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.
28-11-00	201		28-533
28-22-11	401	Boe	28-1001
28-22-11	401	*	28-541
28-41-04	401		28-536

D. Remove and Destroy the following TRs/Alerts:

* Indicates TRs/Alerts issued with this control page

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 28-533

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).
CAA DESIGN APPROVAL No. DAI/8566/78.

Manual Reference 28-11-00 Page 201

REASON FOR REVISION

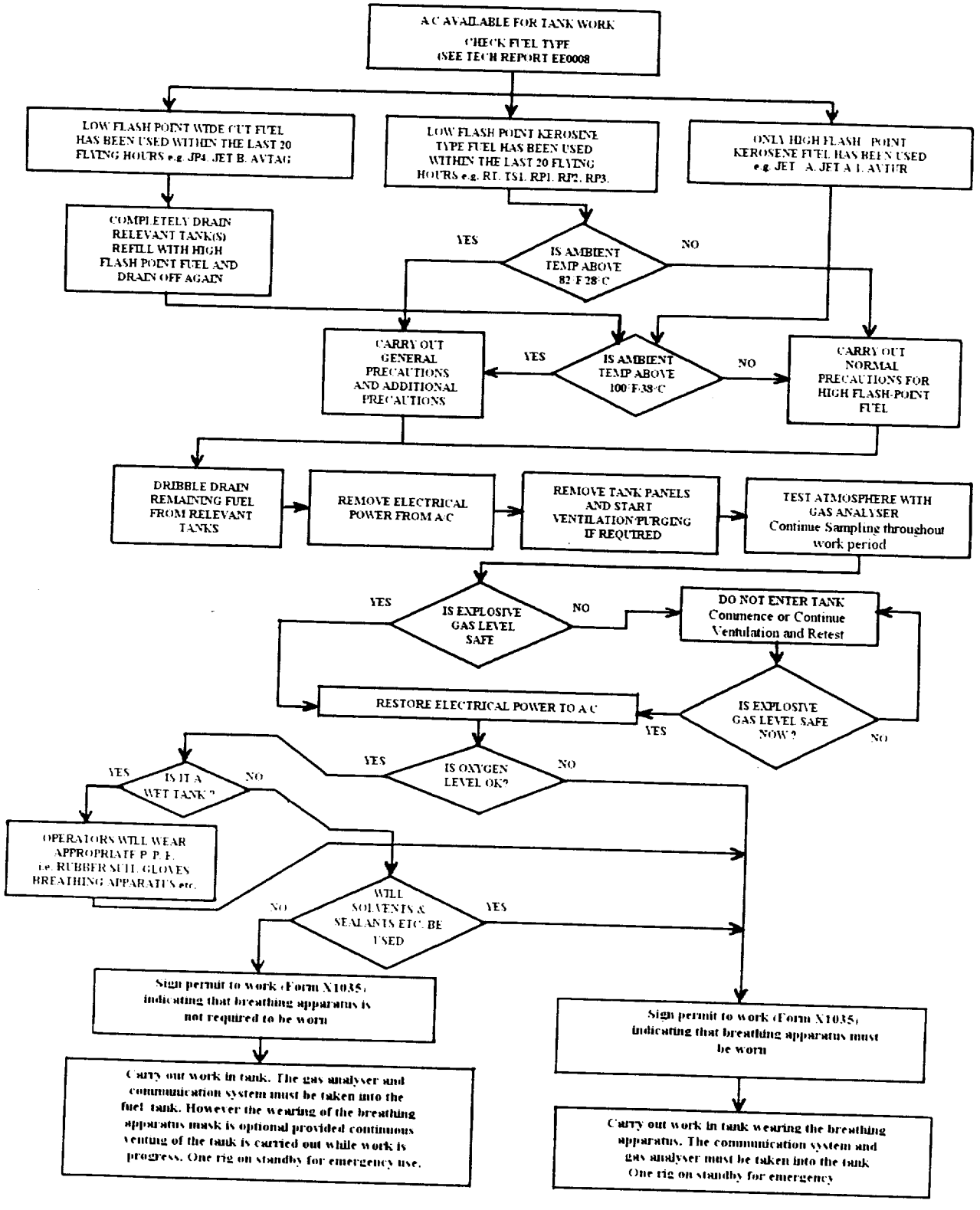
British Airways tank entry procedures are detailed within the Engineering Health and Safety manual which supersede the existing AMM procedure, hence reference within the AMM to the health and safety document will ensure compliance with British Airways requirements.

ACTION

FUEL TANKS - MAINTENANCE PRACTICES

Para 1.C.

Read the General Process Flow Chart overleaf.



General Process Flow Chart

BOEING
757
MAINTENANCE MANUAL

ENGINE FUEL SHUTOFF VALVE ACTUATOR - REMOVAL/INSTALLATION

TEMPORARY REVISION 28-1001

FILING INSTRUCTIONS

This temporary revision applies only to document D633N132. For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm supplement, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

This temporary revision will be incorporated in the revision dated Jan 28/01.

Revision reason: Added check of dual redundant wiring path for engine fuel shutoff valve.

This temporary revision furnishes an advance copy of the enclosed page(s) which supersede any previously issued page(s). The information thereon is to be used until this revision is either incorporated or rescinded.

At the end of this TR there is a TR Status Report for document D633N132.

REVISED LIST OF EFFECTIVE PAGES FOR THIS DOCUMENT

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
* 401	SEP 28/00	03.1						
* 402	MAY 28/99	01						
* 403	SEP 28/00	01.1						
* 404	SEP 28/00	01.1						
* 405	SEP 28/00	01.1						
* 406	SEP 28/00	01.1						
* 407	SEP 28/00	01.101						

* INDICATES PAGE INCLUDED IN THIS TEMPORARY REVISION.

ENGINE FUEL SHUTOFF VALVE ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. The actuator of the engine fuel shutoff valve is installed on the rear spar, out of the fuel tank. Each actuator is found aft of the fuel measuring stick No. 3 in each main fuel tank (AMM 28-44-00/001).
   B. It is not necessary to defuel the fuel tank to remove the actuator.
   C. This procedure contains two tasks. The first task removes the actuator of the engine fuel shutoff valve. The second task installs the actuator of the engine fuel shutoff valve.
   D. The procedure to remove and install the adapter shaft and the valve body is contained in AMM 28-22-01/401.

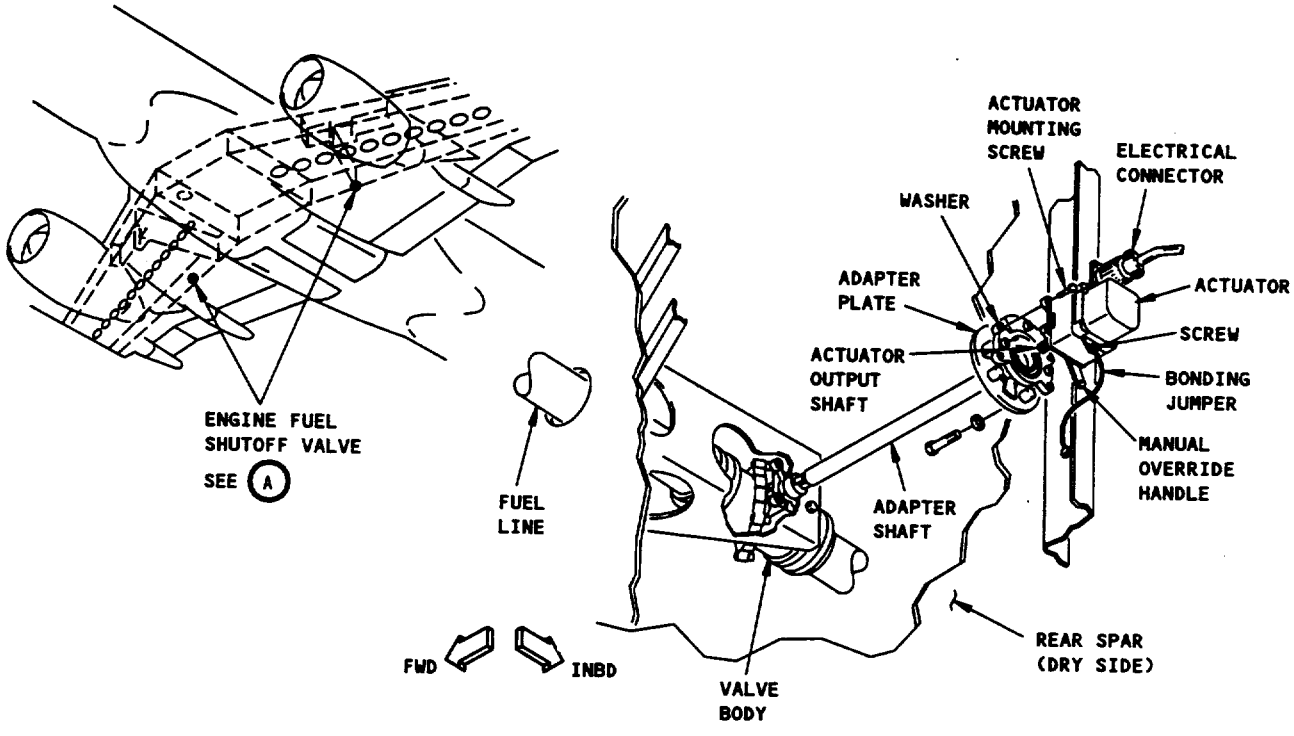
TASK 28-22-11-004-001

2. Remove the Actuator of the Engine Fuel Shutoff Valve (Fig. 401)
   A. Equipment
      (1) Hex key wrench (9/64-inch) with 6 inch extension - commercially available
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
   C. Access
      (1) Location Zones
          551 Rear Spar to MLG Support Beam (Left)
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panels
          551BB Access Panel (Left)
          651BB Access Panel (Right)

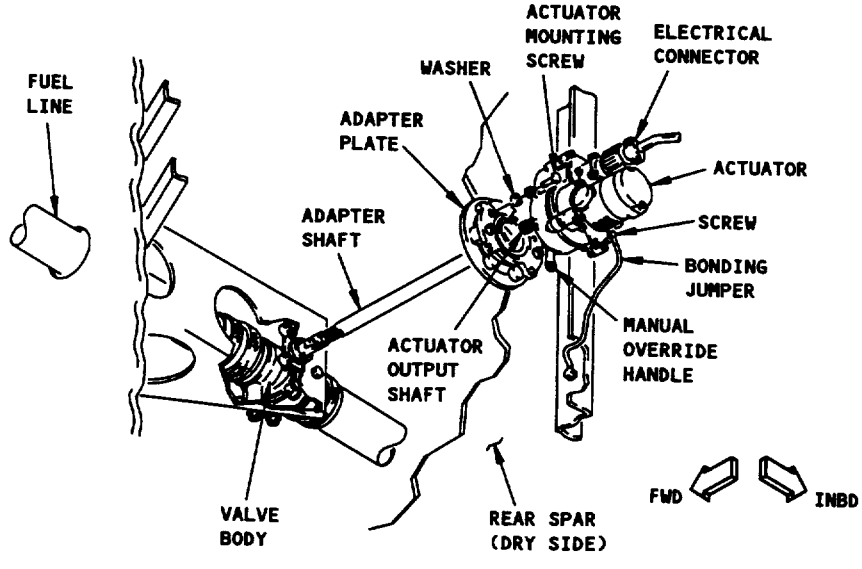
   D. Procedure

      S 864-015
      (1) For the left actuator, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E1, FUEL VALVES L SPAR



ENGINE FUEL SHUTOFF VALVE

A 1



ENGINE FUEL SHUTOFF VALVE

A 2

1 PREFERRED
2 ALTERNATE

Engine Fuel Shutoff Valve Actuator Installation
Figure 401

S 864-016
(2) For the right actuator, 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 014-002
(3) Open the applicable left or right panel, 551BB or 651BB (AMM 06-44-00/201).

S 984-003
(4) Move the manual override handle of the actuator to the CLOSED position.

S 034-004
(5) Disconnect the electrical connector from the actuator.

S 034-005
(6) Remove the screw to disconnect the bonding jumper from the actuator.

S 034-006
(7) Remove the four actuator mounting screws.

S 024-017
(8) Remove the actuator.

TASK 28-22-11-404-007

3. Install the Actuator of the Engine Fuel Shutoff Valve (Fig. 401)

A. Equipment
(1) Hex key wrench (9/64-inch) with 6 inch extension - commercially available

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 20-10-21/601, Electrical Bonding
(3) AMM 24-22-00/201, Electric Power Control

C. Access
(1) Location Zones
551 Rear Spar to MLG Support Beam (Left)
651 Rear Spar to MLG Support Beam (Right)

(2) Access Panels
551BB Access Panel (Left)
651BB Access Panel (Right)

D. Procedure

S 984-008
(1) Move the manual override handle of the actuator to the CLOSED position.

S 824-009

(2) Align the actuator output shaft with the adapter shaft.

S 214-018

(3) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.

S 424-026

(4) Put the actuator output shaft into the adapter shaft.

NOTE: The mounting feet on the actuator automatically align with the mounting points on the adapter plate.

S 424-010

(5) Install the four actuator mounting screws and washers to attach the actuator to the adapter plate.

S 434-019

(6) Install the lockwire on the actuator mounting screws.

S 434-020

(7) Install the screw to connect the bonding jumper to the actuator.

S 224-012

(8) Make sure the bonding resistance between the bonding jumper and the airplane structure is not more than 0.005 ohms (AMM 20-10-21/601).

S 724-031

WARNING: OBEY THE APPLICABLE SHOP PROCEDURES FOR MAINTENANCE ON ENERGIZED ELECTRICAL SYSTEMS. SHORT CIRCUIT AND ELECTRICAL SHOCK TO PERSONS CAN OCCUR.

(9) Do these steps to do a check of each of the two redundant wires that supply power to close the engine fuel spar valve:

(a) Open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:

1)

6E1	L SPAR VALVE
6E2	R SPAR VALVE
6H1	FIRE EXTINGUISHING ENG L BTL1
6H2	FIRE EXTINGUISHING ENG L BTL 2
6H3	FIRE EXTINGUISHING ENG R BTL 1
6H4	FIRE EXTINGUISHING ENG R BTL 2

(b) Put the left engine fuel control switch, found on the P10 quadrant panel, to the CUTOFF position.

(c) Put the right engine fuel control switch, found on the P10 quadrant panel, to the CUTOFF position.

(d) Put the left engine fire switch, found on the P8 quadrant panel, to the NORMAL position.

(e) Put the right engine fire switch, found on the P8 quadrant panel, to the NORMAL position.

(f) To do a check of the left spar valve, disconnect the connector for the left spar valve actuator, D2142.

(g) To do a check of the right spar valve, disconnect the right spar valve actuator, D2022.

(h) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
1) Main Power Distribution Panel, P6:
a) 6E1 L SPAR VALVE
6E2 R SPAR VALVE

(i) For the left spar valve, do a check for 28VDC power (21.0 VDC minimum, 34.0 VDC maximum) between these pins on the connectors, D2142:
1) D2142 D2142

pin 5 ——— pin 4
pin 6 ——— pin 4

(j) For the right spar valve, do a check for 28 VDC power (21.0 VDC minimum, 34.0 VDC maximum) between these pins on the connector, D2022.
1) D2022 D2022

pin 5 ——— pin 4
pin 6 ——— pin 4

(k) Open these circuit breakers and attach DO-NOT-CLOSE tags:
1) Main Power Distribution Panel, P6:
a) 6E1, L FUEL SPAR VALVE
b) 6E2, R FUEL SPAR VALVE

(l) For the left spar valve, re-connect the connector for the left spar valve actuator, D2142.

(m) For the right spar valve, re-connect the connector for the right spar valve actuator, D2022.
(n) For the left actuator, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6E1, L FUEL SPAR VALVE
6H1, FIRE EXTINGUISHING ENG L BTL 1
6H2, FIRE EXTINGUISHING ENG L BTL 2
(o) For the right actuator, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6E2, R FUEL SPAR VALVE
6H3, FIRE EXTINGUISHING ENG R BTL 1
6H4, FIRE ENTINGUISHING ENG R BTL 2
(p) Supply electrical power (AMM 24-22-00/201).

S 714-022
(10) Do the steps that follow to do a test of the left actuator:
(a) Make sure the L ENG FIRE switch on the pilots aft control stand, P8, is in the NORMAL position.
(b) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
1) 6C1, FUEL COND CONT - L
(c) Put the L FUEL CONTROL switch on the P10 quadrant control stand to the RUN position.
(d) Make sure the left SPAR VALVE disagreement light goes off after the left engine fuel shutoff valve opens.
(e) Put the L FUEL CONTROL switch on the P10 quadrant control stand to the CUTOFF position.
(f) Make sure the left SPAR VALVE disagreement light comes on.
(g) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6C1, FUEL COND CONT - L

S 714-023
(11) Do the steps that follow to do a test of the right actuator:
(a) Make sure the R ENG FIRE switch on the pilots aft control stand, P8, is in the NORMAL position.
(b) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
1) 6C2, FUEL COND CONT - R
(c) Put the R FUEL CONTROL switch on the P10 quadrant control stand to the RUN position.
(d) Make sure the right SPAR VALVE disagreement light goes off after the right engine fuel shutoff valve opens.
(e) Put the R FUEL CONTROL switch on the P10 quadrant control stand to the CUTOFF position.
(f) Make sure the right SPAR VALVE disagreement light comes on.
(g) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6C2, FUEL COND CONT - R

S 864-014

(12) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-024

(13) Close the applicable left or right access panel, 551BB or 651BB (AMM 06-44-00/201).

TEMPORARY REVISION STATUS REPORT FOR DOCUMENT D633N132

THIS LIST CONTAINS ALL TRs WITH TR DATES AFTER SEP 28/99. THIS LIST CREATED AT 2000/08/21.19:01:15 UTC

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT
27-1001	JUN 05/00	SEP 28/00	27-81-18
28-1001	SEP 29/00	* ACTIVE	28-22-11
71-1001	FEB 18/00	MAY 28/00	71-51-00
72-1001	FEB 29/00	MAY 28/00	72-00-00
73-1001	JUN 26/00	SEP 28/00	73-11-06

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT

* INDICATES TR WAS ACTIVE AT THE TIME OF THIS REPORT;
REMOVE IT WHEN YOU RECEIVE THE REGULAR REVISION DATED JAN 28/01.
# INDICATES TR WAS SUPERSEDED BY THE TR LISTED.

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 28-541

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).
CAA DESIGN APPROVAL No. DAI/8566/78.

Manual Reference 28-22-11 Page 401

REASON FOR REVISION

SB757-28-0060 Calls for a one off check of the Fuel Shutoff Valve dual circuit wiring. BA consider this an essential safety circuit and requires this check to be done every 500 hours.

ACTION

FUEL SHUT OFF VALVE DUAL CIRCUIT TEST

1. Apply electrical power to the aircraft AMM TASK 24-22-00-862-028

   NOTE: DO NOT use electrical power from the battery for this test.

2.

   CAUTION: IT IS POSSIBLE TO ACCIDENTALLY OPERATE THE FIRE BOTTLES DURING THIS CHECK. MAKE SURE YOU OPEN THE CIRCUIT BREAKERS FOR THE FIRE EXTINGUISHING SYSTEM.

   Open the following circuit breakers and attach 'DO NOT CLOSE' tags:

C778	Fire Extinguishing Eng L BTL 1	Panel P6-1
C779	Fire Extinguishing Eng R BTL 1	Panel P6-1
C786	Fire Extinguishing Eng L BTL 2	Panel P6-1
C787	Fire Extinguishing Eng R BTL 2	Panel P6-1
C01061	L Spar Valve	Panel P6-1
C01062	R Spar Valve	Panel P6-1

3. Disconnect electrical connector D2142 from the Fuel Shutoff Valve for engine No.1.
4. Make sure the Fuel Control switches for both engines are in the CUTOFF position.

   NOTE: The fuel control switches are on the aisle stand in the cockpit.

5. Make sure the Fire switches for both engines are in the NORMAL position.

←

6.

WARNING: BE CAREFUL WHEN WORKING ON ENERGISED ELECTRICAL SYSTEMS. THESE SYSTEMS CAN CAUSE INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT.

WARNING: WHEN CARRYING OUT STEP 6 ELECTRICAL POWER WILL BE SUPPLIED TO CONNECTOR D2142.

Close this circuit breaker:

C01061 L SPAR VALVE Panel P6-1.

7. Make sure there is 21 to 34V DC between pins 4(-) and 5(+) of connector D2142.
8. Make sure there is 21 to 34V DC between pins 4(-) and 6(+) of connector D2142.
9. Open this circuit breaker and attach 'DO NOT CLOSE' tag:

C01061 L SPAR VALVE Panel P6-1.

10. Connect electrical connector D2142 to the Fuel Shutoff Valve for engine No.1.
11. Disconnect electrical connector D2022 from the Fuel Shutoff Valve for engine No.2.

12.

WARNING: BE CAREFUL WHEN WORKING ON ENERGISED ELECTRICAL SYSTEMS. THESE SYSTEMS CAN CAUSE INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT.

WARNING: WHEN CARRYING OUT STEP 12 ELECTRICAL POWER WILL BE SUPPLIED TO CONNECTOR D2022.

Close this circuit breaker:

C01062 R SPAR VALVE Panel P6-1.

13. Make sure there is 21 to 34V DC between pins 4(-) and 5(+) of connector D2022.
14. Make sure there is 21 to 34V DC between pins 4(-) and 6(+) of connector D2022.
15. Open this circuit breaker and attach 'DO NOT CLOSE' tag:

C01062 R SPAR VALVE Panel P6-1.

16. Connect electrical connector D2022 to the Fuel Shutoff Valve for engine No.2.

17. Remove the 'DO NOT CLOSE' tags and close the following circuit breakers:

C778	Fire Extinguishing Eng L BTL 1	Panel P6-1
C779	Fire Extinguishing Eng R BTL 1	Panel P6-1
C786	Fire Extinguishing Eng L BTL 2	Panel P6-1
C787	Fire Extinguishing Eng R BTL 1	Panel P6-1
C01061	L Spar Valve	Panel P6-1
C01062	R Spar Valve	Panel P6-1

18. Remove electrical power from the aircraft AMM TASK 24-22-00-862-028.
19. If the voltages measured were not in the range 21 to 37V DC between pins 4 and 5 or pins 4 and 6 in any steps of the test, use the usual procedures to locate and repair the wiring discontinuity (WDM 28-22-21).

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 28-536

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).
CAA DESIGN APPROVAL No. DAI/8566/78.

Manual Reference 28-41-04 Page 401

REASON FOR REVISION

To advise of a cross connection possibility.

ACTION

TASK 28-41-04-004-001

2. Remove the Fuel Quantity Indicator

Ref Para B step (6)

Read the following additional caution

CAUTION: CROSS CONNECTION POSSIBILITY WHEN WORKING WITH THIS COMPONENT. CLEARLY IDENTIFY CONNECTIONS UPON DISCONNECTION AND FUNCTION CHECK UPON RECONNECTION.

TASK 28-41-04-404-007

3. Install the Fuel Quantity Indicator

Ref Para C step (1)

Read the following additional caution

CAUTION: CROSS CONNECTION POSSIBILITY WHEN WORKING WITH THIS COMPONENT. POSITIVELY IDENTIFY CONNECTIONS PRIOR TO RECONNECTION.

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R 710	JAN 20/09	01.1
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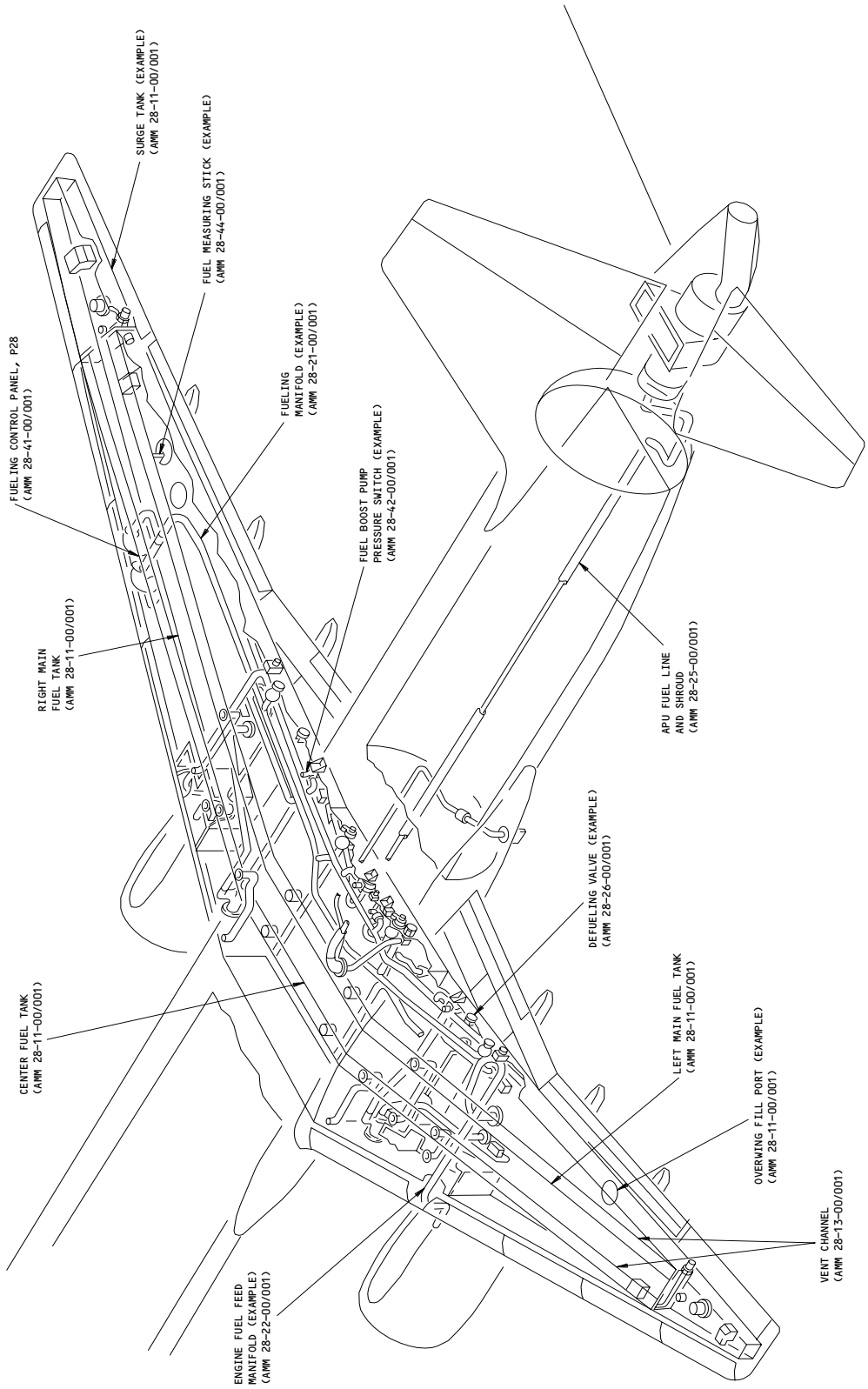
FUEL-GENERAL - DESCRIPTION/OPERATION

1. General (Fig. 1 and 2)
   A. The airplane fuel system keeps fuel and distributes it to the engines and auxiliary power unit (APU). The fuel system also has equipment for pressure fueling and defueling and for fuel quantity measurement.
   B. Fuel Tanks
      (1) Two main fuel tanks and one center fuel tank keep fuel for the engines and APU (AMM 28-11-00/001). A surge tank near each wing tip supplies main tank overflow containment and venting. A drain check valve installed inboard of each surge tank lets fuel collected in the surge tanks return to the main fuel tanks but prevents fuel from the main fuel tank from going into the surge tanks. Overwing fill ports for each main fuel tank permit manual overwing fueling (AMM 28-11-00/001). Access doors on the wing lower surface permit access into the fuel tanks for inspection or component repair. Sump drain valves at the low point of each fuel tank permit the drainage of fuel tank contaminants, condensation, and fuel.
   C. Venting
      (1) The fuel vent system (AMM 28-13-00/001) supplies venting from each fuel tank to the surge tanks to prevent pressure/vacuum build-up. The surge tanks vent out of the fuel tanks through a vent scoop. A pressure relief valve in each surge tank supplies backup venting if flame arrester blockage occurs. Float valves prevent fuel from going into the vent channels. A flame arrestor also prevents external flame from going into the surge tank through the vent scoop.
   D. Fueling
      (1) The fueling system (AMM 28-21-00/001) supplies automatic and manual fueling capability. The fueling control panel, P28, on the right wing leading edge supplies control for the fueling process. Four fueling shutoff valves, one for each main and two for the center fuel tank, control the supply of fuel from the fueling adapters to the three fuel tanks. A load select control, controlled by the Fuel Quantity Indication System (FQIS) processor (AMM 28-41-00/001), supplies automatic control of fueling. The load select control automatically closes the applicable fueling shutoff valves when the selected fuel load is reached.
      (2) The volumetric top-off function and the overfill control function supply backup for the load select system. The volumetric top-off, controlled by the FQIS processor, closes the fueling shutoff valves when the fuel tanks are full. The overfill control has an fuel level sensor in each surge tank and a control card for the fuel level sensor. The overfill system closes the fueling shutoff valves when the fuel level sensor detects fuel entering the surge tanks.
      (3) Overwing fill ports supply access for manual fueling of each main fuel tank (AMM 28-11-00/001).



Fuel System
Figure 1

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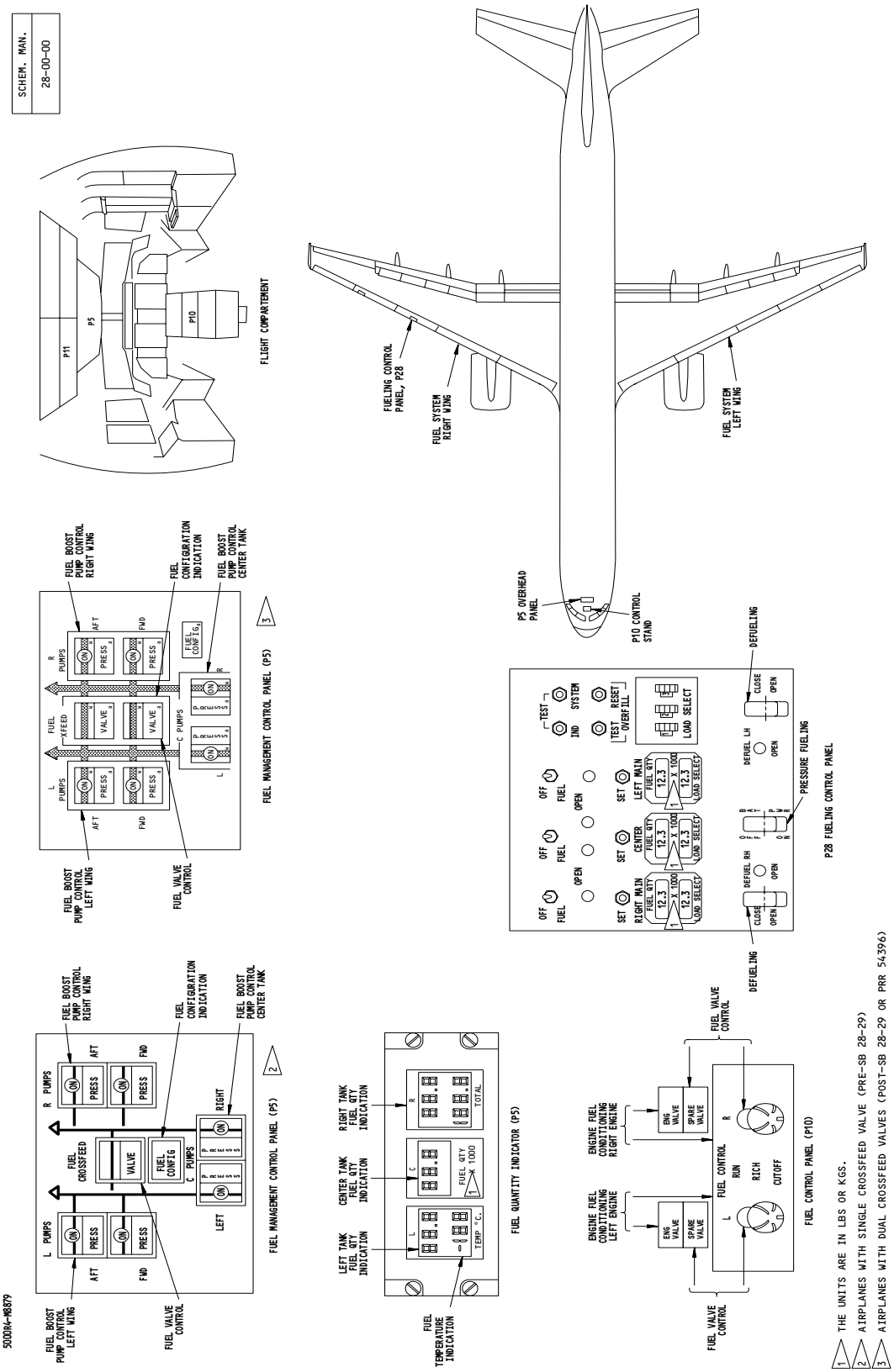

Fuel System Control and Indication Schematic
Figure 2

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E. Engine and APU Fuel-Feed
   (1) The fuel-feed systems supply fuel to the main engines (AMM 28-22-00/001) and the APU (AMM 28-25-00/001). Four fuel boost pumps (AC), two in each main fuel tank, and two fuel override pumps (AC), in the center fuel tank, usually supply fuel to the engines. The left forward fuel boost pump in the left main fuel tank usually supplies fuel to the APU. Switchlights on the fuel management control panel on the P5 panel control the fuel boost pumps (AC).
   (2) An APU DC fuel pump supplies backup fuel-feed to the APU if the left forward fuel boost pump (AC) fails or AC power is not available. A pressure switch for APU fuel shutoff, found in the engine fuel-feed manifold in the left main fuel tank, supplies pressure information for the AC/DC pump control circuit during APU operation. A crossfeed system supplies fuel through a engine fuel crossfeed valve from any fuel tank to either engine. A switchlight on the P5 panel controls the engine fuel crossfeed valve.

F. Defueling
   (1) Two defueling valves let fuel go into the fueling manifold from the engine fuel-feed manifold for defueling. The main fuel tanks can be suction defueled or pressure defueled. The center fuel tank must be pressure defueled. A switch for each defueling valve on the fueling control panel, P28, controls the defueling valves.

G. Fuel Quantity Indicating and Measurement
   (1) The fuel quantity indicating system (AMM 28-41-00/001) has tank units, compensators, and densitometers that supply fuel volume and density measurements to the FQIS processor. The FQIS processor uses these measurements to compute the weight of the fuel in each fuel tank. The fuel quantity indicator on the P5 panel shows the fuel weight in each fuel tank as well as the total fuel quantity. Fuel measuring sticks attached to the inside of some fuel tank access doors supply a means to measure fuel quantity manually (AMM 28-44-00/001).

H. System Protection and Fault Isolation
   (1) Fuel system protection and fault isolation consists of the Engine Indication and Crew Alerting System (EICAS) (AMM 31-41-00/001) and the FQIS processor functions. EICAS supplies status, caution, advisory faults or maintenance messages during airplane operation and for later recall by ground maintenance crews. The FQIS processor supplies protection and fault isolation only for the FQIS portion of the fuel system.

I. Fuel Temperature Indication
   (1) A fuel temperature sensor in the right main fuel tank supplies temperature input to the fuel temperature indicator on the P5 panel.

J. Fuel Pressure Indicating
   (1) A pressure switch connected to each fuel boost pump and fuel override pump supplies low pressure indication to each EICAS computer and to a low pressure light on the P5 panel (AMM 28-42-00/001).

FUEL SYSTEM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains these tasks:
      (1) Airworthiness Limitation Precautions
      (2) Examine the Fuel Boost Pumps
      (3) Inspection of the Electrical Bonding Jumpers in the Fuel System
      (4) Fuel System Electrical Bonding Jumper Replacement
      (5) Fuel System Static Bond Path, No. 1 Tank - Inspection
      (6) Fuel System Static Bond Path, No. 2 Tank - Inspection
      (7) Fuel System Static Bond Path, Center Tank - Inspection
   B. The inspection of the boost pumps is part of an inspection to find if there is fuel contamination in the fuel systems. To complete the inspection of the fuel systems for fuel contamination do a check on the engine equipment (Chapter 71), the engine fuel system (Chapter 73) and the APU (Chapter 49).

TASK 28-00-00-912-036

2. Airworthiness Limitation Precautions
   A. General
      (1) Critical Design Configuration Control Limitations (CDCCLs)
         (a) All occurrences of CDCCLs found in this chapter of the AMM are identified by this note after each applicable CDCCL design feature:
            1) NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

         (b) Design features that are CDCCLs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88, and can be found in Section 9 of the Maintenance Planning Data (MPD) document. CDCCLs are a means of identifying certain design configuration features intended to preclude a fuel tank ignition source for the operational life of the airplane. CDCCLs are mandatory and cannot be changed or deleted without the approval of the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency. A critical fuel tank ignition source prevention feature may exist in the fuel system and its related installation or in systems that, if a failure condition were to develop, could interact with the fuel system in such a way that an unsafe condition would develop without this limitation. Strict adherence to configuration, methods, techniques, and practices as prescribed is required to ensure the CDCCL is complied with. Any use of parts, methods, techniques or practices not contained in the applicable CDCCL must be approved by the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency.

(2) Airworthiness Limitation Instructions (ALIs)

(a) All occurrences of fuel tank system ALIs found in this chapter of the AMM are identified by this step after the General section in the applicable ALI inspection task:

1) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

(b) Inspection tasks that are ALIs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88, and can be found in Section 9 of the Maintenance Planning Data (MPD) document. These ALIs identify inspection tasks related to fuel tank ignition source prevention which must be done to maintain the design level of safety for the operational life of the airplane. These ALIs are mandatory and cannot be changed or deleted without the approval of the FAA officethat is responsible for the airplane model Type Certificate, or applicable regulatory agency. Strict adherence to methods, techniques and practices as prescribed is required to ensure the ALI is complied with. Any use of methods, techniques or practices not contained in these ALIs must be approved by the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency.

B. Access

(1) Location Zones

100 Lower Half of Fuselage
200 Upper Half of Fuselage
500 Left Wing
600 Right Wing

C. Critical Design Configuration Control Limitations (CDCCLs)

S 912-039

WARNING: OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO ANY MAINTENANCE THAT MAY AFFECT A CDCCL. IF YOU DO NOT FOLLOW THE PROCEDURES, IT CAN INCREASE THE THE RISK OF A FUEL TANK IGNITION SOURCE.

(1) Make sure you follow the procedures for items identified as CDCCLs.

D. Airworthiness Limitation Instructions (ALIs)

S 912-040

WARNING: OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO ANY MAINTENANCE THAT MAY AFFECT AN ALI. IF YOU DO NOT FOLLOW THE PROCEDURES, IT CAN INCREASE THE RISK OF A FUEL TANK IGNITION SOURCE.

(1) Make sure you follow the procedures for tasks identified as ALIs.

TASK 28-00-00-212-001

3. Examine the Fuel Boost Pumps

A. References

(1) AMM 28-11-00/701, Fuel Tanks

(2) AMM 28-22-03/401, Main Tank Fuel Boost Pump

B. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

C. Procedure - Examine the Fuel Boost Pumps

S 012-002

(1) Remove the pump motor and the impeller unit from the housing (AMM 28-22-03/401).

S 212-003

(2) If you find corrosion in one of the pumps, examine all of the applicable tanks and the fuel system components as soon as possible.

S 172-004

(3) Clean the applicable fuel tanks (AMM 28-11-00/701) and flush the fuel lines with clean fuel.

S 032-005

(4) Remove, disassemble, and clean or replace the airplane fuel system components.

S 412-006

(5) Install the pump motor and the impeller unit (AMM 28-22-03/401).

TASK 28-00-00-282-024

4. Fuel System Static Bond Path, No. 1 Tank - Inspection

A. References

(1) AMM 28-11-00/201, Fuel Tanks

(2) AMM 28-11-01/401, Main Tank Access Door
(3) DWG 343N4001, Tubing Instl - Engine Fuel Feed System
(4) DWG 344N4001, Tubing Instl - Fueling System
(5) DWG 346N3001, APU Fuel Feed - Instl - Wing

B. Access
(1) Location Zones
541 Main tank - rib No. 5 to No. 17 (Left)
542 Main tank - rib No. 17 to No. 21 (Left)

C. Procedure

S 282-025
(1) For the area in the No. 1 main tank between rib No. 5 and rib No. 21, do these steps:
(a) Remove the applicable access panels on the left wing (AMM 28-11-01/401).
(b) Go into the No. 1 main tank (AMM 28-11-00/201).
(c) Do this task for all bonding jumpers between rib No. 5 and rib No. 21: Inspection of the Electrical Bonding Jumpers in the Fuel System.
1) Refer to drawings 343N4001, 344N4001 and 346N3001 for bonding jumper locations.
(d) If access is not necessary for subsequent tasks, install the access panels you removed (AMM 28-11-01/401).

TASK 28-00-00-282-027

5. Fuel System Static Bond Path, No. 2 Tank - Inspection

A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door
(3) DWG 343N4001, Tubing Instl - Engine Fuel Feed System
(4) DWG 344N4001, Tubing Instl - Fueling System
(5) DWG 346N3001, APU Fuel Feed - Instl - Wing

B. Access
(1) Location Zones
641 Main tank - rib No. 5 to No. 17 (Right)
642 Main tank - rib No. 17 to No. 21 (Right)

C. Procedure

S 282-026

(1) For the area in the No. 2 main tank between rib No. 5 and rib No. 21, do these steps:

(a) Remove the applicable access panels on the right wing (AMM 28-11-01/401).

(b) Go into the No. 2 main tank (AMM 28-11-00/201).

(c) Do this task for all bonding jumpers between rib No. 5 and rib No. 21: Inspection of the Electrical Bonding Jumpers in the Fuel System.

1) Refer to drawings 343N4001, 344N4001 and 346N3001 for bonding jumper locations.

(d) If access is not necessary for subsequent tasks, install the access panels you removed (AMM 28-11-01/401).

TASK 28-00-00-282-028

6. Fuel System Static Bond Path, Center Tank - Inspection

A. References

(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-02/401, Center Tank Access Door
(3) DWG 343N4001, Tubing Instl - Engine Fuel Feed System
(4) DWG 344N4001, Tubing Instl - Fueling System
(5) DWG 346N3001, APU Fuel Feed - Instl - Wing

B. Access

(1) Location Zones

134	Wing Center Section (Right)
194	Wing to Body - Forward Lower Half (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Wing Tank Access Door
194ER	Air Conditioning Access Door
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
531CB	Center Tank Access Door (Right)

C. Procedure

S 282-029

(1) For the area in the left center tank between the Side-of-Body rib and rib No. 5, do these steps:
   (a) Remove the applicable access panels for the left center tank (AMM 28-11-02/401).
   (b) Go into the left center tank (AMM 28-11-00/201).
   (c) Do this task for all bonding jumpers between the Side-of-Body rib and rib No. 5: Inspection of the Electrical Bonding Jumpers in the Fuel System.
      1) Refer to drawings 343N4001, 344N4001 and 346N3001 for bonding jumper locations.
   (d) If access is not necessary for subsequent tasks, install the access panels you removed (AMM 28-11-02/401).

S 282-030

(2) For the area in the right center tank between the Side-of-Body rib and rib No. 5, do these steps:
   (a) Remove the applicable access panels for the right center tank (AMM 28-11-02/401).
   (b) Go into the right center tank (AMM 28-11-00/201).
   (c) Do this task for all bonding jumpers between the Side-of-Body rib and rib No. 5: Inspection of the Electrical Bonding Jumpers in the Fuel System.
      1) Refer to drawings 343N4001, 344N4001 and 346N3001 for bonding jumper locations.
   (d) If access is not necessary for subsequent tasks, install the access panels you removed (AMM 28-11-02/401).

S 282-031

(3) For the area in the center section of the center tank between the Side-of-Body ribs, do these steps:
   (a) Remove the applicable access panels for the center section of the center tank (AMM 28-11-02/401).
   (b) Go into the center tank (AMM 28-11-00/201).
   (c) Do this task for all bonding jumpers between the Side-of-Body ribs: Inspection of the Electrical Bonding Jumpers in the Fuel System.
      1) Refer to drawings 343N4001, 344N4001 and 346N3001 for bonding jumper locations.

(d) If access is not necessary for subsequent tasks, install the access panels you removed (AMM 28-11-02/401).

TASK 28-00-00-202-041

7. Inspection of the Electrical Bonding Jumpers in the Fuel System

A. General

(1) This task contains visual and mechanical inspections of the electrical bonding jumpers in the fuel system.

(2) Do not flex, bend or kink the bonding jumpers more than is necessary. If the bonding jumpers are moved too much, it can cause the loss of tin plating on the wire braid of the bonding jumper.

(3) When you inspect the bonding jumpers you may see black or brown deposits on the wire braid. This can occur when there is deterioration of the tin plating on the bonding jumper and the copper in the wire reacts with the sulfur compounds. This discoloration is not a problem unless the wire braid has broken strands. If the bonding jumper has broken strands, then you must replace the bonding jumper.

(4) When you inspect the bonding jumpers, inspect for loose clamps and corrosion.

B. References

(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door
(3) AMM 28-11-02/401, Center Tank Access Door
(4) AMM 28-26-00/201, Defueling
(5) SWPM 20-20-00, Electrical Bonds and Grounds

C. Access

(1) Location Zones

133	Wing Center Section (left)
134	Wing Center Section (Right)
511	Leading Edge To Front Spar (left)
611	Leading Edge To Front Spar (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tanks Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel (Left)
611FB	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

D. Prepare for the Electrical Bonding Jumper Inspection

S 652-042

(1) Defuel the applicable fuel tanks (AMM 28-26-00/201).

S 012-043
(2) Remove the applicable main or center tank access doors (AMM 28-11-01/401, AMM 28-11-02/401).

S 942-044

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Go into the applicable fuel tank (AMM 28-11-00/201).

E. Electrical Bonding Jumper Visual Inspection

S 212-045
(1) Visually inspect the bonding jumper and clamp for color and deterioration.
(a) If the bonding jumper is silver in color and is free from black or brown deposits, then the bonding jumper is satisfactory.
(b) If the wire braid on the bonding jumper has black or brown deposits, then inspect the bonding jumper for broken strands.
(c) If the wire braid does not have broken strands, then the bonding jumper is satisfactory.
(d) If the wire braid has broken strands, then do this task: Fuel System Electrical Bonding Jumper Replacement.

F. Electrical Bonding Jumper Mechanical Inspection

S 772-046
(1) Try to turn the bonding jumper lugs and tube clamps, if applicable, with light finger pressure.

S 772-047
(2) If the bonding jumper is loose, rework the electrical bond path (SWPM 20-20-00).

TASK 28-00-00-422-050

8. Fuel System Electrical Bonding Jumper Replacement

A. References
(1) SWPM 20-20-00, Electrical Bonds and Grounds

B. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Ceter Section (Right)
511 Leading Edge To Front Spar (Left)
611 Leading Edge To Front Spar (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tanks Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel (Left)
611FB	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

C. Replace the Electrical Bonding Jumper

S 022-051

(1) Remove the bonding jumper.

(a) Keep all the parts necessary for the installation of the bonding jumper.

S 422-052

(2) For the bonding jumpers used to bond electrical equipment, follow the applicable installation procedure in the AMM.

S 422-053

(3) For the bonding jumpers used to bond mechanical equipment or tubing, install the new bonding jumper and hardware (SWPM 20-20-00)>

(a) Make sure the mating surface(s) are correctly prepared.

(b) Make sure the bonding jumper installation gives adequate clearance from the structure, tubing or all fuel system parts.

NOTE: This will prevent abrasion.

S 282-054

(4) Do the "Electrical Integrity Check of the Fuel System Bond Path" procedure.

D. Electrical Integrity Check of the Fuel System Bond Path

NOTE: SWPM 20-20-00 defines the measurement processes necessary for installation of electrical bonding hardware. The fuel sytem tubing and components often incorporate multiple electrical bonds in series between the component and the primary structure. The measurement of the tubing or component bond is a separate requirement.

S 452-055

(1) For the bonding jumper hardware installations, do the jumper resistance measurement for electrical integrity (SWPM 20-20-00).

S 452-056

(2) For the fuel system tubing or components, do the subsequent steps:

S 452-057

(3) Measure the total resistance from the tubing or components, to the adjacent primary structure.

S 772-058

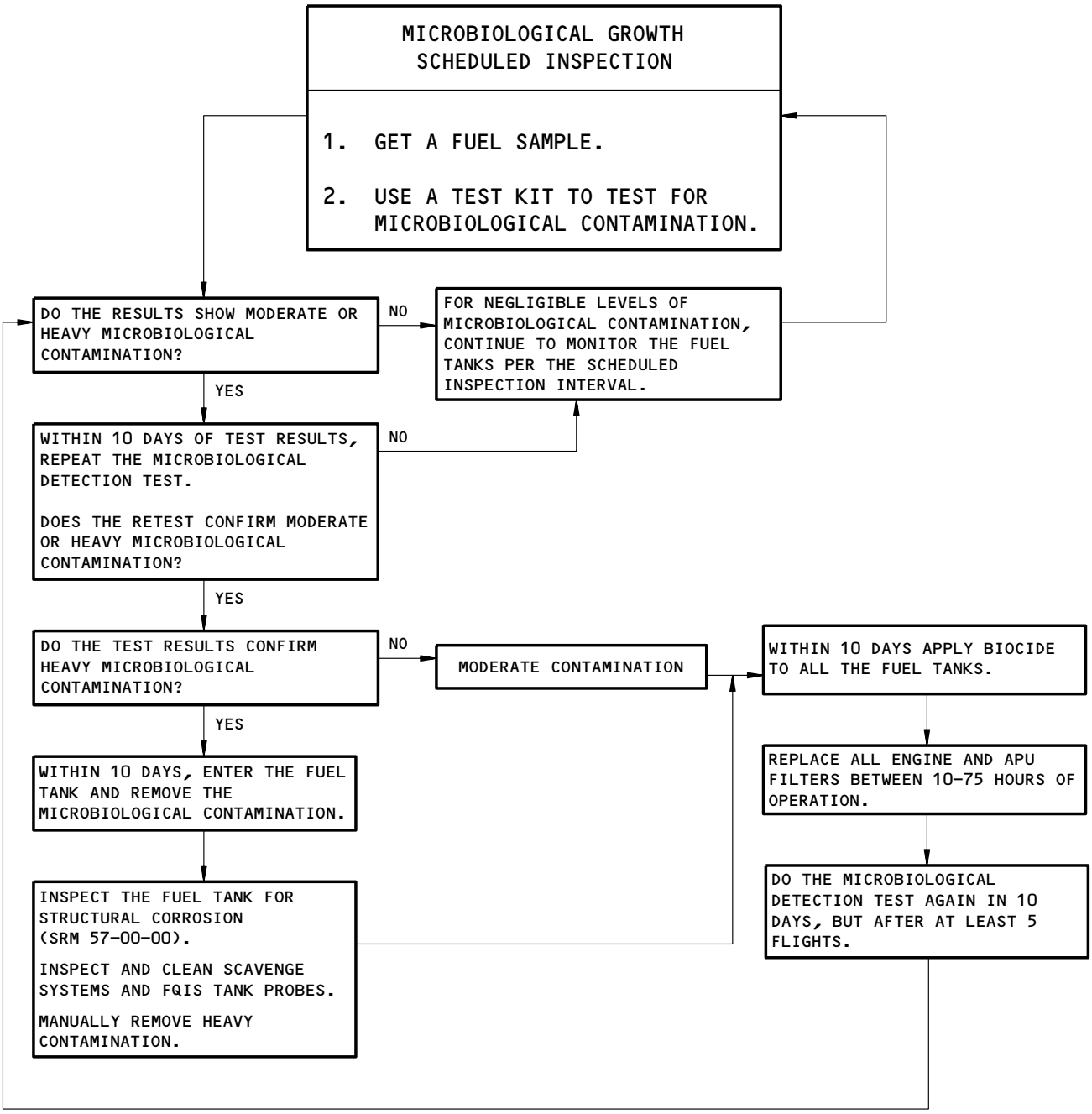
(4) Make sure the resistance is 0.10 ohm (100 milliohms) or less.

MICROBIAL GROWTH - MAINTENANCE PRACTICES

1. General
   A. This procedure contains these tasks:
      (1) Detection Test for Microbial Growth
      (2) Treatment of Fuel Tanks Contaminated With Microbial Growth
      (3) Biocide Treatment of Fuel Tanks - Metered Injection Cart
      (4) Biocide Treatment of Fuel Tanks - Overwing Fuel Port
      (5) Microbial Growth Removal - Manual Removal Method
      (6) Microbial Growth Removal - Pressure Washer Method
   B. Contamination in fuel tanks and structural corrosion can result from the presence of microorganisms, which live and multiply at the interface of fuel and water.
   C. Figure 201 provides an overview of actions necessary to detect, treat and remove microbial contamination. CPM 20-62-00, Preventative Methods, gives more information about microbial growth and the microbial growth prevention program.

TASK 28-10-00-202-001

2. Detection Test for Microbial Growth (Fig. 201)
   A. General
      (1) Use a microbial detection kit or laboratory standard test to check the fuel/water samples taken from each fuel tank. A positive result for microbial contamination requires action that may include a biocide treatment or physical removal of the growth from the fuel tanks.
      (2) These are the approved test kits:
         (a) FUELSTAT
         (b) Easicult Combi
         (c) MicrobMonitor 2
         (d) HY-LiTE Jet A-1 Fuel Test
         (e) The fuel samples can also be sent to a laboratory for testing. IP385 is the Institute for Petroleum's test for microbial contamination.
      (3) All instructions supplied with the detection kits should be followed closely. It is important to retest if a detection test shows microbial contamination. Differences in the fuel/water sample and the ability of the detection kits to consistently measure the level of microbial growth make it important to retest and verify test results. Do not compare the test results between the different types of detection kits.
      (4) All time intervals listed in this task are recommendations. There is no MMEL or scheduled maintenance requirements for testing for microbial contamination.
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Panels and Doors
      (2) AMM 12-11-03/301, Fuel Tank Sumping



NOTE: IF THE DETECTION TEST SHOWS MICROBIAL GROWTH, THEN DO THE SCHEDULED INSPECTION TEST MORE OFTEN.

NOTE: AFTER A TREATMENT WITH BIOCIDE, DON'T TEST AGAIN UNTIL YOU FLY AT LEAST 5 FLIGHTS. THIS IS TO MAKE SURE THE FUEL TREATED WITH BIOCIDE IS FULLY REMOVED FROM THE FUEL TANKS BEFORE THE NEXT TEST.

NOTE: IF THE BIOCIDE TREATMENT IS NOT EFFECTIVE USING A 1/3 FUEL LOAD, USE A BIOCIDE TREATMENT WITH A FULL FUEL LOAD AND USE THE MAXIMUM SOAK TIME. THE CONTAMINATION MAY BE TOWARDS THE TOP OF THE TANK.

Microbial Growth - In Fuel Tanks
Figure 201

(3) CPM 20-62-00, Preventative Methods

C. Equipment

(1) Microbial Contamination Test Kits:
Use one of these:

(a) MicrobMonitor2
Hemel Hempstead, UK
Tel: +44 (0) 1442 225711
Fax: +44 (0) 1442 223960
Email: microbmonitor2@bp.com

(b) Fuelstat Resinae
Conidia Bioscience (Manufacturer)
Bakeham Lane, Egham, Surrey, TW20 9TY, UK
Tel: +44 (0) 1491 829012
Fax: +44 (0) 1491 829100
Email: info@conidia.com
or
SATAIR A/S - Amagerlandevej 147A, 2770 Kastrup, Denmark
SATAIR USA Inc - 4260 Frontage Rd, Atlanta, Georgia USA
SATAIR ASIA PTE Ltd - 8 Loyang Link, Singapore
Transworld Aviation Ltd - Jebel Ali Free Zone, Dubai, UAE

(c) Easicult Combi
Orion Diagnostica (Manufacturer)
P.O. Box 83, 02101 Espoo, Finland

Tel: 358-9-429-2888
Fax: 358-9-429-2794
or
Metalworking Chemicals & Equipment Co., Inc
P.O. Box 990, 34 Main Street, Lake Placid
New York USA 12946
Tel: (518) 523-2355
Fax: (518) 523-2821

(d) FQS HY-LiTE Jet A-1 Fuel Test
Merck KGaA, Germany
Distributor: Fuel Quality Services Inc.
P.O. Box 1380
Flowery Branch, GA 30542
Tel USA: 1-800-827-9790
Fax USA: 770-967-9982
www.fqsinc.com

(2) Use one of these:

(a) Fuel Sampling Kit, P/N 100-1028-04 (or equivalent)
Shaw Aero Devices, Inc.
3580 Shaw Boulevard
Naples, Florida 34117-8408
Tel: (941) 304-1000
Fax: (941) 304-1088
Email: www.shawaero.com

(b) A12001-14 Fuel Sampling Equipment

(3) Fuel sample bottle - glass or fuel-resistant plastic

(4) Protective equipment:
(a) Eye protection
(b) Clean fuel resistant gloves
(c) Clean protective outerwear.

D. Consumable Materials
(1) B00130 Alcohol - Isopropyl, to clean the equipment
(2) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

E. Access
(1) Location Zones
193 Wing to Body - Forward Lower Half (Left)
194 Wing to Body - Forward Lower Half (Right)
500 Main Tank (Left)
600 Main Tank (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

(2) Access Panels
193GL Fuel Drain Access Door (Left)
194DR Fuel Drain Access Door (Right)

F. Clean the Fuel Sampling Equipment

S 282-002
(1) You must wear protective equipment when you clean, sample and test for microbial growth. Protective equipment includes:
(a) Eye protection
(b) Clean fuel resistant gloves
(c) Clean protective outerwear.

S 282-003
(2) Do these steps to clean the fuel sampling equipment:
(a) Mix a solution of one part tap water to three to four parts isopropyl alcohol.
(b) Clean these items with the alcohol solution:
1) Sump drain tool
2) Sump drain container
3) Fuel sample container (if reused)
(c) Air dry the fuel sampling equipment.
(d) Make sure the fuel sampling equipment is free from residue alcohol.
(e) Protect the containers from contamination.

S 282-004
(3) Do these steps to clean the sump drain area:
(a) Mix a solution of one part water to three to four parts isopropyl alcohol.
(b) Thoroughly clean the exterior area of the fuel sump drain with the alcohol solution.
(c) Air dry the sump area.
(d) Repeat for each sump drain.

G. Collect the Fuel Sample

S 282-005
(1) Make sure the sump drain container and the fuel sample container are clean and dry.

S 282-006
(2) Do these steps to collect a fuel sample:

NOTE: Each fuel sample must be collected separately for each fuel tank and stored in separate sample containers.

(a) Use the fuel sump drain to get a fuel sample (AMM 12-11-03/301).
(b) Fill the sump drain container with approximately one quart (one liter) of fuel.
(c) If possible, make sure the fuel sample contains some visible water (free water) and some fuel.
(d) Pour the fuel from the sump drain container into the fuel sample container.
(e) Do not add any additives, such as food coloring, to identify the presence of water.

S 282-007
(3) After you collect the fuel sample, do these steps:
(a) Install the cover on the sample container.
(b) Label each fuel sample with a date, airplane and fuel tank identification.
(c) Protect the fuel samples from contamination.

S 282-008
(4) Continue to collect fuel samples for the remaining tanks.
(a) Clean the fuel sampling equipment again before you collect a new sample.
(b) Make sure to collect a fuel sample from each tank.

H. Microbial Growth Detection Test

S 282-009
(1) Test the sample within 6 hours of collection if possible, but no more than 24 hours after collection.

NOTE: After you collect the fuel sample, any microbial growth in the sample will start to die.

S 282-010
(2) Use one of the approved test kits to test the fuel samples.

S 282-011
(3) Follow all instructions supplied with the test kit.

NOTE: Some test kits will not function correctly if fuel is tested. Even traces of fuel can coat the test slide and prevent the microbes from growing. Other test kits can test either fuel or free water, but free water is recommended.

I. Initial Test Results

S 282-012
(1) Use the data supplied with the test kit to define the level of microbial growth:
(a) Negligible contamination
(b) Moderate contamination
(c) Heavy contamination

S 282-013
(2) If the test confirms negligible levels of contamination, then do these steps:
(a) Continue with the usual operations.
(b) Continue to test the aircraft at the usual intervals.

S 282-014
(3) If the initial test results are positive for moderate or heavy levels of microbial contamination, then do these steps:
(a) Within 10 days (after receipt of test results) get a new fuel sample.
(b) Repeat the microbial detection test with the same test method.
(c) Confirm the level of microbial contamination.

J. Retest Results

S 282-015
(1) If the retest confirms negligible levels of microbial contamination, then do these steps:
(a) Continue with the usual operations.
(b) Continue to test the aircraft at the usual intervals.

S 282-016

(2) If the retest confirms moderate levels of microbial contamination, then do these steps:
   (a) Within 10 days (after receipt of test results) schedule a biocide treatment to kill the microbial growth.
   (b) Do the subsequent task for moderate levels of contamination.

S 282-017

(3) If the retest confirms heavy levels of microbial contamination, then do these steps:
   (a) Within 10 days (after receipt of test results) schedule a task to go into the fuel tank(s) to inspect and remove the microbial growth.
   (b) Do the subsequent task for heavy levels of microbial contamination.

TASK 28-10-00-602-018

3. Treatment of Fuel Tanks Contaminated With Microbial Growth (Fig. 201)
   A. General
      (1) A positive result for moderate or heavy levels of microbial contamination requires action that may include a biocide treatment or physical removal of the growth from the fuel tanks.
      (2) All time intervals listed in this task are recommendations. There is no MEL or scheduled maintenance requirements for testing for microbial contamination.
   B. References
      (1) AMM 12-11-03/301, Fuel Tank Sumping
      (2) AMM 28-11-00/201, Fuel Tank
      (3) AMM 28-26-00/201, Defuel
      (4) AMM 49-31-04/401, APU Fuel Filter
      (5) AMM 73-11-10/401, Low Pressure Engine Fuel Filter
      (6) SRM 51-00-00
      (7) SRM 57-00-00, Wings
   C. Equipment
      (1) Protective outer clothing to prevent skin contact with microbial contamination:
         (a) Fuel and solvent resistant gloves
         (b) Saranex suit
         (c) Neoprene boots
         (d) Respirator - Half face canister style respirators (minimum), U.S. Bureau of Mines Approved or equivalent

D. Access

(1) Location Zones

134	Wing Center Section (Right)
193	Wing to Body - Forward Lower Half (Left)
194	Wing to Body - Forward Lower Half (Right)
500	Main Tank (Left)
600	Main Tank (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Wing Access Door (Center)
193GL	Fuel Drain Access Door (Left)
194DR	Fuel Drain Access Door (Right)
194ER	Air Conditioning Access Door
531AB thru 531CB	Center Tank Access Door (Left)
631AB thru 631CB	Center Tank Access Door (Right)
541AB thru 542DB	Fuel Tank Access Doors, (Left)
641AB thru 642DB	Fuel Tank Access Door, (Right)

E. Treatment of Fuel Tanks with Moderate Levels of Microbial Contamination

NOTE: It is recommended to apply biocide to all tanks within 10 days after positive results for moderate levels of microbial contamination.

S 622-019

(1) Within 10 days (after receipt of positive test results) do these steps:
   (a) Do a biocide treatment for all of the fuel tanks.
   (b) Return the airplane to service.
   (c) Make sure all of the biocide treated fuel has been burned through the engines (a minimum of five flights).
   (d) After 10 and before 75 flight hours, replace these filters:
      1) Low Pressure Engine Fuel Filter (AMM 73-11-10/401)
      2) APU fuel filter (AMM 49-31-04/401).

S 622-020

(2) After the biocide treatment do these steps:
   (a) Wait for 10 days after the biocide treatment.
   (b) Get a new fuel sample for each tank.
   (c) Do the microbial growth detection test again.

(d) If the tests show that the biocide treatment was not successful, do these steps:
1) Completely fill the fuel tanks with biocide treated fuel.
2) Use the maximum soak time:
a) Biobor JF - 72 Hours
b) Kathon FP 1.5 - 24 Hours
(e) If the tests show that the biocide treatment was successful, then continue to test the aircraft at the usual intervals.

F. Treatment of Fuel Tanks with Heavy Levels of Microbial Contamination

NOTE: If the detection test (and retest) confirms heavy levels of microbial contamination, then do this procedure. It is recommended to do a fuel tank entry within 10 days after positive results for heavy levels of microbial contamination.

S 622-021
(1) Within 10 days (after receipt of test results) schedule a task to inspect the fuel tank(s) for microbial growth.

S 622-022
(2) Do these steps to prepare for the fuel tank inspection:

WARNING: CAREFULLY DO ALL THE SAFETY PROCEDURES TO GO INTO A FUEL TANK. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR IF YOU DO NOT OBEY THE SAFETY PROCEDURES.

(a) Defuel and drain the applicable fuel tank(s) (AMM 28-26-00/201).
(b) Prepare for a fuel tank entry (AMM 28-11-00/201).
(c) Make sure the fuel tank has a sufficient flow of air.

WARNING: WEAR AN APPROVED RESPIRATOR AND PROTECTIVE CLOTHING BEFORE YOU ENTER A FUEL TANK CONTAMINATED WITH MICROBIAL GROWTH. IF YOU BREATHE AIR CONTAMINATED WITH MICROBIAL GROWTH RESIDUE OR ALLOW THE MICROBIAL GROWTH TO TOUCH YOUR SKIN, POSSIBLE HEALTH PROBLEMS CAN OCCUR.

(d) Put on this protective gear to prevent contact with microbial growth:
1) Respirator - Half face canister style respirators (minimum)
2) Eye protection
3) Fuel resistant gloves
4) Saranex suit
5) Neoprene boots
(e) Go into the fuel tank (AMM 28-11-00/201).

S 212-023
(3) Examine the fuel tank for microbial growth:
  (a) Microbial growth usually occurs at the fuel/water interface in the fuel tanks.
  (b) Microbial growth can also occur in other areas such as vertical surfaces and convex shapes such as fuel tubing.
  (c) Microbial growth can appear in a variety of colors.
  (d) If a tank is wet with fuel, the microbial growth can appear as a smooth slimy transparent gel material.
  (e) If a tank is dry, the microbial growth can appear as a dark solid material on the tank surfaces.
  (f) Microbial growth can cause the tank protective primer coating to appear stained.

S 212-024
(4) Microbial growth is usually found in these areas:
  (a) The bottom of the tank where water collects.
  (b) The lower surfaces of the wing structure (stringers, spars, ribs etc).
  (c) The top surfaces of the tubing.
  (d) The flow holes and the drain tubes.
  (e) Areas where water is possibly trapped.
  (f) Inside or around fuel system components.

S 622-025
(5) Do these steps if you find microbial growth:
  (a) Do the applicable task to remove the microbial growth:
    1) Microbial Growth Removal - Manual Removal Method
    2) Microbial Growth Removal - Pressure Washer Removal Method
  (b) Examine the fuel tank structure for corrosion (SRM Chapter 57).

S 622-026
(6) Do these steps after you clean the fuel tank:
  (a) Do the inspection for the remaining tanks that have tested positive for microbial growth.
  (b) Do this task: Fuel Tank Closure (AMM 28-11-00/201).
  (c) Do a biocide treatment of the fuel tanks.
  (d) Return the airplane to service.
  (e) Within 10 days, get a new fuel/water sample and do the microbial detection test again.

    NOTE: This test is necessary to make sure the microbial growth removal and biocide treatment processes have reduced the level of microbial contamination to an acceptable level.

(f) Make sure all of the biocide treated fuel has been burned through the engines (a minimum of five flights).
(g) After 10 and before 75 flight hours, replace these filters:
1) Low Pressure Engine Fuel Filter (AMM 73-11-10/401)
2) APU fuel filter (AMM 49-31-04/401).

S 622-027
(7) After the biocide treatment do these steps:
(a) Wait for 10 days after the biocide treatment.
(b) Get a new fuel sample for each tank.
(c) Do the microbial growth detection test again.
(d) If the tests show that the biocide treatment was not successful, do these steps:
1) Completely fill the fuel tanks with biocide treated fuel.
2) Use the maximum soak time:
a) Biobor JF - 72 Hours
b) Kathon FP 1.5 - 24 Hours
(e) If the tests show that the biocide treatment was successful, then continue to test the aircraft at the usual intervals.

TASK 28-10-00-622-028
4. Biocide Treatment of Fuel Tanks - Metered Injection Cart
A. General
(1) There are two methods to add biocide treatment to the fuel tanks:
(a) Metered injection cart
(b) Overwing fuel port
(2) Do this task if a metered injection cart is available.
(3) If you need to add biocide without a metered injection cart, then do the overwing fill port task.
(4) There are two types of metered-injection carts:
(a) Adjustable metered injection cart
(b) Non-adjustable metered injection cart
(5) ADJUSTABLE METERED INJECTION CART;
This type of metered injection cart is equipped with an adjustable concentration setting. You can adjust the concentration setting from tank to tank.
(6) NON-ADJUSTABLE METERED INJECTION CART;
This type of metered injection cart is not field adjustable. You cannot adjust the concentration setting from tank to tank. You can recalibrate the cart (in a maintenance shop) to achieve the desired 270 ppm by weight concentration for Biobor JF or 100 ppm by volume concentration for Kathon FP 1.5. To account for the typical fuel remaining on-board after a flight, a procedure is given to recalibrate the cart to 1.5 times the usual setting. This method will allow the correct concentration of treated fuel to be added to the fuel tanks.

(7) Biocide treatment is used to kill microbial growth within the fuel tank. The process requires that the biocide be mixed at a specified concentration with fuel and allowed to soak for a period of time. After soaking, the biocide treated fuel may be burned through the engines.
(8) Two biocidal fuel additives are certified by the airframe and engine manufactures. These are:
(a) Biobor JF - manufactured by Hammonds
(b) Kathon FP 1.5 - manufactured by Rohm & Haas Company

NOTE: Biobor JF and Kathon FP 1.5 have not been approved in some geographic areas. Local regulatory agencies should be consulted with respect to approval status.

(9) Obey all Health and Safety precautions specified by the manufacturer related to the use of biocide.
(10) It is recommended to do this task with no fuel or a minimum fuel load (after a flight, before fuel servicing). It is not necessary to defuel the aircraft before you begin the biocide treatment.

B. References
(1) AMM 12-11-01/301, Fuel Servicing
(2) AMM 12-11-01/301, Manual Pressure Refueling
(3) AMM 12-11-03/301, Fuel Tank Sumping
(4) AMM 28-26-00/201, Defuel
(5) AMM 49-31-04/401, APU Fuel Filter
(6) AMM 73-11-10/401, Low Pressure Engine Fuel Filter
(7) CPM 20-62-00

C. Equipment
(1) Cart - Hydrant, Portable, Biocide Injection (or equivalent)
Model 800 (Manufactured by Hammonds)
Mil-International Inc
Vendor Code 3Z256
(2) Cart, Hydrant, portable, metered injection of jet fuel additives
Model #69-10-04-999, (or equivalent) manufactured by Lubrizol

Lubrizol Performance Systems Inc
2000 Northfield Court
Roswell, GA 30076
(770) 475-1900
(770) 475-1717 (Fax number)

D. Consumable Materials
(1) Biocide - Use one of these fuel additives:
(a) G00452 - Biobor JF, Biocide

(b) GO2347 - Kathon FP 1.5 biocide, Rohm and Haas Company, Pennsylvania, USA (215) 592-3000

Distributor for Kathon FP 1.5,
Fuel Quality Services, Inc.
Georgia, USA
(770) 967-9790
(770) 967-9982 (Fax number)

E. Access

(1) Location Zones

621 Leading Edge to Front Spar (Right)

(2) Access Panels

621GB Fueling Station Door (Right)

F. Biocide Precautions

S 622-029

(1) Obey these personnel precautions:

WARNING: DO NOT BREATHE BIOCIDE VAPOR OR TOUCH THE BIOCIDE FUEL ADDITIVE. IF YOU BREATHE THE VAPORS OR TOUCH THE BIOCIDE FUEL ADDITIVE, IT CAN CAUSE HEALTH PROBLEMS. CONSULT THE MANUFACTURES MSDS.

(a) Do not breathe or touch the biocide fuel additive.
(b) During maintenance with biocide fuel additives, wear these protective equipment items:
1) Eye protection
2) Fuel resistant gloves
3) Protective outerwear
(c) Do not sump the fuel tanks when biocide has been added to the fuel tank(s). A high concentration of biocide will be present at the sump drain.

S 622-030

(2) Obey these biocide additive precautions:
(a) Obey all requirements specified by the manufacturer related to the use of the biocide.

CAUTION: DO NOT EXCEED THE MAXIMUM CONCENTRATION OF BIOCIDE. DAMAGE TO THE ENGINES CAN OCCUR IF THE BIOCIDE CONCENTRATION IS ABOVE THE MAXIMUM LIMIT.

(b) Do not exceed the maximum allowable concentration of biocide (parts per million) in a fuel tank.

(c) If the concentration exceeds the limit, then add more untreated fuel to dilute the biocide concentration.
(d) If you exceed the maximum allowable concentration of biocide in a fuel tank and you cannot dilute the concentration with untreated fuel, then contact the engine manufacturer for corrective action.
(e) If you spill biocide, then do these steps:
1) Immediately contain the spill area.
2) Use cotton wipers (BMS15-5) and water to clean the area.
3) Use the correct procedures to dispose of the material.

G. Prepare for the Biocide Treatment

S 682-031
(1) Sump the fuel tanks (AMM 12-11-03/301).

S 622-032
(2) Do one of these procedures:
(a) Apply the Biocide to the Fuel Tanks - Adjustable Metered
(b) Apply the Biocide to the Fuel Tanks - Non-adjustable Metered Injection

H. Apply the Biocide to the Fuel Tanks - Adjustable Metered Injection

S 622-033
(1) Obey the biocide precautions.

S 622-034
(2) Use the instructions provided with the metered injection cart to connect the cart to the refueling equipment.

S 622-035
(3) Do these steps to calculate the metered injection setting:
(a) Use Table 201 to determine the final biocide concentration.

NOTE: Table 201 gives the final concentration of biocide allowed in the fuel tank. This is the maximum concentration of biocide that can be run through the engines. You must adjust the metered injection setting to achieve the correct concentration of biocide.

NOTE: If you add a biocide concentration that is much lower than the maximum concentration, the biocide treatment must soak longer and is not as effective in killing the microbial growth.

(b) Use Table 202 to calculate the biocide concentration setting for each fuel tank.

(c) The metered injection cart setting depends on these variables:
1) Type of biocide used.
2) Amount of untreated fuel in the fuel tank.
3) Amount of treated fuel to be uplifted into the fuel tank.

Table 201	
BIOCIDE	CONCENTRATION
BIOBOR JF	270 ppm by weight
KATHON FP 1.5	100 ppm by volume

Table 202	
METERED INJECTION CART SETTING	
BIOBOR JF	KATHON FP 15
$C(uf) = \frac{270\ (FOB + UPLIFT)}{UPLIFT}$	$C(uf) = \frac{100\ (FOB + UPLIFT)}{UPLIFT}$
C(uf) = Concentration of fuel to be uplifted FOB = Untreated fuel quantity on-board UPLIFT = Fuel quantity with metered biocide to be added NOTE: Fill each tank to a minimum of 1/3 full.	

S 622-036
(4) Adjust the metered injection cart:
(a) Use the instructions provided with the metered injection cart to adjust the cart.
(b) Set the injection setting to achieve the desired biocide concentration.

S 622-037
(5) Plan the refueling operation:
(a) Each tank must be filled to a minimum of 1/3 full.

S 622-038
(6) Do these steps to add the biocide:
(a) Open the refuel valve(s) for one tank only (AMM 12-11-01/301).
(b) Begin the refuel operation (manual pressure refueling) (AMM 12-11-01/301).
(c) The correct biocide concentration is mixed with the fuel and added to the fuel tank.
(d) Refuel the tank to the desired fuel load.
(e) Make sure the tank is filled a minimum of 1/3 full.
(f) Stop the refuel operation (AMM 12-11-01/301).
(g) Do the biocide calculation again and adjust the injection cart setting for the next tank (Table 202).
(h) Continue to apply the treated fuel to all fuel tanks.

S 622-039
(7) Do this procedure: Biocide Treatment Soak Time
I. NO FUEL ON-BOARD;
Apply the Biocide to the Fuel Tanks - Non-Adjustable Metered Injection

S 622-040
(1) Do this procedure if all of the fuel tanks are empty before you begin to add the biocide treated fuel.

S 622-041
(2) Obey the biocide precautions.

S 622-042
(3) Do these steps to calibrate the metered injection cart:
(a) Use the instructions provided with the metered injection cart to calibrate the equipment.

NOTE: The equipment is not field adjustable. The calibration must be done in a maintenance shop.

(b) Calibrate the concentration setting to the applicable value:
1) Biobor JF - 270 ppm by weight
2) Kathon FP 1.5 - 100 ppm by volume
(c) Use the instructions provided with the metered injection cart to connect the cart to the refueling equipment.

S 622-043
(4) Plan the refueling operation:
(a) Each tank must be filled to a minimum of 1/3 full.

S 622-044
(5) Do these steps to add the biocide:
(a) Begin the refuel operation (AMM 12-11-01/301).
(b) The correct biocide concentration is mixed with the fuel and added to the fuel tank.
(c) Fill each fuel tank to a minimum of 1/3 full.
(d) Stop the refueling operation (AMM 12-11-01/301).

S 622-045
(6) Do this procedure: Biocide Treatment Soak Time

J. UNTREATED FUEL ON-BOARD;
Apply the Biocide to the Fuel Tanks - Non-Adjustable Metered Injection

S 622-046
(1) Do this procedure if there is less than 10,000 lbs (4,600 kgs) of untreated fuel on-board before you begin to add the biocide treated fuel.

S 622-047
(2) Obey the biocide precautions.

S 622-048
(3) Do these steps to distribute the untreated on-board fuel:
(a) Transfer all of the fuel to the left and right main tanks (AMM 28-26-00/201).
(b) Make sure the fuel quantity is equally distributed between the two main tanks.
(c) If necessary, refuel the left and right main tanks with untreated fuel until each tank is 1/3 full, 5,000 lbs (2,300 kgs) (AMM 12-11-01/301).

S 622-049
(4) Do these steps to calibrate the metered injection cart:
(a) Use the instructions provided with the metered injection cart to calibrate the equipment.

NOTE: The equipment is not field adjustable. The calibration must be accomplished in a maintenance shop.

(b) With 10,000 lbs (4,600 kgs) of untreated fuel on-board, calibrate the concentration setting to 1.5 times the maximum concentration:
1) Biobor JF - 405 ppm by weight
2) Kathon FP 1.5 - 150 ppm by volume
(c) Use the instructions provided with the metered injection cart to connect the cart to the refueling equipment.

S 622-050
(5) Do these steps to add the biocide:
(a) Open the refuel valves for the left and right main tanks only (AMM 12-11-01/301).
(b) Begin the refuel operation (manual pressure refueling) (AMM 12-11-01/301).
(c) Completely fill the left and right main tanks with treated fuel.
(d) After the treated and untreated fuel is mixed in the tanks, the concentration of biocide will be correct.

S 622-051
(6) Do these steps to distribute the treated fuel:
(a) Distribute the biocide treated fuel in the left and right main tanks to all other tanks (AMM 28-26-00/201).
(b) Make sure each fuel tank is a minimum of 1/3 full.

S 622-052
(7) Do this procedure: Biocide Treatment Soak Time

K. Biocide Treatment Soak Time

S 622-053
(1) Obey the biocide precautions.

S 622-054
(2) Allow the biocide treatment to soak per the applicable minimum time given in Table 203.

Table 203

BIOCIDE	SOAK TIME
BIOBOR JF	36 - 72 HOURS
KATHON FP1.5	12 - 24 HOURS

S 622-055
(3) These factors affect how quickly the biocide kills the microbial growth:
(a) The longer the soak time, the better the biocide will work.
(b) Additional soak time may be required for low temperatures.
(c) A low concentration of biocide is not as effective in killing microbial growth.

NOTE: If the concentration of biocide is too low, the microbes can become resistant to the biocide.

S 622-056
(4) During the soak time, do not move the airplane or operate the fuel pumps or APU pumps.

L. Post-Biocide Treatment Maintenance Actions

S 622-057
(1) After the biocide soak time, return the airplane to service.

NOTE: The biocide treated fuel is burned through the engines.

S 622-058
(2) After 10 and before 75 flight hours, replace these filters:

NOTE: If one engine filter shows high levels of particulates, replace the other filters before the next flight.

(a) Low Pressure Engine Fuel Filter (AMM 73-11-10/401)
(b) APU fuel filter (AMM 49-31-04/401).

S 622-059
(3) Within 10 days, but after at least five flights, do the microbial growth detection test again.

S 622-060
(4) If the tests show that the biocide treatment was not successful, then do these steps:
(a) Completely fill the fuel tanks with biocide treated fuel.
(b) Use the maximum soak time:
1) Biobor JF - 72 Hours
2) Kathon FP 1.5 - 24 Hours

TASK 28-10-00-602-061

5. Biocide Treatment of Fuel Tanks - Overwing Fill Ports (Alternate Method)

A. General

(1) If metered fuel injection equipment is not available, you can add the biocide treatment into the fuel tanks through the overwing ports.

(2) You must calculate and add the correct amount of biocide treatment to the fuel tanks.

(3) After you add the biocide treatment to the main tanks, you must transfer the treated fuel to the other tanks.

B. References

(1) AMM 12-11-01/301, Manual Pressure Refueling
(2) AMM 20-10-27/201, Safety Harness
(3) AMM 20-41-00/201, Electrical Ground and Bond
(4) AMM 27-81-00/201, Leading Edge Flaps
(5) AMM 28-26-00/201, Defuel
(6) AMM 49-31-04/401, Inlet Fuel Filter Element
(7) AMM 73-11-10/401, Low Pressure Engine Fuel Filter

C. Equipment

(1) Container - Metal, suitable for adding Biocide
(2) Funnel - Metal, suitable for adding Biocide at the overwing fuel port

D. Consumable Materials

(1) Biocide - Use one of these fuel additives:
(2) G00452 - Biobor JF, Biocide
(3) G02347 - Kathon FP 1.5 Biocide, Rohm and Haas Company, Philadelphia, PA, (215) 592-3000

E. Access

(1) Location Zones:
500 Left Wing
600 Right Wing

F. Biocide Precautions

S 622-062

(1) Obey these personnel precautions:

WARNING: DO NOT BREATHE BIOCIDE VAPOR OR TOUCH THE BIOCIDE FUEL ADDITIVE. IF YOU BREATHE THE VAPORS OR TOUCH THE BIOCIDE FUEL ADDITIVE, IT CAN CAUSE HEALTH PROBLEMS. CONSULT THE MANUFACTURES MSDS.

(a) Do not breathe or touch the biocide fuel additive.

(b) During maintenance with biocide fuel additives, wear these protective equipment items:
1) Eye protection
2) Fuel resistant gloves
3) Protective outerwear
(c) Do not sump the fuel tanks when biocide has been added to the fuel tank(s). A high concentration of biocide will be present at the sump drain.

S 622-063
(2) Obey these biocide additive precautions:
(a) Obey all requirements specified by the manufacturer related to the use of the biocide.

CAUTION: DO NOT EXCEED THE MAXIMUM CONCENTRATION OF BIOCIDE. DAMAGE TO THE ENGINES CAN OCCUR IF THE BIOCIDE CONCENTRATION IS ABOVE THE MAXIMUM LIMIT.

(b) Do not exceed the maximum allowable concentration of biocide (parts per million) in a fuel tank.
(c) If the concentration exceeds the limit, then add more untreated fuel to dilute the biocide concentration.
(d) If you exceed the maximum allowable concentration of biocide in a fuel tank and you cannot dilute the concentration with untreated fuel, then contact the engine manufacturer for corrective action.
(e) For Biobor JF; Do not exceed the maximum concentration of the biocide fuel additive to the fuel tanks. A large concentration of the biocide fuel additive can make salt deposits in the fuel tanks.
(f) If you spill biocide, then do these steps:
1) Immediately contain the spill area.
2) Use cotton wipers (BMS15-5) and water to clean the area.
3) Use the correct procedures to dispose of the material.

G. Prepare the Fuel System for the Biocide Treatment

S 622-064
(1) Make sure the total fuel load is within these limits:
(a) Minimum - approximately 1/3 the total fuel capacity (all tanks)
(b) Maximum - total fuel capacity for the main tanks.
(c) Obey the maximum allowable fuel quantity when you use the main tank overwing fill ports.
(d) If it is necessary, add fuel to the main tanks to make sure the minimum fuel quantity is available (AMM 12-11-01/301).

S 652-065
(2) Transfer all of the on-board fuel evenly between the left and right main tanks (AMM 28-26-00/201).

H. Prepare the Overwing Fill Ports for the Biocide Treatment

S 482-066

WARNING: INSTALL THE LOCKS ON ALL EXTENDED LEADING EDGE FLAPS. THIS WILL PREVENT INJURY FROM AN ACCIDENTAL OPERATION OF THE FLAPS.

(1) Do this task for extended leading edge flaps: Extended Leading Edge Flaps Deactivation and Safety Locks Installation (AMM 27-81-00/201).

S 482-067

WARNING: YOU MUST GROUND THE AIRPLANE TO AN APPROVED EARTH GROUND BEFORE YOU REMOVE THE OVERWING FILL CAP. IF YOU DO NOT OBSERVE THIS PROCEDURE, A STATIC SPARK CAN CAUSE A FIRE OR EXPLOSION TO OCCUR.

(2) Connect a grounding cable from an approved earth ground to an approved electrical ground point on the airplane (static ground) (AMM 20-41-00/201).

S 912-068

WARNING: YOU MUST WEAR A SAFETY HARNESS WHEN YOU ADD BIOCIDE TO THE OVERWING FILL PORT. A SERIOUS INJURY CAN OCCUR IF YOU FALL FROM THE WING SURFACE.

(3) Put on a safety harness and connect the harness to the supplied harness receptacle (AMM 20-10-27/201).

S 482-069
(4) Position pads on the wing surface to prevent damage.

S 482-070
(5) Do these steps to make a spill containment barrier around the overwing fill port:
(a) Position a sheet of plastic around the overwing fill port.
(b) Use sandbags to hold down the plastic.
(c) Adjust the sheet to make a spill containment barrier.

I. Calculate the Amount of Biocide to Add to the Fuel

S 622-071
(1) For Biobor JF:
(a) Multiply the quantity of fuel in pounds by 0.004 to get the fluid ounces of Biobor JF.
(b) Multiply the quantity of fuel in kilograms by 0.26 to get the milliliters of Biobor JF.

S 622-072
(2) For Kathon FP 1.5:
(a) Multiply the quantity of fuel in pounds by 0.000015 to get the gallons of Kathon FP 1.5
(b) Multiply the quantity of fuel in kilograms by 0.125 to get the milliliters of Kathon FP 1.5

J. Add the Biocide to the Fuel Tanks

S 622-073
(1) Obey the biocide precautions.

S 622-074
(2) Do not exceed the maximum allowable concentration of biocide (parts per million) in a fuel tank (Table 204).

Table 204

BIOCIDE	CONCENTRATION
BIOBOR JF	270 ppm by weight
KATHON FP 1.5	100 ppm by volume

S 622-075
(3) Pour the correct amount of biocide for a single tank into an approved 5 gallon metal container.

S 622-076
(4) Fill the metal container with fuel.

S 482-077

WARNING: BOND THE OVERWING FILL PORT FUNNEL AND BIOCIDE CONTAINER TO THE AIRCRAFT BEFORE THE OVERWING FILL CAP IS REMOVED. THIS CONNECTION MUST REMAIN IN PLACE UNTIL AFTER THE TANK FILL CAP IS REPLACED. IF YOU DO NOT OBSERVE THIS PROCEDURE, A STATIC SPARK CAUSING A FIRE OR EXPLOSION CAN OCCUR.

(5) Connect the biocide container and funnel to an approved airplane bonding point (AMM 20-41-00/201).

S 912-078

CAUTION: KEEP ALL LOOSE OBJECTS AWAY FROM THE FILL PORT. REMOVE ANY OBJECTS FROM YOUR SHIRT POCKET (PENS, CIGARETTES, LIGHTERS ETC.) BEFORE YOU OPEN THE FILL CAP. IF AN OBJECT DOES FALL INTO THE FUEL TANK, FIND AND REMOVE THE OBJECT IMMEDIATELY. UNWANTED OBJECTS IN THE FUEL TANK CAN CAUSE DAMAGE TO IN-TANK EQUIPMENT AND ELECTRICAL WIRING.

(6) Do these steps to add the biocide to the fuel tank:
   (a) Open the overwing fill port for left main tank.
   (b) Install the funnel in the overwing fill port.
   (c) Pour the biocide into the fuel tank.
   (d) Install the overwing fill cap.
   (e) Remove the equipment used to add biocide to the overwing port.
   (f) Repeat these steps for the right main tank.

S 082-079

(7) Remove all of the equipment used to add the biocide additive.

K. Distribute the Biocide Treated Fuel to the Other Fuel Tanks

S 622-080

(1) Plan the distribution of the fuel:
   (a) Make sure each tank contains a minimum of 1/3 of the total capacity of the tank.
   (b) Maintain an even distribution between opposite tanks.

S 622-081

(2) Transfer fuel to all of the fuel tanks (AMM 28-26-00/201).

L. Put the Airplane Back to the Usual Condition

S 082-082

(1) Disconnect the grounding cable from the airplane to the earth ground (AMM 20-41-00/201).

S 082-083

WARNING: DO THE PROCEDURE IN AMM 27-81-00/201 TO REACTIVATE THE EXTENDED LEADING EDGE FLAPS. THE FLAPS MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do this task for extended leading edge flaps: Safety Locks Removal and Extended Leading Edge Activation (AMM 27-81-00/201).

M. Biocide Treatment Soak Time

S 622-084

(1) Obey the biocide precautions.

S 622-085

(2) Allow the biocide treatment to soak per the applicable minimum time given in Table 205.

Table 205

BIOCIDE	SOAK TIME
BIOBOR JF	36 - 72 HOURS
KATHON FP1.5	12 - 24 HOURS

S 622-086

(3) These factors affect how quickly the biocide kills the microbial growth:
(a) The longer the soak time, the better the biocide will work.
(b) Additional soak time may be required for low temperatures.
(c) A low concentration of biocide is not as effective in killing microbial growth.

NOTE: If the concentration of biocide is too low, the microbes can become resistant to the biocide.

S 622-087

(4) During the soak time, do not move the airplane or operate the fuel pumps or APU pumps.

N. Post-Biocide Treatment Maintenance Actions

S 622-088
(1) After the biocide soak time, return the airplane to service.

NOTE: The biocide treated fuel is burned through the engines.

S 622-089
(2) After 10 and before 75 flight hours, replace these filters:

NOTE: If one engine filter shows high levels of particulates, replace the other filters before the next flight.

(a) Low Pressure Engine Fuel Filter (AMM 73-11-10/401)
(b) APU fuel filter (AMM 49-31-04/401).

S 622-090
(3) Within 10 days, but after at least five flights, do the microbial growth detection test again.

S 622-091
(4) If the tests show that the biocide treatment was not successful, then do these steps:
(a) Completely fill the fuel tanks with biocide treated fuel.
(b) Use the maximum soak time:
1) Biobor JF - 72 Hours
2) Kathon FP 1.5 - 24 Hours

TASK 28-10-00-102-092

6. Microbial Growth Removal - Manual Removal Method

A. General
(1) There are two methods to remove the microbial growth. If the fuel tank inspection shows that the area that is contaminated is small, then do this task to manually remove the contamination.
(2) If the fuel tank inspection shows that the contamination area is large or the area is inaccessible (manual removal is not practical), then do this task: Microbial Growth Removal - Pressure Washer Method.

B. Reference
(1) AMM 28-11-00/201, Fuel Tanks
(2) SRM 57-00-00, Wings

C. Equipment
(1) Brush - fiber

(2) Protective outer clothing to prevent skin contact with microbial contamination:
(a) Fuel and solvent resistant gloves
(b) Saranex suit
(c) Neoprene boots
(3) Respirator - Half face canister style respirators (minimum), U.S. Bureau of Mines Approved or equivalent

D. Consumables
(1) B00130 Alcohol - Isopropyl
(2) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

E. Access
(1) Location Zones

134	Wing Center Section (Right)
194	Wing to Body - Forward Lower Half (Right)
500	Main Tank (Left)
600	Main Tank (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Wing Access Door (Center)
194ER	Air Conditioning Access Door
531AB thru 531CB	Center Tank Access Door (Left)
631AB thru 631CB	Center Tank Access Door (Right)
541AB thru 542DB	Fuel Tank Access Doors, (Left)
641AB thru 642DB	Fuel Tank Access Door, (Right)

F. Prepare to Remove the Microbial Growth

S 862-093
(1) Do this procedure after you have completed this task: Microbial Growth Fuel Tank Inspection.

S 912-094

WARNING: CAREFULLY DO ALL THE SAFETY PROCEDURES TO GO INTO THE FUEL TANKS. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR IF YOU DO NOT OBEY THE SAFETY PROCEDURES.

(2) Prepare the fuel tank for a tank entry (AMM 28-11-00/201).

S 862-095

WARNING: MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE FUEL TANK WHERE YOU WILL REMOVE THE MICROBIAL GROWTH. A GOOD FLOW OF AIR WILL PREVENT THE BUILD-UP OF ISOPROPYL ALCOHOL VAPOR THAT IS USED TO REMOVE THE MICROBIAL GROWTH. ISOPROPYL ALCOHOL IS FLAMMABLE AND TOXIC.

(3) Make sure the fuel tank has a sufficient flow of air.

S 912-096

WARNING: WEAR AN APPROVED RESPIRATOR AND PROTECTIVE CLOTHING BEFORE YOU ENTER A FUEL TANK CONTAMINATED WITH MICROBIAL GROWTH. IF YOU BREATHE AIR CONTAMINATED WITH MICROBIAL GROWTH RESIDUE, OR ALLOW THE MICROBIAL GROWTH TO TOUCH YOUR SKIN, IT IS POSSIBLE THAT HEALTH PROBLEMS CAN OCCUR.

(4) Put on this protective gear to prevent contact with microbial growth:
   (a) Respirator - Half face canister style respirators (minimum)
   (b) Fuel and alcohol resistant gloves
   (c) Eye protection
   (d) Saranex suit
   (e) Neoprene boots

G. Remove the Microbial Growth - Manual Method

S 012-097

(1) Go into the fuel tank (AMM 28-11-00/201).

S 162-098

(2) Do these steps to remove the microbial growth:
   (a) Use a fiber brush to loosen the contamination.
   (b) Apply isopropyl alcohol to a clean cotton wiper (BMS15-5).
   (c) Use the minimum amount of isopropyl alcohol that is necessary.
   (d) Use the cotton wiper (BMS15-5) to remove the microbial growth.
   (e) Put any used cotton wipers (BMS15-5) in a plastic bag to reduce the isopropyl alcohol vapor in the tank.
   (f) Use an air hose or a wire to make sure the flow hole areas are free of unwanted material.
   (g) Use an air hose with a nozzle (90 psi maximum) to blow any material from the inlet screen on the water and fuel scavenge pumps.

S 212-099
(3) Do a visual check of the fuel tank structure for corrosion.
(a) If you find corrosion, then repair the damage (SRM 57-00-00).

H. Put the Airplane Back to the Usual Condition

S 012-100
(1) Install any panels or structure that you removed.

S 912-101
(2) Go out of and close the fuel tank (AMM 28-11-00/201).

S 622-102
(3) Do this task: Biocide Treatment of the Fuel Tanks.

TASK 28-10-00-102-103

7. Microbial Growth Removal - Pressure Washer Method

A. General
(1) There are two methods to remove the microbial growth. If the fuel tank inspection shows that the area that is contaminated is small, then do this task: Microbial Growth Removal - Manual Removal Method.
(2) If the fuel tank inspection shows that the contamination area is large or the area is inaccessible (manual removal is not practical), then use the pressure washer method to remove the contamination.
(3) If you use a pressure washer you must remove all of the in-tank FQIS components and use care not to damage the fuel tank sealant. After you finish the procedure make sure all the water is removed and the tank is completely dried.

B. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-00/801, Fuel Tanks
(3) AMM 28-11-05/401, Fuel Sump Drain Valve
(4) AMM 28-22-06/401, Automatic Sumping Jet Pumps
(5) AMM 28-22-13/401, Scavenge Ejector Jet Pumps
(6) AMM 28-41-01/401, FQIS Tank Units
(7) AMM 28-41-02/401, FQIS Compensators
(8) AMM 28-41-03/401 FQIS Densitometers
(9) SRM 57-00-00, Wings

C. Consumables
(1) B00130 Alcohol - Isopropyl
(2) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

D. Equipment
(1) Gloves - applicable for hot water cleaning
(2) Protective Clothing - Waterproof pants, boots, jacket with hood

(3) Pressure Washer - Hot Water - Surface impact requirement (Maximum):
Temperature: 160 Degree F (70 degrees C)
Pressure: 100 psi (690 kpa)
Flow: 3 to 5 gallons (11 to 20 liters) per minute

(4) Respirator - Full face canister style respirators (minimum), U.S. Bureau of Mines Approved or equivalent

(5) Source of hot water

(6) Vacuum cleaner - air powered, wet/dry

E. Access

(1) Location Zones

134	Wing Center Section (Right)
193	Wing to Body - Forward Lower Half (Left)
194	Wing to Body - Forward Lower Half (Right)
500	Main Tank (Left)
600	Main Tank (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Wing Access Door (Center)
193GL	Fuel Drain Access Door (Left)
194DR	Fuel Drain Access Door (Right)
194ER	Air Conditioning Access Door
531AB thru 531CB	Center Tank Access Door (Left)
631AB thru 631CB	Center Tank Access Door (Right)
541AB thru 542DB	Fuel Tank Access Doors, (Left)
641AB thru 642DB	Fuel Tank Access Door, (Right)

F. Hot Water Pressure Washer - Precautions

S 162-104

WARNING: OBEY THESE PRECAUTIONS WHEN YOU CLEAN THE FUEL TANK WITH A HOT WATER PRESSURE WASHER. HOT WATER CAN BURN YOU AND HIGH TEMPERATURES IN THE TANK CAN CAUSE HEAT-RELATED HEALTH PROBLEMS. USE THE CORRECT PRESSURE WASHER TECHNIQUE TO PREVENT DAMAGE TO THE FUEL TANK SEALS.

(1) The person in the fuel tank must have these items for protection:
(a) Heat protective gloves
(b) Water-proof outer gloves
(c) Water-proof coat and pants
(d) Water-proof and heat protective hood
(e) A full face mask

(f) Protective gear to protect against breathing or touching microbial growth
(g) A hot water line that closes automatically when you release it ("deadman" control switch).

S 912-105
(2) The fuel tank observer must monitor the person in the tank for signs of health problems related to overheating.

S 912-106
(3) Use air movers to have a good flow of air in the tanks.

S 912-107
(4) While you clean, continue to move air through the tank.

S 022-108
(5) To prevent damage, remove the in-tank FQIS system components.

S 162-109
(6) Make sure to use the correct pressure washer technique:
(a) Use a spray of approximately 100 psi maximum at the tank surface.
(b) Keep the time you point the nozzle at one position to a minimum.
(c) Move the spray through an area at approximately 6 inches per second.
(d) Many fast passes are better than one slow pass.
(e) Do not point the spray at the feathered edge of the seal compound.

NOTE: This loosens the joint.

(f) If you put heat or water pressure on the sealant for a long time, you can damage the sealant.

G. Prepare the Tank for the Hot Water Pressure Washing

S 912-110

WARNING: CAREFULLY DO ALL THE SAFETY PROCEDURES TO GO INTO THE FUEL TANKS. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR IF YOU DO NOT OBEY THE SAFETY PROCEDURES.

(1) Prepare to go into the fuel tank (AMM 28-11-00/201).

S 912-111

WARNING: WEAR AN APPROVED RESPIRATOR AND PROTECTIVE CLOTHING BEFORE YOU ENTER A FUEL TANK CONTAMINATED WITH MICROBIAL GROWTH. IF YOU BREATHE AIR CONTAMINATED WITH MICROBIAL GROWTH RESIDUE, OR ALLOW THE MICROBIAL GROWTH TO TOUCH YOUR SKIN, IT IS POSSIBLE THAT HEALTH PROBLEMS CAN OCCUR.

(2) Put on this protective gear to prevent contact with microbial growth:
   (a) Respirator - Half face canister style respirators (minimum)
   (b) Fuel resistant gloves
   (c) Saranex coveralls
   (d) Neoprene boots

S 022-112

(3) Remove these components for the tank(s) to be cleaned:

NOTE: Make a component removal record.

   (a) Fuel sump drain valve (AMM 28-11-05/401).
   (b) Automatic sumping jet pumps (AMM 28-22-06/401).
   (c) Scavenge ejector jet pumps (AMM 28-22-13/401).
   (d) FQIS tank units (AMM 28-41-01/401)
   (e) FQIS compensators (AMM 28-41-02/401)
   (f) FQIS densitometers (AMM 28-41-03/401).

S 912-113

(4) Put a protective cover on these fuel system components and attach a REMOVE BEFORE FLIGHT TAG:
   (a) Fuel pump inlets
   (b) Automatic sumping jet pump inlets
   (c) Scavenge ejector pump inlets
   (d) By-pass valve inlets

S 112-114

(5) Use the applicable supplier CMM to clean these components:
   (a) Fuel tank units
   (b) Compensators
   (c) Densitometer
   (d) Automatic sumping jet pumps
   (e) Scavenge jet pump

H. Pressure Wash the Fuel Tank

S 912-115

WARNING: OBEY ALL OF THE APPLICABLE PRECAUTIONS WHEN YOU CLEAN THE FUEL TANK WITH PRESSURIZED HOT WATER. INJURIES FROM THE PRESSURIZED HOT WATER OR DAMAGE TO THE FUEL TANK CAN EASILY OCCUR.

(1) Put on this protective gear to protect against the hot water pressure spray:
   (a) Respirator - Full face canister style respirators (minimum)
   (b) Heat protective gloves
   (c) Water-proof outer gloves
   (d) Water-proof pants, coat and boots
   (e) Water-proof and heat protective hood
   (f) A full face mask.

S 162-116

(2) Use the pressure washer to clean the fuel tank:
   (a) Start at the outboard end of the tank.
   (b) Hold the nozzle at a distance between 6 and 10 inches (150-250 mm) from the tank surface.
   (c) Position the nozzle at a 45 degree angle to the tank surface.
   (d) Point the nozzle in the direction of the access opening and the drain valve opening.
   (e) Continue to clean in the direction of the drain valve opening and the access opening.
   (f) Only use enough spray to remove the microbial growth.
   (g) Use short bursts, not a continuous flow.
   (h) Move the loose microbial growth and any unwanted material to the inboard end of the tank and out of the openings.
   (i) Complete the pressure washing of the fuel tank.

S 162-117

(3) After you pressure wash the fuel tank, do these steps:

CAUTION: MAKE SURE YOU REMOVE ALL OF THE WASTE PARTICLES CAUSED BY THE FUEL TANK CLEANING. THE UNWANTED MATERIAL CAN CAUSE A BLOCKAGE OF THE EJECTOR AND SCAVENGE PUMPS AND STOP THE OPERATION OF THESE SYSTEMS.

   (a) Use an air hose or a wire to make sure the flow hole areas are free of loosened microbial growth or unwanted material.

S 162-118

(4) Repeat these steps to pressure wash the remaining tanks as necessary.

I. Restore the Fuel Tank

S 162-119
(1) Remove the water from the fuel tank:
(a) Continue to have a good flow of air until the tank is dry.
(b) Use an air-powered vacuum cleaner to remove the water.
(c) Mop-up any water that remains with a cotton wiper (BMS15-5).
(d) Continue to move air through the fuel tanks until all moisture is removed.

S 212-120
(2) Do a check of the fuel tank for damage:
(a) Do a visual check of the fuel tank structure for corrosion.
1) If you find corrosion, then repair the damage (SRM 57-00-00).
(b) Do a visual check for missing or damaged fuel tank sealant.
1) If there is damage, repair the sealant (AMM 28-11-00/801).
(c) Do a visual check for missing or loose fuel tank protective finish (topcoat).
1) If there is loose finish, do this task: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/801).

J. Put the Airplane Back to Its Usual Condition

S 082-121
(1) Remove the fuel tank cleaning equipment and material.

S 412-122
(2) Install these components:
(a) Fuel sump drain valve (AMM 28-11-05/401).
(b) Automatic sumping jet pump (AMM 28-22-06/401).
(c) Scavenge ejector jet pump (AMM 28-22-13/401).
(d) FQIS Tank Units (AMM 28-41-01/401)
(e) FQIS Compensators (AMM 28-41-02/401)
(f) FQIS Densitometers (AMM 28-41-03/401)

S 082-123
(3) Remove the protective covers from these fuel system components:
(a) Fuel pump inlets
(b) Automatic sumping jet pump
(c) Scavenge ejector pump inlets
(d) Bypass valve inlets

K. Put the Airplane Back to the Usual Condition

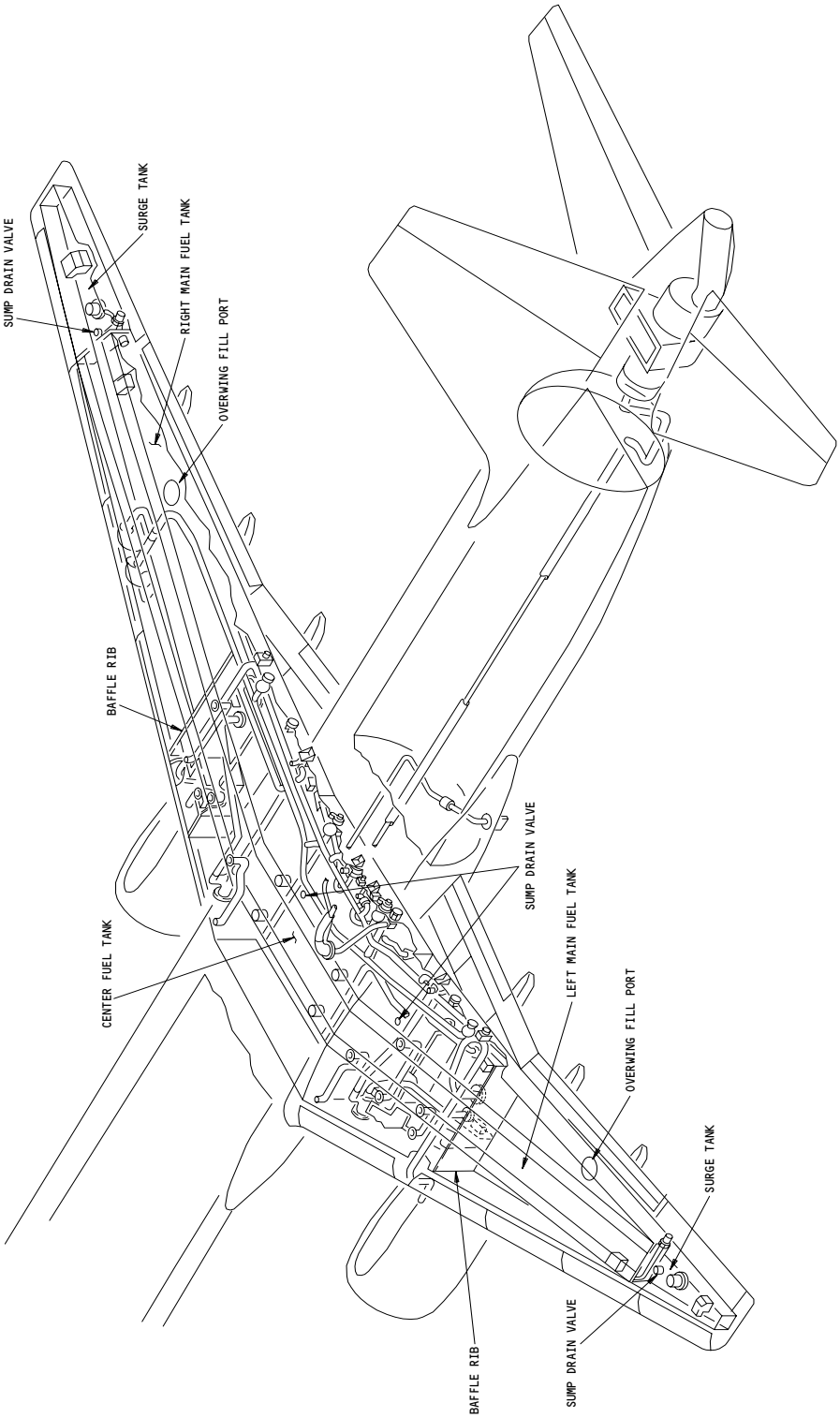
S 012-124
(1) Install any panels or tank structure removed for access.

