CHAPTER

30

ICE AND RAIN PROTECTION

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CHAPTER 30 - ICE AND RAIN PROTECTION
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CHAPTER 30 - ICE AND RAIN PROTECTION
TABLE OF CONTENTS

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ICE AND RAIN PROTECTION - DESCRIPTION AND OPERATION

1. General

A. The only protection against rain which may be required is the application of a film of rain repellant on the airplane windscreen. The shape of the windscreen is such that, during take-off, flight and approach, any rain is swept away by the surrounding airflow.

B. Anti-ice/de-ice systems are installed to protect against the accretion (build-up) of ice in the areas where ice accretion could occur and would be hazardous if not prevented. These areas are:

- wing leading edges
- air intakes
- pitot/static and AOA sensors
- windshields.

Engine bleed air is used to warm the main wing leading edge and the oil cooler air intake lip; engine bleed air is also used as the inflation medium for the de-icing boots of the engine air intake lips.
Electrical heating elements are used to warm the forward wing leading edge, the pitot tubes, static ports and AOA sensing vane, and the windshields.
An inertial separation system is installed in each of the engine air intake ducts to prevent ice accretion on the duct surfaces and the engine air inlet screen.

C. An ice detection system is installed to give the pilot visual indication of impending icing conditions.

D. A monitoring unit is installed to interface with the ice detector, the amber master caution ICE caption and the following systems:

- main wing anti-ice
- forward wing anti-ice
- inertial separator
- oil cooler air intake lip anti-ice.

The function of the monitoring unit is to give the pilot indication of failure of any of the systems listed above and to give indication in case one or more of the systems is not activated during icing conditions.
Indication of failure or a non-active system is given by means of continuous flashing of the ICE master caution caption.
Maintenance practices for the monitoring unit is included in this section.

E. Each anti-ice/de-ice system is dealt with in its own section within this chapter, as follows:

30-11-00 Main Wing Anti-ice System
30-12-00 Forward Wing Anti-ice System
30-21-00 Engine Air Intake Lip De-icing System
30-22-00 Engine Air Intake Inertial Separation System
30-23-00 Oil Cooler Air Intake Lip Anti-ice System
30-30-00 Pitot-Static and AOA Vane Anti-ice System
30-40-00 Windshield Anti-ice System
30-80-00 Ice Detection System.

F. Anti-Ice Status

The Anti-Ice Status display consists of a textual indication of the operational status of the engine, oil, boots, forward wing and main wing anti-ice systems.

- A white ON indication shows to the left or right of the respective anti-ice system legend when the associated anti-ice system (left or right) is selected to on. When the Boots De Ice system is selected on, a white ON indication shows for both the left and right Boots status.
- The ON indication changes from white to green when the associated anti.ice system is reporting status as on. The ON indication for the Boots De Ice system changes from white to green when the associated side (left or right) reports a status of on.
- When the anti-ice legend for the main wing (MW) is flashing, the green ON indication flashes continuously.
- The message ANTI-ICE shows in white below line select key R4 on all MFD formats other than the System Page when the main wing (MW) anti-ice system reporting a status of ON (normal). The message flashes for 5 seconds then shows steady white.
- When the anti-ice status changes from OFF to ON, if the cross-side anti-ice status does not change from OFF to ON, the associated anti-ice legend shows in yellow.
- The message ANTI-ICE shows in yellow below line select key R4 on all formats other than the System Page when any anti-ice system does not report a status of ON after being selected to ON. The message flashes for 5 seconds then shows steady yellow.
- Two yellow dashes show when the anti-ice system reports a status of failed.

ICE AND RAIN PROTECTION - MAINTENANCE PRACTICES

1. Monitoring Unit - Removal

A. Referenced Information

Maintenance Manual Chapter 25-10-00

B. Procedure (Refer to Fig. 201)

(1) Open, tag and safety this circuit breaker:

Pilot CB panel:

ICE DET

(2) Remove the pilot and copilot seats (Refer to 25-10-00).
(3) Disconnect the electrical connector (3).
(4) Remove the screws (1) that secure the monitoring unit (2) to the structure.
(5) Remove the Monitoring Unit (2).

2. Monitoring Unit - Installation

A. Referenced Information

Maintenance Manual Chapter 25-10-00

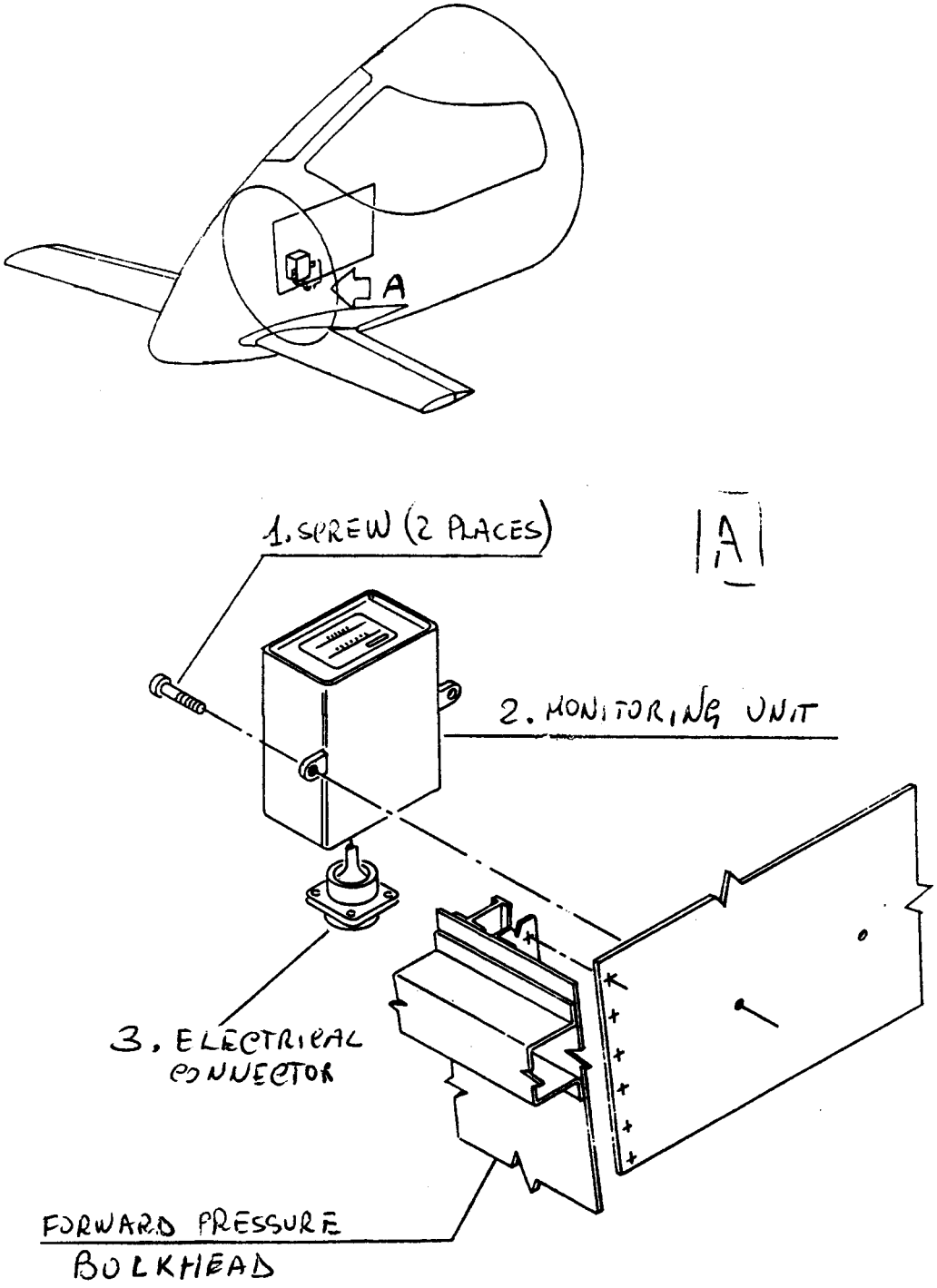
B. Procedure (Refer to Fig. 201)

(1) Make sure as necessary that:
- the applicable circuit breaker is open, tagged and safetied
- the system is safe
- access is available.

(2) Install the monitoring unit (2) and secure it to the structure with the screws (1).
(3) Connect the electrical connector (3).
(4) Install the pilot and copilot seats (Refer to 25-10-00).
(5) Remove and safety tag and close this circuit breaker:

Pilot CB panel:

ICE DET



MM_300000-201

Fig. 201 - Monitoring Unit - Removal/Installation

WING ANTI-ICE SYSTEMS - DESCRIPTION AND OPERATION

1. General

A. This section gives information for the wing anti-ice systems. Because the Avanti has a main wing and a forward wing this section is subdivided as follows:

- 30-11-00 Main Wing Anti-Ice System
- 30-12-00 Forward Wing Anti-Ice System

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MAIN WING ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

1. General

A. The main wing anti-ice system uses hot air from the engine high pressure port. The hot air is distributed through tubes and ducting along the main wing leading edge. The system is electronically controlled and has facilities for AUTO and MANUAL control as well as built-in-test facilities.
Under normal operating conditions, air from the left engine is used to warm the left wing and air from the right engine is used for the right wing; however, there is a facility for distributing the air from one engine to the left and right main wings if required.

B. The system includes the following components:

NOTE: Components for the left system are described, the right system is identical.

- main wing anti-ice shut-off valve
- temperature switch
- ejector
- main wing leading edge anti-ice duct
- temperature sensor
- regulator box
- controller.

2. Description

A. Main Wing Anti-Ice Shut-off Valve

The shut-off valve is installed downstream of the engine high pressure port. The valve is located inside the upper nacelle panel between the center and rear firewalls. The valve is a butterfly type operated by a 28 Vdc motor.

B. Temperature Switch

The temperature switch provides positive indication that hot air is distributed in the system. The temperature switch is located inside the upper nacelle panel between the center and rear firewalls downstream of the shut-off valve. The switch opens and closes at set temperatures, it closes at 80 ± 3°C (176 ± 5°F) and opens at 70 ± 3°C (158 ± 5°F).

C. Ejector

The ejector mixes hot air from the engine high pressure port with cold air from the atmosphere. The ejector nozzle acts as a bleed air control orifice when both engines are running. The ejector is installed downstream of the temperature switch and is located inside the upper nacelle panel between the center and rear firewalls.

D. Main Wing Leading Edge Anti-Ice Diffuser Duct

The diffuser duct is basically a "piccolo" tube which extends along the wing leading edge. The (anti-icing) warm air flows out of the piccolo holes, warms the inside of the leading edge and, by conduction, warms the outer surface and prevents icing.

E. Temperature Sensors

A triple temperature sensor (three sensors in one body) is installed in the main wing leading edge. Each sensor is a platinum type with a nominal resistance of 1000 Ohm at 0°C (32°F) with a maximum operating temperature of 210°C (410°F).

F. Three air outlet (exhaust) ducts are incorporated into the main wing structure. Two ducts exhaust in the lower nacelle panel, the other duct is located close to the wing tip.

G. Regulator Box

The regulator box is located inside the baggage compartment at FS 6710. The regulator box is powered from the 28 Vdc essential bus and the 28 Vdc dual feed bus. Automatic test facilities are incorporated into the regulator box to permit operational test of the system. The regulator box can operate at temperatures between -54 and +54°C (-65 and +130°F).

H. Controller

The controller is located in the flight compartment on the anti-ice control panel. The controller can operate in two modes - AUTO or MANUAL. AUTO mode is the normal method of operation.

3. Operation (Refer to Fig. 1)

A. General

NOTE: The LH system is described, the RH system is identical.

Wing leading edge anti-icing is accomplished by directing engine bleed air through diffuser ducts installed in the inboard and outboard wing leading edge.
The airflow from the engine high pressure port is separated initially into two parts: the air conditioning flow and the emergency pressurization flow. The emergency pressurization flow line is further divided to provide airflow to:

- the engine air intake de-icing system and the oil cooler air intake lips anti-icing system
- the main wing anti-ice system.

The airflow to the main wing anti-ice system first flows through the shutoff valve, then through the temperature switch and the ejector.
At the ejector the anti-ice airflow is mixed with cold air (which is taken from outside the nacelle assembly) as required to reduce its temperature to the ideal temperature for anti-icing.

Downstream of the ejector the air flows into the wing leading edge diffuser ducts, inboard and outboard of the engine nacelle.
Air outlet ducts are provided inside the engine nacelle and at the wing tip.
The main wing anti-ice system can be operated in two modes, MANUAL or AUTO. AUTO is the normal mode of operation; MANUAL mode is used only if the AUTO mode fails.
In case of failure of a main wing anti-ice system the corresponding green advisory light will go off and, if the failure occurs during icing condition, the master amber ICE caption will flash on and off continuously until the pilot resets the ICE master caption. After resetting, the ICE caption continues its function of informing the pilot of icing conditions (five seconds on) followed by indication of system failure (continuous flashing). The ICE master caution caption will flash in the same way as for a system failure if, during icing conditions, one or both of the MAIN WING switches is in the OFF position.

B. System Operation AUTO Mode

When the main control is in the AUTO position the temperature regulator box controls the system by receiving electrical signals from the temperature sensors and regulating the position of the shut-off valve accordingly.
The temperature switch provided between the shut-off valve and the ejector makes the MFD main wing anti-ice status indication (ON) change from white to green when hot bleed air is distributed in the system.
If the temperature detected by the sensor rises above 90°C (194°F), a signal from the sensors will cause the shut-off valve to close. simultaneously, the L/R MN WG OVHT warning caption and the master WARNING caption on the instrument panel will come ON.

C. System Operation MANUAL Mode

When the main control is in the MANUAL position an opening command is sent to the shut-off valve.
The green MFD main wing anti-ice status indication (ON) will be displayed.
If the temperature of the air in the leading edge rises above 90°C (194°F) the L/R MN WG OVHT warning caption and the master WARNING caption will come on.
Selecting OFF on the main control will shut down the system.
In the MANUAL mode of operation, anti-icing is maintained, and overheating is avoided, by switching the system to MANUAL and OFF, using the L/R MN WG OVHT warning caption and master WARNING caption to advise of overheating.

D. System Indicating

– When the anti-ice legend for the main wing (MW) is flashing, the green ON indicating flashes continuously.
The message ANTI-ICE shows in white below line select key R4_on all MFD formats other than the System Page when the main wing (MW) anti-ice system is reporting a status of ON (normal). The message flashes for 5 seconds then shows steady white.
When the anti-ice status changes from OFF to ON, if the cross-side anti-ice status does not change from off to on, the associated anti-ice legend shows in yellow.
The message ANTI-ICE shows in yellow below line select key R4_on all formats other than the System Page when any anti-ice system does not report a ststus of ON after being selected to ON. The message flashes for 5 seconds then shows

steady yellow.
Two yellow dashes show when the anti-ice system reports a status of failed.

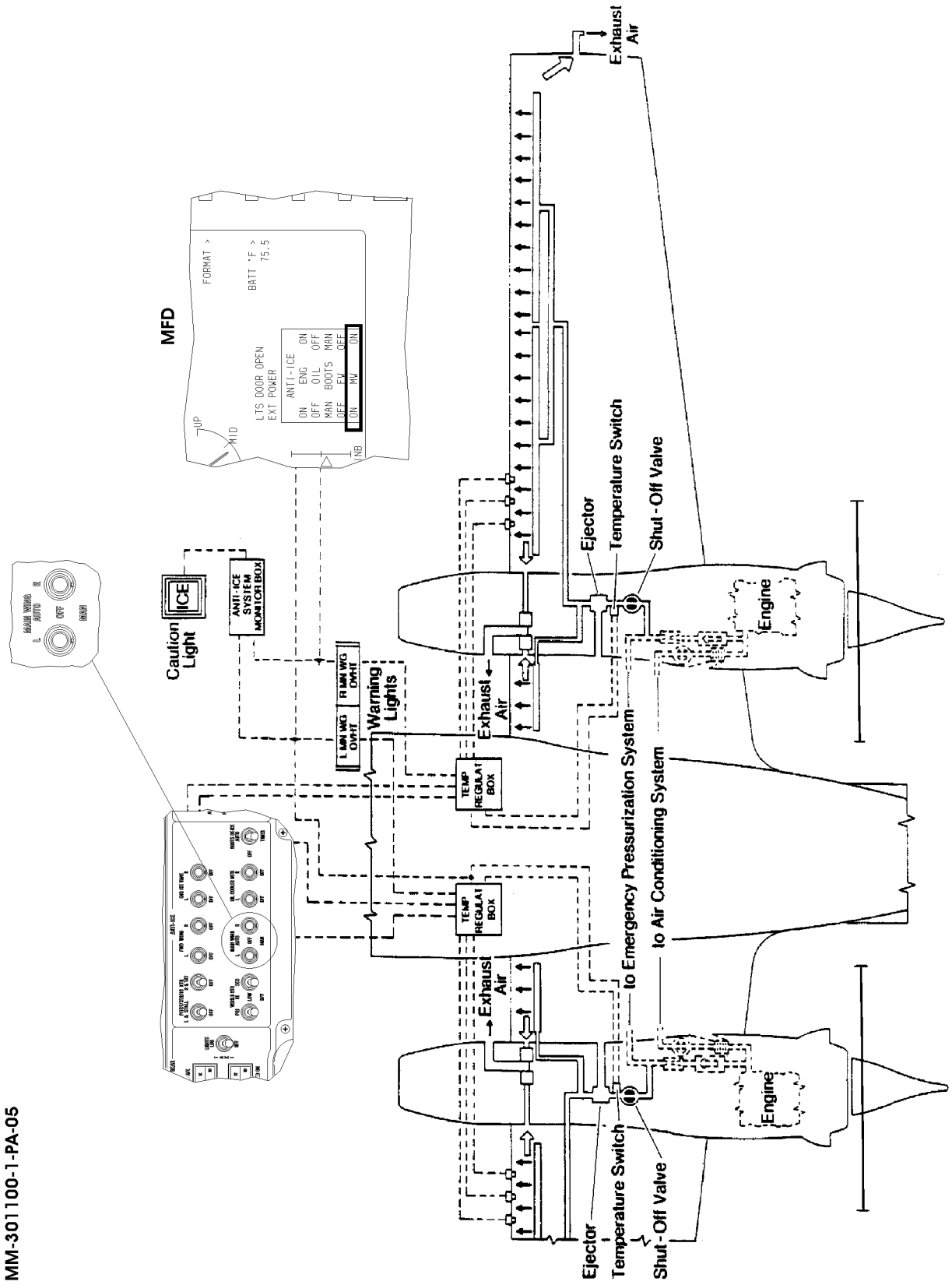

Fig. 1 - Main Wing Anti-Ice System - Schematic

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MAIN WING ANTI-ICE SYSTEM - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- removal/installation/inspection of the main wing anti-ice shut-off valve
- removal/installation/inspection of the temperature switch
- removal/installation/inspection of the ejector
- removal/installation/inspection of the regulator box
- removal/installation of the temperature sensors
- operational test of the main wing anti-ice system.

2. Main Wing Anti-Ice Shut-off Valve - Removal

A. Fixtures, Test and Support Equipment

Blanking Caps	Not Specified
Warning Notice	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 201)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
	L ENG START
	R ENG START
R WING HTR	L WING HTR
	WING OVHT

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Remove the electrical connector (1) from the shut-off valve (2).
(4) Disconnect the two couplings (3) that attach the valve to the anti-ice duct system.
(5) Support the valve (2) and remove the clamp (4) that secures the valve (2) to the support.
(6) Remove the valve (2).
(7) Put blanking caps on the line ends.

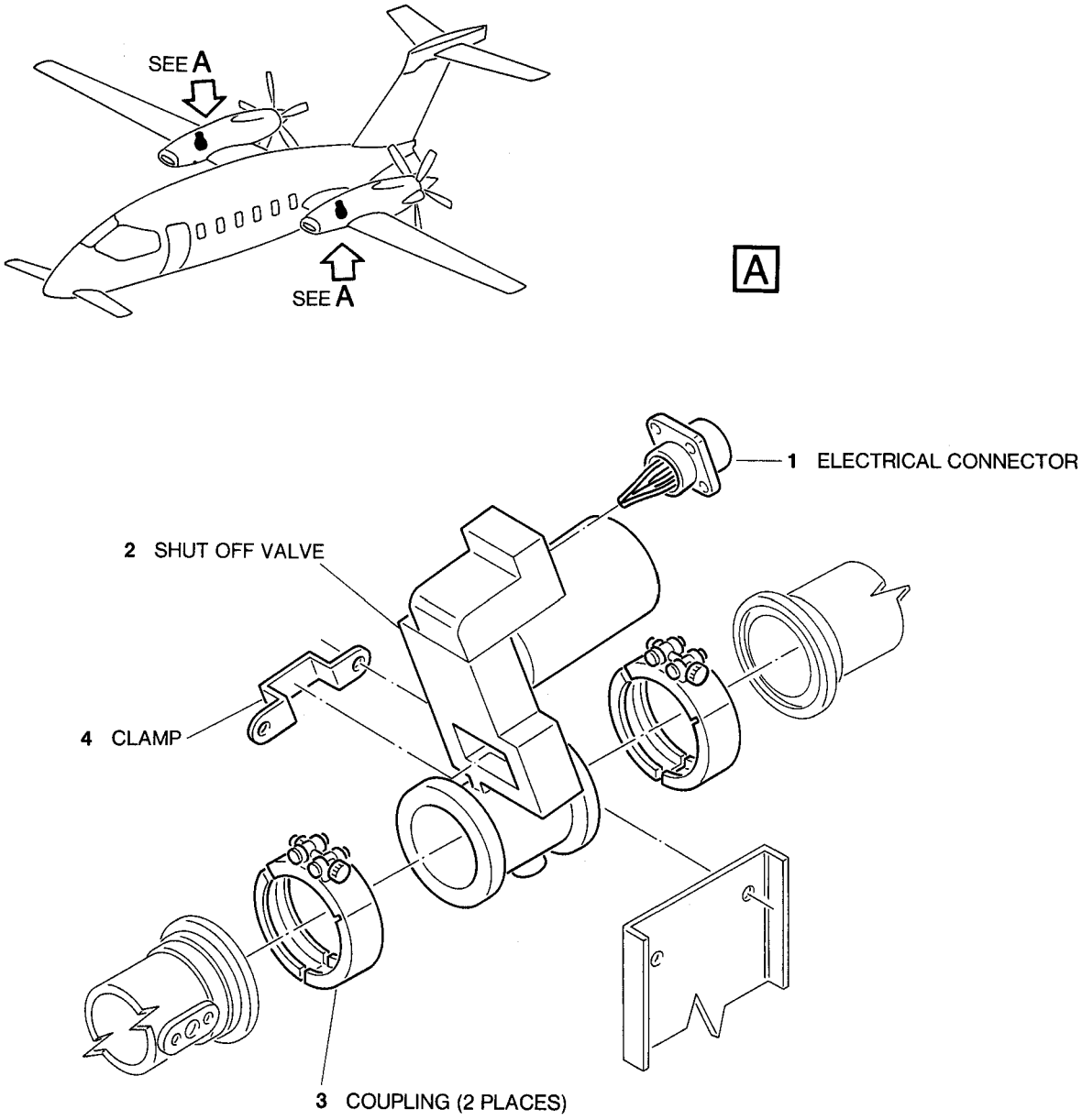

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Fig. 201 - Main Wing Anti-Ice Shut-Off Valve - Removal/Installation

3. Main Wing Anti-Ice Shut-Off Valve - Installation

A. Fixtures, Test and Support Equipment

Isopropyl Alcohol	02-008
Lint-Free Cloth	04-013

B. Referenced Information

Maintenance Manual Chapter 20-00-00
Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 201)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Make sure, as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- the system is safe
- access is available.
(Refer to the Removal Procedure)

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS DETAILED IN CHAPTER 20-00-00.

(2) Remove the blanking caps from the line ends.
(3) Use a clean lint-free cloth made moist with isopropyl alcohol to clean the components and their interfaces. Wipe the components with a clean lint-free cloth before the fluid dries.
(4) Secure the shut-off valve (2) to the support with the clamp (4).
(5) Attach the valve (2) to the anti-ice duct system with the couplings (3).
(6) Install the electrical connector (1).
(7) Make sure the work area is clear of tools and equipment. Make sure the area is clean.
(8) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(9) Remove the safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
	L ENG START
	R ENG START
R WING HTR	L WING HTR
	WING OVHT

(10) Do an Operational Test of the main wing anti-ice system (Refer to Para 16).

4. Main Wing Anti-Ice Shut-Off Valve - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Use a strong light source and do a visual inspection for security of installation. Make sure as necessary that:
- the couplings are correctly installed
- the electrical connector is secure

(3) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

5. Temperature Switch - Removal

A. Referenced Information

Maintenance Manual Chapter 54-10-00

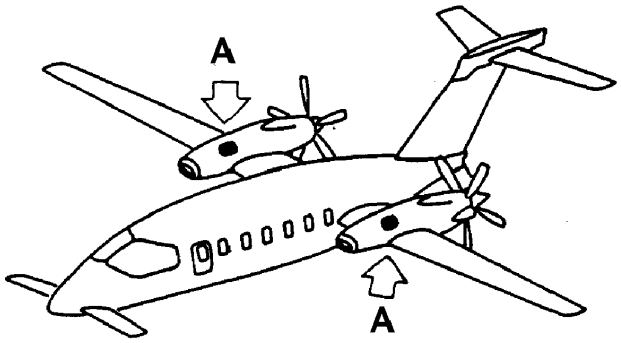
B. Procedure (Refer to Fig. 202)

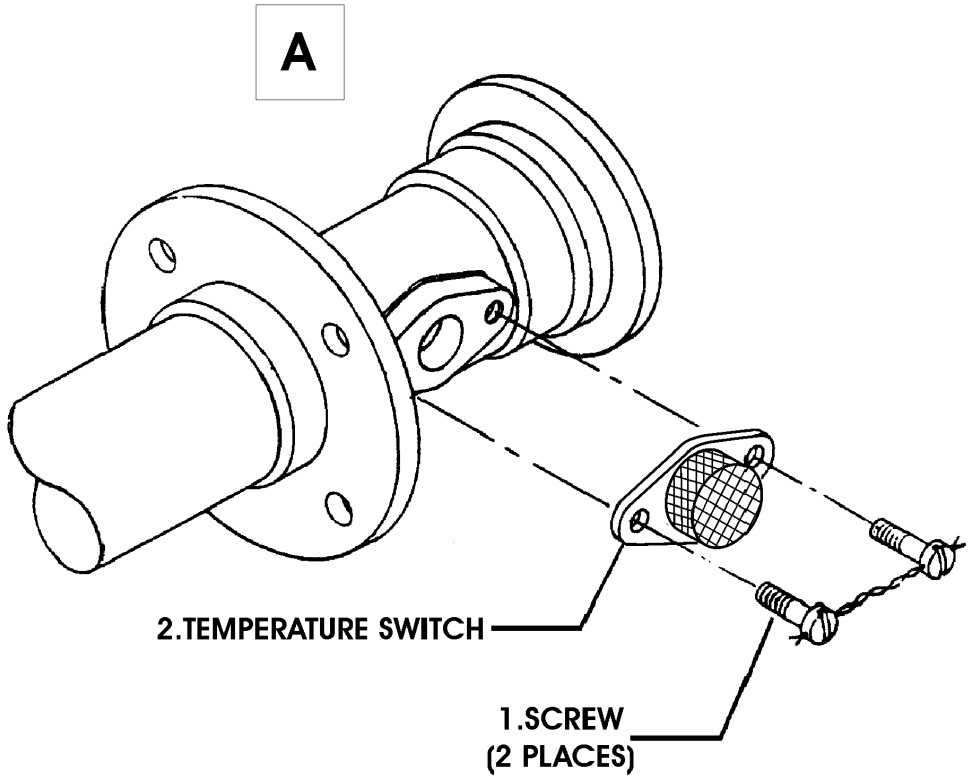
NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
	L ENG START
	R ENG START
R WING HTR	L WING HTR
	WING OVHT

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Cut the wires as close as possible to the switch lugs.
(4) Cut the lockwire and remove the two screws (1).
(5) Remove the temperature switch (2).





01100-202

Fig. 202 - Temperature Switch - Removal/Installation

6. Temperature Switch - Installation

A. Materials

Isopropyl Alcohol	02-008
Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 202)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Make sure, as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- the system is safe
- access is available.
(Refer to the Removal Procedure)

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth made moist with isopropyl alcohol to clean the mating surfaces of the component parts. Wipe the components with a clean lint-free cloth before the fluid dries.
(3) In the workshop solder an insulated wire (approx. 6 inches/10 cm long) to each of the two switch lugs.
(4) Install the temperature switch (2).
(5) Install the two screws (1) and safety with lockwire.
(6) Connect the wires with in-line connectors (Refer to 20-00-00).
(7) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00.
(8) Remove and safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
	L ENG START
	R ENG START
R WING HTR	L WING HTR
	WING OVHT

(9) Do an Operational Test of the main wing anti-ice system (Refer to Para. 16).

7. Temperature Switch - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Examine the switch for the following:
- damage and corrosion
- security of installation
- correct attachment of the electrical wires
- make sure the lockwire is secure.

(3) Tighten or replace any defective parts as necessary.
(4) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

8. Main Wing Ejector - Removal

A. Fixtures, Test and Support Equipment

Blanking Caps	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 203)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
	L ENG START
	R ENG START
R WING HTR	L WING HTR
	WING OVHT

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Remove the two clamps (5) and remove the hose (6).
(4) Disconnect the couplings (1) and (7).
(5) Support the ejector (2).
(6) Remove the bolts (3) that secure the flange (4) to the ejector downstream of the temperature switch.
(7) Remove the ejector (2); be careful not to damage the tubes.
(8) Install blanking caps on the line ends.

9. Main Wing Ejector - Installation

A. Fixtures, Test and Support Equipment

Methyl-Ethyl-Ketone	02-009
Lint-Free Cloth	04-013

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 203)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Make sure as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- the system is safe
- access is available.

(2) Remove the blanking caps from the line ends.

