CHAPTER

54

NACELLES

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CHAPTER 54 - NECELLES
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NACELLE ASSEMBLY - DESCRIPTION AND OPERATION

1. General

A. Each of the two engines of the P.180 Avanti is housed within a streamlined nacelle assembly comprising a set of four panels. The nacelle assembly is aerodynamically shaped for maximum efficiency of the airflow over the nacelle surfaces and to optimize the laminar airflow over the wing in the area of the nacelles.

B. Description and operation and all maintenance practices for the nacelle panels is given in Chapter 54-10-00.

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NACELLE PANELS - DESCRIPTION AND OPERATION

1. General

A. The nacelle assembly comprises four separate panels. The four panels are:
- upper and lower panels which are attached to, and extend forward from, the wing
- left and right panels which extend rearward from the wing.

The rear edges of the upper and lower panels and the front edges of the rear panels abut at, and are attached to, a splice bulkhead which is bolted to the rear frame of the engine mounting frame assembly.

B. The upper and lower panels are of laminate composite structure and, to withstand the radiant heat from the engine hot section, the rear panels are of sandwich structure with a honeycomb core.

C. To maintain the efficiency of the airflow over the nacelle surfaces, the panels are secured in place by screws which are flush with the panel external surfaces. Quick-release fasteners are not required because the panels need not to be removed on a regular basis. The oil tank is the only engine item which requires regular servicing, and for this purpose an access panel is incorporated at the top of the upper nacelle panel.

D. The upper nacelle panel includes the engine air intake duct. The duct is a single passageway from the front of the panel to approximately half its length; the remainder of the duct is a dual (bifurcated) passageway which passes each side of the front section of the engine mounting framework and the engine accessory gearbox. The rear ends of the duct direct the air into a plenum area around the air inlet section of the engine. The front part of the duct incorporates an inertial separation system which is described in Chapter CHAPTER 30 - ice and rain protection TABLE OF CONTENTS of this manual. A window is incorporated at the outboard side of the rear end of the upper nacelle panels for inspection of the pressure indicator of the fire bottle (if installed). The upper nacelle panel of the left engine incorporates a window behind which is a light which shines on the wing leading edge so that the pilot can visually inspect for ice formation.

E. The lower nacelle panel includes:
- the cooling air inlet duct to the starter-generator
- the cold air inlet to the pre-cooler of the air conditioning system
- the exit duct of the inertial separation system
- the air exit duct of the wing anti-ice system
- the oil cooler air inlet duct.

F. The left and right rear nacelle panels surround the hot section of the engine and include cut-outs for the exhaust stacks. The length of the panels is such that the engine propshaft flange is located immediately behind the panels; when the propeller is installed, its spinner forms the rear end of the streamlined nacelle assembly.

2. Operation

The part of the nacelle panels which operates is the inertial separator; refer to Chapter CHAPTER 30 - ice and rain protection TABLE OF CONTENTS for details of the inertial separation system.