S 912-125
(2) Go out of and close the fuel tank (AMM 28-11-00/201).

S 622-126
(3) Do this task: Biocide Treatment of the Fuel Tanks.

FUEL TANKS - DESCRIPTION/OPERATION

1. General (Fig. 1)
   A. Three fuel tanks, left main, right main, and center, keep the fuel necessary to run the engines and auxiliary power unit (APU). A surge tank, outboard of each main fuel tank, collects fuel overflow from the fuel tanks and includes equipment for venting the fuel tanks overboard (AMM 28-13-00/001).
   B. The fuel tanks hold the necessary equipment for fueling (AMM 28-21-00/001), defueling (AMM 28-26-00/001), and engine fuel-feed (AMM 28-22-00/001). Equipment necessary for APU fuel-feed (AMM 28-25-00/001) and fuel quantity indicating (AMM 28-41-00/001) is also contained in the fuel tank structure.
   C. Fuel Tank Construction
      (1) The 757 uses primary wing structure for the airplane fuel tanks. The fuel tanks are installed between the front and rear wing spars and between the upper and lower wing skin. Solid "tank end" ribs close the ends of each fuel tank, while all other wing ribs act as fuel baffles to minimize fuel slosh.
      (2) The wing structure permits inboard fuel flow. Fuel sump areas are found at the lowest point of each fuel tank. Sump drain valves at these sump areas permit unwanted materials to be drained from the fuel tank. The sump drain valves also permit removal of all remaining fuel after a fuel tank is defueled.
      (3) All fuel tanks are fluid tight. Close metal to metal fit of all parts forms the basic seal. BMS 5-45 sealing compound and sealed fasteners are used on all joints to complete the fluid tight seal.
      (4) Forty-five oval shaped access doors on the wing lower surface supply access to the fuel tanks.
   D. Main Fuel Tanks
      (1) Each main fuel tank extends from the rib just inboard of the bypass valve of the fuel boost pump (AMM 28-22-04/401) outboard to the rib just inboard of the pressure relief valve for the surge tank (AMM 28-13-00/001). A baffle rib just outboard of each bypass valve contains 11 baffle rib check valves. The check valves prevent outboard fuel flow while they permit inboard fuel flow. The check valves make sure that the boost pump inlets remain covered with fuel when the airplane is in a roll attitude.
      (2) Each main fuel tank holds 2176 U.S. gallons of fuel of which 4 gallons are unuseable.
      (3) Sixteen access doors on the wing lower surface supply access to each main fuel tank.
      (4) A dry bay directly above the engine protects the fuel tank from hot engine fragments in the case of an engine burst. The dry bay contains 4 drain holes each with a flame arrestor to drain all moisture. Access panels exist for internal inspections.



Fuel Tanks
Figure 1

(5) An overwing fill port, found on the upper wing surface permits gravity feed fueling if pressure fueling equipment is not available (AMM 28-21-00/001).

E. Center Fuel Tank

(1) The center fuel tank is found between the inboard tank end ribs of the left and right main fuel tanks.

(2) Seven access doors on the lower tank surface supply access to the center fuel tank.

(3) There is a fuel scavenge system in the center fuel tank. There are 6,924 U.S. gallons of usable fuel and 12 U.S. gallons of unusable fuel in the center fuel tank.

F. Surge Tank

(1) A surge tank, found outboard of each main fuel tank, contains all fuel overflow from the main fuel tank and supplies fuel tank venting. A drain check valve in the surge tank permits the fuel overflow to drain back into the main fuel tank but prevents fuel flow from the main fuel tank to the surge tank.

2. Component Details

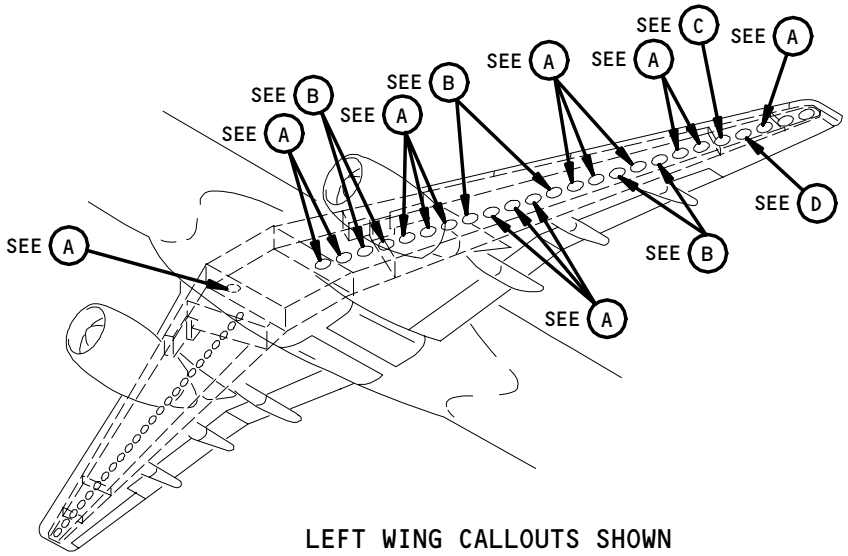
A. Access Doors (Fig. 2)

(1) Forty-five access doors permit entry into the airplane fuel tanks for inspection or component repair. The oval shaped access doors fit in each fuel tank over cutouts in the lower wing surface. For all except one access door, a clamp ring with a knitted aluminum gasket bolted to the access door from outside the wing holds the access door in its position. The gasket forms an electrical bond between the access door and the wing skin. A molded rubber seal ring prevents fluid leakage around the access door. The remaining access door (vent scoop door) bolts to a nut plate attached to the inside of the lower wing surface. A rubber seal and an O-ring prevent fuel leakage. Removal of an access door requires fuel tank defueling (AMM 28-26-00/201).

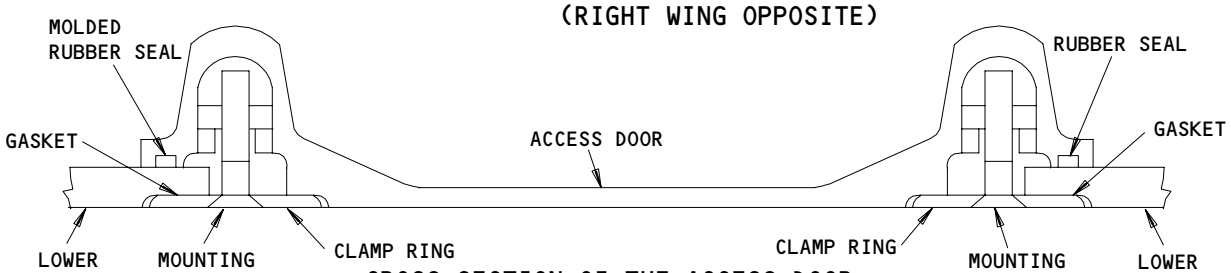
(2) Each main fuel tank has 16 access doors. Each access door measures 10 x 18 inches except for three farthest outboard access doors. These access doors measure 8 x 18 inches. Five main tank access doors have fuel measuring sticks attached to their inside surface (AMM 28-44-00/001).

(3) The center fuel tank has 7 access doors. Each access door measures 10 x 18 inches. Two access doors have fuel measuring sticks attached to their inside surface (AMM 28-44-00/001). The center fuel tank has 3 baffle doors in the center section of the fuel tank.

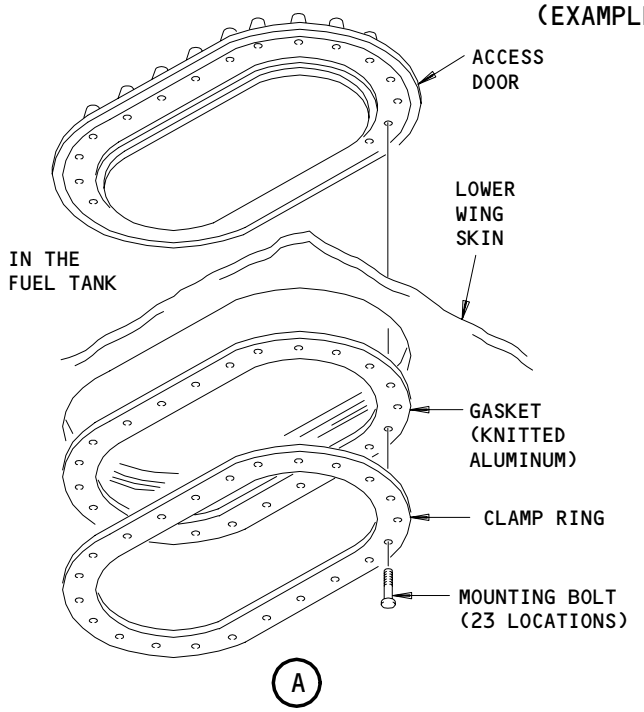
(4) Each surge tank has three access doors. Two access doors measure 8 x 18 inches. A housing of the vent flame arrestor is attached to the inside of the center access door (vent scoop door) which is 10 x 18 inches. A pressure relief valve is attached to the inside of the most inboard access door.

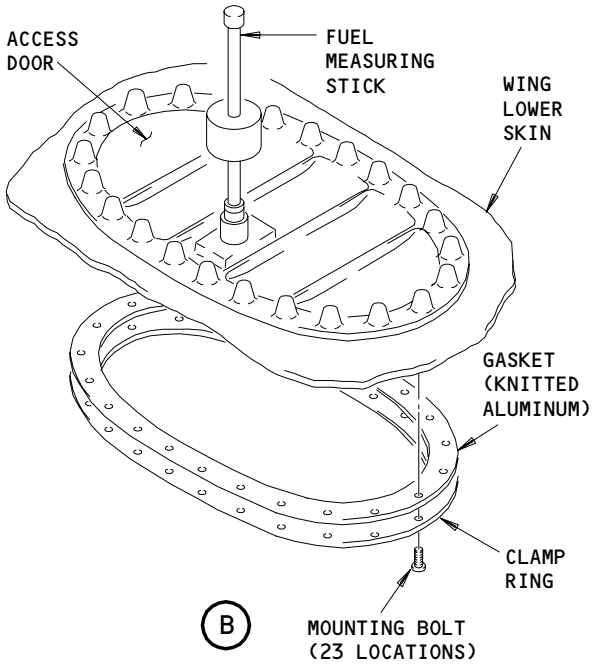


LEFT WING CALLOUTS SHOWN
(RIGHT WING OPPOSITE)

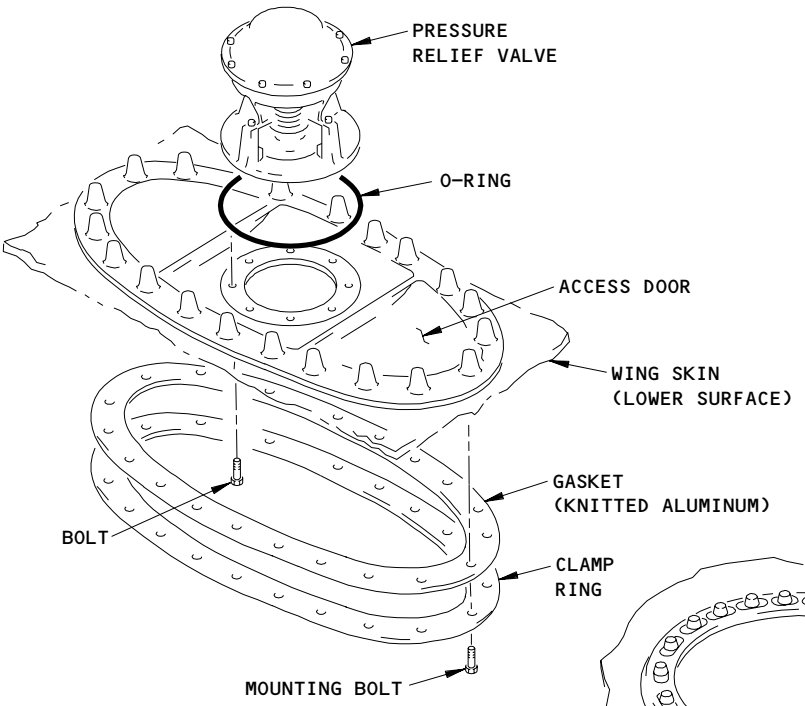


CROSS SECTION OF THE ACCESS DOOR
FOR THE MAIN, CENTER OR SURGE TANK
(EXAMPLE)



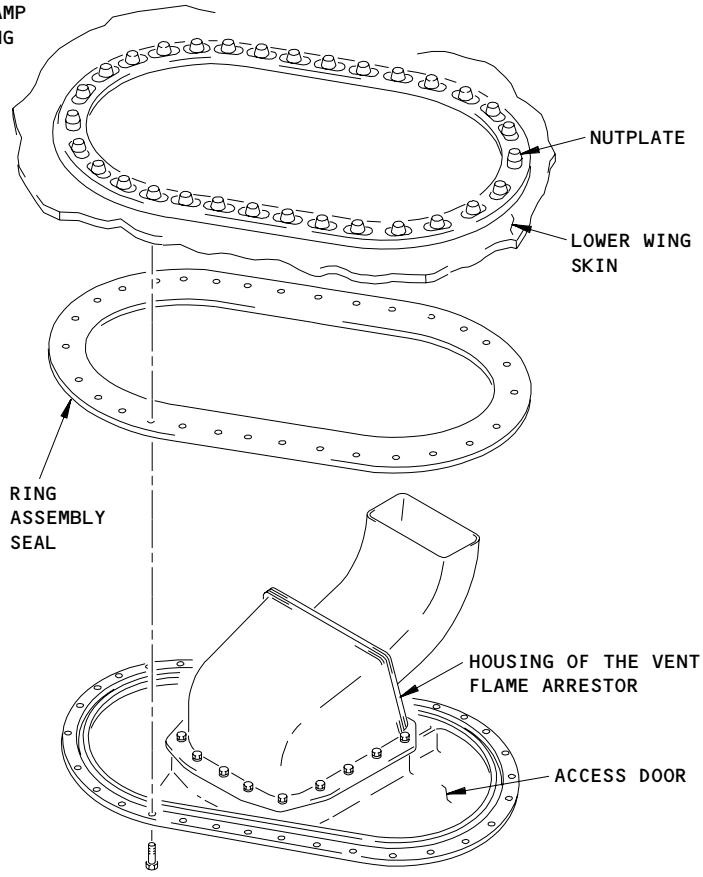


Fuel Tank Access Doors
Figure 2 (Sheet 1)



SURGE TANK ACCESS DOOR,
543AB OR 643AB

C



SURGE TANK ACCESS DOOR, 543BB OR 643BB

D

Fuel Tank Access Doors
Figure 2 (Sheet 2)

(5) Center tank access panel 531AB, 531BB, 531CB, 631AB, 631BB, and 631CB are high impact resistant panels. These access panels must not be replaced with standard access panels.

(6) Main tank access panel 541AB, 541BB, 541CB, 641AB, 641BB, and 641CB are high impact resistant panels. These access panels must not be replaced with standard access panels.

B. Overwing Fill Ports (Fig. 3)

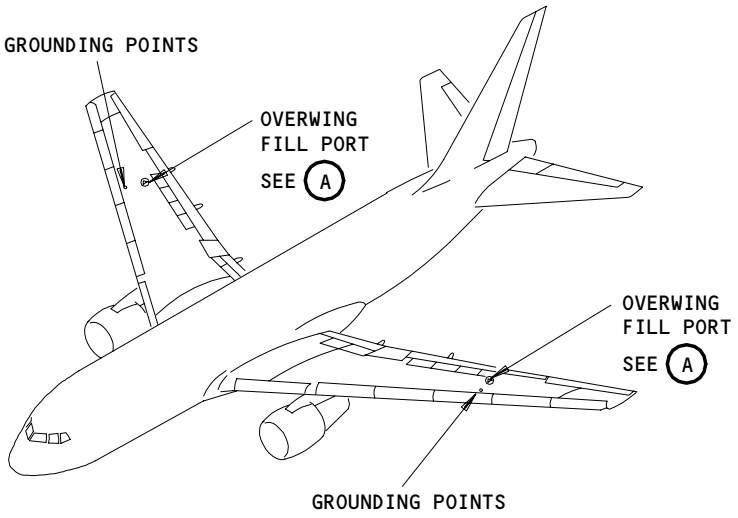
(1) An overwing fill port is installed for each main fuel tank. Each overwing fill port is found on the upper wing surface about two thirds of the way out on the wing. The overwing fill ports permit an alternate way of fueling the main fuel tanks if pressure fueling equipment is not available.

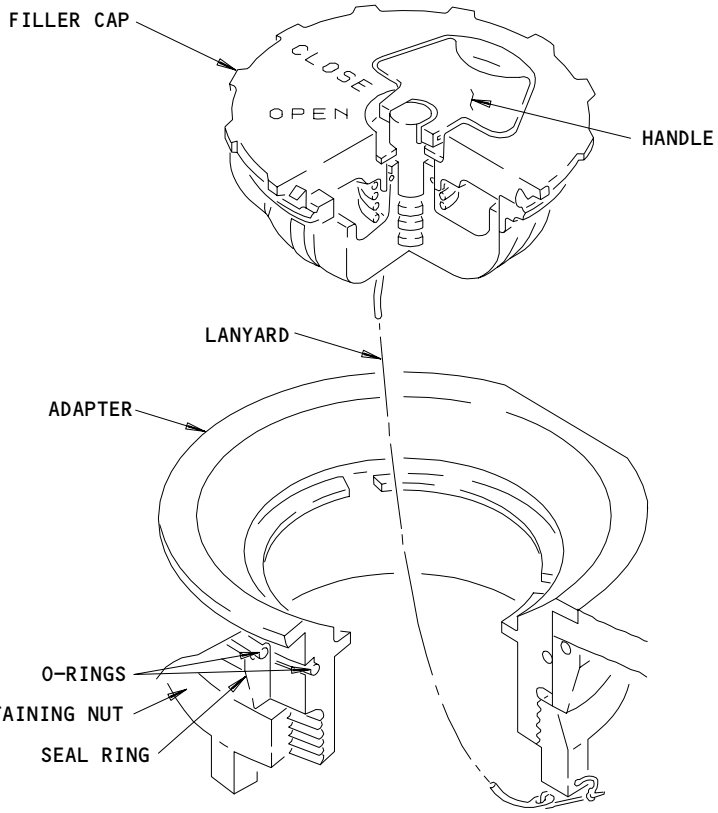
(2) Each overwing fill port has an adapter, seal ring, two O-rings, a retaining nut, and a quick release filler cap. Lift and turn the handle on the filler cap counterclockwise to unlock the filler cap. It is then lifted from the adapter. Installation reverses the procedure and the downward turn of the handle locks and seals the filler cap against the adapter.

C. Sump Drain Valves (Fig. 4)

(1) Six sump drain valves permit manual drainage of accumulated water and sediment from the fuel tanks. One sump drain valve is installed flush to the lower wing surface at the low point of each main fuel and surge tank. Two sump drain valves are installed flush to the lower surface of the center fuel tank. Drain lines attached to the sump drain valves in the center fuel tank extend to drain line fittings on the wing-to-body fairings.

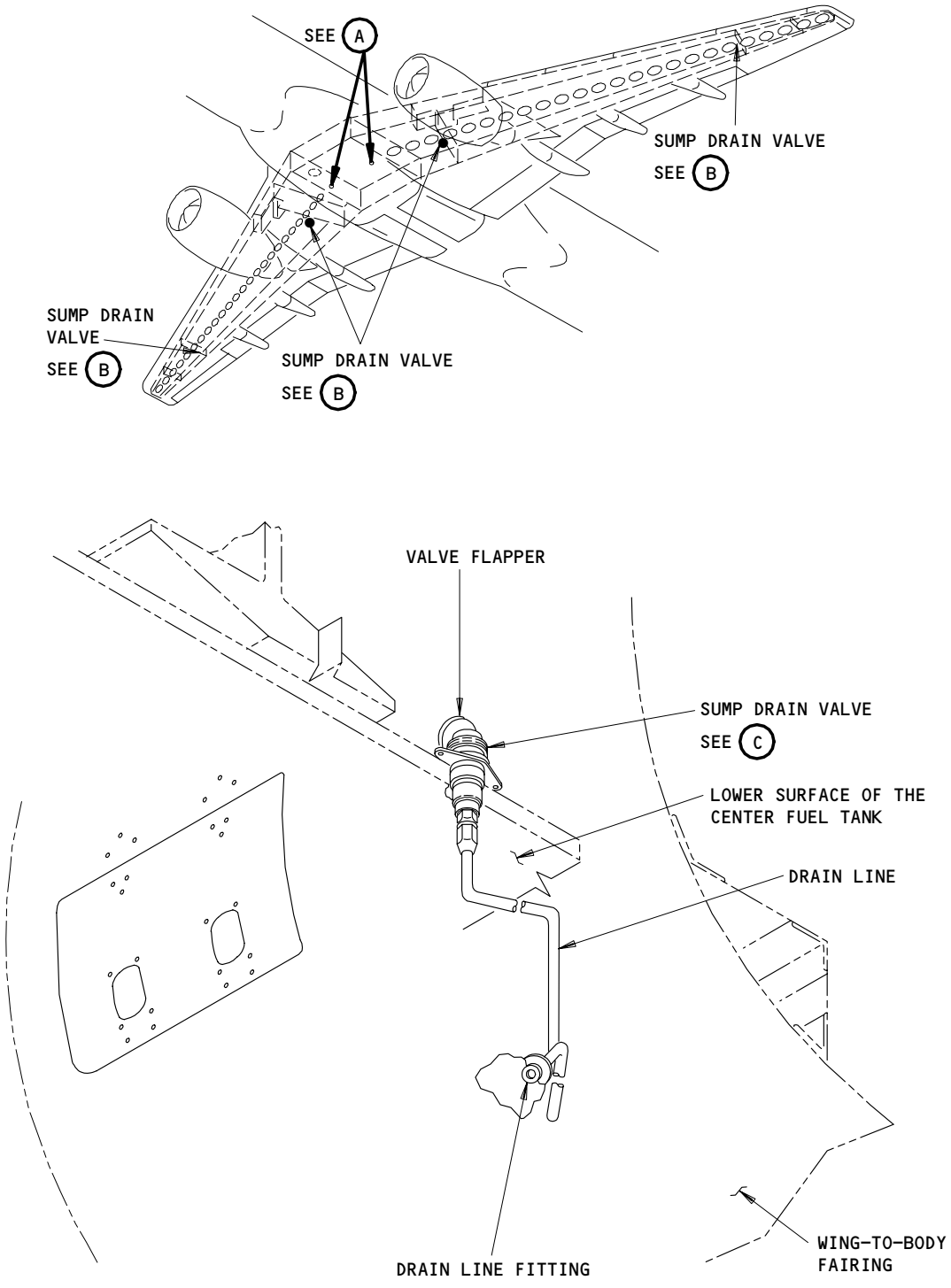
(2) The sump drain valves have a valve body with inlet holes, a poppet valve with corresponding holes, and a spring. A valve screen over the valve body inlet holes protects the valve body against contaminants which can clog the poppet valve. Usually held closed by spring force, the holes in the poppet valve do not align with the housing holes. Thus no fuel drains through the sump drain valve. Pushing up on and holding the poppet valve permits the holes in the piston to align with the holes in the valve body and drainage occurs. Pushing up on and holding the drain line fitting of the sump drain valves in the center fuel tank permits drainage. A separate flapper closes over the sump drain valve hole in the wing skin when the sump drain valve is removed from the airplane. This permits removal of the sump drain valves without fuel tank defueling.



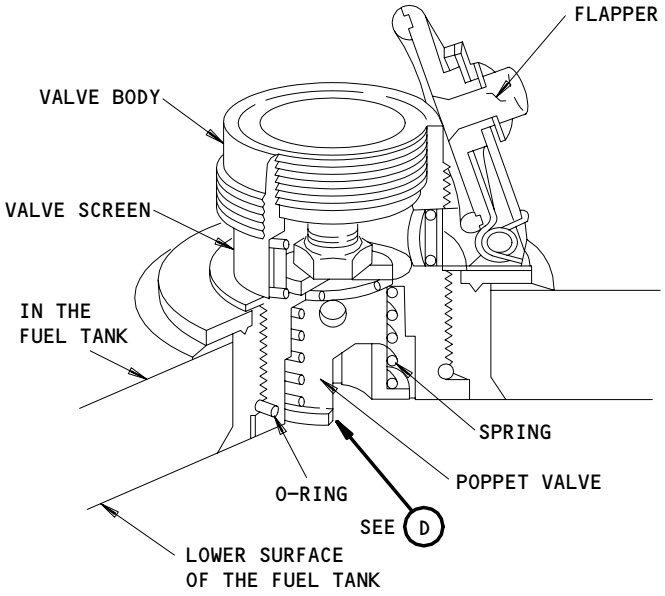


OVERWING FILL PORT
A

Overwing Fill Ports
Figure 3

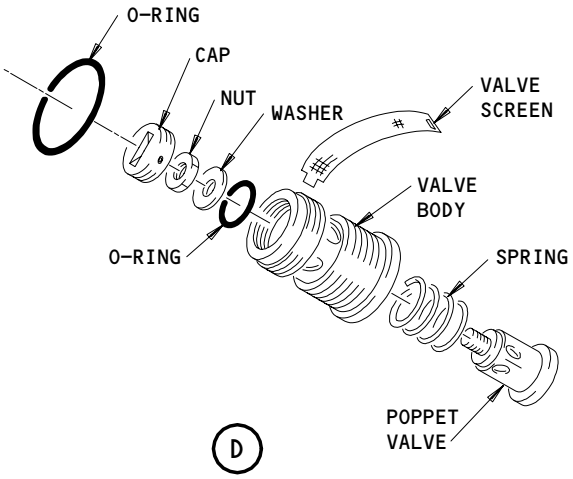


Fuel Sump Drain Valves
Figure 4 (Sheet 1)



SUMP DRAIN VALVE

B



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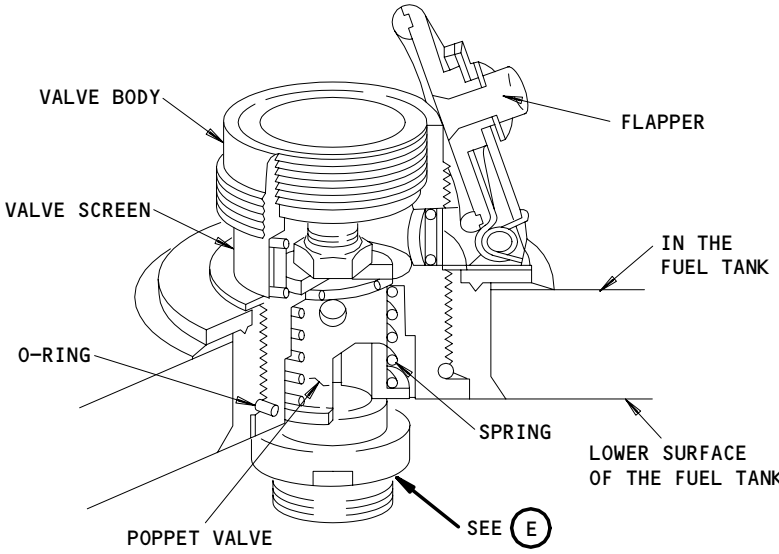
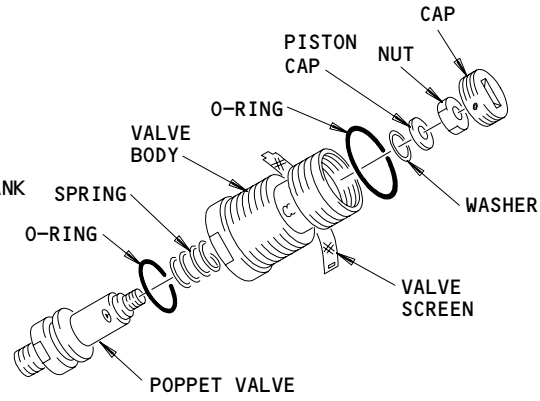


SUMP DRAIN VALVE

C



E

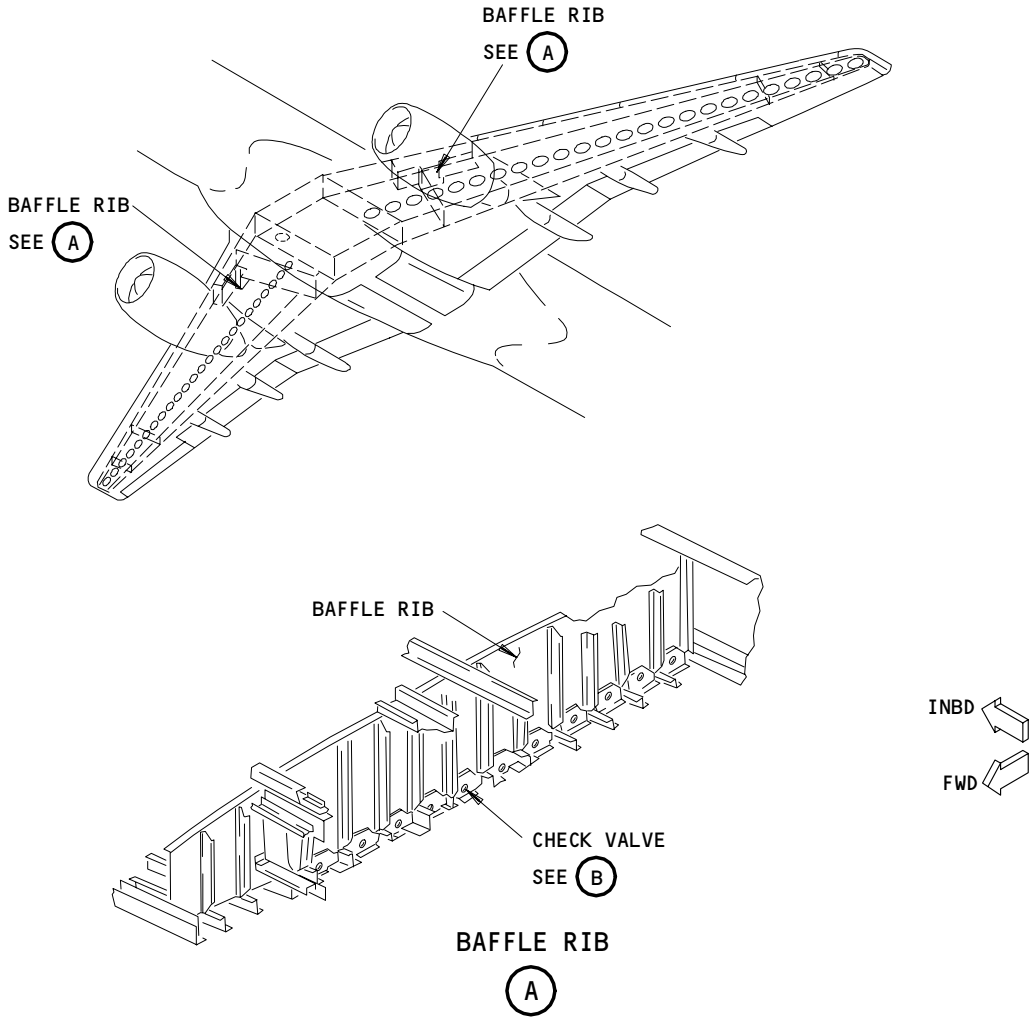
Fuel Sump Drain Valves
Figure 4 (Sheet 2)

43293

D. Baffle Rib Check Valve (Fig. 5)

(1) Eleven baffle rib check valves are installed on the baffle rib just inboard of each fueling shutoff valve in the main fuel tank. The check valves prevent fuel flow in the outboard direction but permit fuel flow in the inboard direction. This prevents a low fuel level between the baffle rib and the inboard tank end rib in the main fuel tank. Thus the check valves prevent the boost pump inlets from being uncovered.

(2) Each check valve is a free swinging flow actuated valve. Inboard fuel flow opens the check valves and outboard flow forces the check valves closed.

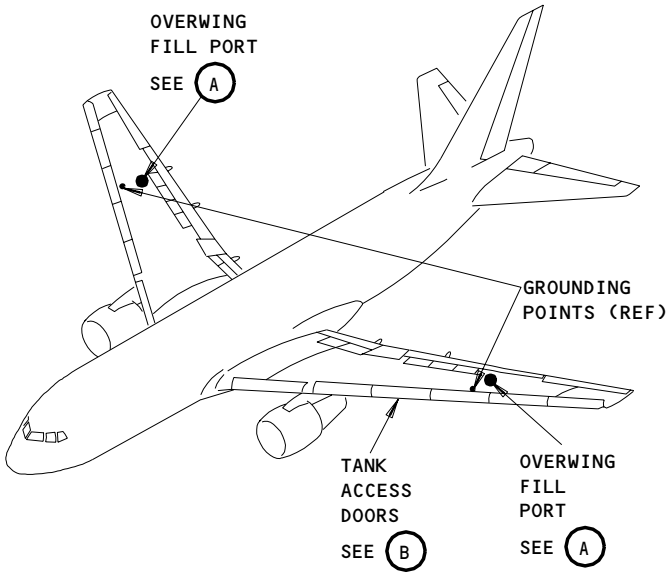


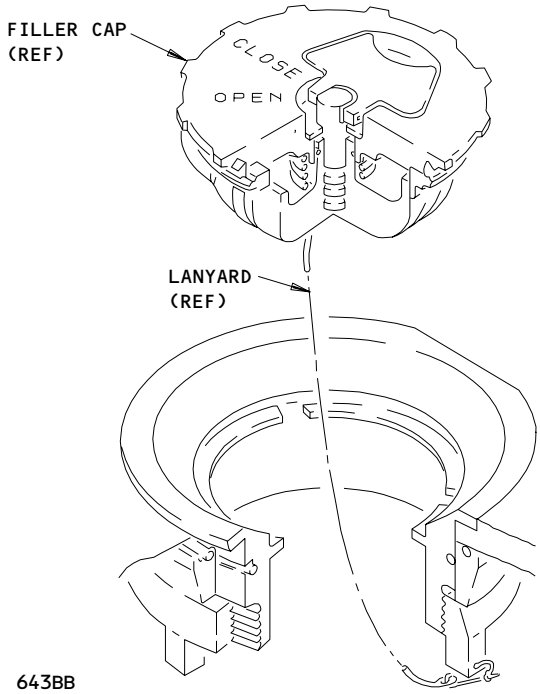
Baffle Rib Check Valve
Figure 5

FUEL TANKS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
DOOR - CENTER TANK ACCESS	1	7	134AZ,531AB,531BB,531CB,631AB, 631BB,631CB	28-11-02
DOOR - LEFT MAIN TANK ACCESS	1	16	541AB,541BB,541CB,541DB,541EB, 541FB,541GB,541HB,541JB,541KB, 541LB,541MB,542AB,542BB,542CB, 542DB	28-11-01
DOOR - LEFT SURGE TANK ACCESS	1	3	543AB,543BB,543CB	28-11-03
DOOR - RIGHT MAIN TANK ACCESS	1	16	641AB,641BB,641CB,641DB,641EB, 641FB,641GB,641HB,641JB,641KB, 641LB,641MB,642AB,642BB,642CB, 642DB	28-11-01
DOOR - RIGHT SURGE TANK ACCESS	1	3	643AB,643BB,643CB	28-11-03
PORT - OVERWING FILL	1	2	L & R UPPER WING SURFACE, OUTBD	28-11-04
VALVE - LEFT BAFFLE RIB CHECK	2	11	541AB	28-11-00
VALVE - LEFT CENTER TANK SUMP DRAIN	2	1	194CL, L ECS EQUIPMENT BAY ACCESS DOOR	28-11-05
VALVE - LEFT MAIN TANK SUMP DRAIN	2	1	541AB	28-11-05
VALVE - LEFT SURGE TANK SUMP DRAIN	2	1	543AB	28-11-05
VALVE - RIGHT BAFFLE RIB CHECK	2	11	641AB	28-11-00
VALVE - RIGHT CENTER TANK SUMP DRAIN	2	1	194CR, R ECS EQUIPMENT BAY ACCESS DOOR	28-11-05
VALVE - RIGHT MAIN TANK SUMP DRAIN	2	1	641AB	28-11-05
VALVE - RIGHT SURGE TANK SUMP DRAIN	2	1	643AB	28-11-05

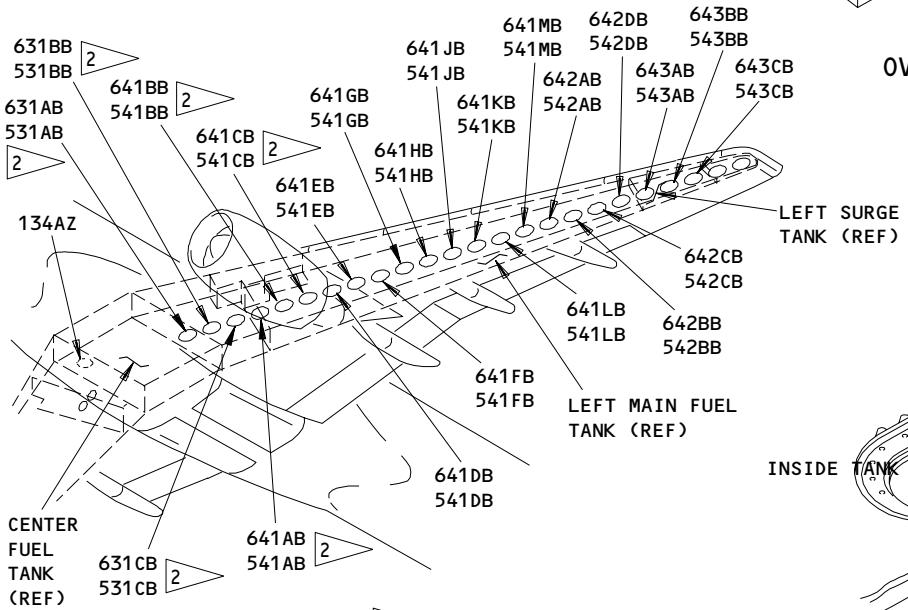
Fuel Tanks - Component Index
Figure 101





OVERWING FILL PORT

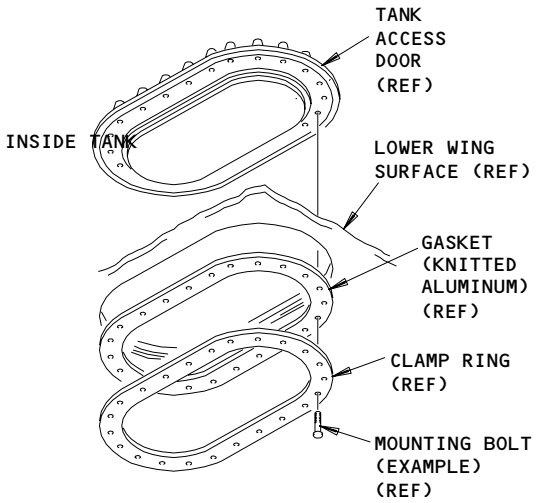
A



TANK ACCESS DOORS 1

(SEE C)

B



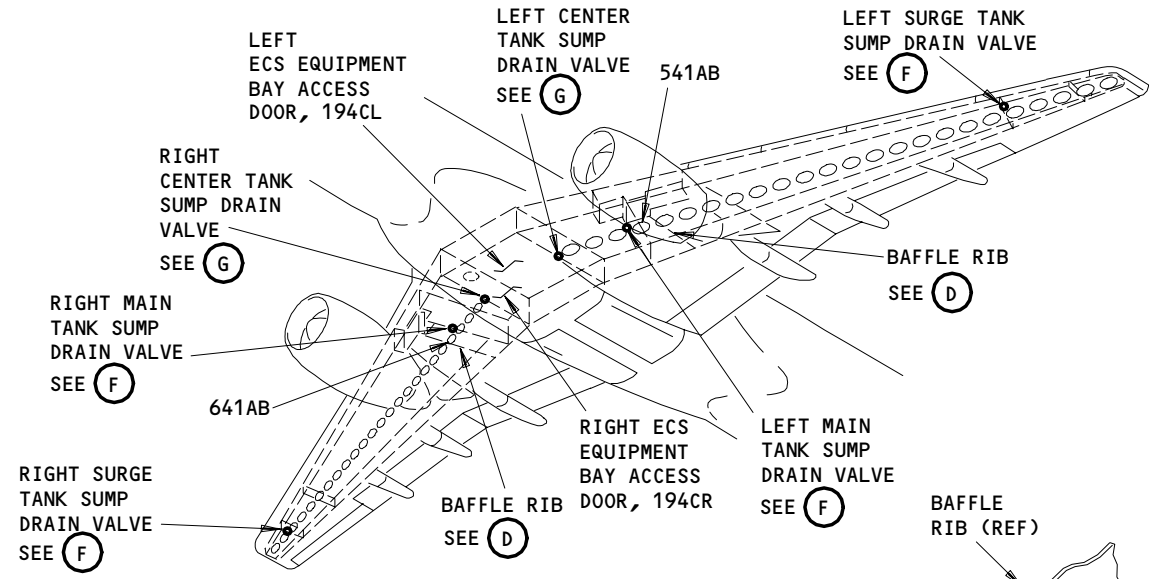
TANK ACCESS DOOR (EXAMPLE)

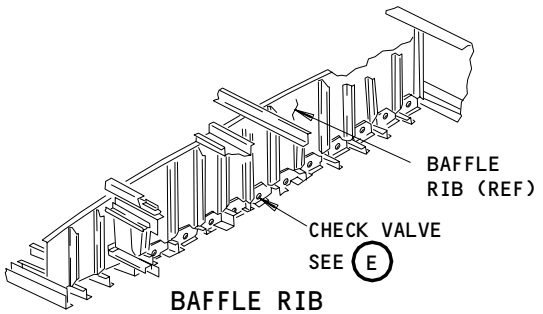
C

1 500 SERIES, LEFT WING
600 SERIES, RIGHT WING

2 IMPACT RESISTANT ACCESS DOORS

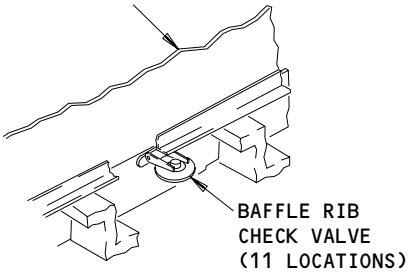
Fuel Tanks - Component Location
Figure 102 (Sheet 1)





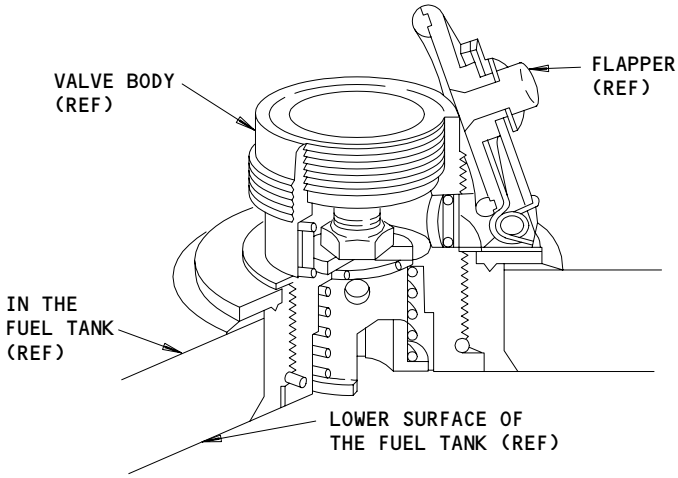
BAFFLE RIB

D



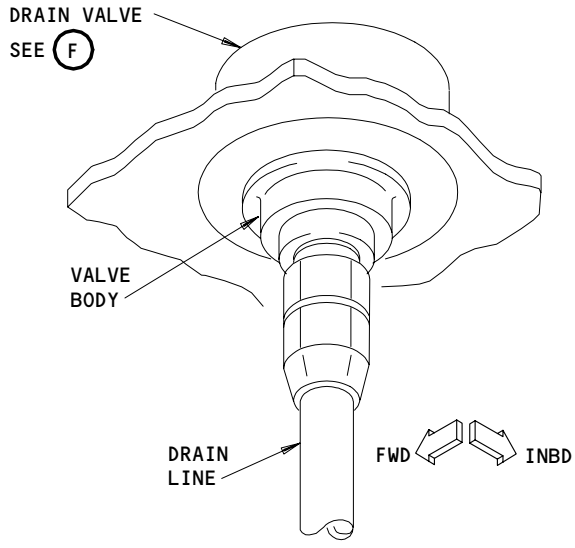
CHECK VALVE

E



DRAIN VALVE (EXAMPLE)

F



CENTER TANK SUMP DRAIN VALVE

G

Fuel Tanks - Component Location
Figure 102 (Sheet 2)

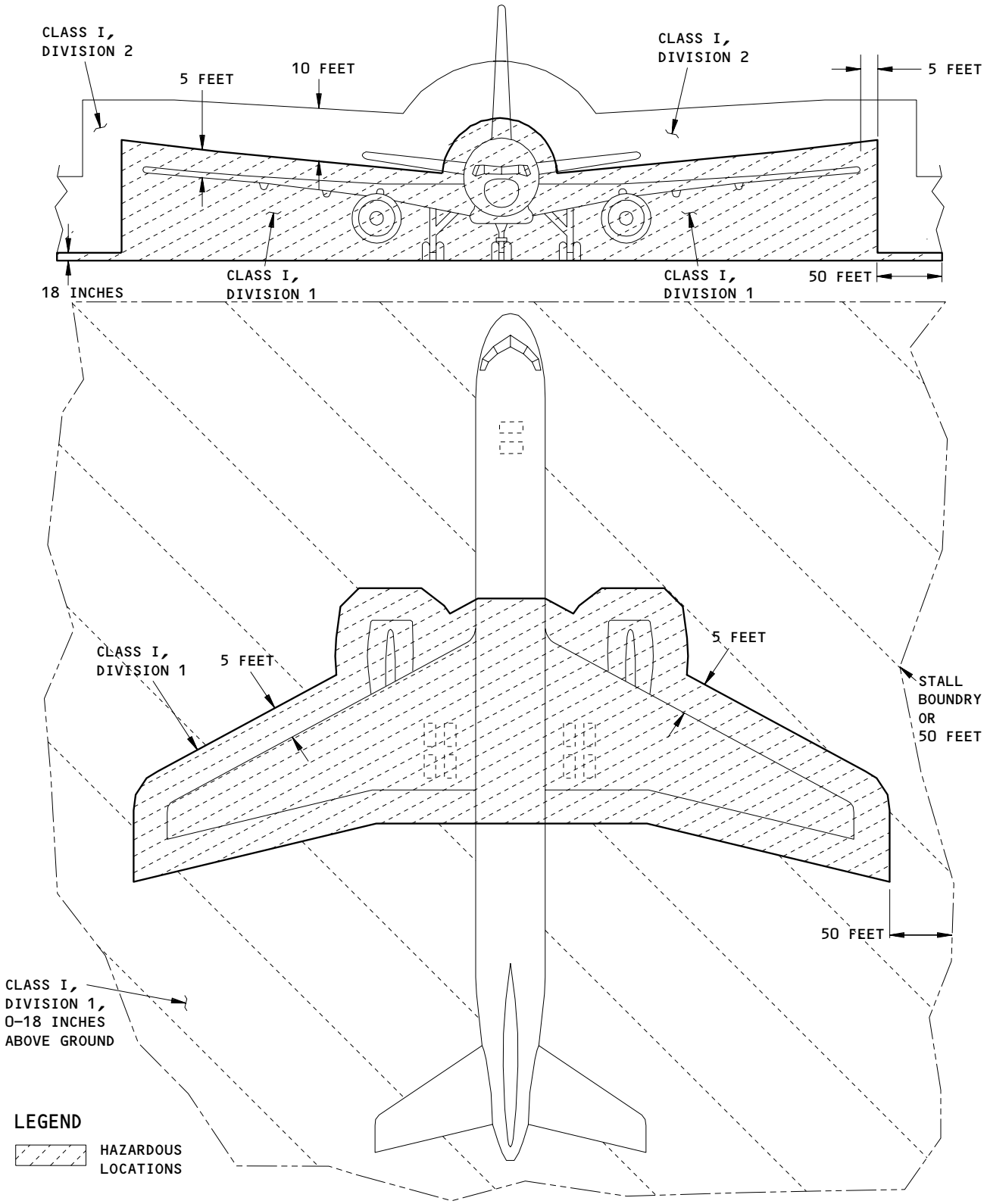
FUEL TANKS - MAINTENANCE PRACTICES

1. General
   A. This procedure contains these tasks:
      (1) Purging and Fuel Tank Entry Precautions
      (2) Purging and Fuel Tank Entry
      (3) Fuel Tank Closure.

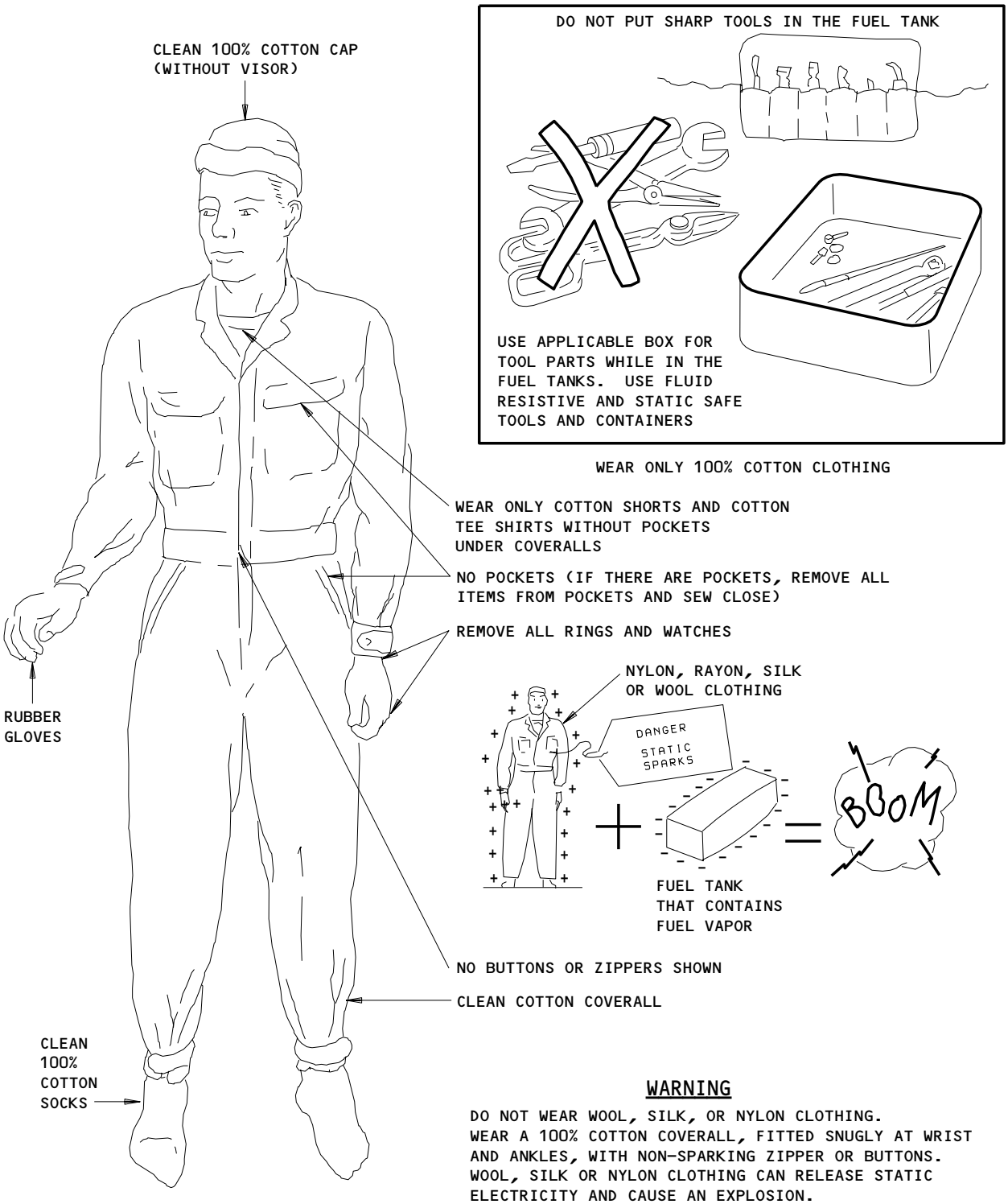
   B. If you make a decision not to do this recommended procedure, you must have an approved alternate procedure. Make sure the conditions during the purging and fuel tank entry operations give sufficient protection to the persons and equipment used in this procedure. It is possible that local fire codes, and standards make it necessary to use more restrictive procedures or more procedures than those given in the subsequent steps.
   C. The safety, fire and health limits in this procedure are used by Boeing at the manufacturing sites in the state of Washington. For fuel tank and confined space entry, Boeing is required to have an aircraft confined space entry program. This program is established to control the entry into confined spaces to protect the safety and health of persons who go into fuel tanks and other closed areas. Important requirements of the program include:
      (1) Identification and Warning Sign Placement
      (2) Observer Communication with Persons inside Confined Spaces
      (3) Entry Permit Requirements
      (4) Pre-entry Procedures
      (5) Entry Procedures
      (6) Emergency and Rescue Service
      (7) Fuel Tank Closure
      (8) Training
   D. It is recommended that a fuel tank entry program which complies with the local, state and national regulations be followed.

TASK 28-11-00-912-209

2. Purging and Fuel Tank Entry Precautions
   A. General
      (1) This procedure contains the precautions you must obey before you purge and enter the fuel tanks for maintenance. This task contains these procedures:
         (a) Purging and Fuel Tank Entry - Definitions
         (b) Purging and Fuel Tank Entry - Airplane Precautions
         (c) Purging and Fuel Tank Entry - Electrical Equipment Precautions
         (d) Purging and Fuel Tank Entry - Equipment Precautions
         (e) Purging and Fuel Tank Entry - Personnel Precautions
         (f) Purging and Fuel Tank Entry - Adverse Weather Conditions Precautions
      (2) The next task, Purging and Fuel Tank Entry, contains the steps you must follow to purge and enter a fuel tank.



Hazardous Locations - Open Fuel Tank(s)
Figure 201



WARNING

DO NOT WEAR WOOL, SILK, OR NYLON CLOTHING. WEAR A 100% COTTON COVERALL, FITTED SNUGLY AT WRIST AND ANKLES, WITH NON-SPARKING ZIPPER OR BUTTONS. WOOL, SILK OR NYLON CLOTHING CAN RELEASE STATIC ELECTRICITY AND CAUSE AN EXPLOSION.

Fuel Tank Entry Precautions
Figure 202

B. Purging and Fuel Tank Entry - Definitions

S 912-210
(1) Approved Persons:
(a) Persons who are trained and understand the dangers and procedures for fuel tank entry and are responsible to make sure the airplane, equipment and the environment is safe for maintenance operations.

S 912-211
(2) Approved Persons For Fuel Tank Entry:
(a) Persons who are trained and understand the dangers and procedures for fuel tank entry.

S 912-212
(3) Class I, Division 1, Hazardous Locations (or equivalent standard):
(a) Locations where ignitable concentrations of flammable gases or vapors can exist under standard operational conditions.
(b) Locations where ignitable concentrations of flammable gases or vapors may exist frequently because of repair or maintenance operations.
(c) Locations where ignitable concentrations of flammable gases or vapors can exist because of leakage.
(d) Locations where equipment problems or incorrect operation of equipment or processes can release ignitable concentrations of flammable gases or vapor, and can also cause failure of electrical equipment at the same time.

S 912-213
(4) Class I, Division 2, Hazardous Locations (or equivalent standard):
(a) Locations where flammable liquids or gases are handled, processed or used, but where the liquid, vapors, or gases will usually be in closed containers or closed systems. The containers or systems will not allow the release of liquid, gas or vapor in sufficient quantity to produce an ignitable fuel and air mixture unless the container or system fails or is damaged.

S 912-214
(5) Explosion-Proof Equipment:
(a) Equipment contained in a case that will not be damaged by an internal explosion caused by explosive vapors inside the unit.
(b) Equipment which will not cause explosive vapors around the unit to ignite even when sparks, flashes or an explosion of vapor occurs inside the unit.
(c) Equipment which operates at an external temperature which will not cause explosive vapors around the unit to ignite.
(d) Equipment which has been approved by an independent test laboratory such as Underwriters Laboratories (UL) or Factory Mutual, for use in Class I Division 1 hazardous locations (or an equivalent standard).

S 912-215

(6) Fire-Safe Condition:

(a) 10% or less of the lower explosive limit (LEL).

FIRE-SAFE CONDITION

A FIRE-SAFE CONDITION OCCURS WHEN THE VAPOR CONCENTRATION IS LESS THAN 10 PERCENT OF THE LOWER EXPLOSIVE LIMIT (LEL).

S 912-216

(7) Health-Safe Condition:

(a) An atmosphere where oxygen content is a minimum of 19.5% to a maximum of 23.5% by volume at sea level, and the vapor concentrations are below the permissible exposure limits (PEL).

(b) Because kerosene has a low vapor pressure, the concentrations are usually within the limits needed for a Health-Safe condition. Thus, you usually get very low (safe) values at usual temperatures (less than approximately 70°F). At tank temperatures of approximately 90°F, it is possible to get gas concentrations more than the Health-Safe value with kerosene. At tank temperatures of more than 90°F, it is possible to get gas concentrations more than the Fire-Safe value. It is also possible that a different type of fuel was kept in a tank that usually contains kerosene. If the purging procedure was not done, this causes high concentration values when you use the combustible gas indicator.

WARNING: THERE IS NO HEALTH-SAFE LIMIT FOR JP-4/JET-B FUEL WHICH CAN CONTAIN BENZENE. IT IS POSSIBLE THAT BENZENE CAUSES CANCER.

(c) Before you go into a fuel tank that contained JP-4/Jet-B, wear a full-mask respirator with an attached breathing-air supply.

HEALTH-SAFE CONDITION A HEALTH-SAFE CONDITION OCCURS WHEN THE OXYGEN CONTENT IS A MINIMUM OF 19.5% TO A MAXIMUM OF 23.5% BY VOLUME AT SEA LEVEL, AND THE VAPOR CONCENTRATIONS ARE BELOW THESE PERMISSIBLE EXPOSURE LIMITS:		
Fuel	Permissible Exposure Level Total Hydrocarbons TWA *[1] (ppm)	Lower Explosive Level (percent)
Aviation Gasoline	300	1.0
Jet A Jet A-1 JP-5 JP-8	160	0.7

*[1] TWA - Time Weighted Average

S 912-217
(8) Lower Explosive Limits (LEL):
(a) The minimum concentration of flammable vapors in air below which propagation of flame does not occur on contact with a source of ignition.

S 912-218
(9) Permissible Exposure Level (PEL):
(a) The time weighted average airborne concentrations of substances at which it is believed that nearly all workers may be repeatedly exposed 8 hours a day, 40 hours a week, without adverse health effects.

NOTE: The PEL limits used in this procedure are the PEL limits used by Boeing personnel during fuel tank entry. If the local PEL limits are more restrictive than the ones given in this procedure, use the equivalent local PEL limits.

S 912-219
(10) Purging or Purged (For Fuel Tank Entry):
(a) Purging an aircraft fuel tank is defined as the removal of any fuel or fuel vapor that remains after the fuel tanks are sumped. A purged fuel tank contains a nonflammable atmosphere that can be maintained by mechanical ventilation.

S 912-220

(11) Unwanted Sources of Ignition:

(a) Unwanted sources of ignition include

1) Open flames (matches, cigarette lighters etc.)
2) Electrical equipment (lights, motors, sparks from engine exhaust etc.)
3) Frictional hot spots
4) Electromagnetic energy (radio transmissions or radars)
5) Static electricity
6) Lightning

C. Purging and Fuel Tank Entry - Airplane Precautions

S 912-221

(1) Do the maintenance on the fuel tanks in areas which allow the free movement of air, fire fighting equipment and other emergency equipment.

S 912-222

(2) A rope barrier must be placed around the airplane, to identify the Clas I, Division 1 hazardous locations. See Figure 201 for the distance requirements. The rope barrier must include signs or placards which state "DANGER - OPEN FUEL TANKS.

S 912-223

(3) The airplane must be correctly grounded to an approved ground before you defuel the airplane or open any fuel tanks.

S 912-224

WARNING: DO NOT USE AIRPLANE ELECTRICAL POWER WHEN FUEL TANK ACCESS DOORS ARE OPEN. A FIRE OR EXPLOSION CAN OCCUR IF FUEL VAPOR IS IGNITED BY SPARK(S) FROM ELECTRICAL EQUIPMENT. A FIRE OR EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(4) Before the fuel tank access doors are opened, all of the electrical power to and from the airplane must be removed. Placards which state that power should not be restored on the airplane until the fuel tank(s) are closed should be attached to applicable locations.

S 912-225

(5) The main, and APU batteries must be disconnected. Placards which state not to connect the batteries unit the fuel tanks are closed should be attached to all disconnected battery locations.

S 912-226

(6) All safety, support and maintenance equipment must be in place before you open the fuel tank access doors. Movement of equipment can cause sparks which can cause fuel vapors to ignite.

S 912-227

(7) No painting operations are allowed on airplanes with open fuel tanks.

D. Purging and Fuel Tank Entry - Electrical Equipment Precautions

S 912-228

WARNING: FOLLOW THE SUBSEQUENT RADIO AND RADAR LIMITS. FAILURE TO FOLLOW THE SUBSEQUENT RADIO AND RADAR LIMITS CAN CAUSE A FIRE OR EXPLOSION. A FIRE OR EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(1) No radio or radar equipment should operate nearer to an open fuel tank than the distances specified in Table 201.

TABLE 201

POWER (EIRP *[1]) OF EQUIPMENT TRANSMITTING RADAR OR RADIO *[2]	SEPARATION DISTANCE (FEET)	
	MAINTENANCE WITH OPEN FUEL TANKS PURGED	MAINTENANCE WITH OPEN FUEL TANKS NOT PURGED (or during purging)
More than 100 watts	200	200
25 to 100 watts	50	50
Less than 25 watts *[3]	10	50
Radiating ground approach control or pattern surveillance radar	300	300
Open flame, heat sources, lighted smoking material, and any other potential ignition sources	50	50

*[1] EIRP is Effective Isotropic Radiated Power in watts
*[2] This separation distance does not apply to airplane installed radio transmitters. Any limits on operations for the airplane VHF, SATCOM, HF, weather radar, etc., are listed in the airplane operations manuals.
*[3] This category includes mobile phones, pagers, two-way radios, etc. There are low power (explosion proof) radios that are approved for use in Class I division 1 hazardous locations that can be used safely in the vicinity of open, not purged, fuel cells and other areas containing fuel vapors.

S 912-229

(2) Fuel in the beam of operational high-powered radar which can produce a peak power density that exceeds 5 watts per square centimeter is hazardous. Electromagnetic energy of this intensity can ignite fuel vapors and cause a fire.

S 912-349

WARNING: DURING OPEN FUEL TANK OPERATIONS, THE ENTIRE AREA AROUND THE AIRPLANE AND ANY ADJACENT AREAS THAT COULD COLLECT FUEL VAPORS ARE CLASSIFIED AS CLASS I DIVISION 1 HAZARDOUS LOCATIONS. THE HAZARDOUS LOCATION CLASSIFICATION APPLIES TO AIRPLANES BEFORE AND AFTER A FUEL TANK IS PURGED.

THE CLASS I DIVISION 1 HAZARDOUS LOCATION EXTENDS FROM THE GROUND UP TO 18 INCHES ABOVE THE GROUND. ONLY USE ELECTRICAL EQUIPMENT WHICH IS APPROVED FOR THE APPLICABLE HAZARDOUS LOCATION.

(3) Electrical equipment which is energized or operated within 50 feet horizontally and 18 inches or less above the ground of an open fuel tank, must be rated explosion-proof for Class I, Division 1 hazardous locations. This includes energized plugs and receptacles. For radio and radar equipment (transmitting equipment) see Table 201 for separation distance requirements.

S 912-231

(4) Figure 201 shows the different classification of hazardous locations around airplanes with open fuel tanks.

S 912-232

(5) Only use approved explosion-proof flashlight that operate correctly in the fuel tanks.

NOTE: The use of explosion-proof lights in or near an open fuel tank is allowed only by approved persons. The air in the fuel tank must be 10 percent or less of the lower explosive limit (LEL).

S 912-233

(6) Only use explosion-proof flood extension lights and power cords which are approved to supply external light.

S 912-234

(7) Do not connect or disconnect electrical equipment from energized outlets (within 100 feet of an open fuel tank) unless the equipment is fitted with explosion-proof plugs.

S 912-235

(8) Do not use electrical test equipment which can cause sparks in a fuel tank.

E. Purging and Fuel Tank Entry - Equipment Precautions

S 912-237

(1) All metal work platforms or stands used for entry into the fuel tanks or located within a 50-foot radius of an open fuel tank (before and after the fuel tank purging) must be bonded to the airplane and grounded to an approved earth ground.

S 912-238

(2) Before you use ventilation equipment, make sure the blower or venturi is connected to the airplane ground. The ventilation blower or the venturi must be explosion-proof.

S 912-239

(3) Air ducts must be bonded to form a continuous electrical conductor, and grounded in at least one place to a static electrical ground.

S 912-240

(4) If you use the ventilation equipment to exhaust fuel vapors from the tank, static build-up on or in the air ducts can reach a level where a spark can ignite the vapors and an explosion can occur. It is strongly recommended that the air ducts be coated inside and out with a conductive coating. Each section of the air duct must be correctly bonded to each other. Air ducts made from vinyl fabric are not recommended because vinyl is an insulator of static charges. If the air duct uses a metal helical wire to create a non-collapsible duct, make sure the wire is permanently attached to a metal or conductive plastic connection on each end of the duct section.

S 912-241

(5) Equipment used to ventilate the fuel tanks or provide warm or cool air must not be turned off with the air duct in the fuel tank. The fuel vapor from the fuel tank can enter the air duct and cause an explosion at the motor. Make sure the blower is on before you put the air duct in the fuel tank. Make sure the blower remains on until the air duct is removed from the fuel tank.

S 912-242

(6) When you remove an air duct from the fuel tank or disconnect the air duct at the blower, turn the duct 180 degrees away from the purging area. This will stop the flow of fuel vapor into the air duct line.

S 912-243

(7) During fuel tank maintenance, make sure there is continuous mechanical ventilation. The fresh air flow from the ventilation equipment must maintain the oxygen levels between 19.5% and 23.5% by volume and the fuel vapor levels below 10% LEL (fire safe limit).

S 912-244

(8) Use a combustible gas indicator to monitor the environment inside the fuel tank. The indicator must be designed for Class I, Division 1 hazardous locations and calibrated for the correct type of jet fuel. The indicator must be securely attached to a ladder or stand at the fuel tank entry location. As an alternate procedure, you can take an additional combustible gas indicator into the fuel tank to monitor the environment where you will do the maintenance.

S 912-245

(9) Obey these precautions for equipment and materials used to do maintenance in the fuel tanks:

(a) Always use a checklist to record all equipment, tooling and material that you bring into the fuel tank. Use the checklist to make sure all maintenance items are removed before you close the fuel tank.

(b) Do not use steel wool in the fuel tank. A piece of wire from steel wool is a potential ignition source.

(c) Only use approved non-static plastic containers with rounded corners to hold tools and supplies.

(d) Keep all sharp edged tools in the container at all times when not in use. Sharp edged tools can cause damage to equipment and sealant.

(e) Only use cotton wipers (BMS15-5) in open fuel tanks. When you wipe up fuel in the fuel tank, use the cotton wipers (BMS15-5).

NOTE: Do not use paper towels or other paper products.

(f) Solvents, sealants, or other materials used in the fuel tank can be a health and fire hazard. Use the correct protective equipment for the solvent or material that is used. Protective equipment includes: respirators, eye protection, protective clothes, gloves etc.

(g) Keep the quantity of solvents that you use to a minimum. Only bring enough solvent in the tank to complete the maintenance. Apply the solvent to a clean cotton wiper (BMS15-5), not the airplane structure or sealant. After you finish with the cotton wiper (BMS15-5), put the cotton wiper (BMS15-5) in a polyethlene bag or remove from the airplane. This will keep the solvent vapor to a minimum.

(h) Powered tools must be air driven.

WARNING: ONLY USE SHOP AIR OR BOTTLED AIR AS THE SOURCE OF GAS TO POWER AIR DRIVEN EQUIPMENT. GASES OTHER THAN SHOP OR BOTTLED AIR CAN REMOVE OXYGEN FROM A CLOSED AREA. IF YOU GO INTO A CLOSED AREA WITHOUT ENOUGH OXYGEN, YOU CAN BECOME UNCONSCIOUS OR IT CAN KILL YOU.

(i) Only use shop air or bottled air as a gas source for air-driven tools. Do not use nitrogen, oxygen, carbon dioxide (CO2) or any other non-air source of gas.

F. Purging and Fuel Tank Entry - Personnel Precautions (Fig. 202)

S 912-246

(1) Make sure the persons who will go into fuel tanks are approved persons for fuel tank entry.

S 912-247

(2) Make sure observers who will watch persons in the fuel tank(s) are approved as fuel tank entry observers.

S 912-248

(3) The fuel vapors in and from the fuel tank are explosive and hazardous to your health. The fuel tanks must be in a fire-safe condition when an initial fuel tank entry is made. You must wear an approved respirator with a breathing-air supply when you go into a fuel tank that is in a fire-safe condition. It is necessary to have a good flow of air through the fuel tank to get a fire-safe condition. The air must flow continuously during the fuel tank entry procedure.

S 912-249

(4) The fuel tank must be in a health-safe condition before you can go into the fuel tank without a breathing-air supply. When the fuel tank is in a health-safe condition, at a minimum, it is recommended that a half-mask respirator with an organic vapor filter be used. It is necessary to have a good flow of air through the fuel tank to get a health-safe condition. The air must flow continuously during the fuel tank entry procedure.

S 912-250

(5) Hydrocarbon fuels that touch the skin can remove protective oils. Without protective oils, the skin can become dry, chapped, cracked, or possibly become infected. If a person breathes too much fuel vapor, the person can become dizzy, get a headache or lose his or her coordination. Jet fuel is composed of many different kinds of hydrocarbon molecules. Exposure to some of these molecules for a long time is known to cause cancer.

S 912-251

(6) Vapors from fuel or other materials (solvents etc.) used for fuel tank maintenance can replace oxygen from a confined area such as a fuel tank or dry bay. If a person goes into a confined area that contains fuel vapor (or other vapors) without an air supply, the person may not get enough oxygen. This may cause unconsciousness or death. Make sure the environment is continously monitored with an approved combustible gas indicator.

S 912-252

(7) No one is allowed to go into or remain in a fuel tank if:
   (a) The flammable vapor concentration is more than 10% of the lower explosive limit.
   (b) The oxygen content of the fuel tank is below 19.5% or above 23.5%.
   (c) The air ventilation system fails.
   (d) A strong fuel odor is noticed.
   (e) A person feels any physical problems, such as trouble breathing, dizziness, irritation, confusion, light-headedness, fullness in the head, ringing sensation on the ears, nausea, headache, difficulty in breathing, sensation of apparent suffocation, immobility, unusual behavior, failure to respond to communication, or other signs of illness.
   (f) There is an observed or reported hazard which may reduce the level of safety.

S 912-253

(8) Persons who work in or near an open fuel tank must <u>not</u>:
   (a) Slide metal objects, such as tool boxes, ladders, etc.
   (b) Carry matches or pocket warmers.
   (c) Wear shoes with metal clips or exposed nails.
   (d) Wear or use battery-operated devices such as hearing aids, electrical pacemakers or watches, pocket radios, cellular phones or paging equipment unless it is explosion-proof and permitted by approved persons.

(e) Use the tank wiring harnesses as handholds.

S 912-254

(9) Persons who work in an open fuel tank must wear approved fuel tank protective clothing. Protective clothing includes:
(a) Cotton coveralls with non-sparking zippers or buttons. Do not wear wool, silk, nylon or other synthetic clothing.

WARNING: MAKE SURE THE TEMPERATURE IN THE FUEL TANK DOES NOT GET TOO HOT. IF THE FUEL TANK TEMPERATURE GETS TOO HOT, A PERSON IN THE FUEL TANK CAN HAVE HEAT-RELATED DISORDERS. IF A PERSON BECOMES TOO HOT, GET THE PERSON OUT OF THE FUEL TANK. FIND OUT IF MEDICAL ASSISTNCE IS NECESSARY.

COVERALLS THAT ARE COATED WITH SARANEX 23P WILL KEEP BODY HEAT IN. CLOSELY MONITOR A PERSON IN SARANEX 23P COVERALLS FOR SIGNS OF HEAT-RELATED DISORDERS. IF A PERSON BECOMES TOO HOT, GET THE PERSON OUT OF THE FUEL TANK. FIND OUT IF MEDICAL ASSISTANCE IS NECESSARY.

(b) Saranex coveralls are also approved for use in fuel tanks.
(c) Clean cotton boot socks or fuel cell boots.

NOTE: It is recommended that boot socks be worn over fuel cell boots when you stand in a fuel tank. This will reduce the chance that you will slip and fall down.

(d) Clean cotton head cover (doctor-type hats) with tie strings or a lint free shower-type cap with an attached elastic headband.
(e) Cotton or rubber gloves.

S 102-369

(10) If a fuel tank entry is necessary before two flights after a biocide treatment, do one of these:
(a) Flush the fuel tank with untreated fuel a minimum of two times (AMM 12-11-01/301, AMM 28-26-00/201).

NOTE: After the biocide treatment, if you refuel the fuel tank two times, it will reduce the concentration of the biocide to a low level.

WARNING: DO NOT GET THIS MATERIAL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. PUT ON A RESPIRATOR, EYE PROTECTION (GOGGLES, OR OTHER APPROVED PROTECTION) AND GLOVES WHEN YOU USE THIS MATERIAL. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. KEEP THIS MATERIAL AWAY FROM SPARKS, FLAME, AND HEAT. THIS MATERIAL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

1) Before fuel tank entry, put on a respirator, coverall (approved cotton substitute), and gloves.

NOTE: The biocide manufacturers Material Safety Data Sheet (MSDS) has information regarding the handling of the product. However, the MSDS is intended for the product before it is diluted in fuel. Once diluted, the concentration is greatly reduced.

(b) Move the treated fuel to a different fuel tank or defuel the applicable fuel tank (AMM 28-26-00/201).

WARNING: DO NOT GET THIS MATERIAL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. PUT ON A RESPIRATOR, EYE PROTECTION (GOGGLES, OR OTHER APPROVED PROTECTION) AND GLOVES WHEN YOU USE THIS MATERIAL. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. KEEP THIS MATERIAL AWAY FROM SPARKS, FLAME, AND HEAT. THIS MATERIAL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

1) Before fuel tank entry, put on a respirator, coverall (approved cotton substitute), and gloves.

NOTE: The biocide manufacturers Material Safety Data Sheet (MSDS) has information regarding the handling of the product. However, the MSDS is intended for the product before it is diluted in fuel. Once diluted, the concentration is greatly reduced.

S 912-255

(11) Persons who work in or near an open fuel tank must not remove or change clothes near an open fuel tank. You can create sufficient static electricity in the clothes to cause fuel vapor to ignite.

S 912-256

(12) Persons who work in fuel tanks must wear the correct respiratory protection for the fuel tank conditions.
   (a) Persons that use respiratory protection must be trained and know the proper use and limitations of respiratory protection.
   (b) An approved respirator with an attached breathing-air supply is necessary for each person who goes into a fuel tank that is in a fire-safe condition.
   (c) An approved half-mask respirator with a organic vapor filter, at a minimum, is recommended for each person who goes into a fuel tank that is in a health-safe condition.
   (d) Airline Hoods (or equivalent) should be worn by persons if the respirator does not fit correctly due to facial hair or other facial configurations.

S 912-257

(13) At each fuel tank entry location there must be an observer who is outside of the fuel tank. The observer's responsibility is to make sure that person(s) in the fuel tank are safe. The observer must remain outside of the fuel tank in visual contact with the access opening. The observer must be able to communicate with the person(s) inside the fuel tank at all times.
   (a) There are two ways the observer and the person(s) in the fuel tank can communicate:
      1) A confined space communication system designed for aircraft fuel tank use.
      2) The observer and the person who will go into the tank can agree on a communication plan such as tugs on the safety rope at a set time interval.

S 912-258

(14) The observer must also keep a report that shows who is in the fuel tank and when that person comes out. A sign attached to the ladder or support equipment which states, "CAUTION - PERSONNEL INSIDE - MOVE NO EQUIPMENT", must be placed at the location of a fuel tank entry. When the personnel in the tank come out, the observer should remove the sign or place it where it does not show.

S 912-259

(15) Many local, state and national regulatory agencies require a confined space entry permit to be signed and approved before a person goes into a fuel tank. A pre-entry checklist is often required by the confined space entry permit. It is recommended that a pre-entry checklist be used before you go into a fuel tank. Figure 206 is an example of a pre-entry checklist used at Boeing facilities.

G. Purging and Fuel Tank Entry - Adverse Weather Conditions

S 912-260

(1) When thunderstorms or lightning are within a 10 mile radius of the immediate area, open fuel tank maintenance procedures should stop. Persons inside of the fuel tanks should get out. Air ducts inside the fuel tanks should be removed and the power for all support equipment should be switched off. The fuel tank access openings must be closed.

S 912-261

(2) Strong wind conditions can cause a build-up of static electricity. Large charges of static electricity can develop on support equipment while parked as a result of the movement of dust particles and air currents during strong wind conditions. Strong wind conditions can also cause the unwanted movement of items or equipment which can hit the airplane or injure persons. Wind gusts can damage the airplane structure. Fueling, defueling or open fuel tank maintenance procedures should stop if strong wind conditions are present.

TASK 28-11-00-912-262

3. Purging and Fuel Tank Entry

A. General

(1) This task contains these procedures:
  (a) Prepare the Airplane for Fuel Tank Purging
  (b) Prepare the Equipment for Fuel Tank Purging
  (c) Fuel Tank Purging
  (d) Fuel Tank Entry

(2) Make sure you read and obey the precautions in this task: Purging and Fuel Tank Entry Precautions.

B. References

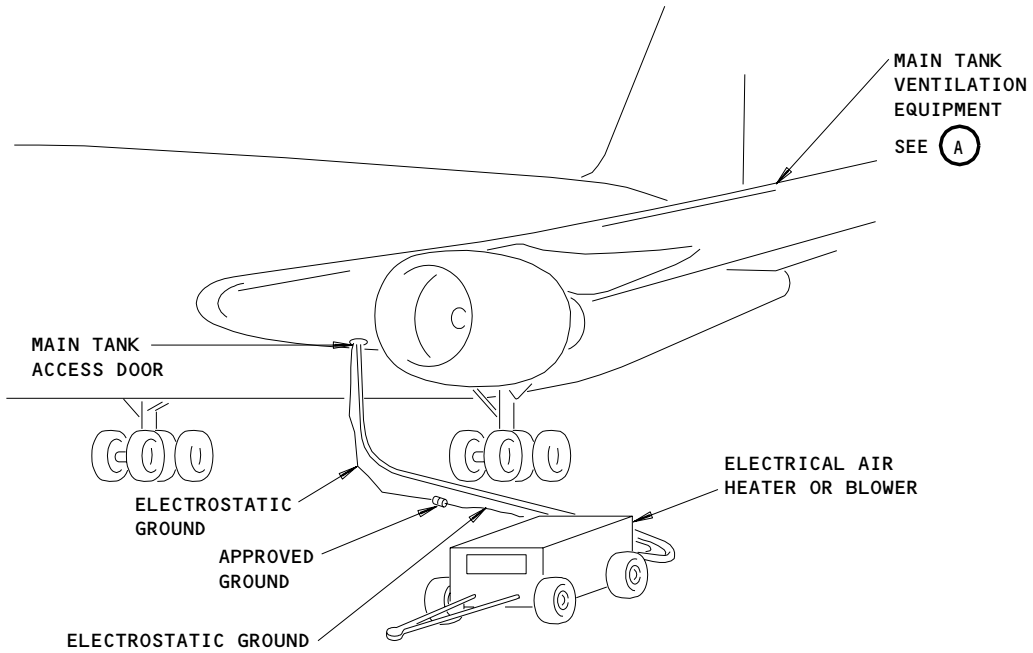
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 12-11-03/301, Fuel Sump Draining
(3) AMM 20-41-00/201, Static Grounding
(4) AMM 24-22-00/201, Electrical Power - Control
(5) AMM 24-31-01/401, Main Battery
(6) AMM 24-31-03/401, APU Battery
(7) AMM 27-51-00/201, Trailing Edge Flaps
(8) AMM 27-81-00/201, Leading Edge Slats
(9) AMM 28-11-01/401, Main Tank Access Door
(10) AMM 28-11-02/401, Center Tank Access Door
(11) AMM 28-11-03/401, Surge Tank Access Door
(12) AMM 28-26-00/201, Defueling
(13) AMM 32-00-15/201, Landing Gear Door Locks
(14) AMM 32-00-20/201, Landing Gear Downlocks

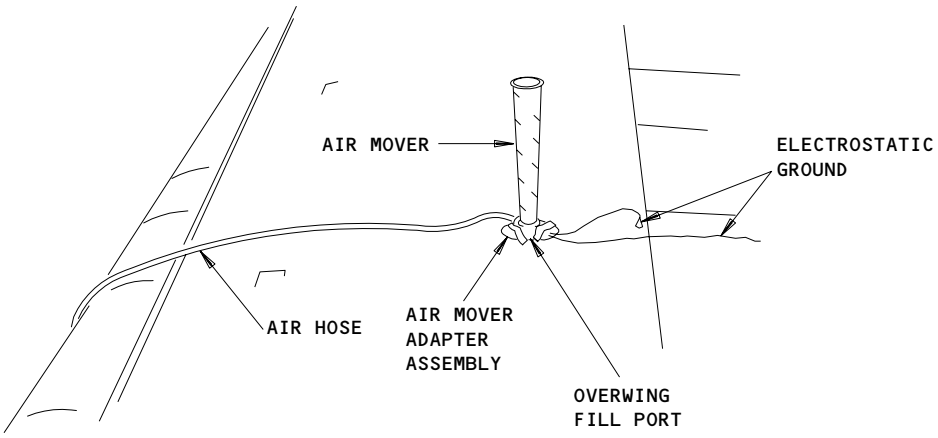
C. Equipment

(1) Air Compressor-Explosion-proof, for use with the Lamb Air Mover (commercially available)

(2) Blower - Air Heater/Blower, Explosion-proof,
Coats Model GH75-2
CAM Industries Inc.,
Kent, Washington

(3) Boots - Neoprene, Part Number RB135 (or equivalent)
Safety & Supply Co.
Seattle, Washington USA
Phone: (206) 762-8500

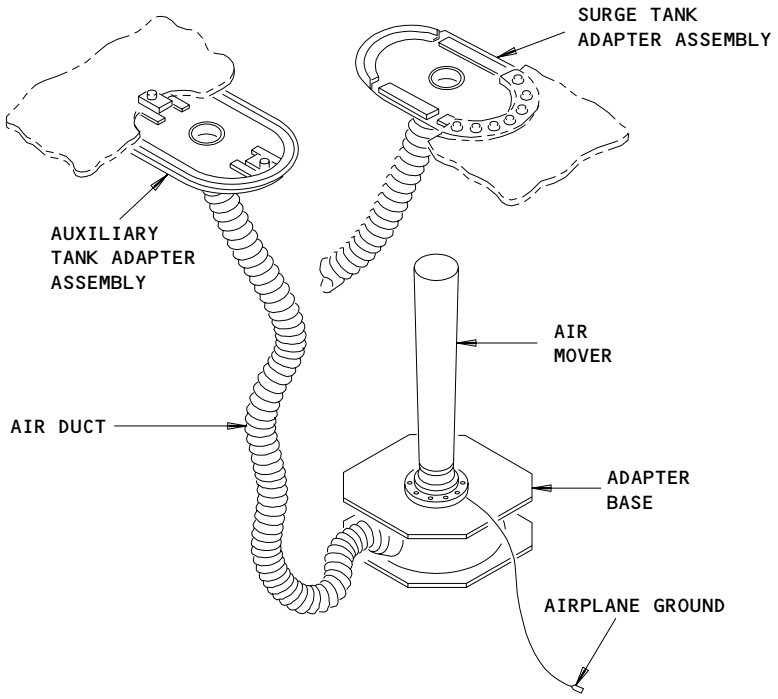




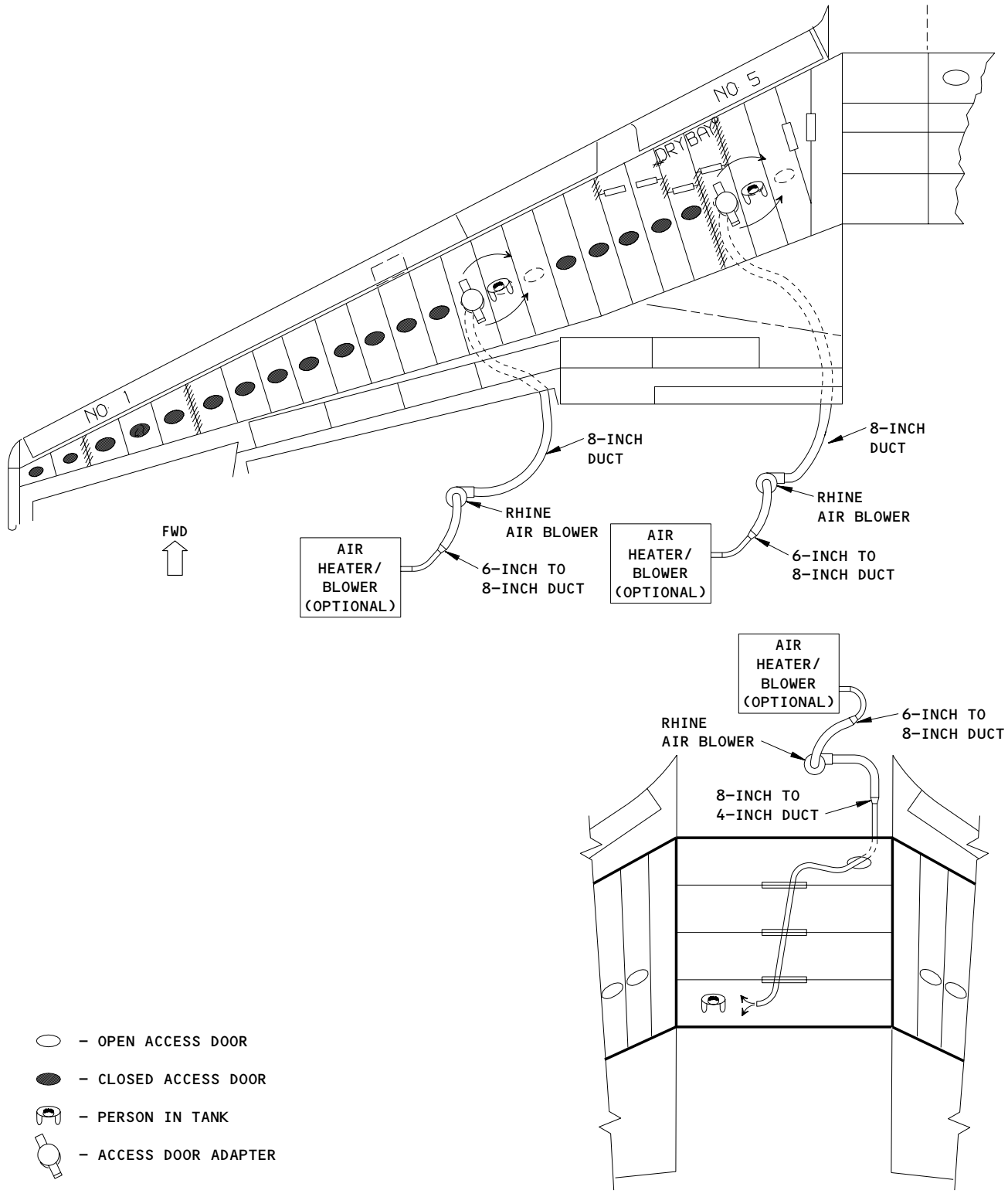
MAIN TANK VENTILATION EQUIPMENT

A

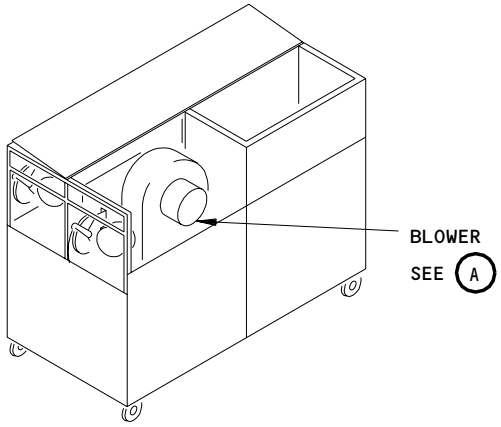
Tank Ventilation Equipment
Figure 203 (Sheet 1)



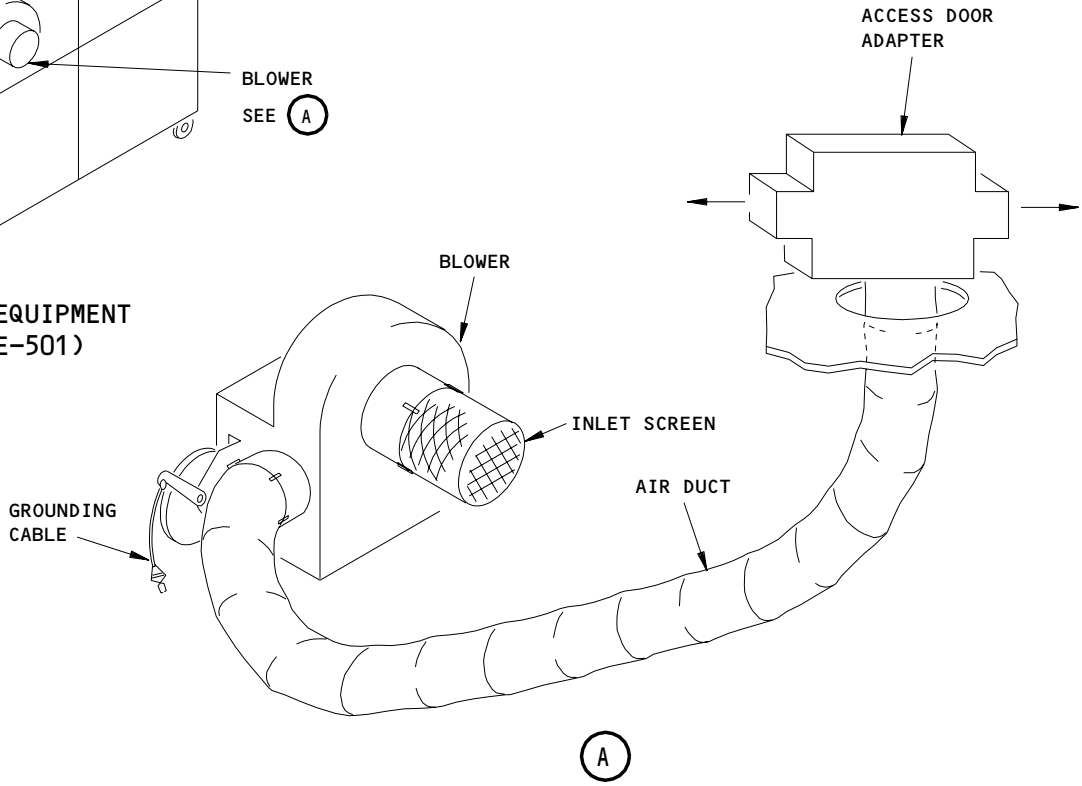
Tank Ventilation Equipment
Figure 203 (Sheet 2)

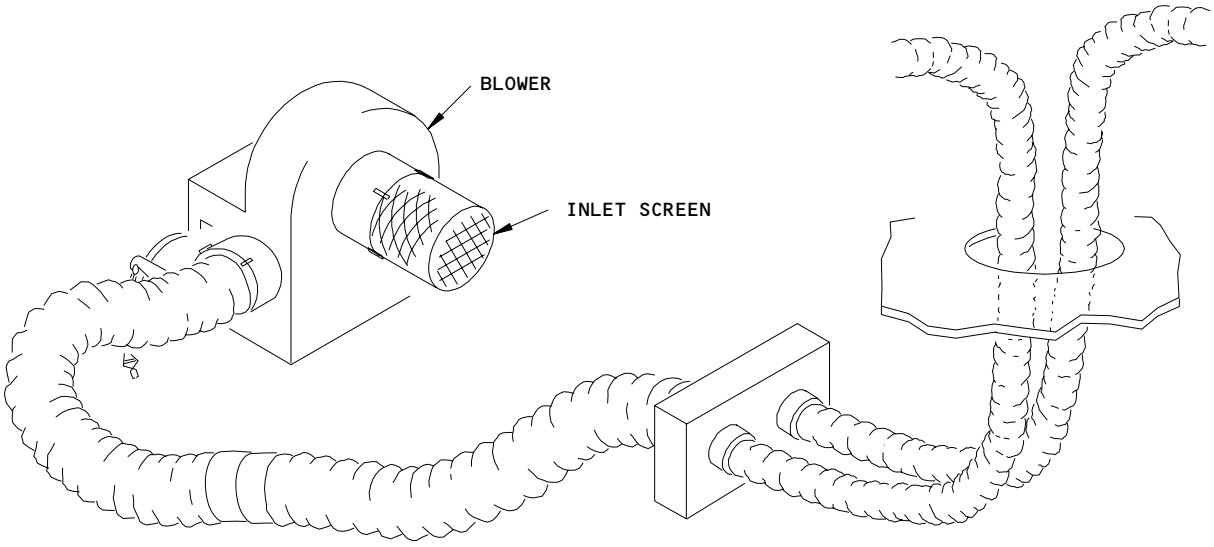


Tank Ventilation Equipment
Figure 203 (Sheet 3)



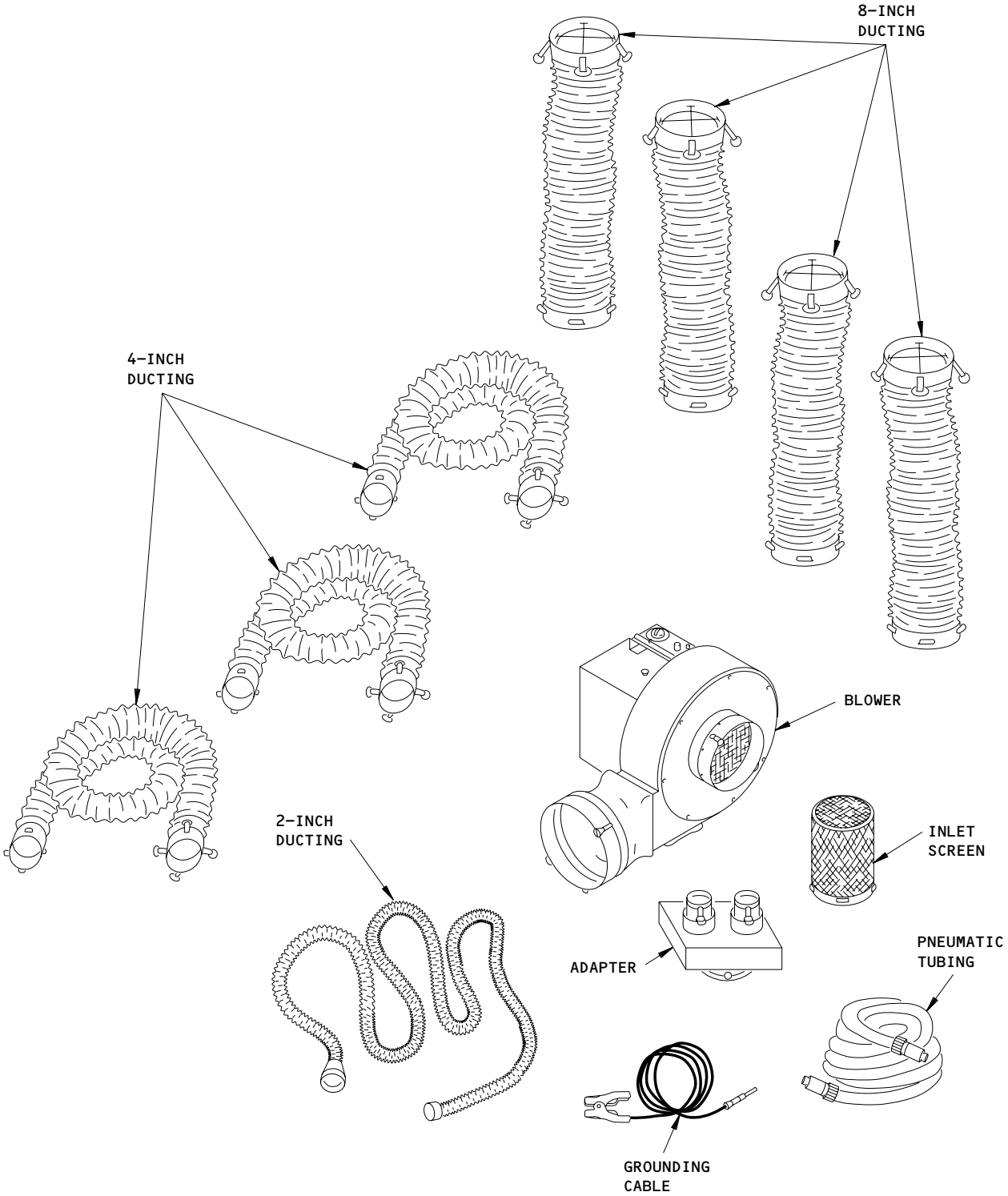
VENTILATION EQUIPMENT
(MODEL BOE-501)





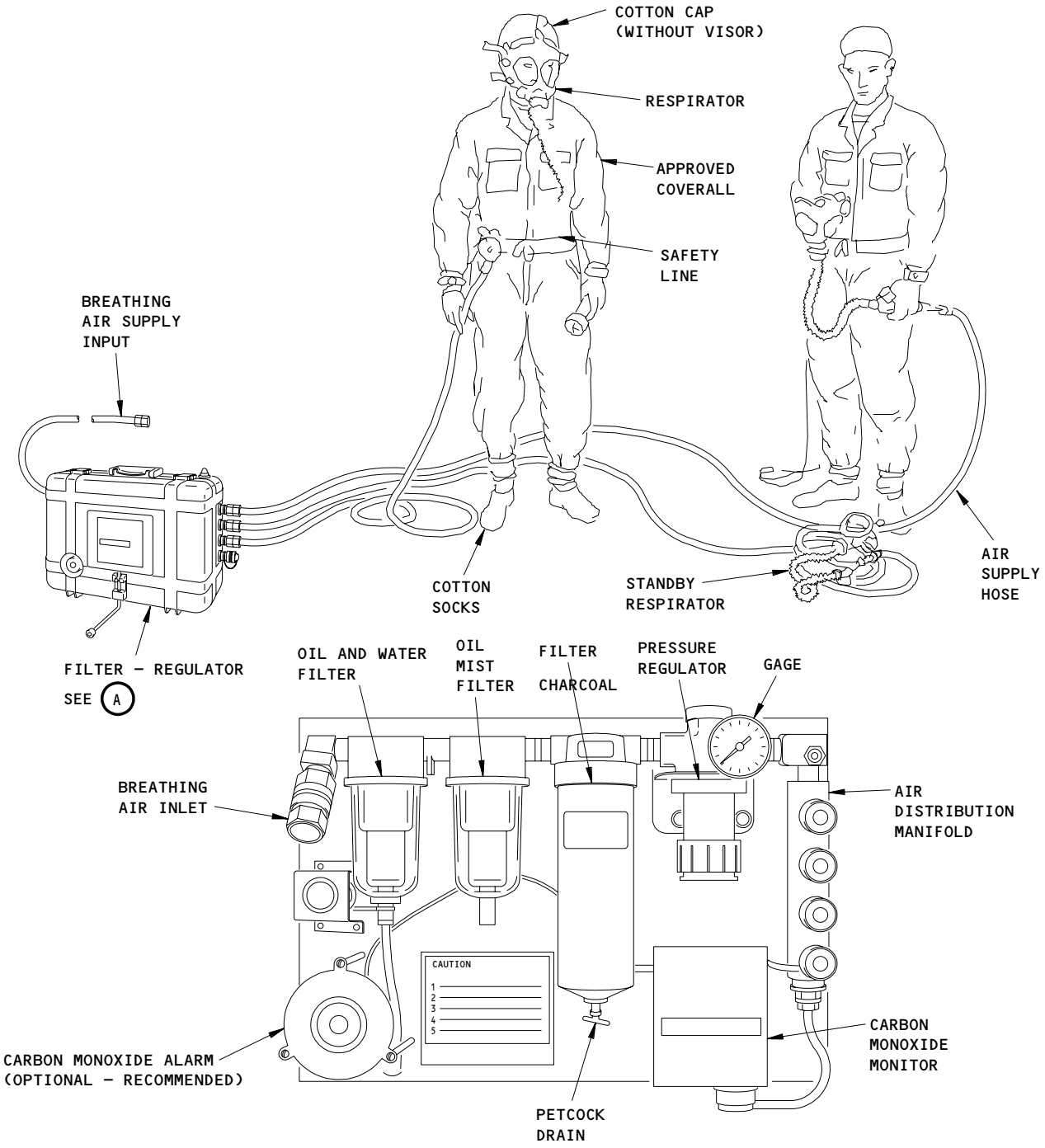
EXAMPLE CONFIGURATION FOR
VENTILATION EQUIPMENT (MODEL BOE-501)

Tank Ventilation Equipment
Figure 203 (Sheet 4)



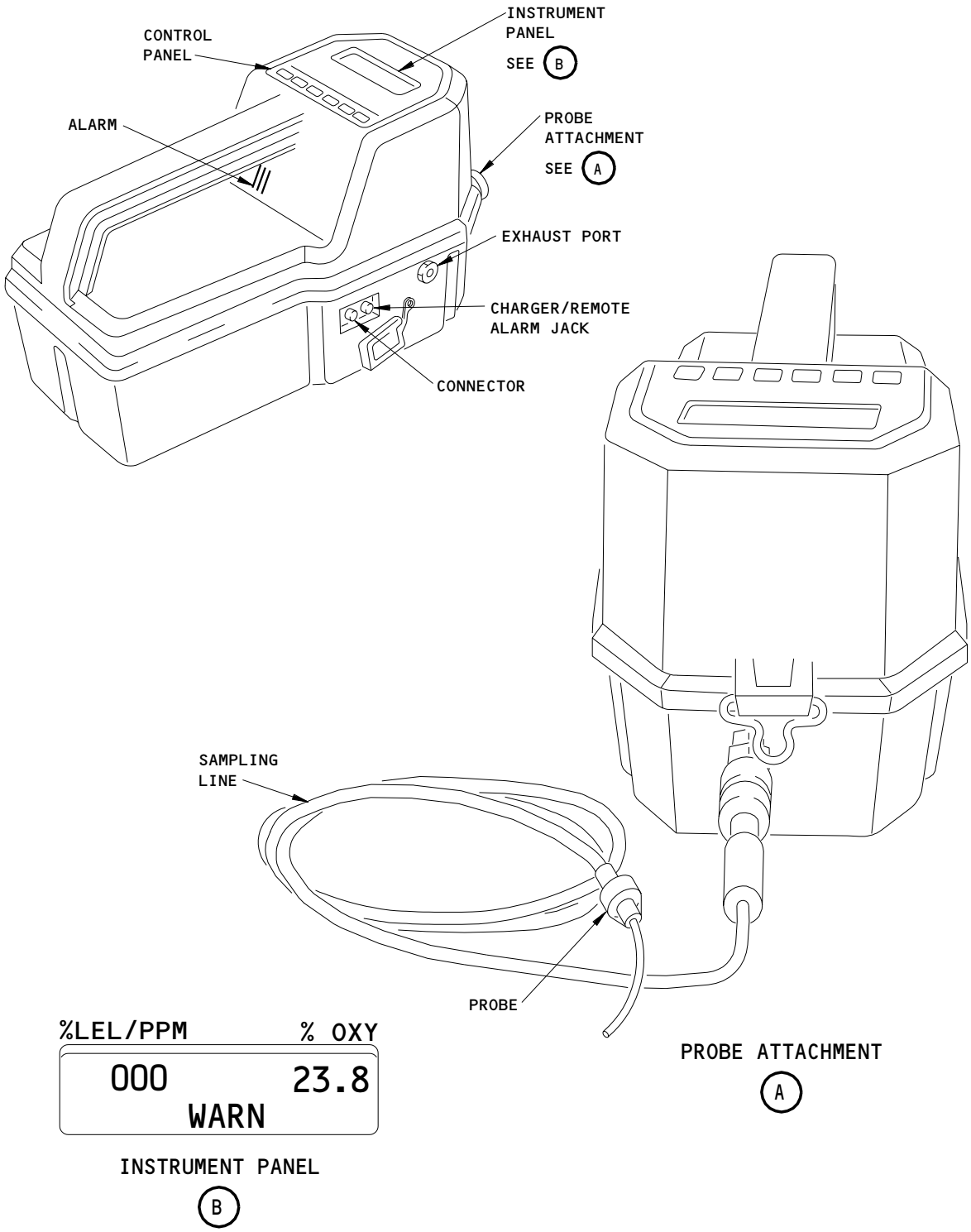
AVAILABLE VENTILATION EQUIPMENT

Tank Ventilation Equipment
Figure 203 (Sheet 5)



FILTER – REGULATOR
(EXAMPLE)
A

Respiratory Equipment and Clothing (Example)
Figure 204



Combustible Gas Indicator (Example)
Figure 205

EXAMPLE OF A WET FUEL CELL PRE-ENTRY CHECKLIST

This checklist must be completed prior to start of wet fuel cell entry and/or at shift change PRIOR to work assignment for the continuation of tank work started by a previous shift.

