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| Operation | | 1 | |
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FAULT CODE INDEX

1. General

- A. The Fault Code Index includes fault isolation or corrective action for each fault code in the Fault Reporting Manual (FRM). The fault codes for each chapter are in numerical order.
 - (1) The first paragraph given with each fault code is the log book report from the FRM. The log book report is a short description of the fault.
 - (2) The numbered paragraphs after the log book report contain the fault isolation or the corrective action.
- B. The fault isolation for most EICAS messages, engine exceedances, or PFD flags includes a list of one or more possible correlated CMCS messages.
 - (1) For each CMCS message in the list, there is the message number and an ATA number. The ATA number is the prompt under which you can find the message in Existing Faults or Fault History on the CDU.
 - (2) The corrective action refers to the procedure in Figure 1 of this section. Figure 1 shows how to use the Present Leg Faults, Existing Faults, and Fault History functions of the CMC to isolate the fault to a specific CMCS message.
- C. For those EICAS status messages which latch into EIU memory when they occur, this index includes the letters NVM, NVM-A, or NVM-G to the right of the log book report.
 - (1) NVM indicates that the message latches if it occurs in the air or on the ground.
 - (2) NVM-A indicates that the message latches only if it occurs in the air.
 - (3) NVM-G indicates that the message latches only if it occurs on the ground.
 - (4) To remove the latched message from the EICAS after you correct the fault, you must use the ERASE function of the CMC.

NOTE: Do not erase a latched EICAS message until you are sure that you have corrected the fault.

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- D. When the CDU shows a large number of Flight Deck Effects (FDEs) or CMCS messages, it is possible that there is a bus failure. Do these steps to isolate the cause of the bus failure:
- (1) Look at the CMCS messages to determine which system or LRU is related to all the messages.
 - (2) Look at the wiring diagram for each system and determine if the suspect LRUs are on a common bus.
 - (3) Do a check of the wiring between each of the suspect LRUs and the common bus.
 - (4) Repair any problems that you find.
 - (5) If the problem continues, remove each LRU individually to determine which LRU is the cause of the fault.
 - (6) Replace the LRU which caused the fault.

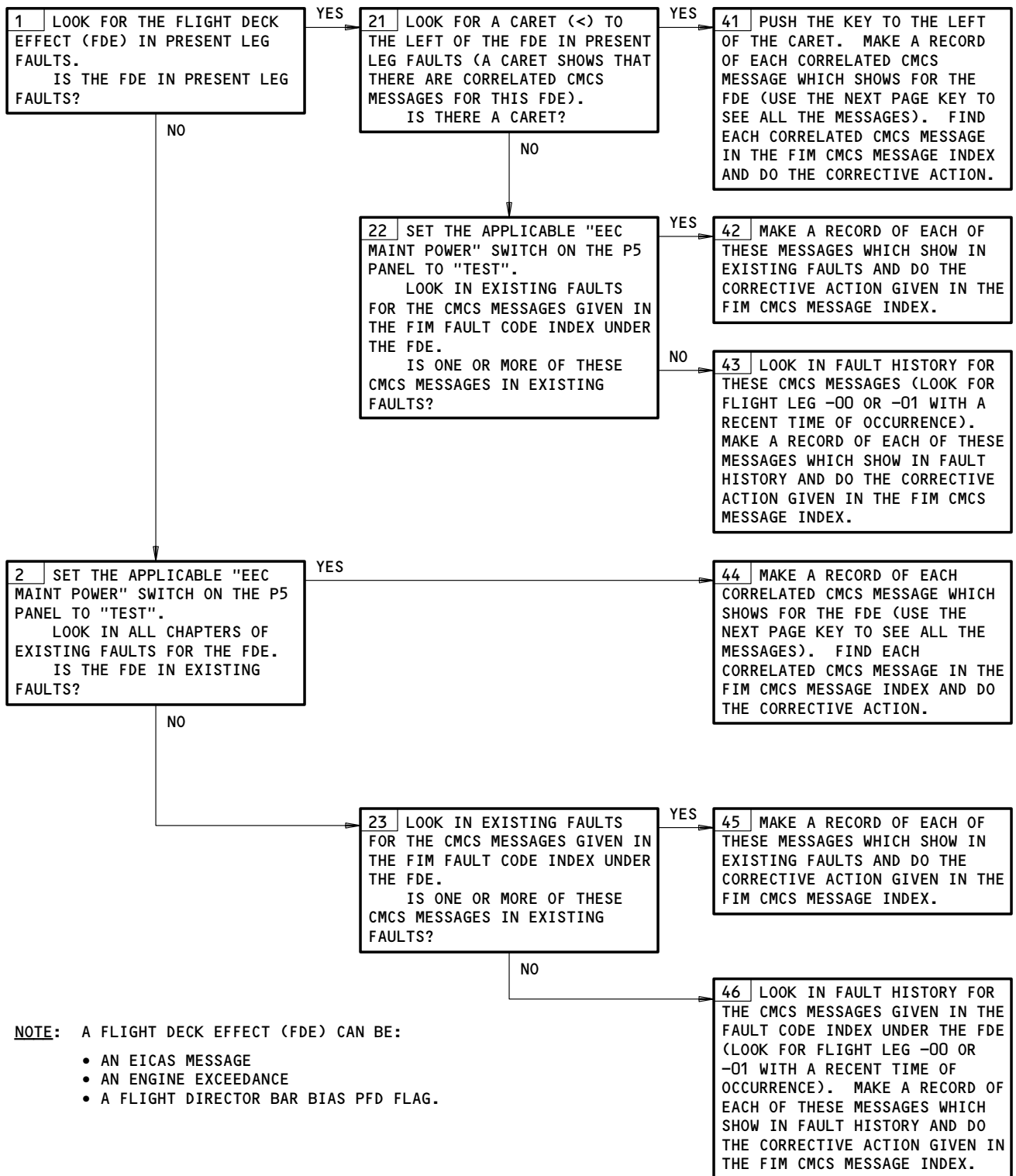
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|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 79 03 XA 00 | Not Used. |
| 79 03 XB 00 | The flight crew found an oil pressure problem that is not on the fault code diagrams in the FRM. See the entry that the crew wrote in the log book. 1. AMM 79-32-00/501 |
| 79 03 XC 00 | The flight crew found an oil temperature problem that is not on the fault code diagrams in the FRM. See the entry that the crew wrote in the log book. 1. AMM 79-31-01/401 |
| 79 03 XD 00 | Not Used. |
| 79 03 XE 00 | The flight crew found an oil quantity/high oil consumption problem that is not on the fault code diagrams in the FRM. See the entry that the crew wrote in the log book. 1. AMM 79-31-00/501 2. If the Oil Quantity Indicating System is satisfactory, and the problem continues, see fault code 79 03 35 and 79 03 36. OIL QUANTITY DROPS DURING CRUISE, RETURNS TO USUAL DURING DESCENT (FIM 79-00-00/101). |
| 79 03 01 00 | The EICAS message ENG 1 OIL FILT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 71572 (71-00) |
| 79 03 02 00 | The EICAS message ENG 1 OIL FILT (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1). 71572 (71-00) |
| 79 03 03 00 | IDS S/W -009; The EICAS message ENG 1 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 71571 (71-00) |
| 79 03 04 00 | The EICAS message ENG 1 OIL PRESS (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1). 71571 (71-00) |
| 79 03 05 00 | The EICAS message ENG 1 OIL TEMP (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 71305 (71-00) 71405 (71-00) 71570 (71-00) 71592 (71-00) |
| 79 03 06 00 | Not Used |

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| 79 03 07 00 | The EICAS message ENG 2 OIL FILT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 72572 (71-00) |
| 79 03 08 00 | The EICAS message ENG 2 OIL FILT (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1). 72572 (71-00) |
| 79 03 09 00 | IDS S/W -009; The EICAS message ENG 2 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 72571 (71-00) |
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| 79 03 11 00 | The EICAS message ENG 2 OIL TEMP (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 72305 (71-00) 72405 (71-00) 72570 (71-00) 72592 (71-00) |
| 79 03 12 00 | Not Used |
| 79 03 13 00 | The EICAS message ENG 3 OIL FILT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 73572 (71-00) |
| 79 03 14 00 | The EICAS message ENG 3 OIL FILT (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1). 73572 (71-00) |
| 79 03 15 00 | IDS S/W -009; The EICAS message ENG 3 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 73571 (71-00) |
| 79 03 16 00 | The EICAS message ENG 3 OIL PRESS (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1). 73571 (71-00) |
| 79 03 17 00 | The EICAS message ENG 3 OIL TEMP (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 73305 (71-00) 73405 (71-00) 73570 (71-00) 73592 (71-00) |
| 79 03 18 00 | Not Used |

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|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 79 03 19 00 | The EICAS message ENG 4 OIL FILT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 74572 (71-00) | |
| 79 03 20 00 | The EICAS message ENG 4 OIL FILT (STATUS) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 74572 (71-00) | (NVM) |
| 79 03 21 00 | IDS S/W -009; The EICAS message ENG 4 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 74571 (71-00) | |
| 79 03 22 00 | The EICAS message ENG 4 OIL PRESS (STATUS) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 74571 (71-00) | (NVM) |
| 79 03 23 00 | The EICAS message ENG 4 OIL TEMP (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 74305 (71-00) 74405 (71-00) 74570 (71-00) 74592 (71-00) | |
| 79 03 24 00 | Not Used | |
| 79 03 25 00 | The EICAS message OIL PRESS SNS 1 (STATUS) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 71573 (71-00) | (NVM-G) |
| 79 03 26 00 | The EICAS message OIL PRESS SNS 2 (STATUS) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 72573 (71-00) | (NVM-G) |
| 79 03 27 00 | The EICAS message OIL PRESS SNS 3 (STATUS) shows. | (NVM-G) |

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| FAULT CODE | LOG BOOK REPORT/ CORRECTIVE ACTION | | | | | | | | | | | | | | | |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|---------------|---|------|--------|---|------|--------|---|------|----------|---|------|----------|
| | 1. Look for one or more of these CMCS messages (Fig. 1). 73573 (71-00) | | | | | | | | | | | | | | | |
| 79 03 28 00 | The EICAS message OIL PRESS SNS 4 (STATUS) shows. (NVM-G) 1. Look for one or more of these CMCS messages (Fig. 1). 74573 (71-00) | | | | | | | | | | | | | | | |
| 79 03 29 __ | No. (01=1, 02=2, 03=3, 04=4) engine oil pressure indication is (blank, intermittent). 1. Replace the oil pressure transmitter T679 (AMM 79-32-01/401). If the problem continues, examine and repair the circuit between the pressure transmitter and EIU M7351; the connector DT679 and the connector DM7351EA. Connector <table><tr><td>Eng</td><td>DT679 Pins</td><td>DM7351EA Pins</td></tr><tr><td>1</td><td>B, C</td><td>B6, C1</td></tr><tr><td>2</td><td>B, C</td><td>J6, H3</td></tr><tr><td>3</td><td>B, C</td><td>G15, C15</td></tr><tr><td>4</td><td>B, C</td><td>J12, H13</td></tr></table> | Eng | DT679 Pins | DM7351EA Pins | 1 | B, C | B6, C1 | 2 | B, C | J6, H3 | 3 | B, C | G15, C15 | 4 | B, C | J12, H13 |
| Eng | DT679 Pins | DM7351EA Pins | | | | | | | | | | | | | | |
| 1 | B, C | B6, C1 | | | | | | | | | | | | | | |
| 2 | B, C | J6, H3 | | | | | | | | | | | | | | |
| 3 | B, C | G15, C15 | | | | | | | | | | | | | | |
| 4 | B, C | J12, H13 | | | | | | | | | | | | | | |
| 79 03 30 __ | No. (01=1, 02=2, 03=3, 04=4) engine oil temperature indication is (blank, intermittent). 1. Replace the oil temperature sensor (AMM 79-34-01/401). If the problem continues, replace the ECU (AMM 73-21-15/401). | | | | | | | | | | | | | | | |
| 79 03 31 __ | No. (01=1, 02=2, 03=3, 04=4) engine oil quantity indication is (blank, intermittent). 1. Replace the oil quantity transmitter T675 (AMM 79-31-01/401). If the problem continues, examine and repair the circuit between the oil quantity transmitter and EIU M7351; the connector DT679 and the connector DM7351EA. Connector <table><tr><td>Eng</td><td>DT675 Pins</td><td>DM7351EA Pins</td></tr><tr><td>1</td><td>2, 3</td><td>A7, C6</td></tr><tr><td>2</td><td>2, 3</td><td>E3, K6</td></tr><tr><td>3</td><td>2, 3</td><td>D14, J14</td></tr><tr><td>4</td><td>2, 3</td><td>J10, K12</td></tr></table> | Eng | DT675 Pins | DM7351EA Pins | 1 | 2, 3 | A7, C6 | 2 | 2, 3 | E3, K6 | 3 | 2, 3 | D14, J14 | 4 | 2, 3 | J10, K12 |
| Eng | DT675 Pins | DM7351EA Pins | | | | | | | | | | | | | | |
| 1 | 2, 3 | A7, C6 | | | | | | | | | | | | | | |
| 2 | 2, 3 | E3, K6 | | | | | | | | | | | | | | |
| 3 | 2, 3 | D14, J14 | | | | | | | | | | | | | | |
| 4 | 2, 3 | J10, K12 | | | | | | | | | | | | | | |

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| FAULT CODE | LOG BOOK REPORT/ CORRECTIVE ACTION |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 79 03 32 ___ | No. (01=1, 02=2, 03=3, 04=4) engine oil pressure is (high, low, fluctuating). The oil consumption is satisfactory. 1. FIM 79-00-00/101, Fig. 105 |
| 79 03 33 ___ | Not Used |
| 79 03 34 ___ | No. (01=1, 02=2, 03=3, 04=4) engine oil temperature is high, ___ °C. The oil pressure is satisfactory. 1. Replace the oil temperature sensor (AMM 79-34-01/401). If the problem continues, examine the MCD (AMM 79-21-05/201) and inlet screens (AMM 79-21-06/201). Look for particles that are more than the limits. If you find these particles, do the Metal-In-Screen analysis (AMM 79-00-00/601). If you do not find the particles, replace the fuel/oil heat exchanger (AMM 79-21-01/401). If the problem continues replace the ECU (AMM 73-21-15/401). |
| 79 03 35 ___ | No. (01=1, 02=2, 03=3, 04=4) engine oil consumption is high, ___ liters per hour. The oil press is satisfactory. 1. FIM 79-00-00/101, Fig. 106 |
| 79 03 36 ___ | No. (01=1, 02=2, 03=3, 04=4) engine oil consumption is high, ___ ltrs per hour. The oil press is (low, fluctuating, low and fluctuating). 1. FIM 79-00-00/101, Fig. 106 |
| 79 03 37 ___ | No. (01=1, 02=2, 03=3, 04=4) engine oil quantity is high. 1. FIM 79-00-00/101, Fig. 107 |

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| FAULT CODE | LOG BOOK REPORT/ CORRECTIVE ACTION |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 79 03 38 __ | No. (01=1,02=2, 03=3, 04=4) engine oil quantity is low 1. Service as it is necessary, only. |
| 79 03 39 00 | IDS S/W -010; The EICAS message ENG 1 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 71571 (71-00) |
| 79 03 40 00 | IDS S/W -010; The EICAS message ENG 2 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 72571 (71-00) |
| 79 03 41 00 | IDS S/W -010; The EICAS message ENG 3 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 73571 (71-00) |
| 79 03 42 00 | IDS S/W -010; The EICAS message ENG 4 OIL PRESS (CAUTION) shows. 1. Look for one or more of these CMCS messages (Fig. 1). 74571 (71-00) |

| | |
|-------------|-----|
| EFFECTIVITY | |
| | ALL |

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OIL - DESCRIPTION AND OPERATION

1. General

- A. The engine oil system (Fig. 1) is a self-contained, center-vented, recirculating-type system. The oil is monitored for quantity, temperature, pressure, low pressure, and pressure differential. Each engine contains an independent oil system to provide lubrication and cooling for the engine mainshaft support bearings, radial driveshaft bearings, and gearbox gears and bearings.

2. Operation

- A. Oil storage is provided by the engine oil tank (Ref 79-11-00/001). A continuous supply of oil is provided for distribution in the engine (Ref 79-21-00/001). A lube and scavenge pump distributes oil under pressure to lubricated components and returns oil to the tank scavenged from engine oil sumps. Filters and screens remove foreign material from the oil. A fuel/oil heat exchanger cools the oil in preparation to recycle through the system. A master magnetic chip detector in the lube and scavenge discharge line traps metallic contaminants suspended in the oil. A servo fuel heater (Ref 73-11-00/001) heats fuel entering the hydromechanical unit.
- B. Indicating systems provide measurements of oil quantity (Ref 79-31-00/001), oil pressure (Ref 79-32-00/001), and oil temperature (Ref 79-34-00/001). Advisory and status messages provide for low oil pressure warning (Ref 79-33-00/001), and oil scavenge filter bypass warning (Ref 79-35-00/001). Condition of the engine oil system and the performance of associated engine components are determined by the visual indication of these systems on the Engine Indicating and Crew Alert System (EICAS) (Ref 31-61-00/001).

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STATUS PAGE

ENG 3 OIL PRESS
ENG 3 OIL FILT
ENG 3 OIL TEMP
OIL PRESS SNS 3

MAIN EICAS
DISPLAY

ENG 3 OIL PRESS
ENG 3 OIL FILT
ENG 3 OIL TEMP

65 65 12 65
OIL P
105 105 168 107
OIL T
15 15 OIL Q 19 15

AUX EICAS
DISPLAY

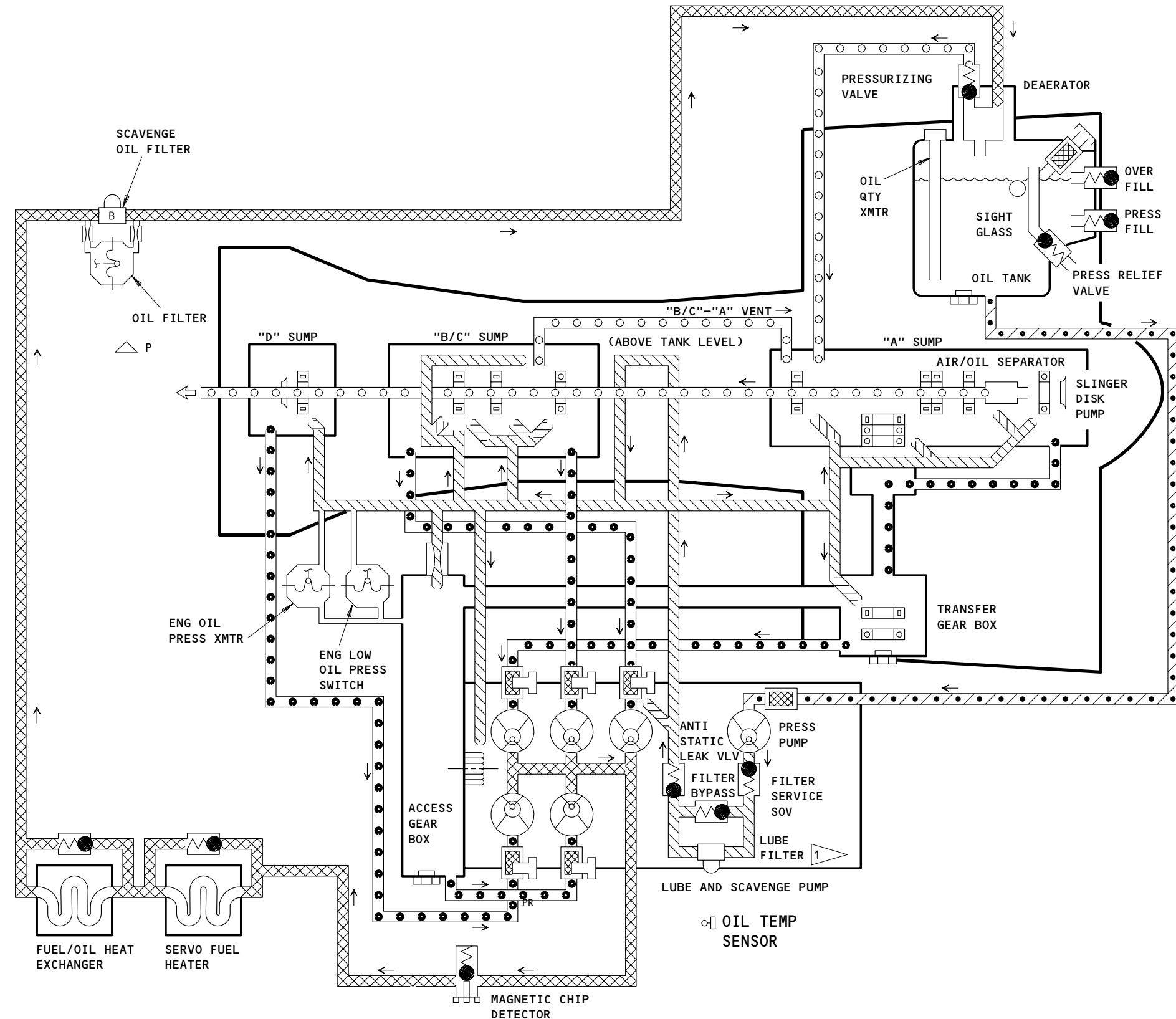
OIL
65 65 12 65
105 105 TEMP 168 107
15 15 QTY 19 15

PERF MAINT PAGE

OIL LINE

- | | |
|-------------------|--------------|
| PRESS | BALL BRG |
| SUPPLY | ROLLER BRG |
| SCAVENGE PUMP IN | MAG DET |
| SCAVENGE PUMP OUT | OIL STRAINER |
| VENT | DRAIN PLUG |
| OIL JET | |

1 ENGINES PRE-GE-SB 79-047



Engine Oil System Schematic
Figure 1A

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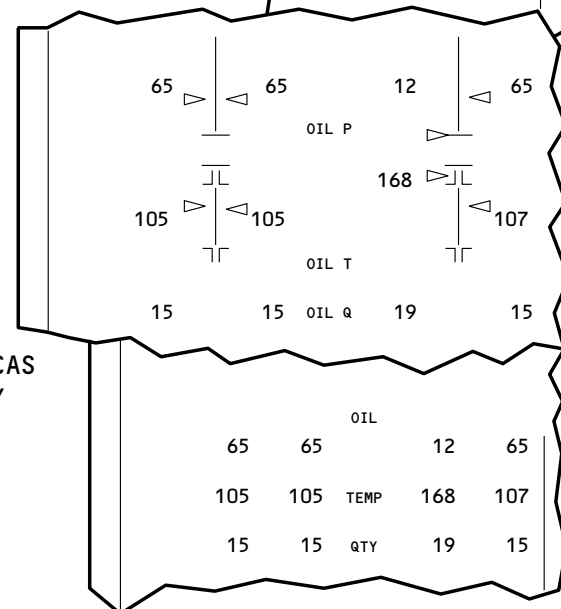
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STATUS PAGE

ENG 3 OIL PRESS
ENG 3 OIL FILT
ENG 3 OIL TEMP
OIL PRESS SNS 3

MAIN EICAS
DISPLAY

ENG 3 OIL PRESS
ENG 3 OIL FILT
ENG 3 OIL TEMP



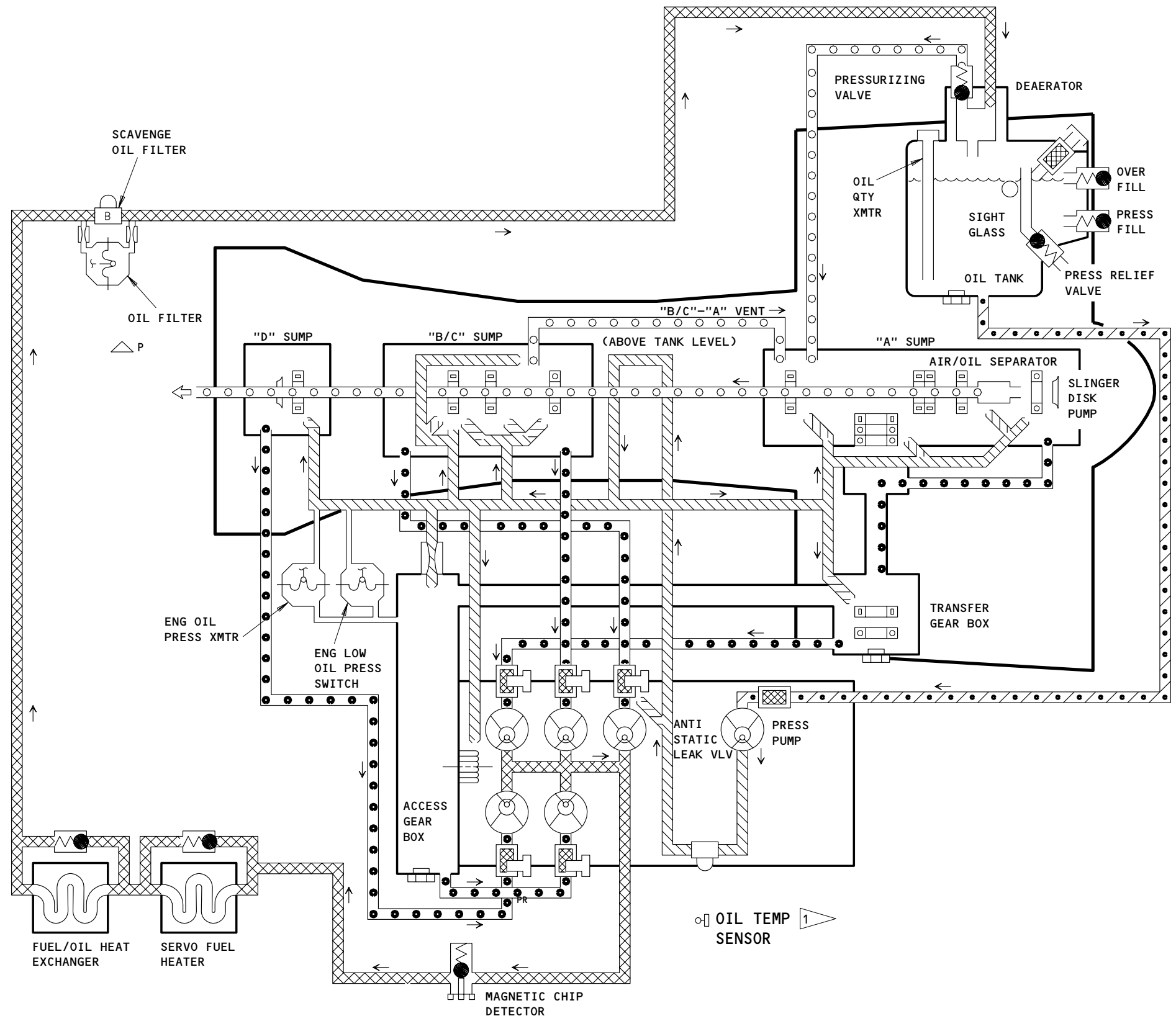
AUX EICAS
DISPLAY

PERF MAINT PAGE

OIL LINE

- | | | | |
|--|-------------------|--|--------------|
| | PRESS | | BALL BRG |
| | SUPPLY | | ROLLER BRG |
| | SCAVENGE PUMP IN | | MAG DET |
| | SCAVENGE PUMP OUT | | OIL STRAINER |
| | VENT | | DRAIN PLUG |
| | OIL JET | | |

1 ENGINES POST-GE-SB 79-047



Engine Oil System Schematic
Figure 1

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

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OIL

| COMPONENT | FIG. 102 SHT | QTY | ACCESS/AREA | AMM REFERENCE |
|----------------------------------------------------------------------------------------------------------|--------------------|-----|------------------------------------------------------------|------------------|
| CAP - OIL TANK FILLER, ENG 1 | 2 | 1 | 414, RIGHT FAN COWL PANEL, OIL TANK | 79-11-03 |
| CAP - OIL TANK FILLER, ENG 2 | 2 | 1 | 424, RIGHT FAN COWL PANEL, OIL TANK | 79-11-03 |
| CAP - OIL TANK FILLER, ENG 3 | 2 | 1 | 434, RIGHT FAN COWL PANEL, OIL TANK | 79-11-03 |
| CAP - OIL TANK FILLER, ENG 4 | 2 | 1 | 444, RIGHT FAN COWL PANEL, OIL TANK | 79-11-03 |
| CIRCUIT BREAKER - | 1 | | FLT COMPT, P6 | |
| OIL PRESS ENG 1, C49 | | 1 | 6D1 | * |
| OIL PRESS ENG 2, C50 | | 1 | 6D2 | * |
| OIL PRESS ENG 3, C51 | | 1 | 6D3 | * |
| OIL PRESS ENG 4, C52 | | 1 | 6D4 | * |
| DETECTOR - MAGNETIC CHIP, ENG 1 | 3 | 1 | 415D, IDG OIL THRUST REVERSER ACCESS DOOR, AGB AFT FACE | 79-21-05 |
| DETECTOR - MAGNETIC CHIP, ENG 2 | 3 | 1 | 425D, IDG OIL THRUST REVERSER ACCESS DOOR, AGB AFT FACE | 79-21-05 |
| DETECTOR - MAGNETIC CHIP, ENG 3 | 3 | 1 | 435D, IDG OIL THRUST REVERSER ACCESS DOOR, AGB AFT FACE | 79-21-05 |
| DETECTOR - MAGNETIC CHIP, ENG 4 | 3 | 1 | 445D, IDG OIL THRUST REVERSER ACCESS DOOR, AGB AFT FACE | 79-21-05 |
| ELEMENT - SCAVENGE OIL FILTER, ENG 1 | 1 | 1 | 414, RIGHT FAN COWL PANEL, FAN CASE | 79-21-04 |
| ELEMENT - SCAVENGE OIL FILTER, ENG 2 | 1 | 1 | 424, RIGHT FAN COWL PANEL, FAN CASE | 79-21-04 |
| ELEMENT - SCAVENGE OIL FILTER, ENG 3 | 1 | 1 | 434, RIGHT FAN COWL PANEL, FAN CASE | 79-21-04 |
| ELEMENT - SCAVENGE OIL FILTER, ENG 4 | 1 | 1 | 444, RIGHT FAN COWL PANEL, FAN CASE | 79-21-04 |
| FILTER - LUBE, ENG 1  | 4 | 1 | 415, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-07 |
| FILTER - LUBE, ENG 2  | 4 | 1 | 425, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-07 |
| FILTER - LUBE, ENG 3  | 4 | 1 | 435, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-07 |
| FILTER - LUBE, ENG 4  | 4 | 1 | 445, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-07 |
| FILTER - SCAVENGE OIL, ENG 1 | 1 | 1 | 414, RIGHT FAN COWL PANEL, FAN CASE | 79-21-08 |
| FILTER - SCAVENGE OIL, ENG 2 | 1 | 1 | 424, RIGHT FAN COWL PANEL, FAN CASE | 79-21-08 |
| FILTER - SCAVENGE OIL, ENG 3 | 1 | 1 | 434, RIGHT FAN COWL PANEL, FAN CASE | 79-21-08 |
| FILTER - SCAVENGE OIL, ENG 4 | 1 | 1 | 444, RIGHT FAN COWL PANEL, FAN CASE | 79-21-08 |

* SEE THE WDM EQUIPMENT LIST

 ENGINES WITHOUT GE SB 79-047

Oil - Component Index
Figure 101 (Sheet 1)

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| COMPONENT | FIG. 102 SHT | QTY | ACCESS/AREA | REFERENCE |
|------------------------------------------------------------|--------------------|-----|-------------------------------------------------------|-----------|
| HEAT EXCHANGER - FUEL/OIL, ENG 1 | 5 | 1 | 416, RIGHT THRUST REVERSER HALF, AGB FWD FACE | 79-21-01 |
| HEAT EXCHANGER - FUEL/OIL, ENG 2 | 5 | 1 | 426, RIGHT THRUST REVERSER HALF, AGB FWD FACE | 79-21-01 |
| HEAT EXCHANGER - FUEL/OIL, ENG 3 | 5 | 1 | 436, RIGHT THRUST REVERSER HALF, AGB FWD FACE | 79-21-01 |
| HEAT EXCHANGER - FUEL/OIL, ENG 4 | 5 | 1 | 446, RIGHT THRUST REVERSER HALF, AGB FWD FACE | 79-21-01 |
| PUMP - LUBE AND SCAVENGE, ENG 1 | 4 | 1 | 415, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-21-03 |
| PUMP - LUBE AND SCAVENGE, ENG 2 | 4 | 1 | 425, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-21-03 |
| PUMP - LUBE AND SCAVENGE, ENG 3 | 4 | 1 | 435, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-21-03 |
| PUMP - LUBE AND SCAVENGE, ENG 4 | 4 | 1 | 445, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-21-03 |
| SCREENS - SUPPLY NAD SCAVENGE INLET - ENG 1 | 4 | 6 | 415, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-06 |
| SCREENS - SUPPLY NAD SCAVENGE INLET - ENG 2 | 4 | 6 | 425, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-06 |
| SCREENS - SUPPLY NAD SCAVENGE INLET - ENG 3 | 4 | 6 | 435, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-06 |
| SCREENS - SUPPLY NAD SCAVENGE INLET - ENG 4 | 4 | 6 | 445, LEFT THRUST REVERSER HALF, LUBE/SCAVENGE PUMP | 79-21-06 |
| SENSOR - OIL TEMPERATURE, ENG 1 | 4 | 1 | 415, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-34-01 |
| SENSOR - OIL TEMPERATURE, ENG 2 | 4 | 1 | 425, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-34-01 |
| SENSOR - OIL TEMPERATURE, ENG 3 | 4 | 1 | 435, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-34-01 |
| SENSOR - OIL TEMPERATURE, ENG 4 | 4 | 1 | 445, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-34-01 |
| SWITCH - LOW OIL PRESSURE WARNING, ENG 1, S1584 | 4 | 1 | 415, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-33-01 |
| SWITCH - LOW OIL PRESSURE WARNING, ENG 2, S1584 | 4 | 1 | 425, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-33-01 |
| SWITCH - LOW OIL PRESSURE WARNING, ENG 3, S1584 | 4 | 1 | 435, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-33-01 |
| SWITCH - LOW OIL PRESSURE WARNING, ENG 4, S1584 | 4 | 1 | 445, LEFT THRUST REVERSER HALF, AGB, FWD FACE | 79-33-01 |
| SWITCH - OIL FILTER DIFFERENTIAL PRESSURE, ENG 1, S1583 | 1 | 1 | 414, RIGHT FAN COWL PANEL, FAN CASE | 79-35-01 |
| SWITCH - OIL FILTER DIFFERENTIAL PRESSURE, ENG 2, S1583 | 1 | 1 | 424, RIGHT FAN COWL PANEL, FAN CASE | 79-35-01 |
| SWITCH - OIL FILTER DIFFERENTIAL PRESSURE, ENG 3, S1583 | 1 | 1 | 434, RIGHT FAN COWL PANEL, FAN CASE | 79-35-01 |
| SWITCH - OIL FILTER DIFFERENTIAL PRESSURE, ENG 4, S1583 | 1 | 1 | 444, RIGHT FAN COWL PANEL, FAN CASE | 79-35-01 |

* SEE WDM EQUIPMENT LIST

Oil - Component Index Figure 101 (Sheet 2)

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| COMPONENT | FIG. 102 SHT | QTY | ACCESS/AREA | REFERENCE |
|------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|-------------------------------------------------|-----------|
| TANK - OIL, ENG 1 | 1,2 | 1 | 414, RIGHT FAN COWL PANEL, FAN CASE | 79-11-01 |
| TANK - OIL, ENG 2 | 1,2 | 1 | 424, RIGHT FAN COWL PANEL, FAN CASE | 79-11-01 |
| TANK - OIL, ENG 3 | 1,2 | 1 | 434, RIGHT FAN COWL PANEL, FAN CASE | 79-11-01 |
| TANK - OIL, ENG 4 | 1,2 | 1 | 444, RIGHT FAN COWL PANEL, FAN CASE | 79-11-01 |
| TRANSMITTER - OIL PRESSURE, ENG 1, T679 | 4 | 1 | 415, LEFT THRUST REVERSER HALF, AGB FWD FACE | 79-32-01 |
| TRANSMITTER - OIL PRESSURE, ENG 2, T679 | 4 | 1 | 425, LEFT THRUST REVERSER HALF, AGB FWD FACE | 79-32-01 |
| TRANSMITTER - OIL PRESSURE, ENG 3, T679 | 4 | 1 | 435, LEFT THRUST REVERSER HALF, AGB FWD FACE | 79-32-01 |
| TRANSMITTER - OIL PRESSURE, ENG 4, T679 | 4 | 1 | 445, LEFT THRUST REVERSER HALF, AGB FWD FACE | 79-32-01 |
| TRANSMITTER - OIL QUANTITY, ENG 1, T675 | 2 | 1 | 414, RIGHT FAN COWL PANEL, OIL TANK | 79-31-01 |
| TRANSMITTER - OIL QUANTITY, ENG 2, T675 | 2 | 1 | 424, RIGHT FAN COWL PANEL, OIL TANK | 79-31-01 |
| TRANSMITTER - OIL QUANTITY, ENG 3, T675 | 2 | 1 | 434, RIGHT FAN COWL PANEL, OIL TANK | 79-31-01 |
| TRANSMITTER - OIL QUANTITY, ENG 4, T675 | 2 | 1 | 444, RIGHT FAN COWL PANEL, OIL TANK | 79-31-01 |
| UNIT - (REF 31-61-00, FIG. 101) C EFIS/EICAS INTERFACE, M7352 C EFIS/EICAS INTERFACE, M7353 C EFIS/EICAS INTERFACE, M7351 | | | | |
| VALVE - OIL TANK PRESSURIZING, ENG 1 | 2 | 1 | 414, RIGHT FAN COWL PANEL, OIL TANK | 79-11-02 |
| VALVE - OIL TANK PRESSURIZING, ENG 2 | 2 | 1 | 424, RIGHT FAN COWL PANEL, OIL TANK | |
| VALVE - OIL TANK PRESSURIZING, ENG 3 | 2 | 1 | 434, RIGHT FAN COWL PANEL, OIL TANK | |
| VALVE - OIL TANK PRESSURIZING, ENG 4 | 2 | 1 | 444, RIGHT FAN COWL PANEL, OIL TANK | |
| VALVE - OIL TANK RELIEF, ENG 1 | 2 | 1 | 414, RIGHT FAN COWL PANEL, OIL TANK | 79-11-04 |
| VALVE - OIL TANK RELIEF, ENG 2 | 2 | 1 | 424, RIGHT FAN COWL PANEL, OIL TANK | |
| VALVE - OIL TANK RELIEF, ENG 3 | 2 | 1 | 434, RIGHT FAN COWL PANEL, OIL TANK | |
| VALVE - OIL TANK RELIEF, ENG 4 | 2 | 1 | 444, RIGHT FAN COWL PANEL, OIL TANK | |

* SEE WDM EQUIPMENT LIST

Oil - Component Index Figure 101 (Sheet 3)

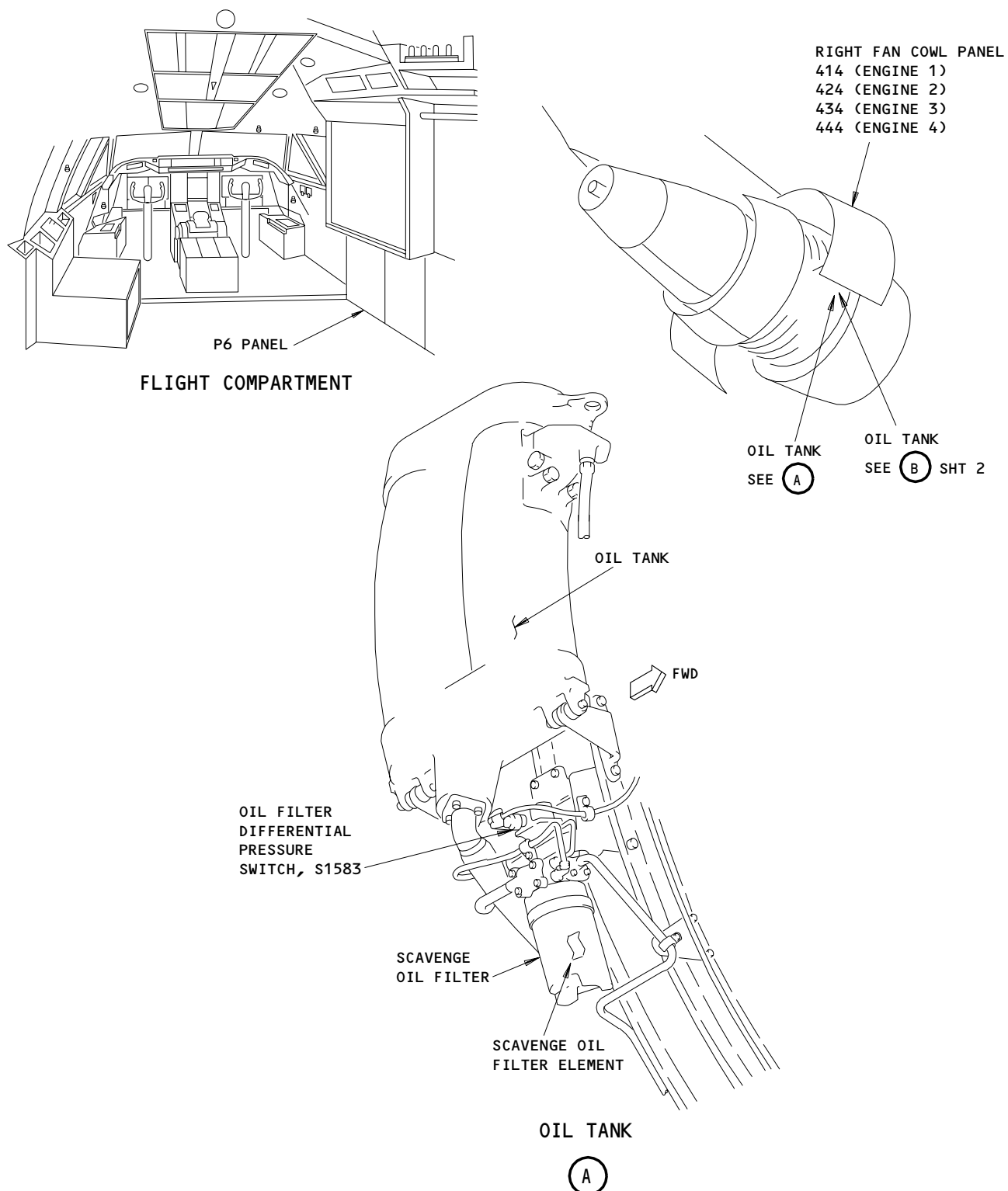
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Oil - Component Location
Figure 102 (Sheet 1)

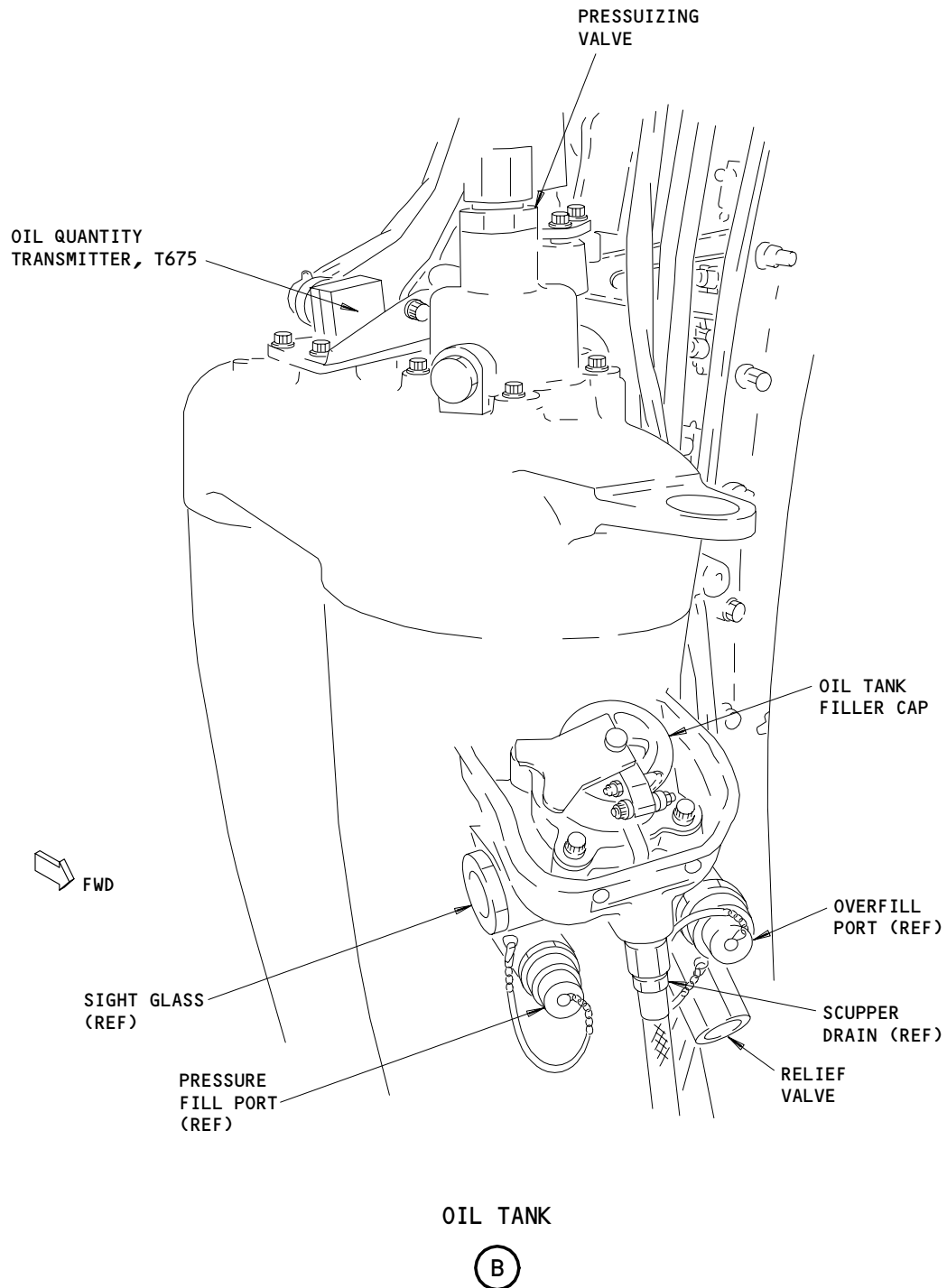
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Oil - Component Location (Detail from Sht 1)
Figure 102 (Sheet 2)

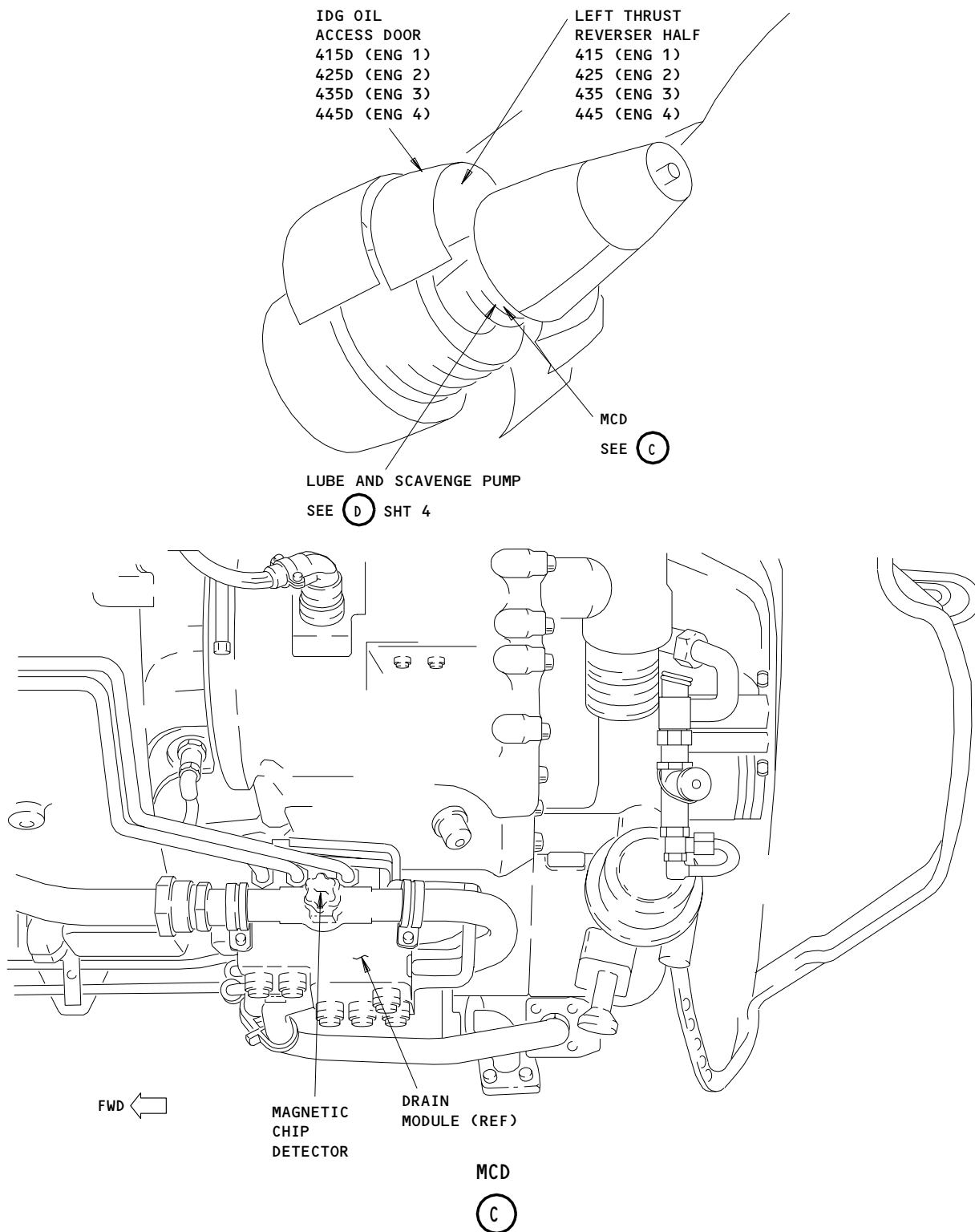
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Oil - Component Location
Figure 102 (Sheet 3)

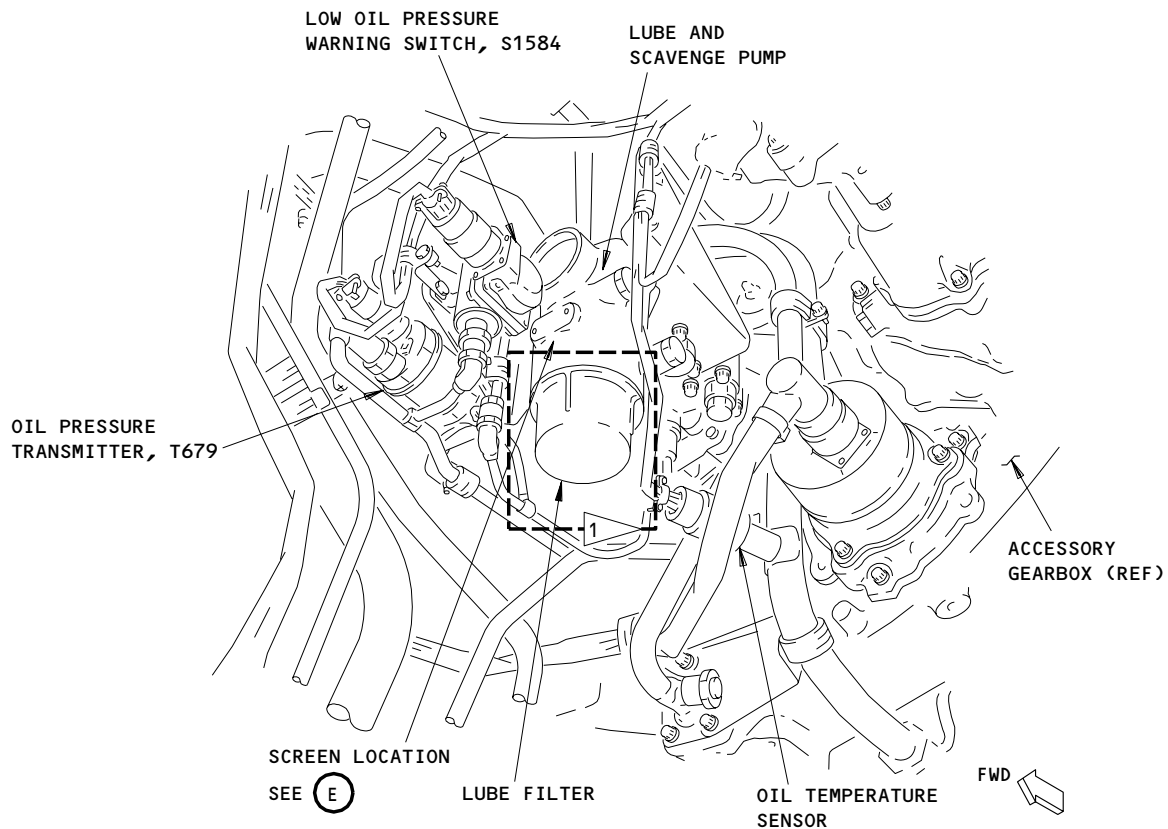
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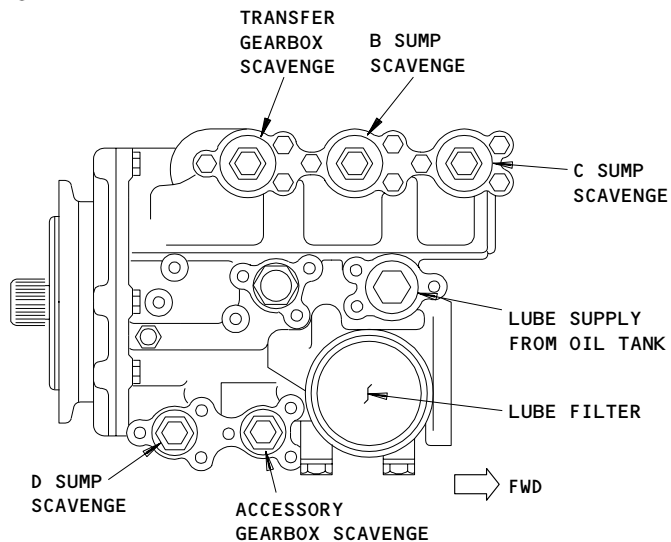
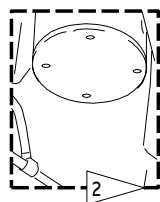
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LUBE AND SCAVENGE PUMP

(D) FROM SHT 3



SCREEN LOCATIONS

(E)

- 1 ENGINES PRE-GE SB 79-047
- 2 ENGINES POST-GE SB 79-047

Oil - Component Location
Figure 102 (Sheet 4)

EFFECTIVITY

ALL

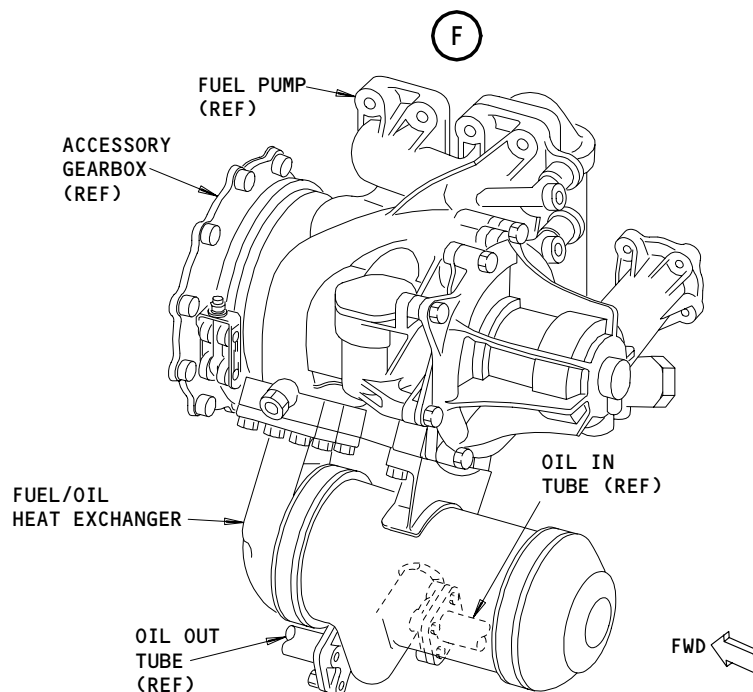
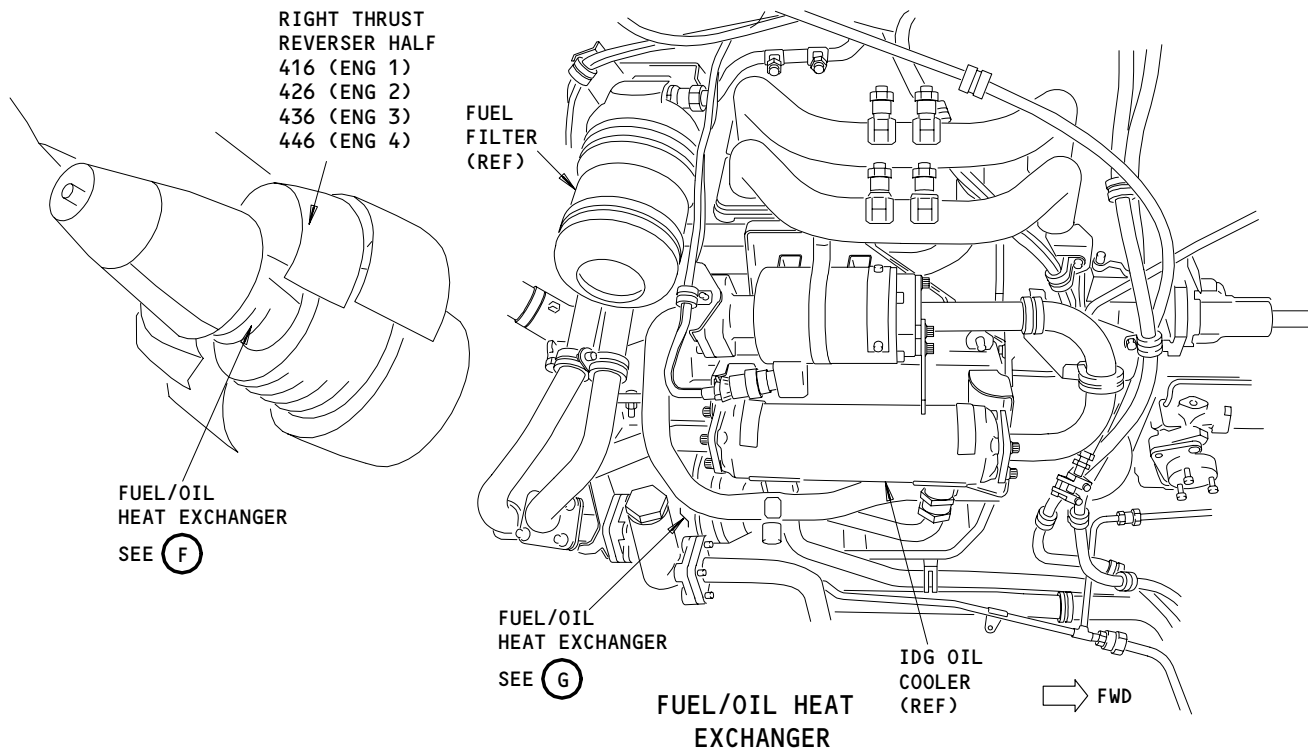
79-00-00

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BOEING
747-400
FAULT ISOLATION/MAINT MANUAL

////////////////////
/ CF6-80C SERIES /
/ ENGINES /
////////////////////



FUEL/OIL HEAT EXCHANGER

(G)

Oil - Component Location
Figure 102 (Sheet 5)

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OIL - FAULT ISOLATION

1. General

- A. Oil fault isolation consists of procedures to isolate the cause and correct the oil system problems. These problems can be indications of oil filter bypass and low oil pressure, and problems with oil pressure, oil consumption, oil quantity, and engine master chip detector has broken pieces of metal.
- B. The fault isolation procedures use messages that appear on the CMCS, visual and operational checks of components, and the Wiring Diagram Manual.