WARNING: BE CAREFUL WHEN YOU USE METHYL-ETHYL-KETONE. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(3) Use a clean lint-free cloth made moist with Methyl-Ethyl-Ketone to clean the component and the mating surfaces. Wipe the components and their mating surfaces with a clean lint-free cloth before the fluid dries.
(4) Position the ejector (2) to allow the installation of the tubes.
(5) Install the bolts (3) to secure the flange (4) to the ejector downstream of the temperature switch.
(6) Connect the couplings (1) and (7).
(7) Install the hose (6) with the clamps (5).
(8) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(9) Remove and safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
	L ENG START
	R ENG START
R WING HTR	L WING HTR
	WING OVHT

(10) Do an Operational Test of the main wing anti-ice system (Refer to Para. 16).

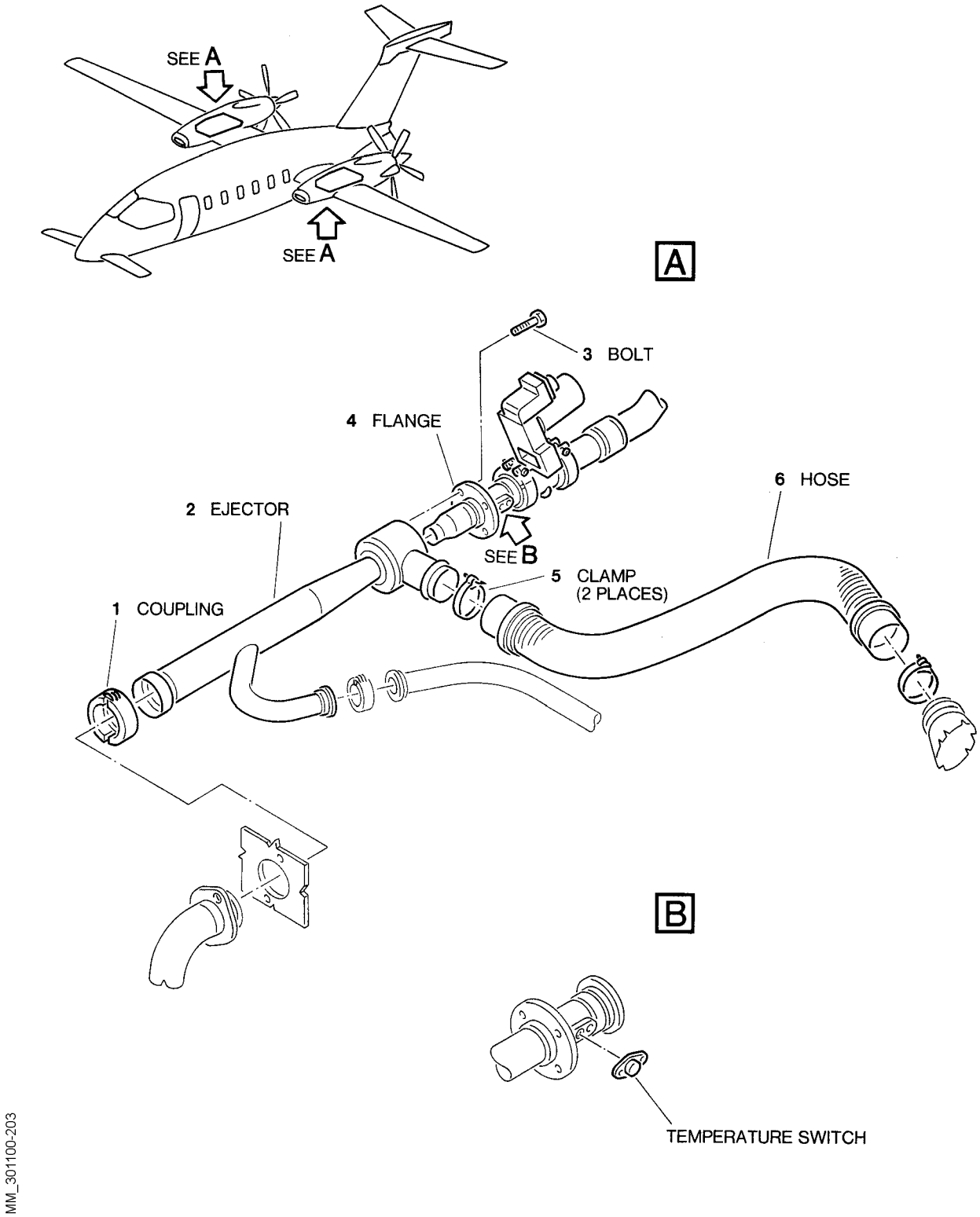


Fig. 203 - Ejector - Removal/Installation

10. Main Wing Ejector - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 203)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Do an inspection for security of installation, make sure as necessary that:
- the bolts are tight
- the clamp and hose are secure.
- the couplings are secure.

(3) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

11. Regulator Box - Removal

A. Procedure (Refer to Fig. 204)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
R WING HTR	L WING HTR
	WING OVHT

(2) Open the baggage compartment door.
(3) Disconnect the electrical connector (2).
(4) Support the regulator box (1) and remove the four screws (3).
(5) Remove the regulator box (1).

12. Regulator Box - Installation

A. Fixtures, Test and Support Equipment

Isopropyl Alcohol	02-008
Lint-Free Cloth	04-013

B. Procedure (Refer to Fig. 204)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Make sure as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- the system is safe
- access is available.
(Refer to the Removal Procedure)

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL-ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth made moist with isopropyl-alcohol to clean the components and their interfaces. Wipe the components with a clean piece of lint-free cloth before the fluid dries.
(3) Position the regulator box (1) and install the four screws (3).
(4) Connect the electrical connector (2).
(5) Remove and safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
R WING HTR	L WING HTR
	WING OVHT

(6) Close the baggage compartment door.
(7) Do an Operational Test of the main wing anti-ice system (Refer to Para. 16).

13. Regulator Box - Inspection

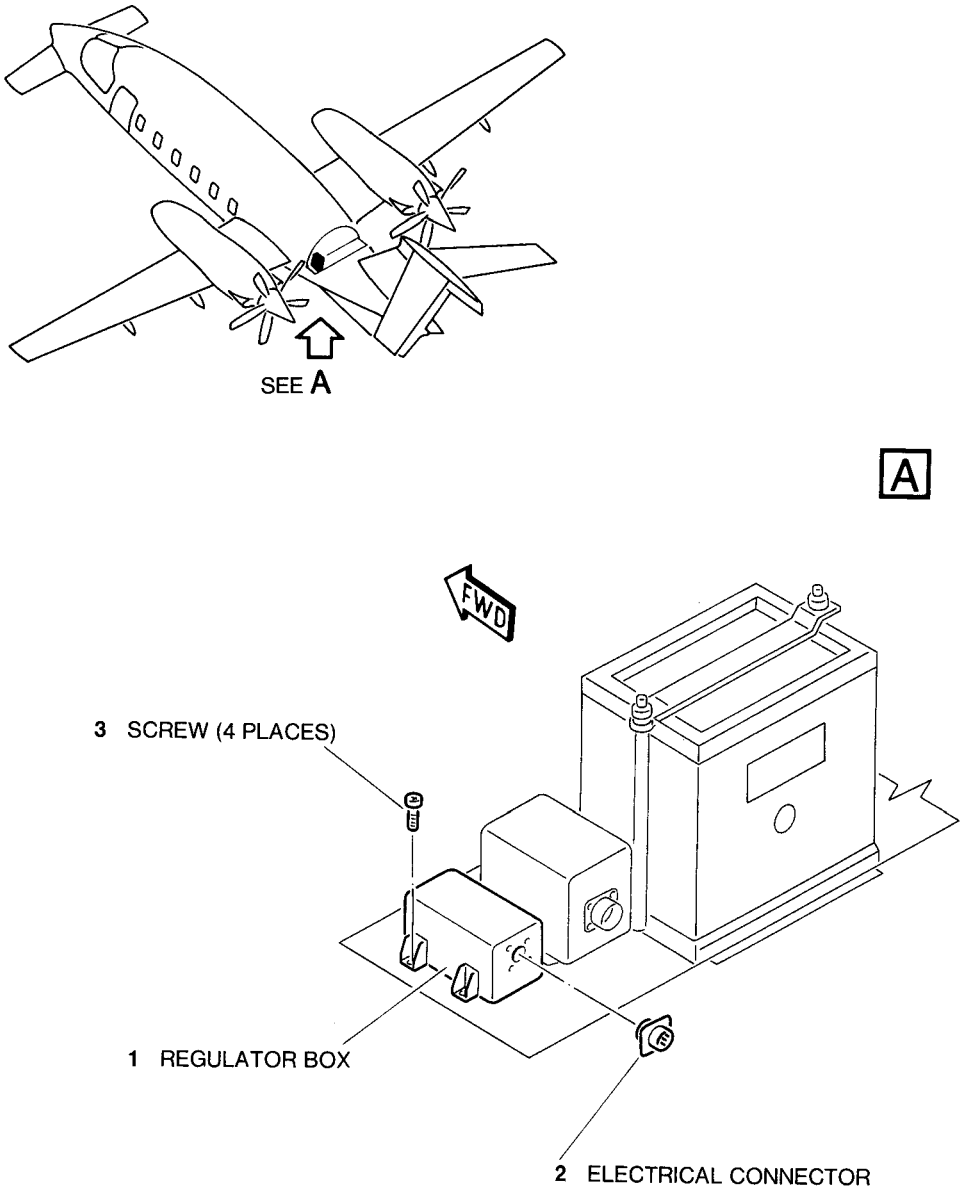
A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Procedure (Refer to Fig. 204)

(1) Open the baggage compartment door.
(2) Do an inspection for security of installation, make sure as necessary that:
- the regulator box is secure on the bulkhead
- the screws are tight
- the electrical connector is secure.

(3) Close the baggage compartment door.



MM_301100-204

Fig. 204 - Regulator Box - Removal/Installation

14. Temperature Sensor - Removal

A. Referenced Information

Maintenance Manual Chapter 54-10-00
Maintenance Manual Chapter 57-40-00

B. Procedure (Refer to Fig. 205)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
R WING HTR	L WING HTR
	WING OVHT

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Tag and disconnect the temperature sensor electrical wires from the terminal block (1).
(4) Remove the central part of the main wing leading edge (Refer to 57-40-00vvvv).
(5) Remove the lockwire and loosen the screw (4) by hand.
(6) Remove the bolts (2) that secure the temperature sensor to the leading edge structure.
(7) Remove the temperature sensor (3).

15. Temperature Sensor - Installation

A. Materials

Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 54-10-00
Maintenance Manual Chapter 57-40-00

C. Procedure (Refer to Figs. 205 and 206)

(1) Make sure as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- the system is safe
- access is available.
(Refert to the Removal Procedure)

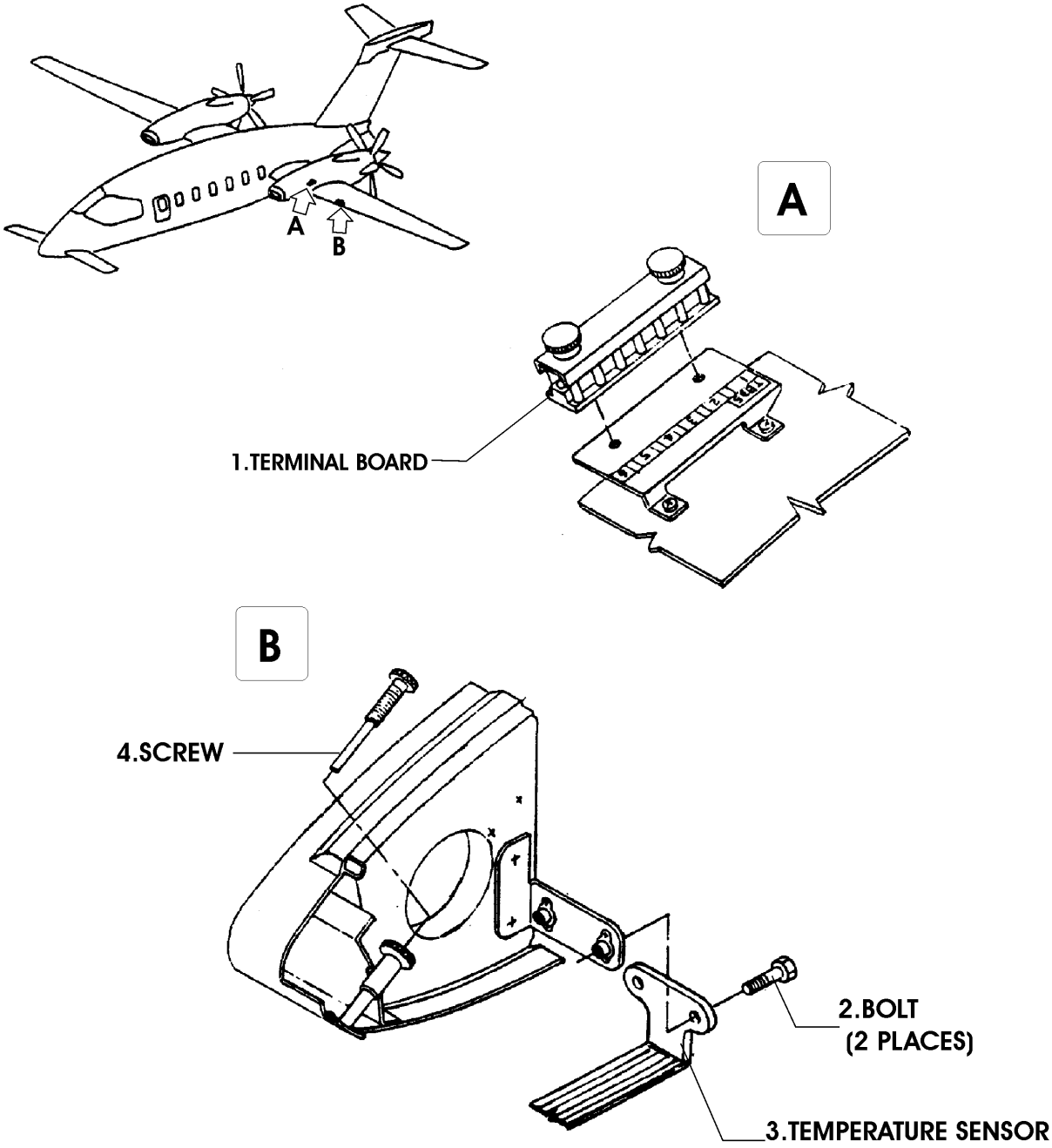
(2) Install the temperature sensor (3) in the main wing leading edge.
(3) Install the bolts (2) to secure the temperature sensor to the leading edge structure.

CAUTION: WHEN YOU INSTALL SCREW (4) PAY ATTENTION TO TURN SMOOTHLY BY HAND WITHOUT TIGHTENING. THE SCREW (4) NEEDS ONLY TO BE IN CONTACT WITH THE SENSOR. AN EXCESSIVE SCREW (4) TIGHT COULD DAMAGE THE SENSOR.

(4) Turn, by hand, the screw (4) to bring the temperature sensor into contact with the internal surfaces of the leading edge. Safety the screw (4) with lockwire.
(5) Check that the resistance of the temperature sensors is in accordance with the requirement for the ambient temperature (Refer to Fig. 206).
(6) Install the main wing leading edge (Refer to 57-40-00).
(7) Connect the temperature sensor electrical wires to the terminal block, in accordance with the tags attached during removal. Remove the tags.
(8) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(9) Remove the safety tags and close these circuit breakers:

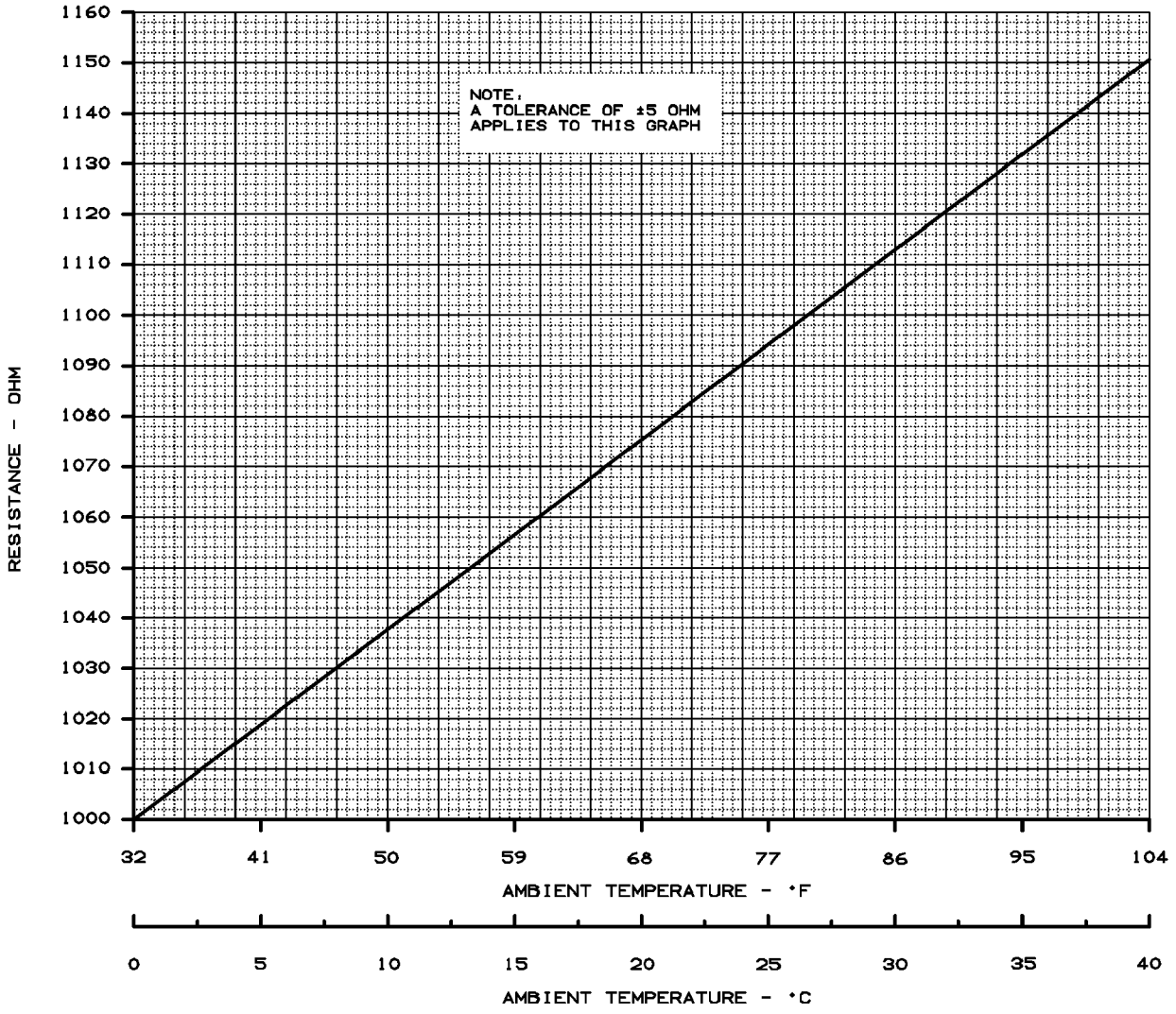
Copilot CB panel:	Pilot CB panel:
R WING HTR	L WING HTR
	WING OVHT

(10) Do an operational test of the main wing anti-ice system (Refer to Para. 16).



MM_301100-205

Fig. 205 - Temperature Sensors - Removal/Installation



MM_301100-206

Fig. 206 - Ambient Temperature/Resistance Correlation Graph

16. Main Wing Anti-Ice System - Operational Test

A. Fixtures, Test and Support Equipment

Stop Watch	Not Specified

B. Referenced Information

Maintenance Manual Chapter 24-00-00

C. Procedure

CAUTION: DO NOT PERFORM AN OPERATIONAL TEST OF THE MAIN WING ANTI-ICE SYSTEM IF THE OUTSIDE AIR TEMPERATURE IS ABOVE 40°C.
TESTING THE SYSTEM AT HIGH OUTSIDE AIR TEMPERATURE CAN DAMAGE THE MAIN WING LEADING EDGE.

(1) Start the RH engine (Refer to 71-00-00).
(2) Make sure that electrical power is available (Refer to 24-00-00).
(3) Do the test:

	Action	Result
(a)	On the System Test Panel set the selector switch to MN WG A/I.	-
(b)	Set the LH main control switch to the AUTO position.	-
(c)	At the same time, start the stop watch and press and release the system test button.	After 20 seconds the L MN WG A/ICE advisory caption will come on.
(d)	Set the RH main control switch to the AUTO position.	-
(e)	At the same time, start the stop watch and press and release the system test button.	After 20 seconds the R MN WG A/ICE advisory caption will come on.
(f)	Set the main control switches to the OFF position.	-

(4) Stop the RH engine (Refer to 71-00-00).

NOTE: The main wing anti-ice system has an automatic test facility built into the regulating box. Faults in the system can be found by calculating the time it takes for the L/R MN WG A/ICE advisory captions to come on.
If the caption comes on at the beginning of the test the shut-off valve is stuck in the fully open position.

If the caption fails to come on, or begins to flash after 20 seconds, there is an unspecified fault in the system which will require further investigation.

FORWARD WING ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

1. General

A. The forward wing leading edge is protected against ice accretion by an electrical anti-ice system.
Each forward wing leading edge anti-ice system consists of eight heating elements and five temperature sensors that is fixed on the leading edge.
The leading edge temperature is detected by two temperature sensors in series connection; two other temperature sensors in parallel connection give overtemperature information.
A fifth temperature sensor causes a green advisory caption to come on when the system is functioning correctly.

B. The system includes the following components:

NOTE: Components for the left system are described, the right system is identical.

- heating element
- temperature sensors.

2. Description

A. Heating Element

The heating element unit operates at a nominal voltage of 28 Vdc and is divided into eight sections or zones.

B. Temperature Sensors

Five temperature sensors are mounted on each forward wing.
Two control temperature sensors turn the system ON at 37.7 ± 4.4°C (100 ± 8°F) and turn it OFF at 48.8 ± 4.4°C (120 ± 8°F).
Two overheat temperature sensors turn the red warning light ON at 60 ± 4.4°C (140 ± 8°F) and turn it OFF at 48.8 ± 4.4°C (120 ± 8°F).
The fifth temperature sensor turns the green advisory light ON at 15.5 ± 4.4°C (60 ± 8°F) and turns it OFF at 4.4 ± 4.4°C (40 ± 8°F).

3. Operation

A. General

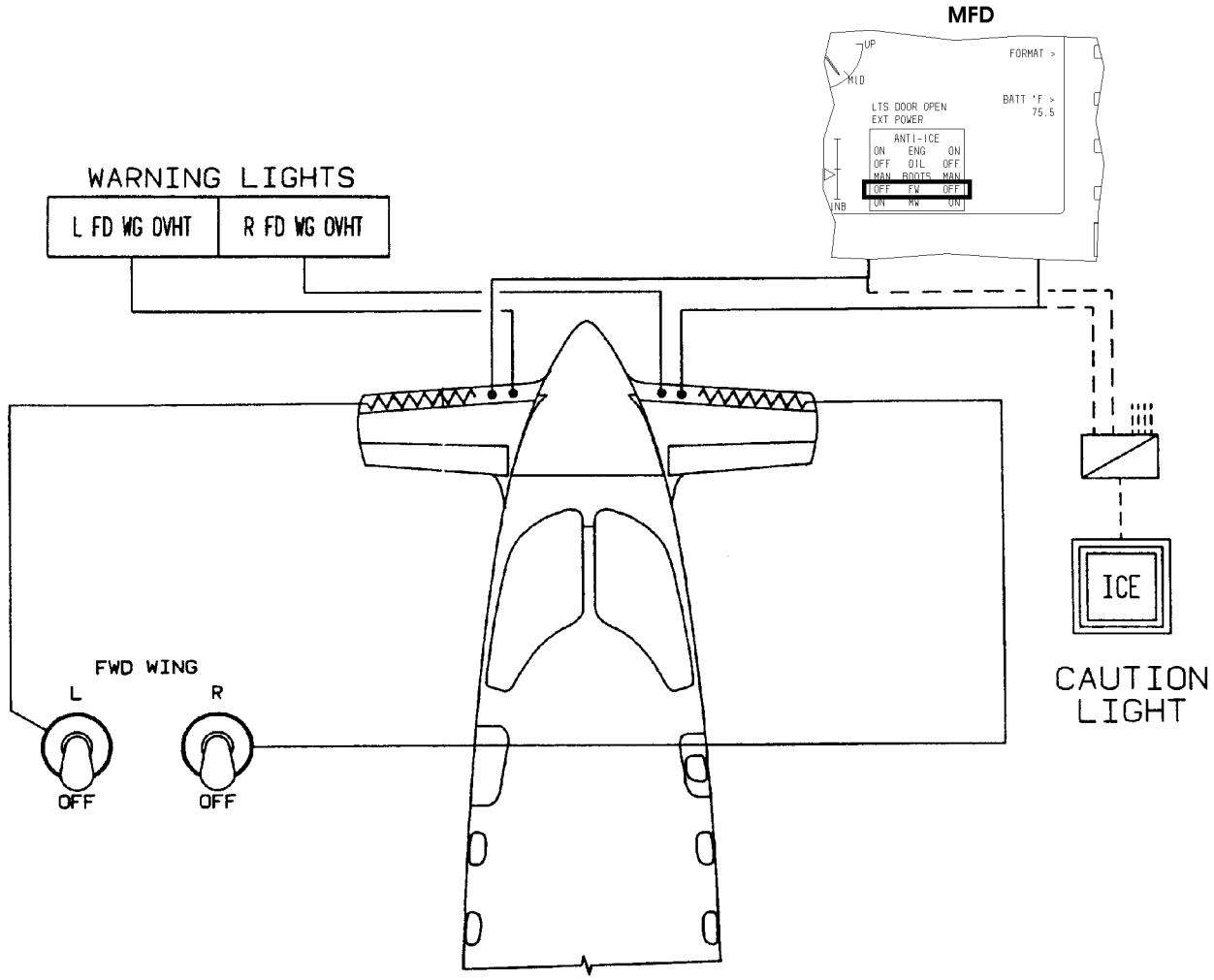
NOTE: The LH system is described, the RH system is identical.

A two-position switch installed on the anti-ice control panel captioned L and R FWD WING-OFF is provided for each forward wing.
When the L/R FWD WING-OFF switch is to the L/R FWD WING position, the forward wing leading edge skin begins to heat and the ON indication on the MFD is white, then, when the preset temperature is reached, the indication change color from white to green.

The temperature continues to increase until it reaches the operative range and is maintained automatically in this range by means of two temperature sensors electrically connected in series. Should a malfunction occur to the sensors, another two temperature sensors provide protection against overtemperature: in this case the L/R FWD WG OVHT red warning caption on the annunciator panel will come on.
Electrical power to control both (left and right) systems is supplied by the left and right single feed bus through the L and R FWD WING HTR 3 Amp circuit breakers located on the pilot and copilot circuit breaker panels.
Electrical power for the heating elements is supplied from the L and R GEN bus remote control circuit breakers (RCCB) located in the main junction box.
Two additional 0.5 Amp circuit breakers, captioned L and R FWD WG HTR CONT and located in the left and right circuit breaker panel, are connected with the above mentioned RCCB.
Two yellow dashes show when the anti-ice system reports a status of failure and the master amber ICE caption will flash ON and OFF continuously until the pilot resets the ICE master caption. After resetting, the ICE caption continues its function of informing the pilot of icing conditions (five seconds on) followed by indication of system failure (continuous flashing). The ICE master caution caption will flash in the same way as for a system failure if, during icing conditions, one or both of the FWD WING switches is in the OFF position.

4. Indicating

- A white ON indication shows to the left or right of the respective anti-ice system legend when the forward wing anti-ice system (left or right) is selected to on.
- The ON indication changes from white to green when the forward wing anti.ice system is reporting status as on.
- When the anti-ice status changes from OFF to ON, if the cross-side anti-ice status does not change from OFF to ON, the associated anti-ice legend shows in yellow.
- The message ANTI-ICE shows in yellow below line select key R4 on all formats other than the System Page when any anti-ice system does not report a status of ON after being selected to ON. The message flashes for 5 seconds then shows steady yellow.
- Two yellow dashes show when the anti-ice system reports a status of failed.



MM-301200-1-PA-05

Fig. 1 - Forward Wing Anti-Ice System - Schematic

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FORWARD WING ANTI-ICE SYSTEM - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- removal/installation/inspection of the forward wing leading edge
- operational test of the forward wing anti-ice system
- replacement of the forward wing temperature sensor.

2. Forward Wing Leading Edge - Removal

A. Referenced Information

Maintenance Manual Chapter 51-25-00
Maintenance Manual Chapter 53-10-00

B. Procedure (Refer to Fig. 201)

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:	Copilot CB panel:
L FWD WING HTR	R FWD WING HTR
L FWD WING HTR CONT	R FWD WING HTR CONT

(2) Remove the radome/nosecone (Refer to 53-10-00).
(3) Remove the forward wing tip.
(4) Tag and disconnect the heating elements supply cables (3) from the terminal block (1) by remove the nuts (5) and the washers (4).
(5) Disconnect the sensors connector (2).
(6) Remove the surface finish as required to locate the attachment screws (Refer to 51-25-00).
(7) Support the forward wing leading edge.
(8) Remove the screws.
(9) Remove the forward wing leading edge.

3. Forward Wing Leading Edge - Installation

A. Referenced Information

Maintenance Manual Chapter 51-25-00
Maintenance Manual Chapter 53-10-00

B. Materials

Methyl-Ethyl-Ketone (MEK)	02-009
Lint-free Cloth	04-013

C. Procedure (Refer to Fig. 201)

WARNING: BE CAREFUL WHEN YOU USE METHYL-ETHYL-KETONE. OBEY THE HEALTH AND SAFETY PRECAUTIONS GIVEN IN 20-00-00.

(1) Use a clean lint-free cloth made moist with solvent (MEK) to clean the parts and their interfaces.
(2) Place the forward wing leading edge in position on the forward wing.
(3) Install the screws.
(4) Connect the heating elements supply cables in the correct position on the terminal block (1) with proper washers (4) and nuts (5). Remove the identification tags
(5) Connect the sensor connector (2).
(6) Install the forward wing tip.
(7) Restore the surface finish (Refer to 51-25-00).
(8) Install the radome/nosecone (Refer to 53-10-00).
(9) Remove the safety tags and close these circuit breakers:

Pilot CB panel:	Copilot CB panel:
L FWD WING HTR	R FWD WING HTR
L FWD WING HTR CONT	R FWD WING HTR CONT

(10) Do an Operational Test of the forward wing anti-ice sytem (Refer to Para. 5).

