OIL DISTRIBUTION - MAINTENANCE PRACTICES
(PT6A-140)

1. General

A. This section gives the removal and installation procedures for the airframe mounted oil cooler, the oil cooler mount, oil cooler check valves, and the oil cooler hoses for airplanes with the PT6A-140 Engine Installation. The removal, installation and the functional test of the vernatherm bypass valve is also given.

B. For the servicing of the oil system, including checking engine oil level, draining/changing engine oil, and oil filter removal/installation, refer to Chapter 12, Engine Oil System - Servicing.

WARNING: The U.S. Environmental Protection Agency advises that mechanics and other workers who handle engine oil are advised to minimize skin contact with used oil and promptly remove used oil from the skin. In a laboratory study, mice developed skin cancer after skin was exposed to used engine oil twice a week without being washed off, for most of their life span. Substances found to cause cancer in laboratory mice may also cause cancer in humans.

2. Description and Operation

A. A remote oil cooler is mounted in right nose cap. Heated oil that is scavenged from the accessory gearbox and reduction gearbox is routed to the oil cooler through a hose under engine. A thermal bypass vernatherm valve begins to close at 120°F (48.9°C) and is fully closed between 140°F and 185°F (60.0°C and 85.0°C). The oil is then routed past the cooler and returns through a hose, located on top of engine, to engine oil tank.

B. Oil cooler check valve (C100490-1) is installed on the oil cooler outlet hose side. The oil cooler check valve (C100490-1) prevents reverse flow direction of oil to the oil cooler when the oil shut-off valve is closed and the bypass circuit becomes active.

C. Oil cooler check valve (2650121-118) is a pressure-relieving check valve that prevents reverse flow towards the engine scavenge pump during normal operation, with the shut-off valve open. When the shut-off valve is closed, pressure increases and when the cracking pressure of the check valve (2650121-118) is reached, oil flow bypasses the oil cooler traveling upwards through the check valve (2650121-118) and drains into the oil tank.

3. Oil Cooler Removal/Installation

A. Remove the Oil Cooler (Refer to Figure 201).

(1) Remove the right nose cap. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices.

(2) Drain the oil from the oil cooler as follows:

(a) Remove the plug to drain oil from oil cooler.

(b) When the oil is drained, install the plug.

(3) Loosen the inlet hose and remove it from the oil cooler elbow fitting.

(4) Loosen the outlet hose and remove it from the oil cooler elbow fitting.

(5) To prevent entry of foreign materials into oil system, cap the components that follow:

- The inlet and outlet hoses
- The oil cooler outlet elbow fitting
- The oil cooler inlet elbow fitting.

(6) Remove the oil cooler as follows:

(a) Make sure that you support the oil cooler before the bolts are removed.

(b) Cut the safety-wire from the bolts that attach the oil cooler to the upper mount.

(c) Remove the bolts that attach the oil cooler to the lower and upper mount.

(d) Remove the oil cooler from the airplane.

B. Install the Oil Cooler (Refer to Figure 201).

(1) Put the oil cooler in its correct position on the mount.

(2) Install the upper and lower bolts that attach the oil cooler to the mount.

(a) Safety the upper mount bolts. Refer to Chapter 20, Safetying - Maintenance Practices

(3) Remove the caps from the components that follow:

- The inlet and outlet hoses

- The oil cooler outlet elbow fitting
- The oil cooler inlet elbow fitting.

(4) Put the oil cooler outlet hose on its correct position on the outlet elbow fitting.

(a) Carefully tighten the outlet hose fitting on the outlet elbow fitting.

(5) Put the oil cooler inlet hose on its correct position on the inlet elbow fitting.

(a) Carefully tighten the inlet hose fitting on the inlet elbow fitting.

(6) If necessary, install the drain plug on the oil cooler.

(a) Make sure that you tighten the drain plug sufficiently.

(7) Service the oil system. Refer to Chapter 12, Engine Oil - Servicing.

(8) Install the right nose cap half. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices.

(9) Service the oil system. Refer to Chapter 12, Engine Oil System - Servicing.

4. Vernatherm Removal/Installation

A. Remove the Vernatherm (Refer to Figure 201).

(1) Remove right nose cap half. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices.