2. Fault Isolation Tips

- A. Any single parameter out of tolerance should be suspected as primarily an indication malfunction and the indicating system should be checked first. Most actual engine malfunctions will be accompanied by more than one engine parameter shift.

3. Fault Isolation Procedures

| | |
|------------|--------------------------------------------------------------------|
| Figure 103 | EICAS Message ENG (1,2,3, or 4) OIL FILT Displayed |
| Figure 104 | EICAS Message ENG (1,2,3, or 4) OIL PRESS Displayed |
| Figure 105 | No. (1,2,3, or 4) Engine Oil Pressure Was (High, Low, Fluctuating) |
| Figure 106 | No. (1,2,3, or 4) Engine High Oil Consumption |
| Figure 107 | No. (1,2,3, or 4) Engine Oil Quantity High |
| Figure 108 | No. (1,2,3, or 4) Engine Master Chip Detector Has Broken Pieces |

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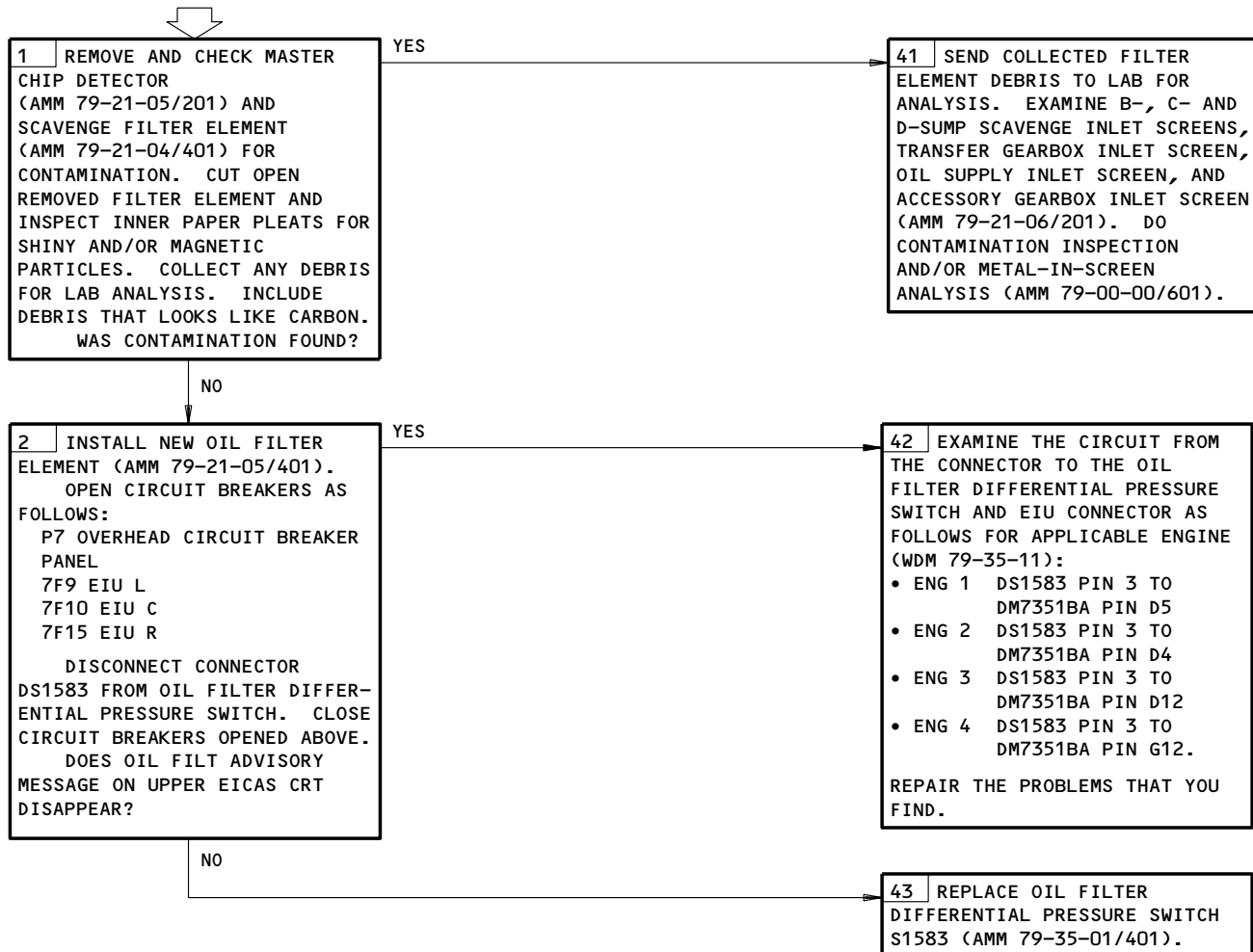
EICAS MESSAGE "ENG
(1, 2, 3, OR 4) OIL
FILT" DISPLAYED

PREREQUISITES

MAKE SURE THESE SYSTEMS WILL OPERATE:
EICAS (AMM 31-61-00/201)

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED:
7F9, 7F10, 7F15

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION:
ELECTRICAL POWER IS ON (AMM 24-22-00/201)



EICAS Message ENG (1,2,3, or 4) OIL FILT Displayed
Figure 103

EFFECTIVITY

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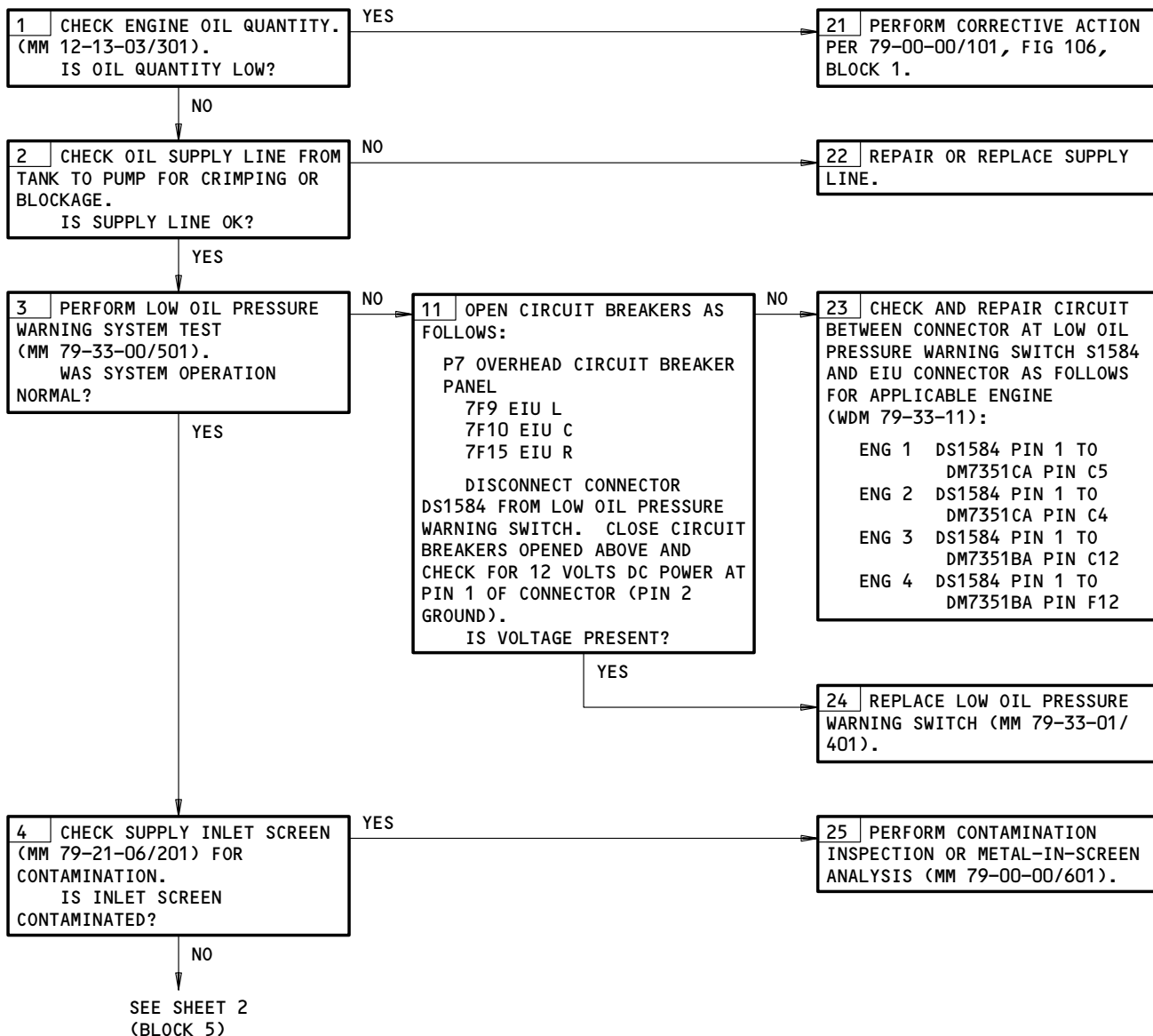
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EICAS MESSAGE "ENG
(1,2,3, OR 4) OIL
PRESS" DISPLAYED

PREREQUISITES

ELECTRICAL POWER (MM 24-22-00/201)
EICAS (MM 31-61-00/201)

CB'S: 7F9,7F10,7F15



EICAS Message ENG (1,2,3, or 4) OIL PRESS Displayed
Figure 104 (Sheet 1)

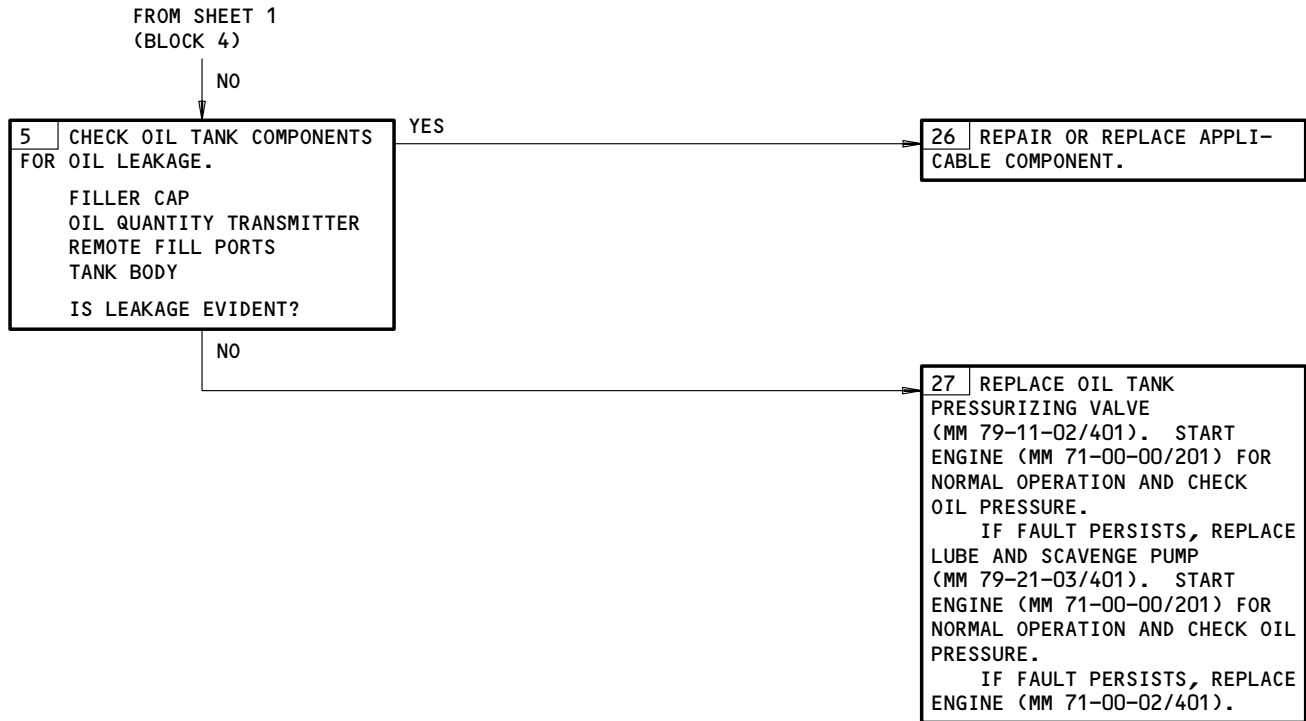
EFFECTIVITY

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EICAS Message ENG (1,2,3, or 4) OIL PRESS Displayed
Figure 104 (Sheet 2)

| EFFECTIVITY | |
|-------------|--|
| ALL | |

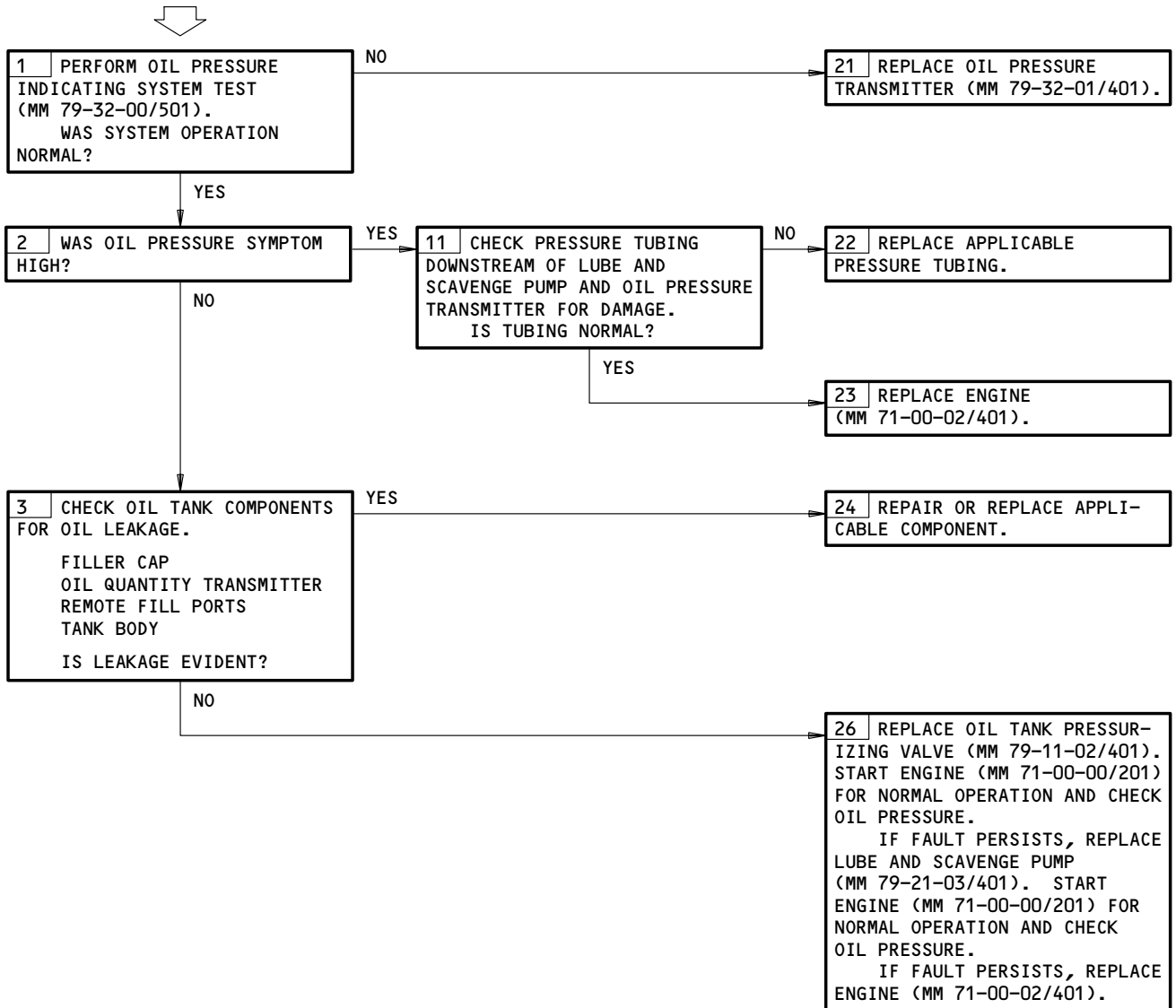
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PREREQUISITES

ELECTRICAL POWER (MM 24-22-00/201)
EICAS (MM 31-61-00/201)

CB'S: 7F9,7F10,7F15
6D1,6D2,6D3,6D4

**OIL PRESSURE WAS
HIGH,LOW,FLUCTUATING)**



Oil Pressure Was (High,Low,Fluctuating)
Figure 105

EFFECTIVITY

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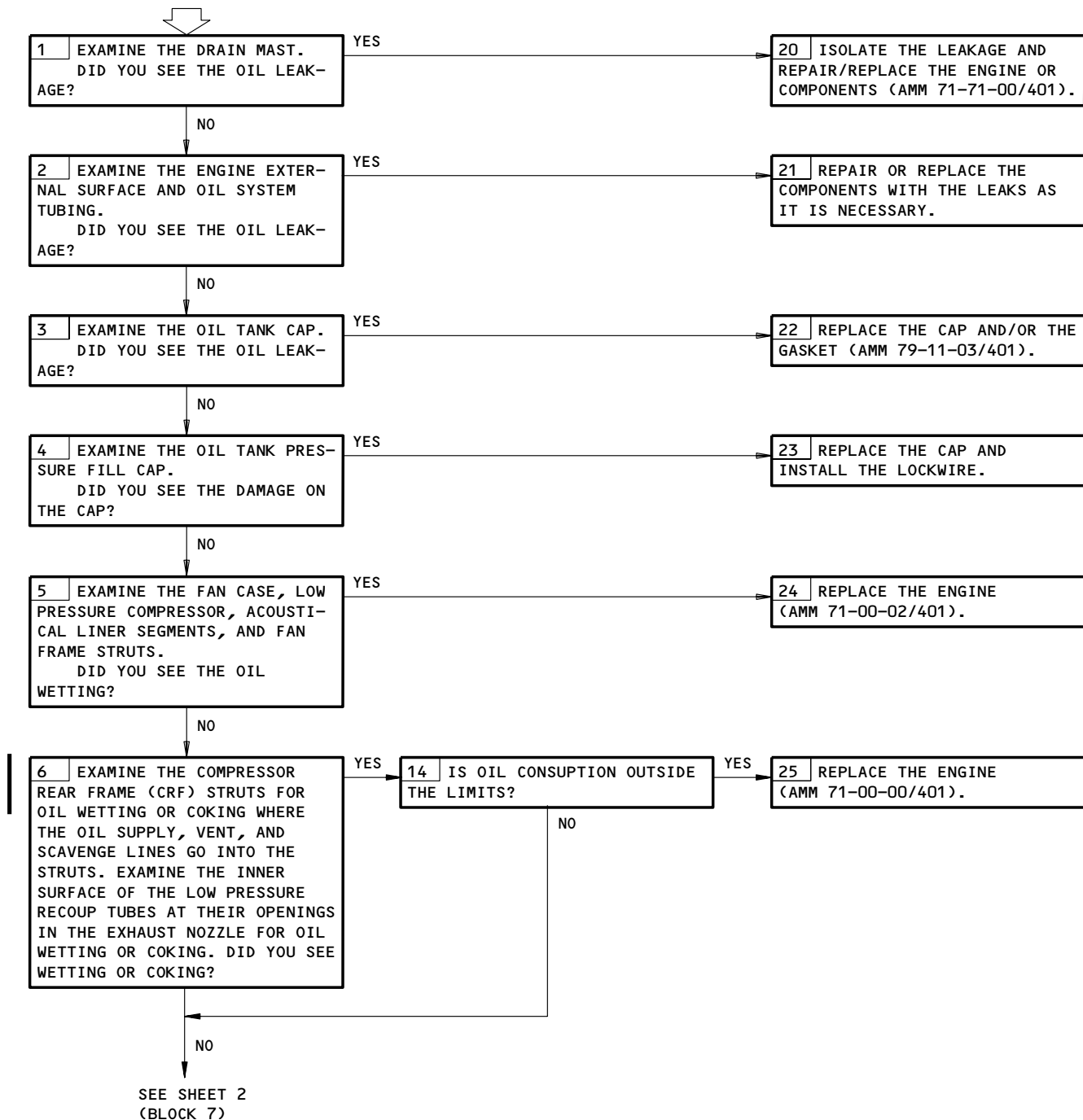
FAULT ISOLATION/MAINT MANUAL

//////////////////////////////////
 / CF6-80C SERIES /
 / ENGINES /
 //////////////////////////////////

HIGH OIL CONSUMPTION

PREREQUISITES

NONE



High Oil Consumption
Figure 106 (Sheet 1)

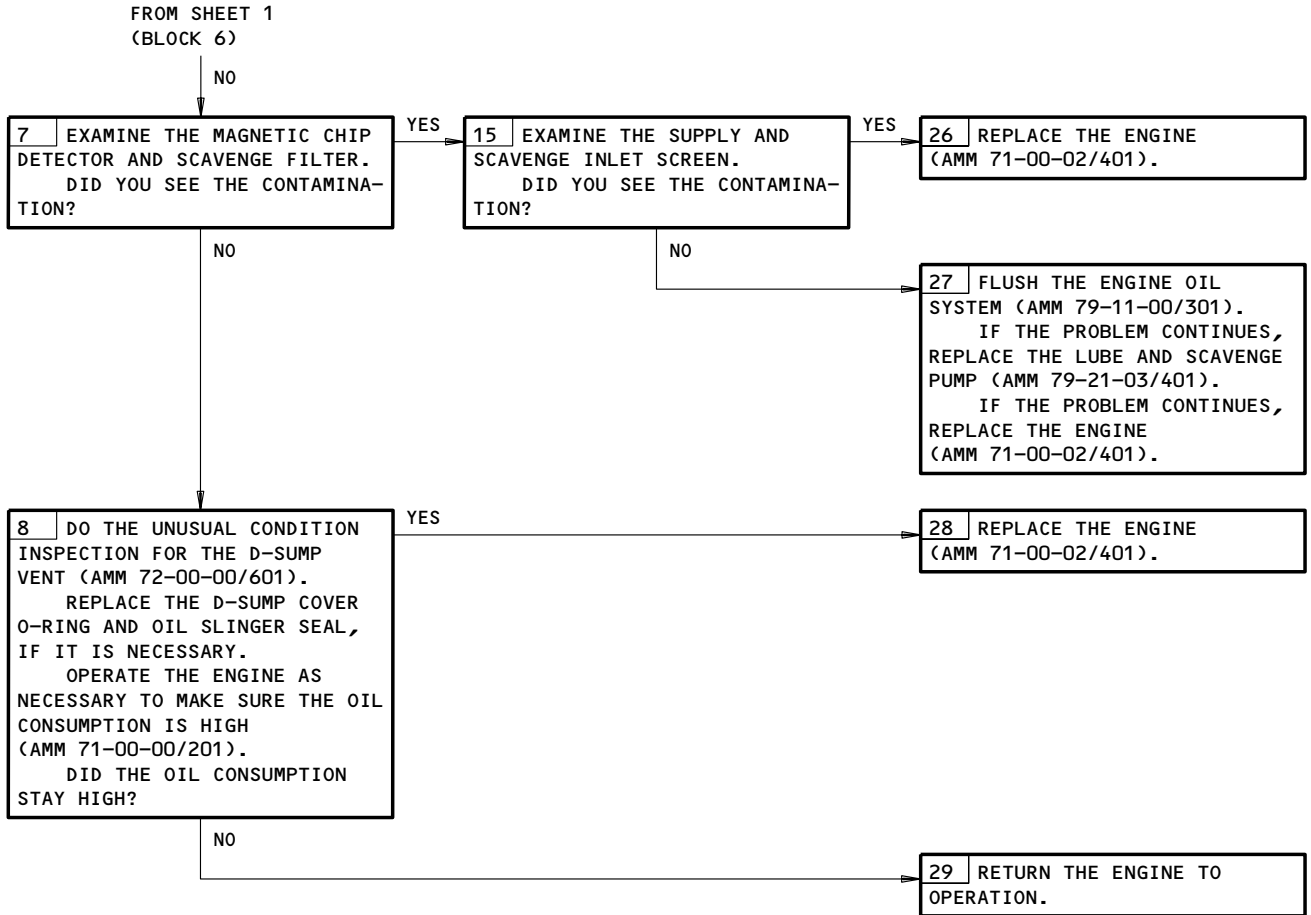
EFFECTIVITY:

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 High Oil Consumption
 Figure 106 (Sheet 2)

EFFECTIVITY

ALL

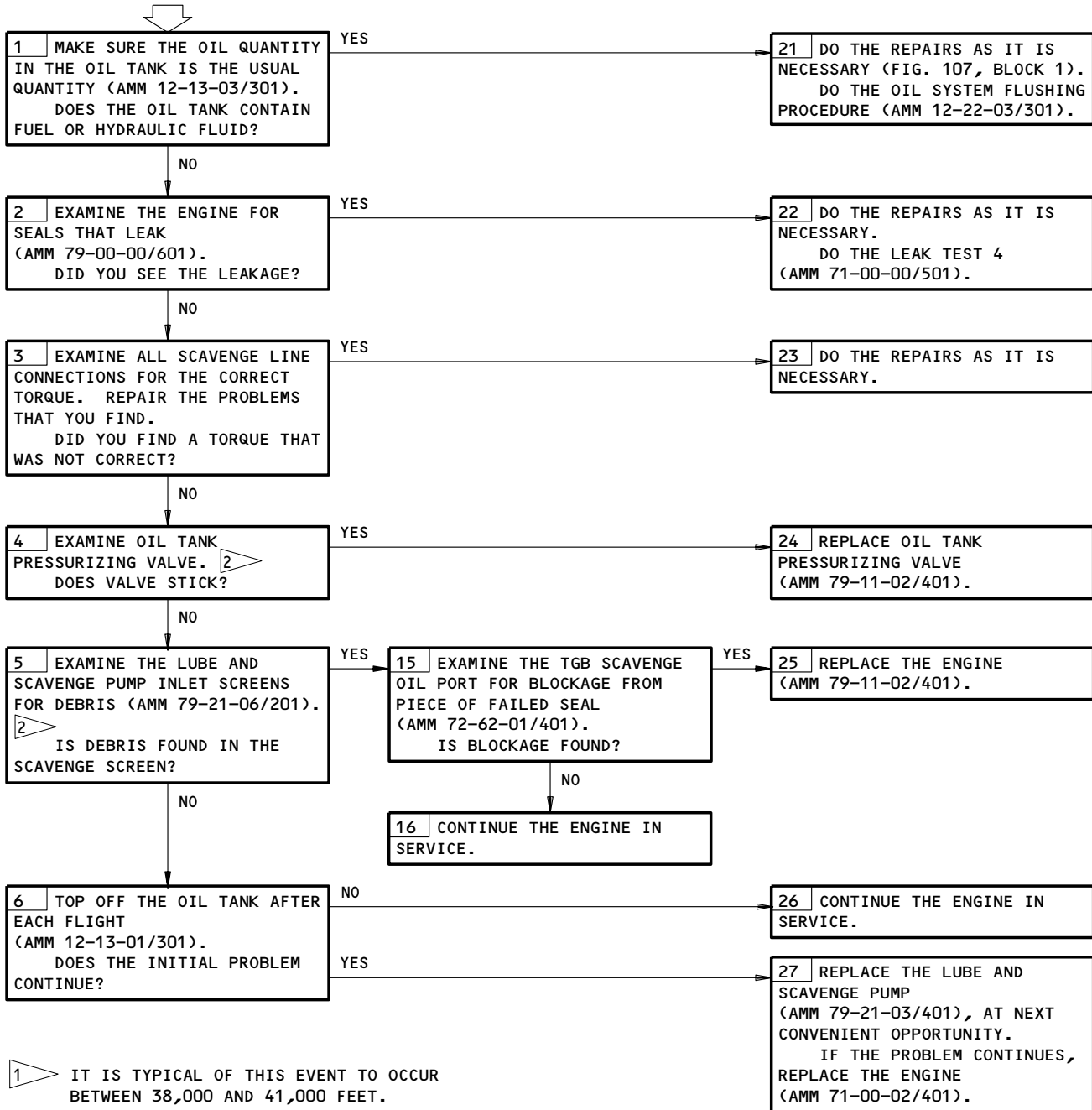
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**OIL QUANTITY DROPS
DURING CRUISE,
RETURNS TO USUAL
DURING DESCENT** 1

PREREQUISITES
NONE



1 IT IS TYPICAL OF THIS EVENT TO OCCUR BETWEEN 38,000 AND 41,000 FEET.

2 IF OIL QUANTITY DROP IS LESS THAN 4 QUARTS MORE THAN NORMAL DROP, THIS STEP MAY BE DEFERRED FOR UP TO 10 FLIGHT CYCLES.

Oil Quantity Drops during Cruise, Returns to Usual during Descent
Figure 106A

EFFECTIVITY

ALL

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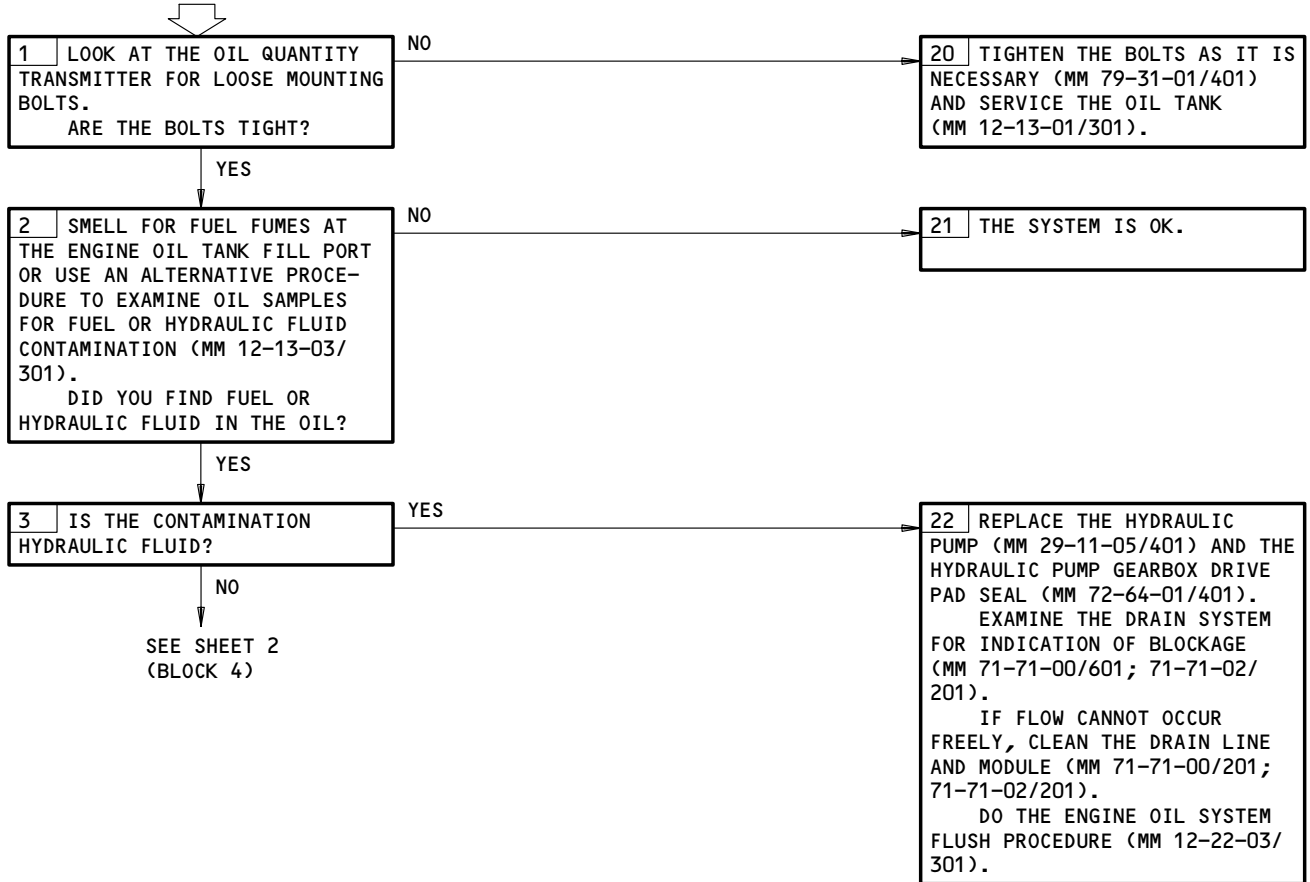
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PREREQUISITES

NONE

HIGH OIL QUANTITY



High Oil Quantity
Figure 107 (Sheet 1)

EFFECTIVITY

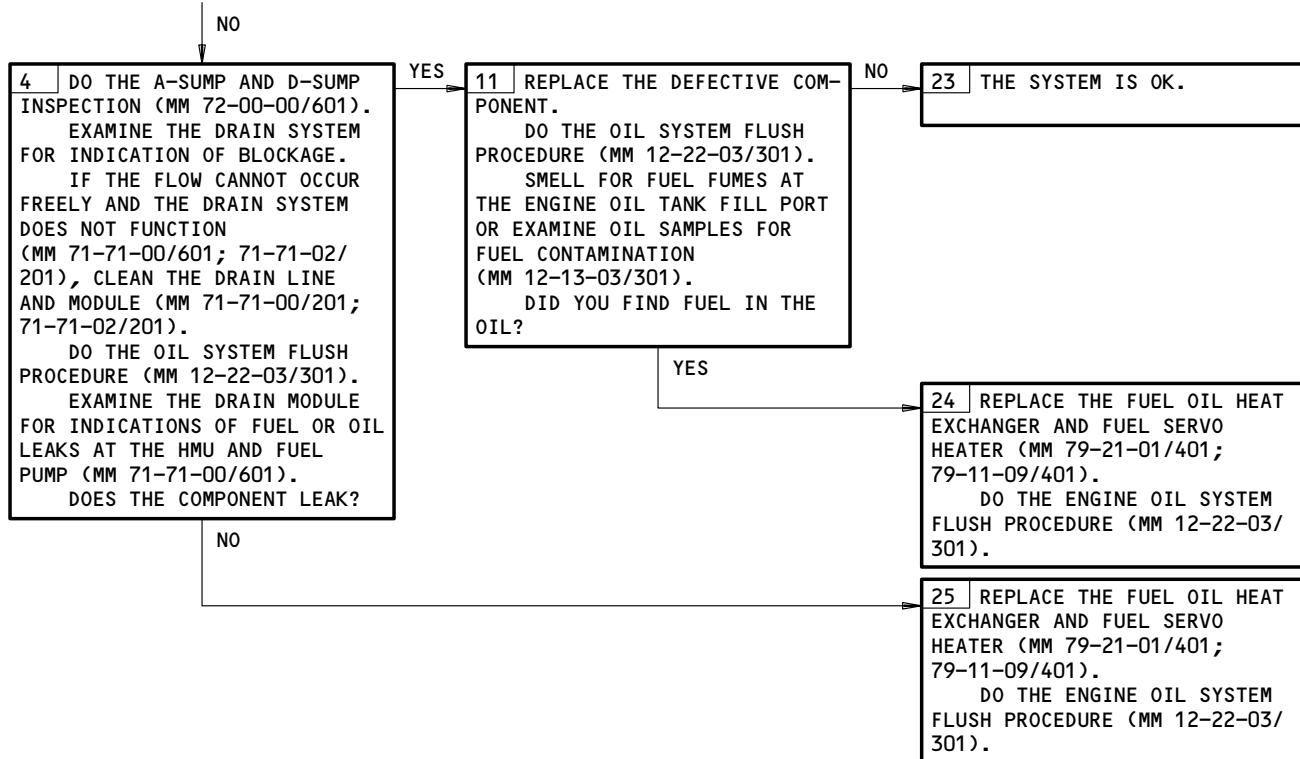
ALL

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FROM SHEET 1
(BLOCK 3)



High Oil Quantity
Figure 107 (Sheet 2)

EFFECTIVITY

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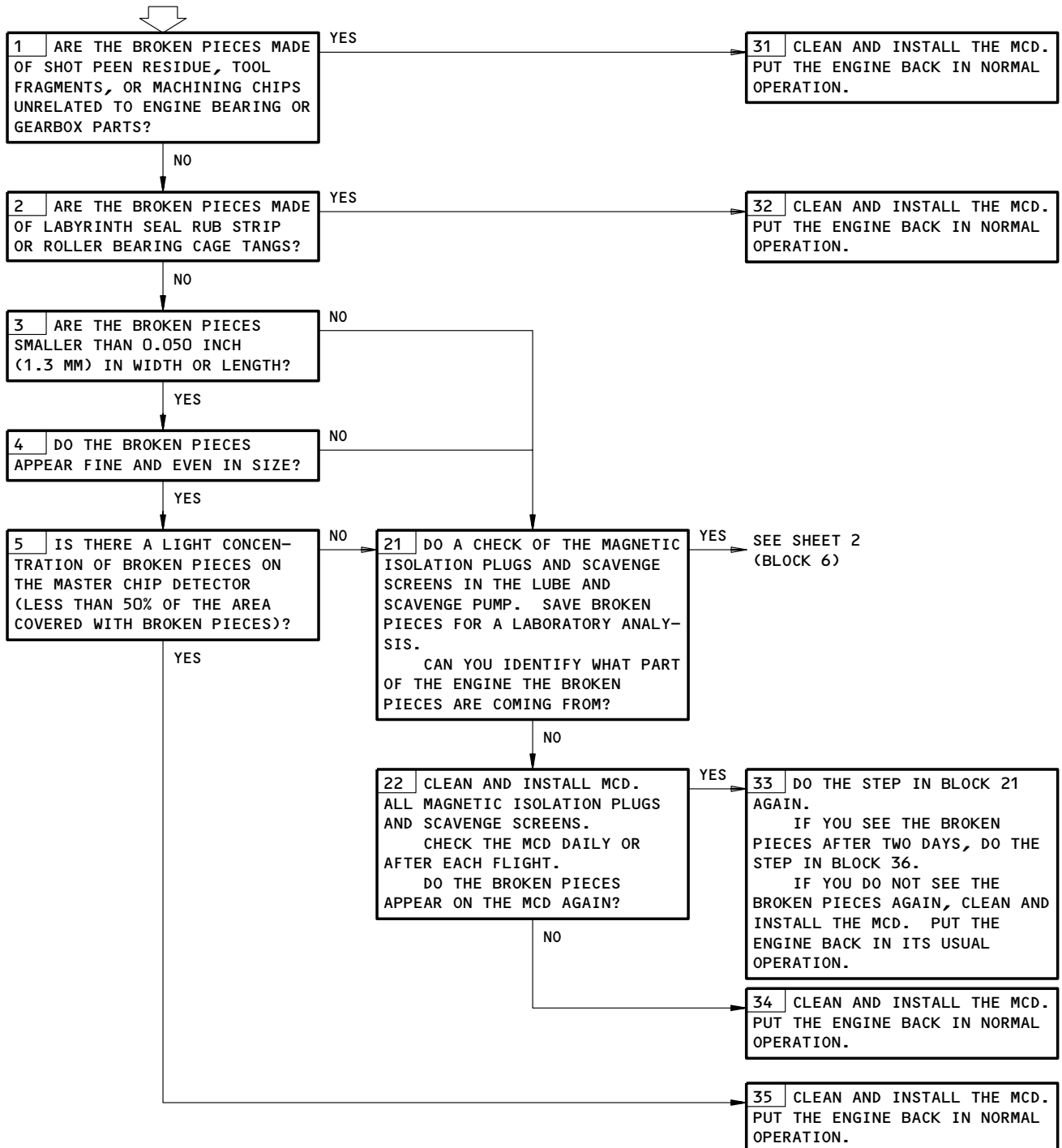
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NO. (1,2,3, OR 4) ENGINE MASTER CHIP DETECTOR (MCD) HAS BROKEN PIECES

PREREQUISITES

NONE



No. (1,2,3, or 4) Engine Master Chip Detector (MCD) Has Broken Pieces
 Figure 108 (Sheet 1)

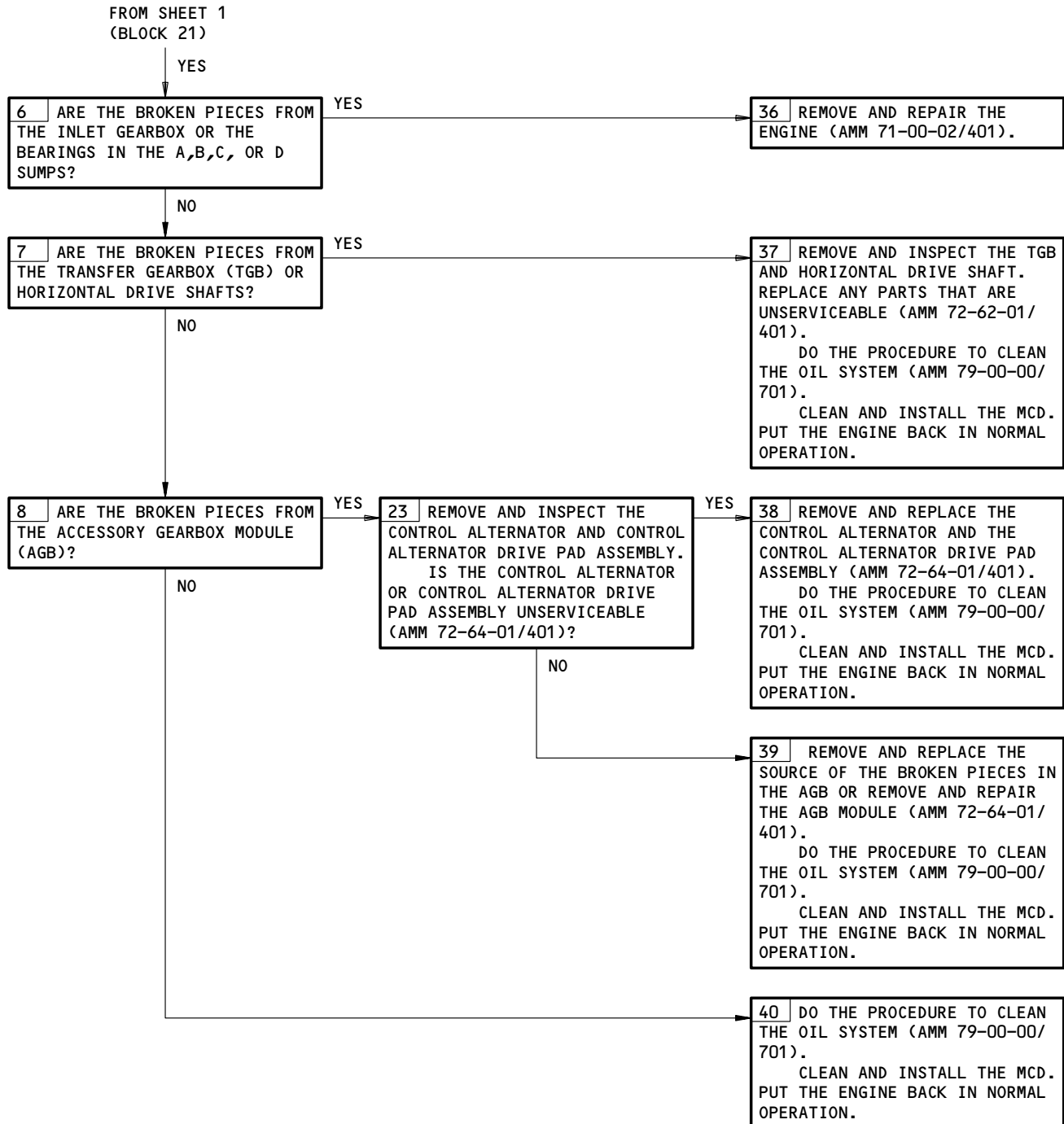
EFFECTIVITY

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No. (1,2,3, or 4) Engine Master Chip Detector (MCD) Has Broken Pieces
Figure 108 (Sheet 2)

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OIL - INSPECTION/CHECK

1. General

- A. The inspection/check procedure for the oil system has six tasks which follow:
- examine the engine for the oil system leaks
 - examine the engine for the external oil leakage
 - examine the engine for the internal oil leakage
 - examine the oil system for the contamination
 - an analysis of the metal in the screen (MIS)
 - the sample procedure for the engine oil.
- B. You will find an engine borescope procedure to look for the oil system contamination (Ref 72-00-00/601).

TASK 79-00-00-206-038-J00

2. Examine the Engine for the Oil System Leaks.

A. References

- (1) AMM 12-22-03/301, Engine - Servicing
- (2) AMM 71-11-04/201, Fan Cowl Panels
- (3) AMM 78-31-00/201, Thrust Reverser System
- (4) AMM 79-00-00/701, Oil - Cleaning/Painting
- (5) AMM 79-21-05/201, Magnetic Chip Detector
- (6) AMM 79-21-06/201, Supply and Scavenge Inlet Screen

B. Access

(1) Location Zones

- | | |
|-----|----------|
| 412 | Engine 1 |
| 422 | Engine 2 |
| 432 | Engine 3 |
| 442 | Engine 4 |

(2) Access Panels

- | | |
|-------------|-----------------------------------|
| 415 and 416 | Thrust Reverser Halves - Engine 1 |
| 425 and 426 | Thrust Reverser Halves - Engine 2 |
| 435 and 436 | Thrust Reverser Halves - Engine 3 |
| 445 and 446 | Thrust Reverser Halves - Engine 4 |

C. Procedure.

S 216-039-J00

- (1) Do these steps to examine the engine for the oil system leaks:
 - (a) Do an inspection of the engine with the cowl closed (walk around).
 - (b) Examine these areas for signs of oil:
 - 1) The drain mast

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- 2) The cowl surfaces
 - 3) The cowl ports
 - 4) The center vent tube
 - 5) The cowl split line.
- (c) Look at the cowl split lines for drops of oil and surfaces that are wet with oil.
- (d) Look at the surfaces aft of the oil ports for drops of oil and surfaces that are wet with oil.
- (e) Examine these areas for wet oil:

NOTE: Engine oil vapors from the oil vents can condense and collect at the bottom of the turbine rear frame and exhaust sleeve at the times that follow:

- after an engine shutdown
- during an engine windmill action
- during an engine motor operation.

Maintenance is not necessary for the the above conditions. To make sure that the engine is serviceable, do a check of the engine oil consumption rate. If the engine oil consumption rate is more than the specified limit (AMM 71-00-00/201), do an inspection to find the location of the leak.

- 1) The lower fan exhaust
- 2) The tailpipe inner surfaces
- 3) Inside the center body of the turbine exhaust nozzle.

S 216-040-J00

- (2) Do an inspection of the engine with the cowls open.
- (a) Open the fan cowl panels (AMM 71-11-04/201).

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (b) Open the thrust reversers (AMM 78-31-00/201).
- (c) Examine these areas for oil leakage:
- 1) The surfaces of the engine
 - 2) The tubes
 - 3) The inner surfaces of the cowls.
- (d) Examine the pipes of these systems for cracks and connections that are loose:
- 1) The oil
 - 2) The sump air pressurization
 - 3) The vent.
- (e) Look at the marks or the location of the oil drops for signs of the oil source.
- (f) Look carefully at the lower frame struts for signs of internal oil leakage.
- 1) The oil goes through the tube sleeves.

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- (g) Examine the areas that you can see and the wires of these components for their condition and the way they are attached:
- 1) The oil quantity transmitter
 - 2) The oil pressure transmitter
 - 3) The warning switch for the low oil pressure
 - 4) The oil temperature bulb or thermocouple
 - 5) The differential pressure switch for the oil filter.
- (h) Examine the drain module (AMM 71-71-00/601 CONFIG 1) or drain manifold (AMM 71-71-00/601 CONFIG 2) for oil leakage.

NOTE: If you do not find oil in the module or manifold, it is not unusual. The module and manifold automatically discard the oil overboard during the flight.

S 216-068-J00

- (3) Examine the engine for indications of the deterioration of the parts in the oil system.

NOTE: When these parts collect unusual material, you must make an analysis for parts deterioration:

- the scavenge inlet screens or magnetic isolation plugs of the pump
- the oil scavenge filter.

See the task, an analysis of the metal in the screen (MIS), for the material analysis related to these areas:

- estimates of the deterioration of the parts in the oil system.
- isolation of the parts in the oil system.
- corrective action for the parts in the oil system.

- (a) Remove and examine the probe of the magnetic chip detector (AMM 79-21-05/201) for metal particles.
- 1) Examine the probe O-ring for damage and look for oil leakage from the receptacle after you remove the probe.
 - 2) Clean and install the MCD with the new O-ring that you lubricated with the engine oil.
- (b) Remove the scavenge inlet screens and magnetic isolation plugs of the lube and scavenge pump (AMM 79-21-06/201).
- 1) Examine them for the metal particles.
 - 2) Clean and install the screens and magnetic isolation plugs.
- (c) If you find metal particles, do these steps:
- 1) - drain
 - 2) - flush
 - 3) - clean the oil system (AMM 79-00-00/701).

S 416-056-J00

- (4) Close the thrust reverser halves (AMM 78-31-00/201).

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TASK 79-00-00-206-041-J00

3. Examine the Engine for the External Oil Leakage.

A. General

- (1) This procedure gives the data to find oil leaks that are external to the engine. Use this procedure when you examine the engine for oil leaks and do not find the source of oil leaks. Repair all of the leaks that are more than the limit (AMM 71-00-00/201). Clean the oil and signs of oil from all of the surfaces so that you can find all indications of oil leakage.

B. Standard Tools and Equipment

- (1) Light Source - Ultraviolet Commercially Available

C. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- (2) G01114 Penetrant - Zyglo ZL22A
- (3) G01256 Developer - Zyglo ZL7
- (4) B00185 Alcohol - Isopropyl, TT-I-735
- (5) B00722 Solvent - P-D-680

D. References

- (1) AMM 12-22-03/301, Engine - Servicing
- (2) AMM 71-00-00/201, Power Plant
- (3) AMM 71-00-00/501, Power Plant
- (4) AMM 71-71-00/601, Engine Vents and Drains

E. Procedure

S 816-042-J00

- (1) Do these steps for a visual inspection for the oil leaks.
 - (a) Wrap the gauze around all fittings that you think are defective to absorb the oil.
 - 1) Hold the gauze in position with a sheet of aluminum foil and hold the foil in position with lockwire.

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- (b) Disconnect the drain tubes and put the drained fluids in the containers to aid in the isolation of the leakage.

NOTE: The accessory gearbox drains into the drain module or manifold located aft of the AGB. The sump drains follow:

- the A sump drains into the fan exhaust
- the B and C sumps drain into the engine exhaust thru the LP recoup ducts
- the D sump drains into the engine exhaust thru the lower struts of the turbine rear frame.

1) Refer to AMM 71-71-00/601 for the leakage limits.

- (c) ON ENGINES WITH ELECTRONIC PROPULSION CONTROL SYSTEM (EPCS); Do an idle leak check in accordance with the Power Plant Test Information Table (AMM 71-00-00/501).

NOTE: If it is necessary to look for leaks that occur only at high engine speed, do these steps:

- do the engine start procedure
- accelerate slowly as necessary to get the leakage condition (95 to 100% of maximum power assurance for 5 minutes)
- move the thrust lever to the idle position
- operate at the idle position for 10 minutes and do the engine shut down procedure.

- (d) ON ENGINES WITHOUT ELECTRONIC PROPULSION CONTROL SYSTEM (EPCS); Do an idle leak check in accordance with the Power Plant Test Information Table (AMM 71-00-00/501).

NOTE: It can be necessary to look for leaks that occur only at high engine speed. Do these steps to find the leakage of the accessory gearbox and speed sensor carbon seals of the hydromechanical N1 at takeoff power:

- Look for the fluid in the container that you attach to the seal drain of the accessory gearbox
- Attach a sensitive pressure or vacuum/pressure gage and look for a positive indication.

- (e) Look for the oil that collect at the drain and for the leakage stains on the gauze at the fittings.

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S 796-057-J00

- (2) Do a leakage inspection with leak detection fluid.
- (a) This fluid can be added to the oil to find leakage which you do not find but is present.
- 1) Mix one ounce Zyglo penetrant powder (ZL7) or equivalent, with 2 quarts (1.9 liters) of engine lubricant oil.

NOTE: If you use the developer (ZL22A), add one quart (0.95 liter) liquid to the oil tank.

- 2) Mix the solution very good to make sure you get the correct mixture of the powder in the oil.
- 3) Remove the filler cap and add all of the leak detection mixture into the engine oil tank and add the oil that is necessary to fill the tank.
- a) Install the oil filler cap.
- 4) Clean the engine with the isopropyl alcohol before you operate the engine.
- 5) Blow the area dry to make sure you can see the leak detection fluid.
- 6) Remove the insulation blankets from the sump vent fittings so you can see the area clearly.
- (b) Operate the engine at the idle position for five minutes and do the engine shut down procedure (AMM 71-00-00/201).
- 1) Do these steps if it is necessary to examine for leakage that occurs only at a high engine speed:
- a) Do the engine start procedure and accelerate slowly as it is necessary to get the leakage condition (AMM 71-00-00/201).

NOTE: Operate the engine up to maximum continuous thrust if it necessary.

- b) Move the throttle to the idle position.
- c) Operate the engine at the idle position for ten minutes, and do the engine shut down procedure (AMM 71-00-00/201).
- 2) Look for the leak detection fluid which shows as fluorescent yellow below an ultraviolet light source.
- 3) Repair the leakage area as it is necessary.
- (c) Use alcohol to clean the leak detection fluid from the repair area to permit you to see if there is more leakage.
- 1) Look for more fluorescent yellow color with the black light after the engine operation.
- (d) After you correct the oil leak, do these steps to the oil system (AMM 12-22-03/301):
- 1) - drain
- 2) - flush
- 3) - service.

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TASK 79-00-00-796-058-J00

4. Examine the Engine for the Internal Oil Leakage.

A. General

- (1) The borescope inspection procedure of the compressor can find the internal oil leaks shown by the wet parts or stains. Refer to AMM 72-00-00/601 for the internal inspection of the compressor.

TASK 79-00-00-796-059-J00

5. Examine the Oil System for the Contamination.

A. References

- (1) AMM 12-22-03/301, Engine - Servicing
(2) AMM 71-00-02/401, Power Plant
(3) AMM 78-31-00/201, Thrust Reverser System
(4) AMM 79-00-00/701, Oil
(5) AMM 79-21-05/201, Magnetic Chip Detector
(6) AMM 79-21-06/201, Supply and Scavenge Inlet Screens
(7) AMM 79-21-07/401, Lube Filter
(8) FIM 79-00-00, Fig. 107

B. Access

(1) Location Zones

- | | |
|-----|----------|
| 412 | Engine 1 |
| 422 | Engine 2 |
| 432 | Engine 3 |
| 442 | Engine 4 |

(2) Access Panels

- | | |
|-------------|-----------------------------------|
| 415 and 416 | Thrust Reverser Halves - Engine 1 |
| 425 and 426 | Thrust Reverser Halves - Engine 2 |
| 435 and 436 | Thrust Reverser Halves - Engine 3 |
| 445 and 446 | Thrust Reverser Halves - Engine 4 |

C. Procedure

S 016-060-J00

- (1) Open the thrust reverser halves (AMM 78-31-00/201).

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S 216-043-J00

- (2) Do these steps to examine the oil system for the contamination.
- (a) If the engine analysis causes you to examine the condition of the oil, do these steps to the components that follow, as it is necessary:
- remove
 - examine
 - install.

NOTE: You must also look for the contamination in the solutions which you use to clean the filters and screens.

- 1) ENGINES WITHOUT GE SB 79-047;
The lube filter (AMM 79-21-07/401)
- 2) The supply and scavenge inlet screens and MCD's
(if installed) (AMM 79-21-06/201)
- 3) The element of the scavenge oil filter (AMM 79-21-04/401)
- 4) The master magnetic chip detector (AMM 79-21-05/201).

S 816-071-J00

- (3) If the contamination is from fuel or hydraulic fluid, do the high oil quantity fault isolation procedure (FIM 79-00-00/101, Fig. 107).

S 966-044-J00

- (4) Replace the engine (AMM 71-00-02/401) if you find contamination in these areas:
- (a) The supply oil that is downstream from the lube and scavenge pump.
- (b) A quantity of contamination in the lube supply inlet screen
- (c) ENGINES WITHOUT GE SB 79-047;
A quantity of contamination in the lube filter which can show the oil did not go through the lube filter.

S 116-061-J00

- (5) If you find contamination in the scavenge oil, clean the oil system components (AMM 79-00-00/701).

S 816-070-J00

- (6) If the contamination is from fuel or hydraulic fluid, do the high oil quantity fault isolation procedure (FIM 79-00-00, Fig. 107).

S 416-062-J00

- (7) Close the thrust reverser halves (AMM 78-31-00/201).

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TASK 79-00-00-206-045-J00

6. An Analysis of the Metal in the Screen (MIS).

A. General

- (1) The metal contamination that collects on these lube system parts can show a deterioration of components in the engine oil system:
 - the scavenge screens
 - the filters
 - the magnetic chip detectors.
- (2) In the usual engine operations, the engine will collect some particles.
 - (a) They are usually small in dimension and quantity.
- (3) Also, these materials will collect which are not related to the engine parts:
 - (a) - the shot-peen particles
 - (b) - the tool fragments
 - (c) - the chips from machine operations.

B. Consumable Materials

- (1) B00148 Solvent - Methyl Ethyl Ketone (MEK),
TT-M-261

C. References

- (1) AMM 12-22-03/301, Engine - Servicing
- (2) AMM 71-00-00/201, Power Plant
- (3) AMM 71-00-02/401, Power Plant -Removal/Installation
- (4) AMM 78-31-00/201, Thrust Reverser System
- (5) AMM 79-00-00/701, Oil - Cleaning/Painting
- (6) AMM 79-21-05/201, Magnetic Chip Detector
- (7) AMM 79-21-06/201, Supply and Scavenge Inlet Screens
- (8) FIM 79-00-00, Fig. 108

D. Access

(1) Location Zones

| | |
|-----|----------|
| 412 | Engine 1 |
| 422 | Engine 2 |
| 432 | Engine 3 |
| 442 | Engine 4 |

(2) Access Panels

| | |
|-------------|-----------------------------------|
| 415 and 416 | Thrust Reverser Halves - Engine 1 |
| 425 and 426 | Thrust Reverser Halves - Engine 2 |
| 435 and 436 | Thrust Reverser Halves - Engine 3 |
| 445 and 446 | Thrust Reverser Halves - Engine 4 |

E. Procedure.

S 016-063-J00

- (1) Open the thrust reverser halves (AMM 78-31-00/201).

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S 816-046-J00

- (2) Isolate the source of the unsatisfactory material that you find when you examine the magnetic chip detector or the scavenge oil filter (FIM 79-00-00, Fig. 108).
- (a) If you find unsatisfactory material on the MCD or scavenge oil filter, examine the inlet screens of the supply and scavenge pump and the magnetic plugs installed in each inlet screen.

NOTE: The pump has five scavenge ports. Make a record of which port you examine to prevent errors when you identify the source of the unsatisfactory material. The port identification is on the bottom of the pump housing.

WARNING: DO NOT GET THE METHYL ETHYL KETONE (MEK) IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE MEK. PUT ON THE PROTECTION GOGGLES TO PREVENT INJURIES TO YOUR EYES. PUT ON THE GLOVES WHEN YOU USE THE MEK. KEEP THE MEK AWAY FROM THE SPARKS, FLAME, AND HOT TEMPERATURES. THE MEK IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURIES OR DAMAGE.

- (b) Use the solvent to clean the oil from the unsatisfactory material.
- 1) Move the magnetic materials apart.
- a) Isolate the large and different pieces for an inspection and identification.
- (c) If you can not identify the material or the source of a special part, send the material to an approved laboratory.
- 1) The laboratory can do an analysis and identify the material.
- (d) If you find that an internal ("A", "B", "C", or "D" sump) bearing deterioration occurs, you must do the engine removal procedure (AMM 71-00-02/401).
- 1) Remove the engine and repair the engine as soon as it is possible.
- 2) Clean the lube system because it is necessary (Refer to the contamination examination).