4. Forward Wing Leading Edge - Inspection

A. Referenced Information

Maintenance Manual Chapter 53-10-00

B. Procedure

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:	Copilot CB panel:
L FWD WING HTR	R FWD WING HTR
L FWD WING HTR CONT	R FWD WING HTR CONT

(2) Remove the radome/nosecone (Refer to 53-10-00).
(3) Do an inspection for security of installation; make sure as necessary that:
- the electrical connector is secure
- the wires are securely attached to the terminal block.

(4) Install the radome/nosecone (Refer to 53-10-00).

(5) Remove the safety tags and close these circuit breakers:

Pilot CB panel:	Copilot CB panel:
L FWD WING HTR	R FWD WING HTR
L FWD WING HTR CONT	R FWD WING HTR CONT

5. Forward Wing Leading Edge - Functional Test

A. Fixtures, Test and Support Equipment

Ammeter (with cable current consumption pincers)

B. Referenced Information

Maintenance Manual Chapter 24-00-00

C. Procedure

NOTE: For this procedure it is necessary to have two persons - one in the flight compartment to make the necessary selections and one to check the power consumption (at the external power unit cable).

(1) Connect the external power (Refer to 24-00-00).
(2) Do the test:

	Action	Result
(a)	Set the BAT switch to BAT.	–
(b)	Select FWD WG A/I on the system test selector.	–
(c)	Place the ammeter around one of the two external power cables;read and make a note of the current consumption.	–
(d)	Set the left FWD WING switch to the L position.	–

CAUTION: DO NOT HOLD THE TEST PUSHBUTTON IN FOR MORE THAN TWO SECONDS. DAMAGE TO THE HEATING ELEMENTS CAN OCCUR.

NOTE: During this test the ON white indication is displayed on the MFD System Page and may or may not change to green color, depending on the duration the test button is pushed; this has no relevance to this test.

	Action	Result
(e)	Push the system test pushbutton (max. 2 seconds) and at the same time read and make a note of the current consumption at the ammeter.	–
(f)	Subtract the reading taken at step (c) from the reading taken at step (e).	The difference should be between 60 and 70 Amps
(g)	Set the left FWD WING switch to the OFF position and set the right FWD WING switch to the R position.	–
(h)	Repeat steps (e) and (f).	–
(i)	Set the right FWD WING switch to the OFF position.	–
(j)	Set the BAT switch to OFF.	–

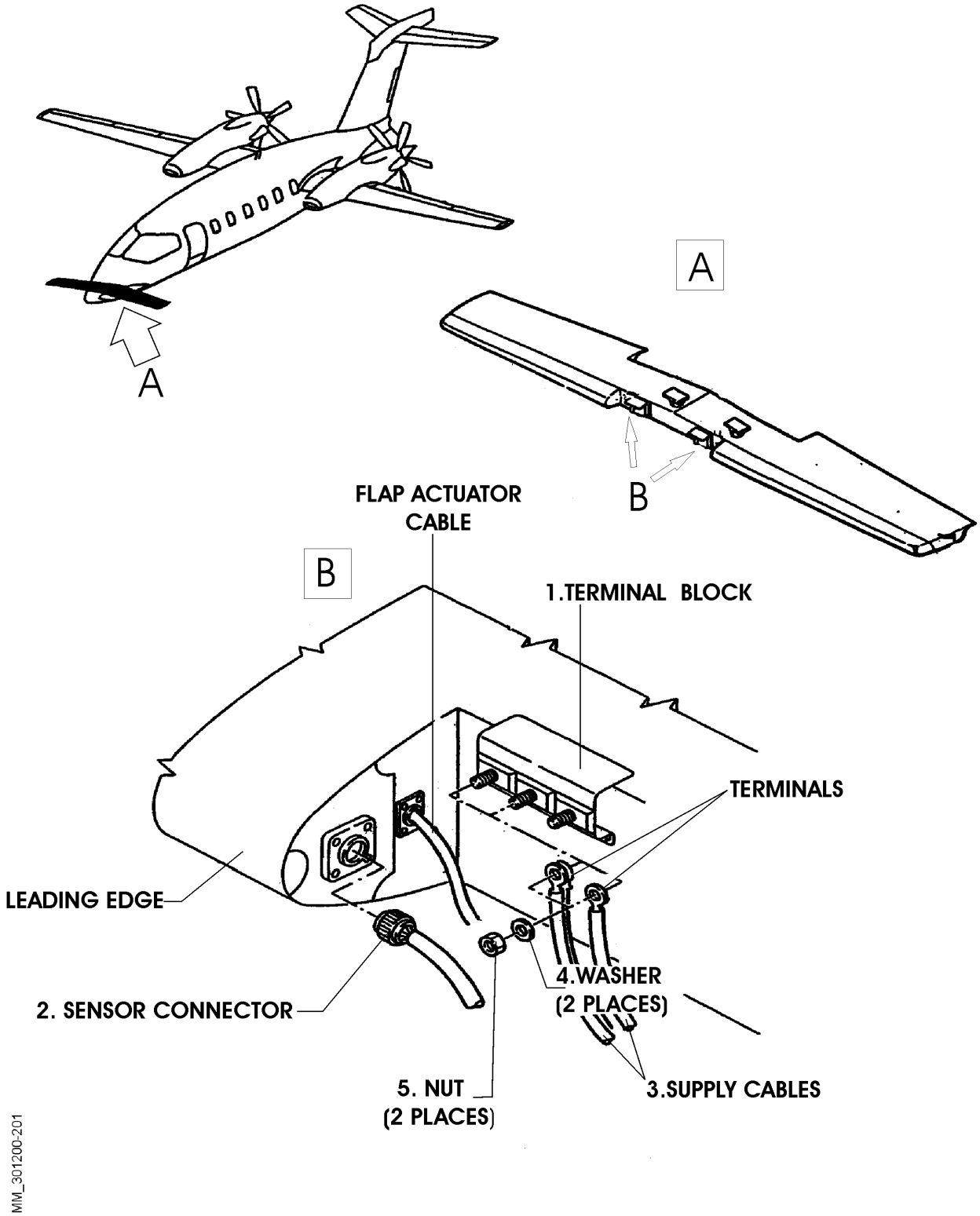

Fig. 201 - Forward Wing Leading Edge - Removal/Installation

6. Forward Wing Temperature Switch - Replacement (Ref. Fig. 202)

A. Procedure

(1) Remove the forward wing leading edge (Refer to Para. 2).

NOTE: The following steps should be done away from the airplane, on a bench or similar.

NOTE: On the airplanes up to SN 1033 the packing keep in position the sensors with two nuts, on the airplanes from SN 1034 and up with four nuts.

(2) Remove the two nuts (1) and remove the switch plate assembly (2).
(3) Separate the switch (3) from the switch plate assembly (2).
(4) Attach identity tags to the two wires of the switch to be replaced.
(5) Unsolder the two wires from the switch lugs and remove the two nuts (5) that secure the switch (4) to the plate assembly (2).
(6) Remove the switch (4).
(7) Install the new switch (4) and secure it to the plate assembly (2) with the two nuts (5). Do not overtighten the nuts.
(8) Solder the two wires to the switch (4) in accordance with the identity tags. Remove the identity tags.

CAUTION: TIGHTEN THE SECURING NUTS (1) JUST ENOUGH SO THAT THE SWITCH MAKES FIRM CONTACT WITH THE LEADING EDGE INNER SURFACE. DAMAGE CAN OCCUR IF THE NUTS ARE OVERTIGHTENED.

(9) Install the plate assembly (2) in the forward wing leading edge and secure it with the two nuts (1).
(10) Install the forward wing leading edge (Refer to Para. 3).

7. Forward Wing Temperature Switches - Continuity Check (Ref. Fig. 201)

A. Fixtures, Test and Support Equipment

Continuity Tester	Not Specified

B. Procedure

NOTE: The procedure for the LH side is given, the procedure for the RH side is identical.

(1) Disconnect the electrical connector (2) from the left leading edge.
(2) Check that there is continuity between pins A and B, pins C and D and between pins J and K.
(3) Check that there is not continuity between pins E and F, and between pins G and H.
(4) Connect the electrical connector (2) to the left leading edge.

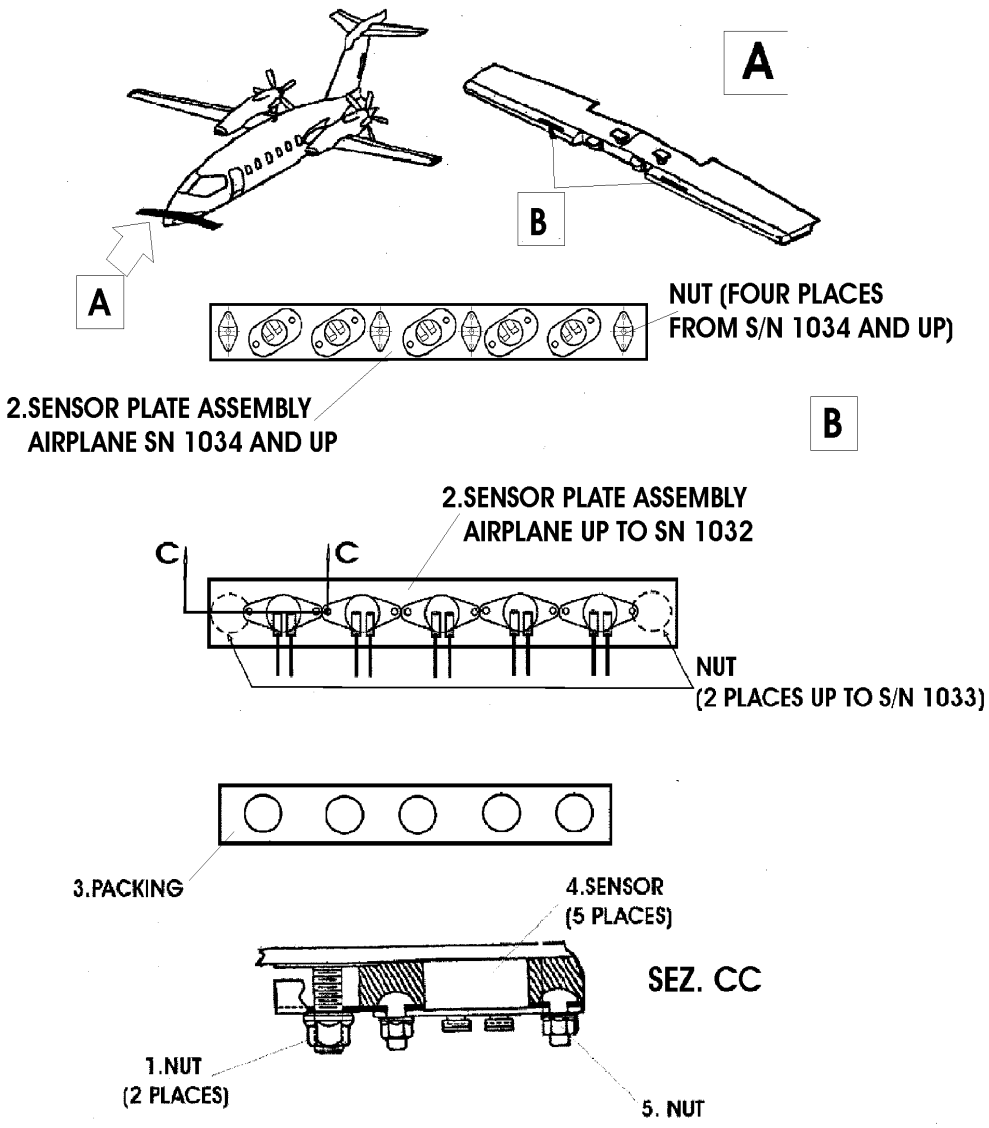

Fig. 202 - Temperature Sensor -Replacement

8. Forward Wing Anti-Ice Relays and RCCBs - Functional Test

A. Fixtures, Test and Support Equipment

Ammeter (with cable current consumption pincers)

B. Referenced Information

Maintenance Manual Chapter 24-00-00

C. Procedure

NOTE: For this procedure it is necessary to have two persons - one in the flight compartment to make the necessary selections and one to check the power consumption (at the external power unit cable).

NOTE: The procedure given is for (LH) relay K27 and RCCB K25, the procedure for (RH) relay K28 and RCCB K27 is identical.

(1) Connect the external power (Refer to 24-00-00).
(2) Do the test:

	Action	Result
(a)	Set the BAT switch to BAT.	–
(b)	Select FWD WG A/I on the system test selector.	–
(c)	Place the ammeter around one of the two external power cables.	The ammeter reading should be more than zero.
(d)	Set the left FWD WING switch to the L position.	–

CAUTION: DO NOT HOLD THE TEST PUSHBUTTON IN FOR MORE THAN TWO SECONDS. DAMAGE TO THE HEATING ELEMENTS CAN OCCUR.

(e)	Push and hold the system test pushbutton for 2 seconds then,while the pushbutton is still held, open the L FWD WING HTR circuit breaker.	The ammeter reading should rise to approx. 70 Amps, then, when the circuit breaker is open, fall to a zero reading.
(f)	Set the left FWD WING switch to the OFF position and set the right FWD WING switch to the R position.	

Action	Result
(g) Close the L FWD WING HTR circuit breaker.	
(h) Set the BAT switch to OFF.	

(3) Do the test on the RH relay (K28) and RCCB (K27).

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AIR INTAKE DE-ICING/ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

1. General

A. This section gives information for the air intakes anti-ice/de-icing systems. As the Avanti has three of these systems (each side), this section is subdivided as follows:

B. 30-21-00 Engine Air Intake Lip De-icing System

C. 30-22-00 Engine Air Intake Interial Separation System

D. 30-23-00 Oil Cooler Air Intake Lip Anti-ice System

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ENGINE AIR INTAKE LIP DE-ICING SYSTEM - DESCRIPTION AND OPERATION

1. General

A. The engine air intake lip de-icing system uses hot air from the engine high pressure port. The system is controlled by an electronic system controller (in normal condition), located on the anti-ice panel in the flight compartment and by a timer (during the emergency condition) located on the support forward of the instrument panel.

B. The system includes the following components:
- a pressure regulator/relief valve
- an ejector/flow control valve
- a pressure switch
- an engine air intake boot assembly
- a timer
- a control box
- a control switch
- warning and advisory annunciators.

2. Description

NOTE: Components for the LH installation are described, the RH installation is identical.

A. Pressure Regulator/Relief Valve
The pressure regulator/relief valve is installed downstream of the engine high pressure port. The valve is located inside the nacelle at NAC S-885.71 and operates at 20 to 225 psig, has an outlet pressure of 18 ±1 psig and a relief pressure of 21 ±1 psig.

B. Ejector/Flow Control Valve
The ejector/flow control valve is installed downstream of the pressure regulator/ relief valve. The valve is located inside the nacelle at NAC S-885.71. The valve has an inlet and outlet pressure of 18 psig and an outlet vacuum of 5.5 inches Hg. The valve controls inflation of the pneumatic boot.

C. Pressure Switch
The pressure switch is installed downstream of the ejector/flow control valve. The pressure switch is set to close when the pressure rises above 15 ±1 psig and opens when the pressure drops below 13 psig.

D. Engine Air Intake Boot
The de-icing is a smooth, thin elastomer and fabric blanket that covers the surface of the engine air inlet in the area where ice is likely to accumulate. The blankets contain small stretchable de-icing tubes that are normally in a collapsed (flat) condition. Accumulated ice is removed by momentarily pressurizing the stretchable de-icing tubes with compressed air. The inflation of the tubes produces cracking stresses in the ice, and shearing stresses between the ice and the boot surface. This action causes the ice to be broken into pieces and breaks its bond with the boot surface. The forward motion of the airplane causes the ice pieces to be

swept rearward away from the airplane; any pieces that enter the engine air inlet are ejected to atmosphere by the effect of the inertial separation system, which is always in operation during icing conditions.

E. Timer
The timer is located in the flight compartment behind the center instrument panel. The timer is powered, when the selector switch is in the TIME position, by the +28 Vdc R DUAL FEED BUS through a 5 Amp circuit breaker captioned BOOTS DE ICE.

F. De-Icer Electronic Control Box
The de-icer electronic control box is located in the flight compartment behind the center instrument panel.
The control box is powered, when the selector switch is in the AUTO position, by the +28 Vdc R DUAL FEED BUS through a 5 Amp circuit breaker captioned BOOTS DE ICE.

3. Operation (Refer to Fig. 1)

A. General

NOTE: The LH system is described, the RH system is identical.

The air is supplied by the high pressure bleed port and is routed to a pressure regulator/relief valve where it is reduced to the de-icer system pressure of 18 ±1 psig. The boots are protected against failure of the pressure regulator by an integral relief section that operates at 21 ±1 psig. Downstream of the pressure regulator, an ejector/flow control valve controls the air flow to and from the boot through electrical signals coming from the timer or from the electronic controller interfaced with the ice detector installed on the airplane. The pilot can operate the system in two different modes, by selecting AUTO during normal condition or TIMER during emergency condition. The BOOTS DE ICE selector switch is located in the anti-ice system panel. The air flow is controlled as follows:

– when the control valve solenoid is de-energized, the ejector section of the valve provides the vacuum needed to keep the boots deflated
– when the control valve solenoid is energized, the vacuum is shut off air under pressure is supplied and the tube inflated.

When the Boots De Ice system is selected on, a white MAN indication shows for both the left and right Boots status. The MAN indication changes from white to green when the corresponding boot is being inflated and a pressure of 15 psig is reached.

B. System Operation (AUTO mode)
When the AUTO position is selected, the 28 Vdc voltage is supplied to the electronic controller that receives and counts the ice detector pulses. Every ten pulses, the controller energizes the control valve solenoid for six seconds causing the boot to be inflated; as the ice detector sends an output signal when a preset ice thickness has been reached on its probe, the frequency of the boot actuation is proportional to the severity of the icing condition encountered. The counter is automatically reset after the tenth pulse.

C. System Operation (TIMER mode)
When the TIMER position is selected, the 28 Vdc voltage is supplied to a timer that energizes the valve solenoid for 5 seconds at 175 second fixed intervals.

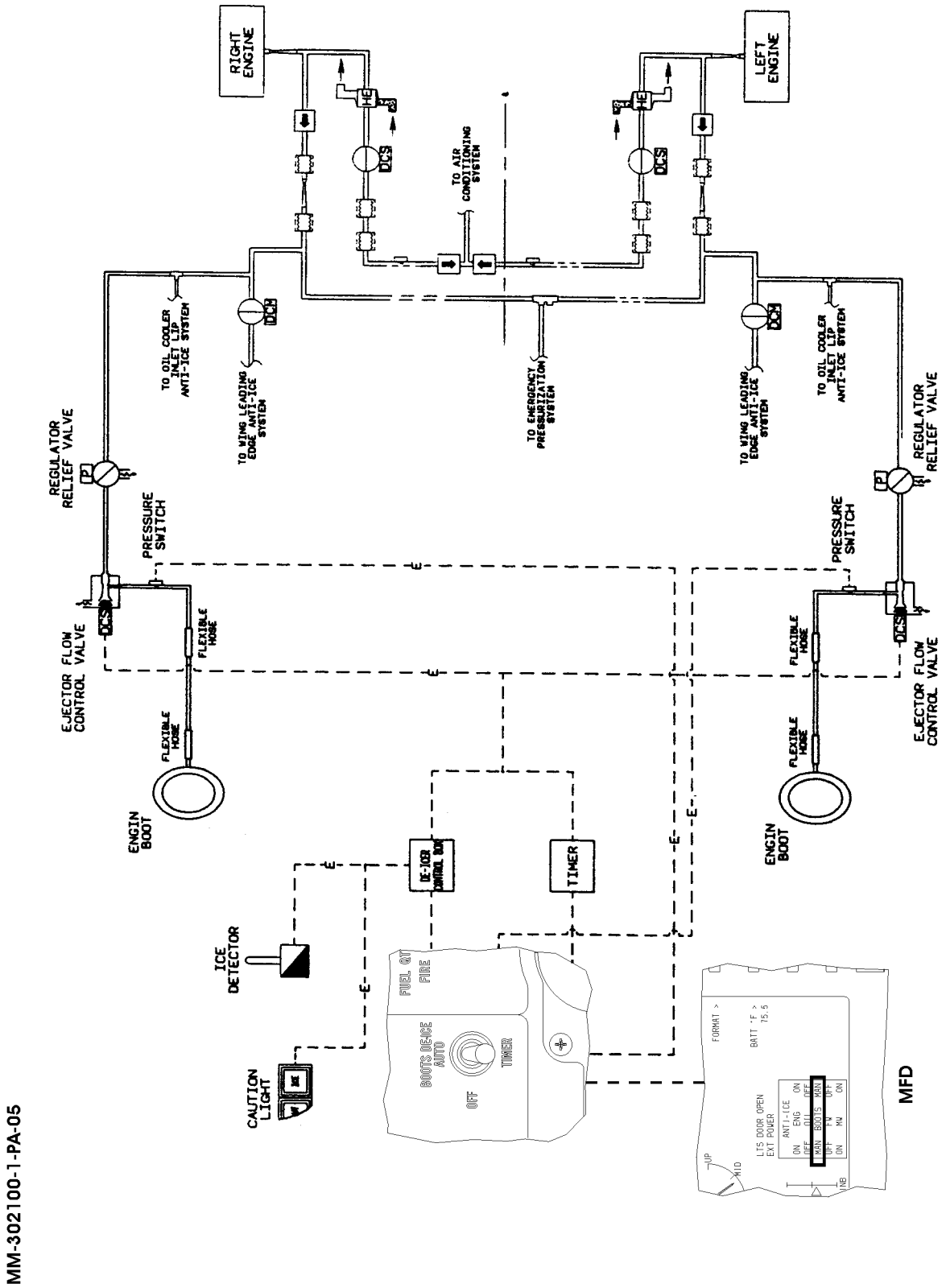

Fig. 1 - Engine Air Intake Anti-Ice System - Schematic

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ENGINE AIR INTAKE LIP DE-ICING SYSTEM - MAINTENANCE PRACTICES

1. General

A. This page block contains the following Maintenance Practices:

- removal/installation/inspection of the Pressure Regulator/Relief Valve
- removal/installation/inspection of the Ejector/Flow Control Valve
- removal/installation/inspection of the Pressure Switch
- removal/installation/inspection of the Engine Air Intake Boot
- removal/installation of the Timer
- removal/installation of the Control Box
- Operational Test of the Engine Air Intake Lip De-icing System.

2. Pressure Regulator/Relief Valve - Removal

A. Fixtures, Test and Support Equipment

Blanking Caps	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 201)

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
	R ENG START

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

(3) Cut and remove the lockwire and disconnect the unions (1) and (4).

NOTE: The pressure regulator/relief valve of the left engine is secured to its support by four screws; the valve of the right engine is secured by two screws.

(4) Cut and remove the lockwire and remove the screws (2) that secure the valve to the support (3).

(5) Carefully move the tubes (5) and (7).

(6) Remove the pressure regulator/relief valve (6).

(7) Put blanking caps on the line ends.

3. Pressure Regulator/Relief Valve - Installation

A. Materials

Lint-Free Cloth	04-013
Isopropyl Alcohol	02-005
Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 20-00-00
Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 201)

(1) Make sure as necessary that:
- the circuit breakers are open, tagged and safetied (Refer to the Removal Procedure)
- access is available.

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth, made moist with isopropyl alcohol to clean the components and their contact surfaces. Wipe the components and their contact surfaces, with a clean piece of lint-free cloth, before the fluid dries.

(3) Place the pressure regulator/relief valve (6) on its support (3).

NOTE: The pressure regulator/relief valve of the left engine is secured to its support by four screws; the valve of the right engine is secured by two screws.

(4) Install and tighten the screws (2).

(5) Safety the screws (2) with lockwire.

(6) Remove the blanking caps from the line ends.

(7) Carefully reposition the tubes (5) and (7).

(8) Install the unions (1) and (4).

(9) Safety the unions (1) and (4) with lockwire.

(10) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

(11) Remove the safety tags and close these circuit breakers:

Copilot CB panel_	Pilot CB panel:
BOOTS DE-ICE	L ENG START
	R ENG START

(12) Do an Operational Test of the engine air intake lip de-icing system (Refer to Para. 20).

4. Pressure Regulator/Relief Valve - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: The procedure given is for the LH inspection, the RH inspection is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Do an inspection for security of installation; make sure as necessary that:
- the pressure regulator/relief valve is secure on its mounting
- the lockwire is intact
- the components are in good condition.

(3) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

5. Ejector/Flow Control Valve - Removal

A. Referenced Information

Maintenance Manual Chapter 54-10-00

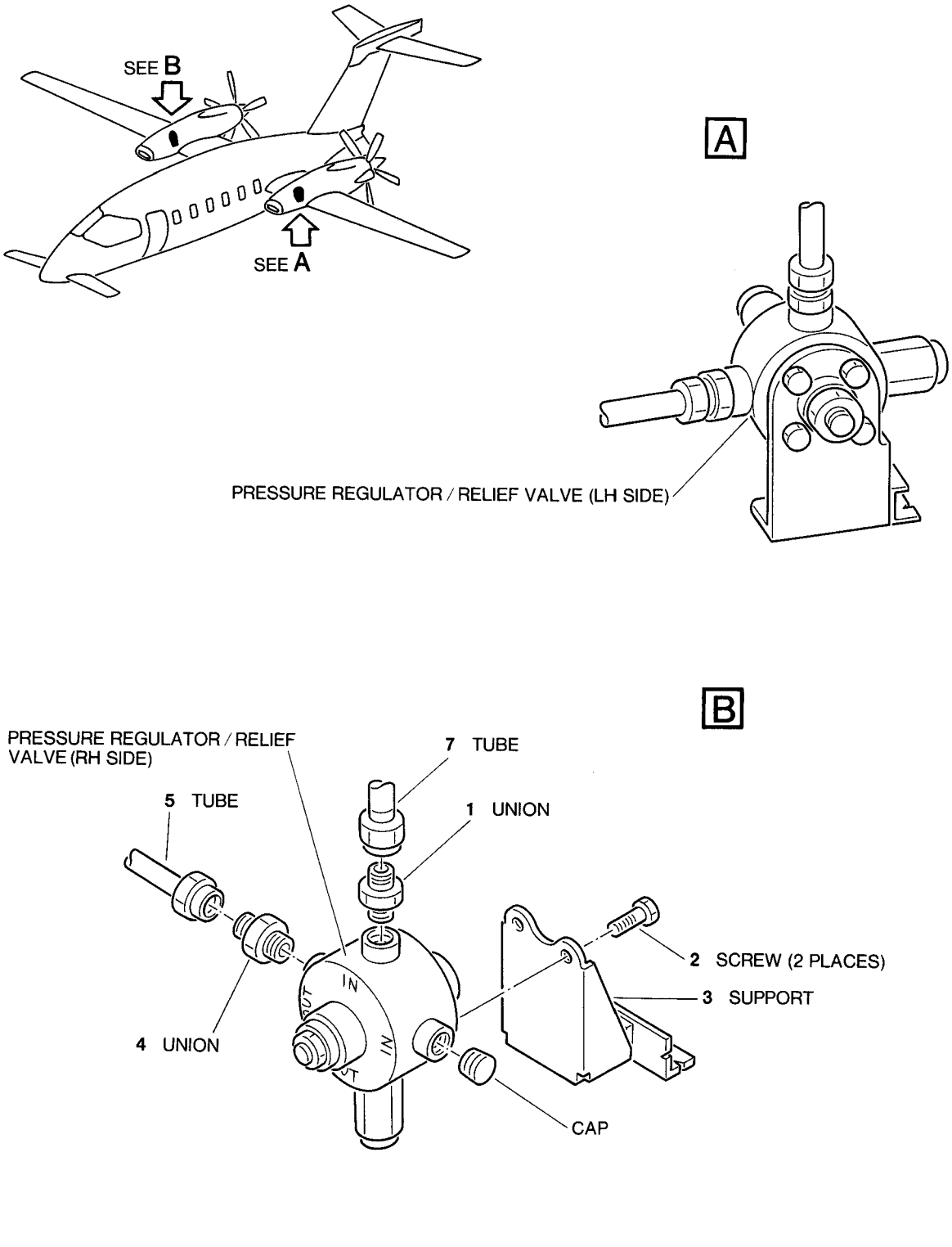
B. Procedure (Refer to Fig. 202)

NOTE: This procedure is for the LH installation, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

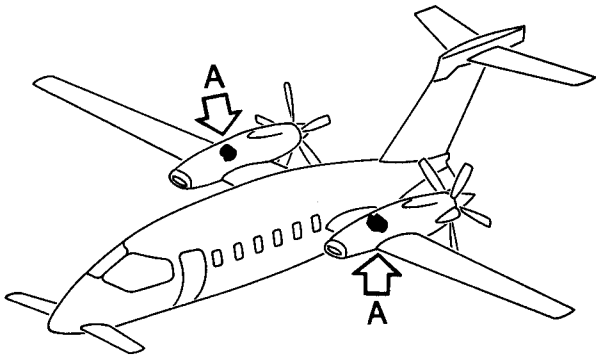
Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
	R ENG START

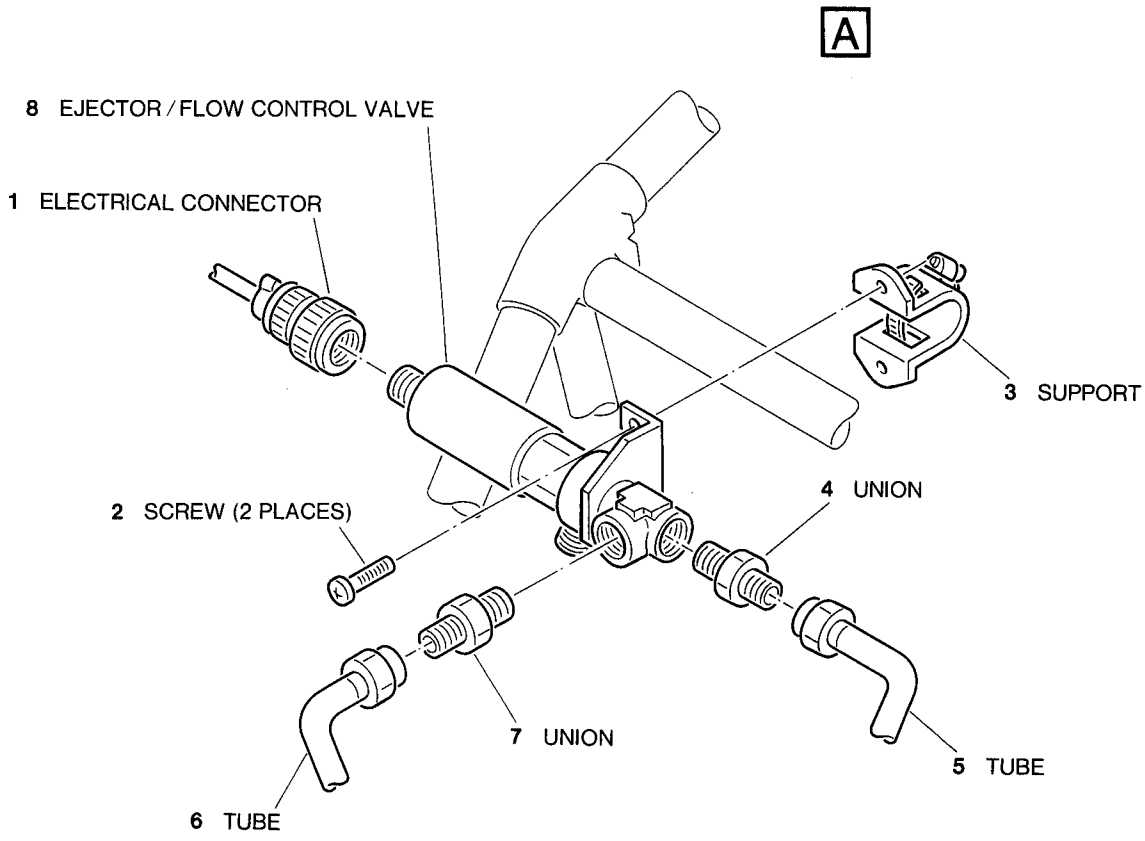
(2) Remove the upper nacelle panel401AT (420AT) (Refer to 54-10-00).
(3) Disconnect the electrical connector (1).
(4) Cut and remove the lockwire and disconnect the unions (4) and (7).
(5) Cut the lockwire and remove the two screws (2) that secure the valve to the support (3).
(6) Carefully move the tubes (5) and (6).
(7) Remove the ejector flow control valve (8).
(8) Put blanking caps on the line ends.



