A. File the attached Temporary Revision/Alerts in the Manual Supplement in ATA Chapter/Section/Subject/Page sequence

B. File this Control Page in front of the Chapter TRs/Alerts.

C. The following list shows active TRs/Alerts together with TRs/Alerts added by this control page.

Chapter Section Subject	Page	TR/Alert No.
73-11-10	404	73-525

D. Remove and Destroy the following TRs/Alerts:

73-11-06	801	Boe	73-1001

* Indicates TRs/Alerts issued with this control page

ATP TEMPORARY REVISION

AIRPLANE

NB322

22 December, 1997

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 73-525

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS ENGINEERING (TECHNICAL INFORMATION SERVICES, G2, TBA, S401, P. O. BOX 10, HEATHROW AIRPORT, HOUNSLOW, MIDDLESEX TW6 2JA) AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.

G Litchfield For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 73-11-10 Page 404

REASON FOR REVISION

To ensure the correct part number fuel filter is always fitted.

ACTION

D. Install the filter

Ignore the existing step (4) caution and read the following

CAUTION: SOME FUEL FILTERS MAY HAVE RED STRIPES OR RED END FITTINGS, THESE MARKINGS SHOULD BE IGNORED. YOU MUST PHYSICALLY CHECK AND ENSURE THE FUEL FILTER TO BE FITTED IS IDENTIFIED CORRECTLY BY ITS PART NUMBER AND MATCHES THE PART NUMBER LISTED IN THE AIRPLANE IPC.

Originator: M.TIVEY
Reference: 00002540
Workbook: ENG-390

←

GPA Group plc

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ENGINE FUEL AND CONTROL - DESCRIPTION AND OPERATION

1. General
   A. The engine fuel and control system automatically delivers fuel to the combustion system at a flow rate consistent with engine power requirements set by the thrust levers. The system maintains the set power irrespective of ambient temperature up to specific ISA limits during take-off, climb, and cruise. Above these temperatures it may be necessary to restrict engine power to prevent limiting values of shaft speed and exhaust gas temperature (EGT) being exceeded.
   B. The system is divided into the 5 subsystems listed below:
      (1) Fuel distribution system (AMM 73-11-00/001).
      (2) Fuel control system (AMM 73-21-00/001).
      (3) Fuel flow indicating system (AMM 73-31-00/001).
      (4) Fuel filter bypass warning system (AMM 73-34-00/001).
      (5) Fuel low pressure warning system (AMM 73-35-00/001).
2. Component Details
   A. Fuel Distribution System
      (1) Fuel from the airplane supply system is delivered by a low pressure (LP) fuel pump through a LP fuel-cooled oil cooler and filter to a high pressure (HP) fuel pump. The HP pump delivers the fuel through a fuel flow governor (which includes the HP spill control, metering valve and HP shut-off valve), a transient fuel valve (TFV), fuel flow transmitter, HP fuel filter, emergency shut-off valve, and fuel manifold to eighteen spray nozzles located in the combustion section.
      (2) RB211-535E4 AND RB211-535E4-B ENGINES PRE RR SB 72-C230 (PHASE II COMBUSTOR);
      the HP pump delivers the fuel through a fuel flow governor (which includes the HP spill control, metering valve, and shut-off valve), a transient fuel valve (TFV), fuel flow transmitter, HP fuel filter, emergency shut-off valve, and fuel manifold to eighteen spray nozzles located in the combustion chamber.
      (3) RB211-535E4 AND RB211-535E4-B ENGINES POST RR SB 72-C230 (PHASE V COMBUSTOR);

the HP pump delivers the fuel through a fuel flow governor (which includes the HP spill control, metering valve, and shut-off valve), a transient fuel valve (TFV), fuel flow transmitter, HP fuel filter, and fuel manifold to twenty-four spray nozzles located in the combustion chamber.

(4) Manual control of fuel flow for engine starting and stopping is effected through a 3-position fuel control switch assembly that controls the power supply to the electrically actuated HP shut-off valve and a fuel enrichment solenoid.

B. Fuel Control System

(1) Fuel scheduling, at idle and above, is effected automatically by the fuel flow governor in response to the power requirement selected by the thrust lever. The fuel flow governor uses the ratio of HP compressor delivery pressure (P4) to air intake pressure (P1), as the main controlling parameter (P4/P1). In addition to P4 and P1, the fuel flow governor senses HP shaft speed (N3) and LP compressor delivery temperature (TF). The combined effect of these signals is to position two metering devices in the fuel flow governor to schedule fuel flow consistent with the power selected. The fuel pressure drop created by the metering devices is transmitted to a spill control, which spills delivery flow in excess of engine requirement back to pump inlet.

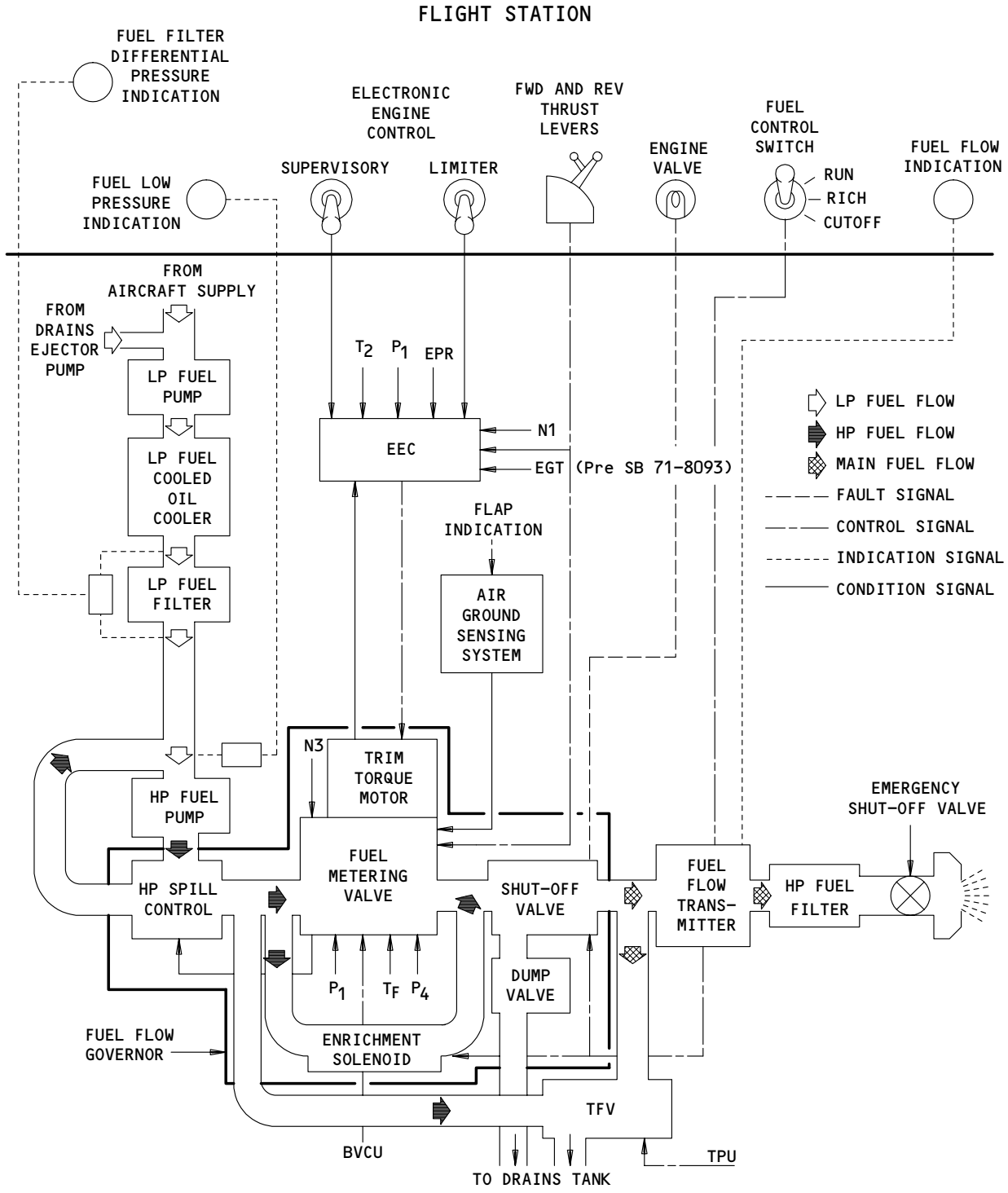
(2) The fuel flow governor also facilitates the automatic selection of a reduced idle power for taxiing and ground holding, and incorporates stops that limit the maximum and minimum fuel flow.

(3) To assist starting with a cold engine, an additional enrichment fuel supply can be selected from the flight compartment. This supply bypasses the fuel metering valve within the fuel flow governor to augment the main flow downstream. The enrichment solenoid is energized by the fuel control switch.

(4) The fuel system incorporates a transient fuel valve (TFV) which in the event of an engine surge at low power conditions, temporarily reduces fuel flow to the spray nozzles to assist in surge recovery. The TFV is controlled by the transient pressure sensor unit (TPU) (Ref 75-32-00).

(5) Electronic Engine Control (EEC)

(a) The fuel control system incorporates an EEC system, comprising an engine supervisory controller with supervisory and limiter channels.



Engine Fuel and Control Schematic
Figure 1

(b) The supervisory channel makes sure that the engine thrust level is controlled to match the necessary thrust level. The system keeps the engine at the correct rate (with changes in the ambient temperature, pressure forward speed or air bleed), by compare of the measured EPR with the necessary EPR and then sends a trim signal to operate a torque motor in the fuel flow governor to adjust the fuel flow. Necessary EPR is found from inputs of thrust lever angle, P1, and air bleed. The system also receives signals of altitude, mach no. and total air temperature (TAT) from the aircraft air data computer. The TAT is verified by a cross check of the IP compressor inlet temperature (T2) corrected for LP shaft speed (N1) which is T1E.

(c) The limiter channel of the supervisory controller monitors N1 and EGT, and provides a safety function by preventing either parameter from rising above predetermined values that represent the limit of safe operation.

NOTE: ENGINES POST RR SB 71-8093;
the EGT signal to the limiter channel is removed.

C. Fuel Flow Indicating System

(1) The fuel flow transmitter provides flight compartment indication of fuel flow rate and fuel used. The transmitter is located between the fuel flow governor and the HP fuel filter.

D. Fuel Filter Bypass Warning System

(1) The fuel filter bypass warning system comprises a differential pressure switch found on the LP fuel filter housing, and an indication on EICAS. The switch measures pressure at the LP filter inlet and outlet and provides an indication to the flight compartment if the differential pressure is above a predetermined value.

E. Fuel Low Pressure Warning System

(1) The fuel low pressure warning system comprises a fuel pressure switch found on the LP fuel filter housing, and an indication on EICAS. The fuel pressure switch senses pressure at the HP pump inlet and provides a signal to the flight compartment if the pressure falls below a predetermined valve.

FUEL SUPPLY SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1, 2, and 3)
   A. Fuel from aircraft supply is delivered by a low pressure (LP) pump through a LP fuel cooled oil cooler and a fuel filter to a high pressure (HP) pump. The HP pump delivers the fuel through a fuel flow governor, transient fuel valve, fuel flow transmitter, fuel filter, emergency fuel shut-off valve, and fuel manifold to the fuel spray nozzles.
   B. Some of the above units are not basically distribution units but have been included in this section to complete the flow sequence. Those units, listed below, are described in the Chapter/Section indicated:
      (1) Engine vents and drains (Ref 71-71-00)
      (2) Fuel flow governor (Ref 73-21-00)
      (3) LP fuel cooled oil cooler (Ref 79-21-00)
2. Component Details
   A. Low Pressure Fuel Pump
      (1) The LP fuel pump is located on the front face of the high speed external gearbox, from where the drive for the pump is taken.
      (2) The pump is a high speed, single stage centrifugal unit, supplying fuel to the HP fuel pump inlet at a pressure and flow rate sufficient to prevent fuel cavitation at the HP pump inlet.
   B. Low Pressure Fuel Cooled Oil Cooler
      (1) The LP fuel cooled oil cooler is located on the right side of the LP compressor case in a common housing with the LP fuel filter.
      (2) The unit performs a dual function of oil cooling and fuel heating (Ref 79-21-00).
   C. Low Pressure Fuel Filter
      (1) The LP fuel filter housing is integral with the fuel cooled oil cooler, located on the right side of the LP compressor case. The filter provides filtration of the LP fuel supply to the HP pump.
      (2) The filter housing contains a fuel filter by-pass valve, set to operate if the pressure drop across the filter exceeds a pre-determined value. A filter differential pressure switch and a low fuel pressure switch are also mounted on the housing assembly. A spring loaded element retainer and a drain plug are incorporated in the base of the filter housing.
   D. High Pressure Fuel Pump
      (1) The HP fuel pump receives fuel from the LP pump at outlet pressure and delivers it at high pressure to the inlet to the fuel flow governor. The pump, comprising straight toothed spur gear type pumping elements, is located on the rear face of the high speed gearbox, from where the drive for the pump is taken.
      (2) The driver gear shaft is supported by a single row ball bearing race and is externally splined at its driven end to accept the drive from the gear shaft.

(3) A full flow relief valve limits pump delivered pressure to a pre-set maximum value, above which the valve opens and returns fuel to pump inlet.

E. Fuel Flow Governor
(1) The fuel flow governor is hydro-mechanical unit, which provides the main engine control and also to divide primary and main fuel supplies (Ref 73-21-00).

F. Transient Fuel Valve
(1) The transient fuel valve (TFV) is located on the right side of the LP compressor case in the HP fuel delivery line between the shutoff valve and the fuel flow transmitter. Its purpose is to assist in surge recovery by temporarily reducing fuel flow to the spray nozzles in the event of an engine surge at low power conditions.
(2) Operation of the TFV is controlled by the transient pressure sensor unit (Ref 75-32-00).

G. Fuel Flow Transmitter
(1) The fuel flow transmitter (Ref 73-31-00) is located on the LP compressor case in the HP fuel delivery line between the transient fuel valve and fuel filter.
(2) Signals from the unit are used to provide flight compartment indication of fuel consumed and fuel flow rate.

H. High Pressure Fuel Filter
(1) The HP fuel filter is located on the lower right side of the LP compressor case and is positioned in the main fuel supply to the manifold.

I. Emergency Fuel Shutoff Valve
(1) An emergency shutoff valve is located in the main fuel supply line at the junction of supply line with fuel manifold. The shutoff valve is to effect a rapid shut-down by cancelling fuel supply to the spray nozzles in the event of failure of the engine LP shaft.
(2) The shutoff valve is a rotary type on/off valve, activation of which is effected through a cable assembly connecting the valve to a pawl mechanism attached to the LP turbine stubshaft. A detailed description of the turbine overspeed shut-down mechanism is referenced in 76-22-00.
(3) Once operated, the valve must be removed from the engine to be reset to open position.

J. Fuel Manifold
(1) The fuel manifold is on two halves joined at the top and the bottom. The fuel inlet is at the bottom. On engines pre RR SB 72-C230 (phase II combustor), the fuel tubes connect the manifold to 18 spray nozzles. On engines post RR SB 72-C230 (phase V combustor), the fuel tubes connect the manifold to 24 spray nozzles.
(2) A manifold drain (Ref 71-71-00) is positioned to ensure the manifold is kept primed to the level of the lower spray nozzles at all times.

K. Fuel Spray Nozzles (Fig. 3)

(1) RB211-535E4 AND RB211-535E4-B ENGINES PRE-RR-SB 72-C230 (PHASE II COMBUSTOR);
Eighteen spray nozzles are fitted in location bores positioned around the combustion section outer case. The spray nozzles protrude into the area forward of the combustion chambers and are located in miniflares positioned around the forward section of the combustion liner. A seal assembly is fitted in each location bore to prevent air leakage past the spray nozzles.

(2) RB211-535E4 AND RB211-535E4-B ENGINES POST-RR-SB 72-C230 (PHASE V COMBUSTOR);
Twenty-four nozzles, are fitted in location bores positioned around the combustion section outer case. The spray nozzles protrude into the area forward of the combustion chambers and are located in miniflares positioned around the forward section of the combustion liner. A seal assembly is fitted in each location bore to prevent air leakage past the spray nozzles.

(3) Each spray nozzle comprises a feed arm, incorporating a mounting flange, and a nozzle head in which a swirl chamber is supported. A fuel distributor weight assembly, featuring a weighted valve and spring, is located in each feed arm. The weight is held on to the valve seat by the spring, retained by a spring guide which is itself located by an adjusting nut to provide an adjustment when calibrating during test. The distributor weight assembly controls fuel passing down the feed arm, ensuring adequate distribution of the fuel under all conditions.

(4) Fuel is fed to an annulus formed between the inner wall of the nozzle head and the outer wall of the swirl chamber, from where it is injected into the swirl chamber through tangential drillings that impart a swirling motion to the fuel. Air enters the head through a row of inner swirl vanes, by which a swirling motion is imparted to the air before it enters the swirl chamber to be mixed with the fuel. A row of outer swirl vanes around the outside of the discharge nozzle imparts a further swirl to the fuel/air mixture ejecting from the nozzle.

(5) The mounting flanges of spray nozzles at No. 3 and 15 positions each incorporate an orifice into which a tube, attached to the seal assembly, locates to provide a tapping for HP compressor delivery air (P4). The air from No. 3 nozzle position is directed to the aircraft cabin air controller, and from No. 15 nozzle to the fuel flow governor.

(6) RB211-535E4 AND RB211-535E4-B ENGINES PRE-RR-SB 72-C230;
The spray nozzles in the No. 8 and 12 positions also incorporate a boss into which an igniter plug is fitted.

3. Operation

A. Functional Description

(1) The LP fuel pump receives fuel from the aircraft supply system and delivers it to the HP fuel pump at a pressure sufficient to ensure satisfactory HP pump performance at all operating conditions.

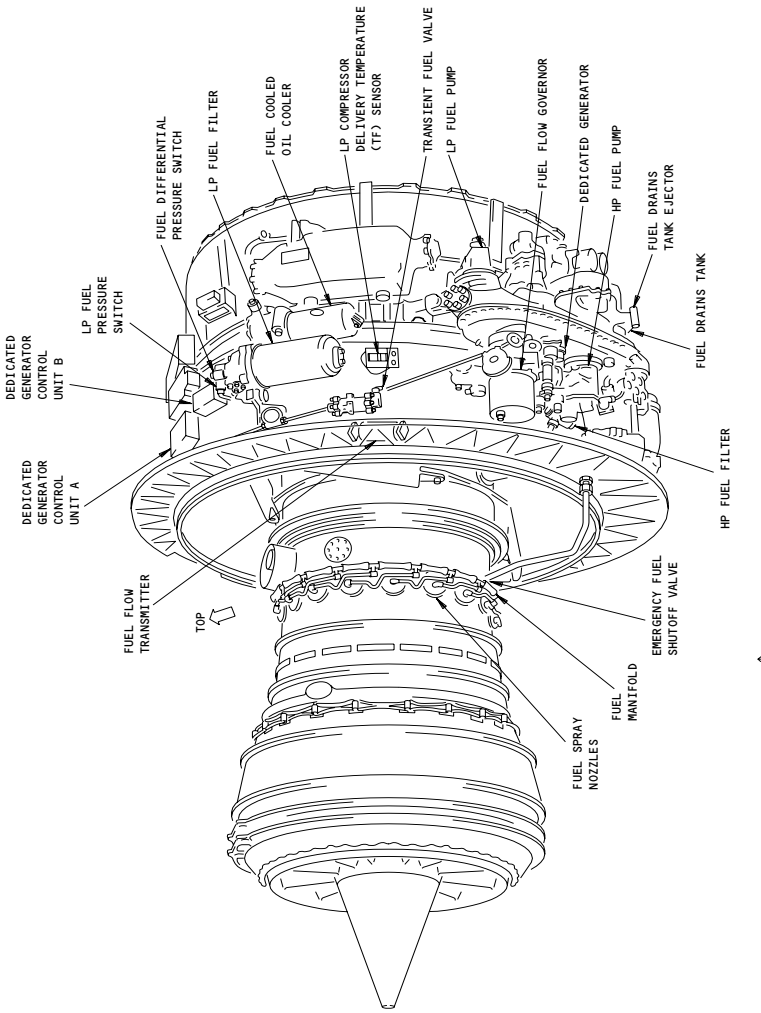
(2) From the LP pump outlet the fuel flows through the LP fuel cooled oil cooler where heat is transferred to the fuel, thereby achieving fuel heating and oil cooling.

(3) The fuel then flows through the LP fuel filter to the HP fuel pump, from where it is delivered at high pressure to the inlet of the fuel flow governor. The relief valve limits pump delivery pressure to a maximum pre-set value above which the valve opens and returns fuel to the pump inlet.

(4) Fuel passes to the fuel flow governor, which computes the requirements of the engine and meters the correct fuel flow for all engine speeds and operating conditions. A spill valve spills back to the LP side of the HP pump that portion of HP delivery flow that is in excess of engine requirements. The main fuel supply then passes through the fuel shutoff valve.

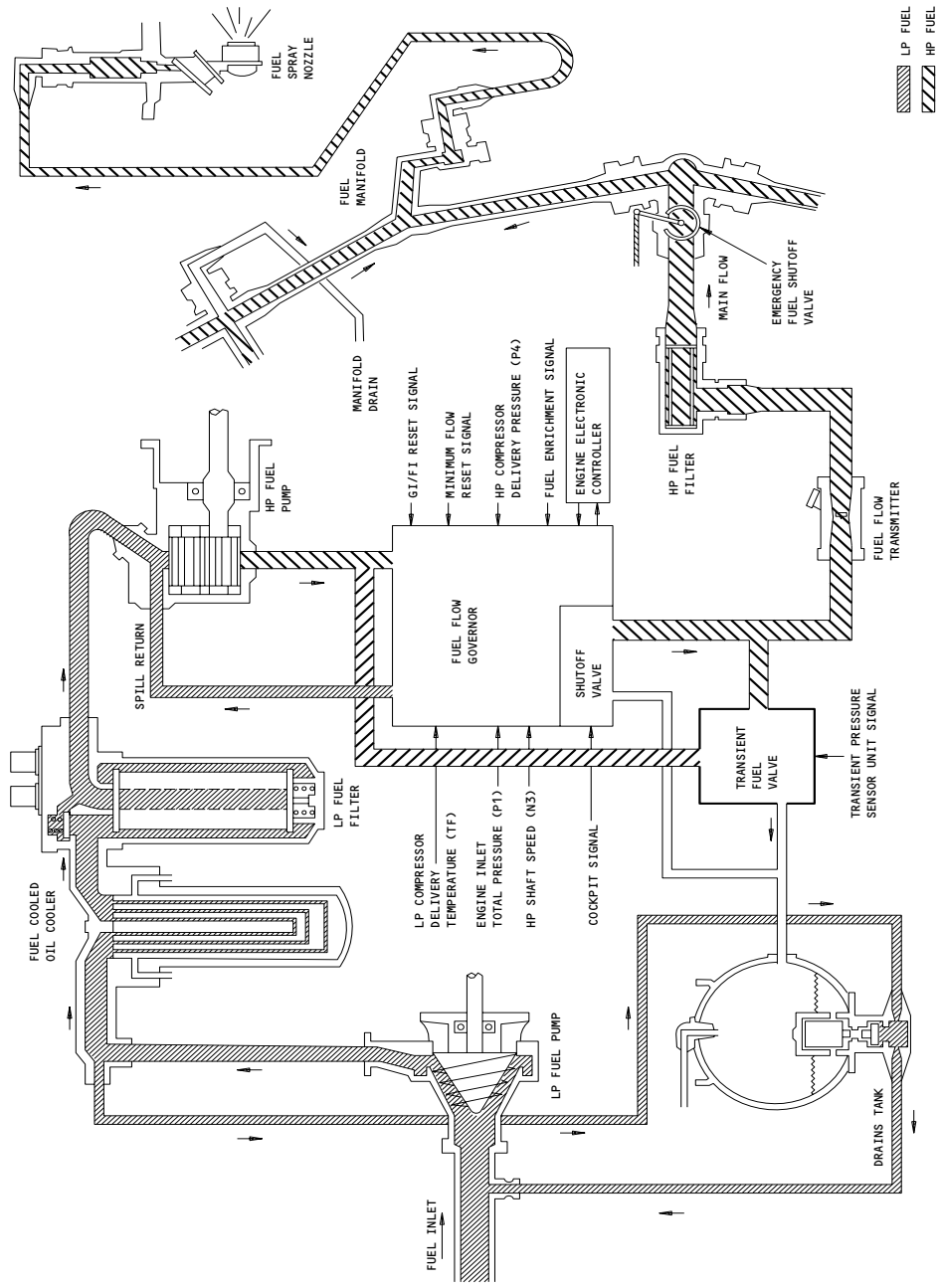
(5) HP fuel shutoff is effected through a shutoff and pump unloading valve. This is a 2-position solenoid valve, which, when energized to open, governs fuel supply to the spray nozzles via a pressurizing and dump valve. When energized closed, shuts off fuel and drains manifold to level of lower spray nozzles. Drained fuel is then collected in drains collector tank.

(6) On leaving the shutoff valve the fuel flows through a supply tube and the fuel manifold to the distributor valves. These direct fuel flow through the feed arms to the annulus incorporated in the head of each spray nozzle. From the annulus the fuel flows through tangential drillings, which impart a swirling motion to the fuel as it enters the swirl chamber. The air enters the nozzle through the inner swirl vanes, which also impart a swirling motion to the air as it enters the swirl chamber to be mixed with the fuel. The fuel/air mixture is then discharged through the discharge nozzle into the combustion chamber.



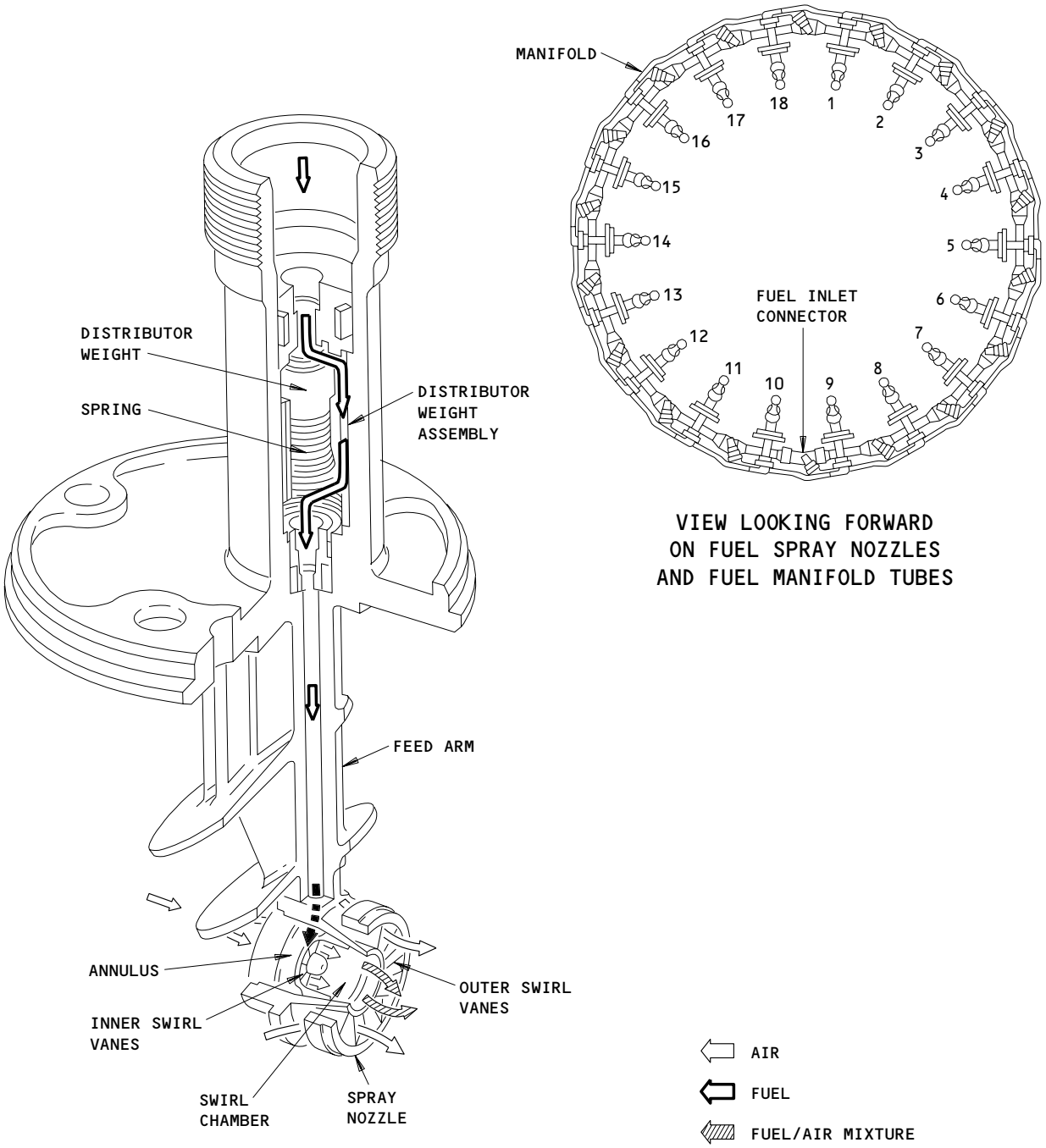
Fuel Distribution Components
Figure 1

65635A

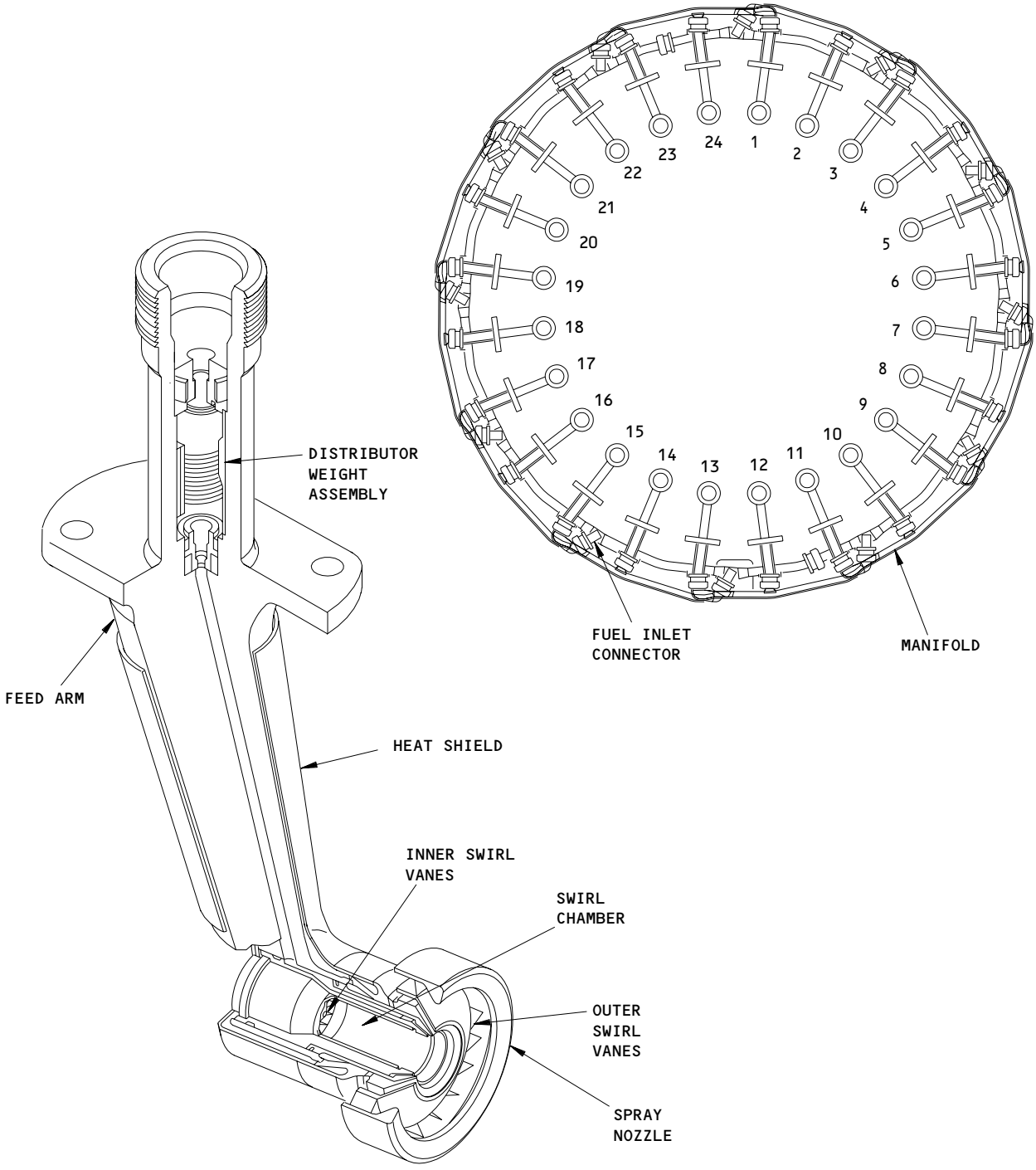


Fuel Distribution System
Figure 2

19629S



Fuel Manifold, Distribution Valve and Spray Nozzles
Figure 3 (Sheet 1)



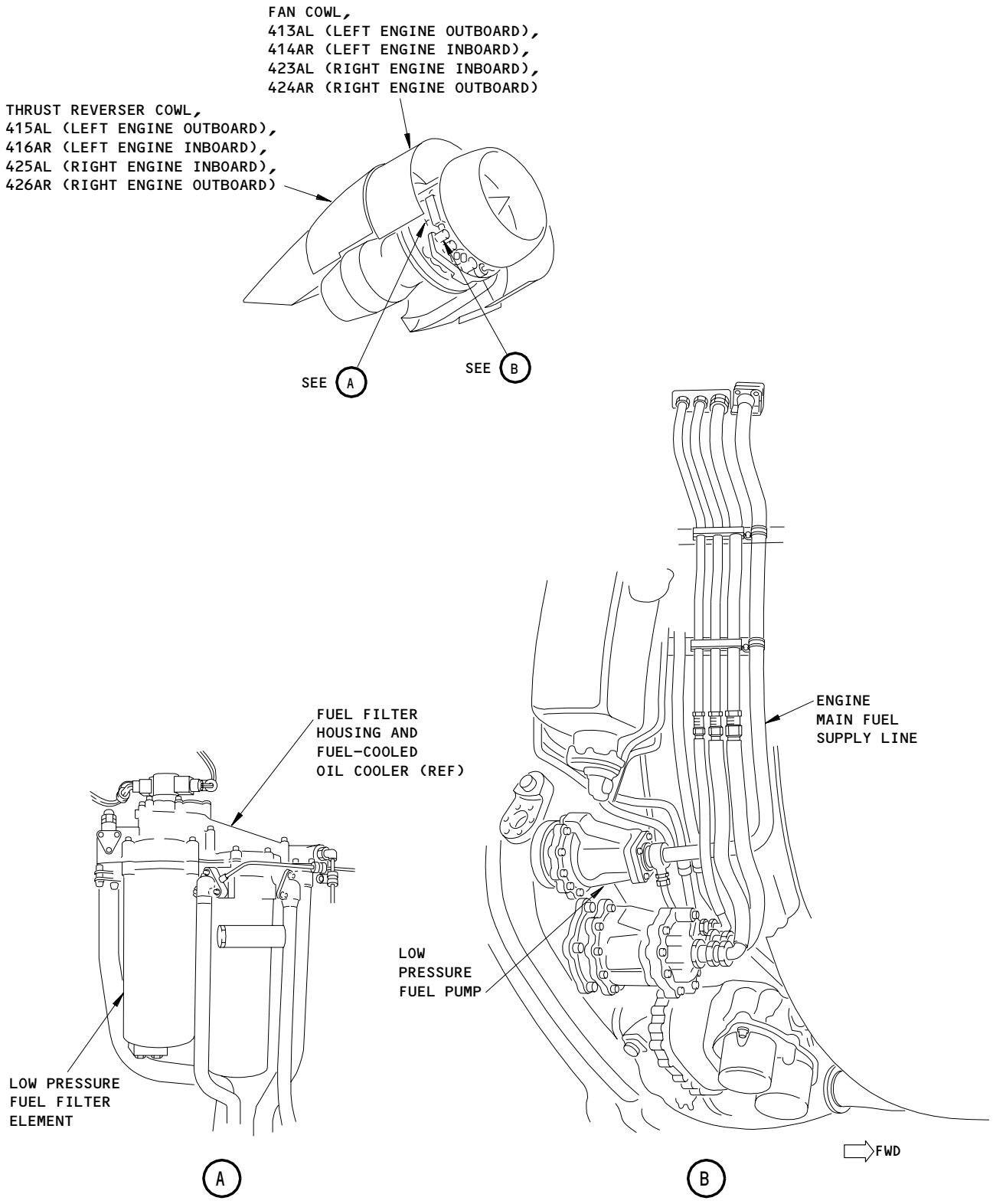
Fuel Manifold, Distribution Valve and Spray Nozzles
Figure 3 (Sheet 2)

FUEL DISTRIBUTION SYSTEM

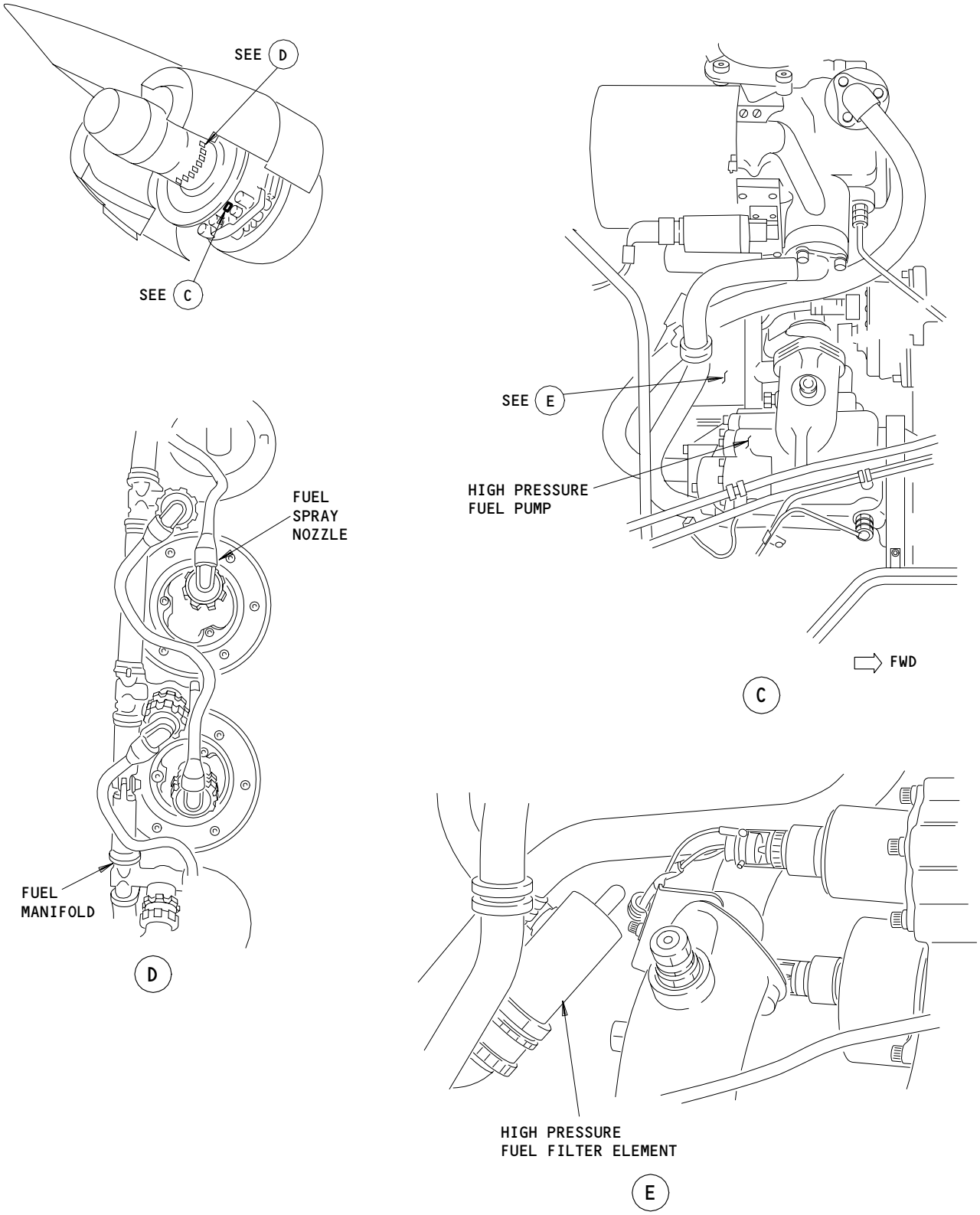
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ELEMENT – HIGH PRESSURE FUEL FILTER		2	414AR,424AR	73-11-12
ELEMENT – LOW PRESSURE FUEL FILTER		2	414AR,424AR	73-11-10
LINE – ENGINE MAIN FUEL SUPPLY		2	414AR,424AR	73-11-07
MANIFOLD – FUEL		2	415AL,425AL,416AR,426AR	73-11-11
NOZZLE – FUEL SPRAY 1		36	415AL,425AL,416AR,426AR	73-11-05
NOZZLE – FUEL SPRAY 2		48	415AL,425AL,416AR,426AR	73-11-05
PUMP – HIGH PRESSURE FUEL		2	413AL,423AL	73-11-03
PUMP – LOW PRESSURE FUEL		2	414AR,424AR	73-11-01

1 ENGINES PRE RR-SB 72-C230
2 ENGINES POST RR-SB 72-C230

Fuel Distribution System – Component Index
Figure 101



Fuel Distribution System - Component Location
Figure 102 (Sheet 1)



Component Location
Figure 102 (Sheet 2)

LOW PRESSURE FUEL PUMP - REMOVAL/INSTALLATION

1. General
   A. This procedure includes steps to remove and install the low pressure fuel pump.

TASK 73-11-01-004-003-R00

2. Remove the Low Pressure Fuel Pump
   A. Equipment
      (1) Clean container - minimum capacity:
          5 U.S. gallons, 4 Imperial gallons, 18 Litres
      (2) Fluid container, fitted with a fine mesh filter
          (5 micron)
   B. Consumable Materials
      (1) Inhibiting Fluid
          British Spec/Ref - D.ENG.RD 2490 or DEF.STAN. 91-44/1
          American Spec/Ref - VV-L 800A
          OMat No.- 1003
      (2) White spirit
          British Spec/Ref - B.S.245
          OMat No.- 102
      (3) Stoddard solvent
          American Spec/Ref - ASTM D.484-62
          OMat No.- 102A
   C. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
      (3) AMM 73-11-06/401, Fuel Tubes
      (4) AMM 73-11-06/601, Fuel Tubes and Fittings
   D. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414 Left Engine Hinged Cowl Panel (RH)
          424 Right Engine Hinged Cowl Panel (RH)

E. Prepare to remove the low pressure fuel pump.

S 864-004-R00
(1) Supply the electrical power (AMM 24-22-00/201).

S 864-005-R00
(2) For left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
(a) 6E1, FUEL VALVES L SPAR

S 864-006-R00
(3) For right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
(a) 6E2, FUEL VALVES R SPAR

S 864-008-R00
(4) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

S 864-009-R00
(5) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are not on.

S 864-010-R00
(6) For left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVE L SPAR

S 864-011-R00
(7) For right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVE R SPAR

S 864-012-R00
(8) Remove the electrical power (AMM 24-22-00/201).

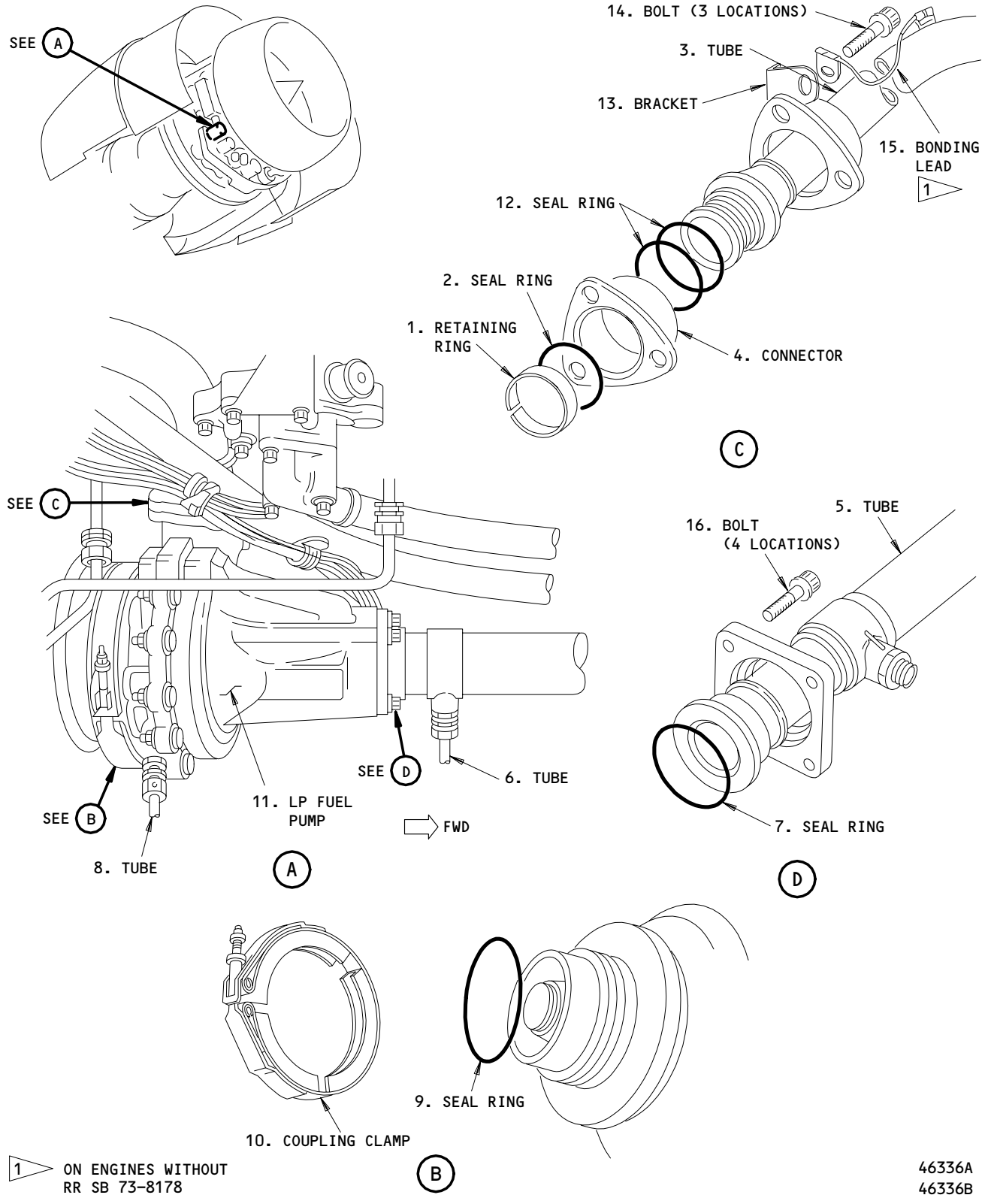
F. Remove the low pressure fuel pump (Fig. 401).

S 014-001-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 034-013-R00
(2) Disconnect, but do not remove the tube (8).



Low Pressure Fuel Pump Installation
Figure 401

S 944-014-R00
(3) Put the clean container below tube (6).

S 034-015-R00
(4) Disconnect, but do not remove tube (6).

S 684-016-R00
(5) Drain the fuel into the container.

S 034-017-R00
(6) Remove the bolts (14).

S 034-018-R00
(7) Disconnect, but do not remove tube (3).

S 034-019-R00
(8) Remove the retaining ring (1), seal ring (2) and connector (4).

S 034-020-R00
(9) Remove the coupling clamp (10) (AMM 70-12-02/201).

S 024-021-R00
(10) Remove the fuel pump (11).

S 034-022-R00
(11) Remove the bolts (16).

S 034-023-R00
(12) Disconnect, but do not remove the tube (5).

S 434-024-R00
(13) Install dust caps to all of the open apertures and connectors.

S 624-025-R00
(14) Do these steps to prevent LP fuel pump corrosion:

NOTE: You can ignore this procedure for up to 48 hours if you install the protective covers on the openings immediately after LP fuel pump removal.

(a) Drain all fuel from the LP fuel pump.

(b) Install approved covers and gaskets to the fuel inlet and outlet ports.
(c) Install approved covers to the seal drain connection and the LP fuel pump drive end.
(d) Fully clean the external surfaces of the LP fuel pump with white spirit or stoddard solvent.
(e) Turn the LP fuel pump until the outlet port is on the top.
(f) Remove the cover and gasket from the outlet port.
(g) Put inhibiting fluid into the outlet port until the LP fuel pump is full.

NOTE: Stop and let the fluid flow through the pump impeller as you fill the port.

(h) Install the approved cover and gasket to the outlet port.
(i) Turn the LP fuel pump until the seal drain connection is on the top.
(j) Remove the cover from the seal drain.
(k) Fill the seal drain connection to the top with inhibiting fluid and install the cover.
(l) Clean and dry the external surface of the LP fuel pump and examine it for leaks.
(m) Replace any defective gaskets, and add inhibiting fluid as necessary to keep the fluid level at the top.
(n) When there are no leaks, attach a label to the unit with the date and details of when this procedure was done.

TASK 73-11-01-404-026-R00

3. Install the Low Pressure Fuel Pump

A. Consumable Materials

(1) Lockwire
British Spec/Ref - DTD189A, 22 S.W.G.
American Spec/Ref - 21 A.W.G.
OMat No.- 238

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Retaining Ring	73-11-06	05	164
	2	Seal - Toroidal Sealing		05	150
	4	Connector - Fluid Line		05	157
	7	Seal - Toroidal	73-11-07	01	115
	9	Ring - Seal Pump	73-11-01	01	5
	10	Clamp		01	10
	11	Pump Assy		01	15
	12	Seal - Toroidal	73-11-06	05	140
	13	Bracket		05	120
	14	Bolt		05	110
	16	Bolt	73-11-07	01	35

C. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 71-00-00/501, Power Plant
(3) AMM 71-11-04/201, Fan Cowl Panels

D. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
414 Left Engine Hinged Cowl Panel (RH)
424 Right Engine Hinged Cowl Panel (RH)

E. Install the low pressure fuel pump (Fig. 401).

S 034-027-R00
(1) Remove the dust caps from all of the apertures and connectors.

S 684-028-R00
(2) Drain the inhibiting fluid.

S 164-029-R00
(3) Make sure all of the mating aperture faces and connector faces are clean and free from damage (Fig. 401).

S 214-051-R00
(4) Examine the fuel tube end fitting (3) (AMM 73-11-06/601).

S 434-030-R00
(5) Install the retaining ring (1), seal ring (12) and connector (4).

S 434-031-R00
(6) Lubricate and install the new seal rings (12) to the tube (3).

S 434-032-R00
(7) Lubricate and install the new seal ring (7) to the tube (5).

S 434-033-R00
(8) Lubricate and install the new seal ring (9) to the fuel pump mounting shoulder.

S 844-034-R00
(9) Prepare the coupling clamp (10), the fuel pump and the gearbox mounting flanges for installation.

S 424-035-R00
(10) Put the fuel pump (11) on the gearbox mounting pad and make sure the dowl is in the correct location.

S 434-036-R00
(11) Install the coupling clamp (10).

S 434-037-R00
(12) Install the tube (5) with the bolts (16).

S 434-038-R00
(13) ENGINES POST RR SB 73-8178;
Install the tube (3) with the bracket (13) and the bolt (14).

S 434-039-R00
(14) ENGINES PRE RR SB 73-8178;
Install the tube (3) with the bracket (13), bonding lead (15), and bolt (14).

S 434-041-R00
(15) Install the tubes (6) and (8) and install a lockwire.

F. Put the airplane back to its initial condition.

S 864-042-R00
(1) For left engine, remove the DO-NOT-CLOSE tags and close this circuit on the main power distribution panel, P6:
(a) 6E1, FUEL VALVES L SPAR

S 864-043-R00
(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the main power distribution panel, P6:
(a) 6E2, FUEL VALVES R SPAR

S 864-044-R00
(3) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch on the control stand.

S 864-045-R00
(4) Supply the electrical power (AMM 24-22-00/201).

S 414-002-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 714-046-R00
(6) Do the test of the Low Pressure Fuel Pump that is shown in the Power Plant Reference Table (AMM 71-00-00/501).

LOW PRESSURE FUEL PUMP - INSPECTION/CHECK

1. General
   A. This procedure is for an on-wing visual inspection of the overboard drain port of the Low Pressure Fuel Pump. This is to make sure the internal drain cavity of the unit is clear.

   TASK 73-11-01-216-001-R00

2. Examine the Overboard Drain Port of the Low Pressure Fuel Pump
   A. References
      (1) AMM 24-22-00/201, Electrical Power
      (2) AMM 70-51-00/201, Standard Practices - Torque Tightening Technique
      (3) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Power Plant
          420 Right Power Plant

      (2) Access Panels
          414AR Left Engine Fan Cowl Panel (RH)
          424AR Right Engine Fan Cowl Panel (RH)

   C. Procedure

      S 866-002-R00
      (1) Do these steps to make sure that the engine and spar fuel valves are closed:
          (a) Supply the electrical power (AMM 24-22-00/201).
          (b) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E1, FUEL VALVE L SPAR
          (c) For the right engine, make sure this curcuit breaker on the main power distribution panel, P6, is closed:
              1) 6E2, FUEL VALVE R SPAR
          (d) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.
          (e) Make sure that the ENG VALVE and FUEL SPAR lights on the control stand are off.
          (f) For the left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
              1) 6E1, FUEL VALVE L SPAR
          (g) For the right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
              1) 6E2, FUEL VALVE R SPAR
          (h) Remove the electrical power (AMM 24-22-00/201).

S 016-003-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF PRECAUTIONS ARE NOT OBEYED, DAMAGE CAN OCCUR TO THE KEVLAR WRAPPING.

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

S 216-004-R00

(3) Examine the overboard drain port of the Low pressure fuel pump (Fig. 601).
  (a) Remove the drain tube (1) from the drain union (2).
  (b) Remove the drain union (2) and seal ring (3) from the fuel pump.
  (c) Visually inspect the union (2) and make sure it is clear.
  (d) Use a bright light and look into the drain port.
    1) If you can see a shiny metal surface (at the inner end of the drain port), the drain port is clear.
    2) If you cannot see a shiny metal surface, the drain port is blocked and you must reject the fuel pump.
  (e) If the drain port is clear, install the union (2) with a new seal ring (3).
    1) Tighten the union to 670 pound inches (75.71 N.m).
    2) Unstall the overboard drain tube (1) on the fuel pump.
      a) Tighten the drain tube (8) (AMM 70-51-00/201).

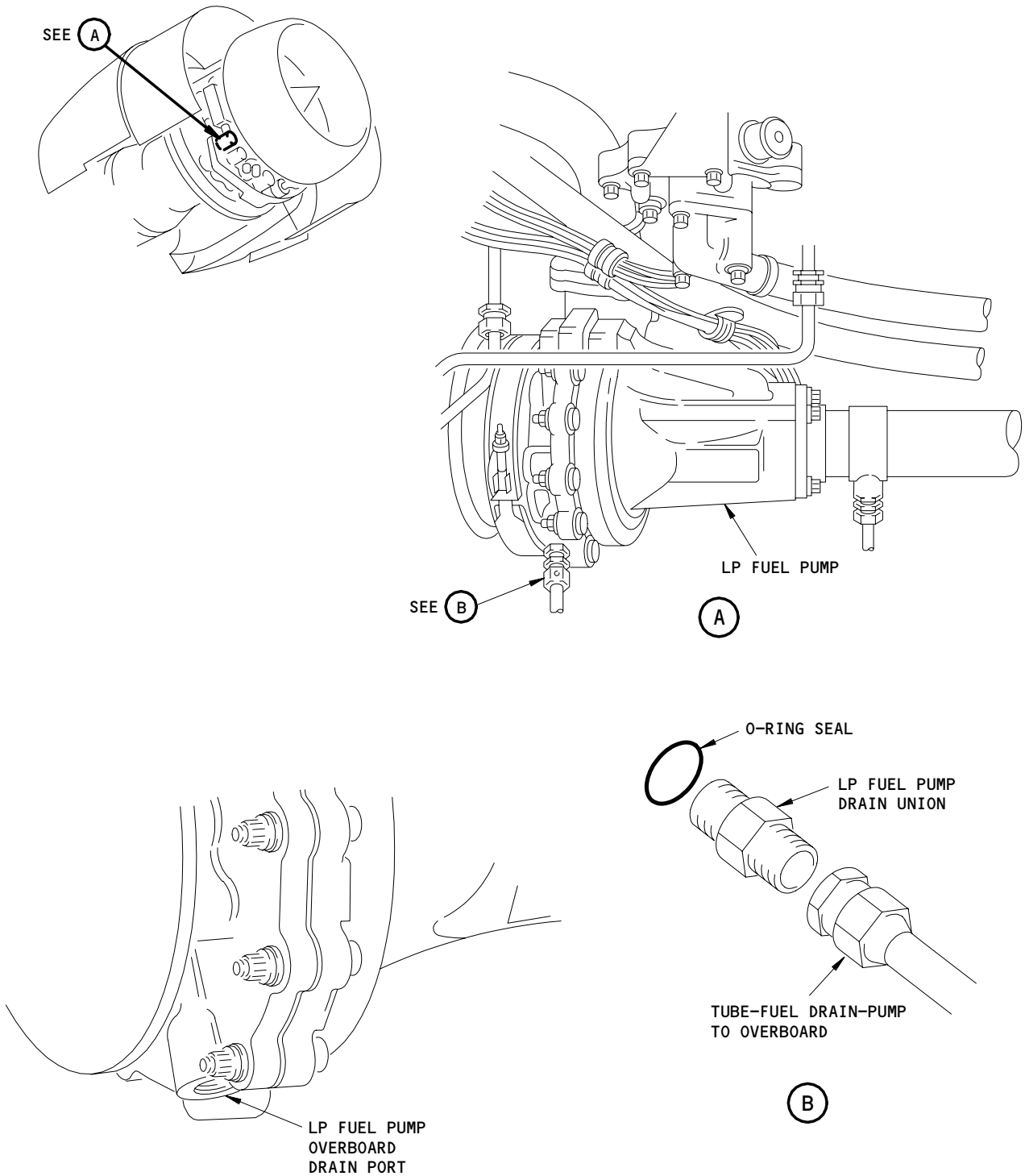
S 416-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF PRECAUTIONS ARE NOT OBEYED, DAMAGE CAN OCCUR TO THE KEVLAR WRAPPING.

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

S 866-006-R00

(5) Do these steps to put the airplane back to its usual condition.
  (a) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the main power distribution panel, P6:
    1) 6E1, FUEL VALVES L SPAR
  (b) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the main power distribution panel, P6:
    1) 6E2, FUEL VALVES R SPAR
  (c) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch on the control stand.



C8382

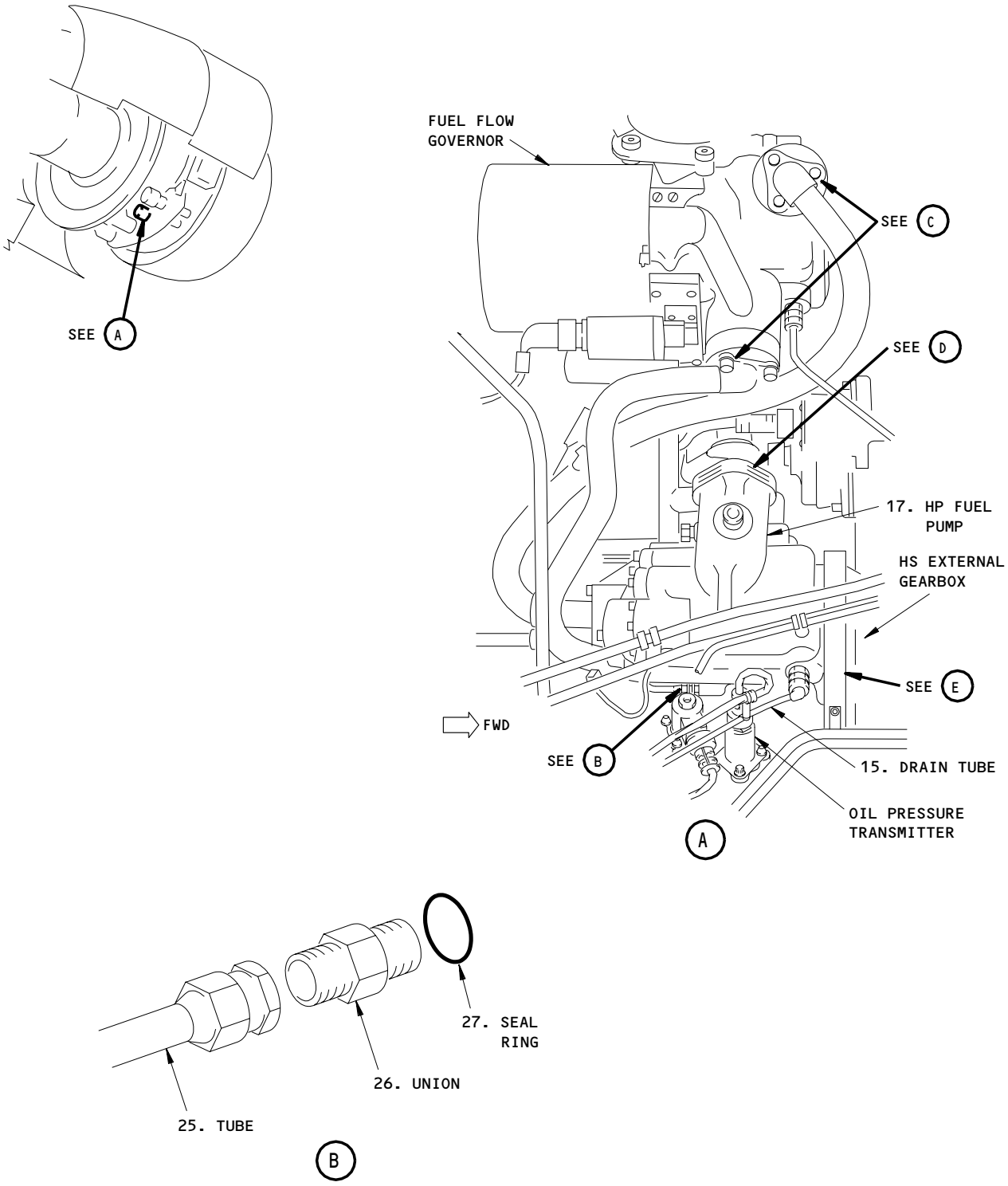
LP Fuel Pump Drain Port Inspection
Figure 601

HIGH PRESSURE FUEL PUMP - REMOVAL/INSTALLATION

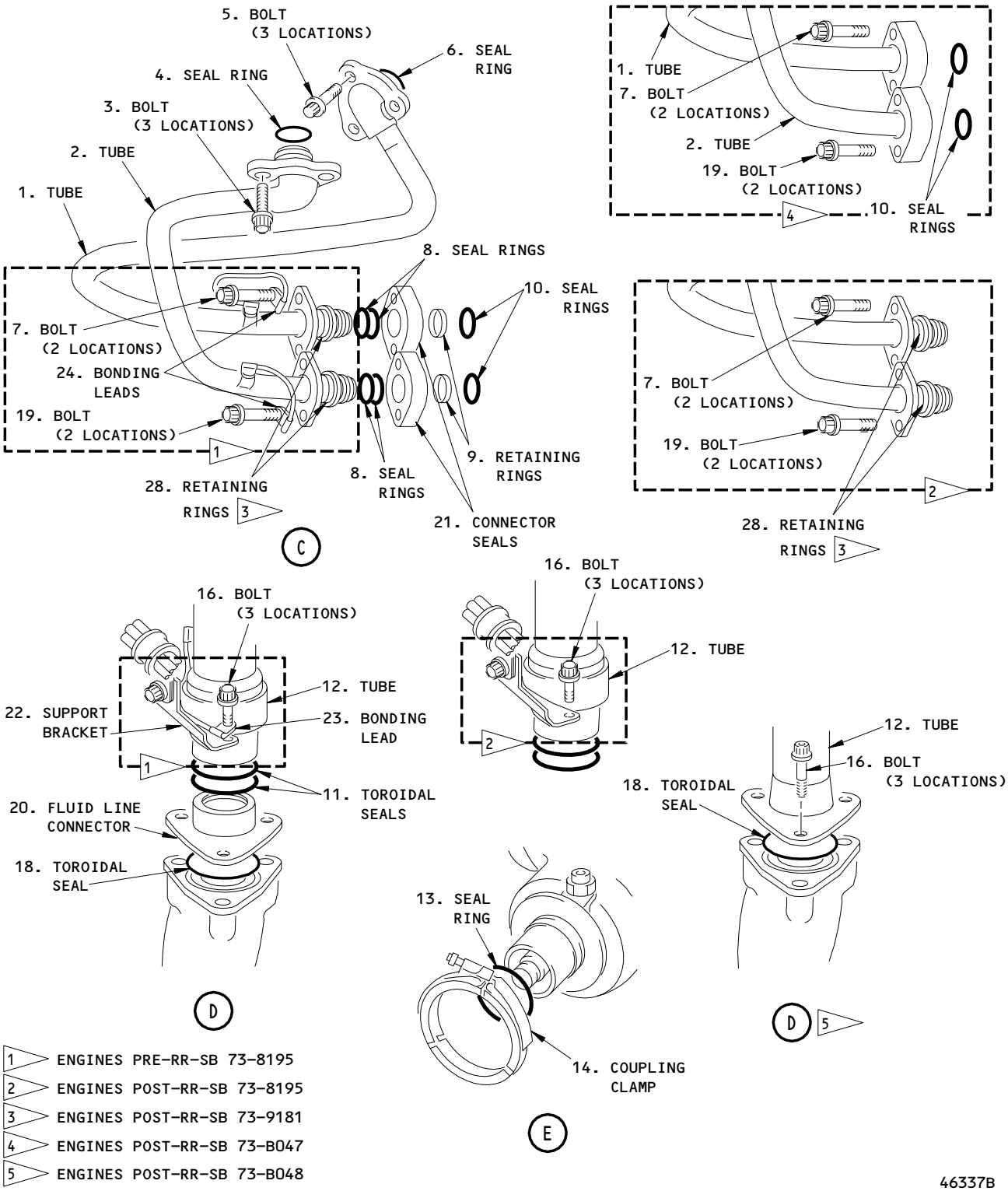
1. General
   A. This procedure includes steps to remove and install the High Pressure Fuel Pump.
   B. Service Bulletins referred to:
      (1) 73-8195: Fuel and Control- Fuel tubes with non-essential earth bonding features deleted.
      (2) 73-9181: Engine Fuel system Tubes and Fittings - Reduction of tube end float.
      (3) 73-B047: Engine Fuel and Control - Fuel Tubes- Introduction of HP fuel pipes with rigid end connectors.
      (4) 73-B048: Engine fuel and Control - Fuel Tubes - introduction of HP fuel tubes with rigid end connectors.

   TASK 73-11-03-004-001-R00

2. Remove the High Pressure Fuel Pump.
   A. Equipment
      (1) Clean container - minimum capacity:
          5 U.S. gallons, 4 Imperial gallons, 18 Liters
      (2) Rolls-Royce (Lucas) T430085 Pump Inhibiting Key (PRE-RR-SB 73-B946)
      (3) Rolls-Royce (Argo-Tech) 100-51777 Pump Inhibiting Key (POST-RR-SB 73-B946)
      (4) Fluid Container, fitted with fine mesh filter (5 microns)
   B. Consumable Materials
      (1) Inhibiting fluid
          British Spec/Ref - D.Eng.RD2490 or DEF.STAN91-44/1
          American Spec/Ref - VV-L-800A
          OMat No. 1003
      (2) White spirit
          British Spec/Ref - B.S.245
          OMat No. 102
      (3) Stoddard solvent
          American Spec/Ref - ASTM D484-62
          OMat No. 102A
   C. References
      (1) AMM 24-22-00/201, Electrical Power
      (2) AMM 71-11-04/201, Fan Cowl Panels



High Pressure Fuel Pump Installation
Figure 401 (Sheet 1)



High Pressure Fuel Pump Installation
Figure 401 (Sheet 2)

(3) AMM 72-61-72/401, HP Fuel Pump Drive Shaft

D. Access

(1) Location Zones

410 Left Power Plant
420 Right Power Plant

(2) Access Panels

414AR Left Engine Fan Cowl Panel (RH)
424AR Right Engine Fan Cowl Panel (RH)

E. Prepare to remove the HP fuel pump (Fig. 401).

S 864-002-R00

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

S 864-003-R00

(2) Do these steps to make sure that the engine and spar fuel valves are closed:

(a) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
1) 6E1, FUEL VALVE L SPAR

(b) For the right engine, make sure this curcuit breaker on the main power distribution panel, P6, is closed:
1) 6E2, FUEL VALVE R SPAR

(c) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

(d) Make sure that the ENG VALVE and FUEL SPAR lights on the control stand are off.

(e) For the left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
1) 6E1, FUEL VALVE L SPAR

(f) For the right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
1) 6E2, FUEL VALVE R SPAR

S 864-004-R00

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

S 014-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF PRECAUTIONS ARE NOT OBEYED, DAMAGE CAN OCCUR TO THE KEVLAR WRAPPING.

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

F. Remove the HP fuel pump.

S 944-006-R00

(1) Put the fluid container in position below the HP fuel pump to collect fuel that drains from the system.

S 034-007-R00
(2) Loosen the HP fuel tubes (1), (2), and (12) and allow fuel to drain from the system.

S 034-008-R00
(3) Disconnect the fuel drain tube (15).

S 034-010-R00
(4) Do these steps to disconnect the HP fuel tubes:
(a) Disconnect the HP fuel tube (2).
(b) ENGINES PRE-RR-SB 73-B047;
Remove the bolts (3) (3 locations) and (19) (2 locations) that attach the HP fuel tube (2).
(c) Disconnect and remove the tube (2), connector seal (21), and retaining ring (9).
1) Remove and discard seal rings (4), (10), and (8) (2 locations).
(d) ENGINES POST-RR-SB 73-9181;
Remove the three retaining rings (28) from the tube.

S 034-011-R00
(5) ENGINES POST-RR-SB 73-B047;
Remove the three bolts (3) and two bolts (19) from the HP fuel tube (2). Remove the tube. Remove and discard the seal rings (4) and (10).

S 034-012-R00
(6) ENGINES POST-RR-SB 73-B047;
Remove the three bolts (3) and two bolts (19) from the HP fuel tube (2). Remove the tube.
(a) ENGINES PRE-RR-SB 73-B047;
Remove the bolts (5) (3 locations) and (7) (2 locations) that attach the HP fuel tube (1).
(b) Disconnect and remove the tube (1), connector seal (21), and retaining ring (9).
1) Remove and discard seal rings (6), (10), and (8) (2 locations).
(c) ENGINES POST-RR-SB 73-9181;
If necessary remove the three retaining rings (28).
(d) ENGINES POST-RR-SB 73-B047;
Remove the bolts (5) (3 locations) and (7) (2 locations) that attach the HP fuel tube (1). Remove the tube.
1) Remove and discard seal rings (6), (10), and (8) (2 locations).

(e) Remove the bolts (16) (3 locations) to disconnect the LP fuel tube (12).
(f) ENGINES POST-RR-SB 73-B048;
Remove the three bolts (16) to disconnect the LP fuel tube. Discard toroidal seal (18).

S 034-013-R00
(7) Disconnect the oil pressure transmitter electrical connector and install approved dust caps.

NOTE: To prevent possible damage to the connector while you remove or install the High Pressure Fuel Pump, tie-back the connector clear of the pump.

S 024-014-R00
(8) Do these steps to remove the HP fuel pump:
(a) Hold the HP fuel pump (17) and remove the coupling clamp (14).
(b) Remove the HP fuel pump (17) from the gearbox mounting pad and put it on a work surface.
(c) Remove the fuel pump drive shaft (AMM 72-61-72/401).
(d) Remove and discard the seal rings (13), (18), and (11) (2 locations).

S 624-015-R00
(9) Do these steps to prevent HP fuel pump corrosion:

NOTE: You can ignore this procecedure for up to 48 hours if you install the protective covers on the apertures immediately after HP fuel pump removal.

(a) Drain all fuel from the HP fuel pump.
(b) Install approved transportation covers and gaskets to the fuel inlet, outlet, and spill return ports.
(c) Install approved transportation covers to the seal drain connection, the HP fuel pump drive end, and the union (10).
(d) Fully clean the exterior of the HP fuel pump with white spirit or stoddard solvent.
(e) Turn the HP fuel pump until the pump inlet port is on the top.
(f) Remove the cover and gasket.
(g) Put inhibiting fluid into the inlet port until the pump is full.
(h) Remove the drive end transportation cover.
(i) Engage the pump inhibiting key with the drive coupling and turn the coupling in a counter-clockwise direction.

(j) Add inhibiting fluid to the inlet while you turn the coupling until the inlet stays full.
(k) Install the approved cover and gasket to the pump inlet port.
(l) Remove the pump inhibiting key from drive coupling.
(m) Install the drive end transportation cover.
(n) Turn the HP fuel pump until the fuel drain connection is on the top.
(o) Remove the transportation cover.
(p) Fill the fuel drain connection to the top with inhibiting fluid and install the transportation cover.
(q) Clean and dry the external surface of the HP fuel pump and examine it for leaks.
(r) Replace any defective gaskets and add inhibiting fluid as necessary to keep the fluid level at the top.
(s) When there are no leaks, attach a label to the unit with the date and details of the inhibiting procedure.

TASK 73-11-03-404-016-R00

3. Install High Pressure Fuel Pump

A. Equipment
(1) Clean container - minimum capacity:
5 U.S. gallons, 4 Imperial gallons, 18 Liters
(2) Rolls-Royce (Lucas) T430085 Pump Inhibiting Key (PRE-RR-SB 73-B946)
(3) Rolls-Royce (Argo-Tech) 100-51777 Pump Inhibiting Key (POST-RR-SB 73-B946)
(4) Fluid Container, fitted with fine mesh filter (5 microns)

B. Consumable Materials
(1) Lockwire
British Spec/Ref - DTD. 189A, 22 S.W.G.
American Spec/Ref - 21 A.W.G.
OMat No. 238

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Tube	73-11-06	06	250
	2	Tube			160
	3	Bolt			150
	4	Seal Ring			165
	5	Bolt			240
	6	Seal Ring			255
	7	Bolt			245
	8	Seal Ring			255
	9	Retaining Ring			270
	10	Seal Ring			265
	11	Seal - Toroidal	73-11-06	05	140
	12	Tube			131
	13	Ring - Seal Pump	73-11-03	01	5
	14	Clamp			10
	16	Bolt	73-11-06	05	115
	17	Pump Assy - HP Fuel	73-11-03	01	15
	18	Seal - Toroidal	73-11-06	05	145
	19	Bolt		06	155
	20	Connector - Fluid Line		05	157
	21	Connector Seal		06	260
	22	Support Bracket		05	125
	23	Bonding Lead			102
	24	Bonding Lead		06	105
	25	Tube			345
	26	Union			337
	27	Seal Ring			340
	28	Retaining Ring	73-11-06	06	167 & 257

D. References
(1) AMM 70-02-01/201, Identification, Lubrication and Fitting of Rubber Sealing Rings
(2) AMM 71-00-00/501, Power Plant
(3) AMM 71-11-04/201, Fan Cowl Panels

(4) AMM 72-61-72/401, Main Gearbox HP Fuel Pump Drive Shaft

E. Access

(1) Location Zones

410 Left Power Plant
420 Right Power Plant

(2) Access Panels

414AR Left Engine Fan Cowl Panel (RH)
424AR Right Engine Fan Cowl Panel (RH)

F. Prepare to install the HP fuel pump (Fig. 401).

S 864-017-R00

(1) For the left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVE L SPAR

S 864-018-R00

(2) For the right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVE R SPAR

S 014-019-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF PRECAUTIONS ARE NOT OBEYED, DAMAGE CAN OCCUR TO THE KEVLAR WRAPPING.

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

G. Install the HP fuel pump.

S 034-020-R00

(1) Remove the dust caps and drain off the inhibiting fluid.

S 424-021-R00

(2) Do these steps to install the HP fuel pump:
(a) Lubricate and install the new seal ring (13) to the HP fuel pump (17).
(b) Lubricate and install the fuel pump drive shaft (AMM 72-61-72/401).
(c) Prepare the coupling clamp (14), mounting flange and pad on the HP fuel pump (17), and the high speed gearbox for installation.
(d) Lift the HP fuel pump (17) and install it to the mounting pad on the high speed gearbox.
1) Make sure the dowel is in the correct location.

CAUTION: YOU MUST BE CAREFUL WHEN YOU INSTALL THE ARGO-TECH STANDARD OF HP FUEL PUMP (ENGINES POST RR SB 73-B946). MAKE SURE THE DOWEL LOCATION HOLE OF THE PUMP IS IN THE CORRECT POSITION (THE PUMP DRAINS UNION AT BOTTOM DEAD CENTER) BEFORE THE COUPLING CLAMP IS INSTALLED. IF YOU DO NOT DO THIS, THE FUEL TUBES WILL NOT FIT AND DAMAGE TO THE MATING FACE OF THE PUMP AND TO THE DOWEL CAN OCCUR.

(e) Install the coupling clamp (14).

S 034-022-R00

(3) Remove the oil pressure transmitter approved covers.

S 214-023-R00

(4) Examine the electrical connector for damage that possibly occured while the HP fuel pump removal or installation was done.

S 434-024-R00

(5) Connect the Oil Pressure Transmitter connector.

S 434-025-R00

(6) Do these steps to connect the HP fuel tubes:
   (a) Lubricate and install the new seal rings (11) (2 locations) to the LP fuel tube (12).
   (b) Lubricate and install the new seal ring (18) to the HP fuel pump inlet.
   (c) ENGINES PRE-RR-SB 73-8195;
   Align the LP fuel tube (12) and fluid line connector (20) and install it with bolts (16) (3 locations).
      1) Make sure the harness support bracket (22) and bonding lead assembly (23) are in the correct position.
   (d) ENGINES POST-RR-SB 73-8195;
   Align the LP fuel tube (12) and fluid line connector (20) and install it with bolts (16) (3 locations).
      1) Make sure the harness support bracket (22) is in the correct position.
   (e) ENGINES POST-RR-SB 73-B047;
   Lubricate and install the new seal rings (6), (10), and (8) (2 locations) to the HP fuel tube (1).
   (f) ENGINES POST-RR-SB 73-9181;
   Install the three retaining rings (28).
      1) Make sure the connector seal (21) and retaining ring (9) are in the correct position.

(g) ENGINES POST-RR-SB 73-B047;
Lubricate and install (AMM 70-02-01/201) the new seal rings (6) and (10) on the HP fuel tube (1).
(h) ENGINES PRE-RR-SB 73-B047;
Lubricate and install the new seal ring (4), (10), and (8) (2 locations) to the HP fuel tube (2).
(i) ENGINES POST-RR-SB 73-9181;
Install the three retaining rings (28).
1) Make sure the connector seal (21) and retaining ring (9) are in the correct position.
(j) ENGINES POST-RR-SB 73-B047;
Lubricate and install (AMM 70-02-01/201) the new seal rings (4) and (10) on the HP fuel tube (2).
(k) ENGINES PRE-RR-SB 73-8195;
Install the HP fuel tube (1) with bolts (5) (3 locations) and bolts (7) (2 locations).
1) Make sure the bonding lead assembly (24) is in the correct position.
(l) ENGINES POST-RR-SB 73-8195;
Install the HP fuel tube (1) with bolts (5) (3 locations) and bolts (7) (2 locations).
(m) ENGINES PRE-RR-SB 73-8195;
Install the HP fuel tube (2) with bolts (3) (3 locations) and bolts (19) (2 locations).
1) Make sure the bonding lead assembly (24) is in the correct position.
(n) ENGINES POST-RR-SB 73-8195;
Install the HP fuel tube (2) with bolts (3) (3 locations) and bolts (19) (2 locations).
(o) Connect the HP fuel tube (25) to the union (26) and install the lockwire.

S 434-026-R00
(7) Connect the fuel drain tube (15) and install the lockwire.

S 794-027-R00
(8) Examine the connections for leaks after the HP fuel pump installation (AMM 71-00-00/501).

H. Put the Airplane Back To The Usual Condition.

S 864-028-R00
(1) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the main power distribution panel, P6:
(a) 6E1, FUEL VALVES L SPAR

S 864-029-R00
(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the main power distribution panel, P6:
(a) 6E2, FUEL VALVES R SPAR

S 864-030-R00
(3) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch on the control stand.

S 864-031-R00
(4) Close the right fan cowl panel (AMM 71-11-04/201).

FUEL SPRAY NOZZLES - REMOVAL/INSTALLATION

1. General
   A. This procedure gives the steps for the removal and installation of the Fuel Spray Nozzles.
   B. This service bulletin is used in this procedure:
      (1) 73-7374 - Engine - Fuel and Control - Fuel Manifold - Fuel tube assemblies with drilled passages and a manifold that weighs less.
   C. This procedure applies to all of the fuel spray nozzles whether changing a complete set or individual ones.
   D. Use the procedures in AMM 70-51-00/201 to tighten the fasteners. Tighten the fasteners to the torque values in AMM 70-51-00/201 unless a torque value is given in this procedure.
   E. Use the procedures in AMM 70-02-01/201 to install the seal rings.

   TASK 73-11-05-004-001-R01

2. Remove the Fuel Spray Nozzles
   A. Equipment
      (1) Spanner (Wrench) - Rolls-Royce HU26895
      (2) Spanner (Wrench) - Rolls-Royce HU28445
      (3) Spanner (Wrench) - Rolls Royce HU26929
      (4) Spanner (Wrench) - Rolls-Royce UT819
      (5) ENGINES PRE RR SB 73-7374;
          Crimping Pliers - Rolls Royce E2J60591
      (6) ENGINES PRE RR SB 73-7374;
          Crimping Pliers - Rolls Royce E2J60592
      (7) ENGINES POST RR SB 73-7374;
          Crimping Pliers - Rolls-Royce HU32144
      (8) ENGINES POST RR SB 73-7374;
          Crimping Pliers - Rolls-Royce HU33096
      (9) Extractor and Assembly Tool - Rolls-Royce HU28491
      (10) Impact Extractor - Rolls-Royce HU29255
      (11) Extractor Adaptor - Rolls-Royce HU36560
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones
          410 No. 1 Power Plant (Left)
          420 No. 2 Power Plant (Right)

(2) Access Panels

415AL	Thrust Reverser (Left)
416AR	Thrust Reverser (Right)
425AL	Thrust Reverser (Left)
426AR	Thrust Reverser (Right)

D. Prepare for the Removal (Fig. 401)

S 864-002-R01

(1) Remove the electrical power (AMM 24-22-00/201).

S 014-003-R01

WARNING: OBEY THE INSTRUCTIONS IN AMM 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.

(2) Open the thrust reversers (AMM 78-31-00/201).

S 034-004-R01

WARNING: DO NOT CAUSE DAMAGE TO THE NEW SEAL RINGS FOR THE FUEL SPRAY NOZZLE BECAUSE THEY CONTAIN A SOLUTION WHICH IS DANGEROUS TO YOUR HEALTH. IF THE SOLUTION TOUCHES YOUR EYES, YOU MUST FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID.

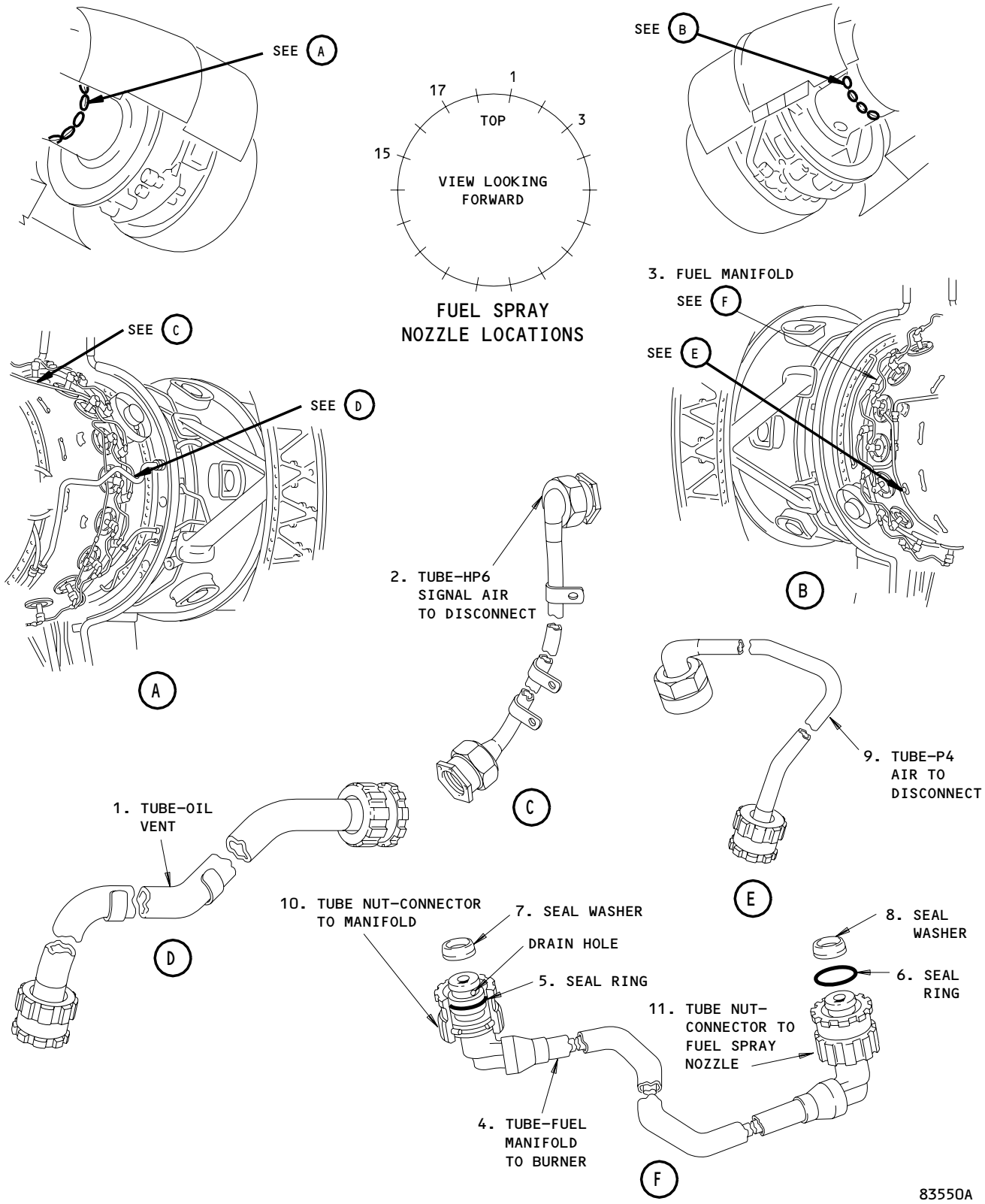
YOU MUST WEAR FACE AND EYE PROTECTION AND IMPERVIOUS GLOVES IF THE SEAL RINGS ARE TO BE REMOVED.

CAUTION: BE CAREFUL WHEN YOU TOUCH THE FUEL TUBES TO PREVENT DAMAGE TO THE SPHERICAL END FITTINGS. THERE CAN BE FUEL LEAKAGE IF THE TUBES ARE DAMAGED.

(3) Do these steps to prepare for the fuel nozzle removal.

NOTE: The above warnings do not apply if the seal rings have been used during engine run.

(a) Use a container to collect the fuel.
(b) Remove the igniter plugs (AMM 74-21-02/401).



Fuel Spray Nozzles Installation
Figure 401

(c) Put a label (number), on the tubes (4) that go from the fuel manifold to the burner, then disconnect and remove the tubes.
1) Discard the seal rings (5) and (6), and the sealing washers (7) and (8).
(d) Disconnect the tube (2) for the HP6 signal air at the fuel spray nozzle in the number 3 position.
1) Release the clip details that hold the tube in its position.
2) Remove the tube.
(e) Disconnect the oil vent tube (1) at the fuel spray nozzle in the number 5 position.
1) Release the clip details that hold the tube in its position.
2) Remove the tube.
(f) Disconnect the P4 air tube (9) at the fuel spray nozzle in the number 15 position.
1) Release the clip details that hold the tube in its position.
2) Remove the tube.

E. Remove the Fuel Spray Nozzles (Fig. 402)

S 424-005-R01

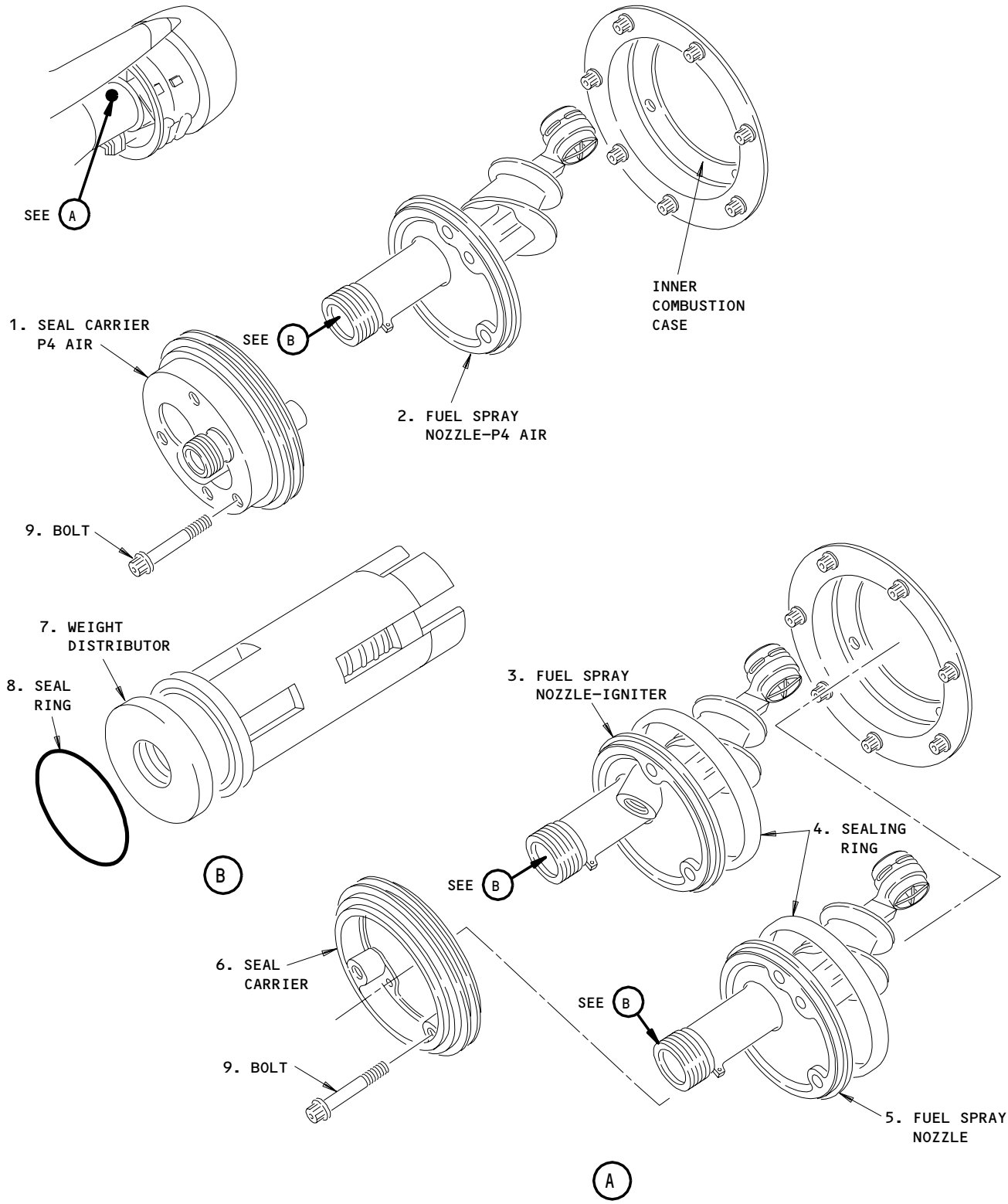
(1) Do these steps to remove the fuel spray nozzles:
(a) Put an identifier on each seal carrier and each fuel spray nozzle.
(b) Remove the retaining seal carrier for the bolts.
(c) Carefully move the seal carrier out of the opening for the combustion case.

CAUTION: MAKE SURE THE TRANSFER AIR TUBE STAYS IN THE SEAL CARRIER BEFORE YOU REMOVE THE FUEL SPRAY NOZZLES AT POSITIONS 3, 15 AND 17. FAILURE TO DO THIS WILL LET THE TRANSFER TUBE FALL INTO THE HP TURBINE MODULE AND MAKE AN ENGINE REMOVAL NECESSARY.

CAUTION: MAKE SURE THE SEAL RING (4) DOES NOT FALL BETWEEN THE INNER AND OUTER COMBUSTION CASES WHEN YOU REMOVE THE FUEL SPRAY NOZZLE.

(d) Use one of these methods to remove the fuel spray nozzle and seal ring:

NOTE: Seal rings are not fitted at these nozzle positions: No. 3, 15 and 17.



Number 3 Fuel Spray Nozzle Installation
Figure 402

1) Give the bottom of the fuel spray nozzle a hit with a soft face hammer.

NOTE: This will remove the fuel spray nozzle from the combustion lining.

a) Remove the fuel spray nozzle and seal ring.
b) Discard the seal ring.

2) Use the HU29255 impact extractor and HU36560 extractor adaptor.
a) Remove the fuel spray nozzle and seal ring.
b) Discard the seal ring.

(e) Remove the weight distributor (7).

NOTE: It is only necessary to remove the weight distributor if a replacement for the fuel spray nozzle will be installed.

(f) Install a standard 0.250 in. (6.35 mm.) UNF bolt into the weight distributor (7) and pull.

NOTE: Keep the weight distributor (7) for the installation into the replacement spray nozzle.

(g) Remove the bolt from the weight distributor (7).
(h) Install the dust caps to all the openings and connectors.

TASK 73-11-05-404-006-R01

3. Install the Fuel Spray Nozzles

A. Equipment
(1) Spanner (Wrench) - Rolls-Royce HU26895
(2) Spanner (Wrench) - Rolls-Royce HU28445
(3) Spanner (wrench) - Rolls Royce HU26929
(4) Spanner (Wrench) - Rolls-Royce UT819
(5) ENGINES PRE RR SB 73-7374;
Crimping Pliers - Rolls Royce E2J60591
(6) ENGINES PRE RR SB 73-7374;
Crimping Pliers - Rolls Royce E2J60592
(7) ENGINES POST RR SB 73-7374;
Crimping Pliers - Rolls Royce HU32144
(8) ENGINES POST RR SB 73-7374;
Crimping Pliers - Rolls Royce HU33096

(9) Clean container - minimum capacity:

1 U.S. gallon

1 Imperial gallon

4 Liters

(10) Clean, stiff bristled brush

B. Consumable Materials

(1) Lockwire
British Spec - DTD.189A 22 S.W.G.
American Spec - 21 A.W.G.
OMat No. - 238

(2) Cleaning fluid - Methylene Chloride
British Spec - B.S.1994: 1953
OMat No. - 169

(3) Jointing compound
British Spec - DTD.900/4586 PL.32
OMat No. - 4/46

C. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 72-00-00/601, Engine
(3) AMM 73-11-11/501, Fuel Manifold
(4) AMM 74-21-02/401, Igniter Plugs
(5) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

410	No. 1 Power Plant (Left)
420	No. 2 Power Plant (Right)

(2) Access Panels

415AL	Thrust Reverser (Left)
416AR	Thrust Reverser (Right)
425AL	Thrust Reverser (Left)
426AR	Thrust Reverser (Right)

E. Install the Fuel Spray Nozzles (Fig. 402).

S 424-017-R01

CAUTION: WHEN YOU INSTALL THE FUEL SPRAY NOZZLE, YOU MUST OBEY THE INSTALLATION PROCEDURES (AMM 73-11-05/401). IF YOU INSTALL THE FUEL SPRAY NOZZLE INCORRECTLY, A FUEL LEAK CAN OCCUR WHEN THE ENGINE IS OPERATED. YOU WILL ALSO CAUSE DISTORTION OF THE FUEL MANIFOLD TO BURNER FUEL TUBE.

(1) Prepare to install the fuel spray nozzles:
(a) Install the weight distributor (7).

NOTE: This operation is necessary only if the replacement spray nozzle is to be installed.

1) Lubricate the seal ring (8).
2) Install the seal ring (8) to the weight distributor (7).
3) Put the weight distributor (7) into the fuel spray nozzle and push it into its position.

CAUTION: MAKE SURE THE SEAL RINGS ARE INSTALLED IN THE MIDDLE GROOVE OF EACH TUBE. THIS WILL MAKE SURE THE FUEL WILL DRAIN CORRECTLY AND THAT THERE ARE NO FUEL LEAKS.

(b) Install the new seal rings (5) and (6), to the fuel manifold and the burner tubes (4) (Fig. 401).
(c) ENGINES POST RR SB 73-7374;
put the new seal washers (7) and (8) on the ends of the tube (4) that goes from the fuel manifold to the burner.
1) Use these pliers to crimp seal washers into their position:
a) For the burner end use crimping pliers HU 32144.
b) For the manifold end use the crimping pliers HU 33096.
(d) ENGINES PRE RR SB 73-7374;
put the new seal washers (7) and (8) on the ends of the tube (4) that goes from the fuel manifold to the burner.
1) Use these pliers to the crimp seal washers into their positions:
a) For the burner end use the crimping pliers E2J60591.
b) For the manifold end use the crimping pliers E2J60592.

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

CAUTION: YOU MUST BE CAREFUL WITH SURFACES THAT ARE PROTECTED WHEN YOU USE THE CLEANING FLUID. AFFECTED AREAS MUST BE PROTECTED AGAIN.

(e) Use a stiff bristled brush and cleaning fluid, to remove all the joint compound from the inner combustion case and the fuel spray nozzles.
(f) Use a brush to apply a small quantity of joint compound to the groove of each fuel spray nozzle.

NOTE: A seal ring is not installed at the spray nozzles in the number 3, 15, and 17 positions.

1) Install a new seal ring (Fig. 402).
2) Let the compound air dry for a minimum of 10 minutes before you attach it to the engine.

(g) Lubricate the seal rings of each seal carrier with clean oil.
(h) Remove all the dust caps from the openings and the connectors.

S 424-008-R01

(2) Do these steps to install the fuel spray nozzles:
(a) Start at the fuel spray nozzle in the number 1 position.
(b) Install the nozzle with the HU28491 extractor and assembly tool or the HU29255 impact extractor and HU36560 extractor adaptor.

NOTE: Make sure the correct seal carrier and the fuel spray nozzle are in the correct position in the combustion case.

1) Make sure the seal ring (4) is correctly fitted.
(c) Put the seal carrier on the fuel spray nozzle.
(d) Make sure the bolt holes are aligned.
(e) Carefully hit the carrier with a soft face hammer, until the carrier touches the fuel spray nozzle.

NOTE: When you install the P4 seal carriers (1), use the guide pins to help during the installation.

(f) Attach the seal carrier and the fuel spray nozzle to the combustion case with the bolts.

NOTE: The bolts are longer at the positions for the P4 seal carriers.

(g) Remove the applicable access details.
(h) Use the internal inspection equipment to do a check to make sure all the fuel spray nozzles are correctly installed (AMM 72-00-00/601).

NOTE: Make sure the fuel spray nozzles are seated concentric or it may cause hot spots.

The shroud ring of the fuel spray nozzle must be in the center of the rear seal hole for the burner. The shroud ring face must be approximately flush with the rear face of the burner seal.

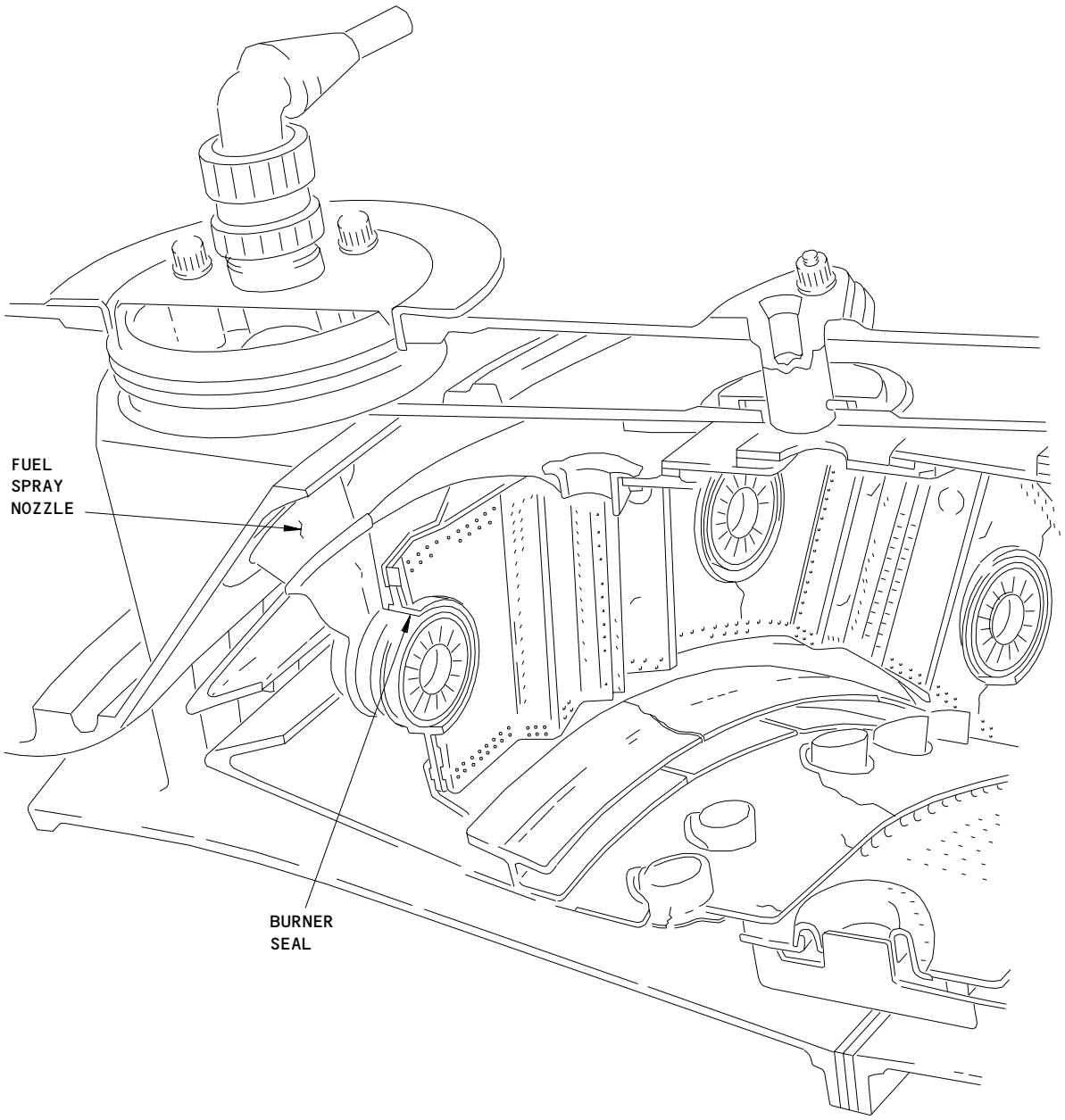
CAUTION: IF THE COMPRESSION OF THE SEAL RING (4) IS NOT COMPLETED THE TORQUE LOAD ON THE BOLTS CAN DECREASE.

(i) Tighten the bolts for the fuel spray nozzle to 100 inch-pounds (11.3 newton-meters).

S 424-009-R01

(3) Do these steps to install the correct tubes (Fig. 401):
(a) Install the P4 air tube (9) at the fuel spray nozzle at the Number 15 position.
1) Tighten the nut on the air tube with the HU26929 spanner wrench.
2) Install the lockwire.
(b) Install the tube (2) for the HP6 signal air at the fuel spray nozzle in the number 3 position.
1) Tighten the nut on the air tube with the HU26929 spanner wrench.
2) Install the lockwire.
(c) Install the fuel manifold to the burner tubes (4), to the positions that were identified with a label during the removal.

NOTE: The tube installed on the fuel spray nozzles in the number 9 and 10 positions have a different shape and must not be used in another position. A teleflex cable prevents the incorrect pigtail installation at the number 9 position. A baulk bracket prevents the incorrect tube installation at the number 10 position.



94594A

Fuel Nozzle Installation Check
Figure 403

S 424-018-R01

CAUTION: YOU MUST TIGHTEN THE FUEL TUBE CONNECTORS IN THE CORRECT SEQUENCE, AND WITH THE CORRECT TORQUE. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DISTORTION OF THE BURNER TUBES OR FUEL LEAKAGE CAN OCCUR.

(4) Do these steps to tighten the fuel manifold to the burner tubes:
  (a) Use a HU26895 spanner wrench to tighten the tube nut connector to the fuel manifold to 380 pound-inches (42.9 newton meters).
    1) Install the lockwire.
  (b) Use a UT819 spanner wrench to tighten the tube nut connector to the fuel spray nozzle to 485 pound-inches (54.85 newton meters).
    1) Install the lockwire.

S 424-011-R01

(5) Install the oil vent tube (1).
  (a) Use a HU28445 spanner wrench to tighten the connectors on the oil vent tube (1).
    1) Install the lockwire.

S 424-012-R01

(6) Install all the clips that hold the vent tube (1) in its position.
  (a) Tighten the clips.

S 424-013-R01

(7) Install igniter plugs (AMM 74-21-02/401).

F. Put the Airplane Back To Its Usual Condition.

S 864-014-R01

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

S 784-015-R01

(2) Do a pressure test of the system (AMM 73-11-11/501).

S 414-016-R01

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

(3) Close the thrust reversers (AMM 78-31-00/501).

FUEL SPRAY NOZZLES - REMOVAL/INSTALLATION

1. General
   A. This procedure gives the steps for the removal and installation of the Fuel Spray Nozzles.
   B. This procedure applies to all of the fuel spray nozzles whether changing a complete set or individual ones.
   C. Use the procedures in AMM 70-51-00/201 to tighten the fasteners. Tighten the fasteners to the torque values in AMM 70-51-00/201 unless a torque value is given in this procedure.