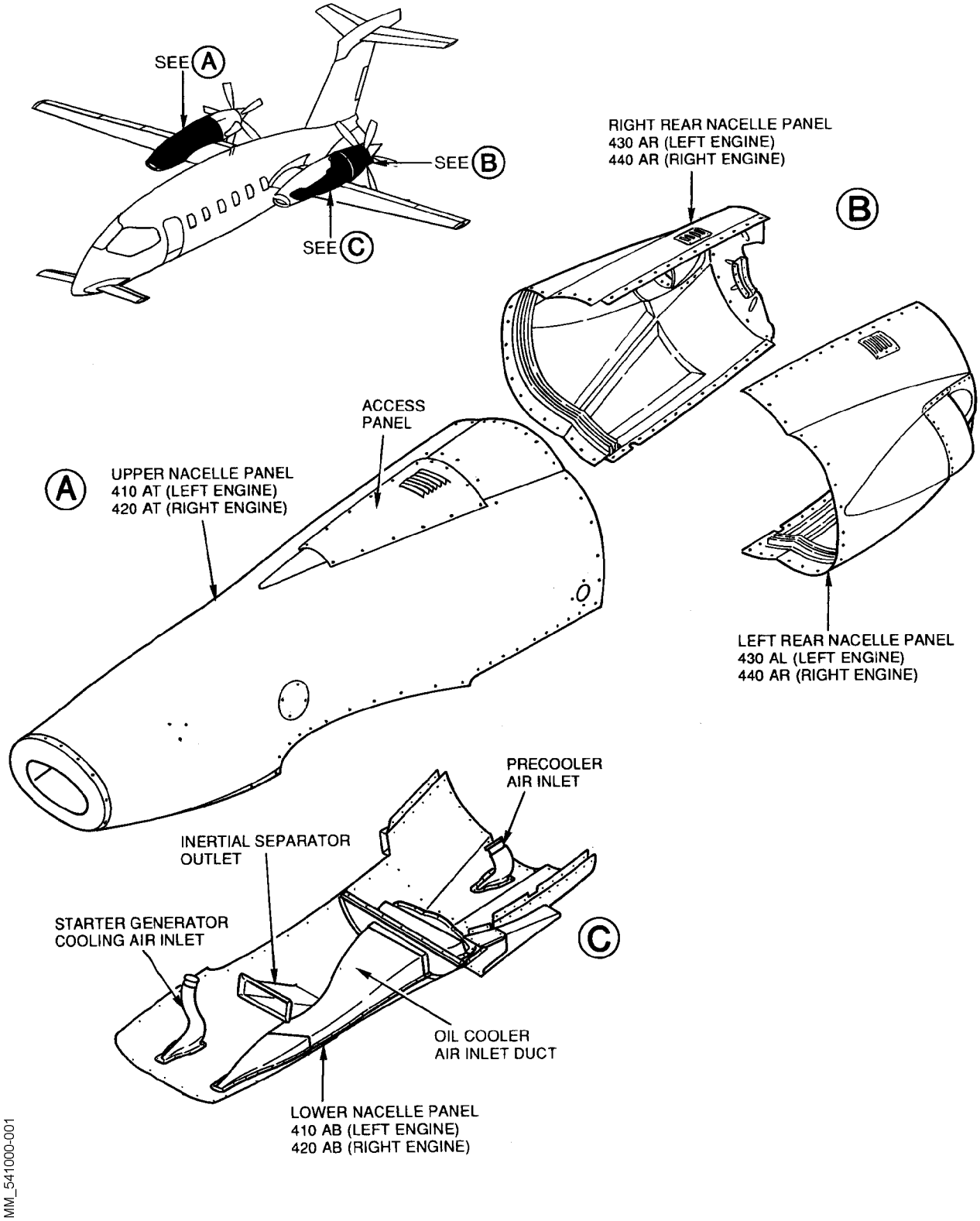


Fig. 1 - Nacelle Panels

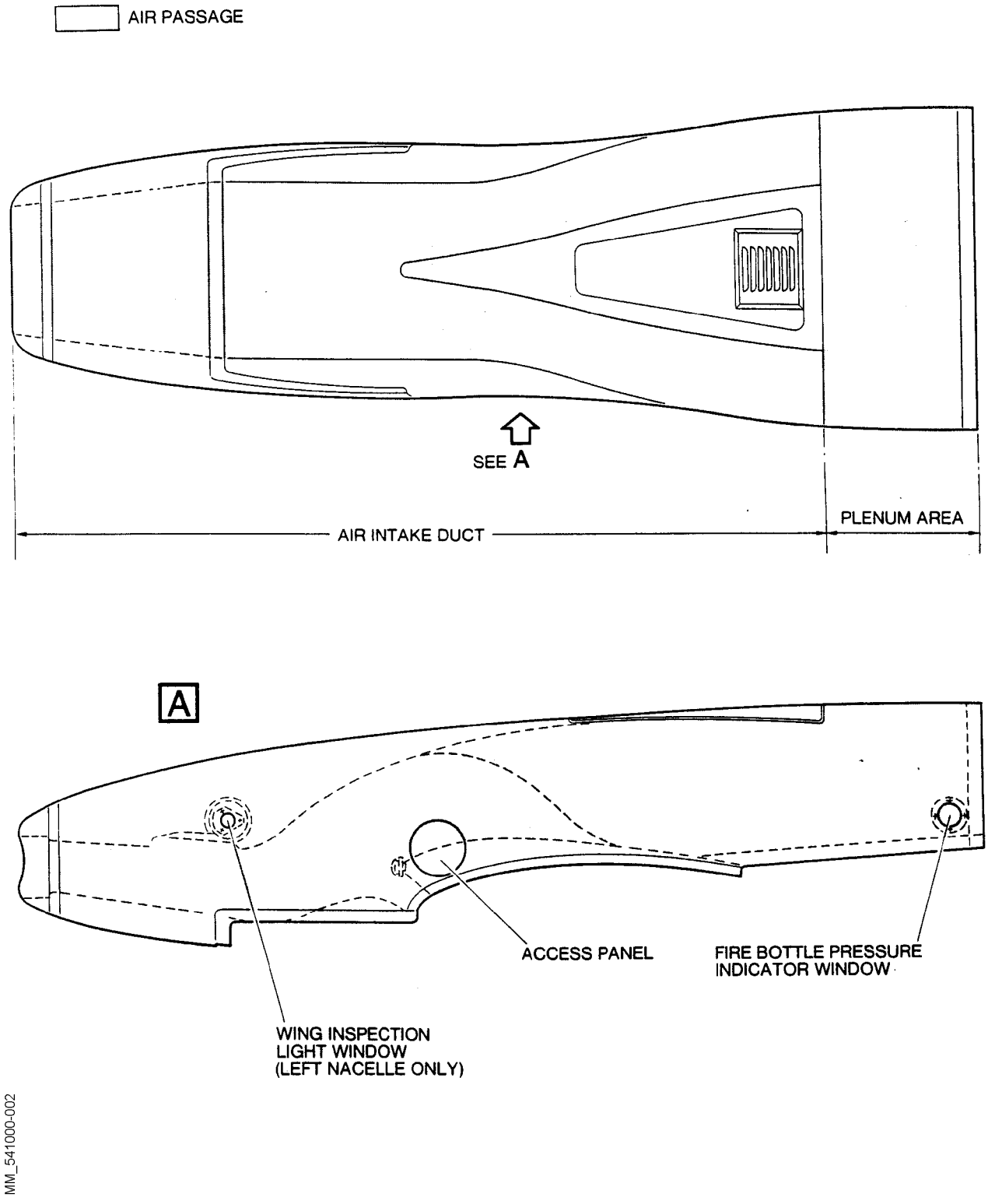


Fig. 2 - Upper Nacelle Panel

NACELLE PANELS - MAINTENANCE PRACTICES

1. General

A. This topic gives removal, installation and inspection information for the nacelle panels. For the purposes of this topic the left and right nacelle assemblies are identical, so the maintenance practices given are for one set of nacelle panels and are applicable to both sets.

NOTE: The screws that secures the nacelles to the engine mount structure have different sizes and types. To simplify the installation procedure it is recommended that, on removal, the screws are pushed into a large sheet of cardboard, polistyrene foam or other suitable device in the correct pattern.

2. Upper Nacelle Panel 410AT or 420AT - Removal (Ref. Fig. 201)

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Remove the screws which secure the upper nacelle panel to:
- the wing
- the lower nacelle panel
- the upper part of the splice bulkhead
- the upper part of the center frame.

NOTE: The screws are different sizes according to their location. To make sure that the correct screws are installed in all locations it is recommended that, on removal, the screws are pushed into a large sheet of cardboard in the correct pattern.

(2) Remove the four screws which secure the circular access panel to the outboard side of the upper nacelle panel. Remove the access panel.

(3) Remove all electrical power from the airplane (refer to 24-00-00) and disconnect plug P267 from its receptacle.

(4) Disconnect the tube of the air intake anti-ice system at its quick-disconnect coupling.

(5) Carefully lift the upper nacelle panel up and forward to clear the airplane. Remove the panel from the vicinity of the airplane and put it in a safe place on a surface which will not cause any damage to the panel.

(6) Place caps on the ends of disconnected tubes and electrical connectors.

(7) If required, restore electrical power to the airplane (refer to 24-00-00).

