CHAPTER

79

OIL

Learjet

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79-Rec. of Temp. Rev.	1	May 1/89
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* Asterisk indicates pages revised, added, or deleted by current revision. The portion of the text affected by the current revision is indicated by a vertical line in the outer margin of the page.

RECORD OF TEMPORARY REVISIONS

TEMP REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERT BY	DATE REMOVED	REV INCOR	REMOVE BY
79-1/-2	REMOVED						

REV. NO.	DATE INSERTED	DATE REMOVED	PAGE NUMBER	REV. NO.	DATE INSERTED	DATE REMOVED	PAGE NUMBER
79-1	Mar 25/75	Oct 1/75 Rev #4	79-30-00 Page 2				
79-2	Mar 25/75	Oct 1/75 Rev #4	79-80-00 Page 1				

OIL INDICATING - DESCRIPTION AND OPERATION

1. **DESCRIPTION** (See figures 1 thru 3.)
   A. The oil is drawn from the oil tank by the oil pressure pump and is passed through the pressure-regulating valve, the oil filter, and through to the oil-to-air oil coolers. The oil coolers comprise a three-segment finned cooler that forms the inner surface of the engine fan duct. From the oil-to-air oil coolers, the oil flow is divided so that part of the flow is directed to the accessory drive and transfer gear boxes and the engine bearings. The remaining oil passes through the oil-to-fuel/oil cooler and is then delivered to the planetary gear assembly. Both the oil-to-air oil coolers and the fuel/oil cooler are equipped with thermostatic bypass valves to maintain the oil at the desired temperature during cold-weather operation. The oil cooler system is equipped with a drain plug to drain the finned oil coolers. For further information on the storage and distribution systems, refer to Engine Maintenance Manual.
   B. The aircraft is equipped with an oil pressure indicating system, an oil temperature indicating system and an oil pressure warning system. These systems provide the crew with a constant visual indication of the aircraft engine oil system at all times.
      (1) **Oil Pressure Indicating System.** The oil pressure indicating system consists of an oil pressure switch and an oil pressure transmitter located on each engine and a dual reading indicator on the instrument panel. The system is powered by 26 vac, 400 Hz through the R OIL PRESS and L OIL PRESS circuit breakers. The indicator has dual pointers marked L and R with inputs from the separate left and right oil pressure transmitters. The indicator is marked as follows:

Green Arc	-	38 to 46 psi
Yellow Arc	-	26 to 38 and 46 to 54 psi
Red Line	-	25 and 55 psi

On Aircraft 35-002 thru 35-508 and 36-002 thru 36-053, the oil pressure transmitter incorporates a zero adjustment eccentric which allows the indicator and transmitter to be zeroed if a transmitter or indicator is replaced. *On Aircraft 35-509 and Subsequent and 36-054 and Subsequent*, the oil pressure transmitter is not adjustable.

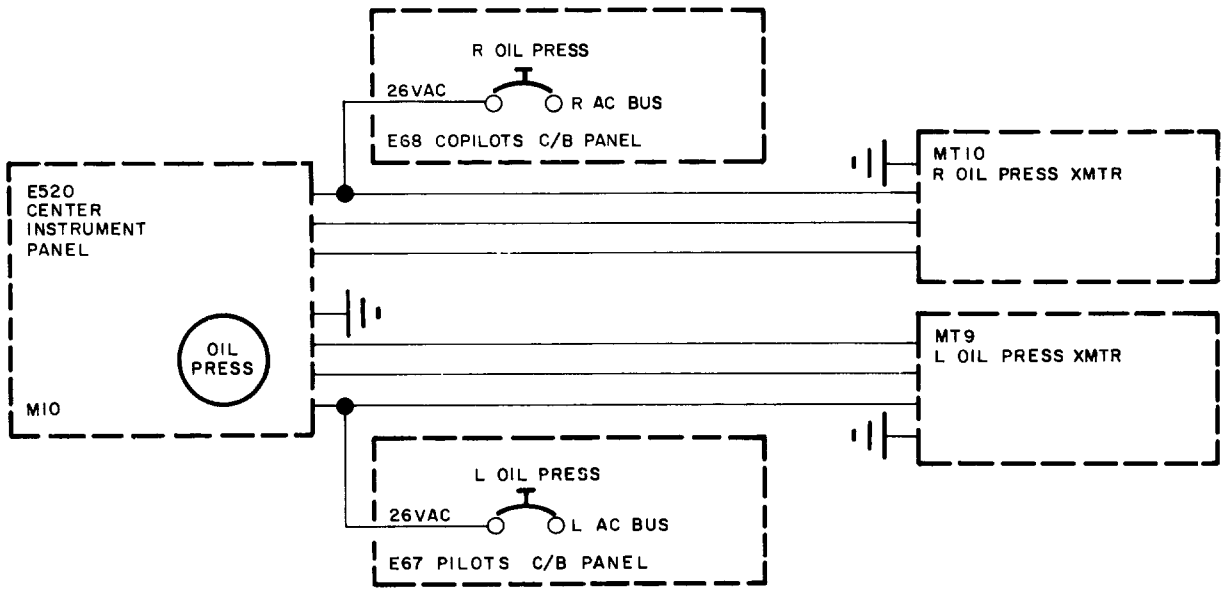
      (2) **Oil Pressure Warning System.** The low oil pressure warning system utilizes the oil pressure switches and a LO OIL PRESS (Red) warning light located on the glareshield. The oil pressure switch completes a ground circuit, to illuminate the warning light when engine oil pressure drops to 23 (±1) psi in either engine. The switch closes at 23 (±1) psi decreasing pressure and opens at 30 psi increasing pressure. *On Aircraft 35-490 and Subsequent and 36-051 and Subsequent*, dual oil pressure warning lights are installed. The warning lights are marked L LO OIL and R LO OIL and are controlled by their respective engine oil pressure switch. On prior aircraft the dual oil pressure warning lights were installed as optional equipment. Refer to the Aircraft Customization package for applicable wiring diagrams.