MM_302100-201

Fig. 201 - Pressure Regulator/Relief Valve - Removal/Installation





MM_302100-202

Fig. 202 - Ejector/Flow Control Valve - Removal/Installation

6. Ejector/Flow Control Valve - Installation

A. Materials

Lint-Free Cloth	04-013
Isopropyl Alcohol	02-005
Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 20-00-00
Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 202)

NOTE: This procedure is for the LH installation, the RH installation is identical.

(1) Make sure as necessary that:
- the circuit breakers are open, tagged and safetied (Refer to the Removal Procedure)
- access is available.

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth, made moist with isopropyl alcohol to clean the components and their contact surfaces. Wipe the components and their contact surfaces with a clean lint-free cloth before the fluid dries.
(3) Place the ejector/flow control valve (8) on the support (3).
(4) Install and tighten the two screws (2).
(5) Safety the screws with lockwire.
(6) Remove the blanking caps from the line ends.
(7) Carefully reposition the tubes (5) and (6).
(8) Connect the unions (4) and (7) to the valve (8).
(9) Safety the unions (4) and (7) with lockwire.
(10) Install the electrical connector (1).
(11) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(12) Remove the safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
	R ENG START

(13) Do an Operational Test of the engine air intake lip de-icing system (Refer to Para. 20).

7. Ejector/Flow Control Valve - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: This procedure is for the LH installation, the RH installation is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Do an inspection for security of installation, make sure as necessary that:
- the ejector/flow control valve is tightly clamped to the engine mount
- the wirelocking is intact
- the components are in good condition.

(3) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

8. Pressure Switch - Removal

A. Referenced Information

Maintenance Manual Chapter 54-10-00

B. Procedure (Refer to Fig. 203)

NOTE: This procedure is for the LH installation, the RH installation is identical.

(1) Open, tag and safety this circuit breaker:

Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
	R ENG START

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Put temporary identification tags on the switch wires.
(4) Cut the wires as close as possible to the switch lugs (1).
(5) Use an applicable wrench to loosen the switch (4).
(6) Carefully unscrew and remove the pressure switch (4) from the tube (3).

9. Pressure Switch - Installation

A. Fixtures, Test and Support Equipment

Lint-Free Cloth	04-013
Isopropyl Alcohol	02-005

B. Referenced Information

Maintenance Manual Chapter 20-00-00
Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 203)

NOTE: This procedure is for the LH installation, the RH installation is identical.

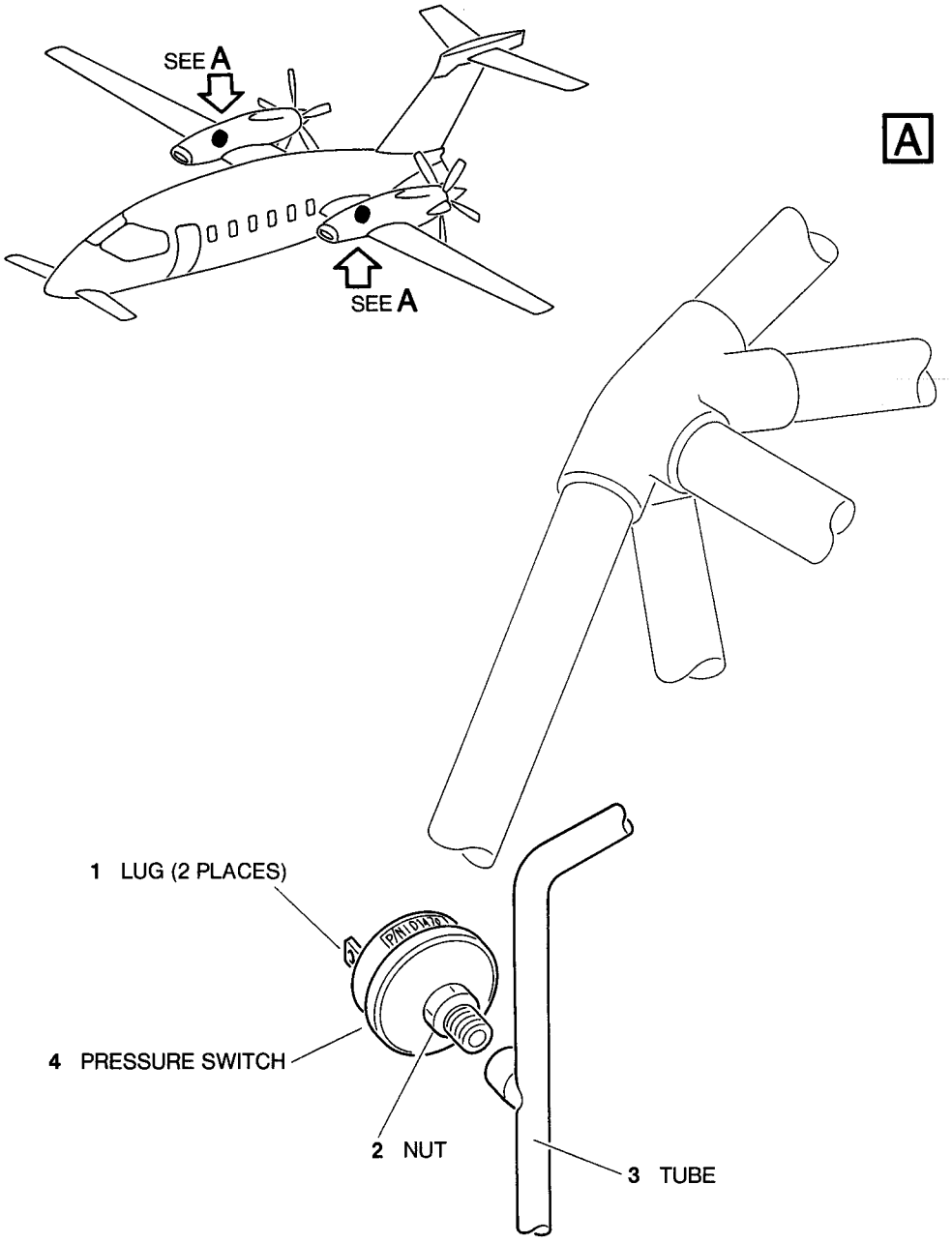
(1) Make sure as necessary that:
- the circuit breakers are open, tagged and safetied
- access is available.

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL-ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth, made moist with isopropyl alcohol to clean the components and their contact surfaces. Wipe the components and their contact surfaces with a clean lint-free cloth before the fluid dries.
(3) In the workshop, solder an insulated wire (approx. 6 inches/10 cm long) to each of the two lugs (1).
(4) Install the pressure switch (4) on the tube (3) and tighten the nut (2).
(5) Connect the wires with in-line connectors (Refer to 20-00-00).
(6) Remove the temporary identification tags from the wires.
(7) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(8) Remove the safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
	R ENG START

(9) Do an Operational Test of the engine air intake lip de-icing system (Refer to Para. 20).



MM_302100-203

Fig. 203 - Pressure Switch - Removal/Installation

10. Pressure Switch - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 203)

NOTE: The procedure given is for the LH installation, the RH installation is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Do an inspection for security of installation, make sure as necessary that:
- the pressure switch is secure in the tube
- the components are in good condition.

(3) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

11. Engine Air Intake Boots - Removal

A. Fixtures, Test and Support Equipment

Blanking Caps	Not Specified

B. Referenced Information

Maintenance Manual Chapter 51-25-00

C. Procedure (Refer to Fig. 204)

(1) Open, tag and safety these circuit breakers:

Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
R ENG ICE VANE	R ENG START
	L ENG ICE VANE

(2) Remove the surface finish as required to locate the attachment screws (Refer to 51-25-00).
(3) Remove the screws (1) and (2) that secure the boot to the leading edge of the nacelle.
(4) Ease off the boot assembly (7) until the hose (4) is visible.
(5) Cut the cable tie (6) that secures the hose (4) and the tube (5).
(6) Carefully remove the hose (6) from the tube (5).
(7) Remove the boot assembly (7).
(8) Put a blanking cap on the line end.

12. Engine Air Intake Boots - Installation

A. Materials

Methyl-Ethyl-Ketone (MEK)	02-009
Lint-Free Cloth	04-013

B. Expendable Parts

ITEM	IPC-CSN
Cable tie	30-21-00 1-445

C. Referenced Information

Maintenance Manual Chapter 20-00-00
Maintenance Manual Chapter 51-25-00

D. Procedure (Ref. Fig. 204)

(1) Make sure as necessary that:
- the circuit breakers are open, tagged and safetied (Refer to the Removal Procedure)
- access is available.

WARNING: BE CAREFUL WHEN YOU USE METHYL-ETHYL-KETONE. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth, made moist with MEK, to clean the components and their contact surfaces. Wipe the components and their contact surfaces with a clean lint-free cloth before the fluid dries.
(3) Put the boot assembly (7) in a position which will allow the hose (4) to be connected to the tube (5).
(4) Connect the hose (4) to the tube (5). Make sure that the hose is pushed firmly over the tube olive (3).
(5) Secure the hose (4) using a new cable tie (6).
(6) Position the boot assembly (7) and install the attachment screws (1) and (2).
(7) Restore the surface finish (Refer to 51-25-00).
(8) Remove the safety tags and close these circuit breakers:

Copilot CB panel:	Pilot CB panel:
BOOTS DE-ICE	L ENG START
R ENG ICE VANE	R ENG START
	L ENG ICE VANE

(9) Do an Operational Test of the engine air intake lip de-icing system (Refer to Para. 20).

13. Engine Air Intake Boots - Inspection

A. Procedure

(1) Visually examine the intake boots of both engines for cuts, splits, crazing, perishing, proper adhesion, signs of leaks and a general condition.

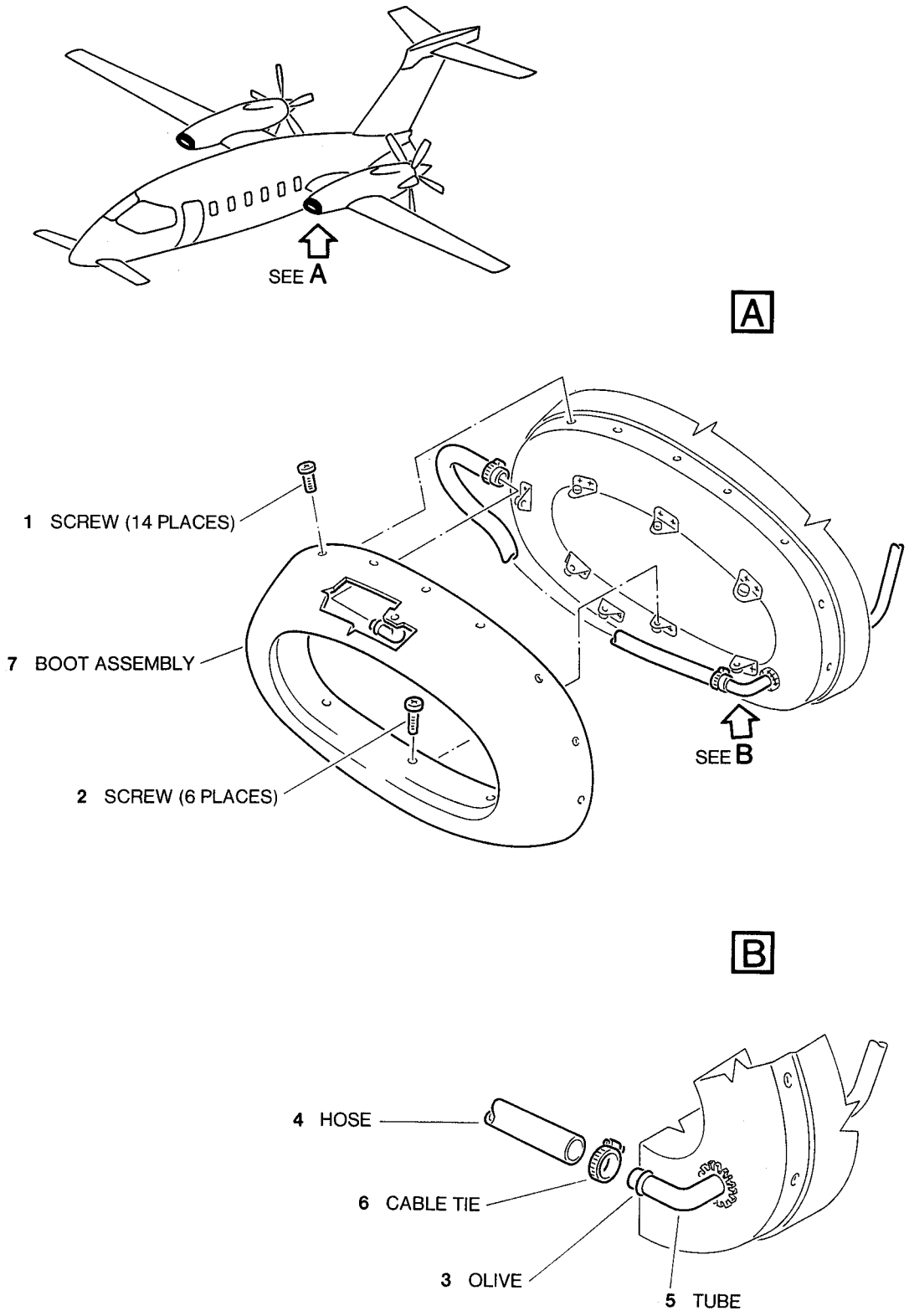


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Fig. 204 - Engine Air Intake Boot - Removal/Installation

14. Timer - Removal

A. Fixtures, Test and Support Equipment

Warning Notice — Not Specified

B. Referenced Information

C. Maintenance Manual Chapter 25-10-00

D. Procedure (Refer to Fig. 205)

(1) Open, tag and safety this circuit breaker:

Coilot CB panel:
BOOTS DE-ICE

(2) Put a Warning Notice at the rear of the airplane, to tell persons to keep clear of the flight controls.
(3) Remove the pilot or copilot seat (25-10-00).
(4) Disconnect the electrical connector (2).
(5) Remove the four screws (1) that secure the timer (4) to the support (3) located forward of the instrument panel.
(6) Remove the timer (4).

15. Timer - Installation

A. Referenced Information

Maintenance Manual Chapter 25-10-00

B. Procedure (Refer to Fig. 205)

(1) Make sure as necessary that:
- the circuit breaker is open, tagged and safetied (Refer to the Removal Procedure)
- access is available.

(2) Install the timer (4) to its support (3), forward of the instrument panel.
(3) Install and tighten the four screws (1).
(4) Connect the electrical connector (2).
(5) Remove the Warning Notice from the rear of the airplane.
(6) Install the pilot or copilot seat (Refer to 25-10-00).
(7) Do an Operational Test of the engine air intake lip de-icing system (Refer to Para. 20).

16. Timer - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

C. Maintenance Manual Chapter 25-10-00

D. Procedure (Refer to Fig. 205)

(1) Remove the pilot or copilot seat (25-10-00).
(2) Do an inspection for security of installation, make sure as necessary that:
- the timer is secure on its support
- the screws are tight
- the electrical connector is secure.

(3) Install the pilot or copilot seat (Refer to 25-10-00).

17. Control Box - Removal

A. Fixtures, Test and Support Equipment

Warning Notice	Not Specified

B. Referenced Information

C. Maintenance Manual Chapter 25-10-00

D. Procedure (Refer to Fig. 206)

(1) Open, tag and safety this circuit breaker:

Copilot CB panel:
BOOTS DE-ICE

(2) Put a Warning Notice at the rear of the airplane, to tell persons to keep clear of the flight controls.
(3) Remove the pilot or copilot seat (Refer to 25-10-00).
(4) Disconnect the electrical connector (2).
(5) Remove the three screws (1) that secure the control box (4) to the support (3) located forward of the instrument panel.
(6) Remove the control box (4).

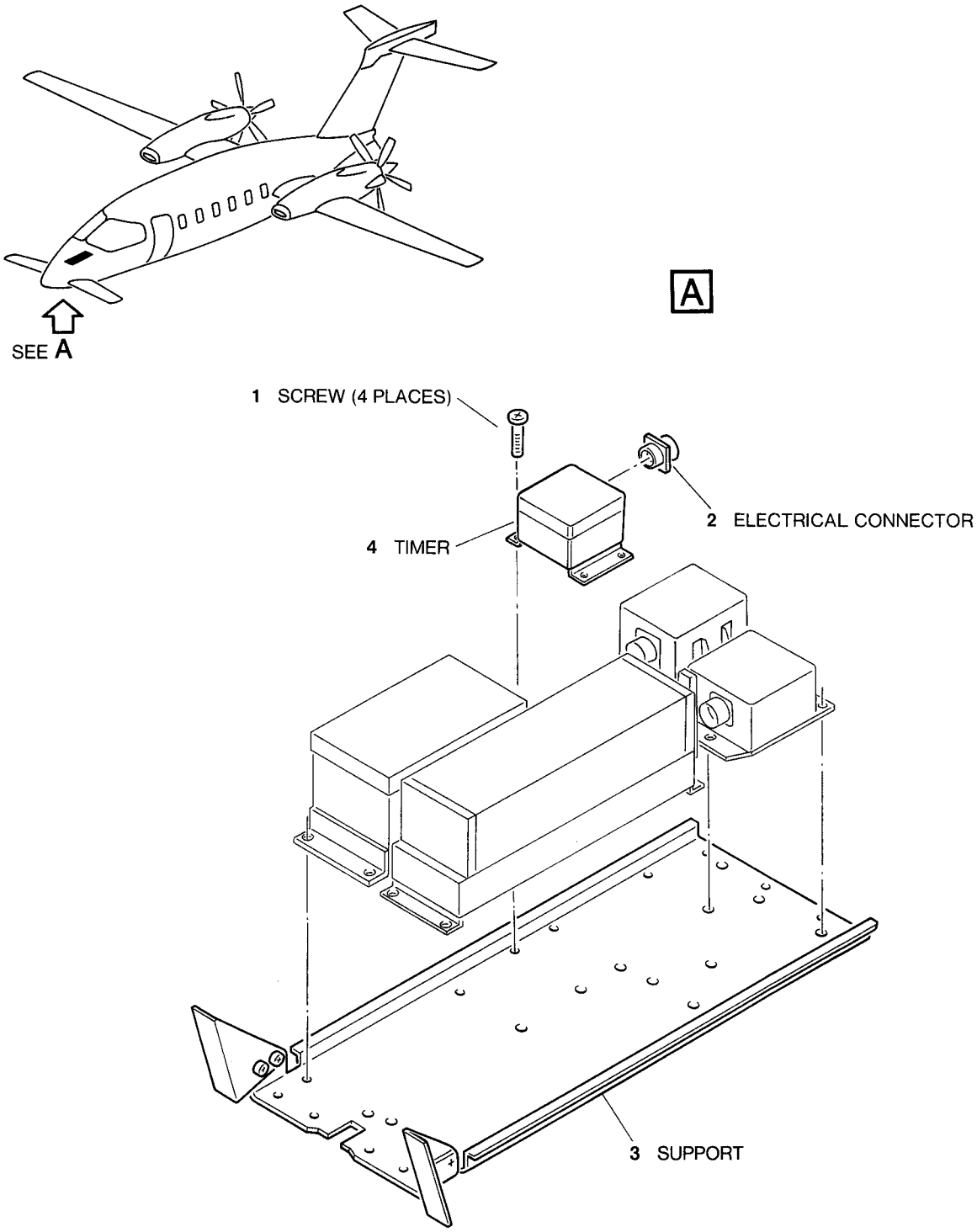

Fig. 205 - Timer - Removal/Installation

18. Control Box - Installation

A. Referenced Information

Maintenance Manual Chapter 25-10-00

B. Procedure (Refer to Fig. 206)

(1) Make sure as necessary that:
- the circuit breaker is open, tagged and safetied (Refer to the Removal Procedure)
- access is available.

(2) Install the control box (4) to its support (3), forward of the instrument panel.
(3) Install and tighten the three screws (1).
(4) Connect the electrical connector (2).
(5) Remove the Warning Notice from the rear of the airplane.
(6) Install the pilot or copilot seat (Refer to 25-10-00).
(7) Do an Operational Test of the engine air intake lip de-icing system (Refer to Para. 20).

19. Control Box - Inspection

A. Fixtures, Test and Support Equipment

Strong Light Source	Not Specified

B. Referenced Information

C. Maintenance Manual Chapter 25-10-00

D. Procedure (Refer to Fig. 206)

(1) Remove the pilot or copilot seat (25-10-00).
(2) Do an inspection for security of installation, make sure as necessary that:
- the control box is secure on the bulkhead
- the screws are tight
- the electrical connector is secure.

(3) Install the pilot or copilot seat (Refer to 25-10-00).

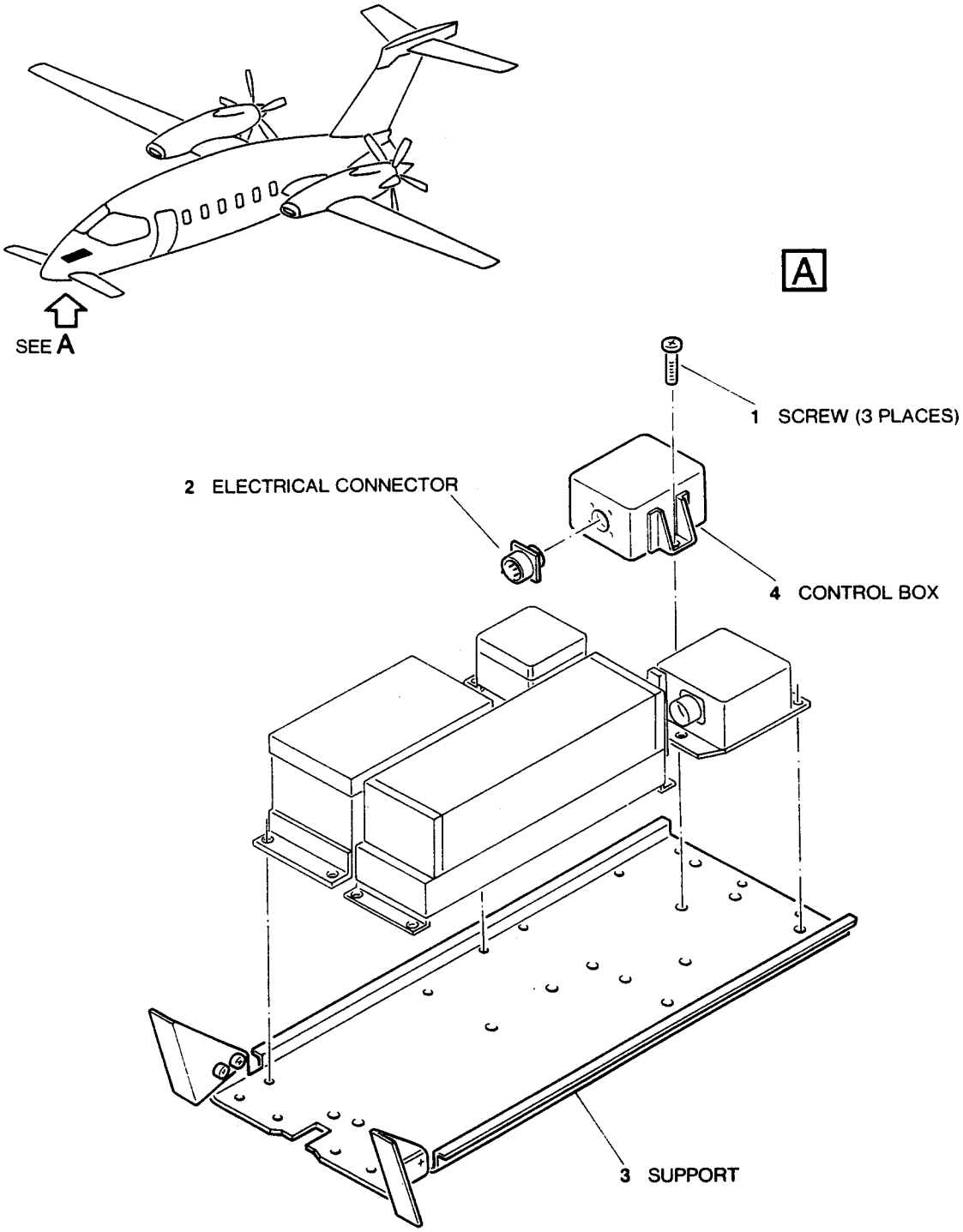

Fig. 206 - Control Box - Removal/Installation

20. Engine Air Intake Lip De-icing System - Operational Test

A. Referenced Information

Maintenance Manual Chapter 71-00-00

B. Procedure

(1) Position man A at the ice detector probe in Zone 122.
(2) Position man B at the left engine air intake to manually feel the de-icer boot inflate.
(3) Start the right engine (Refer to 71-00-00).
(4) Set the right propeller control lever to flight idle (FI).
(5) Do the test:

	Action	Result
(a)	On the pilot's switch panel, set the BOOTS DE-ICE switch to AUTO.	

WARNING: WHEN YOU SQUEEZE THE PROBE RELEASE IT IMMEDIATELY AFTER THE HEATER OPERATES TO AVOID BURNING YOUR FINGERS.

(b)	Man A: Squeeze the ice detector probe between finger and thumb.	On the LH instrument panel, the ICE cautionary annunciator comes on. The ice detector probe gets hot.
(c)	Release the ice detector probe.	The ICE cautionary annunciator goes off and the ice detector probe goes cold.
(d)	Repeat actions (b) and (c) ten times. Allow the ice detector to cool between each action.	After the tenth time, Man B feels the de-icer boot inflation cycle start. The MAN captions on the MFD system turn from white to green. After six seconds captions turn from green to white and the de-icer boot inflation cycle stops.

NOTE: If the L E and R E captions do not come on, increase the setting of the engine POWER lever and do the test again.

	Action	Result
(e)	On the pilot's switch panel, set the BOOTS DE-ICE switch to TIMER.	Man B feels the de-icer boot inflation cycle start. The MAN captions white/green on. After five seconds, captions go off and the de-icer boot inflation cycle stops. After 175 seconds Man B feels the de-icer boot inflation cycle start. The captions come white/green. After five seconds, the captions green/white and the de-icer boot inflation cycle stops.

(6) On the pilot switch panel, set the BOOTS DE-ICE switch to OFF.
(7) Start the left engine (Refer to 71-00-00).
(8) Set the left propeller control lever to flight idle (FI).
(9) Shut the right engine down (Refer to 71-00-00).
(10) Position man B at the right engine air intake to manually feel the de-icer boot inflate.
(11) Do actions (a) thru (e) again.
(12) On the pilot switch panel, set the BOOTS DE-ICE switch to OFF.
(13) Shut the left engine down (Refer to 71-00-00).

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ENGINE AIR INTAKE INERTIAL SEPARATION SYSTEM - DESCRIPTION AND OPERATION

1. General

A. To avoid ice and snow ingestion the engine inlet ducts are fitted with an inertial separator. The inertial separator is operated in conjunction with the oil cooler air intake anti-ice system.

2. Description (Refer to Fig. 1)

NOTE: The LH system is described, the RH system is identical.

A. The sysem comprises a linear actuator, an ice vane, two doors, interconnection rods, a control switch and associated electrical circuitry.

B. The linear actuator is installed inside the nacelle at NACS -2377.33. The actuator has an integral 28 Vdc motor, a remote electrical connector provides connection to the control switch.

C. One ice vane and two doors are installed in each nacelle. Control rods are attached to the ice vane and to the doors which are operated by the linear actuator.

D. A two position control switch is installed on the anti-ice control panel in the flight compartment. The switch is labelled ENG ICE VANE which is marked on the placard above the switch. 28 Vdc power is supplied to the switch from the L and R dual feed bus.

3. Operation (Refer to Fig. 2)

NOTE: The LH system is described, the RH system is identical.

A. A control switch installed on the anti-ice panel captioned L and R ENG ICE VANE is provided for each inertial separation system. When the L ENG ICE VANE-OFF switch is to the L ENG ICE VANE position, the electrical actuator moves the vane and doors, and the correct position of the vane and doors in "separating mode" is indicated by a green ON indication on the MFD System Page.

