CHAPTER

79

Engine Oil GE 115

(GE90-100 SERIES ENGINES)

CHAPTER 79
ENGINE OIL GE 115

Subject/Page	Date	COC
79-EFFECTIVE PAGES		
1 thru 2	Sep 05/2018	
79-CONTENTS		
1	May 05/2017	
2	May 05/2015	
79-00-00		
1	May 05/2015	
2	May 05/2015	
3	May 05/2015	
4	May 05/2015	
5	Sep 05/2017	
6	Sep 05/2017	
7	May 05/2015	
8	BLANK	
79-10-00		
1	May 05/2015	
2	May 05/2015	
3	May 05/2015	
4	May 05/2017	
5	May 05/2017	
6	May 05/2017	
7	May 05/2017	
8	Sep 05/2017	
9	May 05/2017	
10	BLANK	
79-20-00		
1	May 05/2015	
2	May 05/2015	
3	May 05/2015	
4	May 05/2015	
5	May 05/2015	
6	Sep 05/2017	
7	Sep 05/2016	
8	Sep 05/2016	
9	Sep 05/2016	
10	Sep 05/2016	
11	Sep 05/2016	
12	Sep 05/2016	
13	Sep 05/2016	
14	Sep 05/2016	
15	Sep 05/2016	
16	Sep 05/2016	
17	Sep 05/2016	
18	Sep 05/2016	
19	Sep 05/2016	
20	Sep 05/2016	
21	Sep 05/2016	
22	Sep 05/2016	
23	Sep 05/2016	
24	BLANK	

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79-EFFECTIVE PAGES

CHAPTER 79
ENGINE OIL GE 115

Subject/Page	Date	COC	Subject/Page	Date	COC
79-30-00					
1	May 05/2015				
2	May 05/2015				
3	May 05/2015				
4	May 05/2015				
5	May 05/2015				
6	May 05/2015				
7	May 05/2015				
8	May 05/2015				
9	May 05/2015				
10	May 05/2015				
11	May 05/2015				
12	May 05/2015				
13	May 05/2015				
14	BLANK				

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79-EFFECTIVE PAGES

CHAPTER 79
ENGINE OIL GE 115

79-CONTENTS

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ENGINE OIL GE 115

79-CONTENTS

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OIL - INTRODUCTION

Purpose

The engine oil system does these functions:

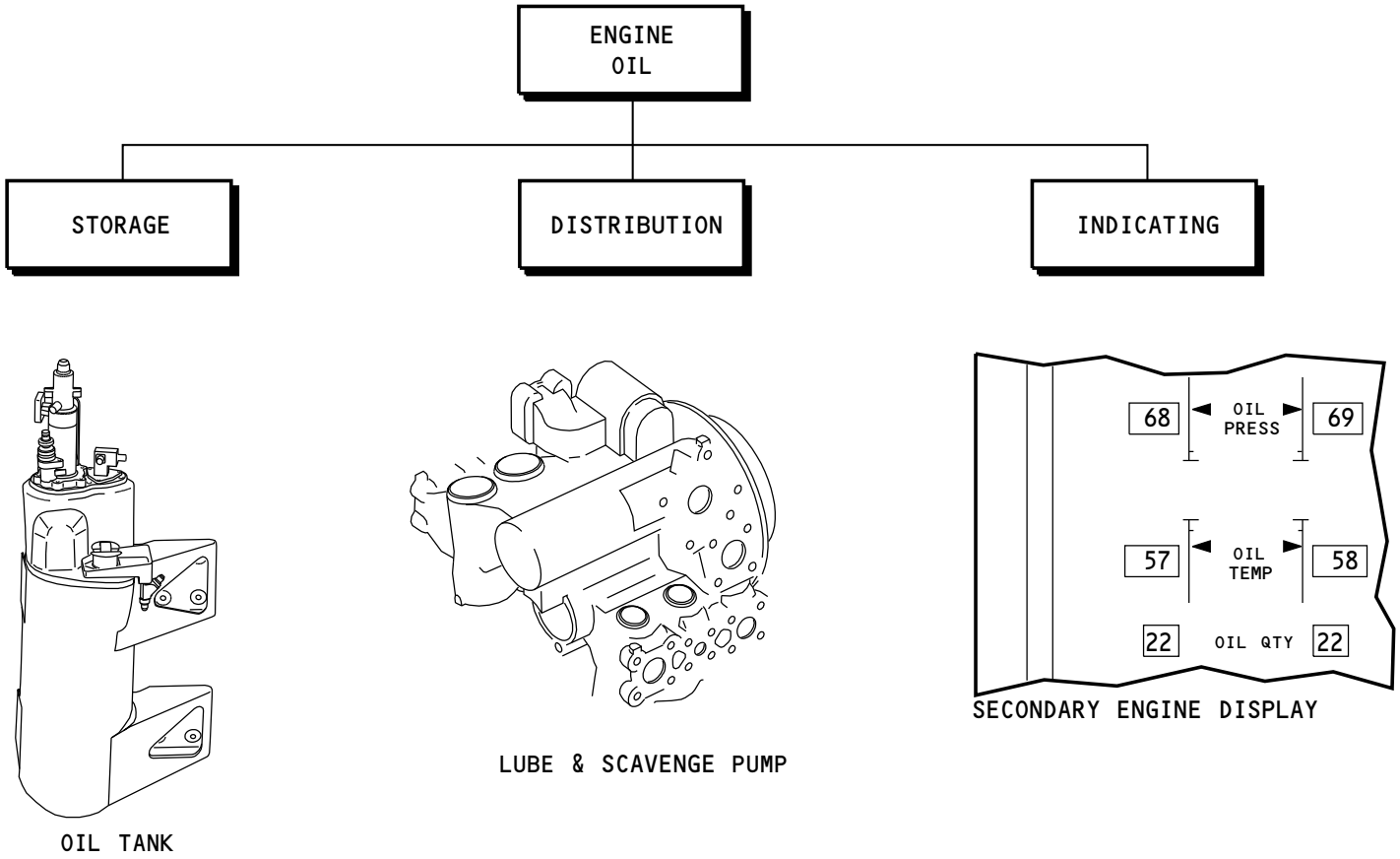
- Supplies oil to lubricate, cool, and clean the engine bearings and gearboxes
- Supplies oil to decrease vibration at the engine bearings (oil damping)
- Gives heat to the engine fuel to prevent ice formation in the fuel.

The oil system has these subsystems:

- Storage
- Distribution
- Indicating.

Abbreviations and Acronyms

- AGB - accessory gearbox
- AIMS - airplane information management system
- ARINC - Aeronautical Radio, Inc.
- C - Celsius
- CA - control alternator
- DMS - debris monitoring system
- EDIU - engine data interface unit
- EEC - electronic engine control
- EICAS - engine indication and crew alerting system
- eng - engine
- EPCS - electronic propulsion control system
- filt - filter
- fwd - forward
- HPC - high pressure compressor
- IDG - integrated drive generator
- LPT - low pressure turbine
- MFD - multi-function display
- press - pressure
- psi - pounds per square inch
- qty - quantity
- ref - reference
- temp - temperature
- TGB - transfer gearbox



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OIL - INTRODUCTION

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OIL - GENERAL DESCRIPTION

Storage

The engine oil tank is the reservoir for the engine oil system. You fill the oil tank through the manual gravity filling cap assembly.

Distribution

The engine oil distribution subsystem has these parts:

(1) Pressure

(2) Scavenge

(3) Breather.

Oil flows from the engine oil tank to the lube and scavenge pump. The lube pump elements pressurize the oil for output. The lube pump does not control the oil output pressure. When the engine speed changes, the oil pressure changes.

The pressurized oil flows through the oil filter element. The oil filter differential pressure sensor and the EEC monitor the condition of the filter.

The oil flows through the main fuel/oil heat exchanger. The heat exchanger gives the heat of the engine oil to the fuel. The fuel/oil heat exchanger is the primary source of engine oil cooling. The oil/oil heat exchanger uses engine oil to cool the backup generator oil. The oil then flows to the engine bearings and gears.

See the generator drive section for more information (SECTION 24-10).

Downstream of the main fuel/oil heat exchanger, some pressurized oil returns to the lube pump boost element. The engine uses this boost oil at the bearings to decrease engine vibration.

The scavenge oil flows through the scavenge oil inlet screens inside to the lube and scavenge oil pump. The scavenge pump elements remove oil and contaminants from the bearing compartments and gearboxes. The scavenge oil returns to the engine oil tank.

The scavenge oil enters the oil tank through the Debris Monitoring System (DMS). The DMS has an air/oil separator, sensor, and conditioner that monitor ferrous particles in the scavenge oil.

The DMS air/oil separator removes air from the scavenge oil. This air pressurizes the oil tank and then goes overboard through the center vent tube extension in the turbine exhaust plug.

Indication

The engine oil indication subsystem uses these sensors and the EEC to monitor the oil system:

(1) Oil Pressure Sensor

(2) Oil Temperature Sensor

(3) Oil Filter Differential Pressure Sensor.

The AIMS uses the oil level sensor to monitor the oil quantity.

The primary display system (PDS) shows oil pressure, temperature, and quantity.

The PDS also shows advisory and status messages to indicate oil system fault conditions.

Additional oil system data is available at the maintenance access terminal (MAT).

Training Information Point

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY FIVE MINUTES AFTER AN ENGINE IS STOPPED. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

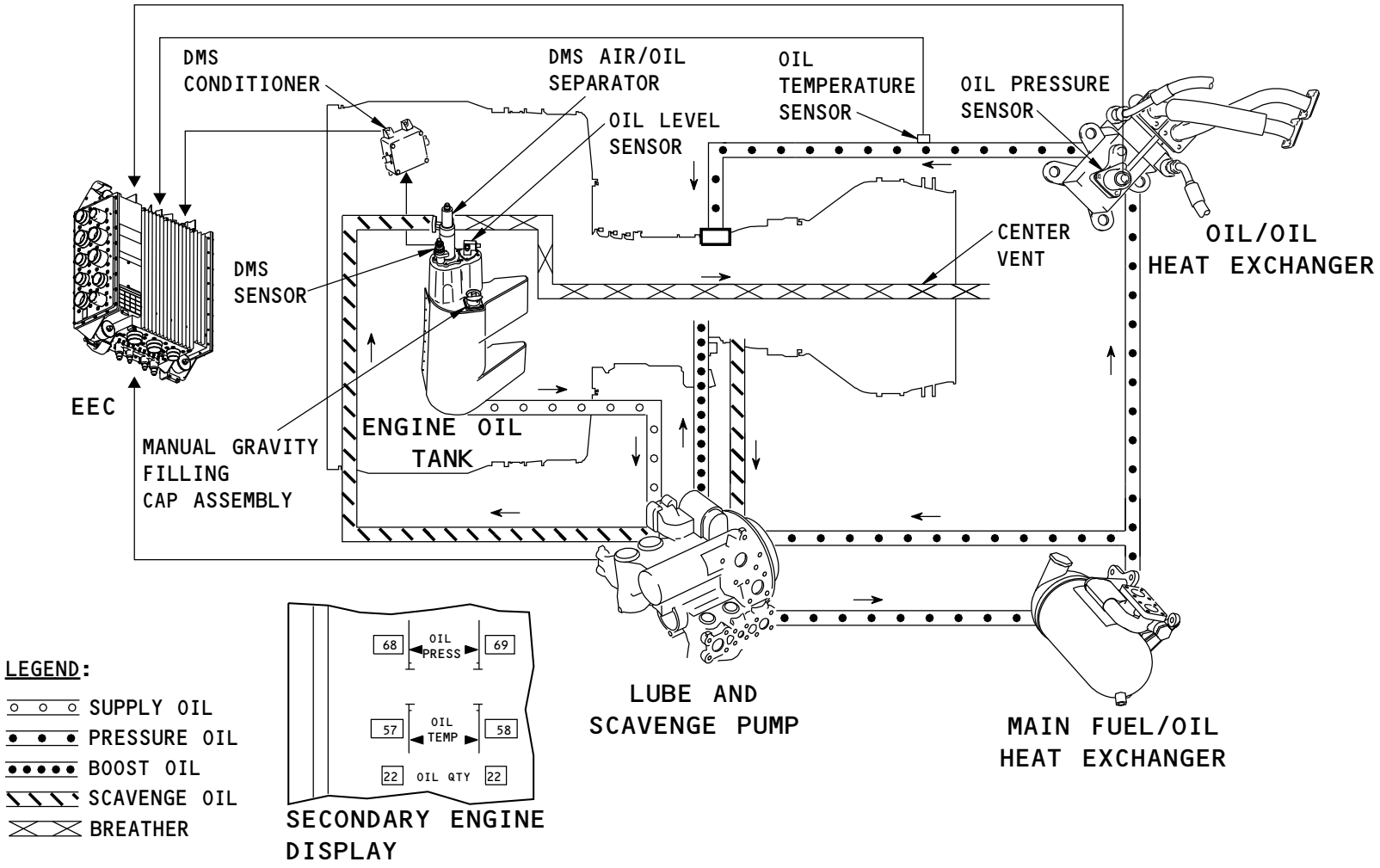
OIL - GENERAL DESCRIPTION

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND EQUIPMENT FOR PROTECTION OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

WARNING DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION DO NOT LET OIL GET ON THE ENGINE, OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE AREAS THAT OIL FALLS ON. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

Obey these WARNINGS and CAUTIONS when you do maintenance on the engine oil system:



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OIL - GENERAL DESCRIPTION

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OIL - STORAGE - GENERAL DESCRIPTION

Purpose

The engine oil tank contains the engine oil. It supplies oil to the lube pump elements and gets scavenge oil from the scavenge pump elements.

Location

The engine oil tank attaches to the fan case at the 9:00 position.

Physical Description

The engine oil tank is an aluminum structure. It has a maximum capacity of 28 quarts (26.5 liters).

The oil tank has these line replaceable units (LRU):

- Oil level sensor
- Manual gravity filling cap assembly
- DMS sensor
- DMS air/oil separator.

Functional Description

The oil level sensor sends oil quantity data to the AIMS for display.