S 816-065-J00

- (3) Use the data that follows to isolate the source of the unsatisfactory material found when you examined these parts:
- the lube and scavenge pump
 - the transfer gearbox
 - the scavenge inlet screens
 - the isolation plugs.
- (a) The bearing cage rivets show that a bearing of the radial drive shaft is defective.

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- (b) The aluminum shim material shows that there is deterioration of the inlet gearbox.

S 816-066-J00

- (4) If you can not find the source of the unsatisfactory material, monitor the engine as follows:
- (a) Clean or replace the devices that you use to monitor the engine.
 - (b) Keep the remaining materials for an analysis.
 - (c) Drain, flush and do the oil system servicing (AMM 12-22-03/301).
 - (d) Continue the engine in the operation, if the other engine parameters (AMM 71-00-00/201) do not agree with these problems:
 - the vibration increases
 - the EGT increases
 - the oil consumption increases, etc.
 - 1) Examine these parts daily or after each flight:
 - the magnetic chip detector (AMM 79-21-05/201)
 - the inlet screens of the scavenge pump (AMM 79-21-06/201).
 - (e) If you do not find deterioration of the parts one day after one more day of operation, do this step:
 - 1) Go back to the usual procedures and time to monitor the operations.

S 816-064-J00

- (5) Do an analysis of the unsatisfactory material to find the part(s) that is (are) not serviceable.
- (a) Make corrections as the example that follows recommends:
 - (b) Use a magnifying glass to examine the material found on these parts:
 - 1) - the magnetic chip detector
 - 2) - the inlet screens for the scavenge pump
 - 3) - the magnetic isolation plugs.
 - 4) Look specially for the bearing spall material that looks almost the same as a chip particle.

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- 5) If you find indications of gear or bearing distress or failure, remove these parts one at a time until you identify which has a failure:
 - a) The accessory gearbox drive pads
 - b) The accessory gearbox
 - c) The transfer gearbox or horizontal driveshaft.
 - d) The engine.
- 6) Clean the lubrication system (AMM 79-00-00/701).

S 816-049-J00

- (6) Do not remove the engine immediately if you collect the materials that follow:
 - (a) The rub strip from the labyrinth seal and the layers of material such as silver plate or Sermetel.
 - 1) You must send the material to a laboratory for the analysis and identification of the material.
 - (b) The packings made to the dimension, the O-rings, the gaskets or the omniseals.
 - (c) The fragments (pieces) from a control alternator magnet.
 - (d) Go back to the usual procedures and schedule inspection times to monitor the operations.

TASK 79-00-00-816-067-J00

7. The Sample Procedure for the Engine Oil

A. General

- (1) You do engine oil samples to find signs of fuel in the engine oil. Fuel in the engine oil tells that there is leakage in the fuel/oil heat exchanger. If you find fuel in the oil, you must do these steps:

- replace the heat exchanger and drain it
- flush and fill the lubrication system.

The recommended procedures to find the fuel are the flash point and the viscosity analysis.

B. Standard Tools and Equipment

- (1) Plastic Tube - 50 cm (19.685 Inches) in Length
- (2) Bottle - 20 ml (1.220 cubic inches)
- (3) Bottle - 150 ml (9.153 cubic inches)
- (4) Fuel Detection

Identification Label

A/C Registration number:

Engine S/N :

Date of sampling:

Engine hours:

Oil adds since last sample:

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(5) Mailing Case

(6) Cart

Engine oil servicing (5 gallon capacity)
53481-8P
Malabar
Simi Valley, California 93065

C. Consumable Materials

(1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

NOTE: The sample material must have no chemical action on the oil and fuel. The sample material must be clean.

D. References

(1) AMM 12-13-03/301, Engine - Servicing (Oil Replenishing)

(2) FIM 79-00-00, Fig. 107

E. Access

(1) Location Zones

| | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 3 o'clock |
| 422 | Engine 2 - Fan Case 3 o'clock |
| 432 | Engine 3 - Fan Case 3 o'clock |
| 442 | Engine 4 - Fan Case 3 o'clock |

(2) Access Panels

| | |
|-----|---------------------------------|
| 414 | Right Fan Cowl Panel - Engine 1 |
| 424 | Right Fan Cowl Panel - Engine 2 |
| 434 | Right Fan Cowl Panel - Engine 3 |
| 444 | Right Fan Cowl Panel - Engine 4 |

F. Do the steps that follow to get an oil sample:

S 016-050-J00

(1) Open the servicing access door on the right fan cowl to get an oil sample.

S 016-051-J00

WARNING: STOP FOR A MINIMUM OF FIVE MINUTES AFTER THE ENGINE SHUTDOWN PROCEDURE TO LET THE PRESSURE IN THE TANK DECREASE TO ZERO. A FAST FLOW OF HOT OIL CAN OCCUR AND CAUSE INJURIES TO PERSONS. IF YOU DO NOT OBEY THIS PROCEDURE, YOU CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

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- (2) Remove the filler cap for the oil tank.

NOTE: If oil comes out of the oil tank when you open the filler cap, the oil system can have fuel or hydraulic fluid contamination. Do the engine fault isolation procedure for high oil quantity (FIM 79-00-00, Fig. 107) before you operate the engine.

S 866-052-J00

- (3) Do these steps before you add more oil:
- (a) Put the plastic tube in the oil tank until the tube touches the bottom of the strainer for the tank filler cap.
 - (b) Lift the tube approximately 0.5 inch (12.5 mm) from the bottom of the strainer to get a sample of the oil into the tube.

S 686-053-J00

- (4) Use a siphon procedure to remove a sample of the oil from the tank.

NOTE: If you use a plastic bottle with a sealed tube, push the air from the plastic bottle and slowly release the bottle. This procedure will not siphon unwanted materials into the sample.

- (a) You can use a plastic bottle with a sealed tube or a plastic tube only.
- (b) Put a cap on the bottle.
 - 1) Discard the plastic tube after each sample.

NOTE: It is important to use a new tube with each oil sample that you get. This makes sure that the sample shows the correct condition of the oil.

- 2) Add engine oil to the lubrication system as it is necessary (AMM 12-13-03/301).
- 3) Make a record of the oil quantity samples that you add for an oil consumption check.
- 4) Put the oil filler cap in its position and lock it.
 - a) Lift the cap and make sure that the cap is closed correctly.
- (c) Correct and accurate data is important.
 - 1) Monitor the data that follows on the bottle label:
 - the aircraft registration number:
 - the engine S/N:
 - the date of the sample:
 - the engine hours:
 - the oil that you add since the last sample:

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- (d) More data is necessary to make sure that the sample identification and analysis will agree.

NOTE: Send the sample to the laboratory as soon as possible to make sure you get good results.

- 1) Make a record before you send the sample to the laboratory.

S 416-054-J00

- (5) Close the access door and put the aircraft back to its usual condition.

S 866-055-J00

- (6) Use these serviceable limits for the oil contamination caused by the fuel:

NOTE: The laboratory will use one of these procedures to make an analysis of the oil sample that you get from the tank:

| | Procedure | Permitted Limit |
|---------------------|------------------------------------------------------------------------------|------------------------|
| Flash Point | (a) ASTM D92-57 | 340°F (171°C) & higher |
| | (b) SETA Flash | 340°F (171°C) & higher |
| Viscosity ASTM D445 | 35% increase from the actual measured new oil viscosity at 100°F (37.8°C) | |
| | 20% decrease from the correctly measured new oil viscosity at 100°F (37.8°C) | |

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OIL - CLEANING/PAINTING

1. General

- A. This procedure contains one task, clean the engine oil system after a failure of parts that touch the oil.
- B. These conditions can cause an oil filter bypass:
 - (1) Contamination downstream of the filter of the lube and scavenge pump
 - (2) A large quantity of contamination on the screen of the supply filter
 - (3) Contamination in the pump scavenge screens for the tubes that are not from the area that had the failure
- C. It is possible that you must disassemble the engine to clean these parts:
 - (1) Oil tubes
 - (2) Oil jets
 - (3) Sumps
 - (4) Gearboxes
 - (5) Bearings.

TASK 79-00-00-107-001-J00

2. Clean the Oil System Parts

- A. Consumable Materials
 - (1) B00722 Solvent - P-D-680
- B. References
 - (1) 12-22-03/301, Engine - Servicing
 - (2) 78-31-00/201, Thrust Reverser System
 - (3) 79-11-01/401, Oil Tank
 - (4) 79-21-01/401, Fuel/Oil Heat Exchanger
 - (5) 79-21-03/401, Lube and Scavenge Pump
 - (6) 79-21-04/401, Scavenge Oil Filter Element
 - (7) 79-21-05/201, Magnetic Chip Detector
 - (8) 79-21-06/201, Supply and Scavenge Inlet Screens
 - (9) 79-21-07/401, Lube Filter
 - (10) 79-21-08/401, Scavenge Oil Filter
 - (11) AIPC 79-21-02 Fig. 10
 - (12) AIPC 79-21-08 Fig. 1
- C. Access
 - (1) Location Zone
 - 412 Engine 1
 - 422 Engine 2
 - 432 Engine 3
 - 442 Engine 4

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(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 416 Right Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 426 Right Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 436 Right Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4
- 446 Right Thrust Reverser Half - Engine 4

D. Remove the Parts

S 017-002-J00

- (1) Open each thrust reverser half (Ref 78-31-00/201).

S 027-003-J00

- (2) Remove the oil scavenge tubes between the area with contamination and the lube and scavenge pump.

S 027-004-J00

- (3) Remove the scavenge return tube between the lube and scavenge pump and the scavenge oil filter.

S 027-005-J00

- (4) Remove the magnetic chip detector (Ref 79-21-05/201).

E. Clean the Parts

S 177-007-J00

WARNING: CLEAN THE PARTS IN AN AREA WITH A LARGE FLOW OF AIR. DO NOT BREATHE THE FUMES OR TOUCH THE SOLVENT WITH YOUR SKIN FOR A LONG TIME. DO NOT USE THE SOLVENT NEAR FLAMES.

- (1) Flush the tubes (that were removed) fully with solvent.

S 167-008-J00

- (2) Rub the inner surface of the tube with a clean rag, or dry it with filtered compressor air.

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S 117-019-J00

- (3) Clean the scavenge oil filter:
- (a) Remove the element of the scavenge oil filter (Ref 79-21-04/401).
 - (b) Clean the oil filter bowl with solvent.
 - (c) Install a new element in the scavenge oil filter.

S 027-010-J00

- (4) If the scavenge oil filter had a bypass condition, do these steps:
- (a) Replace these parts:

NOTE: Disassemble and clean the parts in the shop with the Component Maintenance Manual.

- 1) Scavenge oil filter (Ref 79-21-08/401)
- 2) Fuel/oil heat exchanger (Ref 79-21-01/401)
- 3) Oil tank (Ref 79-11-01/401).
- 4) Lube and scavenge pump (AMM 79-21-03/401).

NOTE: Remove the lube filter (AMM 79-21-07/401) and the pump inlet screens (AMM 79-21-06/201). Examine these parts to find out how much contamination is in the engine.

- (b) Remove the scavenge return tube between the filter and the oil tank.
- (c) Clean the scavenge return tube between the filter and the oil tank.
- (d) Remove the supply tube between the oil tank and the lube and scavenge pump.
- (e) Clean the supply tube between the oil tank and the lube and scavenge pump.

F. Install the Parts

S 427-011-J00

- (1) Install the lube and scavenge pump (Ref 79-21-03/401).

S 427-012-J00

- (2) Install the scavenge return tube between the lube and scavenge pump and the scavenge oil filter with bolts and washers.
- (a) Tighten the bolts to 55-70 pound-inches (6.2-7.9 N.m.).

S 427-013-J00

- (3) Install the magnetic chip detector (Ref 79-21-05/201).

S 427-014-J00

- (4) Install the oil tubes in the area with contamination.

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G. Flush the Oil System

S 177-015-J00

- (1) Flush the oil system (AMM 12-22-03/301).

S 117-016-J00

- (2) Clean the supply and the scavenge inlet screens (Ref 79-21-06/201).

S 117-021-J00

- (3) Clean the probe of the magnetic chip detector (Ref 79-21-05/201).

S 177-018-J00

- (4) Flush the oil system again, if there is a large quantity of contamination.

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OIL STORAGE - DESCRIPTION AND OPERATION

1. General

- A. An engine oil tank provides a continuous supply of oil for distribution to bearings and gearboxes in the engine. A tank pressurizing valve maintains a low pressure in the tank to ensure a positive flow of oil for distribution. The tank is serviced with oil at the oil tank filler cap or pressure fill port. A relief valve protects the oil tank from overpressure conditions.

2. Oil Tank (Fig. 1)

- A. The oil tank is located on the right side of the aft fan case at the 3 o'clock position. The tank is an anodized aluminum fabrication externally coated with a fireproof, insulating silicone rubber. The tank is mounted to fan case brackets by vibration isolators bolted to tank mounting clevises. The oil tank has these ports: Scavenge return, lube supply, vent, gravity fill (filler cap), pressure fill and overflow, scupper drain, pressure relief valve, and drain. The drain port, at the bottom of the tank, contains a drain plug which is removed to drain the oil. The oil tank has a total volume of 8.0 U.S. gallons (30.3 liters) and measures 6.5 U.S. gallons (24.6 liters) at the fill level.
- B. An oil deaerator is integral to the tank. Oil returning to the tank contains large amounts of air which is removed by the deaerator and vented to the transfer gearbox through the tank pressurizing valve and vent tube.

3. Oil Tank Pressurizing Valve (Fig. 1)

- A. The oil tank pressurizing valve vents excess air in the oil tank to the transfer gearbox, which is vented overboard. The tank pressurizing valve limits the air pressure in the oil tank to 7-9 psi (48-62 kPa) above the pressure in the transfer gearbox which may be as high as 9 psi (62 kPa).

4. Oil Tank Filler Cap (Fig. 1)

- A. The oil tank is serviced with oil at a gravity fill port by opening the hinged filler cap, located on the forward column of the tank. The fill port includes an inlet screen for contamination protection, a flapper valve for self sealing and a stand pipe for sampling. A scupper and drain carries off excess oil from servicing the oil tank.

5. Oil Tank Pressure Relief Valve (Fig. 1)

- A. A pressure relief valve located below the scupper drain protects the oil tank from overpressure conditions. The relief valve opens at 27 psid (3.5 KPaD) to ambient air.

6. Operation

- A. Oil supply for the lubrication system flows from the supply port located in a sump at the bottom of the oil tank. Generally, the tank supplies oil to the system during all flight attitudes not exceeding 30 degrees nose up or nose down with the exception that a nose down condition between 20 and 30 degrees is limited to 30 seconds of supply time.

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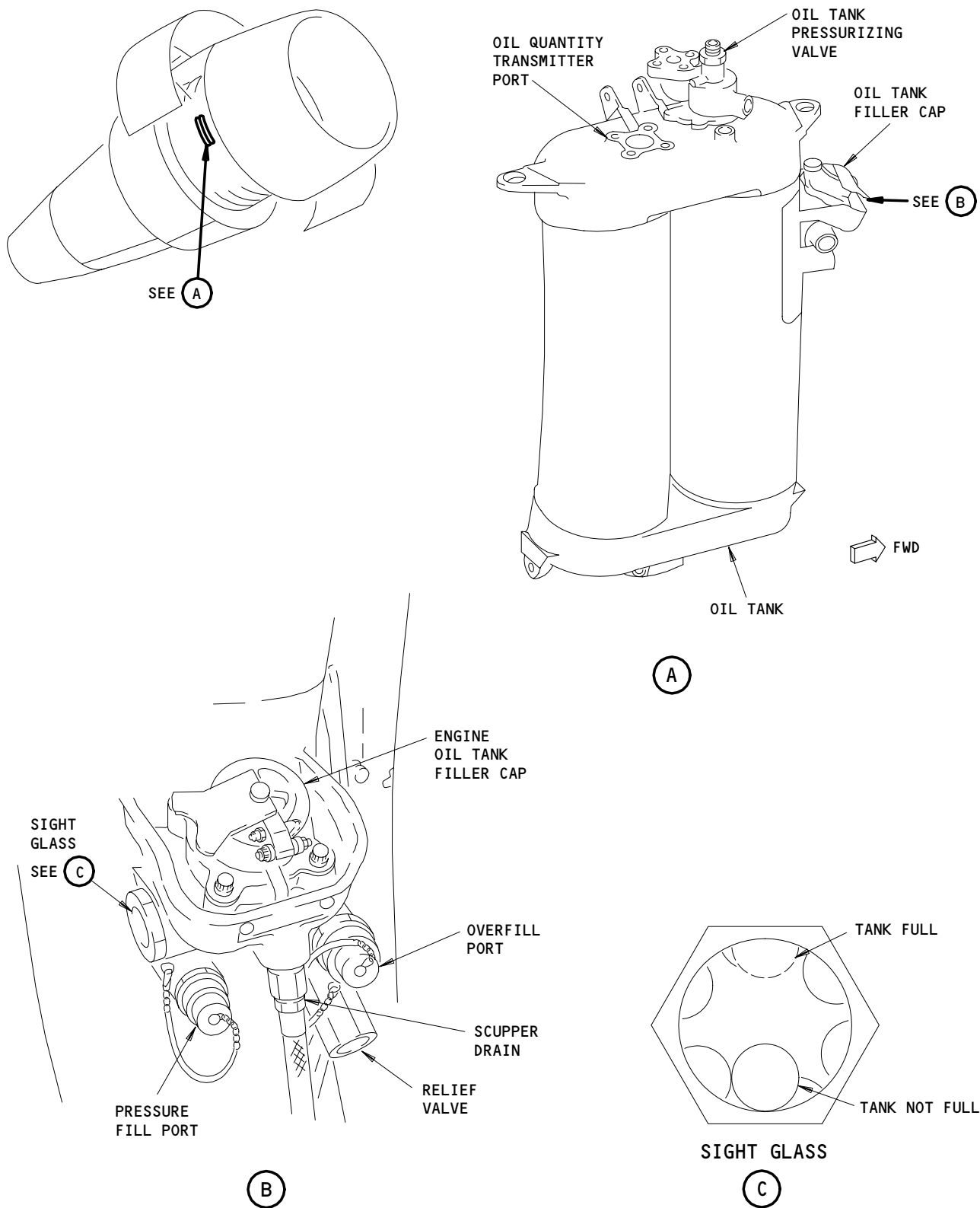
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Oil Storage Component Location
Figure 1

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- B. Oil flows at a positive low pressure from the oil tank for distribution and is returned from the recirculating oil system frothy with entrapped air. The air is removed from the oil in the tank deaerator and the air is vented out of the tank through the tank pressurizing valve.
- C. The scavenge oil contains a large amount of air because the capacity of the scavenge elements is much greater than the supply elements. This entrained air is removed by the deaerator assembly. The deaerator assembly is mounted inside the tank and consists of a forced vortex generator, a deaerator, and a vent port. The flow energy in the scavenge return air/oil mixture is used to form and maintain a vortex within the deaerator by forcing the air/oil mixture through the vortex generator. The centrifugal force of the oil against the deaerator separates the air from the oil. This air is vented into the top of the tank. A tank pressurizing valve limits the air pressure within the tank and vents excess air to the transfer gearbox.
- D. During engine operation, the oil level within the tank decreases from the static or full level. At 100 percent engine speed, the operating level may be 6 to 9 quarts (5.7-8.5 liters) lower than the full level. The decrease in oil level is termed gulping and is attributed to oil that is collected on bearings, sump walls, gearboxes, and within components of the oil system. As engine speed decreases, less oil volume is captured within the engine. When the engine stops rotating, the oil which has been gulped returns to the tank except for oil lost from the system.
- E. Whenever the engine is motored but not operating, oil will flow into the engine and approximately 2 quarts (1.9 liters) will not return to the tank until the engine is operated. The oil tank could be inadvertently overfilled if serviced when this condition exists.

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OIL STORAGE – SERVICING (OIL CHANGE)

1. General

A. This procedure contains the data to change the engine oil.

NOTE: When you mix oils, servicing with the same brand of oil already in the engine is recommended. Approved oil brands may be mixed, if necessary. Check GE Service Bulletin 79-001 for a list of approved oil brands and the oil brand change procedure.

B. This procedure contains the data to flush the engine oil system.

C. If you do a chemical analysis of the oil, change the oil when the contamination is greater than these limits:

| <u>Property</u> | <u>Test Method</u> | <u>Limits</u> |
|-----------------------------|--------------------------------------------------|-----------------------------------------------------|
| Viscosity at 100°F (38°C) | ASTM D455 | 35% increase from actual measured new oil viscosity |
| Acid Number | ASTM D644 or D974 | 2.0 Mg Max. of KOH per gram of oil |
| Foams | ASTM D892 | 300 Milliliters |
| Solids | MIL-L-23699B, using a 1.2 micron membrane filter | 75 milligrams per liter [*] |
| Flash Point [Test for Fuel] | ASTM D92-57 or SETA Flash | 340°F [171°C] and higher |

[*] After you change the oil, if solids are greater than 40 miligrams for each liter, flush the system.

NOTE: Remove the oil sample from the bottom of the oil tank. Make sure the removal equipment and the container are clean.

TASK 79-11-00-603-001-J00

2. Change the Engine Oil

A. Equipment

(1) Container - 10-gallon capacity for oil.

B. Consumable Materials

(1) D00072 Oil - G.E. D50TF1

(2) B00074 Solvent - Stoddard P-D-680

C. References

(1) 12-13-03/301, Engine - Servicing (Oil Replenishing)

(2) 71-00-00/501, Power Plant - General

(3) 71-11-04/201, Fan Cowl Panels

(4) 78-31-00/201, Thrust Reverser System

(5) 79-21-01/401, Fuel/Oil Heat Exchanger

(6) 79-21-04/401, Scavenge Oil Filter Element

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- (7) AMM 79-21-06/201, Supply and Scavenge Inlet Screens
- (8) 79-21-07/401, Lube Filter

- (9) 79-21-07/701, Lube Filter

D. Prepare to Change the Oil

S 043-002-J00

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

- (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 013-003-J00

- (2) Open the fan cowl panels (Ref 71-11-04).

S 013-005-J00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open the thrust reversers (Ref 78-31-00).

S 013-004-J00

- (4) Open the core cowl panels (Ref 71-11-06).

S 683-006-J00

- (5) Put the container below the drain plug.

E. Drain the Oil (Fig. 301)

S 683-007-J00

WARNING: DO NOT KEEP THE OIL ON YOUR SKIN, CLOTHES, OR PAINTED SURFACES. IF YOU DO NOT CLEAN OFF THE OIL, THE OIL CAN CAUSE THESE CONDITIONS:

- AN INJURY TO YOUR SKIN
- A STAIN ON YOUR CLOTHES
- THE PAINT TO BECOME SOFT.

- (1) Do these steps to drain the oil from the oil tank:

NOTE: If you must flush the system, do not discard the packing or permanently tighten the drain parts. Do this after you flush the system.

- (a) Remove the drain plug from the engine oil tank and discard the packing.

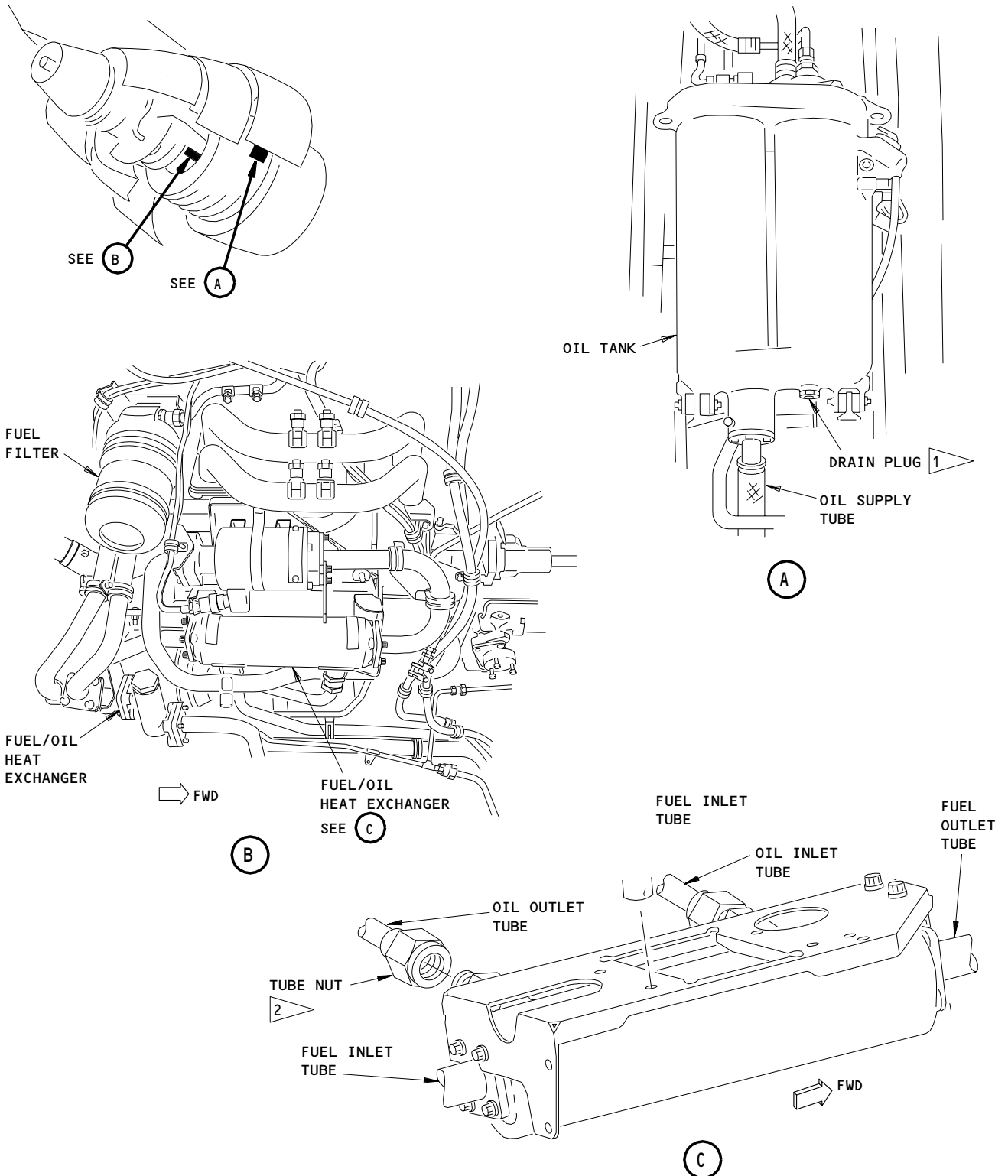
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Engine Oil Servicing
Figure 301 (Sheet 1)

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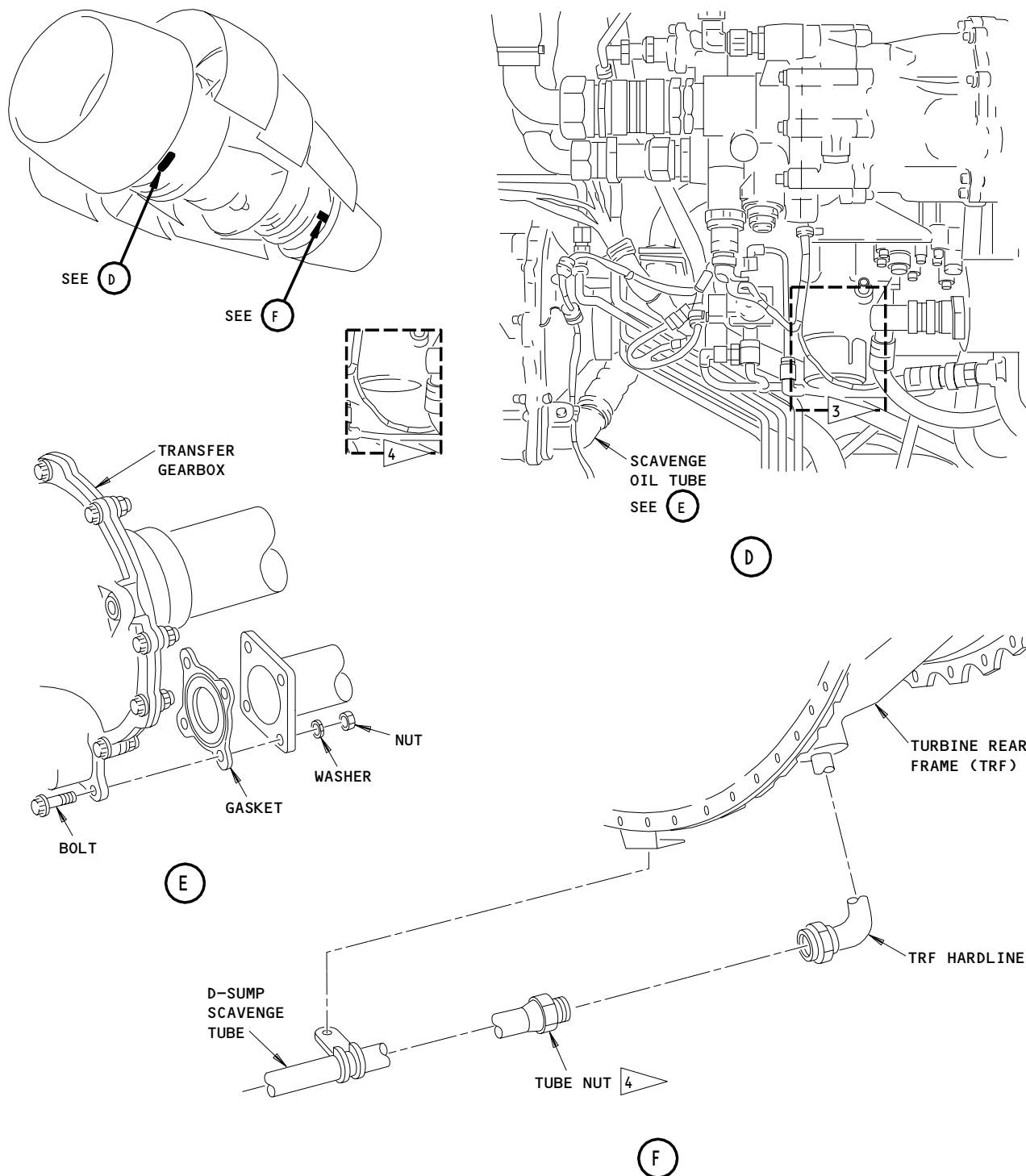
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BOEING
747-400
MAINTENANCE MANUAL



- 3 ENGINES WITHOUT GE SB 79-047
4 ENGINES WITH GE SB 79-047

CF8-8927-00-A
CF8-8929-00-A

Engine Oil Servicing
Figure 301 (Sheet 2)

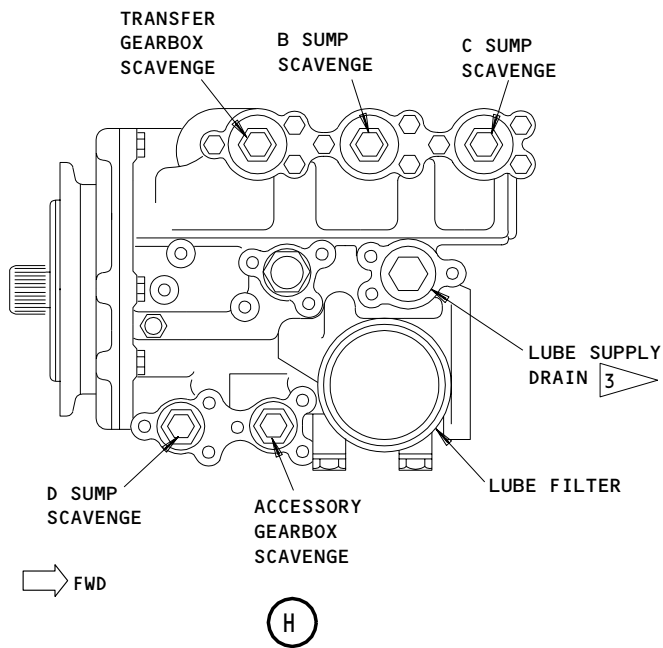
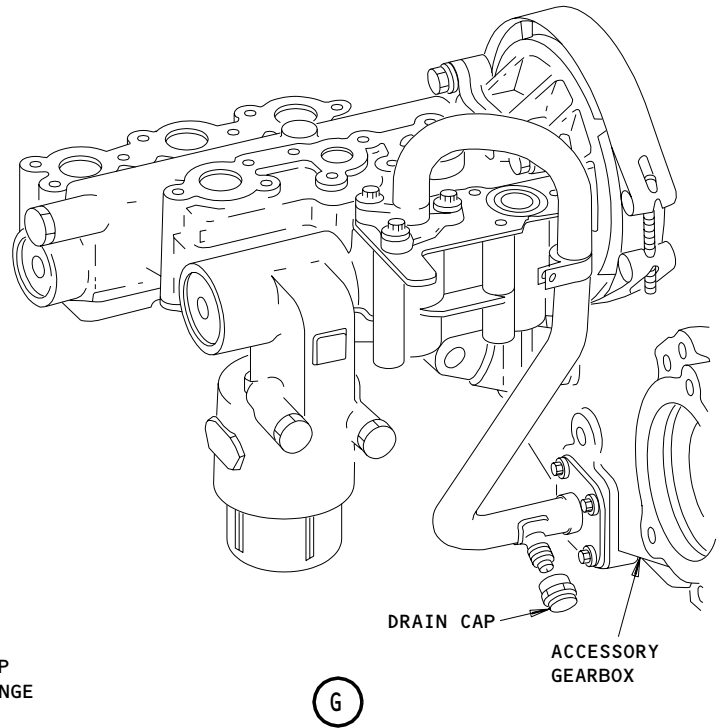
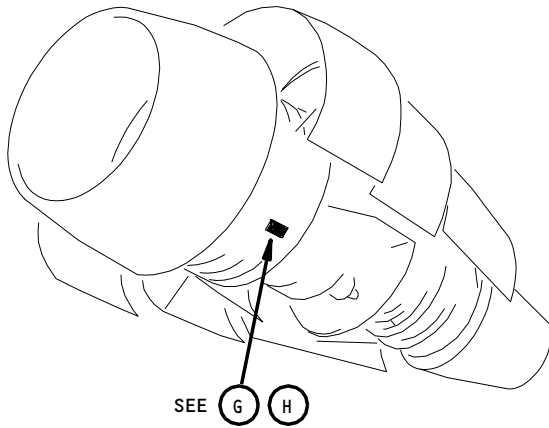
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Engine Oil Servicing
Figure 301 (Sheet 3)

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- (b) Drain the oil fully into the container.
- (c) Lubricate the packing with the oil and install the packing on the drain plug.
- (d) Install the drain plug in the tank port.
- (e) Tighten the drain plug to 540-600 pound inches (61.0-67.7 newton meters).
- (f) Install the lockwire.

S 683-008-J00

- (2) Do these steps to drain the oil from the accessory gearbox:
 - (a) Remove the drain plug from the accessory gearbox and discard the packing.
 - (b) Drain the oil fully into the container.
 - (c) Lubricate the packing with oil and install the packing on the drain plug.
 - (d) Install the drain plug in the accessory gearbox and tighten the plug to 270-300 pound inches (30.5-33.9 newton meters).

S 683-009-J00

- (3) Do these steps to drain the oil from the master chip detector:
 - (a) Remove the master chip detector (Ref 79-21-05) from the housing.
 - (b) Push in the automatic valve (in the housing) and drain the oil fully into the container.
 - (c) Install the master chip detector into the housing (Ref 79-21-05).

S 683-010-J00

- (4) Do these steps to drain the oil from the fuel/oil heat exchanger:
 - (a) Remove the oil output tube from the fuel/oil heat exchanger on the IDG.
 - (b) Drain the oil fully into the container.
 - (c) Install the oil output tube and tighten the nut to 540-600 pound inches (61.0-67.7 newton meters).

S 683-011-J00

- (5) Do these steps to drain the oil from the scavenge oil tube:
 - (a) Remove the scavenge oil tube from the transfer gearbox, and keep the gasket.

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- (b) Drain the oil fully into the container.
- (c) Install the scavenge oil tube to the transfer gearbox with the gasket, the washers, the bolts, and the nuts.
- (d) Tighten the bolts to 55-70 pound inches (6.2-7.9 newton meters).

S 683-012-J00

- (6) Do these steps to drain the oil from the scavenge tube on the D-sump:
 - (a) Disconnect the scavenge tube from the TRF hard line.
 - (b) Drain the oil fully into the container.
 - (c) Connect the scavenge tube of the D-sump to the TRF.
 - (d) Tighten the tube coupling nut to 650-770 pound inches (73.5-77.0 newton meters).

S 683-013-J00

- (7) Do these steps to drain the oil from the oil supply:

CAUTION: USE THE SCREEN ONLY TO OPEN THE AUTOMATIC VALVE. IF YOU USE SOMETHING ELSE TO OPEN THE VALVE, YOU CAN CAUSE DAMAGE TO THE VALVE.

- (a) Remove and examine each supply and scavenge inlet screen (AMM 79-21-06/201).

NOTE: Hold the screen up when you remove the supply inlet screen. This opens the automatic valve.

- (b) Drain the oil fully into the container.
- (c) Install the supply and the scavenge inlet screens (Ref 79-21-06).

S 683-014-J00

- (8) ENGINES WITHOUT GE SB 79-047;
Do these steps to drain the lube filter:

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- (a) Remove the lube filter bowl (Ref 79-21-07).
 - 1) Hold the lube filter with your hand to lift the automatic valve.
- (b) Drain the oil fully into the container.
- (c) Clean and install the lube filter (Ref 79-21-07).

S 683-015-J00

- (9) Do these steps to drain the oil from the scavenge oil filter:
 - (a) Remove and examine the filter element for the scavenge oil or contamination (Ref 79-21-04).
 - 1) Replace the filter element if it is necessary.
 - (b) Carefully lift the automatic valve for the scavenge oil filter.
 - (c) Drain the oil fully into the container (from the outlet tube).
 - (d) Install the filter element for the scavenge oil (Ref 79-21-04).

S 613-016-J00

- (10) Use the Periodic Servicing to fill the oil system (AMM 12-13-03/301).
 - (a) Do these steps to fill the supply line (if you drained the supply line from oil tank to lube and scavenge pump):
 - 1) Remove the LUBE IN plug from the lube and scavenge pump drain
 - 2) Hold the screen with your hand and lift the automatic valve
 - 3) Hold the valve open until oil flows continuously
 - 4) Install the drain cap and tighten to 270-300 pound inches (30.5-33.9 newton meters)
 - 5) Install the lockwire.

F. Do the Oil System Servicing

S 613-017-J00

- (1) Do the Servicing After Maintenance procedure (AMM 12-13-03/301).

G. Flush the Oil System

S 683-018-J00

- (1) Do the procedure to Drain the Oil, shown before.

S 613-019-J00

- (2) Do the procedure for Oil System Servicing, shown before.

S 413-020-J00

- (3) Do these steps to close the cowls:
 - (a) Close the core cowl panels (Ref 71-11-06).

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WARNING: OBEY THE INSTRUCTIONS IN 78-31-00 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (b) Close the thrust reversers (Ref 78-31-00).
- (c) Do the activation procedure for the thrust reverser (Ref 78-31-00).
- (d) Close the fan cowl panels (Ref 71-11-04).

S 863-021-J00

WARNING: USE 71-00-00/201 TO OPERATE THE POWER PLANT. IF YOU DO NOT USE THIS PROCEDURE, YOU CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

- (4) Use the Power Plant Operation (Normal) procedure to start the engine (Ref 71-00-00/201).

S 863-022-J00

CAUTION: MONITOR THE ENGINE OIL SYSTEM CAREFULLY WHEN YOU OPERATE THE ENGINE. STOP THE ENGINE IMMEDIATELY IF THE OIL SYSTEM LIMITS ARE NOT CORRECT, OR YOU CAN CAUSE DAMAGE TO THE ENGINE.

- (5) Operate the engine to these conditions:
 - 75% N1 until the scavenge oil temperature increases to 139°F (65°C)
 - A minimum of 3 minutes, to fully cycle the oil through the system.

S 863-023-J00

- (6) Use the Power Plant Operation (Normal) procedure to do the engine shutdown (Ref 71-00-00/201).

S 013-024-J00

- (7) Do these steps to open the cowl:
 - (a) Open the fan cowl panels (Ref 71-11-04).

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

- (b) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (c) Open the thrust reversers (Ref 78-31-00).
(d) Open the core cowl panels (Ref 71-11-06).

S 683-025-J00

WARNING: DO NOT DRAIN THE OIL UNTIL YOU STOP THE ENGINE FOR A MINIMUM OF FIVE MINUTES. THE HOT OIL IS PRESSURIZED, AND CAN CAUSE INJURY TO PERSONS.

- (8) Drain the Oil System, shown before.

S 613-026-J00

- (9) Do the Oil System Servicing, shown before.

H. Clean the Oil System

S 173-027-J00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THIS SOLVENT. KEEP THIS SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THIS SOLVENT IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (1) Flush all removed tubes fully with the solvent.

S 113-028-J00

- (2) Clean the inside of the tubes with clean rags or with dry, filtered, compressor air.

S 113-029-J00

- (3) Clean all dirty components with solvent.

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S 963-030-J00

- (4) Replace all filters, if it is necessary.

S 113-031-J00

- (5) Clean all dirty components with solvent and replace or clean all filters when it is necessary.

I. Put the Airplane Back to Its Usual Condition

S 413-033-J00

- (1) Close the core cowl panels (Ref 71-11-06).

S 413-032-J00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Close the thrust reversers (Ref 78-31-00).

S 443-034-J00

- (3) Do the activation procedure for the thrust reverser (Ref 78-31-00).

S 413-035-J00

- (4) Close the fan cowl panels (Ref 71-11-04).

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OIL TANK - REMOVAL/INSTALLATION

1. General

- A. This procedure provides two tasks: a removal and an installation of the engine oil tank.
- B. To remove the oil tank you must do these steps:
 - (1) Remove electrical power
 - (2) Open the right fan cowl panel
 - (3) Drain the oil tank
 - (4) Disconnect the tubes, the electrical connector, and the cable
 - (5) Remove the oil quantity transmitter
 - (6) Remove the oil tank filler cap
 - (7) Remove the oil tank pressurizing valve
 - (8) Remove the oil tank pressure relief valve
 - (9) Remove the oil tank.
- C. To install the oil tank you must do these steps:
 - (1) Install the oil tank
 - (2) Install the oil tank pressure relief valve
 - (3) Install the oil tank pressurizing valve
 - (4) Install the oil tank filler cap
 - (5) Install the oil quantity transmitter
 - (6) Connect the tubes, the electrical connector, and the cable
 - (7) Fill the oil tank with oil
 - (8) Close the right fan cowl
 - (9) Apply electrical power
 - (10) Do an engine dry motor
 - (11) Do an engine idle leak check
 - (12) Do a check of the quantity of oil in the oil tank.

TASK 79-11-01-004-001-J00

2. Engine Oil Tank Removal (Fig. 401)

- A. Standard Tools and Equipment
 - (1) Container - 10 gallon (40 liter) capacity for oil
- B. Consumable Materials
 - (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- C. References
 - (1) AMM 24-22-00/201, Manual Control
 - (2) AMM 71-11-04/201, Fan Cowl Panels
 - (3) AMM 79-11-02/401, Oil Tank Pressurizing Valve
 - (4) AMM 79-11-03/401, Oil Tank Filler Cap
 - (5) AMM 79-11-04/401, Oil Tank Relief Valve
 - (6) AMM 79-31-01/401, Oil Quantity Transmitter
 - (7) AIPC 72-33-60, Fig. 1

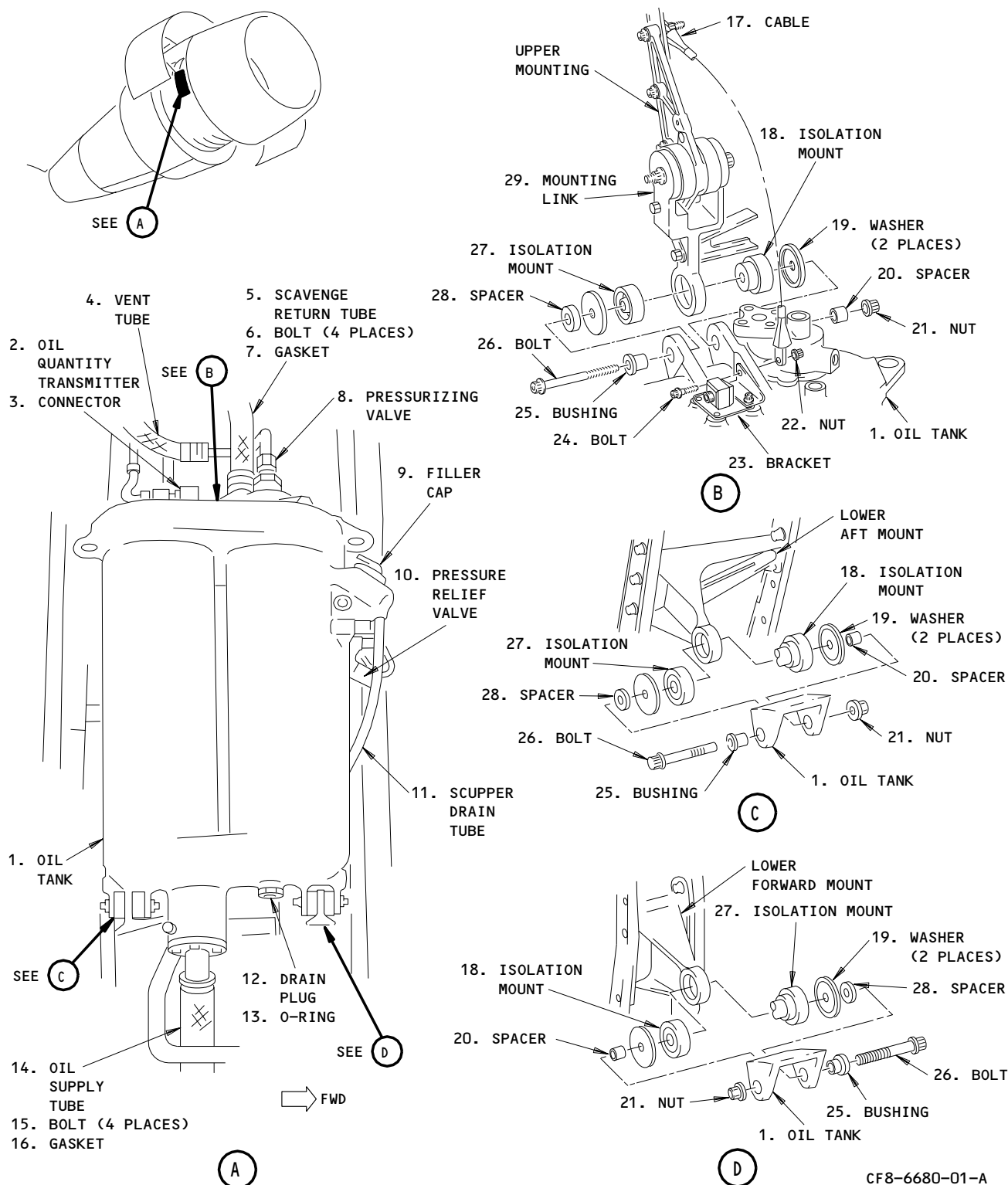
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Oil Tank Installation
Figure 401

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(8) AIPC 79-11-01, Fig. 1 and 5

(9) AIPC 79-31-01, Fig. 5

D. Access

(1) Location Zone

- 412 Engine 1 - Fan Case 3 o'clock
- 422 Engine 2 - Fan Case 3 o'clock
- 432 Engine 3 - Fan Case 3 o'clock
- 442 Engine 4 - Fan Case 3 o'clock

(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

E. Procedure

S 864-002-J00

- (1) Do this task: "Remove Electrical Power" (AMM 24-22-00/201) for the applicable engine.

S 014-003-J00

- (2) Do this task: "Open Fan Cowl Panels" (AMM 71-11-04/201) to open the right fan cowl panel.

S 684-034-J00

WARNING: DO NOT LET HOT OIL TOUCH YOU. LET 5 MINUTES GO BY AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

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

- (3) Drain the oil from the oil tank (1):

(a) Remove the drain plug (12):

- 1) Remove the drain plug (12) from the oil tank (1).
- 2) Drain the oil into a container.
- 3) Remove and discard the O-ring (13).

(b) Install the drain plug (12):

- 1) Lubricate a new O-ring (13) with oil.
- 2) Install a new O-ring (13) on the drain plug (12).
- 3) Install the drain plug (12) in the oil tank (1).
- 4) Tighten the plug to 540-600 pound-inches (61.0-67.7 N.m).
- 5) Install lockwire on the drain plug (12).

S 034-005-J00

- (4) Disconnect the tubes from the oil tank:

- (a) Disconnect the scupper drain tube (11) from the fitting on the scupper.

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- (b) Disconnect the vent tube (4) from the pressurizing valve (8).
- (c) Remove four bolts (6) that attach the scavenge return tube (5) to the oil tank.
 - 1) Remove the scavenge return tube (5).
 - 2) Keep the gasket (7), if it has no damage.
- (d) Remove four bolts (15) that attach the oil supply tube (14) to the oil tank.
 - 1) Remove the oil supply tube (14).
 - 2) Keep the gasket (16), if it has no damage.

S 034-009-J00

- (5) Disconnect the electrical connector and the cable:
 - (a) Disconnect electrical connector (3) from oil quantity transmitter (2).
 - (b) Remove the nut (22) and the bolt (24) that attach the cable (17) to the bracket (23).

S 034-036-J00

- (6) Do this task: "Oil Quantity Transmitter Removal" (AMM 79-31-01/401) to remove the oil quantity transmitter (2) and the bracket (23).

S 034-045-J00

- (7) Do this task: "Oil Tank Filler Cap Removal" (AMM 79-11-03/401).

S 034-046-J00

- (8) Do this task: "Oil Tank Pressurizing Valve Removal" (AMM 79-11-02/401).

S 034-047-J00

- (9) Do this task: "Oil Tank Pressure Relief Valve Removal" (AMM 79-11-04/401).

S 024-037-J00

- (10) Remove the oil tank (1):
 - (a) Remove the nut (19) and the bolt (26) that attach the top mounting clevis to the mounting link.
 - (b) Remove two washers (19), two isolation mounts (18 and 27), two spacers (20 and 28), and the bushing (25).
 - (c) Remove two nuts (21), two bolts (26), four washers (19), two spacers (20 and 28), four isolation mounts (18 and 27), and two bushings (25) that attach the bottom mounting clevises to the fan case brackets.
 - (d) Remove the oil tank (1) from the fan case.
 - (e) Install protective caps or plugs on the tube ends and the openings on the oil tank.

TASK 79-11-01-404-015-J00

3. Engine Oil Tank Installation (Fig. 401)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

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B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|--------------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 1 | Oil Tank | 79-11-01 | 05 | 80 |
| | 2 | Oil Quantity Transmitter | 79-31-01 | 05 | 50 |
| | 6 | Bolt | 79-11-01 | 05 | 45 |
| | 7 | Gasket | | | 50 |
| | 8 | Pressurizing Valve | 79-11-01 | 01 | 05 |
| | 9 | Filler Cap | 79-11-01 | 05 | 60 |
| | 10 | Relief Valve | 79-11-01 | 01 | 45 |
| | 12 | Plug (Drain Plug) | | | 65 |
| | 13 | Packing (O-ring) | | | 70 |
| | 15 | Bolt | 79-11-01 | 05 | 70 |
| | 16 | Gasket | | | 75 |
| | 17 | Cable | 72-33-60 | 01 | 125 |
| | 18 | Spacer (Isolation Mount) | 79-11-01 | 05 | 25 |
| | 19 | Washer | | | 20 |
| | 20 | Spacer | | | 15 |
| | 21 | Nut | | | 10 |
| | 22 | Nut | 79-31-01 | 05 | 230 |
| | 23 | Bracket | | | 220 |
| | 24 | Bolt | | | 225 |
| | 25 | Bushing | 79-11-01 | 05 | 35 |
| | 26 | Bolt | | | 5 |
| | 27 | Spacer (Isolation Mount) | | | 25 |
| | 28 | Spacer | | | 30 |

C. References

- (1) AMM 12-13-03/301, Engine - Servicing
- (2) AMM 24-22-00/201, Manual Control
- (3) AMM 71-00-00/201, Power Plant
- (4) AMM 71-00-00/501, Power Plant
- (5) AMM 71-11-04/201, Fan Cowl Panels

D. Access

- (1) Location Zone
 - 412 Engine 1 - Fan Case 3 o'clock
 - 422 Engine 2 - Fan Case 3 o'clock
 - 432 Engine 3 - Fan Case 3 o'clock
 - 442 Engine 4 - Fan Case 3 o'clock

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(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

E. Procedure

S 424-038-J00

(1) Install the oil tank (1):

- (a) Put two isolation mounts (18 and 27), two washers (19), and the larger spacer (28) on the mounting link (29).
- (b) Put the oil tank (1) on the mounting link (29).
- (c) Attach the top mounting clevis with the bushing (25), the bolt (24), the smaller spacer (20), and the nut (21).
 - 1) Do not tighten the nut.
- (d) Put two isolation mounts (18 and 27) and two washers (19) on each of the lower fan case brackets.
- (e) Attach each of the tank bottom mounting clevises with the bushing (25), the bolt (26), the spacer (20), and the nut (21).
 - 1) Tighten three nuts (19), that attach the oil tank (1), to 190-230 pound-inches (21.5-26.0 N.m).

S 434-039-J00

- (2) Do this task: "Oil Quantity Transmitter Installation:" (AMM 79-31-01/401) to install the oil quantity transmitter (2) and the bracket (23).

S 434-040-J00

- (3) Do this task: "Oil Tank Filler Cap Installation" (AMM 79-11-03/401).

S 434-041-J00

- (4) Do this task: "Oil Tank Pressurizing Valve Installation" (AMM 79-11-02/401).

S 434-042-J00

- (5) Do this task: "Oil Tank Pressure Relief Valve Installation" (AMM 79-11-04/401).

S 434-043-J00

(6) Connect the tubes:

- (a) Connect the oil supply tube (14):
 - 1) Lubricate the gasket (16) with oil.
 - 2) Install four bolts (15) that attach the oil supply tube (14) and the gasket (16) to the oil tank.
 - a) Tighten the bolts to 55-70 pound-inches (6.2-7.8 N.m).
- (b) Connect the scavenge return tube (5):
 - 1) Lubricate the gasket (7) with oil.

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- 2) Install four bolts (6 that attach the scavenge return tube (5) and the gasket (7) to the oil tank.
 - a) Tighten the bolts to 55-70 pound-inches (6.2-7.8 N.m).
 - b) Install lockwire on the bolts.
- (c) Connect the vent tube (4) to the pressurizing valve (8).
 - 1) Tighten the tube nut to 650-770 pound-inches (73.4-87.0 N.m).
 - 2) Install lockwire on the tube nut.
- (d) Install the scupper drain tube (11) to the scupper drain.
 - 1) Tighten the tube nut to 270-300 pound-inches (30.5-33.9 N.m).
 - 2) Install lockwire on the tube nut.

S 434-044-J00

- (7) Connect the electrical connector and the cable:
 - (a) Install the nut (22) and the bolt (24) that attach the cable (17) to the bracket (23).
 - 1) Tighten the nut to 55-70 pound-inches (6.2-7.8 N.m).
 - 2) Install lockwire on the bolt and the nut.
 - (b) Connect the electrical connector (2) to the oil quantity transmitter (3).
 - 1) Tighten the electrical connector (2) with your hand.

NOTE: This will put a cover over the witness band.

- 2) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/8 turn.
- 3) Install lockwire on the connector.

S 614-025-J00

- (8) Do this task: "Fill the Oil Tank" (AMM 12-13-03/301).

S 414-027-J00

- (9) Do this task: "Close Fan Cowl Panels" (AMM 71-11-04/201).

S 864-028-J00

- (10) Do this task: "Apply Electrical Power" (AMM 24-22-00/201) for the applicable engine.

S 864-029-J00

- (11) Do this task: "Engine Dry Motor" (AMM 71-00-00/201) for 3-5 minutes to remove the air from the lubrication system.

S 794-030-J00

- (12) Do this task: "Engine Idle Leak Check" (AMM 71-00-00/501, Test No. 3).

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- S 614-031-J00
- (13) Do a check of the quantity of oil in the oil tank.
- (a) If the oil tank is not full of oil,
Do this task: "Fill the Oil Tank" (AMM 12-13-03/301).

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OIL TANK - INSPECTION/CHECK

1. General

- A. This procedure contains a task to examine the oil tank.
- B. To examine the oil tank, you must do these steps:
 - (1) Open the right fan cowl panel
 - (2) Visually examine the oil tank for damage and for oil leaks
 - (3) Do the corrective action, if you find damage that is not in the limits
 - (4) Close the right fan cowl panel.
 - (5) Visually examine the oil tank filler cap.

TASK 79-11-01-206-001-J00

2. Engine Oil Tank Examination

A. References

- (1) 71-11-04/201, Fan Cowl Panels
- (2) 79-11-01/401, Engine Oil Tank
- (3) 79-11-03/401, Oil Tank Filler Cap

B. Access

(1) Location Zone

- 412 Engine 1 - Fan Case 3 o'clock
- 422 Engine 2 - Fan Case 3 o'clock
- 432 Engine 3 - Fan Case 3 o'clock
- 442 Engine 4 - Fan Case 3 o'clock

(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

C. Procedure

S 016-002-J00

- (1) Do this task: "Open Fan Cowl Panels" (Ref 71-11-04/201) to open the right fan cowl panel.

S 226-003-J00

- (2) Visually examine the oil tank body:
 - (a) Visually examine the oil tank body for these types of damage:
 - 1) Dents that are more than 0.250 inch (6.35 mm) in depth

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- 2) Dents that do not have a smooth contour
- 3) Nicks or scratches that are more than 0.008 inch (0.20 mm) in depth
- 4) Cracks
- 5) Leaks.
- (b) If this damage is found,
Do these tasks: "Oil Tank Removal" (AMM 79-11-01/401) and "Oil Tank Installation" (AMM 79-11-01/401).

S 216-005-J00

- (3) Visually examine the coating on the oil tank body:
 - (a) Examine the oil tank body for the silicone rubber coating that is loose.
 - 1) Loose coating is not permitted.
 - (b) If you find this type of damage, you must remove the loose coating.

S 216-006-J00

- (4) Visually examine the tube flanges on the oil tank:
 - (a) Visually examine the tube flanges on the oil tank for leaks.
 - (b) If leaks are found,
Do the steps that are necessary to repair the area that has the leaks:
 - 1) Make sure the flange bolts are tightened to the correct torque.
 - 2) Replace the gasket at the tube flange.
 - 3) Do a check of the surfaces that seal the gasket for damage.

S 216-007-J00

- (5) Visually examine the tube fittings on the oil tank:
 - (a) Visually examine the tube fittings on the oil tank for leaks.
 - (b) If leaks are found,
Do the steps that are necessary to repair the area that has the leaks:
 - 1) Make sure the fittings are tightened to the correct torque.
 - 2) Replace the O-ring on the fitting.
 - 3) Do a check of the surfaces that seal the O-ring for damage.
 - (c) Visually examine the oil tank filler cap for corrosion and discoloration.
 - (d) If there are areas of corrosion with scales or pits,
Do these tasks: "Oil Tank Filler Cap Removal" (AMM 79-11-03/401) and "Oil Tank Filler Cap Installation" (AMM 79-11-03/401).

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- S 416-004-J00
(6) Do this task: "Close Fan Cowl Panels" (AMM 71-11-04/201).

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OIL TANK PRESSURIZING VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure provides two tasks, remove and install the oil tank pressurizing valve (pressurizing valve).

