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Removal/Installation		401	[*]
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THERMOSTATS - HEATER TAPE	30-71-02		
Removal/Installation		401	ALL
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CHAPTER 30 - ICE AND RAIN PROTECTION

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ICE AND RAIN PROTECTION – DESCRIPTION AND OPERATION

1. Ice Protection

A. General

- (1) The anti-icing system makes sure the airplane systems operate correctly when ice occurs. The anti-icing system includes five or six subsystems: wing thermal anti-icing, engine inlet thermal anti-icing, probe anti-icing, flight compartment window anti-icing, water and drain line heaters.
 - (a) SAS 150-154 POST-SB 30-17;
SAS 050-149, 155-274;
An ice detection system is also installed.
- (2) The use of the thermal anti-ice system for the wing or the engine cowl will change the engine pressure ratio (EPR) as it is displayed on EICAS. The two EPR values will decrease if the left or the right engine air is used by the anti-ice system (AMM 77-12-00/001).

B. Component Details

- (1) Wing Thermal Anti-Icing (AMM 30-11-00)
 - (a) The wing thermal anti-icing (TAI) system uses engine bleed air to prevent ice on the leading edge slats. The system components include the wing TAI valves, wing temperature switches (not on all airplanes), wing pressure switches, telescoping ducts, flexible couplings, spray tubes, wing and engine anti-ice control panel, and test panel.
- (2) Engine Inlet Thermal Anti-Icing (AMM 30-21-00)
 - (a) The engine inlet TAI system uses engine bleed air to prevent ice on the engine inlets. The system components include the engine inlet TAI valves, engine inlet TAI pressure switches, engine inlet TAI ducts, and wing and engine anti-ice control panel.
- (3) Probe Anti-Icing
 - (a) Pitot-Static Probe Anti-Icing (AMM 30-31-00)
 - 1) Electrical heat is supplied to the pitot-static probes to prevent incorrect indications caused by ice. The system components are the pitot-static probes, test panel, and auxiliary annunciator panel.
 - (b) Angle of Attack Probe Anti-Icing (AMM 30-32-00)
 - 1) Electrical heat is supplied to the angle of attack (AOA) probes to prevent incorrect indications caused by ice. The system components are the angle of attack probes, test panel, and auxiliary annunciator panel.

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- (c) Total Air Temperature Probe Anti-Icing (AMM 30-33-00)
 - 1) Electrical heat is supplied to the total air temperature (TAT) probe to prevent incorrect indications caused by ice. The system components are the total air temperature probe, test panel, and auxiliary annunciator panel.
- (d) Engine Probe Anti-Icing (AMM 30-34-00)
 - 1) Electrical heat is supplied to the engine probes to prevent incorrect indications caused by ice formation. System components are the engine probes, and the probe heat test switch located on the Miscellaneous Test panel at the (P-61)panel.
- (4) Flight Compartment Window Anti-Icing (AMM 30-41-00)
 - (a) Control units with built-in-test (BIT) function remove ice from the flight compartment windows. The system components are the window heat control units, window heat control panel, and test panel.
- (5) Entry/Service Door Viewport Heaters (AMM 30-46-00)
 - (a) Wire-grid type heaters are bonded to the inner surface of the entry/service door viewport prisms. The system components are the heaters and a circuit breaker.
- (6) Water and Drain Line Heaters (AMM 30-71-00)
 - (a) Heat prevents ice on the water and drain lines. The heat system components include the heater tapes, thermostats, heating gaskets, drain mast heaters, potable water tank heater blankets, and heater blanket controller.
- (7) Ice Detection System (AMM 30-81-00)
- (8) AIRPLANES WITH PRIMARY ICE DETECTION;
The Primary Ice Detection system lets the flight crew know about ice on the engines and wings and can automatically start the anti-ice systems. Components of the ice detection system include two ice detectors, the wing and engine anti-ice control panel.

2. Rain Protection

A. General

- (1) The rain protection system helps the pilots see better during rain or snow. The rain protection system includes the windshield wiper system and the rain repellent system.

B. Component Details

- (1) Windshield Wiper System (AMM 30-42-00)
 - (a) Electrically operated windshield wipers help the pilots see better during rain and snow. The components of the windshield wiper system include the windshield wiper motors, windshield wiper arms, windshield wiper blades, and windshield wiper control panel. On some airplane there are rain repellent push button controls on the windshield wiper control panel.

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- (2) Rain Repellent System (AMM 30-43-00/201)
- (a) Rain repellent fluid helps the windshield wipers keep rain and snow off of the windshield. The rain repellent system includes the rain repellent bottle, rain repellent valves, spray nozzles, accumulator, and windshield wiper/rain repellent control panel.

NOTE: The rain repellent system is deactivated on some airplanes. These airplanes can have a hydrophobic coating that is applied to the No. 1 flight compartment windows.

- (3) AIRPLANES WITH HYDROPHOBIC COATING ON THE WINDSHIELD;
The rain repellent system consists of a hydrophobic coating applied to the number 1 window. No pilot actions are necessary to operate the system.

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ICE AND RAIN PROTECTION – DDG MAINTENANCE PROCEDURES

1. General

- A. This procedure has the maintenance tasks that prepare the airplane for flight with certain systems/components deactivated.
- B. It also has the tasks that put the airplane back to its usual condition.
- C. These are the tasks for the components in ice and rain protection:
 - (1) DDG 30-11-1 Preparation – Wing Anti-Ice Valves Inoperative
 - (2) DDG 30-11-1 Restoration – Wing Anti-Ice Valves Inoperative
 - (3) DDG 30-21-1 Preparation – Engine Anti-Ice Valve Inoperative
 - (4) DDG 30-21-1 Restoration – Engine Anti-Ice Valve Inoperative
 - (5) DDG 30-21-2 Preparation – Engine Anti-Ice VALVE Lights Inoperative
 - (6) DDG 30-21-2 Restoration – Engine Anti-Ice VALVE Lights Inoperative
 - (7) DDG 30-21-3 Preparation – Engine Cowl Overheat Indication (RR Engines) Inoperative
 - (8) DDG 30-21-3 Restoration – Engine Cowl Overheat Indication (RR Engines) Inoperative
 - (9) DDG 30-31-2 Preparation – Probe Heat Lights Inoperative
 - (10) DDG 30-31-2 Restoration – Probe Heat Lights Inoperative
 - (11) DDG 30-31-3 Preparation – ENG EEC PROBE Light (P&W Engines) Inoperative
 - (12) DDG 30-31-3 Restoration – ENG EEC PROBE Light (P&W Engines) Inoperative
 - (13) DDG 30-41-1 Preparation – Flight Deck Window Heater Systems Inoperative
 - (14) DDG 30-41-1 Restoration – Flight Deck Window Heater Systems Inoperative
 - (15) DDG 30-41-2 Preparation – Window Heat INOP Lights Inoperative
 - (16) DDG 30-41-2 Restoration – Window Heat INOP Lights Inoperative
 - (17) DDG 30-71-1 Preparation – Drain Mast Heaters Inoperative
 - (18) DDG 30-71-1 Restoration – Drain Mast Heaters Inoperative
 - (19) DDG 30-72-1 Preparation – Waste System Heaters
 - (20) DDG 30-72-1 Restoration – Waste System Heaters

TASK 30-00-00-049-022

2. DDG 30-11-1 Preparation – Wing Anti-Ice Valves Inoperative (Fig. 901)

- A. General
 - (1) This task gives the maintenance steps which prepare the airplane for flight with the wing anti-ice valve(s) inoperative.
- B. Access
 - (1) Location Zones
 - 511 Leading Edge to Front Spar (Left)
 - 611 Leading Edge to Front Spar (Right)

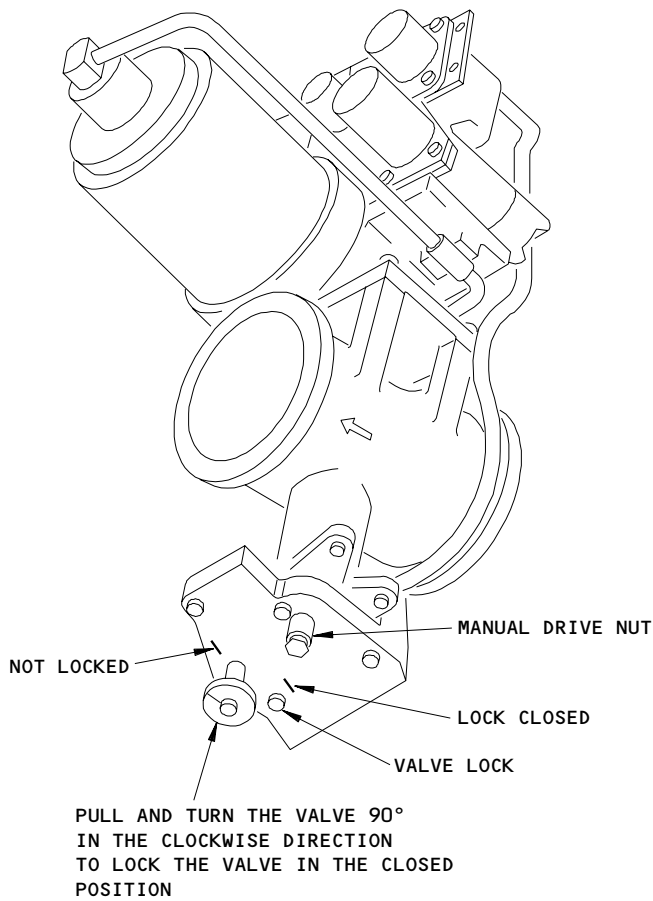
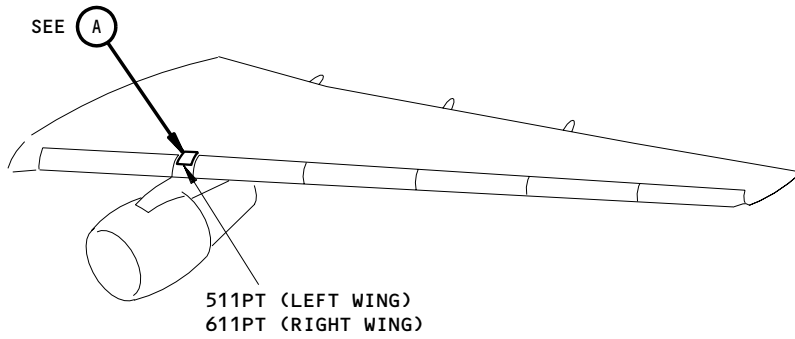
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(A)

Wing Anti-Ice Valve
Figure 901

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- (2) Access Panels
 - 511 PT Fixed Wing Upper Panel (Left)
 - 611 PT Fixed Wing Upper Panel (Right)

C. Wing Anti-Ice Valve Deactivation

S 869-002

- (1) Make sure the WING ANTI-ICE switch, on the Pilot's overhead panel, P5, is in the OFF position.

S 019-003

- (2) Get access to the applicable wing anti-ice valve through one of the fixed wing upper panels:
 - (a) 511PT (left wing)
 - (b) 611PT (right wing)

S 869-004

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (3) If the wing anti-ice valve is not closed, use a 7/16 inch hex drive to close the valve manually.
 - (a) Turn the valve counterclockwise to close the valve.

S 049-027

- (4) Pull and turn the valve lock 90-degrees clockwise to lock the valve closed.

NOTE: There is a button on the valve housing which lets you manually operate the valve.

The valve can be locked only in the fully closed position.

S 419-023

- (5) Install the applicable fixed wing upper panel(s):
 - (a) 511PT (left wing)
 - (b) 611PT (right wing)

S 049-024

- (6) Put an 'INOP' placard on the WING ANTI-ICE switch, on the P5 panel.

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TASK 30-00-00-449-021

3. DDG 30-11-1 Restoration - Wing Anti-Ice Valves Inoperative (Fig. 901)

A. General

- (1) This task puts the airplane back to its usual condition after operation with the wing anti-ice valves inoperative.

B. Access

(1) Location Zones

211, 212	Control Cabin
511	Leading Edge to Front Spar (Left)
611	Leading Edge to Front Spar (Right)

(2) Access Panels

511 PT	Fixed Wing Upper Panel (Left)
611 PT	Fixed Wing Upper Panel (Right)

C. Wing Anti-Ice Valve Reactivation

S 869-020

- (1) Make sure the WING ANTI-ICE switch, on the Pilot's overhead panel, P5, is in the OFF position.

S 019-025

- (2) Get access to the applicable wing anti-ice valve through one of the fixed wing upper panels:
 - (a) 511PT (left wing)
 - (b) 611PT (right wing)

S 449-026

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (3) Pull and turn the valve lock 90-degrees counter-clockwise to unlock the valve.

NOTE: There is a button on the valve housing which lets you manually operate the valve.

D. Put the Airplane in its Usual Condition

S 819-028

- (1) Do the fault isolation for the Wing Anti-Ice System (FIM 30-11-00/101).

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- S 449-029
- (2) Remove the 'INOP' placard from the Wing Anti-Ice switch on the P5 panel.

- S 419-030
- (3) Install the applicable fixed wing upper panel(s):
 - (a) 511PT (left wing)
 - (b) 611PT (right wing)

TASK 30-00-00-049-031

4. DDG 30-21-1 Preparation - Engine Anti-Ice Valve Inoperative
(Fig. 902, 902A, 902B, 902C)

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with an engine anti-ice valve inoperative.

B. References

- (1) AMM 27-81-00/201, Leading Edge Slat System
(Airplanes with General Electric or Pratt and Whitney engines)
- (2) AMM 36-00-00/201, Air Supply (Pressurize/Depressurize)
- (3) AMM 36-00-00/901, Pneumatic System
(Airplanes with Pratt and Whitney JT9D series engines)
- (4) AMM 71-11-04/201, Fan Cowl Panels
(Airplanes with Pratt and Whitney JT9D series engine)
- (5) AMM 71-11-06/201, Core Cowl Panels
- (6) AMM 78-31-00/201, Thrust Reverser System
(Airplanes with General Electric or Pratt and Whitney engines)

C. Access

- (1) Location Zone

211, 212	Control Cabin
410	No. 1 Engine
420	No. 2 Engine

D. Prepare for Engine Anti-Ice Valve Deactivation

- S 869-032
- (1) Open the applicable engine anti-ice system circuit breakers on the P11 panel and install DO-NOT-CLOSE tags.

- S 869-033
- (2) Make sure the pneumatic system is not pressurized (AMM 36-00-00/201).

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E. AIRPLANES WITH GENERAL ELECTRIC OR PRATT AND WHITNEY ENGINES

Do these steps:

S 869-143

- (1) Retract the leading edge slats to give you access to the TAI valve.

S 869-139

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. ACCIDENTAL SLAT MOVEMENT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Do the leading edge slat deactivation procedure (AMM 27-81-00/201).

S 869-140

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER ISOLATION VALVE. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (3) Do the deactivation procedure for the thrust reverser isolation valve for ground maintenance (AMM 78-31-00/201).

F. ROLLS ROYCE ENGINES;

Engine Anti-Ice Valve Deactivation (Fig. 902)

S 019-035

- (1) Remove the applicable valve access panel on the right side of the nose cowl:
 - (a) 412CR (Engine No. 1)
 - (b) 422CR (Engine No. 2)

S 049-036

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (2) Disconnect, cap and stow the electrical connector to the valve.

NOTE: The valve will be held closed by pneumatic power when the electrical actuator for the valve is disabled.

S 419-037

- (3) Install the applicable valve access panel on the right side of the nose cowl:
 - (a) 412CR (Engine No. 1)
 - (b) 422CR (Engine No. 2)

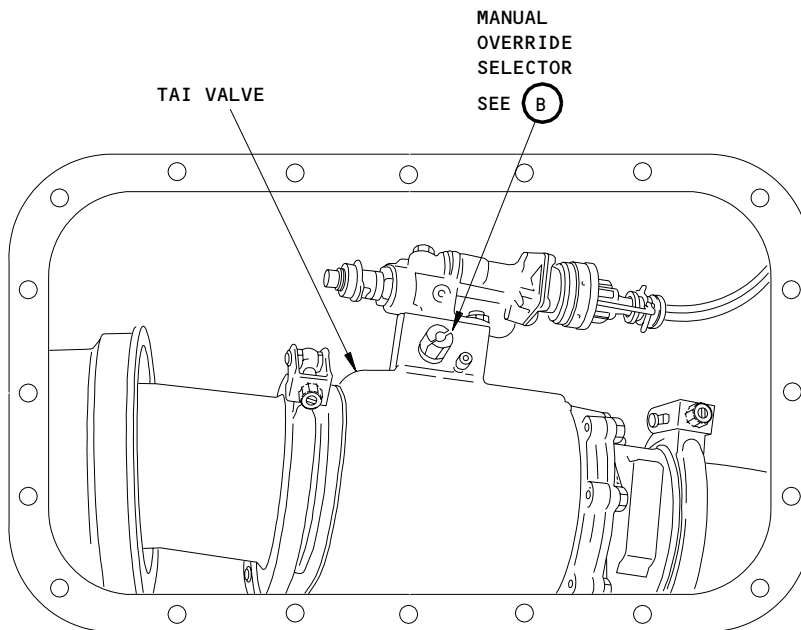
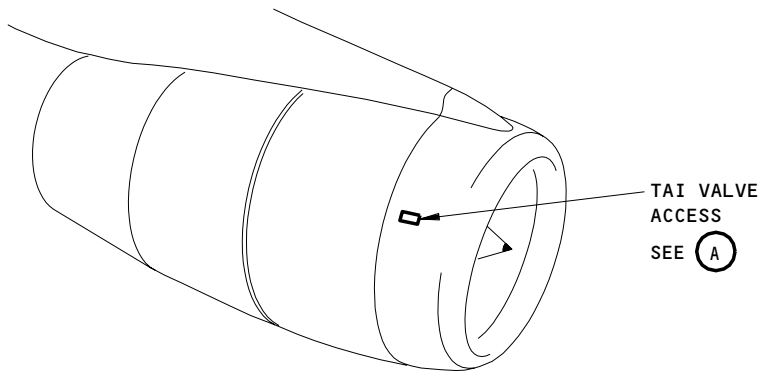
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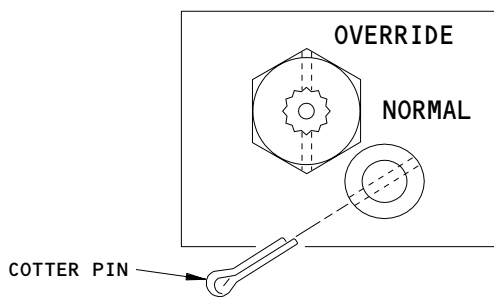
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TAI VALVE ACCESS PANEL

(A)



OVERRIDE POSITION

(B)

Engine Inlet Thermal Anti-Ice Valve
Figure 902

EFFECTIVITY
ROLLS ROYCE ENGINES

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S 869-038

- (4) Remove the DO-NOT-CLOSE tags and close the applicable engine anti-ice system circuit breakers on the P11 panel.

S 049-039

- (5) Put an 'INOP' placard on the ENGINE ANTI-ICE switch, on the P5 panel.

G. PRATT AND WITNEY AND GENERAL ELECTRIC ENGINES
Engine Anti-Ice Valve Deactivation (Fig. 902A)

S 049-040

- (1) Do these steps to deactivate the valve in the closed position:
 - (a) Open these access panels to get access to the engine inlet thermal anti-ice valve on the applicable engine strut:
 - 1) For the left engine, open access panels 434AL and 434AR.
 - 2) For the right engine, open access panels 444AL and 444AR.

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (b) Disconnect the electrical connector for the engine anti-ice valve.
 - 1) Cap and stow the electrical connector in a safe location.
- (c) Use a 7/16 inch hex drive, to manually turn the vane counterclockwise until the vane position indicator is in the closed position.
- (d) Pull and turn the valve locking mechanism 90-degrees clockwise to lock the valve in the closed position.
- (e) Close the access panels for the applicable engine strut.
- (f) Make sure the applicable ANTI-ICE ENGINE L or R switchlight on the Pilot's overhead panel, P5, is not on.
- (g) Put the placard 'COWL VALVE INOP - CLOSED' on the applicable ANTI-ICE ENGINE switch, on the P5 panel.

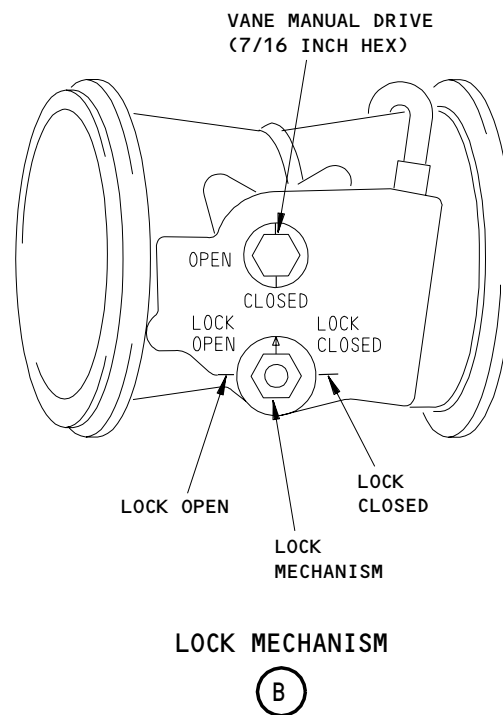
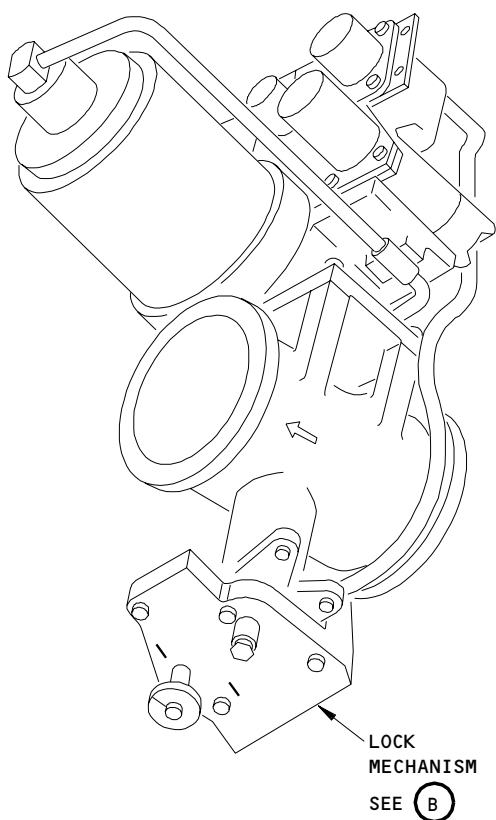
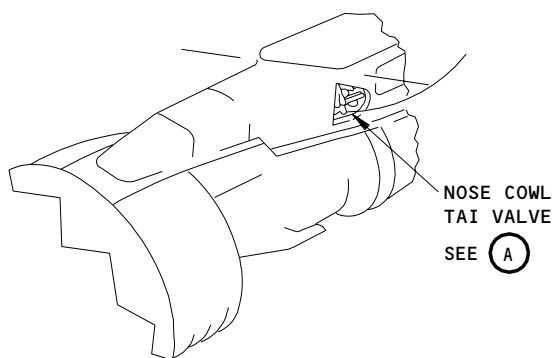
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Engine Inlet Thermal Anti-Ice Valve
Figure 902A

EFFECTIVITY
GENERAL ELECTRIC AND PRATT WHITNEY
ENGINES

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S 049-147

- (2) Do these steps to deactivate the valve in the open position:
- (a) Open these access panels to get access to the engine inlet thermal anti-ice valve on the applicable engine strut:
 - 1) For the left engine, open access panels 434AL and 434AR.
 - 2) For the right engine, open access panels 444AL and 444AR.

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (b) Disconnect the electrical connector for the engine anti-ice valve.
 - 1) Cap and stow the electrical connector in a safe location.
- (c) Use a 7/16 inch hex drive, to manually turn the vane clockwise until the vane position indicator is in the open position.
- (d) Pull and turn the valve locking mechanism 90-degrees to lock the valve in the open position.
- (e) Close the access panels for the applicable engine strut.
- (f) Make sure the applicable ANTI-ICE ENGINE L or R switchlight on the Pilot's overhead panel, P5, is not on.
- (g) Put the placard 'COWL VALVE INOP - OPEN' on the applicable ANTI-ICE ENGINE switch, on the P5 panel.

S 049-041

- (3) P&W JT9D SERIES ENGINES ONLY;
- Do these steps to deactivate the valve in the open position:
- (a) Use a 7/16 inch hex drive to manually turn the vane clockwise until the vane position indicator is in the open position.
 - (b) Pull and turn the valve locking mechanism 90-degrees counterclockwise to lock the valve in the open position.
 - (c) Lock the Fan Air Modulation Valve in the intermediate position (Fig. 902B):
 - 1) Open the right fan cowl panel (AMM 71-11-04/201).
 - 2) Open the right core cowl panel (AMM 71-11-06/201).

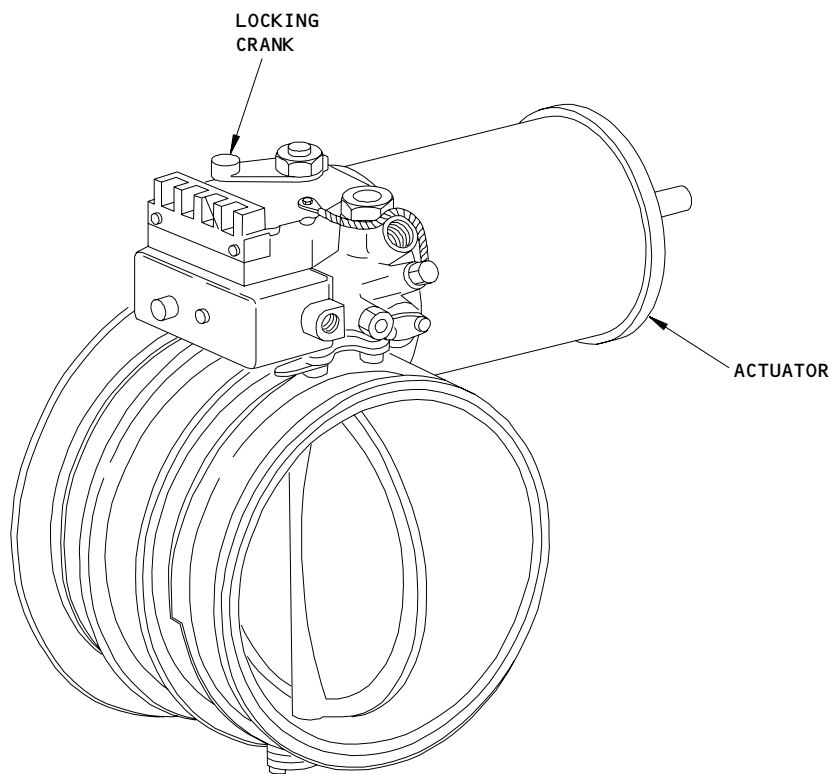
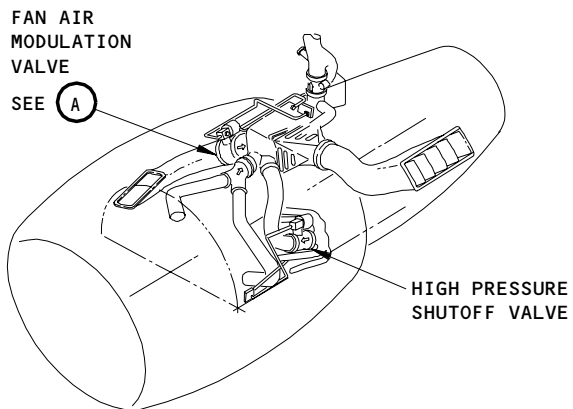
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FAN AIR MODULATION VALVE

(A)

Fan Air Modulation Valve
Figure 902B

EFFECTIVITY
P&W JT9D SERIES ENGINES

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WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- 3) Open the right thrust reverser (AMM 78-31-00/201).
 - 4) Remove the lockpin which is located in the valve actuator cap.
 - 5) Use a wrench to manually put the actuator to the intermediate position (the intermediate position is between the OPEN and the CLOSED positions).
 - 6) Turn the lockpin in the butterfly shaft linkage to lock the valve in the intermediate position.
- (d) Lock the high stage bled valve (HPSOV) in the closed position with the task given for DDG 36-11-2 (AMM 36-00-00/901).
- (e) Close the access panels.
- (f) Put the placard 'HI STAGE BLD VLV CLOSED' on the L or R ENG switch.
- (g) Put the placard 'COWL VALVE INOP - OPEN' on the applicable ANTI-ICE ENGINE switch, on the P5 panel.

H. P&W JT9D SERIES ENGINES;

Engine Anti-Ice Stator Vane Valve Deactivation (Fig. 902C)

S 049-042

- (1) Do these steps to deactivate the Stator Vane Valve:
- (a) Do these steps to get access to the stator vane anti-ice valve:
- 1) Open the left fan cowl panel (AMM 71-11-04/201).
 - 2) Open the left core cowl panel (AMM 71-11-06/201).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- 3) Open the left thrust reverser (AMM 78-31-00/201).
- 4) Disconnect the electrical connector.
 - a) Install covers on the connectors and put the electrical connector in a safe location.
- 5) Do a visual inspection of the valve position (a small red flag show the valve is in the closed position).
 - a) If the valve is not closed, tell dispatch.

NOTE: If the valve is not closed, there will be performance penalties.

- 6) Close the access panels on the engine.
- 7) Make sure the applicable ANTI-ICE ENGINE L or R switchlights, on the Pilot's overhead panel, P5, is not on.
- 8) Put the placard 'VANE VALVE INOP - CLOSED (or OPEN)' on the applicable ANTI-ICE ENGINE SWITCH.

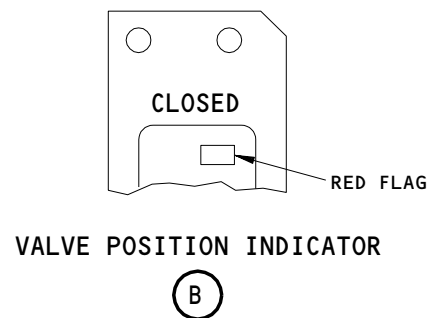
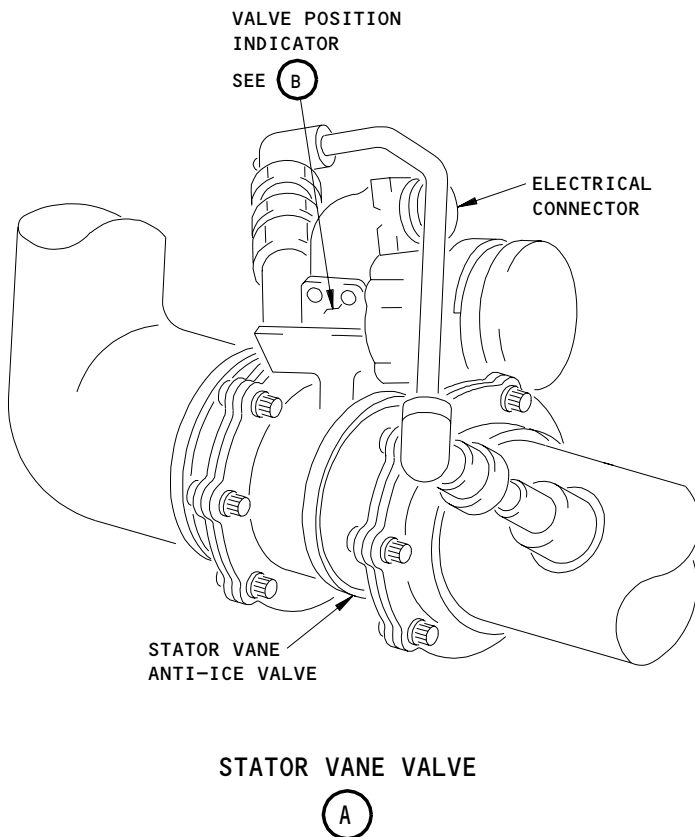
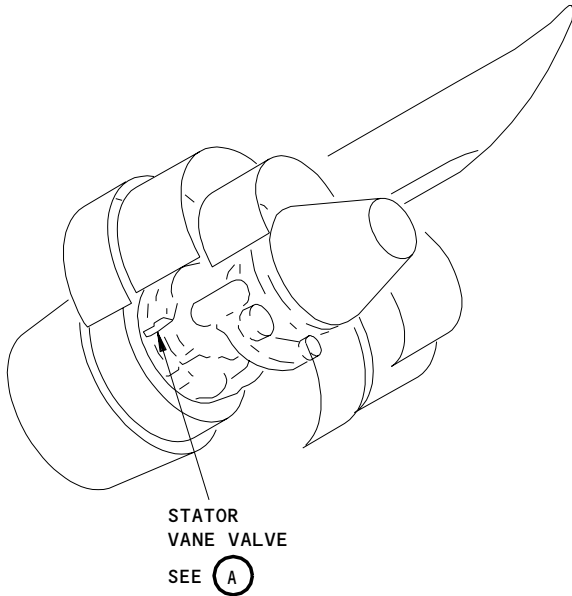
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Stator Vane Valve
Figure 902C

EFFECTIVITY
P&W JT9D SERIES ENGINES

30-00-00

I. Put the Airplane in its Usual Condition

S 869-043

- (1) AIRPLANES WITH GENERAL ELECTRIC OR PRATT AND WHITNEY ENGINES;
Do these steps:
- (a) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).
 - (b) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 869-044

- (2) Remove the DO-NOT-CLOSE tags and close the applicable engine anti-ice system circuit breakers on the P11 panel.

TASK 30-00-00-449-045

5. DDG 30-21-1 Restoration - Engine Anti-Ice Valve Inoperative
(Fig. 902, 902A, 902B, 902C)

A. General

- (1) This task puts the airplane back to its usual condition after operation with the engine anti-ice valves inoperative.

B. References

- (1) AMM 36-00-00/201, Air Supply (Pressurize/Depressurize)
- (2) AMM 36-00-00/901, Pneumatic System (Airplanes with Pratt and Whitney JT9D series engines)
- (3) AMM 71-11-04/201, Fan Cowl Panels (Airplanes with Pratt and Whitney JT9D series engines)
- (4) AMM 71-11-06/201, Core Cowl Panels (Airplanes with Pratt and Whitney JT9D series engines)
- (5) AMM 78-31-00/201, Thrust Reverser System (Airplanes with General Electric or Pratt and Whitney engines)
- (6) FIM 30-21-00/101, Engine Anti-Ice System
- (7) FIM 75-11-00/101, Stator Vane Anti-Ice System (Airplanes with Pratt and Whitney JT9D series engines)

C. Access

- (1) Location Zone
- | | |
|----------|---------------|
| 211, 212 | Control Cabin |
| 410 | No. 1 Engine |
| 420 | No. 2 Engine |

D. Prepare for Engine Anti-Ice Valve Activation

S 869-102

- (1) Open the applicable engine anti-ice system circuit breakers on the P11 panel and install DO-NOT-CLOSE tags.

S 869-103

- (2) Make sure the pneumatic system is not pressurized (AMM 36-00-00/201).

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S 869-104

- (3) AIRPLANES WITH GENERAL ELECTRIC OR PRATT AND WHITNEY ENGINES;
Do these steps:
(a) Retract the leading edge slats to give you access to the TAI valve.

S 869-141

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. ACCIDENTAL SLAT MOVEMENT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (4) Do the leading edge slat deactivation procedure (AMM 27-81-00/201).

S 869-142

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER ISOLATION VALVE. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (5) Do the deactivation procedure for the thrust reverser isolation valve for ground maintenance (AMM 78-31-00/201).

E. ROLLS ROYCE ENGINES;

Engine Anti-Ice Valve Activation (Fig. 902)

S 019-105

- (1) Remove the applicable valve access panel on the right side of the nose cowl:
(a) 412CR (Engine No. 1)
(b) 422CR (Engine No. 2)

S 449-106

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (2) Connect the electrical connector to the valve.

S 869-107

- (3) Remove the DO-NOT-CLOSE tags and close the applicable engine anti-ice system circuit breakers on the P11 panel.

S 819-122

- (4) Do the fault isolation for the Engine Anti-Ice System (FIM 30-21-00/101).

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S 419-123

- (5) Install the applicable valve access panel on the right side of the nose cowl.

S 449-124

- (6) Remove the 'INOP' placard from the ENGINE ANTI-ICE switch, on the P5 panel.

F. PRATT AND WHITNEY AND GENERAL ELECTRIC ENGINES;
Engine Anti-Ice Valve Activation (Fig. 902A)

S 449-108

- (1) Do these steps to activate the valve:
 - (a) Open these access panels to get access to the engine inlet thermal anti-ice valve on the applicable engine strut:
 - 1) For the left engine, open access panels 434AL and 434AR.
 - 2) For the right engine, open access panels 444AL and 444AR.

WARNING: BE CAREFUL WHEN YOU TOUCH THE TAI VALVE. THE TAI VALVE CAN BE HOT, YOU MUST LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT. IF YOU DO NOT LET THE VALVE BECOME COOL BEFORE YOU TOUCH IT, IT CAN CAUSE INJURIES TO PERSONS.

- (b) Pull and turn the valve locking mechanism 90-degrees counterclockwise to unlock the valve.

NOTE: The arrow on lock mechanism should point in the direction of the manual drive nut when the valve is unlocked.

- (c) Connect the electrical connector to the engine anti-ice valve.
- (d) P&W JT9D SERIES ENGINES ONLY;
Do these steps if the valve was deactivated the valve in the open position:
 - 1) Pull and turn the valve locking mechanism 90-degrees clockwise to unlock the valve.

NOTE: The arrow on lock mechanism should point in the direction of the manual drive nut when the valve is unlocked.

- 2) Put the Fan Air Modulation Valve in its normal operating condition (Fig. 902B):
 - a) Open the right fan cowl panel (AMM 71-11-04/201).
 - b) Open the right core cowl panel (AMM 71-11-06/201).

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WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- c) Open the right thrust reverser (AMM 78-31-00/201).
 - d) On the fan air valve, remove the lockpin that holds the butterfly shaft linkage in the intermediate position.
 - e) Stow the lockpin in the valve actuator cap.
- 3) Put the high stage bled valve (HPSOV) in its normal operating condition with the task given for DDG 36-11-2 (AMM 36-00-00/901).

S 869-121

- (2) Remove the DO-NOT-CLOSE tags and close the applicable engine anti-ice system circuit breakers on the P11 panel.

S 819-115

- (3) Do the fault isolation for the Engine Anti-Ice System (FIM 30-21-00/101).

S 419-119

- (4) P&W JT9D SERIES ENGINES ONLY;
Do these steps if the valve was deactivated in the open position:

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (a) Close the left thrust reverser (AMM 78-31-00/201).
- (b) Close the left core cowl panel (AMM 71-11-06/201).
- (c) Close the left fan cowl panel (AMM 71-11-04/201).

S 419-118

- (5) Close the applicable access panels on the engine strut.

S 449-116

- (6) Remove the placard 'HI STAGE BLD VLV CLOSED' from the L or R ENG switch on the P5 panel.

S 449-117

- (7) Remove the placard 'COWL VALVE INOP - OPEN' from the applicable ANTI-ICE ENGINE switch, on the P5 panel.

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G. P&W JT9D SERIES ENGINES;
Engine Anti-Ice Stator Vane Valve Activation (Fig. 902C)

S 449-109

- (1) Do these steps to activate the Stator Vane Valve:
 - (a) Do these steps to get access to the stator vane anti-ice valve:
 - 1) Open the left fan cowl panel (AMM 71-11-04/201).
 - 2) Open the left core cowl panel (AMM 71-11-06/201).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- 3) Open the left thrust reverser (AMM 78-31-00/201).
- 4) Connect the electrical connector to the valve.

S 869-120

- (2) Remove the DO-NOT-CLOSE tags and close the applicable engine anti-ice system circuit breakers on the P11 panel.

S 819-110

- (3) Do the fault isolation for the Stator Vane Anti-Ice System (FIM 75-11-00/101).

S 419-114

- (4) Close the access panels on the engine.

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (a) Close the left thrust reverser (AMM 78-31-00/201).
- (b) Close the left core cowl panel (AMM 71-11-06/201).
- (c) Close the left fan cowl panel (AMM 71-11-04/201).

S 449-111

- (5) Remove the placard 'VANE VALVE INOP - CLOSED (or OPEN)' from the applicable ANTI-ICE ENGINE SWITCH.

H. Put the Airplane in its Usual Condition

S 869-112

- (1) AIRPLANES WITH GENERAL ELECTRIC OR PRATT AND WHITNEY ENGINES;
Do these steps:
 - (a) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).
 - (b) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

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S 869-113

- (2) Remove the DO-NOT-CLOSE tags and close the applicable engine anti-ice system circuit breakers on the P11 panel.

TASK 30-00-00-049-046

6. DDG 30-21-2 Preparation - Engine Anti-Ice VALVE Lights Inoperative
(Fig. 903)

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the engine anti-ice VALVE lights inoperative.
- (2) Put a placard 'LIGHT INOP' on the applicable light.

B. References

- (1) AMM 24-22-00/201, Control (Supply Power)

C. Access

- (1) Location Zone

211, 212	Control Cabin
410	No. 1 Engine
420	No. 2 Engine

D. Procedure

S 719-091

- (1) Before you let the airplane fly in ice conditions, do these steps to make sure the engine anti-ice valve(s) operate correctly:
 - (a) Supply electrical power (AMM 24-22-00/201).
 - (b) Put a ground observer near the applicable valve (FIG. 903).

NOTE: The nacelle anti-ice valve is in the nacelle strut area, above the middle of the engine.

The stator anti-ice valve is in the engine cowling, aft of the fan exhaust.

- (c) Put the applicable anti-ice switch in the ON position and then in the OFF position.
 - 1) The ground observer will hear the solenoid operate.

NOTE: If it is too noisy to hear the solenoid, it can be necessary to open the access door or the cowling and look at the position indicator for the valve.

- 2) The access panels for the nacelle anti-ice valves are:
 - a) 432 CL and 432 CR (Left engine)
 - b) 442 CL and 442 CR (Right engine)
- (d) Put the airplane back to its usual condition.

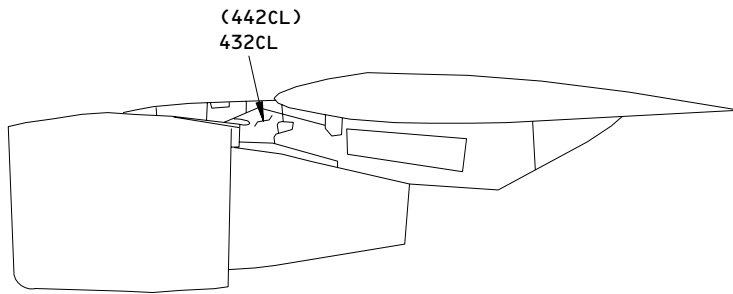
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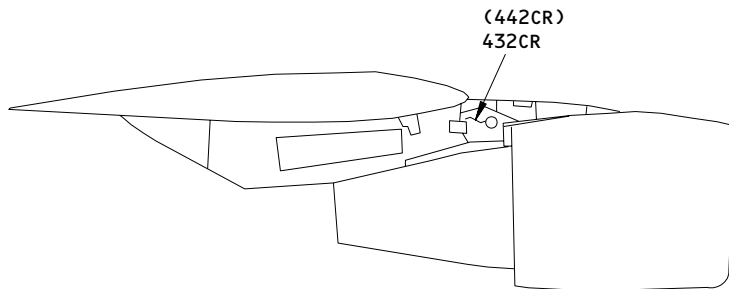
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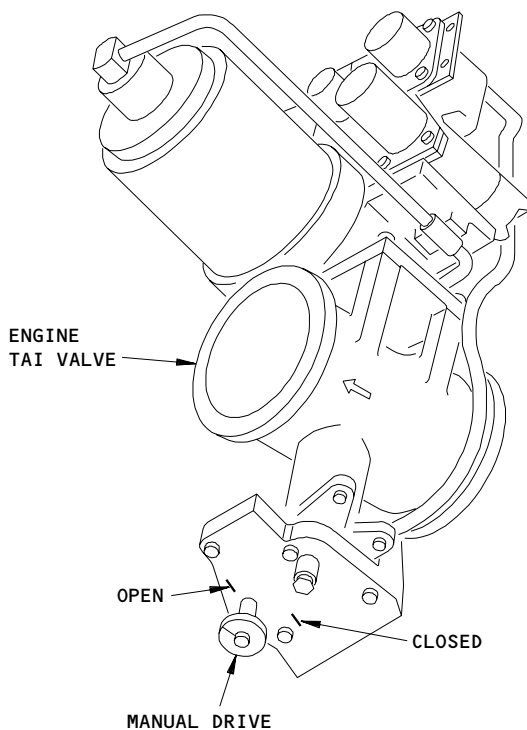
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NO. 1 ENGINE
(LEFT SIDE)



NO. 1 ENGINE
(RIGHT SIDE)



VALVE INDICATOR

Engine Anti-Ice Valve Lights
Figure 903

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TASK 30-00-00-449-068

7. DDG 30-21-2 Restoration - Engine Anti-Ice VALVE Lights Inoperative
(Fig. 903)

A. General

- (1) This task puts the airplane back to its usual condition after operation with the engine anti-ice VALVE lights inoperative.

B. References

- (1) FIM 33-Fault Code Index (Lighting System)
- (2) WDM 30-11-11

C. Procedure

S 819-089

- (1) Do the fault isolation for the indicator lights (FIM 33-Fault Code Index).

NOTE: Look at the fault codes that begin with 33-13 and 33-16 and find the applicable problem.

S 819-088

- (2) If the problem continues, examine and repair the circuit associated with the indicator light (WDM 30-11-11).

S 449-090

- (3) Remove the 'LIGHT INOP' placard near the light on the P5 panel.

TASK 30-00-00-049-047

8. DDG 30-21-3 Preparation - Engine Cowl Overheat Indication (RR Engines) Inoperative

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the engine cowl overheat indication inoperative.
- (2) Placard the airplane flight log as appropriate.

B. References

- (1) AMM 26-10-01/401, Engine Fire Detection Cards
- (2) AMM 36-00-00/901, Pneumatic System

C. Access

- (1) Location Zone

119, 120	Main Equipment Center
410	No. 1 Engine
420	No. 2 Engine

D. Procedure

S 049-085

- (1) Lock the high stage bled valve (HPSOV) in the closed position with the task given for DDG 36-11-2 (AMM 36-00-00/901).

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S 049-086

- (2) To prevent the L or R COWL OVHT caution EICAS message from being shown, do these steps:
 - (a) For the L COWL OVHT message, remove L Eng Cowl Ovht Det card, M01700 (AMM 26-10-01/401).
 - (b) For the R COWL OVHT message, remove R Eng Cowl Ovht Det card, M01699 (AMM 26-10-01/401).

S 049-087

- (3) Protect and stow the card that was removed.

TASK 30-00-00-449-048

9. DDG 30-21-3 Restoration - Engine Cowl Overheat Indication (RR Engines) Inoperative

A. General

- (1) This task puts the airplane back to its usual condition after operation with the engine cowl overheat indication inoperative.

B. References

- (1) AMM 26-10-01/401, Engine Fire Detection Cards
- (2) AMM 36-00-00/901, Pneumatic System
- (3) FIM 33-Fault Code Index (Lighting System)
- (4) WDM 30-21-11

C. Procedure

S 819-092

- (1) Do the fault isolation for the indicator lights (FIM 33-Fault Code Index).

NOTE: Look at the fault codes that begin with 33-13 and 33-16 and find the applicable problem.

S 819-125

- (2) If the problem continues, examine and repair the circuit associated with the indicator light (WDM 30-21-11).

S 449-094

- (3) Install the applicable L or R Eng Cowl Ovht Det card, M1700 or M1699 (AMM 26-10-01/401).

S 449-093

- (4) Put the high stage bled valve (HPSOV) in its normal condition with the task given for DDG 36-11-2 (AMM 36-00-00/901).

TASK 30-00-00-049-049

10. DDG 30-31-2 Preparation - Probe Heat Lights Inoperative

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the probe heat lights inoperative.

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- (2) Put a placard '____PROBE HEAT LIGHT INOP' on the applicable probe heat light on the overhead panel, P5.
- B. References
 - (1) AMM 24-22-00/201, Control (Supply Power)
- C. Access
 - (1) Location Zone
211, 212 Control Cabin
- D. Procedure

S 719-084

- (1) Do these steps to make sure the probe heater operates correctly:
 - (a) Supply electrical power (AMM 24-22-00/201).

WARNING: DO NOT TOUCH THE PROBES DURING THE TEST. THE PROBES WILL BECOME VERY HOT AND CAN CAUSE INJURIES TO PERSONS.

CAUTION: DO NOT OPERATE THE PROBE HEATERS FOR MORE THAN 10 MINUTES AT ONE TIME. THE PROBE HEATERS CAN BE DAMAGED IF YOU DO NOT FOLLOW THESE INSTRUCTIONS.

- (b) On the right side panel, P61, put the test switch (on the miscellaneous test panel) in the WINDOW/PROBE HEAT position.
 - 1) Hold your hand near the applicable probe(s) and make sure the probe starts to become warm.
- (c) Release the test switch.

TASK 30-00-00-449-069

11. DDG 30-31-2 Restoration - Probe Heat Lights Inoperative

- A. General
 - (1) This task puts the airplane back to its usual condition after operation with the probe heat lights inoperative.
- B. References
 - (1) FIM 33-Fault Code Index (Lighting System)
 - (2) WDM 30-31-11 (Capt Pitot Heat)
 - (3) WDM 30-31-13 (R Aux Pitot Heat)
 - (4) WDM 30-31-21 (F/O Pitot Heat)
 - (5) WDM 30-31-23 (L Aux Pitot Heat)
 - (6) WDM 30-32-11 (L AOA Heat)
 - (7) WDM 30-32-21 (R AOA Heat)
 - (8) WDM 30-33-11 (TAT Heat)
 - (9) WDM 30-33-21 (R TAT Heat, dual TAT systems)
- C. Procedure

S 819-095

- (1) Do the fault isolation for the indicator lights (FIM 33-Fault Code Index).

NOTE: Look at the fault codes that begin with 33-13 and 33-16 and find the applicable problem.

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S 819-096

- (2) If the problem continues, examine and repair the circuit associated with the indicator light (WDM 30-31-11, Capt Pitot Heat; 30-31-13, R Aux Pitot Heat; 30-31-21, F/O Pitot Heat; 30-31-23, L Aux Pitot Heat; 30-32-11, L AOA Heat; 30-32-21, R AOA Heat; 30-33-11, TAT Heat; or 30-33-21, R TAT Heat - dual TAT systems).

S 449-097

- (3) Remove the 'LIGHT INOP' placard near the light on the P5 panel.

TASK 30-00-00-049-080

12. DDG 30-31-3 Preparation - ENG EEC PROBE Light (P&W Engines) Inoperative

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the ENG EEC PROBE light inoperative.

B. References

- (1) AMM 24-22-00/201, Control (Supply Power)

C. Access

- (1) Location Zone
- | | |
|----------|---------------|
| 211, 212 | Control Cabin |
| 410 | No. 1 Engine |
| 420 | No. 2 Engine |

D. Procedure

S 869-081

- (1) Supply electrical power (AMM 24-22-00/201).

S 719-083

WARNING: DO NOT TOUCH THE PROBES DURING THE TEST. THE PROBES WILL BECOME VERY HOT AND CAN CAUSE INJURIES TO PERSONS.

CAUTION: DO NOT OPERATE THE PROBE HEATERS FOR MORE THAN 10 MINUTES AT ONE TIME. THE PROBE HEATERS CAN BE DAMAGED IF YOU DO NOT FOLLOW THESE INSTRUCTIONS.

- (2) On the right side panel, P61, put the test switch (on the miscellaneous test panel) in the WINDOW/PROBE HEAT position.
- (a) Hold your hand near the probe and make sure the probe starts to become warm.

S 719-082

- (3) Release the test switch.

TASK 30-00-00-449-079

13. DDG 30-31-3 Restoration - ENG EEC PROBE Light (P&W Engines) Inoperative

A. General

- (1) This task puts the airplane back to its usual condition after operation with the ENG EEC PROBE light inoperative.

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B. References

- (1) FIM 33-Fault Code Index (Lighting System)
- (2) WDM 30-34-11
- (3) WDM 30-34-21

C. Procedure

S 819-098

- (1) Do the fault isolation for the indicator lights (FIM 33-Fault Code Index).

NOTE: Look at the fault codes that begin with 33-13 and 33-16 and find the applicable problem.

S 819-099

- (2) If the problem continues, examine and repair the circuit associated with the indicator light (WDM 30-34-11 or 30-34-21).

S 449-100

- (3) Remove the 'LIGHT INOP' placard near the light on the P5 panel.

TASK 30-00-00-049-073

14. DDG 30-41-1 Preparation - Flight Deck Window Heater Systems Inoperative

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the flight deck window heater systems inoperative.
- (2) Put a placard in the flight compartment to indicate the system is inoperative.

B. Access

- (1) Location Zone
211, 212 Control Cabin

C. Procedure

S 049-077

- (1) Open the associated circuit breaker for the inoperative window heater, on the P36 or P37 panel in the main equipment center.
 - (a) Put a collar on the circuit breaker.

TASK 30-00-00-449-074

15. DDG 30-41-1 Restoration - Flight Deck Window Heater Systems Inoperative

A. General

- (1) This task puts the airplane back to its usual condition after operation with the flight deck window heater systems inoperative.

B. References

- (1) FIM 30-41-00/101, Flight Compartment Window Anti-Icing

C. Procedure

S 449-078

- (1) Remove the collar and close the applicable circuit breaker for the inoperative window heater, on the P36 or P37 panel in the main equipment center.

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S 819-075

- (2) Do the fault isolation for the flight compartment window anti-icing system (FIM 30-41-00/101).

S 449-076

- (3) Remove the system inoperative placard from the flight compartment.

TASK 30-00-00-049-066

16. DDG 30-41-2 Preparation - Window Heat INOP Lights Inoperative

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the Window Heat INOP lights inoperative.
- (2) Put a placard 'LITE INOP' on the applicable window heat light on the Pilot's overhead panel, P5.

B. References

- (1) AMM 24-22-00/201, Control (Supply Power)

C. Access

- (1) Location Zone
211, 212 Control Cabin

D. Procedure

S 719-014

- (1) Do the steps that follow to make sure the window heat system operates correctly:
 - (a) Supply electrical power to the left and the right main AC buses (AMM 24-22-00/201).
 - (b) Put the four WINDOW HEAT switches, on the Pilots overhead panel, P5, to the OFF (OUT) position.
 - 1) Make sure the WINDOW HEAT message is shown on EICAS.

NOTE: This is a level C, advisory message.

- (c) Put the four WINDOW HEAT switches, on the Pilots overhead panel, P5, to the ON (latched-in) position.
 - 1) Make sure none of these messages are shown on EICAS:

NOTE: These are level C, advisory messages.

- a) WINDOW HEAT
- b) L SIDE WINDOW
- c) L FWD WINDOW
- d) R SIDE WINDOW
- e) R FWD WINDOW
- (d) Put the L FWD WINDOW HEAT switch, on the Pilots overhead panel, P5, to the INOP (out) position.
 - 1) Make sure the L FWD WINDOW message is shown on EICAS.
- (e) Put the L FWD WINDOW HEAT switch, on the Pilots overhead panel, P5, to the ON (latched-in) position.

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- (f) Put the R FWD WINDOW HEAT switch, on the Pilots overhead panel, P5, to the INOP (out) position.
 - 1) Make sure the R FWD WINDOW message is shown on EICAS.
- (g) Put the R FWD WINDOW HEAT switch, on the Pilots overhead panel, P5, to the ON (latched-in) position.
- (h) Put the L SIDE WINDOW HEAT switch, on the Pilots overhead panel, P5, to the INOP (out) position.
 - 1) Make sure the L SIDE WINDOW message is shown on EICAS.
- (i) Put the L SIDE WINDOW HEAT switch, on the Pilots overhead panel, P5 to the ON (latched-in) position.
- (j) Put the R SIDE WINDOW HEAT switch, on the Pilots overhead panel, P5, to the INOP (out) position.
 - 1) Make sure the R SIDE WINDOW message is shown on EICAS.
- (k) Put the R SIDE WINDOW HEAT switch, on the Pilots overhead panel, P5 to the ON (latched-in) position.

S 869-015

- (2) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 30-00-00-449-067

17. DDG 30-41-2 Restoration - Window Heat INOP Lights Inoperative

A. General

- (1) This task puts the airplane back to its usual condition after operation with the Window Heat INOP lights inoperative.

B. References

- (1) FIM 33-Fault Code Index (Lighting System)
- (2) WDM 30-41-11
- (3) WDM 30-41-12

C. Procedure

S 819-071

- (1) Do the fault isolation for the indicator lights (FIM 33-Fault Code Index).

NOTE: Look at the fault codes that begin with 33-13 and 33-16 and find the applicable problem.

S 819-101

- (2) If the problem continues, examine and repair the circuit associated with the indicator light (WDM 30-41-11 or 30-41-12).

S 449-072

- (3) Remove the 'LITE INOP' placard on the P5 panel near the applicable window heat light.

TASK 30-00-00-049-061

18. DDG 30-71-1 Preparation - Drain Mast Heaters Inoperative (Fig. 904)

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the drain mast heater(s) inoperative.

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- (2) Put a placard 'INOPERATIVE' on the applicable drains and sinks.
- B. References
 - (1) WDM 30-71-11
- C. Access
 - (1) Location Zone
119, 120 Main Equipment Center
- D. Procedure (Fig. 904)
 - S 049-058
 - (1) If the drain mast heater(s) do not operate, close the applicable water supply shutoff valves located as follows:
 - (a) The galley shutoff valve
 - 1) There is a placard installed in the galley which tells where each galley shutoff valve is found.
 - (b) The lavatory sink shutoff valve
 - 1) Each sink shutoff valve is found below the sink.
 - (c) The drinking fountain shutoff valve
 - 1) Most of the shutoff valves for the drinking fountains are found immediately to the left of the fountain.
 - 2) Other drinking fountains are supplied from the shutoff valve at the adjacent lavatory sink.

- S 049-060
 - (2) Do these steps if the two drain mast heaters do not operate:
 - (a) Open the two circuit breakers, DRAIN MAST HTG, on the fwd miscellaneous electric equipment panel, P33.
 - (b) Put a placard 'INOP' on the circuit breakers.

- S 049-059
 - (3) Do these steps if the forward or the aft drain mast heater does not operate and you want to deactivate only one of the heaters:
 - (a) Open the two circuit breakers, DRAIN MAST HTG, on the fwd miscellaneous electric equipment panel, P33.
 - (b) Open the right miscellaneous electrical equipment panel, P37.
 - 1) Find the applicable terminal board (WDM 30-71-11):
 - a) TB320, Block YA20

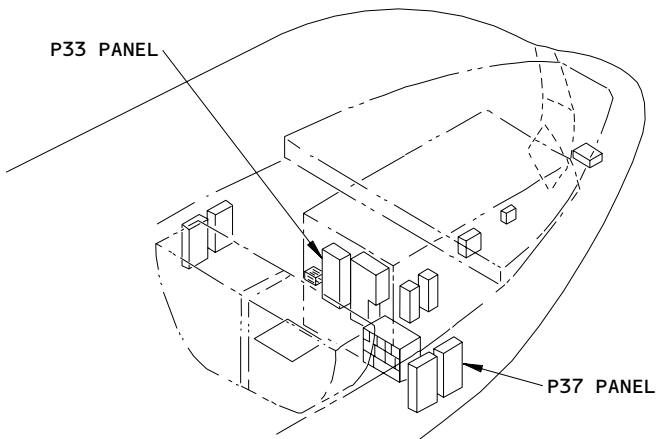
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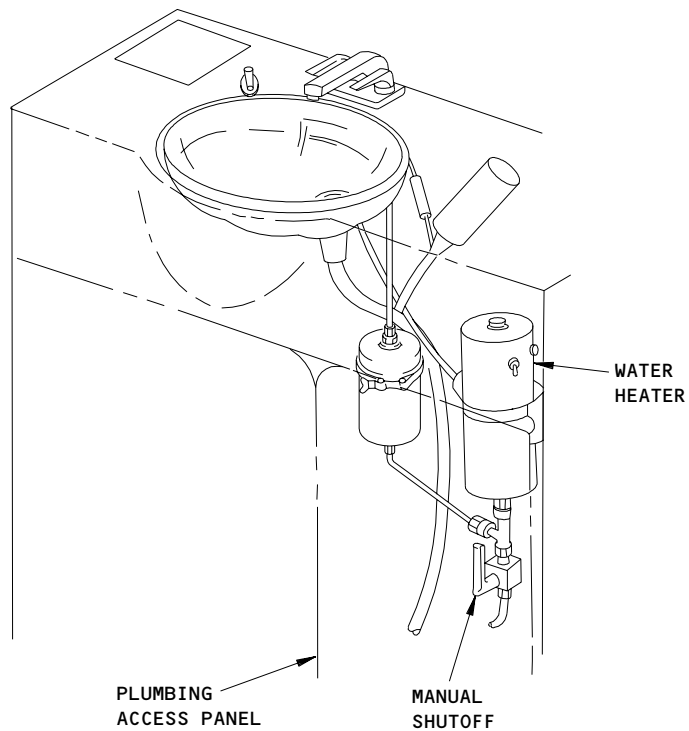
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MAIN EQUIPMENT CENTER



SINK
(EXAMPLE)

Drain Mast Heaters
Figure 904

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- b) TB192, Block G20
- 2) Disconnect one of these wires:
 - a) Forward Mast - W1118-155-20.
 - b) Aft Mast - W192-823-18 or W192-823-20.
- 3) Cap and stow the electrical wire.
- 4) Close the P37 panel.
- 5) Close the two circuit breakers, DRAIN MAST HTG, on the P33 panel.

TASK 30-00-00-449-050

19. DDG 30-71-1 Restoration - Drain Mast Heaters Inoperative (Fig. 904)

A. General

- (1) This task puts the airplane back to its usual condition after operation with the drain mast heater(s) inoperative.

B. References

- (1) FIM 30-71-00/101, Water and Drain Line Heaters
- (2) WDM 30-71-11

C. Procedure (Fig. 904)

S 449-062

- (1) Close the DRAIN MAST HTG circuit breakers on the P33 panel if they were opened to deactivate the drain masts.

S 449-063

- (2) Connect the forward or aft drain mast wires in the P37 panel, if disconnected to deactivate either the forward or aft drain mast (WDM 30-71-11).

S 819-064

- (3) Do the fault isolation for the drain mast(s) (FIM 30-71-00/101).

S 449-070

- (4) Open the applicable water supply shutoff valves for the affected galley, lavatory sink(s) and drinking fountain(s).

NOTE: Refer to the 'DDG 30-71-1 Preparation' procedure for information on the location of the shutoff valves.

S 449-065

- (5) Remove the 'INOPERATIVE' placards from any of the affected drains and sinks.

TASK 30-00-00-049-051

20. DDG 30-72-1 Preparation - Waste System Heaters

A. General

- (1) This task gives the maintenance steps which prepare the airplane for flight with the waste system heater(s) inoperative.
 - (a) These heaters can be inoperative:
 - 1) Drain cap gasket heater
 - 2) Rinse hose heater boot

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- (2) It is only necessary to do one of the two procedure options that is provided.
- B. References
(1) WDM 30-71-11
- C. Access
(1) Location Zone
119, 120 Main Equipment Center
- D. Procedure to Deactivate All Waste System Heaters (Option 1)

NOTE: This method will deactivate all the heaters associated with the circuit breaker for the inoperative heater.

- S 869-053
- (1) Open the Heating Waste Drain System circuit breaker, C1188 on the P33 panel.
(a) Put a collar on the circuit breaker.
- E. Procedure to Deactivate Selected Heater (Option 2)
- S 869-056
- (1) Open the Heating Waste Drain System circuit breaker, c1188 on the P33 panel and install a DO-NOT-CLOSE tag.
- S 049-055
- (2) Disconnect, cap and stow the wire to the associated inoperative heater at the P33 panel (WDM 30-71-11).
- S 869-057
- (3) Remove the DO-NOT-CLOSE tag and close the Heating Waste Drain System circuit breaker, C1188 on the P33 panel.

TASK 30-00-00-449-052

21. DDG 30-72-1 Restoration - Waste System Heaters

- A. General
(1) This task puts the airplane back to its usual condition after operation with the waste system heater(s) inoperative.
- B. References
(1) FIM 30-71-00/101, Water and Drain Line Heaters
- C. Procedure

- S 819-054
- (1) Do the fault isolation for the Waste System Heater(s) (FIM 30-71-00/101).

NOTE: If procedure option 1 was used to deactivate the waste system heaters, a circuit breaker for the system is open and collared on the P33 panel.

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WING THERMAL ANTI-ICING - DESCRIPTION AND OPERATION

1. General

A. AIRPLANES WITHOUT PRIMARY ICE DETECTION;

During flight, the engine bleed air supplies wing thermal anti-icing to the three outboard slats on each wing. The system components include the wing thermal anti-ice (TAI) valves, wing TAI overheat switches, wing TAI pressure switches, telescoping ducts, flexible couplings, spray tubes, wing and engine anti-ice control panel, and test panel.

B. AIRPLANES WITH PRIMARY ICE DETECTION;

During flight, the engine bleed air supplies wing thermal anti-icing to the three outboard slats on each wing. The system components include the wing thermal anti-ice (TAI) valves, wing TAI pressure switches, telescoping ducts, flexible couplings, spray tubes, wing and engine anti-ice control panel, and test panel.

The use of the thermal anti-ice system for the wing or the engine cowl will change the engine pressure ratio (EPR) as it is displayed on EICAS. The two EPR values will decrease if the left or the right engine air is used by the anti-ice system.

2. Component Details (Fig. 1)

A. Wing Thermal Anti-Ice (TAI) Valves

- (1) Wing TAI valves control the flow of pre-cooled engine bleed air into anti-ice ducts. One valve is above the strut position in each wing. The valves are set to keep the duct air pressure between 20-26 psi.
- (2) An indicator on the valve shows when it is CLOSED and when it is NOT CLOSED. You can manually set the valve to the full open or full closed position. A switch on the valve housing permits manual operation. You can lock the valve only in the full closed position.
- (3) When the TAI valve solenoid is energized, it opens an upstream air passage to the actuator diaphragm. When the upstream air pressure is more than the forces of the return spring, the return spring closes. The actuator diaphragm opens the valve vane.
- (4) When electrical power is removed from the TAI valve solenoid, it closes the upstream air passage to the actuator diaphragm. The actuator diaphragm is opened to ambient air. Upstream air pressure on the closing diaphragm and the return spring close the valve vane. Upstream air pressure keeps the valve vane in the closed position.
- (5) The pilot pressure regulator gets input from the downstream (regulated) pressure regulator. If downstream pressure is more than the adjustment setting of the pilot regulator, a valve bleeds off the actuator diaphragm pressure. The closing diaphragm and the return spring partially close the valve vane.

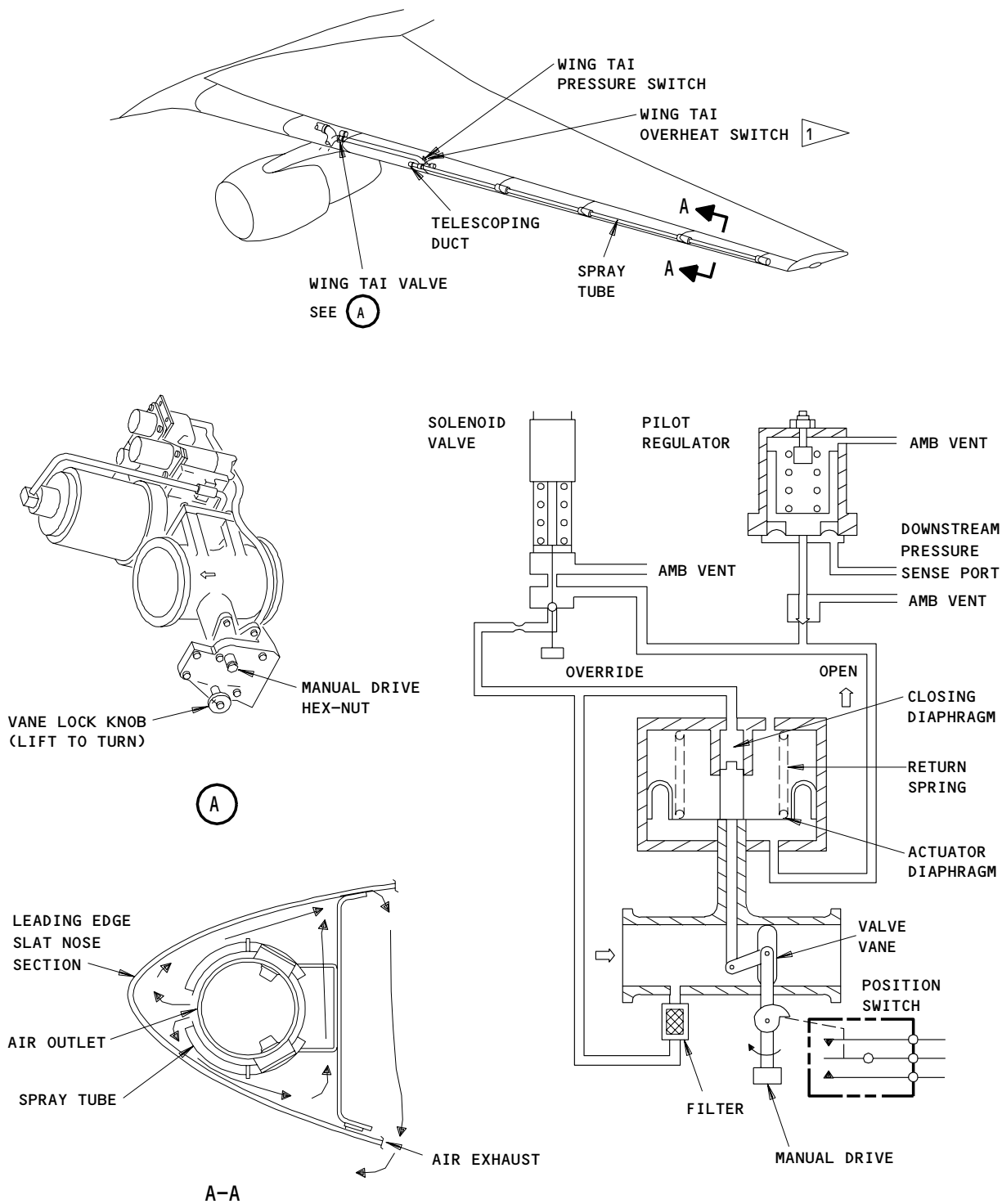
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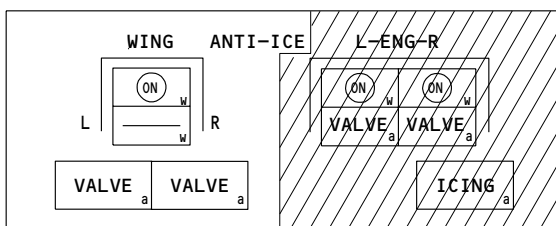
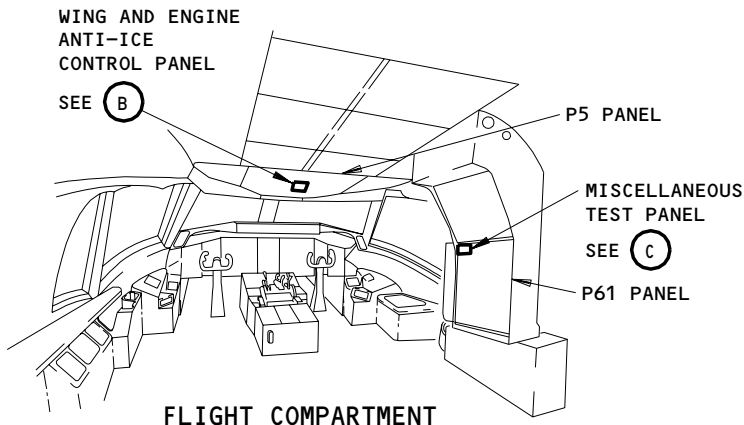


1 AIRPLANES WITHOUT PRIMARY ICE DETECTION

Wing TAI - Component Location
Figure 1 (Sheet 1)

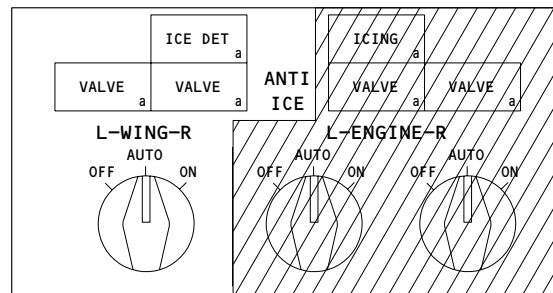
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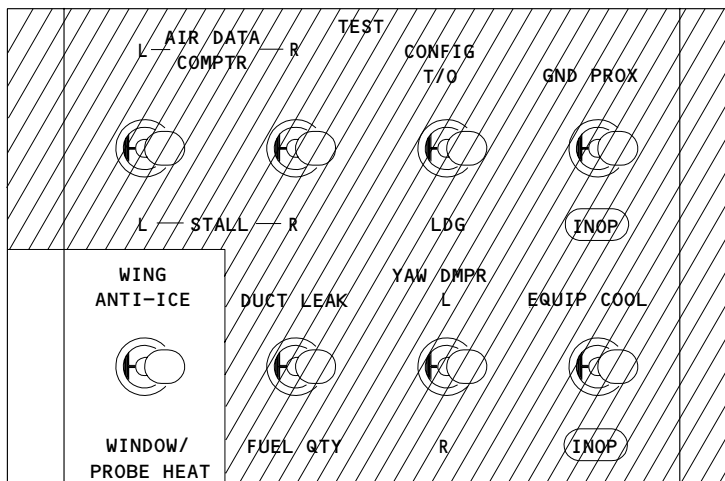
WING AND ENGINE ANTI-ICE CONTROL PANEL

(B) 1



WING AND ENGINE ANTI-ICE CONTROL PANEL

(B) 2



MISCELLANEOUS TEST PANEL

(C)

- 1 AIRPLANES WITHOUT PRIMARY ICE DETECTION
- 2 AIRPLANES WITH PRIMARY ICE DETECTION

Wing TAI - Component Location
Figure 1 (Sheet 2)

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- B. AIRPLANES WITHOUT PRIMARY ICE DETECTION;
Wing TAI Overheat Switches
 - (1) Each wing has a TAI overheat switch to prevent too much heat in its TAI valve and duct during the ground test. These switches do not operate during flight. One switch is on each wing's supply manifold, near the telescoping duct.
 - C. Wing TAI Pressure Switches
 - (1) Each wing has a TAI pressure switch on the supply manifold, just inboard of and near the telescoping duct to the wing's leading edge. The wing TAI pressure switch gets an input when a failure occurs in the pressure regulating function of the TAI valve.
 - D. Telescoping Ducts
 - (1) Each wing has a telescoping duct that connects the wing supply manifold to the leading edge distribution duct. The telescoping duct can supply bleed air to the leading edge slat ducts with the slats in all positions.
 - E. Flexible Couplings
 - (1) Flexible couplings connect the leading edge ducts where the slats are not attached. The flexible couplings make allowance for errors in alignment during slat movements. There are four flexible couplings on each wing between the leading edge slats.
 - F. Spray Tubes
 - (1) The ducts on the three outboard slats on each wing have spray holes. The spray holes send bleed air to the leading edge surfaces.
 - G. Wing and Engine Anti-Ice Control Panel
 - (1) The wing and engine anti-ice control panel M10397 controls the wing thermal anti-icing system. The M10397 panel also controls the engine inlet thermal anti-icing. The M10397 panel is on the overhead panel, P5.
 - H. Test Panel
 - (1) The test panel, M10398, is on the right side panel, P61. The M10398 panel permits a ground test of the wing TAI system with the WING ANTI-ICE WINDOW/PROBE HEAT switch. The switch is spring-loaded and has three positions with a center OFF position.
3. Operation (Fig. 2 and 3)
- A. Functional Description
 - (1) The WING ANTI-ICE switch on the M10397 panel controls the operation of the wing thermal anti-ice (TAI) system during flight.

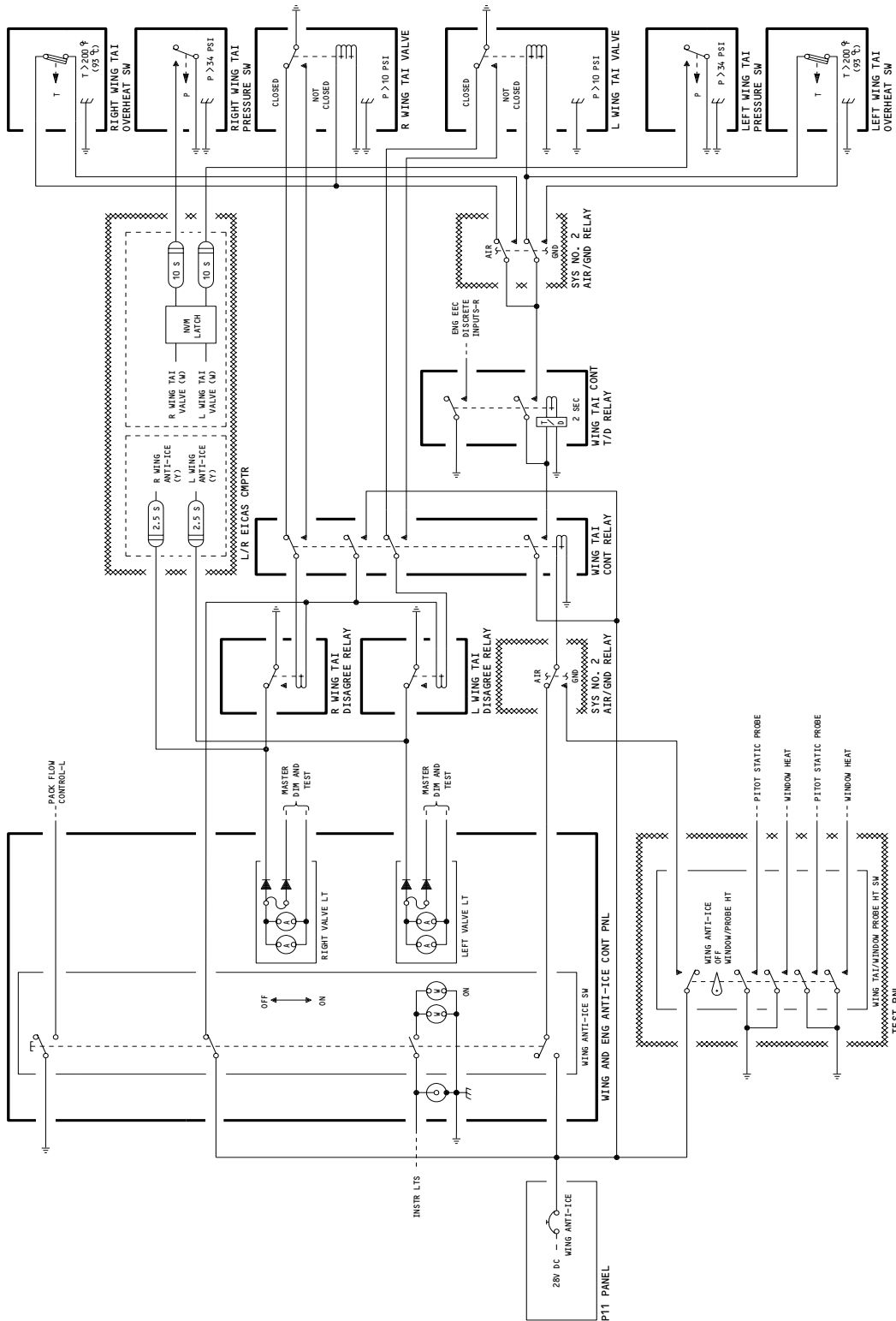
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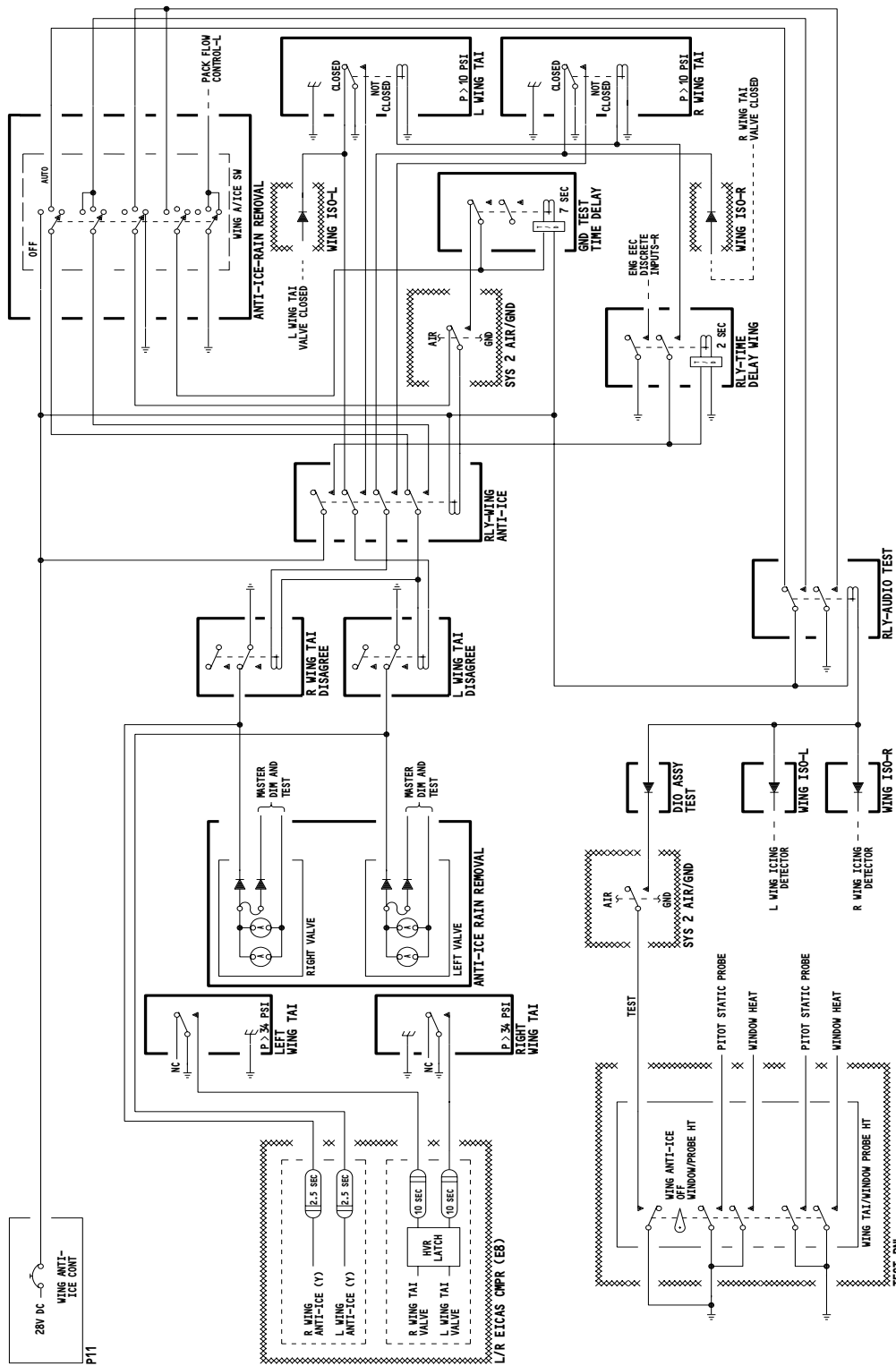


Wing Thermal Anti-Ice Schematic
Figure 2 (Sheet 1)

EFFECTIVITY
AIRPLANES WITHOUT PRIMARY ICE DETECTION

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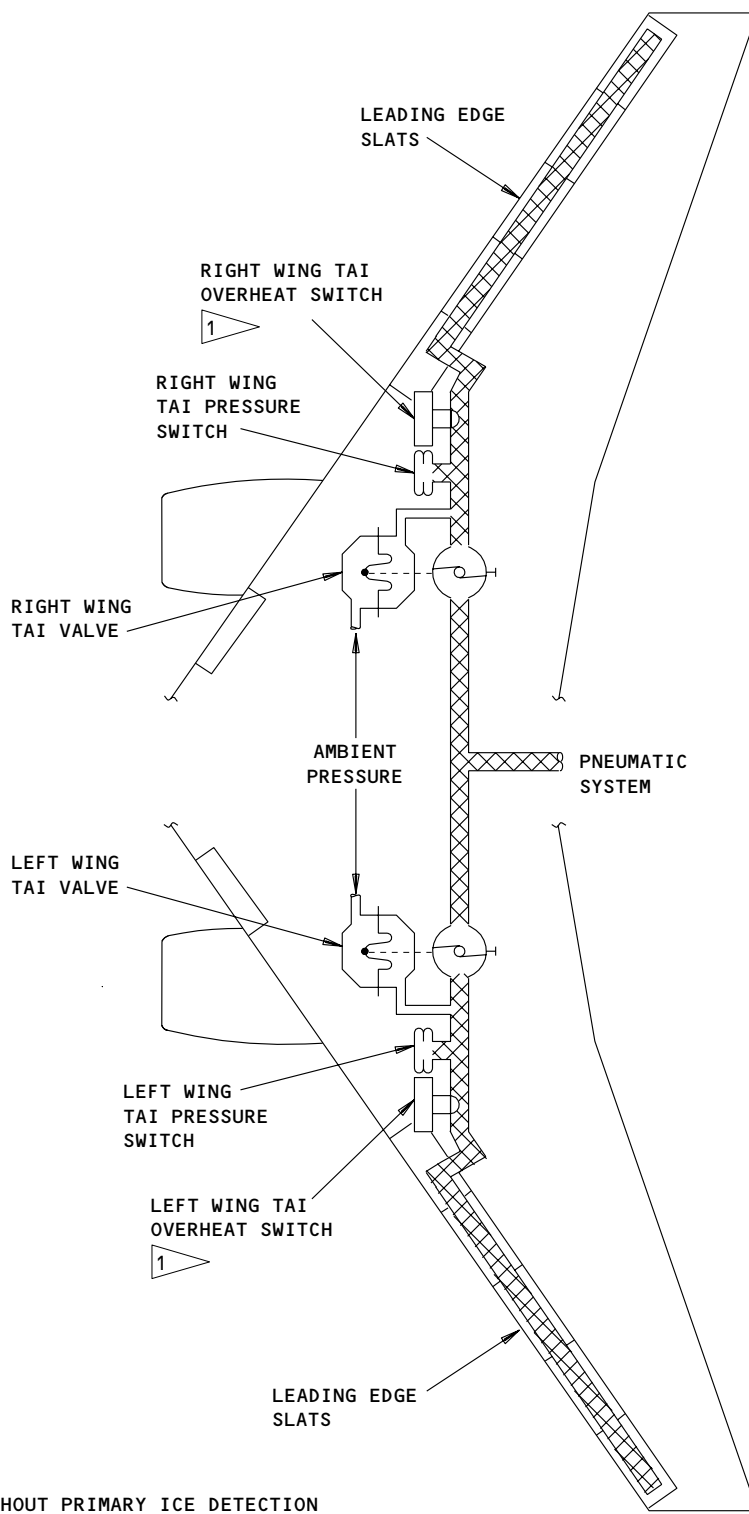
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Wing Thermal Anti-Ice Schematic
Figure 2 (Sheet 2)

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AIRPLANES WITH PRIMARY ICE DETECTION

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Wing Thermal Anti-Icing Pneumatic Schematic
Figure 3

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- (2) AIRPLANES WITHOUT PRIMARY ICE DETECTION;
During flight, when you put the Wing Anti-Ice switch to the on position, it energizes the wing TAI control relay. The amber L and R VALVE lights on M10397 panel come on. After two seconds, the wing TAI control time delay (T/D) relay closes and the TAI valves open. The L and R VALVE lights go off.
- (3) AIRPLANES WITH PRIMARY ICE DETECTION;
During flight, when you put the L-WING-R ANTI-ICE switch in the ON position, it energizes the wing TAI control relay which opens the left and right wing TAI valves. The wing TAI control relay is also supplied with power when the L-WING-R ANTI-ICE switch is in the AUTO position and the ice detection system starts the wing anti-ice system. Automatic start of the wing anti-ice system occurs by a ground applied to the wing TAI control relay, which energizes it and opens the wing TAI valves.
- (4) If the position of a wing's TAI valve does not agree with its commanded position, that wing's VALVE light comes on and applicable EICAS message L or R WING ANTI-ICE will show.
- (5) If the duct pressure is more than 34 psi, the L and R wing TAI pressure switches close to the ground position and applicable EICAS message L WING TAI VALVE and R WING TAI VALVE will show.
- (6) With the airplane on the ground, when you put the Wing Anti-Ice switch to the on position, the L and R VALVE lights come on. In 4 seconds or less, the EICAS messages L WING ANTI-ICE and R WING ANTI-ICE will show.

B. Control

- (1) To put the system in operation, supply electrical power (AMM 24-22-00/201).
 - (a) Pressurize the pneumatic system (AMM 36-00-00/201).
 - (b) Make sure the ANTI-ICE WING circuit breaker on the overhead circuit breaker panel, P11, is closed.
 - (c) AIRPLANES WITHOUT PRIMARY ICE DETECTION;
To start the system for manual operation in flight, put the WING ANTI-ICE switch on the WING and ENGINE ANTI-ICE control panel M10397 to the "ON" position.

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- (d) AIRPLANES WITH PRIMARY ICE DETECTION;
To start the system for manual or automatic operation when in flight, put the L-WING-R ANTI-ICE switch on the WING and ENGINE ANTI-ICE control panel M10397 to the "ON" or "AUTO" position.

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




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

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FAULT ISOLATION/MAINT MANUAL

WING THERMAL ANTI-ICING

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER - ANTI-ICE WING, C1132	1	1	FLT COMPT, P11 11A31	*
COMPUTER - EICAS L, M10181 EICAS R, M10182				* *
DIODE - R455, R490, R491 		3	119AL, MAIN EQUIPMENT CTR, P33	*
DUCTING - WING THERMAL ANTI-ICE	2	2	WING OUTBOARD LEADING EDGE	30-11-00
LIGHT - L VALVE INDICATOR, L1	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397	*
LIGHT - R VALVE INDICATOR, L2	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397	*
PANEL - MISCELLANEOUS TEST, M10398				
PANEL - WING AND ENGINE ANTI-ICE CONTROL, M10397	1	1	FLT COMPT, P5	*
RELAY - GND TEST TIME DELAY, K2115 		1	119AL, MAIN EQUIPMENT CTR, P33	*
L WING TAI DISAGREE, K1156		1		*
R WING TAI DISAGREE, K1155		1		*
RLY AUTO TEST, K2116 		1		*
SYSTEM 2 AIR/GROUND, K520		1		*
WING TAI CONT, K414		1		*
WING TAI CONT T/D, K319		1		*
SWITCH - WING ANTI-ICE, S3	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PANEL, M10397	*
SWITCH - L WING TAI OVERHEAT, S398 	2	1	521ANB, L WING FIXED LEADING EDGE	30-11-03
SWITCH - L WING TAI PRESSURE, S400	2	1	521ANB, L WING FIXED LEADING EDGE	30-11-04
SWITCH - R WING TAI OVERHEAT, S399 	2	1	621ANB, R WING FIXED LEADING EDGE	30-11-03
SWITCH - R WING TAI PRESSURE, S401	2	1	621ANB, R WING FIXED LEADING EDGE	30-11-04
SWITCH - WING ANTI-ICE WINDOW/PROBE HT TEST, S5	1	1	FLT COMPT, P61, MISC TEST PANEL, M10398	*
VALVE - L WING TAI, V52	2	1	511ST, LEFT WING FIXED LEADING EDGE	30-11-02
VALVE - R WING TAI, V57	2	1	611ST, RIGHT WING FIXED LEADING EDGE	30-11-02

* SEE THE WDM EQUIPMENT LIST

-  AIRPLANES WITHOUT PRIMARY ICE DETECTION.
 AIRPLANES WITH PRIMARY ICE DETECTION.

Wing Thermal Anti-Icing - Component Index
Figure 101

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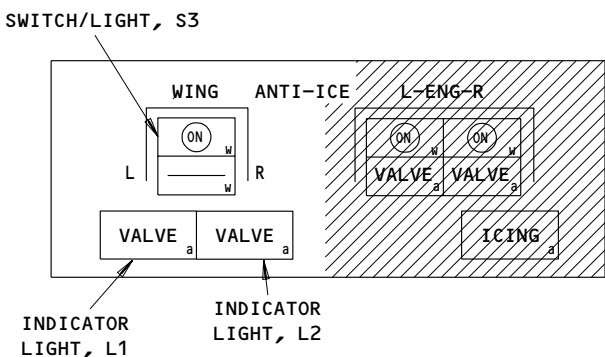
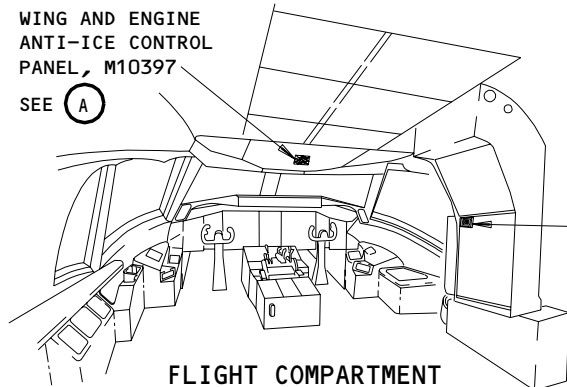
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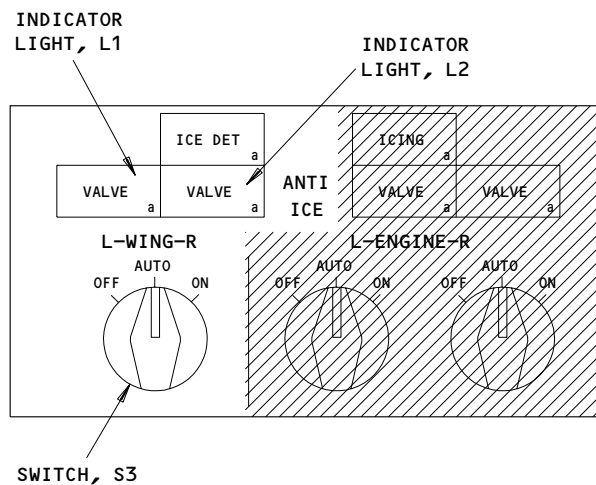
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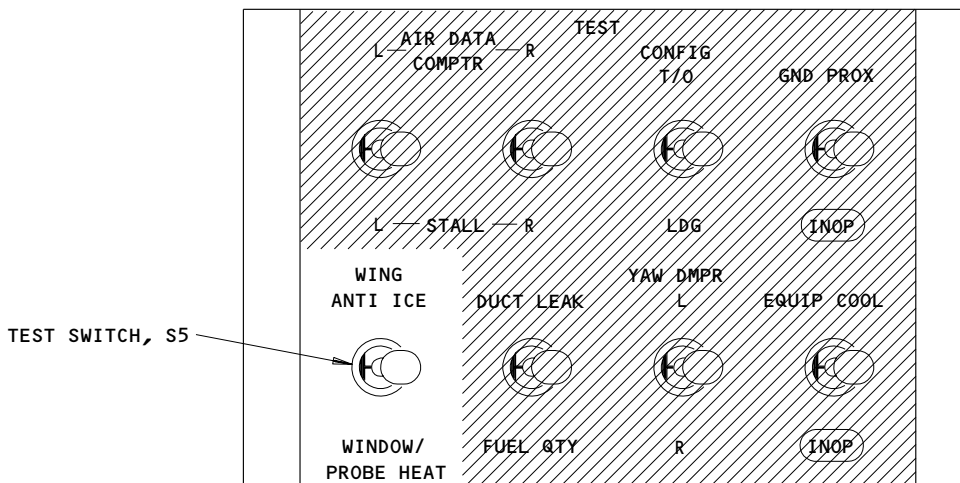
FAULT ISOLATION/MAINT MANUAL



(A) 1



(A) 2



(B)

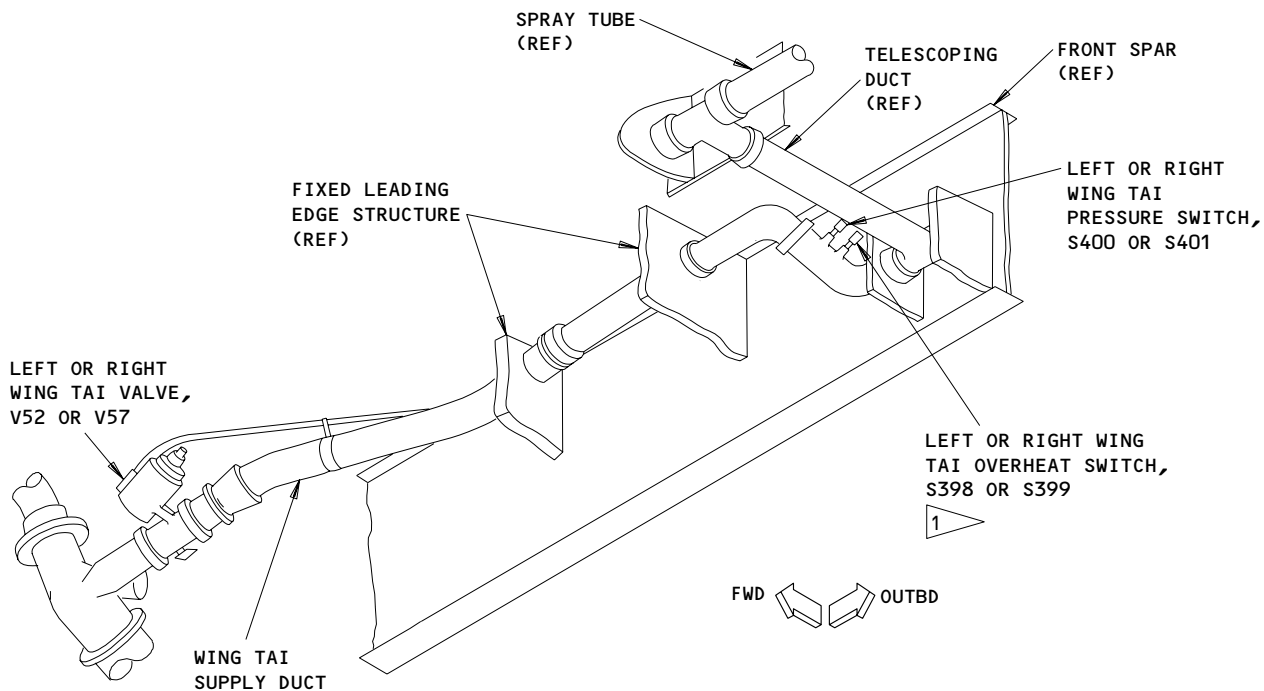
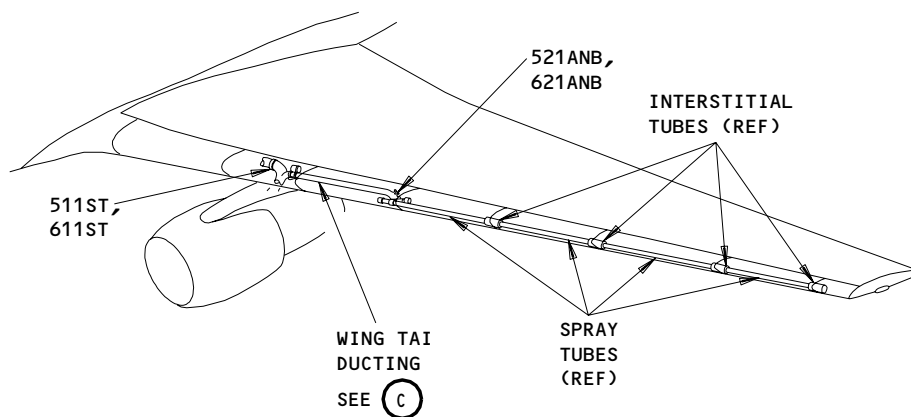
- 1 AIRPLANES WITHOUT PRIMARY ICE DETECTION
- 2 AIRPLANES WITH PRIMARY ICE DETECTION

Wing Thermal Anti-Icing - Component Location
Figure 102 (Sheet 1)

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FAULT ISOLATION/MAINT MANUAL



WING TAI DUCTING
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

(C)

1 AIRPLANES WITHOUT PRIMARY ICE DETECTION

Wing Thermal Anti-Icing - Component Location
Figure 102 (Sheet 2)

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WING THERMAL ANTI-ICING - ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. This task is a test of the wing thermal anti-ice (TAI) system.
- B. This task must be performed two times, one time for the left wing and one time for the right wing, to make sure the system operates.
- C. The tests for the left and the right side can be done at the same time if two sets of equipment are available.
- D. The task is written for the left wing data and, where there are differences, the right wing data is in parentheses.

TASK 30-11-00-735-002

2. System Test - Left (Right) Wing TAI

A. Equipment

- (1) Union - MS21902J6 (2 are necessary if you will do the test of the left and the right systems at the same time)
- (2) Gauge - Pressure, 0-150 psig \pm 1% accuracy with 30 feet of hose (commercial source) (2 are necessary if you will do the test of the left and the right systems at the same time)

B. References

- (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 30-11-04/401, Wing TAI Pressure Switch
- (4) AMM 31-41-00/201, Engine Indication and Crew Alerting System
- (5) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

(1) Location Zone

- 521 Leading Edge to Front Spar (Left)
- 621 Leading Edge to Front Spar (Right)

(2) Access Panels

- 521 ANB (Left)
- 511 PT (Left)
- 621 ANB (Right)
- 611 PT (Right)

D. Procedure

S 015-003

- (1) Remove the fixed wing lower panel 521 ANB (621 ANB) (AMM 06-44-00/201).

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- S 035-149
- (2) Remove the electrical connector from the wing TAI pressure switch.
- S 035-004
- (3) Remove the wing TAI pressure switch from the TAI duct.
- S 435-150
- (4) Install the electrical connector on the wing TAI pressure switch.
- S 485-005
- (5) Install the MS21902J6 union in the TAI duct at the port for the wing TAI pressure switch.
- S 485-006
- (6) Connect the pressure gage to the union.
- S 865-007
- (7) Supply electrical power (AMM 24-22-00/201).
- S 215-008
- (8) Make sure the L (R) UTILITY BUS switch-light on the pilot's overhead panel, P5, is in the OFF position.
- S 715-010
- (9) Make sure the Engine Indication and Crew Alerting System (EICAS) operates correctly (AMM 31-41-00/201).
- S 215-011
- (10) Make sure the WING ANTI-ICE switch on the P5 panel is in the OFF position.
- S 865-012
- (11) Start the APU (AMM 49-11-00/201).
- S 215-013
- (12) Put the WING ANTI-ICE switch on the P5 panel to the ON position.
- (a) Make sure the valve light comes on.

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S 865-014

- (13) Put the WING ANTI-ICE switch to the OFF position.
(a) Make sure the valve light goes off.

S 215-015

- (14) Push the L (R) ISLN VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.

S 215-188

- (15) Push the CENTER ISLN VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.

S 215-017

- (16) Push the APU VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.

S 215-019

- (17) Make sure the pressure gauge shows 0 psig.

S 215-198

- (18) AIRPLANES WITHOUT PRIMARY ICE DETECTION;
Hold the WING ANTI-ICE WINDOW/PROBE HEAT test switch on the P61 panel in the WING ANTI-ICE position.
(a) Make sure the L (R) VALVE light on P5 panel comes on for approximately 1 to 3 seconds, then goes off for 10 to 20 seconds, and then stays on.
(b) Make sure the pressure gauge shows 20-28 psig.
(c) Make sure the EICAS message, L (R) WING ANTI-ICE, shows on the top display 4 seconds after the L (R) VALVE light stays on.

S 215-201

- (19) AIRPLANES WITH PRIMARY ICE DETECTION;
Push the L (R) ISLN VALVE switch-light on the P5 panel to the OFF position.
(a) Make sure the white bar light in switch is off.

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S 215-191

- (20) Push the CENTER ISLN VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.

S 215-192

- (21) Push the APU VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.

S 215-193

- (22) Push the L ISLN VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.
(b) Note the L bleed duct pressure when stabilized.

S 215-199

- (23) Hold the WING ANTI-ICE WINDOW/PROBE HEAT test switch on the P61 panel in the WING ANTI-ICE position.
(a) Make sure the L VALVE light on P5 panel comes on for approximately 1 to 3 seconds, then goes off (accompanied by a drop in L duct pressure) for approximately 7 seconds, and then comes on momentarily and then stays off (accompanied by a rise in L duct pressure).