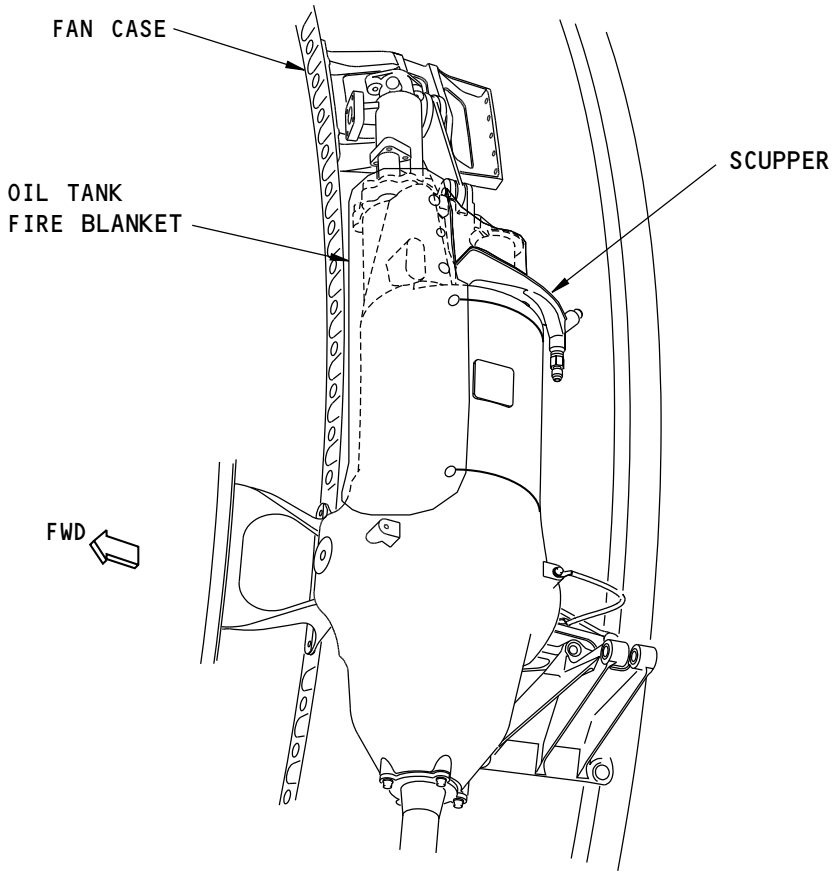
You fill the oil tank through the manual gravity filling cap assembly.

The DMS sensor finds ferrous particles in the scavenge oil.

The DMS air/oil separator removes the air from the scavenge oil.

Training Information Point

You use the drain plugs in the oil pump supply tube and oil tank supply tube to drain the engine oil tank.



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OIL TANK - GENERAL DESCRIPTION

OIL - STORAGE - MANUAL GRAVITY FILLING CAP ASSEMBLY

Purpose

The manual gravity filling cap assembly lets you fill the oil tank.

Location

The manual gravity filling cap assembly attaches to the top of the engine oil tank.

Physical Description

The manual gravity filling cap assembly is a self-sealing device with an internal screen and valve assembly. It has two sub-assemblies: The locking plug assembly and the body assembly.

The locking plug assembly has three pins which guide and lock the plug into the cap assembly. It has a manual locking lever that shows the direction to open and close the cap. When this is locked it causes the ball to push the spring with the piston. This pushes the packing against the body and seals the locking plug assembly. It has an oil tank cap with a dipstick and a lanyard which attaches the oil tank cap and dipstick to the cap assembly.

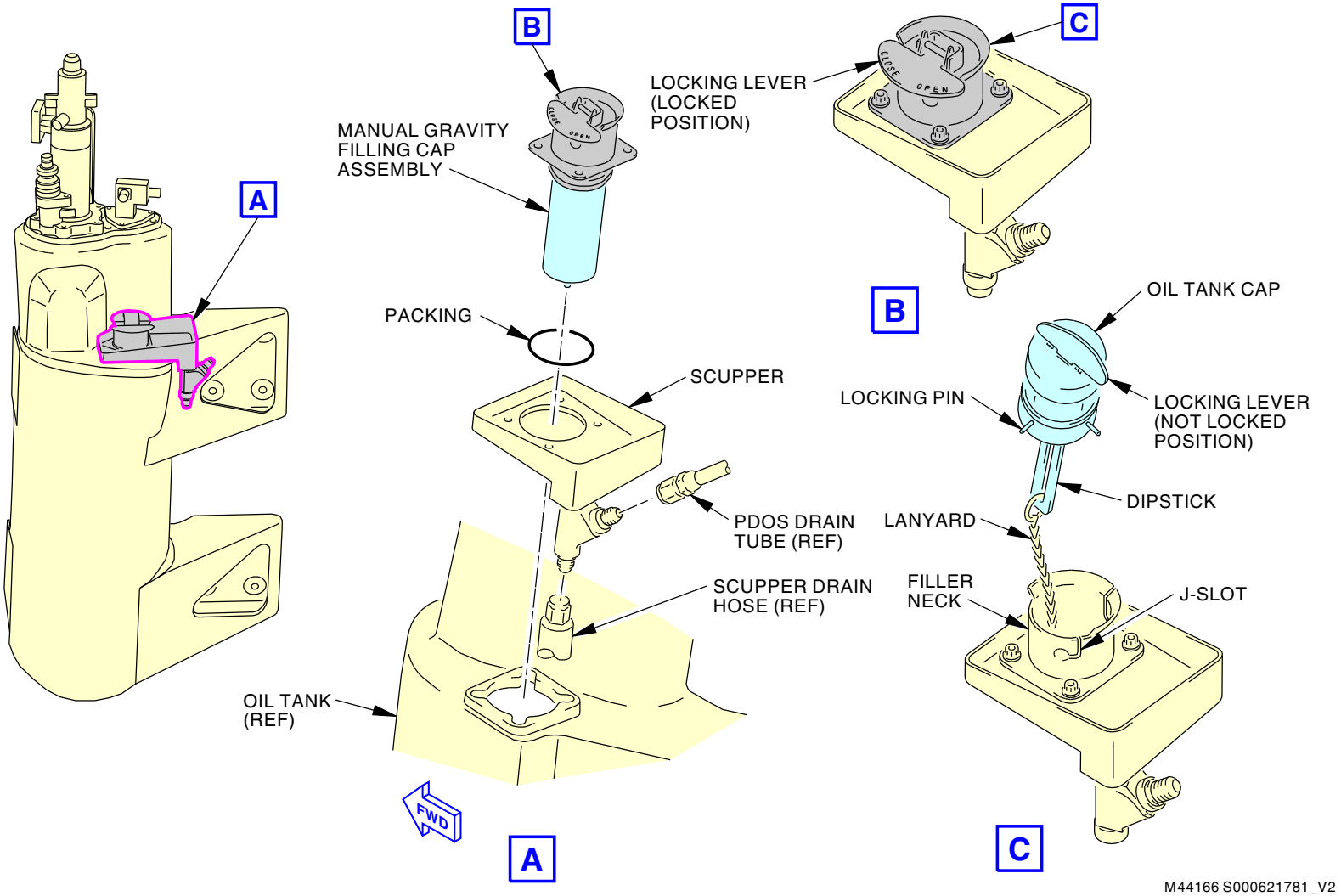
The body consists of a flange with three holes to attach it to the tank and packing seal. It has a strainer to prevent contamination of oil during filling and a sampling tube. It also has a diaphragm which seals the lower holes of the body and prevents oil loss due to incorrect installation of the oil tank cap. When the tank is under pressure, the diaphragm seals the lower holes of the body assembly and prevents leakage of the oil. This is an additional safety measure, but does not replace the efficiency of oil tank cap.

A scupper goes between the cap assembly and the tank. The scupper drains overboard through the scupper drain hose.

Operation

To remove the oil tank cap, put the locking lever up (in the not locked position). Push down on the cap and turn the lever counterclockwise. Pull the cap and dipstick straight up until the dipstick is above the edge of the filler neck.

To install the oil tank cap, align the cap locking pins and dipstick with the filler neck J-slots. Push the cap and dipstick straight into the filler neck. Turn the locking lever clockwise. Put the locking lever down so that it is flat against the top of oil tank cap. This is the locked position.



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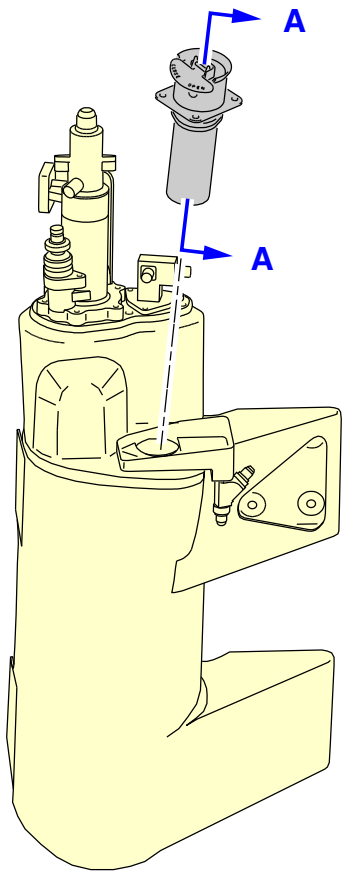
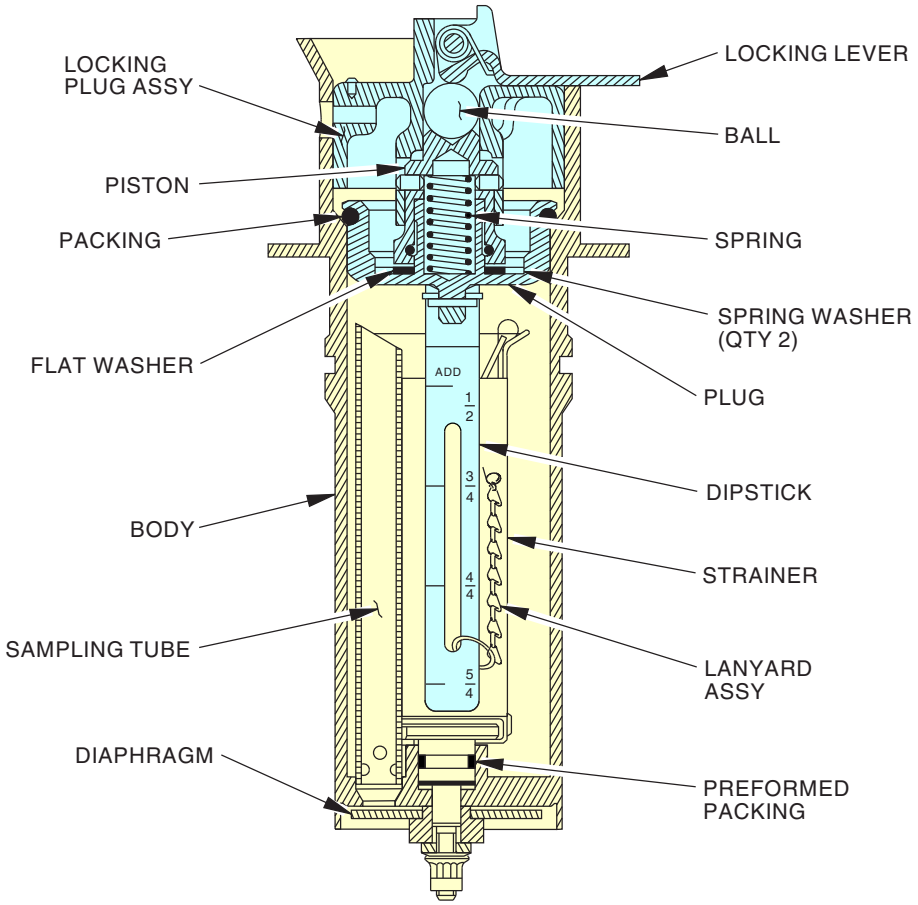
OIL - STORAGE - MANUAL GRAVITY FILLING CAP ASSEMBLY





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OIL - STORAGE - MANUAL GRAVITY FILLING CAP ASSEMBLY

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OIL - STORAGE - TRAINING INFORMATION POINTS - SERVICING

General

Fill the engine oil tank for any of these conditions:

- Normal servicing
- After replacement of an oil system component
- An engine oil change.

The oil tank access door is on the left fan cowl. You get access to the engine oil tank filler cap through this door.

Engine Oil Level

Examine the engine oil level in the engine oil tank in 60 minutes or less after you stop the engine.

Obey these WARNINGS and CAUTIONS when you do maintenance on the engine oil system:

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WARNING DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

When you open the engine oil filler cap, do a check for fuel in the oil. A smell check at the engine oil tank fill port can find the odor of fuel.

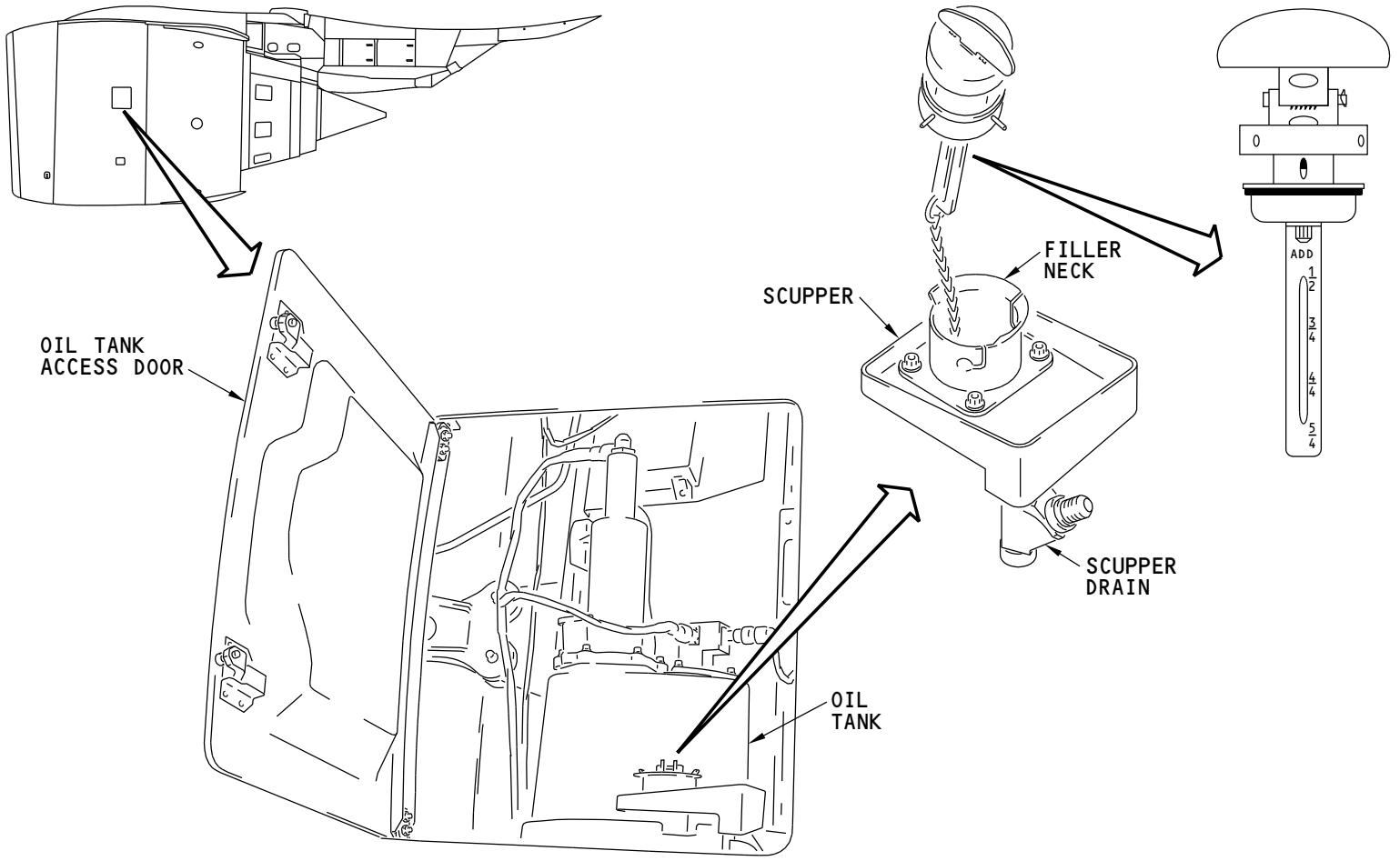
NOTE: When you add engine oil to the engine oil tank, make sure you add the oil slowly. If you fill the engine oil tank too quickly, it can cause an overflow at the fill port or cause oil spillage.