TASK 79-11-02-004-001-J00

2. Oil Tank Pressurizing Valve Removal (Fig. 401)

A. References

- (1) 71-11-04/201, Fan Cowl Panels
(2) IPC 79-11-01 Fig. 1

B. Access

(1) Location Zone

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 3 o'clock |
| 422 | Engine 2 - Fan Case 3 o'clock |
| 432 | Engine 3 - Fan Case 3 o'clock |
| 442 | Engine 4 - Fan Case 3 o'clock |

(2) Access Panel

- | | |
|-----|---------------------------------|
| 414 | Right Fan Cowl Panel - Engine 1 |
| 424 | Right Fan Cowl Panel - Engine 2 |
| 434 | Right Fan Cowl Panel - Engine 3 |
| 444 | Right Fan Cowl Panel - Engine 4 |

C. Procedure

S 014-002-J00

- (1) Open the right fan cowl panel (Ref 71-11-04/201).

S 034-003-J00

- (2) Disconnect the vent tube from the pressurizing valve.

S 024-004-J00

WARNING: DO NOT LET HOT OIL TOUCH YOU. LET 5 MINUTES GO BY AFTER THE ENGINE STOPS TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. THE HOT PRESSURIZED OIL CAN COME OUT AND BURN YOU.

DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

- (3) Remove the pressurizing valve:

- (a) Remove the pressurizing valve from the oil tank.

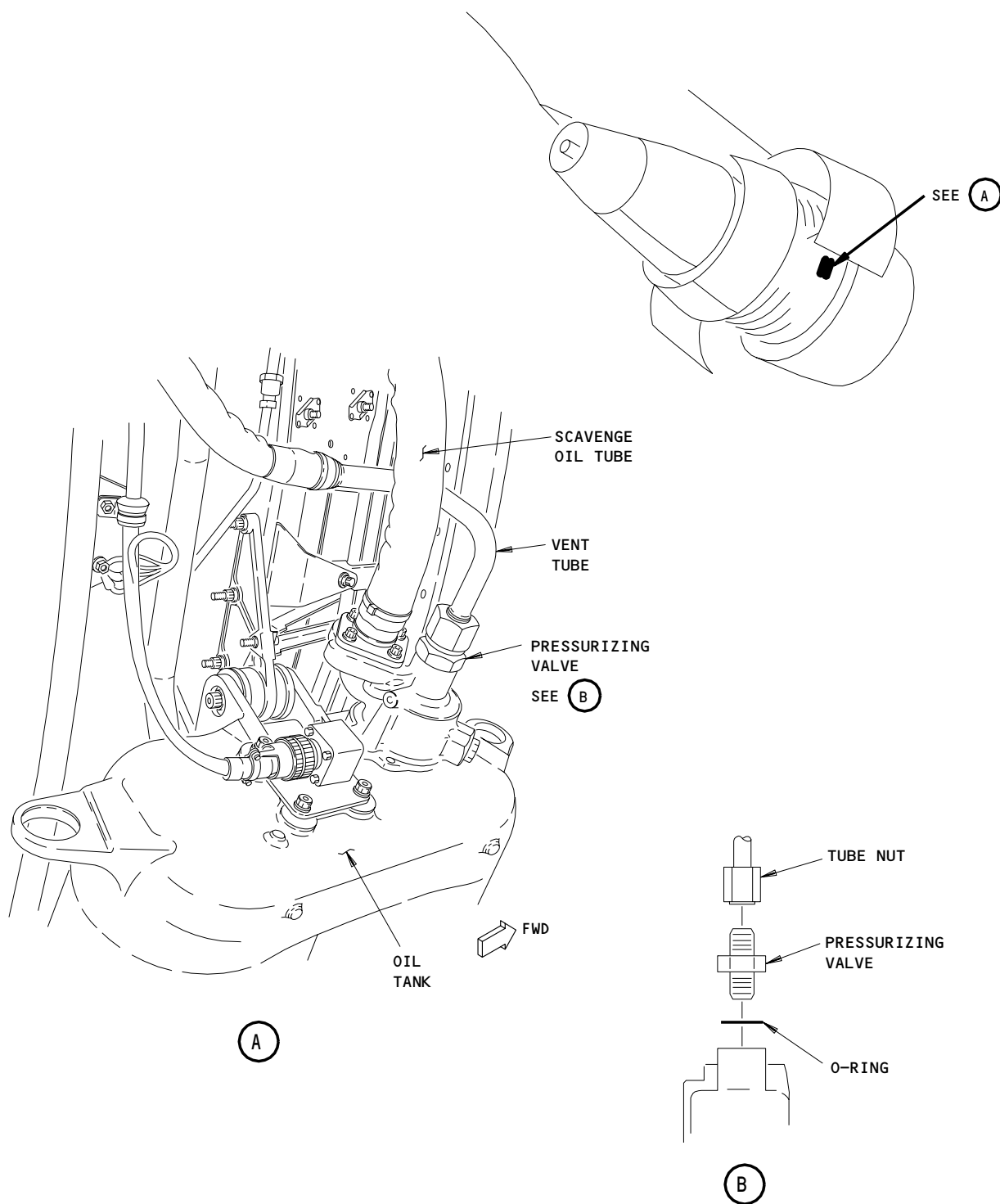
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Oil Tank Pressurizing Valve Installation
Figure 401

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(b) Remove and discard the O-ring on the pressurizing valve.

TASK 79-11-02-404-005-J00

3. Oil Tank Pressurizing Valve Installation (Fig. 401)

A. Consumable Materials

(1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. References

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

(2) IPC 79-11-01 Fig. 1

C. Access

(1) Location Zone

412 Engine 1 - Fan Case 3 o'clock

422 Engine 2 - Fan Case 3 o'clock

432 Engine 3 - Fan Case 3 o'clock

442 Engine 4 - Fan Case 3 o'clock

(2) Access Panel

414 Right Fan Cowl Panel - Engine 1

424 Right Fan Cowl Panel - Engine 2

434 Right Fan Cowl Panel - Engine 3

444 Right Fan Cowl Panel - Engine 4

D. Procedure

S 424-007-J00

(1) Install the pressurizing valve:

(a) Lubricate a new O-ring with oil.

(b) Install the O-ring on the pressurizing valve.

(c) Turn the pressurizing valve into the applicable opening on the oil tank.

1) Make sure the arrow on the side of the pressurizing valve points away from the oil tank.

(d) Tighten the pressurizing valve to 300-425 pound-inches (33.9-48.0 N.m).

S 434-013-J00

(2) Install the vent tube:

(a) Connect the vent tube to the pressurizing valve.

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(b) Tighten the tube nut on the vent tube to 650-770 pound-inches
(73.5-87.0 N.m).

S 414-009-J00

(3) Close the right fan cowl panel (Ref 71-11-04/201).

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OIL TANK FILLER CAP - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks: a removal and an installation of the oil tank filler cap.

TASK 79-11-03-004-001-J00

2. Oil Tank Filler Cap Removal (Fig. 401)

A. References

- (1) 71-11-04/201, Fan Cowl Panels
- (2) IPC 79-11-01 Fig. 5

B. Access

(1) Location Zone

- 412 Engine 1 - Fan Case 3 o'clock
- 422 Engine 2 - Fan Case 3 o'clock
- 432 Engine 3 - Fan Case 3 o'clock
- 442 Engine 4 - Fan Case 3 o'clock

(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

C. Procedure

S 014-002-J00

- (1) Do this task: "Open Fan Cowl Panels" (Ref 71-11-04/201) to open the right fan cowl panel.

S 024-011-J00

- (2) Remove the oil tank filler cap:
- (a) Remove four bolts that attach the oil tank filler cap to the oil tank scupper.
 - (b) Remove the oil tank filler cap.
 - (c) Remove and discard the O-ring from the oil tank filler cap.

TASK 79-11-03-404-006-J00

3. Oil Tank Filler Cap Installation (Fig. 401)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. References

- (1) 71-11-04/201, Fan Cowl Panels
- (2) IPC 79-11-01 Fig. 5

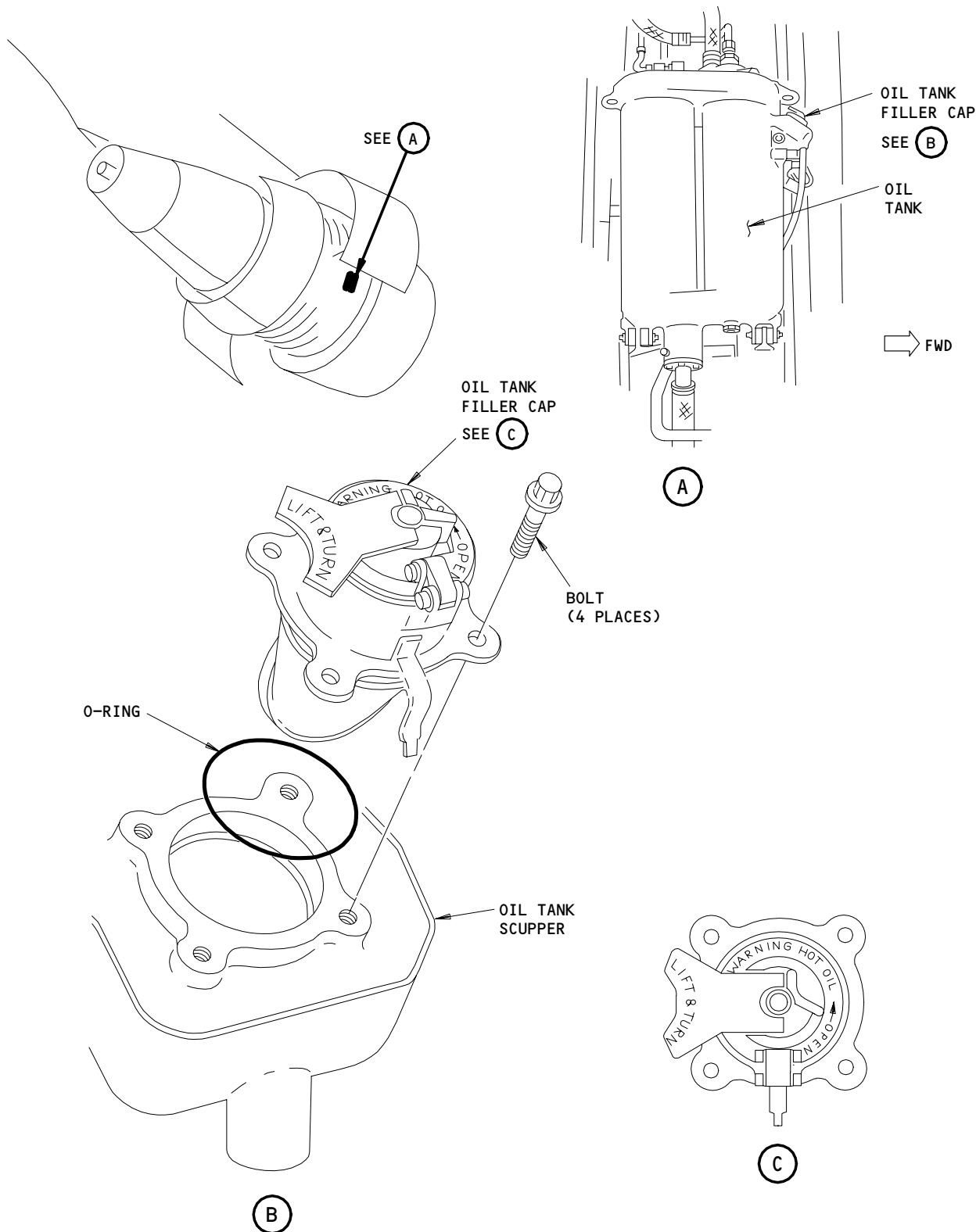
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Oil Tank Filler Cap - Removal/Installation
Figure 401

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C. Access

(1) Location Zone

412 Engine 1 - Fan Case 3 o'clock
422 Engine 2 - Fan Case 3 o'clock
432 Engine 3 - Fan Case 3 o'clock
442 Engine 4 - Fan Case 3 o'clock

(2) Access Panel

414 Right Fan Cowl Panel - Engine 1
424 Right Fan Cowl Panel - Engine 2
434 Right Fan Cowl Panel - Engine 3
444 Right Fan Cowl Panel - Engine 4

D. Procedure

S 424-010-J00

(1) Install the oil tank filler cap:

- (a) Lubricate a new O-ring with oil.
- (b) Install the O-ring on the oil tank filler cap.
- (c) Install four bolts that attach the oil tank filler cap to the oil tank scupper.
 - 1) Make sure you align the oil tank filler cap correctly.
 - 2) Tighten the bolts to 55-70 pound-inches (6.2-7.8 N.m).
 - 3) Install lockwire on the bolts.

S 414-009-J00

(2) Do this task: "Close Fan Cowl Panels" (Ref 71-11-04/201).

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OIL TANK RELIEF VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains instructions to remove and install the oil tank relief valve (relief valve).

TASK 79-11-04-004-001-J00

2. Oil Tank Relief Valve Removal (Fig. 401)

- A. Standard Tools and Equipment
(1) Container - 10 gallon (39 liter) capacity for oil
- B. Consumable Materials
(1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- C. References
(1) 71-11-04/201, Fan Cowl Panels
(2) IPC 79-11-01 Fig. 1
- D. Access
(1) Location Zone
412 Engine 1 - Fan Case 3 o'clock
422 Engine 2 - Fan Case 3 o'clock
432 Engine 3 - Fan Case 3 o'clock
442 Engine 4 - Fan Case 3 o'clock
- (2) Access Panel
414 Right Fan Cowl Panel - Engine 1
424 Right Fan Cowl Panel - Engine 2
434 Right Fan Cowl Panel - Engine 3
444 Right Fan Cowl Panel - Engine 4

E. Procedure

S 014-014-J00

- (1) Open the right fan cowl panel (Ref 71-11-04/201).

S 684-015-J00

WARNING: LET AT LEAST 5 MINUTES GO BY AFTER YOU STOP THE ENGINE TO LET THE TANK PRESSURE GO TO ZERO. HOT OIL FROM THE TANK COULD CAUSE INJURY TO PERSONS.

DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME OR IT COULD CAUSE DERMATITIS. OIL WILL PUT STAINS ON YOUR CLOTHING AND CAN MAKE PAINT SOFT.

- (2) Drain the oil tank.
(a) Remove the plug from the oil tank and let the oil drain into a container.

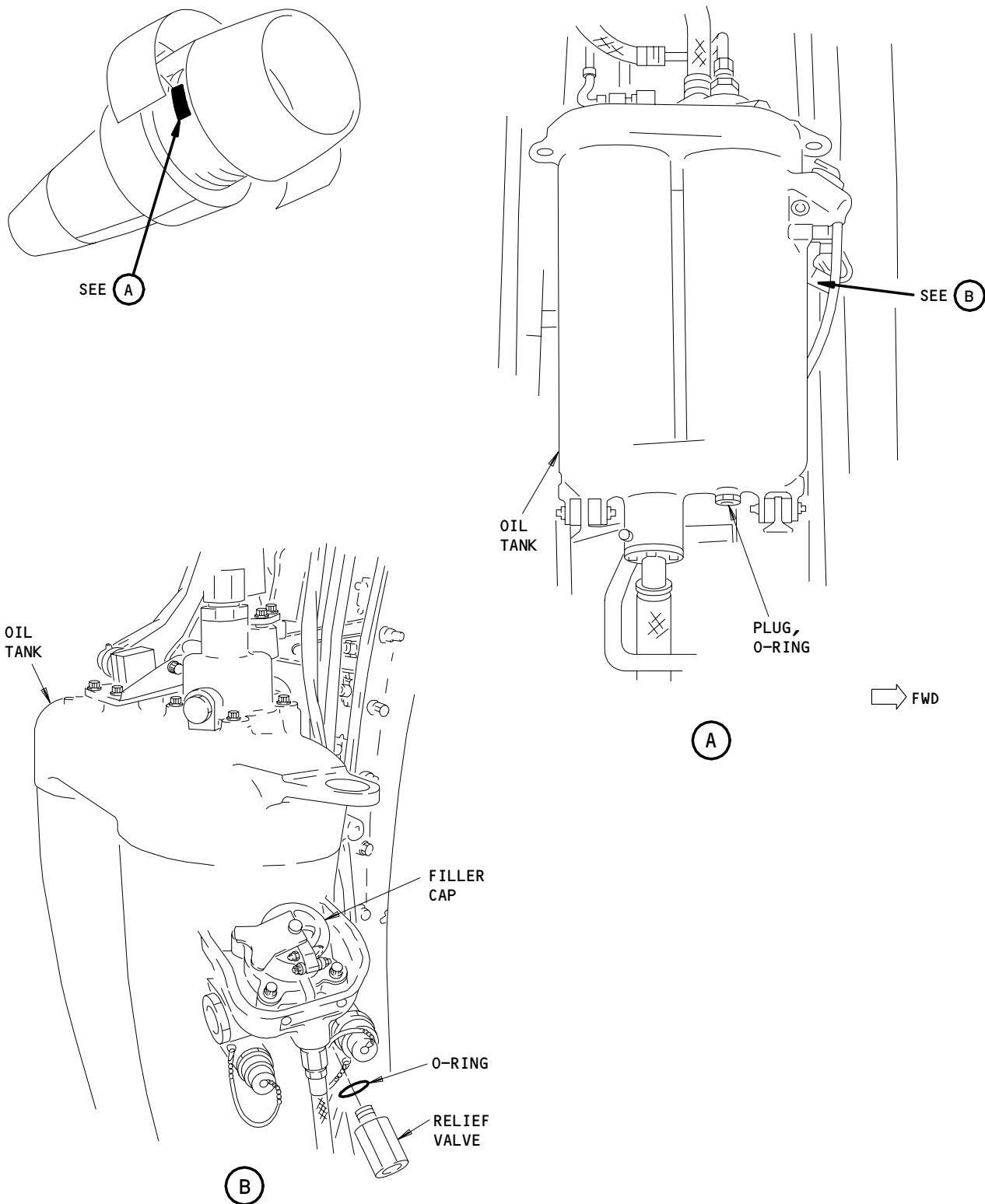
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Oil Tank Relief Valve Installation
Figure 401

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- (b) Remove and discard the O-ring on the plug.
- (c) Lubricate a new O-ring with oil.
- (d) Install the O-ring on the plug.
- (e) Install the plug in the oil tank.
- (f) Tighten the plug to 540-600 pound-inches (61.0-67.8 N.m).
- (g) Install the lockwire on the plug.

S 024-016-J00

- (3) Remove the relief valve:
 - (a) Remove the relief valve from the oil tank.
 - (b) Remove and discard the O-ring on the relief valve.

TASK 79-11-04-404-005-J00

3. Oil Tank Relief Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. References

- (1) 12-13-03/301, Engine
- (2) 71-00-00/501, Power Plant
- (3) 71-11-04/201, Fan Cowl Panels
- (4) IPC 79-11-01 Fig. 1

C. Access

(1) Location Zone

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 3 o'clock |
| 422 | Engine 2 - Fan Case 3 o'clock |
| 432 | Engine 3 - Fan Case 3 o'clock |
| 442 | Engine 4 - Fan Case 3 o'clock |

(2) Access Panel

- | | |
|-----|---------------------------------|
| 414 | Right Fan Cowl Panel - Engine 1 |
| 424 | Right Fan Cowl Panel - Engine 2 |
| 434 | Right Fan Cowl Panel - Engine 3 |
| 444 | Right Fan Cowl Panel - Engine 4 |

D. Procedure

S 424-012-J00

- (1) Install the relief valve:
 - (a) Lubricate a new O-ring with oil.
 - (b) Install the O-ring on the relief valve.
 - (c) Install the relief valve on the tank.
 - (d) Tighten the relief valve to 270-300 pound-inches (30.5-33.9 mm).
 - (e) Install the lockwire on the relief valve.

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- S 614-017-J00
- (2) Fill the oil tank (Ref 12-13-03/301).
- S 414-019-J00
- (3) Close the right fan cowl panel (Ref 71-11-04/201).
- S 794-018-J00
- (4) Do the idle leak check procedure (Ref 71-00-00/501, Test No. 3).

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OIL DISTRIBUTION - DESCRIPTION AND OPERATION

1. General

A. ENGINES WITHOUT GE SB 79-047;

Oil is gravity fed from the engine oil tank through a particle retaining screen to the lube and scavenge pump. Oil is pumped through a supply lube filter located in the pump outlet. The pump provides positive pressure and flow of oil, according to the engine operating speed, to the engine bearings and gearboxes. Oil tubes are located along the bottom of the engine with high points above the engine oil tank to prevent gravity feed of oil from the tank into the gearboxes. Lube discharge nozzles and jets provide oil at each main bearing and at all locations in the drive train where lubrication and cooling is required.

B. ENGINES WITH GE SB 79-047;

Oil is gravity fed from the engine oil tank through a particle retaining screen to the lube and scavenge pump. The pump provides positive pressure and flow of oil, according to the engine operating speed, to the engine bearings and gearboxes. Oil tubes are located along the bottom of the engine with high points above the engine oil tank to prevent gravity feed of oil from the tank into the gearboxes. Lube discharge nozzles and jets provide oil at each main bearing and at all locations in the drive train where lubrication and cooling is required.

C. Five elements in the lube and scavenge pump remove scavenge oil from the B, C, and D sumps and the accessory and transfer gearboxes. Oil from the A sump drains down the radial drive shaft housing into the transfer gearbox where it is scavenged. Slinger-type disk pumps in the A and D sumps provide positive sump draining for high altitude operation or airplane maneuvers when scavenge would otherwise be difficult. Scavenge oil passes through particle retaining screens in the pump inlet ports and also through a magnetic chip detector to remove contaminants in the return oil. Heat buildup in the oil is transferred to fuel as the fuel and oil pass through separate chambers of the fuel/oil heat exchanger and servo fuel heater. The oil then passes through the scavenge oil filter before returning through a deaerator into the tank.

2. Fuel/Oil Heat Exchanger (Fig. 2)

A. The fuel/oil heat exchanger is mounted on the bottom of the fuel pump which is located on the aft face of the AGB at the 5 o'clock position. The two purposes of the heat exchanger are to heat the fuel delivered by the fuel pump to prevent icing, and to cool the scavenge engine oil before its return to the oil tank.

B. The heat exchanger consists of a bundle of tubes carrying fuel, around which oil is allowed to circulate. Fuel passes from the inlet end, through half the tubes, and back through the remaining tubes. The scavenge oil is directed by internal baffles to circulate through the entire length of the heat exchanger.

C. A pressure relief valve is located in the scavenge oil inlet allowing oil bypass of the heat exchanger if oil passages are blocked or restricted by contamination or cold viscous oil. The relief valve opens at 85-100 psi (586-689 kPa).

3. Lube and Scavenge Pump (Fig. 3)

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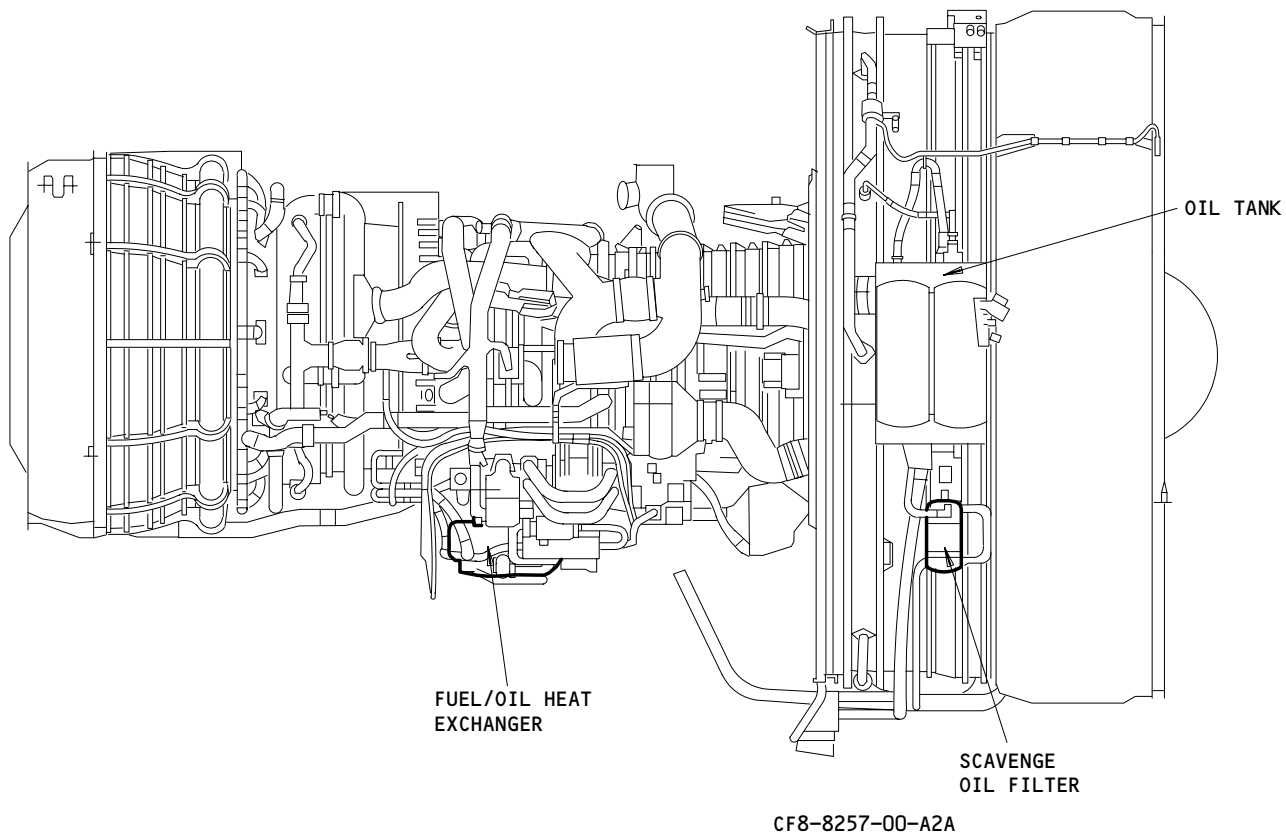
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Oil Distribution Component Location
Figure 1 (Sheet 1)

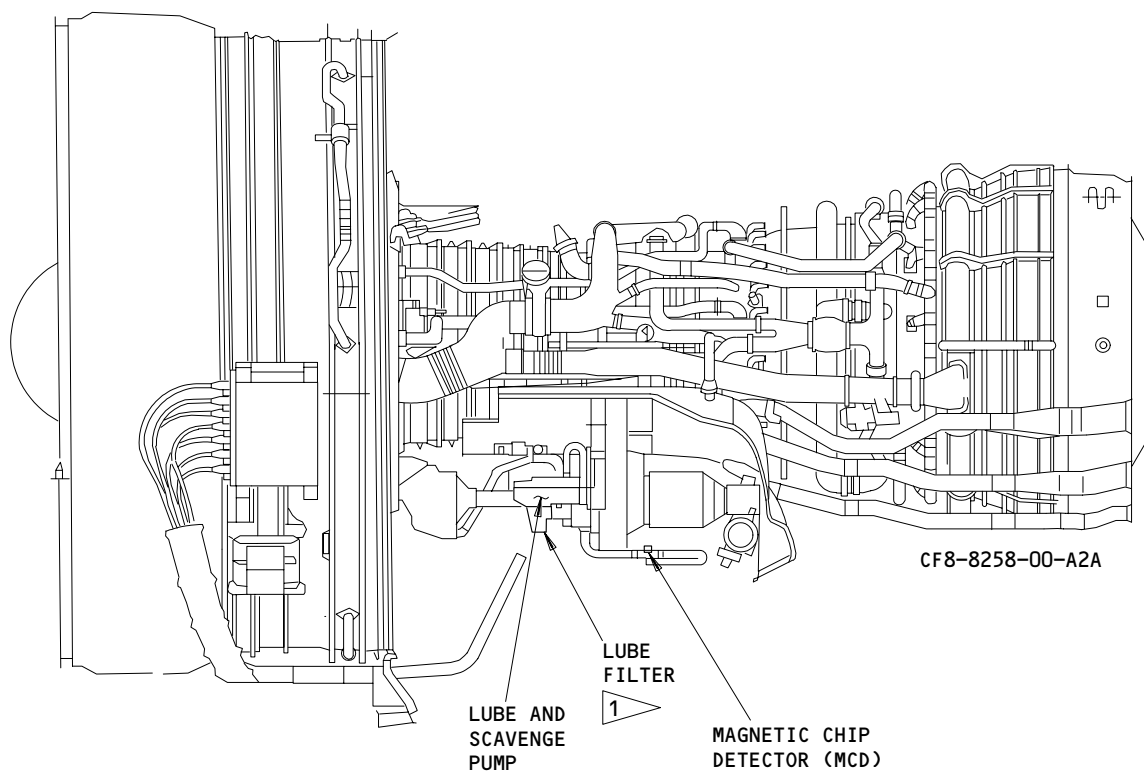
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1 ENGINES WITHOUT GE SB 79-047

Oil Distribution Component Location
Figure 1 (Sheet 2)

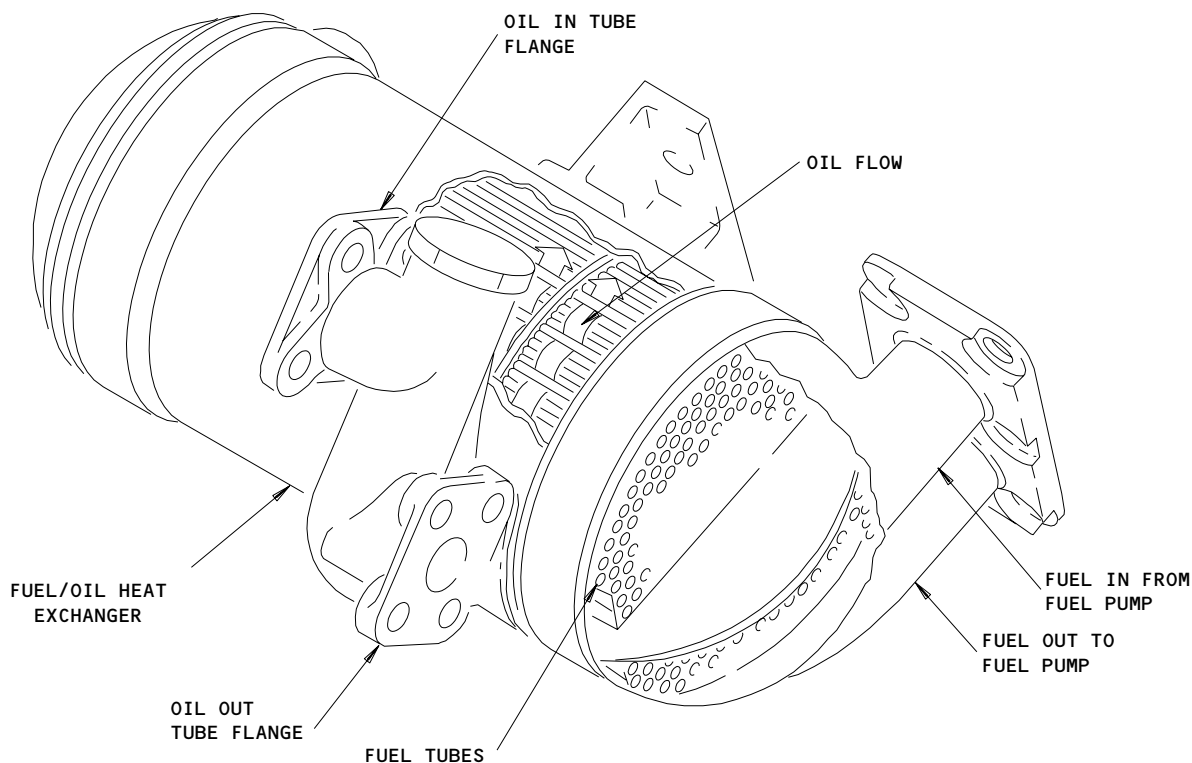
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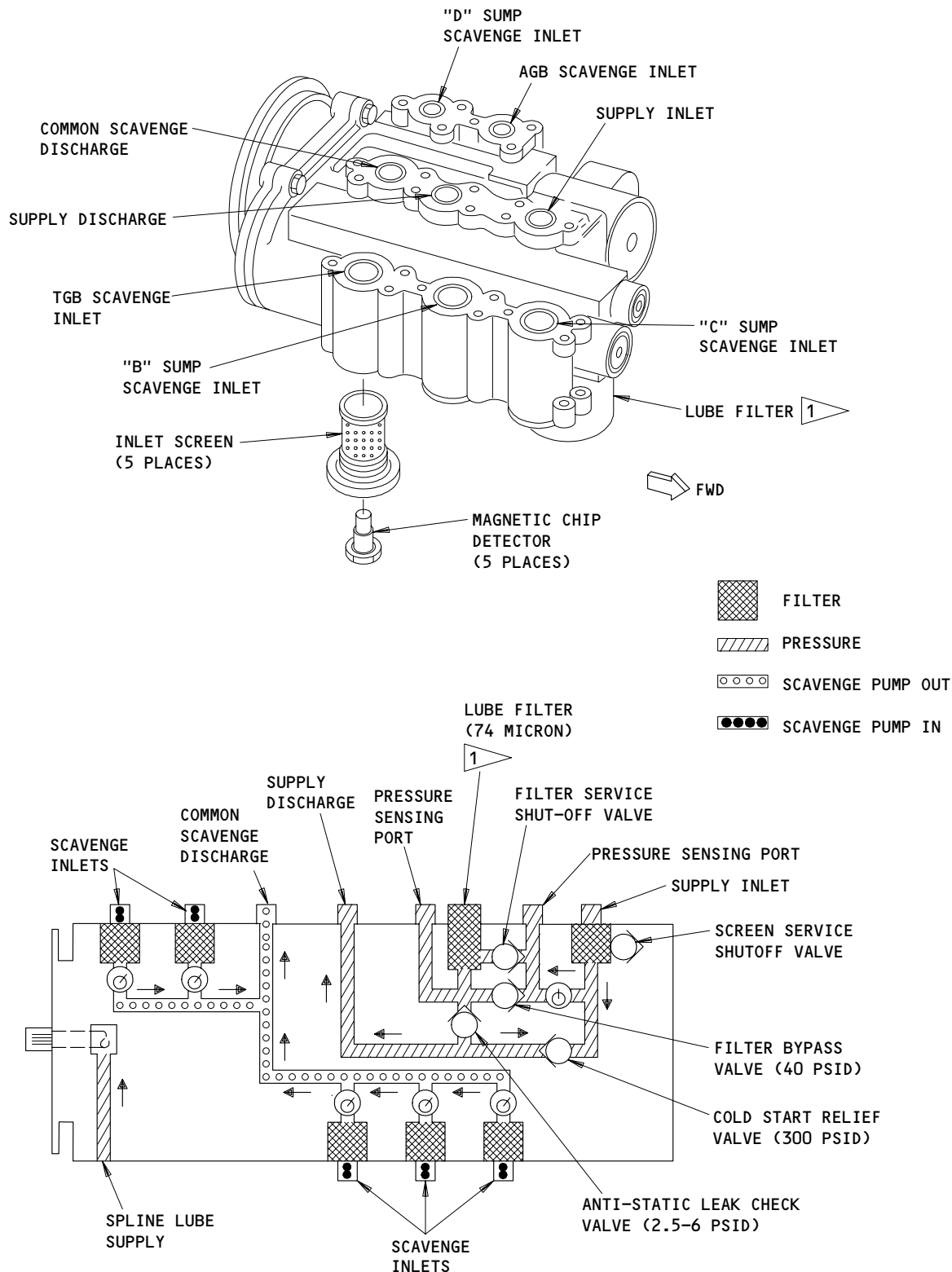
Fuel/Oil Heat Exchanger Diagram
Figure 2

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1 ENGINES WITHOUT GE SB 79-047

Lube and Scavenge Pump
Figure 3

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- A. The lube and scavenge pump is mounted on the forward face of the AGB at the 7 o'clock position and driven through a splined shaft. The pump contains six pumping elements which are sized according to the needs of each element. One element supplies oil from the oil tank to the oil jets in the sumps and gearboxes and five elements scavenge oil from the transfer gearbox, accessory gearbox, B sump, C sump, and D sump.
 - B. Each inlet port to the pumping elements contains an inlet screen to trap coarse debris. A magnetic plug may be threaded into each scavenge inlet screen.
 - C. A static anti-leak check valve, which opens at 2.5-6 psi (17-41 kPa), is incorporated in the pump in the oil supply flow path. At engine shutdown, the valve closes, preventing oil from draining from the oil tank into the sumps.
 - D. ENGINES WITHOUT GE SB 79-047;
A lube filter is screwed into the underside of the pump housing. A filter bypass valve opens at 70 psid (483 kpa). No indication of lube filter bypass is provided.
4. Oil Tubes
- A. Supply and scavenge oil tubes consist of formed rigid tubing coupled by threaded spherical seat-flared fittings and tube nuts. Oil tubes are run below the engine centerline in order to minimize fire hazard from leaking couplings or tubes. Supply lines also have deflector shields around couplings to prevent leaking oil from spraying directly on hot engine parts.
5. Magnetic Chip Detector (Fig. 4)
- A. The master magnetic chip detector (MCD) is located in the scavenge return line between the lube and scavenge pump and the servo fuel heat exchanger.
 - B. The MCD consists of a permanent magnet incorporated into a probe. The probe is installed in a housing either using a bayonet type connector or threaded connector. A check valve in the housing closes when the probe is removed, or is incorrectly installed preventing oil leakage under static conditions.
 - C. The MCD probe is accessible for inspection through the thrust reverser core cowl hatch provided to check the IDG oil level and hydraulic filter clogging indicator buttons.
6. Scavenge Oil Filter (Fig. 5)
- A. The scavenge oil filter is mounted on a bracket attached to the fan stator case just below the oil tank. The filter cleans the scavenge oil before the oil returns to the oil tank.
 - B. A relief valve is incorporated into the filter to allow oil to bypass if the filter becomes obstructed. The relief valve cracks open at 40 psi (276 kPa) and will allow full bypass of the filter at 60 psi (414 kPa). Normal pressure developed through a clean element is less than 14 psi (97 kPa) when the rate of flow is 16 gpm. Filter differential pressure is monitored through pressure ports in the filter head.
7. Operation (Fig. 6)

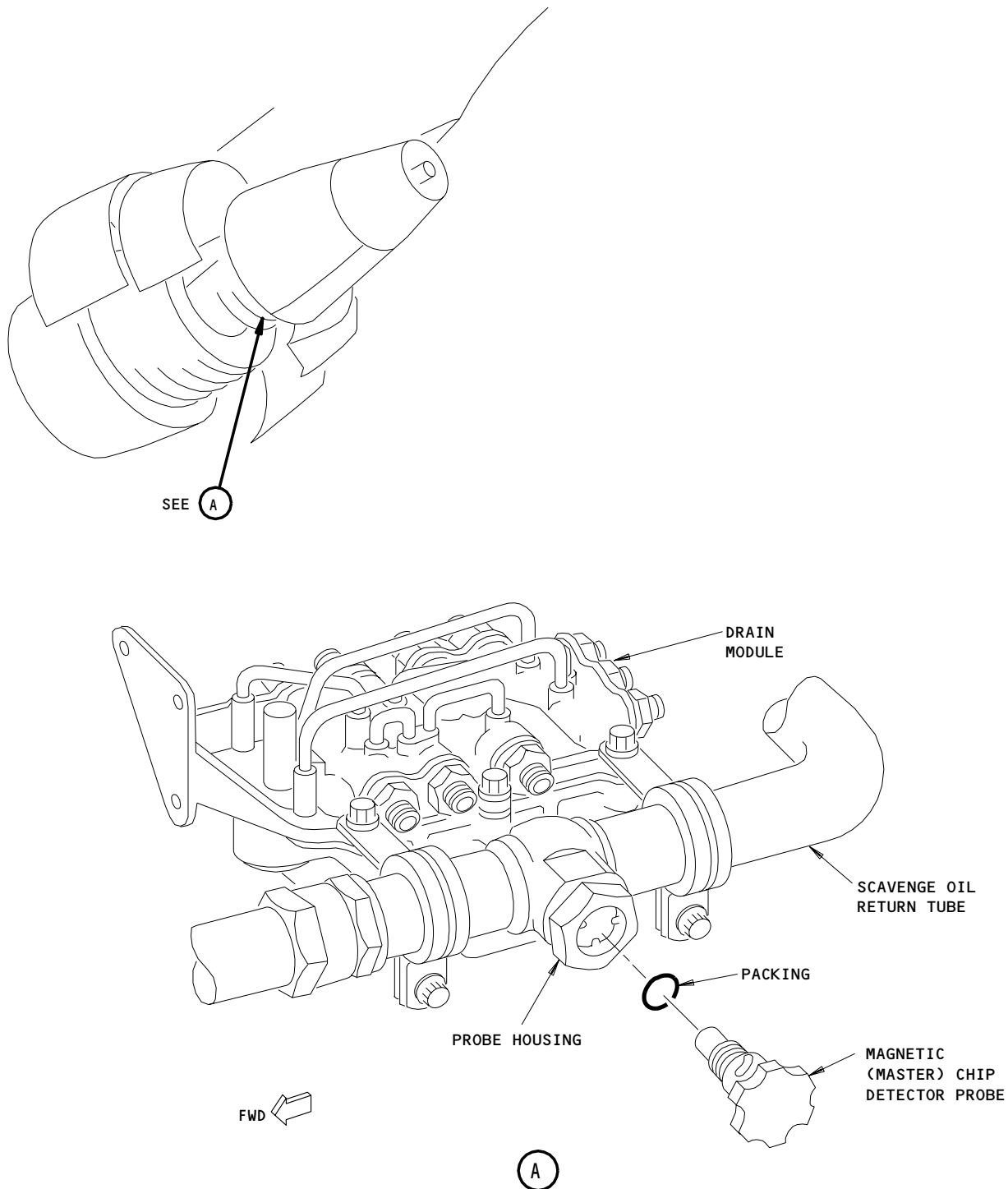
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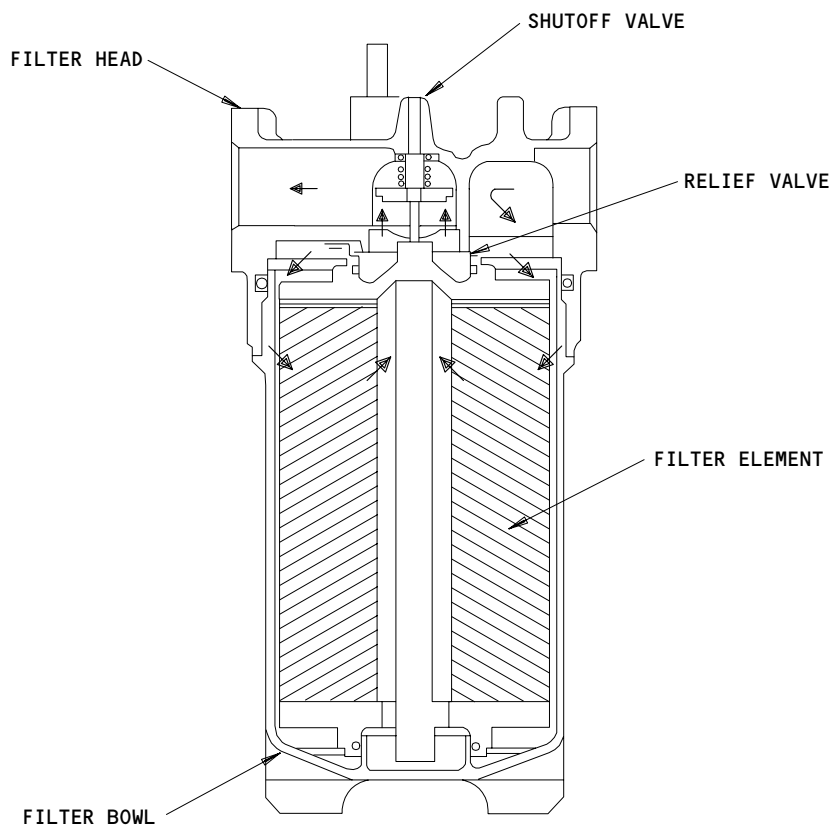
Magnetic Chip Detector Location
Figure 4

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Scavenge Oil Filter Diagram
Figure 5

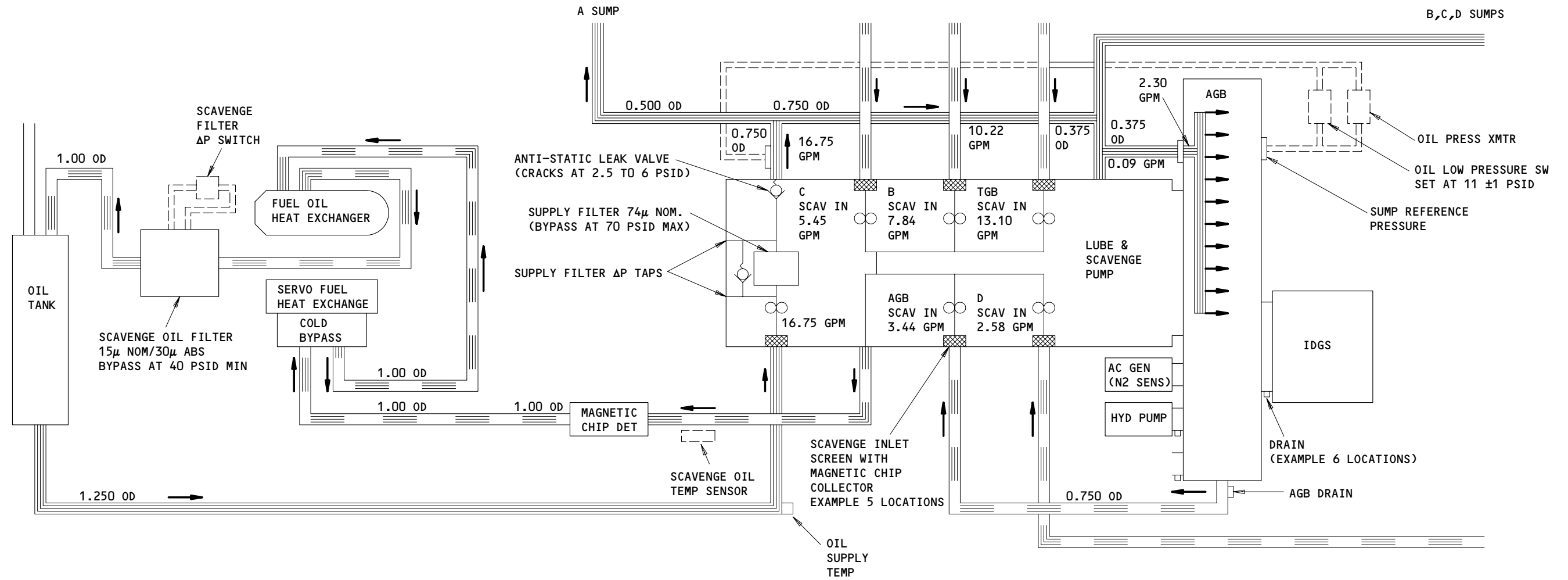
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===== OIL PRESSURE/SUPPLY
===== OIL SCAVENGE

Oil Distribution System Schematic
Figure 6

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- A. ENGINES WITHOUT GE SB 79-047;
Oil flows from the engine oil tank through the lube and scavenge pump 30 micron scavenge filter. If a pressure differential across the 30 micron scavenge filter exceeds 40 psid (276 kPa), a relief valve will bypass the oil around the filter. The oil then passes to the lube and scavenge pump supply inlet through an inlet screen and exits from the pump through the lube filter to the oil supply tubes. If a pressure differential across the 150 micron lube filter exceeds 40 psid (276kPa), a relief valve will bypass the oil around the filter. A cold start relief valve will bypass viscid oil back to the supply inlet when the pumps discharge pressure exceeds 300 psid (2068 kPa).
- B. ENGINES WITH GE SB 79-047;
Oil flows from the engine oil tank through the lube and scavenge pump 30 micron scavenge filter. If a pressure differential across the 30 micron scavenge filter exceeds lube filter exceeds 40 psid (276 kPa), a relief valve will bypass the oil around the filter. The oil then passes to the lube and scavenge pump supply inlet through an inlet screen and exits from the pump through the lube filter to the oil supply tubes.
- C. From the lube and scavenge pump, oil is supplied through rigid oil tubes to oil jets located in the four main sumps and the inlet, transfer and accessory gearboxes.
- D. Engine main shaft oil seals are pressurized by air flow across the seals and into the sumps to prevent oil leakage during all engine operating conditions. Air is distributed internally to pressurize the A sump seals and provide cooling air for the mid-shaft. Bleed air, extracted at the leading edge of seven fan frame struts in the core flow path, is provided externally to the compressor rear frame and turbine to pressurize the B and C sump oil seals and to supply additional cooling air for the mid-shaft. Air flow through the D sump oil seal is minimal. The minimal air flow is generated from a small pressure reduction of the air/oil mixture being scavenged from the sump which prevents oil leakage from the D sump.
- E. The A, B, and C sumps are vented to remove air that enters across the oil seals. The B and C sumps are vented externally to the A sump, and the A sump is vented through a radial air/oil separator to the fan mid-shaft vent tube, and then routed overboard through the vent exit. The D sump is not vented and leakage air over the seal is scavenged back to the engine oil tank where the air/oil mixture is separated and the air is vented to the A sump. The gearboxes are vented to the A sump which, in turn, is vented overboard.
- F. Oil leakage through the A, B, and C sump seals is discharged overboard. The A sump leakage discharges into the fan exhaust. Seal leakage from the B/C sump discharges into the primary exhaust through a LP recoup line. Seal leakage from the D sump, discharges directly into the engine exhaust.
- G. Two scavenge elements of the pump remove oil from the accessory gearbox and from the transfer gearbox, and the three remaining elements remove oil from the B, C, and D sumps, respectively. Transfer gearbox oil includes oil from the A sump. Each element has an inlet screen to trap larger contaminants in the oil.

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- H. Scavenge oil discharged from the pump passes through a magnetic chip detector.
- I. The scavenge oil then flows through the fuel/oil heat exchanger where heat absorbed from lubricated areas of the engine is transferred to engine fuel. Oil chambers circulate oil around the fuel tubes to accomplish the heat exchange to cool the oil and also to heat the fuel to prevent fuel system icing. During cold weather starting, high pressure scavenge oil, caused by cold viscous oil flowing through the exchanger, is bypassed at 85-100 psi (586-689 kPa) by a valve in the exchanger until the oil warms and normal pressure and flow is returned.
- J. A servo fuel heater (Ref 73-11-00/001)) in the oil scavenge return acts as a small fuel/oil heat exchanger for the Hydromechanical Unit (HMU) servo fuel. Cold viscous oil bypass occurs at 60-110 psid (413-758 kPa).
- K. The oil is then filtered through the oil scavenge filter. A shutoff valve prevents oil leakage from the filter when the element is removed. A relief valve will bypass the flow from the element if a pressure differential from the inlet to the outlet of a restricted or plugged element exceeds 40 psid (276 kPa).

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FUEL/OIL HEAT EXCHANGER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, remove the fuel/oil heat exchanger and install the fuel/oil heat exchanger.
- B. To remove the fuel/oil heat exchanger, you must do these steps:
 - (1) Open the right thrust reverser half
 - (2) Drain the fuel and oil
 - (3) Disconnect the tubes
 - (4) Remove the fuel/oil heat exchanger.
- C. To install the fuel/oil heat exchanger, you must do these steps:
 - (1) Install the fuel/oil heat exchanger
 - (2) Fill the oil tank
 - (3) Do a leak check.

TASK 79-21-01-004-001-J00

2. Fuel/Oil Heat Exchanger Removal (Fig. 401)

- A. Standard Tools and Equipment
 - (1) Container - 4 gallon (16 liter) capacity, two are necessary, one for fuel and one for oil
- B. Consumable Materials
 - (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- C. References
 - (1) 24-22-00/201, Manual Control
 - (2) 78-31-00/201, Thrust Reverser System
 - (3) AIPC 73-11-01 Fig. 1
 - (4) AIPC 79-21-01 Fig. 1
 - (5) AIPC 79-21-01 Fig. 5
- D. Access
 - (1) Location Zone
 - 412 Engine 1 - Accessory Gearbox Aft Face 5 o'clock
 - 422 Engine 2 - Accessory Gearbox Aft Face 5 o'clock
 - 432 Engine 3 - Accessory Gearbox Aft Face 5 o'clock
 - 442 Engine 4 - Accessory Gearbox Aft Face 5 o'clock
 - (2) Access Panel
 - 416 Right Thrust Reverser Half - Engine 1
 - 426 Right Thrust Reverser Half - Engine 2
 - 436 Right Thrust Reverser Half - Engine 3
 - 446 Right Thrust Reverser Half - Engine 4
- E. Procedure

S 864-002-J00

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

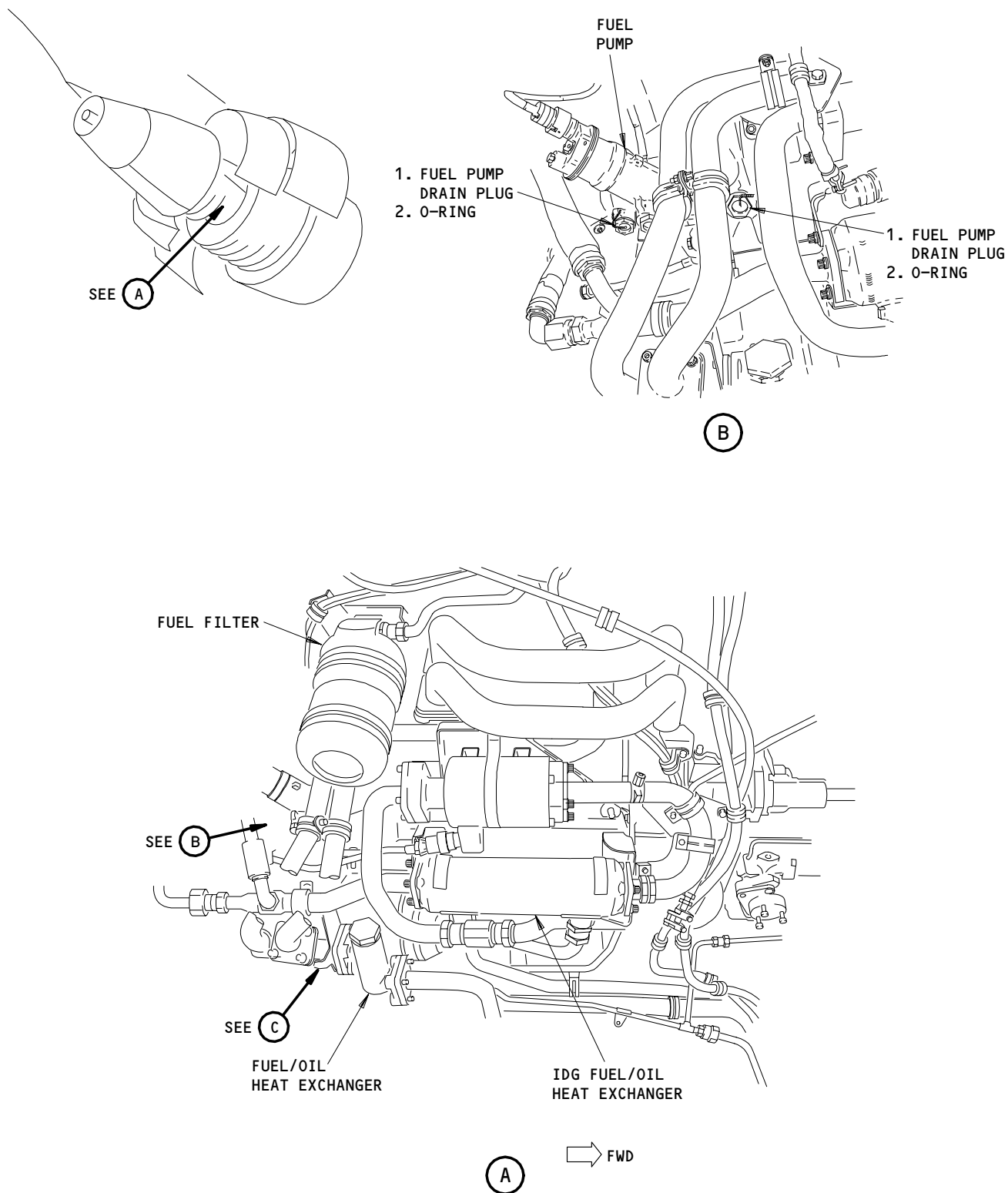
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Fuel/Oil Heat Exchanger Installation
Figure 401 (Sheet 1)

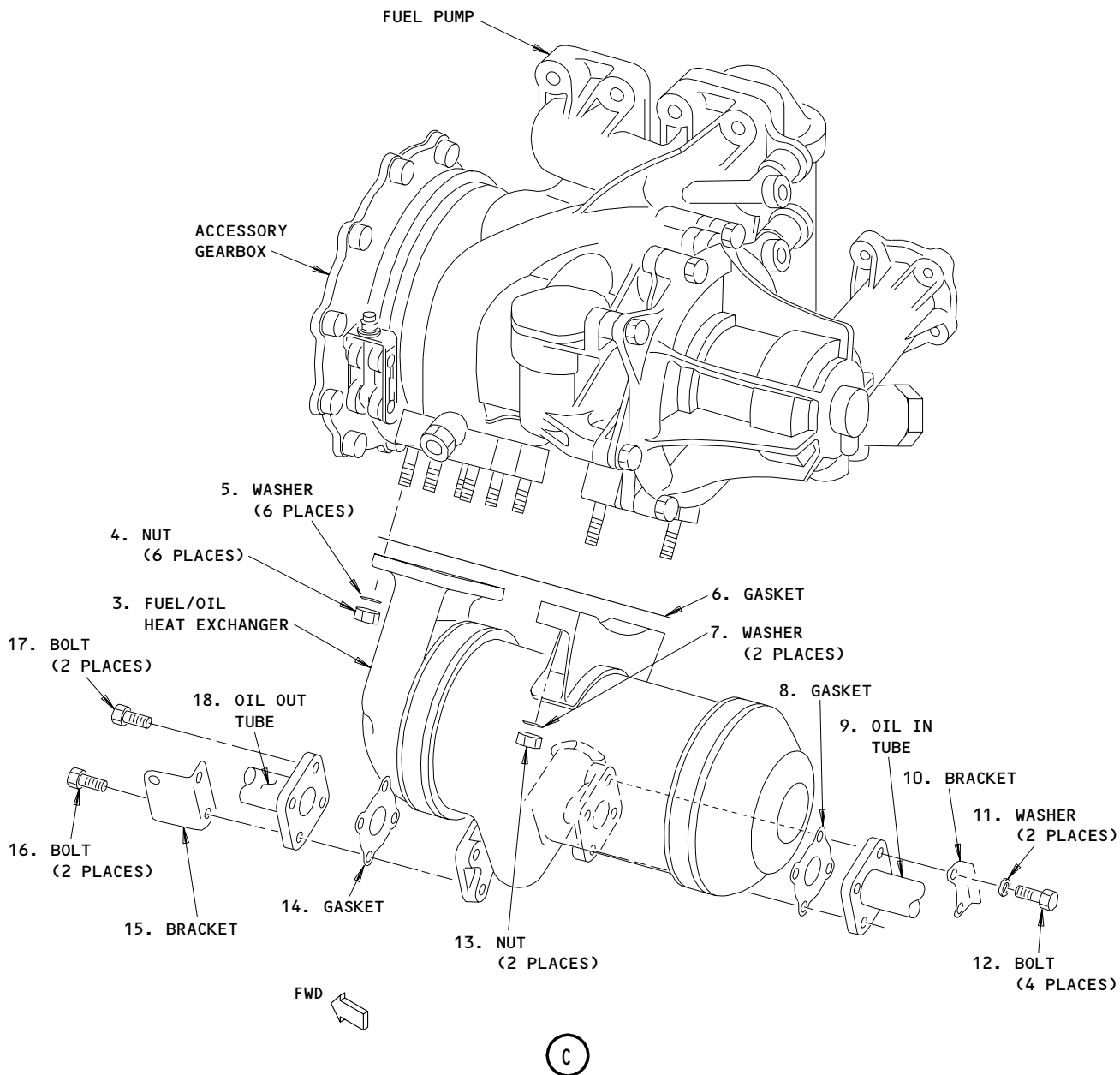
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Fuel/Oil Heat Exchanger Installation
Figure 401 (Sheet 2)

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S 864-003-J00

- (2) Make sure the applicable HP fuel valve (V236) stays closed, for the applicable engine:
- (a) Make sure the applicable FUEL CONTROL switch is set to CUTOFF, and attach a DO-NOT-OPERATE tag.
 - (b) Push the STAT switch on the EICAS select panel.
 - (c) Look at the status page on the bottom EICAS display.
 - 1) Make sure the applicable FUEL CUTOFF ENG 1, 2, 3, or 4 EICAS message does not show.
 - (d) Open this circuit breaker for the applicable engine, and attach a DO-NOT-CLOSE tag:
 - 1) P6 Main Power Distribution Panel
 - a) 6G1 FUEL SHUTOFF VALVE ENG 1
 - b) 6G2 FUEL SHUTOFF VALVE ENG 2
 - c) 6G3 FUEL SHUTOFF VALVE ENG 3
 - d) 6G4 FUEL SHUTOFF VALVE ENG 4

S 014-006-J00

- (3) Open the right thrust reverser half (Ref 78-31-00/201).