Wet Fuel Cell Entry Location

Area or Building: _____ Stall: _____ Airplane: _____ Tank: _____

Shift: _____ Date: _____ Supervisor: _____

☐ 1. Airplane and adjacent equipment properly grounded.

☐ 2. Area secured and warning signs positioned.

☐ 3. Boost pump switches off and circuit breakers pulled and placarded.

☐ 4. No power on airplane: battery disconnected, external Power Cord disconnected from airplane, and external power receptacle placarded.

☐ 5. Radio and radar equipment off (see separation distance requirements).

☐ 6. Only approved explosion proof equipment and tools will be used for fuel cell entry (lights, blowers, pressure and test equipment, etc.).

☐ 7. Ensure requirements listed on Aircraft Confined Space Entry Permit are complied with, including appropriate personal protective equipment: OSH class 110 respirator at a minimum, approved coveralls, caps and foot coverings, and eye protection.

☐ 8. Trained attendant and confined space logsheet required for all wet fuel cell entries.

☐ 9. Aerators checked for cleanliness prior to use.

☐ 10. Sponges available for residual fuel mop out.

☐ 11. All plugs used have streamers attached.

☐ 12. Mechanical ventilation (venturis or blowers) installed to ventilate all open fuel cells.

NOTE: Ventilation system must remain in operation at all times while fuel cells are open. If ventilation system fails or any ill effects such as dizziness, irriation, or excessive odors are noted, all work shall stop and fuel cells must be evacuated.

☐ 13. Shop personnel entering cells and standby observers have current "fuel cell entry" certification cards. Certification requires the following training:
- Aircraft Confined Space Entry Safety
- Respirator Use and Maintenance
- Wet Fuel Cell Entry

☐ 14. Fire Department notified.

Meter Readings

☐ 15. Oxygen reading (%): _____ By: _____

☐ 16. Fuel vapor level reading (ppm): _____ By: _____

☐ 17. Combustible gas meter (LEL) reading: _____ By (FD): _____

I confirm that all entry requirements were met prior to any entry.

_____ _____

Signature of Supervisor or Designee Date

Fuel Tank Pre-Entry Checklist (Example)
Figure 206

(4) Combustible gas indicator - explosion-proof
Use one of these indicators or equivalent:
(a) Innova FV Monitor, Model No. 72-0026-49
Thermo Elecron Corporation (Gas Tech)
Franklin, Massadchusetts USA
www.thermo.com/ih
(b) The following Gastech products are not available for purchase, but are satisfactory for monitoring the fuel tank environment.
1) Gastech GT series indicator
2) Gastech 1314 Super Surveyor
3) Gastech 1314 SMPN Super Surveyor
Available from:
Gastech Inc.
8407 Central Avenue,
Newark, California, USA

(5) Confined Space Communication System - use one of these systems (or equivalent):
CS1-1000 or CS1-2000 Intrinsically Safe System
CON-SPACE COMMUNICATIONS INC.
P.O. BOX 1540
1160 Yew Ave.
Blaine, Washington, USA

(6) Containers, plastic - Non-static material and rounded corners, used to hold tools or absorb fuel in the fuel tank

(7) Coveralls - use one of these approved coveralls:
(a) Cotton (100%) clothing (Fig. 202, Fig. 204)
Aramark, Uniform Services
P.O. Box 3556
Seattle, Washington 98124
(b) Saranex 23P, Film Laminated Tyvex Coverall
Grainger
District Sales Office,
6725 Todd Boulevard, Seattle, Washington, USA
98188-4771

(8) Fire Extinguisher - 150 pounds, portable, wheeled (commercially available). Use one of these types of fire extinguishers:
- Dry chemical
- Carbon dioxide
- Halon

(9) Flashlight - Explosion-proof (commercially available)

(10) Light - Explosion-proof, Model EP-300 026 (or equivalent)
KH Industries
P.O. Box 312
Angola, New York, USA

(11) Respiratory equipment (use the applicable equipment) (Fig. 204)
(a) Air Supply Hoses - commercially available
(b) Breathing Air Supply - 125 psig maximum output
Compressed Gas Association Commodity, Specification G-7.1-1966
Grade D (or equivalent)

(c) Regulator Unit - Biosystems Travelpanel 50 (or equivalent)
Biosystems Inc.
P.O. Box 158
Rock Fall, Connecticut, USA

(d) Respirator - Full Face, Supplied Air Type
North 85200 Series Full Facepiece continuous flow airline respirator (or equivalent)

(e) Respirator - Half-Face, Organic Filter Type
North 7700 Series Half Mask,
North N7500-1 Organic Vapors Cartridge
(or equivalent)

(f) Respirator - Airline Hood
North 85300 Series Disposable Airline Hood
(or equivalent)

(12) Thermometer, alcohol (commercially available)

(13) Ventilation Equipment - use one of these (or equivalent):

(a) Ventilation System - Fuel Cell - (B0E-501 or MAV-1C),
Rhine Air Inc.,
Santee, California, USA 92071
Telephone: (619) 460-5928

(b) A28003-1 Equipment - Ventilation, fuel tank

(c) Lamb Air Mover - Venturi 3-inch diameter,
Mine Safety Appliances Company
Pittsburgh, Pennsylvania

D. Consumable Materials

(1) G00034 Cotton Wiper - Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

E. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
543	Surge Tank - Rib No. 21 to No. 23 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Doors

134AZ	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)

541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
541DB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541FB	Main Tank Access Door (Left)
541GB	Main Tank Access Door (Left)
541HB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541KB	Main Tank Access Door (Left)
541LB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542AB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
542CB	Main Tank Access Door (Left)
542DB	Main Tank Access Door (Left)
543AB	Surge Tank Access Door (Left)
543BB	Surge Tank Access Door (Left)
543CB	Surge Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right
641AB	Main Tank Access Door (Right)
641BB	Main Tank Access Door (Right)
641CB	Main Tank Access Door (Right)
641DB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641FB	Main Tank Access Door (Right)
641GB	Main Tank Access Door (Right)
641HB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641KB	Main Tank Access Door (Right)
641LB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642AB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)
642CB	Main Tank Access Door (Right)
642DB	Main Tank Access Door (Right)
643AB	Surge Tank Access Door (Right)
643BB	Surge Tank Access Door (Right)
643CB	Surge Tank Access Door (Right)

F. Prepare the Airplane for Fuel Tank Purging

S 942-263

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(1) Read and obey the precautions in this task: Purging and Fuel Tank Entry Precautions.

S 652-264

(2) Do this task: Pressure Defueling (AMM 28-26-00/201).

S 652-265

(3) Drain the fuel tank sumps (AMM 12-11-03/301).

S 942-266

(4) Make sure the airplane is correctly grounded to an approved and identified ground (AMM 20-41-00/201).

S 492-267

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE TRAILING EDGE FLAPS. ACCIDENTAL OPERATION OF THE TRAILING EDGE FLAPS COULD CAUSE INJURY TO PERSONS.

(5) Do the deactivation procedure for the trailing edge flaps (AMM 27-51-00/201).

S 492-268

WARNING: DO THE DEACTIVATION PROCEDURE OF THE LEADING EDGE SLAT (AMM 27-81-00/201). IF THE LEADING EDGE SLAT OPERATES ACCIDENTALLY, IT CAN CAUSE INJURY.

(6) Do the deactivation procedure of the leading edge slats (AMM 27-81-00/201).

S 492-269

(7) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 492-270

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(8) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 942-271
(9) Put ropes around the airplane to identify the hazardous location areas (Figure 201), and attach these signs with words you can see clearly written on both sides:
(a) DANGER - OPEN FUEL TANKS - NO SMOKING
(b) AUTHORIZED PERSONNEL ONLY

S 862-272
(10) Make sure the fuel pump switch lights on the overhead panel, P5, are in the off position, and attach DO-NOT-OPERATE tags.

S 862-275
(11) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6F15, L FUEL OVRD PUMP
(b) 6F20, R FUEL OVRD PUMP
(c) 6H15, L AFT FUEL BOOST PUMP
(d) 6H17, R FWD FUEL BOOST PUMP
(e) 6H20, R AFT FUEL BOOST PUMP
(f) 6H23, L FWD FUEL BOOST PUMP

S 862-276
(12) Open the applicable circuit breakers for the system on which you will do maintenance.

S 942-277
(13) Look at the maintenance history of the airplane.
(a) Open the applicable circuit breakers for any system(s) that show a problem with wiring or electrical faults.

S 862-278
(14) Remove the electrical power from the airplane before you remove the fuel tank access doors (AMM 24-22-00/201).

S 942-279

WARNING: DO NOT USE AIRPLANE ELECTRICAL POWER WHEN FUEL TANK ACCESS DOORS ARE OPEN. A FIRE OR EXPLOSION CAN OCCUR IF FUEL VAPOR IS IGNITED BY SPARK(S) FROM ELECTRICAL EQUIPMENT. A FIRE OR EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(15) Do not supply electrical power again until you have completed this task: Fuel Tank Closure.

S 862-280
(16) Disconnect these airplane batteries:
(a) Main (AMM 24-31-01/401)
(b) APU (AMM 24-31-03/401)

S 942-281
(17) Attach this sign to each of the battery locations:
(a) OPEN FUEL TANKS - DO NOT CONNECT

S 942-282
(18) Attach this sign to the external power receptacle:
(a) OPEN FUEL TANKS - DO NOT PUT POWER ON

G. Prepare the Equipment for Fuel Tank Purging

S 912-283

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(1) Read and obey the precautions in this task: Purging and Fuel Tank Entry Precautions.

S 942-284
(2) Make sure one of these portable fire extinguishers is available:
(a) One - 150 pound dry chemical wheeled extinguisher
(b) One - 150 pound CO2 wheeled extinguisher
(c) One - 150 pound Halon wheeled extinguisher

S 942-285
(3) Make sure the electrical equipment is approved and is appropriate for the hazardous location as shown in Figure 201.

S 862-286
(4) Make sure all radio or radar equipment is off and locked out if it is closer than the minimum separation distance allowed in Table 201.

S 942-287
(5) Do these steps to prepare metal support equipment such as work platforms/stands, ladders etc:

NOTE: These steps apply to all metal support equipment within a 50-foot radius of an open fuel tank.

(a) All support equipment must be in place before you begin the fuel purging procedure.
(b) Bond the support equipment at an approved airplane bonding location.
(c) Ground the support equipment to the same earth ground as the airplane.

S 492-288

(6) VENTURI TYPE VENTILATION EQUIPMENT;

Do these steps to prepare the air ventilation equipment for purging:

(a) For the main fuel tanks, do these steps (Fig. 203):

1) Go to the applicable left or right overwing fill port on top of the wing.
2) Connect an air supply hose to the air mover assembly (P/N A28003-30).
3) Bond the air mover assembly (A28003-30) to the airplane ground.
4) Remove the cap on the overwing fill port.
5) Install the air mover assembly (A28003-30) in the overwing fill port.
6) Put the exhaust horn of the air mover in the overwing fill port vertically above the wing to let the fuel vapors leave the fuel tank.
7) Put the portable air compressor a minimum of 100 feet from the fuel tank that will be opened, unless the air compressor is explosion-proof.
8) Connect the air compressor to the air mover with the air supply hose.
9) Connect a power supply to the air compressor.

(b) For the center fuel tanks or surge tanks, do these steps:

1) Assemble these ventilation equipment components (Fig. 203):
   a) Tank adapter assembly - (P/N A28003-8)
   b) Air mover assembly (P/N 28003-2)
   c) Air supply hose
2) Make sure each flexible air duct section is attached correctly and that each section is bonded correctly.

WARNING: MAKE SURE THE AIR MOVER ASSEMBLY IS AWAY FROM THE AIRPLANE. THE EXHAUST AIR FROM THE AIR MOVER EXHAUST HORN MUST VENT AWAY FROM THE AIRPLANE STRUCTURE. IF THE EXHAUST AIR FLOWS AGAINST THE AIRPLANE STRUCTURE, A BUILD-UP OF STATIC ELECTRICITY CAN OCCUR. IT IS POSSIBLE THAT THE STATIC ELECTRICITY CAN IGNITE THE FUEL VAPOR AND CAUSE AN EXPLOSION. AN EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND DAMAGE TO EQUIPMENT.

3) Set-up the air mover assembly (P/N A28003-2) away from the airplane.
4) Ground the air mover assembly (A28003-2) to the airplane ground.
5) Put the portable air compressor a minimum of 100 feet from the fuel tank that will be opened, unless the air compressor is explosion-proof.
6) Connect the air compressor to the air mover assembly (A28003-2) with the air hose.
7) Connect a power supply to the air compressor.

S 492-289

(7) AIR BLOWER TYPE VENTILATION EQUIPMENT (BOE-501 OR EQUIVALENT);
Do these steps to prepare the air ventilation equipment for purging: (Fig. 203):

(a) Set-up the ventilation blower(s) in an area where the fuel tank entry will be made.
  1) Make sure the ventilation blower will be in an area free from fuel vapor when the access doors are open.

(b) Attach the static grounding cable on the ventilation blower(s) to an approved ground source.

(c) Do these steps to connect an air supply to the ventilation blower:
  1) If shop air is used, connect an air supply hose to the ventilation blower.
  2) If a portable air compressor is used, do these steps:
    a) Put the air compressor a minimum of 100 feet from the fuel tank that will be opened, unless the air compressor is explosion-proof.
    b) Connect an air supply hose from the air compressor to the ventilation blower.
    c) Connect the portable air compressor to a power source.

(d) Do these steps to connect the air ducts to the ventilation blower.
  1) Connect the eight inch air duct to the ventilation blower outlet port.
  2) Connect enough air duct segments to get to the access door where you will do maintenance.
  3) Use the attached bonding connections to electrically bond each air duct segment.

(e) For main tank maintenance, attach the access door adapter to the end of the air duct.

(f) For center tank maintenance, do these steps to prepare the air ducts that will go inside the fuel tank:

NOTE: The air ducts will be positioned inside the fuel tank at the location where you will do the maintenance.

  1) Attach an adapter/reducer to the end of the eight inch air duct segments.
  2) Attach the four inch air ducts.
  3) Use the attached bonding connections to electrically bond each air duct segment.
  4) Make sure you have enough segments to route the air ducts to the maintenance area.

S 492-290

(8) HEATER AIR/BLOWER EQUIPMENT;
Do these steps to prepare the heater/air blower equipment for purging (if it is necessary):

NOTE: The use of a heater/air blower is for the comfort of persons in the fuel tank. It is not part of the air ventilation equipment which is used to remove hazardous fuel vapor during the fuel purging procedure.

(a) Set-up the heater/air blower in the area where the fuel tank entry will be made.
    1) Make sure the heater/air blower will be in an area free from fuel vapor when the access doors are open.
(b) Attach the static grounding cable on the heater/air blower(s) to an approved ground source.
(c) Do these steps to connect an air supply to the blower:
    1) If shop air is used, connect an air supply hose to the heater/air blower.
    2) If a portable air compressor is used, do these steps:
        a) Put the air compressor a minimum of 100 feet from the fuel tank that will be opened, unless the air compressor is explosion-proof.
        b) Connect an air supply hose from the air compressor to the heater/air blower.
        c) Connect the portable air compressor to a power source.
(d) Do these steps to connect the air ducts to the heater/air blower.
    1) Connect the air duct to the heater/air blower outlet port.
    2) Connect enough air duct segments to get to the maintenance area.
    3) Connect the air duct segments to the inlet port on the ventilation blower (if it is necessary for your ventilation system set-up).
    4) Use the attached bonding connections to electrically bond each air duct segment.
(e) Connect a power supply to the heater/air blower.

S 482-291

WARNING: MAKE SURE THE COMBUSTIBLE GAS INDICATOR IS EXPLOSION-PROOF (CLASS I, DIVISION 1 OR EQUIVALENT STANDARD) AND IS SATISFACTORY FOR USE IN A FUEL TANK. IF YOU USE A COMBUSTIBLE GAS INDICATOR THAT IS NOT INTENDED FOR USE IN A FUEL TANK, AN EXPLOSION CAN OCCUR. AN EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND DAMAGE TO EQUIPMENT.

(9) Do these steps to prepare the combustible gas indicator (Fig. 205):

NOTE: These steps are for the combustible gas indicators called out in the equipment section of this procedure. If you use a different combustible gas indicator, use the instruction manual supplied with the indicator.

(a) Make sure the indicator is calibrated for each of these scales:

NOTE: Make sure the GASTECH GT-series combustible gas indicators are labeled for calibration with hexane gas, and that the ppm range in the channel set-up menu is set to 5000 ppm hexane.

1) Oxygen
2) Lower Explosive Limit (LEL)
3) Parts Per Million (PPM)

(b) Make sure the calibration on the combustible scales are specific to hexane gas.

(c) Make sure the alarm values are set to these limits:
1) 160 PPM
2) 10% of the LEL
3) 19.5% oxygen by volume.

(d) Do these steps to make sure the combustible gas indicator operates correctly:
1) Make sure the indicator, sampling line, and sampling probe (with dust filter) are clean and not damaged.
2) Put the indicator switch to the ON position.
3) Make sure there is enough charge on the battery for the scheduled time in the fuel tank.
4) Let the indicator warm-up for 20 minutes before you look at the readings.
5) Adjust the indicator to zero in clean air for these scales:
a) Oxygen
b) PPM
c) LEL

6) If there is a negative value during the use of the indicator, adjust the indicator scale(s) to zero in clean air.

NOTE: Do not turn the indicator off before you adjust the scales.

(e) Do these steps to do a check of the alarms:
1) To do a check of the oxygen alarm, blow across the probe until the alarm comes on (19.5%).
2) To do a check of the PPM and LEL scales, hold the tip of the probe over a solvent bottle or some solvent on a cotton wiper (BMS15-5) until the alarm comes on.

(f) Put the combustible gas indicator on a stand or ladder next to the access door where you will enter the fuel tank.
1) To prevent the accidental movement of the combustible gas indicator, safely attach the indicator to the stand or ladder.

H. Fuel Tank Purging

S 912-292

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(1) Read and obey the precautions in this task: Purging and Fuel Tank Entry Precautions.

S 492-293
(2) VENTURI TYPE VENTILATION EQUIPMENT;
Do these steps to install the air ventilation equipment (Fig. 203):
(a) For the main fuel tanks, do these steps:
1) Remove one or more main tank access doors to have a good flow of air through the fuel tank (AMM 28-11-01/401).
2) Install rubber protectors around the openings of the main tank access doors.
3) Start the air supply connected to the air mover.
(b) For the surge tanks, do these steps:
1) Remove the surge tank access doors (AMM 28-11-03/401).
2) Install the tank adapter assembly (A28003-8) to one of the surge tank access doors (Fig. 203).
3) Start the air supply connected to the air mover.

(c) For the center fuel tank, do these steps:
1) Remove the center wing access door 134AZ and one center wing access door in each wing (AMM 28-11-02/401).
a) In addition, you can also remove the center tank purge door (AMM 28-11-08/401).

NOTE: This step is optional.

2) Install the tank adapter assembly (A28003-8) to one of the center tank wing access doors (Fig. 203).
3) Start the air supply connected to the air mover.

S 492-294
(3) AIR BLOWER TYPE VENTILATION EQUIPMENT (BOE-501 OR EQUIVALENT);
Do these steps to install the air ventilation equipment (Fig. 204):

WARNING: DO NOT STOP OR START THE VENTILATION BLOWER WHILE THE AIR DUCT IS IN THE FUEL TANK. THE FUEL VAPOR FROM THE FUEL TANK COULD CAUSE AN EXPLOSION AT THE BLOWER MOTOR. AN EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Start the ventilation blower before you put the air duct in the fuel tank.
(b) For the surge tank, main tank and center tank in each wing, do these steps:
1) At the location where you will do maintenance, remove three adjacent access doors (AMM 28-11-01/401, AMM 28-11-03/401).

NOTE: Usually the middle access door is the door where you will go into the fuel tank.

2) Install rubber protectors around the openings of the main tank access doors.
3) Install the access door adapter to the access door (the outboard access door is the preferred door).
4) Bond the access door adapter to the airplane structure.
5) Make sure there will be a flow of air into the area where you will do the maintenance.
(c) For the center fuel tank, do these steps:
1) Remove the center wing access door 134AZ and one center wing access door in each wing (AMM 28-11-02/401).
a) In addition, you can also remove the center tank purge door (AMM 28-11-08/401).

NOTE: This step is optional.

2) Put the four inch air duct inside the open access door where you will do the maintenance.
3) Use the pigtail on the end of the air duct to bond the air duct to the airplane structure.

4) Make sure there will be a flow of air into the area where you will do the maintenance.

S 482-295

(4) After the air supply has operated for approximately 30 minutes, put the sampling line of the combustible gas indicator (Fig. 205) as far into the fuel tank as possible.

NOTE: It is recommended that you take the combustible gas indicator value regardless of the type of fuel that was contained in the fuel tank. If the fuel tank had contained kerosene only, then the combustible gas indicator should show zero. This shows that the tank atmosphere is in fire-safe and health-safe condition.

S 482-296

(5) Wait one minute for each foot of sampling line before you take a reading.

S 482-297

(6) Use Table 202 to convert the values on the combustible gas indicator to the actual levels.

NOTE: If you use a combustible gas indicator that is not listed below, follow the manufacturer's instructions to get the actual values.

TABLE 202

COMBUSTIBLE GAS INDICATOR	FOR PPM MULTIPLY VALUE BY:	FOR LEL, MULTIPLY VALUE BY:
GASTECH 1314	2	3
GASTECH 1314SMPN	2	3
GASTECH GT SERIES	2	3

S 492-298

WARNING: DO NOT USE A HEATER/AIR BLOWER UNTIL THE FUEL VAPOR CONCENTRATION IS 10% OR LESS OF THE LOWER EXPLOSIVE LIMIT AS SHOWN BY A COMBUSTIBLE GAS INDICATOR. IF THE FUEL VAPOR CONCENTRATION IS NOT 10% OR LESS OF THE LOWER EXPLOSIVE LIMIT, IGNITION OF THE FUEL VAPORS COULD OCCUR.

(7) When the combustible gas indicator shows the fuel vapor concentration is 10% or less of the lower explosive limit, you can put warm or cool air in the fuel tank through the tank access opening with an explosion-proof heater/air blower.

NOTE: The use of warm or cool air is for the comfort of persons in the fuel tank. It is not part of the purging procedure.

S 492-299

WARNING: DO NOT STOP OR START THE HEATER/AIR BLOWER WHILE THE AIR DUCT IS IN THE FUEL TANK. THE FUEL VAPOR FROM THE FUEL TANK COULD CAUSE AN EXPLOSION AT THE HEATER OR BLOWER MOTOR. A FIRE OR EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(8) Start the heater/air blower before you put the air duct in the fuel tank.

S 492-300

(9) Put the air duct for the heater/air blower in the fuel tank through the tank access opening.

S 492-301

(10) Bond the air duct to the airplane structure.

S 942-302

(11) Continue to have a good flow of air through the fuel tank with the air mover until you prepare to the close the fuel tank.
(a) Read the combustible gas indicator values every half hour or less.

S 942-303

(12) If fuel vapors get into the fuel tank that was in a fire-safe condition, get all persons out of the fuel tank until you make sure the air in the fuel tank is in a fire-safe condition again.

S 942-304

(13) Go into the fuel tank per the "Fuel Tank Entry" procedure to do maintenance.

I. Fuel Tank Entry

S 912-305

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Read and obey the precautions in this task: Purging and Fuel Tank Entry Precautions.

S 972-306

(2) Complete the confined space entry permit (if it is a requirement).

S 972-307

(3) Use the pre-entry checklist (an example is given in Figure 206).

S 492-308

(4) Do these steps to prepare the respirators for fuel tank entry:
(a) Use Table 203 to find out what level of respiratory protection is necessary.
(b) If the fuel tank is in a fire-safe condition, wear a full-face respirator with an attached breathing-air supply.

WARNING: PUT ON AN APPROVED RESPIRATOR WITH ATTACHED BREATHING-AIR SUPPLY BEFORE YOU GO INTO A FUEL TANK THAT WAS FILLED WITH JP-4/JET-B FUEL. THERE IS NO HEALTH-SAFE LIMIT FOR JP-4 /JET-B WHICH CAN CONTAIN BENZENE. IT IS POSSIBLE THAT BENZENE CAUSES CANCER.

(c) If the fuel tank was filled with JP-4/Jet-B, wear a full face respirator with an attached breathing-air supply.

NOTE: There is not a health-safe limit for JP-4 or JET B.

(d) If the fuel tank was not filled with JP-4/Jet-B and is in a health-safe condition, wear a full face respirator with an attached breathing-air supply, or at a minimum, a half-face respirator with an organic vapor filter.
(e) Connect the subsequent respirators to the air supply (Fig. 204):
1) One respirator for the person who goes into the fuel tank.
2) Two emergency rescue respirators.
(f) Make sure air gets to the respirators.

(g) Make sure the respirator system (regulator, mask etc.) is clean.

NOTE: When you use the respirator, you should regularly drain moisture from the filter on the regulator. If you drain dirt or oil from the filter, or if the air in the respirator smells bad, replace the filter.

(h) Make sure the emergency air supply and respirators operate correctly.

FIRE-SAFE CONDITION

A FIRE-SAFE CONDITION OCCURS WHEN THE VAPOR CONCENTRATION IS LESS THAN 10% OF THE LEL.

TABLE 203

HEALTH-SAFE CONDITION

A HEALTH-SAFE CONDITION OCCURS WHEN THE OXYGEN CONTENT IS A MINIMUM OF 19.5% TO A MAXIMUM OF 23.5% BY VOLUME AT SEA LEVEL, AND THE VAPOR CONCENTRATIONS ARE BELOW THESE PERMISSIBLE EXPOSURE LIMITS:

Fuel	Permissible Exposure Level Total Hydrocarbons TWA *[1] (ppm)	Lower Explosive Level (percent)
Aviation Gasoline	300	1.0
Jet A Jet A-1 JP-5 JP-8	160	0.7

*[1] TWA - Time Weighted Average

S 942-309

(5) Remove these items before you go into a fuel tank:
(a) All jewelry - rings, bracelets, wrist watches etc.
(b) Matches
(c) Pocket warmers

(d) Hearings aid devices or other battery operated equipment.

S 942-310

(6) Remove any clothes made of this material:
(a) Wool
(b) Silk
(c) Nylon
(d) Synthetic clothing.

S 942-311

(7) Put on these approved protective clothes (Fig. 202):
(a) Cotton or SARANEX 23P coveralls (non-sparking zippers or buttons)
(b) Clean cotton head cover
(c) Approved cotton or rubber gloves
(d) Safety glasses or face shield

CAUTION: DO NOT PUT ON COTTON SOCKS UNTIL YOU ARE TO GO INTO THE FUEL TANK. IF THE COTTON SOCKS ARE NOT CLEAN, YOU CAN CAUSE DAMAGE TO THE FUEL TANK.

(e) 100% cotton socks and/or fuel cell boots
(f) Put rubber bands around your wrists and ankles to hold clothes tight.

S 492-312

(8) Attach a safety line to the person who goes into the fuel tank.

S 942-313

(9) Make sure the person who goes into the fuel tank and the person who watches agree on safety signals.

S 942-314

(10) If a confined space communication system is used, attach the system.
(a) Do a check to make sure the system operates correctly.

S 492-315

(11) Put on the necessary respiration protection.

S 282-316

(12) Make sure the respirator operates.

S 912-317

(13) Do these steps if you are the observer:
(a) Make sure the confined space entry permit is complete and approved (if this is a requirement).
(b) Make a record that shows the time and who is inside the fuel tank.
(c) Attach this sign at the fuel tank entry location where it can be seen:
1) CAUTION - PERSONNEL INSIDE - MOVE NO EQUIPMENT

(d) Make sure you and the person(s) who will go into the tank agree that the checklist items are complete.
(e) Make sure you and the person(s) who will go into the tank agree on communication signals and set a communication time interval.
(f) Look at the filter-regulator to make sure the supplied air system operates correctly.
(g) Keep visual contact with the fuel tank entry location.
(h) Keep constant communication with the person(s) the fuel tank.
(i) Look at the combustible gas indicator to make sure the air in the fuel tank is at 10% or less of the lower explosive limit.
(j) Do not put your head in the fuel tank access hole unless you have the correct respirator on, for the condition of the tank, and there is another observer to watch you.

NOTE: This is considered the same as a fuel tank entry.

(k) Look out for any changes which could cause a dangerous condition.
(l) Make sure person(s) in the fuel tank get out if there is a dangerous condition.

S 942-318
(14) Persons with respirators must touch the identified airplane ground to release static electricity before they go into the fuel tank.

S 492-319
(15) Go into the fuel tank.

S 482-320
(16) As an alternate procedure, you can take an additional combustible gas indicator into the fuel tank to monitor the environment where you will do the maintenance.

S 492-321
(17) If it is necessary for your air ventilation system, route the air duct to the maintenance area (Fig. 204).
(a) Bond the air duct to the airplane structure.

S 942-322

WARNING: MAKE SURE TO WEAR THE CORRECT RESPIRATION PROTECTION FOR THE CONDITION OF THE FUEL TANK. PERSONS WHO BREATHE HIGH CONCENTRATIONS OF FUEL VAPOR CAN GET HEADACHES, FEEL SLEEPY OR FAINT. IF A PERSON'S BREATH SLOWS OR STOPS, SEND A PERSON FOR MEDICAL ASSISTANCE. GET THE PERSON OUT OF THE TANK IMMEDIATELY. START ARTIFICIAL RESPIRATION AT ONCE IF A PERSON'S BREATH STOPS. CONTINUE THE ARTIFICIAL RESPIRATION. PERSONS WITH HEADACHES, OR IRRITATION OF THE EYES OR SKIN SHOULD GET OUT OF THE FUEL TANK AT ONCE. JET FUELS CONTAIN SMALL QUANTITIES OF CHEMICAL ANTIOXIDANTS, METAL DEACTIVATORS AND CORROSION INHIBITORS. THESE CHEMICALS ARE IRRITANTS. IF SPLASHED INTO THE EYES, FLUSH THE EYES WITH WATER FOR A MINIMUM OF 15 MINUTES. LIFT THE UPPER AND LOWER EYELIDS FREQUENTLY TO REMOVE CHEMICALS. GET MEDICAL ASSISTANCE IMMEDIATELY.

WARNING: MAKE SURE THE TEMPERATURE IN THE FUEL TANK DOES NOT GET TOO HOT. IF THE FUEL TANK TEMPERATURE GETS TOO HOT, A PERSON IN THE FUEL TANK CAN HAVE HEAT-RELATED DISORDERS. IF A PERSON BECOMES TOO HOT, GET THE PERSON OUT OF THE FUEL TANK. FIND OUT IF MEDICAL ASSISTANCE IS NECESSARY.

COVERALLS THAT ARE COATED WITH SARANEX 23P COVERALLS WILL KEEP BODY HEAT IN. CLOSELY MONITOR A PERSON IN SARANEX 23P COVERALLS FOR SIGNS OF HEAT-RELATED DISORDERS. IF A PERSON BECOMES TOO HOT, GET THE PERSON OUT OF THE FUEL TANK. FIND OUT IF MEDICAL ASSISTANCE IS NECESSARY.

(18) The observer must keep in communication with person(s) in the tank and watch for changes in conditions or a signal of danger.

S 682-323

WARNING: MAKE SURE THAT THERE IS A GOOD FLOW OF AIR WHEN YOU ARE IN THE FUEL TANK. DO NOT REMOVE THE RESPIRATOR WHILE YOU ARE IN THE FUEL TANK. DO NOT DO MAINTENANCE IN THE FUEL TANK UNTIL YOU REMOVE ALL FUEL. FUEL FUMES CAN KILL YOU.

(19) Do these steps to remove any fuel that remains in the fuel tank:
- (a) Put cotton wipers (BMS15-5) on the bottom of the fuel tank to absorb any fuel that remains in the tank.
- (b) Count the number of cotton wipers (BMS15-5) as they are put into the fuel tank.
- (c) Remove the cotton wipers (BMS15-5) when they are soaked.
- (d) Count the number of cotton wipers (BMS15-5) as they are removed from the fuel tank.
- (e) Make sure the counts agree.

(f) Make sure you remove all cotton wipers (BMS15-5) from the fuel tank.

WARNING: OBEY THE APPROVED PROCEDURES FOR FUEL SOAKED COTTON WIPERS. PUT FUEL SOAKED COTTON WIPERS IN APPROVED BARRELS ONLY. COTTON WIPERS THAT YOU USE TO CLEAN THE FUEL TANK CAN CAUSE FIRES. FIRES CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(g) Follow approved procedures to dispose of or clean the fuel soaked cotton wipers (BMS15-5).

S 362-357

(20) Do the necessary repair or maintenance procedures.

S 082-358

(21) After you complete the maintenance, do this task: Fuel Tank Closure.

TASK 28-11-00-002-359

4. Fuel Tank Closure

A. General

(1) After you do the maintenance, do this task to close the fuel tank.
(2) Make sure you read and obey the precautions in this task: Purging and Fuel Tank Entry Precautions.

B. References

(1) AMM 24-31-01/401, Main Battery
(2) AMM 24-31-03/401, APU Battery
(3) AMM 27-51-00/201, Trailing Edge Flaps
(4) AMM 27-81-00/201, Leading Edge Slats
(5) AMM 28-11-01/401, Main Tank Access Door
(6) AMM 28-11-02/401, Center Tank Access Door
(7) AMM 28-11-03/401, Surge Tank Access Door
(8) AMM 28-11-08/401, Center Tank Purge Door
(9) AMM 32-00-15/201, Landing Gear Door Locks

(10) AMM 71-71-04/201, Fuel Drains Tank Ejector Valve Filter Assembly

C. Equipment

(1) Air Source, Regulated, Dry Filtered, 0-150 psig (commercially available)

(2) Air Hose - (commercially available)

(3) Vacuum - industrial type, pneumatically powered, with attachments for cleaning the fuel tank interior (ATI Industries, 2425 West Vineyard Ave., Escondido, CA 92029) or equivalent

D. Consumable Materials

(1) G00034 Cotton Wiper - Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

E. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
543	Surge Tank - Rib No. 21 to No. 23 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Doors

134AZ	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
541DB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541FB	Main Tank Access Door (Left)
541GB	Main Tank Access Door (Left)
541HB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541KB	Main Tank Access Door (Left)
541LB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542AB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
542CB	Main Tank Access Door (Left)
542DB	Main Tank Access Door (Left)

543AB	Surge Tank Access Door (Left)
543BB	Surge Tank Access Door (Left)
543CB	Surge Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right
641AB	Main Tank Access Door (Right)
641BB	Main Tank Access Door (Right)
641CB	Main Tank Access Door (Right)
641DB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641FB	Main Tank Access Door (Right)
641GB	Main Tank Access Door (Right)
641HB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641KB	Main Tank Access Door (Right)
641LB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642AB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)
642CB	Main Tank Access Door (Right)
642DB	Main Tank Access Door (Right)
643AB	Surge Tank Access Door (Right)
643BB	Surge Tank Access Door (Right)
643CB	Surge Tank Access Door (Right)

F. Clean the Fuel Tank

S 212-360

WARNING: REMOVE ALL MAINTENANCE ITEMS, AND UNWANTED MATERIAL FOR THE FUEL TANK BEFORE YOU CLOSE IT. EQUIPMENT, TOOLS, LOOSE HARDWARE, OR CONTAMINATION CAN CAUSE DAMAGE TO THE FUEL SYSTEM. METAL ITEMS ARE POSSIBLE IGNITION SOURCES. AN IGNITION SOURCE IN A FUEL TANK CAN CAUSE A FIRE OR AN EXPLOSION.

(1) Each time you go into a fuel tank you must examine the fuel tank very carefully before you close it.

S 082-361

(2) Remove all of the equipment used to do the maintenance (for example, tools, solvent, containers, plugs, brushes, and other equipment).

NOTE: Keep a written record of all of the tools, equipment, material, and persons when they go into and go out of the fuel tank. Before you close the fuel tank, make sure the record shows there are no unwanted items in the tank.

S 162-362

(3) Use a cotton wiper (BMS15-5) to clean any unwanted solvents, liquids or grease.

S 162-363

WARNING: GROUND ALL OF THE EQUIPMENT AND THE HOSES USED IN THE FUEL TANK OR ADJACENT TO THE OPEN FUEL TANK. IF YOU DO NOT GROUND ALL OF THE EQUIPMENT AND HOSES, AN EXPLOSION CAN OCCUR.

WARNING: USE ONLY SHOP AIR OR BOTTLED AIR AS THE SOURCE OF GAS TO POWER AIR DRIVEN EQUIPMENT. GASES OTHER THAN SHOP OR BOTTLED AIR CAN REMOVE OXYGEN FROM A CLOSED AREA. IF YOU GO INTO A CLOSED AREA WITHOUT ENOUGH OXYGEN, YOU CAN BECOME UNCONSCIOUS OR IT CAN KILL YOU.

(4) Only use shop air or bottled air as a gas source for air-driven tools. Do not use nitrogen, oxygen, carbon dioxide (CO2) or any other non-air source of gas.

S 162-364

(5) Use an air-driven vacuum to remove unwanted particles and pieces of used sealant.

G. Inspect the Fuel Tank

S 212-352

(1) Examine all the repairs, sealant and finishes to make sure they are correct and complete.

S 212-365

WARNING: MAKE SURE YOU REMOVE ALL UNWANTED PARTICLES AND MATERIALS FROM THE FUEL TANK. UNWANTED MATERIALS CAN COLLECT IN THE FUEL TANK, WHICH CAN CAUSE BLOCKAGE OR INCORRECT SYSTEM OPERATION, OR CREATE A POTENTIAL IGNITION SOURCE.

(2) Makse sure these components are free from unwanted material or objects:
(a) Fuel and water drain holes and paths
(b) FQIS components

(c) Fuel scavenge system components.

S 212-353
(3) Examine the areas of the fuel tank that were accessed for any damage to in-tank components, bonding jumpers, wiring and structure.
(a) Repair any problem that you find.

S 412-356
(4) For the center fuel tank, if the center tank purge door was removed, make sure you re-install it (AMM 28-11-08/401).

S 092-324
(5) After you are done with maintenance in the fuel tank, make sure you remove all tools, equipment and materials from the fuel tank.

S 212-354
(6) Do a final inspection of the fuel tank to make sure you removed all tools, unwanted materials and equipment.

NOTE: Make sure the necessary approved persons do an inspection of the tank before you close it.

S 942-355
(7) Do a check of the record to make sure no unwanted items remain in the tank.

H. Close the Fuel Tank

S 092-325
(1) If an air duct was used at the maintenance area, move the air duct to the access door opening.

S 942-326
(2) Go out of the fuel tank.

S 972-327
(3) If you are the observer, do these steps:
(a) Make a report that states the time and that all persons are out of the tank.

(b) Remove the sign that states:
CAUTION - PERSONNEL INSIDE TANK - MOVE NO EQUIPMENT.

S 092-328

WARNING: DO NOT STOP OR START THE HEATER/AIR BLOWER OR VENTILATION BLOWER WHILE THE AIR DUCT IS IN THE FUEL TANK. THE FUEL VAPOR FROM THE FUEL TANK COULD CAUSE AN EXPLOSION AT THE HEATER/AIR OR VENTILATION BLOWER MOTOR. AN EXPLOSION CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONS AND CAN CAUSE DAMAGE TO EQUIPMENT.

(4) If a heater or ventilation blower was used, remove the air duct from the fuel tank.

S 092-329
(5) Turn the air duct 180 degrees away from the open fuel tank.

S 092-330
(6) Stop the heater/air and ventilation blower if used.

S 092-331
(7) Stop the air compressor.

S 092-332
(8) Disconnect the air supply hose from the air mover or blower(s).

S 092-333
(9) VENTURI TYPE VENTILATION EQUIPMENT;
Do these steps to remove the air mover equipment:
(a) For the main tanks, do these steps:
1) Remove the air mover from the overwing fill port (Fig. 203).
2) Remove the ground from the air mover.
3) Remove the air mover adapter assembly from the overwing fill port.
4) Install the cap on the overwing fill port.
5) Install the applicable main tank access doors (AMM 28-11-01/401).

(b) For the surge tanks, do these steps:
1) Remove the air mover from the adapter base (Fig. 203).
2) Remove the ground from the air mover.
3) Remove the tank adapter assembly from the opening of the surge tank access door.
4) Install the surge tank access doors (AMM 28-11-03/401).
(c) For the center fuel tanks, do these steps:
1) Remove the air mover from the adapter base (Fig. 203).
2) Remove the ground from the air mover.
3) Remove the tank adapter assembly from the opening of the center tank access door.
4) Install the center tank access doors (AMM 28-11-02/401).

S 092-334

(10) FOR AIR BLOWER TYPE VENTILATION EQUIPMENT;
Do these steps to remove the air blower equipment:
(a) For the main tanks, do these steps:
1) Remove the ventilation equipment from the airplane.
2) Remove the ground from the airplane to the ventilation blower.
3) Install the applicable main tank access doors (AMM 28-11-01/401).
(b) For the surge tank access doors, do these steps:
1) Remove the ventilation equipment from the airplane.
2) Remove the ground from the airplane to the ventilation blower.
3) Install the surge tank access doors (AMM 28-11-03/401).
(c) For the center tank, do these steps:
1) Remove the ventilation equipment from the airplane.
2) Remove the ground from the airplane to the ventilation blower.
3) Install the center tank access doors (AMM 28-11-02/401).

I. Put the Airplane Back to Its Usual Condition

S 092-335

(1) Follow approved procedures to clean and return all respiratory equipment.

S 092-336

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 092-337

WARNING: DO THE ACTIVATION PROCEDURE FOR THE TRAILING EDGE FLAPS. ACCIDENTAL OPERATION OF THE TRAILING EDGE FLAPS COULD CAUSE INJURY TO PERSONS.

(3) Do the activation procedure for the trailing edge flaps (AMM 27-51-00/201).

S 092-338

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION OF THE LEADING EDGE SLAT PROCEDURE. IF PERSONS ARE IN THE SLAT AREA, INJURY CAN OCCUR.

(4) Do the activation of the leading edge slat procedure (AMM 27-81-00/201).

S 862-340

(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
   (a) On the overhead circuit breaker panel, P6:
      1) 6F15, L FUEL OVRD PUMP
      2) 6F20, R FUEL OVRD PUMP
      3) 6H15, L AFT FUEL BOOST PUMP
      4) 6H17, R FWD FUEL BOOST PUMP
      5) 6H20, R AFT FUEL BOOST PUMP
      6) 6H23, L FWD FUEL BOOST PUMP

S 862-366

(6) Close any other circuit breakers that you opened for the purging and entry procedure.

S 412-341

(7) Connect these airplane batteries:
   (a) Main (AMM 24-31-01/401)

(b) APU (AMM 24-31-03/401)

S 942-342

(8) Remove all precautionary signs, and placards.

S 942-346

(9) Remove all support equipment, stands, ladders, ropes etc.

S 112-367

(10) Do these steps to inspect and clean the engine ejector valve filters, if a major fuel tank repair was done during the fuel tank entry:

(a) Schedule a task for the inspection and cleaning of the engine ejector valve filters (AMM 71-71-04/201).

NOTE: The MPD recommends that you inspect and clean the engine ejector valve filters for the No. 1 and No. 2 engines 50 flight hours and 200 flight hours after major fuel tank repairs.

(b) Inspect and clean the engine ejector valve filters at the scheduled interval.

FUEL TANKS - INSPECTION/CHECK

1. General
   A. This procedure has these tasks:
      (1) Fuel Tank Leak Detection and Repair
      (2) Alternative Procedures for Fuel Tank Leak Detection
      (3) Helitest Leak Detection
      (4) Leak Detection for the Fuel Tank Access Doors
      (5) Leak Detection for the Dry Bay
      (6) Leak Path Analysis
      (7) Dry Bay Leak Detection and Repair Aids
      (8) External Wires Over the Center Tank
   B. The task: Fuel Tank Leak Detection and Repair, has these general procedures:
      (1) Find the external leak and leak type.
      (2) Use the backblowing procedure to find the leak path and the internal leak.
      (3) Remove the sealant that has the leak.
      (4) Apply new sealant on the internal leak location.
      (5) Do a test to make sure you repaired the leak correctly.
   C. More data about the repair of integral fuel tanks is in AMM 28-11-00/801.
   D. If there is indication of damage to the secondary fuel barrier, you must find and repair the leakage in the fuel tank and in the secondary fuel barrier (AMM 28-11-00/801) before the airplane can be released for flight.

      NOTE: The most usual indication of such damage is a report of fuel fumes in the passenger cabin.

TASK 28-11-00-206-001

2. Fuel Tank Leak Detection, Analysis, and Repair
   A. Equipment
      (1) ST8744 - vacuum cup, to find bad fasteners (optional)
      (2) Tools - for sealant removal and application (Fig. 604, 607).
      (3) Brushes - to apply the precoat and the primer (corrosion resistant finish)
      (4) Markers - non-lead, Berol filmograph to mark in the tank, Berol hydromarker to mark out of the tank (or equivalent)
      (5) Source - air pressure, 100 psi maximum
      (6) Source - vacuum, 10 psi (optional)
      (7) Flashlight - Explosion-proof
      (8) Gloves - neoprene or rubber (commercially available)
      (9) Gun - to apply sealant (optional)
   B. Consumable Materials
      (1) A00706 - PR-1826, Class B-1/2 & B-1/4 - to repair fillet seals of BMS 5-45 which are fully cured. Available in 6 ounce Semkits from Products Research and Chemical Corporation, Glendale, California with special primer.

          NOTE: Use with PR-1826 adhesion promoter.

(2) A00708 - PR-1828, Class B-1/2 & B-1/4 - to repair fillet seals of BMS 5-45 which are fully cured. Available in 6 ounce Semkits from Products Research and Chemical Corporation, Glendale, California. This sealant is white, thus the repaired area is easily visible.

NOTE: Use with PR-186 adhesion promoter on polysulfide sealants.

(3) A00767 - Sealant - BMS 5-45

NOTE: Use one of these sealants:

(a) BMS 5-45 Class A - For brush application
(b) BMS 5-45 Class B - For sealing gun application
(c) BMS 5-45 Class C - For extrusion gun, roller, or spatula application

(4) Use one of these approved solvents to remove sealant and to prepare surfaces before you apply sealant:
(a) B00148 - solvent, Methyl Ethyl Ketone (MEK) TT-M-261 (recommended solvent)
(b) B00666 Methyl Propyl Ketone (MPK) (recommended option)
(c) B00096 - Dowclene EC, Dow Chemical Company
(d) B00300 - 1,1,1-Trichloroethane
(e) Mixture by volume of 42 percent Methyl Ethyl Ketone (ASTM D 740) and 58 percent Sec-Butyl Alcohol (TT-B-848B)
(f) FCC-55, Van Waters and Rogers, Kent, WA

(5) G00835 - soap solution for leak detection (or equivalent)
(6) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

C. References
(1) AMM 27-51-00/201, Trailing Edge Flap System
(2) AMM 27-81-00/201, Leading Edge Slat System
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-00/801, Fuel Tanks
(5) AMM 28-11-01/401, Main Tank Access Door
(6) AMM 28-11-02/401, Center Tank Access Door
(7) AMM 28-26-00/201, Defueling
(8) AMM 51-31-01/201, Seals and Sealing

D. Access
(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank-Rib No. 5 to No. 17 (Left)
542	Main Tank-Rib No. 17 to No. 21 (Left)
543	Surge Tank-Rib No. 21 to No. 23 (Left)
631	Center Wing Tank (Right)
641	Main Tank-Rib No. 5 to No. 17 (Right)
642	Main Tank-Rib No. 17 to No. 21 (Right)
643	Surge Tank-Rib No. 21 to No. 23 (Right)

(2) Access Doors

134AZ	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
541DB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541FB	Main Tank Access Door (Left)
541GB	Main Tank Access Door (Left)
541HB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541KB	Main Tank Access Door (Left)
541LB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542AB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
542CB	Main Tank Access Door (Left)
542DB	Main Tank Access Door (Left)
543AB	Surge Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right
641BB	Main Tank Access Door (Right)
641CB	Main Tank Access Door (Right)
641DB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641FB	Main Tank Access Door (Right)
641GB	Main Tank Access Door (Right)
641HB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641KB	Main Tank Access Door (Right)
641LB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)

642AB Main Tank Access Door (Right)
642BB Main Tank Access Door (Right)
642CB Main Tank Access Door (Right)
642DB Main Tank Access Door (Right)
643AB Surge Tank Access Door (Right)

E. Make an Analysis of the Fuel Leak Type

S 216-077

(1) Fuel leak types:
Fuel leakage is divided into four groups to calculate flight safety. The four groups are stain, seep, heavy seep, and running leak. Examine the wet area around the leak source to find the group of the fuel leak. After you examine the leak area, rub the area clean and examine the leak area again. The dimension patterns of fuel leaks specified in Fig. 602 are based on an examination 15 minutes after the leak area was rubbed clean. The four groups of leaks in Fig. 602 are evaluated as follows:
(a) A "stain" is a leak where the wet area is not more than 1 1/2 inches wide after the 15 minute time.
(b) A "seep" is a leak where the wet area is not more than 4 inches wide after the 15 minute time.
(c) A "heavy seep" is a leak where the wet area is not more than 6 inches wide after the 15 minute time.
(d) A "running leak" is a leak where the wet area is more than 6 inches wide after the 15 minute time.

NOTE: Fuel will usually come into view again immediately after you wipe the area dry and can run or drip from the surface.

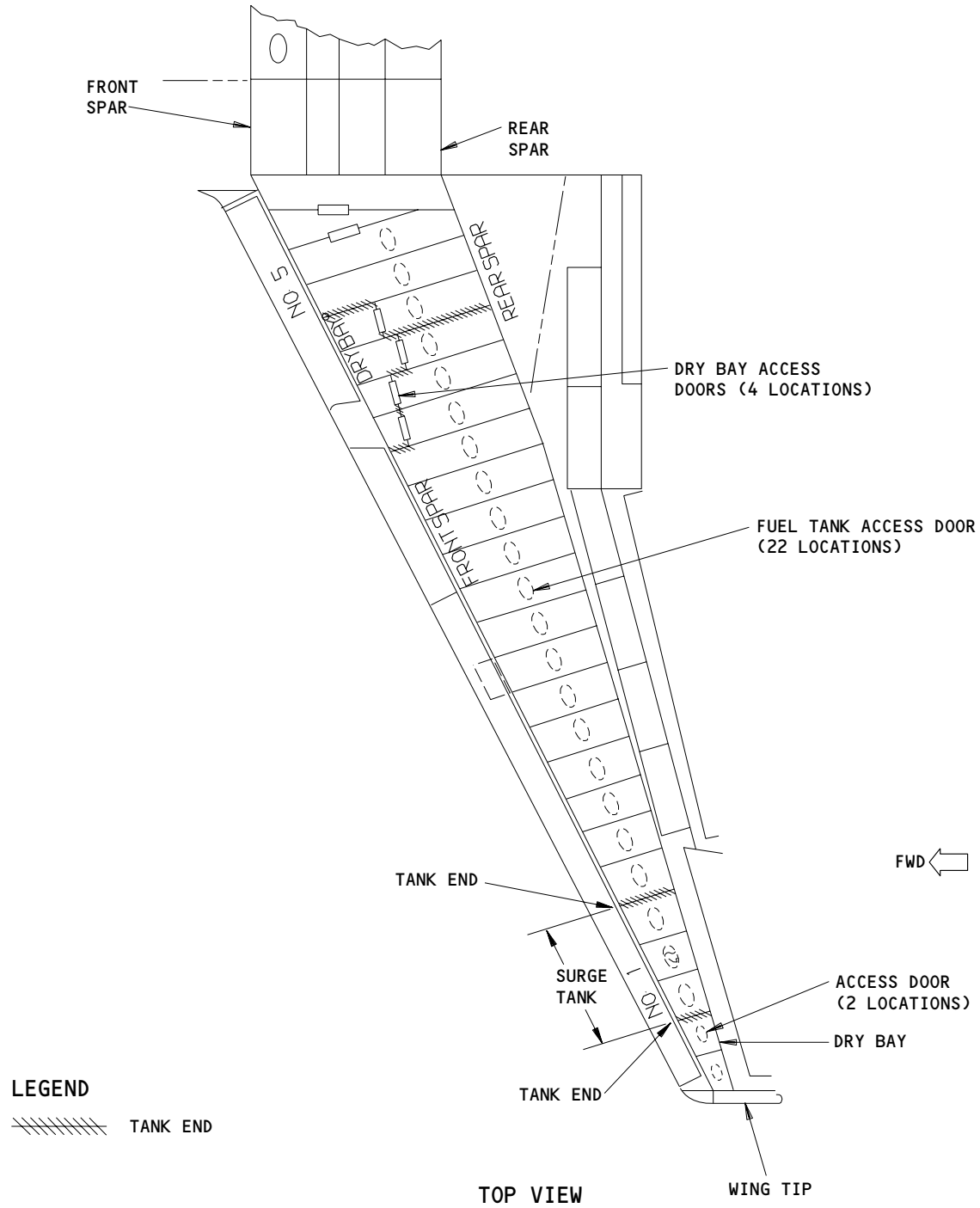
F. Find External Leaks (with Talcum Powder) and Leak Type

S 286-002

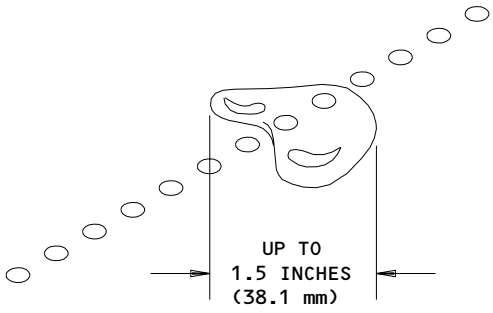
(1) Find the exact location of the leak on the airplane skin (Fig. 601).

NOTE: If the tank is defueled when you start this procedure, refuel the tank and continue this procedure. It is also possible to transfer fuel into the tank with the leak to get more data about the external leak location. If it is not possible to refuel the tank, refer to the procedure: Internal Pressure and Bubble Procedure, in the Task: Alternative Procedures for Fuel Tank Leak Detection.

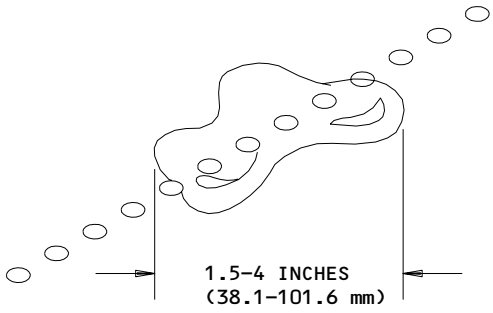
(a) Find the area of the skin that is wet with the fuel.



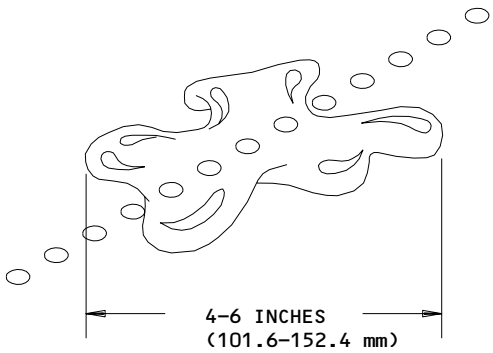
Integral Fuel Tank
Figure 601



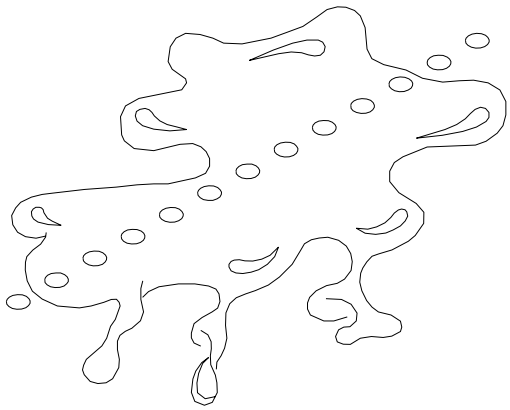
STAIN



SEEP



HEAVY SEEP



RUNNING LEAK

Fuel Leak Evaluation
Figure 602 (Sheet 1)

LEAKAGE LOCATION	STAIN	SEEP	HEAVY SEEP	RUNNING LEAK
Open areas with a good flow of air where fuel leakage cannot move to a possible fire source. Example: upper and lower wing surfaces that do not have the fairings.	1	1	2	3
Areas that are not fully closed and do not have a good flow of air. Example: rear spar at the trailing edge flaps and wheel wells.	1	2 Two locations maximum	3	3
Wing Dry Bay/Drain Holes	5	4	4	4
Closed areas without a flow of air. Example: the fueling station on the front spar.	1	2 Two locations maximum	3	3
Closed areas without a flow of air. Example: wing lower surface, air-conditioning bay wing/body fairings, and front and rear spar with fairings or panels.	2	3	3	3
Exterior empty space of the fuel boost pump.	1	One location maximum 2	3	3
Pressurized area of the center fuel tank.	4	4	4	4

1 No repair procedure is necessary; examine the fuel leak frequently to make sure it does not get larger.

2 It is not necessary to repair the fuel leak immediately. Examine the fuel leak frequently to make sure it does not get larger. Make the necessary repairs at the next applicable scheduled airplane maintenance.

3 Repair the fuel leak immediately to a minimum of 1 or 2 classification.

4 Repair the fuel leak immediately. No fuel leakage is permitted.

5 Do an inspection of the dry bay drain holes after each flight. If no fuel drops are seen 15 minutes after you wipe away the fuel, the airplane can be released for the subsequent flight. If fuel drops are seen 15 minutes after you wipe away the fuel, repair the leak immediately. (The leak is at least a seep).

Fuel Leak Evaluation
Figure 602 (Sheet 2)

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF YOU DO NOT DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(b) If the leak is near the front spar, extend the leading edge slats and do the deactivation procedure (AMM 27-81-00/201).

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE TRAILING EDGE FLAPS. IF YOU DO NOT DO THE DEACTIVATION PROCEDURE FOR THE TRAILING EDGE FLAPS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(c) If the leak is near the rear spar, extend the trailing edge flaps to get access to the area with the leak and do the deactivation procedure (AMM 27-51-00/201).
(d) If the leak is near the engine dry bay, you can use the dry bay inspection procedure (AMM 28-11-07/601) to examine the dry bay for leakage.
(e) If the leak is near the side-of-body rib, remove the necessary panels to get access to the external part of the fuel tank.
(f) If there is leakage from the upper surface of the wing center section, look for leakage in the fillet seals in the upper surface of the wing center section, and for leakage through the secondary fuel barrier on top of the wing center section.
(g) Rub the area that has the leak with a cotton wiper (BMS15-5) to dry it.
(h) Use a camel hair brush or a squeeze bottle to apply talcum powder to the area of the skin that contains the leak.
(i) Monitor the talcum powder continuously to see where it changes color.
(j) Compare the dimensions of the leak with the dimensions shown in Fig. 602 to find the type of leak.

NOTE: Monitor the leak area with the talcum powder for fifteen minutes to make sure you have the correct leak type and the correct leak position.

1) A stain is a leak where the wetted area is not more than 1 1/2 inches wide after the time interval noted above.
2) A seep is a leak where the wetted area is not more than 4 inches wide after the time interval noted above.
3) A heavy seep is a leak where the wetted area is not more than 6 inches wide after the time interval noted above.

4) A running leak is all fuel leaks that are more than a heavy seep.

NOTE: Fuel will usually come into view again immediately after you wipe it dry, and can run or drip from the surface.

(k) If the talcum powder starts to change color at the edge of the area where you applied it, apply more talcum powder at that edge.
(l) Make a mark that you can see easily at the location of all external leaks.

S 286-003
(2) If you find the external leak in a location that has aerodynamic smoother, remove some aerodynamic smoother around the area of the leak (AMM 51-31-01/201).

NOTE: It is a good procedure if the hole in the smoother is approximately the same as the dimensions of the nozzle that you use for the backblowing procedure.

S 286-004
(3) Do not defuel the fuel tanks until you know the exact location of all leaks on the airplane skin.

G. Use the Backblowing Procedure to Find the Internal Leaks

S 656-005
(1) Defuel the applicable fuel tank(s) (AMM 28-26-00/201).

S 016-006

WARNING: CAREFULLY DO ALL OF THE SAFETY PROCEDURES IN THE PURGING AND ENTRY PROCEDURE FOR THE FUEL TANK. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this Task: Fuel Tank Purging and Entry, for the tank that has the leak (AMM 28-11-00/201).

S 946-007
(3) Two persons are necessary to do this task:
(a) One person must be out of the tank at the external location of the leak.
(b) One person must go into the tank and find the internal location of the leak.

(c) If the leak external leak location is near the tank end rib, the leak can be in the center tank or the wing tank.

NOTE: It is a faster procedure to put a person in the center tank and in the wing tank at the same time to look for the internal leak.

S 946-008

(4) The two persons must agree on a procedure to communicate.

S 286-009

(5) One person must go into the tank to a location near the external leak location.

NOTE: The person out of the tank can knock on the airplane skin to make it easier for the other person to find the correct location.

(a) The person that goes into the tank must have these items:
1) An explosion-proof flashlight
2) Non-corrosive soap solution (bubble bath)
3) Marking pen (Berol Filmograph or equivalent)

S 286-010

(6) The person in the tank must apply the soap solution to a large area near the external location of the leak.

NOTE: The internal leak can easily be several feet from the external location of the leak that you found before. Examine the internal surface of the tank for loose sealant or bad sealant or a bad fastener. This can help you make a decision about where to look for the internal leak. If the external leak location is a fastener, find the fastener on the internal surface of the tank. Examine this fastener before you try to find the leak in a different location.

(a) If the external leak location is a skin joint, examine the fillet seal on the nearest splice stringer.

NOTE: Splice stringers are stringers that cover the joints of the airplane skin. Faying surface seals ("isolation seals") are applied at intervals of 30 inches along the splice stringers. These seals are applied between the splice stringers and the airplane skin. Their purpose is to keep the length of a leak path along a splice stringer to a limit of approximately 30 inches. Leak paths and backblowing paths do not usually go through these isolation seals.

(b) If the external leak location is the front or the rear spar, examine the fillet seals on the internal surface of that spar.

S 286-011

(7) The person in the tank must tell the person out of the tank when to blow air through the external leak.

NOTE: Agree on a system of knocks. For example, the person in the tank knocks one time to start the backblowing, two times if he finds the leak, three times if the leak is not found.

S 286-012

(8) The person out of the tank must use an air supply with a nozzle to blow air through the external leak location (Fig. 603).

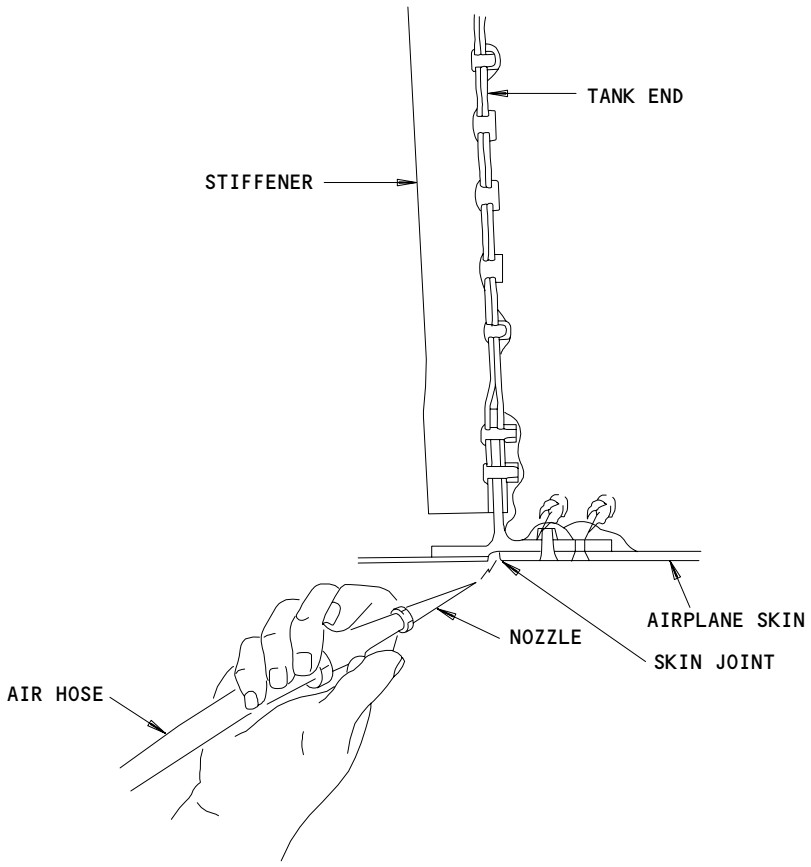
NOTE: The external leak location can be a hole in the aerodynamic smoother, a bad fastener, or an open seam in one of the spars, the side-of-body rib, or the dry bay.

(a) If the leak is small, it can be necessary to use the maximum pressure (100 psi).
(b) If the leak is larger, it is easier to find the leak with less pressure (for example, 50 psi or less).
(c) Look for bubbles that show the location of the leak.
(d) It is also possible to feel for blowing air to find the leak.
(e) Find all leak locations on the internal surface of the fuel tank.

NOTE: It is possible that three or four internal leaks are related to one external leak location. Make a signal to the person out of the tank to stop the backblowing procedure when you find all of the leaks.

(f) Make a mark on these leak locations with the marking pen.

NOTE: If you are not sure you found the correct leak path, you can apply the bubble solution to the external leak location and blow air through the internal leaks. If air blows through the external leak location, you found the correct leak path.



Backblowing Procedure (Example)
Figure 603

S 366-013

(9) If you find a leak in a self-sealing fastener, refer to AMM 28-11-00/801 for procedures to do a temporary repair of self-sealing fasteners with leaks.

NOTE: Self-sealing fasteners are frequently used in the fuel tank. These fasteners have a plastic collar that prevents fuel flow. They are not covered with sealant. Do not put sealant on these fasteners unless you find one with a leak. The only permanent repair of a self-sealing fastener with a leak is to remove the used fastener and install a new one (Ref Structural Repair Manual).

H. Repair the Internal Leaks

S 366-014

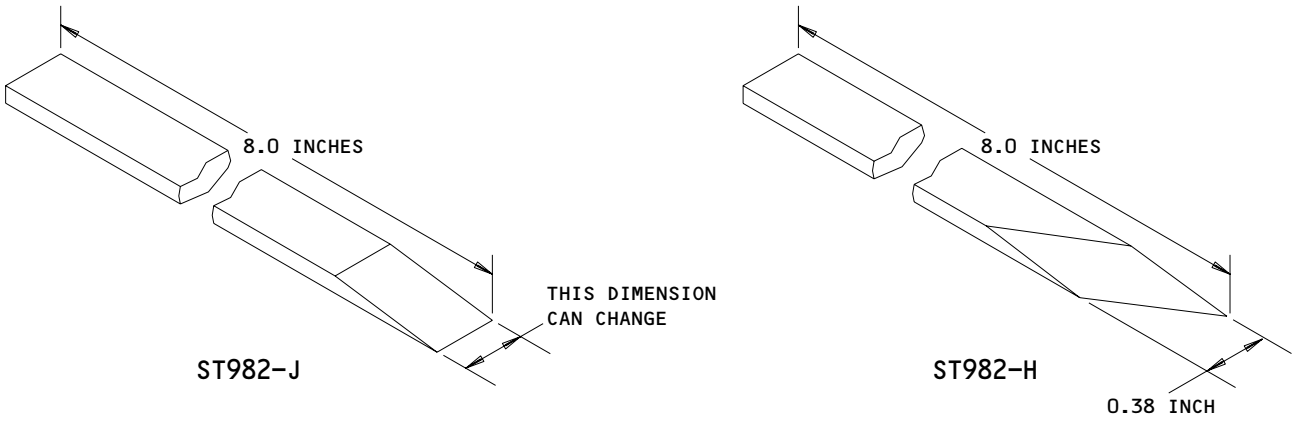
CAUTION: DO NOT APPLY SEALANT TO SURFACES THAT HAVE A TEMPERATURE LESS THAN 50 DEGREES FAHRENHEIT OR MORE THAN 120 DEGREES FARENHEIT. THE SEALANT WILL NOT BOND CORRECTLY TO THE STRUCTURE.

(1) Use sealant cutting tools (Fig. 604) to remove the bad sealant around the internal leak.

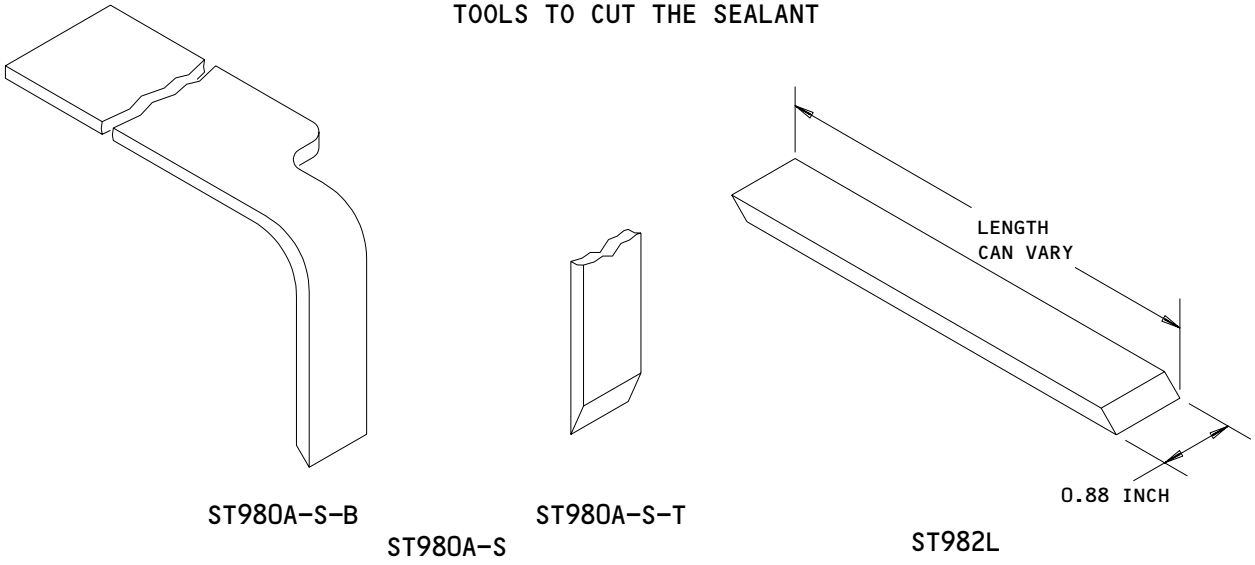
NOTE: If the leak is in the sealant around a sealed fastener, it is usually necessary to remove all of the used sealant around the fastener and seal it again (Fig. 609).

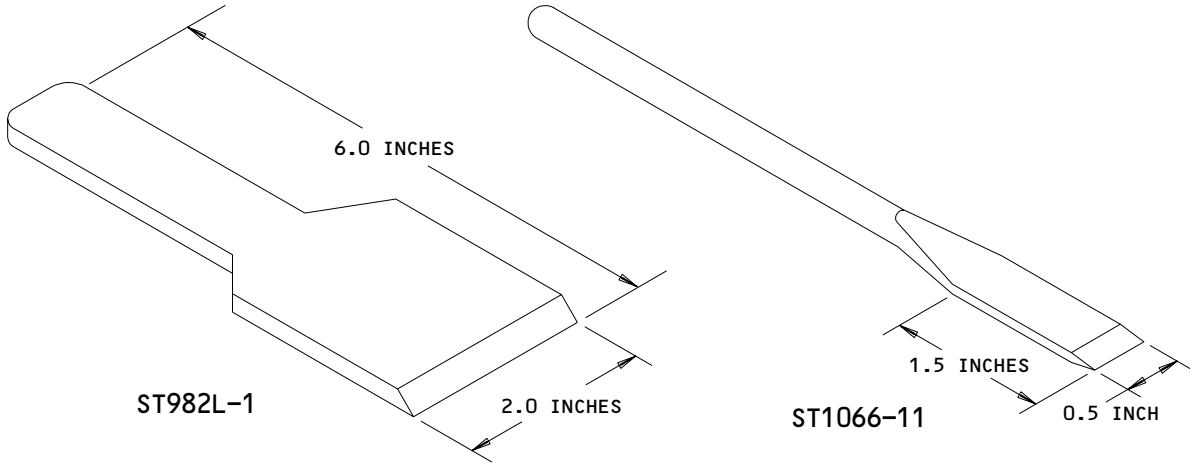
(a) An aluminum tool is usually necessary to cut the sealant away from the tank structure.

NOTE: Aluminum is the recommended metal, but all metal tools can cause dents in the fuel tank if you are not careful.



TOOLS TO CUT THE SEALANT





TOOLS TO REMOVE UNWANTED SEALANT
(SCRAPERS)

Sealant Removal Tools
Figure 604

(b) You can use a non-metallic tool to scrape away the remaining sealant.
(c) Make sure you remove all of the loose sealant.
(d) Cut into the good sealant on each side of the leak with a margin of an inch or more.
(e) Cut the sealant at an angle to make sure the new sealant has an overlap with the remaining sealant (Fig. 605).

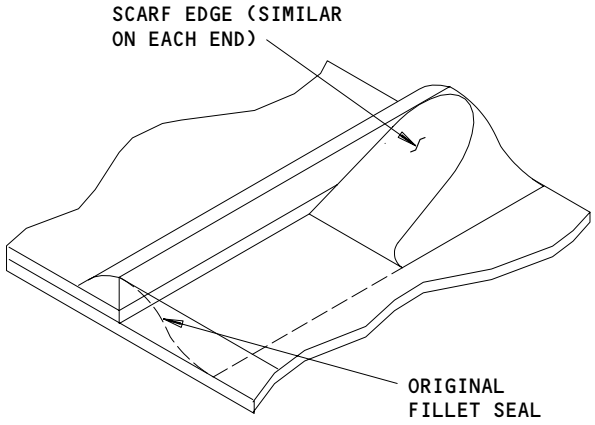
S 116-186

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

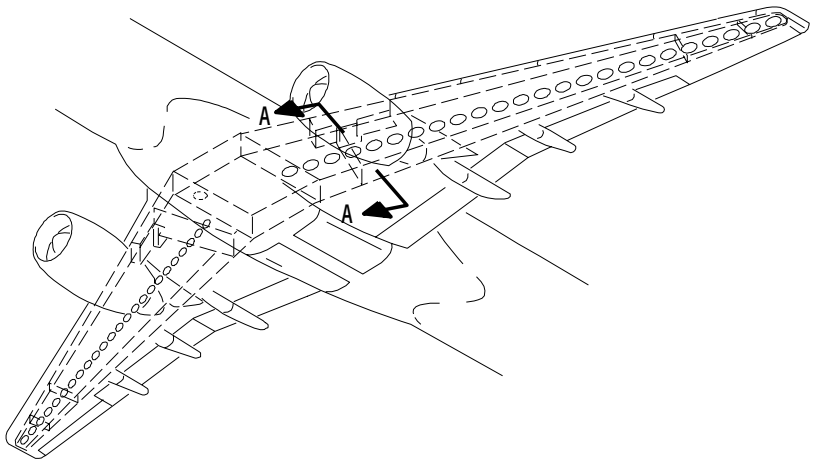
(2) Clean the surface with the solvent, Series 93 (AMM 20-30-93/201), or an approved alternative solvent.

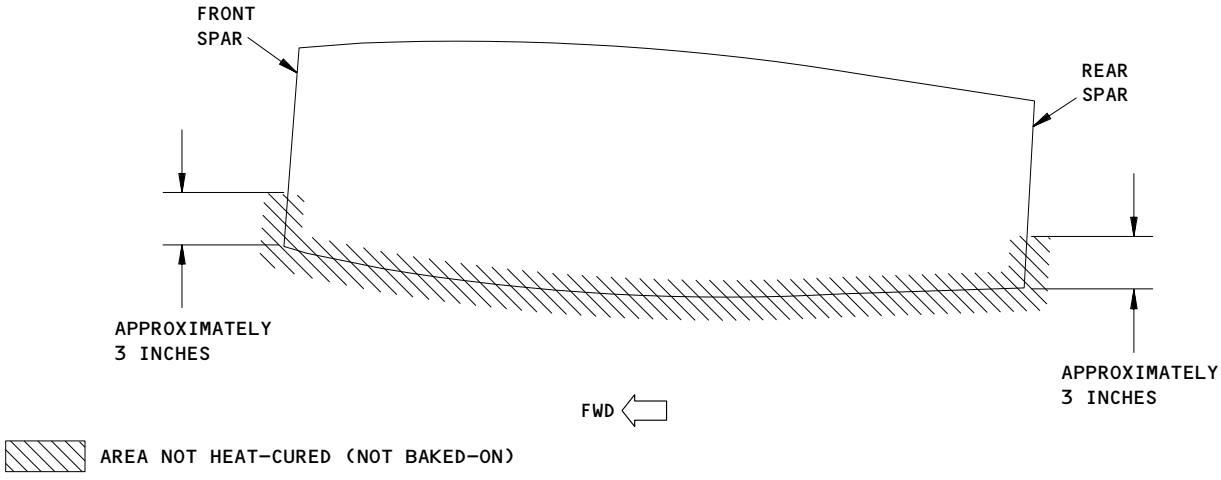
NOTE: Clean an area approximately twice as large as the area where you will apply the sealant.

(a) Clean the surface with a cotton wiper (BMS15-5) wet with the solvent and dry the surface immediately with a dry cotton wiper (BMS15-5).



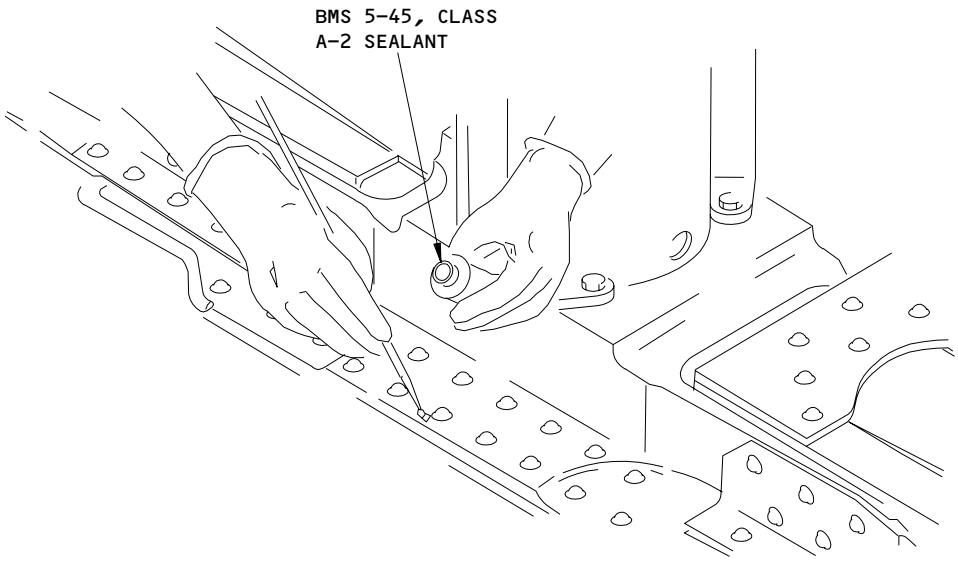
Fillet Seal Removal
Figure 605



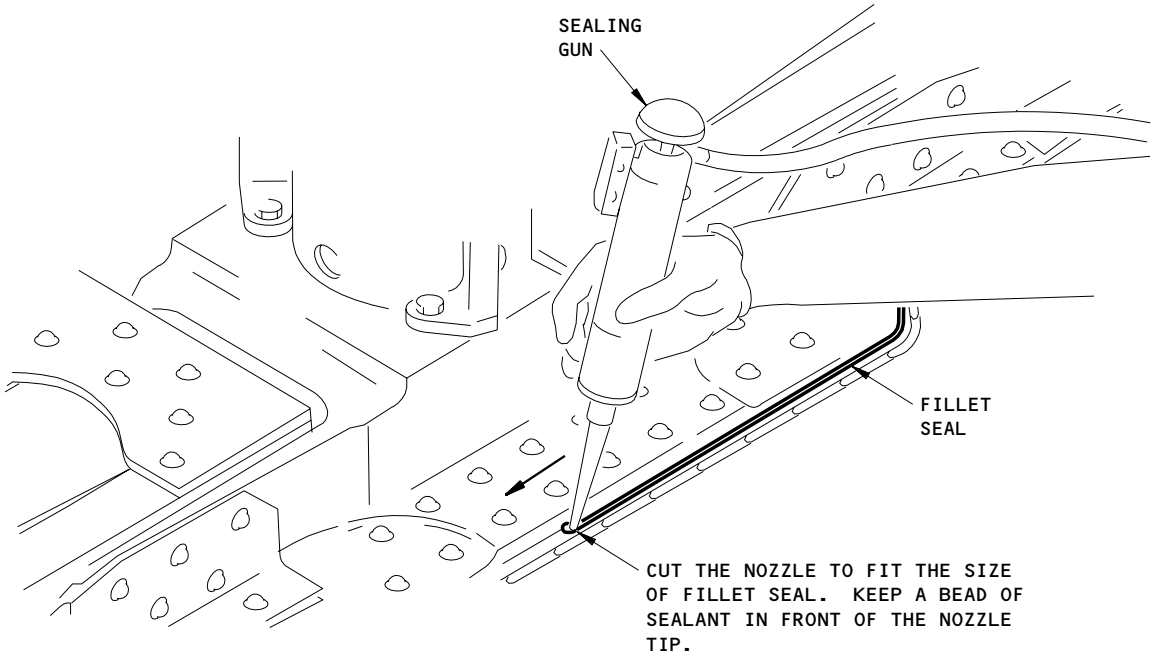


(CROSS SECTION OF THE FUEL TANK - EXAMPLE)
A-A

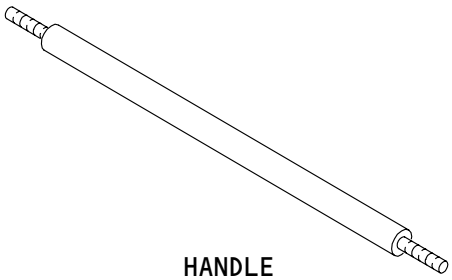
Heat-Cured Finish
Figure 605A



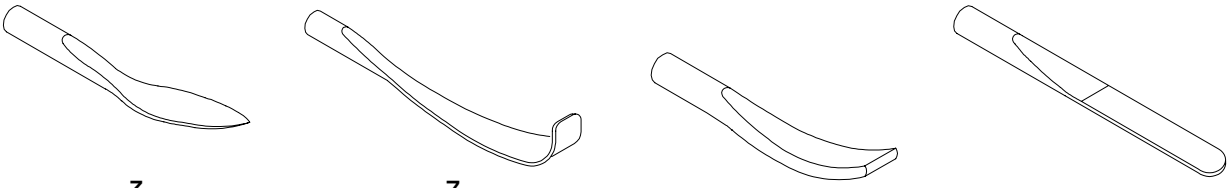
APPLY THE PRECOAT WITH A BRUSH



Apply a Fillet Seal
Figure 606

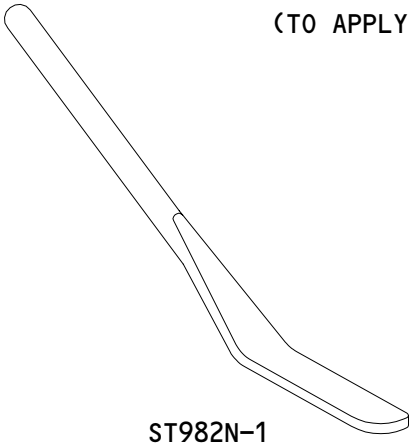


HANDLE

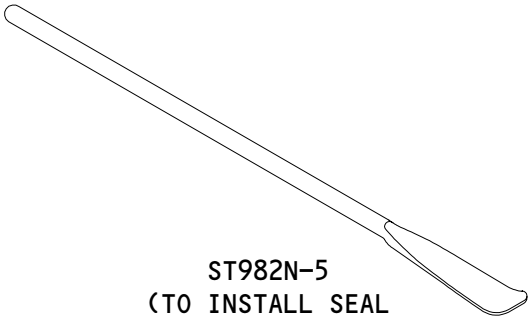


-3 -7 -8 -14

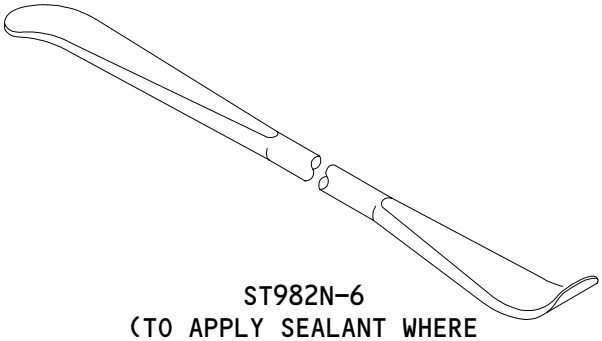
ST982H
(TO APPLY SEALANT AND MAKE IT SMOOTH)



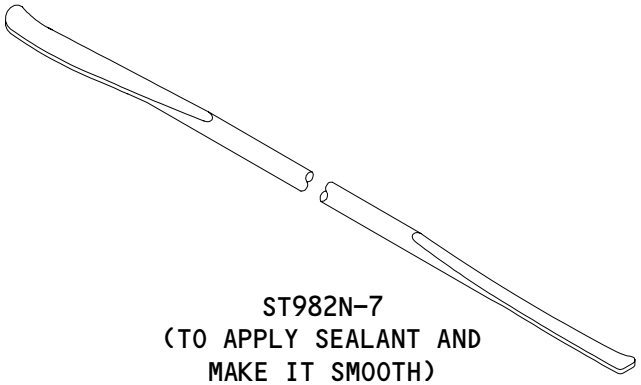
ST982N-1
(TO APPLY SEALANT WHERE IT IS NOT POSSIBLE TO USE A SEALANT GUN)



ST982N-5
(TO INSTALL SEAL CAPS AND FILLETS



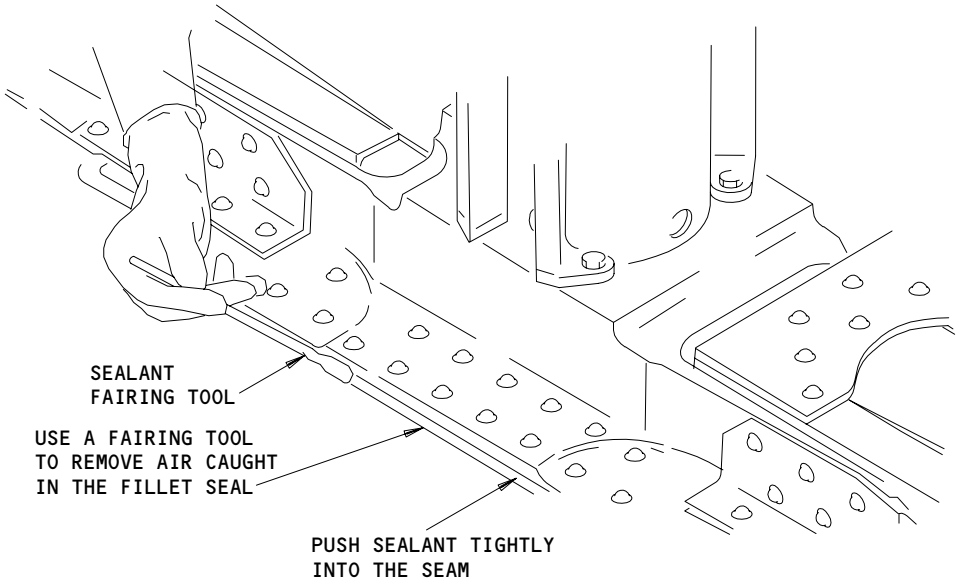
ST982N-6
(TO APPLY SEALANT WHERE IT IS NOT POSSIBLE TO USE A SEALANT GUN)



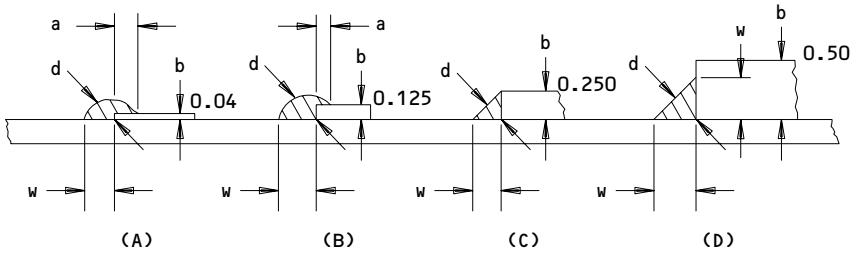
ST982N-7
(TO APPLY SEALANT AND MAKE IT SMOOTH)

ST982N

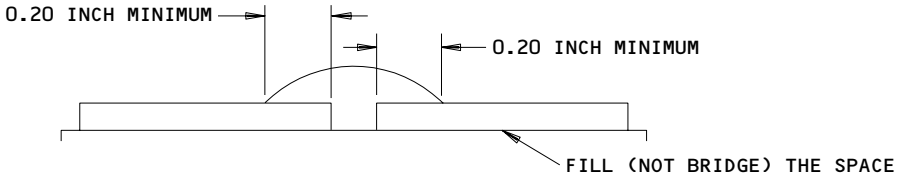
Sealant Application Tools (Spatulas)
Figure 607



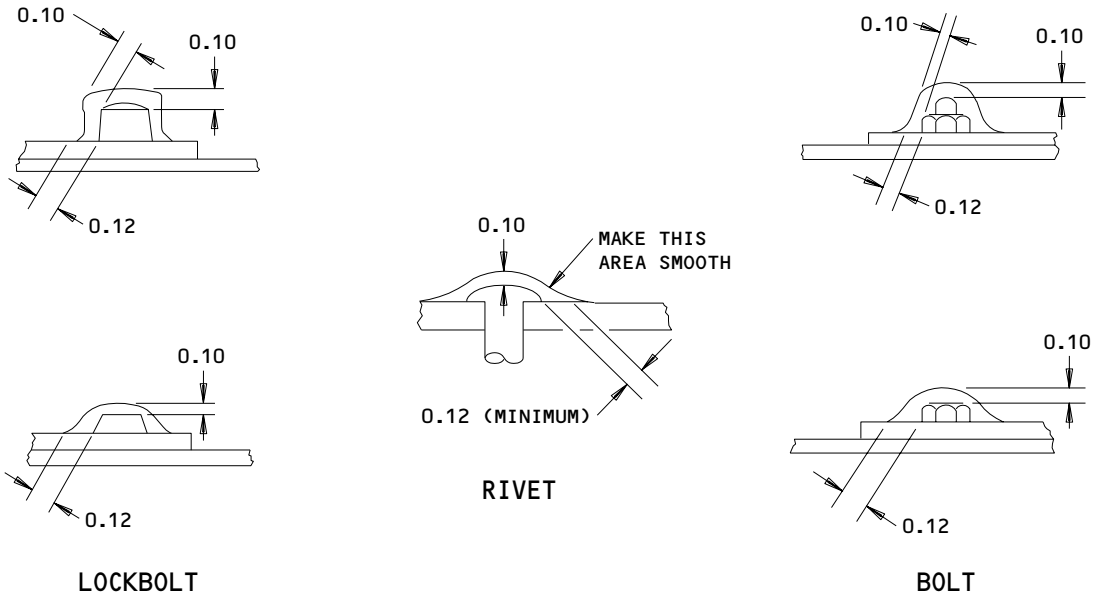
Push the First Fillet Seal into the Seam
Figure 608



d = 0.15 INCH (MINIMUM)
w = 0.25–0.50 INCH
a+b = w, EXCEPT a=ZERO WHEN b=0.25 INCH OR MORE



DIMENSIONS OF FULL BODIED FILLET SEALS



DIMENSIONS OF FILLET SEAL FOR FASTENERS

NOTE: ALL DIMENSIONS ARE IN INCHES.

Dimensions of Fillet Seals
Figure 609

(b) Examine the cotton wiper (BMS15-5) to see if it is dirty.
(c) Continue to clean the surface and dry it until the dry cotton wiper (BMS15-5) is clean when you examine it.

S 366-070

CAUTION: MAKE SURE THE PRIMER IS REMOVED IF IT IS NOT HEAT CURED (BAKED ON) BMS 10-20. THE SEALANT WILL NOT STAY IN PLACE IF THE PRIMER IS NOT HEAT CURED. THIS CAN CAUSE FUEL LEAKAGE.

(3) If the surface has a finish layer (topcoat), remove all of the finish from the sealant repair area.

NOTE: This is not necessary if the finish is heat-cured (baked-on) BMS 10-20 Type II finish material (as it is applied to a new airplane in the factory).

The area in the fuel tank that is not heat-cured extends from approximately three inches from the bottom of the fuel tank on the front spar, along the bottom of the fuel tank, to approximately three inches from the bottom of the fuel tank on the rear spar (Fig. 605A).

S 366-075

CAUTION: MAKE SURE YOU CLEANED THE AREAS THAT YOU APPLY SEALANT TO. SEALANT WILL NOT ADHERE TO AREAS THAT ARE NOT CLEANED.

(4) Apply a thin layer (precoat) of BMS 5-45 Class A sealant with a stiff bristled brush to the area that you prepared (Fig. 606).

NOTE: Refer to AMM 28-11-00/801 for more data about sealant preparation.

(a) Use a circular motion to apply the precoat to the full repair area.
(b) Make sure the sealant goes into all holes, seams, and surfaces that must be sealed.
(c) Make sure the area where you apply the precoat is a minimum of 0.1 inches larger than the area of the fillet seal.

S 366-017
(5) Apply the first layer of a new fillet seal of BMS 5-45 Class B sealant with one of these procedures:
(a) Use a sealant gun to apply a small fillet seal (Fig. 606).

NOTE: Point the nozzle tip into the seam, towards the direction of travel. Keep a bead of solvent in front of the nozzle tip.

(b) Use a sealant fairing tool (Fig. 607) to push the small fillet seals tightly into their correct position (Fig. 608).
1) Make sure all sealant fairing tools are clean.
2) Clean the fairing tools frequently with clean cotton wipers (BMS15-5).

S 366-018
(6) Apply BMS 5-45 Class B sealant to make a second (full bodied) fillet seal with one of these procedures:
(a) Use a sealant gun with the nozzle cut to the dimensions in Figure 609.
1) Push the nozzle head against the surface to make sure the fillet seal is thickest in the middle of the surfaces.
2) Keep the nozzle of the sealant gun near the surface to prevent air bubbles in the seal.
(b) Use the necessary sealant fairing tools to make a second fillet seal with the dimensions in Figure 609.
1) Remove all air bubbles and re-entrant fillet seal edges.

S 366-020
(7) Make sure you do the repair procedure for all internal leaks that you found with the backblowing procedure.

S 366-072
(8) If leakage was found in the upper surface of the wing center section, you must also repair the secondary fuel barrier (AMM 28-11-00/801) before you release the airplane for flight.

S 366-021
(9) Permit the sealant to dry for the applicable tack-free time before you close the fuel tank (Fig. 611).

NOTE: You can increase the temperature and the relative humidity to decrease the cure time. Do not increase the temperature to more than 120 degrees Farenheit.

I. Close the Repaired Fuel Tank

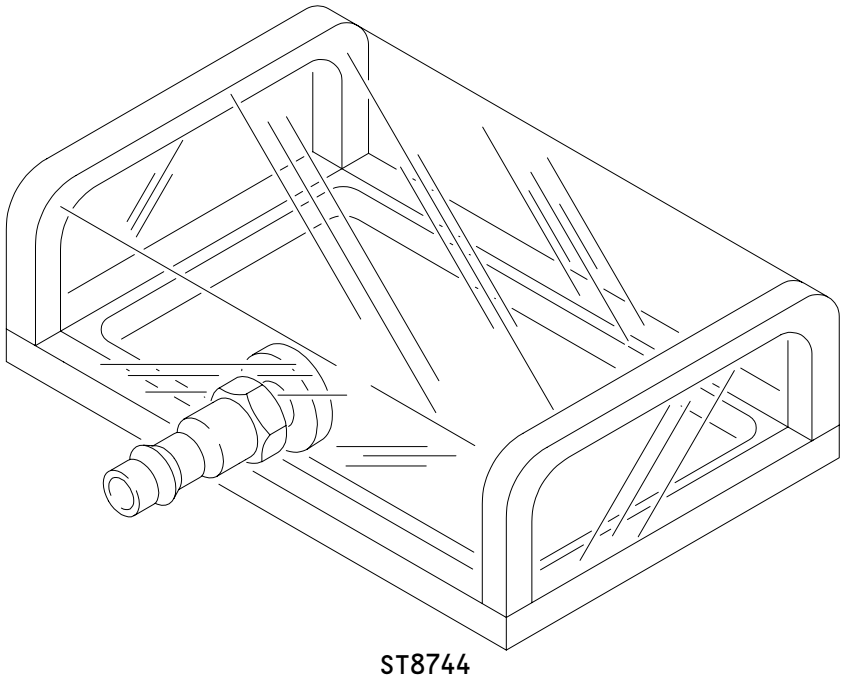
S 946-022
(1) Remove all of the equipment that you put into the tank (for example, tools, solvent containers, plugs, brushes, and other equipment).

S 166-023
(2) Clean the repaired fuel tank fully to remove unwanted particles and pieces of used sealant.

S 166-024
(3) Make sure there is no blockage in the fuel and water drain holes and paths.

S 216-025
(4) Do a final inspection of the fuel tank to make sure you removed all unwanted materials and equipment.

NOTE: Make sure the necessary approved persons do an inspection of the tank before you close it.



ST8744
(TO DO A CHECK FOR FASTENERS THAT HAVE A LEAK)

Vacuum Cup
Figure 610

SEALANT	CLASS	APPLICATION TIME HOURS (1)	TACK-FREE TIME HOURS (1)	SQUEEZE-OUT LIFE HOURS (1)	CURING TIME HOURS (1)
BMS 5-45	B - 1/2	1/2	10	N/A	12
	B - 2	2	12	6	24
	C - 24 (4)	DNA	DNA	24	168
	C - 48 (4)	DNA	DNA	48	336
PR-1826 (5)	B - 1/2	1/2	2.5	DNA	3
	B - 1/4	1/4 (15 MINUTES)	1	DNA	2
PROSEAL 860 (3)	B - 1/6	1/6 (10 MINUTES)	1.5 (2)	DNA	4

NOTE: DNA= DOES NOT APPLY.

(1) AT 77°F (25°C) AND 50 PERCENT RELATIVE HUMIDITY AMBIENT CONDITIONS. OTHER TEMPERATURE AND RELATIVE HUMIDITY CONDITIONS WILL CHANGE THE TIME.

(2) DO NOT LET FUEL TOUCH THE SEALANT YOU APPLIED UNTIL IT IS TACK-FREE FOR 2 HOURS MINIMUM.

(3) WHEN YOU USE PROSEAL 860, NO PRECOAT IS NECESSARY. PROSEAL 860 IS RECOMMENDED FOR SMALL REPAIRS ONLY, DUE TO ITS SHORT APPLICATION TIME.

(4) USED FOR FAYING SURFACE SEALS ONLY.

(5) USED TO REPAIR FILLET SEALS OF BMS 5-45 WHICH ARE IN A TACK-FREE CONDITION. AVAILABLE IN 6 OUNCE SEMKITS ONLY FROM PRODUCTS RESEARCH AND CHEMICAL CORPORATION, GLENDALE, CA. USE WITH ADHESION PROMOTER.

Sealant Usable Time
Figure 611

S 416-026
(5) Install all of the fuel tank access doors that you removed (AMM 28-11-01/401, AMM 28-11-02/401).

J. Put the Airplane Back to Its Usual Condition

S 656-027
(1) Refuel the fuel tanks (AMM 12-11-01/301).

S 216-083
(2) Examine the external leak area regularly for 1 hour.

NOTE: You can monitor the leak area for a longer time to make sure the leak repair is OK.

S 796-068
(3) If you repaired a fastener, you can use the vacuum cup, ST8744, to make sure it does not have a leak.
(a) Attach a vacuum source (10 psi) to the vacuum cup.
(b) Put the vacuum cup on the fastener that you repaired.
(c) Apply the vacuum pressure (10 psi).
(d) If no bubbles or other leak indications occur, you repaired the fastener correctly.

S 216-084
(4) Make sure there are no fuel leaks.

NOTE: Make sure the leakage area is maintained, at a minimum, to the leakage limits shown in Figure 602 after the 1 hour inspection.

S 396-031
(5) If you removed aerodynamic smoother to find the external leak, repair the hole (AMM 51-31-01/201).

S 416-032
(6) If you removed some skin panels to get access to the external leaks, install them again.

TASK 28-11-00-796-033

3. Alternative Procedures for Fuel Tank Leak Detection

A. General
(1) The best leak detection procedure is usually this procedure: Fuel Tank Leak Detection and Repair. This procedure finds the leak externally with talcum powder. Then it finds the internal leak with the air pressure and soap bubble procedure ("backblowing").
(2) This task contains alternative procedures used to find a leak. These procedures can be used if backblowing is not possible, or if it fails to show all of the leaks.

(3) Before you defuel a fuel tank which has a leak, try to find all of the leaks in the fuel tank. Repair all leaks each time a fuel tank is defueled to repair leaks.

B. Equipment
(1) Tracing Device - Integral Fuel Tank Leak F71329
(2) Explosion-proof flashlight
(3) Adapter Assembly - Fuel Leak Tracing Hollow Bolt F70206-1
(4) Pressure Plug Equipment - B28005-1
(5) Water Manometer Assembly - F72951-1
(6) Air pressure capable of 4 psig (commercially available).
(7) Air pressure capable of 90 to 100 psig (commercially available).
(8) Markers - non-lead, Berol filmograph to mark in the tank, Berol hydromarker to mark out of the tank (or equivalent)

C. Consumable Materials
(1) C00069 Dye, Automate Red BSF

D. References
(1) AMM 28-11-01/401, Main Tank Access Door
(2) AMM 28-11-02/401, Center Tank Access Door
(3) AMM 28-11-03/401, Surge Tank Access Door
(4) AMM 28-26-00/201, Defueling

E. Access
(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank-Rib No. 5 to No. 17 (Left)
542	Main Tank-Rib No. 17 to No. 21 (Left)
543	Surge Tank-Rib No. 21 to No. 23 (Left)
631	Center Wing Tank (Right)
641	Main Tank-Rib No. 5 to No. 17 (Right)
642	Main Tank-Rib No. 17 to No. 21 (Right)
643	Surge Tank-Rib No. 21 to No. 23 (Right)

(2) Access Doors

134AZ	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
541DB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541FB	Main Tank Access Door (Left)
541GB	Main Tank Access Door (Left)
541HB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541KB	Main Tank Access Door (Left)
541LB	Main Tank Access Door (Left)

541MB Main Tank Access Door (Left)
542AB Main Tank Access Door (Left)
542BB Main Tank Access Door (Left)
542CB Main Tank Access Door (Left)
542DB Main Tank Access Door (Left)
543AB Surge Tank Access Door (Left)
631AB Center Tank Access Door (Right)
631BB Center Tank Access Door (Right)
631CB Center Tank Access Door (Right
641BB Main Tank Access Door (Right)
641CB Main Tank Access Door (Right)
641DB Main Tank Access Door (Right)
641EB Main Tank Access Door (Right)
641FB Main Tank Access Door (Right)
641GB Main Tank Access Door (Right)
641HB Main Tank Access Door (Right)
641JB Main Tank Access Door (Right)
641KB Main Tank Access Door (Right)
641LB Main Tank Access Door (Right)
641MB Main Tank Access Door (Right)
642AB Main Tank Access Door (Right)
642BB Main Tank Access Door (Right)
642CB Main Tank Access Door (Right)
642DB Main Tank Access Door (Right)
643AB Surge Tank Access Door (Right)

F. Alternative Procedures to Find Leaks in the Fuel Tank

S 846-067
(1) Prepare to Find Leaks
(a) Find the exact location of the external leak with talcum powder if it is possible.
(b) Defuel the applicable fuel tank (AMM 28-26-00/201).
(c) Do the Purging and Fuel Tank Entry procedure (AMM 28-11-00/201).
(d) Remove the applicable tank access door (AMM 28-11-01/401, AMM 28-11-02/401, AMM 28-11-03/401).

S 786-066
(2) Internal Pressure and Bubble Procedure

NOTE: Use this procedure only if it is not possible to use the talcum powder procedure to find the external leaks. For example, you can use this procedure if the airplane is defueled. But the recommended procedure to find external fuel leaks is the talcum powder procedure with fuel in the tanks.

(a) Install the pressure plug equipment as follows:
1) Install the vent cover assembly in the surge tank vent.

2) Install the tank cover assembly in the door opening of the pressure relief valve in the surge tank (AMM 28-11-03/401).

(b) Install all other fuel tank access doors removed (AMM 28-11-01/401, AMM 28-11-02/401, AMM 28-11-03/401).

WARNING: BLOW INTO THE MANOMETER HOSE AND MAKE SURE THE WATER LEVEL CHANGES TO MAKE SURE THE WATER MANOMETER ASSEMBLY OPERATES SAFELY. MAKE SURE THE OPEN END OF THE MANOMETER IS COMPLETELY FREE OF ALL OBSTRUCTIONS. IF THE MANOMETER IS NOT CLEAR, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT COULD OCCUR.

(c) Install plugs in the fuel vent at each wing tip.
(d) Connect the water manometer assembly to the adapter on the tank cover assembly.

WARNING: DO NOT GO INTO A FUEL TANK THAT IS PRESSURIZED. DO NOT USE MORE THAN THE MAXIMUM SAFE PRESSURE OF 5.20 PSIG. IF YOU GO INTO A PRESSURIZED FUEL TANK OR USE MORE THAN THE MAXIMUM SAFE PRESSURE, YOU COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(e) Supply 4.0 psig air pressure to the fuel tank.
(f) Apply the bubble solution to the area out of the fuel tank that you think contains the leak.
(g) Watch the area you think contains the leak for bubbles.