TASK 73-11-05-004-001-R02

2. Remove the Fuel Spray Nozzles
   A. Equipment
      (1) Spanner (Wrench) - Rolls-Royce UT630/2
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 73-11-11/501, Fuel Manifold
      (3) AMM 78-31-00/201, Fan Thrust Reverser System
   C. Access
      (1) Location Zones

410	No. 1 Power Plant (Left)
420	No. 2 Power Plant (Right)

      (2) Access Panels

415AL	Thrust Reverser (Left)
416AR	Thrust Reverser (Right)
425AL	Thrust Reverser (Left)
426AR	Thrust Reverser (Right)

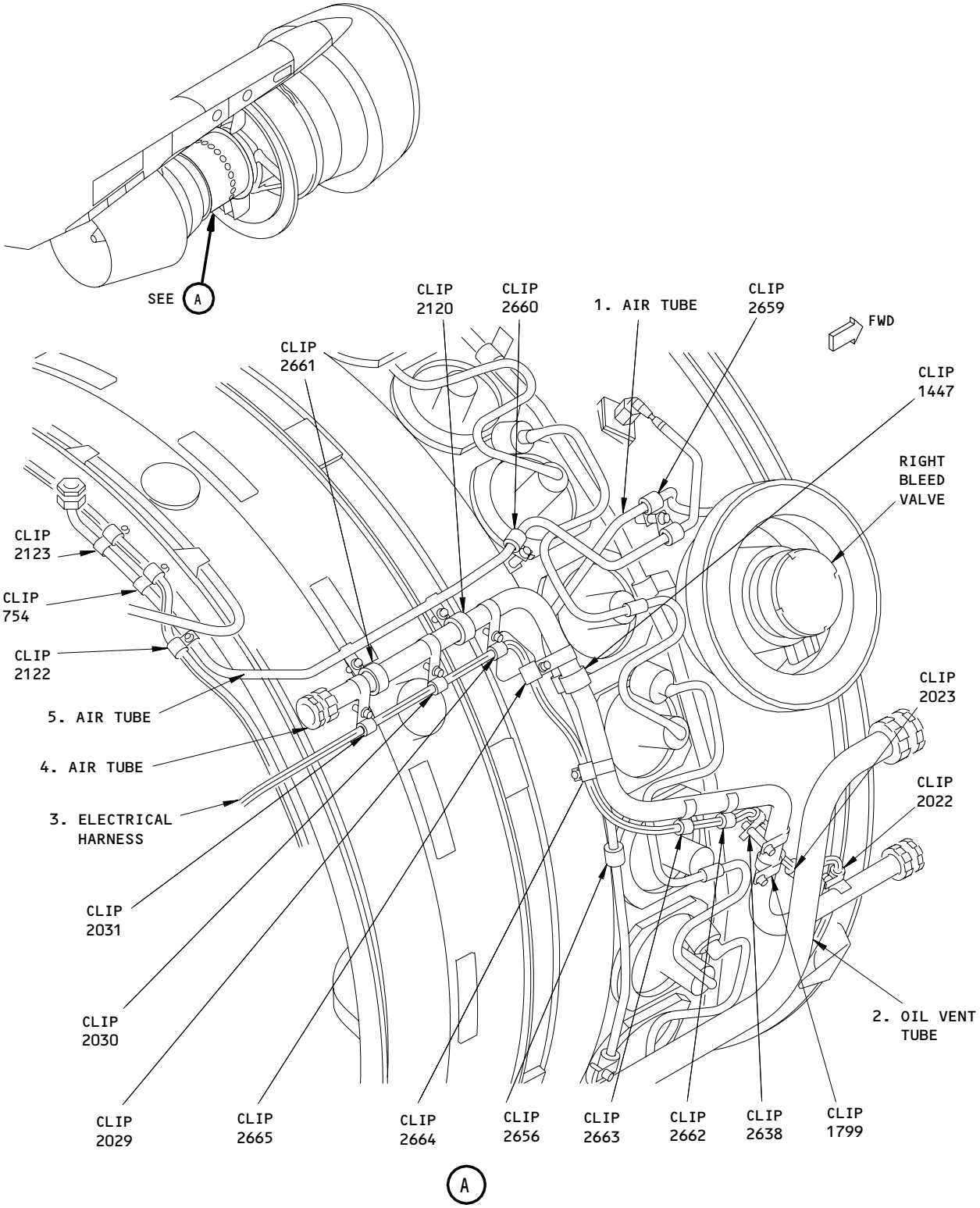
   D. Prepare for the Removal (Fig. 401)

      S 864-002-R02
      (1) Remove the electrical power (AMM 24-22-00/201).

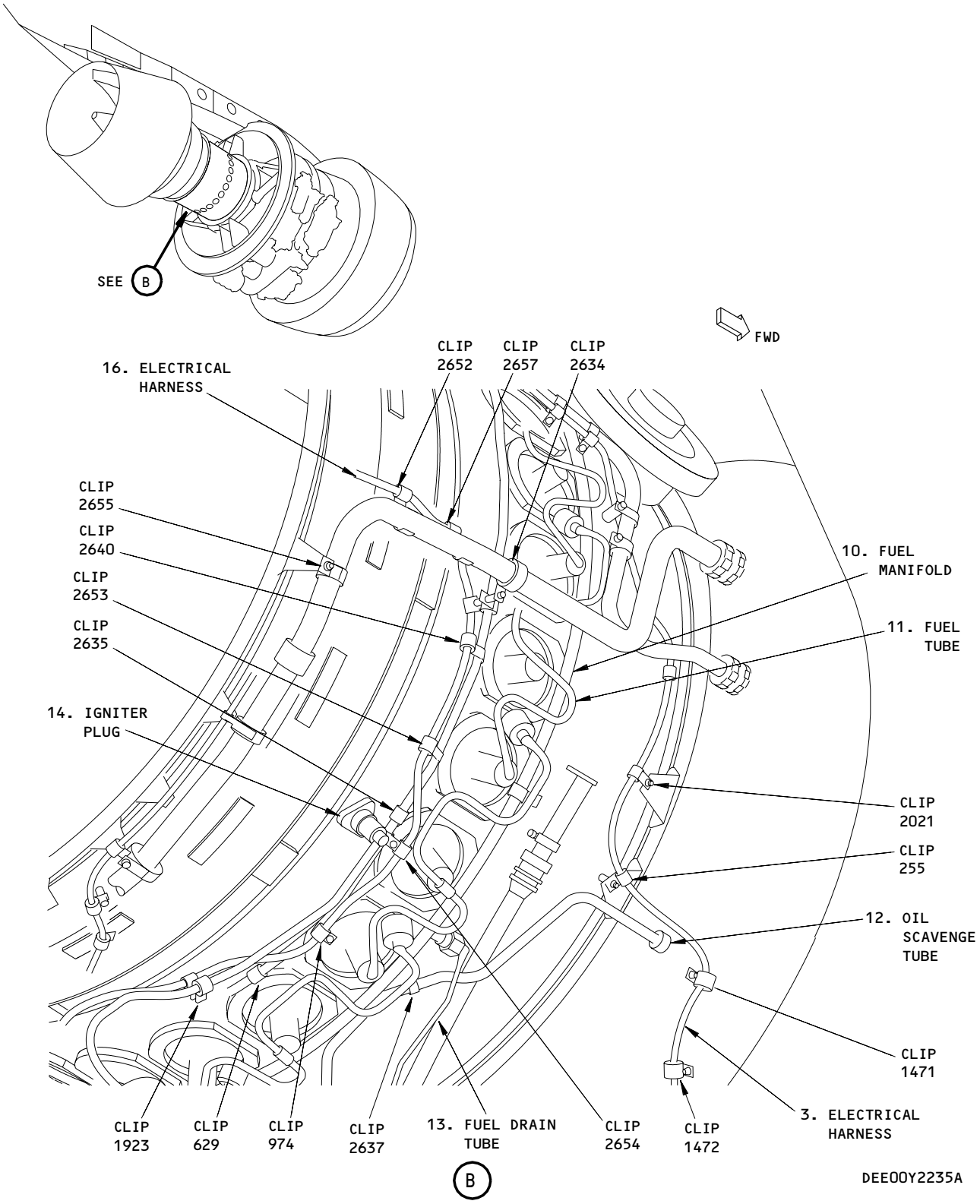
      S 014-003-R02

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

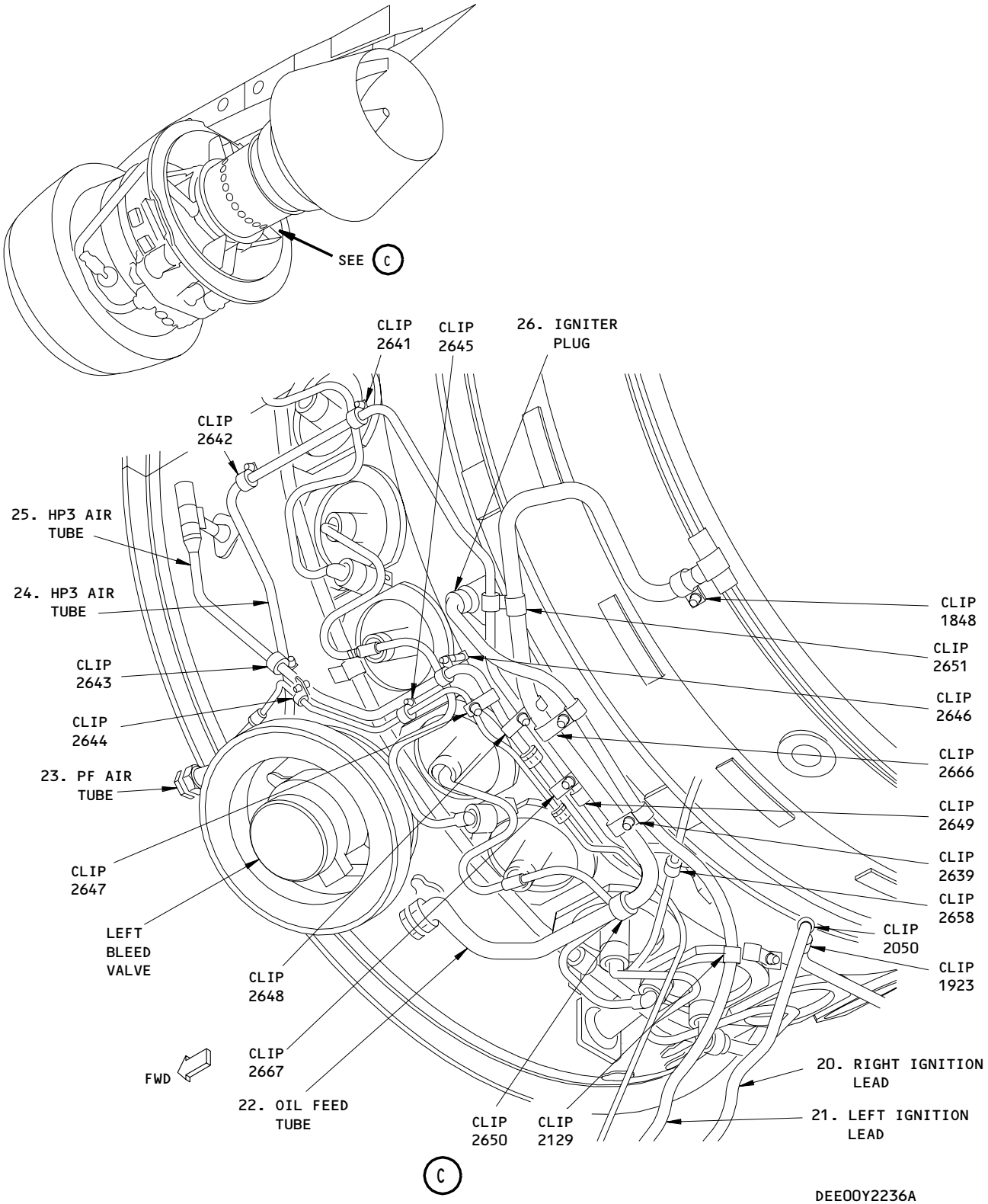
      (2) Open the thrust reversers (AMM 78-31-00/201).



Fuel Spray Nozzles - Removal/Installation
Figure 401 (Sheet 1)



Fuel Spray Nozzles – Removal/Installation
Figure 401 (Sheet 2)



Fuel Spray Nozzles - Removal/Installation
Figure 401 (Sheet 3)

S 034-004-R02

WARNING: YOU MUST BE CAREFUL WHEN YOU DO WORK ON THE ENGINE AFTER THE ENGINE IS STOPPED. THE ENGINE PARTS CAN STAY HOT FOR UP TO AN HOUR AFTER THE ENGINE IS STOPPED.

WARNING: YOU MUST NOT TOUCH HOT ENGINE PARTS IF YOU ARE NOT WEARING GLOVES THAT GIVE PROTECTION FROM HEAT. HOT ENGINE PARTS CAN CAUSE BURNS OR OTHER INJURIES. IF YOU ARE BURNED BY A HOT ENGINE PART, PUT THE BURN INJURY IN COLD WATER AND GET MEDICAL AID.

WARNING: YOU MUST NOT LET THE ENGINE FUEL STAY ON YOUR SKIN. IF YOU GET FUEL ON YOUR SKIN, FLUSH THE FUEL FROM YOUR SKIN WITH WATER. ENGINE FUEL IS POISONOUS AND CAN BE ABOSRBED INTO YOUR BODY THROUGH YOUR SKIN.

(3) Remove the related items.

NOTE: It is only necessary to remove the items adjacent to the fuel spray nozzles you will remove.

(a) Remove the HP3 air tube (Fig. 401).
  1) Disconnect the HP3 air tube (25) at the tube disconnects.
  2) Remove the clip details at clip positions 2643, 2646, 2647, and 2648.
  3) Put dust caps on the open tube ends.

(b) Remove the HP air tube (Fig. 401).
  1) Disconnect the HP3 air tube (24) at the left bleed valve and the tube disconnect.
  2) Remove the clip details at clip positions 2643, 2642, 2641, and 2651.
  3) Put dust caps on the open tube ends.

(c) Remove the PF air tube (Fig. 401).
  1) Disconnect the PF air tube (23) at the tube disconnects.
  2) Remove the clip details at clip positions 2644, 2645, 2647, and 2667.
  3) Put dust caps on the open tube ends.

(d) Remove the oil feed tube (Fig. 401).
  1) Disconnect the oil feed tube (22) at the tube disconnects.
  2) Remove the clip details at clip positions 1848, 2651, 2648, 2666, 2667, 2639 and 2649.
  3) Put dust caps on the open tube ends.

(e) Disconnect the left ignition lead (Fig. 401).
  1) Disconnect the left ignition lead (21) at the igniter plug (26).
  2) Remove the clip details at clip positions 2050, 1923, 2129 and 974.
  3) Put dust caps on the igniter plug and the ignition lead connector.
(f) Disconnect the right ignition lead (Fig. 401).
  1) Disconnect the right ignition lead (20) at the igniter plug (14).
  2) At the electrical harness (3), remove the clip details at clip positions 2031, 2030, 2029, 2665, 2664, 2663, 2662, 2638, 1799, 2023, 2022, 2021 and 255.
  3) Put dust caps on the igniter plug and the ignition lead connector.
(g) Remove the electrical harness for access (Fig. 401).
  1) At the electrical harness (16), remove the clip details at clip positions 2652, 2657, 2634, 2640, 2653, 2654, 974 and 2123.
  2) Put caps on the open tube ends.
(h) Remove the air tube (5) (Fig. 401).
  1) Disconnect the air tube (5) at the tube disconnects.
  2) Remove the clip details at clip positions 2659, 2660, 2120, 2661, 2122, 754 and 2123.
  3) Put caps on the open tube ends.
(i) Remove the air tube (4) (Fig. 401).
  1) Disconnect the air tube (4) at the tube disconnects.
  2) Remove the clip details at clip positions 2661, 2030, 2120, 2029, 2665, 1447, 2664, 2663, 2661, 1799 and 2022.
  3) Put caps on the open tube ends.
(j) Remove the oil vent tube (Fig. 401).
  1) Disconnect the oil vent tube (2) at the tube disconnects.
  2) Remove the clip details at clip positions 2634, 2657, 2652, and 2655.
  3) Put dust caps on the open tube ends.
(k) Remove the air tubes (Fig. 401).
  1) Remove the air tube (4).
    a) Disconnect the air tube (4) at the tube disconnects.
    b) Remove the clip details at clip positions 2031, 2661, 2030, 2120, 2029, 2665, 1447, 2664, 2663 , 2662, 2638, 1799 and 2022.
    c) Put dust caps on the open tube ends.
  2) Remove the air tube (1).
    a) Disconnect the air tube (1) at the tube disconnects and at the right bleed valve.
    b) Remove the clip details at clip positions 2659, 1447, 2664, 2656, 2640, 2653, 2635 and 1923.
    c) Put dust caps on the open tube ends.
(l) Remove the fuel supply tubes (Fig. 402).
  1) At each fuel tube (6), attach a label to identify its position.

2) Disconnect the connector(5), then the connectors (1) and (4) and remove the tubes.
3) Discard the seal rings (3) and the sealing washers (2).
4) Put dust caps on the open tube ends.

E. Remove the Fuel Spray Nozzles (Fig. 403, 404).

S 424-005-R02

(1) Do these steps to remove the fuel spray nozzles:
(a) Put an identifier on each seal carrier (5) and each fuel spray nozzle.
(b) Remove the bolts (6).
(c) Remove the seal carrier (5).
(d) Remove the fuel spray nozzle (1) and (2).
1) Remove and discard the seal ring (4).
(e) Remove the weight distributor (3).

NOTE: It is only necessary to remove the weight distributor if you will install a new (replacement) fuel spray nozzle.

1) Install a standard 0.250 in. (6,36 mm) UNF bolt in the weight distributor (3) and pull.
(f) Remove the bolt from the weight distributor (3).
(g) Install the dust caps on all the openings and connectors.

TASK 73-11-05-404-006-R02

3. Install the Fuel Spray Nozzles

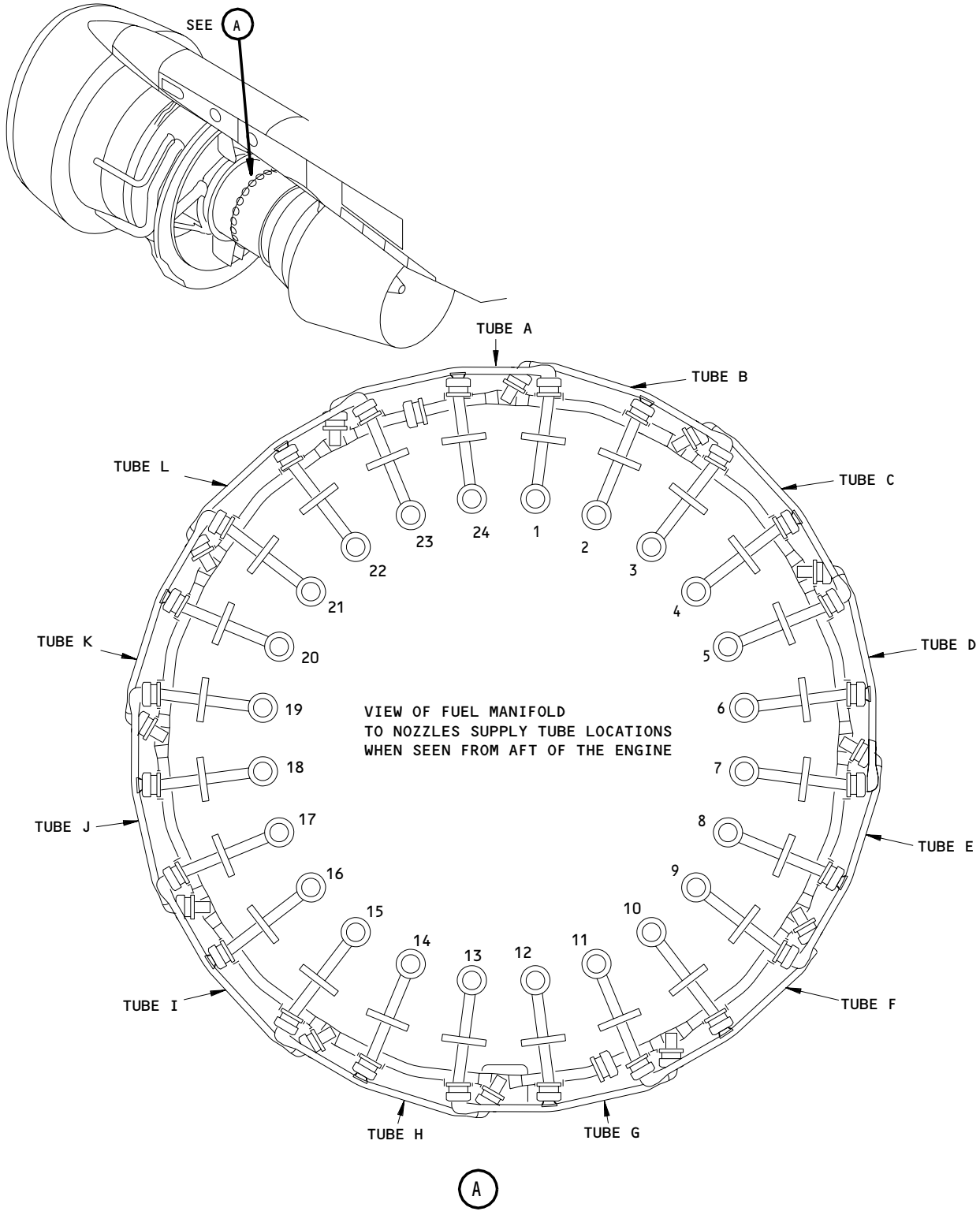
A. Equipment
(1) Spanner (Wrench) - Rolls-Royce UT630/2
(2) Crimping Pliers - Rolls Royce HU38837
(3) Reactor Bar - Rolls Royce HU39311
(4) Reactor Bar - Rolls Royce HU39313
(5) Reactor Bar - Rolls Royce HU39312
(6) Torque Wrench - 0 to 600 pound-inches
(7) Clean container - minimum capacity:

1 U.S. gallon

1 Imperial gallon

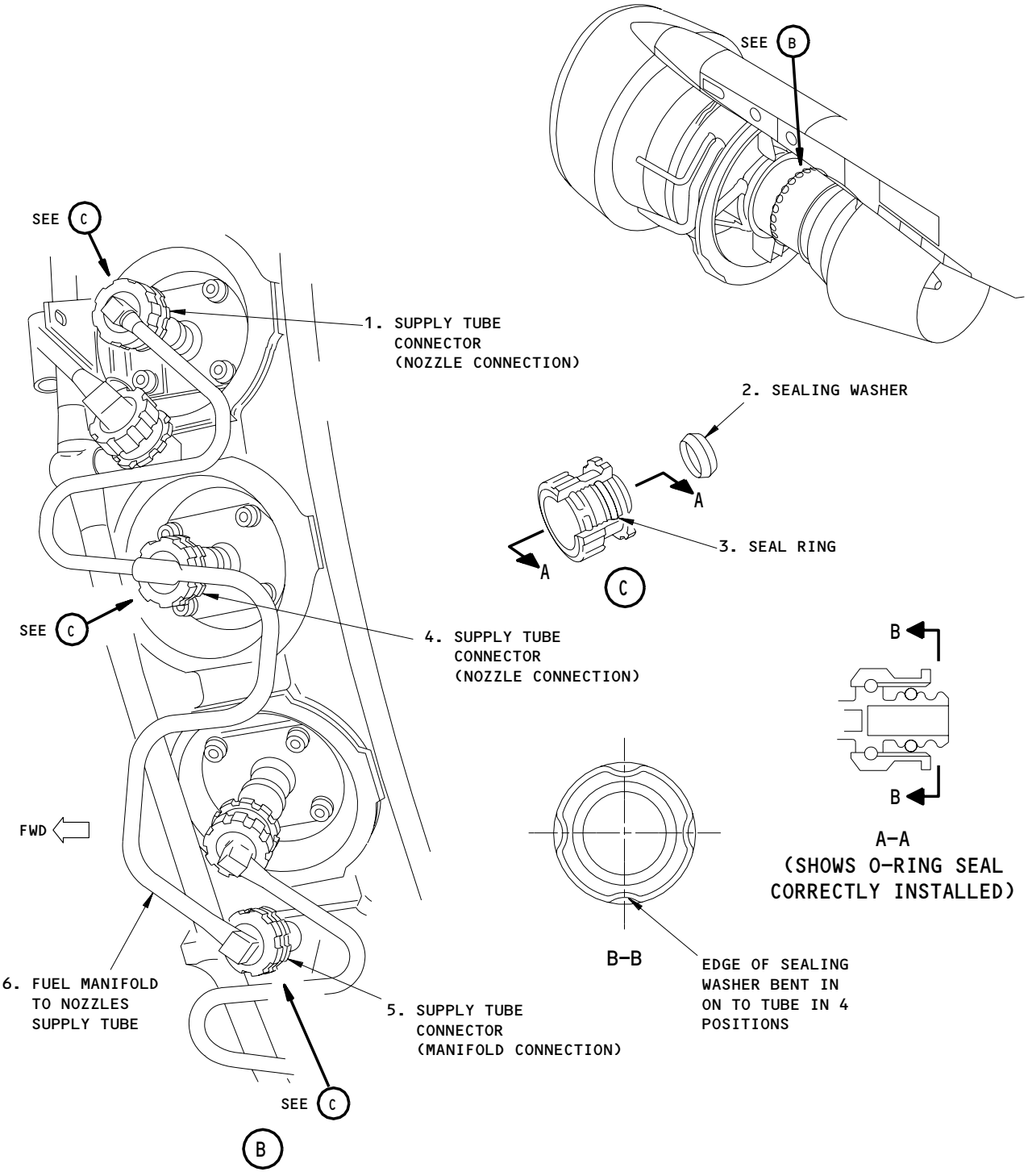
4 Liters

(8) Clean, stiff bristled brush



DEE00Y2238
DEE00Y2387

Fuel Spray Nozzle Supply Tubes
Figure 402 (Sheet 1)



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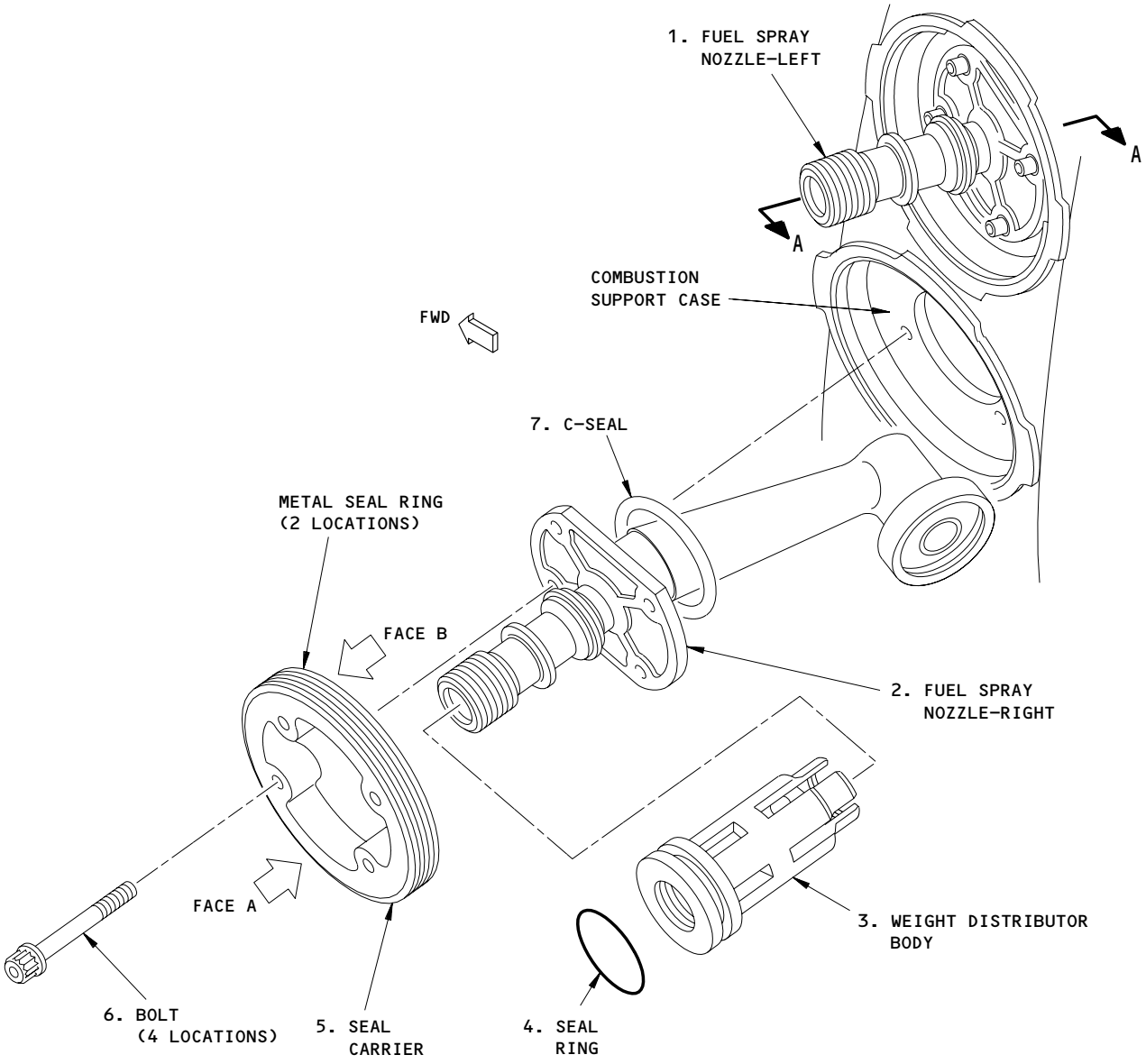
Fuel Spray Nozzle Supply Tubes
Figure 402 (Sheet 2)

EFFECTIVITY
RB211–535E4 AND E4–B ENGINES POST RR SB72–C230 (PHASE V COMBUSTOR) AND RB211–535E4–C ENGINES

H70846



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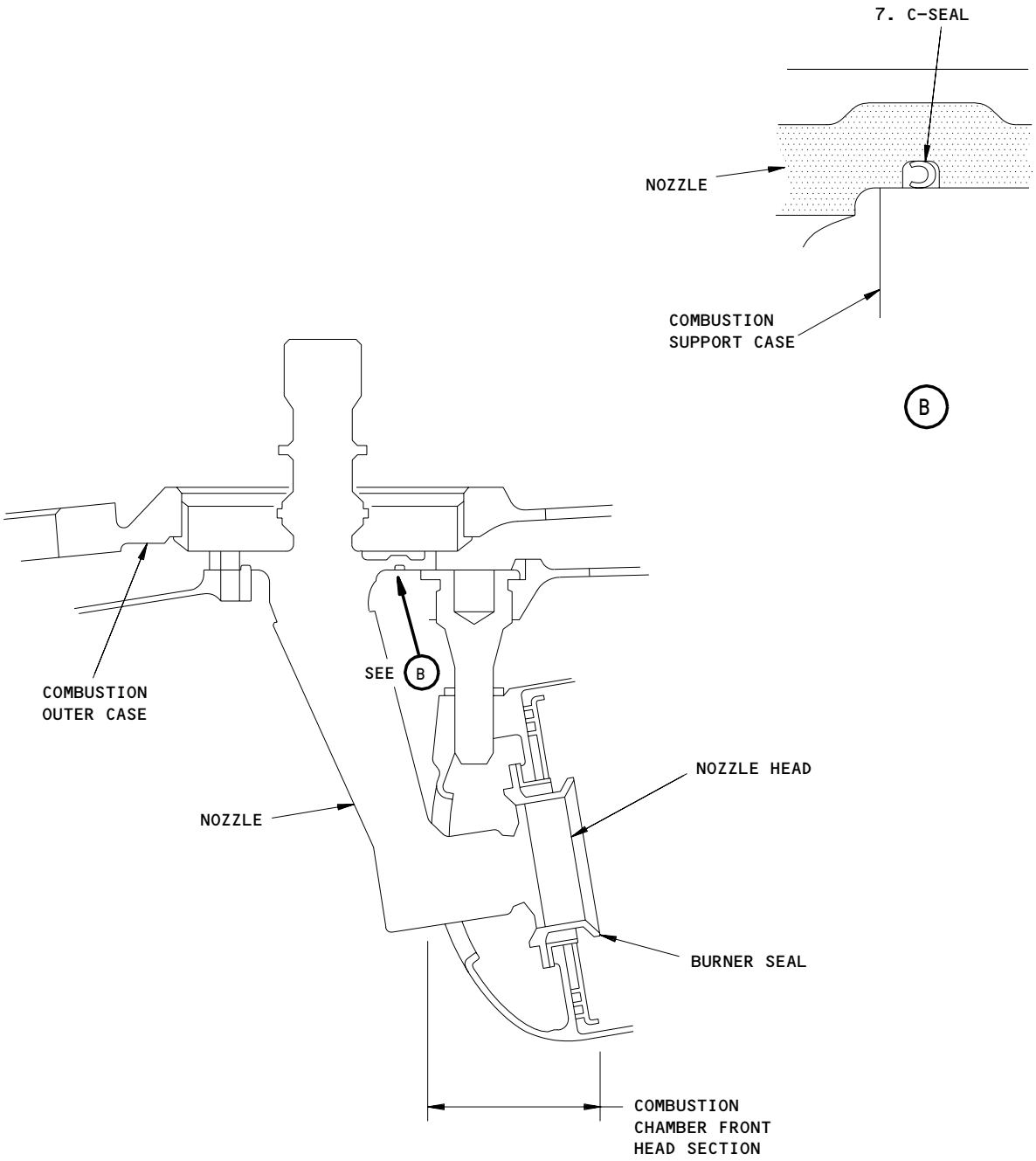
Fuel Spray Nozzles
Figure 403 (Sheet 1)



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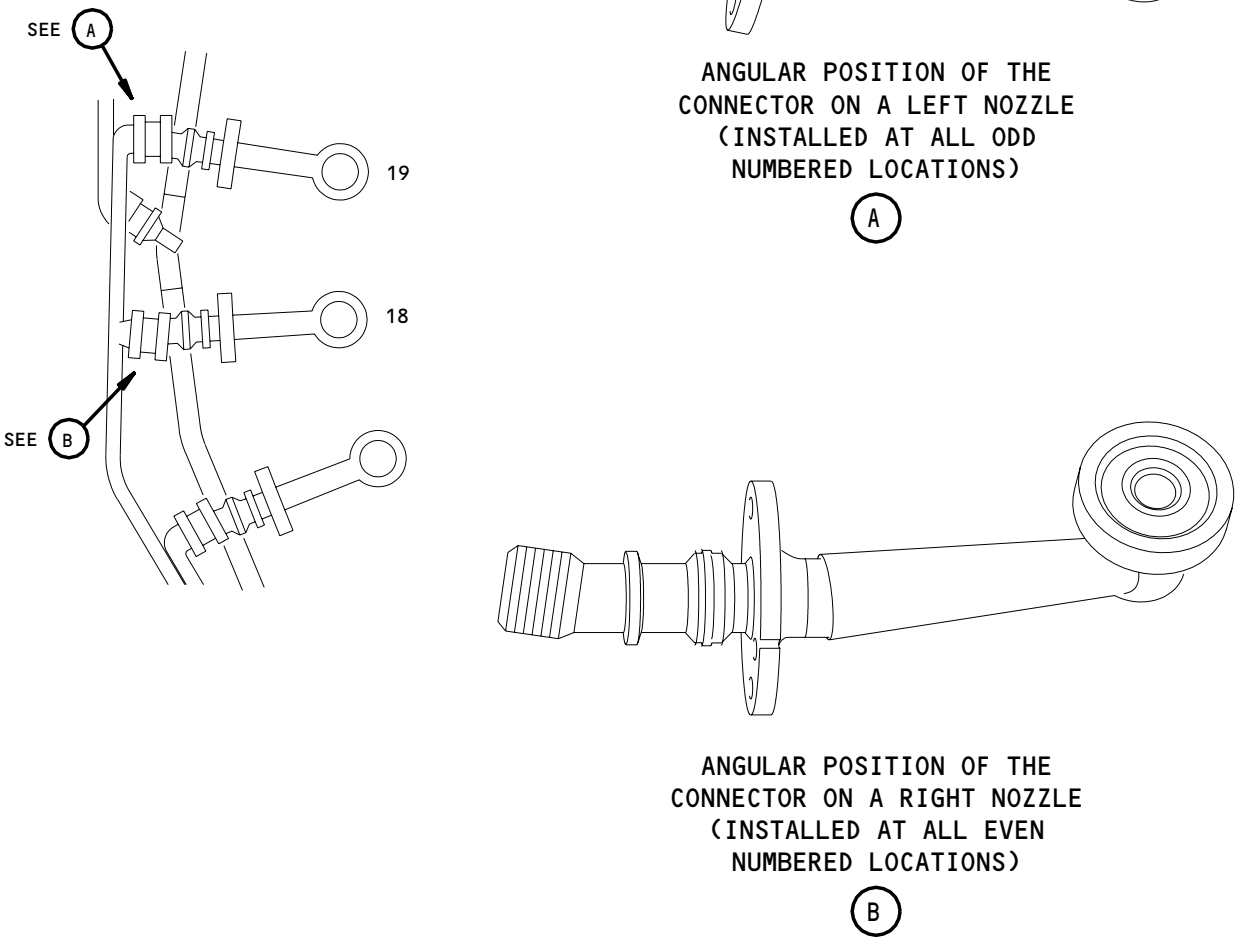
Fuel Spray Nozzles
Figure 403 (Sheet 2)



DEE00Y2333

Left and Right Fuel Spray Nozzles
Figure 404

B. Consumable Materials
   (1) Lockwire
       British Spec - DTD.189A 22 S.W.G.
       American Spec - 21 A.W.G.
       OMat No. - 238
   (2) Cleaning fluid - Methylene Chloride
       British Spec - B.S.1994: 1953
       OMat No. - 169
   (3) Jointing compound
       British Spec - DTD.900/4586 PL.32
       OMat No. - 4/46
   (4) Clean Engine Lubricating Oil
       OMat No. - 1011

C. References
   (1) AMM 24-22-00/201, Electrical Power - Control
   (2) AMM 70-51-00/201, Torque Tightening Technique
   (3) AMM 71-00-00/501, Power Plant
   (4) AMM 72-00-00/601, Engine - Inspection/Check
   (5) AMM 78-31-00/201, Fan Thrust Reverser System

D. Access
   (1) Location Zones

410	No. 1 Power Plant (Left)
420	No. 2 Power Plant (Right)

   (2) Access Panels

415AL	Thrust Reverser (Left)
416AR	Thrust Reverser (Right)
425AL	Thrust Reverser (Left)
426AR	Thrust Reverser (Right)

E. Install the Fuel Spray Nozzles (Fig. 403, 404).

   S 424-007-R02
   (1) Do these steps to install the fuel spray nozzles:
       (a) Install the weight distributor (3) to the spray nozzle.
           1) Install the weight distributor to the fuel spray nozzles.
           2) Lubricate the seal ring (4).
           3) Install the seal ring (4) to the weight distributor (3).

CAUTION: MAKE SURE THE SEAL RINGS ARE INSTALLED IN THE MIDDLE GROOVE OF EACH TUBE. THIS WILL MAKE SURE THE FUEL WILL DRAIN CORRECTLY AND THAT THERE ARE NO FUEL LEAKS.

(b) Install the new seal rings (5) and (6) to the fuel manifold and the fuel tubes (2).
(c) Put the new seal washers (7) and (8) on the ends of the fuel tube (6) that goes from the fuel manifold to the burner.
1) Use the crimping pliers HU38837 to install the seal washers. Let the washers turn freely on the tube.

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

CAUTION: YOU MUST BE CAREFUL WITH SURFACES THAT ARE PROTECTED WHEN YOU USE THE CLEANING FLUID. AFFECTED AREAS MUST BE PROTECTED AGAIN.

(d) Use a stiff bristled brush and cleaning fluid, to remove all the joint compound from the inner combustion case and the fuel spray nozzles.
(e) Use a brush to apply a small quantity of joint compound to the groove of each fuel spray nozzle.
1) Install a new seal ring (4).
2) Let the compound air dry for a minimum of 10 minutes before you attach it to the engine.
(f) Lubricate the seal rings of each seal carrier with clean OMat 1011 engine lubricating oil.
(g) Remove all the dust caps from the openings and the connectors.

S 424-008-R02

(2) Do these steps to install the fuel spray nozzles (Fig. 403, 404):
(a) Put the applicable fuel spray nozzle in the correct position.
(b) Engage the head of the fuel spray nozzle with the burner seal in the combustion chamber.
(c) Lubricate the metal seal rings of the seal carrier (4) with clean OMat 1011 engine lubricating oil.
(d) Align the seal carrier (4) and the bolt holes for the fuel spray nozzle, and engage the seal rings in the combustor case opening.

(e) Push the seal carrier (4) into position so that the seal carrier and the spray nozzle face fully touch each other.

(f) Install the bolts (6).

1) Torque tighten the bolts to 100 pound-inches (11,3 Newton-meters).

2) Do a check of the torque value at each bolt. Torque tighten the bolts in sequence until all the bolts are at the correct torque value.

(g) Examine the spray nozzle head.

1) Use the applicable borescope equipment to look at the spray nozzle head. The shroud ring of the fuel spray nozzle must be in the center of the rear seal hole for the spray nozzle.

2) The shroud ring face must be approximately flush with the rear face of the burner seal.

CAUTION: IF ALL THE FUEL SUPPLY TUBES ARE REMOVED, THE TUBES MUST BE INSTALLED IN THIS TUBE LOCATION SEQUENCE:

- H, B, E, K, G, A, C, I, F, L, D, T

IF YOU DO NOT INSTALL THE TUBES IN THIS CORRECT SEQUENCE, THE TUBES CAN BECOME DAMAGED.

(h) Install the fuel supply tubes (Fig. 402).

1) Put the tube (6) in position identified at removal and install the connectors (1), (4) and (5). Tighten the connectors in increments of one or two turns until the sealing surfaces contact.

CAUTION: YOU MUST USE THE REACTOR BAR HU39312 WHEN YOU TORQUE TIGHTEN THE CONNECTORS. IF YOU DO NOT DO THIS, THE TUBE CAN BECOME DAMAGED.

(i) Torque tighten the connector (5).

1) Torque tighten the tube connector (5) to 310 pound-inches (35.2 Newton-meters).

2) Use the reactor bar HU39312 on the flats adjacent to the connector (5).

3) Loosen each tube connector (5) approximately one-half turn.

4) Torque tighten the tube connectors to 310 pound-inches (35.2 Newton-meters).
5) Do steps 3) and 4) two more times for each of the tube connectors (5).
6) A last time, torque tighten the connectors (5) to 310 pound-inches (35,2 Newton-meters).

CAUTION: YOU MUST USE THE REACTOR BARS HU39311 AND HU39313 WHEN YOU TORQUE TIGHTEN THE CONNECTORS. IF YOU DO NOT DO THIS, THE TUBES CAN BECOME DAMAGED.

(j) Torque tighten the connectors (1) and (4).
1) Torque tighten the tube connectors (1) and (4) to 310 pound-inches (35.2 Newton-meters).
2) Use the reactor bar HU39311 on the flats adjacent to the connector (4).
3) Use the reactor bar HU39313 on the flats adjacent to connector (1).
4) Loosen the tube connectors (1) and (4) approximately one-half turn.
5) Torque tighten the tube connectors (1) and (4) to 310 pound-inches (35.2 Newton-meters).
6) Do steps 4) and 5) two more times for the tube connectors (1) and (4).
7) A last time, torque tighten the tube connectors (1) and (4) to 310 pound-inches (35.2 Newton-meters).
(k) Install OMat 238 lockwire to the connectors (1), (4), and (5).

S 424-018-R02
(3) Install the related items.
(a) Install the air tubes (Fig. 401, 405).
1) Install the air tube (1).
a) Remove the dust caps from the air tube (1).
b) Install the air tube (1) to the right bleed valve and the tube disconnect.
c) Install the clip details at clip positions 2659, 1447, 2664, 2656, 2640, 2653, 2635 and 1923.
d) Torque tighten the clip bolts to 55 pound-inches (6,2 Newton-meters).
e) Install OMat 238 lockwire.
2) Install the air tube (5).
a) Remove the dust caps from the air tube (5).
b) Install the air tube (5) to the combustor outer case and the tube disconnect.
c) Install the clip details at clip positions 2659, 2660, 2120, 2661, 2122, 754 and 2123.
d) Torque tighten the clip bolts to 55 pound-inches (6,2 Newton-meters).

3) Torque tighten air tube (5) the connector at the tube disconnect.
   a) Torque tighten the connector at the tube disconnect to 240 pound-inches (27 Newton-meters).
   b) Loosen the connector approximately one-half turn.
   c) Do steps a) and b) two more times.
   d) Torque tighten the connector to 240 pound-inches (27 Newton-meters).
   e) Install OMat 238 lockwire to the connector.
4) Torque tighten the air tube (5) connector at the combustor case.
   a) Torque tighten the connector to 170 pound-inches (19 Newton-meters).
   b) Loosen the connector approximately one-half turn.
   c) Do steps a) and b) two more times.
   d) Torque tighten the connector to 170 pound-inches (19 Newton-meters).
   e) Install OMat 238 lockwire to the connector.
5) Install the air tube (4).
   a) Remove the dust caps from the air tube (4).
   b) Install the air tube (4) between the tube disconnects.
   c) Install the clip details at clip positions 2661, 2030, 2120, 2029, 2665, 1447, 2664, 2663, 2661, 1799 and 2022.
   d) Torque tighten the clip bolts to 55 pound-inches (6,2 Newton-meters).
6) Torque tighten the air tube (4) front connector.
   a) Torque tighten the front connector to 420 pound-inches (47 Newton-meters).
   b) Loosen the connector approximately one-half turn.
   c) Do steps a) and b) two more times.
   d) Torque tighten the front connector to 420 pound-inches (47 Newton-meters).
   e) Install OMat 238 lockwire to the connector.
7) Torque tighten the air tube (4) rear connector.
   a) Torque tighten the rear connector to 325 pound inches (37 Newton-meters).
   b) Loosen the connector approximately one-half turn.
   c) Do steps a) and b) two more times.
   d) Torque tighten the rear connector to 325 pound inches (37 Newton-meters).
   e) Install OMat 238 lockwire to the connector.

(b) Install the oil vent tube (Fig. 401, 405).
1) Remove the dust caps from the oil vent tube (2).
2) Install the oil vent tube (2) at the tube disconnects.
3) Install the clip details at clip positions 2634, 2657, 2652, and 2655.

4) Torque tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).

(c) Install the connectors of the oil vent tube (2) (Fig. 401).
1) Torque tighten the front and rear connectors of the oil vent tube (2) to 590 pound-inches (67 Newton-meters).
2) Loosen the front and rear connectors approximately one-half turn.
3) Do steps 1) and 2) two more times.
4) Torque tighten the front and rear connectors of the oil vent tube (2) to 590 pound-inches (67 Newton-meters).
5) Install OMat 238 lockwire to the connectors.

(d) Install the electrical harnesses (Fig. 401, 405).
1) Install the electrical harness (3).
a) Install the clip details at clip positions 2031, 2030, 2656, 2021, 2022, 2662, 2663, 2664, 2029, 2030, 2031, 2021 and 255.
b) Torque tighten the clip bolts to 55 pound-inches (6.2 Newton meters).
2) Install the electrical harness (16).
a) Install the clip details at clip positions 2652, 2657, 2634, 2640, 2653, 2654, 974 and 2123.
b) Torque tighten the clip bolts to 55 pound-inches (6.2 Newton meters).

(e) Install the HP3 air tubes (Fig. 401, 405).
1) Install the HP3 air tube (24).
a) Remove the dust caps from the HP3 air tube (24).
b) Install the HP3 air tube to the left bleed valve and the tube disconnect.
c) Install the clip details at clip positions 2642, 2641, and 2651.
d) Torque tighten the clip bolts to 55 pound-inches (6,2 Newton-meters).
e) Torque tighten the tube connector to the standard loading (AMM 70-51-00/201).
f) Install OMat 238 lockwire to the connector.

2) Install the HP3 air tube (25).
   a) Remove the dust caps from the HP3 air tube (25).
   b) Install the HP3 air tube to the tube disconnects.
   c) Install the clip details at clip positions 2643, 2644, 2645, 2647, and 2648.
   d) Torque tighten the clip bolts to 55 pound-inches (6,2 Newton-meters).
   e) Torque tighten the tube connector to the standard loading (AMM 70-51-00/201).
   f) Install OMat 238 lockwire to the connector.

(f) Install the PF air tube (Fig. 401, 405).
   1) Remove the dust caps from the PF air tube (23).
   2) Install the PF air tube at the tube disconnects.
   3) Install the clip details at the clip positions 2644, 2645, 2647, 2640, and 2667.
   4) Torque tighten the clip bolts to 55 pound-inches (6,2 Newton-meters).

(g) Torque tighten the connectors of the PF air tube (23) (Fig. 401).
   1) Torque tighten the top connector of the PF air tube.
      a) Torque tighten the top connector of the PF air tube to 295 pound-inches (33 Newton-meters).
      b) Loosen the connector approximately one-half turn.
      c) Do steps a) and b) two more times.
      d) Torque tighten the top connector of the PF air tube to 295 pound-inches (33 Newton-meters).
      e) Install OMat 238 lockwire to the connector.
   2) Torque tighten the bottom connector of the PF air tube.
      a) Torque tighten the bottom connector of the PF air tube to 240 pound-inches (27 Newton-meters).
      b) Loosen the connector approximately one-half turn.
      c) Do steps a) and b) two more times.
      d) Torque tighten the bottom connector of the PF air tube to 240 pound-inches (27 Newton-meters).
      e) Install OMat 238 lockwire to the connector.

(h) Install the oil feed tube (Fig. 401, 405).
   1) Remove the dust caps from the oil feed tube (22).
   2) Install the oil feed tube to the tube disconnects.
   3) Install the clip details at clip positions 1848, 2651, 2639, and 2650.
   4) Torque tighten the clip bolts to 55 pound-inches (6.2 Newton meters).

(i) Torque tighten the connectors of the oil feed tube (22) (Fig. 401).
   1) Torque tighten the front connector.
      a) Torque tighten the front connector to the standard loading.
      b) Loosen the connector approximately one-half turn.
      c) Do steps a) and b) two more times.
      d) Torque tighten the front connector to the standard loading.

e) Install OMat 238 lockwire to the connector.

2) Torque tighten the connector at the 3-way connection.

a) Torque tighten the connector at the 3-way connection to the standard loading.

b) Loosen the connector approximately one-half turn.

c) Do steps a) and b) two more times.

d) Torque tighten the connector at the 3-way connection to the standard loading.

e) Install OMat 238 lockwire to the connector.

(j) Install the ignition leads (Fig. 401, 405).

1) Install the right ignition lead (20).

a) Remove the dust caps from the ignition lead (20) and the igniter plug (14).

b) Connect the ignition lead to the igniter plug (AMM 74-21-02/401).

c) Install the clip details at clip positions 974 and 1723.

d) Torque tighten the clip bolts to 55 pound-inches (6.2 Newton meters).

2) Install the left ignition lead (21).

a) Remove the dust caps from the ignition lead (21) and the igniter plug (26).

b) Connect the ignition lead to the igniter plug (AMM 74-21-02/401).

c) Install the clip details at clip positions 2129 , 2666, and 2639.

d) Torque tighten the clip bolts to 55 pound-inches (6.2 Newton meters).

F. Put the Airplane Back To Its Usual Condition.

S 864-014-R02

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

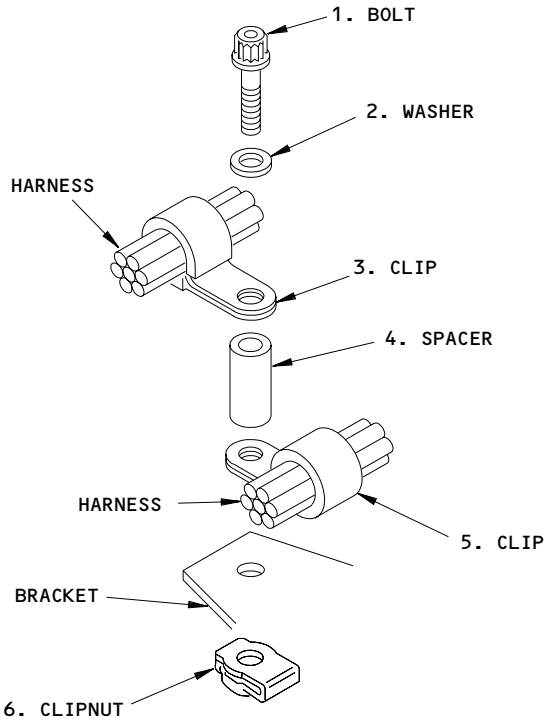
S 784-015-R02

(2) Do the Fuel and Oil Leak Test (AMM 71-00-00/501).

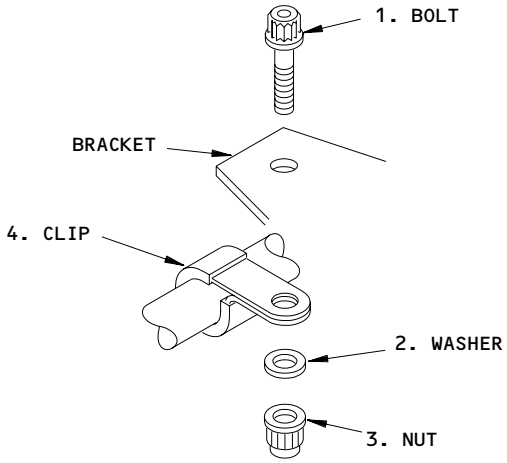
S 414-016-R02

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

(3) Close the thrust reversers (AMM 78-31-00/501).



CLIP POSITION 255

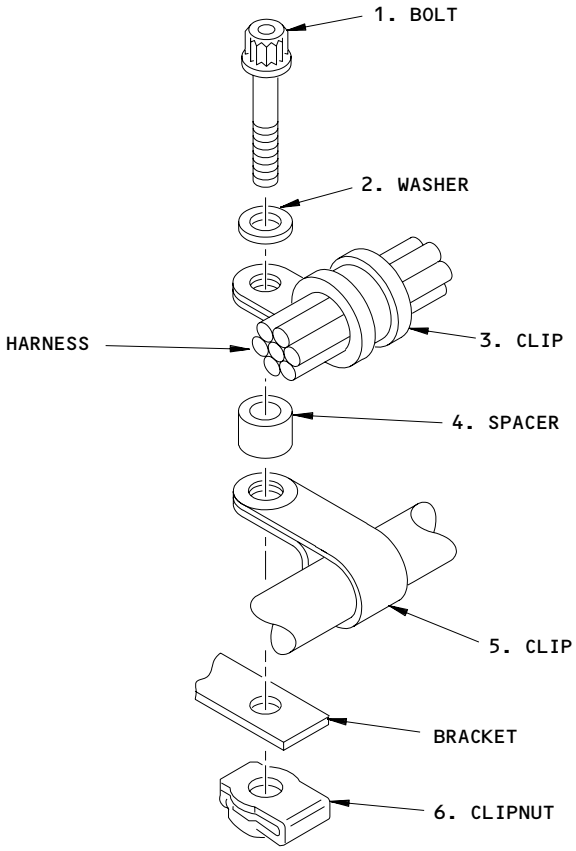


CLIP POSITION 629

YFMM-R73-11-0113

DEE0004094

Clip Positions
Figure 405 (Sheet 1)



CLIP POSITION 754

DEE00Y2421

Clip Positions
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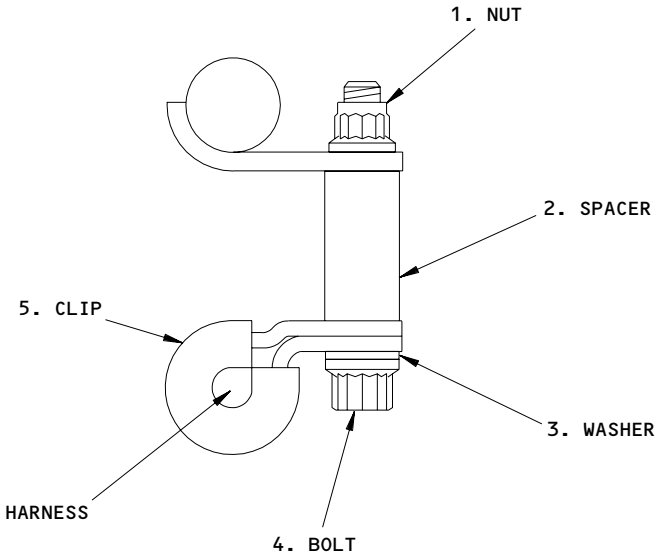
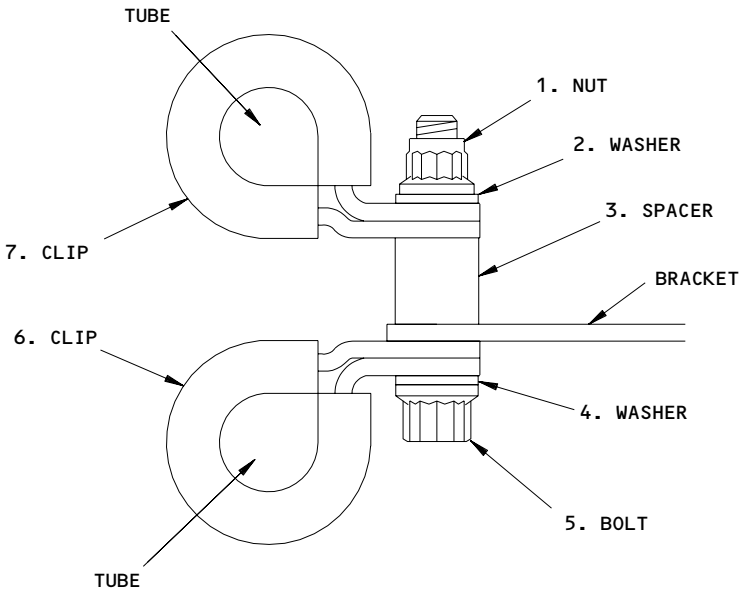


CLIP POSITION 974

DEE00Y2243

Clip Positions
Figure 405 (Sheet 3)

REAR FRONT



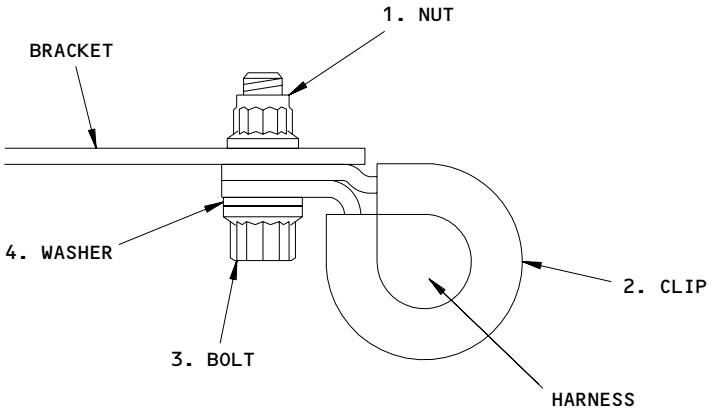
CLIP POSITION 1447

DEE00Y2303

Clip Positions
Figure 405 (Sheet 4)

REAR

FRONT

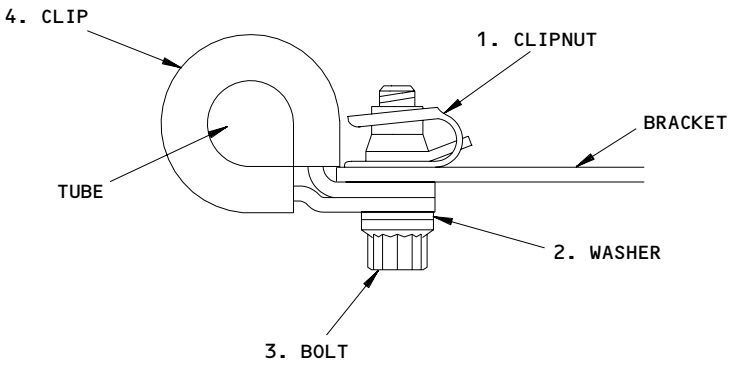


CLIP POSITION 1471

DEE0002294

Clip Positions
Figure 405 (Sheet 5)

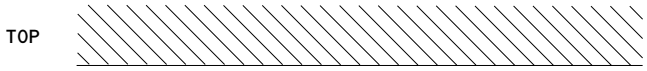
REAR FRONT

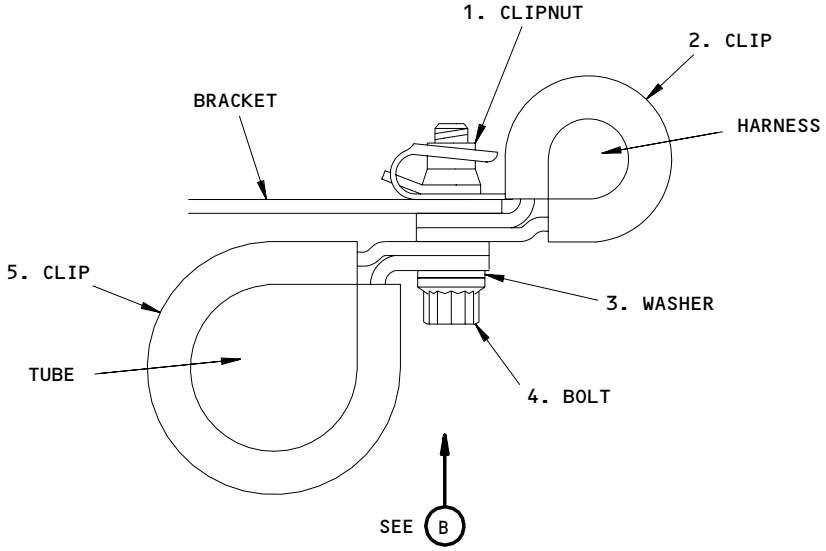


CLIP POSITION 1799

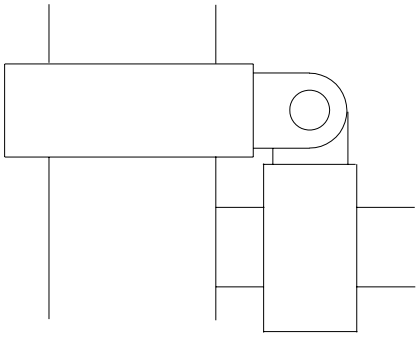
DEE0002244

Clip Positions
Figure 405 (Sheet 6)





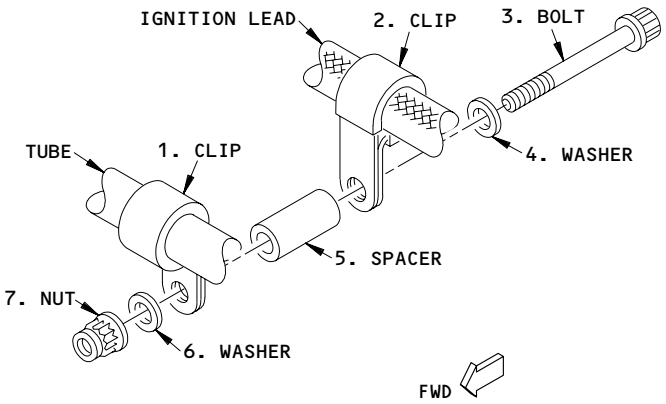
CLIP POSITION 1848



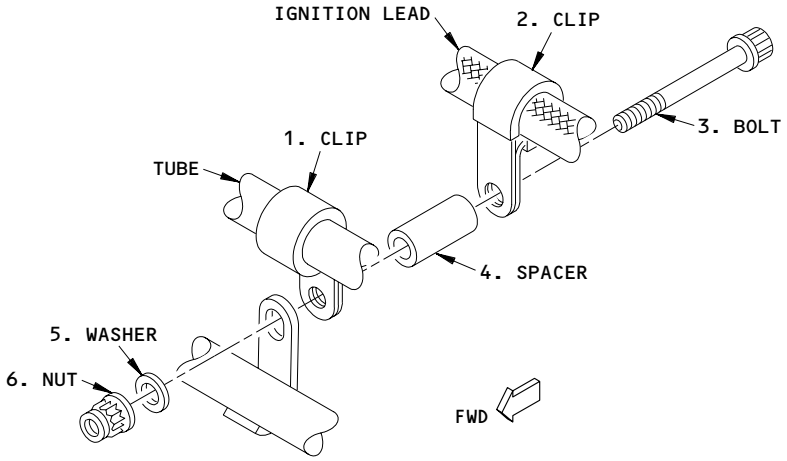
B

DEE0002293

Clip Positions
Figure 405 (Sheet 7)



CLIP POSITION 1923
(PRE-SB 72-D352)



CLIP POSITION 1923
(POST-SB 72-D352)

DEEOOY2245A

Clip Positions
Figure 405 (Sheet 8)

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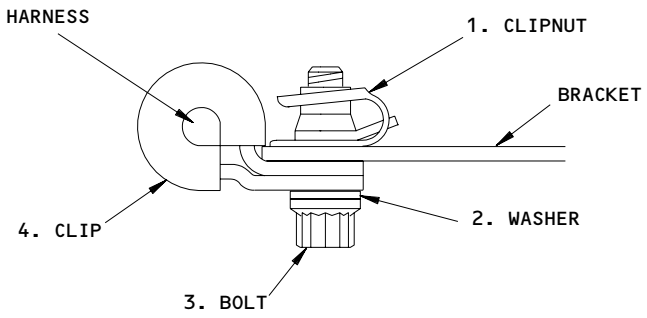

CLIP POSITION 2021

DEE00Y2246

Clip Positions
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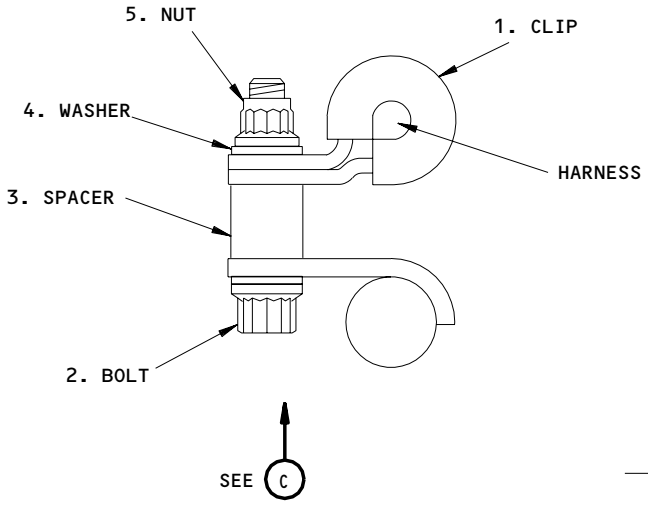

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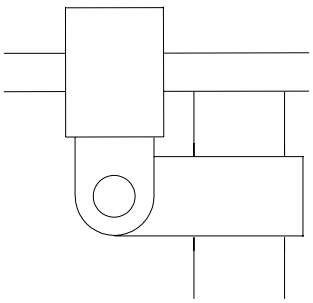

C

DEEOOY2247

Clip Positions
Figure 405 (Sheet 10)

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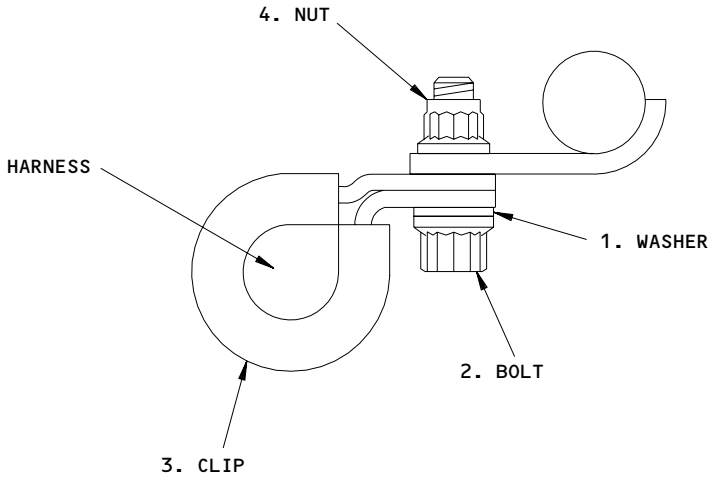

CLIP POSTION 2029

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Clip Positions
Figure 405 (Sheet 11)

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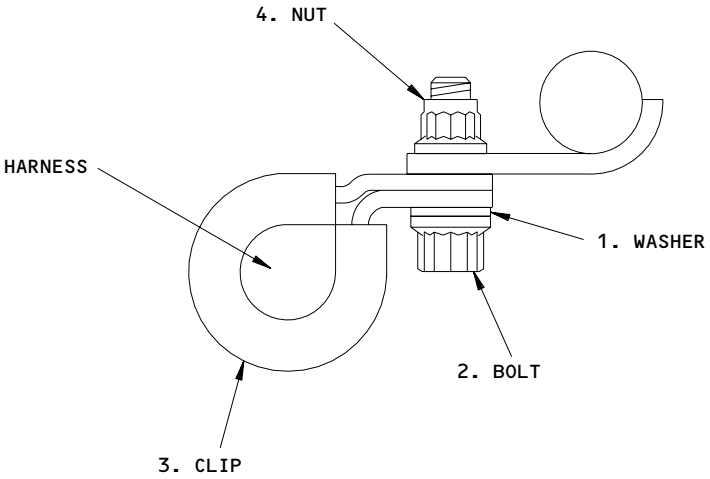

CLIP POSTION 2030

DEE00Y2300

Clip Positions
Figure 405 (Sheet 12)

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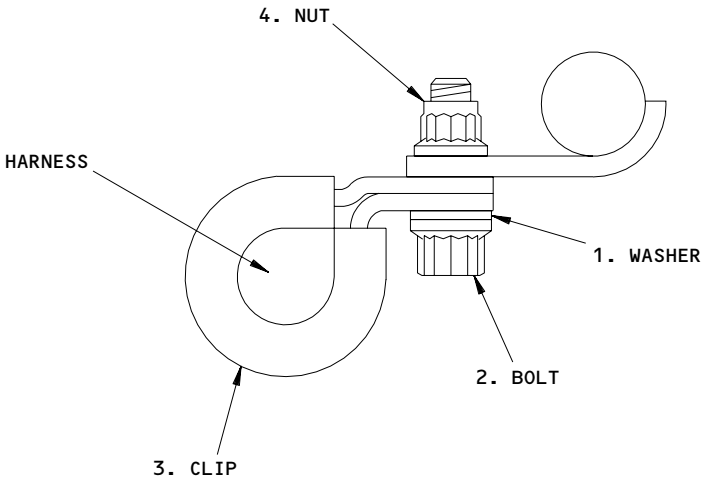

CLIP POSITION 2031

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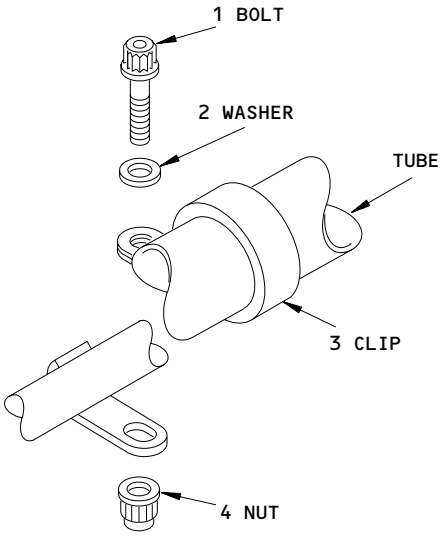

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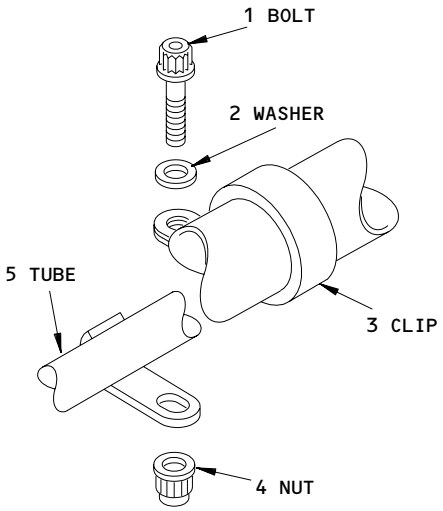
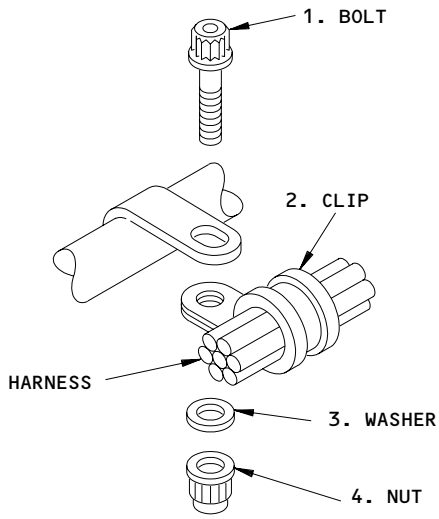


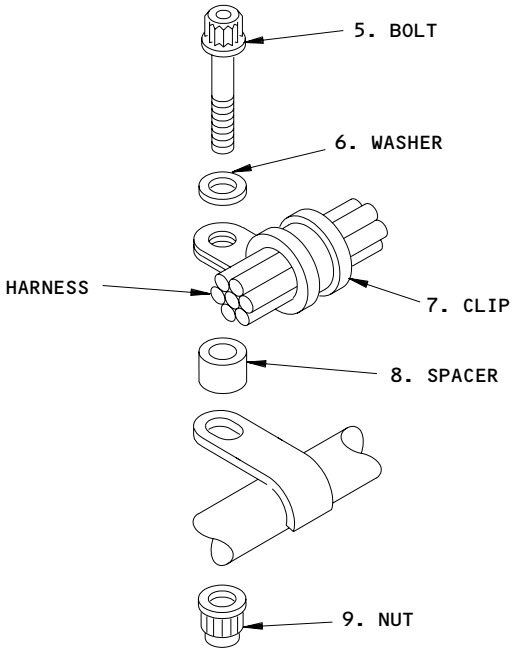
CLIP POSITION 2120

dee0004095

Clip Positions
FIgure 405 (Sheet 14)



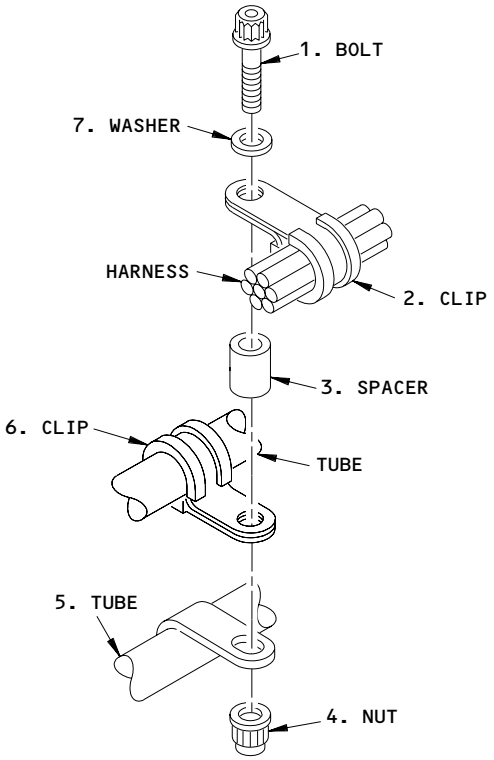
CLIP POSITION 2122



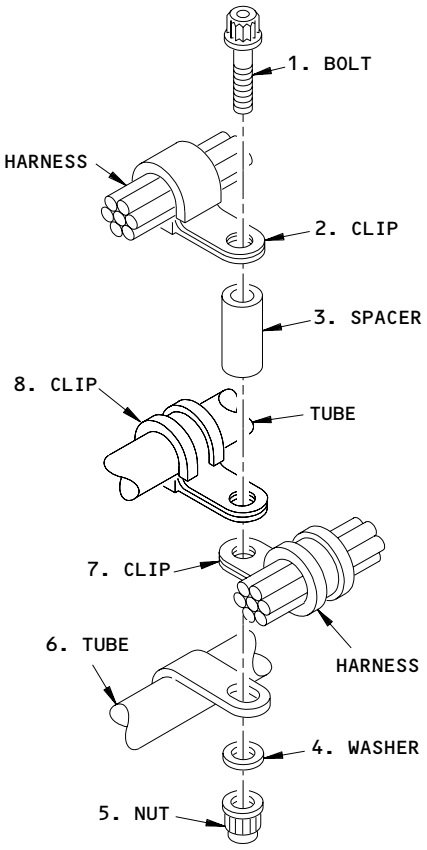
CLIP POSITION 2123

DEE00Y2422

Clip Positons
Figure 405 (Sheet 15)



CLIP POSITION 2129
(PRE-SB 72-D352)



CLIP POSITION 2129
(POST-SB 72-D352)

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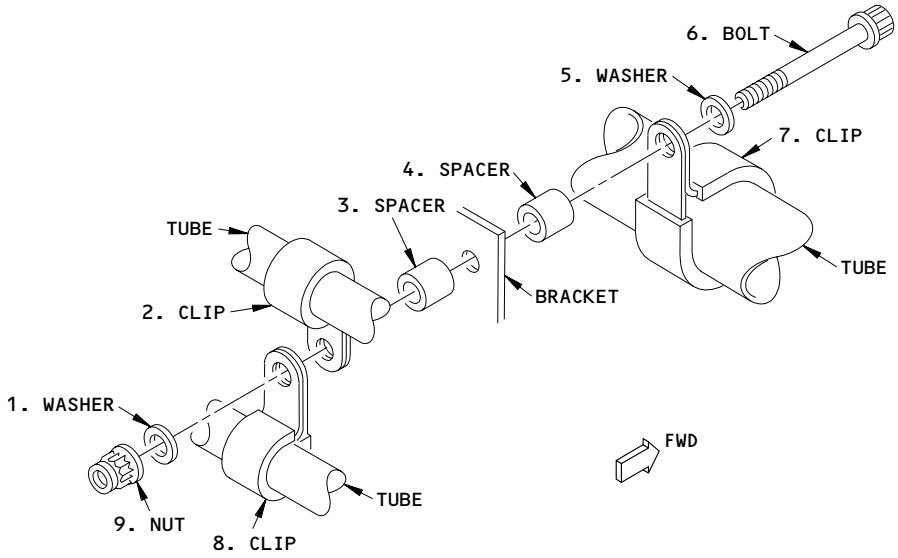
Clip Positions
Figure 405 (Sheet 16)



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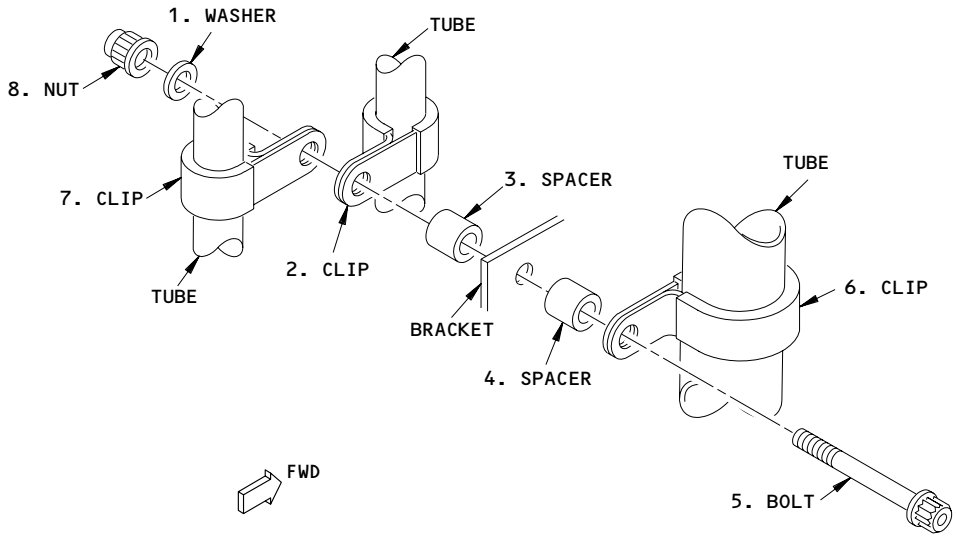
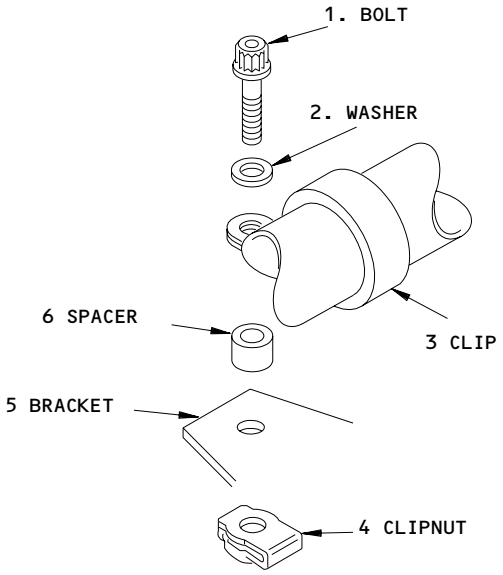


CLIP POSITION 2634
(POST-SB 72-D352)

DEE00Y2251A

Clip Positions
Figure 405 (Sheet 17)



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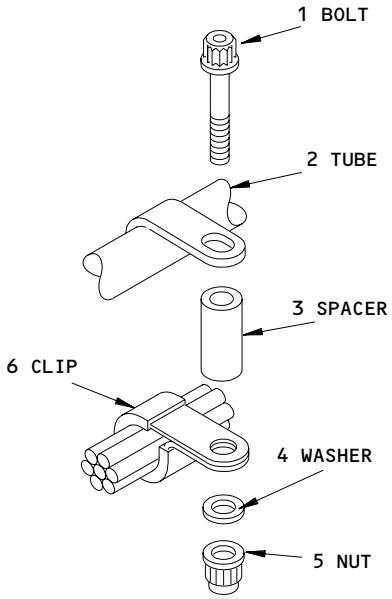
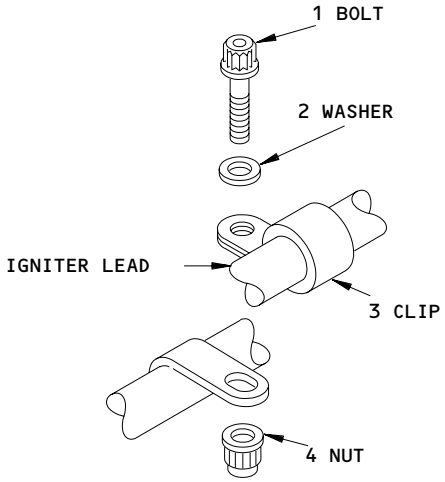


CLIP POSITION 2638



CLIP POSITION 2639

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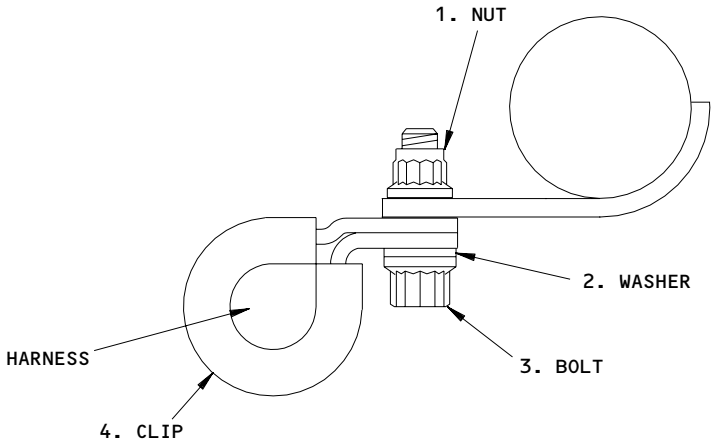
Clip Positions
Figure 405 (Sheet 18)

REAR

FRONT



CLIP POSITION 2640

DEE00Y2265

Clip Positions
Figure 405 (Sheet 19)

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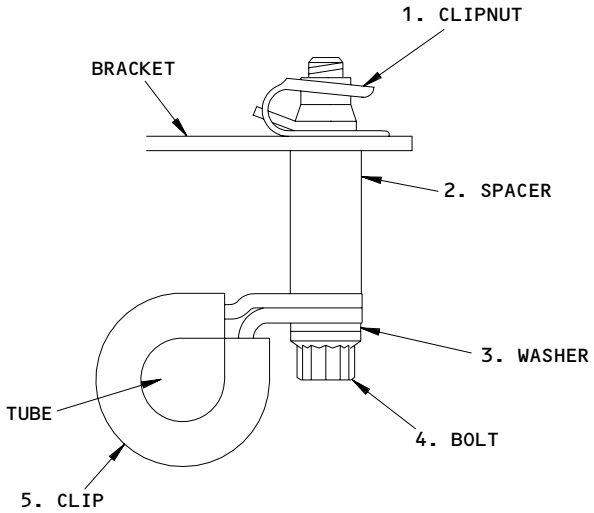
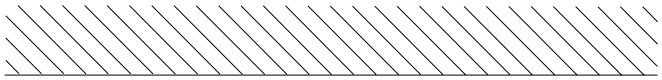
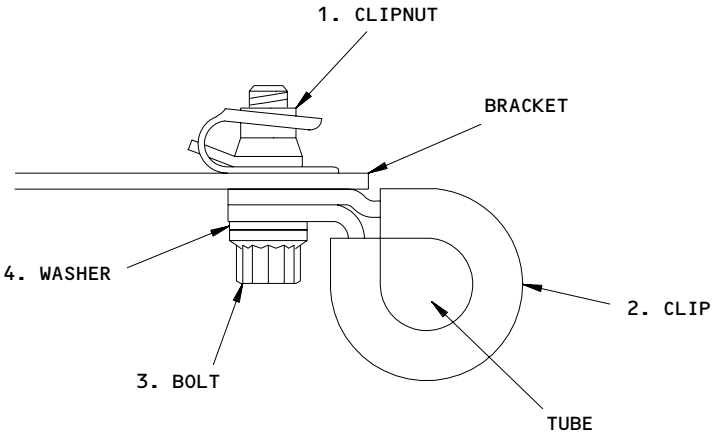


CLIP POSTION 2641

DEE00Y2266

Clip Positions
Figure 405 (Sheet 20)

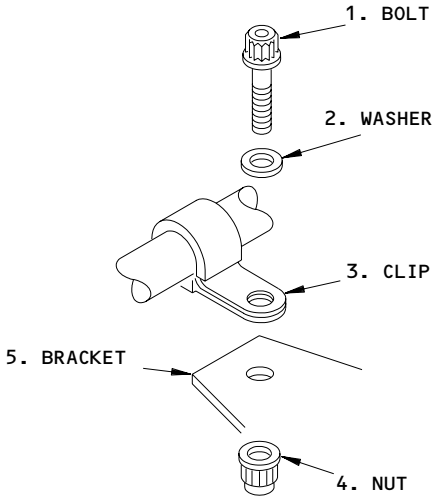




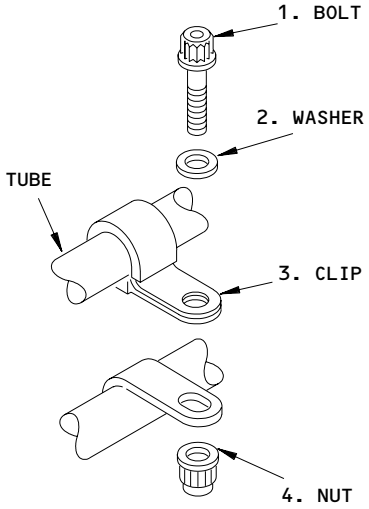
CLIP POSIITON 2642

DEE0002289

Clip Positions
Figure 405 (Sheet 21)



CLIP POSITION 2643



CLIP POSITION 2644

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Clip Positions
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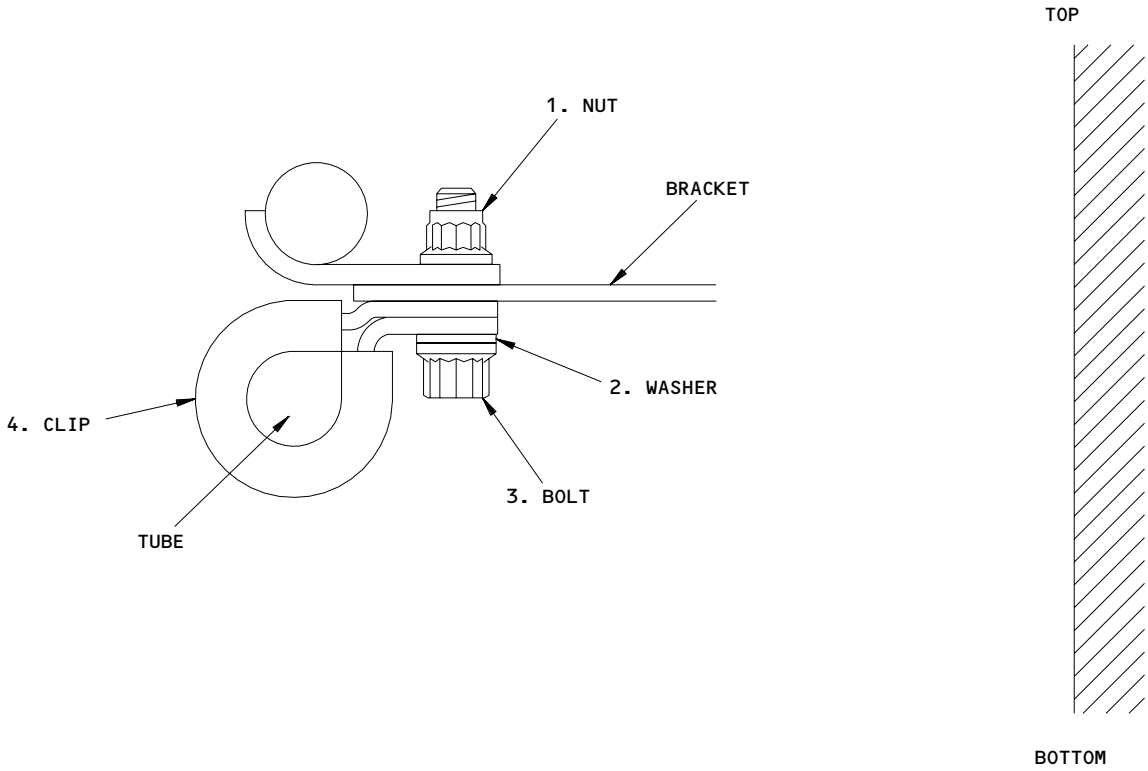

CLIP POSITION 2645

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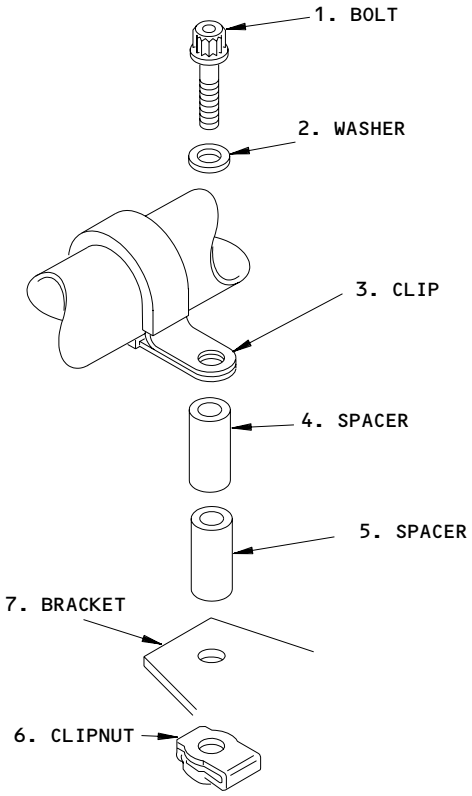
Clip Positions
Figure 405 (Sheet 23)



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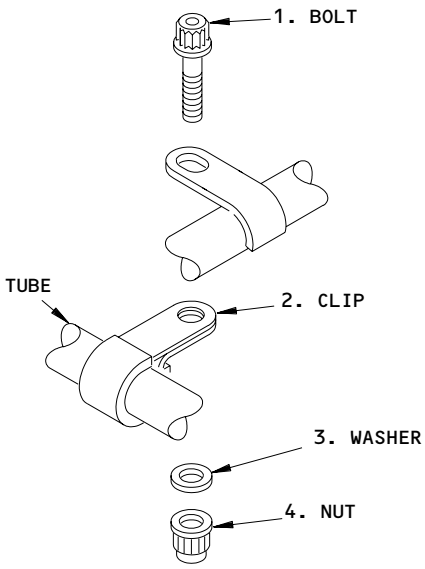

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Clip Positions
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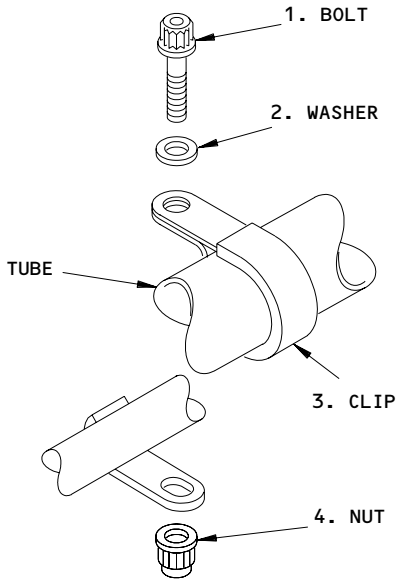

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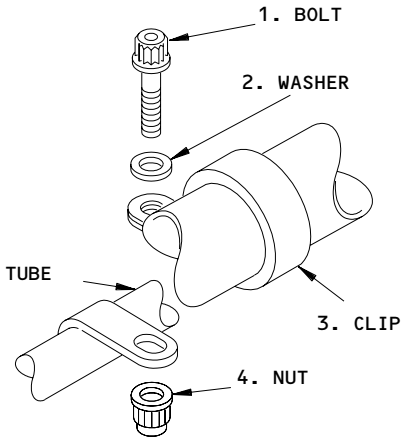
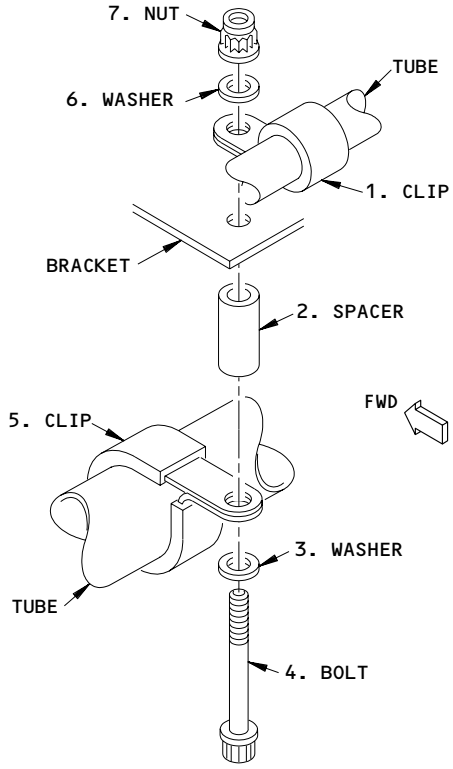


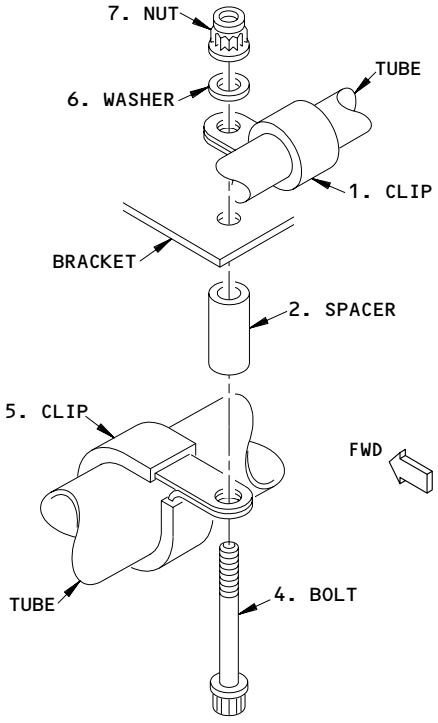
CLIP POSITION 2649

DEE0004093

Clip Positions
Figure 405 (Sheet 25)



CLIP POSITION 2650
(PRE-SB 72-D352)

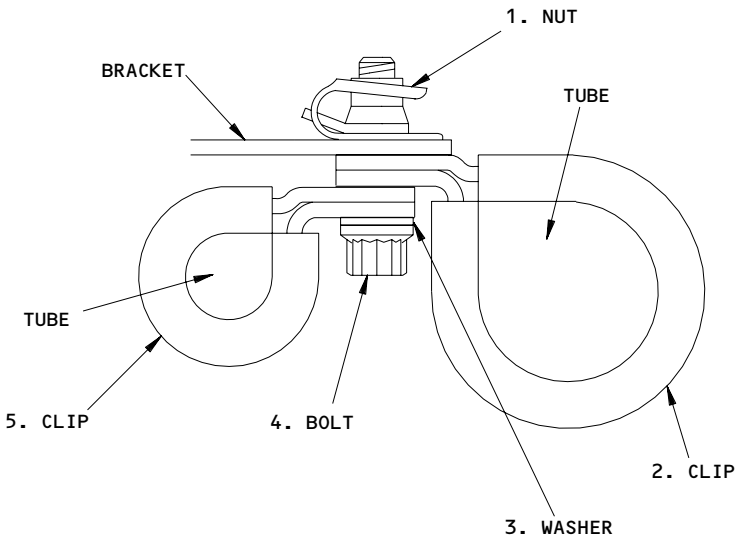


CLIP POSITION 2650
(POST-SB 72-D352)

DEE00Y2270A

Clip Positions
Figure 405 (Sheet 26)

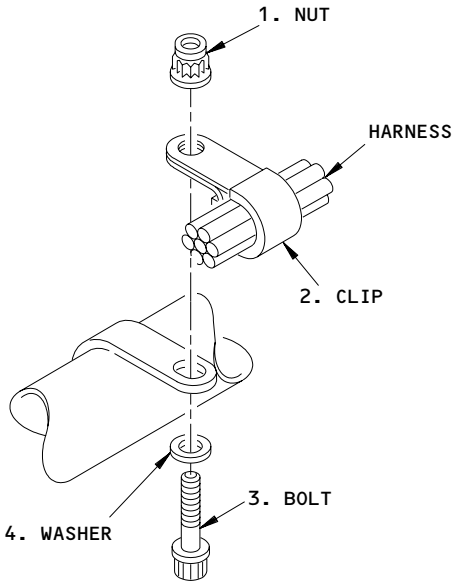
FRONT REAR



CLIP POSITION 2651

DEE00y2271

Clip Positions
Figure 405 (Sheet 27)



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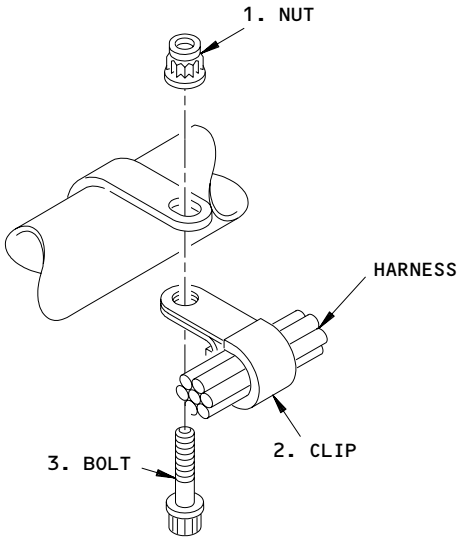
(PRE-SB 72-D352)

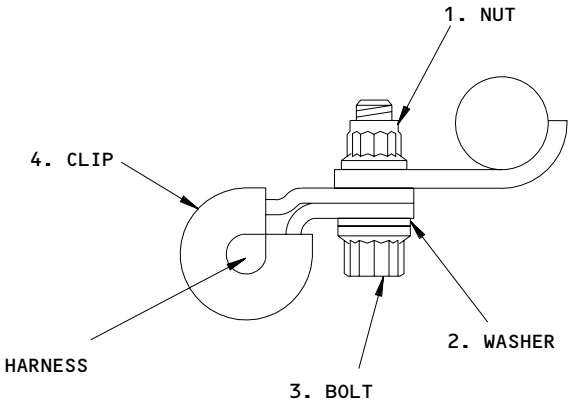


CLIP POSITION 2652
(POST-SB 72-D352)

DEE0002297A

Clip Positions
Figure 405 (Sheet 28)

REAR FRONT



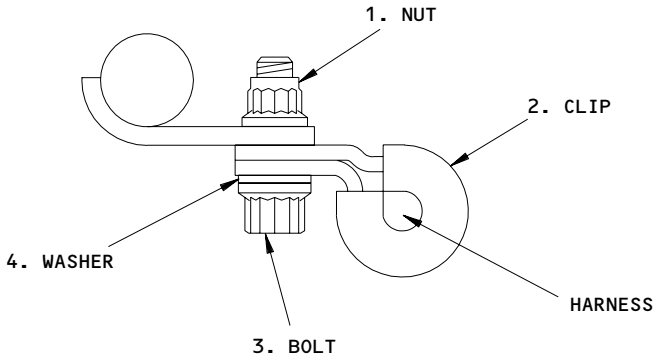
CLIP POSITION 2653

DEE00y2272

Clip Positions
Figure 405 (Sheet 29)

REAR

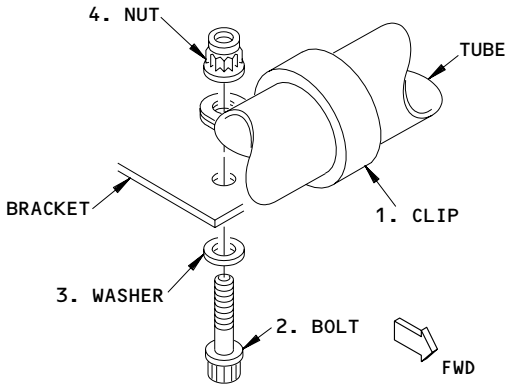
FRONT



CLIP POSITION 2654

DEE00y2273

Clip Positions
Figure 405 (Sheet 30)



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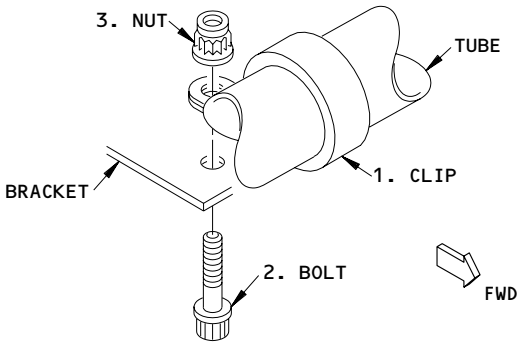
(PRE-SB 72-D352)



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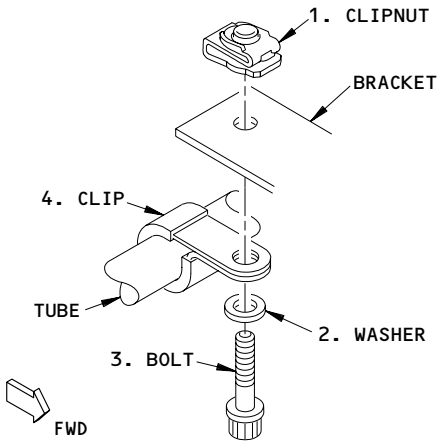
(POST-SB 72-D352)

DEE00Y2274A

Clip Positions
Figure 405 (Sheet 31)



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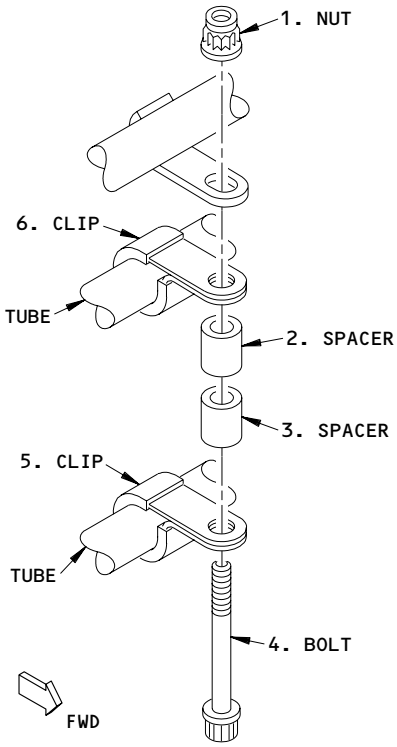
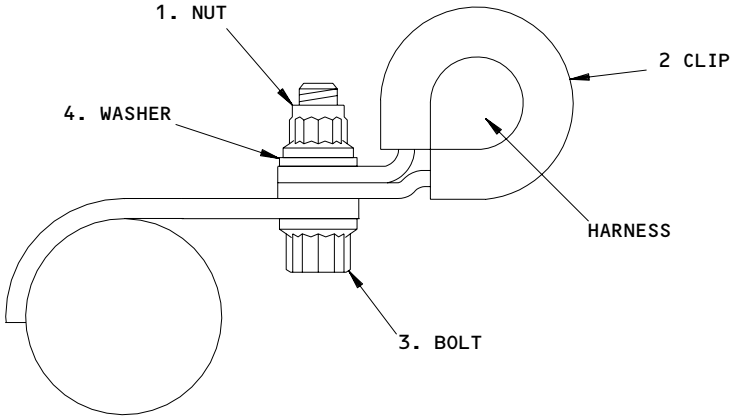
(PRE-SB 72-D352)



CLIP POSITION 2658
(POST-SB 72-D352)

DEEOOY2275A

Clip Positions
Figure 405 (Sheet 32)

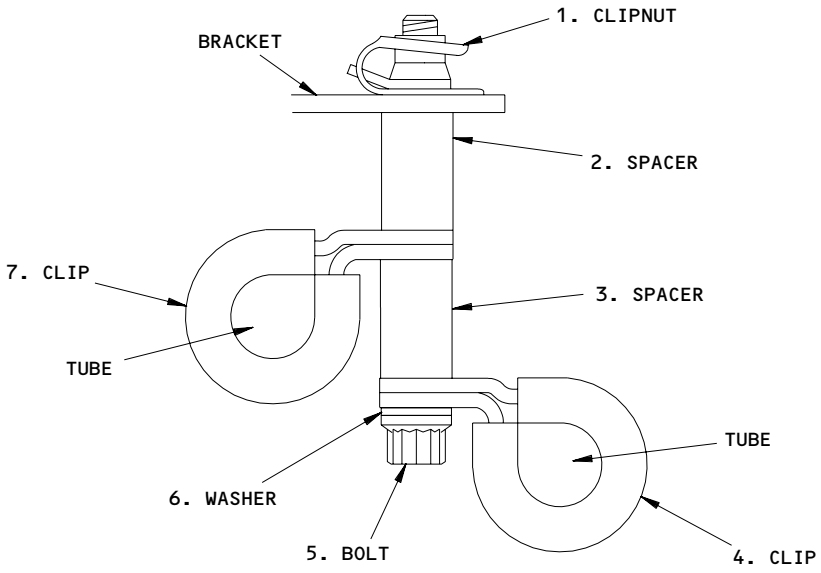


CLIP POSITION 2657

DEE0002298

Clip Positions
Figure 405 (Sheet 33)

BOTTOM TOP

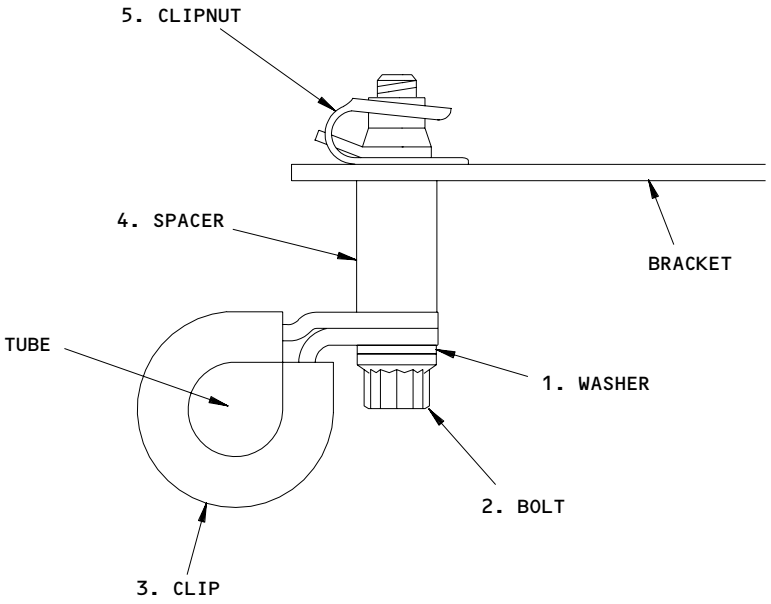


CLIP POSITION 2659

DEE00y2276

Clip Positions
Figure 405 (Sheet 34)

REAR FRONT

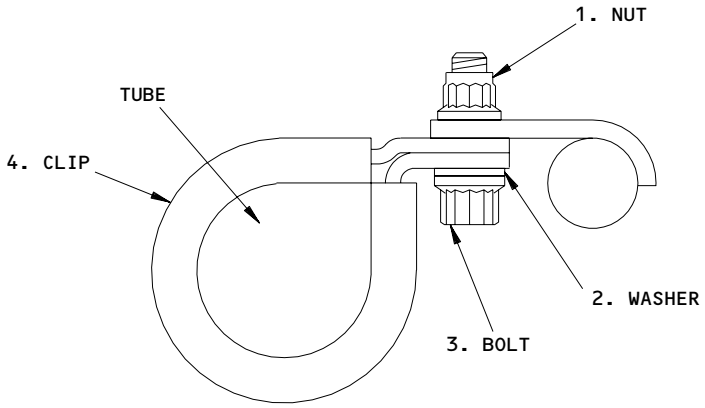


CLIP POSITION 2660

DEE00y2302

Clip Positions
Figure 405 (Sheet 35)

BOTTOM TOP

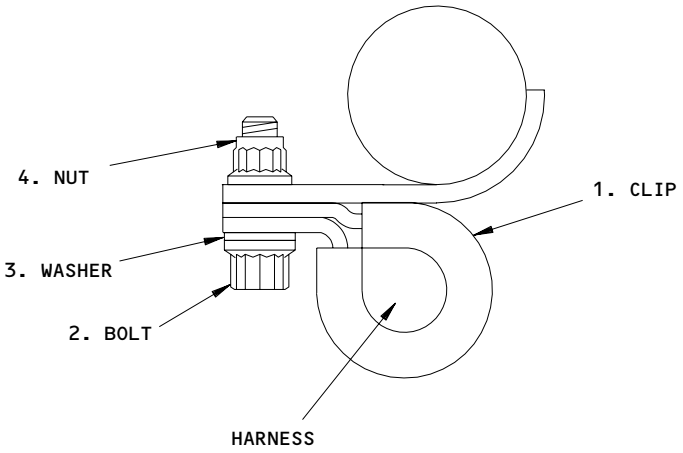


CLIP POSITION 2661

DEE00y2277

Clip Positions
Figure 405 (Sheet 36)

BOTTOM TOP

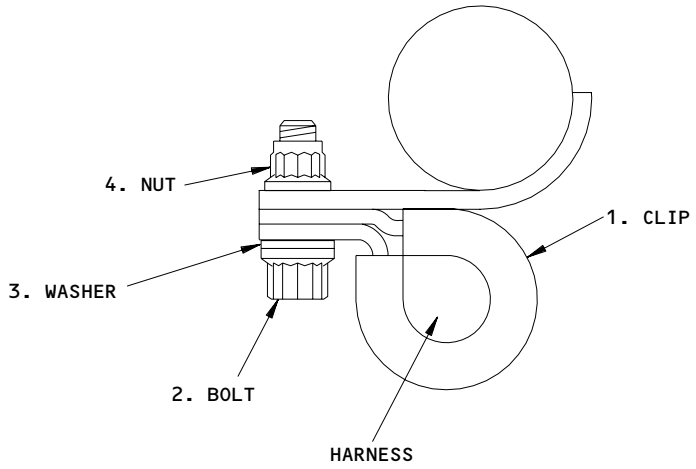


CLIP POSITION 2662

DEE00y2278

Clip Positions
Figure 405 (Sheet 37)

BOTTOM TOP

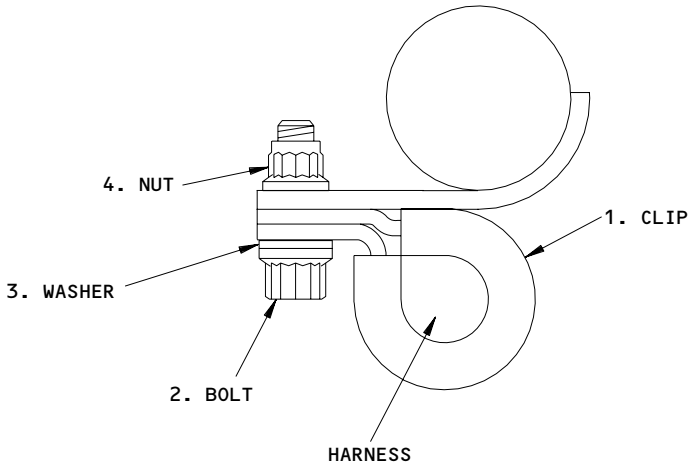


CLIP POSITION 2663

DEE00y2279

Clip Positions
Figure 405 (Sheet 38)

REAR FRONT

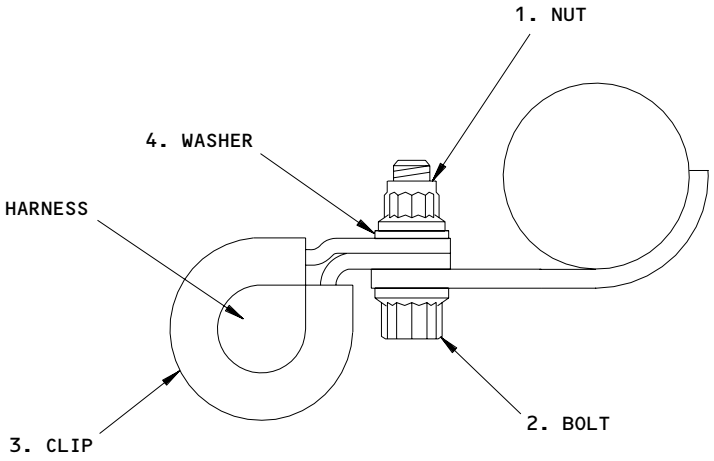


CLIP POSITION 2664

DEE00y2280

Clip Positions
Figure 405 (Sheet 39)

REAR FRONT

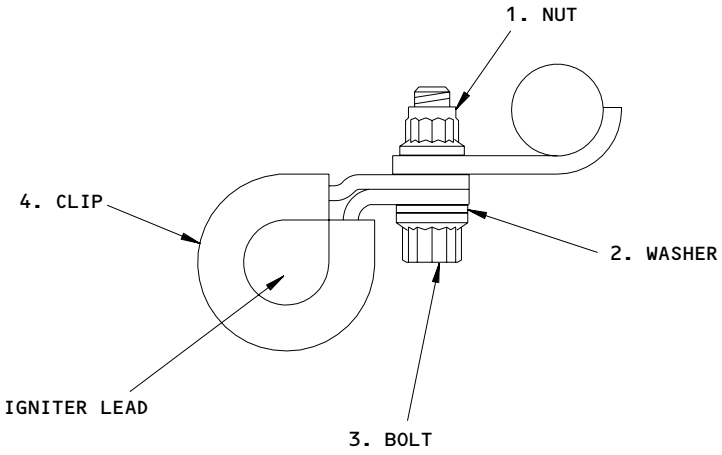


CLIP POSITION 2665

DEE00y2281

Clip Positions
Figure 405 (Sheet 40)

FRONT REAR



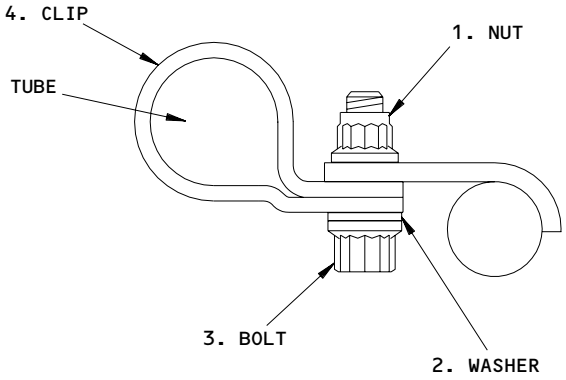
CLIP POSITION 2666

DEE00y2282

Clip Positions
Figure 405 (Sheet 41)

FRONT

REAR



CLIP POSITION 2667

DEE00y2283

Clip Positions
Figure 405 (Sheet 42)

FUEL SPRAY NOZZLES - INSPECTION/CHECK

1. General
   A. There are two tasks in this procedure. The first task is to examine the fuel spray nozzles in the installed position. The second task is to examine the fuel spray nozzles which have been removed.
   B. You can see the fuel spray nozzles in the installed position through the borescope access holes.