(3) **Oil Temperature System.** The engine oil temperature indicating system consists of a resistance-type temperature bulb in each oil tank and two oil temperature indicators, on the instrument panel. The system is powered by 28 vdc through the OIL TEMP circuit breaker. The indicators are marked as follows:

Green Arc - 30° to 127°C
Yellow Arc - 127° to 140°C
Red Line - 140°C

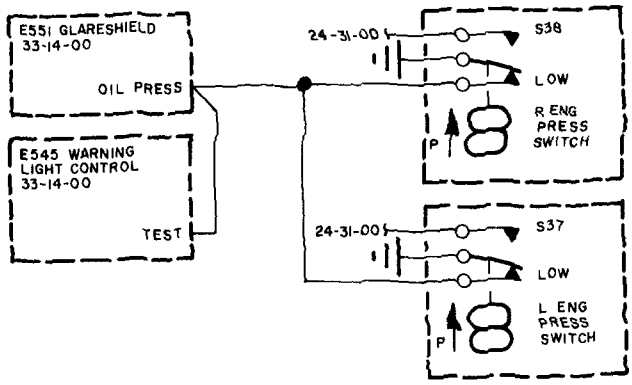
The indicator readings (°C) versus ohms resistance are as follows:

112.28 ± 0.40 ohms - 60 ± 6°C
124.55 ± 0.50 ohms - 90 ± 6°C
137.78 ± 0.60 ohms - 120 ± 6°C
151.91 ± 0.60 ohms - 150 ± 6°C

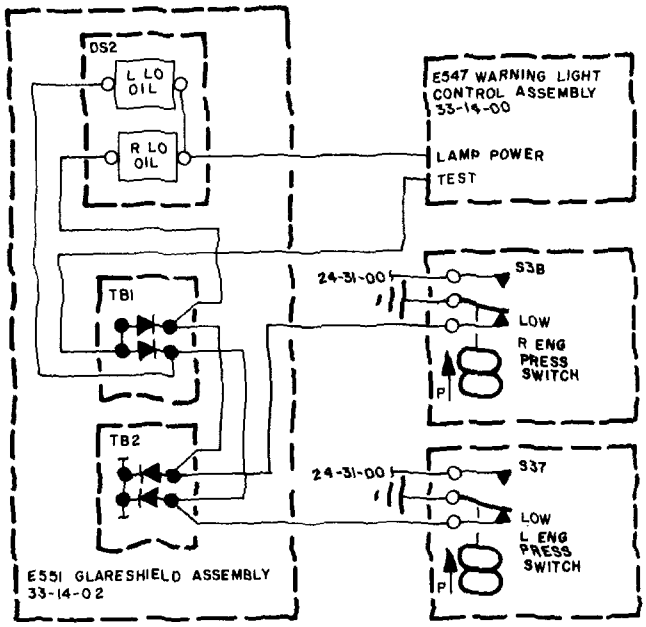


Engine Oil Pressure Indicating System
Figure 1

35/36-S79-30-00

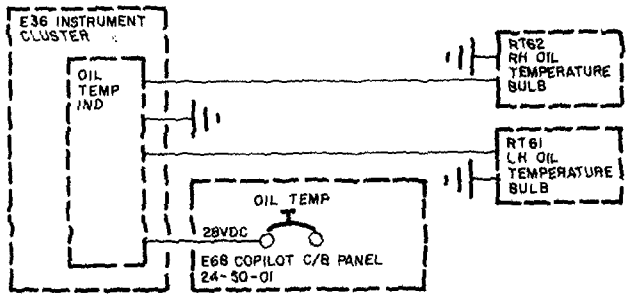


(35-002 thru 35-489 and 36-002 thru 36-050, except 36-036)



(35-490 and Subsequent; 36-036, 36-051 and Subsequent)

Engine Oil Pressure Warning System
Figure 2



Engine Oil Temperature Indicating System
Figure 3

OIL INDICATING - TROUBLE SHOOTING

1. **Trouble Shooting**
   A. Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following items:

NAME	PART NUMBER	MANUFACTURER	USE
Voltmeter	3430A	Hewlett Packard	Check circuits.
or			
Voltmeter	260	Simpson	Check circuits.

B. Oil Indicating Trouble Shooting (See Figure 101.)
   (1) Refer to Chapter 79 of the 35/35A/36/36A Wiring Manual for oil indicating system wiring diagrams. Refer to the Garrett Engine Maintenance Manual for further trouble shooting procedures.