B. When the system is actuated, the actuator rod extends and, through the system of interconnected rods, deploys:

- the forward door down into the air intake passage
- the ice vane trailing edge up
- the rear door up to open the bypass duct.

When deployed, the forward door reduces the throat area of the air intake passage (at the ice vane leading edge) by approx. 40%; this causes a venturi effect and the intake air accelerates rearwards. Particles/pieces of snow or ice, being heavier-than-air continue to travel rearward under their own inertia and impinge on the rear door to be swept out through the bypass duct, or are directly swept through the duct, by the airflow.
The airflow that continues upward past the ice vane and the front edge of the rear door, then rearward to the engine air inlet screen is thereby cleared of particles/ pieces which could cause blockage of the screen.

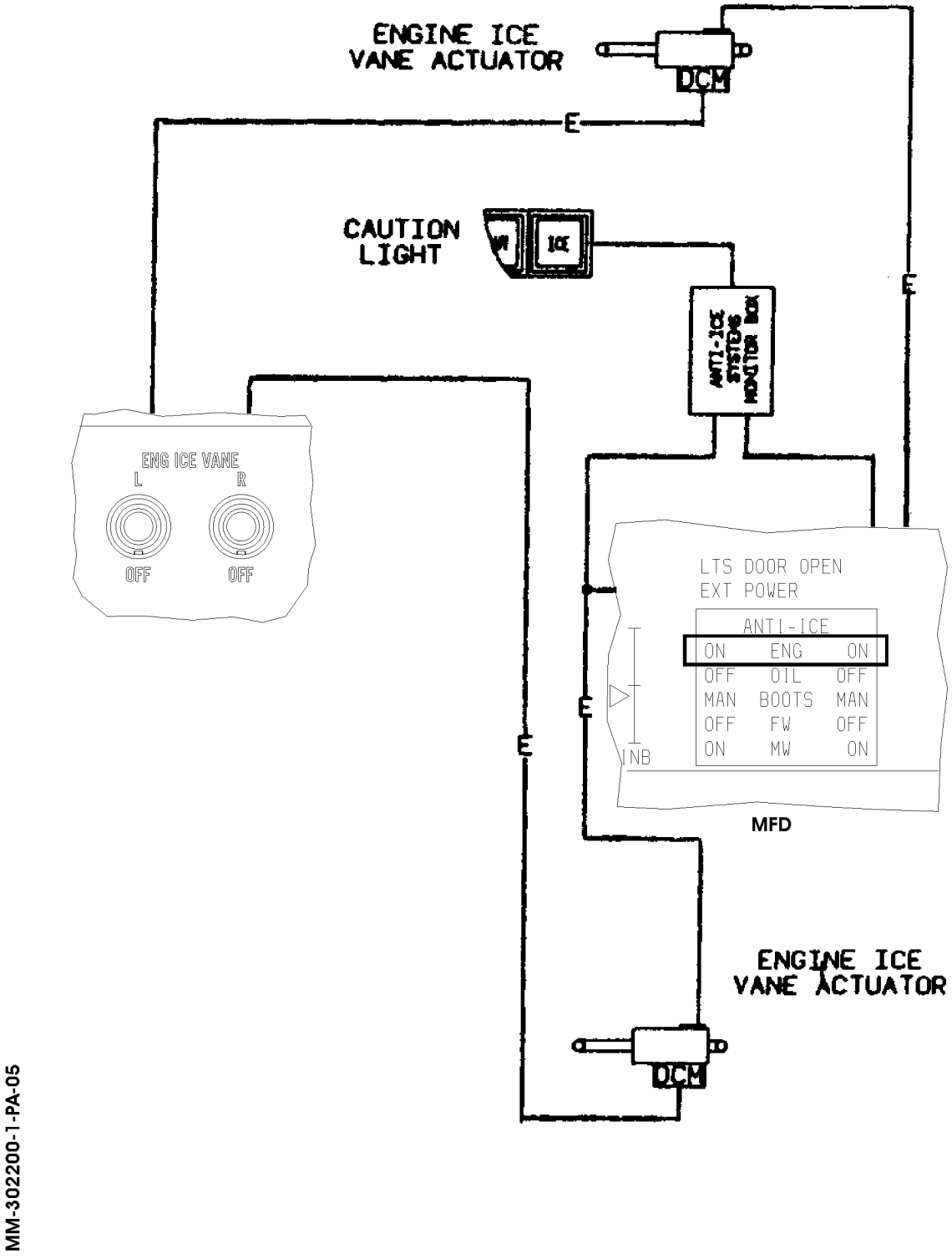
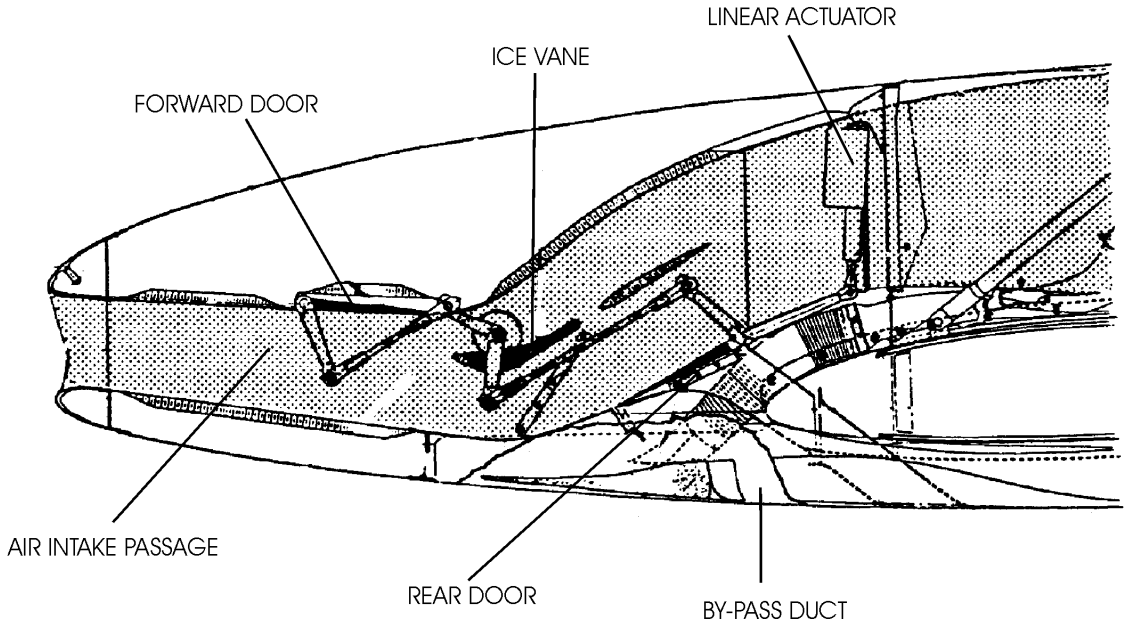


Fig. 1 - Engine Air Intake Inertial Separation System - Electrical Schematic

NON-ACTUATED POSITION



ACTUATED POSITION

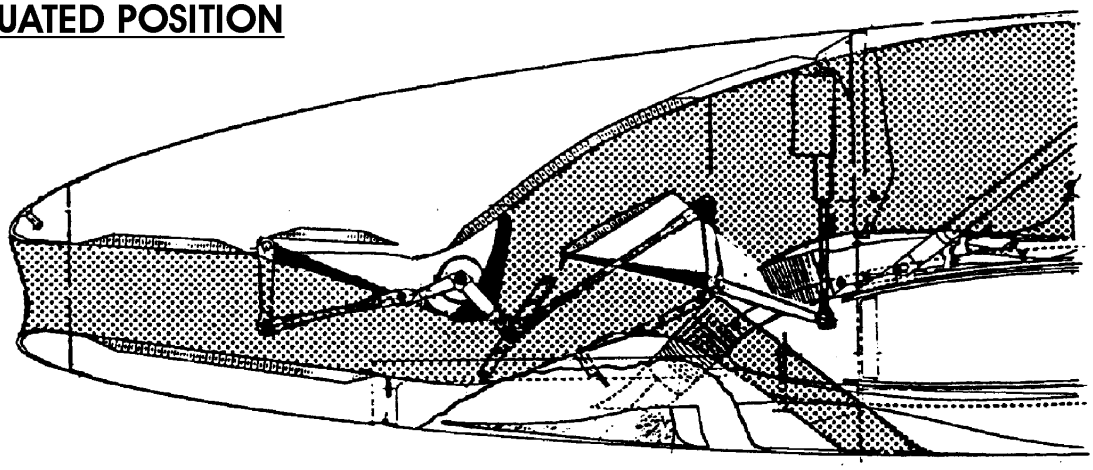


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Fig. 2 - Inertial Separation System - Operation Details

ENGINE AIR INTAKE INERTIAL SEPARATION SYSTEM - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- Linear Actuator - Removal/Installation
- Inertial Separator Rear Door - Removal/Installation
- Inertial Separator Rear Door - Visual Inspection
- Inertial Separation System - Inspection/Check
- Inertial Separation System - Operational Test
- Inertial Separation System - Vanes Clearance Check
- Inertial Separation System - Vane System Rigging Check

2. Linear Actuator - Removal(Ref. Fig. 201)

A. Fixtures, Test and Support Equipment

Support Stand	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: This procedure is for the actuator on the left hand nacelle, the procedure for the right nacelle is identical.

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START
L ICE VANE

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Put the upper nacelle panel 410AT (420AT) on a support stand.
(4) Remove the cotter pin (9), nut (7), washer (8) and bolt (6) that connect the eye end (11) of the linear actuator connecting rod (12) to the lever (10). Discard the cotter pin.
(5) Remove the cotter pin (4), nut (2), washer (3) and bolt (1) that connect the linear actuator (13) to the support (5). Discard the cotter pin.
(6) Remove the linear actuator (13).

3. Linear Actuator - InstallationRefer to Fig. 201)

A. Expendable Parts

Cotter Pin	MS24665-155 (Qty 2)

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: This procedure is for the actuator on the left hand nacelle, the procedure for the right nacelle is identical.

(1) Make sure as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- access is available
(Refer to the Removal Procedure).

(2) Make a wear/friction check of the vane, doors and levers assembly as follows:
(a) Attach a spring scale to the eye-end which was attached to the actuator.
(b) Apply the force necessary to move the system, first to the actuated (up) position, then to the non-actuated (down) position. Make a note of the maximum reading on the scale during lever movement downward and during lever movement upward.
(c) Make sure that the force required to move the system (in either direction) is 6.6 lbs (3 kg) maximum.
(d) If the force required to move the lever is more than 6.6 lbs (3 kg), find and rectify the cause.

(3) Make a check for correct actuator and lever system travel as follows:

WARNING: BE CAREFUL WHEN YOU HOLD AND OPERATE THE ACTUATOR, MAKE SURE THAT THE ACTUATOR SCREWJACK DOES NOT MAKE CONTACT WITH ANY PART OF THE AIRPLANE OR YOUR PERSON.

(a) Temporarily connect the electrical connector of the new actuator to its receptacle on the airplane.
(b) Close the L (R) ICE VANE circuit breaker.
(c) Make sure that electrical power is available and the ENG ICE VANE/OIL COOLER INTK switch is in the OFF position; this makes sure that the actuator is fully retracted.
(d) Open and safety the L (R) ICE VANE circuit breaker.
(e) Disconnect the electrical connector of the actuator from the airplane receptacle.
(f) Install the actuator on the support (5) and secure it temporarily with the bolt (1) and nut (2).
(g) Move the inertial separator rear door toward the actuator until the seals are contacted.

(h) Check that the lever hole and the actuator eye-end hole are aligned, if necessary adjust the eye-end.

(i) Remove the actuator from the support (5) and do steps (a), (b), (c), (d), (e) and (f) again except during step (c) make sure that the switch is at the L (R) position; this makes sure that the actuator is fully extended.

(j) Temporarily connect the linear actuator eye-end (11) to the inertial separator rear door lever (10) and check the door edge don't touch the air nacelle air duct surface.

(k) Connect the eye-end (11) of the linear actuator (13) to the inertial separator rear door lever (10). Secure the bolt with cotter pin.

(4) Install the bolt (1), washer (3) and nut (2) that connect the actuator (13) to the support (5).

(5) Safety the nut (2) with a new cotter pin (4).

(6) Install the bolt (6), washer (8) and nut (7) that connect the eye end (11) of the linear actuator connecting rod (12) to the lever (10).

(7) Safety the nut (7) with a new cotter pin (9).

(8) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

(9) Remove the safety tags and close these circuit breakers:

Pilot CB panel:

L ENG START

R ENG START

L ICE VANE

(10) Do an Operational Test of the inertial separation system as described in this section.

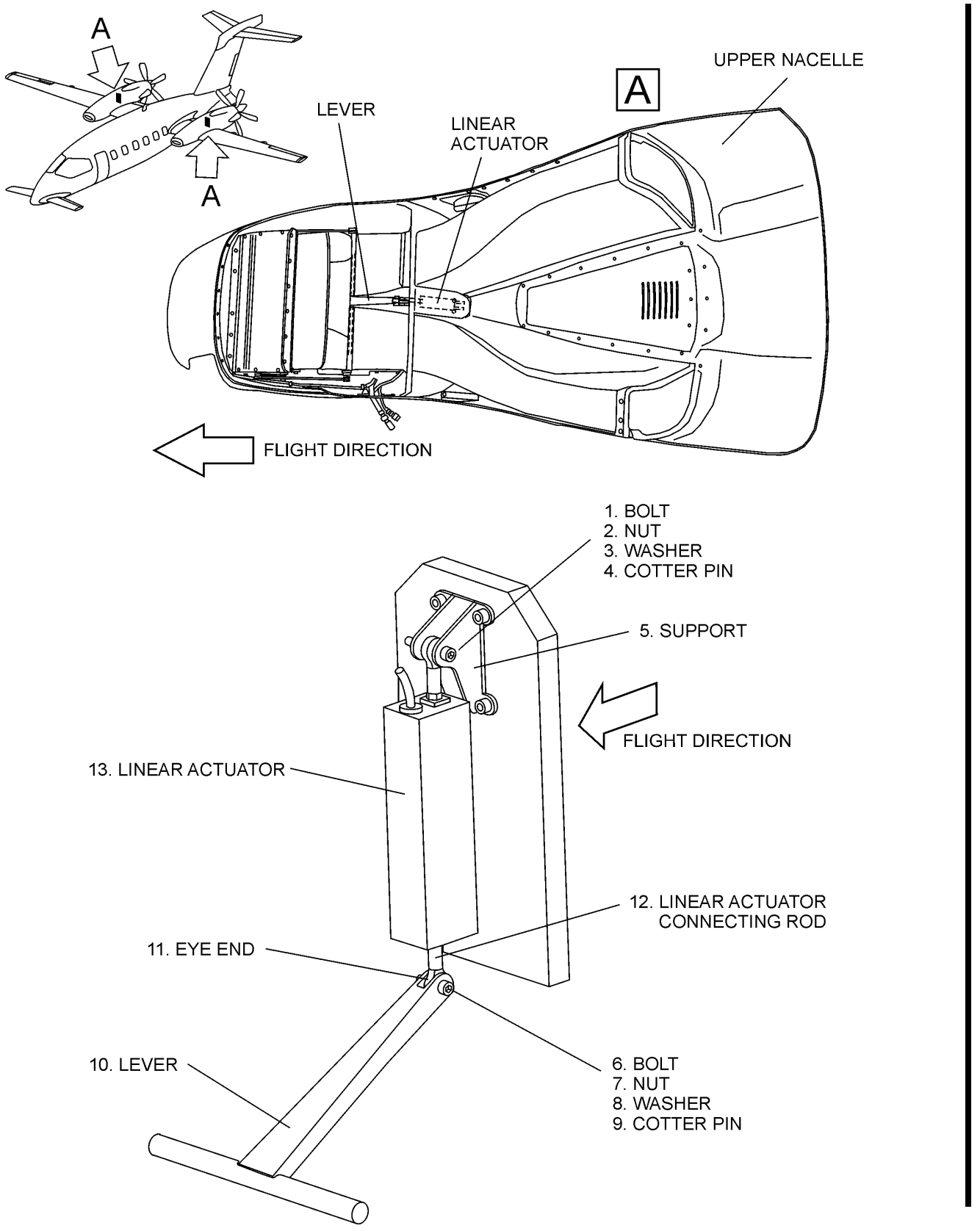


Fig. 201 - Linear Actuator - Removal/Installation

4. Inertial Separator Rear Door - Removal (Ref. to Fig. 202)

A. Fixtures, Test and Support Equipment

Support Stand	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: This procedure is for the Rear Door, on the left hand nacelle the procedure for the right Rear Door is identical.

(1) Open, tag and make safe these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START
L ICE VANE

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Put the upper nacelle panel 410AT (420AT) on a support stand.
(4) Remove the cover (1) from the nacelle panel.
(5) Disconnect the eye end (2) of the linear actuator (3) from the inertial separator rear door lever (4).
(6) Remove the bolt (5) located at each end of the inertial separator rear door torque tube (6).
(7) Slide out the inertial separator chinematism lever N°1 (7) from the two inertial separator torque tube end.
(8) Remove the Inertial Separator Rear Door (8).

5. Inertial Separator Rear Door - Installation (Ref. to Fig. 202)

A. Referenced Information

Maintenance Manual Chapter 54-10-00

B. Procedure

NOTE: This procedure is for LH Rear Door, the procedure for the RH Rear Door is identical.

(1) Make sure as necessary that:
- the applicable circuit breakers are open, tagged and safetied
- access is available
(Refer to the Removal Procedure).

(2) Place the inertial separator rear door (8) in the its own position in the nacelle.

(3) Connect the inertial separator torque tube (6) to the inertial separator kinematism levers N°1 (7) by installing the two shim washers (with the fillet toward the nacelle centerline) and the two bolt (5) located at the each end of the inertial separator torque tube.

(4) Make a wear/friction check of the vane, doors and levers assembly as follows:

(a) Attach a spring scale to the eye-end which was attached to the actuator.

(b) Apply the force necessary to move the system, first to the actuated (up) position, then to the non-actuated (down) position. Make a note of the maximum reading on the scale during lever movement downward and during lever movement upward.

(c) Make sure that the force required to move the system (in either direction) is 6.6 lbs (3 kg) maximum.

(d) If the force required to move the lever is more than 6.6 lbs (3 kg), find and rectify the cause.

WARNING: BE CAREFUL WHEN YOU HOLD AND OPERATE THE ACTUATOR, MAKE SURE THAT THE ACTUATOR SCREWJACK DOES NOT MAKE CONTACT WITH ANY PART OF THE AIRPLANE OR YOUR PERSON.

(5) Temporarily connect the electrical connector of the actuator to its receptacle on the airplane.

(6) Close the L (R) ICE VANE circuit breaker.

(7) On the ENG ICE VANE/OIL COOL INTK panel, set the R(L)/OFF switch to OFF position.

(8) Make sure that actuator rod is completely retracted.

(9) Move the inertial separator rear door toward the actuator until the seals are contacted.

(10) Check that the lever hole and the actuator eye-end hole are aligned, if necessary adjust the eye-end. Temporarily connect the linear actuator eye-end (2) to the inertial separator rear door lever (4).

(11) Disconnect the linear actuator eye-end (2) from the inertial separator rear door lever.

(12) On the ENG ICE VANE/OIL COOL INTK panel, set the R(L)/OFF switch to R(L) position.

(13) Make sure that actuator rod is completely extended.

(14) Temporarily connect the linear actuator eye-end (2) to the inertial separator rear door lever (4) and check the door edge don't touch the air nacelle air duct surface.

(15) Connect the eye-end (2) of the linear actuator (3) to the inertial separator rear door lever (4) (Ref. to Fig 201). Secure the bolt with cotter pin.

(16) Install the cover (1) from the nacelle panel.

(17) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

(18) Remove the safety tags and close these circuit breakers:

Pilot CB panel:

L ENG START

Pilot CB panel:

R ENG START

L ICE VANE

(19) Do a Operational Test to the Inertial Separator System as described in this section.

Fig. 202 - Inertial Separator Rear Door - Removal / Installation (Sheet 1 of 2)

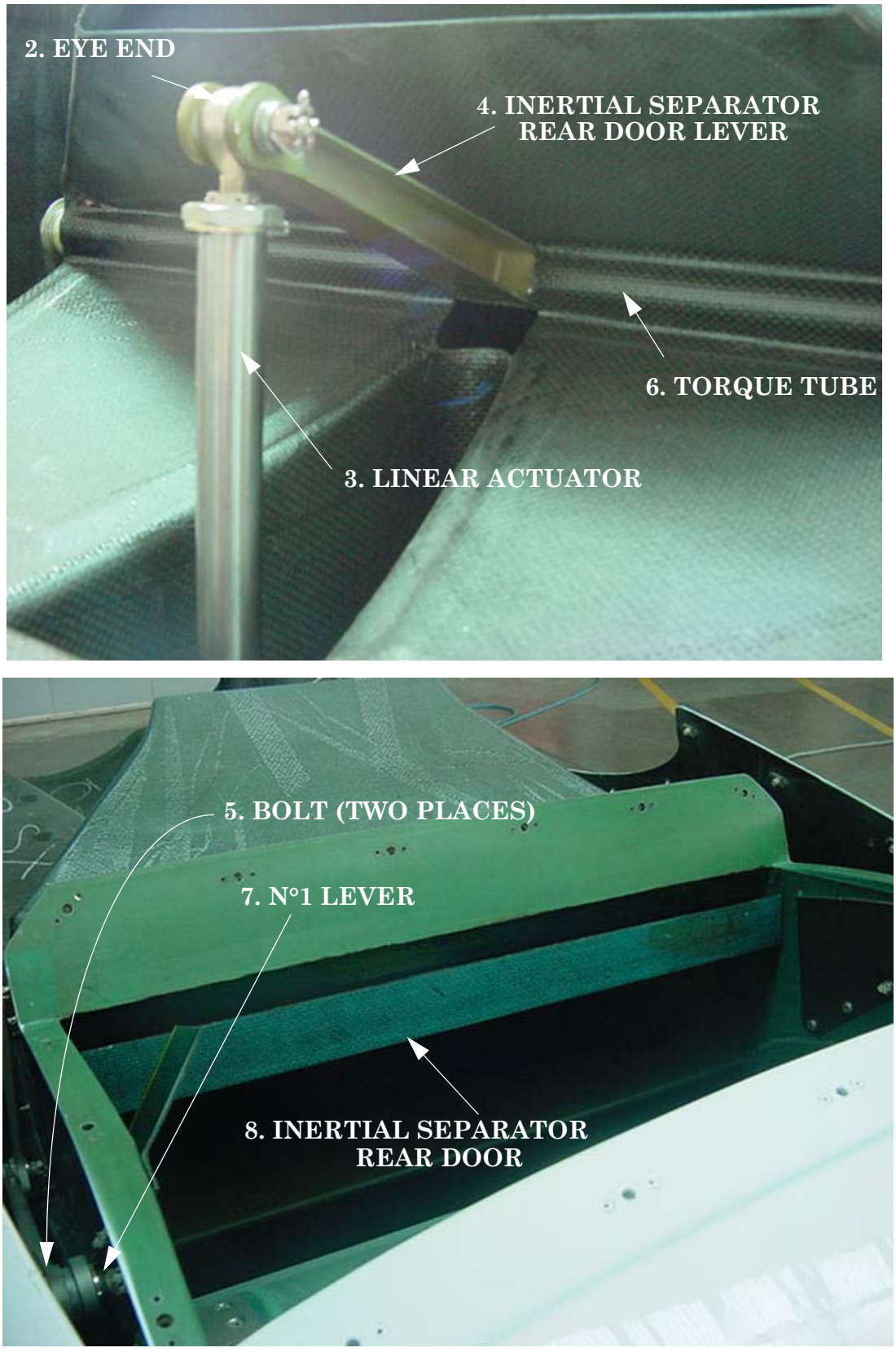


Fig. 202 - Inertial Separator Rear Door - Removal / Installation (Sheet 2 of 2)

6. Inertial Separator Rear Door - Visual Inspection (Ref. to Fig. 203)

A. Fixtures, Test and Support Equipment

Support Stand	Not Specified
Boroscope	Not Specified
Light Source	Not Specified
Mirror	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00
Maintenance Manual Chapter 24-00-00

C. Procedure

NOTE: This procedure is for LH Rear Door, the procedure for the RH Rear Door is identical.

(1) Remove the electrical power. (Refer to 24-00-00)
(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Put the upper nacelle panel 410AT (420AT) on a support stand.
(4) Remove the cover (1), from the nacelle panel.
(5) Check the inertial separator rear door lower surface (2) for cracks or desbonding.
(6) With a boroscope check the inertial separator rear door upper surface (3) for cracks or desbonding.
(7) If during inspection of the upper and lower surfaces are found cracks or desbonding, remove the inertial separator rear door panel and sobstituted with a new one as described in this section.
(8) If no cracks or desbondings are founded install the nacelle panel 410AT (420AT) (Refer to 54-10-00).
(9) Restore the electrical power (Refer to 24-00-00).
(10) Do a Operational Test to the Inertial Separator System as described in this section.

D. Alternate Procedure

(1) If not already removed, remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Put the upper nacelle panel 410AT (420AT) on a support stand.
(3) Remove the Engine Air Duct Access Cover from the nacelle panel (Refer to 54-10-00).
(4) Clean nacelle from any residual of gaskets.
(5) Remove the bolt, washer and nut that connect the Linear Actuator Eye End (5) to the Inertial Separator Rear Door Lever (4).
(6) Check the Inertial Separator Rear Door Upper Surface (3) for cracks or desbonding. Using a source light and a mirror check the Inertial Separator Rear Door Lower Surface (2) for cracks or desbonding.

(7) If during the upper and lower surfaces inspection are found cracks or desbonding, remove the Inertial Separator Rear Door Panel and replace with a new one as described in this section.

(8) Connect the Linear Actuator Eye End (5) to the Inertial Separator Rear Door Lever (4) with bolt, washer and nut.

(9) Install the Engine Air Duct Access Cover to the nacelle panel (Refer to 54-10-00).

(10) Install the Upper Nacelle Panel 410AT (420AT) (Refer to 54-10-00).

(11) Do a Operational Test to the Inertial Separator System as described in this section.

Fig. 203 - Inertial Separator Rear Door - Visual Inspection (Sheet 1 of 3)

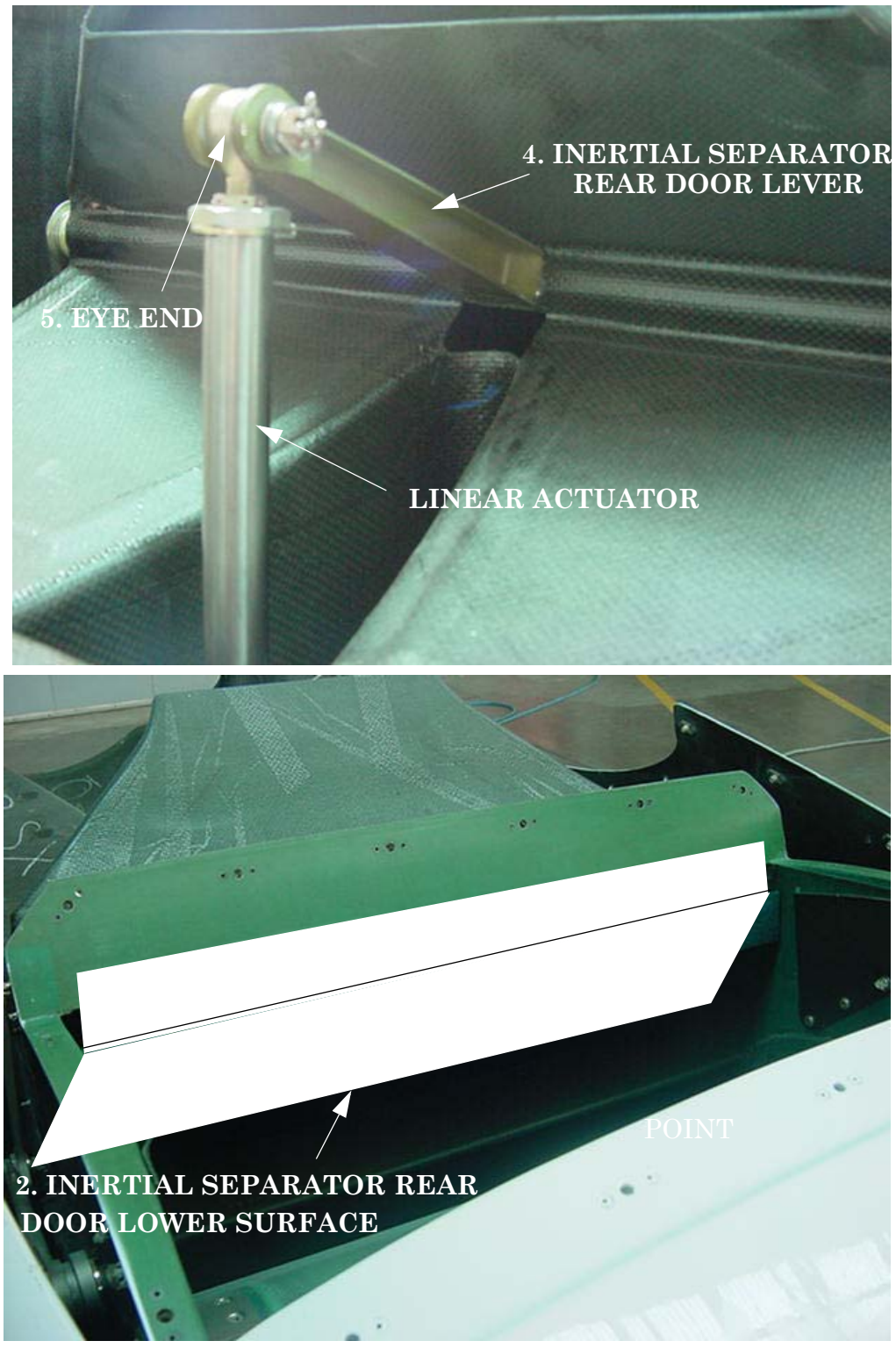


Fig. 203 - Inertial Separator Rear Door - Visual Inspection (Sheet 2 of 3)

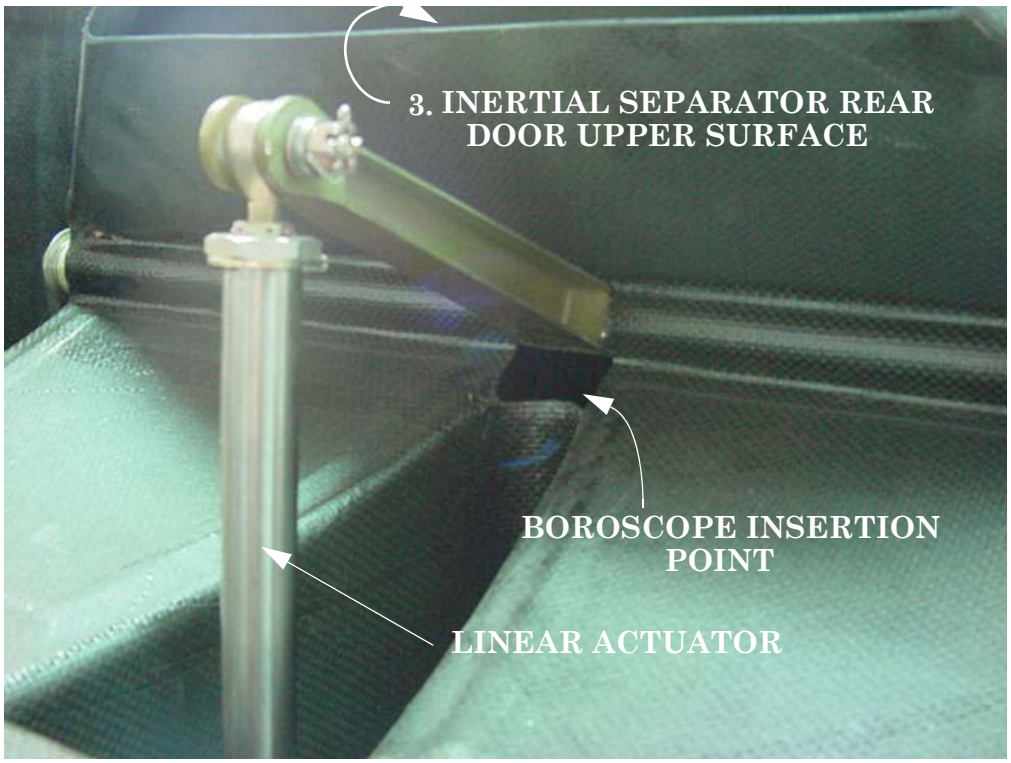


Fig. 203 - Inertial Separator Rear Door - Visual Inspection (Sheet 3 of 3)

7. Inertial Separation System - Inspection/Check

A. Fixtures, Test and Support Equipment

Support Stand	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START
L ICE VANE

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Put the nacelle panel on a support stand.