TASK 73-11-05-206-001-R00

2. Examine The Fuel Spray Nozzles (Installed)
   A. Consumable Materials
      (1) Degreasing Fluid (Inhibited and stabilized 1.1.1 Trichloroethane)
          British Spec/Ref - BS44B7, 1969
          American Spec/Ref - MIL-T-81533
          OMat No. 1/21
      (2) Anti-seize compound
          OMat No. 4/62
   B. References
      (1) AMM 72-00-00/601, Engine
      (2) AMM 72-03-01/401, Compressor Fairings
      (3) AMM 73-11-05/401, Fuel Spray Nozzles
      (4) AMM 78-31-00/201, Thrust Reverser
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine
      (2) Access Panels
          415AL Thrust Reverser (Left)
          416AR Thrust Reverser (Right)
          425AL Thrust Reverser (Left)
          426AR Thrust Reverser (Right)
   D. Prepare for the inspection

S 046-002-R00

WARNING: DO THE DEACTIVATION PROCEDURE OF THE THRUST REVERSER SYSTEM, WHICH MUST INCLUDE THE INSTALLATION OF LOCKBARS (OR BLOCKERS) TO PREVENT THE ACCIDENTAL OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER COULD CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Do the deactivation procedure for the thrust reverser (AMM 78-31-00/201).

S 016-003-R00
(2) Remove the compressor fairings (AMM 72-03-01/401).

S 016-004-R00
(3) Remove the borescope blanking plugs.

S 296-005-R00
(4) Do an inspection of the installed fuel spray nozzles.
  (a) Carefully put the borescope into the engine and examine the outer swirl vanes (4) for these conditions:
    1) Cracks
    2) Burns and erosion
    3) Distortion
    4) Oxidization
    5) Collected carbon
  (b) Examine the inner swirl vanes (3) for these conditions:
    1) Burns
    2) Erosion
    3) Collected carbon
    4) Cracks
  (c) Make sure that the fuel spray nozzles are correctly installed.
    1) The outer swirl vane of the fuel spray nozzle must be concentric with the burner seal.
  (d) For the damage limits, refer to the end of this task.

S 116-006-R00

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Use the degreasing fluid to clean the anti-seize compound from the mating surfaces of the blanking plugs and the combustion outer case.
  (a) Let all of the surfaces dry.

S 646-007-R00
(6) Apply anti-seize compound to the mating faces.
  (a) Apply a thin layer of the OMat No. 4/62 anti-seize compound (with a brush) to the mating faces of these parts:
    1) The blanking plug.

2) The combustion outer case

NOTE: Install the blanking plugs while the anti-seize compound is still wet.

S 426-008-R00

(7) Install the borescope blanking plugs.

CAUTION: MAKE SURE THAT YOU CORRECTLY INSTALL THE BLANKING PLUGS AFTER YOU DO A BORESCOPE INSPECTION. IF YOU DO NOT DO THIS, ENGINE DAMAGE CAN OCCUR.

(a) Install the borescope blanking plugs in the combustion outer case.
(b) Tighten the bolts.

S 296-010-R00

(8) The damage limits for the fuel spray nozzles are as follows:
(a) Inner and outer swirl vanes.
1) Oxidation and erosion is permitted, if there is no distortion.
2) Cracks are not permitted.
3) Material that has decreased is not permitted.
(b) Spray nozzle head (6)
1) Burns or large areas of erosion are not permitted.
2) Cracks are not permitted.
3) Collected carbon is permitted.

S 296-011-R00

(9) Do these steps of one or more of the fuel spray nozzles in not in it's correct position:
(a) Make sure that the combustion chamber does not have damage that is out of limits.
(b) Replace the fuel spray nozzles.

TASK 73-11-05-206-012-R00

3. Fuel Spray Nozzle Inspection (Removed)

A. Consumable Materials
(1) Degreasing fluid (Inhibited and stabilized 1.1.1 Trichloroethane)
British Spec/Ref - BS44B7, 1969
American Spec/Ref - MIL-T-81533
OMat No. 1/21

B. References
(1) AMM 72-00-00/601, Engine
(2) AMM 72-03-01/401, Compressor Fairings

(3) AMM 73-11-05/401, Fuel Spray Nozzles
(4) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones
410 Left Engine
420 Right Engine
(2) Access Panels
415AL Thrust Reverser (Left)
416AR Thrust Reverser (Right)
425AL Thrust Reverser (Left)
426AR Thrust Reverser (Right)

D. Procedure (Fig. 601)

S 026-013-R00
(1) Remove the fuel spray nozzles (AMM 73-11-05/401).

S 116-019-R00

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. DEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Use the degreaser to clean the fuel spray nozzles.
(a) Let all the parts dry.

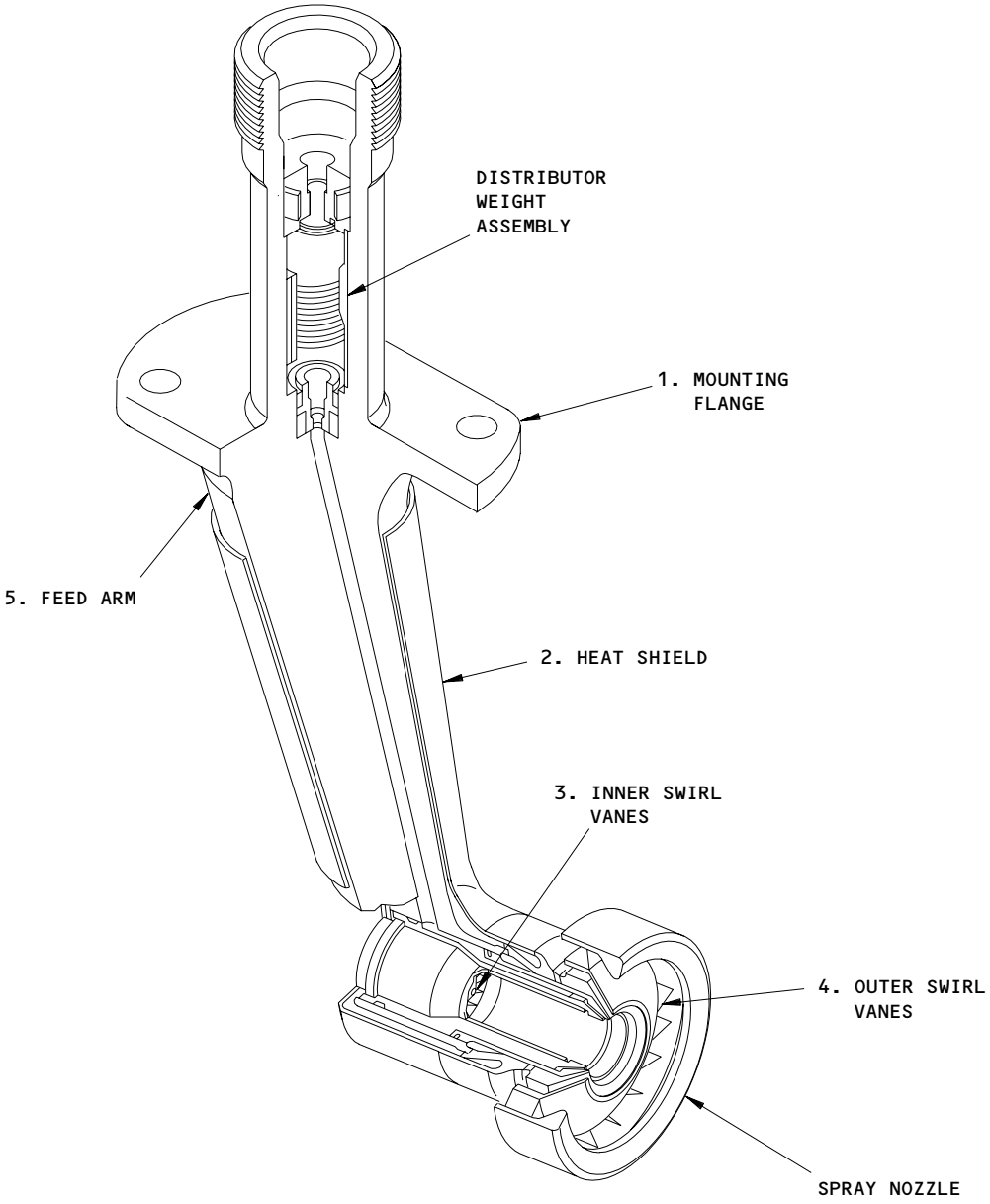
S 226-015-R00
(3) Do an inspection of the fuel spray nozzles.
(a) Examine the area above the mounting flange (1).
1) Cracks are not serviceable.
(b) Examine the remaining areas of the mounting flange.
1) Galled or scored flanges are not serviceable.
2) Examine the flange for flatness.
a) The permitted distortion within a diameter of 1.75 in. (44.45 mm) is 0.005 in. (0.127 mm).
b) The permitted distortion of the flange between 1.75 in. (44.45 mm) diameter and 2.085 in. (52.9 mm) diameter is 0.010 in. (0.245 mm).
3) Cracks in the mounting flange are not serviceable.
(c) Examine the external threads.
1) The threads are not serviceable if they are stripped, crossed or show signs of distortion.

(d) Examine the bores.
1) Blocked bores are not serviceable.
(e) Examine the feed arm (5).
1) Cracks are not permitted.
2) Nicks, scratches and dents are serviceable if they are less than 0.015 in. (0.38 mm) deep.
(f) Examine the heat shield (2).
1) Cracks are not serviceable.
2) Nicks and scratches that are more then 0.015 in. (0.38 mm) deep are not serviceable.
3) Dents are acceptable, if there are no cracks.
(g) Examine the inner swirl vanes (3).
1) Examine for carbon buildup.
a) If carbon is present, remove the buildup.
2) Erosion without distortion is serviceable.

S 426-016-R00
(4) Install the fuel spray nozzles (AMM 73-11-05/401).

S 426-017-R00
(5) Install the compressor fairings (AMM 72-03-01/401).

S 446-018-R00
(6) Do the activation procedure for the thrust reverser (78-31-00/201).



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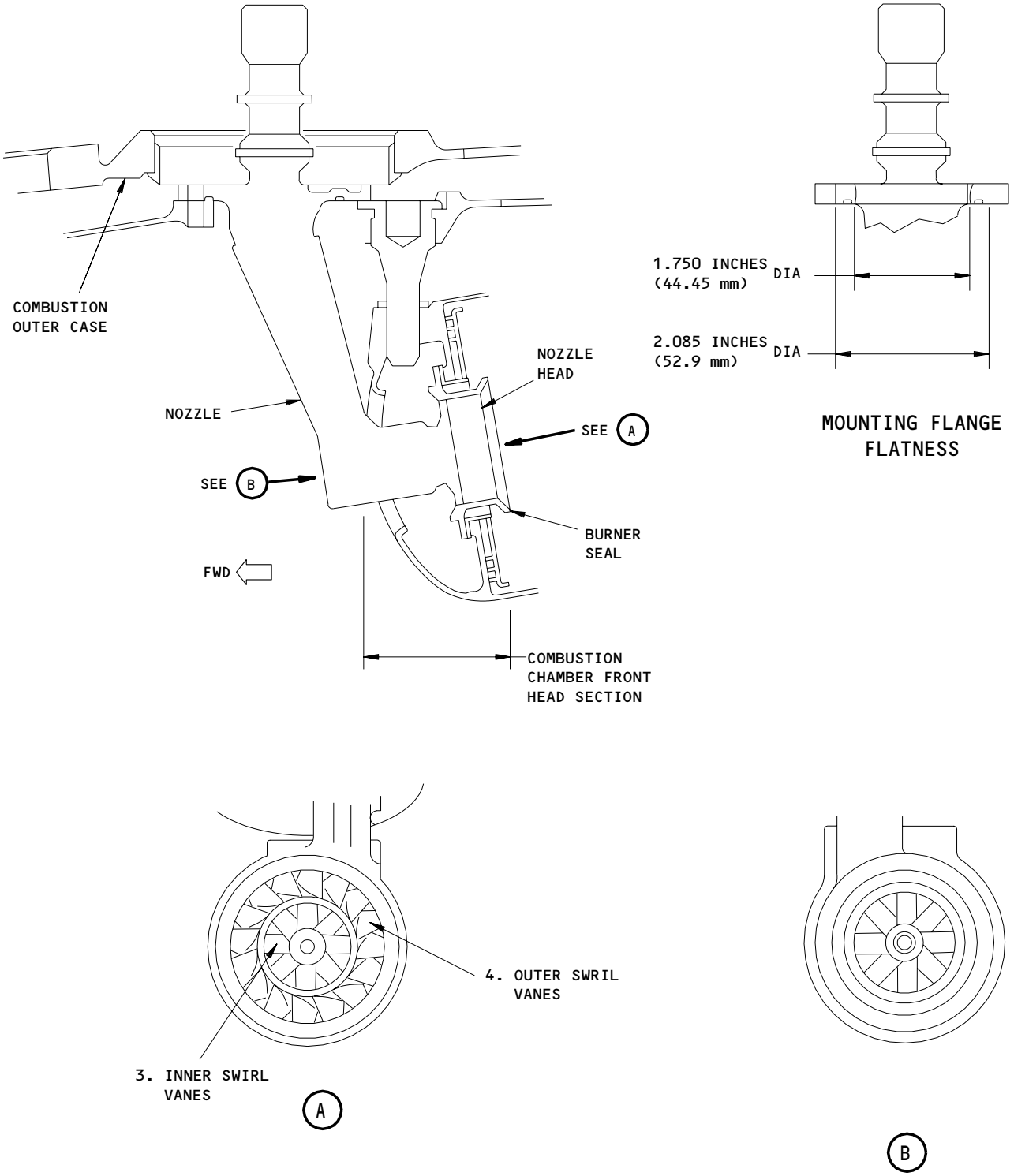
Fuel Sysytem Spray Nozzles - Inspection/Check
Figure 601 (Sheet 1)



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Fuel System Spray Nozzles - Inspection/Check
Figure 601 (Sheet 2)

FUEL TUBES AND FITTINGS - REMOVAL/INSTALLATION

1. General
   A. This section gives the procedure for the removal and installation of the LP fuel tubes and HP fuel tubes.
   B. RR Service Bulletins referred to:

      73-9181 - Fuel and Control - Fuel System Tubes and Fittings - Reduction of tube end float.

      73-B047 - Engine Fuel and Control-Fuel Systems Tubes - Introduction of HP fuel tubes with rigid end fittings.

   TASK 73-11-06-004-001-R00

2. The Fuel Tubes Removal
   A. Equipment
      (1) Clean receptable - minimum capacity:
          5 U.S. gallons
          4 Imperial gallons
          18 Litres

   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
      (3) AMM 77-12-02/401, Tachometer Generator
      (4) AMM 79-21-09/401, Oil Bypass Valve
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          413/423 Fan Cowl Panel (LH)
          414/424 Fan Cowl Panel (RH)

   D. Prepare to Remove the Fuel Tubes

      S 864-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 864-003-R00
      (2) Do the steps that follow to isolate the fuel system and related systems:
          (a) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed.
              1) 6E1, L SPAR FUEL VALVE
          (b) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed.
              1) 6E2, R SPAR FUEL VALVE
          (c) Make sure the FUEL CONTROL switch on the control stand is in the CUT OFF position and install a DO-NOT-OPERATE identifier.

(d) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.
(e) For the left engine, open this circuit breaker on the panel P6 and install a DO-NOT-CLOSE identifier.
1) 6E1, L SPAR FUEL VALVE
(f) For the right engine, open this circuit breaker on the panel P6 and install a DO-NOT-CLOSE identifier.
1) 6E2, R SPAR FUEL VALVE

S 864-004-R00

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

S 014-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(4) Open the fan cowl panels (AMM 71-11-04/201).

E. Remove the LP Fuel Tube - LP Fuel Filter to HP Fuel Pump (Fig. 401)

S 024-062-R00

(1) Release the clips for the firewire raceways and electrical harnesses as necessary.

S 024-063-R00

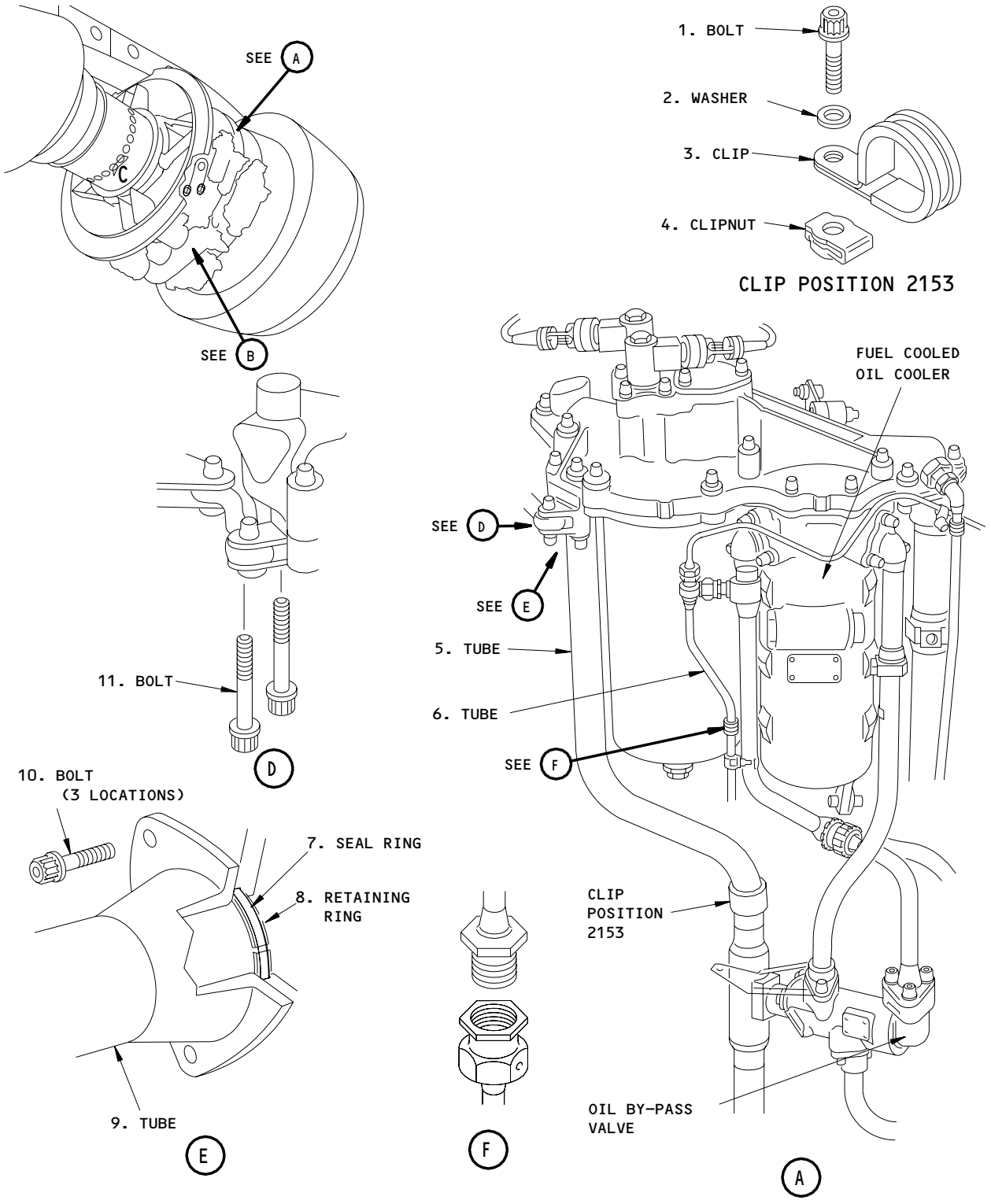
(2) Put a container in position below the HP fuel pump to catch the fuel leakage.

S 024-047-R00

(3) At the HP fuel pump, remove the bolts (12) and the clip bracket (15) from the tube (13).

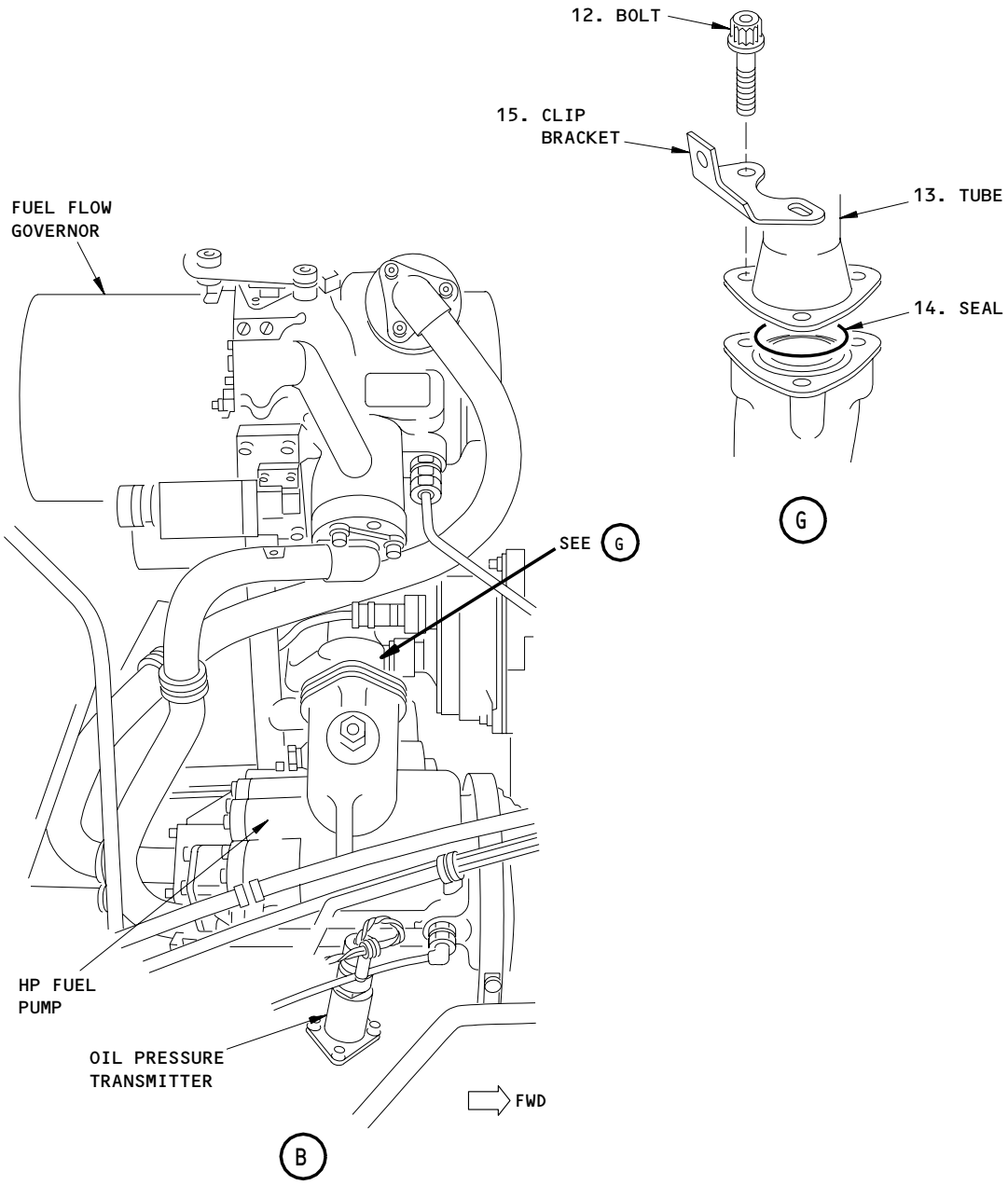
S 024-064-R00

(4) Remove the tachometer generator (AMM 77-12-02/401).



LP Fuel Tubes
Figure 401 (Sheet 1)

H97457



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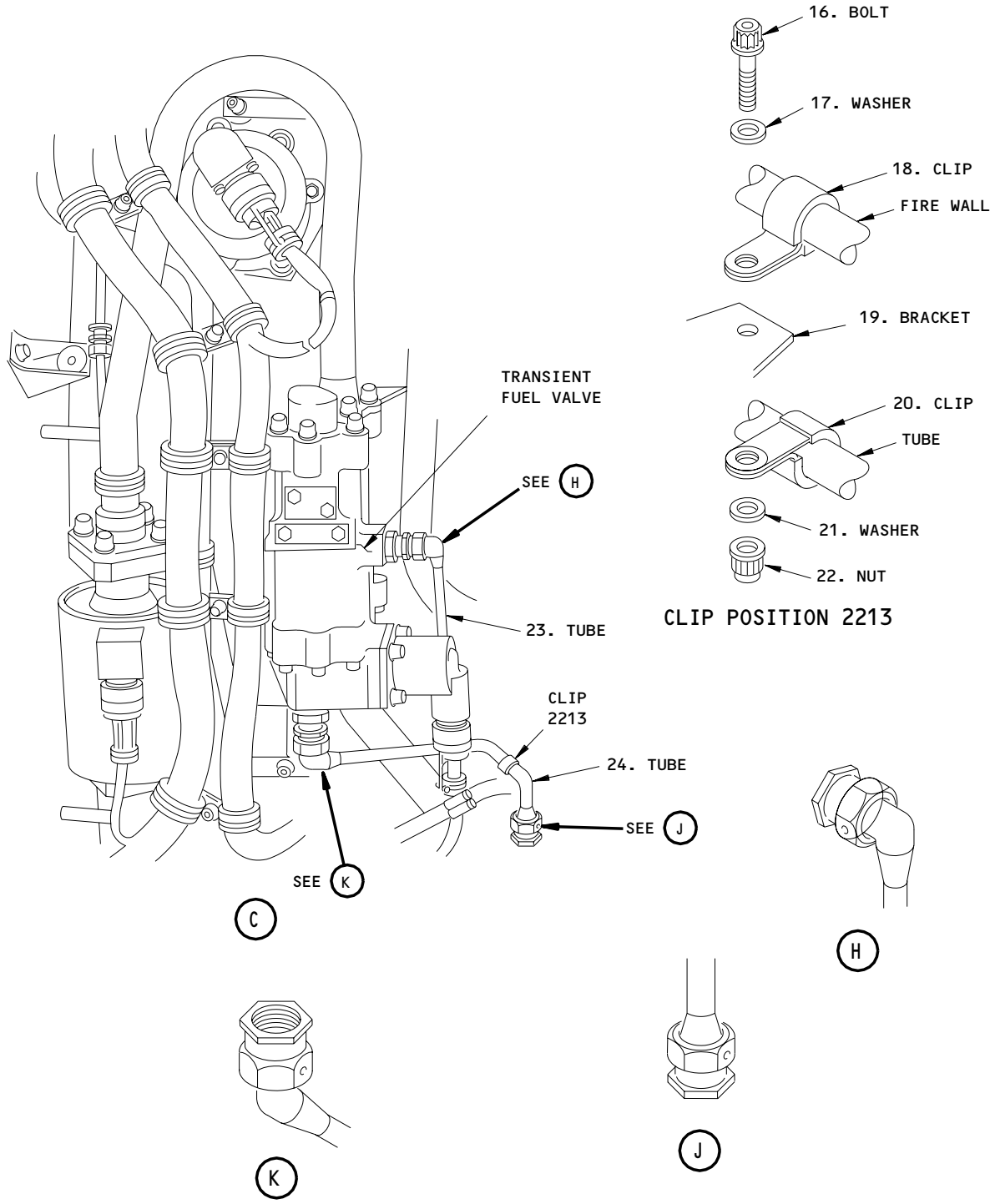
LP Fuel Tubes
Figure 401 (Sheet 2)



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LP Fuel Tubes
Figure 401 (Sheet 3)

H97463

S 024-065-R00
(5) Remove the oil bypass valve (79-21-09/401).

S 024-066-R00
(6) Disconnect the oil tube (6).

S 424-067-R00
(7) Put caps on the open tube ends.

S 024-068-R00
(8) At the transient fuel valve, disconnect the HP fuel tube (23).

S 424-069-R00
(9) Put caps on the open tube ends.

S 024-070-R00
(10) At the transient fuel valve, remove the drain tube (24).
(a) Remove the clip at clip position 2213 (Fig. 401).

S 024-071-R00
(11) Disconnect the tube at the connector.

S 424-072-R00
(12) Put caps on the open tube ends.

S 024-073-R00
(13) Remove the FCOC attachment bolt (11) at the top rear attachment (Fig. 401).

S 024-074-R00
(14) Remove the LP fuel tube (5).
(a) Remove the clip at clip position 2153.

S 024-075-R00
(15) Remove the bolts (10).

S 024-076-R00
(16) Remove and discard the seal ring (7) and (14).

S 024-077-R00
(17) Remove and discard the retaining rings (8).

S 424-078-R00
(18) Put caps on the open tube ends.

F. Remove the HP Fuel Tubes (Fig. 402)

S 034-011-R00
(1) Remove the tube clips and brackets if it is necessary.

S 034-012-R00
(2) Remove the bolts.

S 024-013-R00

CAUTION: BE CAREFUL WHEN YOU REMOVE THE FUEL TUBES FROM THE CONNECTORS. YOU CAN CAUSE DAMAGE TO THE FUEL TUBES IF THEY ARE REMOVED INCORRECTLY.

(3) ENGINES PRE-RR-SB 73-B047;
Carefully remove the tube from the connector seal.

S 034-044-R00
(4) Discard the seal rings.

S 024-081-R00
(5) ENGINES POST-RR-SB 73-9181;
Remove the three retaining rings.

S 024-082-R00
(6) ENGINES POST-RR-SB 73-B047;
Remove the tube.

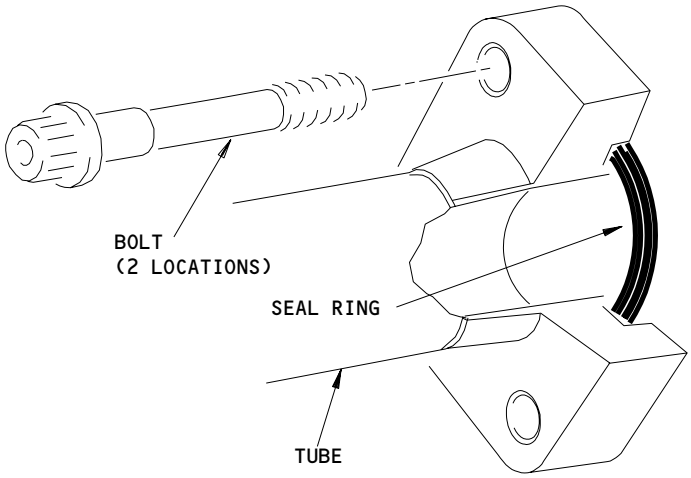
S 034-059-R00
(7) Discard the seal ring.

S 434-014-R00
(8) Seal all the openings with the applicable caps.

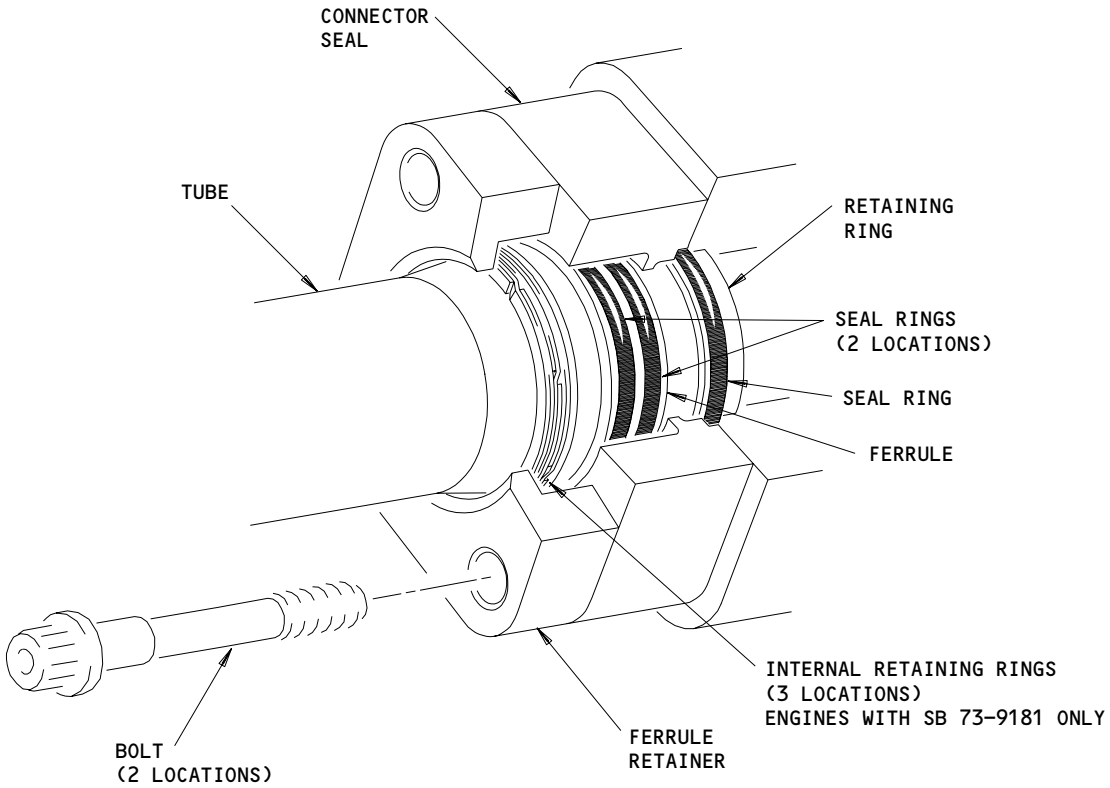
TASK 73-11-06-004-015-R00

3. The Fuel Tubes Installation

A. Equipment
(1) Firesleeve Protection Kit
HU40245



SB 73-B047



C3113

Usual HP Fuel Connectors - Removal/Installation
Figure 402

(2) Masking Tape
OMat No. 872
(3) Lockwire
British Spec. DTD189A, 225.W.G.
American Spec. 21 A.W.G.
OMat No. 238

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 70-02-01/201, Sealing Rings
(3) AMM 70-51-00/201, Torque Tightening Technique
(4) AMM 71-00-00/501, Power Plant
(5) AMM 71-11-04/201, Fan Cowl Panels
(6) AMM 79-21-09/401, Oil Bypass Valve

C. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panel
413/423 Fan Cowl Panel (LH)
414/424 Fan Cowl Panel (RH)

D. Install the LP Fuel Tube - LP Fuel Filter to HP Fuel Pump (Fig. 401)

S 424-080-R00

CAUTION: YOU MUST BE CAREFUL WHEN YOU INSTALL THE LP FUEL TUBE. IF YOU BEND THE FLEXIBLE SECTION TOO MUCH, DAMAGE TO THE INTERNAL P.T.F.E. TUBE CAN OCCUR.

(1) Install the LP fuel tube.
(a) Install new seal rings (7) and (14).
(b) Install new retaining rings (8).
(c) Attach the firesleeve protection kit (HU40245) to the LP fuel tube. Use the OMat No. 272 masking tape.
(d) Put the LP tube in position between the LP filter and the HP fuel pump.
(e) Loosely install the bolts (10) at the LP fuel filter end of the LP fuel tube.
(f) Put the clip bracket (15) in position and loosely install the bolts (12) at the HP fuel pump end of the LP fuel tube.
(g) Install the clip at position 2153.
(h) Torque the clip bolts (4) to 55 pound-inches (6.2 Newton-meters).
(i) At the two ends of the LP fuel pump tube (5), torque the bolts to the standard loading.
(j) Remove the firesleeve protection kit.
(k) Tear the masking tape and remove the protection sleeves.
(l) Install the top bolt (11) at the FCOC top rear attachment.
(m) Install transient fuel valve drain tube (24).

(n) Remove the caps from the tube ends.
(o) Connect the drain tube (24) at the transient fuel valve.
(p) Torque the tube connector to the standard loading (AMM 70-51-00/201).
(q) Install the HP fuel tube (23).
(r) Remove the caps from the tube ends.
(s) Connect the HP fuel tube at the transient fuel valve and the tube disconnect.
(t) Install the clip at clip position 2213.
(u) Torque the clip bolt (16) to 55 pound-inches (6.2 Newton-meters).
(v) Torque the tube connectors to the standard loading (AMM 70-51-00/201).
(w) Connect the oil tube (6).
(x) Remove the caps from the tube ends.
(y) Connect the oil tube.
(z) Torque the oil tube to standard loading.
(aa) Install the Oil Bypass Valve (AMM 79-21-09/401).
(ab) Install the tachometer generator (AMM 77-12-02/401).
(ac) Install the firewire raceway and the electrical harness clips.
(ad) Install a lockwire to the tube connections.

E. Install the HP Fuel Tubes (Fig. 402)

S 034-039-R00

(1) Remove the caps from the openings and connectors.

S 214-025-R00

(2) Make sure that the mating faces, the inner surface of the connector and the tube are clean and not damaged.

S 644-026-R00

(3) ENGINES PRE-RR-SB 73-B047;
Do the steps that follow:
(a) Lubricate and install the new seal rings to the tube (AMM 70-02-01/201).
(b) Lubricate and install the new seal ring to the retaining ring (AMM 70-02-01/201).

CAUTION: DO NOT USE THE FERRULE RETAINER TO PUSH THE TUBE INTO THE FLUID LINE CONNECTOR. THE TUBE MUST BE EASY TO PUSH INTO THE FLUID LINE CONNECTOR. IF IT IS NOT, YOU MUST FIND AND CORRECT THE CAUSE.

(c) Carefully install the tube into the connector seal.
1) Make sure you do not damage the two seal rings.
2) ENGINES POST-RR-SB 73-9181;
Make sure that the internal retaining rings are against the fuel tube collar.
(d) Move the ferrule retainer along the tube until it comes against the connector seal.

S 434-083-R00

(4) ENGINES POST-RR-SB 73-B047;
Do the steps that follow:
(a) Lubricate and install the new seal rings on the tube (AMM 70-02-01/201).
(b) Install and tighten the bolts (AMM 70-51-00/201).
(c) Install the tube clips and brackets if it is necessary.

F. Put the Airplane Back to its Usual Configuration

S 864-032-R00

(1) For the left engine, remove the DO-NOT-CLOSE identifier and close this circuit breaker on the P6 panel.
(a) 6E1, L SPAR FUEL VALVE

S 864-033-R00

(2) For the right engine, remove the DO-NOT-CLOSE identifier and close this circuit breaker on the P6 panel.
(a) 6E2, R SPAR FUEL VALVE

S 864-034-R00

(3) Remove the DO-NOT-OPERATE identifier from the FUEL CONTROL switch.

S 414-036-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-037-R00
(5) Supply the electrical power (AMM 24-22-00/201).

S 794-038-R00
(6) Do a leak test on the connections that were removed (AMM 71-00-00/501).

FUEL TUBES AND FITTINGS - INSPECTION/CHECK

1. General
   A. This procedure contains an inspection of the fuel tubes and fittings.

TASK 73-11-06-226-001-R00

2. Examine the Fuel Tubes and Fittings
   A. References
      (1) 71-11-04/201, Fan Cowl Panels
      (2) 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          413/423 Fan Cowl Panel (LH)
          414/424 Fan Cowl Panel (RH)
          415/425 Fan Reverser (LH)
          416/426 Fan Reverser (RH)

   C. Procedure

      S 016-002-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 016-003-R00

      WARNING: OBEY THE INSTRUCTIONS IN AMM 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.

      (2) Open the thrust reversers (Ref 78-31-00/201).
   D. Procedure

      S 226-004-R00
      (1) Examine the fuel tubes for cracks, dents, scores, nicks, tightness and fretting.

      S 226-005-R00
      (2) Examine the fuel tube end connectors for galling and axial scores:

      NOTE: Do the inspection of the end connectors only after you remove the related fuel tubes.

S 226-006-R00
(3) Examine the fuel tube end fittings that follow for wear:

NOTE: Do the inspection of the end fittings only after you remove the related fuel tubes.

(a) Tube (12) LP filter to HP pump.
(b) Tube (3) LP pump to fuel cooled oil cooler.
(c) Tube (2) HP pump to FFG.
(d) Tube (1) FFG to HP pump overspill return.

S 226-040-R00
(4) Examine the flexible sections of the LP fuel tube, LP filter to HP pump for splits in the firesleeve.

E. Acceptance standard - Low pressure fuel tubes

S 226-016-R00
(1) Cracks
(a) No cracks are permitted.

S 226-017-R00
(2) Dents
(a) Smooth dents with a large area in relation to depth are permitted if:
1) The diameter of the tube has not decreased by more than 10 percent.
2) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.
(b) Smooth dents not more than 0.125 square inches (80.60 square mm) in area are permitted if:
1) The dents are rounded at the bottom.
2) The dents on the outside surface of a bend are not more than 0.015 inches (0.381 mm) in depth.
3) The dents on the remaining section of the tube are not more than 0.025 inches (0.635 mm) in depth.
4) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

S 226-018-R00
(3) Nicks
(a) Nicks that are rounded at the bottom are permitted if:
1) They are not more than 0.004 inches (0.101 mm) in depth and all burrs are removed.

S 226-019-R00
(4) Fretting
(a) Fretting up to a maximum depth of 0.005 inches (0.127 mm) is permitted.

S 226-020-R00

(5) Scoring

(a) Thin scoring is permitted if:

1) It can be made smooth and it is not on the outside surface of a bend.

2) Not more than 0.005 inches (0.127 mm) of the metal is removed.

S 226-039-R00

(6) Firesleeve splitting

(a) Splitting up to 4 inches (101.6 mm) in length is permitted if:

1) The wire braid/PTFE core is not damaged.

2) No part of the split is less than 1 inch (25.4 mm) from the end of the firesleeve.

3) There is no loss of firesleeve material.

F. Acceptance standard - High pressure fuel tubes

S 226-021-R00

(1) Cracks

(a) No cracks are permitted.

S 226-022-R00

(2) Dents

(a) Smooth dents with a large area in relation to depth are permitted if:

1) The diameter of the tube has not decreased by more than 10 percent.

2) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

3) The dents are not on the outside surface of a bend.

(b) Smooth dents not more than 0.125 square inches (80.60 square mm) in area are permitted if:

1) The dents are rounded at the bottom.

2) The dents are not more than 0.025 inches (0.635 mm) in depth.

3) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

S 226-023-R00

(3) Nicks

(a) Nicks that are rounded at the bottom are permitted if:

1) They are not more than 0.004in. (0.102 mm.) in depth and all burrs are removed.

2) They are not on the outside surface of a bend.

S 226-024-R00

(4) Fretting

(a) Fretting up to a maximum depth of 0.004 inches (0.102 mm) is permitted if it is not on the outside surface of a bend.

S 226-026-R00

(5) Scoring

(a) Thin scoring is permitted if:

1) It can be made smooth and it is not on the outside surface of a bend.

2) Not more than 0.004 in. (0.102 mm.) of the metal is removed.

G. Acceptance Standard - Fuel tube end connector.

S 226-027-R00

(1) Galling

(a) Galling up to a maximum depth of 0.008 inches (0.203 mm) is permitted if you do the repair procedure FRS 3253 (Ref 70-42-11/201).

(b) It is not permitted to have a depth more than 0.008 inches (0.203 mm).

S 226-028-R00

(2) Axial Scoring

(a) Axial scoring up to a maximum depth of 0.002 inches (0.051 mm) is permitted if you do the repair procedure FRS 3253 (Ref 70-42-11/201).

(b) It is not permitted to have a depth more than 0.002 inches (0.051 mm).

H. Acceptance standard - Low pressure fuel tube end fittings (Fig. 601).

S 226-029-R00

(1) Wear at location A

(a) It is permitted to have wear as much as 0.010 inches (0.254 mm).

(b) It is not permitted to have wear more than 0.010 inches (0.254 mm).

S 226-030-R00

(2) Wear at location B

(a) It is permitted to have wear as much as 0.010 inches (0.254 mm).

(b) It is not permitted to have wear more than 0.010 inches (0.254 mm).

I. Acceptance standard - High pressure fuel tube end fittings (Fig. 602).

S 226-031-R00

(1) Wear at location A
  (a) It is permitted to have wear as much as 0.010 inches (0.254 mm).
  (b) It is not permitted to have wear more than 0.010 inches (0.254 mm).

S 226-032-R00

(2) Wear at location B
  (a) It is permitted to have wear as much as 0.010 inches (0.254 mm).
  (b) It is not permitted to have wear more than 0.010 inches (0.254 mm).

S 416-014-R00

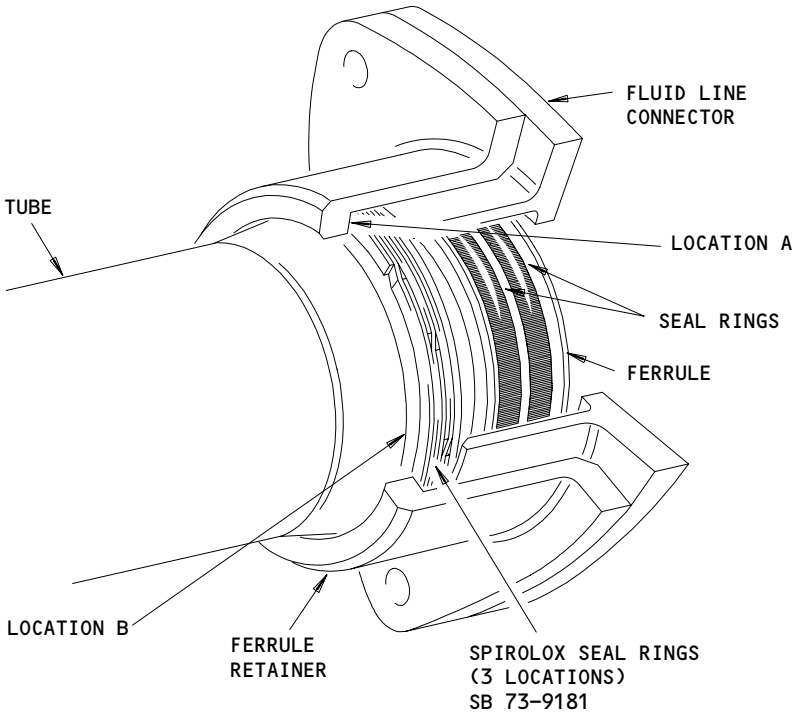
WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Close the thrust reversers (Ref 78-31-00/201).

S 416-037-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(4) Close the fan cowl panels (Ref 71-11-04/201).



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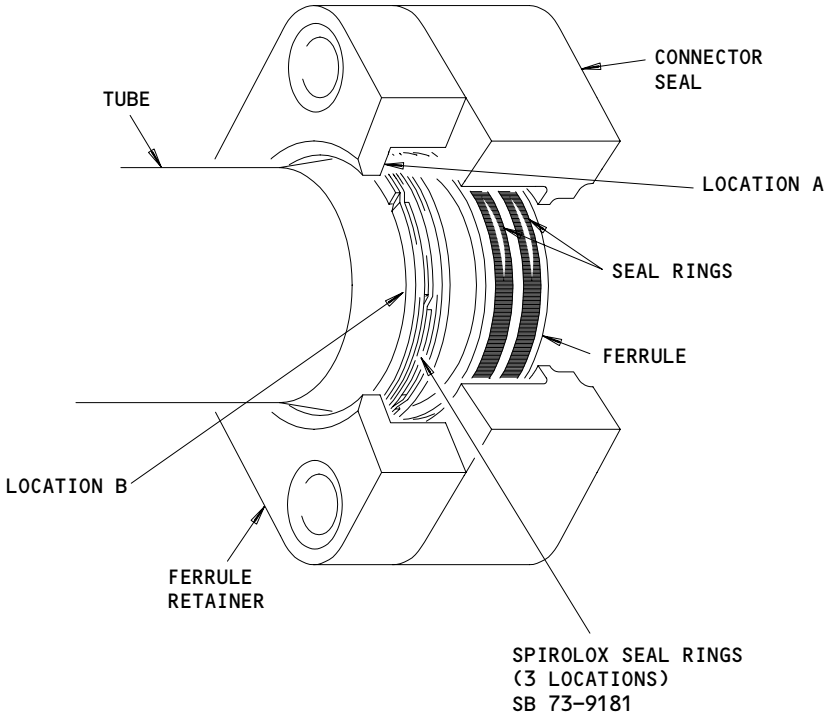
Low Pressure Fuel Tube - Non Rigid End Fitting Inspection
Figure 601



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High Pressure Fuel Tube - Non Rigid End Fitting Inspection
Figure 602

FUEL TUBES AND FITTINGS - APPROVED REPAIRS

1. General
   A. This procedure includes the data for the FRS 6909 - Temporary Repair for a split firesleeve on the LP Fuel Tube.
   B. This procedure is applicable to the RB211-535E4 and RB211-535E4-B engine fuel tube with this part number: 163521538.
   C. This procedure lets a repaired LP Fuel Tube stay in service for a period of not more than 25 flight hours.

TASK 73-11-06-308-001-R00

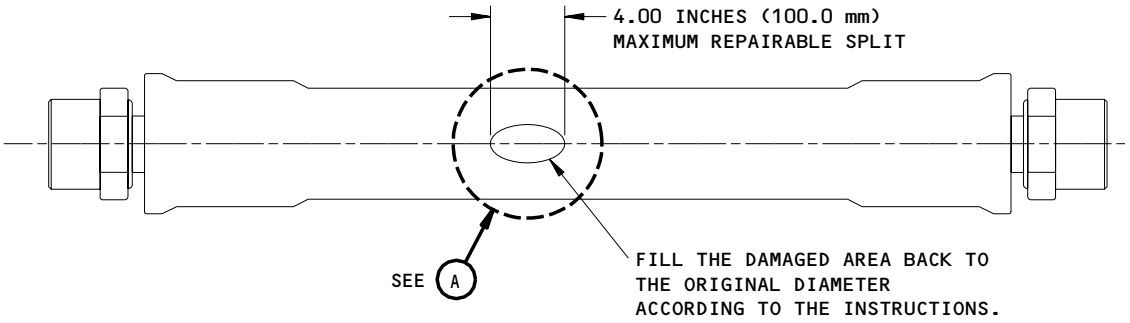
2. Repair the LP Fuel Tube Firesleeve
   A. Consumable Materials
      (1) G02354 Lockwire
          Omat No. 238, 22SWG
      (2) A00081 Silicone compound,
          cold curing, RTV 106 - Omat No. 872A
      (3) B00130 Isopropyl alcohol
          Omat No. 1/40
      (4) G01043 Lint-free cloth
          Omat No. 2/101
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414 Fan Cowl Panel (RH)
          424 Fan Cowl Panel (RH)

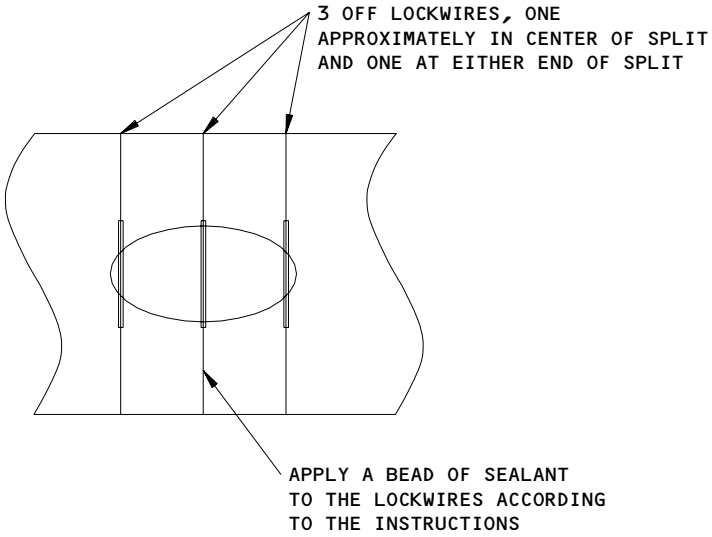
   D. Prepare to Repair the Firesleeve

      S 868-002-R00
      (1) Supply electrical power (AMM 24-22-00/201).

      S 868-003-R00
      (2) Do these steps to isolate the fuel system and related systems:
          (a) For the left engine, make sure that this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E1, FUEL VALVES L SPAR
          (b) For the right engine, make sure that this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E2, FUEL VALVES R SPAR



TYPICAL DAMAGE TO SILICON RUBBER FIRESLEEVE



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Temporary Repair of Firesleeve
Figure 801

(c) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.
(d) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.
(e) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
1) 6E1, FUEL VALVES L SPAR
(f) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
1) 6E2, FUEL VALVES R SPAR

S 028-004-R00

(3) Remove electrical power if it is not necessary for others maintenance (AMM 24-22-00/201).

S 018-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

E. Repair the Firesleeve.

S 308-006-R00

(1) Do these steps to repair the firesleeve (Fig. 801):
(a) If there is an identification tag adjacent to the repair area, move the tag along the tube to clear the repair area.
(b) Clean the damaged area with Isopropyl alcohol and a clean lint-free cloth.
1) Let the damaged area dry for 15 minutes.
(c) Fill the damaged area with the silicone compund.
1) Make the silicone compound the same diameter as the firesleeve.
2) Let the silicone compound cure in air for 30 minutes.

S 358-007-R00

(2) Wind lockwire around the repair area (Fig. 801).
(a) Install three lockwires to prevent an increase in the length of the split.
(b) Apply the silicone compound to the twisted ends of the lockwires.
1) Let the silicone compound cure for 30 minutes.

S 868-008-R00

(3) Move the identification tag.
(a) If the identification tag was moved in the above paragraph, install the tag adjacent to the tube part number.
(b) Write FRS 6909 on one of the stainless steel tube sections. Use suitable permanent paint or ink.

F. Put the Airplane back to its Usual Condition

S 028-009-R00

(1) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 028-010-R00

(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 028-011-R00

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

S 418-012-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

ENGINE MAIN FUEL SUPPLY LINE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the Engine Main Fuel Supply Line. The second task is to install the engine Main Fuel Supply Line. The Engine Main Fuel Supply Line is referred to as the fuel supply line in this procedure.
   B. Use the procedures given in (AMM 70-02-01/201) for the identification, lubricant, and installation of rubber seal rings.
   C. Use the procedures given in (AMM 70-50-02/201) to connect the electrical plugs.
   D. Use the procedures given in (AMM 70-51-00/201) to tighten the fasteners. Tighten the fasteners to the torque values given in (AMM 70-51-00/201) unless a torque value is specified in this procedure.

TASK 73-11-07-004-001-R00

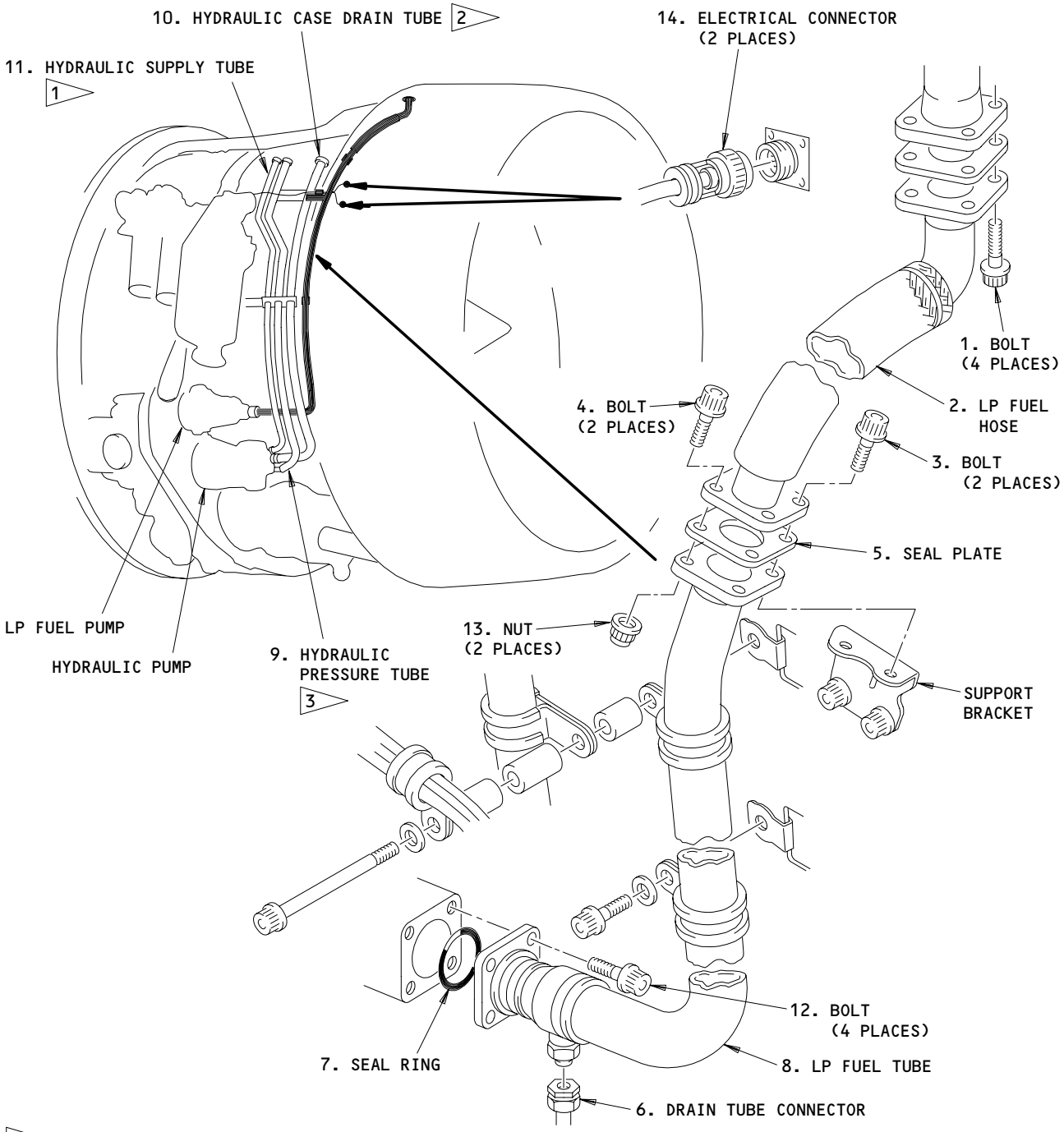
2. Remove the Fuel Supply Line (Fig. 401)
   A. Equipment
      (1) Clean receptacle - minimum capacity
          3 U.S. gallons
          2 Imperial gallons
          14 litres
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-00-02/401, Power Plant
      (3) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          414 Fan Cowl Panel (RH)
          424 Fan Cowl Panel (RH)

   D. Prepare to remove the fuel supply line.

      S 864-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 864-003-R00
      (2) Isolate the fuel system and related systems.
          (a) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E1, FUEL VALVES L SPAR
          (b) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E2, FUEL VALVES R SPAR
          (c) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.



1 TIGHTEN HOSE NUT TO 665-735 POUND-INCHES (75-83 NEWTON-METERS)

2 TIGHTEN HOSE ADAPTER TO 1520-1680 POUND-INCHES (172-190 NEWTON-METERS)

3 TIGHTEN SELF-SEALING HOSE ADAPTER TO 1140-1260 POUND-INCHES (129-142 NEWTON-METERS)

77685

Engine Main Fuel Supply Line Installation
Figure 401

(d) Make sure that the ENG VALVE and FUEL SPAR lights, on the control stand, are off.
(e) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
1) 6E1, FUEL VALVES L SPAR
(f) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
1) 6E2, FUEL VALVES R SPAR

S 864-004-R00
(3) Remove electrical power (AMM 24-22-00/201).

S 014-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 944-006-R00
(5) Put the container below the hydraulic flexible tubes to collect the hydraulic fluid and fuel leakage.

S 034-007-R00
(6) Disconnect the hydraulic flexible tubes (9), (10), and (11) (Fig. 401) at the self-sealing adapters.

E. Remove the Engine Main Fuel Supply Tube and Hose Assembly.

S 034-009-R00
(1) Remove the drain connector (6).

S 034-010-R00
(2) Release the support clips (2 locations) from the tube (8).

S 034-012-R00
(3) Remove the electrical connectors (14) (2 locations).

S 034-013-R00
(4) Remove the bolts (12) that attach the tube (8) flange to the LP fuel pump.

S 034-014-R00
(5) While you hold the tube, remove the bolts (3) and (4) that attach the tube to support bracket and hose assembly (2).

S 034-015-R00
(6) Remove the tube (8).

S 034-016-R00
(7) Discard the seal (7) and seal plate (5).

S 034-017-R00
(8) Release the support clip from the hose (2).

S 034-018-R00
(9) Remove the bolts (1) at the interface between the hose and pylon.

S 024-037-R00
(10) Remove the hose assembly (2) (AMM 71-00-02/401).

TASK 73-11-07-404-019-R00

3. Install the Fuel Supply Line (Fig. 401)

A. Consumable Materials
(1) Lockwire
British Spec - DTD189A: 22 S.W.G.
American Spec - 21 A.W.G.
OMat No. - 238

B. References
(1) AMM 24-22-00/201, Control
(2) AMM 71-00-00/501, Power Plant
(3) AMM 71-11-04/201, Fan Cowl Panels

C. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
414 Fan Cowl Panel (RH)
424 Fan Cowl Panel (RH)

D. Install the Fuel Supply Tube and Hose Assembly.

S 434-020-R00
(1) Lubricate and install the new seal ring (7) to the inlet face on the LP fuel pump.

S 434-021-R00
(2) Put the tube (8) in its position for installation.

S 434-022-R00
(3) Loosely put the support clips in their installed positions (2 locations).

S 434-024-R00
(4) Install the electrical connectors (14) (2 locations).

S 434-025-R00
(5) Install the tube (8) with the bolts (12) to the LP fuel pump.
(a) Tighten the bolts (12) with your hand.

S 434-026-R00
(6) Install the bolts (1) to the engine interface connector (AMM 71-00-02/401).
(a) Tighten the bolts (1) with your hand.

S 434-027-R00
(7) Install the connector (6).
(a) Safety the connector (6) with a lockwire.

S 434-028-R00
(8) Lubricate and install the seal plate (5), between the flanges of the tube (8) and hose (2), with the bolts (4) and nuts (13).

S 434-029-R00
(9) Install the bolts (3) that attach the tube (8) and hose (2) to the support bracket.

S 434-030-R00
(10) Tighten all the bolts and nuts that were removed during this procedure.

S 434-031-R00
(11) Connect the hydraulic flexible tubes.
(a) Connect the self-sealing adapter (11), on the flexible hose of the case drain, to the hydraulic pump adapter.
1) Hold the pump adaptor back with spanner flats, and tighten the hose nut to 665-735 pound-inches (75-83 Newton meters).
(b) Connect the self-sealing adapter (10) on the supply flexible hose to the hydraulic pump adapter.
1) Hold the pump adapter aft with the spanner flats, and tighten the hose nut to 1520-1680 pound-inches (172-190 Newton meters).
(c) Connect the self-sealing adapter (9) on the pressure flexible hose to the hydraulic pump adapter.
1) Hold the pump adaptor aft with the spanner flats, and tighten the hose nut to 1140-1260 pound-inches (129-142 Newton meters).

E. Put the airplane back to its usual condition.

S 864-032-R00
(1) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 864-033-R00

(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 864-034-R00

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

S 414-035-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 794-036-R00

(5) Do a leak check on all connections on the fuel supply line that were disconnected during this procedure (AMM 71-00-00/501).

ENGINE MAIN FUEL SUPPLY LINE - INSPECTION/CHECK

1. General
   A. This procedure contains an inspection of the Engine Main Fuel Supply Line.

TASK 73-11-07-226-001-R00

2. Engine Main Fuel Supply Line Inspection
   A. References
      (1) 24-22-00/201, Control
      (2) 70-42-11/201, Repair of Surfaces with Light Damage
      (3) 71-11-04/201, Fan Cowl Panels
      (4) 73-11-07/801, Engine Main Fuel Supply Line
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414/424 Fan Cowl Panel (RH)

   C. Prepare for the Inspection.

      S 866-002-R00
      (1) Supply electrical power (Ref 24-22-00/201).

      S 866-003-R00
      (2) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E1, L SPAR FUEL VALVE

      S 866-004-R00
      (3) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E2, R SPAR FUEL VALVE

      S 866-005-R00
      (4) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag:

      S 866-006-R00
      (5) Make sure the ENG VALVE and FUEL SPAR lights on the on control stand are off.

      S 866-007-R00
      (6) For the left engine, open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
          (a) 6E1, L SPAR FUEL VALVE

S 866-008-R00

(7) For the right engine, open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
(a) 6E2, R SPAR FUEL VALVE

S 866-009-R00

(8) Remove the electrical power (Ref 24-22-00/201).

S 016-010-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

D. The LP fuel hose assembly inspection.

S 226-011-R00

(1) Examine the rubber outer sleeve of the LP fuel hose for nicks, cuts or chafing.

S 226-012-R00

(2) Examine the steel-braid inner core of the LP fuel hose for damage.

E. The LP fuel tube assembly inspection.

S 226-013-R00

(1) Examine the LP fuel tube for cracks, dents, scores, nicks and fretting.

F. Acceptance standard - LP fuel hose assembly

S 226-018-R00

(1) If there is damage to steel-braid inner core - Reject.

S 226-019-R00

(2) Chafing:
(a) Chafing up to 0.030 inches (0.762 mm) in depth - Accept.
(b) Chafing more than 0.030 inches (0.762 mm) - Repair FRS.5231 (Ref 73-11-07/801).

S 226-020-R00

(3) Cuts or nicks - Repair FRS.5231 (Ref 73-11-07/801).

G. Acceptance standard - LP fuel tube assembly

S 226-021-R00

(1) Cracks are not permitted - Reject.

S 226-022-R00

(2) Dents

(a) Smooth dents with a large area in relation to depth are permitted if:

1) The diameter of the tube has not decreased by more than 10 percent.

2) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

(b) Smooth dents not more than 0.125 square inches (80.60 square mm) in area are permitted if:

1) The dents are rounded at the bottom.

2) The dents on the outer surface of a bend are not more than 0.015 inches (0.381 mm) in depth.

3) The dents on the remaining section of the tube are not more than 0.025 inches (0.635 mm) in depth.

4) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

S 226-023-R00

(3) Nicks

(a) Nicks that are rounded at the bottom, if they are not more than 0.004inches (0.101 mm) in depth and all burrs are removed - are permitted.

(b) Damage that is more than above - Reject.

S 226-024-R00

(4) Fretting

(a) Fretting up to a maximum depth of 0.007 inches (0.178 mm) on the outside surface of a bend or 0.010 inches (0.254 mm) on the remaining section of the tube - Accept.

(b) Damage that is more than (a) - Reject.

S 226-025-R00

(5) Scoring

(a) Light scoring up to 0.005 inches (0.127 mm) in depth not on the outside surface of a bend - Repair FRS.3253 (Ref 70-42-11/201).

(b) Damage that is more than (a) - Reject.

H. Put the airplane back to its usual condition.

S 866-014-R00

(1) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:

(a) 6E1, L SPAR FUEL VALVE

S 866-015-R00

(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:

(a) 6E2, R SPAR FUEL VALVE

S 036-016-R00

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

S 416-017-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

ENGINE MAIN FUEL SUPPLY LINE - APPROVED REPAIRS

1. General
   A. This procedure includes the data for the FRS 5231 - Damage Repair for the outer sleeve of the flexible LP fuel hose assembly. The outer sleeve of the flexible LP fuel hose assembly is referred to as the outer sleeve in this procedure.
   B. This procedure is applicable to the fuel hose assemblies with these part number:

      AE 706557-1
      107180.

   TASK 73-11-07-348-001-R00

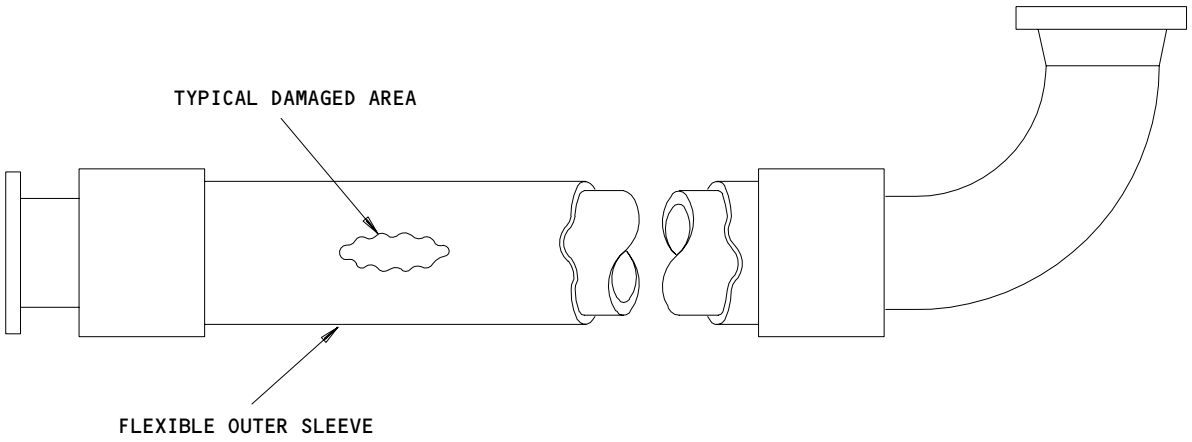
2. Repair the Flexible LP Fuel Hose Assembly Outer Sleeve
   A. Consumable Materials
      (1) Isopropyl alcohol
          OMat No. - 1/40
      (2) Silicone compound, cold curing, RTV106
          OMat No. - 872A
      (3) Lockwire, 20 S.W.G.
          OMat No/. - 2/72
      (4) Clean, lintfree cloth
      (5) Firesleeve patch
          British Spec - UL17697
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

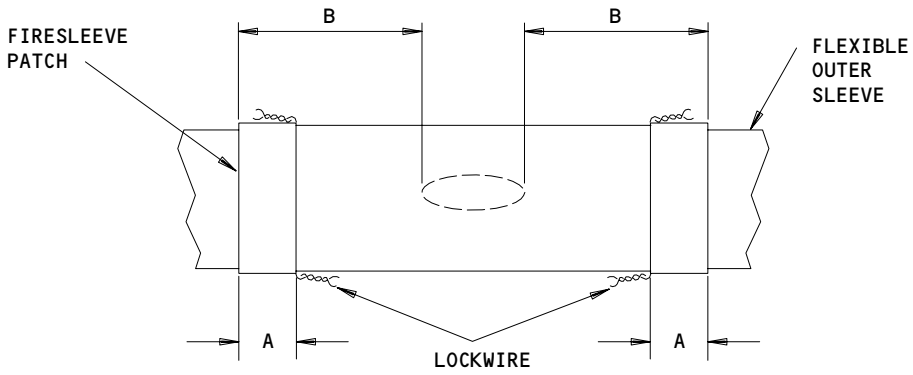
      (2) Access Panels
          414 Fan Cowl Panel (RH)
          424 Fan Cowl Panel (RH)

   D. Prepare to Repair the Outer Sleeve.

      S 868-002-R00
      (1) Supply electrical power (AMM 24-22-00/201).

      S 868-003-R00
      (2) Do these steps to isolate the fuel system and related systems:
          (a) For the left engine, make sure that this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E1, FUEL VALVES L SPAR
          (b) For the right engine, make sure that this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E2, FUEL VALVES R SPAR





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Installation of Firesleeve Patch
Figure 801

(c) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.
(d) Make sure the ENG VALVE and FUEL SPAR lights , on the control stand, are off.
(e) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
1) 6E1, FUEL VALVES L SPAR
(f) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
1) 6E2, FUEL VALVES R SPAR

S 868-004-R00
(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 018-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

E. Repair the Outer Sleeve.

S 348-010-R00
(1) Do these steps to repair the outer sleeve:
(a) Clean the damaged area with Isopropyl alcohol and a clean, lintfree cloth.
1) Let the damaged area dry for 15 minutes.
(b) Fill the damaged area with the silicone compound.
1) Make the silicone compound the same shape as the initial hose diameter.
(c) Let the silicone compound cure for 30 minutes.
(d) Cut the firesleeve patch to the dimension of the damaged area.
1) Cut the firesleeve patch such that dimension B is not less than 2.00 inches (50.8 mm) (Fig. 801).
2) Make the firesleeve patch with a sufficient length to wind around the damaged area two times.
(e) Find the identification tag for the LP fuel hose.
1) If the tag is near the damaged area, remove the tag.
(f) Apply a bead of the silicone compound to the bottom edges (but not the outer edge) of the patch.
(g) Put the inner edge of the firesleeve patch opposite the damaged area.
(h) Wind the firesleeve patch around the LP fuel hose.
1) Make sure that dimension B stays constant (Fig. 801).
2) Push the edges of the patch (but not the outer edge) tightly in its position.
3) Push all of the air from below the patch.
(i) Apply the silicone compound to the outer edge of the patch.
(j) Push the outer edge tightly in the correct position.

(k) Remove the unwanted silicone compound with a clean, lintfree cloth.
(l) Wind a lockwire around each end of the patch such that dimension A is 0.5 inches (12.7 mm) (Fig. 801).
1) Apply the silicone compound to the twisted ends of the lockwire.
(m) Apply the silicone compound to the edge of the patch.
(n) Seal the patch to the flexible outer sleeve of the LP fuel hose.
(o) Move the identification tag.

NOTE: If the identification tag is removed in paragraph E, move the tag to the top flange of the hose assembly, adjacent to the part number.

(p) Write FRS 5231 adjacent to the part number with a vibro engraver.

F. Put the Airplane Back to its Usual Condition.

S 868-006-R00
(1) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 868-007-R00
(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 868-008-R00
(3) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch.

S 418-009-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

LOW PRESSURE FUEL FILTER ELEMENT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is the Low Pressure Fuel Filter Element removal. The second task is the Low Pressure Fuel Filter Element installation. The Low Pressure Fuel Filter Element is referred to as the filter in this procedure.

TASK 73-11-10-004-001-R00

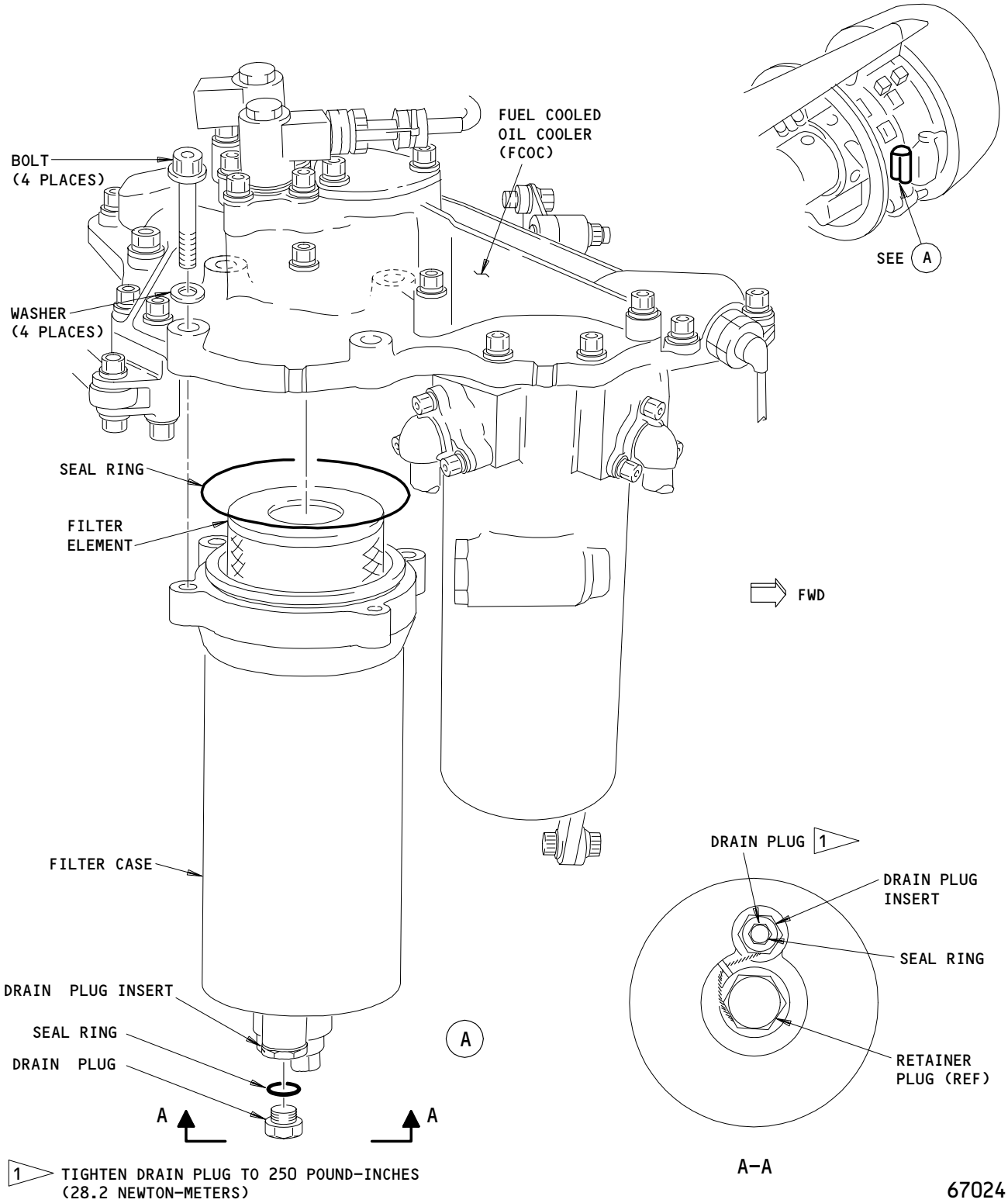
2. Remove the Low Pressure Fuel Filter Element
   A. Equipment
      (1) Clean container - minimum capacity:
          5 U.S. gallons, 4 Imperial gallons, 18 Liters
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 28-10-00/201, Microbial Growth
      (3) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          414AR Fan Cowl Panel (RH)
          424AR Fan Cowl Panel (RH)

   D. Remove the Filter

      S 864-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 864-003-R00
      (2) Do these steps to isolate the fuel system and the related systems.
          (a) For the left engine, make sure that this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E1, FUEL VALVE L SPAR
          (b) For the right engine, make sure that this circuit breaker on the main power distribution panel, P6, is closed:
              1) 6E2, FUEL VALVE R SPAR
          (c) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.
          (d) Make sure the ENG VALVE and FUEL SPAR lights, on the control stand are off.
          (e) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
              1) 6E1, FUEL VALVE L SPAR
          (f) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
              1) 6E2, FUEL VALVE R SPAR



Low Pressure Fuel Filter Element Installation
Figure 401

S 864-004-R00
(3) Remove the electrical power (AMM 24-22-00/201).

S 014-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 944-006-R00
(5) Put the container below the drain plug of the filter case.

S 034-007-R00
(6) Remove the plug and let the fuel drain in the container.

NOTE: When you remove or install the drain plug, hold the drain plug insert with a wrench. Do not let the drain plug insert turn when you remove the drain plug.

S 434-008-R00
(7) Lubricate and install the new seal ring to the drain plug.

S 434-009-R00
(8) When the fuel flow stops, install the drain plug (Fig. 401).
(a) Tighten the drain plug to 250 pound-inches (28.2 newton meters).
(b) Safety the drain plug with a lockwire.

S 034-010-R00
(9) Hold the filter case and remove the bolts.

S 024-011-R00
(10) Remove the filter case.

S 034-012-R00

(11) Remove and discard the filter element and seal ring from the filter case.

(a) Examine the fuel filter element for signs of microbial contamination.

NOTE: Microbial contamination may be evident in the filter as a dark colored sludge or slime but does not always have these characteristics. Microbial contamination can cause a blocked fuel filter and result in a fuel filter bypass condition.

1) If the fuel filter element has trapped fine debris of unknown origin, it is recommended you do the inspection of the fuel tanks for microbial contamination (AMM 28-10-00/201).

TASK 73-11-10-404-013-R00

3. Install the Low Pressure Fuel Filter Element

A. Consumable Materials

(1) Lockwire
British Spec/Ref - DTD189A, 22 S.W.G.
American Spec/Ref - 21 A.W.G.
OMat No. 238

(2) Clean Engine Fuel

B. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 71-00-00/501, Power Plant
(3) AMM 71-11-04/201, Fan Cowl Panels

C. Access

(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
414AR Fan Cowl Panel (RH)
424AR Fan Cowl Panel (RH)

D. Install the Filter

S 114-014-R00

(1) Clean the inner surface of the filter case with clean engine fuel.

S 824-015-R00

(2) Push and release the filter retainer (inner filter case) and make sure the retainer touches the bottom of the bolt head.

S 434-024-R00

(3) Install the new seal ring on the filter case.

S 434-025-R00

CAUTION: MAKE SURE THE FUEL FILTER IS THE CORRECT TYPE: IDENTIFIED BY EITHER RED END FITTINGS AND CENTER BANDS OR RED END CAP WITHOUT RED CENTER BAND . IF THE FUEL FILTER IS NOT THE CORRECT TYPE, LEAKAGE OR UNSATISFACTORY FILTRATION WILL OCCUR.

(4) Install the new filter to the filter case.

S 424-026-R00

(5) Put the filter case on the filter housing with the filter case drain in the outboard position.

S 434-027-R00

CAUTION: MAKE SURE THE FILTER IS INSTALLED CORRECTLY ON THE ELEMENT RETAINER BEFORE YOU TIGHTEN THE BOLTS. IF THE FILTER IS NOT CORRECTLY INSTALLED, FUEL LEAKAGE WILL OCCUR.

(6) Install the bolts and washers.
(a) Tighten the bolts to 370 inch-pounds (42 newton-meters).

E. Put the Airplane Back to its Usual Condition

S 864-032-R00

(1) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVE L SPAR

S 864-028-R00

(2) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVE R SPAR

S 864-029-R00

(3) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch on the control stand.

S 724-030-R00

(4) Do the test of the low pressure fuel filter element that is shown in the Power Plant Test Reference Table (AMM 71-00-00/501).

S 414-031-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

FUEL MANIFOLD - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task is to remove the left half of the fuel manifold. The second task is to install the left half of the fuel manifold. The third task is to remove the right half of the fuel manifold. The fourth task is to install the right half of the fuel manifold.
   B. This service bulletin is used in this procedure:
      (1) RR SB 73-7374 - Engine - Fuel and Control - Fuel Manifold-Fuel tube

TASK 73-11-11-004-001-R01

2. Remove the Left Fuel Manifold Half (Fig. 401)
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 74-21-02/401, Igniter Plug
      (3) AMM 78-31-00/201, Thrust Reverser System
   B. Equipment
      (1) Clean container - minimum capacity:
          1 U.S. gallon
          1 Imperial gallon
          4 Liters
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          415/425 Fan Reverser (LH)
          416/426 Fan Reverser (RH)

   D. Prepare to remove the fuel manifold.

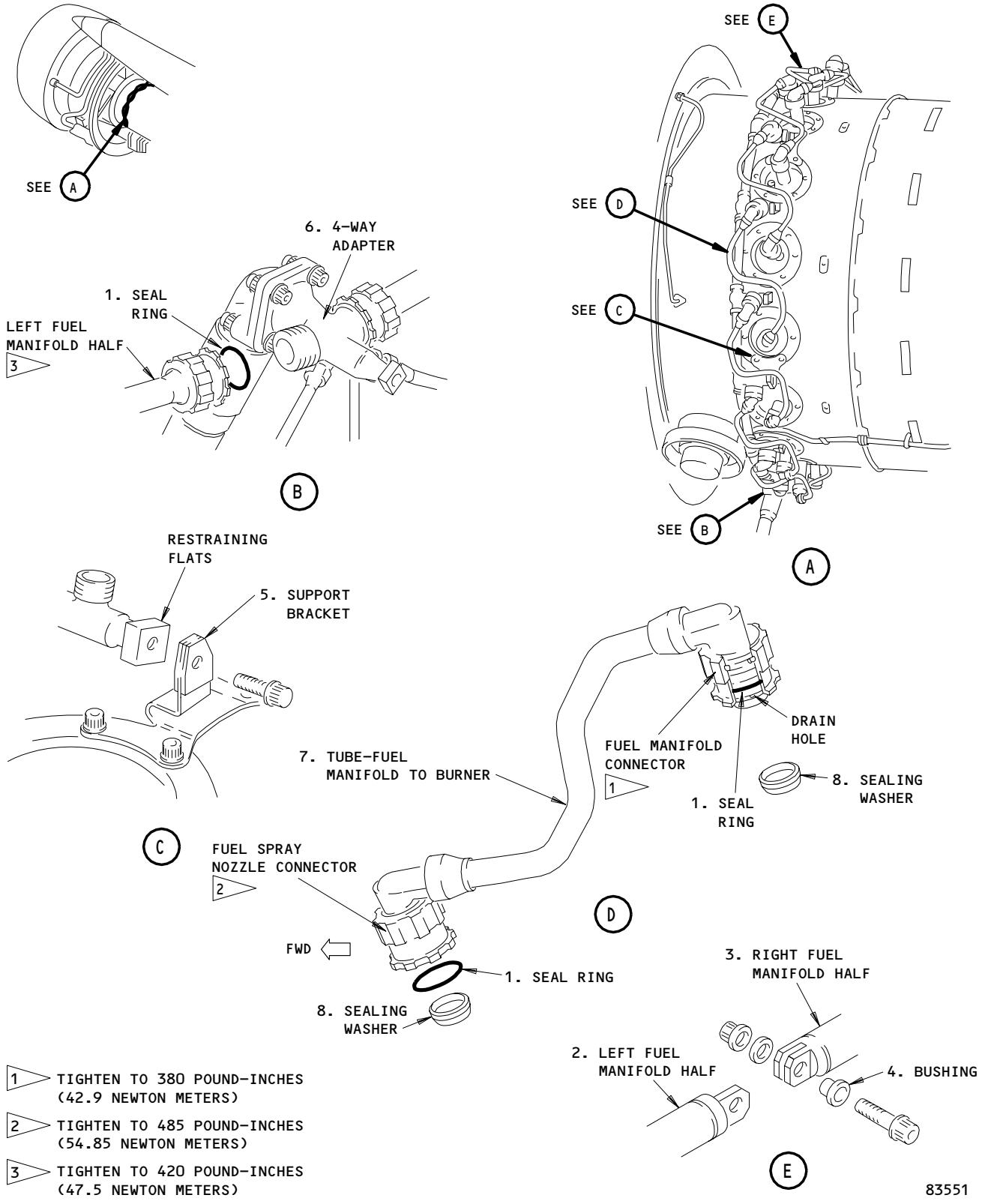
      S 864-002-R01
      (1) Remove the electrical power (AMM 24-22-00/201).

      S 014-003-R01

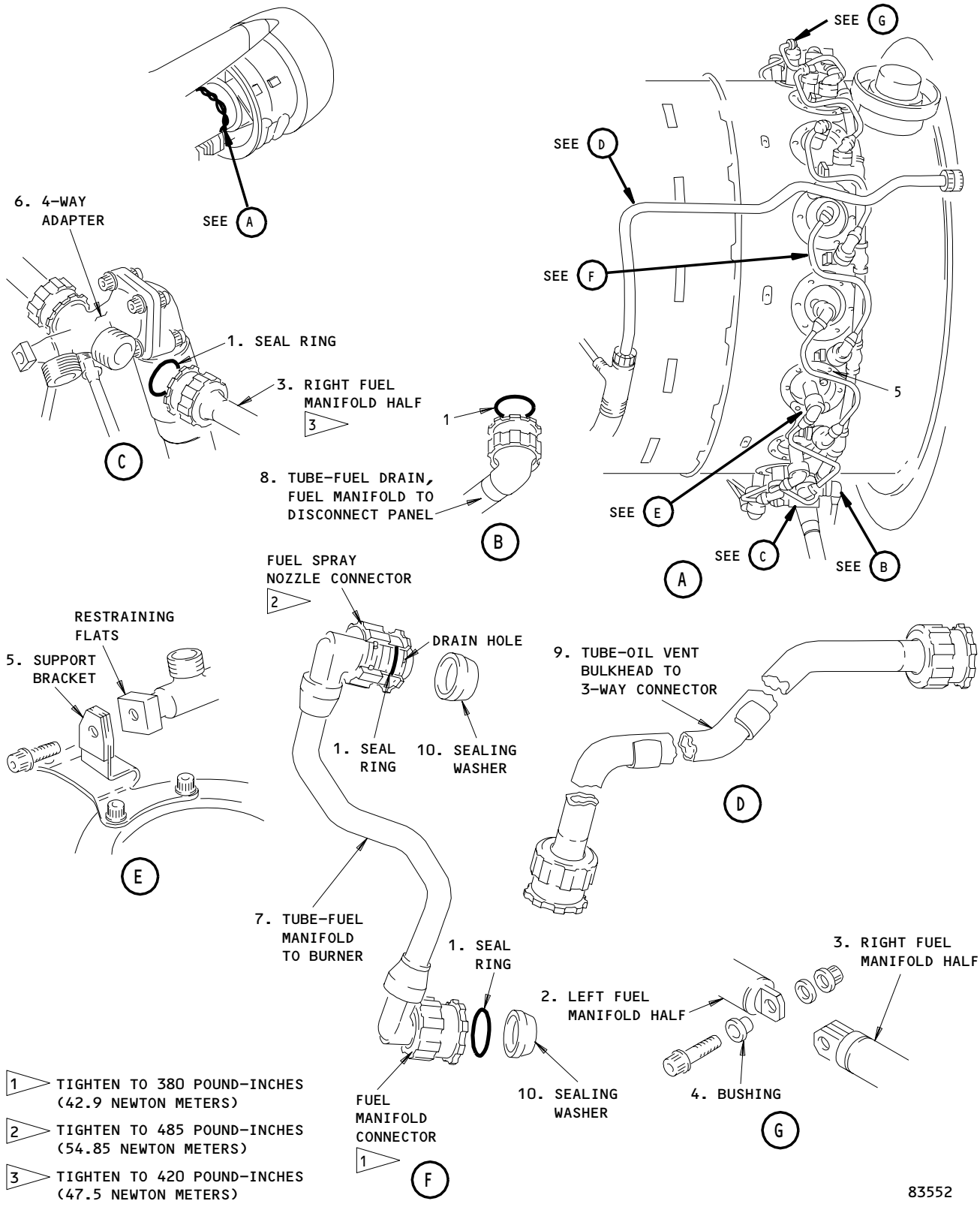
      WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (2) Open the thrust reversers (AMM 78-31-00/201).

      S 944-004-R01
      (3) Put a container below the fuel manifold to collect the fuel leakage.



Left Fuel Manifold Half Installation
Figure 401



Right Fuel Manifold Half Installation
Figure 402

E. Procedure

S 024-005-R01

(1) Remove the igniter plug from the number 12 fuel spray nozzle (AMM 74-21-02/401).

S 034-008-R01

CAUTION: BE CAREFUL WHEN YOU MOVE THE FUEL TUBES. IF YOU CAUSE DAMAGE TO THE SPHERICAL END FITTINGS ON THE FUEL TUBES, FUEL LEAKAGE CAN OCCUR.

(2) Install a Label (number) on each fuel manifold to burner tube (7), then disconnect and remove tubes.
(a) Discard the seal rings (1) and the sealing washers (8).

S 034-009-R01

(3) Remove the electrical harness clips, if necessary, to help remove the fuel manifold (2).

S 024-010-R01

(4) Disconnect the fuel manifold (2) from the 4-way adapter (6).

S 034-011-R01

(5) Remove the nut, bolt, washer and bushing (4) that hold the left fuel manifold to the right fuel manifold.

S 034-012-R01

(6) Hold the fuel manifold and remove the bolts that attach the fuel manifold (2) to the support brackets (5).

S 024-013-R01

(7) Remove the fuel manifold half.
(a) Discard the seal ring (1).

S 434-014-R01

(8) Install dust caps to all of the openings.

TASK 73-11-11-404-015-R01

3. Install the Left Fuel Manifold Half (Fig. 401)

A. References
(1) AMM 74-21-02/401, Igniter Plug

B. Equipment
(1) Spanner (Wrench) - Rolls-Royce HU26895
(2) Reactor Bar - Rolls-Royce HU27524/1 or
Reactor Bar - Rolls-Royce HU37801

(3) Spanner (Wrench) - Rolls-Royce HU28445
(4) Spanner (Wrench) - Rolls-Royce UT819
(5) ENGINES PRE-RR-SB 73-7374;
Crimping Pliers - Rolls Royce E2J60591
(6) ENGINES PRE-RR-SB 73-7374;
Crimping Pliers - Rolls Royce E2J60592
(7) ENGINES POST-RR-SB 73-7374;
Crimping Pliers - Rolls Royce HU32144
(8) ENGINES POST-RR-SB 73-7374;
Crimping Pliers - Rolls Royce HU33096

C. Consumable Materials
(1) Lockwire
British Spec./Ref - DTD. 189A 22 S.W.G.
American Spec./Ref - 21 A.W.G.
OMat Item No. - 238

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
415/425 Fan Reverser (LH)
416/426 Fan Reverser (RH)

E. Procedure

S 034-016-R01
(1) Remove the dust caps from all of the openings.

S 424-017-R01
(2) Put the fuel manifold half on the combustion case.

S 214-018-R01
(3) Make sure the manifold installs correctly below the electrical harness.

S 434-019-R01
(4) Install, but do not tighten, the support bracket bolts.

S 434-020-R01

CAUTION: MAKE SURE YOU INSTALL THE SEAL RINGS IN THE MIDDLE GROOVE OF EACH TUBE CONNECTOR. IF YOU INCORRECTLY INSTALL THE SEAL RINGS IN THE TUBE CONNECTORS, FUEL LEAKAGE CAN OCCUR.

(5) Install the seal ring (1) in the left fuel manifold.

S 424-021-R01
(6) Connect the left fuel manifold to the 4-way adapter (6).

S 434-022-R01
(7) Make sure the left and right halves of the fuel manifold engage correctly then install the bushing (4) from the rear.

S 434-023-R01
(8) Install the bolt, washer, and nut that connects the left and right halves of the fuel manifold.

S 434-026-R01
(9) ENGINES POST-RR-SB 73-7374;
Install the new seal rings (1) and the sealing washers (8) on the fuel manifold tubes (7).
(a) Lock the new sealing washers (8) in the correct position with the crimping pliers that follow:
1) For the burner end, use crimping pliers HU32144.
2) For the manifold end, use crimping pliers HU33096.

S 434-029-R01
(10) ENGINES PRE-RR-SB 73-7374;
Install the new seal rings (1) and the sealing washers (8) on the fuel manifold tubes (7).
(a) Lock the new sealing washers (8) in the correct position with the crimping pliers that follow:
1) For the burner end use crimping pliers E2J60591.
2) For the manifold end use crimping pliers E2J60592.

S 434-032-R01
(11) Connect the fuel manifold to burner tubes (7) to their correct positions.

NOTE: The fuel manifold to burner tube (7) for the No. 9 and No. 10 fuel spray nozzles have a different shape and must only be installed at these positions. The teleflex cable prevents the installation of an incorrect burner tube at position No. 9. A baulking bracket prevents the installation of an incorrect burner tube at the No. 10 position.

S 434-033-R01
(12) Tighten all tubes and fittings as follows (Fig. 401):
(a) Hold the 4-way adapter (6) with the flat sides of the spanners.

(b) Tighten the fuel manifold connector to 420 pound-inches (47.5 newton-meters) with an HU28445 spanner.
1) Install a lockwire.
(c) Tighten the fuel manifold to burner tube connector to the fuel manifold to 380 pound-inches (42.9 newton-meters) with a HU26895 spanner.
1) Install a lockwire.
(d) Tighten the fuel manifold to burner tube connector to the fuel spray nozzle to 485 pound-inches (54.85 newton-meters) with a UT819 spanner.
1) Install a lockwire.
(e) Tighten the support bracket (5) bolts.
1) Use a reactor bar on the manifold restraining flats to prevent manifold distortion.

S 434-034-R01

(13) Install all of the electrical harness clips.

S 424-035-R01

(14) Install the igniter plug (AMM 74-21-02/401) to the No. 8 fuel spray nozzle.

TASK 73-11-11-004-036-R01

4. Remove the Right Fuel Manifold Half (Fig. 402)

A. References
(1) AMM 74-21-02/401, Igniter Plug

B. Equipment
(1) Clean container - minimum capacity:
1 U.S. gallon
1 Imperial gallon
4 Liters

C. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
415/425 Fan Reverser (LH)
416/426 Fan Reverser (RH)

D. Procedure

S 024-037-R01

(1) Remove the igniter plug from the No. 8 fuel spray nozzle (AMM 74-21-02/401).

S 034-038-R01

CAUTION: BE CAREFUL WHEN YOU MOVE THE FUEL TUBES. IF YOU CAUSE DAMAGE TO THE SPHERICAL END FITTINGS ON THE FUEL TUBES, FUEL LEAKAGE CAN OCCUR.

(2) Install a label (number) on each fuel manifold to burner tube (7), then disconnect and remove the tubes.
(a) Discard the seal rings (1) and sealing washers (10).

S 034-040-R01

(3) Disconnect the fuel drain manifold to disconnect tube (8) from the fuel manifold.
(a) Discard the seal ring (1).

S 034-041-R01

(4) Disconnect all of the clipping details attached to the oil vent bulkhead to 3-way connector tube (9), then disconnect and remove the oil vent tube.

S 034-042-R01

(5) Remove the electrical harness clips, as necessary, to help remove the fuel manifold (3).

S 024-043-R01

(6) Disconnect the fuel manifold from the 4-way adapter (6).

S 034-044-R01

(7) Remove the nut, bolt, washer and bushing (4) that attach the right fuel manifold to the left fuel manifold.

S 034-045-R01

(8) Hold the fuel manifold (3) and remove the bolts that attach the fuel manifold to the support brackets (5).

S 024-046-R01

(9) Remove the fuel manifold (3).
(a) Discard the seal ring (1).

S 034-047-R01

(10) Install dust caps to all of the openings.

TASK 73-11-11-404-048-R01

5. Install the Right Fuel Manifold Half (Fig. 402)

A. References
(1) AMM 73-11-11/501, Fuel Manifold
(2) AMM 74-21-02/401, Igniter Plug
(3) AMM 78-31-00/201, Thrust Reverser System

B. Equipment
(1) Spanner (Wrench) - Rolls-Royce HU26895
(2) Reactor Bar - Rolls-Royce HU27524/1
(3) Spanner (Wrench) - Rolls-Royce HU28445
(4) Spanner (Wrench) - Rolls-Royce UT819
(5) ENGINES PRE-RR-SB 73-7374;
Crimping Pliers - Rolls Royce E2J60591
(6) ENGINES PRE-RR-SB 73-7374;
Crimping Pliers - Rolls Royce E2J60592
(7) ENGINES POST-RR-SB 73-7374;
Crimping Pliers - Rolls Royce HU32144
(8) ENGINES POST-RR-SB 73-7374;
Crimping Pliers - Rolls Royce HU33096

C. Consumable Materials
(1) Lockwire
British Spec./Ref - DTD. 189A 22 S.W.G.
American Spec./Ref - 21 A.W.G.
OMat Item No. - 238

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
415/425 Fan Reverser (LH)
416/426 Fan Reverser (RH)

E. Procedure

S 034-049-R01
(1) Remove the dust caps from all of the openings.

S 424-050-R01
(2) Put the right half of the fuel manifold (3) on the combustion case and make sure it installs correctly below the electrical harness.

S 434-051-R01
(3) Install, but do not tighten, the support bracket (5) bolts.

S 434-052-R01

CAUTION: MAKE SURE YOU INSTALL THE SEAL RINGS IN THE MIDDLE GROOVE OF EACH TUBE CONNECTOR. IF YOU INCORRECTLY INSTALL THE SEAL RINGS IN THE TUBE CONNECTORS, FUEL LEAKAGE CAN OCCUR.

(4) Install the seal ring (1) in the right fuel manifold.

S 424-053-R01

(5) Connect the right fuel manifold to the 4-way adapter (6).

S 434-054-R01

(6) Make sure the right and left halves of the fuel manifold engage correctly and install the bushing (4) from the rear.

S 434-055-R01

(7) Install the bolt and washer that attach the left fuel manifold to the right fuel manifold.

S 434-058-R01

(8) ENGINES POST-RR-SB 73-7374;
Install the new seal rings (1) and the sealing washers (10) on the fuel manifold tubes (7).

(a) Lock the new sealing washers in their correct position with the crimping pliers that follow:
1) For the burner end, use crimping pliers HU32144.
2) For the manifold end, use crimping pliers HU33096.

S 434-062-R01

(9) ENGINES PRE-RR-SB 73-7374;
Install the new seal rings (1) and the sealing washers (10) on the fuel manifold tubes (7).

(a) Lock the new sealing washers in their correct positions with the crimping pliers that follow:
1) For the burner end, use crimping pliers E2J60591.
2) For the manifold end, use crimping pliers E2J60592.

S 434-064-R01
(10) Connect the fuel manifold to burner tubes (7) to their correct positions.

S 434-065-R01
(11) Tighten all tubes and fittings as follows (Fig. 401):
(a) Hold the 4-way adapter (6) with the flat sides of the spanner.
(b) Tighten the fuel manifold connector to 420 pound-inches (47.5 newton-meters) with an HU28445 spanner.
(c) Tighten the fuel manifold to burner tube connector to the fuel manifold to 380 pound-inches (42.9 newton-meters) with a HU26895 spanner.
(d) Tighten the fuel manifold to burner tube connector to the fuel spray nozzle to 485 pound-inches (54.85 newton-meters) with a UT819 spanner.
(e) Tighten the support bracket (5) bolts.

S 434-066-R01
(12) Install the seal ring (1) in the fuel drain tube (8).

S 434-067-R01
(13) Install the fuel drain tube (8).
(a) Install a lockwire.

S 434-068-R01
(14) Install the oil vent tube (9).
(a) Tighten the connectors with an HU28445 spanner.
(b) Install a lockwire.

S 434-069-R01
(15) Install all of the clip details for the oil vent tube (9).

S 434-070-R01
(16) Install all of the clip details for the electrical harness.

S 424-071-R01
(17) Install the igniter plug (AMM 74-21-02/401) to the No. 12 fuel spray nozzle.

F. Put the airplane back to its usual condition.

S 724-072-R01
(1) Do a full Proof Pressure Test on the fuel system (AMM 73-11-11/501).

S 414-073-R01

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 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 (AMM 78-31-00/201).

FUEL MANIFOLD - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task is to remove the left half of the fuel manifold. The second task is to install the left half of the fuel manifold. The third task is to remove the right half of the fuel manifold. The fourth task is to install the right half of the fuel manifold.