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
1. No or Low Oil Pressure Indication.		
a. Loss of power to oil pressure indicator.	Visually inspect R OIL PRESS circuit breaker (on copilot's circuit breaker panel) and L OIL PRESS circuit breaker (on pilot's circuit breaker panel).	Ensure that circuit breakers are depressed.
	On Aircraft 35-509 and Subsequent and 36-054 and Subsequent, check for 28 vac at pins B (R pressure) and F (L pressure) of P14 on center instrument panel. *On prior Aircraft*, check for 28 vac at pins B (L pressure) and E (R pressure) of P14 on center instrument panel.	Repair or replace wiring or components as applicable.
b. Defective oil pressure transmitter or oil pressure indicator.	Verify wiring continuity from transmitter to indicator. Perform Functional Test of Pressure Transmitter. (Refer to 79-30-02.)	Replace defective transmitter. (Refer to 79-30-02.) If transmitter is not defective, replace indicator. (Refer to 79-30-01.)
c. Low oil level or defective oil pump pressure regulator.	Trouble shoot in accordance with Garrett Engine Maintenance Manual.	

Oil Indicating Trouble Shooting
Figure 101 (Sheet 1 of 3)

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
2. No or Low Oil Temperature Indication.		
a. Loss of power or continuity to oil temperature indicator.	Visually inspect OIL TEMP circuit breaker (on copilot's circuit breaker panel).	Ensure that circuit breaker is depressed.
	Check for 28 vdc at pin E of P122 on instrument cluster. Verify wiring continuity to RT61 and RT62.	Repair or replace wiring or components as applicable.
b. Defective temperature bulb or oil temperature indicator.	Swap indicators and check operation.	If problem still exists, replace defective temperature bulb. (Refer to 79-30-05.)
		If problem disappears, replace defective indicator. (Refer to 79-30-04.)
3. Oil Pressure Warning Light Illuminated.		
NOTE: • The warning light illuminates when the oil pressure switch completes a ground circuit. • On *Aircraft 35-490 and Subsequent, 36-051 and Subsequent, and prior Aircraft equipped with optional dual oil pressure warning lights*, the warning lights and pressure switches are separate circuits.		
a. Defective pressure switch.	Disconnect plugs P69 and P70 from pressure switches (S37 and S38). Check continuity between pins A and B of switch.	If continuity exists, replace switch. (Refer to 79-30-03.)
b. Defective warning circuit.	Check wiring continuity between pressure switch and warning light.	Repair or replace wiring or components as applicable.
4. Oil Pressure Fluctuation.		
a. Oil pressure fluctuates during engine start.	Remove oil pressure warning light switch from oil pressure circuit and cap line. Install direct reading gage in line with oil pressure transducer. Purge system. Perform engine start and note any oil pressure fluctuations.	Replace switch. (Refer to 79-30-03.)

Oil Indicating Trouble Shooting
Figure 101 (Sheet 2 of 3)

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
5. Sluggish or Slow Oil Pressure Indications.		
a. Time response varied from RH to LH engine.	Pressure is within normal specs, but comes up slower than other side.	Purge oil line of air at the engine oil pressure transducer and oil pressure switch.
6. Oil Pressure Indication Jumps Approximately 10 - 15 Psi at Mid Range on Oil Pressure Indicator.		
a. Oil pressure is within normal limits, but jumps approximately 10 -15 psi at mid range on oil pressure indicator.	Install direct reading gage in place of pressure transmitter. Start engine and note any oil pressure jumps at mid range on gage.	Replace oil pressure transmitter. (Refer to Removal/ Installation, 79-30-02.)

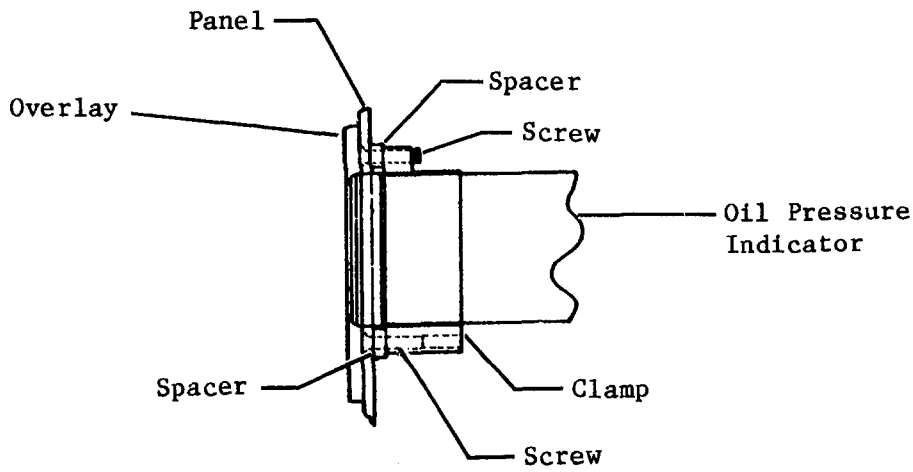
Oil Indicating Trouble Shooting
Figure 101 (Sheet 3 of 3)

1. Adjustment/Test
   A. Operational Check of Engine Oil Indicating System
      (1) Start applicable engine in accordance with procedures outlined in the appropriate FAA Approved Airplane Flight Manual. Verify oil pressure indication within 10 seconds of ITT rise.
      (2) After start, verify oil pressure indication is within green arc (38 to 46 psi [262 to 317 kPa]), and that applicable L and R OIL PRESS annunciators are extinguished.
      (3) Verify oil temperature indication is within green arc (30°C to 127°C).
      (4) Shut down engine in accordance with flight manual procedures.

      NOTE: In the event of a discrepancy in any of the preceeding steps, refer to the Trouble Shooting section, and perform the applicable trouble shooting procedure as required to determine cause of the discrepancy.