(2) Remove the safety wire on the vernatherm.

(3) Remove vernatherm from oil cooler.

(4) Discard the old gasket.

B. Install Vernatherm (Figure 201).

(1) Before you install the new vernatherm do a check of its operation. Refer to Vernatherm Function Test .

(2) Install the vernatherm with a new gasket in oil cooler.

(3) Safety wire the vernatherm to oil cooler. Refer to Chapter 20, Safetying - Maintenance Practices

(4) Install the right nose cap half. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices.

5. Vernatherm Functional Test

A. Test Vernatherm.

(1) Put the vernatherm in water at the temperature of 120°F (48.9°C) (start to close temperature) for five minutes.

(2) Remove the vernatherm from the water.

(3) Measure and record the length.

(4) Put the vernatherm in water at the temperature of 185°F (85.0°C) (fully closed temperature) for five minutes.

(5) Remove the vernatherm from the water.

(6) Measure and record the length again.

(a) Make sure that the minimum increase in the length from the length recorded before, is 0.100 inch.

(7) If valve does operate correctly, replace with a new valve.

6. Oil Cooler Shroud Removal/Installation

A. Remove the Oil Cooler Shroud (Refer to Figure 202).

(1) While you support the shroud, remove the bolts that attach the oil cooler shroud to the engine flange and oil cooler mount brackets.

(a) Remove the oil cooler shroud and seals.

(2) If you are not replacing the oil cooler shroud install the bolts that were removed from the engine assembly flange.

B. Install the Oil Cooler Shroud (Refer to Figure 202).

(1) Put the shroud and seals in their correct position on the engine flange and oil cooler mount brackets.

(2) Install the bolts that attach the shroud to the engine flange and the oil cooler mount brackets.

(a) Torque the engine flange bolts between 36 inch pounds and 40 inch pounds.

(3) Seal gaps between the inboard seal and the inboard shroud with Type II Class sealant. Refer to Chapter 20, Fuel, Weather and High-Temperature - Maintenance Practices.

7. Forward/Aft and Outer Panel Assemblies Removal/Installation

A. Remove the Forward/Aft and Outer Panel Assemblies (Refer to Figure 203).
   (1) Remove the primary exhaust duct. Refer to Primary and Secondary Exhaust Duct - Maintenance Practices.
   (2) While you support the panel assembly, remove the bolts that attach the upper/aft and outer panels to the oil cooler mount assembly.
      (a) Remove the panels and seal from the engine exhaust flange and the oil cooler mount assembly brackets.
   (3) If you are not replacing the panels install the bolts that were removed from the engine assembly.

B. Install the Forward/Aft and Outer Panel Assemblies (Refer to Figure 203).
   (1) Put the exhaust panel assembly in its correct position on the exhaust flange.
   (2) Install the primary exhaust duct. Refer to Primary and Secondary Exhaust Duct - Maintenance Practices.
   (3) Put the outer and lower oil cooler panels and seal in their correct positions on the oil cooler mount brackets.
   (4) Install the bolts that attach the outer and lower oil cooler panels to the oil cooler mount brackets.

8. Oil Cooler Mount Removal/Installation

A. Remove the Oil Cooler Mount Assembly (Refer to Figure 201 and Figure 202).
   (1) The engine exhaust upper panel. Refer to Chapter 78, Engine Primary and Secondary Exhaust Duct - Maintenance Practices.

      NOTE: It can be possible that it is only necessary to remove the bolts and washers that attach the panel to the upper shroud assembly to let the oil cooler mount to be removed.

   (2) The oil cooler panel assemblies. Refer to Forward/Aft and Outer Panel Assemblies Removal/Installation.
   (3) Remove the oil cooler. Refer to Remove the Oil Cooler.
   (4) Support the mount and remove the bolts that attach the mount to the forward right engine flange.
      (a) Remove the mount from the airplane.