TASK 73-11-11-004-001-R02

2. Remove the Left Fuel Manifold Half (Fig. 401,402)
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 74-21-02/401, Igniter Plug
      (3) AMM 78-31-00/201, Thrust Reverser System
   B. Equipment
      (1) Clean container - minimum capacity:
          1 U.S. gallon
          1 Imperial gallon
          4 Liters
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          415/425 Fan Reverser (LH)
          416/426 Fan Reverser (RH)

   D. Prepare to remove the fuel manifold.

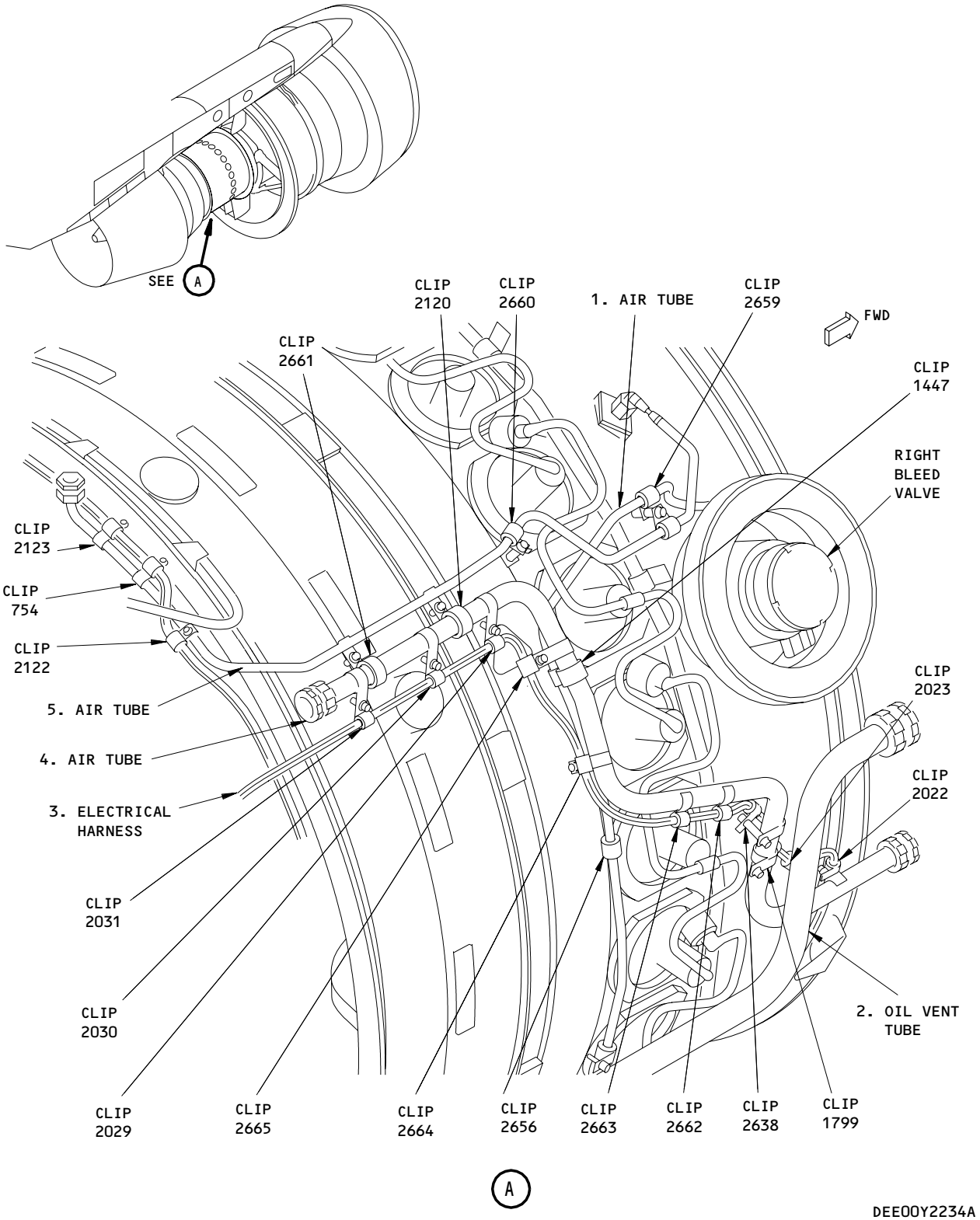
      S 864-002-R02
      (1) Remove the electrical power (AMM 24-22-00/201).

      S 014-003-R02

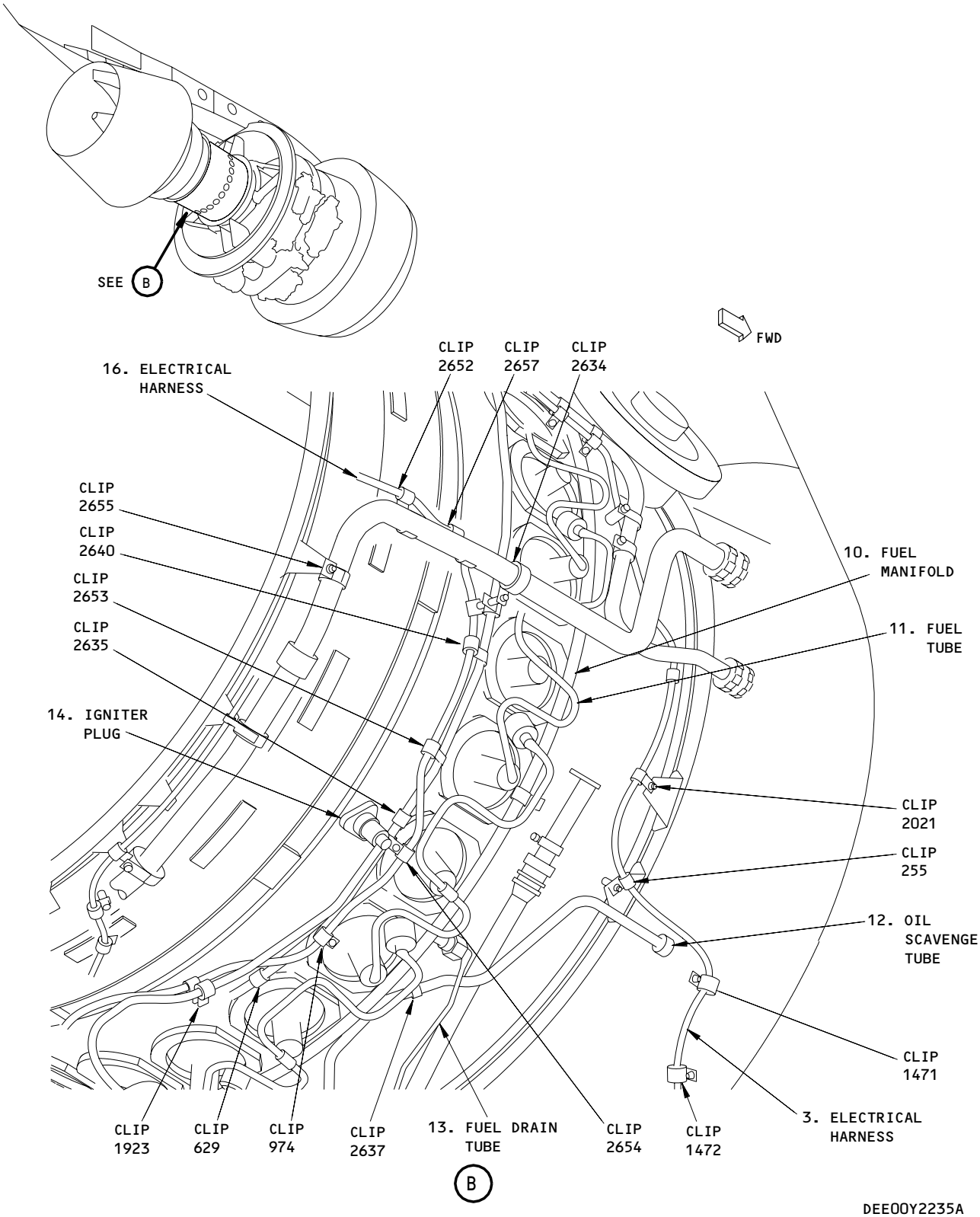
      WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (2) Open the thrust reversers (AMM 78-31-00/201).

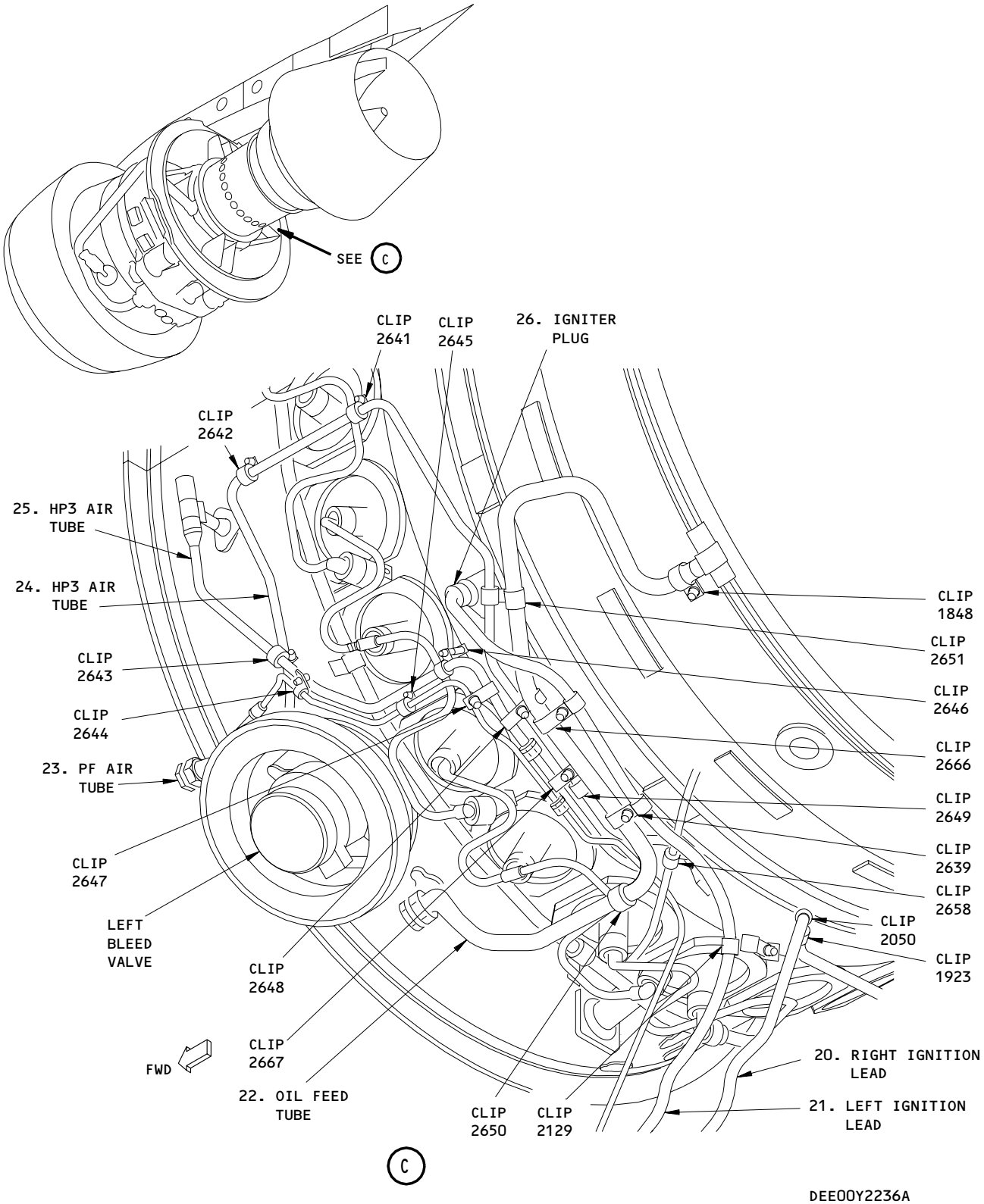
      S 944-004-R02
      (3) Put a container below the fuel manifold to collect the fuel leakage.
   E. Procedure



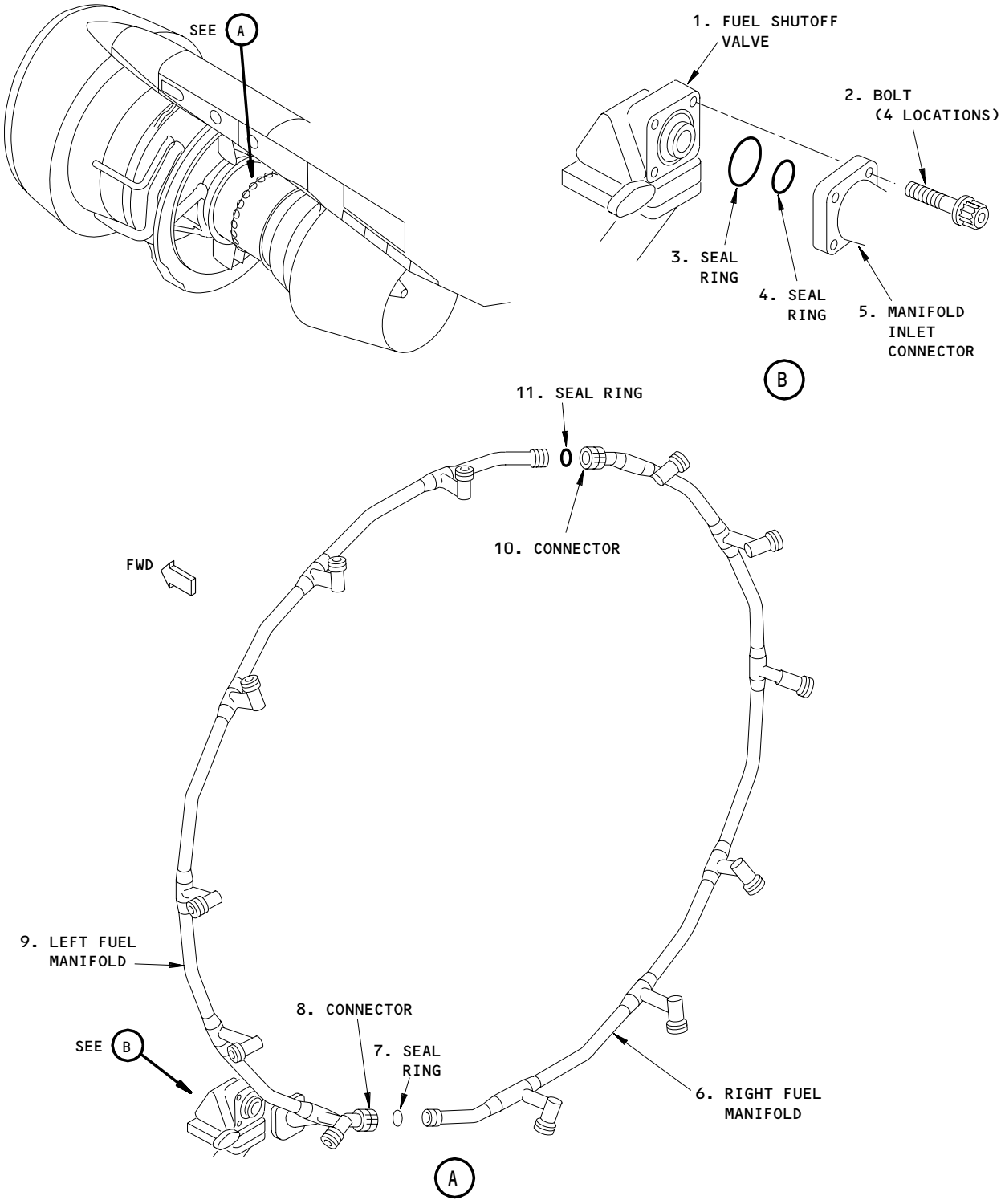
Fuel Manifold - Removal/Installation
Figure 401 (Sheet 1)



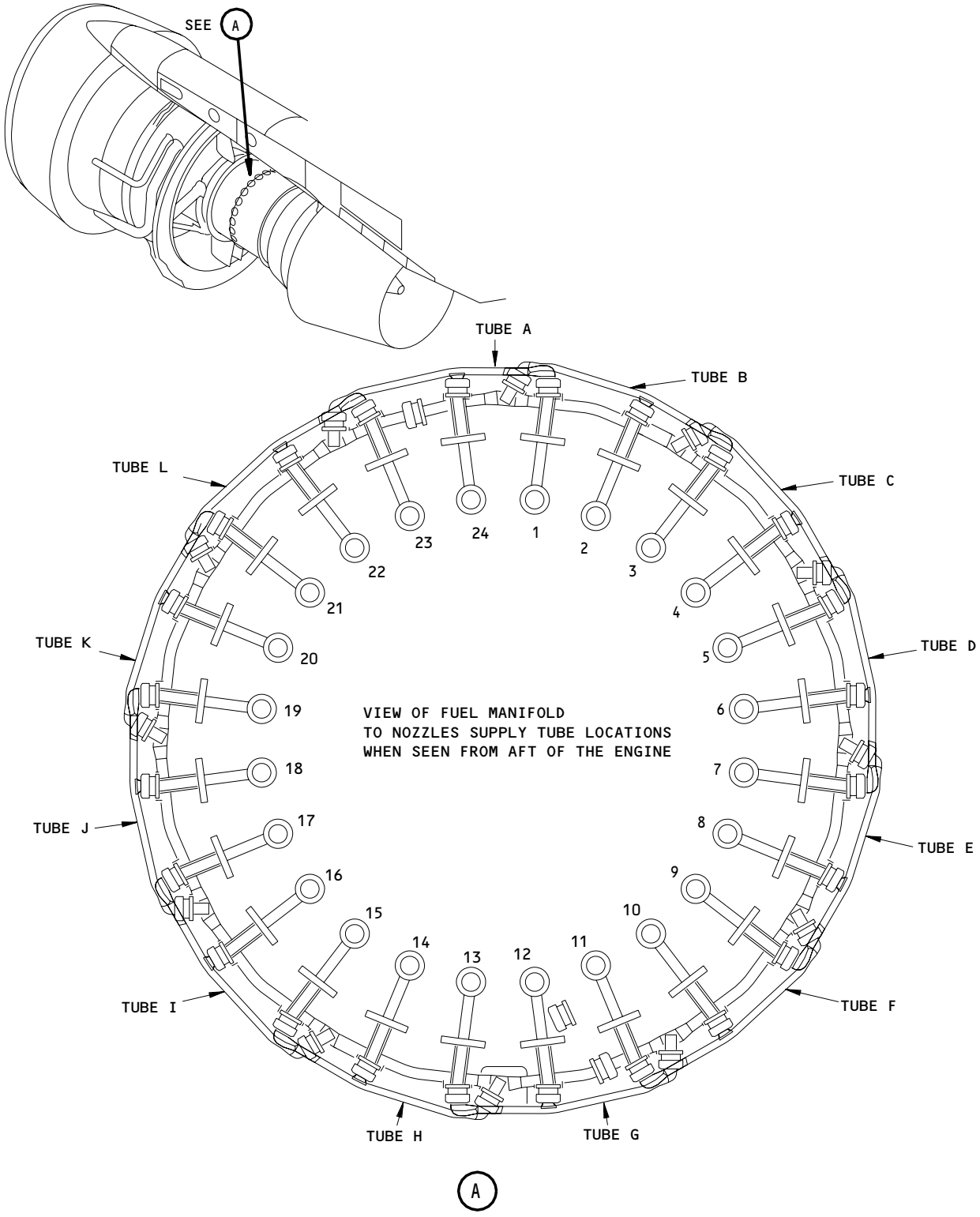
Fuel Manifold - Removal/Installation
Figure 401 (Sheet 2)



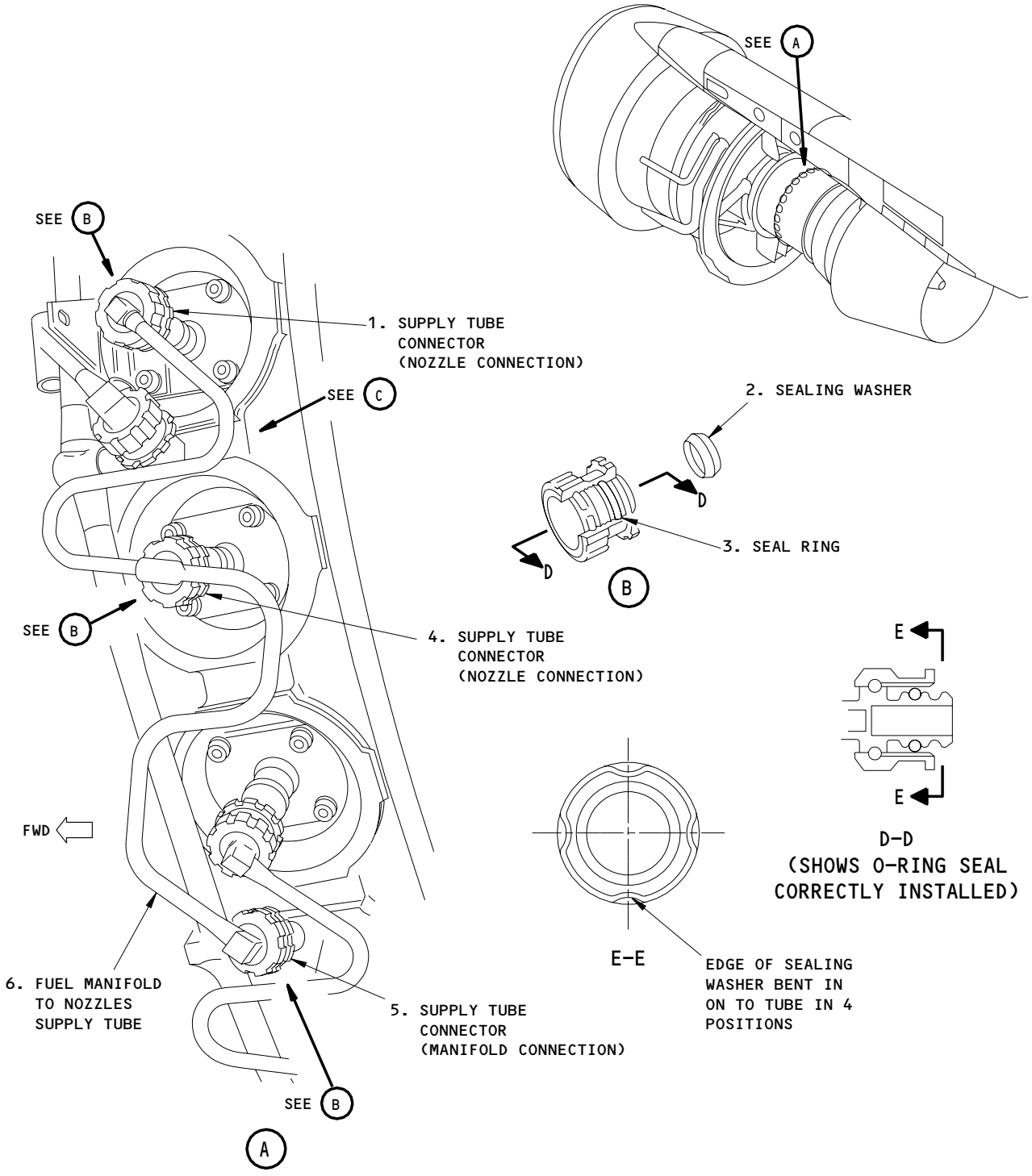
Fuel Manifold - Removal/Installation
Figure 401 (Sheet 3)



Fuel Manifold
Figure 402



Fuel Manifold to Nozzles Supply Tubes
Figure 403



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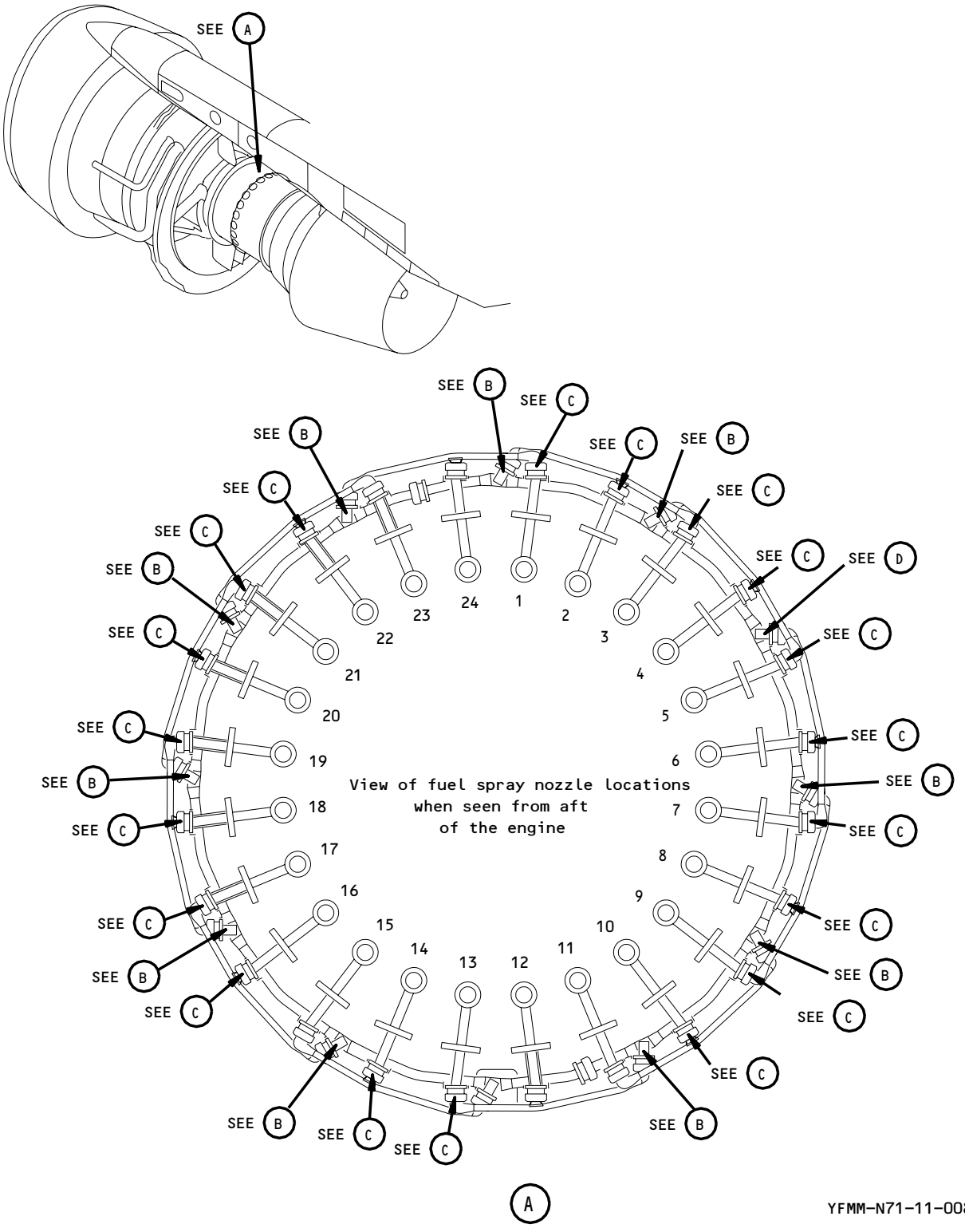
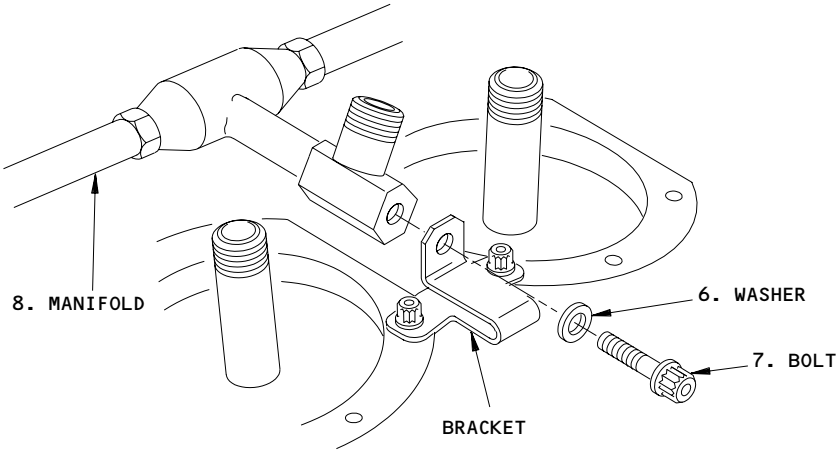
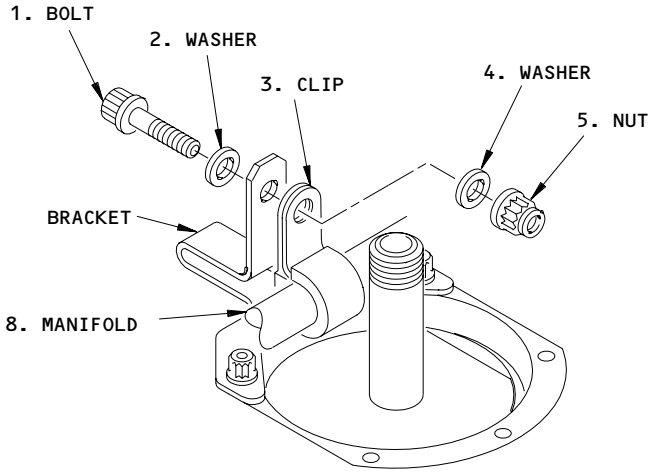
Fuel Manifold to Nozzles Supply Tubes
Figure 404



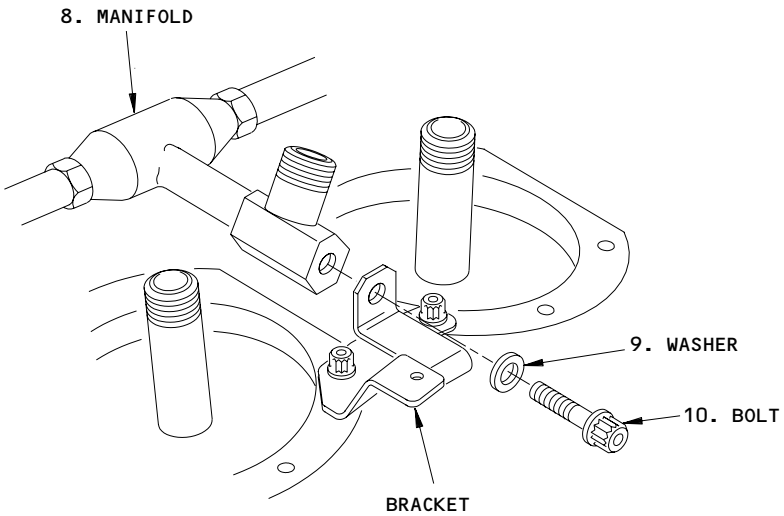
Fuel Manifold Support Brackets
Figure 405 (Sheet 1)



B



C



D

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DEE0002429A

Fuel Manifold Support Brackets
Figure 405 (Sheet 2)

S 024-074-R02

WARNING: YOU MUST BE CAREFUL WHEN YOU DO WORK ON THE ENGINE AFTER THE ENGINE HAS STOPPED. THE ENGINE PARTS CAN STAY HOT FOR ALMOST AN HOUR. YOU MUST PUT ON GLOVES WHEN YOU TOUCH THE HOT PARTS. IF YOU DO NOT DO THIS, AN INJURY CAN OCCUR.

YOU MUST NOT LET THE ENGINE FUEL STAY ON YOUR SKIN. FLUSH THE FUEL FROM YOUR SKIN WITH WATER. THE FUEL IS POISONOUS AND CAN BE ABSORBED INTO YOUR BODY.

(1) Disconnect the left ignition lead for access (Fig. 401).
  (a) Disconnect the ignition lead (21) from the igniter plug (26) (AMM 74-21-02/401).
  (b) Remove the clips at positions 2666,2129 and 2639.
  (c) Install caps on the igniter plug and the ignition lead.
  (d) Temporarily fasten the ignition lead clear of the fuel manifold.

S 024-075-R02

(2) Remove the HP3 air tube for access (Fig. 401).
  (a) Disconnect the HP3 air tube (25) at the tube disconnect.
  (b) Remove the clips at positions 2643, 2645, 2646, 2647 and 2648.
  (c) Remove the HP3 air tube.
  (d) Put caps on the open tube ends.

S 024-076-R02

(3) Remove the HP3 air tube for access (Fig. 401).
  (a) Disconnect the HP3 air tube (24) at the left bleed valve and the tube disconnect.
  (b) Remove the clips at positions 2643, 2642, 2641, 2651 and 2649.
  (c) Remove the HP3 air tube.
  (d) Put caps on the open tube ends.

S 024-079-R02

(4) Remove the PF air tube (Fig. 401).
  (a) Disconnect the PF air tube (23) at the tube disconnects.
  (b) Remove the clips at positions 2644, 2645, 2647 and 2667.
  (c) Put caps on the open tube ends.

S 024-080-R02

(5) Remove the oil feed tube (Fig. 401).
  (a) Disconnect the oil feed tube (22) at the tube disconnects.
  (b) Remove the clips at positions 1848, 2651, 2648, 2639, 2666, 2667, 2649 and 2650.
  (c) Remove the oil feed tube.
  (d) Put caps on the open tube ends.

S 024-005-R02

(6) Remove the fuel supply tubes (Fig. 404).
  (a) Install a Label (number) on each fuel tube (6).

  CAUTION: BE CAREFUL WHEN YOU MOVE THE FUEL TUBES. IF YOU CAUSE DAMAGE TO THE SPHERICAL END FITTINGS ON THE FUEL TUBES, FUEL LEAKAGE CAN OCCUR.

  (b) At each fuel supply tube, disconnect the connector (5).
  (c) At each fuel supply tube, disconnect the connectors (1) and (4).
  (d) Remove the fuel supply tube (6).
  (e) Discard the seal rings (3) and the sealing washers (2).
  (f) Put caps on the open tube ends.

S 024-010-R02

(7) Disconnect the manifold from the inlet connector.
  (a) Remove the bolts (2) that attach the manifold inlet connector (5) to the fuel shut-off valve.
  (b) Discard the seal rings (2) and (11).

S 024-077-R02

(8) Remove the left fuel manifold half (Fig. 402).
  (a) Remove the clip details that attach the fuel manifold to the support brackets.
  (b) Disconnect the fuel manifold end connectors (8) and (11).
  (c) Remove and discard the seal rings (7) and (11).
  (d) Remove the left fuel manifold half.
  (e) Put caps on the open tube ends.

TASK 73-11-11-404-015-R02

3. Install the Left Fuel Manifold Half (Fig. 401-406)

A. References
  (1) AMM 24-22-00/201, Electrical Power
  (2) AMM 70-51-00/201, Torque Tightening Technique
  (3) AMM 74-21-02/401, Igniter Plug
  (4) AMM 78-31-00/201, Thrust Reverser System

B. Equipment
  (1) Reactor Bar - Rolls-Royce HU39311
  (2) Reactor Bar - Rolls-Royce HU39313
  (3) Reactor Bar - Rolls-Royce HU39312
  (4) Spanner (Wrench) - Rolls-Royce UT818
  (5) Spanner (Wrench) - Rolls-Royce UT630/2
  (6) Crimping Pliers - Rolls Royce HU38837
  (7) TORQUE WRENCH - 0-600 POUND-INCHES

C. Consumable Materials
  (1) Lockwire
    British Spec./Ref - DTD. 189A 22 S.W.G.
    American Spec./Ref - 21 A.W.G.
    OMat Item No. - 238

(2) Engine Oil
OMat Item 1011

D. Access

(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
415/425 Fan Reverser (LH)
416/426 Fan Reverser (RH)

E. Procedure

S 424-078-R02

(1) Install the left fuel manifold half (Fig. 401-406).
(a) Remove the dust caps from all of the openings.

CAUTION: MAKE SURE YOU INSTALL THE SEAL RINGS IN THE MIDDLE GROOVE OF EACH TUBE CONNECTOR. IF YOU INCORRECTLY INSTALL THE SEAL RINGS IN THE TUBE CONNECTORS, FUEL LEAKAGE CAN OCCUR.

(b) Install new seal ring (7) to the tube connector (8) and the seal ring (11) to the tube connector (10) (Fig. 402).
(c) Lubricate the threads of the tube connectors (8) and (10) with OMat No. 1011 clean engine lubricating oil.
(d) Loosely connect the left fuel manifold (9) to the right fuel manifold half (6).

S 424-117-R02

(2) Connect the fuel manifold inlet connector (Fig. 404).
(a) Install new seal rings (3) and (4) to the manifold inlet connector (5).
(b) Align the manifold inlet connector (5) with the fuel shut-off valve.
(c) Install the bolts (2) to attach the fuel manifold inlet connector to the fuel shut-off valve.
(d) Torque tighten the bolts (2) to the standard loading (AMM 70-51-00/201).

S 424-118-R02

(3) Tighten the fuel manifold connectors (Fig. 404).
(a) Tighten the tube connectors (8) and (10) in increments of one or two turns until the sealing surfaces are in contact.
(b) Torque tighten the connectors (8) and (10) to 395 pound-inches (44.9 Newton-meters) with the UT818 wrench.
(c) Loosen the tube connectors approximately one-half turn.
(d) Repeat steps (b) and (c) two more times.
(e) Torque the connectors (8) and (10) to 395 pound-inches (44.9 Newton-meters).

(f) Install a lockwire (OMat 238) to the end connectors (8) and (10).
(g) Install the clips which attach the fuel manifold to the support brackets.
1) Install the clip (3) with the bolt (1), the washers (2 and 4) and the nut (5) to the bracket.
2) Torque the nut to the standard loading.
(h) Prepare the fuel tubes for installation.
1) Remove the caps from the tube connectors (1), (4) and (5).
2) Install the new seal rings (3) on the tube connectors (1), (4) and (5).
3) Use the HU38837 Crimping Pliers to install new sealing washers (2) on the ferrule end of the tube connectors (1), (4) and (5). Make sure that the sealing washer can turn freely on the ferrule end.
4) Lubricate the threads of the tube connectors and the seal sealing surfaces with Engine Lubricating Oil (OMat 1011).
(i) Put the tubes in the position identified at removal.
1) Tighten each of the connectors (1), (4) and (5) in increments of one or two turns, until the sealing surfaces contact.

S 424-082-R02

CAUTION: YOU MUST USE THE HU39312 REACTOR BAR WHEN YOU TIGHTEN THE CONNECTORS. IF YOU DO NOT DO THIS, THE TUBE CAN BECOME DAMAGED.

(4) Tighten the fuel tubes (6) (Fig. 403 and 404) as follows:
(a) Tighten the tube connector (5) in the tube location sequence H, K, A, I, L and J.
(b) Make sure that each tube has the connector (5) tightened before the next tube in the sequence.
1) Use the HU39312 Reactor Bar on the flats next to the connector (5) to prevent damage to the tube (6).
(c) Tighten the tube connector (5).
1) Tighten the connector (5) to 310 pound-inches (35.2 Newton-meters). Use the UT630 Spanner Wrench on the connector.
2) Loosen each connector approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the connector (5) to 310 pound-inches (35.2 Newton-meters).

S 424-081-R02

CAUTION: YOU MUST USE THE HU39311 AND HU39313 REACTOR BARS WHEN YOU TIGHTEN THE CONNECTORS. IF YOU DO NOT DO THIS, THE TUBE CAN BECOME DAMAGED.

(5) Tighten the fuel tube connectors (1) then (4).
  (a) Tighten the fuel tube connectors (1) then (4) in the tube location sequence H, K, A, I, L and J.
  (b) Make sure that each tube has the connectors (1) and (4) tightened before the next tube in the sequence is tightened.
  (c) Use the HU39311 Reactor Bar on the flats next to the connector (4) to prevent damage to the tube (6).
    1) Tighten the connectors (1) then (4) to 310 pound-inches (35.2 Newton-meters).
    2) Loosen the connectors approximately one-half turn.
    3) Do steps 1 and 2 again two more times.
    4) Tighten the connectors (1) then (4) to 310 pound-inches (35.2 Newton-meters).

S 424-083-R02

(6) Install a lockwire (OMat 238) to each tube connectors (1), (4) and (5).

S 424-084-R02

(7) Install the oil feed tube (Fig. 401, 406).
  (a) Remove the caps from the tube ends.
  (b) Lubricate the threads of the tube connectors with clean engine lubricating oil (OMat 1011).
  (c) Install the oil feed tube (22) between the tube disconnects.
  (d) Install the clips at positions 1848, 2651, 2666, 2649, 2639 and 2650.
  (e) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).
  (f) Tighten the tube connectors.
    1) Tighten the tube connectors to the standard loading (AMM 70-51-00/201) .
    2) Loosen the connectors approximately one-half turn.
    3) Do steps 1 and 2 again two more times.
    4) Tighten the tube connector to the standard loading (AMM 70-51-00/201).
    5) Install a lockwire (OMat 238) to each of the tube connectors.

S 424-085-R02

(8) Install the PF air tube (Fig. 401, 406).
  (a) Remove the caps from the tube connectors.
  (b) Install the PF air tube (23) between the tube disconnects.
  (c) Install the clips at positions 2644, 2645, 2647 and 2667.
  (d) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters)

(e) Tighten the tube top connector.
1) Tighten the tube top connector to 295 pound-inches (33 Newton-meters).
2) Loosen the connector approximately one-half turn.
3) Do steps 1 and 2 two more times.
4) Tighten the connector to 295 pound-inches (33 Newton-meters).
(f) Tighten the tube bottom connector.
1) Tighten the tube bottom connector to 170 pound-inches (19 Newton-meters).
2) Loosen the connector approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the connector to 170 pound-inches (19 Newton-meters).
(g) Install a lockwire (OMat. 238) to the tube connectors of the PF air tube (23).

S 424-086-R02

(9) Install the HP3 air tube (24) (Fig. 401, 406).
(a) Remove the caps from the open tube ends.
(b) Install the HP3 air tube (24) between the left bleed valve and the tube disconnect.
(c) Connect the HP3 air tube to the bleed valve (AMM 75-32-04/401).
(d) Install the clips at positions 2643, 2642, 2641, 2651 and 2649.
1) Tighten the clip bolts to 55 pound-inches (6.2 Newton -meters).
(e) Tighten the HP3 air tube connector.
1) Tighten the tube connector to 240 pound-inches (27 Newton-meters).
2) Loosen the connector approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the tube connector to 240 pound-inches (27 Newton-meters).
5) Install a lockwire (OMat. 238) to the tube connector.

S 424-087-R02

(10) Install the HP3 air tube (25) (Fig. 401, 406).
(a) Remove the caps from the open tube ends.
(b) Install the HP3 air tube (25) between the tube disconnects.
(c) Install the clips at positions 2643, 2646, 2647 and 2648.
1) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).
(d) Tighten the tube connectors.
1) Tighten the tube connectors to 240 pound-inches (27 Newton-meters).
2) Loosen the connectors approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the connectors to 240 pound-inches (27 Newton-meters).
5) Install a lockwire (OMat. 238) to the tube connectors.

S 424-089-R02

(11) Connect the left ignition lead to the igniter plug (Fig. 401 and 406).
  (a) Remove the caps from the left ignition lead (21) and the igniter plug (26).
  (b) Connect the ignition lead to the igniter plug.
  (c) Install the clips at positions 2639, 2129 and 2666.
  (d) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).
  (e) Tighten the ignition lead connector (AMM 74-21-02/401).

TASK 73-11-11-004-036-R02

4. Remove the Right Fuel Manifold Half (Fig. 402)
  A. References
    (1) AMM 24-22-00/201, Electrical Power - Control
    (2) AMM 74-21-02/401, Igniter Plug
    (3) AMM 78-31-00/201, Thrust Reverser System
  B. Equipment
    (1) Clean container - minimum capacity:
      1 U.S. gallon
      1 Imperial gallon
      4 Liters
  C. Access
    (1) Location Zone
      410 Left Engine
      420 Right Engine

    (2) Access Panels
      415/425 Fan Reverser (LH)
      416/426 Fan Reverser (RH)

  D. Prepare to remove the fuel manifold.

    S 864-090-R02

    (1) Remove the electrical power (AMM 24-22-00/201).

    S 014-091-R02

    WARNING: OBEY THE INSTRUCTIONS IN AMM 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.

    (2) Open the thrust reversers (AMM 78-31-00/201).

    S 944-092-R02

    (3) Put a container below the fuel manifold to collect the fuel leakage.
  E. Procedure

S 024-093-R02

WARNING: YOU MUST BE CAREFUL WHEN YOU DO WORK ON THE ENGINE AFTER THE ENGINE HAS STOPPED. THE ENGINE PARTS CAN STAY HOT FOR ALMOST AN HOUR. YOU MUST PUT ON GLOVES WHEN YOU TOUCH THE HOT PARTS. IF YOU DO NOT DO THIS, AN INJURY CAN OCCUR.

YOU MUST NOT LET THE ENGINE FUEL STAY ON YOUR SKIN. FLUSH THE FUEL FROM YOUR SKIN WITH WATER. THE FUEL IS POISONOUS AND CAN BE ABSORBED INTO YOUR BODY.

(1) Disconnect the right igniter lead for access (Fig. 401).
  (a) Disconnect the igniter lead (20) from the igniter plug (14) (AMM 74-21-02/401).
  (b) Remove the clips at positions 974, 2050 and 1923.
  (c) Install caps on the igniter plug and the igniter lead.
  (d) Temporarily fasten the igniter lead clear of the fuel manifold.

S 024-112-R02

(2) Remove the electrical harnesses for access (Fig. 401).
  (a) Remove the electrical harness (3) clips at positions 2031, 2030, 2029, 2665, 2664, 2663, 2662, 2638, 1799, 2023, 2022, 2021 and 255.
  (b) Remove the electrical harness (16) clips at positions 2652, 2657, 2634, 2640, 2653, 2654, 974 and 1923.

S 024-094-R02

(3) Remove the air tube (1) for access (Fig. 401).
  (a) Disconnect the air tube (1) at the right bleed valve and the tube disconnect.
  (b) Remove the clips at positions 2659, 1447, 2664, 2656, 2640, 2653, 2635 and 1923.
  (c) Remove the air tube (1).
  (d) Put caps on the open tube ends.

S 024-095-R02

(4) Remove the air tube (5) for access (Fig. 401).
  (a) Disconnect the air tube (5) at the tube disconnects.
  (b) Remove the clips at positions 2659, 2660, 2120, 2661, 2122, 754 and 2123.
  (c) Remove the air tube (5).
  (d) Put caps on the open tube ends.

S 024-096-R02

(5) Remove the air tube (4) (Fig. 401).
  (a) Disconnect the air tube (4) at the tube disconnects.
  (b) Remove the clips at positions 2031, 2661, 2030, 2120, 2029, 2665, 1447, 2664, 2663, 2662, 1799 and 2022.
  (c) Remove the air tube (4).
  (d) Put caps on the open tube ends.

S 024-097-R02

(6) Remove the oil vent tube (2) (Fig. 401).
  (a) Disconnect the oil vent tube (2) at the tube disconnects.
  (b) Remove the clips at positions 2634, 2657, 2652 and 2655.
  (c) Remove the oil vent tube (2).
  (d) Put caps on the open tube ends.

S 024-098-R02

(7) Remove the fuel supply tubes (Fig. 402-404).
  (a) Install a Label (number) on each fuel tube (6) to identify it's position.

CAUTION: BE CAREFUL WHEN YOU MOVE THE FUEL TUBES. IF YOU CAUSE DAMAGE TO THE SPHERICAL END FITTINGS ON THE FUEL TUBES, FUEL LEAKAGE CAN OCCUR.

  (b) Disconnect the fuel tube at connectors (5).
  (c) Disconnect the connectors (1) and (4).
  (d) Discard the seal rings (3) and the sealing washers (2).
  (e) Put caps on the open tube ends.

S 024-099-R02

(8) Disconnect the fuel drain tube (13).
  (a) Put caps on the open tube ends.

S 024-100-R02

(9) Remove the right fuel manifold half (Fig. 402).
  (a) Remove the clips at the fuel manifold support brackets.
  (b) Disconnect the fuel manifold end connectors (8) and (10).
  (c) Remove and discard the seal rings (7) and (11).
  (d) Remove the right fuel manifold half.
  (e) Put caps on the open tube ends.

TASK 73-11-11-404-101-R02

5. Install the Right Fuel Manifold Half (Fig. 402)

A. References
  (1) AMM 24-22-00/201, Electrical Power
  (2) AMM 70-51-00/201, Torque Tightening Technique
  (3) AMM 73-11-11/501, Fuel Manifold
  (4) AMM 74-21-02/401, Igniter Plug
  (5) AMM 78-31-00/201, Thrust Reverser System

B. Equipment
  (1) Reactor Bar - Rolls-Royce HU39311
  (2) Reactor Bar - Rolls-Royce HU39313
  (3) Reactor Bar - Rolls-Royce HU39312
  (4) Spanner (Wrench) - Rolls-Royce UT818
  (5) Spanner (Wrench) - Rolls-Royce UT630/2
  (6) Crimping Pliers - Rolls Royce HU38837
  (7) TORQUE WRENCH - 0-600 POUND-INCHES

C. Consumable Materials
(1) Lockwire
British Spec./Ref - DTD. 189A 22 S.W.G.
American Spec./Ref - 21 A.W.G.
OMat Item No. - 238
(2) Engine Oil
OMat Item 1011

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
415/425 Fan Reverser (LH)
416/426 Fan Reverser (RH)

E. Procedure

S 424-102-R02
(1) Install the right fuel manifold half (Fig. 401-406).
(a) Remove the dust caps from all of the openings.

CAUTION: MAKE SURE YOU INSTALL THE SEAL RINGS IN THE MIDDLE GROOVE OF EACH TUBE CONNECTOR. IF YOU INCORRECTLY INSTALL THE SEAL RINGS IN THE TUBE CONNECTORS, FUEL LEAKAGE CAN OCCUR.

(b) Install new seal ring (7) to the tube connector (8) and the eal ring (11) to the tube connector (10) (Fig. 402).
(c) Loosely connect the right fuel manifold (6) to the left fuel manifold half (9).
(d) Tighten the fuel manifold connectors (Fig. 404).
1) Tighten the connectors (8) and (10) in increments of one or two turns until the sealing surfaces are in contact.
2) Torque the connectors (8) and (10) to 395 pound-inches (44.9 Newton-meters) with the UT818 Wrench.
3) Loosen the connectors approximately one-half turn.
4) Do steps 2 and 3 again two more times.
5) Torque the connectors (8) and (10) to 395 pound-inches (44.9 Newton-meters).
6) Install a lockwire (OMat 238) to the end connectors (8) and (10).
(e) Install the clips which attach the fuel manifold to the support brackets (Fig. 405).
1) Install the clip (3) with the bolt (1), the washers (2 and 4) and the nut (5) to the bracket.
2) Torque the nut to 55 pound-inches (6.5 Newton-meters).
(f) Prepare the fuel tubes for installation.
1) Remove the caps from the tube connectors (1), (4) and (5).
2) Install the new seal rings (3) on the tube connectors (1), (4) and (5).

3) Use the HU38837 Crimping Pliers to install new sealing washers (2) on the ferrule end of the tube connectors (1), (4) and (5). Make sure that the sealing washer can turn freely on the ferrule end.
4) Lubricate the threads of the tube connectors and the seal sealing surfaces with Engine Lubricating Oil (OMat 1011).

(g) Install the tubes in the position identified at removal.
1) Tighten each of the connectors (1), (4) and (5) in increments of one or two turns, until the sealing surfaces contact.

S 424-103-R02

CAUTION: YOU MUST USE THE HU39312 REACTOR BAR WHEN YOU TIGHTEN THE CONNECTORS. IF YOU DO NOT DO THIS, THE TUBES CAN BECOME DAMAGED.

(2) Tighten the fuel tube connector (5) on each fuel supply tube (6) as follows:
(a) Tighten the tube connector (5) in the tube location sequence B, E, G, C, F and D.
(b) Make sure that each tube has the connector (5) tightened before the next tube in the sequence.
1) Use the HU39312 Reactor Bar on the flats next to the connector (5) to prevent damage to the tube (6).
(c) Do the following steps to tighten the fuel tubes:
1) Tighten the connector (5) to 310 pound-inches (35.2 Newton-meters). Use the UT630 Spanner Wrench on the connectors.
2) Loosen the connector approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the connector (5) to 310 pound-inches (35.2 Newton-meters).

S 424-104-R02

CAUTION: YOU MUST USE THE HU39311 AND HU 39313 REACTOR BARS WHEN YOU TIGHTEN THE CONNECTORS. IF YOU DO NOT DO THIS, THE TUBE CAN BECOME DAMAGED.

(3) Tighten the fuel tube connector (1) then (4) at each fuel supply tube (6) as follows:
(a) Tighten each fuel tube connector (1) then (4) in the tube location sequence B, E, G, C, F and D.
(b) Make sure that each tube has the connector (1) and (4) tightened before the next tube in the sequence is tightened.
(c) Use the HU39311 Reactor Bar on the flats next to the connector (4) to prevent damage to the tube (6).

(d) Use the HU39313 Reactor Bar on the flats next to the connector (1) to prevent damage to the tube (6).
1) Tighten the connectors (1) then (4) to 310 pound-inches (35.2 Newton-meters).
2) Loosen the connectors approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the connectors (1) then (4) to 310 pound-inches (35.2 Newton-meters).

S 424-105-R02

(4) Install a lockwire (OMat 238) to each tube connectors (1), (4) and (5).

S 424-113-R02

(5) Install the fuel drain tube (13).
(a) Connect the fuel drain tube (13) to the fuel manifold.
(b) Tighten the fuel drain tube connector.
1) Tighten the fuel drain connector to 265 pound-inches (30 Newton-meters).
2) Loosen the connector approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the fuel drain tube connector to 265 pound-inches (30 Newton-meters).

S 424-106-R02

(6) Install the oil vent tube (Fig. 401, 406).
(a) Remove the caps from the tube ends.
(b) Lubricate the threads of the tube connectors with clean engine lubricating oil (OMat 1011).
(c) Install the oil vent tube (2) between the tube disconnects.
(d) Install the clips at positions 2634, 2657, 2652 and 2655.
(e) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).
(f) Tighten the tube connectors.
1) Tighten the tube connectors to 590 pound-inches (67 Newton-meters).
2) Loosen the connectors approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the tube connector to 590 pound-inches (67 Newton-meters).
5) Install a lockwire (OMat 238) to each of the tube connectors.

S 424-107-R02

(7) Install the air tube (1) (Fig. 401, 406).
(a) Remove the caps from the tube connectors.
(b) Install the air tube (1) between the right bleed valve and the tube disconnects.
(c) Install the clips at positions 2659, 1447, 2664, 2656, 2640, 2653, 2635 and 1923.
(d) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters)
(e) Tighten the tube connectors (AMM 70-51-00/201).

(f) Install a lockwire (OMat. 238) to the tube connectors of the air tube (1).

S 424-109-R02

(8) Install the air tube (5) (Fig. 401, 406).
  (a) Remove the caps from the open tube ends.
  (b) Install the air tube (5) between the tube disconnect and the combustion outer case.
  (c) Install the clips at positions 2659, 2660, 2120, 2661 , 2122, 754 and 2123.
    1) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).
  (d) Tighten the tube connector at the combustion outer case.
    1) Tighten the tube connectors to 170 pound-inches (19 Newton-meters).
    2) Loosen the connectors approximately one-half turn.
    3) Do steps 1 and 2 again two more times.
    4) Tighten the connectors to 170 pound-inches (19 Newton-meters).
  (e) Tighten the tube connector at the tube disconnect.
    1) Tighten the tube connector to 240 pound-inches (27 Newton-meters).
    2) Loosen the connector approximately one-half turn.
    3) Do steps 1 and 2 again two more times.
    4) Tighten the tube connector to 240 pound-inches (27 Newton-meters).
  (f) Install a lockwire (OMat. 238) to the tube connectors.

S 424-108-R02

(9) Install the air tube (4) (Fig. 401, 406).
  (a) Remove the caps from the open tube ends.
  (b) Install the air tube (4) between the tube disconnects.
  (c) Install the clips at positions 2031, 2661, 2030, 2120, 2029, 2665, 1447, 2664, 2663, 2662, 1799 and 2022.
    1) Tighten the clip bolts to 55 pound-inches (6.2 Newton -meters).

(d) Tighten the air tube connector.
1) Tighten the tube connector to 590 pound-inches (67 Newton-meters).
2) Loosen the connector approximately one-half turn.
3) Do steps 1 and 2 again two more times.
4) Tighten the tube connector to 590 pound-inches (67 Newton-meters).
5) Install a lockwire (OMat. 238) to the tube connector.

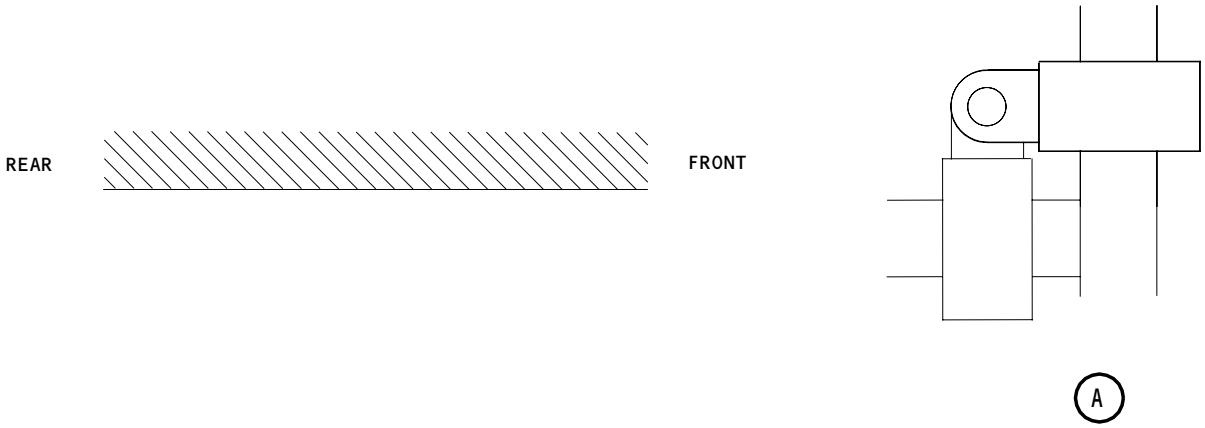
S 424-114-R02
(10) Install the electrical harness (Fig. 401).
(a) Install the electrical harness (3) clips at position 1471, 2030, 2029, 2665, 1447, 2664, 2663, 2662, 2638, 1799, 2023, 2022, 2021 and 255.
(b) Install the electrical harness (16) clips at positions 2652, 2657, 2634, 2640, 2653, 2654, 974 and 1923.
(c) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).

S 424-111-R02
(11) Connect the right ignition lead to the igniter plug (Fig. 401).
(a) Remove the caps from the right ignition lead (20) and the igniter plug (14).
(b) Connect the ignition lead to the igniter plug (AMM 74-21-02/401) .
(c) Install the clip at position 1923.
(d) Tighten the clip bolts to 55 pound-inches (6.2 Newton-meters).

TASK 73-11-11-404-048-R02
6. Put the Airplane Back to Normal
A. References
(1) AMM 71-00-00/501, Power Plant
(2) AMM 78-31-00/201, Thrust Reverser System
B. Procedure

S 424-116-R02
(1) Do this procedure: Fuel And Oil Leak Test (AMM 71-00-00/501).

S 424-115-R02
(2) Close the thrust reversers (78-31-00/201).



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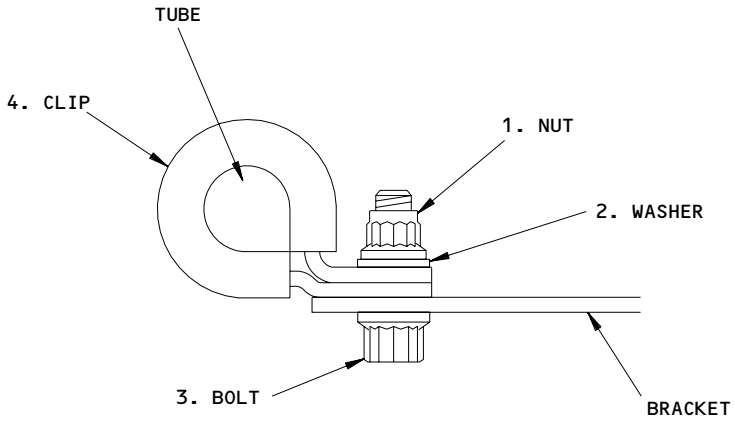

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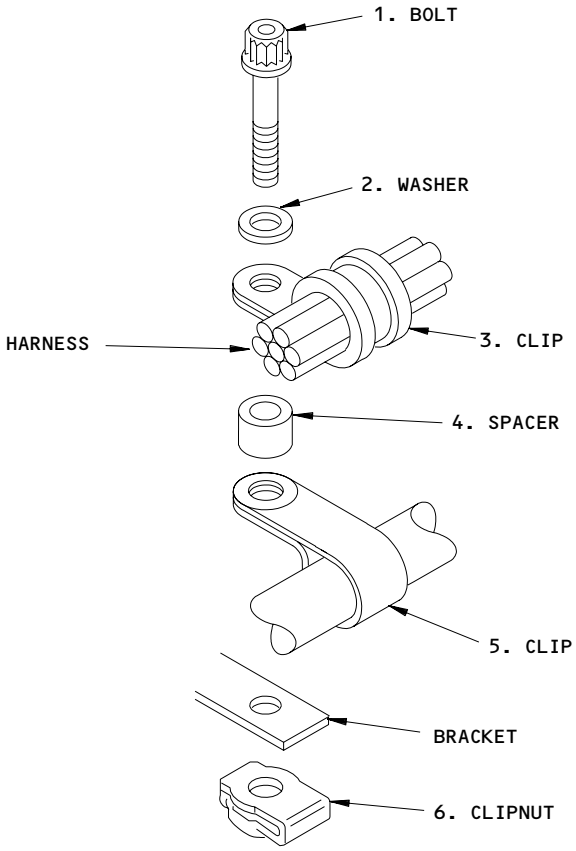

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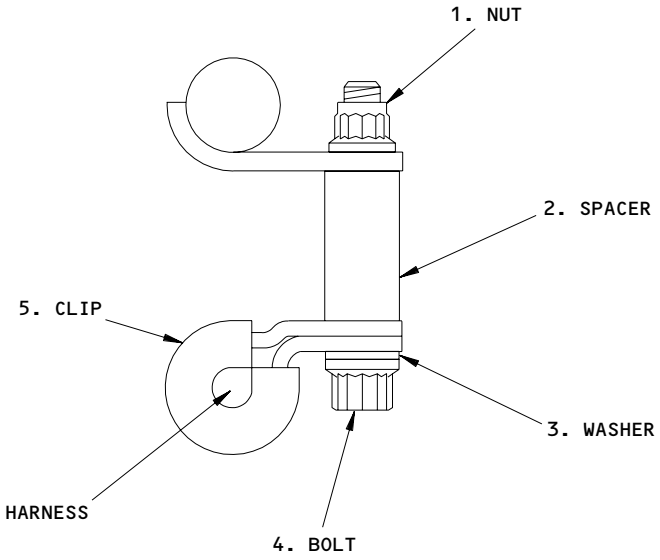

CLIP POSITION 974

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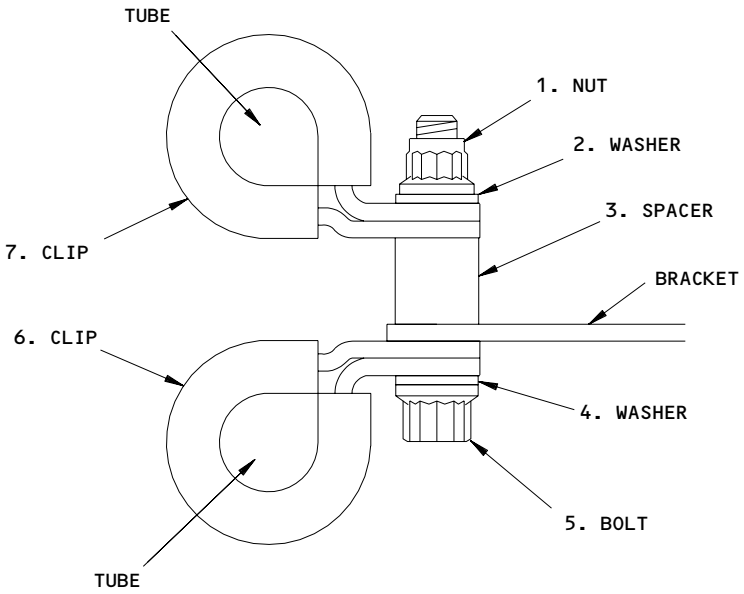

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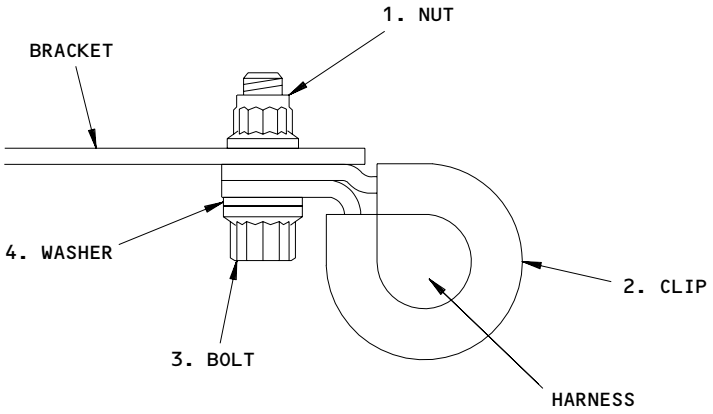

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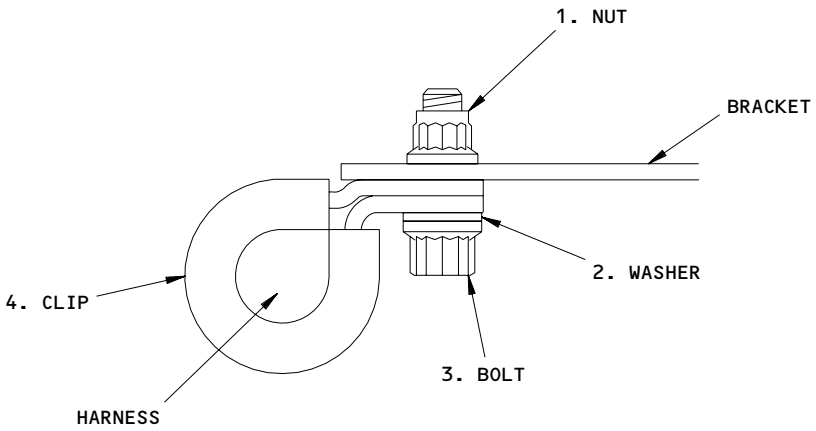

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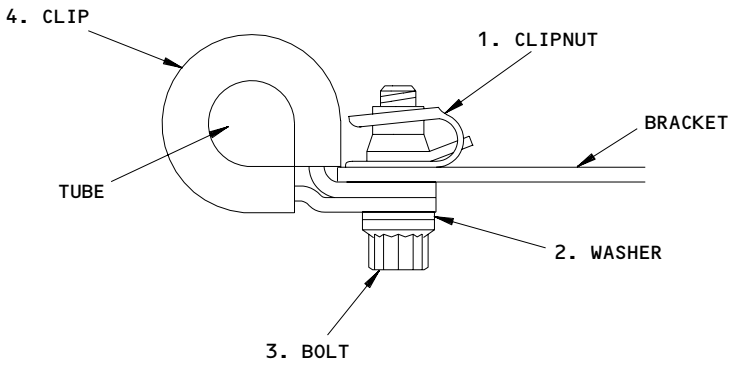

CLIP POSITION 1799

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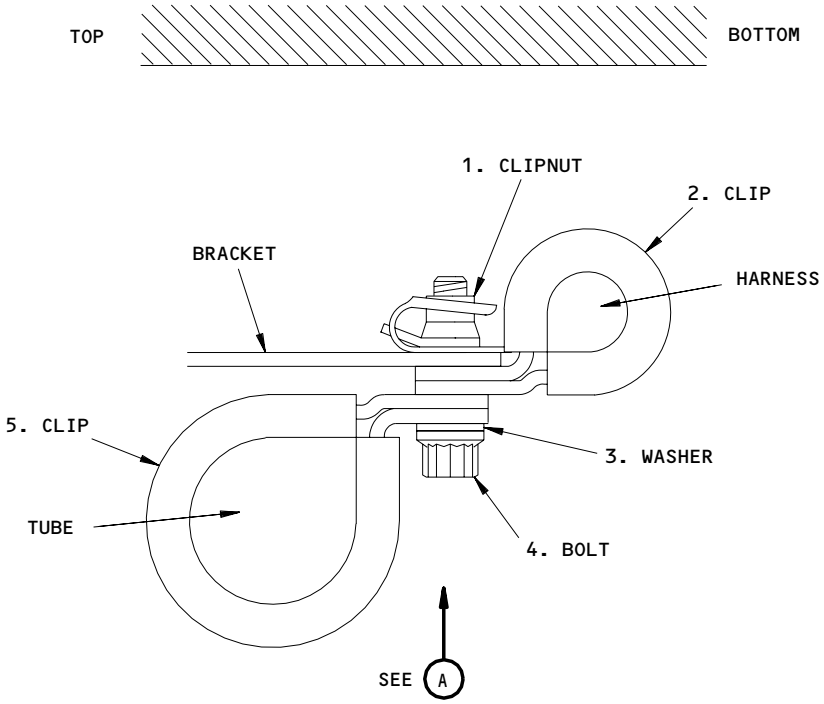

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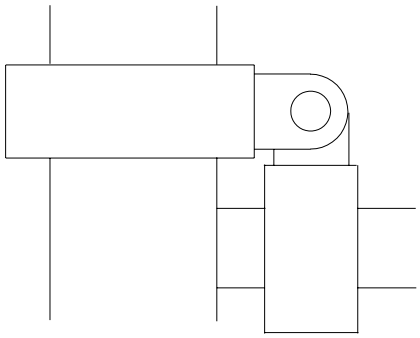

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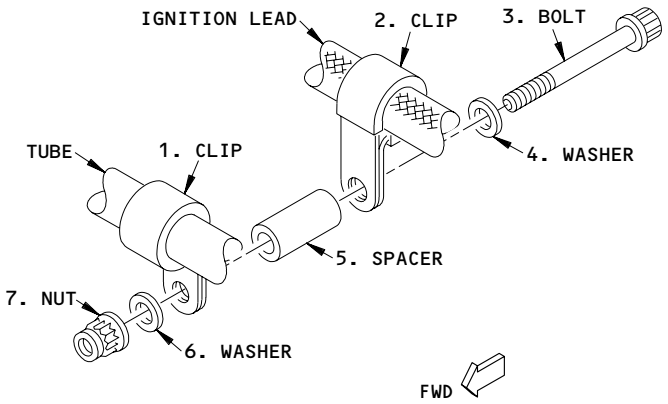

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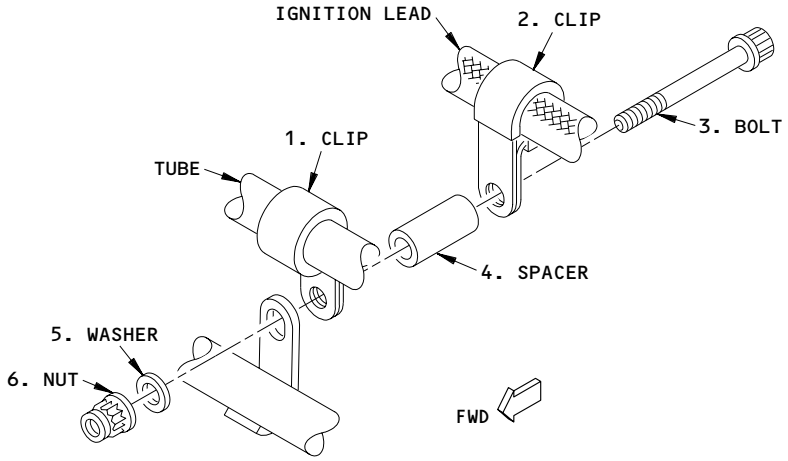
(PRE-SB 72-D352)



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(POST-SB 72-D352)

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Figure 406 (Sheet 10)

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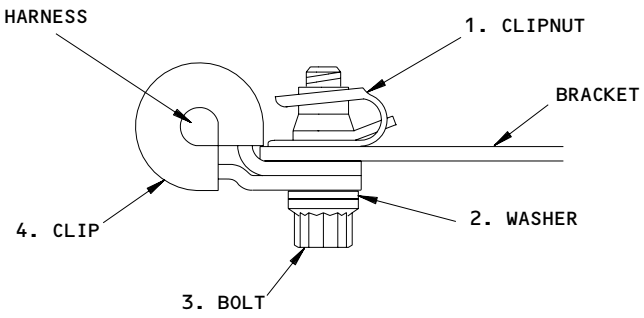

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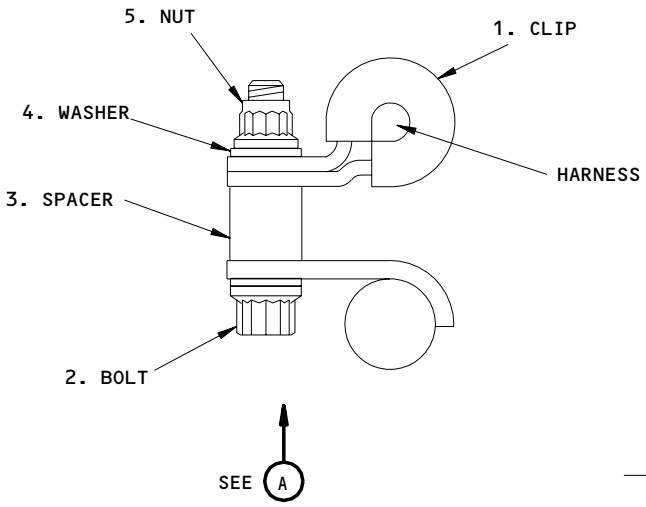

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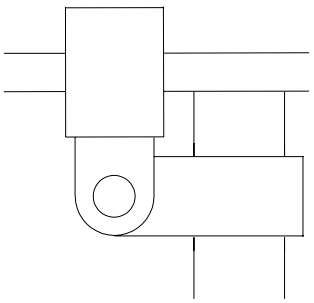

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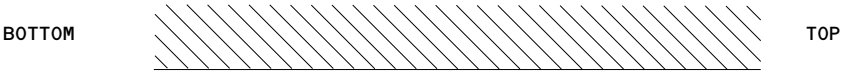
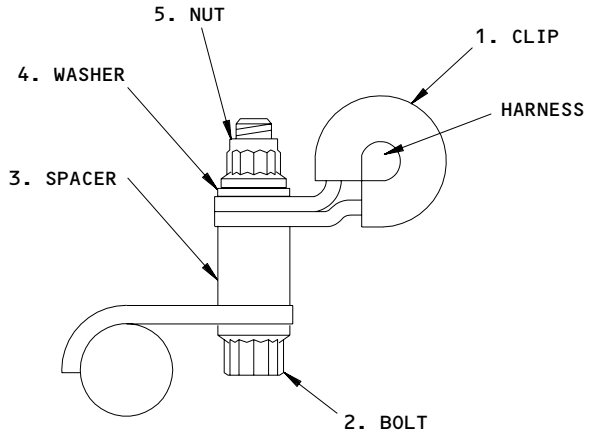


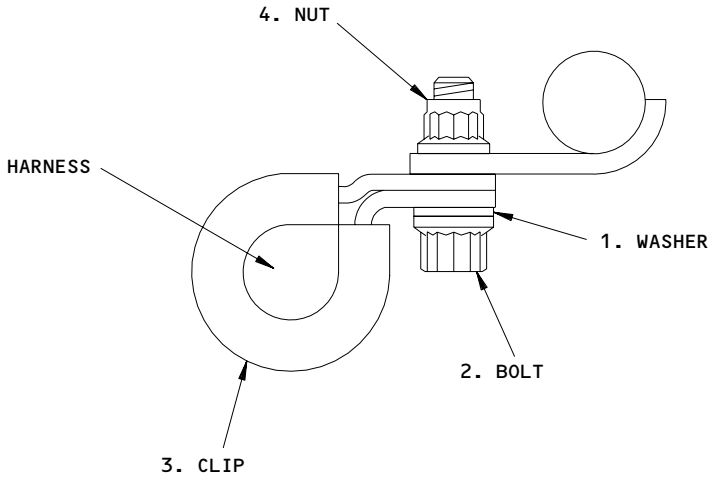


CLIP POSITION 2023

DEEOOy2248

Clip Position
Figure 406 (Sheet 13)

BOTTOM TOP



CLIP POSTION 2029

DEE00Y2299

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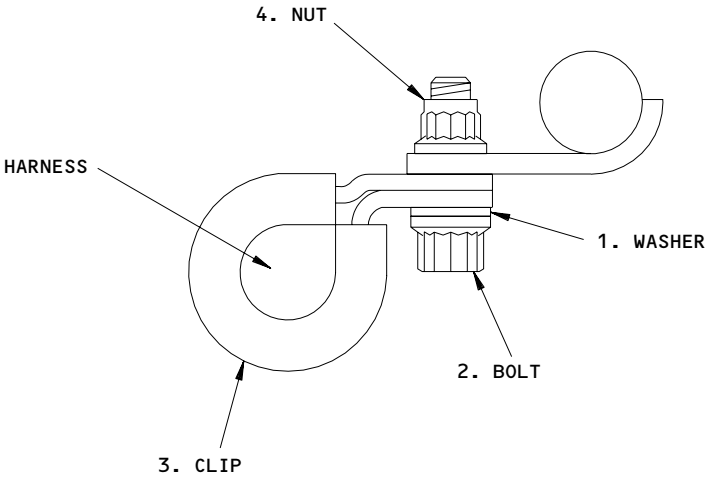
Figure 406 (Sheet 14)

BOTTOM TOP



CLIP POSTION 2030

DEE00Y2300

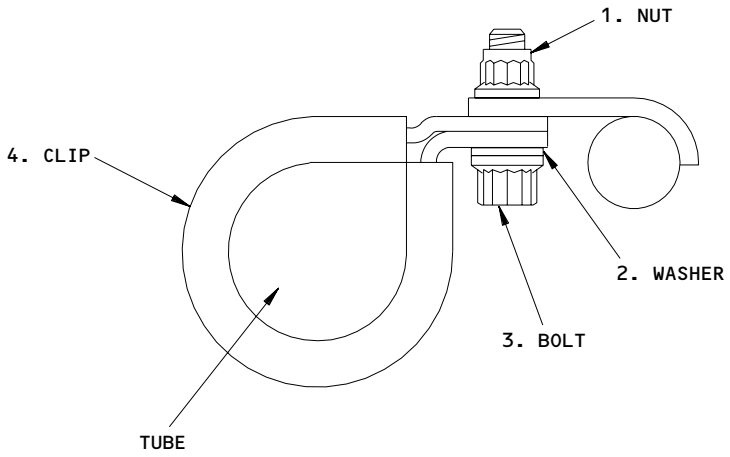
Clip Position
Figure 406 (Sheet 15)

TO BE FURNISHED

Clip Postion
Figure 406 (Sheet 16)

M23266

BOTTOM TOP



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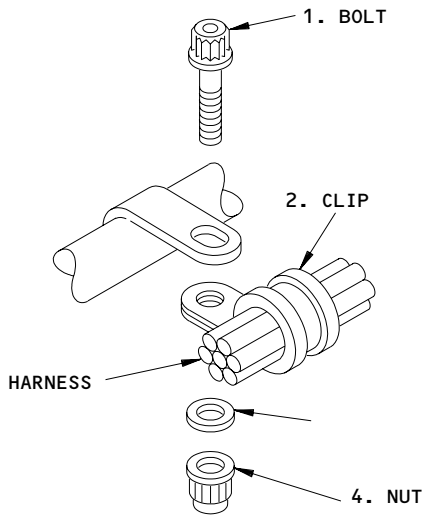
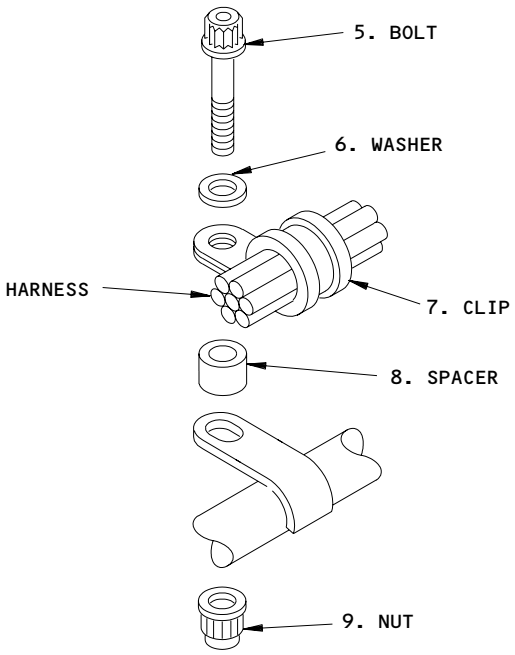


CLIP POSITION 2122



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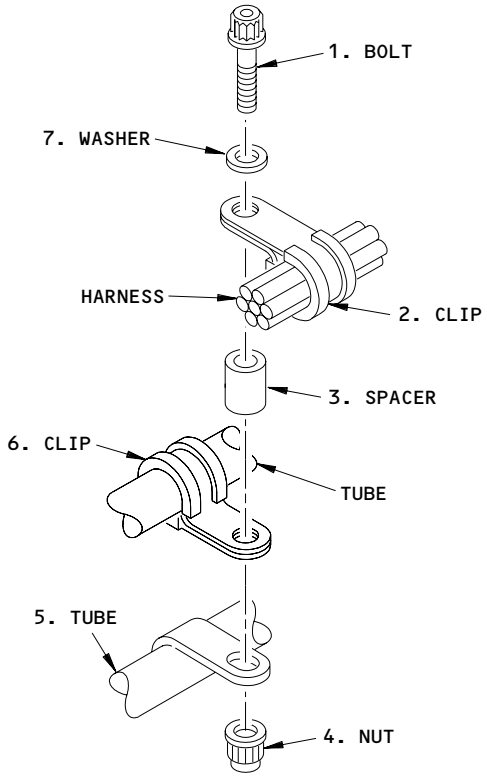
DEE00Y2422

Clip Position
Figure 406 (Sheet 18)



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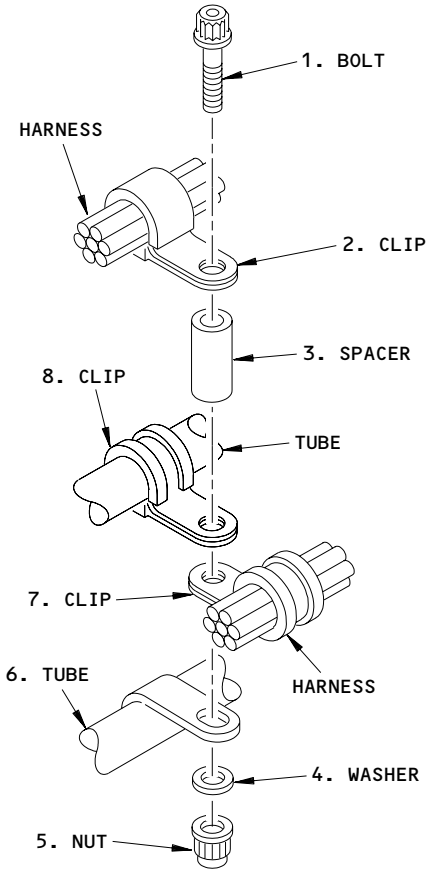
(PRE-SB 72-D352)



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DEE00Y2318B

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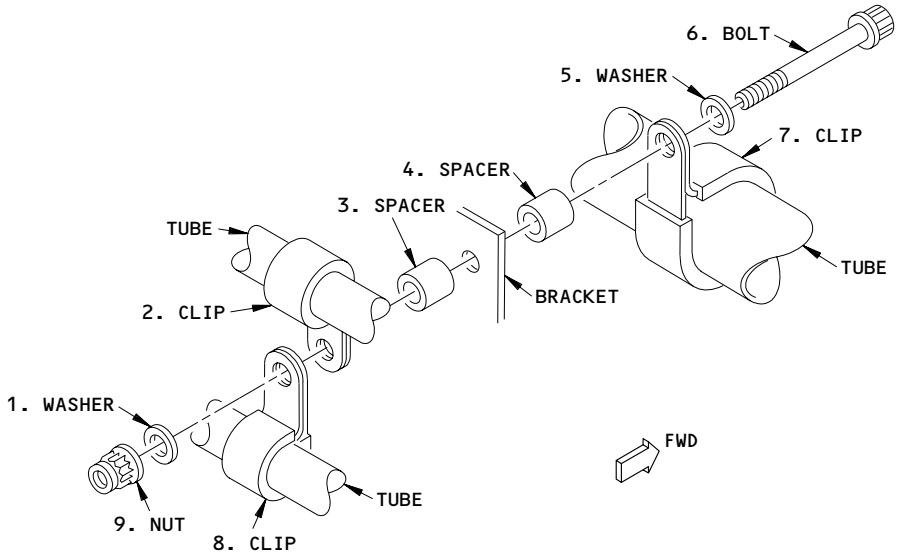

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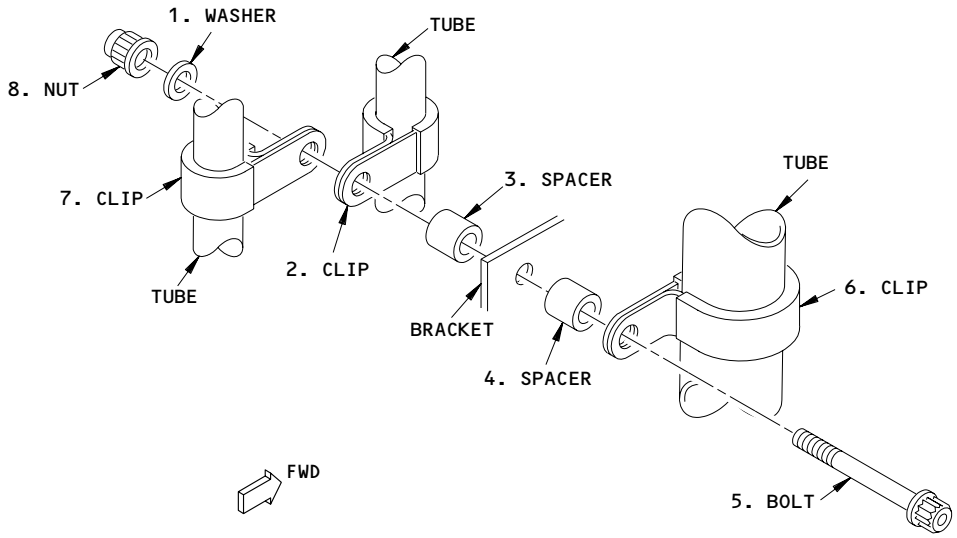
(PRE-SB 72-D352)



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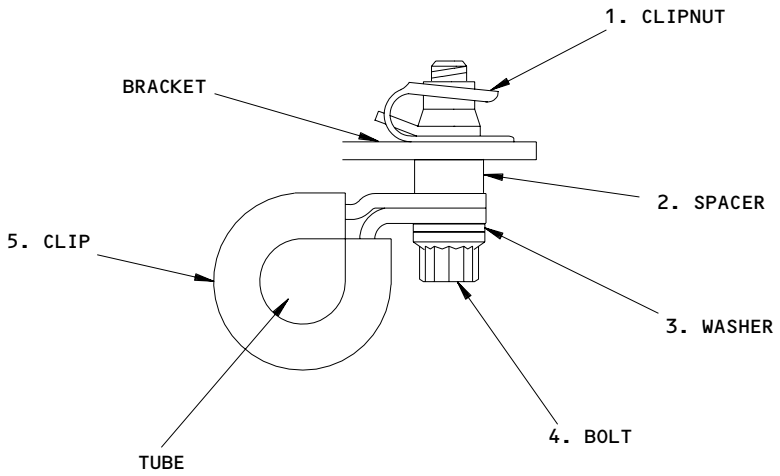
(POST-SB 72-D352)

DEE00Y2251A

Clip Positions
Figure 406 (Sheet 20)

REAR FRONT



CLIP POSITION 2635

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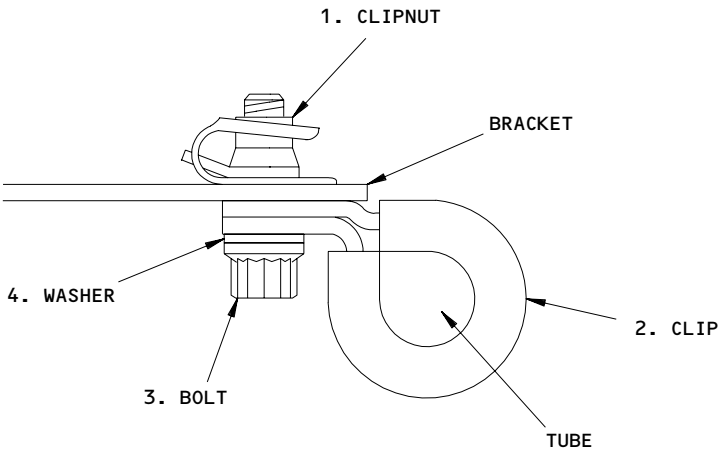
Clip Position
Figure 406 (Sheet 21)

REAR FRONT



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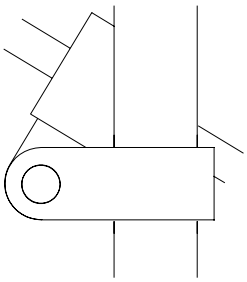
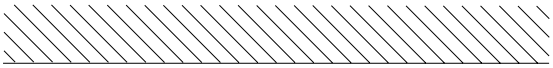


REAR



FRONT

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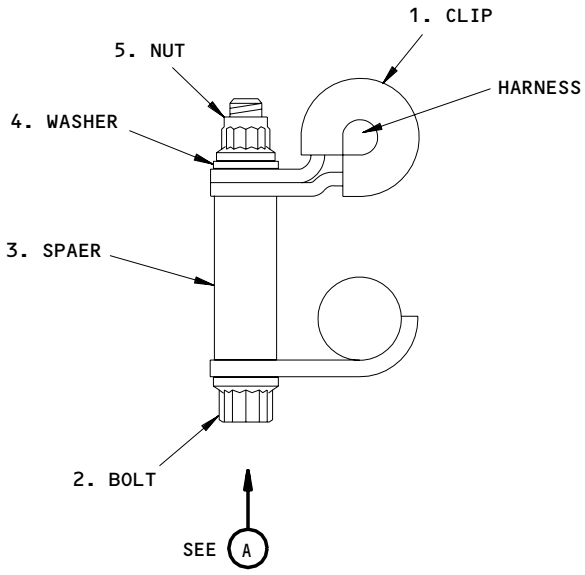

CLIP POSITION 2638

DEE00y2253

Clip Position
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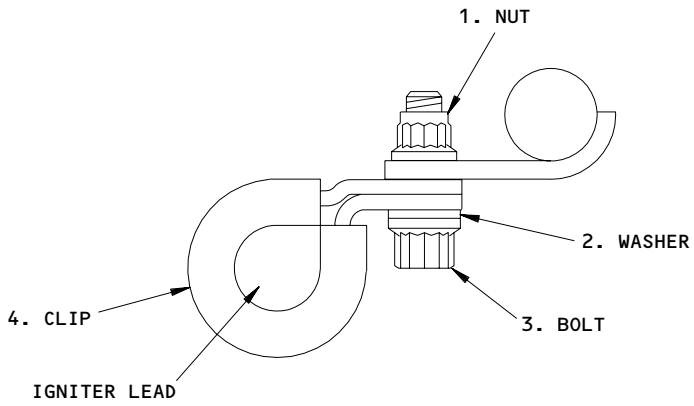
FRONT REAR



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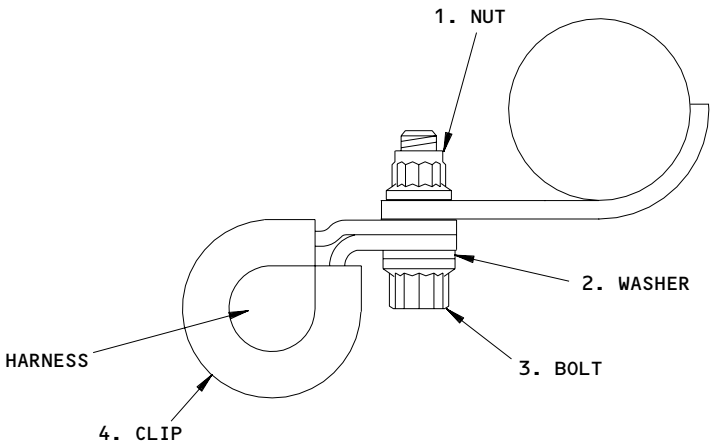
REAR FRONT



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Clip Position
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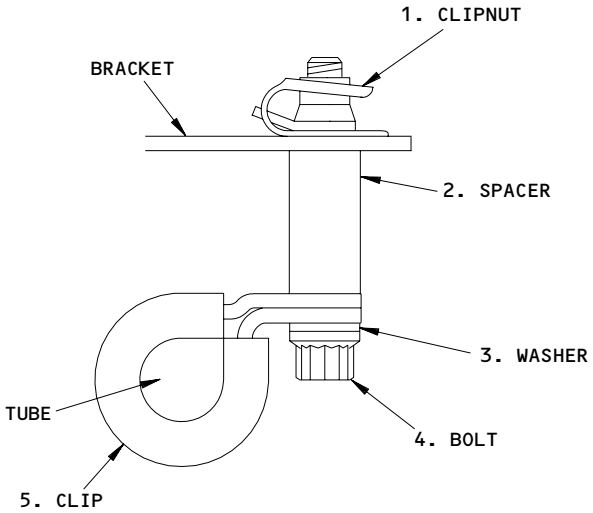

CLIP POSTION 2641

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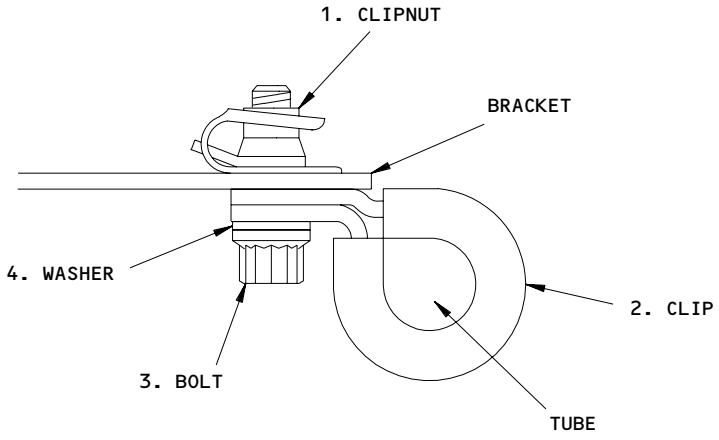
Figure 406 (Sheet 26)

TOP

BOTTOM

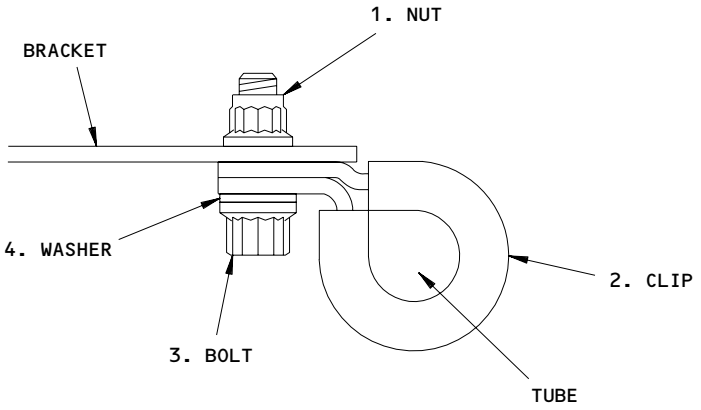


CLIP POSIITON 2642

DEE0002289

Clip Position
Figure 406 (Sheet 27)

TOP BOTTOM



CLIP POSITION 2643

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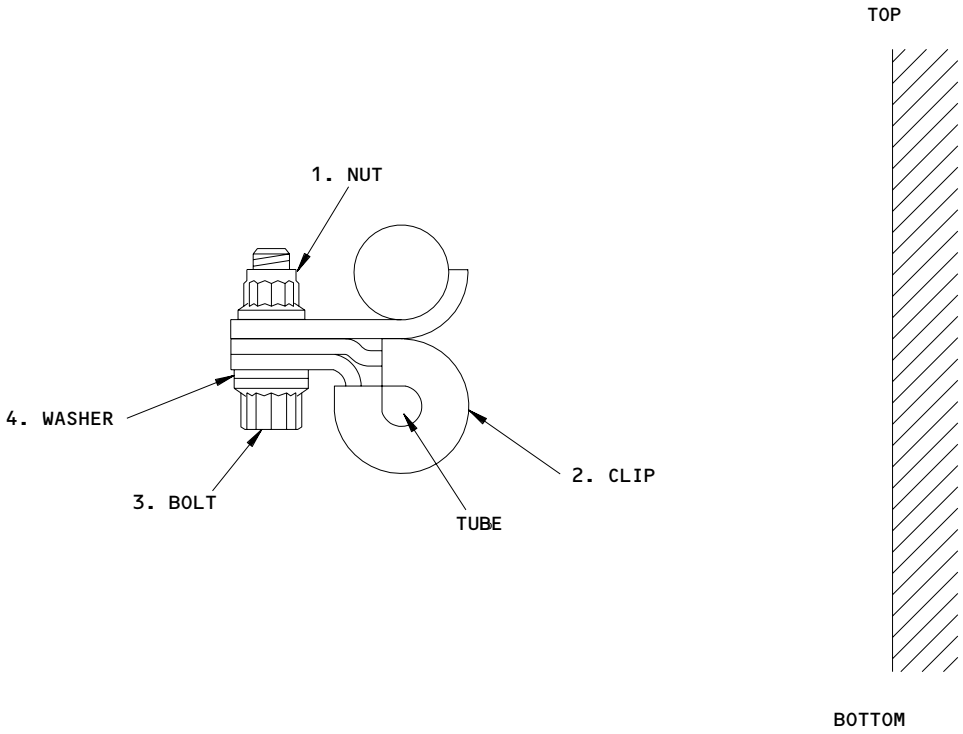
Clip Position
Figure 406 (Sheet 28)



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DEEOOy2267

Clip Position
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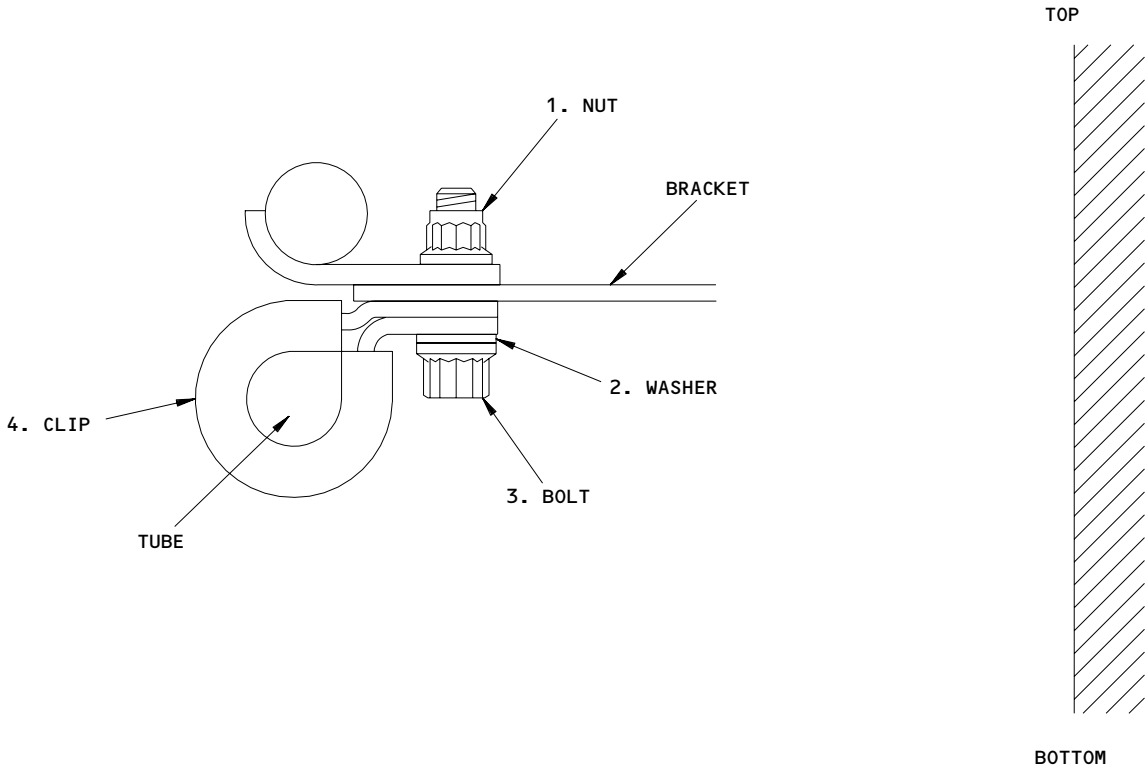

CLIP POSITION 2645

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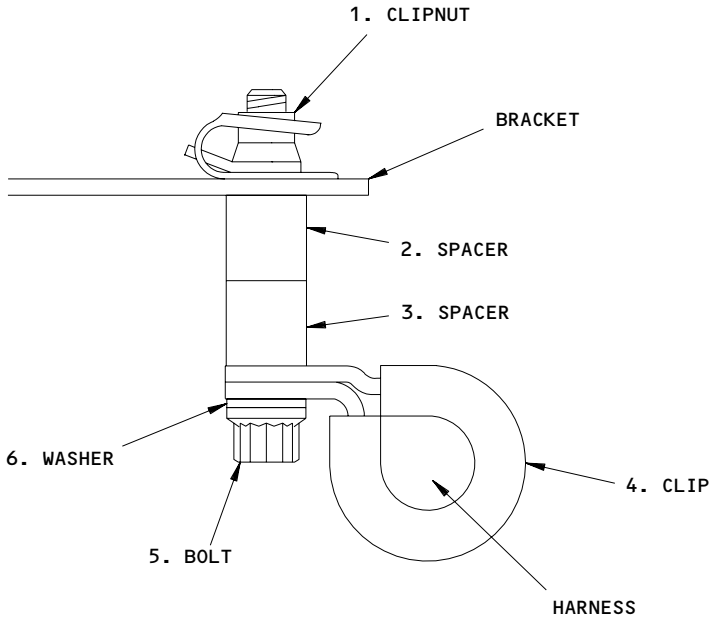
Clip Position
Figure 406 (Sheet 30)

FRONT REAR



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Clip Position
Figure 406 (Sheet 31)

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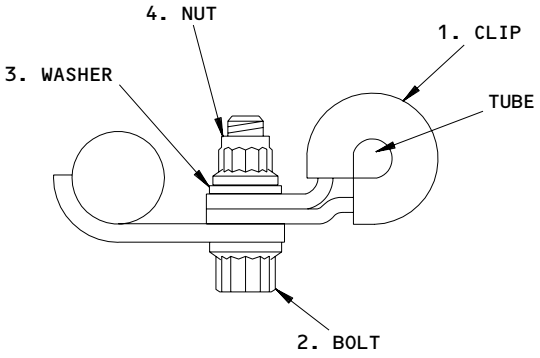
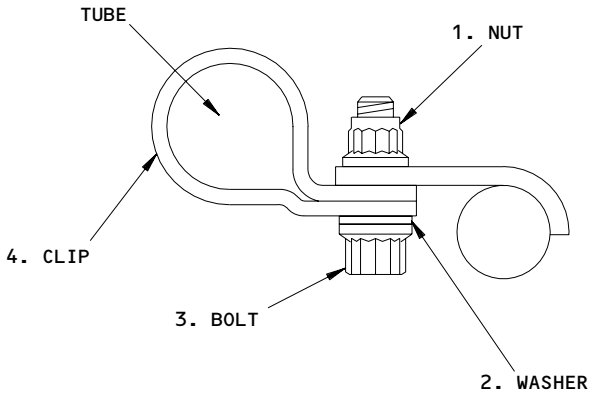


CLIP POSITION 2647

DEE00y2268

Clip Position
Figure 406 (Sheet 32)

FRONT REAR



CLIP POSITION 2648

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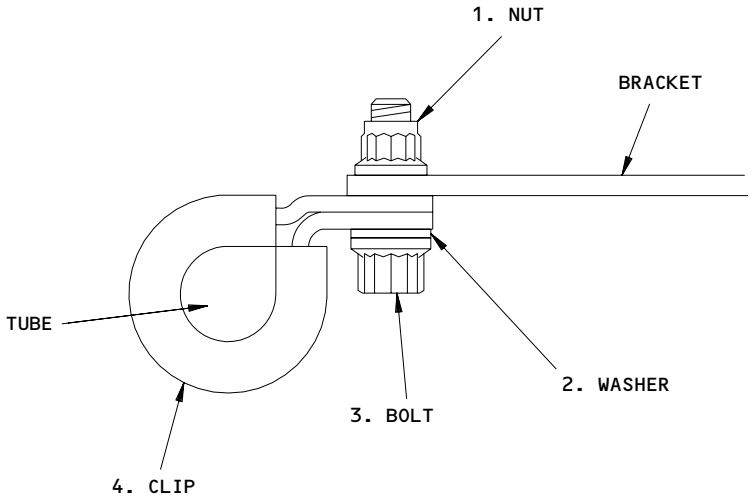
Clip Position
Figure 406 (Sheet 33)

FRONT REAR



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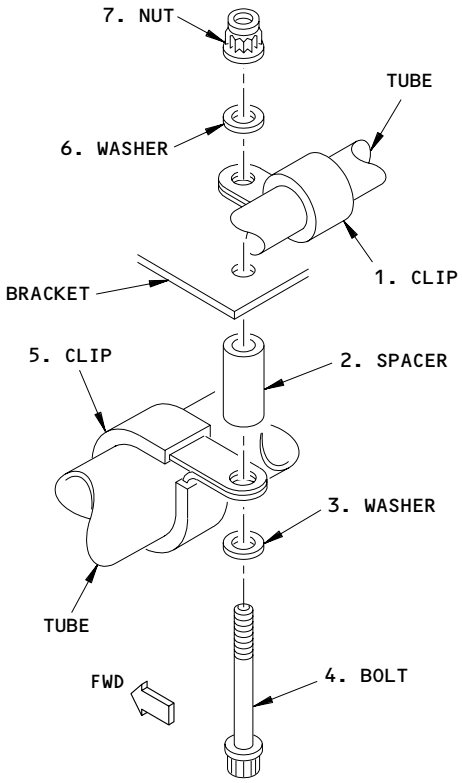
Clip Position
Figure 406 (Sheet 34)



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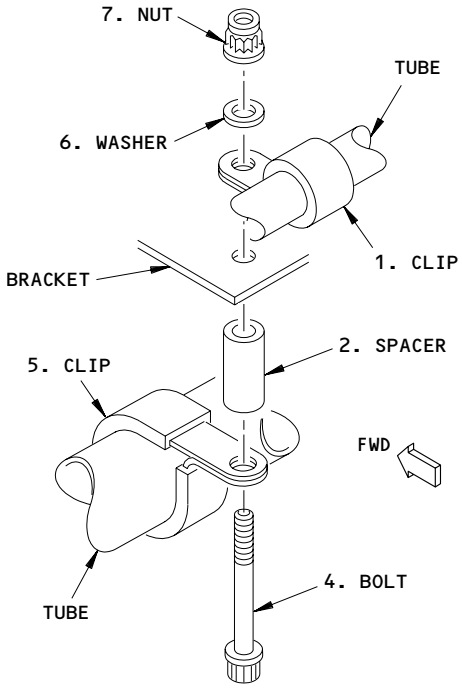
(PRE-SB 72-D352)

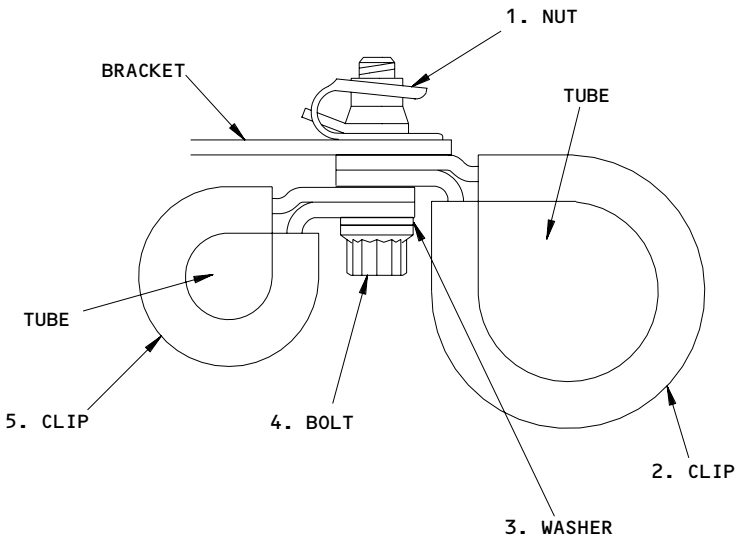


CLIP POSITION 265O
(POST-SB 72-D352)