NOTE: During test the R VALVE light on P5 panel will go on and off at the same time as the L VALVE light except for the momentary illumination of the L VALVE light when the L WING ANTI-ICE VALVE is commanded closed after 7 seconds.

S 215-022

- (24) Release the WING ANTI-ICE WINDOW/PROBE HEAT test switch.
(a) Make sure the EICAS message, L (R) WING ANTI-ICE, does not show on the top display.

S 215-194

- (25) Push the L ISLN VALVE switch-light on the P5 panel to the off position.

NOTE: The L WING ANTI-ICE test switch can be placed in the test position momentarily to aid in pressure bleed off.

S 215-196

- (26) Push the R ISLN VALVE switch-light on the P5 panel to the ON position.
(a) Make sure the white bar light in switch is on.

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(b) Note the R bleed duct pressure when stabilized.

S 215-195

(27) Hold the WING ANTI-ICE WINDOW/PROBE HEAT test switch on the P61 panel in the WING ANTI-ICE position.

(a) Make sure the R VALVE light on P5 panel comes on for approximately 1 to 3 seconds, then goes off (accompanied by a drop in R duct pressure) for approximately 7 seconds, and then comes on momentarily and then stays off (accompanied by a rise in R duct pressure).

NOTE: During test the L VALVE light on P5 panel will go on and off at the same time as the R VALVE light except for the momentary illumination of the R VALVE light when the R WING ANTI-ICE VALVE is commanded closed after 7 seconds.

S 215-197

(28) Release the WING ANTI-ICE WINDOW/PROBE HEAT test switch.

(a) Make sure the EICAS message, L (R) WING ANTI-ICE, does not show on the top display.

S 865-200

(29) Push the R ISLN VALVE switch-light on the P5 panel to the off position.

NOTE: The R WING ANTI-ICE test switch can be placed in the test position momentarily to aid in pressure bleed off.

S 865-023

(30) Push the APU VALVE switch-light on the P5 panel to the OFF position.

S 715-053

(31) Do a test of the disagree system for the left (right) wing TAI valve as follows:

(a) Remove the fixed wing upper panel 511 PT (611 PT) (AMM 06-44-00/201).

(b) Make sure the WING ANTI-ICE switch on the P5 panel is in the OFF position.

WARNING: LET THE WING TAI DUCT BECOME COOL BEFORE YOU MOVE THE WING TAI VALVE. THE DUCT CAN BE HOT. A HOT DUCT CAN BURN YOU.

(c) Manually put the left (right) wing TAI valve in the open position.

(d) Make sure the left (right) wing VALVE light comes on and stays on.

(e) Manually put the left (right) wing TAI valve in the closed position.

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- (f) Make sure the left (right) wing VALVE light goes off.
- (g) Put the WING ANTI-ICE switch in the ON position.
- (h) Make sure the left wing and right wing VALVE lights come on.
- (i) Put the WING ANTI-ICE switch in the OFF position.

S 865-054

- (32) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
 - (a) 11A31, ANTI-ICE WING

S 825-170

WARNING: LET THE TAI DUCT BECOME COOL BEFORE YOU MOVE THE THE VALVE. THE DUCT CAN BE HOT. A HOT DUCT CAN BURN YOU.

- (33) Manually set the left (right) wing TAI valve to the open position.

S 085-058

- (34) Remove the pressure gauge and union from the wing TAI duct.

S 035-059

- (35) Install the wing TAI pressure switch in the wing TAI duct (AMM 30-11-04/401).

S 865-060

- (36) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
 - (a) 11A31, ANTI-ICE WING

S 865-061

- (37) Push the APU VALVE switch-light on P5 to the ON position.

S 215-063

- (38) Push the ECS/MSG switch on the EICAS maintenance panel (P61).
 - (a) Make sure the EICAS message, L (R) WING TAI VALVE, does not show on the display.

NOTE: To test the functionality of the wing TAI pressure switch, refer to Do a Test of the Wing TAI Pressure Switch (AMM 30-11-04/401) or the Alternative Test for the Wing TAI Pressure Switch (AMM 30-11-04/401).

S 865-064

- (39) Push the APU VALVE switch-light on P5 to the OFF position.

S 865-180

- (40) Do the EICAS erase procedure (AMM 31-41-00/201).

S 865-066

- (41) Stop the APU if it is not necessary.

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S 865-067

- (42) Put the L (R) ISLN VALVE switch-light on panel P5 in the OFF position.

S 985-069

WARNING: LET THE WING TAI DUCT BECOME COOL BEFORE YOU MOVE THE WING TAI VALVE. THE DUCT CAN BE HOT. A HOT DUCT CAN BURN YOU.

- (43) Manually set the left (right) wing TAI valve in the NORMAL (unlocked) position.

S 415-070

- (44) Replace all the access panels you removed.

S 865-071

- (45) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WING AND ENGINE ANTI-ICE CONTROL PANEL – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the wing and engine anti-ice control panel. The second task is the installation of the wing and engine anti-ice control panel.
- B. The wing and engine anti-ice control panel is on the pilot's overhead panel, P5.
- C. Do a test of the wing and engine anti-ice control panel after you install it. The test makes sure the installation and function of the control panel are correct.

TASK 30-11-01-004-001

2. Remove the Wing and Engine Anti-Ice Control Panel

A. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

B. Procedure

S 864-002

- (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11A16, ANTI-ICE ENG L
 - (b) 11T19, ANTI-ICE ENG R
 - (c) 11A30, ANTI-ICE ALT R ENG
 - (d) 11A31, ANTI-ICE WING
 - (e) SAS 150-154 WITH SB 30-17, AND SAS 050-149, 155-274;
11T14, ICE DETECTOR L
11T23, ICE DETECTOR R

S 024-003

- (2) Remove the wing and engine anti-ice control panel.

TASK 30-11-01-404-004

3. Install the Wing and Engine Anti-Ice Control Panel

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control

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- (2) AMM 32-09-02/201, Air/Ground Relays
- (3) AMM 36-00-00/201, Pneumatic - General

B. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

C. Procedure

S 424-005

- (1) Install the wing and engine anti-ice control panel.

S 864-006

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - (a) 11A16, ANTI-ICE ENG L
 - (b) 11T19, ANTI-ICE ENG R
 - (c) 11A30, ANTI-ICE ALT R ENG
 - (d) 11A31, ANTI-ICE WING
 - (e) SAS 150-154 WITH SB 30-17, AND SAS 050-149, 155-274;
11T14, ICE DETECTOR L
11T23, ICE DETECTOR R

D. Test - Wing and Engine Anti-Ice Control Panel Installation

S 864-024

WARNING: PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. IN THE AIR MODE, MANY OF THE AIRPLANE SYSTEMS CAN OPERATE AND CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Prepare the safety-sensitive systems for air mode simulation (AMM 32-09-02/201).

S 864-008

- (2) Open these circuit breakers on the Overhead Circuit Breaker Panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11C29, LANDING GEAR POSITION AIR/GND SYS 2 ALT
 - (b) 11U23 or 11U24, LANDING GEAR POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

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- S 864-011
- (3) Supply electrical power (AMM 24-22-00/201).
- S 864-012
- (4) Remove pressure from the pneumatic system (AMM 36-00-00/201).
- S 214-033
- (5) AIRPLANES WITHOUT THE PRIMARY ICE DETECTION SYSTEM (NO ICE DET AND ICING LIGHTS ON THE PANEL);
Push and release the WING ANTI-ICE switch-light.
(a) Make sure the WING ANTI-ICE switch-light latches.
(b) Make sure the WING ANTI-ICE switch-light comes on and shows ON.
(c) Make sure the two WING ANTI-ICE VALVE lights come on.
- S 214-032
- (6) AIRPLANES WITH THE PRIMARY ICE DETECTION SYSTEM (ICE DET AND ICING LIGHTS ON THE PANEL);
Set the wing anti-ice switch on the P5 panel to the ON position.
(a) Make sure the two WING ANTI-ICE VALVE lights come on.
- S 214-045
- (7) AIRPLANES WITHOUT THE PRIMARY ICE DETECTION SYSTEM (NO ICE DET AND ICING LIGHTS ON THE PANEL);
Push and release the WING ANTI-ICE switch-light.
(a) Make sure the WING ANTI-ICE switch-light unlatches.
(b) Make sure the WING ANTI-ICE switch-light goes off.
(c) Make sure the two WING ANTI-ICE VALVE lights go off.
- S 214-037
- (8) AIRPLANES WITH THE PRIMARY ICE DETECTION SYSTEM (ICE DET AND ICING LIGHTS ON THE PANEL);
Set the wing anti-ice switch on the P5 panel to the OFF position.
(a) Make sure the two WING ANTI-ICE VALVE lights go off.
- S 214-034
- (9) AIRPLANES WITHOUT THE PRIMARY ICE DETECTION SYSTEM (NO ICE DET AND ICING LIGHTS ON THE PANEL);
Push and release the L ENGINE ANTI-ICE switch-light.
(a) Make sure the L ENGINE ANTI-ICE switch-light latches.
(b) Make sure the L ENGINE ANTI-ICE switch-light comes on and shows ON.
(c) Make sure the L ENGINE ANTI-ICE VALVE light comes on.

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- S 214-039
- (10) AIRPLANES WITH THE PRIMARY ICE DETECTION SYSTEM (ICE DET AND ICING LIGHTS ON THE PANEL);
Set the L ENGINE anti-ice switch on the P5 panel to the ON position.
(a) Make sure the L ENGINE anti-ice VALVE light comes on.
- S 214-046
- (11) AIRPLANES WITHOUT THE PRIMARY ICE DETECTION SYSTEM (NO ICE DET AND ICING LIGHTS ON THE PANEL);
Push and release the R ENGINE ANTI-ICE switch-light.
(a) Make sure the R ENGINE ANTI-ICE switch-light latches.
(b) Make sure the R ENGINE ANTI-ICE switch-light comes on and shows ON.
(c) Make sure the R ENGINE ANTI-ICE VALVE light comes on.
- S 214-041
- (12) AIRPLANES WITH THE PRIMARY ICE DETECTION SYSTEM (ICE DET AND ICING LIGHTS ON THE PANEL);
Set the R ENGINE anti-ice switch on the P5 panel to the ON position.
(a) Make sure the R ENGINE anti-ice VALVE light comes on.
- S 214-035
- (13) AIRPLANES WITHOUT THE PRIMARY ICE DETECTION SYSTEM (NO ICE DET AND ICING LIGHTS ON THE PANEL);
Push and release the two ENGINE ANTI-ICE switch-lights.
(a) Make sure the two ENGINE ANTI-ICE switch-lights unlatch.
(b) Make sure the two ENGINE ANTI-ICE switch-lights go off.
(c) Make sure the two ENGINE ANTI-ICE VALVE lights go off.
- S 214-043
- (14) AIRPLANES WITH THE PRIMARY ICE DETECTION SYSTEM (ICE DET AND ICING LIGHTS ON THE PANEL);
Set the both the L and R ENGINE anti-ice switches on the P5 panel to the OFF position.
(a) Make sure the two ENGINE anti-ice VALVE lights go off.
- S 214-025
- (15) Push and release the ICING light.
(a) Make sure that the ICING light comes on when the light was pushed.
- S 214-027
- (16) AIRPLANES WITH THE PRIMARY ICE DETECTION SYSTEM (ICE DET AND ICING LIGHTS ON THE PANEL);
Push and release the ICE DET light.
(a) Make sure the ICE DET light comes on when the light was pushed.

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S 864-018

- (17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11C29, LANDING GEAR POSITION AIR/GND SYS 2 ALT
 - (b) 11U23 or 11U24, LANDING GEAR POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

S 864-020

- (18) Put the safety-sensitive systems back to their initial conditions (AMM 32-09-02/201).

S 864-021

- (19) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WING THERMAL ANTI-ICE VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the wing thermal anti-ice valve. The second task is the installation of the wing thermal anti-ice valve.
- B. The wing thermal anti-ice valve is on the wing thermal anti-icing duct above the engine strut on each wing. The removal/installation procedure is the same for the two units.

TASK 30-11-02-004-001

2. Remove the Wing Thermal Anti-Ice Valve (Fig. 401)

A. References

- (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels

B. Access

(1) Location Zones

- 511 Leading Edge to Front Spar (Left)
- 611 Leading Edge to Front Spar (Right)

(2) Access Panels

- 511 PT Fixed Wing Upper Panel (Left)
- 611 PT Fixed Wing Upper Panel (Right)

C. Procedure

S 864-002

- (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11A31, ANTI-ICE WING

S 014-003

- (2) To remove the left valve V52, remove the fixed wing upper panel 511 PT (AMM 06-44-00/201).

S 014-004

- (3) To remove the right valve V57, remove the fixed wing upper panel 611 PT (AMM 06-44-00/201).

S 034-005

WARNING: DO NOT TOUCH THE THERMAL ANTI-ICE DUCT IF IT IS HOT. YOU CAN GET BURNED.

- (4) Disconnect the electrical connector from the valve (1).

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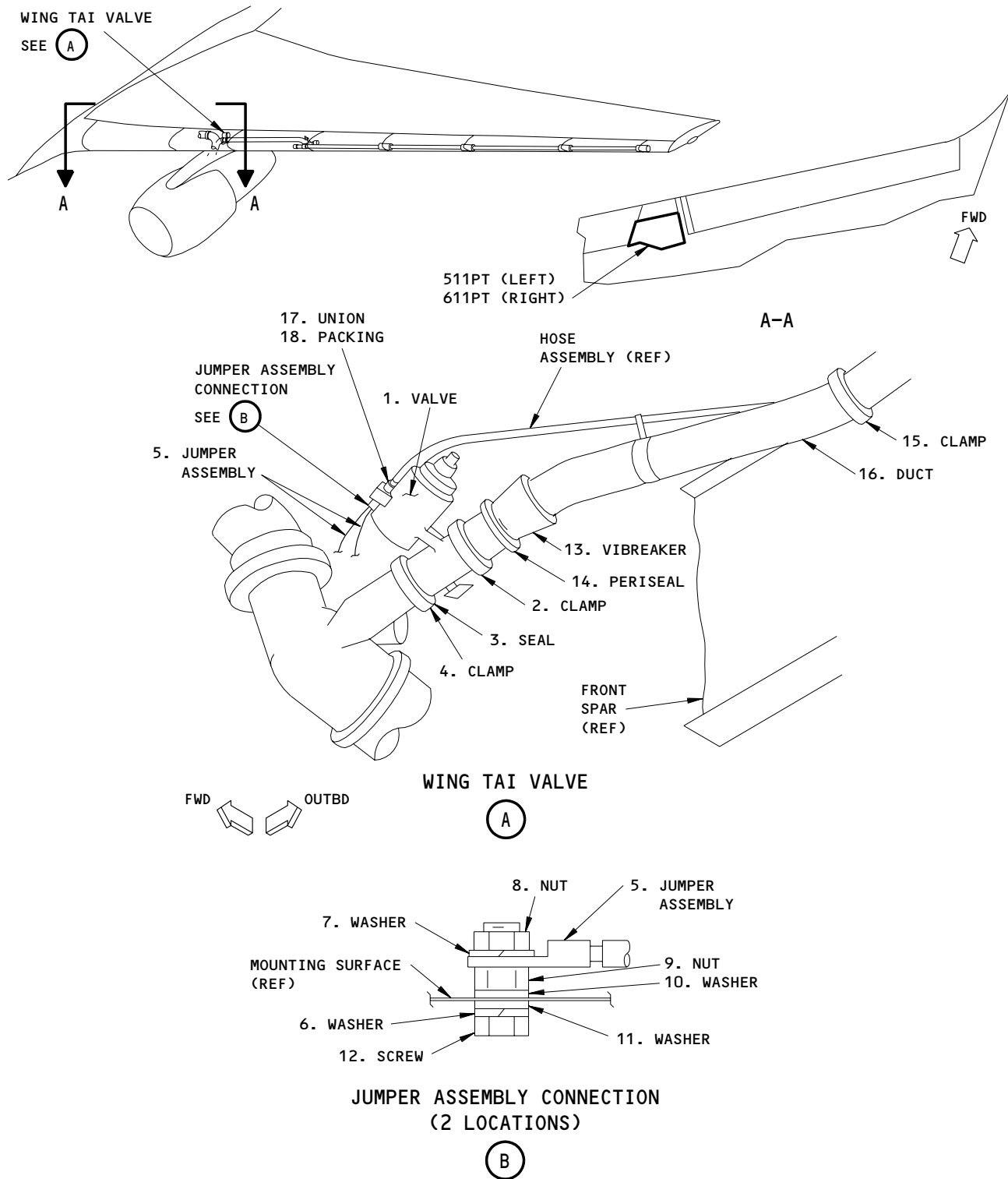
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Wing TAI Valve Installation
Figure 401

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S 034-006
(5) Remove the nuts (8) and the washers (7) to disconnect the jumper assemblies (5) from the valve (1).

S 034-007
(6) Disconnect the hose assembly from the valve (1).

S 034-008
(7) Remove the clamp (2) from the valve (1).

S 034-009
(8) Remove the clamp (4) and the seal (3) from the valve (1).

S 024-010
(9) Remove the valve (1).

S 034-011
(10) Remove the nuts (9), the washers (10), the washers (11), the washers (6), and the screws (12) from the valve (1), as shown (View B).

TASK 30-11-02-404-012

3. Install Wing Thermal Anti-Ice Valve (Fig. 401)

A. References

- (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 36-00-00/201, Pneumatic - General

B. Access

(1) Location Zones

- 511 Leading Edge to Front Spar (Left)
- 611 Leading Edge to Front Spar (Right)

(2) Access Panels

- 511 PT Fixed Wing Upper Panel (Left)
- 611 PT Fixed Wing Upper Panel (Right)

C. Parts

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AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Valve	30-11-02	01	675
	2	Clamp			591
	3	Seal			694
	4	Clamp			689
	5	Jumper Assembly			661
	6,7	Washer			664
	8	Nut			664A
	9	Nut			664B
	10,11	Washer			663
	12	Screw			662
	13	Vibreakeer			772
	14	Periseal			773
	15	Clamp			591
	16	Duct (Left) (Right)			760
	17	Union			765
	18	Packing			635
					640

D. Procedure

S 434-013

- (1) Install the screw (12), the washer (6), the washer (11), the washer (10), and the nut (9) on the valve (1) for the two jumper assemblies as shown (View B).

S 424-014

CAUTION: MAKE SURE THERE IS A 0.75 INCH MINIMUM CLEARANCE BETWEEN THE VALVE AND THE ADJACENT STRUCTURE. DAMAGE TO THE VALVE, THE STRUCTURE, OR OTHER EQUIPMENT CAN OCCUR IF THIS MINIMUM CLEARANCE IS NOT KEPT.

- (2) Install the valve (1) with a minimum of 0.75 inch clearance between the valve (1) and adjacent equipment or structure. Install the clamp (2).

S 434-015

- (3) Install the seal (3) between the valve (1) and the inboard duct section.

S 434-016

- (4) Install the clamp (4).

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- S 214-027
- (5) Look at the gap between the inside of the vibreaker (13) and the outside of the duct that is attached to the valve, at the periseal (14).
- S 034-028
- (6) Loosen the clamp (15) at the outboard end of the duct (16) enough to let the outboard end of duct (16) turn within the clamp (15).
- S 034-029
- (7) Turn the duct (16) to get an equal clearance between the inside of the vibreaker (13) and the outside of the interfacing duct, at the periseal (14).
- S 214-030
- (8) Make sure that the flange at the outboard end of the duct (16) touches the adjacent downstream duct, which makes a stable surface and aligns the duct centerlines.
- S 434-031
- (9) Tighten the locknut on the clamp (15).
- S 434-045
- (10) Install the union (17) and packing (18).
- S 434-017
- (11) Connect the tube assembly to the valve (1).
- S 434-018
- (12) Connect the electrical connector to the valve (1).
- S 434-019
- (13) Install the washers (7) and the nuts (8) to connect the jumper assemblies (5) to the valve (1).
- S 414-020
- (14) Install the applicable fixed wing upper panel (AMM 06-44-00/201).
- S 864-021
- (15) Remove DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11A31, ANTI-ICE WING

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E. Post Installation Test of the Valve

- S 864-023
- (1) Supply electrical power (AMM 24-22-00/201).
- S 864-024
- (2) Supply pneumatic power (AMM 36-00-00/201).
- S 714-022
- (3) Do a test of the wing thermal anti-ice valve installation:
- S 864-043
- (4) AIRPLANES WITHOUT PRIMARY ICE DETECTION;
Make sure the WING ANTI-ICE switch is in the OFF position.
- S 214-036
- (5) Hold the WING ANTI-ICE WINDOW/PROBE HEAT test switch on the P61 panel in the WING ANTI-ICE position.
- (a) Make sure the L (R) VALVE light on P5 panel comes on for approximately 1 to 3 seconds, then goes off for 10 to 20 seconds, and then stays on.
- (b) Make sure the EICAS message, L (R) WING ANTI-ICE, shows on the top display 4 seconds after the L (R) VALVE light stays on.
- S 864-042
- (6) AIRPLANES WITH PRIMARY ICE DETECTION;
Make sure the L-WING-R ANTI-ICE switch is in the off position.
- S 214-039
- (7) Hold the WING ANTI-ICE WINDOW/PROBE HEAT test switch on the P61 panel in the WING ANTI-ICE position.
- (a) Make sure the R and L VALVE lights on P5 panel come on for approximately 1 to 3 seconds, then goes off for approximately 7 seconds, and then comes on momentarily and then stays off .

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- S 214-040
- (8) Release the WING ANTI-ICE WINDOW/PROBE HEAT test switch.
(a) Make sure the EICAS message, L (R) WING ANTI-ICE, does not show on the top display.
- S 864-026
- (9) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).
- S 864-025
- (10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

EFFECTIVITY

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WING THERMAL ANTI-ICE OVERHEAT SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains three tasks. These tasks are the removal, the installation, and the test of the wing thermal anti-ice (TAI) overheat switch.
- B. The wing TAI overheat switch is near the middle of slats No. 5 (left wing) and No. 8 (right wing). The wing TAI overheat switch is installed on the wing TAI duct inboard of the telescoping duct. The removal and the installation procedures are the same for the left and right units.

TASK 30-11-03-004-001

2. Remove the Wing TAI Overheat Switch (Fig. 401)

A. References

- (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels

B. Access

(1) Location Zones

- 521 Leading Edge to Front Spar (Left)
- 621 Leading Edge to Front Spar (Right)

(2) Access Panels

- 521 ANB Fixed Wing Lower Panel (Left)
- 621 ANB Fixed Wing Lower Panel (Right)

C. Procedure

S 864-002

- (1) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tag:
 - (a) 11A31, ANTI-ICE WING

S 014-003

- (2) When you remove the left wing TAI overheat switch (S398), remove the fixed wing lower panel 521 ANB (AMM 06-44-00/201).

S 014-004

- (3) When you remove the right wing TAI overheat switch (S399), remove the fixed wing lower panel 621 ANB (AMM 06-44-00/201).

S 034-005

WARNING: LET THE WING TAI DUCT COOL BEFORE YOU TOUCH THE DUCT. THE WING THERMAL ANTI-ICE DUCT CAN BE HOT AND CAUSE INJURY TO PERSONS.

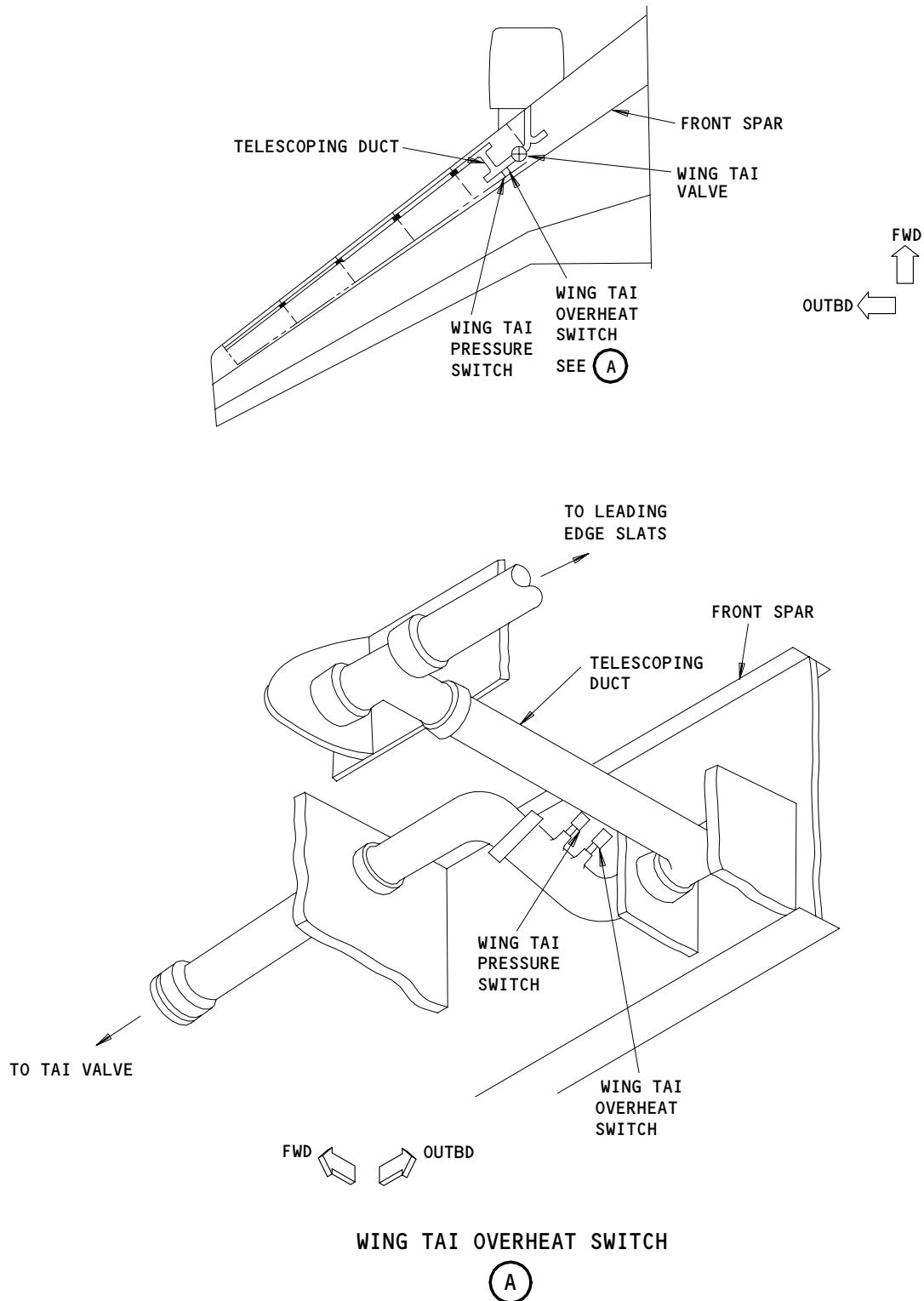
- (4) Remove the electrical connector from the wing TAI overheat switch.

EFFECTIVITY
SAS 150-154 WITHOUT SB 30-17,
AND MTH 275-999

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Wing Thermal Anti-Ice (TAI) Overheat Switch Installation
Figure 401

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SAS 150-154 WITHOUT SB 30-17,
AND MTH 275-999

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S 024-006

- (5) Remove the wing TAI overheat switch. Discard the O-ring.

TASK 30-11-03-404-007

3. Install the Wing TAI Overheat Switch (Fig. 401)

A. Consumable Materials

- (1) D00006 Anti-seize Compound, High Temperature - Ease-Off 990

B. References

- (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels

C. Access

(1) Location Zones

- | | |
|-----|------------------------------------|
| 521 | Leading Edge to Front Spar (Left) |
| 621 | Leading Edge to Front Spar (Right) |

(2) Access Panels

- | | |
|---------|--------------------------------|
| 521 ANB | Fixed Wing Lower Panel (Left) |
| 621 ANB | Fixed Wing Lower Panel (Right) |

D. Procedure

S 644-008

- (1) Apply the anti-seize compound to the threads.

S 424-029

- (2) Install a new O-ring on the wing TAI overheat switch.

S 424-009

- (3) Install the wing TAI overheat switch.

S 434-010

- (4) Connect the electrical connector to the wing TAI overheat switch and install the lockwire.

S 414-011

- (5) Install the fixed wing lower panel (AMM 06-44-00/201).

S 864-012

- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
 - (a) 11A31, ANTI-ICE WING

TASK 30-11-03-714-013

4. Do a Test of the Wing TAI Overheat Switch

A. References

- (1) AMM 24-22-00/201, Electrical Power - Control

EFFECTIVITY
SAS 150-154 WITHOUT SB 30-17,
AND MTH 275-999

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- (2) AMM 49-11-00/201, Auxiliary Power Unit
B. Access

(1) Location Zone
211/212 Control Cabin - Section 41

C. Procedure

S 864-014

- (1) Supply electrical power (AMM 24-22-00/201).

S 864-015

- (2) Start the APU (AMM 49-11-00/201).

NOTE: The APU is not necessary if you do the wing TAI overheat switch test during engine runup.

S 714-016

- (3) Push the L or R ISLN switch/light (air supply control module) (as applicable) on the pilot's overhead panel, P5, to the ON position.
(a) Make sure the white bar light is on.

S 714-018

- (4) Push the APU VALVE switch/light (air supply control module) on the P5 panel to the ON position.
(a) Make sure the white bar light is on.

S 714-020

- (5) Hold the WING ANTI-ICE WINDOW/PROBE HEAT test switch (on the P61 panel) in the WING ANTI-ICE position.
(a) Make sure the applicable light (L or R VALVE) on the P5 panel is on for approximately 2 seconds, goes off for approximately 10-20 seconds, and then stays on.

S 714-021

- (6) Release the WING ANTI-ICE WINDOW/PROBE HEAT test switch.
(a) Make sure the applicable light (L or R VALVE) goes off.

S 714-022

- (7) Push the APU VALVE switch/light on the P5 panel to the OFF position.
(a) Make sure the white bar light is off.

S 714-024

- (8) Push the L or R ISLN switch/light on the P5 panel to the OFF position.
(a) Make sure the white bar light is off.

S 864-026

- (9) Stop the APU if it is not necessary (AMM 49-11-00/201).

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SAS 150-154 WITHOUT SB 30-17,
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S 864-027

(10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

EFFECTIVITY
SAS 150-154 WITHOUT SB 30-17,
AND MTH 275-999

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WING THERMAL ANTI-ICE PRESSURE SWITCH – REMOVAL/INSTALLATION

1. General

- A. This procedure contains four tasks. These tasks are the removal, the installation, the test, and the circuit verification of the wing thermal anti-ice (TAI) pressure switch.
- B. The wing TAI pressure switches are near the middle of slats number 5 (left wing) and number 8 (right wing). Each wing TAI pressure switch is installed on the wing TAI duct inboard of the telescoping duct. The removal and the installation procedures are the same for the left and right switches.

TASK 30-11-04-004-001

2. Remove the Wing TAI Pressure Switch (Fig. 401)

A. References

- (1) AMM 06-44-00/201 Wings (Major Zones 500 and 600) Access Doors and Panels

B. Access

(1) Location Zones

- 521 Leading Edge to Front Spar (Left)
- 621 Leading Edge to Front Spar (Right)

(2) Access Panels

- 521ANB Fixed Wing Lower Panel (Left)
- 621ANB Fixed Wing Lower Panel (Right)

C. Procedure

S 864-002

- (1) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tag:
 - (a) 11A31, ANTI-ICE WING

S 014-003

- (2) For the left wing TAI pressure switch (S400), remove the fixed wing lower panel 521 ANB (AMM 06-44-00/201).

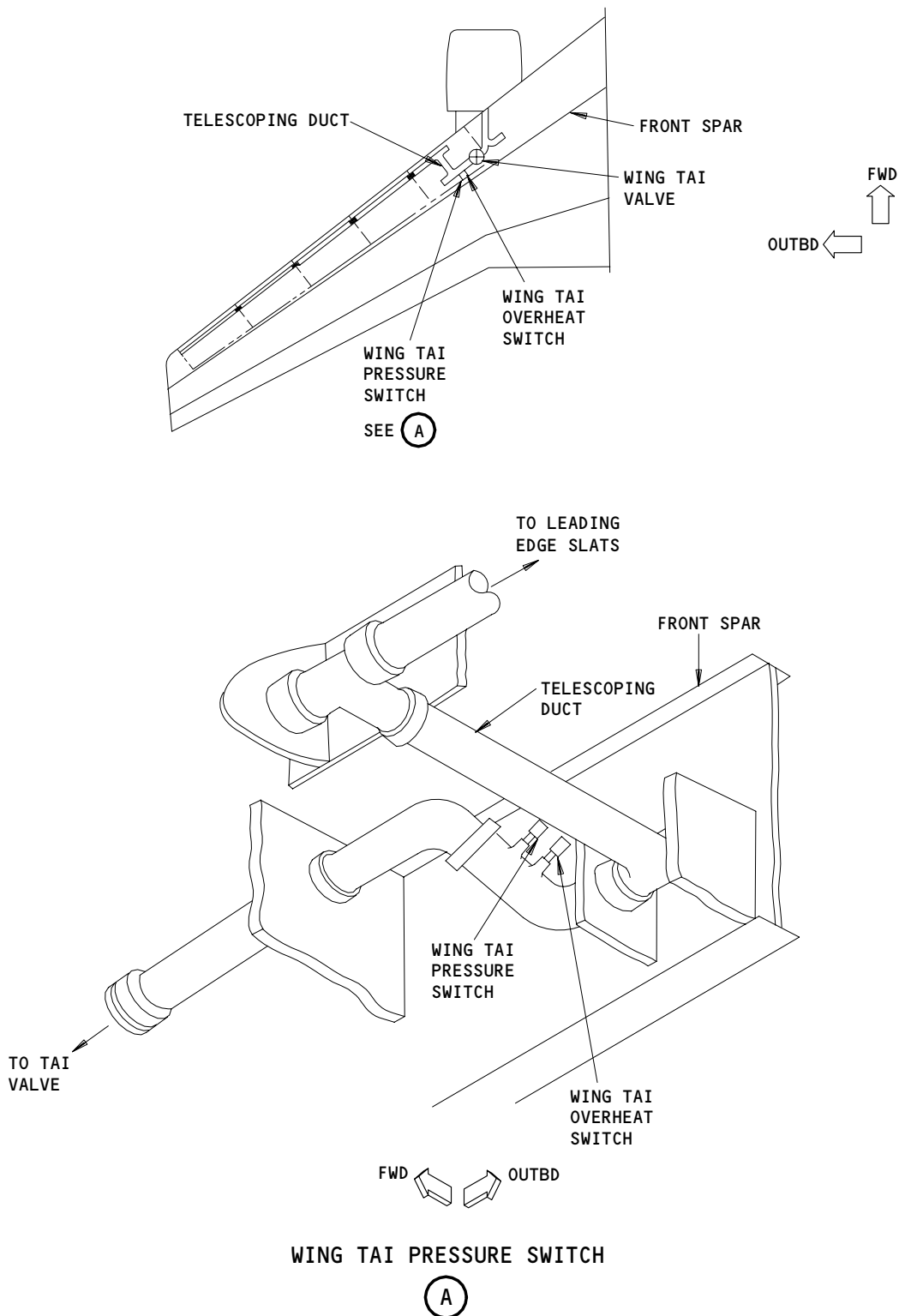
EFFECTIVITY

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Wing Thermal Anti-Ice (TAI) Pressure Switch Installation
Figure 401

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S 014-042

- (3) For the right wing TAI pressure switch (S401),
remove the fixed wing lower panel 621 ANB (AMM 06-44-00/201).

S 034-004

WARNING: LET THE WING TAI DUCT COOL BEFORE YOU TOUCH THE DUCT. THE WING
THERMAL ANTI-ICE DUCT CAN BE HOT AND CAUSE INJURY TO PERSONS.

- (4) Remove the electrical connector from the wing TAI pressure switch.

S 024-005

- (5) Remove the wing TAI pressure switch and the O-ring packing.

TASK 30-11-04-404-006

3. Install the Wing TAI Pressure Switch (Fig. 401)

A. Consumable Materials

- (1) Bostik NEVER-SEEZ Pure Nickel Special

B. References

- (1) AMM 06-44-00/201 Wings (Major Zones 500 and 600) Access Doors and
Panels

C. Access

(1) Location Zones

- 521 Leading Edge to Front Spar (Left)
621 Leading Edge to Front Spar (Right)

(2) Access Panels

- 521ANB Fixed Wing Lower Panel (Left)
621ANB Fixed Wing Lower Panel (Right)

D. Procedure

S 394-007

- (1) Apply the anti-seize compound to the threads.

S 424-008

- (2) Install the wing TAI pressure switch with a new O-ring packing.

S 434-009

- (3) Connect the electrical connector to the wing TAI pressure switch and
install the lockwire.

S 414-010

- (4) Install the fixed wing lower panel.

S 864-011

- (5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the
overhead circuit breaker panel P11.
(a) 11A31, ANTI-ICE WING

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TASK 30-11-04-704-012

4. Do a Test of the Wing TAI Pressure Switch

A. Equipment

- (1) Blanking Plate - A30002-1

B. Access

(1) Location Zones

- 511/521 Leading Edge to Front Spar (Left)
- 611/621 Leading Edge to Front Spar (Right)

(2) Access Panels

- 511 PT Fixed Wing Upper Panel (Left)
- 611 PT Fixed Wing Upper Panel (Right)
- 521 ANB Fixed Wing Lower Panel (Left)
- 621 ANB Fixed Wing Lower Panel (Right)

C. References

- (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 31-41-00/201, Engine Indication and Crew Alerting System (EICAS)
- (4) AMM 36-00-00/201, Pneumatic Power

D. Procedure

S 014-013

- (1) Remove the fixed wing upper panel 511 PT (left) or 611 PT (right) as applicable (AMM 06-44-00/201).

S 014-014

- (2) Remove the fixed wing lower panel 521 ANB (left) or 621 ANB (right) as applicable.

S 484-015

- (3) Remove the first duct clamp that is downstream of the wing TAI pressure switch and install the blanking plate. Install the duct clamp.

NOTE: The blanking plate causes blockage of the piccolo holes in the duct downstream of the switch. This blockage lets enough pressure upstream to operate the wing TAI pressure switch during the test.

S 864-016

- (4) Supply electrical power (AMM 24-22-00/201).

S 714-017

- (5) Make sure the Engine Indication and Crew Alerting System (EICAS) operates (AMM 31-41-00/201).

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S 864-018

- (6) Push the ECS MSG switch on the P61 right panel to ON.

S 864-019

- (7) Supply pneumatic pressure at 35 to 40 psi (AMM 36-00-00/201).

S 984-120

- (8) Push the L or R ISLN switch/light (air supply control module) (as applicable) on P5 panel to ON.
(a) Make sure the white bar light is ON.

S 984-022

WARNING: BE CAREFUL WHEN YOU HOLD THE TAI VALVE OPEN. THE WING TAI VALVE IS HOT WHEN PNEUMATIC PRESSURE IS SUPPLIED. THE HOT VALVE CAN CAUSE INJURY.

- (9) Manually set the applicable wing TAI valve to the fully open position and hold.

NOTE: The valve is spring loaded.

S 214-114

- (10) Make sure the L or R WING TAI VALVE message (as applicable) is shown after 25 sec. on the lower EICAS display.

S 864-116

WARNING: RELEASE THE PRESSURE IN THE PNEUMATIC DUCT BEFORE YOU REMOVE A PNEUMATIC SYSTEM COMPONENT. THE HOT, HIGH PRESSURE AIR CAN CAUSE INJURY TO PERSONS.

- (11) Decrease the air pressure to zero psi.

S 984-024

- (12) Manually release the TAI valve to the closed position.

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S 214-117

- (13) Make sure the message stays shown on the lower EICAS display.

S 864-026

- (14) Remove the pneumatic power if it is not necessary (AMM 36-00-00/201).

S 864-027

- (15) Do the EICAS erase procedure (AMM 31-41-00/201).

S 864-028

- (16) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 084-029

CAUTION: REMOVE THE BLANKING PLATE FROM THE DUCT. THE WING TAI SYSTEM WILL NOT OPERATE WITH THE BLANKING PLATE INSTALLED.

- (17) Remove the blanking plate from the TAI duct downstream of the wing TAI pressure switch and install the duct clamp.

E. Do a leak test of TAI duct clamp.

S 864-101

- (1) Supply pneumatic pressure at 35 to 40 psi (AMM 36-00-00/201).

(a) Make sure the white bar light is on.

NOTE: If there is internal leakage of the valve or if the valve is partially open, the pressure switch can close. This can cause the L or R WING TAI VALVE message to show on the bottom of the EICAS display before the valve is manually opened.

S 984-104

WARNING: BE CAREFUL WHEN YOU HOLD THE TAI VALVE OPEN. THE WING TAI VALVE IS HOT WHEN PNEUMATIC PRESSURE IS SUPPLIED. THE HOT VALVE CAN CAUSE INJURY.

- (2) Manually set the applicable wing TAI valve to the fully open position and hold.

NOTE: The valve is spring loaded.

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S 214-122

- (3) Make sure that the L or R WING TAI VALVE EICAS message (as applicable) does not show after 25 sec. on the lower EICAS display.

S 794-053

- (4) Do a check of the duct and clamp connections in the reinstalled area for air leakage.

NOTE: Air leakage is when you feel the airflow with your hand hand at a distance of 12 inches from a point on the duct joint or connection.

S 864-054

WARNING: RELEASE THE PRESSURE IN THE PNEUMATIC DUCT BEFORE YOU REMOVE A PNEUMATIC SYSTEM COMPONENT. THE HOT, HIGH PRESSURE AIR CAN CAUSE INJURY TO PERSONS.

- (5) Decrease the air pressure to zero psi.

S 364-056

- (6) Repair air leakage by joint or coupling adjustment or replacement of the duct.

S 794-057

- (7) Do a leak test again after you do a repair.

S 984-107

- (8) Manually release the TAI valve to the closed position.

S 864-110

- (9) Remove the pneumatic power if it is not necessary (AMM 36-00-00/201).

S 864-113

- (10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-100

- (11) Install the wing access panels.

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TASK 30-11-04-704-031

5. Circuit Verification for the Wing TAI Pressure Switch

NOTE: This test does not use a blanking plate. This test does a check of the system circuit when there is a problem. It is not intended to use for pressure switch post-installation testing.

A. References

- (1) AMM 06-44-00/201 Wings (Major Zones 500 and 600) Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 31-41-00/201, Engine Indication and Crew Alerting System (EICAS)

B. Access

- (1) Location Zones
 - 521 Leading Edge to Front Spar (Left)
 - 621 Leading Edge to Front Spar (Right)
- (2) Access Panels
 - 521ANB Fixed Wing Lower Panel (Left)
 - 621ANB Fixed Wing Lower Panel (Right)

C. Procedure

- S 864-032
 - (1) Supply electrical power (AMM 24-22-00/201).
- S 714-074
 - (2) Make sure the Engine Indication and Crew Alerting System (EICAS) operates (AMM 31-41-00/201).
- S 864-035
 - (3) Push the ECS MSG switch on the P61 right side panel to show the maintenance level messages.
- S 034-036
 - (4) Disconnect the electrical connector from the wing TAI pressure switch.
- S 484-037
 - (5) Connect a jumper between pins 2 and 3.
- S 714-038
 - (6) Make sure the L or R WING TAI VALVE message (as applicable) is shown on the EICAS display.
- S 084-039
 - (7) Remove the jumper.

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- S 434-040
- (8) Connect the electrical connector to the wing TAI pressure switch.
- S 864-041
- (9) Do the EICAS erase procedure (AMM 31-41-00/201).
- S 864-034
- (10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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TELESCOPING DUCT - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the wing thermal anti-ice system telescoping ducts from the outboard leading edge slats of each wing. The second task is the installation of the wing thermal anti-ice system telescoping ducts.

TASK 30-11-05-004-001

2. Remove the Telescoping Duct (Fig. 401)

A. References

- (1) AMM 27-81-00/201, Leading Edge Slat System
(2) AMM 30-11-06/401 Interstitial Duct

B. Access

- (1) Location Zones
521/621 Leading Edge to Front Spar

C. Procedure

S 864-002

- (1) Extend the leading edge slats to the fully extended position with hydraulic or electric drive (AMM 27-81-00/201).

S 864-003

- (2) Do the deactivation procedure for the slat drive system (AMM 27-81-00/201).

S 034-004

- (3) Remove the two bolts that attach the TAI seal door to the telescoping duct.

S 034-005

- (4) At the aft end of the telescoping duct, remove the clamp that attaches the inboard anti-ice duct to the telescoping duct.

S 034-006

- (5) Pull the inner tube out of the tee at the telescoping duct aft mount.

S 034-007

- (6) Remove the three bolts that attach each telescoping duct bearing to the wing front spar.

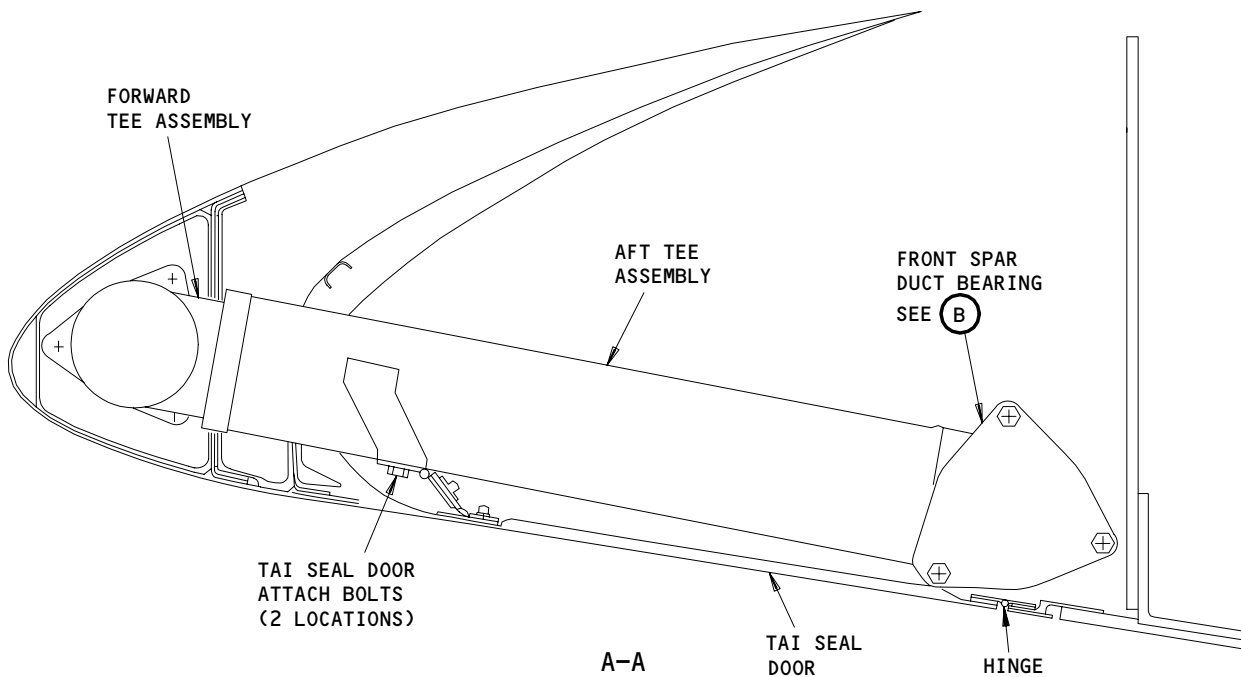
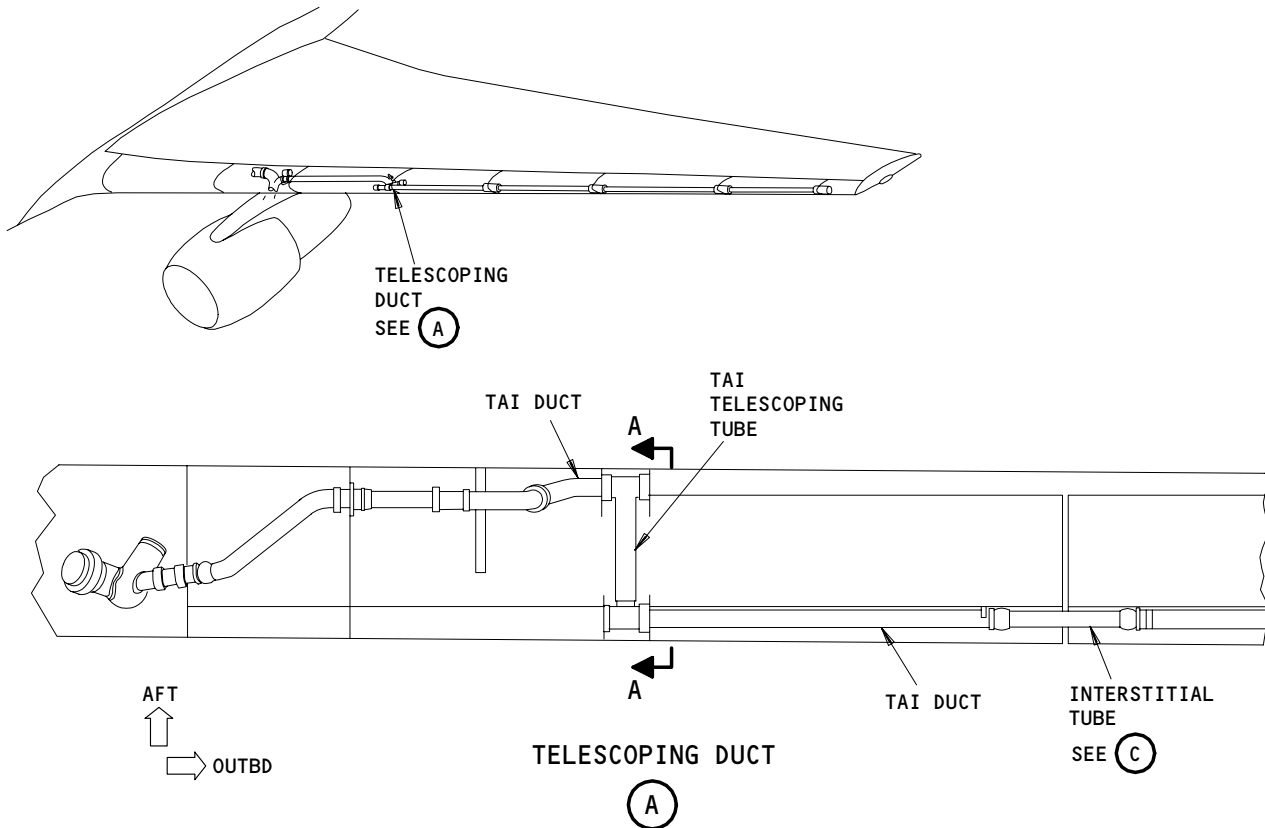
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Telescoping Duct Installation
Figure 401 (Sheet 1)

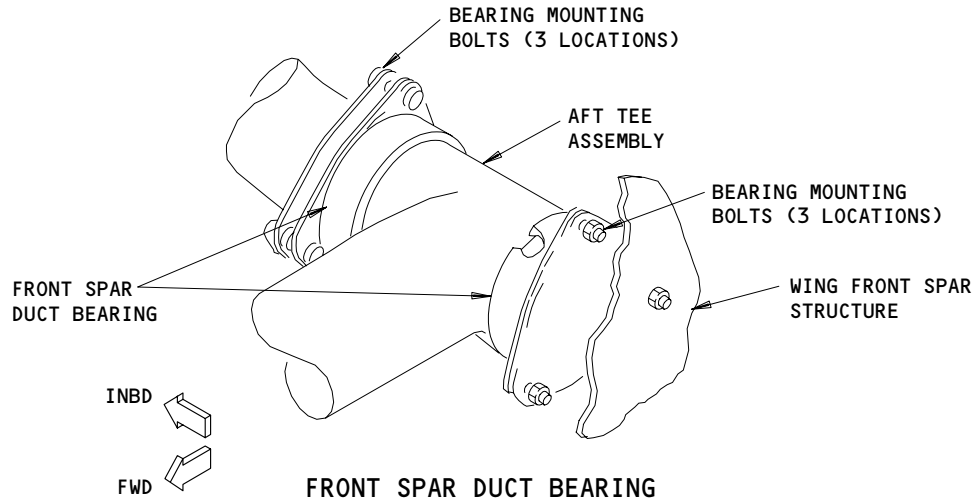
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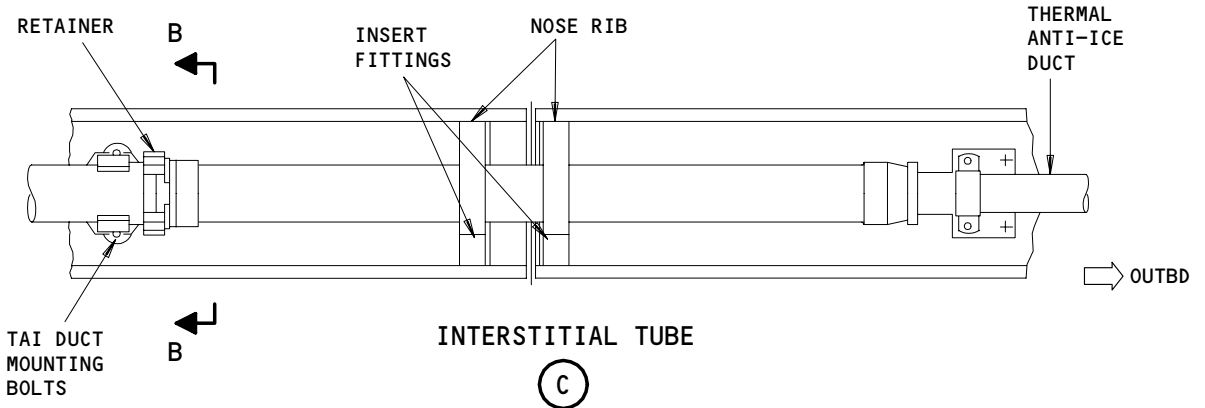
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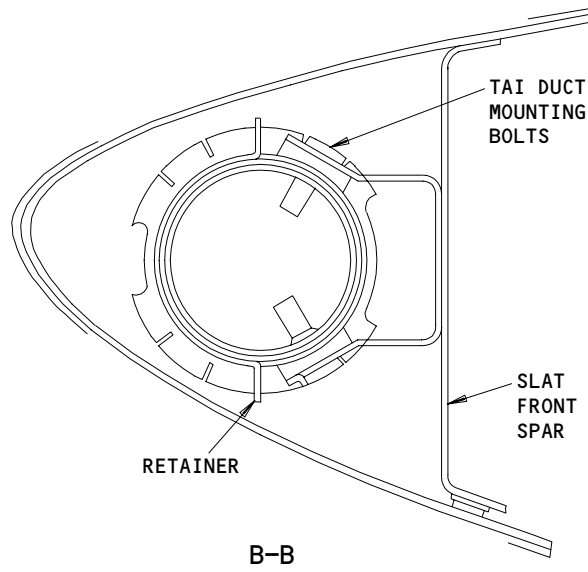
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(B)



(C)



B-B

Telescoping Duct Installation
Figure 401 (Sheet 2)

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S 024-008

- (7) To remove the aft tee assembly only, lower the aft end of telescoping tube from the airplane and pull the aft and forward tee assemblies apart.

NOTE: Be careful not to let the expansion ring seal on the forward tee assembly come apart while you remove the aft tee assembly from the forward tee assembly.

S 024-009

- (8) To remove the forward tee assembly:
- (a) Remove the access panels between slats 4 and 5 or between slats 8 and 9, as applicable.
 - (b) Remove the retainer at the inboard end of the interstitial duct (Ref 30-11-06).
 - (c) Move the interstitial duct outboard until it is clear of the end of the inboard TAI duct.
 - (d) Remove the two bolts that hold the TAI duct to the slat.
 - (e) Pull the TAI duct outboard until the forward tee assembly is free.
 - (f) Turn the forward tee assembly to align the tee with clearance cutouts in the slat structure and remove forward tee assembly.

TASK 30-11-05-404-010

3. Install the Telescoping Duct

A. References

- (1) AMM 27-81-00/201, Leading Edge Slat System

B. Access

- (1) Location Zones
521/621 Leading Edge to Front Spar

C. Procedure

S 424-011

- (1) Attach the forward tee assembly to the slat:
- (a) Push the forward tee through the clearance cutouts in the slats and put it between the slat duct bearings.
 - (b) Push the TAI duct through the slat duct bearings and the end of the forward tee assembly.
 - (c) Attach the outboard end of the TAI duct to the slat structure with two bolts.
 - (d) Move the interstitial duct inboard over the end of the TAI duct.
 - (e) Install the retainer that holds the interstitial duct to the TAI duct.
 - (f) Replace the access panels.

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- S 434-012
- (2) Move the aft tee assembly over the seals and bearings on the forward tee assembly.
- S 434-013
- (3) Push the front spar duct bearings over each end of the aft tee assembly.
- S 434-014
- (4) Turn the telescoping duct to put the front spar duct bearings between the mounting points on the wing front spar. Install the bearings with three bolts each.
- S 434-015
- (5) Push the inner tube through the bearings and tee assembly.
- S 434-016
- (6) Attach the inner tube with a clamp to the inboard TAI duct.
- S 434-017
- (7) Attach the TAI seal door to the telescoping duct with two bolts.
- S 864-018
- (8) Put the slat drive system back to its usual condition (AMM 27-81-00/201).

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INTERSTITIAL DUCT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the interstitial duct. The second task is the installation of the interstitial duct.

TASK 30-11-06-004-001

2. Remove the Interstitial Duct (Fig. 401)

A. References

- (1) AMM 27-81-00/201, Leading Edge Slat System

B. Procedure

S 914-002

- (1) Do the deactivation procedure for the slat drive system (AMM 27-81-00/201).

NOTE: You can remove the interstitial ducts with the slats in any position.

S 014-003

- (2) Remove the access panels at the slat leading edge.

S 034-004

- (3) Remove the bolts that attach the lower retainers to the nose ribs (Section D-D). Remove the lower retainers.

S 034-005

- (4) Drill out the rivets that hold the insert fittings to the nose ribs. Remove the insert fittings.

S 034-006

- (5) Remove the bolts that hold the forward and aft retainers together (Section C-C). Remove the forward retainer.

S 034-007

- (6) Loosen the bolts that attach the inboard TAI duct and aft retainer to the slat front spar (Section B-B). Release the interstitial duct from the aft retainer.

S 034-016

- (7) Move the interstitial duct outboard until the inboard end is free of the inboard TAI duct.

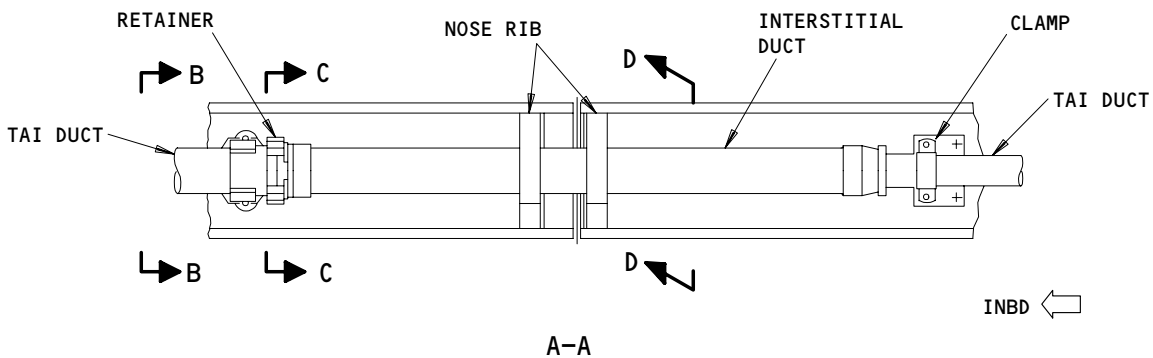
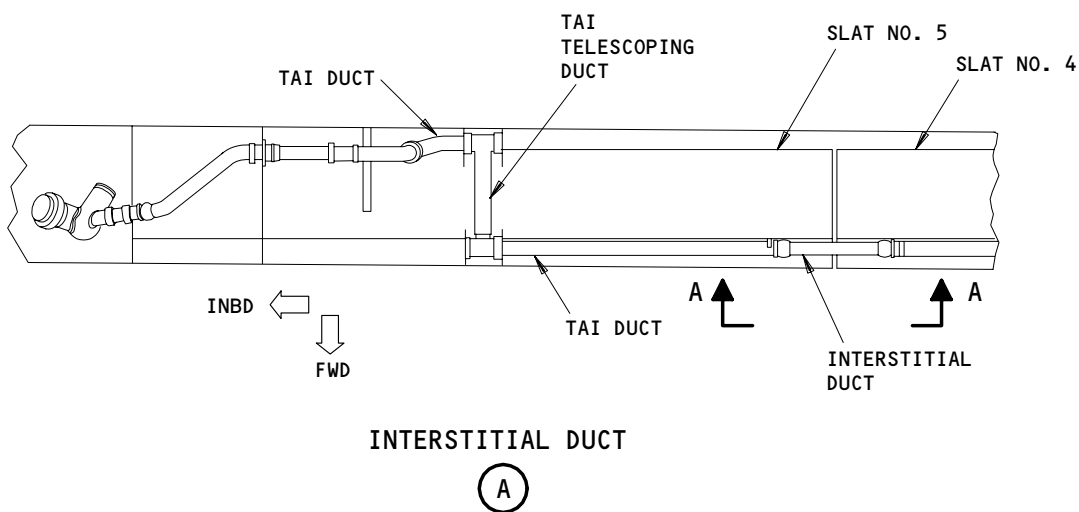
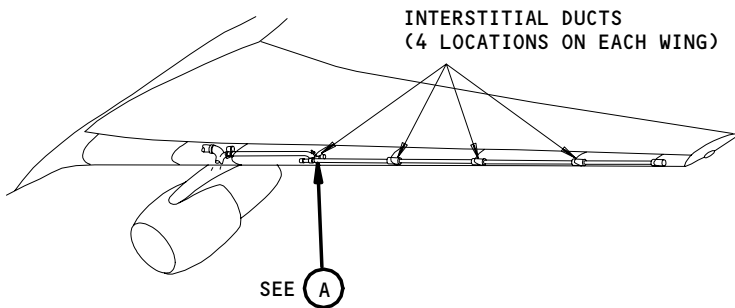
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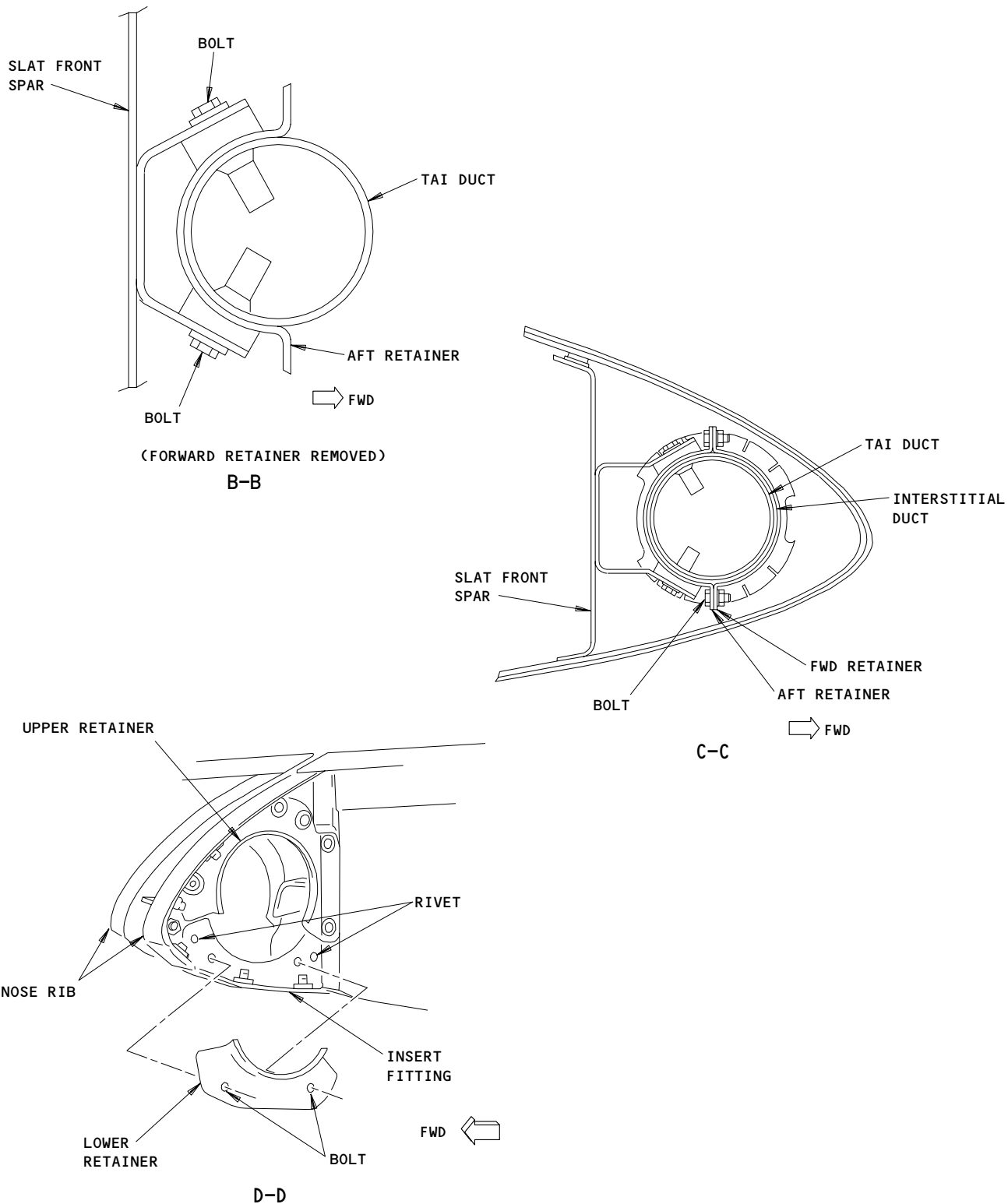


Interstitial Duct Installation
Figure 401 (Sheet 1)

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Interstitial Duct Installation
Figure 401 (Sheet 2)

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S 024-008

- (8) Pull the inboard end of the duct out, away from from TAI duct. Move the interstitial duct inboard to remove the duct from the slat.

TASK 30-11-06-404-009

3. Install the Interstitial Duct (Fig. 401)

A. Consumable Materials

- (1) Rivets, BACR15BA5A5 (5/32 inch diameter)

B. References

- (1) AMM 27-81-00/201, Leading Edge Slat System

C. Procedure

S 424-010

- (1) Put the end of the interstitial duct on the outboard TAI duct.

S 434-017

- (2) Align the inboard end of the duct with the inboard TAI duct, then move the end inboard until duct aligns with the retainer (Section A-A and C-C).

S 434-011

- (3) Tighten the bolts that attach the inboard TAI duct and aft retainer to the slat front spar (Section B-B).

S 434-018

- (4) Attach the forward retainer to the aft retainer with bolts (Section C-C).

S 434-012

- (5) Attach the insert fittings to the nose ribs with the rivets (Section D-D).

S 434-013

- (6) Attach the lower retainers with the bolts to the nose ribs (Section D-D).

S 414-014

- (7) Install the access panels at the slat leading edge.

S 914-015

- (8) Put the slat drive system back to its usual condition (AMM 27-81-00/201).

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ENGINE INLET THERMAL ANTI-ICING - DESCRIPTION AND OPERATION

1. General

- A. Engine bleed air removes ice from the engine inlets. The system has these components:
 - (1) Engine inlet thermal (TAI) anti-ice valves
 - (2) Pressure switches
 - (3) Engine inlet thermal anti-ice ducts
 - (4) Engine inlet thermal anti-ice overheat temperature switches
 - (5) Wing and engine anti-ice control panel.
- B. System electrical power is usually from the 28v dc standby bus, and the right main bus, through circuit breakers found on the overhead circuit breaker panel, P11. If no power is available on the right main bus, system electrical power will come from the 28v dc battery bus.
- C. The use of the thermal anti-ice system for the wing or the engine cowl will change the engine pressure ratio (EPR). The two EPR values will decrease if the left or the right engine air is used by the anti-ice system (AMM 77-12-00/001).

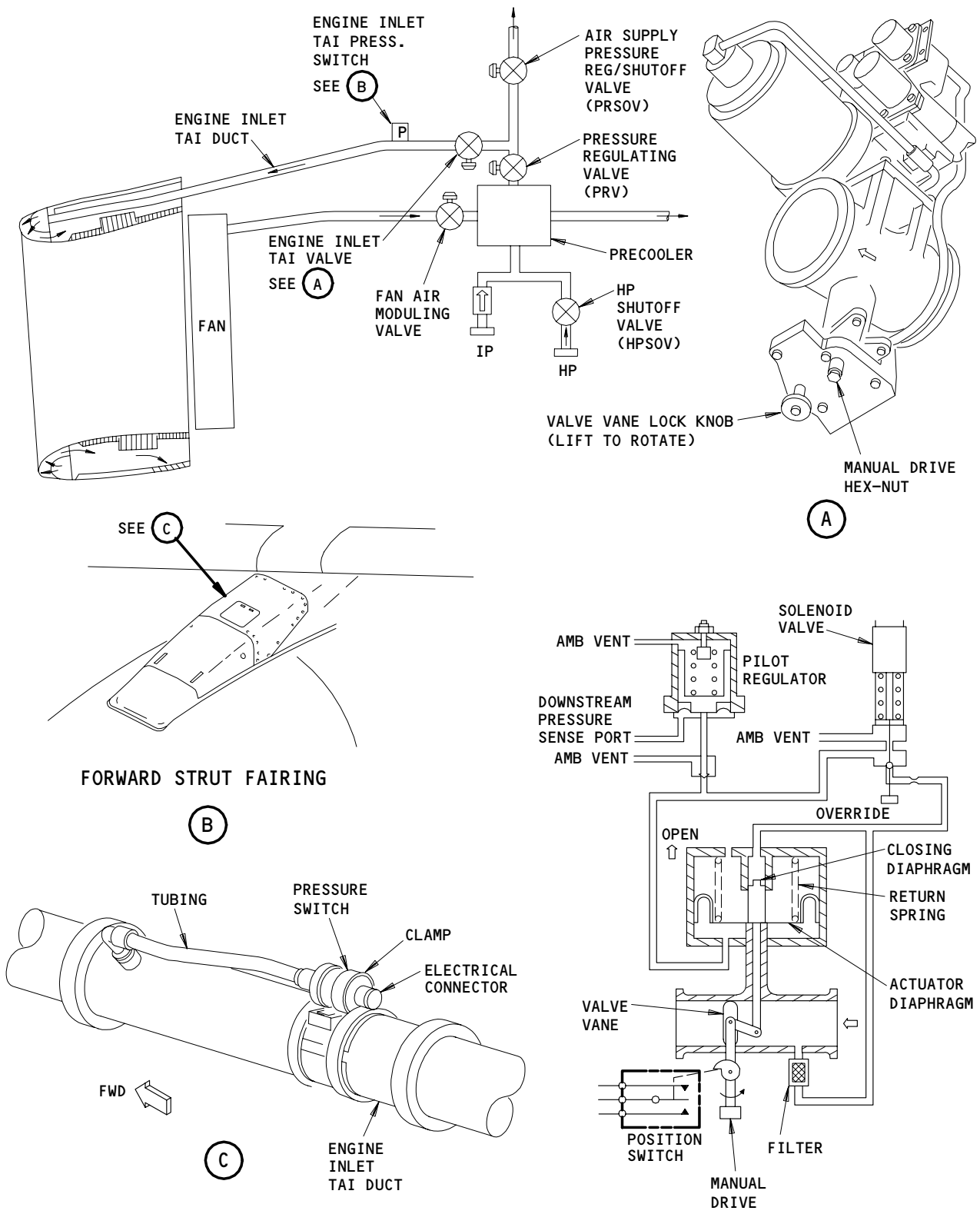
2. Component Details (Fig. 1)

- A. Engine Inlet Thermal Anti-Ice (TAI) Valves
 - (1) The engine inlet TAI valve controls the flow of engine bleed air into the TAI ducts. One valve is on the top part of each engine. The valve is electrically controlled, pneumatically operated, and is set to keep duct air pressure between 20-28 psi.
 - (2) An indicator on the valve shows if the valve vane is CLOSED or NOT CLOSED. A person can manually operate the valve and lock it at the fully open or fully closed position.
 - (3) When the TAI valve solenoid is energized, it opens an upstream air passage to the actuator diaphragm. Upstream air pressure becomes more than the forces of the return spring and the closing diaphragm. The actuator diaphragm opens the valve vane.
 - (4) When the TAI valve solenoid is not energized, it closes the upstream air passage to the actuator diaphragm. The actuator diaphragm is opened to ambient air. Upstream air pressure on the closing diaphragm and the return spring close the valve vane. Upstream air pressure keeps the valve vane in the closed position.
 - (5) The pilot pressure regulator gets input from the downstream (regulated) pressure. If downstream pressure is more than the adjustment setting of the pilot regulator, a valve bleeds off the actuator diaphragm pressure. The closing diaphragm and return spring partially close the valve vane.
- B. Engine Inlet TAI Pressure Switches
 - (1) A pressure switch is on the TAI duct at the top of each engine. The pressure switch gets input from a failure in the pressure regulating function of the TAI valve.
- C. Engine Inlet TAI Ducts
 - (1) The TAI ducts move engine bleed air along the top and left side of each engine. The bleed air is supplied to the inner surface along the leading edge of the engine inlet.

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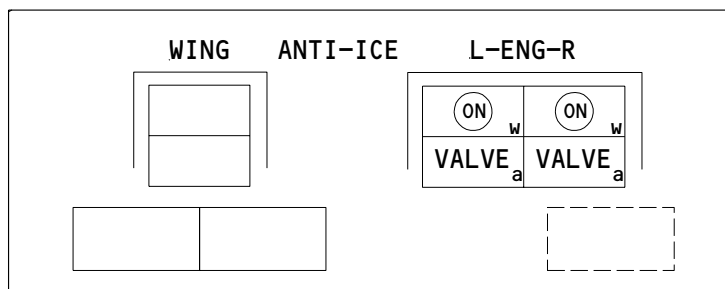
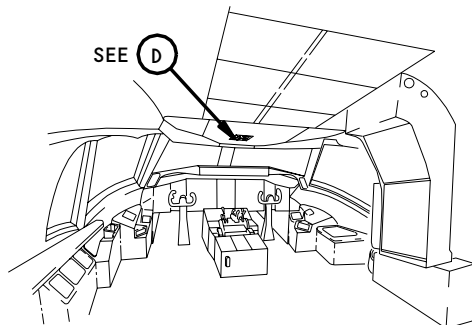
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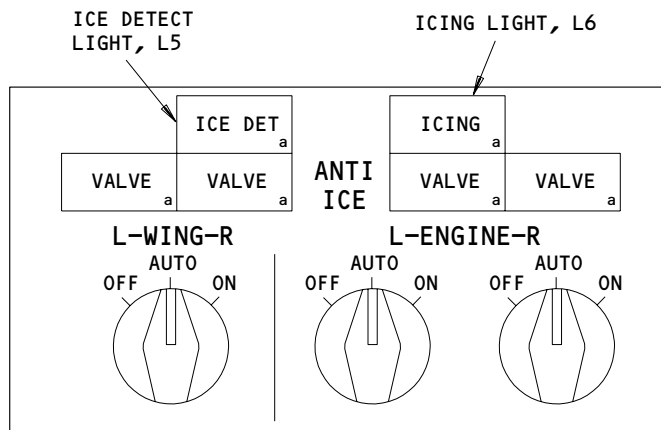
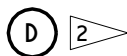
Engine Inlet TAI Component Location
Figure 1 (Sheet 1)

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M10397 - WING AND ENGINE ANTI-ICE CONTROL PANEL



M10397 - WING AND ENGINE ANTI-ICE CONTROL PANEL

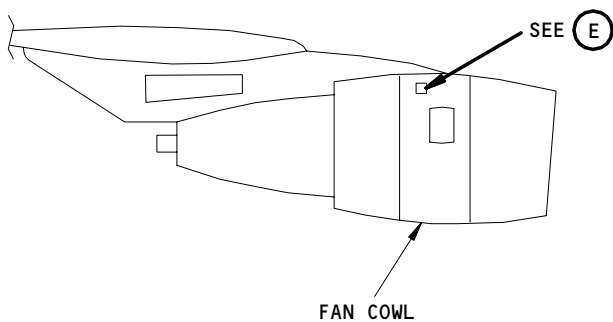


- AIRPLANES WITHOUT PRIMARY ICE DETECTION
- AIRPLANES WITH PRIMARY ICE DETECTION

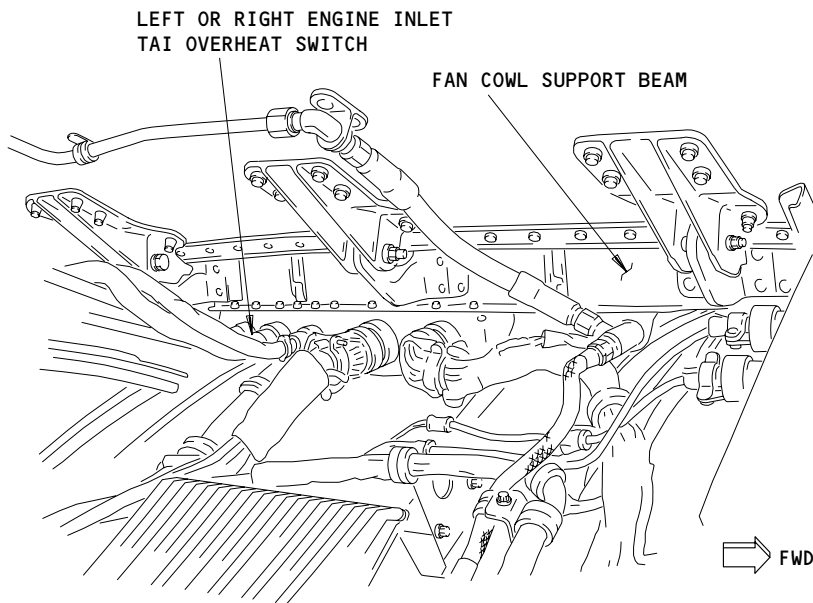
Engine Inlet TAI Component Location
Figure 1 (Sheet 2)

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LEFT OR RIGHT ENGINE



ENGINE INLET THERMAL ANTI-ICE OVERHEAT SWITCH

(E)

Engine Inlet TAI Component Location
Figure 1 (Sheet 3)

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- D. Engine Inlet TAI Overheat Temperature Switch
- (1) An overheat switch is on the right side of the fan cowl support beam for each engine. If ambient air temperature inside the cowl exceeds 250 + or - 5 Degrees F, the switch contacts will close, energizing and latching the Eng EEC Overheat relay, which will close the anti-ice valve until air temperature drops below 250 Degrees F and the engine inlet TAI system is turned off and back on. When the switch closes, the message L (R) COWL DUCT LEAK is displayed.
- E. Wing and Engine Anti-Ice Control Panel
- (1) SAS 150-154 WITHOUT SB 30-17, AND MTH 275-999;
Two switches on the wing and engine anti-ice control panel, M10397, control the operation of the engine anti-ice system. The switches are push-on/push-off type with a white ON light and an amber VALVE light. The M10397 panel also controls the wing anti-ice system. The M10397 panel is on the pilot's overhead panel, P5.
 - (2) SAS 150-154 WITH SB 30-17, AND SAS 050-149, 155-274;
Two switches on the wing and engine anti-ice control panel, M10397, control the engine anti-ice system. The switches are rotary switches with three positions: ON, OFF, and AUTO. The M10397 panel is on the pilot's overhead panel, P5.

3. Operation (Fig. 2)

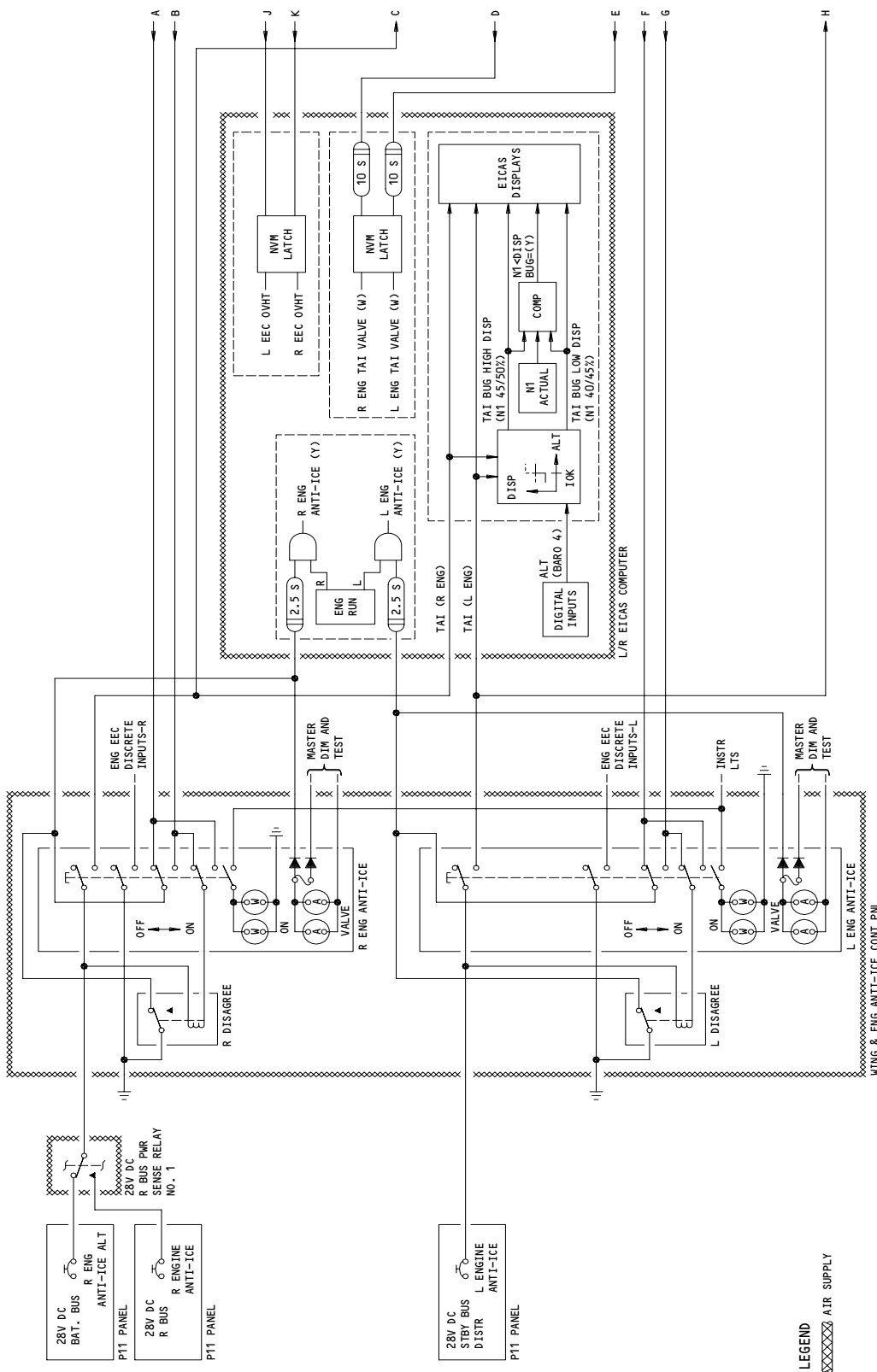
A. Functional Description

- (1) SAS 150-154 WITHOUT SB 30-17, AND MTH 275-999;
When you push an ANTI-ICE ENGINE switch on the M10397 panel, the amber VALVE light comes on. Two seconds later, the cowl TAI valve control time delay (T/D) relay closes and the TAI valve opens. The VALVE light goes off after the valve opens.
- (2) SAS 150-154 WITH SB 30-17, AND SAS 050-149, 155-274;
The ENGINE ANTI-ICE switches will usually be in the AUTO position during flight and the engine anti-ice system will operate automatically. A person can operate the engine anti-ice system manually, if necessary. In manual or automatic operation, the VALVE light above the switch comes on when the anti-ice system starts. Two seconds later, the cowl TAI valve control time delay (T/D) relay closes and the TAI valve opens. The VALVE light goes off after the valve opens.
 - (a) The VALVE light above the switch comes on if the valve's position disagrees with its commanded position. The EICAS display shows L or R ENG ANTI-ICE.
- (3) If the duct pressure is more than 30 psi, the pressure switch closes, and the EICAS display shows the message, ENG TAI VALVE.
- (4) If the temperature in an engine compartment is more than 250 degrees F the engine inlet TAI overheat temperature switch opens. The engine inlet TAI valve closes. The EICAS display shows the messages, L(R) COWL DUCT LEAK and L(R) ENG TAI VALVE. The amber VALVE light comes on.

EFFECTIVITY

ALL

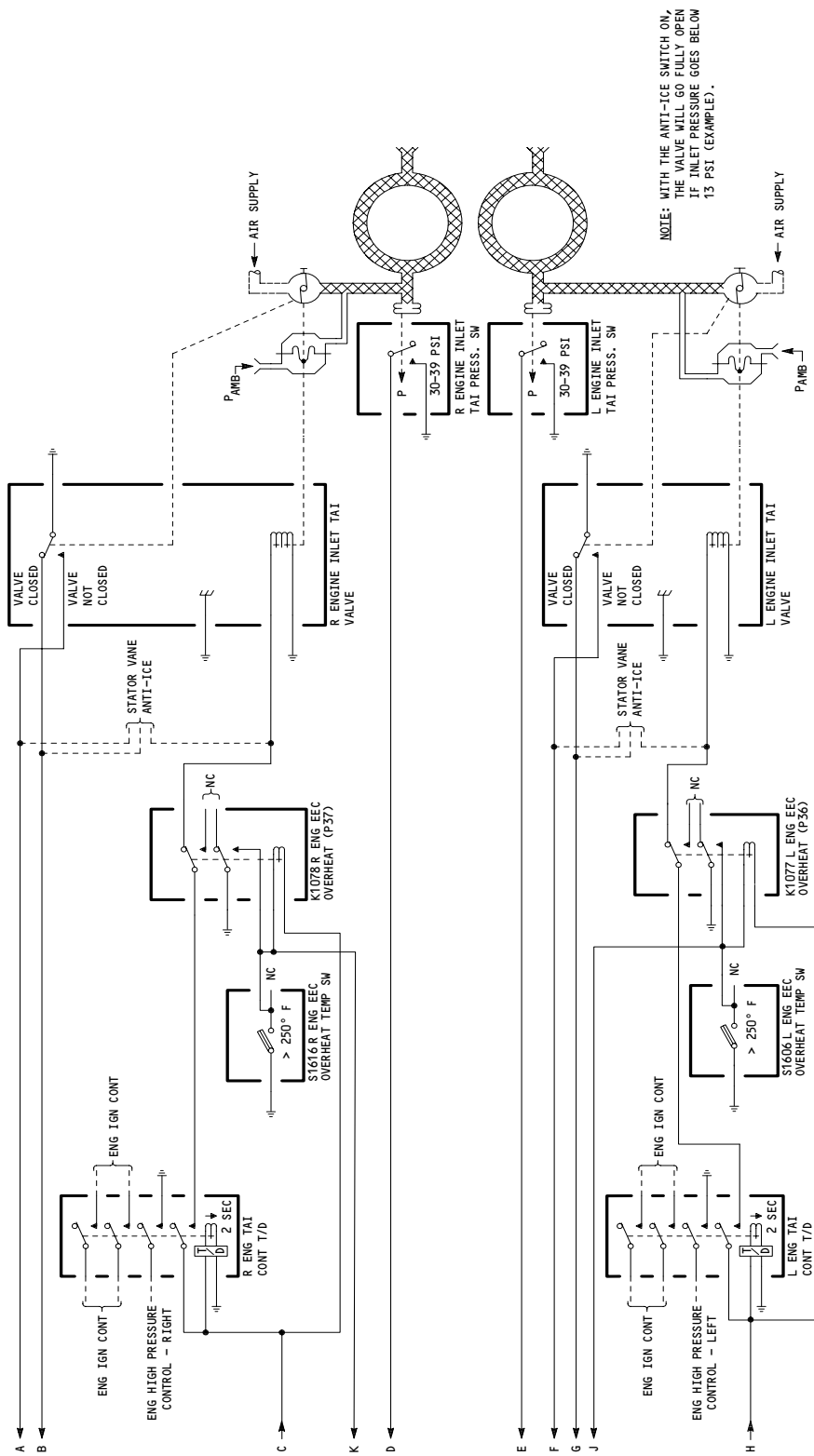
30-21-00



Engine Inlet Thermal Anti-Icing Schematic
Figure 2 (Sheet 1)

EFFECTIVITY
SAS 150-154 WITHOUT SB 30-17; MTH ALL

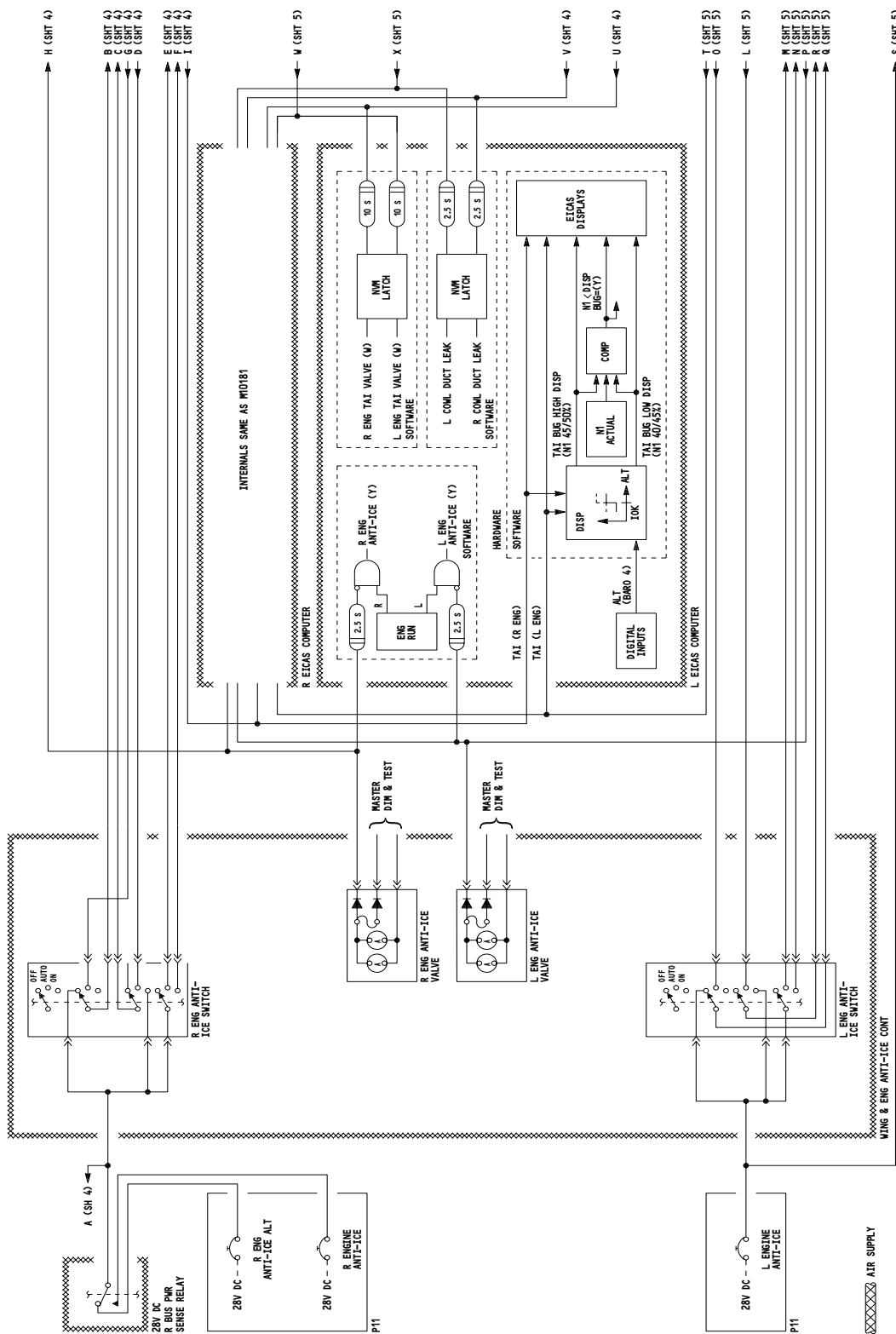
30-21-00



Engine Inlet Thermal Anti-Icing Schematic
Figure 2 (Sheet 2)

EFFECTIVITY
SAS 150-154 WITHOUT SB 30-17; MTH ALL

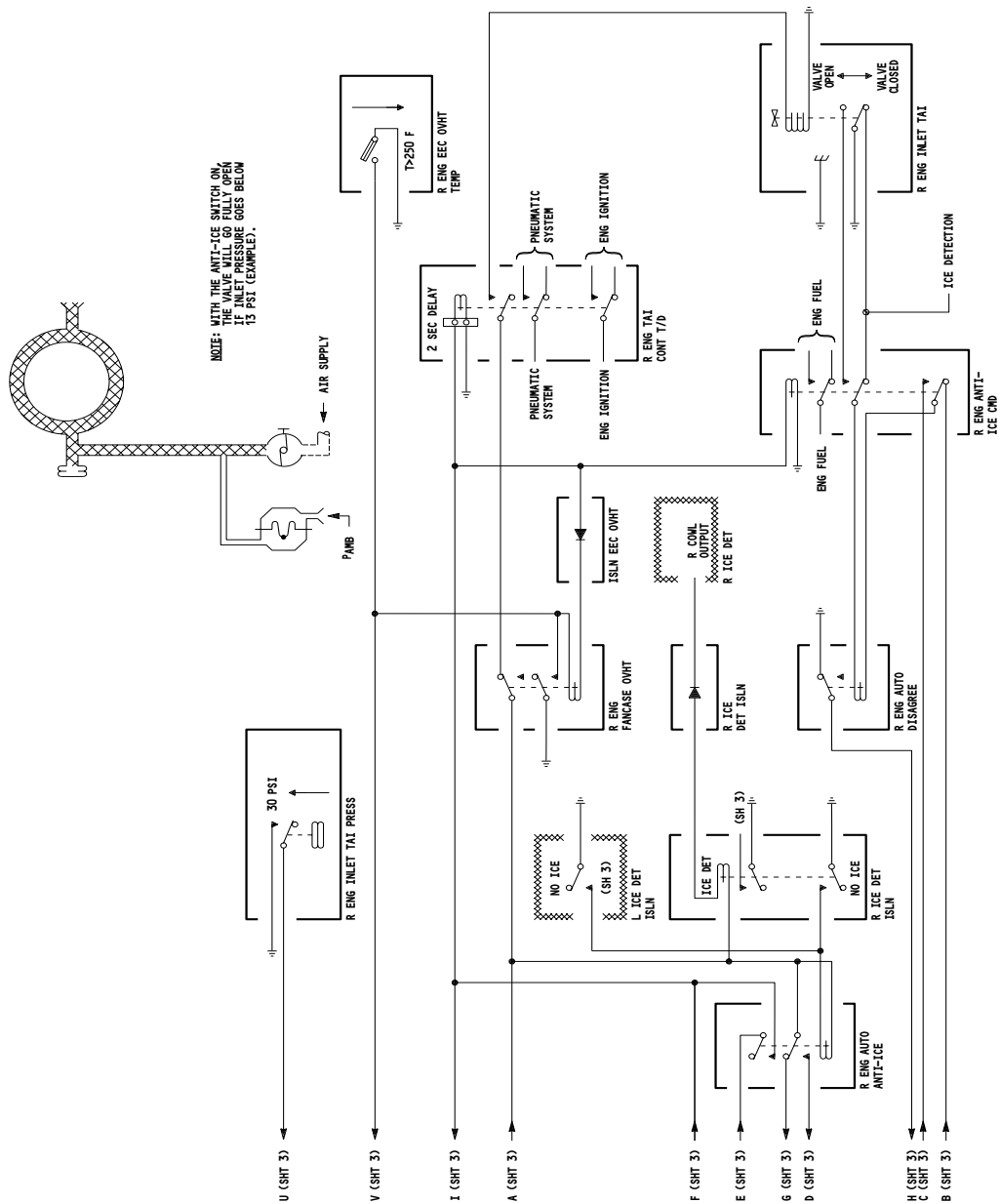
30-21-00



Engine Inlet Thermal Anti-Icing Schematic
Figure 2 (Sheet 3)

EFFECTIVITY
SAS 150-154 WITH SB 30-17, AND
SAS 050-149, 155-999

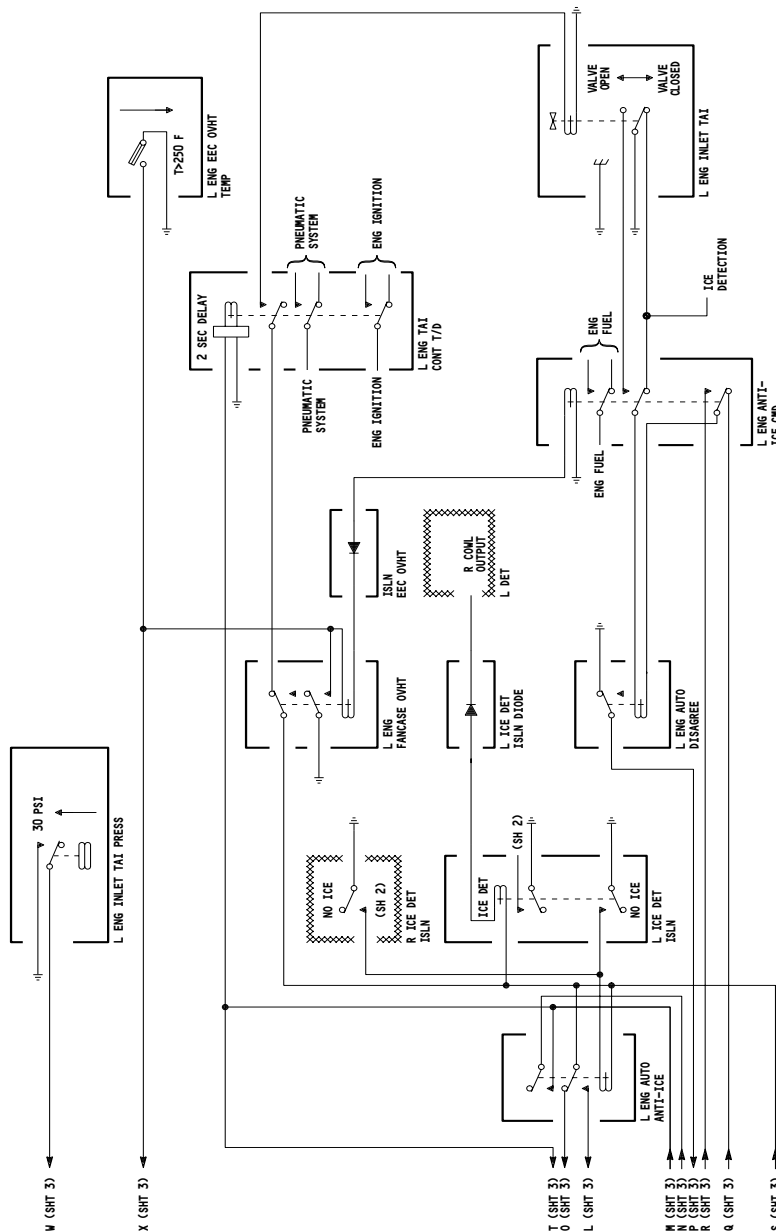
30-21-00



Engine Inlet Thermal Anti-Icing Schematic
Figure 2 (Sheet 4)

EFFECTIVITY
SAS 150-154 WITH SB 30-17, AND
SAS 050-149, 155-999

30-21-00



Engine Inlet Thermal Anti-Icing Schematic
Figure 2 (Sheet 5)

EFFECTIVITY
SAS 150-154 WITH SB 30-17, AND
SAS 050-149, 155-274

30-21-00

215614

B. Control

- (1) To put the system in operation, supply electrical power (AMM 24-22-00/201).
 - (a) Pressurize the pneumatic system (AMM 36-00-00/201).
 - (b) Make sure the ANTI-ICE ENG L, ANTI-ICE ENG R, and ANTI-ICE R ENG ALT circuit breakers on the overhead circuit breaker panel, P11, are closed.
 - (c) SAS 150-154 WITHOUT SB 30-17, AND MTH 275-999;
To operate the engine anti-ice systems, put the two ANTI-ICE ENGINE switches to the ON position. The amber VALVE lights will come on, then go off.
 - (d) SAS 150-154 WITH SB 30-17, AND SAS 050-149, 155-274;
To operate the engine anti-ice systems, set the two ENGINE ANTI-ICE switches to the ON or AUTO position. The amber VALVE lights will come on, then go off.