NOTE: The size of the leak may be such that bubbles form very slowly. It is necessary to watch constantly to find the leak.

(h) Make a mark at the locations where you see bubbles.
(i) Use a moist cotton wiper (BMS15-5) to remove the bubble solution from the external surface of the fuel tank.
(j) Remove the pressure from the fuel tank.
(k) Remove the pressure plug equipment from the surge tank vent and the door opening of the pressure relief valve in the surge tank.
(l) Remove the plugs from the fuel vent at each wing tip.
(m) Disconnect the water manometer assembly from the adapter on the tank cover assembly.
(n) Use one of the procedures given to find the internal leak source (the "Air pressure and Bubble Solution Procedure" is recommended).

S 286-037

(3) Air Bubble with Hollow Bolt Method
(a) Remove a fastener and install the hollow bolt.
(b) Connect the integral fuel tank leak tracer, F71329, to the hollow bolt.

CAUTION: MAKE SURE THE FUEL TANK VENTS ARE OPEN AND NOT BLOCKED. IF THE FUEL TANK IS CLOSED (ACCESS DOORS INSTALLED AND VENTS BLOCKED), THE FUEL TANK PRESSURE CAN INCREASE AND CAUSE DAMAGE TO EQUIPMENT.

(c) Supply air pressure with an air source, to the tracer, F71329 and look for air bubbles in the fuel tank.

NOTE: Use a lower pressure (1-5) psi to look for leaks.

(d) Apply the noncorrosive soap solution to the area in the fuel tank that you think contains the leak.
(e) Make a mark at the locations where you see air bubbles in the fuel tank.
(f) Remove the hollow bolt.
(g) Install the fastener.
(h) Clean the bubble solution from in the fuel tank.

S 286-038

(4) Dye Injection with Hollow Bolt Method

NOTE: Use this method only after you use the Air Bubble with Hollow Bolt Method.

This method is to be used only after the tank is defueled and purged. If the leak area is cleaned after the detection procedure, any remaining dye will not affect the fuel tank or the engine.

(a) Remove a fastener and install the hollow bolt.
(b) Connect the integral fuel tank leak tracing device to the hollow bolt.
(c) Add dye through the hollow bolt.
(d) Remove the integral fuel tank leak tracing device.
(e) Remove the hollow bolt.
(f) Install the fastener.
(g) Make a mark at the location where you first see the dye.
(h) Use a cotton wiper (BMS15-5) and remove all the dye.

S 286-039

(5) Dye Injection Method

NOTE: This method injects dye through the external leak point to find the internal leak source.

This method is to be used only after the tank is defueled and purged. If the leak area is cleaned after the detection procedure, any remaining dye will not affect the fuel tank or the engine.

(a) Put the integral fuel tank leak tracing device in position near the external leak.
(b) Use the integral fuel tank leak tracing device to add dye through the external leak.
(c) Continue dye pressure until dye shows in the fuel tank.
(d) Make a mark at the point where dye is first seen.
(e) Remove the integral fuel tank leak tracing device.
(f) Use a cotton wiper (BMS15-5) and remove all the dye.

TASK 28-11-00-796-188

4. Helitest Leak Detection Procedure

A. Equipment
(1) HeliTest Wing Kit - Varian Vacuum Products, Inc. - 121 Hartwell Avenue, Lexington, MA 02173, Phone: 1-800-882-7426 (USA Only)
(2) Scissors, razor or knife
(3) Helium - compressed, industrial grade, standard cylinder
(4) Regulator - pressure, and gage for helium cylinder
(5) Ventilation equipment - positive and negative (if available), to evacuate helium
(6) Compressed air, to blow dry areas

B. Consumable Materials
(1) B01002 Solvent, General Cleaning of Solvent Resistant Organic Coatings (AMM 20-30-82/201) - Series 82
(2) G50004 Tape, vacuum - SM5126 or SM5127
(3) G00252 Material, Plastic Sheeting (polyethylene) - L-P-512
(4) G02329 Tape, high speed - 3M #434

C. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-00/801, Fuel Tanks
(3) AMM 28-26-00/201, Defueling

D. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank-Rib No. 5 to No. 17 (Left)
542 Main Tank-Rib No. 17 to No. 21 (Left)
543 Surge Tank-Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank-Rib No. 5 to No. 17 (Right)
642 Main Tank-Rib No. 17 to No. 21 (Right)
643 Surge Tank-Rib No. 21 to No. 23 (Right)

E. Procedure

S 796-189

(1) Find the location of the external leaks.

S 656-187

(2) Defuel the tank that has the leak (AMM 28-26-00/201).

S 916-190

(3) For the tank that has the leak, purge and enter the fuel tank (AMM 28-11-00/201).

S 166-191

(4) Apply compressed air, to a maximum of 100 psig, to the external leak point to dry the fuel leak path.

S 116-192

(5) Completely clean and dry the area immediately around the external leak point with solvent.

S 486-193

(6) Do one of these two steps:

(a) If it is possible, install one of the pressure cups supplied in the HeliTest Wing Kit to contain the pressure of helium on the outer surface of the tank.

1) Install vacuum tape around the pressure cup.
a) Work the tape to stick it to the surface.
2) Attach the helium injection tube to the cup with the fittings supplied with the kit.

(b) Build a custom plastic pressure chamber around the external leak point with plastic film.

1) Install vacuum tape around the leak area.
a) Work the tape to stick it to the surface.
2) Cut a piece of material, L-P-512, to the size of the chamber formed by the tape.
3) Set the plastic over the tape.
4) Work the plastic to make sure it sticks well to the tape.

5) Make sure the chamber is as small as possible.

NOTE: A small chamber can contain more helium pressure than a larger one.

6) Trim the plastic with a razor knife to follow the outline of the vacuum tape.
7) Apply high speed tape over the plastic chamber and work it well for the best adhesion.
   a) Use a sufficiently large quantity of tape to reinforce the plastic helium chamber so it can handle more pressure.
8) Wrap the helium injection tube with vacuum tape to form a 2 inch (5 cm) diameter flange 1 to 2 inches (2.5 to 5 cm) from the end of the tube.
9) Slice a small hole in the plastic chamber and put the helium tube in the hole.
10) Work the tape flange on the injection tube so it sticks well and seals the plastic chamber.

S 486-194

(7) Set up the HeliTest Wing Kit and purge the lines with helium to remove air.

NOTE: Refer to the instructions supplied with the kit.

S 786-195

(8) Carefully and slowly apply about 0.2 psig helium pressure to the pressure cup or chamber.

NOTE: Start with low pressure and then slowly increase the pressure. Less helium is necessary for larger leaks than for smaller leaks. Too much helium will flood the fuel tank. Inspect the chamber or pressure cup to make sure there is no leakage. If it leaks too much, rebuild the chamber because the helium can interfere with the detector.

S 796-196

(9) Apply negative ventilation, if available, around the helium chamber to draw away leaking helium to make sure it does not interfere with the detector by drifting into the tank (AMM 28-11-00/201).

NOTE: Use positive ventilation if negative pressure is not available, but make sure the helium is removed from the area and does not go into the tank where the detector probe is used.

S 796-197

(10) Permit the helium to soak into the leak path for 10 to 15 minutes before you go into the tank.

NOTE: Time is necessary to push the remaining fuel out of the leak path and start the flow of helium from the external leak point to the internal leak point.

S 796-198

WARNING: KEEP THE DETECTOR AND THE PUMP AWAY FROM THE TANK. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(11) Keep the HeliTest detector and the auxiliary pump away from the open fuel tank at all times.

S 796-199

(12) Go into the tank with the HeliTest Visual Probe (intrinsically safe for Class I, Div I areas).

S 796-200

(13) Slowly move the probe inside of the fuel tank.

NOTE: Patience is important.

S 796-201

CAUTION: DO NOT PUT THE PROBE INTO FUEL PUDDLES. IT CAN CAUSE DAMAGE TO THE INSTRUMENT.

(14) If there is a puddle of fuel in the area where you expect to find the leak, use cotton wipers (BMS15-5) and compressed air to dry the area.
  (a) Build cotton wiper (BMS15-5) dams to soak up additional running fuel.
  (b) Completely dry hidden areas.

S 796-202

(15) If fuel is drawn into the HeliTest probe, immediately remove it to a safe area and permit it to operate until all the fuel is vaporized.
  (a) Disconnect the Visual Probe gas line and permit it to run dry also.
  (b) Replace the wet filter on the visual probe tip with a dry filter.
  (c) Do not shut the HeliTest off while it is contaminated with fuel because permanent damage can occur.

S 796-203
(16) If you do not find the leak, increase the helium pressure to 0.6 psig, and 1.2 psig and so on.
(a) Continue to increase the helium pressure in similar increments until the leak is found.

NOTE: The compression chamber can hold 2 to 5 psig maximum. The maximum pressure depends on the size of the chamber. A smaller chamber can hold a larger pressure.

(b) Do not apply more than 5 psig maximum.

S 366-204
(17) When you find the leak, repair it with the applicable repair procedure (AMM 28-11-00/801).

S 366-205
(18) Let the sealant cure to a tack-free condition (AMM 28-11-00/801).

S 796-206
(19) After the leak repair, do another test of the leak with the HeliTest equipment before you remove the helium chamber or pressure cup from the outside of the tank.

NOTE: This procedure makes sure the leak was repaired correctly.

S 086-207
(20) Do these steps to put the area back to its usual condition:
(a) Remove the pressure chamber or pressure cup and the tape.
(b) Clean the area around the leak with solvent.

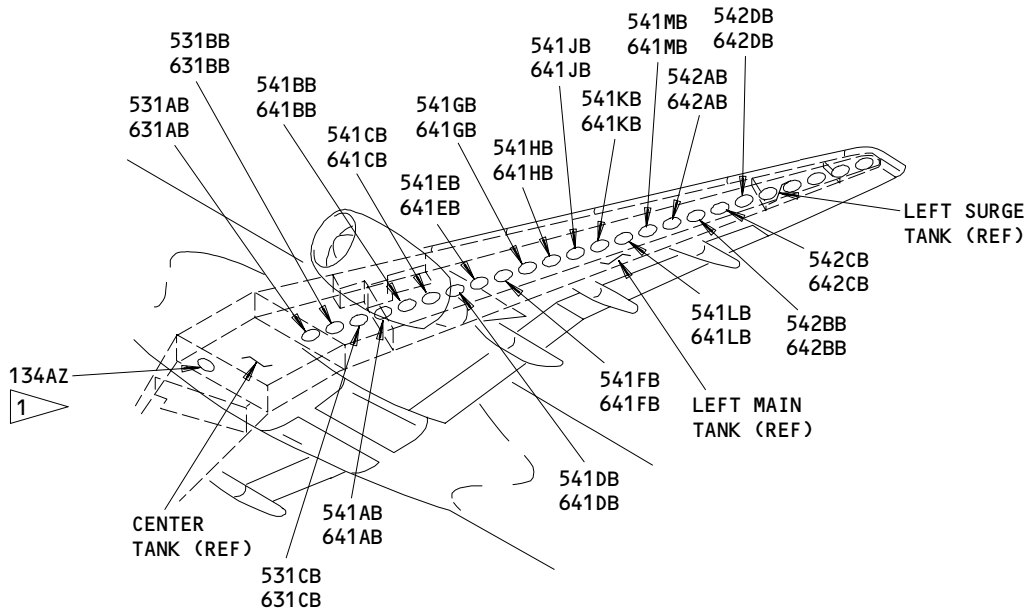
TASK 28-11-00-796-062

5. Leak Detection for Fuel Tank Access Doors (Fig. 612)

A. References
   (1) AMM 28-11-01/401, Main Tank Access Door
   (2) AMM 28-11-02/401, Auxiliary Tank Access Door
   (3) AMM 28-11-03/401, Surge Tank Access Door
   (4) AMM 28-26-00/201, Defueling

B. Access
   (1) Location Zones
   133 Wing Center Section (Left)
   134 Wing Center Section (Right)
   531 Center Wing Tank (Left)
   541 Main Tank-Rib No. 5 to No. 17 (Left)
   542 Main Tank-Rib No. 17 to No. 21 (Left)
   543 Surge Tank-Rib No. 21 to No. 23 (Left)
   631 Center Wing Tank (Right)
   641 Main Tank-Rib No. 5 to No. 17 (Right)
   642 Main Tank-Rib No. 17 to No. 21 (Right)
   643 Surge Tank-Rib No. 21 to No. 23 (Right)

   (2) Access Doors
   134AZ Center Tank Access Door (Right)
   531AB Center Tank Access Door (Left)
   531BB Center Tank Access Door (Left)
   531CB Center Tank Access Door (Left)
   541AB Main Tank Access Door (Left)



1 RIGHT SIDE ONLY-ON THE SIDE OF BODY RIB

500 SERIES, LEFT WING
600 SERIES, RIGHT WING

Component Location
Figure 612

541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
541DB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541FB	Main Tank Access Door (Left)
541GB	Main Tank Access Door (Left)
541HB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541KB	Main Tank Access Door (Left)
541LB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542AB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
542CB	Main Tank Access Door (Left)
542DB	Main Tank Access Door (Left)
543AB	Surge Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right
641BB	Main Tank Access Door (Right)
641CB	Main Tank Access Door (Right)
641DB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641FB	Main Tank Access Door (Right)
641GB	Main Tank Access Door (Right)
641HB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641KB	Main Tank Access Door (Right)
641LB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642AB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)
642CB	Main Tank Access Door (Right)
642DB	Main Tank Access Door (Right)
643AB	Surge Tank Access Door (Right)

C. Find the Leaks at the Tank Access Doors

S 656-041

(1) Fill the applicable fuel tank to a level which will cover the tank access door that you think has a fuel leak (Table I).

NOTE: Data calculated at an airplane attitude of zero degree pitch, zero degree roll.

TABLE I
Fuel Necessary to Cover the Access Door

ACCESS DOOR	FUEL NECESSARY TO COVER THE ACCESS DOOR (LBS)*[1]
134AZ	3,500
531AB/631AB	9,300
531BB/631BB	14,700
531CB/631CB	20,600
541AB/641AB	200
541BB/641BB	700
541CB/641CB	1,300
541DB/641DB	2,100
541EB/641EB	3,200
541FB/641FB	4,500
541GB/641GB	5,600
541HB/641HB	7,200
541JB/641JB	8,600
541KB/641KB	9,700
541LB/641LB	10,800
541MB/641MB	11,900
542AB/642AB	13,000
542BB/642BB	13,800
542CB/642CB	14,400
542DB/642DB	14,600

*[1] AIRPLANES WITH UNITS IN POUNDS

TABLE I Fuel Necessary to Cover the Access Door	
ACCESS DOOR	FUEL REQUIRED TO COVER THE ACCESS DOOR (KGS) *[2]
134AZ	1,600
531AB/631AB	4,300
531BB/631BB	6,700
531CB/631CB	9,400
541AB/641AB	100
541BB/641BB	300
541CB/641CB	600
541DB/641DB	1,000
541EB/641EB	1,500
541FB/641FB	2,100
541GB/641GB	2,600
541HB/641HB	3,300
541JB/641JB	3,900
541KB/641KB	4,400
541LB/641LB	4,900
541MB/641MB	5,400
542AB/642AB	6,000
542BB/642BB	6,300
542CB/642CB	6,600
542DB/642DB	6,700

*[2] AIRPLANES WITH UNITS IN KILOGRAMS

TASK 28-11-00-796-063

6. Leak Detection in the Dry Bay

A. Equipment

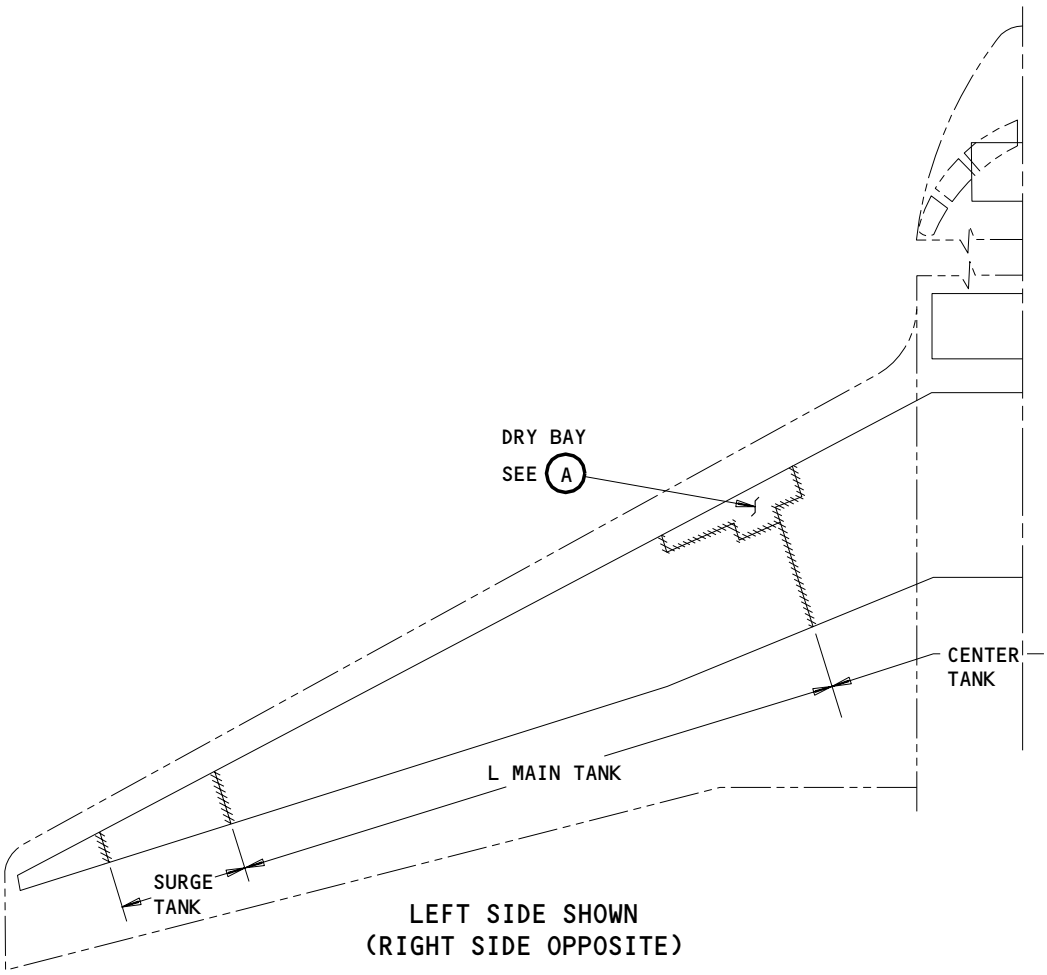
(1) Use one of these:

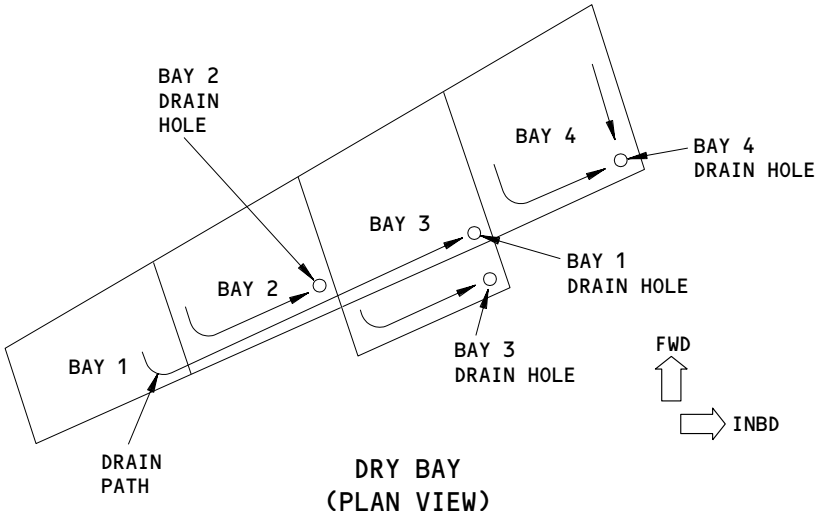
(a) B28008-10 or equivalent - Pressurization Equipment for Wing Dry Bay Fuel Leak Detection

NOTE: This task uses this equipment. If J28007-1 is used the steps in this task that install the equipment will be different.

(b) J28007-1 or equivalent - Pressurization Equipment for Wing Dry Bay Fuel Leak Detection

(2) Source - vacuum, 2.5 psi





LEGEND

TANK END

Dry Bay Drain Holes
Figure 613

B. Access
(1) Location Zones
541 Main Tank-Rib No. 5 to No. 17 (Left)
641 Main Tank-Rib No. 5 to No. 17 (Right)

C. Find the Leaks in the Dry Bay

NOTE: If you use J28007-1 pressurization equipment, rubber stoppers are put in three of the four drain holes and the pressurization equipment (air supply line with the air pressure gage) is installed in the remaining drain hole.

S 216-044
(1) Look and find which of the four drain holes on the bottom of each wing has a leak in the area (Fig. 613).

S 286-045
(2) Find which dry bay that the leak starts from.

NOTE: The fuel leak at a drain hole does not always correspond to the dry bay that is the source of the fuel leak. The fuel leak can flow down a stringer and go out one of the other drain holes. Use the drain holes only as an aid to find where the source of a fuel leak is. For more information refer to AMM 28-11-07/601.

S 286-046
(3) Find the correct location of the leak by the air pressure and bubble method.
(a) Defuel the applicable fuel tank (AMM 28-26-00/201).
(b) Remove the applicable fuel tank access door (AMM 28-11-02/401, AMM 28-11-01/401).
(c) Do the Purging and Fuel Tank Entry procedure.
(d) Put rubber stoppers in two of the four drain holes.
(e) Connect the air pressure gage to one of the drain holes that does not have a rubber stopper installed.
(f) Connect the air supply to the drain hole that does not have a rubber stopper or an air pressure gage installed.
(g) Put one person or more in the fuel tank and one person out of the fuel tank.

CAUTION: WHEN YOU PRESSURIZE THE DRY BAY, DO NOT PRESSURIZE IT MORE THAN 5.0 PSIG. A HIGHER PRESSURE THAN 5.0 PSIG CAN CAUSE DAMAGE TO THE AIRPLANE STRUCTURE.

(h) Open the shutoff valve of the Pressurization Equipment to pressurize the dry bay.
(i) Pressurize the dry bay to 4.0 psig.
(j) Close the shutoff valve of the Pressurization Equipment.

(k) Apply noncorrosive soap solution to all dry bay sealed joint areas in leaking tank, including areas where sealant has been extended to adjacent structure.
(l) Identify all the areas where there are air bubbles.
(m) Identify all the areas where there is damaged sealant.

S 286-076
(4) If you can not find the leak, do the steps that follow:
(a) Disconnect the air supply from the drain hole.
(b) Connect the vacuum source to the drain hole.
(c) Apply a vacuum of 2.5 psi maximum to the dry bay.

NOTE: The vacuum is applied to the dry bay only. This can loosen sealant that is not bonded correctly to the dry bay structure.

(d) Remove the vacuum.
(e) Disconnect the vacuum source from the drain hole.
(f) Do the steps to find the correct location of the leak by the air pressure and bubble method again.

TASK 28-11-00-216-064
7. Leak Path Analysis
A. Access
(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank-Rib No. 5 to No. 17 (Left)
542	Main Tank-Rib No. 17 to No. 21 (Left)
543	Surge Tank-Rib No. 21 to No. 23 (Left)
631	Center Wing Tank (Right)
641	Main Tank-Rib No. 5 to No. 17 (Right)
642	Main Tank-Rib No. 17 to No. 21 (Right)
643	Surge Tank-Rib No. 21 to No. 23 (Right)

B. Procedure

S 216-065
(1) After you find the external leak point and the internal leak source, find the point where fuel goes through the seal plane.
(a) The internal area where you see the bubble or dye usually shows the point where fuel goes through the seal plane.
(b) If there is an injection, prepack or hidden seal failure, the fuel goes into and moves in the tank structure and shows at a point far from the leak source.
(c) If you repair the internal area where you see the bubble or dye and do not repair the injection, prepack or hidden seal failure, you can only temporarily repair the leak.

(d) You must find all possible leak paths between the external leak point and internal leak source to repair the seal failure.

NOTE: You can raise the seal plane as an alternative to a repair of the seal (AMM 28-11-00/601).

(e) When there is a seal plane failure, the faying surfaces of the fuel tank structure, external to the seal plane, get wet.

NOTE: The area that gets wet extends in all directions from the point fuel goes through until it finds an injection, faying surface, prepack or hidden seal. The seal plane stops the release of fuel from the fuel tank.

(f) There are no seals on the external side of the seal plane and fuel that goes through the seal plane follows the path of least resistance.
1) For example, a row of fasteners in a groove are wet but only one fastener has a leak.
2) If the fastener with the leak is sealed, then the fastener with the next least resistance leaks.

(g) If you examine the leak path you can see how fuel gets from the internal leak source to the external leak point.

(h) To understand the leak, examine the fuel tank structure and sealant.

TASK 28-11-00-796-105

8. Dry Bay Leak Detection and Repair Aids

A. General

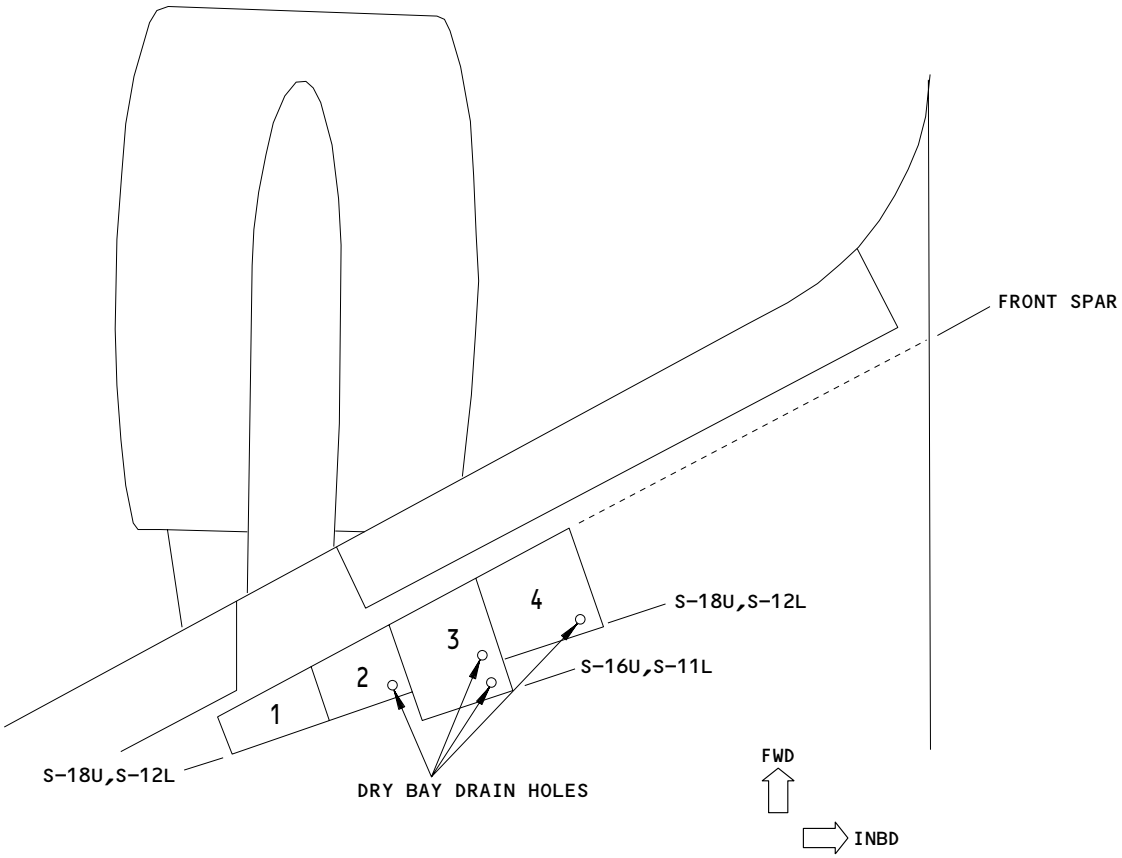
(1) This task gives general instructions to find and repair leaks in the dry bay. It is an aid to the Leak Detection in the Dry Bay task and the repair procedures in AMM 28-11-00/801 and does not replace them.

B. Equipment

(1) Tools - for sealant removal and application (Fig. 604, 607)

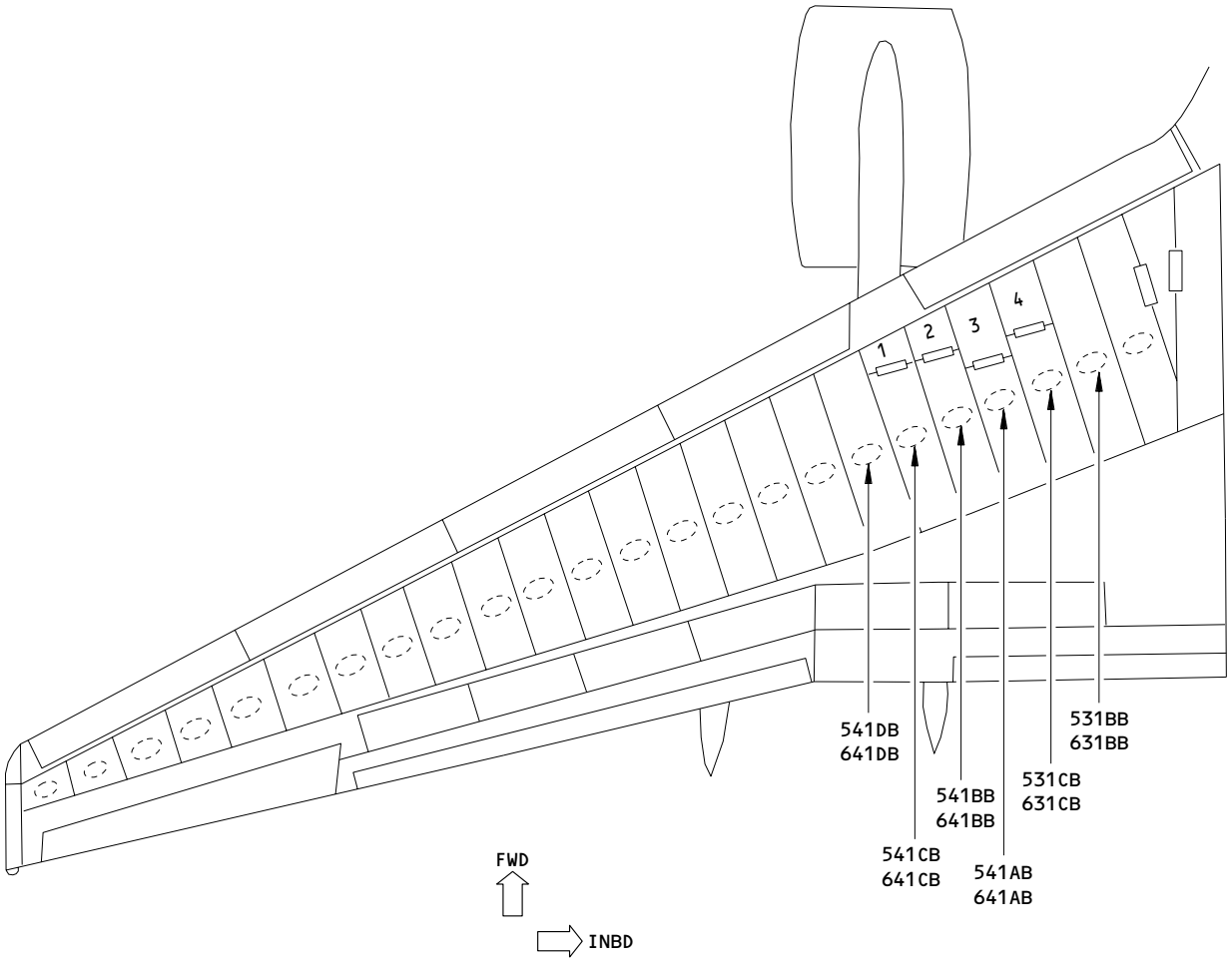
(2) Brushes - to apply the precoat and the primer (corrosion resistant finish)

(3) Markers - non-lead, Berol filmograph to mark in the tank, Berol hydromaker to mark out of the tank (or equivalent)



DRY BAY BOUNDARIES			
DRY BAY	FORWARD	AFT UPPER	AFT LOWER
DRY BAY 1	FRONT SPAR	S-18U	S-12L
DRY BAY 2	FRONT SPAR	S-18U	S-12L
DRY BAY 3	FRONT SPAR	S-16U	S-11L
DRY BAY 4	FRONT SPAR	S-18U	S-12L

Dry Bay Locations
Figure 614



NOTE: 500 SERIES – LEFT WING.
600 SERIES – RIGHT WING.

Fuel Tank Access Doors
Figure 615

(4) Source - air pressure, 100 psi maximum
(5) Source - vacuum, 10 psi (optional)
(6) Flashlight - Explosion-proof
(7) Gloves - neoprene or rubber (commercially available)
(8) Gun - to apply sealant (optional)

C. Consumable Materials
(1) A00706 - PR-1826, Class B-1/2 & B-1/4 - to repair fillet seals of BMS 5-45 which are fully cured. Available in 6 ounce Semkits from Products Reseach and Chemical Corporation, Glendale, California with special primer.

NOTE: Use with PR-1826 adhesion promoter.

(2) A00708 - PR-1828, Class B-1/2 & B-1/4 - to repair fillet seals of BMS 5-45 which are fully cured. Available in 6 ounce Semkits from Products Research and Chemical Corporation, Glendale, California. This sealant is white, thus the repaired area is easily visible.

NOTE: Use with PR-186 adhesion promoter on polysulfide sealants.

(3) A00767 - Sealant - BMS 5-45
Use one of these sealants:
(a) BMS 5-45 Class A - For brush application
(b) BMS 5-45 Class B - For sealing gun application
(4) Use one of these approved solvents to remove sealant and to prepare surfaces before you apply sealant:
(a) B00148 - solvent, Methyl Ethyl Ketone (MEK) TT-M-261 (recommended solvent)
(b) B00666 Methyl Propyl Ketone (MPK) (recommended option)
(c) B00096 - Dowclene EC, Dow Chemical Company
(d) B00300 - 1,1,1-Trichloroethane
(e) Mixture by volume of 42 percent methyl Ethyl Ketone (ASTM D 740) and 58 percent Sec-Butyl Alcohol (TT-B-848B)
(f) FCC-55, Van Waters and Rogers, Kent, WA
(5) G00835 - soap solution for leak detection (or equivalent)
(6) G00034 Cotton Wiper, Process cleaning Absorbent Wiper (cheesescloth, gauze) BMS15-5

D. References
(1) AMM 27-51-00/201, Trailing Edge Flap System
(2) AMM 27-81-00/201, Leading Edge Slat System
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-00/801, Fuel Tanks
(5) AMM 28-11-00/401, Main Tank Access Door
(6) AMM 28-11-02/401, Center Tank Access Door
(7) AMM 28-26-00/201, Defueling
(8) AMM 51-31-01/201, Seals and Sealing

E. Access

F. Leak Detection Aids

S 796-229

(1) Find the external leak point(s).

(a) Fuel can go down a rib, or a stringer and come out of a different drain hole (Fig. 613).

(b) Do not open a fuel tank until you find out which dry bay has the leak(s).

(c) Do not defuel the fuel tank(s) until you find all the external leak(s).

NOTE: Transfer fuel between the center tank and the main tank if it is necessary, to find the location of the internal leak with respect to the rib between bay 3 and bay 4 (Fig. 615) (AMM 28-26-00/201).

S 796-227

(2) Mark the external leak(s) with marking pen.

S 686-243

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do the purging and fuel tank entry procedure (AMM 28-11-00/201).

S 016-230

(4) Do not remove the dry bay access doors unless the access doors have leak(s).

NOTE: Dry bay access doors are difficult to remove and to reseal.

S 796-231

(5) Do the "Internal Pressure and Bubble Procedure" in the Alternate Procedures for Fuel Tank Leak Detection task to find the internal leak point(s).

(a) Use more than one person when you search for leak(s).

NOTE: If it is possible, have people in this configuration:

One person in the bay outboard of dry bay one, one person aft of each of the access panels for dry bays one thru four, and one person in the inboard of dry bay four. One person controls the pressure of the dry bay.

(b) Keep the dry bay pressurized until you find all leak(s).

(c) Pressurize the dry bay in steps:

1) Start at 2.0 psig.
2) Increase by 0.5 psig increments if it is necessary.
3) Do not pressure the dry bay more than 4.0 psig.

(d) Use soap, diluted with water, to make a 50 percent soap solution.

(e) Apply diluted 50 percent soap solution on the tank surfaces.

(f) Use a flashlight and an inspection mirror to look for bubbles along the upper and lower stringers and rib chords.

NOTE: The leak path between the internal leak point and the external leak point can be a long distance.

1) Start at the dry bay and move away from it.
2) Examine the edges of the dry bay access doors.

(g) Mark leaks with marking pen.

G. Leak Repair Aids

S 366-232

(1) Do not start the repair until you find all the internal leak point(s).

S 366-233

(2) Have the materials and equipment necessary for safe and reliable leak repairs ready to use.

NOTE: Refer to Fig. 604 and Fig. 605 and AMM 28-11-00/801 for sealants removal tools and how to scarf the edge of a fillet seal at each end where sealant is removed.

S 366-235
(3) Do NOT use metallic tools which can damage the dry bay barrier panel or access door, or the BMS 10-20, Type II primer applied to the metal structure.

S 366-147
(4) Remove the bad sealant (AMM 28-11-00/801).
(a) Remove about two inches of sealant on each side of the internal leak point when the leak is in a fillet seal.

NOTE: Sealant that does not stick well to the structure can be pulled up easily by hand. This sealant must be removed and replaced.

S 166-234
(5) Clean the area that has bad sealant removed (AMM 28-11-00/801).
(a) Use cotton wipers (BMS15-5), and methyl ethyl ketone (MEK) or another approved solvent listed in the task: Fuel Tank Leak Detection, Analysis and Repair.
(b) Clean the surface with one cotton wiper (BMS15-5) wet with solvent and then rub the surface with a dry cotton wiper (BMS15-5).
(c) Change the cotton wipers (BMS15-5) frequently to prevent the spread of contaminants.
(d) Continue to clean the surface with a wet cotton wiper (BMS15-5) then a dry cotton wiper (BMS15-5) until the dry cotton wiper (BMS15-5) does not show any dirt, sealant, or any other substance.
(e) Use a plastic scraper and solvent as necessary to remove all pieces of remaining sealant.

S 366-150
(6) Mix the sealant (AMM 28-11-00/801).
(a) Use BMS 5-45 Class A and B sealant.

NOTE: Brand-name equivalents to BMS 5-45 sealant are Pro-Seal 890 and PR-1440. Class A sealant is thin. Class B sealant is thick.

(b) Use brush for class A sealant.
(c) Use Fairing tools for class B sealant.

(d) BMS 5-45 sealant is made to stick to the BMS 10-20, Type II primer used in the fuel tank.

S 366-151

(7) Sealant is sold in cans and cartridges.
   (a) Sealant in cartridges is pre-measured and can be more completely mixed. Class B sealant in cans must be mixed on a clean piece of scrap metal.
   (b) Empty the complete contents of the two cans onto the scrap metal.
   (c) Mix the base and accelerator together until the mixture is uniform in color with no streaks.
   (d) Class A sealant in cans must be mixed in a paper cup.
   (e) Empty the complete contents of the two cans into the cup.
   (f) Do not permit air to mix with the sealant. Sealant in cartridges helps to prevent air from mixing with the sealant.

       NOTE: Commercially available electric mixers do most of the work to mix sealant supplied in cartridges.

S 366-152

(8) Use the Class A sealant as a precoat first. Then apply the Class B sealant. It is not necessary for the Class A precoat to cure before the Class B sealant is applied.

S 366-153

(9) Apply sealant within its application time, or "work life". For example, Class A-1/2 sealant has a work life of 1/2 hour or less. Class B-2 sealant has a work life of two hours or less. The work life decreases as tempereature and/or humidity increase.

S 366-154

(10) Apply a brush coat of Class A sealant.
   (a) Use a small paint brush and work the sealant into all empty spaces (voids).
   (b) Apply the brush coat to an area slightly larger than the area where the Class B sealant will be applied.

(c) Make sure the brush coat is applied only to cured BMS 10-20, Type II primer or to bare metal.
1) DO NOT apply the brush coat to uncured BMS 10-20 Type II primer.

S 366-156
(11) Apply the Class B sealant.
(a) It is helpful to use a pneumatic sealant gun. Certain type of plastic nozzles that are used with pneumatic sealant guns can help you give the fillet seals the correct shape. One type of nozzle has a flat tip that is one inch or less in width. A bench grinder can be used to change such a nozzle to the necessary fillet shape. Fillets applied with a pneumatic sealant gun and a nozzle with a shaped tip are usually better than those shaped by hand. When you apply fillet seals, use the fillet dimensions shown in Fig. 609.

S 366-155
(12) Repair sealant must look like the shape of the adjacent production sealant.
(a) Do not apply too much sealant. Too much sealant will make subsequent work in this area more difficult.

S 366-157
(13) Take a small piece of scrap metal into the tank.
(a) When the repair is almost complete, apply a small quantity of the Class B sealant onto the scrap metal. Put the scrap metal inside the tank, within arm's reach of the open access door. The sealant on the scrap metal will cure at approximately the same rate as the actual repair sealant.

S 366-158
(14) Sealant is tack-free when it will not stick to a clean polyethylene film that is pushed lightly against the sealant and withdrawn perpendicular to the surface.

S 366-236
(15) Go out of and close the tank (AMM 28-11-00/201).

S 656-159
(16) Refuel the closed tank (AMM 12-11-00/301).
(a) Re-examine the external leak area.

H. Dry Bay One Outboard Side (View A, Fig. 616)

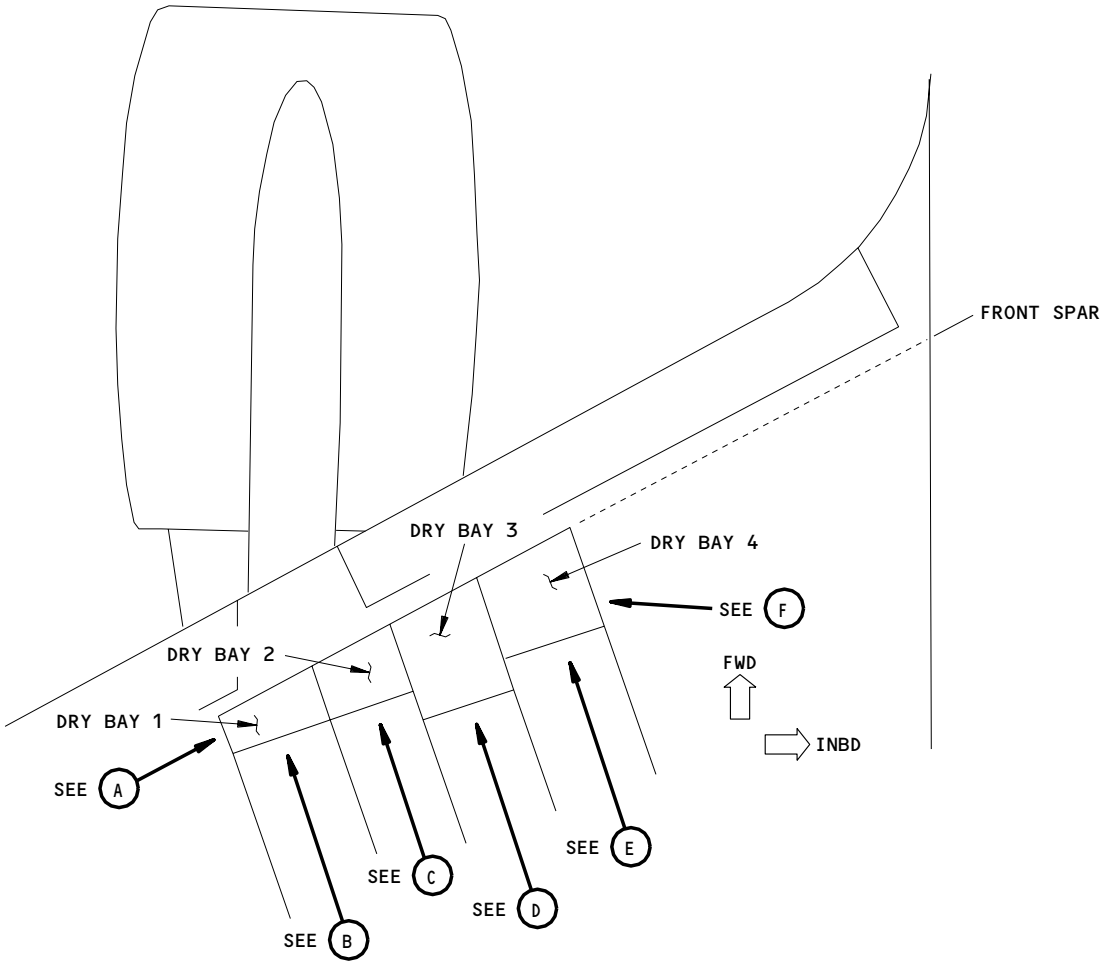
S 016-160
(1) To get internal access to the outboard side of dry bay one, remove main tank access door 541DB or 641DB (Fig. 615) (AMM 28-11-01/401).

S 796-237
(2) Find the leak points.
(a) Refer to the Leak Detection procedure to find external leak point(s) and internal leak point(s).
(b) Use Fig. 616, View A, to help to find the internal leak points.
(c) You can usually find internal leak points for this bay at one of these locations:
1) At a fillet seal common to the outboard rib upper or lower chord.
2) At a fillet seal common to the upper or lower wing skin and the front spar upper or lower chord
3) At a fillet seal common to the upper or lower wing skin and the forward or aft side of a stringer.
4) At a fillet seal common to the front spar web and the front spar upper or lower chord.

I. Dry Bay One Aft Side (View B, Fig. 616)

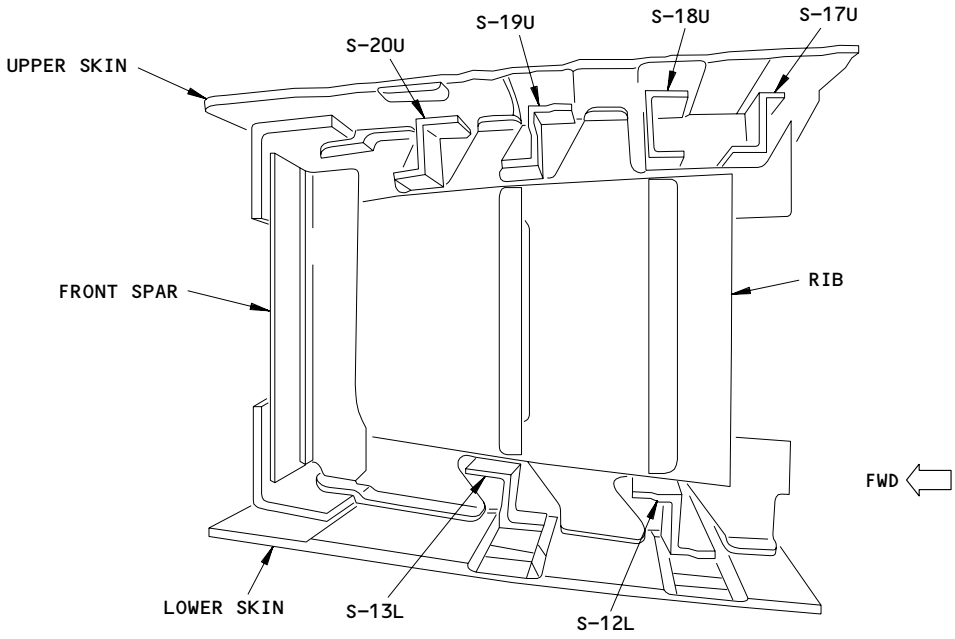
S 016-163
(1) Internal access to the aft side of dry bay one is through access door 541CB or 641CB (Fig. 615).

S 796-238
(2) Find the leak points.
(a) Refer to the Leak Detection procedure, to find the external leak point(s) and internal leak point(s).



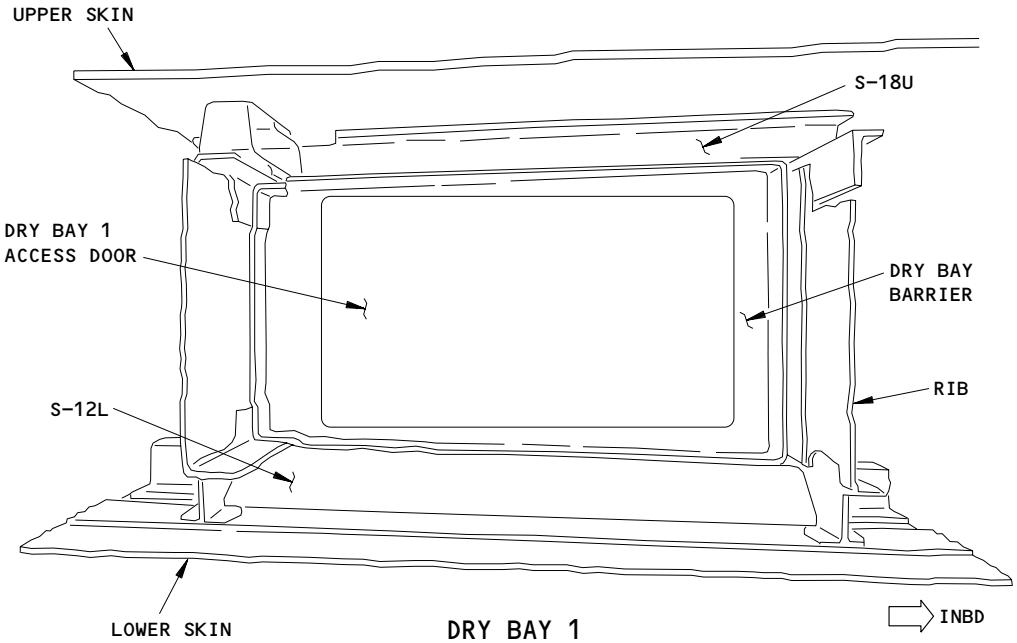
LEFT WING
(RIGHT WING IS OPPOSITE)

Dry Bay Detail Views
Figure 616 (Sheet 1)



DRY BAY 1
(OUTBOARD SIDE)

A

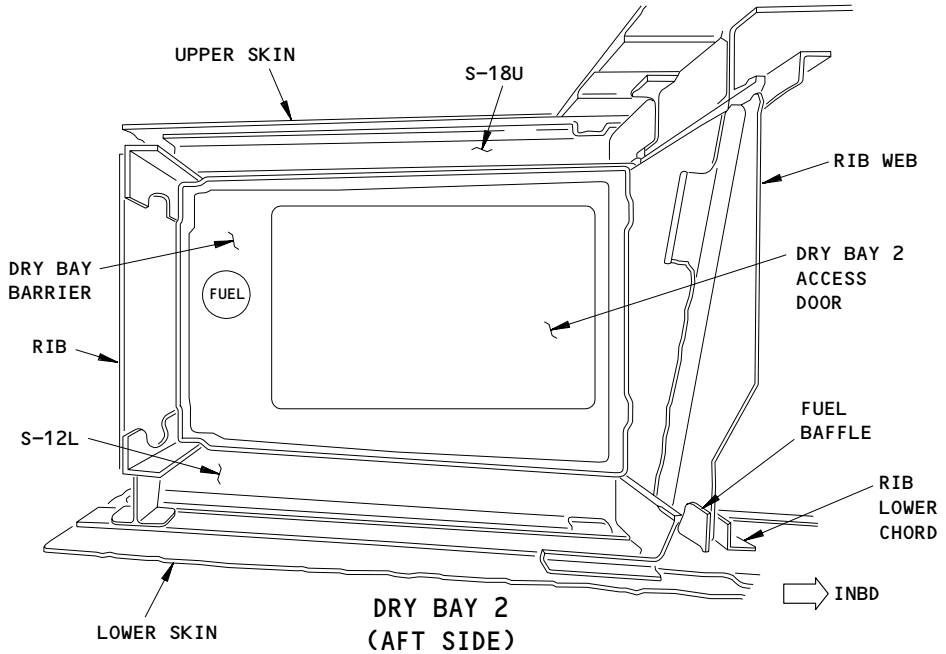


DRY BAY 1
(AFT SIDE)

B

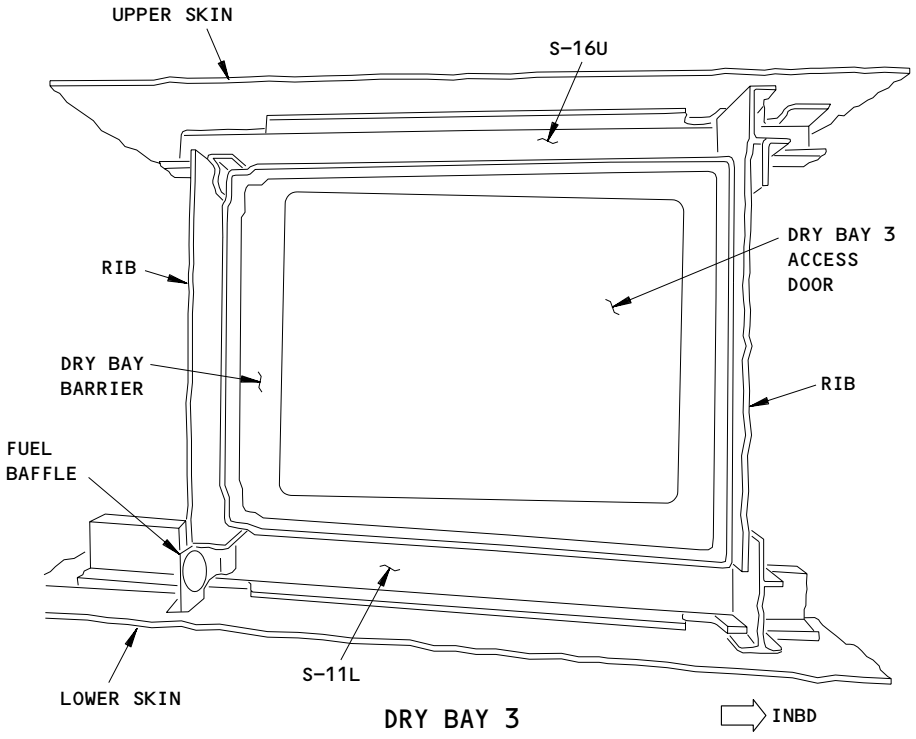
NOTE: VIEWS ARE SHOWN WITHOUT SEALANT.

Dry Bay Detail Views
Figure 616 (Sheet 2)



DRY BAY 2
(AFT SIDE)

C

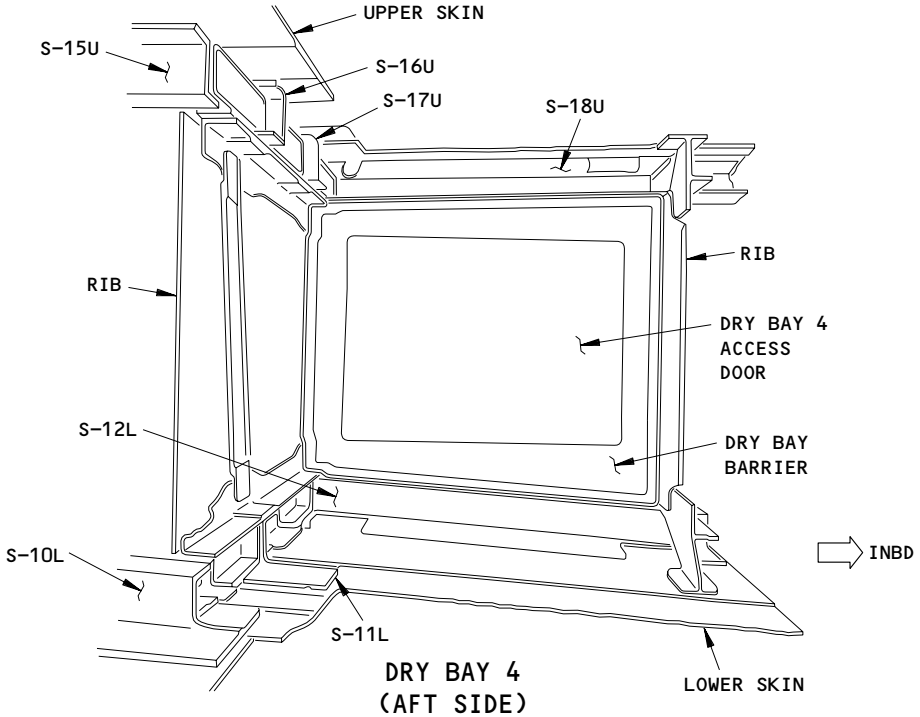


DRY BAY 3
(AFT SIDE)

D

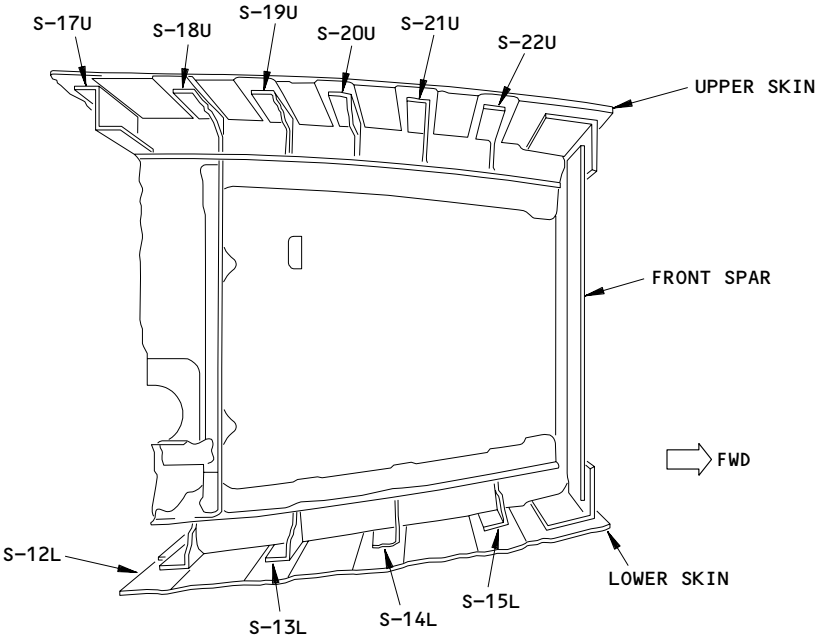
NOTE: VIEWS ARE SHOWN WITHOUT SEALANT.

Dry Bay Detail Views
Figure 616 (Sheet 3)



DRY BAY 4
(AFT SIDE)

E



DRY BAY 4
(INBOARD SIDE)

F

NOTE: VIEWS ARE SHOWN WITHOUT SEALANT.

Dry Bay Detail Views
Figure 616 (Sheet 4)

(b) Use Fig. 616, View B, to help to find the internal leak points.

S 796-165

(3) Internal leak points for this bay are most usually found at one of these locations:
   (a) At the edge of the access door for dry bay one, or at one of the door attachment fasteners.
   (b) At a fillet seal common to the upper or lower chord of the inboard rib or the outboard rib.
   (c) At a fillet seal common to a rib web and the mating rib upper or lower chord.
   (d) At a fillet seal common to the upper or lower wing skin and the forward or aft side of a stringer.

J. Dry Bay Two Aft Side (View C, Fig. 616)

S 016-166

(1) Internal access to the aft side of dry bay two is through access door 541BB or 641BB (Fig. 615).

S 796-239

(2) Find the leak points.
   (a) Refer to the Leak Detection procedure to find the external leak point(s) and internal leak point(s).
   (b) Use Fig. 616, View C, to help you find the internal leak points.

S 796-168

(3) Internal leak points for this bay are usually found at one of these locations:
   (a) At the edge of the dry bay two access door, or at one of the door attachment fasteners.
   (b) At a fillet seal common to the upper or lower chord of the inboard or the outboard rib.
   (c) At a fillet seal common to the upper or lower wing skin and the forward or aft side of a stringer.

(d) At a fillet seal common to a rib web and the mating rib upper or lower chord.

K. Dry Bay Three Aft Side (View D, Fig. 616)

S 016-169

(1) Internal access to the aft side of dry bay three is through access door 541AB or 641AB.

S 016-171

(2) Internal access to the outboard side of dry bay three is through access door 541BB or 641BB.

S 016-170

(3) Internal access to the inboard side of dry bay three is through access door 531CB or 631CB.

S 806-172

(4) Note that dry bay three extends further aft than the other dry bays (Fig. 613).

S 796-240

(5) Find the leak points.
(a) Refer to the Leak Detection procedure to find the external leak point(s) and internal leak point(s).
(b) Use Fig. 616, View D, to help to find the internal leak points.

S 796-174

(6) The internal leak points are usually found at one of these locations:
(a) At the edge of the dry bay three access door, or at one of the door attachment fasteners.
(b) At a fillet seal common to the upper or lower chord of the inboard or the outboard rib.
(c) At a fillet seal common to the upper or lower wing skin and the forward or aft side of a stringer.

(d) At a fillet seal common to a rib web and the mating rib upper or lower web chord.
(e) At a fillet seal common to a stringer or rib chord outboard of the outboard rib or inboard of the inboard rib, where dry bay three extends aft of the adjacent dry bays.

S 796-175
(7) The inboard rib of dry bay three separates the center tank from the main wing tank. If an internal leak point is near this rib, it can be necessary to transfer fuel from one tank to the other to find out which tank has the leak.

L. Dry Bay Four Aft Side (View E, Fig. 616)

S 016-176
(1) Internal access to the aft side of dry bay four is through access door 531CB or 631CB (Fig. 615).

S 796-241
(2) Find the leak points.
(a) Refer to the Leak Detection procedure to find the external leak point(s) and internal leak point(s).
(b) Use Fig. 616, View E to help to find the internal leak points.

S 796-178
(3) The internal leak points are most usually at one of these locations:
(a) At the edge of the dry bay four access door, or at one of the door attachment fasteners.
(b) At a fillet seal common to the upper or lower chord or the outboard rib or the inboard rib of dry bay four.
(c) At a fillet seal common to the upper or lower wing skin and the forward or aft side of a stringer.
(d) At a fillet seal common to a rib web and the mating rib upper or lower chord.

S 796-179
(4) The outboard rib of dry bay four separates the center tank from the main wing tank. If an internal leak point is near this rib, it can be necessary to tranfer fuel from one tank to the other to find out which tank has the leak.

M. Dry Bay Four Inboard Side (View F, Fig. 616)

S 016-180
(1) Internal access to the inboard side of dry bay four is through access door 531BB or 631BB (Fig. 615).

S 796-242

(2) Find the leak points.

(a) Refer to the Leak Detection procedure to find the external leak point(s) and internal leak point(s).

(b) Use Fig. 616, View F, to help to find the internal leak points.

S 796-184

(3) The internal leak points are usually found at one of these locations:

(a) At a fillet seal common to the upper or lower chord of the inboard rib of dry bay four.

(b) At a fillet seal common to the upper or lower wing skin and the front spar upper or lower chord.

(c) At a fillet seal common to the upper or lower wing skin and the forward or aft side of a stringer.

(d) At a fillet seal common to the front spar web and the upper or lower chord of the front spar.

TASK 28-11-00-206-221

9. External Wires Over the Center Tank Inspection

A. General

(1) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References

(1) AMM 24-22-00/201, Control (Supply Power)

(2) AMM 25-25-01/201, Passenger Seats

(3) AMM 25-24-01/401, Windscreens

(4) AMM 25-27-01/401, Floor Covering

(5) AMM 25-27-31/401, Floor Proximity Escape Path Lighting Raceway

(6) AMM 53-01-01/401, Floor Panel

C. Access

(1) Location Zones

133 Wing Center Section (Left)

134 Wing Center Section (Right)

D. Prepare for the Inspection

S 866-209
(1) Remove electrical power from the airplane (AMM 24-22-00/201).

S 016-211
(2) To get access to the top of the center tank from Station 900 to Station 1040, do these steps:
(a) Remove the seats (AMM 25-25-01/201).
(b) Remove the partitions (AMM 25-24-01/401).
(c) Remove the floor covering (AMM 25-27-01/401).
(d) Remove the floor proximity escape path lighting (AMM 25-27-31/401).
(e) Remove the floor panels (AMM 53-01-01/401).

E. External Wires Over the Center Tank Inspection

S 216-212
(1) Do a detailed inspection of the wire bundles routed on the main deck over the center tank and under the floor beams between Station 900 and Station 1040 and left and right body buttock line 70.5.
(a) Look for these items:
(b) Damaged clamps,
(c) Wire chafing,
(d) Wire bundles that are in contact with the surface of the center tank.

S 216-213
(2) If you find any these discrepancies, repair per the Standard Wiring Practices Manual D6-54446 (SWPM 20-10-11).

F. Put the Airplane Back to Its Usual Condition

S 416-214
(1) Install the floor panels (AMM 53-01-01/401).

S 416-216
(2) Install the floor proximity escape path lighting (AMM 25-27-31/401).

S 416-215
(3) Install the floor covering (AMM 25-27-01/401).

S 416-222
(4) Install the partitions (AMM 25-24-01/401).

S 416-218
(5) Install the seats (AMM 25-25-01/201).

S 866-220
(6) Supply electrical power if it is necessary (AMM 24-22-00/201).

FUEL TANKS - CLEANING/PAINTING

1. General
   A. This procedure has these tasks:
      (1) Apply the Corrosion Resistant Finish (Topcoat)
      (2) Fuel Tanks Contaminated With Red Dye

TASK 28-11-00-607-055

2. Apply the Corrosion Resistant Finish (Topcoat)
   A. General
      (1) Corrosion resistant finish (topcoat) is applied to prevent corrosion to the internal structural and tubing surfaces, especially the bottom and lower sides, of the fuel tank. BMS 10-20 Type II and AMS-C-27725 are two kinds of corrosion resistant material which are approved for internal fuel tank use. An advantage of BMS 10-20 Type II finish material is that you can make additional BMS 5-45 sealant repairs. But only if the finished material is cured before BMS 5-45 sealant is applied. The AMS-C-27725 material can only be used as a topcoat after sealant installation is complete.
   B. Equipment

      WARNING: MAKE SURE THE CAPACITY OF THE EXHAUST FAN IS MORE THAN THE CAPACITY OF THE AIR BLOWER. THIS WILL MAKE SURE THERE IS A GOOD FLOW OF AIR. THE CORROSION RESISTANT FINISH IS A POISONOUS AND FLAMMABLE COMPOUND WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) Explosionproof air blower, with sufficient flexible hose to reach all areas in the fuel tanks. The capacity must be 90-100 cubic feet per minute (Rhine Air, Inc., 10744 Prospect Avenue, Suite A, Santee, CA 92071)
      (2) Explosionproof centrifugal exhaust fan with 125-150 cubic feet per minute capacity and approximately 75 feet of 3-inch diameter flexible suction hose plus sufficient delivery hose to carry exhausted air outside hangar or work area (Rhine Air, Inc., 10744 Prospect Avenue, Suite A, Santee, CA 92071).

(3) Full face supplied air type respirator, U.S. Bureau of Mines approved
(4) Neoprene or rubber gloves (commercially available)
(5) Spray Equipment - DeVilbiss Model MBC or JGA, The DeVilbiss Co., 300 Phillips Ave., Toledo, Ohio (Recommended for large area application of corrosion resistant finish)
(6) Vacuum cleaner - industrial type, pneumatically powered, with attachments for cleaning fuel tank interior (ATI Industries, 2425 West Vineyard Ave., Escondido, CA 92029)
(7) Container - Stainless steel

C. Consumable Materials
(1) G00250 Pressure Sensitive Tape - 1-inch width 3M No. 250, Minnesota Mining and Mfg. Co.
(2) E00017 - Scrapers (for removal of loose paint) wood or plastic (commercially available)
(3) B00168 Abrasive paper - 600 grit or finer
(4) Cleaning Solvent

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

(a) B00184 Cleaning Solvent, Pre-Sealing - BMS 11-7 (recommended)

(b) B00148 and B00153 Methyl Ethyl Ketone (MEK)/Toluene, 50-50% Mix - TT-M-261/TT-T-548 (1st option)
(c) B00148 Solvent - Methyl Ethyl Ketone (MEK), TT-M-261 (2nd option)

(5) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5
(6) Alodine application equipment
(a) C00064 Alodine 600 Powder - MIL-C-5541
(b) G01061 - Distilled water - 1 gallon containers
(c) G00116 or G00218 Brush, Swab, Sprayer, for application
(7) Corrosion resistant finish for integral fuel tanks
(a) C00307 BMS 10-20, Type II Class A (recommended)

NOTE: BMS 10-20, Type II Class A is mutually compatible with recommended fuel tank sealant BMS 5-45.

CAUTION: USE AMS-C-27725 FINISH MATERIAL AS A TOPCOAT ONLY. AMS-C-27725 FINISH MATERIAL IS NOT COMPATIBLE WITH SEALANT (BMS 5-45).

(b) C00321 AMS-C-27725

D. References
(1) AMM 12-11-01/301, Pressure Fueling
(2) AMM 20-41-00/201, Static Grounding
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-00/801, Fuel Tanks - Approved Repairs
(5) AMM 28-11-01/401, Main Tank Access Door
(6) AMM 28-11-02/401, Center Auxiliary Tank Access Door

(7) AMM 28-11-03/401, Surge Tank Access Door
(8) AMM 28-26-00/201, Defueling

E. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
543	Surge Tank - Rib No. 21 to No. 23 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

F. Prepare to Apply the Corrosion Resistant Finish (Topcoat)

S 657-046
(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 657-047
(2) Drain and purge the fuel tank (AMM 28-11-00/201).

S 497-003

WARNING: MAKE SURE THERE IS AN ELECTRICAL GROUND FOR ALL VENTILATION EQUIPMENT IN OR NEAR AN OPEN FUEL TANK. SPARKS IN OR NEAR AN OPEN FUEL TANK COULD CAUSE A FIRE OR EXPLOSION.

(3) Set up the air blower and the flexible hose to have a good flow of air in the fuel tank.

S 497-004
(4) Connect the hoses and nozzles to an electrical ground (AMM 20-41-00/201).

S 167-005

(5) Use the exhaust fan and hoses to move exhaust air from the fuel tank to an open space away from the work area or hangar.

S 217-048

(6) Examine the internal fuel tank and tubing surfaces for fungus (mildew) and corrosion.

NOTE: A slimy, black layer on the inner surfaces of the fuel tank, soon after defueling, shows fungus contamination. As it drys, the layer becomes solid and turns light brown in color.

(a) If there is fungus or corrosion, clean the fuel tank.

S 147-049

(7) Remove all loose finish with wood or plastic scrapers and sand with aluminum oxide abrasive paper or abrasive disks.

(a) Do a check for loose finish on the surfaces adjacent to those with loose finish and other areas you are not sure about.

1) Apply a strip of pressure sensitive tape to the applicable surface.
2) Push on the pressure sensitive tape with constant and hard pressure.
3) Pull the pressure sensitive tape off the surface with a quick movement, vertical to the surface.
4) Examine the surface and the pressure sensitive tape for signs of loose finish.
   a) If there are signs of loose finish, remove the loose finish.

S 127-006

(8) Use wet abrasive paper to make all finish areas and adjacent areas, rough.

S 167-007
(9) Use cotton wipers (BMS15-5) soaked in cleaning solvent and rub all unwanted materials from the applicable surfaces.

S 167-008
(10) Use a clean cotton wiper (BMS15-5) to make the surfaces dry.

S 167-009
(11) Clean the area with a vacuum cleaner to remove the flakes of the used finish and other unwanted material.

S 377-010
(12) If alodine metal surface treatment is worn or damaged, apply alodine metal surface solution before you apply the finish.

CAUTION: USE ONLY ALODINE 600 TO REPAIR ALUMINUM WING SURFACES. PRIMER ADHESION PROBLEMS CAN OCCUR IF OTHER ALODINE SOLUTIONS ARE USED.

(a) Apply an alodine layer to the surface with Alodine 600 (SRM 51-20-01).

S 397-011
(13) Apply sealant if it is necessary because of removal of corrosion resistant finish (AMM 28-11-00/801).

S 217-012
(14) Make sure all equipment used to apply the corrosion resistant finish is clean.
(a) If you are not sure, clean the equipment in solvent, Series 81 (AMM 20-30-81/201) before you apply the corrosion resistant finish.

S 217-013
(15) Make sure that all surfaces of the fuel tank that you apply corrosion resistant finish to are clean.
(a) If you are not sure, clean the surfaces of the fuel tank with BMS 11-7 solvent before you apply the corrosion resistant finish.

S 217-014

(16) Make sure the storage life of the corrosion resistant compounds that are not mixed is not expired.

(a) The storage life of BMS 10-20, Type II Class A is 12 months at 75 ±15°F (23.9 ±8.4°C) from the date of manufacture.

(b) For AMS-C-27725, see manufactures product description for storage life.

S 217-015

(17) Make sure there is sufficient corrosion resistant material to apply the corrosion resistant finish.

S 957-016

CAUTION: REMOVE ALL MASKING TAPE AFTER YOU APPLY THE CORROSION RESISTANT FINISH. FAILURE TO REMOVE ALL THE MASKING TAPE COULD BLOCK THE SUCTION INLETS OF THE FUEL BOOST PUMP.

(18) Apply masking tape to all non structural equipment areas in the fuel tank which are near the surfaces that you apply the corrosion resistant finish (topcoat) to.

NOTE: Do not apply the corrosion resistant finish (topcoat) to electrical bonding surfaces, clamps, O-rings, valves, fuel measuring sticks, tank units, compensators, wiring, pumps, filler caps or other non structural equipment.

S 227-017

(19) Keep the corrosion resistant finish between 50° to 100°F (10.00 to 37.8°C) with less than 85 percent relative humidity when the corrosion resistant finish is applied.

G. Apply the Corrosion Resistant Finish (Topcoat)

S 627-057

(1) Do not use the corrosion resistant finish until a minimum of 1 hour after you mix it.

NOTE: The maximum usable life of the corrosion resistant finish is 8 hours at 75° ±5°F (23.9° ±2.8°C).

S 627-058

(2) To apply the corrosion resistant finish, use the brush procedure or spray gun procedure as follows:

(a) For the brush procedure (applicable for small areas), do the steps that follow:

NOTE: The sealant must be tack-free (AMM 28-11-00/801).

1) Apply a thin layer of corrosion resistant finish (approximately 0.0005 inch (0.013 mm)) with a soft bristle paint brush.

NOTE: Move the brush in one direction as much as possible.

a) To prevent air bubbles, spaces and removal of finish already applied, do not move the brush quickly or too many times when you apply the corrosion resistant finish.

2) Let the corrosion resistant finish dry for a minimum of 30 minutes.

3) Apply a second thin layer like the first layer.

4) Make sure the corrosion resistant finish you applied makes an overlap with all adjacent topcoat applied before.

WARNING: MAKE SURE YOU HAVE A GOOD FLOW OF AIR. OBEY ALL OF THE FIRE PRECAUTIONS WHEN YOU APPLY THE CORROSION RESISTANT FINISH. BAD INJURIES TO PERSONS CAN EASILY OCCUR.

(b) For the spray gun procedure (recommended for large areas), do the steps that follow:

1) Set the spray gun to 40 psi (276 kPa) air pressure and 5 (34 kPa) to 10 psi (69 kPa) fluid pressure.

2) Apply the corrosion resistant finish with a spray gun on the surface.

3) Let the corrosion resistant finish dry for a minimum of:
   a) 30 minutes with BMS 10-20.
   b) 4 hours with AMS-C-27725.
4) Apply the second layer like the first layer.
5) Make sure the corrosion resistant finish you applied makes an overlap with all adjacent topcoat applied before.

S 117-021

(3) Clean the equipment and tools after you apply the corrosion resistant finish (topcoat).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(a) Clean the equipment with solvent, Series 81 (AMM 20-30-81/201) immediately after use.
(b) Soak the brushes in solvent, Series 81 (AMM 20-30-81/201) immediately after use.

NOTE: Discard the brushes when the bristles become rigid.

(c) Remove all of the masking tape applied.

S 627-059

(4) Cure the corrosion resistant finish.

NOTE: See the manufacture's product description for dry (cure) times.

(a) Do the fuel (JP-4) or solvent (MEK) resistance check that follows to make sure the cure is complete.
   1) Soak a cotton wiper (BMS15-5) with MEK or JP-4 as applicable.

2) Apply the cotton wiper (BMS15-5) to the surface.
   a) Let the solvent or fuel soak the area.
3) Use hard pressure and rub the area 100 strokes.

   NOTE: Count each movement in one direction as a stroke.

4) Look and see if the corrosion resistant finish is removed.

   NOTE: If you can see metal, the corrosion resistant finish is removed.

   a) If no bare metal is seen, the cure is satisfactory.

H. Put the Airplane Back to Its Usual Condition

S 957-051
(1) Make sure all masking tape is removed from the fuel tank and tank equipment.

S 417-052
(2) Install all substructure, support brackets, and fuel tank equipment removed for access.

S 217-053
(3) Make sure all tools, cotton wipers (BMS15-5), air movers, hoses, and other equipment are removed from the fuel tank.

S 417-054
(4) Install the applicable main, center or surge tank access doors (AMM 28-11-01/401, AMM 28-11-02/401, AMM 28-11-03/401).

S 657-023
(5) Refuel the applicable fuel tank (AMM 12-11-01/301).

S 217-022
(6) Make sure there are no fuel leaks (AMM 28-11-00/601).

TASK 28-11-00-207-067

3. Fuel Tanks Contaminated with Red Dye

A. General

(1) Service criteria and reporting requirements for red dye concentrations can be found in the Boeing service letter 757-SL-28-034, Airplane Use of Fuels Contaminated with Dye.

(2) Do the procedure that follows if:

(a) The concentration of red dye is more than 0.28 milligrams per liter as shown by the JT-100s analyzer or equivalent.

B. References

(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 12-11-03/301, Fuel Sump Draining
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-26-00/201, Defueling
(5) AMM 49-11-00/201, Auxiliary Power Unit (APU)
(6) AMM 71-00-00/201, Power Plant
(7) AMM 73-11-10/401, Low Pressure Fuel Filter Element
(8) AMM 73-11-12/401, High Pressure Fuel Filter Element

C. Procedure

S 287-070

(1) Do not start or operate the engines or APU.

S 657-071

(2) Defuel the fuel tanks to the fuel tank sump levels (AMM 28-26-00/201).

S 687-072

(3) Drain the fuel tank sumps, leaving only trapped fuel (AMM 12-11-03/301).

S 027-084

(4) Remove the LP fuel filter (AMM 73-11-10/401).

S 027-085

(5) Remove the HP fuel filter (AMM 73-11-12/401).

S 207-073

(6) Do a check of the engine fuel filters and bowl for signs of contamination of the fuel.

(a) Do these steps:

1) Replace the LP fuel filter if you think that there is contamination (AMM 73-11-10/401).

2) If there is no contamination, install the same LP filter (AMM 73-11-10/401).

3) Replace the HP fuel filter if you think that there is contamination (AMM 73-11-12/401).

4) If there is no contamination, install the same HP filter (AMM 73-11-12/401)

S 657-074

(7) Refuel the fuel tanks with new clean fuel (AMM 12-11-01/301).

NOTE: For most airplane fuel tanks, this will give a dilution ratio of new fuel to trapped fuel fuel in the range of 1000:1 to 10,000:1.

S 707-075

(8) Take a fuel sample from the tank sumps (AMM 12-11-03/301).

S 657-076

(9) If you see signs of continued contamination, repeat the defueling and refueling steps above.

(a) If the contamination continues, remove all fuel from the tank, including trapped fuel.

S 837-077

(10) If the samples from the fuel tank sumps do not show signs of contamination, do the subsequent steps:

(a) Start the APU (AMM 49-11-00/201)

(b) Start the engines (AMM 71-00-00/201).
(c) Let them operate approximately 5-8 minutes or until the dirty fuel is flushed from the fuel system.
(d) Make sure that the engine and its controls operate correctly in all standard power settings.
(e) Speak to the engine and APU manufacturers about more inspections or tests.

S 097-086
(11) After you operate the engine and the APU, do these tasks:
(a) Remove the LP fuel filter (AMM 73-11-10/401).
(b) Remove the HP fuel filter (AMM 73-11-12/401).

S 207-087
(12) Do a check of the engine fuel filter and the fuel filter bowl for signs of contamination of the fuel.

S 207-079
(13) If you see no signs of contamination, do these steps:
(a) Install the LP fuel filter (AMM 73-11-10/401).
(b) Install the HP fuel filter (AMM 73-11-12/401).
(c) Operate the airplane as usual.

S 207-080
(14) If you see signs of contamination, do these steps:
(a) Clean the filter bowl.
(b) Replace the LP fuel filter (AMM 73-11-10/401).
(c) Replace the HP fuel filter (AMM 73-11-12/401)
(d) Apply the full procedure described above again.

S 207-088
(15) If the engines do not operate correctly, or if contamination continues, you will possibly have to do more engine inspections and tests.

NOTE: Speak to the engine and APU manufacturer for more procedures for their equipment.

S 207-082

(16) If you operated the engine for a long time with contaminated fuel, you must fully examine the engine fuel system, its components, and the turbine blades.

NOTE: Speak to the engine and APU manufacturer for the appropriate procedures for their equipment.

FUEL TANKS - APPROVED REPAIRS

1. General
   A. This procedure contains eight tasks. The tasks are:
      (1) Make an analysis of the fuel leak type and the usual repair procedure
      (2) Make an analysis of the causes of the fuel leaks
      (3) Repair of sealant leaks in the fuel tank structure
      (4) Repair of fuel tank corrosion
      (5) Examination and closure of repaired fuel tanks
      (6) Fueling of repaired fuel tanks
      (7) Approved repairs of nonsealant leaks
      (8) Approved repairs of the secondary fuel barrier sealant.
   B. These procedures contain information on how to prepare, use and cure the sealant and finish materials, and apply the corrosion resistant finishes in the fuel tank. The sealant and recommended finish materials shown for use in this procedure can be used with each other. For example, you can use fully cured corrosion resistant finish as a topcoat that you can apply with a spray gun or brush over the sealant. If the surface has a finish layer (topcoat), remove all of the finish from the sealant repair area. This is not necessary if the finish is heat-cured (baked-on) BMS 10-20 Type II finish material (as it is applied to a new airplane in the factory).
   C. Before you repair a leak, make an analysis of the source and cause of the leak (AMM 28-11-00/601). If the cause is a result of structural damage, do the structural repair per the Structural Repair Manual before you apply sealant.

TASK 28-11-00-308-001

2. Make an Analysis of the Fuel Leak Type and the Usual Repair Procedure
   A. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          531 Center Wing Tank (Left)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          542 Main Tank - Rib No. 17 to No. 21 (Left)
          543 Surge Tank - Rib No. 21 to No. 23 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)
          642 Main Tank - Rib No. 17 to No. 21 (Right)
          643 Surge Tank - Rib No. 21 to No. 23 (Right)

B. Make an Analysis of the Fuel Leak Type

S 228-088

WARNING: MAKE SURE THE FUEL LEAK DOES NOT GO INTO A CRITICAL AREA OF THE AIRPLANE, OR CANNOT GET ONTO THE FUSELAGE AREAS. FUEL LEAKS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Refer to AMM 28-11-00/601 to make a decision about the type of leak that you find.
   (a) Some types of leaks must be repaired immediately.
   (b) If there is leakage in the secondary fuel barrier, the leakage must be repaired before the airplane is released for flight.

C. Usual Repair Procedures

S 368-070

(1) For a bad fillet seal or fastener seal:
   (a) Remove the bad sealant.
   (b) Fully clean the surfaces.
   (c) Apply new sealant to make a seal of the same dimensions as the initial seal.

S 368-071

(2) For a bad faying surface seal or prepack seal:
   (a) Disassemble the structure or remove the fasteners.

      NOTE: Refer to the Structural Repair Manual.

   (b) An alternative method is to raise the seal plane.
      1) The new seal plane must isolate the bad seal from fuel.
      2) You cannot raise the seal plane by a large quantity.

         NOTE: In most cases it is better to remove and replace the structure.

S 368-072

(3) For a bad injection seal:

NOTE: Air that is caught causes a space and causes you to reject the injection seal. As an option, you can repair the bad injection seal if you raise the seal plane.

(a) Remove all the bad sealant.

(b) Fully clean the channel.
(c) Fill the channels fully with sealant.

TASK 28-11-00-208-031

3. Make an Analysis of the Causes of the Fuel Leaks

A. General

(1) The causes of most of the fuel leaks in the fuel tank structure are:
(a) Surfaces are prepared incorrectly
(b) Sealants are mixed or kept incorrectly
(c) Sealants are applied incorrectly
(d) Fasteners are loose
(e) Fittings and connections are installed incorrectly.
(2) This task lists the causes of the fuel leaks.

B. Access

(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

C. Procedure - The Causes of Fuel Leaks

S 288-002

(1) Surfaces are prepared incorrectly.
(a) The surfaces must not contain unwanted materials such as grease, metal particles, hair, loose paint or wax.
(b) Unwanted materials can cause the sealant not to bond correctly.

S 288-003

(2) Sealants are mixed or kept incorrectly.
(a) Synthetic rubber makes the base for most sealing compounds. The manufacturer adds ingredients to control strength, cure time, plasticity, usable life, and fuel resistance.

(b) Sealants are supplied in two parts; base material and accelerator. You must be very careful to make sure the correct proportions of the base material and the accelerator recommended by the manufacturer are used. If you do not obey the manufacturer's instructions you can change the physical properties of the mixture which can cause a seal failure and a fuel tank leak.
(c) Sealing compounds have a specified shelf life. After the specified time, you must do a test of the sealing compounds to find out if you can use them.
(d) You can keep some sealants in refrigeration for a short time after they are mixed with the accelerator. You must discard these sealants after the specified time.

S 288-004
(3) Sealants are applied incorrectly.
(a) If you do not do the subsequent steps, fuel leaks can occur:
1) Follow all manufacturer's instructions.
2) Use a brush to apply precoat when recommended.
3) Do all the steps to apply the sealant.
4) Make sure there are no air bubbles in the sealant.
5) Make sure you fill all the spaces completely with sealant.
6) Make sure you do not make an overlap with the sealants.
7) Make sure the sealant touches all the surfaces.

S 288-005
(4) The fasteners are loose.
(a) Loose fasteners start fuel leaks because they let attached surfaces move.
1) Faying surface seals get cracks and let fuel leak through the seal plane.
(b) Loose rivets are not self-sealing.
(c) Sealant or metal seal covers do not bond with loose fasteners.

S 288-006
(5) Fittings and connections are installed incorrectly.
(a) Fittings and connections attached to or that go through the fuel tank structure are sealed with O-rings. Damaged or incorrectly installed O-rings can cause fuel leaks.

TASK 28-11-00-308-032

4. Repair of Sealant Leaks in the Fuel Tank Structure

NOTE: To seal dry bay access panels, refer to AMM 51-31-01/201.

A. General

WARNING: MAKE SURE YOU HAVE GOOD FLOW OF AIR IN THE AREA. OBEY ALL FIRE SAFETY PRECAUTIONS. POISONOUS AND FLAMMABLE MATERIALS ARE USED THAT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) It is necessary to use materials that are poisonous and flammable when you repair the sealant. You must have a good flow of air in the area. You must obey all fire safety precautions.

B. Equipment

NOTE: All equipment used to apply the sealing compound must be clean. All equipment used must be cleaned thoroughly after each sealing job. Two-part compounds, those mixed with activator, will harden. It is not easy to clean the hardened compound from the equipment.

(1) Sealant removal and fairing tools (Fig. 801)
(2) Paint brushes (commercially available)
(3) Neoprene or rubber gloves (commercially available)
(4) Pipe cleaners (commercially available)
(5) Funnel brush (commercially available)
(6) Sealing gun (commercially available)
(7) J28006-1 or equivalent - Sealing tool (Fig. 802)
(8) Click Patch Kit - SEMCO, 5454 San Fernando Rd., Glendale, CA 91203
(9) Semkit - SEMCO, 5454 San Fernando Rd., Glendale, CA 91203

WARNING: MAKE SURE THE CAPACITY OF THE EXHAUST FAN IS MORE THAN THE CAPACITY OF THE AIR BLOWER. THIS WILL MAKE SURE THERE IS A GOOD FLOW OF AIR. THE CORROSION RESISTANT FINISH IS A POISONOUS AND FLAMMABLE COMPOUND WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Explosionproof air blower, with sufficient flexible hose to reach all areas in the fuel tanks. The capacity must be 90 to 100 cubic feet per minute.
(11) Explosionproof centrifugal exhaust fan, capacity to be 125 to 150 cubic feet per minute, and approximately 75 feet of 3-inch diameter flexible suction hose, and sufficient delivery hose to remove exhaust air out of the hangar or work area
(12) Rivet gun - Commercially available
(13) Temporary Repair Tool - F70230 (Fig. 810)
(14) Full Face Supplied Air Type Respirator, U.S. Bureau of Mines Approved
(15) Spray Equipment - DeVilbiss Model MBC or JGA, The DeVilbiss Co., 300 Phillips Ave., Toledo, Ohio (Recommended if you apply corrosion resistant finish to a large area)
(16) Container - Stainless Steel (commercially available)

C. Consumable Materials
(1) One of these abrasive pads:
(a) B00105 Aluminum oxide abrasive - Scotch Brite Sheet
(b) B00101 Aluminum oxide nylon pad, TYPE F
(c) B00102 Aluminum oxide - Bear-Tex
(d) B00103 Aluminum oxide - Microlon

(2) B00168 Abrasive Paper - 320 grit or finer (commercially available)
(3) Use one of these approved solvents to remove sealant and to prepare surfaces before you apply sealant:
    (a) B00148 - solvent, Methyl Ethyl Ketone (MEK) TT-M-261 (recommended solvent)
    (b) B00666 Methyl Propyl Ketone (MPK) (recommended option)
    (c) B00096 - Dowclene EC, Dow Chemical Company
    (d) B00300 - 1,1,1-Trichloroethane
    (e) Mixture by volume of 42 percent Methyl Ethyl Ketone (ASTM D 740) and 58 percent Sec-Butyl Alcohol (TT-B-848B)
    (f) FCC-55, Van Waters and Rogers, Kent WA
(4) B00184 Cleaning Solvent - BMS 11-7
(5) Sealant

NOTE: Other sealants are not recommended because they cannot be used with paint primer used in fuel tanks.

Use one of the sealants that follow:

(a) A00908 Pro-Seal 860, B 1/6

NOTE: Use with PR-148 adhesion promoter.

(b) A00707 PR-1826, Class B-1/2

NOTE: Use with PR-1826 primer.

(c) A00767 - Sealant - BMS 5-45

NOTE: Use one of these sealants:

1) BMS 5-45 Class A - For brush application
2) BMS 5-45 Class B - For sealing gun application
3) BMS 5-45 Class C - For extrusion gun, roller, or spatula application

(6) A00057 Cement and Catalyst - Eastman 910
(7) The subsequent additional material and equipment is necessary if alodine application is necessary:
(a) C00862 Alodine 600 Powder
(b) G01061 - Distilled water - 1 gallon containers (commercially available)
(c) G00116 Brush, swab, or sprayer - for application (commercially available)
(d) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5

D. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-26-00/201, Defueling
(3) SRM 51-20-01, Protective Treatment of Metallic and Graphite Materials

E. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

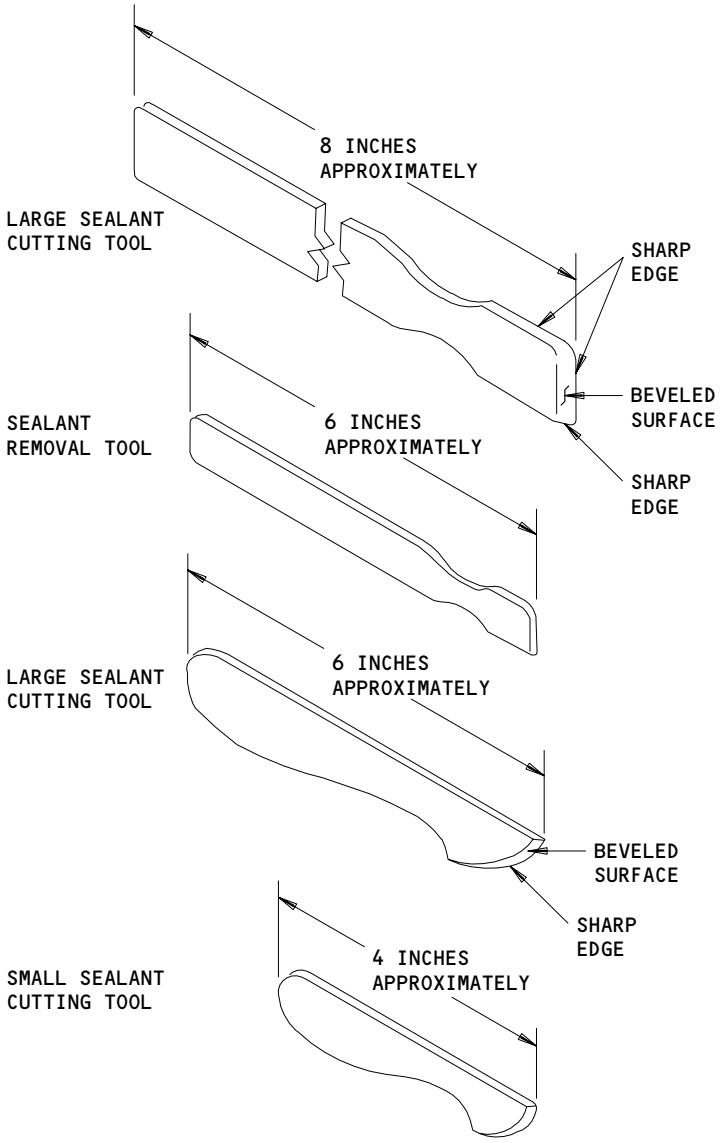
F. Prepare for Fuel Tank Repair

S 658-033
(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 658-075

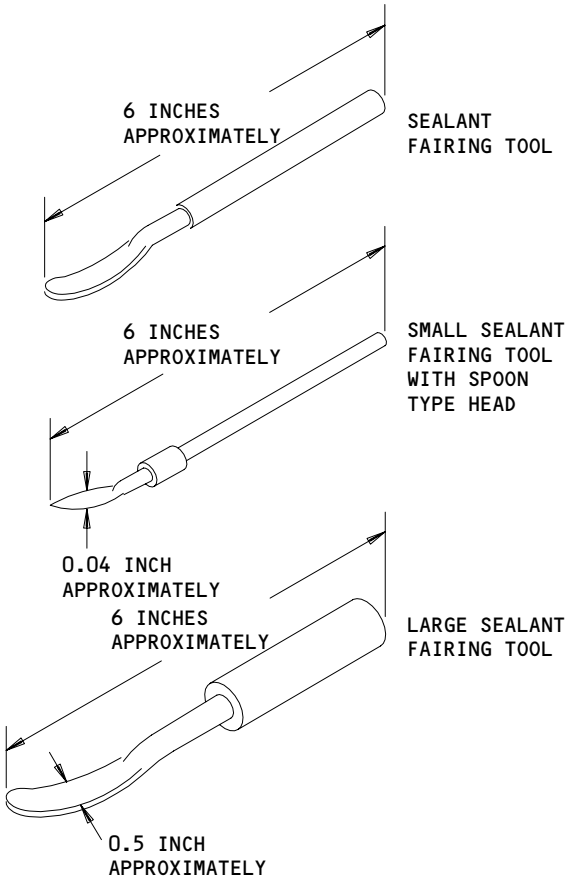
WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PROCEDURE. FAILURE TO OBEY THE PURGING AND FUEL TANK ENTRY PROCEDURE COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do the Purging and Fuel Tank Entry procedure (AMM 28-11-00/201).



NOTE: THESE TOOLS SHOULD BE MADE OF PLASTIC, HARDWOOD, OR METAL NO HARDER THAN 2024-T3 ALUMINUM TO REDUCE THE POSSIBILITY OF DAMAGE TO THE STRUCTURE (PLASTIC AND HARDWOOD TOOLS ARE RECOMMENDED).

SEALANT REMOVAL AND CUTTING TOOLS

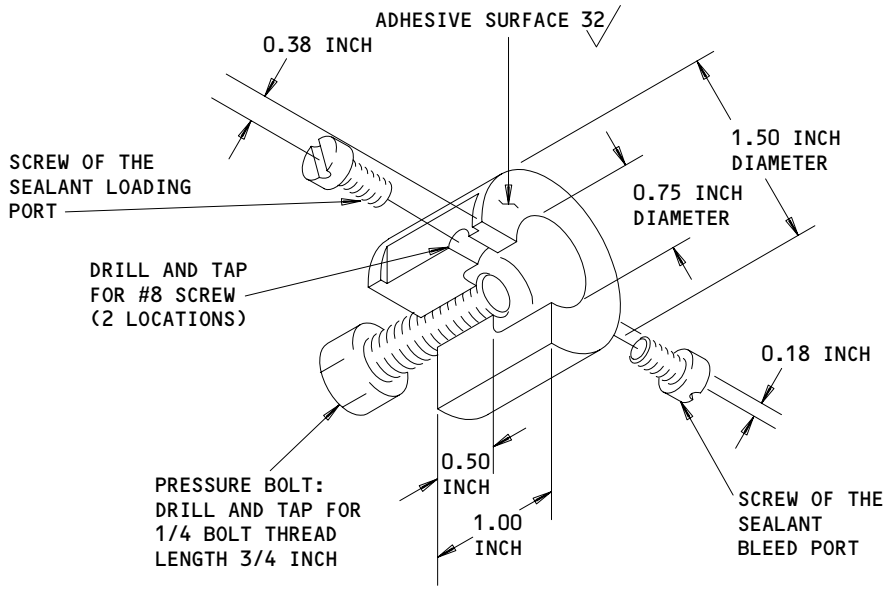


NOTE: THESE TOOLS CAN BE MADE OF 1/4-INCH DIA BRONZE OR STEEL WELDING ROD AND CAN BE PLATED TO IMPROVE THE SMOOTHNESS.

SEALANT FAIRING TOOLS

Sealant Removal, Cutting and Fairing Tools
Figure 801

54679



MATERIAL – MILD STEEL
CADMIUM PLATED

Sealing Tool for Rivets that Leak
Figure 802

S 158-034

(3) Use the sealant cutting tools (Fig. 801) and remove the bad sealant.

(a) Cut the bad section away from the fillet seal (Fig. 803).

1) Cut the ends of the bad section at a slope such that the new sealant makes an overlap with the remaining sealant.

2) Make sure you cut the seal smoothly.

(b) If the fillet seal bond is good, it is not necessary to cut the sealant to the bare metal.

1) Make sure you remove all loose sealant.

(c) If the bad sealant includes fasteners with fillet seals, do the steps that follow:

1) Cut around the base of the fastener with a sealant cutting tool (Fig. 801).

2) Use a pliers and pull the sealant from the fastener.

NOTE: It is not necessary to remove small quantities of sealant that bond to the fastener.

(d) If an injection seal is bad, do the steps that follow:

1) Remove the bad sealant from short injection channels with hooked wire and small cutting tools.

NOTE: You must disassemble long injection channels (Ref Structural Repair Manual). You can repair bad injection seals if you raise the seal plane to isolate the bad seal from the fuel.

2) Make sure the injection channel is completely clear.

NOTE: If air is caught in the injection channel, new sealant cannot completely fill the channel.

3) Be careful not to damage the tank structure.

S 368-007

(4) For bad prepack or faying surface sealant, do these steps:

(a) Disassemble the structure around the defective sealant (Ref Structural Repair Manual).

1) If you do not want to disassemble the structure, you can repair the leak if you raise the seal plane to isolate the defective sealant from the fuel.

NOTE: The area of defective sealant must be small.

(b) Remove the bad sealant with cutting tools and scrapers.

S 158-090

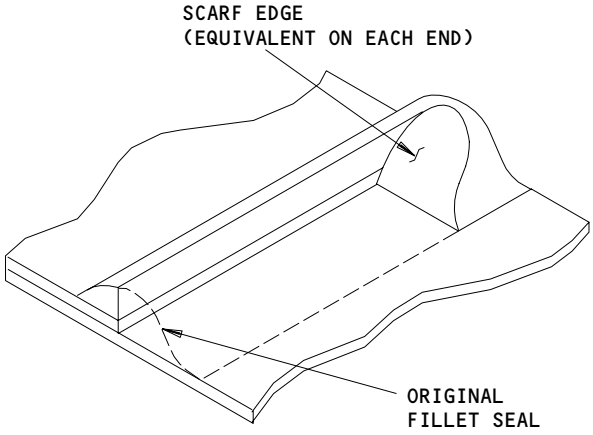
CAUTION: MAKE SURE THE PRIMER IS REMOVED IF IT IS NOT HEAT CURED (BAKED ON) BMS 10-20. THE SEALANT WILL NOT STAY IN PLACE IF THE PRIMER IS NOT HEAT CURED. THIS CAN CAUSE FUEL LEAKAGE.

(5) If the surface has a finish layer (topcoat), remove all of the finish from the sealant repair area.

NOTE: This is not necessary if the finish is heat-cured (baked-on) BMS 10-20 Type II finish material (as it is applied to a new airplane in the factory).

The area in the fuel tank that is not heat-cured extends from approximately three inches above the bottom of the fuel tank on the front spar, along the bottom of the fuel tank, to approximately three inches above the bottom of the fuel tank on the rear spar.

(a) Use abrasive paper and remove the used topcoat until either bare metal or sealant (in good condition) is shown.



Fillet Seal Removal
Figure 803

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(b) Use clean cotton wipers (BMS15-5) soaked with solvent, Series 93 (AMM 20-30-93/201) to clean all surfaces, also sealant, from which you removed topcoat.
(c) Rub dry with a clean cotton wiper (BMS15-5).
(d) Continue to clean and dry the surfaces until the dry cotton wiper (BMS15-5) remains clean.

S 158-036
(6) Remove all used sealant precoat from the repair area unless it is known that precoat is BMS 5-45 material in good condition.

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(a) Remove the used precoat with an abrasive pad and solvent, Series 93 (AMM 20-30-93/201).
(b) Clean the surface with a clean brush and cotton wiper (BMS15-5) soaked with the solvent.

NOTE: The area you clean should make an overlap with the adjacent area. The total area should be at least twice as wide as the area you cover with sealant.

(c) Rub dry with a clean, dry cotton wiper (BMS15-5).
(d) Continue to clean and dry the surface until the dry cotton wiper (BMS15-5) remains clean.

S 218-067

(7) Make sure that all fasteners in the sealant repair area are installed and tightened unless you must install the fastener after you apply the faying surface sealant.

NOTE: You cannot install and tighten most fasteners after you apply the sealant.

S 378-037

(8) If the alodine metal surface treatment is worn or damaged, you must alodize the metal surface before you apply the new sealant or finish material.

CAUTION: USE ONLY ALODINE 600 TO REPAIR ALUMINUM WING SURFACES. PRIMER ADHESION PROBLEMS CAN OCCUR IF OTHER ALODINE SOLUTIONS ARE USED.

(a) Apply an alodine layer to the surface with Alodine 600 (SRM 51-20-01).

S 118-038

(9) Immediately before you apply the sealant, clean the surface with BMS 11-7 solvent and rub dry.

NOTE: Do not let the solvent dry on the surface. Do not touch the area with your fingers.

G. Prepare, Apply, and Cure Sealants and Corrosion Resistant Finish

NOTE: It is very important to mix, use and keep sealants and corrosion resistant finish correctly.

You must follow approved procedures to prevent damage or injury.

Fully mix all components per manufacturer's instructions.

Do not mix sealants that you apply with a brush until you use them.

Do not put thinners in the sealant.

Keep the sealants covered when not in use.

S 398-008

CAUTION: DISCARD ALL SEALANT OR CORROSION RESISTANT FINISH THAT DOES NOT APPLY SMOOTHLY. INCORRECTLY APPLIED SEALANT OR TOPCOAT COULD CAUSE DAMAGE.

(1) Storage of Sealant Compound that is not Mixed
   (a) Sealant that is not mixed and is kept for more than 6 months should be tested before you use it. A satisfactory check for outdated sealant is to mix a container of base material with its curing compound and, at room temperature, find the time necessary before a sample of the sealant you apply is not tacky. Compare this time with maximum permitted tack-free time given in the applicable sealant specification. If this time is more than the maximum permitted time, discard the sealant. You should keep sealant at temperatures between 50° to 80°F (10°C to 26.7°C).
   (b) Storage life may be extended only once by a maximum of 3 months.

S 398-039
(2) Mix the Sealant Compound

WARNING: MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA THAT YOU MIX THE SEALANT COMPOUNDS. SEALANT COMPOUNDS ARE POISONOUS.

(a) Mix only the quantity of sealant necessary for the job to be done.

NOTE: Identify the necessary sealant for the repair before you mix it.

The use of premeasured Semkits, purchased from the vendor, is recommended, specially for small repairs.

(b) Make sure all equipment used to mix the sealant is clean.
(c) Mix the sealant compounds per the manufacturer's instructions.

NOTE: Always use the curing compound with the base compound from the same repair kit. Do not mix the contents of one repair kit with that of another kit. Do not mix the sealant too much or the time you can apply the sealant will decrease.

The mixing of BMS 5-45 Class B-2, may be modified by using an accelerator-to-base ratio range of 8.4:100 to 16.8:100 by volume or 10:100 to 20:100 by weight. The 10:100 ratio is standard for Class B-2 sealant. The 20:100 ratio results in a material with an application time of approximately 1/2 hour and a cure time of approximately 6 hours at 77°F and 50 percent relative humidity. The purchase of premeasured Semkits from the vendor is recommended to prevent errors when you mix the sealant.

CAUTION: MAKE SURE NO AIR BUBBLES ARE IN THE SEALANT WHEN YOU MIX IT. IF THERE ARE AIR BUBBLES IN THE SEALANT, IT WILL NOT BOND CORRECTLY.

(d) Mix the curing compound and base compound until the sealant is of a constant, equal color.
1) If a mixing machine is not available, use a clean spatula.
(e) Put the sealant in a container cleaned with solvent, Series 93 (AMM 20-30-93/201).

CAUTION: DO NOT REFRIGERATE MIXED SEALANT AFTER YOU THAW IT. THE SEALANT IS NOT USABLE IF IT IS FROZEN MORE THAN ONCE.

(f) If you do not use the mixed BMS 5-45 sealant immediately, you can keep the sealant for a longer time if it is refrigerated.
1) Put the sealant in a sealed container.

2) Write the date you mix the sealant, sealant type, class, supplier, and date when the sealant cannot be used.
3) Discard all sealant kept more than 21 days at -40°F (-40°C).
4) Discard all sealant kept more than 7 days at -20°F (-28.9°C).