OIL PRESSURE INDICATOR - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Remove Oil Pressure Indicator (See Figure 201.)
      (1) Remove electrical power from aircraft.
      (2) Lower copilot's instrument panel.
      (3) Disconnect electrical connector from oil pressure indicator.
      (4) Remove attaching parts and electroluminescent panel. This will allow access to the instrument clamp attaching parts.
      (5) Loosen and remove screws securing instrument clamp to panel.
      (6) Remove oil pressure indicator and spacers from panel.
      (7) Remove instrument clamp from indicator.
   B. Install Oil Pressure Indicator (See Figure 201.)
      (1) Install instrument clamp on indicator.
      (2) Install indicator and spacers and secure to engine instrument panel.
      (3) Install electroluminescent panel and secure with attaching parts.
      (4) Connect electrical connector to indicator.
      (5) Raise copilot's instrument panel and secure.
      (6) Check zero adjustment between indicator and transmitter. (Refer to Oil Pressure Transmitter Adjustment/Test, 79-30-02.)



Oil Pressure Indicator Installation
Figure 201

OIL PRESSURE TRANSMITTER - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE: Removal and installation procedures for the LH and RH transmitters are typical.

A. Remove Oil Pressure Transmitter *(Aircraft 35-002 thru 35-113 and 36-002 thru 36-032 not modified per AMK 76-9, "Installation of Engine Oil Pressure Transmitter Mount Isolators")* (See Figure 201.)
   (1) Remove upper and lower nacelle covers. (Refer to Chapter 71.)
   (2) Disconnect electrical connector from pressure transmitter.
   (3) Disconnect pressure tube from transmitter. Cap tube.
   (4) Remove attaching parts and transmitter from brackets.
   (5) If transmitter is to be replaced, remove dampening orifice fitting and O-ring from transmitter.
   (6) Check condition of O-ring and replace if necessary. Check to ensure that orifice is clean.

B. Install Oil Pressure Transmitter *(Aircraft 35-002 thru 35-113 and 36-002 thru 36-032 not modified per AMK 76-9, "Installation of Engine Oil Pressure Transmitter Mount Isolators")* (See Figure 201.)
   (1) Install O-ring and orifice fitting in pressure transmitter.
   (2) Install pressure transmitter and secure with attaching parts.

      NOTE: If oil pressure transmitter bracket was removed, torque bracket attaching bolts to 40 inch-pounds.

   (3) Remove cap from pressure tube and connect pressure tube to transmitter.
   (4) Purge lines of air.
   (5) Connect electrical connector to transmitter.
   (6) Check for zeroed indicator and transmitter. (Refer to Oil Pressure Transmitter Test and Adjustment.)
   (7) Install upper and lower nacelle covers. (Refer to Chapter 71.)

C. Remove Oil Pressure Transmitter *(Aircraft 35-114 thru 35-508 and 36-033 thru 36-053 and prior aircraft modified per AMK 76-9, "Installation of Engine Oil Pressure Transmitter Mount Isolators")* (See Figure 201.)
   (1) Remove upper and lower nacelle covers. (Refer to Chapter 71.)
   (2) Disconnect electrical connector from transmitter.
   (3) Disconnect pressure hose from transmitter. Cap hose.
   (4) Remove safety wire from transmitter attaching screws. Remove screws, washers, and spring releasing transmitter from bracket.
   (5) If transmitter is to be replaced, remove union and O-ring from transmitter.
   (6) Check condition of O-ring and replace if necessary.

D. Install Oil Pressure Transmitter *(Aircraft 35-114 thru 35-508 and 36-033 thru 36-053 and prior aircraft modified per AMK 76-9, "Installation of Engine Oil Pressure Transmitter Mount Isolators")* (See Figure 201.)
   (1) Install O-ring and union in transmitter.
   (2) Install transmitter and secure with springs, washer and screws as shown.
   (3) Tighten screws until they bottom out in transmitter. Check that clearance between bracket and washer does not exceed 0.450 inch maximum.
   (4) Safety wire screws.

      NOTE: If oil pressure transmitter bracket was removed, torque bracket attaching bolts to 40 inch-pounds.

   (5) Remove cap from pressure hose and connect to union on transmitter.
   (6) Purge lines of air.
   (7) Connect electrical plug to transmitter.

(8) Check for zeroed indicator and transmitter. (Refer to Oil Pressure Transmitter Test and Adjustment.)
(9) Install upper and lower nacelle covers. (Refer to Chapter 71.)

E. Remove Oil Pressure Transmitter *(Aircraft 35-509 and Subsequent, 36-054 and Subsequent)* (See Figure 201.)
(1) Remove electrical power from aircraft.
(2) Remove upper and lower covers from engine nacelle. (Refer to Chapter 71.)
(3) Disconnect electrical connector from pressure transmitter.
(4) Disconnect pressure tube from transmitter.
(5) Cap tube.
(6) Remove attaching parts and transmitter from brackets.
(7) Remove orifice fitting from transmitter.

F. Install Oil Pressure Transmitter *(Aircraft 35-509 and Subsequent, 36-054 and Subsequent)* (See Figure 201.)
(1) Install O-ring and orifice fitting in pressure transmitter. Ensure that orificed end of fitting is installed away from transmitter.
(2) Install pressure transmitter and secure with attaching parts.

NOTE: If oil pressure transmitter bracket was removed, torque bracket attach bolts to 40 inch-pounds.

(3) Remove cap from pressure tube and connect pressure tube to transmitter.
(4) Purge lines of air.
(5) Connect electrical connector to transmitter.
(6) Install upper and lower covers on engine nacelle. (Refer to Chapter 71.)
(7) Restore electrical power to aircraft.