B. Install the Oil Cooler Mount Assemblies (Refer to Figure 201 and Figure 202).
   (1) Put the mount assembly in its correct position on the forward engine.
   (2) Install the bolts that attach the engine mount to the forward engine flange.
      (a) Torque the bolts between 36 inch pounds and 40 inch pounds.
   (3) Install the oil cooler. Refer to Install the Oil Cooler.
   (4) The engine exhaust upper panel. Refer to Chapter 78, Engine Primary and Secondary Exhaust Duct - Maintenance Practices.
   (5) The oil cooler panel assemblies. Refer to, Forward/Aft and Outer Panel Assemblies Removal/Installation.

9. Oil Cooler Hoses and Check Valve(s) Removal/Installation

A. Remove the Oil Cooler hoses (Refer to Figure 201 and Figure 202, Sheet 1 and Sheet 2).
   (1) Remove the oil cooler panel assemblies. Refer to Forward/Aft and Outer Panel Assemblies Removal/Installation
   (2) Drain the oil from the oil cooler as follows:
      (a) Remove the plug to drain oil from oil cooler.
      (b) When the oil is drained, install the plug.
   (3) Loosen the inlet hose and remove it from the oil cooler elbow fitting.
   (4) Loosen the outlet hose and remove it from the oil cooler elbow fitting.

      NOTE: If necessary the outlet oil hose can be separated in two sections at the hose elbows for easier hose removal.

      (a) As necessary, change the oil cooler check valve (C100490-1), refer to Chapter 5, Component Time Limits.
   (5) Loosen and remove the hose fittings from the PT6A-140 engine fittings.
   (6) To prevent entry of foreign materials into oil system, cap the components that follow:
      - The inlet and outlet hoses
      - Oil Cooler Check Valves
      - The oil cooler outlet elbow fitting
      - The oil cooler inlet elbow fitting.

- The engine oil inlet and outlet fittings.

(7) Remove the bolts and washers that attach the forward and aft oil hose closeout panels from the inboard oil cooler shroud.

(a) Remove the closeout panels from the airplane.

(8) Remove the bolts, washers and nuts from the inlet and output hose clamps.

(a) Remove the hoses and clamps from the airplane.

(b) If necessary, remove the clamps from the hoses.

B. Install the Oil Cooler hoses (Refer to Figure 201 and Figure 202, Sheet 1 and Sheet 2).

CAUTION: To keep hose chafing to a minimum after hose installation it is important to use correct size and type of clamps. Make sure you use the correct clamps when you attach the hoses. If clamps of insufficient size are used and tightened excessively, the hose can be damaged when the engine expands because of thermal expansion. If the clamps are too tight the hoses cannot slip through the clamps and chafe.

(1) If necessary install the oil cooler hose brackets. Oil Cooler hoses Brackets Removal/Installation

(2) Put the hoses in their correct position on the engine with the hose clamps at the attach points.

(3) Remove the caps from the components that follow:

- The inlet and outlet hoses
- Oil Cooler Check Valves
- The oil cooler outlet elbow fitting
- The oil cooler inlet elbow fitting.
- The engine oil inlet and outlet fittings.

(4) Install the bolts and washers that attach the hose clamps to the engine attach points and tighten with your hand.

(5) If necessary connect the two sections of the outlet at the oil cooler check valve(s) and tighten with your hand.

(6) Put the oil hoses in their correct position on the outlet elbow fitting and the inlet elbow fitting.

(a) Carefully tighten the hose fittings.

(7) Put the oil hoses in their correct position on the engine outlet fitting and the inlet fitting.

(a) Carefully tighten the hose fittings.

(8) Make sure that the hoses are aligned correctly, and if removed, oil cooler check valves are installed properly as indicated in Figure 202 Sheet 2, and tighten the hoses.

(9) Carefully tighten the hose clamps.

(10) Service the oil system. Refer to Chapter 12, Engine Oil - Servicing.

(11) Put the forward and aft oil hose closeout panels in their correct position on the inboard oil cooler shroud.

(a) Install the bolts and washers that attach the closeout panels to the shroud.

(12) Install the oil cooler panel assemblies. Refer to Forward/Aft and Outer Panel Assemblies Removal/Installation

10. Oil Cooler Hose Brackets Removal/Installation

A. Remove the Oil Cooler hose Brackets (Refer to Figure 202).

(1) If necessary, remove the oil cooler hoses. Refer to Oil Cooler hoses Removal/Installation.