DEEOOY227OA

Clip Position
Figure 406 (Sheet 35)

FRONT REAR



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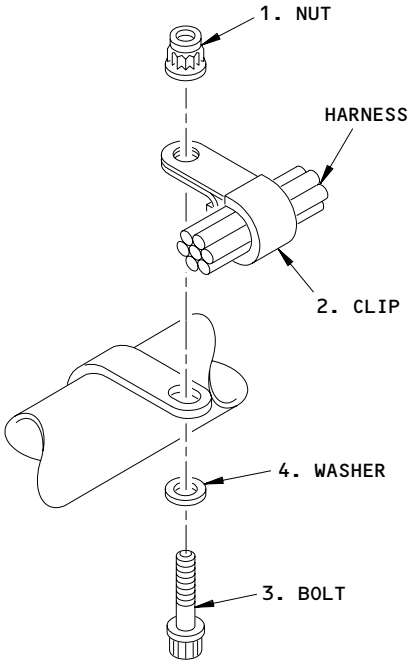
Clip Positions
Figure 406 (Sheet 36)



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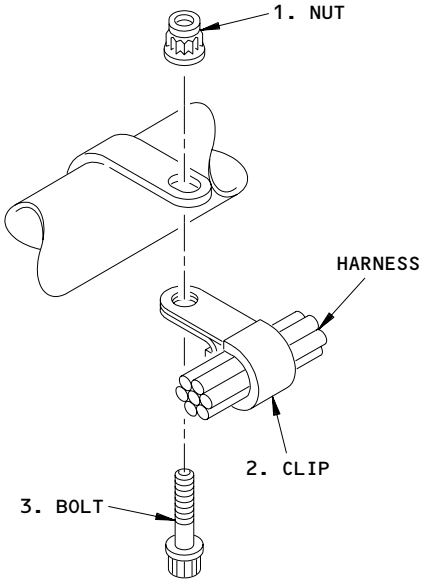
(PRE-SB 72-D352)



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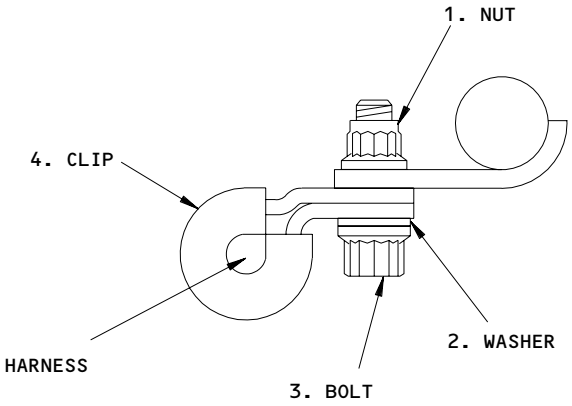
(POST-SB 72-D352)

DEE0002297A

Clip Position
Figure 406 (Sheet 37)

REAR FRONT



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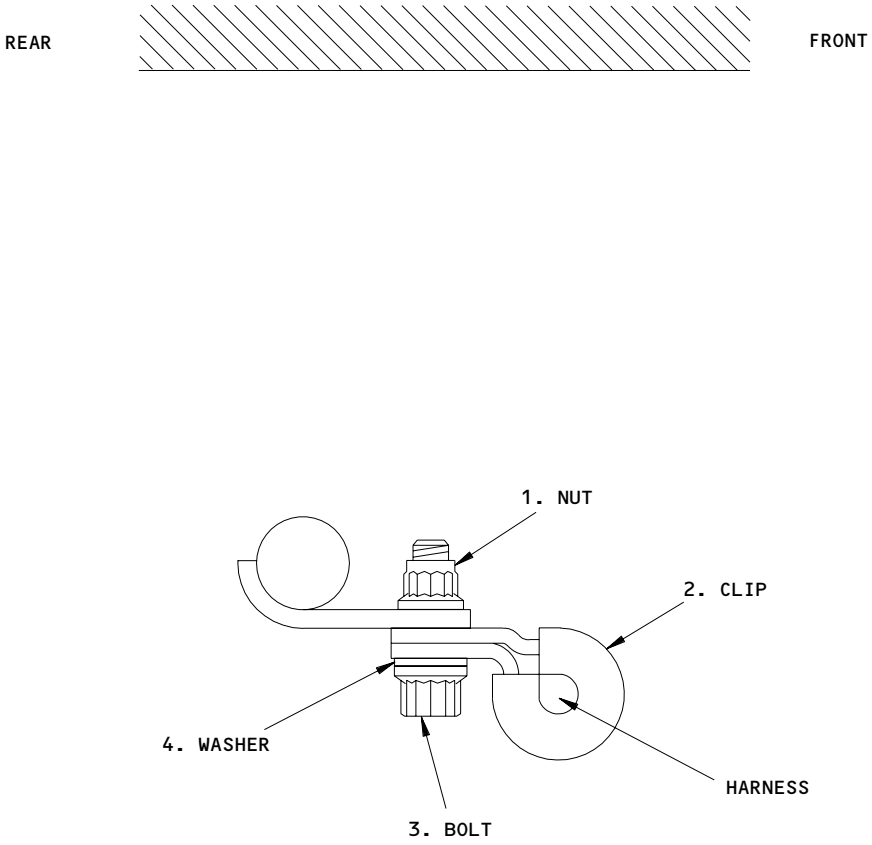

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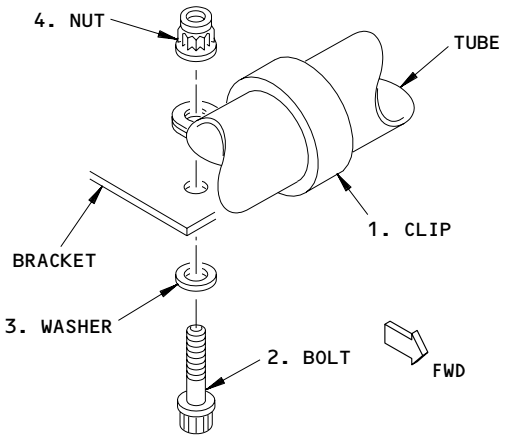

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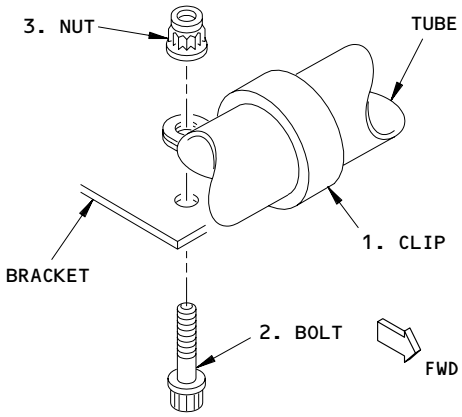

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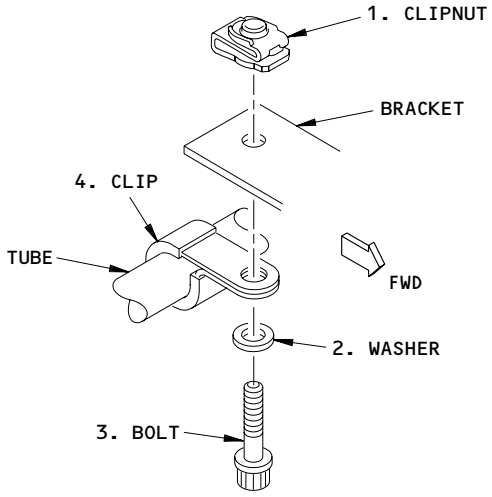

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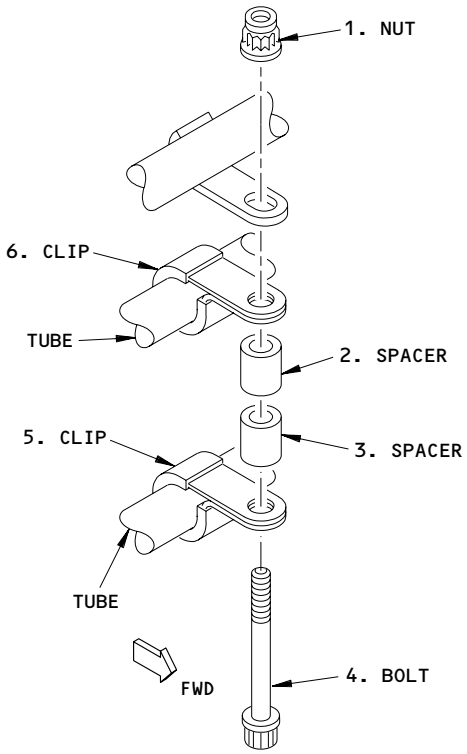
(PRE-SB 72-D352)



CLIP POSITION 2658
(POST-SB 72-D352)

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Clip Position
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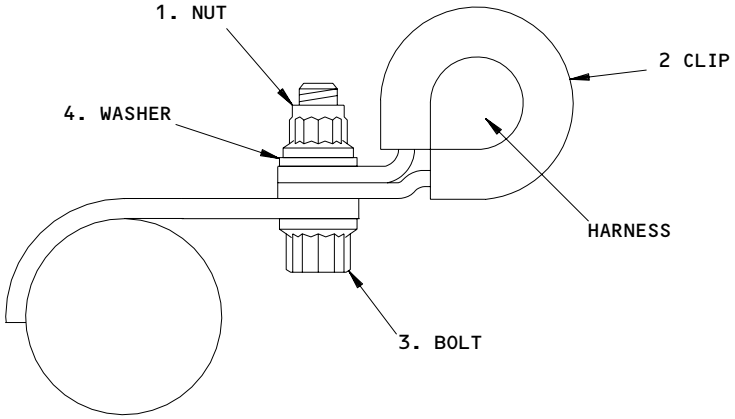

CLIP POSITION 2657

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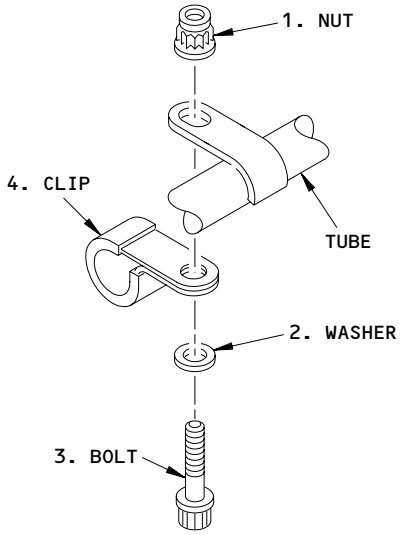

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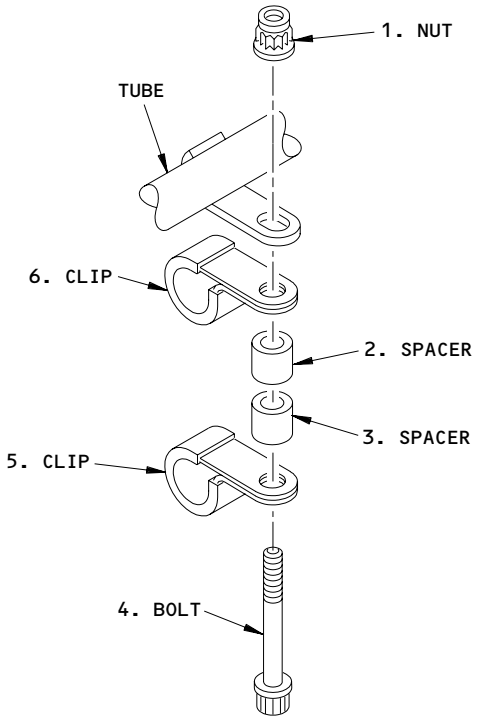
(PRE-SB 72-D352)



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(POST-SB 72-D352)

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Clip Position
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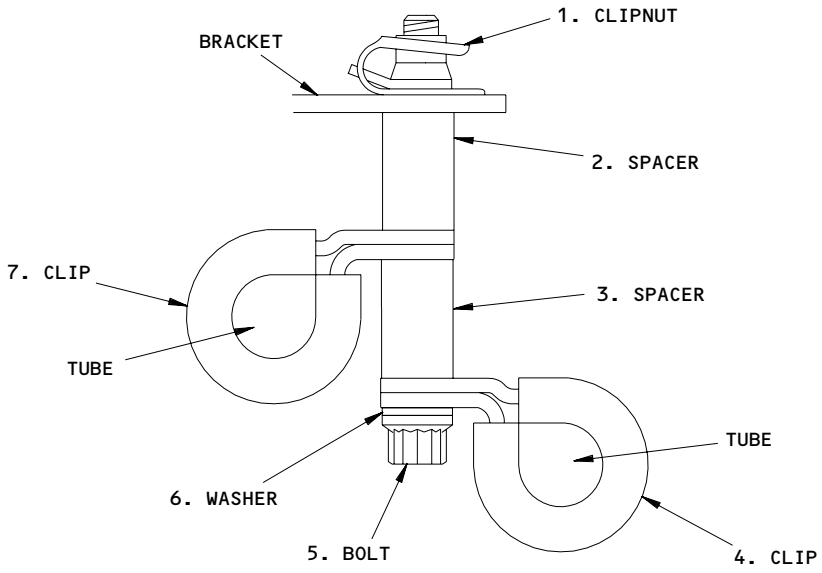

CLIP POSITION 2659

DEE00y2276

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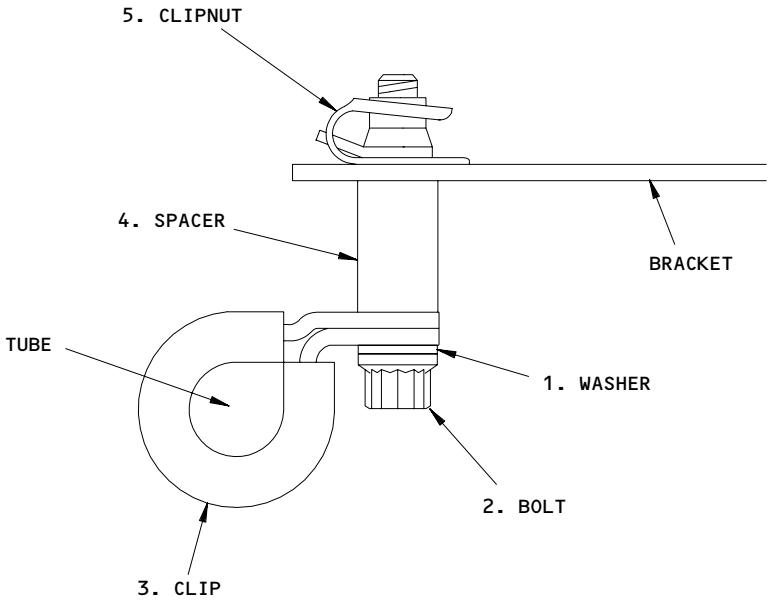
Figure 406 (Sheet 44)

REAR FRONT



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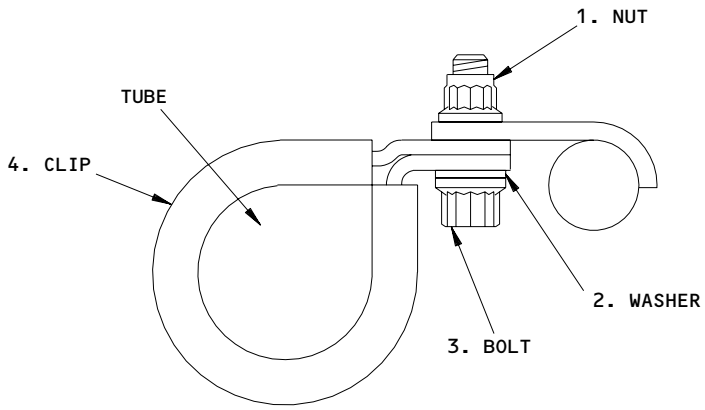

CLIP POSITION 2661

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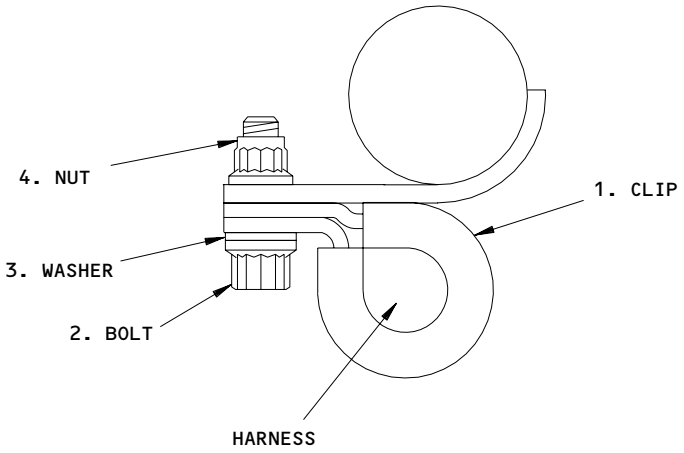
Clip Position
Figure 406 (Sheet 46)

BOTTOM TOP



CLIP POSITION 2662

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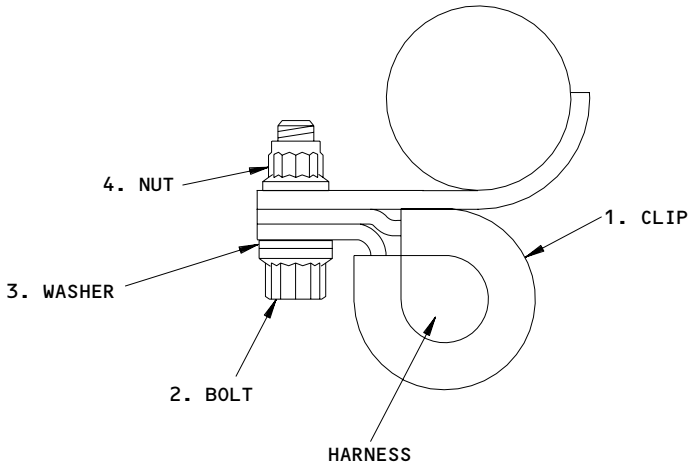
Clip Position
Figure 406 (Sheet 47)

BOTTOM TOP



CLIP POSITION 2663

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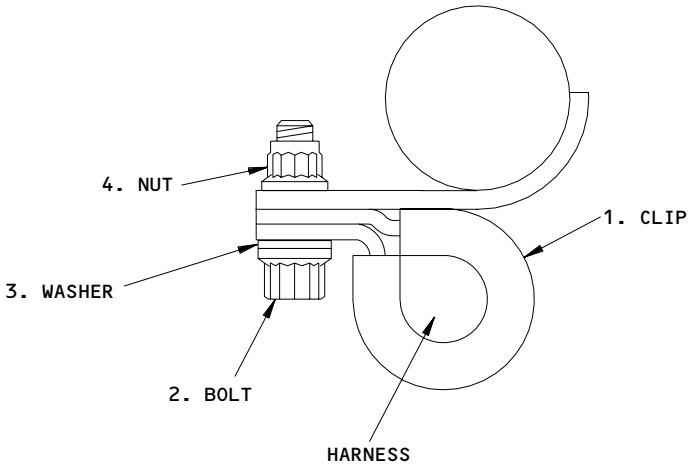
Clip Position
Figure 406 (Sheet 48)

REAR FRONT



CLIP POSITION 2664

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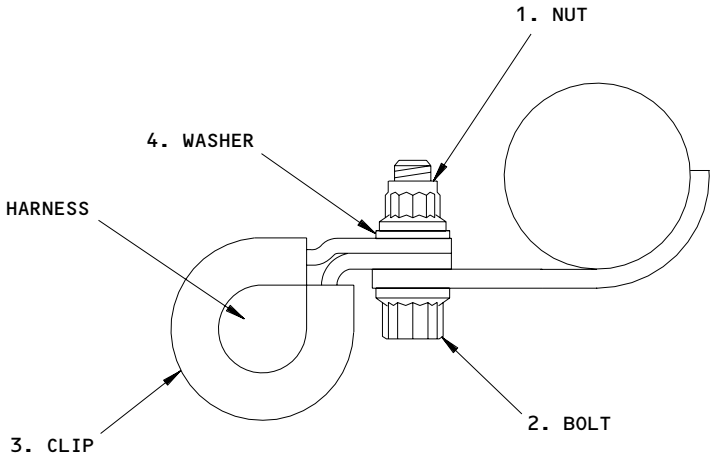
Clip Position
Figure 406 (Sheet 49)

REAR FRONT

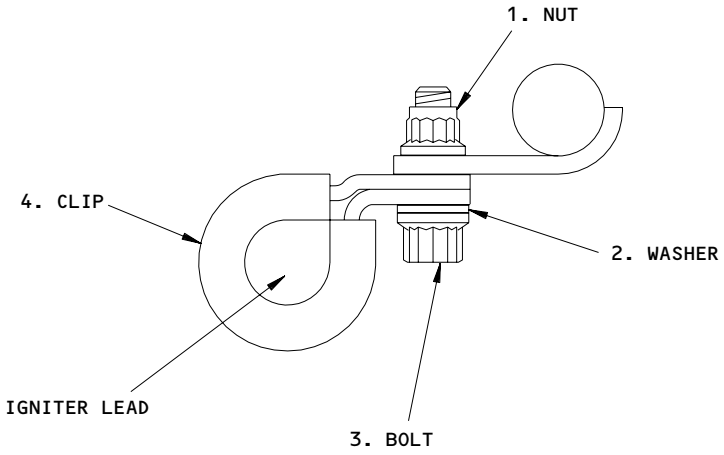


CLIP POSITION 2665

DEE00y2281

Clip Position
Figure 406 (Sheet 50)

FRONT REAR



CLIP POSITION 2666

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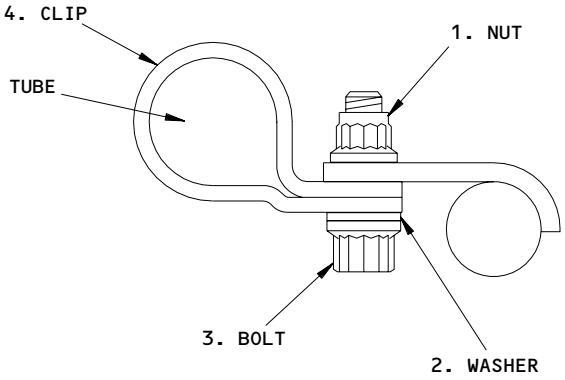
Clip Position
Figure 406 (Sheet 51)

FRONT

REAR



CLIP POSITION 2667

DEE00y2283

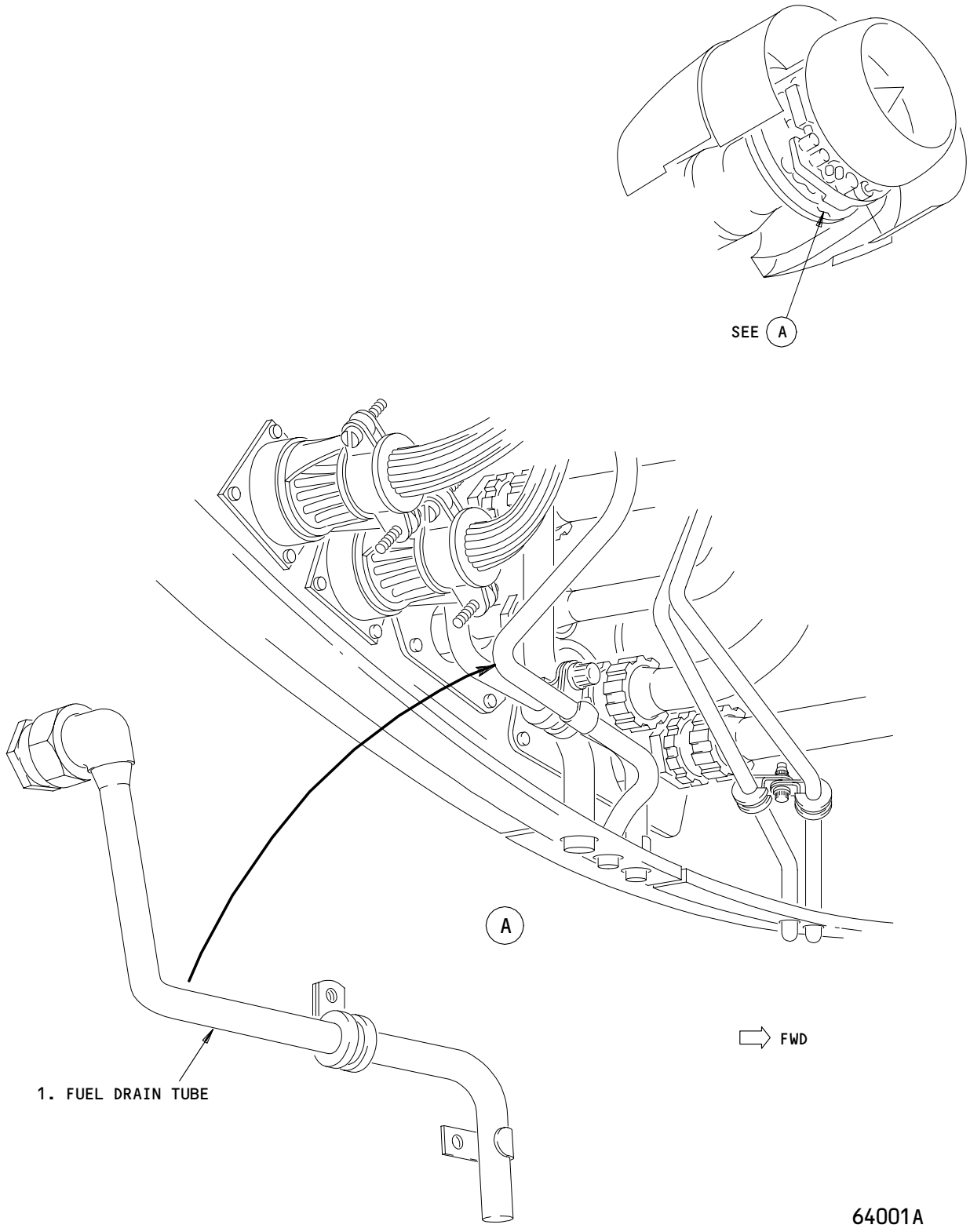
Clip Position
Figure 406 (Sheet 52)

FUEL MANFIOLD - ADJUSTMENT/TEST

1. General
   A. The main HP fuel feed together with the left and right fuel manifold halves and their associated fuel manifold to burner tubes and the fuel manifold drain, are manufactured with an inner and outer tube, termed shroud. The inner tube carries fuel while the outer tube conveys fuel due to a leak within the inner tube to a common 'dry drains' to be distributed overboard. This section, therefore, details a pressure test of the outer tube shroud system.

   TASK 73-11-11-725-009-R00

2. System Test - Full Manifold Drain System
   A. General
      (1) The pressure leak test of the full manifold drains system is given as a system test after a fuel manifold component removal/installation procedure is done.
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-00-00/501, Power Plant
      (3) AMM 71-11-04/201, Fan Cowl Panels
      (4) AMM 73-11-11/401, Fuel Manifold
      (5) AMM 78-31-00/201, Thrust Reverser System
   C. Equipment
      (1) Blank (9 locations) - Rolls-Royce HU27553
      (2) Plug (9 locations) - Rolls-Royce HU27554
      (3) Pressure test equipment (locally made, to include an isolation valve and a pressure gauge in excess of 80 lbf./in.sq. (550 kPa)).
      (4) Nitrogen or Air Supply.
   D. Consumable Material
      (1) Lockwire
          British Spec - DTD189A; 22 S.W.G.
          American Spec - 21 A.W.G.
          OMat No. - 238
   E. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine



Fuel Drain Tube - Panel to Overboard Disconnect Point
Figure 501

(2) Access Panels
413 Left Engine Fan Cowl Panel (LH)
414 Left Engine Fan Cowl Panel (RH)
423 Right Engine Fan Cowl Panel (LH)
424 Right Engine Fan Cowl Panel (RH)

F. Do a pressure leak test of the Full Manifold Drains System (Fig. 501).

S 865-033-R00

CAUTION: WHEN YOU DO A LEAK CHECK OF THE FUEL MANIFOLD, YOU MUST DO VISUAL CHECK OF THE FUEL MANIFOLD TO BURNER TUBES FOR SIGNS OF OBVIOUS DISTORTION.

(1) Remove electrical power (AMM 24-22-00/201).

S 015-001-R00

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

(2) Open the thrust reversers (AMM 78-31-00/201).

S 015-002-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the fan cowl panels (AMM 71-11-04/201).

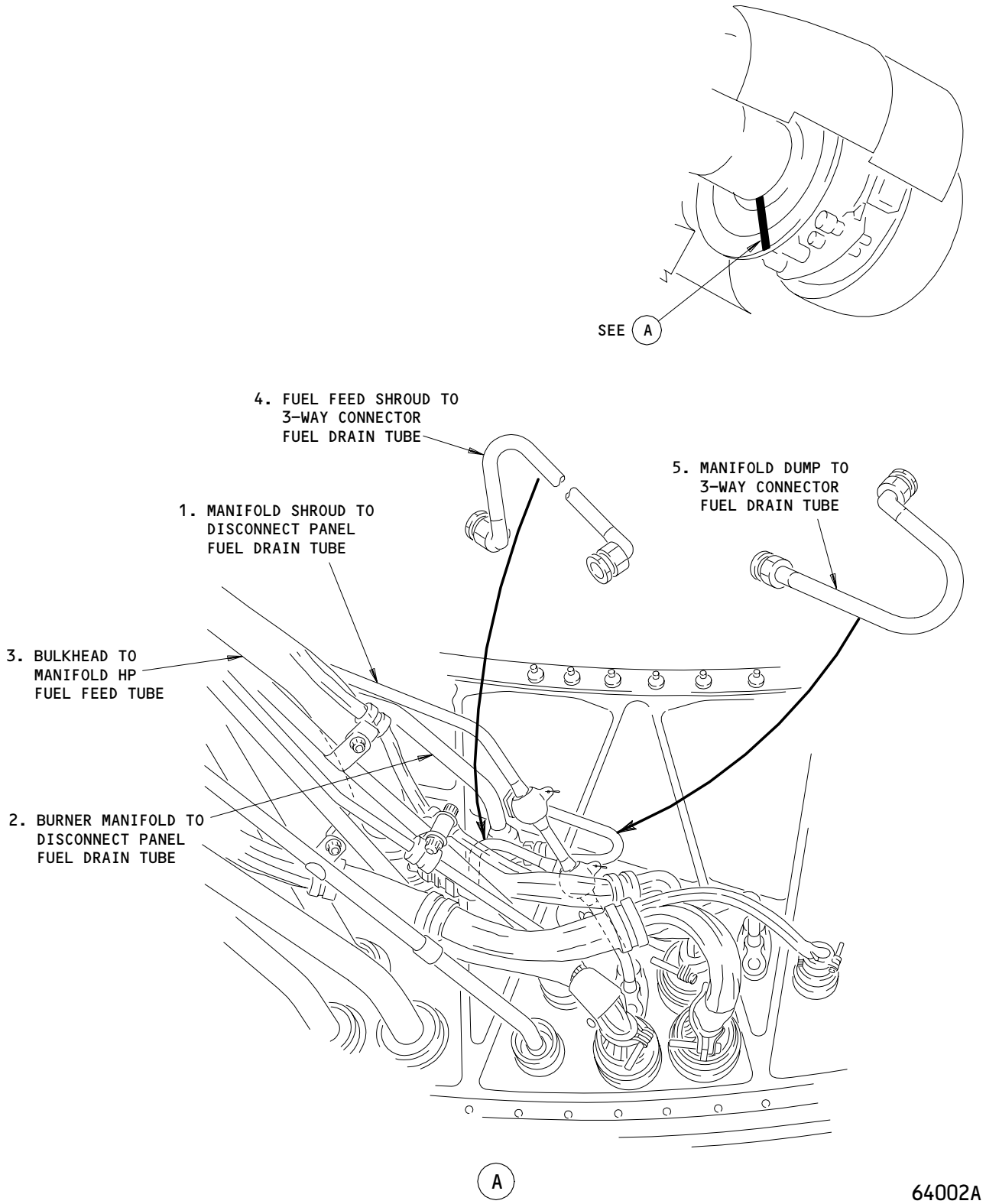
S 035-011-R00
(4) Disconnect the fuel drain tube (1).

S 035-012-R00
(5) Remove the clamp and the fuel drain tube.

S 485-013-R00
(6) Attach the locally made pressure test equipment to the fuel drain tube (1) disconnect point on the firewall bulkhead.

S 865-014-R00
(7) Make sure the isolation valve is closed.

S 485-015-R00
(8) Attach a satisfactory pressure supply.



HP Fuel Feed and Manifold Shroud Disconnect Points
Figure 502

S 865-016-R00

(9) Do these steps to pressurize the system.
  (a) Open the isolation valve and pressurize the system to 80 lbf./in.sq. (550 kPa).
  (b) Close the isolation valve.
  (c) Do not change the system for a minimum time of 2 minutes.

S 795-017-R00

(10) Examine the system for a decrease in pressure.

S 085-018-R00

(11) Disconnect the pressure supply.

S 085-019-R00

(12) Remove the pressure test equipment.

S 435-020-R00

(13) Install the fuel drain tube (1) through the overboard drain hole in the firewall.

S 435-021-R00

(14) Tighten the connector and install a lockwire.

S 435-022-R00

(15) Install the fuel drain tube clips.

S 795-023-R00

(16) If a pressure decrease occurs, do the isolated pressure test of the manifold drains system (para. F).

S 415-006-R00

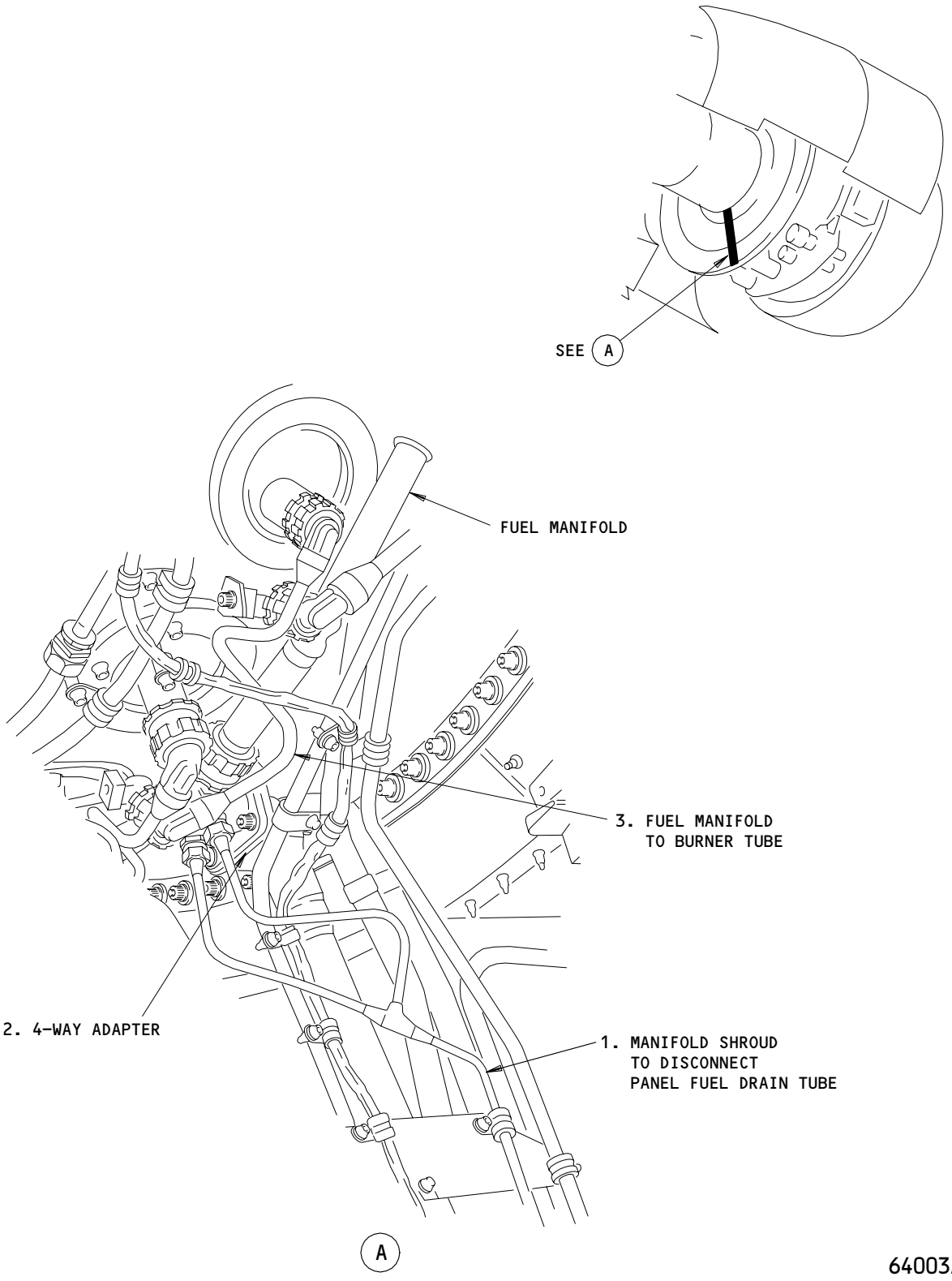
CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 415-005-R00

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

(18) Close the thrust reversers (AMM 78-31-00/201).



Fuel Manifold Disconnect and Pressure Test Points
Figure 503

TASK 73-11-11-725-024-R00

3. System Test - Isolated Components of the Manifold Drains Systems

A. General

(1) The isolated pressure leak test of the manifold drains system (para. F) finds the leak in the system with the minimum number of operations. It is important that you complete the procedure to make sure that there is not more than one failure in the system.

B. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 71-00-00/501, Power Plant
(3) AMM 71-11-04/201, Fan Cowl Panels
(4) AMM 73-11-11/401, Fuel Manifold
(5) AMM 78-31-00/201, Thrust Reverser System

C. Equipment

(1) Blank (9 locations) - Rolls-Royce HU27553
(2) Plug (9 locations) - Rolls-Royce HU27554
(3) Pressure test equipment (locally made, to include an isolation valve and a pressure gauge in excess of 80 lbf./in.sq. (550 kPa)).
(4) Nitrogen or Air Supply.

D. Consumable Material

(1) Lockwire
British Spec - DTD189A; 22 S.W.G.
American Spec - 21 A.W.G.
OMat No. - 238

E. Access

(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
415 Left Engine Fan Reverser (LH)
416 Left Engine Fan Reverser (RH)
425 Right Engine Fan Reverser (LH)
426 Right Engine Fan Reverser (RH)

F. Do a functional test of the isolated components of the manifold drains system.

S 865-025-R00

(1) Remove electrical power (AMM 24-22-00/201).

S 015-031-R00

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

(2) Open the thrust reversers (AMM 78-31-00/201).

S 015-030-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the fan cowl panels (AMM 71-11-04/201).

S 795-026-R00

(4) Do a pressure leak test of the HP fuel feed - bulkhead to manifold tube (Fig. 502).
  (a) Disconnect and remove the fuel feed shroud to 3-way connector tube (4).
  (b) Attach the pressure test equipment to the HP fuel feed - bulkhead to manifold tube (3) connector.
  (c) Make sure the isolation valve is closed, and attach a satisfactory supply pressure.
  (d) Do these steps to pressurize the system:
    1) Open the isolation valve and pressurize the system to 80 lbf./in.sq. (550 kPa).
    2) Close the isolation valve.
    3) Do not change the system for a minimum time of 2 minutes.
  (e) Examine the system for a decrease in pressure.
  (f) If a pressure loss occurs, do these steps:
    1) Disconnect the pressure supply.
    2) Replace the HP fuel feed - bulkhead to manifold tube (3).
    3) Do the pressure leak test operation step (d) again.
  (g) Disconnect the pressure supply.
  (h) Remove the pressure test equipment.
  (i) Install the fuel feed shroud to 3-way connector tube (4) and install a lockwire.
  (j) Do the pressure test of the fuel drain - burner manifold to disconnect panel tube given in step (5).

S 795-027-R00

(5) Do the pressure leak test of the fuel drain - burner manifold to disconnect panel tube.
  (a) Disconnect and remove the fuel drain - manifold dump to 3-way connector tube (5).
  (b) Attach a locally made pressure test equipment to fuel drain - burner manifold to disconnect panel tube (2).
  (c) Make sure the isolation valve is closed, and attach a satisfactory pressure supply.
  (d) Do these steps to pressurize the system:
    1) Open the isolation valve and pressurize the system to 80 lbf./in.sq. (550 kPa).
    2) Close isolation valve.

3) Do not change the system for a minimum time of 2 minutes.
(e) Examine the system for a decrease in pressure.
(f) If a pressure loss occurs, do these steps:
1) Disconnect the pressure supply.
2) Replace the fuel drain - burner manifold to disconnect panel tube (2).
3) Do the pressure leak test operation in step (d) again.
(g) Disconnect the pressure supply and remove the pressure test equipment.
(h) Install the fuel drain - manifold dump to 3-way connector tube (5) and install a lockwire.
(i) Do the pressure leak test of the left and right fuel manifold halves and the fuel manifold to burner tubes given in step (6).

S 795-028-R00

(6) Do the pressure leak test of the left and right fuel manifold halves and the fuel manifold to burner tubes (Fig. 503).
(a) Disconnect the fuel drain - manifold shroud to disconnect panel tube (1) from the 4-way adapter (2), and release, as necessary, the clips to allow the tube to move.
(b) Attach locally manufactured pressure test equipment to left disconnect point on 4-way adapter (2).
(c) Make sure the isolation valve is closed, and attach a satisfactory supply pressure.
(d) Do these steps to pressurize the system.
1) Open the isolation valve and pressurize the system to 80 lbf./in.sq. (550 kPa).
2) Close the isolation valve.
3) Do not change the system for a minimum time of 2 minutes.
(e) Examine the system for a decrease in pressure.
(f) If a pressure loss occurs, do these steps:
1) Disconnect the pressure supply.
2) Attach a label to each fuel manifold to burner tube (3).
3) Disconnect and remove all fuel manifold to burner tubes (3) (Ref 73-11-11) from the left fuel manifold half.
4) Examine the condition of the plug seals.
5) Lubricate and install a plug into the manifold connection and attach it with a blank, at each manifold connection.
6) Do the pressure leak test operation in step (d) again.
7) If there is a decrease in pressure, disconnect the pressure supply and replace the left fuel manifold half and do the pressure leak test operation in step (d) again (AMM 73-11-11/401).

NOTE: A pressure leak test must be done as each manifold to burner tube is installed to make sure there is not more than one failure.

8) Disconnect the pressure supply.
9) Remove the blank and plug, farthest from the 4-way connector (2).
10) Install the correct fuel manifold to burner tube (3) to the left fuel manifold half and the No. 16 fuel spray nozzle.
11) Do the pressure leak test operation again.
    a) If there is a decrease in pressure, disconnect the pressure supply.
    b) Replace the fuel manifold to burner tube (3).
    c) Do the pressure leak test operation in step (d).
    d) If there is no decrease in pressure, continue to remove the blanks and plugs.
    e) Install the fuel manifold to burner tubes (3).
    f) Do the pressure leak test operation in step (d).
    g) Replace the defective fuel manifold to burner tubes (3) as necessary (AMM 73-11-11/401).

(g) Disconnect the pressure supply and remove the pressure test equipment.
(h) Attach the pressure test equipment to the right disconnect point the on 4-way adapter (2).
(i) Do the pressure leak test procedure given for the left manifold half.
(j) Disconnect the pressure supply and remove the pressure test equipment.
(k) Install the fuel drain - manifold shroud to disconnect panel tube (1) to the 4-way adapter (2) and install a lockwire.
(l) Install the clips.

S 795-029-R00

(7) Examine the connections for signs of leaks after the fuel manifold adjustment/test procedure (AMM 71-00-00/501).

S 415-007-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 415-008-R00

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

(9) Close the thrust reversers (AMM 78-31-00/201).

HIGH PRESSURE FUEL FILTER ELEMENT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the high pressure fuel filter element. The second task is to install the high pressure fuel filter element.
   B. The HP fuel filter element is on the lower-right side of the engine. Unwanted material that can possibly go through the HP fuel filter will not cause damage to the fuel spray nozzles or the weight type distributors.

TASK 73-11-12-004-001-R00

2. Remove the High Pressure Fuel Filter Element
   A. Equipment
      (1) UT893 - Wrench, Rolls Royce
      (2) UT894 - Wrench, Rolls Royce
      (3) Clean container - minimum capacity
          1.2 U.S. gallons, 1.0 Imperial gallon, 4.544 Litres
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          413AL Left Fan Cowl Panel (L Engine)
          414AR Right Fan Cowl Panel (L Engine)
          423AL Left Fan Cowl Panel (R Engine)
          424AR Right Fan Cowl Panel (R Engine)

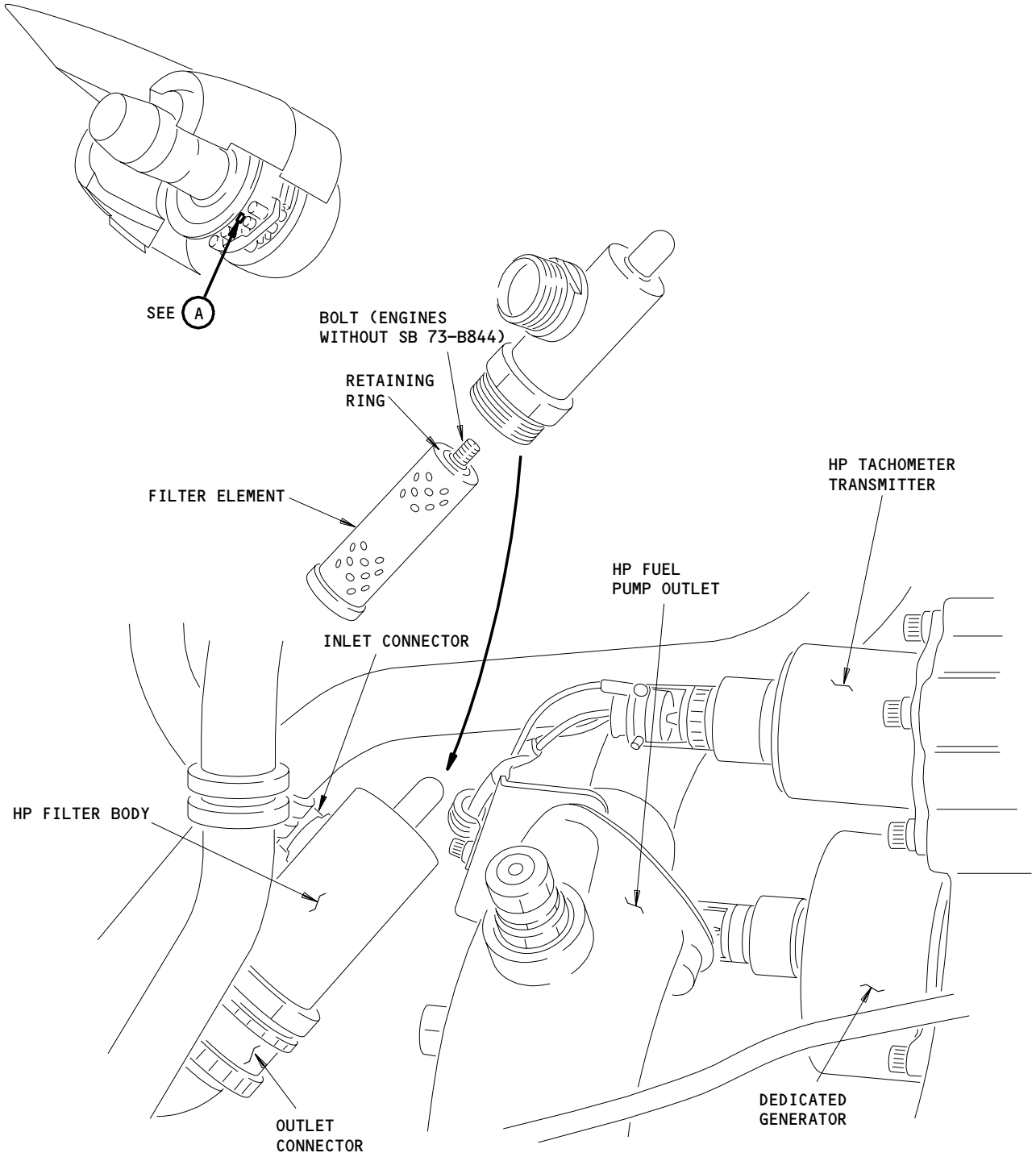
   D. Procedure

      S 864-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 864-003-R00
      (2) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E1, FUEL VALVES L SPAR

      S 864-004-R00
      (3) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E2, FUEL VALVES R SPAR

      S 864-005-R00
      (4) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.



High Pressure Fuel Filter Element Installation
Figure 401

S 864-006-R00
(5) Make sure the ENG VALVE and FUEL SPAR lights, on the control stand, are off.

S 864-007-R00
(6) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVES L SPAR

S 864-008-R00
(7) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVES R SPAR

S 864-009-R00
(8) Remove the electrical power (AMM 24-22-00/201).

S 014-010-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(9) Open the fan cowl panels (AMM 71-11-04/201).

S 944-011-R00
(10) Put the clean containers below the fuel filter and tubes to collect the fuel leakage when you remove the connectors.

S 034-012-R00
(11) Disconnect the connectors (1) and (2) with the wrenches.
(a) Hold the flat sides of the filter body (3) when you remove the connectors (1) and (2).

S 034-013-R00
(12) Loosen the bolt (4) and remove the filter element (5).

NOTE: ON ENGINES WITH SB73-B844: The bolt (4) is permanently attached to the filter element (5).

S 434-014-R00
(13) Install the dust caps to all of the openings and connectors.

TASK 73-11-12-404-015-R00
3. Install the High Pressure Fuel Filter Element
A. References
(1) AMM 24-22-00/201, Control

(2) AMM 70-51-00/201, Torque Tightening Technique
(3) AMM 71-00-00/501, Power Plant
(4) AMM 71-11-04/201, Fan Cowl Panels

B. Equipment
(1) UT893 - Wrench, Rolls Royce
(2) UT894 - Wrench, Rolls Royce

C. Consumable Materials
(1) Lockwire
British Spec/Ref - DTD. 189A, 22 S.W.G.
American Spec/Ref - 21 S.W.G.
OMat No. 238

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
413AL Left Fan Cowl Panel (L Engine)
423AR Right Fan Cowl Panel (R Engine)
414AL Left Fan Cowl Panel (R Engine)
424AR Right Fan Cowl Panel (R Engine)

E. Procedure

S 214-016-R00

CAUTION: YOU MUST CORRECTLY INSTALL THE FILTER ELEMENT AND BOLT. IF NOT INSTALLED CORRECTLY, THE FILTER ELEMENT AND BOLT WILL DECREASE THE FUEL FLOW AND CAN CAUSE TURBINE DAMAGE.

(1) ENGINES PRE-SB 73-B844;
Make sure the retaining ring that attaches the bolt (4) to the element (5) is not damaged and is correctly installed.

S 424-017-R00
(2) Install the filter element (5) in the filter body.
(a) Tighten the bolt (4) (AMM 70-51-00/201).

NOTE: On engines with SB 73-B844, the bolt(4) is permanently attached to the filter element(5).

S 034-018-R00
(3) Remove the dust caps from all of the openings and connectors.

S 424-019-R00
(4) Put the filter body in the correct position.

S 434-020-R00
(5) Install the connectors (1) and (2) in sequence and tighten them with your hand.

S 434-021-R00

(6) Tighten the connectors (1) and (2) in sequence with the wrenches to these values.
   (a) Connector (1) - 1020 pound-inches (115.2 N.m)
       Connector (2) - 1440 pound-inches (162.7 N.m)
   (b) Hold the flat sides of the filter body (3) when you install the connectors (1) and (2).

S 414-022-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-023-R00

(8) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
   (a) 6E1, FUEL VALVES L SPAR

S 864-024-R00

(9) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
   (a) 6E2, FUEL VALVES R SPAR

S 864-025-R00

(10) Remove the DO-NOT-CLOSE tag from the FUEL CONTROL switch on the control stand.

S 864-026-R00

(11) Supply the electrical power (AMM 24-22-00/201).

S 714-027-R00

(12) Do an engine test with the Power Plane Test Reference Table (AMM 71-00-00/501).

HIGH PRESSURE FUEL FILTER ELEMENT - CLEANING/PAINTING

1. General
   A. This procedure contains two tasks. The first task is to clean the HP fuel filter element with the flush procedure. The second task is to clean the HP fuel filter element in an ultrasonic bath (ultrasonic procedure).
      (1) Use the ultrasonic procedure when the flush procedure is not sufficient.

TASK 73-11-12-117-001-R00

2. HP Fuel Filter Element Cleaning (Flush Procedure)
   A. Equipment
      (1) Air - dry compressed
   B. Consumable Materials
      (1) Kerosene, clean engine fuel
          British Spec/Ref - Commercial Grade (D.Eng. RD2494)
          OMat No. 101

   C. References
      (1) AMM 73-11-12/401, High Pressure Fuel Filter Element
   D. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          413AL Left Fan Cowl Panel (L Engine)
          414AR Right Fan Cowl Panel (L Engine)
          423AL Left Fan Cowl Panel (R Engine)
          424AR Right Fan Cowl Panel (R Engine)

   E. Procedure

          S 027-002-R00
      (1) Remove the filter element (AMM 73-11-12/401).

          S 117-003-R00
      (2) Clean the filter element with kerosene.
          (a) Use clean kerosene to flush the filter element.
          (b) Remove the filter element from the kerosene and shake the element to remmove unwanted kerosene.

CAUTION: MAKE SURE THAT YOU ONLY USE SUFFICIENT AIR PRESSURE. IF YOU USE TOO MUCH AIR PRESSURE, YOU COULD CAUSE DAMAGE TO THE ELEMENT.

(c) Use the dry compressed air to remove contamination from the inner surface of the element.

S 217-004-R00

(3) Examine the filter element:
(a) Put the filter element in a good light and visually examine it for contamination.
(b) If the filter element is not clean, do the flush procedure again.
(c) If the contamination is not removed with the flush procedure, clean the fuel filter element with the ultrasonic procedure.

S 427-005-R00

(4) Install the fuel filter element (AMM 73-11-12/401).

TASK 73-11-12-137-006-R00

3. HP Fuel Filter Element Cleaning (Ultrasonic Procedure)

A. Equipment
(1) Air - dry compressed
(2) Ultrasonic Bath

B. Consumable Materials
(1) Kerosene, clean engine fuel
British Spec/Ref - Commercial Grade (D.Eng. RD2494)
OMat No. 101

C. References
(1) AMM 73-11-12/401, High Pressure Fuel Filter Element

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
413AL Left Fan Cowl Panel (L Engine)
414AR Right Fan Cowl Panel (L Engine)
423AL Left Fan Cowl Panel (R Engine)
424AR Right Fan Cowl Panel (R Engine)

E. Procedure

S 027-007-R00
(1) Remove the filter element (AMM 73-11-12/401).

S 137-008-R00
(2) Clean the filter element in an ultrasonic bath:
  (a) Put the filter element fully into an ultrasonic bath which contains clean kerosene.
    1) Operate the ultrasonic bath for 10 minutes.
  (b) Remove the filter element and shake it to remove unwanted kerosene.

CAUTION: MAKE SURE THAT YOU ONLY USE SUFFICIENT AIR PRESSURE. IF YOU USE TOO MUCH AIR PRESSURE, YOU COULD CAUSE DAMAGE TO THE ELEMENT.

  (c) Use the dry compressed air to remove contamination from the inner surface of the element.

S 217-009-R00
(3) Examine the filter element:
  (a) Put the filter element in a good light and visually examine it for contamination.
  (b) Do the ultrasonic cleaning procedure again if the filter element is not clean.

S 427-010-R00
(4) Install the filter element (AMM 73-11-12/401).

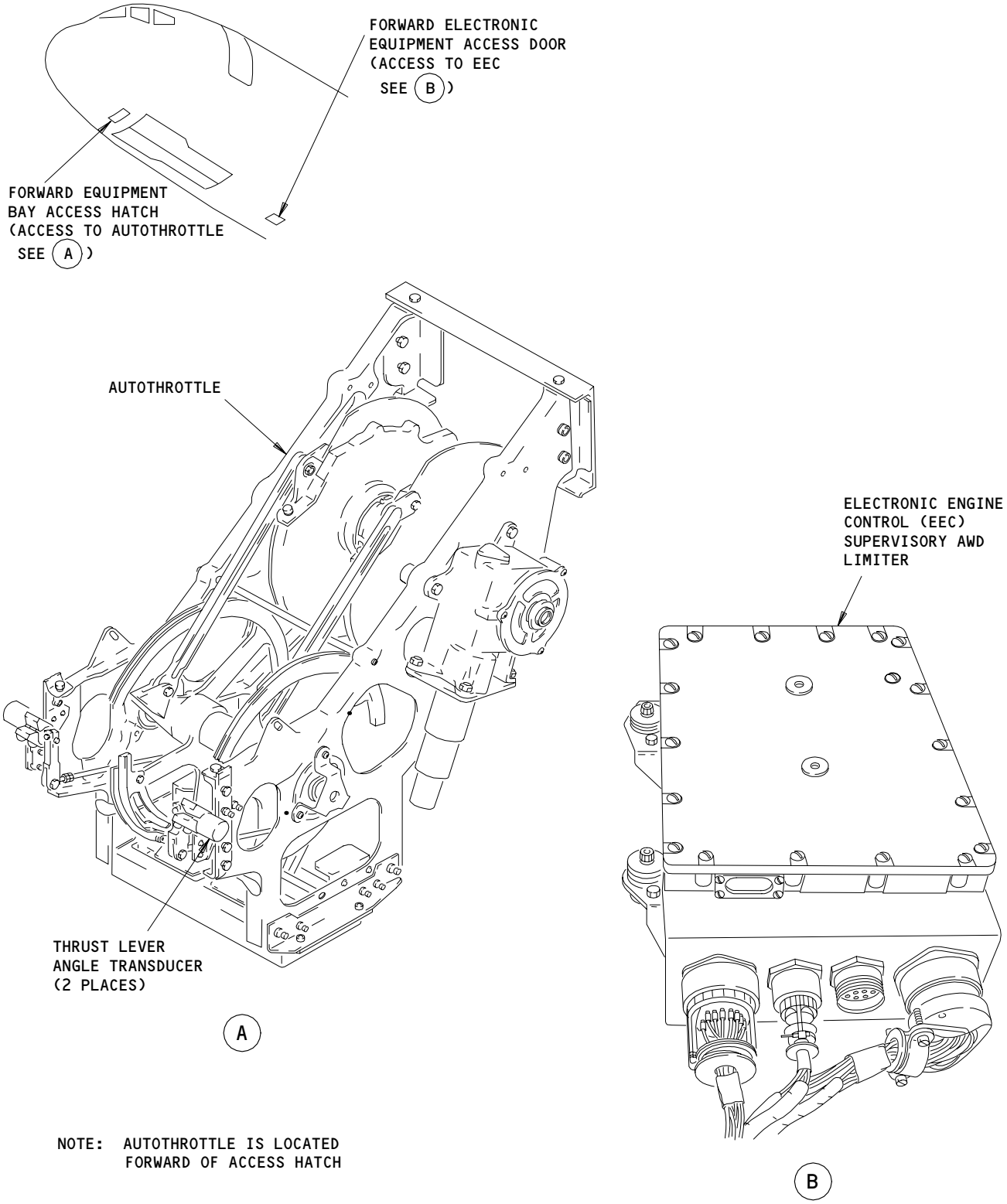
FUEL CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The fuel control system enables fuel to be controlled from the flight compartment to effect engine starting, shutdown and power selection.
   B. The system includes a fuel flow governor (FFG), an Electronic Engine Control (EEC) supervisory and limiter, a LP compressor delivery temperature sensor (TF), an IP compressor inlet temperature sensor (T2), P1 probe and tubes, thrust lever angle transducer, fuel system air tubes, dedicated generator and a dedicated generator control unit. The system automatically adjusts fuel flow to maintain the selected power, irrespective of altitude, forward speed, ambient temperature and pressure, provides power flat rating and prevents limiting values of exhaust gas temperature (EGT) and N1 being exceeded. In the event that a failure is sensed in the EEC supervisory and limiter, a CAUTION level message L/R ENG LIMITER will be displayed on EICAS.

      NOTE: AIRPLANES WITH -106 OR -107 EICAS COMPUTERS;
      The L/R ENG LIMITER or L/R ENG EEC EICAS message will be inhibited until 4 seconds after engines are running.

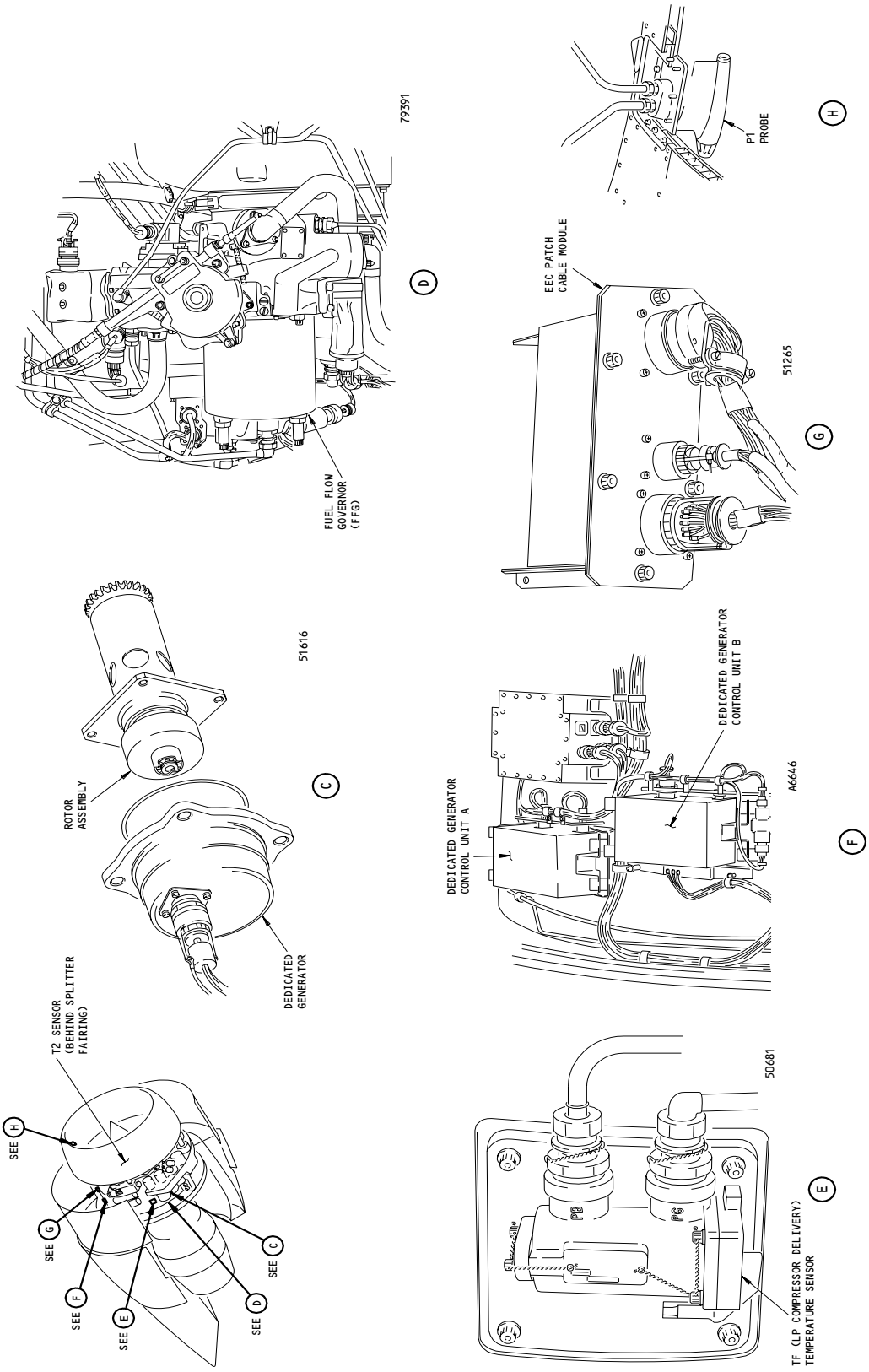
      NOTE: ENGINES POST-RR-SB 71-8093;
      The EGT limit function of the EEC is not serviceable because the EGT signal is removed.

   C. Manual control for starting and stopping is effected through a fuel control switch, electrically connected to a fuel shut-off valve in the FFG.
   D. Power selection is by means of a thrust lever, connected through the engine control system (AMM 76-11-00/001) to the FFG.
   E. Fuel flow is automatically scheduled by the FFG to maintain the selected power. The supervisory channel of the EEC accurately maintains the selected rating to ensure that actual engine power matches the commanded power, regardless of changes in flight and environmental conditions, thus providing optimum fuel economy.
   F. A second (Limiter) channel in the EEC functions to reduce the fuel flow set by the FFG, and the supervisory channel of the EEC, should N1 and, on engines pre RR SB 71-8093, EGT reach its limiting value.
2. Component Details
   A. Fuel Flow Governor (Fig. 2 or Fig. 3)
      (1) The FFG is mounted on the rear face of the high speed external gearbox and basically includes the following:
         (a) P4 sensor
         (b) P4 servo
         (c) P1 sensor
         (d) P4/P1 governor
         (e) TF servo
         (f) Tachometer servo
         (g) Fuel metering valve (FMV)



NOTE: AUTOTHROTTLE IS LOCATED FORWARD OF ACCESS HATCH

Fuel Control System Components
Figure 1 (Sheet 1)



Fuel Control System Components
Figure 1 (Sheet 2)

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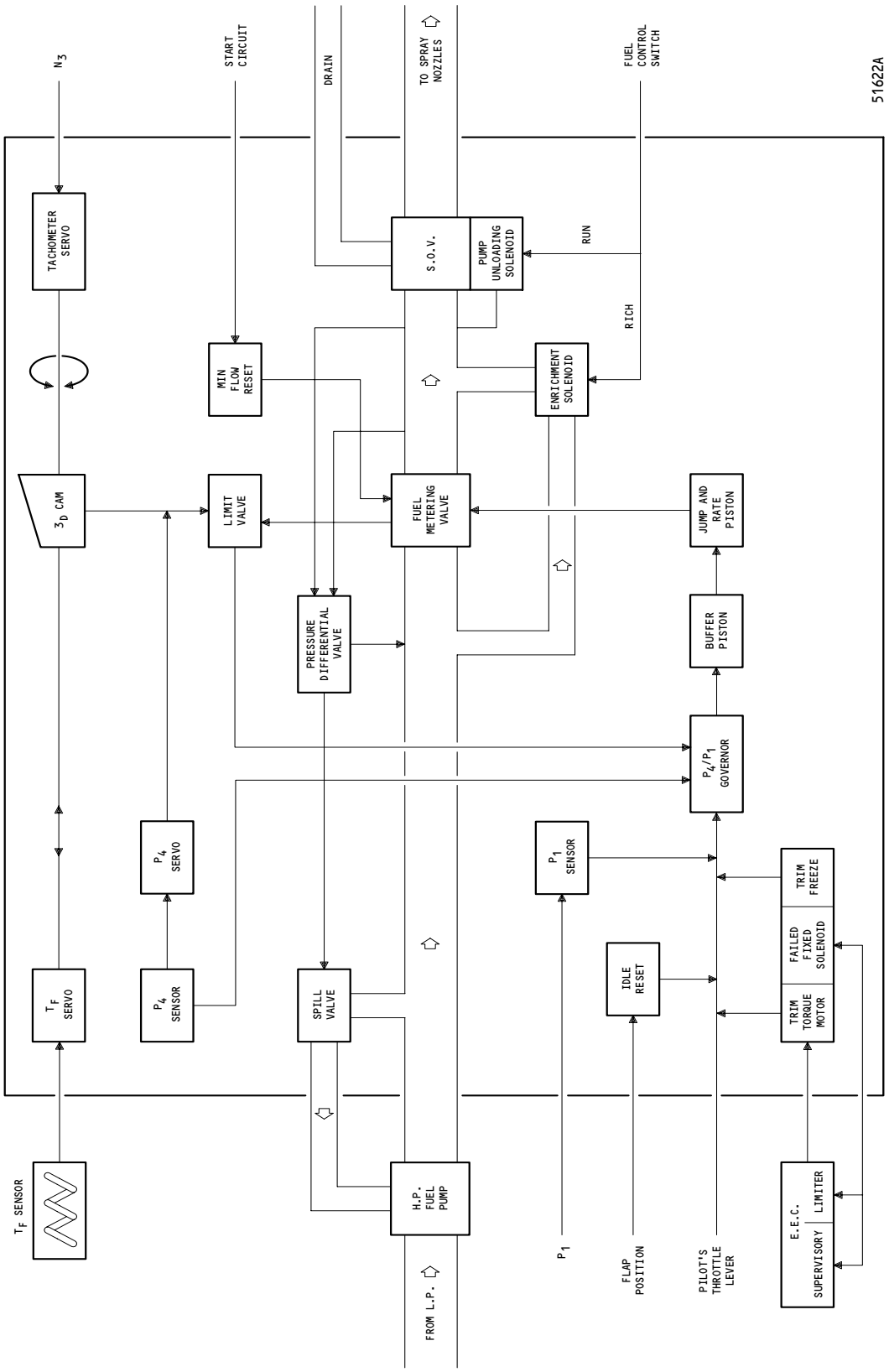


Fuel Flow Governor Components
Figure 2

(h) Pressure differential valve
(i) Enrichment valve
(j) Shut-off valve and pump unloading solenoid
(k) Minimum flow reset solenoid
(l) Idle reset solenoid.

(2) The FFG uses the ratio of HP compressor delivery pressure (P4) to air intake pressure (P1) as the main control parameter (P4/P1). HP compressor delivery pressure is sensed by a P4 sensor that converts it to a hydraulic pressure. The modified pressure is applied to one side of a P4/P1 governor. P4/P1 ratio, at all throttle lever angles and all altitudes, can be modified by P1 pressure. This is achieved through a P1 sensor incorporating a 3D cam that is positioned, axially by a P1 bellows and rotationally by the throttle lever angle, to adjust governor spring load.

(3) The P4/P1 governor balances throttle position against P4 sensor pressure to control the position of the FMV and schedule fuel flow consistent with the power requirement set by the power lever. The system is also sensitive to HP shaft speed (N3) and LP compressor delivery temperature TF.

(4) The N3 idle governor maintains idle speed at a level sufficient to prevent N3 shaft speed from falling below the integrated drive generator (IDG) cut-out speed. This system overrides the existing P4 control when required to maintain the speed in conditions of cold ambient temperatures, particularly in high power take-off conditions.

B. Electronic Engine Control (EEC) Supervisory and Limiter (Fig. 4 and 5)

(1) The EEC is located in the avionics bay.

(2) The unit is a limited authority digital controller comprised of a supervisory channel and a limiter channel.

(3) The supervisory channel effectively trims the fuel flow scheduled by the fuel flow governor (FFG) to match actual engine power with a calculated engine power for a given throttle angle, consistent with optimum fuel economy.

(4) The limiter channel prevents LP compressor shaft speed (N1) and, on engines PRE-RR-SB 71-8093 prevents EGT, from exceeding maximum values by overriding the fuel flow scheduled by the FFG.

(5) The EEC achieves both the supervisory and the limiter functions by means of a single control output signal to the torque motor in the FFG.

(6) Both channels basically include a microprocessor, a memory and input and output circuitry.

(7) Each channel can operate independently in the event of a failure in the other channel, but under normal (no fault) conditions operate in conjunction with each other.

(8) Data transfer between the channels is through a serial data highway.

C. Supervisory and Limiter

(1) The supervisory channel monitors inputs of throttle lever angle (TLA), IP compressor inlet temperature (T2), engine pressure ratio (EPR), engine inlet pressure (P1) and the engine air bleed state.

(2) Mach number, total air temperature (TAT), altitude and probe heat status are other factors that can affect engine power. These are also supplied to the supervisory channel through the air data computers (ADC).

(3) To provide for fail safe operation, data from the left ADC is the primary signal supplied to both EEC's. If the left signal fails to be supplied after a time delay to either the right and/or the left EEC, the right ADC signal is used for EEC calculations.

(4) The limiter channel monitors inputs of N1 and, on engines PRE-RR-SB 71-8093, EGT and compares them with datum values programmed into its memory to produce two error signals. While these error signals remain below their datum levels, no output is signalled to the torque motor.

(5) From the ADC inputs and engine parameters monitored the supervisory channel predicts the value of N1 required to achieve the command EPR calculated for the throttle angle.

(6) Simultaneously the supervisory channel compares the calculated command EPR with the actual EPR and in turn compares the difference with a programmed datum.

(7) During acceleration the comparitor connects the predicted value of N1 signal to the limiter section until the difference between the command and actual EPR is approximately 0.03 EPR. At this point the predicted N1 signal is disconnected and the EPR difference signal connected to the limiter section. The predicted N1 signal would also be disconnected should it fall below a predetermined limit.

(8) This achieves maximum response of the system during acceleration and minimizes overshoots.

(9) The final output from the supervisory channel in the form of an error signal is supplied to a lowest wins circuit along with the error signals produced by the limiter channel.

(10) While the three error signals remain positive (N1 below datum level and actual EPR below command EPR) no output is signalled to the torque motor. If, however, the output stage of the EEC predicts that EGT will exceed its datum or that N1 will either exceed its datum or the predicted level for the command EPR within a predetermined time, then a signal is passed to the torque motor to trim fuel flow.

NOTE: On engines POST-RR-SB 71-8093, the EGT signal to the EEC is removed.

(11) The lowest wins circuit is arranged to allow only the lowest error signal (parameter nearest to its datum) to preceed. In this way over trimming of fuel flow is prevented.

D. Dedicated Generator
   (1) The generator is mounted on, and driven through, the high speed external gearbox. The generator consists of a three-phase permanent magnet, the output from which is fed direct to the control unit.

E. Dedicated Generator Control Unit
   (1) The generator control unit is mounted on the upper right side of the IP compressor case and includes a rectifier and switching regulator, voltage monitor switch and a tachometer.
   (2) Power from the generator is supplied to the control unit, where it is converted to 28 Vdc output. The control unit provides this power to the EEC and bleed valve control unit for operation.

F. TF (LP Compressor Delivery) Temperature Sensor
   (1) The TF (LP compressor delivery) temperature sensor is attached to the right side of the fan case above the FFG. A helium filled coil protrudes from the sensor housing through the fan case into the fan air stream.
   (2) The TF sensor provides changes in the restricted PC pressure in the FFG.

G. T2 (IP Compressor Inlet) Temperature Sensor
   (1) The T2 sensor is also referred as the T2 Sonic Thermocouple (AMM 75-32-00/001) and provides a signal to the EEC and the BVCU.

(2) The T2 sensor is mounted on the front bearing housing behind the spiltter fairing.

H. P1 Probe

(1) The P1 probe is attached to the inside of the inlet cowl at about the 12 O'clock position. The probe consists of a pitot tube housed in a fabricated body of aerodynamic shape.

(2) The probe senses the air pressure entering the LP compressor and sends this signal through the P1 tubes to the EPR transmitter (AMM 77-11-00/001) and the FFG.

I. Thrust Lever Angle Transducer

(1) The thrust lever angle transducer is attached to the front of the autothrottle frame below the control stand. The transducer transmits the angle of the thrust levers to the EEC.

3. Operation

A. Functional Description

(1) Fuel Flow Governor (Fig. 3)

(a) Normal fuel scheduling

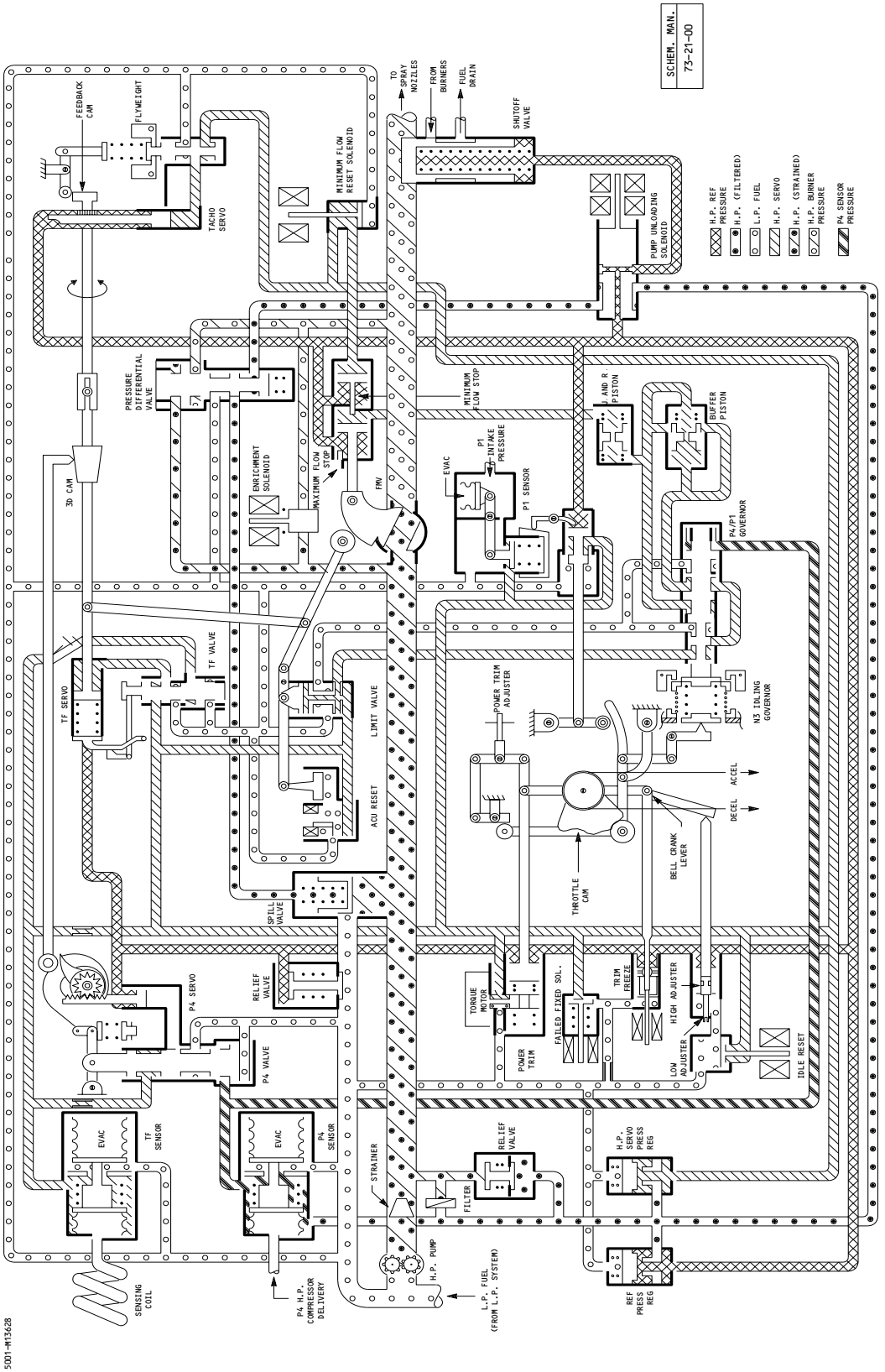
1) Normal fuel scheduling is achieved by maintaining a constant pressure drop across the FMV. The total pressure drop created is sensed by a pressure differential valve, that controls a spill valve in the HP delivery line to spill fuel, in excess of FFG requirements, back to HP pump inlet.

2) The rate of FMV movement, and hence acceleration/deceleration, is controlled through a limit valve that controls HP servo pressure passing through the governor to the FMV. The position of the limit valve is determined by inputs from the P4 servo, tachometer servo, TF servo and FMV feedback.

(b) Acceleration

1) The fuel flow limiting provides maximum fuel flow during acceleration and minimum fuel flow during deceleration. These limits are set as a function of N3, TF and P4.

2) Advancing the thrust lever increases the load on the P4/P1 governor, with a resulting increase in control pressure acting on the FMV.



Fuel Flow Governor Operation
Figure 3

3) Fuel flow increases to the spray nozzles with a resultant increase in engine power and therefore P4.
4) When engine power reaches the selected value, P4 sensor pressure acting on th P4/P1 governor balances the loading on the throttle linkage, and stabilizes FMV position.
5) To prevent instability in the system, due to engine response lagging behind change in fuel flow, a buffer piston and a jump and rate piston are incorporated between governor and FMV. When the engine is accelerated the buffer piston nulls the effect of governor movement at a speed slightly lower than the desired speed until engine response catches up. When a greater fuel flow change is required to accommodate a rapid speed change, the jump and rate piston allows initial fuel flow change at a rapid rate with completion at a slower rate.
6) An increase in P4 resulting from rapid acceleration increases P4 sensor pressure acting on a P4 servo. Movement of the servo piston operates a cam in the servo system and alters the position of the limit valve to increase HP servo pressure passing through the governor to open the FMV.

(c) Deceleration
1) The sequence of operation during deceleration is the reverse of acceleration.

(d) Temperature sensing
1) A change in LP compressor delivery temperature (TF) is sensed by a sensing coil situated in the fan duct. The helium filled coil reacts to temperature changes by transmitting a signal to the bellows of a sensor, that in turn regulates HP servo pressure acting on a valve to control the position of a servo piston.
2) The TF servo converts the temperature signal into a force to change the axial position of the 3D cam and adjust the limit valve to increase or decrease servo pressure through the governor, depending on whether temperature decreases or increases.

(e) Speed governing
1) Engine speed is sensed through a tachometer servo that monitors engine speed through engine driven flyweights, the centrifugal force of which is proportional to engine speed. This force is applied to a pilot valve that controls the movement of a servo piston, through which rotational movement is applied to the 3D accel/decel cam, resulting in adjustment of the limit valve.
2) Rotational movement of the 3D cam also operates a feedback cam, through which pressure is applied to the restoring spring that pushes the pilot valve down to the null position.

(f) Differential pressure regulation
  1) The pressure drop across the FMV is maintained at a constant value by a pressure differential valve, that compares FMV fuel inlet and discharge pressures and controls the operation of a spill valve to vary the amount of excess inlet fuel returned to HP pump inlet.

(g) Fuel enrichment solenoid
  1) The FFG incorporates a fuel enrichment solenoid enabling additional fuel to be supplied to facilitate engine starting. The solenoid is energized through a fuel control switch at the flight station and, when energinzed, allows fuel to by-pass the FMV and augment the fuel supply downstream.

(h) Maximum/Minimum fuel flow stops
  1) Maximum and minimum fuel flow stops are incorporated in the FFG. The maximum flow stop limits fuel flow through the FMV to prevent the engine being overstressed at high forward speed at low altitude. The minimum flow stops ensures that, in idling conditions at altitude, engine off-take air available is sufficient to meet aircraft demand. The minimum flow stop is withdrawn during starting to prevent overfueling when starting at altitude.
  2) Although withdrawn for all starts, the minimum flow stop has no effect on fuel flow during ground starting. Withdrawl of the minimum flow stop is achieved through a minimum flow reset solenoid that is energized through the dedicated generator, in preparation for the next start, as engine speed reduces below idle during run down. One side of a minimum stop piston is vented, and fuel pressure acting on the opposite side moves the piston to withdraw the stop.
  3) The minimum flow stop is returned to the normal operating position when the reset solenoid is de-energized by the dedicated generator, as engine speed increases toward idle during start.

(i) Idle scheduling
  1) Engine power at idling is determined by an idle reset solenoid, energized to provide a low idle setting for all normal in-flight and ground operations. When higher idling speeds are required, during approach and touchdown, to facilitate engine acceleration in the event of a go-around and when reverse thrust is selected, the solenoid is de-energized by a flap switch when the trailing edge flaps are selected to the landing range.

2) With the idle reset solenoid energized, one side of a reset piston is ported to LP and the piston moves to the low idle stop. With the aircraft trailing edge flaps positioned in the landing range, the solenoid is de-energized through the flap switch and pressure is applied to move the reset piston to high idle position. This increased power is cancelled, approximately 5 seconds after touchdown, when the reset solenoid is re-energized through a relay, actuated by the air/ground sensing system.

(j) Shut-off valve and pump unloading solenoid

1) A servo operated fuel shut-off valve (SOV) controls the supply of metered fuel to the spray nozzles and shuts off the supply when the engine is shut down. The SOV is actuated by a fuel control switch in the flight compartment. The unit incorporates a pump unloading solenoid to facilitate unloading of the HP pump during engine shut-down.

2) With the SOV selected to open, the pump unloading solenoid positions a pilot valve to disconnect HP pump pressure from the closing side of the SOV. The SOV opens when the FMV downstream pressure is sufficient to overcome SOV closing spring pressure.

3) With the SOV selected to close, the pump unloading solenoid positions the pilot valve so that HP pump pressure is directed to the closing side of the SOV to assist spring pressure in closing the valve.

4) After shutdown the contents of the fuel manifold are drained into a drains tank, to the level of the lowest spray nozzles. Fuel collected in the drains tank is fed back to the inlet side of the system, during subsequent start, through an ejector pump and float valve (AMM 71-71-00/001).

(k) Power trim

1) Fuel trimming resulting from an EEC error signal input to the torque motor (ref par.2.B.), is effected through a double acting flapper valve that controls the positon of a trim piston connected to the throttle linkage. A linear variable differential transformer (LVDT) provides an electrical feedback signal of trim position to the EEC.

2) To guard against a failure in either channel of the EEC, the power trim system incorporates a failed solenoid that receives a signal from the EEC and 'freezes' the torque motor current to prevent further trimming of fuel flow by the EEC.

3) A bellcrank lever, freely rotating on the throttle shaft, is connected at one end to the trim piston rod and the other end to a sliding rod in a trim freeze servo. With the failed fixed solenoid energized, the sliding rod is gripped by collects, preventing further movement and thus trim action.

4) Provision is made to override the trim freeze and revert to zero trim.

(l) Transient Fuel Valve (T.F.V.) (Fig. 7).

1) The T.F.V. is located on the right side of the L.P. compressor case in the fuel supply line between the shut-off valve and the fuel flow transmitter.

2) It consists of a spring-loaded differential area piston and control solenoid, and utilizes H.P. fuel pump outlet pressure as a servo pressure to drive the piston. Operation of the solenoid is controlled by the transient pressure sensor unit (AMM 75-32-00/001).

3) The purpose of the T.F.V. is to assist in surge recovery by reducing fuel flow to the spray nozzles temporarily in the event of an engine surge at low power conditions.

(2) Electronic Engine Control (EEC) Supervisory and Limiter (Fig. 4 and 5)

(a) In order to perform its function the supervisory channel monitors inputs of: throttle lever angle (TLA), IP compressor inlet temperature (T2), engine pressure ratio (EPR), engine inlet pressure (P1) and the engine air bleed state.

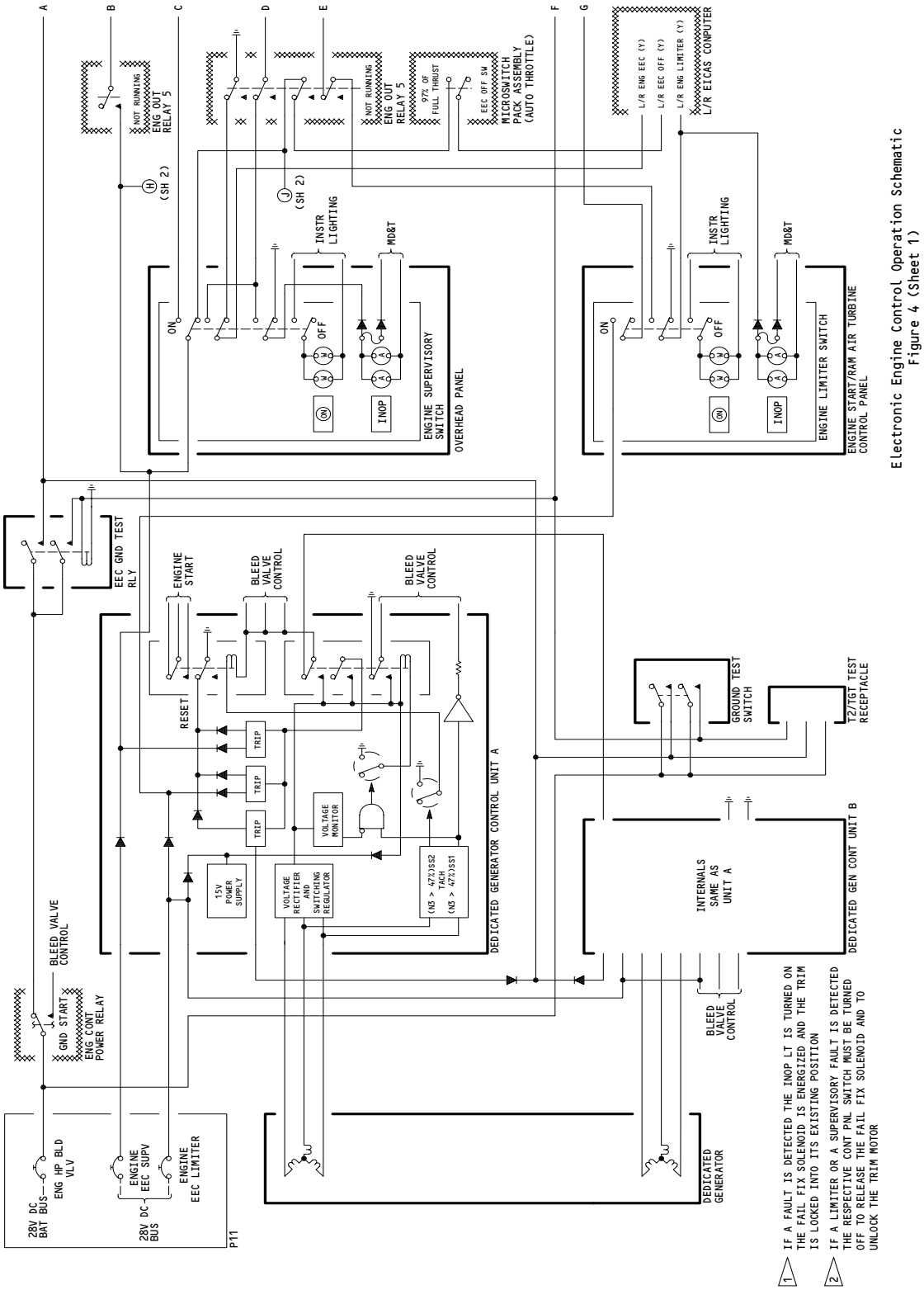
(b) In addition the following factors that can affect engine power are supplied to the supervisory channel by the air data computers (ADC): mach number, total air temperature (TAT), altitude and probe heat status.

(c) The limiter channel monitors inputs of N1 and, (on engines PRE-SB 71-8093) EGT and compares them with datum values programmed into its memory to produce two error signals. While these error signals remain below their datum levels no output is signalled to the torque motor.

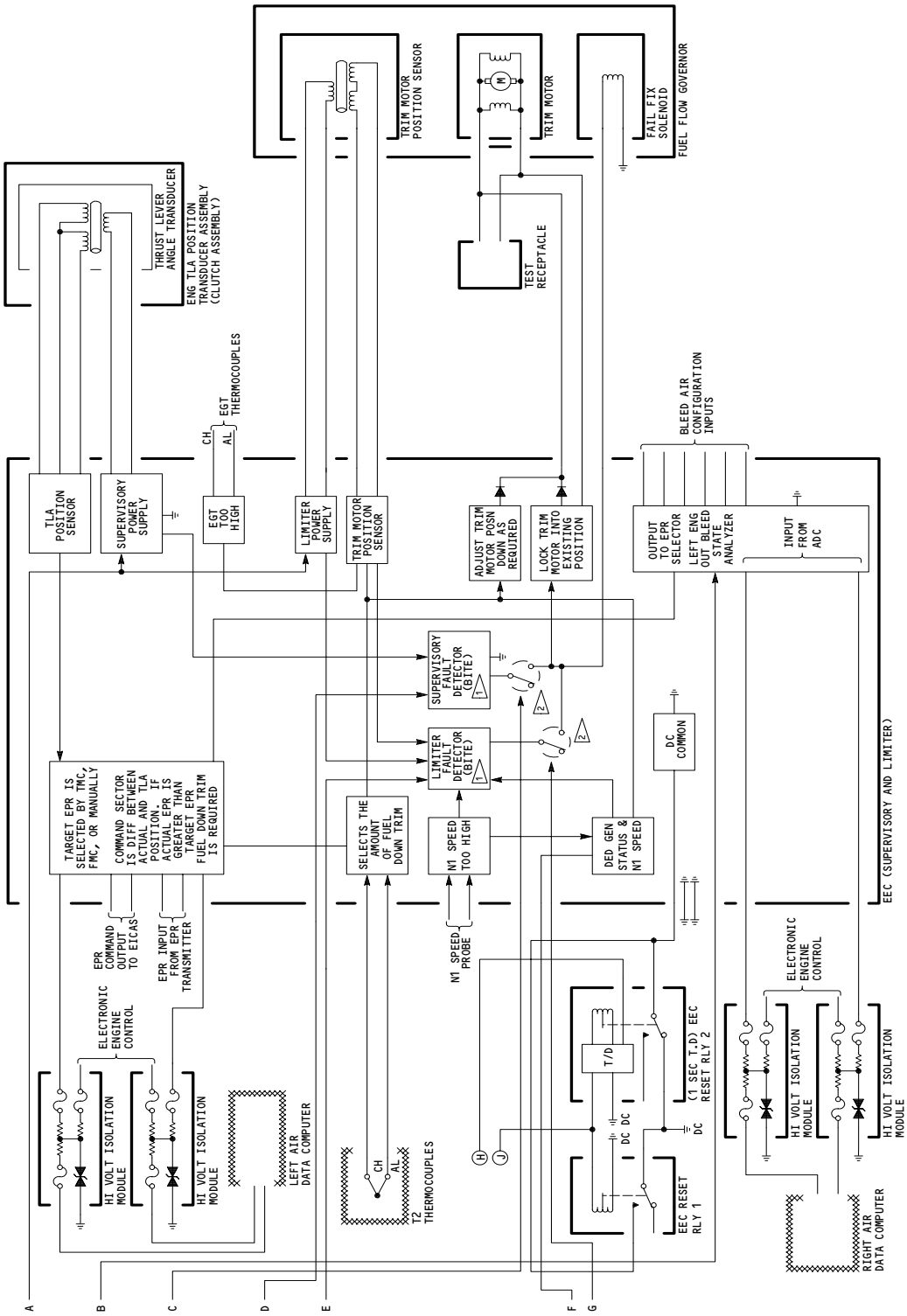
(d) From the ADC inputs and engine parameters monitored, the supervisory channel predicts the value of N1 required to achieve the command EPR calculated for the throttle angle.

(e) Simultaneously the supervisory channel compares the calculated command EPR with the actual EPR and in turn compares the difference with a programmed datum.

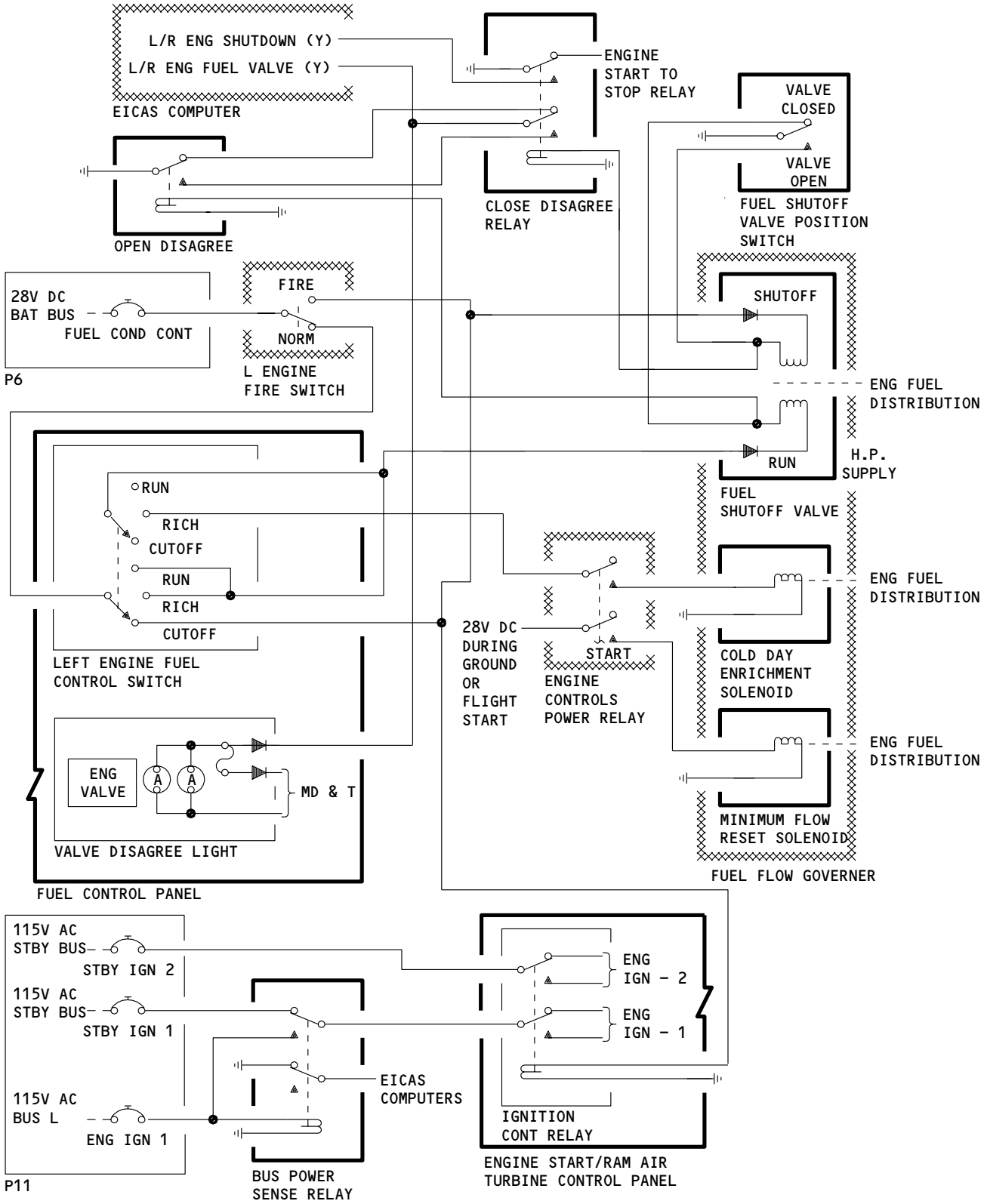
(f) During acceleration the comparitor connects the predicted value of N1 signal to the limiter section until the difference between the command and actual EPR is approximately 0.03 EPR. At this point the predicted N1 signal is disconnected and the EPR difference signal connected to the limiter section. The predicted N1 signal would also be disconnected should it fall below a predetermined limit.



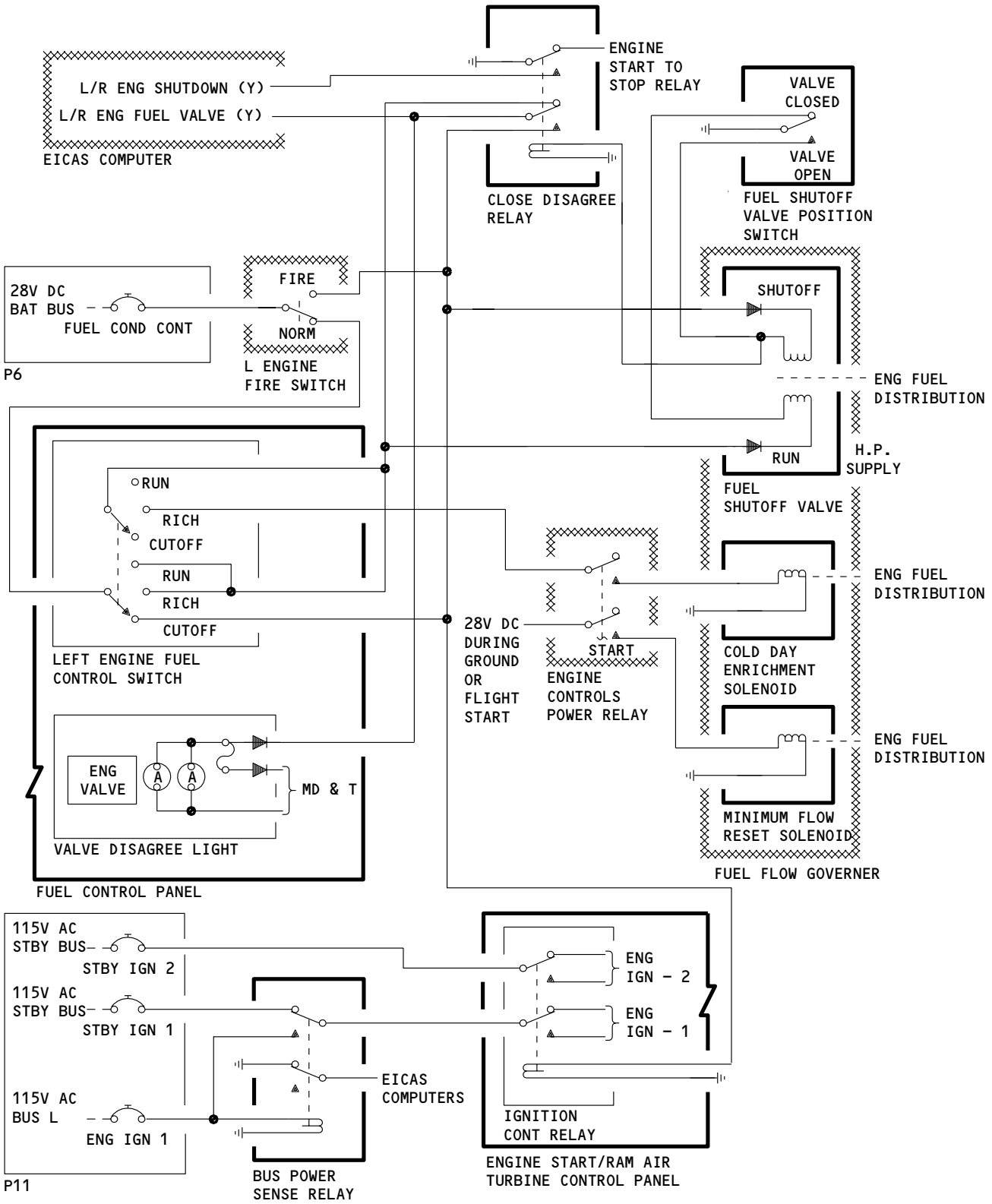
Electronic Engine Control Operation Schematic
Figure 4 (Sheet 1)



Electronic Engine Control Operation Schematic
Figure 4 (Sheet 2)



Fuel Conditioning Operation Schematic
Figure 5 (Sheet 1)



Fuel Conditioning Operation Schematic
Figure 5 (Sheet 2)

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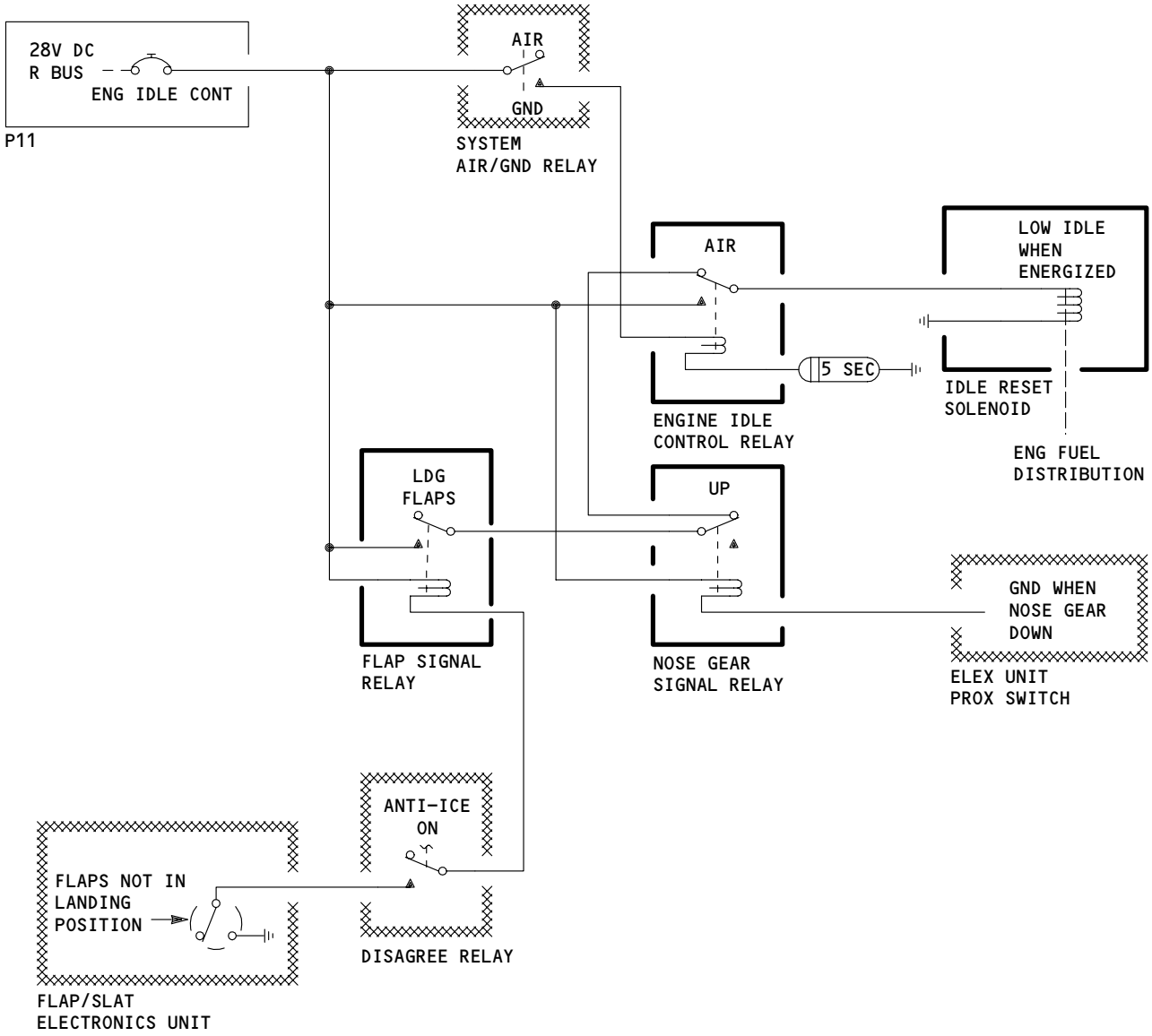


NOTES: LOW IDLE IS AVAILABLE IN NORMAL FLIGHT AND GROUND OPERATIONS
HIGH IDLE IS AVAILABLE IN LANDING OPERATION AND REMAIN IN
HIGH IDLE FOR 5 SECONDS AFTER LANDING. HIGH IDLE ALSO AVAILABLE
IN AIR WHEN COWL ANTI-ICE IS ON OR NOSE GEAR IS DOWN.

Idle Select Fuel Control Operation Schematic
Figure 6

(g) This achieves maximum response of the system during acceleration and minimizes overshoots.
(h) The final output from the supervisory channel in the form of an error signal is supplied to a lowest wins circuit along with the error signals produced by the limiter channel.
(i) The lowest wins circuit is arranged to allow only the lowest error signal (parameter nearest to its datum) to proceed. In this way over trimming of fuel flow is prevented.

(3) Dedicated Generator Control Unit
(a) A dedicated generator and two control units provide 28V dc electrical power for operation of the EEC and bleed valve control units, independent of aircraft electrical supply.
(b) The generator is mounted on, and driven through, the high speed external gearbox. The generator consists of two three-phase permanent magnets, the output from each being fed direct to a control unit.
(c) The dedicated generator control units (DGCU A and B) are mounted on the upper RH side of the LP compressor case. The units are identical, each including a rectifier and switching regulator, voltage monitor switch and a tachometer.
(d) The DGCU A powers ring main A of the bleed valve control solenoids and DGCU B powers coil B of the solenoids. The bleed valve control unit and EEC internal circuits receive power through highest wins diodes from either DGCU A or B.
(e) Power from the generator is supplied to the control units, where it is converted to 28V output by the rectifier and switching regulator in each unit.
(f) The generator output voltage is monitored by the voltage monitor switch to drive the regulator circuits. In the event that voltages outside of set tolerances are experienced, the voltage monitor switch will disconnect the control unit from the output.
(g) Generator output is monitored by a voltage monitor switch and if outside the set tolerances it will provide a signal to disconnect the control unit from the output.
(h) The tachometer circuit uses the frequency output of the generator to perform two speed switching functions at pre-determined values of N3. Each speed switch controls the switching of a relay; one energizes to bring the unit on-line during acceleration and de-energizes to switch the unit off-line on deceleration; the second is set at starter cut-out speed to terminate the start cycle and also de-energize the minimum fuel flow reset solenoid.
(i) A diode highest wins circuit provides EEC supervisory and limiter reversion circuits with dedicated generator or aircraft power supply to ensure continuity of supply feed trim failed fixed solenoid.
(j) A fault occurring in the dedicated generator system will be indicated by a 'Status' message on the EICAS screen, for crew awareness, and by a 'Maintenance' message for post-flight maintenance action.