S 398-040

(3) Sealant application time
(a) The time in which you can apply the mixed BMS 5-45 Class B-2 sealant is 2 hours at 77°F (25°C) and 50% relative humidity.
(b) The time in which you can apply the mixed Pro-Seal 860, B 1/6 is 10 minutes at 77°F (25°C) and 50% relative humidity.
(c) The time in which you can apply the mixed PR-1826, Class B-1/2 is 1/2 hour at 77°F (25°C) and 50% relative humidity.

S 398-041

(4) BMS 5-45 sealant squeeze-out life
(a) Squeeze-out life is the length of time you can use the sealant for structure assembly when you apply faying surface seals.
(b) The time, shown in Fig. 804, is the maximum time between when you start to thaw the sealant or mix sealant that is not frozen and the final attachment of mating surfaces.

S 398-042

(5) Sealant curing
(a) You must let the BMS 5-45 sealant cure for the minimum time (Fig. 804) before you continue maintenance operations in the fuel tank or refuel the fuel tank.
(b) Pro-Seal 860, B 1/6 sealant can touch fuel after 2 hours and has a cure time of 4 hours.
(c) PR-1826, Class B-1/2 sealant can touch fuel after 2-1/2 hours and has a cure time of 3 hours.

WARNING: DO NOT START OR STOP THE AIR BLOWER WITH THE AIR HOSE IN THE FUEL TANK. OBEY ALL SAFETY PRECAUTIONS WHEN YOU USE WARM AIR. FAILURE TO OBEY THE SAFETY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: DO NOT APPLY SEALANT WHEN THE STRUCTURE TEMPERATURE IS LESS THAN 50°F (10°C) OR MORE THAN 140°F (60°C). THE SEALANT WILL NOT CURE CORRECTLY IF THE STRUCTURE TEMPERATURE IS OUT OF RANGE.

(d) The best conditions to cure the sealant are at an ambient temperature of 77°F (25°C) and a relative humidity of 50 ±5 percent, with a good flow of air in the area.
   1) Relative humidity is an important factor in the cure time for sealants.
      a) You must know the relative humidity at all times during the sealant operations.
      b) If the relative humidity is less than 40 percent it slows the cure of the sealant.
      c) To increase the relative humidity, let moist, warm air, at a temperature of less than 120°F (49°C), flow over the repair area.

         NOTE: In hot, dry climates if you put a pan of water in the fuel tank near the repair area it could add the necessary humidity.

      d) Make sure the water added to the air contains less than 100 parts per million of total solids and less than 10 parts per million of chlorides.
   2) If warm, moist air, at a temperature of less than 120°F (48.9°C), flows over the sealant, it decreases the curing time.
   3) If you increase the temperature of the tank structure, but not more than 120°F (48.9°C), it decreases the curing time.

      CAUTION: MAKE SURE THE TEMPERATURE OF THE TANK SURFACE THAT YOU APPLY THE SEALANT TO IS AT A TEMPERATURE MORE THAN THE AMBIENT TEMPERATURE. IF THE RELATIVE HUMIDITY IS LARGE, CONDENSATION FORMS IF THE TEMPERATURE OF THE METAL SURFACE IS LESS THAN THE AMBIENT TEMPERATURE. THE TANK SURFACE MUST BE DRY TO APPLY THE SEALANT.

   4) For BMS 5-45 sealant, if you keep the humidity constant, the times, shown in Fig. 804, change as follows for each 20°F (11°C) change in temperature:
      a) Tack-free times are approximately one-half as long for each 20°F (11.1°C) increase in temperature.

b) Tack-free times are approximately double for each 20°F (11.1°C) decrease in temperature.

S 368-046

(6) To apply a new fillet seal, do the steps that follow:

(a) BMS 5-45 Class B sealant is used to apply all fillet seals after a precoat of BMS 5-45 Class A-2 sealant.

NOTE: Precoat is not used when you use Pro-Seal 860, B 1/6 sealant. PR-1826 primer is required before the use of PR-1826 sealant. Obey the instructions from the manufacturer.

(b) Examine the seal area to make sure you have the correct selection of tools for the task.

(c) Apply a thin layer (precoat) of correctly accelerated BMS 5-45 Class A-2 sealant to the surface with a stiff bristled brush (Fig. 805).

1) Make sure you apply precoat into all crevices and the full length of the area that you will apply sealant to.
2) Apply the precoat at a width of 1/2 inch on each side of seams.
3) Make sure the precoat is applied smoothly.

NOTE: If you let the precoat fully cure, clean with solvent, Series 93 (AMM 20-30-93/201) before you apply the fillet seal. It is not necessary to let the precoat cure unless the precoat and the sealant you use for a fillet seal are from different manufacturer product lines. For example, do not use a precoat of BMS 5-45 Class A-2 with a fillet seal of PR-1826.

(d) If you use PR-1826, Class B-1/2 sealant, let the PR-1826 primer have a minimum tack-free time of 30 minutes.

1) If the PR-1826 primer becomes contaminated or sealant is not applied within 24 hours, it is necessary to re-prime.

SEALANT	CLASS	APPLICATION TIME (MINIMUM) HOURS [1]	TACK-FREE TIME (MAXIMUM) HOURS [1]	SQUEEZE-OUT LIFE (MINIMUM) HOURS [1]	CURING TIME (MAXIMUM) HOURS [1]
BMS 5-45	A - 2	2	36	DNA	72
	B - 2	2	12	6.0	48
	C - 24	DNA	DNA	24	168
	C - 48	DNA	DNA	48	336
PR-1826 [4]	B - 1/2	1/2	2.5	DNA	3
PROSEAL 860 [3]	B - 1/6	1/6 (10 MINUTES)	DNA [2]	DNA	4

NOTE: DNA - DOES NOT APPLY.

[1] AT 77°F (25°C) AND 50% RELATIVE HUMIDITY AMBIENT CONDITIONS. OTHER TEMPERATURE AND RELATIVE HUMIDITY CONDITIONS WILL CHANGE THE TIME.

[2] DO NOT LET FUEL TOUCH THE SEALANT YOU APPLIED UNTIL IT IS TACK-FREE FOR 2 HOURS MINIMUM.

[3] WHEN YOU USE PROSEAL 860, DO NOT USE A PRECOAT. PROSEAL 860 IS RECOMMENDED FOR SMALL REPAIRS ONLY, DUE TO ITS SHORT APPLICATION TIME.

[4] USED TO REPAIR FILLET SEALS OF BMS 5-45 WHICH ARE IN A FULLY CURED CONDITION. AVAILABLE IN 6 OUNCE SEMKITS ONLY FROM PRODUCTS RESEARCH AND CHEMICAL CORPORATION, GLENDALE, CA. PR-1826 PRIMER IS REQUIRED BEFORE THE USE OF PR-1826 SEALANT.

Sealant Usable Time
Figure 804

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

a) Remove the used precoat with an abrasive pad and solvent, Series 93 (AMM 20-30-93/201).
b) Clean the surface with a clean brush and cotton wiper (BMS15-5) soaked with the solvent.

NOTE: The area you clean should make an overlap with the adjacent area. The total area should be at least twice as wide as the area you cover with sealant.

c) Rub dry with a clean, dry cotton wiper (BMS15-5).
d) Continue to clean and dry the surface until the dry cotton wiper (BMS15-5) remains clean.
e) Re-prime the surface.

CAUTION: MAKE SURE YOU APPLY THE FILLET SEAL CAREFULLY TO PREVENT AIR BUBBLES IN THE SEALANT. THE FILLET SEAL WILL NOT BOND CORRECTLY IF THERE ARE AIR BUBBLES IN THE SEALANT.

(e) Apply a small fillet seal of BMS 5-45 Class B or other approved sealant with the sealing gun (Fig. 806).
    1) When you use a nozzle tip, point the nozzle tip into the seam, almost perpendicular to the direction of travel. Keep a bead of solvent in front of the nozzle tip.
(f) Use a sealant fairing tool and push the first fillet seals tightly into position (Fig. 807).
    1) Apply all the first fillet seals.
    2) Make sure all sealant fairing tools are clean.
    3) Do not use solutions or lubricants to help the fairing tools move over the sealant.
    4) Clean the fairing tools frequently with clean, cotton wipers (BMS15-5).

(g) Apply BMS 5-45 Class B or other approved sealant a second time to make a full bodied fillet seal.

NOTE: A larger nozzle than was used for the first fillet seal is necessary. If the first fillet seal is fully cured but is not clean, then it must be cleaned before you apply the second fillet seal. Do not use different sealants for the first fillet and the second fillet.

1) If you use an extruded nozzle, do the steps that follow:
   a) Cut the nozzle to make a fit of the dimensions shown in Fig. 808.
   b) Push the nozzle head against the surfaces such that the fillet seal you apply is thickest in the middle of the surfaces.

      NOTE: Keep the nozzle of the sealing gun near the surface to prevent air bubbles.

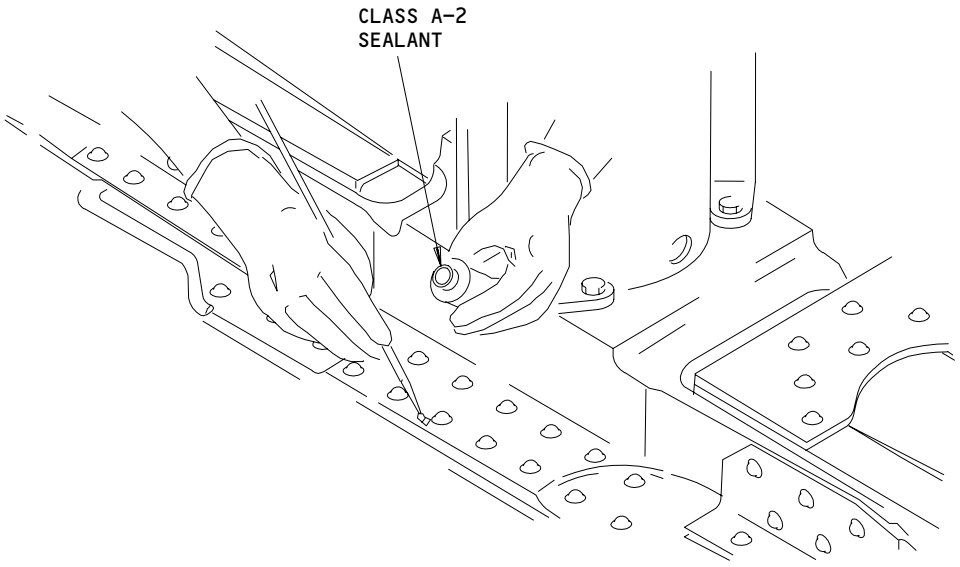
2) If you do not use an extruded nozzle, use a sealant fairing tool to make a full bodied fillet seal.
3) Remove all air bubbles and re-entrant fillet seal edges.

(h) If it is necessary, do this Task: Application of Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

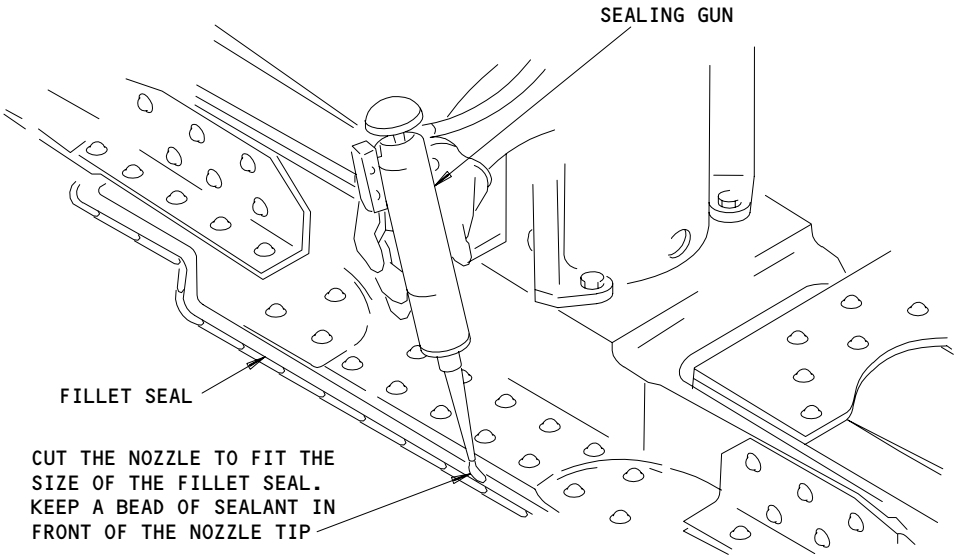
NOTE: A layer of corrosion resistant finish is necessary only to protect bare (anodized) metal. It is not necessary to apply a layer of corrosion resistant finish on sealant. Corrosion resistant finish can be applied on sealant, but it is not necessary. Usually topcoat is applied to sealant only when it must be applied to protect adjacent bare metal.

S 368-047

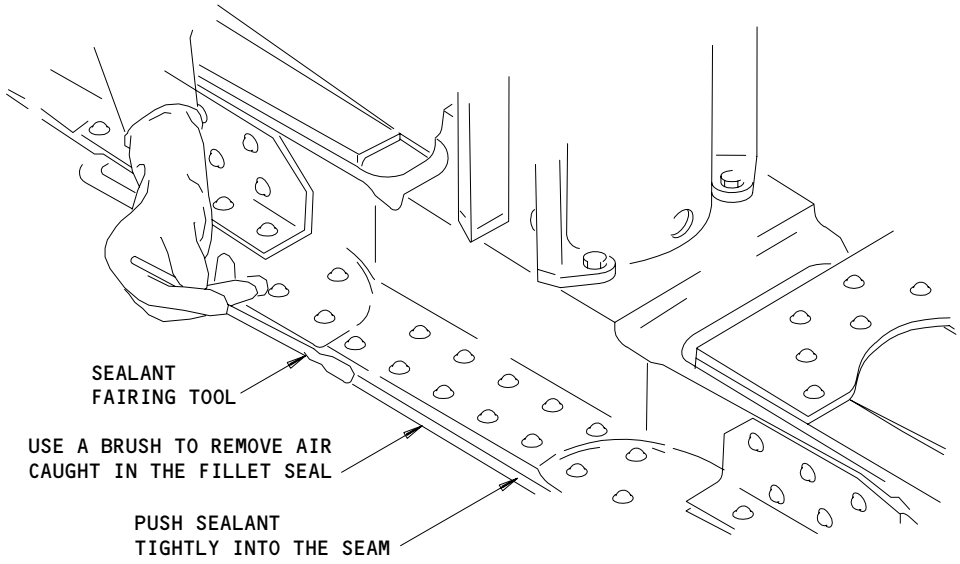
(7) Repair of the fastener seals (Ref Structural Repair Manual)
   (a) Repair self-sealing rivets.
      1) Self-sealing rivets are used a lot in skin panels in the fuel tank area. If you find a fuel leak at a rivet, you must replace the rivet to make a permanent repair. You can make a temporary repair if you make a permanent repair the next time you go into the fuel tank per the structural repair manual.



Apply the Precoat
Figure 805



Apply a Fillet Seal
Figure 806

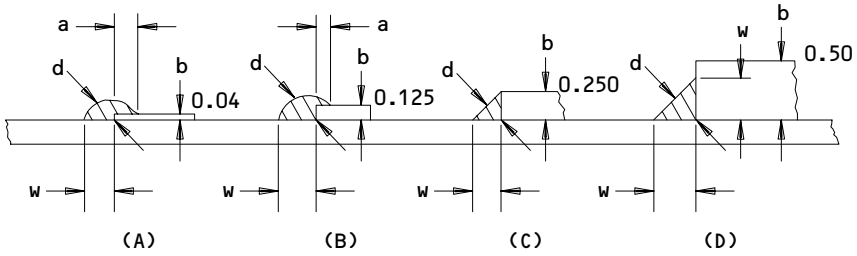


Push the First Fillet Seal into the Seam
Figure 807

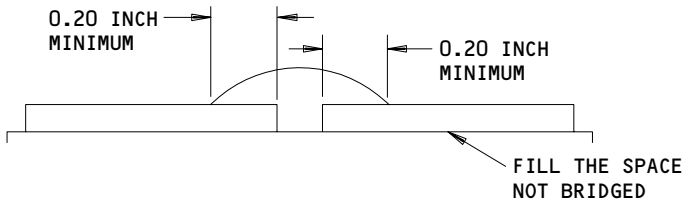
2) To make a temporary repair of a self-sealing rivet, use one of the methods that follows:
   a) Apply sealant to a self-sealing rivet with a sealing tool (Fig. 809).
   b) Apply sealant to a self-sealing rivet with a temporary repair tool (Fig. 810).
   c) Install a Click Patch.
3) Apply sealant to a self-sealing rivet with a sealing tool (Fig. 802, 809).

   NOTE: Use this procedure for fuel leaks at mechanically sealed rivets only.

   a) Clean the surface of the adapter with emery cloth if it is necessary.
   b) Remove the paint from around the rivet that leaks.



D = 0.15 INCH MINIMUM
w = 0.25-0.50 INCH
a+b = w, EXCEPT a=ZERO WHEN b=0.25 INCH OR MORE



Re-Entrant Fillet Seal and Dimensions of Full Bodied Fillet Seals
Figure 808

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

c) Clean the surface with solvent, Series 93 (AMM 20-30-93/201).

NOTE: Do not touch the surface with your fingers after you clean it.

WARNING: DO NOT LET THE ADHESIVE TOUCH YOUR SKIN. THE ADHESIVE CAUSES INJURY TO SKIN.

d) Use a cotton-tipped stick to apply a thin coat of Eastman 910 adhesive to the surface of the adapter (Step 1, Fig. 809).
e) Put the adapter over the center of the rivet and tightly push against the wing surface for 10 seconds (Step 2).
f) Release your hold on the adapter.
g) Do not touch the adapter for 15 minutes.
h) Remove the screw from the sealant loading port (Fig. 802).
i) Turn the screw in the sealant bleed port until only one more turn will remove it.
j) Remove the pressure bolt.
k) Drain all collected fuel.
l) Install the pressure bolts (approximately 12 turns or 1/2 inch).
m) Put BMS 5-45 Class A-2 sealant in the sealant loading port until it comes out of the sealant bleed port (Step 3, Fig. 809).
n) Install the screw in the sealant loading port.
o) Tighten the screw in the sealant bleed port.
p) Tighten the pressure bolt to 5 pound-inches and hold for 5 minutes.
q) Hit the sides of the adapter lightly with a small hammer or mallet (Step 4) to remove the adapter.
r) Examine the repair for fuel leaks.
s) If the fuel leak continues, do the procedure again.
t) If you must replace the self-sealing rivet, refer to the structural repair manual.
u) Clean the sealant from the wing surface and the adapter with solvent, Series 93 (AMM 20-30-93/201).
v) Do not try to clean the adhesive from the wing surface. The adhesive wears off in 1 to 2 weeks.

4) Apply sealant to a self-sealing rivet with a temporary repair tool (Fig. 810).
   a) Remove paint from around the rivet that leaks with emery cloth that is approved to remove chemical paint.

   WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

   b) Clean the temporary repair tool and the wing surface with solvent, Series 93 (AMM 20-30-93/201).

      NOTE: Do not touch the wing surface with your fingers after you clean it.

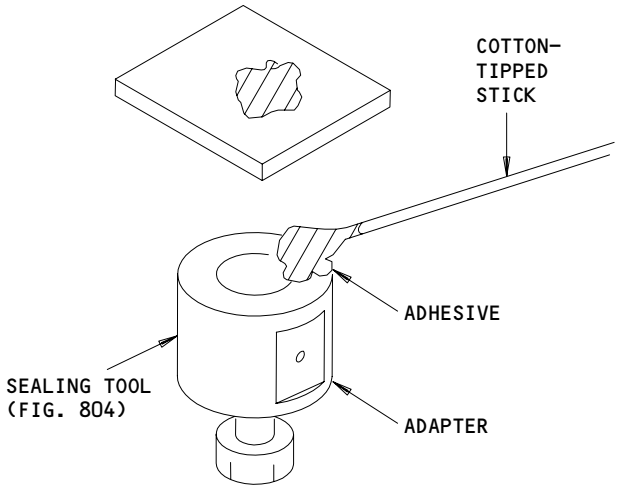
   c) Make a mark on the wing surface to show the position of the temporary repair tool (Fig. 810) during use.
   d) Fill the temporary repair tool with mixed BMS 5-45 Class A-2 sealant.
   e) Put the temporary repair tool into a small rivet gun.
   f) Put the O-ring of the temporary repair tool on the wing surface at the marked location.

   CAUTION: ALWAYS KEEP THE TEMPORARY REPAIR TOOL PERPENDICULAR TO THE WING SURFACE. IF YOU DO NOT KEEP THE TEMPORARY REPAIR TOOL PERPENDICULAR TO THE WING SURFACE, DAMAGE TO THE WING SURFACE COULD OCCUR.

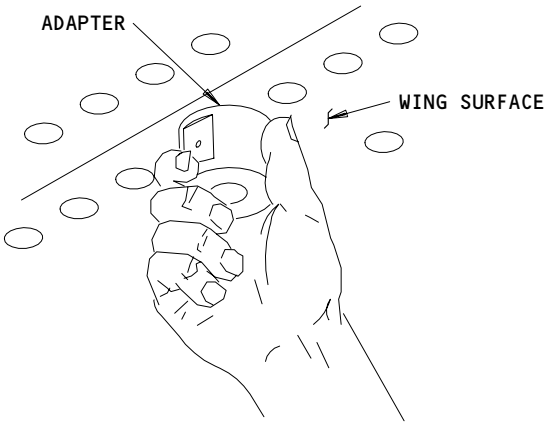
   g) Operate the rivet gun until sealant is applied around the rivet that leaks.
   h) Examine the repair for fuel leaks.
   i) If the fuel leak continues, do the procedure again.
   j) If you must replace the self-sealing rivet, refer to the structural repair manual.
   k) Clean the sealant from the temporary repair tool and the wing surface with solvent ,Series 93 (AMM 20-30-93/201).

      NOTE: Make sure you do not touch the area with the new sealant.

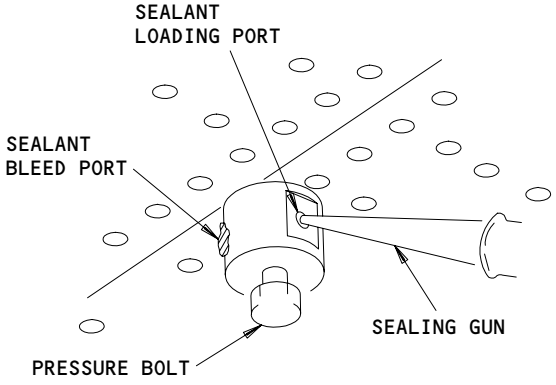
5) Install a Click Patch.
   a) You can use a Click Patch kit to repair fuel leaks through Class C (Heavy Seep) (AMM 28-11-00/601).



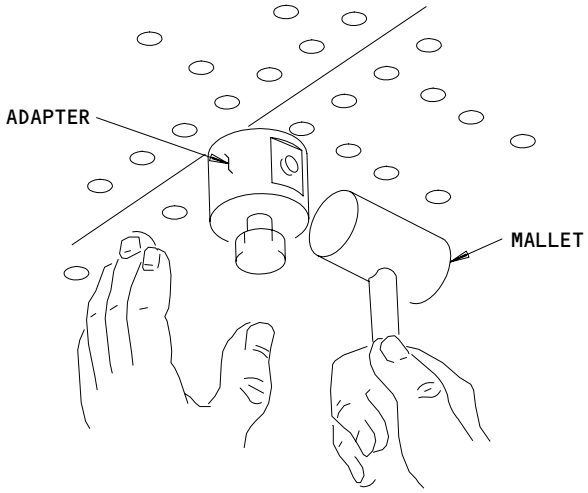
STEP 1



STEP 2

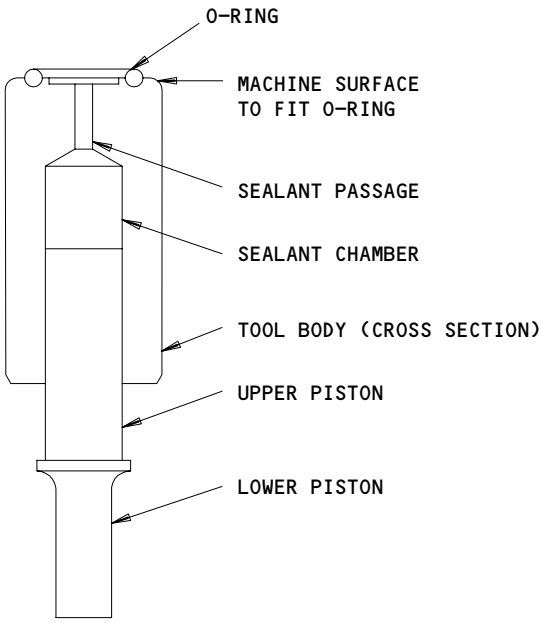


STEP 3



STEP 4

Temporary Repair of Self-Sealing Rivets
Figure 809



Temporary Repair Tool (F70230) for Self-Sealing Rivets
Figure 810

b) Click Patch kits contain flat disks for fasteners that do not come out of the surface and hatted disks for rivets or bolts that are above the wing surface. The disks are put on the fasteners that leak.

c) The subsequent limits apply to Click Patch repairs:

1 You can install a Click Patch only after you make sure there are no structural cracks in the area of the fuel leak.

2 The maximum size of a Click Patch is 1.25 inches in diameter.

3 A Click Patch is a temporary repair and you must make a permanent repair when possible.

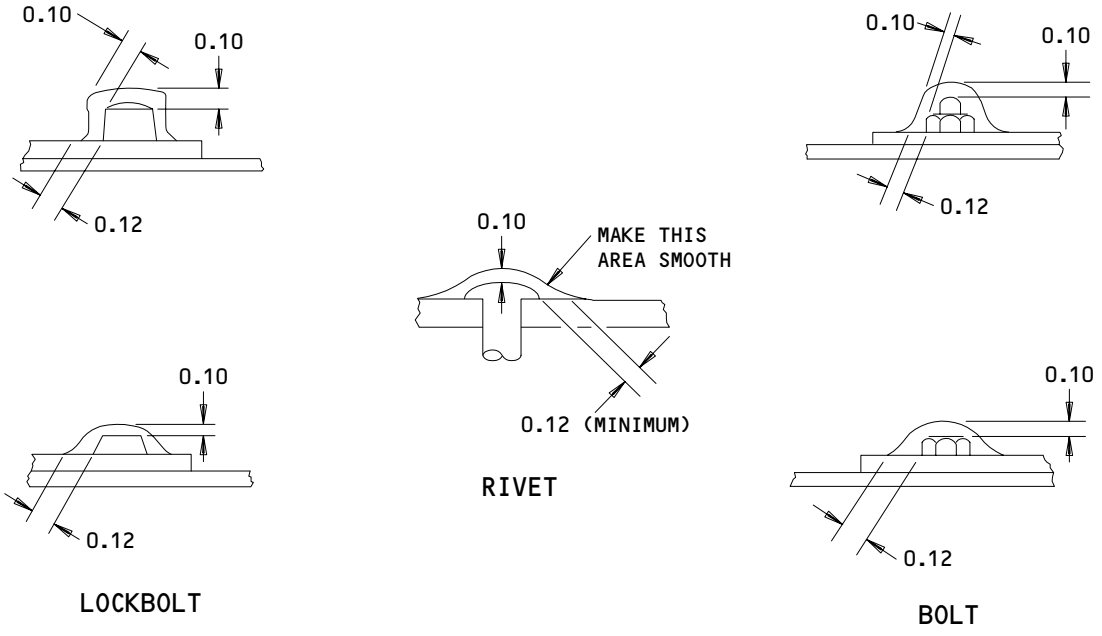
(b) Apply a fillet seal to a sealed fastener.

1) Apply a precoat of correctly accelerated BMS 5-45 Class A-2 sealant to the fastener and the area 1/2 inch in width in all directions from the fastener.

NOTE: Precoat is optional when you use Pro-Seal 860, B 1/6 or PR-1826, Class B-1/2 sealant. PR-1826 primer is required before the use of PR-1826 sealant. Obey the instructions from the manufacturer.

a) Use a stiff, bristled brush to apply the precoat on the surfaces and into crevices.

2) Let the precoat cure until it is not tacky.



NOTE: ALL DIMENSIONS ARE IN INCHES.

Dimensions of Fillet Seals (Inches) for Fasteners
Figure 811

3) Use a sealing gun or spatula and apply a layer of BMS 5-45 Class B, Pro-Seal 860, B 1/6 , or PR-1826 Class B-1/2 sealant around and on the fastener.
4) Move the sealant with a sealant fairing tool until you get the dimensions shown in Fig. 811 for the fillet seal.
5) Examine the sealant for holes, bubbles, or spaces.
   a) If there are holes, bubbles or spaces, do the procedure again.
6) If it is necessary, do this Task: Application of Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: A layer of corrosion resistant finish is necessary only to protect bare (anodized) metal. It is not necessary to apply a layer of corrosion resistant finish on sealant. Corrosion resistant finish can be applied on sealant, but it is not necessary. Usually topcoat is applied to sealant only when it must be applied to protect adjacent bare metal.

(c) Repair fasteners with metal seal covers.
1) Use a sealant cutting tool to cut around and under the metal seal cover and to separate the sealant from the structure.
2) Hold the metal seal cover with pliers and pull away from the fastener.

NOTE: This should remove most of the sealant.

3) Cut and remove the remaining sealant.

NOTE: You do not have to remove small quantities of sealant that bond tightly to the fastener.

4) Clean the metal seal covers, fastener ends, and structure area with cleaning solvent.
5) Apply precoat to the area with BMS 5-45 Class A-2 sealant.

NOTE: Precoat is optional when you use Pro-Seal 860 or B 1/6 sealant. Obey the instructions from the manufacturer.

   a) Apply the precoat smoothly and equally into all the crevices.
6) Fill a metal seal cover, of the correct size and shape, two-thirds full of BMS 5-45 Class B or Pro-Seal 860, B 1/6 sealant with a sealing gun or a clean spatula (Fig. 812).
7) Make sure there is sufficient sealant to be extruded around the base and through the hole in the top of the metal seal cover.

8) Push the sealant in the metal seal cover to make sure there are no holes left.
9) Push the metal seal cover on the fastener until the metal seal cover touches the structure (Fig. 812).
10) Move the extruded sealant around the top of the metal seal cover and remove unwanted sealant.

NOTE: Use clean cotton wipers (BMS15-5) to rub the sealant fairing tool.

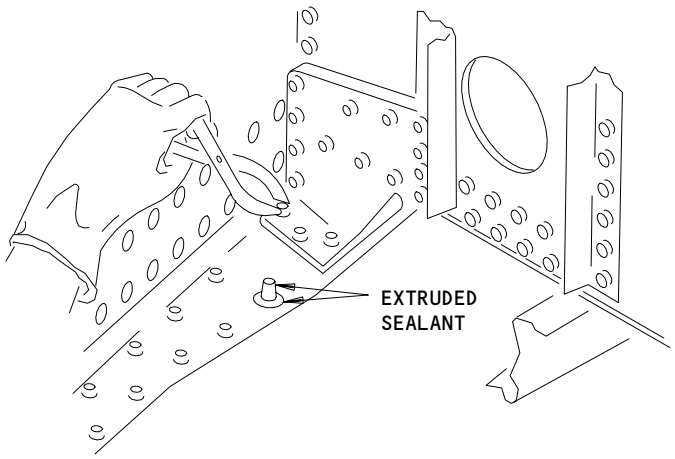
11) Hold the metal seal cover in position and move the extruded sealant around the base.
    a) Keep the metal seal cover on the center of the bolt.
    b) Do not let the metal seal cover move.
    c) If there is not sufficient clearance with adjacent metal seal covers, structures, or fillet seal, you can remove 25 percent or less of the area of the metal seal cover.
    d) Make sure the metal seal cover has the dimensions shown in Fig. 813.
12) If it is necessary, do this Task: Application of Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: A layer of corrosion resistant finish is necessary only to protect bare (anodized) metal. It is not necessary to apply a layer of corrosion resistant finish on sealant. Corrosion resistant finish can be applied on sealant, but it is not necessary. Usually topcoat is applied to sealant only when it must be applied to protect adjacent bare metal.

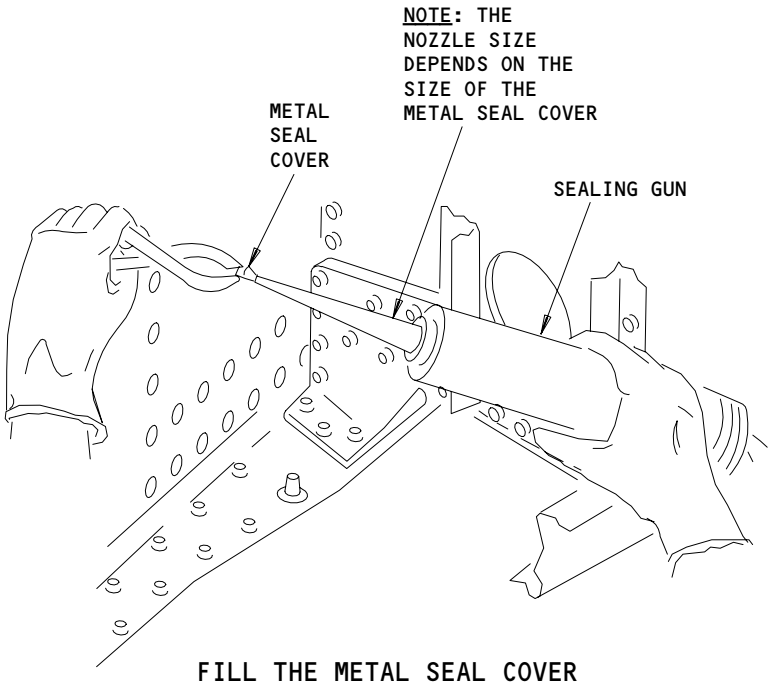
S 368-076
(8) Apply an injection seal.

NOTE: You could raise the seal plane to isolate the faulty seal from the fuel as an alternative to a new injection seal.

(a) Make sure you have these tools: pipe cleaners, a sealant fairing tool, and a sealing gun with an injection nozzle attached.
(b) Make sure the channel is thoroughly clean.



PUSH THE METAL SEAL COVER INTO POSITION



FILL THE METAL SEAL COVER

Metal Seal Cover Installation
Figure 812

C76341

(c) Apply a precoat of BMS 5-45 Class A-2 sealant to the channel surfaces with pipe cleaners or a long, bristled pencil brush.

NOTE: If the channel cross-section is 0.07-inch or less, it is not necessary to apply precoat.

1) Make sure you do not seal the channel with the precoat of BMS 5-45 Class A-2 sealant.
   a) If you seal the channel, it will prevent the flow of the sealant into the channel.

(d) Put BMS 5-45 Class B sealant into one end of the channel and fill until sealant comes out of all other openings (Fig. 814).

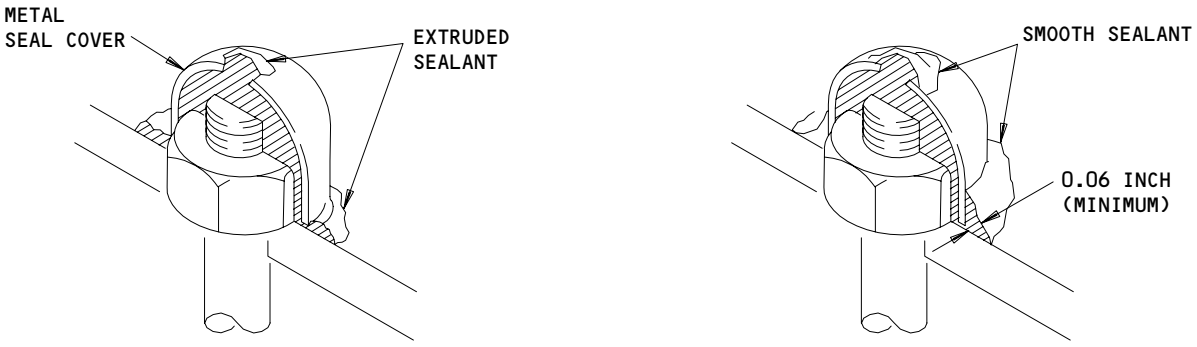
(e) Fill all slots, joggles and channels where continuity of a seal or a block-off seal is necessary.

CAUTION: MAKE SURE THERE IS SUFFICIENT SEALANT IN THE SEALING GUN FOR A COMPLETE SEAL. IF YOU STOP AND START WHEN YOU APPLY THE SEAL, AIR BUBBLES CAN GET INTO THE SEAL AND IT WILL NOT BOND CORRECTLY.

(f) Slowly and continuously move the sealant into the area that you apply a fillet seal.

(g) Remove unwanted sealant with the sealant fairing tool.

(h) Make the ends of the seal smooth.



Installed Metal Seal Cover
Figure 813

54691

(i) Examine the seal for a bad bond or air bubbles.
1) If the seal has a bad bond or air bubbles, do the procedure again.

(j) If it is necessary, do this Task: Application of Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: A layer of corrosion resistant finish is necessary only to protect bare (anodized) metal. It is not necessary to apply a layer of corrosion resistant finish on sealant. Corrosion resistant finish can be applied on sealant, but it is not necessary. Usually topcoat is applied to sealant only when it must be applied to protect adjacent bare metal.

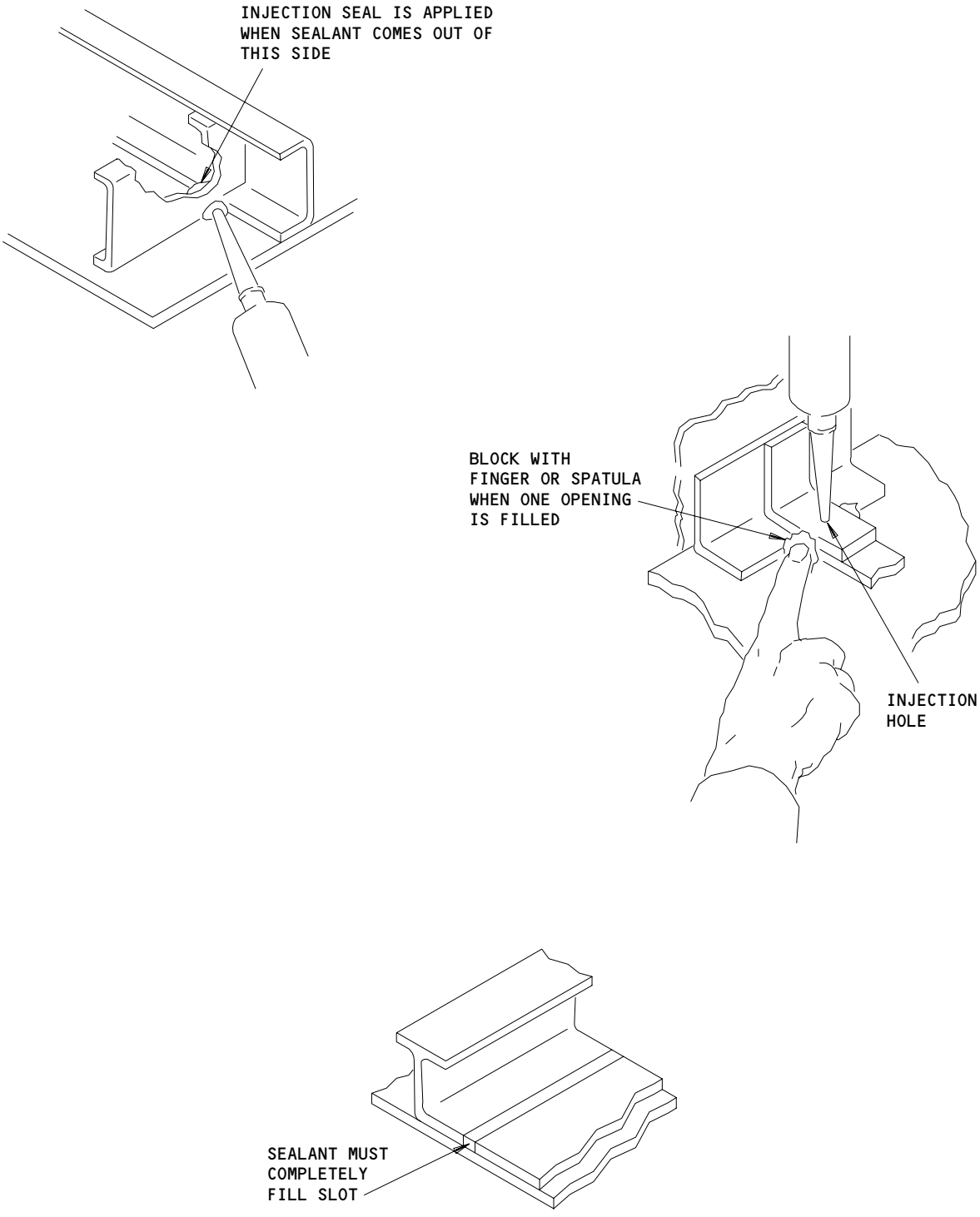
S 368-068

(9) Apply a prepack seal.
(a) Apply a layer of BMS 5-45 Class B sealant to one of the parts (Fig. 815).
(b) Use a sealant fairing tool to move the sealant such that it is in the shape of the cavity.
(c) Make sure you apply sufficient sealant to completely fill the cavity.
(d) Assemble the parts in the sealant usable time (Fig. 806).
(e) If it is necessary, do this Task: Application of Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: A layer of corrosion resistant finish is necessary only to protect bare (anodized) metal. It is not necessary to apply a layer of corrosion resistant finish on sealant. Corrosion resistant finish can be applied on sealant, but it is not necessary. Usually topcoat is applied to sealant only when it must be applied to protect adjacent bare metal.

S 368-048

(10) Apply a faying surface seal.
(a) Apply a layer of Class B sealant to one faying surface with a sealing gun or spatula (Fig. 816).



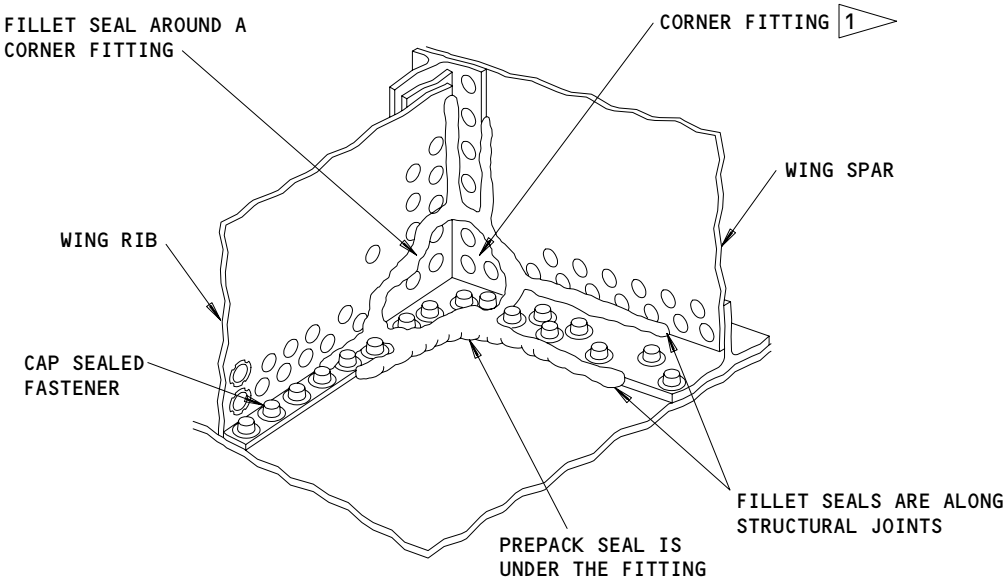
Apply an Injection Seal
Figure 814

(b) Move the sealant on all of the surface to get an equal layer approximately 0.03 inch thick (Fig. 816).
(c) Assemble the parts in the sealant usable time.
(d) Make the extruded sealant smooth along the joint.

NOTE: You must apply sufficient sealant to make sure there is continuous extruded sealant on the two sides of the joint.

(e) If it is necessary, do this Task: Application of Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: A layer of corrosion resistant finish is necessary only to protect bare (anodized) metal. It is not necessary to apply a layer of corrosion resistant finish on sealant. Corrosion resistant finish can be applied on sealant, but it is not necessary. Usually topcoat is applied to sealant only when it must be applied to protect adjacent bare metal.



1 THE FITTING MUST BE TEMPORARILY REMOVED AND CLEANED OF USED SEALANT BEFORE YOU APPLY A NEW PREPACK SEAL

Example of a Combination of Prepack Seal and Fillet Seals
Figure 815

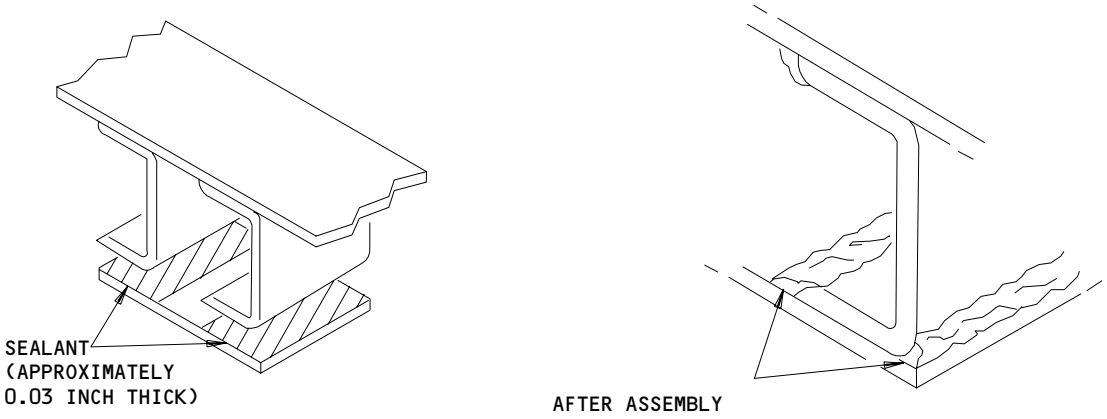
S 368-049

(11) Raise the seal plane (Fig. 817).

(a) You can replace an injection, prepack, or faying surface seal, or you can raise the seal plane to isolate a defective seal from the fuel.

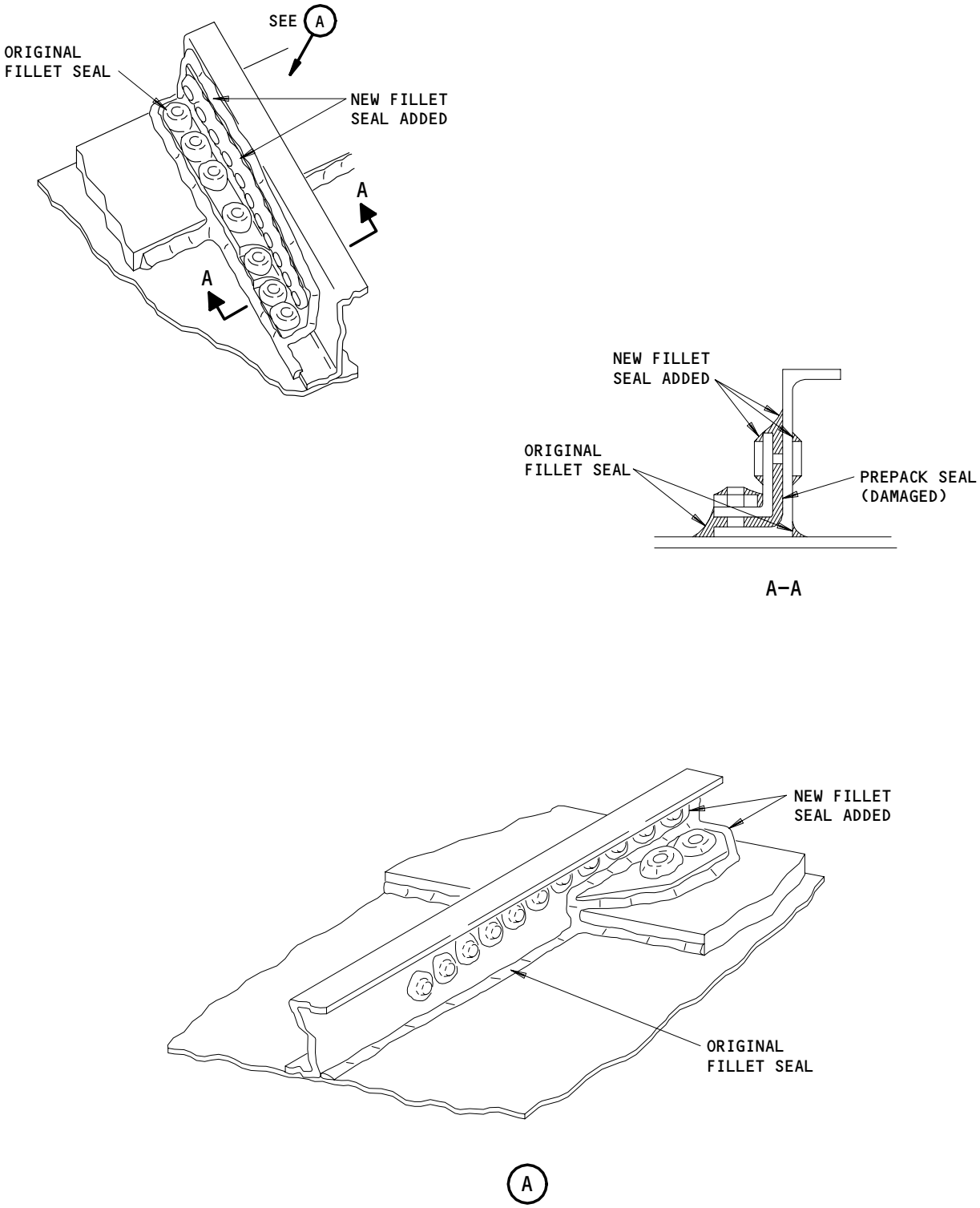
NOTE: Because you add a large quantity of sealant when you raise the seal plane, it is better to replace the defective seal.

1) Examine the structure around the bad seal to find where to raise the seal plane.
2) Apply a new fillet seal around the structure that with the applicable seals and fasteners to raise the seal plane (Fig. 817).



Faying Surface Seal
Figure 816

C76355



Raise the Seal Plane to Repair a Defective Prepack Seal
Figure 817

TASK 28-11-00-308-050

5. Repair of Fuel Tank Corrosion

A. General

(1) To repair fuel tank corrosion, the applicable surfaces in the fuel tank must be cleaned and treated with etchant and alodine. Corrosion resistant finish (topcoat) is then applied to the surfaces to prevent more corrosion. Be careful to clean and treat all corners, crevices and other limited access areas.

B. Consumable Materials

(1) B00184 Cleaning Solvent - BMS 11-7
(2) G00011 Etchant - TEC 361

C. References

(1) SRM 51-20-01, Protective Treatment of Metallic and Graphite Materials

D. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

E. Repair of the Fuel Tank Corrosion

S 118-051

(1) Clean the fuel tank surfaces with corrosion with BMS 11-7 solvent.

S 158-052

(2) Apply etchant over the cleaned fuel tank surfaces with corrosion.

S 158-010

(3) Keep the etchant on the fuel tank surfaces for 3 to 5 minutes.

S 178-011

(4) Flush the surface with water.

S 378-089

CAUTION: USE ONLY ALODINE 600 TO REPAIR ALUMINUM WING SURFACES. PRIMER ADHESION PROBLEMS CAN OCCUR IF OTHER ALODINE SOLUTIONS ARE USED.

(5) Apply an alodine layer to the surface with Alodine 600 (SRM 51-20-01).

S 398-054
(6) Repair all sealant damaged or removed when you remove corrosion.

NOTE: Follow the procedure in the Repair of Sealant Leaks in the Fuel Tank Structure paragraph.

S 378-055
(7) Apply corrosion resistant finish (topcoat).

NOTE: Follow the procedure in the Repair of Sealant Leaks in the Fuel Tank Structure paragraph.

TASK 28-11-00-208-056

6. Examine and Close the Repaired Fuel Tanks

A. References
(1) AMM 28-11-00/201, Fuel Tanks

B. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

C. Procedure

S 218-012
(1) Each time you go into a fuel tank (AMM 28-11-00/201), you must examine the fuel tank very carefully before you close it.
(a) If sealant was applied, the fuel tank must be cleaned and examined before you close the fuel tank.

S 418-013
(2) Do the steps that follow to close the repaired fuel tank:
(a) Remove all coverplates, plugs, and equipment used in leak isolation tests.

(b) Remove all tools, solvent containers, cotton wipers (BMS15-5), and brushes used for sealant repairs.

NOTE: Keep a written record of all tools, equipment, material, and persons as they go into and go out of the fuel tank. Make sure the list matches before you close the fuel tank.

S 168-014

WARNING: GROUND ALL EQUIPMENT AND HOSES USED IN OR NEAR THE OPEN FUEL TANK. IF YOU DO NOT GROUND ALL THE EQUIPMENT AND HOSES, AN EXPLOSIVE SITUATION COULD OCCUR.

(3) Use a vacuum to clean the repaired fuel tank thoroughly to remove unwanted particles and pieces of used sealant.

S 168-015

(4) If the fuel tank is wet, rub the wet area clean with cotton wipers (BMS15-5).

S 218-057

(5) Examine all repair sealant and topcoat to make sure it was applied correctly.

S 418-058

(6) Install all rib braces or structure removed for access.

S 218-016

CAUTION: MAKE SURE YOU REMOVE ALL UNWANTED PARTICLES AND MATERIALS FROM THE FUEL TANK. IF THE UNWANTED MATERIALS COLLECT IN THE FUEL TANK THEY CAN BLOCK THE PUMPS.

(7) Make sure the fuel and water drainage holes and paths are not blocked.

S 218-059

(8) Make a final check of the interior of the fuel tank to make sure all particles and unwanted materials are removed.

S 418-060

(9) Install all tank access doors removed.

TASK 28-11-00-658-061

7. Fueling of Repaired Fuel Tanks

A. References

(1) AMM 12-11-01/301, Fuel Tank - Pressure Fueling

B. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

C. Procedure

S 218-017

(1) Do not refuel the fuel tanks that were repaired and topcoat was applied to until the topcoat is cured.

NOTE: Under normal conditons it is necessary to wait 12 hours at a minimum temperature of 65°F to cure the topcoat.

S 218-018

(2) If the fuel tank is repaired and no topcoat is applied, you can refuel the fuel tank when the sealant is not tacky.

S 658-019

(3) Refuel the fuel tanks (AMM 12-11-01/301).

S 218-020

(4) Examine the external leak area regularly for 1 hour.

NOTE: You can monitor the leak area for a longer time to make sure the leak repair is OK.

S 218-021

(5) Make sure there are no fuel leaks.

NOTE: Make sure the leakage area is maintained, at a minimum, to the leakage limits shown in AMM 28-11-00/601 after the 1 hour inspection.

TASK 28-11-00-308-062

8. Approved Repairs of Nonsealant Leaks

A. General

(1) Nonsealant leaks are leaks around plumbing fittings that you can remove, primary tension bolts, tank access doors, and fuel system components that go through the fuel tank surfaces. These components are sealed by O-rings or molded rubber seals. Replace the O-rings or molded rubber seals if they are damaged or fuel leaks through them. You must apply alodine again to all surfaces of the tank structure that are damaged before you install new O-rings or molded rubber seals.

B. References

(1) AMM 20-10-19/401, O-rings

C. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

D. Repair of Nonsealant Leaks

S 968-022

(1) If the molded rubber seal on a tank access door leaks, replace the tank access door.

S 968-023

(2) If an O-ring on a fuel system component leaks, do the steps that follow to replace the O-ring:

(a) Get the correct replacement O-ring.
(b) Make sure the cure date of the replacement O-ring is less than 48 months ago.
(c) Remove the used O-ring from the component.

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(d) Clean the O-ring groove and the flat surfaces that the O-ring is between with solvent, Series 93 (AMM 20-30-93/201).

(e) Rub the surfaces dry with clean cotton wipers (BMS15-5).
(f) Examine the O-ring groove and the adjacent fuel surface for cuts, scratches, dents, distortions, and unwanted material.
(g) Repair or replace all defective components.
(h) Examine the new O-ring for defects.
(i) Discard the O-ring if it is defective.
(j) Make a mark on the component that you install the O-ring on of the cure date.
(k) Make sure the O-ring fits in the groove.
(l) Install the O-ring (AMM 20-10-19/401).
(m) Assemble the component.

TASK 28-11-00-308-063

9. Approved Repair of the Secondary Fuel Barrier Sealant

A. General
(1) If there is leakage in the secondary fuel barrier, the leakage must be repaired before the airplane is released for flight.
(2) Secondary fuel barrier sealant is a polyurethane (Type II) material applied to the upper exterior surface of the center fuel tank.

B. Equipment
(1) Brush - Paint
(2) Instrument - Dualscope Thickness Measurement, Model MP20
9U437 Fischer Technology Inc.
750 Marshall Phelps Road, Windsor CT 06095-2199
(3) Probe - Thickness Measurement, Pencil - Type, Model ETA3.3H
9U437 Fischer Technology Inc.
750 Marshall Phelps Road, Windsor CT 06095-2199

C. Consumable Materials
(1) G00034 Cotton Wiper, Process Cleaning Absorbent
Wiper (cheesecloth, gauze) BMS15-5
(2) A00184 Cleaning Solvent - BMS 11-7
(3) C00259 Primer - BMS 10-11, Type I (yellow)
(4) A00015 Sealant - BMS 5-81, Type II
(5) B00137 - Abrasive paper, 180 grit or finer
(6) G00215 Flat, bristle brush

D. Reference
(1) AMM 51-21-02/701, Prepaint Cleaning and Treatment

E. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Seciton (Right)

F. Repair of the Secondary Fuel Barrier Sealant

S 128-024
(1) Lightly sand the damaged area with 180 grit, or finer, abrasive paper.

NOTE: Be careful not to make the bare metal rough if possible.

S 118-064
(2) Remove all contamination with a clean cotton wiper (BMS15-5) soaked with BMS 11-7 cleaning solvent.

S 168-025
(3) Rub the area dry with a clean, dry cotton wiper (BMS15-5).

S 378-069
(4) Refinish all bare metal (AMM 51-21-02/701).

S 378-065
(5) Apply the BMS 10-11 primer, until it makes an overlap with the adjacent area that is not damaged.

S 398-026
(6) Let the primer dry for 30 minutes to 4 hours before applying BMS 5-81.

S 368-066
(7) Prepare the secondary fuel barrier sealant (BMS 5-81, Type II) as follows:
   (a) Make sure the base and accelerator are each homegeneous, free from lumps or gelled particles.

   CAUTION: BE CAREFUL WHEN YOU MIX AND MAKE THE SEALANT SMOOTH TO KEEP AIR BUBBLES TO A MINIMUM. AIR BUBBLES CAN MAKE THE SEALANT DIFFICULT TO APPLY.

   (b) Before you mix the sealant, stir each component in its container to make sure it is homogeneous.
   (c) Carefully mix the total contents of the base and accelerator containers or mix at a measured ratio of 100 parts of base to 90 parts of accelerator by weight or by volume.

      NOTE: The material is normally supplied in premeasured kits to give the correct ratio.

(d) Stir slowly until you get a homogeneous mixture.

S 398-027

WARNING: DO NOT BREATHE THE FUMES FROM THE SECONDARY FUEL BARRIER SEALANT (BMS 5-81, TYPE II). KEEP THE SEALANT AWAY FROM SPARKS, FLAME OR HEAT. THE SEALANT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE.

CAUTION: DO NOT APPLY THE SECONDARY FUEL BARRIER SEALANT (BMS 5-81, TYPE II), IF THE AIR TEMPERATURE IS LESS THAN 60°F (15°C) OR THE RELATIVE HUMIDITY IS MORE THAN 95 PERCENT. THE SEALANT WILL NOT CURE CORRECTLY IF THE TEMPERATURE AND RELATIVE HUMIDITY CONDITIONS ARE NOT IN THE LIMITS.

(8) Apply BMS 10-11 Type I primer, before you apply BMS 5-81 Type II to make areas smooth that have sharp edges (recommended).

S 398-074

(9) Apply two layers of BMS 5-81, Type II sealant with a flat, bristle brush.
   (a) Make sure the combined thickness of the applied sealant and the primer layer is 0.012 to 0.017 inch (0.30 to 0.43 mm). (These dimensions include a 0.02 inch (0.05 mm) layer of primer.)

      NOTE: Previously applied coating which is 0.007 to 0.012 inch thick (0.18 to 0.30 mm) (including primer) does not require re-work; however, new repairs or applications must be 0.012 to 0.017 inch thick (0.30 to 0.43 mm) (including primer).

   (b) In some cases, dry sealant thickness of more than 0.015 inch (0.38 mm) or less than 0.010 inch (0.25 mm) can occur. These conditions are acceptable, but the thickness must not be less than 0.007 inch (0.18 mm) or more than 0.022 inch (0.56 mm). (These dimensions include a 0.002 inch (0.05 mm) layer of primer.)
   (c) For horizontal surfaces, let the sealant dry a minimum of 1/2 hour between layers.
   (d) For vertical surfaces, let the sealant dry a minimum of 2 hours between layers.

S 398-028

(10) Cure the sealant.
   (a) The cure rates of the sealant are as follows:

      NOTE: A cure temperature of more than 80°F (26.7°C) is recommended for the best results.

TABLE I BMS 5-81 CURE RATES				
	CURE CONDITIONS			
	DRY HARD (HOURS) *[1]		DRY THROUGH (HOURS) *[2]	
CURE TEMPERATURE	TYPE II, CLASS 1	TYPE II, CLASS 2	TYPE II, CLASS 1	TYPE II, CLASS 2
75 ±5°F	50	8	96	24
100 ±5°F	18	2.5	36	3.5
125 ±5°F	7.5	1.5	15	2.5
150 ±5°F	2.5	1.5	5	2

*[1] Condition where metal particles do not bond to the sealant.
*[2] Condition where sealant is sufficiently hard to prevent damage when walked on with boot socks.

MAIN TANK ACCESS DOOR - REMOVAL/INSTALLATION

1. General
   A. Each main fuel tank has 16 elliptical shaped access doors located on the lower wing surface. The access doors let you go into the main fuel tanks.
   B. These main tank access doors have fuel measuring stick assemblies that attach to the inner surface of the door:

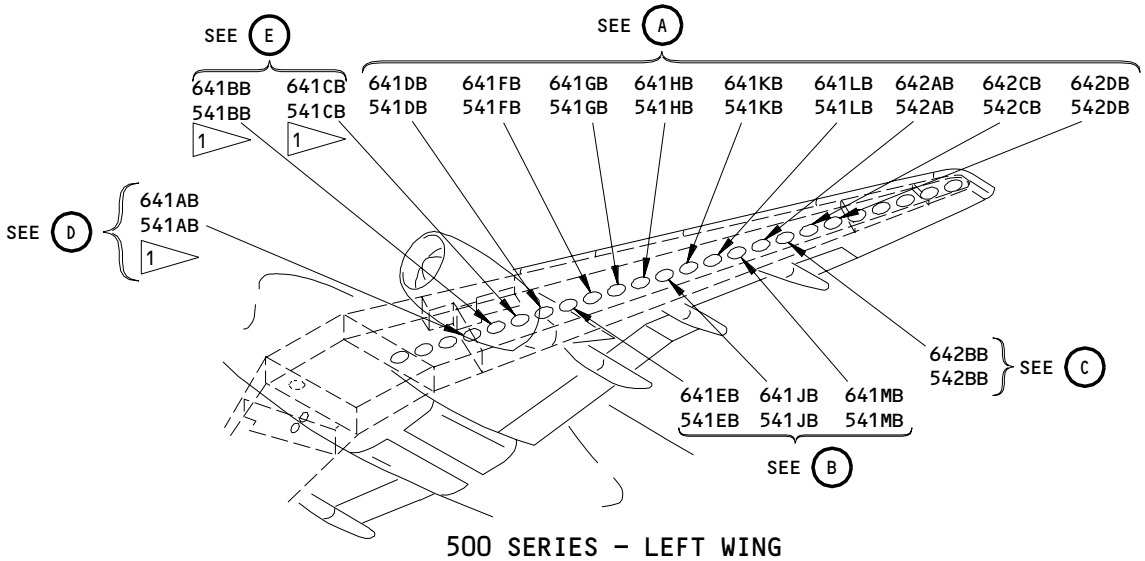
LEFT WING	RIGHT WING
541MB	641MB
541JB	641JB
541EB	641EB
541AB	641AB
542BB	642BB

   C. This procedure contains two tasks. The first task removes the main tank access door. The second task installs the main tank access door.

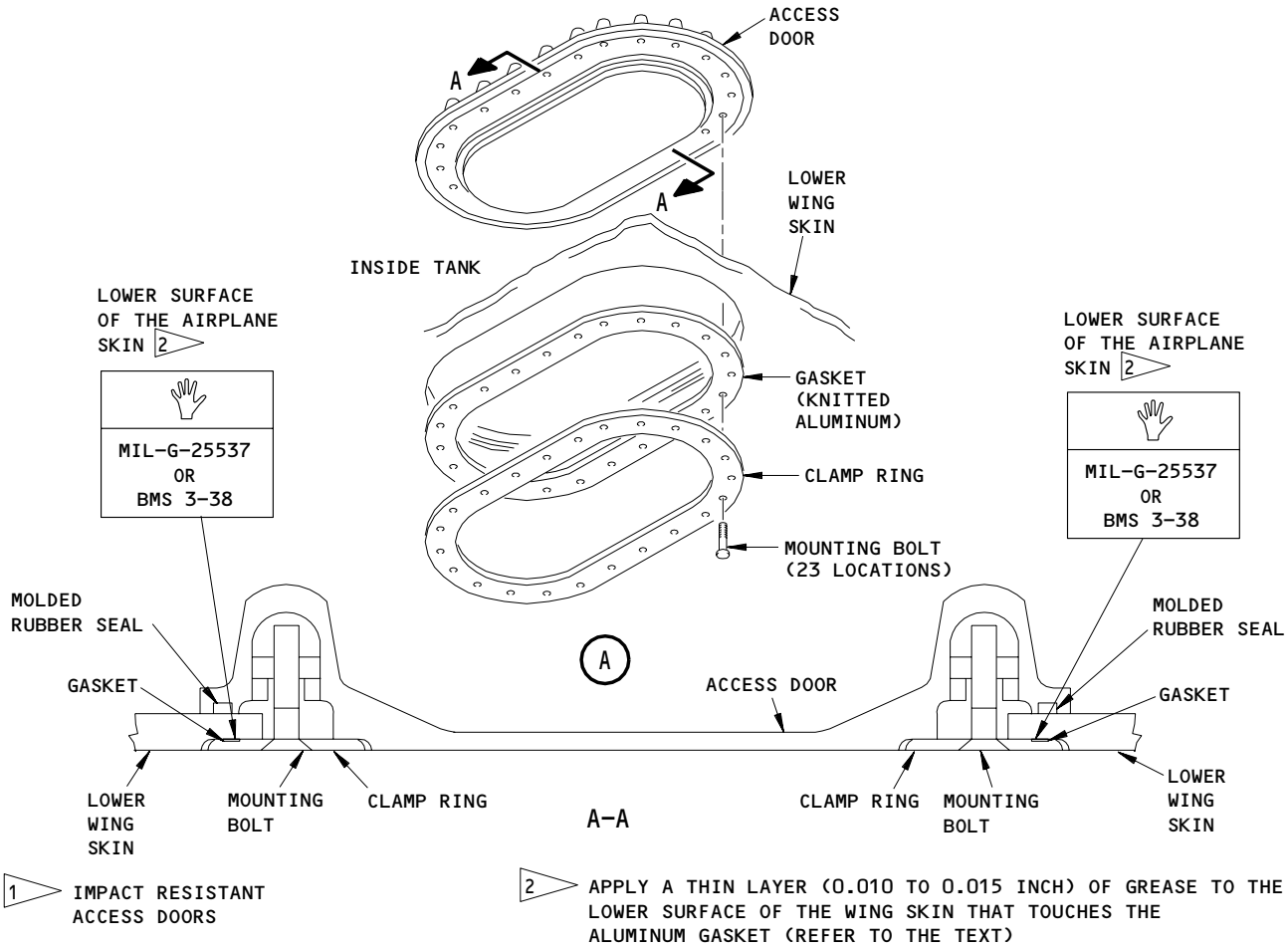
TASK 28-11-01-004-003

2. Remove the Main Tank Access Door (Fig. 401)
   A. References
      (1) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
      (2) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairing
      (3) AMM 28-11-00/201, Fuel Tanks
      (4) AMM 28-26-00/201, Defueling
      (5) AMM 54-52-01/401, Strut Fairings
   B. Access
      (1) Location Zones
          541 Main tank - rib No. 5 to No. 17 (Left)
          542 Main tank - rib No. 17 to No. 21 (Left)
          641 Main tank - rib No. 5 to No. 17 (Right)
          642 Main tank - rib No. 17 to No. 21 (Right)

      (2) Access Panels
          541AB/641AB
          541BB/641BB
          541CB/641CB
          541DB/641DB
          541EB/641EB
          541FB/641FB
          541GB/641GB
          541HB/641HB
          541JB/641JB
          541KB/641KB
          541LB/641LB
          541MB/641MB
          542AB/642AB
          542BB/642BB
          542CB/642CB
          542DB/642DB



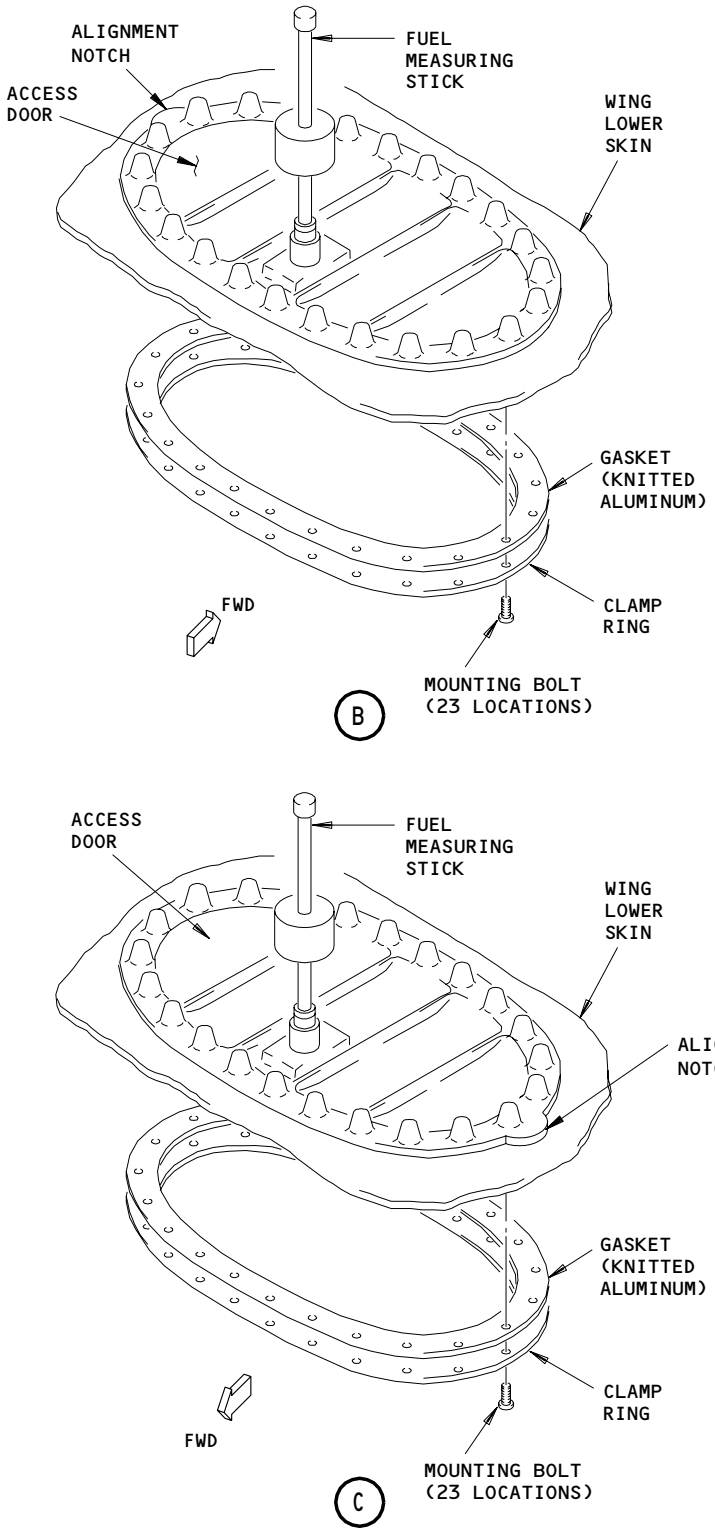
500 SERIES – LEFT WING
600 SERIES – RIGHT WING



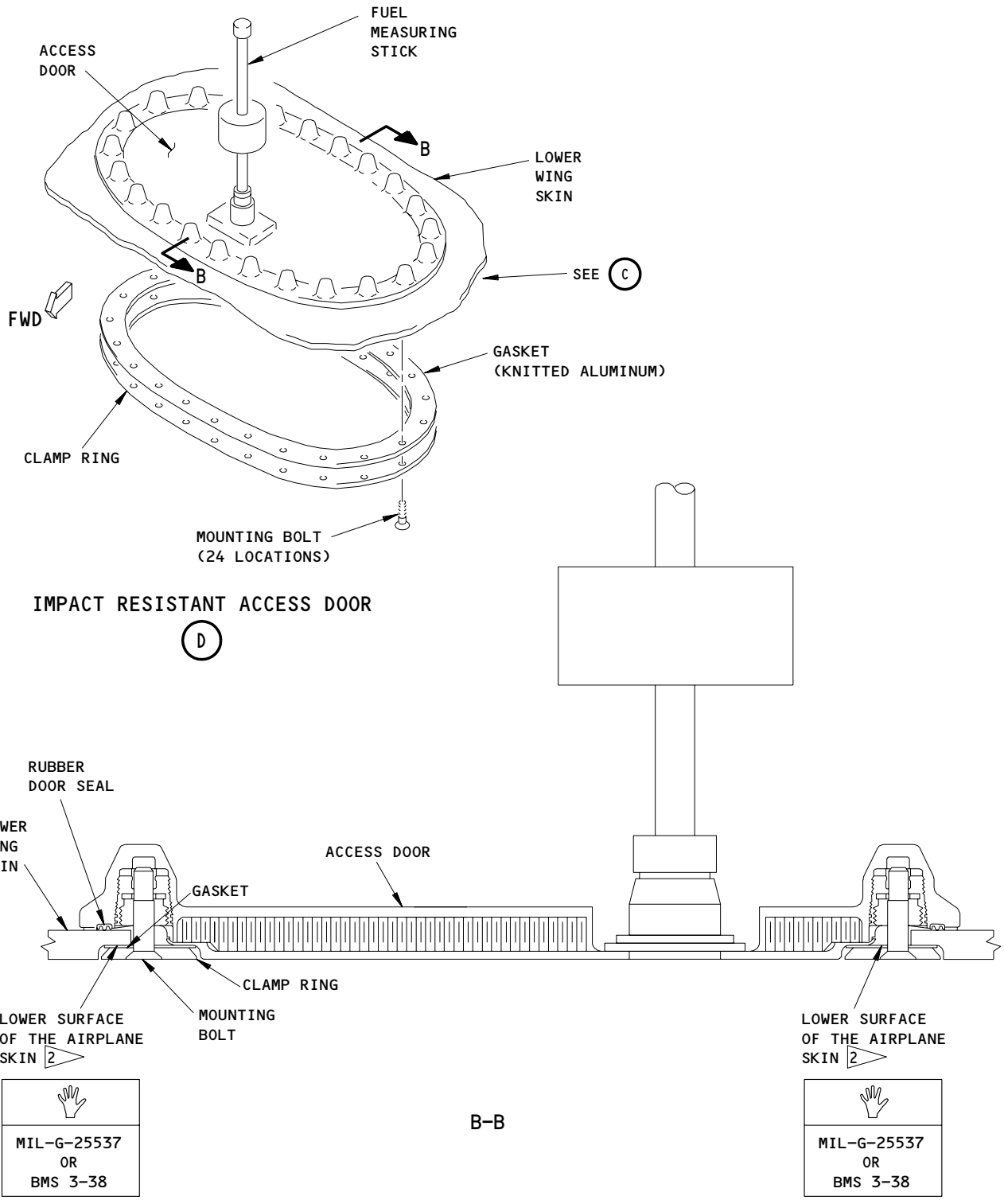
1 IMPACT RESISTANT ACCESS DOORS

2 APPLY A THIN LAYER (0.010 TO 0.015 INCH) OF GREASE TO THE LOWER SURFACE OF THE WING SKIN THAT TOUCHES THE ALUMINUM GASKET (REFER TO THE TEXT)

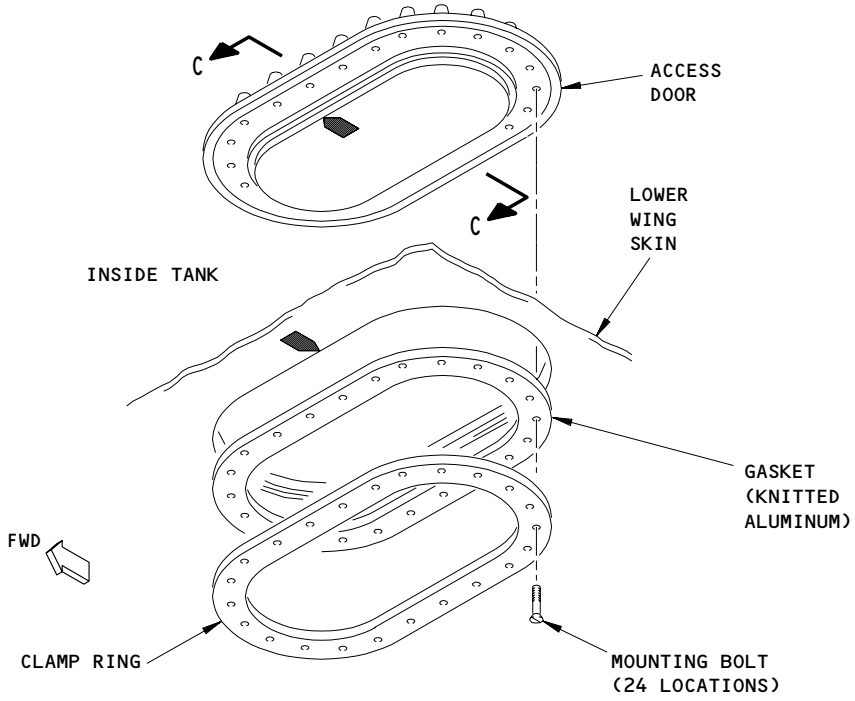
Main Tank Access Door Installation
Figure 401 (Sheet 1)



Main Tank Access Door Installation
Figure 401 (Sheet 2)

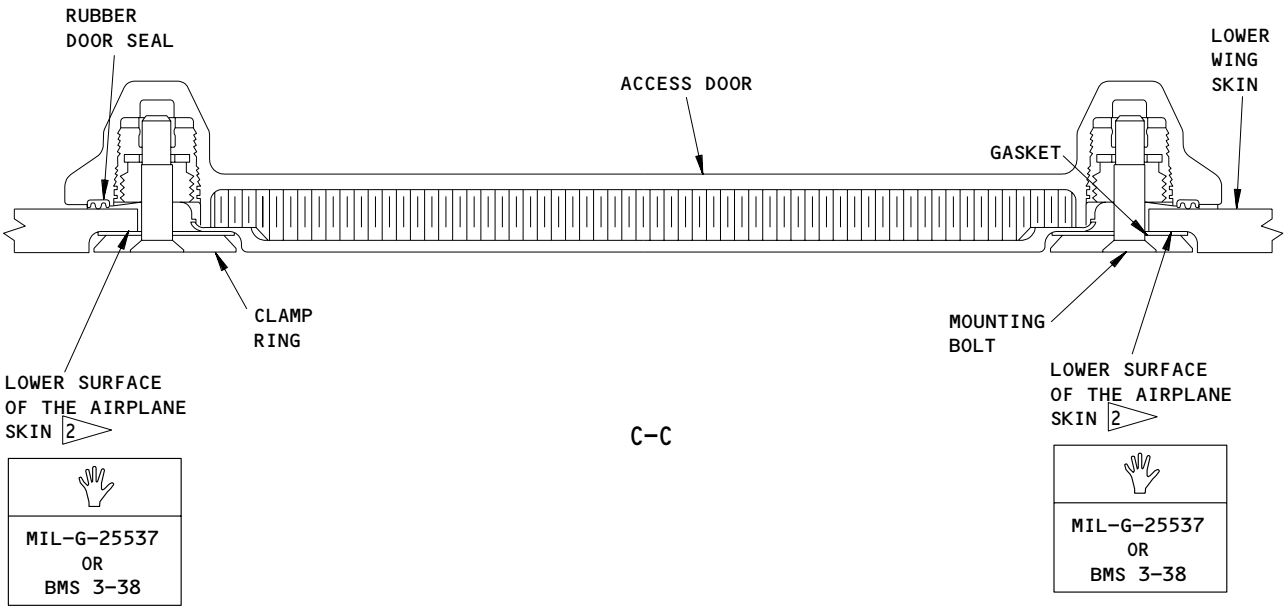


Main Tank Access Door Installation
Figure 401 (Sheet 3)



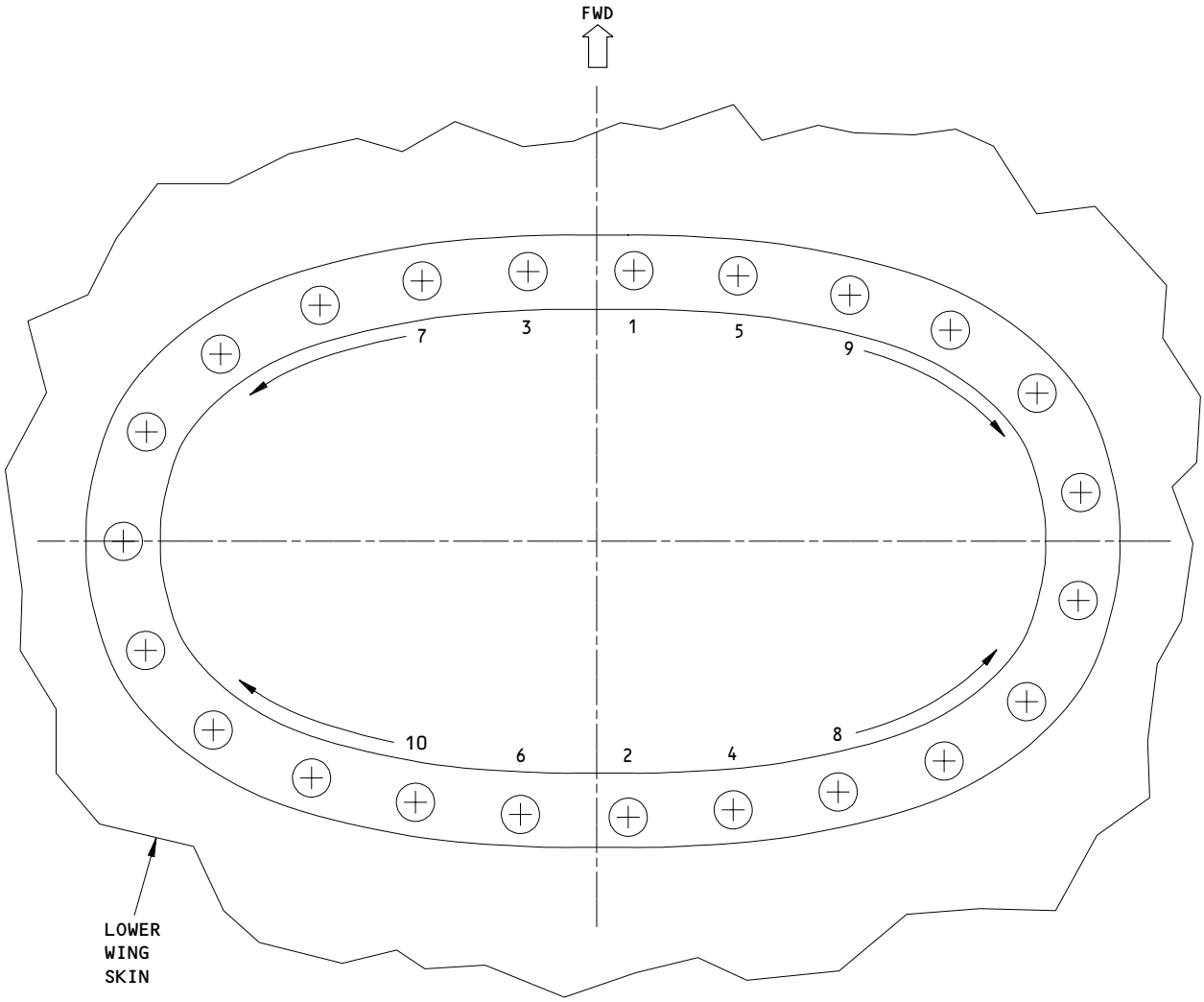
IMPACT RESISTANT ACCESS DOOR

E



C-C

Main Tank Access Door Installation
Figure 401 (Sheet 4)



NOTE: TORQUE THE MOUNT BOLTS IN THE SEQUENCE SHOWN BY THE NUMBERS. THIS WILL MAKE SURE FUEL DOES NOT LEAK AROUND THE ACCESS PANEL.

Access Panel Mount Bolt Torque Pattern
Figure 402

C. Procedure

S 654-004
(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 014-005
(2) Remove the inboard trailing edge flap track fairing as necessary (AMM 27-51-30/201).

S 014-006
(3) Remove the outboard trailing edge flap track fairing as necessary (AMM 27-51-31/201).

S 014-007
(4) Remove the applicable strut fairing as necessary (AMM 54-52-01/401).

S 944-015

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 034-009
(6) Hold the clamp ring and remove the mounting bolts.

S 034-010
(7) Remove the clamp ring and the gasket.

S 424-001

CAUTION: DO NOT USE A LEVER (PRY) ON THE MAIN TANK ACCESS DOOR. THE LOWER SURFACE OF THE ACCESS DOOR FLANGE AND THE UPPER SURFACE OF THE WING SKIN AROUND THE ACCESS DOORS ARE SEAL SURFACES. IF YOU ARE NOT CAREFUL, SCRATCHES OR DAMAGE TO THE SEAL SURFACE CAN OCCUR.

BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOORS WITH THE FUEL MEASURING STICKS. IF THE FUEL MEASURING STICKS TOUCH THE STRINGERS AT THE TOP OF THE FUEL TANK, DAMAGE TO THE FUEL MEASURING STICKS CAN OCCUR.

(8) On the main tank access doors without the fuel measuring sticks, push up on the access door.
(a) If the main tank access door does not move freely, use a rubber mallet and lightly hit around the main tank access door.

S 024-012

(9) On the main tank access doors with the fuel measuring sticks, push up and put the access doors at an angle so the fuel measuring sticks do not touch the stringers at the top of the fuel tank.
   (a) If the main tank access door does not move freely, use a rubber mallet and lightly hit around the main tank access door.

S 024-013

(10) Remove the main tank access door from the fuel tank.

TASK 28-11-01-404-014

3. Install the Main Tank Access Door (Fig. 401)
   A. General
      (1) BMS3-38 (Cor-Ban 27L) is the recommended anti-corrosion compound for access door gasket installations. BMS3-38 gives improved corrosion protection between the access door, mesh gasket and wing surfaces. Anti-corrosion compound, MIL-G-25537 (Aero Shell No. 14), can still be used for access door gaskets, but should be replaced with BMS3-38 as soon as practical.
      (2) Do not mix the two types of anti-corrosion compounds, BMS3-38 and MIL-G-25537. When you apply the recommended anti-corrosion compound BMS3-38, make sure to remove all MIL-G-25537 compound from the mesh gasket, clamp ring and the access door structure on the airplane.
      (3) Access panel 541AB, 541BB, 541CB, 641AB, 641BB, and 641CB on each of the lower wing surface are high impact resistant access panels. These panels must not be replaced with standard access panels.
   B. Consumable Materials
      (1) Anticorrosion Grease - Use one of these (BMS3-38 recommended):
         (a) D00020 Grease, Anti-corrosion - Aero Shell No. 14 (AMM 20-30-03/201)
         (b) G50237 Corrosion Inhibiting material, Non-Drying Paste, Cor-Ban 27L (BMS3-38)
      (2) B00316 Solvent - Aliphatic Naphtha TT-N-95
      (3) D00504 Grease - Petrolatum
   C. References
      (1) AMM 12-11-01/301, Pressure Fueling
      (2) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
      (3) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairing
      (4) AMM 28-11-10/801, Wing Fuel Tank Access Panels
      (5) AMM 54-52-01/401, Strut Fairings
   D. Access
      (1) Location Zones
         541 Main tank - rib No. 5 to No. 17 (Left)
         542 Main tank - rib No. 17 to No. 21 (Left)
         641 Main tank - rib No. 5 to No. 17 (Right)
         642 Main tank - rib No. 17 to No. 21 (Right)

(2) Access Panels
541AB/641AB
541BB/641BB
541CB/641CB
541DB/641DB
541EB/641EB
541FB/641FB
541GB/641GB
541HB/641HB
541JB/641JB
541KB/641KB
541LB/641LB
541MB/641MB
542AB/642AB
542BB/642BB
542CB/642CB
542DB/642DB

E. Prepare to Install the Access Door

S 214-015
(1) Make sure the areas on access door and wing skin, that the molded rubber seal touches, are clean.

NOTE: Use sovlent to clean the surfaces if it is necessary.

S 214-016
(2) Examine the rubber seals for deterioration.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: You can remove the rubber seal on all high impact-resistant access doors and all new replacement access doors (AMM 28-11-10/801).

(a) Replace the rubber seal if it is necessary (AMM 28-11-10/801).

S 644-036
(3) Apply a thin layer of petrolatum, D00504 to the molded rubber seal.

NOTE: This will prevent damage to the rubber seal during subsequent access panel removal. It will also be easier to remove the access panel.

S 424-016
(4) On the main tank access doors without fuel measuring sticks, put the access door in the fuel tank and set it in the opening.

S 424-002

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOORS THAT HAVE FUEL MEASURING STICKS. IF THE MEASURING STICKS TOUCH THE STRINGERS AT THE TOP OF THE FUEL TANK, DAMAGE TO THE FUEL MEASURING STICKS CAN OCCUR.

(5) On the main tank access doors with the fuel measuring sticks, put the access door in the fuel tank at an angle so the fuel measuring sticks do not touch the stringers at top of the fuel tank and set in the opening.

S 424-019

CAUTION: MAKE SURE THE ALIGNMENT INSERT ON THE ACCESS DOOR IS ON THE CORRECT SIDE OF THE ACCESS OPENING. FUEL LEAKAGE CAN OCCUR IF THE ACCESS DOOR IS NOT INSTALLED IN THE CORRECT DIRECTION.

(6) On the main tank access doors with the fuel measuring sticks, make sure the alignment insert in the access door is in the same position as the alignment notch in the wing skin (Fig. 401).

F. Prepare the Original Knitted Aluminum Gasket for Installation

S 214-027
(1) Do a check of the knitted aluminum gasket for serviceability.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Replace the gasket if any of the subsequent conditions exist:
1) Fastener holes torn
2) Elongated out of shape
3) More than 10% of strands broken through thickness of gasket in one area.
(b) Use a vapor degrease process (BAC5408) to remove all of the MIL-G-25537, anti-corrosion compound.
(c) Fill the gasket mesh with BMS3-38 anti-corrosion compound.

S 644-030
(2) Apply the correct quantity of anti-corrosion compound:

NOTE: If there is not a sufficient quantity of anti-corrosion compound, the compound can have holes that collect moisture. If you use too much anti-corrosion compound, it can flow out of the lower wing surface.

(a) Make sure the anticorrosion compound correctly fills the aluminum mesh on the two sides of the gasket before you install it.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) If the gasket mesh has too much anti-corrosion compound, remove the excess compound with a cotton wiper (BMS 5-5) that is moist with a solvent.
(c) If the gasket mesh is not fully filled with anti-corrosion compound, do these steps:
1) Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.
2) Apply a 1/2 to 1 ounce (14.7 to 29.5 ml) layer of anti-corrosion compound equally to each side of the gasket.
3) Make sure the layer is continuous on the gasket.

G. Prepare a New Knitted Aluminum Gasket for Installation

S 114-033
(1) Clean the clamp ring with a cotton wiper (BMS15-5) and solvent.

S 644-031
(2) Make sure the new gasket is filled with the correct anti-corrosion compound.

NOTE: Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.

S 214-032
(3) Do a check of the manufacturing date (shelf-life) information on the replacement gasket container.
(a) If the gasket is more than five years old, do these steps:
1) Remove the old anti-corrosion compound from the gasket.

2) Refill the two sides of the gasket with new anti-corrosion compound.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) If the gasket is less than five years old, it is not necessary to remove the old anti-corrosion compound.

S 644-034

(4) Apply the correct quantity of anti-corrosion compound:

NOTE: If there is not a sufficient quantity of anti-corrosion compound, the compound can have holes that collect moisture. If you use too much anti-corrosion compound, it can flow out of the lower wing surface.

(a) Make sure the anti-corrosion compound correctly fills the aluminum mesh on the two sides of the gasket before you install it.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) If the gasket mesh has too much anti-corrosion compound, remove the excess compound with a cotton wiper (BMS15-5) that is moist with a solvent.

(c) Install a new gasket to the clamp ring.

NOTE: Make sure the clamp ring and gasket holes align. The holes are not symmetrical.

H. Install the Access Door

S 644-035

(1) Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.

S 644-020

CAUTION: DO NOT APPLY TOO MUCH ANTI-CORROSION COMPOUND IN FRONT OF THE MOUNTING SCREWS. YOU CAN CAUSE DAMAGE TO THE PANEL WITH THE HYDRAULIC PRESSURE FROM THE ANTI-CORROSION COMPOUND.

(2) Apply 0.010 to 0.015 inch (0.25 to 0.38 mm) of anti-corrosion compound to the lower surface of the wing skin that touches the aluminum gasket for the access panel (Fig. 401).

S 434-017
(3) Set and hold the gasket and the clamp ring in the opening between the outer face of the access door and the wing skin while you install the mounting bolts.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-026
(4) Make sure the clamp ring has an equal gap around the edges of the access door and the lower surface of the wing.

S 434-018
(5) Tighten the mounting bolts to 30-40 pound-inches.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Start at the centerline and tighten the mounting bolts equally in both directions (Fig. 402).

S 414-019
(6) Install the inboard trailing edge flap track fairing as necessary (AMM 27-51-30/201).

S 414-020
(7) Install the outboard trailing edge flap track fairing as necessary (AMM 27-51-31/201).

S 414-021
(8) Install the applicable strut fairing as necessary (AMM 54-52-01/401).

S 654-022
(9) Refuel the fuel tank (AMM 12-11-01/301).

S 214-023
(10) Make sure there are no leaks in the fuel tanks.

CENTER TANK ACCESS DOOR - REMOVAL/INSTALLATION

1. General
   A. There are seven access doors for the center wing fuel tank. Three access doors are on the lower left wing surface (531AB, 531BB, 531CB from inboard to outboard respectively) inboard of the center tank end rib. Three access doors are on the lower right wing surface (631AB, 631BB, 631CB from inboard to outboard respectively) inboard of the center tank end rib. One access door (134AZ) is on the forward lower surface of the center wing tank to the right of the airplane centerline. Removal/Installation procedures are the same for all access doors but access door 134AZ, where you must first get access to the access door.
   B. This procedure contains two tasks. The first task removes the center tank access door. The second task installs the center tank access door.

TASK 28-11-02-004-018

2. Remove the Center Tank Access Door (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-10/801, Wing Fuel Tank Access Panel
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones

134	Wing Center Section (Right)
194	Wing to Body - Forward Lower Half (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

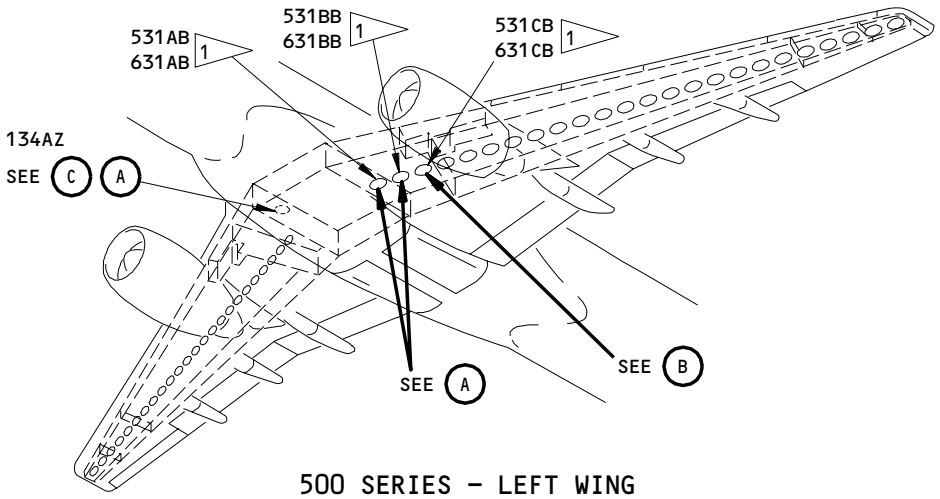
      (2) Access Panels

134AZ	Center Wing Tank Access Door
194ER	Air Conditioning Access Door
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)

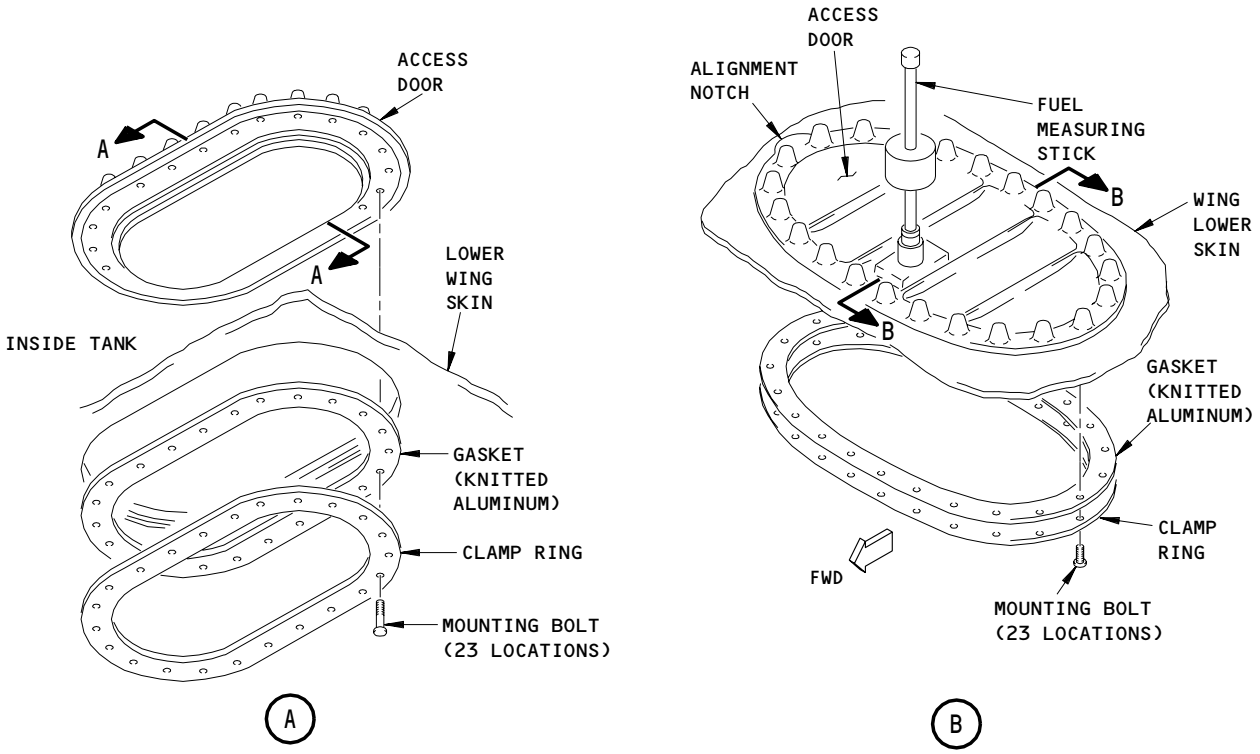
   C. Procedure

      S 654-001
      (1) Defuel the center fuel tank (AMM 28-26-00/201).

      S 014-002
      (2) For all center tank access doors less 134AZ, find the applicable center tank access door on the wing lower surface.



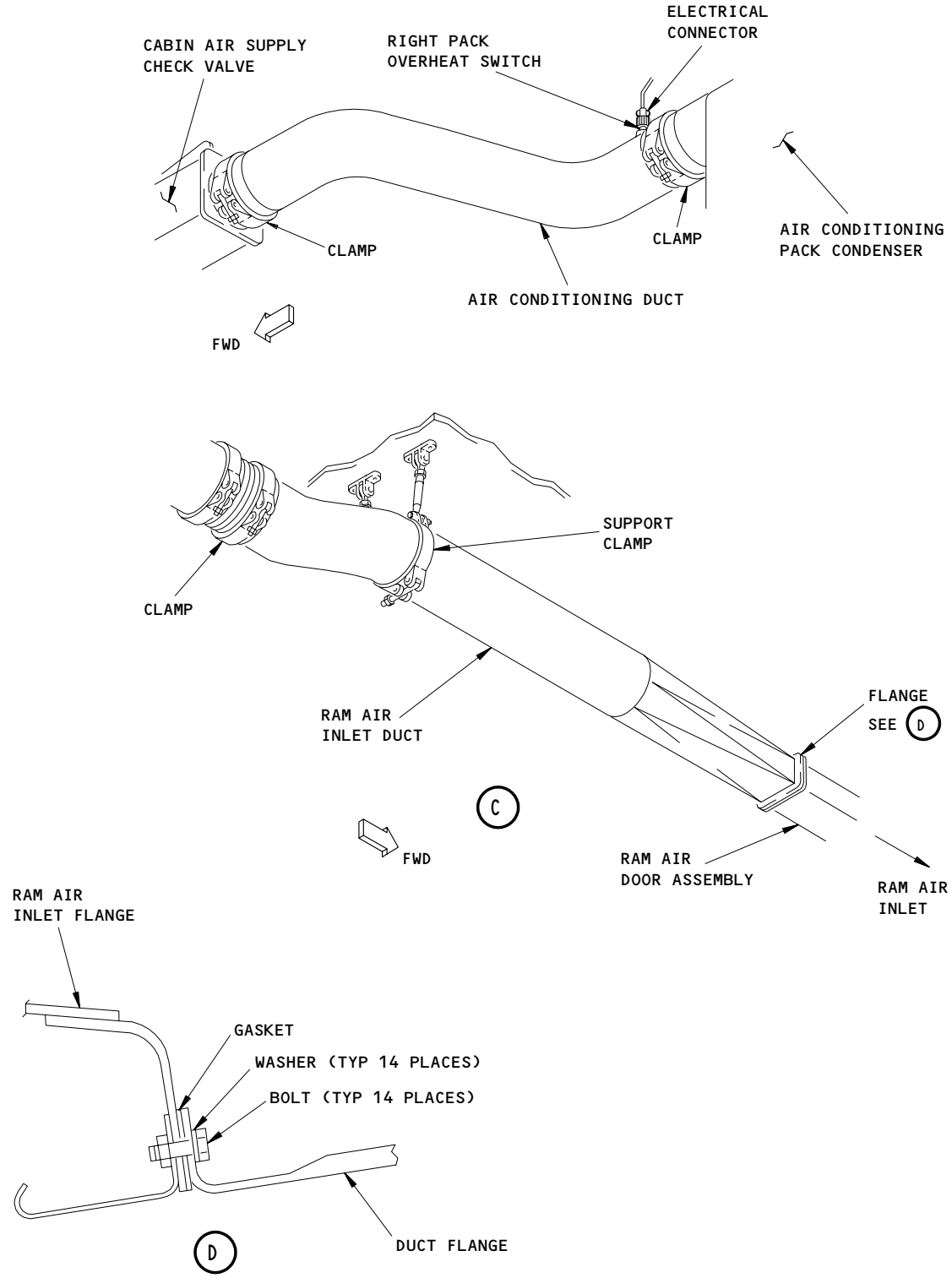
500 SERIES – LEFT WING
600 SERIES – RIGHT WING



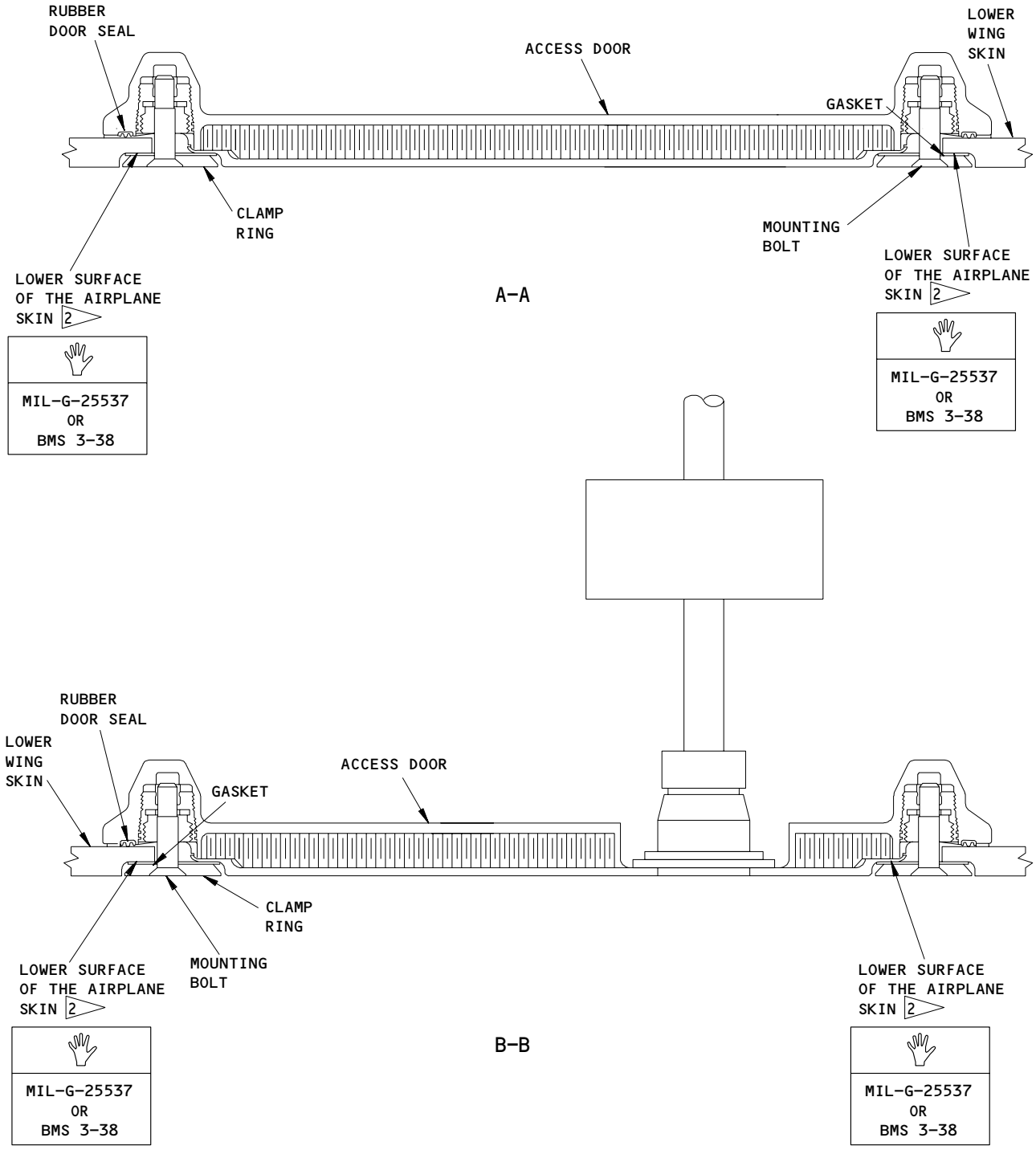
1 IMPACT RESISTANT ACCESS DOORS

2 APPLY A THIN LAYER (0.010 TO 0.015 INCH)OF GREASE TO THE LOWER SURFACE OF THE WING SKIN THAT TOUCHES THE ALUMINUM GASKET (REFER TO THE TEXT)

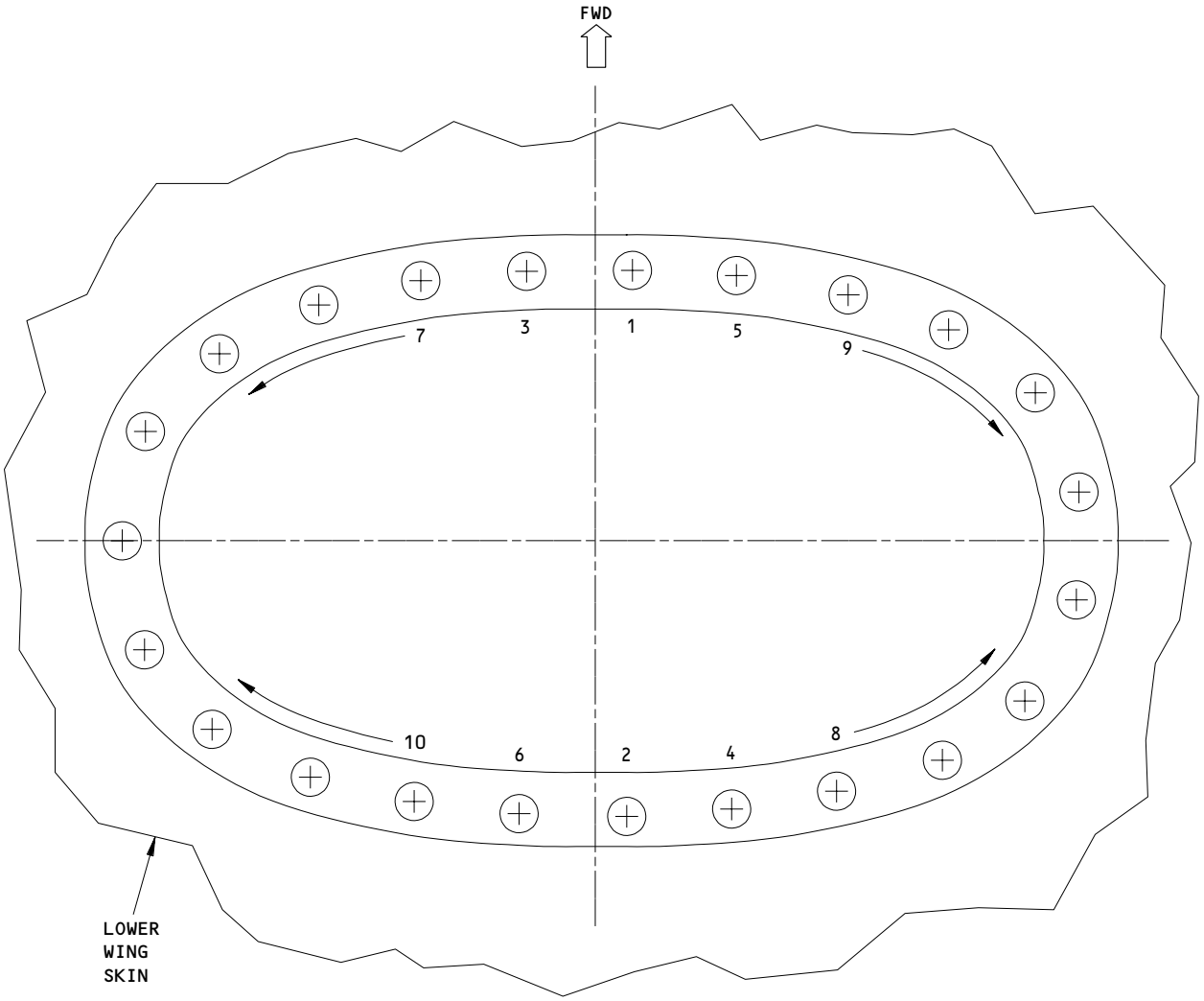
Center Tank Access Door Installation
Figure 401 (Sheet 1)



Center Tank Access Door Installation
Figure 401 (Sheet 2)



Main Tank Access Door Installation
Figure 401 (Sheet 3)



NOTE: TORQUE THE MOUNT BOLTS IN THE SEQUENCE SHOWN BY THE NUMBERS. THIS WILL MAKE SURE FUEL DOES NOT LEAK AROUND THE ACCESS PANEL.