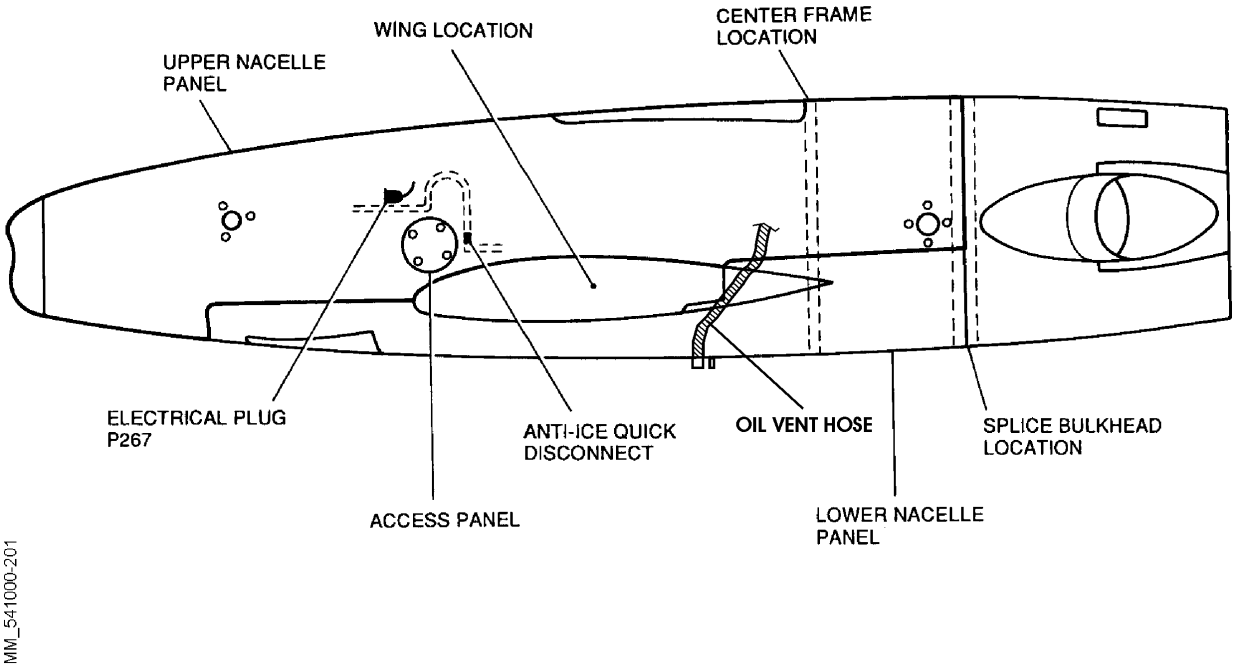


Fig. 201 - Upper Nacelle Panel - Removal and Installation

3. Upper Nacelle Panel 410AT or 420AT - Installation

A. Referenced Information

NOTE: Install the Lower Nacelle Panel (if previously removed) before Upper Nacelle Panel installation.

Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 30-21-00
Maintenance Manual Chapter 30-22-00
Maintenance Manual Chapter 33-42-00

B. Procedure

(1) Carefully maneuver the upper nacelle panel into position so that its attachment screw holes are aligned with, and on the correct side of, the corresponding holes in the wing and the lower nacelle panel.

(2) Install the screws which secure the upper nacelle to:

- the wing
- the lower nacelle panel
- the splice bulkhead
- the center frame.

(3) Make sure that, after tightening, all screws are flush with the adjacent skin.
(4) Make sure that the electrical power has been removed (refer to 24-00-00).
(5) Remove the caps from electrical plug P267 and its receptacle; connect the plug to the receptacle.
(6) Remove the caps from the ends of the quick-disconnect coupling of the air intake anti-ice tube; connect the coupling.
(7) Install the circular access panel at the outboard side of the upper nacelle panel and secure it in place with the four screws.
(8) Restore electrical power to the airplane (refer to 24-00-00).
(9) Do an operational test of the inertial separation system (refer to 30-22-00).
(10) Do an operational test of the engine air intake anti-ice system (refer to 30-21-00).
(11) After installation of the left engine upper nacelle panel, do an operational test of the wing inspection light (refer to 33-42-00).