EFFECTIVITY

ALL

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ENGINE INLET THERMAL ANTI-ICING

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	1		FLT COMPT, P11	
ANTI-ICE ALT R ENG, C1140		1	11A30	*
ANTI-ICE ENG L, C1147		1	11A16	*
ANTI-ICE ENG R, C1148		1	11T19	*
COMPUTER - (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
DIODE -			MAIN EQUIPMENT CTR, P33	
R451,R452,R476,R477		4		*
DIODE -			MAIN EQUIPMENT CTR, P36	
ISLN EEC OVHT, R732		1		*
DIODE -			MAIN EQUIPMENT CTR, P37	
ISLN EEC OVHT, R373		1		*
LIGHT - L ENGINE ANTI-ICE VALVE, YDNL3	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397 (REF)	*
LIGHT - R ENGINE ANTI-ICE VALVE, YDNL4	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397 (REF)	*
PANEL - (FIM 30-11-00/101)				
WING AND ENGINE ANTI-ICE CONTROL, M10397				
RELAY -			FLT COMPT, P11	
28V DC R BUS PWR SENSE 1, K853				*
RELAY -			MAIN EQUIPMENT CTR, P36	
L ENGINE ANTI-ICE COMMAND, K2103		1		*
L ENGINE AUTO ANTI-ICE, K2105		1		*
L ENGINE AUTO DISAGREE, K2107		1		*
L ENGINE FAN CASE OVHT, K1077		1		*
L ENGINE TAI CONTROL T/D, K650		1		*
L ICE DETECTOR ISOLATION, K2109		1		*
RELAY -			MAIN EQUIPMENT CTR, P37	
R ENGINE ANTI-ICE COMMAND, K2104		1		*
R ENGINE AUTO ANTI-ICE, K2106		1		*
R ENGINE AUTO DISAGREE, K2108		1		*
R ENGINE FAN CASE OVHT, K1078		1		*
R ENGINE TAI CONTROL T/D, K649		1		*
R ICE DETECTOR ISOLATION, K2120		1		*
RELAY - L DISAGREE, K1		1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397 (REF)	*
RELAY - R DISAGREE, K2		1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397 (REF)	*
SWITCH - L ENGINE EEC OVHT, S1606	3	1	424AR, L ENGINE FAN COWL	30-21-04
SWITCH - R ENGINE EEC OVHT, S1616	3	1	414AR, R ENGINE FAN COWL	30-21-04
SWITCH - L ENGINE INLET TAI PRESSURE, S524	2	1	431BT, L ENGINE STRUT	30-21-01
SWITCH - R ENGINE INLET TAI PRESSURE, S525	2	1	441BT, R ENGINE STRUT	30-21-01
SWITCH - L ENGINE, YDNS1	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397 (REF)	*
SWITCH - R ENGINE, YDNS2	1	1	FLT COMPT, P5, WING/ENGINE ANTI-ICE CONTROL PNL, M10397 (REF)	*
VALVE - L ENGINE INLET TAI, V115	2	1	432CL,432CR, L ENGINE STRUT	30-21-03
VALVE - R ENGINE INLET TAI, V117	2	1	442CL,442CR, R ENGINE STRUT	30-21-03

* SEE THE WDM EQUIPMENT LIST

- SAS 150-154 WITHOUT SB 30-17; MTH ALL
- SAS 150-154 WITH SB 30-17, AND SAS 050-149,155-274

Engine Inlet Thermal Anti-Icing - Component Index
Figure 101

EFFECTIVITY

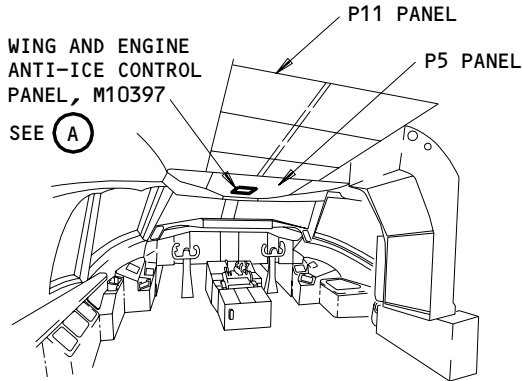
ALL

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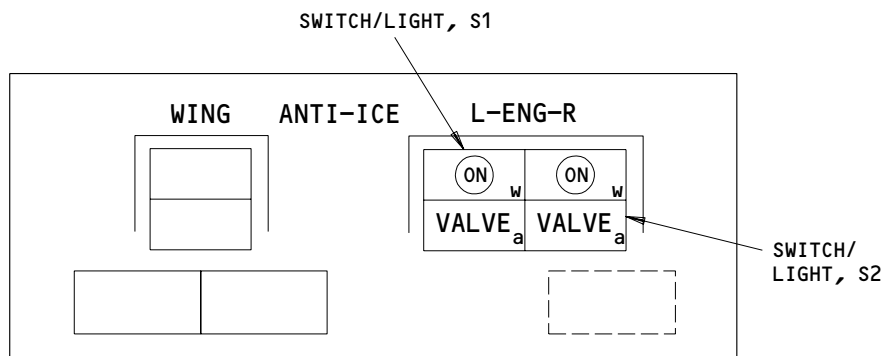
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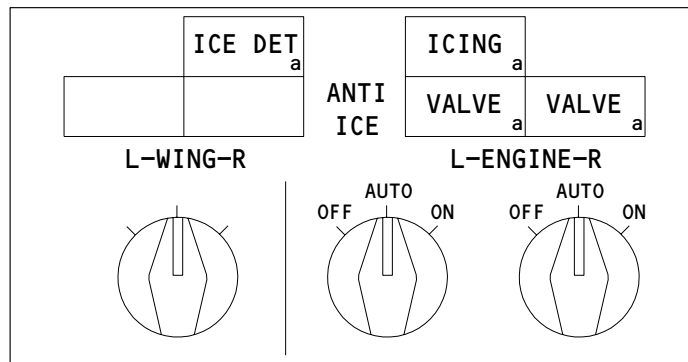


FLIGHT COMPARTMENT



WING AND ENGINE ANTI-ICE CONTROL PANEL, M10397

(A) 1



WING AND ENGINE ANTI-ICE CONTROL PANEL, M10397

(A) 2

- 1 SAS 150-154 WITHOUT SB 30-17; MTH 275-999
- 2 SAS 150-154 WITH SB 30-17 AND SAS 050-149,155-274

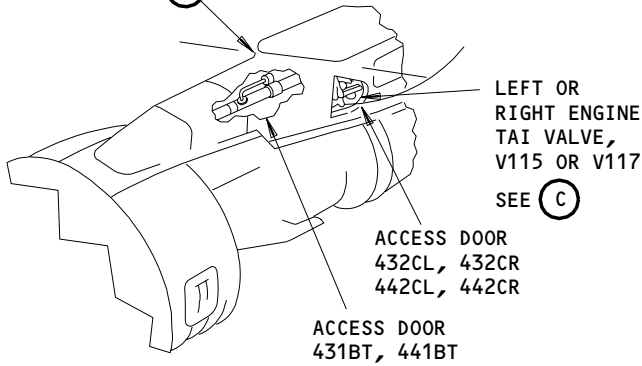
Engine Inlet Thermal Anti-Icing - Component Location
Figure 102 (Sheet 1)

EFFECTIVITY	ALL
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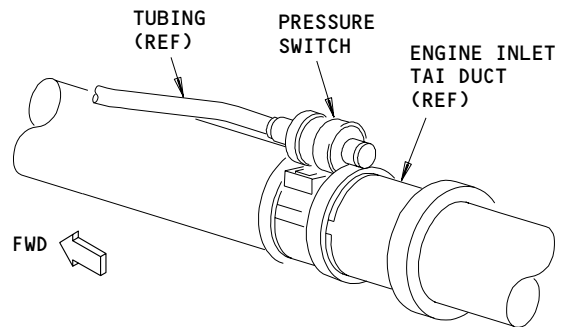
30-21-00

LEFT OR RIGHT ENGINE INLET
TAI PRESSURE SWITCH,
S524 OR S525

SEE (B)

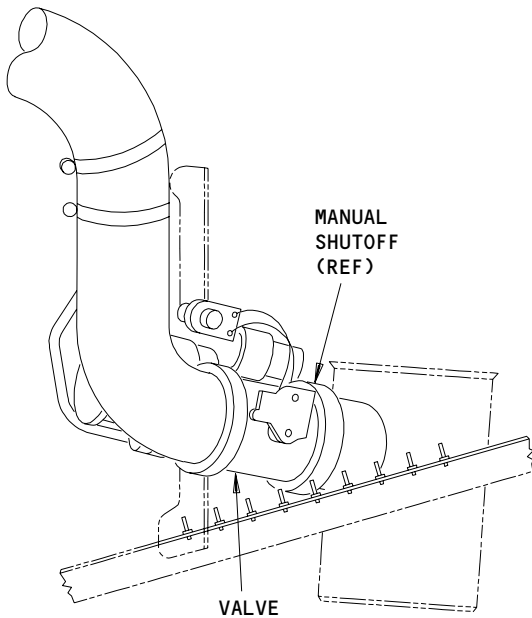


ENGINE STRUT



L OR R ENGINE INLET
TAI PRESSURE SWITCH,
S524 OR S525

(B)



L OR R ENGINE INLET
TAI VALVE, V115 OR V117

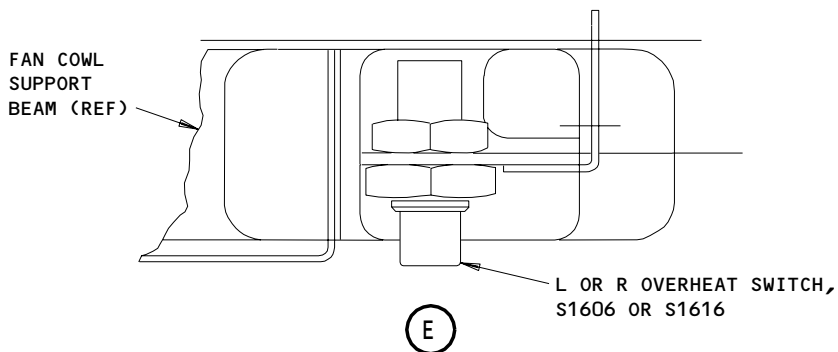
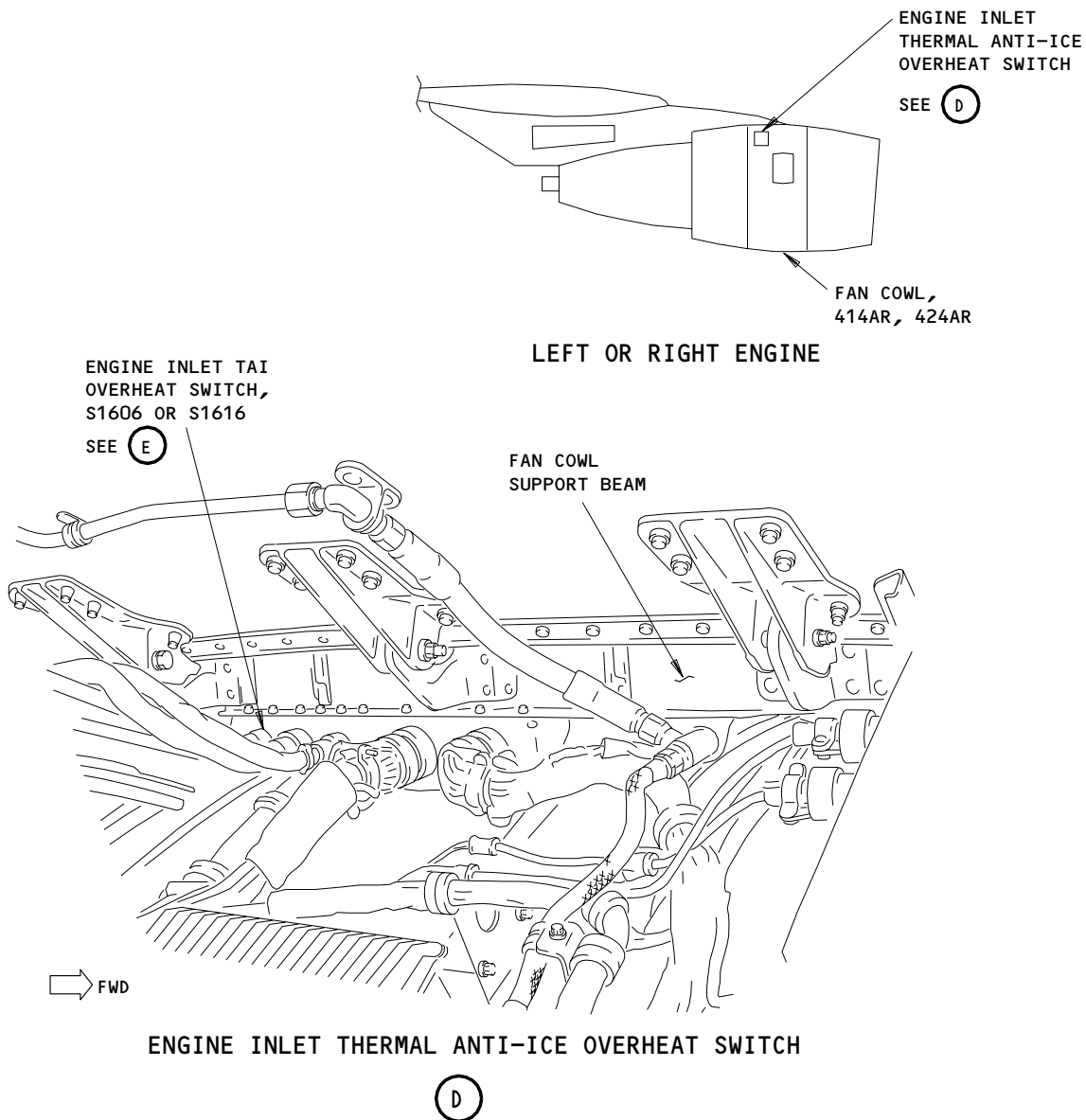
(C)

Engine Inlet Thermal Anti-Icing - Component Location
Figure 102 (Sheet 2)

EFFECTIVITY	
	ALL

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Engine Inlet Thermal Anti-Ice Overheat Switch Location
Figure 102 (Sheet 3)

EFFECTIVITY	
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ENGINE INLET THERMAL ANTI-ICING – ADJUSTMENT/TEST

1. General

- A. This procedure contains the instructions to do these two tasks:
 - (1) Do a system test of the thermal anti-icing system on the engine inlets.
 - (2) Do a check of the pressure switch settings of the thermal anti-icing system on the engine inlets.
- B. The second task is included in the first task. Thus, if you do the first task, then it is not necessary to do the second task.

TASK 30-21-00-735-001

2. System Test – Engine Inlet TAI System (Fig. 501, 502)

A. Equipment

- (1) Tee – MS21905J6
- (2) Gage – Pressure 0-50 psig ± 1% accuracy with 30 feet of hose; Commercially available

B. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power – Control
- (3) AMM 30-21-01/401, Engine Inlet Anti-Ice Pressure Switch
- (4) AMM 31-41-00/201, Engine Indication and Crew Alerting Systems (EICAS)
- (5) AMM 36-00-00/201, Air Supply (Pressurize/Depressurize)
- (6) AMM 36-11-07/401, High Pressure Shutoff Valve
- (7) AMM 36-11-09/201, Air Supply Pressure Regulating and Shutoff Valve
- (8) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zones
 - 431/441 Forward Nacelle Strut Fairing
- (2) Access Panels
 - 431DT/441DT

D. Prepare for the Test

S 045-028

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Do the deactivation procedure for the thrust reverser for ground maintenance (AMM 78-31-00/201).

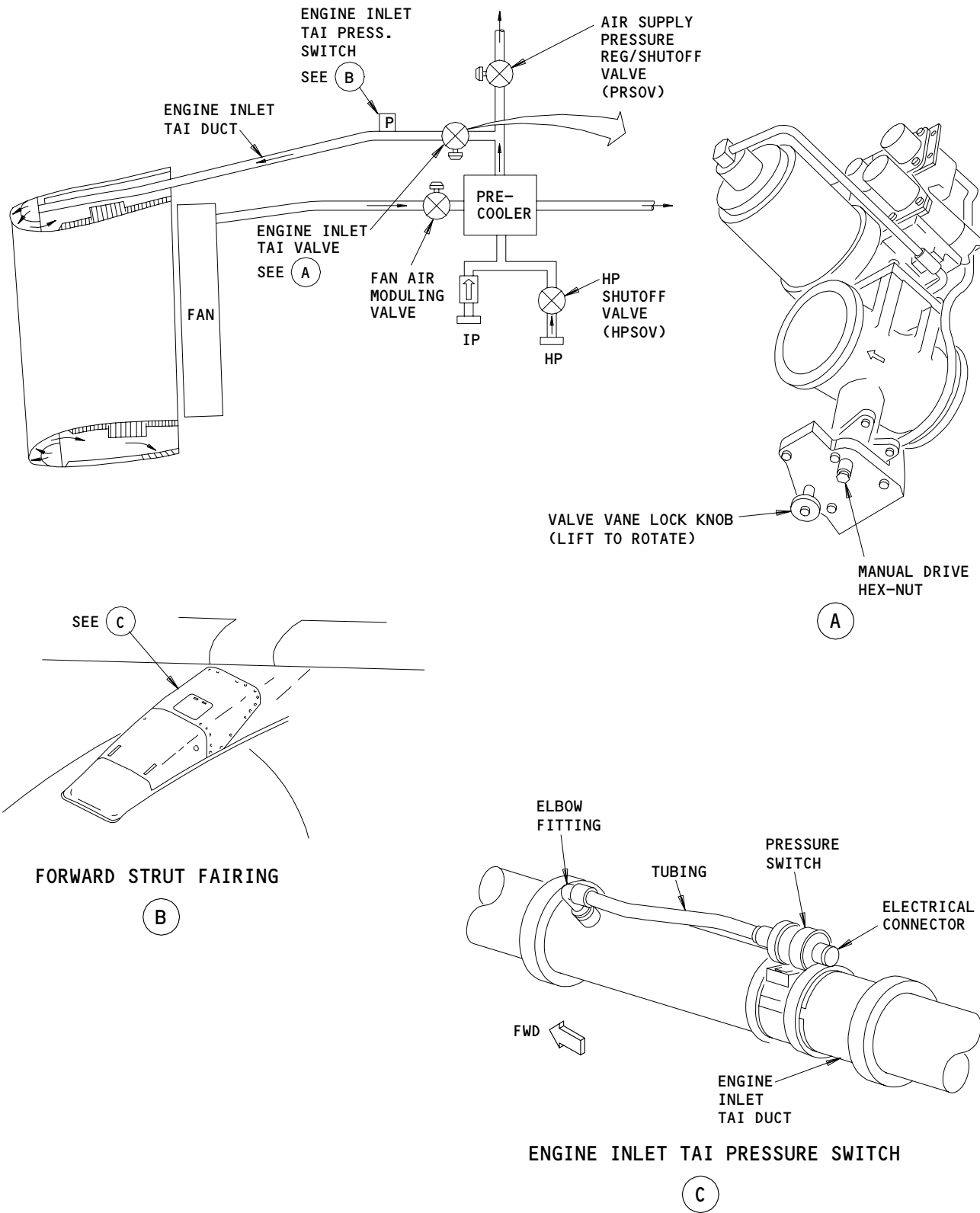
EFFECTIVITY

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Engine Inlet TAI Components
Figure 501

EFFECTIVITY	
	ALL

30-21-00

- S 015-026
- (2) Remove the aft section of the forward strut fairing to get access to the engine inlet anti-ice pressure switch (AMM 30-21-01/401).
- S 965-012
- (3) Do the steps that follow:
- (a) Disconnect the pressure switch sense tube from the elbow fitting on the engine TAI duct.
 - (b) Remove the elbow from the duct.
 - (c) Install the MS21905J6 tee fitting in the duct.
 - (d) Connect the pressure switch sense tube and the pressure gage line to the tee fitting.
- S 865-027
- (4) Supply electrical power (AMM 24-22-00/201).
- S 215-014
- (5) Make sure the UTILITY BUS switches on the pilot's overhead panel, P5, are in the OFF position.
- S 715-016
- (6) Make sure the Engine Indication and Crew Alerting System (EICAS) operates (AMM 31-41-00/201).
- S 215-017
- (7) Make sure these switches on the pilot's overhead panel, P5, are in the OFF or closed position:
- (a) L and R ENGINE ANTI-ICE
 - (b) L and R ENG START VALVE
 - (c) L and R ENG BLEED (air supply module)
 - (d) APU VALVE (air supply module)
 - (e) L, C and R ISLN VALVE (air supply module)
- S 215-018
- (8) Make sure the switches, L and R AIR CONDITIONING PACK, on the P5 panel are in the OFF positions.
- S 015-021
- (9) Get access to the applicable high pressure shutoff valve (HPSOV) (AMM 36-11-07/401).

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S 215-022

- (10) Make sure the HPSOV valve is in the fully closed position.
- (a) If the valve is not fully closed, turn the manual drive until the position indicator is in the closed position. Install the valve lock pin in the manual drive.

S 915-023

- (11) Do this procedure: Pressurization Upstream of the Pressure Regulating and Shutoff Valve (AMM 36-11-09/201).

NOTE: Make sure the ground air source or APU can keep a duct pressure of 35-45 psig.

S 215-025

- (12) Push the L, C, and R ISLN VALVE switch-lights on the P5 panel to the open positions.
- (a) AIRPLANES WITH PUSHBUTTON SWITCH ON THE ANTI-ICE PANEL;
Make sure the white bar light in the switch is on.
 - (b) Make sure the amber VALVE light comes on and goes off.
- E. Test - Engine Inlet TAI System

S 215-027

- (1) Make sure the pressure gage shows 0 psig.

S 215-023

WARNING: DO NOT KEEP THE ENGINE INLET THERMAL ANTI-ICE VALVE OPEN FOR MORE THAN 30 SECONDS CONTINUOUSLY. THE HEATED ENGINE INLET CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT. BEFORE YOU OPEN THE ENGINE INLET THERMAL ANTI-ICE VALVE, MAKE SURE THE ENGINE INLET IS COOL.

- (2) Put the ANTI-ICE ENGINE L (or R) switch-light on the P5 panel to the ON position.
- (a) Make sure the amber VALVE light comes on, then goes off, and the white ON light comes on.

S 215-070

- (3) Make sure the pressure gage shows 20-28 psig.

S 865-036

- (4) Open these circuit breakers on the overhead panel, P11:
- (a) 11A16, ANTI-ICE ENG L
 - 11A30, ANTI-ICE ALT R ENG
 - 11T19, ANTI-ICE ENG R

S 215-036

- (5) Make sure the amber VALVE light on the ANTI-ICE CONTROL PANEL for the L (or R) engine switch, on the P5 panel comes on.

EFFECTIVITY

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- S 215-106
- (6) Make sure the pressure gage shows 0 psig.
- S 865-041
- (7) Close these circuit breakers on the P11 panel:
- (a) 11A16, ANTI-ICE ENG L
 - 11A30, ANTI-ICE ALT R ENG
 - 11T19, ANTI-ICE ENG R
- S 215-042
- (8) Make sure the amber VALVE light in the ANTI-ICE ENGINE L (or R) switch-light on the P5 panel goes off.
- S 865-043
- (9) Push the ANTI-ICE ENGINE L (or R) switch-light on the P5 panel to the OFF position.
- S 215-045
- (10) Push the L, C, and R ISLN VALVE switch-lights on the P5 panel to the OFF positions.
- (a) Make sure the VALVE light comes on and then goes off.
 - (b) AIRPLANES WITH PUSH BUTTONS ON THE ANTI-ICE PANEL;
Make sure the white bar light in the switch is off.
- S 865-046
- (11) Remove the pneumatic power (AMM 36-00-00/201).
- S 715-072
- (12) Do a test of the engine inlet TAI pressure switch:
- (a) Disconnect the pressure switch sense tube from the tee fitting.
 - (b) Connect the ground air source directly to the pressure switch sense tube.
 - (c) Supply an air pressure of 34.5 +/- 4.5 psi (30-39 psi).
 - (d) Make sure the status message, L (or R) ENG TAI VALVE, shows on the status page of the display.
 - (e) Remove the ground air source.
 - (f) Do the EICAS status page erase procedure (AMM 31-41-00/201).
 - (g) Make sure the status message, L (R) ENG TAI VALVE, does not show on the status page of the display.
 - (h) Remove the tee fitting from the duct.
 - (i) Install the elbow fitting in the duct.
 - (j) Connect the pressure switch sense tube to the elbow fitting.
- F. Put the Airplane Back to Its Usual Condition
- S 015-048
- (1) Remove the strut access panels (434AL, 434AR on the left engine or 444AL, 444AR on the right engine), if installed, to get access to the engine inlet TAI valve (AMM 06-43-00/201).

EFFECTIVITY

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- S 965-144
- (2) AIRPLANES WITH G.E. CF6-80C2 SERIES ENGINES;
Do the steps that follow:
- (a) Disconnect the pressure switch sense tube and the pressure gage line from the tee fitting.
 - (b) Disconnect the electrical connector from the pressure switch.
 - (c) Remove the pressure switch from the tee fitting.
 - (d) Remove the BACT16BL060606 tee fitting from the duct.
 - (e) Connect the pressure switch to the TAI duct.
 - (f) Connect the electrical connector to the pressure switch.
- S 965-145
- (3) ALL EXCEPT AIRPLANES WITH G.E. CF6-80C2 SERIES ENGINES;
Do the steps that follow:
- (a) Disconnect the pressure switch sense tube and the pressure gage line from the tee fitting.
 - (b) Remove the MS21905J6 tee fitting from the duct.
 - (c) Attach the elbow to the duct.
 - (d) Connect the pressure switch sense tube to the elbow fitting on the engine TAI duct.
- S 985-049
- (4) Manually set the applicable engine inlet TAI valve to the normal position.
- S 985-050
- (5) Manually set the applicable HPSOV to the normal position (AMM 36-11-07/401).
- S 985-051
- (6) Manually set the applicable PRSOV to the normal position (AMM 36-11-09/201).
- S 415-052
- (7) Install the access panel(s) (AMM 06-43-00/201).
- S 445-056
- (8) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).
- S 865-020
- (9) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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18.1

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TASK 30-21-00-785-061

3. Pressure Switch Setting Check- Engine Inlet TAI System (Fig. 501, 502)

NOTE: This is a scheduled maintenance task.

A. Equipment

- (1) Gage - Pressure 0-50 psig \pm 1% accuracy with 30 feet of hose; Commercially available

B. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 31-41-00/201, Engine Indication and Crew Alerting Systems (EICAS)
- (4) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zones
431/441 Forward Nacelle Strut Fairing
- (2) Access Panels
431DT/441DT

D. Prepare for the Test

S 045-032

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Do the deactivation procedure for the thrust reverser for ground maintenance (AMM 78-31-00/201).

S 015-033

- (2) Remove the aft section of the forward strut fairing to get access to the engine inlet TAI pressure switch (AMM 30-21-01/401).

S 865-037

- (3) Supply electrical power (AMM 24-22-00/201).

S 865-016

- (4) Make sure that EICAS operates (AMM 31-41-00/201).

E. Procedure

S 715-115

- (1) Do a test of the engine inlet TAI pressure switch:
 - (a) Disconnect the pressure switch sense tube from the elbow fitting on the engine TAI duct.
 - (b) Connect the ground air source directly to the pressure switch sense tube.
 - (c) Supply an air pressure of 34.5 +/- 4.5 psi (30-39 psi).

EFFECTIVITY

ALL

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11.101

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- (d) Make sure the status message, L (or R) ENG TAI VALVE, shows on the status page of display.
 - (e) Remove the ground air source.
 - (f) Do the EICAS status page erase procedure (AMM 31-41-00/201).
 - (g) Make sure the status message, L (R) ENG TAI VALVE, does not show on the status page of the display.
 - (h) Install the elbow fitting in the duct.
 - (i) Connect the pressure switch sense tube to the elbow fitting.
- F. Put the Airplane Back to Its Usual Condition

S 415-065

- (1) Install the applicable access panel(s) (AMM 06-43-00/201).

S 445-066

- (2) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 865-077

- (3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

EFFECTIVITY

ALL

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23.101

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ENGINE INLET THERMAL ANTI-ICE PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the engine inlet thermal anti-ice pressure switch (EITAPS). The second task is the installation of the EITAPS.
- B. The EITAPS is on the thermal anti-ice (TAI) duct in the forward fairing of each engine strut. The removal and installation procedures are the same for each EITAPS.

TASK 30-21-01-004-001

2. Remove Engine Inlet Thermal Anti-Ice Pressure Switch (Fig. 401)

A. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 78-31-00/201, Thrust Reverser System

B. Access

- (1) Location Zones
 - 431/441 Forward Nacelle Strut Fairing
- (2) Access Panels
 - 431DT/441DT

C. Procedure

S 864-002

- (1) To remove the left or right EITAPS, open the applicable (left or right) circuit breaker(s) on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tag(s):
 - (a) 11A16, ANTI-ICE ENG L
 - (b) 11A30, ANTI-ICE ALT R ENG
 - (c) 11T19, ANTI-ICE ENG R

S 914-003

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Do the deactivation procedure for the thrust reverser for ground maintenance (AMM 78-31-00/201).

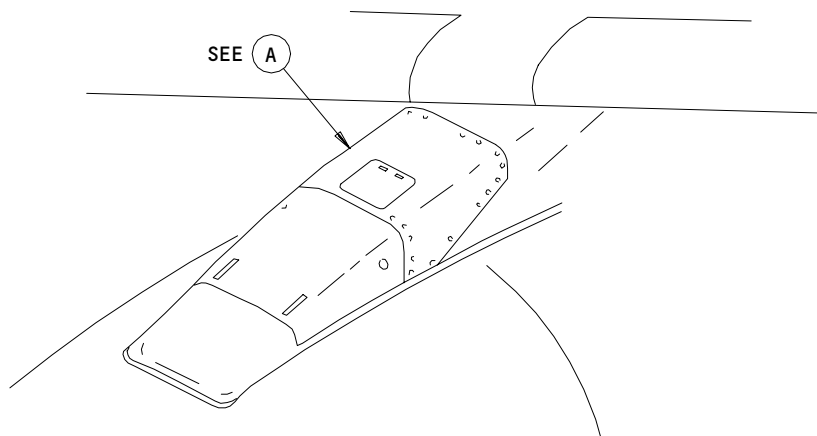
EFFECTIVITY

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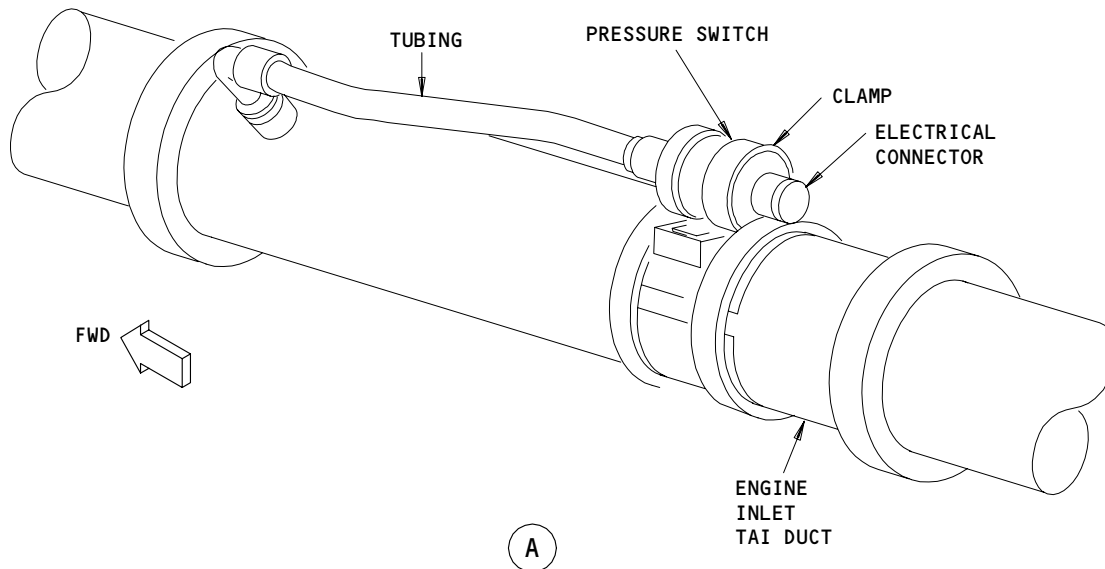
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FORWARD STRUT FAIRING



Engine Inlet Thermal Anti-Ice Pressure Switch Installation
Figure 401

EFFECTIVITY	
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S 014-004

WARNING: THE THERMAL ANTI-ICE (TAI) DUCT CAN BE HOT. A HOT DUCT CAN BURN YOU.

- (3) Remove the aft section of the forward strut fairing to get access to TAI duct (AMM 06-43-00/201).

S 034-011

- (4) Disconnect the electrical connector from EITAPS.

S 034-015

- (5) Disconnect the pressure sense tube from the EITAPS.

S 024-016

- (6) Remove the clamp that holds the EITAPS to the duct and then remove the EITAPS.

TASK 30-21-01-404-022

3. Install Engine Inlet Thermal Anti-Ice Pressure Switch (Fig. 401)

A. References

- (1) 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 31-41-00/201, Engine Indication and Crew Alerting System (EICAS)
- (4) AMM 78-31-00/201, Thrust Reverser System

B. Access

- (1) Location Zones
431/441 Forward Nacelle Strut Fairing
- (2) Access Panels
431DT/441DT

C. Procedure

S 434-023

- (1) Attach the EITAPS on the duct with a clamp.

S 434-030

- (2) Connect the electrical connector to EITAPS.

S 864-032

- (3) For the left or right EITAPS installation, remove the DO-NOT-CLOSE tag(s) and close the applicable (left or right) circuit breaker(s) on the overhead circuit breaker panel, P11:
 - (a) 11A16, ANTI-ICE ENG L
 - (b) 11A30, ANTI-ICE ALT R ENG
 - (c) 11T19, ANTI-ICE ENG R

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- S 864-033
(4) Supply electrical power (AMM 24-22-00/201).
- S 434-034
(5) Connect the air supply directly to the pressure switch.
- S 864-035
(6) Supply approximately 40 psig of air to the pressure switch.
(a) Make sure the pressure switch releases.
- S 214-036
(7) Make sure the message, L (R) ENG TAI VALVE, shows on the bottom display.
- S 034-037
(8) Remove the air supply.
- S 424-072
(9) Make sure the EITAPS is correctly attached with the clamp.
- S 434-044
(10) Connect the pressure sense tube to the EITAPS.
- S 414-045
(11) Install the aft section of the forward strut fairing (AMM 06-43-00/201).
- S 804-047
(12) Erase the EICAS maintenance page (AMM 31-41-00/201).
- S 914-048
(13) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).
- S 864-049
(14) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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ENGINE INLET THERMAL ANTI-ICE VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the engine inlet TAI valve. The second task is the installation of the engine inlet TAI valve.
- B. An engine inlet thermal anti-ice (TAI) valve is in each engine strut, forward of the precooler outlet duct. The removal/installation procedure is the same for the two TAI valves.

TASK 30-21-03-004-001

2. Remove the Engine Inlet TAI Valve (Fig. 401)

A. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 27-81-00/201, Leading Edge Slat System
- (3) AMM 36-00-00/201, Air Supply (Pressurize/Depressurize)
- (4) AMM 78-31-00/201, Thrust Reverser System

B. Access

- (1) Location Zones
434/444 Mid Torque Box
- (2) Access Panels
434AL/434AR
444AL/444AR

C. Procedure

S 864-003

- (1) To remove the left or right TAI valve, open the applicable (left or right) circuit breaker(s) on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tag(s):
 - (a) 11A16, ANTI-ICE ENG L
 - (b) 11A30, ANTI-ICE ALT R ENG
 - (c) 11T19, ANTI-ICE ENG R

S 864-053

- (2) Retract the leading edge slats to give you access to the TAI valve.

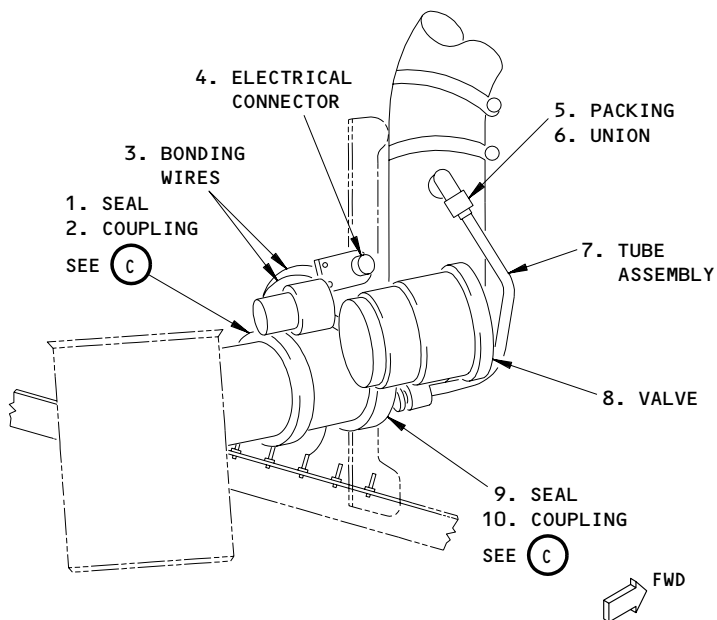
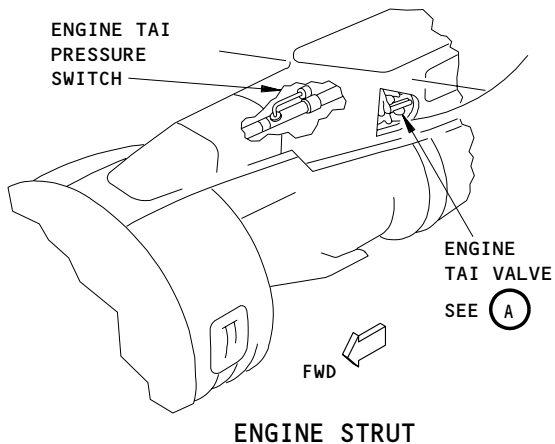
EFFECTIVITY

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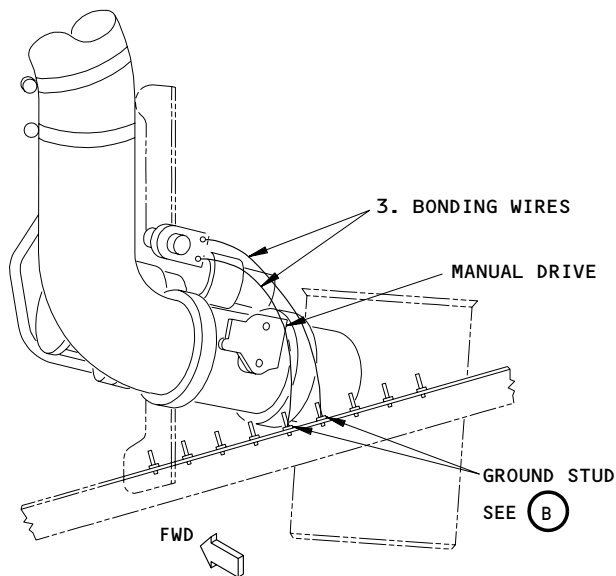
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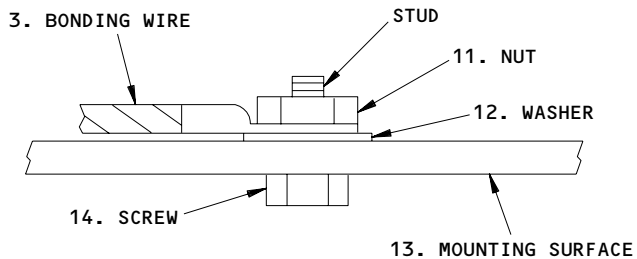
**ENGINE TAI VALVE
(RIGHT SIDE VIEW)**

(A)



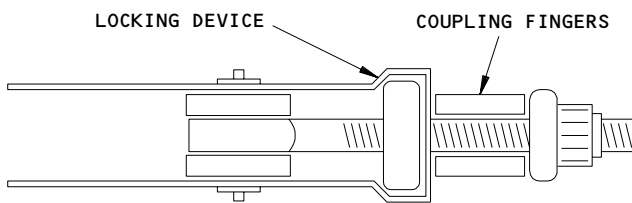
**ENGINE TAI VALVE
(LEFT SIDE VIEW)**

(A)



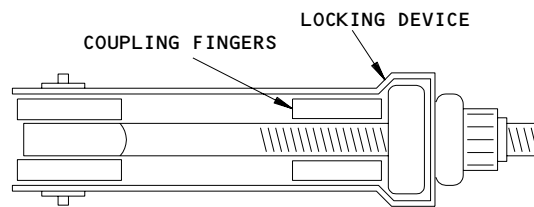
**GROUND STUD
(EXAMPLE)**

(B)



(INCORRECT COUPLING ASSEMBLY)

(C)



(CORRECT COUPLING ASSEMBLY)

(C)

**Engine Inlet TAI Valve Installation
Figure 401**

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S 864-042

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. ACCIDENTAL SLAT MOVEMENT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (3) Do the leading edge slat deactivation procedure (AMM 27-81-00/201).

S 914-005

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER ISOLATION VALVE. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (4) Do the deactivation procedure for the thrust reverser isolation valve for ground maintenance (AMM 78-31-00/201).

S 014-006

- (5) Open the pressure relief doors on the two sides of the engine strut (434AL, 434AR on left engine; 444AL, 444AR on right engine) (AMM 06-43-00/201).

S 034-009

WARNING: DO NOT TOUCH THE TAI DUCT. THE TAI DUCT CAN BE HOT. A HOT DUCT CAN BURN YOU.

- (6) Remove the electrical connector (4) from the valve (8).

S 034-046

- (7) Do these steps to remove the bonding wires from the studs:
(a) Loosen the couplings (2)(10) and move the valve (8) as necessary to get access to the ground studs (11)(12)(14).
(b) To disconnect the bonding wires (3) from the ground studs, remove the nuts (11), the washers (12), and the screws (14).

S 034-011

- (8) Remove the tube assembly (7) from the valve (8).

S 034-012

- (9) Remove the forward coupling and the seal (9).

S 034-013

- (10) Remove the aft coupling and the seal (1).

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S 034-016

(11) Remove the valve (8) from the strut.

NOTE: For access, it may be necessary to remove the PRSOV (AMM 36-11-09/201). As an alternative, the valve can easily be removed from the right side without removing the PRSOV.

TASK 30-21-03-404-022

3. Install Engine Inlet TAI Valve (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	8	Valve - cowl thrm anti-ice press reg & shutoff	30-21-03	06	130
	6	Union			60
	5	Packing			55
	7	Tube Assy			35
	2,10	Coupling			95
	1,9	Seal			105
	14	Screw			110
	12	Washer			115
	11	Nut			120

B. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 27-81-00/201, Leading Edge Slat System
- (4) AMM 36-00-00/201, Air Supply (Pressurize/Depressurize)
- (5) AMM 36-11-09/201, Air Supply Pressure Regulating and Shut-Off Valve
- (6) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zones
434/444 Mid Torque Box
- (2) Access Panels
434AL/434AR
444AL/444AR

D. Procedure

S 434-025

(1) Put the seal (9) on the forward flange of valve (8).

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S 434-026

- (2) Put the seal (1) on the aft flange of the duct.

S 424-027

- (3) Put the valve (8) in position and make sure there is a correct seal at the flanges.

S 434-043

CAUTION: MAKE SURE YOU CORRECTLY INSTALL THE DUCT COUPLING FOR THE ENGINE ENG TAI VALVE. IF YOU DO NOT INSTALL THE COUPLING FINGERS INSIDE THE LOCKING DEVICE, THE COUPLING CAN LOOSEN OR FAIL DURING FLIGHT AND CAUSE DAMAGE TO THE AIRPLANE SYSTEMS.

- (4) Put the coupling (2) on the aft flange (Fig. 401).

S 434-044

- (5) Put the coupling (10) on the forward flange.

S 434-024

- (6) Connect the bonding wires (3) to the studs (14) with the washers (11) and the nuts (12).

S 434-029

- (7) Tighten the coupling (10) and (2) on the forward and aft flanges to 85-100 pound-inches.

S 434-030

- (8) Connect the hose assembly (7) to the valve (8).

S 434-056

- (9) Connect the electrical connector (4) to the valve (8).

NOTE: If the PRSOV was removed for access to the TAI valve, reinstall PRSOV. (AMM 36-11-09/201)

S 864-038

- (10) For the left or right TAI valve installation, remove the D0-NOT-CLOSE tag(s) and close the applicable (left or right) circuit breaker(s) on the P11 panel:
- (a) 11A16, ANTI-ICE ENG L
 - (b) 11A30, ANTI-ICE ALT R ENG
 - (c) 11T19, ANTI-ICE ENG R

S 714-040

- (11) Do a test of the engine inlet TAI valve installation:
- (a) Supply electrical power (AMM 24-22-00/201).

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- (b) Make sure these switch-lights on the pilot's overhead panel, P5, are in the OFF or closed positions:
 - 1) L and R ENGINE ANTI-ICE
 - 2) L and R ENG START VALVE
 - 3) L and R ENG BLEED (air supply module)
 - 4) APU VALVE (air supply module)
 - 5) L, C, and R ISLN VALVE (air supply module)
- (c) Make sure the L and R PACK control selectors on the P5 panel are in the OFF positions.
- (d) Pressurize the pneumatic system upstream of the applicable pressure regulating and shutoff valve (PRSOV) (AMM 36-11-09/201).
- (e) Push the L, C, and R ISLN VALVE switch-lights on the P5 panel to the open positions.
 - 1) Make sure the VALVE light comes on and then goes off.
- (f) Set the applicable ANTI-ICE ENGINE switch-light on the P5 panel to the ON position.

NOTE: The amber VALVE light will come on and then go off.

- (g) Make sure the TAI valve position indicator moves to the NOT CLOSED position.
- (h) Make sure there is not too much air leakage around the valve flanges.

NOTE: Diffused leakage is permitted.

- 1) To repair jet blast leakage, align the joint or coupling.
- (i) Set the applicable ANTI-ICE ENGINE switch to the OFF position.
- (j) Make sure the TAI valve position indicator moves to the CLOSED position.

E. Put the Airplane Back to Its Usual Condition

S 864-052

- (1) Remove the pneumatic power (AMM 36-00-00/201).

S 214-042

- (2) Push the L, C, and R ISLN VALVE switch-lights to the closed position.
 - (a) Make sure the VALVE light comes on and then goes off.

S 864-043

- (3) Remove pressure from the pneumatic system, upstream of the applicable PRSOV (AMM 36-11-09/201).

S 864-044

- (4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-045

- (5) Close the pressure relief doors (AMM 06-43-00/201).

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- S 444-047
- (6) Do the necessary steps in the leading edge slat deactivation procedure to put them to the usual condition (AMM 27-81-00/201).
- S 914-046
- (7) Do the activation procedure for the thrust reverser isolation valve (AMM 78-31-00/201).

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ENGINE INLET THERMAL ANTI-ICE OVERHEAT SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the engine inlet thermal anti-ice overheating switch. The second task is the installation of the engine inlet thermal anti-ice overheating switch.

TASK 30-21-04-004-001

2. Remove the Engine Inlet Thermal Anti-Ice Overheat Switch (Fig. 401)

A. References

- (1) AMM 71-11-04/201, Fan Cowl Panels

B. Access

- (1) Location Zones
413/414/423/424 Fan Cowl Panel

C. Procedure

S 864-002

- (1) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11A16, ANTI-ICE ENG LEFT
(b) 11T19, ANTI-ICE ENG RIGHT
(c) 11A30, ANTI-ICE R ENG-ALT

S 014-003

- (2) Open the fan cowl panels (AMM 71-11-04/201).

S 034-004

- (3) Disconnect the electrical connector from the switch.

S 034-005

- (4) Remove the nuts from the switch.

S 024-006

- (5) Remove the switch.

TASK 30-21-04-404-007

3. Install the Engine Inlet Thermal Anti-Ice Overheat Switch (Fig. 401)

A. References

- (1) AMM 20-10-21/601, Electrical Bonding

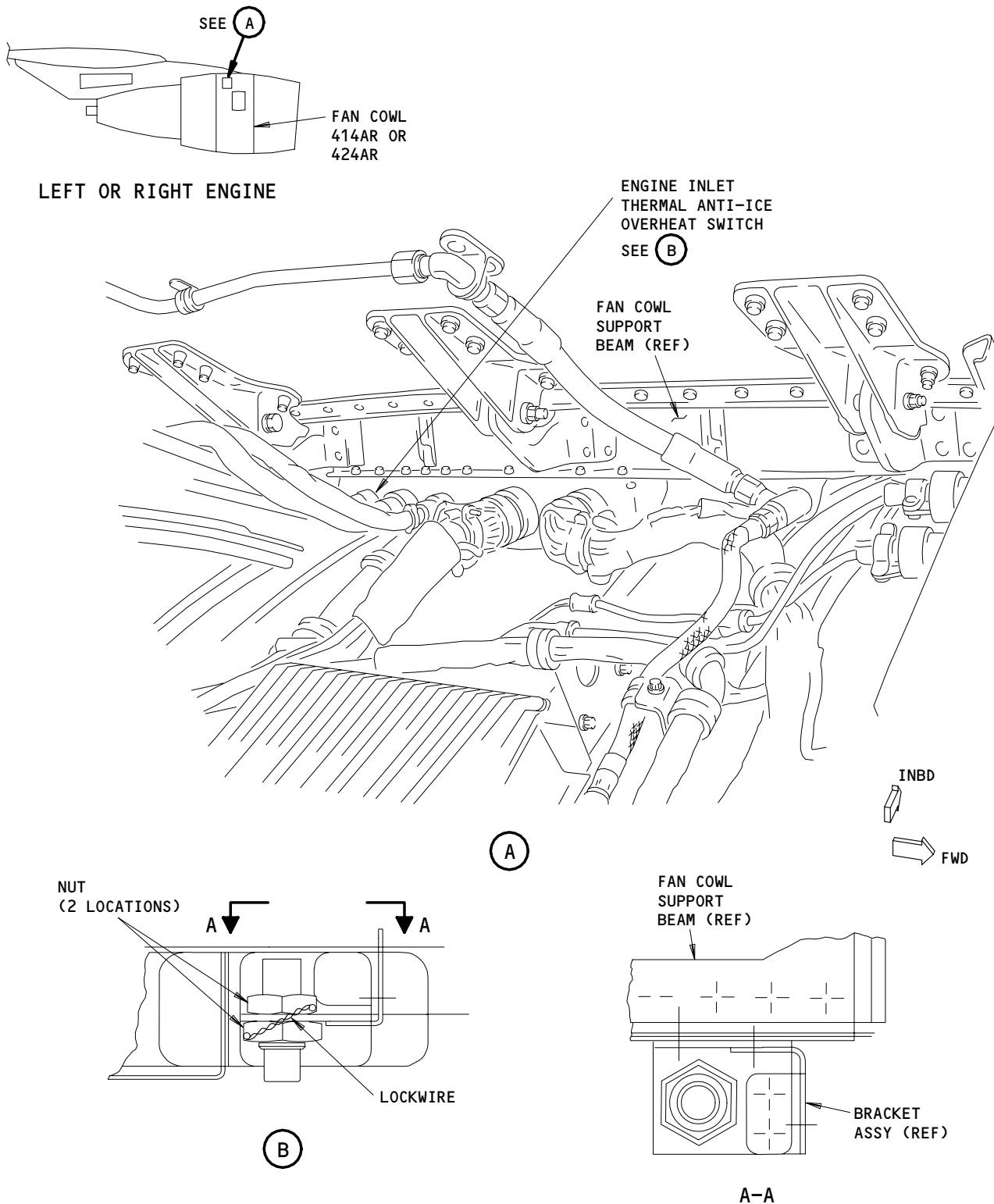
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Engine Inlet Thermal Anti-Ice Overheat Switch Installation
Figure 401

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- (2) AMM 71-11-04/201, Fan Cowl Panels
- B. Access
 - (1) Location Zones
 - 413/414/423/424 Fan Cowl Panel
- C. Procedure
 - S 424-008
 - (1) Put the switch in the mounting bracket.
 - S 434-009
 - (2) Tighten the nuts to 60-75 pound-inches.
 - S 764-010
 - (3) Make sure the resistance between the hex nut and the mounting bracket is 0.005 ohm or less (AMM 20-41-00/201).
 - S 764-011
 - (4) Make sure the resistance between the mounting bracket and the primary structure is 0.005 ohm or less (AMM 20-41-00/201).
 - S 434-012
 - (5) Install the lockwire through the nuts.
 - S 434-013
 - (6) Install the electrical connector on the switch.
 - S 414-014
 - (7) Close the fan cowl (AMM 71-11-04/201).
 - S 864-015
 - (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - (a) 11A16, ANTI-ICE ENG LEFT
 - (b) 11T19, ANTI-ICE ENG RIGHT
 - (c) 11A30, ANTI-ICE R ENG-ALT

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PITOT STATIC PROBE ANTI-ICING -
DESCRIPTION AND OPERATION

1. General

A. Four pitot-static (P/S) probes (two on each side of the airplane) have electrical heat to prevent incorrect indications caused by ice. The components of the P/S probe heat system include the P/S probes, miscellaneous annunciator panel, and miscellaneous test panel. Power for the current sensing relays and ground test relays is from the main left and right 28-volt DC buses. Power for the probe heaters is from the left and right main 115-volt AC buses. The circuit breakers are on the overhead circuit breaker panel, P11, and the main power distribution panel, P6.

2. Component Details (Fig. 1)

A. P/S Probes

(1) Two P/S probes are on each side of the airplane, half the distance down the fuselage, below the left and right number 3 flight deck windows. The P/S probe heat has two levels, low for on the ground and high for in flight.

B. Miscellaneous Annunciator Panel

(1) The miscellaneous annunciator panel, M10394, is on the pilot's overhead panel, P5. The annunciator panel contains an amber annunciator for each P/S probe. The lights are identified CAPT PITOT, F/O PITOT, L AUX PITOT, and R AUX PITOT. These lights come on to show a probe heater failure.

C. Miscellaneous Test Panel

(1) The miscellaneous test panel, M10398, permits a ground test of the probe heaters. The test panel is on the right side panel, P61.

3. Operation (Fig. 2)

A. Functional Description

(1) The air/ground relays and PROBE HT N2 relays automatically control the P/S probe heat. The engine speed from the N2 engine speed cards sets the positions of the relays. The only operation started from the flight deck is the probe heat test.

(2) On the ground, engine speed sets the P/S probe heat. If the two engines are not in operation, the PROBE HT N2 relays are not energized. The circuit that connects electrical power to the probe heaters is open and the probes do not have heat. The current sensing relay (CSR) for each P/S probe is not energized. This gives a closed path to the ground for the P/S lights on the miscellaneous annunciator panel. Thus, the P/S probes do not have heat when the airplane is on the ground with the engines not in operation. All the amber P/S annunciator lights on the P5 panel are on. The display will show the level C PROBE HEAT messages.

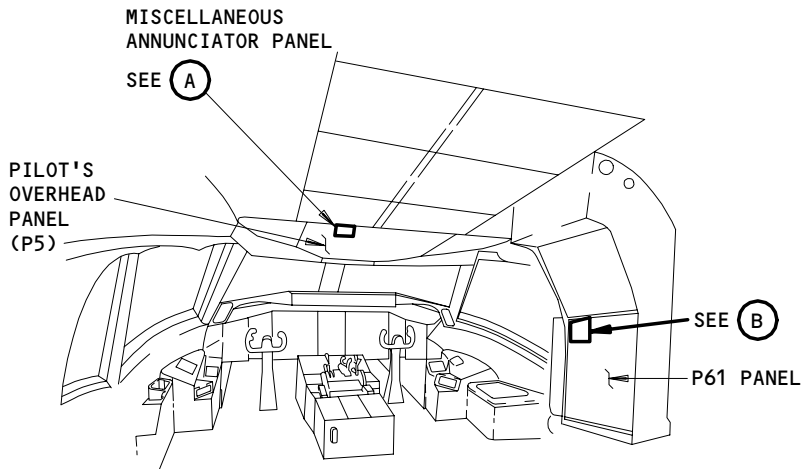
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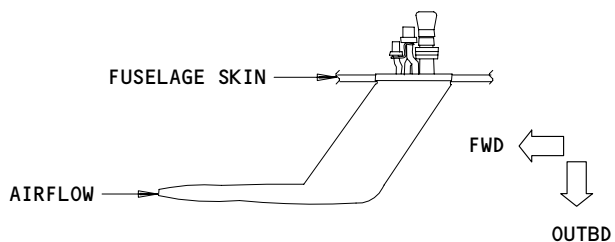
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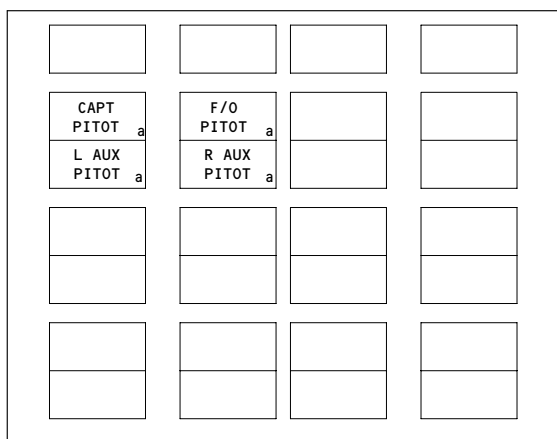
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FLIGHT COMPARTMENT

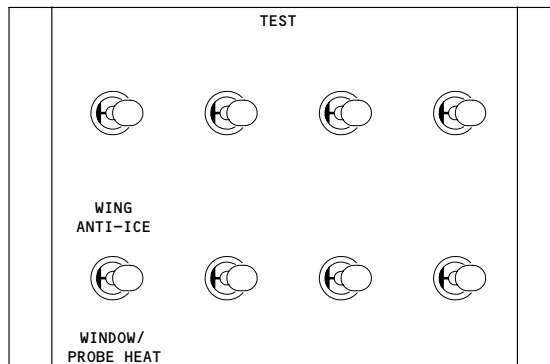


**PITOT-STATIC PROBE
(EXAMPLE)**



**M10394 - MISCELLANEOUS
ANNUNCIATOR PANEL (P5)**

(A)



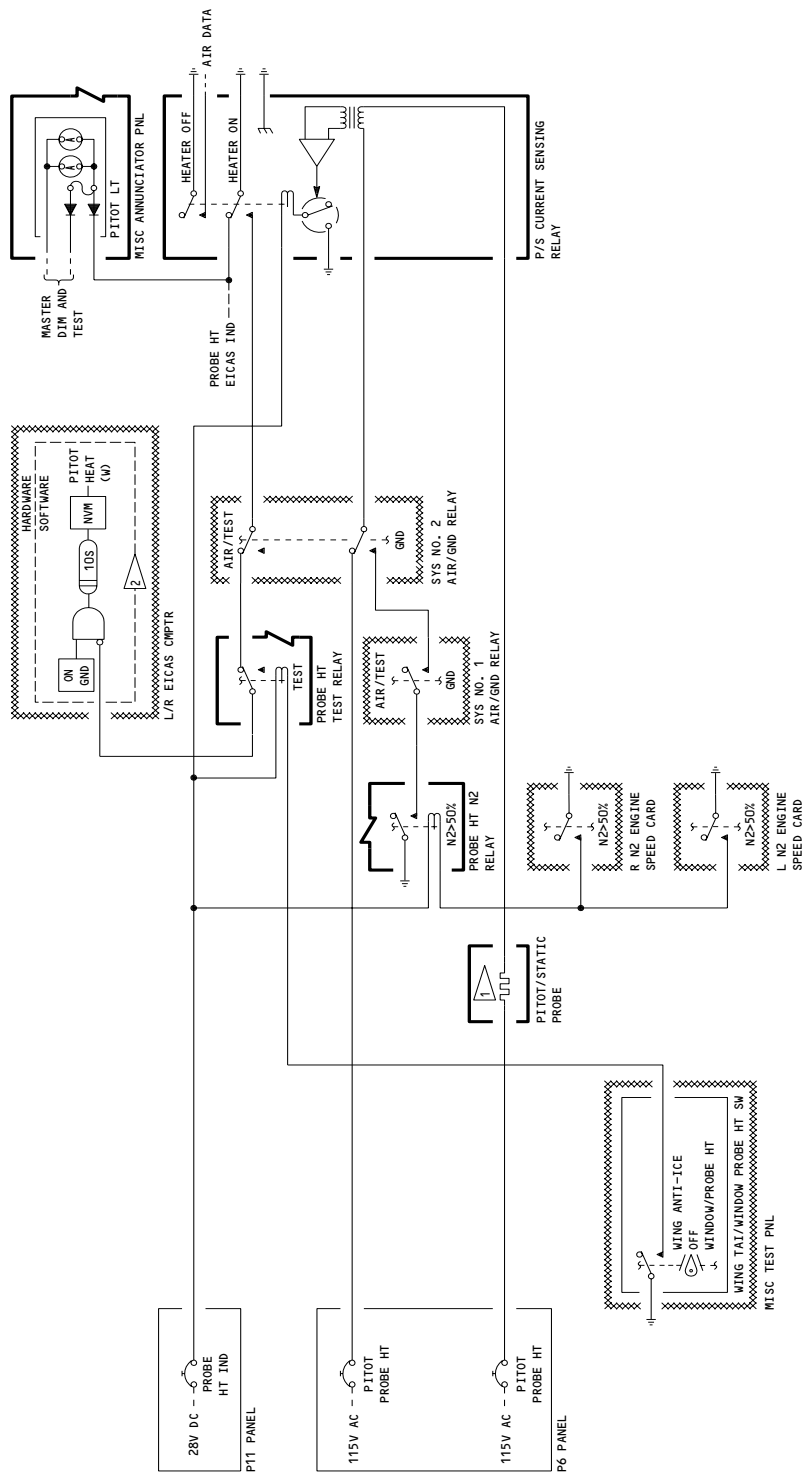
**M10398 - MISCELLANEOUS
TEST PANEL (P61)**

(B)

**Pitot-Static Probe Anti-Icing - Component Location
Figure 1**

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1 200V APPLIED IN AIR
115V APPLIED ON GND
2 THESE MAINTENANCE MESSAGES ARE
DISPLAYED AND LATCHED IF THE AIRPLANE
IS ON THE GROUND AND THE PROBE IS ON
FULL POWER FOR 10 SECONDS

Pitot Static Probe Anti-icing Schematic
Figure 2

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- (3) When one or two engines are in operation on the ground, the PROBE HT N2 relays are energized. This gives a path from the 115-volt AC power source, through the heaters, to the ground. The air/ground relays in the P33 panel are in the ground position and close the circuit. 115-volt AC supplies low heat. The current flow in the heaters energizes the CSRs. This opens the ground path for the P/S lights on the miscellaneous annunciator panel. Thus, on the ground with a minimum of one engine in operation, all the P/S probes have low heat (115-volt AC), and the P/S lights on the P5 panel are off.
 - (4) If a P/S probe has high heat (200-volt AC) while on the ground, the display shows a maintenance message. (There is a ten-second time delay between the time of the problem and the message.) The applicable amber P/S probe light (on the miscellaneous annunciator panel) does not come on when the probe has an incorrect heat level on ground.
 - (5) In the air, all the air/ground relays (in the P33 panel) are in the air position. In the air position, the probe has high heat (200-volt AC power). The current flow in the heater and the DC power energize the CSRs. This opens the ground path for the P/S lights on the miscellaneous annunciator panel. Thus, in the air, all the P/S probes have high heat (200-volt AC), and the P/S lights are off. If a P/S probe heat circuit opens (and removes power from the heater), the applicable amber P/S probe light comes on. A level C message also appears.
 - (6) If two or more probe heaters in the system have failures, the display shows the advisory message PROBE HEAT. The display does not show the probe heat failure message for each failure.
- B. Ground Test
- (1) Use the WING ANTI-ICE WINDOW/PROBE HEAT switch to do a ground test of the P/S probe heaters. The switch is on the miscellaneous test panel and is a momentary-action, center-off type. Hold the switch in the WINDOW/PROBE HEAT position to energize the left and right PROBE HT TEST relays in the P33 panel. The test relays remove electrical power from all air/ground relays for the probe heaters. The air/ground relays stay in the air position when they do not have electrical power.
 - (a) Thus, during the test the P/S probe heaters operate as they do in the air. If all heaters operate correctly, the P/S probe heater lights on the P5 panel are off. If a probe heater has a failure, its amber heater light comes on. (The WINDOW/PROBE HEAT switch position also does tests of all the other probe heaters.)
- C. Control
- (1) To put the system in operation, supply electrical power to the main AC buses (AMM 24-22-00/201).
 - (2) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) PROBE HEAT IND R
 - (b) PROBE HEAT IND L

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- (3) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
- (a) PITOT HEAT CAPT ϕ A
 - (b) PITOT HEAT CAPT ϕ B
 - (c) PITOT HEAT R AUX ϕ B
 - (d) PITOT HEAT R AUX ϕ C
 - (e) PITOT HEAT F/O ϕ A
 - (f) PITOT HEAT F/O ϕ B
 - (g) PITOT HEAT L AUX ϕ B
 - (h) PITOT HEAT L AUX ϕ C

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BOEING
767
FAULT ISOLATION/MAINT MANUAL

PITOT-STATIC PROBE ANTI-ICING

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	1		FLT COMPT, P6	
PITOT HEAT CAPT ϕ A, C1110		1	6K14	*
PITOT HEAT CAPT ϕ B, C1111		1	6K15	*
PITOT HEAT F/O ϕ A, C1116		1	6K23	*
PITOT HEAT F/O ϕ B, C1117		1	6K22	*
PITOT HEAT L AUX ϕ B, C1114		1	6K21	*
PITOT HEAT L AUX ϕ C, C1115		1	6K20	*
PITOT HEAT R AUX ϕ B, C1112		1	6K16	*
PITOT HEAT R AUX ϕ C, C1113		1	6K17	*
CIRCUIT BREAKER -			FLT COMPT, P11	
PROBE HEAT IND L, C1120		1	11A15	*
PROBE HEAT IND R, C1121		1	11A28	*
COMPUTER - (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
LIGHT - CAPT PITOT ANNUNCIATOR, L5	1	1	FLT COMPT, P5, MISCELLANEOUS ANNUNCIATOR PNL, M10394	*
LIGHT - F/O PITOT ANNUNCIATOR, L6	1	1	FLT COMPT, P5, MISCELLANEOUS ANNUNCIATOR PNL, M10394	*
LIGHT - L AUX PITOT ANNUNCIATOR, L9	1	1	FLT COMPT, P5, MISCELLANEOUS ANNUNCIATOR PNL, M10394	*
LIGHT - R AUX PITOT ANNUNCIATOR, L10	1	1	FLT COMPT, P5, MISCELLANEOUS ANNUNCIATOR PNL, M10394	*
PANEL - (FIM 28-43-00/101)				
MISC TEST, M10398				
PANEL - MISCELLANEOUS ANNUNCIATOR, M10394	1	1	FLT COMPT, P5	*
PROBE - (FIM 34-11-00/101)				
CAPT PITOT-STATIC, B26				
F/O PITOT-STATIC, B28				
L AUX PITOT-STATIC, B29				
R AUX PITOT-STATIC, B27				
RELAY -	--		MAIN EQUIP CTR, P33 PANEL	
AIR/GND SYS 1, K515		1		*
AIR/GND SYS 1, K516		1		*
AIR/GND SYS 2, K522		1		*
AIR/GND SYS 2, K528		1		*

* SEE THE WDM EQUIPMENT LIST

Pitot-Static Probe Anti-Icing - Component Index
Figure 101 (Sheet 1)

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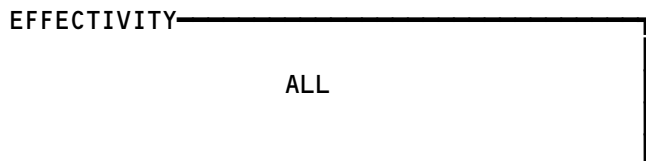
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 767
 FAULT ISOLATION/MAINT MANUAL

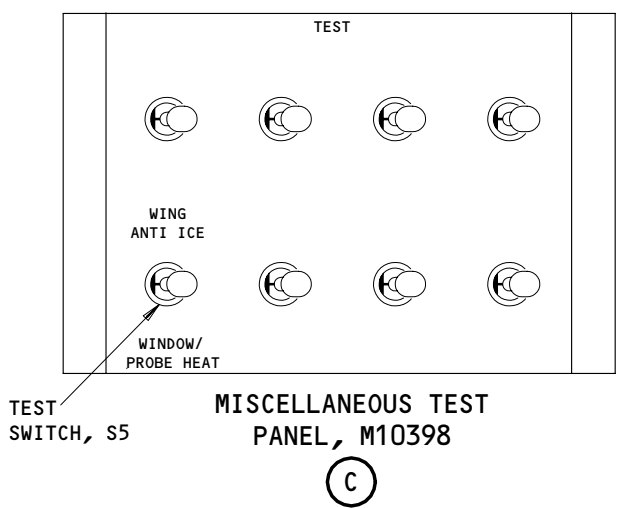
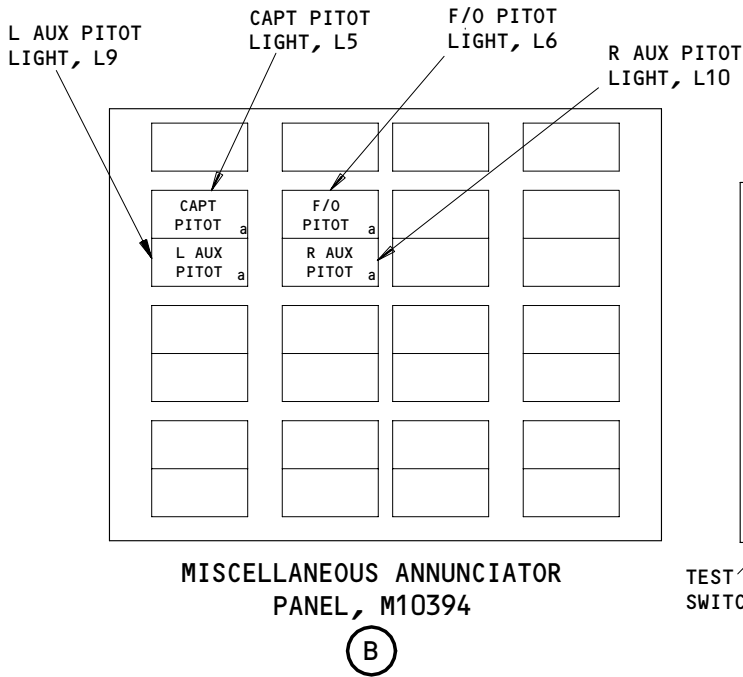
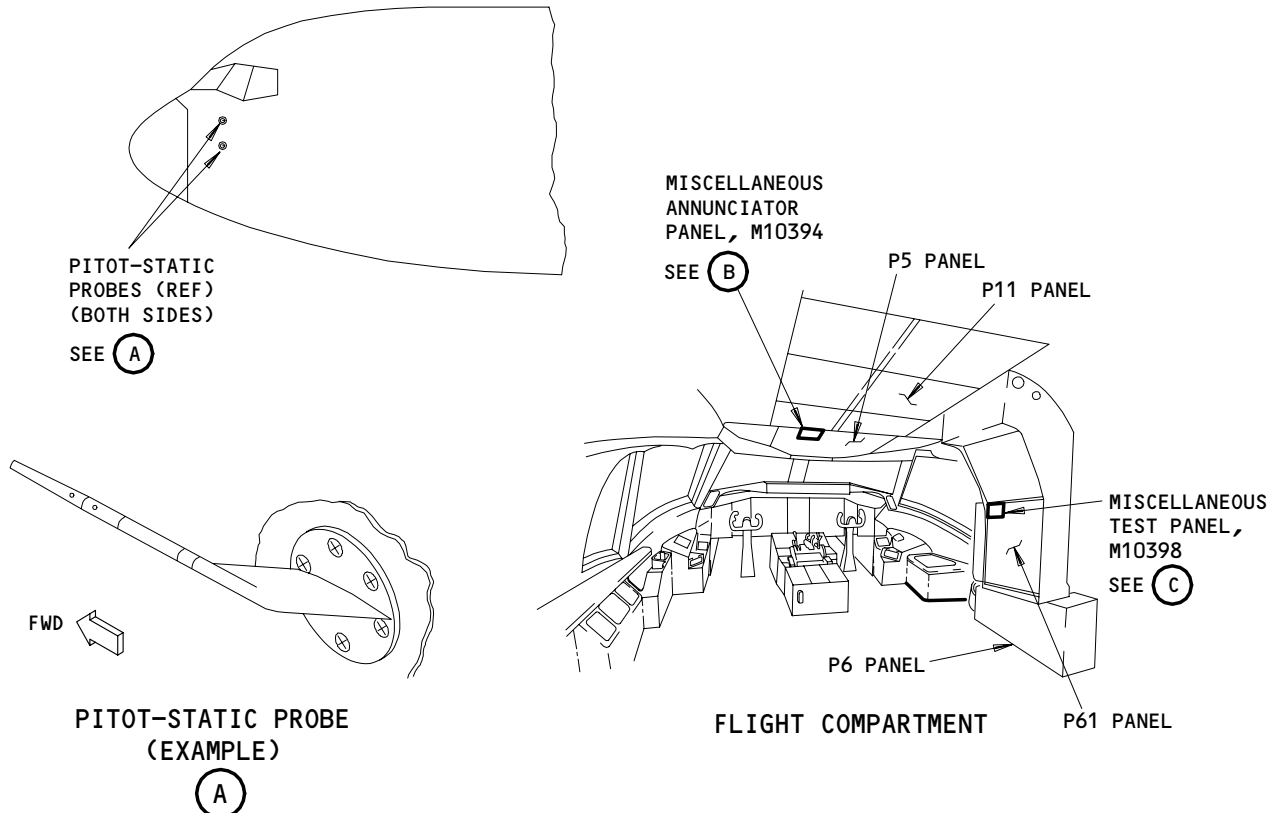
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
RELAY - CAPT P/S CURRENT SENSING, K241 F/O P/S CURRENT SENSING, K310 L AUX P/S CURRENT SENSING, K312 R AUX P/S CURRENT SENSING, K243 L PROBE HT N2, K644 L PROBE HT TEST, K643 R PROBE HT N2, K646 R PROBE HT TEST, K645 SPEED CARD - (FIM 73-21-00/101) L N2 ENGINE, M1093 R N2 ENGINE, M1092 SWITCH - WINDOW/PROBE HEAT TEST, YEIS5	--	1 1 1 1 1 1 1 1 1 1 1	MAIN EQUIP CTR, P33 PANEL FLT COMPT, P61, MISC TEST PANEL, M10398	* * * * * * * * * * * *

* SEE THE WDM EQUIPMENT LIST

Pitot-Static Probe Anti-Icing - Component Index
 Figure 101 (Sheet 2)



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Pitot-Static Probe Anti-Icing - Component Location
Figure 102

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E40714

PITOT STATIC PROBE ANTI-ICING – ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. The task is an operational test of the four pitot static probe anti-icing systems.
- B. The four pitot static probe anti-icing systems are the captain's, first officer's, left auxiliary, and right auxiliary.

TASK 30-31-00-715-008

2. Operational Test – Pitot Static Probe Anti-Icing System

- A. Equipment
 - (1) Tester – Pyrometer
- B. References
 - (1) AMM 24-22-00/201, Electrical Power – Control
 - (2) AMM 33-16-00/501, Master Dim and Test
 - (3) AMM 31-41-00/501, Engine Indication and Crew Alerting System
- C. Access
 - (1) Location Zones
 - 211/212 Control Cabin
- D. Prepare for Test

S 095-001

CAUTION: REMOVE ALL THE TEST EQUIPMENT AND COVERS FROM THE PITOT STATIC, ANGLE OF ATTACK, AND TOTAL AIR TEMPERATURE PROBES. DAMAGE CAN OCCUR TO THE TEST EQUIPMENT, COVERS, AND PROBES WHEN THE PROBES BECOME HOT.

- (1) Remove all the test equipment and covers from the pitot static, angle of attack, and total air temperature probes.

S 865-002

- (2) Supply electrical power to the main AC buses (AMM 24-22-00).

S 865-022

- (3) AIRPLANES WITH AUTO SPEEDBRAKE TRUCK TILT SENSOR (POST SB 767-27A0160 OR PRR 12900-086);
 - (a) Make sure that the 6K14 and 6K15 PITOT HEAT CAPT PHASE A, PHASE B circuit breakers are closed.

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(b) Make sure that the 11A15 or 11T17 PROBE HEAT IND L circuit breaker is closed.

S 715-003

(4) Make sure the master dim and test system operates (AMM 33-16-00).

S 715-004

(5) Make sure the Engine Indication and Crew Alerting System operates (AMM 31-41-00/201).

S 215-005

(6) Make sure these lights on the M10394 miscellaneous annunciator panel (P5 panel) are on:

- (a) CAPT PITOT
- (b) F/O PITOT
- (c) L AUX PITOT
- (d) R AUX PITOT

S 865-006

(7) Set the EICAS computer select switch to AUTO.

NOTE: This switch is on panel P9.

S 215-007

(8) Make sure the EICAS message, PROBE HEAT, shows on the top display on P2 panel.

E. Procedure

S 865-023

(1) AIRPLANES WITH AUTO SPEEDBRAKE TRUCK TILT SENSOR (POST SB 767 27-A0160 OR PRR 12900-086);

- (a) Make sure that the CAPT PITOT light on M10394 miscellaneous annunciator panel (P5 panel) is on.
- (b) Apply actuator to S10598 sensor (AMM 32-09-07/201).
- (c) Make sure that the CAPT PITOT light on M10394 goes off.
- (d) With pyrometer, make sure that the probe temperature increases.

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(e) Remove the actuator from the S10598 Sensor (AMM 32-09-07/201).

S 215-009

CAUTION: DO NOT OPERATE THE PROBE HEATERS FOR MORE THAN 2 MINUTES. STOP FOR 5 MINUTES MINIMUM BETWEEN EACH OPERATION OF THE PROBE HEATERS. DAMAGE TO THE PROBE AND HEATER CAN OCCUR.

(2) Hold the WING ANTI-ICE WINDOW/PROBE HEAT switch (P61 right side panel) in the WINDOW/PROBE HEAT position.

(a) Make sure these P5 panel lights are off:

- 1) CAPT PITOT
- 2) F/O PITOT
- 3) L AUX PITOT
- 4) R AUX PITOT

(b) Make sure these EICAS messages are not shown on the top display:

- 1) PROBE HEAT
- 2) CAPT PITOT
- 3) F/O PITOT
- 4) L AUX PITOT
- 5) R AUX PITOT

WARNING: DO NOT TOUCH THE PROBES. THE PROBES CAN BURN YOU.

(c) Hold your hand near each pitot-static probe and make sure the probes become warm.

(d) Open each circuit breaker in the table below. Make sure the applicable EICAS message and panel light come into view. Close the circuit breaker after you see the message and light.

CIRCUIT BREAKER	EICAS MESSAGE AND PANEL LIGHT
6K14, PITOT HEAT CAPT ϕ A	CAPT PITOT
6K23, PITOT HEAT F/O ϕ A	F/O PITOT
6K21, PITOT HEAT L AUX ϕ B	L AUX PITOT
6K16, PITOT HEAT R AUX ϕ B	R AUX PITOT

S 865-010

(3) Release the WING ANTI-ICE WINDOW/PROBE HEAT switch.

S 865-011

(4) Remove electrical power if it is not necessary.

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ANGLE OF ATTACK PROBE HEAT – DESCRIPTION AND OPERATION

1. General

A. Two angle of attack (AOA) probes (one on each side of the airplane) have electrical heat to prevent incorrect indications caused by ice. The components of the AOA probe heat system include the AOA probes, the miscellaneous annunciator panel, and the miscellaneous test panel. System electrical power comes from the main left and right 28-volt DC buses and the main left and right 115-volt AC buses. The circuit breakers are on the overhead circuit breaker panel, P11, and main power distribution panel, P6.

2. Component Details (Fig. 1)

A. AOA Probes

(1) One AOA probe is on each side of the airplane, half the distance down the fuselage, below the left and right no. 3 flight deck windows. Each AOA probe has a vane heater and a case heater. The vane heater keeps an efficient vane airfoil. The case heater makes sure the vane turns freely. The AOA probe has only one heat level on the ground and during flight.

B. Miscellaneous Annunciator Panel

(1) The miscellaneous annunciator panel, M10394, is on the pilot's overhead panel, P5. The annunciator panel contains two amber lights, one for each AOA probe. The lights are identified L AOA and R AOA. These lights come on to show a probe heater failure.

C. Miscellaneous Test Panel

(1) The miscellaneous test panel, M10398, permits a ground test of the probe heaters. The test panel is on the right side panel, P61.

3. Operation (Fig. 2)

A. Functional Description

(1) Air/ground relays and PROBE HT N2 relays automatically control the AOA probe heat. The engine speed from the N2 engine speed cards sets the positions of the relays. The only operation started from the flight deck is the probe heat test.

(2) The AOA probe current sensor measures only the current flow to the vane heater. This permits fault isolation of the AOA sensor vane heater independently of the case heater.

(3) On the ground, engine speed sets the AOA probe heat. The air/ground relays (in the forward miscellaneous electrical equipment panel, P33) are energized to the ground position. This opens the probe heat circuit. If the two engines are not in operation, the PROBE HT N2 relays (in the P33 panel) are also not energized. The probe heat circuit stays open, and the probes do not have heat. The current sensing relay (CSR) in the P33 panel for each AOA probe is not energized. This gives a closed path to the ground for the AOA lights on the miscellaneous annunciator panel.

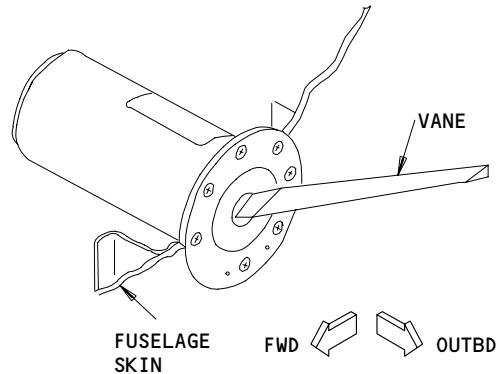
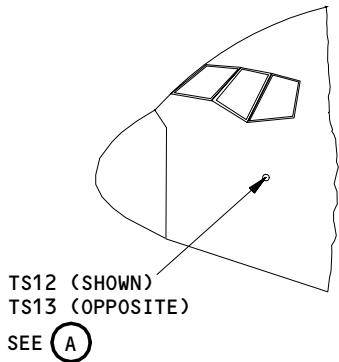
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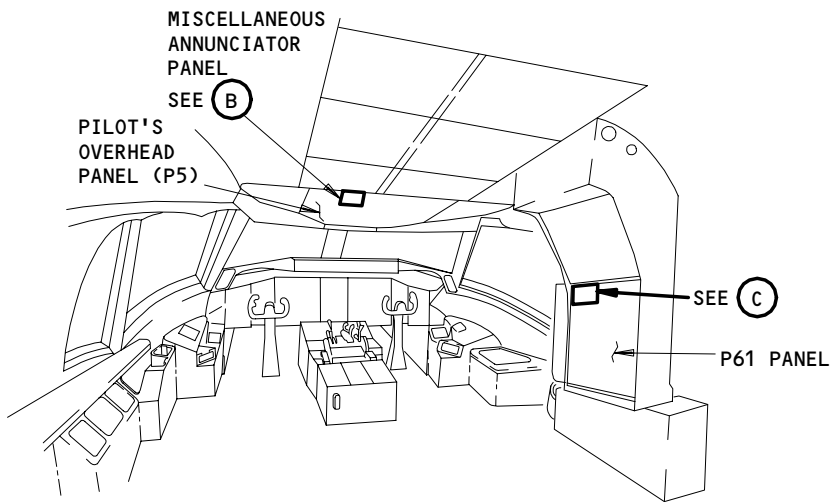
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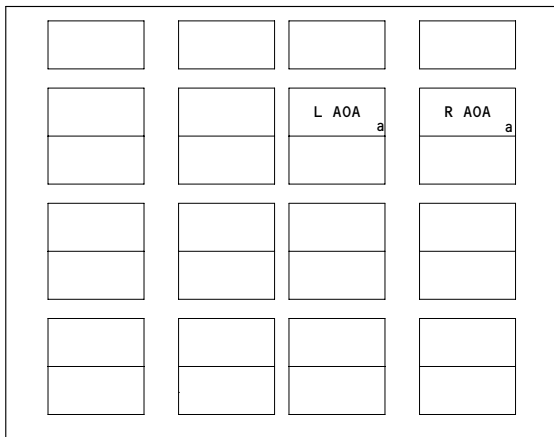


ANGLE OF ATTACK PROBE
(EXAMPLE)

(A)

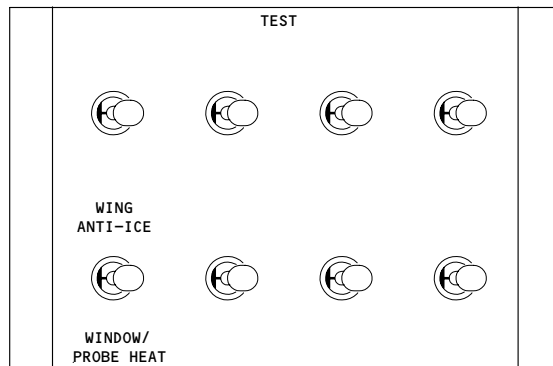


FLIGHT COMPARTMENT



M10394 - MISCELLANEOUS ANNUNCIATOR PANEL (P5)

(B)



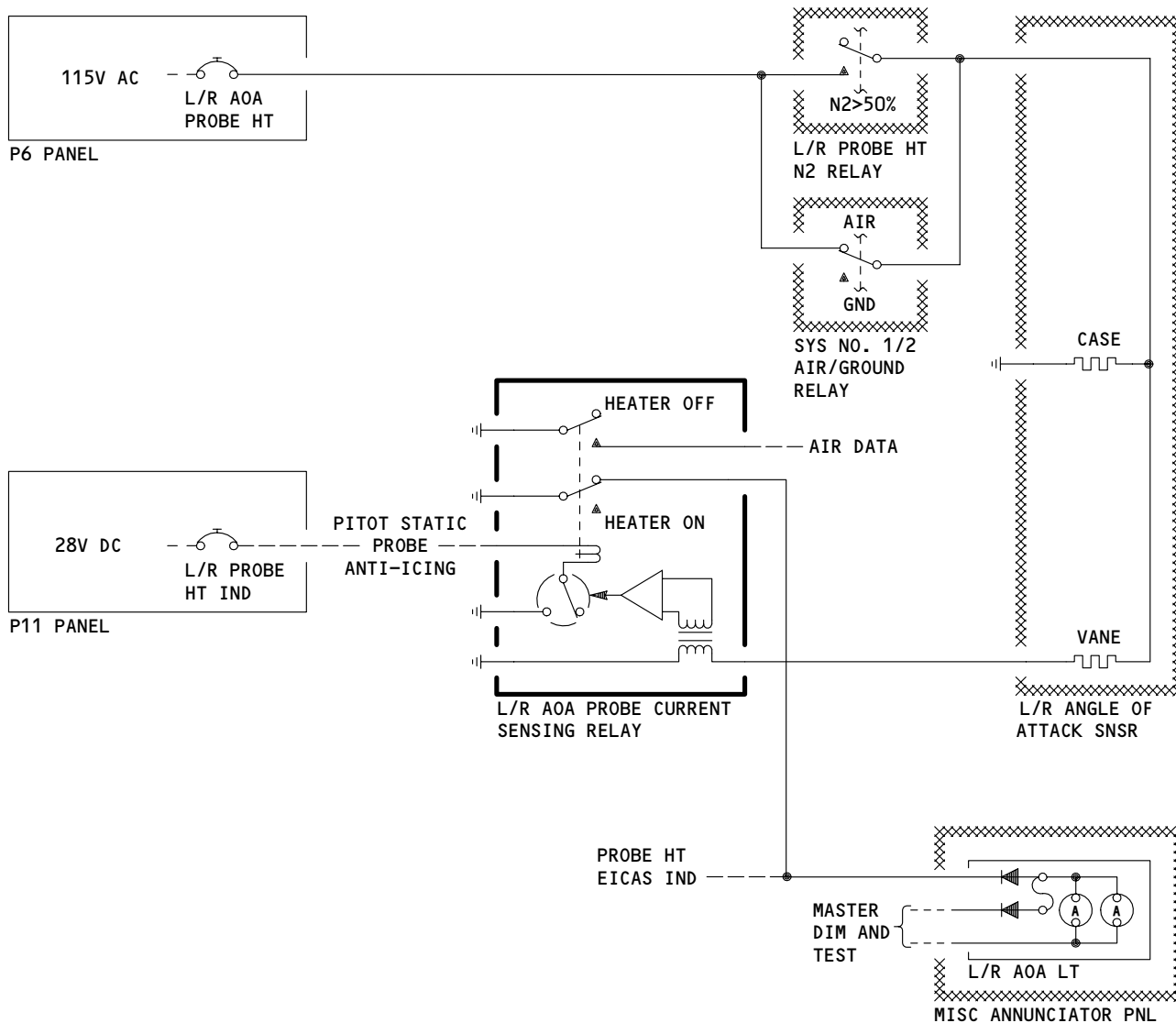
M10398 - MISCELLANEOUS TEST PANEL (P61)

(C)

Angle of Attack Probe Anti-Icing - Component Location
Figure 1

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Angle of Attack Probe Heat Schematic
Figure 2

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- (4) Thus, on the ground with the engines off, the AOA probes do not have heat, and the amber AOA lights on the P5 panel are on. The EICAS display will show the level C messages, L AOA PROBE and R AOA PROBE.
- (5) When one or two engines are in operation on the ground, it energizes the PROBE HT N2 relays. This gives a path from the 115-volt AC power source, through the heaters, to the ground. The current flow in the heaters energize the CSRs. This opens the ground path for the AOA lights on the miscellaneous annunciator panel. Thus, on the ground with a minimum of one engine in operation, the two AOA probes have heat from the 115-volt AC power, and the AOA lights on the P5 panel are off. If an AOA probe heater has a failure, the applicable amber AOA light on the P5 panel comes on. The EICAS display shows a level C message.
- (6) In the air, the PROBE HT N2 and air/ground relays give a path for the current flow through the heaters. The probe heat is the same as when a minimum of one engine is in operation on the ground. If an AOA probe heater has a failure, the applicable amber AOA light on the P5 panel comes on. The EICAS display shows a level C message.
- (7) If two or more probe heaters in the system have a failure, the EICAS display shows the advisory message PROBE HEAT. The EICAS display does not show the probe heat failure messages for each failure. The system includes the pitot-static, angle of attack, and total air temperature probes.
 - (a) AIRPLANES WITH ENGINE PROBES;
The engine probes are also included in the PROBE HEAT EICAS message logic.

B. Ground Test

- (1) Use the WING ANTI-ICE WINDOW/PROBE HEAT switch to do a ground test of the AOA probe heaters. The switch is on the miscellaneous test panel and is a momentary-action, center-off type. Hold the switch in the WINDOW/PROBE HEAT position to energize the left and right PROBE HT TEST relays in the P33 panel. The test relays remove electrical power from all the air/ground relays for the probe heaters. The air/ground relays stay in the air position when they do not have electrical power.
 - (a) Thus, during the test the AOA probe heaters operate as they do in the air or on the ground with one engine in operation. If all the heaters operate correctly, the AOA lights on the P5 panel are off. If a probe heater has a failure, its amber probe heater light comes on. (The WINDOW/PROBE HEAT switch position also does tests of all the other probe heaters.)

C. Control

- (1) To put the system in operation, supply electrical power to the main AC buses (AMM 24-22-00/201).
- (2) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) PROBE HEAT IND R
 - (b) PROBE HEAT IND L

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- (3) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
- (a) PROBE HEAT L AOA
 - (b) PROBE HEAT R AOA

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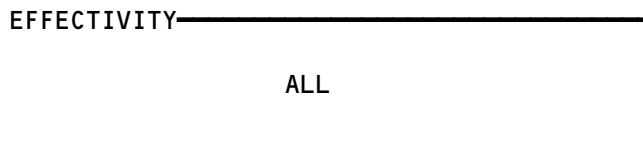
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FAULT ISOLATION/MAINT MANUAL

ANGLE OF ATTACK PROBE HEAT

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER - PROBE HEAT LEFT AOA, C1133 PROBE HEAT RIGHT AOA, C1141	1	1 1	FLIGHT COMPARTMENT, P6 6L17 6K24	* *
CIRCUIT BREAKER - PROBE HEAT IND LEFT, C1120 PROBE HEAT IND RIGHT, C1121		1 1	FLIGHT COMPARTMENT, P11 11A15 11A28	* *
COMPUTER - (FIM 31-41-00/101) EICAS LEFT, M10181 EICAS RIGHT, M10182				
LIGHT - LEFT AOA ANNUNCIATOR, L7	1	1	FLIGHT COMPARTMENT, P5, MISCEL- LANEOUS ANNUNCIATOR PANEL, M10394	*
LIGHT - RIGHT AOA ANNUNCIATOR, L8	1	1	FLIGHT COMPARTMENT, P5, MISCEL- LANEOUS ANNUNCIATOR PANEL, M10394	*
PANEL - (FIM 28-43-00/101) MISCELLANEOUS TEST, M10398				
PANEL - (FIM 30-31-00/101) MISCELLANEOUS ANNUNCIATOR, M10394				
RELAY - LEFT AOA PROBE CURRENT SENSING, K400 LEFT PROBE HT N2, K644 RIGHT AOA PROBE CURRENT SENSING, K401 RIGHT PROBE HT N2, K646 SYS 1 AIR/GND, K514 SYS 2 AIR/GND, K517	--	1 1 1 1 1 1	MAIN EQUIP CTR, P33 PANEL	* * * * * *
SENSOR - (FIM 34-12-00/101) LEFT AOA, TS12 RIGHT AOA, TS13				
SPEED CARD - (FIM 73-21-00/101) LEFT N2 ENGINE, M1093 RIGHT N2 ENGINE, M1092				
SWITCH - (FIM 30-31-00/101) WINDOW/PROBE HEAT, YEIS5				

* SEE THE WDM EQUIPMENT LIST

Angle of Attack Probe Heat - Component Index
Figure 101



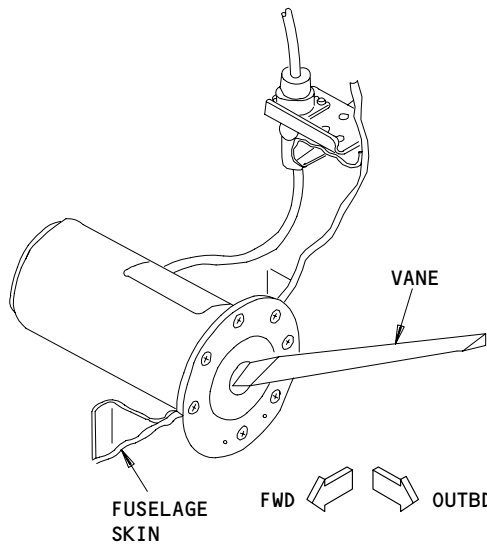
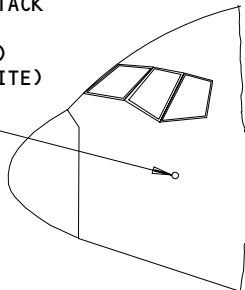
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FAULT ISOLATION/MAINT MANUAL

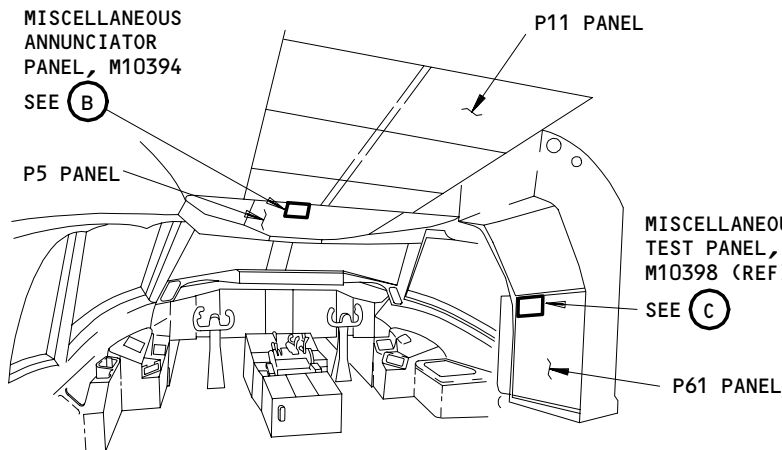
ANGLE OF ATTACK
PROBES,
TS12 (SHOWN)
TS13 (OPPOSITE)
SEE (A)



ANGLE OF ATTACK PROBE
(EXAMPLE)

(A)

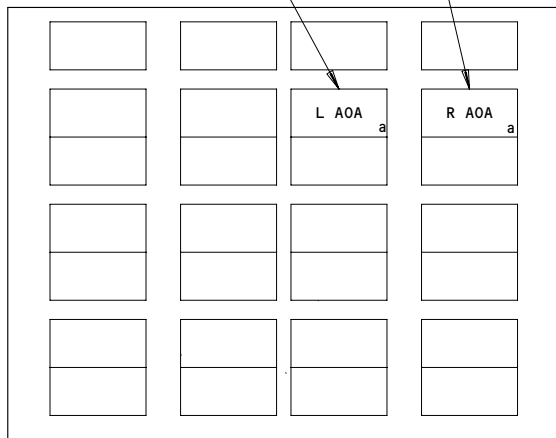
MISCELLANEOUS
ANNUNCIATOR
PANEL, M10394
SEE (B)



FLIGHT COMPARTMENT

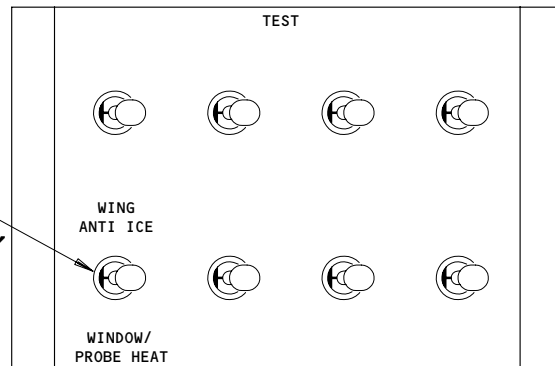
LEFT AOA ANNUNCIATOR
LIGHT, L7

RIGHT AOA ANNUNCIATOR
LIGHT, L8



MISCELLANEOUS ANNUNCIATOR PANEL, M10394 (REF)

(B)



MISCELLANEOUS TEST PANEL, M10398 (REF)

(C)

Angle of Attack Probe Heat - Component Location
Figure 102

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103601

ANGLE OF ATTACK PROBE HEAT – ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. The task is an operational test of the two angle of attack (AOA) probe heat systems.

TASK 30-32-00-715-009

2. Operational Test – Angle of Attack Probe Heat System

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
- (2) AMM 33-16-00/501, Master Dim and Test
- (3) AMM 31-41-00/501, Engine Indication and Crew Alerting System

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Prepare for Test

S 215-001

- (1) Make sure no test equipment or covers are installed on the probes. This includes pitot-static, total air temperature, and engine probes.

S 865-003

- (2) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 715-004

- (3) Make sure the master dim and test system operates (AMM 33-16-00/501).

S 715-005

- (4) Make sure the Engine Indication and Crew Alerting System operates (AMM 31-41-00/201).

S 215-006

- (5) Make sure L and R AOA lights on M10394 miscellaneous annunciator panel (P5 panel) are on.

S 865-007

- (6) Set the EICAS computer select switch to AUTO.

NOTE: This switch is on panel P9.

S 215-008

- (7) Make sure the EICAS message, PROBE HEAT, shows on the top EICAS display on the P2 panel.

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D. Procedure

S 215-010

WARNING: DO NOT TOUCH THE PROBES DURING THE TEST. THE PROBES CAN BURN YOU.

CAUTION: DO NOT OPERATE PROBE HEATERS FOR MORE THAN 2 MINUTES. STOP FOR 5 MINUTES MINIMUM BETWEEN EACH OPERATION OF THE PROBE HEATERS. DAMAGE TO THE PROBES CAN OCCUR.

- (1) Hold the WING ANTI-ICE WINDOW/PROBE HEAT switch (P61 right side panel) in the WINDOW/PROBE HEAT position.
 - (a) Make sure the and R AOA lights (P5) are off.
 - (b) Make sure these EICAS messages do not show on the top display:
 - 1) PROBE HEAT
 - 2) L AOA PROBE
 - 3) R AOA PROBE
 - (c) Hold your hand near each AOA probe and make sure the probe becomes warm.
 - (d) Open the PROBE HEAT L AOA (6L17) circuit breaker.
 - 1) Make sure the EICAS message, L AOA PROBE, shows on the display.
 - 2) Make sure the L AOA light is on.
 - (e) Close the PROBE HEAT L AOA (6L17) circuit breaker.
 - (f) Open the PROBE HEAT R AOA (6K24) circuit breaker.
 - 1) Make sure the EICAS message, R AOA PROBE, shows on the display.
 - 2) Make sure the R AOA light is on.
 - (g) Close the PROBE HEAT R AOA (6K24) circuit breaker.

S 865-011

- (2) Release the WING ANTI-ICE WINDOW/PROBE HEAT switch.

S 865-012

- (3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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TOTAL AIR TEMPERATURE PROBE HEAT - DESCRIPTION AND OPERATION

1. General

A. The left total air temperature (TAT) probe has electrical heat to prevent incorrect indications caused by ice. The components of the TAT system include the TAT probe, miscellaneous annunciator panel, and miscellaneous test panel. Electrical power for the system comes from the left main 28-volt DC bus and the left main 115-volt AC bus. The circuit breakers are on the overhead circuit breaker panel, P11, and the main power distribution panel, P6.

2. Component Details (Fig. 1)

A. TAT Probe

(1) The TAT probe is on the left side of the airplane, half the distance down the fuselage, below the no. 1 flight deck window. The TAT probe has only one heat level.

B. Miscellaneous Annunciator Panel

(1) The miscellaneous annunciator panel, M10394, is on the pilot's overhead panel, P5. The annunciator panel contains an amber TAT light. The light comes on to show a left TAT probe heater failure when it occurs.

C. Miscellaneous Test Panel

(1) The miscellaneous test panel, M10398, lets you do a ground test of the probe heater. The test panel is on the right side panel, P61.

3. Operation (Fig. 2)

A. Functional Description

(1) The air/ground relays and PROBE HT N2 card relays automatically control the TAT probe heat. The engine speed from the N2 engine speed cards sets the positions of the relays. The only operation started from the flight deck is the probe heat test.

(2) On the ground, the TAT probe does not have heat. When the air/ground relays are energized, the heater circuit opens. The L PROBE HT N2 relay puts the TAT light on or off. If the two engines are not in operation, the L PROBE HT N2 relay does not have electrical power. The circuit from the TAT lights through the current sensing relay (CSR) in the P33 panel to the ground is closed. The amber TAT light on the P5 panel is on, and a level C EICAS message, TAT PROBE, appears.

(a) If one or two engines are in operation, it energizes the L PROBE HT N2 relay. This opens the ground path for the TAT probe heater light. Thus, the TAT light and the EICAS message TAT PROBE are off when a minimum of one engine is in operation on the ground.

(3) In the air, all the air/ground relays go to the air position. This lets current flow through the TAT probe heater and energizes the CSR. 115-volt AC power supplies heat to the TAT probe. The energized CSR opens the ground path for the TAT light on the P5 panel. The TAT light will be off. If power to the TAT probe heater stops, the TAT light comes on and the level C EICAS message, TAT PROBE, appears on the EICAS display.