(4) Do an inspection/check of the inertial separator:
- examine the inertial separator operating linkage for evidence of wear
- examine the vane assembly for evidence of buckling
- examine the complete assembly for security of installation.

(5) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

(6) Remove the safety tags and close these circuit breakers:

Pilot CB panel:

L ENG START

R ENG START

L ICE VANE

(7) Do an Operational Test of the inertial separation system as described in this section.

8. Inertial Separation System - Operational Test

A. Fixtures, Test and Support Equipment

Boroscope	Not Specified

B. Referenced Information

Maintenance Manual Chapter 24-00-00

C. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).

(2) Do the test:

	Action	Result
(a)	On the pilot switch panel set the L/R ENG ICE VANE-OFF switch to L/R position.	The doors and the vanes move smoothly through the entire run and reach the fully deployed position (symmetrically) on both sides (of each LH/RH nacelle inlet).
(b)	On the pilot switch panel set the L/R ENG ICE VANE-OFF switch to OFF position.	The door moves smoothly through the entire run until fully retracted and the FWD vane is in the normal (non-deployed) position, with the same alignment of its corners (look LH/RH nacelle inlets).

9. Inertial Separation System - Vanes Clearance Check

A. Fixtures, Test and Support Equipment

Support Stand	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: The procedures for the LH and RH inertial separation system are identical.

(1) Open, tag and make safe these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Place each removed upper nacelle panel on a suitable support stand.
(4) Remove the cover (Ref. to Fig 203 sheet 1 of 2) from the upper nacelle air inlet duct.
(5) Visually check the actuator connected vane for evidence of cracks alongside the torque tube especially at side levers engagements.

NOTE: If any evidence of cracks should be noted, the immediate replacement of the affected vane is required.

(6) Check the entire vane system and related side actuating linkages for correct engagement and positive connection.
(7) Check the free rotation of the hinge side shims of the vane (3). Record the check result in the Table 1.(Ref. to Fig 205 and 206)
(8) With a suitable extension cable (Ref. to Fig 207 for extension cable preparation), temporarily connect the actuator electrical connector to its receptacle on the airplane in order to move the vane system to the required position.

WARNING: CARE IS TO BE TAKEN DURING THE VANE SYSTEM OPERATION. AFTER THE VANE SYSTEM HAS BEEN MOVED TO THE REQUIRED POSITION, THE INVOLVED (L OR R) ENG ICE VANE CIRCUIT BREAKER SHALL BE DISENGAGED IN ORDER TO AVOID INADVERTENT ACTUATION AND CONSEQUENT DAMAGES WHILE WORKING ON THE SYSTEM.

(9) With the vane system in the fully retracted position (no-ice operation configuration), and using a suitable thikness feeler, check the clearance of the three vanes side edges from the engine air duct side surface (Ref. to Fig 204 and 205) and record in the Table 1 the measured values.

NOTE: The required clearance should not be less than 2 millimeters alongside the entire lengt of each vane side edge.

(10) Keeping the vane system in the fully retracted position, check the clearance of the front edge of each vane from the duct surface and record in the Table 1 the measured values.

NOTE: A minimum clearance of at least 0,3 millimeter is required alongside the entire lenght of each vane front edge

(11) Move the vane system to the fully deployed position (ice operation configuration) and check the clearance of the three vanes side edges from the engine air duct side walls surface and record in the Table 1 the measured values.

NOTE: The required clearance should not be less than 2 millimeters alongside the entire lengt of each vane side edge.

(12) Keeping the vane system in the fully deployed position, check the clearance of the front edge of each vane from the duct surface and record in the Table 1 the measured values.

NOTE: A minimum clearance of at least 0,3 millimeter is required alongside the entire lenght of each vane front edge

CAUTION: NO INSUFFICIENT VANE SIDE CLEARANCE, NO INCORRECT ENGAGEMENT OF THE VANES SIDE ACTUATING LINKAGES, AND NO LOOSEN CONNECTION ARE ALLOWED. CONTACT PIAGGIO AERO INDUSTRIES PRODUCT SUPPORT DEPARTMENT FOR CORRECTIVE ACTIONS.

NOTE: In the event of any vane insufficient front clearance at system travel ends (full retraction and full deployment), a vane system actuator rigging check is required

(13) Install the cover (Ref. to Fig 203 sheet 1 of 2) from the upper nacelle air inlet duct.

(14) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

(15) Remove the safety tags and close these circuit breakers:

Pilot CB panel:

L ENG START

R ENG START

Table 1:

Reference code	Vanes configuration	
	NO - ICING	ICING
	Clearance mm	Clearance mm
A1		
A2		
A3		
B1		
B2		
B3		
B4		
C1		
C2		
C3		
Shims free rotation	YES	NO

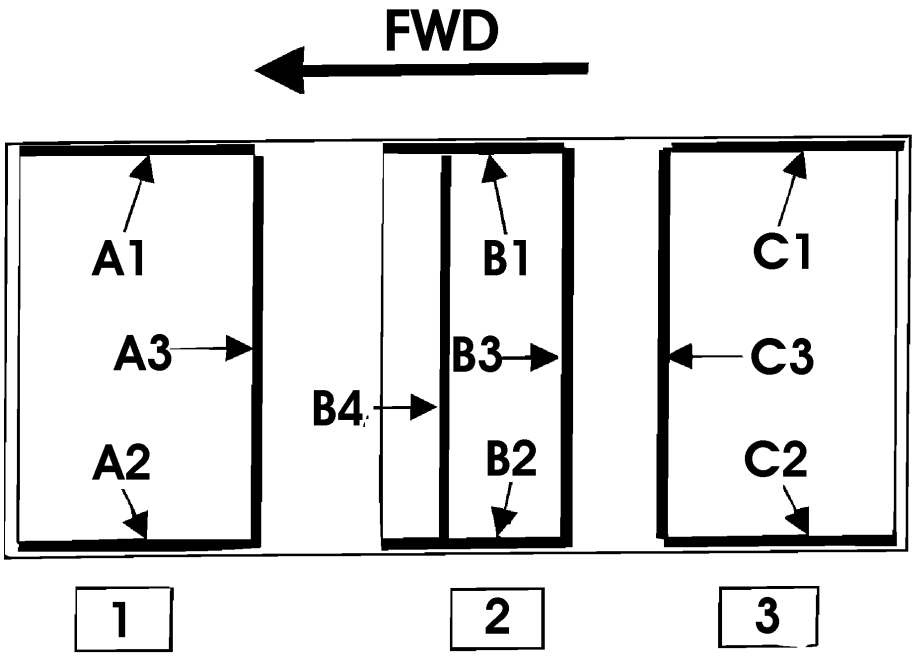


Fig. 204 - Ice Vane System Schematic - Clearance Check

NOTE: Dashed lines for vanes in deployed (icing operation) configuration.

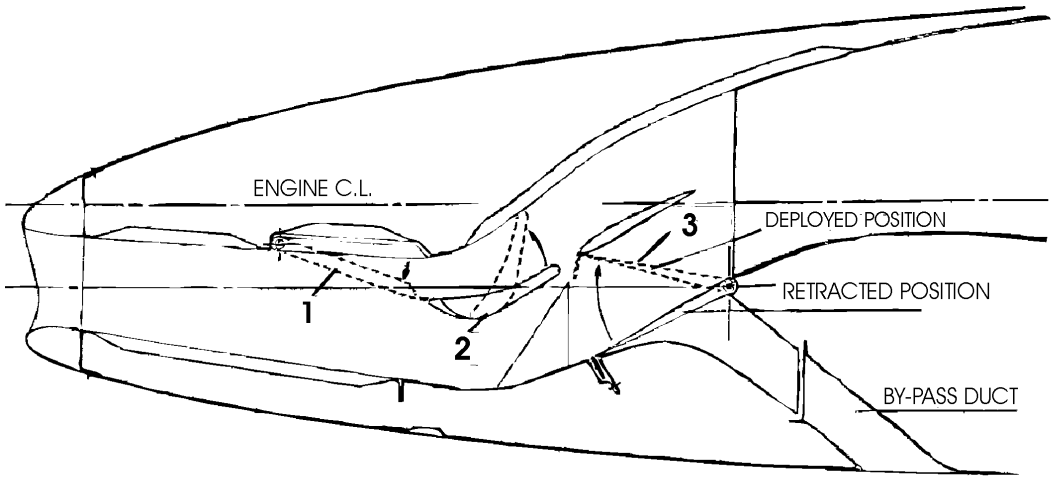


Fig. 205 - Ice Vane System Side View

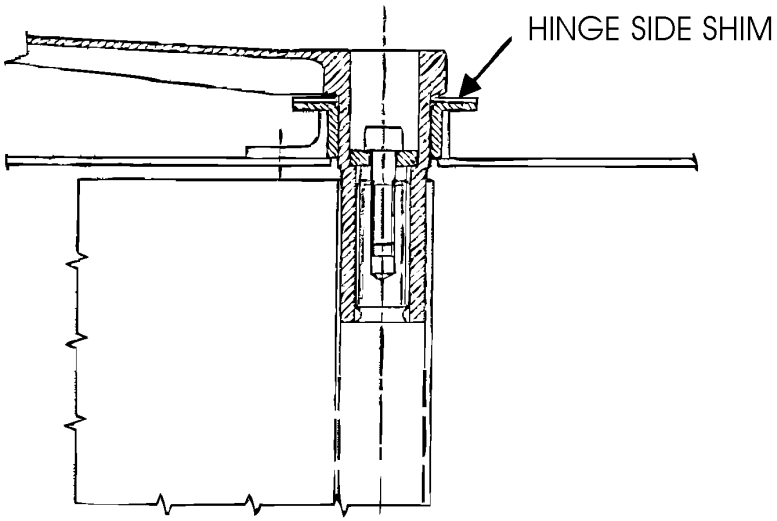


Fig. 206 - Ice Vane Hinge Side Shim Free Rotation Check

10. Inertial Separation System - Vane System Rigging Check

A. Fixtures, Test and Support Equipment

Support Stand	Not Specified

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure

NOTE: The procedures for the LH and RH inertial separation system are identical.

(1) Open, tag and make safe these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START

(2) With the actuator fully extended disconnect the vane lever from the eye end of the vane actuator by removing the connecting bolt, washer and nut (Ref. to Fig 201).

(3) Make a wear/friction check of the vane, doors and lever assembly as described in this section.

CAUTION: IN THE EVENT THAT MORE THAN THE MAXIMUM ALLOWED 3-KILOGRAMS LOAD IS CHECKED, AN

INCORRECT SYSTEM RIGGING IS TO BE ASSUMED. CONTACT PIAGGIO AERO INDUSTRIES PRODUCT SUPPORT DEPARTMENT FOR CORRECTIVE ACTION.

(4) Temporarily connect the electrical connector of the actuator to its receptacle on the airplane by means of a suitable extension cable (Ref. to Fig. 207).

WARNING: MAKE SURE THAT THE ACTUATOR ROD DOES NOT MAKE CONTACT WITH ANY PART OF THE AIRPLANE OR YOUR PERSON.

(5) Close the L (R) ICE VANE circuit breaker.
(6) Move the affected ENG ICE VANE/OIL COOLER INTK switch to the L (R) position in order to obtain the actuator full extension.
(7) Open and safety the L (R) ICE VANE circuit breaker.
(8) Move the vane lever to the ICE OPERATIONS position (fully up when the nacelle panel is with the upside surface down) and check that the vane lever connecting hole and the actuator eye end hole are perfectly aligned. Adjust the actuator eye end position as necessary: a free and smooth movement of the connecting bolt through the holes is to be checked without any forcing of the vanes agaist the duct surface (a clearance of at least 0.3 millimeters shall be allowed between each vane front edge and the duct surface).
(9) Remove the vane/actuator connecting bolt.

WARNING: MAKE SURE THAT THE ACTUATOR ROD DOES NOT MAKE CONTACT WITH ANY PART OF THE AIRPLANE OR YOUR PERSON.

(10) Close the L (R) ICE VANE circuit breaker.
(11) Move the affected ENG ICE VANE/OIL COOLER INTK switch to the OFF position in order to obtain the actuator full retraction.
(12) Open and safety the L (R) ICE VANE circuit breaker.

NOTE: A suitable shortened MS27576-4-16 bolt can be used, just as a tool, for checking the holes alignement, due to installation problems of the connecting bolt in the following position.

(13) Move and hold the vane lever in the NO ICE position (fully down when the nacelle panel is with the upside surface down): the lever connecting hole and the actuator eye end hole should be aligned when the vane is at travel end. A free and smooth movement of the connecting tool through the holes should be checked without forcing of the vanes against the duct surface. However a light pressure of the vane against the run stop is allowed to obtain the correct alignment of the connecting holes: in this event a load of no more than 5 kilograms shall be applied on the vane lever to obtain the connecting holes alignment. Ref. to Fig. 208 for the load meter engagement.

CAUTION: IN THE EVENT THAT MORE THAN THE ABOVE MAXIMUM ALLOWABLE 5-KILOGRAMS LOAD IS REQUIRED TO OBTAIN THE CONNECTING HOLES ALIGNEMENT, AN INCORRECT SYSTEM RIGGING IS TO BE ASSUMED. CONTACT PIAGGIO AERO INDUSTRIES PRODUCT

SUPPORT DEPARTMENT FOR CORRECTIVE ACTION.

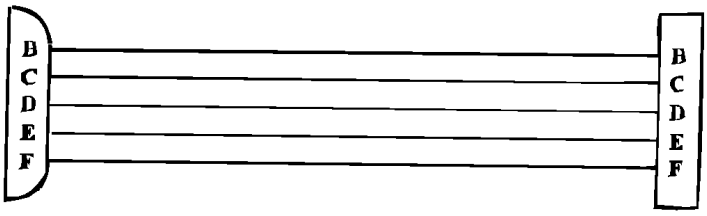
(14) Remove the vane actuator connecting tool.

WARNING: MAKE SURE THAT THE ACTUATOR ROD DOES NOT MAKE CONTACT WITH ANY PART OF THE AIRPLANE OR YOUR PERSON.

(15) Close the L (R) ICE VANE circuit breaker.
(16) Move the affected ENG ICE VANE/OIL COOLER INTK switch to the L (R) position in order to obtain the actuator full extension.
(17) Open and safety the L (R) ICE VANE circuit breaker.
(18) Move and hold the vane lever to the ICE OPERATIONS position (fully down when the nacelle panel is with the upside surface down).
(19) Install the vane lever/actuator connecting bolt, whasher and nut.
(20) Safety the nut with a new cotter pin.
(21) Install the access panel on the upper nacelle air inlet duct (Ref. to Fig 203 sheet 1 of 2).
(22) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(23) Open, tag and safety these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START

(24) Perform the Operational Test of the Inertial Anti-Ice System (LH and RH) as described in this section.



NOTE: Wire P/N M22759-16A120-9 should be used.

Fig. 207 - Preparation of the 5 - Wire Extension Cable

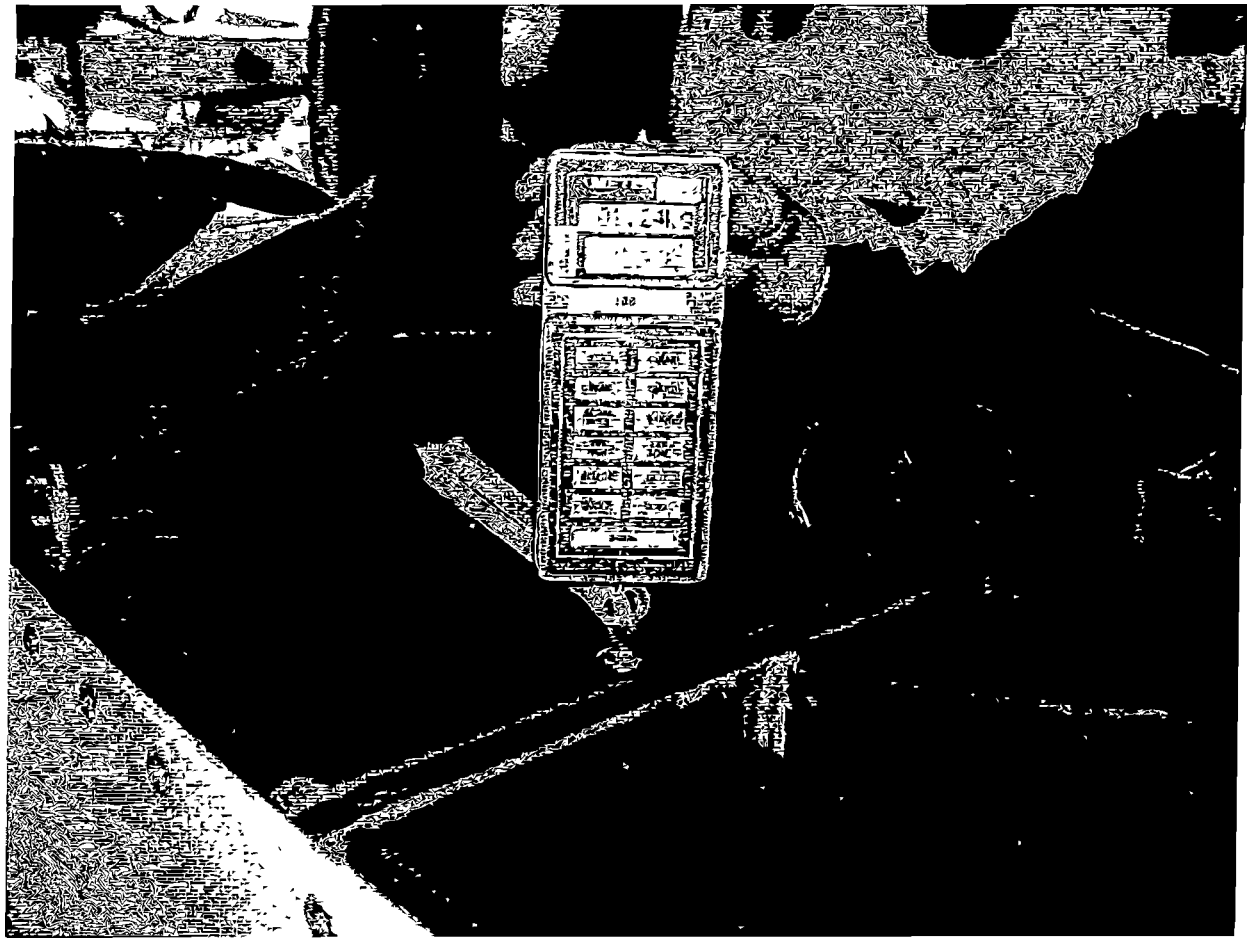


Fig. 208 - Load Meter/Recorded Equipment Engagement

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OIL COOLER AIR INTAKE LIP ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

1. General

The air intake lip of the oil cooler is protected against ice accretion by a hot-air system utilizing compressor delivery bleed air; the air comes from a tee provided in the nacelle lip de-icing system, upstream the shut-off valve. The oil cooler air intake lip anti-ice system is operated in conjunction with the inertial separator.

2. Description (Refer to Fig. 1)

NOTE: The LH system is described, the RH system is identical.

A. The system comprises a shut-off valve, and a temperature switch.

B. The shut-off valve is installed downstream of the engine high pressure port, inside the nacelle at NACS -887.71. The valve is solenoid controlled and operated by 28 Vdc. The valve has a maximum operating pressure of 200 psig and a maximum operating temperature of 435°C (815°F).

C. The temperature switch provides positive indication that hot air is distributed in the system. The temperature switch is located downstream of the shut-off valve, inside the engine nacelle at NACS -887.71.

3. Operation

NOTE: The LH system is described, the RH system is identical.

A. A control switch installed on the anti-ice panel captioned L and R OIL COOLER INTK is provided for each oil cooler air intake lip anti-ice system.
When the L OIL COOL INTK-OFF switch is in the L OIL COOLER INTK position, the shut-off valve opens and the airflow to the oil cooler air intake anti-ice system flows first through the shut-off valve, then through the temperature switch and finally to the lip of the oil cooler air intake. Air flow is discharged through a series of holes into the nacelle. A green ON indication on the MFD System Page is displayed when the airflow detected by the temperature switch reaches the correct temperature.

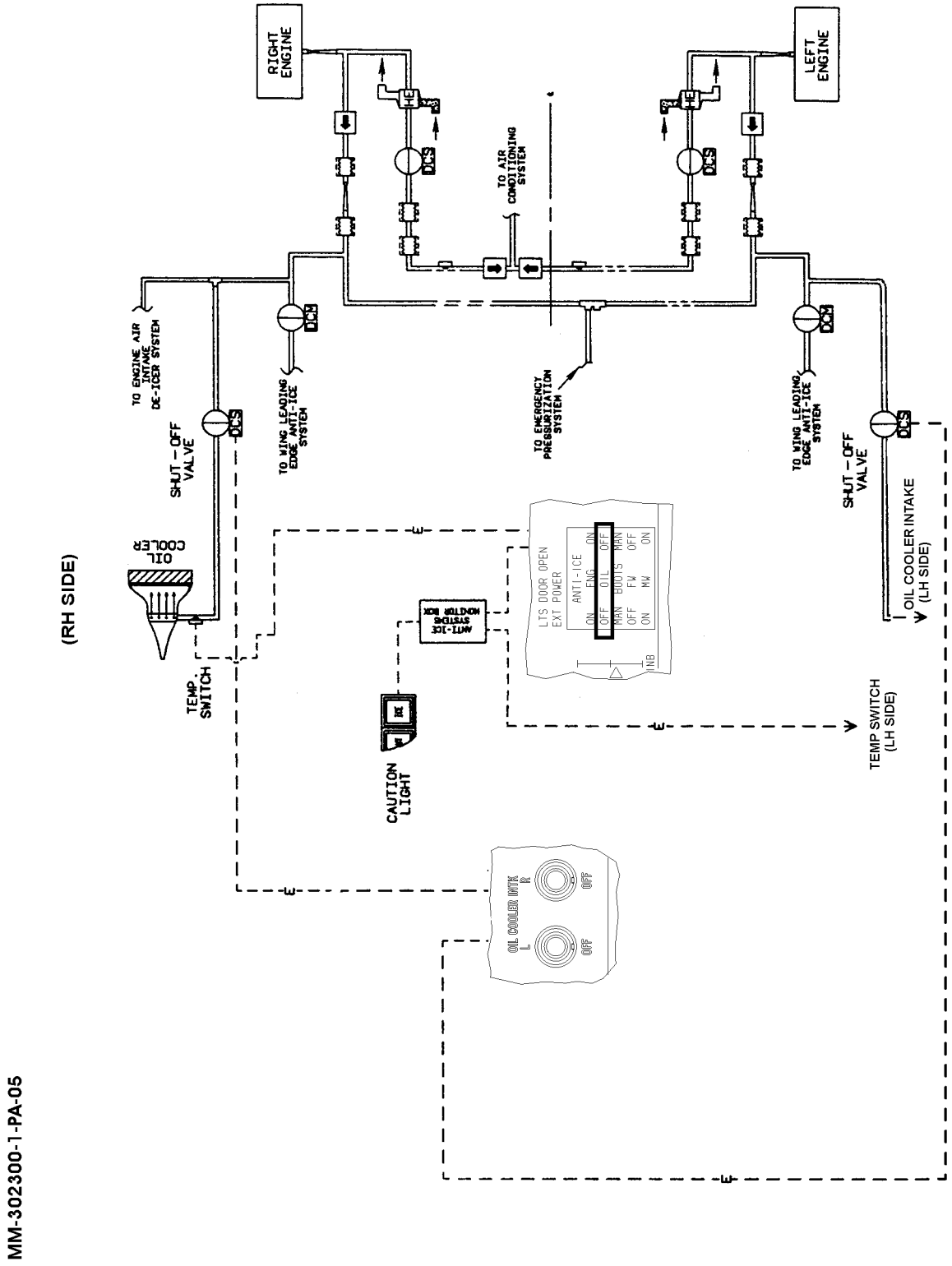


Fig. 1 - Oil Cooler Air Intake Lip Anti-ice System - Schematic

OIL COOLER AIR INTAKE LIP ANTI-ICE SYSTEM - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:
- removal/installation/inspection of the shut-off valve
- removal/installation/inspection of the temperature switch
- operational test of the oil cooler air intake lip anti-ice system.

2. Shut-off Valve - Removal

A. Referenced Information

Maintenance Manual Chapter 54-10-00

B. Procedure (Ref. Fig. 201)

NOTE: This procedure is for LH shutoff valve, the procedure for the RH shutoff valve is identical.

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:
L ENG STRAT
R ENG START
L OIL COOLER

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Disconnect the electrical connector (3).
(4) Cut and remove the lockwire.
(5) Disconnect the unions (1) and (4) from the shut-off valve (2).
(6) Remove the clamp (5) that secures the shut-off valve (2) to the engine mount.

3. Shut-off Valve - Installation

A. Referenced Information

Maintenance Manual Chapter 54-10-00

B. Procedure (Ref. Fig. 201)

NOTE: This procedure is for LH shutoff valve, the procedure for the RH shutoff valve is identical.

(1) Make sure as necessary that:
- The applicable circuit breakers are open, tagged and safetied
- The system is safe
- Access is available
(Refer to the Removal Procedure).

(2) Install the shut-off valve (2) on the engine mount with the clamp (5). Make sure the arrow points in the correct direction of flow.
(3) Connect the unions (1) and (4) to the shut-off valve (2).
(4) Safety the unions with lockwire.
(5) Connect the electrical connector (3).
(6) Remove the safety tags and close these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START
L OIL COOLER

(7) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(8) Do an Operational Test of the oil cooler air intake lip anti-ice system (Refer to Para. 8).

4. Shut-off Valve - Inspection

A. Referenced Information

Maintenance Manual Chapter 54-10-00

B. Procedure

NOTE: The procedure given is for the LH installation, the RH installation is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Do an inspection for security of installation; make sure as necessary that:
– the shut-off valve is secure on the engine mount
– the lockwire is intact
– the components are in good condition.
(3) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).