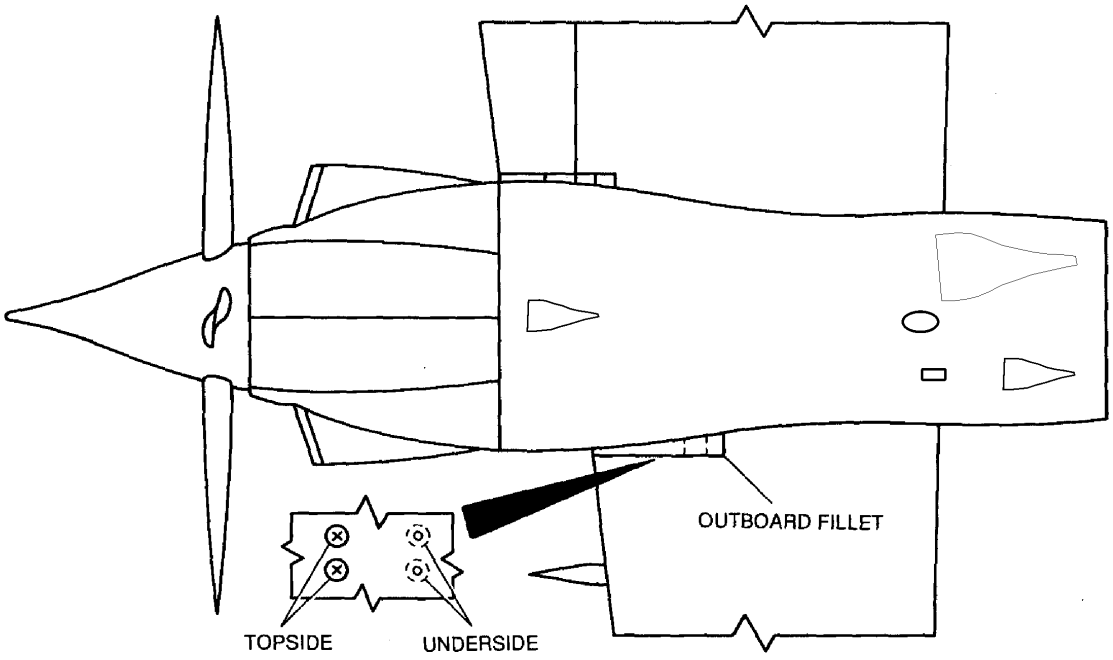
4. Lower Nacelle Panel 410AB or 420AB - Removal (Ref. Fig. 202)

A. Procedure

(1) Remove the upper nacelle panel 410AT or 420AT as applicable (refer to Para. 2).
(2) Loosen the clamp and disconnect the precooler air inlet hose at the precooler.
(3) Loosen the clamp and disconnect the starter-generator cooling air hose at its forward end.
(4) Loosen the clamps and disconnect the wing anti-ice air outlet hoses at the nacelle panel.
(5) Disconnect the anti-ice tube of the oil cooler air intake at the air intake.
(6) Remove the two screws from the topside of the outboard fillet.
(7) Remove the two screws from the underside of the outboard fillet.
(8) Remove the four screws that secure the Oil Vent Hose Support to the lower nacelle.
(9) Support the lower nacelle panel and remove the screws which secure the panel to:
- the wing
- the lower part of the splice bulkhead
- the lower part of the center frame.

NOTE: The screws are different sizes according to their location. To make sure that the correct screws are installed in all locations it is recommended that, on removal, the screws are pushed into a large sheet of cardboard in the correct pattern.

(10) Continue to support the weight of the panel and carefully maneuver the panel down and rearward to clear the airplane; make sure that the precooler air inlet hose does not become snagged or damaged during removal of the panel.
(11) Remove the panel from the vicinity of the airplane and put it in a safe place on a surface which will not cause any damage to the panel.
(12) Place caps on the ends of disconnected tubes and hoses.



PLAN VIEWS OF RH LOWER NACELLE
(LH LOWER NACELLE SIMILAR)