Oil servicing is necessary If the next flight is more than 6 hours. If the next flight is less than 6 hours, examine the secondary EICAS display oil quantity indicator. If the quantity is less than 18 quarts, servicing is necessary.

NOTE: Examine the engine oil quantity between 5 and 60 minutes after engine shutdown. If more than 60 minutes since engine shutdown, you must dry motor the engine for 4 minutes to return engine oil to the tank.

NOTE: Only use oil approved by GE SB 79-0001. There are no incompatibilities among the approved brands, but do not mix oil brands. If a non-approved oil is accidentally used when topping off, the full lube system must be drained, flushed and service again before the next engine run.

NOTE: You can do a fleet changeover from one oil brand to another by additions of the new oil brand when the engine is serviced.



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OIL - STORAGE - TRAINING INFORMATION POINTS - SERVICING

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OIL - DISTRIBUTION - GENERAL DESCRIPTION

Distribution

The engine oil distribution subsystem has these parts:

(1) Pressure

(2) Scavenge

(3) Breather.

Pressure

Oil flows from the engine oil tank through the anti-leak valve to the lube and scavenge pump. The lube pump elements pressurize the oil for output. The lube pump does not control the oil output pressure. When the engine speed changes, the oil pressure changes.

The pressurized oil flows through the oil filter element. The oil filter differential pressure sensor and the EEC monitor the condition of the filter element.

The oil flows through the main fuel/oil heat exchanger. The heat exchanger gives the heat of the engine oil to the fuel. The fuel/oil heat exchanger is the primary source of engine oil cooling. The oil/oil heat exchanger gives more engine oil cooling. The oil then flows to the engine bearings and gears. The engine uses oil to dampen the 1R, 3R, and 5R bearings to decrease engine vibration. See the generator drive section for more information (SECTION 24-10).

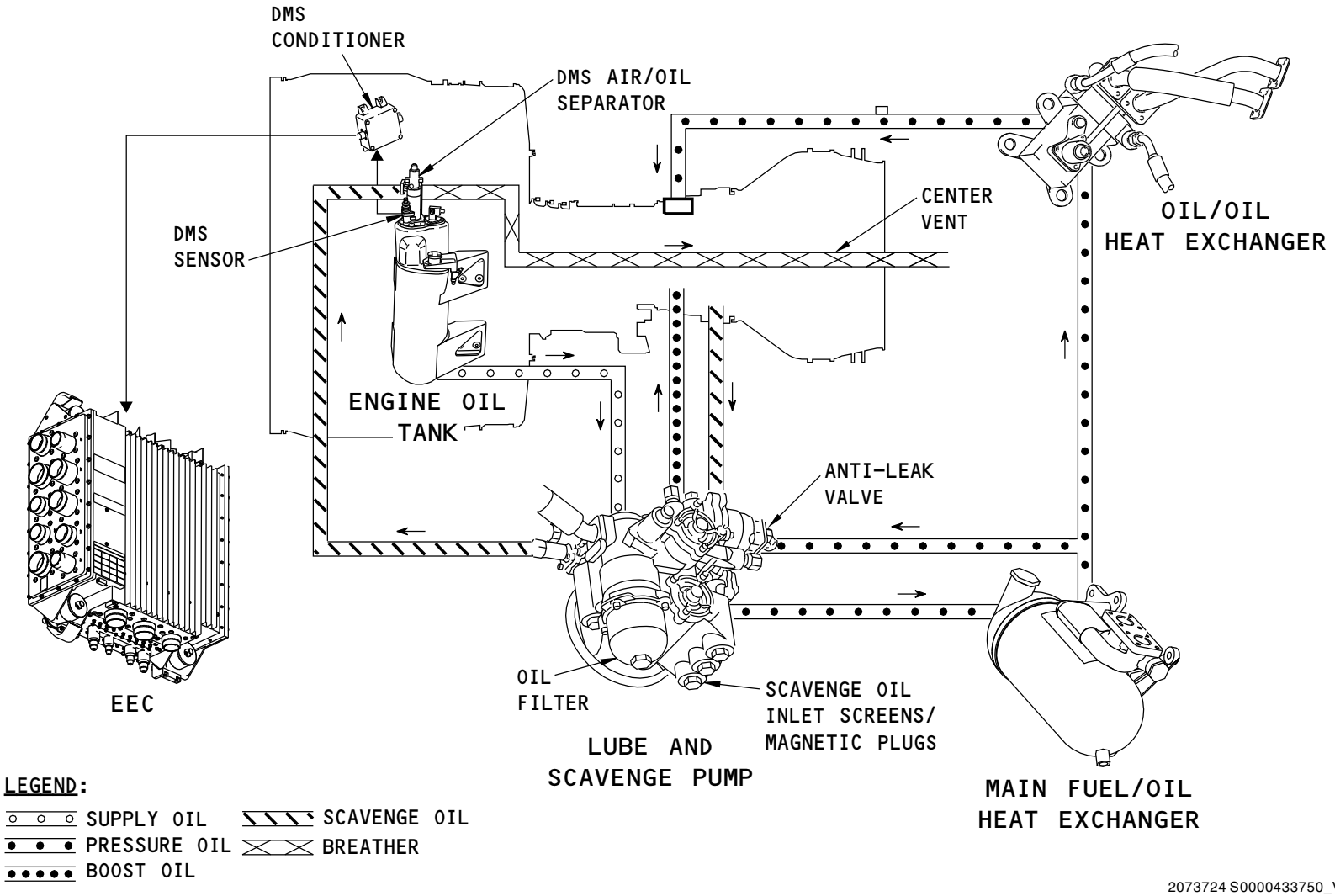
Scavenge

The scavenge oil flows through scavenge oil inlet screens in the lube and scavenge oil pump. The scavenge pump elements remove oil and contaminants from the bearing compartments and gearboxes. The scavenge oil returns to the engine oil tank.

The scavenge oil enters the oil tank through the debris monitoring system (DMS). The DMS has an air/oil separator, sensor, and conditioner. The EEC uses DMS inputs to monitor the ferrous particles in the scavenge oil.

Breather

The DMS air/oil separator removes air from the scavenge oil. This air pressurizes the oil tank and then goes overboard through the center vent tube extension in the turbine exhaust plug.



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OIL - DISTRIBUTION - GENERAL DESCRIPTION

OIL - DISTRIBUTION - COMPONENT LOCATIONS

Left Side

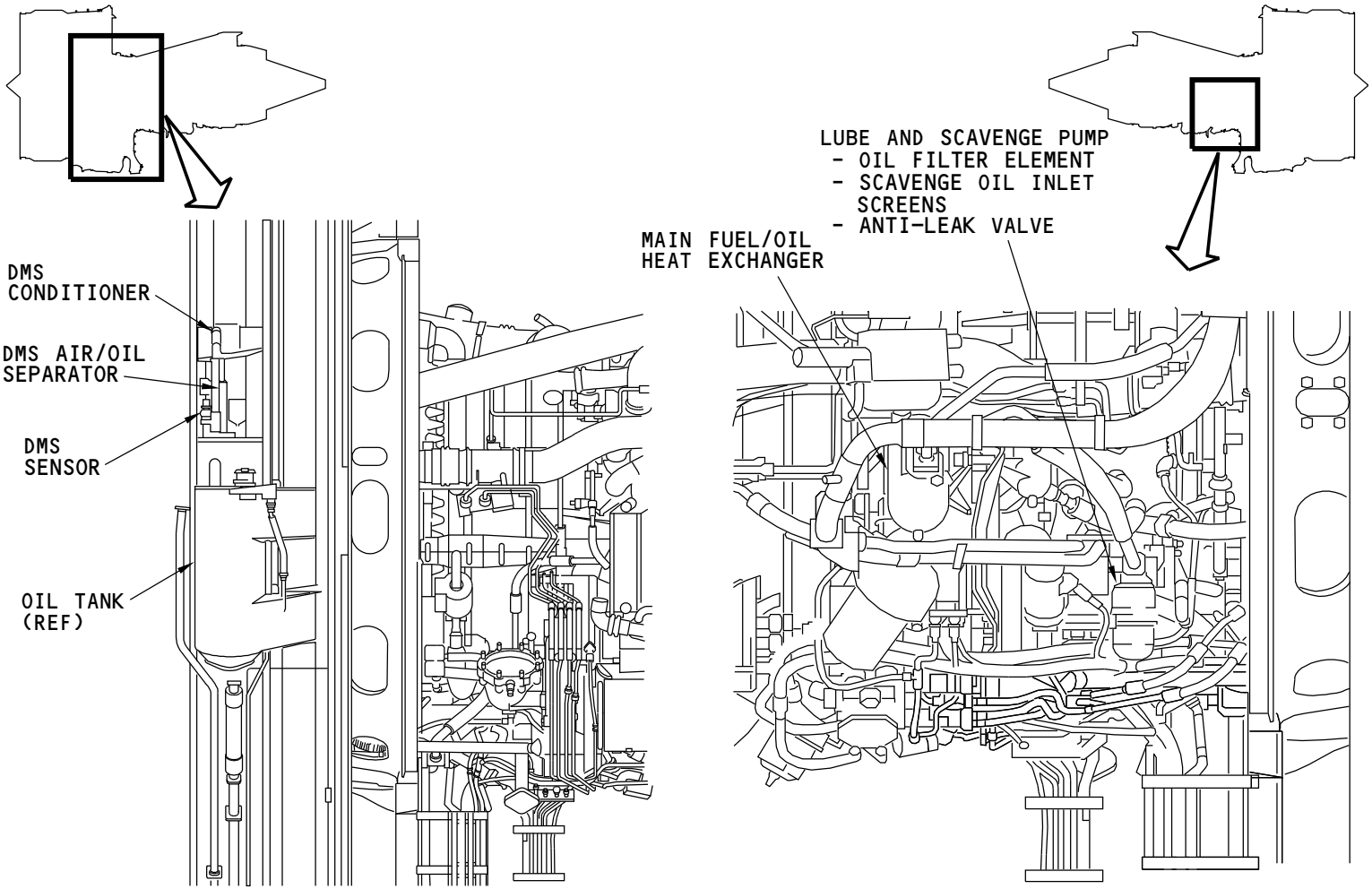
These are the engine oil distribution components on the left side of the engine:

- DMS air/oil separator
- DMS conditioner
- DMS sensor.

Right Side

These are the engine oil distribution components on the right side of the engine:

- Main fuel/oil heat exchanger
- Lube and scavenge pump
- Scavenge oil inlet screens
- Oil filter element
- Anti-leak valve.



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OIL - DISTRIBUTION - COMPONENT LOCATIONS

OIL - DISTRIBUTION - LUBE AND SCAVENGE PUMP

Purpose

The lube and scavenge pump does these functions:

- Pressurizes the oil for distribution to the engine bearings and gearboxes
- Pressurizes and controls the boost oil for engine bearing damping.
- Collects the scavenge oil from the engine bearing sumps and gearboxes and sends it to the engine oil tank.

Location

The pump is on the forward right side of the accessory gearbox (AGB) at the 5:00 position.

A V-band clamp (not shown) attaches the lube and scavenge pump to the AGB. The pump locating pin (not shown) and the AGB locating pin slot aligns the pump to the AGB.

Physical Description

The lube and scavenge pump uses one casting that has these items:

- Positive displacement gerotor-type pump elements
- Filter housing
- Internal valves
- Scavenge oil inlet screen housings.

These oil tubes attach to the lube and scavenge pump:

- Supply-in
- Supply-out
- Boost-in
- Boost-out
- Scavenge-in (5)
- Scavenge-out.

These LRUs attach to the lube and scavenge pump:

- Oil filter element (not shown)
- Oil filter differential pressure sensor
- Anti-leak valve
- Scavenge oil inlet screen (5).

Functional Description

Two lube pump elements pressurize the oil for lubrication. One boost pump element pressurizes boost oil for engine bearing damping. Seven scavenge pump elements collect scavenge oil from five engine locations.

The filter housing contains the oil filter element.

The lube and scavenge pump has internal valves that do these functions:

- Prevent accumulated oil in the low point of the engine when the engine is shutdown
- Let oil flow around a blocked filter
- Stop oil flow downstream of the lube pump elements when you remove the oil filter element.
- Control the boost oil pressure for bearing damping.