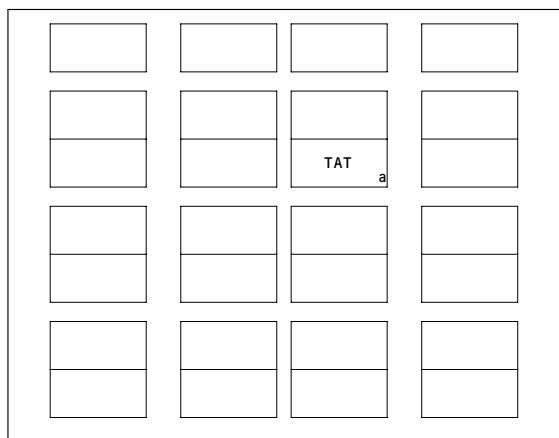
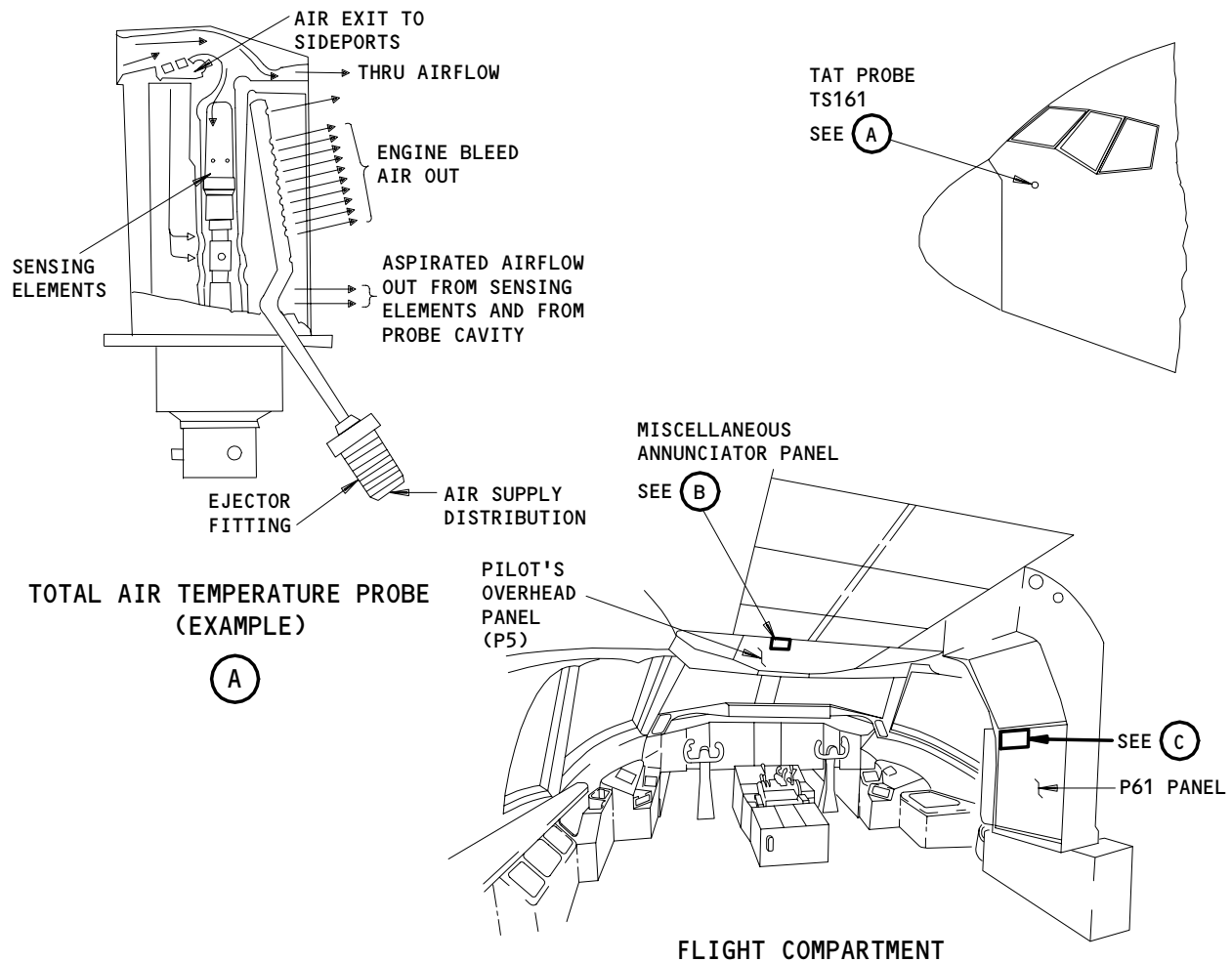
EFFECTIVITY

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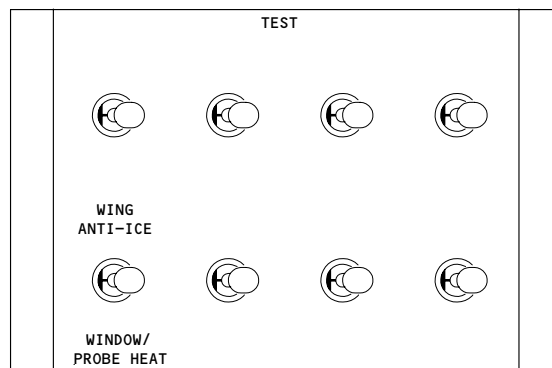
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M10394 - MISCELLANEOUS ANNUNCIATOR PANEL (P5)

(B)



M10398 - MISCELLANEOUS TEST PANEL (P61)

(C)

Total Air Temperature Probe Heat - Component Location
Figure 1

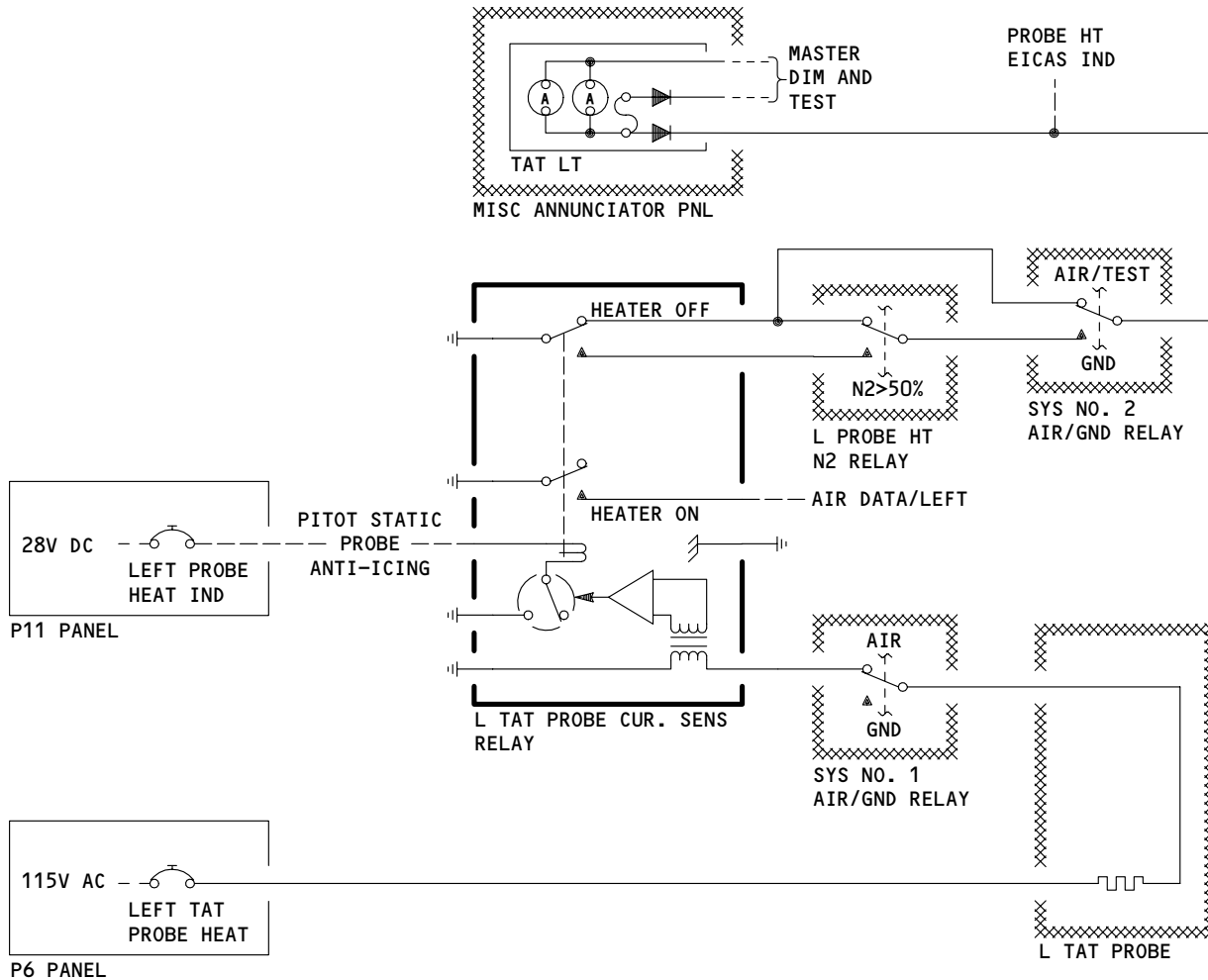
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Total Air Temperature Probe Heat Schematic
Figure 2

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(4) If two or more probe heaters in the system have failures, the EICAS display shows the advisory message, PROBE HEAT. The EICAS does not show the probe heat failure messages for each failure. The system includes the pitot-static, angle of attack, and total air temperature probes.

(a) ON AIRPLANES WITH ENGINE PROBES;

The engine probes are also included in the PROBE HEAT EICAS message logic.

B. Ground Test

(1) Use the WING ANTI-ICE WINDOW/PROBE HEAT switch to do a ground test of the TAT heater. The switch is on the miscellaneous test panel and is a momentary-action, center-off type. Hold the switch in the WINDOW/PROBE HEAT position to energize the left and right PROBE HT TEST relays in the P33 panel. The test relays remove electrical power from all the air/ground relays for the probe heaters. The air/ground relays stay in the air position when they do not have electrical power.

(a) Thus, during the ground test, the TAT probe heater operates as it does in the air. If the heater operates correctly, the TAT light on the P5 panel is off. If the probe heater has a failure, the amber TAT light comes on and the EICAS message, TAT PROBE, is shown. The WINDOW/PROBE HEAT switch position also does tests of all the other probe heaters.

C. Control

(1) To put the system in operation, supply electrical power to the main AC buses.

(2) Make sure the PROBE HEAT IND L circuit breaker on the overhead circuit breaker panel, P11, is closed.

(3) Make sure the PROBE HEAT TAT circuit breaker on the main power distribution panel, P6, is closed.

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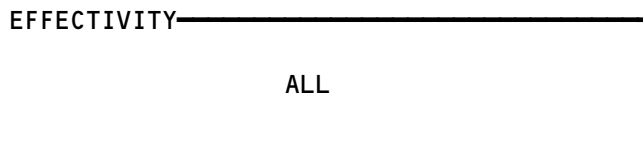
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TOTAL AIR TEMPERATURE PROBE HEAT

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER - PROBE HEAT IND LEFT, C1120	1	1	FLIGHT COMPARTMENT, P11 11A15	*
CIRCUIT BREAKER - PROBE HEAT TAT, C1138		1	FLIGHT COMPARTMENT, P6 6L18	*
COMPUTER - EICAS LEFT, M10181 EICAS RIGHT, M10182				
LIGHT - TAT ANNUNCIATOR, L11	1	1	FLIGHT COMPARTMENT, P5, MISCELLANEOUS ANNUNCIATOR PANEL, M10394	
PANEL - MISCELLANEOUS TEST, M10398				
PANEL - MISCELLANEOUS ANNUN., M10394				
PROBE - TAT, TS161				
RELAY - LEFT PROBE HT N2, K644	--	1	MAIN EQUIP CTR, P33 PANEL	*
LEFT TAT PROBE CURRENT SENSING, K411		1		*
SYS 1 AIR/GND, K514		1		*
SYS 2 AIR/GND, K517		1		*
SWITCH - WINDOW/PROBE HEAT TEST, YEIS5				

* SEE THE WDM EQUIPMENT LIST

Total Air Temperature Probe Heat - Component Index
 Figure 101

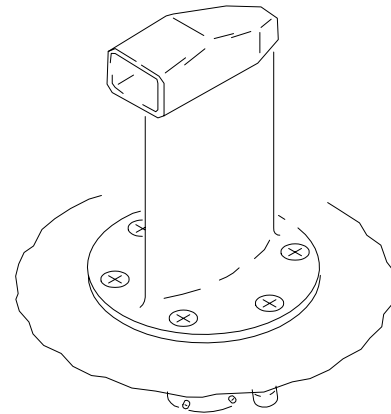
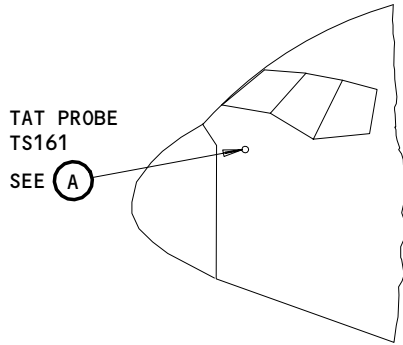


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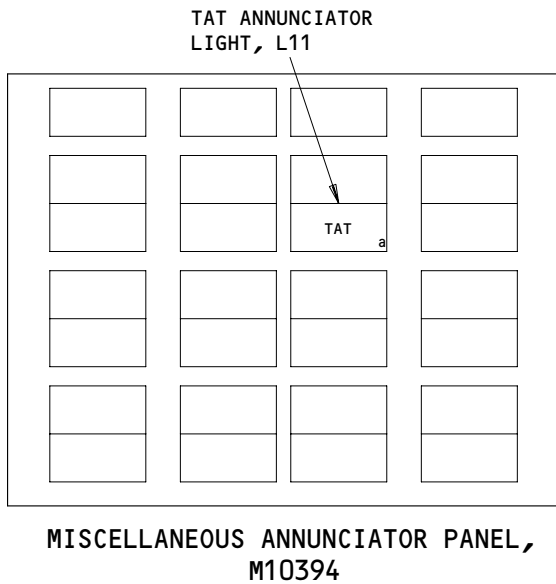
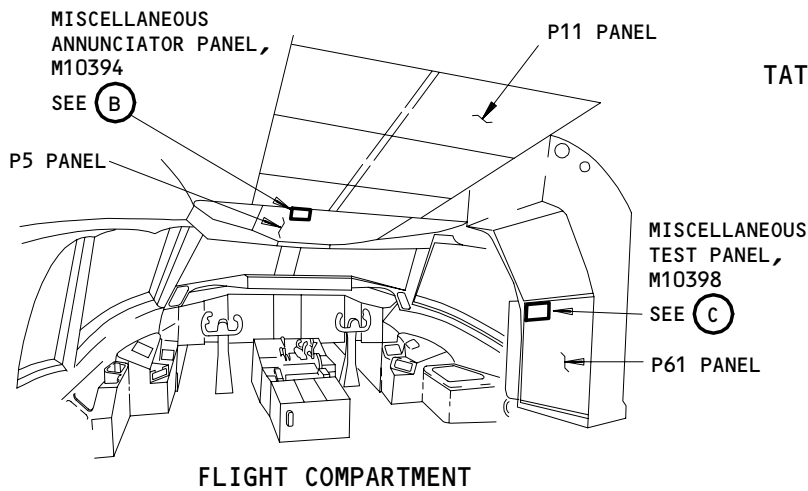
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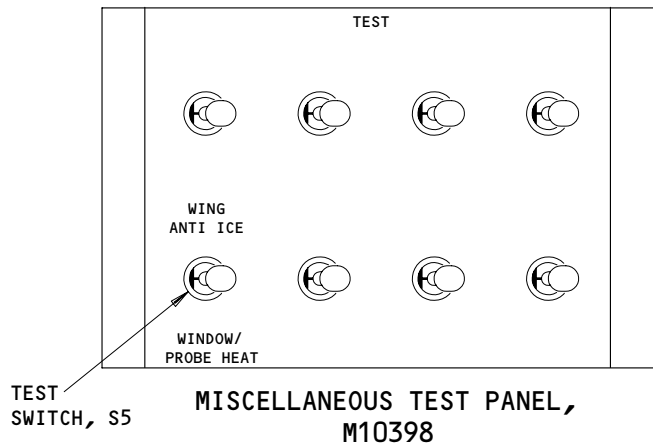
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TAT PROBE, TS161
(A)



(B)



(C)

Total Air Temperature Probe Heat - Component Location
Figure 102

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TOTAL AIR TEMPERATURE PROBE HEAT – ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. The task is an operational test for the total air temperature (TAT) probe heat system.

TASK 30-33-00-715-010

2. Operational Test – Total Air Temperature Probe Heat System

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
- (2) AMM 33-16-00/501, Master Dim and Test
- (3) AMM 31-41-00/501, Engine Indication and Crew Alerting System

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Prepare for Test

S 215-001

- (1) Make sure no test equipment or covers are installed on the probes. This includes pitot-static, angle of attack, and engine probes.

S 865-003

- (2) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 715-004

- (3) Make sure the master dim and test system operates (AMM 33-16-00/501).

S 715-005

- (4) Make sure the Engine Indication and Crew Alerting System operates (AMM 31-41-00/201).

S 215-007

- (5) Make sure the TAT light on M10394 miscellaneous annunciator panel (P5 panel) is on.

S 865-008

- (6) Set the EICAS computer select switch to AUTO.

NOTE: This switch is on panel P9.

S 215-009

- (7) Make sure the EICAS message, PROBE HEAT, shows on the top EICAS display on the P2 panel.

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D. Procedure

S 215-011

WARNING: DO NOT TOUCH THE PROBES DURING THE TEST. THE PROBES CAN BURN YOU.

CAUTION: DO NOT OPERATE PROBE HEATERS FOR MORE THAN 2 MINUTES. STOP FOR 5 MINUTES MINIMUM BETWEEN EACH OPERATION OF THE PROBE HEATERS. DAMAGE TO THE PROBE CAN OCCUR.

- (1) Hold the WING ANTI-ICE WINDOW/PROBE HEAT switch (P61 right side panel) in the WINDOW/PROBE HEAT position.
 - (a) Make sure the TAT light (P5) is off.
 - (b) Make sure these EICAS messages do not show on the top display:
 - 1) PROBE HEAT
 - 2) TAT PROBE
 - (c) Hold your hand near the TAT probe and make sure the probe becomes warm.
 - (d) Open the PROBE HEAT TAT (6L18) circuit breaker.
 - (e) Make sure the EICAS message, TAT PROBE, shows on the top display.
 - (f) Make sure the TAT light is on.
 - (g) Close the PROBE HEAT TAT (6L18) circuit breaker.

S 865-012

- (2) Release the WING ANTI-ICE WINDOW/PROBE HEAT switch.

S 865-013

- (3) Remove electrical power if it is not necessary.

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ENGINE PROBE HEAT - DESCRIPTION AND OPERATION

1. General

- A. Each engine has one engine PT2/TT2 probe. The PT2/TT2 probe will be referred to as the engine probe.
- B. The engine probe has electrical heat to prevent incorrect indications caused by ice. The components of the engine probe heat system include the engine probes, and the miscellaneous test panel. System electrical power is from the left and right 28-volt DC buses and the left and right 115-volt AC buses. The circuit breakers are on the overhead circuit breaker panel, P11, and the main power distribution panel, P6.

2. Component Details (Fig. 1)

A. Engine Probes

- (1) One engine probe is on the top inner surface of each engine nose cowl. The engine probe has only one heat level.

B. Miscellaneous Test Panel

- (1) The miscellaneous test panel, M10398, permits a ground test of the probe heaters. The test panel is on the right side panel, P61.

3. Operation

A. Functional Description

- (1) The air/ground relays and the probe heat relays automatically control the engine probe heat. The engine speed from the engine speed cards sets the position of the relays. The only operation started from the flight deck is the probe heat test.
 - (a) On the ground, engine speed sets the engine probe heat. If the engines are not in operation, the probe heat relays are not energized. The circuits to the probes are open, and the current sensing relay (CSR) for each engine probe is not energized. The CSRs for the engine probes are in the forward miscellaneous electrical equipment panel, P33.
- (2) When one engine operates on the ground, it energizes the probe heat relay for that engine. This gives a path from the 115-volt AC power source, through the engine probe heater, to the ground. The CSRs are energized for the engine probe of the engine in operation. If the engine probe heater of that engine has a failure, the EICAS message, L (R) ENG PROBE HEAT, shows.

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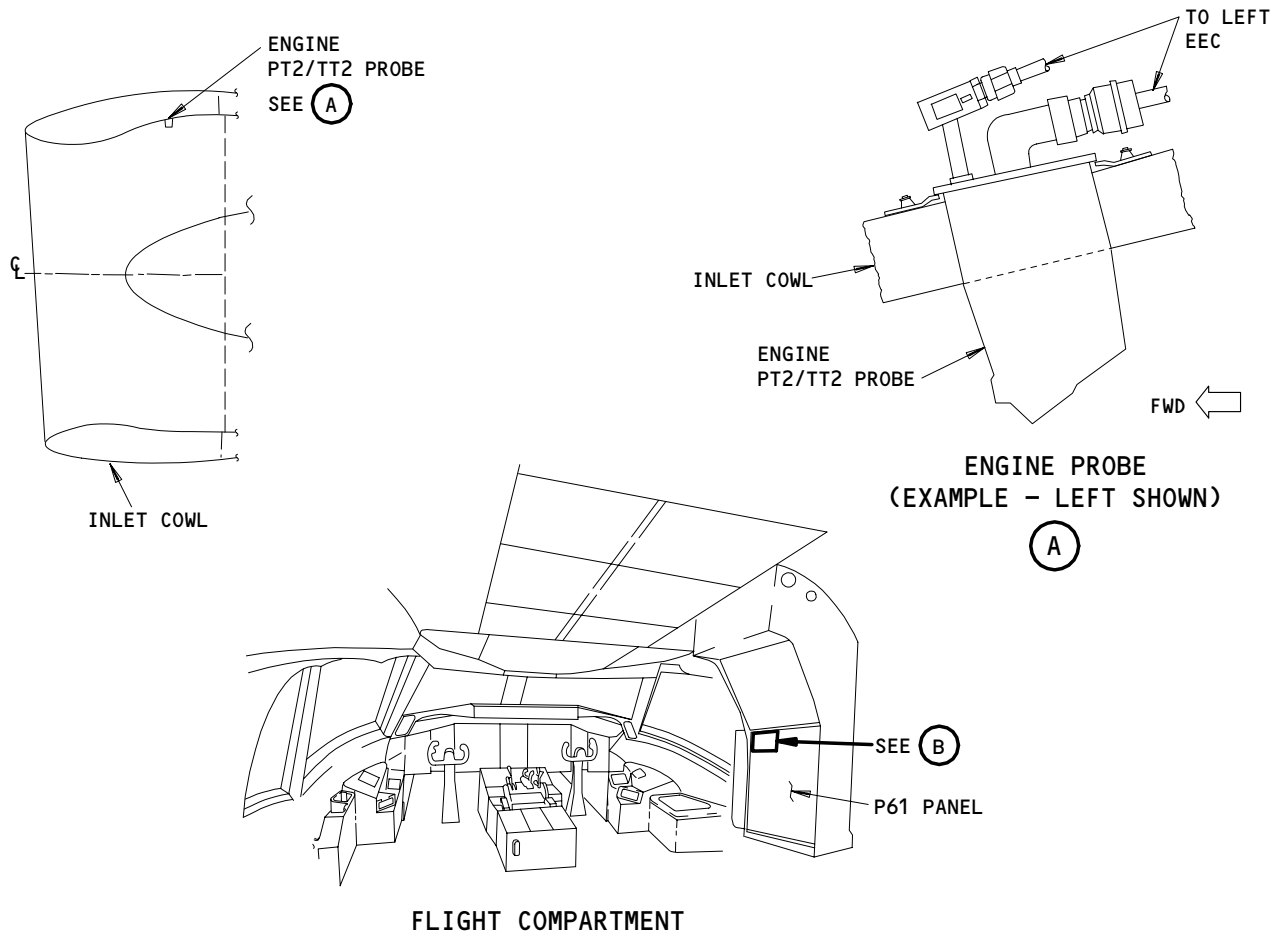
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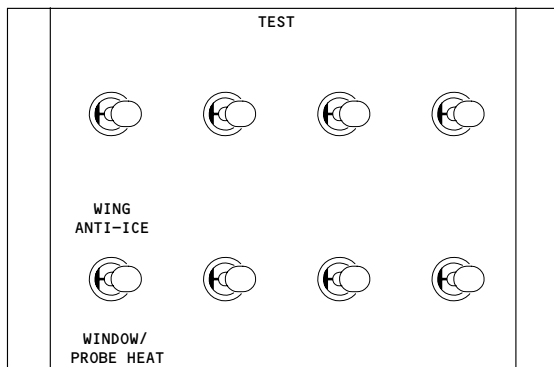
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**ENGINE PROBE
(EXAMPLE - LEFT SHOWN)**

(A)



**M10398 - MISCELLANEOUS
TEST PANEL (P61)**

(B)

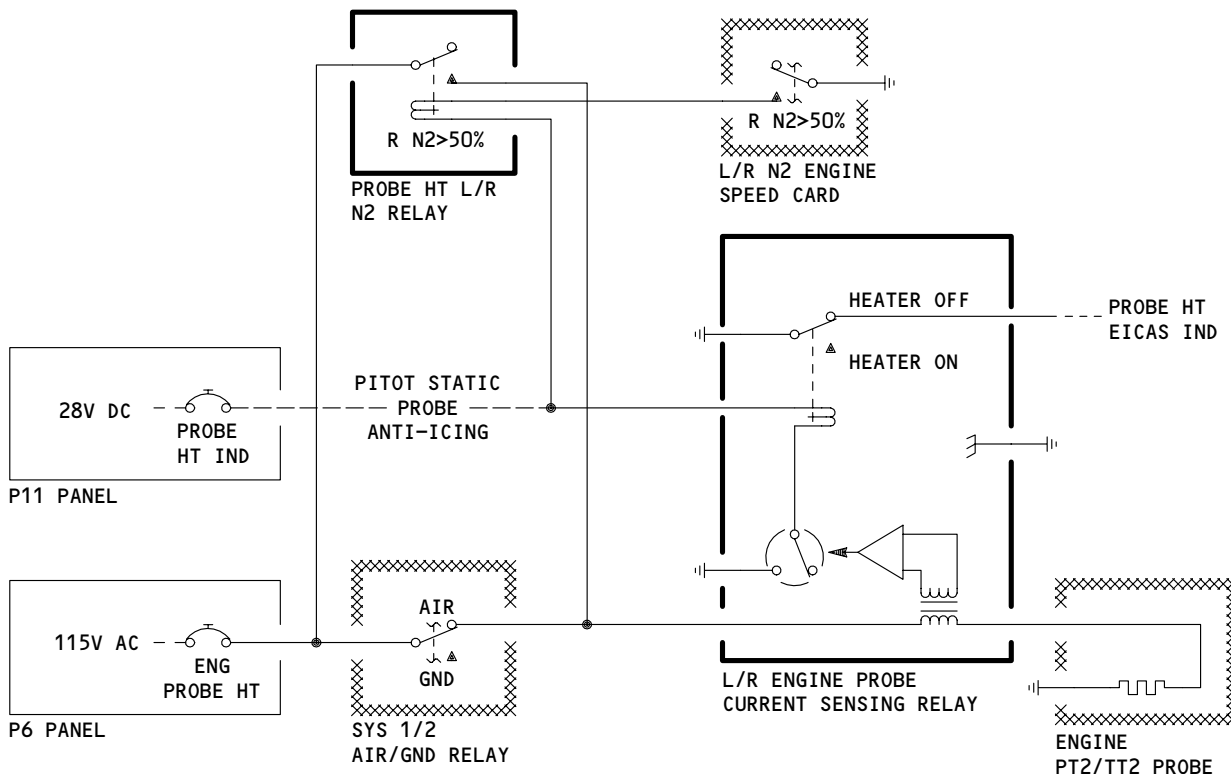
**Engine Probe Heat - Component Location
Figure 1**

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Engine Probe Heat Schematic
Figure 2

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- (3) When the two engines operate on the ground, they energize the probe heat relays of the two engines. This supplies heat to the engine probes of the two engines and energizes all the CSRs. If an engine probe heater has a failure, the EICAS display will show a level M message, L (R) ENG PROBE HEAT.
- (4) In the air, none of the air/ground relays are energized. This permits heat to the engine probe of each engine. Indication of engine probe failure is the same as for two engine operation on the ground.
- (5) If two or more probe heaters in the system have failures, the EICAS display shows the advisory message PROBE HEAT. The EICAS display does not show the probe heat failure messages for each failure. The system includes the pitot-static, angle of attack, total air temperature, and engine probes.

B. Ground Test

- (1) Use the WING ANTI-ICE WINDOW/PROBE HEAT switch to do a ground test of the engine probe heaters. The switch is on the miscellaneous test panel and is a momentary-action, center-off type. Hold the switch in the WINDOW/PROBE HEAT position to energize the left and right PROBE HT TEST relays in the P33 panel. The test relays remove electrical power from all the air/ground relays for the probe heaters. The air/ground relays stay in the air position when they do not have electrical power. Thus, during the test the engine probe heaters operate as they do in the air.

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ENGINE PROBE HEAT

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CARD - (FIM 73-21-00/101) LEFT N2 ENGINE SPEED, M1093 RIGHT N2 ENGINE SPEED, M1092				
CIRCUIT BREAKER - PROBE HEAT L ENG, C1122 PROBE HEAT R ENG, C1123	1	1	FLT COMPT, P6 6L19	*
		1	6K25	*
CIRCUIT BREAKER - L ENG EEC DISCRETES, C1404 R ENG EEC DISCRETES, C1405 PROBE HT IND L, C1120 PROBE HT IND R, C1121	1	1	FLT COMPT, P11 11D17	*
		1	11M32	*
		1	11A15	*
		1	11A28	*
CIRCUIT BREAKER - EEC GND TEST-L, C1422 EEC GND TEST-R, C1423	1	1	FLT COMPT, P34 34P2	*
		1	34P3	*
COMPUTER - (FIM 22-31-00/101) L THRUST MGMT, M183				
COMPUTER - (FIM 31-41-00/101) EICAS L, M10181 EICAS R, M10182				
DIODE - R167	3	1	FLT COMPT, P61	*
DIODE - (FIM 31-01-33/101) R166 R172 R173				
PANEL - (FIM 28-43-00/101) MISCELLANEOUS TEST, M10398				
PANEL - (FIM 30-31-00/101) MISC ANNUNCIATOR, M10394				
PROBE - (FIM 73-21-00/101) ENG EEC PT2/TT2, T867				
RELAY - L ENG PROBE CURRENT SENSING, K402 R ENG PROBE CURRENT SENSING, K403 PROBE HT L N2, K648 PROBE HT R N2, K670 SYS 1 AIR/GND, K514 SYS 1 AIR/GND, K516 SYS 2 AIR/GND, K517 SYS 2 AIR/GND, K528	--	1	MAIN EQUIP CTR, P33 PANEL	*
		1		*
		1		*
		1		*
		1		*
		1		*
		1		*
		1		*
RESISTOR - R552	--	1	MAIN EQUIP CTR, P33 PANEL	*
SWITCH - (FIM 30-31-00/101) WINDOW/PROBE HEAT TEST, YEIS5				

* SEE THE WDM EQUIPMENT LIST

Engine Probe Heat - Component Index
Figure 101

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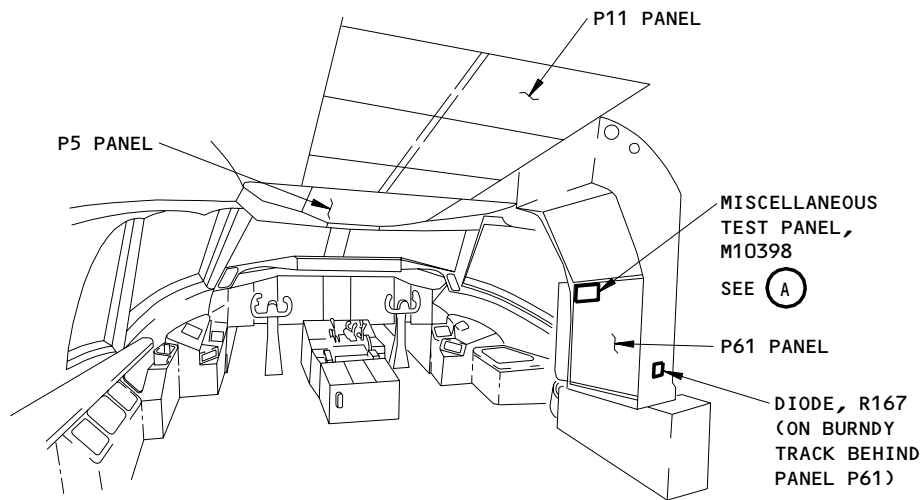
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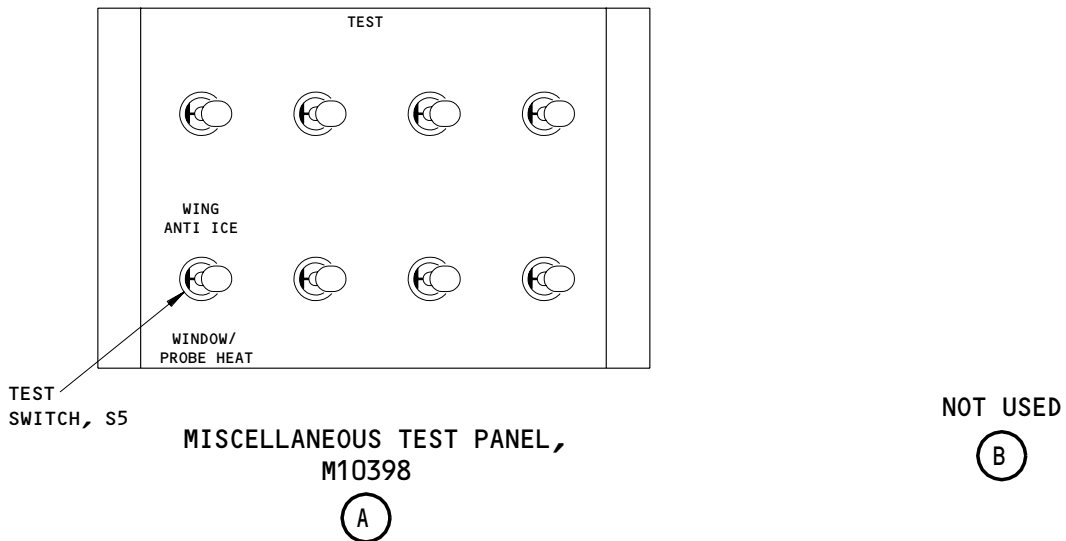
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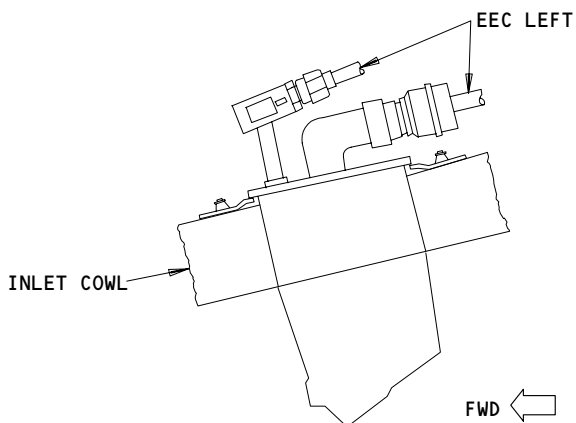
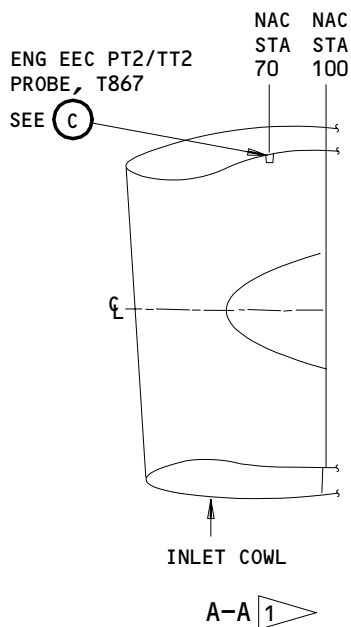
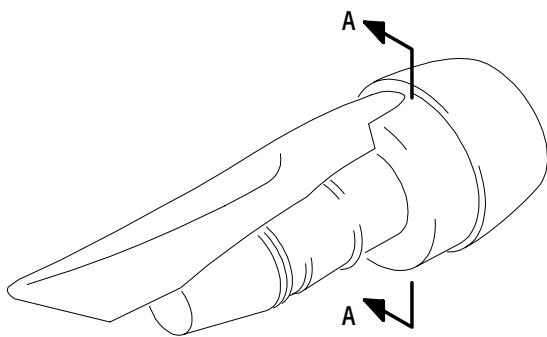
FLIGHT COMPARTMENT



Engine Probe Heat - Component Location
Figure 102 (Sheet 1)

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ENG EEC PT2/TT2 PROBE, T867 (EXAMPLE)

(C)

1 ▴ PROBES AT THIS LOCATION
HAVE HEATING PROVISIONS

Engine Probe Heat - Component Location
Figure 102 (Sheet 2)

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ENGINE PROBE HEAT – ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. The task is an operational test for the engine probe heat system.

TASK 30-34-00-715-016

2. Operational Test – Engine Probe Heat System

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
(2) AMM 31-41-00/201, Engine Indication and Crew Alerting System

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 865-017

- (1) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 865-034

- (2) Put the EEC MAINT L ENG POWER switch on the P61 panel to the TEST position.

S 865-035

CAUTION: DO NOT OPERATE PROBE HEATERS MORE THAN 2 MINUTES. STOP FOR 5 MINUTES MINIMUM BETWEEN EACH OPERATION OF THE PROBE HEATERS. DAMAGE TO THE PROBE CAN OCCUR.

- (3) Push the CH 2 test switch on the N2 engine speed card for the left engine to the TEST position.

NOTE: The test switches for the N2 engine speed cards are on the P50 card file.

- (a) Hold the switch in the TEST position.

WARNING: DO NOT TOUCH THE ENGINE PROBES DURING THE TEST. THE ENGINE PROBES CAN BURN YOU.

- (b) Hold your hand near each engine probe and make sure the probe becomes warm.

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- S 865-019
- (4) Release the CH 2 test switch.
- (a) Make sure the ECS/MSG switch on the EICAS maintenance panel is on.
- S 865-020
- (5) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Circuit Breaker Panel
- 1) 11D25, ENGINES L FUEL CONTROL VALVE
 - 2) 11M1, ENGINES L IGN 1
 - 3) 11M28, ENGINES L IGN 2
 - 4) 11D7, ENGINE STBY IGN 1
 - 5) 11D8, ENGINE STBY IGN 2
- S 215-021
- (6) Move the fuel switch to the RUN position for 5 minutes.
- (a) Make sure the EICAS message, L ENG PROBE HEAT, shows on the bottom display.
- S 865-045
- (7) Move the fuel switch to the CUTOFF position.
- S 865-023
- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P11 Overhead Circuit Breaker Panel
- 1) 11D25, ENGINES L FUEL CONTROL VALVE
 - 2) 11M1, ENGINES L IGN 1
 - 3) 11M28, ENGINES L IGN 2
 - 4) 11D7, ENGINE STBY IGN 1
 - 5) 11D8, ENGINE STBY IGN 2
- S 805-024
- (9) Erase the EICAS message L ENG PROBE HEAT (AMM 31-41-00/201).
- S 865-042
- (10) Put the EEC MAINT R ENG POWER switch on the P61 panel to the test position.

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S 215-036

CAUTION: DO NOT OPERATE PROBE HEATERS MORE THAN 2 MINUTES. STOP FOR 5 MINUTES MINIMUM BETWEEN EACH OPERATION OF THE PROBE HEATERS. DAMAGE TO THE PROBE CAN OCCUR.

(11) Push the CH 2 test switch on the N2 engine speed card for the right engine to the TEST position.

NOTE: The test switches for the N2 engine speed cards are on the P50 card file.

(a) Hold the switch in the TEST position.

WARNING: DO NOT TOUCH ENGINE PROBES DURING TEST. THE ENGINE PROBES CAN BURN YOU.

(b) Hold your hand near each engine probe and make sure the probe becomes warm.

S 865-032

(12) Release the CH 2 test switch.

S 865-037

(13) Make sure the ECS/MSG switch on the EICAS maintenance panel is on.

S 865-038

(14) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Circuit Breaker Panel
- 1) 11D26, ENGINES R FUEL CONTROL VALVE
 - 2) 11M2, ENGINES R IGN 1
 - 3) 11M29, ENGINES R IGN 2
 - 4) 11D7, ENGINE STBY IGN 1
 - 5) 11D8, ENGINE STBY IGN 2

S 865-039

(15) Move the fuel switch to the RUN position for 5 minutes.

(a) Make sure the EICAS message, R ENG PROBE HEAT, shows on the bottom display.

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S 865-046

(16) Move the fuel switch to the CUTOFF position.

S 865-040

(17) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P11 Overhead Circuit Breaker Panel
- 1) 11D26, ENGINES R FUEL CONTROL VALVE
 - 2) 11M2, ENGINES R IGN 1
 - 3) 11M29, ENGINES R IGN 2
 - 4) 11D7, ENGINE STBY IGN 1
 - 5) 11D8, ENGINE STBY IGN 2

S 805-041

(18) Erase the EICAS message R ENG PROBE HEAT (AMM 31-41-00/201).

S 865-033

(19) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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FLIGHT COMPARTMENT WINDOW ANTI-ICING - DESCRIPTION AND OPERATION

1. General
 - A. Window heaters supply heat to the captain's and first officer's No. 1, No. 2, and No. 3 windows. The primary system components are the window heat control units, the window heat control panel, and the miscellaneous test panel. System power comes from the main left and right 28-volt dc buses and the main left and right 115-volt ac buses.
2. Component Details (Fig. 1)
 - A. Window Heat Control Unit
 - (1) Two window heat control units (WHCU's), each with built-in-test (BIT) circuits, control the heat and isolate the system failures. The left WHCU is on shelf 2 of the left forward equipment center rack E1. The right WHCU is on shelf 1 of the right forward equipment center rack E2. The BIT buttons, fault indicating lights, and BIT instructions are on the front of the WHCU.
 - (2) The WHCU uses 200 volt (No. 1 window) and 115 volt (No. 2 and 3 window) ac power for heat. The WHCU uses 28-volt dc power to do the system tests.
 - B. Window Heat Control Panel
 - (1) The window heat control panel, M10395, is on the pilot's overhead panel, P5. The M10395 panel contains four WINDOW HEAT switches to control the window heat.
 - C. Miscellaneous Test Panel
 - (1) The miscellaneous test panel, M10398, permits tests of the window heat system. The test panel is on the right side panel, P61.
3. Operation (Fig. 2 and 3)
 - A. Functional Description
 - (1) Each window has its own control channel, temperature sensor, and heater. The control channel sends power to the window heater when the sensor gives the applicable signal. The sensor keeps the window temperature at a specified value.
 - (2) Each window heat control unit (WHCU) contains one front (No. 1) window channel and the opposite two (No. 2 and No. 3) window channels.
 - (3) Push the WINDOW HEAT switches on the window heat control panel, M10395, to ON to start the window heat. These are push on/push off switches which latch in when ON. Each switch contains a white ON light and an amber INOP light.
 - (4) The L and R FWD switches control the heat to the applicable No. 1 windows. The L and R SIDE switches control the heat to the applicable No. 2 and No. 3 windows.

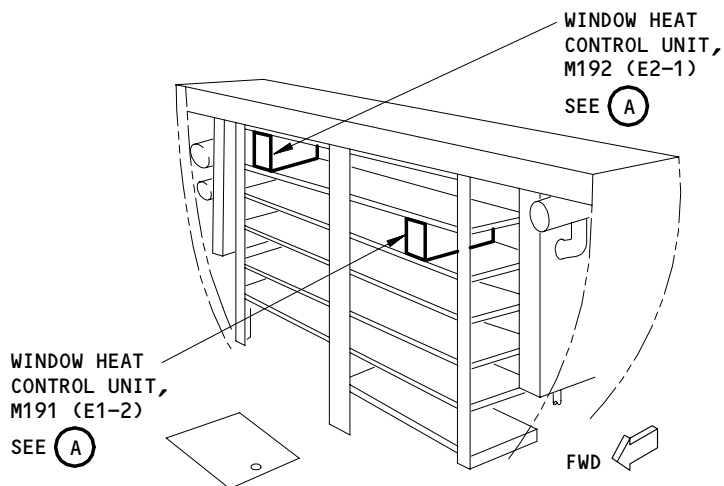
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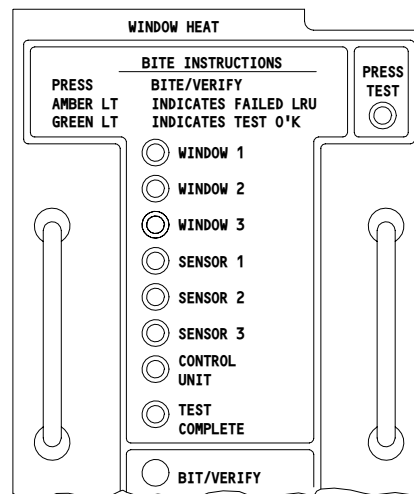
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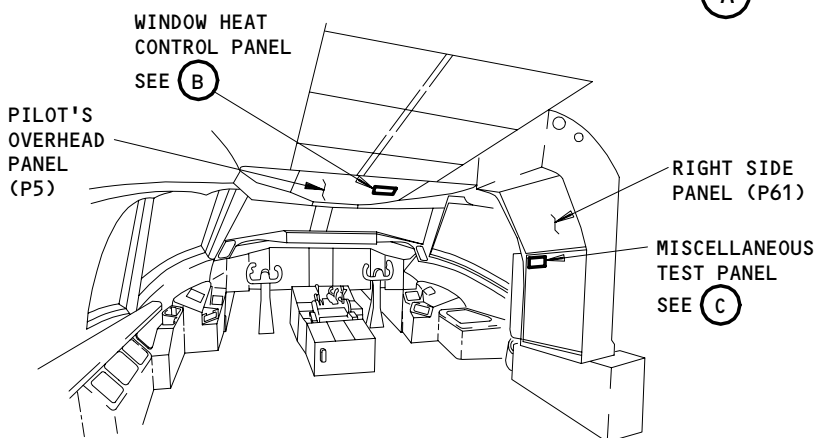
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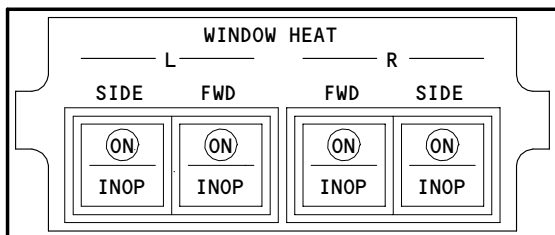
MAIN EQUIPMENT CENTER



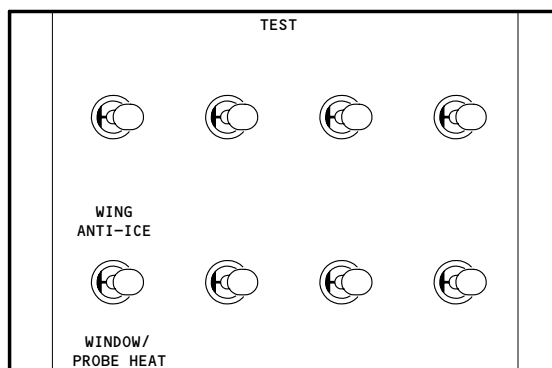
WINDOW HEAT CONTROL UNIT



FLIGHT COMPARTMENT



M10395 - WINDOW HEAT CONTROL PANEL (P5)



M10398 - MISCELLANEOUS TEST PANEL (P61)

Flight Compartment Window Anti-Icing - Component Location
Figure 1

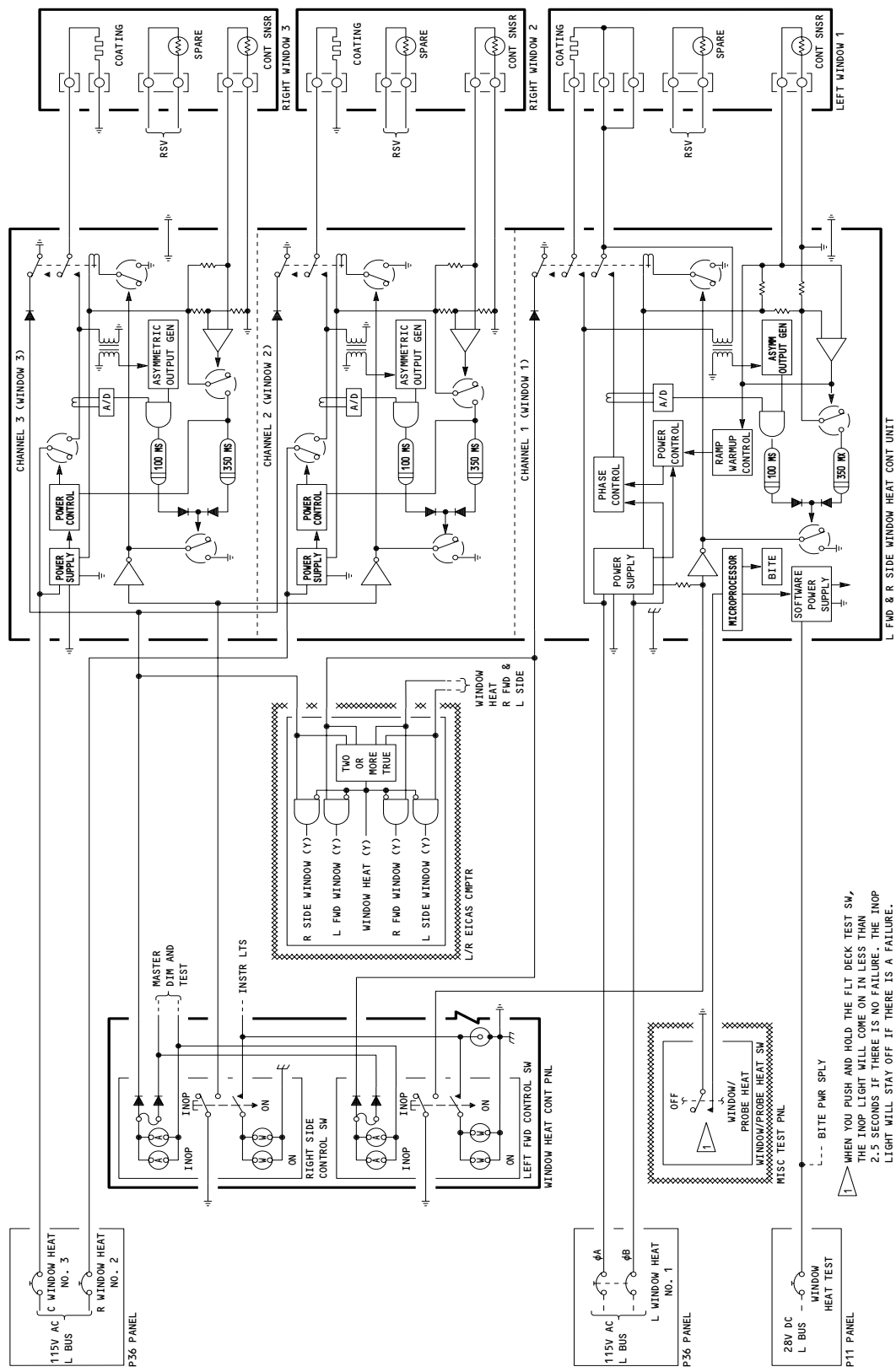
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Left Forward and Right Side Window Anti-Icing Schematic
Figure 2

WHEN YOU PUSH AND HOLD THE FLT DECK TEST SW, THE INOP LIGHT WILL COME ON IN LESS THAN 2.5 SECONDS IF THERE IS NO FAILURE. THE INOP LIGHT WILL STAY OFF IF THERE IS A FAILURE.

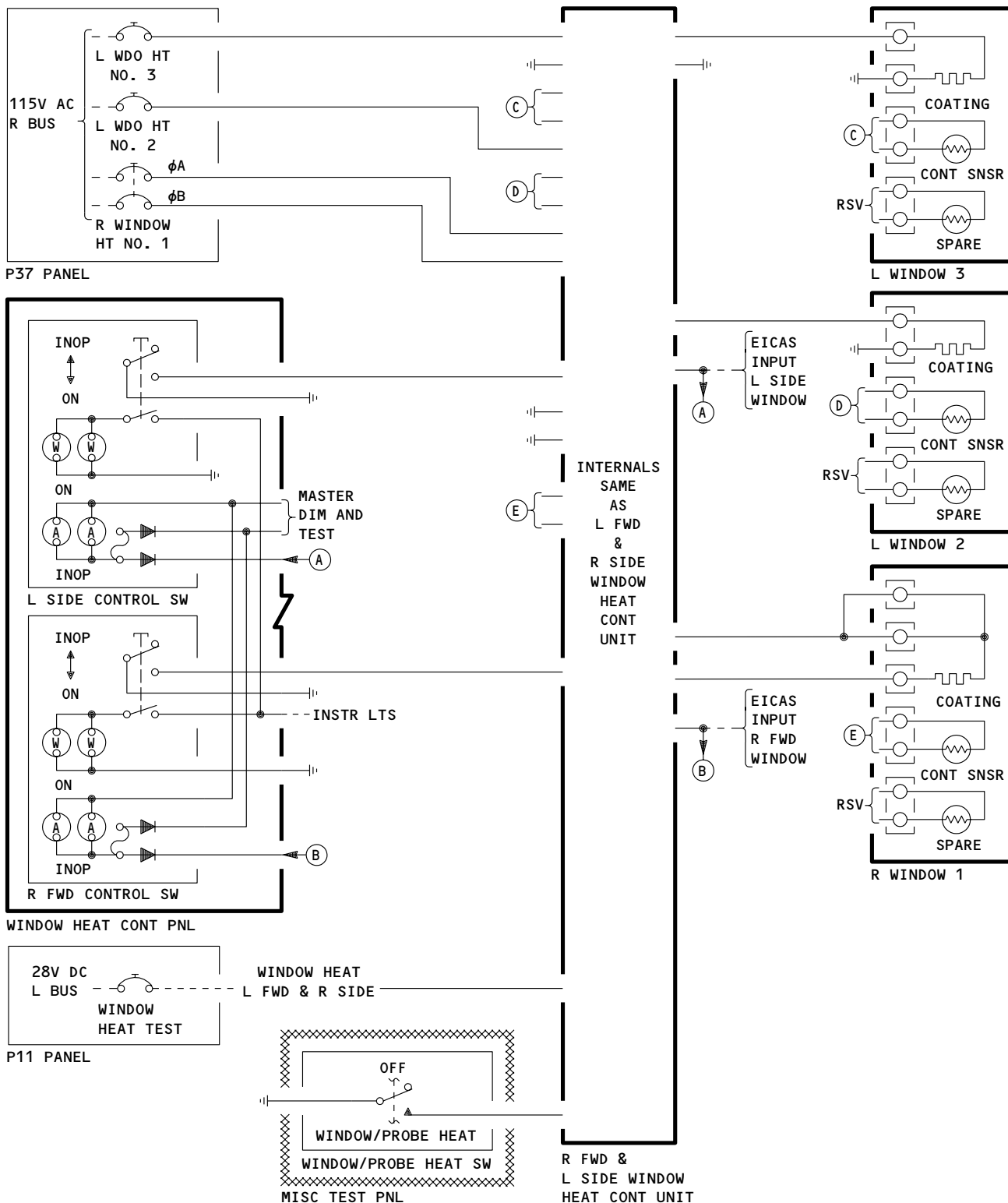
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Right Forward and Left Side Window Anti-Icing Schematic
Figure 3

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- (5) The amber INOP switch-light comes on to show a failure in the heat channels controlled by that switch. A window heat failure also causes a EICAS level C message to appear on the displays. If a failure occurs in more than one heat channel, the advisory message WINDOW HEAT appears on the display and the individual window heat failure messages do not appear.

NOTE: The INOP light can come on when outside ambient temperature is more than 85°F (29.5°C).

- (6) No. 1 Windows
- (a) The No. 1 windows are electrically heated to prevent ice and fog. Each No. 1 window channel can supply from zero to 4000 watts of power to its heater to keep the window temperature at 95°F (32.8°C). After ramp warm-up, the quantity of power to the heaters depends on the difference between the specified window temperature of 95°F (32.8°C) and the actual window temperature. The more the actual temperature is less than the specified temperature, the more power is supplied to the window heater.
- (b) To prevent thermal shock to a cold window, supply ramp warm-up to the window before you supply full power to it. When the No. 1 window has full power (after six minutes), ramp operation stops and the proportional mode starts.
- (7) No. 2 and No. 3 Windows
- (a) The No. 2 and No. 3 windows are electrically heated to prevent fog. Power to the side window (No. 2 and No. 3) heaters is not continuously adjusted as for the front window (No. 1) heaters. The side window control channels operate either on or off. When a side window channel is on, 800 watts is supplied to its heater. The heater does not have power when its channel is off.
- (b) When the temperature sensor in a side window finds a temperature of 105°F (40.6°C), the control channel will cause its side window heater to go off. When the side window temperature is less than 100°F (37.8°C), the control channel comes on and supplies power to the heaters. No heat is supplied to the side windows before full power is supplied.
- (8) System Protection
- (a) Circuits in the window heat control unit (WHCU) continuously monitor the status of the control unit, window sensors, and window heaters. The controller power line to each window heater contains a fail-safe relay which opens (and removes heater power) if one of these conditions occurs for more than 350 milliseconds: no input power, a sensor with a short, an open sensor, too much heat (temperature more than 110°F at the window), demand without heat, heat without demand, asymmetrical output, power on with switch in the off position. These conditions cause the INOP light on the window heat control panel to come on and a EICAS message to appear on the displays.

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B. Ground Test

- (1) To do the ground test of the window heat system, the four WINDOW HEAT switches must be ON (latched-in). Use the WING ANTI-ICE WINDOW/PROBE HEAT switch on the miscellaneous test panel. The switch is a momentary-action, center-off type. Hold the switch in the WINDOW/PROBE HEAT position. Each window heat control unit (WHCU) does a continuity check of its window heaters, a resistance check (open/short test) of its temperature sensors, and a check of its own functions. The test of the overheat circuits is done last.
- (2) When the test is successfully complete, the amber INOP lights on the window heat control unit come on. When all four INOP lights are on, the system is OK. To set the WHCU's (all six window channels) to the usual flight condition, release the WING ANTI-ICE WINDOW/PROBE HEAT switch. (The switch goes back to the center position). The test continues for 3 seconds.
- (3) Failure of an INOP light to come on during the ground test shows a system failure. The defective channels are then related to the switch that contains the off light. To find the defective channel components, do a test of the WHCU that controls the failed channel.
- (4) Window Heat Control Unit Test
 - (a) To do the built-in-test of the WHCU, push the BIT/VERIFY button on the front of the unit. If there is no failure, only the TEST COMPLETE light on the WHCU will be on. The unit goes automatically back to the usual flight condition in three minutes after the test starts. If there is a failure, the applicable light on the unit shows which LRU is defective.
 - (b) To do a check of the lights on the WHCU, push the PRESS/TEST button. All the lights will be on while you push the button.

C. Control

- (1) To put the system in operation, supply electrical power to the main ac buses (AMM 24-22-00/201).
- (2) Make sure the WINDOW HEAT TEST circuit breaker on the overhead circuit breaker panel, P11-3, is closed.
- (3) Make sure these circuit breakers on the left miscellaneous electrical equipment panel, P36, are closed:
 - (a) ICE/RAIN WINDOW HEAT NO. 1 LEFT
 - (b) ICE/RAIN WINDOW HEAT 2R
 - (c) ICE/RAIN WINDOW HEAT 3R
- (4) Make sure these circuit breakers on the right miscellaneous electrical equipment panel, P37, are closed:
 - (a) ICE/RAIN WINDOW HEAT NO. 1 RIGHT
 - (b) WINDOW HEAT 2L
 - (c) WINDOW HEAT 3L

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FAULT ISOLATION/MAINT MANUAL

FLIGHT COMPARTMENT WINDOW ANTI-ICING

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER - WINDOW HEAT TEST, C1128		1	FLT COMPT, P11 11T15	*
CIRCUIT BREAKER - ICE/RAIN WINDOW HEAT 1L, C391		1	119AL, MAIN EQUIP CTR, P36 ① 36H4 OR 36L5	*
ICE/RAIN WINDOW HEAT 2R, C1125		1	① 36H2 OR 36H6	*
ICE/RAIN WINDOW HEAT 3R, C1127		1	① 36H1 OR 36H7	*
CIRCUIT BREAKER - ICE/RAIN WINDOW HEAT 1R, C392		1	119AL, MAIN EQUIP CTR, P37 ① 37D2 OR 37F4	*
ICE/RAIN WINDOW HEAT 2L, C1124		1	① 37E1 OR 37H7	*
ICE/RAIN WINDOW HEAT 3L, C1126		1	① 37E2 OR 37H6	*
COMPUTER - EICAS L, M10181 EICAS R, M10182				
PANEL - MISCELLANEOUS TEST, M10398	--	1	FLT COMPT, P5	30-41-02
PANEL - WINDOW HEAT CONTROL, M10395	--	1	FLT COMPT, P5, WINDOW HEAT CONTROL PANEL, M10395	*
SWITCH - L FWD CONTROL, S3	--	1	FLT COMPT, P5, WINDOW HEAT CONTROL PANEL, M10395	*
SWITCH - L SIDE CONTROL, S4	--	1	FLT COMPT, P5, WINDOW HEAT CONTROL PANEL, M10395	*
SWITCH - R FWD CONTROL, S2	--	1	FLT COMPT, P5, WINDOW HEAT CONTROL PANEL, M10395	*
SWITCH - R SIDE CONTROL, S1	--	1	FLT COMPT, P5, WINDOW HEAT CONTROL PANEL, M10395	*
SWITCH - WINDOW/PROBE HEAT, S5	--	1	FLT COMPT, P5, WINDOW HEAT CONTROL PANEL, M10395	*
UNIT - LEFT FWD AND RIGHT SIDE WINDOW HEAT CONTROL, M191	--	1	119AL, MAIN EQUIP CTR, E1-2	30-41-01
UNIT - RIGHT FWD AND LEFT SIDE WINDOW HEAT CONTROL, M192	--	1	119AL, MAIN EQUIP CTR, E2-2	30-41-01

* SEE THE WDM EQUIPMENT LIST

① THIS CIRCUIT BREAKER CAN BE IN ONE OF TWO LOCATIONS

Flight Compartment Window Anti-Icing - Component Index
Figure 101

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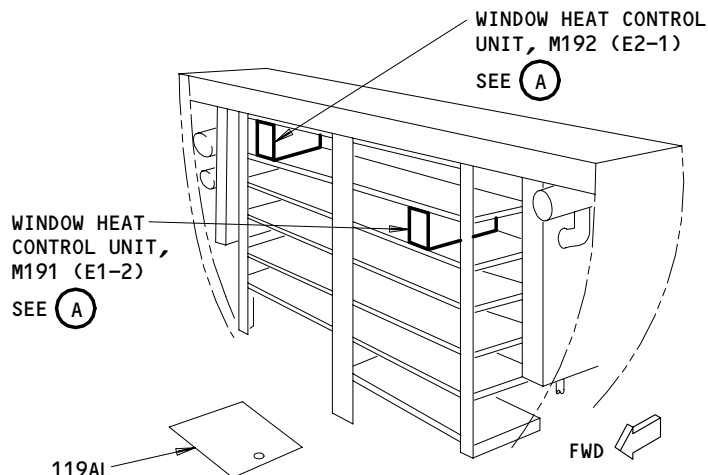
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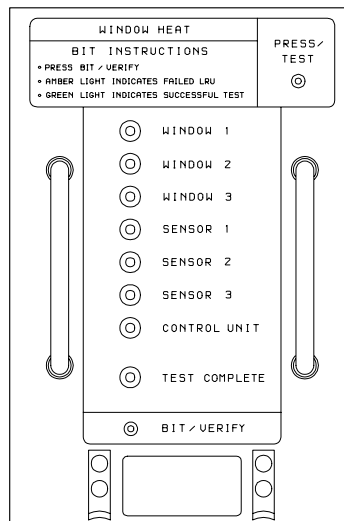
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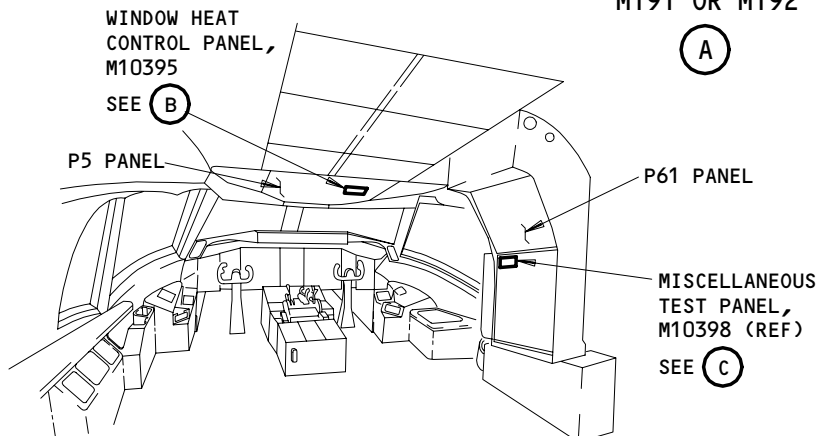
FAULT ISOLATION/MAINT MANUAL



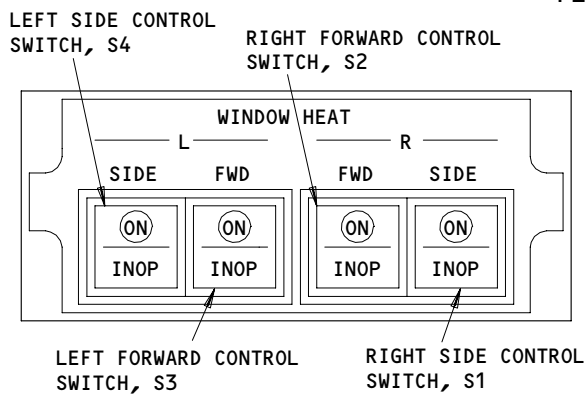
MAIN EQUIPMENT CENTER



WINDOW HEAT CONTROL UNIT, M191 OR M192

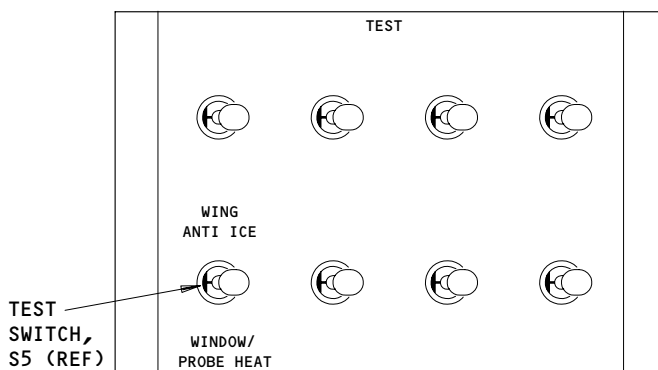


FLIGHT COMPARTMENT



WINDOW HEAT CONTROL PANEL, M10395

(B)



MISCELLANEOUS TEST PANEL, M10398 (REF)

(C)

Flight Compartment Window Anti-Icing - Component Location
Figure 102

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FLIGHT COMPARTMENT WINDOW ANTI-ICING - ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. The task is an operational test of the flight compartment window anti-icing system. The test is done on the flight deck and in the main E/E equipment bay and uses only test equipment on the airplane.

TASK 30-41-00-715-001

2. Operational Test - Flight Compartment Window Anti-Icing System

A. References

- (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 31-41-00/501, Engine Indication and Crew Alerting System

B. Access

- (1) Location Zones
 - 119/120 Main Equipment Center
 - 211/212 Control Cabin - Section 41
- (2) Access Panel
 - 119AL E/E Bay Access Door

C. Prepare for the Test

- S 865-002
 - (1) Supply electrical power (AMM 24-22-00/201).
- S 715-003
 - (2) Make sure the Engine Indication and Crew Alerting System (EICAS) operates (AMM 31-41-00/501).
- S 865-005
 - (3) Make sure this circuit breaker on the main power distribution panel, P6, is closed:
 - (a) 6L30, L2 PLT
- S 865-006
 - (4) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) 11R2, LEFT IND LIGHTS 2

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- (b) 11R29, RIGHT IND LIGHTS 2
- (c) 11T15, WINDOW HEAT TEST

S 865-007

- (5) Make sure these circuit breakers on the left misc electrical equipment panel, P36, are closed:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 865-008

- (6) Make sure these circuit breakers on the right misc electrical equipment panel, P37, are closed:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 865-009

- (7) Turn the IND LTS control knob on the right overhead panel lighting control panel to the BRT position.

S 215-010

- (8) Make sure the four WINDOW HEAT switches on the window heat control panel M10395 (P5) are in the off (out) position.

S 215-011

- (9) Make sure the amber INOP lights in the switches are on.

S 215-012

- (10) Make sure the EICAS message, WINDOW HEAT, shows on the EICAS display on the P2 panel.

D. Do the Operational Test

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S 215-045

WARNING: WHEN WINDOW/PROBE HEAT IS ON, DO NOT TOUCH THE PROBES OR WINDOWS. HOT PROBES OR WINDOWS CAN CAUSE BURNS AND OTHER INJURIES TO PERSONS.

CAUTION: REMOVE ALL CAPS AND COVERS FROM ALL AIR DATA SENSORS. THE SENSORS BECOME HOT. THIS CAN CAUSE DAMAGE TO THE COVERS.

- (1) Set the four WINDOW HEAT switches on the M10395 panel in the ON (latched-in) position.
 - (a) Make sure the white ON lights in the switches are on.
 - (b) Make sure the amber INOP light in each switch is off.

S 215-014

- (2) Make sure these EICAS messages do not show on the top display on the P2 panel:
 - (a) L FWD WINDOW
 - (b) L SIDE WINDOW
 - (c) R FWD WINDOW
 - (d) R SIDE WINDOW
 - (e) WINDOW HEAT

S 215-015

- (3) Hold the WING ANTI-ICE WINDOW/PROBE HEAT switch on the M10398 panel (P61) in the WINDOW/PROBE HEAT position.
 - (a) Make sure the amber INOP light in each WINDOW HEAT switch (P5) comes on after approximately three seconds.

S 215-016

- (4) Release the WING ANTI-ICE WINDOW/PROBE HEAT switch.
 - (a) Make sure the INOP lights in the four WINDOW HEAT switches (P5) go off.

S 015-018

- (5) Open the E/E bay access door 119 AL (AMM 06-41-00/201).

S 015-019

- (6) Get access to the window heat control units (WHCUs) in the main E/E equipment bay.

NOTE: WHCU M191 is on shelf E1-2 and WHCU M192 is on shelf E2-1.

S 215-020

- (7) Push the PRESS/TEST switch on the front of one of the WHCUs.
 - (a) Make sure all the lights on the WHCU come on.

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S 865-021
(8) Release the PRESS/TEST switch.

S 215-022
(9) Push and hold the BIT/VERIFY switch on the front of the same WHCU.
(a) Make sure the green TEST COMPLETE light comes on after approximately five seconds.

S 865-023
(10) Release the BIT/VERIFY switch.

S 215-024
(11) Push the PRESS/TEST switch on the front of the other WHCU.
(a) Make sure all the lights on the WHCU come on.

S 865-025
(12) Release the PRESS/TEST switch.

S 215-026
(13) Push and hold the BIT/VERIFY switch on the front of this WHCU.
(a) Make sure the TEST COMPLETE light comes on after approximately five seconds.

S 865-027
(14) Release the BIT/VERIFY switch.

E. Put the Airplane Back to Its Usual Condition

S 415-028
(1) Close the E/E bay access door 119 AL (AMM 06-41-00/201).

S 865-029
(2) Set the four WINDOW HEAT switches on the M10395 panel (P5) in the off (out) position.

S 865-030
(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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FLIGHT COMPARTMENT WINDOW ANTI-ICING – APPROVED REPAIRS

1. General

- A. This procedure contains one task. The task is to connect the spare window temperature control sensor.
- B. The captain's and first officer's No. 1, No. 2, and No. 3 windows are electrically heated. In each window is a primary and a spare temperature control sensor.
- C. This procedure gives the steps necessary to disconnect the defective primary temperature sensor and to connect the spare temperature sensor. If the two sensors are defective, replace the window.

TASK 30-41-00-968-001

2. Connect Spare Window Temperature Control Sensor (Fig. 801)

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
- (2) Boeing SWPM 20-90-11, Insertion/Removal Tool – P/N DHK 21

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 868-002

- (1) For the No. 1 left (1L) window, open this circuit breaker on the miscellaneous electrical equipment panel, P36, and attach a DO-NOT-CLOSE tag:
 - (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT

NOTE: This circuit breaker (C391) can be in one of these two locations.

S 868-003

- (2) For the No. 2 right (2R) window, open this circuit breaker on the left miscellaneous electrical equipment panel, P36, and attach a DO-NOT-CLOSE tag:
 - (a) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R

NOTE: This circuit breaker (C1125) can be in one of these two locations.

S 868-004

- (3) For the No. 3 right (3R) window, open this circuit breaker on the left miscellaneous electrical equipment panel, P36, and attach a DO-NOT-CLOSE tag:
 - (a) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

NOTE: This circuit breaker (C1127) can be in one of these two locations.

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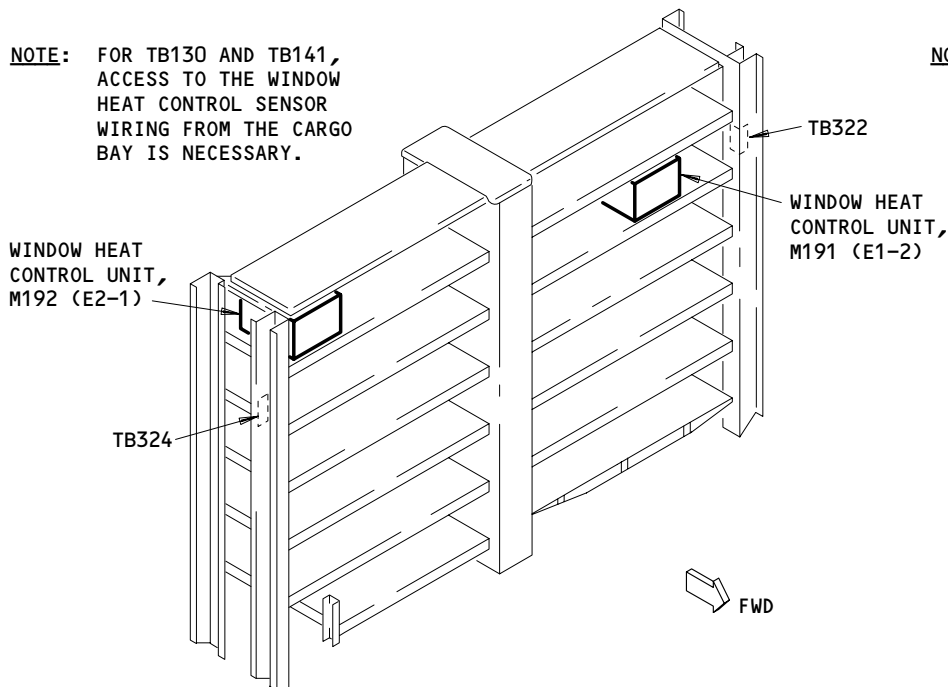
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NOTE: FOR TB130 AND TB141, ACCESS TO THE WINDOW HEAT CONTROL SENSOR HEAT CONTROL SENSOR WIRING FROM THE CARGO BAY IS NECESSARY.



NOTE: SOME AIRPLANES HAVE THE SENSOR WIRES INSTALLED AT TERMINAL BLOCK TB130 AND TB141. OTHER AIRPLANES WILL HAVE TB322 AND TB324 INSTALLED, AND THE SENSOR WIRES INSTALLED THERE. LOOK FOR TB322 AND TB324 TO FIND WHICH CONFIGURATION YOU HAVE.

MAIN EQUIPMENT CENTER

MAIN AND SPARE SENSOR WIRE CONNECTIONS (WDM 30-41-11,-12)

SENSOR	WIRE NO.	MAIN PIN NO.	SPARE PIN NO.
SENSOR 1 - TB130	205B-24	FA36	FA34
LEFT NO. 1 WINDOW	205R-24	FC36	FC34
SENSOR 2 - TB130	204B-24	FA94	FA93
RIGHT NO. 2 WINDOW	204R-24	FC94	FC93
SENSOR 3 - TB130	203B-24	FA157	FA156
RIGHT NO. 3 WINDOW	203R-24	FC157	FC156
SENSOR 1 - TB141	204B-24	FA193	FC192
RIGHT NO. 1 WINDOW	204R-24	FC193	FA192
SENSOR 2 - TB141	205B-24	FA195	FA194
LEFT NO. 2 WINDOW	205R-24	FC195	FC194
SENSOR 3 - TB141	206B-24	FA197	FA196
LEFT NO. 3 WINDOW	206R-24	FC197	FC196 ¹
SENSOR 1 - TB322	214B-24	FA6	FA5
LEFT NO. 1 WINDOW	214R-24	FC6	FC5
SENSOR 2 - TB322	213B-24	FA4	FA3
RIGHT NO. 2 WINDOW	213R-24	FC4	FC3
SENSOR 3 - TB322	212B-24	FA2	FA1
RIGHT NO. 3 WINDOW	212R-24	FC2	FC1
SENSOR 1 - TB324	215B-24	FA2	FA1
RIGHT NO. 1 WINDOW	215R-24	FC2	FC1
SENSOR 2 - TB324	216B-24	FA4	FA3
LEFT NO. 2 WINDOW	216R-24	FC4	FC3
SENSOR 3 - TB324	217B-24	FA6	FA5
LEFT NO. 3 WINDOW	217R-24	FC6	FC5 ²

¹ AIRPLANES WITHOUT TERMINAL BLOCKS TB322 AND TB324 (SENSOR WIRES AT TB130 AND TB141)

² AIRPLANES WITH TERMINAL BLOCKS TB322 AND TB324

**Flight Compartment Window Temperature Sensor Connections
Figure 801**

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A60904

S 868-005

- (4) For the No. 1 right (1R) window, open this circuit breaker on the right miscellaneous electrical equipment panel, P37, and attach a DO-NOT-CLOSE tag:
(a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT

NOTE: This circuit breaker (C392) can be in one of these two locations.

S 868-006

- (5) For the No. 2 left (2L) window, open this circuit breaker on the right miscellaneous electrical equipment panel, P37, and attach a DO-NOT-CLOSE tag:
(a) 37E1 OR 37H7, WINDOW HEAT 2L

NOTE: This circuit breaker (C1124) can be in one of these two locations.

S 868-007

- (6) For the No. 3 left (3L) window, open this circuit breaker on the right miscellaneous electrical equipment panel, P37, and attach a DO-NOT-CLOSE tag:
(a) 37E2 OR 37H6, WINDOW HEAT 3L

NOTE: This circuit breaker (C1126) can be in one of these two locations.

S 028-008

- (7) Disconnect the electrical wires from the terminal block pins for the primary sensor.

S 428-009

- (8) Connect the electrical wires to the terminal block pins for the spare sensor as shown.

S 868-022

- (9) For the No. 1 left (1L) window, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P36 panel:
(a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT

NOTE: This circuit breaker (C391) can be in one of these two locations.

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S 868-023

- (10) For the No. 2 right (2R) window, remove the D0-NOT-CLOSE tag and close this circuit breaker on the P36 panel:
(a) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R

NOTE: This circuit breaker (C1125) can be in one of these two locations.

S 868-024

- (11) For the No. 3 right (3R) window, remove the D0-NOT-CLOSE tag and close this circuit breaker on the P36 panel:
(a) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

NOTE: This circuit breaker (C1127) can be in one of these two locations.

S 868-025

- (12) For the No. 1 right (1R) window, remove the D0-NOT-CLOSE tag and close this circuit breaker on the P37 panel:
(a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT

NOTE: This circuit breaker (C392) can be in one of these two locations.

S 868-026

- (13) For the No. 2 left (2L) window, remove the D0-NOT-CLOSE tag and close this circuit breaker on the P37 panel:
(a) 37E1 OR 37H7, WINDOW HEAT 2L

NOTE: This circuit breaker (C1124) can be in one of these two locations.

S 868-027

- (14) For the No. 3 left (3L) window, remove the D0-NOT-CLOSE tag and close this circuit breaker on the P37 panel:
(a) 37E2 OR 37H6, WINDOW HEAT 3L

NOTE: This circuit breaker (C1126) can be in one of these two locations.

S 868-017

- (15) Supply electrical power (AMM 24-22-00/201).

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S 718-016

- (16) Do a test of the temperature control sensor connections:
- (a) Push the BIT/VERIFY switch on the window heat control unit.
 - (b) Make sure the TEST COMPLETE light on the window heat control unit comes on after 5 seconds.

S 868-018

- (17) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WINDOW HEAT CONTROL UNIT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the window heat control unit. The second task is the installation of the window heat control unit.
- B. The left forward and right side window heat control unit, WHCU M191, is on shelf 2 of the left forward equipment center rack E1. The right forward and left side window heat control unit, WHCU M192, is on shelf 1 of the right forward equipment center rack E2. The removal/installation procedure is the same for the two WHCUs.

TASK 30-41-01-004-001

2. Remove the Window Heat Control Unit (WHCU)

A. References

- (1) AMM 20-10-01/401, E/E Rack-Mounted Components
- (2) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices

B. Access

- (1) Location Zones
 - 119/120 Main Equipment Center
 - 211/212 Control Cabin – Section 41

C. Procedure

S 864-002

- (1) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
 - (a) 11T15, WINDOW HEAT TEST

S 864-003

- (2) For the left forward and right side WHCU M191, open these circuit breakers on the left misc electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT

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- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-004

- (3) For the right forward and left side WHCU M192, open these circuit breakers on the misc electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 914-005

CAUTION: DO NOT TOUCH THE WHCU'S BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE WHCU'S.

- (4) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 024-006

- (5) Remove the window heat control unit (AMM 20-10-01/401).

TASK 30-41-01-404-007

3. Install Window Heat Control Unit (WHCU)

A. References

- (1) AMM 20-10-01/401, E/E Rack Mounted Components
- (2) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices
- (3) AMM 24-22-00/201, Electrical Power - Control

B. Access

- (1) Location Zones
 - 119/120 Main Equipment Center
 - 211/212 Control Cabin - Section 41

C. Procedure

S 914-008

CAUTION: DO NOT TOUCH THE WHCU'S BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE WHCU'S.

- (1) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 424-010

- (2) Install the window heat control unit (AMM 20-10-01/401).

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S 864-009

- (3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11T15, WINDOW HEAT TEST

S 864-017

- (4) For the left forward and right side WHCU M191, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
(b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
(c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-018

- (5) For the right forward and left side WHCU M192, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
(b) 37E1 OR 37H7, WINDOW HEAT 2L
(c) 37E2 OR 37H6, WINDOW HEAT 3L

S 714-019

- (6) Supply electrical power (AMM 24-22-00/201).

S 714-013

- (7) Do a test of the control unit installation:
(a) Push the BIT/VERIFY switch on the WHCU.
(b) Make sure the TEST COMPLETE light on the WHCU comes on after 5 seconds.

S 864-015

- (8) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WINDOW HEAT CONTROL PANEL - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the window heat control panel. The second task is the installation of the window heat control panel.
- B. The window heat control panel, M10395, is on the pilot's overhead panel, P5.

TASK 30-41-02-004-001

2. Remove the Window Heat Control Panel

A. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

B. Procedure

S 864-002

- (1) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11R2, LEFT IND LIGHTS 2
 - (b) 11R29, RIGHT IND LIGHTS 2
 - (c) 11T15, WINDOW HEAT TEST

S 864-003

- (2) Open these circuit breakers on the left misc electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-004

- (3) Open these circuit breakers on the right misc electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 024-005

- (4) Remove the window heat control panel.

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TASK 30-41-02-404-006

3. Install the Window Heat Control Panel

A. References

- (1) AMM 24-22-00/201, Electrical Power - Control

B. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

C. Procedure

S 424-011

- (1) Install the window heat control panel.

S 864-007

- (2) Remove the D0-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11R2, LEFT IND LIGHTS 2
 - (b) 11R29, RIGHT IND LIGHTS 2
 - (c) 11T15, WINDOW HEAT TEST

S 864-008

- (3) Remove the D0-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-009

- (4) Remove the D0-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 864-012

- (5) Supply electrical power (AMM 24-22-00/201).

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S 714-010

- (6) Do a test of the control panel installation:
- (a) Push the four WINDOW HEAT switches on the M10395 panel on P5 to the ON position.
 - 1) Make sure the white ON lights in the switches are on.

NOTE: The amber OFF lights in the switches are off.

- (b) Hold the WING ANTI-ICE WINDOW/PROBE HEAT switch on the M10398 misc test panel, P61, in the WINDOW/PROBE HEAT position.
- (c) Make sure the amber INOP lights in the four WINDOW HEAT switches come on after three seconds.
- (d) Release the WING ANTI-ICE WINDOW/PROBE HEAT switch on the M10398 panel.
- (e) Put the four WINDOW HEAT switches to the OFF positions.

S 864-013

- (7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WINDSHIELD WIPER SYSTEM – DESCRIPTION AND OPERATION

1. General

A. Two windshield wipers keep the captain's and first officer's No. 1 windows clear during takeoff, approach, and landing in rain or snow. A separate motor operates each wiper to make sure one window is clear if one motor has a failure. System components include the windshield wiper/rain repellent control panel, windshield wiper motor/converter, windshield wiper arm, and windshield wiper blades. The system uses main left and right 28-volt DC power, through circuit breakers on the overhead circuit breaker panel, P11.

2. Component Details (Fig. 1)

A. Windshield Wiper/Rain Repellent Control Panel

(1) The control panel, M10023, is on the pilot's overhead panel, P5. The control panel contains a switch to control the windshield wiper system.

B. Windshield Wiper Motor/Converter

(1) Two motor/converters operate the two windshield wipers. Each motor/converter is one unit. The units are installed on access panels below the windows.

(2) The converter changes the rotary motion of the motor to cause the motion of the wiper arm. The motors operate at low or high speed, as chosen by the wiper speed switch on the windshield wiper/rain repellent control panel. A parking switch in the motor/converters sets the wiper blades to the park position when the wiper switch is moved to the OFF position. The windshield motors use 28-volts DC power. A connector on each unit supplies power and control.

C. Windshield Wiper Arm

(1) The wiper arm connects the output shaft of the motor/converter to the wiper blade.

D. Windshield Wiper Blade

(1) The wiper blade has a wiper edge connected to a metal channel. This metal channel attaches to the wiper arm.

3. Operation (Fig. 2)

A. Functional Description

(1) The windshield wiper/rain repellent control panel, M10023, contains one rotary WIPER switch that controls the two windshield wipers. The switch has OFF, LOW, and HIGH positions.

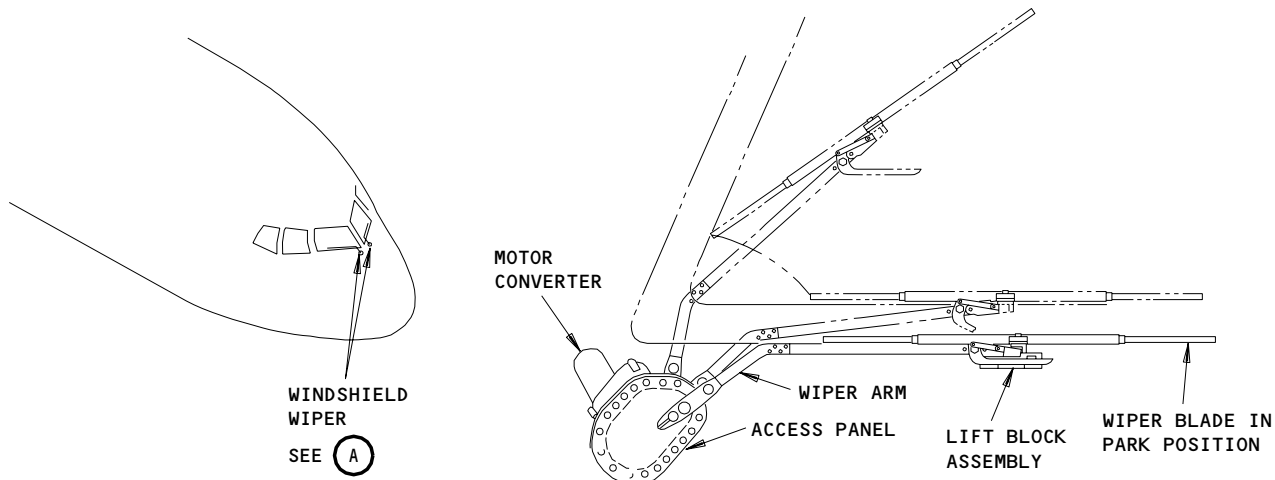
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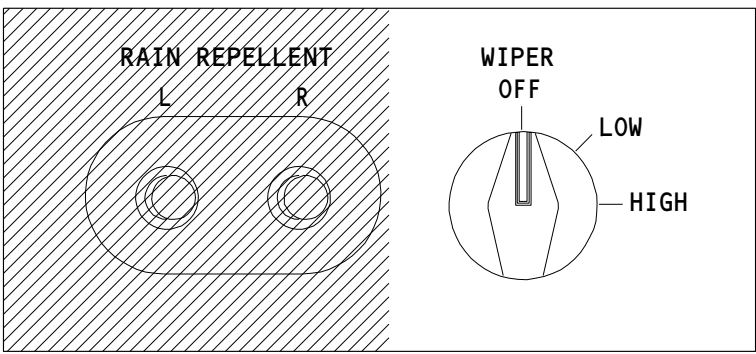
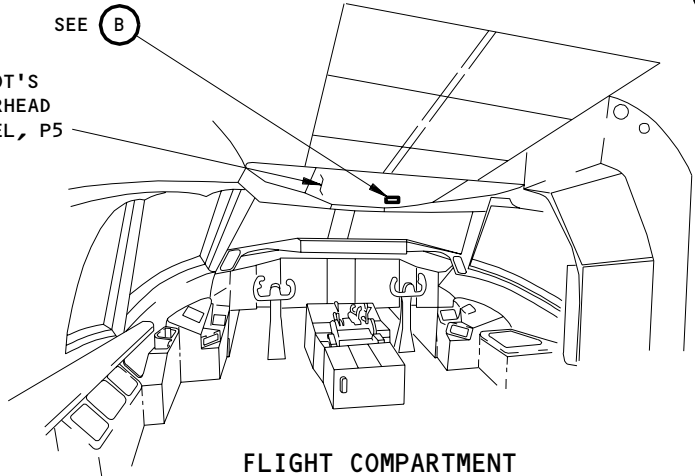
WINDSHIELD WIPER

(A)

WINDSHIELD WIPER/RAIN REPELLENT CONTROL PANEL

SEE (B)

PILOT'S OVERHEAD PANEL, P5



WINDSHIELD WIPER/RAIN REPELLENT CONTROL PANEL (P5)

(B)

Windshield Wiper System - Component Location
Figure 1

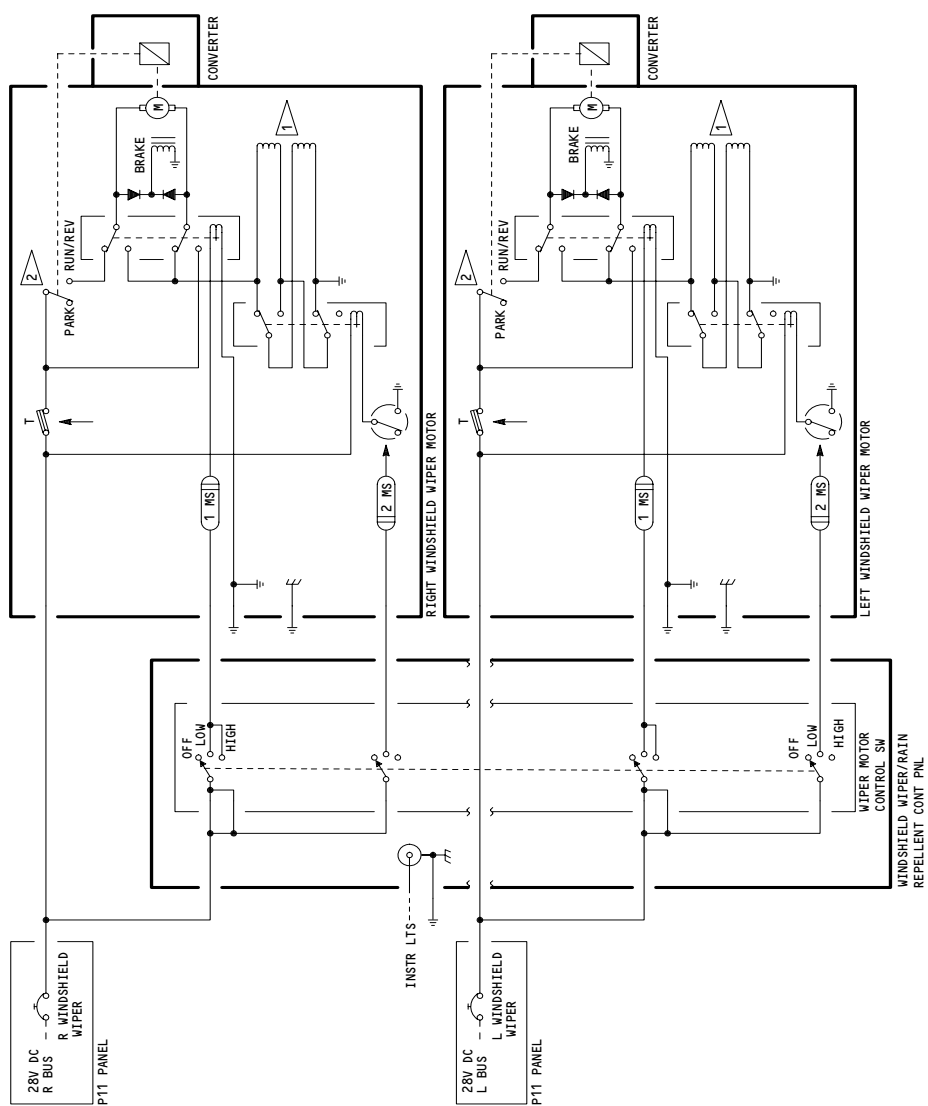
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1 'HIGH' SPEED WHEN FIELD WINDINGS CONNECTED IN PARALLEL. 'LOW' SPEED WHEN FIELD WINDINGS CONNECTED IN SERIES.

2 WHEN 'OFF' SELECTED, THE MOTOR REVERSES UNTIL THE CONVERTER PUTS THE SWITCH IN THE PARK POSITION

Windshield Wiper System Schematic
Figure 2

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- (2) The LOW and HIGH positions change the speed at which the wiper blades are driven on the windshield.
- (3) In the OFF position, the motor/converter direction is reversed. This causes the blades to go to the park position on the lift blocks at the bottom of each windshield where the motor/converter power is removed. To prevent dirt between each blade and its window, the lift block lifts the blade above the window surface.

B. Control

- (1) To put the system in operation, supply electrical power to the main AC buses (AMM 24-22-00/201).
- (2) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) WSHLD WIPER L
 - (b) WSHLD WIPER R

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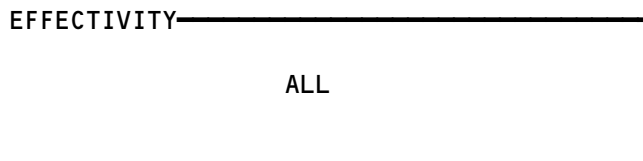

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WINDSHIELD WIPER SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ARM - WINDSHIELD WIPER	2	2		30-42-00
BLADE - WINDSHIELD WIPER	2	2		30-42-00
CIRCUIT BREAKER -			FLT COMPT, P11	
WSHLD WIPER L, C1143	--	1	11T13	*
WSHLD WIPER R, C1144	--	1	11T22	*
MOTOR/CONVERTER - WINDSHIELD WIPER L, M237	2	1	L FWD WINDOW SILL	30-42-02
MOTOR/CONVERTER - WINDSHIELD WIPER R, M238	2	1	R FWD WINDOW SILL	30-42-02
PANEL - WINDSHIELD WIPER/RAIN REPELLENT CONTROL, M10023	1	1	FLT COMPT, P5	30-42-01
SWITCH - WINDSHIELD WIPER MOTOR CONTROL, S1	1	1	FLT COMPT, P5, WINDSHIELD WIPER/ RAIN REPELLENT CONTROL PANEL, M10023	*

* SEE THE WDM EQUIPMENT LIST

Windshield Wiper System - Component Index
Figure 101

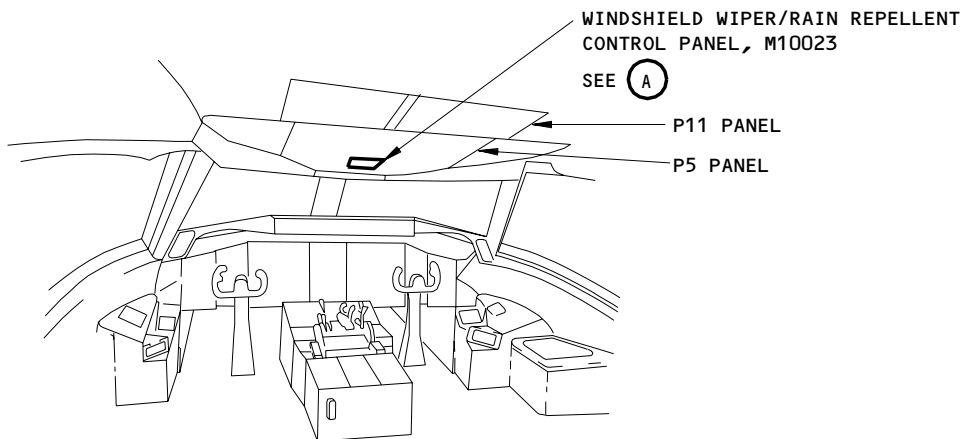


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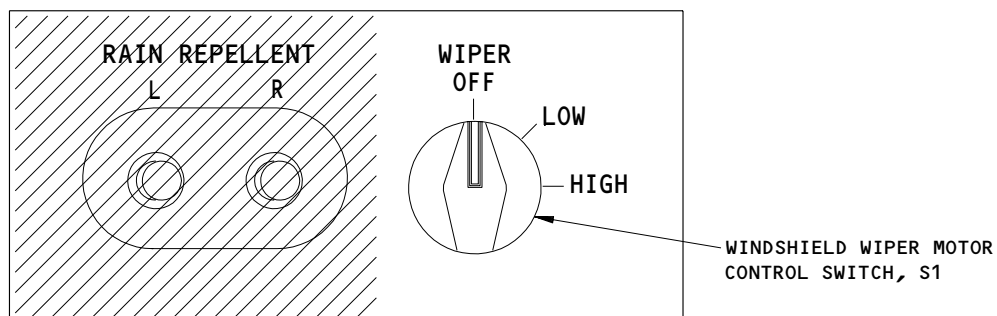
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FLIGHT COMPARTMENT



WINDSHIELD WIPER/RAIN REPELLENT CONTROL PANEL, M10023

(A)

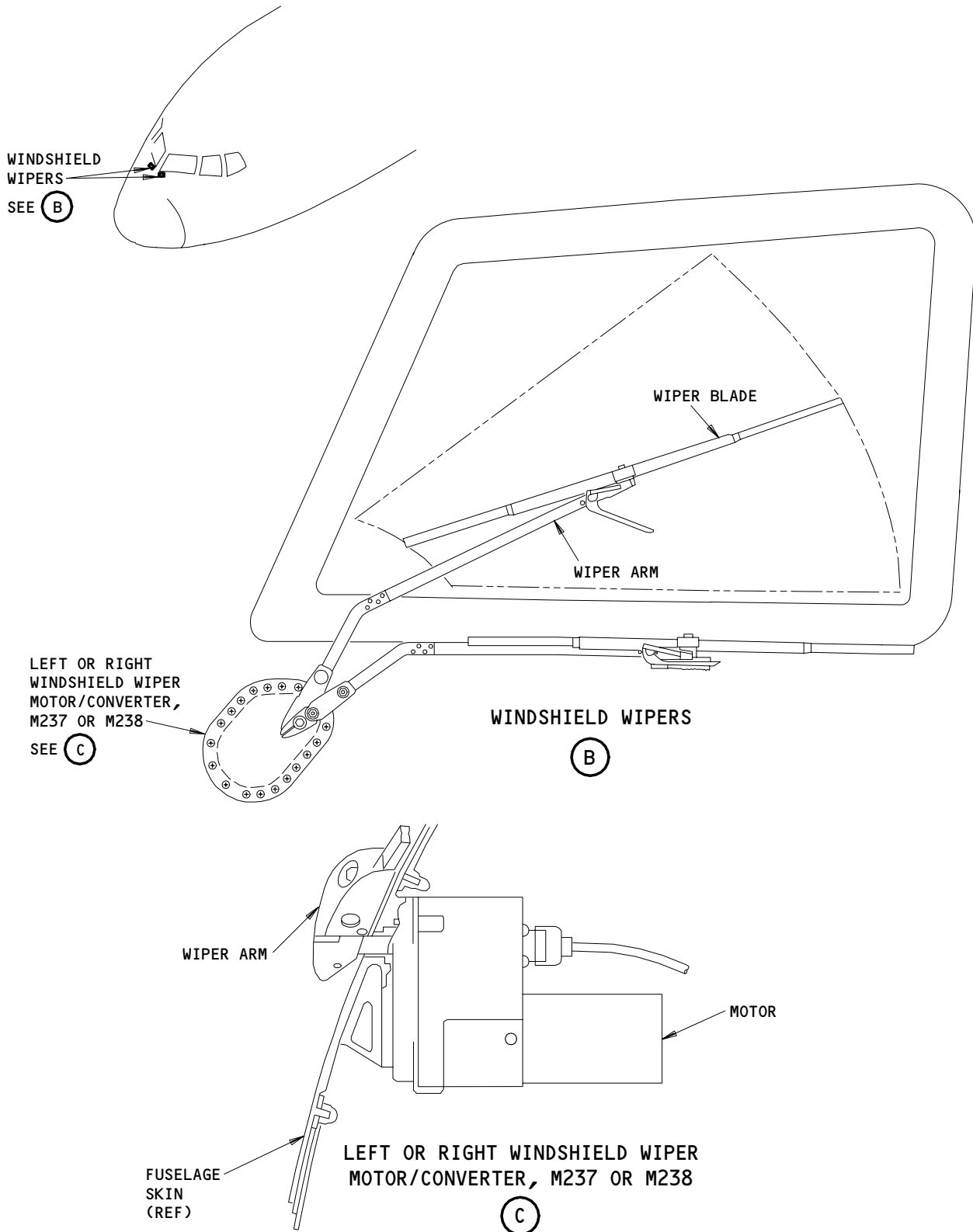
Windshield Wiper System - Component Location
Figure 102 (Sheet 1)

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Windshield Wiper System - Component Location
Figure 102 (Sheet 2)

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WINDSHIELD WIPER SYSTEM - ADJUSTMENT/TEST

1. General

- A. This procedure contains two tasks. The first task is an operational test of the windshield wiper system. The second task is an adjustment of the windshield wiper system.
- B. The left windshield wiper system is the same as the right windshield wiper system. The WIPER switch (OFF/LOW/HIGH) controls both the left and the right windshield wiper systems.
- C. The operational test is a test of the operation of the windshield wiper system in a minimum of time. The operational test uses only the equipment installed in the airplane. The operational test is not a test of adjustments or a replacement for the system test.
- D. The adjustment task includes a wiper arm pressure adjustment, a check of the wiper arm speed, and a wiper arm sweep adjustment.

TASK 30-42-00-715-002

2. Operational Test - Windshield Wiper System

- A. Consumable Materials
 - (1) Water source - to wet the windshield during the wiper operation
- B. References
 - (1) AMM 24-22-00/201, Electrical Power - Control
- C. Access
 - (1) Location Zones
211/212 Control Cabin - Section 41
- D. Procedure
 - S 865-145
 - (1) On the pilot's overhead panel, P5, make sure that the WIPER switch is in the OFF position.
 - S 865-004
 - (2) Supply electrical power to the main AC buses (AMM 24-22-00/201).
 - S 865-005
 - (3) To isolate electrical power for a test of the left wiper, do these steps:
 - (a) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
 - 1) 11T22, WSHLD WIPER R

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- (b) Make sure this circuit breaker on the overhead panel, P11, is closed:
 - 1) 11T13, WSHLD WIPER L

S 865-006

- (4) To isolate electrical power for a test of the right wiper, do these steps:
 - (a) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - 1) 11T13, WSHLD WIPER L
 - (b) Make sure this circuit breaker on the P11 panel is closed:
 - 1) 11T22, WSHLD WIPER R

S 805-085

CAUTION: DO NOT OPERATE THE WIPER ON A DRY WINDSHIELD. WIPER MOVEMENT CAN CAUSE DAMAGE TO THE WINDSHIELD.

- (5) Use a water source to keep the windshield wet while the wiper operates.

S 715-146

- (6) On the pilot's overhead panel, P5, set the WIPER switch to the HIGH position.

S 715-149

- (7) Make sure the wiper operates smoothly and correctly and moves freely at high speed.

S 715-150

- (8) Make sure the wiper sweep is on the windshield and the blades do not make an overlap on the windshield seal.

S 715-147

- (9) Set the WIPER switch to the LOW position.

S 715-151

- (10) Make sure the wiper operates smoothly and correctly and moves freely at low speed.

S 715-152

- (11) Make sure the wiper blade is on the windshield and the blades do not make an overlap on the windshield seal.

S 715-148

- (12) Set the WIPER switch in the OFF position.

S 715-153

- (13) Make sure the wiper operates no more than three strokes before it goes to the parked position.

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S 715-154

- (14) Make sure the wiper arm is on the lift block to hold the wiper blade away from the windshield frame surface.

S 865-011

- (15) Remove the DO-NOT-CLOSE tag and close the applicable circuit breakers on the P11 panel:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 865-012

- (16) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 30-42-00-825-013

3. Adjustment of the Windshield Wiper System

A. General

- (1) This task contains these adjustment/tests to make sure the wiper system is correctly adjusted:
- (a) Wiper arm pressure.
 - (b) Wiper arm speed.
 - (c) Wiper arm sweep.
- (2) It is necessary to make sure the wiper arm pressure is correct before you do a check of the wiper arm speed or sweep.

B. Equipment

- (1) Counter (0-300 strokes per minute) - Commercially available
- (2) Spring scale - 0 to 20 pounds
- (3) Arm height gage - plastic cube with edge dimension of 0.78 ± 0.01 inch
- (4) Sealing gun - 6-inch length cartridge
- (5) Sealing compound cutting tool - hardwood or plexiglass
- (6) Varnish brush - 1 or 2 inch
- (7) Spatula
- (8) Pad to prevent wiper arm from scratching windshield
- (9) Arm Unloading Tool, P/N 91-0700, Grimes Aerospace Co.
50 Altair Ave
Plymouth, CN 06702

NOTE: This tool can be used in the sweep adjustment procedure. This tool will let you remove and install the wiper arm without loosening the pressure adjustment bolt.

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C. Consumable Materials

- (1) Water source - to wet the windshield during the wiper operation
- (2) A00247 Sealing compound - BMS 5-95, Class B
- (3) B00083 Aliphatic Naphtha - TT-N-95

D. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 30-42-02/401, Windshield Wiper Motor/Converter

E. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

F. Prepare for the Adjustment/Test

S 865-014

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (1) Open these circuit breakers on the left miscellaneous electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 865-015

- (2) Open these circuit breakers on the right miscellaneous electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

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- S 865-142
- (3) On the pilot's overhead panel, P5, make sure that the WIPER switch is in the OFF position.
- S 865-017
- (4) Supply electrical power to the main AC buses (AMM 24-22-00/201).
- S 865-018
- (5) To operate the left wiper only, do these steps:
- (a) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - 1) 11T22, WSHLD WIPER R
 - (b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
 - 1) 11T13, WSHLD WIPER L
- S 865-019
- (6) To operate the right wiper only, do these steps:
- (a) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - 1) 11T13, WSHLD WIPER L
 - (b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
 - 1) 11T22, WSHLD WIPER R
- G. Adjust the Wiper Arm Pressure (Fig. 501)
- S 865-072
- (1) Put the wiper blade in the midstroke position before adjustment:
- CAUTION:** DO NOT OPERATE THE WIPER ON A DRY WINDSHIELD. WIPER MOVEMENT CAN CAUSE DAMAGE TO THE WINDSHIELD.
- (a) Use a water source to keep the windshield wet while the wiper operates.
 - (b) On the pilot's overhead pannel, P5, set the WIPER switch to the LOW position and stop blade during sweep.