Access Panel Mount Bolt Torque Pattern
Figure 402

S 014-003

(3) For the center tank access door 134AZ, get access as follows:
   (a) Open the air conditioning access door, 194ER (AMM 06-41-00/201).
   (b) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
      1) 11M22, RIGHT PACK FLOW CONT
   (c) Remove the electrical connector from the right pack overheat switch.
   (d) Hold the air conditioning duct found between the cabin air supply check valve and the air conditioning pack condenser.
   (e) Remove the clamp that attaches the air conditioning duct to the cabin air supply check valve.
   (f) Remove the clamp that attaches the air conditioning duct to the air conditioning pack condenser.
   (g) Remove the air conditioning duct.
   (h) Hold the ram air inlet duct between the ram air inlet and the clamp that is at a location four feet downstream.
   (i) Remove the 14 bolts from the flange that attaches the ram air inlet duct to the ram air door assembly.
   (j) Remove the gasket from the flange.
   (k) Remove the support clamp from the ram air inlet duct.

      NOTE: Do not remove the support clamp from the airplane structure.

   (l) Loosen the clamp that is approximately four feet downstream of the ram air door assembly.
   (m) Remove the ram air inlet duct.

S 944-020

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 034-005

(5) Hold the clamp ring on the center tank access door and remove the mounting bolts.

S 034-006

(6) Remove the clamp ring and the gasket.

S 024-021

CAUTION: DO NOT USE A LEVER (PRY) ON THE CENTER TANK ACCESS DOOR. THE LOWER SURFACE OF THE ACCESS DOOR FLANGE AND THE UPPER SURFACE OF THE WING SKIN AROUND THE ACCESS DOORS ARE SEAL SURFACES. IF YOU ARE NOT CAREFUL, SCRATCHES OR DAMAGE TO THE SEAL SURFACE CAN OCCUR.

(7) Push up on the center tank access door.
  (a) If the center tank access door does not move freely, use a rubber mallet and hit lightly around the access door.

S 024-017

(8) Remove the center tank access door from the fuel tank.

TASK 28-11-02-404-019

3. Install the Center Tank Access Door (Fig. 401)

A. General
  (1) BMS3-38 (Cor-Ban 27L) is the recommended anti-corrosion compound for access door gasket installations. BMS3-38 gives improved corrosion protection between the access door, mesh gasket and wing surfaces. Anti-corrosion compound, MIL-G-25537 (Aero Shell No. 14), can still be used for access door gaskets, but should be replaced with BMS3-38 as soon as practical.
  (2) Do not mix the two types of anti-corrosion compounds, BMS3-38 and MIL-G-25537. When you apply the recommended anti-corrosion compound BMS3-38, make sure to remove all MIL-G-25537 compound from the mesh gasket, clamp ring and the access door structure on the airplane.
  (3) Access panel 531AB, 531BB, 531CB, 631AB, 631BB, and 631CB on each of the lower wing surface are high impact resistant access panels. These panels must not be replaced with standard access panels.

B. Consumable Materials
  (1) Anticorrosion Grease - Use one of these (BMS3-38 recommended):
    (a) D00020 Grease, Anti-corrosion - Aero Shell No. 14 (AMM 20-30-03/201)
    (b) G50237 Corrosion Inhibiting material, Non-Drying Paste, Cor-Ban 27L (BMS3-38)
  (2) B00316 Solvent - Aliphatic Naphtha TT-N-95

C. References
  (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
  (2) AMM 12-11-01/301, Pressure Fueling
  (3) AMM 21-51-00/501, Air Cycle Pack System

D. Access
  (1) Location Zones
    134 Wing Center Section (Right)
    194 Wing to Body - Forward Lower Half (Right)
    531 Center Wing Tank (Left)
    631 Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Wing Tank Access Door
194ER	Air Conditioning Access Door
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)

E. Prepare to Install the Access Door

S 214-021

(1) Make sure the areas on access door and wing skin, that the molded rubber seal touches, are clean.

NOTE: Use sovlent to clean the surfaces if it is necessary.

S 214-022

(2) Examine the rubber seals for deterioration.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: You can remove the rubber seal on all high impact-resistant access doors and all new replacement access doors (AMM 28-11-10/801).

(a) Replace the rubber seal if it is necessary (AMM 28-11-10/801).

S 424-009

(3) Set the access door in the opening of the fuel tank.

S 424-029

CAUTION: MAKE SURE THE ALIGNMENT INSERT ON THE ACCESS DOOR IS ON THE CORRECT SIDE OF THE ACCESS OPENING. FUEL LEAKAGE CAN OCCUR IF THE ACCESS DOOR IS NOT INSTALLED IN THE CORRECT DIRECTION.

(4) On the center tank access doors with the fuel measuring sticks, make sure the alignment insert in the access door is in the same position as the alignment notch in the wing skin (Fig. 401).

F. Prepare the Original Knitted Aluminum Gasket for Installation

S 114-033

(1) Clean the clamp ring and knitted gasket with a cotton wiper (BMS15-5) and solvent.

S 214-032
(2) Do a check of the knitted aluminum gasket for serviceability.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Replace the gasket if any of the subsequent conditions exist:
1) Fastener holes torn
2) Elongated out of shape
3) More than 10% of strands broken through thickness of gasket in one area.

S 644-034
(3) When you apply BMS3-38 (Cor-Ban 27L anti-corrosion compound) for the first time, do these steps:
(a) Use a vapor degrease process (BAC5408) to remove all of the MIL-G-25537, anti-corrosion compound.
(b) Fill the two sides of the gasket mesh with BMS3-38 anti-corrosion compound.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 644-035
(4) Apply the correct quantity of anti-corrosion compound:

NOTE: If there is not a sufficient quantity of anti-corrosion compound, the compound can have holes that collect moisture. If you use too much anti-corrosion compound, it can flow out of the lower wing surface.

(a) Make sure the anticorrosion compound correctly fills the aluminum mesh on the two sides of the gasket before you install it.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) If the gasket mesh has too much anti-corrosion compound, remove the excess compound with a cotton wiper (BMS15-5) that is moist with a solvent.

(c) If the gasket mesh is not fully filled with anti-corrosion compound, do these steps:
1) Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.
2) Apply a 1/2 to 1 ounce (14.7 to 29.5 ml) layer of anti-corrosion compound equally to each side of the gasket.
3) Make sure the layer is continuous on the gasket.

G. Prepare a New Knitted Aluminum Gasket for Installation

S 114-036

(1) Clean the clamp ring with a cotton wiper (BMS15-5) and solvent.

S 644-037

(2) Make sure the new gasket is filled with the correct anti-corrosion compound.

NOTE: Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.

S 214-038

(3) Do a check of the manufacturing date (shelf-life) information on the replacement gasket container.
(a) If the gasket is more than five years old, do these steps:
1) Remove the old anti-corrosion compound from the gasket.
2) Refill the two sides of the gasket with new anti-corrosion compound.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) If the gasket is less than five years old, it is not necessary to remove the old anti-corrosion compound.

S 644-039

(4) Apply the correct quantity of anti-corrosion compound:

NOTE: If there is not a sufficient quantity of anti-corrosion compound, the compound can have holes that collect moisture. If you use too much anti-corrosion compound, it can flow out of the lower wing surface.

(a) Make sure the anti-corrosion compound correctly fills the aluminum mesh on the two sides of the gasket before you install it.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) If the gasket mesh has too much anti-corrosion compound, remove the excess compound with a cotton wiper (BMS15-5) that is moist with a solvent.

(c) Install the new gasket to the clamp ring.

NOTE: Make sure the clamp ring and gasket holes align. The holes are not symmetrical.

H. Install the Access Door

S 644-040

(1) Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.

S 644-026

CAUTION: DO NOT APPLY TOO MUCH ANTI-CORROSION COMPOUND IN FRONT OF THE MOUNTING SCREWS. YOU CAN CAUSE DAMAGE TO THE PANEL WITH THE HYDRAULIC PRESSURE FROM THE ANTI-CORROSION COMPOUND.

CAUTION: APPLY THE ANTI-CORROSION COMPOUND CAREFULLY. THE COMPOUND CAN CAUSE CONTAMINATION OF THE FUEL TANK.

(2) Apply 0.010 to 0.015 inch (0.25 to 0.38 mm) of anticorrosion compound to the lower surface of the wing skin that touches the aluminum gasket for the access panel (Fig. 401).

S 434-010
(3) Put the gasket and the clamp ring in the opening between the outer face of the access door and the wing skin and install the mounting bolts.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-031
(4) Make sure the clamp ring has an equal gap around the edges of the access door and the lower surface of the wing.

S 434-011
(5) Tighten the mounting bolts to 30-40 pound-inches.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Start at the centerline and tighten the mounting bolts equally in both directions (Fig. 402).

I. Center Tank Access Door Leakage Check

S 654-012
(1) Refuel the fuel tank (AMM 12-11-01/301).

S 214-013
(2) Make sure there is no fuel leakage at the center tank access door.

S 414-014
(3) For the center tank access door 134AZ, do the steps that follow:
(a) Align the ram air inlet duct with the flange on the ram air door assembly and the clamp downstream.
(b) Put the washers on the 14 mounting bolts.
(c) Put a new gasket between the duct flange and the flange on the ram air door assembly (View D).
(d) Install the mounting bolts through the duct flange, gasket and the flange of ram air door assembly.
(e) Align the ram air inlet duct with the clamp at the opposite end of the ram air inlet duct.
(f) Tighten the nut on the clamp to 15-20 pound-inches.
(g) Install the support clamp on the ram air inlet duct.
(h) Tighten the nut on the support clamp to 25-30 pound-inches.
(i) Make sure the right pack overheat switch is in the vertical position.
(j) Align the air conditioning duct with the cabin air supply check valve and the air conditioning pack condenser.

(k) Install the clamp that attaches the air conditioning duct to the air conditioning pack condenser.
(l) Tighten the nut on the clamp to 70-90 pound-inches.
(m) Install the clamp that attaches the air conditioning duct to the cabin air supply check valve.
(n) Tighten the clamp to 70-90 pound-inches.
(o) Attach the electrical connector to the right pack overheat switch.
(p) Remove the DO-NOT-CLOSE tag and close this P11 circuit breaker:
1) 11M22, RIGHT PACK FLOW CONT

S 794-022
(4) For the center tank access door 134AZ,
do the leakage test on the right air conditioning pack
(AMM 21-51-00/501).

S 014-020
(5) For the center tank access door 134AZ,
Close the air conditioning access door, 194ER (AMM 06-41-00/201).

SURGE TANK ACCESS DOOR - REMOVAL/INSTALLATION

1. General
   A. Each surge tank has three access doors found in the lower wing surface. A pressure relief valve attaches to the surge tank access doors 543AB and 643AB. A flame arrestor attaches to the surge tank access doors 543BB and 643BB.
   B. This procedure contains two tasks. The first task removes the surge tank access door. The second task installs the surge tank access door.

TASK 28-11-03-004-004

2. Remove the Surge Tank Access Door (Fig. 401)
   A. References
      (1) AMM 12-11-03/301, Fuel Sump Draining
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-13-04/201, Surge Tank Pressure Relief Valve
      (4) AMM 28-13-05/401, Surge Tank Vent Flame Arrestor
   B. Access
      (1) Location Zones

543	Surge Tank - Rib No. 21 to No. 23 (Left)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

      (2) Access Panels

543AB	Surge Tank Access Door (Left)
543BB	Surge Tank Access Door (Left)
543CB	Surge Tank Access Door (Left)
643AB	Surge Tank Access Door (Right)
643BB	Surge Tank Access Door (Right)
643CB	Surge Tank Access Door (Right)

   C. Procedure

      S 654-001

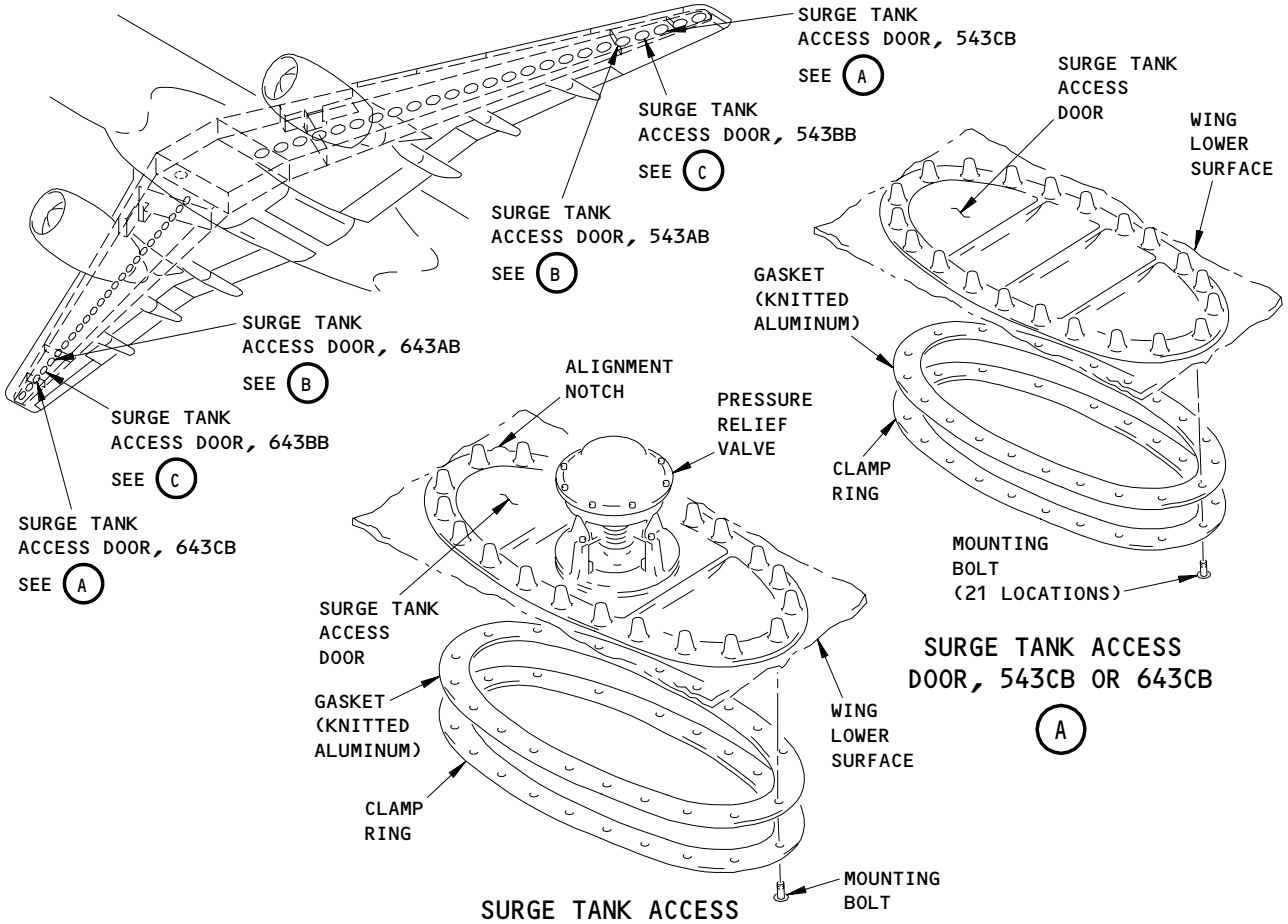
      WARNING: FOLLOW THE FUEL TANK DRAINING PROCEDURES (AMM 12-11-03/301). FAILURE TO FOLLOW THE FUEL TANK DRAINING PROCEDURE COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

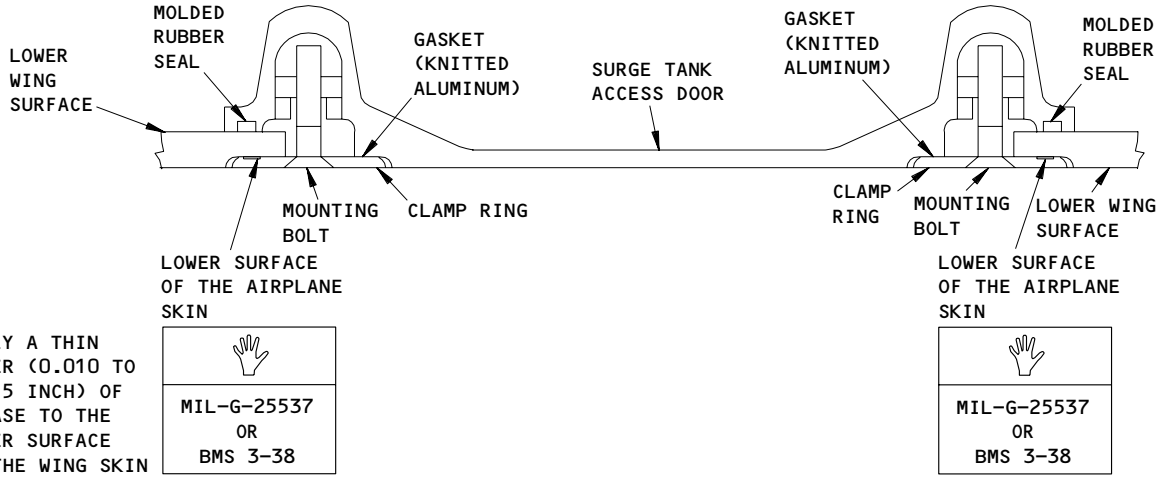
      (1) Drain the surge tank at the sump drain valve (AMM 12-11-03/301).

      S 944-002

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Obey the fuel tank entry precautions (AMM 28-11-00/201).

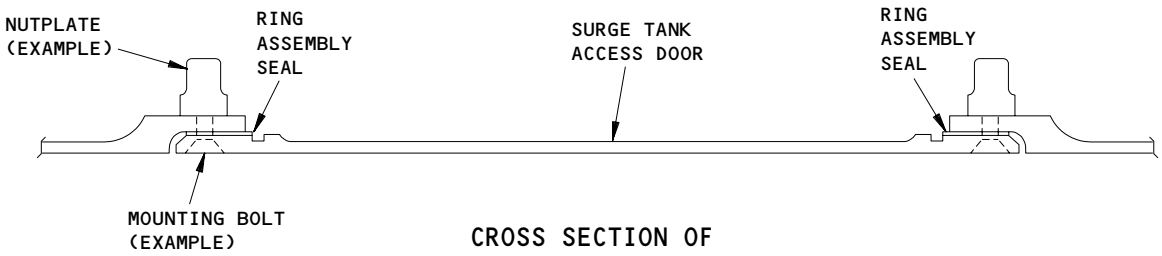




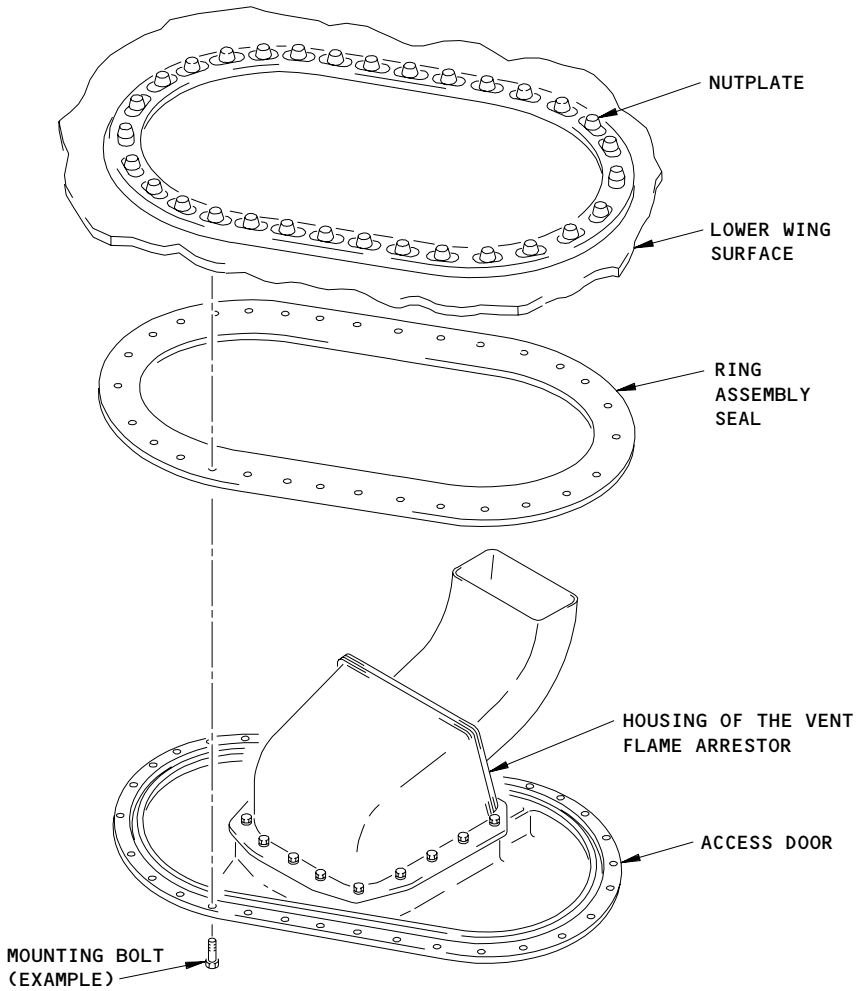
NOTE: APPLY A THIN LAYER (0.010 TO 0.015 INCH) OF GREASE TO THE LOWER SURFACE OF THE WING SKIN THAT TOUCHES THE ALUMINUM GASKET (REFER TO THE TEXT)

CROSS SECTION OF SURGE TANK ACCESS DOOR, 543AB, 543CB, 643AB, OR 643CB

Surge Tank Access Door Installation
Figure 401 (Sheet 1)



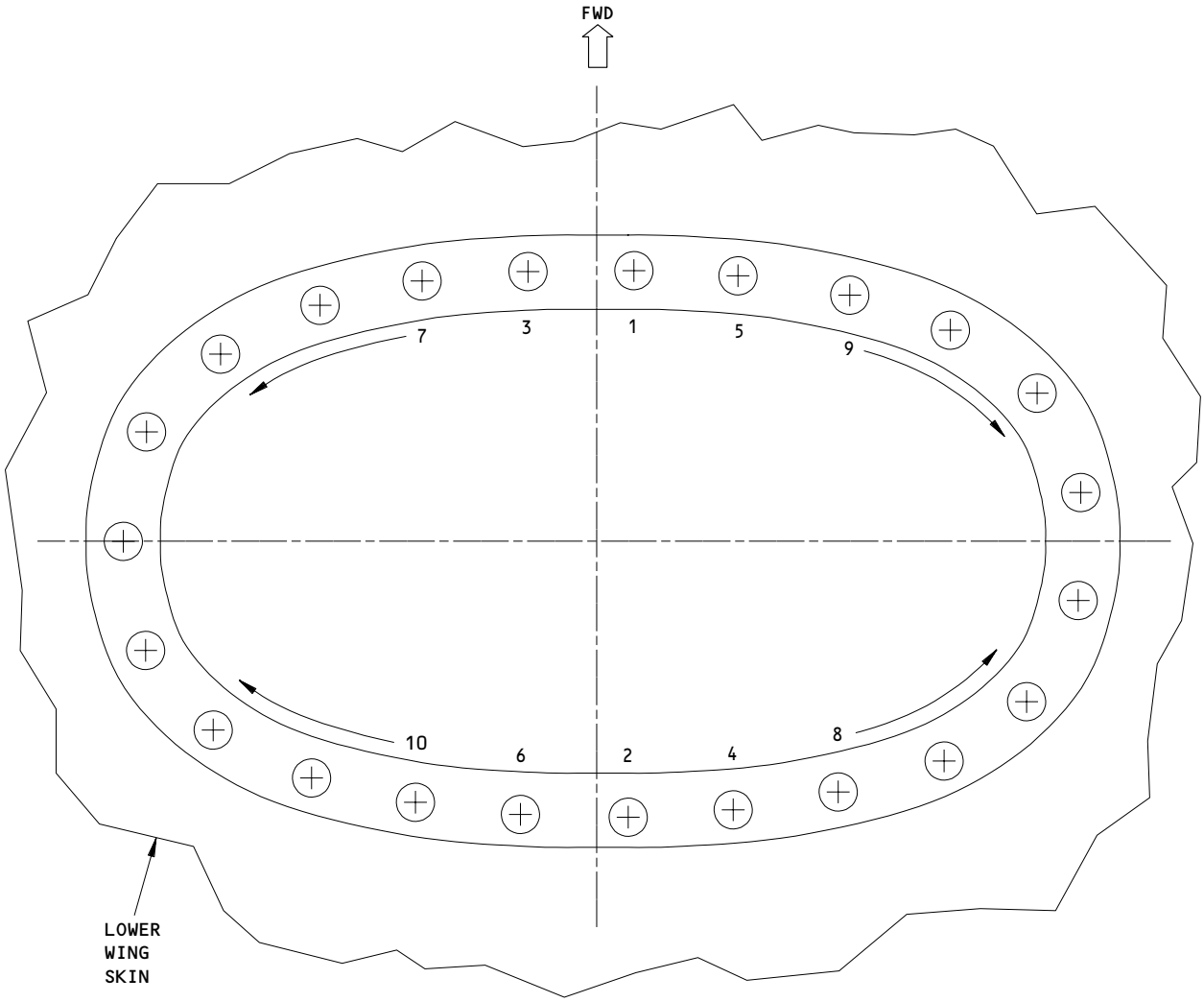
CROSS SECTION OF
SURGE TANK ACCESS DOOR,
543BB OR 643BB



SURGE TANK ACCESS DOOR,
543BB OR 643BB

(C)

Surge Tank Access Door Installation
Figure 401 (Sheet 2)



NOTE: TORQUE THE MOUNT BOLTS IN THE SEQUENCE SHOWN BY THE NUMBERS. THIS WILL MAKE SURE FUEL DOES NOT LEAK AROUND THE ACCESS PANEL.

Access Panel Mount Bolt Torque Pattern
Figure 402

S 024-005

(3) To remove surge tank access door 543CB or 643CB, do the steps that follow:
   (a) Hold the clamp ring and remove the mounting bolts (View A).
   (b) Remove the clamp ring and the gasket.

   CAUTION: DO NOT USE A LEVER (PRY) ON THE SURGE TANK ACCESS DOOR. IF THE SURGE TANK ACCESS DOOR DOES NOT MOVE FREELY, USE A RUBBER MALLET AND HIT LIGHTLY AROUND THE SURGE TANK ACCESS DOOR. IF YOU ARE NOT CAREFUL, SCRATCHES OR DAMAGE TO THE SEAL SURFACE CAN OCCUR.

   (c) Push up on the surge access door.
   (d) Remove the surge tank access door from the surge tank.
   (e) Install a rubber protector around the opening in the lower wing surface.

S 024-006

(4) To remove surge tank access door 543AB or 643AB, do the steps that follow:
   (a) Hold the clamp ring and remove the mounting bolts (View B).
   (b) Remove the clamp ring and the gasket.

   CAUTION: DO NOT USE A LEVER (PRY) ON THE SURGE TANK ACCESS DOOR. IF THE SURGE TANK ACCESS DOOR DOES NOT MOVE FREELY, USE A RUBBER MALLET AND HIT LIGHTLY AROUND THE SURGE TANK ACCESS DOOR. IF YOU ARE NOT CAREFUL, SCRATCHES OR DAMAGE TO THE SEAL SURFACE CAN OCCUR.

   (c) Push up on the surge access door.
   (d) Remove the surge tank access door from the surge tank.

   WARNING: DO NOT TOUCH THE PRESSURE RELIEF VALVE WHEN YOU REMOVE THE SURGE TANK ACCESS DOOR. IF THE PRESSURE RELIEF VALVE OPENS ACCIDENTALLY, INJURY TO PERSONS CAN OCCUR.

   (e) Remove the pressure relief valve from the surge tank access door (AMM 28-13-04/201).

S 024-007

(5) To remove the surge tank access door 543BB or 643BB, do the steps that follow:
   (a) Hold the surge tank access door and remove the mounting bolts (View C).
   (b) Remove the surge tank access door, O-ring and rubber seal.
   (c) Remove the housing of the vent flame arrestor from the surge tank access door (AMM 28-13-05/401).

TASK 28-11-03-404-008

3. Install the Surge Tank Access Door (Fig. 401)

A. General

(1) BMS3-38 (Cor-Ban 27L) is the recommended anti-corrosion compound for access door gasket installations. BMS3-38 gives improved corrosion protection between the access door, mesh gasket and wing surfaces. Anti-corrosion compound, MIL-G-25537 (Aero Shell No. 14), can still be used for access door gaskets, but should be replaced with BMS3-38 as soon as practical.

(2) Do not mix the two types of anti-corrosion compounds, BMS3-38 and MIL-G-25537. When you apply the recommended anti-corrosion compound BMS3-38, make sure to remove all MIL-G-25537 compound from the mesh gasket, clamp ring and the access door structure on the airplane.

B. Consumable Materials

(1) Anticorrosion Grease - Use one of these (BMS3-38 recommended):

(a) D00020 Grease, Anti-corrosion - Aero Shell No. 14 (AMM 20-30-03/201)

(b) Corrosion Inhibiting material, Non-Drying Paste, Cor-Ban 27L (BMS3-38)

(2) B00316 Solvent - Aliphatic Naphtha TT-N-95

(3) D00504 Grease - Petrolatum

C. References

(1) AMM 28-11-10/801, Fuel Tank Access Doors

(2) AMM 28-13-04/201, Surge Tank Pressure Relief Valve

(3) AMM 28-13-05/401, Surge Tank Vent Flame Arrestor

D. Access

(1) Location Zones

543	Surge Tank - Rib No. 21 to No. 23 (Left)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels

543AB	Surge Tank Access Door (Left)
543BB	Surge Tank Access Door (Left)
543CB	Surge Tank Access Door (Left)
643AB	Surge Tank Access Door (Right)
643BB	Surge Tank Access Door (Right)
643CB	Surge Tank Access Door (Right)

E. Prepare to Install Access Door 543AB, 543CB, 643AB or 643CB

S 214-003

(1) Make sure the areas on access door and wing skin, that the molded rubber seal touches, are clean.

NOTE: Use sovlent to clean the surfaces if it is necessary.

S 214-004
(2) Examine the rubber seals for deterioration.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: You can remove the rubber seal only on access doors that are high impact-resistant.

(a) Replace the rubber seal if it is necessary (AMM 28-11-10/801).

S 644-027
(3) Apply a thin layer of petrolatum, D00504 to the molded rubber seal.

NOTE: This will prevent damage to the rubber seal during subsequent access panel removal. It will also be easier to remove the access panel.

S 424-009
(4) To install the surge tank access door 543CB or 643CB, do the steps that follow:
(a) Remove the rubber protector from the opening in the lower wing surface.
(b) Make sure the seal surfaces on the surge tank access door and lower wing surface are clean (View A).
(c) Make sure the molded rubber seal in the surge tank access door is clean and not damaged.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 164-024
(5) Prepare the Original Knitted Aluminum Gasket for Installation
(a) Clean the clamp ring and knitted gasket with a cotton wiper (BMS15-5) and solvent.
(b) Do a check of the knitted aluminum gasket for serviceability.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Replace the gasket if any of the subsequent conditions exist:
a) Fastener holes torn

b) Elongated out of shape
c) More than 10% of strands broken through thickness of gasket in one area.

(c) When you apply BMS3-38 (Cor-Ban 27L anti-corrosion compound) for the first time, do these steps:
1) Use a vapor degrease process (BAC5408) to remove all of the MIL-G-25537, anti-corrosion compound.
2) Fill the gasket mesh with BMS3-38 anti-corrosion compound.

(d) Apply the correct quantity of anti-corrosion compound:

NOTE: If there is not a sufficient quantity of anti-corrosion compound, the compound can have holes that collect moisture. If you use too much anti-corrosion compound, it can flow out of the lower wing surface.

1) Make sure the anticorrosion compound correctly fills the aluminum mesh on the two sides of the gasket before you install it.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

2) If the gasket mesh has too much anti-corrosion compound, remove the excess compound with a cotton wiper (BMS15-5) that is moist with a solvent.
3) If the gasket mesh is not fully filled with anti-corrosion compound, do these steps:
a) Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.
b) Apply a 1/2 to 1 ounce (14.7 to 29.5 ml) layer of anti-corrosion compound equally to each side of the gasket.
c) Make sure the layer is continuous on the gasket.

S 164-025

(6) Prepare a New Knitted Aluminum Gasket for Installation
(a) Clean the clamp ring with a cotton wiper (BMS15-5) and solvent.
(b) Make sure the new gasket is filled with the correct anti-corrosion compound.

NOTE: Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.

(c) Do a check of the manufacturing date (shelf-life) information on the replacement gasket container.
1) If the gasket is more than five years old, do these steps:
a) Remove the old anti-corrosion compound from the gasket.

b) Refill the two sides of the gasket with new anti-corrosion compound.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

2) If the gasket is less than five years old, it is not necessary to remove the old anti-corrosion compound.

(d) Apply the correct quantity of anti-corrosion compound:

NOTE: If there is not a sufficient quantity of anti-corrosion compound, the compound can have holes that collect moisture. If you use too much anti-corrosion compound, it can flow out of the lower wing surface.

1) Make sure the anti-corrosion compound correctly fills the aluminum mesh on the two sides of the gasket before you install it.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

2) Install a new gasket to the clamp ring.

NOTE: Make sure the clamp ring and gasket holes align. The holes are not symmetrical.

S 414-026

(7) To install surge tank access door 543CB or 643CB, do the steps that follow:

(a) Do not mix MIL-G-25537 and BMS3-38 anti-corrosion compounds.

CAUTION: DO NOT APPLY TOO MUCH ANTI-CORROSION COMPOUND IN FRONT OF THE MOUNTING SCREWS. YOU CAN CAUSE DAMAGE TO THE PANEL WITH THE HYDRAULIC PRESSURE FROM THE ANTI-CORROSION COMPOUND.

CAUTION: APPLY THE ANTI-CORROSION COMPOUND CAREFULLY. THE CAUSE CONTAMINATION OF THE FUEL TANK.

(b) Apply 0.010 to 0.015 inch (0.25 - 0.38 mm) thick layer of anticorrosion compound to the lower surface of the wing skin that touches the aluminum gasket for the access panel (Fig. 401).
   1) Put the surge tank access door in the opening of the surge tank.
   2) Put and hold the gasket and the clamp ring in the opening between the outer face of the access door and the wing skin.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

   3) Make sure the clamp ring has an equal gap around the edges of the access door and the lower surface of the wing.
   4) Install the mounting bolts.
   5) Start at the centerline and tighten the mounting bolts to 30-40 pound-inches equally in each direction (Fig. 402).

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-003

(8) To install the surge tank access door 543AB or 643AB, do the steps that follow:

WARNING: BE CAREFUL WHEN YOU INSTALL THE PRESSURE RELIEF VALVE. IF YOU ARE NOT CAREFUL, INJURY TO PERSONS COULD OCCUR IF THE PRESSURE RELIEF VALVE OPENS ACCIDENTALLY.

(a) Install the pressure relief valve on the surge tank access door (AMM 28-13-04/201).
(b) Make sure the seal surfaces on the surge tank access door and the lower wing surface are clean (View B).

(c) Make sure the molded rubber seal in the surge tank access door is clean and not damaged.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(d) Put the surge tank access door in the opening of the surge tank.
(e) Put and hold the gasket and the clamp ring in the opening.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(f) Make sure the clamp ring has an equal gap around the edges of the access door and the lower surface of the wing.
(g) Install the mounting bolts.
(h) Start at the centerline and tighten the mounting bolts to 30-40 pound-inches equally in each direction.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

F. Install Surge Tank Access Door 543BB or 643BB

S 424-010
(1) To install the surge tank access door 543BB or 643BB, do the steps that follow.
(a) Install the housing of the vent flame arrestor on the surge tank access door (AMM 28-13-05/401).
(b) Clean the countersinks on the surge tank access door.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(c) Install a new O-ring in the groove on the surge tank access door (View C).
(d) Put a rubber seal on the inner surface of the surge tank access door such that the bolt holes align.
(e) Align the surge tank access door with the nutplate in the opening on the lower wing surface.
(f) Install the mounting bolts on the surge tank access door.

(g) Tighten the mounting bolts to 30-40 pound-inches.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

G. Do a Check of the Surge Tank Access Door Installation

S 944-014

WARNING: MAKE SURE YOU INSTALL THE SURGE TANK ACCESS DOORS CORRECTLY. FUEL CAN ENTER THE SURGE TANKS DURING SOME GROUND OR FLIGHT MANEUVERS. IF THE SURGE TANK ACCESS DOOR(S) ARE NOT INSTALLED CORRECTLY AN OVERBOARD FUEL SPILL CAN OCCUR. AN OVERBOARD FUEL SPILL IS A FIRE HAZARD.

(1) Use one of these methods to do a check of the surge tank access door installation:
(a) Do a visual check to make sure the access door installation is fluid tight.
(b) Do a fuel leak check for the surge tank access doors.
1) Do this task: Overfill Shutoff Test (AMM 28-21-00/501).

OVERWING FILL PORTS - REMOVAL/INSTALLATION

1. General
   A. There are two overwing fill ports, one in each main tank.
   B. This procedure contains two tasks. The first task is to remove the overwing fill port. The second task is to install the overwing fill port.

TASK 28-11-04-004-001

2. Remove the Overwing Fill Port (Fig. 401)
   A. Equipment
      (1) Spanner Wrench - ST2580-302
      (2) Maintenance mats
   B. References
      (1) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
      (2) AMM 28-11-01/401, Main Tank Access Door
   C. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panel
          541JB Main Tank Access Door (Left)
          641JB Main Tank Access Door (Right)

   D. Procedure

      S 014-011
      (1) Remove the main tank access door, 541JB or 641JB (AMM 28-11-01/401).

      S 654-010
      (2) Purge the fuel tank (AMM 28-11-00/201).

      S 494-009

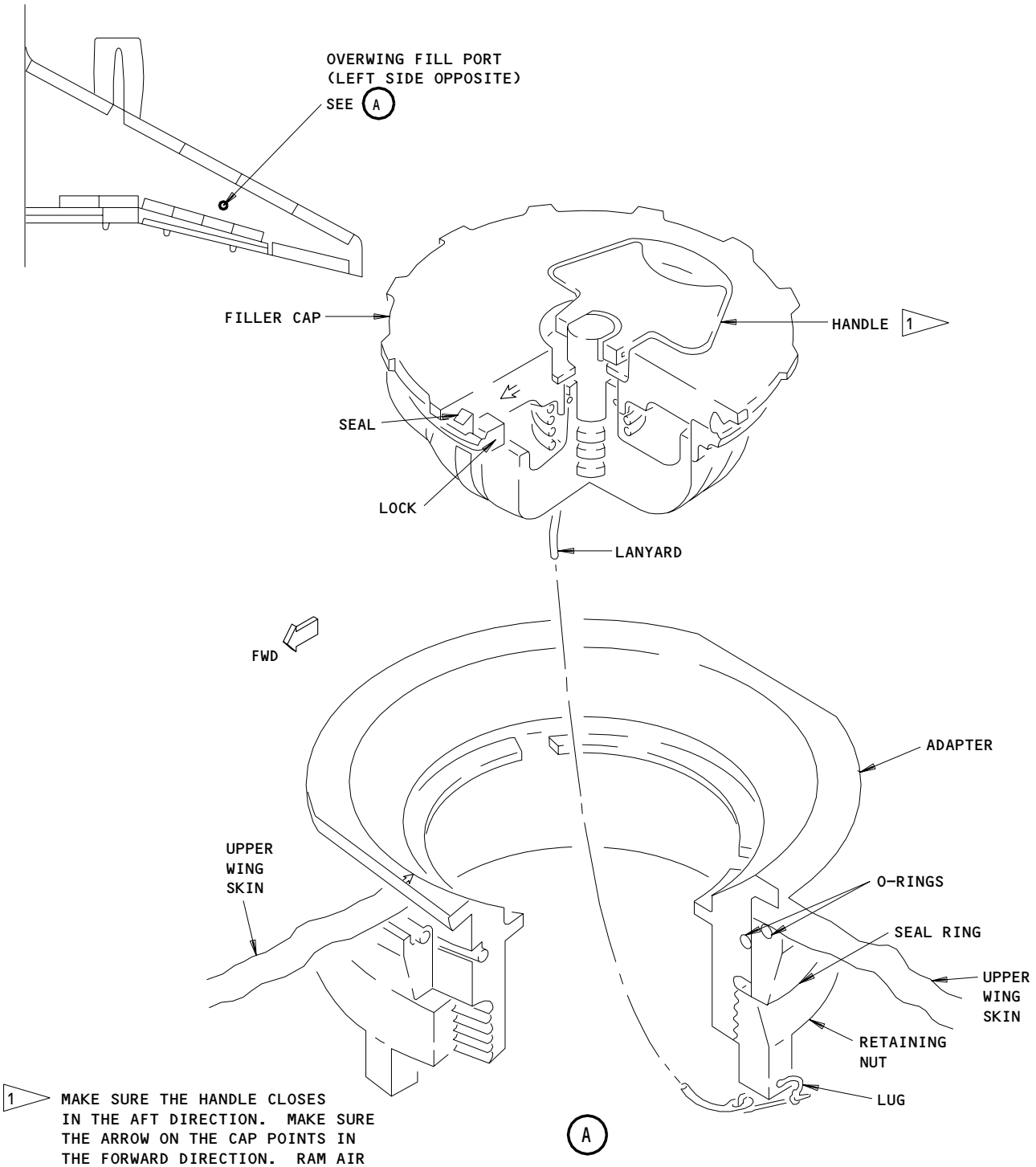
      CAUTION: PUT MAINTENANCE MATS IN THE AREAS WHERE YOU WORK. IF YOU DO NOT USE MAINTENANCE MATS, YOU CAN CAUSE DAMAGE TO WING PANELS.

      (3) Put maintenance mats in the areas where work is done.

      S 014-008
      (4) Open the filler cap on the overwing fill port.

      S 034-007
      (5) Disconnect the lanyard on the filler cap from the lug on the retaining nut.

      S 034-006
      (6) Remove the lockwire from the retaining nut and the wing structure.



Overwing Fill Port Installation
Figure 401

S 024-005

(7) Use the spanner wrench and remove the retaining nut from the adapter of the overwing fill port.

S 034-004

(8) Remove the seal ring from the adapter.

S 024-003

(9) Lift the adapter through the opening in the upper wing skin.

TASK 28-11-04-404-002

3. Install the Overwing Fill Port (Fig. 401)

A. Equipment

(1) Spanner Wrench - ST2580-302

(2) Maintenance Mats

B. Consumable Materials

(1) D00128 Petrolatum - Technical, VV-P-236

(2) Aerodynamic Smoother (BAC 5030)

C. References

(1) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)

(2) AMM 28-11-01/401, Main Tank Access Door

D. Access

(1) Location Zones

541 Main Tank - Rib No. 5 to No. 17 (Left)

641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panel

541JB Main Tank Access Door (Left)

641JB Main Tank Access Door (Right)

E. Procedure

S 914-022

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 394-026
(2) Prepare these faying surfaces for an electrical faying surface bond (SWPM 20-20-00):
(a) Upper surface of retaining nut
(b) Upper and lower surface of seal ring
(c) Lip/flange of adapter (horizontal surface that mates with upper wing skin)
(d) Mating surfaces of the upper wing skin adjacent to the adapter (outside the tank) and the seal ring (inside the tank).
(e) Apply Alodine 600 to the above bared surfaces.

S 434-021
(3) Do these steps to install the O-ring:
(a) Apply petrolatum to the new O-rings.
(b) Install a new O-ring in the groove on the adapter.
(c) Install a new O-ring in the groove on the seal ring.
(d) Make sure the faying surfaces adjacent to the O-ring groove on the seal ring are free from petrolatum.

S 424-004

CAUTION: MAKE SURE THE ADAPTER IS INSTALLED IN THE CORRECT DIRECTION. IF THE ADAPTER IS NOT INSTALLED IN THE CORRECT DIRECTION, RAM AIR CAN CAUSE THE CAP TO RELEASE DURING FLIGHT.

(4) Put and hold the adapter in the opening in the wing skin panel.
(a) Make sure the arrow on the adapter points in the aft direction.
(b) Make sure that the filler cap can be installed in the adapter with the handle locked aft and down (Fig. 401).

S 434-019
(5) Install a new O-ring in the groove on the seal ring.

S 424-018
(6) Put the seal ring on the adapter.

S 424-017
(7) Install the retaining nut with the spanner wrench.

S 424-024
(8) Torque the retaining nut to 30-40 foot-pounds.

S 764-027
(9) Measure the bonding resistance between the adapter of the overwing fill port and the upper wing skin (SWPM 20-20-00).
(a) Make sure the resistance is less than 0.010 ohm (10 milliohms).

S 434-016
(10) Install the lockwire between the lug on the retaining nut and the tab on the airplane structure.

S 434-015
(11) Attach the lanyard on the filler cap to the lug on the retaining nut.

S 424-031
(12) Apply aerodynamic smoother (BAC 5030) around the periphery of the adapter.

NOTE: Make sure the aerodynamic smoother is flush with the upper surface of the wing skin.

S 434-005

CAUTION: MAKE SURE THE FILLER CAP IS INSTALLED IN THE CORRECT DIRECTION. IF THE FILLER CAP IS NOT INSTALLED IN THE CORRECT DIRECTION, RAM AIR CAN CAUSE THE CAP TO RELEASE DURING FLIGHT.

(13) Install the filler cap on the overwing fill port.

S 434-003
(14) Make sure the handle on the filler cap goes in the aft direction when it is locked.

NOTE: This will make sure that ram air does not release the handle during flight.

S 094-013
(15) Remove the equipment used to purge and ventilate the fuel tank (AMM 28-11-00/201).

S 084-028
(16) Remove the maintenance mats.

S 654-029
(17) Refuel the fuel tank.

S 214-030
(18) Make sure there are no leaks.

S 414-012
(19) Install the main tank access door, 541JB or 641JB (AMM 28-11-01/401).

OVERWING FILL PORTS - INSPECTION/CHECK

1. General
   A. There are two overwing fill ports, one in each main tank.

TASK 28-11-04-766-027

2. Overwing Fill Port - Bonding Resistance Check (Fig. 601)
   A. References
      (1) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Model T477W, Avtron Manufacturing Co., Cleveland OH
      (2) Maintenance Mats - commercially available
   C. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

   D. Procedure

S 496-004

CAUTION: PUT MAINTENANCE MATS IN THE AREAS WHERE YOU DO WORK. IF YOU NOT USE MAINTENANCE MATS, YOU CAN CAUSE DAMAGE TO WING PANELS.

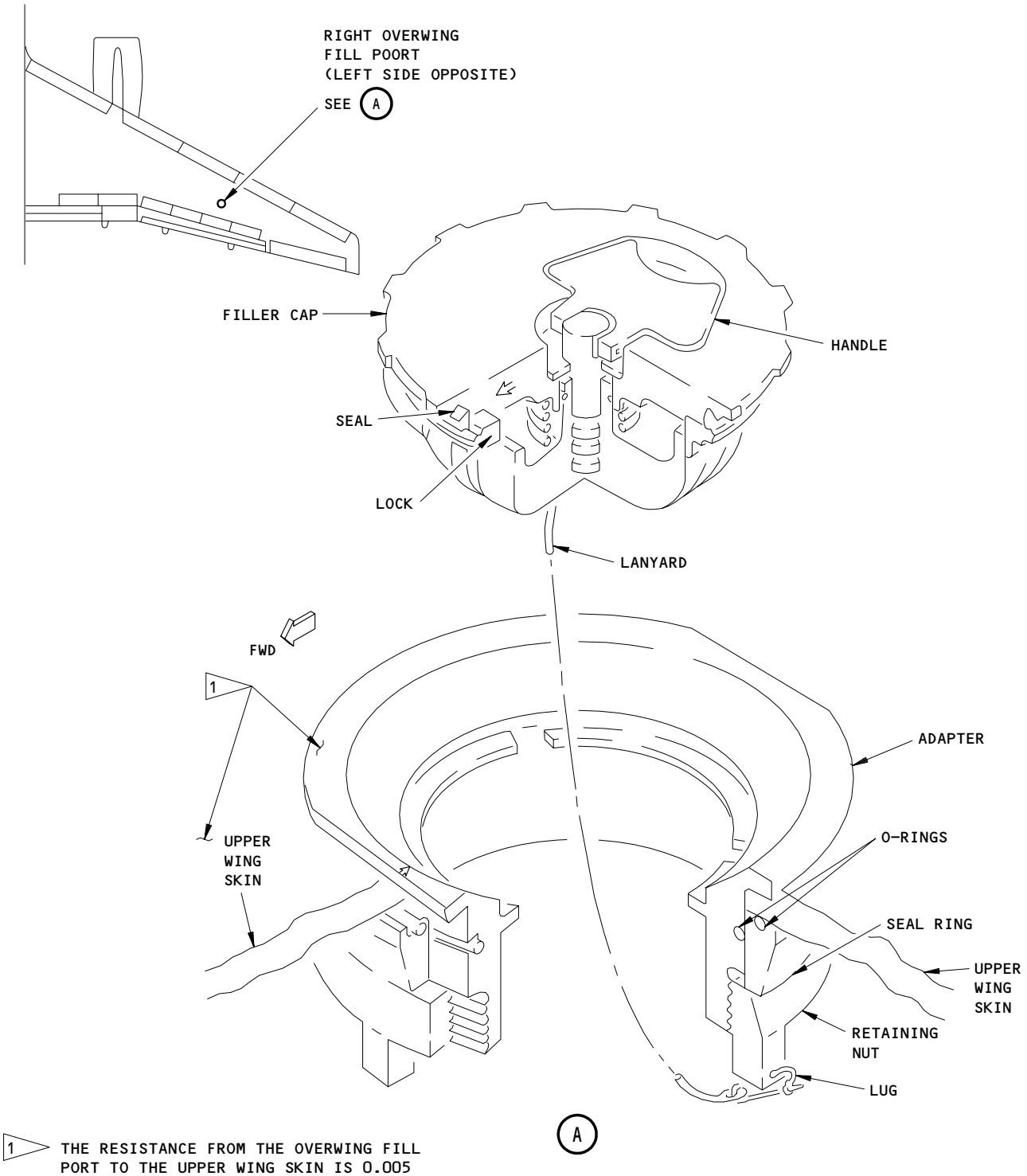
(1) Put maintenance mats in the areas where work is done.

S 766-025

(2) Measure the bonding resistance between the adapter of the overwing fill port and the upper wing skin (SWPM 20-20-00).
   (a) Make sure the resistance is less than 0.005 ohm (5.0 milliohms).

S 086-026

(3) Remove the maintenance mats.



Overwing Fill Port Resistance Check
Figure 601

FUEL SUMP DRAIN VALVES - REMOVAL/INSTALLATION

1. General
   A. There is one sump drain valve installed at each fuel sump location. Fuel sumps are located at the low point of each main fuel and surge tank. There are two fuel sump drain valves in the center fuel tank. The fuel sump drain valves remove collected fuel, water and contaminants. Removal of fuel remaining in the fuel tanks after tank defueling, is also through the sump drain valves.
   B. This procedure contains intructions for four tasks.
   The first task is to remove the drain valve and flapper assembly.

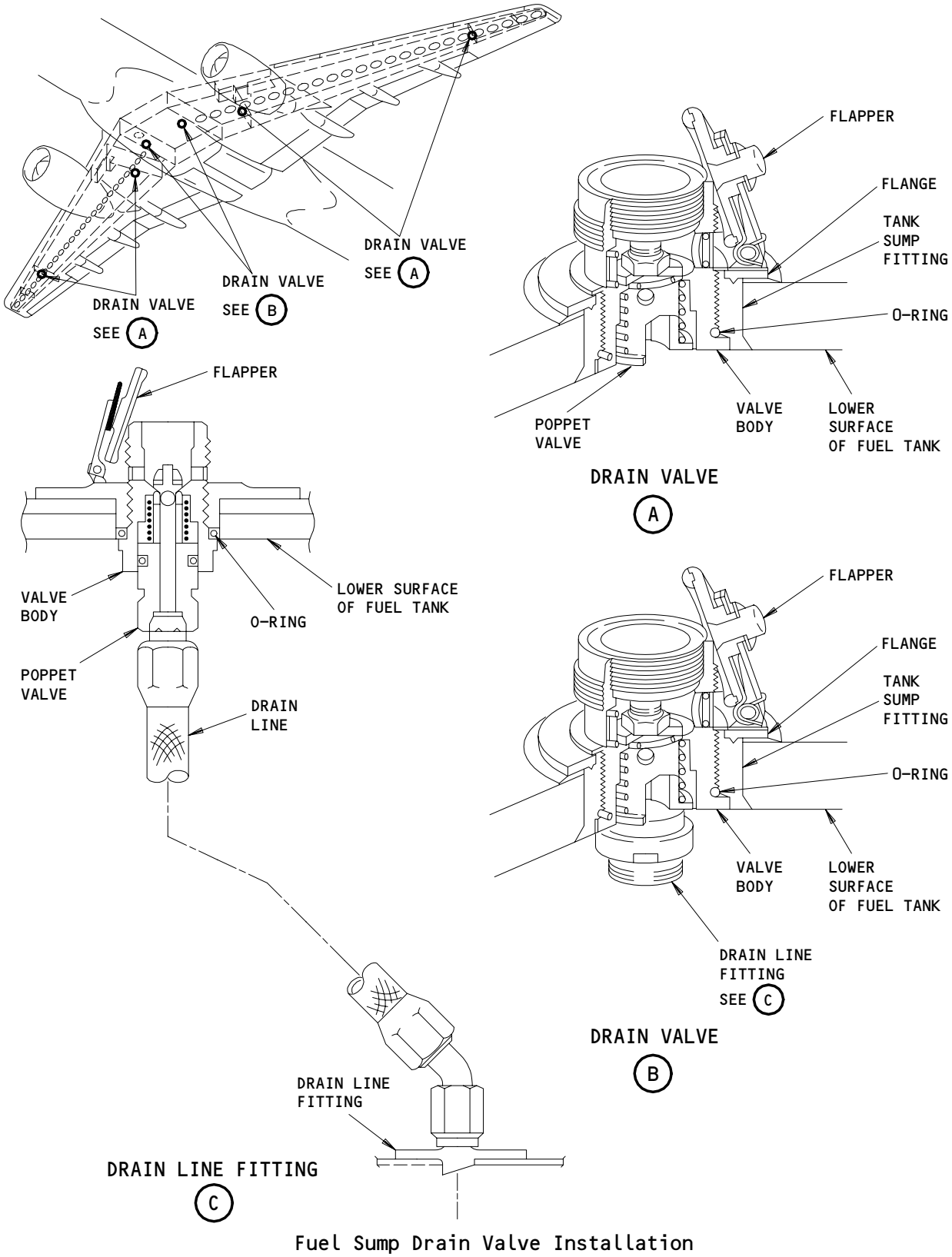
      NOTE: To remove the drain valve and flapper assembly you must go into the applicable fuel tank.

      The second task is to install the drain valve and flapper assembly.
      The third task is to remove the drain valve.

      NOTE: To remove the drain valve you do not have to go into the applicable fuel tank.

      The fourth task is to install the drain valve.

   TASK 28-11-05-004-001
2. Remove the Sump Drain Valve and Flapper Assembly (Fig. 401)
   A. Equipment
      (1) Adapter, Sump Drain Valve R/I - B28001-1
          Adapter, Main and Surge Tanks - B28001-2
          Adapter, Center Tank - B28001-5
   B. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
      (3) AMM 28-11-01/401, Main Tank Access Door
      (4) AMM 28-11-03/401, Surge Tank Access Door
   C. Access
      (1) Location Zones
          194 Wing to Body - Forward Lower Half (Right)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          543 Surge Tank - Rib No. 21 to No. 23 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)
          643 Surge Tank - Rib No. 21 to No. 23 (Right)



Fuel Sump Drain Valve Installation
Figure 401

(2) Access Panels

194CL	ECS Equipment Bay Access Door (Left)
194CR	ECS Equipment Bay Access Door (Right)
541AB	Main Tank Access Door (Left)
543AB	Surge Tank Access Door (Left)
641AB	Main Tank Access Door (Right)
643AB	Surge Tank Access Door (Right)

D. Procedure

S 014-007

(1) For the drain valve in the main tank,
remove the main tank access door 541AB or 641AB (AMM 28-11-01/401).

S 014-012

(2) For the drain valve in the center tank,
open the ECS equipment bay access door 194CR or 194CL
(AMM 06-41-00/201).

S 014-008

(3) For the drain valve in the surge tank,
remove the surge tank access door 543AB or 643AB (AMM 28-11-03/401).

S 914-031

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201).
FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE
INJURY OR DAMAGE.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 024-032

(5) To remove the drain valves in the main or surge tanks,
do the steps that follow:
(a) Use the adapter to remove the valve body from the tank sump
fitting.
(b) Go into the applicable fuel tank and get access to the drain
valve.
(c) Remove the screw to open the flange on the drain valve.
(d) Remove the flange with the flapper attached.

S 024-002

(6) To remove the center tank drain valve,
do the steps that follow:
(a) Disconnect the drain line from the drain valve.
(b) Use the adapter to remove the valve body from the tank sump
fitting.
(c) Go into the center fuel tank and get access to the drain valve.
(d) Remove the screw to open the flange on the drain valve.
(e) Remove the flange with the flapper attached.

TASK 28-11-05-404-003

3. Install the Sump Drain Valve and Flapper Assembly (Fig. 401)

A. Equipment

(1) Adapter, Sump Drain Valve R/I - B28001-1
Adapter, Main and Surge Tanks - B28001-2
Adapter, Center Tank - B28001-5

B. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 12-11-01/301, Pressure Fueling
(3) AMM 12-11-03/301, Fuel Tank Sump Draining
(4) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
(5) AMM 28-11-01/401, Main Tank Access Door
(6) AMM 28-11-03/401, Surge Tank Access Door

C. Access

(1) Location Zones

194	Wing to Body - Forward Lower Half (Right)
541	Main Tank - Rib No. 5 to No. 17 (Left)
543	Surge Tank - Rib No. 21 to No. 23 (Left)
641	Main Tank - Rib No. 5 to No. 17 (Right)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels

194CL	ECS Equipment Bay Access Door (Left)
194CR	ECS Equipment Bay Access Door (Right)
541AB	Main Tank Access Door (Left)
543AB	Surge Tank Access Door (Left)
641AB	Main Tank Access Door (Right)
643AB	Surge Tank Access Door (Right)

D. Procedure

S 914-033

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 214-016

(2) Make sure the areas of the drain valve and the lower surface of the fuel tank that touch are clean and not damaged.

S 424-028

(3) Put the flange of the drain valve in the groove of the lower surface of the fuel tank.

S 434-027

(4) Install the screw to close the flange on the drain valve.

S 424-026
(5) Install a new O-ring on the drain valve.

S 424-025
(6) Use the adapter to install the valve body on the lower surface of the fuel tank.

S 424-024
(7) Tighten the valve body to 200 pound-inches.

S 414-023
(8) For the drain valve in the main tank, install the main tank access door 541AB or 641AB (AMM 28-11-01/401).

S 414-022
(9) For the drain valve in the surge tank, install the surge tank access door 543AB or 643AB (AMM 28-11-03/401).

S 414-021
(10) For the drain valve in the center tank, connect the drain line to the drain valve.

S 414-020
(11) For the drain valve in the center tank, close the ECS equipment bay access door 194CR or 194CL (AMM 06-41-00/201).

S 634-019
(12) Refuel the fuel tank (AMM 12-11-01/301).

S 214-018
(13) Make sure there is no fuel leakage.

S 604-017
(14) Drain a small quantity of fuel from the applicable fuel tank to do a check on the drain valve (AMM 12-11-03/301).
(a) If the drain valve does not operate correctly, replace the drain valve.

TASK 28-11-05-004-009

4. Remove the Sump Drain Valve (Fig. 401)
A. Equipment
(1) Adapter, Sump Drain Valve R/I - B28001-1
Adapter, Main and Surge Tanks - B28001-2
Adapter, Center Tank - B28001-5
B. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels

C. Access
(1) Location Zones
194 Wing to Body - Forward Lower Half (Right)
541 Main Tank - Rib No. 5 to No. 17 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels
194CL ECS Equipment Bay Access Door (Left)
194CR ECS Equipment Bay Access Door (Right)

D. Procedure

S 014-004
(1) For the drain valve in the center tank, open the ECS equipment bay access door 194CR or 194CL (AMM 06-41-00/201).

S 034-013
(2) To remove the drain valve from the center tank, disconnect the drain line from the drain valve.

S 024-014
(3) Use the adapter and remove the valve body from the tank sump fitting.

TASK 28-11-05-404-010

5. Install the Sump Drain Valve (Fig.401)
A. Equipment
(1) Adapter, Sump Drain Valve R/I - B28001-1
Adapter, Main and Surge Tanks - B28001-2
Adapter, Center Tank - B28001-5
B. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 12-11-03/301, Fuel Tank Sump Draining
C. Access
(1) Location Zones
194 Wing to Body - Forward Lower Half (Right)
541 Main Tank - Rib No. 5 to No. 17 (Left)
543 Surge Tank - Rib No. 21 to No. 23 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels
194CL ECS Equipment Bay Access Door (Left)
194CR ECS Equipment Bay Access Door (Right)

D. Procedure

S 434-015
(1) Install a new O-ring on the drain valve.

S 424-029
(2) Use the adapter and install the valve body in the lower surface of the fuel tank.

S 424-030
(3) Tighten the valve body to 200 pound-inches.

S 434-005
(4) For the drain valve in the center tank, connect the drain line to the drain valve.

S 604-011
(5) Drain a small quantity of fuel from the applicable fuel tank to do a check on the drain valve (AMM 12-11-03/301).
(a) If the drain valve does not operate correctly, replace the drain valve.

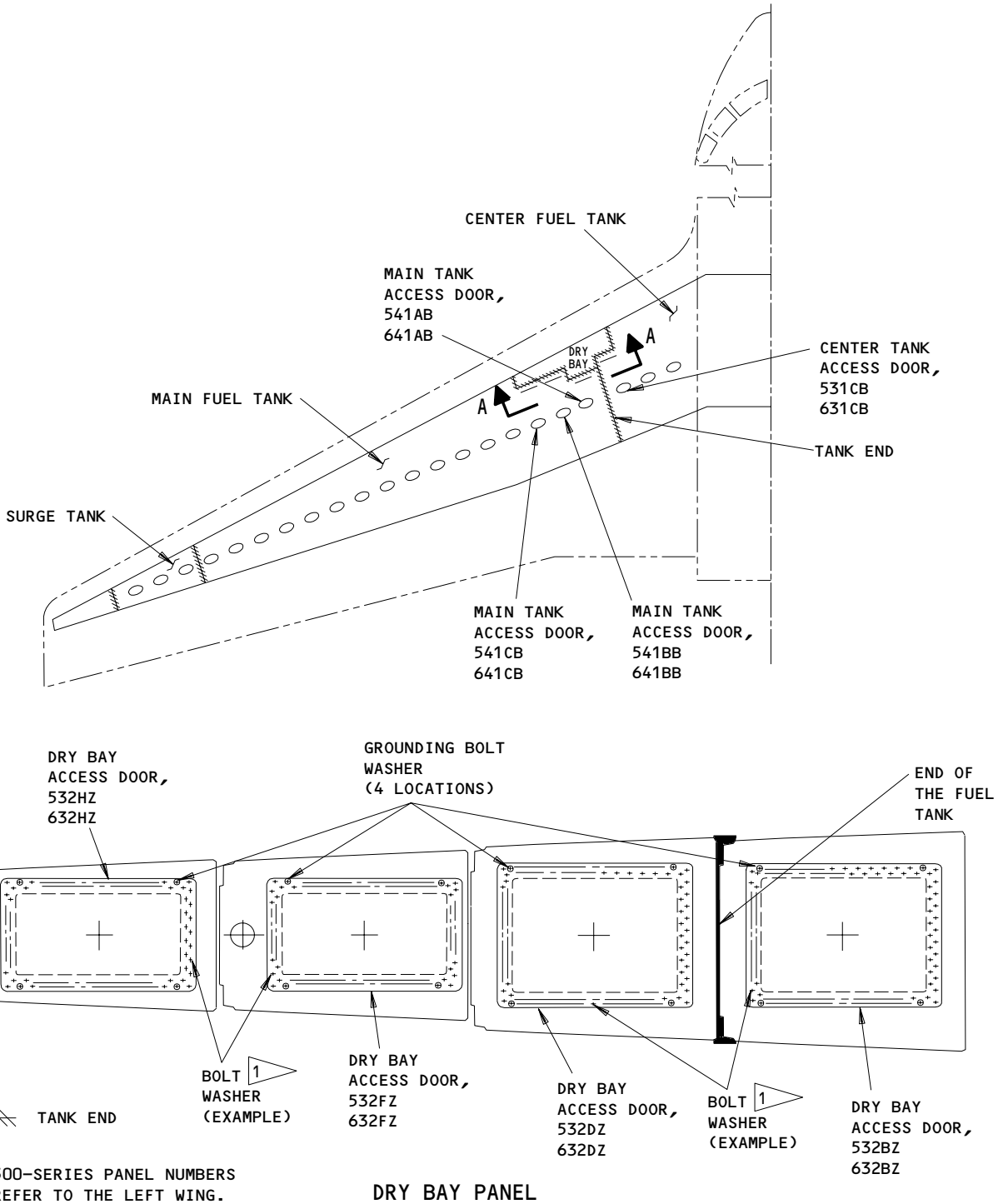
S 414-006
(6) For the drain valve in the center tank, close the ECS equipment bay access door 194CR or 194CL (AMM 06-41-00/201).

WING DRY BAY ACCESS DOOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the dry bay access door. The second task installs the dry bay access door.

TASK 28-11-07-004-001

2. Remove the Dry Bay Access Door (Fig. 401)
   A. Consumable Materials
      (1) Use one of these approved solvents to remove sealant and gasket, if installed:
         (a) B00148 - solvent, Methyl Ethyl Ketone (MEK) TT-M-261 (recommended solvent)
         (b) B00666 Methyl Propyl Ketone (MPK) (recommended option)
         (c) B00096 - Dowclene EC, Dow Chemical Company
         (d) B00300 - 1,1,1-Trichloroethane
         (e) B00634 - Solvent - Citra Safe, Inland Technology, Inc., Tacoma, WA
         (f) Mixture by volume of 42 percent Methyl Ethyl Ketone (ASTM D 740) and 58 percent Sec-Butyl Alcohol (TT-B-848B)
         (g) FCC-55, Van Waters and Rogers, Kent WA
   B. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-00/701, Fuel Tanks
      (3) AMM 28-11-01/401, Main Tank Acess Door
      (4) AMM 28-11-02/401, Center Tank Access Door
      (5) AMM 28-26-00/201, Defueling
   C. Access
      (1) Location Zones
         531 Center Wing Tank (Left)
         532 Dry Bay (Left)
         541 Main Tank - Rib No. 5 to No. 17 (Left)
         631 Center Wing Tank (Right)
         632 Dry Bay (Right)
         641 Main Tank - Rib No. 5 to No. 17 (Right)



Dry Bay Access Door Installation
Figure 401

(2) Access Panels

531CB	Center Tank Access Door (Left)
532BZ	Dry Bay Access Door (Left)
532DZ	Dry Bay Access Door (Left)
532FZ	Dry Bay Access Door (Left)
532HZ	Dry Bay Access Door (Left)
541AB	Main Tank Access Door (Left)
541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
632BZ	Dry Bay Access Door (Right)
632DZ	Dry Bay Access Door (Right)
632FZ	Dry Bay Access Door (Right)
632HZ	Dry Bay Access Door (Right)
641AB	Main Tank Access Door (Right)
641BB	Main Tank Access Door (Right)
641CB	Main Tank Access Door (Right)

D. Procedure

S 654-002

(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 654-012

(2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

S 014-011

(3) Remove the applicable main tank access door in the subsequent table to get access to the applicable dry bay access door (AMM 28-11-01/401).

MAIN TANK ACCESS DOOR	DRY BAY ACCESS DOOR
541AB	532DZ
541BB	532FZ
541CB	532HZ
641AB	632DZ
641BB	632FZ
641CB	632HZ

S 014-005

(4) To get access to the applicable left or right dry bay access door, 532BZ or 632BZ, remove the applicable left or right center tank access door, 531CB or 631CB (AMM 28-11-02/401).

S 034-018

CAUTION: MAKE SURE YOU DO NOT DAMAGE THE DRY BAY ACCESS DOOR OR SUBSTRUCTURE WHEN YOU REMOVE THE FILLET SEAL OR THE DRY BAY ACCESS DOOR. THE DRY BAY ACCESS DOOR AND SUBSTRUCTURE CONTAIN A FLAME-SPRAYED COATING WHICH IS DIFFICULT TO REPAIR.

(5) Remove the fillet seal around dry bay access door, if installed (AMM 28-11-00/701).

S 034-007

(6) Remove the bolts that attach the dry bay access door to the dry bay panel.

S 024-008

(7) Remove the dry bay access door.

NOTE: Use non-metallic tools to remove the dry bay access door if it is necessary.

S 034-009

(8) Use Naphtha, BMS 11-7, FCC-55, MEK:sec-Butyl Alcohol (42:58), MEK, or MPK, to remove the faying surface sealant and gasket between the dry bay access door and the dry bay panel, if installed.

TASK 28-11-07-404-010

3. Install the Dry Bay Access Door (Fig. 401)

A. Consumable Materials

(1) A00767 - Sealant - BMS 5-45

NOTE: Use one of these sealants:

(a) BMS 5-45 Class A - For brush application
(b) BMS 5-45 Class B - For sealing gun application
(c) BMS 5-45 Class C - For extrusion gun, roller, or spatula application

(2) Gasket, Dry Bay Access Door - 112N8005-7 (optional)
Gasket, Dry Bay Access Door - 112N8006-9 (optional)
Hexcel Structure
19819 84 Avenue South
Kent, WA 98032
Telephone (206) 395-4800
or
Fabricate a gasket with a sheet of MIL-R-6855, Class I, Grade 6.0 bulk gasket material and cut and punch to fit

B. References

(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 20-10-21/401, Electrical Bonding
(3) AMM 28-11-01/401, Main Tank Acess Door
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 51-31-01/201, Seals and Sealing

C. Access

(1) Location Zones

531	Center Wing Tank (Left)
532	Dry Bay (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
631	Center Wing Tank (Right)
632	Dry Bay (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

531CB	Center Tank Access Door (Left)
532BZ	Dry Bay Access Door (Left)
532DZ	Dry Bay Access Door (Left)
532FZ	Dry Bay Access Door (Left)
532HZ	Dry Bay Access Door (Left)
541AB	Main Tank Access Door (Left)
541BB	Main Tank Access Door (Left)
541CB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
632BZ	Dry Bay Access Door (Right)
632DZ	Dry Bay Access Door (Right)
632FZ	Dry Bay Access Door (Right)
632HZ	Dry Bay Access Door (Right)
641AB	Main Tank Access Door (Right)
641BB	Main Tank Access Door (Right)
641CB	Main Tank Access Door (Right)

D. Procedure

NOTE: You can apply faying surface sealant between the dry bay access door and the dry bay panel (optional).

S 424-023

(1) If you want to install a gasket between the dry bay access door and the dry bay panel, do these steps:
   (a) Apply a thin layer of BMS 5-45 sealant on the faying surface of the dry bay access door.

      NOTE: Sealant must be applied to all faying surfaces to get a continuous sealant layer between the rubber gasket and the dry bay access door.

   (b) Install the gasket on the dry bay access door.

      NOTE: If you want to make a gasket, use a sheet of bulk gasket material (MIL-R-6855, Class I, Grade 6.0) and cut it to the correct size.

   (c) Use the dry bay access door as a template and make (punch, not drill) holes through the gasket.
   (d) Make sure all the fastener holes on the gasket are not damaged.

S 424-024

(2) Install the grounding bolts and washers (four locations) to connect the dry bay access door to the dry bay panel.

S 424-025

(3) Install the bolts and washers with wet sealant to attach the dry bay access door to the wing structure as follows:
   (a) Install the bolts and washers in a star pattern.
      1) Tighten the 3/16 inch diameter bolts to a torque of 15-20 pound-inches.
      2) Tighten the 1/4 inch diameter bolts to a torque of 30-50 pound-inches.
   (b) After the initial installation, tighten the bolts again to the subsequent values:
      1) Tighten the 3/16 inch diameter bolts to a torque of 30-35 pound-inches.
      2) Tighten the 1/4 inch diameter bolts to a torque of 65-100 pound-inches.

S 394-027

(4) Apply a fillet seal around the edge of the dry bay access door (AMM 51-31-01/201).

S 224-014
(5) Make sure the bonding resistance between the dry bay access door and the wing structure is 0.50 ohm (500 millohms) or less (AMM 20-10-21/401).

S 224-015
(6) Make sure the bonding resistance between the dry bay panel and the wing structure is 0.50 ohm (500 milliohms) or less (AMM 20-10-21/401).

S 414-014
(7) Install the applicable main tank access door in the subsequent table for the applicable dry bay access door (AMM 28-11-01/401).

MAIN TANK ACCESS DOOR	DRY BAY ACCESS DOOR
541AB	532DZ
541BB	532FZ
541CB	532HZ
641AB	632DZ
641BB	632FZ
641CB	632HZ

S 414-017
(8) For the applicable left or right dry bay access door, 532BZ or 632BZ, install the applicable left or right center tank access door, 531CB or 631CB (AMM 28-11-02/401).

S 654-018
(9) Refuel the fuel tank, if no more work is necessary (AMM 12-11-01/301).

WING DRY BAY ACCESS DOOR - INSPECTION/CHECK

1. General
   A. This procedure contains one task. This task removes the dry bay access doors to do a borescope inspection of the dry bays.

   TASK 28-11-07-006-001

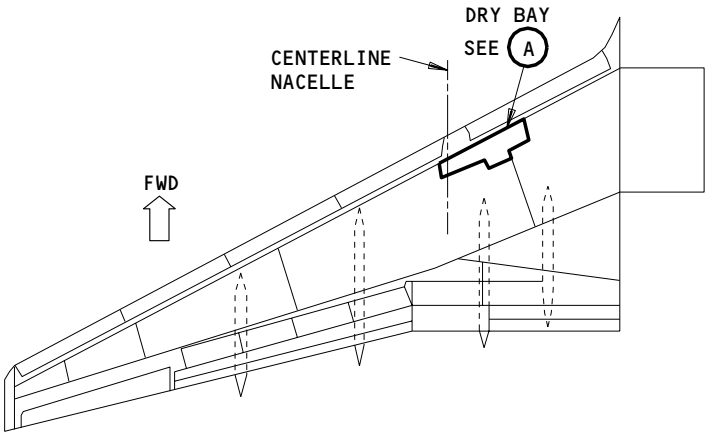
2. Wing Dry Bay - Inspection/Check (Fig. 601)
   A. Equipment
      (1) Borescope equipment - flexible fiberscope system, fuel resistant and explosionproof
         (a) Olympus Corporation, Industrial Fiberoptics Division, 4 Nevada Drive, Lake Success, NY 11042-1179
         (b) Fibertron, Inc., 600 N. Sheppard, Bdlg. 102, Houston, TX 7707
      (2) 2C688 - Borescope Set Fiber Light, (fiber light rigid optic borsecope system), General Electric Co., 111 Merchant St., Room 425 Cincinnati, OH 45426
   B. Consumable Materials
      (1) A00246 Sealant - BMS 5-95
   C. References
      (1) AMM 06-44-00/201, Wing Access Panels and Doors
      (2) AMM 24-22-00/201, Electrical Power Control
      (3) AMM 27-81-00/201, Leading Edge Slat System
      (4) AMM 28-11-00/801, Fuel Tanks - Sealing
      (5) AMM 36-11-01/401, Pneumatic Duct
      (6) AMM 51-31-01/201, Seals and Sealing
   D. Access
      (1) Location Zones

532	Dry Bay (Left)
632	Dry Bay (Right)

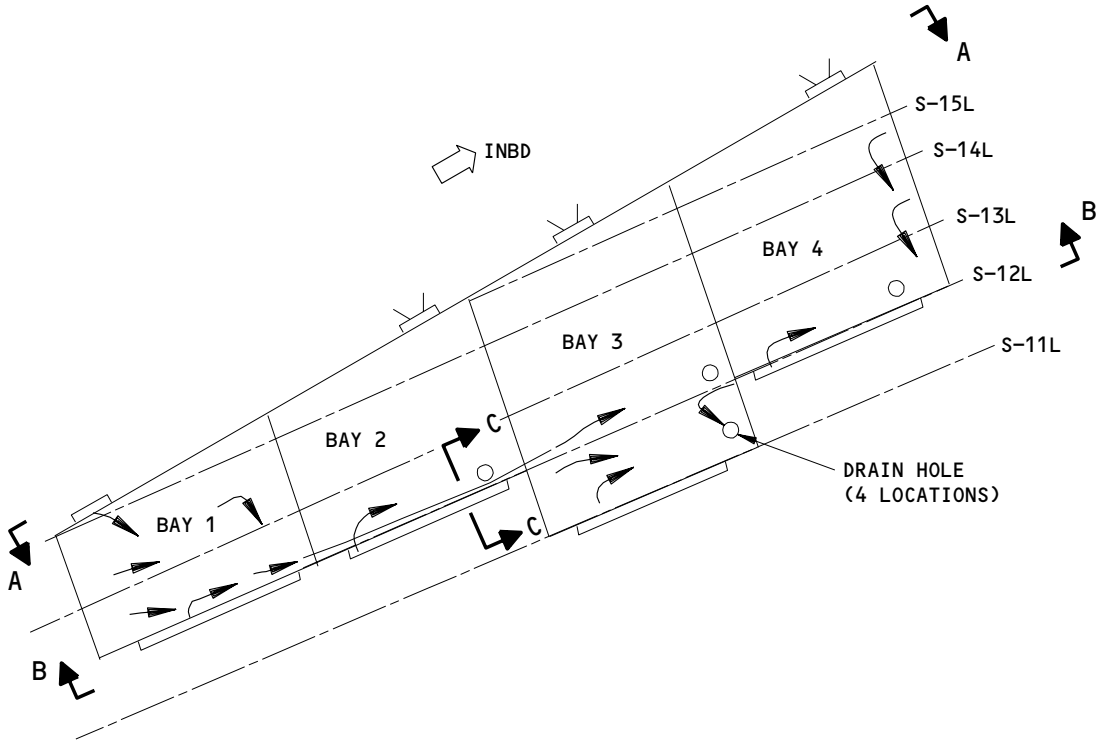
      (2) Access Panels

521UBX	Leading Edge Access Door (Left)
532GZ	Dry Bay Access Panel (Left)
532EZ	Dry Bay Access Panel (Left)
532CZ	Dry Bay Access Panel (Left)
532AZ	Dry Bay Access Panel (Left)
631UBX	Leading Edge Access Door (Right)
632GZ	Dry Bay Access Panel (Right)
632EZ	Dry Bay Access Panel (Right)
632CZ	Dry Bay Access Panel (Right)
632AZ	Dry Bay Access Panel (Right)

   E. Procedure



LEFT WING SHOWN (RIGHT WING OPPOSITE)



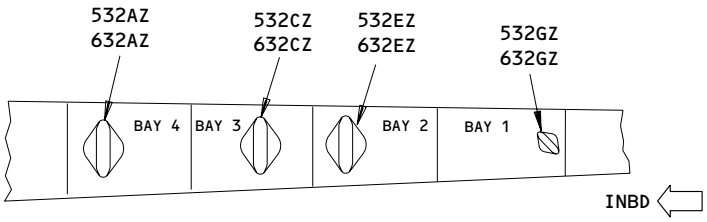
LEFT WING DRY BAY
(RIGHT WING OPPOSITE)

A

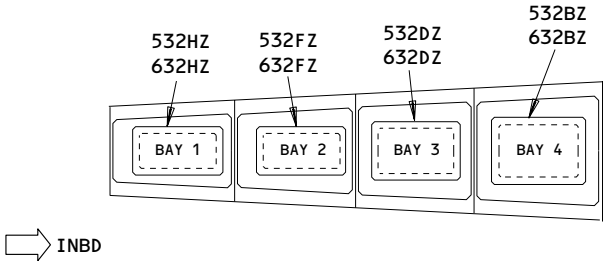
LEGEND

DRAIN PATH

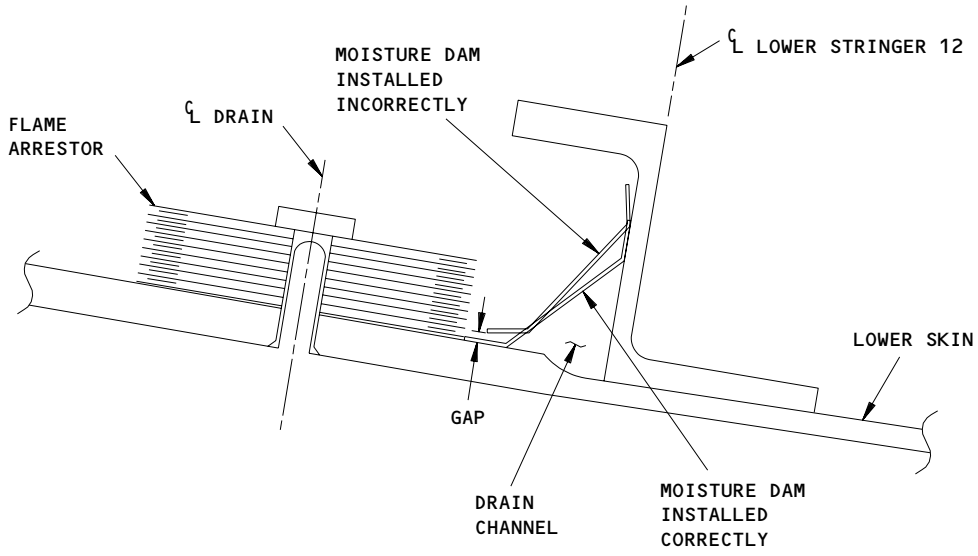
Wing Dry Bay Access Doors and Panels
Figure 601 (Sheet 1)



DRY BAY ACCESS PANELS
(FRONT SPAR AS YOU LOOK AFT)
A–A



DRY BAY ACCESS DOORS
(VIEW IN THE FORWARD DIRECTION)
B–B



C–C

NOTE: 500–SERIES PANEL NUMBERS REFER TO LEFT WING.
600–SERIES PANEL NUMBERS REFER TO RIGHT WING.

Wing Dry Bay Access Doors and Panels
Figure 601 (Sheet 2)

S 866-001

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(1) To get access to the dry bay access panels for dry bays 2, 3 and 4 fully extend and do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 016-002

(2) To get access to the dry bay access panel for dry bay 1, open the access door 521UBX (621UBX) (AMM 06-44-00/201).

S 016-005

(3) Do the Remove the Wing Leading Edge Duct procedure to remove the necessary pneumatic ducts for access (AMM 36-11-01/401).

S 036-004

(4) Remove the wire bundle clamps as necessary.

S 026-003

(5) Remove the applicable dry bay access panel or nut on the dry bay access panel, if installed, in the subsequent table to get access to the left or right dry bays (Fig. 601).

NOTE: Each access panel is installed with BMS 5-95 sealant. The sealant is put over parting adjent on the front spar to permit removal of the panels.

DRY BAY ACCESS PANEL	DRY BAY
532GZ	1 (LEFT)
532EZ	2 (LEFT)
532CZ	3 (LEFT)
532AZ	4 (LEFT)
632GZ	1 (RIGHT)
632EZ	2 (RIGHT)
632CZ	3 (RIGHT)
632AZ	4 (RIGHT)

S 296-004

(6) Insert the borescope through the applicable access hole to inspect for leaks.

S 796-005

(7) If there is a leak into the dry bay area repair the leak as shown in AMM 28-11-00/801.

S 726-003

(8) An additional test to check drain path of the No. 1 dry bay follows:
  (a) Remove the access door 532GZ or 632GZ for the No. 1 dry bay.
  (b) Pour 8 to 10 ounces (500 ml) of clean water into the No. 1 dry bay, between the lower stringer 13 and the front spar.
  (c) If the water does not drain from the forward drain hole of the No. 3 dry bay, the drain path for dry bay No. 1 is blocked.
  (d) If the water drains from the drain hole in the No. 2 dry bay, there is water leakage from under the moisture dam.
  (e) If the water drains from the aft drain hole of the No. 3 dry bay, the groove under the No. 12 lower stringer (in dry bay No. 3) is not sealed correctly.
  (f) If the No. 1 dry bay does not drain correctly, refer to Boeing Service Letter 757-SL-57-5 for more information.

S 416-006

(9) Apply a new bead of BMS 5-95 sealant to the applicable dry bay access panel on the front spar (AMM 51-31-01/201).

S 426-007

(10) Install the applicable dry bay access panel or nut on the dry bay access panel.

S 426-008

(11) Install the fasteners for the applicable dry bay access panel.

S 416-009

(12) Install the wire bundle support brackets as necessary.

S 416-002

(13) Install the pneumatic ducts removed for access (AMM 30-11-01/401).

S 866-002

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(14) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 866-003

(15) Remove electrical power if it is not necessary (AMM 24-22-00/201).

CENTER TANK PURGE DOOR - REMOVAL/INSTALLATION

1. General
   A. The center tank purge door, 134EZ, is installed on the rear spar of the center fuel tank, approximately 2 feet (0.5 meter) to the right of the airplane centerline. The center tank purge door can be removed to help purge the center fuel tank.
   B. This procedure contains two tasks. The first task removes the center tank purge door. The second task installs the center tank purge tank.

TASK 28-11-08-004-015

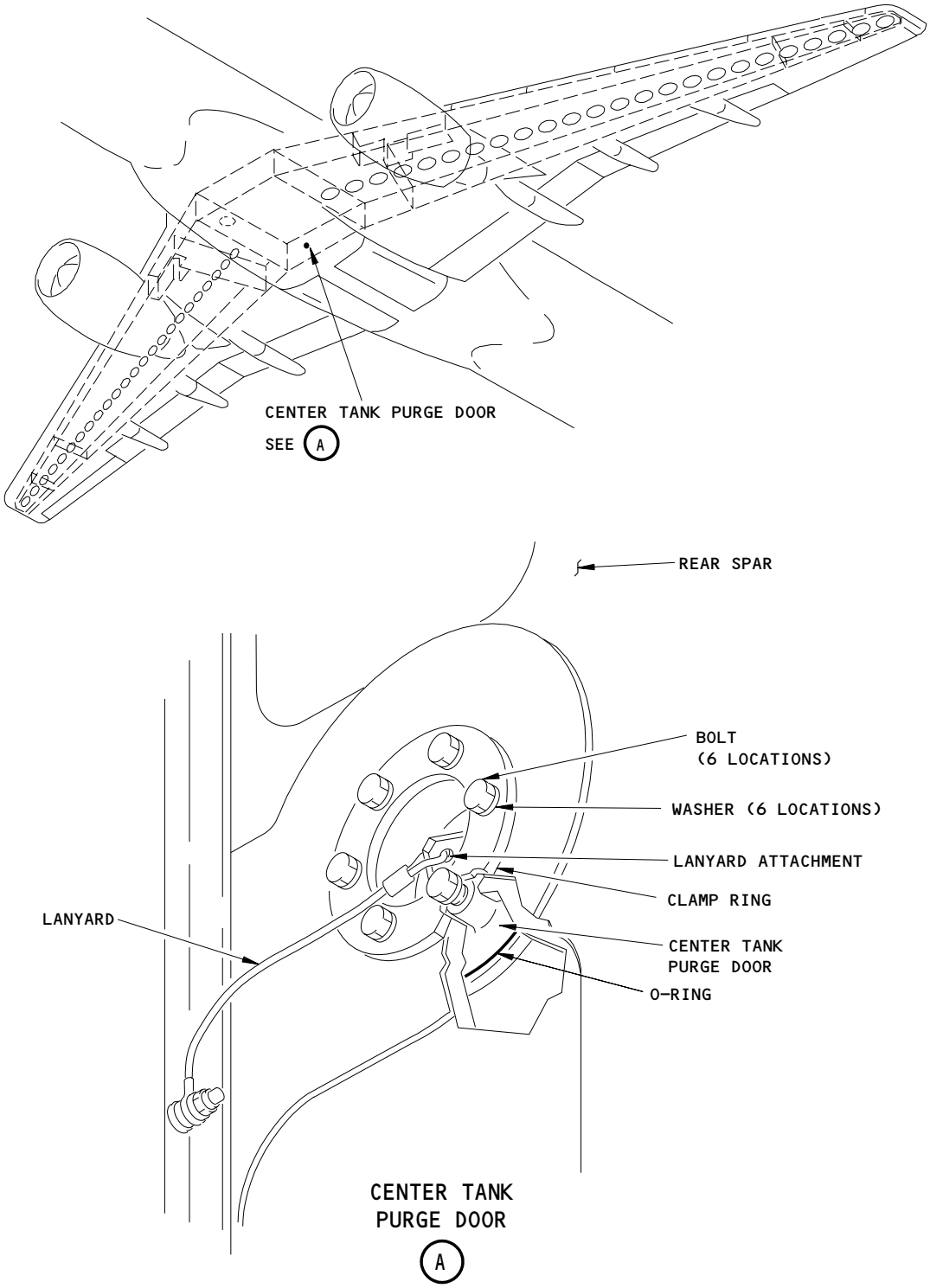
2. Remove the Center Tank Purge Door (Fig. 401)
   A. Equipment
      (1) Lanyard - commercially available
      (2) Streamer - REMOVE-BEFORE-FLIGHT, commercially available
   B. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
      (5) AMM 32-00-15/201, Landing Gear Door Locks
      (6) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zone
          134 Wing Center Section (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door
          134CZ Baffle Door
          134DZ Baffle Door
          134EZ Center Tank Purge Door

   D. Procedure

      S 654-020
      (1) Defuel the center fuel tank (AMM 28-26-00/201).

      S 214-016
      (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).



Center Tank Purge Door
Figure 401

S 494-017

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 494-001

(4) If it is not installed, attach a lanyard between the lanyard attachment on the center tank purge door and the rear spar structure.

NOTE: The center tank purge door will fall to the bottom of the center fuel tank when you remove the bolts, if the lanyard is not attached.

S 034-002

(5) Remove the bolts, washers and clamp ring from the center tank purge door as you pull on the lanyard.

S 034-033

(6) Attach a REMOVE-BEFORE-FLIGHT streamer to the opening for the center tank purge door.
(a) Make sure the REMOVE-BEFORE-FLIGHT streamer is extended and can be easily seen from outside of the fuel tank.

S 014-003

(7) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-019

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(8) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-020

(9) Go into the center fuel tank.

S 014-004
(10) Remove the baffle doors, 134BZ, 134CZ and 134DZ (AMM 06-41-00/201).

S 024-030
(11) Get access to the center tank purge door, 134EZ.

S 024-029
(12) Disconnect the lanyard from the lanyard attachment on the center tank purge door.

S 024-005
(13) Remove the center tank purge door and O-ring.
(a) Discard the O-ring.

TASK 28-11-08-404-006

3. Install the Center Tank Purge Door (Fig. 401)

A. Equipment
(1) Lanyard - commercially available
(2) Streamer - REMOVE-BEFORE-FLIGHT, commercially available

B. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 12-11-01/301, Pressure Fueling
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 32-00-15/201, Landing Gear Door Locks

D. Access
(1) Location Zone
134 Wing Center Section (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door
134EZ Center Tank Purge Door

E. Procedure

S 424-027
(1) Install a new O-ring in the groove of the center tank purge door, 134EZ.

S 944-018

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(2) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-021

(3) Go into the center fuel tank.

S 434-031

(4) Attach the lanyard to the lanyard connection on the center tank purge door.

NOTE: Make sure the lanyard goes through the opening in the rear spar for the center tank purge door and attaches to the airplane structure.

S 424-022

(5) Let the center tank purge door hang from the lanyard in the center fuel tank.

S 414-023

(6) Go out of the fuel tank.

S 094-028

(7) Remove the REMOVE-BEFORE-FLIGHT streamer from the opening in the rear spar for the center tank purge door.

S 424-010

(8) Pull on the lanyard from out of the center fuel tank until the center tank purge door aligns with the bolt holes in the rear spar.

S 434-032
(9) Apply grease to each bolt.

S 424-019
(10) Install the bolts and washers through the clamp ring to attach the center tank purge door to the rear spar.

S 414-012
(11) Install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-013
(12) Install the center tank access door, 134AZ (AMM 28-11-02/401).

S 654-014
(13) Refuel the center fuel tank (AMM 12-11-01/301) to a minimum of 30,000 pounds (13,700 kilograms).

S 214-024
(14) Make sure there are no fuel leaks at the center tank purge door.

S 094-025

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(15) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

FUEL TANK ACCESS DOORS - APPROVED REPAIRS

1. General

A. This procedure has one task. The task is the replacement of the molded rubber door seal for the access doors. You can use this procedure to replace all the rubber seals on high impact resistant access doors. All new replacement Cast Aluminum access doors will also have molded rubber seals you can remove and replace.

TASK 28-11-10-908-000

2. Replacement of the Molded Rubber Door Seal

A. Equipment

(1) Sealant removal tool - wood or plastic

B. Consumable Materials

(1) A00767 Sealant - Integral fuel tank, BMS 5-45 (recommended)
(2) A00413 Sealant - Adhesive, BMS 5-45 Class B
(3) A50052 Sealant - PR-1826 Class B Rapid Curing Fuel Tank Sealant, SAE AMS3277 Class B
(4) A50084 Sealant - Polysulfide Pro Seal 860 Class B, AMS-S-83318A
(5) B00068 Alcohol - Ethyl (Denatured), AMS 3002F, MIL-E-51434, Type II
(6) G00034 Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauge), BMS 15-5
(7) G00624 Bag - Plastic, General Purpose
(8) G50078 Sandpaper - Aluminum Oxide, 320 Grit

C. References

(1) AMM 28-11-00/801, Integral Fuel Tanks

D. Access

(1) Location Zones

134 Wing Center Section (Right)
194 Wing to Body - Forward Lower Half (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)
541 Main Tank - rib No. 5 to rib No. 17 (Left)
542 Main Tank - rib No. 17 to rib No. 21 (Left)
641 Main Tank - rib No. 5 to rib No. 17 (Right)
642 Main Tank - rib No. 17 to rib No. 21 (Right)

E. Prepare for the Replacement of the Rubber Door Seal

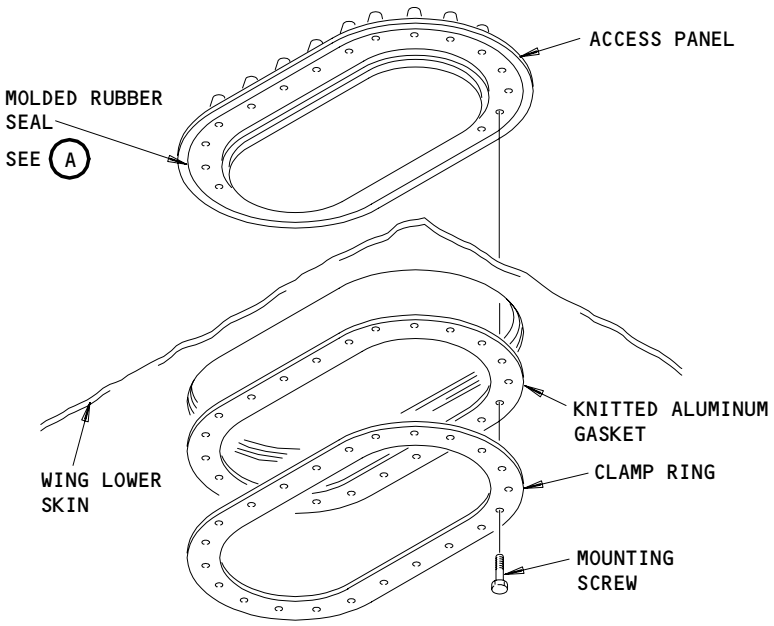
S 018-023

(1) Remove the applicable access door (AMM 28-11-01/401, AMM 28-11-02/401, AMM 28-11-03/401).

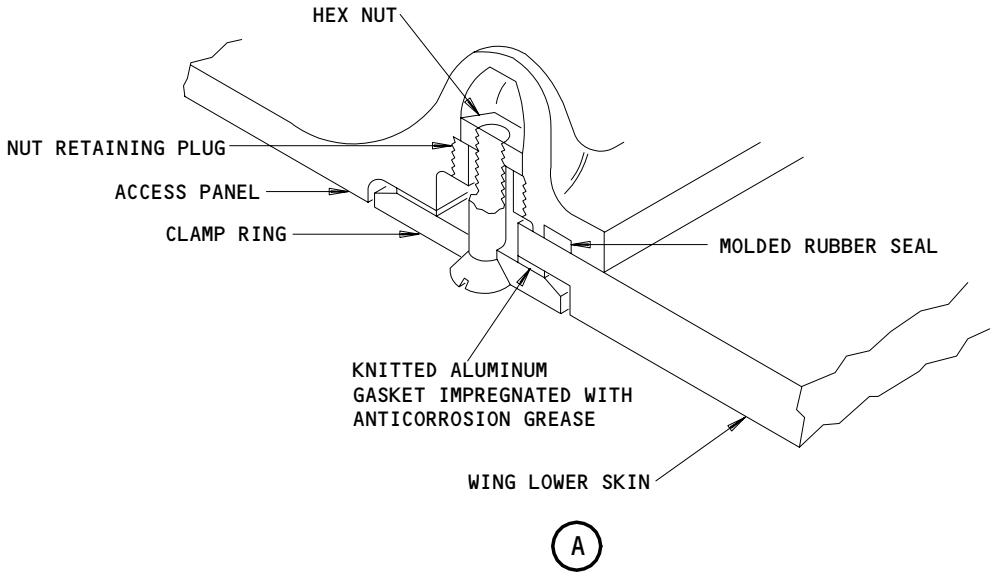
S 028-002

(2) Remove the seal from the door fully.

NOTE: If the seal cannot be removed from a Cast Aluminum access door, the access door does not have a molded rubber seal that you can remove and replace. You must replace the full access door. Only new Cast Aluminum access doors have molded rubber seals you can remove and replace.



FUEL TANK ACCESS PANEL



Fuel Tank Access Panel Repair
Figure 801

S 148-003

CAUTION: DO NOT CAUSE DAMAGE TO THE FINISH WHEN YOU REMOVE THE SEALANT. TOO MUCH FORCE CAN REMOVE THE PAINT OR PRIMER.

(3) Remove the remaining sealant from the seal groove with the sealant removal tool.

F. Prepare the New Rubber Door Seal

S 918-010

(1) Put on rubber gloves.

NOTE: Wear rubber gloves during this procedure to prevent contamination to the rubber door seal.

S 128-012

(2) Abrade the bottom surface of the rubber door seal with a 320 grit or finer abrasive sandpaper, G50078, to remove the parting agent.

S 868-011

(3) Obey all safety precautions when using solvents, special cleaning compounds, paint strippers (strong alkalies or acids), etchants (corrosion removers that contain acids) or conversion coating chemicals.

S 118-009

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(4) Remove the unwanted material from the rubber door seal with a clean cotton wiper, G00034 (BMS 15-5), moist with denatured alcohol, B00068.

S 558-013

(5) Keep the rubber door seal in a clean plastic bag, G00624, or a clean sealed plastic container, to prevent contamination of the rubber seal.

S 428-014
(6) Install the rubber door seal in 60 minutes or less.

NOTE: Do the alcohol cleaning procedure if the rubber door seal is not installed in 1 hour.

G. Prepare the Seal Groove on the Door

S 118-015
(1) Clean the surface of the door groove with a clean, dry cotton wiper to remove wax, dirt, grease, oil or unwanted material.

S 118-016

WARNING: DO NOT GET THE DENATURED ALCOHOL IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM DENATURED ALCOHOL. PUT ON A PROTECTIVE SPLASH GOGGLE FROM THE SPARKS, FLAME AND HEAT. THE DENATURED ALCOHOL IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY OR DAMAGE.

WARNING: DENATURED ETHYL ALCOHOL IS FLAMMABLE AND TOXIC. AVOID PROLONGED BREATHING OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES. CLEAN PARTS IN WELL-VENTILATED AREA AND USE APPROVED SAFETY EQUIPMENT.

(2) Clean the seal groove with a clean cotton wiper, G00034, moist with denatured alcohol, B00068.
  (a) Continue to clean the groove until the cotton wiper, G00034, shows no contamination.
  (b) Let the denatured alcohol dry, B00068.

H. Rubber Door Seal Replacement

S 648-024
(1) Apply the BMS 5-45, Class A sealant, A00767, to the full width of the seal groove with a stiff bristle non-metallic brush (AMM 28-11-00/801).

NOTE: An alternative to BMS 5-45, Class A sealant, A00767, is (AMS-S-83318A) sealant, A50084 or (SAE AMS 3277, Class B) sealant, A50052.

S 428-017
(2) Install the rubber door seal into the door groove.
  (a) Make sure that the rubber door seal is tight against the seal groove.

S 118-018
(3) Clean off the unwanted sealant with a clean cotton wiper, G00034 (BMS 15-5), and denatured alcohol, B00068.

S 498-019
(4) Apply sufficient clamp pressure to make sure that the rubber door seal is fully installed in the seal groove.

S 498-020
(5) Continue to apply clamp pressure for a minimum of 2 hours at room temperature or 1 hour at 120 °F (48.9 °C).