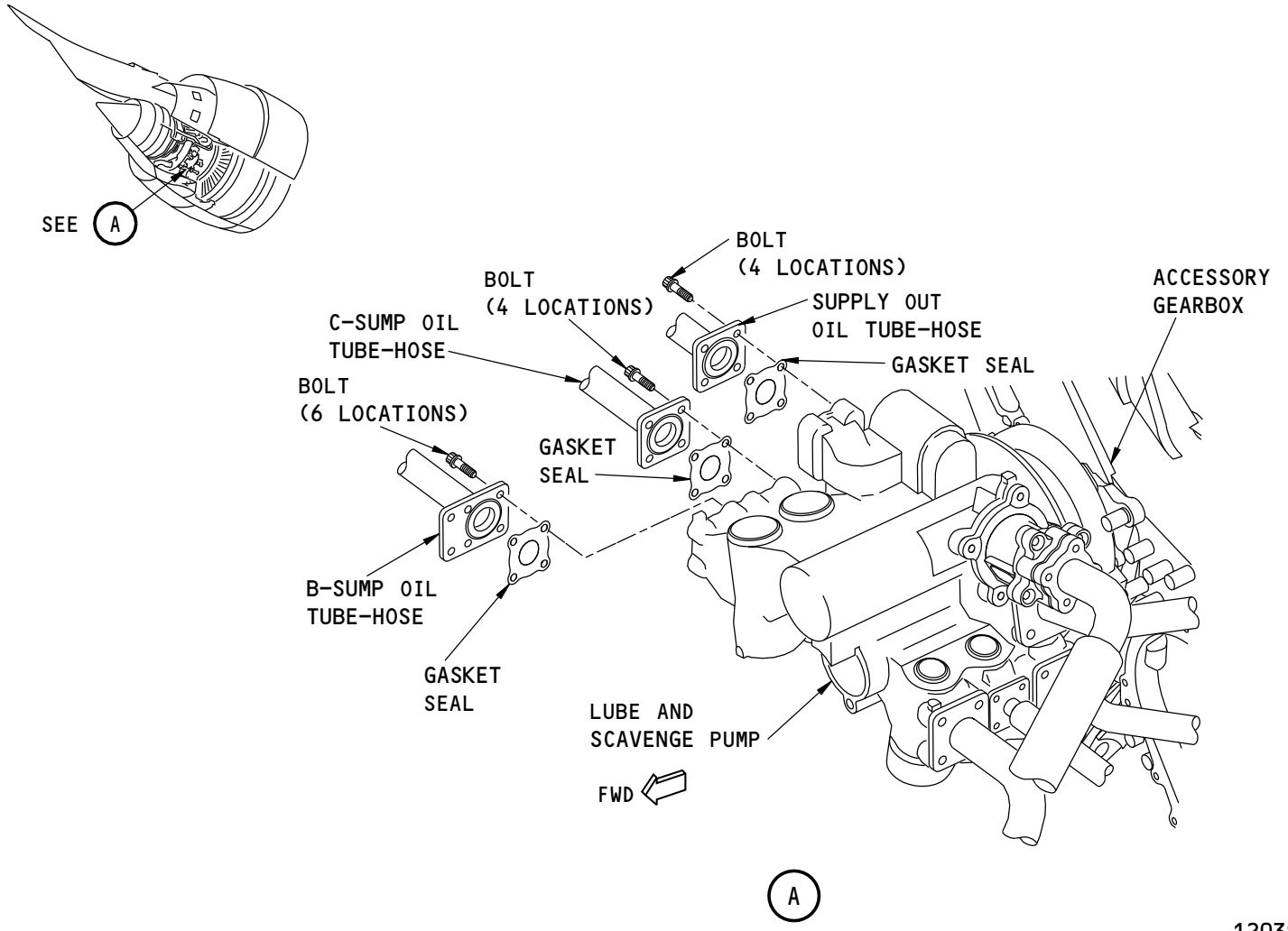
The scavenge oil inlet screen housings contain the screens that collect scavenge oil contamination.

Training Information Point

Keep the anti-leak valve with the supply-in oil tube when you remove the pump.

CAUTION DO NOT REMOVE THE ANTI-LEAK VALVE FROM THE SUPPLY IN OIL TUBE-HOSE. ENGINE OIL WILL DRAIN OUT OF THE OIL TANK.

When you remove and install the lube and scavenge pump, do not put the weight of the pump on the pump drive shaft. This will prevent damage to the pump and the AGB.



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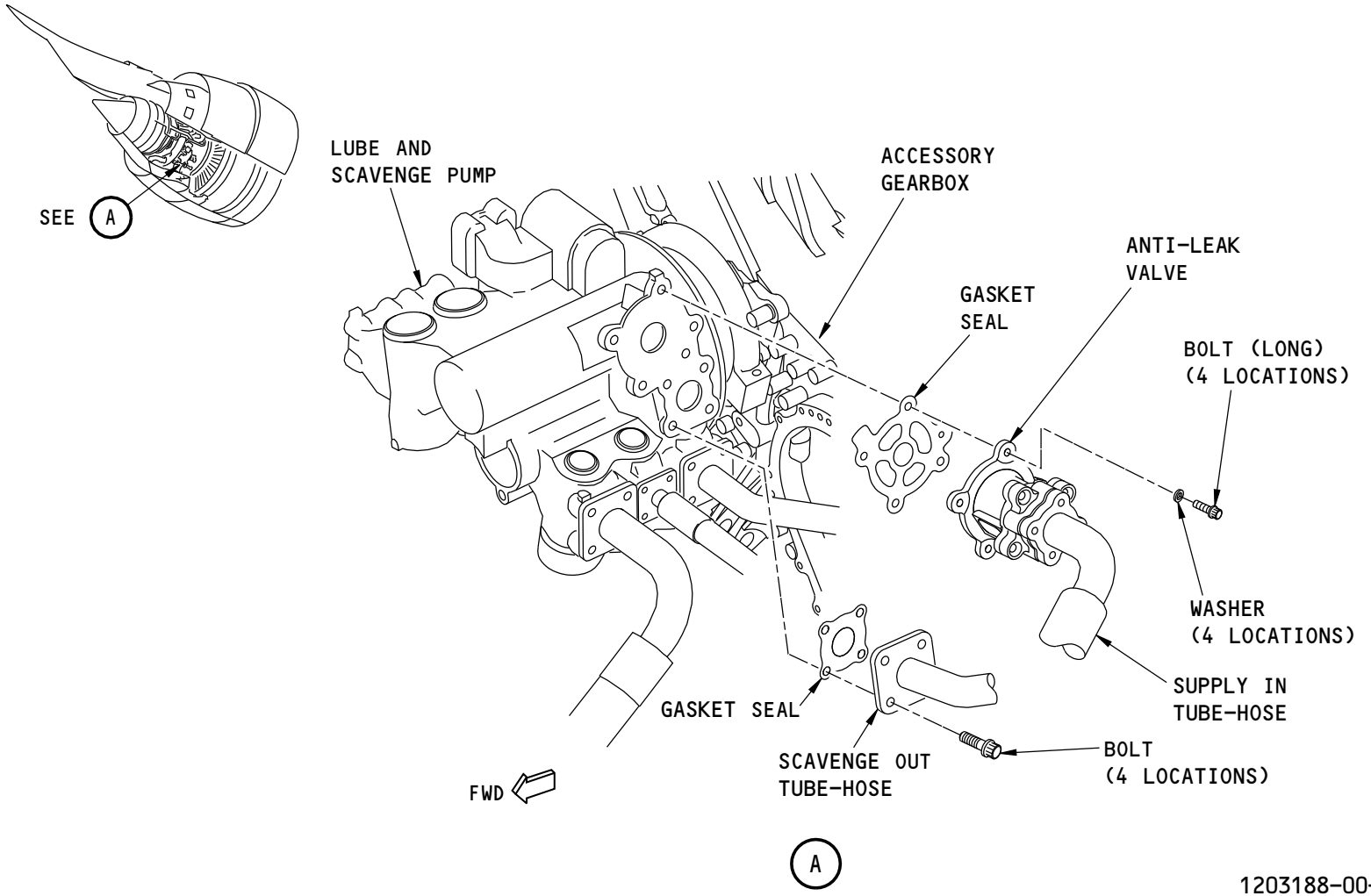
OIL - DISTRIBUTION - LUBE AND SCAVENGE PUMP



OIL - DISTRIBUTION - LUBE AND SCAVENGE PUMP

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OIL - DISTRIBUTION - ANTI-LEAK VALVE

Purpose

The anti-leak valve prevents the flow of engine oil from the oil tank to the lube and scavenge pump when the engine is shutdown. This decreases the possible hiding of oil in the AGB.

Location

The anti-leak valve is on the oil inlet port of the lube and scavenge pump. The oil pump supply-in tube hose attaches to the valve.

Functional Description

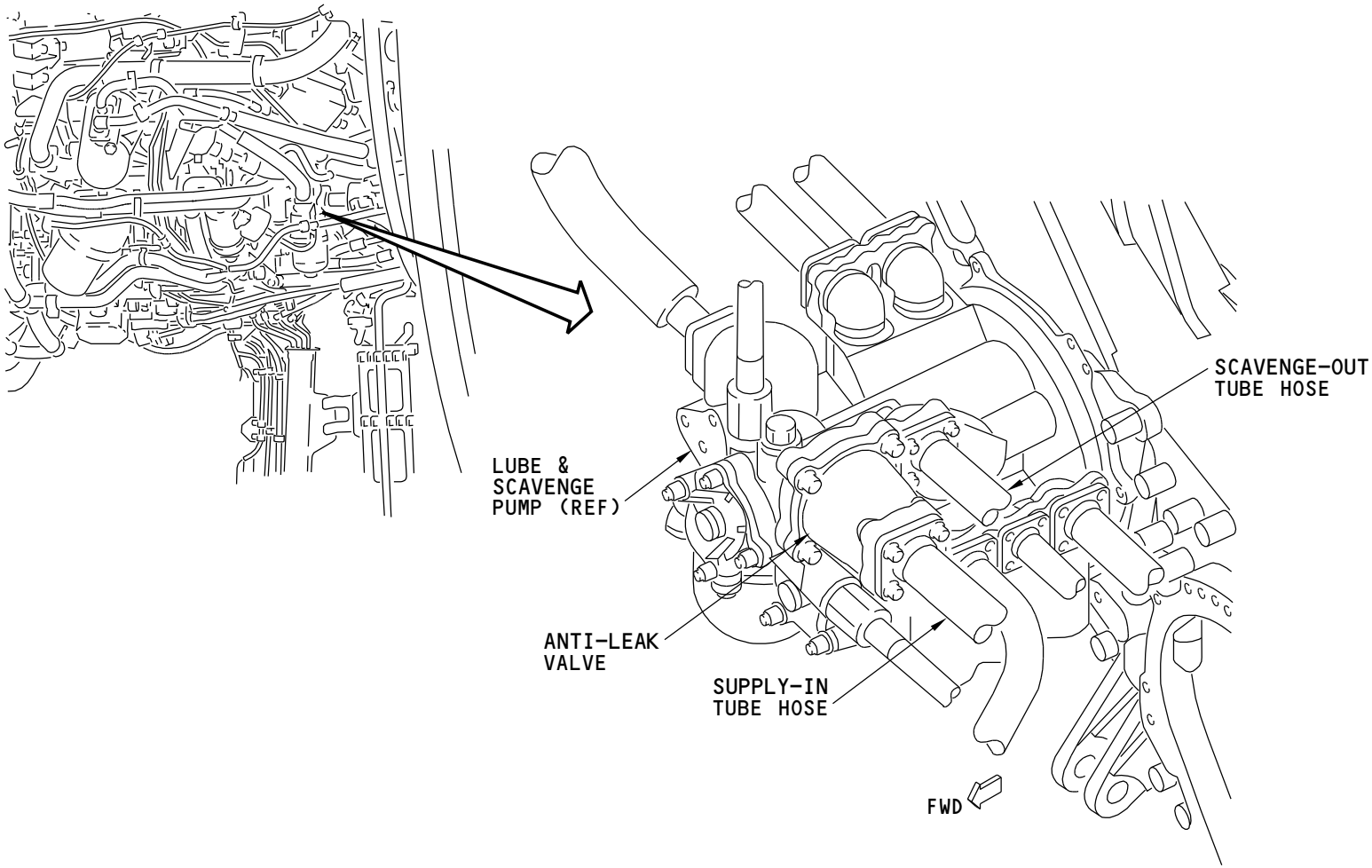
When the engine is shutdown, a spring holds the anti-leak valve in the closed position.

When you start the engine, the suction from the lube pump opens the anti-leak valve. The pump then supplies oil pressure to the valve to keep it in the full open position.

Training Information Point

You must drain the engine oil system when you remove and install the anti-leak valve. Also, you must remove the scavenge-out tube hose.

NOTE: There is only a one-piece seal between the anti-leak valve, the scavenge-out tube hose, and the lube pump.



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OIL - DISTRIBUTION - ANTI-LEAK VALVE

OIL - DISTRIBUTION - OIL FILTER ELEMENT

Purpose

The oil filter element cleans the engine oil.

Location

The oil filter element is in the filter housing. The filter housing is part of the lube and scavenge pump.

There is a shutoff valve and bypass valve in the filter housing.

Physical Description

The oil filter element is a disposable element. One end of the filter element has a mechanical interface that opens the shutoff valve when the element is in the filter housing. The other end of the element has threads and a locating pin.

The drain plug, the filter bowl, and the bolts keep the filter element in the filter housing. You use the drain plug to drain the filter bowl when you do maintenance on the oil filter element.

The drain plug, the filter bowl, and the bowl attach nuts keep the filter element in the filter housing. The filter bowl attaches to the housing with four self-locking nuts on the housing studs. You use the drain plug to drain the filter bowl when you do maintenance on the oil filter element.

Functional Description

If the oil filter element becomes blocked, an internal bypass valve opens and lets the oil go around the filter element.