(k) Failure of one or both DGCUs will also be indicated by a fault code displayed in the bleed valve control unit diagnostic display window (AMM 75-32-00/001).

(4) Starting and Acceleration to Idle

(a) Selection of the fuel control switch to RUN energizes the SOV pump unloading solenoid and when FMV discharge pressure is sufficient to overcome SOV spring pressure the valve opens.

(b) If the fuel control switch is selected to RICH the enrichment solenoid operates and allows delivery fuel to by-pass the FMV to enrich the fuel flow to the spray nozzles.

(c) The loading applied to the P4/P1 governor by the throttle linkage moves the governor to direct fuel and position the FMV in the minimum flow position.

(d) Fuel pressure increases in the delivery line to the FMV increasing the pressure drop across the FMV. This increase in pressure differential is sensed by the pressure differential valve, which opens the spill valve and spills fuel back to the pump inlet, thus restoring the pressure drop.

(e) The resulting increase in N3 is sensed by the tachometer and speed switch assembly. The centrifugal force of the flyweight moves the pilot valve, allowing fuel pressure to act on the tachometer servo piston and rotate the 3D cam. This repositions the limit valve to increase control pressure through the P4/P1 governor.

(f) The resulting increase in N3 is sensed by the tachometer servo. The centrifugal force of the flyweight moves the pilot valve, allowing fuel pressure to act on the tachometer servo piston and rotate the 3D accel/decel cam. This repositions the limit valve to increase control pressure through the P4/P1 governor.

(g) The feedback cam applies pressure to the restoring spring to restore the balance of the pilot valve.

(h) As engine speed increases the resulting increase in P4 increases P4 sensor pressure acting on the P4/P1 governor to balance the loading of the throttle linkage.

(i) As N3 passes through approximately 43% N3, the on-line speed switch energizes the associated relay to bring the generator on-line and power the bleed valve control unit and EEC. At approximately 47% N3 the second speed switch operates and energizes the start signal relay to terminate the start cycle and de-energize the minimum flow reset solenoid.

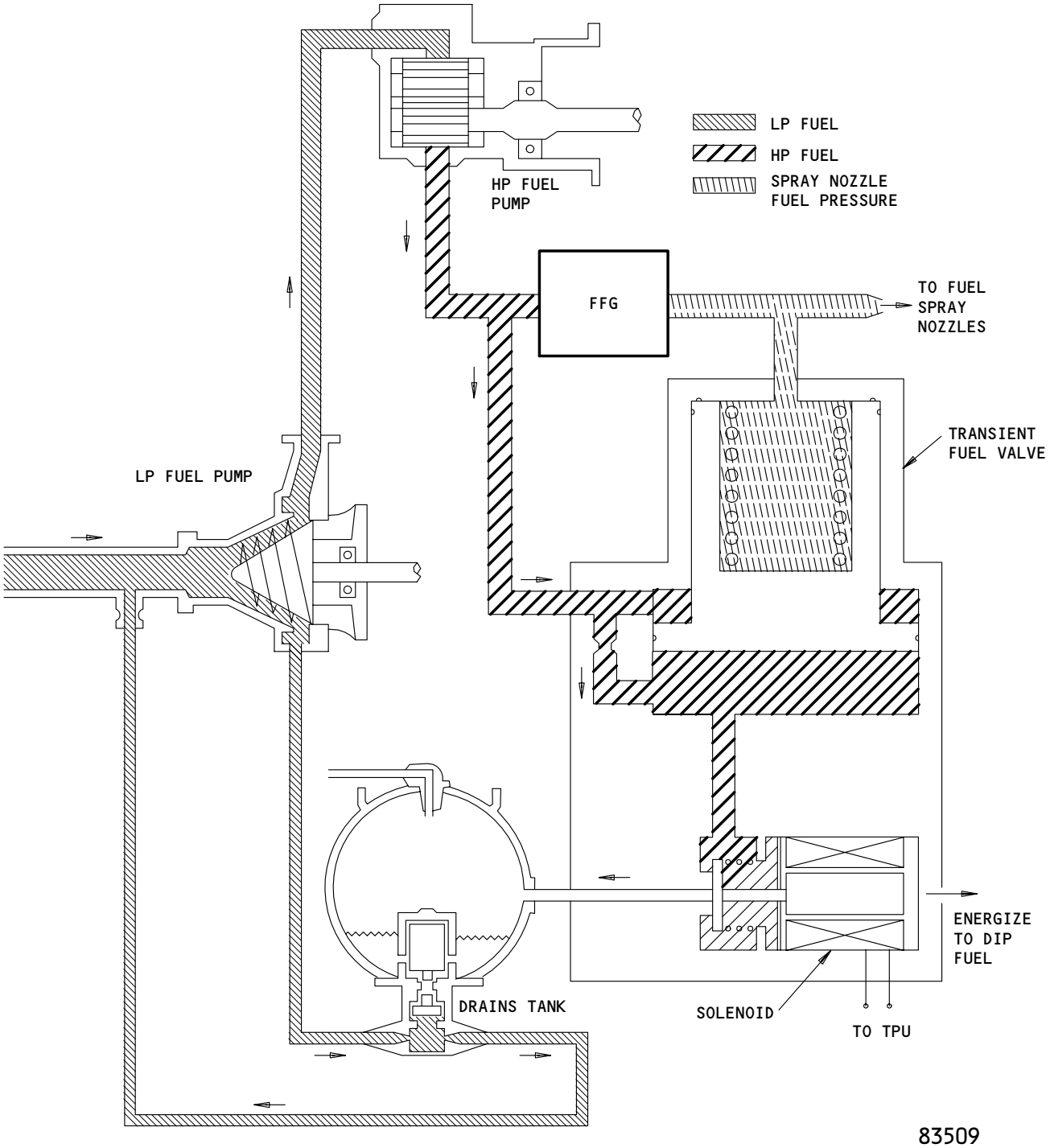
(j) Engine speed runs up to settle at low idle setting. Under these conditions the FMV stabilizes, P4 sensor pressure balances the P4/P1 governor against spring pressure applied by the throttle linkage.

(5) Acceleration

(a) An increase in power is demanded by advancing the thrust lever. Throttle linkage increases loading on the P4/P1 governor resulting in an increase in fuel pressure acting on the FMV, thus increasing FMV opening.

(b) Opening the FMV reduces the pressure drop, causing the pressure differential valve to move and apply pressure to close the spill valve, thus increasing delivery pressure and restoring the pressure differential.
(c) The resulting increase in N3 is sensed by the tachometer servo, operation of which results in rotation of the 3D accel/decel cam and adjustment of the limit valve position to increase servo pressure through the governor.
(d) The increase in P4 will increase P4 sensor pressure acting to restore the balance across the governor.
(e) In the event of a rapid acceleration, the increase in servo pressure passing through the P4/P1 governor is felt by the buffer piston, which is forced forward. A pressure differential is created across the piston, the effect being to create a back pressure on the governor to null governor movement at a speed sigltly lower than the desired speed until engine response catches up.
(f) FMV movement is transmitted to the limit valve through a feedback arm to reduce the opening of the limit valve and restrict control pressure through the P4/P1 governor. This action equalizes the pressure across the buffer piston and allows the piston to center.
(g) The large fuel flow change required to accommodate a rapid speed change is felt by the jump and rate piston. The piston moves forward under the initial pressure increase from the governor, thus permitting initial FMV movement, and consequently fuel flow change, at a rapid rate. This is followed by a flow rate limited to the amount that can pass through an orifice in the piston.
(h) The increase in P4 resulting from rapid acceleration is transmitted to the P4 servo. The servo piston moves under P4 sensor pressure and operates a servo cam, which in turn alters the position of the limit valve to increase the flow through the governor and increase FMV opening.
(i) Overspeed protection is provided through the tachometer system. A trip lever attached to the feedback cam is set at an angular position corresponding to maximum allowable N3. If this condition is reached the trip lever acts on the pressure differential valve, displacing the valve to vent the spill valve, thus reducing metered fuel and limiting engine speed.

(6) Transient Fuel Valve (T.F.V.) (Fig. 7).
(a) During normal (non-surge) flight conditions, high pressure fuel is fed direct to an annular chamber on the upper side of the piston and to the lower side via a metering orifice. The solenoid is de-energized and the vent from the lower chamber to the drains tank is closed.
(b) High pressure fuel on both side of the piston, because of differential area loading, causes the piston to be in a position with spring fully compressed. In this steady state position the T.F.V. has no effect on fuel flow.



Transient Fuel Valve Operation
Figure 7

(c) In the event of an engine surge, the transient pressure sensor (AMM 75-32-00/001) energizes the T.F.V. solenoid to vent high pressure fuel from the lower chamber to the drains tank. The metering orifice renders the T.F.V. incapable of maintaining fuel pressure in the lower chamber and the piston is driven rapidly downwards by fuel and spring pressure on the upper side of the piston. This action drains fuel from the fuel spray nozzle supply line and there by reduces fuel flow to the burners.

(d) After approximately 2.5 seconds, the transient pressure sensor unit de-energizes the solenoid to close the vent to the drains tank. High pressure fuel, bleeding through the metering orifice to the underside of the piston gradually drives the piston upwards against spring and fuel pressure on top of the piston to its steady state position.

(e) Since the piston returns to the steady state position slowly (approximately 13 seconds) the main fuel control system has time to compensate for the piston movement, and hence avoid excessive fuel being added to the burner supply.

(7) Deceleration

(a) The operating procedure during deceleration is the reverse of acceleration.

(8) Altitude Sensing

(a) The affect of increasing altitude is sensed by the P1 and P4 sensors. The reduction in P1 adjusts the P1 sensor, causing the angle of the throttle linkage to change, resulting in a reduction of the loading applied by the linkage to the P4/P1 governor.

(b) The reducing P4 reduces sensor pressure acting on the P4/P1 governor, thus maintaining the balance across the governor. The reduced sensor pressure is felt by the P4 servo, which adjusts the position on the servo cam, resulting in an adjustment to the position of the limit valve to reduce control pressure through the governor.

(c) The FMV moves to restrict fuel flow. This alters the position of the feedback arm and applies pressure on to the limit valve to move in the opposite direction, thus slowing closure of the FMV and maintaining thrust requirement at a fixed throttle position.

(9) Temperature Sensing
  (a) The TF sensing coil monitors temperature in the fan duct and reacts to any change by transmitting a signal to the TF sensor. A temperature increase will expand the sensing bellows and increase pressure acting on the valve. This action will increase pressure to move the servo piston, resulting in axial movement of the 3D cam and adjustment of the limit valve to restrict control pressure.

(10) Power Trim
  (a) The increase in current to the torque motor, resulting from an EEC signal, causes the flapper valve to move against the trim piston and bleed servo pressure from the head of the piston. The trim piston then moves toward the flapper valve and reduces the force applied by the throttle linkage on the governor, thus trimming fuel flow.
  (b) Movement of the trim piston increases spring force on the flapper valve until servo pressure plus spring pressure equals trim piston force, preventing further movement.
  (c) If the failed fixed solenoid is energized servo pressure passes to the trim freeze servo and is applied to collets. The collets clamp the sliding rod, preventing further movement. As the sliding rod is connected through the bellcrank lever to the trim piston rod, the piston is thus locked in the trim position held at the point of failure.
  (d) Operation of the override switch energizes the trim freeze solenoid and releases the sliding rod, unlocking the power trim and reverting to zero trim.

(11) Idle Scheduling
  (a) For normal in-flight and ground operation when a low idle setting is required, the idle reset solenoid is energized. One side of the reset piston is vented through the open solenoid valve, allowing the piston to move to the low idle stop.
  (b) During approach when aircraft flaps are selected to the landing range, the reset solenoid is de-energized through a flap switch. Servo pressure moves the reset piston to the high idle stop and holds the linkage in high idle position.

(c) After touchdown a five second time delay in the air/ground logic system re-energizes the solenoid and the system reverts to the low idle setting.

(12) Reverse Thrust

(a) Reverse thrust is selected immediately after touchdown with high idle selected.

(b) Movement of the reverse thrust lever to reverse idle position reverses the direction of rotation of the throttle cam on the FFG. The cam, which is contoured to provide forward and reverse idle dwells, effects control of the FFG similar to normal forward thrust operation up to maximum reverse thrust power.

(13) Engine Shutdown

(a) When the fuel control switch is selected to cutoff, the pump unloading solenoid directs HP pump pressure to the closing side of the SOV to assist spring pressure to close the valve.

(b) In the closed position the SOV ports the manifold to the fuel drain system.

(c) As the engine runs down, at approximately 41% N3 the on-line speed switch in the DGCU operates to de-energize the on-line relay and cancel power supply from the dedicated generator to the bleed valve control unit and EEC. Generator voltage is thus removed from all relays. The starter circuit is reset and the minimum flow reset solenoid is energized and withdrawn in preparation for the next start.

B. Built in Test Equipment (BITE)

(1) EEC

(a) During operation the EEC performs a self monitoring of all functions at least once per flight and in all but a few cases continuously. The tests includes rate of change and range checks on internal and external signals.

(b) If the function of either channel has degraded such that it cannot be allowed to continue operating, an indication is given in the flight compartment by illumination of a warning light. Failure of the supervisory channel results in illumination of the ELECTRONIC ENGINE CONTROL light only, whereas failure of the limiter channel results in illumination of both the ELECTRONIC ENGINE CONTROL light and the ENGINE LIMITER light.

(c) Simultaneously the torque motor current is frozen to prevent any further trimming of fuel flow by the EEC and, in the case of a limiter failure, the failed fixed solenoid is energized.

(d) If the fault is in the supervisory channel and the limiter channel predicts its datums may be exceeded, it can increase the torque motor current to increase fuel trim.

(e) On indiction of a failure in the limiter channel, a reversionary switch, mounted in the flight compartment, may be operated. This removes the freeze on the torque motor and disconnects the torque motor and failed fixed solenoid from the limiter channel and connects the torque motor to the supervisory channel. The torque motor current is then decreased at a controlled rate to the supervisory channel torque motor current demand.

(f) On indication of a failure in the supervisory channel, operation of its reversionary switch isolates the channel from the torque motor. The torque motor current is then decreased at a controlled rate to the limiter channel torque motor current demand.

(g) Fault recording system

1) Detection of a fault may or may not illuminate the failed light in the flight compartment, the EEC BITE passes a maintenance message to EICAS and also stores a numeric fault code into its own fault memory.

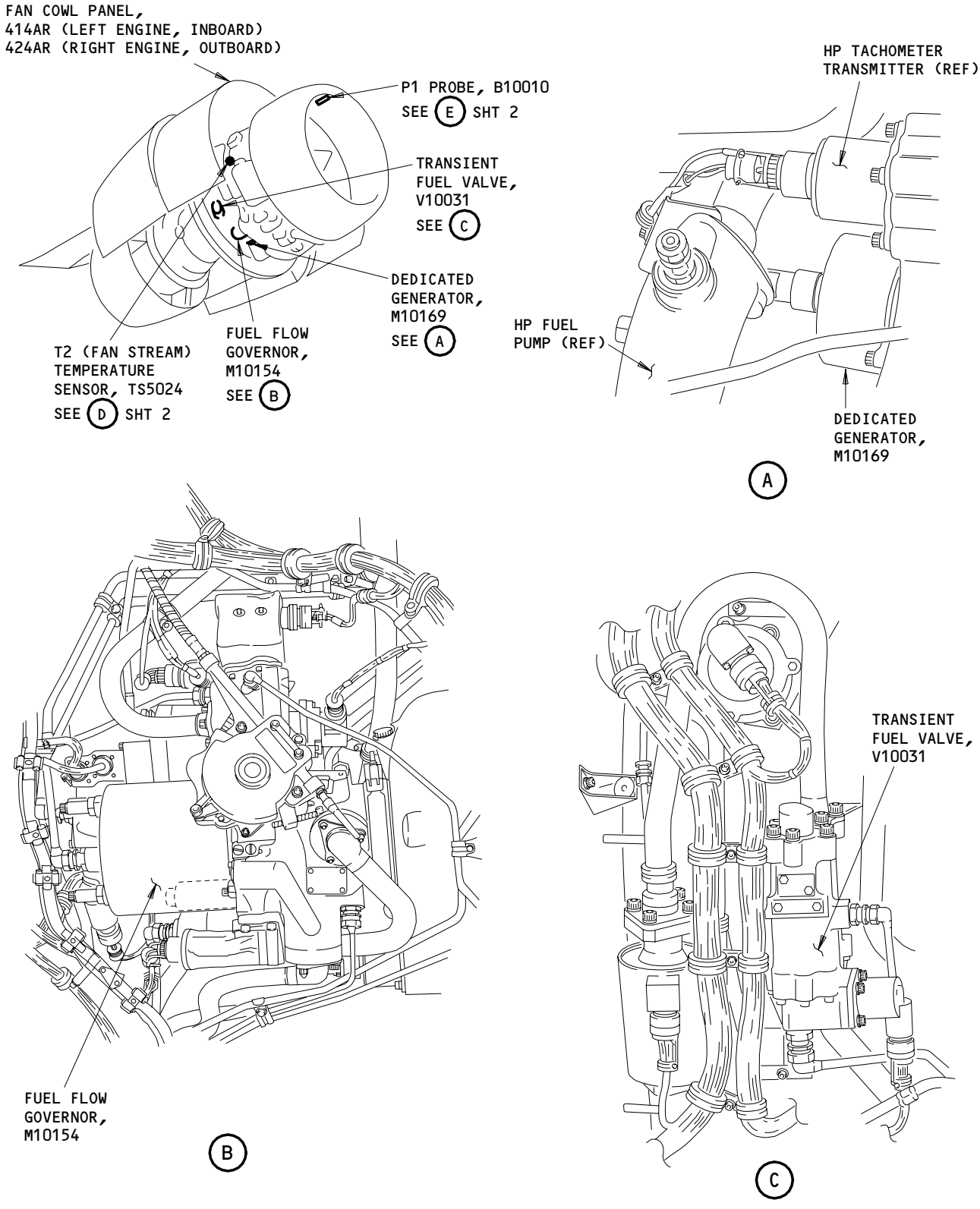
2) By applying ground power to the EEC all fault codes can be accessed and viewed on a window above the unit connectors. Interpretation of the fault code will assist in identifying which system has failed and whether the failure is external to or within the EEC.

FUEL CONTROL SYSTEM

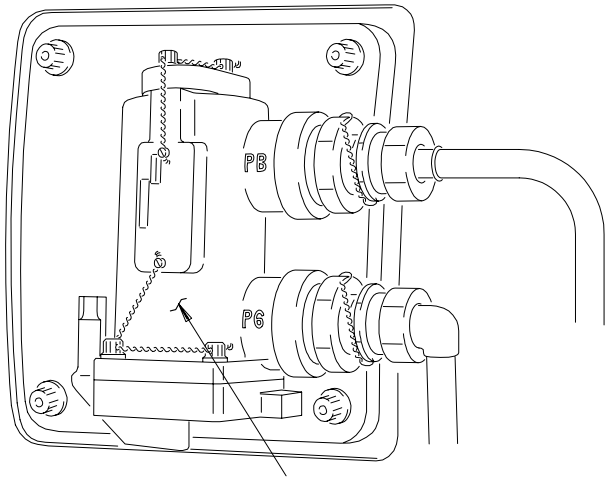
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CONTROL - ELECTRONIC ENGINE (EEC), SUPERVISORY AND LIMITER	3	2	119BL, MAIN EQUIPMENT CENTER	73-21-07
L EEC, M10391				
R EEC, M10392				
GENERATOR - DEDICATED, M10169	1	2	414AR,424AR L (R) FAN COWL PANEL	73-21-08
GOVERNOR - FUEL FLOW, M10154	1	2	414AR,424AR L (R) FAN COWL PANEL	73-21-01
MODULE - EEC PATCH CABLE, M10158	2	2	414AR,424AR L (R) FAN COWL PANEL	73-21-12
PROBE - P1, B10010	2	2	FORWARD FAIRING - FORWARD SECTION	73-21-04
RELAY - (FIM 31-01-36/101)				
LEFT ENGINE CLOSE DISAGREE, K10124				
LEFT ENGINE IDLE CONTROL, K10103				
LEFT ENGINE OPEN DISAGREE, K10126 1>				
RELAY - (FIM 31-01-37/101)				
RIGHT ENGINE CLOSE DISAGREE, K10125				
RIGHT ENGINE IDLE CONTROL, K10102				
RIGHT ENGINE OPEN DISAGREE, K10127 1>				
SENSOR - T2 (FAN STREAM) TEMPERATURE, TS5024	2	2	414AR,424AR L (R) FAN COWL PANEL	73-21-11
TRANSDUCER - THRUST LEVER ANGLE, TS171	3	2	113AL, FWD EQUIPMENT CENTER	73-21-09
UNIT - DEDICATED GENERATOR CONTROL			414AR,424AR L (R) FAN COWL PANEL	73-21-10
DGCU A, M10157	2	2		
DGCU B, M10165	2	2		
VALVE - TRANSIENT FUEL, V10031	1	2	414AR,424AR L (R) FAN COWL PANEL	73-21-14

1> AIRPLANES WITHOUT SB 76-0011

Fuel Control System - Component Index
Figure 101

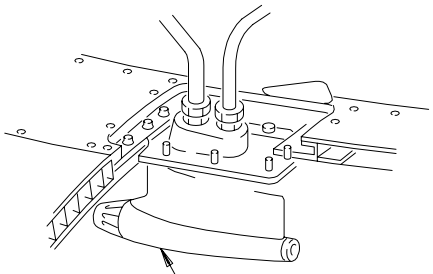


Fuel Control System - Component Location
Figure 102 (Sheet 1)



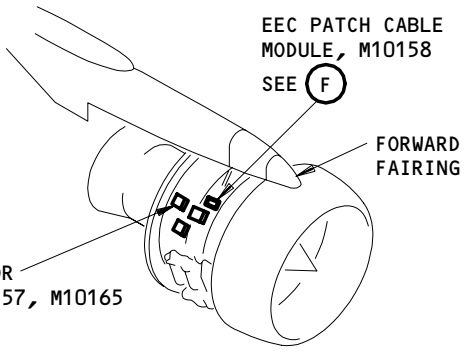
T2 (FAN STREAM)
TEMPERATURE SENSOR,
TS5024

(D) FROM SHT 1



P1 PROBE, B10010

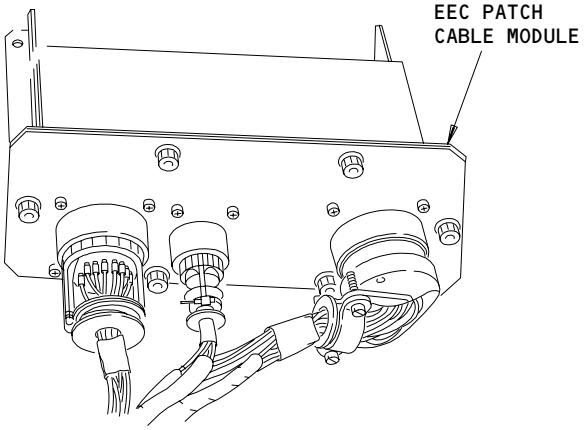
(E) FROM SHT 1



EEC PATCH CABLE
MODULE, M10158
SEE (F)

FORWARD
FAIRING

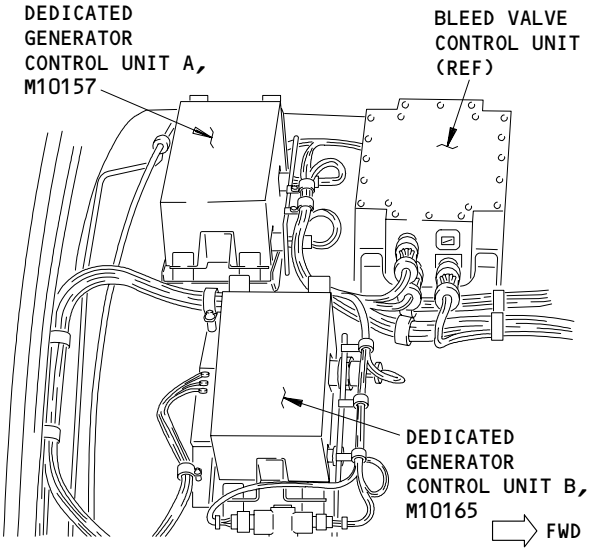
DEDICATED GENERATOR
CONTROL UNIT, M10157, M10165
SEE (G)



EEC PATCH
CABLE MODULE

EEC PATCH CABLE MODULE, M10158

(F)



DEDICATED
GENERATOR
CONTROL UNIT A,
M10157

BLEED VALVE
CONTROL UNIT
(REF)

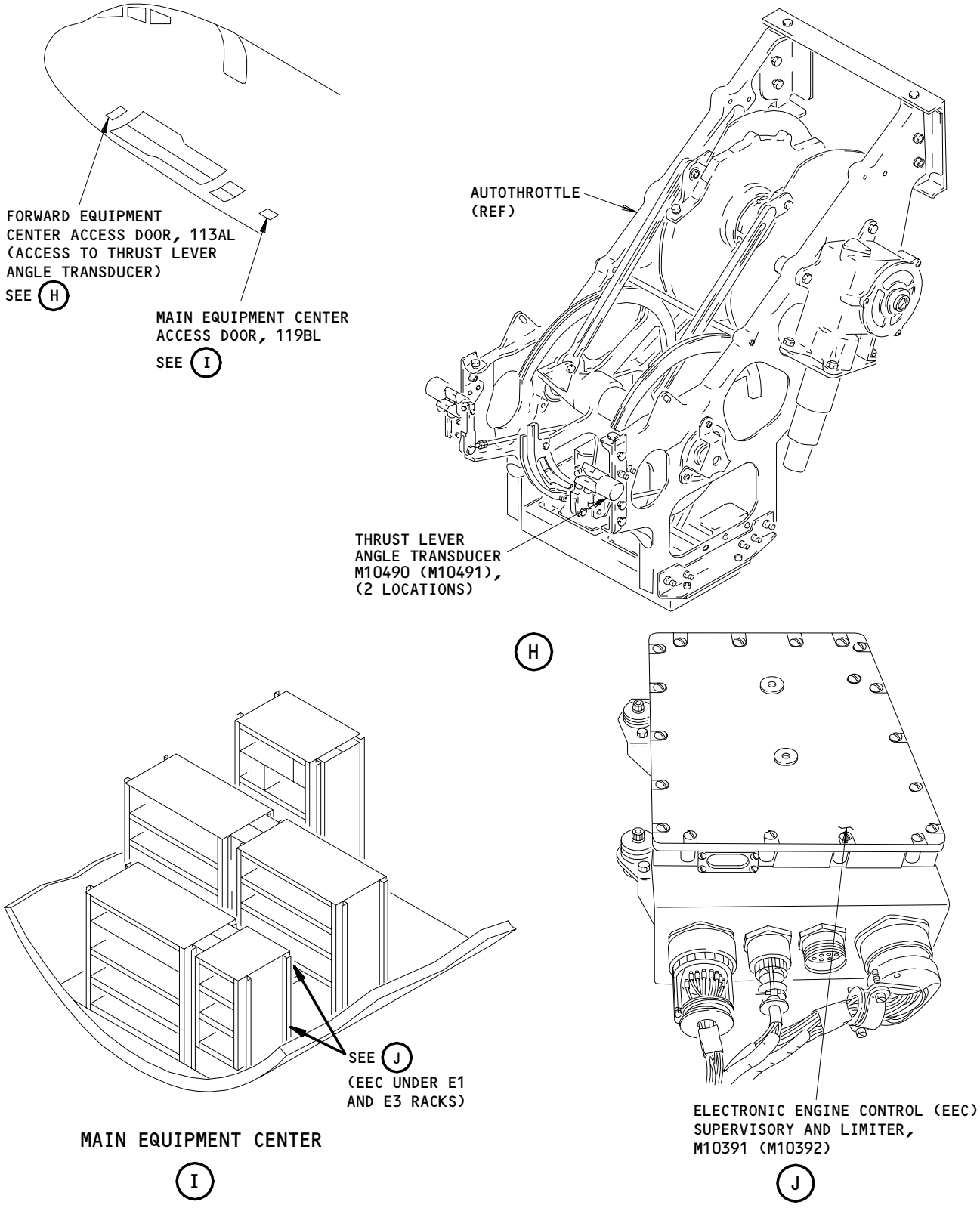
DEDICATED
GENERATOR
CONTROL UNIT B,
M10165

FWD

DEDICATED GENERATOR CONTROL UNIT,
M10157, M10165

(G)

Fuel Control System - Component Location
Figure 102 (Sheet 2)



Fuel Control System - Component Location
Figure 102 (Sheet 3)

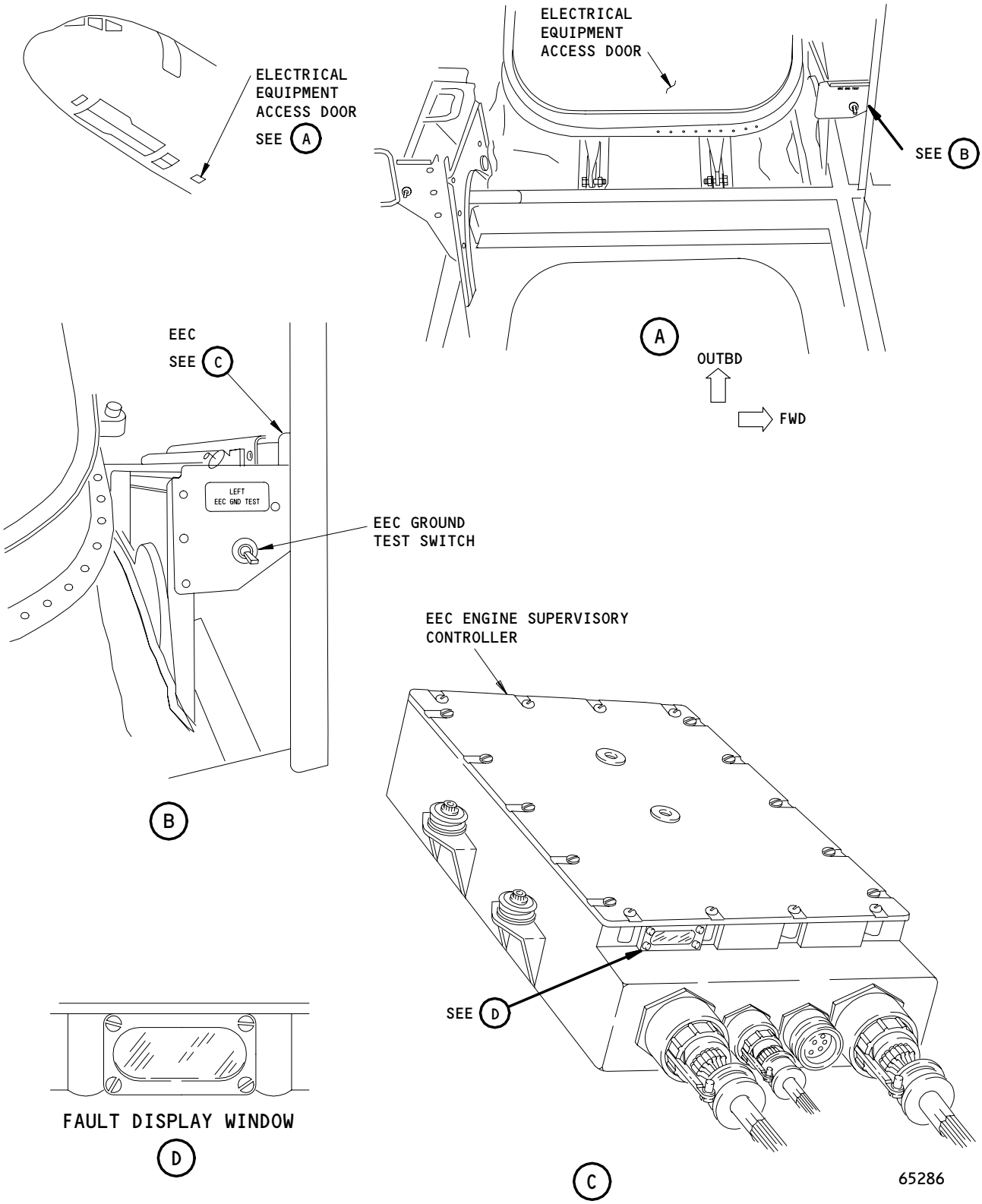
FUEL CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General
   A. This maintenance practice shows how to read the information received from the electronic engine control (EEC) BITE procedure.
   B. The EEC has built-in-test equipment (BITE) that monitors faults that occur in the EEC and the related external sensors.
   C. Faults found are put in the EEC memory and on the EICAS display. A fault that causes a system failure will be shown on the EICAS as a CAUTION message, L(R) ENG LIMITER and/or L(R) ENG EEC, and will also cause the system INOP switchlights, on the pilots' overhead panel and on the control stand, to come on. A fault that lets the EEC to continue to operate, although this can be in a degraded mode, will be put in memory as a MAINTENANCE message, L(R) EEC BITE, and shown on the EICAS maintenance page.

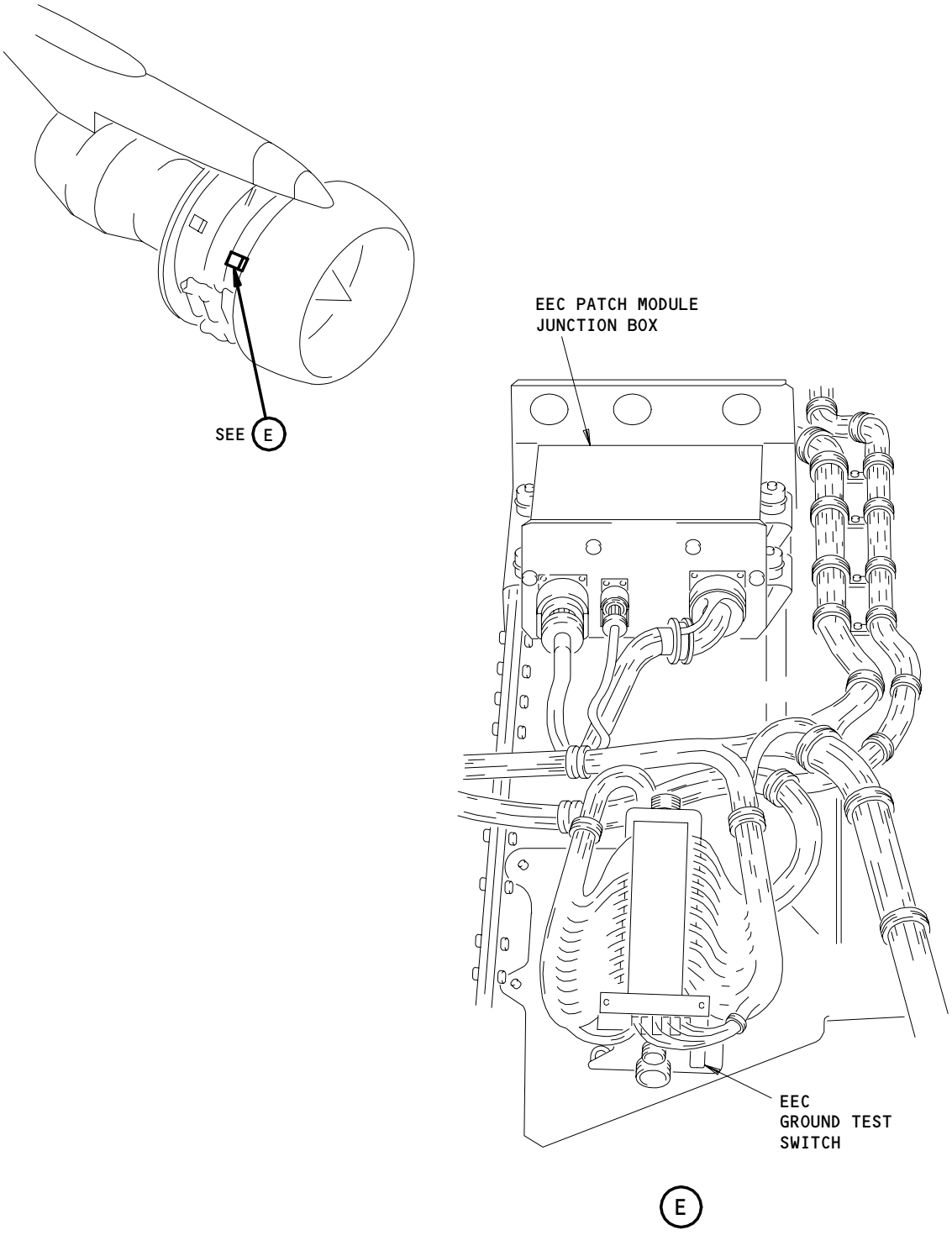
      NOTE: AIRPLANES WITH -106 OR -107 EICAS COMPUTERS;
      The L(R) ENG LIMITER or L(R) ENG EEC messages are not shown until 4 seconds after the engine is in operation.

   D. The contents of the BITE memory can be read through a two-digit light emitting diode (LED) shown in a window on the EEC case and operated by a ground test switch (Fig. 201). An example of the primary display sequence is shown on a label attached to the EEC case.
   E. There are three procedures in which faults are monitored by the EEC:
      (1) Self test - on each engine start the fault monitor system does a test to look for unit or system dormant failures. All faults found will be shown on the EICAS and put in the EEC memory.
      (2) Continuous Monitoring - is done when the engine is in operation and the dedicated generator supplies power to the unit. All faults found will be shown by an EICAS CAUTION message and put in the EEC memory.
      (3) Ground Test - is done when power is supplied by the ground test switch. Faults found during this test, and all faults from other flights, are shown by a two-digit light emitting diode (LED) display on the EEC (Fig. 201).
         (a) Some codes sent from external sensors can only be given while the engine is in operation and will not be put in memory in the ground test mode (engine static). These codes are identified in Table 202.
   F. Fault Code Sequence
      (1) When you use the ground test procedure, faults put in the EEC memory are each identified by a fault code (see Table 202) shown in the LED window. The EEC fault code sequence is shown below (Ref Table 201), and is shown one time only on the EEC.

         NOTE: After more than nine fault-free flights, the F(N) and XX displays are erased automatically.



EEC Interrogation
Figure 201 (Sheet 1)



EEC Interrogation
Figure 201 (Sheet 2)

(2) Primary fault codes, shown in the top half of the label attached to the EEC case, identify the area in which a fault has occurred. These faults are shown by XX in the sequence; the first digit of the code gives the area and the second digit gives the type of fault, e.g., refer to the fault codes in Table 202. If 21 is shown: the first digit 2 identifies an EGT fault, and the second digit 1 shows an open circuit.

Table 201

DISPLAY	FUNCTION	DISPLAY TIME
CC	Self test is in progress.	9 seconds
AA	Four flashes - the memory code sequence is about to start.	
XX	Shows each fault found during the self test - XX is a different code for each fault. If no faults are found, this display is not shown.	4 seconds each fault
F(N)	Where N equals the number of fault free flights since the last flight in which a fault occurred.	4 seconds
XX	Shows each fault found during the last flight in which a fault occurred.	4 seconds each fault
F(N)	Where N equals the number of fault free flights between the last two flights in which faults occurred.	4 seconds
XX	Shows each fault found during the second to last flight in which a fault occurred.	4 seconds each fault
F(N)	Where N equals the number of fault free flights between the second to last and the third to last flights in which faults occurred.	4 seconds
XX	Shows each fault found during the third to last flight in which a fault occurred.	4 seconds each fault
ED	End of the display.	10.5 seconds

G. Fault Code Display

(1) The examples that follow give some of the fault codes that can be shown during seven flights in example 1 and eight flights in example 2.

(a) Example 1

1) Flight numbers and their fault status:

Flight No. 1 - Fault free
Flight No. 2 - Fault free
Flight No. 3 - Faults: 14, BB shown
Flight No. 4 - Fault free
Flight No. 5 - Faults: 14, BB shown
Flight No. 6 - Faults: 14, BB shown
Flight No. 7 - Fault free

2) The display for the seven flights shown above will be as follows, the display is read from the top to the bottom.
   a) Read each display as the one that follows the flight with no ground self test faults:

Flight	1	2	3	4	5	6	7
	CC --	CC --	CC --	CC --	CC --	CC --	CC --
	AA	AA	AA	AA	AA	AA	AA
	ED	ED	FO	F1	FO	FO	F1
			14 --	14 --	14	14	14
			BB	BB	BB	BB	BB
			ED	ED	F1	FO	FO
					14	14	14
					BB --	BB	BB
					ED	F1	F1
						14	14
						BB --	BB --
						ED	ED

NOTE: The code sequence is shown one time only.

(b) Example 2

1) Flight numbers and their fault status:

Flight No. 1 - Faults: 14 shown after the flight
Flight No. 2 - Faults: 14 shown after the flight
Flight No. 3 - Faults: 14 shown after the flight
Flight No. 4 - Fault free flight and ground test
Flight No. 5 - Fault free flight and ground test
Flight No. 6 - Faults: BB shown after the flight and during the ground self test
Flight No. 7 - Faults: BB shown after the flight and during the ground self test
Flight No. 8 - Faults: BB shown after the flight and during the ground self test

2) The display for the eight flights shown above is as follows, read the display from the top to the bottom. Read each display as the one that follows this flight:

Flight	1	2	3	4	5	6	7	8
	CC --	CC --	CC --	CC --	CC --	CC --	CC --	CC --
	AA	AA	AA	AA	AA	AA	AA	AA
				F1	F2	BB	BB	BB
	FO	FO	FO	14	14	FO	FO	FO
	14 --	14	14	FO	FO	BB	BB	BB
	ED	FO	FO	14	14	F2	FO	FO
		14 --	14	FO	FO	14	BB	BB
		ED	FO	14 --	14 --	FO	F2	FO
			14 --	ED	ED	14 --	14 --	BB --
			ED			ED	ED	ED

NOTE: The code sequence is shown one time only.

TASK 73-21-00-902-001-R00

2. Read the Electronic Engine Control (EEC)

A. Procedure

S 972-002-R00

(1) How to read the fault codes from the EEC Engine Supervisory Controller (ESC).

(a) The ESC is found in the forward electronic equipment bay (Fig. 201). Put one of the two ground test switches to the ON position to read the fault codes from the unit. The switches are found: one on the matrix block on the right hand side of the LP compressor case and one adjacent to the EEC in the electronics bay.

(b) Fault codes used to read the EEC and other data are shown in Table 202. Fault codes can be shown in different configurations, and to know these can help give you a more accurate estimate of the fault, specially when the corrective action is not clear; e.g., if code 66 (left ADC altitude fault) and code D6 (altitude from the left or right ADC are different by more than 252 feet) were shown together, the corrective action will be to trouble shoot the left ADC system.

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
02 *[1] *[2]	L(R) ENG LIMITER and L(R) ENG EEC	Ground test switch "ON" with engine in operation.	The unit goes back to its usual condition.
1A *[1]	L(R) EEC BITE	Short time intermittent N1 fault.	No effects occur on the system immediately. This can be the start of a problem.
14 *[1] *[2]	L(R) ENG LIMITER and/or L(R) ENG EEC	N1 primary signal fault. The N1 signal is out of its range or the rate of change is too high.	The Limiter and/or EEC does not operate. A possible malfunction of the N1 indication.
21 *[2] *[2A]	L(R) ENG LIMITER and L(R) ENG EEC	An EGT primary signal open circuit/fault.	The Limiter and EEC do not operate. A Possible malfunction of the EGT indication.
24 *[1] *[2] *[2A]	L(R) ENG LIMITER and L(R) ENG EEC	An EGT primary signal fault. The signal is out of range or the rate of change is too high.	
2A *[1] *[2A]	L(R) EEC BITE	Short time intermittent EGT fault because the signal is out of range or the rate of change is too high.	No effects occur on the system immediately. This can be the start of a problem.
2B *[1] *[2A]	L(R) EEC BITE	Short time intermittent EGT fault because of an open circuit.	

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
31 *[2]	L(R) ENG LIMITER and L(R) ENG EEC	Torque motor open circuit. (both coils) Torque motor short circuit.	Torque motor does not operate. Limiter and EEC do not operate.
	L(R) EEC BITE	Torque motor circuit (one coil open).	There is no effect on the system.
34 *[1]	L(R) EEC BITE	Linear variable differential transformer (LDVT) range fault.	No effects occur on the system immediately. This can be the start of a problem.
35 *[1] *[2]	L(R) ENG LIMITER and L(R) ENG EEC	LDVT/torque motor fault found during power up.	The EEC Supervisory and Limiter do not operate.
39 *[1]	L(R) EEC BITE	Failure to repair the solenoid fault.	No effects occur on the system immediately. This can be the start of a problem.
40 *[1] *[2]	L(R) ENG EEC	EPR and P1 signal failure.	EEC does not operate.
43	L(R) EEC BITE	EPR or P1 signal failure.	EEC does not operate unless: - there is a P1 signal malfunction and an ADC failure - there is an EPR signal malfunction and a limiter failure. There can be a small throttle stagger.

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
44	L(R) EEC BITE	EPR and/or P1 signal rate or range. NOTE: This code will also be shown if the EPR circuit breaker is out and the EEC ground test switch is ON.	EEC does not operate unless the fault is shown with the faults specified in 40 and 43. There can be some throttle stagger.
47 *[1] *[2]	L(R) ENG EEC	The P1 signal from the EPR transmitter (P1E) has a cross-check failure with the P1 signal from the left and right ADC.	EEC does not operate.
4A	L(R) EEC BITE	Short time intermittent EPR and P1 fault.	No effects occur on the system immediately. This can be the start of a problem.
54 *[2]	L(R) ENG EEC	Throttle lever angle transducer (TLA) output is not correct.	EEC Engine Supervisory Control does not operate.
5A	L(R) EEC BITE	Short time intermittent TLA output fault.	No effects occur on the system immediately. This can be the start of a problem.

Table 202			
FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
60 *[1]	L(R) EEC BITE	Left ADC signal malfunction (all parameters)	There is no effect on the system unless the Fault Code 4X or 7X is also shown.
61 *[1]	L(R) EEC BITE	Left ADC signal fault (one or more parameters)	
64 *[1]	L(R) EEC BITE	Left ADC range fault (one or more parameters)	
66 *[1]	L(R) EEC BITE	Left ADC altitude fault.	
67 *[1]	L(R) EEC BITE	The P1 signal from the left ADC has a cross-check failure with the P1 signal from the right ADC and the P1E or Mn from the left ADC is defective	
68 *[1] *[2]	L(R) ENG EEC	The T1 signal from the left ADC has a cross-failure with the T1 signal from the right ADC and T1E.	EEC does not operate.

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
68 *[1] *[2]	L(R) ENG EEC	The T1 signal from the left ADIRU has a cross failure with the T1 signal from the right ADIRU and T1E.	AIRPLANES WITH ADIRU; EEC does not operate.
70 *[1]	L(R) EEC BITE	Right ADC signal malfunction (all parameters)	There is no effect on the system unless Fault Code 4X or 6X is also shown.
71 *[1]	L(R) EEC BITE	Right ADC signal fault (one or more parameters)	
74 *[1]	L(R) EEC BITE	Right ADC range fault (one or more parameters)	
76 *[1]	L(R) EEC BITE	Right ADC altitude fault.	
77 *[1]	L(R) EEC BITE	The P1 signal from the right ADC has a cross-check failure with the P1 signal from the left ADC and P1E or the Mn from the right ADC is defective	
78 *[1] *[2]	L(R) ENG EEC	The T1 signal from the right ADC has a cross-check failure with the T1 signal from the left ADC and T1E	There is no effect on the system.

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
83	L(R) ENG EEC	Left and right airplane TAT probe heat failed.	EEC does not operate.
88	L(R) ENG EEC	Cross check error of more than 8 degrees C between the Left and Right ADC TAT values.	EEC does not operate.
89	L(R) ENG EEC	TAT probe blockage test shows a TAT rise of more than 26 degrees C relative to the EEC modeled value, or Fault Code 8A has been set on 5 consecutive flights. An airplane TAT probe blockage or contamination is suspected.	EEC does not operate.

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
8A	NONE	TAT probe blockage test shows a rise of more than 8 degrees C but less than 26 degrees C relative to the EEC modeled value. The airplane TAT probe may be blocked or contaminated. This Fault Code could also be set by flying through a severe temperature inversion during takeoff.	EEC operates in "Flat Rate Mode".
94	L(R) EEC BITE	T2 range error.	There is no effect on the system unless Fault Code 98 is also shown.
98 *[2]	L(R) ENG EEC	The T1E signal has a cross-check failure with the T1 signal from both left and right ADC's (T1E is calculated from T2).	EEC does not operate.
D6 *[2]	L(R) ENG EEC	Altitude from the left and right ADC's are different by more than 252 feet.	EEC does not operate.

Table 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
D7	L(R) EEC BITE	There is a cross-check failure of one of the signals that follow: P1E against P1R P1L against P1R P1L against P1E.	There is no effect on the system.
D8	L(R) EEC BITE	There is a cross-check failure of one of the signals that follow: T1L against T1E T1L against T1R T1R against T1E.	There is no effect on the system.
B0 B1 B8 B9 BA BC BD *[2]	L(R) ENG EEC	Most codes that start with the letter B are EEC unit internal faults that result in unit replacement. If a B3 code is shown, do the steps that follow: 1. Change the EECs between the left and right positions and monitor them on the next flight. 2. If code B3 stays with the same EEC, replace the EEC. 3. If code B3 stays with the same engine, replace the FFG.	
B2 B3 BB BE BF *[2]	L(R) ENG LIMITER		

*[1] These faults are external to the unit and can only be shown while the engine is in operation.

*[2] When the EICAS messages L(R) ENG LIMITER or L(R) ENG EEC are shown, the related INOP light will come on.

*[2A] ENGINES POST RR SB 71-8093;
The fault code will not be shown.

FUEL CONTROL SYSTEM - INSPECTION/CHECK

1. General
   A. This procedure contains steps to examine the fuel control system.

TASK 73-21-00-766-001-R00

2. Examine the Fuel Control System
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 27-51-00/201, Trailing Edge Flap System
      (3) AMM 32-09-02/201, Air/Ground Relays
      (4) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          413AL Left Fan Cowl Panel (L Engine)
          414AR Right Fan Cowl Panel (L Engine)
          423AL Left Fan Cowl Panel (R Engine)
          424AR Right Fan Cowl Panel (R Engine)

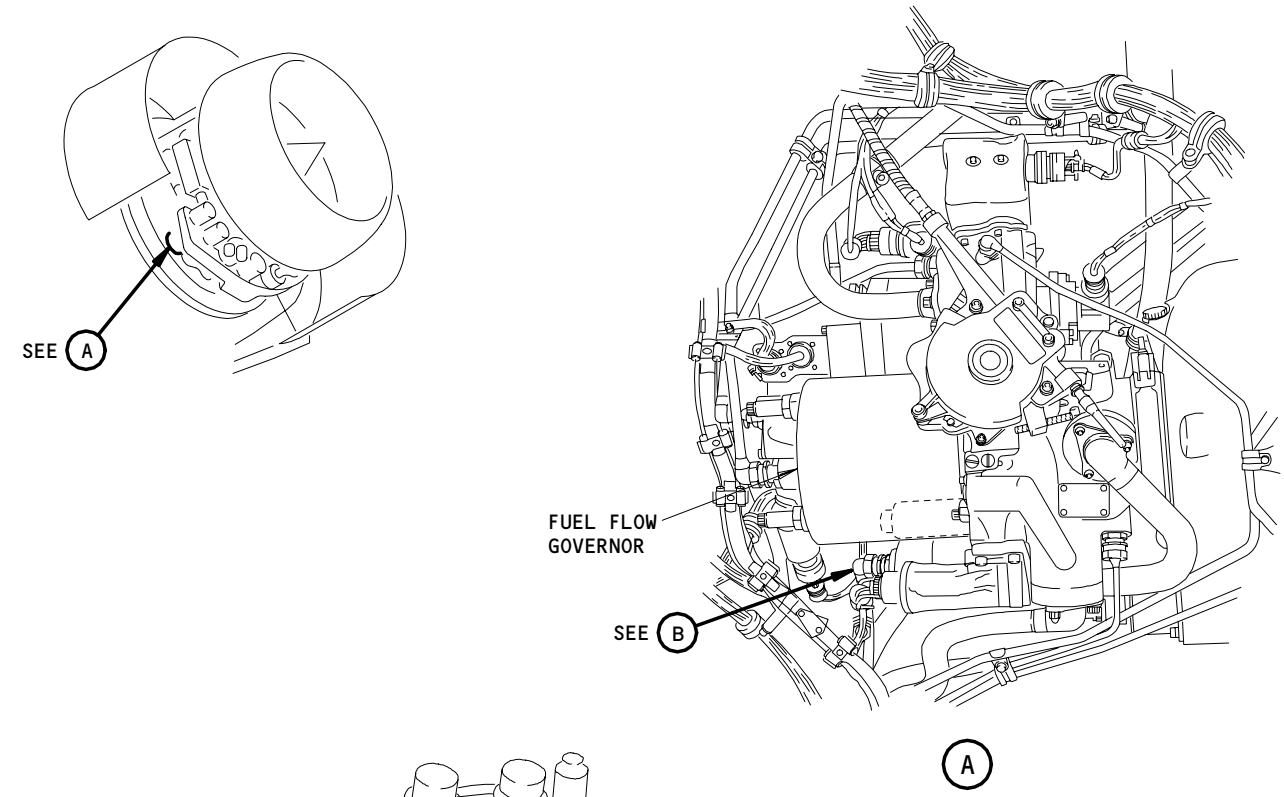
   C. Procedure

      S 016-002-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 216-003-R00
      (2) Examine the condition of the components and related wiring that follow:
          (a) Dedicated generator control unit.
          (b) Fuel flow governor solenoids.
          (c) Fuel flow transmitter.
          (d) Fuel filter differential pressure switch.
          (e) Fuel low pressure switch.



NOTE: FUEL FLOW GOVERNOR SHOWN REMOVED FOR CLARITY.

Idle Reset Solenoid – Electrical Connector
Figure 601

S 866-004-R00

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS, THE AIRPLANE IS IN THE FLIGHT MODE. IN THE FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do the deactivation procedure for flight mode simulation (AMM 32-09-02/201).

S 786-007-R00

(4) Examine the power input signal to the idle reset solenoid of the fuel flow governor as follows (Fig. 601):
   (a) Disconnect the applicable electrical connector D1332 (or D41048) from the idle reset solenoid on the fuel flow governor.

      NOTE: The access to the connector D41048 is easier.

   (b) Supply the electrical power (AMM 24-22-00/201).
   (c) For the left engine, make sure these circuit breakers on the overhead panel, P11, are closed:
      1) 11L7, LEFT ENGINE IDLE CONTROL
      2) 11C30, LANDING GEAR POS SYS 1
   (d) For the right engine, make sure these circuit breakers on the overhead panel, P11, are closed:
      1) 11L33, RIGHT ENGINE IDLE CONTROL
      2) 11S23, LANDING GEAR POS SYS 2
   (e) AIRPLANES WITH T/R SYNC LOCKS;
      Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag.
      1) 11C19, LANDING GEAR POS 2 ALTN
   (f) Make sure there is 28V dc at pin 1 of connector D1332 (or D41048).
   (g) For the left engine, open these circuit breaker(s) on the P11 panel and attach a DO-NOT-CLOSE tag:
      1) 11C30, LANDING GEAR POS SYS 1
   (h) For the right engine, open these circuit breaker(s) on the P11 panel and attach a DO-NOT-CLOSE tag:
      1) 11S23, LANDING GEAR POS SYS 2
   (i) Extend the flaps to the landing position (AMM 27-51-00/201).
   (j) Make sure there is 0V dc at pin 1 of connector D1332 (or D41048).
   (k) Retract the flaps to the usual position (AMM 27-51-00/201).
   (l) Make sure there is 28V dc at pin 1 of connector D1332 (or D41048).

(m) For the left engine, make sure this circuit breaker on the P11 overhead panel is closed:
1) 11C27, ANTI-ICE ENG LEFT
(n) For the right engine, make sure this circuit breaker on the P11 overhead panel is closed:
1) 11C28, ANTI-ICE ENG RIGHT
(o) For the appropriate engine, select the ENGINE ANTI-ICE switch "ON".
(p) Do a check for 0V DC at connector D1332 (or D41048) with the ANTI-ICE switch in the ON position.
(q) Move the ENGINE ANTI-ICE switch to the "OFF" position.
(r) Do a check for 28V DC at connector D1332 (or D41048) with the ANTI-ICE switch in the OFF position.
(s) For the left engine, open this circuit breaker on the P11 panel and attach a DO-NOT-REMOVE tag:
1) 11L7, LEFT ENGINE IDLE CONT
(t) For the right engine, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11L33, RIGHT ENGINE IDLE CONTROL
(u) Connect the applicable electrical connector D1332 (or D41048) to the idle reset solenoid on the fuel flow governor.
(v) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11L7, LEFT ENGINE IDLE CONTROL
2) 11C30, LANDING GEAR POS SYS 1
(w) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11L33, RIGHT ENGINE IDLE CONTROL
2) 11S23, LANDING GEAR POS SYS 2
(x) AIRPLANES WITH T/R SYNC LOCKS;
Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel.
1) 11C19, LANDING GEAR POS 2 ALTN

S 726-012-R00

(5) Examine the idle reset solenoid of the fuel flow governor as follows (Fig. 601):

NOTE: The operation of the idle reset solenoid can be verified by listening or feeling the solenoid for clicking when power is applied or removed.

(a) Supply the electrical power (AMM 24-22-00/201).
(b) For the left engine, make sure these circuit breakers on the P11 Overhead Panel are closed:
1) 11L7, LEFT ENGINE IDLE CONT
2) 11C30, LANDING GEAR POS SYS 1
(c) For the right engine, make sure these circuit breakers on the P11 Overhead Panel are closed:
1) 11L33, RIGHT ENGINE IDLE CONT
2) 11S23, LANDING GEAR POS SYS 2

(d) AIRPLANES WITH T/R SYNC LOCKS;
Open this circuit breaker on the P11 Overhead Panel and attach a DO-NOT-CLOSE tag:
1) 11C19, LANDING GEAR POS SYS 2 ALTN

(e) For the left engine, verify that the idle reset solenoid clicks when the following circuit breaker on the P11 panel is opened and again when the circuit breaker is closed:

NOTE: There will be a five second delay between the time you open or close the circuit breaker to the click of the idle reset solenoid.

1) 11L7, LEFT ENGINE IDLE CONT

(f) For the right engine, verify that the idle reset solenoid clicks when the following circuit breaker on the P11 panel is opened and again when the circuit breaker is closed:

NOTE: There will be a five second delay between the time you open or close the circuit breaker to the click of the idle reset solenoid.

1) 11L33, RIGHT ENGINE IDLE CONT

(g) AIRPLANES WITH T/R SYNC LOCKS;
Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11C19, LANDING GEAR POS SYS 2 ALTN

S 866-008-R00

(6) Put the airplane back to the ground mode (AMM 32-09-02/201).

S 416-009-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

FUEL FLOW GOVERNOR - REMOVAL/INSTALLATION

1. General
   A. This procedure gives the steps to remove and install the Fuel Flow Governor.
   B. Use the procedures given in AMM 70-02-01/201 for identification, lubricant, and installation of rubber seal rings.
   C. Use the procedures given in AMM 70-50-02/201 for connection of electrical plugs.
   D. Use the procedures given in AMM 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in AMM 70-51-00/201 unless a torque value is specified in this procedure.
   E. A new fuel flow governor is introduced which features a revised minimum P4 stop setting to achieve the required increase in low idle fuel flow.
   F. RB211-535E4 ENGINES POST RR SB 72-C230;
      You must install a fuel low governor (FFG) with a FFG05 series part number. If you install the incorrect FFG, the engine will not start.
   G. Rolls-Royce Service Bulletins referred to:

      73-8195 - Fuel and Control - Fuel tubes with non-essential earth bonding features deleted.

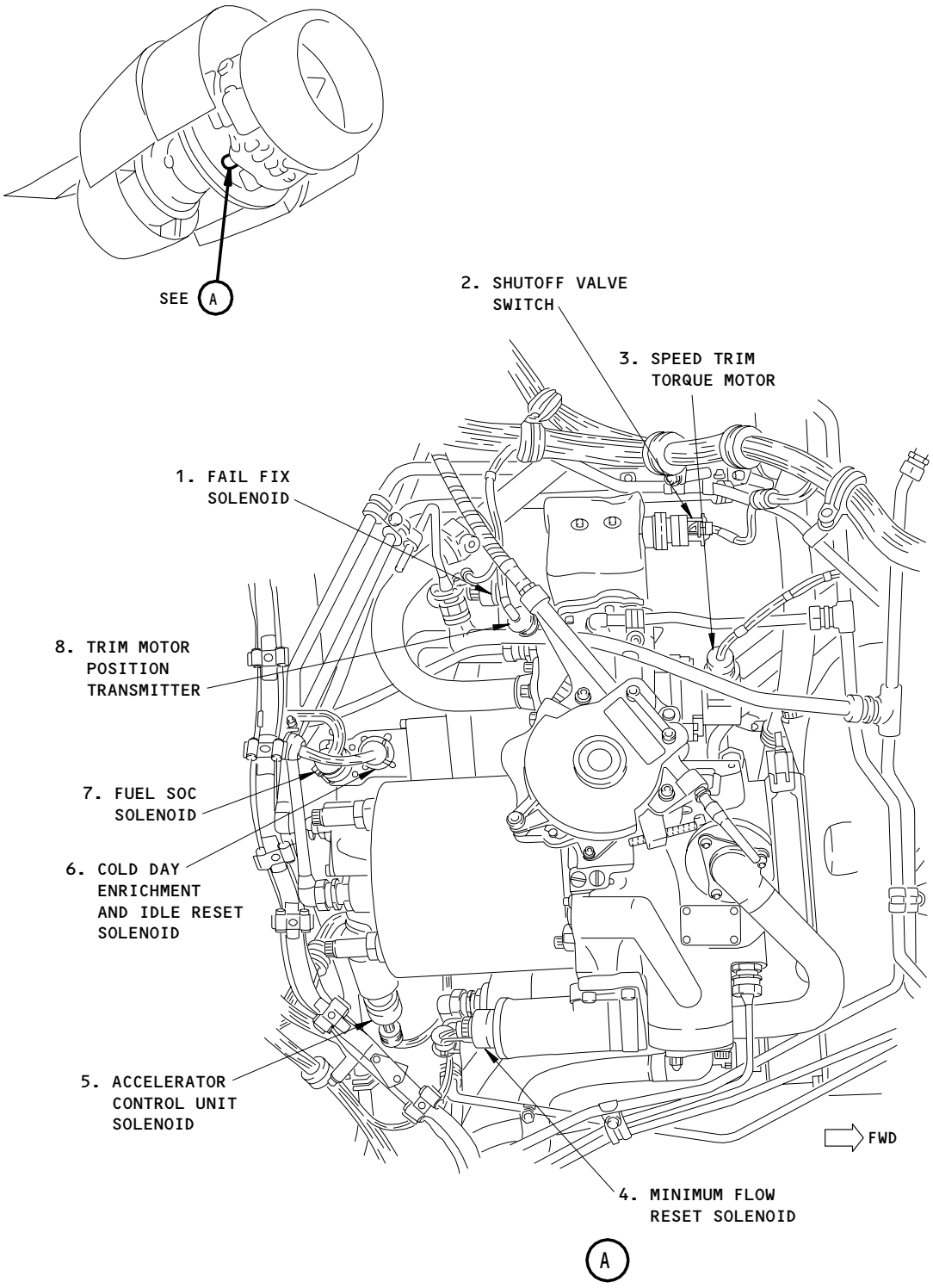
      73-B047 - Engine Fuel and Control - Fuel Tubes- Introduction of HP fuel pipes with rigid end connectors. -
      73-B869 - Engine Fuel and Control - Fuel Flow Governor (F.F.G) Introduction of an FFG with Increased Low Idle Fuel Flow

      76-8386 - Engine Controls - Power Control Linkage - Lower Control Box, Introduction of Revised Gear Sector and Bearings.

      76-9170 - Engine Control Lower Teleflex Box Center Shaft Cover Bracket.

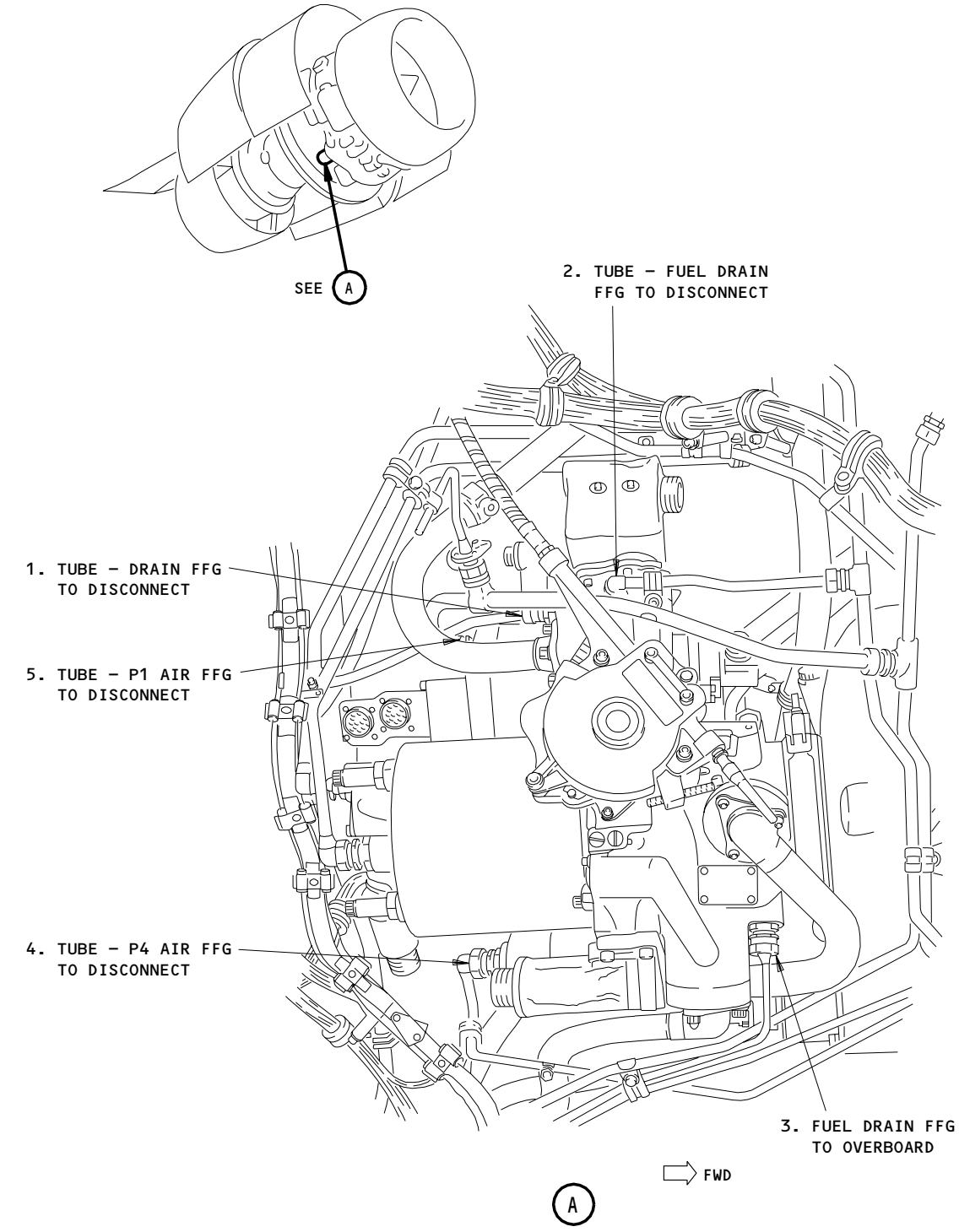
   TASK 73-21-01-004-001-R00

2. Remove the Fuel Flow Governor
   A. Equipment
      (1) Container with a fine mesh filter - minimum capacity: 5 U.S. gallons, 4 Imperial gallons, 18 Liters
      (2) Rolls-Royce UT1315/1 or HU27790 Rig pin - intermediate control box



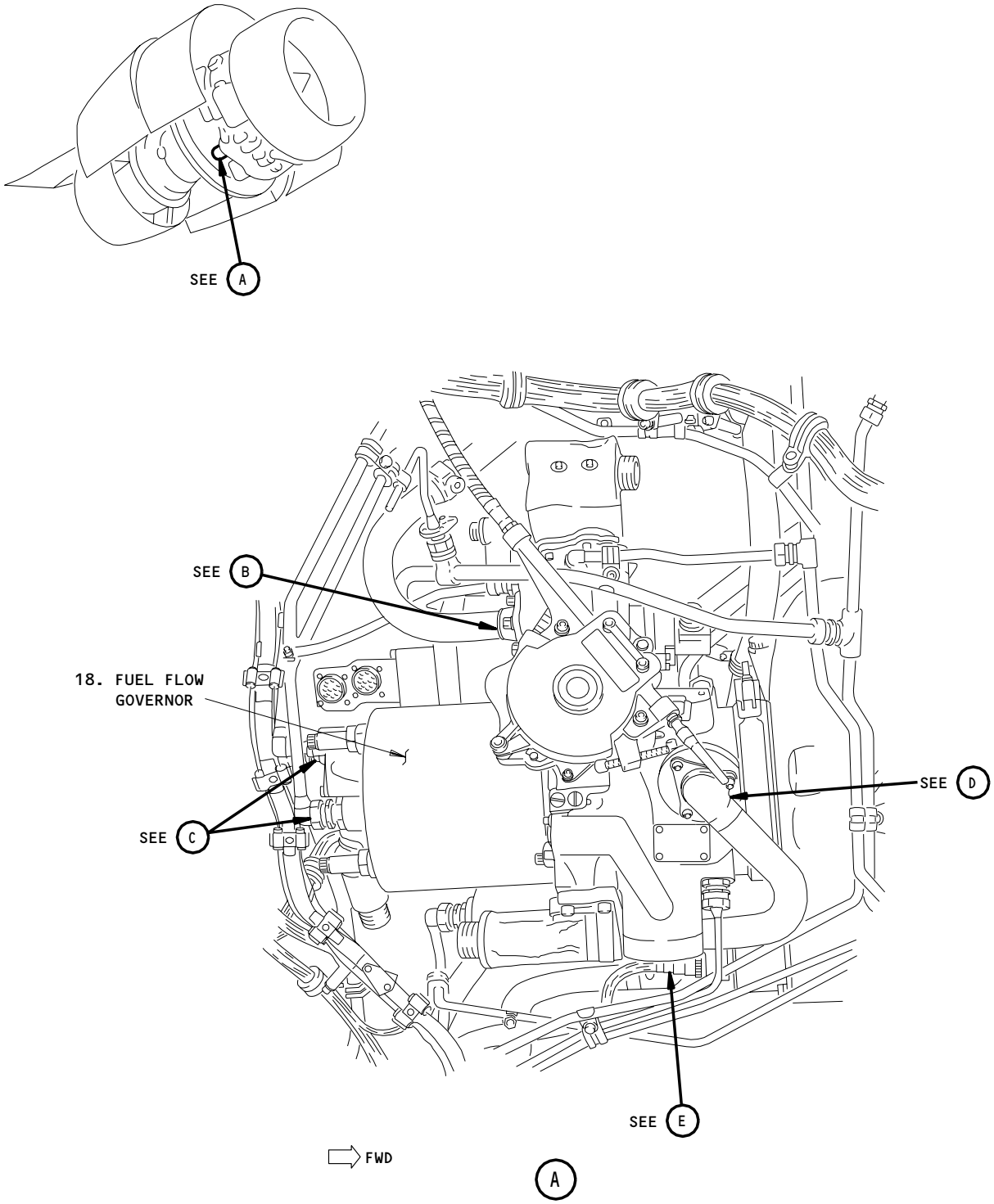
84002

Fuel Flow Governor – Electrical Connectors
Figure 401



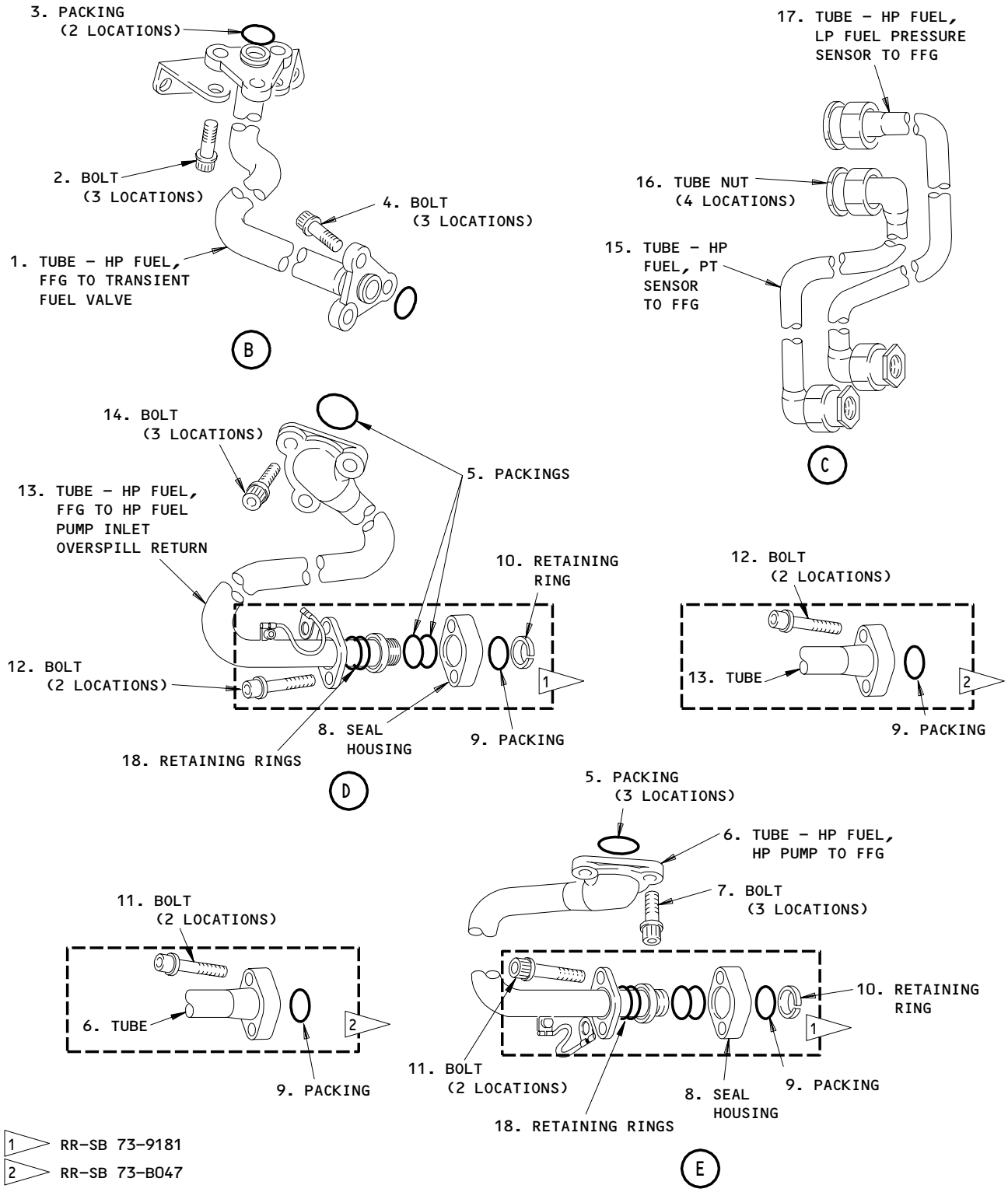
67442A

Fuel Flow Governor – Tube Disconnect Points
Figure 402



67443B

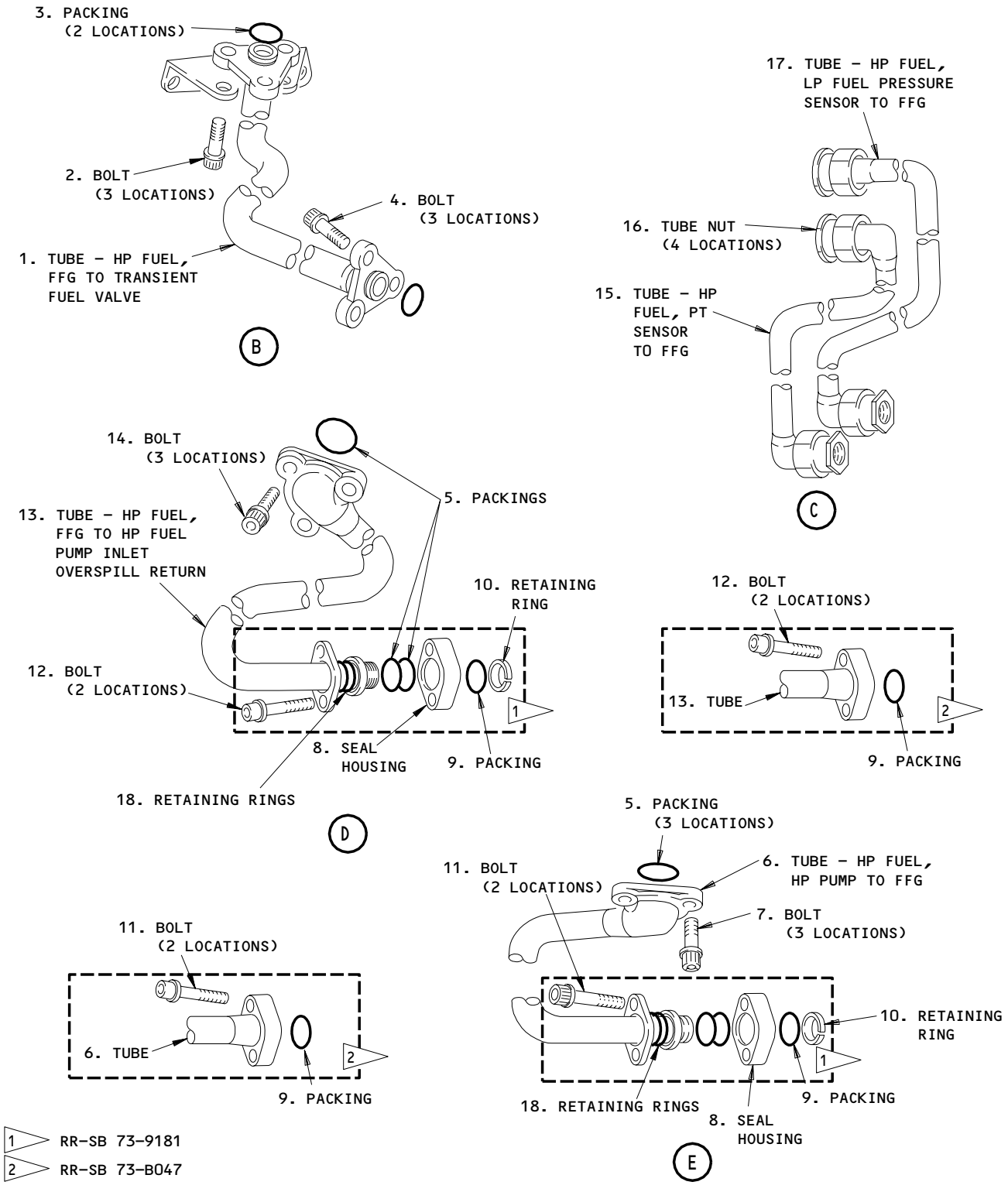
Fuel Flow Governor – Tube Removal/Installation
Figure 403 (Sheet 1)



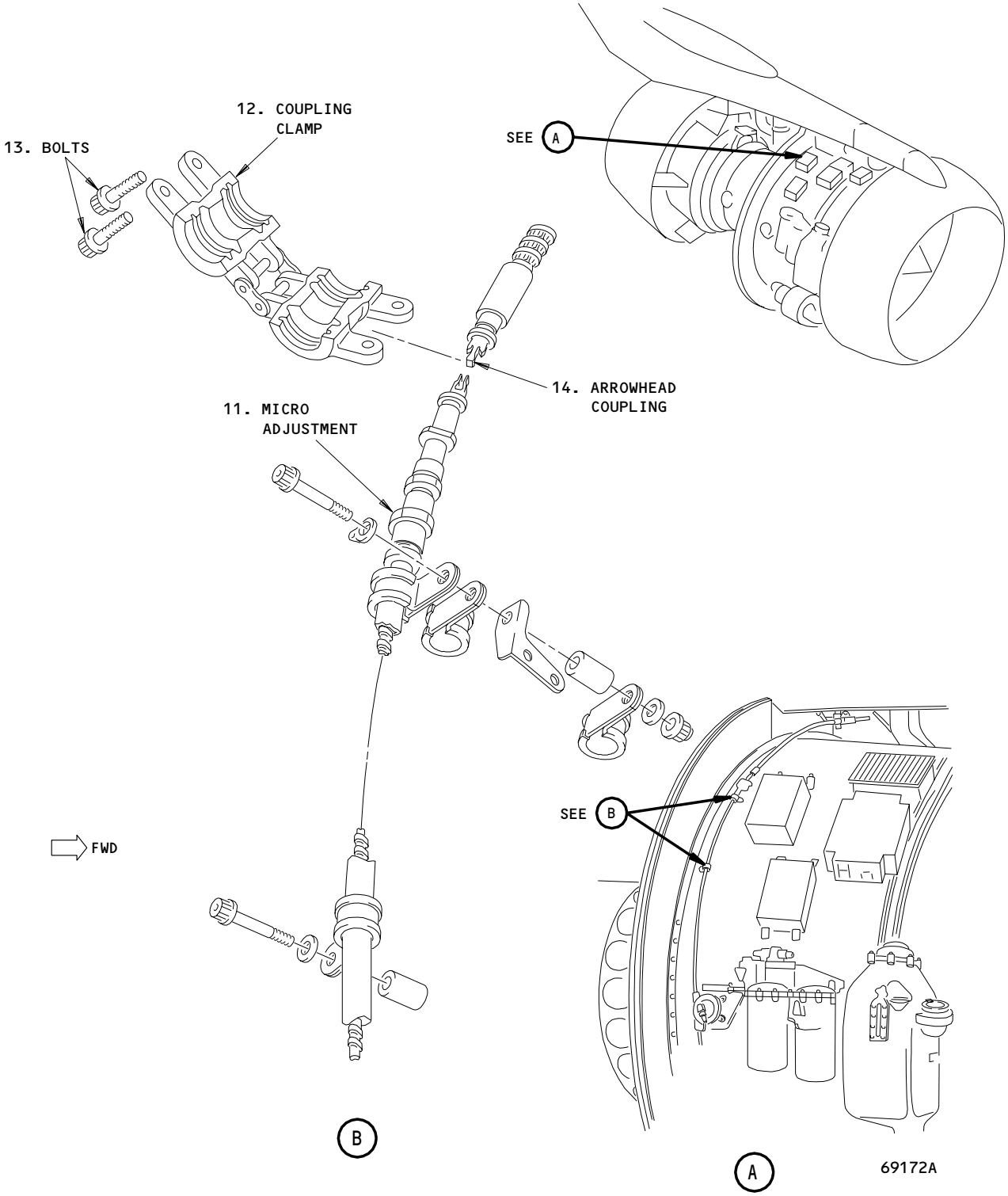
Fuel Flow Governor – Tube Removal/Installation
Figure 403 (Sheet 2)

EFFECTIVITY
ENGINES PRE RR SB 73-8195

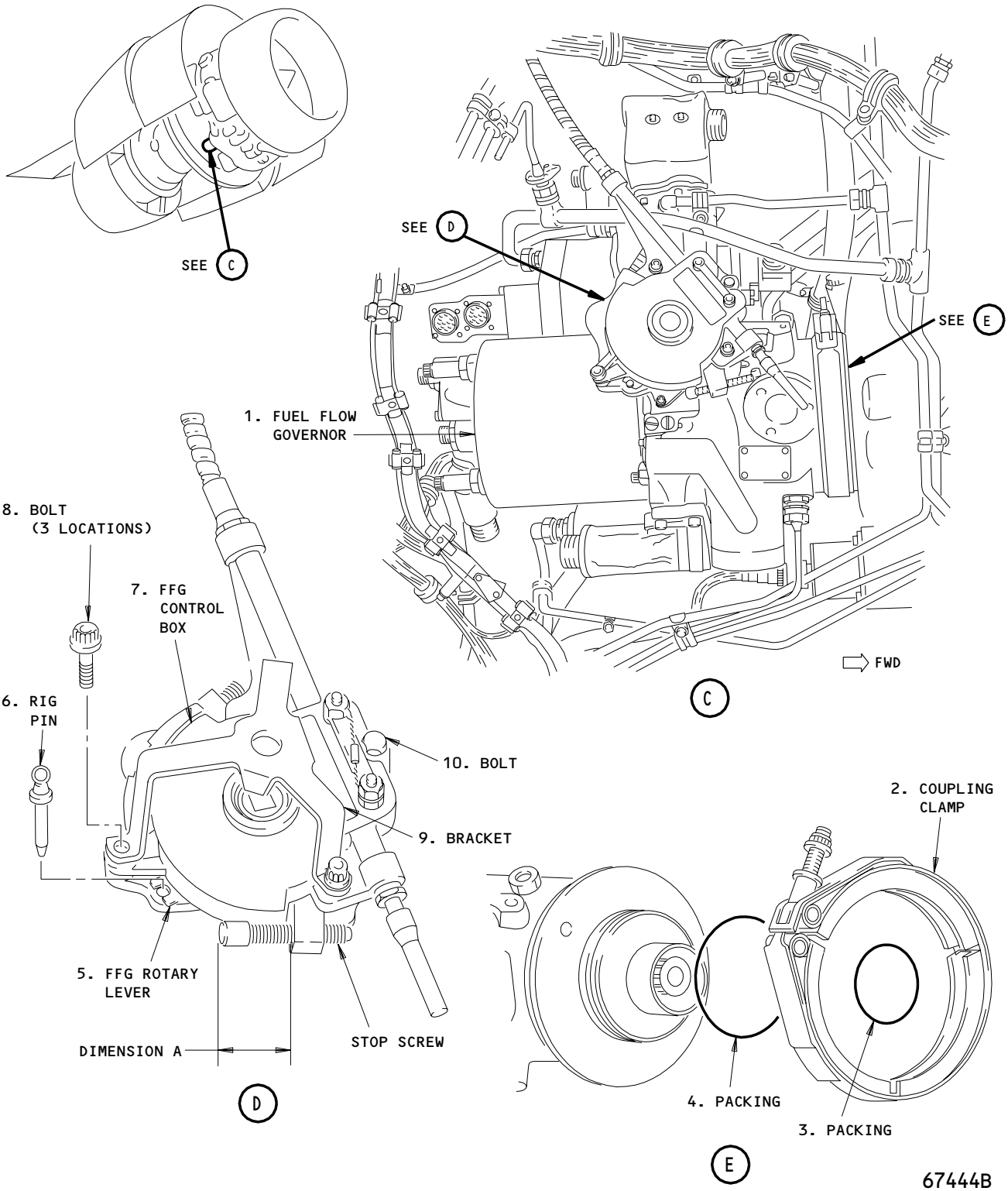
196307



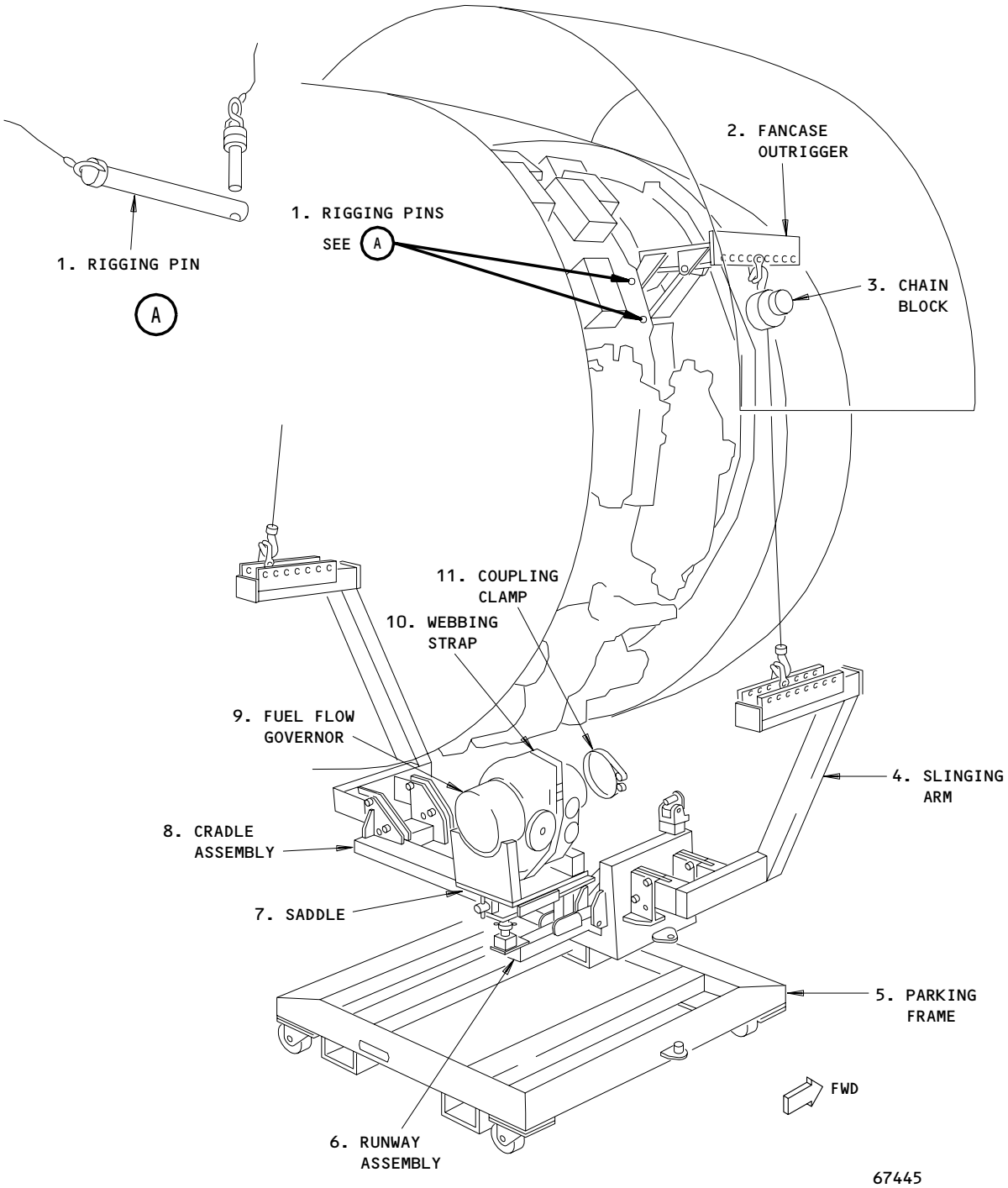
Fuel Flow Governor – Tube Removal/Installation
Figure 403 (Sheet 3)



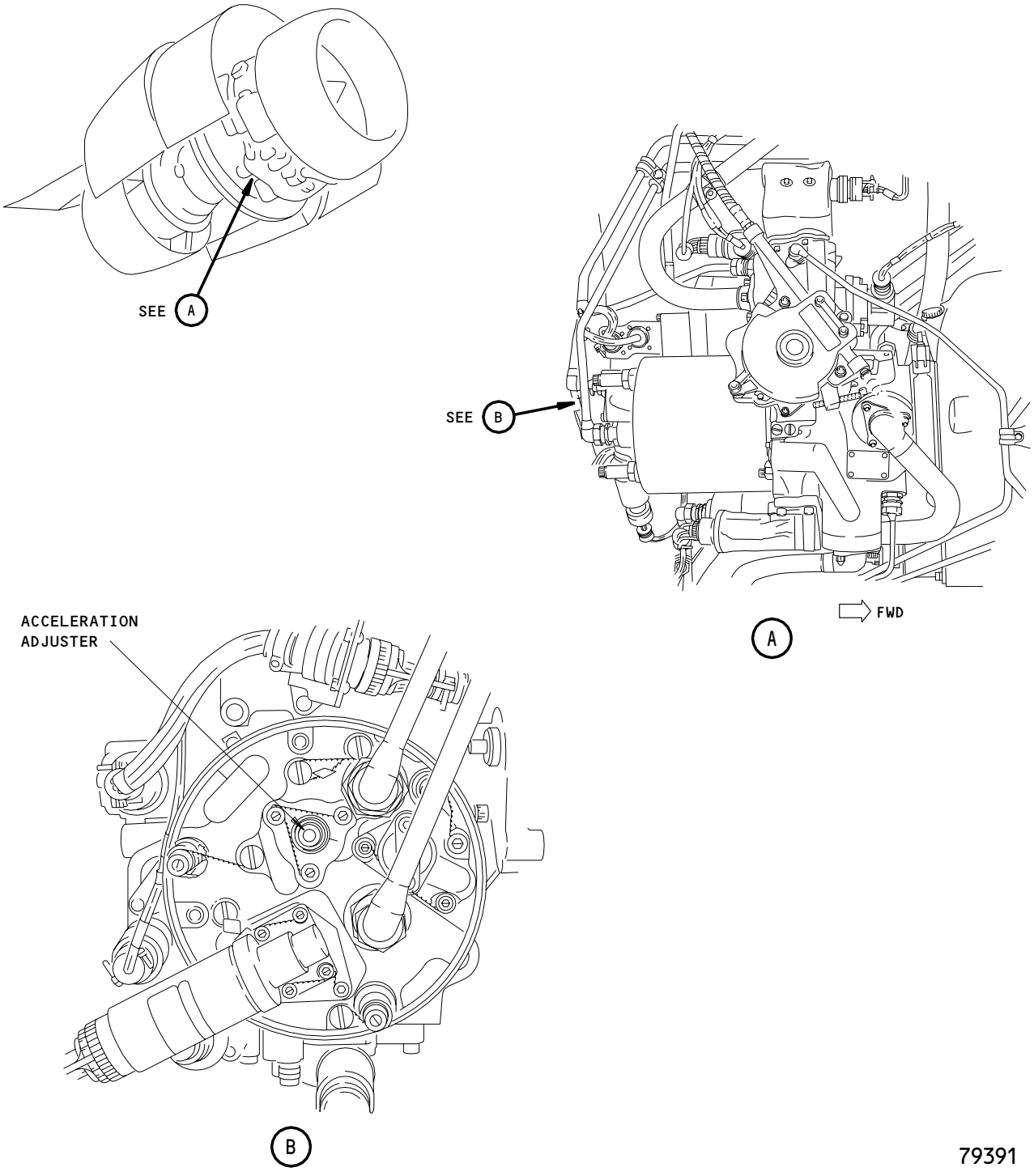
Fuel Flow Governor Control Box - Removal/Installation
Figure 404 (Sheet 1)



Fuel Flow Governor Control Box – Removal/Installation
Figure 404 (Sheet 2)



Fuel Flow Governor – Lifting and Lowering Equipment
Figure 405



Location of Acceleration Adjuster
Figure 406

(3) Slinging cradle comprising:

Rolls-Royce CP30313-2	Cradle, slinging - H.S. Gearbox
Rolls-Royce CP30430-2	Arms, slinging - H.S. Gearbox cradle
Rolls-Royce CP30484/1	Saddle - fuel flow governor
Rolls-Royce CP30476	Runway assemblies

B. Consumable Materials
(1) D00355 Mineral Oil
American Spec - MIL-L-6081C
OMat No. - 1024

C. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 71-11-04/201, Fan Cowl Panels
(3) AMM 75-32-14/401, Power Lever Angle (PLA) Bleed Valve Control Unit (BVCU) and Autothrottle Transducer

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
413AL Fan Cowl Panel (LH)
414AR Fan Cowl Panel (RH)
423AL Fan Cowl Panel (LH)
424AR Fan Cowl Panel (RH)

E. Prepare to remove the Fuel Flow Governor.

S 864-002-R00
(1) Supply the electrical power (AMM 24-22-00/201).

S 044-003-R00
(2) Isolate the fuel system and related systems as follows:
(a) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.
(b) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.
(c) For the left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
1) 6C1, FUEL COND CONT L
2) 6E1, FUEL VALVES L SPAR

(d) For the right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
1) 6C2, FUEL COND CONT R
2) 6E2, FUEL VALVES R SPAR

(e) For the left engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
1) 11D7, ENGINE STBY IGNITION LEFT 1
2) 11D8, ENGINE STBY IGNITION LEFT 2
3) 11L1, LEFT ENGINE IGN 1
4) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
5) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV
6) 11L7, LEFT ENGINE IDLE CONTROL

(f) For the right engine, open these circuit breakers on the overhead panel, P11, and attach DO NOT CLOSE tags:
1) 11D9, ENGINE STBY IGNITION RIGHT 1
2) 11D10, ENGINE STBY IGNITION RIGHT 2
3) 11L28, RIGHT ENGINE IGN 1
4) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
5) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV
6) 11L33, RIGHT ENGINE IDLE CONTROL

F. Remove the Fuel Flow Governor (Fig. 401, 402, 403, 404, and 405).

S 014-004-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 034-005-R00

(2) Remove the electrical connectors (1) through (8) from the FFG and install the approved caps (Fig. 401).

S 034-006-R00

(3) Disconnect, but do not remove the fuel flow governor tubes (1) through (5) (Fig. 402).

S 034-007-R00

(4) Remove the fuel flow governor tubes as follows (Fig. 403):
(a) Remove the bolts (2) and (4) that attach the tube (1) to the transient fuel valve and the FFG (22).
(b) Remove the tube (1) and discard the packing (3).
(c) Remove the bolts (7) and (11) that attach the tube (6) to the HP pump and the FFG (22).

(d) Remove the tube (6) and discard the packings (5) and (9).
(e) ENGINES POST RR SB 73-9181;
If necessary remove the three retaining rings (18).
(f) Remove the bolts (12) and (14) that attach the tube (13) to the HP pump inlet overspill return and the FFG (18).
(g) Remove the tube (13) and discard the packings (5) and (9).
(h) ENGINES POST RR SB 73-9181;
If necessary remove the three retaining rings (18).
(i) Disconnect the tubes (15) and (17) at the FFG (18).
(j) Disconnect and remove the tubes (15) and (17) from the LP fuel pressure sensor and the PT sensor.

S 024-008-R00

CAUTION: DO NOT DAMAGE OR PUT KINKS IN THE CONTROL CABLE. THIS WILL DECREASE THE THROTTLE CONTROL.

(5) Remove the FFG control box (Fig. 404).
(a) Install the rig pin (UT1315/1) or HU22790 in the intermediate control box.
(b) Remove the bolts (13) and clamp (12) which attach the lower cable to the top cable.
(c) Disconnect the lower cable from the top cable at the arrowhead coupling (14).
(d) Remove the power lever angle transducer from the intermediate control box (AMM 75-32-14/401).
(e) Remove the bolts (8) from the control box (7) and pull the control box from the dowel pins on the FFG interface.
(f) Lift the control box (7) clear of the FFG (1).
(g) Use a piece of lockwire to secure the lower control box away from the FFG.

S 024-010-R00

WARNING: BE CAREFUL WHEN YOU MOVE THE FUEL FLOW GOVERNOR. BECAUSE THE FUEL FLOW GOVERNOR WEIGHS 60 POUNDS (27 KG), INJURY CAN OCCUR.

(6) Remove the fuel flow governor (9) (Fig. 405).
(a) Attach the runway assembly (6) and the saddle (7) to the cradle assembly (8).
(b) Attach the outriggers (2) to the LP compressor case with the rigging pins (1).
(c) Attach the chain blocks (3) to the outriggers and attach the cradle (8) to the chain block (3).
(d) Lift the cradle (8) to engage the saddle (7) with the FFG (9).

(e) Make sure the screw jack on the cradle is turned fully counterclockwise and attach the webbing strap (10) around the FFG (9).
(f) Tighten the chain blocks (3) to hold the FFG (9).
(g) Remove the coupling clamp (11) and remove the FFG (9).
(h) Lower the cradle (8) with the FFG (9) on the parking frame (4).
(i) Remove and discard the packings (3) and (4) (Fig. 404).

G. Do the preservation procedure for the Fuel Flow Governor.

S 624-011-R00

(1) If the FFG must be kept less than 30 days, do the steps that follow:
(a) Install the approved caps on the electrical connectors.
(b) Drain as much fuel from the FFG as you can and install the approved caps on all open apertures.
(c) Put the FFG in a vinyl bag and attach a label with the date of the procedure.

S 624-012-R00

(2) If the FFG must be kept 30 days or more, do the steps that follow:
(a) Install the approved caps on the electrical connectors.
(b) Drain as much fuel from the FFG as you can.
(c) Put the FFG on a clean work surface.
(d) Put 1 pint (0.5 liters) of mineral oil in the FFG ports.
(e) Put the FFG on its side and turn the drive shaft slowly to apply a layer of oil on the internal parts.
(f) Drain the oil from the FFG.
(g) Install the approved caps on the open apertures and put the FFG in a vinyl bag with the drive shaft on the top.
(h) Attach a label to the bag with the date and details of the procedure.

TASK 73-21-01-404-013-R00

3. Install the Fuel Flow Governor (Fig. 401, 402, 403, 404 and 405).

A. Equipment

(1) Container with a fine mesh filter - minimum capacity: 5 U.S. gallons, 4 Imperial gallons, 18 Liters
(2) Slinging cradle comprising:

Rolls-Royce CP30313-2	Cradle, slinging - H.S. Gearbox
Rolls-Royce CP30430-2	Arms, slinging - H.S. Gearbox cradle
Rolls-Royce CP30484/1	Saddle - fuel flow governor
Rolls-Royce CP30476	Runway assemblies

(3) Rolls-Royce UT1315 or HU27790 Rig pin - fuel flow governor
(4) Rolls-Royce HU31435 - Seal Ring Loading Tool
(5) Method 1 (Torque Check - FFG input lever)
Force Gage (Spring Scale) - 0-50 inch-pounds
Ruler - 6 inch
Method 2 (Torque Check - FFG input lever)
Woodward Governor tool P/N WT141164 or equivalent.
Torque Wrench

B. Consumable Materials
(1) Lockwire
British Spec - DTD189A: 22 S.W.G.
American Spec - 21 A.W.G.
OMat No. - 238

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
403	1	Tube - FFG to TFV	73-11-06	6	197
	2	Bolt			190
	3	Packing			210
	4	Bolt			192
	5	Packing			165
	6	Tube - HP Pump to FFG			160
	7	Bolt			150
	8	Housing - Seal			170
	9	Packing			175
	10	Retaining Ring			180
	11	Bolt			155
	12	Bolt			245
	13	Tube - FFG to HP Fuel Pump Overspill			250
	14	Bolt			240
	15	Tube - PT Sensor to FFG			330
	17	Tube - LP Fuel Pressure Sensor to FFG			325
	18	Retaining Ring	73-11-06	3	95
404	2	Coupling Clamp	73-21-01	1	5
	3	Packing			15
	4	Packing			10
	7	Box - FFG Control	76-11-59	1	30
404	8	Bolt	76-11-59	1	35
405	9	Fuel Flow Governor	73-21-01	1	26
	11	Clamp - Coupling			5

D. References
(1) AMM 24-22-00/201, Electrical Power - Control

(2) AMM 70-12-02/201, Fitting Vee-Band Coupling Clamps
(3) AMM 71-00-00/501 Power Plant
(4) AMM 71-11-04/201 Fan Cowl Panels
(5) AMM 73-21-01/401, Fuel Flow Governor
(6) AMM 73-21-01/601, Fuel Flow Governor
(7) AMM 76-11-00/501 Engine Control System

E. Access

(1) Location Zone

410	Left Engine
420	Right Engine

(2) Access Panel

413AL	Fan Cowl Panel (LH)
414AR	Fan Cowl Panel (RH)
423AL	Fan Cowl Panel (LH)
424AR	Fan Cowl Panel (RH)

F. Install the Fuel Flow Governor.

S 684-014-R00
(1) Remove the caps from all apperatures and drain off the mineral oil.

S 434-016-R00

CAUTION: DO NOT REMOVE THE FUEL FLOW GOVERNOR DRIVE SHAFT GUARD WHEN YOU INSTALL THE NEW PACKING. INTERNAL DAMAGE TO THE FUEL FLOW GOVERNOR CAN OCCUR.

(2) Lubricate and install the packing (3) on the body of the loading tool (Fig. 404).

S 434-017-R00
(3) Engage the loading tool with the FFG (1) driveshaft and push the tool body on the shaft as far as it will go.

S 434-018-R00
(4) Push the packing (3) in the drive shaft groove with the loading tool adjustable collar and remove the loading tool.

S 434-019-R00
(5) Lubricate and install the packing (4).

S 424-020-R00
(6) Install the FFG as follows:
(a) Install the fuel flow governor (9) on the saddle (7) with the strap (10) and attach the hoist to the runway assembly (6) (Fig. 405).

CAUTION: MAKE SURE THE DRIVE SHAFT, HIGH SPEED EXTERNAL GEARBOX TO FUEL FLOW GOVERNOR DRIVE SHAFT, IS PUSHED FULLY IN THE GEARBOX TO KEEP THE SHAFT SIDE/BENDING LOADS TO A MINIMUM DURING THE FFG INSTALLATION. SIDE/BENDING LOADS CAN CAUSE DAMAGE TO THE EQUIPMENT.

(b) Push the drive shaft, high speed external gearbox to the FFG drive shaft, in the gearbox as far as it will go.
(c) Lift the FFG (9) to connect to the mounting pad on the high speed external gearbox.
1) Prevent side bending loads on the shaft and make sure the dowl is in the correct location.
(d) Install the coupling clamp (7) and remove the strap (10) and the lifting equipment (Fig. 404) (AMM 70-12-02/201).

S 034-021-R00

(7) Install the fuel flow governor tubes as follows (Fig. 403):
(a) Install the tubes (15) and (17) to the LP fuel pressure sensor and the PT sensor to the FFG and tighten the tube nuts (16).
(b) ENGINES PRE RR SB 73-B047;
Lubricate and install the packings (5), seal housing (8), packing (9), and retaining ring (10) on tube (13).
(c) ENGINES PRE RR SB 73-9181;
Install the three retaining rings(18) on the tube if they were removed.
(d) ENGINES POST RR SB 73-B047;
Lubricate and install the packings (5) and (9), on tube (13).
(e) Connect the tube (13) to the HP pump inlet-overspill-return with the bolts (12) and to the FFG with the bolts (14).
(f) ENGINES PRE RR SB 73-8195;
Make sure the bonding leads are in the correct position.
(g) ENGINES PRE RR SB 73-B047;
Lubricate and install the packings (5), seal housing (8), packing (9), and retaining ring (10) on the tube (6).
(h) ENGINES PRE RR SB 73-9181;
Install the three retaining rings (18) on the tube if they were removed.
(i) ENGINES POST RR SB 73-B047;
Lubricate and install the packings (5) and (9), on tube (6).
(j) Connect the tube (6) to the HP pump with the bolts (11) and to the FFG with the bolts (7).
(k) ENGINES PRE RR SB 73-8195;
Make sure the bonding leads are in the correct position.
(l) Lubricate and install the packings (3) on the tube (1).

(m) Connect the tube (1) to the transient fuel valve with the bolts (2) and to the FFG with the bolts (4).

S 434-022-R00

CAUTION: YOU MUST CONNECT AND TIGHTEN THE P1 SYSTEM CONNECTIONS CORRECTLY. LEAKAGE IN THE P1 SYSTEM WILL CAUSE A REDUCTION IN ENGINE POWER.

(8) Connect the fuel flow governor tubes (1) through (5) (Fig. 402).

S 434-023-R00

(9) Tighten the tube nuts and install a lockwire.

S 434-024-R00

(10) Remove the approved caps from the electrical connectors (1) through (8) and install the electrical connectors on the FFG.

NOTE: Tighten all electrical connectors with the recommended pliers.

G. Determine power level torque.

S 424-035-R00

(1) Do a check of the torque at the input lever of the fuel flow governor with Method 1 or Method 2 (AMM 73-21-01-601).