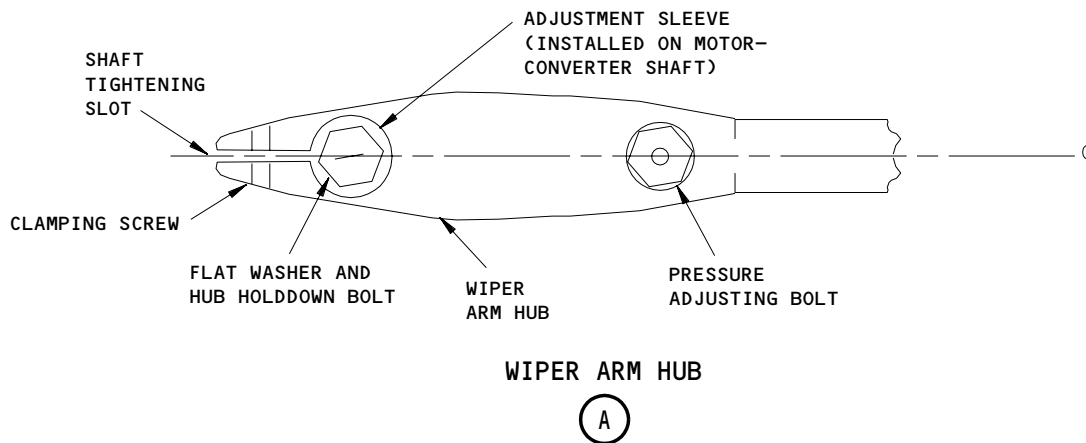
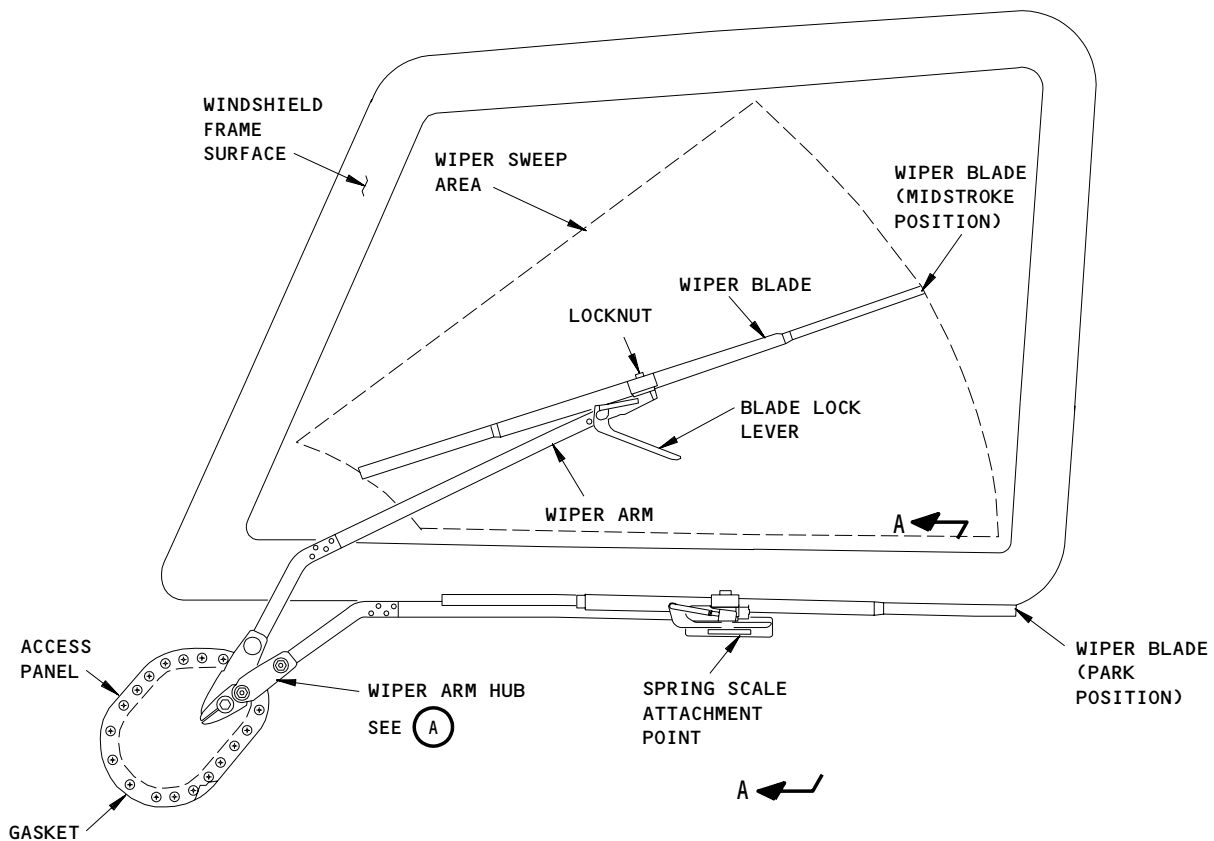
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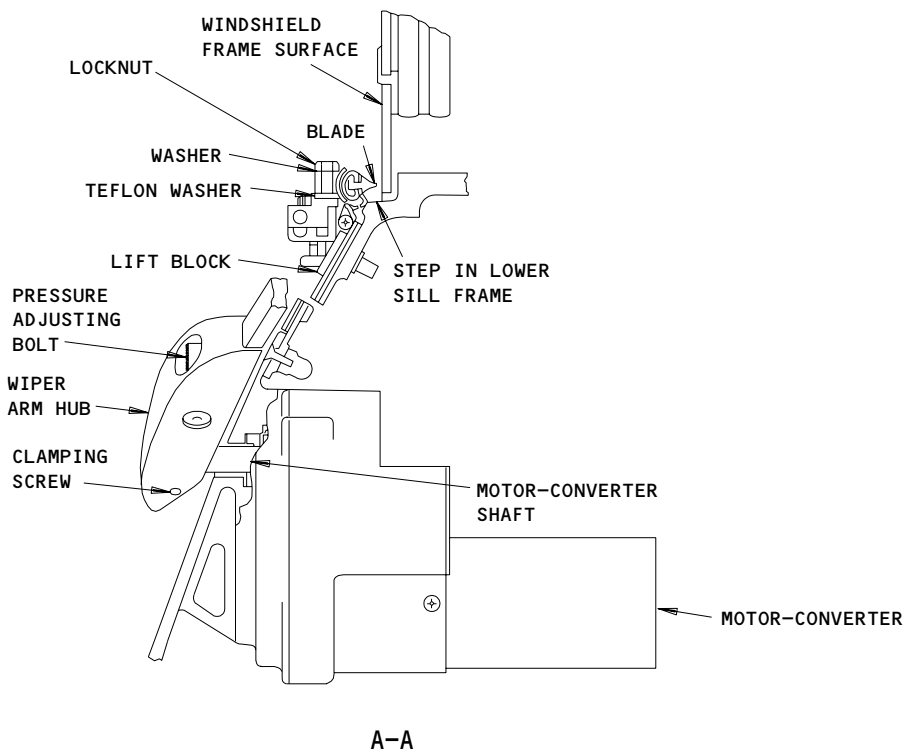


NOTE: SEE FIG. 502 FOR WIPER ARM ADJUSTMENT DETAILS

Windshield Wiper Arm and Blade
Figure 501 (Sheet 1)

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Windshield Wiper Arm and Blade
Figure 501 (Sheet 2)

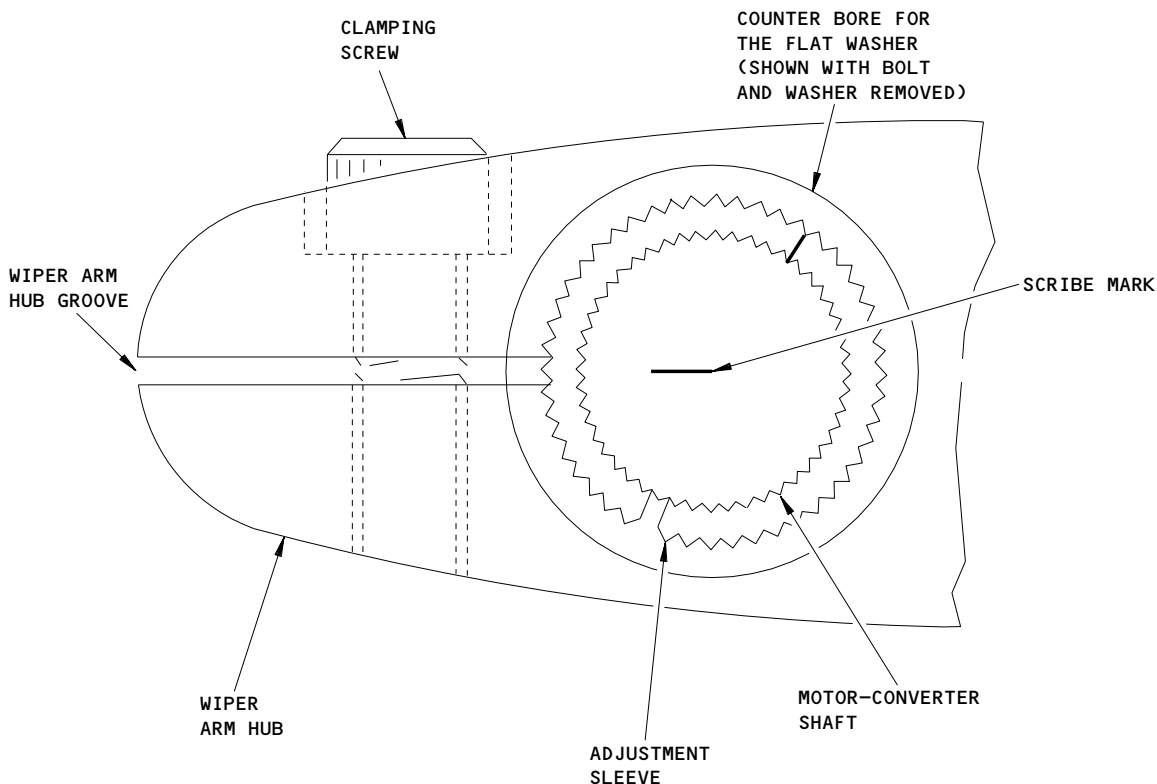
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DESIRED BLADE TIP MOVEMENT INCHES (mm)	TURN THE BUSHING RELATIVE TO SHAFT	TURN THE ARM ASSEMBLY RELATIVE TO BUSHING
0.09 (2.29)	1 TOOTH IN THE DESIRED DIRECTION	1 TOOTH IN THE OPPOSITE DIRECTION
1.20 (30.48)	1/4 TURN IN THE DESIRED DIRECTION	IN THE OPPOSITE DIRECTION TO THE DESIRED POSITION WHERE THE ARM ENGAGES SPLINES ON THE BUSHING
2.40 (60.96)	1/2 TURN IN THE DESIRED DIRECTION	IN THE OPPOSITE DIRECTION TO THE DESIRED POSITION WHERE THE ARM ENGAGES SPLINES ON THE BUSHING
3.60 (91.44)	3/4 TURN IN THE DESIRED DIRECTION	IN THE OPPOSITE DIRECTION TO THE DESIRED POSITION WHERE THE ARM ENGAGES SPLINES ON THE BUSHING
4.67 (118.62)	NONE	1 TOOTH IN THE DESIRED DIRECTION
4.76 (120.90)	1 TOOTH IN THE DESIRED DIRECTION	NONE

Windshield Wiper Arm and Sweep Adjustment
Figure 502

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- (c) To stop the windshield wiper after one cycle, open the applicable circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - 1) 11T13, WSHLD WIPER L
 - 2) 11T22, WSHLD WIPER R
- (d) Remove the water source.

S 725-093

- (2) Do these steps to do a check of the wiper arm pressure:

CAUTION: DO NOT LIFT THE WIPER ARM BEYOND THE LIMITS OF THE TEST. DAMAGE CAN OCCUR TO THE WIPER ARM.

- (a) Put the arm height gage under the wiper arm, adjacent to where the arm and blade are connected.
 - 1) Make sure the blade is free of the windshield or touches only at one tip.
- (b) Connect a spring scale to the locknut that holds the wiper arm to the shaft.
- (c) Slowly pull the scale vertical to the windshield surface until the arm is slightly free of the windshield surface.
 - 1) Read the scale at this point and make sure the wiper arm pressure is 15 ±1 pounds.

S 825-094

- (3) Do these steps if an adjustment of the wiper arm pressure is necessary:

- (a) Remove the sealing compound from the head of the pressure adjusting bolt on the wiper arm hub, if it is necessary.

NOTE: A newly installed wiper arm will not have sealing compound.

- (b) Clean the pressure adjusting bolt, if it is necessary.

NOTE: Do not do this step for a newly installed wiper arm.

- 1) Use a varnish brush to apply fresh aliphatic naphtha.
- 2) Wipe cleaner off with clean cloth before cleaner becomes dry.
- (c) Adjust the pressure adjusting bolt.
 - 1) Tighten the pressure adjusting bolt if the wiper arm pressure is too low or loosen the bolt if wiper arm pressure is too high.
- (d) Measure again to make sure the wiper arm pressure is 15 ±1 pound.
- (e) Adjust again, if it is necessary.

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S 395-080

- (4) Apply sealing compound to the head of the pressure adjusting bolt.

NOTE: Do this step only if you have the correct wiper arm sweep.

H. Do a Test of the Wiper Arm Speed (Fig. 501):

S 285-083

- (1) Make sure the wiper arm pressure is correct before you do a test of the wiper arm speed.

S 805-089

CAUTION: DO NOT OPERATE THE WIPER ON A DRY WINDSHIELD. WIPER MOVEMENT CAN CAUSE DAMAGE TO THE WINDSHIELD.

- (2) Keep the windshield wet while the wiper operates.

S 215-021

- (3) On the pilot's overhead panel, P5, set the WIPER switch to the LOW position.

S 715-155

- (4) Make sure the wiper operates at a minimum of 130 sweeps for each minute.

S 715-156

- (5) Make sure the wiper operates smoothly and correctly and moves freely.

S 715-157

- (6) Make sure the wiper sweep is on the windshield and blade does not make an overlap on the windshield seal (Fig. 501).

S 215-022

- (7) Set the WIPER switch to the HIGH position.

S 715-158

- (8) Make sure the wiper operates at a minimum of 185 sweeps for each minute.

S 715-159

- (9) Make sure the wiper operates smoothly and correctly and moves freely.

S 715-160

- (10) Make sure the wiper sweep is on the windshield and blade does not make an overlap on the windshield seal (Fig. 501).

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- S 715-143
- (11) Set the WIPER switch to the OFF position.
- S 715-161
- (12) Make sure the wiper operates no more than three strokes before it goes to the parked position.
- S 715-162
- (13) Make sure the wiper arm is on the lift block to hold the wiper blade away from the windshield frame surface.
- S 965-024
- (14) If the wiper speed was not in the correct limits, replace the motor-converter (AMM 30-42-02/401).
- S 285-122
- (15) If the wiper sweep or park position was not correct (Fig. 501), adjust them as follows:
- NOTE: If wiper sweep will not adjust, and is still incorrect, replace the motor-converter (AMM 30-42-02/401).

I. Adjust the Windshield Wiper Sweep (Fig. 501, 502)

- S 865-165
- (1) Put the wiper blade in the INT position before adjustment.
- NOTE: For wiper systems without intermittent setting, use LOW setting.
- S 865-025
- (2) To adjust the left wiper sweep, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
- (a) 11T13, WSHLD WIPER L
- S 865-026
- (3) To adjust the right wiper sweep, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
- (a) 11T22, WSHLD WIPER R
- S 805-027
- (4) Remove the sealing compound from the head of the pressure adjusting bolt on the wiper arm hub, if necessary.
- NOTE: This step is not necessary for a newly installed wiper arm.

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S 805-028

- (5) Remove the sealing compound from the head of screws, bolts, and shaft tightening slot on the wiper arm hub, if necessary.

NOTE: This step is not necessary for a newly installed wiper arm. If the Grimes tool will be used, it is not necessary to remove the sealing compound from the pressure adjustment bolt.

S 035-029

- (6) Loosen the pressure adjusting bolt on the wiper arm hub.

NOTE: If the Grimes tool is used to remove the wiper arm, this step is not necessary.

S 825-092

- (7) To adjust a wiper arm hub, do these steps:

CAUTION: DISCARD THE USED HUB HOLDDOWN BOLT. HUB HOLDDOWN BOLTS CAN BECOME LOOSE IF USED AGAIN.

- (a) Remove the hub holddown bolt and washer.
- (b) Make sure the motor-converter operate properly with the split in the bushing.
- (c) Make sure the scribe mark on the end of the shaft aligns with the wiper arm hub groove.
- (d) Remove the wiper arm hub and adjustment sleeve.
- (e) Turn the wiper arm hub and adjustment sleeve in the direction(s) necessary to move the wiper arm tip (Fig. 502).
- (f) Install the wiper arm hub and the adjustment sleeve.

CAUTION: DO NOT USE A USED HUB HOLDDOWN BOLT. HUB HOLDDOWN BOLTS CAN BECOME LOOSE IF USED AGAIN.

- (g) Replace the used hub holddown bolt with a new bolt.
 - 1) Tighten the bolt to 20-30 inch-pounds.

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S 095-095

- (8) If the Grimes tool was used in the sweep adjustment procedure, remove the tool.

S 825-037

- (9) Do the procedures to Measure and Adjust the Wiper Arm Pressure.

S 865-041

- (10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

- (a) 11T13, WSHLD WIPER L
- (b) 11T22, WSHLD WIPER R

S 805-042

CAUTION: DO NOT OPERATE THE WIPER ON A DRY WINDSHIELD. WIPER MOVEMENT CAN CAUSE DAMAGE TO THE WINDSHIELD.

- (11) Use a water source to keep the windshield wet while the wiper operates.

S 865-144

- (12) Set the WIPER switch to the LOW and the HIGH positions to make sure the wiper arm/blade sweep is on the windshield and does not make an overlap on the windshield seal.

S 865-081

- (13) Set the WIPER switch to the OFF position.

S 715-163

- (14) Make sure the wiper operates no more than three strokes before it goes to the parked position.

S 715-164

- (15) Make sure the wiper arm is on the lift block to hold the wiper blade away from the windshield frame surface.

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S 285-167

- (16) If the wiper fails to park after contacting the park block, adjust the sweep further from the park block.

S 285-168

- (17) If the wiper fails to park completely on the park block or contact the park block at all, adjust the sweep closer to the park block.

S 285-087

- (18) If the wiper sweep or park position was not in the correct limits, do the steps above to adjust the windshield wiper sweep again.

S 865-082

- (19) Open these circuit breakers on the P11 panel, and attach DO-NOT-CLOSE tags:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 395-039

- (20) Apply sealing compound to the wiper arm as follows:

NOTE: Do these steps only after you have the correct sweep pattern.

- (a) Make sure the areas on the wiper arm hub are clean and dry.
- (b) Apply sealing compound to the head of the pressure adjusting bolt. Make smooth with a spatula.
- (c) Apply sealing compound to the head of screws, bolts, and shaft tightening slot on wiper arm hub. Make smooth with a spatula.

J. Put the Airplane Back to Its Usual Condition

S 865-067

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 865-068

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 865-069

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

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NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 805-071

- (4) Remove the water source if it is not necessary.

S 865-070

- (5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WINDSHIELD WIPER SYSTEM – INSPECTION/CHECK

1. General

- A. This procedure contains two tasks. The first task is an inspection of the windshield wiper arm. The second task is an inspection of the windshield wiper blade.

TASK 30-42-00-206-001

2. Windshield Wiper Arm Inspection/Check

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
- (2) AMM 30-42-02/401, Windshield Wiper Motor/Converter
- (3) AMM 30-42-03/401, Windshield Wiper Arm/Blade

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Examine the Windshield Wiper Arm (Fig. 601)

S 866-002

- (1) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 866-003

- (2) On the pilot's overhead panel, P5, set the WIPER switch to the OFF position to put the motor/converter unit in the park position.

S 866-004

- (3) Open these circuit breakers on the overhead panel, P11, and attach D0-NOT-CLOSE tags:
 - (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 866-005

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THESE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (4) Open these circuit breakers on the left misc electrical equipment panel, P36, and attach D0-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

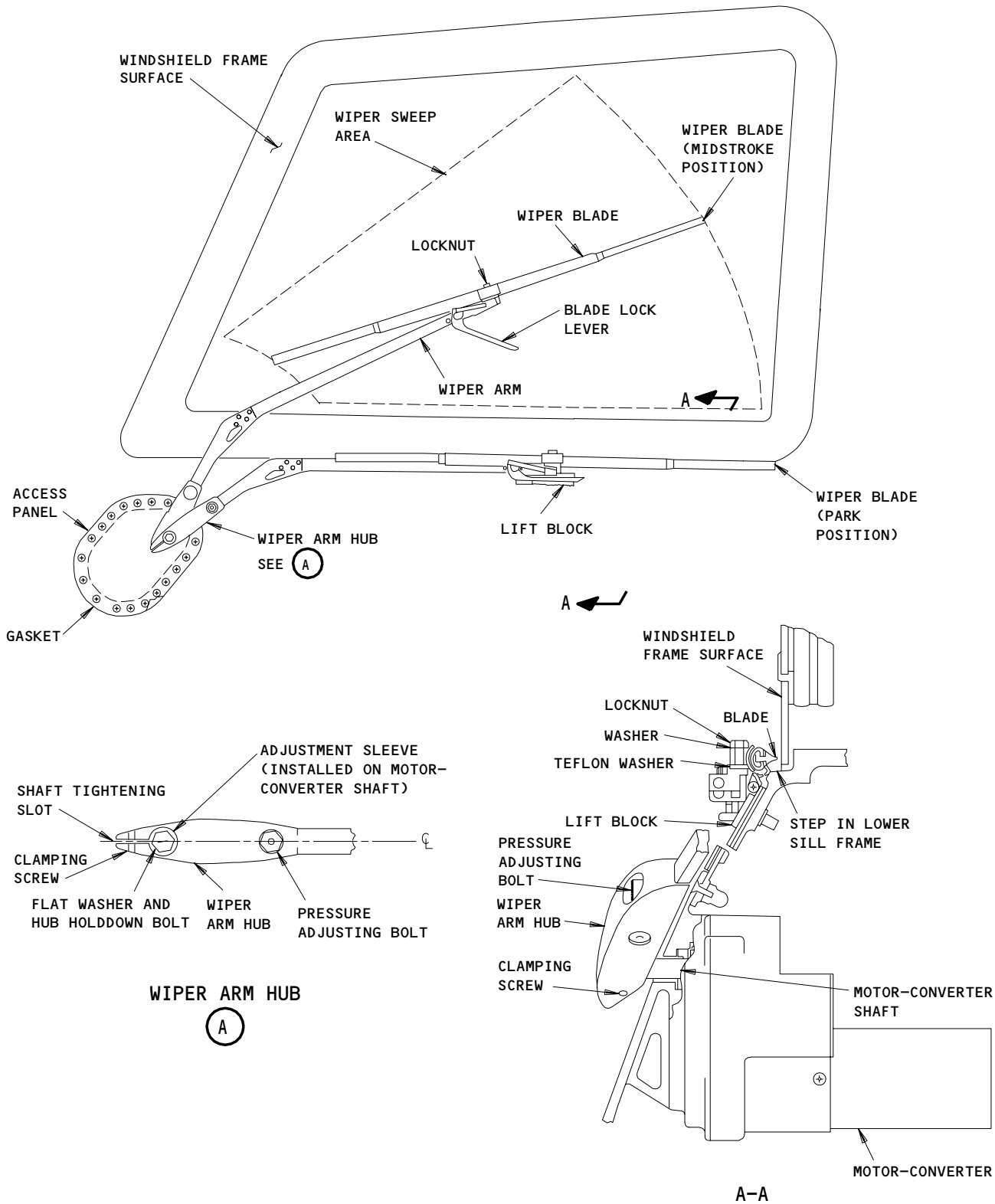
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Windshield Wiper Arm and Blade
Figure 601

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S 866-006

- (5) Open these circuit breakers on the right misc electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 216-007

- (6) Examine the sealant for cracks.

- (a) If there are cracks:
 - 1) Remove the sealant (AMM 30-42-03/401).
 - 2) Do steps (7), (8) and (9).
 - 3) Reapply the sealant (AMM 30-42-03/401).
 - 4) Continue on step (10).
- (b) If there are no cracks:
 - 1) Continue with step (7) and omit steps (8) and (9).

S 216-008

- (7) Examine the wiper arm for corrosion and for loose fasteners.
(a) If necessary, replace the wiper arm (AMM 30-42-03/401).

S 216-009

CAUTION: REPLACE THE HUB HOLDDOWN BOLT IF IT IS LOOSE. DO NOT TIGHTEN AGAIN BECAUSE THE BOLT CAN BECOME LOOSE IF TIGHTENED AGAIN.

- (8) Make sure the hub holddown bolt is tightly attached to the motor/converter shaft.
(a) If the hub holddown bolt is loose, replace it with a new bolt and tighten.

S 216-010

- (9) Make sure the clamping screw is tight (Fig. 601).
(a) If necessary, tighten the clamping screw.

S 216-013

- (10) Examine the motor/converter shaft for corrosion and for wear (Fig. 601).
(a) If necessary, replace the motor/converter (AMM 30-42-02/401).

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D. Put the Airplane Back to Its Usual Condition

S 396-035

- (1) If removed, apply the sealing compound over the bolts and the screws and in the shaft tightening slot of the wiper arm hub. Use a spatula to get a smooth surface and to remove unwanted sealing compound.

S 866-036

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11T13, WSHLD WIPER L
(b) 11T22, WSHLD WIPER R

S 866-037

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
(b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
(c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 866-038

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
(b) 37E1 OR 37H7, WINDOW HEAT 2L
(c) 37E2 OR 37H6, WINDOW HEAT 3L

S 866-039

- (5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 30-42-00-206-014

3. Windshield Wiper Blade Inspection/Check

A. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

B. References

- (1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 30-42-03/401, Windshield Wiper Arm/Blade

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C. Examine the Windshield Wiper Blade

S 866-015

- (1) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 866-016

- (2) On the pilot's overhead panel, P5, set the WIPER switch to the OFF position to put the motor/converter unit in the park position.

S 866-017

- (3) Open these circuit breakers on the overhead panel, P11, and attach D0-NOT-CLOSE tags:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 866-018

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THESE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (4) Open these circuit breakers on the left misc electrical equipment panel, P36, and attach D0-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 866-019

- (5) Open these circuit breakers on the right misc electrical equipment panel, P37, and attach D0-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 216-020

CAUTION: DO NOT LIFT THE WIPER ARM HIGHER THAN NECESSARY. DAMAGE COULD OCCUR TO THE WIPER ARM.

- (6) Make sure the wiper blade is tightly attached to the wiper arm.
- (a) If necessary, tighten the locknut to 25-32 pound-inches (Fig. 601).

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S 216-021

- (7) Make sure the wiper is not worn.
(a) If necessary, replace the wiper blade (AMM 30-42-03/401).

D. Put the Airplane Back to Its Usual Condition

S 396-031

- (1) If removed, apply the sealing compound over the bolts and the screws and in the shaft tightening slot of the wiper arm hub. Use a spatula to get a smooth surface and to remove unwanted sealing compound.

S 866-032

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11T13, WSHLD WIPER L
(b) 11T22, WSHLD WIPER R

S 866-033

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
(b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
(c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 866-034

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
(b) 37E1 OR 37H7, WINDOW HEAT 2L
(c) 37E2 OR 37H6, WINDOW HEAT 3L

S 866-030

- (5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WINDSHIELD WIPER/RAIN REPELLENT CONTROL PANEL – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the windshield wiper/rain repellent control panel. The second task is the installation of the windshield wiper/rain repellent control panel.
- B. The windshield wiper/rain repellent control panel, M10023 is on the pilot's overhead panel P5.

TASK 30-42-01-004-001

2. Remove the Windshield Wiper/Rain Repellent Control Panel

A. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

B. Procedure

S 864-002

- (1) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R
 - (c) AIRPLANES WITH RAIN REPELLENT SYSTEM;
11T21, RAIN REPEL L
11T12, RAIN REPEL R

S 024-003

- (2) Remove the windshield wiper/rain repellent control panel.

TASK 30-42-01-404-004

3. Install the Windshield Wiper/Rain Repellent Control Panel

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 424-005

- (1) Install the windshield wiper/rain repellent control panel.

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S 864-006

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R
 - (c) AIRPLANES WITH RAIN REPELLENT SYSTEM;
11T21, RAIN REPEL L
11T12, RAIN REPEL R

S 714-007

- (3) Test the windshield wiper/rain repellent control panel installation:
- (a) Supply electrical power (AMM 24-22-00/201).
 - (b) Make the windshield wet with water.

CAUTION: DO NOT LET THE WIPERS OPERATE ON A DRY WINDSHIELD. WIPERS CAN CAUSE DAMAGE TO A DRY WINDSHIELD.

- (c) Set the WIPER switch to the LOW position.
- (d) Make sure the wipers operate.
- (e) Set the WIPER switch to the OFF position.
- (f) Remove electrical power if it is not necessary.

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WINDSHIELD WIPER MOTOR/CONVERTER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains three tasks. The first task is the removal of the windshield wiper motor/converters. The second task is the installation of the windshield wiper motor/converters. The third task is the replacement of the fuse on the windshield wiper motor/converter.
- B. The left windshield wiper motor/converter, M237, and the right windshield wiper motor/converter, M238, are on the cover assemblies immediately forward of and below the left and right windows. The two cover assemblies install in the airplane skin to give a plug-type panel installation. Remove each motor/converter and cover assembly from the outer airplane.

TASK 30-42-02-004-006

2. Remove the Windshield Wiper Motor/Converter (Fig. 401)

- A. References
 - (1) AMM 30-42-03/401, Windshield Wiper Arm/Blade
- B. Access
 - (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 864-042

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (1) Open these circuit breakers on the left miscellaneous electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

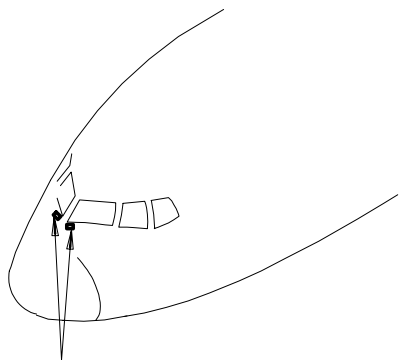
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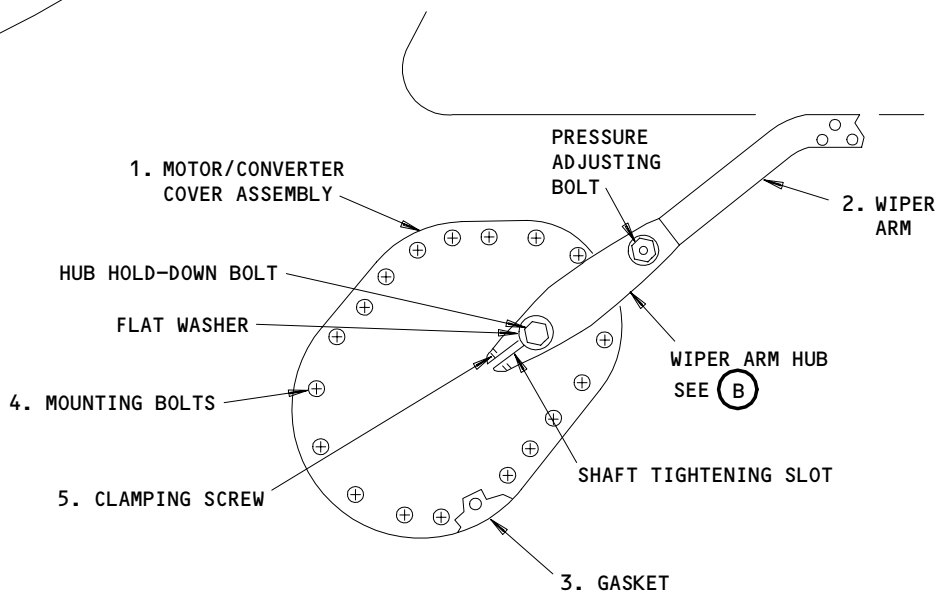
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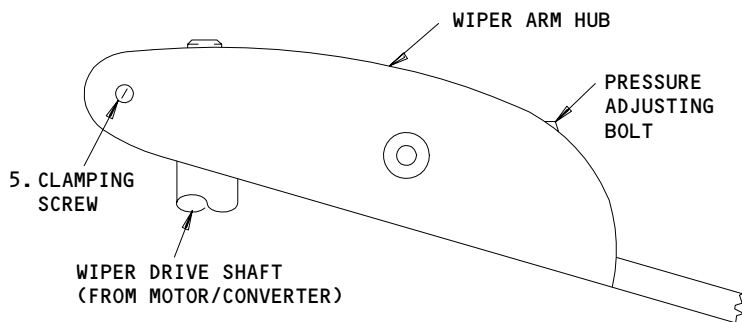


WINDSHIELD WIPER
SEE (A)



WINDSHIELD WIPER

(A)



WIPER ARM HUB

(B)

Windshield Wiper Motor/Converter Installation
Figure 401

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S 864-009

- (2) Open these circuit breakers on the right miscellaneous electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 864-007

- (3) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11T13, WSHDL WIPER L
 - (b) 11T22, WSHDL WIPER R

S 034-010

- (4) Remove the wiper arm assembly (2) (AMM 30-42-03/401).

S 034-011

- (5) Remove the mounting bolts (4) which attach the cover assembly to the airplane.

S 024-012

- (6) Remove the motor/converter cover assembly (1).

S 034-013

- (7) Remove the electrical connector on the rear of the motor/converter.

S 034-014

- (8) Remove the gasket (3) on the rear of the cover assembly.

TASK 30-42-02-404-015

3. Install the Windshield Wiper Motor/Converter (Fig. 401)

A. Equipment

- (1) Sealing gun - 6-inch length cartridge
Commercially available
- (2) Varnish brush - 1 or 2 inch; Commercially available
- (3) Spatula; Commercially available

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B. Consumable Materials

- (1) A00247 Sealing Compound - BMS 5-95, Class B
- (2) B00083 Aliphatic Naphtha - TT-N-95
- (3) A00153, Cement - Low Odor, Synthetic rubber, Adhesive - BMS 5-30

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Converter Assy - Wshld Wiper Sys Elec Motr (LH Side)	30-42-02	01	40
	1	Converter Assy - Wshld Wiper Sys Elec Motr (RH Side)			45
	2	Arm - Wshld Wiper Sys Elec (LH Side)			29,30
	2	Arm - Wshld Wiper Sys Elec (RH Side)			34,35
	3	Gasket - Wshld Wiper Sys Elec Access Pnl			25
	4	Bolt			20
	5	Clamping Screw			36

D. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 30-42-03/401, Windshield Wiper Arm/Blade
- (3) AMM 51-31-01/201, Seals and Sealing

E. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

F. Procedure

S 024-051

CAUTION: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO REMOVE THE SEALANT. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO THE AIRPLANE SURFACE CAN OCCUR.

- (1) Remove the sealing compound from the access opening (AMM 51-31-01/201).

S 114-017

- (2) Clean the access opening. Use the varnish brush to apply the new aliphatic naphtha.
 - (a) Rub the aliphatic naphtha off with a clean cloth before it dries.

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- S 354-018
(3) Bond the gasket (3) to the cover assembly with rubber cement.

- S 434-019
(4) Install the electrical connector.

- S 424-020
(5) Install the motor/converter cover assembly (1).

NOTE: The windshield wiper motor/converter for one and two-piece wiper arm hubs are not interchangeable.

- S 434-022
(6) Install the mounting bolts (4).

- S 864-023
(7) Supply electrical power (Ref 24-22-00).

- S 864-024
(8) For the left motor/converter cover assembly, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11T13, WSHLD WIPER L

- S 864-025
(9) For the right motor/converter cover assembly, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11T22, WSHLD WIPER R

- S 714-049
(10) On the pilot's overhead panel, P5, set the WIPER switch to the LOW position.
(a) Make sure the applicable wiper drive shaft on the motor/converter moves.

- S 864-027
(11) Set the WIPER switch to the OFF position.

- S 864-028
(12) For the left motor/converter cover assembly, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11T13, WSHLD WIPER L

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S 864-029

- (13) For the right motor/converter cover assembly, open this circuit breaker on the P11 and attach a DO-NOT-CLOSE tag:
(a) 11T22, WSHLD WIPER R

S 394-050

CAUTION: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO APPLY THE SEALANT. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO THE AIRPLANE SURFACE CAN OCCUR.

- (14) Apply the sealing compound to the joint between the cover assembly and the airplane skin (AMM 51-31-01/201).
(a) Use the spatula to make the surface smooth and remove unwanted sealing compound.

S 434-031

- (15) Install the wiper arm (2) (AMM 30-42-03/401).

S 864-032

- (16) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11T13, WSHDL WIPER L
(b) 11T22, WSHDL WIPER R

S 864-033

- (17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
(b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
(c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-034

- (18) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
(b) 37E1 OR 37H7, WINDOW HEAT 2L
(c) 37E2 OR 37H6, WINDOW HEAT 3L

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TASK 30-42-02-964-001

4. Replace the Fuse

A. General

- (1) There is a fuse in the gearcase assembly of the windshield wiper motor/converter. If the fuse is bad, the motor/converter will not operate.

B. Procedure

S 034-002

- (1) Remove the fuse holder from the motor/converter.

S 034-003

- (2) Remove the fuse from the fuse holder.

S 434-004

- (3) Put a new fuse into the fuse holder.

S 434-005

- (4) Install the fuse holder into the motor/converter.

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WINDSHIELD WIPER ARM/BLADE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains six tasks. The first task is the removal of the windshield wiper blade. The second task is the installation of the windshield wiper blade. The third task is the removal of the windshield wiper arm. The fourth task is the installation of the windshield wiper arm. The fifth task is the removal of the wiper blade lift block bumper. The sixth task is the installation of the wiper blade lift block bumper.

TASK 30-42-03-004-001

2. Remove the Windshield Wiper Blade

A. General

- (1) The windshield wiper blade is attached to the wiper arm by one locknut.

B. Equipment

- (1) Pad to prevent scratches on the windshield - Commercially available

C. References

- (1) AMM 24-22-00/201, Electrical Power - Control

D. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

E. Procedure (Fig. 401)

S 864-002

- (1) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 864-003

- (2) On the pilot's overhead panel, P5, set the WIPER switch to the OFF position to put the windshield wipers in the park position.

S 864-004

- (3) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11T13, WSHLD WIPER L
(b) 11T22, WSHLD WIPER R

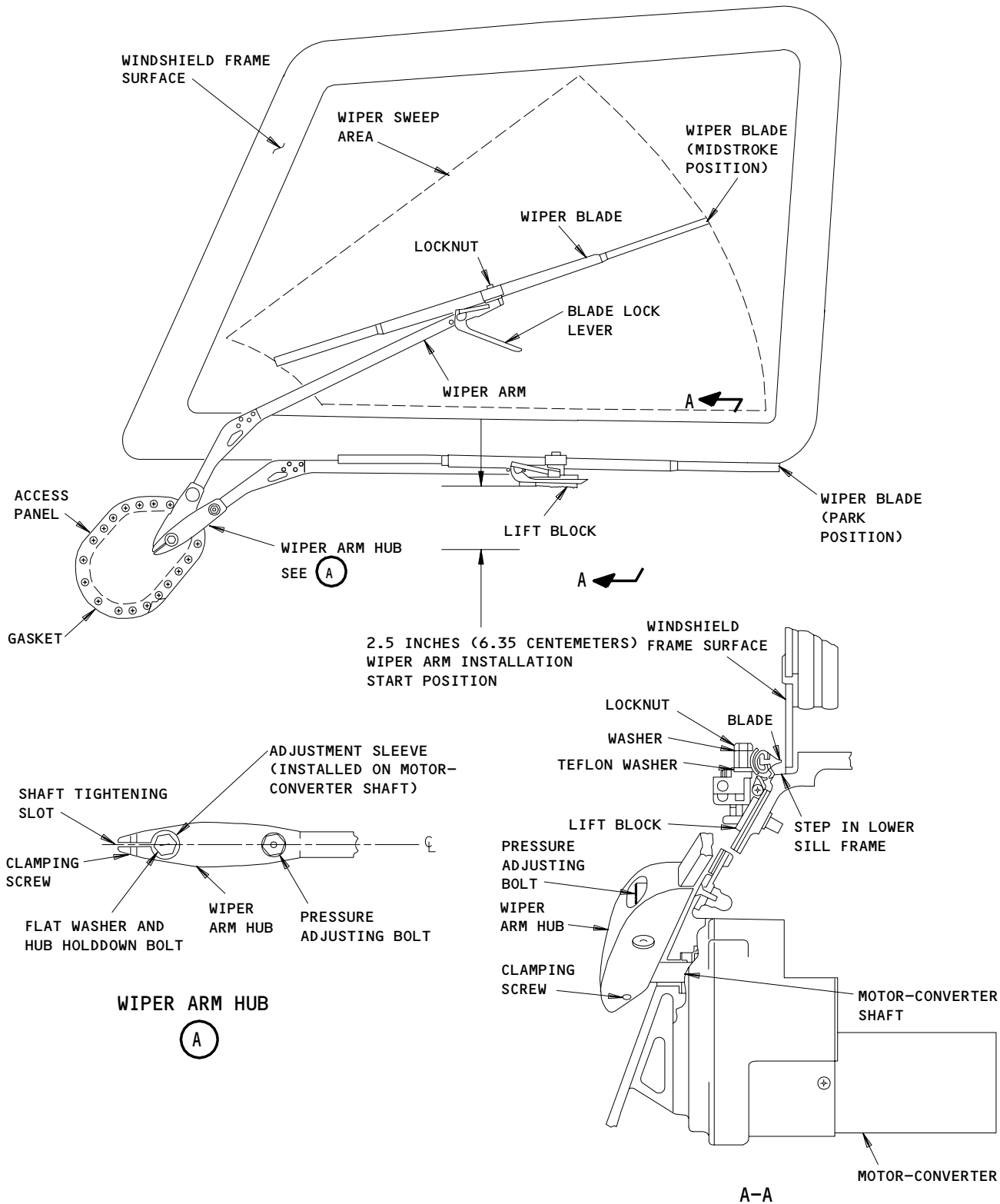
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Windshield Wiper Arm and Blade
Figure 401

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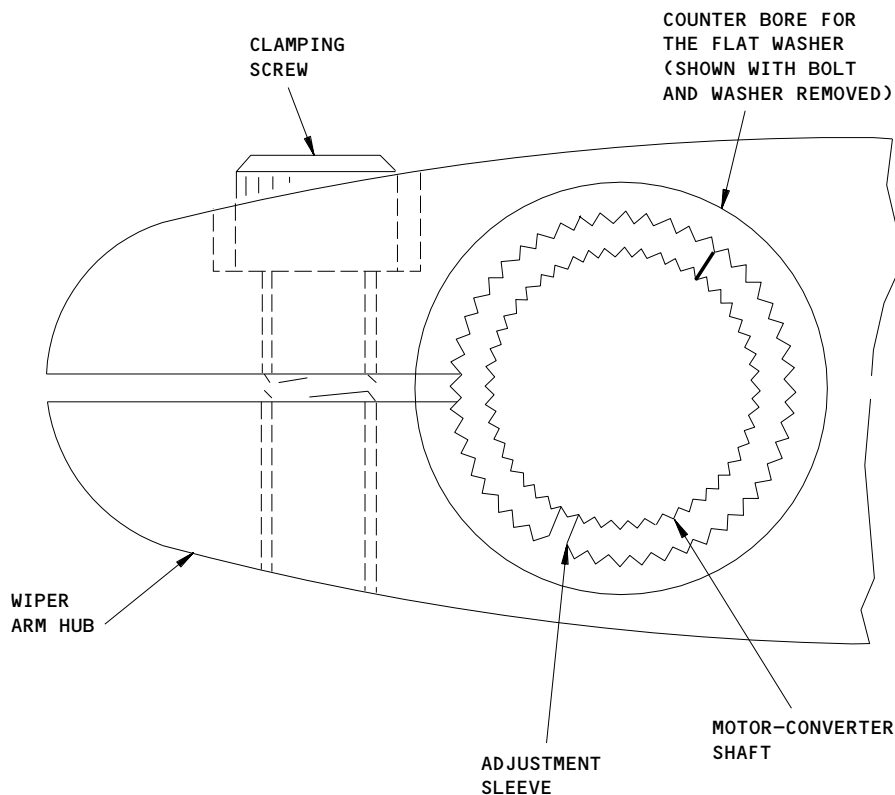
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ADJUSTMENT SLEEVE AND WIPER HUB ADJUSTMENT	APPROXIMATE MOVEMENT AT THE OUTBOARD BLADE TIP
MOVE THE ADJUSTMENT SLEEVE AND THE WIPER ARM HUB TOGETHER ONE TOOTH ON THE SHAFT. DO NOT LET THE MOTOR CONVERTER SHAFT MOVE.	4.76 INCHES
MOVE THE WIPER ARM HUB ONE TOOTH IN RELATION TO THE SLEEVE. DO NOT LET THE MOTOR CONVERTER SHAFT AND THE ADJUSTMENT SLEEVE MOVE.	4.67 INCHES
1. MOVE THE ADJUSTMENT SLEEVE ONE TOOTH CLOCKWISE. 2. MOVE THE WIPER ARM HUB ONE TOOTH COUNTERCLOCKWISE.	0.09 INCHES CLOCKWISE
1. MOVE THE ADJUSTMENT SLEEVE ONE TOOTH COUNTERCLOCKWISE. 2. MOVE THE WIPER ARM HUB CLOCKWISE ONE TOOTH ON THE ADJUSTMENT SLEEVE.	0.09 INCHES COUNTERCLOCKWISE

Windshield Wiper Arm Adjustment
Figure 402

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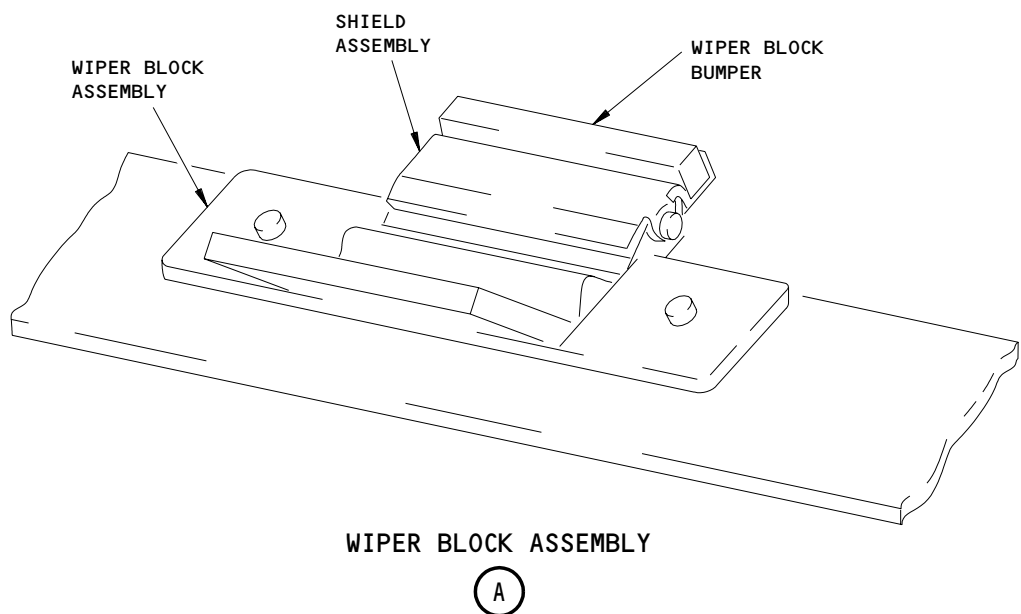
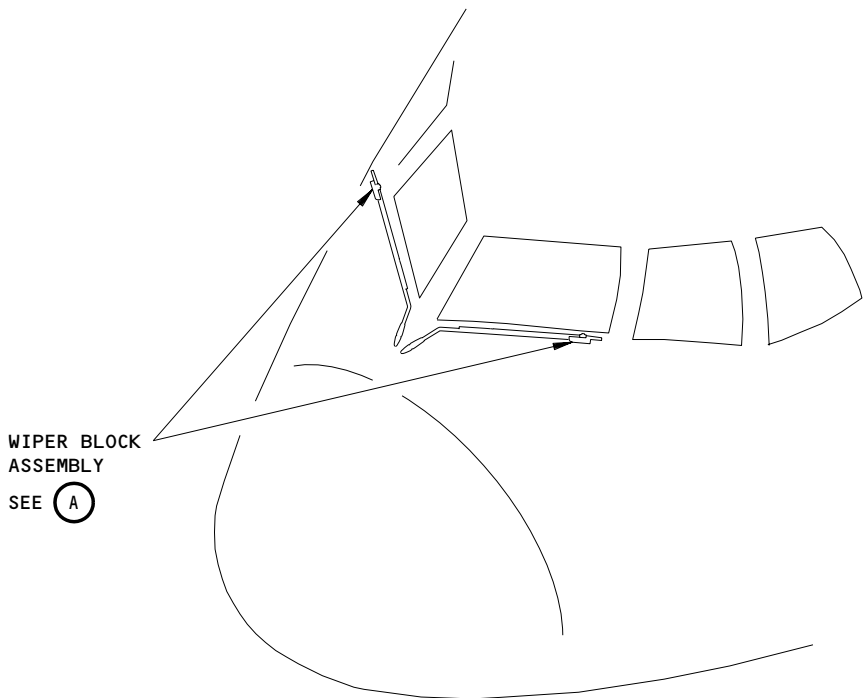
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Windshield Wiper Block Assembly
Figure 403

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S 864-005

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THESE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (4) Open these circuit breakers on the left misc electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-006

- (5) Open these circuit breakers on the right misc electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 494-007

- (6) Put a pad between the wiper arm and the airplane structure to give protection to the surface when you remove the blade.

S 024-008

CAUTION: DO NOT LIFT THE WIPER ARM HIGHER THAN NECESSARY. YOU CAN CAUSE DAMAGE TO THE WIPER ARM AND MAKE IT UNSERVICEABLE.

- (7) Remove the stop nut and the wiper blade and let the teflon washer stay in position on the wiper arm attach pin. Lower the arm onto the pad.

NOTE: Keep the stop nut for installation.

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TASK 30-42-03-404-009

3. Install the Windshield Wiper Blade

A. General

- (1) No adjustment is necessary when you install a wiper blade. Always install the wiper blades with the wiper in the parked position.

B. References

- (1) AMM 24-22-00/201, Electrical Power - Control

C. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

D. Procedure (Fig. 401)

S 214-010

- (1) Make sure the teflon washer is in position on the attach pin before you put the wiper blade on the arm.

S 424-011

- (2) Install the wiper blade to the arm with the locknut. Make sure the blade turns freely. Tighten the locknut to 25-32 pound-inches.

NOTE: You can loosen the locknut slightly to make sure the wiper arm and blade moves freely.

S 824-012

- (3) Push the blade lock lever and put the wiper blade parallel to the arm.

S 094-013

- (4) Remove the pad from between the wiper arm and windshield.

S 864-014

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

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S 864-015

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-016

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 864-017

- (8) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 30-42-03-004-018

4. Remove the Windshield Wiper Arm

A. General

- (1) The windshield wiper arm is attached to the serrated motor/converter shaft by a holddown bolt and flat washer. A clamping screw is also installed on the wiper hub fitting to hold the hub tightly to the serrated shaft of the motor/converter.

B. Equipment

- (1) Sealing compound cutting tool - hardware or plexiglass - Commercially available
- (2) Pad to prevent scratches on the windshield - Commercially available
- (3) Arm Unloading Tool, P/N 91-0700-1:
Grimes Aerospace Co.,
550 Route 55,
P.O. Box 247,
Urbana, Ohio 43078-9482

Phone: (513) 652-1431,
Fax: (513) 652-1045

NOTE: The tool can be used to help remove the wiper arm without loosening the pressure adjustment bolt. Use this tool when you will re-install the same wiper arm.

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C. References

- (1) AMM 24-22-00/201, Electrical Power - Control

D. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

E. Procedure (Fig. 401)

S 864-019

- (1) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11T13, WSHLD WIPER L
(b) 11T22, WSHLD WIPER R

S 864-020

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THESE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (2) Open these circuit breakers on the left misc electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
(b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
(c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 864-021

- (3) Open these circuit breakers on the right misc electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
(b) 37E1 OR 37H7, WINDOW HEAT 2L
(c) 37E2 OR 37H6, WINDOW HEAT 3L

S 494-022

- (4) Put a pad between the wiper arm and the windshield to give protection to the windshield surface.

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S 034-023

- (5) Remove the sealing compound from the heads of the screws, the bolts, and the shaft tightening slot on the wiper arm hub.

NOTE: It is not necessary to remove the sealing compound from the pressure adjustment bolt if you will use the Grimes tool.

S 034-024

- (6) Loosen the pressure adjusting bolt or use the Grimes tool P/N 91-0700-1 to unload the arm to help removal.

NOTE: The Grimes tool is useful when you will re-install the same wiper arm.

S 024-025

- (7) Remove the wiper blade.

NOTE: As an alternative procedure, you can remove the arm and blade together.

S 034-027

- (8) Loosen the clamping screw on the wiper arm hub.

S 034-031

- (9) Remove the hub holddown bolt, the flat washer, the wiper arm assembly, and the adjustment sleeve.

TASK 30-42-03-404-032

5. Install the Windshield Wiper Arm

A. Equipment

- (1) Sealing gun - 6-inch length cartridge - commercially available
- (2) Varnish brush - 1 or 2 inch - commercially available
- (3) Spatula - commercially available
- (4) Arm Unloading Tool, P/N 91-0700-1:
Grimes Aerospace Co.,
50 Altair Ave.,
Plymouth CN 06782

NOTE: The tool can be used to help install the wiper arm.

B. Consumable Materials

- (1) A00247 Sealing compound - BMS 5-95, Class B
- (2) B00083 Solvent - Aliphatic Naphtha - TT-N-95

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- (3) D00633 Grease - BMS 3-33 (Preferred)
- (4) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 30-42-00/501, Windshield Wiper System

D. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

E. Procedure

S 864-064

CAUTION: MAKE SURE MOTOR/CONVERTER IS IN THE PARKED POSITION. THE WIPER ARM AND MOTOR CAN BE DAMAGED IF THIS IS NOT DONE.

- (1) Make sure the wiper converter motor shaft is in the park position.
 - (a) If it is necessary, operate the wiper system as follows:
 - 1) Close the circuit breaker for the wiper motor with the wiper arm that is removed.
 - 2) Make sure the circuit breaker for the opposite wiper motor is open.
 - 3) Put the WIPER switch to the LOW position and let it operate for one or two cycles and put the WIPER switch to the OFF position.
 - 4) Open the circuit breaker for the wiper motor of the wiper arm that is being installed.

S 644-033

- (2) Apply grease to the serrations on the hub and on the motor/converter shaft.

S 034-034

- (3) If a new wiper arm is installed, loosen the pressure adjusting bolt on the wiper arm hub.

NOTE: If the Grimes tool was used to remove the wiper arm and the same arm is re-installed, this step is not necessary.

S 424-067

CAUTION: DO NOT LIFT THE WIPER ARM HIGHER THAN NECESSARY. DAMAGE TO THE WIPER ARM CAN OCCUR IF YOU LIFT IT TOO HIGH.

- (4) Do these steps to install the wiper arm (Fig. 401):
 - (a) Install the adjustment sleeve on the motor/converter shaft.
 - (b) Push the blade lock lever down and put the wiper blade parallel to the arm.

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- (c) Hold the wiper arm and blade in a position 2.5 inches (6.35 centimeters) below the lift block (measured between the wiper blade locknut and lift block) and install the wiper arm hub on the motor converter shaft.

CAUTION: DO NOT LIFT THE WIPER ARM HIGHER THAN NECESSARY. DAMAGE TO THE WIPER ARM CAN OCCUR IF YOU LIFT IT TOO HIGH.

- (d) Lift the wiper arm and blade (just enough to go over the lift block) and put them on the lift block (parked position).
- (e) Install the hub holdown bolt and the flat washer.
 - 1) Tighten the hub holdown bolt to 20-30 inch-pounds and lockwire.
- (f) Tighten the clamping screw to 60-100 inch-pounds.
- (g) Tighten the pressure adjusting bolt.

NOTE: If a Grimes tool was used to remove and install the wiper arm, this step is not necessary.

S 094-059

- (5) If the Grimes tool was used to remove and install the wiper arm, remove the tool.

S 094-045

- (6) Remove the pad from between the wiper arm and the windshield.

S 824-046

- (7) Adjust the wiper pressure and do a check of the wiper arm sweep (AMM 30-42-00/501).

NOTE: If the wiper arm does not park or stops on the seal strip, adjust the blade lower on the glass. If the wiper continues to move in the park position after the wiper is off, adjust the wiper blade higher on the glass.

S 394-060

- (8) Do these steps if the pressure adjusting bolt is not covered with sealing compound:
 - (a) Clean the pressure adjustment bolt.
 - 1) Use a varnish brush to apply fresh aliphatic naphtha.
 - 2) Rub the cleaner off with a clean cloth before the cleaner dries.
 - (b) Apply the sealing compound to the head of the pressure bolt.
 - 1) Use a spatula to make the surface smooth and to remove unwanted sealing compound.

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S 394-049

- (9) Apply the sealing compound to fill the shaft tightening slot on the wiper arm hub. Use a spatula to make the bolt recesses in the hub smooth.

S 894-050

- (10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 894-051

- (11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 894-052

- (12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

S 894-053

- (13) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 30-42-03-024-081

6. Remove the Wiper Blade Lift Block Bumper.

A. General

- (1) The wiper lift block bumper is attached to a shield assembly located on the lift block. The wiper blade rest on the lift block assembly while in the park position.

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- B. Equipment
 - (1) Pad to prevent scratches on the windshield - Commercially available
- C. References
 - (1) AMM 24-22-00/201, Electrical Power - Control
- D. Access
 - (1) Location Zones
 - 211/212 Control Cabin - Section 41
- E. Procedure (Fig. 403)

S 844-076

- (1) Supply electrical power to the main AC bused (AMM 24-22-00/201).

S 844-077

- (2) On the pilots overhead panel, P5, set the WIPER switch to the OFF position to put the windshield wipers in the park position.

S 044-078

- (3) Open these circuit breakers on the overhead circuit breaker panel P11, and attach DO-NOT-CLOSE tags:
 - (a) 11T12, Wshld Wiper L
 - (b) 11T22, WSHLD WIPER R

S 414-079

- (4) Put a pad between the wiper arm and the airplane structure to give protection to the surface if needed when you remove the old lift block bumper.

S 024-091

CAUTION: DO NOT LIFT THE WIPER ARM HIGHER THAN NECESSARY. DAMAGE TO THE WIPER ARM CAN OCCUR IF YOU LIFT IT TOO HIGH.

- (5) Remove the block bumper from the shield assembly.

TASK 30-42-03-424-082

7. Install the Wiper Blade Lift Block Bumper

- A. Equipment
 - (1) Pad to prevent scratches on the windshield - Commercially available

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B. Consumable Materials

- (1) Superdrop 1EC-1500 or 1EC-2500
Scott Technical Services
PO Box 670324
Dallas, Texas 75367
- (2) Permabond 200 or 240
Ellsworth Adhesives
W 129 N 10825 Washington Dr.
Germantown, Wisconsin 53022
- (3) Loctite 416
Henkel Corporation
1001 Trout Brook Crossing
Rocky Hill, Connecticut 06067

C. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 30-42-00/501, Windshield Wiper System

D. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

E. Procedure (Fig.403)

S 844-083

- (1) Supply electrical power to the main AC buses (AMM24-22-00/201).

S 044-084

- (2) On the pilot's overhead panel, P5, set the WIPER switch to the off position to put the windshield wipers in the park position.

S 044-085

- (3) Open these circuit breakers on the overhead circuit breaker panel P11, and attach DO-NOT-CLOSE tags:
 - (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

S 414-086

- (4) Put a pad between the wiper arm and the airplane structure to give protection to the surface if needed when you install the lift block bumper.

S 424-092

CAUTION: DO NOT LIFT THE WIPER ARM HIGHER THAN NECESSARY. DAMAGE TO THE WIPER ARM CAN OCCUR IF YOU LIFT IT TOO HIGH.

- (5) Install the lift block bumper to the shield which is attached to the lift block with one of the adhesives listed or equivalent.

NOTE: Make sure to allow the adhesive time to cure.

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- S 024-088
- (6) Remove the pad from between the wiper arm and the airplane structure if installed.
- S 444-089
- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R
- S 864-090
- (8) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WINDSHIELD RAIN REPELLENT SYSTEM – DESCRIPTION AND OPERATION

1. General

A. The rain repellent system applies rain repellent fluid to the captain's and/or first officer's No. 1 window. The rain repellent fluid makes a protective layer that keeps water off the windshield. System components include the windshield wiper/rain repellent control panel, solenoid valves, rain repellent container, pressure gage, and accumulator. The system uses main left and right 28-volt DC power, through circuit breakers on the overhead circuit breaker panel, P11.

NOTE: The rain repellent system is deactivated on some airplanes. These airplanes can have a hydrophobic coating that is applied to the No. 1 flight compartment windows.

B. AIRPLANES WITH HYDROPHOBIC COATING ON THE WINDSHIELD;

The rain repellent system consists of a hydrophobic coating applied to the number 1 window. No pilot actions are necessary to operate the system.

(1) Periodic maintenance is necessary to test and restore the coating on the windshield surface (AMM 30-43-00/201).

2. Component Details (Fig. 1)

A. Windshield Wiper/Rain Repellent Control Panel

(1) The windshield wiper/rain repellent control panel, M10023, is on the pilot's overhead panel, P5. The control panel contains two switches to control the rain repellent system and one switch to control the windshield wipers.

B. Solenoid Valves

(1) Two electrically operated solenoid valves control the flow of rain repellent fluid to the No. 1 windows. The solenoid valves are forward of the pilot's center panel, P2, on the two sides of the airplane centerline.

C. Rain Repellent Container

(1) A pressurized rain repellent container is on the flight deck partition, aft of the first observer's seat. Replace the container when it is empty.

(a) The fluid in the container P/N 10-38196-5 has a citric scent.

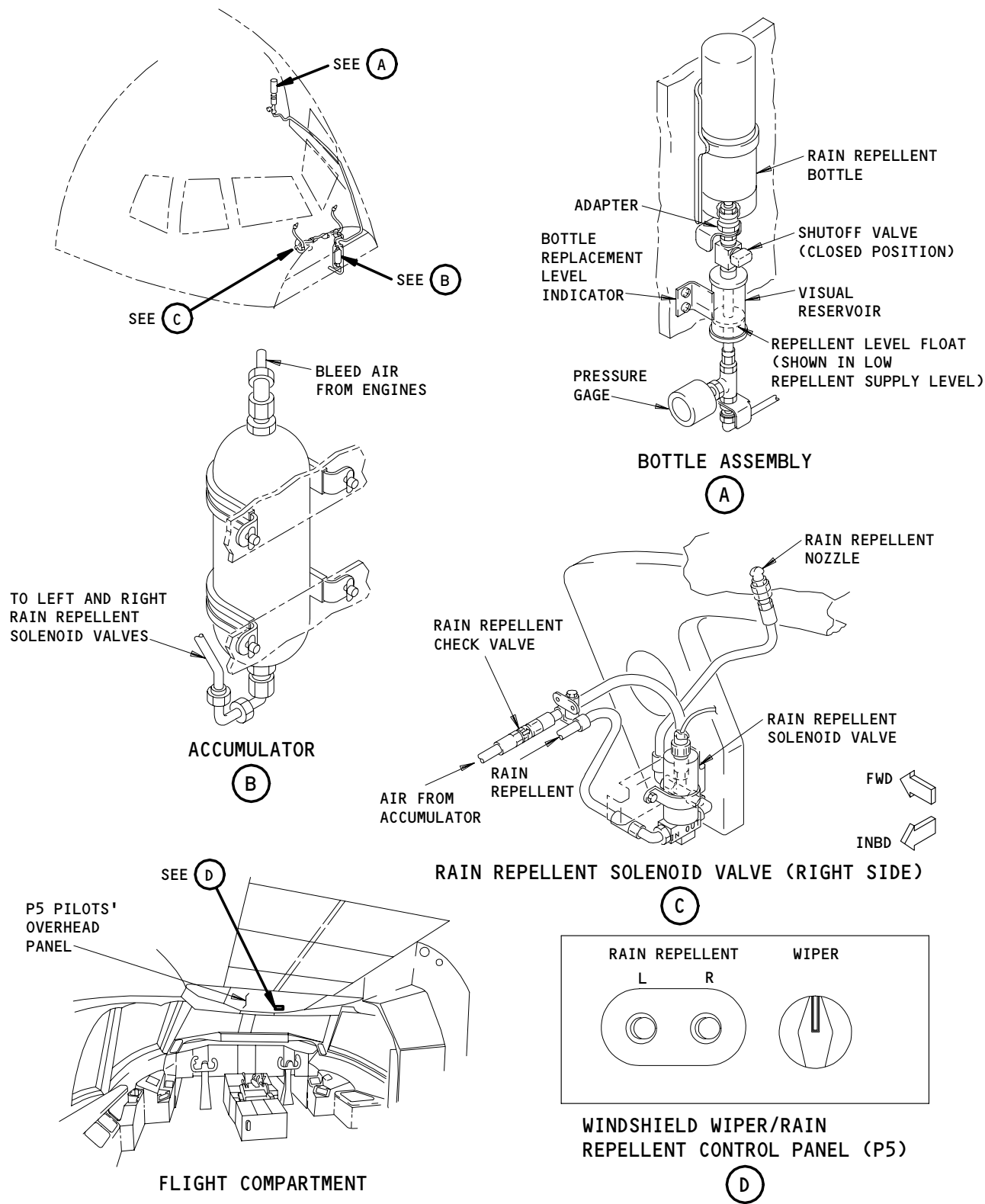
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Rain Repellent System - Component Location
Figure 1

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D. Pressure Gage

- (1) A pressure gage indicates when it is necessary to replace the rain repellent container. The pressure gage is on the flight deck partition, aft of the first observer's seat, under the rain repellent container.

E. Accumulator

- (1) An accumulator is installed to prevent flow back of rain repellent fluid into the pneumatic system if there is a check valve failure. The accumulator is forward of the pilot's center instrument panel, left of the airplane centerline.

3. Operation (Fig. 2)

A. Functional Description

- (1) The windshield wiper/rain repellent control panel, M10023, contains two RAIN REPELLENT switches. The switches control the flow of rain repellent fluid to the No. 1 windows. The switches are momentary-action type, and are identified L and R. Push a switch once to operate the applicable rain repellent system. The wiper blades spread the rain repellent fluid on the window.
- (2) The rain repellent fluid is in a pressurized rain repellent bottle on the aft wall of the flight compartment. Replace the rain repellent bottle when it is empty. A shutoff valve where the bottle connects to the rain repellent system is usually open but is not open for maintenance or bottle replacement.
 - (a) The fluid in the container P/N 10-38196-5 has a citric scent.
- (3) A pressure gage and visual reservoir are installed downstream of the bottle and shutoff valve. The pressure gage shows the pressure of the rain repellent bottle. The visual reservoir shows the fluid level at which you must replace the rain repellent bottle.
- (4) The visual reservoir is made of a translucent material and contains a repellent level float that is free to move on top of the repellent fluid. As the supply of rain repellent fluid falls into the visual reservoir, you can easily see the float. Replace the bottle when the float falls to the mark on the bottle replacement level indicator that is adjacent to the reservoir. If the visual reservoir is completely full of fluid, the float will be at the top of the reservoir. If the reservoir is completely empty of fluid, the float will be at the bottom of the reservoir. Most floats are black, but some are red or blue.
- (5) The pressure of the fluid container pushes the rain repellent fluid onto the windows. A pressure gage below the reservoir monitors the pressure. The pressure gage indicates satisfactory operating pressure when the pointer shows in the green band. When the pointer shows in the yellow band, the system pressure is too low. Use the pressure gage to find containers which do not have a charge or which are almost discharged.
- (6) Aluminum tubes supply rain repellent fluid from the pressure gage, along the flight compartment sidewall, to a T-connection behind the pilot's instrument panel. The T-connection supplies rain repellent fluid to each windshield's rain repellent valve. A tube goes from each valve to the spray nozzle. The spray nozzles are below the No. 1 windows, inboard of the windshield wipers.

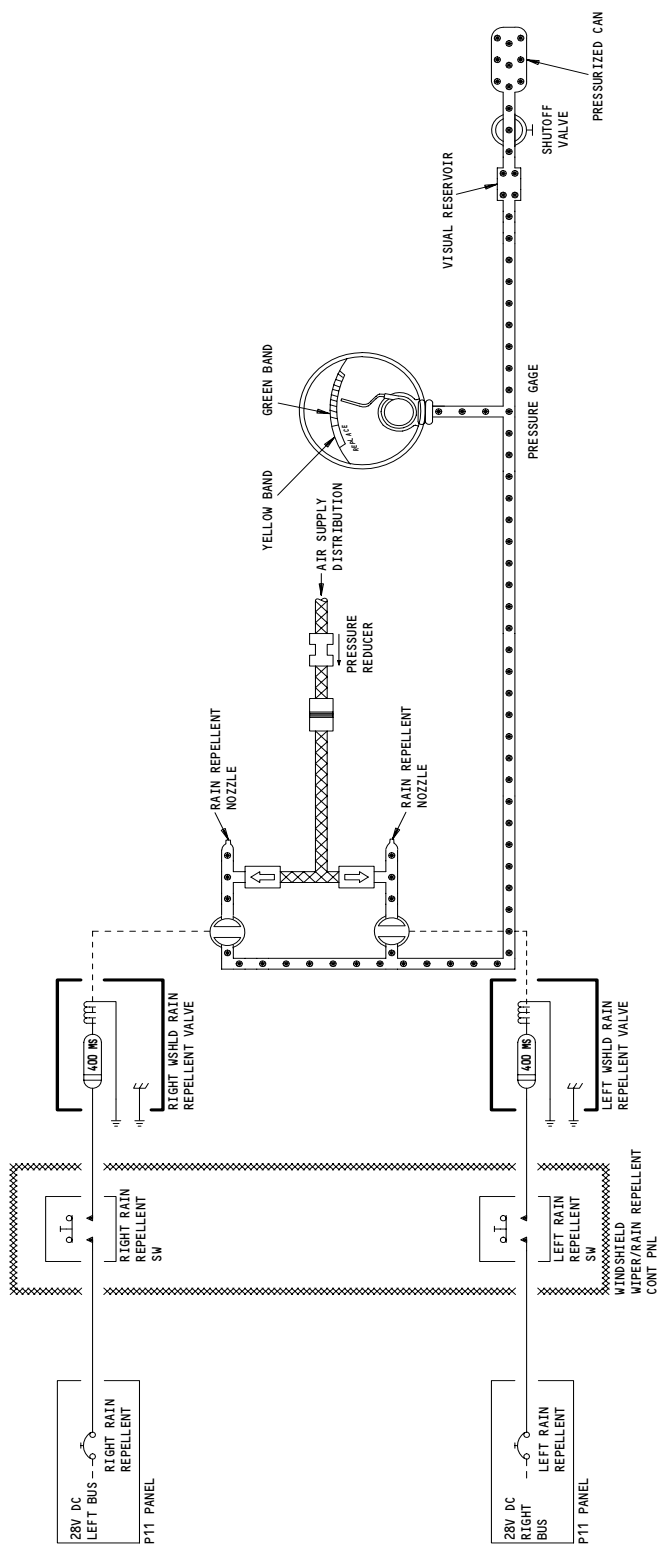
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Windshield Rain Repellent System Schematic
Figure 2

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- (7) When you push a window's REPEL button, 28-volts DC opens the rain repellent valve. Rain repellent fluid flows to the spray nozzles and onto the windows. To control the quantity of the rain repellent fluid, a time delay circuit in the valve closes the valve after 0.4 second.
 - (8) Each tube that goes to the spray nozzles is attached by an air hose. Engine bleed air does not let the rain repellent fluid clog the tube and spray nozzles. An accumulator does not let the rain repellent fluid flow back into the pneumatic system if there is a check valve failure.
 - (9) The check valves keep the pressurized rain repellent fluid out of the air tubes.
- B. Control
- (1) To put the system in operation, supply electrical power to the main AC buses (AMM 24-22-00/201).
 - (2) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) RAIN REPEL R
 - (b) RAIN REPEL L

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WINDSHIELD RAIN REPELLENT SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACCUMULATOR - WINDSHIELD RAIN REPELLENT	2	1	FLT COMPT, BEHIND P1 PANEL	30-43-04
BOTTLE - RAIN REPELLENT	1	1	FLT COMPT, ON WALL BEHIND CAPT	30-43-00
CIRCUIT BREAKERS			FLT COMPT, P11	
RAIN REPEL L, C1145		1	11T21	*
RAIN REPEL R, C1136		1	11T12	*
GAGE - PRESSURE	1	1	FLT COMPT, ON WALL BEHIND CAPT	30-43-00
NOZZLE - SPRAY	2	2	FLT COMPT, BEHIND P1,P2,P3 PANELS	30-43-01
PANEL - (REF 30-42-00, FIG. 101) WINDSHIELD WIPER/RAIN REPELLENT CONTROL, M10023				
RESERVOIR - VISUAL	1	1	FLT COMPT, ON WALL BEHIND CAPT	30-43-00
SWITCH - L WINDSHIELD RAIN REPELLENT, S2	3	1	FLT COMPT, P5, WINDSHIELD WIPER/ RAIN REPELLENT CONTROL PANEL M10023	*
SWITCH - R WINDSHIELD RAIN REPELLENT, S3	3	1	FLT COMPT, P5, WINDSHIELD WIPER/ RAIN REPELLENT CONTROL PANEL M10023	*
VALVE - CHECK	2	2	FLT COMPT, BEHIND P1,P2,P3 PANELS	30-43-03
VALVE - L WINDSHIELD RAIN REPELLENT SOLENOID, V27	2	1	FLT COMPT, BEHIND P1,P2,P3 PANELS	30-43-02
VALVE - R WINDSHIELD RAIN REPELLENT SOLENOID, V28	2	1	FLT COMPT, BEHIND P1,P2,P3 PANELS	30-43-02

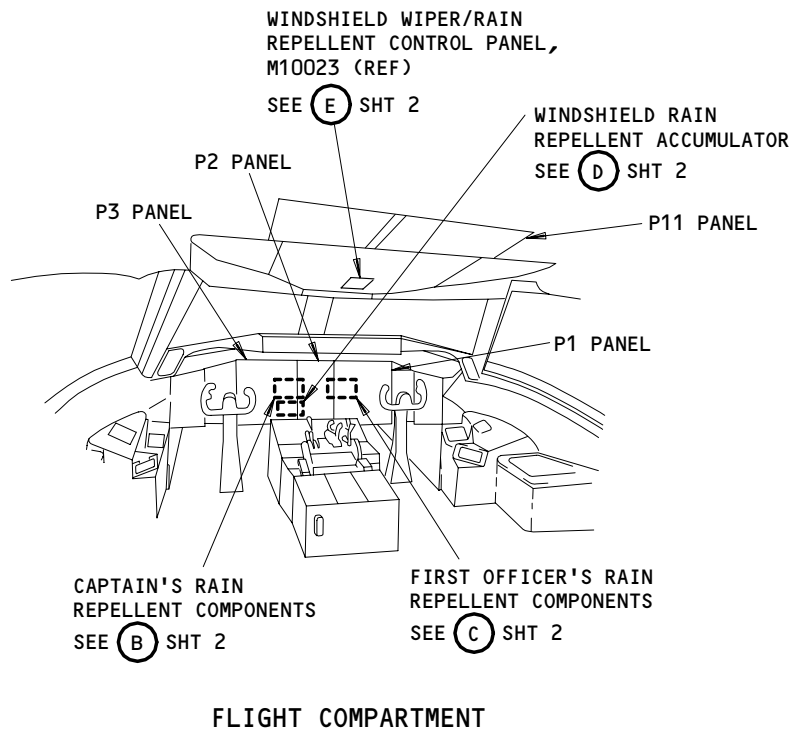
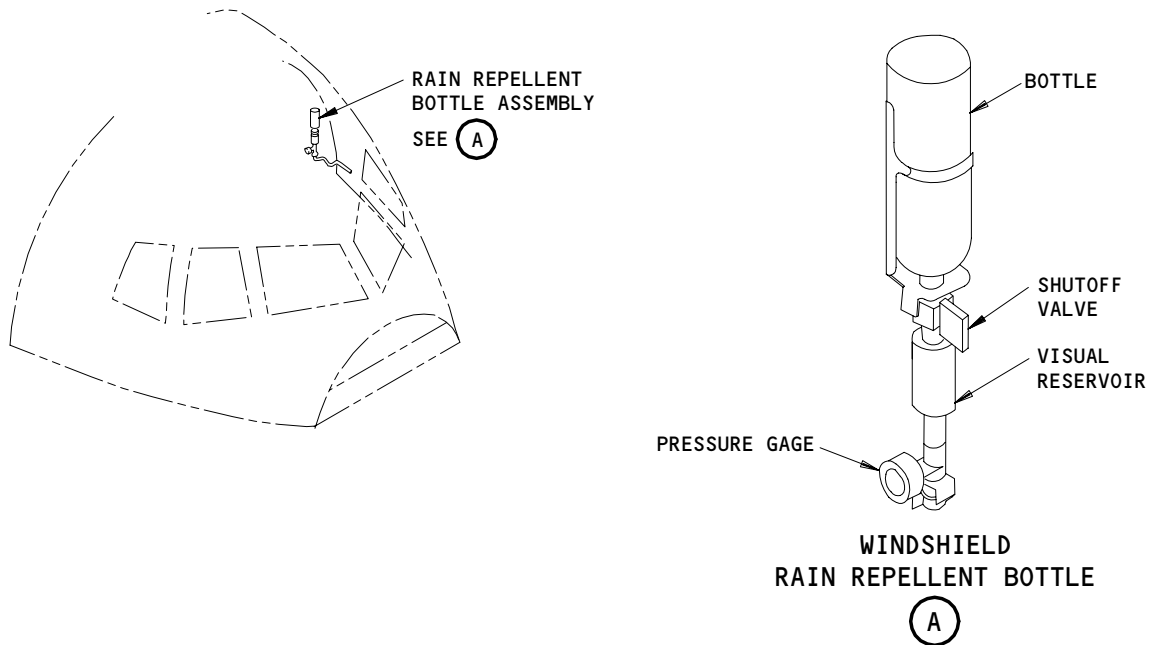
* SEE THE WDM EQUIPMENT LIST

Windshield Rain Repellent System - Component Index
Figure 101

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AIRPLANES WITH RAIN REPELLENT SYSTEM

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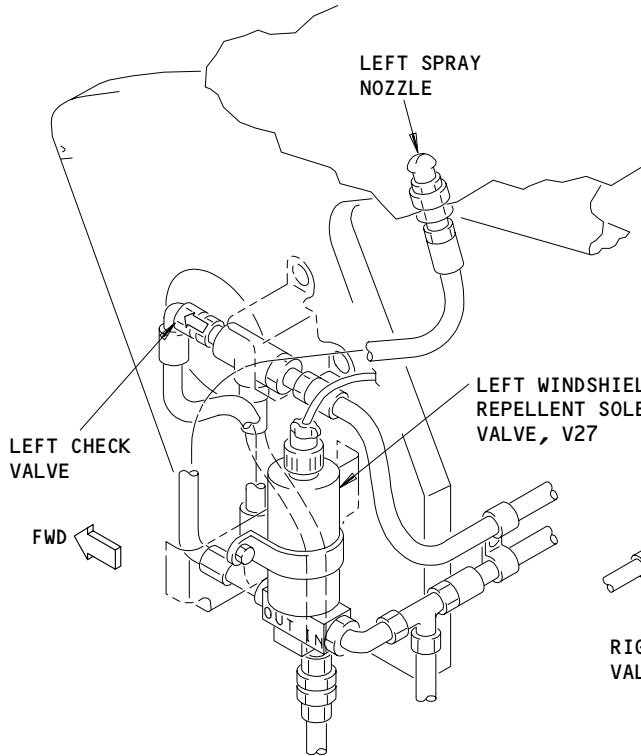
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Windshield Rain Repellent System - Component Location
Figure 102 (Sheet 1)

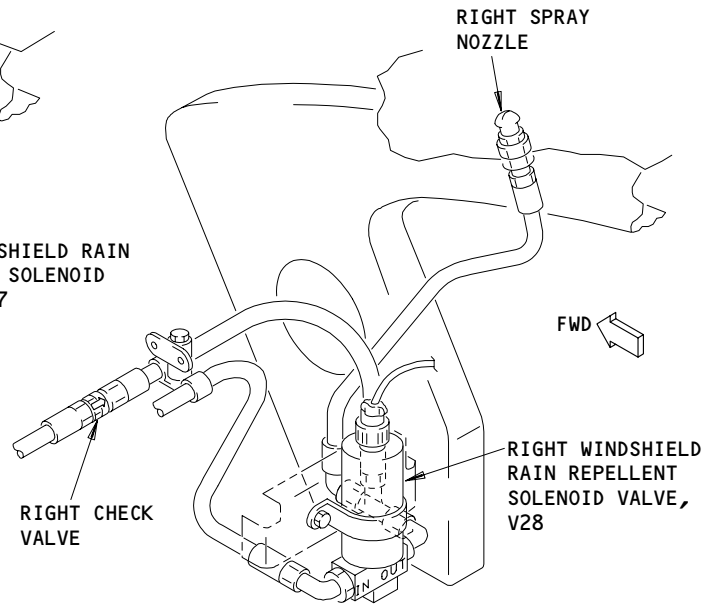
EFFECTIVITY
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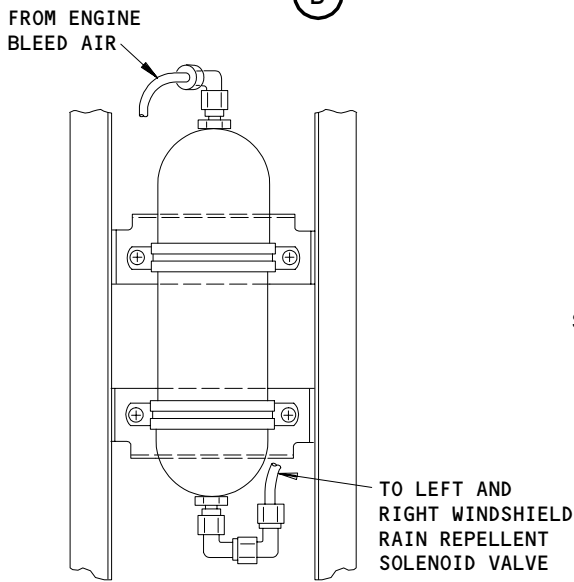
CAPTAIN'S RAIN REPELLENT COMPONENTS

(B)



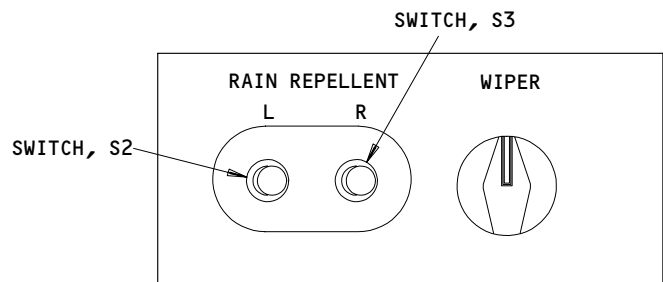
FIRST OFFICER'S RAIN REPELLENT COMPONENTS

(C)



WINDSHIELD RAIN REPELLENT ACCUMULATOR

(D)



WINDSHIELD WIPER/RAIN REPELLENT CONTROL PANEL, M10023 (REF)

(E)

Windshield Rain Repellent System - Component Location (Details from Sht 1)
Figure 102 (Sheet 2)

EFFECTIVITY
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WINDSHIELD RAIN REPELLENT SYSTEM – MAINTENANCE PRACTICES

1. General

- A. This procedure contains two tasks. The first task is the flushing of rain repellent system. The second task is an operational test of the rain repellent system.

TASK 30-43-00-102-001-001

2. Flushing the Rain Repellent System

A. General

- (1) This task can be used to flush the tubing in the rain repellent system and it can be used to prepare the airplane for prolonged parking or storage.
- (a) If this task is being used to prepare the airplane for prolonged parking or storage, do not do the operational test of the rain repellent system at the end of the task.
- 1) The test will let rain repellent fluid remain in the tubing while the airplane is parked or stored.

B. Equipment

- (1) Cleaning Tank Assembly – B30002.
(2) Dry air source – to provide 100 psig
(3) Plastic Bags – clear, fluid-tight
(4) Test Equipment, Windshield Rain Repellent System – B30001-7
(5) Nitrogen (commercial source)

C. Consumable Materials

- (1) B00037 Solvent – Freon TF or
B00090 Solvent – 1 1 1 Trichloroethane, MIL-T-81533A

D. References

- (1) AMM 12-16-01/301, Rain Repellent Bottle
(2) AMM 12-25-01/301, Exterior Airplane Cleaning
(3) AMM 24-22-00/201, Electrical Power – Control
(4) AMM 36-00-00/201, Ground Pneumatic source.
(5) AMM 49-11-00/201, Auxiliary Power Unit

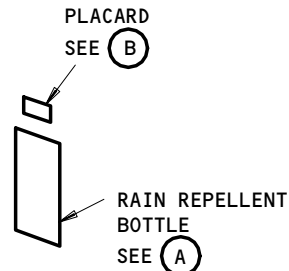
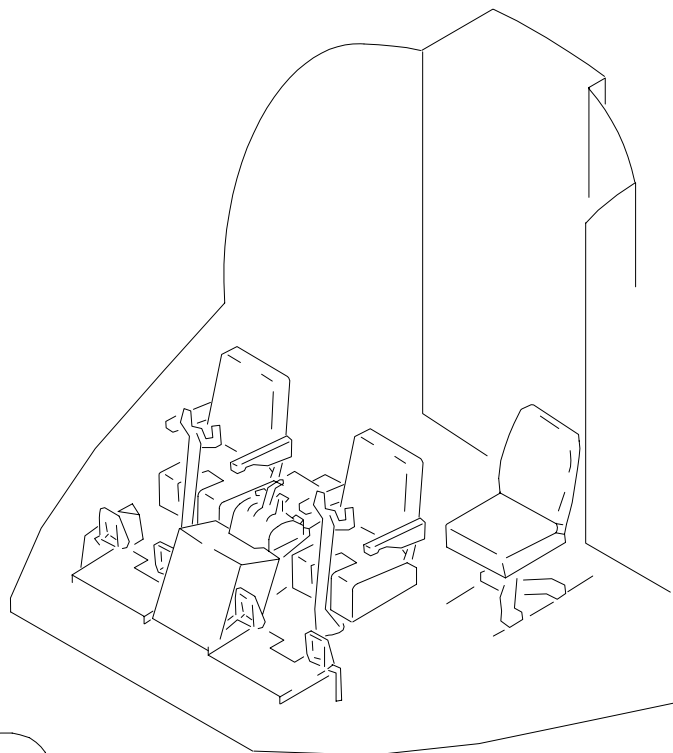
E. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

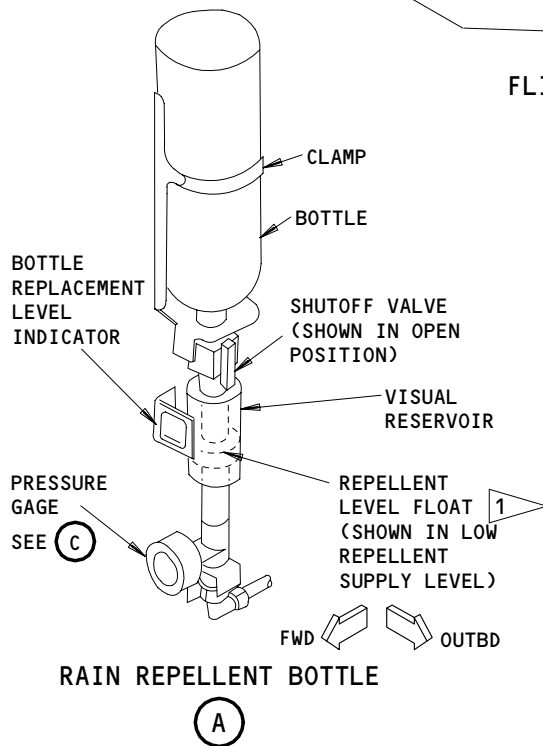
F. Prepare to Flush

S 842-074-001

- (1) Fill the fluid container with 0.5 quart of the solvent.
- (a) Pressurize the fluid container with nitrogen to 50 ±5 psig at
70 ±5°F (21 ±2.8°C).

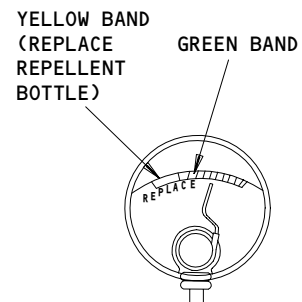


FLIGHT COMPARTMENT



CAUTION
TIGHTEN RAIN REPELLENT CAN INTO SYSTEM FINGER TIGHT. TORQUE IS NOT REQUIRED FOR SEALING. EXCESSIVE TORQUE MAY CAUSE LEAKAGE.
BAC27TFDE0022

PLACARD



PRESSURE GAGE



1 YOU WILL SEE THE REPELLENT LEVEL FLOAT AT THE BOTTOM OF VISUAL RESERVOIR IF THERE IS NO REPELLENT FLUID. FLOAT WILL BE AT TOP OF VISUAL RESERVOIR IF REPELLENT SUPPLY IS FULL

**Rain Repellent Bottle
Figure 201**

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

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S 212-003-001

- (2) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) 11T21, RAIN REPEL L
 - (b) 11T12, RAIN REPEL R

S 862-004-001

- (3) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 862-005-001

- (4) Start the APU (AMM 49-11-00/201), or supply ground pneumatic source (AMM 36-00-00/201).

S 492-006-001

- (5) Install the fluid-tight plastic bags around the two rain repellent nozzles to collect the repellent fluid.

S 862-007-001

- (6) Turn the rain repellent shutoff valve to the closed (horizontal) position.

S 092-027-001

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

CAUTION: IF REPELLENT FLUID TOUCHES THE AIRPLANE SKIN OR GLASS, CLEAN THE SURFACE IMMEDIATELY (AMM 12-25-01/301). REPELLENT FLUID CAN CAUSE STAINS ON THE SKIN OR GLASS.

- (7) Release the bottle clamp and remove the rain repellent bottle from the receptacle.

G. Flush the Rain Repellent System (Fig. 201)

S 492-029-001

- (1) Connect the test equipment to the rain repellent bottle receptacle.

S 492-079-001

- (2) Connect the dry air source to the test equipment.

S 492-030-001

- (3) Set the dry air source to supply air at 100 psi.

S 212-011-001

- (4) If the APU is the source of pneumatic air, Push the APU VALVE switch-light on the air supply module, M15, to ON.

NOTE: The M15 panel is on the pilots' overhead panel, P5.

- (a) Make sure the white bar light in the switch comes on.

S 212-069-001

CAUTION: DO NOT OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR. IF YOU OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR, THE SYSTEM CAN BECOME CLOGGED.

- (5) Make sure there is a strong flow of air at the rain repellent nozzles.

S 862-031-001

- (6) Turn the rain repellent shutoff valve to the open (vertical) position.

S 112-032-001

- (7) Push the RAIN REPELLENT L and R switches until fluid does not flow from the nozzles. It can be necessary to push each switch more than 20 times.

NOTE: If solvent touches the airplane skin and glass, it is not necessary to clean the airplane skin and glass.

S 862-033-001

- (8) Turn the rain repellent shutoff valve to the closed (horizontal) position.

- (a) If the APU is the source of pneumatic air, push the APU VALVE switch-light on the air supply module (on P5) to OFF.

(b) Stop the APU (AMM 49-11-00/201), or turn off the ground pneumatic source (AMM 36-00-00/201).

S 092-034-001

(9) Set the dry air source off.

S 092-035-001

(10) Remove the dry air source from the test equipment fitting.

S 092-036-001

(11) Remove the test equipment from the rain repellent bottle receptacle.

S 862-037-001

(12) Slowly turn the rain repellent shutoff valve to the open (vertical) position.

S 862-038-001

(13) Turn the rain repellent shutoff valve to the closed (horizontal) position.

S 422-039-001

CAUTION: TIGHTEN THE RAIN REPELLENT BOTTLE WITH YOUR FINGERS ONLY. TOO MUCH TORQUE CAN CAUSE LEAKAGE.

(14) Install a rain repellent bottle and tighten it with your hands (AMM 12-16-01/301).

(a) Make sure you install a bottle with an approved rain repellent fluid and not the container that contains the solvent.

S 432-040-001

(15) Tighten the bottle clamp.

S 862-041-001

(16) Turn the rain repellent shutoff valve to the open (vertical) position.

(a) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 712-042-001

(17) Do the operational test of the rain repellent system.

TASK 30-43-00-712-043-001

3. Rain Repellent System - Operational Test

A. Equipment

- (1) Water Source - to make the windshield wet for the test
- (2) Plastic bags - clear, fluid-tight

B. References

- (1) AMM 12-16-01/301, Rain Repellent Bottle
- (2) AMM 12-25-01/301, Exterior Airplane Cleaning

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- (3) AMM 24-22-00/201, Electrical Power - Control
- (4) AMM 36-00-00/201, Ground Pneumatic Source.
- (5) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

D. Prepare for Test

S 862-044-001

- (1) Supply electrical power to main the AC buses (AMM 24-22-00/201).

S 212-045-001

- (2) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed.
 - (a) 11T21, RAIN REPEL L
 - (b) 11T12, RAIN REPEL R

S 862-046-001

- (3) Start the APU (AMM 49-11-00/201), or supply a ground pneumatic source (AMM 36-00-00/201).

S 212-047-001

- (4) If the APU is the source of pneumatic air supply, push the APU VALVE switch-light on the air supply module, M15, to ON.

NOTE: The M15 panel is on the pilots' overhead panel, P5.

- (a) Make sure the white bar light in the switch comes on.

S 212-070-001

CAUTION: DO NOT OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR. IF YOU OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR, THE SYSTEM CAN BECOME CLOGGED.

- (5) Make sure there is a strong flow of air at the rain repellent nozzles.

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S 802-049-001

- (6) Use the water source to make the captain's and first officer's No. 1 windows wet.

S 492-067-001

- (7) Install the fluid tight plastic bags around the two rain repellent nozzles to collect the repellent fluid.

E. Procedure

S 212-050-001

- (1) Push the RAIN REPELLENT L switch to make sure repellent fluid comes out of the left nozzle in a continuous flow with no air bubbles.

NOTE: If you purged the system or installed a new rain repellent bottle, it can be necessary to push the switch many times.

S 212-051-001

- (2) Push and hold the RAIN REPELLENT L switch on the P5 panel.
 - (a) Make sure repellent fluid comes out of the four nozzle holes in equal flows.
 - (b) Make sure repellent fluid does not flow from the nozzle after approximately 0.4 second after you push the switch.

S 212-052-001

- (3) Do the last step again, if necessary.

S 862-053-001

- (4) Release the RAIN REPELLENT L switch.

S 212-054-001

- (5) Push the RAIN REPELLENT R switch to make sure the repellent fluid comes out of the right nozzle in a continuous flow.

S 212-055-001

- (6) Push and hold the RAIN REPELLENT R switch on the P5 panel.
 - (a) Make sure repellent fluid flows out of the four nozzle holes in equal flows.
 - (b) Make sure repellent fluid does not flow from the nozzle after approximately 0.4 second after you push the switch.

S 212-056-001

- (7) Do the last step again, if necessary.

S 862-057-001

- (8) Release the RAIN REPELLENT R switch.

S 112-058-001

CAUTION: DO NOT LET REPELLENT FLUID STAY ON THE AIRPLANE SKIN AND GLASS.
REPELLENT FLUID CAN CAUSE STAINS.

- (9) Immediately and fully clean the airplane skin and windows
(AMM 12-25-01/301).

S 092-071-001

- (10) Remove the plastic bags from the rain repellent nozzles.

S 212-059-001

- (11) Make sure no leakage is found under the captain's instrument panel,
P1, or the first officer's instrument panel, P3.

S 212-060-001

- (12) Make sure no leakage occurs around the rain repellent bottle or
receptacle.

S 212-061-001

- (13) Make sure the rain repellent level is above replacement level in the
sight gage.
(a) Replace the rain repellent bottle if necessary
(AMM 12-16-01/301).

S 212-062-001

- (14) Make sure the repellent fluid pressure gage indicator gives an
indication in the green band.
(a) Replace the rain repellent bottle if necessary
(AMM 12-16-01/301).

S 862-063-001

- (15) If the APU is the source of pneumatic air, push the APU VALVE
switch-light on the air supply module (on P5) to OFF.

S 862-065-001

- (16) Stop the APU (AMM 49-11-00/201), or turn off the ground pneumatic
source (AMM 36-00-00/201).

S 862-066-001

- (17) Remove electrical power if it is not necessary
(AMM 24-22-00/201).

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WINDSHIELD RAIN REPELLENT SYSTEM – MAINTENANCE PRACTICES

1. General

- A. This procedure lists the equipment necessary to test and reapply the hydrophobic coating.
- B. A vendor kit is necessary to do this procedure.

TASK 30-43-00-302-001-002

2. Hydrophobic Coating Maintenance Practices

A. General

- (1) The maintenance procedures for the hydrophobic coating are contained in the Master Kit listed below.

B. References

NOTE: These references are in the Master Kit.

- (1) Maintenance Assessment, Application Procedures for Boeing Aircraft Models
(P/N DSS 1022)
- (2) Coating-Efficiency Assessment – Video Tape
(P/N DSS 1023)
- (3) Re-application and First Time Application – Video Tape
(P/N DSS 1024)

C. Equipment

- (1) Master Kit Complete
(P/N DSS 1020)

PPG Industries, Inc
Aircraft Products Sales
P.O Box 040004
Huntsville, AL. 35804 USA
FAX 205-851-8822

- (2) Stand – 15 feet minimum

D. Prepare for the Test/Re-application

S 862-008-002

- (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11T13, WSHLD WIPER L
 - (b) 11T22, WSHLD WIPER R

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S 862-009-002

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD WIPER SYSTEM, OPEN THE WINDOW HEAT CIRCUIT BREAKERS ON THE P36 AND P37 PANELS. IF THESE CIRCUIT BREAKERS ARE NOT OPEN DURING MAINTENANCE, PERSONS CAN GET AN ELECTRICAL SHOCK WHEN THEY TOUCH THE WINDSHIELD.

- (2) Open these circuit breakers on the left misc electrical equipment panel, P36, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

- (a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT
- (b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R
- (c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 862-010-002

- (3) Open these circuit breakers on the right misc electrical equipment panel, P37, and attach DO-NOT-CLOSE tags:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

- (a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT
- (b) 37E1 OR 37H7, WINDOW HEAT 2L
- (c) 37E2 OR 37H6, WINDOW HEAT 3L

E. Procedures

NOTE: Use the procedure in the master kit to do these maintenance tasks:

S 162-003-002

- (1) Cleaning Procedure

S 212-004-002

- (2) Coating Efficiency Assessment

S 352-005-002

- (3) Coating Application

F. Return the Airplane to Its Usual Condition

S 862-006-002

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11T13, WSHLD WIPER L

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(b) 11T22, WSHLD WIPER R

S 862-011-002

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P36 panel:

NOTE: These circuit breakers (C391, C1125, C1127) can be in one of these two locations.

(a) 36L5 OR 36H4, ICE/RAIN WINDOW HEAT NO. 1 LEFT

(b) 36H6 OR 36H2, ICE/RAIN WINDOW HEAT 2R

(c) 36H7 OR 36H1, ICE/RAIN WINDOW HEAT 3R

S 862-012-002

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P37 panel:

NOTE: These circuit breakers (C392, C1124, C1126) can be in one of these two locations.

(a) 37D2 OR 37F4, ICE/RAIN WINDOW HEAT NO. 1 RIGHT

(b) 37E1 OR 37H7, WINDOW HEAT 2L

(c) 37E2 OR 37H6, WINDOW HEAT 3L

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WINDSHIELD RAIN REPELLENT NOZZLE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the windshield rain repellent nozzle. The second task is the installation of the windshield rain repellent nozzle.
- B. The windshield rain repellent nozzles are in front of the captain's and first officer's number 1 windows, forward of the windshield wiper arm. The removal/installation procedure is the same for the two units.
- C. In this procedure, the windshield rain repellent nozzle is referred to as the nozzle.

TASK 30-43-01-004-001

2. Remove the Windshield Rain Repellent Nozzle

A. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

B. Procedure

S 864-002

- (1) Open the applicable circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
 - (a) 11T21, RAIN REPEL L (captain's nozzle)
 - (b) 11T12, RAIN REPEL R (first officer's nozzle)

S 034-003

- (2) Loosen the check nut on the nozzle assembly.

S 024-004

- (3) Remove the nozzle.

TASK 30-43-01-404-005

3. Install the Windshield Rain Repellent Nozzle

A. Equipment

- (1) Water Source – to make the windshield wet

(2) Plastic bas - Clear, fluid tight

B. References

- (1) AMM 12-16-01/301, Rain Repellent Bottle
- (2) AMM 12-25-01/301, Exterior Airplane Cleaning
- (3) AMM 24-22-00/201, Electrical Power - Control
- (4) AMM 36-00-00/201, Ground Pneumatic Source
- (5) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

D. Procedure

S 434-006

- (1) Put the check nut on the nozzle assembly.

NOTE: The captain's and first officer's nozzles are different. The captain's nozzle has an L on top of the unit directly across from the spray holes. The first officer's nozzle has an R. Failure to install the correct nozzle will cause an incorrect spray pattern.

S 424-007

- (2) Install the nozzle. Put the slot parallel to the window sill with spray holes to the window.

S 434-008

- (3) Tighten the check nut.

S 864-009

- (4) Remove the DO-NOT-CLOSE tag and close the applicable circuit breaker on the overhead circuit breaker panel, P11:
 - (a) 11T21, RAIN REPEL L (captain's nozzle)
 - (b) 11T12, RAIN REPEL R (first officer's nozzle)

S 724-010

- (5) Do a test of the nozzle installation.
 - (a) Supply electrical power to the main AC buses (AMM 24-22-00/201).

- (b) Start the APU (AMM 49-11-00/201), or supply ground pneumatic source (AMM 36-00-00/201).
- (c) If the APU is the source of pneumatic air supply, push the APU VALVE switch-light on air supply module, M15, to ON.

NOTE: The M15 panel is on pilot's overhead panel, P5.

- 1) Make sure the white bar light in switch comes on.

CAUTION: DO NOT OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR. IF YOU OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR, THE SYSTEM CAN BECOME CLOGGED.

- (d) Make sure there is a strong flow of air at the rain repellent nozzles.
- (e) Use the water source to make the captain's and first officer's No. 1 windows wet.
- (f) Install the fluid-tight plastic bags around the two rain repellent nozzles to collect the repellent fluid.
- (g) If you replaced the captain's nozzle, push the RAIN REPELLENT L switch on windshield wiper/rain repellent control panel, M10023.
- (h) If you replaced the first officer's nozzle, push the RAIN REPELLENT R switch on windshield wiper/rain repellent control panel, M10023.
- (i) Make sure sufficient repellent fluid comes out of the four nozzle holes in equal flows.
- (j) Look for signs of leakage around the nozzle assembly.
- (k) Remove the water source.

CAUTION: DO NOT LET REPELLENT FLUID STAY ON THE AIRPLANE SKIN AND GLASS. REPELLENT FLUID CAN CAUSE STAINS.

- (l) Remove the plastic bags from the rain repellent nozzles.
- (m) Immediately and fully wash airplane skin and windows (Ref 12-25-01).
- (n) Make sure that there is a strong flow of air at the rain repellent nozzles.
- (o) Make sure the rain repellent level is above replacement level in the sight gage.
 - 1) Replace the bottle if necessary (AMM 12-16-01/301).
- (p) Make sure the repellent fluid pressure gage indicator gives an indication in the green band.
 - 1) Replace the bottle if necessary (AMM 12-16-01/301).
- (q) If the APU is the source of the pneumatic air supply, push the APU VALVE switch-light on the air supply module M15 (on P5) to OFF.
- (r) Stop the APU, or turn off the ground pneumatic source.
- (s) Remove electrical power if it is not necessary (AMM 24-22-00/201) .

