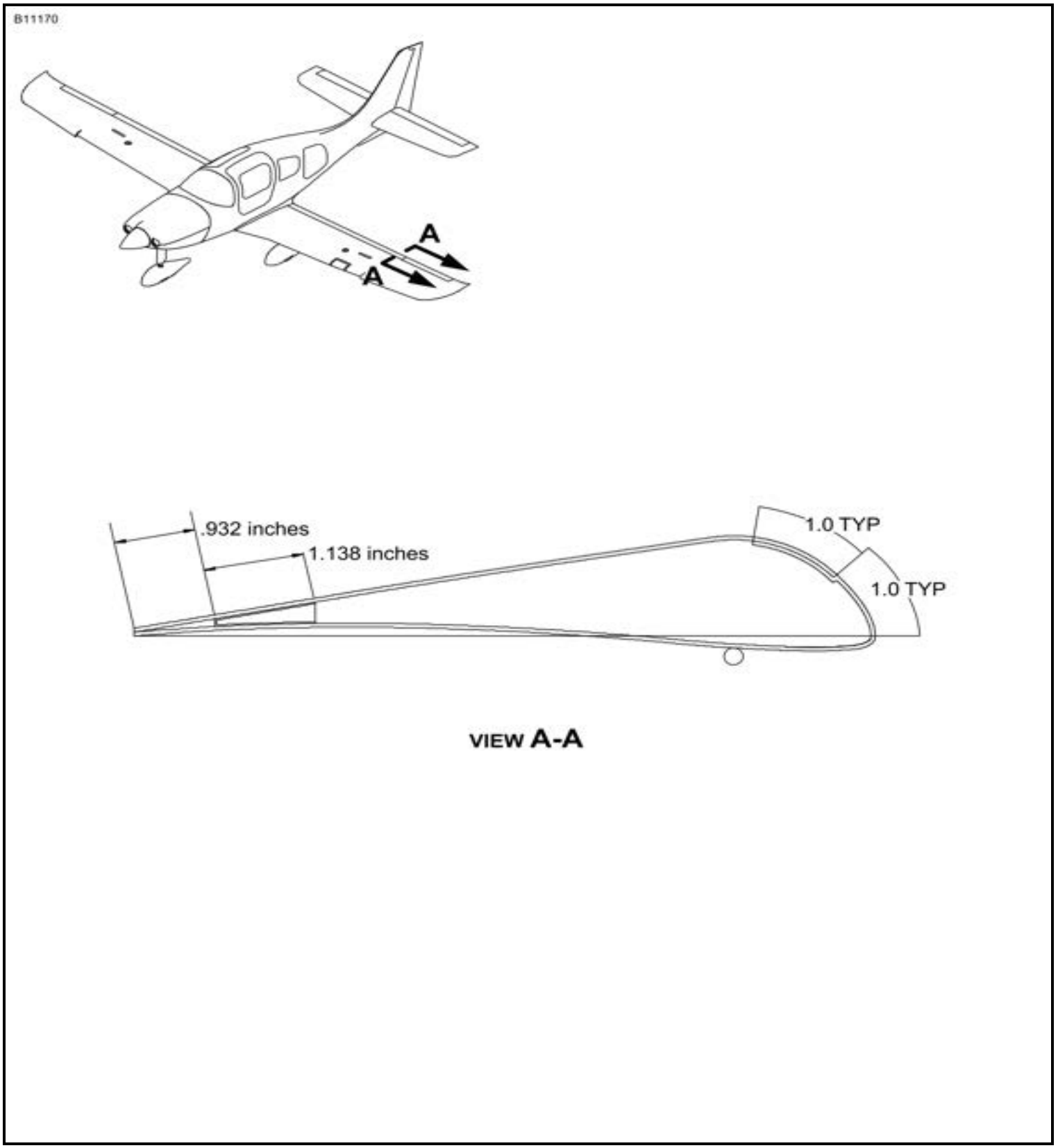
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Figure 1 : Sheet 1 : Tap Testing Area