S 684-007-J00

- (4) Drain the fuel from the fuel pump.
- (a) Remove two plugs (1) from the fuel pump, and drain the fuel into a container.
 - (b) Remove and discard the O-ring (2) from each plug (1).
 - (c) Lubricate two new O-rings (2) with oil.
 - (d) Install an O-ring (2) on each plug (1).
 - (e) Install two plugs (1) in the fuel pump.
 - (f) Tighten each plug to 130-150 pound-inches (14.6-16.9 N.m).
 - (g) Install lockwire on each plug (1).

S 034-008-J00

- (5) Remove the scavenge oil tubes:
- (a) Remove four bolts (12), two washers (11), the bracket (10), and the oil inlet tube (9) from the heat exchanger (3).
 - 1) Keep the gasket (8) for the installation if it has no damage.
 - (b) Remove four bolts (16,17), the bracket (15), and the oil outlet tube (18) from the heat exchanger (3).
 - 1) Keep the gasket (14) for the installation if it has no damage.

S 024-026-J00

- (6) Remove the heat exchanger (3):
- (a) Remove eight self-locking nuts (4, 13) and eight washers (5, 7) that attach the heat exchanger (3) to the fuel pump.
 - (b) Remove the heat exchanger (3).
 - (c) Keep the gasket (6) for the installation if it has no damage.

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S 174-011-J00

(7) Do a preservation of the heat exchanger:

(a) Flush the inner surfaces of the heat exchanger (3):

NOTE: To make sure the fuel/oil heat exchanger will not have atmospheric corrosion damage, you must do a preservation of it. To do a preservation, you must put a layer of oil on the inner surfaces of the fuel/oil heat exchanger.

- 1) Put oil in the openings of the heat exchanger.
- 2) Turn the fuel/oil heat exchanger to put a layer of oil on all the inner surfaces.
- 3) Let the unwanted oil drain from the heat exchanger.

CAUTION: THE FLANGE SURFACES THAT SEAL MUST BE PROTECTED FROM DAMAGE. THE SURFACE FINISH IS VERY IMPORTANT TO HOW WELL THE SURFACE SEALS.

(b) Install protective caps on the flange surfaces.

(c) Put a protective cover on the heat exchanger and put it in a box to protect it from damage when you move it.

TASK 79-21-01-404-014-J00

3. Fuel/Oil Heat Exchanger Installation (Fig. 401)

A. Consumable Materials

(1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|-------------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 1 | Plug | 73-11-01 | 01 | 65 |
| | 2 | Packing (O-ring) | | | 75 |
| | 3 | Fuel/Oil Heat Exchanger | 79-21-01 | 05 | 25 |
| | 4 | Nut | | | 15 |
| | 5 | Washer | | | 05 |
| | 6 | Gasket | | | 20 |
| | 7 | Washer | | | 05 |
| | 8 | Gasket | 79-21-01 | 01 | 10 |
| | 11 | Washer | | | 25 |
| | 12 | Bolt | | | 20 |
| | 13 | Nut | 79-21-01 | 05 | 15 |
| | 14 | Gasket | 79-21-01 | 01 | 10 |
| | 16 | Bolt | | | 07 |
| | 17 | Bolt | | | 05 |

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C. References

- (1) 12-13-03/301, Engine
- (2) 24-22-00/201, Manual Control
- (3) 71-00-00/501, Power Plant
- (4) 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zone

- 412 Engine 1 - Accessory Gearbox Aft Face 5 o'clock
- 422 Engine 2 - Accessory Gearbox Aft Face 5 o'clock
- 432 Engine 3 - Accessory Gearbox Aft Face 5 o'clock
- 442 Engine 4 - Accessory Gearbox Aft Face 5 o'clock

(2) Access Panel

- 416 Right Thrust Reverser Half - Engine 1
- 426 Right Thrust Reverser Half - Engine 2
- 436 Right Thrust Reverser Half - Engine 3
- 446 Right Thrust Reverser Half - Engine 4

E. Procedure

S 434-015-J00

- (1) Remove the protective caps from the flange surfaces.

S 424-016-J00

- (2) Install the heat exchanger (3):

- (a) Lubricate the gasket (6) with oil.
- (b) Attach the heat exchanger (3) to the studs on the fuel pump.
- (c) Install eight washers (5, 7) and eight self-locking nuts (4, 13) on the studs of the fuel pump.
- (d) Tighten the nuts (4, 13) to 100-130 pound-inches (11.3-14.7 N.m).
- (e) Install lockwire on the nuts (4, 13).

S 434-018-J00

- (3) Install the oil inlet tube:

- (a) Lubricate the gasket (8) with oil.

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- (b) Attach the oil inlet tube (9) and the bracket (10) to the heat exchanger (3) with four bolts (12) and two washers (11).
- (c) Tighten the bolts (12) to 55-70 pound-inches (6.2-7.9 N.m).
- (d) Install lockwire on the bolts.

S 434-019-J00

- (4) Install the oil outlet tube:
 - (a) Lubricate the gasket (14) with oil.
 - (b) Attach the oil inlet tube (18) and the bracket (15) to the heat exchanger (3) with four bolts (16, 17).
 - (c) Tighten the bolts (16, 17) to 55-70 pound-inches (6.2-7.9 N.m).
 - (d) Install lockwire on the bolts.

S 614-020-J00

- (5) Fill the oil system (Ref 12-13-03/301).

S 864-021-J00

- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker, for the applicable engine:
 - (a) P6 Main Power Distribution Panel
 - 1) 6G1 FUEL SHUTOFF VALVE ENG 1
 - 2) 6G2 FUEL SHUTOFF VALVE ENG 2
 - 3) 6G3 FUEL SHUTOFF VALVE ENG 3
 - 4) 6G4 FUEL SHUTOFF VALVE ENG 4

S 864-022-J00

- (7) Remove the DO-NOT-OPERATE tag from the applicable FUEL CONTROL switch.

S 414-023-J00

- (8) Close the right thrust reverser half (Ref 78-31-00/201).

S 794-025-J00

- (9) Do an engine wet motor procedure (Ref 71-00-00/501, Test No. 2).
 - (a) Make sure there are no leaks.

S 794-024-J00

- (10) Do an idle leak check procedure (AMM 71-00-00/501, Test No. 3).

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- S 614-027-J00
- (11) Do the engine oil servicing procedure (AMM 12-13-03/301).
- (a) Make sure you do not find fuel in the oil.

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FUEL/OIL HEAT EXCHANGER - INSPECTION/CHECK

1. General

- A. This procedure provides a task to do an examination of the fuel/oil heat exchanger.

TASK 79-21-01-206-001-J00

2. Fuel/Oil Heat Exchanger Examination

A. References

- (1) 78-31-00/201, Thrust Reverser System
- (2) 79-21-01/401, Fuel/Oil Heat Exchanger

B. Access

(1) Location Zone

- 412 Engine 1 - Gearbox Aft Face 5 o'clock
- 422 Engine 2 - Gearbox Aft Face 5 o'clock
- 432 Engine 3 - Gearbox Aft Face 5 o'clock
- 442 Engine 4 - Gearbox Aft Face 5 o'clock

(2) Access Panel

- 416 Right Thrust Reverser Half - Engine 1
- 426 Right Thrust Reverser Half - Engine 2
- 436 Right Thrust Reverser Half - Engine 3
- 446 Right Thrust Reverser Half - Engine 4

C. Procedure

S 016-002-J00

- (1) Do this task: "Open the Thrust Reverser" (Ref 78-31-00/201) to open the right thrust reverser half.

S 216-003-J00

- (2) Visually examine the fuel/oil heat exchanger:
- (a) Visually examine the fuel/oil heat exchanger for these types of damage:
 - 1) Signs of leaks
 - 2) Cracks
 - 3) Bulges
 - (b) If you find this damage,
Do these tasks: "Fuel/Oil Heat Exchanger Removal"
(AMM 79-21-01/401) and "Fuel/Oil Heat Exchanger Installation"
(AMM 79-21-01/401).

S 416-005-J00

- (3) Do this task: "Close the Thrust Reverser" (Ref 78-31-00/201).

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OIL TUBES - INSPECTION/CHECK

1. General

- A. This procedure contains a task to do an examination of the oil tubes in the engine oil system.

TASK 79-21-02-206-001-J00

2. Oil Tubes Examination

A. References

- (1) 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zone

- | | |
|-----|------------------------------------------|
| 412 | Engine 1 - Fan Case and AGB Forward Face |
| 422 | Engine 2 - Fan Case and AGB Forward Face |
| 432 | Engine 3 - Fan Case and AGB Forward Face |
| 442 | Engine 4 - Fan Case and AGB Forward Face |

(2) Access Panel

- | | |
|-----|---------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 416 | Right Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 426 | Right Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 436 | Right Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |
| 446 | Right Thrust Reverser Half - Engine 4 |

C. Procedure

S 016-002-J00

- (1) Do this task: "Open the Thrust Reverser" (Ref 78-31-00/201) to open the left and the right thrust reverser halves.

S 226-003-J00

- (2) Visually examine the oil tubes for splits, cracks, or kinks.
(a) If the length of the splits, cracks, or kinks is less than two times the outer diameter of the tube,
Repair the tube.

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- (b) If the length of the splits, cracks, or kinks is more than two times the outer diameter of the tube,
Replace the tube.

S 226-005-J00

- (3) Visually examine the bends of the oil tubes for wrinkles.
 - (a) If the depth of the wrinkles is more than 5% of the average diameter of the tube,
Replace the tube.

S 226-006-J00

- (4) Visually examine the oil tubes for dents.
 - (a) If you find one of these types of damage,
Repair the tube:
 - 1) More than six dents for each lineal foot
 - 2) A distance between the edges of adjacent dents of more than 0.25 inch (6.35 mm)
 - 3) The depth of the dents is more than 20% of the outer diameter of the tube
 - 4) The radius of the dents is less than two times the thickness of the tube wall.

S 226-007-J00

- (5) Visually examine the flat areas of the oil tubes.
 - (a) If the size of the flat areas is more than the limits,
Repair the tube:
 - 1) The length is less than three times the outer diameter of the tube
 - 2) The contour change is less than 20% of the outer diameter of the tube.

S 216-008-J00

- (6) Visually examine the straight sections of the oil tubes for nicks, scratches, chafes, or scores:
 - (a) For serviceable limits, the depth must not be more than 25 percent of the nominal tube wall thickness.

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S 216-011-J00

- (7) Visually examine the bend sections of the oil tubes for nicks, scratches, chafes, or scores:
- (a) For damage in the bend sections the tubing is not serviceable.
 - (b) You can repair all amounts of damage except the bend depth must not be more than 10 percent of the wall thickness.

S 416-010-J00

- (8) Do this task: "Close the Thrust Reversers" (Ref 78-31-00/201).

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LUBE AND SCAVENGE PUMP – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks:
 - Remove the lube and scavenge oil pump (referred to as the oil pump)
 - Install the lube and scavenge oil pump (referred to as the oil pump).
- B. To remove the oil pump, you must do the following:
 - Open the left thrust reverser half and the fan cowl panels
 - Drain the engine oil tank
 - Drain the oil pump
 - Disconnect electrical connectors and oil tubes
 - Remove bracket and the tubes
 - Remove the oil pump from the accessory gearbox.
- C. To install the oil pump, you must do the following:
 - Install four bolts in the oil pump
 - Install the oil pump on the accessory gearbox
 - Connect the oil tubes
 - Install the low oil pressure warning switch and the oil pressure transmitter
 - Connect electrical connectors
 - Service the oil system
 - Prime the oil pump
 - Close the left thrust reverser half
 - Do a dry motor of the engine to purge the air in the oil system
 - Do a leak check.
 - Service the oil system.

TASK 79-21-03-004-001-J00

2. Remove the Oil Pump (Fig. 401)

- A. Standard Tools and Equipment
 - (1) Container – 10 gallon (38 liter) capacity for oil
- B. Consumable Materials
 - (1) D00552 Oil – Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- C. References
 - (1) AMM 71-11-04/201, Fan Cowl Panels
 - (2) AMM 78-31-00/201, Thrust Reverser System
 - (3) AMM 79-21-06/201, Supply and Scavenge Inlet Screens
 - (4) AIPC 79-11-01 Fig. 1

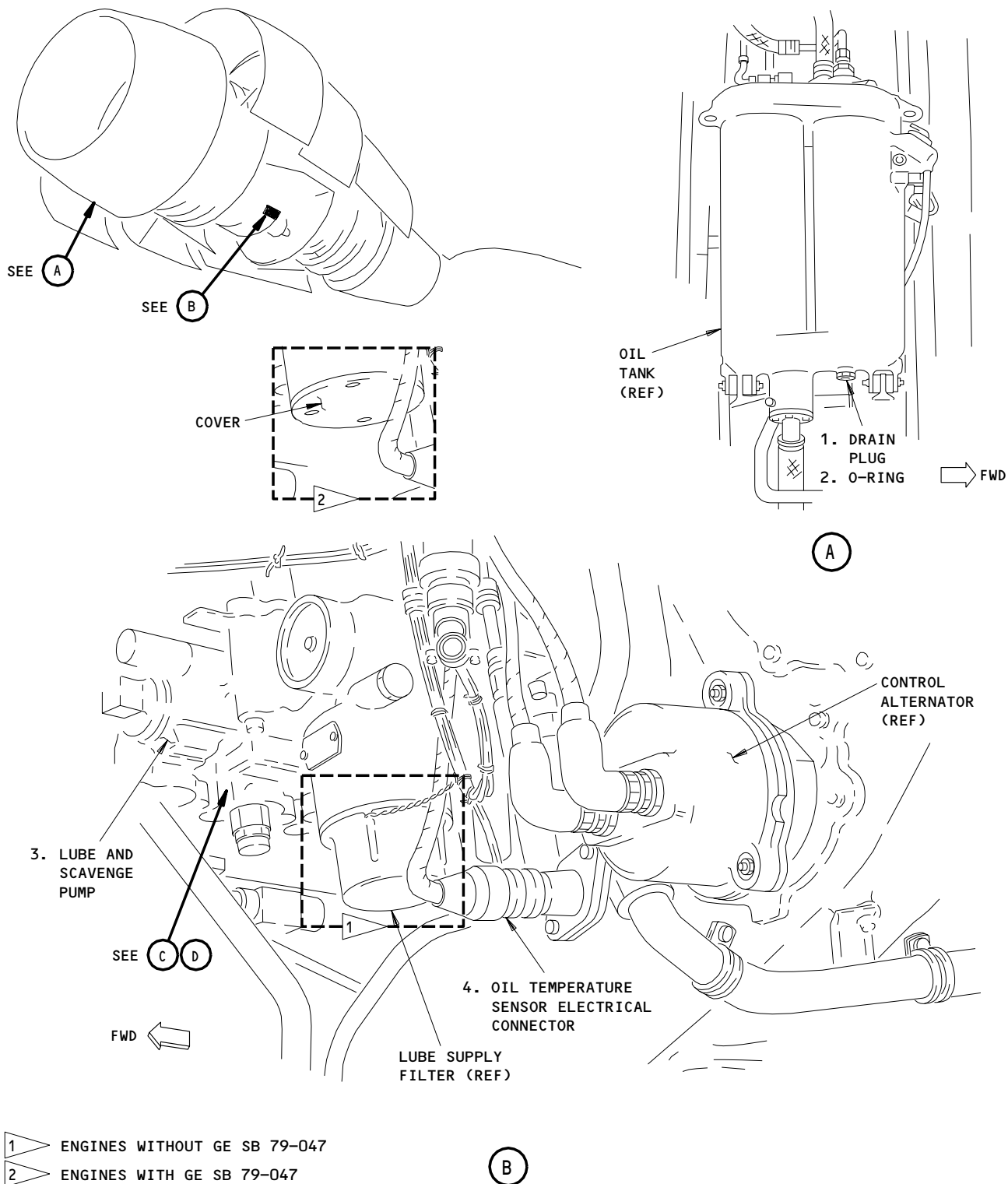
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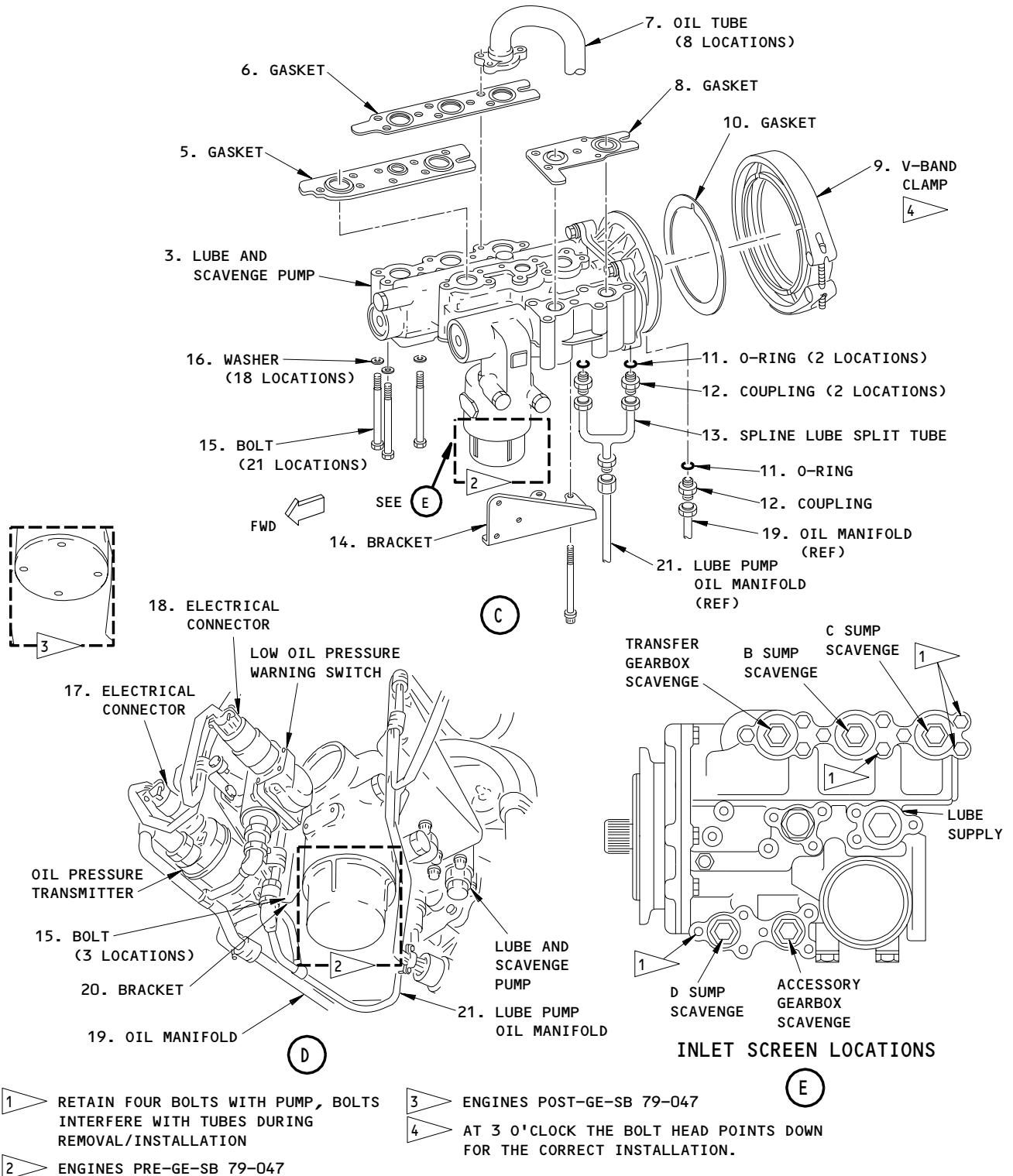
Lube and Scavenge Pump Installation
Figure 401 (Sheet 1)

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Lube and Scavenge Pump Installation
Figure 401 (Sheet 2)

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(5) AIPC 79-21-02 Fig. 5

(6) AIPC 79-21-03 Fig. 1

D. Access

(1) Location Zone

412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

415 Left Thrust Reverser Half - Engine 1
425 Left Thrust Reverser Half - Engine 2
435 Left Thrust Reverser Half - Engine 3
445 Left Thrust Reverser Half - Engine 4

E. Procedure

S 014-002-J00

- (1) Open the left thrust reverser half (AMM 78-31-00/201) and open the two fan cowl panels (AMM 71-11-04/201).

S 684-004-J00

- (2) Drain the engine oil tank.
- (a) Put a container under the drain plug (1) of the oil tank.
 - (b) Remove the drain plug (1) from the oil tank and let the oil drain into the container.
 - (c) Remove and discard the O-ring (2) from the drain plug (1).
 - (d) Lubricate a new O-ring (2) with oil and install the O-ring on the drain plug (1).
 - (e) Install the drain plug (1) in the oil tank and torque the drain plug to 540-600 pound-inches (61.0-67.8 N.m).
 - (f) Install lockwire on the drain plug.

S 684-005-J00

- (3) Drain the oil pump.
- (a) Put a container under the oil pump (3).
 - (b) Remove all five magnetic isolation plugs from the oil pump (AMM 79-21-06/201).
 - 1) Let the oil drain into the container.

S 034-006-J00

- (4) Disconnect the electrical connector (4) from the oil temperature sensor.

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- S 034-007-J00
- (5) Disconnect the electrical connector (17) from the oil pressure transmitter.
- S 034-031-J00
- (6) Disconnect the electrical connector (18) from the low oil pressure warning switch.
- S 034-047-J00
- (7) Disconnect the lube pump oil manifold (21) tube from the spline lube tube (13).
- S 034-039-J00
- (8) Disconnect the oil manifold (19), attached to the oil pump coupling (12).
- S 034-008-J00
- (9) Remove three bolts (15) that attach the bracket (20) to the oil pump.
- (a) Remove the parts that follow as one unit:
- the bracket (20)
 - the oil pressure transmitter
 - the low oil pressure warning switch
 - the oil manifolds (19) and (21).
- S 034-011-J00
- (10) Remove 21 bolts (15) and 18 washers (16) from the bottom of the oil pump (3).
- NOTE:** Four of the flange bolts may interfere with the tubes when you remove them. These four bolts may stay with the oil pump until the oil pump is removed (See Fig. 401, sheet 2 flagnote 1).
- (a) Three bolts are installed at each of eight tube flanges.
- (b) Move the bracket (14) with the cables and the manifold bracket away from the oil pump.

S 034-012-J00

CAUTION: YOU MUST PROVIDE SUFFICIENT SUPPORT OF THE OIL PUMP WHEN YOU REMOVE THE CLAMP. YOU MAY DAMAGE THE SHAFT OR THE SPLINE IF YOU DO NOT HAVE SUFFICIENT SUPPORT.

- (11) Support the oil pump (3) and remove the V-band clamp (9).

S 024-013-J00

- (12) Remove the oil pump (3).

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S 034-014-J00

- (13) Remove the gaskets (5, 6, and 8) from the top of the oil pump. If the gaskets (5, 6 and 8) are not damaged, keep them for installation. Discard the mounting gasket (10).

S 034-015-J00

- (14) Disconnect the spline lube split tube (13) from the oil pump (3).

S 034-013-J00

- (15) Remove three couplings (12) and three 0-rings (11) from the spline lube ports on the oil pump (3). Discard the 0-rings.

S 434-016-J00

- (16) Install protective caps in all the open tubes and pump ports.

TASK 79-21-03-404-042-J00

3. Install the Oil Pump (Fig. 401)

A. Standard Tools and Equipment

- (1) Container - 10 gallon (38 liter) capacity for oil

B. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019) (recommended)
(2) D00639-Lubricant, Acryloid HF825 (C02-013) (alternative)
(3) D00558 Compound - Antiseize

C. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|--------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 1 | Drain Plug | 79-11-01 | 01 | 65 |
| | 2 | Packing (0-ring) | | | 70 |
| | 3 | Oil Pump | 79-21-03 | 01 | 25 |
| | 5 | Gasket | | | 195 |
| | 6 | Gasket | | | 190 |
| | 8 | Gasket | | | 185 |
| | 9 | V-band Clamp | | | 15 |
| | 10 | Gasket | | | 20 |
| | 11 | Packing (0-ring) | 79-21-02 | 05 | 70 |
| | 12 | Reducer (Coupling) | | | 80 |
| | 13 | Spline Lube Tube | | | 110 |
| | 14 | Bracket | | | |
| | 15 | Bolt | 79-21-03 | 01 | 175 |
| | 16 | Washer | | | 180 |

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| | | | | | |
|----|------------------------|----------|----|-----|--|
| 19 | Oil Manifold | | | | |
| 20 | Bracket | 79-31-01 | 05 | 210 | |
| 21 | Lube Pump Oil Manifold | | | 205 | |
| | Bracket | | | 200 | |
| | Transmitter | | | 170 | |
| | Bolt | | | 175 | |
| | Nut | | | 180 | |
| | Switch | | | 190 | |
| | Bolt | | | 195 | |
| | Tube | | | 100 | |

D. References

- (1) AMM 12-13-03/301, Engine - Servicing
- (2) AMM 71-00-00/201, Power Plant
- (3) AMM 71-00-00/501, Power Plant
- (4) AMM 71-11-04/201, Fan Cowl Panels
- (5) AMM 78-31-00/201, Thrust Reverser System
- (6) AMM 79-21-06/201, Supply and Scavenge Inlet Screens
- (7) AIPC 79-11-01 Fig. 1
- (8) AIPC 79-21-02 Fig. 5
- (9) AIPC 79-21-03 Fig. 1

E. Access

(1) Location Zone

- | | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 422 | Engine 2 - Accessory Gearbox Fwd Face 7 o'clock |
| 432 | Engine 3 - Accessory Gearbox Fwd Face 7 o'clock |
| 442 | Engine 4 - Accessory Gearbox Fwd Face 7 o'clock |

(2) Access Panel

- | | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

F. Procedure

S 034-018-J00

- (1) Remove protective caps from all the tubes and pump ports.

S 434-045-J00

- (2) Lubricate three new O-rings (11) with oil.
 - (a) Install three couplings (12) and three O-rings (11) in the spline lube ports on the oil pump (3).

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- (b) Tighten the three couplings (12) to 135-155 pound-inches (15.3-17.5 N.m).

S 434-044-J00

- (3) Connect the spline lube tube (13) to the oil pump couplings (12).
(a) Tighten the two spline lube tube (13) fittings to 270-300 pound-inches (30.5-33.9 N.m).

S 434-021-J00

- (4) Put the V-band clamp (9) over the gearbox mounting flange. Make sure the bolt is at the 3 o'clock position, and the bolthead points down.

S 434-022-J00

- (5) Install four flange bolts (15) and four washers (16) in the oil pump (3) at the locations shown in Fig. 401, sheet 2, flagnote 1.

NOTE: To help to install the oil pump, four bolts (15) may be taped in position. The threaded ends of the bolts should be flush with the top surface of the oil pump.

S 434-023-J00

- (6) Lubricate a new gasket (10) with oil. Install the gasket on the mounting flange of the oil pump. The dowel pin, at the 12 o'clock position, should pass through the hole in the gasket.

S 424-024-J00

- (7) Install the oil pump (3) on the gearbox pad. Make sure the oil pump splines align with the gearbox splines and the dowel pin aligns with the hole.

S 434-043-J00

- (8) Install the V-band clamp (9).
(a) Install the V-band clamp over the oil pump flange and the gearbox flange. Make sure the bolt is at the 3 o'clock position, and the bolthead points down.
(b) Tighten the clamp bolt while you tap lightly on the clamp with a soft-faced mallet.
(c) Tighten the clamp bolt to 70-90 pound-inches (7.9-10.2 N.m).
(d) Make sure the side surface of the lube/scavange pump flange and the side surface of the V-band clamp and ensure that they are even.
(e) Make sure the gap size between the flange and the V-band clamp are consistent around the entire flange.
(f) Install lockwire on the clamp bolt.
(g) Make sure the safety wire does not rub against the tube coupling nut at the spline lube port.

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S 434-028-J00

- (9) Install the bolt (15) and the washer (16) in aft-most hole of each of three rows of oil tubes (7).
(a) Engage the threads in the tube flanges.
(b) Washers (16) are not used on the brackets (14) or (20).

S 434-038-J00

- (10) Slide the gaskets (5, 6, and 8) between the oil pump and the tube flanges.
(a) Make sure the sides of the gaskets with lettering are pointing down.
(b) Make sure the slot in the aft edge of each gasket is aligned with the bolts (15).

S 434-032-J00

- (11) Attach the parts that follow as one unit:
-- the bracket (20)
-- the oil pressure transmitter
-- the low oil pressure warning switch
-- the oil manifolds (19) and (21).
(a) Install the three bolts (15) that attach the bracket (20) to the oil pump.
(b) Install the bracket (14) to the oil pump AGB SCAV IN port with three bolts (15).

S 434-030-J00

- (12) Install the manifold bracket to the oil pump TGB SCAV IN port and the bolts (15) and washers (16) that remain
(a) Tighten all 24 bolts to 55-70 pound-inches (6.2-7.9 N.m).

S 434-035-J00

- (13) Install all five magnetic isolation plugs in the oil pump (AMM 79-21-06/201).

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S 434-033-J00

- (14) Connect the oil manifold (19), to the oil pump coupling (12).
(a) Tighten the oil manifold (19) fitting to 270-300 pound-inches (30.5-33.9 N.m).

S 434-034-J00

- (15) Connect the oil manifold (21) of the lube pump to the spline lube tube (13).
(a) Tighten the oil manifold (21) fitting for the lube pump to 135-155 pound-inches (15.3-17.5 N.m).

S 434-036-J00

- (16) Connect the electrical connector (18) to the low oil pressure warning switch.
(a) Tighten the electrical connector with your hand.

NOTE: This will put a cover over the witness band.

- (b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/8 turn.

S 434-046-J00

- (17) Connect the electrical connector (17) to the oil pressure transmitter.
(a) Tighten the electrical connector with your hand.

NOTE: This will put a cover over the witness band.

- (b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/4 turn.

S 434-037-J00

- (18) Connect the electrical connector (4) to the oil temperature sensor.
(a) Tighten the electrical connector with your hand.

NOTE: This will put a cover over the witness band.

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(b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/4 turn.

S 614-035-J00

(19) Add oil to the engine oil tank (AMM 12-13-03/301).

S 414-037-J00

(20) Close the left thrust reverser half (AMM 78-31-00/201).

S 414-049-J00

(21) Close the fan cowl panels (AMM 71-11-04/201).

S 864-039-J00

(22) Do a dry motor of the engine for 3 to 5 minutes to purge the air from the oil system (AMM 71-00-00/201).

S 794-040-J00

(23) Do an idle leak check (AMM 71-00-00/501).

S 614-041-J00

(24) Add oil to the engine oil tank (AMM 12-13-03/301).

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SCAVENGE OIL FILTER ELEMENT - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks: remove the scavenge oil filter element and install the scavenge oil filter element (filter element).

TASK 79-21-04-004-001-J00

2. Scavenge Oil Filter Element Removal (Fig. 401)

A. Equipment

- (1) Strap Wrench (commercially available)

B. References

- (1) AMM 71-11-04/201, Fan Cowl Panels
(2) AIPC 79-21-04, Fig. 5

C. Access

(1) Location Zone

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 4 o'clock |
| 422 | Engine 2 - Fan Case 4 o'clock |
| 432 | Engine 3 - Fan Case 4 o'clock |
| 442 | Engine 4 - Fan Case 4 o'clock |

(2) Access Panel

- | | |
|-----|---------------------------------|
| 414 | Right Fan Cowl Panel - Engine 1 |
| 424 | Right Fan Cowl Panel - Engine 2 |
| 434 | Right Fan Cowl Panel - Engine 3 |
| 444 | Right Fan Cowl Panel - Engine 4 |

D. Prepare to remove the scavenge oil filter element

S 014-002-J00

- (1) Open the right fan cowl panel (AMM 71-11-04/201).

S 214-015-J00

- (2) Do this task for engine number 1, engine number 2, engine number 3, and engine number 4.

NOTE: This task can be done in one of the four sequences. However, an individual technician must work with one oil scavenge filter element at a time. Complete one engine before moving to the next engine.

S 024-009-J00

- (3) If it is necessary, use one of these instruments to break the torque for the oil filter bowl:
(a) A rod made from the same material

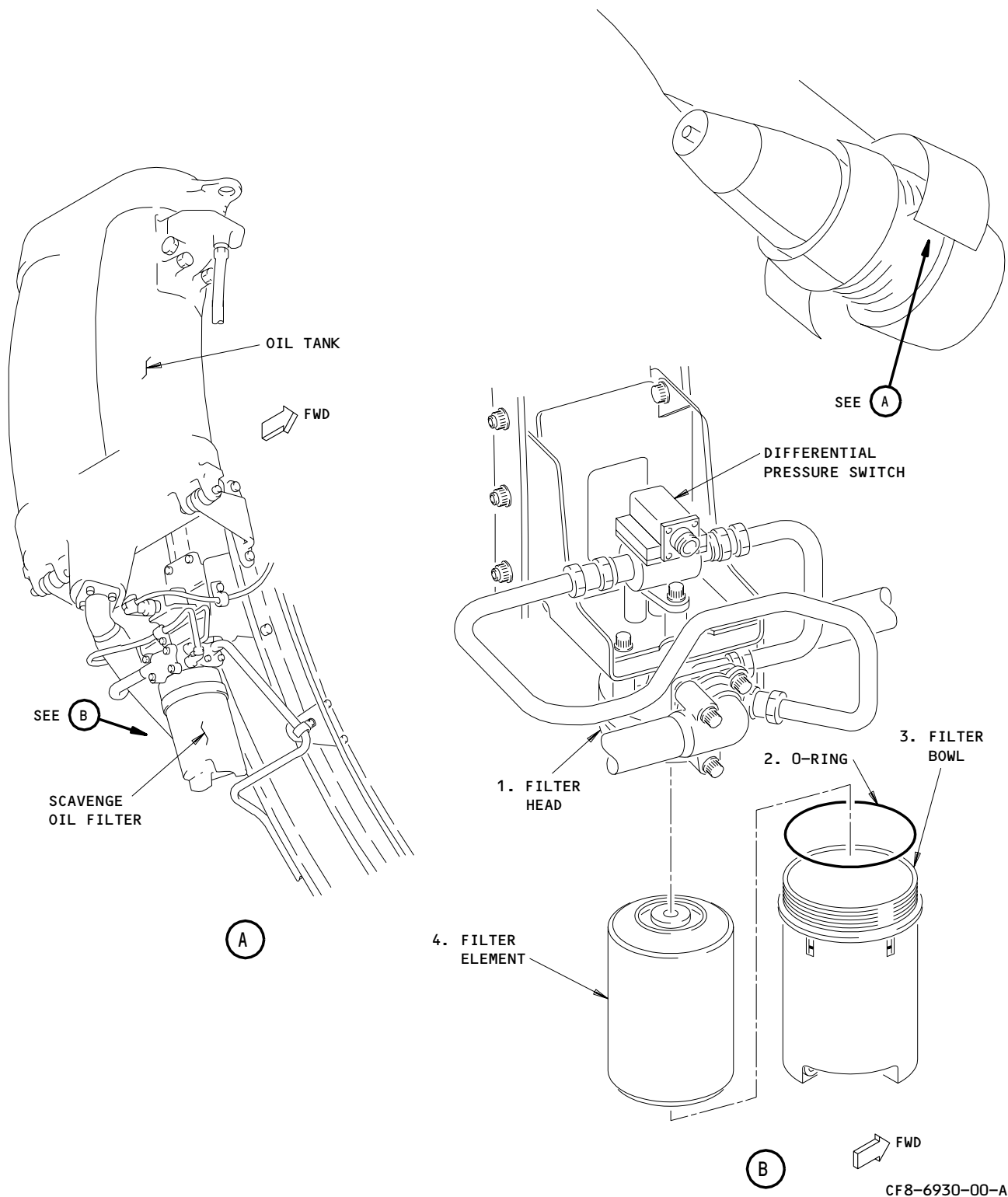
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Scavenge Oil Filter Element Installation
Figure 401

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- (b) A long screwdriver
- (c) Locally made special tools.

S 024-007-J00

- (4) Remove the scavenge oil filter bowl (3):
 - (a) Remove the scavenge oil filter bowl (3) from the filter head (1) with a strap wrench.

NOTE: The shutoff valve in the filter head does not let the oil drain when you remove the filter bowl.

- (b) Remove and discard the O-ring (2).
- (c) Remove the filter element (4) from the scavenge oil filter bowl (3).

S 804-013-J00

- (5) Discard the filter element (4).

TASK 79-21-04-404-005-J00

3. Scavenge Oil Filter Element Installation (Fig. 401)

- A. Consumable Materials
 - (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 2 | Packing (O-ring) | 79-21-04 | 05 | 25 |
| | 3 | Filter Bowl | | | 15 |
| | 4 | Filter Element | | | 20 |

- C. References
 - (1) AMM 12-13-03/301, Engine - Servicing
 - (2) AMM 71-00-00/501, Power Plant
 - (3) AMM 71-11-04/201, Fan Cowl Panels

D. Access

- (1) Location Zone
 - 412 Engine 1 - Fan Case 4 o'clock
 - 422 Engine 1 - Fan Case 4 o'clock
 - 432 Engine 1 - Fan Case 4 o'clock
 - 442 Engine 1 - Fan Case 4 o'clock
- (2) Access Panel
 - 414 Right Fan Cowl Panel - Engine 1
 - 424 Right Fan Cowl Panel - Engine 2
 - 434 Right Fan Cowl Panel - Engine 3
 - 444 Right Fan Cowl Panel - Engine 4

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E. Prepare to install the scavenge oil filter element.

S 214-016-J00

- (1) Do this task for engine number 1, engine number 2, engine number 3, and engine number 4.

NOTE: This task can be done in one of the four sequences. However, an individual technician must work with one oil scavenge filter element at a time. Complete one engine before moving to the next engine.

S 424-008-J00

- (2) Do these steps to install the filter element (4):
- (a) Put a clean filter element (4) in the filter bowl (3), with the open end of the filter element at the top.
 - (b) Lubricate these areas with the oil:
 - 1) The new O-ring (2)
 - 2) The surfaces of the filter bowl (3) that make a seal
 - 3) The filter head (1).
 - (c) Install the O-ring (2) in the groove on the filter head (1).
 - (d) Install the filter bowl (3) into the filter head (1).
 - (e) Tighten the filter bowl with your hand.
 - (f) Install the lockwire from the filter bowl (3) to the filter head (1).

F. Return the airplane to service.

S 614-009-J00

- (1) Fill the oil tank (AMM 12-13-03/301).

S 414-010-J00

- (2) Close the right fan cowl panel (AMM 71-11-04/201).

S 794-011-J00

- (3) Do an idle leak check procedure (AMM 71-00-00/501, Test No. 3).

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MAGNETIC CHIP DETECTOR – MAINTENANCE PRACTICES

1. General

- A. This procedure contains six tasks for the magnetic chip detector (MCD):
 - (1) Remove the MCD probe.
 - (2) Install the MCD probe.
 - (3) Remove the MCD housing.
 - (4) Install the MCD housing.
 - (5) Do an inspection of the MCD.
 - (6) Clean the MCD.
- B. The MCD housing has a check valve. The check valve lets only a small quantity of oil drain when you remove and install the MCD probe.
- C. You must drain the oil when you remove the MCD housing.
- D. You must fill the oil tank when you install the MCD housing.
- E. You must remove the MCD probe and the MCD housing when you clean or do an inspection of the MCD.

TASK 79-21-05-002-001-J00

2. MCD Probe Removal (Fig. 201)

- A. Standard Tools and Equipment
 - (1) Container – 1 gallon (4 liter) capacity for oil
- B. References
 - (1) AIPC 79-21-05 Fig. 1
 - (2) FIM 79-00-00/101, Fig. 108
- C. Access
 - (1) Location Zone
 - 412 Engine 1 – Accessory Gearbox Aft Face 6 o'clock
 - 422 Engine 2 – Accessory Gearbox Aft Face 6 o'clock
 - 432 Engine 3 – Accessory Gearbox Aft Face 6 o'clock
 - 442 Engine 4 – Accessory Gearbox Aft Face 6 o'clock
 - (2) Access Panel
 - 415D IDG Oil Thrust Reverser Access Door – Engine 1
 - 425D IDG Oil Thrust Reverser Access Door – Engine 2
 - 435D IDG Oil Thrust Reverser Access Door – Engine 3
 - 445D IDG Oil Thrust Reverser Access Door – Engine 4
- D. Prepare to remove the MCD Probe
 - S 012-002-J00
 - (1) Open the IDG oil access door, on the left thrust reverser half.

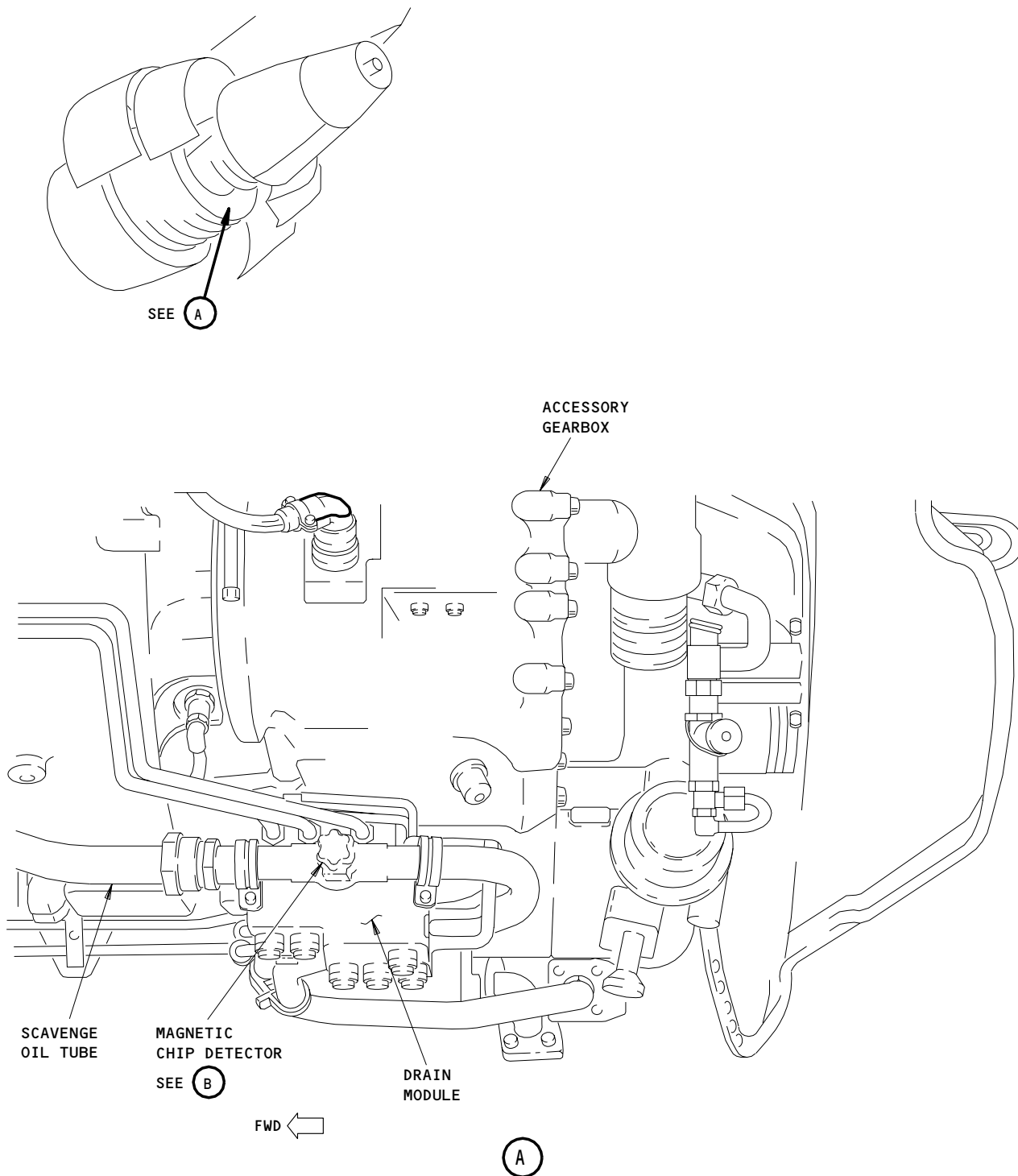
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Magnetic Chip Detector Installation
Figure 201 (Sheet 1)

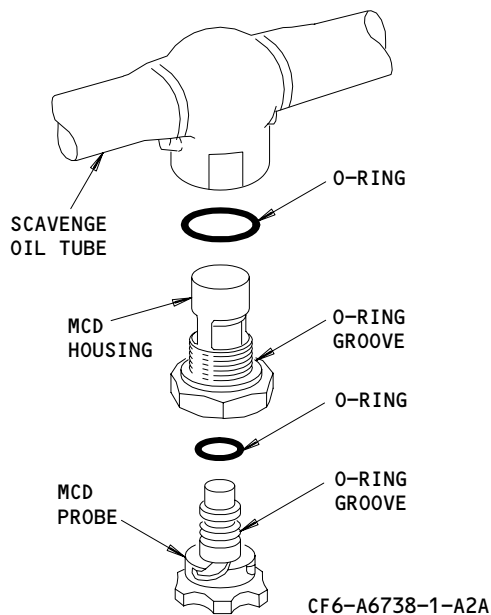
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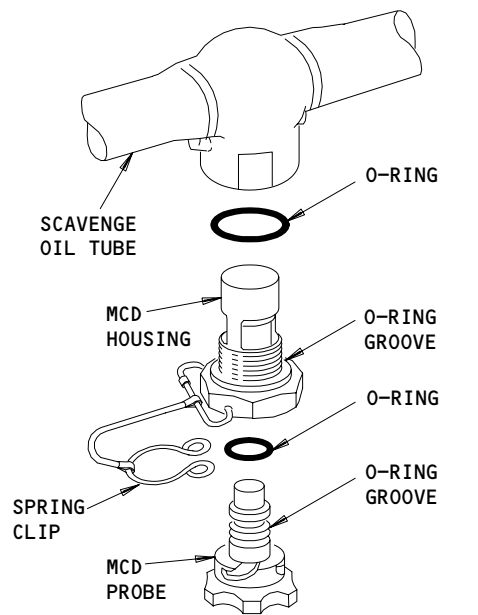
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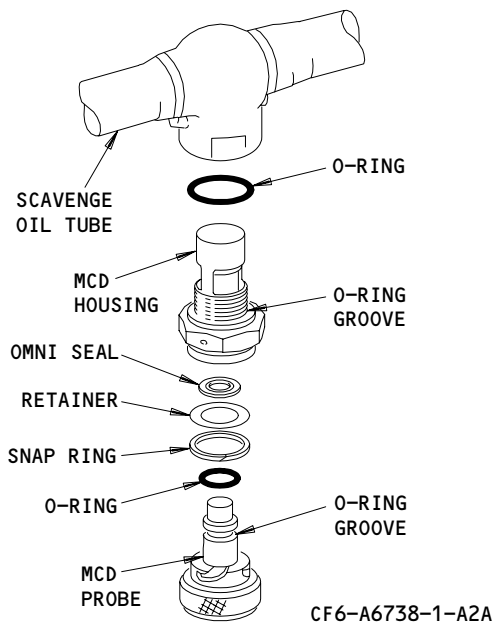
MCD PROBE WITH SCALLOPED KNOB
WITHOUT SPRING CLIP

(B)



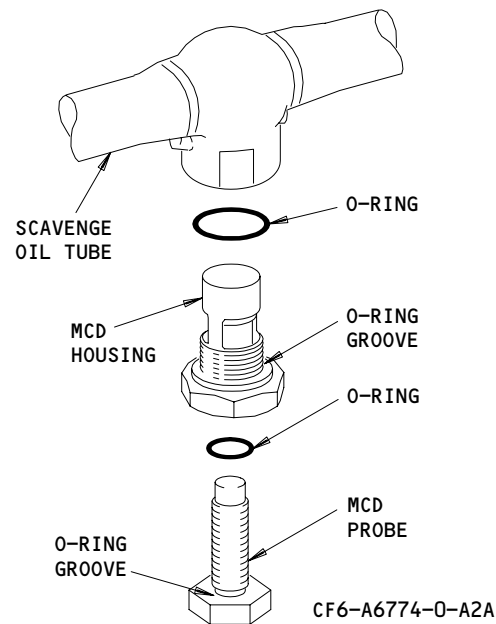
MCD PROBE WITH SCALLOPED KNOB
WITH SPRING CLIP

(B)



MCD PROBE WITH KNURLED KNOB

(B)



MCD PROBE WITH HEXAGONAL KNOB

(B)

Magnetic Chip Detector Installation
Figure 201 (Sheet 2)

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S 012-034-J00

- (2) Remove the MCD probe task for engine number 1, engine number 2, engine number 3, and engine number 4.

NOTE: This task can be done in one of the four sequences. However, an individual technician should work with one oil scavenge filter element at a time. Complete one engine before moving to the next engine.

S 022-003-J00

- (3) Remove the MCD probe:

CAUTION: THE BAYONET MCD PROBE (SCALLOPED OR KNURLED KNOB) ATTACHES TO THE HOUSING BY BAYONET PINS AND SLOTS. YOU MUST PUSH THE PROBE IN BEFORE YOU TURN IT. REMOVE IT WITH YOUR HAND. DO NOT USE TOOLS. REMOVE THE MCD HOUSING IF YOU CAN NOT REMOVE THE MCD PROBE WITH YOUR HAND.

- (a) ENGINES WITH A BAYONET MCD PROBE (SCALLOPED OR KNURLED KNOB); Push in on the knob of the MCD probe and turn it counterclockwise.
- (b) ENGINES WITH AN MCD PROBE WITH THREADS (HEXAGONAL KNOB); Turn the MCD probe to remove it from the MCD housing.
- (c) Pull the MCD probe from the MCD housing and let the oil drain into a container.

NOTE: O-ring friction will hold the MCD probe in the MCD housing.

A valve closes when you remove the MCD probe. Only a small amount of oil will drain, if there is no oil pressure.

- (d) Remove and discard the O-ring on the MCD probe.

S 212-006-J00

- (4) Do a check of the MCD probe for unwanted materials or contamination.

NOTE: More analysis of the broken pieces of metal on the magnetic chip detector is available (FIM 79-00-00/101, Fig. 108).

TASK 79-21-05-402-007-J00

3. MCD Probe Installation (Fig. 201)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. References

- (1) AIPC 79-21-05, Fig. 1

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C. Access

(1) Location Zone

412 Engine 1 - Accessory Gearbox Aft Face 6 o'clock
422 Engine 2 - Accessory Gearbox Aft Face 6 o'clock
432 Engine 3 - Accessory Gearbox Aft Face 6 o'clock
442 Engine 4 - Accessory Gearbox Aft Face 6 o'clock

(2) Access Panel

415D IDG Oil Thrust Reverser Access Door - Engine 1
425D IDG Oil Thrust Reverser Access Door - Engine 2
435D IDG Oil Thrust Reverser Access Door - Engine 3
445D IDG Oil Thrust Reverser Access Door - Engine 4

D. Prepare to install the MCD Probe

S 412-035-J00

- (1) Install the MCD Probe for engine number 1, engine number 2, engine number 3, and engine number 4.

NOTE: This task can be done in one of the four sequences. However, an individual technician should work with one oil scavenge filter element at a time. Complete one engine before moving to the next engine.

S 422-008-J00

CAUTION: THE O-RING MUST BE INSTALLED ON THE MCD PROBE WHEN YOU INSTALL THE MCD PROBE. IF IT IS NOT INSTALLED WHEN YOU OPERATE THE ENGINE, THE ENGINE CAN USE LARGE QUANTITIES OF OIL. THE ENGINE CAN HAVE DAMAGE IF IT USES LARGE QUANTITIES OF OIL.

- (2) Install the MCD probe:

- (a) Lubricate a new O-ring with oil.
(b) Install the O-ring on the MCD probe in the groove that is nearest to the head of the probe.

CAUTION: MAKE SURE THE MCD PROBE IS NOT LOOSE IN THE MCD HOUSING AFTER IT IS INSTALLED. IF IT IS, MAKE SURE THE MCD PROBE IS THE CORRECT ONE FOR THE MCD HOUSING. TRY TO PULL OUT AND TURN THE MCD PROBE COUNTERCLOCKWISE TO MAKE SURE THE MCD PROBE IS INSTALLED CORRECTLY.

- (c) ENGINES WITH A BAYONET MCD PROBE (KNURLED OR SCALLOPED KNOB);
Install the MCD probe in the MCD housing:
1) Put the MCD probe in the MCD housing.

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- 2) Push the MCD probe in.

NOTE: Replace the MCD probe or the MCD housing if they have bent pins. Replace the MCD probe or the MCD housing if the MCD probe does not engage easily in the MCD housing.

- 3) Turn the MCD probe clockwise to engage the pins in the slots.
- 4) Release the MCD probe.

CAUTION: MAKE SURE THE MCD PROBE IS NOT LOOSE IN THE MCD HOUSING AFTER IT IS INSTALLED. IF IT IS, MAKE SURE THE MCD PROBE IS THE CORRECT ONE FOR THE MCD HOUSING. TRY TO PULL OUT AND TURN THE MCD PROBE COUNTERCLOCKWISE TO MAKE SURE THE MCD PROBE IS INSTALLED CORRECTLY.

- (d) ENGINES WITH A MCD PROBE WITH THREADS (HEXAGONAL KNOB);
Install the MCD probe in the MCD housing:
 - 1) Turn the MCD probe in the MCD housing.
 - 2) Tighten the MCD probe with your hand.
 - 3) Make sure the O-ring is installed correctly in the MCD housing.
 - 4) Tighten the MCD probe to 40-50 pound-inches (4.5-5.6 N.m).
 - 5) Install the lockwire from the MCD probe to the MCD housing.

E. Return the Airplane to Service.

S 412-032-J00

- (1) Close the IDG oil access door.

TASK 79-21-05-002-012-J00

4. MCD Housing Removal (Fig. 201)

A. Standard Tools and Equipment

- (1) Container - 1 gallon (4 liter) capacity for oil

B. References

- (1) AMM 78-31-00/201, Thrust Reverser System
- (2) AIPC 79-21-05, Fig. 1

C. Access

- (1) Location Zone

| | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Aft Face 6 o'clock |
| 422 | Engine 2 - Accessory Gearbox Aft Face 6 o'clock |
| 432 | Engine 3 - Accessory Gearbox Aft Face 6 o'clock |
| 442 | Engine 4 - Accessory Gearbox Aft Face 6 o'clock |

- (2) Access Panel

| | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

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D. Procedure

S 012-013-J00

- (1) Open the left thrust reverser half (AMM 78-31-00/201).

S 022-024-J00

- (2) Remove the MCD housing:
 - (a) Remove the MCD housing from the fitting on the scavenge oil tube and let the oil drain into the container.
 - (b) Remove and discard the O-ring on the MCD housing.

S 432-016-J00

- (3) Install a protective plug in the fitting on the scavenge oil tube.

TASK 79-21-05-402-017-J00

5. MCD Housing Installation (Fig. 201)

A. References

- (1) AMM 12-13-03/301, Engine - Servicing
- (2) AMM 78-31-00/201, Thrust Reverser System
- (3) AIPC 79-21-05, Fig. 1

B. Access

(1) Location Zone

- | | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Aft Face 6 o'clock |
| 422 | Engine 2 - Accessory Gearbox Aft Face 6 o'clock |
| 432 | Engine 3 - Accessory Gearbox Aft Face 6 o'clock |
| 442 | Engine 4 - Accessory Gearbox Aft Face 6 o'clock |

(2) Access Panel

- | | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

C. Procedure

S 032-018-J00

- (1) Remove the protective plug from the fitting on the scavenge oil tube.

S 212-019-J00

- (2) ENGINES WITH A BAYONET MCD PROBE (SCALLOPED OR KNURLED KNOB);
Do an inspection of the seal in the MCD housing:
 - (a) Make sure the seal in the MCD housing is there and does not have damage.
 - (b) If the seal in the MCD housing is not there or has damage, replace the MCD detector (the probe and the housing).

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S 422-020-J00

CAUTION: THE O-RING MUST BE INSTALLED ON THE MCD HOUSING WHEN YOU INSTALL IT. IF THE O-RING IS NOT INSTALLED WHEN YOU OPERATE THE ENGINE, THE ENGINE CAN USE LARGE QUANTITIES OF OIL. THE ENGINE CAN HAVE DAMAGE IF IT USES LARGE QUANTITIES OF OIL.

- (3) Install the MCD housing:
 - (a) Lubricate a new O-ring with oil.
 - (b) Install the O-ring in the MCD housing.
 - (c) Install the MCD housing in the fitting on the scavenge oil tube.
 - (d) Tighten the MCD housing to 90-100 pound-inches (10.2-16.3 N.m).
 - (e) Install the lockwire on the MCD housing.

S 432-021-J00

- (4) Install the MCD probe, if it was removed.

S 612-022-J00

- (5) Fill the oil tank (AMM 12-13-03/301).

S 412-023-J00

- (6) Close the left thrust reverser half (AMM 78-31-00/201).

TASK 79-21-05-202-024-J00

6. Master Chip Detector Inspection

A. References

- (1) AIPC 79-21-05, Fig. 1

B. Access

(1) Location Zone

| | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Aft Face 6 o'clock |
| 422 | Engine 2 - Accessory Gearbox Aft Face 6 o'clock |
| 432 | Engine 3 - Accessory Gearbox Aft Face 6 o'clock |
| 442 | Engine 4 - Accessory Gearbox Aft Face 6 o'clock |

(2) Access Panel

| | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

C. Procedure

S 022-025-J00

- (1) Remove the MCD probe and the MCD housing.

S 212-026-J00

- (2) Examine the master chip detector as follows:
 - (a) Look for unwanted materials and contamination.

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- (b) Do a check for the correct installation of the MCD probe in the MCD housing.
- (c) Do a check for the correct operation of the self-closing valve.
- (d) ENGINES WITH A BAYONET MCD PROBE AND A KNURLED KNOB;
Look for a damaged omni seal, or an omni seal that is not there.

S 962-022-J00

- (3) Replace the master chip detector (the MCD probe and the MCD housing) if there is damage or the parts are not installed correctly.

S 422-027-J00

- (4) Install the MCD housing and the MCD probe.

TASK 79-21-05-102-028-J00

7. Master Chip Detector Cleaning

A. Consumable Materials

- (1) C00097 Solvent - O-T-634

B. References

- (1) AIPC 79-21-05, Fig. 1

C. Access

- (1) Location Zone

| | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Aft Face 6 o'clock |
| 422 | Engine 2 - Accessory Gearbox Aft Face 6 o'clock |
| 432 | Engine 3 - Accessory Gearbox Aft Face 6 o'clock |
| 442 | Engine 4 - Accessory Gearbox Aft Face 6 o'clock |

- (2) Access Panel

| | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

D. Procedure

S 022-029-J00

- (1) Remove the MCD probe and the MCD housing.

S 112-030-J00

CAUTION: CLEAN THE PARTS IN AN AREA WITH A GOOD AIR SUPPLY. DO NOT BREATHE THE VAPORS FROM THE TRICHLOROETHYLENE. DO NOT TOUCH THE TRICHLOROETHYLENE FOR A LONG TIME. KEEP TRICHLOROETHYLENE AWAY FROM SPARKS, FLAME, AND HEAT. TRICHLOROETHYLENE IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE EQUIPMENT.