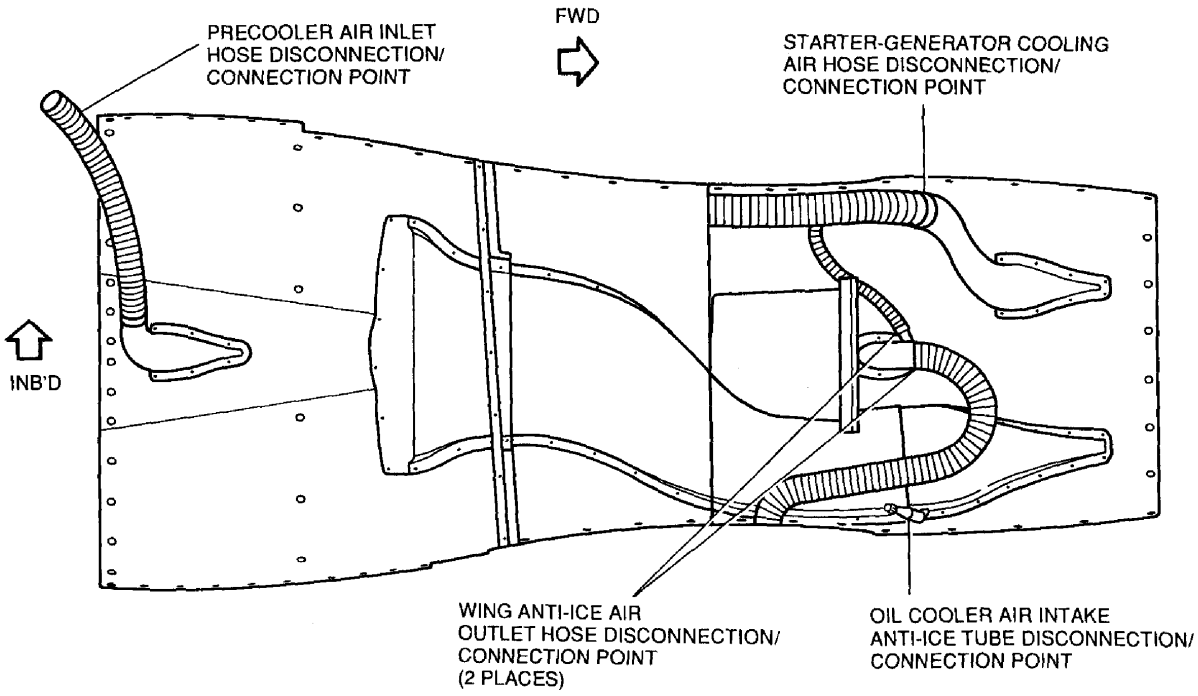


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Fig. 202 - Lower Nacelle Panel - Removal/Installation

5. Lower Nacelle Panel 410AB or 420AB - Installation (Ref. Fig. 202)

A. Procedure

(1) Remove the caps from the ends of the disconnected tubes and hoses.

(2) Carefully maneuver the lower nacelle panel into position; at the same time, make sure that the precooler air inlet hose is correctly routed to the precooler.

(3) Continue to support the panel in its position and install the screws which secure the panel to:
- the wing
- the splice bulkhead
- the center frame.

(4) Install the two screws at the underside of the outboard fillet.

(5) Install the two screws at the topside of the outboard fillet.

(6) Make sure that, after tightening, all screws are flush with the adjacent skin.

(7) Align the oil cooler air intake anti-ice tube thread end, located on the lower nacelle, with the nut coupling, located on the wing upper side.

WARNING: CONNECT THE ANTI-ICE TUBE TO THE OIL COOLER AIR INTAKE BY HANDS, THEN USING TWO SUITABLE WRENCHES, SLOWLY TIGHTEN THE NUTS.

(8) Connect the wing anti-ice air outlet hoses to the nacelle panel; secure the hoses to the panel with the clamps.

(9) Connect the starter-generator cooling air hose to the rigid duct of the panel; secure the hose to the duct with the clamp.

(10) Connect the precooler air inlet hose to the precooler; secure the hose to the precooler with the clamp.

CAUTION: MAKE SURE THAT THE OIL VENT HOSE IS NOT SQUASHED AND PROPERLY ROUTED.

(11) Install the four screws that secure the Oil Vent Hose Support to the lower nacelle.

(12) Insert the probe (MIL-DTL-5593-4, interal diameter 6,35 mm, external 11 MM, lenght 550 +/- 25 mm) in the Oil Vent Hose for half a meter so that is possible check that the Hose is not squashed during the Lower Nacelle Panel installation.

(13) Install the upper nacelle panel 410AT or 420AT as applicable (refer to Para. 3).

6. Rear Nacelle Panels 430AL/430AR or 440AL/440AR - Removal

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A. Procedure

(1) Remove the steel panel.

(2) Remove the screws which secure the left and right rear nacelle panels to each other at their upper and lower edges.

(3) Support the left panel and remove the screws which secure the panel to the splice bulkhead.

(4) Remove the left panel from the vicinity of the airplane and put it in a safe place on a surface which will not cause any damage to the panel.
(5) Support the right panel and remove the screws which secure the panel to the splice bulkhead.
(6) Do step (3) for the right panel.

7. Rear Nacelle Panels 430AL/430AR or 440AL/440AR - Installation

A. Procedure

(1) Put the right panel into position and secure it to the splice bulkhead with the screws.
(2) Put the left panel into position and secure it to the splice bulkhead and the right panel with the screws.
(3) Make sure that, after tightening, all screws are flush with the adjacent skin.
(4) Install the steel panel.

8. Protection Sheet (Rear Nacelle Panels) - Removal

NOTE: Removal of the aluminum protection sheet on the inside of the rear nacelle panels (in the area of the exhaust stack cut-out) will be required for inspection of the inner surface of the panels.