S 788-021
(6) Do not stress the bond line until the sealant is fully cured.

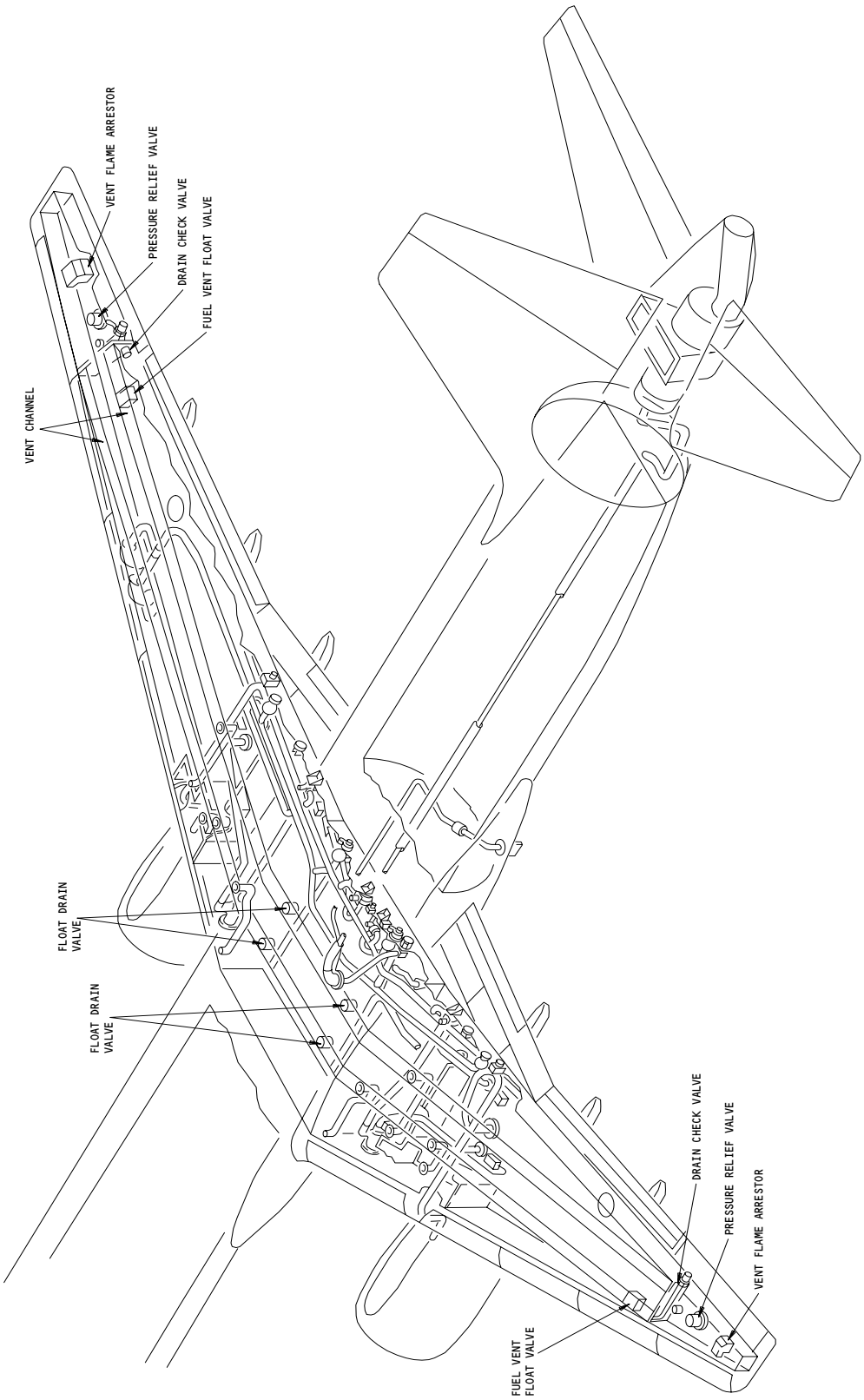
NOTE: Sealant is fully cured at a minimum of 72 hours at 75 ±5°F (23.9 ±2.8°C) and 45–55 percent relative humidity.

I. Put the Airplane Back to Its Usual Condition

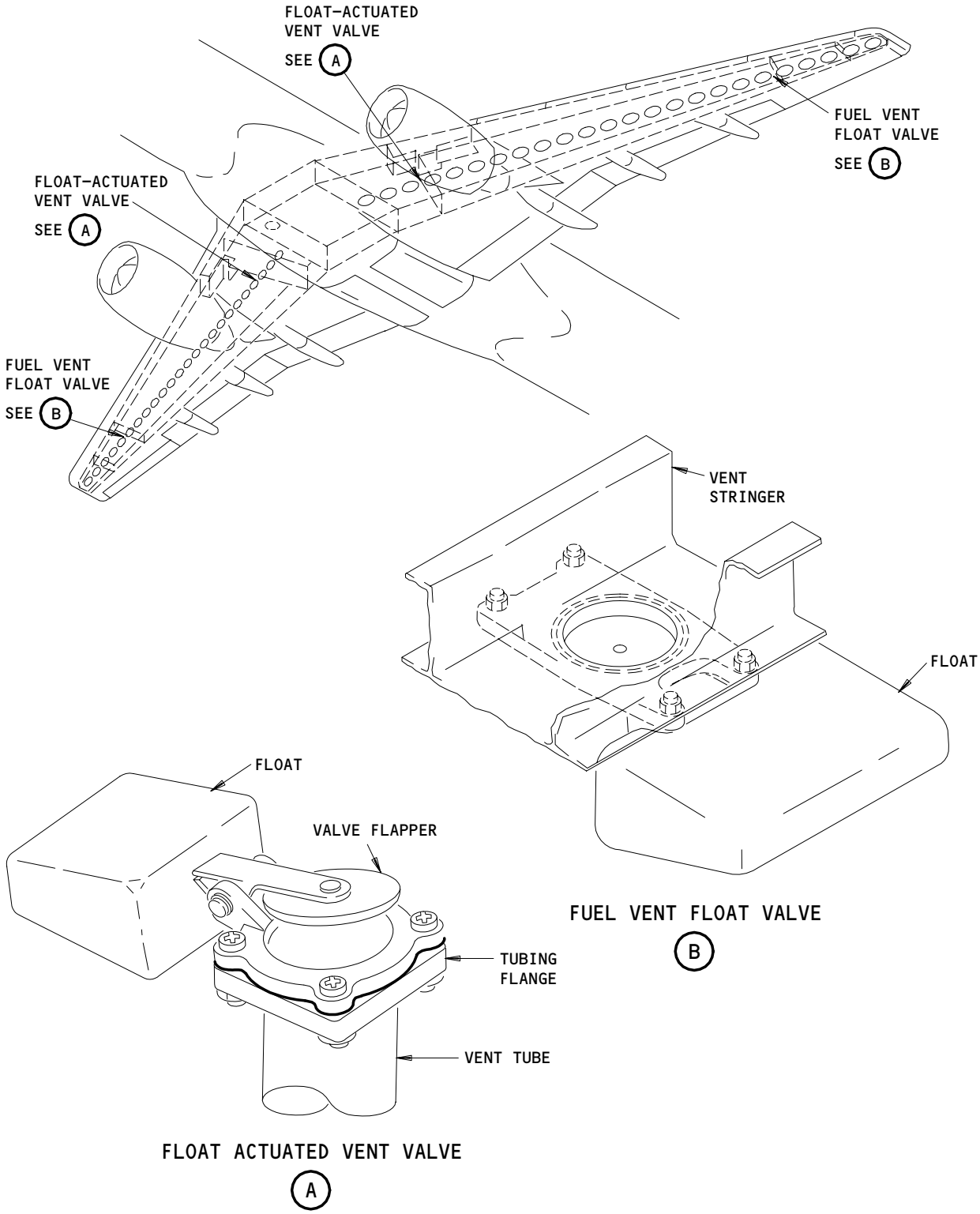
S 418-022
(1) Close the applicable access door (AMM 28-11-01/401, AMM 28-11-02/401, or AMM 28-11-03/401).

FUEL TANK VENT SYSTEM - DESCRIPTION/OPERATION

1. General (Fig. 1)
   A. Air and fuel vapors flow in and out of the fuel tanks through the fuel vent system. This prevents excess pressure and vacuum from developing within the fuel tanks. Two parallel vent channels extend into the main and center fuel tanks from the surge tanks. Two stringers attached to the upper wing skin form each hat section channel. The channels open into each surge tank. Two fuel vent float valves are installed to outboard ends of the two vent channels in the main and center fuel tanks. These fuel vent float valves prevent fuel overflow through the channels into the surge tanks during climb and roll maneuvers. Two float-actuated vent valves attach to vent tubes at opposite ends of the two vent channels in the center fuel tank. These float-actuated vent valves prevent fuel overflow through the vent channels into the surge tanks.
   B. Two vent tubes are attached to inboard channels in the main fuel tank and two vent channels are installed to inboard channels in the center fuel tank. The vent tubes supply venting when the outboard fuel vent float valves close. Four float drain valves, two in each vent channel in the center fuel tank, permit trapped fuel in the vent channels to drain back into the center fuel tank. Drain check valves at the low points of all vent tubes prevent fuel accumulation in the vent tubes.
   C. A surge tank, found at the end of each wing, collects all overflow fuel passed through the vent channels. Two drain check valves permit all overflow fuel to drain back into the main fuel tanks. A vent scoop on the lower wing surface creates a positive pressure during flight. Air flow to the surge tank passes through a vent flame arrestor and through the vent scoop. A pressure relief valve supplies backup venting if the vent flame arrestor becomes plugged.
2. Component Details
   A. Fuel Vent Float Valves (Fig. 2)
      (1) Two fuel vent float valves permit fuel tank venting while preventing fuel from entering the vent channels. The fuel vent float valve opens and closes corresponding to the fuel level in the main fuel tanks and airplane attitude changes. As the fuel level rises to support the float the fuel vent float valves begin to close. The fuel vent float valves close fully when fuel covers the float. As the fuel level lowers during defueling or normal airplane attitude change, the float is exposed and the fuel vent float valve begins to open. The fuel vent float valve opens fully when no fuel supports the float. A float stop supports the float in its fully open position.



Fuel Tank Vent System
Figure 1



Float Valves
Figure 2

B. Float-Actuated Vent Valve

(1) Two float-actuated vent valves permit fuel tank venting while preventing fuel from entering the vent channels. The float-actuated vent valve opens and closes corresponding to the fuel level in the center fuel tank. As the fuel level rises to support the float during fueling, the float-actuated vent valves begin to close. The float-actuated vent valves close fully when fuel covers the float. As the fuel level lowers during defueling or normal operation the float is exposed and the float-actuated vent valves begin to open. The float-actuated vent valves open fully when no fuel supports the float.

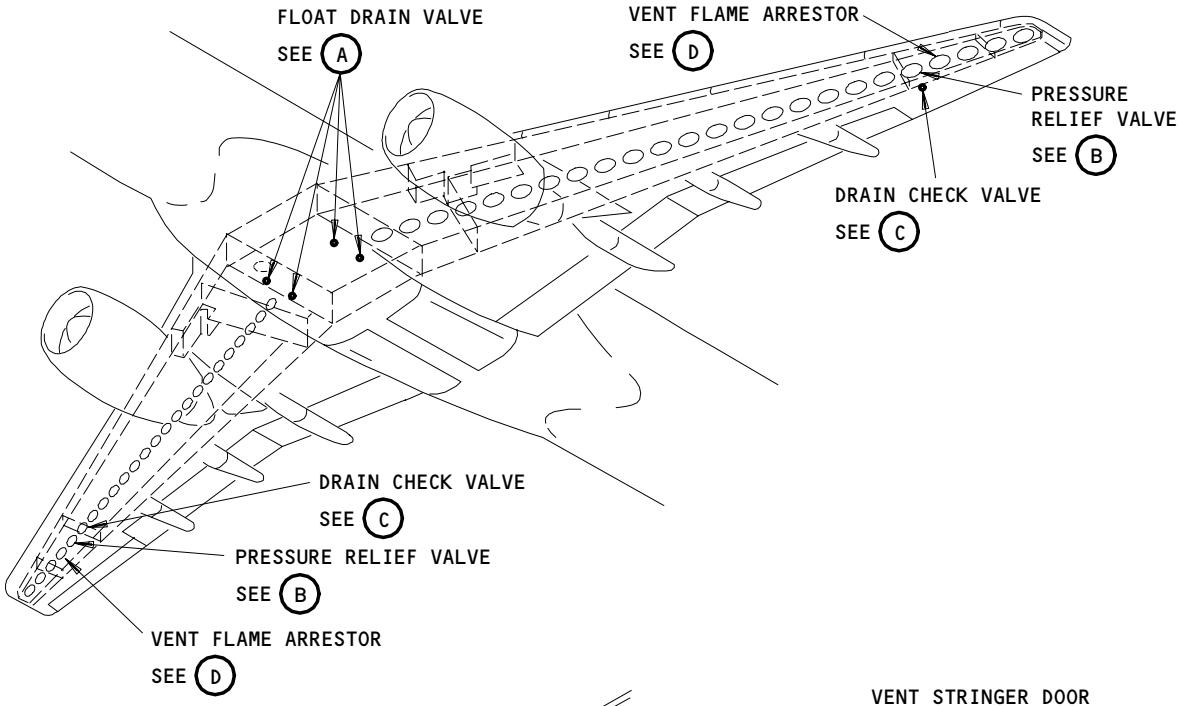
C. Float Drain Valves (Fig. 3)

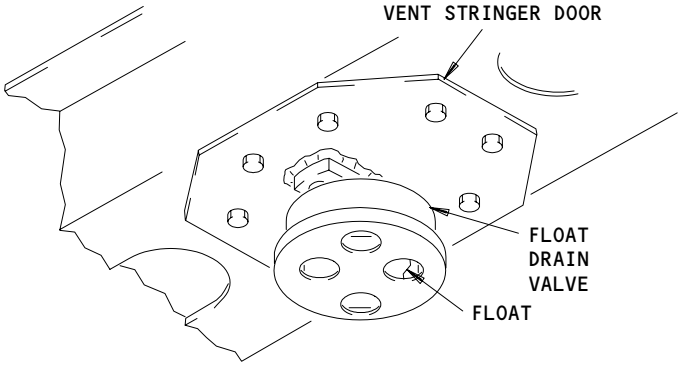
(1) Two float drain valves bolt to the lower surface of each of the two vent channels in the center fuel tank. The float drain valves have a poppet seal and a float contained within a cover which snaps onto a mounting flange. The float drain valves permit fuel tank venting while preventing fuel from entering the vent channels. The float drain valves also supply drainage for all fuel which gets into the vent channels. The float drain valves open and close corresponding to the fuel level in the center fuel tank. As the fuel level rises to support the float during fueling, the float drain valves begin to close. The float drain valves close fully when fuel covers the float. As the fuel level lowers during defueling or normal operation the float is exposed and the float drain valves begin to open. The float drain valves open fully when no fuel supports the float.

D. Pressure Relief Valve

(1) A pressure relief valve is attached to the most inboard surge tank access door of each wing. The pressure relief valve limits positive and negative pressure within the surge tank. A system of compressed springs, a lock, and a poppet are actuated by an actuation stem attached to a diaphragm. In the normally closed position, the poppet locks against the lower housing to seal the pressure relief valve and prevent leakage from the surge tank. When closed, the lock compresses the actuation spring. The spring is locked in this position by the actuation stem and three detent balls.

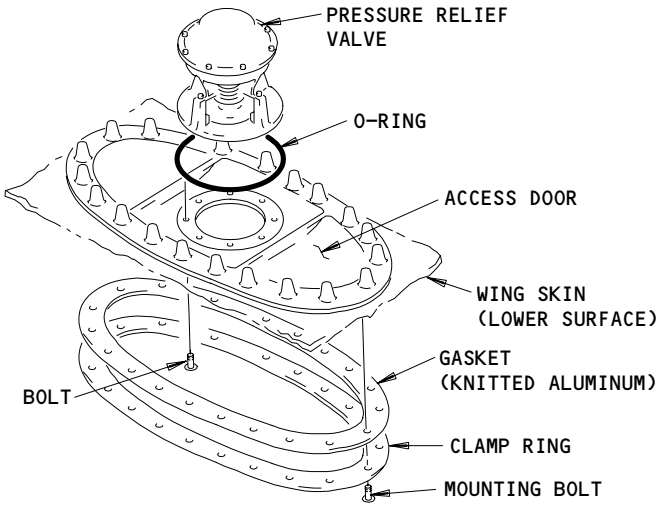
(2) The pressure relief valve opens at a positive surge tank pressure of 2.5 psi or if a negative pressure of 1.0 psi develops in the surge tank. Once opened, the pressure relief valve stays open until it is manually reset. This assures continued venting of each surge tank if a vent flame arrestor becomes plugged. When you pull the reset handle down it resets the pressure relief valve. You can manually open the pressure relief valve if you put a stiff rod, 2.0 inches minimum long by 0.18 inches diameter maximum, into the center ambient sense port and push up. This releases the locking mechanism and permits the poppet to spring open.





FLOAT DRAIN VALVE

A

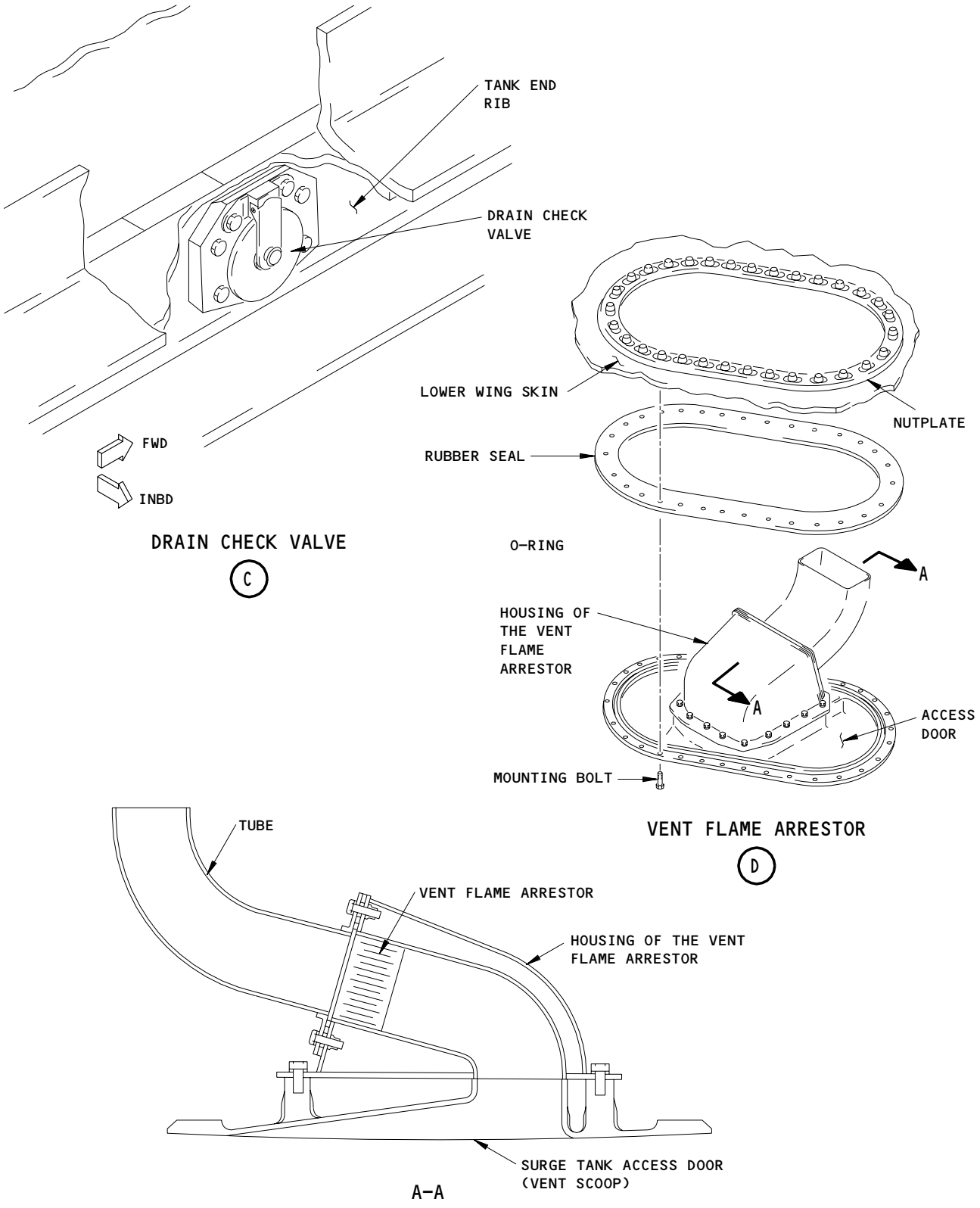


PRESSURE RELIEF VALVE

B

Fuel Vent System Components
Figure 3 (Sheet 1)

42581



Fuel Vent System Components
Figure 3 (Sheet 2)

E. Vent Flame Arrestor

(1) The vent flame arrestor is installed in a housing attached to the center access door in the surge tank. A vent scoop in the access door just below the housing of the vent flame arrestor supplies venting for the surge tank. The vent flame arrestor acts as a heat sink to keep the fuel vapor below the ignition point. This prevents flame propagation into the surge tank through the vent scoop.

F. Drain Check Valve

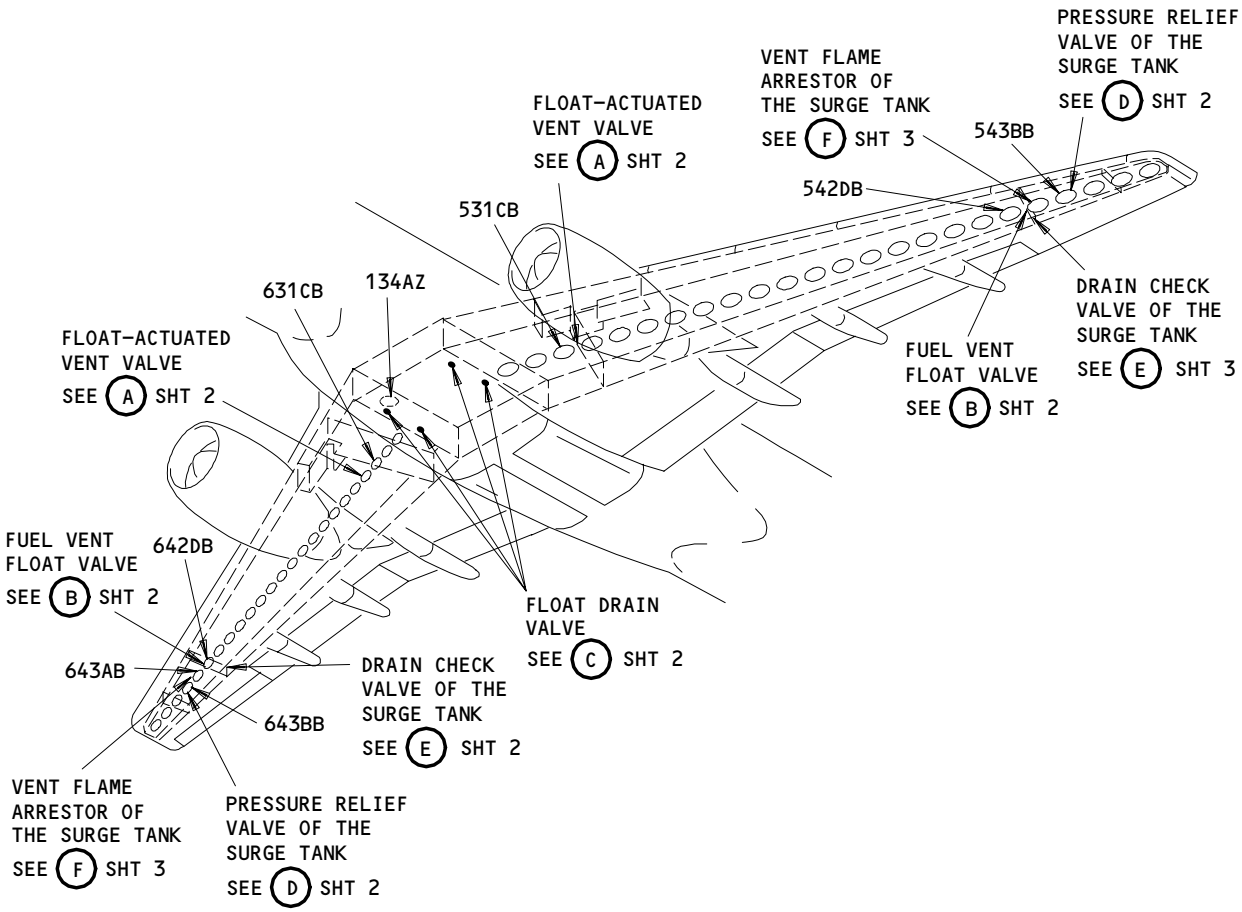
(1) A drain check valve attaches to the side in the main fuel tank of the tank end rib between the main fuel and surge tanks. The drain check valve permits all fuel in the surge tanks to drain back into the main fuel tanks but prevents fuel from entering the surge tank through the drain check valve.

FUEL VENT SYSTEM

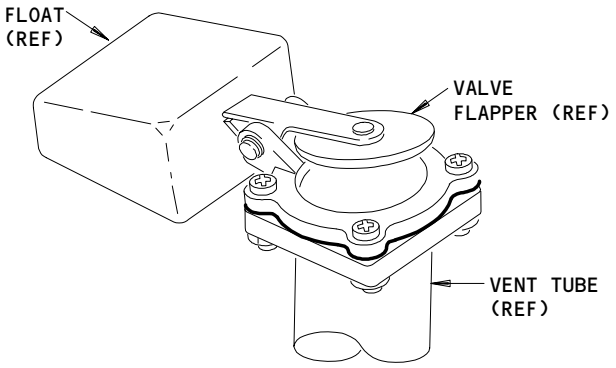
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ARRESTOR – SURGE TANK VENT FLAME	2	2	543BB,643BB, WING, OUTBD	28-13-05
HOUSING – SURGE TANK VENT FLAME ARRESTOR	2	2	543BB,643BB, WING, OUTBD	28-13-05
VALVE – FLOAT DRAIN	2	4	134AZ, WING, INBD	28-13-03
VALVE – FLOAT-ACTUATED VENT	1	2	531CB,631CB, WING, INBD	28-13-01
VALVE – FUEL VENT FLOAT	1	2	542DB,642DB, WING, OUTBD	28-13-01
VALVE – SURGE TANK DRAIN CHECK	2	2	541MB,641MB, WING, OUTBD	28-13-08
VALVE – SURGE TANK PRESSURE RELIEF	2	2	543AB,643AB, WING, OUTBD	28-13-04

* SEE THE WDM EQUIPMENT LIST

Fuel Vent System – Component Index
Figure 101

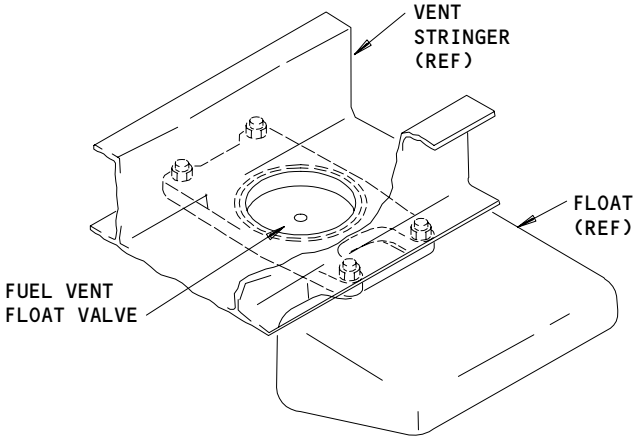


Fuel Vent System - Component Location
Figure 102 (Sheet 1)



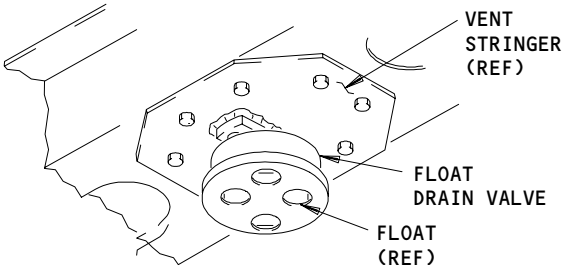
FLOAT-ACTUATED VENT VALVE

A



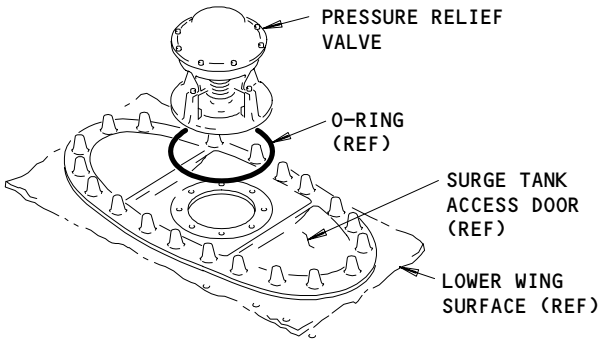
FUEL VENT FLOAT VALVE

B



FLOAT DRAIN VALVE

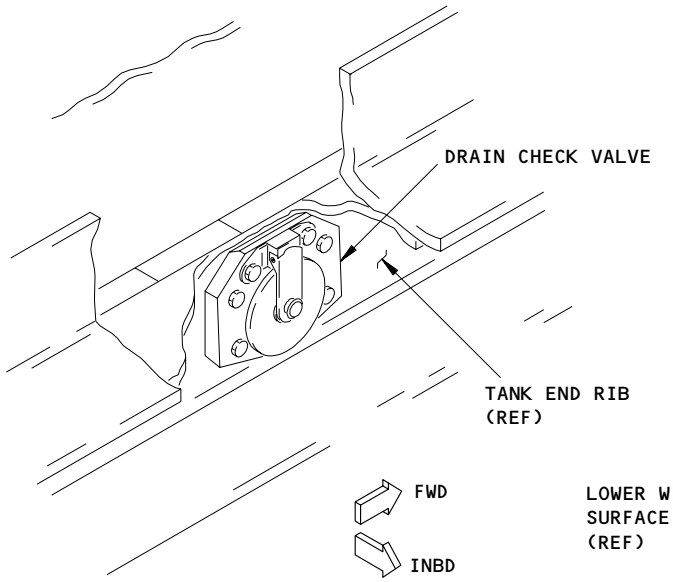
C



PRESSURE RELIEF VALVE OF THE SURGE TANK

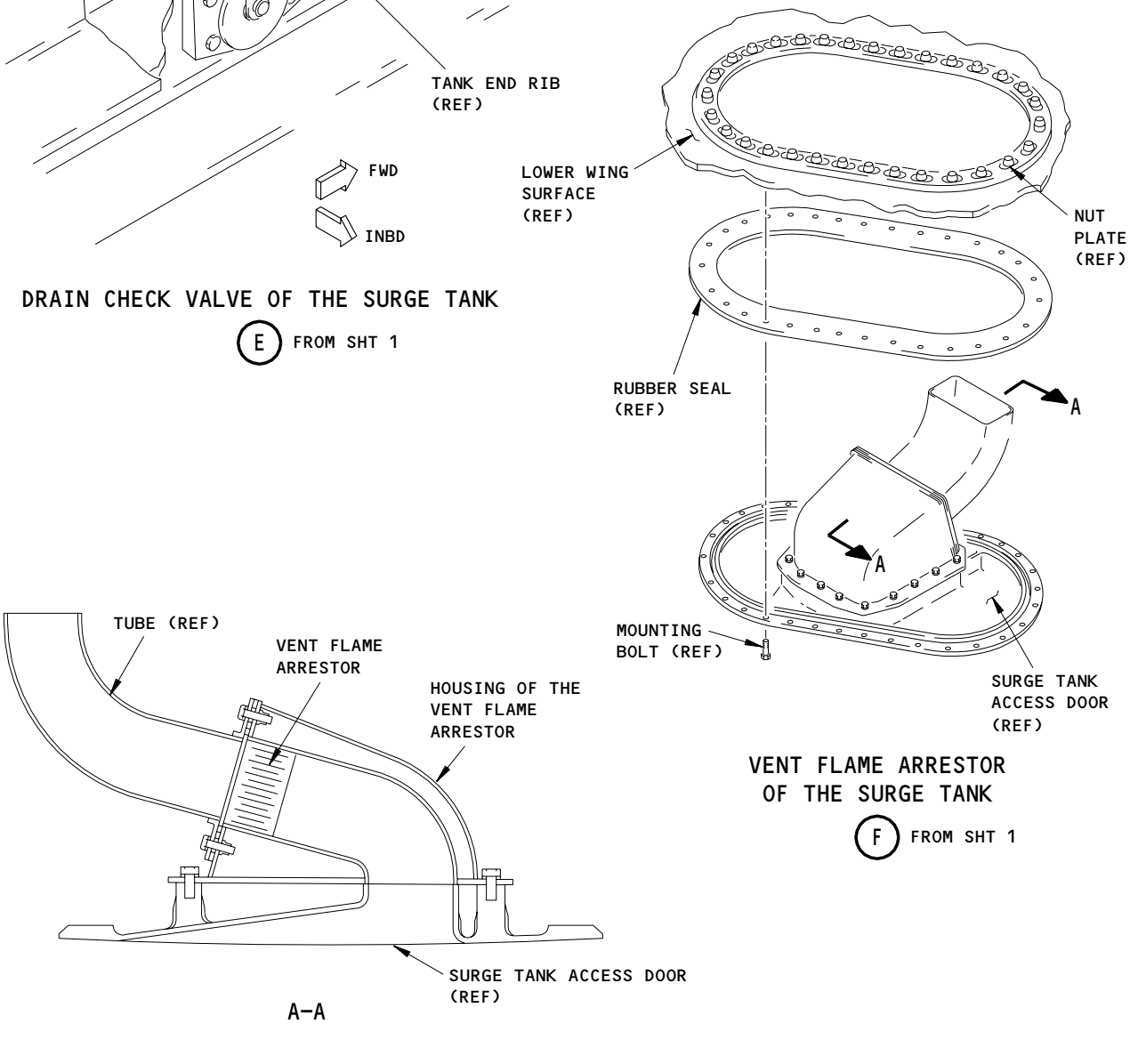
D

Fuel Vent System - Component Location (Details from Sht 1)
Figure 102 (Sheet 2)



DRAIN CHECK VALVE OF THE SURGE TANK

(E) FROM SHT 1



VENT FLAME ARRESTOR
OF THE SURGE TANK

(F) FROM SHT 1

Fuel Vent System - Component Location
Figure 102 (Sheet 3)

FLOAT VALVE - REMOVAL/INSTALLATION

1. General
   A. There are four float valves of the fuel vent. The float valves are found on the inboard side of each end rib in the fuel tanks. The float valve lets air move out of the fuel tank during refueling while it keeps fuel out of the fuel vent system.
   B. There are two types of float valves: a float-actuated vent valve and a fuel vent float valve.
   C. This procedure contains four tasks. The first task removes the float-actuated vent valve. The second task installs the float-actuated vent valve. The third task removes the fuel vent float valve. The fourth task installs the fuel vent float valve.

TASK 28-13-01-004-001

2. Remove the Float-Actuated Vent Valve (View A, Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-02/401, Center Tank Access Doors
      (3) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          531 Center Wing Tank (Left)
          631 Center Wing Tank (Right)

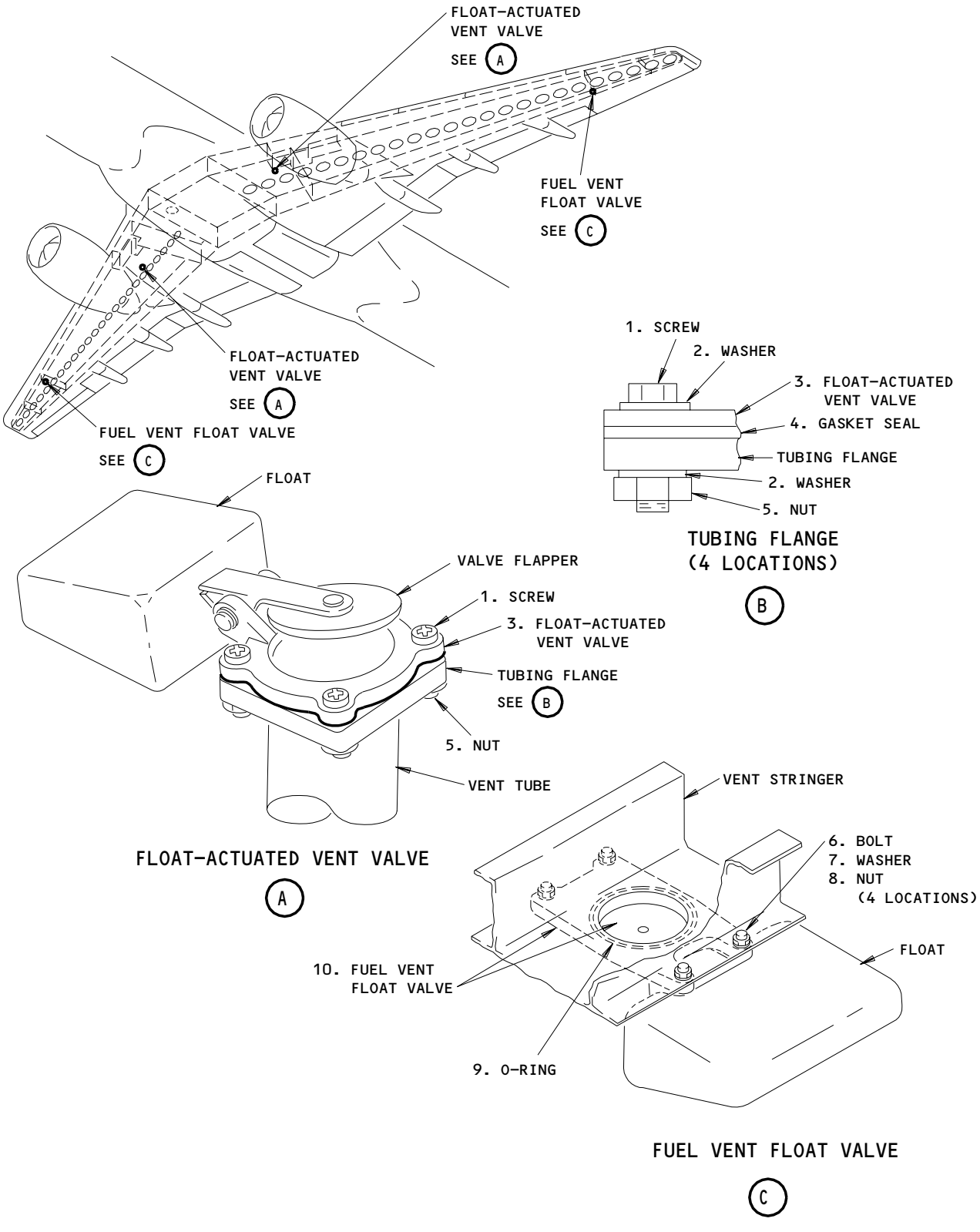
      (2) Access Panels
          531CB Center Tank Access Door (Left)
          631CB Center Tank Access Door (Right)

   C. Procedure

      S 654-002
      (1) Defuel the applicable fuel tanks (AMM 28-26-00/201).

      S 654-003
      (2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

      S 014-034
      (3) Remove the center tank access door, 531CB or 631CB (AMM 28-11-02/401).



Float Valve – Installation
Figure 401

S 944-010

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-004

(5) Go into the fuel tank and find the float-actuated vent valve (3).

S 034-005

(6) Remove the screws (1), washers (2), and nuts (5) from the float-actuated vent valve (3) and the tubing flange.

S 024-006

(7) Remove the float-actuated vent valve (3).

S 034-007

(8) Remove the gasket seal (4).

S 494-008

(9) Put a cover on the hole in the vent tube to keep unwanted objects out.

TASK 28-13-01-404-009

3. Install the Float-Actuated Vent Valve (View A, Fig. 401)

A. Parts

MM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	3 4	Float-Actuated Vent Valve Gasket Seal	28-13-01	01	65 55

B. References

(1) AMM 28-11-00/201, Fuel Tanks

(2) AMM 28-11-02/401, Center Tank Access Doors

C. Access

(1) Location Zones

531 Center Wing Tank (Left)

631 Center Wing Tank (Right)

(2) Access Panels
531CB Center Tank Access Door (Left)
631CB Center Tank Access Door (Right)

D. Procedure

S 944-011

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 094-012
(2) Remove the cover from the vent tube.

S 434-013
(3) Put a gasket seal (4) on the tubing flange and align the holes.

S 424-014
(4) Align the float-actuated vent valve (3) with the gasket seal (4) and the tubing flange.

S 434-015
(5) Install the screws (1), washers (2), and nuts (5).

S 414-016
(6) Install the center tank access door, 531CB or 631CB (AMM 28-11-02/401).

TASK 28-13-01-004-017
4. Remove the Fuel Vent Float Valve (View C, Fig. 401)
A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door
(3) AMM 28-26-00/201, Defueling
B. Access
(1) Location Zones
542 Main Tank - Rib No. 17 to No. 21 (Left)
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels
542DB Main Tank Access Door (Left)
642DB Main Tank Access Door (Right)

C. Procedure

S 654-030
(1) Defuel the applicable fuel tanks (AMM 28-26-00/201).

S 654-031
(2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

S 014-018
(3) Remove the main tank access door, 542DB or 642DB (AMM 28-11-01/401).

S 944-032

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-019
(5) Go into the fuel tank and find the fuel vent float valve (10).

S 034-020
(6) Remove the bolts (6), washers (7), and nuts (8) from the fuel vent float valve (10) and the vent stringer.

S 024-021
(7) Remove the fuel vent float valve (10).

S 034-022
(8) Remove the O-ring (9).

S 494-023
(9) Put a cover on the the hole in the tubing to keep unwanted objects out.

TASK 28-13-01-404-024

5. Install the Fuel Vent Float Valve (View C, Fig. 401)

A. Parts

MM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	O-ring	28-13-01	01	55
	10	Fuel Vent Float Valve			70

B. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door

C. Access

(1) Location Zones

542 Main Tank - Rib No. 17 to No. 21 (Left)
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

542DB Main Tank Access Door (Left)
642DB Main Tank Access Door (Right)

D. Procedure

S 944-033

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSON OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 094-025

(2) Remove the cover from the tubing.

S 434-026

(3) Put the O-ring (9) on the vent stringer.

S 424-027

(4) Align the fuel vent float valve (10) with the holes on the vent stringer.

S 434-028

(5) Install the screws (6), washers (7), and nuts (8) on the fuel vent float valve (10) and vent stringer.

S 414-029

(6) Install the main tank access door, 542DB or 642DB (AMM 28-11-01/401).

FLOAT DRAIN VALVE - REMOVAL/INSTALLATION

1. General
   A. There are four float drain valves in the fuel vent system. The four float drain valves are installed in the center fuel tank symmetrically at RBBL and LBBL 46. Two of the float drain valves are installed between stringers 8 and 9 and two of the float drain valves are installed between stringers 12 and 13.
   B. This procedure contains two tasks. The first task removes the float drain valve. The second task installs the float drain valve.

TASK 28-13-03-004-001

2. Remove the Float Drain Valve (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-02/401, Center Tank Access Door
   B. Access
      (1) Location Zones
          138 Wing Center Section (Left)
          134 Wing Center Section (Right)

      (2) Access Panel
          134AZ Center Tank Access Door (Right)

   C. Procedure

      S 014-018
      (1) Open the center tank access door, 134AZ (AMM 28-11-02/401).

      S 944-002

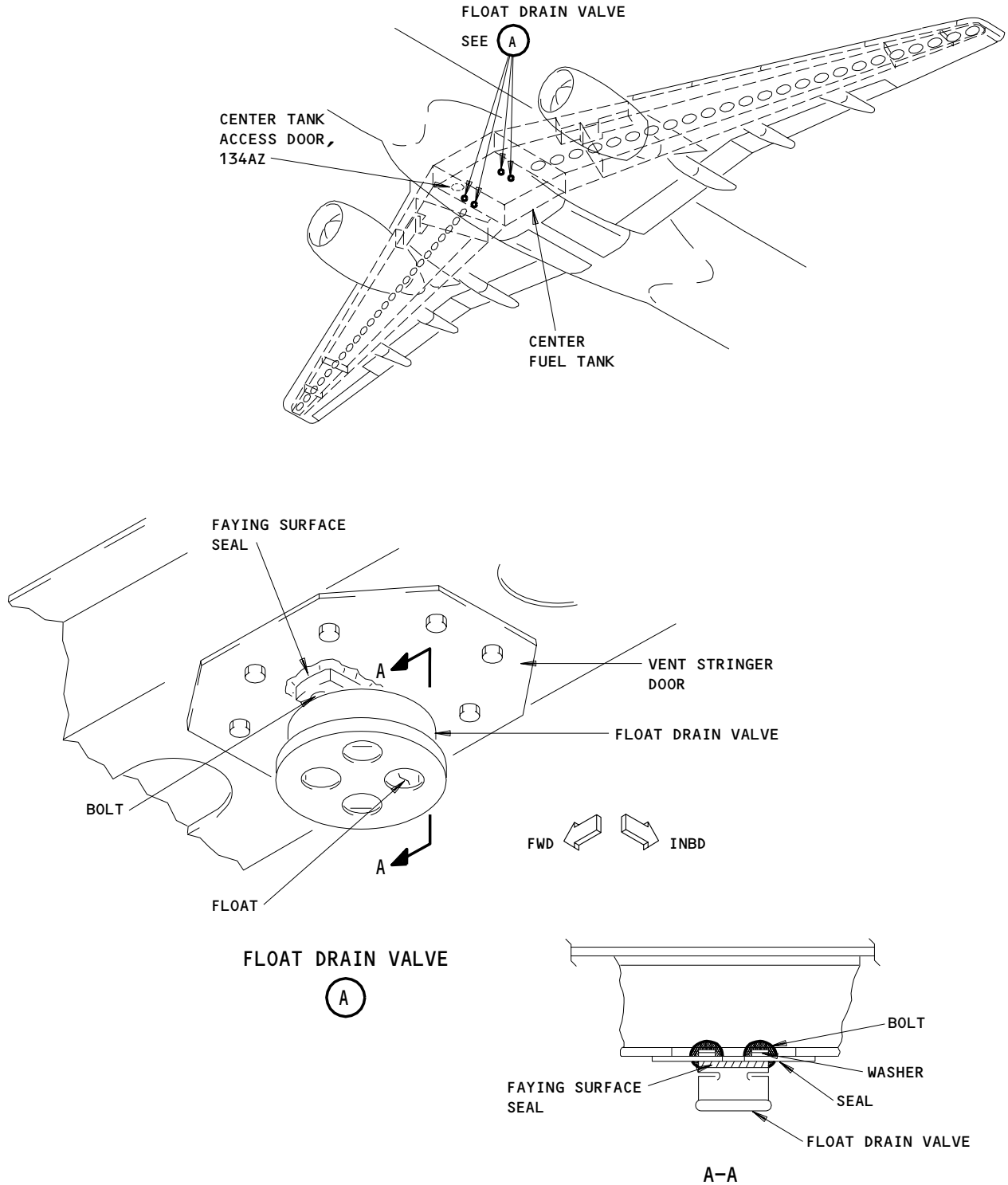
      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

      (2) Obey the fuel tank entry precautions (AMM 28-11-00/201).

      S 014-003
      (3) Go into the center fuel tank.

      S 014-004
      (4) Remove the applicable baffle doors to get access to the float drain valve.

      S 034-005
      (5) Hold the float drain valve and remove the bolts and the washers from the float drain valve.



Float Drain Valve Installation
Figure 401

S 024-009
(6) Remove the float drain valve.

TASK 28-13-03-404-006
3. Install the Float Drain Valve (Fig. 401)
A. Consumable Materials
(1) A000767 - Sealant - BMS 5-45

NOTE: Use one of these sealants:

(a) BMS 5-45 Class A - For brush application
(b) BMS 5-45 Class B - For sealing gun application
(c) BMS 5-45 Class C - For extrusion gun, roller, or spatula application

B. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-02/401, Center Tank Access Door
(3) AMM 51-31-01/201, Seals and Sealing
C. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

(2) Access Panel
134AZ Center Tank Access Door (Right)

D. Procedure

S 944-010

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-007
(2) Go into the center fuel tank.

S 394-008
(3) Apply a faying surface seal between the vent stringer door and the float drain valve with the sealant (BMS 5-45 Classes A and B) (AMM 51-31-01/201).

S 424-012
(4) Align the float drain valve with the holes in the vent stringer door.

S 424-013
(5) Install the bolts and the washers.

S 034-011
(6) Remove all unwanted sealant from the hole in the vent stringer door or the vent float valve.

S 394-014
(7) Apply a seal around the outer edge of the vent float valve flange and over the bolt heads with the sealant (BMS 5-45 Class B) (AMM 51-31-01/201).

S 214-015
(8) Make sure the float in the float drain valve moves freely.

S 414-016
(9) Install the baffle doors.

S 414-017
(10) Install the center tank access door, 134AZ (AMM 28-11-02/401).

SURGE TANK PRESSURE RELIEF VALVE - MAINTENANCE PRACTICES

1. General
   A. A pressure relief valve for the surge tank is installed on the surge tank access doors, 543AB and 643AB.
   B. This procedure has five tasks. The first task removes the pressure relief valve. The second task installs the pressure relief valve. The third task is an inspection/check of the pressure relief valve. The fourth task manually operates the pressure relief valve. The fifth task does a bonding resistance check of the pressure relief valve.

TASK 28-13-04-002-013

2. Remove the Pressure Relief Valve (Fig. 201)
   A. References
      (1) AMM 28-11-03/401, Surge Tank Access Door
   B. Access
      (1) Location Zones
          543 Surge Tank - Rib No. 21 to No. 23 (Left)
          643 Surge Tank - Rib No. 21 to No. 23 (Right)

      (2) Access Panels
          543AB Surge Tank - Access Door (Left)
          643AB Surge Tank - Access Door (Right)

   C. Procedure

      S 012-002

      (1) Remove the left or right surge tank access door, 543AB or 643AB (AMM 28-11-03/401).

      S 032-003

      WARNING: BE CAREFUL WITH A CLOSED PRESSURE RELIEF VALVE. IF THE PRESSURE RELIEF VALVE MOVES QUICKLY, IT CAN CAUSE INJURY.

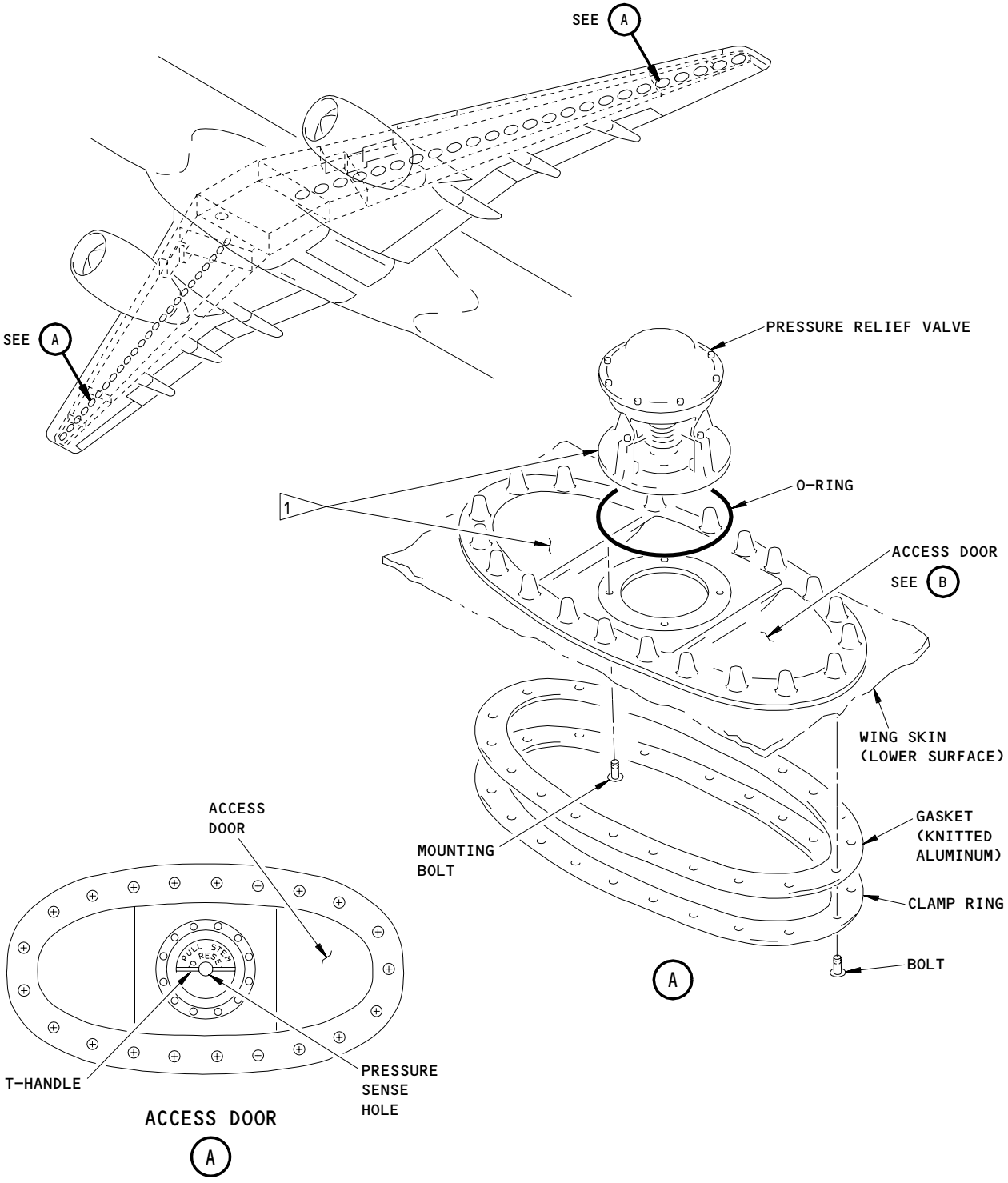
      (2) Remove the four mounting bolts that hold the pressure relief valve to the surge tank access door.

      S 022-004

      (3) Remove the pressure relief valve.

TASK 28-13-04-402-014

3. Install the Pressure Relief Valve (Fig. 201)
   A. References
      (1) AMM 28-11-03/401, Surge Tank Access Door
   B. Access
      (1) Location Zones
          543 Surge Tank - Rib No. 21 to No. 23 (Left)
          643 Surge Tank - Rib No. 21 to No. 23 (Right)



1 THE RESISTANCE FROM THE PRESSURE RELIEF VALVE BASE TO THE ACCESS DOOR IS 0.01 OHM OR LESS.

Surge Tank Pressure Relief Valve
Figure 201

(2) Access Panels

543AB	Surge Tank - Access Door (Left)
643AB	Surge Tank - Access Door (Right)

C. Procedure

S 212-005

(1) Make sure the surfaces on the pressure relief valve and the surge tank access door that the O-ring touches are clean and not damaged.

S 432-006

(2) Install a new O-ring which is hydrocarbon fuel resistant.

S 422-007

WARNING: BE CAREFUL WITH A CLOSED PRESSURE RELIEF VALVE. IF THE PRESSURE RELIEF VALVE MOVES QUICKLY, IT CAN CAUSE INJURY.

(3) Align the pressure relief valve on the surge tank access door.

S 432-008

(4) Install the four mounting bolts on the pressure relief valve.

S 412-009

(5) Install the surge tank access door 543AB or 643AB (AMM 28-11-03/401).

S 762-017

(6) Measure the resistance from the pressure relief valve base to the access door.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Make sure the resistance is 0.01 ohm (10 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

TASK 28-13-04-202-011

4. Pressure Relief Valve - Inspection/Check (Fig. 201)

A. Equipment

(1) Check Fixture, Surge Tank Pressure Relief Valve
- G28005-35 (Recommended)
- G28005-14 (Optional)
- G28005-18 (Optional)
- G28005-23 (Optional)
- G28005-29 (Optional)

(2) Pressure Source, range 0 to +1.50 psig.
Commercially available.

(3) Vacuum Source, range 0 to -3.00 psig.
Commercially available.

B. Access

(1) Location Zones

543	Surge Tank - Rib No. 21 to No. 23 (Left)
643	Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels

543AB	Surge Tank Access Door (Left)
643AB	Surge Tank Access Door (Right)

C. Procedure

S 222-010

(1) Do a check on the pressure relief settings of the pressure relief valve.
(a) Remove the four bolts on the left or right surge tank access door, 543AB or 643AB.
(b) Put and hold the check fixture of the pressure relief valve on the exit of the pressure relief valve.
(c) Install the check fixture bolts.
(d) Connect the pressure source to the check fixture.
(e) Slowly and continuously supply a positive pressure of more than 1.00 psig.
(f) Make sure the pressure relief valve opens between 1.00 and 1.25 psig.
(g) Put the pressure to 0 psig.
(h) Remove the pressure source.
(i) Hold the check fixture and remove the check fixture bolts.
(j) Remove the check fixture.
(k) Pull the T-handle down until the pressure relief valve sets again.
(l) Put and hold the check fixture of the pressure relief valve on the exit of the pressure relief valve.
(m) Install the check fixture bolts.
(n) Install the vacuum source on the check fixture.
(o) Slowly and continuously supply a vacuum pressure of more than -2.50 psig.

(p) Make sure the pressure relief valve opens between -2.50 and -2.75 psig.
(q) Put the pressure to 0 psig.
(r) Remove the vacuum source.
(s) Hold onto the check fixture and remove the check fixture bolts.
(t) Remove the check fixture.
(u) Install the four bolts on the surge tank access door, 543AB or 643AB.
(v) Pull the T-handle down until the pressure relief valve sets again.

TASK 28-13-04-282-015

5. Pressure Relief Valve - Manual Operation (Fig. 201)

A. Access

(1) Location Zones

543 Surge Tank - Rib No. 21 to 23 (Left)
643 Surge Tank - Rib No. 21 to 23 (Right)

(2) Access Panels

543AB Surge Tank Access Door (Left)
643AB Surge Tank Access Door (Right)

B. Procedure

S 282-012

(1) Manually operate the pressure relief valve.
(a) Put a screwdriver into the pressure sense hole on the left or right surge tank access door, 543AB or 643AB.
(b) Push up on the screwdriver.
(c) Make sure the pressure relief valve opens.

NOTE: There is a loud noise and the pressure relief valve moves away from the screwdriver, when the pressure relief valve opens.

(d) Remove the screwdriver from the pressure sense hole.
(e) Pull the T-handle down until the pressure relief valve sets again.

TASK 28-13-04-762-018

6. Pressure Relief Valve - Bonding Resistance Check

A. References

(1) AMM 28-11-03/401, Surge Tank Access Door
(2) SWPM 20-20-00, Electrical Bonds and Grounds

B. Equipment

(1) Bonding Meter - Use one of these:
(a) Bonding Meter - Model T477W
Avtron Manufacturing Inc.
Cleveland OH

(b) Bonding Meter - Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver Canada

C. Access

(1) Location Zones
543 Surge Tank - Rib No. 21 to 23 (Left)
643 Surge Tank - Rib No. 21 to 23 (Right)

(2) Access Panels
543AB Surge Tank Access Door (Left)
643AB Surge Tank Access Door (Right)

D. Procedure

S 012-020
(1) Remove the left or right surge tank access door, 543AB or 643AB (AMM 28-11-03/401).

S 762-021
(2) Do a check of the bonding resistance between the pressure relief valve base and the access door.
(a) Make sure the bonding resistance is 0.01 ohm (10 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 422-019
(3) Install the left or right surge tank access door, 543AB or 643AB (AMM 28-11-03/401).

SURGE TANK VENT FLAME ARRESTOR - REMOVAL/INSTALLATION

1. General
   A. The vent flame arrestor does not let external flames enter the fuel tank through the vent outlet. Each vent scoop contains one vent flame arrestor. The housing of the vent flame arrestor prevents damage to the vent flame arrestor.
   B. This procedure contains four tasks. The first task removes the housing of the vent flame arrestor. The second task installs the housing of the vent flame arrestor. The third task removes the vent flame arrestor. The fourth task installs the vent flame arrestor.

TASK 28-13-05-004-001

2. Remove the Housing of the Vent Flame Arrestor (Fig. 401)
   A. References
      (1) AMM 28-11-03/401, Surge Tank Access Door
   B. Access
      (1) Location Zones
          543 Surge Tank - Rib No. 21 to No. 23 (Left)
          643 Surge Tank - Rib No. 21 to No. 23 (Right)

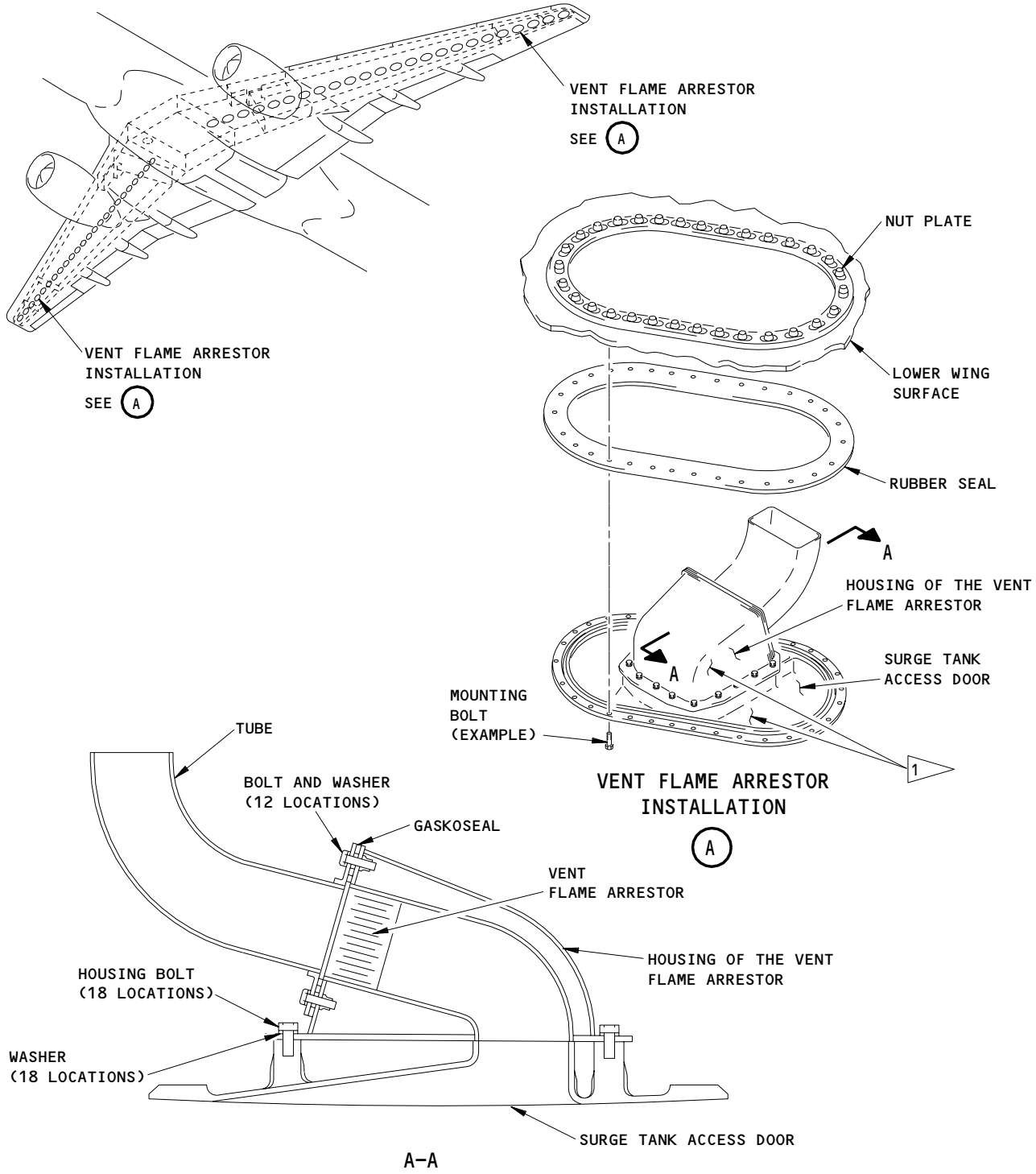
      (2) Access Panels
          543BB Surge Tank Door (Left)
          643BB Surge Tank Door (Right)

   C. Procedure

      S 014-011
      (1) Remove the surge tank access door, 543BB or 643BB (AMM 28-11-03/401).

      S 034-012
      (2) Remove the housing bolts and washers from the surge tank access door (18 locations).

      S 024-002
      (3) Remove the housing of the vent flame arrestor and the tube that attaches to it.



1 THE RESISTANCE FROM THE HOUSING OF THE VENT FLAME ARRESTOR TO THE SURGE TANK ACCESS DOOR IS 0.0025 OHM OR LESS.

Surge Tank Vent Flame Arrestor Installation
Figure 401

S 034-003
(4) Remove the bolts and the washers (12 locations) that hold the vent flame arrestor to the housing of the vent flame arrestor.

S 034-020
(5) Remove the tube and the vent flame arrestor.

TASK 28-13-05-404-004

3. Install the Housing of the Vent Flame Arrestor (Fig. 401)

A. Consumable Materials

(1) A00767 - Sealant - BMS 5-45

NOTE: Use one of these sealants:

(a) BMS 5-45 Class A - For brush application
(b) BMS 5-45 Class B - For sealing gun application
(c) BMS 5-45 Class C - For extrusion gun, roller, or spatula application

B. References

(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 28-11-03/401, Surge Tank Access Door
(3) AMM 51-31-01/201, Seals and Sealing

C. Procedure

S 434-005
(1) Put a new gaskoseal on the vent flame arrestor.

S 434-004
(2) Install the vent flame arrestor in the housing of the vent flame arrestor.

S 434-006
(3) Align the tube with the vent flame arrestor.

S 434-021
(4) Install the bolts and washers (12 locations) to attach the tube and the vent flame arrestor to the housing of the vent flame arrestor.

S 394-007
(5) Apply the sealant (BMS 5-45 Class A-2 and BMS 5-45 Class B-2) (AMM 51-31-01/201) around the bolts.

S 424-008
(6) Align the housing of the vent flame arrestor with the surge tank access door.

S 424-006
(7) Install the housing bolts and washers (18 locations) to attach the housing of the vent flame arrestor to the surge tank access door.

S 224-009
(8) Make sure the bonding resistance between the housing of the vent flame arrestor and the surge tank access door is 0.0025 ohm (2.5 milliohms) or less (AMM 20-10-21/601).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 394-010
(9) Apply the sealant (BMS 5-45 Class A-2 and BMS 5-45 Class B-2) (AMM 51-31-01/201) around the housing bolts.

S 414-011
(10) Install the surge tank access door, 543BB or 643BB (AMM 28-11-03/401).

TASK 28-13-05-004-012

4. Remove the Vent Flame Arrestor (Fig. 401)

A. References
(1) AMM 28-11-03/401, Surge Tank Access Door

B. Access
(1) Location Zones
543 Surge Tank - Rib No. 21 to No. 23 (Left)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels
543BB Surge Tank Door (Left)
643BB Surge Tank Door (Right)

C. Procedure

S 014-013
(1) Remove the surge tank access door, 543BB or 643BB (AMM 28-11-03/401).

NOTE: The housing of the vent flame arrestor is not removed.

S 034-014
(2) Remove the bolts and the washers (12 locations) that hold the vent flame arrestor to the housing of the vent flame arrestor.

S 024-007
(3) Remove the tube and the vent flame arrestor.

S 034-008
(4) Remove the gaskoseal from the vent flame arrestor.

TASK 28-13-05-404-015

5. Install the Vent Flame Arrestor (Fig. 401)

A. Consumable Materials

(1) A00767 - Sealant - BMS 5-45

NOTE: Use one of these sealants:

(a) BMS 5-45 Class A - For brush application
(b) BMS 5-45 Class B - For sealing gun application
(c) BMS 5-45 Class C - For extrusion gun, roller, or spatula application

B. References

(1) AMM 28-11-03/401, Surge Tank Access Door
(2) AMM 51-31-01/201, Seals and Sealing

C. Procedure

S 434-016
(1) Put a new gaskoseal on the vent flame arrestor.

S 424-009
(2) Install the vent flame arrestor in the housing of the vent flame arrestor.

S 434-017
(3) Align the tube with the vent flame arrestor.

S 424-010
(4) Install the bolts and washers (12 locations) to attach the tube and the vent flame arrestor to the housing of the vent flame arrestor.

S 394-018
(5) Apply the sealant (BMS 5-45 Class A-2 and BMS 5-45 Class B-2) (AMM 51-31-01/201) around the bolts.

S 414-019
(6) Install the surge tank access door, 543BB or 643BB (AMM 28-11-03/401).

SURGE TANK VENT FLAME ARRESTOR - INSPECTION/CHECK

TASK 28-13-05-766-030

1. Surge Tank Vent Flame Arrestor - Bonding Resistance Check (Fig. 601)

A. References

(1) AMM 28-11-03/401, Surge Tank Access Door

(2) SWPM 20-20-00, Electrical Bonds and Grounds

B. Equipment

(1) Bonding Meter - Use one of these:

(a) Bonding Meter - Model T477W
Avtron Manufacturing Inc.
Cleveland OH

(b) Bonding Meter - Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver, Canada

C. Access

(1) Location Zones

543 Surge Tank - Rib No. 21 to No. 23 (Left)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panels

543BB Surge Tank Door (Left)
643BB Surge Tank Door (Right)

D. Procedure

S 016-002

(1) Remove the surge tank access door, 543BB or 643BB (AMM 28-11-03/401).

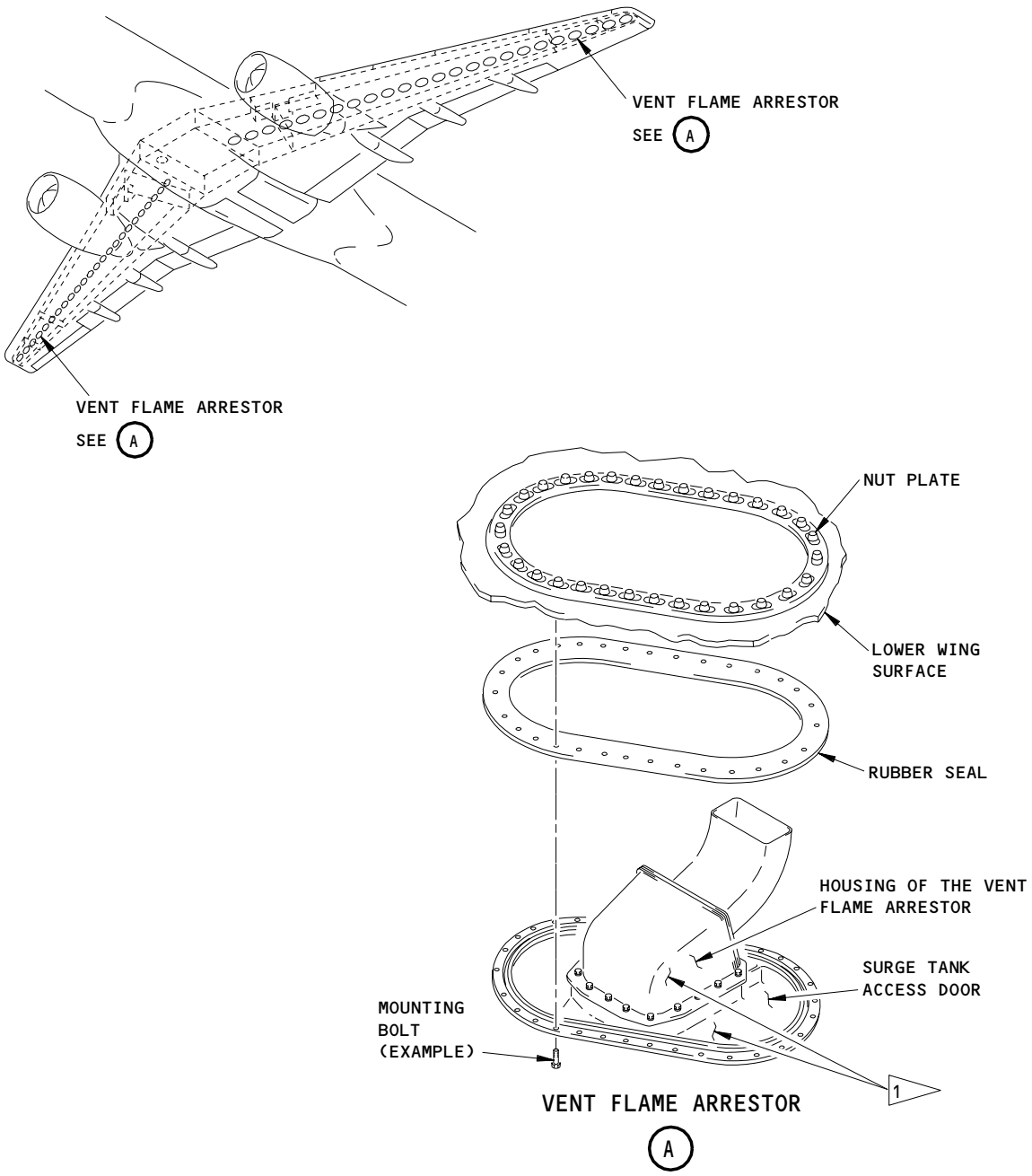
S 766-031

(2) Measure the bonding resistance between the lower vent duct and the access door (SWPM 20-20-00).

(a) Make sure the bonding resistance is 0.005 ohm (5.0 milliohms) or less.

S 416-017

(3) Install the surge tank access door, 543BB or 643BB (AMM 28-11-03/401).



1 THE RESISTANCE FROM THE HOUSING OF THE VENT FLAME ARRESTOR TO THE SURGE TANK ACCESS DOOR IS 0.005 OHMS OR LESS.

Surge Tank Vent Flame Arrestor Resistance Check
Figure 601

SURGE TANK DRAIN CHECK VALVE - REMOVAL/INSTALLATION

1. General
   A. A drain check valve is installed on the inboard side of each end rib in the surge tank. The drain check valve prevents the flow of fuel into the surge tank from the main fuel tank.
   B. This procedure contains two tasks. The first task removes the drain check valve. The second task installs the drain check valve.

TASK 28-13-08-004-001

2. Remove the Drain Check Valve (Fig. 401)
   A. References
      (1) AMM 28-11-01/401, Main Tank Access Door
   B. Access
      (1) Location Zones
          542 Main Tank - Rib No. 17 to No. 21 (Left)
          642 Main Tank - Rib No. 17 to No. 21 (Right)

      (2) Access Panels
          542DB Main Tank Access Door (Left)
          642DB Main Tank Access Door (Right)

   C. Procedure

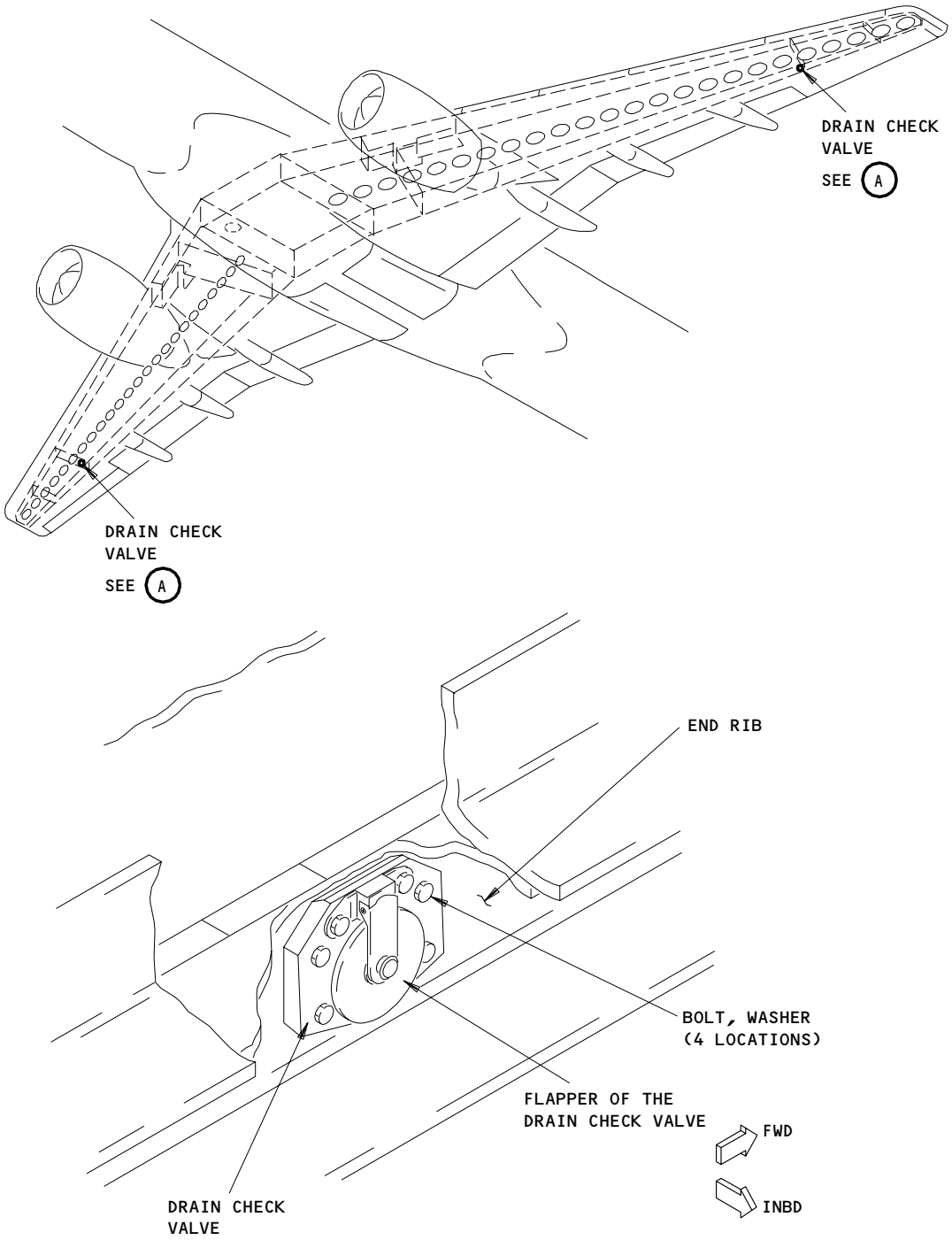
      S 014-002
      (1) Remove the main tank access door, 542DB or 642DB (AMM 28-11-01/401).

      S 034-003
      (2) Remove the four bolts and washers from the drain check valve.

      S 024-008
      (3) Remove the drain check valve.

TASK 28-13-08-404-004

3. Install the Drain Check Valve (Fig. 401)
   A. References
      (1) AMM 28-11-01/401, Main Tank Access Door



DRAIN CHECK VALVE
A

Drain Check Valve
Figure 401

B. Access

(1) Location Zones

542 Main Tank - Rib No. 17 to No. 21 (Left)
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

542DB Main Tank Access Door (Left)
642DB Main Tank Access Door (Right)

C. Procedure

S 424-005

(1) Align the drain check valve with the end rib.

S 424-006

(2) Install the four bolts and washers on the drain check valve.

S 414-007

(3) Install the main tank access door, 542DB or 642DB (AMM 28-11-01/401).

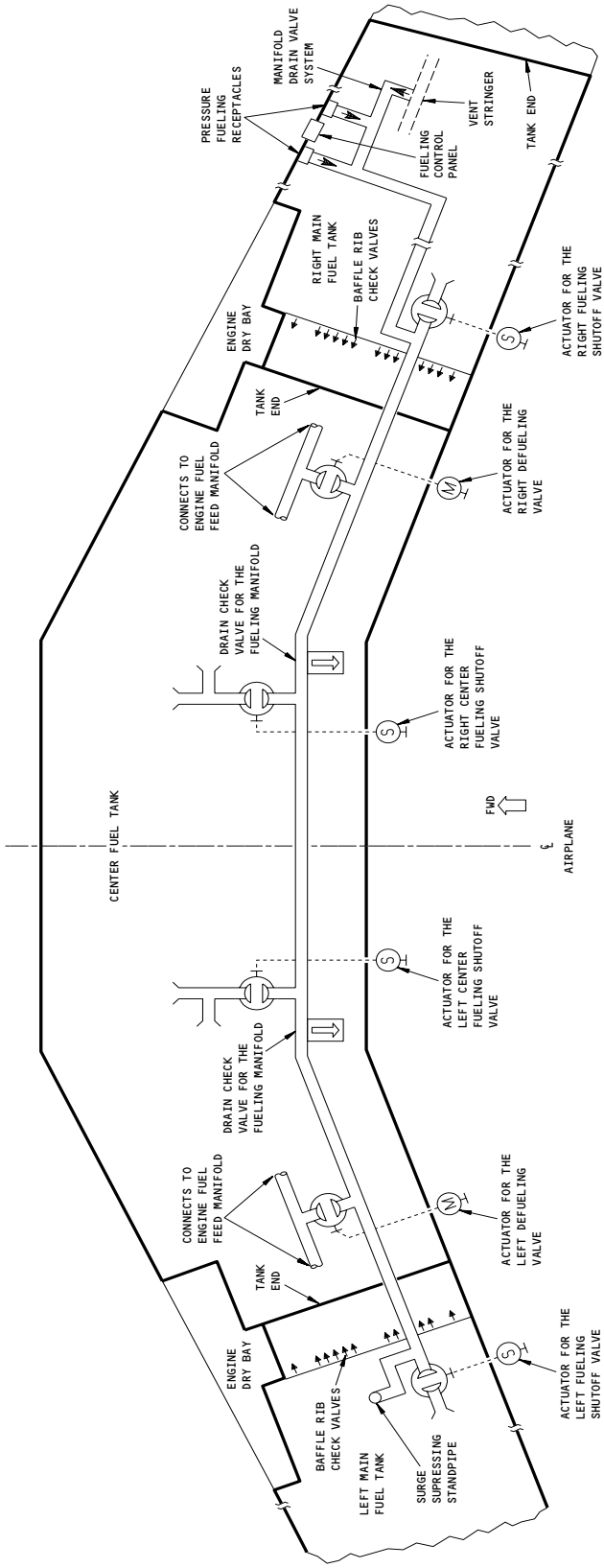
PRESSURE FUELING SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The pressure fueling system supplies a fast procedure to fill the fuel tanks in the airplane. The FQIS processor (AMM 28-41-00/001) controls the fueling operation in the automatic mode. The fueling crew can operate the system manually if it is necessary.
   B. The fueling station, found on the leading edge of the right wing, has a fueling control panel and two fueling adapters. The fueling adapters attach on the front spar and connect to the fueling manifold. The fueling adapters permit fueling and defueling (AMM 28-26-00/201) of the fuel tanks.

   C. The fueling manifold vent valve attaches to the fueling manifold and permits drainage of fuel trapped in the fueling manifold.
   D. A 3 inch diameter fueling manifold extends from the fueling adapters toward the rear spar and across the airplane to the left wing. The fueling manifold moves fuel from the fueling adapters through fueling shutoff valves into each fuel tank. Two drain check valves are installed in the fueling manifold in the center fuel tank. The drain check valves permit drainage of trapped fuel in the fueling manifold into the fuel tank and prevent fuel from the fuel tank from entering the fueling manifold.
   E. Four (pressure) fueling shutoff valves are installed between the fueling manifold and its branch lines. The branch lines direct fuel into the individual fuel tanks. The fueling shutoff valves control the flow of fuel from the main manifold into its branch lines. Defueling valves (AMM 28-26-00/001) connect the engine fuel-feed manifold with the (pressure) fueling manifold.
   F. The fueling control panel, P28, controls the fueling system. The fueling control panel has all the switches and indicators necessary to do the fueling operation.

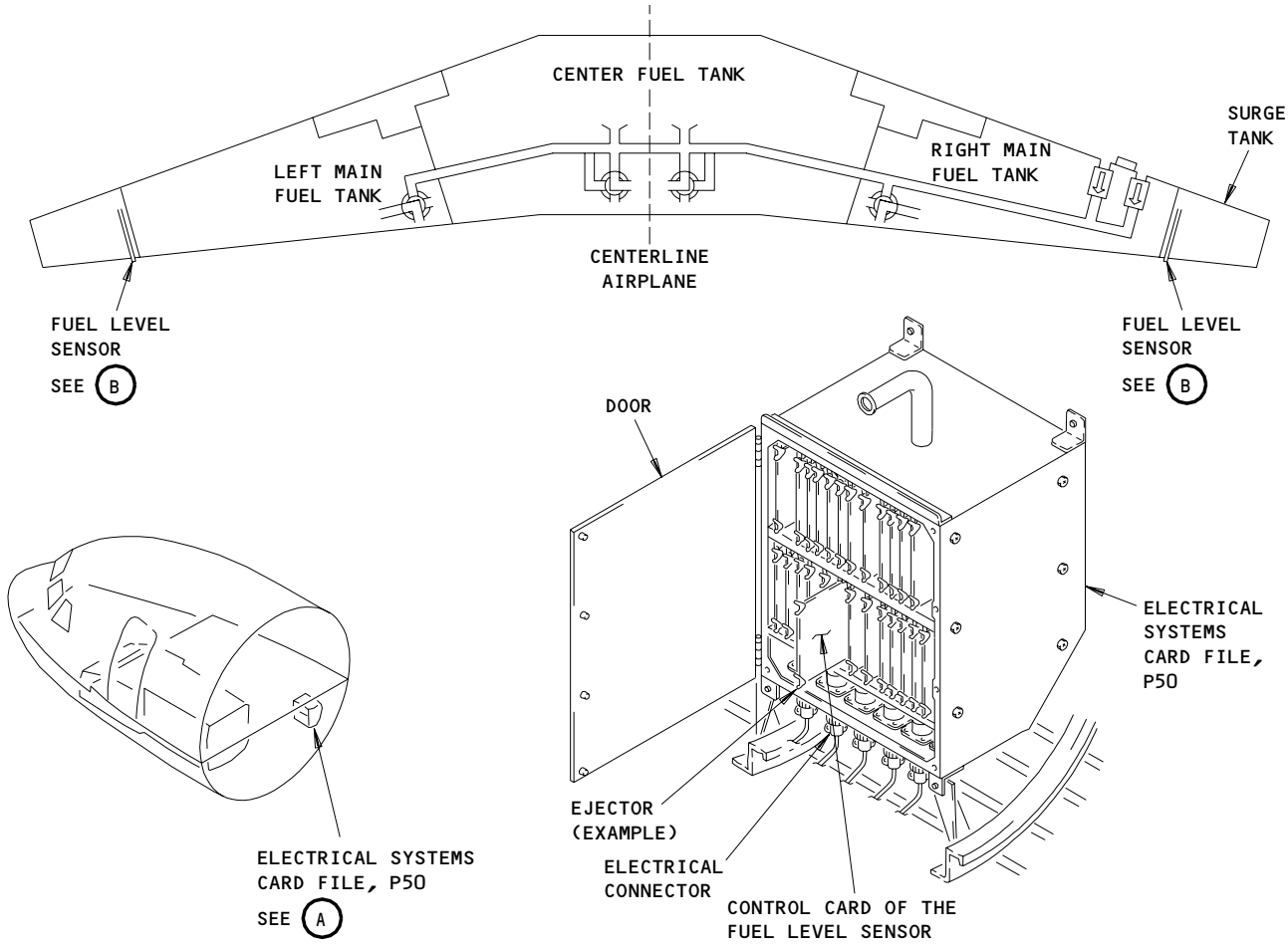
      NOTE: If you can not read the nomenclature on the fueling control panel, you can install placards (AMM 11-24-01/201).

   G. An overfill protection system has a fuel level sensor, on the rear spar of each surge tank, and a control card for the fuel level sensor, in the electrical systems card file, P50, protects the fueling operation from overflow. The system will shut down the fueling operation if the fuel level sensors sense fuel in the surge tank.
2. Component Details
   A. Fuel Level Sensor (Fig. 2)



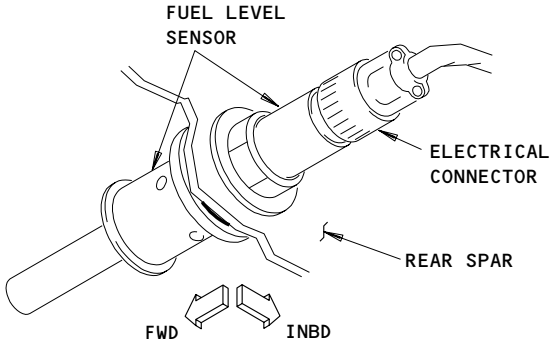
Pressure Fueling System
Figure 1

H42221



ELECTRICAL SYSTEMS CARD FILE, P50

A



FUEL LEVEL SENSOR

B

Pressure Fueling Overfill Protection Components
Figure 2

(1) A fuel level sensor attaches to the rear spar of each surge tank. The fuel level sensor has a probe with a small piezo-electric element sealed in the probe and an electrical connector. The probe, which extends into the fuel tank, and the element form an electromechanical circuit. This circuit sets up acoustic vibrations in the probe when 28v dc from the control card for the fuel level sensor energizes the element. With fuel around the probe the circuit frequency decreases. The control card monitors changes in frequency and controls the fueling shutoff valves accordingly.

B. Control Card for the Fuel Level Sensor

(1) A control card for the fuel level sensor is installed in the electrical systems card file, P50, in the electrical/electronics bay. The control card supplies control logic to protect the fuel system from overfilling during fueling. The control card operates on 28v dc power and supplies drive signals to each fuel level sensor. The fuel level sensors supply frequency outputs back to the control card which controls the refueling valve relays. The frequency level that the control card senses determines whether the control card logic interrupts power to the refueling valve relays.

C. Fueling Shutoff Valve (Fig. 3)

(1) Description

(a) The fueling shutoff valve has two components; the valve, and the actuator. The two components connect through an opening in the rear spar.

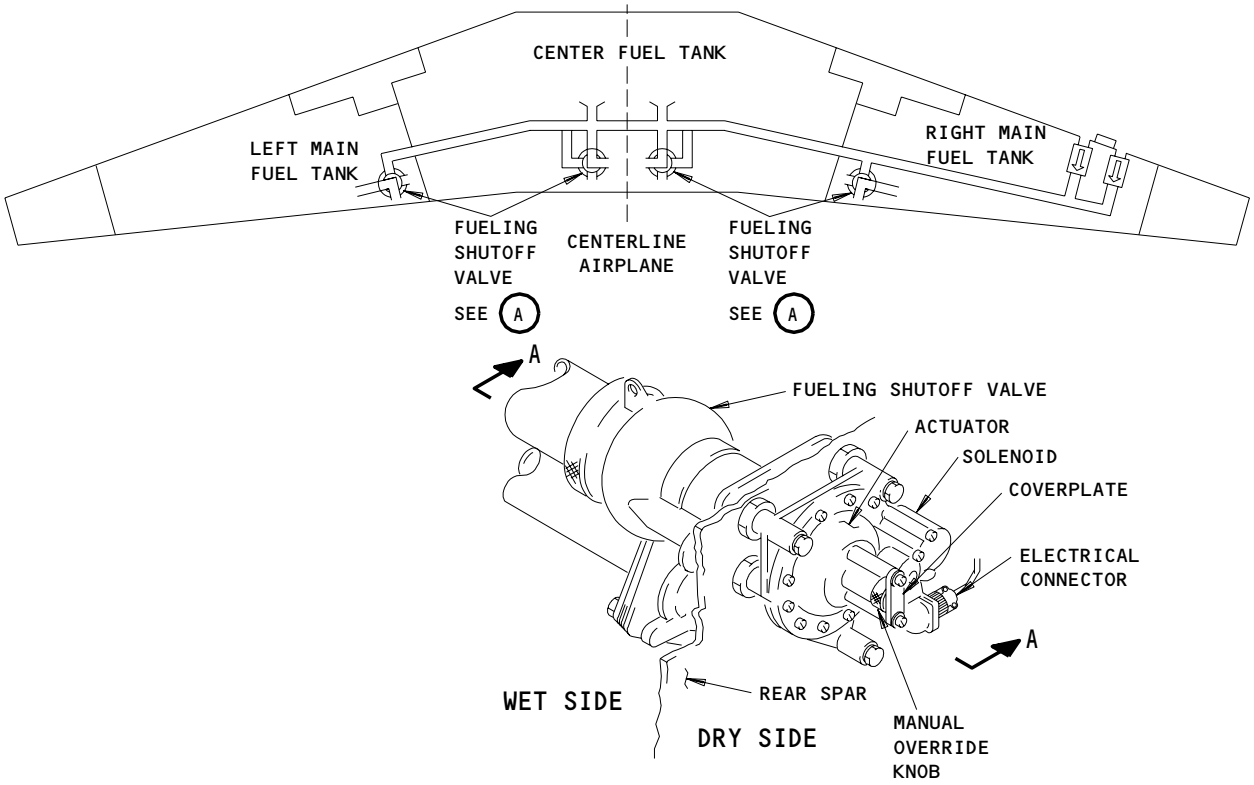
(b) The fueling shutoff valve is a poppet type valve, which connects between the fueling manifold and the fuel tank. The valve body is installed in the fuel tank near the rear spar. Two control ports pass through the spar to connect with passages in the actuator, leading to the actuator control diaphragm. Removal check valves fit in the control ports. Fueling shutoff valve replacement requires defueling.

(c) The actuator for the fueling shutoff valve is installed out of the fuel tank on the rear spar. The actuator engages with the two valve control ports which protrude through the rear spar. The actuator is held in position by three bolts which screw into threaded holes in the valve mounting studs. The actuator houses a diaphragm, fuel passages for diaphragm control, a solenoid operated pilot valve, valve position switch, and a manual override knob. Actuator replacement does not require defueling.

(2) Function

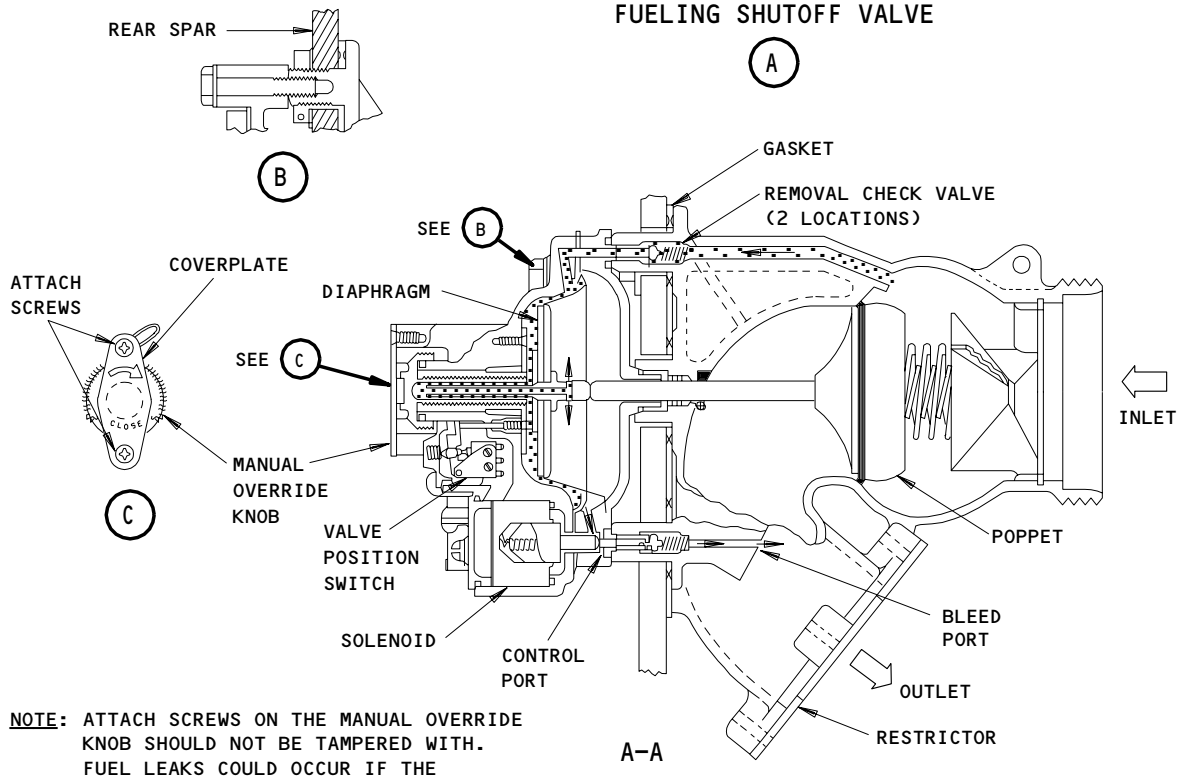
(a) Fueling Shutoff Valve

1) When fuel under pressure enters the valve inlet, fuel pressure and spring tension keep the fueling shutoff valve in its closed position.



FUELING SHUTOFF VALVE

A



NOTE: ATTACH SCREWS ON THE MANUAL OVERRIDE KNOB SHOULD NOT BE TAMPERED WITH. FUEL LEAKS COULD OCCUR IF THE ATTACH SCREWS ARE TAMPERED WITH.

Fueling Shutoff Valve
Figure 3

(b) Actuator of the Fueling Shutoff Valve

1) When fuel under pressure enters the valve inlet, with the fueling shutoff valve closed, fuel flows through a passage to the solenoid side of the diaphragm. A passage through the shaft connects cavities on the two sides of the diaphragm. Actuating the solenoid controlled pilot valve, opens a larger outlet passage on the tank side of the diaphragm. The difference in fuel pressure moves the diaphragm in a direction that forces the poppet open.
2) To close the fueling shutoff valve with pressure in the fueling manifold, de-energize the solenoid valve. With the flow stopped, pressures equalize on the two sides of the diaphragm, and permit the spring loaded poppet to close. Spring pressure holds the poppet closed with pressure removed from the fueling manifold.
3) The valve position switch supplies the fueling station with an indication of the fueling shutoff valve position.

(c) Manual Operation

CAUTION: MAKE SURE THERE IS NO PRESSURE IN THE FUELING MAINFOLD BEFORE YOU TURN THE MANUAL OVERRIDE KNOB. DAMAGE TO THE VALVE OR THE MANIFOLD CAN OCCUR.

1) The fueling shutoff valve opens or closes manually if you turn the manual override knob 10 to 13 complete revolutions. Clockwise rotation closes the fueling shutoff valve. Counterclockwise movement opens it. A lockwire holds the manual override knob in the closed position.

NOTE: The attach screws that attach the coverplate over the manual override knob should not be tampered with. Tampering with the attach screws on the coverplate could cause fuel leaks.

D. Fueling Adapters (Fig. 4)

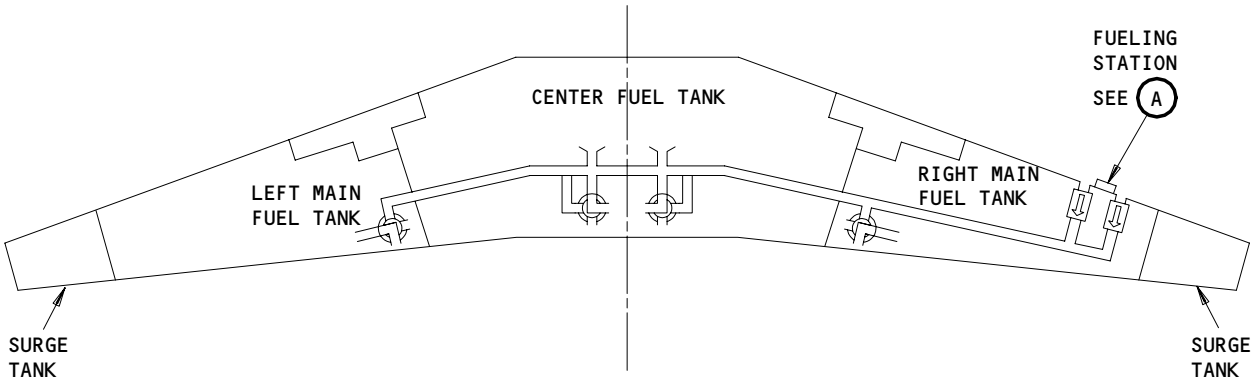
(1) Description

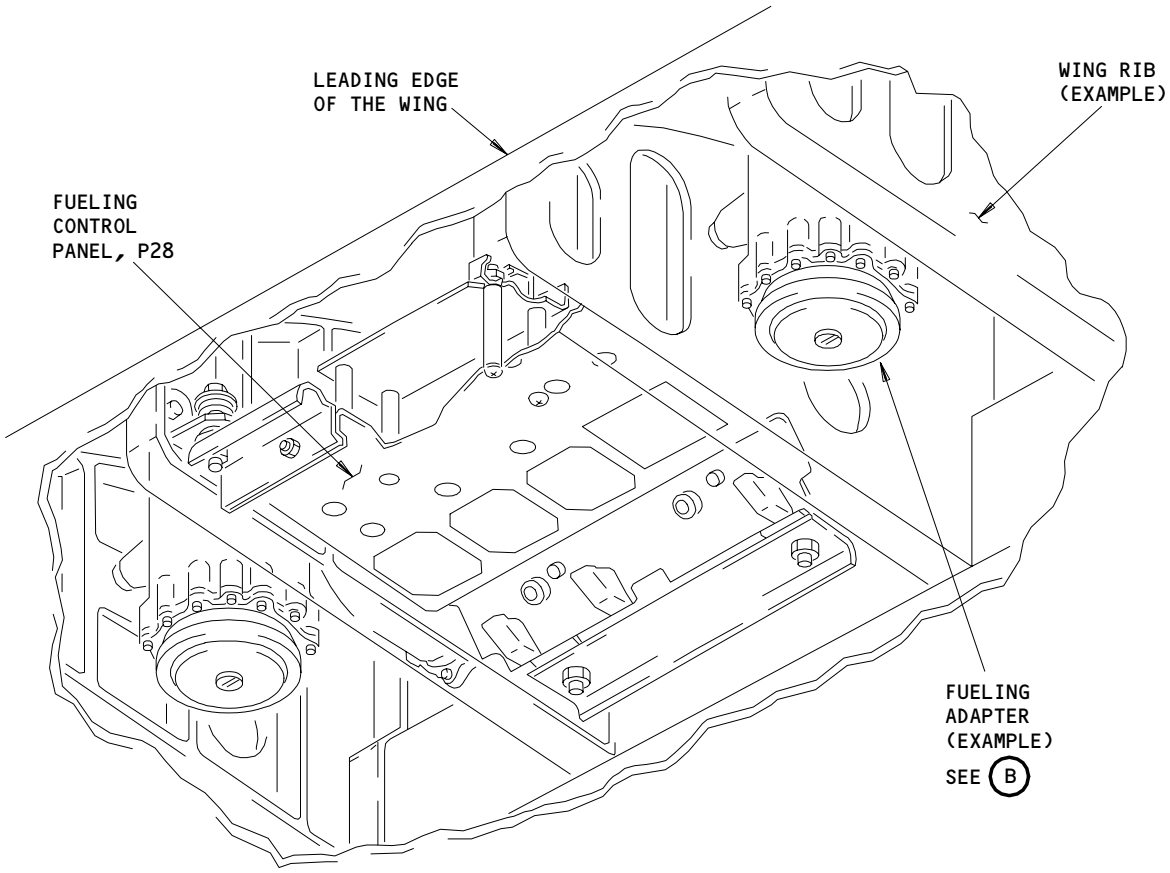
(a) Two fueling adapters attach to the front spar of the right wing at the fueling station. The fueling adapters permit pressure fueling and defueling of the airplane fuel tanks. The fueling adapters have a housing which contains a poppet, piston and a FUEL/DEFUEL cam. The adapters mate with a standard type fueling nozzle.

NOTE: The 757 aircraft does not have a fuel jettison system, therefore fuel adapter caps are not required to be installed on the fuel adapters.

(2) Function

(a) With the FUEL/DEFUEL cam in the FUEL position, fuel pressure forces the poppet to open. The open poppet prevents reverse fuel flow when the fueling operation is complete.





FUELING STATION

(A)

Fueling Adapter
Figure 4 (Sheet 1)

43292

(b) With the FUEL/DEFUEL cam in the DEFUEL position, the poppet and piston interlock to permit reverse fuel flow when the fueling nozzle is attached.

E. Fueling Control Panel (Fig. 4A)

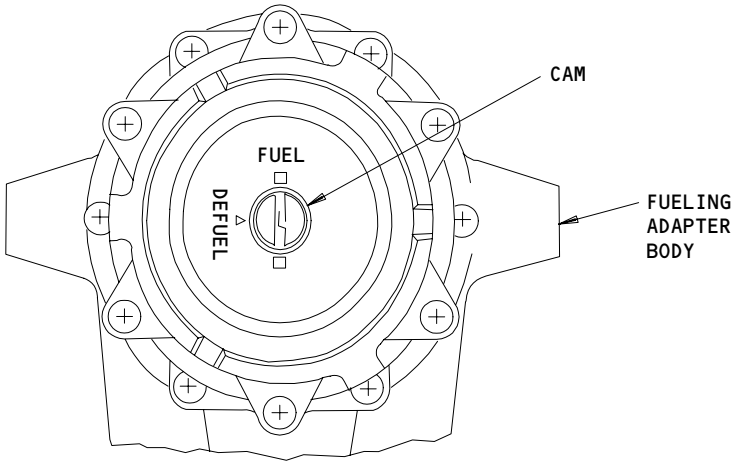
(1) The fueling control panel, P28, is installed forward of the front spar on the right wing between the two fueling adapters. The fueling control panel has switches and indicators for fueling and defueling (AMM 28-26-00/201) operations.

NOTE: If you can not read the nomenclature on the fueling control panel, you can install placards (AMM 11-24-01/201).

F. Fueling Manifold Vent Valve (Fig. 5)

(1) The fueling manifold vent valve attaches to the right fueling manifold. The vent valve lets air to be vented from the fuel tank into the fueling manifold to drain the trapped fuel into the fuel tank.