(2) On Airplanes 20800353 and On and Airplanes 208B0929 and On and Airplanes 20800001 thru 20800352 and Airplanes 208B0001 thru 208B0928 incorporating CAB01-13, remove the bolts that attach the oil cooler inlet hose bracket to the engine flange.

(a) On Airplanes 20800353 and On and Airplanes 208B0929 and On and Airplanes 20800001 thru 20800352 and Airplanes 208B0001 thru 208B0928 incorporating CAB01-13, remove the bracket from the engine flange.

(3) If a new bracket is not to be installed install the bolts in the engine flange.

(a) Torque the bolts between 36 inch pounds and 40 inch pounds.

(4) Remove the left nose cap support from the engine flange.

(a) Remove the bolt, nut and washer that attach the oil cooler outlet hose clamp bracket to the support.

(b) Remove the bolts that attach the left nose cap support to the engine flange.

(c) Remove the support from the engine flange.

(d) If a new support is not to be installed install the bolts in the engine flange.

1 Torque the bolts between 36 inch pounds and 40 inch pounds.

(5) Remove the bolts that attach cooler hose clamps to the engine flanges or other attach points.

(a) Remove the clamps from the engine attach points.

(b) If bolts were removed from an engine flange install the bolts again.

1 Torque the bolts between 36 inch pounds and 40 inch pounds.

B. Install the Oil Cooler hose Brackets (Refer to Figure 202).

(1) On Airplanes 20800353 and On and Airplanes 208B0929 and On and Airplanes 20800001 thru 20800352 and Airplanes 208B0001 thru 208B0928 incorporating CAB01-13, put the oil cooler inlet hose bracket in its correct position on the engine flange.

(a) On Airplanes 20800353 and On and Airplanes 208B0929 and On and Airplanes 20800001 thru 20800352 and Airplanes 208B0001 thru 208B0928 incorporating CAB01-13, install the bolts that attach the bracket to the engine flange.

1 On Airplanes 20800353 and On and Airplanes 208B0929 and On and Airplanes 20800001 thru 20800352 and Airplanes 208B0001 thru 208B0928 incorporating CAB01-13, torque the bolts from 36 to 40 inch-pounds (4.06 to 4.51 N-m).

(2) Put the left nose cap support in its correct position on the engine flange.

(a) Install the bolts that attach the support to the engine flange.

1 Torque the bolts between 36 inch pounds and 40 inch pounds.

(b) Put oil cooler outlet hose clamp bracket in its correct position on the support.

1 Install the bolt, washer and nut that attach the bracket to the support.

(3) Put the oil cooler hose clamps in their correct position on the engine attach points.

(a) Install the bolts that attach the clamps to the engine attach points.

(b) If the bolts were installed in an engine flange torque the bolts between 36 inch pounds and 40 inch pounds.

(4) Install the oil cooler hoses. Refer to Oil Cooler hoses Removal/Installation.

(5) Service the oil system. Refer to Chapter 12, Engine Oil - Servicing.

11. Oil Cooler Shutoff Valve Removal/Installation

A. Remove the Oil Cooler Shutoff Valve (Refer to Figure 204).

(1) Remove the cowling components as follows. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices:

(a) The left upper cowling door.

(b) If necessary, the lower cowling panels.

(c) The right nose cap.

(2) Drain the oil from the oil cooler as follows:

(a) Remove the plug to drain oil from oil cooler.

(b) When the oil is drained, install the plug.

(3) Remove the control cable clamp-nut and washer that attach the control cable to the control cable bracket.

(4) At the valve control lever loosen the nut on the control cable terminal end.

(a) Remove the control cable from the shutoff valve control arm.

(5) Loosen the forward and aft shutoff valve coupling nuts.

(6) As necessary to remove the oil hoses from the shutoff valve, remove the oil hose clamps forward and/or aft of the shutoff valve.

(7) Carefully remove the shutoff valve from the bracket and the oil hoses.

(8) if the valve is not replaced immediately, cap the oil hoses.

B. Install the Oil Cooler Shutoff Valve (Refer to Figure 204).

(1) If necessary, remove caps from oil hoses.

(2) Put the shutoff valve in its correct position on the bracket.