A. Procedure

(1) Start at any of its four corners, and carefully peel the sheet away from the panel.
(2) Continue to carefully peel the sheet away from the panel until the sheet and the panel are separated; make sure that no damage is done to the sheet or the panel.
(3) Inspect the contact surface area of the protection sheet; refer to Para. 10 Sub-para. C., step (8) (b) and (c).

9. Protection Sheet (Rear Nacelle Panels) - Installation

A. Materials

Methyl-Ethyl-Ketone (MEK)	02-009
Lint-Free Cloth	04-013
Abrasive Paper	04-021 or 04-022
Adhesive	01-002
Sealant	06-007

B. Procedure

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

(1) Clean the contact surfaces of the protection sheet and the nacelle panel with MEK; remove all traces of old adhesive and sealant.
(2) Lightly abrade the contact surface of the nacelle panel with abrasive paper.
(3) Clean the contact surfaces of the protection sheet and the nacelle panel with MEK; dry the surfaces with a lint-free cloth before the MEK evaporates.
(4) Apply, by brush, a thin layer of adhesive to the contact (abraded) surface of the nacelle panel. Allow time for the adhesive to dry.
(5) Apply, by brush, a thin layer (approx. 0.02 inch/0.5 mm thick) of sealant to the contact surface of the protection sheet.
(6) Put the protection sheet into position inside the nacelle panel and press on the outer surface of the sheet with enough force to expel any air but not sealant.
(7) Allow time for the sealant to cure (six hours minimum).

10. Nacelle Panels - Inspection

A. Referenced Information

Maintenance Manual Chapter 12-24-00
Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 51-13-00
Maintenance Manual Chapter 51-90-00

B. Procedure - Panels Installed

(1) Clean the external surfaces of the panels (refer to Chapter 12-24-00).
(2) Examine the panels for:
- damage, cracks and splits
- delamination
- blistering and flaking of the paint finish.

(3) Examine the fasteners for:
- looseness
- corrosion
- damage.

(4) Make sure that all fasteners are flush with the adjacent skin.
(5) Examine the vanes of the inertial separation system (as far as possible) for:
- damage, cracks, splits and punctures
- delamination
- security of attachment and excessive play.

(6) Do an operational test of the inertial separation system (refer to 24-00-00) and check the vanes for proper operation.
(7) Visually examine the rear nacelle panels for deterioration.

NOTE: The rear nacelle panels surround the engine hot section and are subjected to heat radiated from the engine and exhaust stacks; uniform, slight discoloration of the panels is to be expected but any localized deterioration/discoloration will require that the panel(s) be removed for further examination.

(8) Do a coin tapping test of the external surfaces of all nacelle panels (refer to 51-90-00).
(9) Repair any minor damage as detailed in 51-13-00.

C. Procedure - Panels Removed

(1) Clean the internal and external surfaces of the panels (refer to 12-24-00).
(2) Examine the panels for:
- damage, cracks and splits
- delamination
- blistering or flaking of the paint finish.

(3) Examine all contact surfaces, edges and parts for excessive wear.
(4) Examine all fastener locations for security of the conical washers/captive nuts.
(5) Examine the vanes of the inertial separation system (as far as possible) for:
- damage, cracks, splits and punctures
- delamination
- security of attachment and excessive play.

(6) Examine the inner skin of the rear panels (430AL, 430AR, 440AL and 440AR) as follows:
(a) At the area adjacent to the exhaust stack cut-out, remove the aluminum protective sheet (which is held in place by silicone sealant). Refer to Para. 8 for the removal procedure.
(b) Examine the contact surface area of the protective sheet for traces of black material. If there are traces, it is a sign of degradation of the inner carbon fiber reinforced plastic (cfrp) layer; refer to Piaggio Product Support Department for repair details.
(c) If there are no traces of black material on the protective sheet, do a coin tapping test of the complete inner surface (while the protection sheet is removed); refer to 51-90-00.
(d) Install the protection sheet as detailed in Para. 9.
(7) Repair any minor damage as detailed in 51-13-00.

11. Engine Air Duct Access Cover(Ref. Fig. 203)

A. Procedure

(1) Remove the Upper Nacelle Panel 410AT or 420AT as described in this section.
(2) Remove the bolts (5) and washers (4) that secure the Engine Air Duct Access Cover (1) to the UIpper Nacelle Panel (3).
(3) Remove the the Engine Air Duct Access Cover (1) and the gasket (2).