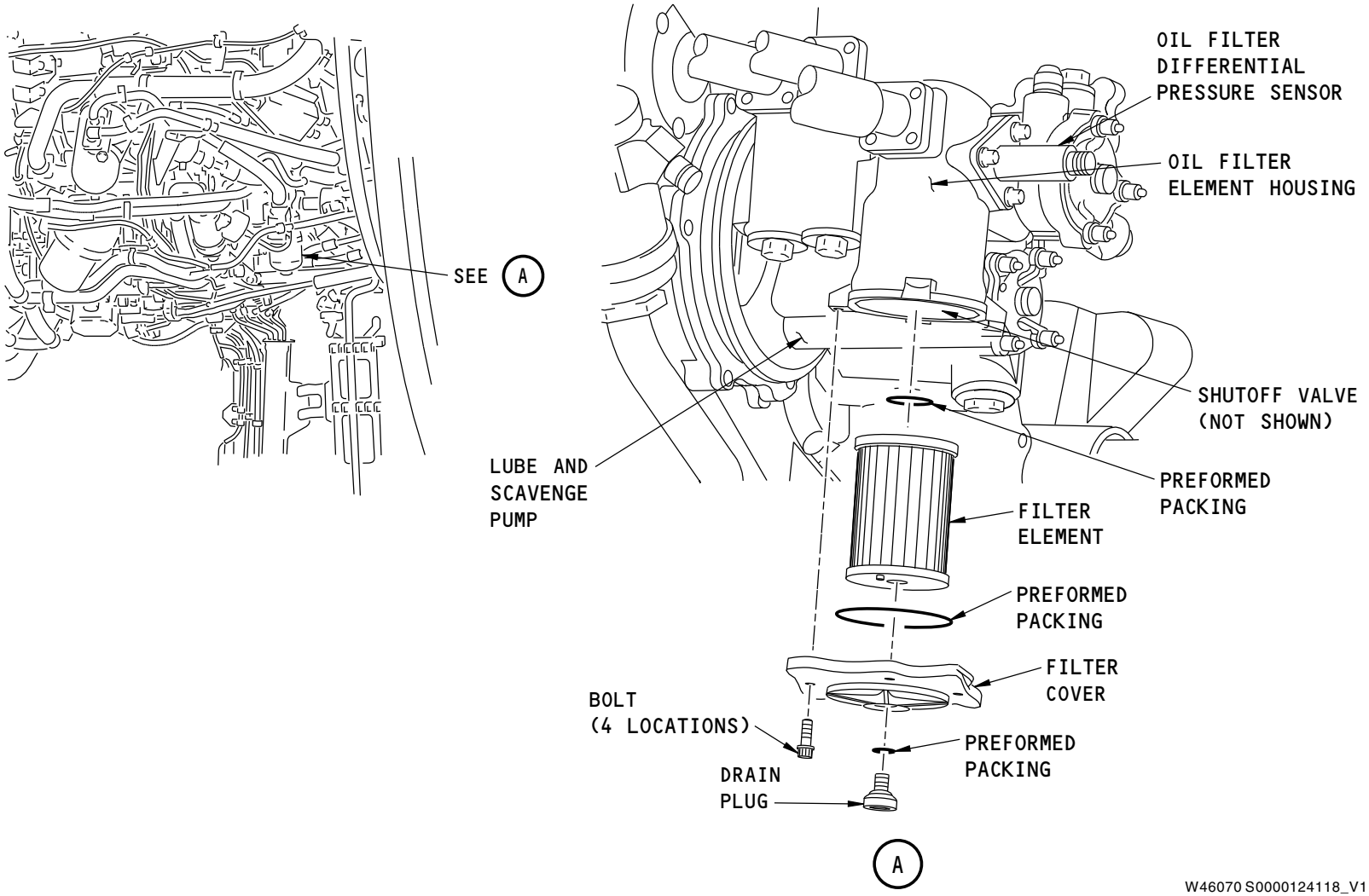
When you remove the oil filter element, an internal shutoff valve (not shown) closes. This prevents the loss of oil.

See the oil filter differential pressure sensor section for more information (SECTION 79-30).

Training Information Point

The locating pin aligns the filter element with a hole inside the filter bowl. It does not let the filter element turn when you remove and install the drain plug.

NOTE: Make sure that the locating pin on the filter element is in the hole in the filter bowl.



OIL - DISTRIBUTION - OIL FILTER ELEMENT

OIL - DISTRIBUTION - MAIN FUEL/OIL HEAT EXCHANGER

Purpose

The main fuel/oil heat exchanger removes heat from the engine oil. It also gives heat to the fuel to prevent ice in the fuel.

Location

The main fuel/oil heat exchanger is on the fuel adapter on the aft right side of the AGB at the 3:00 position.

Physical Description

The main fuel/oil heat exchanger is a stainless steel tube and baffle heat exchanger. It has two fuel paths and one oil path. It also has two bypass valves: one for the fuel paths and one for the oil path.

Functional Description

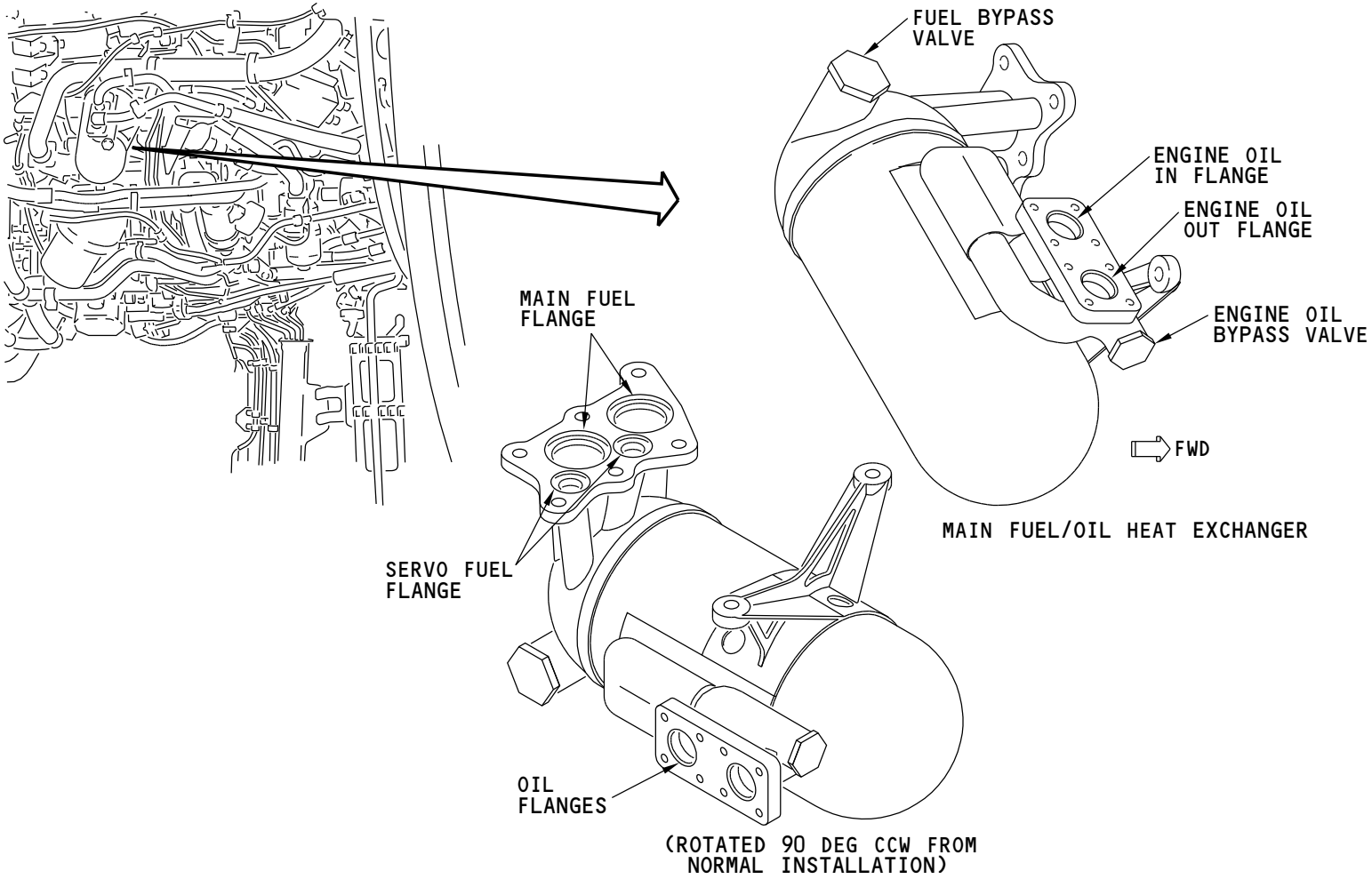
The oil flow goes around these two fuel paths:

- Main fuel
- Servo fuel.

As the oil flows around the fuel paths, the engine oil gives heat to the fuel.

The fuel bypass valve lets fuel go around the heat exchanger if there is a blockage in the fuel paths.

The oil bypass valve lets oil go around the heat exchanger if there is a blockage in the oil path.



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OIL - DISTRIBUTION - MAIN FUEL/OIL HEAT EXCHANGER

OIL - DISTRIBUTION - SCAVENGE OIL INLET SCREENS

Purpose

The scavenge oil inlet screens catch particle contamination in the scavenge oil.

Location

Five scavenge oil inlet screens are in the bottom of the lube and scavenge pump. Marks on the pump housing identify the scavenge oil source and the inlet screen location.

Physical Description

The scavenge oil inlet screens are made of metal and have a magnetic plug inside. They use threads for installation. Each screen has a preformed packing and a back up seal. You can clean the scavenge oil inlet screens.

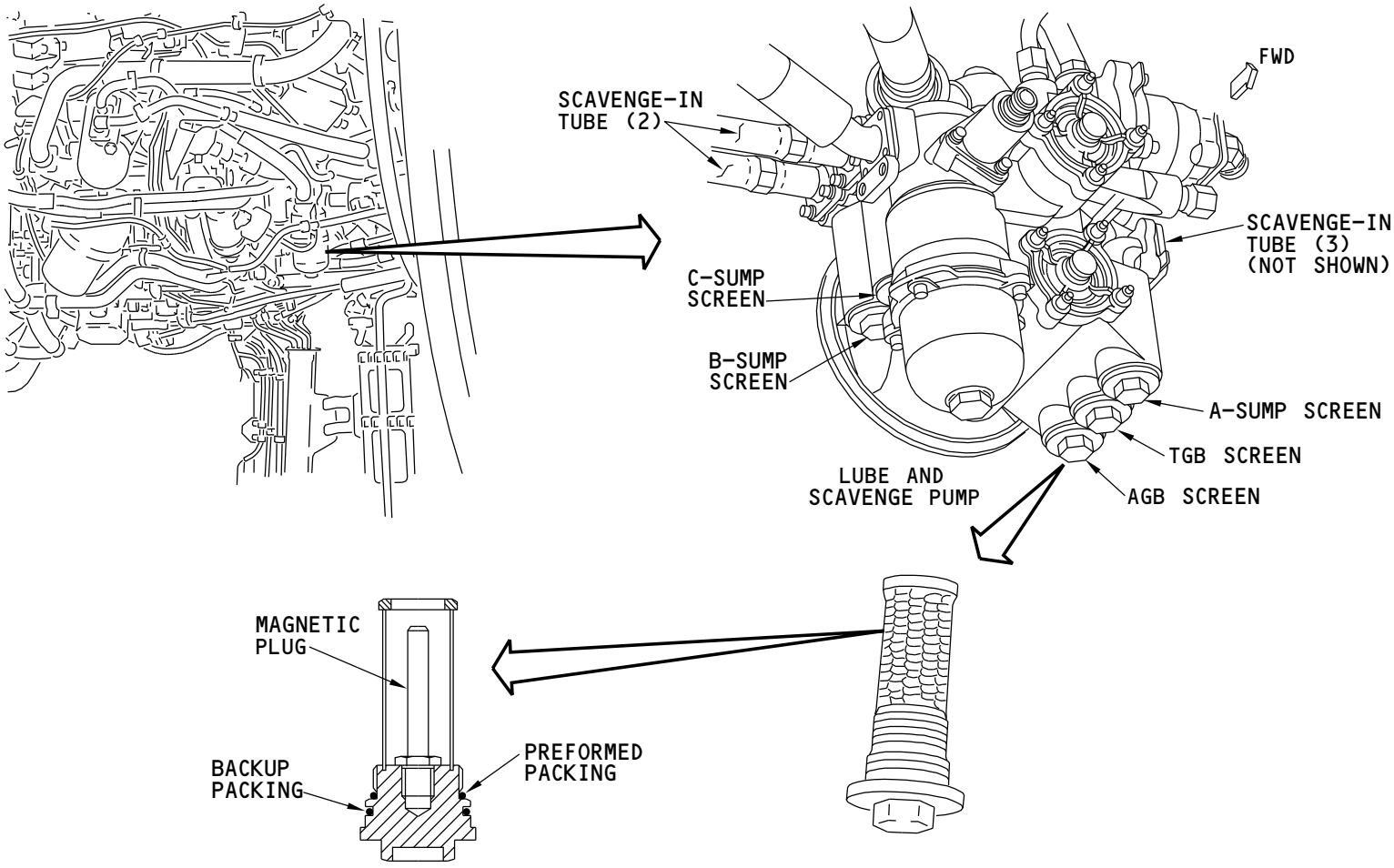
Functional Description

These are the scavenge oil inlet sources:

- A-sump
- TGB
- AGB
- B-sump
- C-sump.

When the scavenge oil returns to the scavenge pump elements, the screens catch the larger particles of contamination. This prevents damage to the pump elements.

You do a check of the magnetic plugs in the scavenge oil inlet screens if the debris monitoring system (DMS) finds ferrous contamination in the scavenge oil. The magnetic plugs catch the ferrous material and let you determine the source(s) of the contamination.



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OIL - DISTRIBUTION - SCAVENGE OIL INLET SCREENS

OIL - DISTRIBUTION - DEBRIS MONITORING SYSTEM (DMS)

Purpose

The Debris Monitoring System (DMS) has these functions:

(1) Removes the air from the engine scavenge oil/air mixture.

(2) Controls the breather air pressure in the engine oil tank.

(3) Catches, retains, and electronically counts ferromagnetic particle contamination larger in mass than 0.13 milligrams.

(4) Reports to the EEC ferromagnetic contamination in the scavenge oil.

Location

The DMS has these LRU components:

(1) DMS air/oil separator

(2) DMS sensor

(3) DMS signal conditioner.

The air/oil separator and sensor are on the top of the engine oil tank. The conditioner is on the left side of the fan case above the engine oil tank.

Physical Description

The DMS air/oil separator is a single assembly that has these internal parts:

(1) Deaerator

(2) Particle Separator.

The DMS sensor has a sensor probe and an adapter. The sensor has a threaded collar that attaches to the adapter. The adapter attaches to the air/oil separator. The sensor has one electrical connector.

The DMS conditioner is an electronic unit that has two electrical connectors. It attaches to the DMS mount adapter on the fan case.

Functional Description

The DMS air/oil separator gets the scavenge oil/air mixture from the lube and scavenge pump. The deaerator removes the air from the mixture. Breather air pressure from the tank goes to a sump and then to the overboard vent. The particle separator collects particle contamination at the DMS sensor.