- (2) Clean the MCD probe and the MCD housing in solvent.
 - (a) Put them fully in the solvent and move them around in the solvent.

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- S 422-031-J00
(3) Install the MCD housing and the MCD probe.

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SUPPLY AND SCAVENGE INLET SCREENS - MAINTENANCE PRACTICES

1. General

- A. This procedure contains four tasks:
 - (1) A removal of the scavenge inlet screens
 - (2) An installation of the scavenge inlet screens
 - (3) An inspection of the scavenge inlet screens
 - (4) Clean the scavenge inlet screens.
- B. This procedure applies to each of the five inlet screens that are installed in the lube and scavenge pump.
- C. This procedure contains steps to remove the magnetic isolation plugs that are installed in each of the inlet screens.

TASK 79-21-06-002-001-J00

2. Scavenge Inlet Screen Removal (Fig. 201)

- A. Standard Tools and Equipment
 - (1) Container - 1 gallon (4 liter) capacity for oil
- B. References
 - (1) AMM 78-31-00/201, Thrust Reverser System
 - (2) IPC 79-21-03 Fig. 1
- C. Access
 - (1) Location Zone
 - 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
 - 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
 - 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock
 - (2) Access Panel
 - 415 Left Thrust Reverser Half - Engine 1
 - 425 Left Thrust Reverser Half - Engine 2
 - 435 Left Thrust Reverser Half - Engine 3
 - 445 Left Thrust Reverser Half - Engine 4
- D. Procedure

S 012-002-J00

- (1) Do this task: "Open the Thrust Reversers" (AMM 78-31-00/201) to open the left thrust reverser half.

S 022-020-J00

- (2) Remove the magnetic isolation plug:
 - (a) Hold the inlet screen (1) with one wrench and remove the magnetic isolation plug (5) with the other wrench.

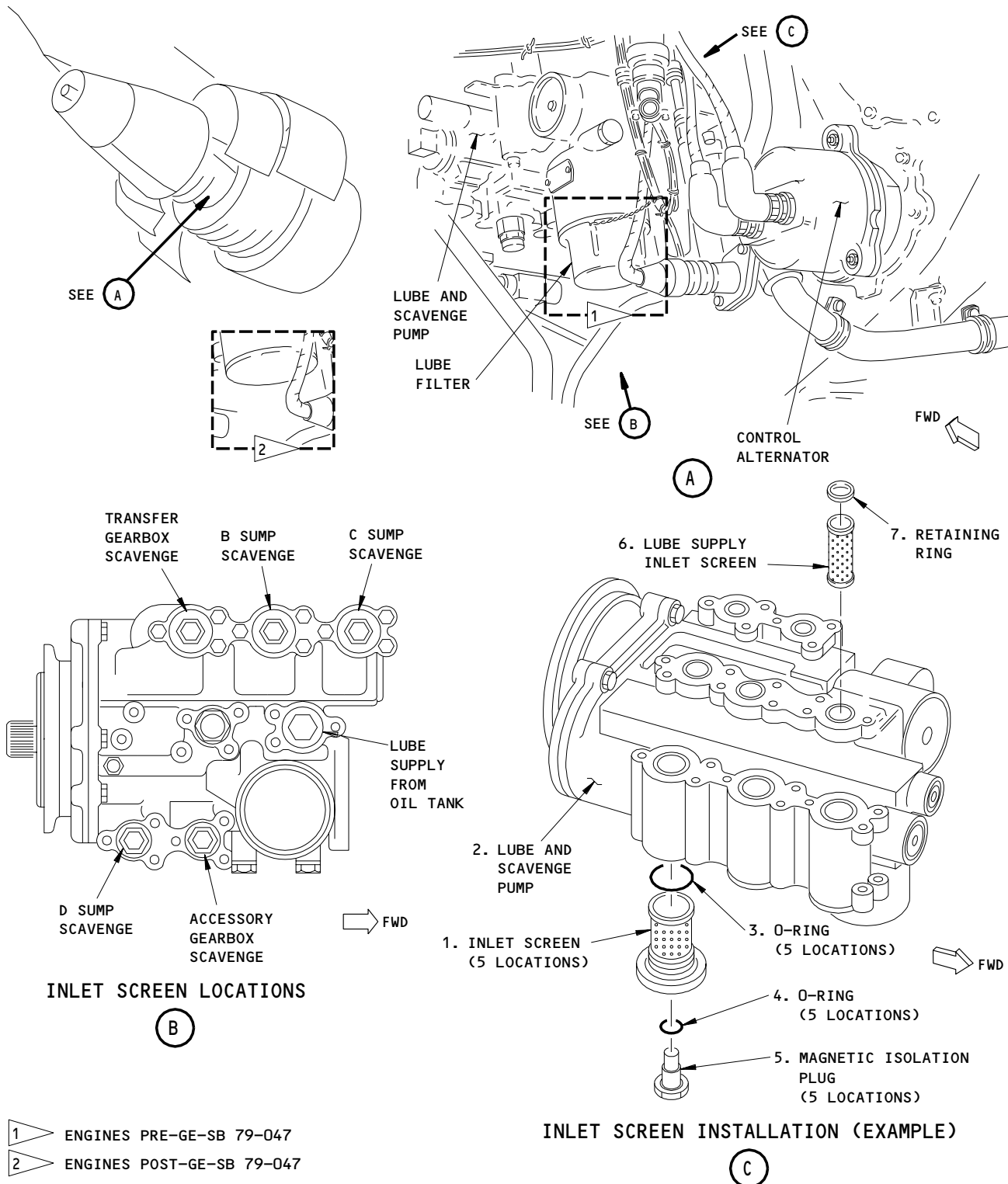
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Scavenge Inlet Screen Installation
Figure 201

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- (b) Drain the oil into a container.
- (c) Remove and discard the performed packing (4) from the magnetic isolation plug (5).

S 022-005-J00

- (3) Remove the scavenge inlet screen (1):
 - (a) Remove the five scavenge inlet screen assemblies (1) from the bottom of the lube and scavenge pump (2).
 - (b) Remove and discard the performed packing (3) from the inlet screen (1).

TASK 79-21-06-002-024-J00

3. Lube Supply Inlet Screen Removal (Fig. 201)

A. Standard Tools and Equipment

- (1) Container - 1 gallon (4 liter) capacity for oil

B. References

- (1) AMM 78-31-00/201, Thrust Reverser System
- (2) IPC 79-21-03 Fig. 1

C. Access

(1) Location Zones

- | | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Fwd Face 7 0'clock |
| 422 | Engine 2 - Accessory Gearbox Fwd Face 7 o'clock |
| 432 | Engine 3 - Accessory Gearbox Fwd Face 7 o'clock |
| 442 | Engine 4 - Accessory Gearbox Fwd Face 7 o'clock |

(2) Access Panel

- | | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

D. Procedure

S 012-026-J00

- (1) Do this task: Open the Thrust Reversers (AMM 78-31-00/201) to open the left thrust reverser half.

S 032-027-J00

- (2) Remove the lube supply inlet screen:

NOTE: Remove the lube supply inlet screen from the lube supply port only if the lube scavenge filter has been bypassed or a main bearing failure has occurred.

- (a) You must gain access to the lube supply inlet screen from the top of the pump.
 - 1) To remove it, it is necessary to remove the oil supply tube (AMM 79-21-03/401).

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- (b) Remove the retaining ring (7) from the lube supply port on top of the lube and scavenge pump (2).
- (c) Remove the lube supply inlet screen (6) from the lube supply port.

TASK 79-21-06-402-006-J00

4. Scavenge Inlet Screen Installation (Fig. 201)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|-------------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 201 | 1 | Scavenge Inlet Screen | 79-21-06 | 05 | 10 |
| | 3 | Packing (O-ring) | | | 25 |
| | 4 | Packing (O-ring) | 79-21-03 | 01 | 10 |
| | 5 | Magnetic Isolation Plug | | | 5 |

C. References

- (1) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zone

- 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
- 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
- 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
- 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

E. Procedure

S 422-007-J00

- (1) Install the scavenge inlet screen (1):
 - (a) Lubricate a new performed packing (3) with oil.
 - (b) Install the scavenge inlet screen (1).
 - 1) Tighten the inlet screen to 150-170 pound-inches (15.9-19.2 N.m).

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S 422-021-J00

- (2) Install the magnetic isolation plug (5):
(a) Lubricate a new performed packing (4) with oil.

CAUTION: MAKE SURE YOU INSTALL THE PERFORMED PACKING ON THE MAGNETIC ISOLATION PLUG. IF YOU DO NOT INSTALL THE PERFORMED PACKING, THE ENGINE CAN HAVE AN OIL LEAK WHEN IT OPERATES. IF YOU DO NOT OBEY THIS PROCEDURE, YOU CAN CAUSE DAMAGE TO THE ENGINE OR CAUSE THE ENGINE TO NOT OPERATE.

- (b) Install the performed packing (4) on the magnetic isolation plug (5).
(c) Install the magnetic isolation plug (5) in the scavenge inlet screen (1) with two wrenches.
1) Hold the scavenge inlet screen (1) with one wrench.
a) Tighten the magnetic isolation plug (5) with the other wrench to 75-85 pound-inches (8.5-9.6 N.m).

S 412-009-J00

- (3) Do this task: "Close the Thrust Reversers" (AMM 78-31-00/201).

TASK 79-21-06-402-025-J00

5. Lube Supply Inlet Screen Installation (Fig. 201)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|--------------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 201 | 6 | Lube Supply Inlet Screen | 79-21-03 | 01 | TBD |

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| | | | | | |
|--|---|----------------|--|--|-----|
| | 7 | Retaining Ring | | | TBD |
|--|---|----------------|--|--|-----|

C. Reference

- (1) AMM 78-31-00/201, Thrust Reverser System

D. Access

- (1) Location Zones

- 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
- 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
- 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
- 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

- (2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

E. Procedure

S 422-028-J00

- (1) Install the lube supply inlet screen (6):

- (a) Install the lube supply inlet screen (6) in the lube supply port of the lube and scavenge pump (2).
- (b) Install the retaining ring (7) in the groove in the lube supply port.
 - 1) Make sure the retaining ring (7) is correctly engaged in the groove.
- (c) Install the oil supply tube (AMM 79-21-03/401).

S 412-029-J00

- (2) Do this task: Close the Thrust Reversers (AMM 79-31-00/201)

TASK 79-21-06-202-010-J00

6. Scavenge Inlet Screen Magnetic Isolation Plug, and Lube Supply Inlet Screen Inspection

A. References

- (1) 79-00-00/601, Engine
- (2) IPC 79-21-03 Fig. 1

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B. Access

(1) Location Zone

412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

415 Left Thrust Reverser Half - Engine 1
425 Left Thrust Reverser Half - Engine 2
435 Left Thrust Reverser Half - Engine 3
445 Left Thrust Reverser Half - Engine 4

C. Procedure

S 022-011-J00

- (1) Do these tasks: "Scavenge Inlet Screen Removal and "Lube Supply Inlet Screen Removal".

S 212-012-J00

- (2) Examine the magnetic isolation plug (5) of the scavenge inlet screen (1) for more than the usual quantity of contamination:
(a) If you find more than the usual quantity of contamination, Do the corrective action:
1) Write the quantity and the type of contamination.
2) Do this task: "Oil System Contamination Inspection" (AMM 79-00-00/601).

S 212-013-J00

- (3) Do a check of the scavenge or lube supply inlet screens:
(a) Do a check of the inlet screen for damage, for a screen that is not straight, and for the correct installation of the screen.
(b) Replace the inlet screen if it has damage.

S 112-014-J00

- (4) If the inlet screen or magnetic isolation plug (5) has contamination, do this task: "Clean the Scavenge Inlet Screens" and "Lube Supply Inlet Screen".

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S 422-015-J00

- (5) Do these tasks: "Scavenge Inlet Screen Installation" and "Lube Supply Inlet Screen Installation".

TASK 79-21-06-102-016-J00

7. Clean the Scavenge Inlet Screens and Lube Supply Inlet Screen

A. Consumable Materials

- (1) B00722 Solvent - P-D-680

B. References

- (1) IPC 79-21-03 Fig. 1

C. Access

(1) Location Zone

- | | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 422 | Engine 2 - Accessory Gearbox Fwd Face 7 o'clock |
| 432 | Engine 3 - Accessory Gearbox Fwd Face 7 o'clock |
| 442 | Engine 4 - Accessory Gearbox Fwd Face 7 o'clock |

(2) Access Panel

- | | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

D. Procedure

S 022-017-J00

- (1) Do these tasks: "Scavenge Inlet Screen Removal" and "Lube Supply Inlet Screen Removal".

S 112-022-J00

WARNING: DO NOT BREATHE THE FUMES FROM THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT CAN CAUSE INJURY TO PERSONS.

- (2) Clean the inlet screen in solvent with a brush that has rigid bristles, until there is no contamination.

(a) Let the inlet screen dry.

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- S 422-019-J00
- (3) Do these tasks: "Scavenge Inlet Screen Installation" and "Lube Supply Inlet Screen Installation".

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LUBE FILTER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks: a removal and an installation of the lube filter element.
- B. ENGINES WITH GE SB 79-047;
Do not have a lube filter element.

TASK 79-21-07-004-001-J00

2. Lube Filter Element Removal (Fig. 401)

A. References

- (1) 78-31-00/201, Thrust Reverser System
- (2) 79-00-00/601, Engine Oil System
- (3) IPC 79-21-03 Fig. 1

B. Access

(1) Location Zone

- 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
- 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
- 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
- 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

C. Procedure

S 014-002-J00

- (1) Do this task: "Open the Thrust Reverser" (Ref 78-31-00/201) to open the left thrust reverser half.

S 034-003-J00

- (2) Remove the lube filter bowl (3) from the lube and scavenge pump (1) with a strap wrench.

S 024-004-J00

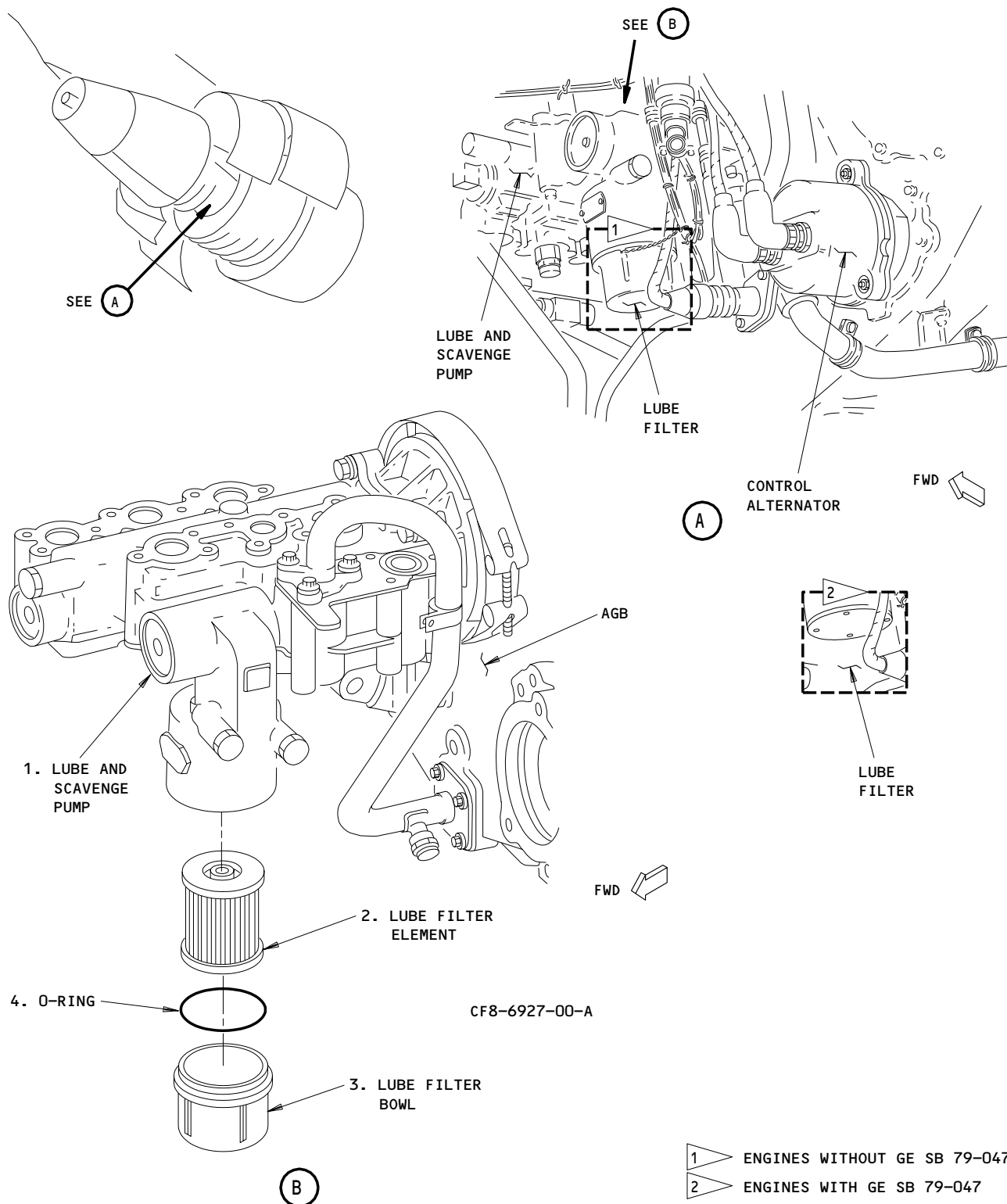
- (3) Remove the lube filter element (2) from the lube filter bowl (3).
 - (a) Remove and discard the O-ring (4).

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Lube Filter Installation
Figure 401

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S 214-011-J00

(4) Examine the lube filter element (2) for contamination:

CAUTION: YOU MUST DO THE CORRECTIVE ACTION IF YOU FIND MORE THAN THE USUAL QUANTITY OF CONTAMINATION IN THE LUBE FILTER ELEMENT. IF YOU DO NOT, YOU CAN CAUSE DAMAGE TO THE ENGINE.

- (a) If you find more than the usual quantity of contamination, Do the corrective action:
- 1) Write the quantity and the type of contamination.
 - 2) Do this task: "Oil System Contamination Inspection" (Ref 79-00-00/601).

TASK 79-21-07-404-006-J00

3. Lube Filter Element Installation (Fig. 401)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|---------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 2 | Filter Element | 79-21-03 | 01 | 40 |
| | 3 | Cover (Filter Bowl) | | | 30 |
| | 4 | Packing (O-ring) | | | 35 |

C. References

- (1) 71-00-00/501, Power Plant
(2) 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zone

- 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
425 Left Thrust Reverser Half - Engine 2
435 Left Thrust Reverser Half - Engine 3
445 Left Thrust Reverser Half - Engine 4

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E. Procedure

S 214-007-J00

- (1) Examine the lube filter element (2):
 - (a) Examine the lube filter element (2) for damage or for an element that is not straight.
 - (b) Replace the lube filter element (2) if you find this damage.

S 424-008-J00

- (2) Install the filter element (2) in the lube and scavenge pump (1):
 - (a) Put a clean filter element (2), with the open end out, in the lube filter bowl (3).
 - (b) Lubricate the O-ring (4), and the surfaces of the lube filter bowl (3) and the pump housing (1) that seal, with engine oil.
 - (c) Install the O-ring (4) in the flange groove on the lube filter bowl (3).
 - (d) Install the lube filter bowl (3), with the lube filter element (2), in the lube and scavenge pump (1).
 - 1) Tighten the lube filter bowl (3) with your hand.
 - 2) Turn it 90 to 180 degrees more than the point where the o-ring for the lube filter bowl and the filter head touch.

S 414-009-J00

- (3) Do this task: "Close the Thrust Reverser" (Ref 78-31-00/201).

S 864-013-J00

- (4) Do the Idle Power Leak Check (AMM 71-00-00/501).

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LUBE FILTER - CLEANING

1. General

- A. This procedure contains two procedures to clean the lube filter element.
- B. We recommend the ultrasonic procedure. Use the immersion procedure as an alternative.

TASK 79-21-07-107-001-J00

2. Clean the Lube Filter Element

- A. Equipment
 - (1) Brush, stiff bristle, commercially available
 - (2) Magnifying Glass, 10-power, commercially available
- B. Consumable Materials
 - (1) B00074 Solvent - Stoddard, Fed. Spec. P-D-680
 - (2) B00097 Solvent - Trichloroethylene, Fed. Spec. O-T-634
- C. References
 - (1) 79-21-07/401, Lube Filter
- D. Do the Ultrasonic Procedure

S 017-002-J00

- (1) Remove the Lube Filter Element (Ref 79-21-07).

S 137-003-J00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THIS SOLVENT. KEEP THIS SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THIS SOLVENT IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (2) Ultrasonic clean the filter elements for 10-20 minutes in trichloroethylene solvent.
 - (a) Hang the elements vertically.

CAUTION: DO NOT USE A WIRE BRUSH. A WIRE BRUSH CAN CAUSE DAMAGE TO THE FILTER ELEMENT. IF YOU DO NOT FOLLOW THIS PROCEDURE, YOU CAN CAUSE DAMAGE TO THE FILTERS.

- (b) Put the element fully into Stoddard solvent and clean the two sides of all the element wafers with the brush.

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S 117-004-J00

- (3) Ultrasonic clean the filter elements for 3-5 minutes in Stoddard solvent.
(a) Hang the elements vertically.

S 177-005-J00

- (4) Flush the filter with warm water.

S 167-006-J00

CAUTION: USE ONLY FILTERED COMPRESSOR AIR TO DRY THE FILTER ELEMENTS. DIRT, WATER, AND OIL FROM THE COMPRESSOR CAN CAUSE CONTAMINATION OF THE FILTER ELEMENTS.

- (5) Dry the elements in an oven at 200 degrees (93 degrees C) or less, or dry the elements with filtered compressor air in a clean area.

S 287-007-J00

- (6) Do these steps to examine the full element with the magnifying glass:
(a) Put a bright light behind the element.
(b) Use the magnifying glass to examine the filter element.

S 137-008-J00

- (7) Do the ultrasonic clean procedure until there are no unwanted materials.

S 417-009-J00

- (8) Install the Lube Filter Element (Ref 79-21-07).

E. Do the Immersion Procedure (alternate procedure)

S 017-010-J00

- (1) Remove the Lube Filter Element (Ref 79-21-07).

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S 117-011-J00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THIS SOLVENT. KEEP THIS SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THIS SOLVENT IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: DO NOT USE A WIRE BRUSH. A WIRE BRUSH CAN CAUSE DAMAGE TO THE FILTER ELEMENT.

(2) Put the element fully into the solvent and clean with the brush.

S 177-012-J00

(3) Flush the element with the solvent.

S 167-013-J00

CAUTION: USE ONLY FILTERED COMPRESSOR AIR TO DRY THE FILTER ELEMENTS. DIRT, WATER, AND OIL FROM THE COMPRESSOR CAN CAUSE CONTAMINATION OF THE FILTER ELEMENTS.

(4) Dry the element with filtered compressor air.

S 287-014-J00

(5) Do these steps to examine the full element with the magnifying glass:

(a) Put a bright light behind the element.

(b) Use the magnifying glass to examine the filter element.

S 117-015-J00

(6) Do the immersion clean procedure until there are no unwanted materials.

S 417-016-J00

(7) Install the Lube Filter Element (Ref 79-21-07).

SCAVENGE OIL FILTER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks: a removal and an installation of the scavenge oil filter.
- B. To remove the scavenge oil filter, you must do these steps:
 - (1) Open the right fan cowl panel
 - (2) Disconnect the oil tubes
 - (3) Remove the scavenge oil filter.
- C. To install the scavenge oil filter, you must do these steps:
 - (1) Install the scavenge oil filter
 - (2) Connect the oil tubes
 - (3) Fill the oil tank
 - (4) Close the right fan cowl panel
 - (5) Do a check for leaks.

TASK 79-21-08-004-015-J00

2. Scavenge Oil Filter Removal (Fig. 401)

- A. Standard Tools and Equipment
 - (1) Container - 1 gallon (4 liter) capacity, for oil
- B. References
 - (1) 71-11-04/201, Fan Cowl Panels
 - (2) IPC 79-21-08 Fig. 1
- C. Access
 - (1) Location Zone
 - 412 Engine 1 - Fan Case 4 o'clock
 - 422 Engine 2 - Fan Case 4 o'clock
 - 432 Engine 3 - Fan Case 4 o'clock
 - 442 Engine 4 - Fan Case 4 o'clock
 - (2) Access Panel
 - 414 Right Fan Cowl Panel - Engine 1
 - 424 Right Fan Cowl Panel - Engine 2
 - 434 Right Fan Cowl Panel - Engine 3
 - 444 Right Fan Cowl Panel - Engine 4
- D. Procedure

S 014-001-J00

- (1) Do this task: "Open Fan Cowl Panels" (Ref 71-11-04/201) to open the right fan cowl panel.

S 034-002-J00

- (2) Disconnect the tubes, and drain the oil in a container:
 - (a) Disconnect the scavenge oil inlet (5) and outlet (13) tubes to the differential pressure switch from the filter head (1).
 - (b) Remove four bolts (7) and four washers (8) that attach the inlet tube (6) to the filter head (1).
 - 1) Keep the gasket (9) for the installation if it has no damage.

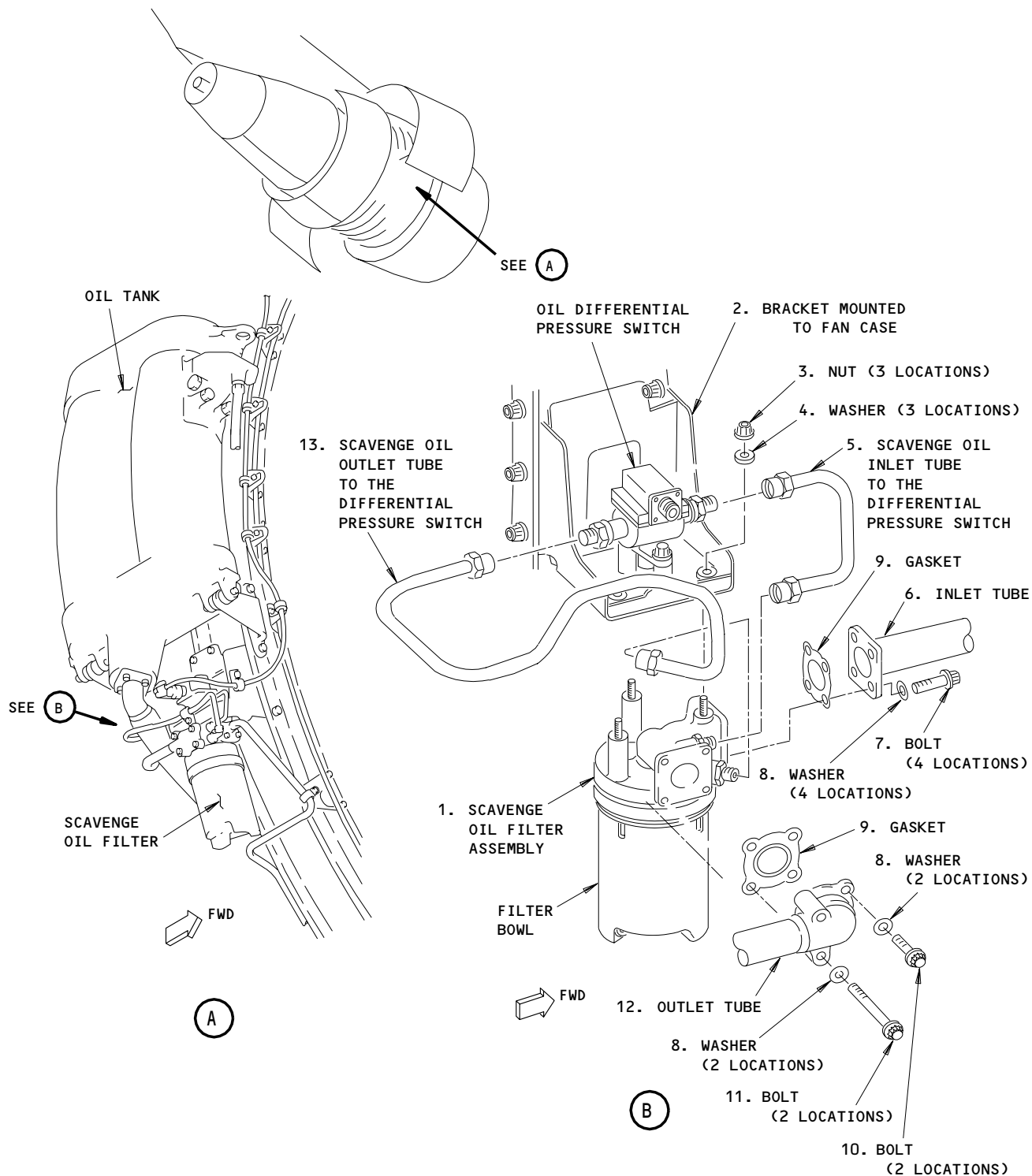
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Scavenge Oil Filter Installation
Figure 401

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- (c) Remove four bolts (10 and 11) and four washers (8) that attach the outlet tube (12) to the filter head (1).
1) Keep the gasket (9) for the installation if it has no damage.

S 024-005-J00

- (3) Remove the scavenge oil filter assembly (1):
(a) Remove three nuts (3) and three washers (4) from the top of the bracket (2) that attach the scavenge oil filter (1) to the bracket (2).
(b) Remove the scavenge oil filter assembly (1).
(c) Install protective covers on the ends of the oil tubes.

TASK 79-21-08-404-007-J00

3. Scavenge Oil Filter Installation (Fig. 401)

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. Parts

| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|---------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 1 | Scavenge Oil Filter | 79-21-08 | 01 | 15 |
| | 3 | Nut | | | 25 |
| | 4 | Washer | | | 20 |
| | 7 | Bolt | | | 50 |
| | 8 | Washer | | | 65 |
| | 9 | Gasket | | | 70 |
| | 10 | Bolt | | | 55 |
| | 11 | Bolt | | | 60 |

C. References

- (1) 12-13-03/301, Engine - Servicing
(2) 71-00-00/501, Power Plant
(3) 71-11-04/201, Fan Cowl Panels

D. Access

- (1) Location Zone

- 412 Engine 1 - Fan Case 4 o'clock
422 Engine 2 - Fan Case 4 o'clock
432 Engine 3 - Fan Case 4 o'clock
442 Engine 4 - Fan Case 4 o'clock

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(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

E. Procedure

S 424-008-J00

- (1) Install the scavenge oil filter assembly (1):
 - (a) Put the scavenge oil filter assembly (1) below the bracket (2), with the inlet opening in the forward direction.
 - (b) Install three nuts (3) and three washers (4) that attach the scavenge oil filter (1) to the bracket (2).
 - 1) Tighten the nuts to 55-70 pound-inches (6.2-7.9 N.m).

S 434-009-J00

- (2) Install the oil tubes:
 - (a) Install four bolts (7) and four washers (8) that attach the inlet tube (6) and the gasket (9) to the filter head (1).
 - 1) Tighten the bolts to 55-70 pound-inches (6.2-7.9 N.m).
 - 2) Install lockwire on the bolts.
 - (b) Install four bolts (10 and 11) and four washers (8) that attach the outlet tube (12) and the gasket (9) to the filter head (1).
 - 1) Tighten the bolts to 55-70 pound-inches (6.2-7.9 N.m).
 - 2) Install lockwire on the bolts.
 - (c) Connect the scavenge oil inlet (5) and outlet (13) tubes to the differential pressure switch to the filter head (1).
 - 1) Tighten the tube nuts to 55-70 pound-inches (6.2-7.9 N.m).

S 614-012-J00

- (3) Do this task: "Fill the Oil Tank" (Ref 12-13-03/301).

S 414-013-J00

- (4) Do this task: "Close Fan Cowl Panels" (Ref 71-11-04/201).

S 794-014-J00

- (5) Do this task: "Engine Idle Leak Check" (Ref 71-00-00/501, Test No. 3).

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SCAVENGE OIL FILTER - INSPECTION/CHECK

1. General

- A. This procedure contains the data to do a check of the scavenge oil filter.

TASK 79-21-08-206-001-J00

2. Examine the Scavenge Oil Filter

A. References

- (1) 71-11-04/201, Fan Cowl Panels
- (2) 79-21-04/401, Scavenge Oil Filter Element
- (3) IPC 79-21-08 Fig. 1

B. Access

(1) Location Zone

- 412 Engine 1 - Fan Case 4 o'clock
- 422 Engine 2 - Fan Case 4 o'clock
- 432 Engine 3 - Fan Case 4 o'clock
- 442 Engine 4 - Fan Case 4 o'clock

(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

C. Procedure

S 016-002-J00

- (1) Open the right fan cowl panel (Ref 71-11-04/201).

S 226-003-J00

- (2) Visually examine the scavenge oil filter for these conditions:

(a) Leaks:

- 1) Not permitted, replace the preformed packings if it is necessary.

(b) Mount studs for:

1) Loose studs:

- a) Not permitted, replace the stud.

2) Damaged threads:

- a) Up to 50 percent of one thread or 10 percent of two threads is allowed, after removal of unwanted metal.

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b) Replace the stud if it is out of the limits.

S 016-004-J00

(3) Remove the scavenge filter element and bowl (Ref 79-21-04/401).

S 226-005-J00

(4) Visually examine the filter head/bowl for these conditions:

(a) Dents and scratches on the surfaces that seal:

1) Any amounts permitted, if they do not extend across the seal surface after removal of unwanted metal.

a) Replace the filter head/bowl if it is out of the limits.

(b) Damaged threads:

1) Up to 50 percent of one thread or 10 percent of two threads is allowed, after removal of unwanted metal.

a) Replace the filter head/bowl if it is out of the limits.

S 216-006-J00

(5) Visually examine the filter element for contamination.

(a) Replace the element if you find contamination.

S 416-007-J00

(6) Install the scavenge filter element and bowl (Ref 79-21-04/401).

S 416-008-J00

(7) Close the right fan cowl panel (Ref 71-11-04/201).

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OIL QUANTITY INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General

- A. The oil quantity indicating system provides a visual indication of the quantity of oil in each of the engine oil tanks. The system consists of an oil quantity transmitter (T675) and uses the auxiliary Engine Indicating and Crew Alert System (EICAS) for display.
- B. The transmitter sends a signal to the EFIS/EICAS interface units (EIU's) indicating the amount of usable oil in the oil tank. This amount is displayed, via a digital readout in quarts/(liters), on the auxiliary EICAS display in the flight compartment.

2. Oil Quantity Transmitter (Fig. 1)

- A. The oil quantity transmitter is installed on the right side of the fan case. It is attached to the top of the engine oil tank.
- B. The transmitter has a metal tube which contains a magnetic float assembly and a multiple switch and resistor assembly. A flange connects the tube to the oil tank and houses the unit's electrical connector.
- C. The float assembly has two magnets that will close switches as the float assembly follows the oil level within the tube. With a switch closed, the voltage will be divided by a resistor or a series of resistors. Using a reference voltage, the transmitter sends a signal proportional to the oil level.

3. Oil Quantity Indication (Fig. 2)

- A. The oil quantity indication is displayed on the auxiliary EICAS display. The display indicates the amount of usable oil to the nearest quarts/(liters) on a digital readout.
- B. The readout will change from white to magenta in color during these conditions:
 - (1) The low oil quantity level is less than four quarts (3.8 liters).
 - (2) During cruise flight, there is a six quart (5.7 liter) difference in the oil quantity indication between the engine with the lowest quantity and one of the other three.

4. Operation (Fig. 3)

- A. The system is operational when 12 volts dc power is supplied to the transmitter.
- B. The float assembly in the transmitter follows the oil level in the oil tank. The transmitter becomes a voltage divider when a reference voltage is applied.
- C. The EIU processes the ratio of the reference voltage and the transmitter output signals to determine the oil quantity. This value is indicated on the auxiliary EICAS display.

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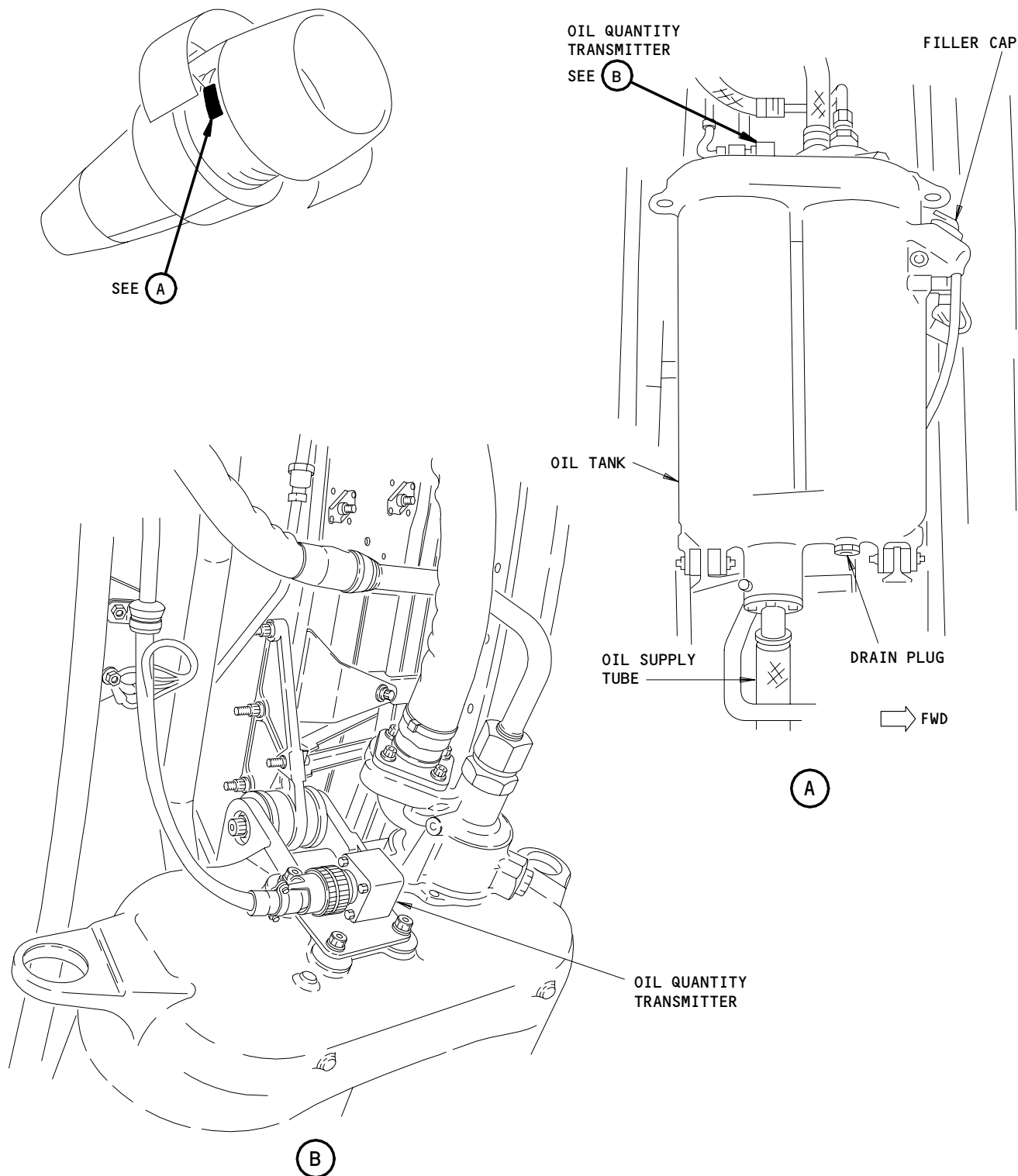
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Oil Quantity Transmitter Location
Figure 1

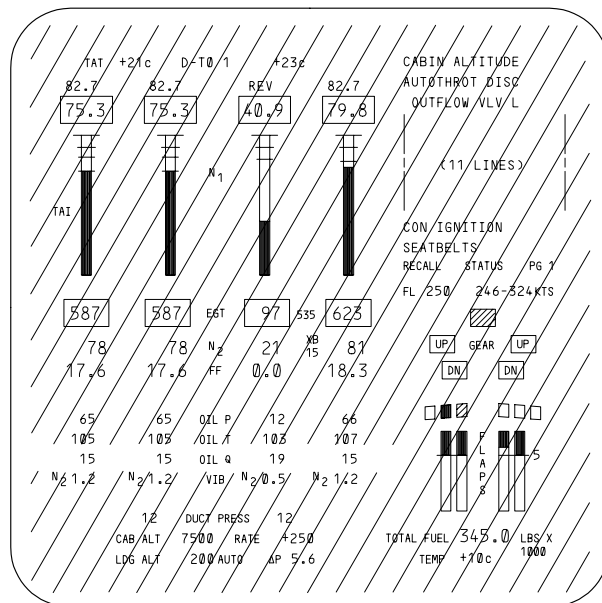
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COMPACTED EICAS DISPLAY

(A) OR (B)

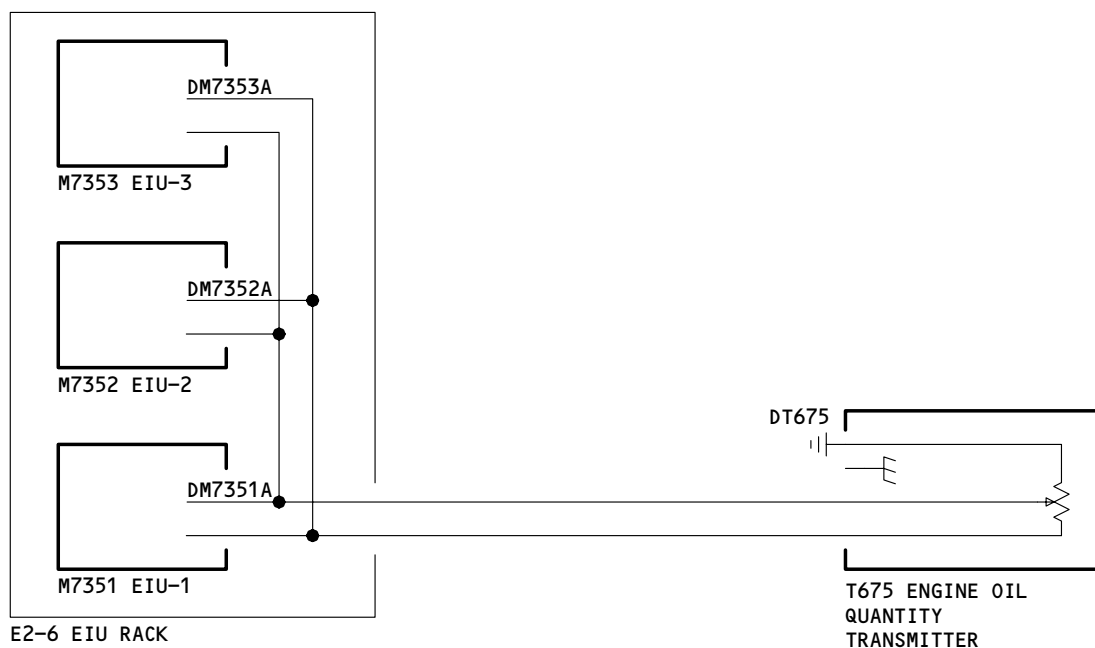
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Oil Quantity Indicating System Simplified Schematic
Figure 3

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OIL QUANTITY INDICATING SYSTEM - ADJUSTMENT/TEST

1. General

- A. This section provides an operational test and a system test procedure for the oil quantity indicating system.
 - (1) The operational test consists of checking the EICAS display for indication of full oil quantity, with engine oil tank filled to capacity.
 - (2) The system test consists of opening the right fan cowl panel for access, draining the oil tank, adding measured quantities of oil to the tank, checking the EICAS display for the oil quantity indicated against the quantity added to the oil tank, replacing the oil quantity indicator if limits are exceeded, replenishing the oil tank, and closing the right fan cowl panel.
- B. The operational test is intended to verify that the indicating system operates. The operational test may be used to verify the system operation after replacement of the oil quantity transmitter.
- C. The system test is designed to test the system accuracy and can be used in conjunction with the system trouble shooting.
- D. The oil quantity transmitter (T675) is installed in the top of the oil tank which is mounted on the fan case at the 3 o'clock position.

TASK 79-31-00-705-001-J00

2. Operational Test - Oil Quantity Indicating System

- A. References
 - (1) AMM 12-13-03/301, Engine - Servicing
 - (2) AMM 24-22-00/201, Manual Control
- B. Access
 - (1) Location Zone
 - 412 Engine 1 - Fan Case 3 o'clock
 - 422 Engine 2 - Fan Case 3 o'clock
 - 432 Engine 3 - Fan Case 3 o'clock
 - 442 Engine 4 - Fan Case 3 o'clock
 - (2) Access Panel
 - 414 Right Fan Cowl Panel - Engine 1
 - 424 Right Fan Cowl Panel - Engine 2
 - 434 Right Fan Cowl Panel - Engine 3
 - 444 Right Fan Cowl Panel - Engine 4
- C. Test Oil Quantity Indicating System
 - S 615-002-J00
 - (1) Service engine oil tank to full capacity (AMM 12-13-03/301).

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- S 865-003-J00
(2) Provide electrical power (AMM 24-22-00/201).

- S 865-004-J00
(3) Check that following circuit breakers on P7 overhead circuit breaker panel are closed:
(a) 7F9 EIU L
(b) 7F10 EIU C
(c) 7F15 EIU R

- S 715-005-J00
(4) Check that oil quantity (OIL Q) indication on auxiliary EICAS display reads 21-23 quart/(20-22 liters).

- S 865-010-J00
(5) Remove electrical power (AMM 24-22-00/201) if no longer required.

TASK 79-31-00-705-011-J00

3. System Test - Oil Quantity Indicating System (Fig. 501)

A. References

- (1) AMM 24-22-00/201, Manual Control
- (2) AMM 71-11-04/201, Fan Cowl Panels
- (3) AMM 79-31-01/401, Oil Quantity Transmitter
- (4) WDM 79-31-11, WDM 79-31-12
- (5) SSM 79-31-01

B. Standard Tools and Equipment

- (1) Container - 10 gallon (37 liter) capacity, for oil
- (2) Beaker - Calibrated (in quarts or liters), 1.0 quart or liter minimum size, suitable for oil

C. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

D. Access

(1) Location Zone

- 412 Engine 1 - Fan Case 3 o'clock
- 422 Engine 2 - Fan Case 3 o'clock
- 432 Engine 3 - Fan Case 3 o'clock
- 442 Engine 4 - Fan Case 3 o'clock

(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

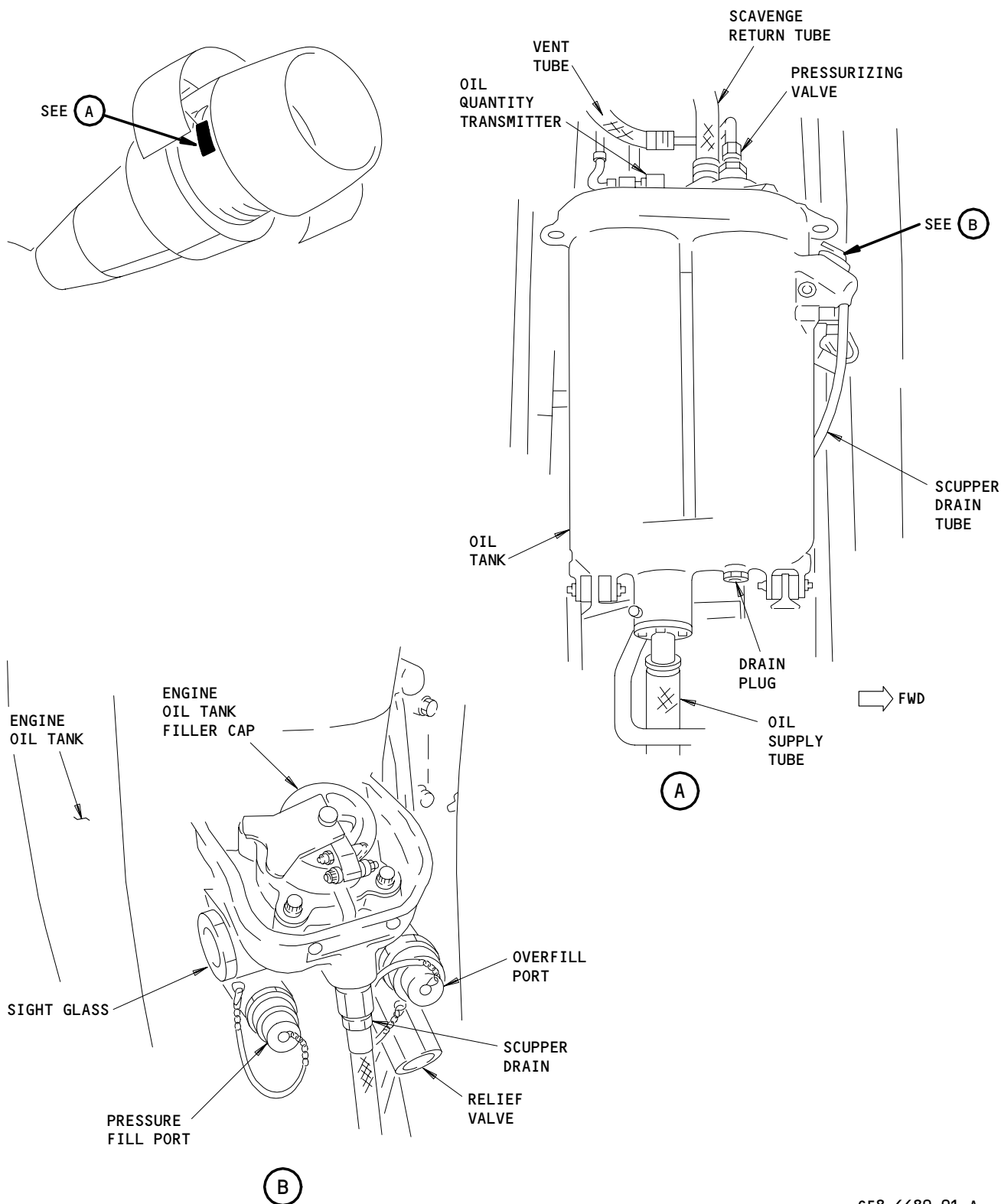
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Oil Quantity Indicating System Component Location
Figure 501

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E. Prepare for Test

S 015-012-J00

- (1) Open right fan cowl panel (AMM 71-11-04/201).

S 685-013-J00

WARNING: HOT OIL CAN CAUSE SEVERE BURNS. ALLOW A MINIMUM OF 5 MINUTES TO ELAPSE AFTER ENGINE SHUTDOWN TO ALLOW OIL SYSTEM PRESSURE TO BLEED OFF. AVOID CONTACT WITH HOT OIL SPLASHES. PROLONGED CONTACT OF OIL WITH SKIN CAN CAUSE DERMATITIS. OIL WILL STAIN CLOTHING AND CAN SOFTEN PAINT.

- (2) If oil tank is not empty, drain oil tank.
(a) Position container under drain plug and remove drain plug.
(b) Wait 5 minutes after removing drain plug to ensure all oil has drained from the tank.
(c) Install drain plug with new O-ring lubricated with oil; tighten plug to 300-425 pound-inches (33.9-48.0 N.m) and lockwire.

S 865-014-J00

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

S 865-015-J00

- (4) Check that the following circuit breakers are closed:
(a) 7F9 EIU L
(b) 7F10 EIU C
(c) 7F15 EIU R

S 865-016-J00

- (5) Ensure EIU select switch on the P2 pilots' center instrument panel is in the AUTO position.

F. Test Oil Quantity Indicating System

S 735-017-J00

- (1) Add oil to tank until oil quantity indication on auxiliary EICAS display reads 1 unit.

NOTE: Amount of oil added to obtain indication of 1 unit will be approximately 4.0-6.0 quarts (3.7-5.7 liters) but will vary between engines due to engine attitude.

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S 735-020-J00

- (2) Verify oil quantity display does not vary for each EIU select switch setting.
- (a) Set EIU select switch to left (L) and ensure oil quantity reading does not vary.
 - (b) Set EIU select switch to center (C) and ensure oil quantity reading does not vary.
 - (c) Set EIU select switch to right (R) and ensure oil quantity reading does not vary.

S 735-021-J00

- (3) Return EIU select switch to the AUTO position.

S 735-022-J00

- (4) Add 5.0 more quart/(liters) of oil to oil tank and check that oil quantity indication on the EICAS display reads 5-7 quarts/(liters).

S 735-023-J00

- (5) Add 5.0 more quart/(liters) of oil to oil tank and check that oil quantity indication on the EICAS display reads 10-12 quarts/(liters).

S 735-024-J00

- (6) Add 5.0 more quart/(liters) of oil to oil tank and check that oil quantity indication on the EICAS display reads 15-17 quarts/(liters).

S 735-025-J00

- (7) Add 4.0 more quart/(liters) of oil to oil tank and check that oil quantity indication on the EICAS display reads 19-21 quarts/(liters).

G. Restore Airplane to Normal

S 425-032-J00

- (1) Replace oil quantity transmitter (AMM 79-31-01/401) if limits are exceeded.

S 615-033-J00

- (2) Service engine oil tank to full capacity (AMM 12-13-03/301).

S 415-034-J00

- (3) Close right fan cowl panel (AMM 71-11-04/201).

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OIL QUANTITY TRANSMITTER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task is the removal of the oil quantity transmitter (referred to as the transmitter). The second task is the installation of the transmitter.

NOTE: The transmitter is on the top aft side of the engine oil tank. You install the engine oil tank on the right side of the engine fan case.

TASK 79-31-01-024-021-J00

2. Remove the Oil Quantity Transmitter (Fig. 401).

A. References

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

B. Access

(1) Location Zones

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 3 o'clock |
| 422 | Engine 1 - Fan Case 3 o'clock |
| 432 | Engine 1 - Fan Case 3 o'clock |
| 442 | Engine 1 - Fan Case 3 o'clock |

(2) Access Panels

- | | |
|-------|---------------------------------|
| 414AR | Right Fan Cowl Panel - Engine 1 |
| 424AR | Right Fan Cowl Panel - Engine 2 |
| 434AR | Right Fan Cowl Panel - Engine 3 |
| 444AR | Right Fan Cowl Panel - Engine 4 |

C. Do these steps for the removal of the transmitter.

S 864-022-J00

- (1) Open these circuit breakers and attach the DO-NOT-CLOSE tags:
(a) P7 Overhead Circuit Breaker Panel.
1) 7F9 EIU L

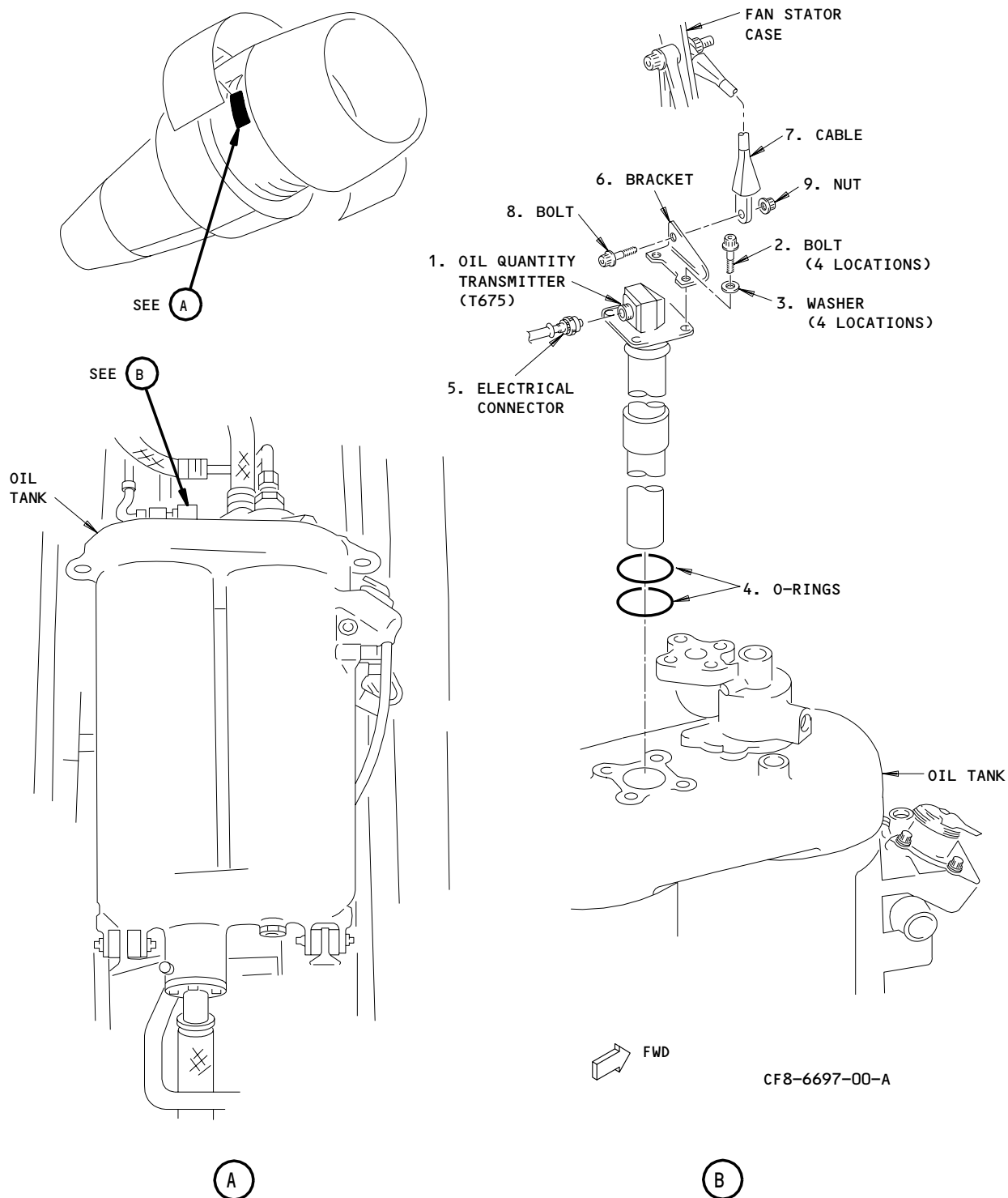
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Oil Quantity Transmitter Installation
Figure 401

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- 2) 7F10 EIU C
- 3) 7F15 EIU R

S 014-023-J00

- (2) Open the right fan cowl panel (Ref 71-11-04/201).

S 034-024-J00

- (3) Disconnect the electrical connector (5) from the transmitter (1).
 - (a) Install the protection covers.

S 034-025-J00

- (4) Remove the bolt (8) that attaches the cable (7) to the bracket (6).

S 034-048-J00

WARNING: STOP FOR A MINIMUM OF FIVE MINUTES AFTER THE ENGINE SHUTDOWN PROCEDURE TO LET THE PRESSURE IN THE TANK DECREASE TO ZERO. A FAST FLOW OF HOT OIL CAN FLOW OUT OF THE TANK AND CAUSE INJURIES TO PERSONS. IF YOU DO NOT OBEY THIS PROCEDURE, YOU CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (5) Remove the four bolts (2) and the four washers (3) that attach the transmitter (1) and the bracket (6) to the oil tank.

S 034-027-J00

- (6) Remove the transmitter (1) and the bracket (6) from the oil tank.
 - (a) Remove and discard the O-rings (4).

S 434-028-J00

- (7) Install the protection covers on the transmitter (1) and the transmitter mount pad.