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-01

WINDSHIELD RAIN REPELLENT SOLENOID VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the rain repellent solenoid valve. The second task is the installation of the rain repellent solenoid valve.
- B. Two rain repellent solenoid valves, one for each windshield, are behind the forward instrument panels.
- C. In this procedure, the rain repellent solenoid valve is referred to as the solenoid valve.

TASK 30-43-02-004-016

2. Remove the Rain Repellent Solenoid Valve (Fig. 401)

- A. Equipment
 - (1) Plastic Bags – clear, fluid-tight
- B. References
 - (1) AMM 12-25-01/301, Exterior Airplane Cleaning
 - (2) AMM 24-22-00/201, Electrical Power – Control
 - (3) AMM 27-61-00/201, Spoiler/Speedbrake Control System
 - (4) AMM 36-00-00/201, Pneumatic – General
 - (5) AMM 49-11-00/201, Auxiliary Power Unit
- C. Access
 - (1) Location Zones
 - 211/212 Control Cabin – Section 41
- D. Prepare for Removal

S 864-001

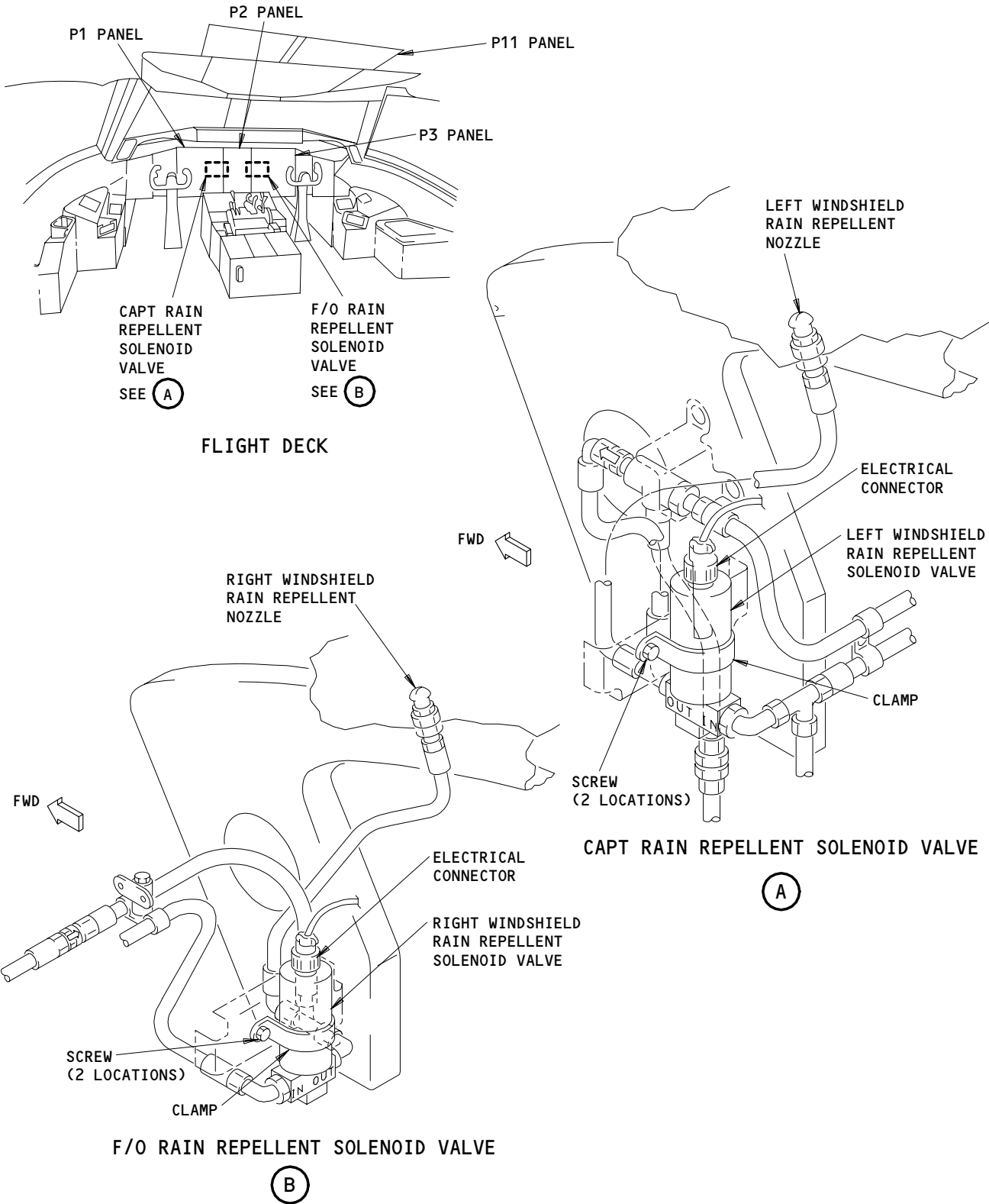
- (1) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 864-041

CAUTION: DO NOT OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR. OPERATING THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR CAN CAUSE THE SYSTEM TO BECOME CLOGGED.

- (2) Start the APU (AMM 49-11-00/201), or supply ground pneumatic source (AMM 36-00-00/201).
 - (a) If the APU is the source of the pneumatic air supply, push the APU VALVE switch-light on the M15 air supply module to ON.

NOTE: The M15 panel is on pilots' overhead panel P5.



Windshield Rain Repellent Solenoid Valve Installation
Figure 401

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-02

(b) Make sure the white bar light in the switch is on.

S 214-042

(3) Make sure there is a strong flow of air at the rain repellent nozzles.

S 214-005

(4) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:

(a) 11T12, RAIN REPEL R

(b) 11T21, RAIN REPEL L

S 494-006

(5) Install fluid-tight bags on the rain repellent nozzles.

S 864-007

(6) Turn the rain repellent shutoff valve to the closed (horizontal) position.

S 874-008

(7) Push the RAIN REPELLENT L and R switches on the M10023 windshield wiper/rain repellent control panel until fluid does not flow from the nozzles.

NOTE: The M10023 panel is on P5. You will have to push the switch many times. Permit a minimum of 30 seconds after you push the switch for APU bleed air to make the nozzles clear of remaining fluid.

S 214-009

(8) If the APU is the source of pneumatic air supply, push the APU VALVE APU VALVE switch-light on the M15 (air supply module) on P5 panel to OFF.

(a) Make sure the white bar light in the switch is off.

S 864-011

(9) Stop the APU, or turn off the pneumatic ground source (AMM 36-00-00/201).

S 864-012

- (10) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11R5, IND LTS DIM CONT (C1309)
 - (b) 11A32, IND LIGHTS TEST (C1307)
 - (c) 11A33, IND LIGHTS 1 (C1306)
 - (d) 11A34, IND LIGHTS 2 (C1308)
 - (e) 11A35, IND LIGHTS 3 (C1200)
 - (f) 11R1, L IND LTS 1 (C1293)
 - (g) 11R2, L IND LTS 2 (C1297)
 - (h) 11R3, L IND LTS 3 (C1298)
 - (i) 11R28, R IND LTS 1 (C1273)
 - (j) 11R29, R IND LTS 2 (C1274)
 - (k) 11R30, R IND LTS 3

S 864-013

WARNING: REFER TO AMM 27-61-00/201 FOR THE APPLICABLE SPOILER/SPEEDBRAKE DEACTIVATION PROCEDURE. ACCIDENTAL SPOILER MOVEMENT CAUSED BY THE SUBSEQUENT STEP COULD CAUSE INJURY.

- (11) Remove electrical power from the main AC buses (AMM 24-22-00/201).

NOTE: External power can supply ground service and/or ground handling buses during removal/installation.

S 864-014

- (12) Set the STBY POWER switch on pilots' overhead panel, P5, to OFF.
E. Procedure

S 014-017

- (1) To get access to the left solenoid valve, remove the captain's instrument panel, P1-3.

S 014-018

- (2) To get access to the right solenoid valve, remove the first officer's instrument panel, P3-1.

S 804-019

CAUTION: PUT A CLOTH IN POSITION TO SOAK UP REPELLENT FLUID THAT FALLS FROM DISCONNECTED LINES. REPELLENT FLUID CAN STAIN AND CAUSE CORROSION.

(3) Put a cloth under the solenoid valve.

S 034-020

(4) Remove the electrical connector from the solenoid valve.

S 034-021

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

(5) Disconnect the two tubes from the solenoid valve. Loosen each nut that connects the solenoid valve to the tubes.

S 804-022

(6) Discard the O-rings. Save nuts and washers.

S 024-023

(7) Loosen the two screws that attach the valve clamp. Move the solenoid valve out of the clamp.

S 084-040

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

CAUTION: IF REPELLENT FLUID TOUCHES THE AIRPLANE SKIN OR GLASS, CLEAN THE SURFACE IMMEDIATELY (AMM 12-25-01/301). REPELLENT FLUID CAN STAIN SKIN OR GLASS.

(8) Remove the plastic bags from the rain repellent nozzles.

TASK 30-43-02-404-024

3. Install the Solenoid Valve (Fig. 401)

A. Consumable Materials

(1) D00062 Lubricant - rubber to metal parts,
pneumatic system thread MIL-G-4343 grease

B. References

(1) AMM 30-43-00/201, Rain Repellent System

C. Access

(1) Location Zones
211/212 Control Cabin

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AIRPLANES WITH RAIN REPELLENT SYSTEM

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D. Procedure

S 424-025

- (1) Move the solenoid valve into the valve clamp.
 - (a) If you install the left solenoid valve, point the "out" indication on the valve forward.
 - (b) If you install the right solenoid valve, point the "out" indication on the valve outboard.

S 434-026

- (2) Put the solenoid valve in a position that lets you connect the tubes.

S 434-039

- (3) Tighten the two screws that attach the valve clamp.

S 644-027

- (4) Lubricate the new O-rings with MIL-G-4343 lubricant.

S 434-028

- (5) Install the washer and O-ring on each rain repellent tube fitting.

NOTE: The O-ring is on the valve side of the valve-fitting connection.

S 434-029

- (6) Connect the two tube fittings to the solenoid valve. Tighten the nut that connects each tube fitting to the valve.

S 804-030

- (7) Remove the cloth at base of the solenoid valve.

S 434-031

- (8) Install the electrical connector to the solenoid valve.

S 414-032

- (9) If you installed the left solenoid valve, install the captain's instrument panel P1-3.

S 414-033

- (10) If you installed the right solenoid valve, install the first officer's instrument panel P3-1.

E. Put the Airplane Back to Its Usual Condition

S 864-034

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - (a) 11R5, IND LTS DIM CONT (C1309)
 - (b) 11A32, IND LIGHTS TEST (C1307)
 - (c) 11A33, IND LIGHTS 1 (C1306)
 - (d) 11A34, IND LIGHTS 2 (C1308)

- (e) 11A35, IND LIGHTS 3 (C1200)
- (f) 11R1, L IND LTS 1 (C1293)
- (g) 11R2, L IND LTS 2 (C1297)
- (h) 11R3, L IND LTS 3 (C1298)
- (i) 11R28, R IND LTS 1 (C1273)
- (j) 11R29, R IND LTS 2 (C1274)
- (k) 11R30, R IND LTS 3

S 864-035

- (2) Put the STBY POWER switch on the pilot's overhead panel, P5, to AUTO.

S 864-037

- (3) Turn the rain repellent shutoff valve to the open (vertical) position.

S 714-038

- (4) Do a test of the rain repellent system (AMM 30-43-00/201).

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-02

WINDSHIELD RAIN REPELLENT CHECK VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the windshield rain repellent check valve. The second task is the installation of the windshield rain repellent check valve. In this procedure, the windshield rain repellent check valve is referred to as the check valve.
- B. There are two check valves installed behind the center instrument panel. The check valves have different removal/installation instructions.

TASK 30-43-03-004-017

2. Remove the Windshield Rain Repellent Check Valves (Fig. 401)

A. Equipment

- (1) Plastic Bags – clear, fluid-tight, commercially available

B. References

- (1) AMM 12-25-01/301, Exterior Airplane Cleaning
- (2) AMM 24-22-00/201, Electrical Power – Control
- (3) AMM 27-61-00/201, Spoiler/Speedbrake Control System
- (4) AMM 36-00-00/201, Pneumatic – General
- (5) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

D. Prepare for Removal

S 864-001

- (1) Supply electrical power to the main AC buses (AMM 24-22-00/201).

S 864-045

CAUTION: DO NOT OPERATE THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR. OPERATING THE RAIN REPELLENT SYSTEM WITHOUT BLEED AIR CAN CAUSE THE SYSTEM TO BECOME CLOGGED.

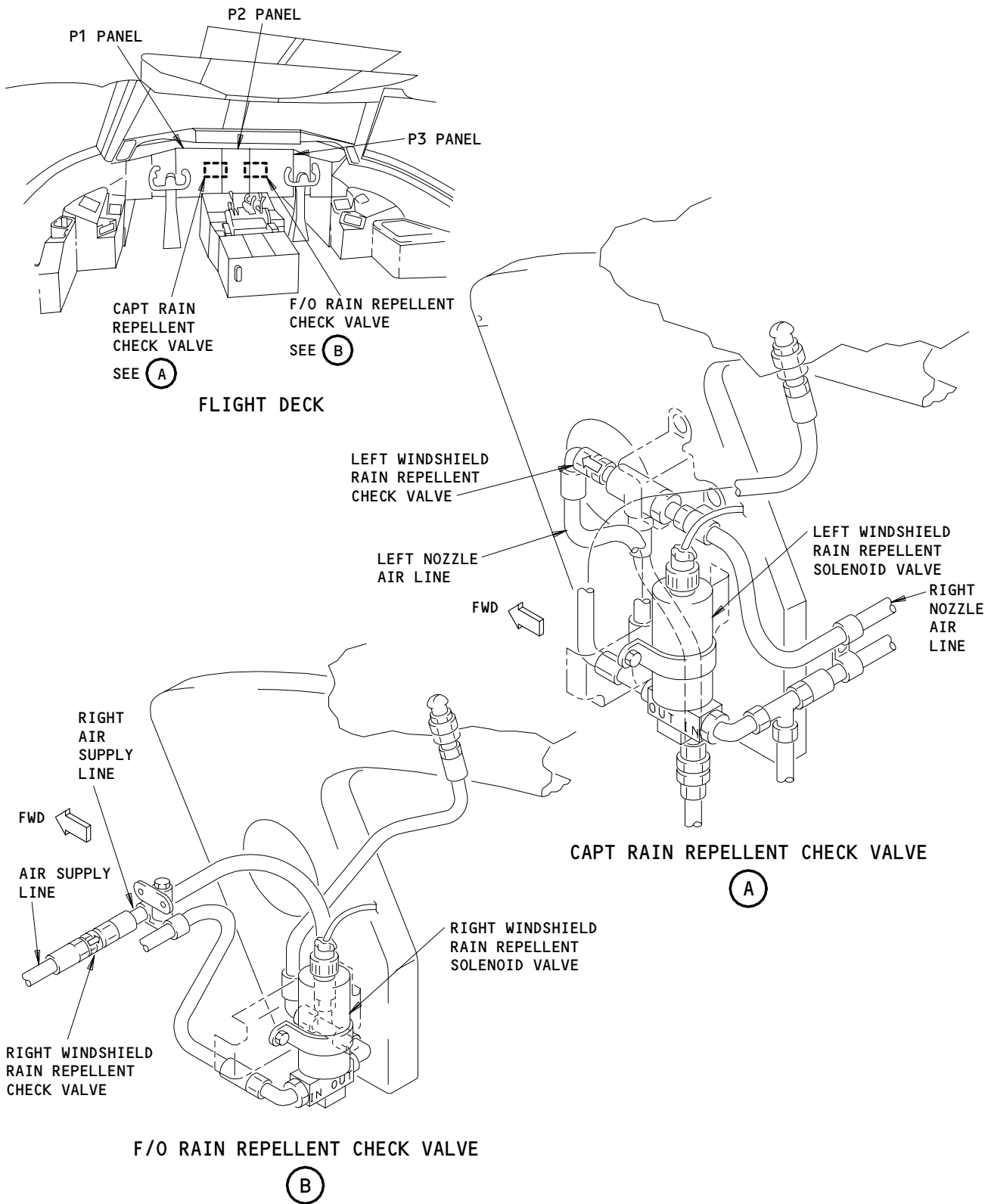
- (2) Start the APU (AMM 49-11-00/201), or supply ground pneumatic source (AMM 36-00-00/201).

S 214-003

- (3) Push the APU VALVE switch–light on the M15 panel (air supply module) to the ON position.

NOTE: The M15 panel is on the pilots' overhead panel, P5.

- (a) Make sure the white bar light in the switch is on.



Windshield Rain Repellent Check Valve Installation
Figure 401

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-03

- S 214-046
- (4) Make sure there is a strong flow of air at the rain repellent nozzles.
- S 864-005
- (5) Make sure these circuit breakers on the overhead panel, P11, are closed:
- (a) 11T12, RAIN REPEL R
 - (b) 11T21, RAIN REPEL L
- S 494-006
- (6) Install a fluid-tight bag on each rain repellent nozzle.
- S 864-007
- (7) Turn the rain repellent shutoff valve to the CLOSED (horizontal) position.
- S 874-008
- (8) Push the RAIN REPELLENT R and L switches on the M10023 windshield wiper/rain repellent control panel (on panel P5) until fluid does not flow from the nozzles.

NOTE: It is possible you will have to push each switch more than one time. Permit at least 30 seconds after each time for the APU bleed air to make the nozzles clear of remaining fluid.

- S 214-009
- (9) If the APU was the source of pneumatic air, push the APU VALVE switch-light on the M15 panel (air supply module on panel P5) to the OFF position.
- (a) Make sure the white bar light in the switch is off.
- S 864-011
- (10) Stop the APU (AMM 49-11-00/201), or turn off the ground pneumatic air source (AMM 36-00-00/201).
- S 864-012
- (11) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11R5, IND LTS DIM CONT (C1309)

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AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-03

- (b) 11A32, IND LIGHTS TEST (C1307)
- (c) 11A33, IND LIGHTS 1 (C1306)
- (d) 11A34, IND LIGHTS 2 (C1308)
- (e) 11A35, IND LIGHTS 3 (C1200)
- (f) 11R1, L IND LTS 1 (C1293)
- (g) 11R2, L IND LTS 2 (C1297)
- (h) 11R3, L IND LTS 3 (C1298)
- (i) 11R28, R IND LTS 1 (C1273)
- (j) 11R29, R IND LTS 2 (C1274)
- (k) 11R30, R IND LTS 3

S 914-013

WARNING: REFER TO AMM 27-61-00/201 FOR THE APPLICABLE SPOILER/SPEEDBRAKE DEACTIVATION PROCEDURE. ACCIDENTAL SPOILER MOVEMENT CAUSED BY THE SUBSEQUENT STEP COULD CAUSE INJURY.

- (12) Do the spoiler/speedbrake deactivation procedure (AMM 27-61-00/201).

S 864-014

- (13) Remove electrical power from the main AC buses (AMM 24-22-00/201).

NOTE: External power can supply the ground service and ground handling buses during the removal/installation.

S 864-015

- (14) Put the STBY POWER switch on the pilots' overhead panel, P5, in the OFF position.

E. Remove the Left Check Valve

S 014-018

- (1) Remove the captain's instrument panel, P1-3, to get access to the check valve.

S 804-019

CAUTION: PUT A CLOTH UNDER THE LINE FITTINGS TO SOAK UP RAIN REPELLENT THAT FALLS FROM THE DISCONNECTED LINES. THE RAIN REPELLENT CAN CAUSE CORROSION AND A STAIN.

- (2) Put a cloth under the check valve and lines you will disconnect.

S 034-020

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (3) Disconnect the left nozzle air line from the check valve.

S 024-021

- (4) Remove the check valve from the tee. Discard the O-ring.

S 094-022

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

CAUTION: IF RAIN REPELLENT GETS ON THE AIRPLANE SKIN OR GLASS, CLEAN THE AREA IMMEDIATELY (AMM 12-25-01/301). THE RAIN REPELLENT CAN CAUSE A STAIN ON THE AIRPLANE SKIN OR GLASS.

- (5) Remove the plastic bags from the rain repellent nozzles.

F. Remove the Right Check Valve

S 014-023

- (1) Remove the first officer's instrument panel, P3-1, to get access to the check valve.

S 804-024

CAUTION: PUT A CLOTH UNDER THE LINE FITTINGS TO SOAK UP RAIN REPELLENT THAT FALLS FROM THE DISCONNECTED LINES. THE RAIN REPELLENT CAN CAUSE CORROSION AND A STAIN.

- (2) Put a cloth under the check valve and lines you will disconnect.

S 034-025

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (3) Disconnect the air supply line from the check valve.

S 034-026

- (4) Hold the check valve in position and disconnect the right air supply line from the check valve.

S 024-027

- (5) Remove the check valve.

S 094-028

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

CAUTION: IF RAIN REPELLENT GETS ON THE AIRPLANE SKIN OR GLASS, CLEAN THE AREA IMMEDIATELY (AMM 12-25-01/301). THE RAIN REPELLENT CAN CAUSE A STAIN ON THE AIRPLANE SKIN OR GLASS.

(6) Remove the plastic bags from the rain repellent nozzles.

TASK 30-43-03-404-029

3. Install the Windshield Rain Repellent Check Valves (Fig. 401)

A. Consumable Materials

- (1) D00062 Lubricant - rubber to metal parts
pneumatic system thread grease, MIL-G-4343

B. References

- (1) AMM 30-43-00/201, Windshield Rain Repellent System

C. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

D. Install the Left Check Valve

S 644-030

- (1) Lubricate the O-ring.

S 434-031

- (2) Install the O-ring on the check valve.

NOTE: Make sure the O-ring is on the side opposite to the direction arrow on the check valve (O-ring on the tee-to-valve interface).

S 424-032

- (3) Install the check valve to the tee.

NOTE: The arrow on the check valve must point away from the tee.

S 434-033

- (4) Connect the left nozzle air line to the check valve.

S 804-044

- (5) Remove the cloth from under the check valve.

S 414-034

- (6) Install the captain's instrument panel, P1-3.

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E. Install the Right Check Valve

S 424-035

- (1) Connect the check valve to the right air supply line.

NOTE: The arrow on the fitting must point outward (to the right solenoid valve).

S 434-036

- (2) Connect the air supply line to the check valve.

S 804-037

- (3) Remove the cloth from under the check valve.

S 414-038

- (4) Install the first officer's instrument panel, P3-1.

F. Put the Airplane Back to Its Usual Condition

S 864-039

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

- (a) 11R5, IND LTS DIM CONT (C1309)
- (b) 11A32, IND LIGHTS TEST (C1307)
- (c) 11A33, IND LIGHTS 1 (C1306)
- (d) 11A34, IND LIGHTS 2 (C1308)
- (e) 11A35, IND LIGHTS 3 (C1200)
- (f) 11R1, L IND LTS 1 (C1293)
- (g) 11R2, L IND LTS 2 (C1297)
- (h) 11R3, L IND LTS 3 (C1298)
- (i) 11R28, R IND LTS 1 (C1273)
- (j) 11R29, R IND LTS 2 (C1274)
- (k) 11R30, R IND LTS 3

S 864-040

- (2) Turn the rain repellent shutoff valve to the OPEN (vertical) position.

S 864-041

- (3) Put the STBY POWER switch on the pilot's overhead panel, P5, in the AUTO position.

S 714-043

- (4) Do the rain repellent operational test (AMM 30-43-00/201).

WINDSHIELD RAIN REPELLENT ACCUMULATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the windshield rain repellent accumulator. The second task is the installation of the windshield rain repellent accumulator.
- B. The windshield rain repellent accumulator is behind the center instrument panel and below the left rain repellent solenoid valve. In this procedure, the windshield rain repellent accumulator is referred to as the accumulator.

TASK 30-43-04-004-001

2. Remove the Windshield Rain Repellent Accumulator

A. References

- (1) AMM 27-61-00/201, Spoiler/Speedbrake Control System
- (2) AMM 49-11-00/501, Auxiliary Power Unit

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 864-002

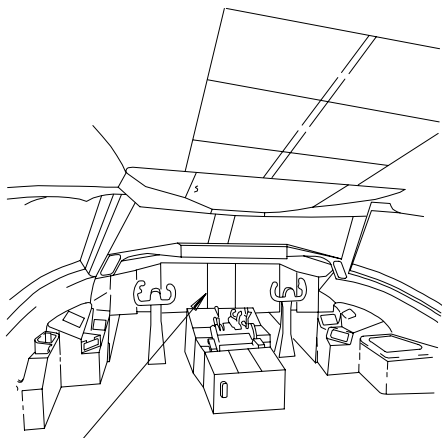
- (1) Stop the Auxiliary Power Unit (APU) (AMM 49-11-00/501).

S 864-003

- (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11R5, IND LTS DIM CONT (C1309)
 - (b) 11A32, IND LIGHTS TEST (C1307)
 - (c) 11A33, IND LIGHTS 1 (C1306)
 - (d) 11A34, IND LIGHTS 2 (C1308)
 - (e) 11A35, IND LIGHTS 3 (C1200)
 - (f) 11R1, L IND LTS 1 (C1293)
 - (g) 11R2, L IND LTS 2 (C1297)

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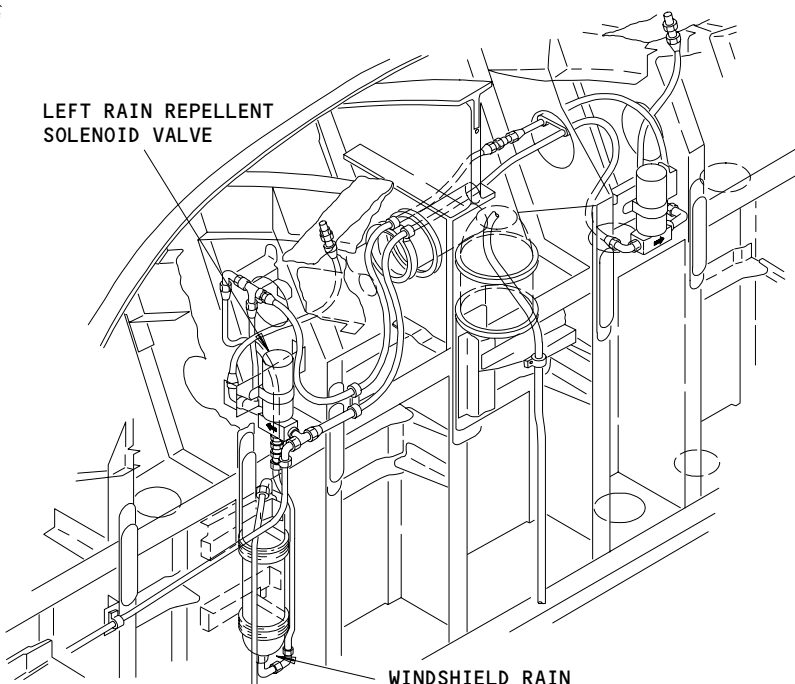
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WINDSHIELD RAIN REPELLENT SYSTEM

SEE (A)

FLIGHT DECK



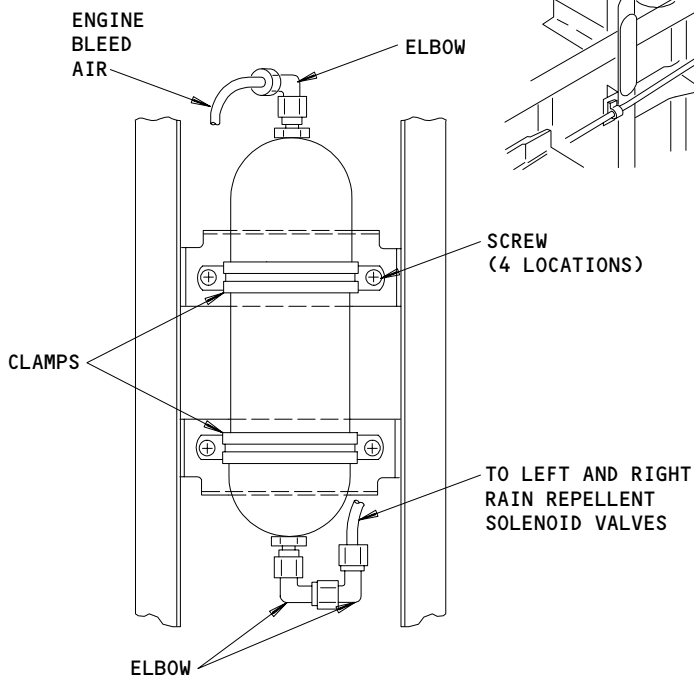
LEFT RAIN REPELLENT SOLENOID VALVE

WINDSHIELD RAIN REPELLENT ACCUMULATOR

SEE (B)

WINDSHIELD RAIN REPELLENT SYSTEM

(A)



ENGINE BLEED AIR

ELBOW

SCREW (4 LOCATIONS)

CLAMPS

TO LEFT AND RIGHT RAIN REPELLENT SOLENOID VALVES

ELBOW

WINDSHIELD RAIN REPELLENT ACCUMULATOR

(B)

Windshield Rain Repellent Accumulator Installation
Figure 401

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AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-04

- (h) 11R3, L IND LTS 3 (C1298)
- (i) 11R28, R IND LTS 1 (C1273)
- (j) 11R29, R IND LTS 2 (C1274)
- (k) 11R30, R IND LTS 3

S 864-004

WARNING: REFER TO AMM 27-61-00/201 FOR THE APPLICABLE SPOILER/SPEEDBRAKE DEACTIVATION PROCEDURE. ACCIDENTAL SPOILER MOVEMENT CAUSED BY THE SUBSEQUENT STEP COULD CAUSE INJURY.

- (3) Remove electrical power from the main AC buses (AMM 24-22-00/201).

NOTE: External power can supply ground service and/or ground handling buses during removal and installation.

S 864-005

- (4) Set the STBY POWER switch on the pilot's overhead panel, P5, to OFF.

S 014-007

- (5) Remove the captain's instrument panel, P1-3, to get access to the accumulator.

S 804-008

CAUTION: PUT A CLOTH IN POSITION TO SOAK UP REPELLENT FLUID THAT FALLS FROM DISCONNECTED LINES. REPELLENT FLUID CAN CAUSE STAINS AND CORROSION.

- (6) Put a cloth under the accumulator.

S 034-009

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (7) Loosen the nut on the elbow and disconnect the tubing from the two ends of the accumulator.

S 034-010

- (8) Remove the four screws that attach the clamps to the bracket assemblies.

S 024-011

- (9) Move the accumulator out of the clamps.

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-04

TASK 30-43-04-404-012

3. Install the Windshield Rain Repellent Accumulator

A. References

- (1) AMM 12-16-01/301, Rain Repellent Bottle

B. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

C. Procedure (Fig. 401)

S 424-013

- (1) Move the accumulator into the clamps.

S 434-014

- (2) Put the accumulator in a position where you can connect the tubing. Tighten the four screws to attach the clamps to the bracket assemblies.

NOTE: You can point either side up when you install the accumulator.

S 434-015

- (3) Connect the tubing to the two ends of the accumulator. Tighten the nut on the elbow that connects each tubing to the accumulator.

S 804-016

- (4) Remove the cloth from under the accumulator.

S 414-017

- (5) Install the captain's instrument panel, P1-3.

S 864-018

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11R5, IND LTS DIM CONT (C1309)

- (b) 11A32, IND LIGHTS TEST (C1307)
- (c) 11A33, IND LIGHTS 1 (C1306)
- (d) 11A34, IND LIGHTS 2 (C1308)
- (e) 11A35, IND LIGHTS 3 (C1200)
- (f) 11R1, L IND LTS 1 (C1293)
- (g) 11R2, L IND LTS 2 (C1297)
- (h) 11R3, L IND LTS 3 (C1298)
- (i) 11R28, R IND LTS 1 (C1273)
- (j) 11R29, R IND LTS 2 (C1274)
- (k) 11R30, R IND LTS 3

S 864-019

- (7) Set the STBY POWER switch on the pilots' overhead panel, P5, to AUTO.

S 214-021

- (8) Make sure the rain repellent level is above replacement level in the sight gage.
 - (a) Replace the bottle if necessary (AMM 12-16-01/301).

S 214-022

- (9) Make sure the repellent fluid pressure gage indicator shows an indication in the green band.
 - (a) Replace the bottle if necessary (AMM 12-16-01/301).

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AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-04

04

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ENTRY/SERVICE DOOR VIEWPORT HEATERS - DESCRIPTION AND OPERATION

1. General (Fig. 1)
 - A. The entry/service door viewports have window panes with electrical heaters to remove the fog.
 - B. These heaters are wire-grid type and are bonded to the inner surface of the viewport prisms.
2. Component Details (Fig. 2)
 - A. The components of the entry/service door viewport heater system are the heaters and one circuit breaker.
 - B. The heaters operate on 28v DC current.
3. Operation
 - A. When the circuit breaker is closed, the heater elements in the door viewport have electrical power.

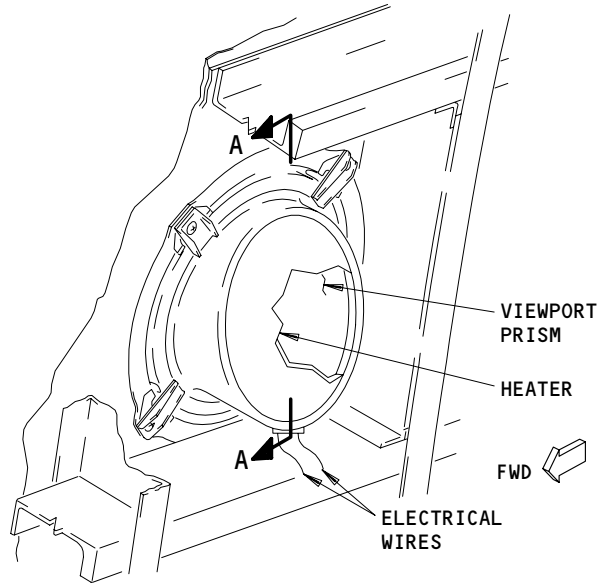
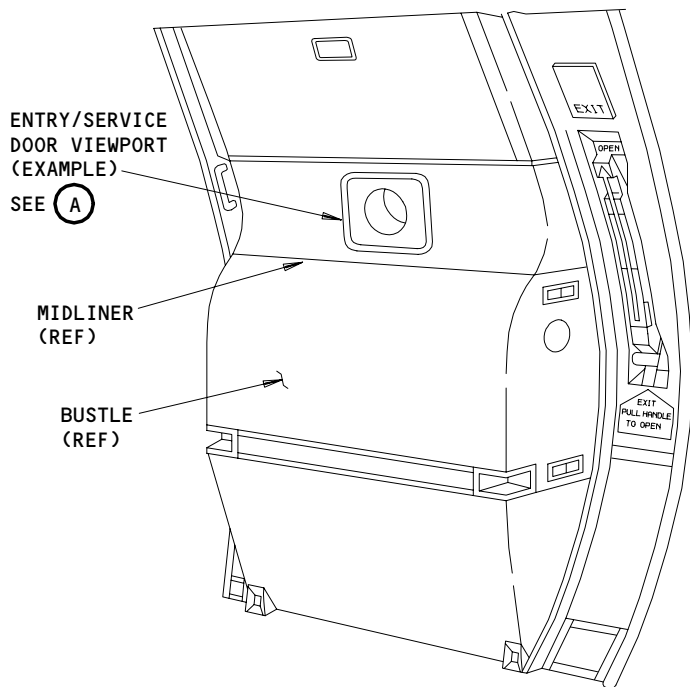
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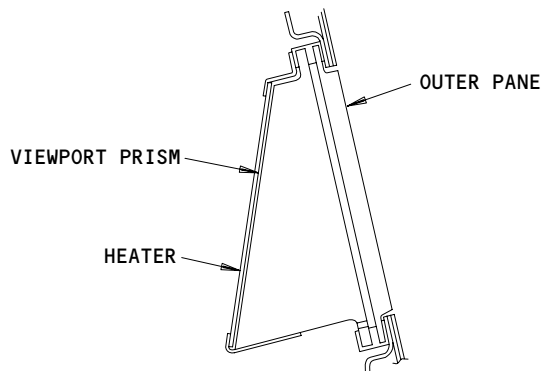
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ENTRY/SERVICE DOOR VIEWPORT

(A)



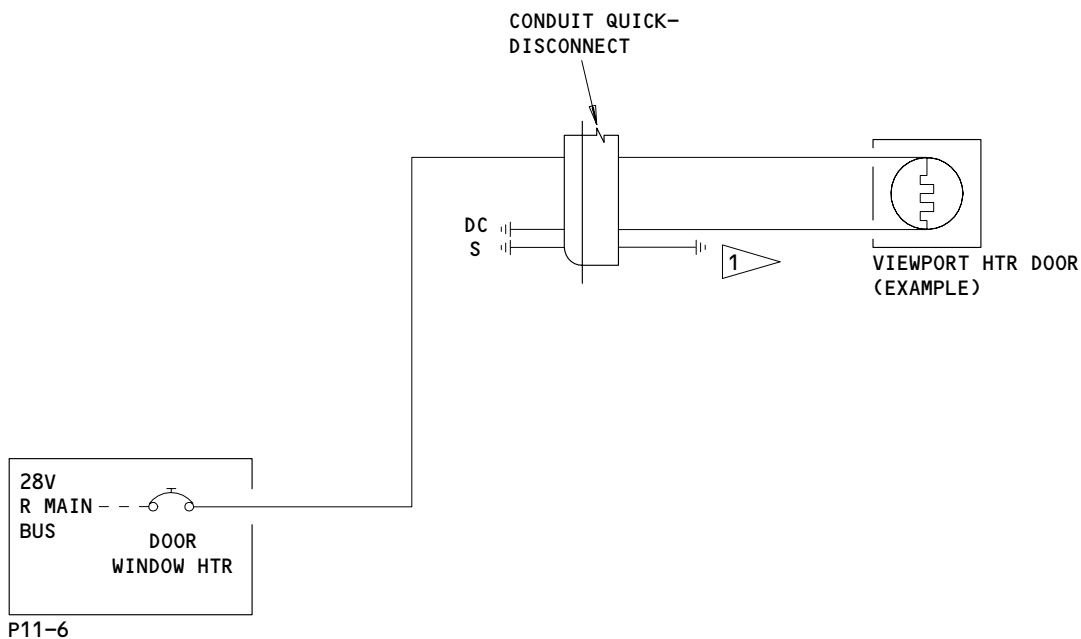
HEATER INSTALLATION

A-A

Entry/Service Door Viewport Heater Installation
Figure 1

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1 STATIC GROUND CONNECTED TO DOOR

Entry/Service Door Viewport Heater - Schematic
Figure 2

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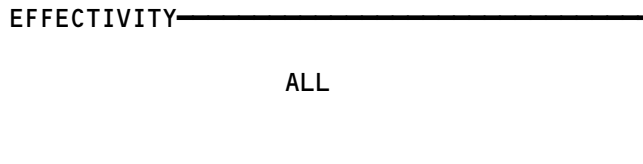
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 FAULT ISOLATION/MAINT MANUAL

ENTRY/SERVICE DOOR VIEWPORT HEATERS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER - HEATER - DOOR WINDOW, C1130		1	FLT COMPT, P11 11U32	*
HEATER -	--			
L AFT DOOR VIEWPORT, B285		1	833	56-31-01
L FWD DOOR VIEWPORT, B283		1	831	56-31-01
R AFT DOOR VIEWPORT, B286		1	843	56-31-01
R FWD DOOR VIEWPORT, B284		1	841	56-31-01

* SEE THE WDM EQUIPMENT LIST

Entry/Service Door Viewport Heaters - Component Index
 Figure 101

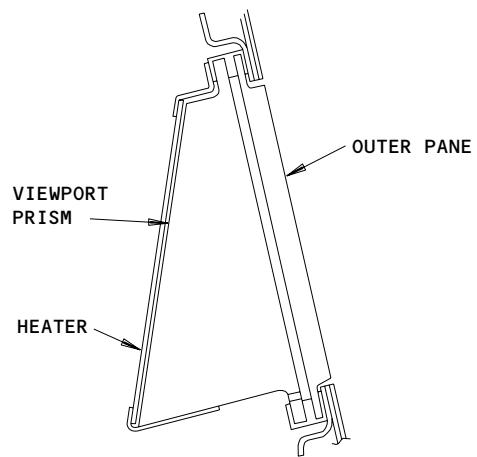
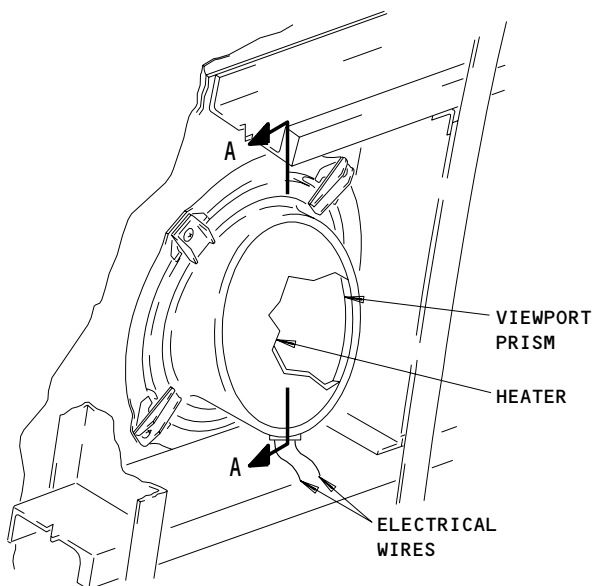
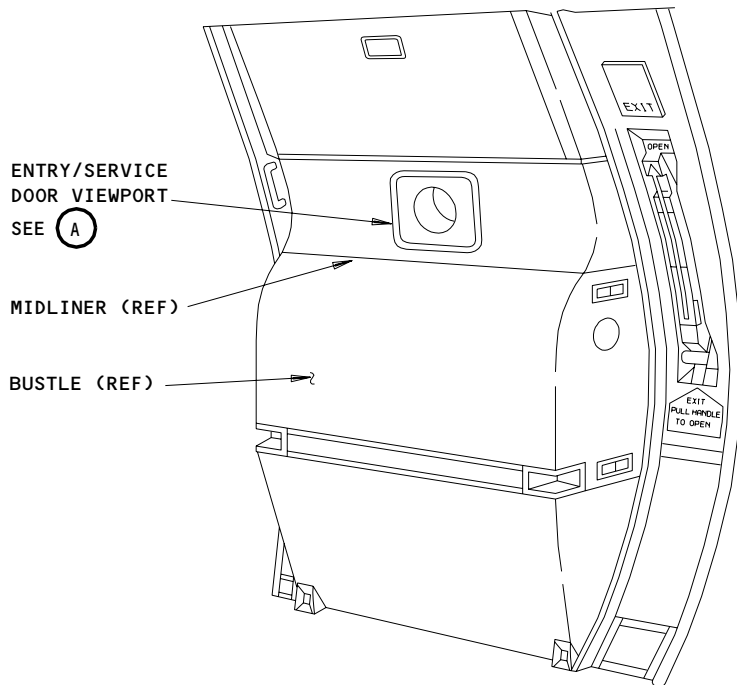


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652124



FWD

VIEWPORT

(A)

A-A

Entry/Service Door Viewport Heaters - Component Location
Figure 102

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VIEWPORT HEATER-ENTRY/SERVICE DOORS - ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. The task is an operational test of the Viewport Heaters-Entry/Service Doors. The test is done on the flight deck and at entry/service door locations.

TASK 30-46-00-715-030

2. Operational Test - Viewport Heaters-Entry/Service Doors

A. Standard Tools and Equipment

- (1) Multimeter suitable to read 0 amp to 0.25 amp.
(2) Viewport Heater test breakout box (Fig. 501).

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 52-11-02/401, Entry/Service Door Removal/Installation.
(4) AMM 56-31-01/401, Entry/Service Door Viewport - Removal/Installation
(5) WDM 30-46-11
(6) SSM 30-46-01
(7) DWG A30003-1, Breakout Box - Viewport Heater

C. Access

- (1) Location Zones
200 - Upper Half of the fuselage
211/212 Control Cabin - Section 41

(2) Access Panels

Upper Access Panels Entry/Service Doors

D. Prepare for the Test

S 865-031

- (1) Supply electrical power (AMM 24-22-00/201).

S 865-032

- (2) Open this circuit breaker on the P11-6 panel and attach a DO-NOT-CLOSE tag:
(a) 11U32, DOOR WINDOW HTR

S 865-033

- (3) Start the Left Fwd Door Window Heater Test.

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Door Viewport Heater connector (disconnect) Location.	
Table I	
CONNECTOR LOCATION	CONNECTOR
FWD LEFT STA 334 WL 278 BL L60 FWD RIGHT STA 334 WL 278 BL R60 AFT LEFT STA 1493 WL 278 BL L65 AFT RIGHT STA 1493 WL 278 BL R65	D6604P D6606P D6612P D6614P

- (a) Disconnect the heater connector D6604P located at STA 334, WL 278, BL L60.
- (b) Make sure no continuity exists between airplane ground and pins 1 and 2 of the viewport heater door connector.
- (c) Install the Viewport Heater Breakout Box between the airplane and the Viewport Heater Door connector (Ref DWG A30003-1).
- (d) Connect the multimeter leads to the positive and negative test jacks of the breakout box.
- (e) Make sure the current is (0) amps.

S 865-034

- (4) Remove a DO-NOT-CLOSE tag and close this circuit breaker on the P11-6 panel:
 - (a) 11U32, DOOR WINDOW HTR

S 865-043

- (5) Wait five minutes for heater temperature to stabilize.

S 865-042

- (6) Make sure the current is in the range of .13 through .24 amps.

S 865-040

- (7) Open this circuit breaker on the P11-6 panel and attach a DO-NOT-CLOSE tag:
 - (a) 11U32, DOOR WINDOW HTR

S 865-044

- (8) Remove the breakout box from the connectors and reconnect the connector D6604P located at STA 334, WL 278, BL L60 to the heater.

S 865-045

- (9) Repeat steps 3 through 5 for the remaining viewport heaters listed in Table I.

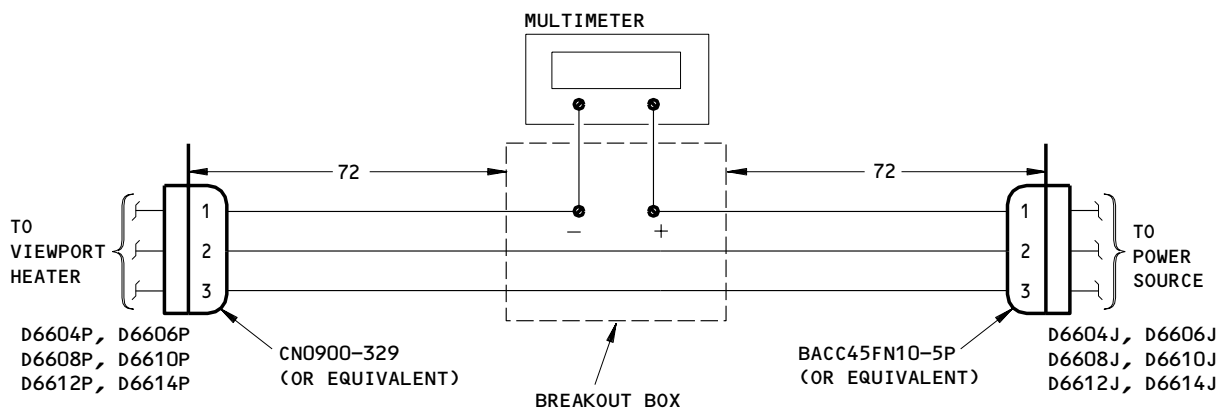
EFFECTIVITY

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FUNTIONAL TEST SET-UP

Entry/Service Door Viewport Heater - Breakout Box
Figure 501

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E. Put the Airplane Back to Its Usual Condition

S 865-041

- (1) Remove a DO-NOT-CLOSE tag and close this circuit breaker on the P11-6 panel:
 - (a) 11U32, DOOR WINDOW HTR

S 865-037

- (2) Make sure all access door are closed.

S 865-038

- (3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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WATER AND DRAIN LINE HEATERS – DESCRIPTION AND OPERATION

1. General

- A. AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
Electrical heat prevents ice in the water and waste systems. The system components include water supply and drain line heaters, heater tape control thermostats, a water fill fitting heater, waste tank rinse fitting heaters, a waste tank drain fitting heating gasket, and drain mast heaters. The 115-volt AC ground service and ground handling buses supply the electrical power to the system.
- B. AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
Electrical heat prevents ice in the water supply lines and part of the drain line systems. The system components include water supply line ribbon heaters, heater control thermostats, a water fill fitting heater, waste tank rinse fitting heaters, a waste tank drain fitting heating gasket, and drain mast heaters. The 115-volt AC ground service and ground handling buses supply the electrical power to the system.
- (1) AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
Water supply and drain line heaters are located in areas exposed to cold temperatures while the airplane is on the ground or in flight. Water supply line heated hoses and in-line heaters are installed on water supply lines to prevent ice in the water supply lines. Drain line heater tapes are wrapped around water drain lines and sealed with adhesive tape to prevent ice in the water drain lines.
- (2) AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
Water supply line heaters and gray water drain lines wrapped with insulation are located in areas exposed to cold temperatures while the airplane is on the ground or in flight. Water supply line heated hoses and in-line heaters are installed on water supply lines to prevent ice in the water supply lines. Gray water drain lines are wrapped with insulation and sealed with adhesive tape to prevent ice in the water drain lines.
- (3) AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
For extreme cold temperatures, a potable water tank heater blanket and heater blanket controller are installed around the potable water tank. Additional water drain line heater tapes and supply line heated hoses and in-line heaters are also installed (WDM 30-71-21, WDM 30-71-22, WDM 30-71-23).

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- (4) AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
For extreme cold temperatures, a potable water tank heater blanket and heater blanket controller are installed around the potable water tank. Gray water drain lines are wrapped with additional insulation and water supply line heated hoses and in-line heaters are also installed (WDM 30-71-21, WDM 30-71-22, WDM 30-71-23).

2. Component Details (Fig. 1)

A. Water Supply and Drain Line Heating

- (1) AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
Water drain line heater tapes are wrapped around the water drain lines to prevent ice. Relays control the drain line heater tapes. Separate heater tape control thermostats energize the relays at low temperatures when the airplane has power. Some drain line heater tapes also have an integral thermostat which starts the heater at a slightly lower temperature than the heater tape control thermostat. Heated hoses, in-line heaters and remote sensors are installed on water supply lines to prevent ice. Integral thermostats control the heated hoses and remote sensors control in-line heaters.
- (2) AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
Heated hoses, in-line heaters, and remote sensors are installed on water supply lines to prevent ice. Integral thermostats control the heated hoses and remote sensors control in-line heaters. Gray water drain lines are wrapped with insulation to prevent ice.

B. Thermostats

- (1) AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
The heater tape control thermostats control the water line heater relays which control the heater tape temperature. The thermostats are adjacent to the water supply and drain lines.
- (2) AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
The ribbon heater control thermostats control the water line heater relays which control the ribbon heater temperature. The thermostats are adjacent to the water supply lines.
- (3) AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
The heater tape control thermostats control the heated tube temperature. The thermostats are adjacent to the water supply and drain lines.

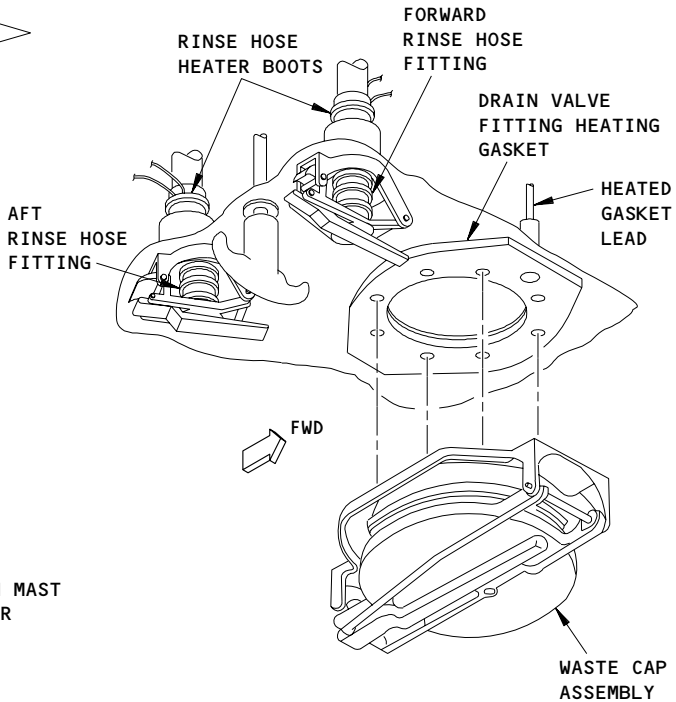
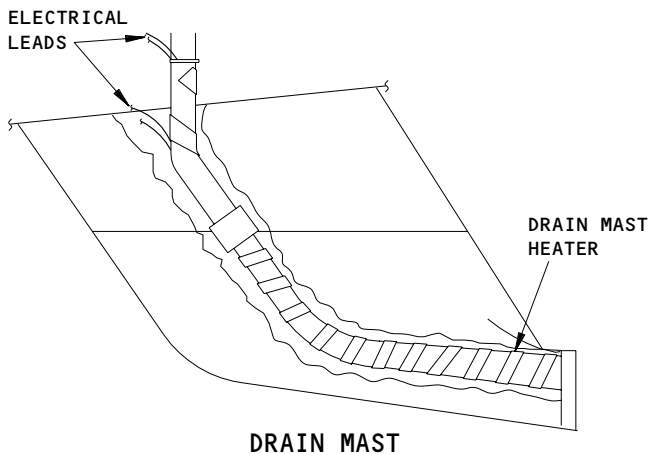
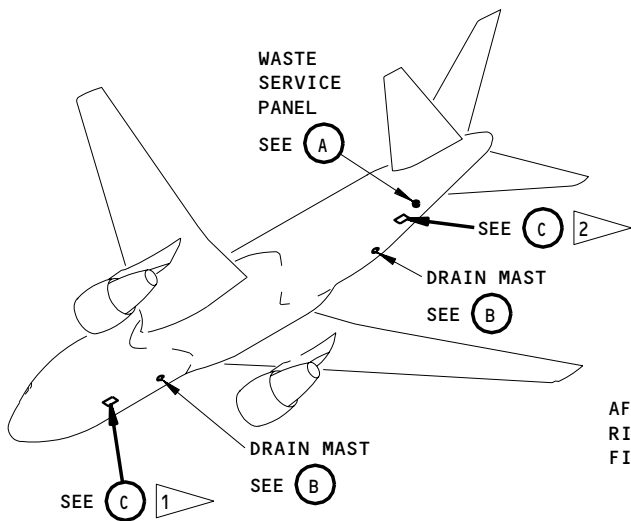
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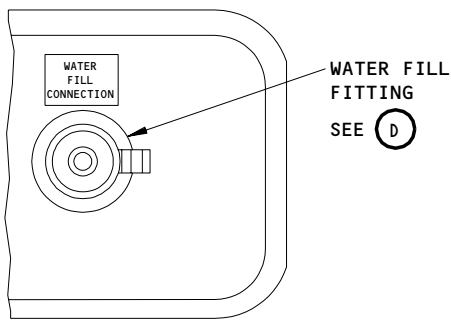
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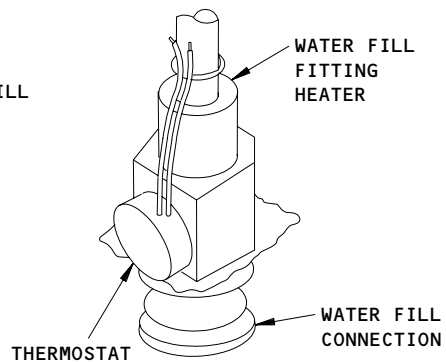
TOILET SERVICE PANEL

(A)



POTABLE WATER SERVICE PANEL

(C)



WATER FILL FITTING

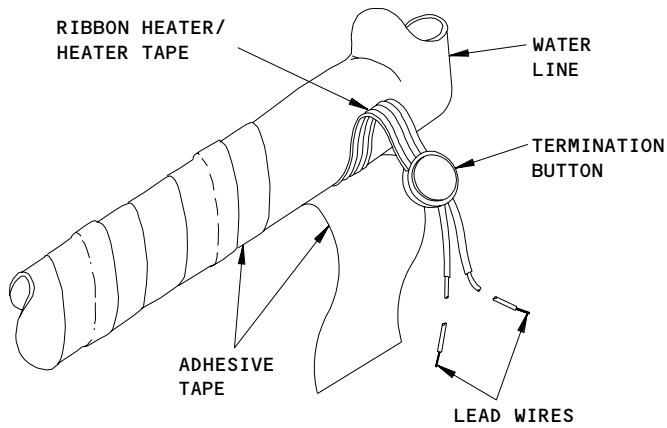
(D)

- 1 AIRPLANES WITH FORWARD WATER FILL FITTING
- 2 AIRPLANES WITH AFT WATER FILL CONNECTION

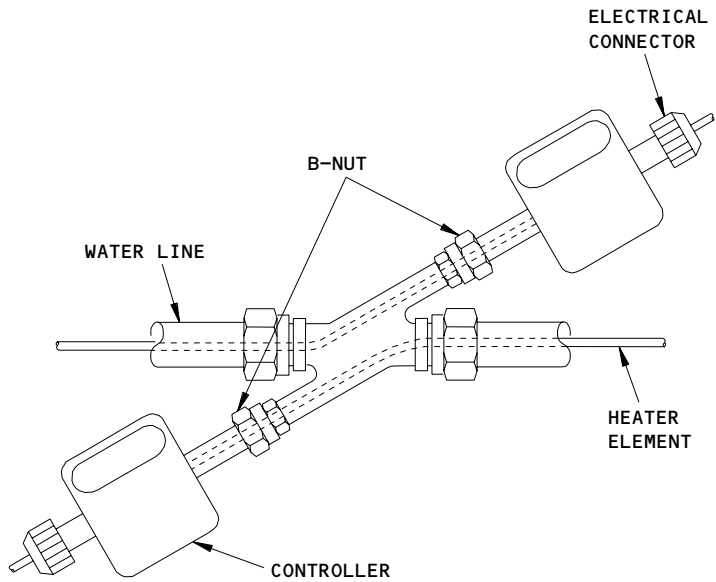
Waste Drain System
Figure 1 (Sheet 1)

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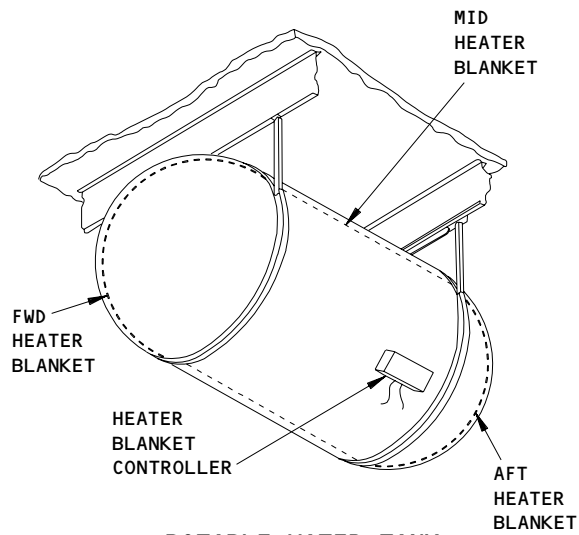
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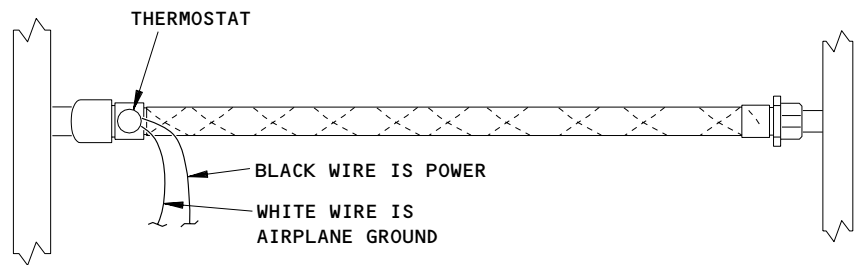
**WATER LINE HEATER
(EXAMPLE)**



**WATER LINE IN-LINE HEATERS
(EXAMPLE)**



**POTABLE WATER TANK
(EXAMPLE)**



**HEATED HOSE
(EXAMPLE)**

**Waste Drain System
Figure 1 (Sheet 2)**

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- (4) AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
The ribbon heater control thermostats control the heated tube temperature. The thermostats are adjacent to the water supply lines.
 - (5) The heated hoses have integral thermostats which control the heated hose temperature. The thermostats are located at the "B"-nut.
 - C. Heating Gaskets
 - (1) A heating gasket is installed in the waste tank drain fitting to prevent ice. The waste tank drain fitting heating gasket has power when the airplane has power.
 - D. Water Fill Fitting Heater
 - (1) A water fill fitting heater is installed on the tubing nut in the airplane skin. The water fill fitting heater has an internal thermostat to control the temperature.
 - E. Waste Tank Rinse Fitting Heaters
 - (1) The waste tank rinse fitting heaters are installed on the rinse line tubing nuts at the waste service panel. The waste tank rinse fitting heaters have an internal thermostat to control the temperature.
 - F. Potable Water Tank Heater Blankets (on some airplanes)
 - (1) Three heater blankets are wound around the potable water tank to prevent ice. The heater blankets operate only on the ground.
 - G. Heater Blanket Controller
 - (1) A heater blanket controller monitors the temperature of the potable water tank. The heater blanket controller supplies low and high heat and does not let the heater blankets become too hot. The controller is installed on the potable water tank.
 - H. Drain Mast Heaters
 - (1) Heat supplied to the drain masts does not permit the waste water to freeze in the drain masts. Heat is supplied to the drain masts with 28-volt AC power on the ground and with 115-volt AC power in flight.
3. Operation (Fig. 2)
- A. Functional Description
 - (1) All devices that supply heat will have power on the ground if the ambient temperature is sufficiently low to close the thermostats. Low power (28-volt) supplies heat to the drain masts.
 - (2) The forward and aft drain masts will have power supplied when the circuit breakers in the P33 panel are closed. On some airplanes the drain masts have integral thermostats that when the heater temperature becomes too hot, the thermostats will cause them to turn off.
 - (3) In flight the air/ground relays change the drain masts to high (115-volt) heat.
 - B. Control
 - (1) To put the system in operation, supply power to the AC ground service and ground handling buses (AMM 24-22-00/201).
 - (2) Make sure all the water line heater circuit breakers on the forward miscellaneous electrical equipment panel, P33, and the right miscellaneous electrical equipment panel, P37, are closed.

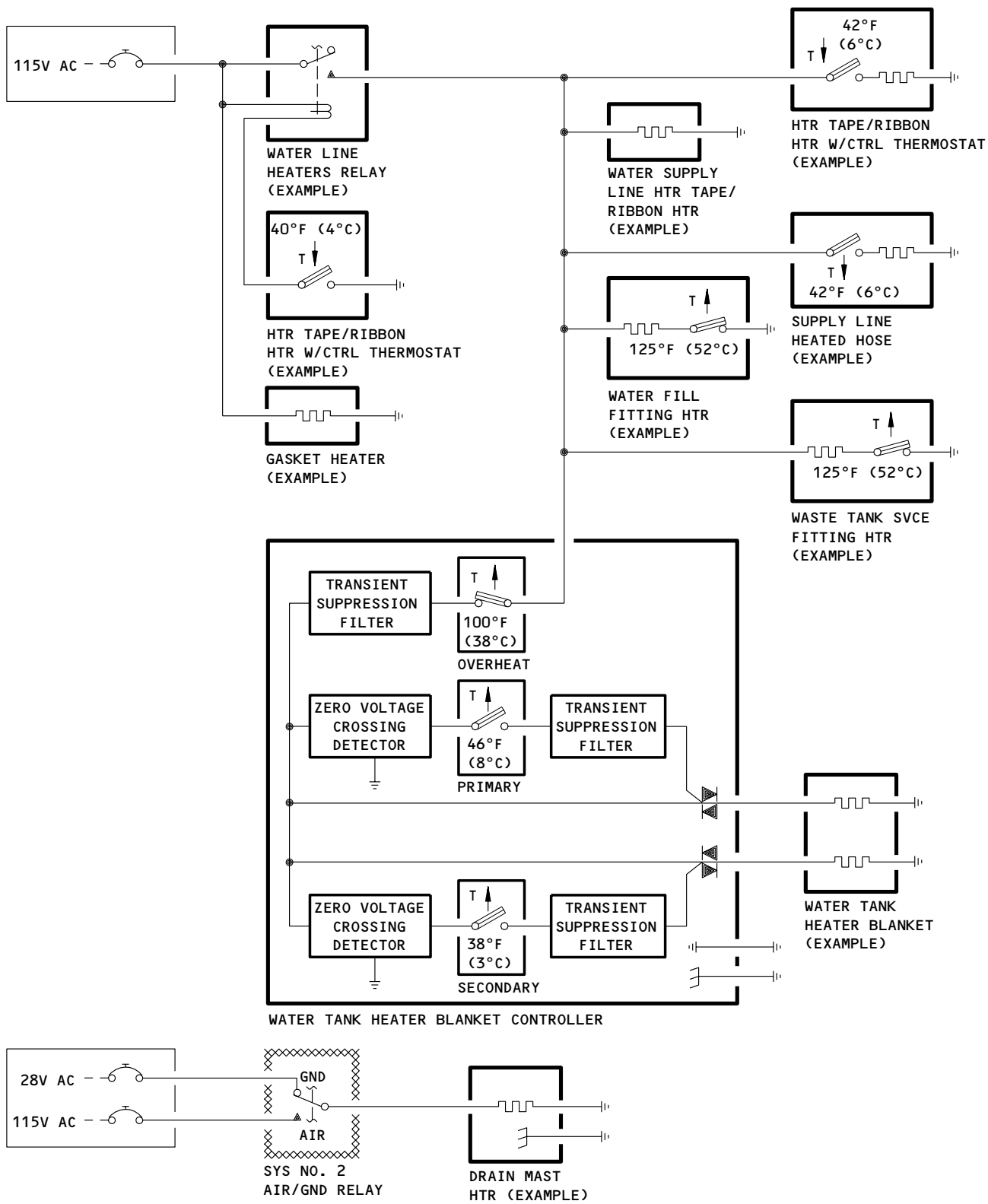
EFFECTIVITY

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Supply and Drain System Heater Schematic
Figure 2

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
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 **BOEING**
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FAULT ISOLATION/MAINT MANUAL

WATER AND DRAIN LINE HEATERS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKERS -	1		119AL, MAIN EQUIP CTR, P33	
DRAIN MAST HTG - FLT, C1142		1	33A2	*
DRAIN MAST HTG - GND, C1165		1	33A1	*
WATER LINE HTRS - AFT 1, C1151		1	33G5	*
WATER LINE HTRS - AFT 2, C1156		1	33G6	*
WATER LINE HTRS - AFT 3, C1166		1	33G7	*
WATER LINE HTRS - FWD, C1149		1	33F1	*
WATER LINE HTRS - MID 1, C1150		1	33G1	*
WATER LINE HTRS - MID 2, C1157		1	33G2	*
WATER LINE HTRS - MID 3, C1155		1	33G3	*
WATER LINE HTRS - MID 4, C1158		1	33G4	*
HEATERS -				
AFT DRAIN MST, B42	2	1	SECTION 46, BOTTOM OF FUSELAGE	30-71-01
AFT DRAIN PIPE GASKET, B44	2	1	SECTION 46, WASTE DISPOSAL SERVICE PANEL	30-71-03
FWD DRAIN MST, B41	2	1	SECTION 41, BOTTOM OF FUSELAGE	30-71-01
WASTE TANK FITTING, B212,B213	2	2	SECTION 46, BOTTOM OF FUSELAGE	30-71-07
WATER FILL CONNECTION, B149	2	1	SECTION 46, BOTTOM OF FUSELAGE	30-71-05
HEATER TAPES/INSULATION/RIBBON HEATERS				
AFT DRAIN LINE, B88	2	1	SECTION 46, LWR FUSELAGE DRAIN LINE	30-71-01
AFT SUPPLY LINE, B87,B95,B98,B99,B100,B102, B110,B112,B132,B158,B233,B237,B241	2	13	SECTION 46, LWR FUSELAGE SUPPLY LINE	30-71-01
FWD DRAIN LINE, B97,B107,B133,B346	2	4	SECTION 41, LWR FUSELAGE DRAIN LINE	30-71-01
FWD SUPPLY LINE, B43,B90,B109,B118,B270, B347,B363,B364,B365,B366,B415 	2	10/11	SECTION 41, LWR FUSELAGE SUPPLY LINE	30-71-01
MID DRAIN LINE, B260,B351	2	2	SECTION 43, LWR FUSELAGE DRAIN LINE	30-71-01
MID DRAIN LINE, B367,B368,B369	2	3	SECTION 45, LWR FUSELAGE DRAIN LINE	30-71-01
MID SUPPLY LINE, B119,B120,B350,B353,B373, B374,B375	2	7	SECTION 43, LWR FUSELAGE SUPPLY LINE	30-71-01
MID SUPPLY LINE, B96,B108,B151,B159,B160, B161,B370,B371,B372	2	9	SECTION 45, LWR FUSELAGE SUPPLY LINE	30-71-01
RELAY - (AMM 31-01-33, FIG. 101)				
SYS NO. 2 AIR/GND, K205				
RELAY - (AMM 31-01-37, FIG. 101)				
AFT WATERLINE HEATERS, K376				
FWD WATERLINE HEATERS, K372,K398,K1069				
MID WATERLINE HEATERS, K373,K374				
THERMOSTATS -				
AFT HEATER TAPE/RIBBON HEATER CONTROL, B93, B104	2	2	SECTION 46, LWR FUSELAGE DRAIN AND SUPPLY LINES	30-71-02
FWD HEATER TAPE/RIBBON HEATER CONTROL, B91, B264,B269	2	3	SECTION 41, LWR FUSELAGE SUPPLY LINE	30-71-02
MID HEATER TAPE/RIBBON HEATER CONTROL, B92	2	1	SECTION 45, LWR FUSELAGE SUPPLY LINE	30-71-02

* SEE THE WDM EQUIPMENT LIST

 SAS 155-169

Water And Drain Line Heaters - Component Index
Figure 101

EFFECTIVITY
ALL SAS 767-300 AIRPLANES

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FAULT ISOLATION/MAINT MANUAL

WATER AND DRAIN LINE HEATERS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKERS -	1		119AL, MAIN EQUIP CTR, P33,P37	
HEATERS 3 AFT WATER LINE, C1166		1	1 ▷ 37H4; 2 ▷ 33G7	*
DRAIN MAST HTG - FLT, C1142		1	33A2	*
DRAIN MAST HTG - GND, C1165		1	33A1	*
WATER LINE HEATERS - AFT 1, C1151		1	1 ▷ 37J6; 2 ▷ 33G5	*
WATER LINE HEATERS - AFT 2, C1156		1	1 ▷ 37J7; 2 ▷ 33G6	*
WATER LINE HEATERS - FWD, C1149		1	1 ▷ 37J1; 2 ▷ 33F1	*
WATER LINE HEATERS - MID 1, C1150		1	1 ▷ 37J2; 2 ▷ 33G1	*
WATER LINE HEATERS - MID 2, C1157		1	1 ▷ 37J3; 2 ▷ 33G2	*
WATER LINE HEATERS - MID 3, C1155		1	1 ▷ 37J4; 2 ▷ 33G3	*
WATER LINE HEATERS - MID 4, C1158		1	1 ▷ 37J5; 2 ▷ 33G4	*
HEATERS -				
AFT DRAIN MST, B42	2	1	SECTION 46, BOTTOM OF FUSELAGE	30-71-01
AFT DRAIN PIPE GASKET, B44	2	1	SECTION 46, WASTE DISPOSAL SERVICE PANEL	30-71-03
FWD DRAIN MST, B41	2	1	SECTION 41, BOTTOM OF FUSELAGE	30-71-01
WASTE TANK FITTING, B212,B213	2	2	SECTION 46, BOTTOM OF FUSELAGE	30-71-07
WATER FILL CONNECTION, B149	2	1	SECTION 46, BOTTOM OF FUSELAGE	30-71-05
HEATER TAPES/INSULATION/RIBBON HEATERS				
AFT DRAIN LINE, B88	2	1	SECTION 46, LWR FUSELAGE DRAIN LINE	30-71-01
AFT SUPPLY LINE, B87,B100,B101,102,B110, B112,B158,B233,B237,B241	2	10	SECTION 46, LWR FUSELAGE SUPPLY LINE	30-71-01
FWD DRAIN LINE, B97,B107,B133	2	3	SECTION 41, LWR FUSELAGE DRAIN LINE	30-71-01
FWD SUPPLY LINE, B43,B90,B109,B118	2	4	SECTION 41, LWR FUSELAGE SUPPLY LINE	30-71-01
MID DRAIN LINE, B120	2	1	SECTION 43, LWR FUSELAGE DRAIN LINE	30-71-01
MID DRAIN LINE, B413	2	1	SECTION 45, LWR FUSELAGE DRAIN LINE	30-71-01
MID SUPPLY LINE, B119	2	1	SECTION 43, LWR FUSELAGE SUPPLY LINE	30-71-01
MID SUPPLY LINE, B96,B108,B115,B116,B159, B160,B164,B234,B256,B411,B412,B414	2	12	SECTION 45, LWR FUSELAGE SUPPLY LINE	
RELAY - (AMM 31-01-33, FIG. 101)				
SYS NO. 2 AIR/GND, K205				
RELAY - (AMM 31-01-37, FIG. 101)				
AFT WATERLINE HEATERS, K376				
FWD WATERLINE HEATERS, K372,K1069				
MID WATERLINE HEATERS, K373,K374				
THERMOSTATS -				
AFT HEATER TAPE/RIBBON HEATER CONTROL, B93,	2	1	SECTION 46, LWR FUSELAGE DRAIN AND SUPPLY LINES	30-71-02
FWD HEATER TAPE/RIBBON HEATER CONTROL, B91, B264,B269	2	3	SECTION 41, LWR FUSELAGE SUPPLY LINE	30-71-02
MID HEATER TAPE/RIBBON HEATER CONTROL, B92	2	1	SECTION 45, LWR FUSELAGE SUPPLY LINE	30-71-02

* SEE THE WDM EQUIPMENT LIST

- 1 ▷ MTH 275
- 2 ▷ MTH 276-999
- 3 ▷ AIRPLANES WITH HEATER TAPE ON THE WATER SUPPLY AND DRAIN LINES

Water And Drain Line Heaters - Component Index
Figure 101A

EFFECTIVITY
ALL MTH AIRPLANES

30-71-00

 **BOEING**
767
FAULT ISOLATION/MAINT MANUAL

WATER AND DRAIN LINE HEATERS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKERS -	1		119AL, MAIN EQUIP CTR, P33	
DRAIN MAST HTG - FLT, C1142		1	33A2	*
DRAIN MAST HTG - GND, C1165		1	33A1	*
WATER LINE HTRS - AFT 1, C1151		1	33G5	*
WATER LINE HTRS - AFT 2, C1156		1	33G6	*
WATER LINE HTRS - AFT 3, C1166		1	33G7	*
WATER LINE HTRS - FWD, C1149		1	33F1	*
WATER LINE HTRS - MID 1, C1150		1	33G1	*
WATER LINE HTRS - MID 2, C1157		1	33G2	*
WATER LINE HTRS - MID 3, C1155		1	33G3	*
WATER LINE HTRS - MID 4, C1158		1	33G4	*
HEATERS -				
AFT DRAIN MST, B42	2	1	SECTION 46, BOTTOM OF FUSELAGE	30-71-01
AFT DRAIN PIPE GASKET, B44	2	1	SECTION 46, WASTE DISPOSAL SERVICE PANEL	30-71-03
FWD DRAIN MST, B41	2	1	SECTION 41, BOTTOM OF FUSELAGE	30-71-01
WASTE TANK FITTING, B212,B213	2	2	SECTION 46, BOTTOM OF FUSELAGE	30-71-07
WATER FILL CONNECTION, B149	2	1	SECTION 46, BOTTOM OF FUSELAGE	30-71-05
HEATER TAPES/INSULATION/RIBBON HEATERS				
AFT DRAIN LINE, B88	2	1	SECTION 46, LWR FUSELAGE DRAIN LINE	30-71-01
AFT SUPPLY LINE, B87,B95,B98,B99,B100,B102, B110,B112,B132,B158,B233,B237,B241	2	13	SECTION 46, LWR FUSELAGE SUPPLY LINE	30-71-01
FWD DRAIN LINE, B97,B107,B133,B346	2	4	SECTION 41, LWR FUSELAGE DRAIN LINE	30-71-01
FWD SUPPLY LINE, B43,B90,B109,B118,B270, B347,B363,B364,B365,B366,B415	2	11	SECTION 41, LWR FUSELAGE SUPPLY LINE	30-71-01
MID DRAIN LINE, B131,B135,B421,B422,B423	2	5	SECTION 45, LWR FUSELAGE DRAIN LINE	30-71-01
MID SUPPLY LINE, B111,B113,B115,B119,B120	2	5	SECTION 43, LWR FUSELAGE SUPPLY LINE	30-71-01
MID SUPPLY LINE, B96,B108,B114,B151,B159, B160,B164,B205,B234,B372,B424	2	11	SECTION 45, LWR FUSELAGE SUPPLY LINE	30-71-01
RELAY - (AMM 31-01-33, FIG. 101)				
SYS NO. 2 AIR/GND, K205				
RELAY - (AMM 31-01-37, FIG. 101)				
AFT WATERLINE HEATERS, K376				
FWD WATERLINE HEATERS, K372,K398,K1069				
MID WATERLINE HEATERS, K373,K374				
THERMOSTATS -				
AFT HEATER TAPE/RIBBON HEATER CONTROL, B93, B104	2	2	SECTION 46, LWR FUSELAGE DRAIN AND SUPPLY LINES	30-71-02
FWD HEATER TAPE/RIBBON HEATER CONTROL, B91, B264,B269	2	3	SECTION 41, LWR FUSELAGE SUPPLY LINE	30-71-02
MID HEATER TAPE/RIBBON HEATER CONTROL, B92	2	1	SECTION 45, LWR FUSELAGE SUPPLY LINE	30-71-02

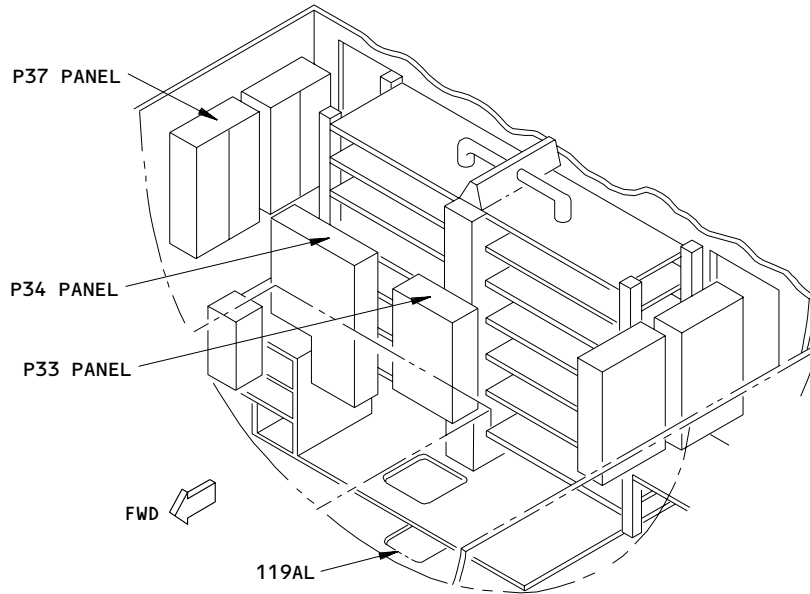
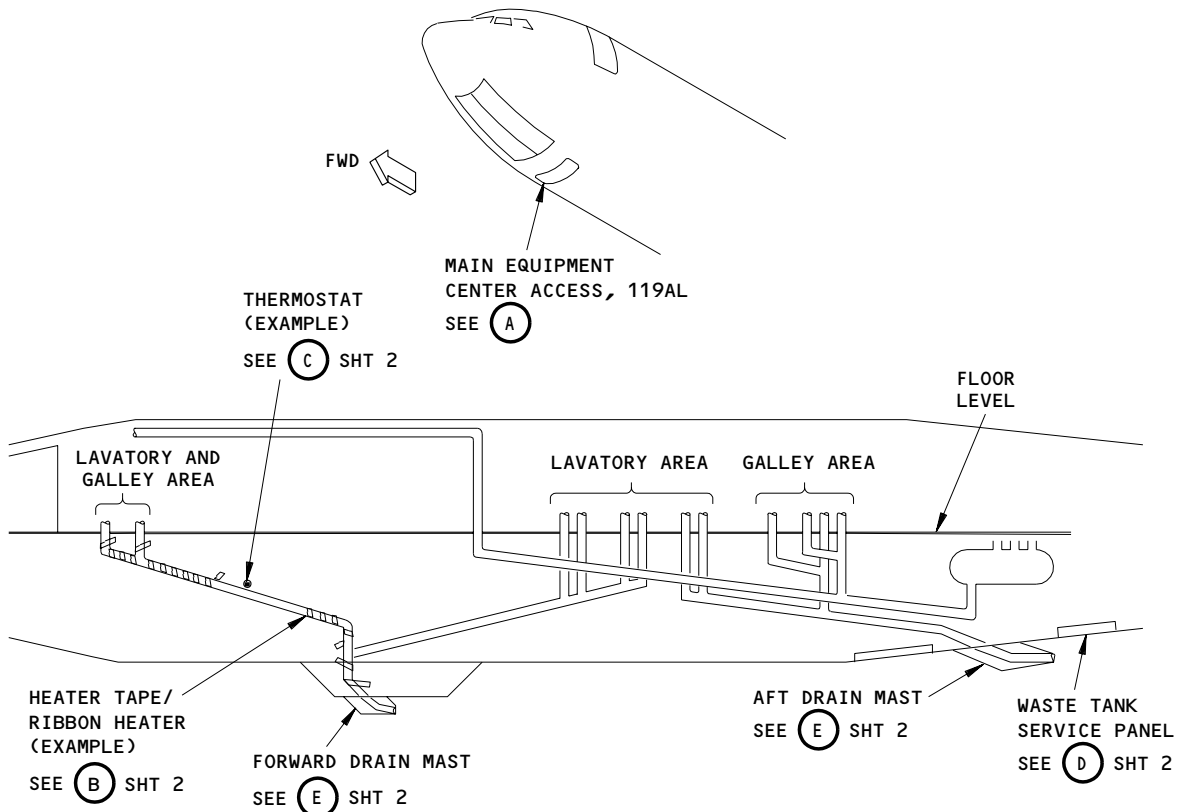
* SEE THE WDM EQUIPMENT LIST

Water And Drain Line Heaters - Component Index
Figure 101B

EFFECTIVITY
ALL SAS 767-200 AIRPLANES

30-71-00

BOEING
767
FAULT ISOLATION/MAINT MANUAL



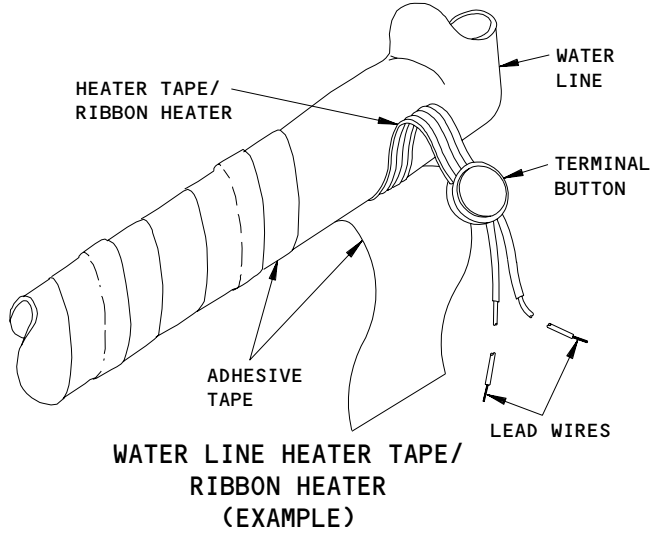
MAIN EQUIPMENT CENTER

(A)

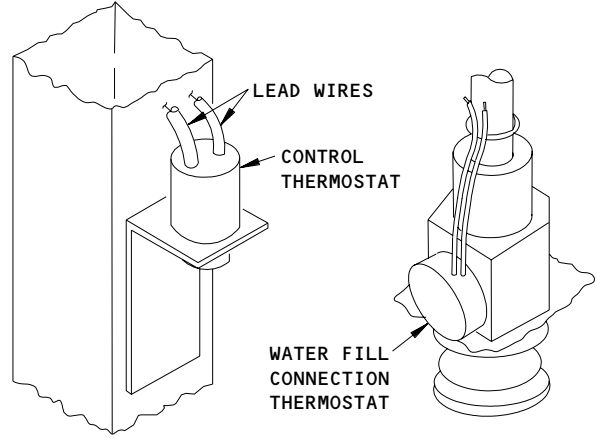
**Water and Drain Line Heaters - Component Location
Figure 102 (Sheet 1)**

EFFECTIVITY	ALL
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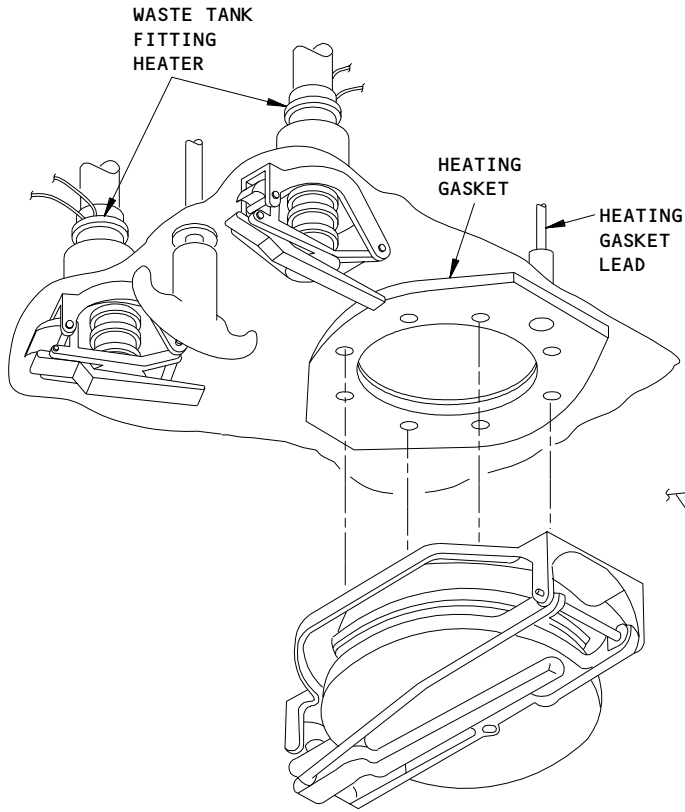
30-71-00



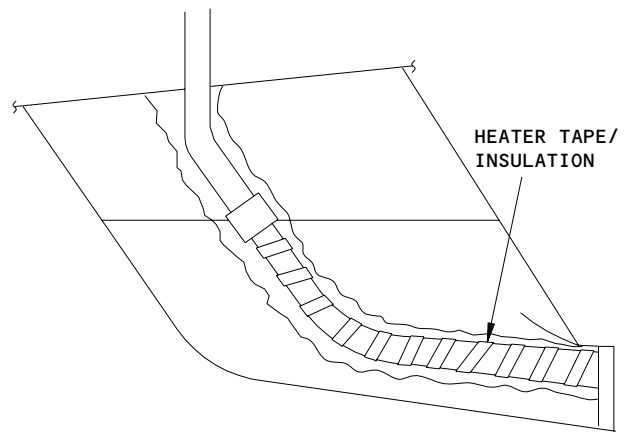
(B)



(C)



(D)

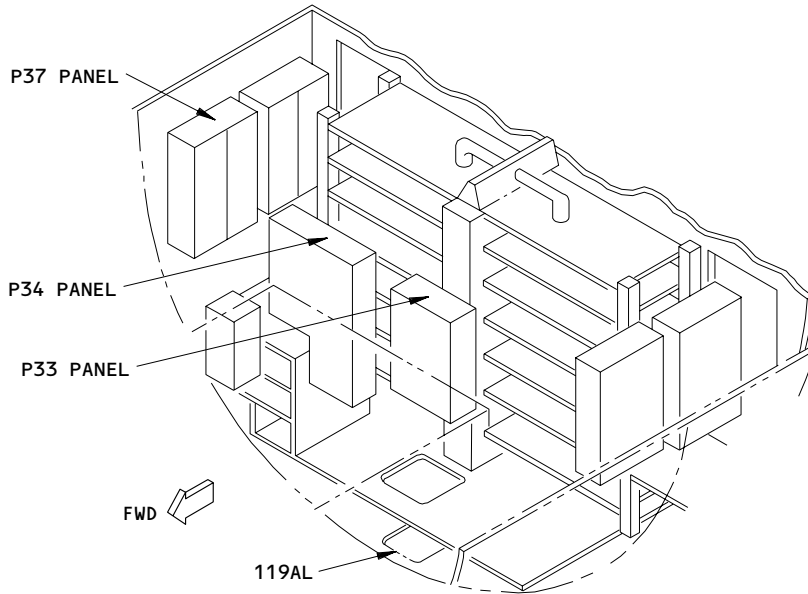
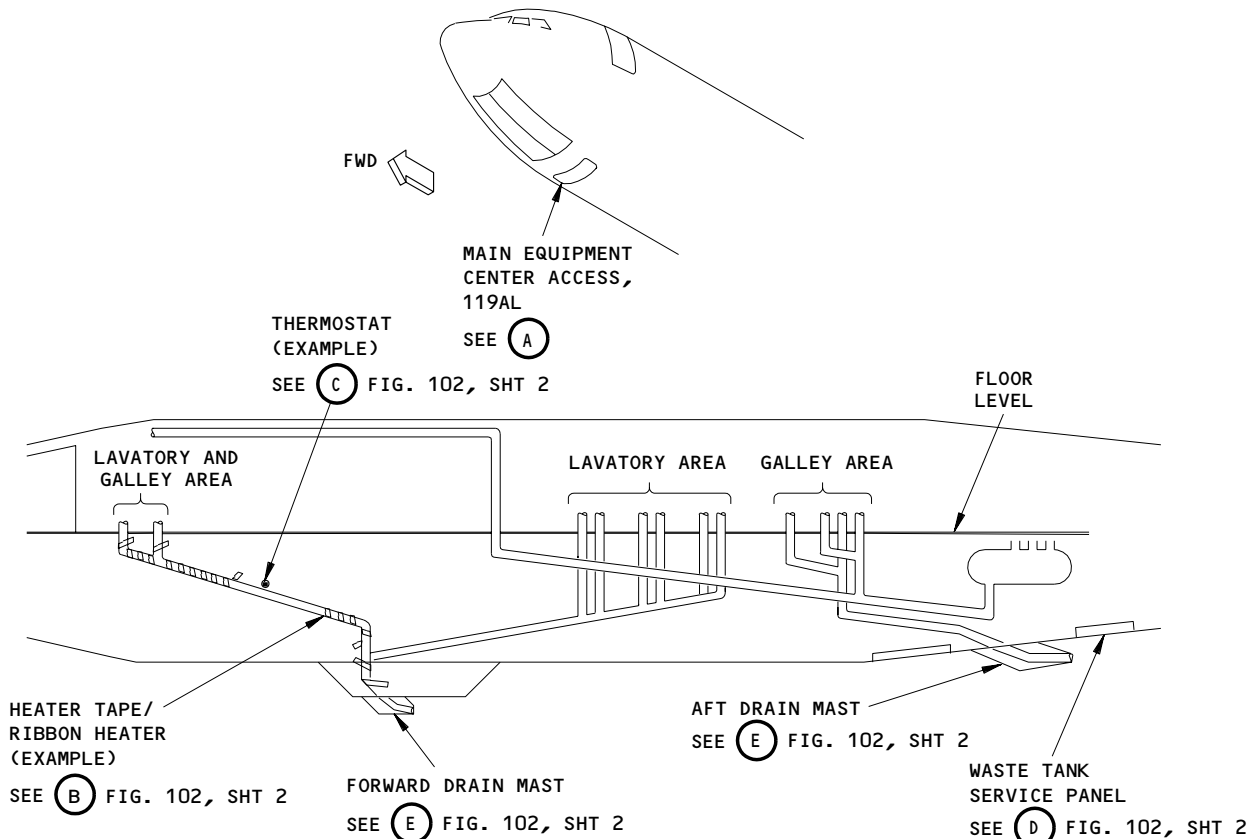


(E)

Water and Drain Line Heaters - Component Location
Figure 102 (Sheet 2)

EFFECTIVITY	ALL
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MAIN EQUIPMENT CENTER

(A)

Water and Drain Line Heaters - Component Location
Figure 102A

EFFECTIVITY	ALL
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30-71-00

WATER AND DRAIN LINE HEATERS – ADJUSTMENT/TEST

1. General

- A. This procedure has these tasks:
- (1) Drain Mast Adjustment and Test
 - (2) AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
Water Supply and Drain Line Heater Tapes Adjustment and Test
 - (3) AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
Water Supply Line Ribbon Heater Adjustment and Test
 - (4) Water Supply Line Heated Hose Adjutment and Test
 - (5) Water Supply Line In-Line Heater Adjustment and Test
 - (6) Waste Tank Service Fitting Heater Adjustment and Test
 - (7) Drain Pipe Gasket Heater Adjustment and Test
 - (8) Water Tank Heater Blanket Adjustment and Test

TASK 30-71-00-725-012

2. Drain Mast – Adjustment and Test

A. Equipment

- (1) Model IR – 16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin, Texas 78769 – 2963
- (2) Model 36 Ammeter – Clamp-on, Digital, Single Hand Operation
(Alternative
89536 Fluke John Mfg. Co. Inc.
6920 Seaway Blvd. Everett, Wa. 98206-9090
P.O. Box 9090

B. References

- (1) AMM 24-22-00/201, Manual Control Electrial Power
- (2) AMM 32-09-02/201, Air/GND Relay System
- (3) WDM 30-71-11, Drain Mast Heating

C. Access

- (1) Location Zones
 - (a) 123, Area Below Forward Cargo Compartment (Left)
 - (b) 156, Area Below Aft Cargo Compartment (Right)
- (2) Access Panels
 - (a) 119AL Main Equipment Center Access Door

D. Prepare for the Procedure

S 865-014

- (1) Supply the external power to the ground handling bus.

NOTE: If external power is not used, two generators are necessary. This is because load shedding removes power from the drain mast heater in the air mode.

- (a) Do this task: Supply and Remove External Power (AMM 24-22-00/201).

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S 015-002

- (2) Open the access door for the main equipment center, 119AL.

S 865-003

- (3) Open this circuit breaker on the P33 panel and attach a DO-NOT-CLOSE tag:
(a) 33A2, FLIGHT DRAIN MAST HEATING

S 725-023

WARNING: DO NOT TOUCH THE DRAIN MAST. WHEN THE DRAIN MAST HEATER OPERATES, THE DRAIN MAST IS SUFFICIENTLY HOT TO BURN YOU.

- (4) Make sure the forward drain mast is warm.
(a) You can verify its temperature with the Infrared heat tracer, or you can hold your hand near the drain mast to monitor its temperature.

S 725-015

- (5) Make sure the aft drain mast is warm.
(a) You can verify its temperature with the infrared heat tracer, or you can hold your hand near the drain mast to monitor its temperature.

S 865-016

- (6) Open this circuit breaker on the P33 panel and attach a DO-NOT-CLOSE tag:
(a) 33A1, GND DRAIN MAST HEATING

S 725-024

WARNING: DO NOT TOUCH THE DRAIN MAST. WHEN THE DRAIN MAST HEATER OPERATES, THE DRAIN MAST IS SUFFICIENTLY HOT TO BURN YOU.

- (7) Make sure the forward drain mast begins to cool.
(a) You can verify its temperature with the Infrared heat tracer, or you can hold your hand near the drain mast to monitor its temperature.

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S 725-018

- (8) Make sure the aft drain mast begins to cool.
(a) You can verify its temperature with the infrared heat tracer ,
or you can hold your hand near the drain mast to monitor its
temperature.

S 865-019

- (9) Remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) 33A2, FLIGHT DRAIN MAST HEATING

S 865-020

WARNING: YOU MUST DO THE STEPS IN THE TASK BELOW TO PREPARE THE
SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE
STEPS CORRECTLY WILL CAUSE THE AUTOMATIC OPERATION OF AIRPLANE
SYSTEMS. THIS WILL CAUSE INJURY TO PERSONS OR DAMAGE TO
EQUIPMENT.

CAUTION: DO NOT OPERATE THE DRAIN MAST HEATERS IN THE AIR MODE FOR MORE
THAN 5 MINUTES. THE DRAIN MASTS WILL BECOME TO HOT.

- (10) Put the airplane in the air mode. To put the airplane in the air
mode, do this task: Put the Air/Ground Relay System in the Air Mode
(AMM 32-09-02/201).

S 865-021

WARNING: DO NOT TOUCH THE DRAIN MAST. WHEN THE MAST HEATER OPERATES,
THE DRAIN MAST IS SUFFICIENTLY HOT TO BURN YOU.

- (11) Make sure the forward drain mast becomes hot.
(a) You can verify its temperature with the Infrared heat tracer,
or you can hold your hand near the drain mast to monitor its
temperature.

S 725-022

- (12) Make sure the aft drain mast becomes hot.
(a) You can verify its temperature with the Infrared heat tracer,
or you can hold your hand near the drain mast to monitor its
temperature.

S 865-025

- (13) Open this circuit breaker on the P33 panel and attach a DO-NOT-CLOSE
tag:
(a) 33A2, FLIGHT DRAIN MAST HEATING

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S 865-039

- (14) Put the airplane in the ground mode. To put the airplane in the ground mode, do this task: Put the Air/GND Relay System to the GND Mode (AMM 32-09-02/201).

S 725-026

WARNING: DO NOT TOUCH THE DRAIN MAST. IF YOU TOUCH IT YOU WILL BE BURNED.

- (15) Make sure the forward drain mast begins to cool.
(a) You can verify its temperature with the Infrared heat tracer, or you can hold your hand near the drain mast to monitor its temperature.

S 725-027

- (16) Make sure the aft drain mast begins to cool.
(a) You can verify its temperature with the infrared heat tracer, or you can hold your hand near the drain mast to monitor its temperature.

S 865-028

- (17) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) 33A1, GND MAST HEATING
(b) 33A2, FLIGHT DRAIN MAST HEATING

S 415-006

- (18) Close the access door for the main equipment center, 119AL.

S 845-076

- (19) Return the airplane back to its usual condition.

TASK 30-71-00-715-029

3. AIRPLANES WITH HEATER TAPE ON WATER AND DRAIN LINES;
Water Supply Line and Drain Line Heater Tape - Adjustment and Test

A. Equipment

- (1) Model IR-16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin Texas 78769-2963

B. Consumable Materials

- (1) G02319 Spray, Freeze - Miller Stephenson MS-242N
(2) G02320 Ice, Crushed

EFFECTIVITY

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C. References

- (1) AMM 06-46-00/201, Entry, Service, and Cargo Doors
- (2) AMM 24-22-00/201, Manual Control Electrical Power
- (3) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
- (4) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
- (5) AMM 53-01-01/401, Floor Panels
- (6) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (7) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (8) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters

#

D. Access

- (1) Location Zones
 - (a) Sub Zones 110, 120, 150, 160

NOTE: For exact heater locations refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.

- (2) Access Panels
 - (a) 119AL Main Equipment Center Access Door
 - (b) 811 Bulk Cargo Door (AMM 06-46-00/201).
 - (c) 821 Forward Cargo Door (AMM 06-46-00/201).

E. Prepare for the Procedure

S 865-030

- (1) Do this task: Supply Electrical Power (AMM 24-22-00/201).

S 015-031

- (2) Open the access door for the main equipment center, 119AL.

S 865-032

- (3) Open the applicable circuit breaker on the P33 panel and attach a DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.
 - (a) 33G1 FWD WATER LINE HTRS CB
 - 33G2 MID WATER LINE HTRS CB
 - 33G5 AFT WATER LINE HTRS CB

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S 865-099

- (4) Open the applicable circuit breaker on the P33 or P37 panel and attach a DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.

- (a) 33F1 OR 37J1 FWD WATER LINE HTRS CB
33G1 OR 37J2 MID WATER LINE HTRS CB
33G2 OR 37J3 MID WATER LINE HTRS CB
33G3 OR 37J4 MID WATER LINE HTRS CB
33G4 OR 37J5 MID WATER LINE HTRS CB
33G5 OR 37J6 MID WATER LINE HTRS CB
33G6 OR 37J7 AFT WATER LINE HTRS CB
33G7 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

- (b) 33G1 OR 37G1 FWD WATER LINE HTRS CB
33G2 OR 37G2 MID WATER LINE HTRS CB
33G3 OR 37G3 MID WATER LINE HTRS CB
37G4 MID WATER LINE HTRS CB
37G5 MID WATER LINE HTRS CB
33G5 OR 37G6 AFT WATER LINE HTRS CB
33G6 OR 37G7 AFT WATER LINE HTRS CB
33G7 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

S 845-034

- (5) Gain access to the applicable heater tape and control thermostat. (AMM 25-52-01/401, AMM 25-52-02/401, AMM 53-01-01/401)

S 855-033

- (6) If required, use spray, Miller Stephenson MS-242N or ice, crushed to make the temperature of the thermostat less than 30 degrees F (-1 degrees C).

NOTE: Allow 3 to 5 minutes for the temperature of the thermostat to decrease before you measure the temperature of the heater tapes. The thermostat must be kept at this temperature until the test for the heater tape is completed.

S 865-035

- (7) Close the applicable circuit breaker on the P33 panel and remove the DO-NOT-CLOSE tag:

- (a) 33G1 FWD WATER LINE HTRS CB
33G2 MID WATER LINE HTRS CB
33G5 AFT WATER LINE HTRS CB

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S 865-100

- (8) Close the applicable circuit breaker on the P33 or P37 panel and remove the DO-NOT-CLOSE tag:

(a) 33F1 OR 37J1 FWD WATER LINE HTRS CB
33G1 OR 37J2 MID WATER LINE HTRS CB
33G2 OR 37J3 MID WATER LINE HTRS CB
33G3 OR 37J4 MID WATER LINE HTRS CB
33G4 OR 37J5 MID WATER LINE HTRS CB
33G5 OR 37J6 AFT WATER LINE HTRS CB
33G6 OR 37J7 AFT WATER LINE HTRS CB
33G7 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

(b) 33G1 OR 37G1 FWD WATER LINE HTRS CB
33G2 OR 37G2 MID WATER LINE HTRS CB
33G3 OR 37G3 MID WATER LINE HTRS CB
37G4 MID WATER LINE HTRS CB
37G5 MID WATER LINE HTRS CB
33G5 OR 37G6 AFT WATER LINE HTRS CB
33G6 OR 37G7 AFT WATER LINE HTRS CB
33G7 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

S 725-036

- (9) Use the infrared heat tracer to measure the increase in the temperature.

or:

Feeling the heater tape to make sure it is warm.

S 415-042

- (10) Close the access door for the main equipment center, 119AL.

S 845-075

- (11) Return the airplane back to its usual condition.

TASK 30-71-00-715-112

4. AIRPLANES WITH RIBBON HEATERS ON WATER SUPPLY LINES;
Water Supply Line Ribbon Heater - Adjustment and Test

A. Equipment

- (1) Model IR-16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin Texas 78769-2963

B. Consumable Materials

- (1) G02319 Spray, Freeze - Miller Stephenson MS-242N

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03

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(2) G02320 Ice, Crushed

C. References

- (1) AMM 06-46-00/201, Entry, Service, and Cargo Doors
- (2) AMM 24-22-00/201, Manual Control Electrical Power
- (3) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
- (4) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
- (5) AMM 53-01-01/401, Floor Panels
- (6) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (7) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (8) WDM 30-71-23, Mid Water Supply Line and Drain Line Heaters
- (9) WDM 30-71-24, Aft Water Supply Line and Drain Line Heaters

D. Access

- (1) Location Zones
 - (a) Sub Zones 110, 120, 150, 160

NOTE: For exact heater locations refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23.

- (2) Access Panels
 - (a) 119AL, Main Equipment Center Access Door
 - (b) 811, Bulk Cargo Door (AMM 06-46-00/201).
 - (c) 821, Forward Cargo Door (AMM 06-46-00/201).