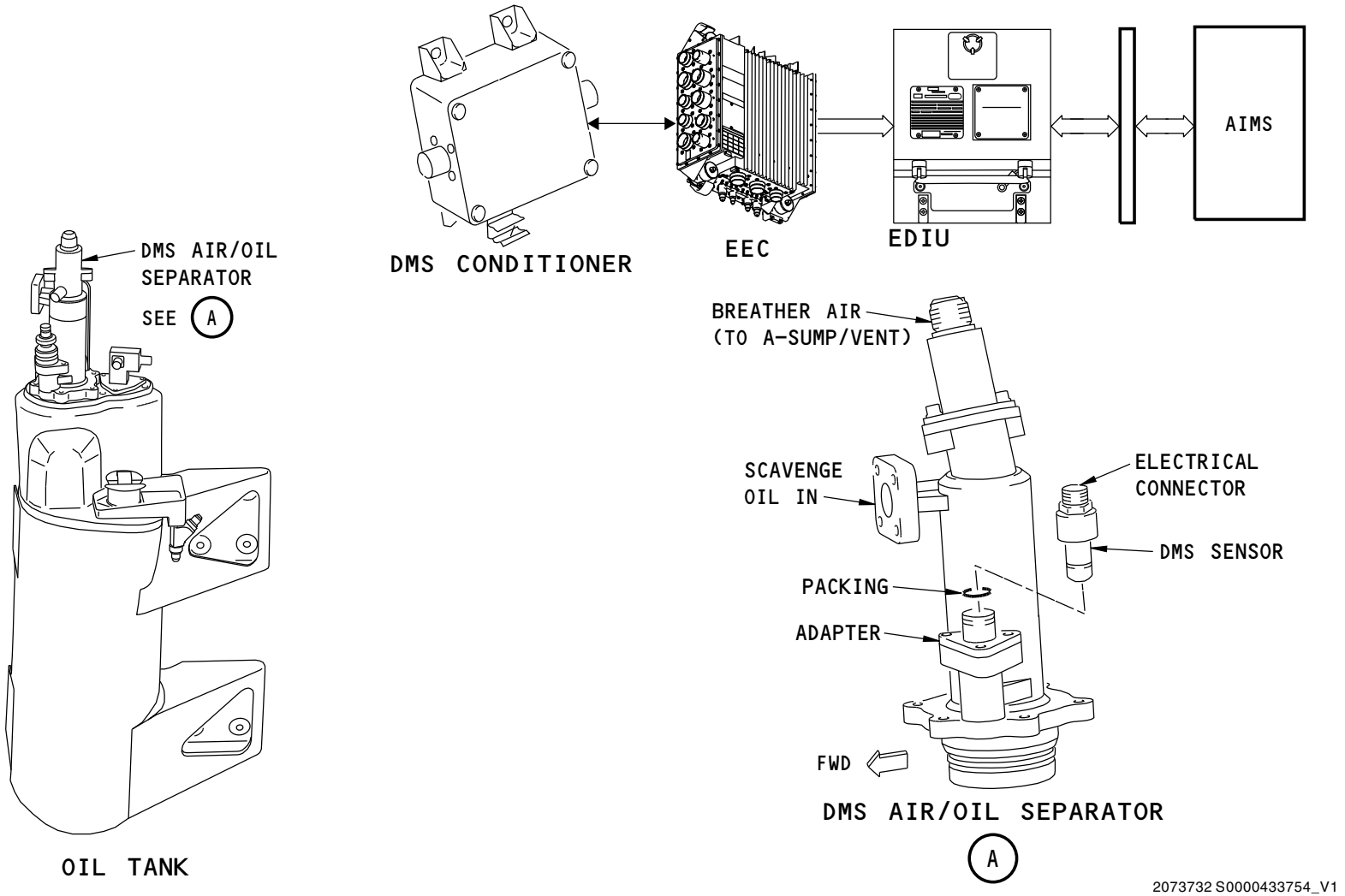
The DMS is a collector of ferromagnetic debris. Depending upon lube system conditions of flow temp and pressure, the DMS can capture magnetic debris at 85% to 95% efficiency.

Contamination data goes from the DMS signal conditioner to the EEC. There it is changed into maintenance messages and sent to the CMC fault history function for display.

A CMCS maintenance message will show if the sensor finds ferrous contamination. The MAT can also tell you if the DMS has a malfunction.

Maintenance Tips

A DMS test may be done from the MAT. The test does a wraparound test of the DMS and monitors maintenance messages that will show the detection of debris. The DMS test also gives the operator the option to reset the cumulative debris counters stored in the EEC Non-Volatile Memory (NVM).



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OIL - DISTRIBUTION - DEBRIS MONITORING SYSTEM (DMS)

OIL - DISTRIBUTION - SUMP EDUCTOR AIR VALVE

Purpose

The purpose of the Sump Eductor System is to reduce engine oil consumption by providing positive oil sump airflow at engine idle speed.

Location

The Sump Eductor System runs from the high pressure compressor 7th stage along the right side of the engine into the turbine rear frame at the 2:00 posistion.

Physical Description

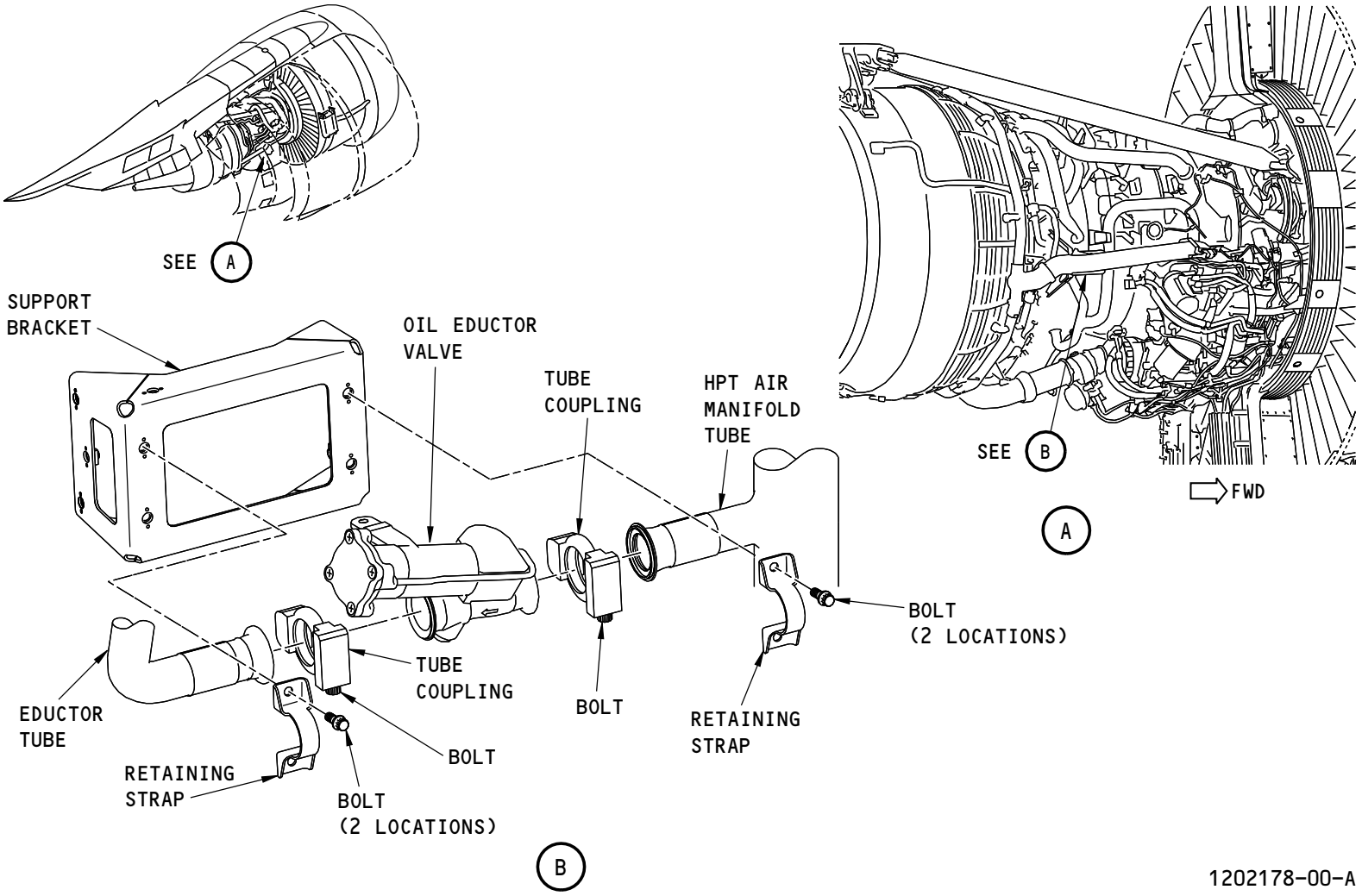
The Sump Eductor Air Valve is a two-position butterfly valve.

Functional Description

The position of the butterfly is determined by air pressure acting on the muscle side of the actuator. The valve is spring loaded in the open position and remainds open for low engine power settings. When engine pressure increases, and the 7th stage pressure increases above 63 psia, the actuator strokes the butterfly to the closed position. The valve remains closed until 7th stage pressure decreases to 35 psia.

Maintenance Tips

Fault monitoring of the valve is performed by the FADEC.



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OIL - DISTRIBUTION - SUMP EDUCTOR AIR VALVE

OIL DISTRIBUTION - FUNCTIONAL DESCRIPTION

Storage

The oil tank supplies oil to the pressure system. The scavenge system returns the oil to the tank. Air from the scavenge air/oil mixture pressurizes the oil tank. This prevents cavitation at the lube pump.

You fill the oil tank through the manual gravity filling cap assembly.

Pressure

The oil from the tank flows through the anti-leak valve to the lube pump. The anti-leak valve prevents the flow of oil from the oil tank to the lube and scavenge pump and the AGB when the engine is shutdown.

The lube pump uses two gerotor-type pump elements to pressurize the oil for distribution to the bearings and gearboxes.

The oil filter element cleans the oil before it enters the engine. An internal bypass valve allows unfiltered oil to not go through the filter element if there is a blockage of the element.

The main fuel/oil heat exchanger removes the heat from the engine oil. It also gives heat to the main fuel and servo fuel paths. This prevents ice in the fuel.

Pressure oil from the fuel/oil heat exchanger flows to these items:

(1) Lube Pump

(2) Oil/Oil Heat Exchanger.

The engine oil that flows to the oil/oil heat exchanger gets more cooling and dampen the number 1R, 3R, and 5R roller bearings. It then goes to lubricate, clean, and cool the individual bearings and gearboxes.

Scavenge

The scavenge pump uses seven gerotor-type pump elements to remove the scavenge air/oil mixture from these engine locations:

(1) A-Sump

(2) B-Sump

(3) C-Sump

(4) TGB

(5) AGB.

The scavenge oil inlet screens catch any large particle contamination before the air/oil mixture flows into the pump elements. This prevents damage to the pump. The DMS receives the scavenge air/oil mixture from the scavenge pump and does these functions:

(1) Removes the air from the mixture.

(2) Controls the air pressure in the tank.

(3) Catches small particle contamination.

(4) Tells the EEC of ferrous contamination in the scavenge oil.

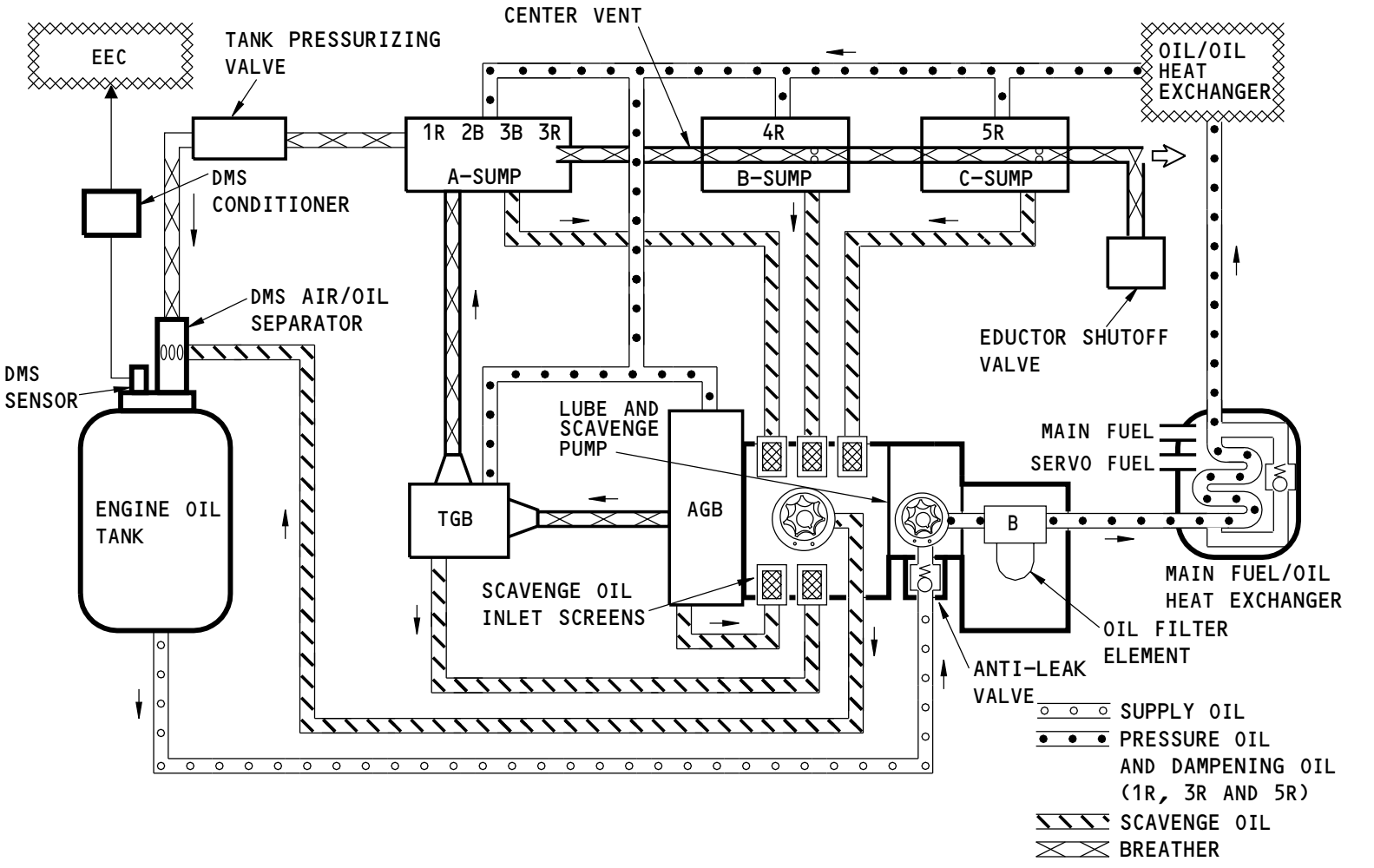
You do a check of the magnetic plugs in the scavenge oil inlet screens if the DMS finds ferrous contamination. The plugs catch the ferrous contamination at the screen location and permit you to identify the source of the contamination.

Breather

The breather system lets the air pressurize in the sumps, the gearboxes, and relieves the excess air pressure in the oil tank to ambient.

The AGB and TGB breather pressure goes to the A-sump. The excess breather pressure from the DMS air/oil separator also goes to the A-sump.

The center vent permits the A, B, and C-sumps breather pressure to go to ambient through the vent tube extension in the aft exhaust plug.



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OIL DISTRIBUTION - FUNCTIONAL DESCRIPTION

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OIL - INDICATING - GENERAL DESCRIPTION

General

The oil indicating subsystem supplies engine oil data to the AIMS for display.