TASK 79-31-01-424-029-J00

3. Install the Oil Quantity Transmitter (Fig. 401).

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. Parts

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| AMM | | NOMENCLATURE | AIPC | | |
|-----|------|--------------------------|----------|-----|------|
| FIG | ITEM | | SUBJECT | FIG | ITEM |
| 401 | 1 | Oil Quantity Transmitter | 79-31-01 | 05 | 50 |
| | 2 | Bolt | | | 55 |
| | 3 | Washer | | | 60 |
| | 4 | O-ring | | | 65 |
| | 5 | Electrical connector | | | 70 |
| | 6 | Bracket | | | 75 |
| | 7 | Cable | | | 80 |
| | 8 | Bolt | | | 225 |
| | 9 | Nut | | | 230 |

C. References

- (1) 71-00-00/501, Power Plant - General
- (2) 71-11-04/201, Fan Cowl Panels
- (3) 79-31-00/501, Oil Quantity Indicating System

D. Access

(1) Location Zones

- 412 Engine 1 - Fan Case 3 o'clock
- 422 Engine 1 - Fan Case 3 o'clock
- 432 Engine 1 - Fan Case 3 o'clock
- 442 Engine 1 - Fan Case 3 o'clock

(2) Access Panels

- 414AR Right Fan Cowl Panel - Engine 1
- 424AR Right Fan Cowl Panel - Engine 2
- 434AR Right Fan Cowl Panel - Engine 3
- 444AR Right Fan Cowl Panel - Engine 4

E. Do these steps to install the transmitter.

S 034-030-J00

- (1) Remove the protection covers on the transmitter (1) and the transmitter mount pad.

S 644-031-J00

- (2) Lubricate the new O-rings (4).
 - (a) Install the new O-rings (4) on the transmitter (1).

S 424-033-J00

- (3) Install the oil quantity transmitter (1) on the oil tank.
 - (a) Make sure the transmitter flanges align with the transmitter port on the oil tank.
 - 1) Make sure that the electrical connector points in the aft direction.

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- (b) Make sure that you install the transmitter (1) correctly into the support bracket (6).

NOTE: Before you install the new oil quantity transmitter, remove the clip that you use to hold the float before the installation. If you do not remove the clip, the float will not move.

S 434-035-J00

- (4) Put the bracket (6) on the transmitter.

S 434-036-J00

- (5) Attach the transmitter (1) and bracket (6) to the oil tank with the four washers (3) and four bolts (2).
(a) Tighten the bolts (2) to 55-70 pound-inches (6.2-7.8 newton meters).
1) Install the lockwire on the bolts (2).

S 434-038-J00

- (6) Attach the cable to the bracket (6) with the bolt (8) and nut (9).
(a) Tighten the nut (9) to 55-70 pound-inches (6.2-7.8 newton meters).

S 034-040-J00

- (7) Remove the protection covers from the electrical connector (5).

S 434-041-J00

- (8) Connect the electrical connector (5) to the transmitter (1).
(a) Tighten the electrical connector (5) with your hand.

NOTE: This will put a cover over the witness band.

- (b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/8 turn.

S 864-044-J00

- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P7 Overhead Circuit Breaker Panel.
1) 7F9 EIU L
2) 7F10 EIU C
3) 7F15 EIU R

S 414-045-J00

- (10) Close the right fan cowl panel (Ref 71-11-04/201).

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- S 714-046-J00
(11) Do the idle leak check procedure (Ref 71-00-00/501, Test No. 3).
- S 714-047-J00
(12) Do the operational test procedure for the oil quantity indicating system (AMM 79-31-00/501).

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OIL PRESSURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. The oil pressure indicating system provides a visual indication in the flight compartment of the oil pressure of each engine. The system consists of an oil pressure transmitter (T679) and uses the auxiliary Engine Indicating and Crew Alert System (EICAS) for display.

2. Oil Pressure Transmitter (Fig. 1)

- A. The oil pressure transmitter is located on the lower left side of the engine, forward of the lube and scavenge pump. It is installed in a oil line between the engine oil supply pressure and accessory gearbox vent.
- B. The transmitter is a variable reluctance type unit, consisting of a pressure sensor diaphragm and electrical transformer. Any change in pressure causes the diaphragm to move a magnetic armature in the transformer. The armature position determines the reluctance of the coils in the transformer.

3. Oil Pressure Indication (Fig. 2)

- A. The oil pressure indication is displayed on the auxiliary EICAS display.
- B. The display indicates engine oil pressure in a vertical scale format. The actual values are shown by analog pointers and by digital readouts. The pointers and readouts change from white to amber and then to red when low pressure limits are exceeded.

4. Operation (Fig. 3)

A. Functional Description

- (1) The system is operational when 28 volts ac power is supplied to the transmitter.
- (2) The transmitter senses the output oil pressure of the lube and scavenge pump. Signals proportional to the oil pressure are generated by the transmitter and sent to the EIU's and then to the auxiliary EICAS display.

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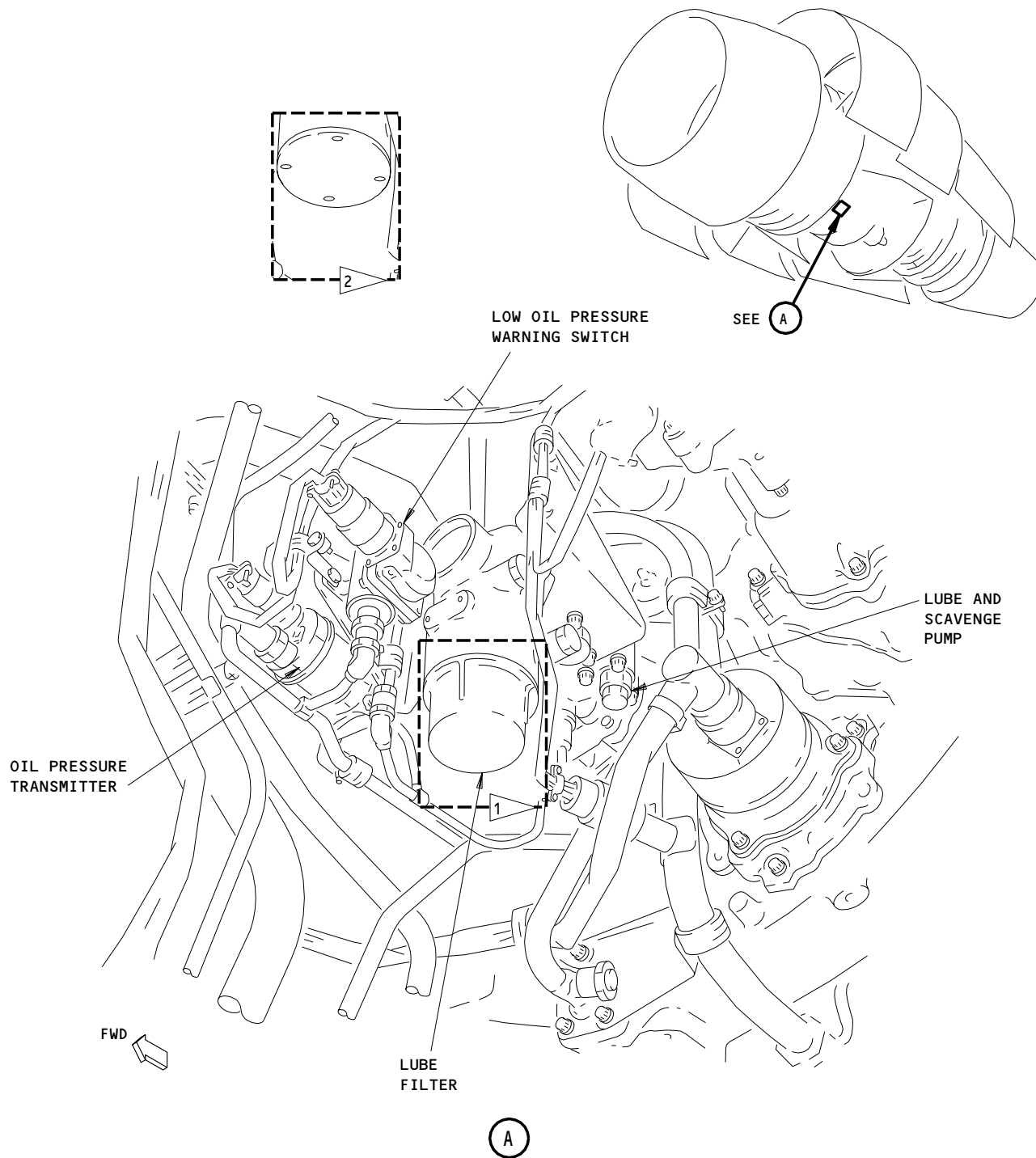
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- 1 ENGINES WITHOUT GE SB 79-047
2 ENGINES WITH GE SB 79-047

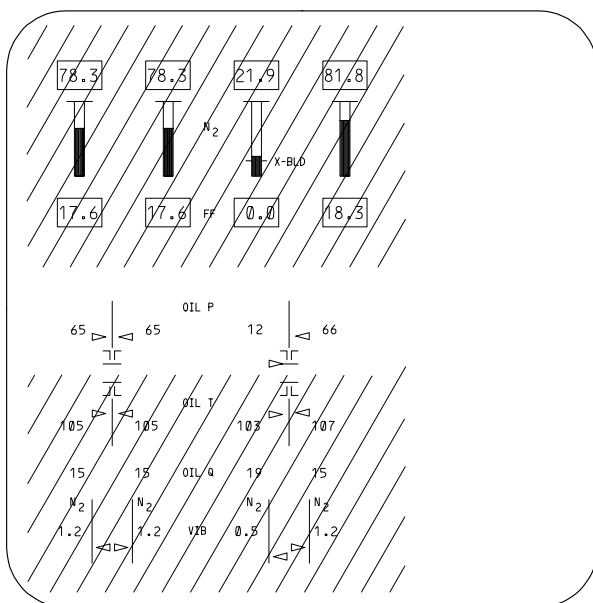
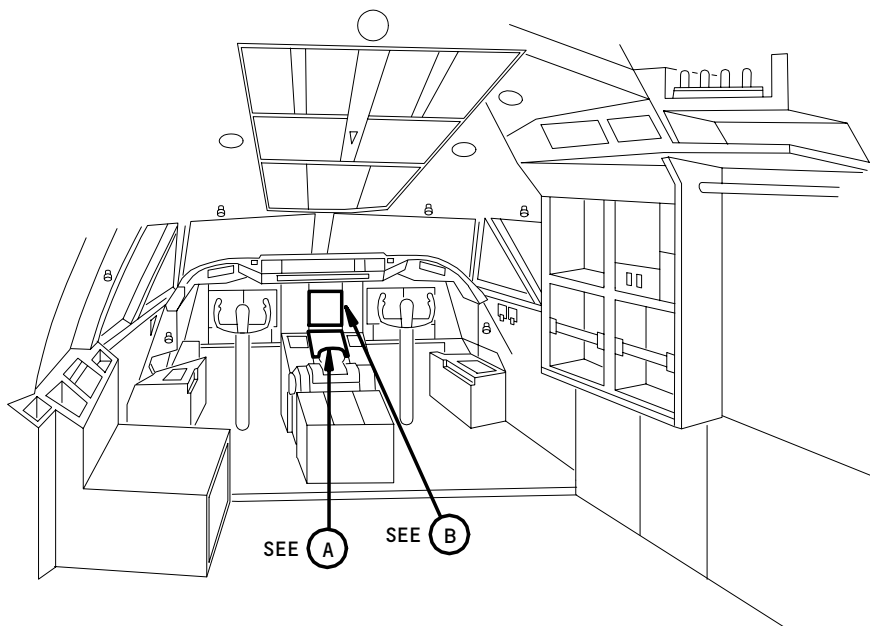
Oil Pressure Transmitter Location
Figure 1

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ENGINES PRE AND POST GE SB 79-047

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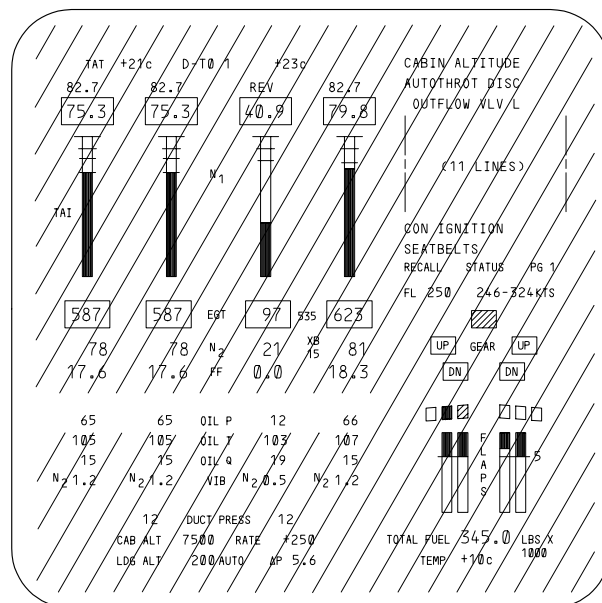
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AUXILIARY EICAS DISPLAY

(A)



COMPACTED EICAS DISPLAY

(A) OR (B)

Oil Pressure Indication
Figure 2

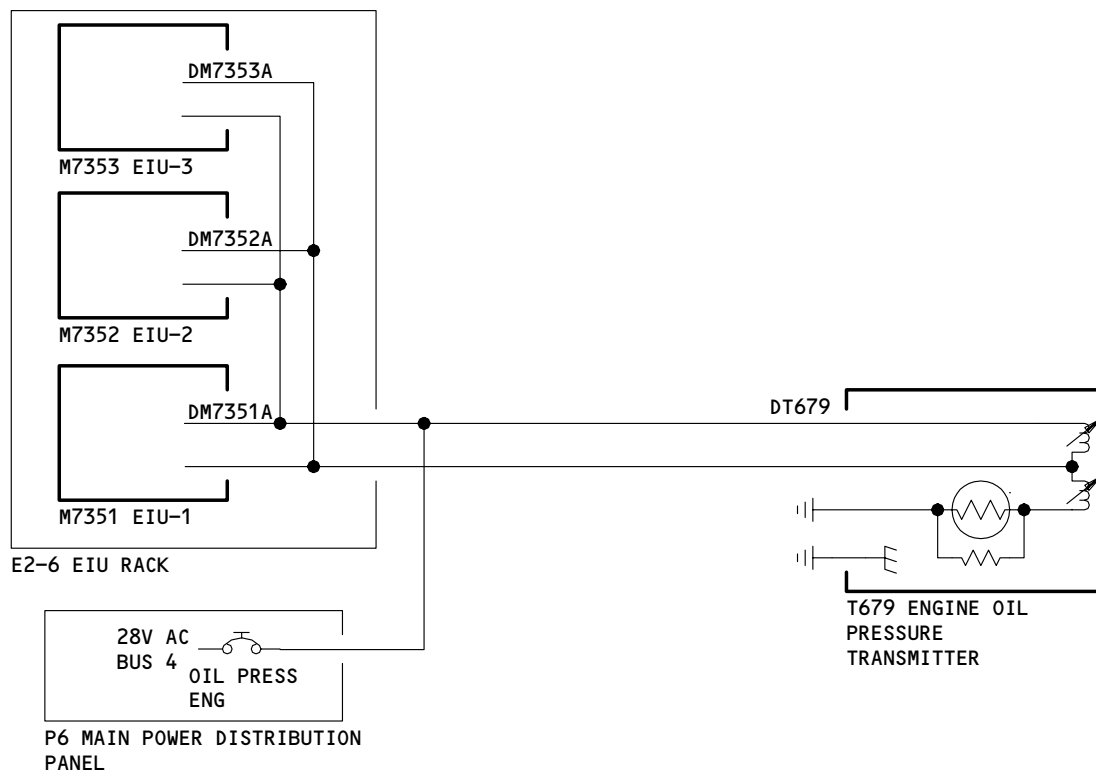
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Oil Pressure Indicating System Simplified Schematic
Figure 3

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OIL PRESSURE INDICATING SYSTEM - ADJUSTMENT/TEST

1. General

- A. This procedure gives two tasks:
- an operational test for the oil pressure indicating system
 - a system test for the oil pressure indicating system.
- In this procedure, refer to the oil pressure indicating system as the indicating system.
- (1) The operational test makes sure the EICAS display agrees with the indication of the oil pressure between all engines. You must operate all of the engines at the same power position.
- B. You can do the operational test when you operate the engines. You do this test to make sure that the indicating system operates. You can also use the operational test to make sure the system operates after you replace the oil pressure transmitter.
- C. Use the system test to do a test to find the precision of the system. You can use this test with the system trouble-shooting procedures.
- D. The oil pressure transmitter (T679) attaches on the forward side of the lube and scavenge pump. You will find this pump on the forward face of the accessory gearbox at the 7 o'clock position.

TASK 79-32-00-705-001-J00

2. The operational test for the indicating system.

- A. References
- (1) AMM 71-00-00/201, Power Plant
- B. Do these steps to do a test of the indicating system:
- S 865-072-J00
- (1) Make sure that the oil pressure indication on the EICAS Auxiliary display reads 0-6 PSI before an engine start.
- S 865-002-J00
- (2) Start and operate all four engines (Ref 71-00-00/201) for the usual operation at the same power position.
- S 715-003-J00
- (3) Make sure that the oil pressure (OIL P) indication on the auxiliary EICAS display is approximately the same for each engine.
- S 865-004-J00
- (4) Do the engine shutdown procedure (Ref 71-00-00/201).

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TASK 79-32-00-705-005-J00

3. The System Test for the Indicating System.

A. Standard Tools and Equipment

- (1) Container - 2 gallon (8 liter) capacity, for oil
- (2) Air Source - Compressed Dry Filtered, 0-100 psi (0-690 kPa)
- (3) Gage - Pressure, 0-100 psi (0-690 kPa), $\pm 1\%$ accuracy
- (4) Valve - Vent
- (5) Valve - Shutoff

B. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

C. References

- (1) AMM 24-22-00/201, Manual Control
- (2) AMM 71-00-00/501, Power Plant
- (3) AMM 78-31-00/201, Thrust Reverser System
- (4) AMM 79-32-01/401, Oil Pressure Transmitter

D. Access

(1) Location Zone

- 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
- 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
- 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
- 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

E. Do the test for the indicating system (Figs. 501 & 502).

S 865-006-J00

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

S 865-007-J00

- (2) Make sure that you close these circuit breakers:
 - (a) P6 Main Power Distribution Panel
 - 1) 6D1 OIL PRESS ENG 1

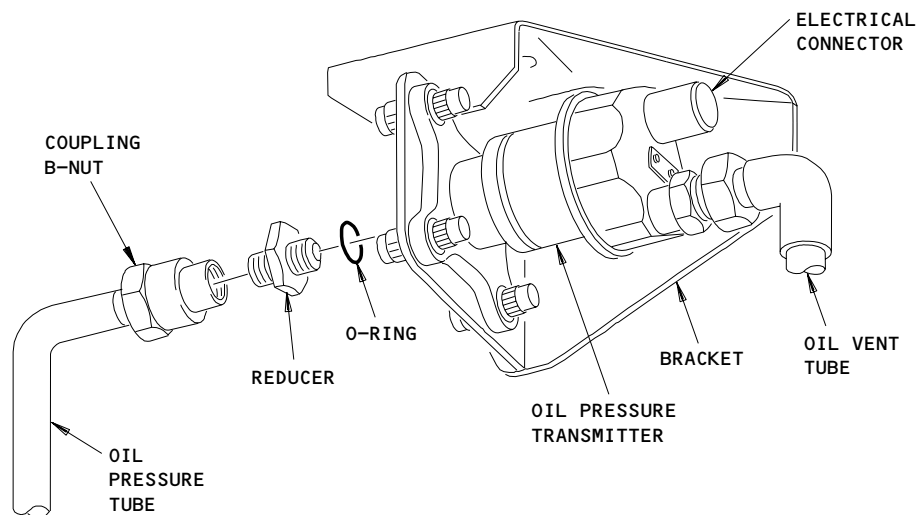
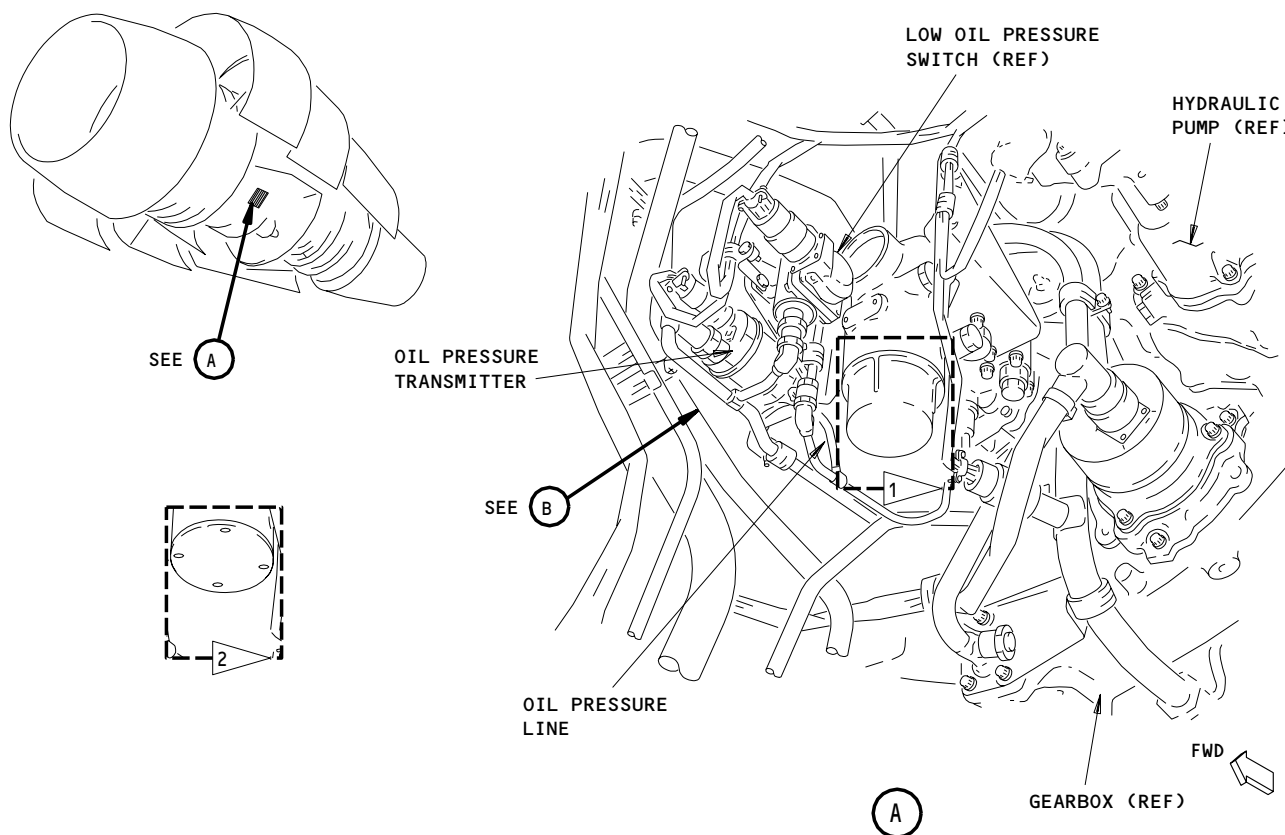
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- 1 ENGINES WITHOUT GE SB 79-047
2 ENGINES WITH GE SB 79-047

(B)

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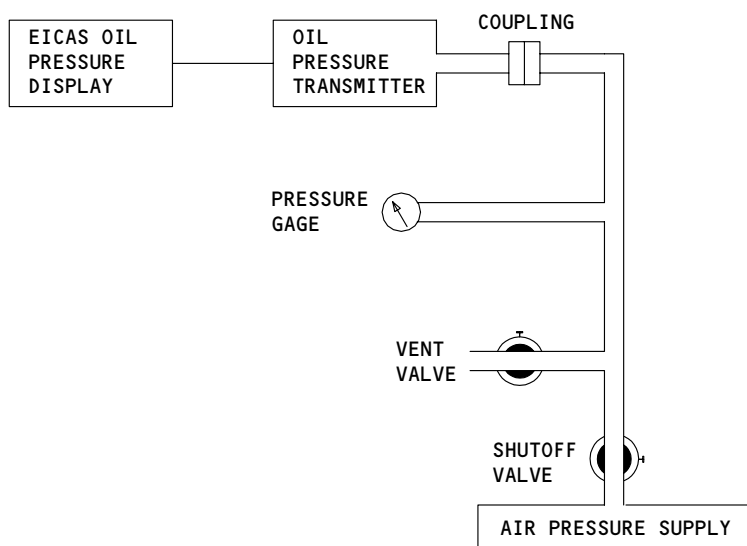
Oil Pressure Transmitter Test Connection
Figure 501

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ENGINES PRE AND POST GE SB 79-047

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Oil Pressure Indicating System Test Schematic
Figure 502

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| |
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|-----|

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- 2) 6D2 OIL PRESS ENG 2
- 3) 6D3 OIL PRESS ENG 3
- 4) 6D4 OIL PRESS ENG 4
- (b) P7 Overhead Circuit Breaker Panel
 - 1) 7F9 EIU L
 - 2) 7F10 EIU C
 - 3) 7F15 EIU R

S 865-008-J00

- (3) Make sure the EIU select switch on the P2 pilots' center instrument panel is in the AUTO position.

S 015-009-J00

- (4) Open the left thrust reverser (Ref 78-31-00/201).

S 035-010-J00

- (5) Disconnect the oil pressure tube from the oil pressure transmitter.
 - (a) Drain the remaining oil into a container.

S 485-011-J00

- (6) Connect this equipment to the port of the oil pressure transmitter as shown in Fig. 502.
 - the air source
 - the gage
 - the vent valve
 - the shutoff valve.

(a) Close the vent valve.

F. Do these steps to do a test of the indicating system.

S 735-012-J00

- (1) Increase the air pressure at the transmitter to 80 psi (552 kPa).

S 735-013-J00

- (2) Close the shutoff valve between the air pressure source and the transmitter.

S 735-014-J00

- (3) For the applicable engine, make sure that the oil pressure indication on the EICAS auxiliary display reads 80 \pm 3.0 psi (552 \pm 21 kPa).

S 735-015-J00

- (4) Make sure that the oil pressure display does not change for each position of the EIU select switch.
 - (a) Move the EIU select switch to the left (L) position.
 - 1) Make sure the oil pressure indication does not change.
 - (b) Move the EIU select switch to the center (C) position.
 - 1) Make sure that the oil pressure indication does not change.
 - (c) Move the EIU select switch to the right (R) position.
 - 1) Make sure that the oil pressure indication does not change.

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S 865-016-J00

- (5) Move the EIU select switch to the AUTO position.

S 735-017-J00

- (6) Open the vent valve and decrease the pressure to zero.

G. Do these steps to put the airplane back to its usual condition.

S 085-018-J00

- (1) Remove this equipment from the port of the oil pressure transmitter:
- the air source
 - the gage
 - the valves.

S 025-019-J00

- (2) Replace the oil pressure transmitter (Ref 79-32-01/401) if the pressure is more than the limits.

S 035-020-J00

- (3) Use a new O-ring lubricated with oil to connect the oil pressure tube to the oil pressure transmitter
- (a) Tighten the tube nuts to 135-150 pound-inches (15.3-16.9 newton-meters).
- 1) Safety the nuts with the lockwire.

S 415-021-J00

- (4) Close the left thrust reverser (Ref 78-31-00/201).

S 795-022-J00

- (5) Do the idle leak check (Ref 71-00-00/501 Test No. 3).
- (a) Look for the leakage at the tubes of the oil pressure transmitter.

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OIL PRESSURE TRANSMITTER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks:
 - (1) Remove the oil pressure transmitter
 - (2) Install the oil pressure transmitter.
- B. Do these steps to remove the oil pressure transmitter:
 - (1) Open the left thrust reverser
 - (2) Remove the oil tubes
 - (3) Remove the oil pressure transmitter.
- C. Do these steps to install the oil pressure transmitter:
 - (1) Install the oil pressure transmitter
 - (2) Install the oil tubes
 - (3) Close the left thrust reverser
 - (4) Do a leak check
 - (5) Do an operational test of the indicating system for the oil pressure.

TASK 79-32-01-024-087-J00

2. Oil Pressure Transmitter Removal (Fig. 401 and 402)

- A. Standard Tools and Equipment
 - (1) Container - 1 gallon (4 liter) capacity, for oil
- B. References
 - (1) AMM 78-31-00/201, Thrust Reverser System
- C. Access
 - (1) Location Zone
 - 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 422 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 432 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 442 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - (2) Access Panel
 - 415 Left Thrust Reverser Half - Engine 1
 - 425 Left Thrust Reverser Half - Engine 2
 - 435 Left Thrust Reverser Half - Engine 3
 - 445 Left Thrust Reverser Half - Engine 4
- D. Procedure

S 864-002-J00

- (1) For the applicable engine,
Open these circuit breakers and install a DO-NOT-CLOSE tag:
 - (a) P6 Main Power Distribution Panel
 - 1) 6D1 OIL PRESS ENG 1
 - 2) 6D2 OIL PRESS ENG 2
 - 3) 6D3 OIL PRESS ENG 3
 - 4) 6D4 OIL PRESS ENG 4

S 014-003-J00

- (2) Open the left thrust reverser (AMM 78-31-00/201).

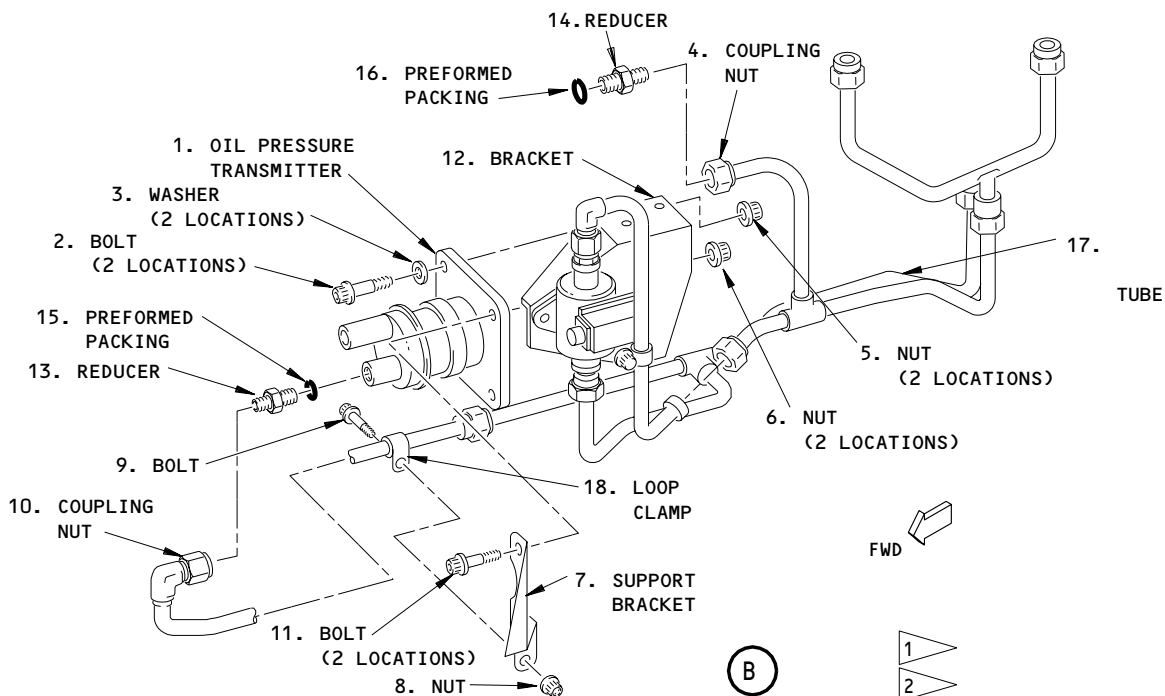
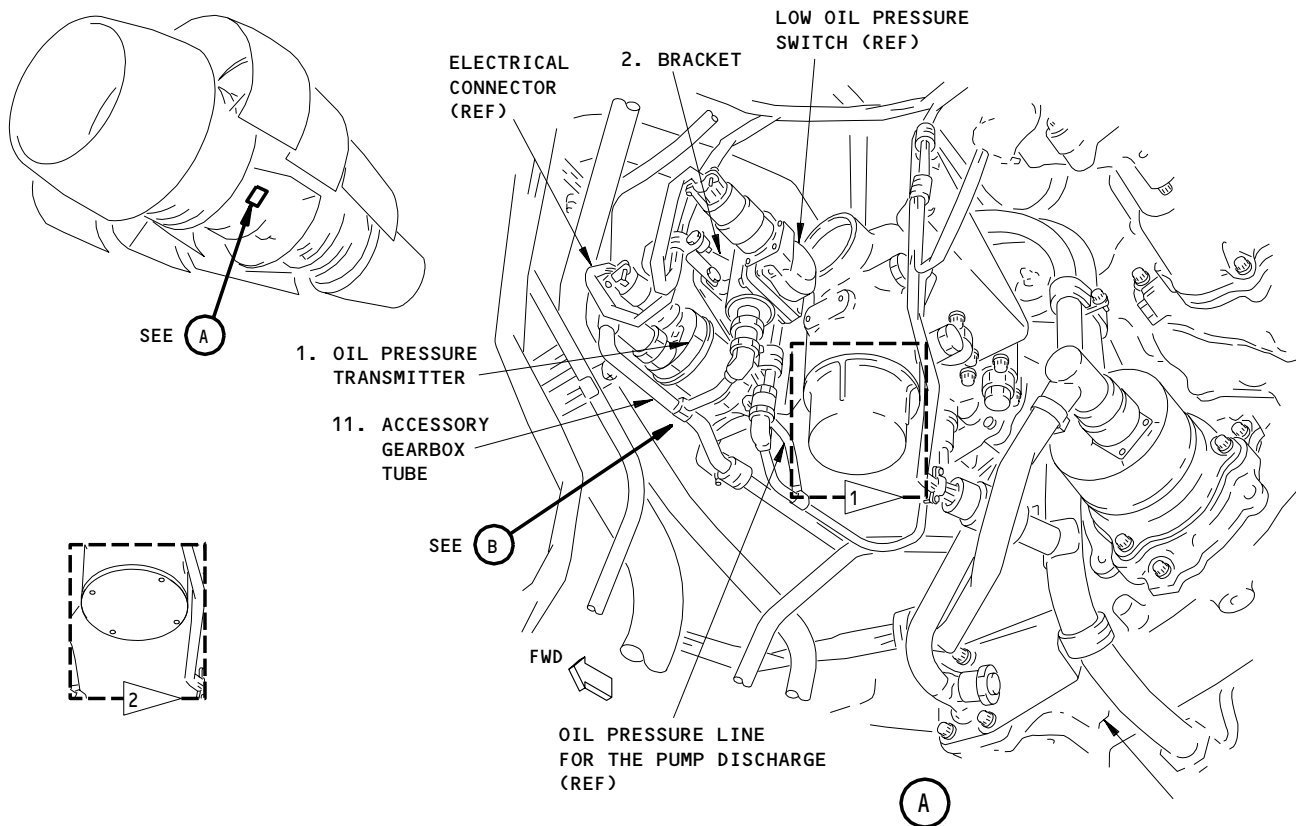
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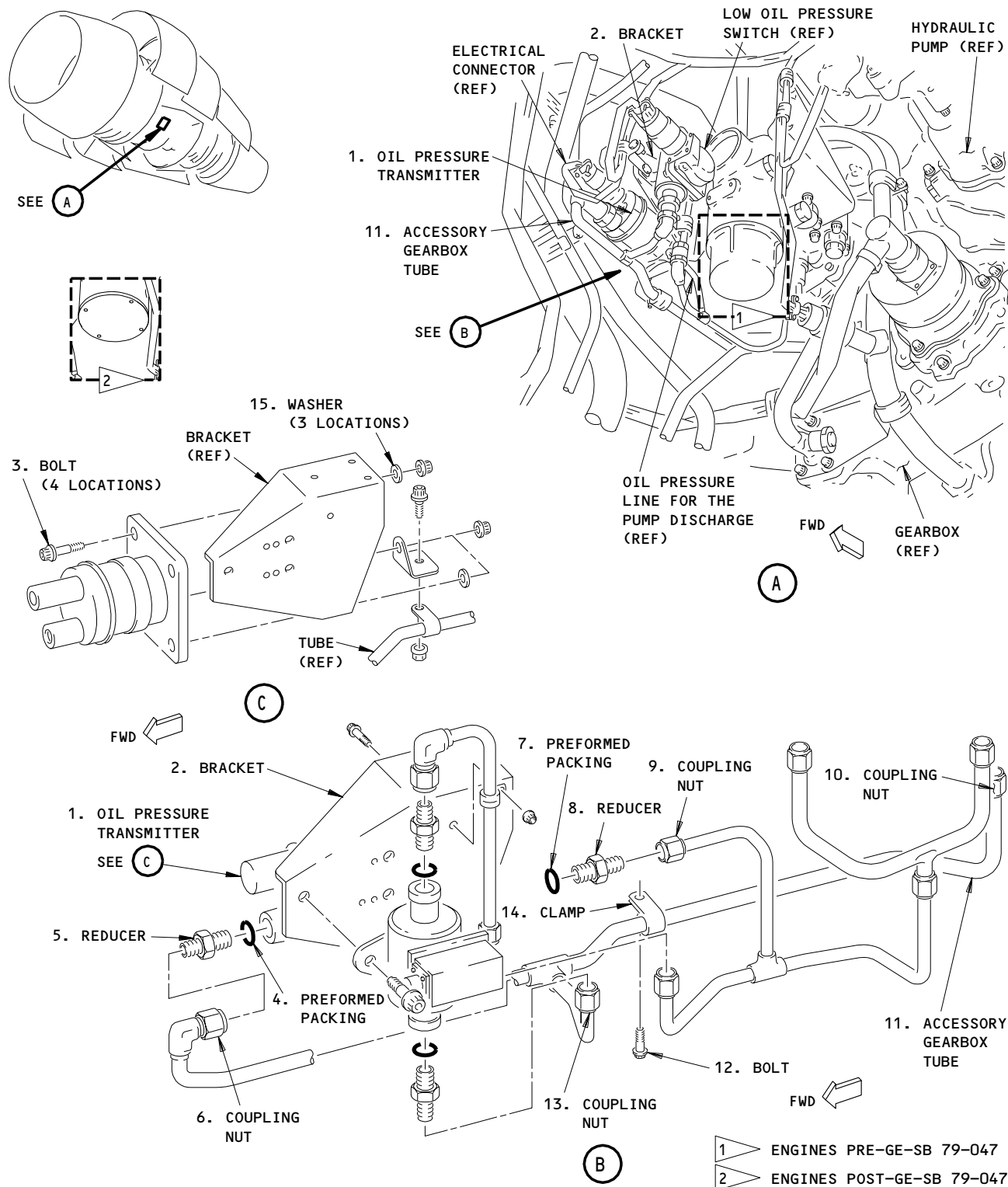
Oil Pressure Transmitter - Removal/Installation
Figure 401

EFFECTIVITY
ENGINES POST GE SB 79-037

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Oil Pressure Transmitter - Removal/Installation
Figure 401A

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ENGINES PRE GE SB 79-037

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S 034-004-J00

- (3) Disconnect the electrical connector from the oil pressure transmitter (1).

NOTE: You can disconnect and move the oil pressure switch and the electrical connector and harness to get better access to the oil tubes.

S 024-085-J00

- (4) ENGINES WITHOUT GE SB 79-37;

Remove the oil pressure transmitter (1) (Fig. 401A).

- (a) Remove the bolt (12) and clamp (14) which holds the accessory gearbox tube (11).
- (b) Loosen the four bolts (3) (by 3 to 4 turns) which attach the oil pressure transmitter (1) to the bracket (2).
- (c) Disconnect the coupling nut (9) and move the nut aft.
 - 1) Drain the oil into a container.
- (d) Disconnect the coupling nut (10).
- (e) Disconnect the coupling nuts (6) and (13).
 - 1) Remove the accessory gearbox tube (11).

- (f) Remove the four bolts (3), three washers (15), and four nuts (5 & 6).

- 1) Remove the oil pressure transmitter (1).

- (g) If you will replace the oil pressure transmitter, do these steps:

- 1) Remove the reducer fittings (5 and 8).
 - 2) Remove and discard the preformed packings (4 and 7).

S 024-088-J00

- (5) ENGINES WITH GE SB 79-37;

Remove the oil pressure transmitter (1) (Fig. 401).

- (a) Put a container below the oil pressure transmitter (1) to drain the oil.

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- (b) Disconnect the coupling nut (10).
- (c) Disconnect the coupling nut (4) and move the nut aft.
- (d) Remove the nut (8) and the bolt (9) from the loop clamp (18) on the tube that connects to the support bracket (7).
- (e) Remove the two nuts (6) and the bolts (11) from the support bracket (7).
- (f) Move the accessory gearbox tube (17) away from the oil pressure transmitter (1).
- (g) Remove the two nuts (5), bolts (2), and washers (3) from the inboard side of the oil pressure transmitter (1).
- (h) Remove the oil pressure transmitter (1) and the support bracket (7) from the bracket (12).
- (i) If you will replace the oil pressure transmitter, do these steps:
 - 1) Remove the reducer fittings (13 and 14).
 - 2) Remove and discard the preformed packings (15 and 16).

S 034-090-J00

- (6) Install the protection caps on the openings of these components:
 - (a) The oil pressure transmitter
 - (b) The oil tubes
 - (c) The electrical connector.

TASK 79-32-01-424-091-J00

3. Oil Pressure Transmitter Installation (Fig. 401 and 401A)

- A. Consumable Materials
 - (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- B. References
 - (1) AMM 71-00-00/501, Power Plant
 - (2) AMM 78-31-00/201, Thrust Reverser System
- C. Access
 - (1) Location Zone
 - 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 422 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 432 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 442 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock

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(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

D. Procedure

S 424-093-J00

(1) ENGINES WITHOUT GE SB 79-37;

Install the oil pressure transmitter (1) (Fig. 401A).

(a) Remove the protective covers from these parts:

- 1) The oil pressure transmitter (1)
- 2) The reducer fittings (5 and 8)
- 3) The coupling nuts (6, 9, 10, and 13).

(b) If you install a new oil pressure transmitter, do these steps:

- 1) Lubricate the preformed packings (4 and 7) with engine oil (C02-019).
- 2) Install the preformed packings (4 and 7) on the reducer fittings (5 and 8).
- 3) Install the reducer fittings on the oil pressure transmitter (1).
- 4) Tighten the reducer fittings (5 and 8) to 135-150 pound-inches (15.3-16.9 N.m).

(c) Install the oil pressure transmitter (1) with four bolts (3), three washers (15), and four nuts (5 & 6).

(d) Keep the bolts loose 3 to 4 turns.

(e) Connect the coupling nuts (6 and 13).

(f) Tighten the coupling nuts by hand.

(g) Connect the coupling nut (10) while you hold the transmitter tight against the transmitter bracket.

- 1) Tighten the coupling nut with your hand.

(h) Connect the coupling nut (9).

- 1) Tighten the coupling nut with your hand.

(i) Install the clamp (14) with the bolt (12).

- 1) Tighten the bolt with your hand.

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- (j) Tighten the four bolts (3) to 55-70 pound-inches (6.2-7.9 N.m).
- (k) Tighten the bolt (12) to 33-37 pound-inches (3.73-4.18 N.m).
- (l) Tighten the coupling nuts (9) and (13) to 135-150 pound-inches (15.3-16.0 N.m).
- (m) Tighten the coupling nut (6) to 270-300 pound-inches (30.5-33.9 Newton-meters).
- (n) Tighten the coupling nut (10) to 270-300 pound-inches (30.5-33.8 Newton-meters).
- (o) Make sure the torques are correct for the coupling nuts you tightened.

S 424-094-J00

(2) ENGINES WITH GE SB 79-37;

Install the oil pressure transmitter (1) (Fig. 401).

- (a) Remove the protective covers from these parts:
 - 1) The oil pressure transmitter (1)
 - 2) The reducer fittings (13 and 14)
 - 3) The coupling nuts (4 and 10).
 - 4) The coupling nuts (4 and 10).
- (b) If you install a new oil pressure transmitter, do these steps:
 - 1) Lubricate the preformed packings (15 and 16) with engine oil (C02-019).
 - 2) Install the preformed packings (15 and 16) on the reducer fittings (13 and 14).
 - 3) Install the reducer fittings on the oil pressure transmitter (1).
 - 4) Tighten the reducer fittings (13 and 14) to 135-150 pound-inches (15.3-16.9 N.m).
- (c) Install the oil pressure transmitter (1) and the support bracket (7) on the bracket (12) with these parts:

NOTE: Only two washers (3) are used on the inboard side of the oil pressure transmitter (1).

- 1) The bolts (2 and 11)
 - 2) The washers (3)
 - 3) The nuts (5) and (6).
- (d) Tighten the nuts by hand.
- (e) Connect the coupling nut (10) to the reducer fitting (13) on the oil pressure transmitter (1) and tighten by hand.
- (f) Connect the coupling nut (4) to the reducer fitting (14) on the oil pressure transmitter (1) and tighten by hand.
- (g) Install the bolt (9) and the nut (8) to connect the loop clamp (18) on the tube to the support bracket (7).
 - 1) Tighten the nut (8) by hand.
- (h) Tighten the nuts (5) and (6) to 55-70 pound-inches (6.2-7.9 N.m).
- (i) Tighten the nut (8) on the clamp to 33-37 pound-inches (3.2-4.2 N.m).
- (j) Tighten the coupling nut (4) to 135-150 pound-inches (15.3-16.9 N.m).

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(k) Tighten the coupling nut (10) to 270-300 pound-inches
(30.5-33.9 Newton-meters).

S 434-096-J00

- (3) Connect the electrical harness to the oil pressure transmitter (1).
(a) Tighten the connector with your hand and turn the connector
45 degrees again.

S 864-015-J00

- (4) For the applicable engine,
Close these circuit breakers and remove the DO-NOT-CLOSE tag:
(a) P6 Main Power Distribution Panel
1) 6D1 OIL PRESS ENG 1
2) 6D2 OIL PRESS ENG 2
3) 6D3 OIL PRESS ENG 3
4) 6D4 OIL PRESS ENG 4

S 414-016-J00

- (5) Close the left thrust reverser (AMM 78-31-00/201).

S 794-017-J00

- (6) Do the procedure for the idle leak check
(AMM 71-00-00/501, Test No. 3).

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LOW OIL PRESSURE WARNING SYSTEM – DESCRIPTION AND OPERATION

1. General

A. The warning system for the low oil pressure provides an indication in the flight compartment of low engine oil pressure. The system consists of a low oil pressure warning switch (S1584) and advisory and status messages that appear on the Engine Indicating and Crew Alert System (EICAS) display. In this procedure, refer to the warning system for the low oil pressure as the warning system.

2. Low Oil Pressure Warning Switch (Fig. 1)

- A. The low oil pressure warning switch is located on the lower left side of the engine, forward of the lube and scavenge pump. The switch senses the pressure differential between the oil supply pressure and accessory gearbox vent pressure.
- B. The warning switch has a pressure sensitive bellows, a spring assembly, an electrical switch, and an electrical connector. The switch is designed to close with decreasing differential pressure below 10 psid due to oil system malfunction. With the engine operating, the switch is normally open with increasing differential pressure above 15 psid.

3. Low Oil Pressure Warning Indication

A. The EICAS advisory message will appear on the main EICAS display. ENG (1,2,3, or 4) OIL PRESS will appear when engine oil pressure decreases below 10 psi with the engine running. The EICAS status message will also appear on the auxiliary EICAS display. ENG (1,2,3, or 4) OIL PRESS will appear if the STAT key is depressed.

4. Operation (Fig. 2)

A. Functional Description

- (1) With power applied to the system and the engine not operating, the differential pressure is near zero energizing the switch. During engine start and until oil pressure differential exceeds 15 psid, the appropriate oil pressure EICAS advisory message is displayed.
- (2) When the oil pressure differential exceeds 15 psid, the warning switch opens and the EICAS message extinguishes.
- (3) If the oil pressure differential decreases and falls below 10 psid, the switch closes, and the appropriate EICAS advisory message is then displayed. This indicates an oil system malfunction with resulting low oil pressure.

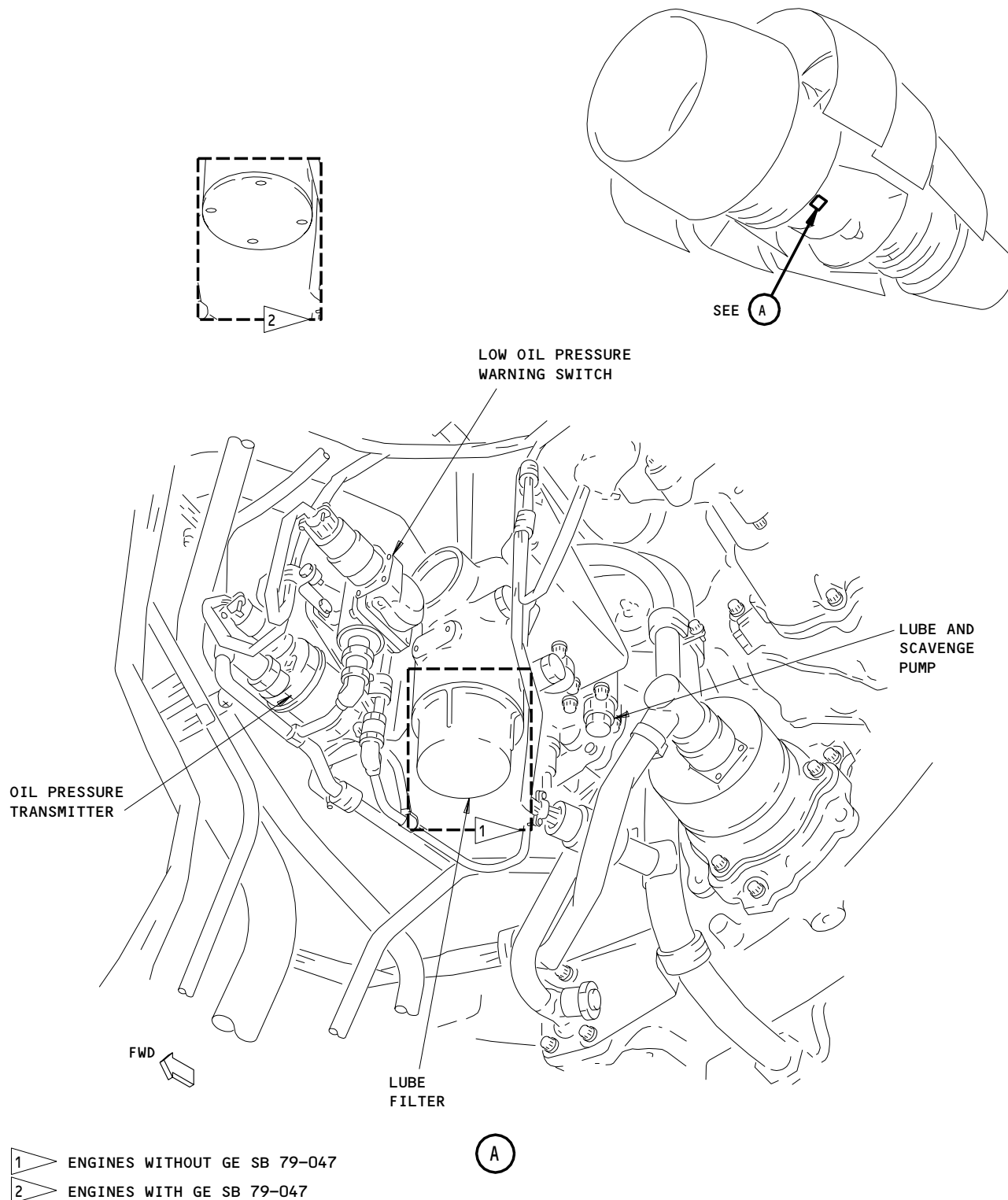
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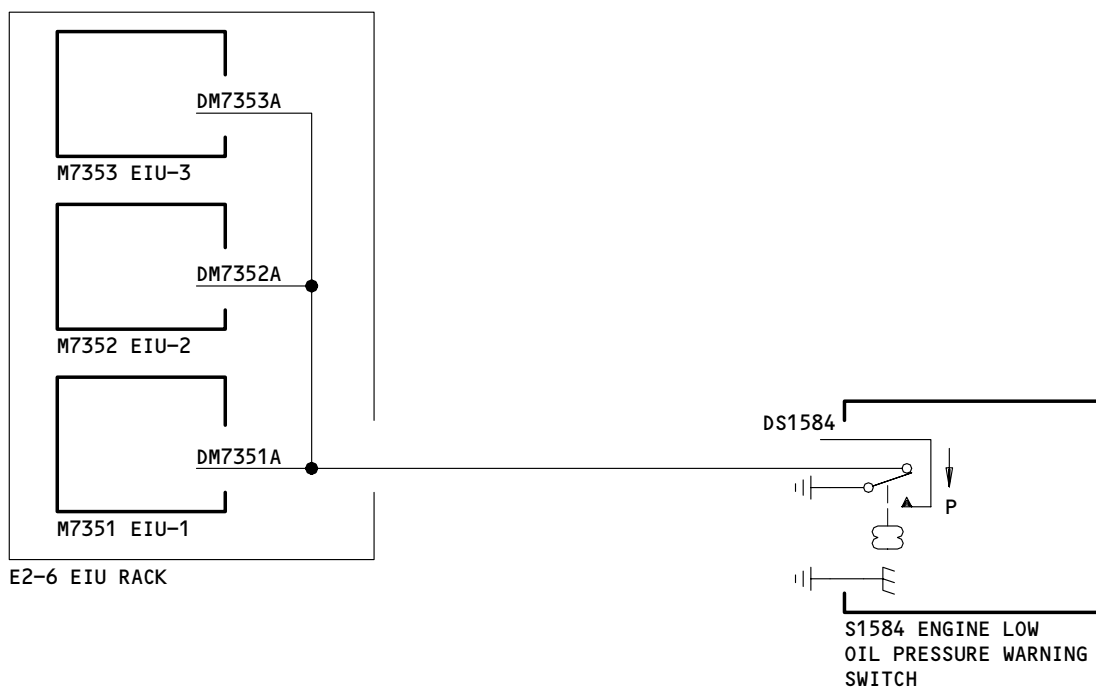
Low Oil Pressure Warning Switch Location
Figure 1

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Low Oil Pressure Warning System Simplified Schematic
Figure 2

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LOW OIL PRESSURE WARNING SYSTEM - ADJUSTMENT/TEST

1. General

A. This procedure gives two tasks:

- an operational test for the low oil pressure warning system
- a system test for the low oil pressure warning system.

In this procedure, refer to the oil pressure warning system as the warning system.

(1) The operational test starts the applicable engine. This test makes sure that you do not see the ENG OIL PRESS message on the EICAS display when the oil pressure goes to the appropriate limit.

(2) You do these steps during the system test:

- open the left thrust reverser for access
- disconnect the oil inlet tube from the warning switch
- connect the test equipment to the switch port
- look at the oil pressure on the EICAS display. Measure the pressures at which the switch closes
- disconnect the test equipment
- replace the switch if the pressure is not in limits
- install the oil tube on the switch
- close the left thrust reverser half.

B. You can use the operational test to make sure the system operates after you replace the warning switch.

C. Use the system test to do a test for the precision of the system. You can use this test together with the system trouble-shooting procedures.

D. The warning switch (S1584) attaches on the forward side of the lube and scavenge pump. You will find this switch on the forward face of the accessory gearbox at the 7 o'clock position.

TASK 79-33-00-705-005-J00

2. The System Test for the Indicating System for the Oil Pressure.

A. Standard Tools and Equipment

- (1) Container - 2 gallon (8 liter) capacity, for oil
- (2) Air Source - Compressed Dry Filtered, 0-40 psi (0-276 kPa)

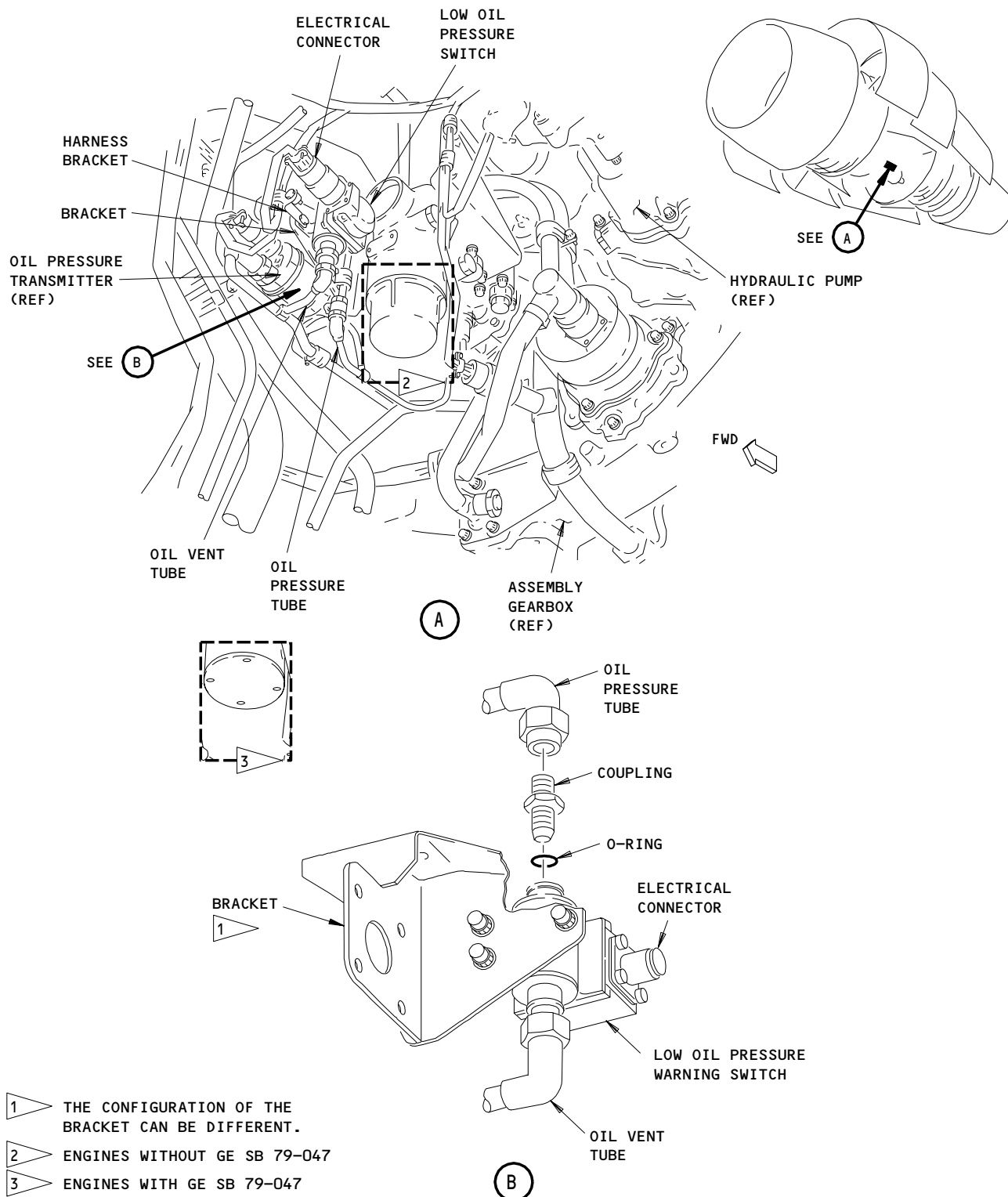
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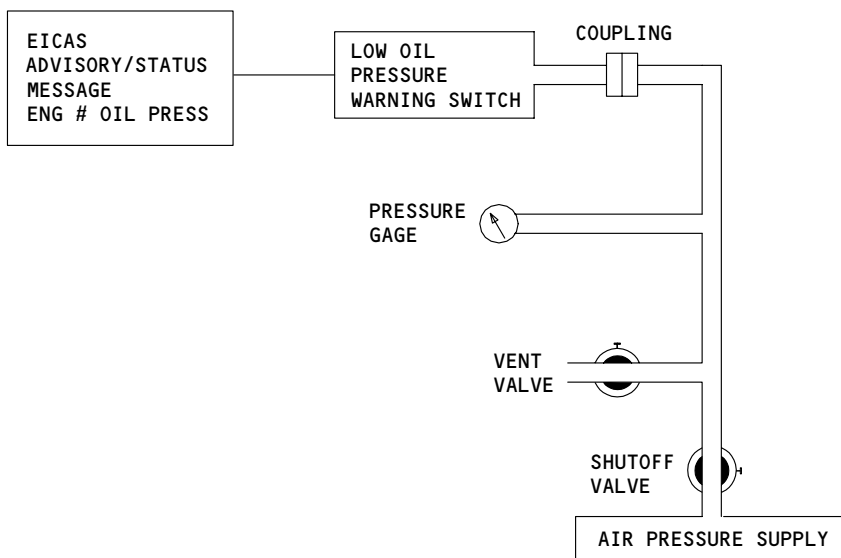
Low Oil Pressure Warning Switch Test Connection
Figure 501

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Low Oil Pressure Warning System Test Schematic
Figure 502

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- (3) Gage - Pressure, 0-40 psi (0-276 kPa) range, $\pm 1\%$ accuracy
- (4) Valve - Shutoff
- (5) Valve - Vent

B. References

- (1) 24-22-00/201, Manual Control
- (2) 71-00-00/501, Power Plant
- (3) 78-31-00/201, Thrust Reverser System
- (4) 79-33-01/401, Low Oil Pressure Warning Switch

C. Access

(1) Location Zone

- 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
- 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
- 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
- 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock

(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

D. Do these steps to prepare for the test.

S 865-006-J00

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

S 865-007-J00

- (2) Make sure that you close these circuit breakers:

(a) P7 Overhead Circuit Breaker Panel

- 1) 7F9 EIU L
- 2) 7F10 EIU C
- 3) 7F15 EIU R

S 015-008-J00

- (3) Open the left thrust reverser (Ref 78-31-00/201).