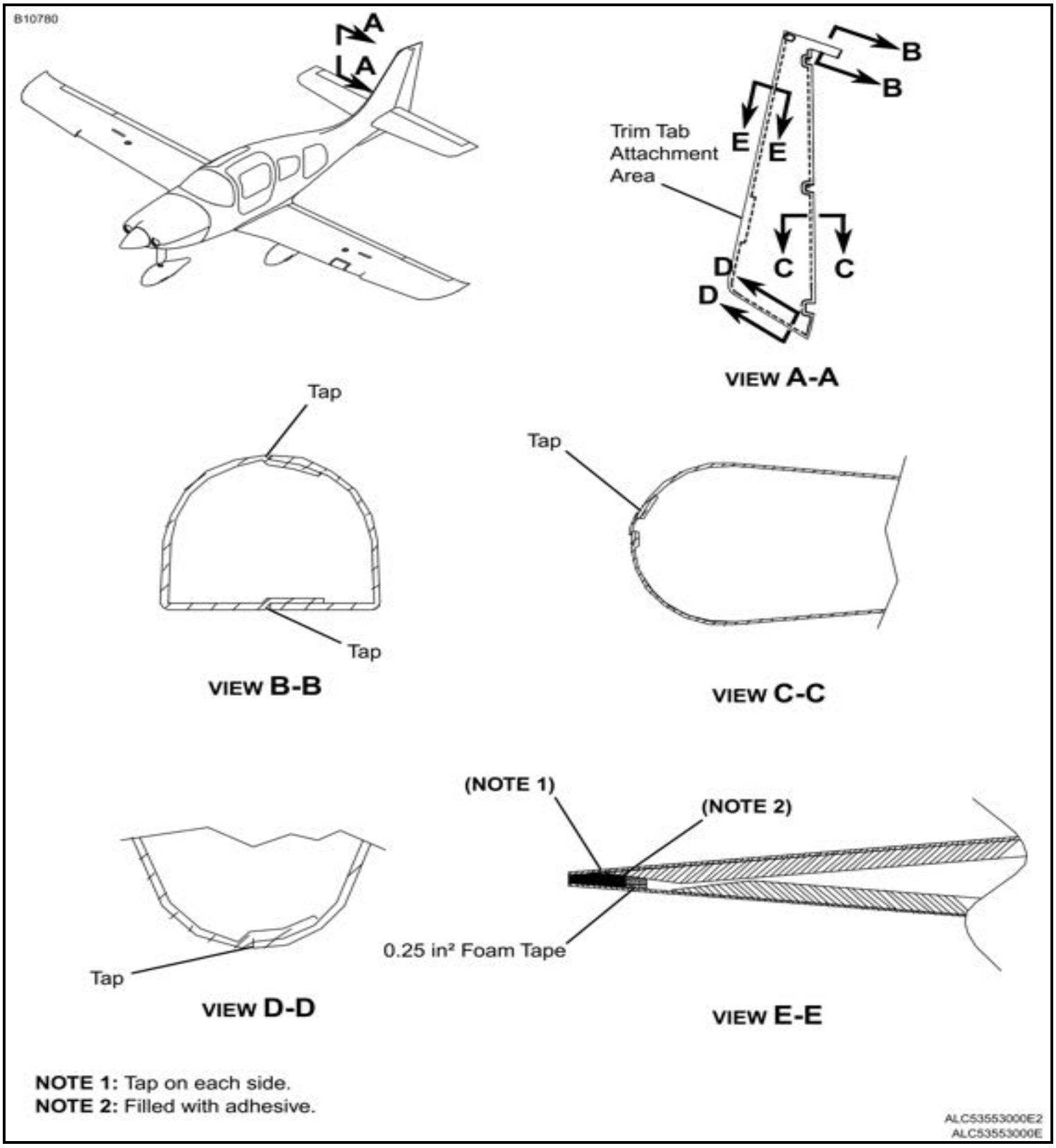
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Figure 2 : Sheet 1 : Aileron Tap Test Areas



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Figure 3 : Sheet 1 : Rudder Tap Test Areas



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STRUCTURAL INSPECTIONS - DESCRIPTION AND OPERATION

1. General

A. This section contains information needed to complete inspections on the structure of the airplane. The procedures given here are the general requirements that must be followed to correctly complete inspections. More specific information relating to the area that is to be inspected can be found in the inspection procedure for each component or area of the airplane.

2. Visual Inspections

A. Equipment.

(1) The following equipment can be used to complete required visual inspections. Not all equipment is required for each inspection and additional tools or equipment can be required for inspections of specific areas of the airplane:

- Flashlight or other light source capable of producing 100 foot-candles at the inspection surface
- Inspection mirror
- Borescope
- Camera or camcorder

B. Personnel.

(1) The following are requirements that the inspector must meet to complete visual inspections of the airplane structure and components:

- Near Vision of 20/25 (Snellen) at 16 inches +1 or -1 inch or equivalent, in at least one eye, natural or corrected
- Capable of distinguishing and differentiating colors
- Familiar with the appearance of visible damage and have training and experience on visual inspection of aircraft structure

C. Access Requirements.

(1) Direct visual examination must be used whenever possible. For areas that are not accessible, the use of a borescope or digital camera or camcorder attached to a pole is recommended.

(2) The examination must be completed at a distance of not more than 24 inches from the surface of the component that is to be inspected.

(3) The examination must be completed at an angle that is within 30 degrees of perpendicular to the surface that is to be inspected.

D. Visual Inspection Procedure.

(1) Clean the inspection surfaces thoroughly to remove all loose materials, dirt, contamination and grease.

(2) Use a towel to dry the inspection surface.

(3) Use a light source held approximately perpendicular to the inspection surface to examine the structure or component.

(4) Use a light source held and an angle of approximately 15 degrees of parallel with the inspection surface to examine the structure or component.

(5) Examine the structure or components for the following:

- Paint that is blistered, swollen, cracked, deformed or missing
- Security of parts or attached components
- Discoloration
- Bucking
- Bulging
- Dents
- Oil-canning
- Wrinkles
- Chafing
- Foreign objects
- Fluid leaks.

(6) Put a mark on any damaged areas that shows the location and type of damage found.

(7) Put a mark on any areas where you are uncertain whether damage exists to indicate that the area is suspect.

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