E. Prepare for the Procedure

S 865-113

- (1) Do this task: Supply Electrical Power (AMM 24-22-00/201).

S 015-114

- (2) Open the access door for the main equipment center, 119AL.

S 845-118

- (3) Gain access to the applicable ribbon heater and control thermostat. (AMM 25-52-01/401, AMM 25-52-02/401, AMM 53-01-01/401)

S 855-119

- (4) If required, use spray, Miller Stephenson MS-242N or ice, crushed to make the temperature of the thermostat less than 30 degrees F (-1 degrees C).

NOTE: Allow 3 to 5 minutes for the temperature of the thermostat to decrease before you measure the temperature of the heater tapes. The thermostat must be kept at this temperature until the test for the heater tape is completed.

S 725-123

- (5) Use the infrared heat tracer to measure the increase in the temperature.

or:

Feeling the heater tape to make sure it is warm.

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- S 415-124
(6) Close the access door for the main equipment center, 119AL.

- S 845-125
(7) Return the airplane back to its usual condition.

TASK 30-71-00-715-043

5. Water Supply Line Heated Hose - Adjustment and Test

A. Equipment

- (1) Model IR-16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin Texas 78769-2963

B. Consumable Materials

- (1) G02319 Spray, Freeze - Miller Stephenson MS-242N

C. References

- (1) AMM 06-46-00/201, Entry, Service, and Cargo Doors
(2) AMM 24-22-00/201, Manual Control Electrical Power
(3) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
(4) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
(5) AMM 53-01-01/401, Floor Panels
(6) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
(7) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
(8) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters
(9) WDM 30-71-24, Aft Water Supply Line and Drain Line Heaters

D. Access

- (1) Location Zones
(a) Sub Zones 110, 120, 150, 160

NOTE: For exact heater locations refer to WDM 30-71-21,
WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.

(2) Access Panels

- (a) 119AL Main Equipment Center Access Door

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- (b) 811 Bulk Cargo Door
- (c) 821 Forward Cargo Door

E. Prepare for the Procedure

S 865-045

- (1) Do this task: Supply Electrical Power (AMM 24-22-00/201)

S 015-046

- (2) Open the access door for the main equipment center, 119AL.

S 865-047

- (3) Open the applicable circuit breaker on the P33 panel and attach a DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.

- (a) 33G1 FWD WATER LINE HTRS CB
- 33G2 MID 1 WATER LINE HTRS CB
- 33G3 MID 2 WATER LINE HTRS CB
- 33G4 MID 3 WATER LINE HTRS CB
- 33G5 AFT 1 WATER LINE HTRS CB
- 33G6 AFT 2 WATER LINE HTRS CB
- 33G7 AFT 3 WATER LINE HTRS CB

S 865-101

- (4) Open the applicable circuit breaker on the P33 or P37 panel and attach a DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23.

- (a) 33F1 OR 37J1 FWD WATER LINE HTRS CB
- 33G1 OR 37J2 MID WATER LINE HTRS CB
- 33G2 OR 37J3 MID WATER LINE HTRS CB
- 33G3 OR 37J4 MID WATER LINE HTRS CB
- 33G4 OR 37J5 MID WATER LINE HTRS CB
- 33G5 OR 37J6 AFT WATER LINE HTRS CB
- 33G6 OR 37J7 AFT WATER LINE HTRS CB
- 33G7 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

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- S 845-102
- (5) Gain access to the applicable heated hose and its integral thermostat.
(AMM 25-52-01/401, AMM 25-52-02/401, AMM 53-01-01/401)
- S 725-049
- (6) If required, use spray, Miller Stephenson MS-242N to make the temperature of the thermostat less than 30 degrees F (-1 degrees C).

NOTE: Allow 3 to 5 minutes for the temperature of the thermostat to decrease before you measure the temperature of the heated hose. The thermostat must be kept at this temperature until the test for the heated hose is complete.

- S 865-103
- (7) Close the applicable circuit breaker on the P33 panel and remove the DO-NOT-CLOSE tag:
- (a) 33G1 FWD WATER LINE HTRS CB
 - 33G2 MID 1 WATER LINE HTRS CB
 - 33G3 MID 2 WATER LINE HTRS CB
 - 33G4 MID 3 WATER LINE HTRS CB
 - 33G5 AFT 1 WATER LINE HTRS CB
 - 33G6 AFT 2 WATER LINE HTRS CB
 - 33G7 AFT 3 WATER LINE HTRS CB

- S 865-104
- (8) Close the applicable circuit breaker on the P33 or P37 panel and remove the DO-NOT-CLOSE tag:
- (a) 33F1 OR 37J1 FWD WATER LINE HTRS CB
 - 33G1 OR 37J2 MID WATER LINE HTRS CB
 - 33G2 OR 37J3 MID WATER LINE HTRS CB
 - 33G3 OR 37J4 MID WATER LINE HTRS CB
 - 33G4 OR 37J5 MID WATER LINE HTRS CB
 - 33G5 OR 37J6 AFT WATER LINE HTRS CB
 - 33G6 OR 37J7 AFT WATER LINE HTRS CB
 - 33G7 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

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- S 725-050
- (9) Use the infrared heat tracer to measure the increase in the temperature.
or:
Feeling the heated hose to make sure it is warm.
- S 415-052
- (10) Close the access door for the main equipment center, 119AL.
- S 845-074
- (11) Return the airplane back to its usual condition.

TASK 30-71-00-715-054

6. Water Supply Line In-Line Heater - Adjustment and Test

A. Equipment

- (1) Model IR-16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin Texas 78769-2963
- (2) Model 36 Ammeter - Clamp-on, Digital, Single Hand Operation
(Alternative)
89536 Fluke John Mfg. Co. Inc.
6920 Seaway Blvd. Everett, Wa. 98206-9090
P.O.Box 9090

B. Consumable Materials

- (1) G02319 Spray, Freeze - Miller Stephenson MS-242N

C. References

- (1) AMM 06-46-00/201, Entry, Service, and Cargo Doors
(2) AMM 24-22-00/201, Manual Control Electrical Power
(3) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
(4) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters

D. Access

- (1) Location Zones
(a) Sub Zones 110, 120, 150, 160

NOTE: For exact heater location refer to WDM 30-71-22

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- (2) Access Panels
 - (a) 119AL Main Equipment Center Access Door
 - (b) 811 Bulk Cargo Door
 - (c) 821 Forward Cargo Door
- E. Prepare for the Procedure

S 865-055

- (1) Do this task: Supply Electrical Power (AMM 24-22-00/201)

S 015-056

- (2) Open the access door for the main equipment center, 119AL.

S 865-057

- (3) Open the this circuit breaker on the P33 panel and attach a DO-NOT-CLOSE tag:
 - (a) 33G2 MID 1 WATER LINE HTRS CB

S 865-105

- (4) Open the applicable circuit breaker on the P33 or P37 panel and attach a DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23.
 - (a) 33F1 OR 37J1 FWD WATER LINE HTRS CB
 - 33G1 OR 37J2 MID WATER LINE HTRS CB
 - 33G2 OR 37J3 MID WATER LINE HTRS CB
 - 33G5 OR 37J6 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

S 015-106

- (5) Remove the applicable cargo liners or floor panels to get access to the applicable in-line heater and its thermostat. (AMM 25-52-01/401, AMM 53-01-01/401 Floor Panel)

S 845-058

- (6) If required, use spray, Miller Stephenson MS-242N to make the temperature of the thermostat less than 40 degrees F (4 degrees C). The thermostat is in the thin tube between the controller body and the B-nut.

NOTE: Allow 3 to 5 minutes for the temperature of the thermostat to decrease before you measure the temperature or current of the in-line heater. Do this procedure as many times as necessary to make the thermostat sufficiently cool.

NOTE: You are permitted to use a clamp-on ammeter to measure the current in one of the lead wires to the in-line heater as an alternative procedure.

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- S 865-107
- (7) Close this circuit breaker on the P33 panel and remove the DO-NOT-CLOSE tag:
- (a) 33G2 MID 1 WATER LINE HTRS CB
- S 865-108
- (8) Close the applicable circuit breaker on the P33 or P37 panel and remove the DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23.
- (a) 33F1 OR 37J1 FWD WATER LINE HTRS CB
33G1 OR 37J2 MID WATER LINE HTRS CB
33G2 OR 37J3 MID WATER LINE HTRS CB
33G5 OR 37J6 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of two locations.

- S 725-059
- (9) Use the infrared heat tracer to measure the increase in the temperature.
or:
Model 36 ammeter to measure the current of the in-line heater.
- S 725-060
- (10) Make sure the current is 0.6 amps or more.
- S 415-062
- (11) Close the access door for the main equipment center, 119AL.
- S 845-073
- (12) Return the airplane back to its usual condition.

TASK 30-71-00-715-063

7. Waste Tank Service Fitting Heater - Adjustment and Test

A. Equipment

- (1) Model IR-16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin Texas 78769-2963

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B. Consumable Materials

- (1) G02319 Spray, Freeze - Miller Stephenson MS-242N

C. References

- (1) AMM 24-22-00/201, Manual Control Electrical Power
(2) AMM 25-52-01/401 Cargo Compartment Sidewall Lining
(3) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters

D. Access

- (1) Access Panels
119AL Main Equipment Center Access Door
163AL Waste Service Panel

E. Prepare for the Procedure

S 865-064

- (1) Do this task: Supply Electrical Power (AMM 24-22-00/201)

S 015-065

- (2) Open the access door for the main equipment center, 119AL.

S 865-066

- (3) Open this circuit breaker on the P33 panel and attach a DO-NOT-CLOSE tag:

(a) 33G5 AFT 1 WATER LINE HTRS CB

S 865-109

- (4) Open the applicable circuit breaker on the P33 or P37 panel and attach a DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-23.

(a) 33G7, 33G5 OR 37J6 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of three locations.

S 015-067

- (5) Gain access to the applicable rinse fitting heater and its thermostat.

(AMM 25-52-01/401)

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S 845-068

- (6) If required, use spray, Miller Stephenson MS-242N or crushed ice to make the temperature of the thermostat less than 40 degrees F (4 degrees C).

NOTE: Allow 3 to 5 minutes for the temperature of the thermostat to decrease before you measure the temperature of the rinse fitting heater.

S 865-069

- (7) Close this circuit breaker on the P33 panel and remove the DO-NOT-CLOSE tag:
(a) 33G5 AFT 1 WATER LINE HTRS CB

S 865-110

- (8) Close the applicable circuit breaker on the P33 or P37 panel and remove the DO-NOT-CLOSE tag: For the applicable circuit breaker refer to WDM 30-71-23.
(a) 33G7, 33G5 OR 37J6 AFT WATER LINE HTRS CB

NOTE: These circuit breakers can be in one of three locations.

S 725-070

- (9) Use the infrared heat tracer to measure the increase in the temperature.
or:
Feel the rinse fitting with your hand to make sure it is getting warm.

S 415-071

- (10) Close the access door for the main equipment center, 119AL.

S 845-072

- (11) Return the airplane back to its usual condition.

TASK 30-71-00-715-077

8. Drain Pipe Gasket Heater - Adjustment and Test

A. Equipment

- (1) Model IR-16L3 Infrared Heat Tracer
3M Austin Center
6801 River Place Blvd.
Austin Texas 78769-2963

B. References

- (1) AMM 24-22-00/201, Manual Control Electrical Power

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- (2) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters
- C. Access
 - (1) Access Panels
 - 163AL Waste Service Panel
- D. Prepare for the Procedure
 - S 865-078
 - (1) Do this task: Supply Electrical Power (AMM 24-22-00/201)
 - S 015-079
 - (2) Open the access door for the Waste Service Panel, 163AL.
 - S 865-080
 - (3) Make sure the waste drain gasket heater at the service drain cap is warm. There is no thermostat control for this heater.
 - S 725-081
 - (4) Use the infrared heat tracer to measure the temperature.
or:
Feel the heater gasket with your hand to make sure it is getting warm.
 - S 415-082
 - (5) Close the access door for the Waste Service Panel , 163AL.
 - S 865-083
 - (6) Return the airplane back to its usual condition.

TASK 30-71-00-715-084

9. Potable Water Tank Heater Blanket - Adjustment and Test

- A. Equipment
 - (1) Model 36 Ammeter - Clamp-on, Digital, Single Hand Operation (Alternative)
89536 Fluke John Mfg. Co. Inc.
6920 Seaway Blvd. Everett, Wa. 98206-9090
P.O.Box 9090
- B. Consumable Materials
 - (1) G02319 Spray, Freeze - Miller Stephenson MS-242N
 - (2) G02320 Ice, crushed
- C. References
 - (1) AMM 24-22-00/201, Manual Control Electrical Power
 - (2) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
- #
- D. Access
 - (1) Location Zones
 - 165 Area aft of Bulk Cargo Compartment (Left)
 - (2) Access Panels
 - (a) 119AL Main Equipment Center Access Door

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E. Prepare for the Procedure

S 865-085

- (1) Do this task: Supply Electrical Power (AMM 24-22-00/201)

S 015-086

- (2) Open the access door for the main equipment center, 119AL.

S 865-087

- (3) Open this circuit breaker on the P34 panel and attach a DO-NOT-CLOSE tag:
(a) 34P10 POTABLE WATER TANK HEATER CB

S 015-092

- (4) Gain access to the applicable water tank and its controller (AMM 25-52-01/401).

S 015-091

- (5) Remove the water tank heating blanket controller from the water tank. Do not disconnect the controller from the airplane wiring.

S 725-088

- (6) Install a clamp-on ammeter over each lead wire, primary circuit (orange) and secondary circuit (brown-gray) to the heating blanket controller.

S 725-096

- (7) If required, use spray, Miller Stephenson MS-242N or crushed ice to make the temperature of the thermostats, located on the back side of the controller, less than 33 degrees F (1 degree C).

NOTE: Allow 3 to 5 minutes for the temperature of the thermostat to decrease before you measure the current of the primary and secondary circuits.

S 865-093

- (8) Close this circuit breaker on the P34 panel and remove the DO-NOT-CLOSE tag:
(a) 34P10 POTABLE WATER TANK HEATER CB

S 725-089

- (9) Make sure the ammeter readings for primary circuit (orange) and secondary circuit (brown-gray) are 2 to 4 amps for main tank (on airplanes with auxiliary tank use 1 to 2 amps), and the forward, middle and aft heater blanket sections are becoming warm.

S 415-095

- (10) Remove the ammeter and install the water tank heating blanket controller.

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S 415-098

(11) Close the access door for the Main Equipment Center 119AL.

S 865-090

(12) Return the airplane back to its usual condition.

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WATER SUPPLY AND DRAIN LINE HEATER TAPES – REMOVAL/INSTALLATION

1. General (Fig. 401)

- A. The name "ribbon heater" and the name "heater tape" refer to the same product, typically the name "heater tape" refers to older types of heaters and the name "ribbon heater" refers to the new types of heaters. This procedure will refer to these heaters as heater tapes.
- B. This procedure has the following tasks:
 - (1) Removal of the heater tape from the water supply line and gray water drain line.
 - (2) Installation of the heater tapes on the water supply line and gray water drain line.
 - (3) Installation of foam insulation without a heater tape on the gray water drain line.
- C. The procedure for individual water line and drain line heater tapes are the same, except for the number of inches between the turns on the line. The number of inches between turns on the drain line or supply line is specified in the drawing and can be measured before the heater tape is removed and replaced.

TASK 30-71-01-004-034

2. Remove the Heater Tapes

- A. Equipment
 - (1) Container – to catch water (for Section 45)
 - (2) Pull-line (approximately 30 feet in length, for Section 45)
- B. References
 - (1) AMM 25-25-01/201, Passenger Seats
 - (2) AMM 25-27-01/401, Floor Covering
 - (3) AMM 25-52-01/401, Containerized Cargo Compartment Sidewall Lining
 - (4) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
 - (5) AMM 25-55-01/401, Bulk Cargo Compartment Sidewall Lining
 - (6) AMM 53-01-01/401, Floor Panels
 - (7) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
 - (8) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters

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ON WATER AND DRAIN LINES

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- (9) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters
- (10) WDM 30-71-24, Aft Water Supply Line and Water Tank Heaters

C. Access

- (1) Location Zones
 - (a) Sub Zones 110, 120, 150, 160

NOTE: For exact heater locations refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.

- (2) Access Panels
 - 119AL Main Equipment Center Access Door
 - 811 Bulk Cargo Door (AMM 06-46-00/201)
 - 821 Forward Cargo Door (AMM 06-46-00/201)
 - 822 Aft Cargo Door (AMM 06-46-00/201)

D. Prepare for Removal

S 014-070

- (1) Get access to the heater tapes.
 - (a) Remove the necessary floor or wall panels (AMM 25-25-01/201, AMM 25-27-01/401, AMM 25-52-01/401, AMM 25-52-02/401, AMM 25-55-01/401, AMM 53-01-01/401).
 - (b) Move insulation blankets as necessary

S 864-071

- (2) Open the applicable circuit breakers
 - (a) 33F1, 33G1, 33H1, 37J1, 37H1 FWD WATER LINE HEATERS CB
 - 33G1, 37J2, 34P2 MID WATER LINE HEATERS CB
 - 33G2, 37J3 MID WATER LINE HEATERS CB
 - 33G3, 33H2, 37J4, 34P4 MID WATER LINE HEATERS CB
 - 33G4, 33G5, 33H3, 37J5 MID WATER LINE HEATERS CB
 - 33F3, 33G4, 33G5, 37J6, 34P5 AFT WATER LINE HEATERS CB
 - 33G6, 37J7, 34P6 AFT WATER LINE HEATERS CB
 - 33G7, 37H3, 34P7 AFT WATER LINE HEATERS CB
 - 37H4, 37L4 AFT WATER LINE HEATERS CB
 - 37L5, 37L6 AFT WATER LINE HEATERS CB
 - 33F2, 34P8 GALLEY WATER LINE HEATERS CB

NOTE: These circuit breakers can be in one of two locations.

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 AIRPLANES WITH HEATER TAPE
 ON WATER AND DRAIN LINES

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E. Remove the heater tapes

S 024-072

- (1) If foam insulation is installed directly on the heater tape, remove the insulation from the water line to get access to the heater tape.

S 024-073

- (2) If the heater tape is wrapped spirally, measure the distance between wraps of the heater tape for reference to help with the new heater tape installation.

S 024-074

- (3) Remove the strap that holds the electrical leads to the water line or drain line.

S 024-075

- (4) Cut the electrical leads of the heater tape near the end of the heater tape.

NOTE: It is satisfactory to let the cut electrical leads stay where they are. This will help you to find the splice. The old electrical leads can then be removed when splice assembled with the new leads.

S 024-076

- (5) Remove the flame-resistant tape that holds the heater tape to the water line.

S 024-077

- (6) Remove the heater tape from the water line.

TASK 30-71-01-404-007

3. Install the Heater Tapes

A. Consumable Materials

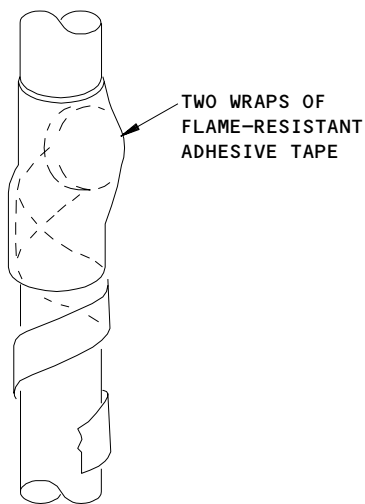
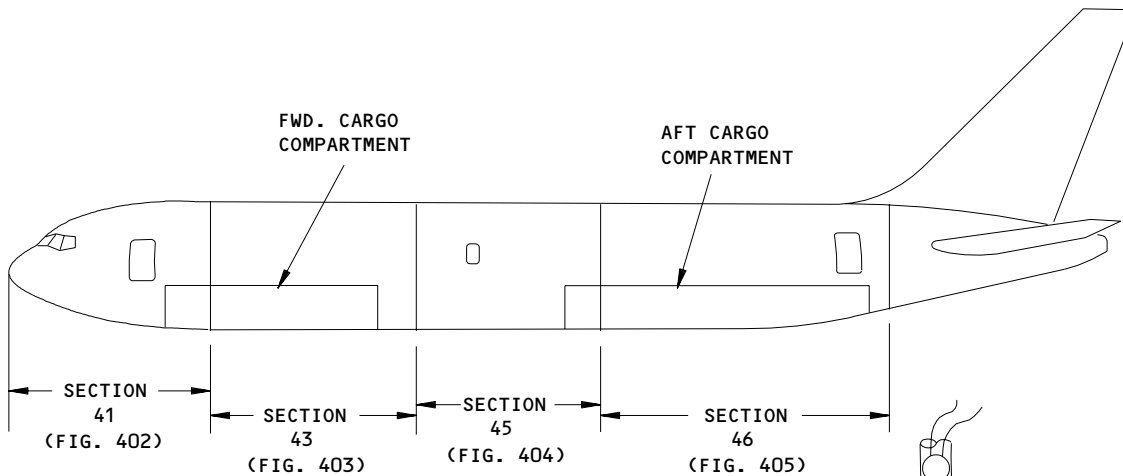
- (1) Plastic Strap (use one of these straps)
(a) MS3367 plastic strap

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

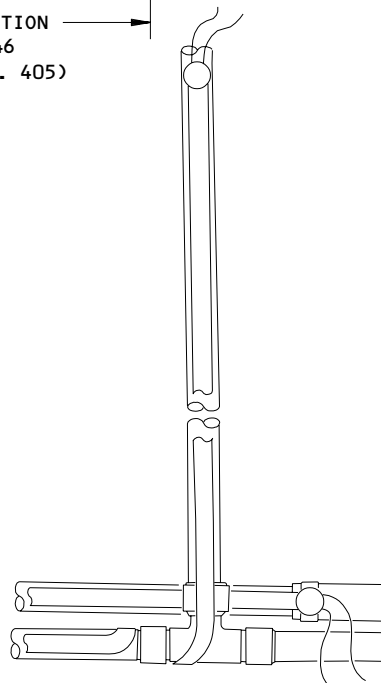
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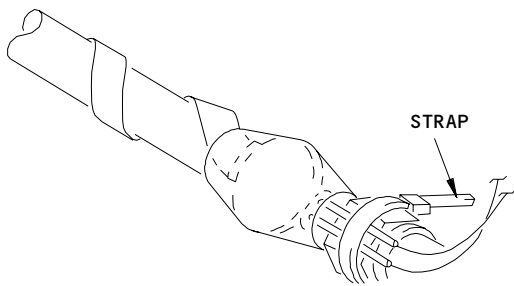
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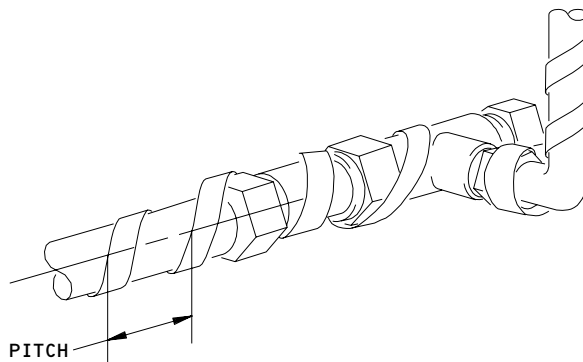
INSTALLATION OF THE ENDS OF THE HEATER TAPE (EXAMPLE)



LONGITUDINALLY INSTALLED HEATER TAPE (EXAMPLE)



STRAP INSTALLATION (EXAMPLE)

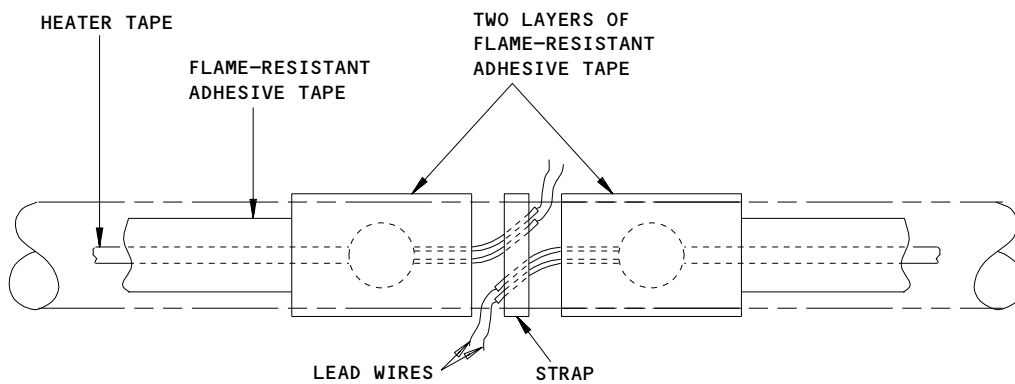
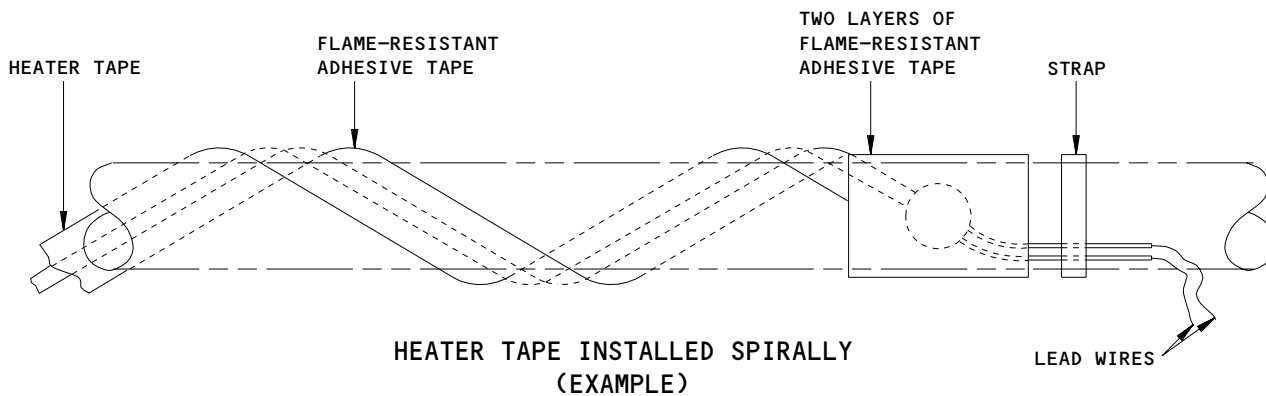


SPIRALLY WRAPPED HEATER TAPE (EXAMPLE)

Heater Tape Installation
Figure 401 (Sheet 1)

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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**HEATER TAPE INSTALLED LONGITUDINALLY
(EXAMPLE)**

Heater Tape Installation
Figure 401 (Sheet 2)

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

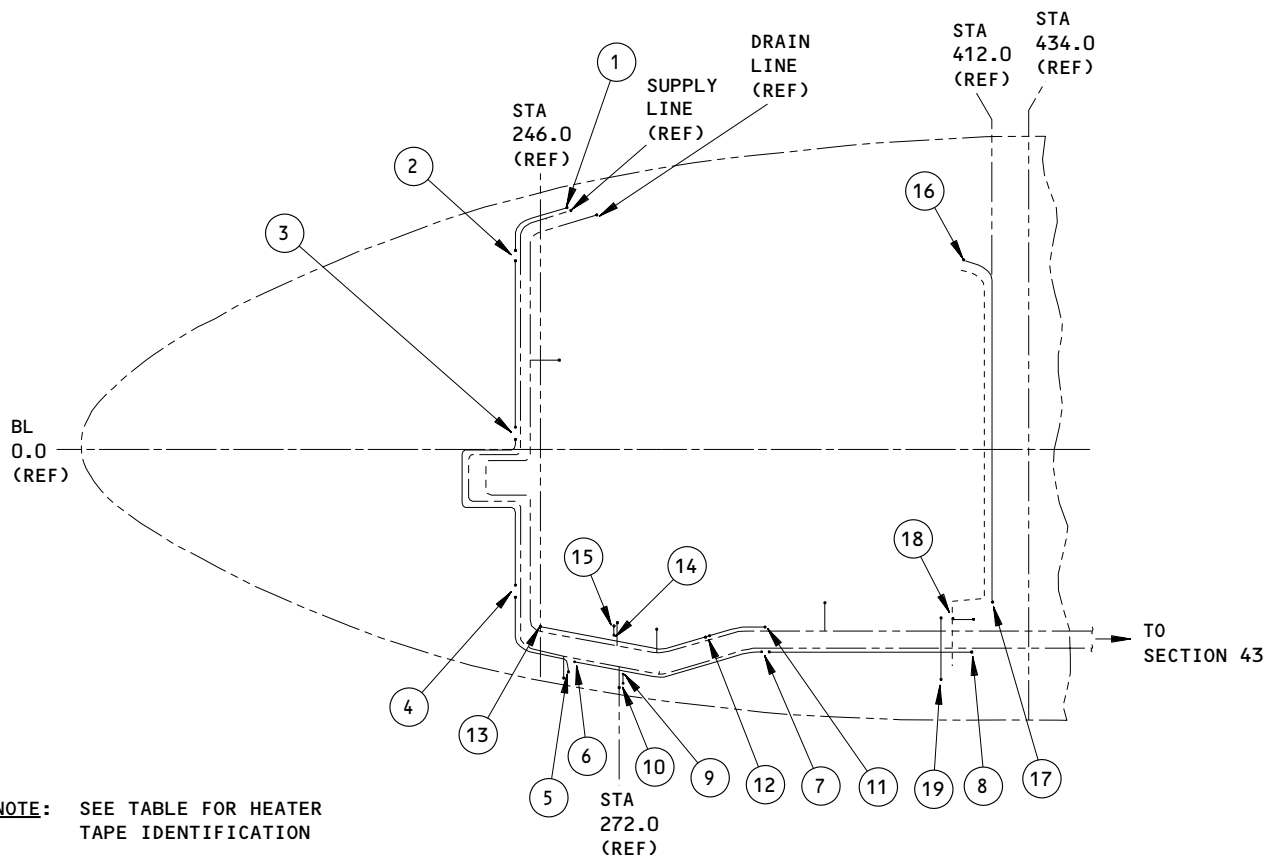
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SECTION 41

BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	2	B109	INSTALLED SPIRALLY WITH 1.3-INCH PITCH
2	3	2	B270	INSTALLED LONGITUDINALLY
3	4	4	B347	INSTALLED LONGITUDINALLY
4	5	5	B118	INSTALLED LONGITUDINALLY
6	7	7	B43	INSTALLED LONGITUDINALLY
7	8	7	B346	INSTALLED LONGITUDINALLY
9	10	9	B90	INSTALLED LONGITUDINALLY
11	12	11	B107	INSTALLED LONGITUDINALLY
12	13	12	B133	INSTALLED LONGITUDINALLY
14	15	14	B97	INSTALLED LONGITUDINALLY
16	17	17	B366	INSTALLED SPIRALLY WITH 7.75-INCH PITCH
17	18	18	B364	INSTALLED SPIRALLY WITH 4.75-INCH PITCH
17	18	18	B365	INSTALLED SPIRALLY WITH 4.75-INCH PITCH
18	19	18	B363	INSTALLED LONGITUDINALLY

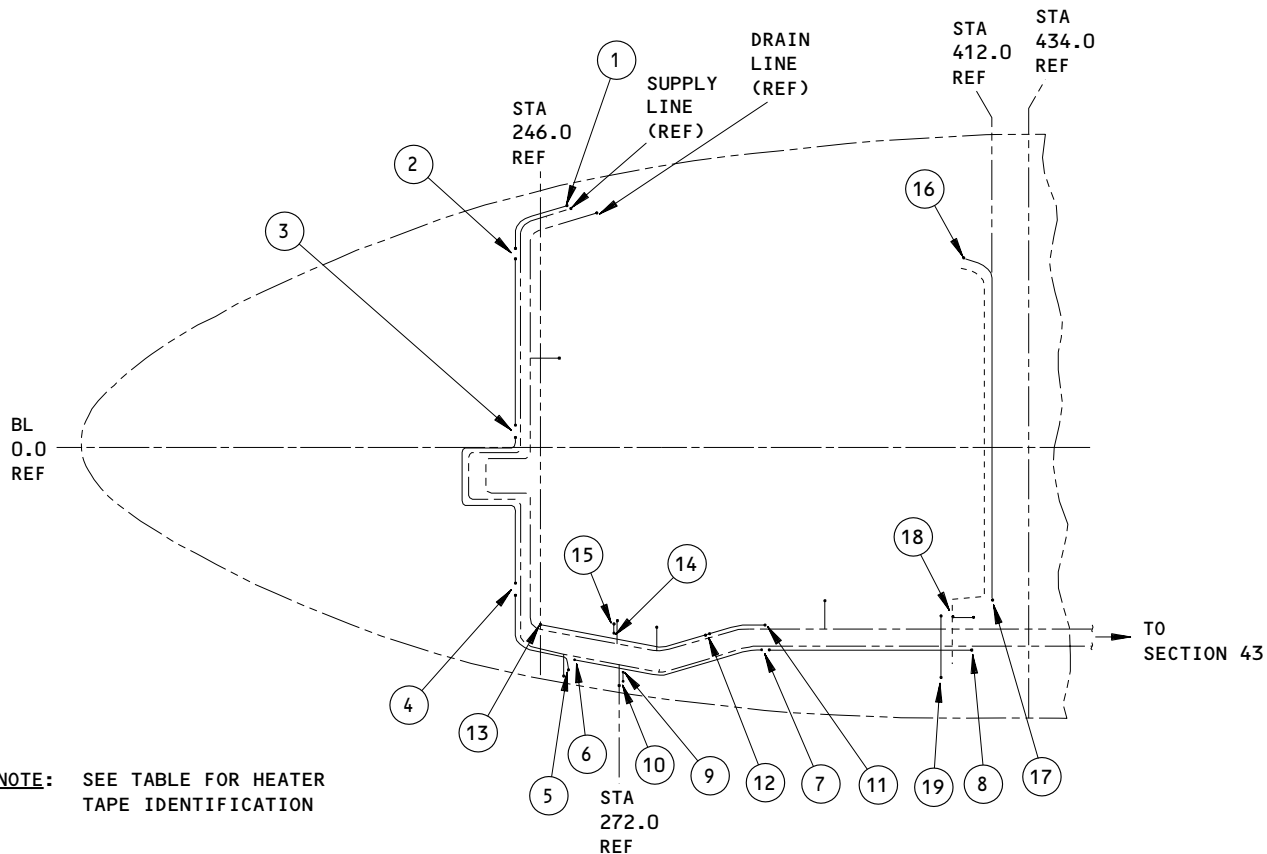
Heater Tape Installation - Section 41
Figure 402A

EFFECTIVITY
SAS 050-051 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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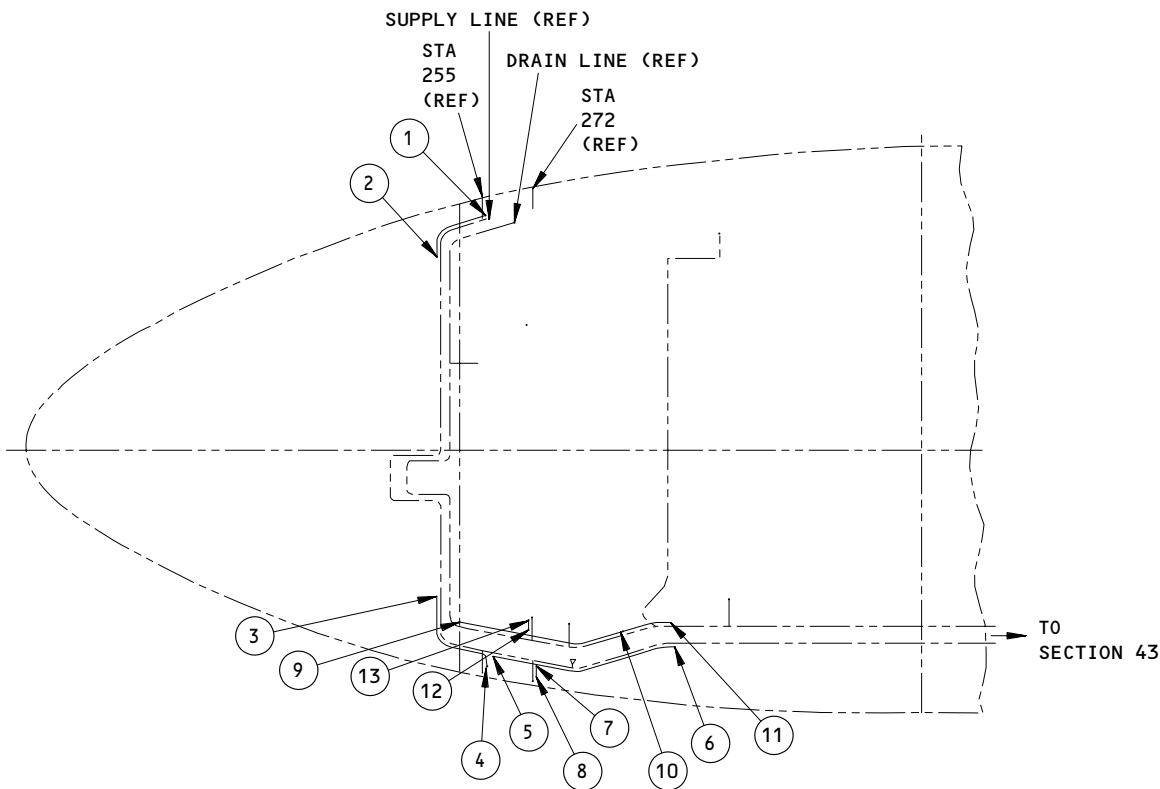
SECTION 41

BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	2	B109	INSTALLED SPIRALLY WITH 1.3-INCH PITCH
2	3	2	B270	INSTALLED LONGITUDINALLY
3	4	4	B347	INSTALLED LONGITUDINALLY
4	5	5	B118	INSTALLED LONGITUDINALLY
6	7	7	B43	INSTALLED LONGITUDINALLY
7	8	7	B346	INSTALLED LONGITUDINALLY
9	10	9	B90	INSTALLED LONGITUDINALLY
11	12	11	B107	INSTALLED LONGITUDINALLY
12	13	12	B133	INSTALLED LONGITUDINALLY
14	15	14	B97	INSTALLED LONGITUDINALLY
16	17	17	B366	INSTALLED SPIRALLY WITH 7.75-INCH PITCH
17	18	18	B364	INSTALLED SPIRALLY WITH 4.75-INCH PITCH
17	18	18	B365	INSTALLED SPIRALLY WITH 4.75-INCH PITCH
18	19	18	B363	INSTALLED LONGITUDINALLY

Heater Tape Installation - Section 41
Figure 402B

EFFECTIVITY
SAS 150-167 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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NOTE: SEE TABLE FOR HEATER TAPE IDENTIFICATION

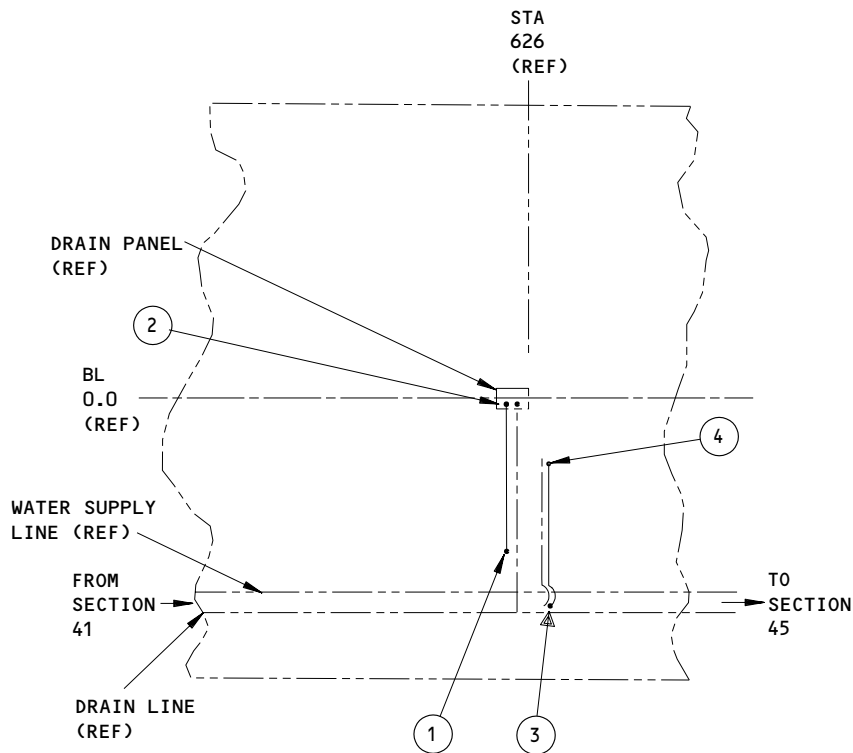
SECTION 41

BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	2	B109	INSTALLED SPIRALLY WITH 1.3-INCH PITCH
3	4	4	B118	INSTALLED LONGITUDINALLY
5	6	6	B43	INSTALLED LONGITUDINALLY
7	8	7	B90	INSTALLED LONGITUDINALLY
9	10	10	B133	INSTALLED LONGITUDINALLY
10	11	11	B107	INSTALLED LONGITUDINALLY
12	13	12	B97	INSTALLED LONGITUDINALLY

Heater Tape Installation - Section 41
Figure 402C

EFFECTIVITY
SAS 275-280 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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NOTE: SEE TABLE FOR HEATER TAPE IDENTIFICATION

SECTION 43

BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	2	B119	INSTALLED LONGITUDINALLY
3	4	4	B120	INSTALLED LONGITUDINALLY

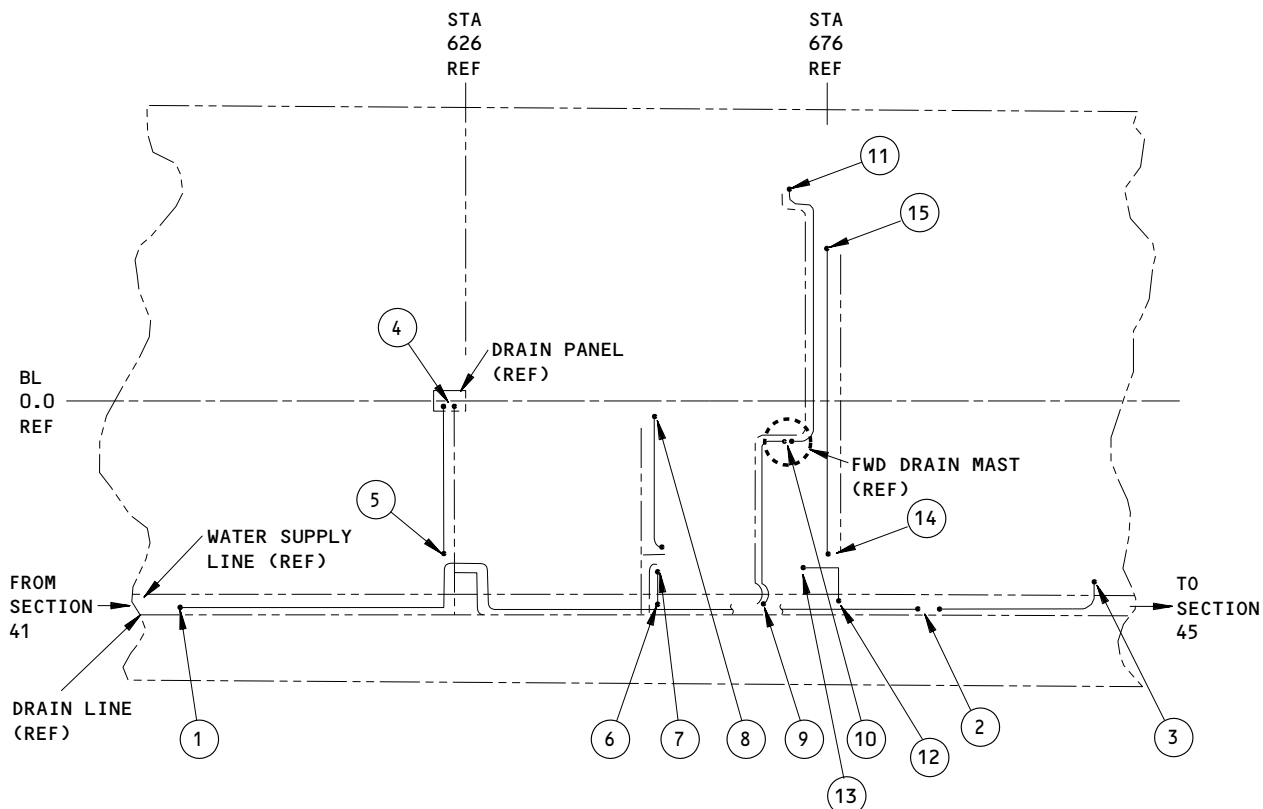
Heater Tape Identification - Section 43
Figure 403A

EFFECTIVITY
SAS 050-051 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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NOTE: SEE TABLE FOR HEATER TAPE IDENTIFICATION

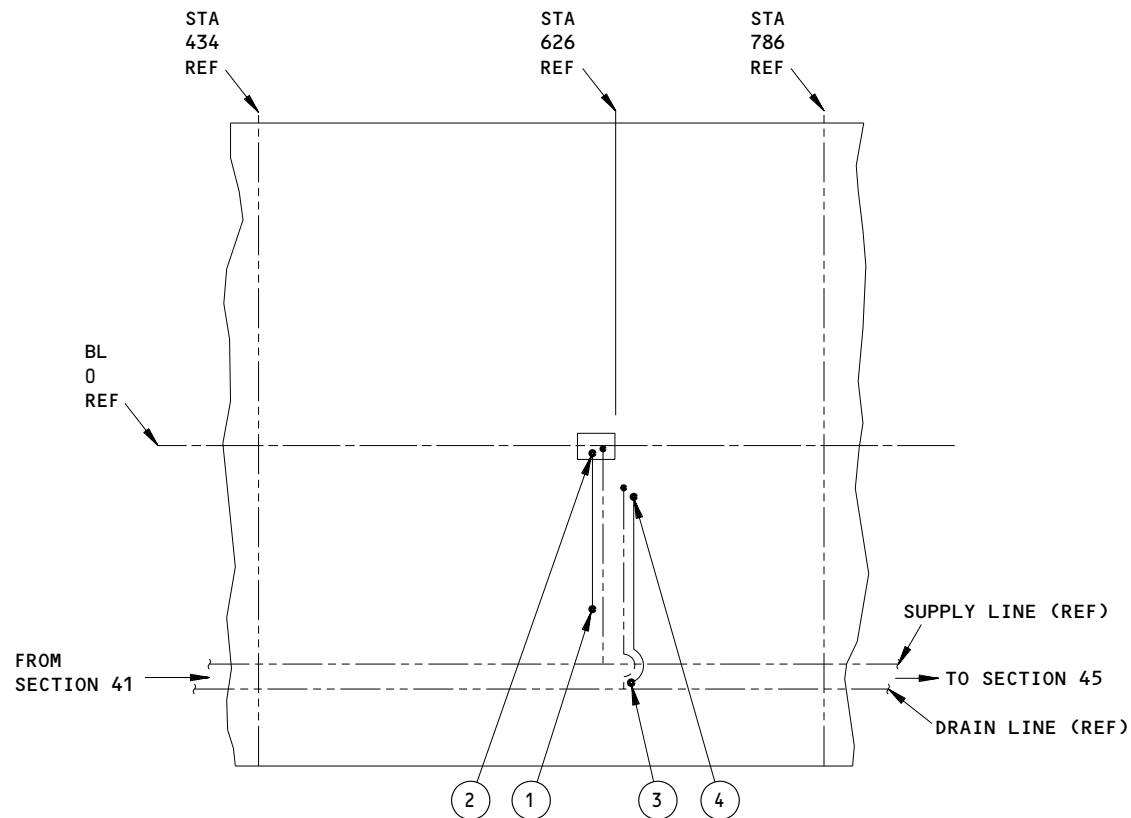
SECTION 43

BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	2	B351	INSTALLED LONGITUDINALLY
2	3	2	B350	INSTALLED LONGITUDINALLY
4	5	5	B119	INSTALLED LONGITUDINALLY
6	7	6	B353	INSTALLED LONGITUDINALLY
7	8	7	B373	INSTALLED LONGITUDINALLY
9	10	9	B120	INSTALLED LONGITUDINALLY
10	11	11	B260	INSTALLED LONGITUDINALLY
12	13	12	B374	INSTALLED LONGITUDINALLY
14	15	15	B375	INSTALLED LONGITUDINALLY

Heater Tape Identification - Section 43
Figure 403B

EFFECTIVITY
SAS 150-167 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01



NOTE: SEE TABLE FOR HEATER TAPE IDENTIFICATION

SECTION 43

BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	1	B119	INSTALLED LONGITUDINALLY
3	4	3	B120	INSTALLED LONGITUDINALLY

Heater Tape Installation - Section 43
Figure 403C

EFFECTIVITY
SAS 275-280 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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- (b) BACS38K plastic strap
- (2) Tape, Flame-Resistant (use one of these tapes)
 - (a) G02129, Permacel P-29 Tape - 1.5 inch wide
 - (b) G00295 3M No. 474
- (3) Tape, Protective (use one of these tapes)
 - (a) G02305, BMS5-149, Type I, Class 1
 - (b) G50327, BMS5-157, Type I, Grade B, Composition MPVF (or PVF)
- (4) BMS8-385, Type IV, Grade 1 foam insulation, 0.156 inch to 0.1875 inch thickness

B. References

- (1) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (2) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (3) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters
- (4) WDM 30-71-24, Aft Water Supply Line and Water Tank Heaters

C. Access

- (1) Location Zones
 - (a) Sub Zones 110, 120, 150, 160

NOTE: For exact heater locations refer to WDM 30-71-21, WDM 30-71-22, WDM 30-71-23, WDM 30-71-24.

- (2) Access Panels
 - 119AL Main Equipment Center Access Door
 - 811 Bulk Cargo Door (AMM 06-46-00/201)
 - 821 Forward Cargo Door (AMM 06-46-00/201)
 - 822 Aft Cargo Door (AMM 06-46-00/201)

D. Install the Heater Tapes in Sections 41, 43, 46 (Fig. 402,403,405)

S 024-078

- (1) If a heater tape will replace the foam insulation on a gray water drain line, then the foam insulation must be removed from the drain lines before the new heater tape is installed.

S 424-079

- (2) Put the end of the heater tape on the line and attach it with two wraps of flame-resistant adhesive tape.

S 424-080

- (3) Make wraps of the spirally installed heater tape around the water supply line or drain line at the same intervals the old heater tape was installed, unless otherwise noted in the Heater Tape Installation tables.

CAUTION: DO NOT LET THE HEATER TAPE MAKE AN OVERLAP WITH ITSELF. TOO MUCH HEAT CAN CAUSE DAMAGE TO THE HEATER TAPE OR OTHER EQUIPMENT.

- (a) Make sure to put the heater tape in position on the water supply line or gray water drain line in the same configuration that the old heater tape was installed, unless otherwise noted in the Heater Tape Installation tables.

NOTE: If the heater tape length is more than necessary, and the heater tape is installed spirally, the distance between the wraps can be shortened, but the heater tape must not make an overlap with itself.

NOTE: If the heater tape is installed longitudinally and it has extra length that extends beyond the end of the hose or tube, spirally wrap the excess tape. Heater tape on adjacent lines should be shifted to avoid contact with the spiral wrapped heater tape. If the heater tape extends beyond the point where another heater tape begins, lay excess tape parallel to, but at no point touching the other tape.

S 424-082

- (4) Attach the other end of the heater tape with two wraps of the flame-resistant adhesive tape.

S 424-083

- (5) For the heater tapes installed spirally, make wraps of the flame-resistant tape continuously along the length of the heater tape.

S 424-084

CAUTION: DO NOT INSTALL CLAMPS OR STRAPS FROM PLUMBING INSTALLATIONS OVER HEATER TAPE. DAMAGE TO THE HEATER TAPE CAN OCCUR.

- (6) For heater tapes installed longitudinally, make wraps of the flame-resistant tape at 7 inch intervals to hold the heater tape in its position, then put a length of flame-resistant tape along the center of the heater tape.

S 424-085

- (7) Find the splice area and make a splice of the electrical leads. Refer to SWPM 20-30-12 as an acceptable procedure.

S 424-086

- (8) Attach the lead wires to the water line with a MS3367 plastic strap.

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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S 424-087

- (9) If foam insulation was installed initial heater tape installation
- (a) Install new BMS8-385, Type IV, Grade 1, foam insulation, 0.156 inch to 0.1875 inch thickness, on the water line.
 - (b) Make wraps of new BMS5-157 tape, G50327 along the length of the foam insulation.

S 424-089

CAUTION: DO NOT COVER SPIRALLY WRAPPED HEATER TAPES WITH FOAM INSULATION. DAMAGE TO THE HEATER TAPE FROM TOO MUCH HEAT CAN OCCUR.

- (10) Make sure that the foam insulation is fully covered by the BMS5-157 tape.

S 424-090

CAUTION: WHERE POSSIBLE, MAKE SURE THAT THE CLEARANCE BETWEEN THE HEATER TAPES AND THE INSULATION BLANKET IS 1 INCH MINIMUM. INCORRECT INSTALLATION OF THE HEATER TAPE CAN CAUSE TOO MUCH HEAT AND CAUSE DAMAGE TO THE INSULATION BLANKET OR HEATER OR HEATER TAPE FAILURE.

- (11) ALL AIRPLANES PRE SEP 2, 2003 FAR STANDARD - AIRPLANES WITHOUT FAR 25.856 AND FAR 121.1.312(e) COMPLIANT THERMAL/ACOUSTIC INSULATION MATERIALS;

If the insulation blankets are out of their position, put the insulation blankets into their correct position and seal the gaps between the blankets with the BMS5-157 tape, G50327.

S 424-091

CAUTION: WHERE POSSIBLE, MAKE SURE THAT THE CLEARANCE BETWEEN THE HEATER TAPES AND THE INSULATION BLANKET IS 1 INCH MINIMUM. INCORRECT INSTALLATION OF THE HEATER TAPE CAN CAUSE TOO MUCH HEAT AND CAUSE DAMAGE TO THE INSULATION BLANKET OR HEATER OR HEATER TAPE FAILURE.

- (12) ALL AIRPLANES AFTER SEP 2, 2003 FAR STANDARD - AIRPLANES WITH FAR 25.856 AND FAR 121.1.312(e) COMPLIANT THERMAL/ACOUSTIC INSULATION MATERIALS;

If the insulation blankets are out of their position, put the insulation blankets into their correct position and seal the gaps between the blankets with the BMS5-149 tape, G02305, or the BMS5-157 tape, G50327.

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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E. Install the heater tapes on water lines in shrouds - Section 45 (Fig. 404)

S 424-092

- (1) Put the end of the heater tape on the line and attach it with two wraps of flame-resistant adhesive tape.

S 424-093

- (2) Make wraps of the heater around the water supply line or drain line at the same intervals the old heater tape was installed.

S 424-096

CAUTION: DO NOT LET THE HEATER TAPE MAKE AN OVERLAP WITH ITSELF. TOO MUCH HEAT CAN CAUSE DAMAGE TO THE HEATER TAPE OR OTHER EQUIPMENT.

- (3) Make sure to put the heater tape in position on the water supply line or gray water drain line in the same configuration that the old heater tape was installed.

NOTE: If heater tapes will replace the foam insulation on a gray water drain lines, then the foam insulation must be removed from the drain line before the new heater tape is installed.

NOTE: If the heater tape length is more than necessary, and the heater tape is installed spirally, the distance between the wraps can be shortened, but the heater tape must not make an overlap with itself.

S 424-097

- (4) Attach the other end of the heater tape with two wraps of the flame-resistant adhesive tape.

S 424-098

- (5) For heater tapes installed spirally, make wraps of the flame-resistant tape continuously along the length of the heater tape.

S 424-099

CAUTION: DO NOT INSTALL CLAMPS OR STRAPS FROM PLUMBING INSTALLATIONS OVER HEATER TAPE. DAMAGE TO THE HEATER TAPE CAN OCCUR.

- (6) For heater tapes installed longitudinally, make wraps of the flame resistant tape at 7 inch intervals to hold the heater tape in its position, then put a length of flame-resistant tape along the center of the heater tape.

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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S 424-100

- (7) Install the water supply line into the shroud.

S 024-101

- (8) Remove old electrical leads and install new leads with a splice.

TASK 30-71-01-404-102

4. Install the foam insulation

A. General

- (1) This procedure gives the instructions to install foam insulation on gray water drain lines without heater tape.

B. Consumable Materials

- (1) Tape, Protective (use one of these tapes):
 - (a) G02305, BMS5-149, Type I, Class 1
 - (b) G50327, BMS5-157, Type I, Grade B, Composition MPVF (or PVF)
- (2) BMS8-300, Type II, foam insulation, 0.25 inch thickness

C. References

- (1) AMM 06-46-00/201, Entry, Service, and Cargo Doors
- (2) AMM 24-22-00/201, Control (Supply Power)
- (3) AMM 25-25-01/201, Passenger Seats
- (4) AMM 25-27-01/401, Floor Covering
- (5) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
- (6) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
- (7) AMM 25-55-01/401, Bulk Cargo Compartment Sidewall Lining
- (8) AMM 30-71-00/501, Water and Drain Line Heaters
- (9) AMM 53-01-01/401, Floor Panels

D. Install the foam insulation

S 424-103

- (1) Install insulation foam, BMS8-300, Type II, 0.25 inch thickness on the drain lines

S 424-104

- (2) Make wraps of new BMS5-157 tape, G50327 along the length of the foam insulation in its position

S 424-105

- (3) Make sure that the foam insulation is fully covered by the BMS5-157 tape

EFFECTIVITY
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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E. Put the airplane back to its usual condition

S 864-106

(1) Close the applicable circuit breakers

(a) 33F1, 33G1, 33H1, 37J1, 37H1	FWD WATER LINE HEATERS	CB
33G1, 37J2, 34P2	MID WATER LINE HEATERS	CB
33G2, 37J3	MID WATER LINE HEATERS	CB
33G3, 33H2, 37J4, 34P4	MID WATER LINE HEATERS	CB
33G4, 33G5, 33H3, 37J5	MID WATER LINE HEATERS	CB
33F3, 33G4, 33G5, 37J6, 34P5	AFT WATER LINE HEATERS	CB
33G6, 37J7, 34P6	AFT WATER LINE HEATERS	CB
33G7, 37H3, 34P7	AFT WATER LINE HEATERS	CB
37H4, 37L4	AFT WATER LINE HEATERS	CB
37L5, 37L6	AFT WATER LINE HEATERS	CB
33F2, 34P8	GALLEY WATER LINE HEATERS	CB

NOTE: These circuit breakers can be in one of two locations.

S 714-107

(2) Do a test of the heater tape operation (AMM 30-71-00/501)

S 424-108

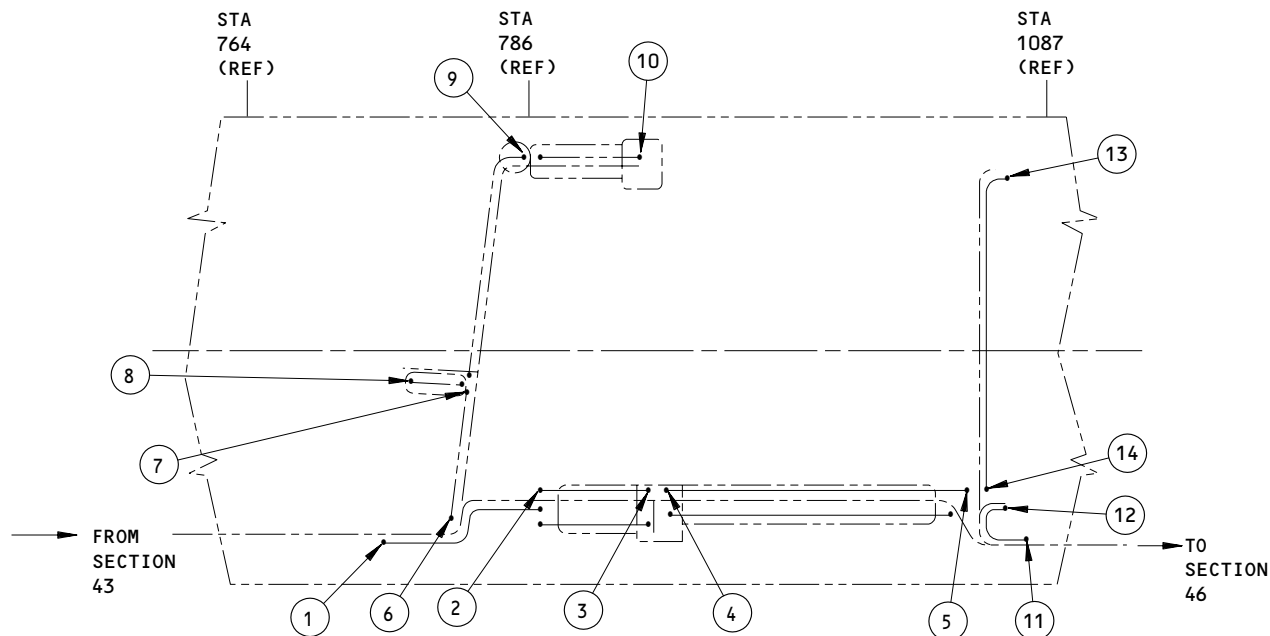
(3) Install the floor and wall panels which you have removed (AMM 25-25-01/201, AMM 25-27-01/401, AMM 25-52-01/401, AMM 25-52-02/401, AMM 25-55-01/401, AMM 53-01-01/401)

S 864-109

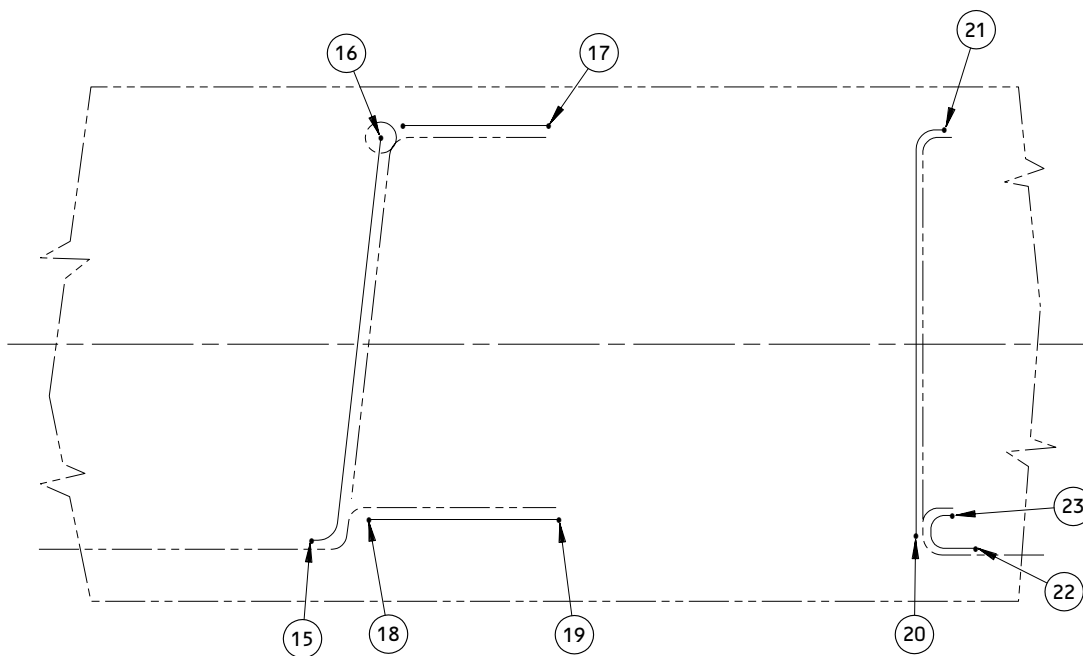
(4) Remove electrical power, if it is not necessary (AMM 24-22-00/201)

EFFECTIVITY
 AIRPLANES WITH HEATER TAPE
 ON WATER AND DRAIN LINES

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SECTION 45 - SUPPLY LINES



SECTION 45 - DRAIN LINES

NOTE: SEE SHEET 2 FOR HEATER TAPE IDENTIFICATION.

Heater Tape Installation - Section 45
Figure 404A (Sheet 1)







EFFECTIVITY
SAS 050-051 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01


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BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	1	B164	INSTALLED LONGITUDINALLY
2	3	2	B159	INSTALLED LONGITUDINALLY 
2	3	2	B160	INSTALLED LONGITUDINALLY 
4	5	5	B96	INSTALLED LONGITUDINALLY 
4	5	5	B108	INSTALLED LONGITUDINALLY 
6	7	6	B372	INSTALLED LONGITUDINALLY
7	8	7	B205	INSTALLED SPIRALLY WITH 2.25-INCH PITCH 
7	9	7	B114	INSTALLED LONGITUDINALLY
9	10	9	B234	INSTALLED LONGITUDINALLY 
11	12	11	B424	INSTALLED LONGITUDINALLY
14	13	14	B151	INSTALLED LONGITUDINALLY
15	16	15	B131	INSTALLED LONGITUDINALLY
16	17	16	B421	INSTALLED LONGITUDINALLY
18	19	18	B135	INSTALLED LONGITUDINALLY
20	21	20	B422	INSTALLED LONGITUDINALLY
22	23	22	B423	INSTALLED LONGITUDINALLY

HEATER TAPE IDENTIFICATION

 SHROUDED LINE

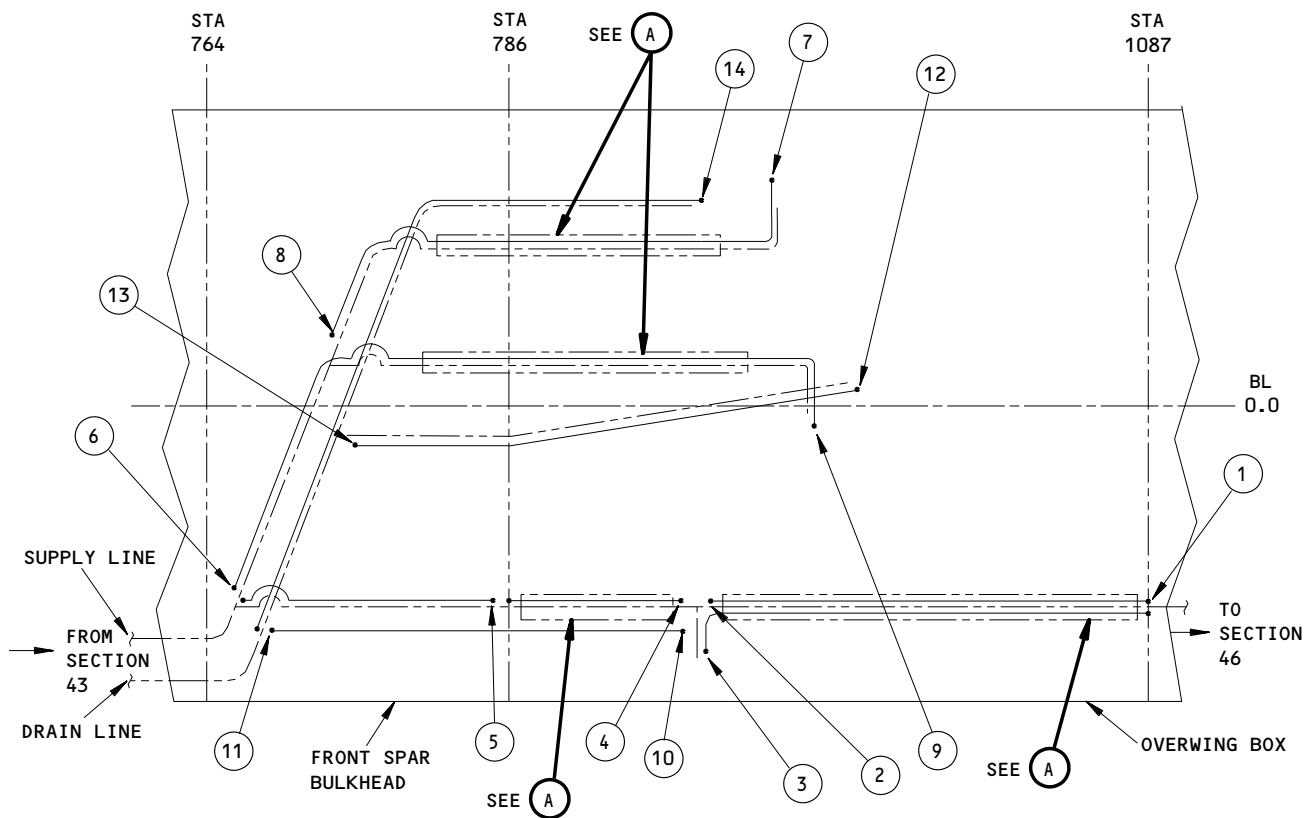
Heater Tape Installation - Section 45
Figure 404A (Sheet 2)

EFFECTIVITY
SAS 050-051 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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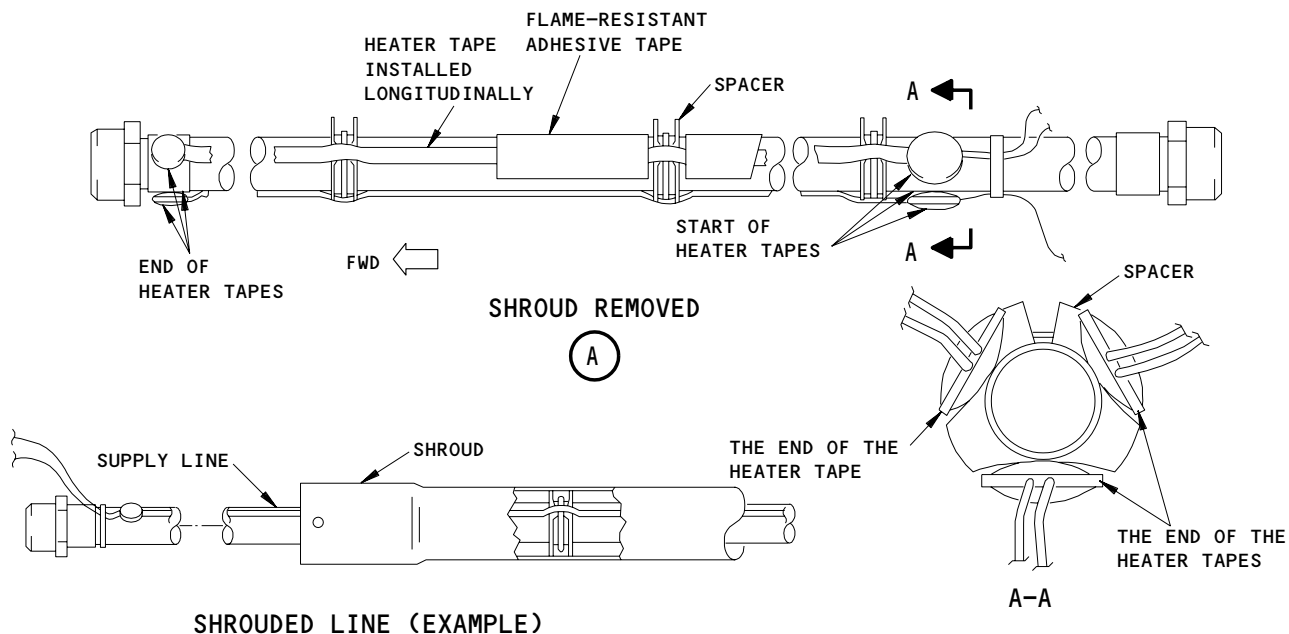
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NOTE: SEE SHEET 2 FOR HEATER TAPE IDENTIFICATION.

SECTION 45



Heater Tape Installation - Section 45
Figure 404B (Sheet 1)








EFFECTIVITY
SAS 150-167 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES


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BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	1	B108	INSTALLED LONGITUDINALLY 
1	2	1	B96	INSTALLED LONGITUDINALLY 
1	3	1	B151	INSTALLED LONGITUDINALLY 
4	5	5	B159	INSTALLED LONGITUDINALLY 
4	5	5	B160	INSTALLED LONGITUDINALLY 
4	5	5	B161	INSTALLED LONGITUDINALLY 
5	6	6	B370	INSTALLED LONGITUDINALLY
7	8	7	B371	INSTALLED LONGITUDINALLY
9	6	6	B372	INSTALLED LONGITUDINALLY 
10	11	10	B367	INSTALLED LONGITUDINALLY
12	13	13	B368	INSTALLED LONGITUDINALLY
14	11	11	B369	INSTALLED LONGITUDINALLY

 SHROUDED LINE

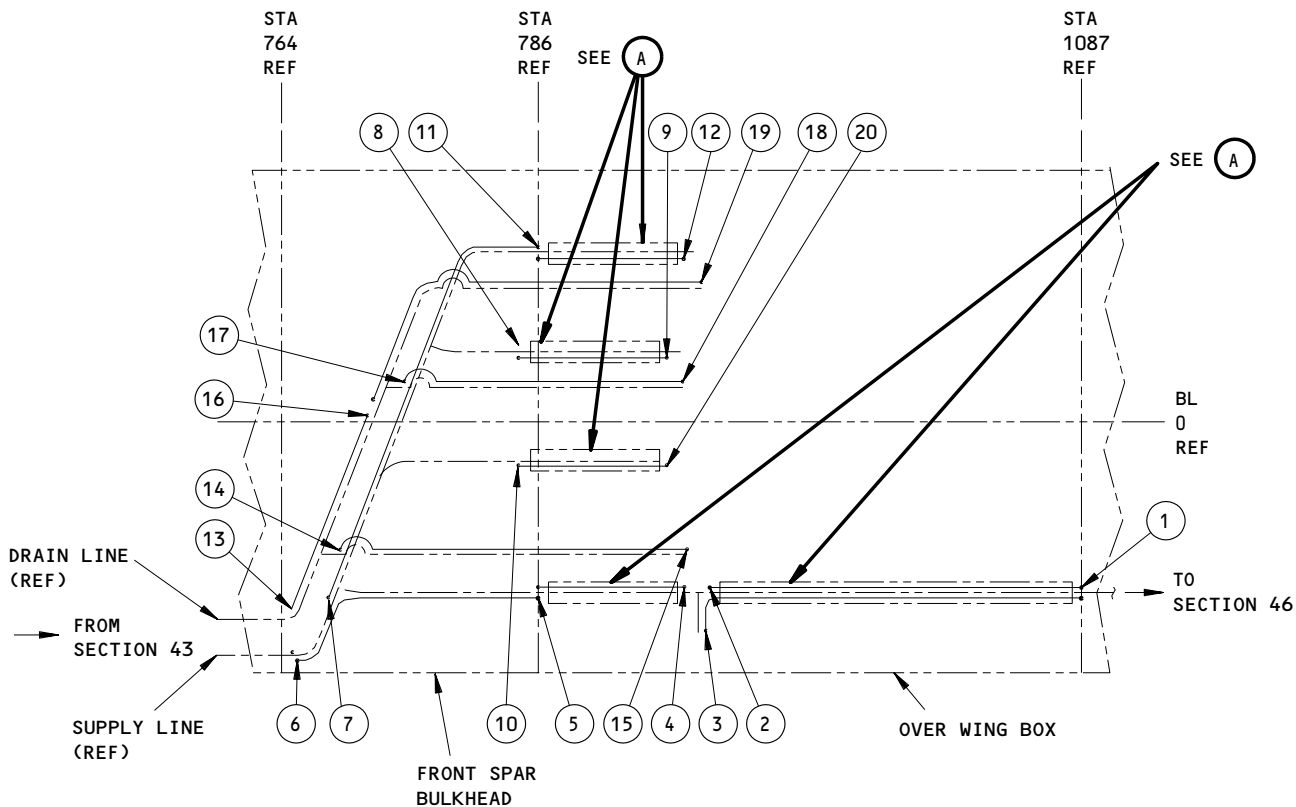
Heater Tape Installation - Section 45
Figure 404B (Sheet 2)

EFFECTIVITY
SAS 150-167 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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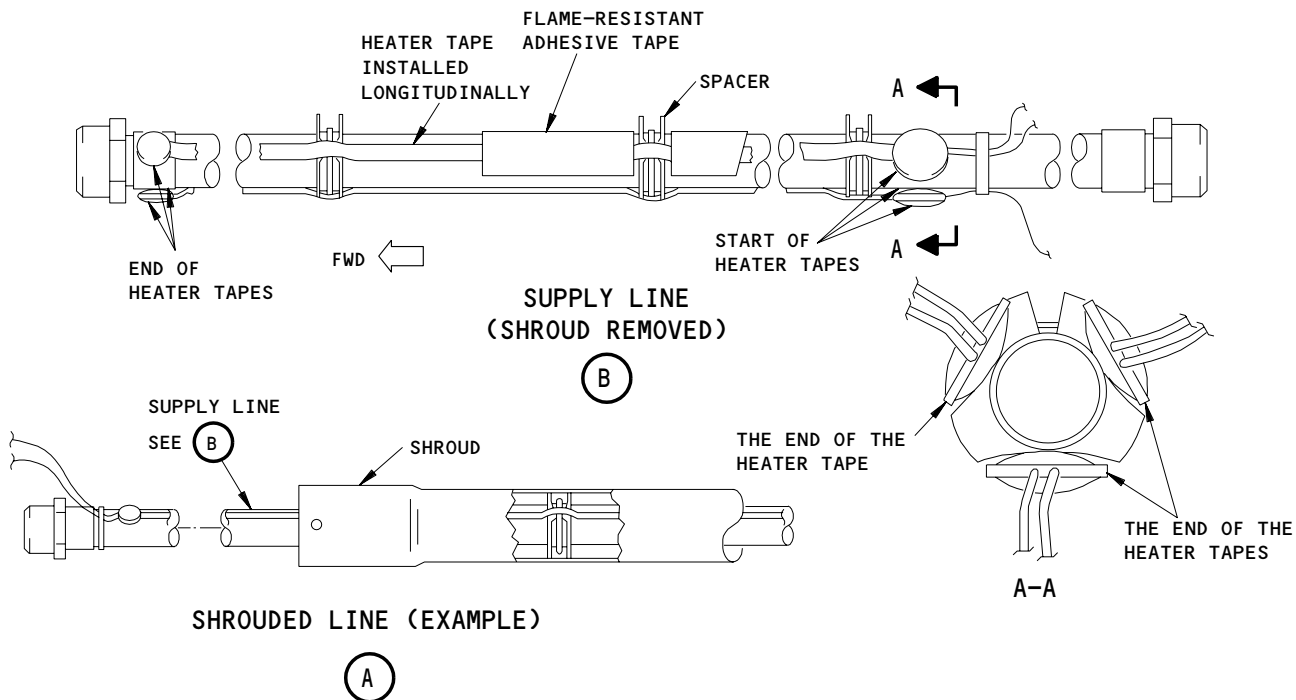
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SECTION 45

NOTE: SEE FIGURE 404 SHEET 2 FOR HEATER TAPE IDENTIFICATION.








**Heater Tape Installation - Section 45
Figure 404C (Sheet 1)**

EFFECTIVITY
SAS 275-280 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	1	B96	INSTALLED LONGITUDINALLY 
1	3	1	B108	INSTALLED LONGITUDINALLY 
4	5	5	B159	INSTALLED LONGITUDINALLY
4	5	5	B160	INSTALLED LONGITUDINALLY
5	6	6	B164	INSTALLED LONGITUDINALLY
7	11	7	B115	INSTALLED LONGITUDINALLY
8	9	8	B116	INSTALLED LONGITUDINALLY 
10	20	10	B411	INSTALLED LONGITUDINALLY 
11	12	11	B234	INSTALLED LONGITUDINALLY 
13	16	13	B412	INSTALLED LONGITUDINALLY
14	15	14	B413	INSTALLED LONGITUDINALLY
16	19	16	B414	INSTALLED LONGITUDINALLY
17	18	17	B256	INSTALLED LONGITUDINALLY

 SHROUDED LINE

Heater Tape Installation - Section 45
Figure 404C (Sheet 2)

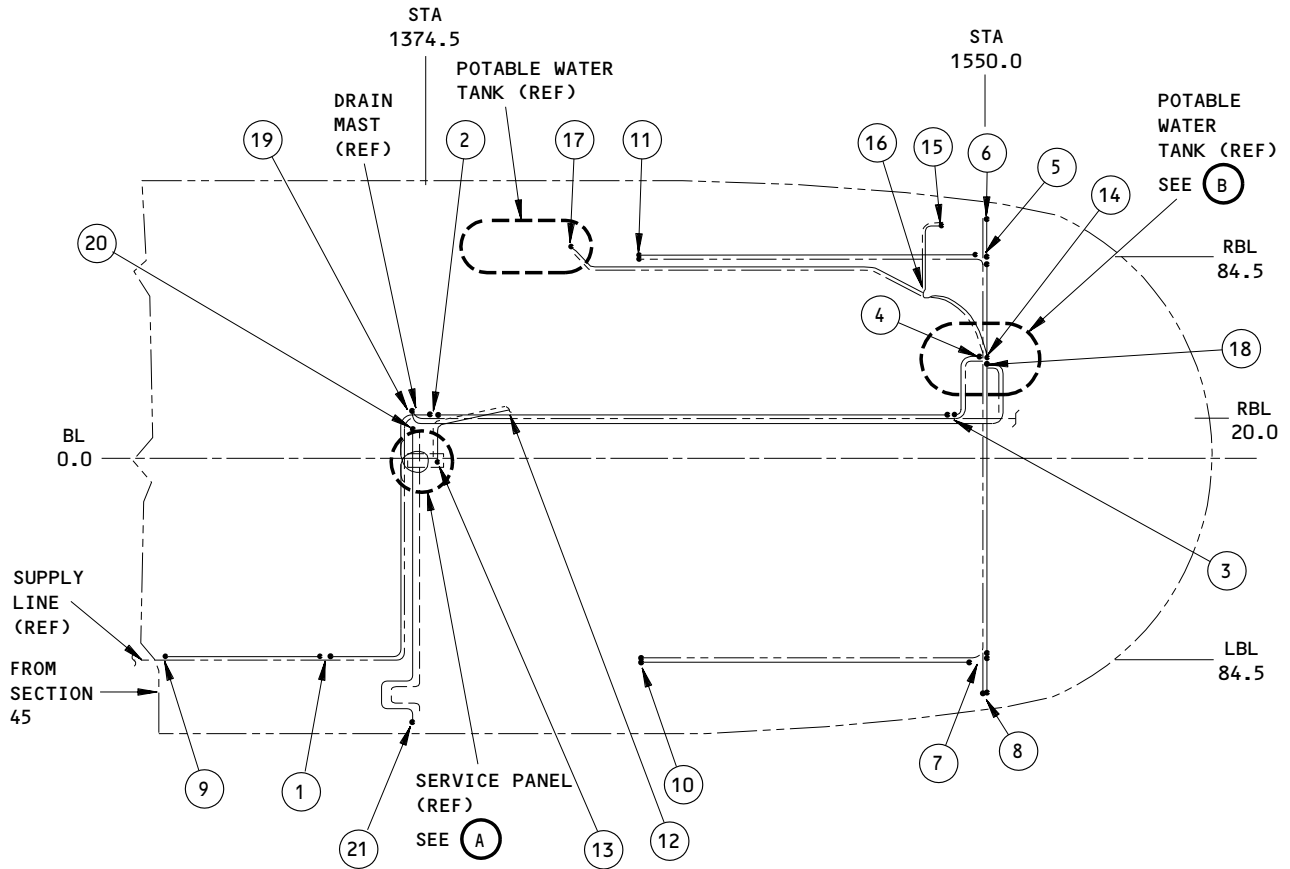
EFFECTIVITY
SAS 275-280 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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SECTION 46

NOTE: SEE TABLE FOR HEATER TAPE IDENTIFICATION

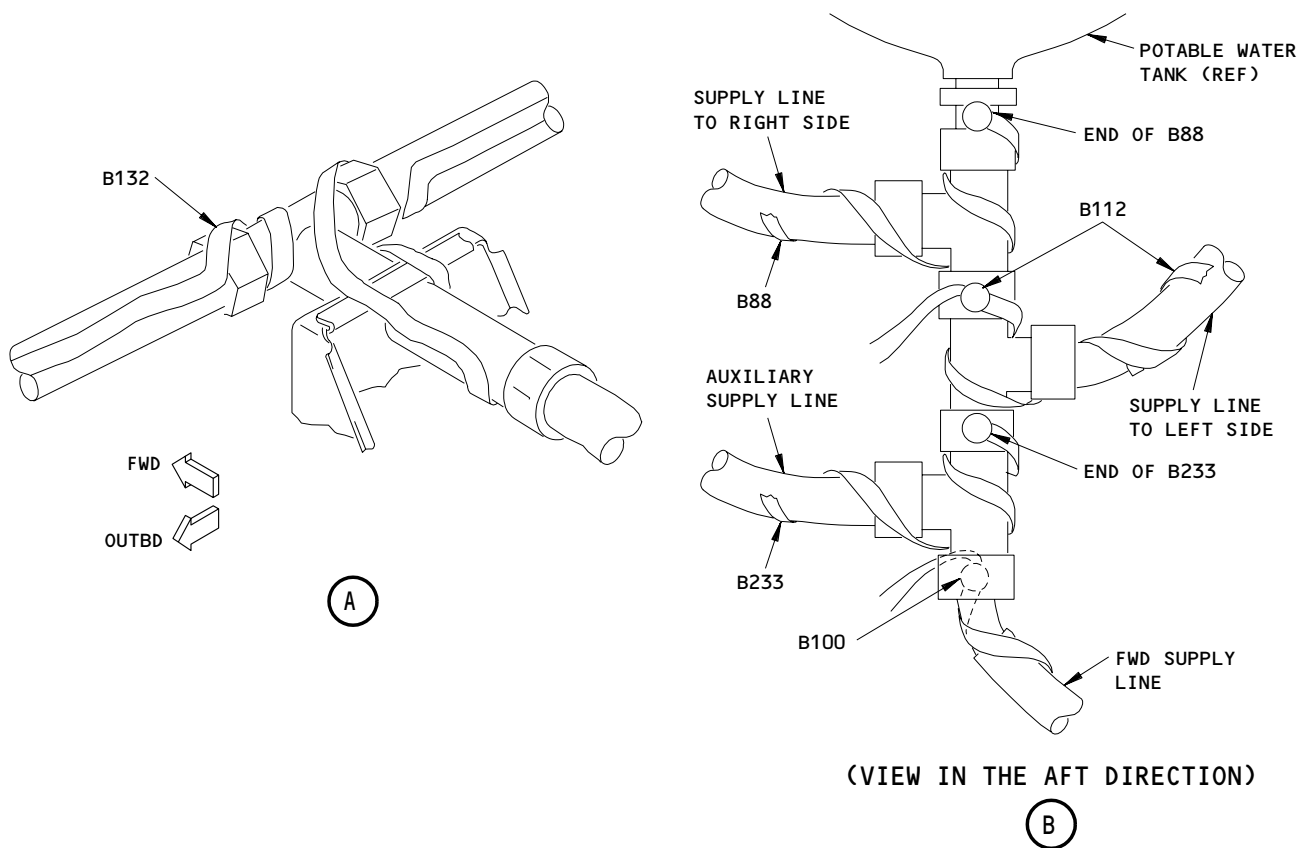
Heater Tape Installation - Section 46
Figure 405A (Sheet 1)

EFFECTIVITY
SAS 050-051 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01

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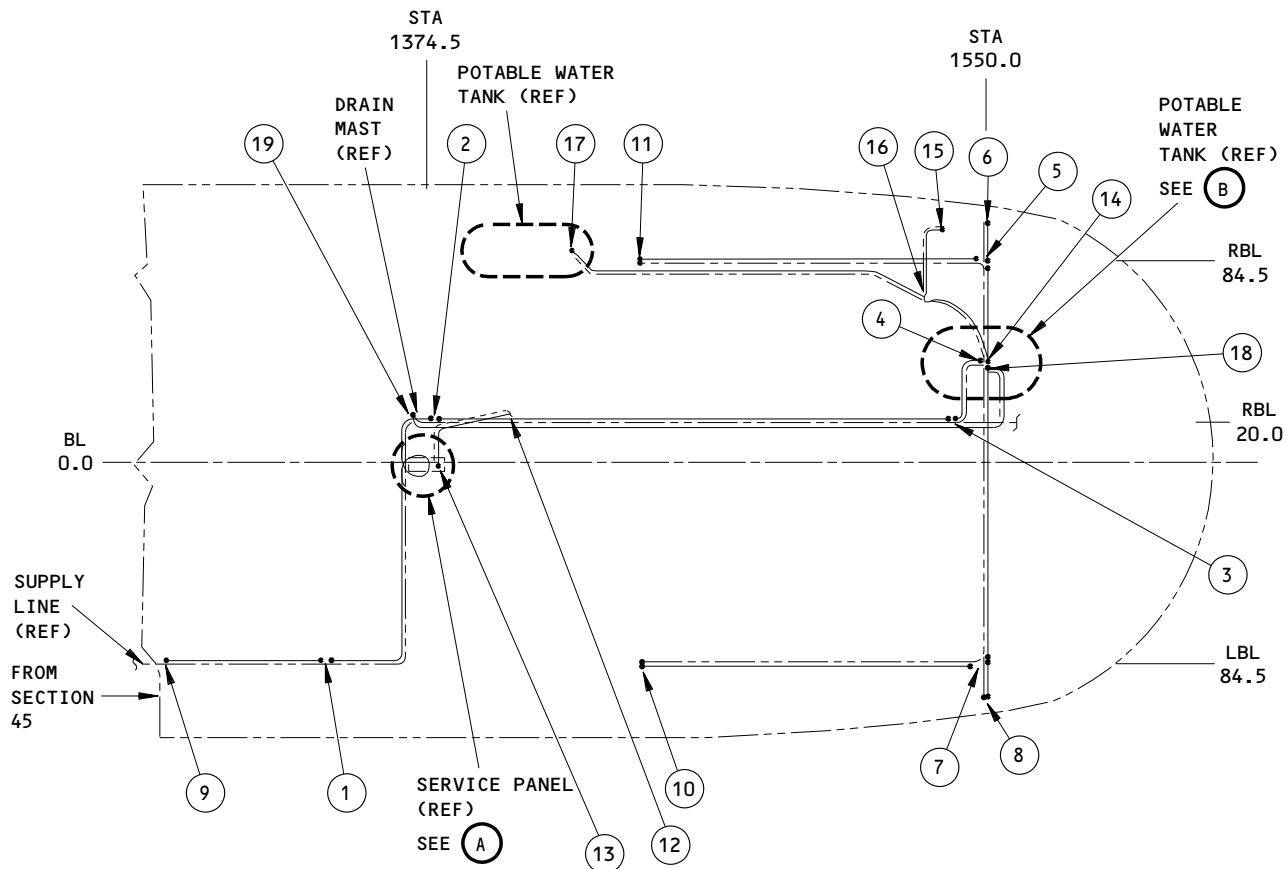


BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	1	B110	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
3	4	4	B100	INSTALLED SPIRALLY WITH 1.8-INCH PITCH
2	3	3	B158	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
4	5	5	B101	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
5	6	5	B102	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
4	7	7	B112	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
7	8	7	B87	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
9	1	9	B95	INSTALLED LONGITUDINALLY
7	10	7	B98	INSTALLED SPIRALLY WITH 1.1-INCH PITCH
5	11	5	B99	INSTALLED SPIRALLY WITH 1.3-INCH PITCH
12	13	12	B241	INSTALLED SPIRALLY WITH 1.1-INCH PITCH
14	15	15	B233	INSTALLED LONGITUDINALLY
16	17	16	B237	INSTALLED LONGITUDINALLY
18	19	18	B88	INSTALLED LONGITUDINALLY
20	21	20	B295	INSTALLED LONGITUDINALLY

Heater Tape Installation - Section 46
Figure 405A (Sheet 2)

EFFECTIVITY
SAS 050-051 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

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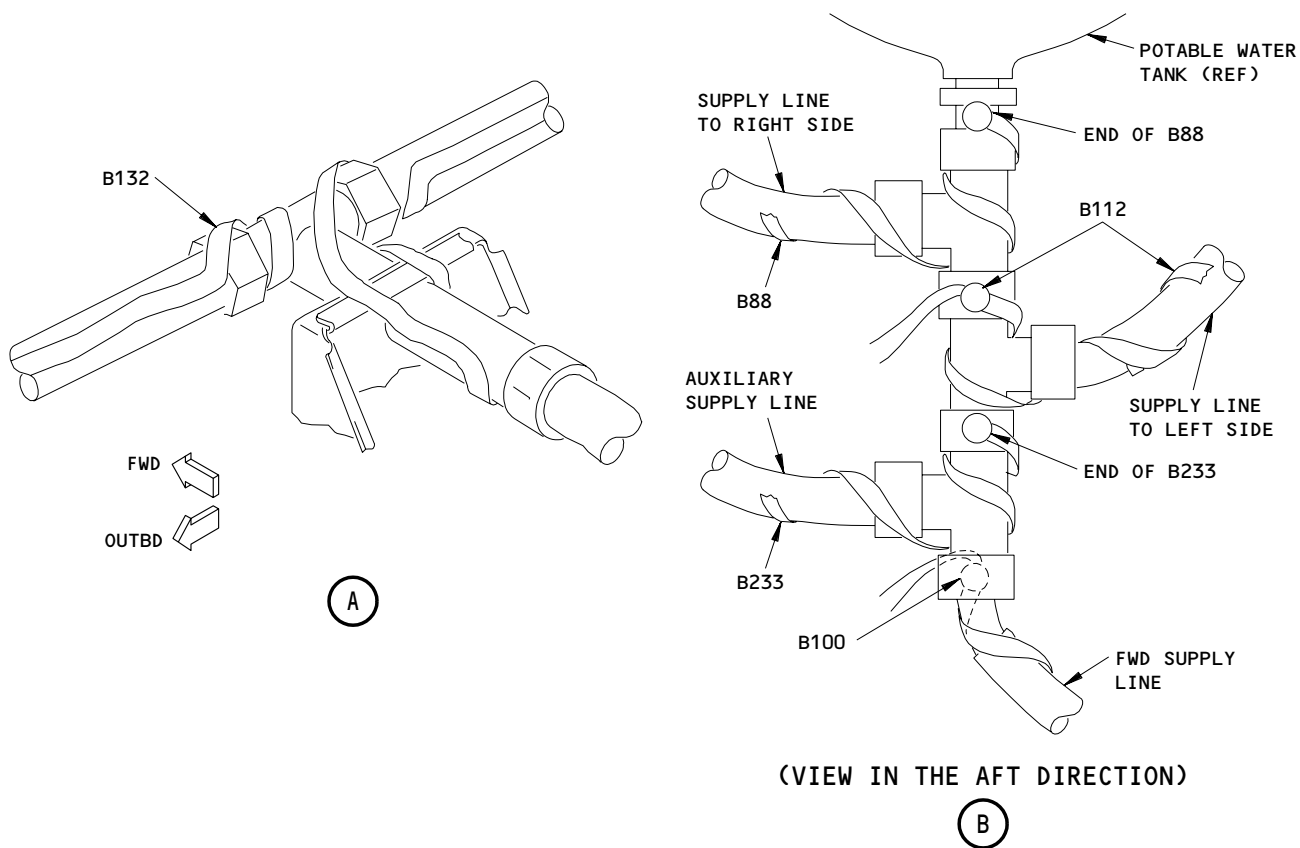
SECTION 46

NOTE: SEE TABLE FOR HEATER TAPE IDENTIFICATION

Heater Tape Installation - Section 46
Figure 405B (Sheet 1)

EFFECTIVITY
SAS 150-167 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01

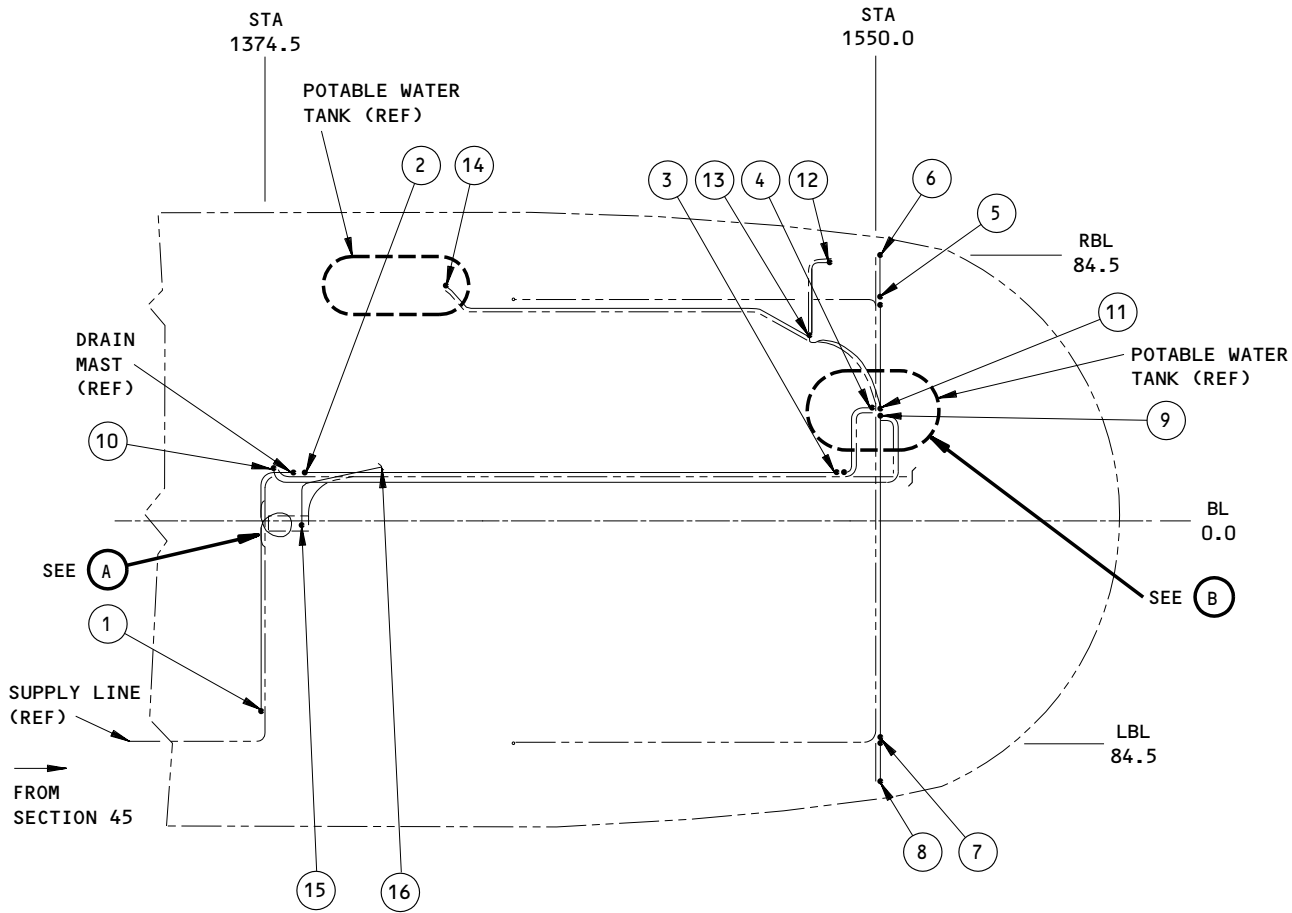


BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	1	B132	INSTALLED LONGITUDINALLY
2	16	16	B110	INSTALLED LONGITUDINALLY
3	4	4	B100	INSTALLED SPIRALLY WITH 1.8-INCH PITCH
3	16	16	B158	INSTALLED LONGITUDINALLY
5	6	5	B102	INSTALLED SPIRALLY WITH 1.6-INCH PITCH
5	7	7	B112	INSTALLED SPIRALLY WITH 1.2-INCH PITCH
7	8	7	B87	INSTALLED SPIRALLY WITH 1.7-INCH PITCH
9	1	9	B95	INSTALLED LONGITUDINALLY
7	10	7	B98	INSTALLED SPIRALLY WITH 1.1-INCH PITCH
5	11	5	B99	INSTALLED SPIRALLY WITH 1.3-INCH PITCH
12	13	12	B241	INSTALLED SPIRALLY WITH 1.1-INCH PITCH
14	15	15	B233	INSTALLED LONGITUDINALLY
16	17	16	B237	INSTALLED LONGITUDINALLY
18	19	18	B88	INSTALLED LONGITUDINALLY

Heater Tape Installation - Section 46
Figure 405B (Sheet 2)

EFFECTIVITY
SAS 150-167 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01



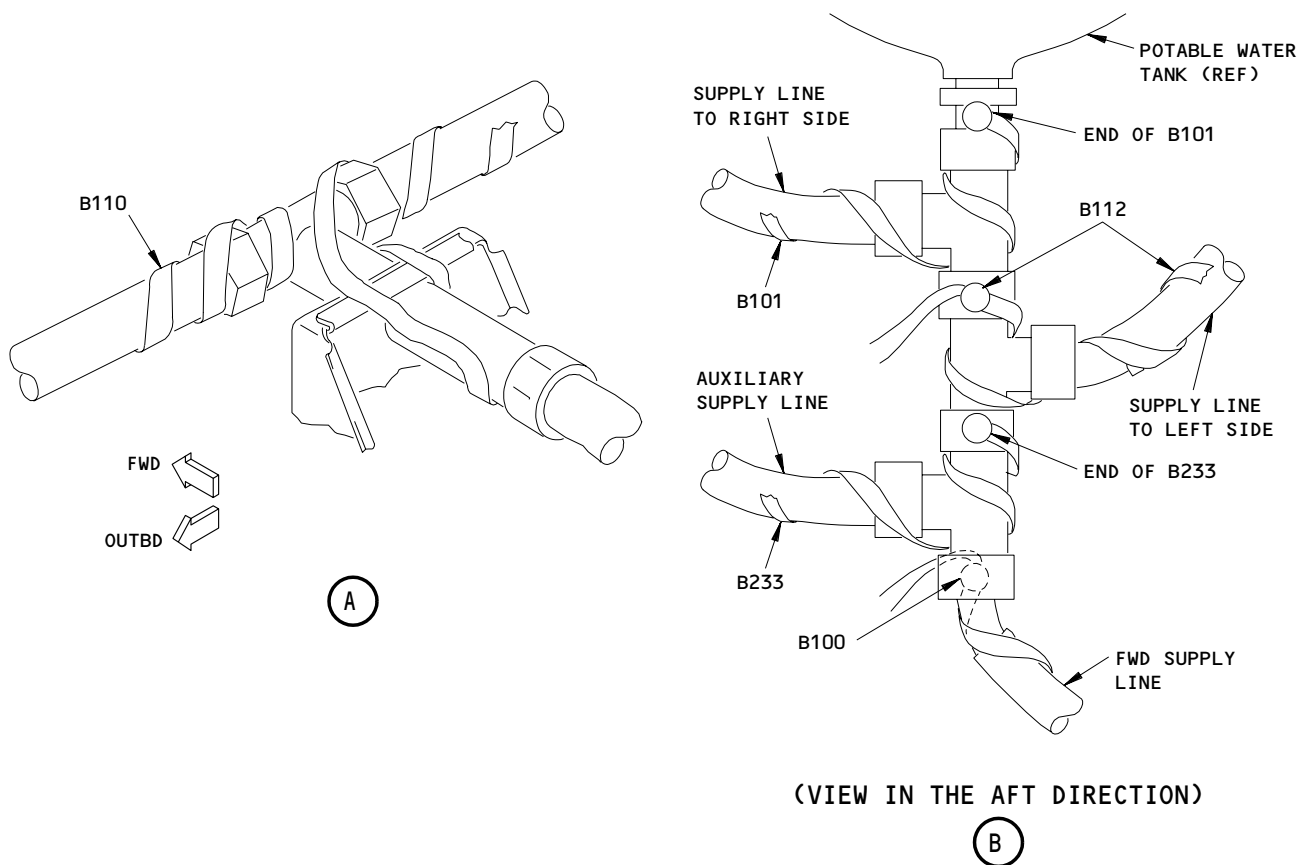
NOTE: SEE SHEET 2 FOR HEATER TAPE IDENTIFICATION

SECTION 46

Heater Tape Installation - Section 46
Figure 405C (Sheet 1)

EFFECTIVITY
SAS 275-280 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01



BETWEEN PTS		TERMINAL LOCATION	HEATER TAPE	HEATER TAPE INSTALLATION CONFIGURATION
FROM	TO			
1	2	2	B110	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
2	3	2	B158	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
3	4	4	B100	INSTALLED SPIRALLY WITH 1.75-INCH PITCH
4	5	5	B101	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
5	6	5	B102	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
4	7	4	B112	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
7	8	7	B 87	INSTALLED SPIRALLY WITH 1.5-INCH PITCH
9	10	9	B 88	INSTALLED LONGITUDINALLY
11	12	12	B233	INSTALLED LONGITUDINALLY
13	14	13	B237	INSTALLED LONGITUDINALLY
15	16	15	B241	INSTALLED SPIRALLY WITH 1.1-INCH PITCH

Heater Tape Installation - Section 46
Figure 405C (Sheet 2)

EFFECTIVITY
SAS 275-280 AND
AIRPLANES WITH HEATER TAPE
ON WATER AND DRAIN LINES

30-71-01

HEATER TAPE THERMOSTATS – REMOVAL/INSTALLATION

1. General

A. This procedure contains two tasks. The first task is the removal of the heater tape thermostats. The second task is the installation of the heater tape thermostats.