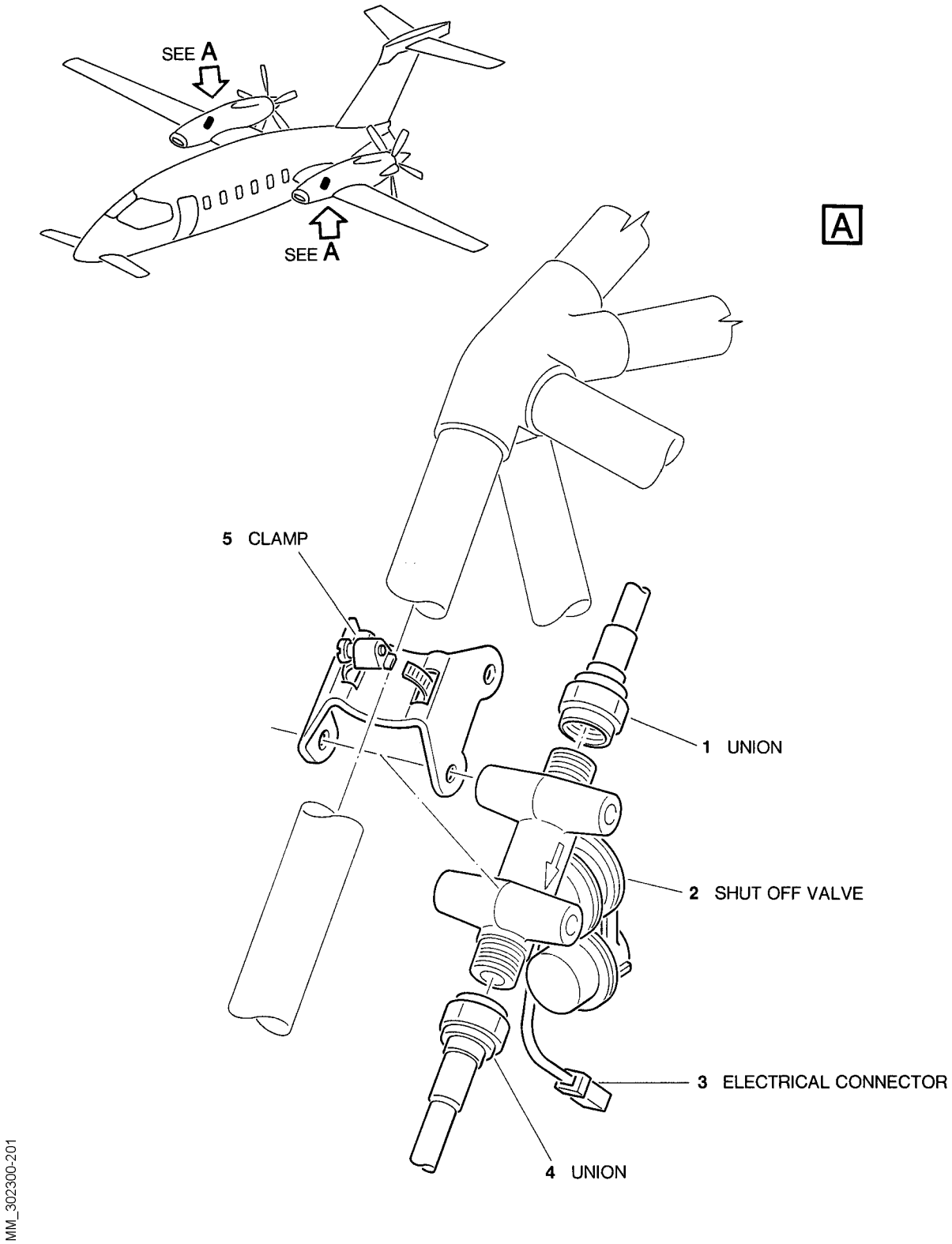


Fig. 201 - Shut-off Valve - Removal/Installation

5. Temperature Switch - Removal

A. Referenced Information

Maintenance Manual Chapter 54-10-00

B. Procedure (Refer to Fig. 202)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START
ANN LTS1
ANN LTS2

(2) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(3) Remove the insulation.
(4) Cut the wires as close as possible to the switch lugs.
(5) Cut the lockwire and remove the two screws (1).
(6) Remove the temperature switch (2).

6. Temperature Switch - Installation

A. Materials

Conductive adhesive	01-006
Isopropyl Alcohol	02-008
Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 54-10-00

C. Procedure (Refer to Fig. 202)

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Make sure as necessary that:
- The applicable circuit breakers are open, tagged and safetied
- The system is safe
- Access is available
(Refer to the Removal Procedure).

WARNING: BE CAREFUL WHEN YOU USE ISOPROPYL ALCOHOL. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(2) Use a clean lint-free cloth made moist with isopropyl alcohol to clean the mating surfaces of compontent parts. Wipe the components with a clean lint-free cloth before the fluid dries.
(3) In the workshop solder an insulated wire (approx. 6 inches/10 cm long) to each of the two switch lugs .
(4) Apply a coat of conductive adhesive to the flange (3).
(5) Install the temperature switch (2).
(6) Install the two screws (1) and safety with lockwire.
(7) Connect the wires with in-line connectors (Refer to 20-00-00).
(8) Install the insulation.
(9) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(10) Remove the safety tags and close these circuit breakers:

Pilot CB panel:
L ENG START
R ENG START
ANN LTS1
ANN LTS2

(11) Do an Operational Test of the oil cooler air intake lip anti-ice system (Refer to Para. 8).

7. Temperature Switch - Inspection

A. Referenced Information

Maintenance Manual Chapter 54-10-00

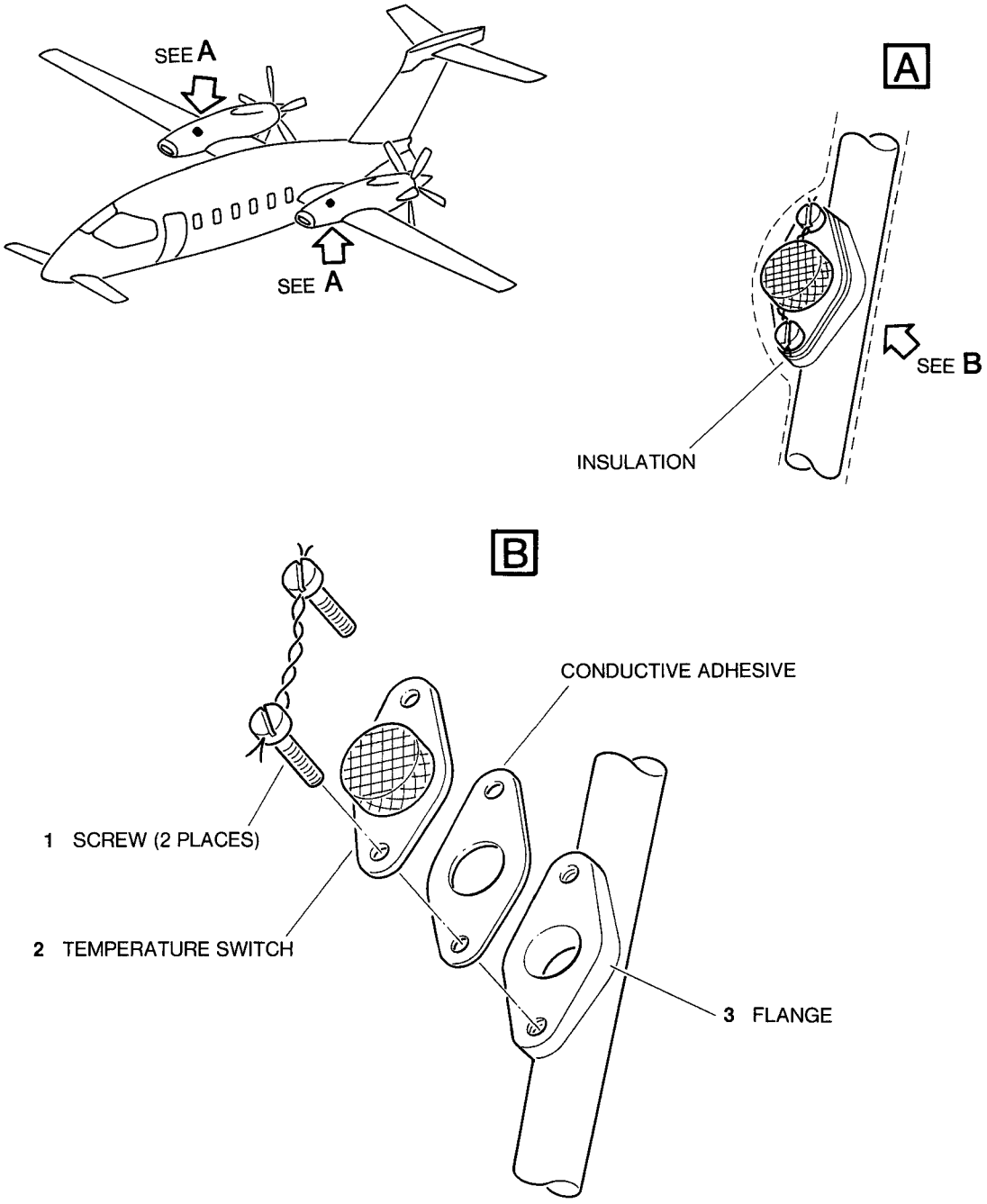
B. Procedure

NOTE: Procedures for the LH installation are described, the RH installation is identical.

(1) Remove the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).
(2) Remove the insulation.
(3) Examine the switch for the following:
- damage and corrosion
- security of installation
- correct attachment of the electrical wires.
- make sure the lockwire is secure.

(4) Examine the insulation for the following:
- cuts and splits
- signs of contamination
- make sure the velcro is serviceable.

(5) Tighten or replace any defective parts as necessary.
(6) Install the upper nacelle panel 410AT (420AT) (Refer to 54-10-00).



MM_302300-202

Fig. 202 - Temperature Switch - Installation

8. Oil Cooler Air Intake Lip Anti-ice System - Operational Test

A. Referenced Information

Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 71-00-00

B. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).
(2) Start the LH engine (Refer to 71-00-00).
(3) Do the test:

	Action	Result
(a)	On the pilot switch panel set the OIL COOLER INTK-OFFswitch to L position.	On the annunciator panel the L ENG OIL A/I green caption comes on.
(b)	Stop the LH engine (Refer to 71-00-00).	
(c)	Make a check by hand of the LH air intake lip.	The air intake lip is warm.

NOTE: If the R ENG OIL A/I caption does not come on, increase the setting of the engine POWER lever and do the test again.

(4) Start the RH engine and stop the LH engine (Refer to 71-00-00).
(5) Do actions (a) and (b) again for the RH oil cooler air intake lip anti-ice system.

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PITOT-STATIC AOA AND TAT ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

1. Description

A. Integral electric heating elements are used to prevent moisture from freezing on the following components:

- LH and RH pitot tubes
- LH and RH instrument static ports
- LH and RH cabin pressure control static ports
- Angle-of-attack (AOA) vane.
- T.A.T. Probe

B. The heating elements are supplied with 28V DC from the following bus bars:

(1) Essential Bus
- LH Pitot Tube
- LH Instrument Static Port
- LH Cabin Pressure Static Port

(2) L Dual Feed Bus
- Angle-of-Attack Vane
- T.A.T. Probe

(3) R Single Feed Bus
- RH Cabin Pressure Static Port
- RH Instr/Fwd Cabin Pressure Static Port
- RH Pitot Tube

The LH pitot tube, LH instrument static port, LH cabin pressure static port and angle-of-attack vane probe heating circuits are controlled by a switch on the Pilot's Switch Panel, placarded L PITOT/STATIC HTR- L & STALL.
The RH cabin pressure control static port, RH instr/fwd cabin pressure static port, the Total Air Temperature probe and the RH pitot tube heating circuits are controlled by a switch on the Pilot's Switch Panel, placarded R PITOT/ STATI HTR - R & TAT.

2. Operation (Ref. Fig. 1)

A. The pitot tubes, static ports and angle-of-attack vane heating elements are powered by 28V DC. The L pitot tube, L instrument static port and angle-of-attack vane probe are heated when the ANTI-ICE switch, located on the Central Switch Panel in Zone 214, is set to L & STALL. The angle-of-attack case is heated whenever the L DUAL FEED BUS BAR is energized.

B. The R pitot tube, R instrument static port and T.A.T. probe are heated when the ANTI-ICE switch, located on the Central Switch Panel in Zone 214, is set to R & T.A.T. The angle-of-attack case is heated whenever the L DUAL FEED BUS BAR is energized.

3. Location

A. The locations of the components of the Pitot-Static, AOA Anti-Ice System are as follows:

LH Pitot Tube - Zone 110
RH Pitot Tube - Zone 110
LH Static Port, Instruments -
RH Static Port, Instruments -
LH Static Port, Cabin Pressure -
RH Static Port, Cabin Pressure -

B. The location of the system circuit breakers are as follows:

Copilot CB panel:	Pilot CB panel:
R PITOT ST HTR	AOA HTR
	TAT HTR
	L PITOT ST HTR

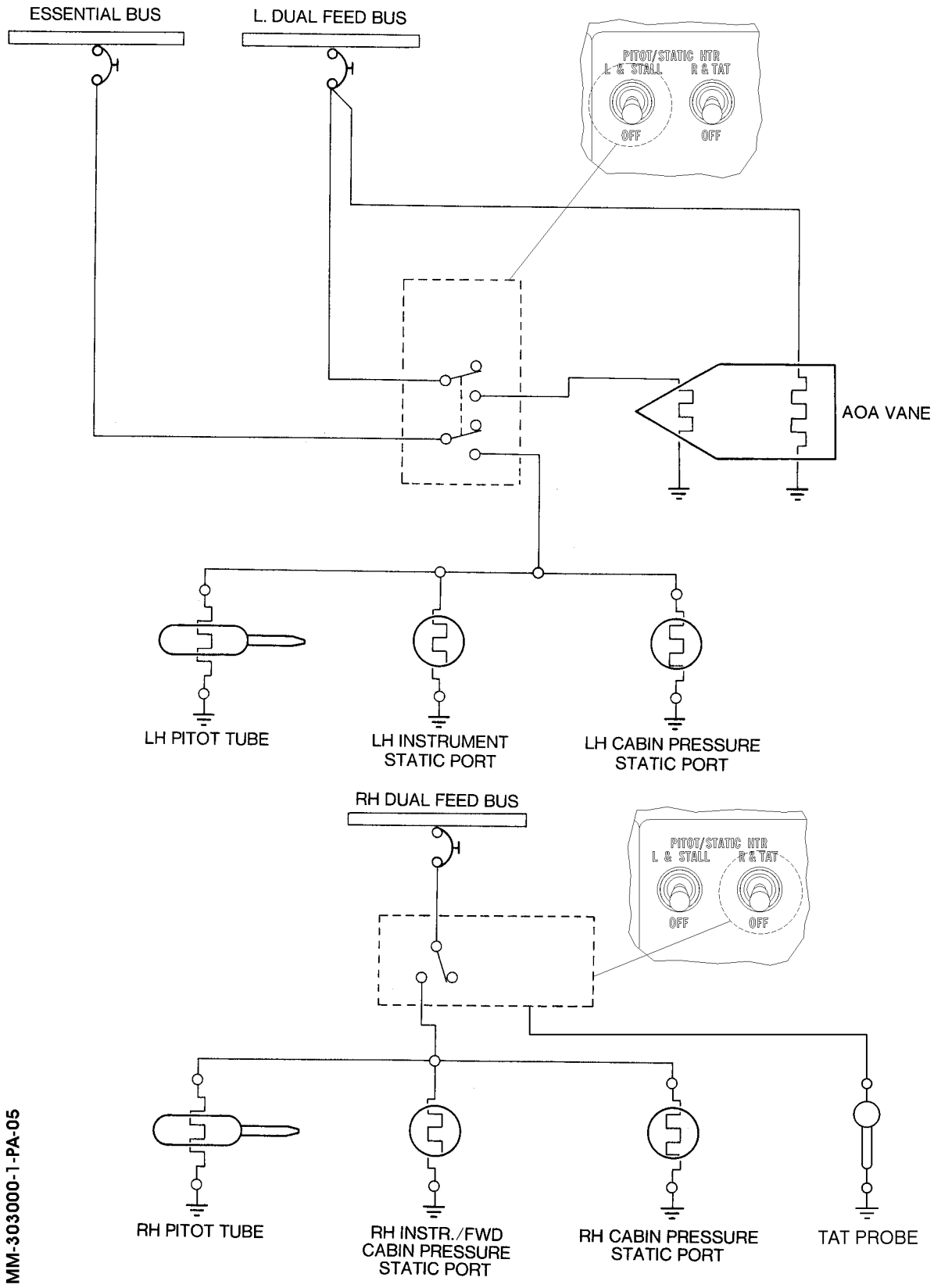

Fig. 1 - Component Electrical Heating - Schematic Diagram

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PITOT-STATIC AOA AND TAT ANTI-ICE SYSTEM - MAINTENANCE PRACTICES

1. General

A. This topic gives the maintenance practices for the electrical components of the Pitot-Static and Angle-of-Attack vane. If the integral heating elements of the components fail to operate when energized, replace the component with a new or serviceable item. Refer to the following Chapters for details of Removal and Installation:

- Pitot Tubes (Refer to Chapter 34-11-00)
- Static Vents - Instruments (Refer to Chapter 34-11-00)
- Static Vents - Cabin Pressurization (Refer to Chapter 21-30-00)
- Angle-of-Attack (Refer to 27-31-00).

2. Pitot-Static, AOA and TAT Anti-Ice System - Operational Test

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Do the Operational Test:

	Action	Result
(a)	Remove pitot tube and AOA vane covers.	
(b)	Make sure that the static ports are clear.	
	NOTE: It is recommended that two mechanics are available for switch operation and heater checks.	
(c)	Make sure the electrical power is available (Refer to 24-00-00).	
(d)	Set the ANTI-ICE switch marked PITOT/STATIC HTR to L & STALL	Pitot tube, static ports and AOA vane become warm.
(e)	Set the ANTI-ICE switch marked PITOT/STATIC HTR to R & TAT	Pitot tube, static ports and TAT probe become warm.
(f)	Remove the electrical power (Refer to 24-00-00).	

3. Pitot-Static , AOA Vane, TAT Probe Anti-Icing System - Inspection

A. Referenced Information

Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 53-80-00

B. Procedure

(1) Remove the electrical power (Refer to 24-00-00).
(2) Remove the radome/nosecone (Refer to 53-80-00).
(3) Examine the LH pitot tube for the following:
- Security of attachment to the structure
- Damage, cracks and corrosion
- Correct attachment of the electrical connectors.

(4) Examine the electrical wires for the following:
- Chafing
- Discoloration and signs of buring
- Correct installation.

(5) If necessary, repair or replace any defective parts.
(6) Repeat steps (3) thru (5) for the RH pitot tube.
(7) Install the radome/nosecone (Refer to 53-80-00).
(8) Examine pitot tubes, static pressure ports and AOA vane for obstruction, damage, corrosion and security.
(9) If necessary, repair or replace any defective parts.

WINDSHIELD ICE PROTECTION SYSTEM - DESCRIPTION AND OPERATION

1. Description

A. The windshields are equipped with electrically heated elements to provide ice protection and de-misting.

B. The elements consist of parallel wires in the windshield interlayer arranged in a pattern of heating zones. The three main forward vision zones have temperature sensors connected to control units which limit the operating temperature to prevent overheating. In the event of an overheat of zone 1 or 2 (left windshield), the appropriate control unit gives a signal to one of two warning captions on the annunciator panel.

C. The system is supplied with 28V DC from the L and R generator bus bars via these circuit breakers:

CB128 CPLT WSHLD HTR
CB129 PLT L WSHLD Z HTR
CB130 PLT R WSHLD Z HTR
CB131 PLT S WSHLD HTR.

D. The system is controlled by two switches on the ANTI-ICE panel. The switch relays are supplied with 28V DC from the L and R single feed bus bars via these circuit breakers:

CB52 SEC WSHLD CONT
CB59 PRI WSHLD CONT

2. Operation (Ref. Fig. 1)

A. PRI LO (de-mist)

(1) When the WSHLD HEAT selector switch is set to PRI LOW a power supply is given, via de-mist relays, to windshield zones 2,4 and 5. The zones become warm and provide a de-mist facility.

B. PRI HI (anti-ice)

(1) When the WSHLD HTR selector switch is set to PRI HI, the de-mist relays open, interrupting the power supply to windshield zones 4 and 5.

(2) The total power supply is then given, via an anti-ice relay, to zone 2, the subsequent increase in heat being adequate to prevent the formation of ice.

(3) The temperature of zone 2 is sensed by a temperature sensor embedded in the laminate. The sensor gives a signal to the control unit which maintains the power supply when the zone temperature is below 33.9°C (93°F) and opens the circuit to interrupt the power supply at 41.1°C (106°F).

(4) If the windshield zone temperature rises above 53.5 plus or minus 2.3°C (139 plus or minus 5°F) the control unit gives a signal to the annunciator panel and the warning caption L WSHLD ZONE comes on. At the same time, the control unit automatically de-energizes the anti-ice relay to interrupt the power supply to the zone.

(5) In the event of a failure of the zone 2 anti-icing, the control unit gives a signal to the annunciator panel and the L WSHLD ZONE caption comes on.

C. SEC LOW (de-mist)

(1) When the WSHLD HTR selector switch is set to SEC LOW, a power supply is given, via de-mist relays, to windshield zones 1,5,3 and 6. The zones become warm and provide a de-mist facility.

NOTE: Zone 5 (left windshield) is supplied from both the PRI LOW and SEC LOW circuits.

D. SEC HI (anti-ice)

(1) When the WSHLD HTR selector switch is set to SEC HI, the de-mist relays open, interrupting the power supply to windshield zones 5 and 3.

(2) The total power is then given, via an anti-ice relay, to zones 1 and 6. The subsequent increase in heat of zone 1 being adequate to prevent the formation of ice. The increased power supply to zone 6 results in de-misting only, due to the low power density of the heating elements in this zone.

(3) The temperature of zones 1 and 6 are sensed by temperature sensors embedded in the laminate. The sensors give a signal to the control units. The control units for zones 1 and 6 maintain the power supply when the windshield zone temperature is below 33.9°C (93°F) and open the circuit to interrupt the power supply at 41.1°C (106°F).

(4) If the temperature of windshield zone 1 rises above 53.5 plus or minus 2.3°C (139 plus or minus 5°F) the control unit gives a signal to the annunciator panel and the warning caption R WSHLD ZONE comes on. At the same time, the control unit automatically de-energizes the anti-ice relay to interrupt the power supply to the zone.

(5) In the event of a failure of the zone 1 anti-icing, the control unit gives a signal to the annunciator panel and the R WSHLD ZONE caption comes on.

(6) If the temperature of zone 6 rises above 53.5 plus or minus 2.3°C (139 plus or minus 5°F) the control unit automatically de-energizes the de-mist relay and interrupts the power supply to the zone.

3. Location (Ref. Fig. 1)

A. The WSHLD HTR selector switches are located on the ANTI-ICE panel on the pilot's switch panel, Zone 214.

B. The control units are mounted behind the pilot's switch panel, Zone 214.

C. The de-mist and anti-ice relays are located behind the instrument panel at FS 300, on the center diaphragm of the support structure.

D. For the location of the windshield heating zones refer to Fig. 1.

E. The locations of the system circuit breakers are as follows:

Pilot CB panel:	Copilot CB panel:
PLT L WSHLD Z HTR	PLT R WSHLD Z HTR
PLT S WSHLD HTR	CPLT WSHLD HTR
PRI WSHLD CONT	SEC WSHLD CONT

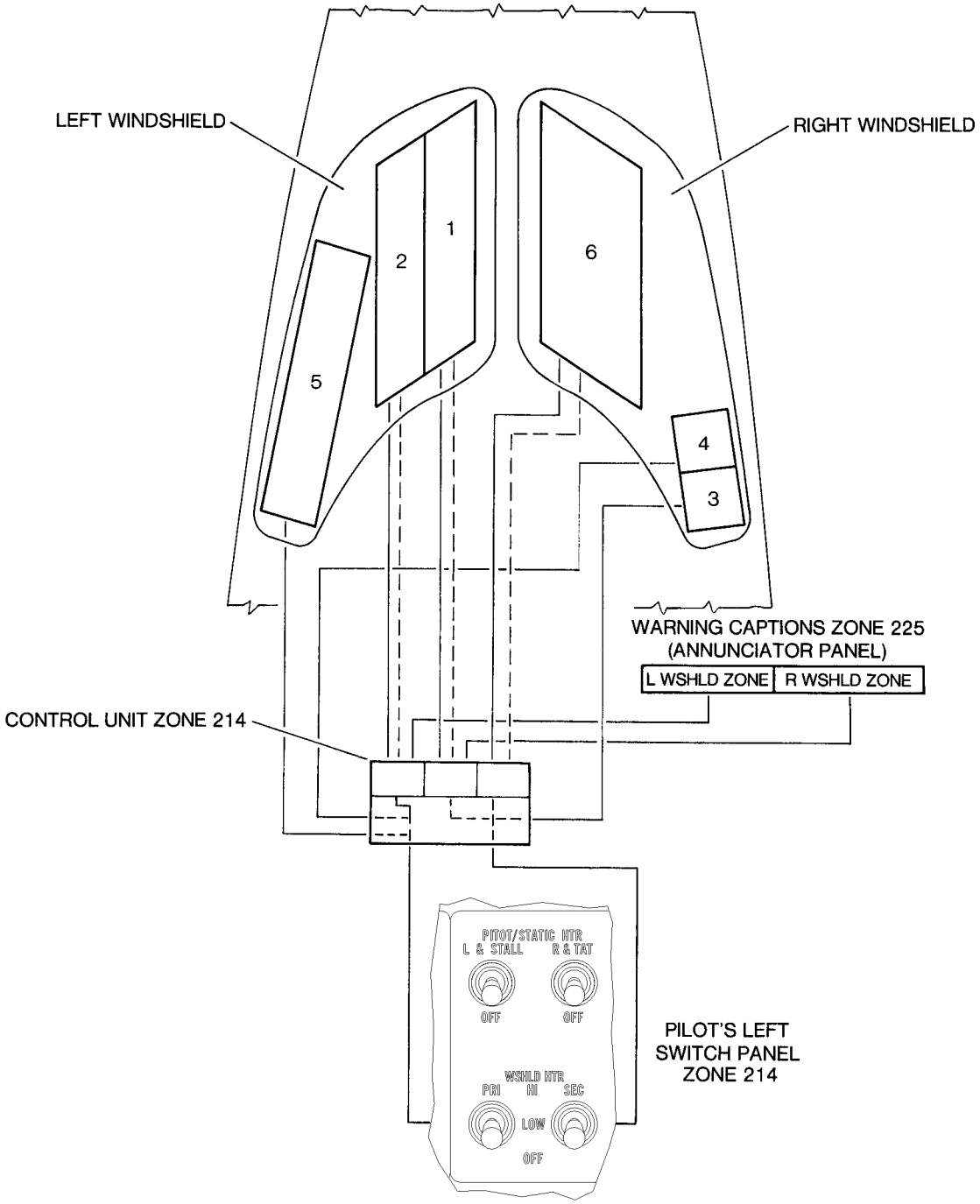

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Fig. 1 - Windshield Ice Protection System - Schematic

WINDSHIELD ICE PROTECTON SYSTEM - MAINTENANCE PRACTICES

1. General

A. This topic gives the maintenance practices for the electrical components of the windshield ice protection system. If a windshield is unserviceable due to faulty heating elements, it must be replaced (Refer to Chapter 56-10-00).

2. Windshield Heating - Functional Test (Ref. Fig. 201 and 202)

A. Fixtures, Test and Support Equipment

Digital Thermometer	Not Specified

B. Materials

Masking Tape	Not Specified

C. Referenced Information

Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 53-80-00

D. Procedure

(1) Clean the interior and exterior of the windshields (Refer to 53-80-00).
(2) Make sure the electrical power is available (Refer to 24-00-00).
(3) Do the test of the windshield heating:

	Action	Result
(a)	Set the WSHLD HTR PRI switch to LOW (Anti -Ice panel).	Zones 2 and 5 (left windshield) and Zone 4 (right windshield) get warm.
(b)	Set the WSHLD HTR PRI switch to OFF.	Zones 2, 5 and 4 go cold.
(c)	Set the WSHLD HTR SEC switch to LOW (Anti-Ice panel).	Zones 1 and 5 (left windshield) and Zones 3 and 6 (right windshield) get warm.
(d)	Set the WSHLD HTR SEC switch to OFF.	Zones 1, 5, 3 and 6 go cold.

(4) Use masking tape to attach the probe of the digital thermometer to the center of Zone 2 (left windshield).

(5) Continue the test:

Action	Result
(a) Set the WSHLD HTR PRI switch to HI (Anti-ice panel).	Zone 2 (left windshield) gets hot and the reading on the digital thermometer stays between 33.9°C (93°F) and 41.1°C (106°F).
(b) Set the WSHLD HTR PRI switch to OFF.	Zone 2 goes cold.

(6) Remove the masking tape and probe of the digital thermometer from the center of Zone 2 and attach to the center of Zone 1.

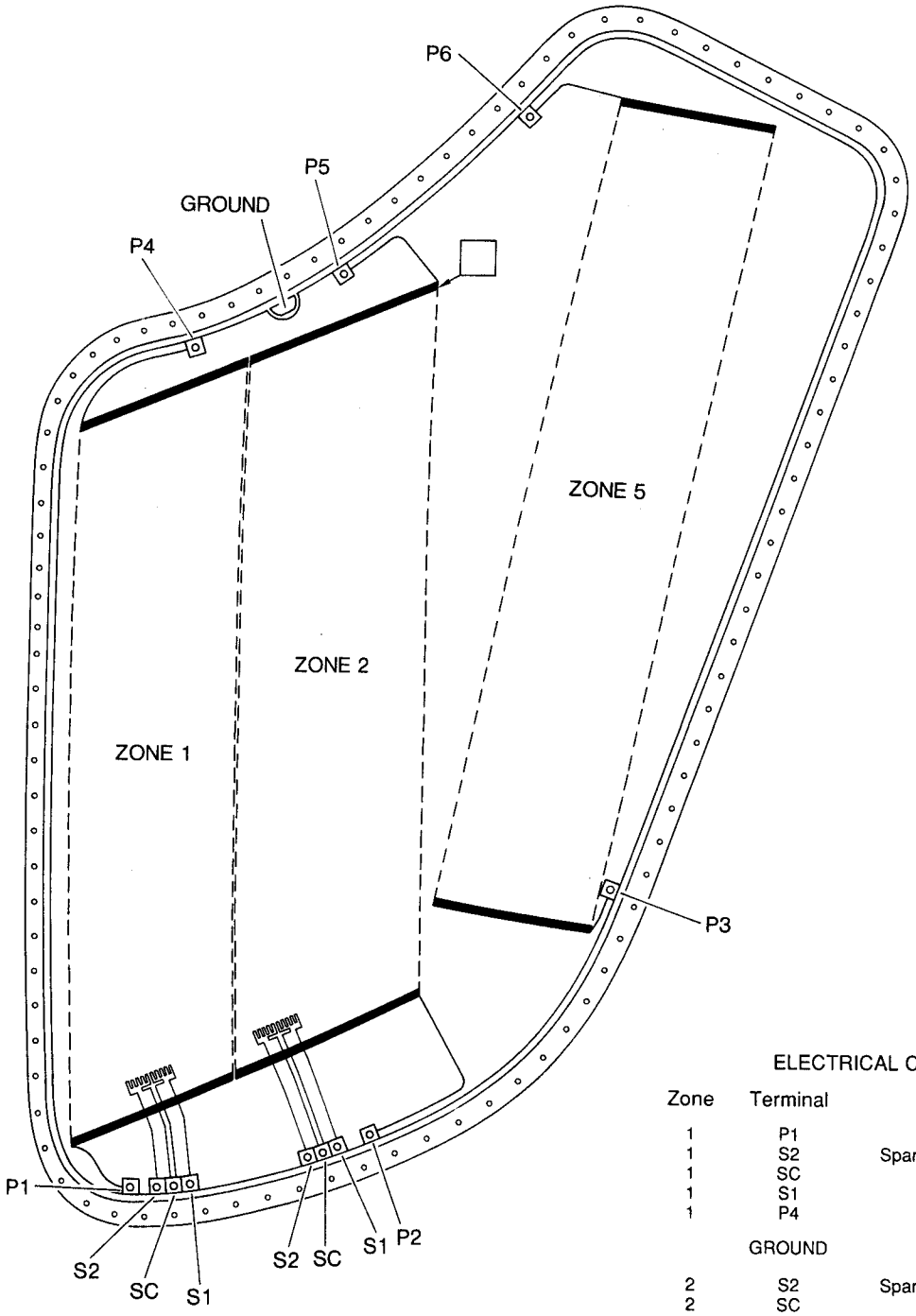
(7) Continue the test:

Action	Result
(a) Set the WSHLD HTR SEC switch to HI (Anti-Ice panel).	Zone 1 (left windshield) gets hot and the reading on the digital thermometer stays between 33.9°C (93°F) and 41.1°C (106°F).Zone 6 (right windshield) gets warm.
(b) Set the WSHLD HTR SEC switch to OFF.	Zones 1 and 6 go cold.