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S 035-009-J00

- (4) Disconnect the oil pressure tube coupling nut from the tube coupling at the warning switch.
 - (a) Drain the remaining oil into a container.

S 485-010-J00

- (5) Connect these items to the switch as shown in Fig. 502 and close the vent valve.
 - the air source
 - the gage
 - the vent valve
 - the shutoff valve.

E. Do the test for the Warning System (Fig. 501 & 502).

S 735-011-J00

- (1) Set the pressure at the switch to 15 psi and monitor the applicable "OIL PRESS SNS X" status message.
 - (a) The message must come into view within 5 minutes (there is a built-in 240 second delay).

S 735-012-J00

- (2) Slowly decrease the pressure at the switch and monitor the applicable "OIL PRESS SNS X" message.
 - (a) The status message must go out of view when the pressure at the switch is 9.5-12.5 psi (65.5-86.2 kPa) (no delay).

S 735-013-J00

- (3) Decrease the pressure at the switch to zero.

F. Put the aircraft back to its usual condition.

S 085-014-J00

- (1) Remove these items from the switch port:
 - the air source
 - the gage
 - the vent valve
 - the shutoff valve

S 025-015-J00

- (2) Replace the warning switch (AMM 79-33-01/401) if the pressure goes above the limits.

S 435-016-J00

- (3) Connect the oil pressure tube to the warning switch.
 - (a) Tighten the tube coupling nut to 135-150 pound-inches (15.3-16.9 newton-meters) and safety with the lockwire.

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- S 415-017-J00
- (4) Close the left thrust reverser (Ref 78-31-00/201).
- S 795-018-J00
- (5) Do the idle leak check (Ref 71-00-00/501 Test No. 3) and examine for leakage from the warning switch tube.

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LOW OIL PRESSURE WARNING SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks:
 - (1) Remove the low oil pressure warning switch (S1584).
 - (2) Install the low oil pressure warning switch (S1584).
- B. In this procedure, refer to the low oil pressure warning switch as the warning switch.
- C. You must do these steps to remove the low oil pressure warning switch:
 - (1) Open the left thrust reverser.
 - (2) Remove the low oil pressure warning switch:
- D. You must do these steps to install the low oil pressure warning switch:
 - (1) Install the low oil pressure warning switch:
 - (2) Close the left thrust reverser.
 - (3) Do a leak check.
 - (4) Do an operational test for the low oil pressure warning switch.

TASK 79-33-01-004-001-J00

2. Remove the Warning Switch (Fig. 401).

- A. Standard Tools and Equipment
 - (1) Container - 1 gallon (4 liter) capacity, for oil
- B. References
 - (1) AMM 78-31-00/201, Thrust Reverser System
- C. Access
 - (1) Location Zone
 - 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 422 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 432 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 442 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - (2) Access Panel
 - 415 Left Thrust Reverser Half - Engine 1
 - 425 Left Thrust Reverser Half - Engine 2
 - 435 Left Thrust Reverser Half - Engine 3
 - 445 Left Thrust Reverser Half - Engine 4
- D. Do these steps to remove the warning switch (Fig. 401):
 - S 864-002-J00
 - (1) For the applicable engine,
Open these circuit breakers and install the DO-NOT-CLOSE tags:
 - (a) P7 Overhead Circuit Breaker Panel
 - 1) 7F9 EIU L
 - 2) 7F10 EIU C
 - 3) 7F15 EIU R

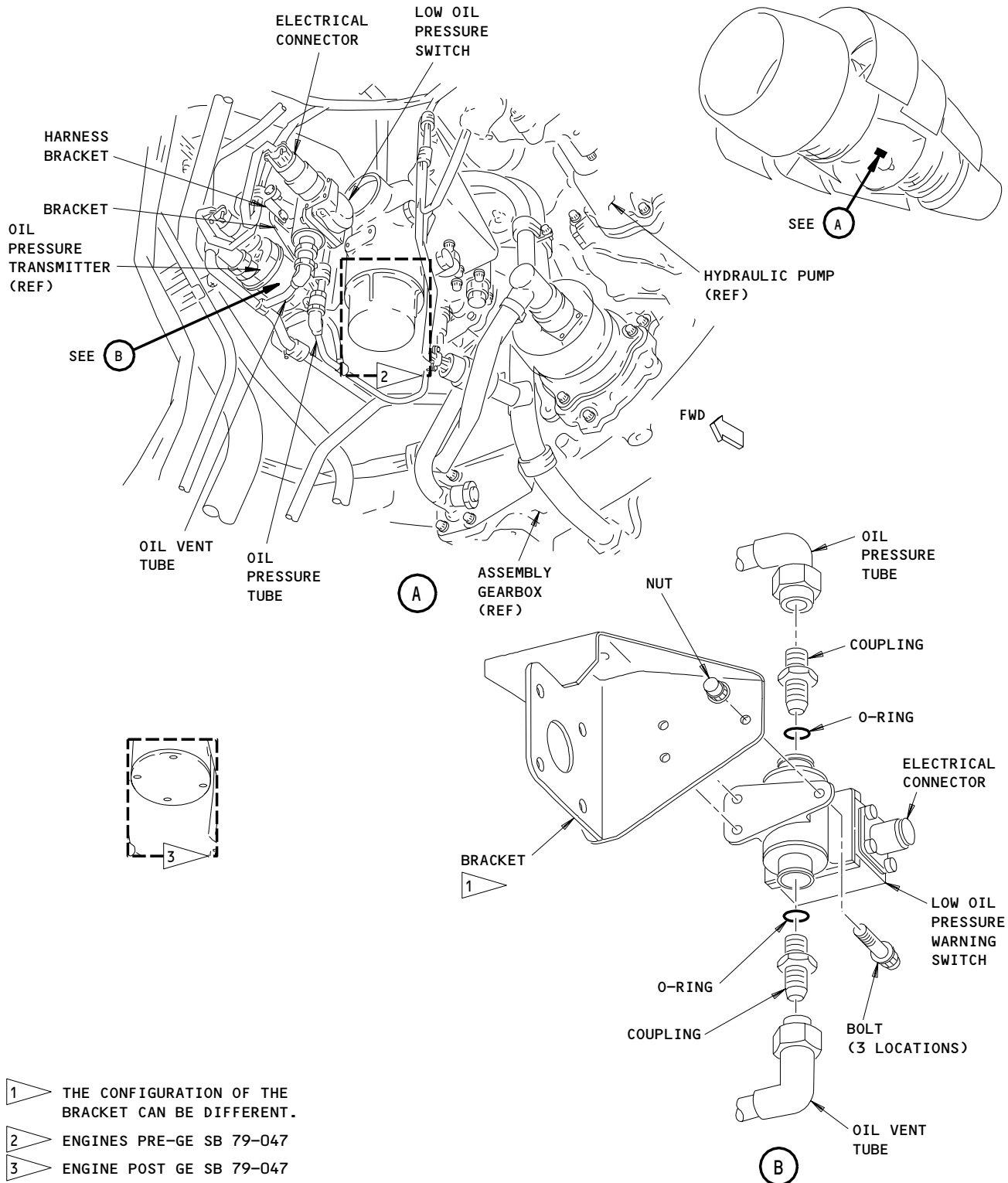
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Low Oil Pressure Warning Switch Installation
Figure 401

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- S 014-042-J00
- (2) Open the left thrust reverser (AMM 78-31-00/201).
- S 034-004-J00
- (3) Disconnect the electrical connector from the warning switch and install the protection caps.
- S 034-005-J00
- (4) Remove the pressure and the vent tubes from the couplings.
(a) Drain the remaining oil into a container.
- S 034-006-J00
- (5) Remove the tube couplings and the O-rings from the ports in the switch.
(a) Keep the tube couplings for the installation.
(b) Remove and discard the O-rings.
- S 024-007-J00
- (6) Remove the three bolts and the nut that attach the switch to the bracket.
(a) Remove the warning switch.
- S 034-008-J00
- (7) Install the protection caps on the switch and the oil tubes.

TASK 79-33-01-404-009-J00

3. Install the Warning Switch (Fig. 401)

- A. Consumable Materials
(1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)
- B. References
(1) AMM 71-00-00/501, Power Plant
(2) AMM 78-31-00/201, Thrust Reverser System
(3) AMM 79-32-00/501, Oil Pressure Indicating System
- C. Access
(1) Location Zone
- | | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 422 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 432 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 442 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |

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(2) Access Panel

- 415 Left Thrust Reverser Half - Engine 1
- 425 Left Thrust Reverser Half - Engine 2
- 435 Left Thrust Reverser Half - Engine 3
- 445 Left Thrust Reverser Half - Engine 4

D. Do these steps to install the warning switch (Fig. 401):

S 034-010-J00

- (1) Remove the protection caps from the switch and the oil tubes.

S 024-041-J00

CAUTION: THE WARNING SWITCH LOOKS THE SAME AS THE DIFFERENTIAL PRESSURE SWITCH FOR THE OIL AND FUEL FILTERS. FOR THE CORRECT SWITCH PART NUMBER, REFER TO THE IPC. IF YOU INSTALL A SWITCH THAT IS NOT CORRECT, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

- (2) Use the three bolts and the nut to install the warning switch on the mounting bracket.

NOTE: Install the harness and bracket with the forward-most bolt and nut.

- (a) Tighten the bolts to 33-37 pound-inches (3.7-4.2 newton-meters).
- 1) Install lockwire on the bolts.

S 434-012-J00

- (3) Use the O-rings lubricated with the oil and attach the tube couplings to the switch.

- (a) Tighten to 135-150 pound-inches (15.3-16.9 newton-meters).

S 224-013-J00

- (4) Attach the tubes to the couplings and tighten the coupling B-nuts to 135-150 pound-inches (15.3-16.9 newton-meters).

S 434-014-J00

- (5) Remove the protection caps and connect the electrical connector to the switch.

- (a) Tighten the electrical connector with your hand.

NOTE: This will put a cover over the witness band.

- (b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/8 turn.

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- S 864-015-J00
- (6) For the applicable engine,
Close these circuit breakers and remove the DO-NOT-CLOSE tags:
(a) P7 Overhead Circuit Breaker Panel
- 1) 7F9 EIU L
 - 2) 7F10 EIU C
 - 3) 7F15 EIU R
- S 414-016-J00
- (7) Close the left thrust reverser (AMM 78-31-00/201).
- S 714-017-J00
- (8) Do the operational test for the warning system (AMM 79-33-00/501)
and examine the connections for leakage.

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OIL TEMPERATURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. The oil temperature indicating system provides a visual indication in the flight compartment of the oil temperature of each engine. The system consists of the oil temperature sensor and uses the auxiliary Engine Indicating and Crew Alert System (EICAS) for display.
- B. The oil temperature sensor measures engine oil temperature. This temperature signal is sent through the Electronic Control Unit (ECU) to the EFIS/EICAS interface units (EIU's).

2. Oil Temperature Sensor (Fig. 1)

- A. The oil temperature sensor is located on the lower left side of the engine, forward of the accessory gearbox. It is installed in the oil scavenge return line next to the lube and scavenge pump.
- B. The sensor consists of dual sensing elements made of chromel-alumel wire. The elements sense the temperature of the scavenge oil returning to the tank. Each element sends a separate signal to the ECU.

3. Oil Temperature Indication (Fig. 2)

- A. The oil temperature indication is displayed on the auxiliary EICAS display.
- B. The display indicates engine oil temperature in °C in a vertical scale format. The actual values are shown by analog pointers and by digital readouts. The pointers and readouts change from white to amber when the oil temperature exceeds 160 °C. The pointers and readouts turn red when the oil temperature exceeds 175 °C.

4. Operation (Fig. 3)

- A. Functional Description
 - (1) The temperature of the chromel-alumel wire will change with the temperature of the scavenge oil. The electrical resistance of the chromel-alumel wire is proportional to the oil temperature.
 - (2) The corresponding oil temperature signal is sent through the ECU to EIU's, then to the auxiliary EICAS display.

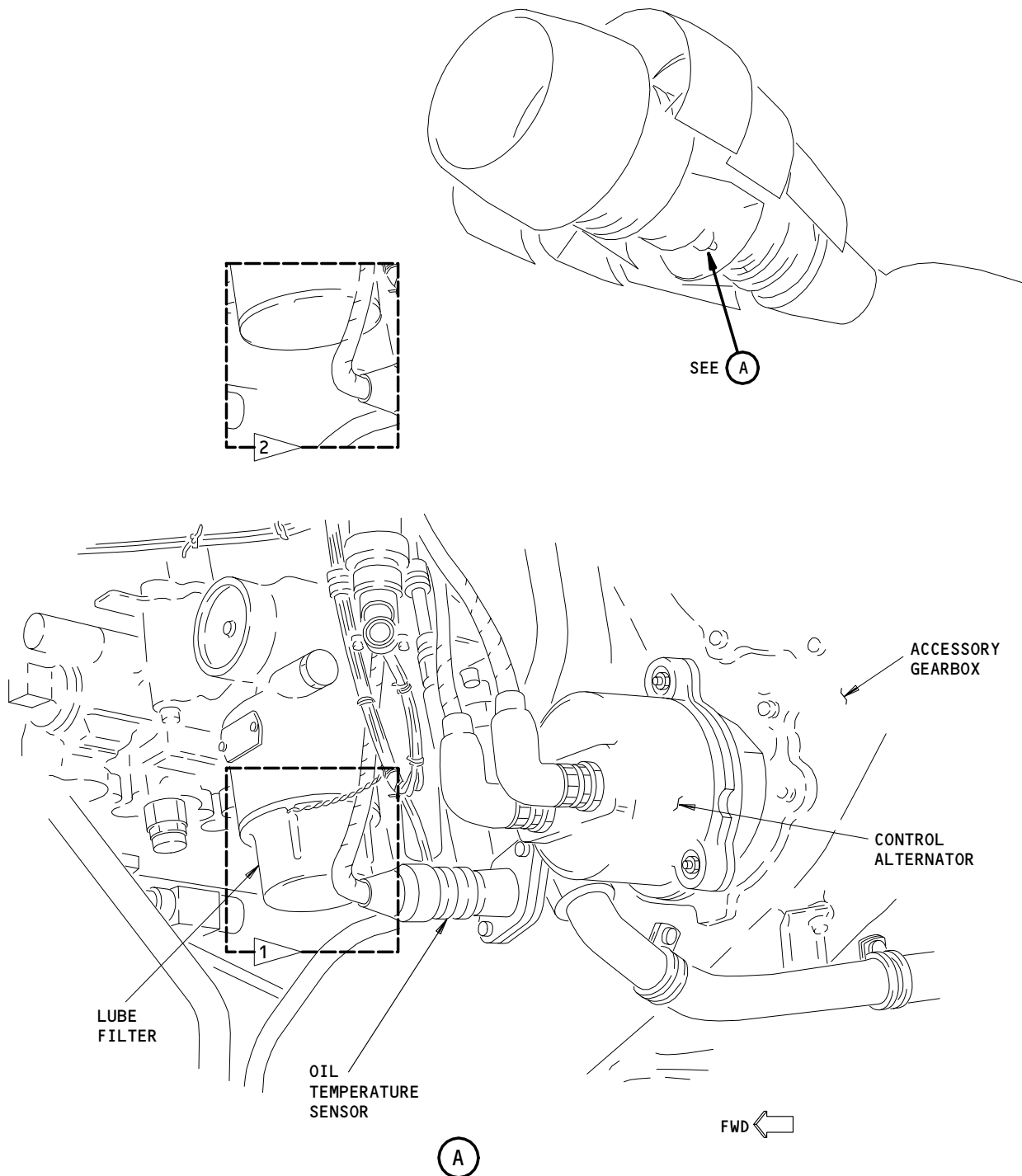
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- 1 ENGINES WITHOUT GE SB 79-047
- 2 ENGINES WITH GE SB 79-047

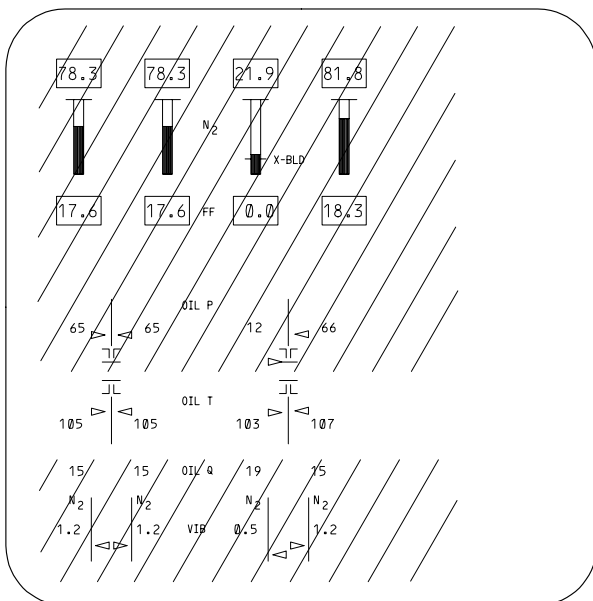
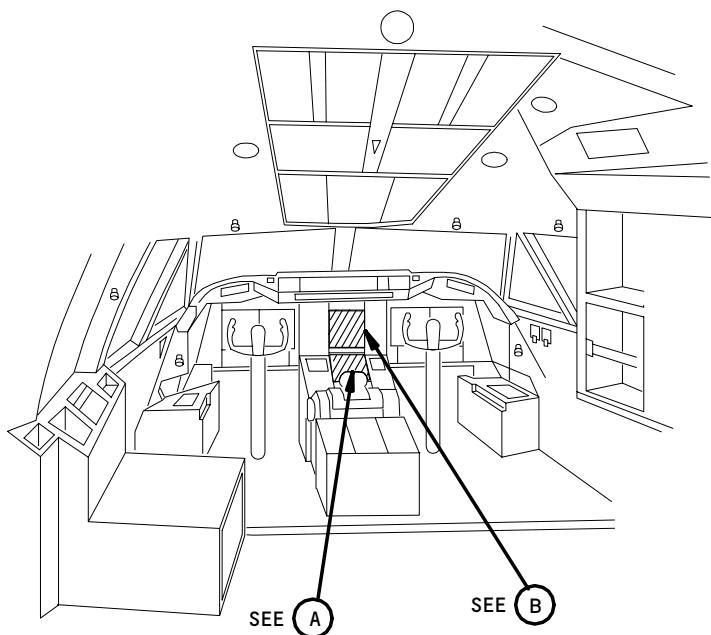
Oil Temperature Sensor Location
Figure 1

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PRE AND POST ENGINE GE SB 79-047

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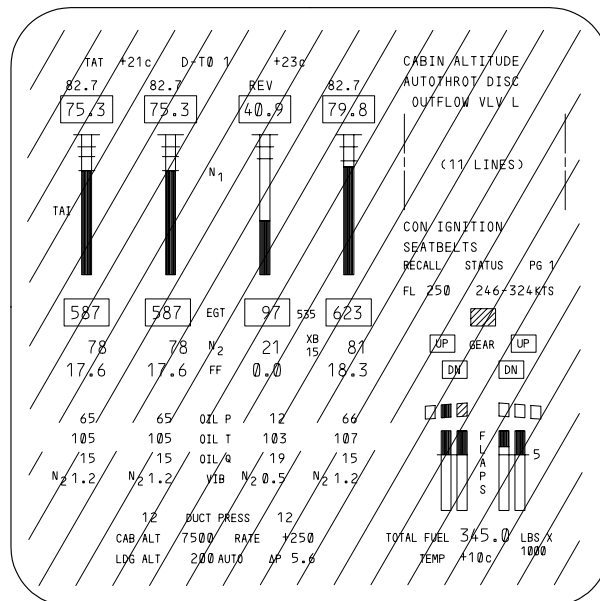
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AUXILIARY EICAS DISPLAY

(A)



COMPACTED EICAS DISPLAY

(A) OR (B)

Oil Temperature Indication
Figure 2

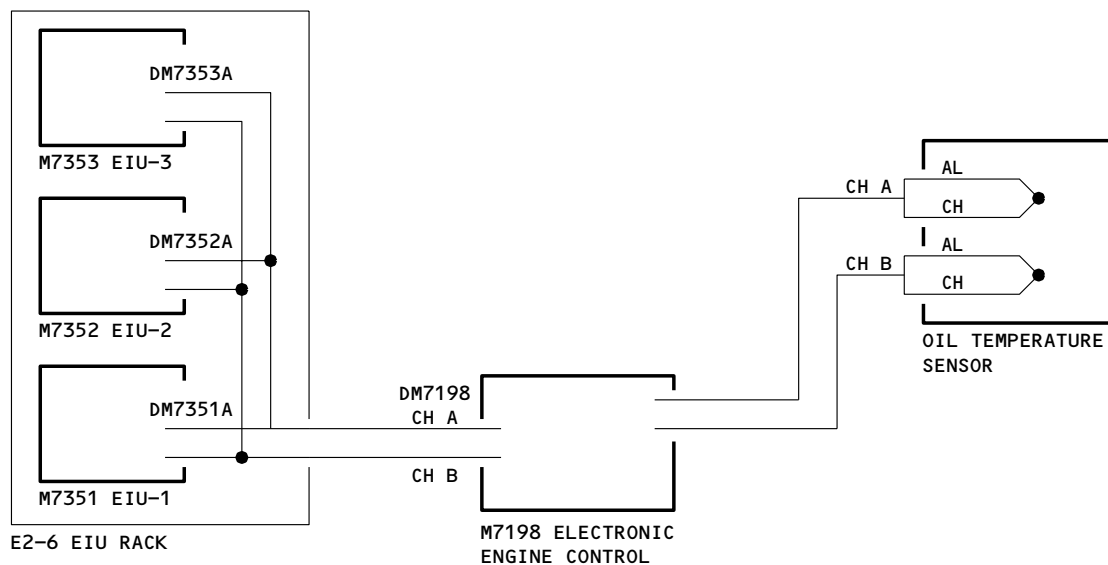
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Oil Temperature Indication Simplified Schematic
Figure 3

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OIL TEMPERATURE INDICATING SYSTEM - ADJUSTMENT/TEST

1. General

- A. This procedure contains the data to do an operational test of the indicating system for the oil temperature.

TASK 79-34-00-705-001-J00

2. Operational Test - Oil Temperature Indicating System

A. References

- (1) 71-00-00/201, Power Plant

B. Do the Test

S 865-002-J00

- (1) Operate the engines at equal power.
(a) Start all four engines (Ref 71-00-00/201).
(b) Make sure the N1 indication on the main EICAS display is approximately the same for each engine.

S 715-003-J00

- (2) Make sure the oil temperature (Oil T) indication on the auxiliary EICAS display is approximately the same for each engine.

S 865-004-J00

- (3) Stop the engines (Ref 71-00-00/201).

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OIL TEMPERATURE SENSOR - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks:
 - (1) Remove the oil temperature sensor
 - (2) Install the oil temperature sensor.
- B. Do these steps to remove the oil temperature sensor:
 - (1) Open the left thrust reverser.
 - (2) Remove the oil temperature sensor.
 - (3) Drain the remaining oil into a container.
- C. Do these steps to install the oil temperature sensor:
 - (1) Install the oil temperature sensor.
 - (2) Close the left thrust reverser.
 - (3) Do a leak check.
 - (4) Do an operational test of the indicating system for the oil temperature sensor.

TASK 79-34-01-004-001-J00

2. Remove the Oil Temperature Sensor (Fig. 401)

- A. Standard Tools and Equipment
 - (1) Container - 1 gallon (4 liter) capacity, for oil
- B. References
 - (1) 78-31-00/201, Thrust Reverser System
- C. Access
 - (1) Location Zone
 - 412 Engine 1 - Accessory Gearbox Fwd Face 7 o'clock
 - 422 Engine 2 - Accessory Gearbox Fwd Face 7 o'clock
 - 432 Engine 3 - Accessory Gearbox Fwd Face 7 o'clock
 - 442 Engine 4 - Accessory Gearbox Fwd Face 7 o'clock
 - (2) Access Panel
 - 415 Left Thrust Reverser Half - Engine 1
 - 425 Left Thrust Reverser Half - Engine 2
 - 435 Left Thrust Reverser Half - Engine 3
 - 445 Left Thrust Reverser Half - Engine 4
- D. Do these steps to remove the oil temperature sensor (Fig. 401).

S 864-031-J00

- (1) For the applicable engine,
Open these circuit breakers and install the DO-NOT-CLOSE tags:
 - (a) P180 Main Power Distribution Panel
 - 1) 180J5 ENG 1 EEC PWR CH A
 - 2) 180J6 ENG 1 EEC PWR CH B
 - 3) 180F5 ENG 2 EEC PWR CH A
 - 4) 180F6 ENG 2 EEC PWR CH B
 - 5) 180G20 ENG 3 EEC PWR CH A
 - 6) 180G21 ENG 3 EEC PWR CH B
 - 7) 180D20 ENG 4 EEC PWR CH A
 - 8) 180D21 ENG 4 EEC PWR CH B

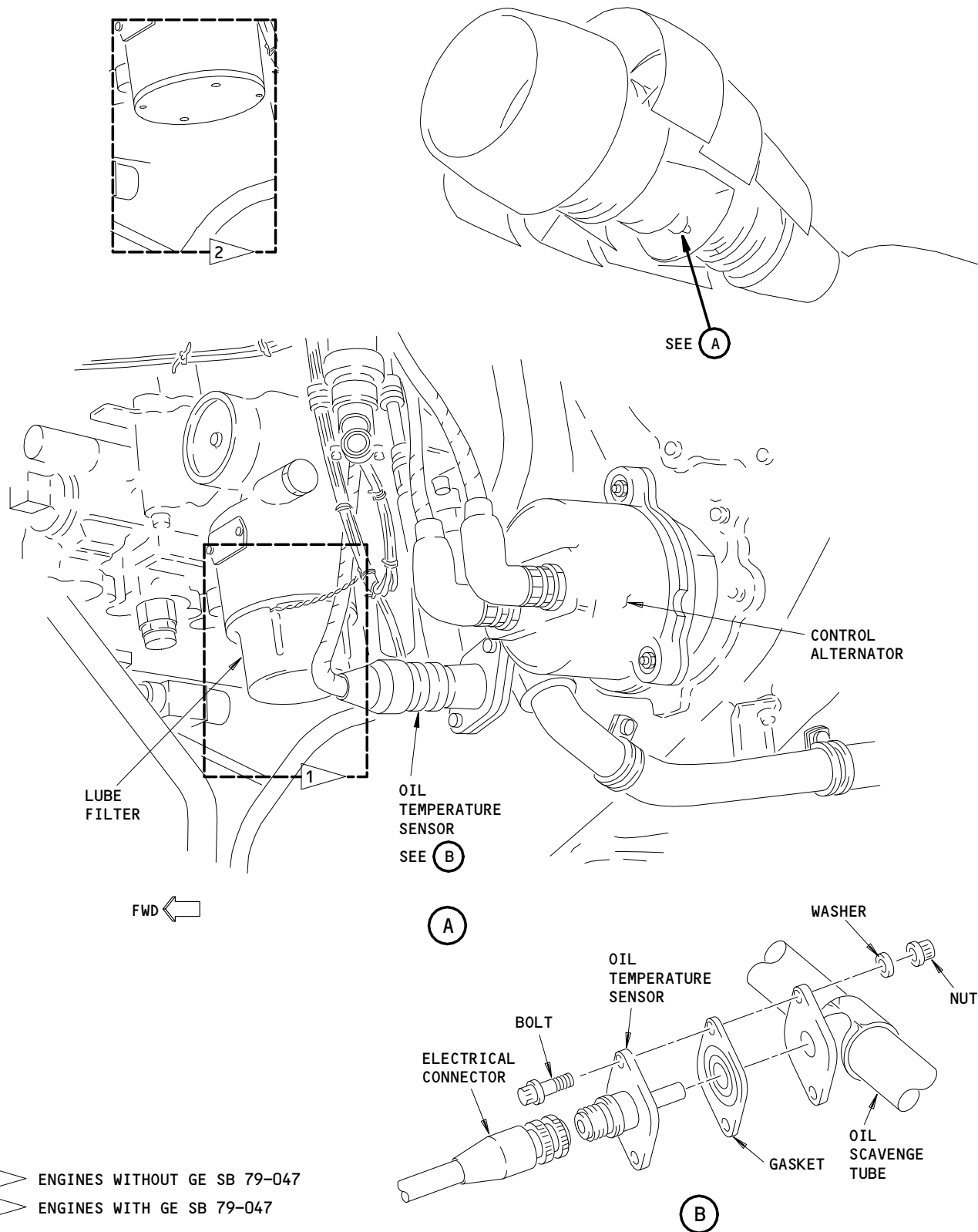
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Oil Temperature Sensor Installation
Figure 401

EFFECTIVITY
PRE AND POST ENGINE GE SB 79-047

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- S 014-003-J00
- (2) Open the left thrust reverser (Ref 78-31-00/201).
- S 034-004-J00
- (3) Disconnect the electrical connector from the oil temperature sensor and install protection caps.
- S 024-005-J00
- (4) Remove these parts that attach the oil temperature sensor to the mounting flange on the scavenge oil tube:
- the nuts
 - the bolts
 - the washers.
- S 024-006-J00
- (5) Remove the oil temperature sensor from the flange and drain the remaining oil into a container.
- (a) Keep the gasket if it is not damaged.
- S 434-007-J00
- (6) Install the protection caps on the sensor and the mounting flange.

TASK 79-34-01-404-008-J00

3. Install the Oil Temperature Sensor.

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. References

- (1) 71-00-00/501, Power Plant
- (2) 78-31-00/201, Thrust Reverser System
- (3) 79-34-00/501, Oil Temperature Indicating System

C. Access

(1) Location Zone

- | | |
|-----|-------------------------------------------------|
| 412 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 422 | Engine 1 - Accessory Gearbox Fwd Face 7 o'clock |
| 432 | Engine 3 - Accessory Gearbox Fwd Face 7 o'clock |
| 442 | Engine 4 - Accessory Gearbox Fwd Face 7 o'clock |

(2) Access Panel

- | | |
|-----|--------------------------------------|
| 415 | Left Thrust Reverser Half - Engine 1 |
| 425 | Left Thrust Reverser Half - Engine 2 |
| 435 | Left Thrust Reverser Half - Engine 3 |
| 445 | Left Thrust Reverser Half - Engine 4 |

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D. Do these steps to install the oil temperature sensor (Fig. 401).

S 034-009-J00

- (1) Remove the protection caps from the sensor and the mounting flange.

S 424-010-J00

- (2) Use a serviceable gasket that you lubricate with engine oil to install the temperature sensor in the oil tube with these parts:
- the bolts
 - the washers
 - the nuts.

S 424-011-J00

- (3) Tighten the nuts to 33-37 pound-inches (3.7-4.2 newton-meters).

S 034-012-J00

- (4) Remove the protection caps from the electrical connector.

S 424-033-J00

CAUTION: EXAMINE THE ELECTRICAL CONNECTOR AND RECEPTACLE WHEN YOU CONNECT THE ELECTRICAL CONNECTOR TO MAKE SURE THE CONNECTOR IS CLEAN. IF IT IS NOT CLEAN, AN INCORRECT OIL TEMPERATURE INDICATION CAN OCCUR DURING A FLIGHT.

- (5) Connect the electrical connector to the oil temperature sensor.
(a) Tighten the electrical connector with your hand.

NOTE: This will put a cover over the witness band.

- (b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/8 turn.

S 864-014-J00

- (6) For the applicable engine,
Close these circuit breakers and remove the DO-NOT-CLOSE tags:

(a) P180 Main Power Distribution Panel

- 1) 180J5 ENG 1 EEC PWR CH A
- 2) 180J6 ENG 1 EEC PWR CH B
- 3) 180F5 ENG 2 EEC PWR CH A
- 4) 180F6 ENG 2 EEC PWR CH B
- 5) 180G20 ENG 3 EEC PWR CH A
- 6) 180G21 ENG 3 EEC PWR CH B
- 7) 180D20 ENG 4 EEC PWR CH A
- 8) 180D21 ENG 4 EEC PWR CH B

S 414-015-J00

- (7) Close the left thrust reverser (Ref 78-31-00/201).

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S 794-016-J00

- (8) Do the idle leak check (AMM 71-00-00/501, Test No. 3).

NOTE: The test is to be a single engine run for the idle leak test of the TEO Sensor, plus confirmation of "NORMAL" oil temperature indication on the EICAS display.

S 714-017-J00

- (9) Do the operational test for the oil temperature indicating system (AMM 79-34-00/501).

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OIL FILTER BYPASS WARNING SYSTEM – DESCRIPTION AND OPERATION

1. General

- A. The bypass warning system for the oil filter provides an indication in the flight compartment of an engine oil scavenge filter that is about to bypass oil. The system consists of a pressure differential switch (S1583) for the oil filter, and advisory and status messages that appear on the Engine Indicating and Crew Alert System (EICAS) display.

2. Oil Filter Pressure Differential Switch (Fig. 1)

- A. The pressure differential switch for the oil filter is located on the right side of the engine fan case, immediately above the engine oil filter. The switch senses the pressure drop across the oil filter.
- B. The pressure differential switch has a pressure sensitive bellows, a spring assembly, an electrical switch and a electrical connector. The switch is normally open and is designed to close at a differential pressure of 25 to 33 psid and open at below 22 psid.

3. Oil Filter Bypass Warning Indication

- A. The EICAS advisory message will appear on the main EICAS display. ENG (1,2,3, or 4) OIL FILT will appear when the pressure differential for the engine oil filter becomes too large. The EICAS status message will also appear on the auxiliary EICAS display. ENG (1,2,3, or 4) OIL FILT will appear if the STAT key is depressed.

4. Operation (Fig. 2)

A. Functional Description

- (1) During engine operation, the oil scavenge filter for the engine traps impurities suspended in the oil. If particle buildup in the filter becomes too restrictive to oil flow, the oil inlet to outlet pressure differential of the filter increases. When the oil pressure differential reaches 25 to 33 psid, the switch closes and the appropriate EICAS advisory message is then displayed.
- (2) The EICAS advisory message is displayed before actual filter bypass. If engine operation is continued in this condition, the pressure differential across the filter will further increase until the filter bypass valve opens allowing oil to bypass the filter.
- (3) When the pressure differential decreases to below 22 psid, the oil filter differential pressure switch closes, and the EICAS advisory message extinguishes.

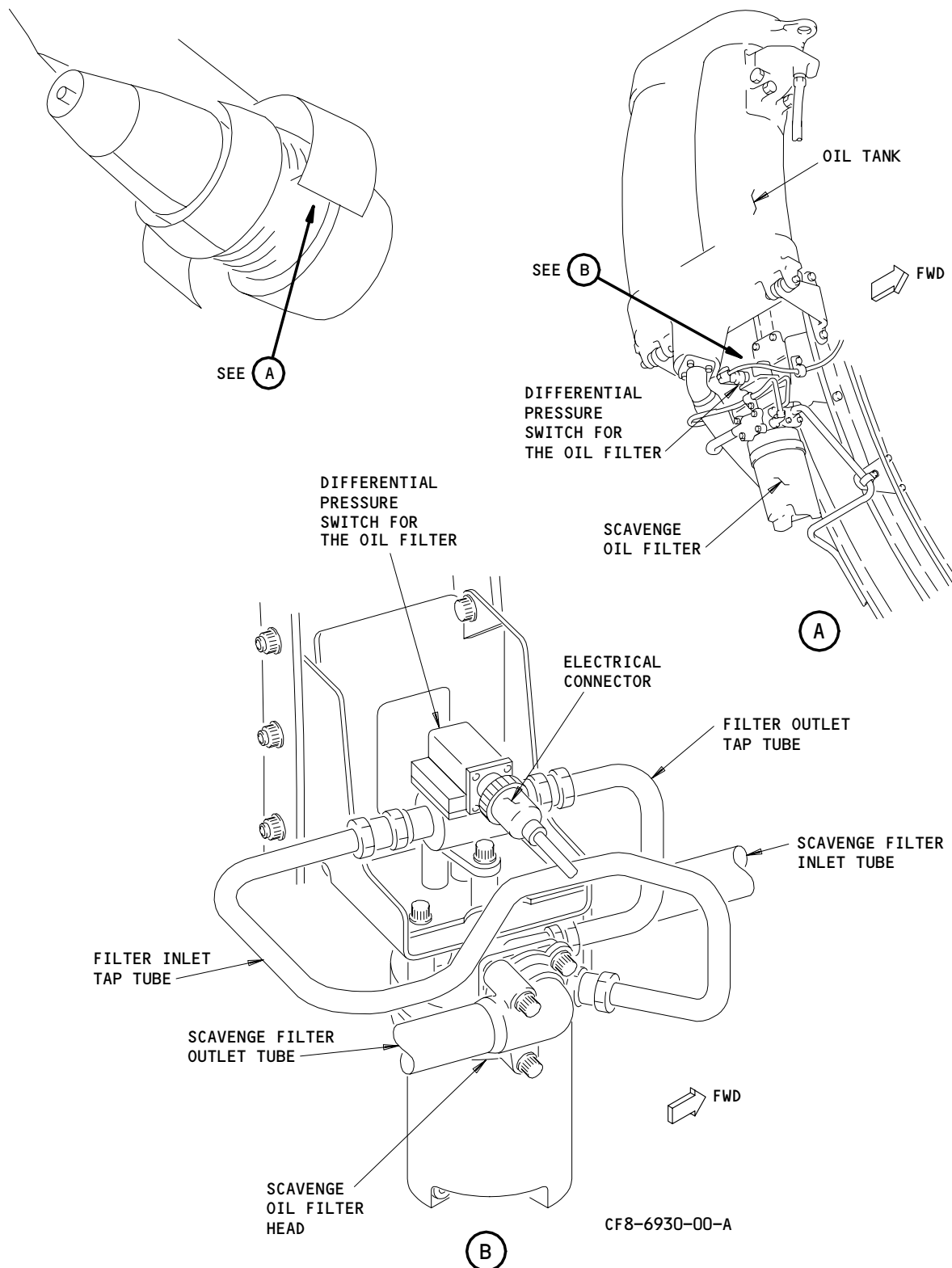
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Oil Filter Differential Pressure Switch Location
Figure 1

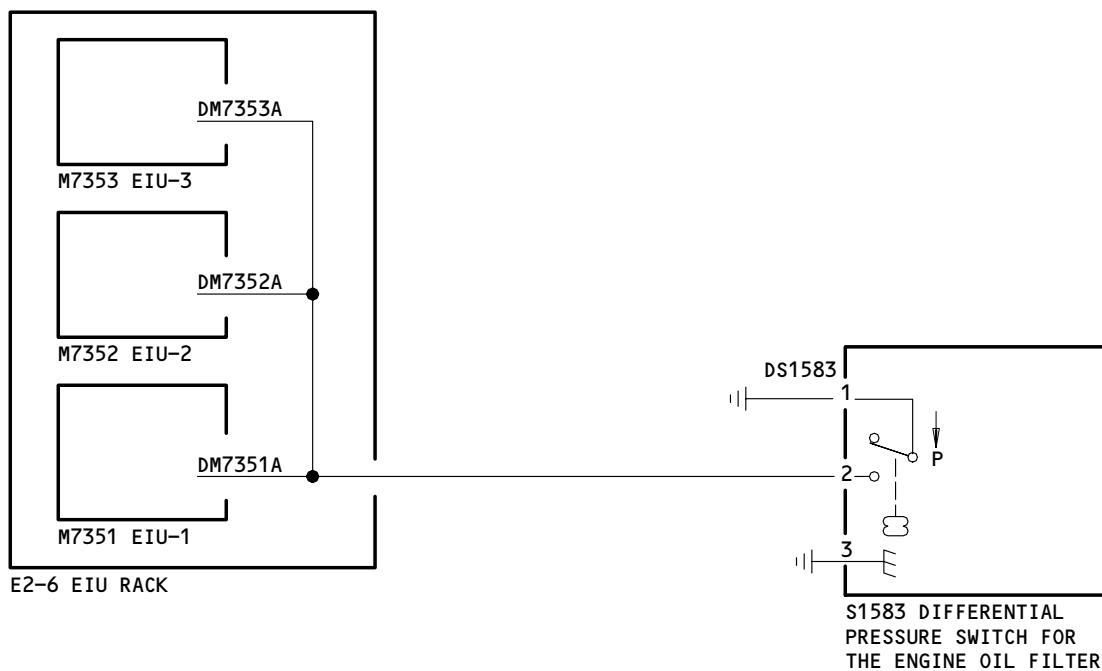
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Oil Filter Bypass Warning System Simplified Schematic
Figure 2

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OIL FILTER BYPASS WARNING SYSTEM - ADJUSTMENT/TEST

1. General

- A. This procedure contains the data to do a system test of the bypass warning system for the oil filter.
- B. You can use this test to do troubleshooting of the system.
- C. You can use this test to make sure the system operates correctly.

NOTE: There is no operational test since the filter must be blocked to make sure the system operates correctly.

- D. The differential pressure switch (S1583) for the oil filter is installed on the fan case of the engine at the 4 o'clock position.
- E. The differential pressure switch for the oil filter is called the switch.

TASK 79-35-00-705-001-J00

2. System Test - Oil Filter Bypass Warning System (Fig. 501 & 502)

A. Standard Tools and Equipment

- (1) Container - 2 gallon (8 liter) capacity, for oil
- (2) Air Source - Compressed Dry Filtered, 0-60 psi (0-412 kPa)
- (3) Gage - Pressure, 0-60 psi (0-412 kPa), $\pm 1\%$ accuracy
- (4) Valve - Vent
- (5) Valve - Shutoff

B. References

- (1) 24-22-00/201, Manual Control
- (2) 71-00-00/501, Power Plant
- (3) 71-11-04/201, Fan Cowl Panels
- (4) 79-35-01/401, Oil Filter Differential Pressure Switch
- (5) IPC 79-31-01 Fig. 5
- (6) WDM 79-35-11
- (7) SSM 79-32-01

C. Access

(1) Location Zone

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 4 o'clock |
| 422 | Engine 2 - Fan Case 4 o'clock |
| 432 | Engine 3 - Fan Case 4 o'clock |
| 442 | Engine 4 - Fan Case 4 o'clock |

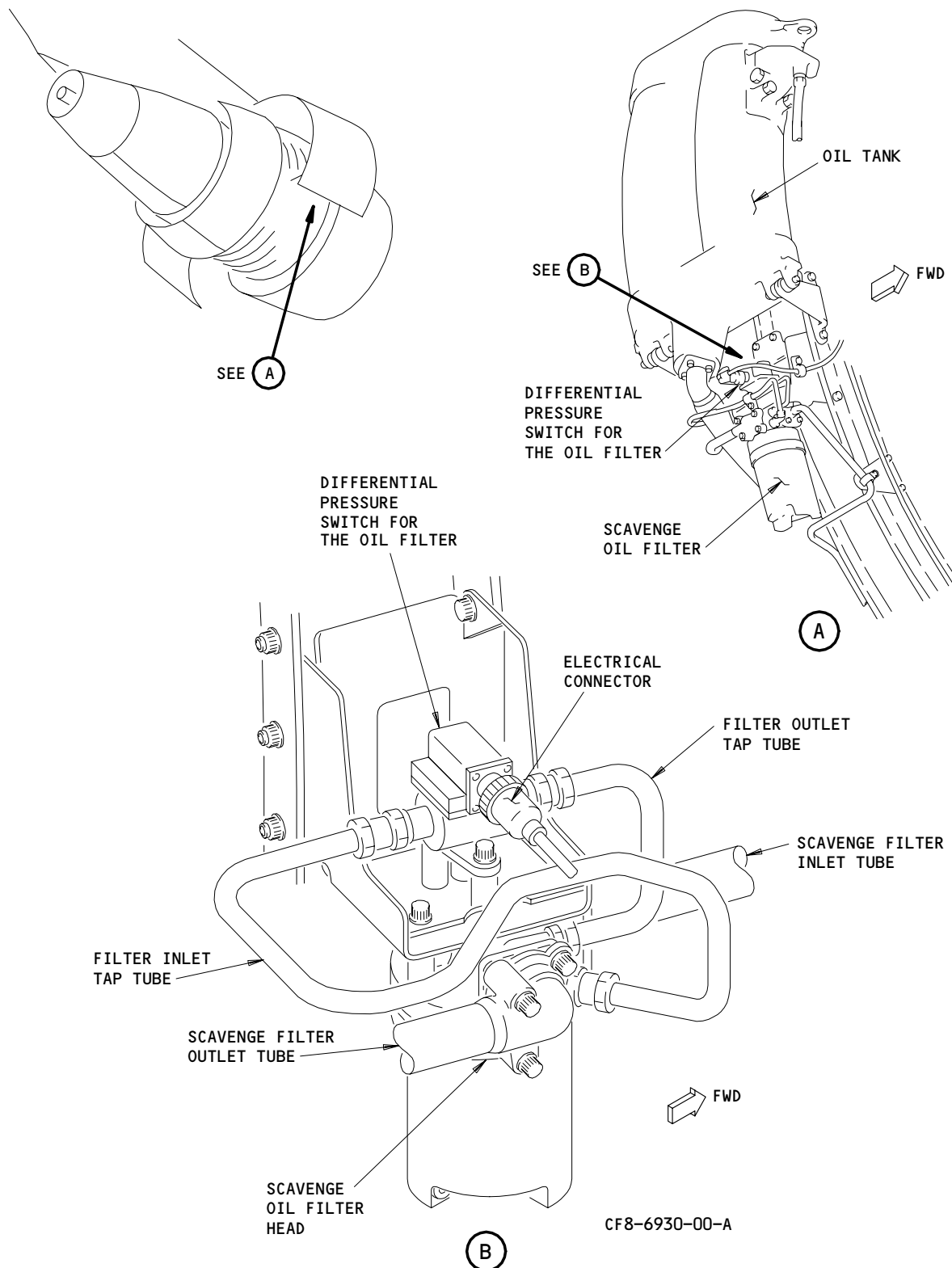
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Oil Filter Differential Pressure Switch Test Connection
Figure 501

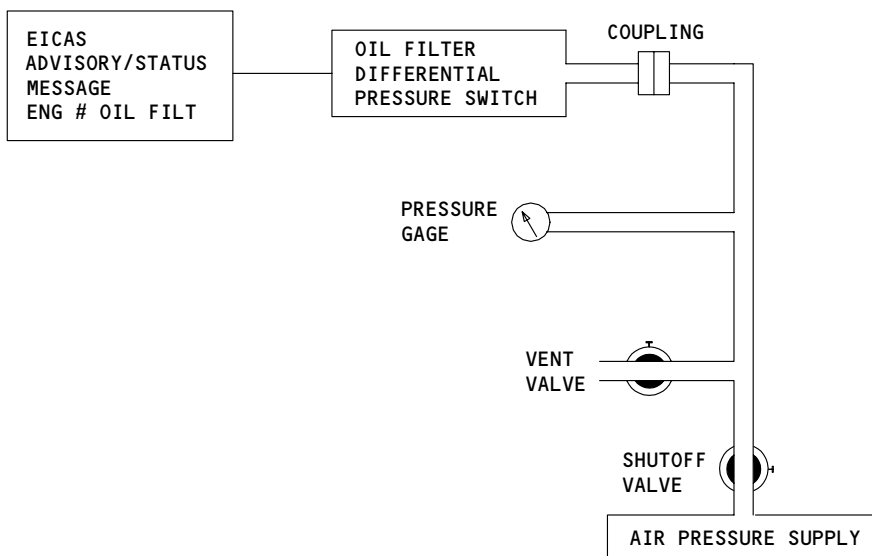
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Oil Filter Bypass Warning System Test Schematic
Figure 502

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(2) Access Panel

- 414 Right Fan Cowl Panel - Engine 1
- 424 Right Fan Cowl Panel - Engine 2
- 434 Right Fan Cowl Panel - Engine 3
- 444 Right Fan Cowl Panel - Engine 4

D. Prepare for the Test

S 865-002-J00

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

S 015-004-J00

- (2) Open the right fan cowl panel (Ref 71-11-04/201).

S 035-005-J00

- (3) Disconnect the filter inlet tap tube.
(a) Drain all remaining oil into the container.

S 485-006-J00

- (4) Connect this equipment to the aft side of the differential pressure switch (Fig. 502):
- the air source
 - the gage
 - the vent and shutoff valves.

S 485-016-J00

- (5) Close the vent valve.

E. Do the Test

S 865-007-J00

- (1) Push the STAT button on the display select panel of EICAS and make sure the status page shows on the auxiliary EICAS.

S 735-008-J00

- (2) Slowly increase the pressure at the switch to 35.0 +/- 1 psid (234-248 kPad).

NOTE: The differential pressure switch for the oil filter closes at 25-33 PSID (172 -227 KPAD) and the EICAS advisory message shows.

- (a) Make sure you see the applicable ENG OIL FILT status message on the status page.

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S 735-018-J00

- (3) Slowly decrease the pressure at the switch to 20 +/- 1 psid (138-145 kPad).

NOTE: The differential pressure switch for the oil filter opens at below 22 PSID (165 KPAD) and the EICAS advisory message does not show.

- (a) Push the erase button on the CMC present leg fault page to erase the applicable ENG OIL FILT status message on the status page (Ref 45-10-00/201).
(b) Make sure you do not see the applicable ENG OIL FILT status message on the status page.

S 735-010-J00

- (4) Set the pressure at the switch to zero.
(a) Make sure you do not see the applicable ENG OIL FILT status message.

F. Put the Airplane to Its Usual Condition

S 085-011-J00

- (1) Remove the air source, the gage, and the valves from the switch.

S 425-012-J00

- (2) If the indications are not correct, replace the switch (Ref 79-35-01/401).

S 435-013-J00

- (3) Install the scavenge oil inlet tube to the differential pressure switch between the switch and the filter.
(a) Tighten the tube nuts to 135-150 pound-inches (15.3-16.9 newton-meters).
(b) Install the lockwire.

S 415-014-J00

- (4) Close the right fan cowl panel (Ref 71-11-04/201).

S 795-015-J00

- (5) Do an idle leak check (AMM 71-00-00/501 Test No. 3).
(a) Look for oil leaks at the two ends of the inlet tube of the oil filter.

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OIL FILTER DIFFERENTIAL PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks:
- remove the differential pressure switch
- install the differential pressure switch.
In this procedure, refer to the oil filter differential pressure switch as the pressure switch.
- B. Do these steps to remove the pressure switch.
(1) Open the right fan cowl panel.
(2) Remove the pressure switch.
(3) Drain the remaining oil into a container.
- C. Do these steps to install the pressure switch:
(1) Install the pressure switch.
(2) Do a system test.
(3) Close the right fan cowl panel.
(4) Do a leak check.

TASK 79-35-01-004-001-J00

2. Remove the pressure switch.

- A. Standard Tools and Equipment
(1) Container - 1 gallon (4 liter) capacity, for oil
- B. Parts
(1) Differential pressure switch (S1583)
- C. References
(1) AMM 71-11-04/201, Fan Cowl Panels
- D. Access
(1) Location Zone
412 Engine 1 - Fan Case 4 o'clock
422 Engine 2 - Fan Case 4 o'clock
432 Engine 3 - Fan Case 4 o'clock
442 Engine 4 - Fan Case 4 o'clock
(2) Access Panel
414 Right Fan Cowl Panel - Engine 1
424 Right Fan Cowl Panel - Engine 2
434 Right Fan Cowl Panel - Engine 3
444 Right Fan Cowl Panel - Engine 4

- E. Do these steps to remove the pressure switch (Fig. 401):

S 864-035-J00

- (1) For the applicable engine,
Open these circuit breakers and install the DO-NOT-CLOSE tags:
(a) P7 Overhead Circuit Breaker Panel
1) 7F9 EIU L
2) 7F10 EIU C
3) 7F15 EIU R

S 014-003-J00

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

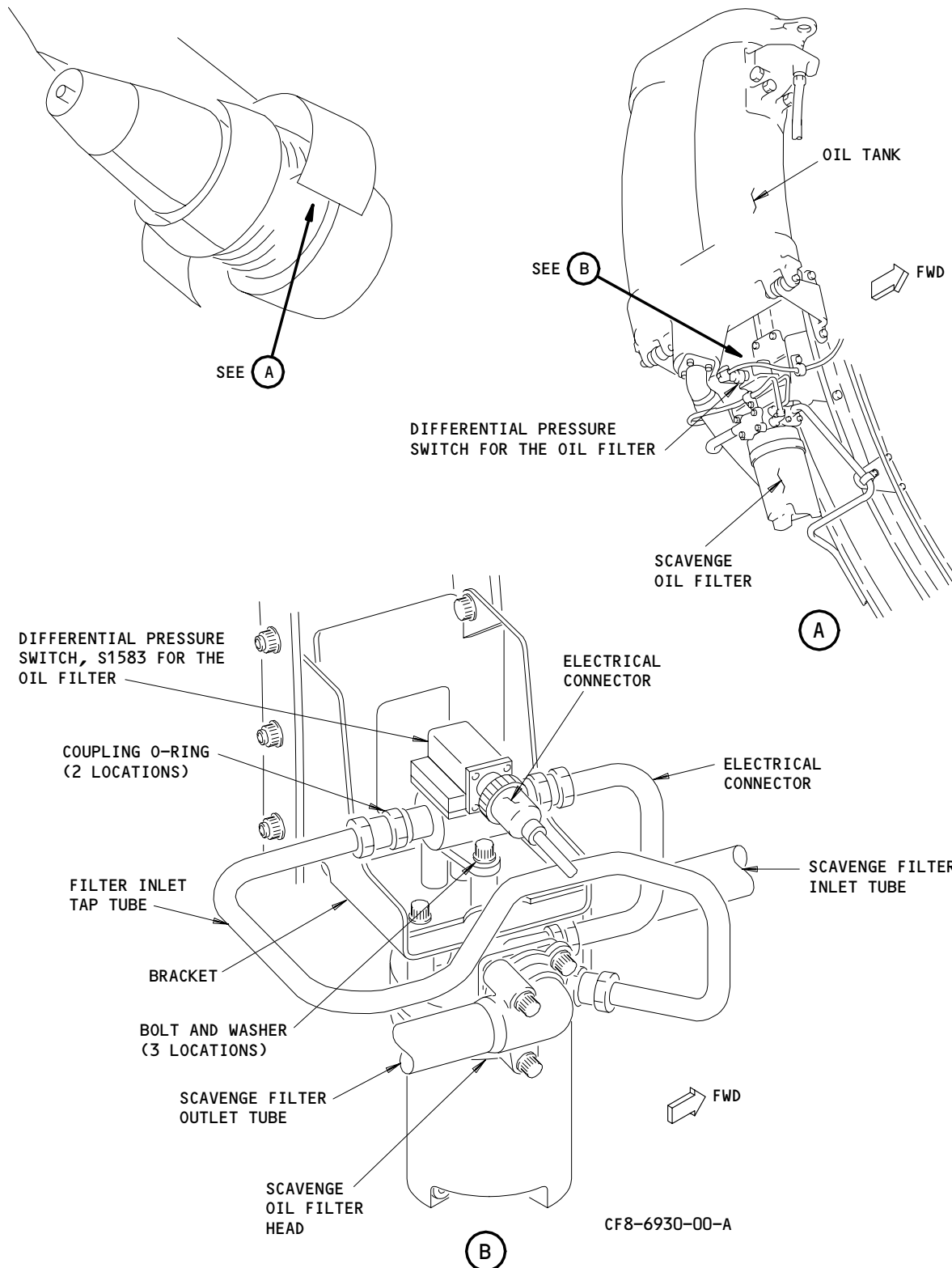
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Oil Filter Differential Pressure Switch Installation
Figure 401

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S 034-004-J00

- (3) Disconnect the electrical connector from the pressure switch and install the protection caps.

S 034-005-J00

- (4) Remove the scavenge oil inlet and outlet tubes to the pressure switch from the switch and the filter.
(a) Drain the remaining oil into a container.

S 034-006-J00

- (5) Remove the tube couplings from the inlet and outlet ports in the switch.
(a) Keep the couplings for the installation and discard the O-rings.

S 024-007-J00

- (6) Remove the three bolts and the three washers that attach the switch to the bracket and remove the switch.

S 434-008-J00

- (7) Install the protection caps on the tubes and the switch.

TASK 79-35-01-404-009-J00

3. Install the pressure switch.

A. Consumable Materials

- (1) D00552 Oil - Lubricating, MIL-L-23699, GE Spec D50TF1 (GE C02-019)

B. References

- (1) AMM 71-00-00/501, Power Plant
(2) AMM 71-11-04/201, Fan Cowl Panels
(3) AMM 79-35-00/501, Oil Filter Bypass Warning System
(4) AIPC 79-31-01, Fig. 5

C. Access

(1) Location Zone

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - Fan Case 4 o'clock |
| 422 | Engine 2 - Fan Case 4 o'clock |
| 432 | Engine 3 - Fan Case 4 o'clock |
| 442 | Engine 4 - Fan Case 4 o'clock |

(2) Access Panel

- | | |
|-----|---------------------------------|
| 414 | Right Fan Cowl Panel - Engine 1 |
| 424 | Right Fan Cowl Panel - Engine 2 |
| 434 | Right Fan Cowl Panel - Engine 3 |
| 444 | Right Fan Cowl Panel - Engine 4 |

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D. Do these steps to install the pressure switch (Fig. 401):

S 034-010-J00

- (1) Remove the protection caps from the tubes and the switch.

S 024-011-J00

CAUTION: THE PRESSURE SWITCH LOOKS THE SAME AS THE PRESSURE SWITCH FOR THE LOW OIL. FOR THE CORRECT SWITCH PART NUMBER, REFER TO THE AIPC. IF YOU INSTALL A SWITCH THAT IS NOT CORRECT, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

- (2) Install the pressure switch on the bracket for the oil scavenge filter with the three bolts and washers.
(a) Tighten the bolts to 24-27 pound-inches (2.7-3.1 newton-meters) and safety with the lockwire.

S 034-012-J00

- (3) Use the new O-rings that you lubricated with the oil to install the tube couplings into the switch ports.
(a) Tighten to 135-155 pound-inches (15.3-17.5 newton-meters).

S 034-013-J00

- (4) Connect the scavenge oil inlet and outlet tubes to the pressure switch.
(a) Tighten the tube nuts to 270-300 pound-inches (30.5-33.9 newton-meters) and safety with the lockwire.

S 434-014-J00

- (5) Remove the protection caps and connect the electrical connector to the switch.
(a) Tighten the electrical connector with your hand.

NOTE: This will put a cover over the witness band.

- (b) Use the soft-jawed pliers or a strap wrench to tighten approximately 1/8 turn.

S 864-036-J00

- (6) For the applicable engine,
Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P7 Overhead Circuit Breaker Panel
1) 7F9 EIU L
2) 7F10 EIU C
3) 7F15 EIU R

S 714-016-J00

- (7) If you install a new pressure switch, do the system test of the procedure for the bypass warning system for the oil filter (AMM 79-35-00/501).

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S 414-017-J00
(8) Close the right fan cowl panel (AMM 71-11-04 201).

S 794-018-J00
(9) Do the idle leak check (AMM 71-00-00/501, Test No. 3).

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