S 424-037-R00

(2) Install the FFG control box (Fig. 404).
(a) Remove the rig pin (UT1315/1 or HU27790) from the intermediate control box.
(b) Align the rotary lever (5) with the rig pin position on the FFG and install the rig pin UT1315/1 or HU27790 (6).
(c) Engage the control box rotary fork with the rotary lever (5) on the FFG.
(d) Align the dowel holes in the control box with the dowels on the FFG and push the control box (7) in position.

(e) Apply a light pressure to the control box to install the box fully.
(f) ENGINES PRE-RR-SB 76-9170;
1) Install the three bolts (8) and tighten (AMM 70-51-00/201).
(g) ENGINES POST-RR-SB 76-9170;
Put the bracket (9) on the lower control box and install the three bolts (8) and tighten (AMM 70-51-00/201).
(h) Remove the rig pin UT1315 or HU27790 (6).
(i) ENGINES POST-RR-SB 76-8386;
Align the lower control box as follows:
1) Loosen the bolt (10) on the back plate of the lower control box.
2) Loosen the three bolts (8) to enable movement of the control box on the dowels.
3) Carefully move the control box on the bolts (8) and the dowels until the necessary position is found.

NOTE: The necessary position is the point where the systems friction is at its lowest while you turn the box with the square drive. The maximum torque permitted is 19 inch-pounds (2.15 newton-meters).

Steps 1) to 3) will let the bearing become aligned and decrease the system friction.

4) Align the rotary level (5) on the FFG with the rig pin position and install the rig pin UT1315/1 or HU27790 (6).
5) Tighten the bolts (8) (AMM 70-51-00/201) while you hold the control box in the necessary position.
6) Tighten the bolt (10) on the back plate of the lower control box to 34 - 50 pound-inches (4.52 - 5.65 newton meters).
7) Remove the rig pin UT1315/1 or HU27790 (6).
(j) Install the power lever angle transducer onto the intermediate control box (AMM 75-32-14/401).
(k) Connect the lower and top cables at the arrowhead coupling (14).
(l) Install the coupling clamp (12) and bolts (13).
1) Tighten the bolts (13) to 27-30 pound-inches (3.05-3.39 Newton-meters).
(m) Install a lockwire to the bolts (13).

S 714-026-R00

(3) Operate the FFG control to make sure it moves fully and freely. If an adjustment is necessary, do the Engine Control System - Adjustment/Test (AMM 76-11-00/501).

H. Put the airplane back to its usual condition.

S 864-027-R00

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

S 864-028-R00

(2) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 864-029-R00

(3) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 864-030-R00

(4) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONT SUPV
(c) 11L7, LEFT ENGINE IDLE CONTROL

S 864-031-R00

(5) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV
(c) 11L33, RIGHT ENGINE IDLE CONTROL

S 414-032-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 714-033-R00

(7) Do the power plant adjustment test with the Power Plant Test Reference Table (AMM 71-00-00/501).

FUEL FLOW GOVERNOR - INSPECTION/CHECK

1. General
   A. This procedure has a task to do a check of the torque of the input lever of the fuel flow governor.

TASK 73-21-01-206-010-R00

2. Fuel Flow Governor Input Lever Torque Check
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
      (2) AMM 73-21-01/401, Fuel Flow Governor
   B. Equipment
      (1) For Method 1
         (a) Force Gauge (Spring Scale) - 0 - 50 inch-pounds
         (b) Ruler - 6 inch
      (2) For Method 2
         (a) Woodward Governor Tool P/N Wt141164
         (b) Torque Wrench
   C. Access
      (1) Location Zone
         410 Left Engine
         420 Right Engine

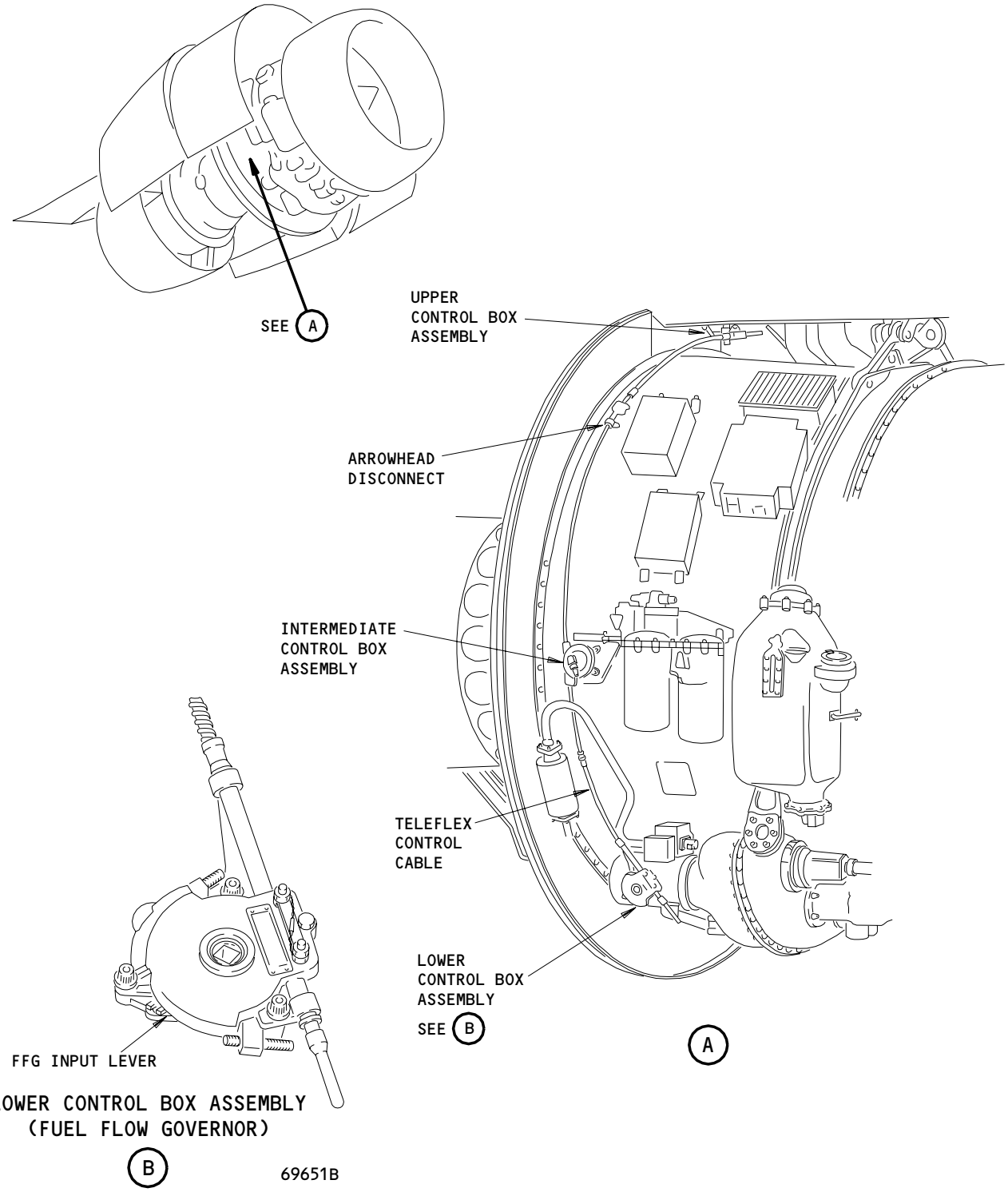
      (2) Access Panel
         413AL Fan Cowl Panel (LH)
         414AR Fan Cowl Panel (RH)
         423AL Fan Cowl Panel (LH)
         424AR Fan Cowl Panel (RH)

   D. Examine the input lever torque (Fig. 601).

      S 016-001-R00
      (1) Open the fan cowl panels (AMM 71-11-04/201).

      S 286-009-R00
      (2) Do a check of the torque at the input lever of the fuel flow governor (You can use method 1 or method 2).

         NOTE: The maximum torque for an unpressurized FFG is 16 inch-pounds (1.81 newton-meters).



Fuel Flow Governer Rotary Lever Input Torque Inspection/Check
Figure 601

S 726-012-R00

(3) Method 1:
   (a) Get a force gauge (spring scale) and ruler.
   (b) Attach the force gauge (spring scale) to the input lever of the fuel flow governor.
   (c) Measure the moment arm from the fuel flow governor input lever axis of rotation to the force gauge attachment point.
   (d) Apply enough force in a direction perpendicular to the line between the fuel flow governor input lever axis of rotation and the point of contact.
   (e) Slowly move the lever from one stop to the other stop.
   (f) Record the maximum force applied.
   (g) Multiply the applied recorded force by the moment arm measurement and convert the result to pound-inches (N.m).
   (h) Make sure the fuel flow governor input lever torque is less than 16 inch-pounds (1.81 newton-meters).
   (i) If the fuel flow governor input lever torque is more than 16 inch-pounds (1.81 newton-meters), replace the fuel flow governor (AMM 73-21-01/401).

S 726-013-R00

(4) Method 2:
   (a) Install the Woodward governor tool to the end of the power shaft.
   (b) Install the torque wrench on the end of the Woodward governor tool.
   (c) Slowly move the lever from one stop to the other stop.
   (d) Record the maximum torque necessary.
   (e) If the torque is more than 16 inch-pounds (1.81 newton-meters), replace the fuel flow governor (AMM 73-21-01/401).

S 416-007-R00

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

P1 PROBE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the P1 Probe. The second task is to install the P1 Probe.
   B. Use the procedures given in (AMM 70-51-00/201) to tighten fasteners. Tighten the fasteners to the torque values given in (AMM 70-51-00/201) unless a torque value is specified in this procedure.

TASK 73-21-04-004-001-R00

2. Remove the P1 Probe
   A. Equipment
      (1) Rolls-Royce 289200 Protective work mats
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 54-52-01/401, Strut Fairings
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          412 Left Inlet Cowl
          422 Right Inlet Cowl

   D. Procedure

      S 864-002-R00
      (1) Remove the electrical power (AMM 24-22-00/201).

      S 014-003-R00
      (2) Remove the forward section of the strut forward fairing (AMM 54-52-01/401).

      S 034-004-R00
      (3) Remove the screws (7) from the access panel (2).

      S 014-005-R00
      (4) Remove the access panel (2).

      S 034-008-R00
      (5) Disconnect the electrical connector (3) and tube (4) at the P1 probe.

      S 944-009-R00
      (6) Install the protective work mat in the inlet cowl.

S 154-048-R00
(7) Remove the old sealing compound. Use a sharp knife and take care not to cause damage to the P1 probe or acoustic panel.

S 034-010-R00
(8) Hold the P1 probe in the inlet cowl and remove the nuts (5) and washers (6).

S 024-011-R00
(9) Remove the P1 probe (1).

S 434-012-R00
(10) Install the dust caps to all openings.

TASK 73-21-04-404-013-R00

3. Install the P1 Probe

A. Equipment
(1) Rolls-Royce 289200 Protective work mats

B. Consumable Materials
(1) Sealing compound, Silcoset 153 OMat No. 842.
Silcoset 152 OMat No. 872 - (Alternate).
(2) Lockwire
British Spec/Ref - 22 S.W.G.
American Spec/Ref - 21 A.W.G.
OMat No. 238

C. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 54-52-01/401, Strut Fairings

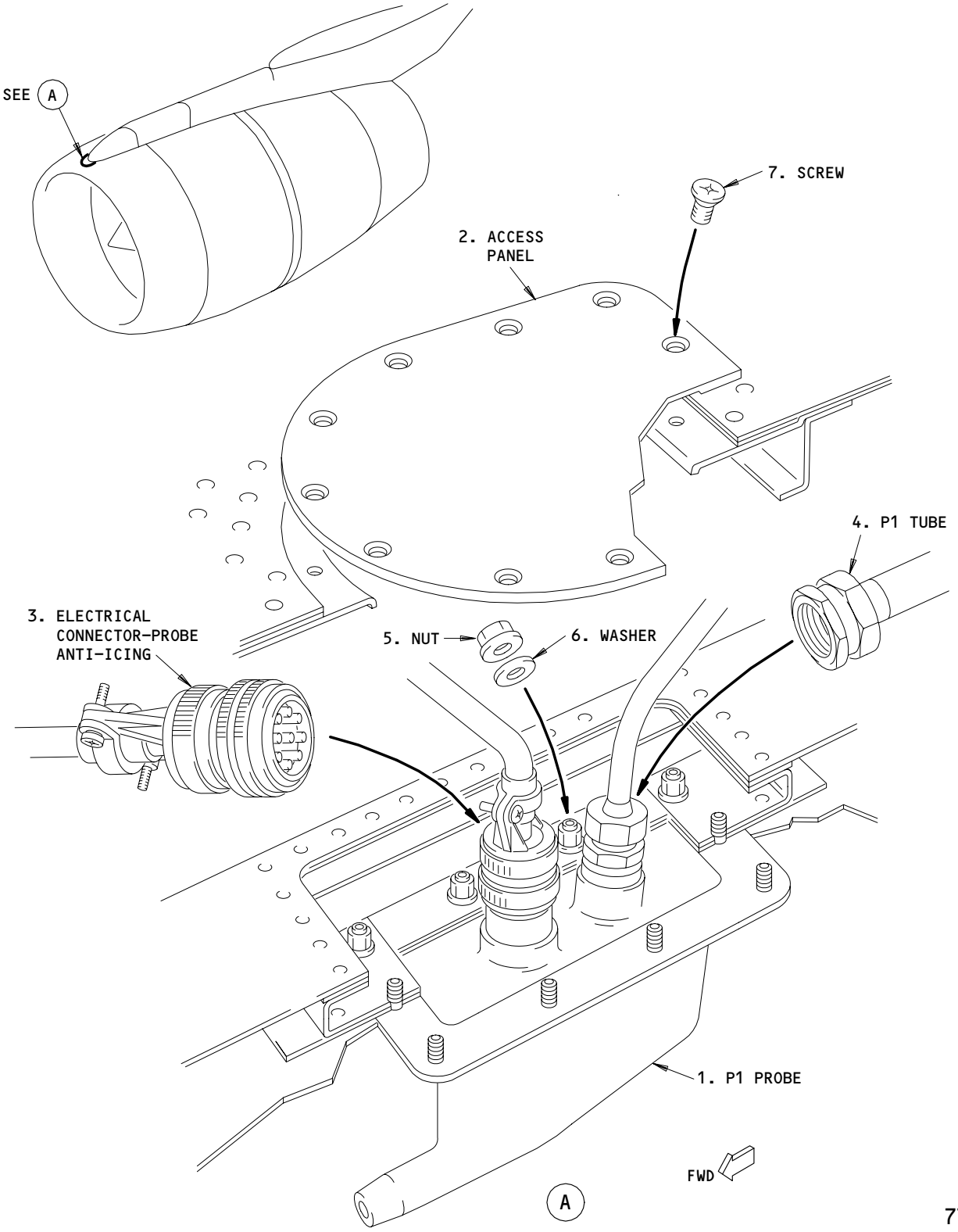
D. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
412 Left Inlet Cowl
422 Right Inlet Cowl

E. Procedure

S 034-014-R00
(1) Remove the dust caps from all openings.

S 424-015-R00
(2) Install the P1 probe (1) in the inlet cowl with the nuts (5) and washers (6).



P1 Probe Installation
Figure 401

S 434-045-R00

CAUTION: YOU MUST CONNECT AND TIGHTEN THE P1 SYSTEM CONNECTIONS CORRECTLY. LEAKAGE IN THE P1 SYSTEM WILL CAUSE A REDUCTION IN ENGINE POWER.

(3) Connect the electrical connector (3) and tube (4) at the P1 probe and safety with a lockwire.

S 414-019-R00

(4) Install the access panel (2) with the screws (7).

S 414-020-R00

(5) Install the forward section of the strut forward fairing (AMM 54-52-01/401).

S 394-049-R00

(6) Apply a bead of Silcoset sealing compound between the P1 probe and the acoustic panel.

S 394-050-R00

(7) Make the silcoset compound smooth along the contour of the P1 probe and the acoustic panel with a precision of plus or minus 0.0197 of an inch (0.5 mm).

S 394-051-R00

(8) Put water on a tissue, and apply the tissue to the sealing compound to decrease the cure time.
  (a) Do not apply heat to the compound to decrease the cure time.
  (b) Remove the tissue after two hours.

NOTE: The sealing compound is sufficiently cured for flight after two hours.

NOTE: The sealant is not fully cured for 48 hours at a minimum of 61°F (16°C).

S 944-021-R00

(9) Remove the protective work mat from the inlet cowl.

S 864-022-R00

(10) Supply the electrical power (AMM 24-22-00/201).

P1 PROBE - INSPECTION/CHECK

1. General
   A. This procedure has one task to examine the P1 probe.

   TASK 73-21-04-206-001-R00

2. P1 Probe Inspection
   A. References
      (1) AMM 54-52-01/401, Strut Fairings
      (2) AMM 73-21-13/601, Fuel System Air Tubes
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

   C. Procedure

      S 016-002-R00
      (1) Remove the forward section of the strut fairing (AMM 54-52-01/401).

      S 016-003-R00
      (2) Remove the screws from the access panel and remove the panel.

      S 216-004-R00
      (3) Examine the P1 probe and welds for cracks.

      S 216-005-R00
      (4) Examine the P1 probe air tubes and welds for cracks (AMM 73-21-13/601).

      S 216-010-R00
      (5) Examine the P1 probe for dents (Fig. 602).

      S 216-011-R00
      (6) Examine the P1 probe for distortion (Fig. 602).

S 216-012-R00
(7) Examine the P1 probe for nicks (Fig. 602).

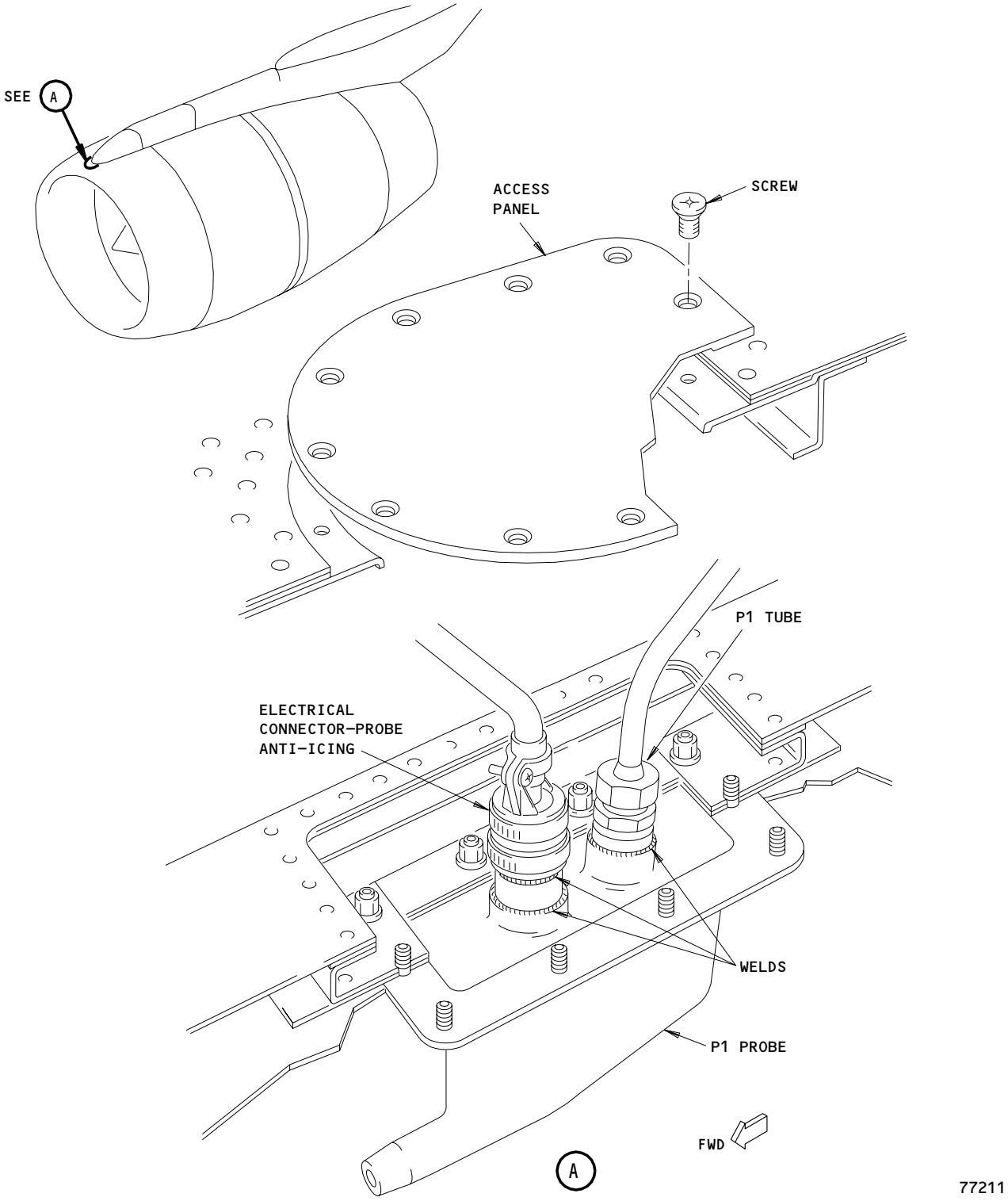
S 216-013-R00
(8) Examine the P1 probe for symmetry (Fig. 602).

S 416-007-R00
(9) Install the access panel for the P1 probe with the screws.

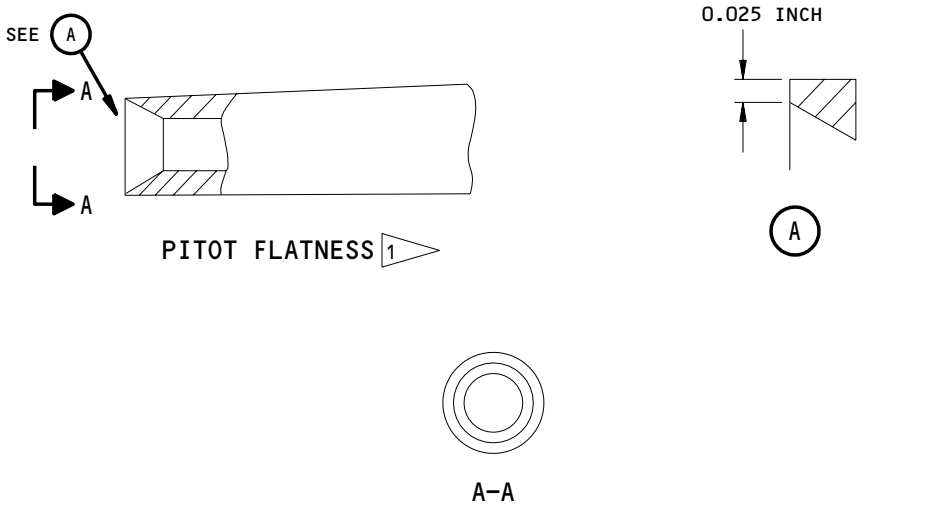
S 416-008-R00
(10) Install the forward section of the strut fairing (AMM 54-52-01/401).

D. Acceptance Standard

S 216-006-R00
(1) Use these standards to make sure the P1 probe, air tubes and welds are serviceable:
(a) Cracks - No cracks permitted.
(b) Use all other standards to reject (Fig. 602).



P1 Probe Installation
Figure 601



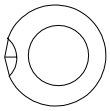
1 REJECTION CRITERIA
PITOT FLAT GREATER THAN 0.025 INCH

2 REJECTION CRITERIA
1. INDENTATION EXCEEDING 0.060 INCH OF NORMAL TIP DIAMETER
2. INDENTATION AFFECTING MORE THAN 20% OF TIP CIRCUMFERENCE

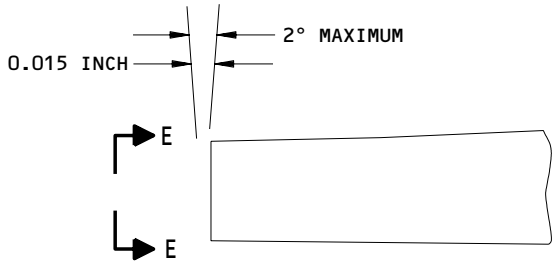
3 REJECTION CRITERIA
DETECTABLE OUTWARD FLARE OR CURL OF LIP GREATER THAN 0.050 INCH

P1 Probe Rejection Criteria
Figure 602 (Sheet 1)

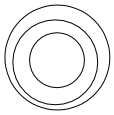
PITOT NICK 4



D–D



PITOT SYMMETRY 5



E–E

4 REJECTION CRITERIA
1. ONE NICK THAT EXCEEDS 0.060 INCH DEEP
2. TWO OR MORE NICKS THAT EXCEED 0.050 INCH DEEP

5 REJECTION CRITERIA
MAXIMUM SIDE–TO–SIDE DIFFERENCE EXCEEDING 0.015 INCH

P1 Probe Rejection Criteria
Figure 602 (Sheet 2)

ELECTRONIC ENGINE CONTROL (EEC) SUPERVISORY AND LIMITER - REMOVAL/INSTALLATION

1. General
   A. The EEC is found in the forward equipment bay. You must remove and install the right engine EEC from in the equipment bay with the access door closed.
   B. Use the procedures given in AMM 70-50-02/201 for connection of electrical plugs.

TASK 73-21-07-004-001-R00

2. Remove the EEC
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 20-10-01/401, E/E Rack Mounted Components
   B. Access
      (1) Location Zones
          100 Lower Half of the Fuselage

      (2) Access Panels
          119AL Main Equipment Center

   C. Procedure

      S 864-002-R00
      (1) For the left engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L5, L ENG EEC SUPV
          (b) 11L4, L ENG EEC LIMITER

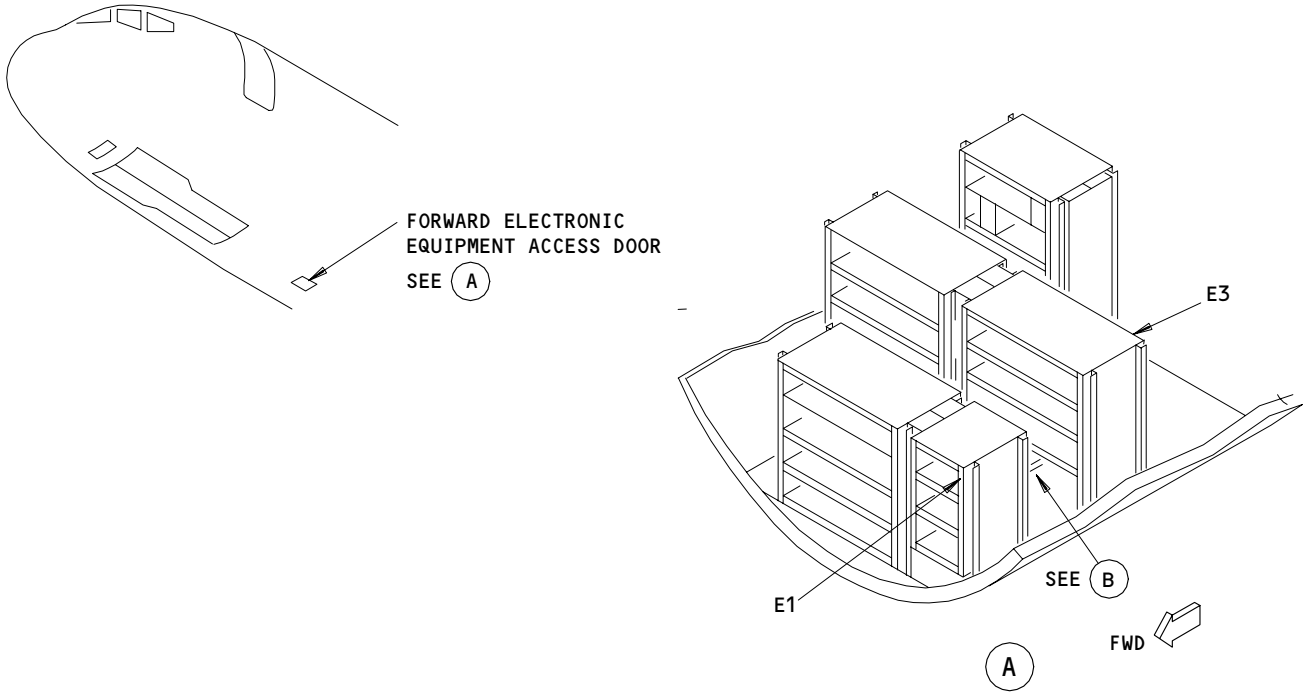
      S 864-003-R00
      (2) For the right engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L32, R ENG EEC SUPV
          (b) 11L31, R ENG EEC LIMITER

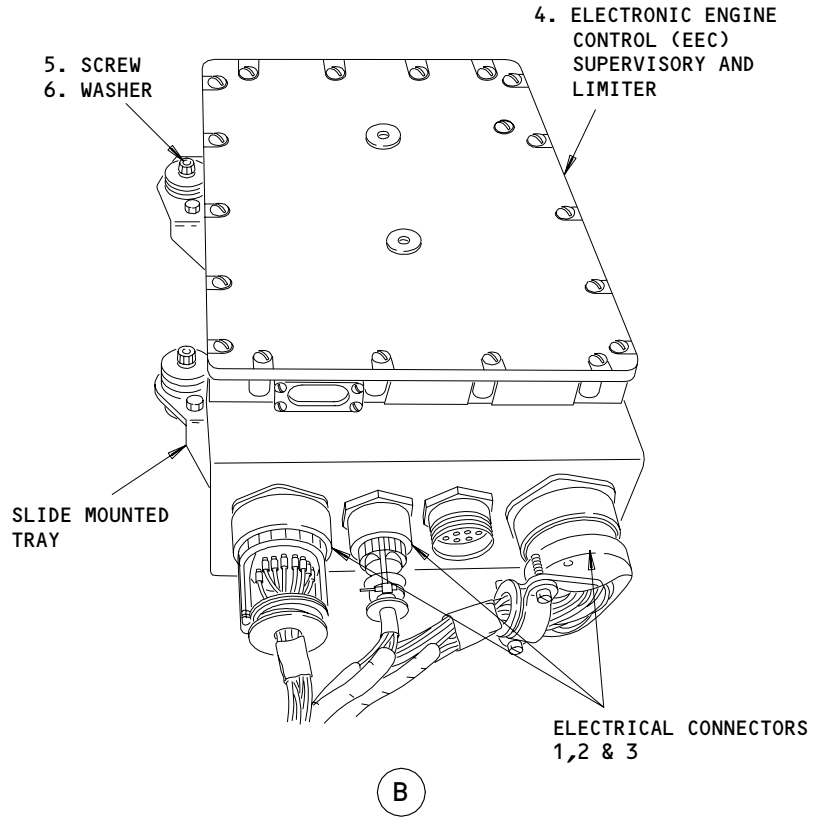
      S 014-004-R00
      (3) Open the forward access door for the electronic equipment bay (AMM 06-41-00/201).

      S 034-005-R00

      CAUTION: MAKE SURE THE ELECTRICAL CONNECTORS ARE FREE FROM LIQUID AND SOLID CONTAMINATION BEFORE YOU DISCONNECT THEM. IF THE ELECTRICAL CONNECTORS ARE NOT FREE FROM CONTAMINATION BEFORE YOU DISCONNECT THEM, THE CONTAMINATION CAN GET INTO THE CONNECTOR AND CAUSE DAMAGE.

      (4) Remove the electrical connectors (1), (2), and (3).
          (a) Install dust caps on the connectors.





Electronic Engine Control (EEC) Supervisory and Limiter Installation
Figure 401

S 034-006-R00
(5) Release the extractors that attach the EEC and the slide mounted tray to the E/E rack (AMM 20-10-01/401).

S 024-007-R00
(6) Remove the EEC and the slide mounted tray from the E/E rack.

S 034-008-R00
(7) Hold the EEC (4) and remove the screws (5) and washers (6).

S 024-009-R00
(8) Remove the EEC from the slide mounted tray.

TASK 73-21-07-404-010-R00

3. Install the EEC

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	4	Control	73-21-53	01	80
	5	Screw			85
	6	Washer			90

B. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 20-10-01/401, E/E Rack Mounted Components
(3) AMM 73-21-00/201, Fuel Control System - EEC Interrogation

C. Access
(1) Location Zones
100 Lower Half of the Fuselage

(2) Access Panels
119AL Main Equipment Center

D. Procedure

S 424-011-R00
(1) Install the EEC (4) on the slide mounted tray with the screws (5) and washers (6).

S 424-012-R00
(2) Install the EEC and the slide mounted tray to the E/E rack.

S 434-013-R00
(3) Attach the EEC to the slide mounted tray with the extractors (AMM 20-10-01/401).

S 434-014-R00

CAUTION: MAKE SURE THE ELECTRICAL CONNECTORS ARE FREE FROM LIQUID AND SOLID CONTAMINATION BEFORE YOU CONNECT THEM. IF THE ELECTRICAL CONNECTORS ARE NOT FREE FROM CONTAMINATION BEFORE YOU CONNECT THEM, THE CONTAMINATION CAN CAUSE DAMAGE TO THE CONNECTOR.

(4) Install the electrical connectors (1), (2), and (3).

S 864-015-R00
(5) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L5, L ENG EEC SUPV
(b) 11L4, LENG EEC LIMITER

S 864-016-R00
(6) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L32, R ENG EEC SUPV
(b) 11L31, R ENG EEC LIMITER

S 744-017-R00
(7) Do the Interrogate procedure for the EEC supervisory and limiter (AMM 73-21-00/201).

S 414-018-R00
(8) Close the forward access door for the electronic equipment bay (AMM 06-41-00/201).

DEDICATED GENERATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the Dedicated Generator. The second task is to install the Dedicated Generator.
   B. Use the procedures given in (AMM 70-02-01/201) for identification, lubricant, and installation of rubber seal rings.
   C. Use the procedures given in (AMM 70-50-02/201) for connection of electrical plugs.
   D. Use the procedures given in (AMM 70-51-00/201) to tighten fasteners. Tighten the fasteners to the torque values given in (AMM 70-51-00/201) unless a torque value is specified in this procedure.

TASK 73-21-08-004-001-R00

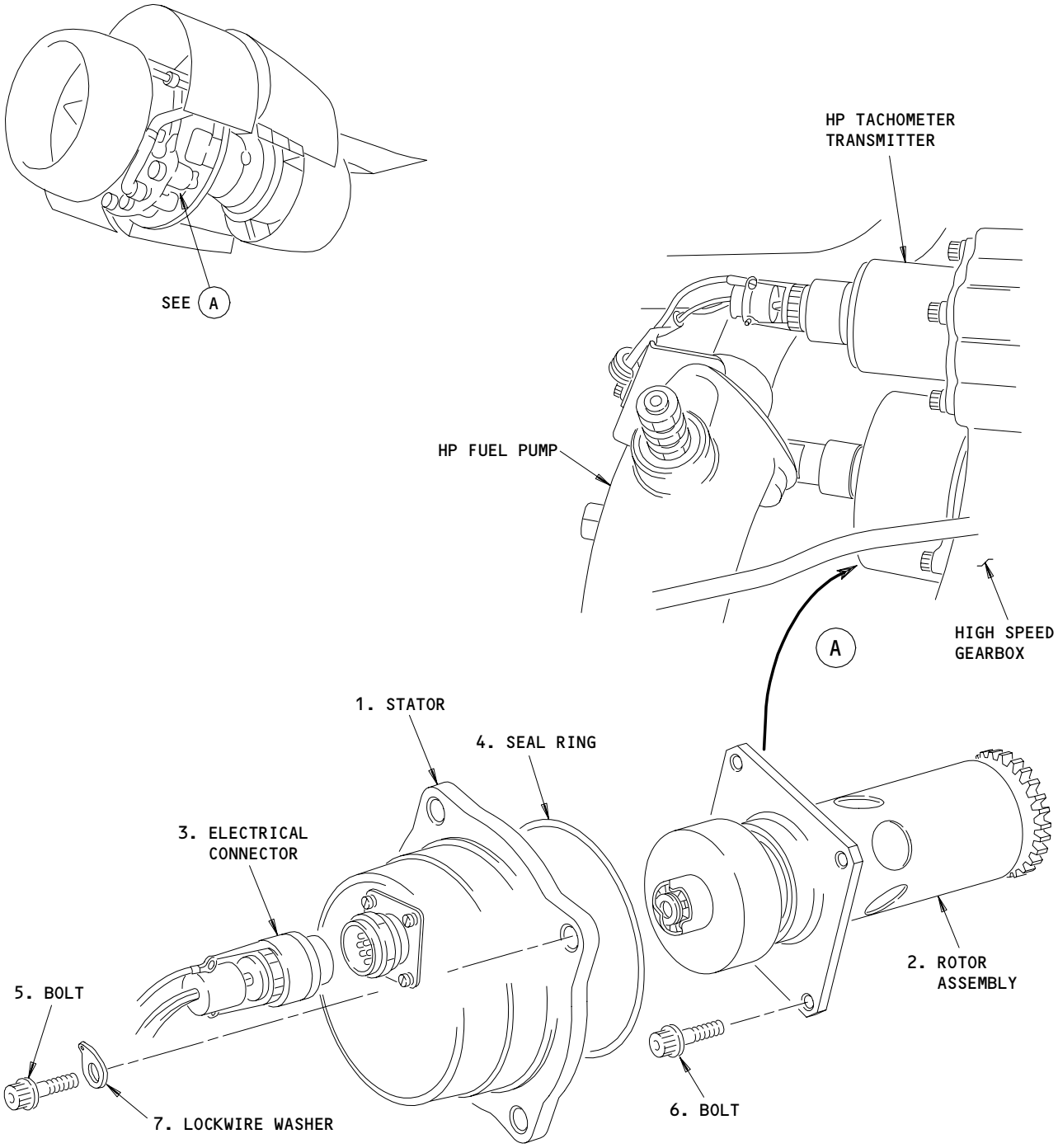
2. Remove the Dedicated Generator
   A. Consumable Materials
      (1) Methylene Chloride (Dichloromethane)
          British Spec/Ref - BS 1994, 1953
          OMat No. 169
   B. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          413AL Left Fan Cowl Panel, Left Engine
          414AR Right Fan Cowl Panel, Left Engine
          423AL Left Fan Cowl Panel, Right Engine
          424AR Right Fan Cowl Panel, Right Engine

   D. Procedure

      S 864-002-R00
      (1) For the left engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
          (b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

      S 864-003-R00
      (2) For the right engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
          (b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV



51616A

Dedicated Generator Installation
Figure 401

S 014-004-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 034-005-R00

(4) Disconnect the electrical connector (3).

S 034-009-R00

(5) Remove the bolts (5), lockwire washers (7), and stator (1).

S 034-010-R00

(6) Remove the bolts (6) from the gearbox housing.

S 034-011-R00

(7) Remove the rotor assembly from the gearbox housing.

S 434-013-R00

(8) Install dust caps on all openings and electrical connectors.

TASK 73-21-08-404-014-R00

3. Install the Dedicated Generator

A. Consumable Materials

(1) Jointing Compound
British Spec/Ref - PL32 (Light)
OMat No. 4/46

(2) Methylene Chloride (Dichloromethane)
British Spec/Ref - BS 1994, 1953
OMat No. 169

(3) Lockwire (O.018 inch)
British Spec/Ref - 26 SWG, Staybrite, DTD 189

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Stator - Dedicated Gen	73-21-08	01	7
	2	Rotor and Drive Assy - Dedicated Gen			20
	4	Ring			15
	5	Bolt			10
	6	Bolt			25
	7	Lockwire Washer			13

C. References
(1) AMM 71-11-04/201, Fan Cowl Panels

D. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
413AL Left Fan Cowl Panel, Left Engine
414AR Right Fan Cowl Panel, Left Engine
423AL Left Fan Cowl Panel, Right Engine
424AR Right Fan Cowl Panel, Right Engine

E. Procedure

S 034-015-R00
(1) Remove the dust caps from all openings and electrical connectors.

S 114-036-R00

WARNING: MAKE SURE THERE IS GOOD FLOW OF AIR IN THE AREA WHEN YOU USE THE CLEANING FLUID. DO NOT BREATHE THE VAPOR FROM THE CLEANING FLUID OR GET THE CLEANING FLUID ON YOUR SKIN. THE CLEANING FLUID IS POISONOUS AND CAN CAUSE INJURY TO PERSONS.

CAUTION: DO NOT GET THE CLEANING FLUID ON THE SURFACE PROTECTION. IF YOU GET THE CLEANING FLUID ON THE SURFACE PROTECTION, DAMAGE TO THE SURFACE PROTECTION WILL OCCUR. ALL AREAS OF SURFACE PROTECTION THAT TOUCH THE CLEANING FLUID MUST BE REPAIRED (AMM 71-11-04/801).

DO NOT GET THE JOINTING COMPOUND ON THE INTERNAL COMPONENTS WHEN YOU TIGHTEN THE JOINT. THE JOINTING COMPOUND WILL CAUSE DAMAGE TO THE INTERNAL COMPONENTS.

(2) Make sure all mating faces are clean and free from damage.

S 624-017-R00

(3) Apply the jointing compound to all mating faces with a brush.
    (a) Let the jointing compound dry for 10 minutes before you connect the joint.

S 434-018-R00

(4) Install the rotor assembly (2) in the gearbox housing with the bolts (6).
    (a) Tighten the bolts.

S 434-019-R00

(5) Lubricate and install a new seal ring (4) to the stator (1).

S 114-020-R00

(6) Make sure all mating faces are clean and free from damage.

S 624-021-R00

(7) Apply the jointing compound to all mating faces with a brush.
    (a) Let the jointing compound dry for 10 minutes before you connect the joint.

S 434-025-R00

(8) Install the stator (1) on the gearbox with the bolts (5) and lockwire washers (7).
    (a) Tighten the bolts.

S 434-029-R00

(9) Install the electrical connector (3).
    (a) Safety the electrical connector with a lockwire.

S 414-030-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-031-R00

(11) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-032-R00

(12) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

THRUST LEVER ANGLE TRANSDUCER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the Thrust Lever Angle (TLA) Transducer. The second task is to install the TLA Transducer.
   B. The TLA Transducer is attached to the forward end of the autothrottle frame assembly found in the forward equipment bay.

TASK 73-21-09-004-001-R00

2. Remove the Thrust Lever Angle Transducer
   A. General
      (1) This procedure can be used for both transducers.
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
   C. Access
      (1) Location Zone
          110 Lower Forward Fuselage

      (2) Access Panels
          113AL Forward Equipment Bay

   D. Procedure

      S 864-002-R00
      (1) For the left engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L5, L ENG EEC SUPV
          (b) 11L4, L ENG EEC LIMITER

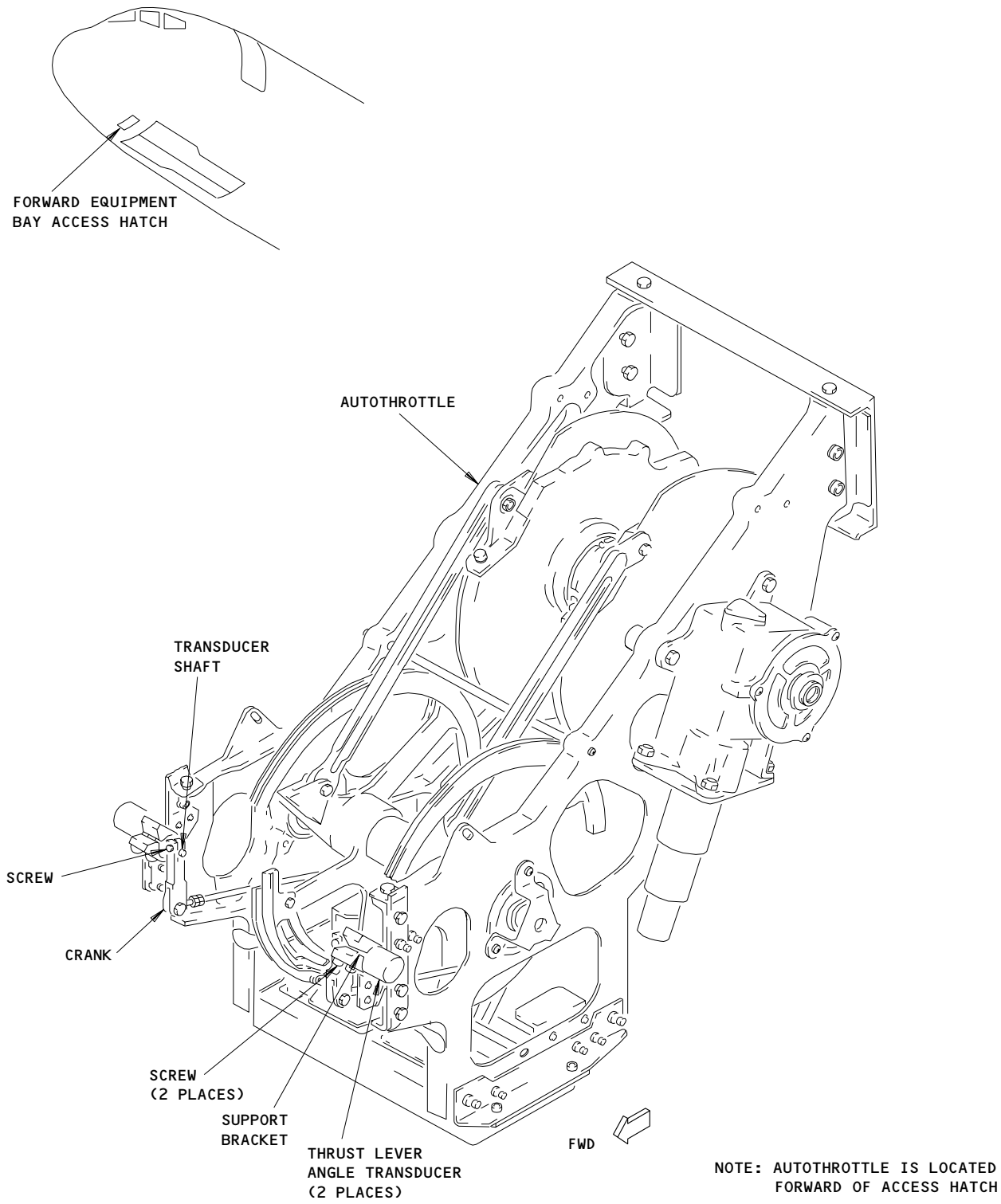
      S 864-003-R00
      (2) For the right engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L32, R ENG EEC SUPV
          (b) 11L31, R ENG EEC LIMITER

      S 014-004-R00
      (3) Open the access hatch for the forward equipment bay (AMM 06-41-00/201).

      S 034-005-R00
      (4) Disconnect the electrical connector and install a dust cap on the connector.

      S 034-006-R00
      (5) Loosen the screw on the crank that holds the transducer shaft in the crank.

      S 034-007-R00
      (6) Loosen the screws on the support bracket and remove the transducer.



Thrust Lever Angle Transducers
Figure 401

TASK 73-21-09-404-008-R00

3. Install Thrust Lever Angle Transducer

A. References

(1) AMM 06-41-00/201, Section 41 Access Doors and Panels

(2) AMM 73-21-09/501, Thrust Lever Angle Transducer

B. Access

(1) Location Zones

110 Lower Forward Fuselage

(2) Access Panels

113AL Forward Equipment Bay

C. Procedure

S 424-009-R00

(1) Install the transducer in the support bracket.

S 434-010-R00

(2) Install the shaft through the crank.

S 434-011-R00

(3) Tighten the screw in the crank to attach the shaft in the crank.

S 824-012-R00

(4) Adjust the transducer (AMM 73-21-09/501).

S 434-013-R00

(5) Connect the electrical connector.

S 414-014-R00

(6) Close the access hatch for the forward equipment bay (AMM 06-41-00/201).

S 864-015-R00

(7) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L5, L ENG EEC SUPV
(b) 11L4, L ENG EEC LIMITER

S 864-016-R00

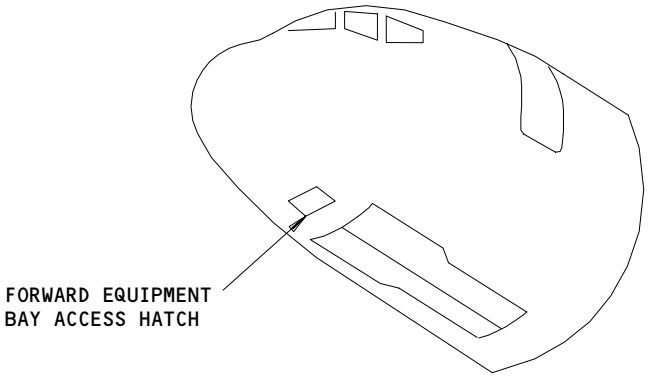
(8) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L32, R ENG EEC SUPV
(b) 11L31, R ENG EEC LIMITER

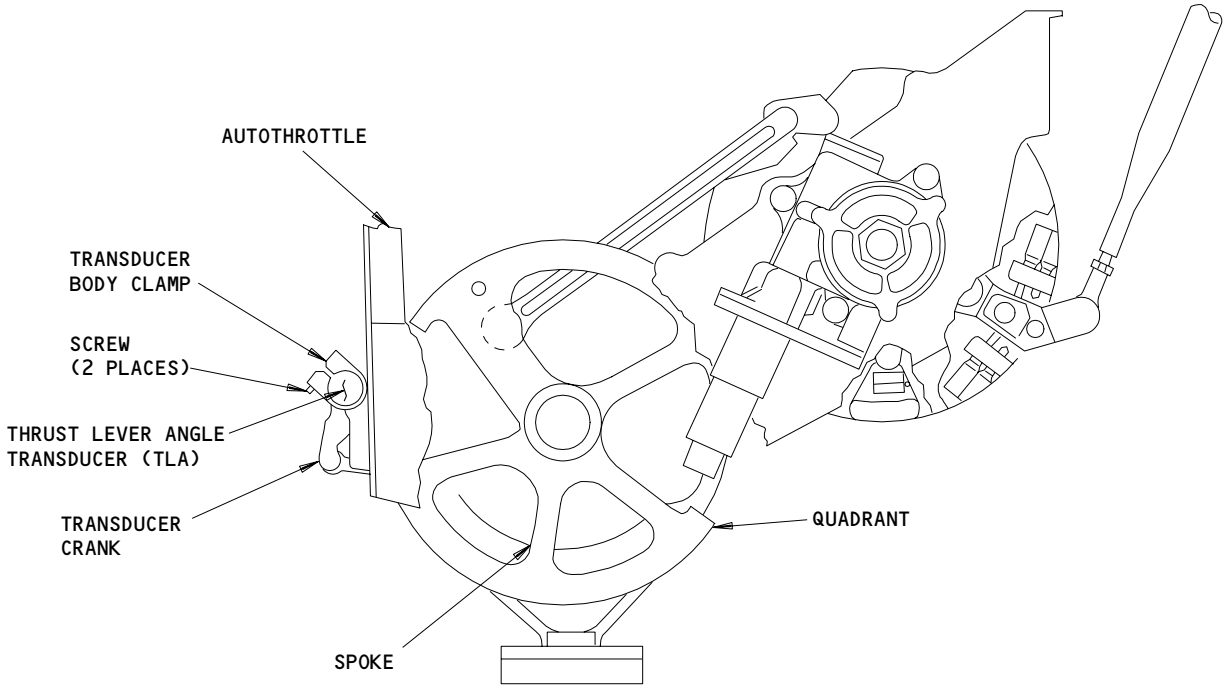
THRUST LEVER ANGLE TRANSDUCER - ADJUSTMENT/TEST

1. General
   A. This procedure has five methods to adjust the thrust lever angle (TLA) transducer.
      (1) The first two methods use the North Atlantic Angle Position indicator (API) with either an oscillator or the EEC to adjust the Thrust Lever Angle (TLA) transducer.
      (2) The third method utilizes the Aviation Systems Technology (AST) Position Transmitter test set P/N PTTS-892A to adjust the transducer.
      (3) AIRPLANES WITH -1001 EICAS AND LUCAS EEC P/N ESC103-04E4 AND LATER, OR LOCKHEED-MARTIN EEC P/N 356A7065G151 AND LATER;
      The fourth method of adjusting the TLA transducer uses the EICAS PERF/APU page to provide a display of the thrust lever resolver signal.
      (4) AIRPLANES WITH LUCAS EEC P/N ESC103-04E4 AND NEWER OR LOCKHEED-MARTIN EEC P/N 356A7065G151 AND NEWER;
      The final method for adjusting the transducers uses the ARINC monitor.
   B. The TLA transducer is attached to the forward end of the autothrottle frame assembly found in the forward equipment bay.

TASK 73-21-09-825-003-R00

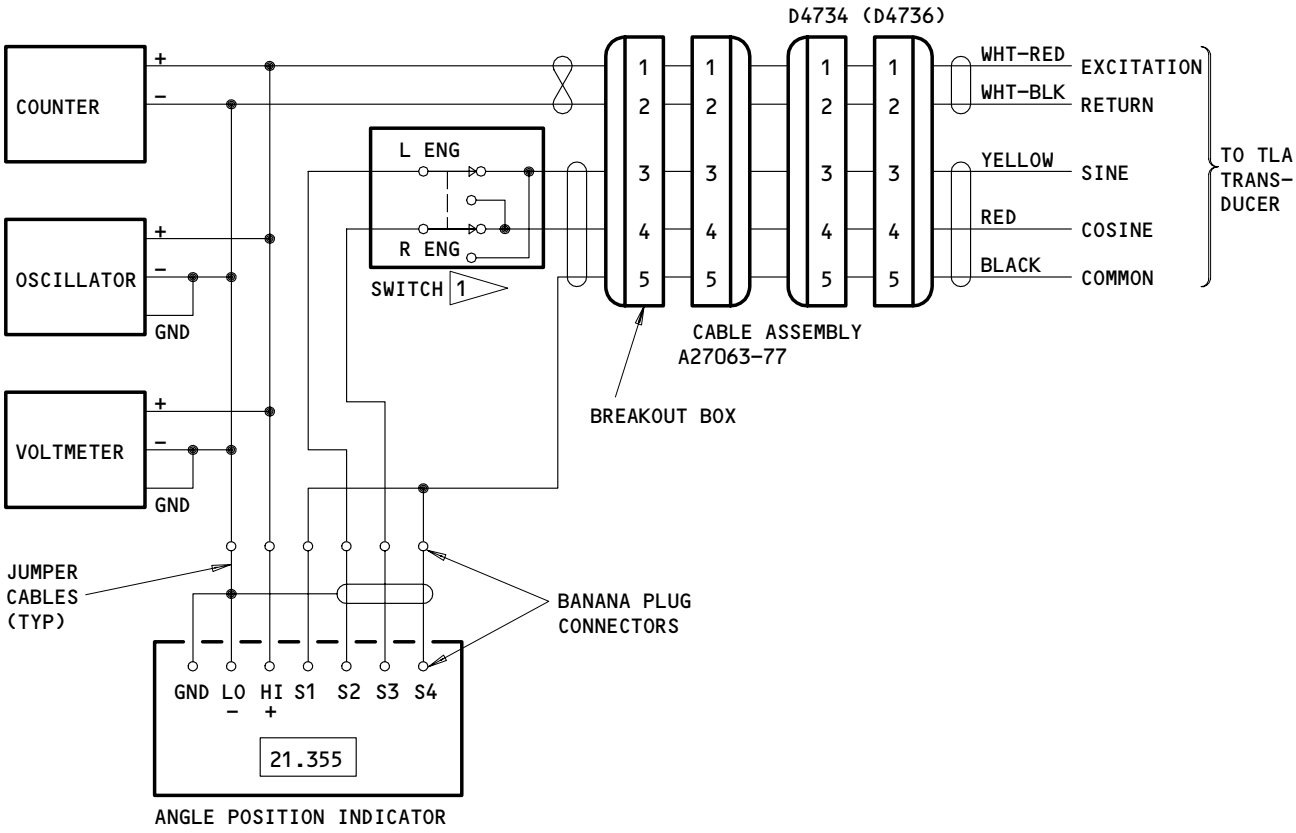
2. Thrust Lever Angle (TLA) Transducer Adjustment With the Oscillator
   A. General
      (1) You can this procedure to adjust the TLA transducer or use the EEC method.
   B. Equipment
      (1) Breakout box assembly - A27063-88
         (a) Breakout box - A27063-2
         (b) Adaptor cable - A27063-77
         (c) Jumper leads with Banana plugs
      (2) Counter - 7261A Fluke or Equiv
      (3) Oscillator - Hewlett Packard HP3312A or equivalent.
      (4) Angle Position Indicator (API) - North Atlantic 8810-S3128 or equivalent.
      (5) Digital Multimeter - 8020B Fluke or equivalent.
      (6) Double Pole, Double Throw Switch
   C. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 71-11-04/201, Fan Cowl Panels
      (3) AMM 73-21-09/401, Thrust Lever Angle Transducer
      (4) AMM 76-11-00/501, Engine Control System





NOTE: RIGHT SIDE VIEW OF AUTOTHROTTLE WHICH
IS LOCATED FORWARD OF ACCESS HATCH

Quadrant Section
Figure 501



1 SWITCH POSITION SHOWN FOR THE LEFT ENGINE SET-UP

Thrust Lever Angle Transducer Test Set-Up with the Oscillator
Figure 502

D. Access
(1) Location Zone
110 Lower Forward Fuselage
410 Left Engine
420 Right Engine

(2) Access Panel
113AL Forward Equipment Bay
413AL Left Fan Cowl Panel, Left Engine
414AR Right Fan Cowl Panel, Left Engine
423AL Left Fan Cowl Panel, Right Engine
424AR Right Fan Cowl Panel, Right Engine

E. Prepare to Adjust the Thrust Lever Angle (TLA) Transducer

S 825-004-R00
(1) Do the engine control system adjustment (AMM 76-11-00/501).

S 425-005-R00
(2) Install the thrust lever angle (TLA) transducer (AMM 73-21-09/401).

S 015-001-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the fan cowl panels (AMM 71-11-04/201).

S 015-006-R00
(4) Open the access door, 113AL, for the forward equipment bay (AMM 06-41-00/201).

F. Adjust the Thrust Lever Angle Transducer (Fig. 501)

S 035-007-R00
(1) Loosen the screws on the left (right) TLA transducer body clamp (Fig. 501) until the TLA transducer can be turned in its installed position.

S 035-008-R00
(2) Disconnect the electrical connector D4734(D4736) and install a connector plug.

S 485-009-R00
(3) Connect the breakout box, the counter, the oscillator, the double pole double throw switch, and the voltmeter test equipment to the angle position indicator (API) and to the TLA transducer (Fig. 502).

NOTE: The switch position in Fig. 502 shows the left engine set-up.

S 865-010-R00
(4) Set the oscillator outputs.
(a) Output voltages: 7 to 12 volts rms
(b) Output frequencies: 2.5 ±0.025 kHz

S 865-011-R00
(5) Set the double pole, double throw switch to the applicable L ENG (R ENG) position.

S 865-012-R00
(6) Push the RES button on the API.

S 825-013-R00
(7) Slowly move the thrust levers forward until the maximum forward stops on the left(right) engine Fuel Flow Governor touch.

NOTE: To accurately adjust the TLA transducer, do not move the thrust levers forward quickly.

S 825-014-R00
(8) Turn the TLA transducer body until the API displays an angular value of 127.5 ±0.5 degrees.

S 435-015-R00
(9) Tighten the transducer body clamp screws and make sure that 127.5 ±.5 degrees stays on the API display.

S 085-016-R00
(10) Disconnect the test equipment from the left(right) TLA transducer.

S 435-017-R00
(11) Connect the electrical connector D4734 (D4736).

S 825-018-R00
(12) Do the TLA transducer adjustment procedure again for the opposite TLA transducer.

S 715-059-R00
(13) Do these steps to make sure the TLA transducer is set correctly.

NOTE: Do this check after you adjust the TLA transducer with the test equipment. If this check is not correct, adjust the TLA transducer with the test equipment again.

(a) Put the left and right EEC ground test switches to the ON position.
(b) In the flight compartment, select the EICAS PERF/APU page (Fig. 505) .

(c) Slowly move both throttle levers forward and monitor the EPR Command value on the PERF/APU page.
(d) Make sure the left and right EPR Command values increase the same as you move the throttle levers.
(e) Make sure the left and right EPR Command values are the same with the throttle levers in the full forward position.
(f) Put the thrust levers to the IDLE position.
(g) Put the left and right EEC ground test switches to the OFF position.

S 415-019-R00

(14) Close the access door, 113AL (AMM 06-41-00/201).

S 415-002-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

TASK 73-21-09-825-042-R00

3. Thrust Lever Angle (TLA) Transducer Adjustment With the EEC

A. General
(1) You can use this procedure to adjust the TLA transducer or use the oscillator method.

B. Equipment
(1) Angle Position Indicator (API) - North Atlantic 8810-S3128 or equivalent.
(2) Test Harness

C. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 73-21-09/401, Thrust Lever Angle Transducer
(3) AMM 76-11-00/501, Engine Control System

D. Access
(1) Location Zones
110 Lower Forward Fuselage

(2) Access Panels
113AL Forward Equipment Bay

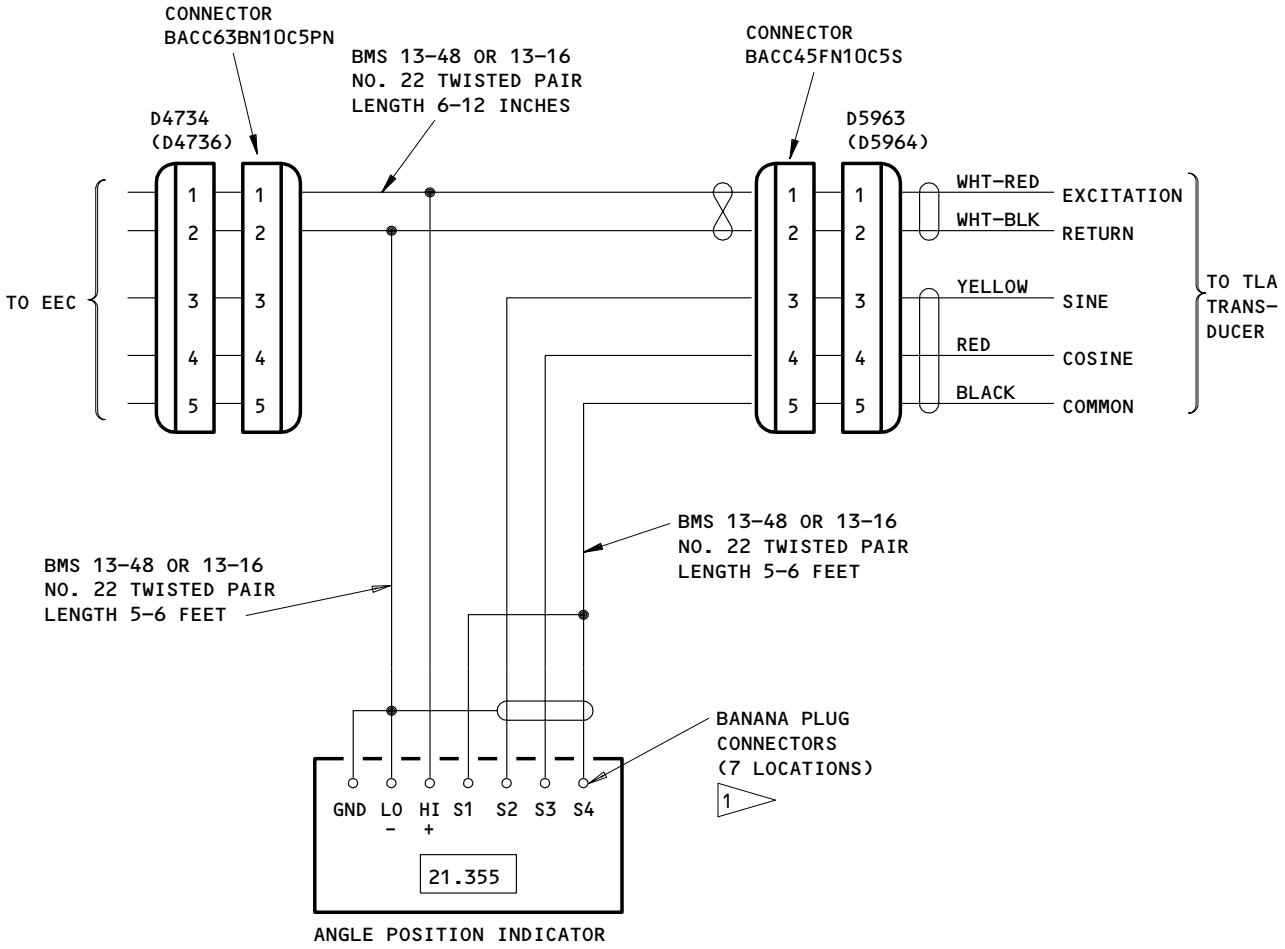
E. Prepare to Adjust the Thrust Lever Angle (TLA) Transducer

S 825-043-R00

(1) Do the engine control system adjustment (AMM 76-11-00/501).

S 425-044-R00

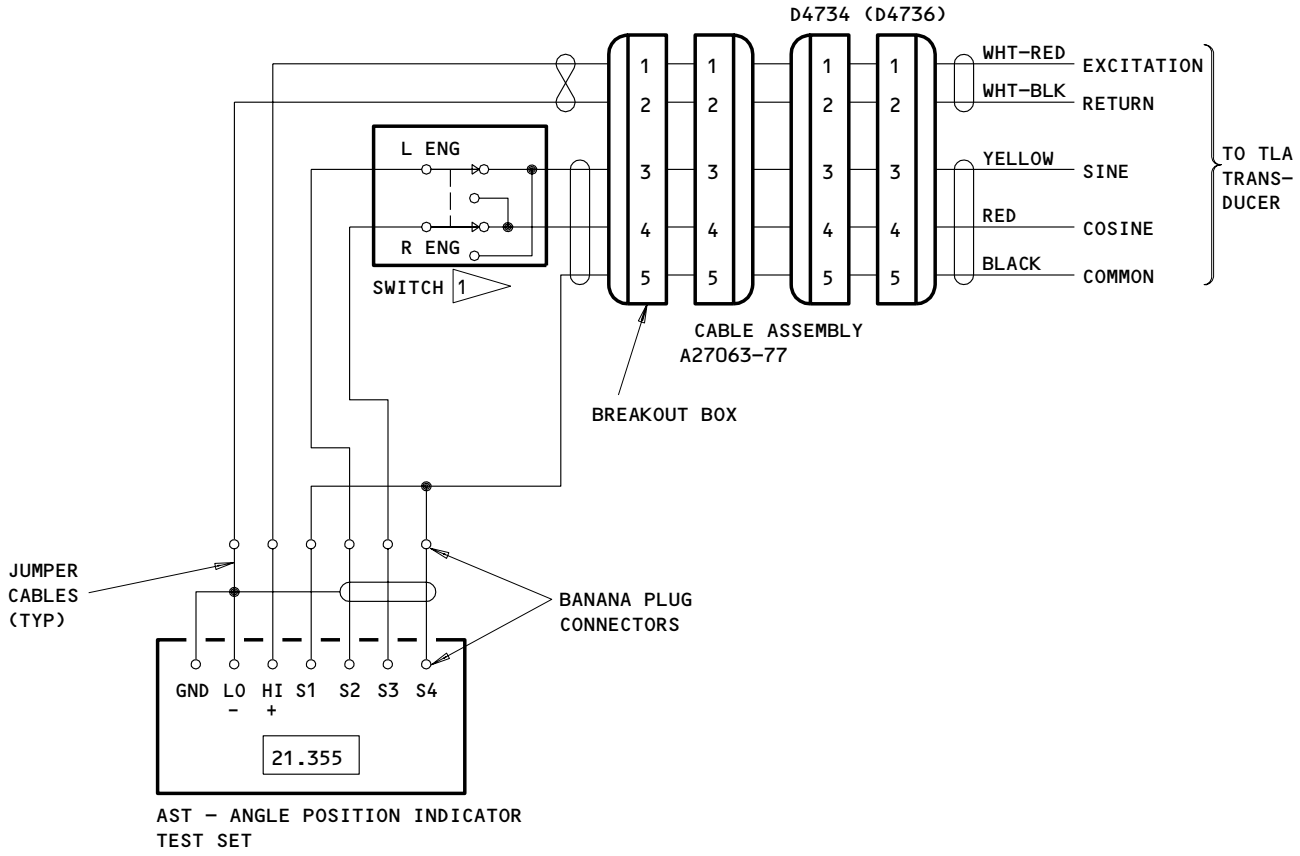
(2) Install the thrust lever angle (TLA) transducer (AMM 73-21-09/401).



1 LEFT ENGINE SET-UP SHOWN.
FOR THE RIGHT ENGINE,
CHANGE S2 WITH S3.

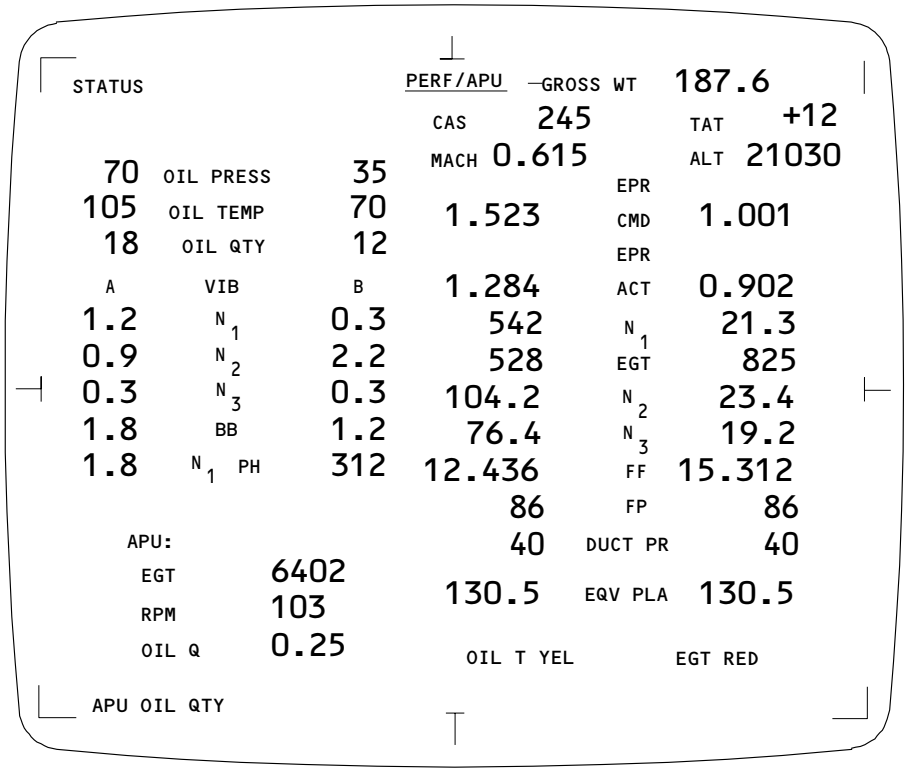
Thrust Lever Angle Transducer Test Set-Up with the EEC
Figure 503

C35358



1 SWITCH POSITION SHOWN FOR THE LEFT ENGINE SET-UP, TOGGLE SWITCH OPTIONAL.

Thrust Lever Angle Transducer Test Set-Up with the AST-Angle Position indiactor
Figure 504



PERF/APU – Real Time
Figure 505

G60494

S 015-045-R00
(3) Open the access door, 113AL, for the forward equipment bay (AMM 06-41-00/201).

F. Adjust the Thrust Lever Angle Transducer

S 865-046-R00
(1) Make sure the left (right) EEC Ground Test switches are in the OFF position.

S 485-047-R00
(2) Do these steps to install the test equipment (Fig. 503).

NOTE: Figure 503 shows the left engine set-up. For the right engine, change the wire at S2 with the wire at S3 at the angle postion indicator (API).

(a) Disconnect the left (right) TLA transducer at the electrical connector D5963 (D5964).
(b) Install the test harness to the angle position indicator (API).
(c) Install the test harness between the API and the TLA resolver at the connector D5963 (D5964).
(d) Install the test harness between the left (right) EEC connector D4734 (D4736) and the TLA connector D5963 (D5964).

S 865-057-R00
(3) Push the RES button on the API.

S 035-048-R00
(4) Loosen the screws on the left (right) TLA transducer body clamp (Fig. 501) until the TLA transducer can be turned in its installed position.

S 865-049-R00
(5) Put the applicable EEC Ground Test switch to the ON position.

S 865-050-R00
(6) Slowly move the thrust levers forward until the maximum forward stop on the left (right) engine Fuel Flow Governor touch and release the levers.

NOTE: To accurately adjust the TLA transducer, do not move the thrust levers forward quickly.

S 825-051-R00
(7) Turn the TLA transducer body until the API shows an angular value of 127.5 ±0.5 degrees.

S 435-052-R00
(8) Tighten the screws on the transducer body clamp and make sure that 127.5 ±.5 degrees stays on the API display.

S 865-053-R00
(9) Put the applicable EEC Ground Test switch to the OFF position.

S 825-054-R00
(10) Do the TLA transducer adjustment procedure again for the opposite TLA transducer.

S 085-055-R00
(11) Do these steps to remove the test equipment (Fig. 503).
  (a) Disconnect the test harness from the left (right) TLA transducer.
  (b) Install the connector D5963P (D5964P) to the TLA transducer.
  (c) Disconnect the test harness from the left (right) EEC.
  (d) Install the connector D4734 (D4736) to the EEC.

S 715-058-R00
(12) Do these steps to make sure the TLA transducer is set correctly.

NOTE: Do this check after you adjust the TLA transducer with the test equipment. If this check is not correct, adjust the TLA transducer with the test equipment again.

  (a) Put the left and right EEC ground test switches to the ON position.
  (b) In the flight compartment, select the EICAS PERF/APU page (Fig. 505) .
  (c) Slowly move both thrust levers forward and monitor the EPR Command value on the PERF/APU page.
  (d) Make sure the left and right EPR Command values increase the same as you move the thrust levers.

(e) Make sure the left and right EPR Command values are the same with the thrust levers in the full forward position.
(f) Put the thrust levers to the IDLE position.
(g) Put the left and right EEC ground test switches to the OFF position.

S 415-056-R00
(13) Close the access door for the forward equipment bay (AMM 06-41-00/201).

TASK 73-21-09-825-064-R00

4. Thrust Lever Angle (TLA) Transducer Adjustment With the Aviation Systems Technology (AST) Angle Position Indicator (API)

A. Equipment
(1) Angle Position Indicator (API) - Aviation Systems Technology PTTS-892A or equivalent.
(2) Test Harness

B. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 73-21-09/401, Thrust Lever Angle Transducer
(3) AMM 76-11-00/501, Engine Control System

C. Access
(1) Location Zones
110 Lower Forward Fuselage

(2) Access Panels
113AL Forward Equipment Bay

D. Prepare to Adjust the Thrust Lever Angle (TLA) Transducer

S 825-065-R00
(1) Do the engine control system adjustment (AMM 76-11-00/501).

S 425-066-R00
(2) Install the thrust lever angle (TLA) transducer (AMM 73-21-09/401).

S 015-067-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the fan cowl panels (AMM 71-11-04/201).

S 015-068-R00

(4) Open the access door, 113AL, for the forward equipment bay (AMM 06-41-00/201).

E. Adjust the Thrust Lever Angle Transducer (Fig. 501)

S 025-071-R00

(1) Loosen the screws on the left (right) TLA transducer body clamp (Fig. 501) until the TLA transducer can be turned in its installed position.

S 025-070-R00

(2) Disconnect the electrical connector D4734(D4736) and install a connector plug.

S 845-072-R00

(3) Fabricate the test wire harness as necessary to connect the AST API test set to the TLA transducer as shown in Fig. 504.

NOTE: It is possible to use either the banana plugs or the J1 connector on the API test set. In addition, the double pole switch is also optional. For convenience, the following Table outlines the the termination points for both left and right TLA transducers and corresponding points on either the API J1 connector or banana plugs.

OPTIONAL TERMINATION			
API BANANA PLUG	API J1 CONNECTOR	LH XDUCER (D4734)	RH XDUCER (D4736)
S1	1	5	5
S2	2	3	4
S3	4	4	3
S4	5	5	5
HI	7	1	1
LO	8	2	2

(a) The HI/LO in the above table correspond to the banana plugs for sensor excitation (voltage output) signal. Wire harness shields can be terminated at the API J1 connector pins 3,6,9, or 12.

(b) Connect the power supply cord to the receptacle on the API test set.

(c) Turn the power switch to the standby (STBY) mode for five minutes (with the API in the standby mode, the test set will not supply an excitation signal to the transducer).

S 825-073-R00

(4) If installed, select the appropriate TLA transducer (left or right) to be adjusted on the double throw switch.

S 825-074-R00

(5) Select the power switch to "ON". Then set the reference voltage to 12 +/- 0.5 volts rms and the reference frequency to 2.5 +/- 0.025 KHZ.

S 825-075-R00
(6) Select the resolver reading so that it registers in degrees (optional voltage signal can be diplayed).

S 715-076-R00
(7) Slowly move the thrust levers forward until the maximum forward stops on the left(right) engine Fuel Flow Governor touch.

NOTE: To accurately adjust the TLA transducer, do not move the thrust levers forward quickly.

S 825-077-R00
(8) Turn the TLA transducer body until the API displays an angular value of 127.5 ±0.5 degrees.

S 425-078-R00
(9) Tighten the transducer body clamp screws and make sure that 127.5 ±.5 degrees stays on the API display.

S 085-079-R00
(10) Disconnect the test equipment from the left(right) TLA transducer.

S 425-080-R00
(11) Connect the electrical connector D4734 (D4736).

S 825-081-R00
(12) Do the TLA transducer adjustment procedure again for the opposite TLA transducer.

S 715-082-R00
(13) Do these steps to make sure the TLA transducer is set correctly.

NOTE: Do this check after you adjust the TLA transducer with the test equipment. If this check is not correct, adjust the TLA transducer with the test equipment again.

(a) Put the left and right EEC ground test switches to the ON position.
(b) In the flight compartment, select the EICAS PERF/APU page (Fig. 505) .
(c) Slowly move both throttle levers forward and monitor the EPR Command value on the Performance/APU page.
(d) Make sure the left and right EPR Command values increase the same as you move the throttle levers.
(e) Make sure the left and right EPR Command values are the same with the throttle levers in the full forward position.

(f) Put the thrust levers to the IDLE position.
(g) Put the left and right EEC ground test switches to the OFF position.

S 415-083-R00
(14) Close the access door, 113AL (AMM 06-41-00/201).

S 415-119-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

TASK 73-21-09-825-085-R00

5. Thrust Lever Angle (TLA) Transducer Adjustment using the -1001 EICAS Computer

A. General
(1) To do this procedure you must have the following components installed:
(a) -1001 EICAS Computer
(b) Lucas EEC P/N ESC103-04E4 and newer or Lockheed-Martin EEC P/N 356A7065G151 and newer.

B. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 73-21-09/401, Thrust Lever Angle Transducer
(3) AMM 76-11-00/501, Engine Control System

C. Access
(1) Location Zone
(a) 110 Lower Forward Fuselage
(2) Access Panel
(a) Forward Equipment Bay

D. Prepare to Adjust the Thrust Lever Angle (TLA) Transducer

S 825-086-R00
(1) Do the engine control system adjustment (AMM 76-11-00/501).

S 485-087-R00
(2) Install the thrust lever angle (TLA) transducer (AMM 73-21-09/401).

S 015-088-R00
(3) Open the access door, 113AL, for the forward equipment bay (AMM 06-41-00/201).

E. Adjust the Thrust Lever Angle Transducer

S 845-089-R00

(1) Turn the Left (Right) EEC Ground test switches (located in the EE bay next to the EEC's) to the ON position.

S 845-090-R00

(2) Make sure that the L/R ENG LIMITER and L/R ELEC ENG CONTROL switches are in the ON position. These switches are located on the P5 overhead panel.

S 845-091-R00

(3) Display the PERF/APU EICAS page (Fig. 505). Locate the equivalent PLA display (EQV PLA).

S 025-092-R00

(4) Loosen the screws on the Left (Right) TLA transducer body clamp until the TLA transducer can be turned in its installed position.

S 725-093-R00

(5) Slowly move the thrust levers forward until the maximum forward stop in the Left (Right) engine Fuel Flow Governor touch and release the levers.

NOTE: To accurately adjust the TLA transducer, do not move the thrust levers forward quickly.

S 825-094-R00

(6) Slowly turn the resolver body until the value shown for the EQV PLA on the EICAS PERF/APU page (Fig. 505) reads between 132.2 degrees and 134.3 degrees.
   (a) If the TLA fails to adjust the following will occur.
      1) The EEC will set the PLA SSM to 'no computed value'.
      2) The EEC will output the last good value of equivalent PLA continuously.

3) The L/R ELEC ENG CONTROL and L/R ENG LIMITER INOP on the overhead P5 panel will illuminate.
4) The EQV PLA output on the EICAS will be blank.

(b) If the above conditions occur,
1) Either, cycle the power to the EEC by alternating the ground test switch between the ON and OFF positions.
2) Or, reset the EEC by switching L/R ELEC ENG CONTROL to the OFF position and then again to the ON position.
3) Continue to rotate the resolver body until the value of EQV PLA on the PERF/APU EICAS page (Fig. 505) reads between 132.2 degrees and 134.3 degrees.
4) This process may be repeated as necessary to complete the adjustment.

S 425-095-R00

(7) Tighten the screws on the transducer body clamp and make sure that the EQV PLA continues to read between 132.2 degrees and 134.3 degrees.

S 825-096-R00

(8) Do the TLA transducer adjustment procedure again for the opposite TLA transducer.

S 715-097-R00

(9) Do these steps to make sure the TLA transducer is set correctly:

NOTE: Do this check after you adjust the TLA transducer. If this check is not correct, adjust the TLA transducer again.

(a) Slowly move both thrust levers forward and monitor the EPR Command value.
(b) Make sure the left and right EPR Command values are the same with the thrust levers in the full forward position.
(c) Put the thrust levers to the IDLE position.
(d) Put the left and right EEC ground test switches to the OFF position.

S 415-098-R00
(10) Close the access door for the forward equipment bay (AMM 06-41-00/201) .

TASK 73-21-09-825-099-R00

6. Thrust Lever Angle (TLA) Transducer Adjustment With The ARINC Monitor

A. General
(1) To do this procedure you must have the following components installed:
(a) Lucas EEC P/N ESC103-04E4 and newer or Lockheed-Martin EEC P/N 356A7065G151 and newer.

B. Equipment
(1) ARINC 429 monitor - commercially available

C. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 73-21-09/401, Thrust Lever Angle Transducer
(3) AMM 76-11-00/501, Engine Control System

D. Access
(1) Location Zone
110 Lower Forward Fuselage
(2) Access Panel
113AL Forward Equipment Bay

E. Prepare to Adjust the Thrust Lever Angle (TLA) Transducer

S 825-101-R00
(1) Do the engine control system adjustment (AMM 76-11-00/501).

S 485-102-R00
(2) Install the thrust lever angle (TLA) transducer (AMM 73-21-09/401).

S 015-103-R00
(3) Open the access door, 113AL, for the forward equipment bay (AMM 06-41-00/201).

F. Adjust the Thrust Lever Angle Transducer

S 845-104-R00
(1) Make sure the Left (Right) EEC Ground Test switches are in the OFF position.

S 845-105-R00
(2) Make sure that the L/R ENG LIMITER and L/R ELEC ENG CONTROL switches are in the ON position.

S 845-106-R00
(3) Position the ARINC 429 monitor in the forward equipment bay near the TLA resolver adjustment location.

S 485-107-R00
(4) Do the following steps to connect the ARINC 429 monitor to the EEC ARINC 429 Output Data Bus:
   (a) For the Left Engine EEC:
      1) Connect Pin YA3, terminal block TB207 to ARINC 429 Pin A.
      2) Connect Pin YC3, terminal block TB207 to ARINC 429 Pin B.
   (b) For Right Engine EEC:
      1) Connect Pin YA4, terminal block TB207 to ARINC 429 Pin A.
      2) Connect Pin YC4, terminal block TB207 to ARINC 429 Pin B.

S 845-108-R00
(5) Turn the Left (Right) EEC Ground Test Switch to the ON position.

S 845-109-R00
(6) Set the ARINC 429 Monitor to monitor Octal Label 133 (Equivalent PLA from the EEC) in Engineering Units.

S 025-110-R00
(7) Loosen the screws on the Left (Right) TLA transducer body clamp (Fig. 501) until the TLA transducer can be turned in its installed position.

S 725-111-R00
(8) Slowly move the thrust levers forward until the maximum forward stop on the Left (Right) engine Fuel Flow Governor touch and release the levers.

NOTE: To accurately adjust the TLA transducer, do not move the thrust levers forward quickly.

S 825-112-R00

(9) Slowly turn the resolver body until the value of the Octal Label 133 reads between 132.2 degrees and 134.3 degrees.

(a) If the EEC detects a TLA resolver range or rate failure during the adjustment, the EEC will set Octal Label 133 SSM to No Computed Data, output the last good value continuously on Octal Label 133, and illuminate the ELEC ENG CONTROL INOP light located on the P5 overhead Panel.

(b) If the L/R ELEC ENG CONTROL INOP light does come on,

1) Cycle the power to the EEC by alternating the ground test switch between the ON and OFF positions.
2) Reset the EEC by switching L/R ELEC ENG CONTROL to the OFF position and then again to the ON position.
3) Continue to rotate the resolver body until the above values are shown on the Octal Label 133 on the ARINC 429 Monitor.
4) This process may be repeated as necessary to complete the adjustment.

S 425-113-R00

(10) Tighten the screws on the transducer body clamp and make sure that the Octal Label 133 reads between 132.2 degrees and 134.3 degrees.

S 845-114-R00

(11) Put the Left (Right) EEC ground test switch to the OFF position.

S 825-115-R00

(12) Do the TLA transducer adjustment procedure again for the opposite TLA transducer.

S 025-116-R00

(13) Disconnect the ARINC 429 Monitor from the Output Data Bus.

S 725-117-R00

(14) Do these steps to make sure the TLA resolver is set correctly.

NOTE: Do this check after you adjust the TLA resolver with the ARINC 429 Monitor. If this check is not correct, adjust the TLA resolver with the ARINC 429 Monitor again.

(a) Put the left and right EEC ground test switches to the ON position.

(b) In the flight compartment, select the EICAS PERF/APU page (Fig. 505).
(c) Slowly move both thrust levers forward and monitor the EPR Command value.
(d) Make sure the left and right EPR Command values increase the same as you move the thrust levers.
(e) Make sure the left and right EPR Command values are the same with the thrust levers in the full forward position.
(f) Put the thrust levers to the IDLE position.
(g) Put the left and right EEC ground test switches to the OFF position.

S 415-118-R00

(15) Close the access door for the forward equipment bay (AMM 06-41-00/201).

DEDICATED GENERATOR CONTROL UNIT - REMOVAL/INSTALLATION

1. General
   A. This procedure gives steps to remove and install both dedicated generator control units. First the higher control unit is removed and installed and then the lower control unit is removed and installed.
   B. Use the procedures given in AMM 70-02-01/201 for identification, lubricant and installation of rubber seal rings.
   C. Use the procedure given in AMM 70-50-00/201 for connection of electrical plugs.
   D. Use the procedures given in AMM 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in AMM 70-51-00/201 unless a torque value is specified in this procedure.

TASK 73-21-10-004-001-R00

2. Remove the Higher Dedicated Generator Control Unit (DGCU A) (Fig. 401)
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Fan Cowl Panel (RH)
          424AR Fan Cowl Panel (RH)

   C. Procedure

      S 864-002-R00
      (1) For the left engine, open these ciruit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
          (b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

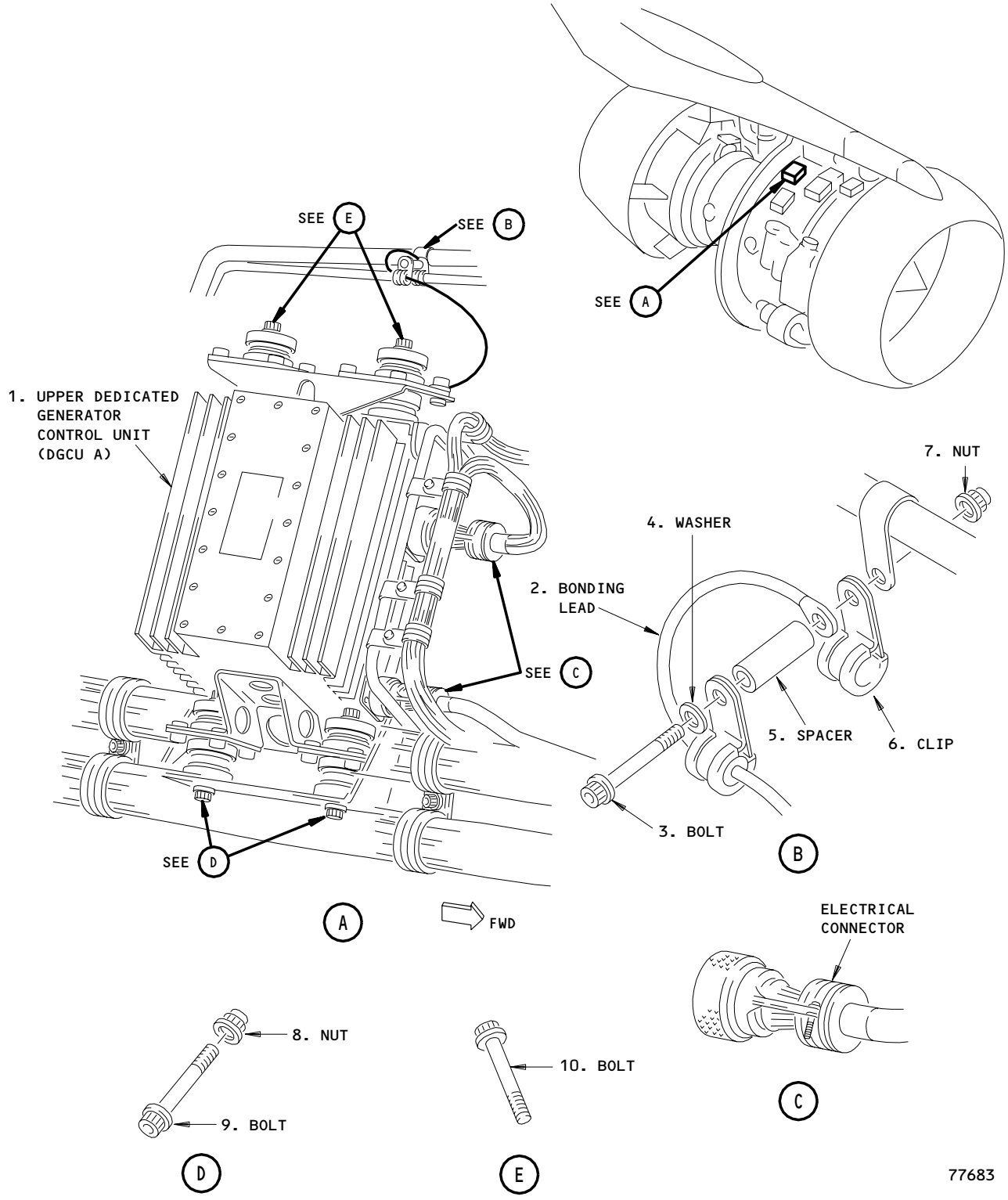
      S 864-003-R00
      (2) For the right engine, open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
          (b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

      S 014-004-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 034-005-R00
      (4) Remove the electrical connectors.



Upper Dedicated Generator Control Unit Installation
Figure 401

S 034-006-R00
(5) Remove the bolt (3) that attaches the bonding lead (2).

S 034-007-R00
(6) Hold the control unit and remove the lower nuts (8) and bolts (9).

S 034-008-R00
(7) Remove the higher bolts (10).

S 434-009-R00
(8) Install dust caps to the open connectors.

TASK 73-21-10-404-010-R00

3. Install the Top Dedicated Generator Control Unit (DGCU A) (Fig. 401)

A. Consumable Materials
(1) Degreasing Fluid, (Inhibited and stablized 1.1.1. Trichloroethane)
British Spec - B.S. 4487
American Spec - MIL-T-81533
OMat No. - 1/21
(2) Lint free cloth
(3) Lockwire (0.018 inch)
British Spec - 26 SWG, Staybrite, DTD 189

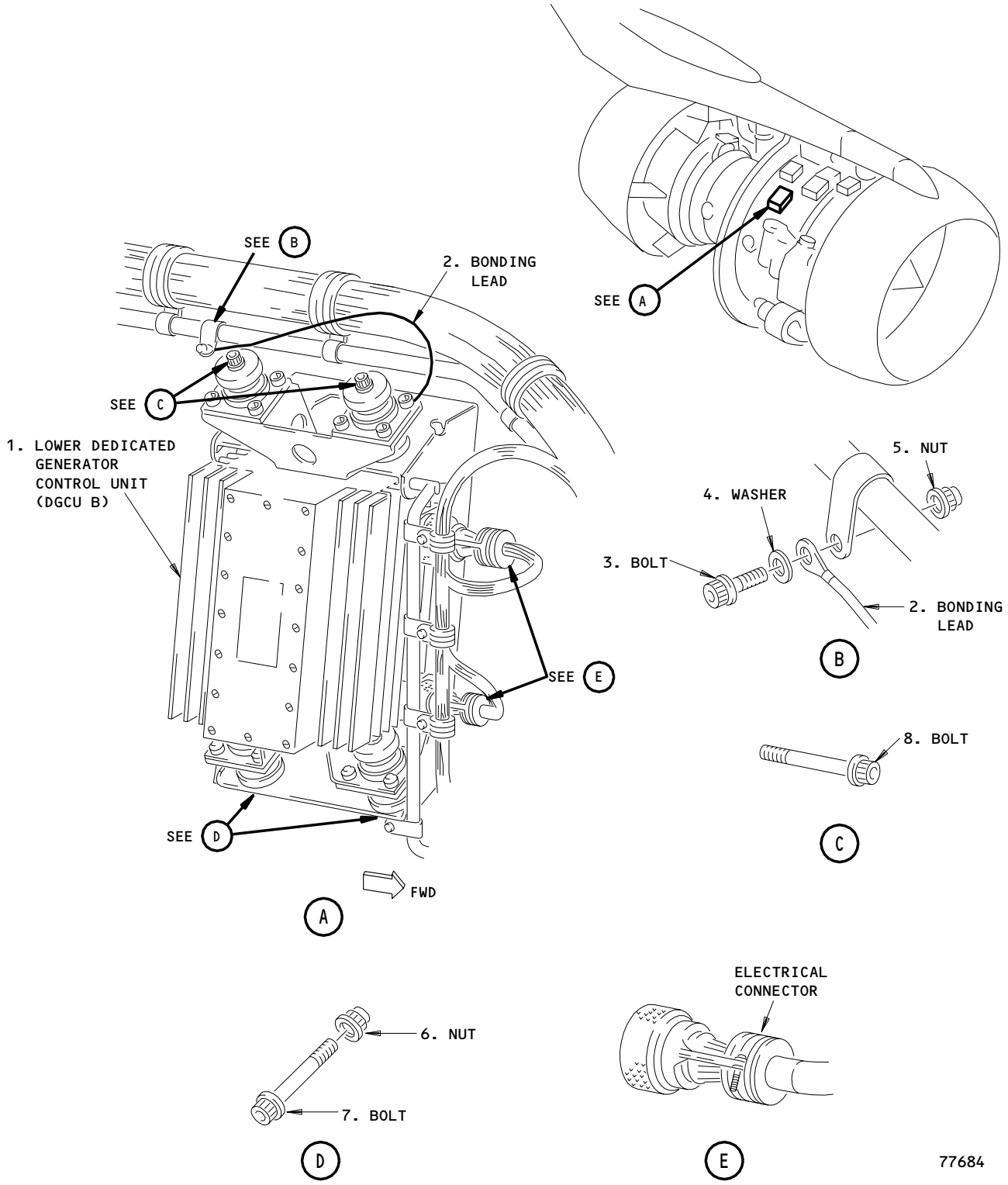
B. References
(1) AMM 71-00-00/501, Power Plant
(2) AMM 71-11-04/201, Fan Cowl Panels

C. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Fan Cowl Panel (RH)
424AR Fan Cowl Panel (RH)

D. Procedure

S 114-011-R00
(1) Do this procedure to clean the mating surfaces:



Lower Dedicated Generator Control Unit Installation
Figure 402

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(a) Put degreasing fluid on a clean, dry, lint-free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

(b) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 034-012-R00

(2) Remove the dust caps from the connectors.

S 424-013-R00

(3) Install the control unit (1).

S 434-014-R00

(4) Install the bolts (9 and 10) and nut (8).
(a) Tighten the bolts (9 and 10) and nuts (8).

S 114-015-R00

(5) Clean the bonding lead end connector as specified in par. 5.A.

S 434-016-R00

(6) Attach the bonding lead (2) with the bolt (3), washer (4), spacer (5), clip (6) and nut (7).
(a) Tighten the bolt (3).

S 434-017-R00

(7) Install the electrical connectors.
(a) Safety the connectors with a lockwire.

S 414-018-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-019-R00

(9) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-020-R00

(10) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 714-021-R00

(11) Do the test of the Dedicated Generator Control Unit that is shown in the Power Plant Test Reference Table (AMM 71-00-00/501).

TASK 73-21-10-004-022-R00

4. Remove the Lower Dedicated Generator Control Unit (DGCU B) (Fig. 402)

A. References
(1) AMM 71-11-04/201, Fan Cowl Panels

B. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Fan Cowl Panel (RH)
424AR Fan Cowl Panel (RH)

C. Procedure

S 864-023-R00
(1) For the left engine, open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-024-R00
(2) For the right engine, open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 014-025-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 034-026-R00
(4) Remove the electrical connectors.

S 034-027-R00
(5) Remove the bolt (3) that attaches the bonding lead (2).

S 034-028-R00
(6) Hold the control unit and remove the lower nuts (6) and bolts (7).

S 034-029-R00
(7) Remove the top bolts (8).

S 024-030-R00
(8) Remove the DGCU (1).

S 034-031-R00
(9) Install the dust caps to the open connectors.

TASK 73-21-10-404-032-R00

5. Install the Lower Dedicated Generator Control Unit (DGCU B) (Fig. 402)

A. Consumable Materials

(1) Degreasing Fluid, (Inhibited and stablized 1.1.1. Trichloroethane)
British Spec - B.S. 4487
American Spec - MIL-T-81533
OMat No. - 1/21

(2) Lint free cloth

(3) Lockwire (0.018 inch)
British Spec - 26 SWG Staybrite DTD 189

B. References

(1) AMM 71-00-00/501, Power Plant

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

C. Access

(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Fan Cowl Panel (RH)
424AR Fan Cowl Panel (RH)

D. Procedure

S 114-033-R00

(1) Do these steps to clean the mating surfaces.

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (Ref 70-42-12).

(a) Put degreasing fluid on a clean, dry, lint-free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

(b) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 034-034-R00

(2) Remove the dust caps from the connectors.

S 024-035-R00

(3) Put the control unit on the mounting bracket.

S 434-036-R00

(4) Install the bolts (7 and 8) and nut (6).
(a) Tighten the bolts (7 and 8) and nuts (6).

S 114-037-R00

(5) Clean the bonding lead end connector as specified in par. 7.A.

S 434-038-R00

(6) Attach the bonding lead (2) with the bolt (3), washer (4), and nut (5).
(a) Tighten the bolt (3).

S 434-039-R00

(7) Install the electrical connectors.
(a) Safety the connectors with a lockwire.

S 414-040-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-041-R00
(9) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-042-R00
(10) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 714-043-R00
(11) Do the test of the Dedicated Generator Control Unit that is shown in the Power Plant Test Reference Table (AMM 71-00-00/501).

T2 (FAN STREAM) TEMPERATURE SENSOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the T2 (Fan Stream) Temperature Sensor. The second task is to install the T2 (Fan Stream) Temperature Sensor.

TASK 73-21-11-004-001-R00

2. Remove the T2 (Fan Stream) Temperature Sensor
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)

   C. Prepare to remove the T2 Temperature Sensor.

      S 864-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

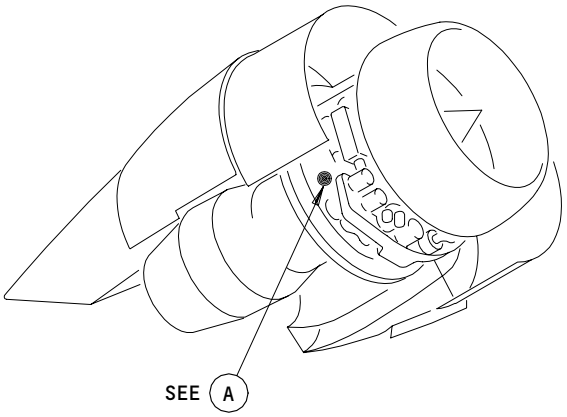
      S 864-003-R00
      (2) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E1, L SPAR FUEL VALVE

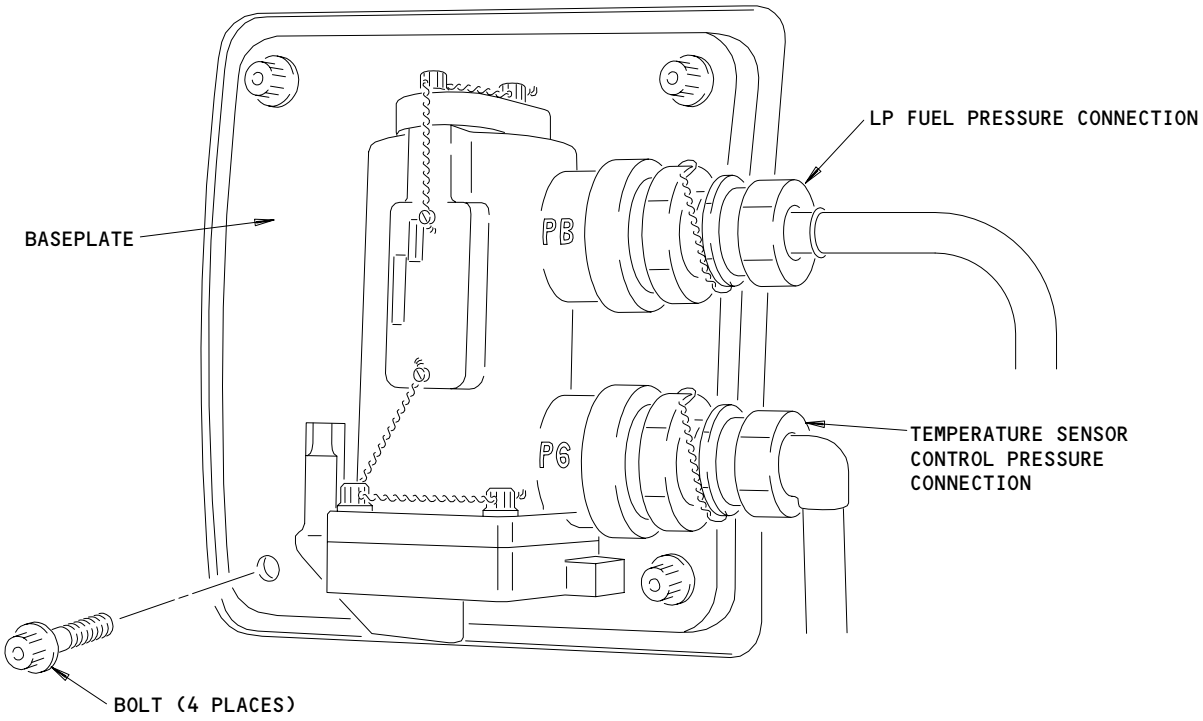
      S 864-004-R00
      (3) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E2, R SPAR FUEL VALVE

      S 864-005-R00
      (4) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

      S 864-006-R00
      (5) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.

      S 864-007-R00
      (6) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
          (a) 6E1, L SPAR FUEL VALVE





T2 (Fan Stream) Temperature Sensor Installation
Figure 401

S 864-008-R00

(7) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E2, R SPAR FUEL VALVE

S 864-009-R00

(8) Remove the electrical power (AMM 24-22-00/201).

S 014-010-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

D. Procedure (Fig. 401)

S 034-011-R00

(1) Disconnect the low pressure fuel (1) and temperature sensor control pressure (2) connectors.

S 034-012-R00

(2) Remove the bolts (4 locations).

S 024-013-R00

(3) Lift the unit clear of the fan casing.

NOTE: The probe extends approximately 2.5 inches (64 mm) below the base plate (3).

S 684-014-R00

(4) Drain all fuel from the unit.

S 434-015-R00

(5) Install dust caps to the openings in the unit.

TASK 73-21-11-404-016-R00

3. Install the T2 (Fan Stream) Temperature Sensor

A. Equipment

(1) Clean stiff bristle brush

B. Consumable Materials
   (1) Methyl Ethyl Ketone
       British Spec/Ref - TT-M-261
   (2) Acetone
       British Spec/Ref - B.S. 509:1964
       OMat No. 150
   (3) Methylene Chloride (Dichloromethane)
       British Spec/Ref - B.S. 1994, 1953
       OMat No. 169
   (4) Lockwire
       British Spec/Ref - DTD. 189A, 22 S.W.G.
       American Spec/Ref - 21 A.W.G.
       OMat No. 238
   (5) Jointing Compound
       British Spec/Ref - PL32 (Light)
       OMat No. 4/46
C. References
   (1) AMM 24-22-00/201, Electrical Power - Control
   (2) AMM 70-51-00/201, Torque Tightening Techniques
   (3) AMM 71-00-00/501, Power Plant
   (4) AMM 71-11-04/201, Fan Cowl Panels
D. Access
   (1) Location Zones
       410 Left Engine
       420 Right Engine

   (2) Access Panels
       414AR Right Fan Cowl Panel (L Engine)
       424AR Right Fan Cowl Panel (R Engine)

E. Procedure (Fig. 401)

   S 034-017-R00
   (1) Remove the dust caps.

S 114-018-R00

WARNING: DO NOT GET METHYL ETHYL KETONE (MEK) OR OTHER CHEMICAL CLEANERS IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM MEK. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE MEK. KEEP MEK AWAY FROM SPARKS, FLAME, AND HEAT. MEK IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY OR DAMAGE.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS THE SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(2) Remove all jointing compound from the face of the T2 temperature sensor with a stiff bristle brush and an approved chemical cleaner (Ref para 3).
   (a) Let the cleaner become dry.

S 214-019-R00
(3) Examine the face of the T2 temperature sensor for damage.

S 624-020-R00
(4) Apply jointing compound to the joint between the fan case and sensor base.

S 434-021-R00
(5) Install the baseplate before the jointing compound dries.

S 434-022-R00
(6) Install the bolts (4 locations).

S 434-023-R00
(7) Connect the low pressure fuel and temperature sensor control pressure connectors.
   (a) Tighten the connectors and safety them with a lockwire.

S 034-024-R00
(8) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch.

S 864-025-R00
(9) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
   (a) 6E1, L SPAR FUEL VALVE

S 864-026-R00
(10) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
   (a) 6E2, R SPAR FUEL VALVE

S 794-027-R00

(11) Do a leak test on all connections that were removed (AMM 71-00-00/501).

S 414-028-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

EEC PATCH CABLE MODULE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the EEC Patch Cable Module. The second task is to install the EEC Patch Cable Module.
   B. Use the procedures given in 70-50-02/201 for connection of electrical plugs.
   C. Use the procedures given in 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in 70-51-00/201 unless a torque value is specified in this procedure.