NOTE: Note the directional arrow on the valve body, the arrow must point forward.

(3) Carefully put the forward and aft oil hose couplings on the valve fittings.

(a) Tighten the hose couplings.

(4) Put the control cable bent wire end on the correct position on the valve control lever.

(a) Make sure the cable is in its correct position on the cable clamp.

(b) Tighten the bolt and nut that attach the cable to the control lever.

(c) Install the nut and washer that attaches clamp the to the control cable.

(5) If necessary, install the removed oil hose clamps.

(6) Service the oil system. Refer to Chapter 12, Engine Oil - Servicing.

(7) Install the cowling components. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices.

Figure 201 : Sheet 1 : Oil Cooler Installation

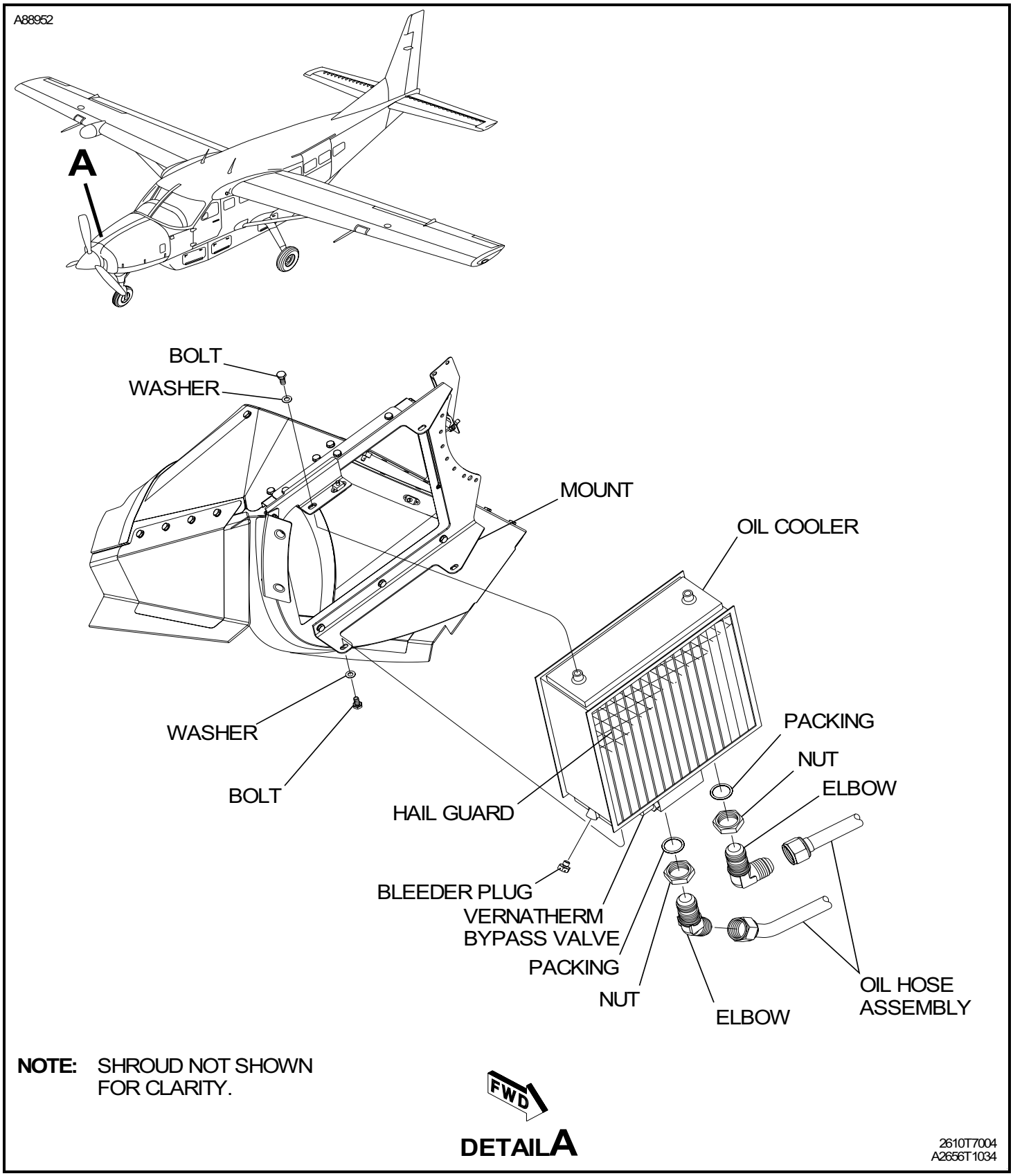

Figure 202 : Sheet 1 : Oil Cooler Shroud Components Installation

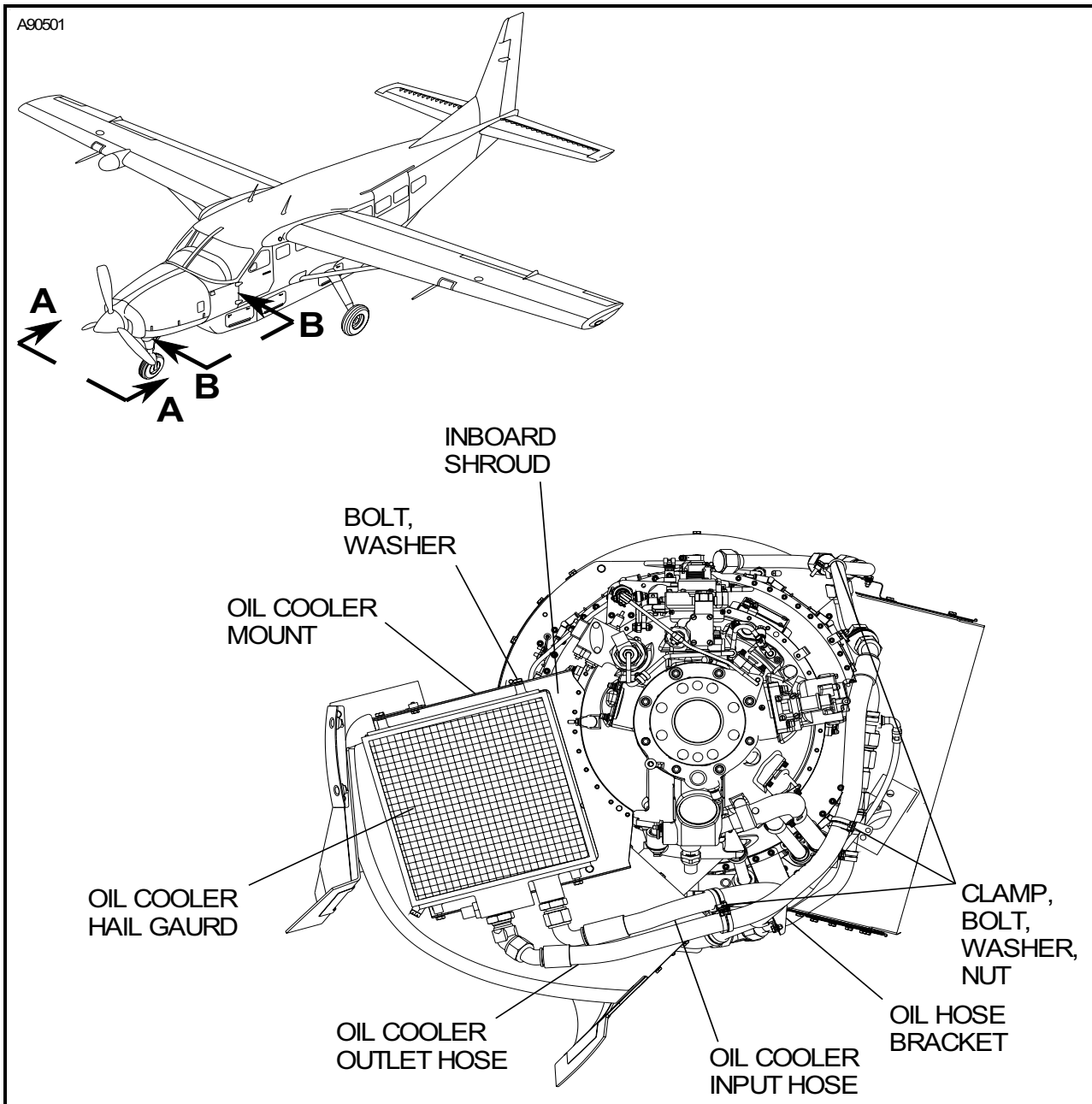

Figure 202 : Sheet 2 : Oil Cooler Shroud Components Installation

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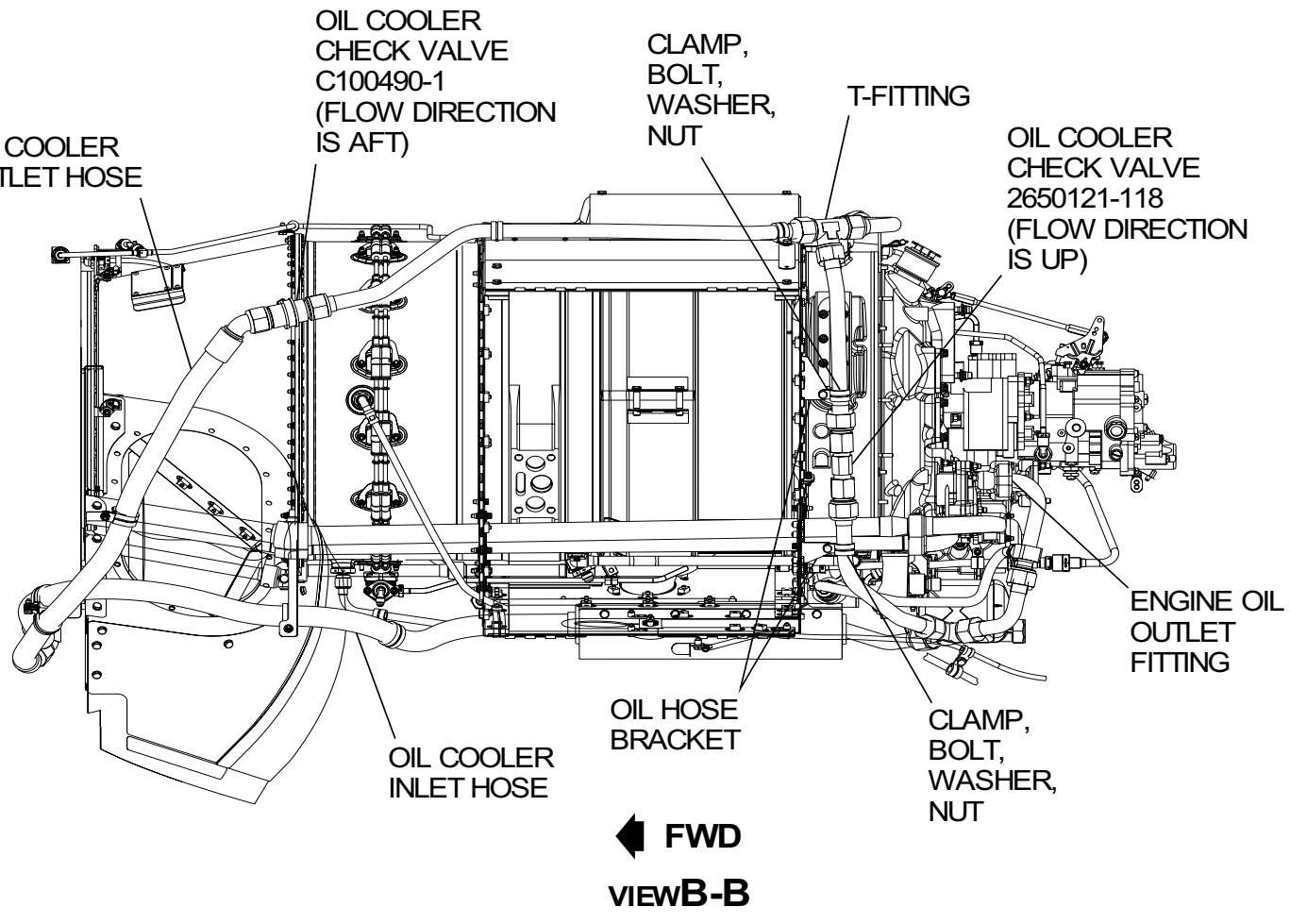