TASK 30-71-02-004-001

2. Remove the Thermostat (Fig. 401)

A. Procedure

S 864-003

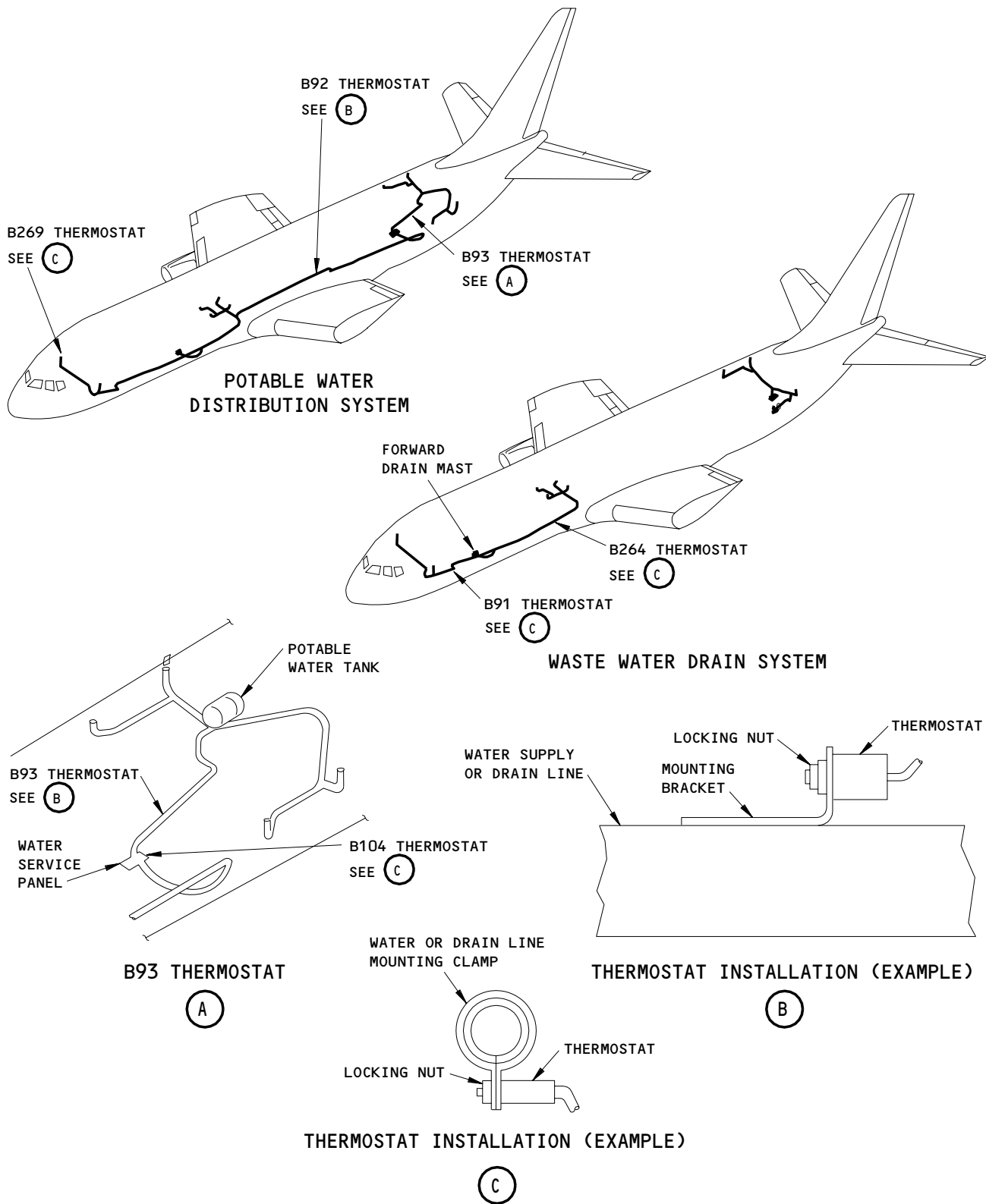
(1) Open the applicable circuit breaker shown in the table that follows and attach a DO-NOT-CLOSE tag:

THERMOSTAT	CIRCUIT BREAKER
B91	ON SAS AIRPLANES, 33F1, HEATER WTR LINE – FWD ON MTH AIRPLANES, 37J1, FWD WATER LINE HTRS
B269	ON SAS AIRPLANES, 33F1, HEATER WTR LINE – FWD ON MTH AIRPLANES, 37J1, FWD WATER LINE HTRS
B264	33G3, WATER LINE HTRS – MID 3
B92	ON SAS AIRPLANES, 33G4, WATER LINE HTRS – MID 4 ON MTH AIRPLANES, 37J4, MID WATER LINE HTRS 3
B103 *[2]	33G3, WATER LINE HTRS – MID 3

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Heater Tape Thermostats Installation
Figure 401

EFFECTIVITY	
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THERMOSTAT	CIRCUIT BREAKER
B93	ON SAS 767-300 AIRPLANES, 33G5, WATER LINE HTRS - AFT 1 ON SAS 767-200 AIRPLANES, 33G7, WATER LINE HTRS - AFT 3 ON MTH AIRPLANES, 37J6, AFT WATER LINE HTRS 1

- *[1] ALL SAS 767-300 AIRPLANES AND MTH AIRPLANES
- *[2] ALL SAS 767-200 AIRPLANES
- *[3] ALL SAS AIRPLANES

- S 804-004
- (2) Find the applicable thermostat.
- S 014-005
- (3) Remove the necessary floor or wall panels.
- S 034-006
- (4) Cut the electrical leads to the thermostat.

NOTE: Let the cut leads stay in position to help you find the new splice location.

- S 034-007
- (5) Remove the locking nut.
- S 024-008
- (6) Remove the thermostat.

TASK 30-71-02-404-009

3. Install the Thermostat (Fig. 401)

A. Consumable Materials

- (1) Dry Ice (Commercial Source)

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B. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 30-71-01/401, Water Supply and Drain Line Heater Tapes

C. Procedure

S 424-011

- (1) Put the thermostat in position and attach it with the locking nut.

S 434-012

- (2) Remove the old electrical leads and install the new leads with a splice.

S 864-013

- (3) Remove the DO-NOT-CLOSE tag and close the circuit breaker that you opened (see table).

S 704-014

- (4) Do a test of the thermostat installation.
 - (a) Supply electrical power (AMM 24-22-00/201).
 - (b) Decrease the temperature of the thermostat to less than 30°F (-1°C) with dry ice.
 - (c) Make sure the applicable heater tape in the table that follows becomes warm. The heater tapes are below the cargo deck floor panels and behind the wall panels (AMM 30-71-01/401).

THERMOSTAT	EXAMINE HEATER TAPE FOR OPERATION
B91	B133 - Drain line heater tape (adjacent to thermostat)
B92	Make sure the shroud around B151, B108, and B96 becomes warm
B93	B87 - Water supply line heater tape
B103 *[2]	B111 - Water supply line heater tape (adjacent to thermostat)
B104 *[3]	B95 - Water supply line heater tape
B264 *[1]	B119 - Water supply line heater tape
B269	B109 - Water supply line heater tape (outboard of F1 galley)

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- *[1] ALL SAS 767-300 AIRPLANES AND MTH AIRPLANES
- *[2] ALL SAS 767-200 AIRPLANES
- *[3] ALL SAS AIRPLANES

S 864-015

- (5) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

S 414-016

- (6) Install the floor panels and wall panels that you removed.

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04

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WASTE TANK DRAIN FITTING HEATING GASKET – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the drain fitting heating gasket. The second task is the installation of the drain fitting heating gasket.
- B. The drain fitting heating gasket supplies heat to the waste drain pipe to prevent ice. The gasket is in position around the drain pipe and below the drain cap. Access is through the drain service door.

TASK 30-71-03-004-001

2. Remove the Drain Fitting Heating Gasket

A. References

- (1) AMM 12-17-01/301, Waste Tank

B. Procedure

S 864-004

- (1) SAS AIRPLANES;
Open this circuit breaker on the forward miscellaneous electrical equipment panel, P33, and attach a DO-NOT-CLOSE tag:
 - (a) 33G7, WATER LINE HTRS – AFT 3

S 864-008

- (2) MTH AIRPLANES;
Open this circuit breaker on the right miscellaneous electrical equipment panel, P37, and attach a DO-NOT-CLOSE tag:
 - (a) 37H4, WATER LINE HTRS – AFT 3

S 014-011

- (3) Open the drain service door.

S 684-012

- (4) Drain and flush the waste tanks (AMM 12-17-01/301). Do not fill the tanks with precharge.

S 034-013

- (5) Remove the drain cap mount bolts (8 locations) and carefully remove the drain cap assembly.

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S 034-014

- (6) Cut the lead wires near the heating gasket.

NOTE: Keep the lead wires in position to help you find the new splice. Remove these wires before you install the new heating gasket.

S 024-016

- (7) Remove the heating gasket.

TASK 30-71-03-404-017

3. Install the Drain Fitting Heating Gasket

A. Consumable Materials

- (1) A00247 Sealant, Chromate Type - BMS 5-95
- (2) G00286 Agent, Parting - 4A-183
- (3) B00148 Methyl-Ethyl-Ketone (MEK) - TT-M-261
- (4) B00299 Abrasive - scotch-brite type A, 100 grit or finer
- (5) G00033 Cheesecloth - BMS 15-5

B. References

- (1) AMM 12-17-01/301, Waste Tank
- (2) AMM 24-22-00/201, Electrical Power - Control

C. Procedure

S 114-018

- (1) Clean the mount surfaces and bolts with solvent to remove old sealant.

S 124-019

CAUTION: DO NOT BREAK THROUGH THE ENAMEL. CORROSION CAN OCCUR.

- (2) To prepare the enamel surface for sealant, make the surface rough until you remove the surface gloss.

S 034-020

- (3) Remove the old heater leads.

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S 434-021

- (4) Install the new leads with a splice.

S 114-022

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. SOLVENTS MAY BE FLAMMABLE OR HARMFUL TO THE ENVIRONMENT. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

- (5) Rub the surfaces with a cheesecloth that is lightly moist with solvent, Series 92 (AMM 20-30-92/201).

S 804-023

- (6) Apply the parting agent to the two faces of the heating gasket.

S 394-024

- (7) Apply the sealant to the external skin surface and the internal shim face.

S 424-025

- (8) Put the heating gasket in position and make sure that no part of the wires stay out.

S 434-026

- (9) Put the shim and drain cap in position.

S 394-027

- (10) Apply the sealant to the threads of the mount bolts.
(a) Install the mounting bolts while the sealant is wet.

S 864-030

- (11) SAS AIRPLANES;
Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P33 panel:

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(a) 33G7, WATER LINE HTRS - AFT 3

S 864-034

(12) MTH AIRPLANES;

Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P37 panel:

(a) 37H4, WATER LINE HTRS - AFT 3

S 704-038

(13) Do a test of the heating gasket installation.

(a) Supply electrical power (AMM 24-22-00/201).

(b) Make sure the heating gasket becomes warm.

(c) Remove electrical power if it is not necessary.

S 414-039

(14) Close the drain cap.

S 804-040

(15) Use a pump to move the precharge into the waste tanks (AMM 12-17-01/301).

S 414-041

(16) Close the drain service door.

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POTABLE WATER TANK HEATER BLANKETS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains four tasks. The first task is the removal of the forward and aft heater blankets. The second task is the installation of the forward and aft heater blankets. The third task is the removal of the center heater blanket. The fourth task is the installation of the center heater blanket.
- B. Potable water tank heater blankets supply heat to the potable water tanks to prevent ice. The heater blankets are at the center and at the two ends of each tank. The center heater blanket has different removal and installation procedures.

TASK 30-71-04-004-001

2. Remove the Forward and Aft Heater Blankets (Fig. 401)

A. Access

- (1) Location Zones

155/156 Area Below Aft Cargo Compartment

B. Procedure

S 864-002

- (1) Open this circuit breaker on the APU/external power panel, P34, and attach a DO-NOT-CLOSE tag:
 - (a) 34P10, POT WATER TK HTR

S 014-003

- (2) Get access to the water tank through the aft cargo door.

S 034-004

- (3) Cut the heater blanket wires.

NOTE: Let the heater blanket wires stay in position to help you find the new splice location.

S 034-005

- (4) Remove the applicable hold-down straps.

S 024-006

- (5) Remove the heater blanket.

TASK 30-71-04-404-007

3. Install the Forward and Aft Heater Blankets (Fig. 401)

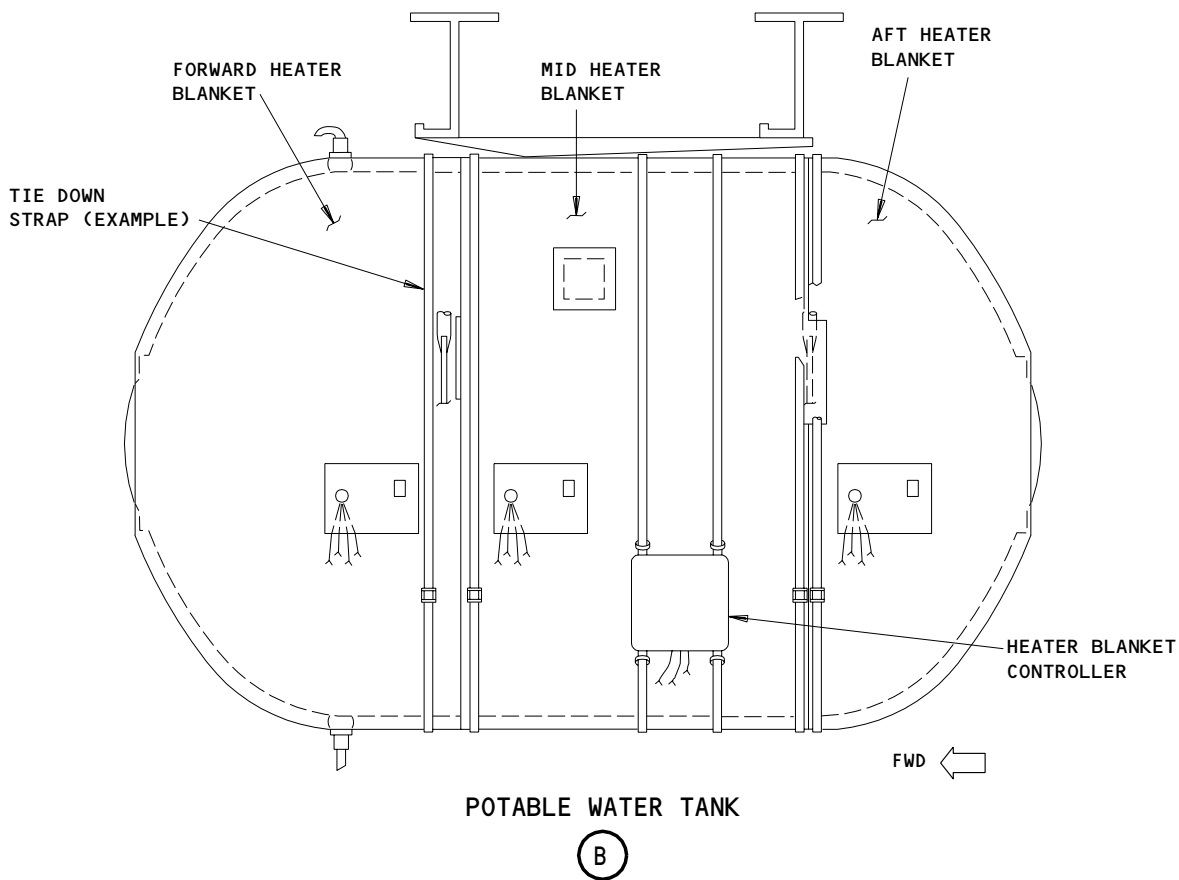
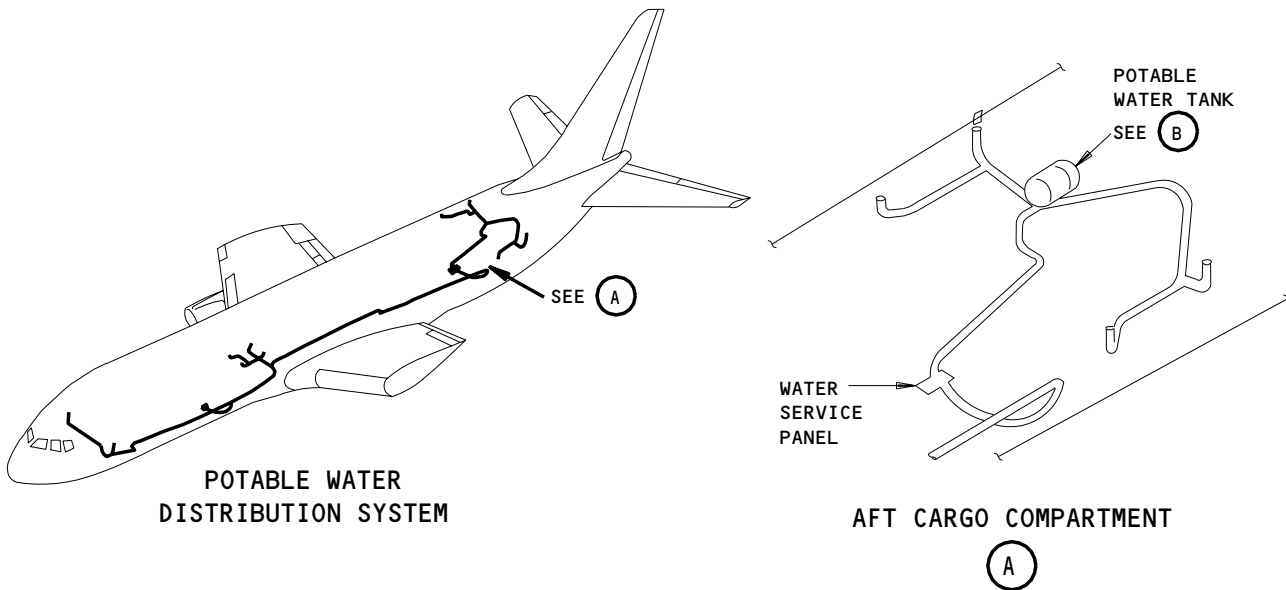
A. Access

- (1) Location Zones

155/156 Area Below Aft Cargo Compartment

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

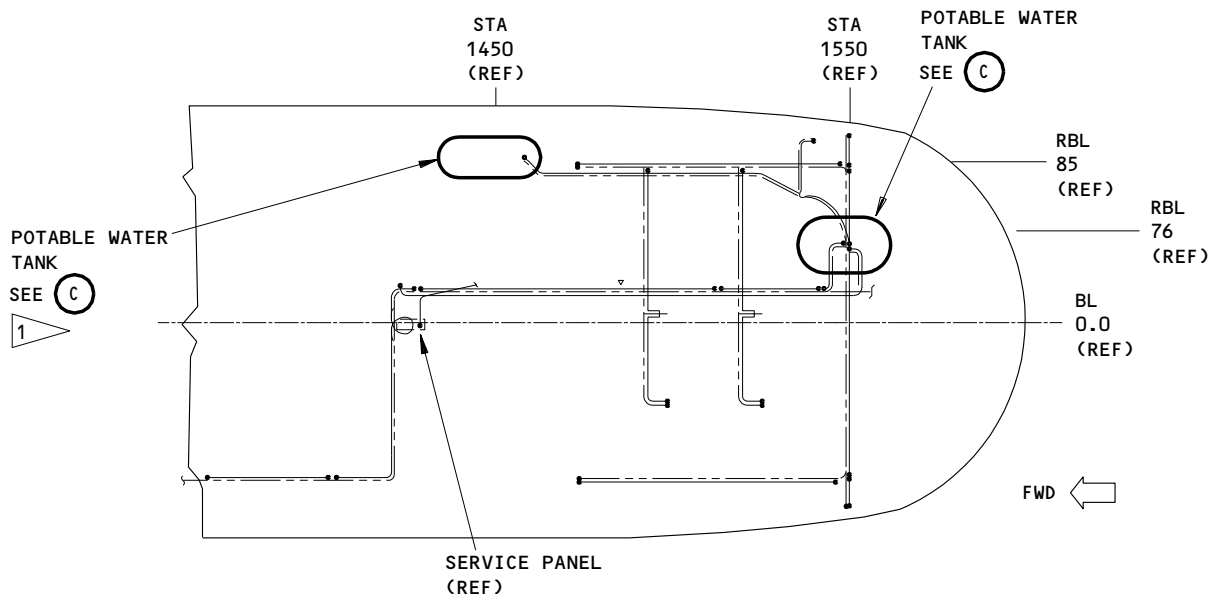
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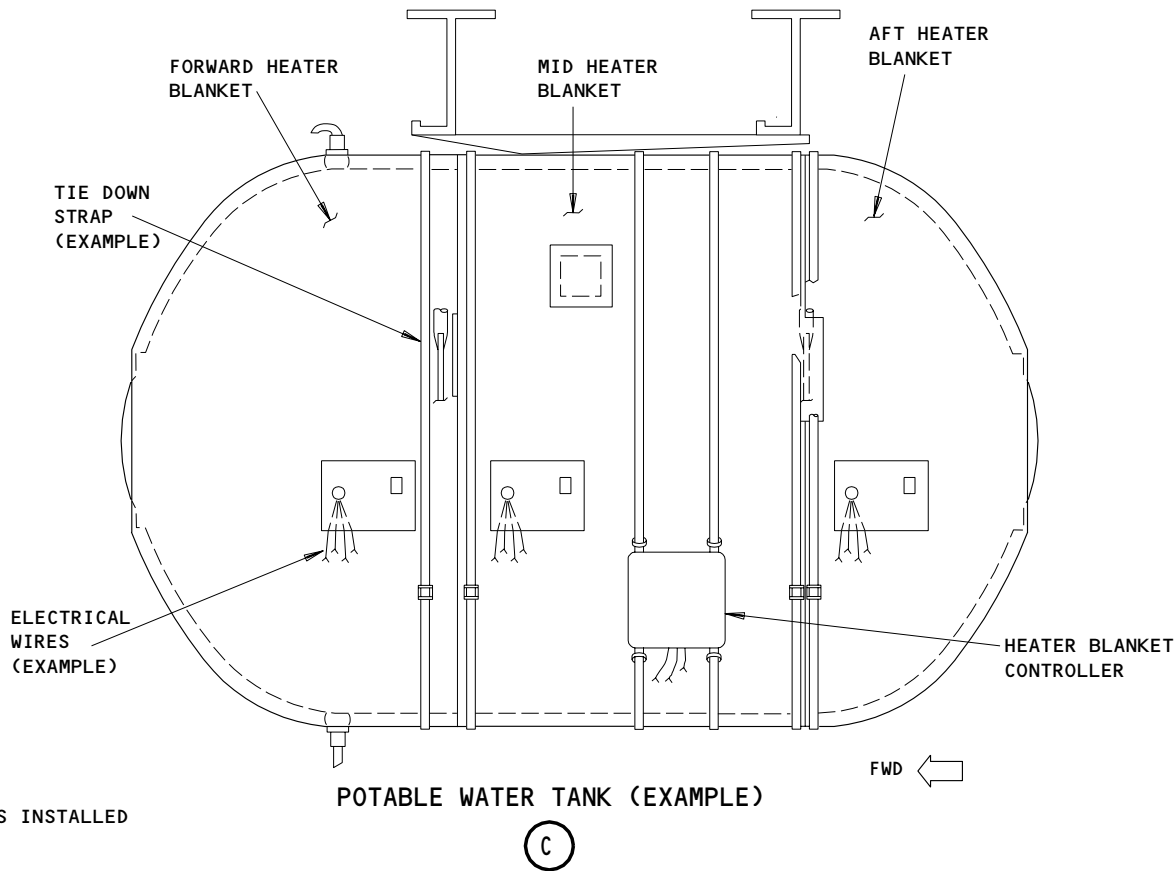
Potable Water Tank Heater Blankets Installation
Figure 401 (Sheet 1)

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

30-71-04



POTABLE WATER DISTRIBUTION SYSTEM
(AFT CARGO COMPARTMENT)



Potable Water Tank Heater Blankets Installation
Figure 401 (Sheet 2)

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

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B. Procedure

- S 424-008
- (1) Put the heater blanket in position so the cutouts permit access to the fittings and the connections.
- S 434-009
- (2) Attach the blanket with the hold-down straps.
- S 034-010
- (3) Remove the old electrical wires from the splice area.
- S 434-011
- (4) Install the new electrical wires with a splice.
- S 864-012
- (5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
 - (a) 34P10, POT WATER TK HTR

TASK 30-71-04-004-013

4. Remove the Center Heater Blanket (Fig. 401)

A. Access

- (1) Location Zones
155/156 Area Below Aft Cargo Compartment

B. Procedure

- S 864-014
- (1) Open this circuit breaker on the APU/external power panel, P34, and attach a DO-NOT-CLOSE tag:
 - (a) 34P10, POT WATER TK HTR
- S 014-015
- (2) Get access to the water tank through the aft cargo door.
- S 034-016
- (3) Remove the straps from the heater blanket controller.
- S 034-017
- (4) Remove the heater blanket controller and accurately make a mark on the location where it was installed.

NOTE: It is important to make sure you install the controller in the correct position.

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

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S 034-018

- (5) Cut the electrical wires of the heater blanket.

NOTE: Let the electrical wires stay in position to help you find the new splice location.

S 034-019

- (6) Remove the heater blanket hold-down straps.

S 024-020

- (7) Remove the heater blanket.

TASK 30-71-04-404-021

5. Install the Center Heater Blanket (Fig. 401)

A. References

- (1) AMM 24-22-00/201, Electrical Power - Control

B. Access

- (1) Location Zones
155/156 Area Below Aft Cargo Compartment

C. Procedure

S 424-022

- (1) Put the heater blanket in position so cutouts permit access to the fittings and connections.

S 434-023

- (2) Attach the blanket with the hold-down straps.

S 034-024

- (3) Remove the old electrical wires from the splice location.

S 434-025

- (4) Install the new electrical wires with a splice.

S 034-026

CAUTION: INSTALL THE HEATER BLANKET CONTROLLER IN THE CORRECT POSITION. IF THE CONTROLLER IS NOT IN THE CORRECT POSITION IT IS POSSIBLE THAT THE THERMOSTATS WILL NOT TOUCH THE SENSING PLATES. INCORRECT THERMOSTAT READINGS CAN OCCUR IN DAMAGED HEATER BLANKETS.

- (5) Install the heater blanket controller in the correct position.
(a) Make sure all three controlling thermostats touch the sensing plate.

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

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S 864-027

- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
- (a) 34P10, POT WATER TK HTR

S 704-028

- (7) Do a test of the heater blanket installation.
- (a) Supply electrical power (AMM 24-22-00/201).
 - (b) Make sure the blanket controller is not attached to the water tank.
 - (c) If the controller is attached, remove the hold-down straps to show the rear (water tank) of the controller.
 - (d) Apply dry ice to the rear of the controller to decrease the temperature of the controller to less than 30°F (-1°C).

NOTE: Keep the controller cool during the test.

- (e) Make sure that the applicable heater blanket becomes warm.
- (f) Put the controller in position and attach it with the hold-down straps.
- (g) Remove electrical power if it is not necessary.

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

30-71-04

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POTABLE WATER FILL FITTING HEATER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the water fill fitting heater. The second task is the installation of the water fill fitting heater.
- B. A water fill fitting heater prevents ice at the potable water fill connection. The heater is on all sides of the water line at the water fill connection. The water fill connection is below the airplane on the center line, forward of the bulk cargo door.

TASK 30-71-05-004-009

2. Remove the Water Fill Fitting Heater (Fig. 401)

A. Access

- (1) Location Zones
151/152 Aft Cargo Compartment

B. Procedure

S 864-012

- (1) SAS AIRPLANES;
Open this circuit breaker on the forward miscellaneous electrical equipment panel, P33 and attach a DO-NOT-CLOSE tag:
(a) 33G5, WATER LINE HTRS – AFT 1

S 864-016

- (2) MTH AIRPLANES;
Open this circuit breaker on the right miscellaneous electrical equipment panel, P37, and attach a DO-NOT-CLOSE tag:
(a) 37H4, WATER LINE HTRS – AFT 3

S 014-027

- (3) Get access to the heater location through the cargo deck floor panels, at approximately Sta. 1390 on the airplane center line.

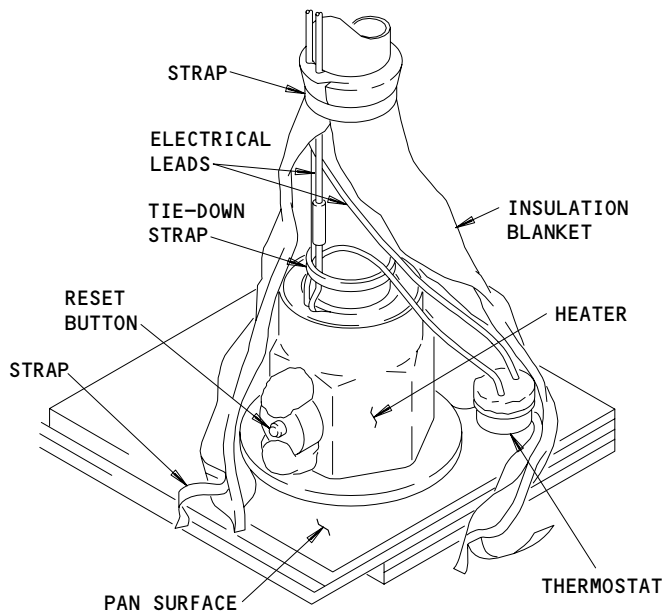
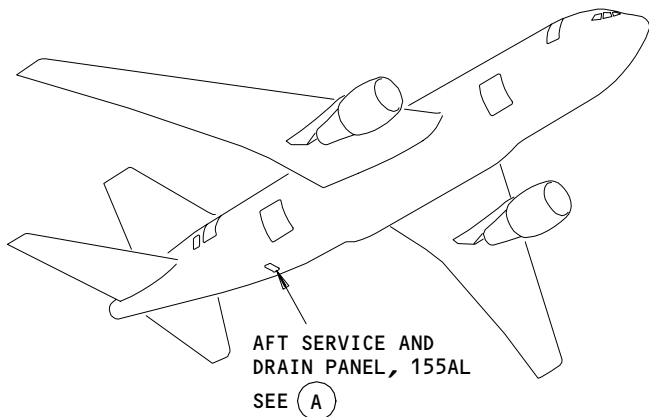
S 034-030

- (4) Disconnect the straps and remove the insulation from around the heater.

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(A)

Potable Water Fill Fitting Heater Installation
Figure 401

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S 034-031

- (5) Cut the heater leads near the heater.

NOTE: Keep the leads in position to help you find the new splice location.

S 034-034

- (6) Remove the thermostat from the pan surface.

S 034-035

- (7) Remove the tie-down strap to disconnect the leads from the water line.

S 034-036

- (8) Remove the flame-resistant adhesive tape from the heater to show the split in the heater.

S 024-037

- (9) Open the heater at the split and remove the water fill fitting heater.

TASK 30-71-05-404-038

3. Install the Water Fill Fitting Heater (Fig. 401)

A. Consumable Materials

- (1) Tape, Adhesive, Flame-Resistant - 1.5 inches wide (use one of these tapes):
(a) G00295 3M No. 494
(b) G02129 Permacel P-29 (Silver or Gray)
- (2) Tape, Pressure-Sensitive (use one of these tapes):
(a) G02305 - BMS5-149, Type I, Class 1
(b) G50327 - BMS5-157, Type I, Class 1
- (3) A00292 Adhesive - BMS 5-105, Type II, Class 1

B. References

- (1) AMM 24-22-00/201, Electrical Power - Control

C. Access

- (1) Location Zones
151/152 Aft Cargo Compartment

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D. Procedure

S 424-079

CAUTION: DO NOT BEND THE HEATER MORE THAN IS NECESSARY TO PUT IT ON THE WATER LINE. HEATER DAMAGE CAN OCCUR.

(1) Open the heater at the split and put it on the water line.

S 434-042

(2) Attach the heater with flame-resistant adhesive tape. Do not put tape on the side-mounted thermostat with the reset button.

S 434-047

(3) Clean the faying surface and use adhesive to bond the thermostat to the pan surface.

(a) Make sure the thermostat is adjacent to, but does not touch, the isolation collar.

(b) Make sure the thermostat surface completely touches the pan surface.

S 034-048

(4) Remove the old electrical leads from the splice location.

S 434-049

(5) Install the new electrical leads with a splice.

S 434-050

(6) Attach the leads to the water line with tie-down straps.

S 864-053

(7) SAS AIRPLANES;

Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P33 panel:

(a) 33G5, WATER LINE HTRS - AFT 1

S 864-057

(8) MTH AIRPLANES;

Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P37 panel:

(a) 37H4, WATER LINE HTRS - AFT 3

S 704-061

(9) Make sure the water fill fitting heater is correctly installed.

(a) Supply electrical power (AMM 24-22-00/201).

(b) Make sure the water fill fitting heater becomes warm.

(c) Remove electrical power if it is not necessary.

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S 434-085

- (10) AIRPLANES WITHOUT ADVANCED INSULATION;
If applicable, install the insulation blanket with the strap, or use the BMS5-149 tape, G02305, or the BMS5-157 tape, G50327.

S 434-086

- (11) AIRPLANES WITH ADVANCED INSULATION;
If applicable, install the insulation blanket with the strap, or use the BMS5-157 tape, G50327.

S 414-063

- (12) Install the cargo deck floor panels.

EFFECTIVITY

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30-71-05

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WATER TANK HEATER BLANKET CONTROLLER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the water tank heater blanket controller. The second task is the installation of the water tank heater blanket controller.
- B. The heater blanket controllers control the temperature of the potable water tanks. A heater blanket controller is on the left side of each potable water tank.

TASK 30-71-06-004-001

2. Remove the Heater Blanket Controller (Fig. 401)

A. Access

- (1) Location Zones

163/164 Area Below Bulk Cargo Compartment

B. Procedure

S 864-002

- (1) Open this circuit breaker on the APU/external power panel, P34, and attach a DO-NOT-CLOSE tag:
 - (a) 34P10, POT WATER TK HTR

S 014-003

- (2) Get access to the water tank through the aft cargo door.

S 034-004

- (3) Cut the controller electrical leads.

NOTE: Keep the electrical wires in position to help you find the new splice location.

S 034-005

- (4) Remove the hold-down straps from the controller unit.

S 024-006

- (5) Remove the controller unit.

TASK 30-71-06-404-007

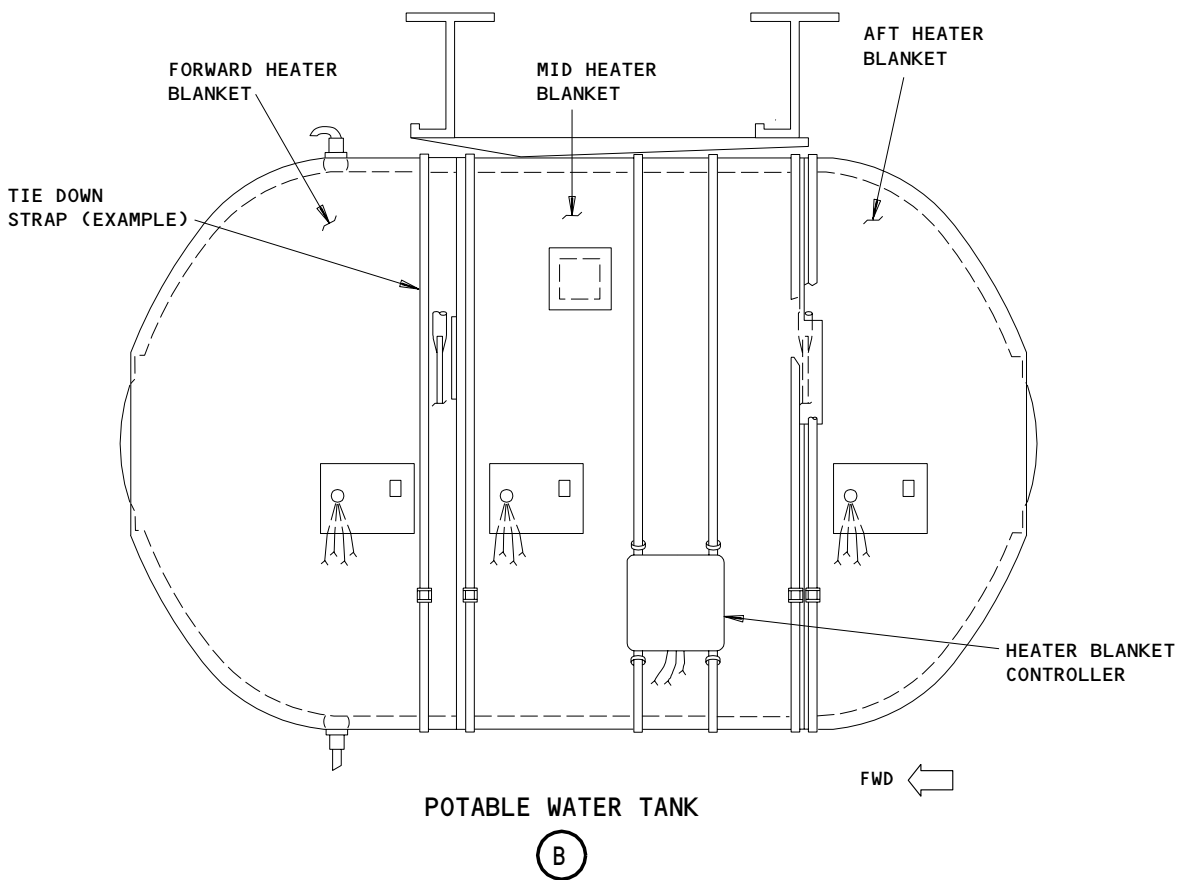
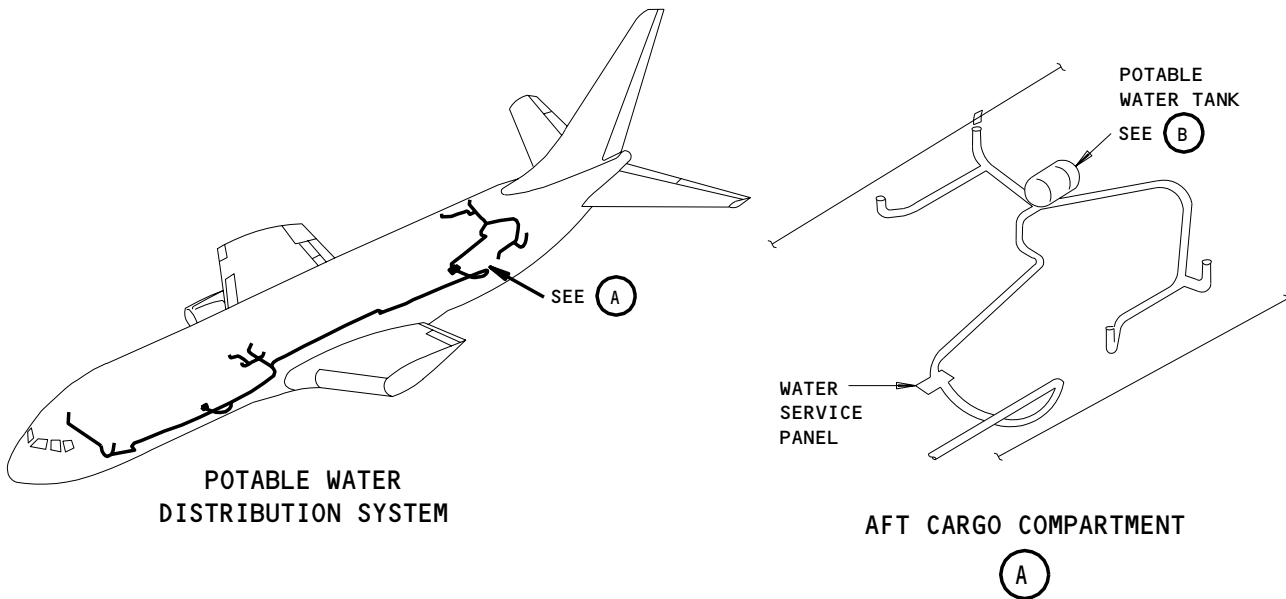
3. Install the Heater Blanket Controller (Fig. 401)

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

30-71-06



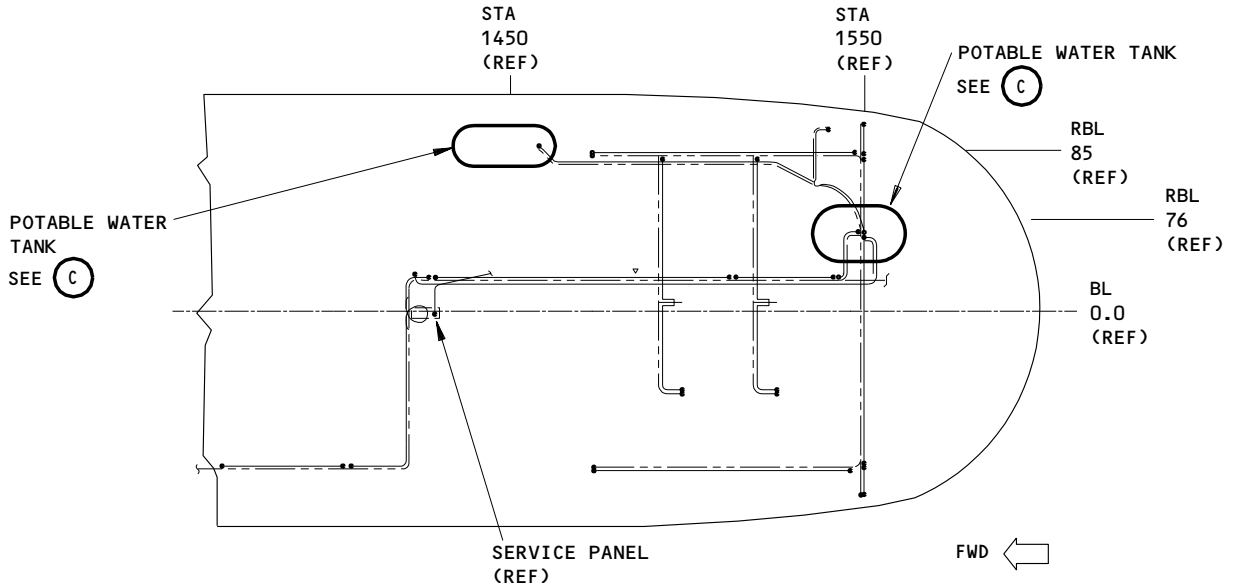
Water Tank Heater Blanket Controller Installation
Figure 401 (Sheet 1)

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

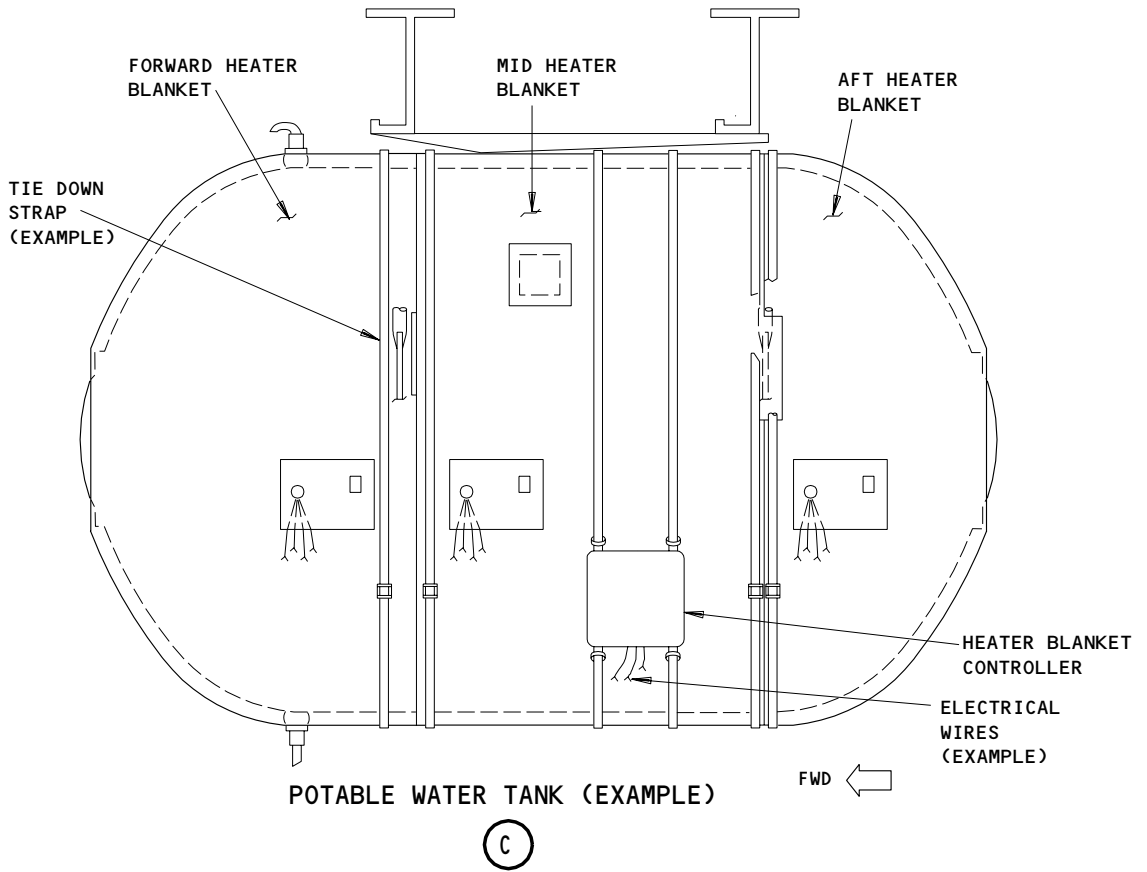
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POTABLE WATER DISTRIBUTION SYSTEM
(AFT CARGO COMPARTMENT)



Water Tank Heater Blanket Controller Installation
Figure 401 (Sheet 2)

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

30-71-06

B. Access

- (1) Location Zones
163/164 Area Below Bulk Cargo Compartment

C. Procedure

S 424-008

- (1) Put the controller in position and attach with the hold-down straps.

S 034-009

- (2) Remove the old electrical wires from the splice location.

S 434-010

- (3) Install the new controller wires with a splice.

S 864-011

- (4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34P10, POT WATER TK HTR

S 704-012

- (5) Do a test of the controller installation.
(a) Supply electrical power (AMM 24-22-00/201).
(b) Loosen the controller hold-down straps.
(c) Put dry ice on the rear (water tank) of the controller to decrease the temperature to less than 30°F (-1°C).

NOTE: Keep the controller cool during the test.

- (d) Make sure the heater blankets become warm.
(e) Put the controller in position and attach it with the hold-down straps.
(f) Remove electrical power if it is not necessary.

EFFECTIVITY
AIRPLANES WITH POTABLE
WATER TANK HEATER

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WASTE TANK RINSE FITTING HEATERS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the waste tank rinse fitting heaters. The second task is the installation of the waste tank rinse fitting heaters.
- B. The heaters are in position around the waste tank rinse fittings to prevent blockage caused by ice. The heaters are installed on the rinse line tubing nuts, in the fuselage at the waste service panel. Removal and installation procedures are the same for the two heaters.

TASK 30-71-07-004-001

2. Remove the Heater (Fig. 401)

A. Access

- (1) Location Zones
163/164 Area Below Bulk Cargo Compartment
- (2) Access Panel
163AL Waste Service Door

B. Procedure

S 864-004

- (1) SAS AIRPLANES;
Open this circuit breaker on the forward miscellaneous electrical equipment panel, P33, and attach a DO-NOT-CLOSE tag:
(a) 33G5, WATER LINE HTRS – AFT 1

S 864-009

- (2) MTH AIRPLANES;
Open this circuit breaker on the right miscellaneous electrical equipment panel, P37, and attach a DO-NOT-CLOSE tag:
(a) 37H4, WATER LINE HTRS – AFT 3

S 014-014

- (3) Get access to the heater in the area aft of the bulk cargo compartment.

NOTE: The heaters are below the waste tanks on the right side of the airplane near the bottom of the wye duct.

S 034-015

- (4) Cut the heater leads near the heater.

NOTE: Keep the leads in position to help you find the new splice location.

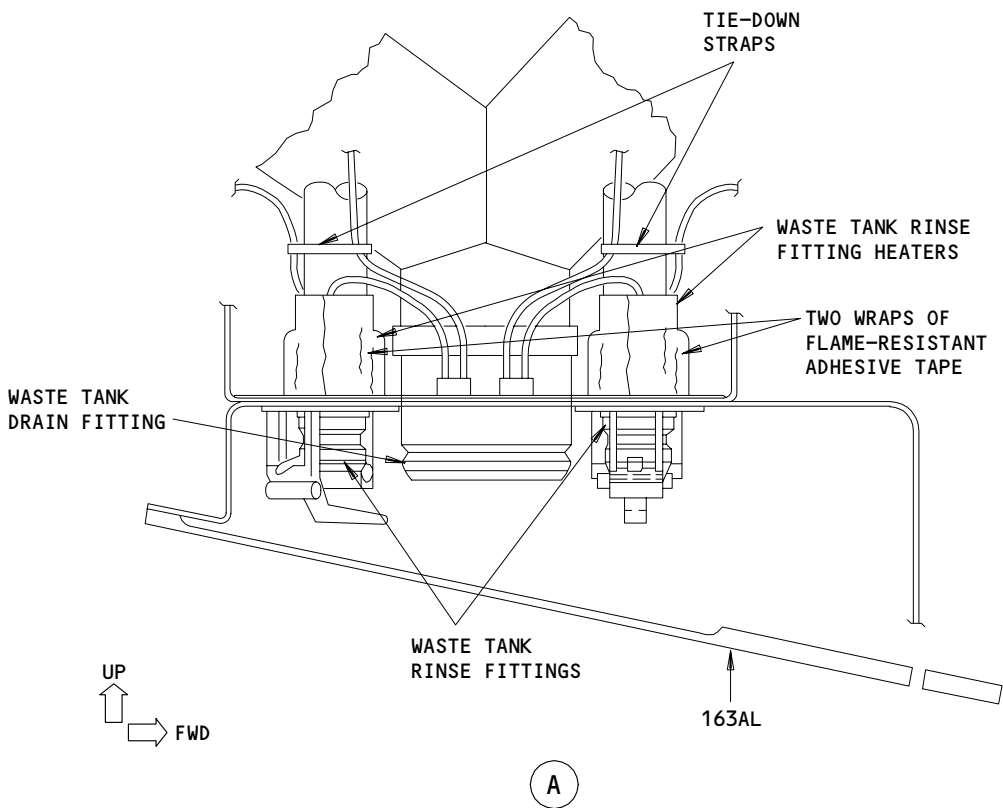
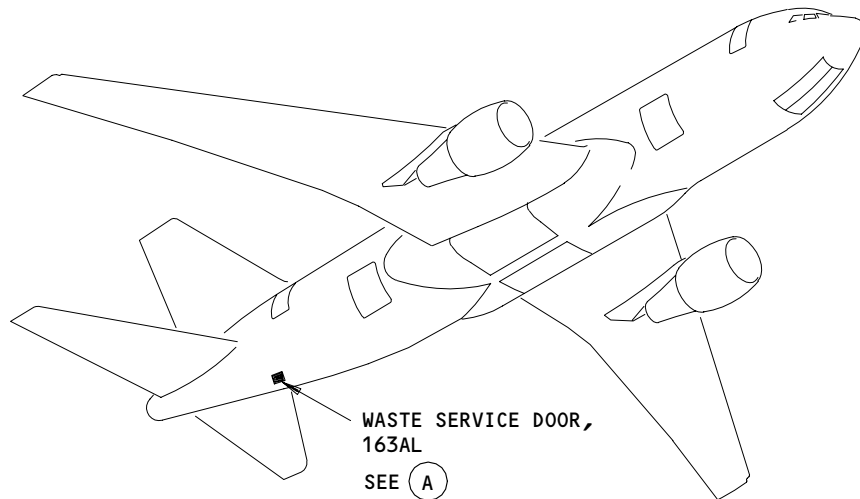
S 034-018

- (5) Remove the thermostat from the pan surface.

EFFECTIVITY

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30-71-07



Waste Tank Rinse Fitting Heaters Installation
Figure 401

EFFECTIVITY	
ALL	

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- S 034-019
(6) Remove the tie-down strap to disconnect the leads from the rinse line.

- S 034-020
(7) Remove the flame-resistant adhesive tape from the heater to show the split in the heater.

- S 024-021
(8) Remove the heater.

TASK 30-71-07-404-022

3. Install the Heater (Fig. 401)

A. Consumable Materials

- (1) A00181 Adhesive - BMS 5-92
(2) Tape, Adhesive, Flame-Resistant - 1.5 inches wide (use one of these tapes):
(a) G00295 3M No. 474
(b) G02129 Permacel P-29 (Silver or Gray)

- (3) G02319 Spray, freeze Miller-Stephenson MS-24n
(4) G02320 Ice, crushed

B. References

- (1) AMM 24-22-00/201, Electrical Power - Control

C. Access

- (1) Location Zones
163/164 Area Below Bulk Cargo Compartment
(2) Access Panel
163AL Waste Service Door

D. Procedure

S 424-056

CAUTION: DO NOT BEND THE HEATER MORE THAN IS NECESSARY TO PUT IT ON THE RINSE LINE. HEATER DAMAGE CAN OCCUR.

- (1) Open the heater at the split and put it on the rinse line.

S 434-028

- (2) Attach the heater with two wraps of flame-resistant adhesive tape. Do not put tape on the electrical leads and the side-mounted thermostat that has a reset button.

S 434-031

- (3) Clean the faying surface and bond the thermostat to the pan surface with adhesive.
(a) Do not install the thermostat on the rivet heads and make sure the thermostat surface touches the pan surface.

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- S 034-032
- (4) Remove the old electrical leads from the splice location.
- S 434-033
- (5) Install the new leads with a splice.
- S 434-034
- (6) Attach the leads to the rinse line with the tie-down straps.
- S 864-037
- (7) SAS AIRPLANES;
Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P33 panel:
- (a) 33G5, WATER LINE HTRS - AFT 1
- S 864-042
- (8) MTH AIRPLANES;
Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P37 panel:
- (a) 37H4, WATER LINE HTRS - AFT 3
- S 704-047
- (9) Do a test of the heater installation.
- (a) Supply electrical power (AMM 24-22-00/201).
- (b) Cool the thermostat to less than 41 Degrees F (5 Degrees C)

NOTE: You can use spray, Miller-Stephenson MS-242N or crushed ice, to decrease the temperature. Permit 3 to 5 minutes for the temperature of the thermostat to decrease before you check the temperature of the heater.

- (c) Make sure the applicable heater becomes warm.
- (d) Remove electrical power if it is not necessary.

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HEATED SUPPLY HOSE – REMOVAL/INSTALLATION

1. General

- A. This subject has two tasks, one for the removal and one for the installation of the heated supply hose which supplies potable water. In this procedure, you will get access to the hose, cut the electrical leads, remove the hose, and make a splice to install the replacement hose.
- B. The removal and installation procedures for all heated supply hoses are the same.

TASK 30-71-09-004-001

2. Heated Supply Hose Removal

A. References

- (1) AMM 38-10-00/201, Water System Pressurization
- (2) SSM 30-71-02, Water and Waste Heaters
- (3) SWPM 20-30-12
- (4) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (5) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (6) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters

B. Access

- (1) Location Zone
121 thru 156 Lower Lobe (Refer to WDM for heater locations)

C. Procedure

S 864-002

- (1) Open these circuit breakers on the forward miscellaneous electrical equipment panel, P33, and attach a DO-NOT-CLOSE tag:
 - (a) 33G1, FWD WTR LINE HEATER
 - (b) 33G2, ICE/RAIN WATERLINE HTR MID 2
 - (c) 33G3, ICE/RAIN WATERLINE HTR MID 2
 - (d) 33G6, ICE/RAIN WATERLINE HTR AFT 2

S 844-003

- (2) Do this task: "Depressurize Water System" (AMM 38-10-00/201).

S 014-004

- (3) Get access to the applicable heated supply hose.

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S 034-005

- (4) Cut the electrical leads on the heated supply hose (SWPM 20-30-12).

NOTE: Let the cut electrical leads stay where they are. This will help you to find the splice. Remove them when you make a splice with the new leads.

S 014-015

- (5) Release the clamps along the length of the heated supply hose.

S 024-006

- (6) Remove the heated supply hose.

TASK 30-71-09-404-007

3. Heated Supply Hose Installation

A. References

- (1) AMM 24-22-00/201, Manual Control
- (2) AMM 30-71-00/501, Water Line and Waste Drain Heaters
- (3) AMM 38-10-00/201, Water System Pressurization
- (4) SSM 30-71-02, Water and Waste Heaters
- (5) SWPM 20-30-12
- (6) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (7) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (8) WDM 30-71-22, Aft Water Supply Line and Drain Line Heaters

B. Access

- (1) Location Zone
121 thru 156 Lower Lobe (Refer to WDM for heater locations)

C. Procedure

S 424-008

- (1) Install the heated supply hose with its clamps.

S 434-009

- (2) Find the splice area and make a splice of the electrical leads (SWPM 20-30-12).

S 864-010

- (3) Remove a DO-NOT-CLOSE tag and close these circuit breakers on the P33 panel that were opened for removal task:
- (a) 33G1, FWD WTR LINE HEATER

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- (b) 33G2, ICE/RAIN WATERLINE HTR MID 2
- (c) 33G3, ICE/RAIN WATERLINE HTR MID 2
- (d) 33G6, ICE/RAIN WATERLINE HTR AFT 2

S 864-011

- (4) Do this task: "Pressurize Water System" (AMM 38-10-00/201).

S 714-012

- (5) Do a test of the heated supply hose (AMM 30-71-00/501).

S 864-013

- (6) Remove electrical power (AMM 24-22-00/201).

S 414-014

- (7) Reinstall the floor panel, sidewall panel, or cargo liner.

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IN-LINE HEATERS - REMOVAL/INSTALLATION

1. General

- A. This subject has two tasks, one for the removal and one for the installation of the in-line water supply line heaters. In this procedure, you will get access to the heater, loosen and remove the heater, and install a replacement unit.
- B. It is necessary to drain the potable water system before you replace an in-line heater.

TASK 30-71-10-004-001

2. In-Line Heater Removal

A. References

- (1) AMM 12-14-01/301, Water System Servicing
- (2) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
- (3) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
- (4) SSM 30-71-02, Water and Waste Heaters
- (5) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (6) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (7) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters

B. Access

- (1) Location Zone
121 thru 156 Lower Lobe (Refer to WDM for heater locations)

C. Procedure

S 864-023

- (1) Open these circuit breakers on the forward miscellaneous electrical equipment panel, P33, and attach a DO-NOT-CLOSE tag:
 - (a) 33G1, FWD WTR LINE HEATER
 - (b) 33G1, ICE/RAIN WATERLINE HTR MID 1
 - (c) 33G3, ICE/RAIN WATERLINE HTR MID 2
 - (d) 33G5, ICE/RAIN WATERLINE HTR AFT 1

S 684-003

- (2) Do this task: "Water System Servicing (Drain)" (AMM 12-14-01/301).

NOTE: Make sure that you release the pressure in the water system.

S 014-004

- (3) Remove the cargo liners or floor panels as necessary to access the in-line heater (AMM 25-52-01/401).

S 034-005

- (4) Disconnect the electrical connector from the in-line heater.

S 034-006

- (5) Loosen the B-nut on the in-line heater.

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S 024-007

- (6) Pull the in-line heater out of the water line.

TASK 30-71-10-404-008

3. In-Line Heater Installation

A. References

- (1) AMM 12-14-01/301, Water System Servicing
- (2) AMM 24-22-00/201, Manual Control
- (3) AMM 25-52-01/401, Cargo Compartment Sidewall Lining
- (4) AMM 25-52-02/401, Cargo Compartment Ceiling Lining
- (5) AMM 30-71-00/501, Water and Drain Line Heaters
- (6) AMM 38-10-00/201, Potable Water System
- (7) SSM 30-71-02, Water and Waste Heaters
- (8) WDM 30-71-21, Forward Water Supply Line and Drain Line Heaters
- (9) WDM 30-71-22, Mid Water Supply Line and Drain Line Heaters
- (10) WDM 30-71-23, Aft Water Supply Line and Drain Line Heaters

B. Access

- (1) Location Zone
121 thru 156 Lower Lobe (Refer to WDM for heater locations)

C. Procedure

S 424-009

- (1) Put the in-line heater into the water line.

S 434-010

- (2) Tighten the B-nut.

S 434-011

- (3) Install the electrical connector.

S 614-012

- (4) Do this task: "Water System Servicing (Fill)" (AMM 12-14-01/301).

S 864-013

- (5) Supply electrical power (AMM 24-22-00/201).

S 864-014

- (6) Do this task: "Pressurize Water System" (AMM 38-10-00/201).

S 794-015

- (7) Make sure that there are no leaks in the water lines that you opened.

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- S 864-022
- (8) Remove a DO-NOT-CLOSE tag and close these circuit breakers on the P33 panel that were opened for removal:
- (a) 33G1, FWD WTR LINE HEATER
 - (b) 33G1, ICE/RAIN WATERLINE HTR MID 1
 - (c) 33G3, ICE/RAIN WATERLINE HTR MID 2
 - (d) 33G5, ICE/RAIN WATERLINE HTR AFT 1
- S 714-017
- (9) Do a test of the in-line heater (AMM 30-71-00/501).
- S 414-018
- (10) Install the cargo liners or floor panels which you removed (AMM 25-52-01/401).
- S 114-019
- (11) Do this task: "Potable Water System Cleaning (with Disinfectant)" (AMM 38-10-00/201).
- S 864-020
- (12) Remove electrical power (AMM 24-22-00/201).

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RIBBON HEATERS - REMOVAL AND INSTALLATION

1. General

- A. The data for the removal and installation of ribbon heaters is included in AMM 30-71-01/401

EFFECTIVITY
AIRPLANES WITH RIBBON HEATERS
ON WATER SUPPLY LINES
AND GRAY WATER DRAIN LINES

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ICE DETECTION SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. The ice detection system lets the flight crew know about ice on the engines and wings and can automatically start the anti-ice systems. Components of the ice detection system include two ice detectors, the wing and engine anti-ice control panel, and the EICAS display.
- (1) The 115v AC L BUS supplies power to the left ice detector. The 115v AC R Bus supplies power to the right ice detector.
 - (2) Automatic or manual operation of the anti-ice systems is possible.

2. Component Details (Fig. 1)

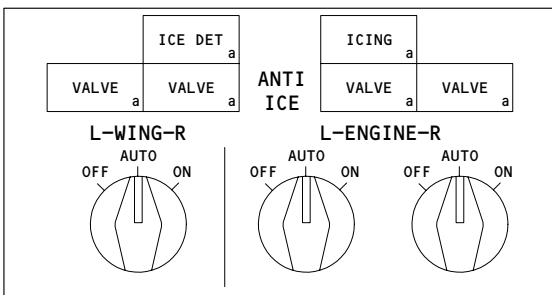
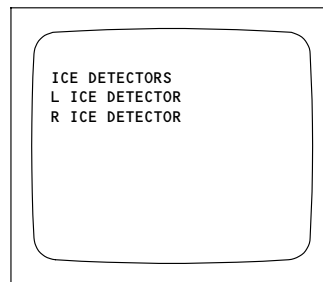
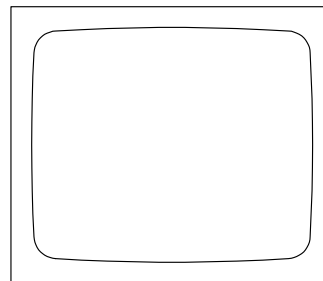
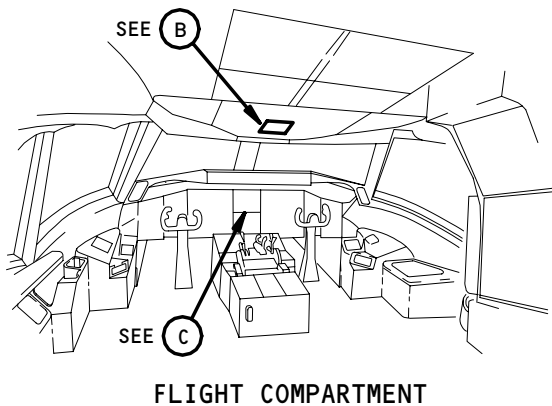
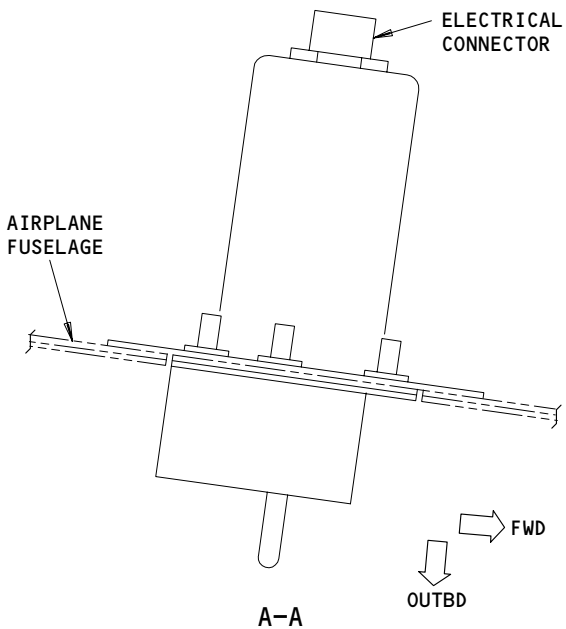
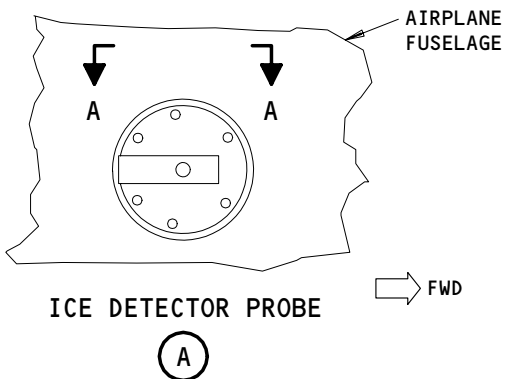
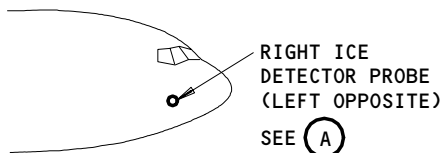
A. Ice Detectors

- (1) Each ice detector contains a probe, a heater, an internal test circuit, and three output ports.
- (2) The probes are installed on the right and left forward fuselage, immediately aft of the pitot-static probes. Each probe is part of an electromechanical resonant circuit which shakes at a frequency of approximately 40 kHz. Ice on the probe increases its weight and decreases the frequency. After a given quantity of ice collects, the heater starts. The heater melts the ice and puts the frequency back to its initial value.
- (3) If the heater does not melt the ice in 25 seconds, the heater and the outputs from the ice detectors automatically stop. If the internal temperature of the ice detector is more than 300° F, the heater and the outputs from the ice detectors automatically stop.
- (4) Each ice detector has three output ports: Wing TAI, Cowl TAI, and Fault Status. The TAI ON/OFF signals are caused by the number of de-ice cycles and when the de-ice cycles occur. A fault occurs when there is a loss of power to the detectors or when the detectors are not able to detect ice.
- (5) One or the other of the ice detectors, or the two ice detectors together, can control all engine and wing TAI systems.

B. Wing and Engine Anti-Ice Control Panel

- (1) The wing and engine anti-ice control panel is on the pilot's overhead panel, P5. The wing and engine anti-ice control panel includes two ENGINE ANTI-ICE switches, one WING ANTI-ICE switch, and amber warning lights. Each switch controls an anti-ice system. Each switch has three positions: ON, OFF, and AUTO. ON and OFF give manual control of the anti-ice systems. AUTO gives control of the anti-ice systems to the ice detection system.

3. Operation (Fig. 2)



WING AND ENGINE ANTI-ICE CONTROL PANEL, M10397

EICAS DISPLAYS

(B)

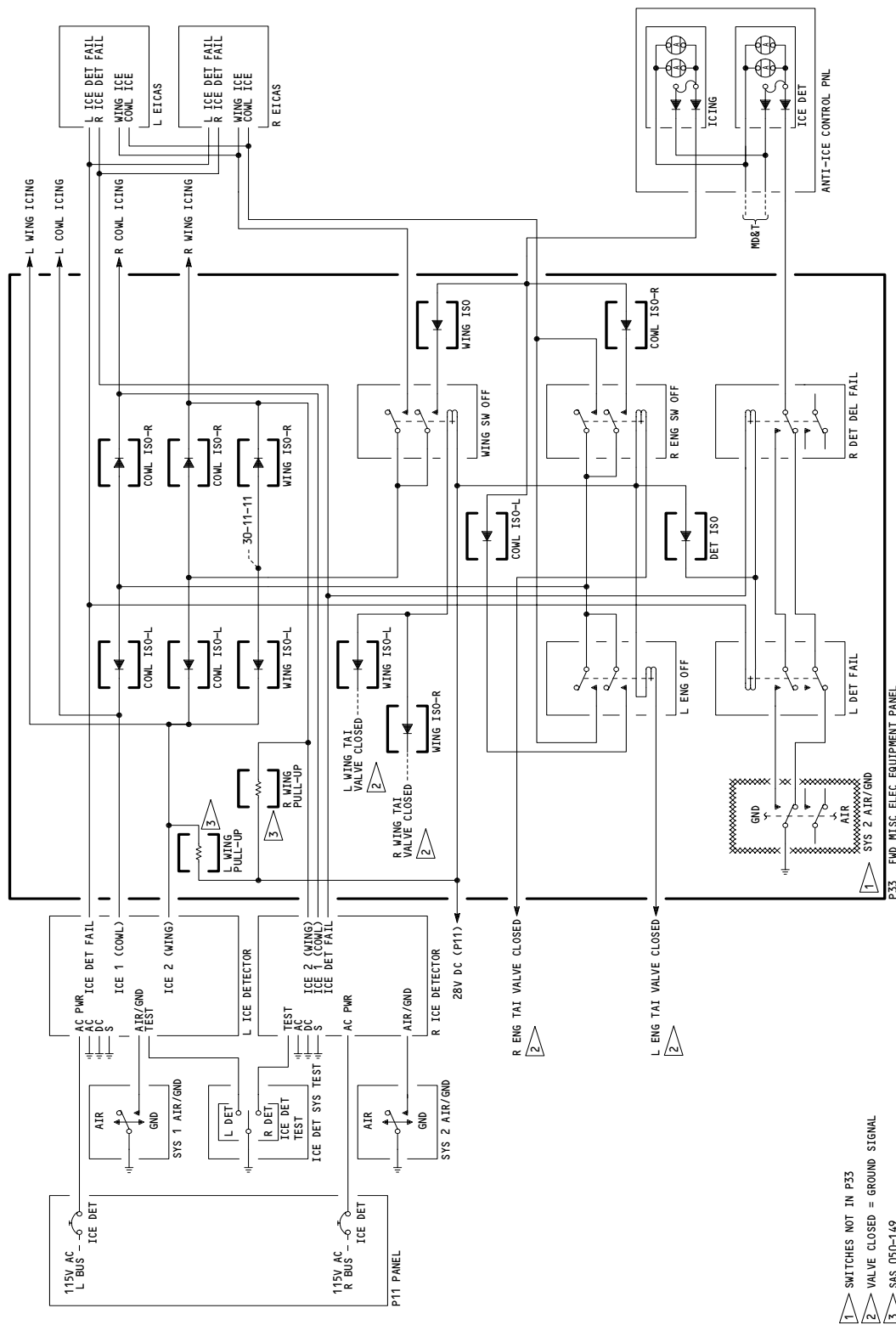
(C)

Ice Detection System - Component Location
Figure 1

EFFECTIVITY
AIRPLANES WITH ICE DETECTION SYSTEM

30-81-00

719707



Ice Detection System Schematic
Figure 2

EFFECTIVITY
AIRPLANES WITH ICE DETECTION SYSTEM

30-81-00

A. Functional Description

- (1) Ice that occurs on the probe during flight causes the frequency of the probe to decrease. When an ice layer of 0.02 ± 0.005 inch collects, the heater starts to melt the ice. The heater stops when the frequency returns to its initial value, usually after 7–8 seconds. If ice collects again, this operation occurs again. This operation is called a de-ice cycle. The ice detector counts the number of de-ice cycles that occur.
- (2) When two de-ice cycles occur one after the other, the ice detector gives an output that starts the engine anti-ice system. The engine anti-ice system operates for a time of 180 ± 10 seconds. If one more de-ice cycle occurs during the operation of the engine anti-ice system, the time of 180 seconds starts again.
 - (a) If more than 15 seconds are necessary to melt the ice on the first de-ice cycle, the engine anti-ice system starts after only one de-ice cycle.
- (3) When ten de-ice cycles occur one after the other, the ice detector gives an output that starts the wing anti-ice system. The wing anti-ice system operates for 180 ± 10 seconds. If one more de-ice cycle occurs during the operation of the wing anti-ice system, the time of 180 seconds starts again.
- (4) If the anti-ice switches are off when the ice detector finds ice, the amber fault light, ICING, will come on. The EICAS display will also show ICING ENGINE or ICING WING.
- (5) If the position of an anti-ice valve does not agree with the anti-ice switch position, the applicable amber fault light, Left or right VALVE, will come on. The EICAS display will also show L/R WING ANTI-ICE or L/R ENG ANTI-ICE.
- (6) If an ice detector does not operate, the EICAS display will show the applicable EICAS message: "L ICE DET" or "R ICE DET". The amber fault light "ICE DET" is an indication of two ice detector failures at the same time, it will come on when both of the ice detectors are failed either on the ground or in the air. Both relay "L Det Fail" and "R Det Fail" must be energized on the ground or de-energized in the air to provide a ground to the "ICE DET" light on the P5 panel.
- (7) The wing anti-ice system does not operate on the ground. The engine anti-ice system does not operate on the ground when the engine anti-ice switch is in the AUTO position.

B. Control

- (1) To put the system in operation, do these steps:

NOTE: The system operates automatically when electrical power is supplied to the system.

- (a) Supply electrical power to the left and right main AC Buses (AMM 24-22-00/201).
- (b) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - 1) LEFT ICE DET

2) RIGHT ICE DET

EFFECTIVITY
AIRPLANES WITH ICE DETECTION SYSTEM

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BOEING
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FAULT ISOLATION/MAINT MANUAL

ICE DETECTION SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER - LEFT ICE DET, C1118 RIGHT ICE DET, C1119	1	1 1	FLT COMPT, P11 11T14 11T23	* *
COMPUTER - EICAS - L, M10181 EICAS - R, M10182				
DIODE - R448-R454, R481-R483, R490, R491				
LIGHT - ICE DETECT, L5	1	1	FLT COMPT, P5, WING AND ENGINE ANTI-ICE CONT PANEL, M10397	*
LIGHT - ICING, L6	1	1	FLT COMPT, P5, WING AND ENGINE ANTI-ICE CONT PANEL, M10397	*
PANEL - WING AND ENGINE ANTI-ICE CONTROL, M10397				
PROBES - L ICE DETECTOR, M1739 R ICE DETECTOR, M1740	1 1	1 1	LEFT NOSE SECTION RIGHT NOSE SECTION	30-81-01 30-81-01
RELAY - L DET FAIL, K2113 L ENG SW OFF, K2111 R DET FAIL, K2114 R ENG SW OFF, K2112 SYS NO. 2 AIR/GND, K520 WING SW OFF, K2110				
RELAY - SYS NO. 1 AIR/GND, K177				
RELAY - SYS NO. 2 AIR/GND, K202				
RESISTOR - L WING PULL-UP, R674 R WING PULL-UP, R675				
SWITCH - ICE DET TEST, M1753	1	1	FLT COMPT, P61, RIGHT SIDE PANEL	

* SEE THE WDM EQUIPMENT LIST

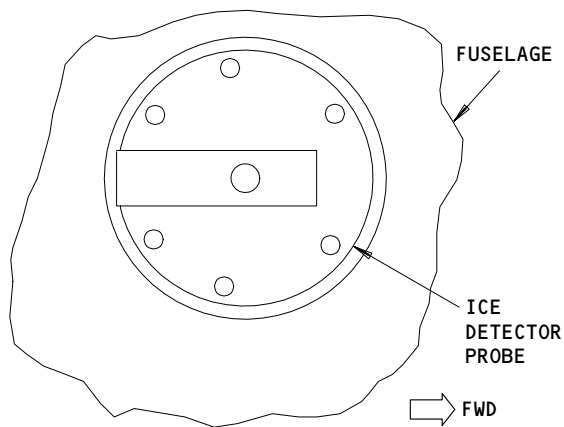
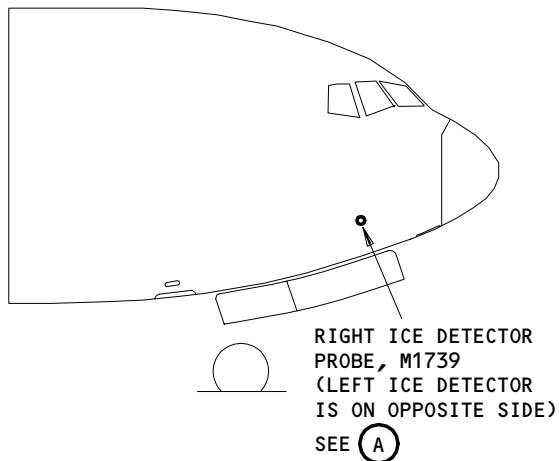
Ice Detection System - Component Index
Figure 101

EFFECTIVITY
AIRPLANES WITH ICE DETECTION SYSTEM

30-81-00

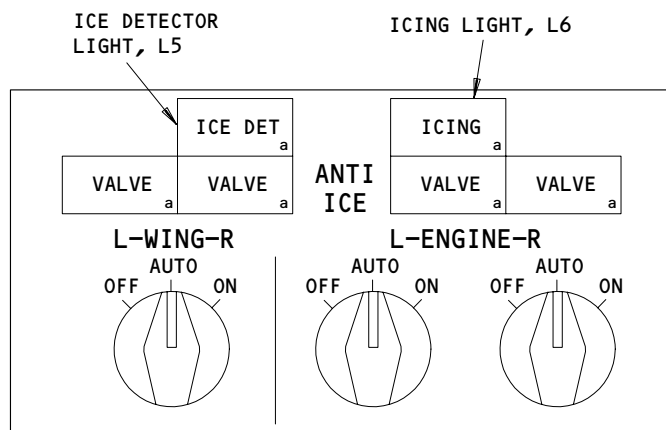
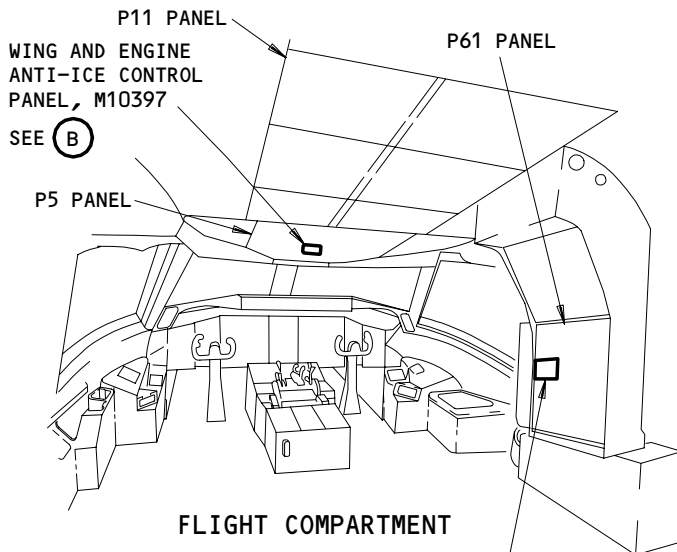
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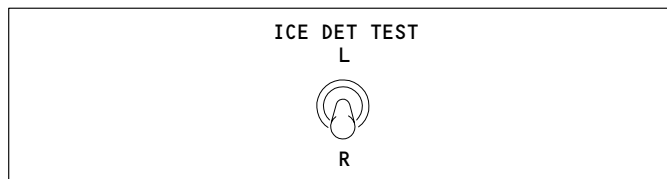
LEFT OR RIGHT ICE DETECTOR PROBE,
M1739 OR M1740

(A)



WING AND ENGINE ANTI-ICE
CONTROL PANEL, M10397

(B)



ICE DETECTOR TEST SWITCH, M1753

(C)

Ice Detection System - Component Location
Figure 102

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AIRPLANES WITH ICE DETECTION SYSTEM

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ICE DETECTION SYSTEM – ADJUSTMENT/TEST

1. General

- A. This procedure contains one task. This task is an operational test of the ice detection system.

TASK 30-81-00-715-017

2. Operational Test – Primary Ice Detection System

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
- (2) AMM 31-41-00/201, Engine Indication and Crew Alerting System (EICAS)
- (3) AMM 32-09-02/201, Air/Ground Relays

B. Access

- (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 865-018

WARNING: DO NOT TOUCH THE ICE DETECTOR PROBES AFTER YOU SUPPLY ELECTRICAL POWER. ELECTRICAL POWER CAN CAUSE THE PROBE HEATERS TO OPERATE. HOT ICE DETECTOR PROBES CAN BADLY BURN YOU.

- (1) Supply electrical power (AMM 24-22-00/201).

S 715-019

- (2) Make sure the EICAS operates (AMM 31-41-00/201).

S 865-063

- (3) Push the ECS MSG button on the right side of the EICAS MAINT panel, P61, to let maintenance level EICAS messages show.

S 215-059

- (4) Make sure the engines are not on.

S 215-060

- (5) Make sure the L ENG and the R ENG switch-lights on the bleed air supply module on the P5 panel are in the OFF position and the OFF lights are on.

S 865-020

- (6) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
 - (a) 11A31, WING ANTI-ICE or ANTI-ICE WING

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- (b) 11C30, POSITION AIR/GND SYS 1
- (c) 11T14, LEFT ICE DET
- (d) 11T23, RIGHT ICE DET
- (e) 11U15, AIR/GND SYS 1
- (f) 11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be located in one of these two locations.

S 715-056

- (7) Do these steps to do a test of the primary ice detection system:
 - (a) Put the L-WING-R ANTI-ICE switch on the P5 panel to the AUTO position.
 - (b) Put the L-ENGINE-R ANTI-ICE switches on the P5 panel to the OFF position.
 - (c) Make sure these messages do not show on the EICAS display:

MESSAGE	LEVEL	TYPE
ICING ENGINE	B	Caution
ICING WING	C	Advisory
ICE DETECTORS	C	Advisory
R ENG ANTI-ICE	C	Advisory
L ENG ANTI-ICE	C	Advisory
R WING ANTI-ICE	C	Advisory
L WING ANTI-ICE	C	Advisory
R ICE DETECTOR	S,M	Status, Maintenance
L ICE DETECTOR	S,M	Status, Maintenance

- (d) Make sure these lights on the P5 panel do not come on:
 - 1) ICE DET
 - 2) ICING
 - 3) VALVE (wing left and right)
 - 4) VALVE (engine left and right)
- (e) Push and hold the ICE DET TEST switch on the P61 panel to the R position for 20 seconds.
- (f) After 10 seconds, make sure these messages show on the EICAS display:
 - 1) ICING ENGINE
 - 2) ICING WING

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- 3) R ICE DETECTOR
- 4) L WING ANTI-ICE
- 5) R WING ANTI-ICE
- (g) Make sure the ICING light on the P5 panel comes on.
- (h) Make sure the left and right wing VALVE lights come on at the M10397 module.
- (i) Release the ICE DET TEST switch.
- (j) After 10 seconds, make sure these messages do not show on the EICAS display:
 - 1) ICING ENGINE
 - 2) ICING WING
 - 3) R ICE DETECTOR
 - 4) L WING ANTI-ICE
 - 5) R WING ANTI-ICE
- (k) Make sure the ICING light on the P5 panel goes off.
- (l) Make sure the left and right wing VALVE lights go off.
- (m) Push and hold the ICE DET TEST switch on the P61 panel to the L position for 20 seconds.
- (n) After 10 seconds, make sure these messages show on the EICAS display:
 - 1) ICING ENGINE
 - 2) ICING WING
 - 3) L ICE DETECTOR
 - 4) L WING ANTI-ICE
 - 5) R WING ANTI-ICE
- (o) Make sure the ICING light on the P5 panel comes on.
- (p) Make sure the left and right wing VALVE lights come on.
- (q) Release the ICE DET TEST switch.
- (r) After 10 seconds, make sure these messages do not show on the EICAS display:
 - 1) ICING ENGINE
 - 2) ICING WING
 - 3) L ICE DETECTOR
 - 4) L WING ANTI-ICE
 - 5) R WING ANTI-ICE
- (s) Make sure the ICING light on the P5 panel goes off.
- (t) Make sure the left and right wing VALVE lights go off.

WARNING: PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. IN THE AIR MODE, MANY OF THE AIRPLANE SYSTEMS CAN OPERATE AND CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (u) Prepare the safety-sensitive systems for air mode simulation (AMM 32-09-02/201).

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- (v) Open this(these) circuit breaker(s) on the P11 panel:
- 1) AIRPLANES WITHOUT THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

- 2) AIRPLANES WITH THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;

Circuit Breakers:

- a) 11C29, LANDING GEAR POSITION AIR/GND SYS 2 ALT
- b) 11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

- (w) Open these circuit breakers on the overhead circuit breaker panel, P11:
- 1) 11T14, LEFT ICE DET
 - 2) 11T23, RIGHT ICE DET
- (x) Make sure the ICE DET light comes on at the M10397 module on the P5 panel.
- (y) Close these circuit breakers on the overhead circuit breaker panel, P11:
- 1) 11T14, LEFT ICE DET
 - 2) 11T23, RIGHT ICE DET
- (z) Open these circuit breakers on the P11 panel:
- 1) 11C30, POSITION AIR/GND SYS 1
 - 2) 11U15, AIR/GND SYS 1
- (aa) Move the ICE DET TEST switch to L DET position and hold for 20 seconds.
- (ab) Make sure the ICING light on the P5 panel stays off.
- (ac) Release the ICE DET TEST switch.
- (ad) Close these circuit breakers on the P11 panel:
- 1) 11C30, POSITION AIR/GND SYS 1
 - 2) 11U15, AIR/GND SYS 1
- (ae) Move the ICE DET TEST switch to the R DET position and hold it there for 20 seconds.
- (af) Make sure the ICING light on the P5 panel stays off.
- (ag) Release the ICE DET TEST switch.

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- (ah) Close this (these) circuit breaker(s) on the P11 panel:
- 1) AIRPLANES WITHOUT THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

- 2) AIRPLANES WITH THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
Circuit Breakers:
 - a) 11C29, LANDING GEAR POSITION AIR/GND SYS 2 ALT
 - b) 11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

WARNING: DO NOT TOUCH THE ICE DETECTOR PROBE AFTER YOU SUPPLY ELECTRICAL POWER. ELECTRICAL POWER CAN CAUSE THE PROBE HEATERS TO OPERATE. A HOT ICE DETECTOR PROBE CAN BADLY BURN YOU.

- (ai) Make sure these circuit breakers on the P11 panel are closed:
- 1) 11A16, L ENGINE ANTI-ICE
 - 2) 11A31, WING ANTI-ICE
 - 3) 11T14, LEFT ICE DET
 - 4) 11T23, RIGHT ICE DET
 - 5) 11T19, R ENGINE ANTI-ICE

- (aj) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
- 1) 11C30, POSITION AIR/GND SYS 1
 - 2) 11U15, AIR/GND SYS 1
 - 3) AIRPLANES WITHOUT THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

- 4) AIRPLANES WITH THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
Circuit Breakers:
 - a) 11C29, LANDING GEAR POSITION AIR/GND SYS 2 ALT

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b) 11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

(ak) Put the L-WING-R switch and the L-ENGINE-R ANTI-ICE switches on the P5 panel in the AUTO position.

(al) Make sure these messages do not show on the EICAS display:

MESSAGE	LEVEL	TYPE
ICING ENGINE	B	Caution
ICING WING	C	Advisory
R ENG ANTI-ICE	C	Advisory
L ENG ANTI-ICE	C	Advisory
R WING ANTI-ICE	C	Advisory
L WING ANTI-ICE	C	Advisory
L WING TAI VALVE	M	Maintenance
R WING TAI VALVE	M	Maintenance

(am) Make sure these messages show on the EICAS display:

MESSAGE	LEVEL	TYPE
ICE DETECTORS	C	Advisory
L ICE DETECTOR	S,M	Status, Maintenance
R ICE DETECTOR	S,M	Status, Maintenance

(an) Make sure these lights on the P5 panel do not come on:

- 1) ICING
- 2) VALVE (wing)
- 3) VALVE (engine)

- (ao) Operate the left ice detector probe heater by one of these methods:

NOTE: Use a soft wet rag or ice to decrease the temperature of the ice detector while this test is done. Make the ice detector probe strut wet with the rag or put the ice on the probe strut.

- 1) Coat the ice detector probe with water and apply refrigerant until the ice layer is at least 0.02 inch (0.51mm) thick.

NOTE: This is the recommended procedure.

WARNING: THE ICE DETECTOR HEATS VERY QUICKLY AND GETS VERY HOT DURING OPERATION. DO NOT TOUCH THE ICE DETECTOR PROBE WITH YOUR HANDS. A HOT ICE DETECTOR PROBE CAN BADLY BURN YOU.

- 2) Put a leather glove on one hand.

NOTE: This is an optional procedure.

- a) With the hand that has the glove on, lightly apply pressure to the ice detector probe with your thumb and index finger and release your fingers.
b) Hold your other hand near the ice detector probe to feel if the ice detector probe gets warm.
c) Let the ice detector probe temperature decrease for 10 to 15 seconds.

- (ap) Operate the ice detector probe again.

- (aq) Make sure this message shows on the EICAS display after 5 seconds:

1) ICING ENGINE

- (ar) Make sure these lights on the P5 panel come on:

1) ICING

2) VALVE (engine)

3) Let the ice detector probe temperature decrease for 10 to 15 seconds.

- (as) Operate the ice detector probe a total of 10 times. Let the ice detector probe temperature decrease for 10 to 15 seconds between each operation.

NOTE: Use a soft wet rag or ice to decrease the temperature of the ice detector while this test is done. Make the ice detector probe strut wet with the rag or put the ice on the probe strut.

- (at) Make sure these messages show on the EICAS display:

1) ICING ENGINE

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- 2) ICING WING
 - 3) L WING ANTI-ICE
 - 4) R WING ANTI-ICE
- (au) Make sure these lights on the P5 panel come on:
- 1) ICING
 - 2) VALVE (wing)
 - 3) VALVE (engine)
- (av) Make sure these messages on the EICAS display go off in less than 170 to 190 seconds from the last ice and deice cycle:
- 1) ICING ENGINE
 - 2) ICING WING
 - 3) R WING ANTI-ICE
 - 4) L WING ANTI-ICE
- (aw) Make sure these lights on the P5 panel do not come on:
- 1) ICING
 - 2) VALVE (wing)
 - 3) VALVE (engine)
- (ax) Operate the right ice detector probe heater by one of these methods:

NOTE: Use a soft wet rag or ice to decrease the temperature of the ice detector while this test is done. Make the ice detector probe strut wet with the rag or put the ice on the probe strut.

- 1) Coat the ice detector probe with water and apply refrigerant until the ice layer is at least 0.02 inch (0.51mm) thick.

NOTE: This is the recommended procedure.

WARNING: THE ICE DETECTOR HEATS VERY QUICKLY AND GETS VERY HOT DURING OPERATION. DO NOT TOUCH THE ICE DETECTOR PROBE WITH YOUR HANDS. THE ICE DETECTOR PROBE CAN BADLY BURN YOU.

- 2) Put a leather glove on one hand.

NOTE: This is an optional procedure.

- a) With the hand that has the glove on, lightly apply pressure to the ice detector probe with your thumb and index finger and release your fingers.
 - b) Hold your other hand near the ice detector probe to feel if the ice detector probe gets warm.
 - c) Let the ice detector probe temperature decrease for 10 to 15 seconds.
- (ay) Operate the ice detector probe again.

- (az) Make sure this message shows on the EICAS display after 5 seconds:
 - 1) ICING ENGINE
- (ba) Make sure these lights on the P5 panel come on:
 - 1) ICING
 - 2) VALVE (engine)
 - 3) Let the ice detector probe temperature decrease for 10 to 15 seconds.
- (bb) Operate the ice detector probe a total of 10 times. Let the ice detector probe temperature decrease for 10 to 15 seconds between each operation.

NOTE: Use a soft wet rag or ice to decrease the temperature of the ice detector while this test is done. Make the ice detector probe strut wet with the rag or put the ice on the probe strut.

- (bc) Make sure these messages show on the EICAS display:
 - 1) ICING ENGINE
 - 2) ICING WING
 - 3) L WING ANTI-ICE
 - 4) R WING ANTI-ICE
- (bd) Make sure these lights on the P5 panel come on:
 - 1) ICING
 - 2) VALVE (wing)
 - 3) VALVE (engine)
- (be) Make sure these messages on the EICAS display go off in less than 170 to 190 seconds from the last ice and deice cycle:
 - 1) ICING ENGINE
 - 2) ICING WING
 - 3) R WING ANTI-ICE
 - 4) L WING ANTI-ICE
- (bf) Make sure these lights on the P5 panel do not come on:
 - 1) ICING
 - 2) VALVE (wing)
 - 3) VALVE (engine)
- (bg) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - 1) AIRPLANES WITHOUT THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

- 2) AIRPLANES WITH THE "LANDING GEAR POSITION AIR/GND SYS 2 ALT" CIRCUIT BREAKER INSTALLED AT PANEL GRID LOCATION 11C29;
Circuit Breakers:
 - a) 11C29, LANDING GEAR POSITION AIR/GND SYS 2 ALT

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b) 11U23 or 11U24, POSITION AIR/GND SYS 2

NOTE: This circuit breaker can be in one of these two locations.

3) 11C30, POSITION AIR/GND SYS 1

4) 11U15, LANDING GEAR - AIR/GND SYS 1

D. Put the Airplane Back to Its Usual Condition.

S 445-061

(1) Put the safety-sensitive systems back to their initial conditions (AMM 32-09-02/201).

S 865-055

(2) Remove electrical power if it is not required (AMM 24-22-00/201).

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ICE DETECTOR PROBE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the ice detector probe. The second task is the installation of the ice detector probe.
- B. The ice detector probes are on the left and right forward fuselage.
 - (1) The removal and installation procedures are the same for the left and right ice detector probes.

TASK 30-81-01-004-001

2. Remove the Ice Detector Probe (Fig. 401)

- A. References
 - (1) AMM 51-31-01/201, Seals and Sealing
- B. Access
 - (1) Location Zones
211/212 Control Cabin – Section 41

C. Procedure

S 864-005

- (1) Open the circuit breaker on the overhead circuit breaker panel, P11, that is applicable to the ice detector probe you will remove:
 - (a) 11T14, LEFT ICE DET
 - (b) 11T23, RIGHT ICE DET

S 034-029

WARNING: BE CAREFUL IF YOU TOUCH THE PROBE. IF IT IS HOT, IT CAN BURN YOU.

CAUTION: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO REMOVE THE SEALANT. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO THE AIRPLANE SURFACE CAN OCCUR.

- (2) Remove the sealant from around the probe base (AMM 51-31-01/201).

S 034-007

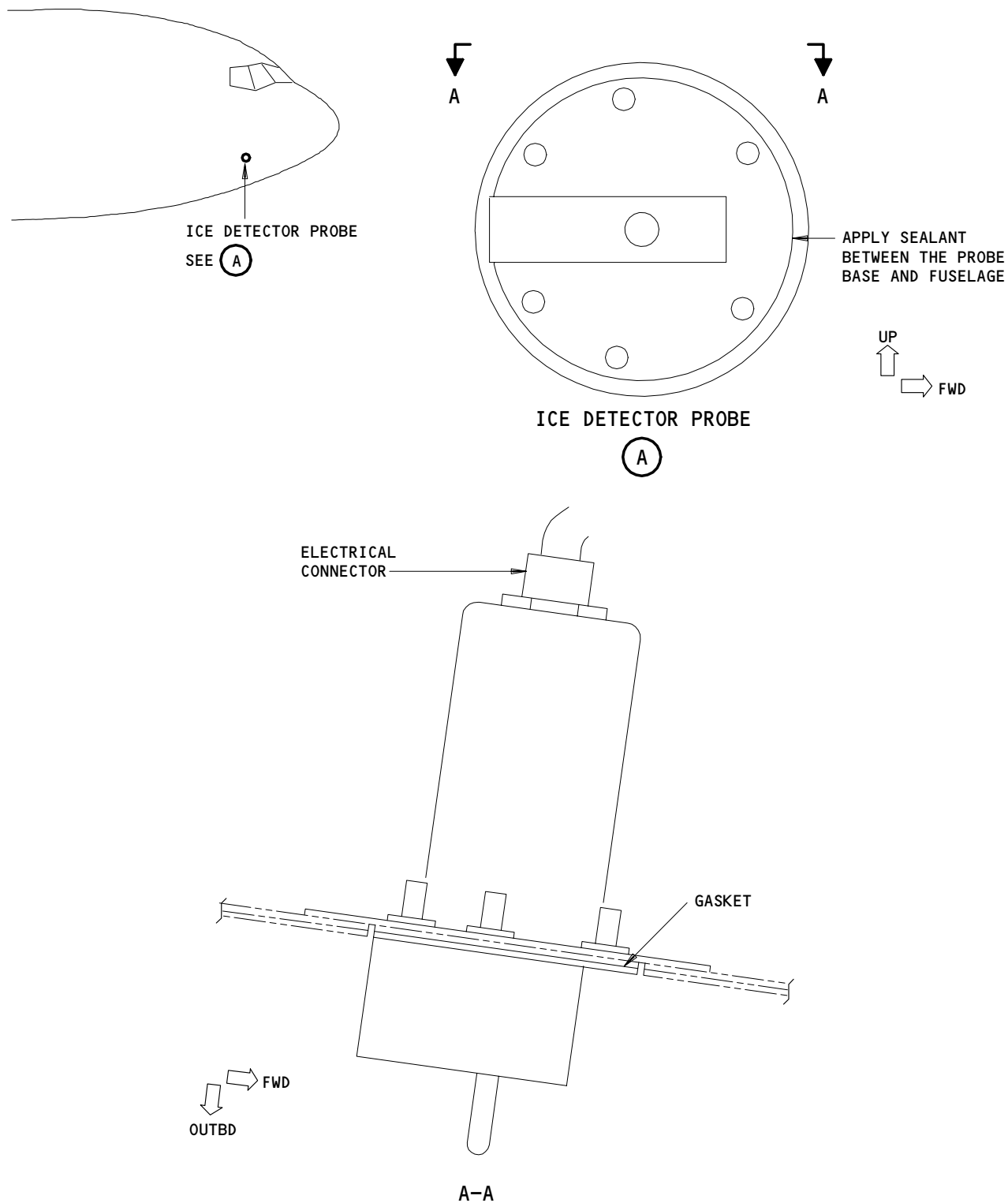
- (3) Remove the screws from the probe mounting flange.

S 024-008

- (4) Hold the probe strut, loosen the gasket, and lightly pull the probe out from the airplane skin until you can see the fitting on the base of the probe.

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Ice Detector Probe Installation
Figure 401

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S 024-009

- (5) Remove the electrical connector and remove the probe.

NOTE: Put the wiring in a position where it will not fall into the fuselage.

S 094-010

- (6) Put protective caps on the airplane wiring electrical connector.

S 034-011

- (7) Remove the gasket and discard it.

TASK 30-81-01-404-012

3. Install the Ice Detector Probe (Fig. 401)

A. Equipment

- (1) Resistance measuring bridge or ohmmeter that can measure 0.010 ohm with an accuracy of 0.001 ohm

B. Consumable Materials

- (1) A00247 Compound, Sealing - BMS 5-95, Class B1/2
(2) B00184 Solvent - BMS 11-7
(3) G00009 Compound, Corrosion Inhibiting - BMS 3-23
(4) G00101 Refrigerant - Freon 12

C. References

- (1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 51-31-01/201, Seals and Sealing

D. Access

- (1) Location Zones
211/212 Control Cabin - Section 41

E. Procedure

S 114-013

CAUTION: BE CAREFUL WHEN YOU TOUCH THE PROBE. YOU CAN CAUSE DAMAGE TO THE PROBE.

CAUTION: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO REMOVE THE SEALANT. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO THE AIRPLANE SURFACE CAN OCCUR.

- (1) Clean and prepare the surface and sides of the mounting hole (AMM 51-31-01/201).

S 114-014

- (2) Clean the surface of the alignment pins on the base of the probe.

- S 624-015
- (3) Put a thin layer of corrosion inhibiting compound on the surface of the alignment pins.
- S 494-016
- (4) Remove the protective caps from the electrical connector, strut, and probe.
- S 434-017
- (5) Set the new gasket into position.
- S 434-018
- (6) Connect the electrical connector to the probe.
- S 424-019
- (7) Put the probe into the fuselage cutout.
- S 434-020
- (8) Install the screws and torque to 18-22 pound-inches.
- (a) Make sure the probe base is aligned with the airplane skin.
- S 224-021
- (9) Measure the resistance between the ice detector mounting plate underside and airplane skin.
- (a) Make sure the resistance is not greater than 0.005 ohm.
- S 704-025
- (10) Do a test of the probe installation.
- (a) Supply power to the main AC bus (AMM 24-22-00/201).
- (b) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
- 1) 11T14, LEFT ICE DET
 - 2) 11T23, RIGHT ICE DET
 - 3) 11A31, WING ANTI-ICE CONT
 - 4) 11U15, AIR/GND SYS 1
 - 5) 11U23 or 11U24, POSITION AIR/GND SYS 2
- NOTE: This circuit breaker can be in one of these two locations.
- (c) Make sure the WING ANTI-ICE switch on the P5 panel to the OFF position.
- (d) Make sure the L ENGINE COWL ANTI-ICE switch on the P5 panel to the OFF position.
- (e) Make sure the EICAS message, L ICE DETECTOR, does not show on the bottom EICAS display.
- (f) Move the ice detector test switch on the P61 panel to L DET and hold.
- (g) Make sure the ICING light on the P5 panel comes on.

- (h) Make sure these EICAS messages, ICING ENGINE and ICING WING, show on the top EICAS display.
- (i) Make sure the EICAS message, L ICE DETECTOR, shows on the bottom EICAS display.
- (j) Release the ice detector test switch.
- (k) Make sure the ICING light on the P5 panel is off.
- (l) Make sure these EICAS messages, ICING ENGINE and ICING WING, do not show on the top EICAS display.
- (m) Put the R ENGINE COWL ANTI-ICE switch to the OFF position.
- (n) Move the ice detector test switch to R DET and hold.
- (o) Make sure the ICING light on the P5 panel comes on.
- (p) Make sure these EICAS messages, ICING ENGINE and ICING WING, show on the top EICAS display.
- (q) Make sure the EICAS message, R ICE DETECTOR, shows on the bottom EICAS display.
- (r) Release the ice detector test switch.
- (s) Make sure the ICING light on the P5 panel is off.
- (t) Make sure these messages, ICING ENGINE and ICING WING, do not show on the top EICAS display.
- (u) Make sure the EICAS message, R ICE DETECTOR, does not show on the bottom EICAS display.

S 864-026

- (11) Remove electrical power if it is not necessary.

S 394-031

CAUTION: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO APPLY THE SEALANT. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO THE AIRPLANE SURFACE CAN OCCUR.

- (12) Fill the cavity between the probe base and fuselage with sealant (AMM 51-31-01/201).

NOTE: It is not necessary to apply the sealant immediately, if the cure time will cause a flight delay. But, you must apply the sealant as soon as possible to keep moisture out of the area between the probe and airplane skin.

S 394-028

- (13) Cure the sealant until you cannot make an indent in it.

NOTE: Heat will decrease the cure time of the sealant (AMM 51-31-01/201).