2. Adjustment/Test

A. Functional Test of Pressure Transmitter (See Figure 202.)

NOTE:
- The following functional test procedure is performed with the pressure transmitter installed on the engine.
- The following functional test should be performed to check the integrity of an oil pressure transmitter.

(1) Disconnect oil pressure line from transmitter. Cap exposed oil pressure line.
(2) Connect test equipment.
(3) Set Battery and Inverter Switches to ON.
(4) Ensure that R OIL PRESS and L OIL PRESS circuit breakers are depressed.
(5) Adjust pressure regulator to bring pressure gage reading up to but not exceeding 40 psi. Lightly tap transmitter.
(6) The oil pressure indicator on the instrument panel should read 40 (±3) psi.
(7) Repeat step (5), adjust pressure regulator to 70 psi and lightly tap transmitter.
(8) The oil pressure indicator on the instrument panel should read 70 (±4) psi.

NOTE: If the indicator fails to respond to the pressure inputs, the transmitter should be replaced. A transmitter known to be good may be substituted and the functional test rerun.

(9) Reverse the procedure by adjusting pressure regulator to 40 psi.
(10) The oil pressure indicator should read 40 (±3) psi.
(11) Set Battery and Inverter Switches to OFF.
(12) Disconnect test equipment and connect oil pressure line.
(13) Purge oil lines of air.
(14) Restore aircraft to normal.

B. Oil Pressure Transmitter Test and Adjustment

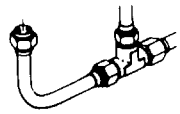
NOTE:
- The adjustment eccentric is located beneath the nut which is located adjacent to the vent (V) and pressure (P) ports on the transmitter.
- If an oil pressure transmitter or indicator is replaced, the following test and adjustment procedures can be used to zero the indicator and the transmitter, if necessary.

(1) Oil Pressure Transmitter Test.

NOTE: The following test and adjustment procedures are performed with no pressure applied to transmitter.

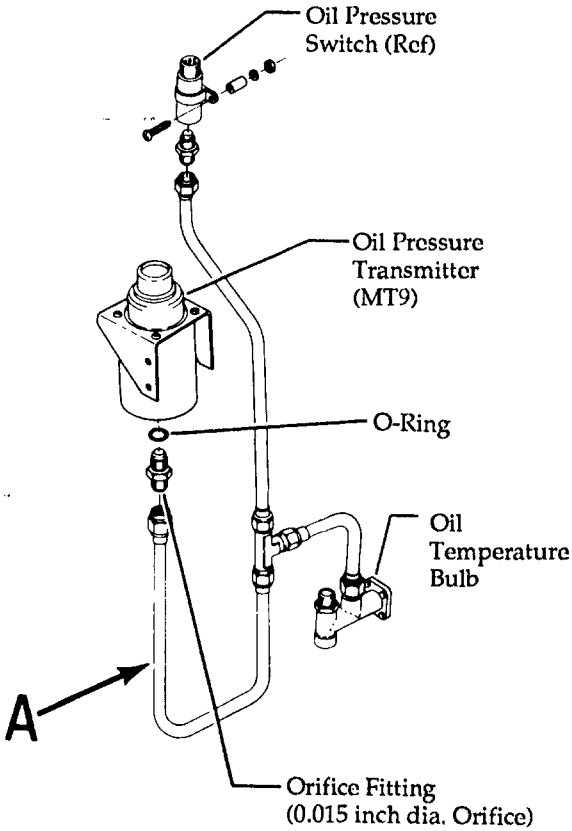
(a) Connect external power to aircraft.
(b) Set Battery Switch and Inverter Switches on.
(c) Check applicable needle on oil pressure indicator for zero indication.
(d) If needle(s) are zeroed, return aircraft to service. If needle(s) do not zero, proceed with steps (2)(a) thru (2)(c).

(2) Oil Pressure Transmitter Adjustment.
(a) Remove nut, located adjacent to vent (V) and pressure (P) ports, from transmitter. DO NOT lose small O-ring.
(b) Using small wrench, turn eccentric clockwise or counterclockwise to zero indicator.
(c) Install O-ring and nut on transmitter.

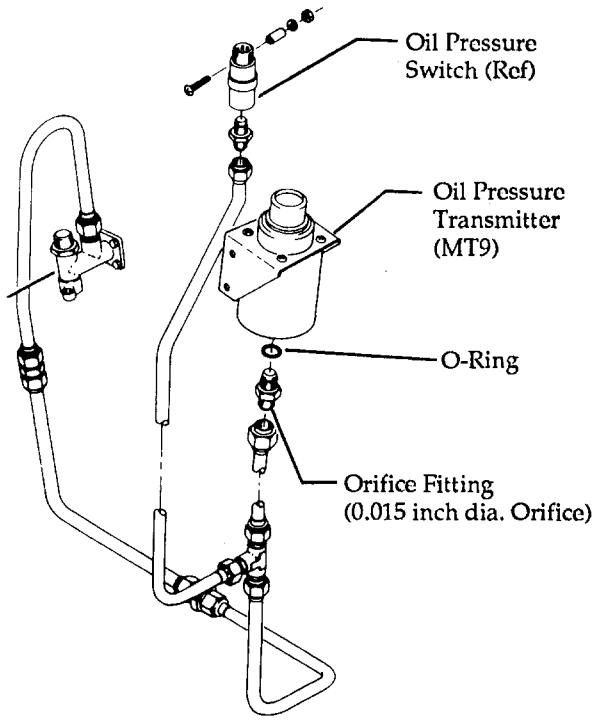


(Aircraft 35-002 thru 35-036 and 36-002 thru 36-013, 36-015 and 36-016 not modified per SSK 929, "Replacement of Engine Air Bleed Plumbing for Engine Interchangeability.")