TASK 73-21-12-004-001-R00

2. Remove the EEC Patch Cable Module
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)

   C. Procedure (Fig. 401)

      S 864-002-R00
      (1) For the left engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
          (b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

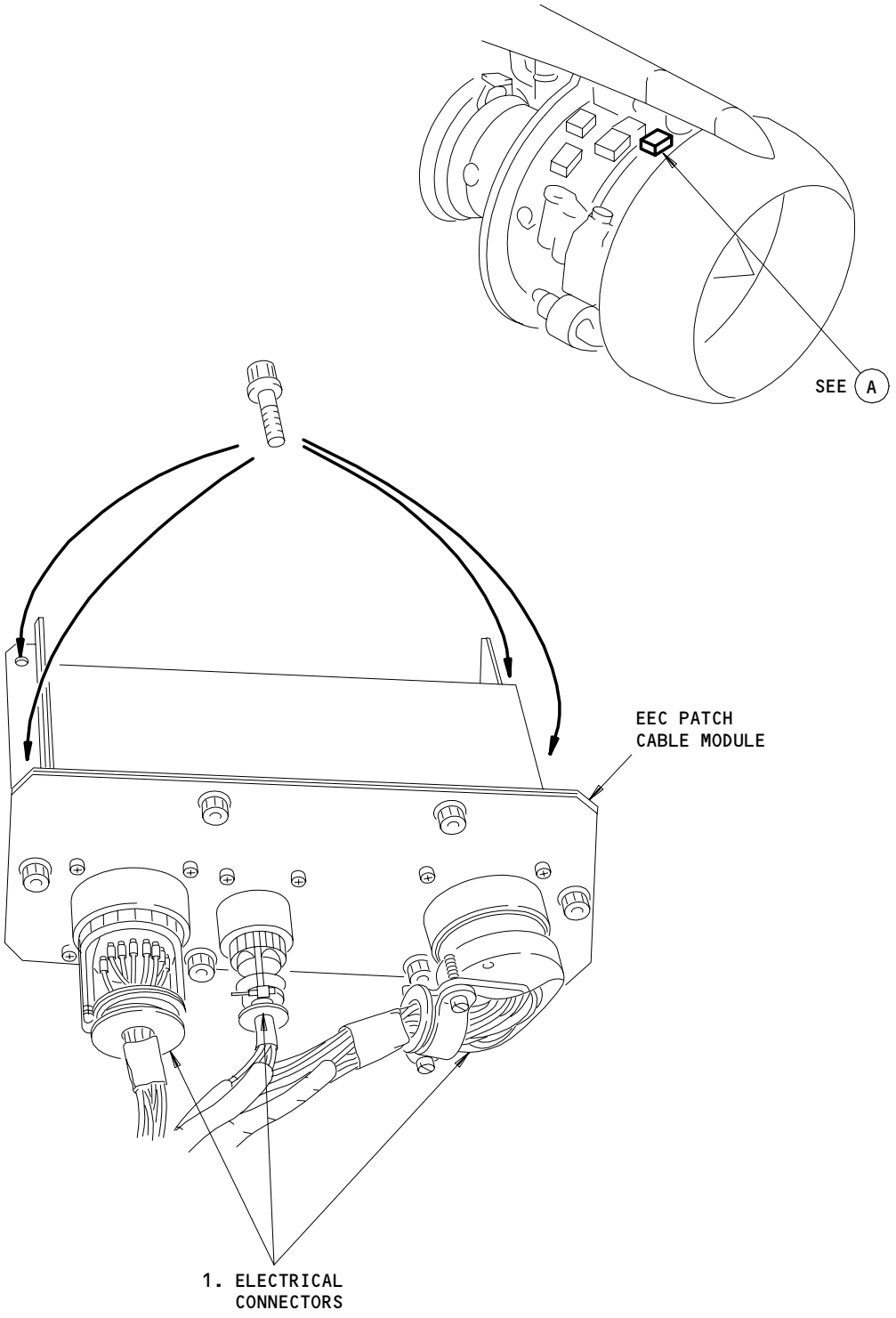
      S 864-003-R00
      (2) For the right engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
          (b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

      S 014-004-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 034-005-R00
      (4) Disconnect the electrical connectors (1).



EEC Patch Cable Module Installation
Figure 401

S 034-006-R00
(5) Remove the bolts that attach the module.

S 024-007-R00
(6) Remove the module.

S 434-008-R00
(7) Install dust caps to the electrical connectors.

TASK 73-21-12-404-009-R00

3. Install the EEC Patch Cable Module

A. Consumable Materials
(1) Degreasing Fluid, (Inhibited and stabalized 1.1.1. Trichloroethane)
British Spec/Ref - B.S. 4487
American Spec/Ref - MIL-T-81533
OMat No. 1/21
(2) Lint-free cloth - Local resources

B. References
(1) AMM 71-11-04/201, Fan Cowl Panels

C. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Right Fan Cowl Panel (L Engine)
424AR Right Fan Cowl Panel (R Engine)

D. Procedure (Fig. 401)

S 114-010-R00
(1) Clean the faying surfaces as follows:

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(a) Put degreasing fluid on a clean, dry, lint-free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

(b) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 034-011-R00

(2) Remove the dust caps from all electrical connectors.

S 424-012-R00

(3) Install the module with the bolts.
(a) Tighten the bolts.

S 434-013-R00

(4) Connect the electrical connectors (1).

S 414-014-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-015-R00

(6) For the engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER

(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-016-R00

(7) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

FUEL SYSTEM AIR TUBES - MAINTENANCE PRACTICES

TASK 73-21-13-602-023-R00

1. Drain the P1 System Air Tubes.
   A. General
      (1) This section contains procedures to drain the P1 air tubes on engines that have an electrically heated P1 probe, a check valve that enables the system to monitor ambient pressure (P0) (if P1 is lost) and a water trap with a drainage point.
      (2) Use the procedures given in AMM 70-50-02/201 for connection of electrical plugs.
      (3) Use the procedures given in AMM 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in AMM 70-51-00/201 unless a torque value is specified in this procedure.
      (4) Use the procedures given in AMM 77-11-00/501 to do a pressure test of the air tubes of the P1 sensing system.
   B. Procedure

      S 012-012-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

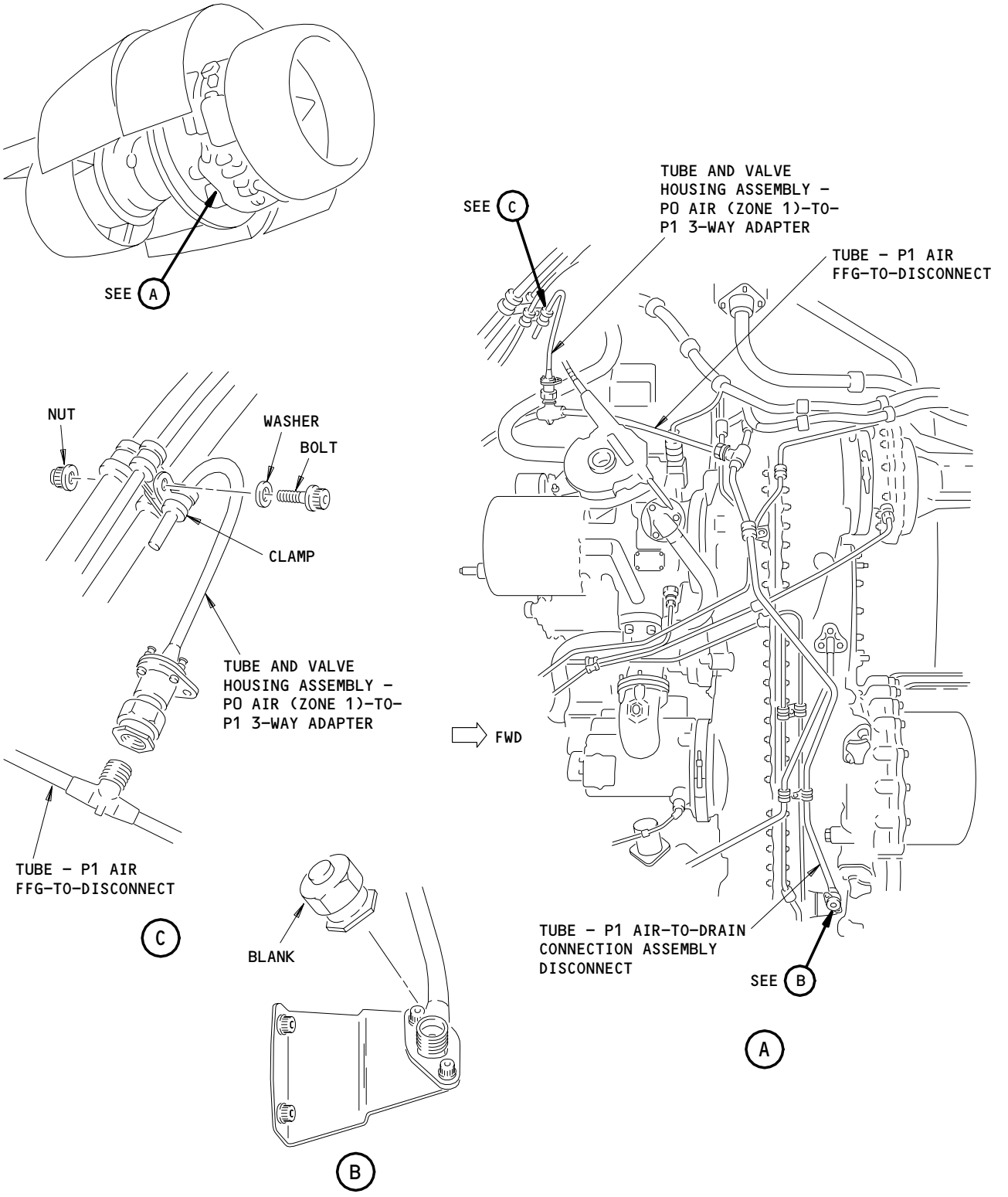
      (1) Open the right fan cowl panel (AMM 71-11-04/201).

      S 682-013-R00

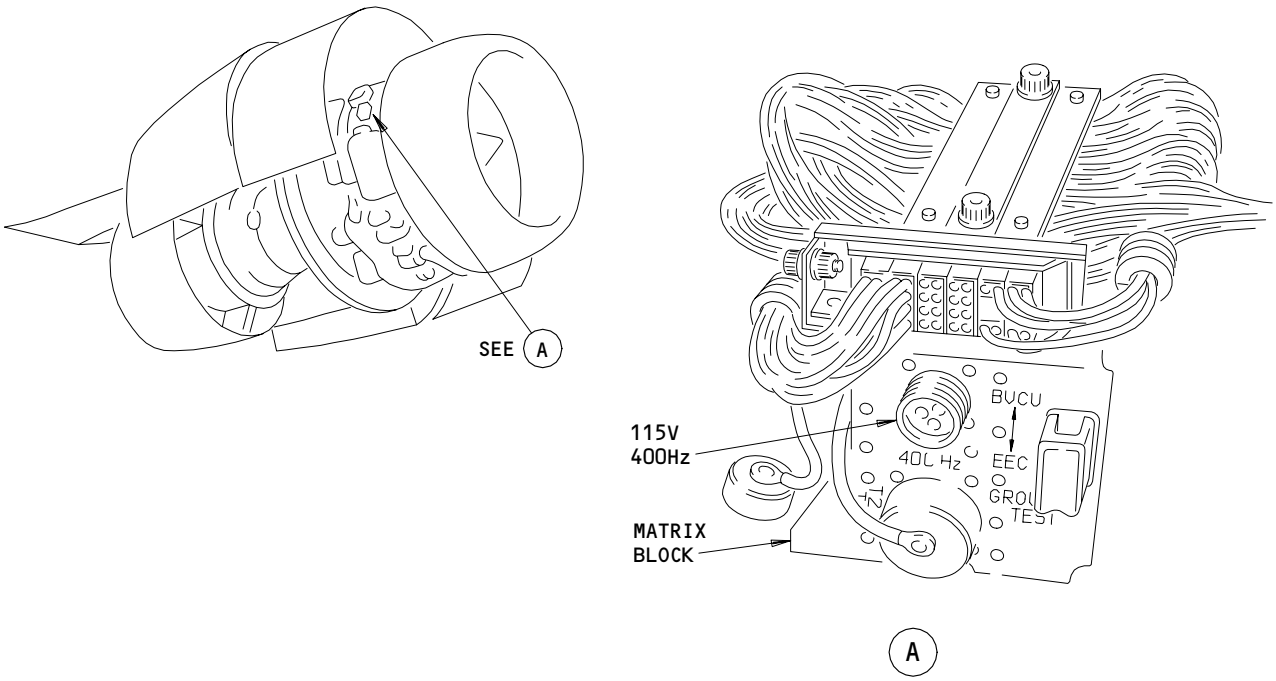
      (2) Do these steps to drain the P1 system Air Tubes:
         (a) Identify the P1 system drain-point blank.
         (b) Remove the lockwire and loosen the blank.
         (c) Put the container below the blank.
         (d) Remove the blank and let the system drain.

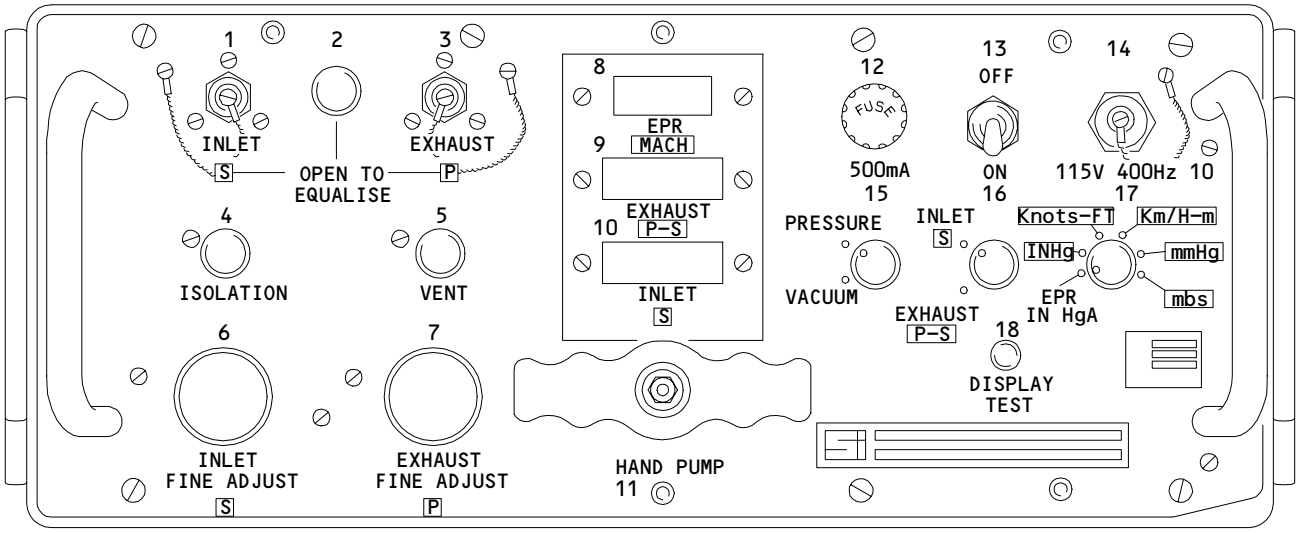
         CAUTION: YOU MUST CONNECT AND TIGHTEN THE P1 SYSTEM DRAIN CAP CORRECTLY. LEAKAGE IN THE P1 SYSTEM WILL CAUSE A REDUCTION IN ENGINE POWER.

         (e) Install and tighten the blank.
            1) Install the lockwire on the blank.



PO Air (Zone 1) to P2 Tube and Valve Housing Assembly
and P1 Air Drain Connection
Figure 201





84091

Test Set 1702409 Front Panel and Engine Power Lead Connection
Figure 202

S 412-011-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

FUEL SYSTEM AIR TUBES - INSPECTION/CHECK

1. General
   A. This procedure contains a check of the Fuel System Air Tubes.

   TASK 73-21-13-226-001-R00

2. Examine the Fuel System Air Tubes
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
      (2) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          413AL Left Fan Cowl Panel (L Engine)
          423AL Right Fan Cowl Panel (R Engine)
          414AR Left Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)
          415AL Left Thrust Reverser (L Engine)
          425AL Right Thrust Reverser (R Engine)
          416AR Left Thrust Reverser (L Engine)
          426AR Right Thrust Reverser (R Engine)

   C. Procedure

      S 016-002-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 016-003-R00

      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.

      (2) Open the thrust reversers (AMM 78-31-00/201).

      S 226-004-R00
      (3) Examine the air tubes for cracks, dents, nicks, fretting, tightness, and scoring.

D. Acceptance Standards

S 226-005-R00

(1) Use these standards to make sure the air tubes are serviceable:

(a) Cracks:

1) No cracks are permitted.

(b) Dents:

1) Smooth dents with a large area in relation to depth are permitted if:

a) The diameter of the tube has not decreased by more than 10 per cent.

b) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

c) The dents are not on the outside surface of a bend.

2) Smooth dents not more than 0.125 square inches (80.60 sq. mm) in area are permitted if:

a) The dents are rounded at the bottom.

b) The dents on the outside surface of a bend are not more than 0.015 inches (0.381 mm) in depth.

c) The dents on the remaining section of the tube are not more than 0.025 inches (0.635 mm) in depth.

d) The dents are not less than 0.500 inches (12.725 mm) or one diameter of the tube if this is larger, from the tube end fitting.

(c) Nicks:

1) Nicks that are rounded at the bottom, if they are not more than 0.004 inches (0.101 mm) in depth and all burrs are removed - are permitted.

(d) Fretting:

1) Fretting up to a maximum depth of 0.007 inches (0.178 mm) on the outer surface of a bend or 0.010 inches (0.254 mm) on the remaining sections of the tube.

(e) Scoring:

1) Light scoring can be made smooth if not more than 0.005 inches (0.127 mm) of metal in depth is removed from the tube wall.

S 416-006-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 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 (AMM 78-31-00/201).

S 416-007-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

TRANSIENT FUEL VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the Transient Fuel Valve. The second task is to install the Transient Fuel Valve.
   B. Use the procedures given in (AMM 70-50-02/201) for connection of electrical plugs.
   C. Use the procedures given in (AMM 70-51-00/201) to tighten fasteners. Tighten the fasteners to the torque values given in (AMM 70-51-00/201) unless a torque value is specified in this procedure.

TASK 73-21-14-004-001-R00

2. Remove the Transient Fuel Valve
   A. Equipment
      (1) Clean receptacle - minimum capacity:
          5 U.S. gallons, 4 Imperial gallons, 8.1 Liters
   B. References
      (1) AMM 71-11-04/201, Fan Cowls Panels
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)

   D. Prepare to Remove the Transient Fuel Valve

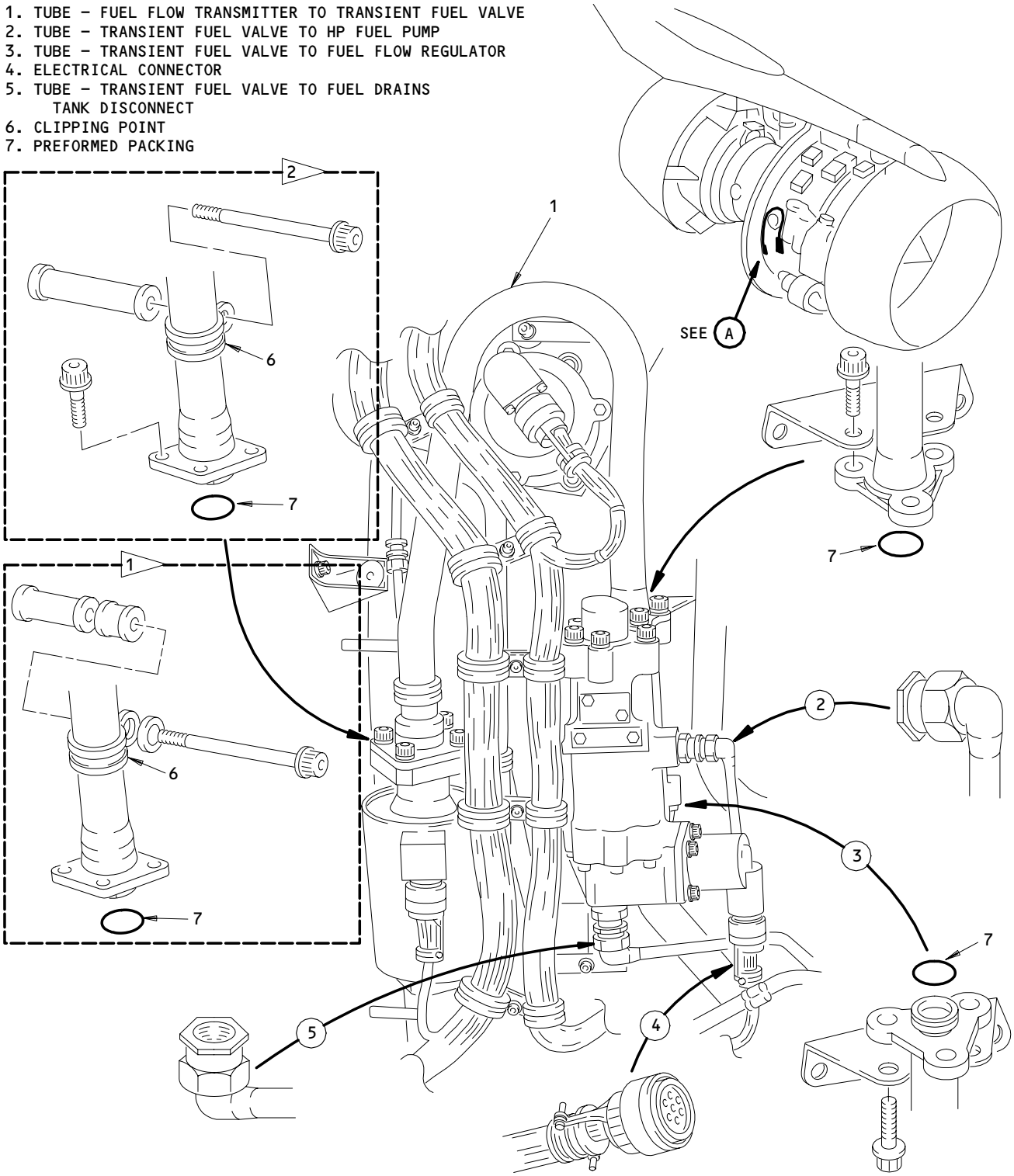
      S 864-002-R00
      (1) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E1, L SPAR FUEL VALVE

      S 864-003-R00
      (2) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E2, R SPAR FUEL VALVE

      S 864-004-R00
      (3) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

      S 864-005-R00
      (4) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.

1. TUBE – FUEL FLOW TRANSMITTER TO TRANSIENT FUEL VALVE
2. TUBE – TRANSIENT FUEL VALVE TO HP FUEL PUMP
3. TUBE – TRANSIENT FUEL VALVE TO FUEL FLOW REGULATOR
4. ELECTRICAL CONNECTOR
5. TUBE – TRANSIENT FUEL VALVE TO FUEL DRAINS TANK DISCONNECT
6. CLIPPING POINT
7. PREFORMED PACKING



1 ON ENGINES WITH RR SB 73-9050
2 ON ENGINES WITHOUT RR SB 73-9050

A

Transient Fuel Valve Installation
Figure 401

S 864-006-R00

(5) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVES L SPAR

S 864-007-R00

(6) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVES R SPAR

S 864-008-R00

(7) For the left engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV
(c) 11L7, LEFT ENGINE IDLE CONTROL

S 864-009-R00

(8) For the right engine, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV
(c) 11L33, RIGHT ENGINE IDLE CONTROL

S 014-010-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

E. Remove the Transient Fuel Valve (Fig. 401)

S 034-011-R00

(1) Disconnect the electrical connector (4).

S 944-012-R00

(2) Put a container below the tubes (2 and 5) to catch the fuel.

S 034-013-R00

(3) Remove the lockwire and disconnect the tubes (2 and 5).

S 684-014-R00

(4) Drain the fuel into the container.

S 034-015-R00

(5) Remove the lockwire and bolts at each end of the tube (1).

S 034-016-R00
(6) Disconnect the clip (6) and remove the tube (1).
(a) Discard the packings (7).

S 034-017-R00
(7) Remove the lockwire and bolts from the connector (3).
(a) Discard the packing (7).

S 024-018-R00
(8) Remove the transient fuel valve from the engine.

S 434-019-R00
(9) Install dust caps to the connectors and openings.

TASK 73-21-14-404-020-R00

3. Install the Transient Fuel Valve

A. Consumable Materials
(1) Lockwire
British Spec/Ref - DTD 189A, 22SWG
American Spec/Ref - 21AWG
OMat No. 238

B. References
(1) AMM 71-11-04/201, Fan Cowls Panels

C. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Right Fan Cowl Panel (L Engine)
424AR Right Fan Cowl Panel (R Engine)

D. Install the Transient Fuel Valve (Fig. 401)

S 424-021-R00
(1) Put the transient fuel valve on the tube (3) with a new preformed packing (7).

S 424-022-R00
(2) Install the transient fuel valve on the tube (3) with the bolts.
(a) Safety the tube (3) with a lockwire.

S 434-023-R00
(3) Install the tube (1) with new preformed packings (7).

S 434-024-R00
(4) Install the bolts that attach the tube (1).
(a) Safety the bolts with a lockwire.

S 434-025-R00
(5) Connect the tube clip (6).

NOTE: ENGINES POST RR SB 73-9050;
A second spacer is added.

S 434-026-R00
(6) Connect the tubes (2 and 5) to the transient fuel valve.
(a) Safety the tubes (2 and 5) with a lockwire.

S 434-027-R00
(7) Connect the electrical connector (4).

E. Put the airplane back to its usual condition.

S 414-028-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-029-R00
(2) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, L SPAR FUEL VALVE

S 864-030-R00
(3) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, R SPAR FUEL VALVE

S 864-031-R00
(4) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV
(c) 11L7, LEFT ENGINE IDLE CONTROL

S 864-032-R00
(5) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV
(c) 11L33, RIGHT ENGINE IDLE CONTROL

S 034-033-R00
(6) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch.

S 724-036-R00

(7) Do the required tests for installation of the transient fuel valve (AMM 71-00-00/501).

FUEL FLOW GOVERNOR SOLENOID VALVES - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and installation of the Fuel Flow Governor (F.F.G.) Solenoid Valves that follow:

      - Pressurizing and Drain Valve and Switch Assembly
      - Pressurizing and Drain Valve Switch
      - Minimum Fuel Flow Reset Solenoid
      - Fail Fixed Solenoid
      - Cold Engine Enrichment Solenoid
      - Idle Reset Solenoid.

   B. Use the procedures given in (AMM 70-02-01/201) for identification, lubricant, and installation of rubber seal rings.
   C. Use the procedures given in (AMM 70-50-02/201) for connection of electrical plugs.
   D. Use the procedures given in (AMM 70-51-00/201) to tighten fasteners. Tighten the fasteners to the torque values given in (AMM 70-51-00/201) unless a torque value is specified in this procedure.

TASK 73-21-15-904-001-R00

2. Remove and Install the Fuel Flow Governor (FFG) Solenoid Valves.
   A. Consumable Materials
      (1) Lockwire (0.025 inch diameter)
          OMat No. 238A
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-00-00/501, Power Plant
      (3) AMM 71-11-04/201, Fan Cowl Panels
      (4) AMM 73-21-01/401, Fuel Flow Governor
   C. Access
      (1) Location Zones
          410 Left Power Plant
          420 Right Power Plant

      (2) Access Panels
          413AL Left Fan Cowl Panel (Left Engine)
          414AR Right Fan Cowl Panel (Left Engine)
          423AL Left Fan Cowl Panel (Right Engine)
          424AR Right Fan Cowl Panel (Right Engine)

   D. Prepare for Fuel Flow Governor Solenoid Valve Removal and Installation.

      S 864-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 864-003-R00
      (2) Make sure that the Fuel Control switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

S 864-004-R00

(3) Make sure that the ENG VALVE and FUEL SPAR lights on the control stand are off.

S 864-005-R00

(4) For the left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVES L SPAR

S 864-006-R00

(5) For the right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVES R SPAR

S 864-007-R00

(6) For the left engine, open these circuit breakers on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
(b) 11L7, LEFT ENGINE IDLE CONTROL
(c) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV
(d) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-009-R00

(7) Remove the electrical power (AMM 24-22-00/201).

S 014-010-R00

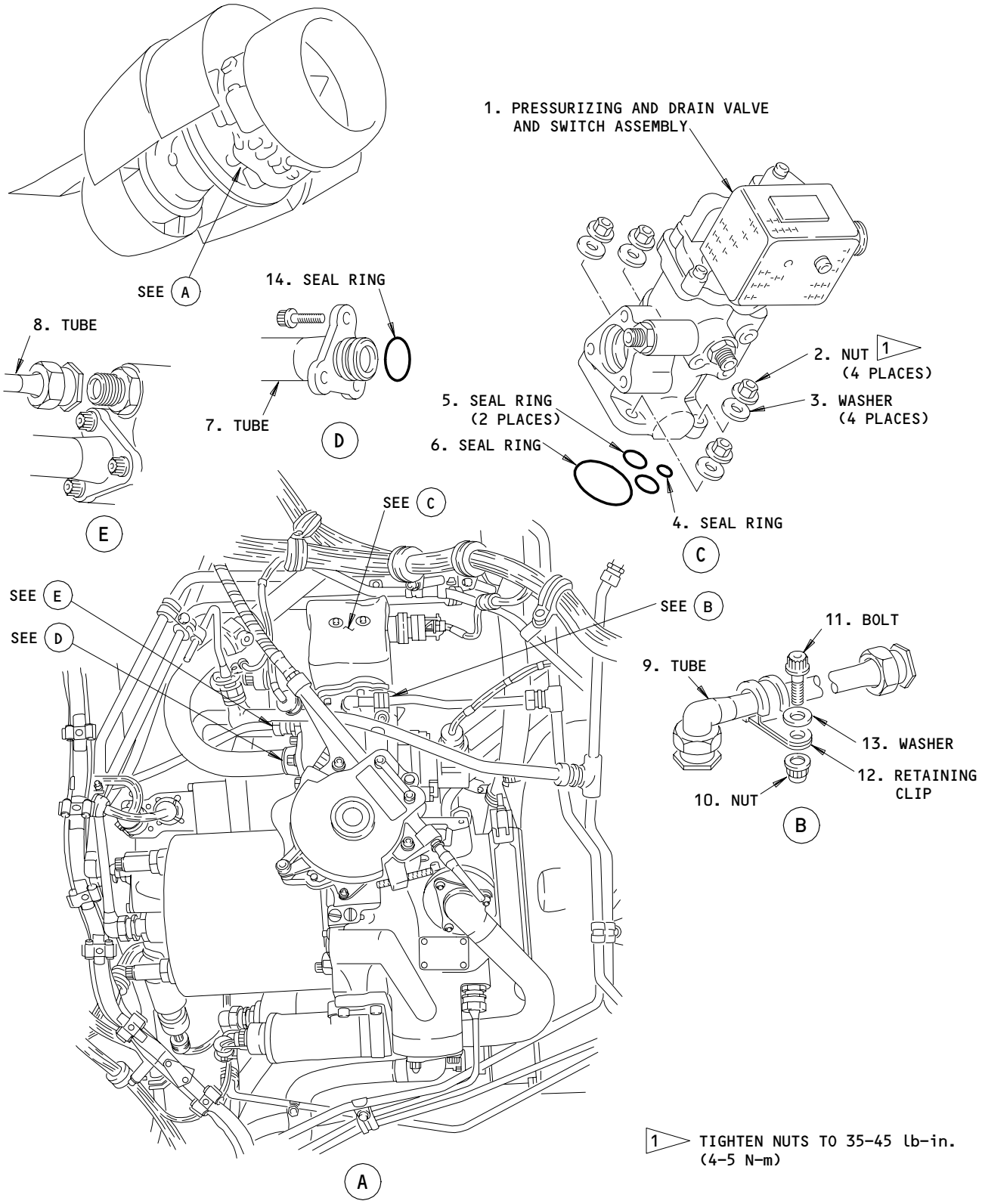
CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(8) Open the fan cowl panels (AMM 71-11-04/201).

E. Remove and install the Pressurizing and Drain Valve and Switch Assembly (Fig. 401).

S 024-011-R00

(1) Remove the Pressurizing and Drain Valve and Switch Assembly as follows:
(a) Disconnect the electrical connector to the shut off valve switch.
(b) Disconnect the tubes (7) and (8).
(c) Remove the nut (10) and bolt (11).
(d) Release the retaining clip (12).
(e) Disconnect and remove the tube (9).
(f) Remove the nuts (2).
(g) Carefully remove the pressurizing and drain valve and switch assembly (1).
(h) Remove the seal rings (4), (5), and (6).



Fuel Flow Governor - Pressurizing and Drain Valve and Switch Assembly
Figure 401

S 424-012-R00

(2) Install the Pressurizing and Drain Valve and Switch Assembly as follows:
   (a) Make sure the mating faces are clean and free from damage.
   (b) Install the new seal rings (4), (5) and (6) on the valve assembly.
   (c) Put the pressurizing and drain valve and switch assembly (1) on the FFG.
   (d) Install the nuts (2) and washers (3).
      1) Tighten the nuts (2) to 35-45 pound-inches (4-5 newton meters).
   (e) Install the new seal ring (14) on the tube (7).
   (f) Install the tube (7).
   (g) Install the tube (8).
      1) Safety the tube (8) with a lockwire.
   (h) Install the tube (9).
   (i) Install the retaining clip (12).
   (j) Install the nut (10), bolt (11), washer (13).
      1) Safety the nut (10) with a lockwire.
   (k) Connect the electrical connector to the shut off valve switch.

      NOTE: Tighten the electrical connector with the recommended pliers.

F. Remove and install the Pressurizing and Drain Valve Switch (Fig. 402).

S 024-013-R00

(1) Remove the Pressurizing and Drain Valve Switch as follows:
   (a) Disconnect the electrical connector from the switch.
   (b) Remove the screws (10) that attach the fire shield (4) to the switch.
   (c) Remove the fire shield (4).
   (d) Remove the screws (8) that attach the bracket (3) and switch (2).
   (e) Remove the bracket (3) and switch (2).

S 424-014-R00

(2) Install the Pressurizing and Drain Valve Switch as follows:

NOTE: Pressurizing and Drain Valve and Switches pre and post RR SB 73-C332 are not interchangable. Make sure that both the Pressurizing and Drain Valve and the Switch are to the same modification standard before you continue.

For Pressurizing and Drain Valves pre RR SB 73-C332 (part number 5252-076, 5252-138, 5252-082 or 5252-104), install Pressure Valve Switch Housing Assembly (part number 5447-096).

For Pressurizing and Drain Valves post RR SB 73-C332 (part number 5252-142, 5252-146, 5252-130 or 5252-150) install Presurizing Valve Switch Housing Assembly (part number 5447-154).

(a) Make sure the mating faces are clean and free from blockage.
(b) Install the switch (2) and bracket (3) on the FFG with the washers (9) and screws (8).
1) Tighten the screws to 13-16 pound-inches (1.5-1.8 newton meters).
(c) Install the fire shield (4) on the switch (2) with the washer (11) and screws (10).
1) Tighten the screws to 7-9 pound-inches (0.8-1.0 newton meters).
(d) Connect the electrical connector to the switch.

NOTE: Tighten the electrical connector with the recommended pliers.

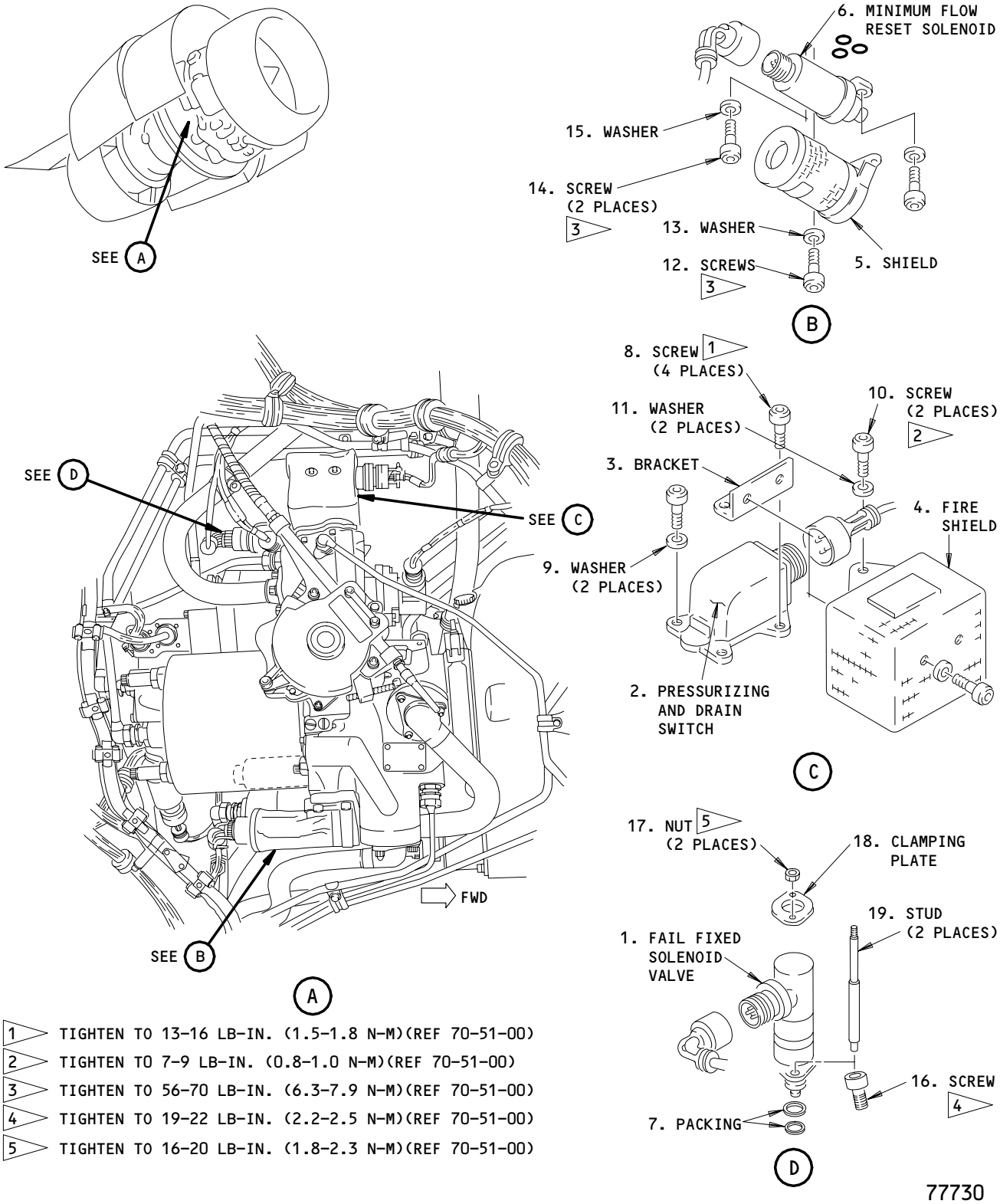
G. Remove and install the Minimum Fuel Flow Reset Solenoid (Fig. 402).

S 024-015-R00

(1) Remove the Fuel Flow Reset Solenoid as follows:
(a) Disconnect the electrical connector from the solenoid.
(b) Remove the screws (12) that attach the shield (5) to the solenoid (6).
(c) Remove the shield (5).
(d) Remove the screws (14) that attach the solenoid (6) to the FFG.
(e) Remove the solenoid (6).

S 424-016-R00

(2) Install the Minimum Fuel Flow Reset Solenoid as follows:
(a) Make sure the mating faces are clean and free from blockage.
(b) Lubricate and install the new packings (7).



1 TIGHTEN TO 13-16 LB-IN. (1.5-1.8 N-M)(REF 70-51-00)
2 TIGHTEN TO 7-9 LB-IN. (0.8-1.0 N-M)(REF 70-51-00)
3 TIGHTEN TO 56-70 LB-IN. (6.3-7.9 N-M)(REF 70-51-00)
4 TIGHTEN TO 19-22 LB-IN. (2.2-2.5 N-M)(REF 70-51-00)
5 TIGHTEN TO 16-20 LB-IN. (1.8-2.3 N-M)(REF 70-51-00)

77730
77730A

Fuel Flow Governer - Pressurizing and Drain Switch,
Minimum Flow Reset Solenoid Valve and Fail Fix Solenoid Valve
Figure 402

(c) Install the solenoid (6) on the FFG with the washers (15) and screws (14).
1) Tighten the screws (14) to 56-70 pound-inches (6.3-7.9 newton meters).
(d) Install the shield (5) on the solenoid with the washers (13) and screws (12).
1) Tighten the screws (12) to 56-70 pound-inches (6.3-7.9 newton meters).
(e) Connect the electrical connector to the solenoid.

NOTE: Tighten the electrical connector with the recommended pliers.

H. Remove and install the Fail Fixed Solenoid (Fig. 402).

S 024-017-R00
(1) Remove the Fail Fixed Solenoid as follows:
(a) Disconnect the electrical connector from the solenoid.
(b) Remove the nuts (17) and screw (16).
(c) Remove the clamping plate (18), studs (19), and solenoid (1).

S 424-018-R00
(2) Install the Fail Fixed Solenoid as follows:
(a) Make sure the mating faces are clean and free from blockage.
(b) Lubricate and install the packings (7).
(c) Install the solenoid (1) on the FFG with the screws (16), studs (19), clamping plate (18), and nuts (17).

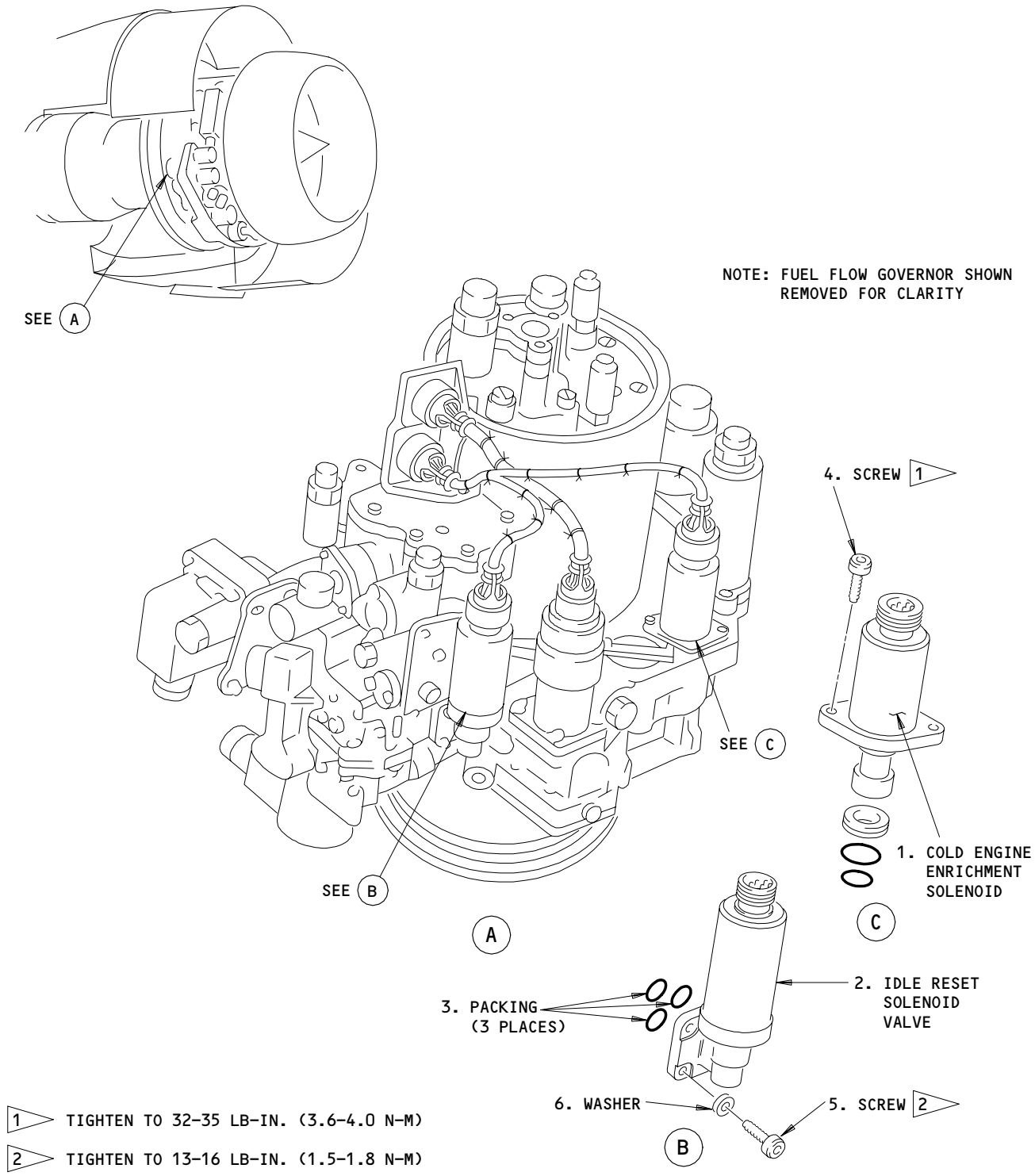
NOTE: First go to one nut and tighten it in a small increment and then go to the other nut and tighten it in a small increment. Do these steps again until the nuts are tight to make sure the clamp plate stays square to the solenoid valve.

1) Tighten the nuts (17) to 16-20 pound-inches (1.8-2.3 newton meters).
2) Safety the nuts (17) with a lockwire.
(d) Connect the electrical connector to the solenoid.

NOTE: Tighten the electrical connector with the recommended pliers.

I. Remove and install the Cold Engine Enrichment Solenoid (Fig. 403).

S 024-019-R00
(1) Remove the Cold Engine Enrichment Solenoid as follows:
(a) Disconnect the electrical connector from the solenoid.
(b) Remove the screws (4) that attach the solenoid (1) to the FFG.
(c) Remove the solenoid (1).



Fuel Flow Governor - Cold Engine Enrichment Solenoid and Idle Reset Solenoid Valve
Figure 403

S 424-020-R00

(2) Install the Cold Engine Enrichment Solenoid as follows:
  (a) Make sure the mating faces are clean and free from blockage.
  (b) Lubricate and install the new packings (3).
  (c) Install the solenoid on the FFG with the screws (4).
    1) Tighten the screws (4) to 32-35 pound-inches (3.6-4.0 newton meters).
  (d) Connect the electrical connector to the solenoid.

    NOTE: Tighten the electrical connector with the recommended pliers.

J. Remove and install the Idle Reset Solenoid (Fig. 403).

S 024-021-R00

(1) Remove the Idle Reset Solenoid as follows:
  (a) Remove the FFG (AMM 73-21-01/401).
  (b) Disconnect the electrical connector from the solenoid.
  (c) Remove the screws (5) that attach the solenoid (2) to the FFG.
  (d) Remove the solenoid (2).

S 424-022-R00

(2) Install the Idle Reset Solenoid as follows:
  (a) Make sure the mating faces are clean and free from blockage.
  (b) Lubricate and install the new packings (3).
  (c) Install the solenoid on the FFG with the washers (6) and screws (5).
    1) Tighten the screws (5) to 13-16 pound-inches (1.5-1.8 newton meters).
  (d) Connect the electrical connector to the solenoid.

    NOTE: Tighten the electrical connector with the recommended pliers.

  (e) Install the FFG (AMM 73-21-01/401).

K. Put the airplane back to its usual condition.

S 864-023-R00

(1) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
  (a) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
  (b) 11L7, LEFT ENGINE IDLE CONTROL
  (c) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-024-R00

(2) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
  (a) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER
  (b) 11L33, RIGHT ENGINE IDLE CONTROL
  (c) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV

S 864-025-R00

(3) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 864-026-R00

(4) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 864-027-R00

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

S 414-028-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-029-R00

(7) Supply the electrical power (AMM 24-22-00/201).

S 724-030-R00

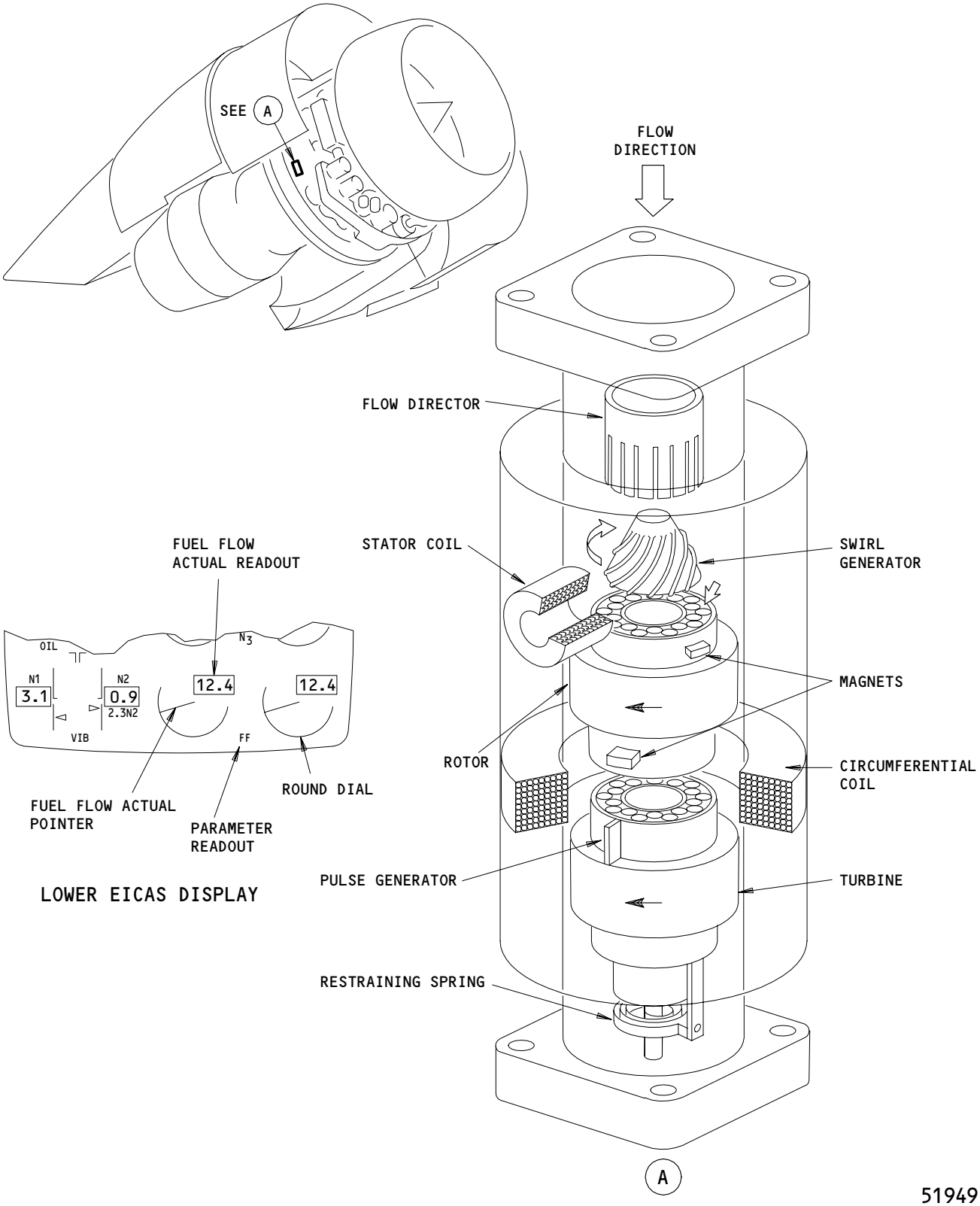
(8) Do an engine test with the Power Plant Test Reference Table (AMM 71-00-00/501).

INDICATING - DESCRIPTION AND OPERATION

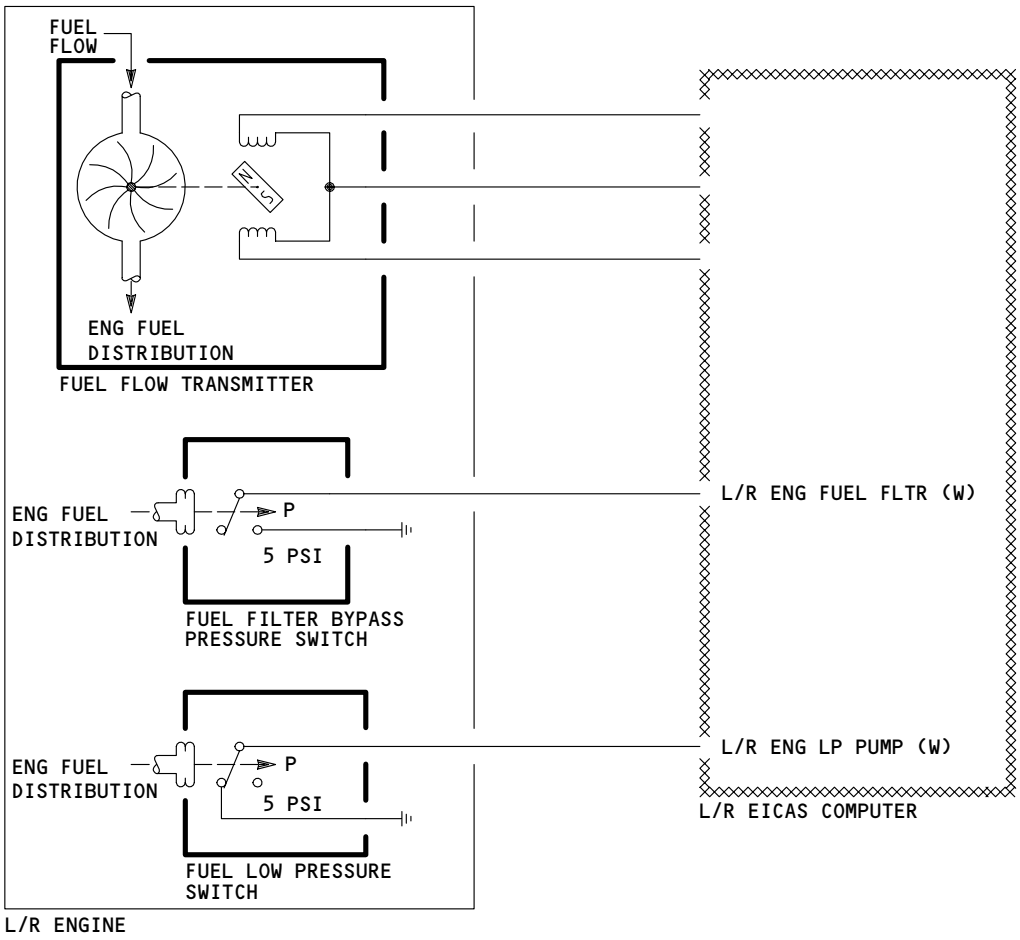
1. General
   A. Indicating for the engine and fuel control system is comprised of the following: fuel flow indicating system (Ref 73-31-00), fuel filter bypass warning system (Ref 73-34-00), and fuel low pressure warning system (Ref 73-35-00).
   B. The fuel flow indicating system measures the flow rate of fuel after the fuel flow governor and displays this rate on the lower Engine Indication and Crew Alerting System (EICAS) display in the flight compartment.
   C. The fuel filter bypass warning system provides a STATUS message to EICAS when an impending filter bypass occurs.
   D. The fuel low pressure warning system provides a STATUS message to EICAS when the pressure after the low pressure fuel pump drops below a predetermined value.

FUEL FLOW INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The fuel flow indicating system provides fuel flow rate indication in the flight compartment. The system comprises a fuel flow transmitter and an indication on the lower Engine Indication and Crew Alerting System (EICAS) display in the flight compartment.
2. Component Details
   A. Fuel Flow Transmitter
      (1) The fuel flow transmitter is mounted vertically on the lower right side of the fan case. It is fitted in the high pressure (HP) fuel supply tube between the fuel flow governor and the HP fuel filter.
      (2) The transmitter is a cylindrical through flow double skinned case, containing, a flow director, swirl generator, rotor and turbine. Mounted on the side of the case is an electrical connection.
      (3) Contained between the skins, are a stator coil and a circumferential coil.
      (4) The coils are positioned in the rotational path of the two magnets attached to the rotor outer periphery at a preset angle relative to each other.
      (5) The rotor is a free rotating assembly with axial flow passages through it.
      (6) The turbine is a rotating assembly with axial flow passages through it, that is prevented from rotating by a restraining spring attached to it.
      (7) The turbine has a pulse generator attached to the outer periphery, positioned to pass in close proximity to the magnet on the rotor.
   B. Fuel Flow Indication on EICAS
      (1) Fuel flow indication is displayed on the lower EICAS display as a full time indication. The indication is shown in round dial format with a pointer and digital readout.
      (2) Fuel used and fuel left is displayed on the flight management computer.
3. Operation
   A. Functional Description
      (1) Fuel entering the transmitter at the top, passes through the flow director onto a swirl generator which gives the fuel a rotary motion.
      (2) This motion causes the rotor to rotate at a velocity dependant on the rate of fuel flow.
      (3) The fuel flow leaving the rotor is directed through the turbine, deflecting the turbine against the retraining spring tension, an amount proportional to the fuel flow rate.
      (4) The magnet attached to the rotor passing over the stator coil induces an electrical pulse on each rotation.



Fuel Flow Transmitter
Figure 1



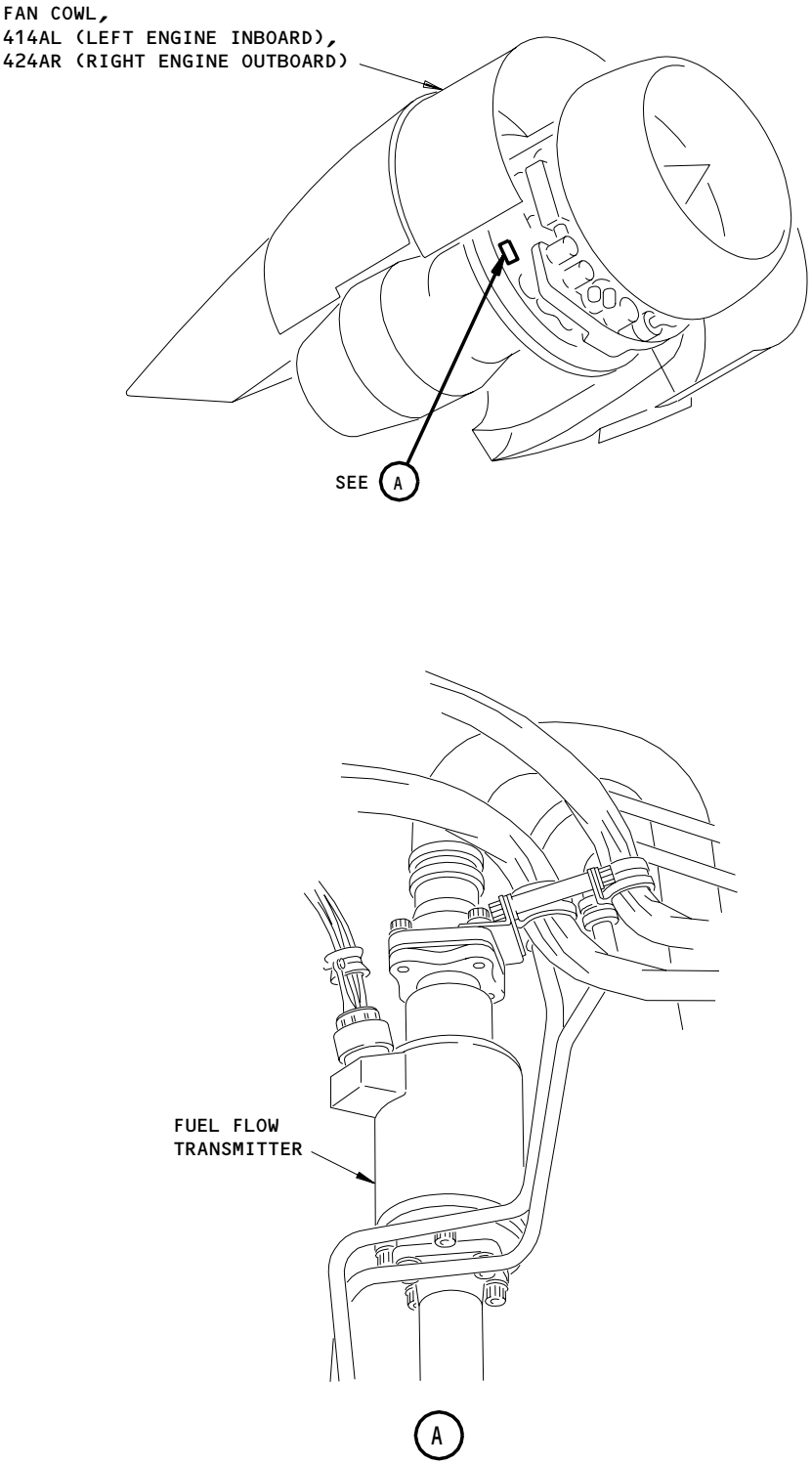
Fuel Flow Indication Operation Schematic
Figure 2

(5) The second magnet attached to the rotor, rotating in the path of the circumferential coil, induces an electrical pulse each time it passes the pulse generator fixed to the turbine.
(6) The elapsed time between the two pulses is proportional to the mass flow rate.
(7) As the flowmeter measures mass flow it is not affected by changes in temperature or specific gravity of the fuel.
(8) This signal from the transmitter is sent to the EICAS computer. The computer changes this signal to a suitable form to be used as an indication on the lower EICAS display in both digital and pointer readout.

FUEL FLOW INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
TRANSMITTER - FUEL FLOW		2	414AR,424AR	73-31-01

Fuel Flow Indicating System - Component Index
Figure 101



Fuel Flow Indicating System - Component Location
Figure 102

FUEL FLOW INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains a check to make sure the fuel flow indicating system operates correctly.

TASK 73-31-00-715-001-R00

2. Operational Test - Fuel Flow Indicating System
   A. References
      (1) AMM 71-00-00/201, Power Plant
   B. Access
      (1) Location Zone
          211/212 Control Cabin

   C. Do a Check of the Fuel Flow Indicating System.

S 865-002-R00

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

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

S 215-003-R00

(2) Make sure the fuel flow indicator on the lower Engine Indication and Crew Alerting System (EICAS) display reads approximately the same for each engine.

S 865-004-R00

(3) Use the Power Plant Operation (Normal) procedure to do the engine shut-down (AMM 71-00-00/201).

FUEL FLOW TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the Fuel Flow Transmitter. The second task is to install the Fuel Flow Transmitter.

TASK 73-31-01-004-001-R00

2. Remove the Fuel Flow Transmitter
   A. Equipment
      (1) Clean receptacle - minimum capacity
          5 U.S. gallons, 4 Imperial gallons, 18 Litres
   B. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (Left Engine)
          424AR Right Fan Cowl Panel (Right Engine)

   D. Procedure

      S 864-002-R00
      (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11J2, LEFT EICAS CMPTR
          (b) 11J29, RIGHT EICAS CMPTR

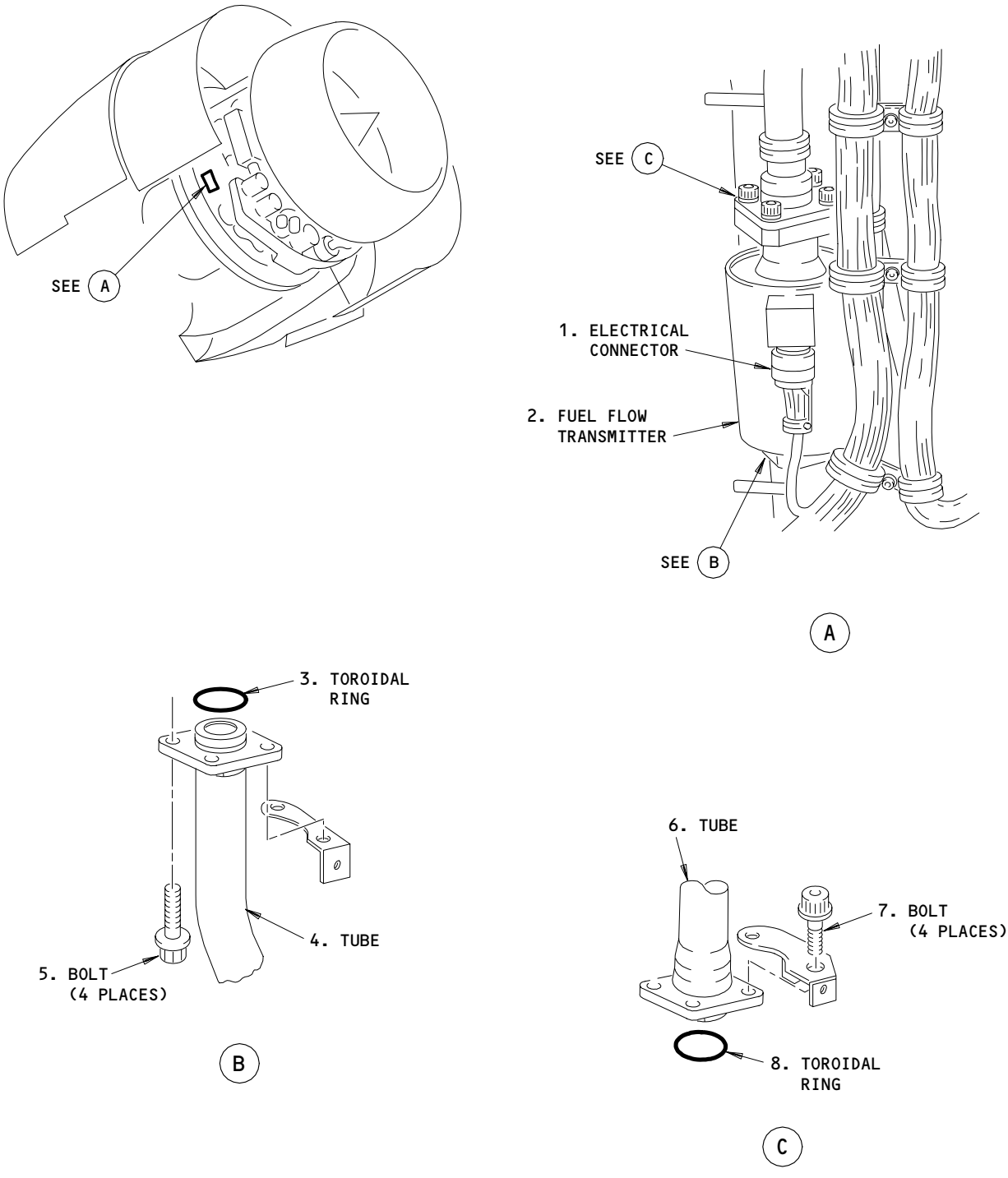
      S 014-003-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 034-004-R00
      (3) Disconnect the electrical connector (1).

      S 034-007-R00
      (4) Remove the bolts (7) from the tube (6).
          (a) Keep the bracket attached to the harness and tube support clips.



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Fuel Flow Transmitter Installation
Figure 401

(b) Discard the toroidal ring (8).

S 034-008-R00

(5) Remove the bolts (5) from the tube (4).

S 034-009-R00

(6) Remove the fuel flow transmitter (2).
(a) Discard the toroidal ring (3).

S 434-010-R00

(7) Install dust caps on all openings and connectors.

TASK 73-31-01-404-011-R00

3. Install the Fuel Flow Transmitter

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	2	Transmitter Assy - Fuel Flowmeter	73-31-01	01	5
	3	Ring - Toroidal	73-11-06	06	205
	5	Bolt			185
	7	Bolt			185
	8	Ring - Toroidal			205

B. Consumable Materials

(1) B00090, Degreasing fluid,
(Inhibited and stabilized 1.1.1. Trichloroethane)
British Spec/Ref - B.S. 4487, 1969
American Spec/Ref - MIL-T-81533
OMat No. 1/21

(2) D00322, Dry Film lubricant (Thixotropic)
British Spec/Ref - PL198
OMat No. 4/20

C. References
(1) AMM 71-11-04/201, Fan Cowl Panels

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Right Fan Cowl Panel (Left Engine)
424AR Right Fan Cowl Panel (Right Engine)

E. Procedure

S 014-012-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 034-013-R00
(2) Remove the dust caps from all openings and connectors.

S 434-016-R00
(3) Lubricate and install a new toroidal ring (3) on the tube (4).

S 424-023-R00
(4) Install the transmitter (2) on the tube (4) with the bolts (5).
(a) Wire-lock the bolts (4) and (5).

S 434-024-R00
(5) Install a new toroidal ring (8) on the transmitter inlet connection.

S 434-025-R00
(6) Install the tube (6) with the bolts (7).

S 434-026-R00
(7) Install the electrical connector (1).

S 414-027-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 864-028-R00

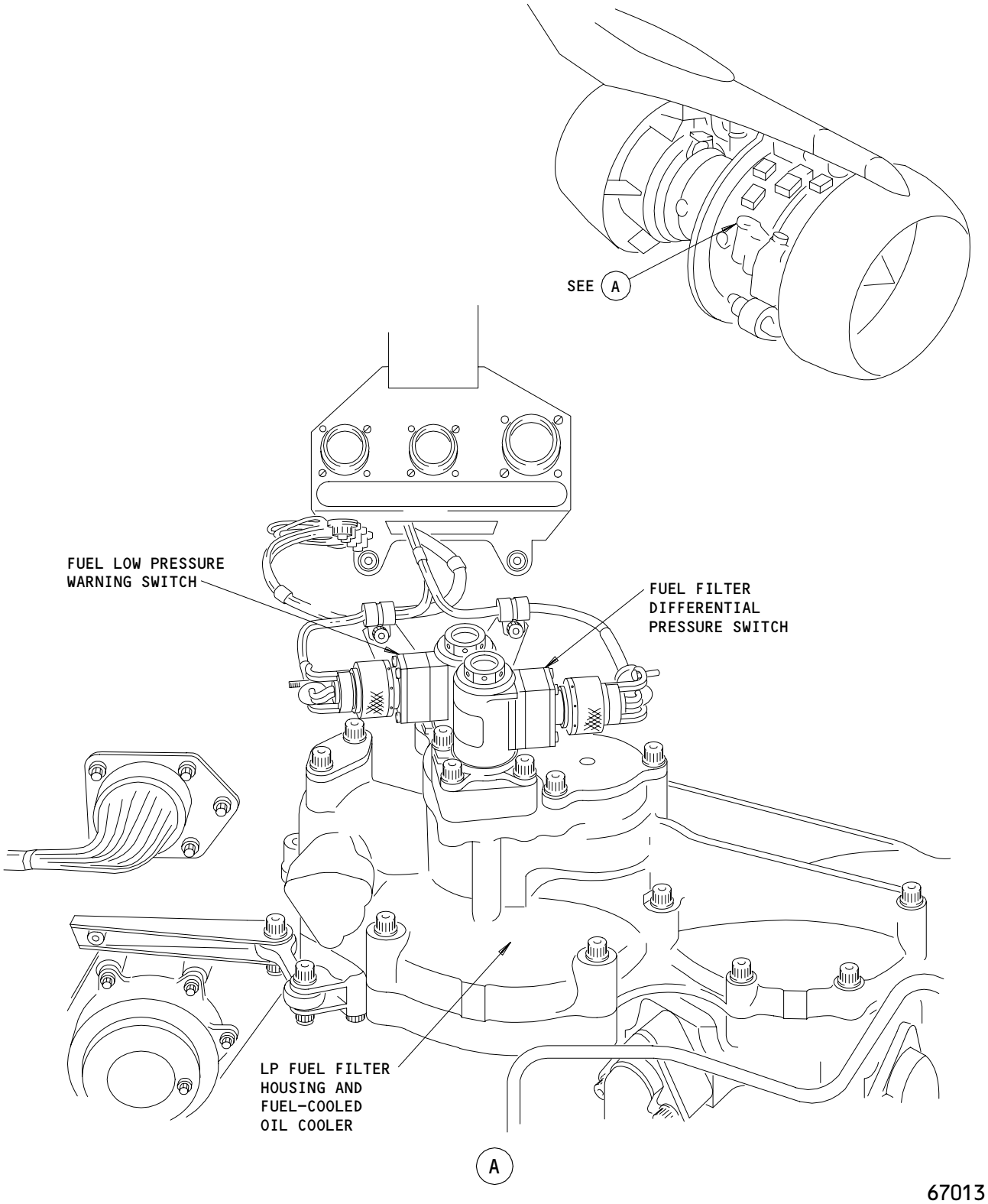
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11J2, LEFT EICAS CMPTR
(b) 11J29, RIGHT EICAS CMPTR

S 724-032-R00

(10) Do the required tests for installation of the fuel flow transmitter (AMM 71-00-00/501).

FUEL FILTER BYPASS WARNING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The fuel filter bypass warning system provides a status level message within the Engine Indication Crew Alerting System (EICAS) when an excessive pressure drop across the low pressure (LP) fuel filter occurs.
   B. The system consists of a differential pressure switch and a message on EICAS.
2. Component Details
   A. Differential Pressure Switch
      (1) The differential pressure switch is mounted on top of the fuel filter housing and fuel-cooled oil cooler (Ref 79-21-00). The switch basically comprises a metal body, that houses an electrical switch and connector, and a pressure sensing bellows to which low pressure fuel is supplied through holes in the mounting face. Fuel from the filter inlet is supplied to the inside of the bellows and fuel from the filter outlet is supplied to the chamber surrounding the bellows. Expansion of the bellows is opposed by a snap-action spring which prevents the bellows actuating the switch until a predetermined fuel pressure differential is reached.
3. Operation
   A. Functional Description
      (1) The fuel filter bypass warning system is operational when the EICAS computer is turned on. This supplies a low voltage through the bypass warning system to enable a message to be brought to the status mode of EICAS when a high differential pressure across the fuel filter is experienced.
      (2) During normal engine operation, the differential pressure switch contacts remain open and no message on EICAS. If, however, the differential pressure across the LP fuel filter increases above a predetermined value the contacts close and the word STATUS is displayed on the lower EICAS display.
      (3) When the STATUS message appears press the STATUS button on the EICAS display select panel. All the status messages will be displayed on the lower EICAS display.
      (4) If R ENG FUEL FILT or L ENG FUEL FILT displays on the lower EICAS display an impending bypass of the fuel filter is indicated.



Differential Pressure Switch
Figure 1

FUEL FILTER BYPASS WARNING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SWITCH - DIFFERENTIAL PRESSURE, S10133	--	2	414AR,424AR, FAN COWL	73-34-01

Fuel Filter Bypass Warning System - Component Index
Figure 101

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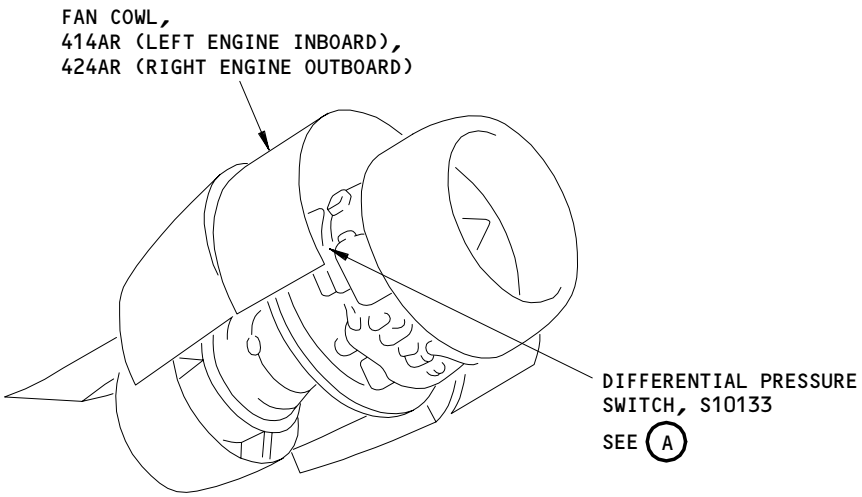
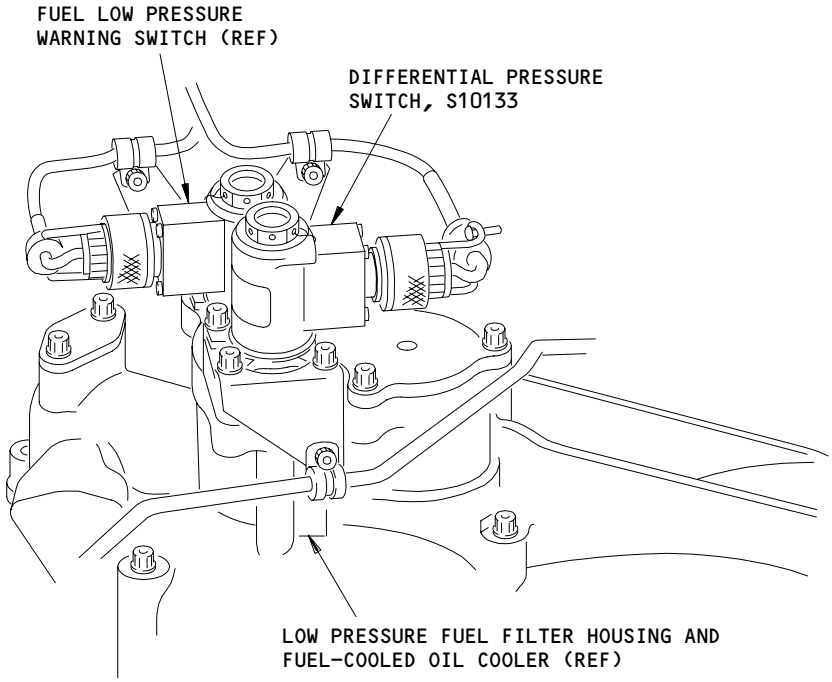




51164

Fuel Filter Bypass Warning System - Component Location
Figure 102

FUEL FILTER BYPASS WARNING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains a check of the fuel filter bypass warning system to make sure the fault indication operates correctly.

TASK 73-34-00-735-001-R00

2. System Test - Fuel Filter Bypass Warning System
   A. Equipment
      (1) Jumper Wire
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   C. Access
      (1) Location Zones
          410 Left Power Plant
          420 Right Power Plant

      (2) Access Panels
          414AR Right Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)

   D. Do a test of the Fuel Filter Bypass Warning System (Fig. 501)

      S 015-002-R00

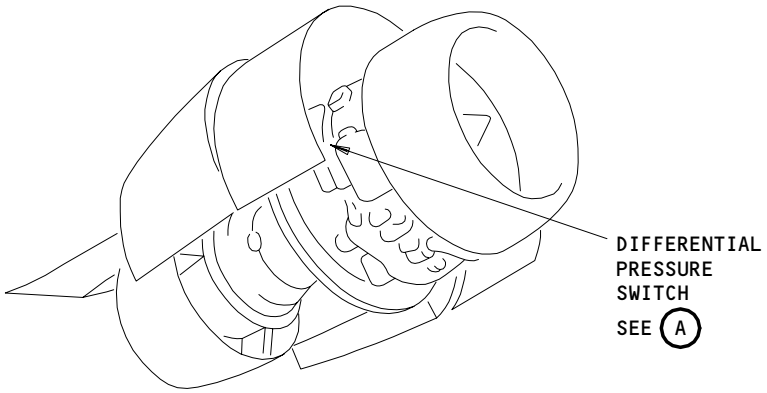
      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

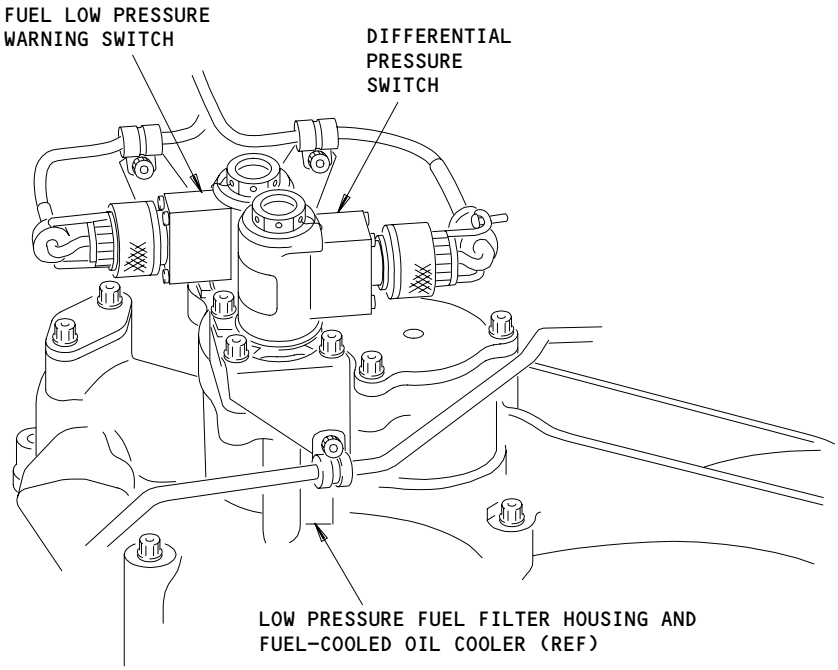
      (1) Open the right fan cowl panel (AMM 71-11-04/201).

      S 035-003-R00
      (2) Disconnect the electrical connector from the differential pressure switch.

      S 865-004-R00
      (3) Supply the electrical power (AMM 24-22-00/201).

      S 865-005-R00
      (4) Make sure these circuit breakers on the overhead panel, P11, are closed:
          (a) 11J2, LEFT EICAS CMPTR or EICAS CMPTR LEFT
          (b) 11J3, EICAS UPPER IND or EICAS UPPER DISPLAY
          (c) 11J29, RIGHT EICAS CMPTR or EICAS CMPTR RIGHT
          (d) 11J30, EICAS LOWER IND or EICAS LOWER DISPLAY
          (e) 11J31, EICAS DSPL SW
          (f) 11J32, EICAS PILOTS DSP or EICAS DISPLAY SELECT





A

51164

Fuel Filter Bypass Warning System Test
Figure 501

S 865-020-R00
(5) Push the ENGINE DISPLAY button on the EICAS display select panel.

S 485-006-R00
(6) Install a jumper wire from pin 1 to pin 3 of the connector.

S 215-009-R00
(7) Make sure the EICAS Advisory message, ENG FUEL FILT, shows on the top EICAS display.
   (a) If not all messages show on PAGE 1, push the CANC switch on the captain's main instrument panel, P1.
   (b) Continue to push the CANC switch as necessary to see all the additional pages.
   (c) Push the RCL switch to go back to the start of the message list.

S 085-010-R00
(8) Remove the jumper wire.

S 435-011-R00
(9) Connect the electrical connector to the pressure switch.

S 865-013-R00
(10) Push the ECS/MSG switch on the EICAS MAINT panel.

S 215-014-R00
(11) Make sure the ENG FUEL FILT message shows on the bottom EICAS display.

S 975-015-R00
(12) Write down the messages shown on the maintenance page if it is necessary.

S 745-019-R00
(13) Push the AUTO EVENT button on the EICAS maintanance panel.

S 745-016-R00
(14) Push and hold the ERASE button on the EICAS maintenance panel until the messages go away.

S 415-017-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 865-018-R00

(16) Remove the electrical power (AMM 24-22-00/201).

DIFFERENTIAL PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the Differential Pressure Switch. The second task is to install the Differential Pressure Switch.
   B. Use the procedures given in AMM 70-02-01/201 for identification, lubrication and installation of rubber seal rings.
   C. Use the procedures given in AMM 70-50-02/201 for connection of electrical plugs.
   D. Use the procedures given in AMM 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in AMM 70-51-00 unless a torque value is specified in this procedure.

TASK 73-34-01-004-001-R00

2. Remove the Differential Pressure Switch
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)

   C. Prepare to Remove the Differential Pressure Switch.

      S 864-002-R00
      (1) Open the EICAS circuit breakers on the overhead panel, P11, row J, and attach a DO-NOT-CLOSE tag.

      S 864-003-R00
      (2) Supply the electrical power (AMM 24-22-00/201).

      S 864-004-R00
      (3) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E1, FUEL VALVES L SPAR

S 864-005-R00
(4) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
(a) 6E2, FUEL VALVES R SPAR

S 864-006-R00
(5) Make sure the FUEL CONTROL switch on control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

S 864-007-R00
(6) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.

S 864-008-R00
(7) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVES L SPAR

S 864-009-R00
(8) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVES R SPAR

S 864-010-R00
(9) Remove the electrical power (AMM 24-22-00/201).

S 014-011-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

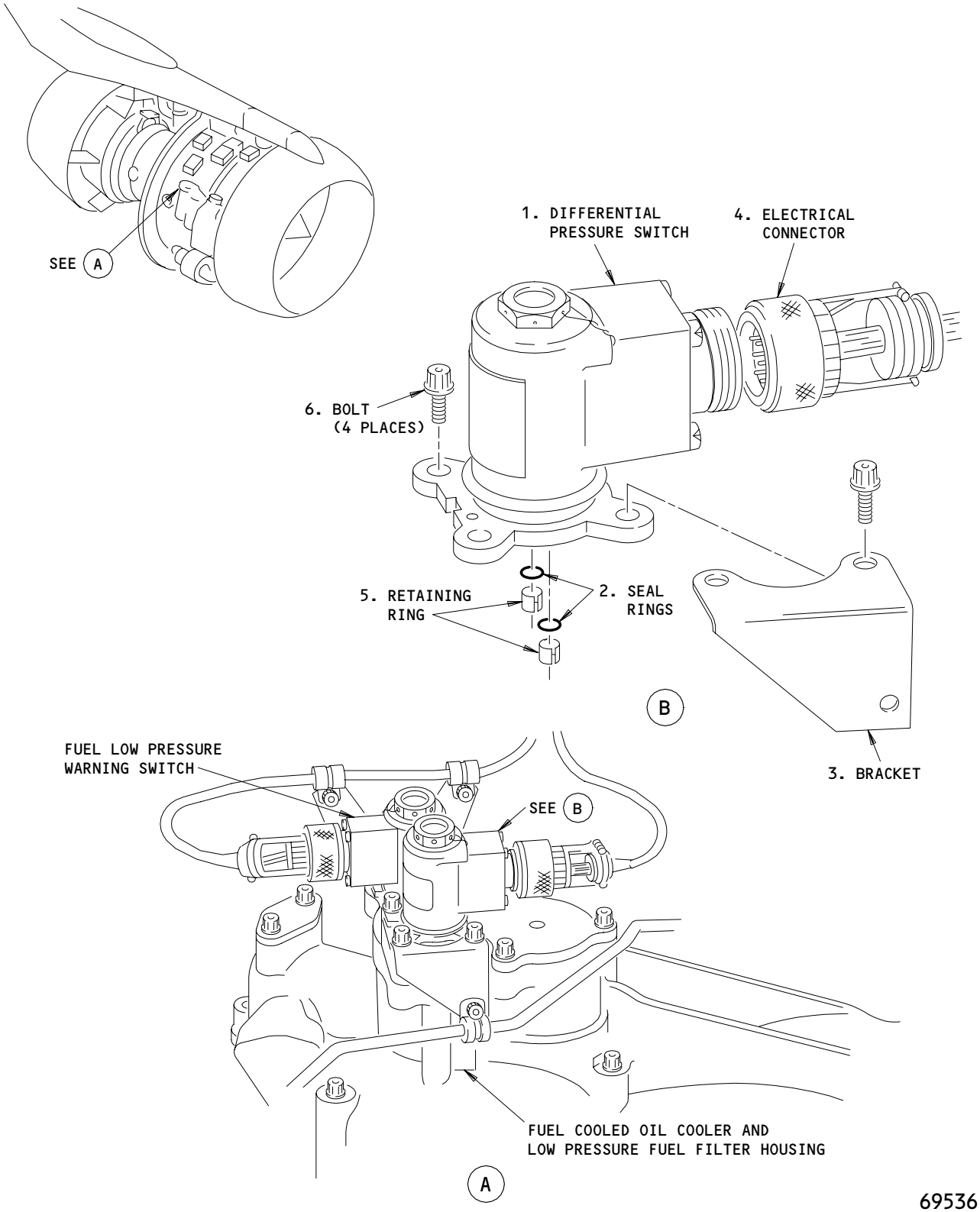
D. Procedure (Fig. 401)

S 034-012-R00
(1) Disconnect the electrical connector (4).

S 034-013-R00
(2) Remove the bolts (6) from the switch (1).

S 034-014-R00
(3) Move the bracket (3) clear of the switch mount.
(a) Do not remove the bracket (3) from the fuel drain pipe.

S 034-015-R00
(4) Lift the pressure switch (1) from the fuel filter clear of the dowel and remove the switch.



Differential Pressure Switch Installation
Figure 401

S 434-016-R00
(5) Install dust caps to all openings and electrical connectors.

TASK 73-34-01-404-017-R00

3. Install the Differential Pressure Switch

A. Consumable Materials
(1) Degreasing Fluid (Inhibited and stabilized 1.1.1 Trichlorethane)
British Spec/Ref - BS 4487,1969
Ameriacn Spec/Ref - MIL-T-81533
OMat No. 1/21
(2) Lint-free cloth

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 71-11-04/201, Fan Cowl Panels

C. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Right Fan Cowl Panel (L Engine)
424AR Right Fan Cowl Panel (R Engine)

D. Procedure (Fig. 401)

S 034-018-R00
(1) Remove the dust caps from the openings and electrical connectors.

S 214-019-R00
(2) Make sure the mounting faces are free from damage.

S 114-020-R00
(3) Clean the mating faces of the pressure switch, bracket, and fuel filter housing as follows:

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(a) Put degreasing fluid on a clean, dry, lint free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

(b) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 434-021-R00

(4) Lubricate and install new seal rings (2) in the filter mounting face and make sure the retaining rings are correctly installed.

S 424-022-R00

(5) Install the differential pressure switch.
(a) Make sure the differential pressure switch is correctly aligned on the dowl.

S 434-023-R00

(6) Install the bracket (3).

S 434-024-R00

(7) Attach the differential pressure switch and bracket with the bolts.

S 434-025-R00

(8) Connect the electrical connector (4).

E. Put the airplane back to its usual condition.

S 864-026-R00

(1) Remove the DO-NOT-CLOSE tags and close the EICAS circuit breakers on the P11 panel, row J.

S 864-027-R00

(2) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 864-028-R00

(3) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 034-029-R00

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

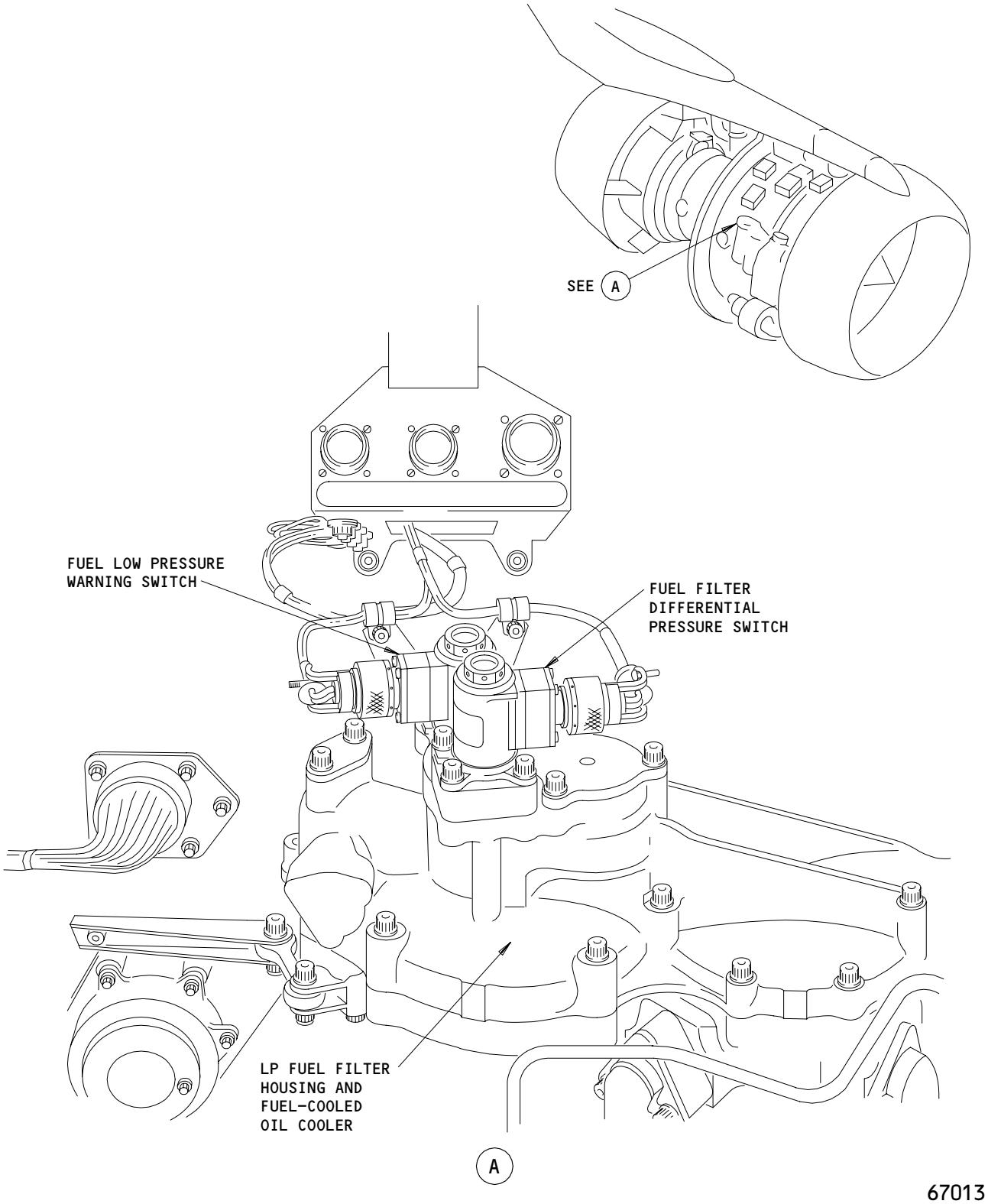
S 414-030-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

FUEL LOW PRESSURE WARNING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The fuel low pressure (LP) warning system provides a status level message within the Engine Indication and Crew Alerting System (EICAS) when the LP fuel pump outlet pressure falls below a predetermined value.
   B. The system consists of a fuel pressure switch and a message on EICAS.
2. Component Details (Fig. 1)
   A. Fuel Pressure Switch
      (1) The pressure switch is mounted on top of the fuel filter housing and fuel-cooled oil cooler (AMM 79-21-00/001). The switch basically comprises a metal body, that houses an electrical switch and connector, and a pressure sensing bellows to which LP fuel is supplied internally through a hole in the mounting face. Expansion of the bellows is opposed by a snap-action spring which prevents the bellows actuating the switch until a predetermined pressure is reached.
3. Operation
   A. Functional Description
      (1) The fuel low pressure warning system is operational when the fuel pressure switch senses low pressure, and the engine is in operation for five seconds. Engine operation can be specified as the fuel control switch not found in the cutoff position for 300 seconds. Engine operation can also be specified as the N3 speed above idle for five seconds. Above idle, the fuel control switch can not be in the cutoff position, or the fire handle pulled, for one second.
      (2) During normal engine operation the fuel pressure is high enough to expand the bellows to actuate the switch and break the circuit to EICAS so no message appears. If the LP fuel pressure falls below the predetermined value this allows the spring to return to its normal position to complete the circuit to EICAS and the word STATUS is displayed on the lower EICAS display.
      (3) By pushing the STATUS button on the EICAS display select panel allows all status messages to be displayed on the lower EICAS display. If R ENG LP PUMP or L ENG LP PUMP appears then LP fuel pump outlet pressure is below the predetermined value.

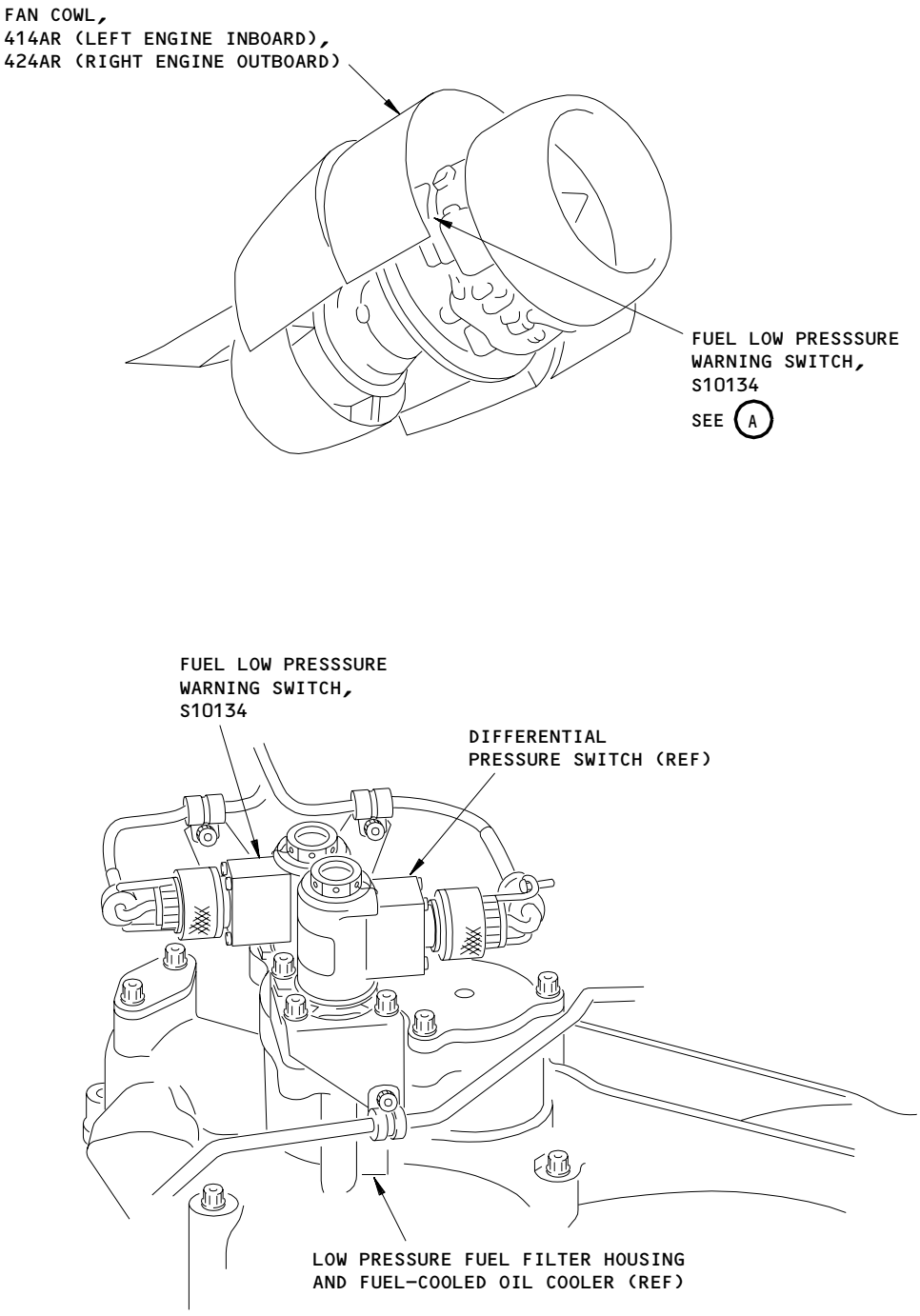


Fuel Pressure Switch
Figure 1

FUEL LOW PRESSURE WARNING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SWITCH - FUEL LOW PRESSURE WARNING, S10134	--	2	414AR,424AR, FAN COWL	73-35-01

Fuel Low Pressure Warning System - Component Index
Figure 101



Fuel Low Pressure Warning System – Component Location
Figure 102

FUEL LOW PRESSURE WARNING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains a check of the Fuel Low Pressure Warning System Components. The Engine Indicating and Crew Alerting System (EICAS) will give the message ENG LP PUMP to show a low fuel pressure condition.

   TASK 73-35-00-735-001-R00

2. System Test - Fuel Low Pressure Warning System
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
   B. Access
      (1) Location Zone
          211 Control Cabin
          212 Control Cabin

   C. Procedure

      S 865-002-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 865-003-R00
      (2) Make sure the ENGINE START switch is in the OFF position.

      S 865-004-R00
      (3) Make sure the FUEL CONTROL switch is in the CUTOFF position.

      S 865-005-R00
      (4) Make sure the SPAR VALVE light is off.

      S 865-006-R00
      (5) For the left engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E1, L SPAR FUEL VALVE

      S 865-007-R00
      (6) For the right engine, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E2, R SPAR FUEL VALVE

      S 865-008-R00
      (7) Make sure all the EICAS circuit breakers on the overhead panel, P11, row J, are closed:

S 865-009-R00
(8) For the left engine, make sure this circuit breaker on the P6 panel is closed:
(a) 6C1, FUEL COND CONT L

S 865-010-R00
(9) For the right engine, make sure this circuit breaker on the P6 panel is closed:
(a) 6C2, FUEL COND CONT R

S 215-011-R00
(10) Make sure that ENG LP PUMP does not show on the EICAS display.

S 745-012-R00
(11) If ENG LP PUMP shows on the EICAS display, do these steps:
(a) Push the ECS/MSG button.
(b) Push the AUTO-EVENT READ button.
(c) Push and hold the ERASE button for 3 seconds to erase the maintenance messages.

S 865-013-R00
(12) Put the FUEL CONTROL switch to the RUN position.

S 215-014-R00
(13) Look for ENG LP PUMP after approximately 3 minutes.

S 865-015-R00
(14) Put the FUEL CONTROL switch in the CUTOFF position.

S 745-016-R00
(15) Erase the EICAS messages as follows:
(a) Push the PERF/APU button.
(b) Push the AUTO-EVENT READ button.
(c) Push and hold the ERASE button for 3 seconds to erase the Performance Auto Event.
(d) Push the ENG EXCD button.
(e) Push and hold the ERASE button for 3 seconds to erase the Engine Exceedance.
(f) Push the ECS/MSG button.
(g) Push the AUTO-EVENT READ button.
(h) Push and hold the ERASE switch for 3 seconds to erase the maintenance messages.
(i) Make sure that ENG LP PUMP does not show on the EICAS display.

S 865-017-R00
(16) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, L SPAR FUEL VALVE

S 865-018-R00
(17) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, R SPAR FUEL VALVE

S 865-019-R00
(18) Remove the electrical power (AMM 24-22-00/201).

FUEL PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task is to remove the fuel pressure switch. The second task is to install the fuel pressure switch.

TASK 73-35-01-004-001-R00

2. Fuel Pressure Switch Removal
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (Left Engine)
          424AR Right Fan Cowl Panel (Right Engine)

   C. Prepare for the Removal of the Switch

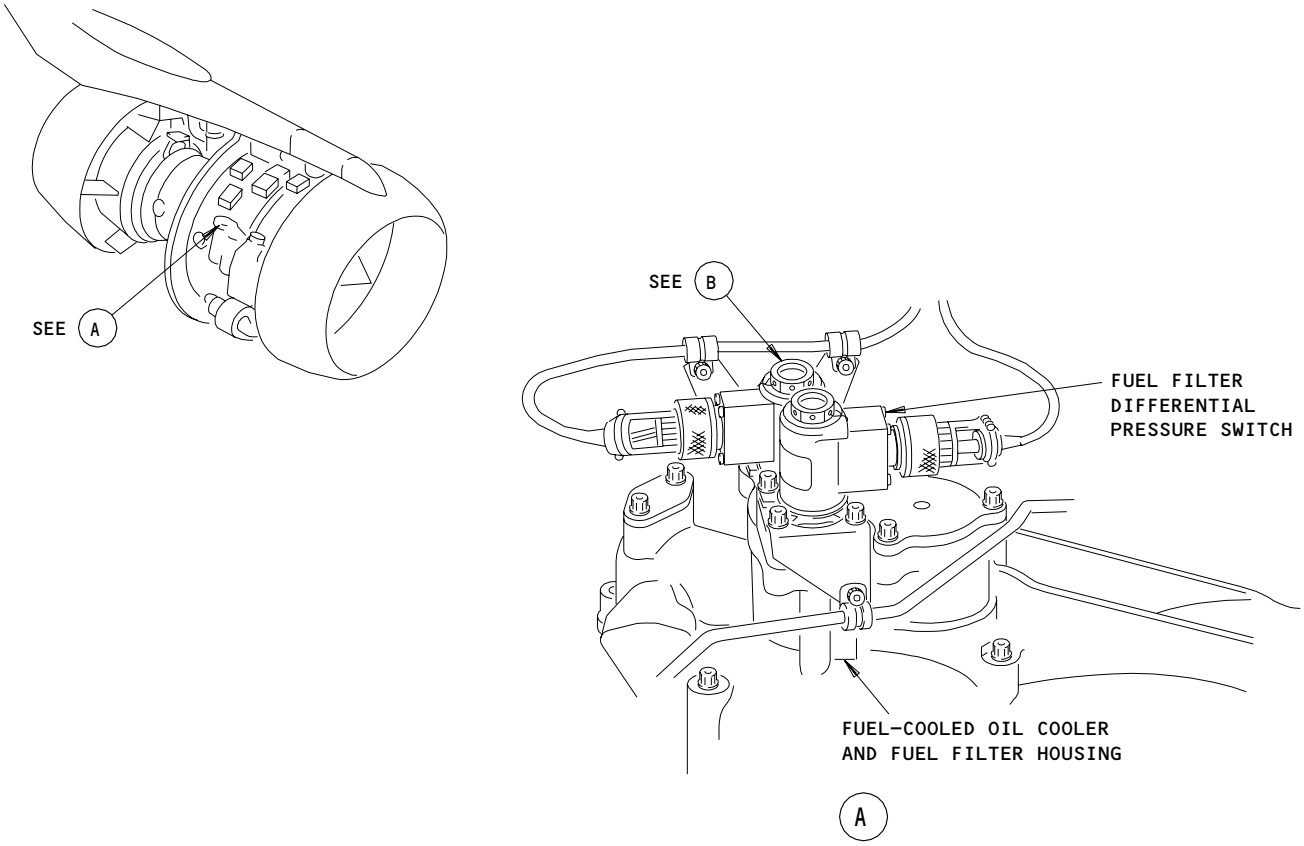
      S 864-002-R00
      (1) Open these circuit breakers on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11J2, LEFT EICAS CMPTR
          (b) 11J3, EICAS UPPER IND
          (c) 11J29, RIGHT EICAS CMPTR
          (d) 11J30, EICAS LOWER IND
          (e) 11J31, EICAS DSPL SW
          (f) 11J32, EICAS PILOTS DSP

      S 864-003-R00
      (2) Supply the electrical power (AMM 24-22-00/201).

      S 864-004-R00
      (3) For the left engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E1, FUEL VALVES L SPAR

      S 864-005-R00
      (4) For the right engine, make sure this circuit breaker on the main power distribution panel, P6, is closed:
          (a) 6E2, FUEL VALVE R SPAR

      S 864-006-R00
      (5) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.



Fuel Pressure Switch Installation
Figure 401

S 864-007-R00
(6) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.

S 864-008-R00
(7) For the left engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVES L SPAR

S 864-009-R00
(8) For the right engine, open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E2, FUEL VALVES R SPAR

S 864-010-R00
(9) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 014-011-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

D. Procedure (Fig. 401)

S 034-012-R00
(1) Disconnect the electrical connector (4).

S 034-013-R00
(2) Remove the bolts (6) from the switch (1).

S 034-014-R00
(3) Move the bracket (3) to be clear of the switch.
(a) Do not disconnect the bracket (3) from the harness.

S 024-015-R00
(4) Lift the pressure switch (1) from the fuel filter to be clear of the dowel and remove the switch.

S 434-016-R00
(5) Install dust caps on all openings and the electrical connector.

TASK 73-35-01-404-017-R00

3. Fuel Pressure Switch Installation

A. Consumable Materials

(1) Degreasing Fluid (Inhibited and stabilized 1.1.1 Trichloroethane)
British Spec/Ref - BS44B7, 1969
American Spec/Ref - MIL-T-81533
OMat No. 1/21

(2) Lint free cloth
OMat No. 1-110

B. References

(1) AMM 24-22-00/201, Electrical Power - Control

(2) AMM 70-02-01/201, Identification, Lubrication and Fitting of Rubber Sealing Rings

(3) AMM 70-42-12/201, Local Surface Protection

(4) AMM 70-50-02/201, Connection of Electrical Plugs

(5) AMM 70-51-00/201, Torque Tightening Technique

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

C. Access

(1) Location Zones

410 Left Engine
420 Right Engine

(2) Access Panels

414AR Right Fan Cowl Panel (Left Engine)
424AR Right Fan Cowl Panel (Right Engine)

D. Procedure (Fig. 401)

S 034-018-R00

(1) Remove the dust caps from the openings and electrical connectors.

S 214-019-R00

(2) Make sure the mounting faces are free from damage.

S 114-020-R00

(3) Clean the mounting faces of the pressure switch, bracket, and fuel filter housing as follows:

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(a) Put degreasing fluid on a clean, dry, lint free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

(b) Remove the contamination from the mounting surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 434-021-R00

(4) Lubricate and install (AMM 70-02-01/201) a new seal ring (2) in the filter mounting face with the retaining ring (5).

S 214-022-R00

(5) Make sure the retaining ring (5) is correctly installed.

S 424-023-R00

(6) Install the pressure switch (1) and make sure it is correctly aligned on the dowel.

S 434-024-R00

(7) Install the bracket (3).

S 434-025-R00

(8) Attach the bracket and pressure switch with the bolts (6) and tighten the bolts (AMM 70-51-00/201).

S 434-026-R00

(9) Connect the electrical connector (4) (AMM 70-50-02/201).

E. Put the airplane back to its usual condition.

S 864-027-R00

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11J2, LEFT EICAS CMPTR
(b) 11J3, EICAS UPPER IND
(c) 11J29, RIGHT EICAS CMPTR
(d) 11J30, EICAS LOWER IND
(e) 11J31, EICAS DSPL SW
(f) 11J32, EICAS PILOTS DSP

S 864-028-R00

(2) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR

S 864-029-R00

(3) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E2, FUEL VALVES R SPAR

S 864-030-R00

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

S 414-031-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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