These components monitor the engine oil system:

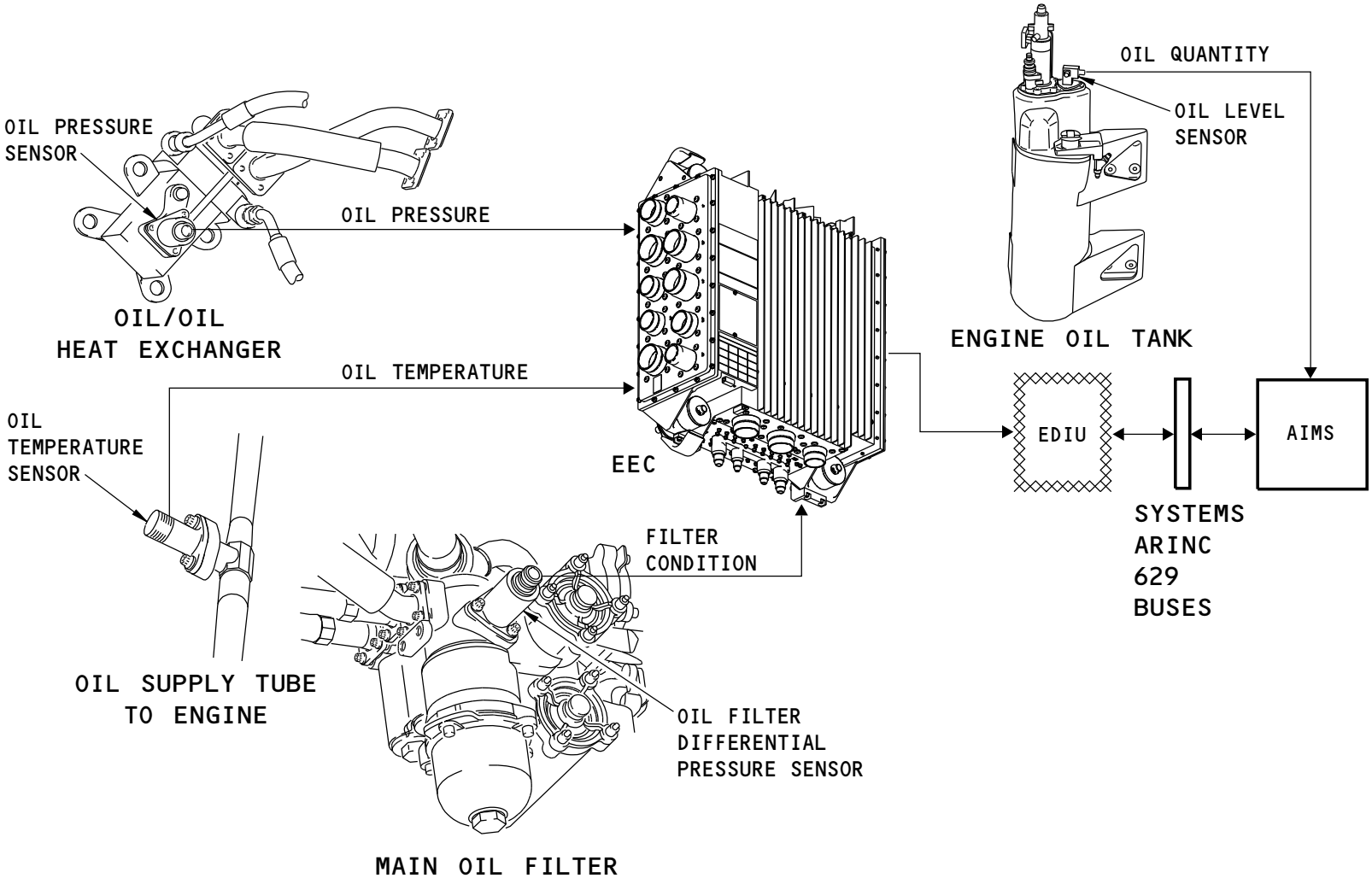
(1) Oil Level Sensor

(2) Oil Ppressure Sensor

(3) Oil Temperature Sensor

(4) Oil Filter Differential Pressure Sensor.

The EEC sends oil pressure, oil temperature, and oil filter element condition to the AIMS. The oil level sensor sends oil quantity data directly to AIMS.



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OIL - INDICATING - GENERAL DESCRIPTION

OIL - INDICATING - COMPONENT LOCATIONS

Component Locations

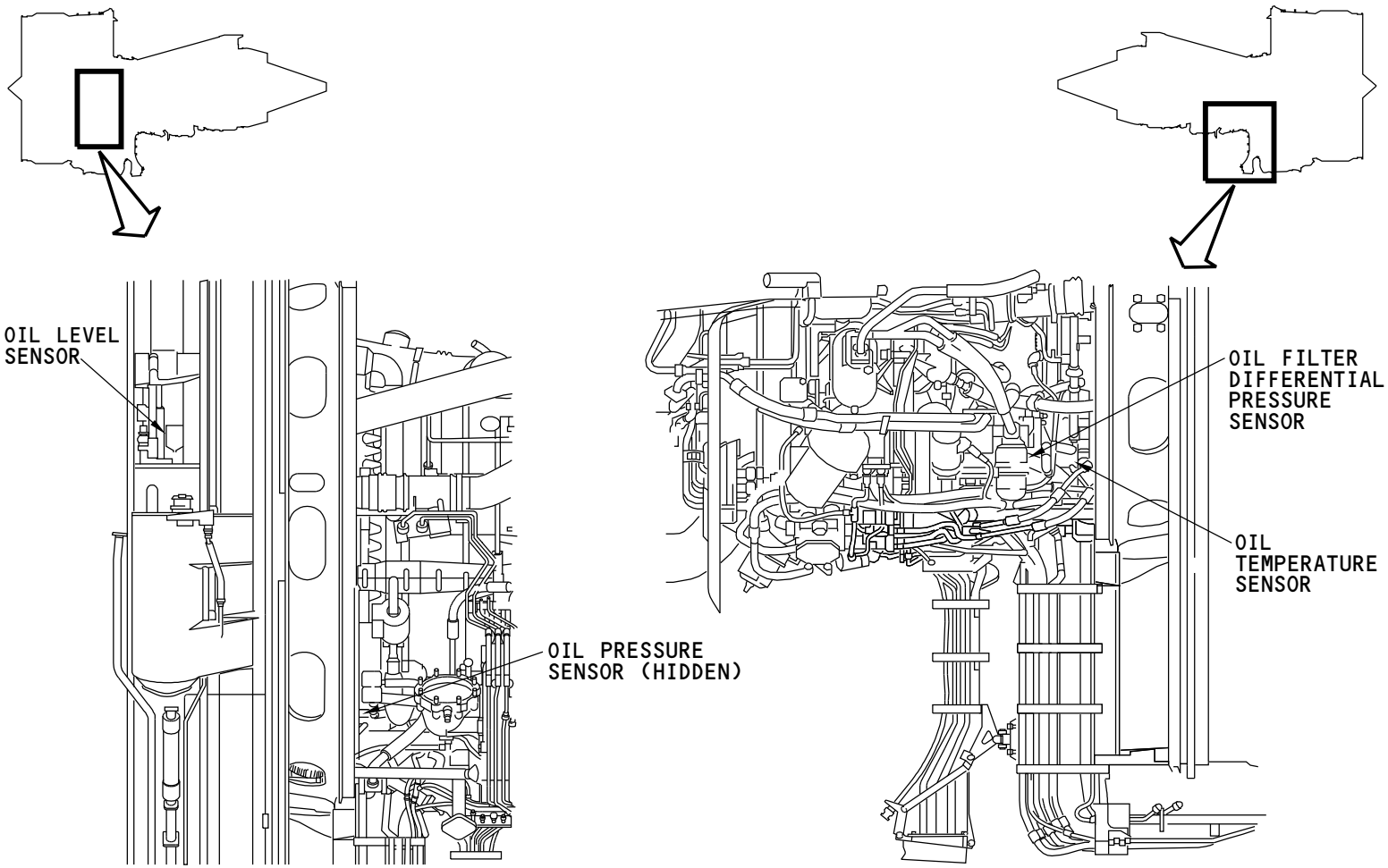
These are the oil indicating components on the left side of the engine:

- Oil level sensor
- Oil pressure sensor.

Component Locations

These are the oil indicating components on the right side of the engine:

- Oil filter differential pressure sensor
- Oil temperature sensor.



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OIL - INDICATING - COMPONENT LOCATIONS

OIL - INDICATING - OIL QUANTITY INDICATING SYSTEM

Purpose

The oil quantity indicating system sends data about the quantity of oil in the engine oil tank to the AIMS for display. It uses an oil level sensor.

Location

The oil level sensor is on the top of the oil tank and extends into the tank.

Physical Description

The oil level sensor is a magnetic float-reed switch device. It has one sensing circuit that use resistors and one electrical connector.

NOTE: Some switch device has two electrical connectors.

Functional Description

The AIMS supplies an excitation signal to the sensing circuit of the oil level sensor. The EEC supplies an excitation signal to the other sensing circuit. As the magnetic float moves up and down with the oil level, the reed switches open and close different resistor circuits. A feedback signal in proportion to the oil level goes to the AIMS and EEC respectively. The AIMS changes its feedback signal to oil quantity for display on the secondary engine display. The AIMS does not use the EEC feedback signal for oil quantity data.

When the AIMS does not get a satisfactory feedback signal, a status message shows.

Indication

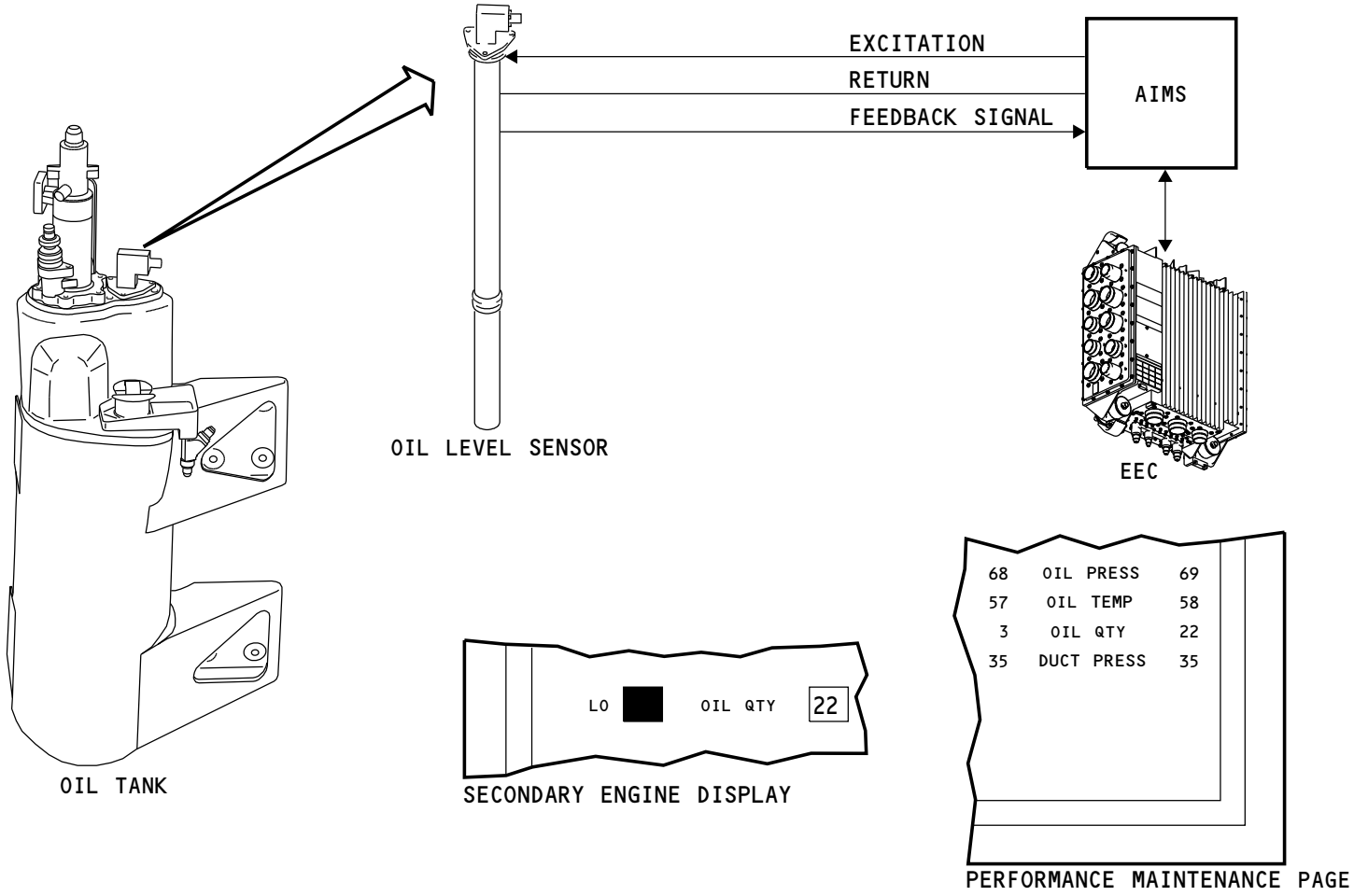
Oil quantity shows in quarts (liters).

Oil quantity shows on the secondary engine display and the performance maintenance page. The propulsion data limits maintenance page (not shown) shows the oil quantity low limit.

The oil quantity low limit is 4 quarts (3.8 liters). When the oil level is below the limit, the oil quantity readout on the secondary engine display changes to reverse video (black numbers on a white background). Also, the letters LO show next to the oil quantity display.

Training Information Point

The AIMS electrical connector can use one or the other of the two connections on the sensor.



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OIL - INDICATING - OIL QUANTITY INDICATING SYSTEM

OIL - INDICATING - OIL PRESSURE INDICATING SYSTEM

Purpose

The oil pressure indicating system sends the engine oil pressure data to the AIMS for display. It uses an oil pressure sensor.

Location

The oil pressure sensor attaches to the oil/oil heat exchanger at the 7:30 position on the fan hub frame.

Physical Description

The oil pressure sensor is a piezoresistive device that contains two sensing elements. The sensor has one electrical connector.

Functional Description

The oil pressure sensor gets oil pressure data after the oil flows through the oil/oil heat exchanger.

Each EEC channel supplies an excitation signal to one sensing element. Each element measures the difference between the engine oil pressure and the bearing sump air pressure. Each element sends an oil pressure signal to its EEC channel.

When both signals from an oil pressure sensor are unsatisfactory, the status display shows a status message.