Detail A

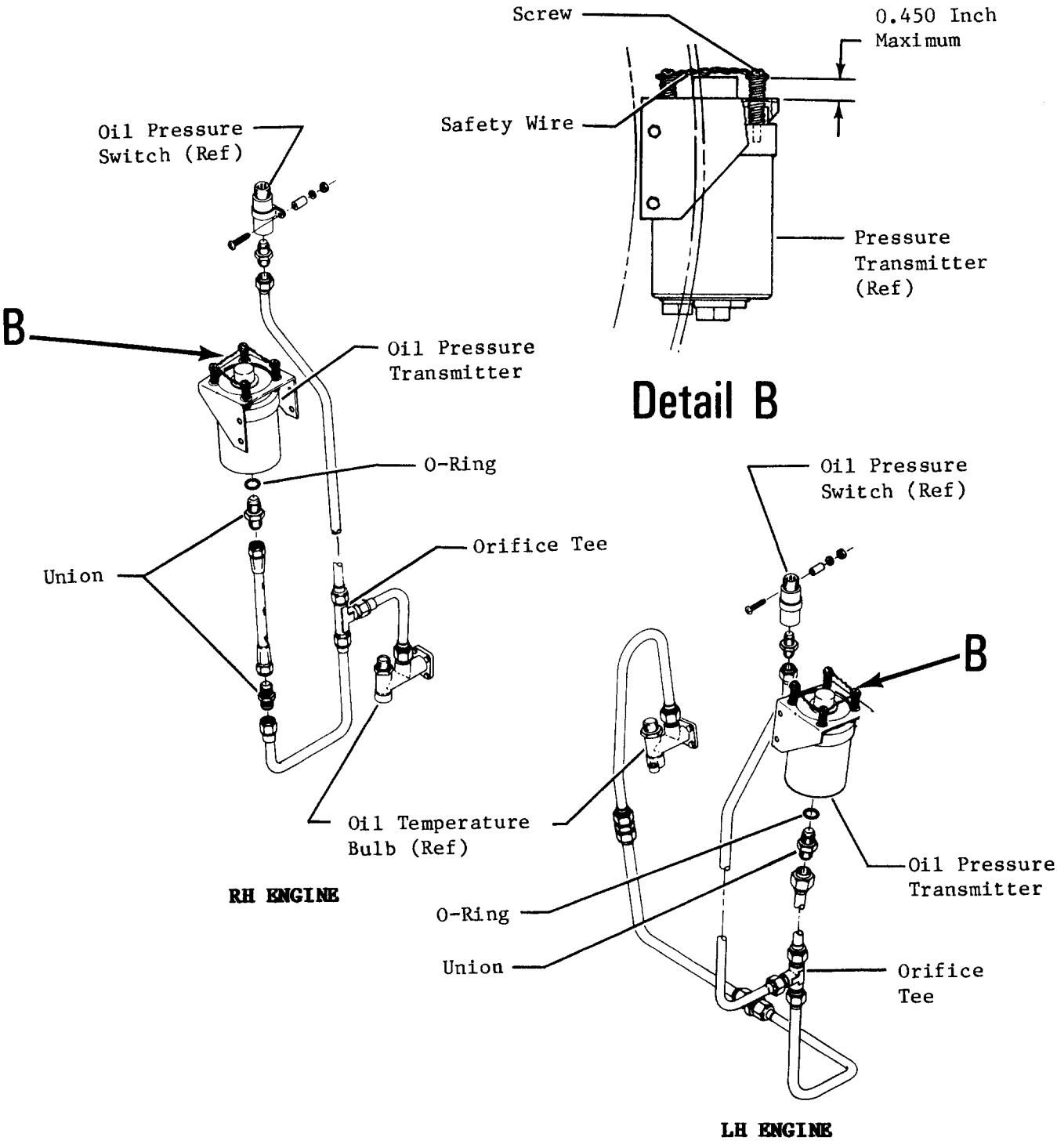


RH ENGINE



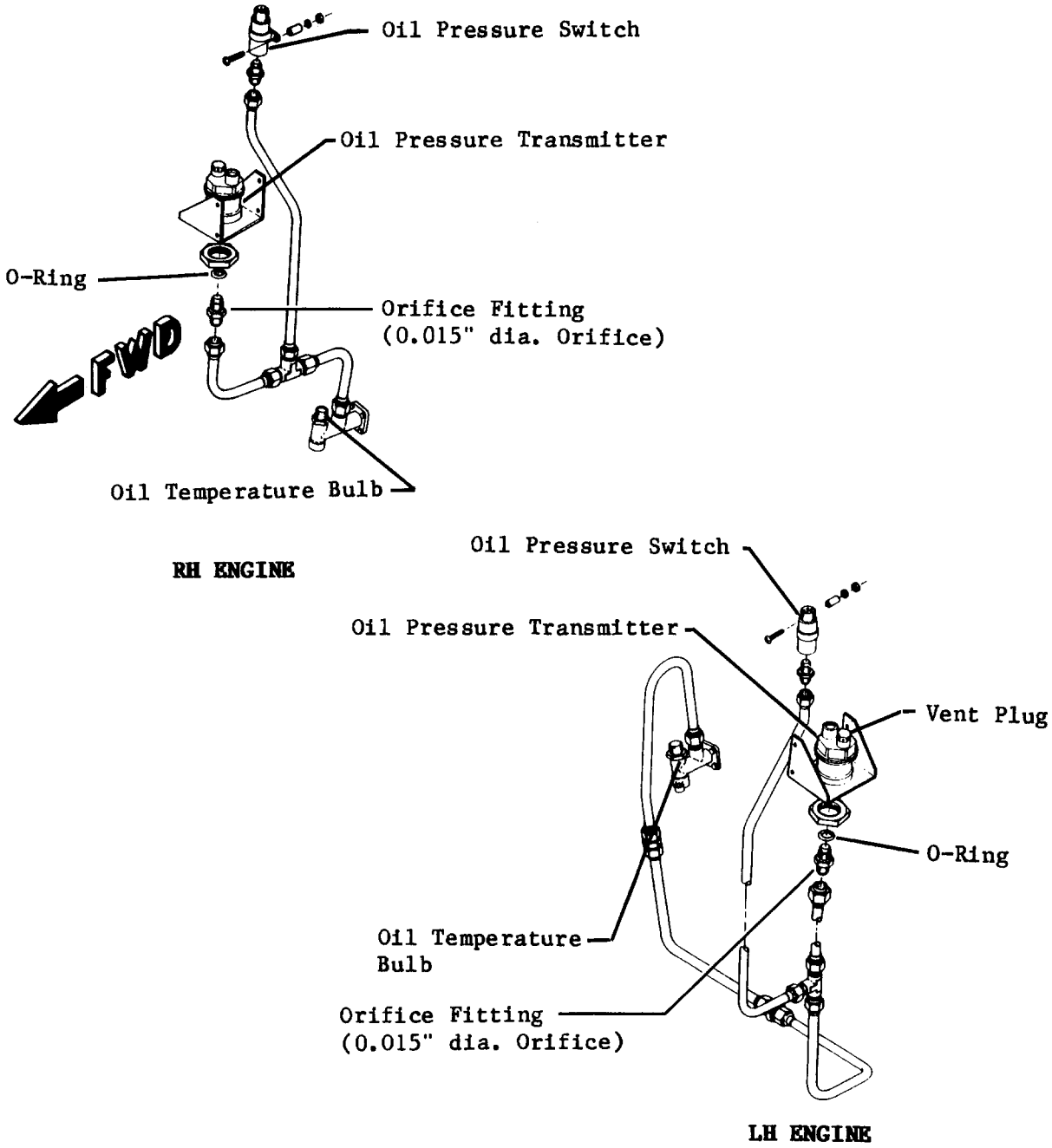
LH ENGINE

Oil Pressure Transmitter Installation
Figure 201 (Sheet 1 of 3)



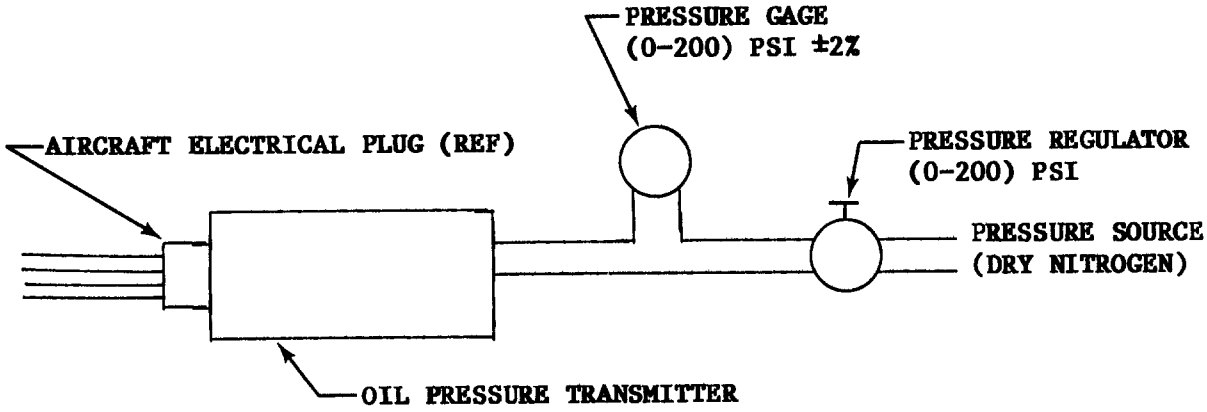
Oil Pressure Transmitter Installation
Figure 201 (Sheet 2 of 3)

EFFECTIVITY: 35-114 thru 35-508, 36-033 thru 36-053, and Prior Aircraft Modified per AMK 76-9, "Installation of Engine Oil Pressure Transmitter Mount Isolators"



Oil Pressure Transmitter Installation
Figure 201 (Sheet 3 of 3)