12. Engine Air Duct Access Cover(Ref. Fig. 203)

A. Procedure

NOTE: Check the gasket for general condition and replace if necessary.

(1) Place the gasket (2) and the Engine Air Duct Access Cover (1) on the Upper Nacelle Panel (3).
(2) Secure the Engine Air Duct Access Cover (1) to the Upper Nacelle Panel (3) with washers (4) and bolt (5).

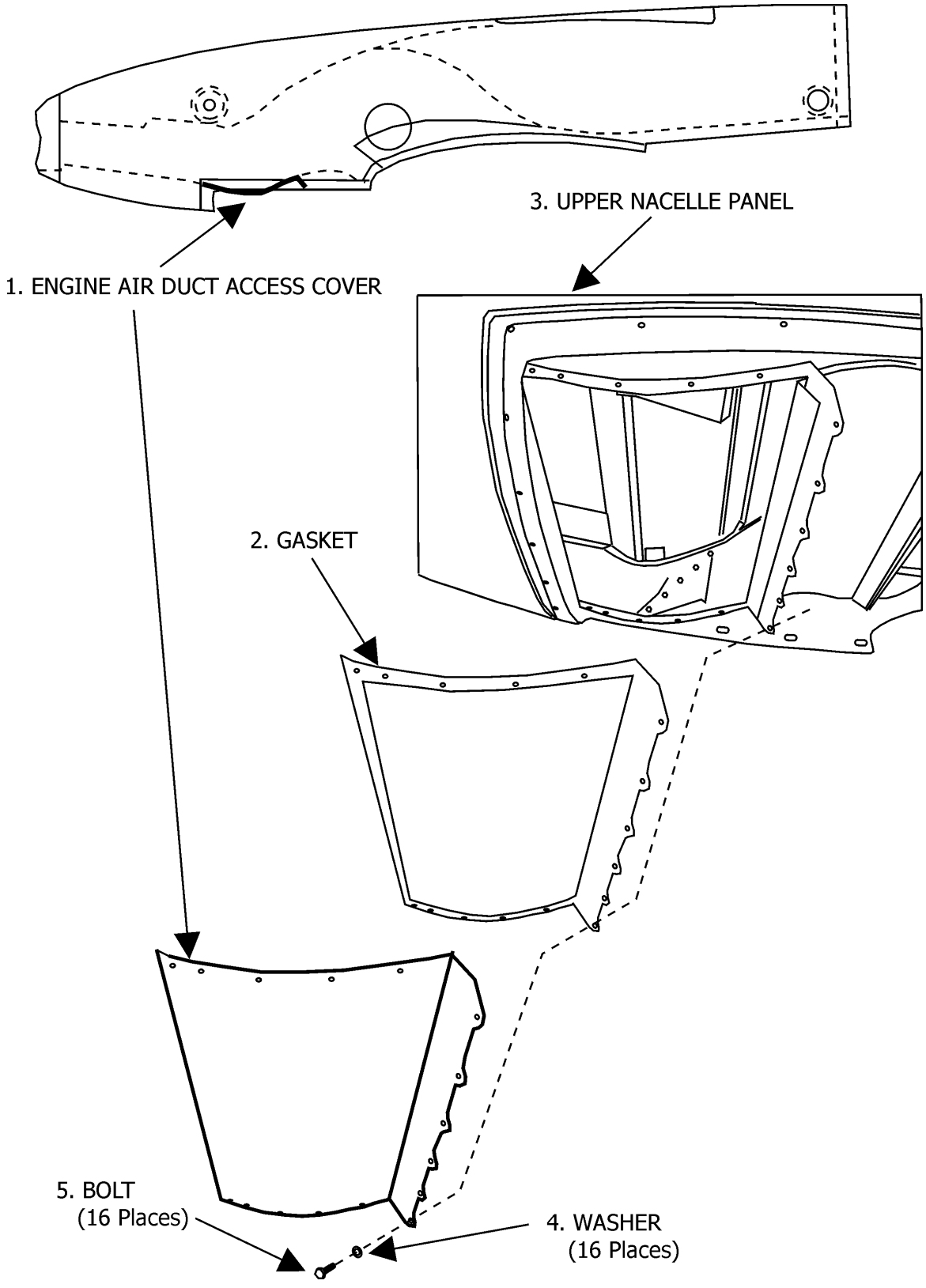

Fig. 203 - Engine Air Duct Access Panel - Removal