Indication

Oil pressure shows in psi.

Oil pressure shows on these formats:

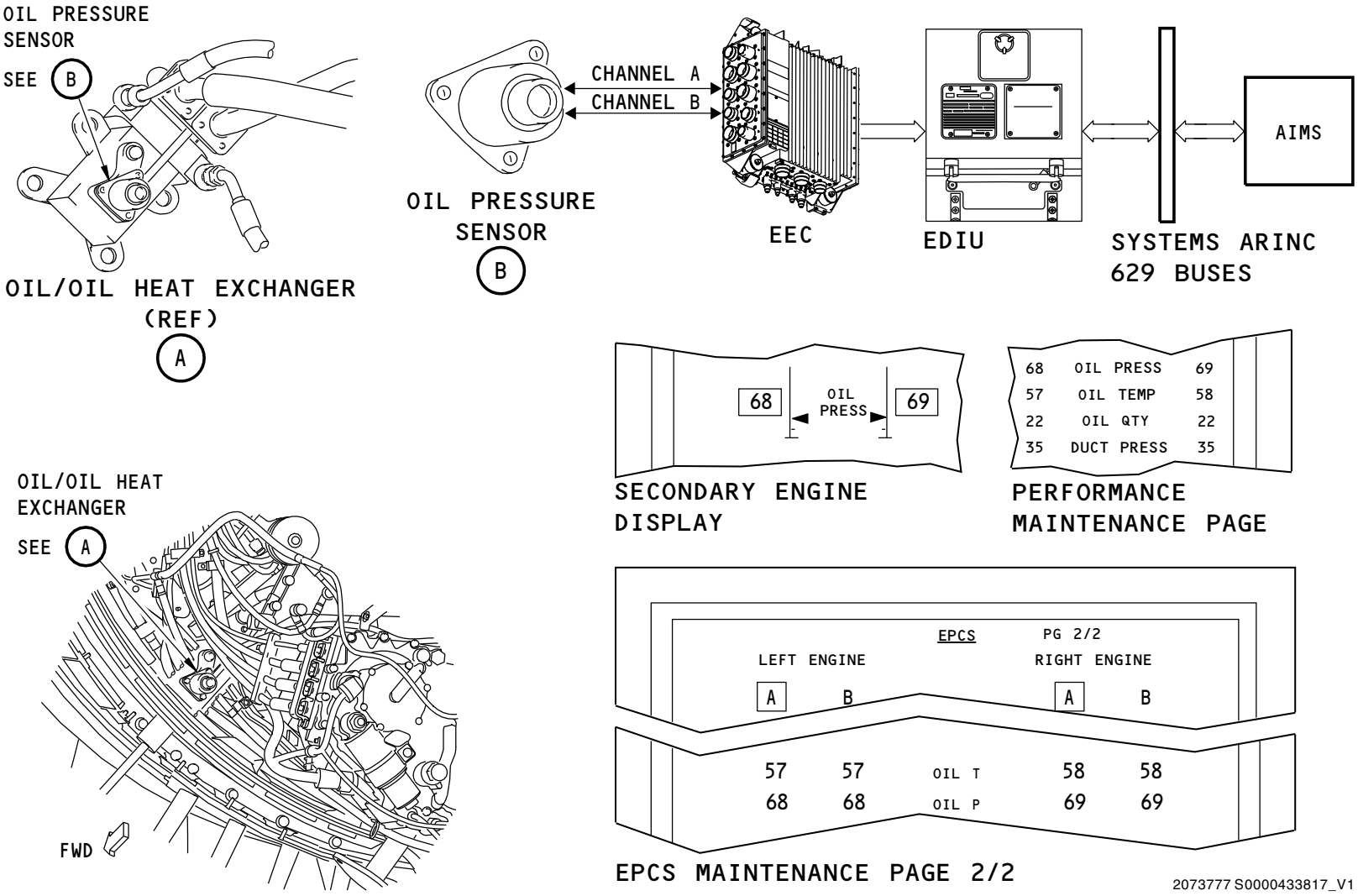
(1) Secondary Engine Display

(2) Performance Maintenance Page

(3) EPCS Maintenance Page 2.

The propulsion data limits maintenance page format shows the oil pressure limits. See the propulsion data limits maintenance page section for more information (SECTION 77-00).

When the engine oil pressure is at or below the red line limit, the ENG OIL PRESS L or R caution message shows. An engine shutdown prevents the message.



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OIL - INDICATING - OIL PRESSURE INDICATING SYSTEM

OIL - INDICATING - OIL TEMPERATURE INDICATING SYSTEM

Purpose

The oil temperature indicating system sends the engine oil temperature data to the AIMS for display. It uses an oil temperature sensor.

Location

The oil temperature sensor installs in an adapter in the engine oil supply tube downstream from the oil/oil heat exchanger. It is at the 5:30 position of the HPC immediately aft of the fan hub frame.

Physical Description

The oil temperature sensor is a variable resistance device. It has two platinum elements and one electrical connector.

Functional Description

The oil temperature sensor gets oil temperature data as the oil flows from the oil/oil heat exchanger to the engine.

Each EEC channel supplies an excitation signal to one element. The resistance value of the element changes as the oil temperature changes. This changes the oil temperature signal to each EEC channel.

When both signals from an oil temperature sensor are unsatisfactory, a status message shows.

Indication

Oil temperature shows in degrees Celsius.

The MFD shows the oil temperature on these pages:

(1) Secondary Engine Display

(2) Performance Maintenance Page

(3) EPCS Maintenance Page 2.

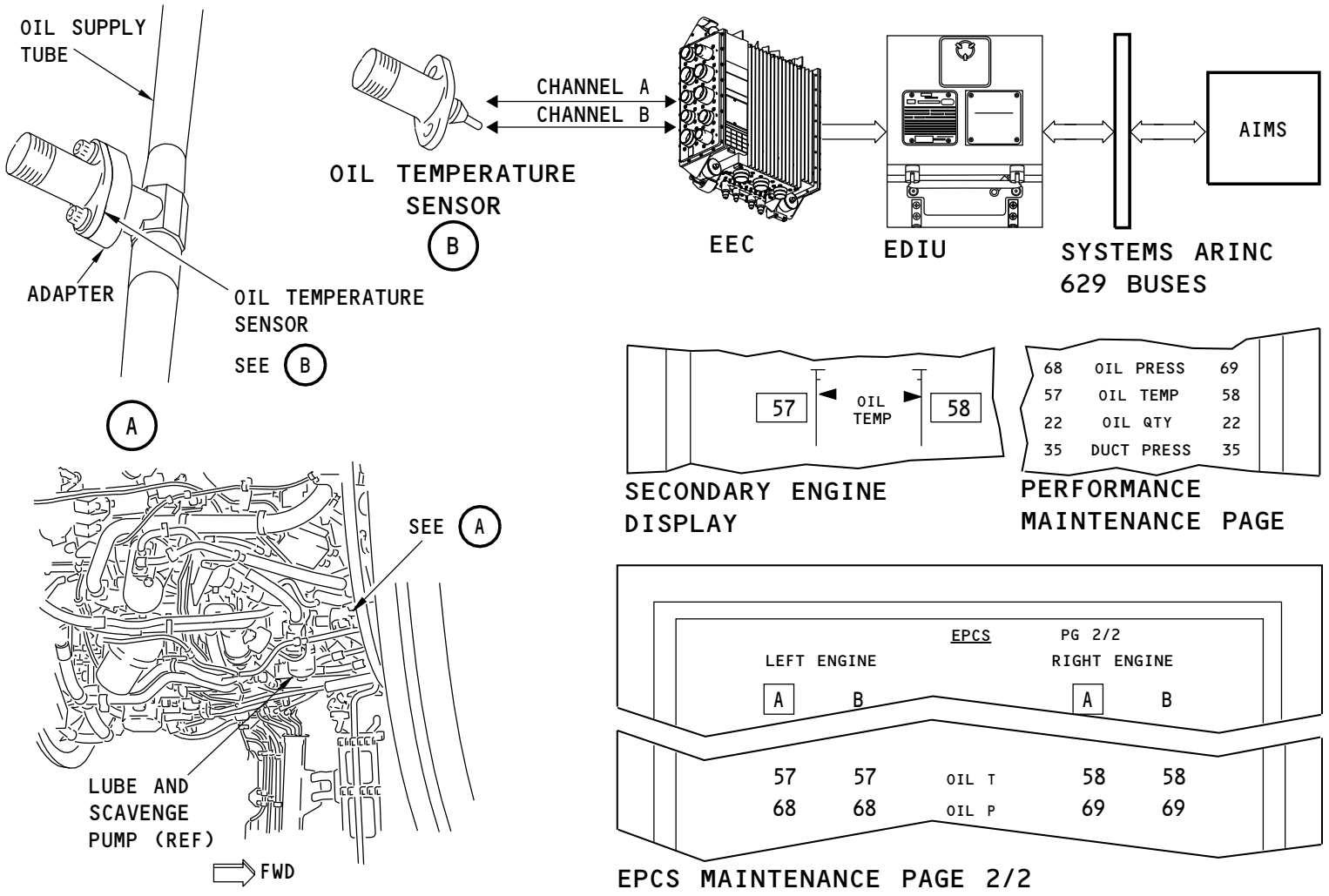
The oil temperature display on the secondary engine display has these limit indications:

(1) High Red Line Limit

(2) High Amber Limit.

The propulsion data limits maintenance page shows the oil temperature limits. See the engine indicating chapter for more information on the propulsion data limits page (CHAPTER 77).

When the engine oil temperature is at or above the amber limit, the ENG OIL TEMP L or R advisory message shows.



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OIL - INDICATING - OIL TEMPERATURE INDICATING SYSTEM

OIL - INDICATING - OIL FILTER BYPASS WARNING SYSTEM

Purpose

The oil filter bypass warning system sends engine oil filter differential pressure data to the EEC. This permits the EEC to monitor the condition of the oil filter element. The system uses an oil filter differential pressure sensor.

Location

The sensor is on the forward end of the lube and scavenge pump.

Physical Description

The oil filter differential pressure sensor is a piezoresistive device. It has two sensing elements and one electrical connector.

Functional Description

Each EEC channel supplies an excitation signal to one sensing element. Each element gets an oil pressure input before and after the oil filter. Each element sends an oil pressure signal to its EEC channel.

When both signals from an oil filter differential pressure sensor are unsatisfactory, a the ENG OIL FILT SNSR L or R status message shows.

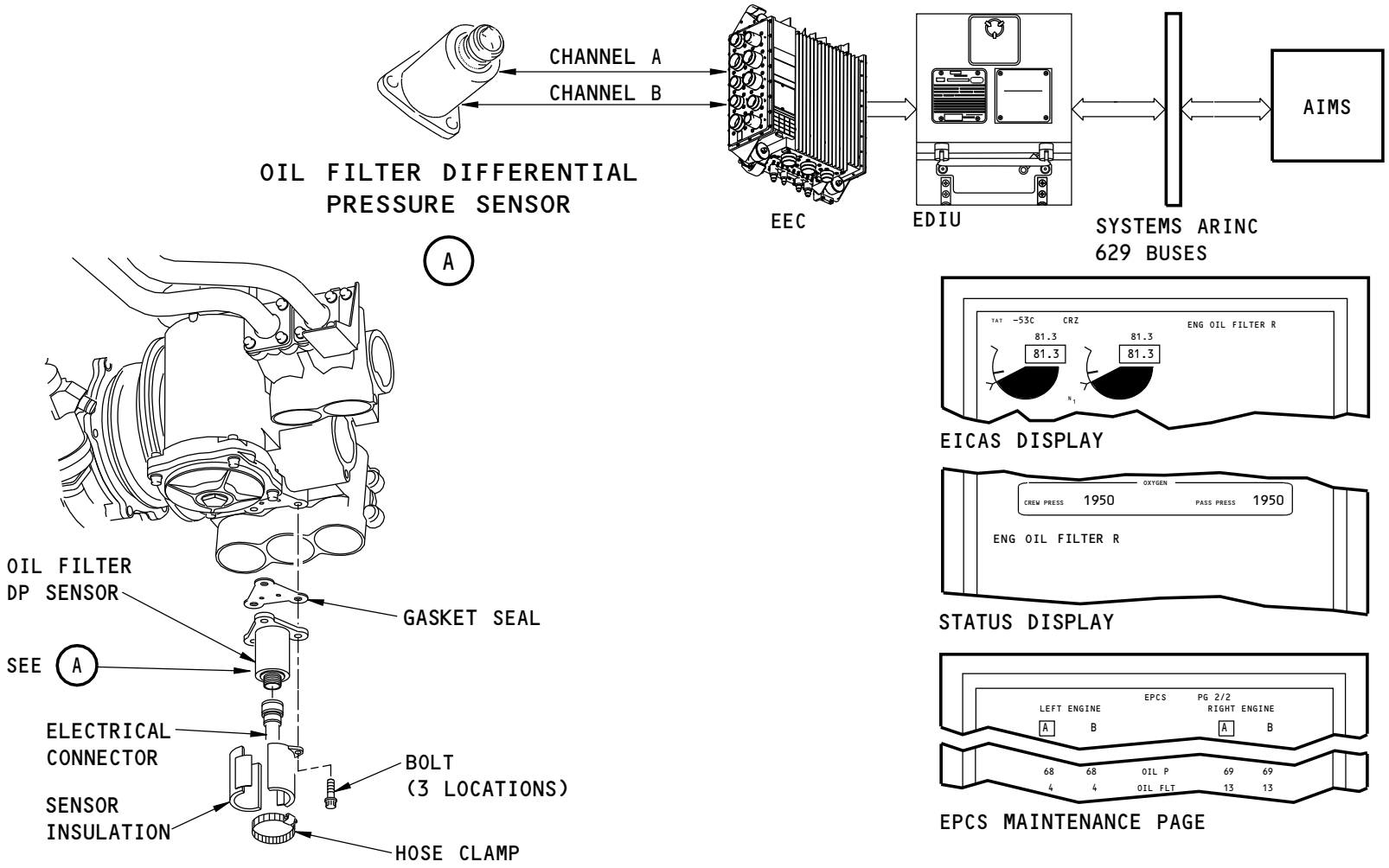
Indication

The MFD shows the oil filter differential oil pressure in psi on the EPCS maintenance page 2/2.

The EEC determines the filter condition and sends signals to AIMS to show advisory and status messages.

When the engine oil filter differential oil pressure goes near the filter bypass condition, the status page display shows the ENG OIL FILTER L or R status message.

When the engine oil filter differential oil pressure is at or above the filter bypass condition, the ENG OIL FILTER L or R advisory message shows.



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OIL - INDICATING - OIL FILTER BYPASS WARNING SYSTEM