7-8C



Functional Test Oil Pressure Transmitter
Figure 202

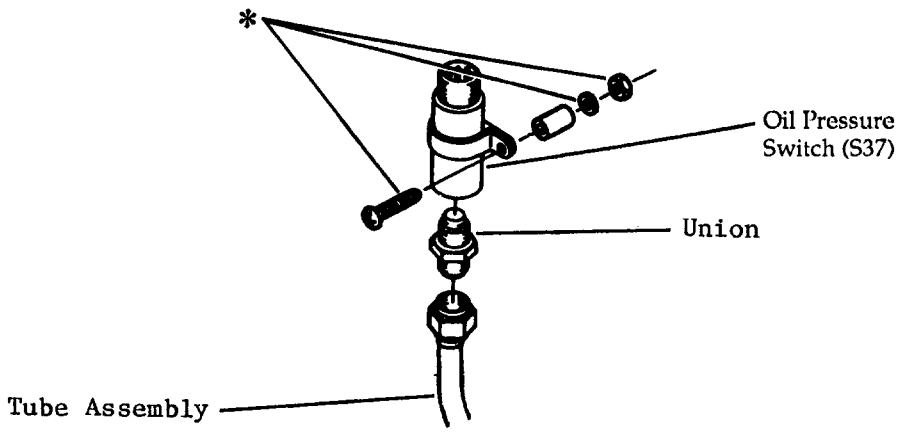
OIL PRESSURE SWITCH - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Remove Oil Pressure Switch (See Figure 201.)
      (1) Remove upper and lower nacelle covers. (Refer to 71-10-00.)
      (2) Disconnect electrical plug from pressure switch.
      (3) Disconnect pressure tube from switch. Cap pressure tube.
      (4) Remove attaching parts, pressure switch with clamp attached from engine.
      (5) Remove clamp from pressure switch.
   B. Install Oil Pressure Switch (See Figure 201.)
      (1) Position clamp on pressure switch.
      (2) Install pressure switch and secure clamp.

      NOTE: *Aircraft 35-038 and Subsequent and 36-014, 36-017 and Subsequent*, the RH engine pressure switch clamp is secured by an existing engine bolt. Torque bolt to 40 inch-pounds.

      (3) Connect electrical plug to pressure switch.
      (4) Remove cap from pressure tube. Connect pressure tube to pressure switch.
      (5) Purge oil lines of air.
      (6) Perform Operational Check of Engine Oil Indicating System. (Refer to 79-30-00.)
      (7) Install upper and lower nacelle covers. (Refer to 71-10-00.)

* ***Effective 35-038 and Subsequent; 36-014, 36-017 and Subsequent,*** **the RH engine pressure switch clamp is secured by an existing engine bolt. Torque bolt to 40 inch-pounds.**



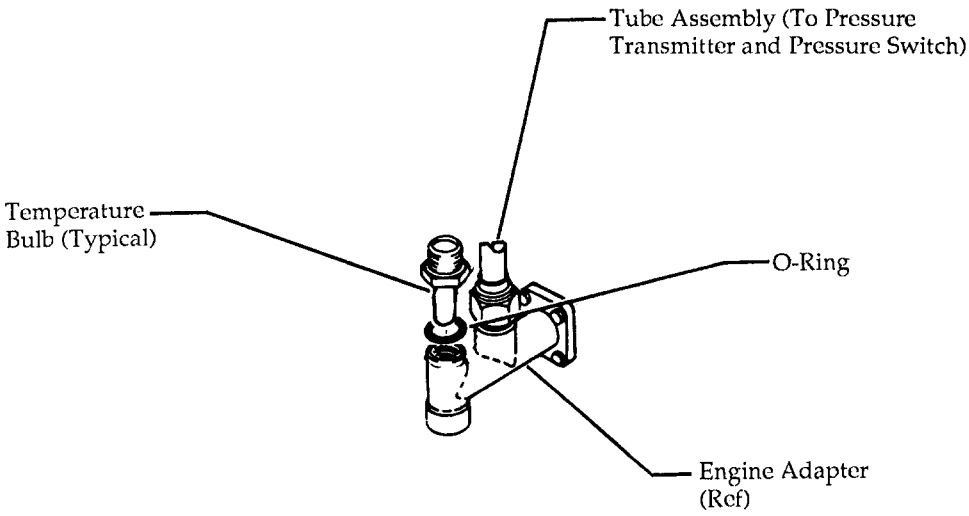
Engine Oil Pressure Switch Installation
Figure 201

OIL TEMPERATURE INDICATOR - MAINTENANCE PRACTICES

1. **Removal/Installation**
   - A. Remove Oil Temperature Indicator
     - (1) Remove screws securing center instrument panel to instrument panel structure.
     - (2) Remove instrument panel sufficiently to allow removal of instrument cluster.
     - (3) Disconnect electrical plug from instrument cluster.
     - (4) Remove screw securing instrument cluster to instrument panel and remove instrument cluster from aircraft.
     - (5) Loosen screw in lower left corner of indicator and remove indicator from cluster.
   - B. Install Oil Temperature Indicator
     - (1) Install indicator in cluster and secure with screw.
     - (2) Install instrument cluster and secure with attaching parts.
     - (3) Connect electrical plug to instrument cluster.
     - (4) Install and secure instrument panel.

OIL TEMPERATURE BULB - MAINTENANCE PRACTICES

1. **Removal/Installation**
   - A. Remove Oil Temperature Bulb (See Figure 201.)
     - (1) Remove upper and lower nacelle covers. (Refer to 71-10-00.)
     - (2) Disconnect electrical plug from temperature bulb.
     - (3) Loosen and remove temperature bulb and O-ring.
   - B. Install Oil Temperature Bulb (See Figure 201.)
     - (1) Install O-ring and temperature bulb.
     - (2) Connect electrical plug to temperature bulb.
     - (3) Purge oil lines of air.
     - (4) Install upper and lower nacelle covers. (Refer to 71-10-00.)



Oil Temperature Bulb Installation
Figure 201