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Figure 203 : Sheet 1 : Oil Cooler Panel Assemblies

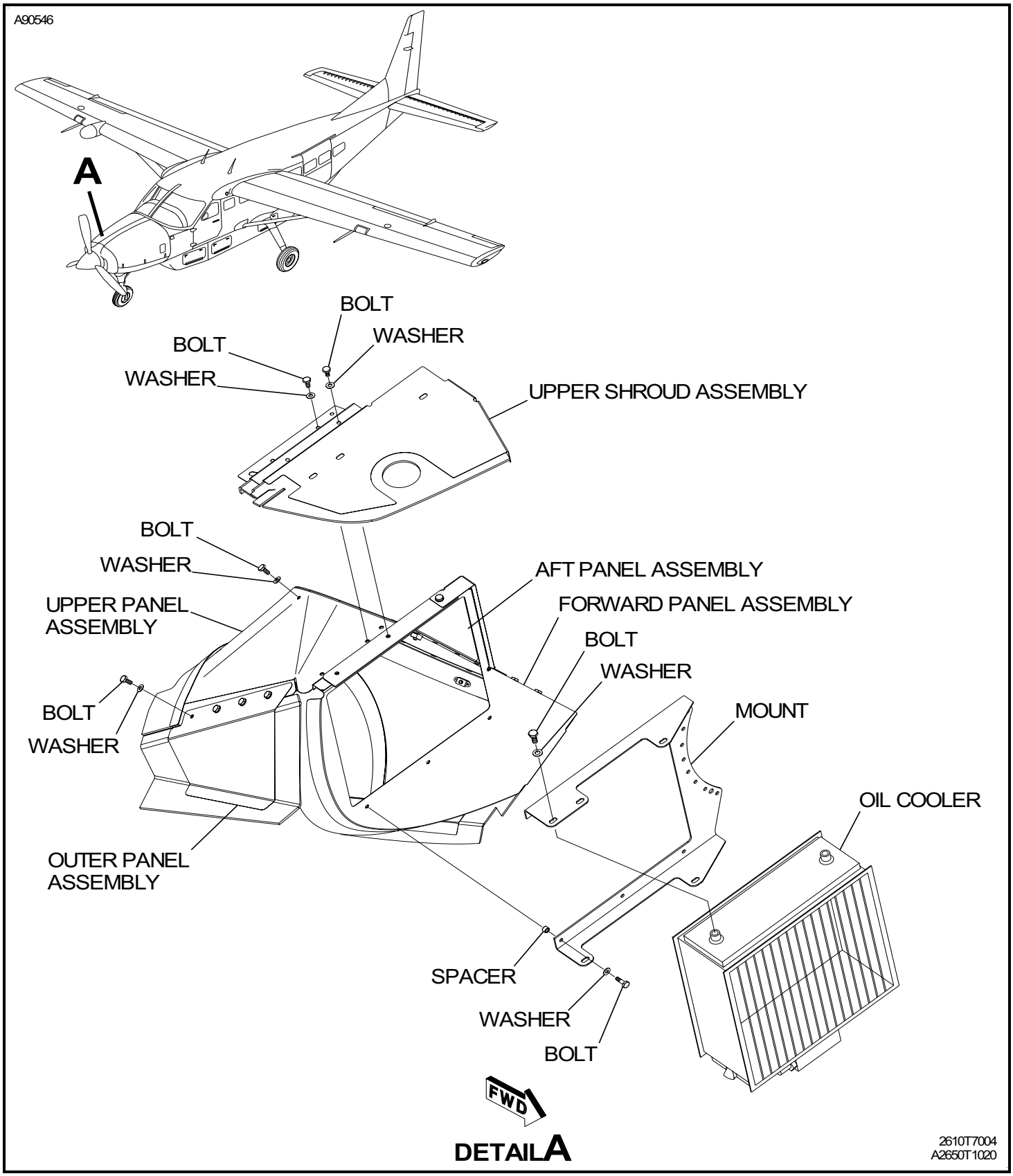

Figure 204 : Sheet 1 : Oil Cooler Shutoff Valve