(8) Remove the masking tape and probe from the left windshield.

(9) Clean all traces of masking tape adhesive from the left windshield (Refer to 56-10-00).

(10) Remove the electrical power (Refer to 24-00-00).



ELECTRICAL CONNECTIONS

Zone	Terminal	Wire Ident
1	P1	H205A10
1	S2	Spare sensor (normally not used)
1	SC	H192B22
1	S1	H193B22
1	P4	H206A10
	GROUND	H218A16N
2	S2	Spare sensor (normally not used)
2	SC	H172B22
2	S1	H173B22
2	P2	H210A10
2	P5	H211A10
5	P3	H216A12
5	P6	H217A12N

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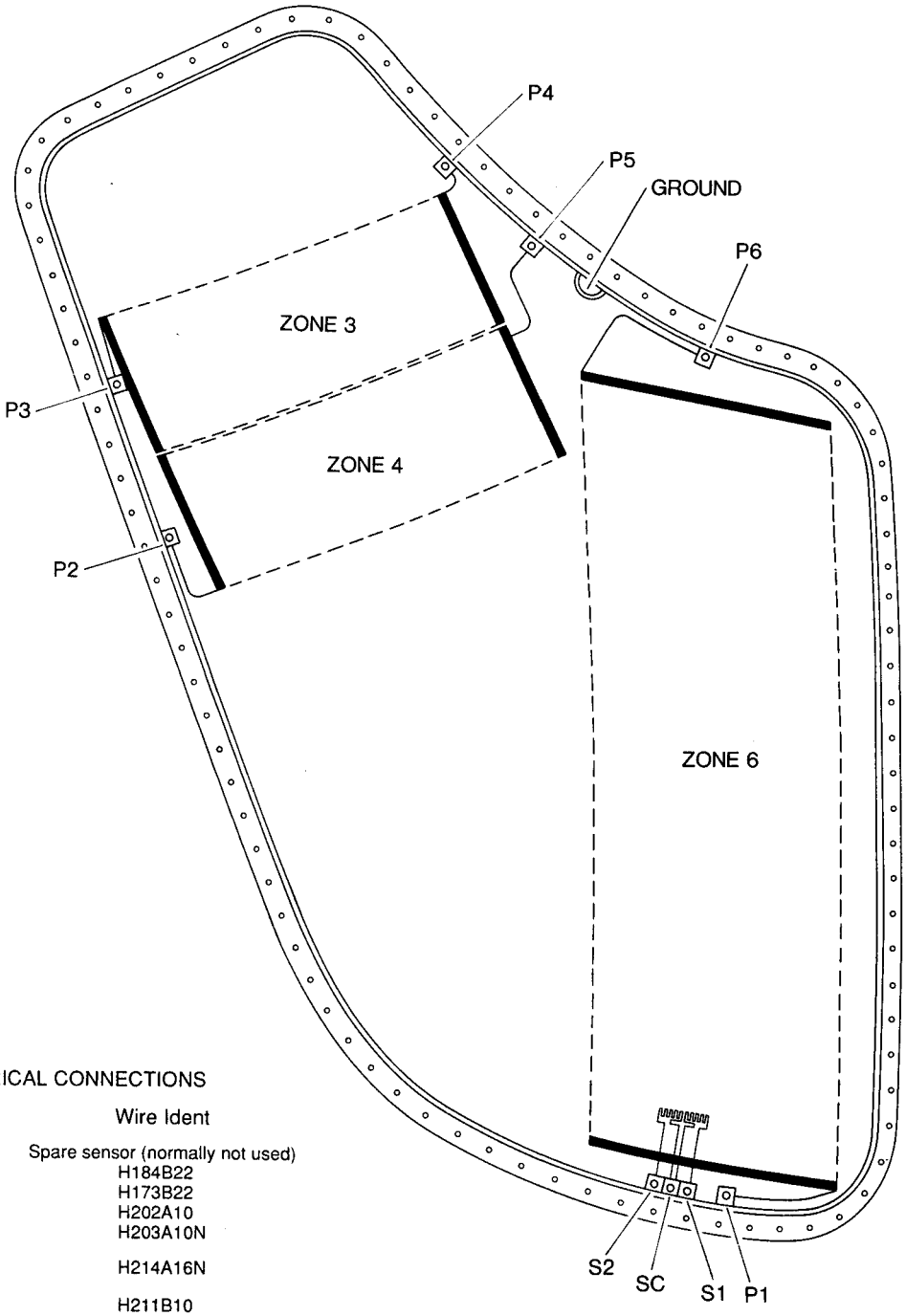
Fig. 201 - Left Windshield Ice Protection - Maintenance Practices



ELECTRICAL CONNECTIONS

Zone	Terminal	Wire Ident
6	S2	Spare sensor (normally not used)
6	SC	H184B22
6	S1	H173B22
6	P1	H202A10
6	P6	H203A10N
	GROUND	H214A16N
4	P5	H211B10
4	P2	H213A10N
3	P4	H206B10
3	P3	H208A10N

MM_304000-202

Fig. 202 - Right Windshield Ice Protection - Maintenance Practices

3. Windshield Heating - Continuity/Resistance Check (Ref. Fig. 201 and 202)

A. Fixtures, Test and Support Equipment

Volt/ohmeter and cables	Not Specified

B. Procedure - Left Windshield

(1) Use a volt/ohmeter to make a resistance check between the left windshield heating zone terminals as follows:

ZONE	TERMINALS	RESISTANCE IN OHMS
1	P1 - P4	0.600 - 0.725
2	P2 - P5	0.600 - 0.725
5	P3 - P6	1.494 - 1.826

NOTE: If any resistance is found to be higher than the limits given, examine the heating zone for broken wires. A maximum of three broken wires are allowed in any zone provided they are not less than 3 in (75 mm) apart.

(2) Use a volt/ohmeter to make a continuity check between the left windshield temperature sensor terminals as follows:

ZONE	TERMINALS
1	SC - S1
1	SC - S2
2	SC - S1
2	SC - S2

NOTE: Each temperature sensor has a paired element to allow for one element failure. If one element is unserviceable the second element can be utilized. Failure of both elements will require replacement of the windshield.

C. Procedure - Right Windshield

(1) Use a volt/ohmeter to make a resistance check between the right windshield heating zone terminals as follows:

ZONE	TERMINALS	RESISTANCE IN OHMS
3	P3 - P4	0.158 - 0.193
4	P2 - P5	0.158 - 0.193
6	P1 - P6	0.927 - 1.133

NOTE: If any resistance is found to be higher than the limits given, examine the heating zone for broken wires. A maximum of three broken wires are allowed in any zone provided they are not less than 3 in (75 mm) apart.

(2) Use a volt/ohmeter to make a continuity check between the right windshield temperature sensor terminals as follows:

ZONE	TERMINALS
6	SC - S1
6	SC - S2

NOTE: Each temperature sensor has a paired element to allow for one element failure. If one element is unserviceable the second element can be utilized. Failure of both elements will require replacement of the windshield.

4. Relays and RCCB's-Functional Test

A. Fixtures, Test and Support Equipment

Ammeter (with cable current consumption pincers)

B. Referenced Information

Maintenance Manual Chapter 24-00-00

C. Procedure

NOTE: For this procedure it is necessary to have two persons - one in flight compartment to make the necessary selections and one to check the power consumption (at the external power unit cable).

(1) Connect the external power (Refer to 24-00-00).
(2) Do the test:

	Action	Result
(a)	Set the BAT switch to BAT.	–
(b)	Place the ammeter around one of the two external power cable.	The ammeter reading should be more than zero.
(c)	Set the PRI WSHLD HTR switch to LOW position.	The ammeter reading is between 44 and 53.5 amps.
(d)	Set the PRI WSHLD HTR switch to OFF position.	The ammeter reading returns to the same value as in step (b).
(e)	Disconnect the temperature sensors of zone "2" (Refer to Fig. 201).	–

	Action	Result
(f)	Set the PRI WSHLD HTR switch to LOW position.	The ammeter reading remains of the same value as in step (b) and on the annunciator panel the L WSHLD ZONE caption comes on.
(g)	Set the PRI WSHLD HTR switch to OFF position and connect the temperature sensors of zone "2" (Refer to Fig. 201).	The ammeter reading remains of the same value as in step (b) and on the annunciator panel the L WSHLD ZONE caption goes off.
(h)	Set the PRI WSHLD HTR switch to HI position.	The ammeter reading is between 37 and 45 amps.
(i)	Set the PRI WSHLD HTR switch to OFF position.	The ammeter reading returns to the same value as in step (b).
(j)	Set the SEC WSHLD HTR switch to LOW position.	The ammeter reading is between 67.5 and 82.5 amps.
(k)	Set the SEC WSHLD HTR switch to OFF position.	The ammeter reading returns to the same value as in step (b).
(l)	Disconnect the temperature sensors of zone "1" and zone "6"(Refer to Fig. 201-202).	–
(m)	Set the SEC WSHLD HTR switch to LO position.	The ammeter reading remains of the same value as in step (b) and on the annunciator panel the R WSHLD ZONE caption comes on.
(n)	Set the SEC WSHLD HTR switch to OFF position and connect the temperature sensors of zone "1" (Refer to Fig. 201).	The ammeter reading remains of the same value as in step (b) and on the annunciator panel the R WSHLD ZONE caption goes off.
(o)	Set the SEC WSHLD HTR switch to LOW position.	The ammeter reading is between 44 and 53.4 amps.
(p)	Set the SEC WSHLD HTR switch to OFF position and connect the temperature sensors of zone "6" (Refer to Fig. 202).	The ammeter reading returns to the same value as in step (b).

	Action	Result
(q)	Set the SEC WSHLD HTR switch to HI position.	The ammeter reading is between 60.5 and 74 Amps.
(r)	Set the SEC WSHLD HTR switch to OFF position.	The ammeter reading returns to the same value as in step (b).

ICE DETECTION - DESCRIPTION AND OPERATION

1. Description

   A. The ice detection system comprises an ice detector, an ICE cautionary annunciator and an ice accretion probe.

   B. The ice detector comprises a detector body, mounted inside the fuselage skin, with a sensing probe and support strut protruding through the skin and into the airflow. The detector has an integral heater to clear the sensing probe and support strut of ice after detection.

   C. The ICE cautionary annunciator gives indication of icing conditions by showing an amber ICE caption against a black background.

   D. The system is supplied with 28V DC from the essential bus bar via circuit breaker CB143 ICE DET.

   E. The system has a test facility operated by the SYS TEST rotary switch on the pilot switch panel.

   F. A visual ice accretion probe, located on the windshield, is provided as a back-up of the ice detector.

2. Operation (Ref. Fig. 1)

   A. The ice detection system is activated when the 28V DC essential bus bar is energized and the ambient temperature is less than 40°C (104°F).
   The sensing probe vibrates at a constant frequency. When ice forms on the sensing probe the frequency of vibration changes.
   At a preset ice thickness of between 0.015 and 0.025 in (0.4 and 0.6 mm) the detector gives an output signal to the master warning annunciator panel and the ICE caption comes on.
   The output signal has a duration of between 3 and 7 seconds after which time the detector resets itself and the ICE caption goes off. At the same time the integral heater de-ices the probe and support strut and the detector is then ready to detect further icing.
   Should the amber light remain always ON (even in clear air), that would indicate a failure of the sensing probe: in this case the ice accretion may be checked observing the visual accretion probe.

3. Location

A. The ice detector is located on the lower forward fuselage, adjacent to the nose landing gear right door, in Zone 122.

B. The ICE cautionary annunciator is located on the master warning annunciator panel in Zone 223.

C. The location of the system circuit breaker is as follows:

Pilot CB panel:
ICE DET.

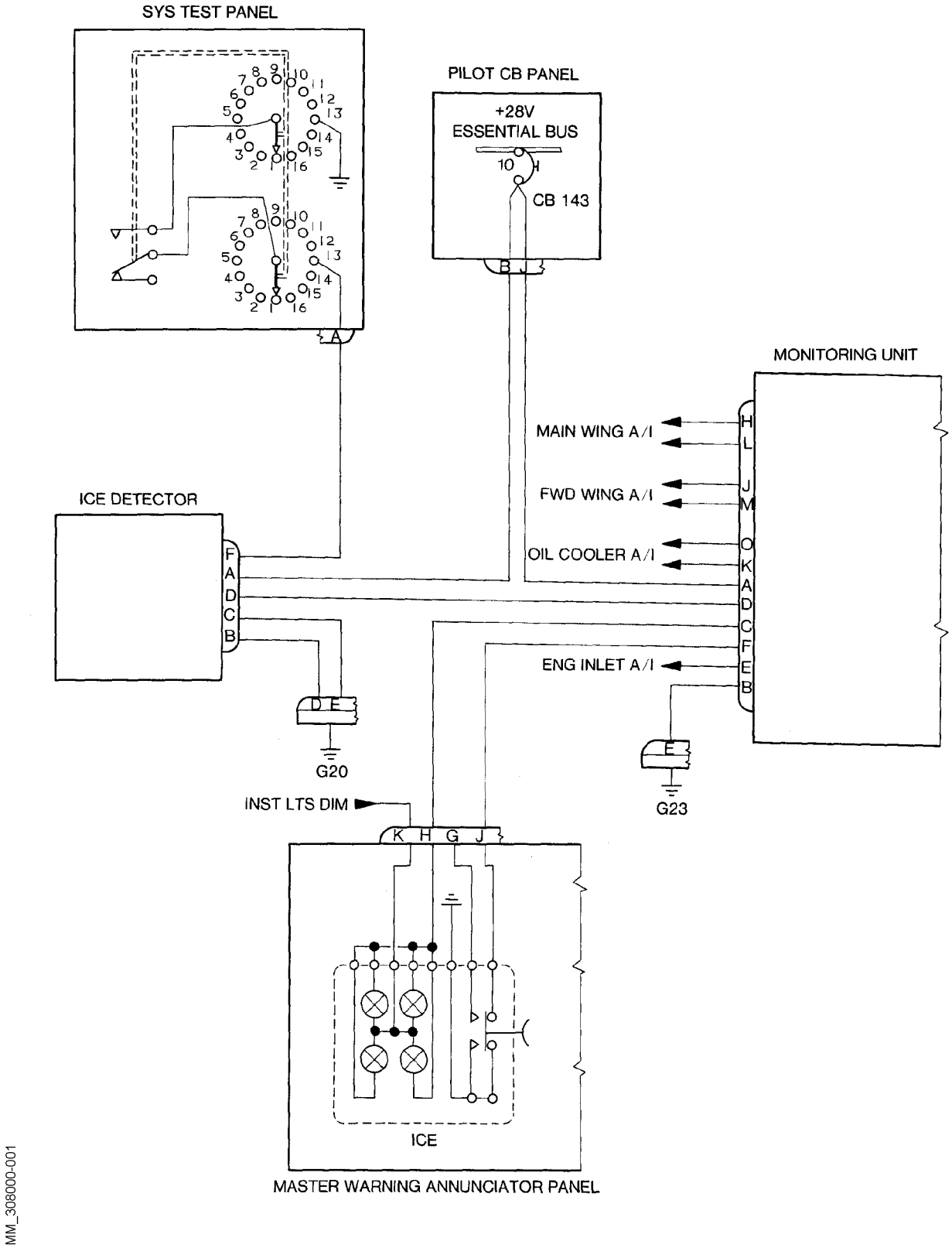


Fig. 1 - Ice Detection - Schematic

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ICE DETECTION - MAINTENANCE PRACTICES

1. General

A. This topic gives the maintenance practices for the Removal/Installation, Adjustment/Test and Inspection/Check of the ice detector.

2. Ice Detector - Removal (Ref. Fig. 201)

A. Materials

Methyl-Ethyl-Ketone (MEK) solvent	02-009

B. Tools

Non-metallic scraper	Not Specified

C. Referenced Information

Maintenance Manual Chapter 34-21-00
Maintenance Manual Chapter 34-22-00
Maintenance Manual Chapter 53-80-00
Maintenance Manual Chapter 20-00-00

D. Procedure

(1) Open, tag and safety the circuit breaker:

Pilot CB panel:
ICE DET.

(2) Remove the radome/nosecone (Refer to 53-80-00).
(3) Remove the secondary vertical gyro (Refer to 34-21-00).
(4) Remove the secondary directional gyro (Refer to 34-22-00).
(5) Remove the access panel from the floor of the avionics compartment.
(6) Disconnect the electrical connector (1) from the ice detector receptacle (2).
(7) Put caps on the connector and receptacle.
(8) Remove the five nuts (6) and bolts (5) attaching the ice detector (3) to the structure.
(9) Remove the ice detector (3).

WARNING: BE CAREFUL WHEN YOU USE THE MEK. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(10) Remove all old sealant from the structure using MEK (02-009) and a non-metallic scraper.

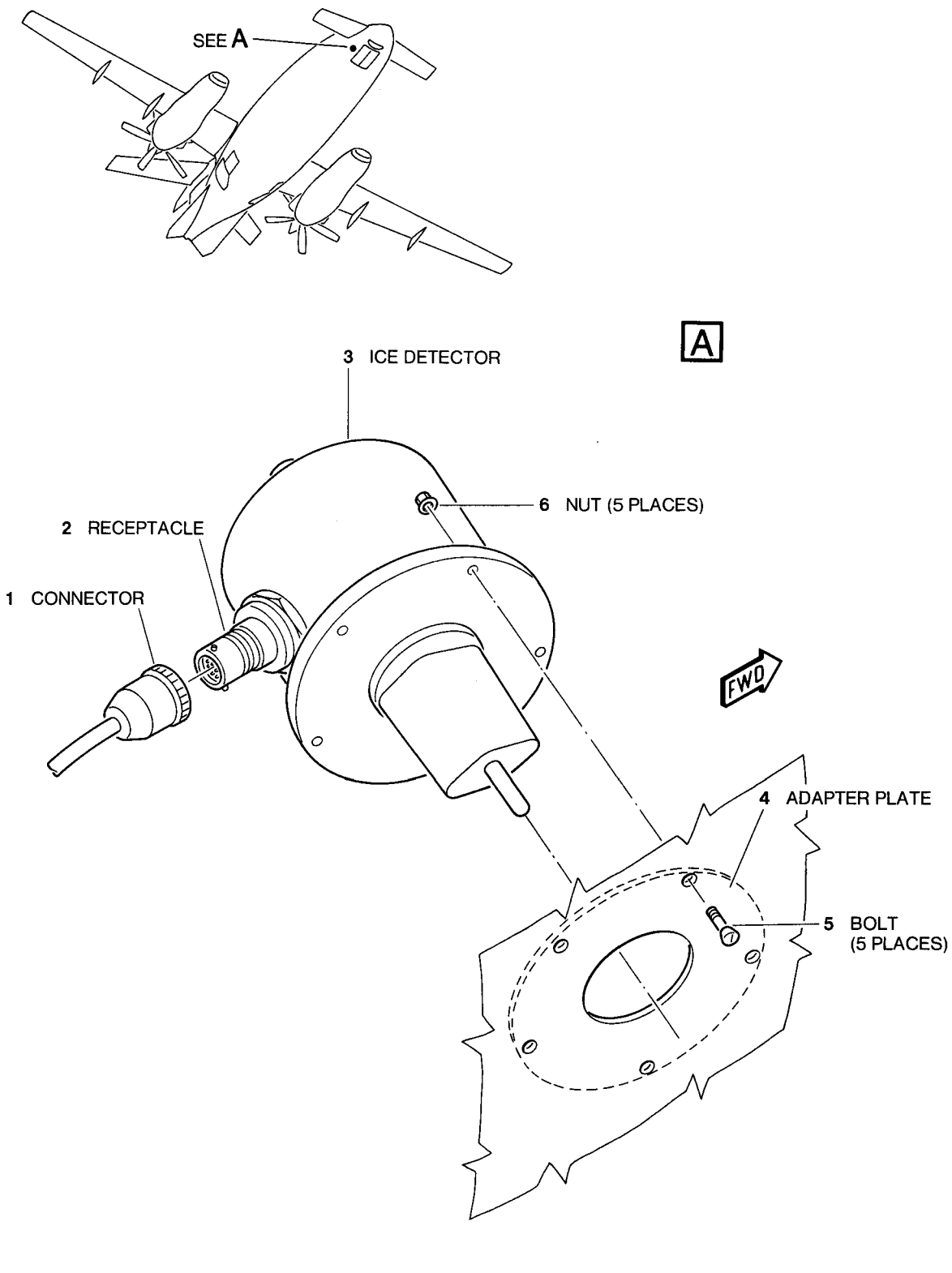

Fig. 201 - Ice Detector - Removal/Installation

3. Ice Detector - Installation (Ref. Fig. 201)

A. Materials

Sealant PR1431G	06-003

B. Referenced Information

Maintenance Manual Chapter 34-21-00
Maintenance Manual Chapter 34-22-00
Maintenance Manual Chapter 51-35-00
Maintenance Manual Chapter 53-80-00

C. Procedure

(1) Make sure, as necessary that:
- The applicable circuit breakers are open, tagged and safetied
- The system is safe
- Access is available

(2) Prepare the surfaces and apply a coat of sealant PR1431G to the adapter plate (4) attached to the structure (Refer to 51-35-00).
(3) Install the ice detector (3) with the five bolts (5) and nuts (6).
(4) Remove any excess sealant that exudes from the interface.
(5) Remove the caps and connect the connector (1) to the receptacle (2).
(6) Remove the safety tag and close the circuit breaker:

Pilot CB panel:
ICE DET.

(7) Do a functional test of the ice detector (Refer to Para. 5).
(8) Install the access panel to the floor of the avionics compartment.
(9) Install the secondary directional gyro (Refer to 34-22-00).
(10) Install the secondary vertical gyro (Refer to 34-21-00).
(11) Remove all tools and equipment from the work area. Make sure that the area is clean.
(12) Install the radome/nosecone (Refer to 53-80-00).

4. Ice Detector - Operational Test

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Make sure the electrical power is available (Refer to 24-00-00).

(2) Do the test:

Action	Result
(a) On the SYS TEST panel in the flight compartment, set the rotaryswitch to ICE DET.	
(b) Push in and release the momentary hold test button in the center of the test switch.	The ICE cautionary annunciator on the LH instrument panel comes on for between 3 to 7 seconds, then it flashes and it may be reset OFF by pressing the button.

(3) Remove the electrical power (Refer to 24-00-00).

5. Ice Detector - Functional Test

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Make sure the electrical power is available (Refer to 24-00-00).
(2) Position a person in the flight compartment to monitor the ICE cautionary annunciator on the LH instrument panel.
(3) On the pilot's switch panel, make sure the BOOTS DE-ICE switch is set to OFF.
(4) Do the test:

Action	Result
WARNING: WHEN YOU SQUEEZE THE PROBE RELEASE IT IMMEDIATELY AFTER THE HEATER OPERATES TO AVOID BURNING YOUR FINGERS.	
(a) Set the BAT switch to BAT.	
(b) Squeeze the ice detector probe between finger and thumb.	The ICE cautionary annunciator comes on for between 3 and 7 seconds and then goes off. The ice detector probe and support strut get hot.
(c) Release the ice detector probe.	The ice detector probe and support strut go cold.

(5) Remove the electrical power (Refer to 24-00-00).

6. Ice Detector - Inspection

A. Fixture, Test and Support Equipment

Strong light source	Not Specified
Mirror	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-81-00

C. Procedure

(1) Disconnect the nose landing gear right door (Refer to 52-81-00).
(2) Examine the ice detector probe and support strut (airplane exterior skin) for the following:
- Damage and deformation
- Cracks and corrosion
- Cleanliness.

(3) Use a strong light source and mirror to examine the body of the ice detector (access through lightening hole in nose landing gear bay) for the following:
- Security of attachment to the structure
- Damage, cracks and corrosion
- Correct attachment of the electrical connector.

(4) Examine the electrical wires for the following:
- Chafing
- Discoloration and signs of burning
- Correct installation away from moving parts.

(5) If necessary, repair or replace any defective parts.
(6) Connect the nose landing gear right door (Refer to 52-81-00).

7. Ice Accretion Probe - Removal (Ref. Fig. 201)

A. Procedure

(1) Remove the screws (1).
(2) Remove the ice accretion probe (2).

8. Ice Accretion Probe - Installation (Ref. Fig. 202)

A. Materials

Methyl-Ethyl-Ketone (MEK) solvent	02-009
Lint-Free Cloth	04-013
Sealant	TBD

B. Tools

Non-metallic scraper	Not Specified
Sharp knife	Not Specified

C. Referenced Information

Maintenance Manual Chapter 20-00-00

D. Procedure

WARNING: BE CAREFUL WHEN YOU USE THE MEK. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTER 20-00-00.

(1) Remove old sealant from the windshield retainer (3) using MEK solvent and a non-metallic scraper.
(2) Clean the portion of the surface of the windshield retainer (3) and the lower surface of the ice accretion probe flange (4) using MEK solvent and a lint-free cloth.
(3) Apply a thin coat of sealant to the portion of the windshield retainer (3).
(4) Position the ice accretion probe flange (4) on the windshield retainer (3).
(5) Secure the probe (2) on the windshield retainer (3) with the screws (1).
(6) Remove the sealant in excess from the windshield retainer (3) and around the flange (4) using a sharp knife.

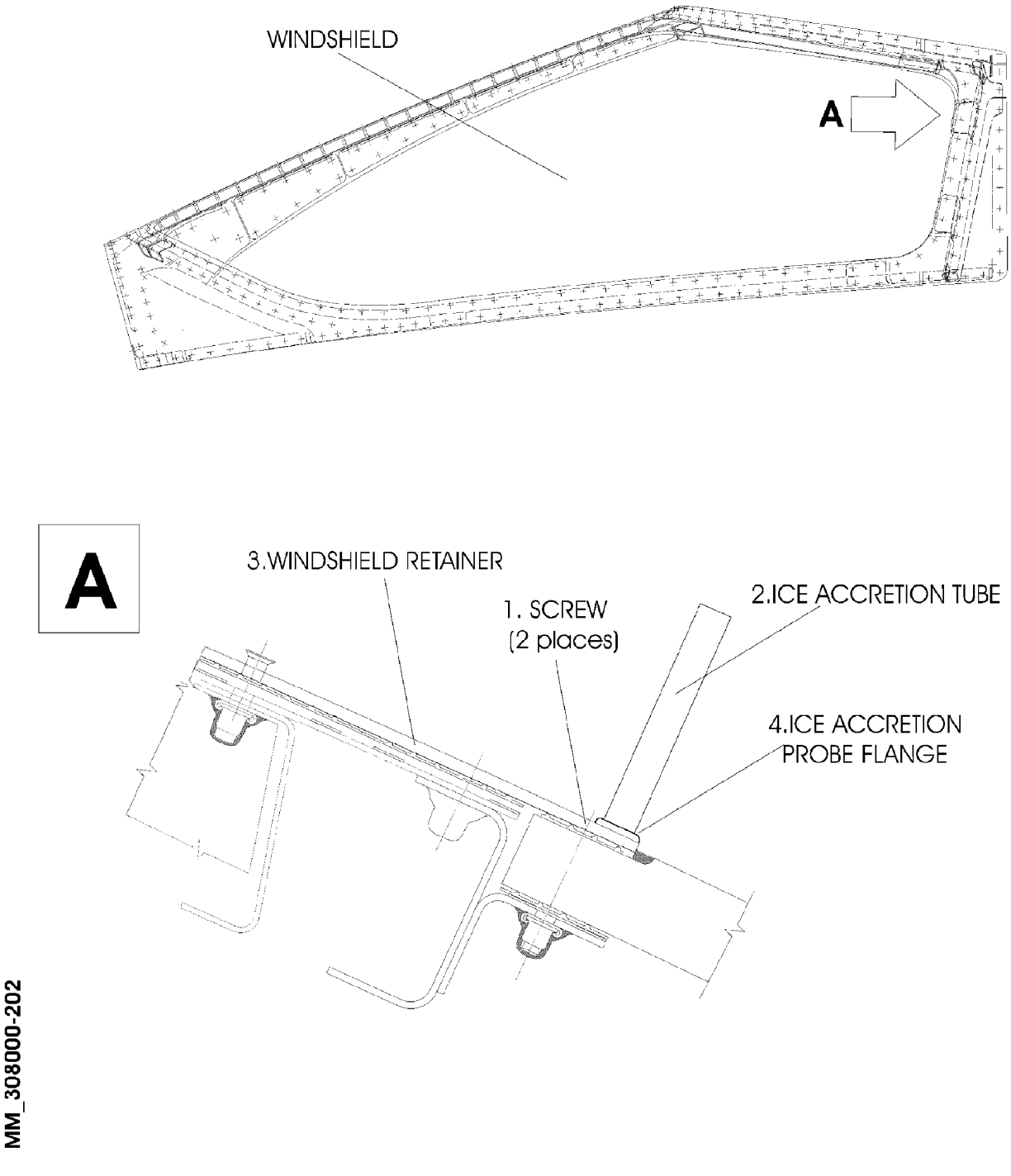

Fig. 202 - Ice Accretion Probe - Removal/Installation

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