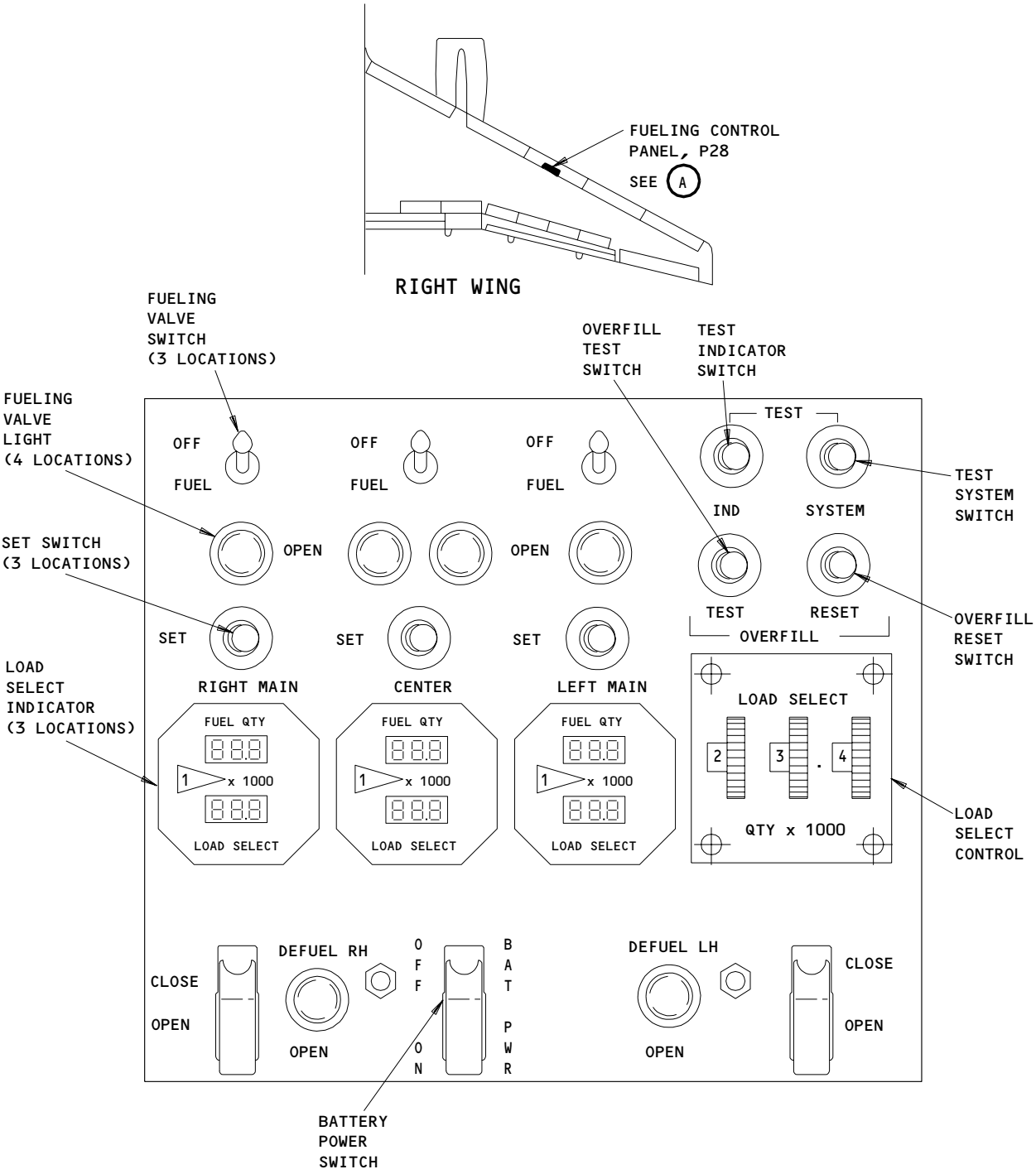
G. Drain Check Valves for the Fueling Manifold (Fig. 5)



FUELING ADAPTER

B

Fueling Adapter
Figure 4 (Sheet 2)

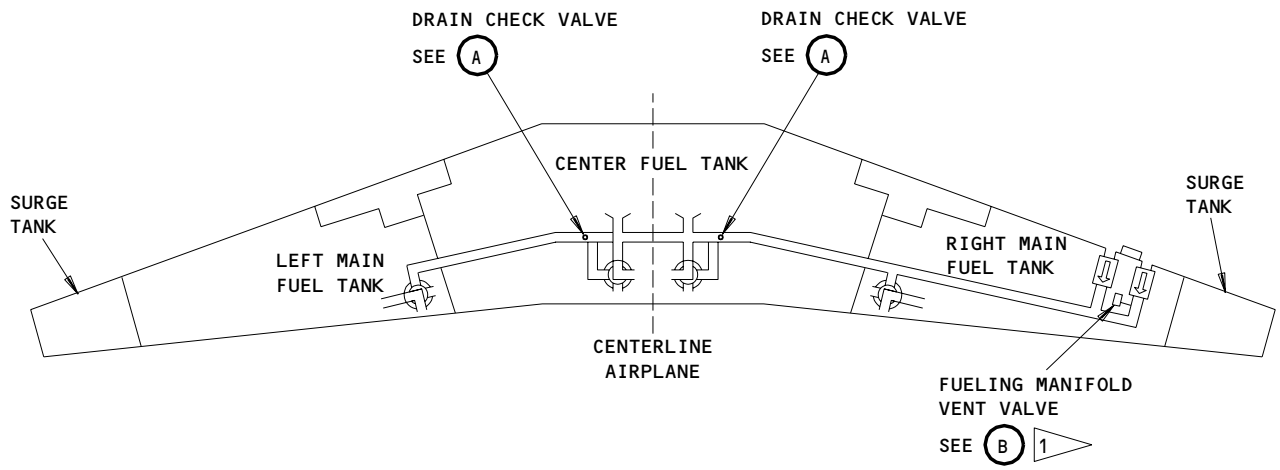


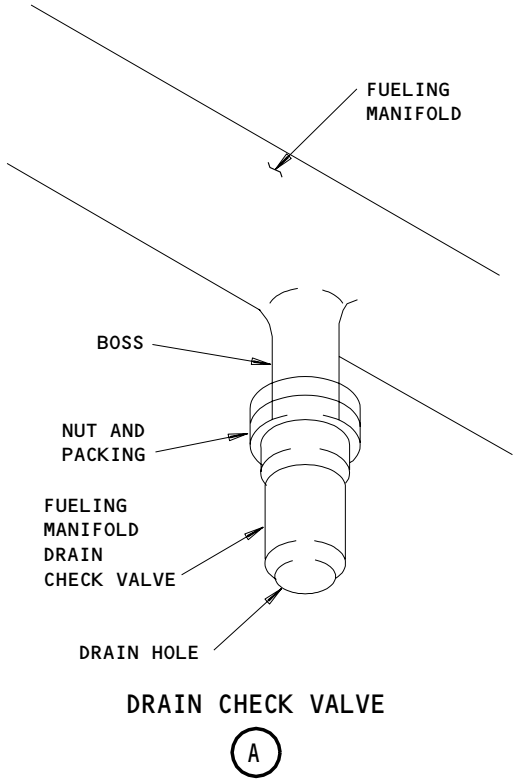
FUELING CONTROL PANEL, P28

(A)

1 THE UNITS ARE IN LBS OR KGS.

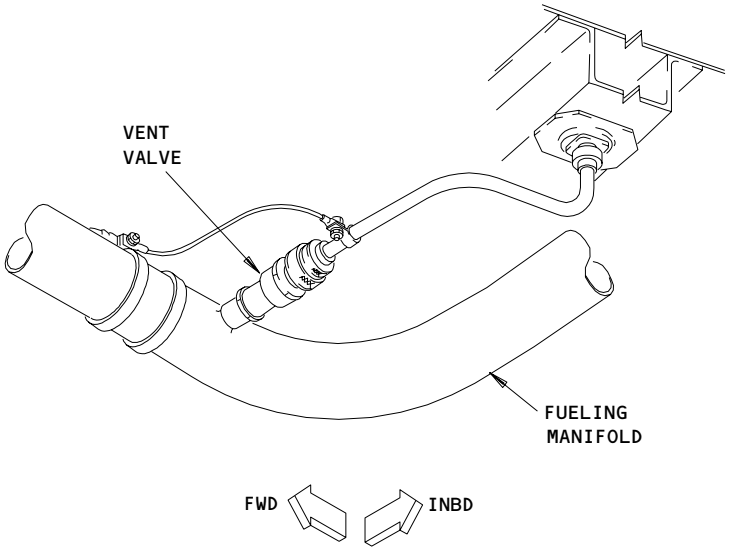
Fueling Control Panel
Figure 4A





DRAIN CHECK VALVE

A



FUELING MANIFOLD VENT VALVE

B

Fueling Manifold Drain Check Valve
Figure 5

(1) Two drain check valves, found in the center fuel tank, attach to the lower side of the fueling manifold. The drain check valves permit drainage of the fueling manifold into the center fuel tank. The drain check valve has an inlet port, outlet port, a hinged flapper, and piston, in its cylindrical housing. The flapper prevents reverse flow of fuel from the fuel tank to the fueling manifold when fuel tank pressure exceeds the manifold pressure. The sliding piston closes the drain check valve when manifold pressure exceeds fuel tank pressure by 8.5 psig or more.

3. Operation (Fig. 6)

A. Functional Description

(1) The pressure fueling system operates with 28v dc power applied through relays to the fueling shutoff valves. The fuel quantity indicating system (AMM 28-41-00/001) supplies control and indication for pressure fueling.

(2) Electrical power controls the automatic and manual modes of pressure fueling. The fueling mode is changed between manual and automatic when you push the applicable SET switch on the fueling control panel, P28.

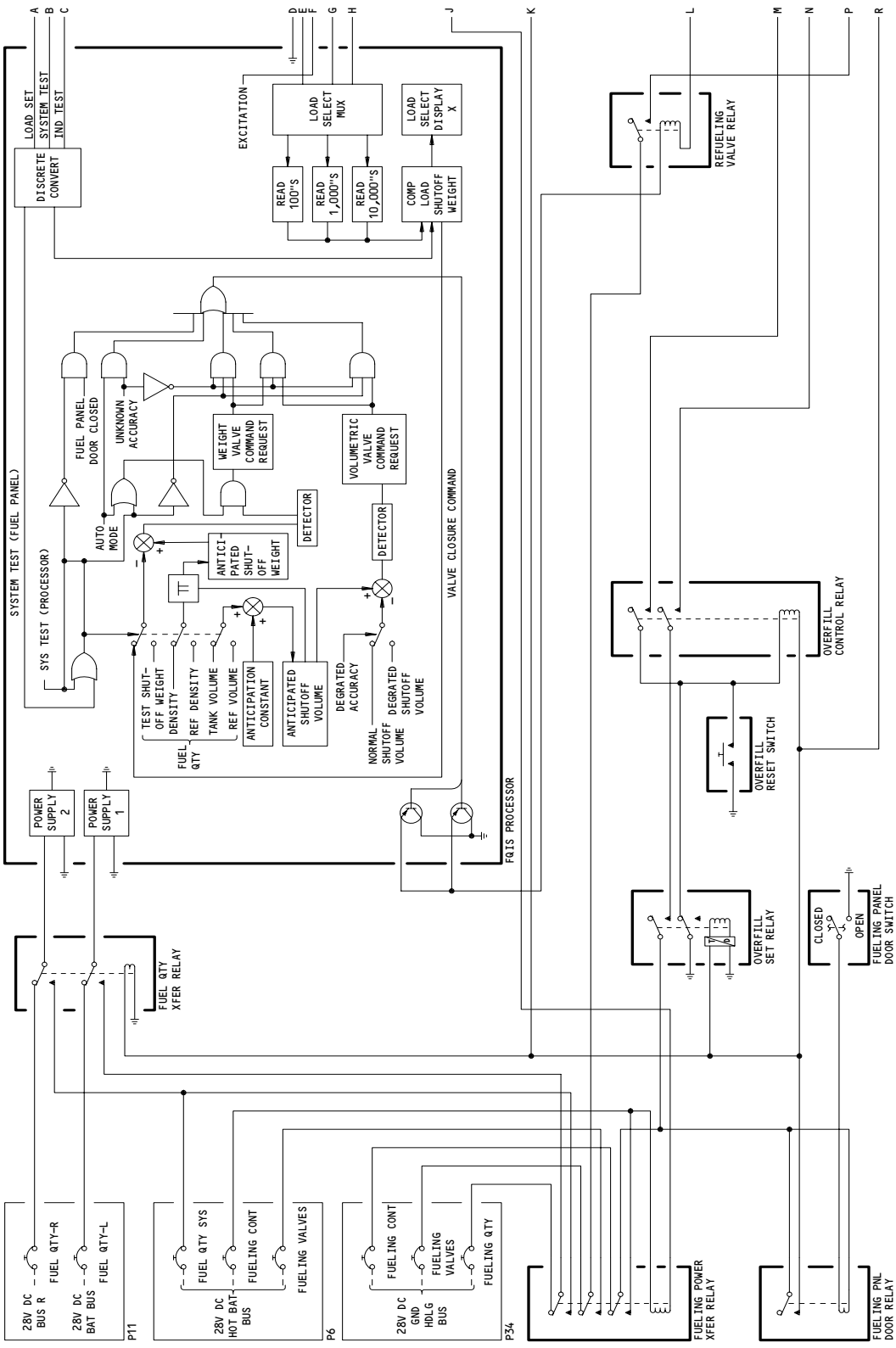
NOTE: When the system is in the automatic mode, the preselected fuel quantity shows in the lower LCD display.

(3) With electrical power, the automatic mode supplies automatic shutdown when the fuel tank is full and automatic shutdown at the preselected value. Automatic shutdown when the fuel tank is full is supplied in the manual mode when electrical power is available. An overfill protection system is supplied in the automatic mode and, when electrical power is available, in the manual mode. Without electrical power, no automatic shutdown or overfill protection is supplied and the fueling shutoff valves must be accessed and opened manually.

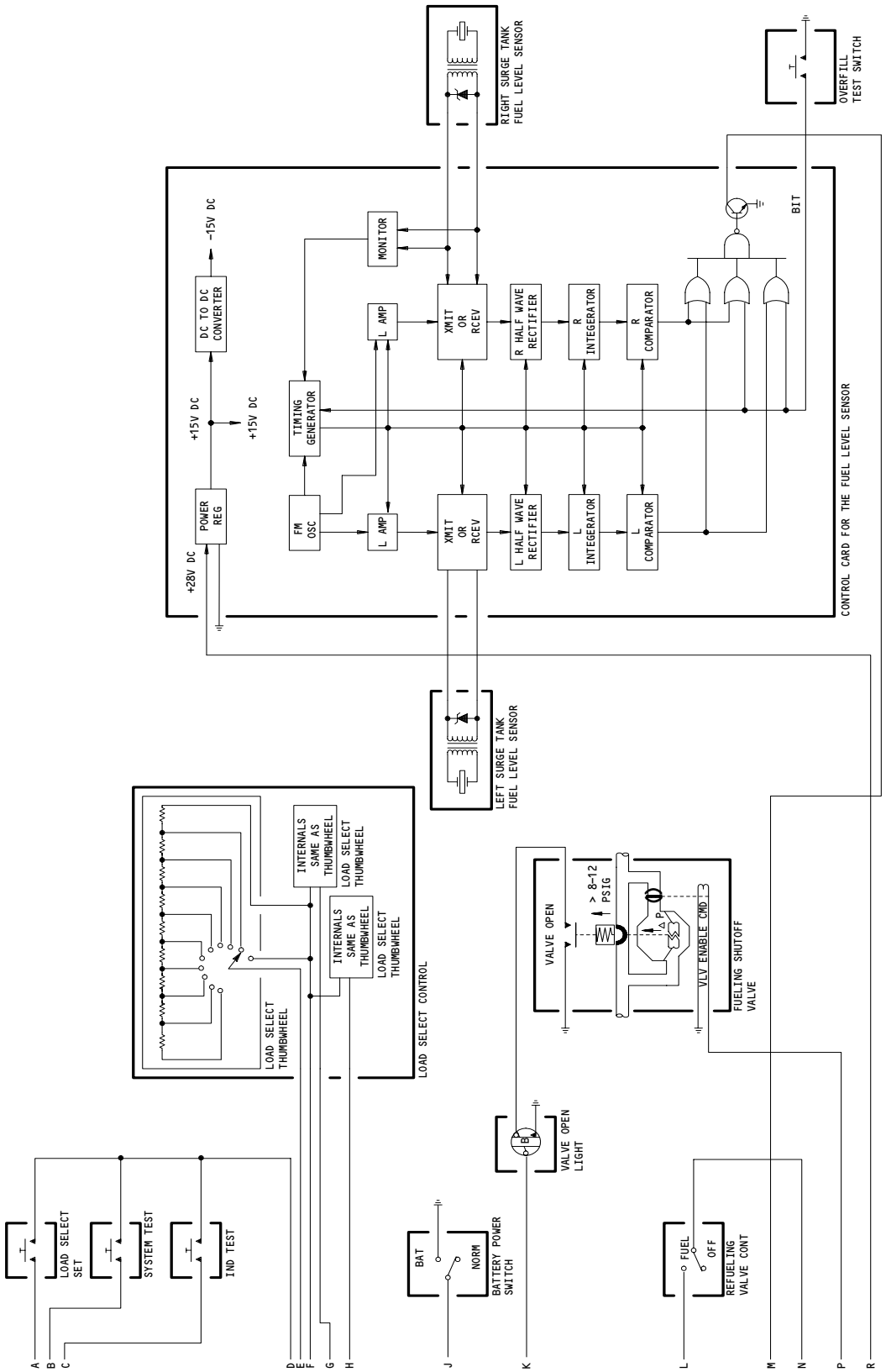
(4) Fueling Modes

(a) Automatic Mode With Electrical Power

1) During automatic mode of pressure fueling, the FQIS processor controls the fueling process. The FQIS processor monitors the quantity of fuel in each fuel tank constantly. The FQIS processor stops the fueling operation when the fuel tanks are full, have reached the selected fuel quantity, or if an unknown accuracy condition is detected by the FQIS processor.



Pressure Fueling Schematic (Example)
Figure 6 (Sheet 1)



Pressure Fueling Schematic (Example)
Figure 6 (Sheet 2)

2) Whenever an unknown accuracy condition occurs, the FQIS processor will close the fueling shutoff valve(s) for the applicable fuel tank. In addition, the failure of a single FQIS processor channel causes one of the two fueling shutoff valves in the center fuel tank to close.
3) Selecting the desired fuel quantity on the LOAD SELECT control thumbwheels and pressing the SET switches for the tanks to be fueled places the system in the automatic mode. The quantity selected is shown in the load select display (lower LCD). With the fuel truck nozzles attached to the fueling adapters (set in the fuel mode) and the fueling valve switches selected to FUEL, fuel enters the fueling manifold and into the selected tank through the corresponding fueling shutoff valve. The FQIS processor closes the fueling shutoff valves when the selected quantity is reached or the fuel tanks are full.

   NOTE: A blank lower display shows that the system is in the manual mode.

4) An overfill protection system closes the fueling shutoff valves if the FQIS processor fails to shutdown the system and fueling continues until fuel is sensed at the fuel level sensor in the surge tank.
5) When you put any fueling valve switch to OFF during pressure fueling, it stops the automatic fueling process.

(b) Manual Mode with Electrical Power
1) In the manual mode, the fueling crew controls the fueling operation. The crew monitors the LOAD SELECT indicator for the fuel tank being fueled. The upper display of the LOAD SELECT indicators shows the fuel in each corresponding fuel tank (the lower display will be blank). With the fuel truck nozzles attached to the fueling adapters (set in the FUEL mode) and the fueling valve switches set to FUEL, fuel enters the fueling manifold and into the selected fuel tank through the corresponding fueling shutoff valve. The fueling valve switches can be placed to OFF at any time to stop the fueling process. The FQIS processor closes the fueling shutoff valve(s) automatically when the fuel tanks are full except for any fuel tank for which the fuel quantity indicating system has declared unknown accuracy. The overfill protection system is available in the manual mode.

(c) Manual Mode Without Electrical Power
1) Without electrical power the fueling shutoff valves must be controlled manually at each fueling shutoff valve with the thumbwheel screw (manual override knob) on the actuator. No automatic shutdown or overfill protection exists with this method.

(5) Pressure Surge Protection
  (a) Pressure surge protection is provided by a surge suppressing standpipe. The standpipe, located on the end of the fueling manifold in the left main tank, helps dissipate pressure surge when the fueling valves are closed.
(6) Pressure Fueling System Circuitry
  (a) One of two sources, the ground handling bus or the hot battery bus provides 28 vdc electrical power for the pressure fueling system. Normally, power comes from the ground handling bus. Switching to the hot battery bus power source requires opening the control panel door and placing the BAT PWR switch to ON. Placing the BAT PWR switch to ON energizes the fueling power transfer relay making the hot battery bus the power source. Opening the fueling control panel door provides a ground to energize the fueling panel door relay. The energized fueling panel door relay makes power available to the rest of the system.
  (b) The FQIS processor receives the load select input and then provides a ground for the refueling valve relays. Power to each refueling valve relay comes through the fueling valve switch (in the FUEL position only).
  (c) Current flows through the energized fueling panel door relay to the energized overfill control relay which grounds through the overfill set relay. After a one to three second time delay the overfill control relay becomes grounded at the fuel level sensor control card if the card senses no fuel at the surge tank fuel level sensor units. After this time delay the overfill set relay energizes. With both the overfill set relay and overfill control relay energized, power becomes available to energize the refueling valve relays. The energized refueling valve relays allow power to pass from the power source through the fueling power transfer relay and refueling valve relays to energize each fueling shutoff valve solenoid. Pressure fueling stops if the fuel quantity processor senses a full tank or selected quantity or if fuel is sensed by the fuel level sensor in the surge tank.
  (d) An OVERFILL TEST switch on the P28 panel simulates an overfill condition and supplies this signal to the control card for the fuel level sensor. The control card then removes the ground from the overfill control relay. This removes power from the refueling valve relays and the fueling shutoff valves close. When the fueling shutoff valves close, their respective OPEN lights go off.
  (e) After you push the OVERFILL TEST switch, the OVERFILL RESET switch must be pushed to return the system to normal. Pushing the OVERFILL RESET switch returns the ground to the overfill control relay long enough for the control card to reestablish the ground to the overfill control relay. Power is then available to open the fueling shutoff valves.

B. Control
(1) For pressure fueling control, refer to the pressure fueling procedure (AMM 12-11-01/301).

PRESSURE FUELING

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR - L CTR TANK FUELING SHUTOFF VALVE, V10001	3	1	LEFT MAIN LANDING GEAR DOOR	28-21-12
ACTUATOR - L TANK FUELING SHUTOFF VALVE, V10003	3	1	551BB, L WING, INBD	28-21-12
ACTUATOR - R CTR TANK FUELING SHUTOFF VALVE, V10064	3	1	RIGHT MAIN LANDING GEAR DOOR	28-21-12
ACTUATOR - R TANK FUELING SHUTOFF VALVE, V10002	3	1	651BB, R WING, INBD	28-21-12
ADAPTER - FUELING	2	2	FUELING PANEL DOOR, 621GB	28-21-01
CARD - SURGE TANK FUEL LEVEL SENSOR CONTROL, M586	4	1	119BL, MAIN EQUIP CTR, P50	28-21-04
CIRCUIT BREAKER -			FLIGHT COMPARTMENT, P6	
FUELING QTY, C1045	1	1	6E4	*
FUELING CONTROL, C1043	1	1	6E5	*
FUELING VALVES, C1046	1	1	6E6	*
CIRCUIT BREAKER -			FLIGHT COMPARTMENT, P11	
FUEL QTY R OR 2, C1048	1	1	11C34	*
FUEL QTY L OR 1, C1053	1	1	11L19	*
CIRCUIT BREAKER -			119BL, MAIN EQUIP CTR, P34	
FLNG VALVE, C1047	4	1	34A9	*
FUEL QTY, C1040	4	1	34A10	*
FLNG CONT, C1041	4	1	34A11	*
CONTROL - LOAD SELECT, M638	2	1	621GB, FUELING CONTROL PANEL, P28	28-41-07
PANEL - FUELING CONTROL, P28	2	1	621GB, R WING, OUTBD	28-21-08
LIGHT - FUELING PANEL DOOR, L243	2	1	621GB, FUELING CONTROL PANEL, P28	*
LIGHT - FUELING PANEL DOOR, L379	2	1	621GB, FUELING CONTROL PANEL, P28	*
LIGHT - L CTR FUELING VALVE OPEN, L402	2	1	621GB, FUELING CONTROL PANEL, P28	*
LIGHT - L MAIN FUELING VALVE OPEN, L83	2	1	621GB, FUELING CONTROL PANEL, P28	*
LIGHT - R CTR FUELING VALVE OPEN, L82	2	1	621GB, FUELING CONTROL PANEL, P28	*
LIGHT - R MAIN FUELING VALVE OPEN, L81	2	1	621GB, FUELING CONTROL PANEL, P28	*
RELAY - (FIM 31-01-33/101)				
FUEL QUANTITY TRANSFER, K356				
FUELING PANEL DOOR, K179				
FUELING POWER TRANSFER, K357				
L CTR REFUELING VALVE, K10013				
L REFUELING VALVE, K10025				
OVERFILL CONTROL, K181				
OVERFILL SET, K180				
R CTR REFUELING VALVE, K10157				
R REFUELING VALVE, K10024				
SENSOR - L SURGE TANK FUEL LEVEL, TS195	3	1	561AB, L WING	28-21-03
SENSOR - R SURGE TANK FUEL LEVEL, TS196	3	1	661AB, R WING, OUTBD	28-21-03

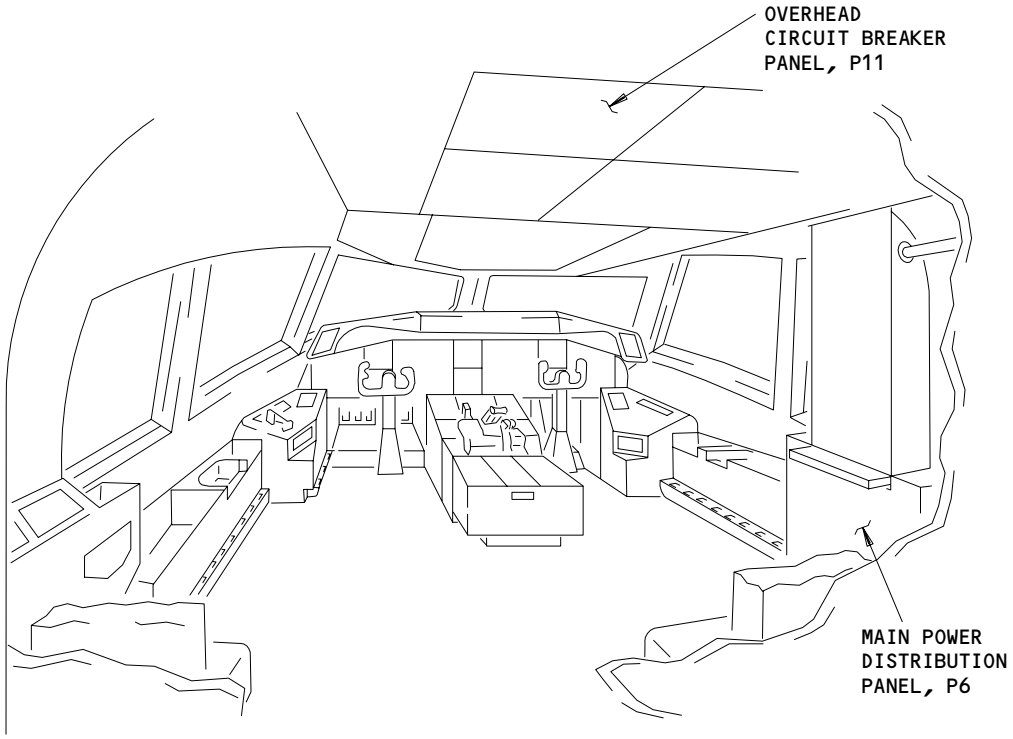
* SEE THE WDM EQUIPMENT LIST

Pressure Fueling - Component Index
Figure 101 (Sheet 1)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SWITCH – BATTERY POWER, S345	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – CENTER LOAD SELECT SET, S420	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – CTR FUELING VALVE, S417	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – FUELING PANEL DOOR, S346	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – L MAIN FUELING VALVE, S348	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – LEFT MAIN LOAD SELECT SET, S418	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – OVERFILL RESET, S347	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – OVERFILL TEST, S416	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – R MAIN FUELING VALVE, S349	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – R MAIN LOAD SELECT SET, S419	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – TEST INDICATOR, S457	2	1	621GB, FUELING CONTROL PANEL, P28	*
SWITCH – TEST SYSTEM, S421	2	1	621GB, FUELING CONTROL PANEL, P28	*
VALVE – FUELING MANIFOLD DRAIN CHECK	3	2	134AZ	28-21-05
VALVE – FUELING MANIFOLD VENT	3	1	642AB	28-21-09
VALVE – L CTR FUELING SHUTOFF, V10001	3	1	134AZ	28-21-02
VALVE – L MAIN FUELING SHUTOFF, V10003	3	1	541AB	28-21-02
VALVE – R CTR FUELING SHUTOFF, V10064	3	1	134AZ	28-21-02
VALVE – R MAIN FUELING SHUTOFF, V10002	3	1	641AB	28-21-02

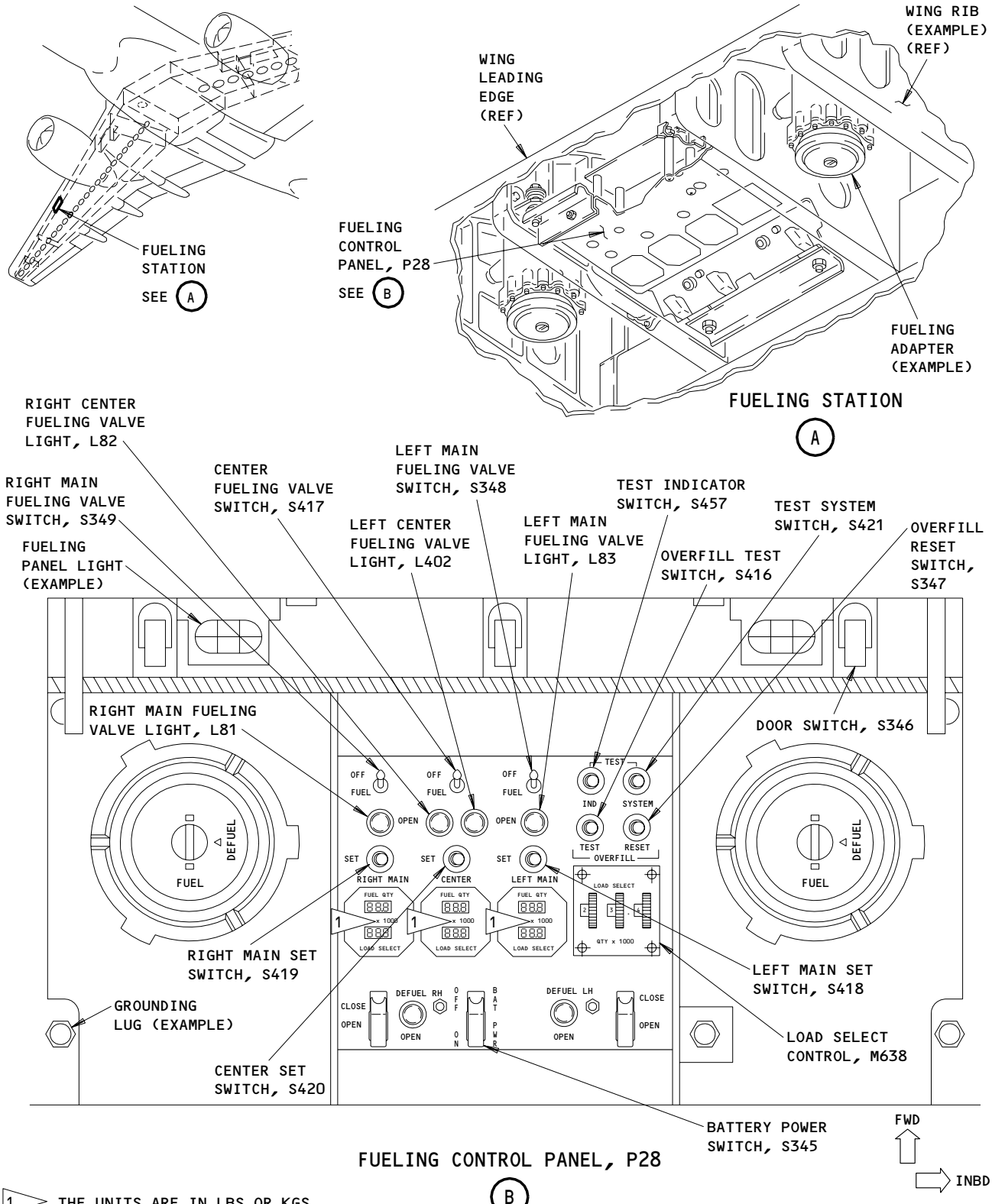
* SEE THE WDM EQUIPMENT LIST

Pressure Fueling – Component Index
Figure 101 (Sheet 2)

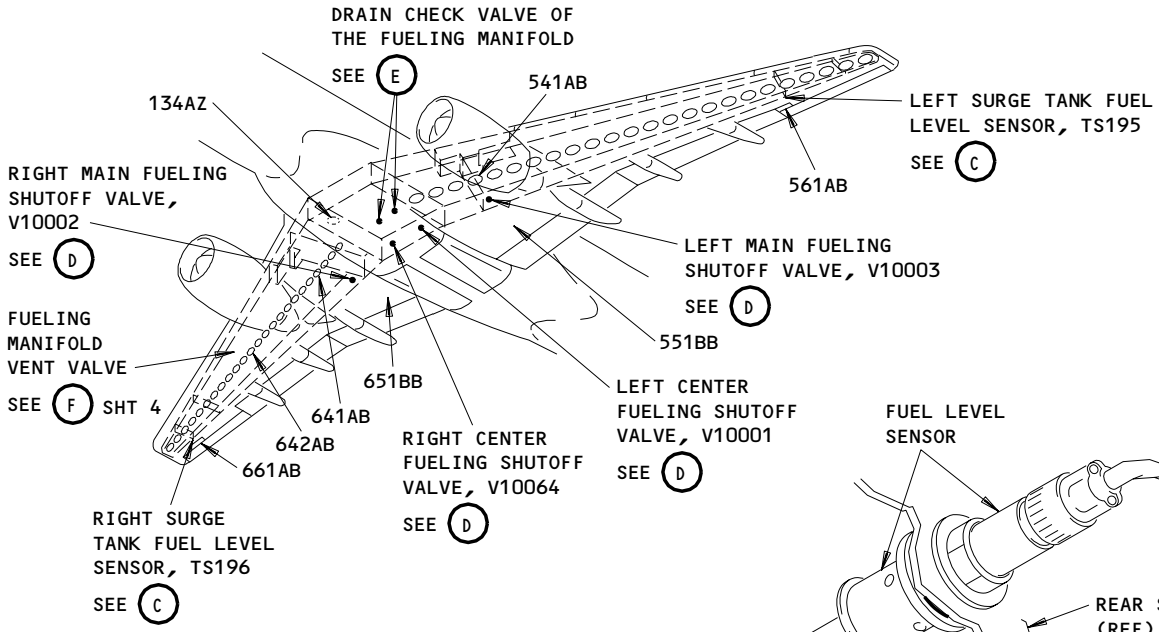


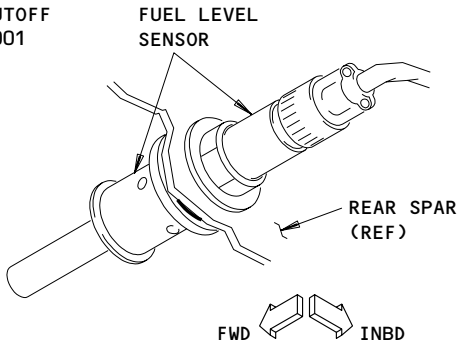
FLIGHT COMPARTMENT

Pressure Fueling - Component Location
Figure 102 (Sheet 1)



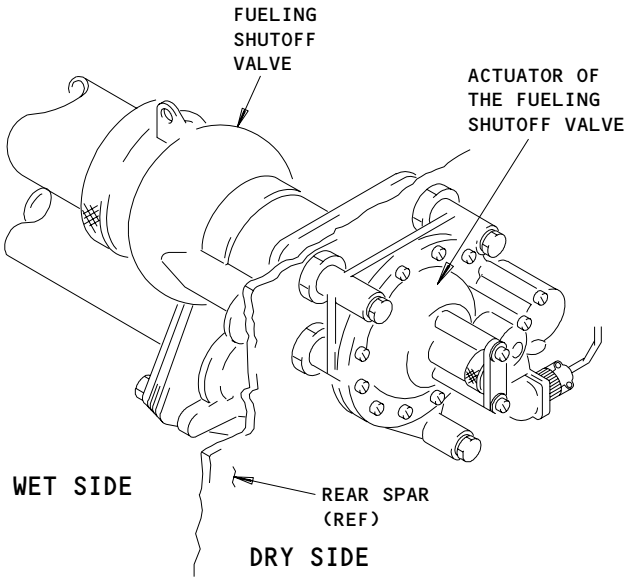
Pressure Fueling – Component Location
Figure 102 (Sheet 2)





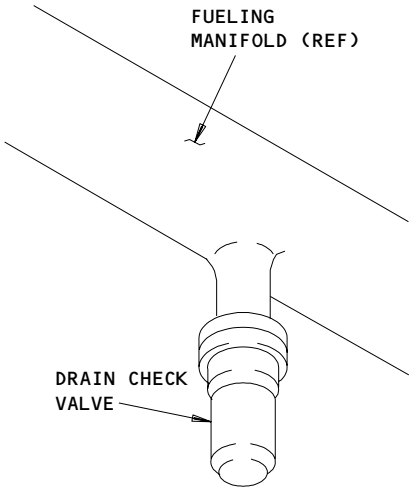
LEFT OR RIGHT SURGE TANK FUEL LEVEL SENSOR, TS195 OR TS196

C



FUELING SHUTOFF VALVE (EXAMPLE)

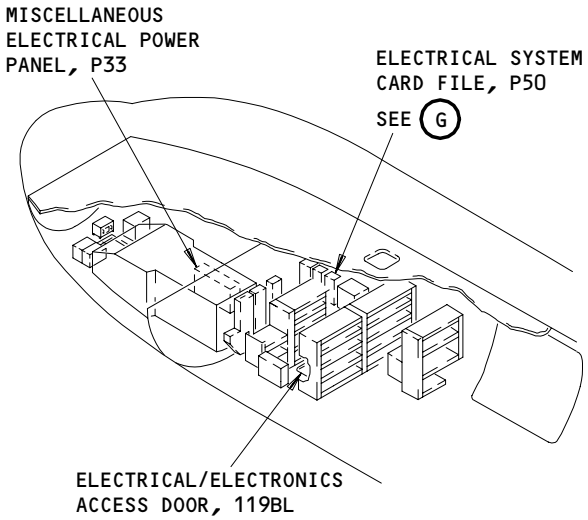
D



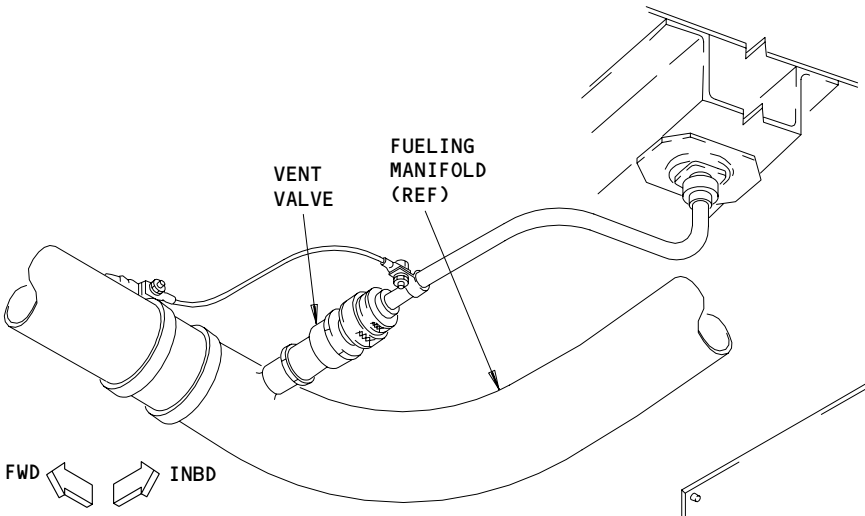
DRAIN CHECK VALVE OF THE FUELING MANIFOLD

E

Pressure Fueling – Component Location
Figure 102 (Sheet 3)

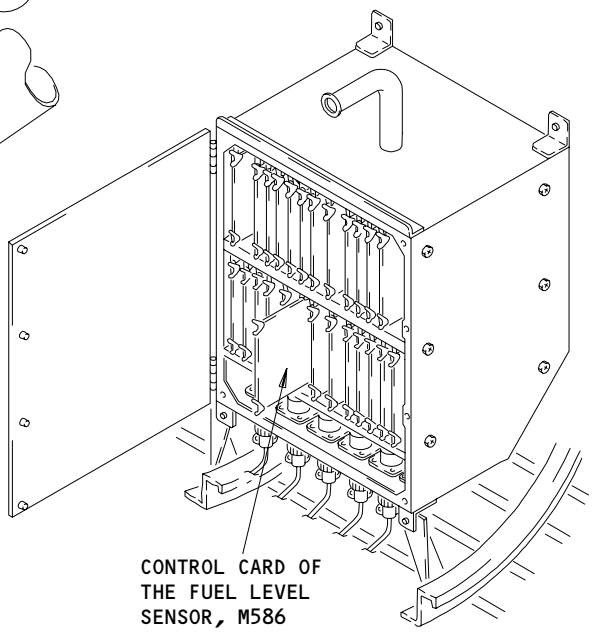


MAIN EQUIPMENT CENTER



FUELING MANIFOLD VENT VALVE

(F) FROM SHT 3



ELECTRICAL SYSTEM CARD FILE, P50

(G)

Pressure Fueling – Component Location
Figure 102 (Sheet 4)

PRESSURE FUELING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task in an operational test of the pressure fueling system. The second task is a system test of the pressure fueling system.
   B. The operational test does an electrical check of each component in the pressure fueling system.
   C. The system test does a check for correct operation, in tolerance, of all the pressure fueling system.

TASK 28-21-00-715-031

2. Operational Test - Pressure Fueling System
   A. General
      (1) The operational test does an electrical check on the fueling shutoff valves, overfill system sensors and card, and fueling control panel.
   B. Equipment
      (1) Test Box - Fuel Level Sensors Surge Tank - A28006-2
   C. References
      (1) AMM 06-44-00/201, Wings Access Panels and Doors
      (2) AMM 12-11-01/301, Fuel Tank - Pressure Fueling
      (3) AMM 20-41-00/201, Static Grounding
      (4) AMM 24-22-00/201, Electrical Power - Control
      (5) AMM 27-81-00/201, Leading Edge Slat System
      (6) AMM 28-26-00/201, Defueling
   D. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

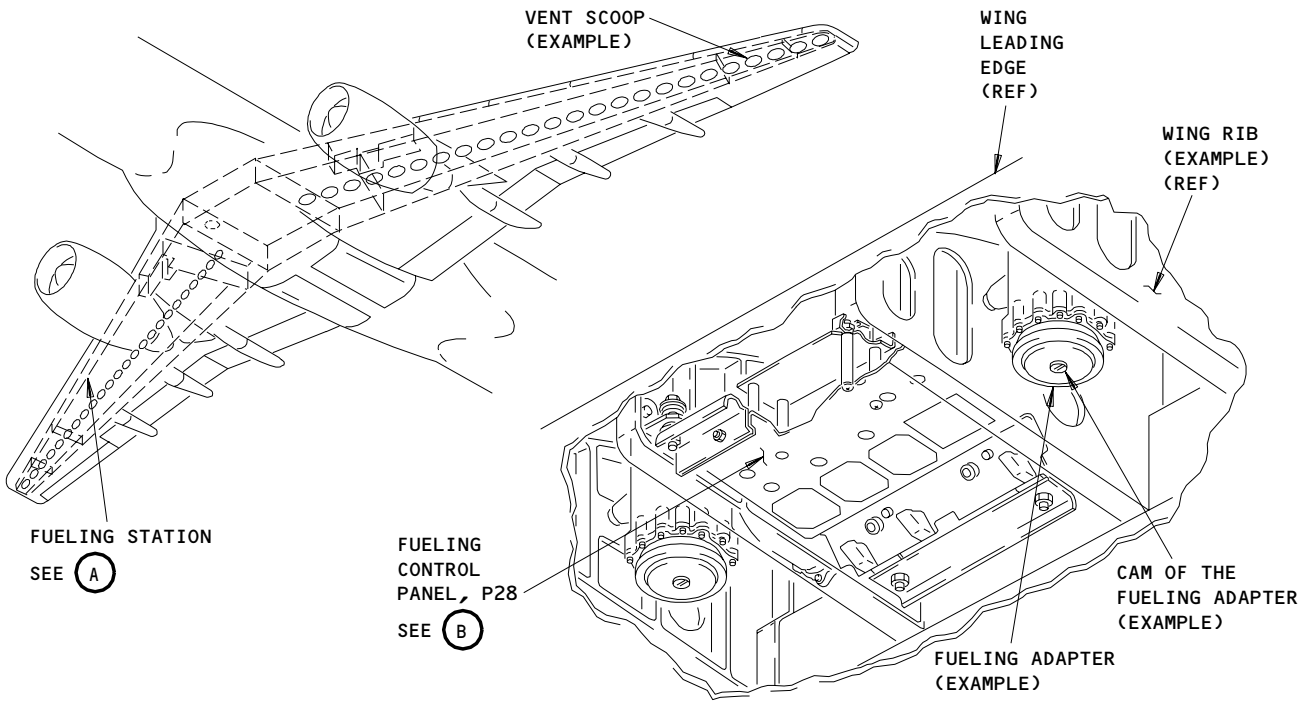
      (2) Access Panel
          621GB Fueling Station Door (Right)

   E. Prepare For Test

      S 865-032
      (1) Supply electrical power (AMM 24-22-00/201).

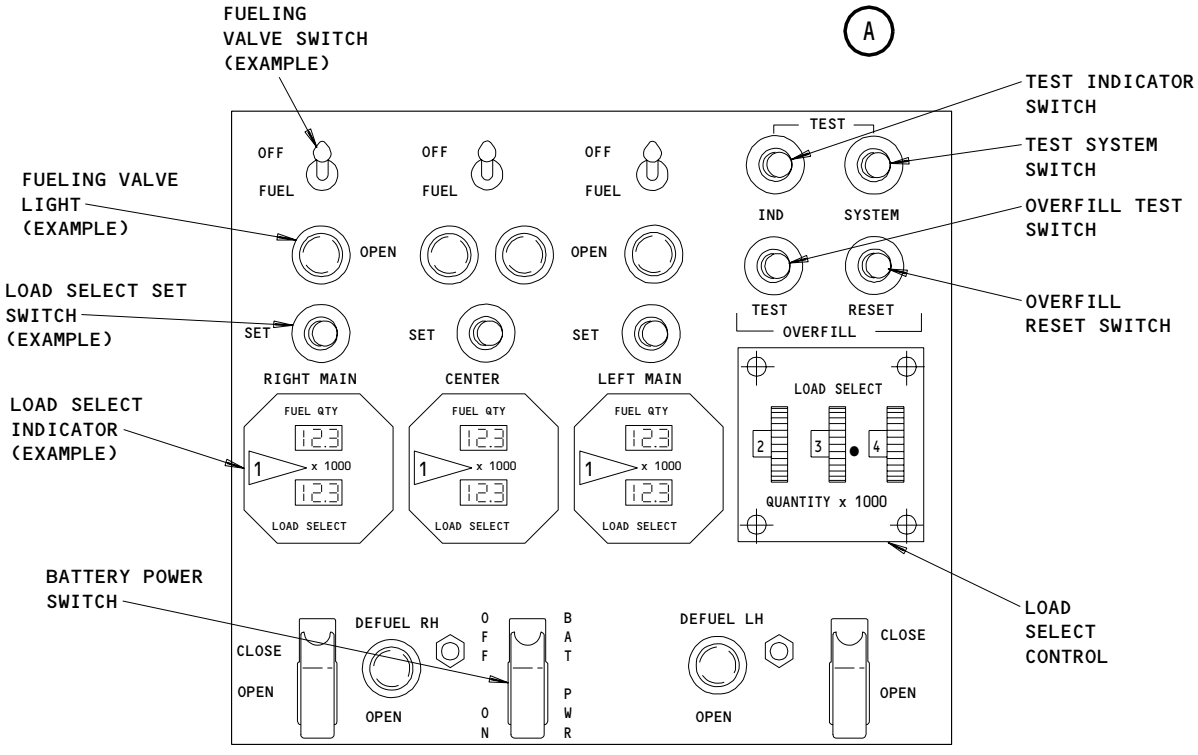
      S 865-033
      (2) Make sure these circuit breakers on the main power distribution panel, P6, are in the closed position:
          (a) 6E4, FUELING QTY
          (b) 6E5, FUELING CONTROL
          (c) 6E6, FUELING VALVE

      S 865-034
      (3) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are in the closed position:
          (a) 11C34, FUEL QTY 1 or FUEL QTY L
          (b) 11L19, FUEL QTY 2 or FUEL QTY R



FUELING STATION

A

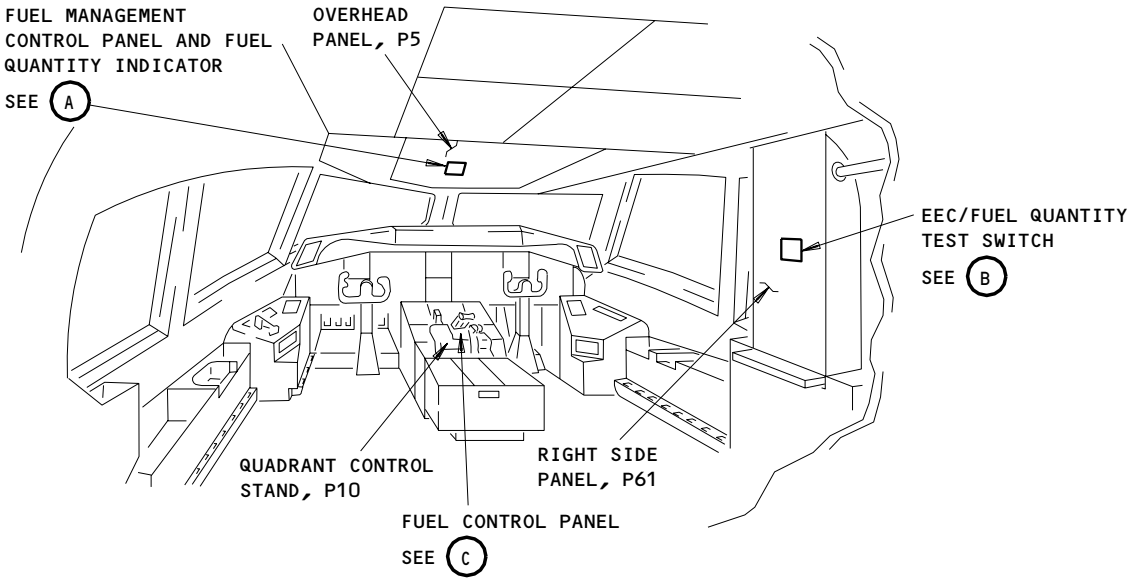


FUELING CONTROL PANEL, P28

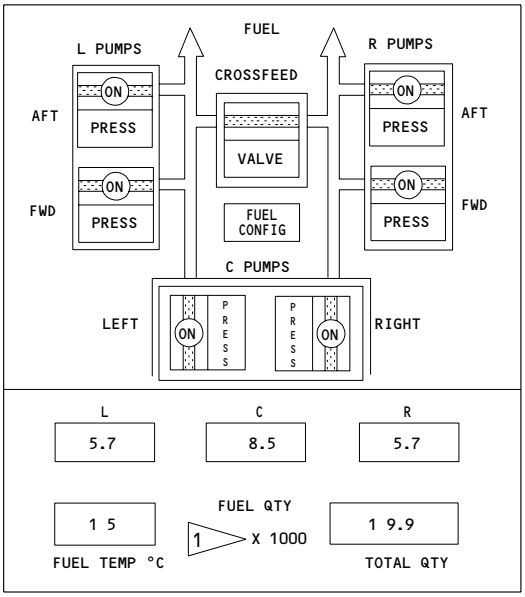
B

1 THE UNITS ARE IN LBS OR KGS.

Fueling Station
Figure 501



FLIGHT COMPARTMENT

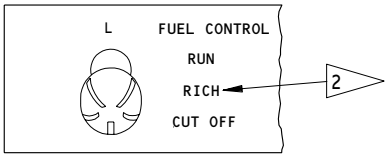


FUEL MANAGEMENT CONTROL PANEL
AND FUEL QUANTITY INDICATOR

A

EEC/FUEL QUANTITY TEST SWITCH

B



FUEL CONTROL PANEL

C

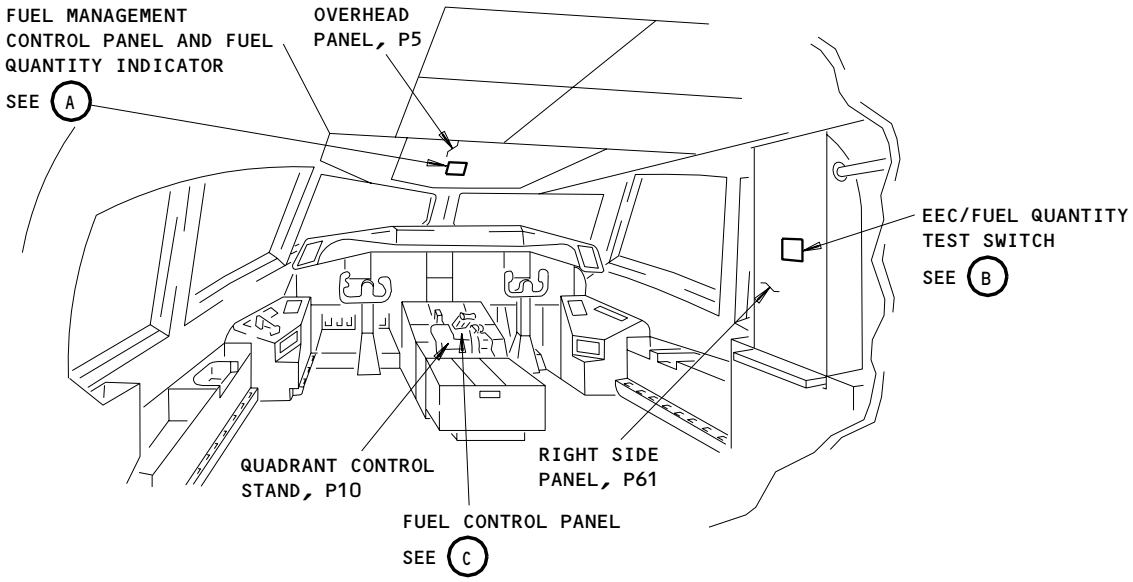
1 THE UNITS ARE IN LBS OR KGS.

2 AIRPLANES WITH ROLLS ROYCE ENGINES

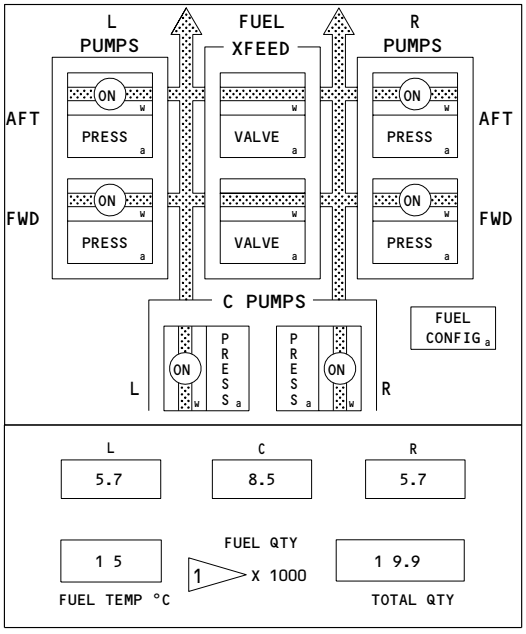
Flight Deck Controls and Indications
Figure 502

EFFECTIVITY
AIRPLANES WITH A SINGLE CROSSFEED VALVE
(PRE-SB 28-29)

H09481



FLIGHT COMPARTMENT

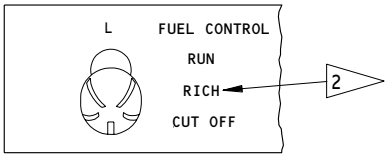


FUEL MANAGEMENT CONTROL PANEL
AND FUEL QUANTITY INDICATOR

A

EEC/FUEL QUANTITY TEST SWITCH

B



FUEL CONTROL PANEL

C

1 THE UNITS ARE IN LBS OR KGS.

2 AIRPLANES WITH ROLLS ROYCE ENGINES

Flight Deck Controls and Indications
Figure 502A

S 865-035
(4) Make sure these circuit breakers on the APU external power panel, P34, are in the closed position:
(a) 34A9, FLNG VALVES
(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 865-036
(5) Make sure the five EICAS circuit breakers on the overhead circuit breaker panel, P11, are closed.

S 865-001

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(6) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

F. Test of the Pressure Fueling System

S 015-037
(1) Open the fueling station door, 621GB, on the leading edge of the right wing (AMM 06-44-00/201).

S 215-038
(2) Make sure the internal lighting on the LOAD SELECT indicators comes on (View B, Fig. 501).

S 215-039
(3) Make sure the fueling panel lights come on.

S 655-040
(4) Defuel all the fuel tanks until the RIGHT MAIN and LEFT MAIN LOAD SELECT indicators show less than 2000 pounds (1000 kgs) of fuel and the CENTER LOAD SELECT indicator shows less than 3000 pounds (1500 kgs) of fuel (AMM 28-26-00/201).

S 215-041
(5) Make sure that the FUEL CONFIG light on the overhead panel, P5, is on.

S 215-050
(6) Make sure the LOAD SELECT CONTROL displays on the fueling control panel, P28, are off (View B, Fig. 501).

S 865-051
(7) Put the BAT PWR switch to the OFF position.

S 865-052
(8) Put the fueling valve switches to the OFF position.

S 865-053
(9) Put the DEFUEL LH and DEFUEL RH valve switches in the CLOSE position.

S 865-054
(10) Push the TEST IND switch.

S 215-010
(11) Make sure the top and bottom displays on the LOAD SELECT indicators show 88.8.

S 215-055
(12) Push each of the subsequent valve OPEN lights and make sure the light comes on.
(a) RIGHT MAIN fueling valve
(b) Right CENTER fueling valve
(c) Left CENTER fueling valve
(d) LEFT MAIN fueling valve
(e) DEFUEL RH valve
(f) DEFUEL LH valve

S 865-056
(13) Put the BAT PWR switch to the ON position.

S 215-057
(14) Push each of the subsequent valve OPEN lights and make sure the light comes on:
(a) RIGHT MAIN fueling valve
(b) Right CENTER fueling valve
(c) Left CENTER fueling valve
(d) LEFT MAIN fueling valve
(e) DEFUEL RH valve
(f) DEFUEL LH valve

S 865-058
(15) Put the BAT PWR switch to the OFF position.

S 865-059
(16) Set the LOAD SELECT control (LOAD SELECT QTY x 1000) to 49.9.

NOTE: If an incorrect quantity is set on the load select control, and then set into the FQIS processor and shown on the load select indicators, push the SET switch for the load select indicator which shows the incorrect quantity. The bottom display of the load select indicator goes off and a new fuel quantity can be set.

Make sure you push the switches for 1 second minimum before you release them.

S 865-060
(17) Push and release the RIGHT MAIN SET switch.

S 215-011
(18) Make sure the bottom display of the RIGHT MAIN LOAD SELECT indicator shows 49.9.

S 865-061
(19) Push and release the LEFT MAIN SET switch.

S 215-012
(20) Make sure the bottom display of the LEFT MAIN LOAD SELECT indicator shows 49.9.

S 865-062
(21) Set the LOAD SELECT control (LOAD SELECT QTY x 1000) to 11.1.

S 865-063
(22) Push and release the CENTER SET switch.

S 215-013
(23) Make sure the bottom display of the CENTER LOAD SELECT indicator shows 11.1

S 865-014
(24) Push and release the RIGHT MAIN SET switch.

S 215-015
(25) Make sure the bottom display on the RIGHT MAIN LOAD SELECT indicator goes off.

S 865-016
(26) Push and release the LEFT MAIN SET switch.

S 215-017
(27) Make sure the bottom display on the LEFT MAIN LOAD SELECT indicator goes off.

S 865-018
(28) Push and release the CENTER SET switch.

S 215-019
(29) Make sure the bottom display on the CENTER LOAD SELECT indicator goes off.

S 865-064
(30) Set the cams of the fueling adapter to the FUEL position (View A, Fig. 501).

S 495-092

WARNING: MAKE SURE THE AIRPLANE AND THE FUELING SOURCE ARE ELECTRICALLY BONDED BEFORE YOU DO THE FUELING PROCEDURE OR THE DEFUELING PROCEDURE. MAKE SURE THE AIRPLANE AND ALL WORK STANDS IN USE ARE GROUNDED AND BONDED BEFORE YOU DO MAINTENANCE ON THE FUEL TANK OR FUEL SYSTEM. REFER TO THE PARAGRAPHS ON STATIC GROUNDING PROCEDURE. CORRECT ELECTROSTATIC GROUNDING AND BONDING PREVENTS STATIC ELECTRICITY DISCHARGES AND POSSIBLE FIRE OR EXPLOSION.

(31) Make sure the airplane is grounded correctly (AMM 20-41-00/201).

S 495-093

(32) Connect a grounding cable from the fueling source and other fuel equipment being used for tank maintenance to an approved and identified static ground.

S 495-095

(33) Connect a bonding cable from the fueling vehicle to an approved electrical grounding or bonding connection on the airplane.

NOTE: If the fueling vehicle has a permanently attached V or Y grounding cable, connect one part of the V or Y to an approved identified ground. Then connect the other part of the V or Y cable to an approved electrical bonding or grounding point on the airplane.

S 495-096

(34) Attach the fueling nozzles to the fueling adapters (AMM 12-11-01/301).

S 655-022

(35) Refuel the airplane (AMM 12-11-01/301).

S 865-023

(36) Put the RIGHT MAIN, CENTER, and LEFT MAIN fueling valve switches on the fueling control panel, P28, to the FUEL position (View B, Fig. 501).

S 215-024

(37) Make sure the RIGHT MAIN, right CENTER, left CENTER, and LEFT MAIN OPEN fueling valve lights come on.

S 865-065
(38) Push the TEST SYSTEM switch.

S 215-025
(39) Make sure the RIGHT MAIN, right CENTER, left CENTER, and LEFT MAIN OPEN fueling valve lights go off.

S 865-066
(40) Release the TEST SYSTEM switch.

S 865-067
(41) Push the OVERFILL TEST switch.

S 215-026
(42) Make sure the RIGHT MAIN, right CENTER, left CENTER, and LEFT MAIN OPEN fueling valve lights go off.

S 865-068
(43) Push the OVERFILL RESET switch.

S 215-027
(44) Make sure the RIGHT MAIN, right CENTER, left CENTER, and LEFT MAIN OPEN fueling valve lights come on.

S 865-028
(45) Put the RIGHT MAIN, CENTER, and LEFT MAIN fueling valve switches to the OFF position.

S 095-069
(46) Disconnect the fueling nozzles.

S 415-070
(47) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 865-071
(48) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-21-00-735-072

3. System Test - Pressure Fueling System

A. General

(1) The system test does a check for correct operation of the pressure fueling system. The test includes automatic fueling, partial and full load shutoff tests for each fuel tank and an overfill shutoff test for each fuel tank.

B. Equipment

(1) Test Box - Surge Tank Fuel Level Sensors - A28006-2

C. References

(1) AMM 06-44-00/201, Wing Access Panels and Doors
(2) AMM 08-21-00/201, Leveling
(3) AMM 12-11-01/301, Fuel Tank - Pressure Fueling

(4) AMM 12-11-03/301, Fuel Sump - Draining
(5) AMM 12-15-01/301, Main Landing Gear Shock Strut
(6) AMM 12-15-02/301, Nose Landing Gear Shock Strut
(7) AMM 24-22-00/201, Electrical Power - Control
(8) AMM 27-81-00/201, Leading Edge Slat System
(9) AMM 28-44-00/201, Fuel Measuring Sticks

D. Access

(1) Location Zones
543 Surge Tank - Rib No. 21 to No. 23 (Left)
621 Leading Edge to Front Spar (Right)
643 Surge Tank - Rib No. 21 to No. 23 (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

E. Prepare For Test

S 865-073
(1) Lower the fuel measuring sticks in each fuel tank (AMM 28-44-00/201).

S 865-074
(2) Adjust the airplane attitude to -0.3° ± 0.25° nose down and 0° ±0.25° roll (AMM 08-21-00/201).

S 865-075
(3) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are in the closed position:
(a) 11C34, FUEL QTY 1 or FUEL QTY L
(b) 11L19, FUEL QTY 2 or FUEL QTY R

S 865-076
(4) Make sure these circuit breakers on the APU external power panel, P34, are in the closed position:
(a) 34A9, FLNG VALVES
(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 865-077
(5) Make sure these circuit breakers on the main power distribution panel, P6, are in the closed position:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E2, FUEL VALVES R SPAR
(c) 6E4, FUELING QTY
(d) 6E5, FUELING CONTROL
(e) 6E6, FUELING VALVES
(f) 6F14, L FUEL OVRD PUMP
(g) 6F20, R FUEL OVRD PUMP
(h) 6H14, L AFT BOOST PUMP
(i) 6H17, R FWD FUEL BOOST PUMP
(j) 6H20, R AFT FUEL BOOST PUMP

(k) 6H23, L FWD FUEL BOOST PUMP

S 865-078

(6) Make sure the five EICAS circuit breakers on the overhead circuit breaker panel, P11, are closed.

S 865-079

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLAT. ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(7) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 015-080

(8) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 865-081

(9) Set the cams of the fueling adapter to the FUEL position (View A, Fig. 501).

S 495-021

WARNING: OBEY ALL OF THE PRECAUTIONS TO REFUEL THE AIRPLANE. A FIRE OR AN EXPLOSION CAN OCCUR.

(10) Refer to the Task: Pressure Fueling System Operational Test, for the correct safety procedures to refuel the airplane.

S 495-097

(11) Attach the fueling nozzles to the fueling adapters (AMM 12-11-01/301).

S 215-091

(12) Make sure the top and bottom displays of the RIGHT MAIN, CENTER and LEFT MAIN LOAD SELECT indicators on the fueling control panel, P28, are off (View B, Fig. 501).

S 865-082

(13) Set the fueling nozzle to keep 30-40 psig pressure.

S 865-083

(14) Supply electrical power (Ref 24-22-00).

F. Test of the Pressure Fueling System

S 725-084

(1) Partial Load Shutoff Test

(a) Set the fuel quantity of the meter on the fueling source to ZERO.

(b) Set the LOAD SELECT control on P28 panel to 23.9 (23,900 lbs.) [10.9 (10,900 kgs)].

(c) Push the CENTER SET switch.
(d) Make sure that 23.9 LB (10.9 KG) shows on the bottom display of the CENTER LOAD SELECT indicator.
(e) Put the CENTER fueling valve switch to the FUEL position.
(f) Make sure the right CENTER and left CENTER fueling valve OPEN lights come on.
(g) Open the valve on the fueling nozzle.
(h) Make sure that fuel flows into the center fuel tank.
(i) Make sure the EICAS message, FUEL CONFIG, shows on the top display when the top display on the CENTER LOAD SELECT indicator shows 1300 lbs (591 kgs) or more of fuel.
(j) Make a written record of the quantity of fuel in the center fuel tank when the EICAS message, FUEL CONFIG, shows on the top display.

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(k) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
    1) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.
(l) Push the LEFT C PUMPS and RIGHT C PUMPS switch-lights of the fuel management control panel on the overhead panel, P5, to the ON position (View A, Fig. 502).
(m) Make sure the EICAS message, FUEL CONFIG, does not show on the top display.
(n) Push and hold the TEST SYSTEM switch on the fueling control panel, P28, (View B, Fig. 501).
(o) Make sure the fuel flow into the center fuel tank stops.
(p) Make sure the right CENTER and left CENTER fueling valve OPEN lights go off.
(q) Release the TEST SYSTEM switch.
(r) Approximately 10 seconds after you push the TEST SYSTEM switch, make sure:
    1) Fuel flow continues
    2) The right CENTER and left CENTER fueling valve OPEN lights come on.
(s) Continue fueling until the automatic shutoff occurs (left CENTER and right CENTER fuel valve OPEN lights go off).
(t) Make sure the top display on the CENTER LOAD SELECT indicator shows between 23.6 to 23.9 (23,600 to 23,900 lbs) (10.9 to 11.1 [10,900 to 11,100 kgs]).
(u) Make sure the C FUEL QTY indicator on the overhead panel, P5, shows between 23.6 to 23.9 (23,600 to 23,900 lbs) (10.9 to 11.1 [10,900 to 11,100 kgs]) (View A, Fig. 502).
(v) Make a written record of the quantity of fuel supplied to the center fuel tank as measured by the meter on the fuel source.

(w) Make sure the fuel supplied is more that 24,100 ±300 pounds (11,000 ±200 kilograms).
(x) Measure and make a written record of the fuel quantity in the center fuel tank with the left and right fuel measuring sticks No. 5 and 6 (AMM 28-44-00/201).
(y) Make sure the fuel quantity measured with the fuel measuring sticks agrees with the fuel quantity shown on the C FUEL QTY indicator on the P5 panel.
(z) Put the CENTER fueling valve switch on the P28 panel to the OFF position (View B, Fig. 501).
(aa) Set the fuel quantity of the meter on the fueling source to ZERO.

NOTE: Decrease the fueling manifold pressure when possible. Fuel is at level which does not let fuel drain into the center fuel tank through the manifold drain check valves.

(ab) Set the LOAD SELECT control on the P28 panel to 06.4 (6400 lbs) (03.0 [3000 kgs]).
(ac) Push the RIGHT MAIN SET switch.
(ad) Make sure that 6.4 (3.0) shows on the bottom display of the RIGHT MAIN LOAD SELECT indicator.
(ae) Put the RIGHT MAIN fueling valve switch to the FUEL position.
(af) Make sure the RIGHT MAIN fueling valve OPEN light comes on.
(ag) Make sure fuel flows into the right main fuel tank.
(ah) Push and hold the TEST SYSTEM switch on the P28 panel.
(ai) Make sure the fuel flow into the right main fuel tank stops.
(aj) Make sure the RIGHT MAIN fueling valve OPEN light goes off.
(ak) Release the TEST SYSTEM switch.
(al) Approximately 10 seconds after you push the TEST SYSTEM switch, make sure:
1) Fuel flow continues
2) The RIGHT MAIN fueling valve OPEN light comes on.
(am) Continue fueling until the automatic shutoff occurs (the RIGHT MAIN fueling valve OPEN light goes off).
(an) Make sure the top display on the RIGHT MAIN LOAD SELECT indicator on the P28 panel shows 6.2 to 6.4 (6200 to 6400 lbs) (3.0 to 3.1 [3000 to 3100 kgs]).
(ao) Make sure the R FUEL QTY indicator on the P5 panel shows 6.2 to 6.4 (6200 to 6400 lbs) (3.0 to 3.1 [3000 to 3100 kgs]) (View A, Fig. 502).
(ap) Make a written record of the fuel quantity supplied to the right main fuel tank as measured by the flow meter on the fuel source.
(aq) Make sure the fuel supplied is between 6300 to 6500 pounds (3080 to 3180 kilograms).
(ar) Measure and make a written record of the fuel quantity in the right fuel tank with the right main fuel measuring sticks (AMM 28-44-00/201).

(as) Make sure the fuel quantity measured for the right main fuel tank with the fuel measuring sticks agrees with the fuel quantity shown on the top display of the RIGHT MAIN LOAD SELECT indicator on the P28 panel (View B, Fig. 501).
(at) Put the RIGHT MAIN fueling valve switch to the OFF position.
(au) Set the fuel quantity of the meter on the fueling source to ZERO.
(av) Set the LOAD SELECT control on the P28 panel to 8.4 (8400 lbs) (3.9 [3900 kgs]).
(aw) Make sure 8.4 (3.9) shows on the bottom display of the LEFT MAIN LOAD SELECT indicator.
(ax) Push the SET switch for the left main fuel tank on the P28 panel.
(ay) Put the LEFT MAIN fueling valve switch to the FUEL position.
(az) Make sure the LEFT MAIN fueling valve OPEN light comes on.
(ba) Make sure the fuel flows into left main fuel tank.
(bb) Push and hold the TEST SYSTEM switch on the P28 panel.
(bc) Make sure the fuel flow into the left main fuel tank stops.
(bd) Make sure the LEFT MAIN fueling valve OPEN light goes off.
(be) Release the TEST SYSTEM switch.
(bf) Approximately 10 seconds after you push the TEST SYSTEM switch, make sure:
1) Fuel flow continues
2) The LEFT MAIN fueling valve OPEN light comes on.
(bg) Make sure the EICAS message, FUEL CONFIG, does not show on the top display when the top display on the LEFT MAIN LOAD SELECT indicator shows 5500 pounds (3500 kilograms) of fuel or more.
(bh) Continue fueling until the automatic shutoff occurs (the LEFT MAIN fueling valve OPEN light goes off).
(bi) Make sure the top display on the LEFT MAIN LOAD SELECT indicator on the P28 panel shows 8.2 to 8.4 (8200 to 8400 lbs) (3.9 to 4.0 [3900 to 4000 kgs]).
(bj) Make sure the L FUEL QTY indicator on the P5 panel shows 8.2 to 8.4 (8200 to 8400 lbs) (3.9 to 4.0 [3900-4000 kgs]) (View A, Fig. 502).
(bk) Make a written record of the fuel quantity supplied to the left main fuel tank as measured by the meter on the fuel source.
(bl) Make sure the fuel supplied is between 8300 to 8500 pounds (3900 to 4000 kilograms).
(bm) Measure and make a written record of the fuel quantity in the left fuel tank with the left main fuel measuring sticks (AMM 28-44-00/201).
(bn) Make sure the fuel quantity measured for the left main fuel tank with the fuel measuring sticks agrees with the fuel quantity shown on the top display of the LEFT MAIN LOAD SELECT indicator on the P28 panel (View B, Fig. 501).

(bo) Put the LEFT MAIN fueling valve switch to the OFF position.

S 725-085

(2) Full Load Shutoff Test

(a) Push the RIGHT MAIN, CENTER, and LEFT MAIN SET switches on the fueling control panel, P28.

NOTE: The fueling system for each fuel tank is now in manual mode. Fueling is controlled by fuel switches on the fueling control panel, P28, or until fueling is stopped by the FQIS auto full shutoff feature.

(b) Make sure the top and bottom displays on the RIGHT MAIN, CENTER, and LEFT MAIN LOAD SELECT indicators go off.
(c) Put the RIGHT MAIN fueling valve switch on the P28 panel to the FUEL position.
(d) Make sure fuel flows into the right main fuel tank.
(e) Push and hold the TEST IND switch on the P28 panel.
(f) Make sure the top and bottom displays on the RIGHT MAIN, CENTER, and LEFT MAIN LOAD SELECT indicators show 88.8.
(g) Make sure the R, C, L FUEL QTY and TOTAL QTY displays on the overhead panel, P5, continue to show the correct fuel quantities.
(h) Release the TEST IND switch on the P28 panel.
(i) Make sure the fuel flow into the right main fuel tank continues.
(j) Push and hold the EEC/FUEL QTY test switch on the right side panel, P61, (View B, Fig. 502).
(k) Make sure the FUEL QTY display on the P5 panel shows 88.8 (View A, Fig. 502).
(l) Make sure the TOTAL QTY display on the P5 panels shows 188.8.
(m) Make sure the top displays on the RIGHT MAIN, CENTER, and LEFT MAIN LOAD SELECT indicators show the correct fuel quantities.
(n) Make sure fuel flow into the right main fuel tank continues.
(o) Release the EEC/FUEL QTY test switch on the P61 panel (View B, Fig. 502).

(p) Push the OVERFILL TEST switch on the P28 panel (View B, Fig. 501).
(q) Make sure fuel flow into the right main fuel tank stops.
(r) Push the OVERFILL RESET switch on the P28 panel.
(s) Make sure fuel flow into the right main fuel tank starts.
(t) Make sure that fueling stops at 2300 gallons.
    1) If fueling does not stop, decrease the pressure of the fueling nozzle to 10 ±2 psig.
(u) Continue fueling until the auto full shutoff feature stops the fueling.
(v) Make a written record of the fuel quantity supplied to the right main fuel tank as measured by the flow meter on the fueling source.
(w) Make sure the volume of fuel supplied is between 2203 and 2243 gallons.
(x) Put the RIGHT MAIN fueling valve switch to the OFF position.
(y) Set the fuel quantity of the meter on the fueling source to ZERO.
(z) Put the LEFT MAIN fueling valve switch to the FUEL position.
(aa) Make sure fuel flow into the left main fuel tank starts.
(ab) Push the OVERFILL TEST switch on the P28 panel.
(ac) Make sure fuel flow into the left main fuel tank stops.
(ad) Push the OVERFILL RESET switch on the P28 panel.
(ae) Make sure fuel flow into the left main fuel tank starts.
(af) Make sure fueling stops at 2300 gallons.
    1) If fueling does not stop, decrease the pressure of the fueling nozzle to 10 ±2 psig.
(ag) Continue fueling until the auto full shutoff feature stops the fueling.
(ah) Make a written record of the fuel quantity supplied to the left main fuel tank as measured by the flow meter on the fueling source.
(ai) Make sure the volume of fuel supplied is between 2170 and 2210 gallons.
(aj) Put the LEFT MAIN fueling valve switch to the OFF position.

(ak) Set the fuel quantity of the meter on the fueling source to ZERO.
(al) Put the CENTER fueling valve switch to the FUEL position.
(am) Make sure fuel flow into the center fuel tank starts.
(an) Push the OVERFILL TEST switch on the P28 panel.
(ao) Make sure fuel flow into the center fuel tank stops.
(ap) Push the OVERFILL RESET switch on the P28 panel.
(aq) Make sure fuel flow into the center fuel tank starts.
(ar) Make sure fueling stops at 7200 gallons.
1) If fueling does not stop, decrease the pressure of the fueling nozzle to 10 ±2 psig.
(as) Continue fueling until the auto full shutoff feature stops the fueling.
(at) Make a written record of the fuel quantity supplied to the center fuel tank as measured by the flow meter on the fueling source.
(au) Make sure the volume of fuel supplied is between 6800 and 7000 gallons.
(av) Put the CENTER fueling valve switch to the OFF position.
(aw) Set the fuel quantity of the meter on the fueling source to ZERO.

S 725-086
(3) Overfill Shutoff Test

CAUTION: PUT CONTAINERS AT THE VENT SCOOP IN EACH SURGE TANK TO CATCH FUEL IF THE OVERFILL SYSTEM DOES NOT OPERATE CORRECTLY. FUEL LEAKAGE COULD CAUSE DAMAGE TO EQUIPMENT.

MAKE SURE THE PRESSURE OF THE FUELING NOZZLE IS NOT MORE THAN 10 ±2 PSIG. IF THE PRESSURE OF THE FUELING NOZZLES IS MORE THAN 10 ±2 PSIG, DAMAGE TO EQUIPMENT COULD OCCUR.

(a) Supply a ground for the fueling valve relays with the A28006-2 Test Box
1) Disconnect the D41718 connector (position 29) from the Miscellaneous Relay Panel, P33.

2) Connect the A28006-2 Test Box connectors between the P33 Relay Panel (position 29) and D41718 connector.

(b) Put the switches on the A28006-2 Test Box to the OVERFILL position.

NOTE: With the switches in the OVERFILL position, the fueling shutoff valves stay open at fuel quantities more than the auto fuel shutoff quantity.

(c) Set the fuel quantity of the meter on the fueling source to ZERO.
(d) Put the RIGHT MAIN fueling valve switch to the FUEL position.
(e) Make sure fuel flows into the right main fuel tank.
(f) Continue fueling until fuel fills the expansion space in the right main fuel tank, fills the fuel vent system and causes the fuel level sensor in the surge tank to stop fueling.
(g) Make sure the fuel level sensor closes the fueling shutoff valve before the fuel spill.
(h) Drain the fuel from the right surge tank (AMM 12-11-03/301).
(i) Make sure less than 50 gallons of fuel are drained from the right surge tank.

NOTE: If you drain more than 50 gallons of fuel it shows there is either a blockage in the fuel level sensor line or the flappers of the sump drain valves do not close correctly.

(j) Put the RIGHT MAIN fueling valve switch to the OFF position.
(k) Push the OVERFILL RESET switch on the P28 panel.
(l) Set the fuel quantity of the meter on the fueling source to ZERO.
(m) Put the LEFT MAIN fueling valve switch to the FUEL position.
(n) Make sure fuel flows into the left main fuel tank.
(o) Continue fueling until the fuel fills the expansion space in the left main fuel tank, fills the fuel vent system and causes the fuel level sensor in the surge tank to stop fueling.
(p) Make sure the fuel level sensor closes the fueling shutoff valve before the fuel spill.
(q) Drain the fuel from the left surge tank (AMM 12-11-03/301).
(r) Make sure less than 50 gallons of fuel are drained from the left surge tank.

NOTE: If you drain more than 50 gallons of fuel it shows there is either a blockage in the fuel level sensor line or the flappers of the sump drain valve do not close correctly.

(s) Put the LEFT MAIN fueling valve switch to the OFF position.
(t) Push the OVERFILL RESET switch on the P28 panel.
(u) Set the fuel quantity of the meter on the fueling source to ZERO.
(v) Put the CENTER fueling valve switch to the FUEL position.
(w) Make sure fuel flows into the center fuel tank.
(x) Continue fueling until the fuel fills the expansion space in the center fuel tank, fills the fuel vent system and causes the fuel level sensor in the surge tank to stop fueling.
(y) Make sure the fuel level sensor closes the fueling shutoff valves before the fuel spill.
(z) Drain the fuel from right and left surge tank (AMM 12-11-03/301).
(aa) Make sure less than 50 gallons of fuel are drained from each surge tank.

NOTE: If you drain more than 50 gallons of fuel from each surge tank it shows that there is either a blockage in the fuel level sensor line or the flappers of the sump drain valve do not close correctly.

(ab) Put the CENTER fueling valve switch to the OFF position.
(ac) Push the OVERFILL RESET switch on the P28 panel.
(ad) Set the fuel quantity of the meter on the fueling source to ZERO.
(ae) Put the switches on the A28006-2 Test Box to the NORMAL position.
(af) Remove the A28006-2 Test Box.

G. Put the Airplane Back to Its Usual Condition

S 095-087
(1) Remove the fueling nozzles from the fueling adapters.

S 865-088
(2) Put all the fuel measuring sticks for each fuel tank to their usual position (AMM 28-44-00/201).

S 865-089
(3) Service the shock struts (AMM 12-15-01/301 and AMM 12-15-02/301).

S 865-030

WARNING: DO THE ACITVATION PROCEDURE FOR THE LEADING EDGE SLAT. ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(4) Do the activation procedure for the leading edge slat (AMM 27-81-00/201).

S 865-090

(5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

PRESSURE FUELING SYSTEM - INSPECTION/CHECK

1. General
   A. This procedure has instructions to do a check of the fueling adapter.
   B. If there is fuel leakage or damage at the fueling adapter, it must be replaced.

TASK 28-21-00-756-001

2. Fueling Adapter Check (Fig. 601)
   A. Parts
      (1) Wear Gage, part number 61657-2, JC Carter Company, Inc., 671 W. 17th Street, Costa Mesa, California 92627
   B. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 28-21-01/401, Fueling Adapter and Valve
   C. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door (Right)

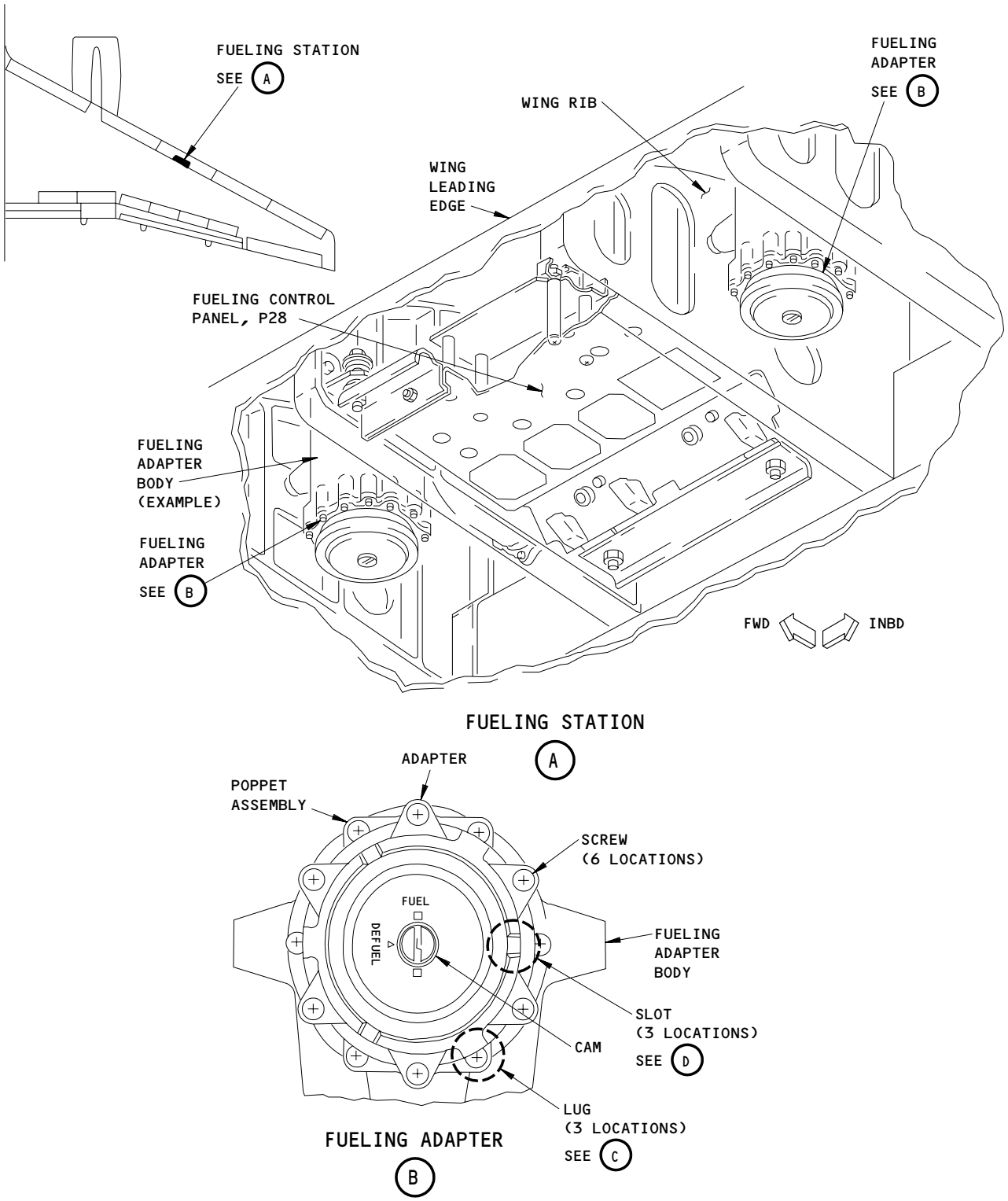
   D. Procedure

      S 016-002
      (1) Open the fueling station door, 621GB (AMM 06-44-00/201).

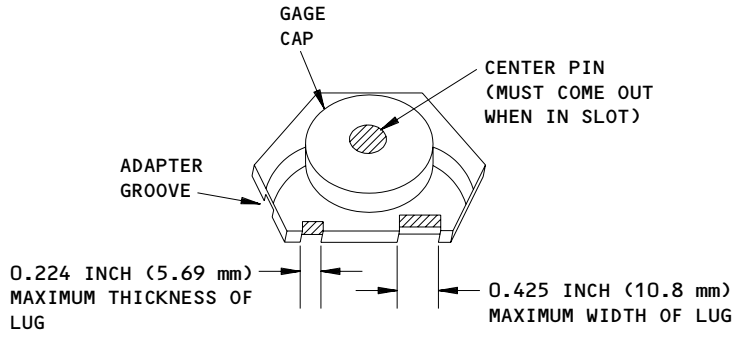
      S 216-006
      (2) Do these steps to make sure the fueling adapter is clean and does not have any damage:
          (a) Examine the fueling adapter to make sure each of the screws that attach the fueling adapter is not loose or damaged.
          (b) Do a detailed visual examination of the cylinder area within 0.5 inch (13 mm) circumferentially on each side of each lug for cracks.

              NOTE: The examination area includes the inner and outer surfaces of the adapter from the bottom of the adapter to the shear groove.

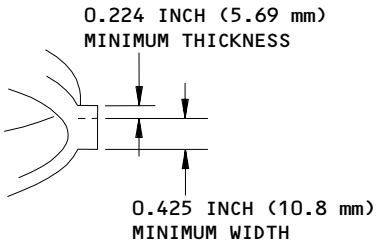
          (c) If there are problems with the adapter, replace the adapter (AMM 28-21-01/401).



Fueling Adapter
Figure 601 (Sheet 1)

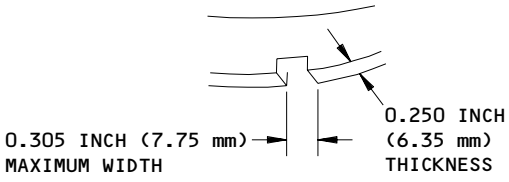


WEAR GAGE



LUG
(3 LOCATIONS)

C



SLOT
(3 LOCATIONS)

D

Fueling Adapter
Figure 601 (Sheet 2)

S 756-007

(3) Make sure the adapter is in these limits:

NOTE: Use of the wear gage is recommended to measure these limits (Fig. 601).

(a) The thickness of the three lugs of the adapter is more than 0.224 inch (5.69 mm) (View C).
(b) The width of the three lugs of the adapter is more than 0.425 inch (10.8 mm) (View C).
(c) The three slots of the adapter must not be worn such that a pin, oblong with full circular ends of 0.305 inch (7.75 mm) width and 0.250 inch (6.35 mm) thickness, can be put into the slots a depth of 0.120 inch (3.05 mm) (View D).

S 216-008

(4) If you use the wear gage to measure the dimensions of the flange, do these steps:
(a) Do these steps to measure the dimensions of the slot:
1) Put the wear gage on the adapter, near one lug so that the gage cap and center pin face away from the adapter, towards you.
2) Make sure the adapter groove in the opposite face of the gage (the face towards the adapter, away from you) fits on the rim of the adapter and moves smoothly along the rim.

NOTE: There are two lines on the face of the wear gage towards you, to help you line up the adapter groove with the adapter rim.

3) Make sure the center pin comes out of the gage cap, towards you.
4) Slide the wear gage around the rim toward the opposite lug until the center pin goes into the slot.
a) If the adapter is okay, you will only hear a slight click and only get a slight feeling of resistance when the center pin touches the slot.

NOTE: The center pin will not move significantly into the slot and will continue to come out from the gage cap.

b) If the adapter is not okay, you will feel more resistance when the center pin goes into the slot.

NOTE: The center pin will be flush (even) with the gage cap or lower than the gage cap.

c) When the center pin is in the slot, do a check to see that the center pin continues to come out from the gage cap, to make sure the center pin has not significantly gone into the slot.

d) If the center pin continues to come out from the gage cap, then the slot is okay.

e) If the center pin is flush (even) with the gage cap or lower than the gage cap, then the slot is not okay.

5) Do this same check for the other two slots on the adapter.

(b) To measure the thickness of the adapter lugs, use the smaller of the two notches on the wear gage.

1) Try to pass the smaller of the two notches across one of the lugs.

2) If the wear gage passes completely across the lug, then the lug has less than the minimum thickness.

a) Replace the adapter (AMM 28-21-01/401).

3) If the wear gage does not pass across the lug, then the lug is okay.

4) Do this same check for the other two lugs.

(c) To measure the thickness of the adapter lugs, use the larger of the two notches on the wear gage.

1) Try to seat the wear gage onto the lug through the larger notch.

2) If you can seat the wear gage onto the lug through the larger notch, then the lug has less than the minimum width.

a) Replace the adapter (AMM 28-21-01/401).

3) If you can not seat the wear gage onto the lug through the larger notch, then the lug is okay.

4) Do this same check for the other two lugs.

S 436-009

(5) If the adapter is not in the correct limits, replace the fueling adapter (AMM 28-21-01/401).

NOTE: Make sure a new adapter is installed.

E. Put the Airplane Back to the Usual Condition

S 416-013

(1) Close the fueling station door, 621GB (AMM 06-44-00/201).

FUELING ADAPTER AND VALVE - REMOVAL/INSTALLATION

1. General
   A. Two fueling adapters attach to the front spar just aft of leading edge slat No. 8 on the right wing. The fueling adapters are found through the fueling control panel door. There is a poppet assembly installed in each fueling adapter.
   B. This procedure contains four tasks. The first task removes the fueling adapter. The second task installs the fueling adapter. The third task removes the poppet assembly. The fourth task installs the poppet assembly.

TASK 28-21-01-004-022

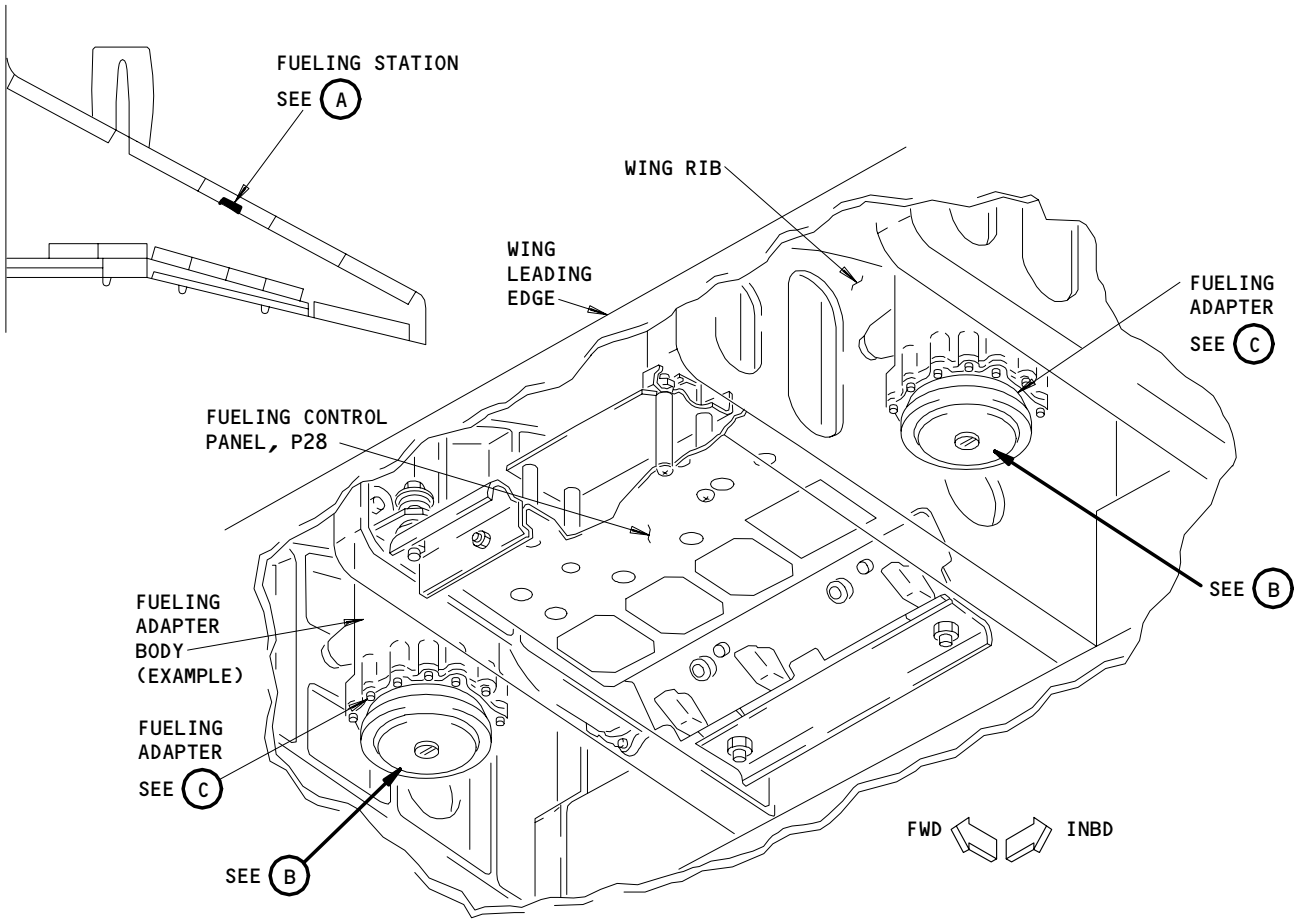
2. Remove the Fueling Adapter (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 24-22-00/201, Electric Power Control
      (3) AMM 27-81-00/201, Leading Edge Slat System
      (4) AMM 28-26-00/201, Defueling
   B. Equipment
      (1) Container - Fuel Resistant, 2 Gallon (7.57 Liters)
   C. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door (Right)

   D. Procedure

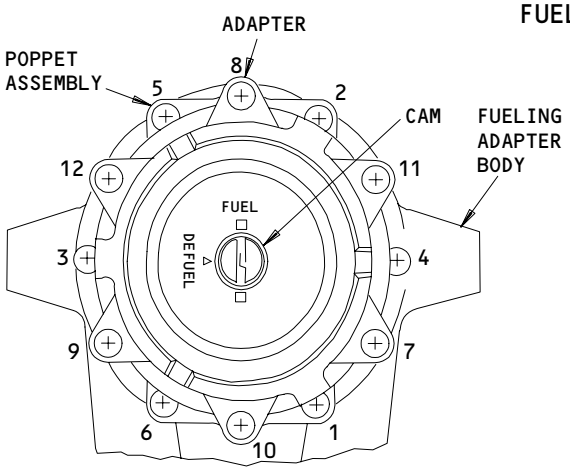
      S 214-064
      (1) Make sure the airplane is grounded to an approved ground.

      S 914-065
      (2) Remove electrical power from the airplane (AMM 24-22-00/201).



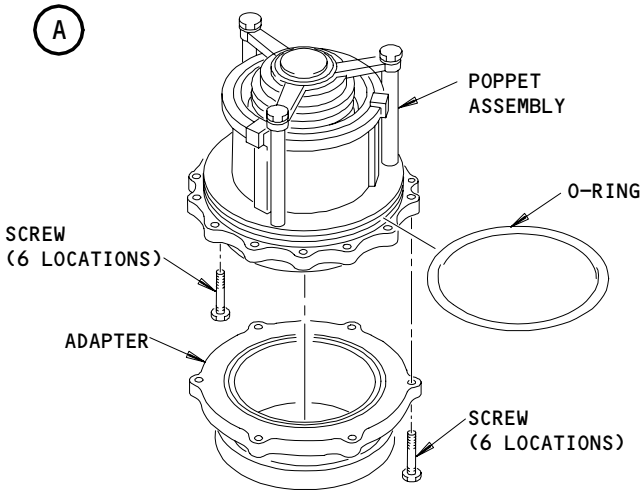
FUELING STATION

A



SEQUENCE TO TIGHTEN THE
SCREWS ON THE FUELING ADAPTER

B



FUELING ADAPTER

C

Fueling Adapter and Poppet Assembly Installation
Figure 401

S 944-066

(3) Disconnect the airplane battery and attach OPEN FUEL TANK - DO NOT CONNECT sign.

S 944-067

(4) Put ropes around the fueling station area and install DANGER - OPEN FUEL TANKS signs.

S 864-068

WARNING: DO THE DEACTIVATION PROCEDURE OF THE LEADING EDGE SLAT (AMM 27-81-00/201). IF THE LEADING EDGE SLAT OPERATES ACCIDENTALLY, IT CAN CAUSE INJURY.

(5) Do the deactivation procedure of the leading edge slats (AMM 27-81-00/201).

S 144-069

(6) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 144-070

WARNING: WAIT 90 MINUTES AFTER REFUELING THE AIRPLANE BEFORE YOU DRAIN THE REFUELING ADAPTER. IF YOU DRAIN THE REFUELING ADAPTER BEFORE 90 MINUTES, PRESSURIZED FUEL CAN CAUSE AN INJURY OR A FUEL LEAK.

(7) Drain the remaining fuel from the refueling adapter.
   (a) Put a container (2 gallon, 7.57 liter) below the refueling adapter to catch the fuel.
   (b) Push the poppet valve installed in the refueling adapter in slowly.
   (c) Let the fuel drain from the refueling adapter and the refueling manifold.

S 034-004

(8) Remove the screws (7 thru 12) that attach the adapter to the fueling adapter body.

S 024-005

(9) Remove the adapter.

TASK 28-21-01-404-006

3. Install the Fueling Adapter (Fig. 401)

A. References

(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(2) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(3) AMM 27-81-00/201, Leading Edge Slat System

B. Access

(1) Location Zone

621 Leading Edge to Front Spar (Right)

(2) Access Panel

621GB Fueling Station Door (Right)

C. Procedure

S 424-007

(1) Align the adapter with the fueling adapter body.

S 434-031

(2) Install the screws (7 thru 12) in the sequence shown (View B).

S 434-032

(3) Tighten the screws (7 thru 12) to 28-30 pound-inches in sequence.

NOTE: Screws 7 thru 12 attach the adapter to the fueling adapter body.

S 654-034

(4) Refuel the fuel tanks (AMM 12-11-01/301).

S 214-035

(5) Make sure there are no fuel leaks at the fueling adapter.

S 414-036

(6) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-037

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLAT PROCEDURE (AMM 27-81-00/201) ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(7) Do the activation procedure for the leading edge slat procedure (AMM 27-81-00/201).

S 944-084
(8) Remove the ropes and DANGER - OPEN FUEL TANKS signs from around the fueling station.

S 494-085
(9) Connect the airplane battery and remove the OPEN FUEL TANK - DO NOT CONNECT signs.

S 914-086
(10) Supply electrical power to the airplane (AMM 24-22-00/201).

TASK 28-21-01-004-008

4. Remove the Poppet Assembly (Fig. 401)

A. References
(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(2) AMM 24-22-00/201, Electric Power Control
(3) AMM 27-81-00/201, Leading Edge Slat System
(4) AMM 28-26-00/201, Defueling

B. Equipment
(1) Container - Fuel Resistant, 2 Gallon (7.57 Liters)

C. Access
(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

D. Procedure

S 214-074
(1) Make sure the airplane is grounded to an approved ground.

S 914-075
(2) Remove electrical power from the airplane (AMM 24-22-00/201).

S 494-076
(3) Disconnect the airplane battery and attach OPEN FUEL TANK - DO NOT CONNECT sign.

S 494-077
(4) Put ropes around the fueling station area and install DANGER - OPEN FUEL TANKS signs.

S 864-078

WARNING: DO THE DEACTIVATION PROCEDURE OF THE LEADING EDGE SLAT (AMM 27-81-00/201). IF THE LEADING EDGE SLAT OPERATES ACCIDENTALLY, INJURY CAN OCCUR.

(5) Do the deactivation procedure of the leading edge slats (AMM 27-81-00/201).

S 144-079

(6) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 144-080

WARNING: WAIT 90 MINUTES AFTER REFUELING THE AIRPLANE BEFORE YOU DRAIN THE REFUELING ADAPTER. IF YOU DRAIN THE REFUELING ADAPTER BEFORE 90 MINUTES, PRESSURIZED FUEL CAN CAUSE AN INJURY OR A FUEL LEAK.

(7) Drain the remaining fuel from the refueling adapter.
  (a) Put a container (2 gallon, 7.57 liter) below the refueling adapter to catch the fuel.
  (b) Push the poppet valve installed in the refueling adapter in slowly.
  (c) Let the fuel drain from the refueling adapter and the refueling manifold.

S 034-012

(8) Remove the screws (7 thru 12) that attach the fueling adapter to the adapter body (View B).

S 034-013

(9) Remove the adapter.

S 034-014

(10) Remove the screws (1 thru 6) that attach the poppet assembly to the fueling adapter body (View C).

S 024-038

(11) Remove the poppet assembly from the fueling adapter body.

S 034-015

(12) Remove the O-ring from the poppet assembly and discard.

TASK 28-21-01-404-016

5. Install the Poppet Assembly (Fig. 401)

A. References

(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels

(2) AMM 12-11-01/301, Fuel Tank Pressure Fueling

(3) AMM 27-81-00/201, Leading Edge Slat System

B. Access

(1) Location Zone

621 Leading Edge to Front Spar (Right)

(2) Access Panel

621GB Fueling Station Door (Right)

C. Procedure

S 644-017

(1) Lubricate the new O-ring with fuel (View C).

S 434-039

(2) Install the O-ring into the groove on the poppet assembly.

S 424-018

(3) Put the poppet assembly in the adapter body.

S 434-040

(4) Install the screws (1 thru 6) in the sequence shown (View B).

S 434-041

(5) Tighten the screws (1 thru 6) to 28-30 pound-inches in sequence.

NOTE: Screws 1 thru 6 attach the poppet assembly to the fueling adapter body.

S 434-019

(6) Align the adapter with the fueling adapter body.

S 434-042

(7) Install the screws (7 thru 12) in the sequence shown (View B).

S 434-043

(8) Tighten the screws (7 thru 12) to 28-30 pound-inches in sequence.

NOTE: Screws 7 thru 12 attach the adapter to the fueling adapter body.

S 654-021

(9) Refuel the fuel tanks (AMM 12-11-01/301).

S 214-044

(10) Make sure there are no fuel leaks at the fueling adapter.

S 414-045

(11) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-046

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLAT PROCEDURE (AMM 27-81-00/201). ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(12) Do the activation procedure for the leading edge slat procedure (AMM 27-81-00/201).

S 944-081

(13) Remove the ropes and DANGER - OPEN FUEL TANKS signs from around the fueling station.

S 494-082

(14) Connect the airplane battery and remove the OPEN FUEL TANK - DO NOT CONNECT signs.

S 864-083

(15) Supply electrical power to the airplane (AMM 24-22-00/201).

FUELING ADAPTER AND VALVE - INSPECTION/CHECK

1. General
   A. This task does an electrical bonding resistance check for the fueling adapter.

TASK 28-21-01-766-063

2. Fueling Adapter - Bonding Resistance Check (Fig. 601)
   A. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 27-81-00/201, Leading Edge Slat System
      (3) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Use one of these:
         (a) Bonding Meter - Model T477W
             Avtron Manufacturing Inc.
             Cleveland OH
         (b) Bonding Meter - Model M1
             (Serial Number A00001112 and subsequent)
             BCD Electronics LTD.
             Vancouver Canada
   C. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door (Right)

   D. Procedure

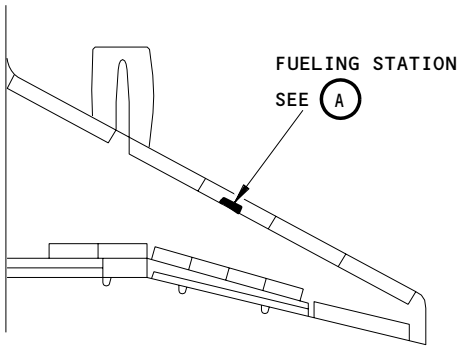
      S 216-002
      (1) Make sure the airplane is grounded to an approved ground.

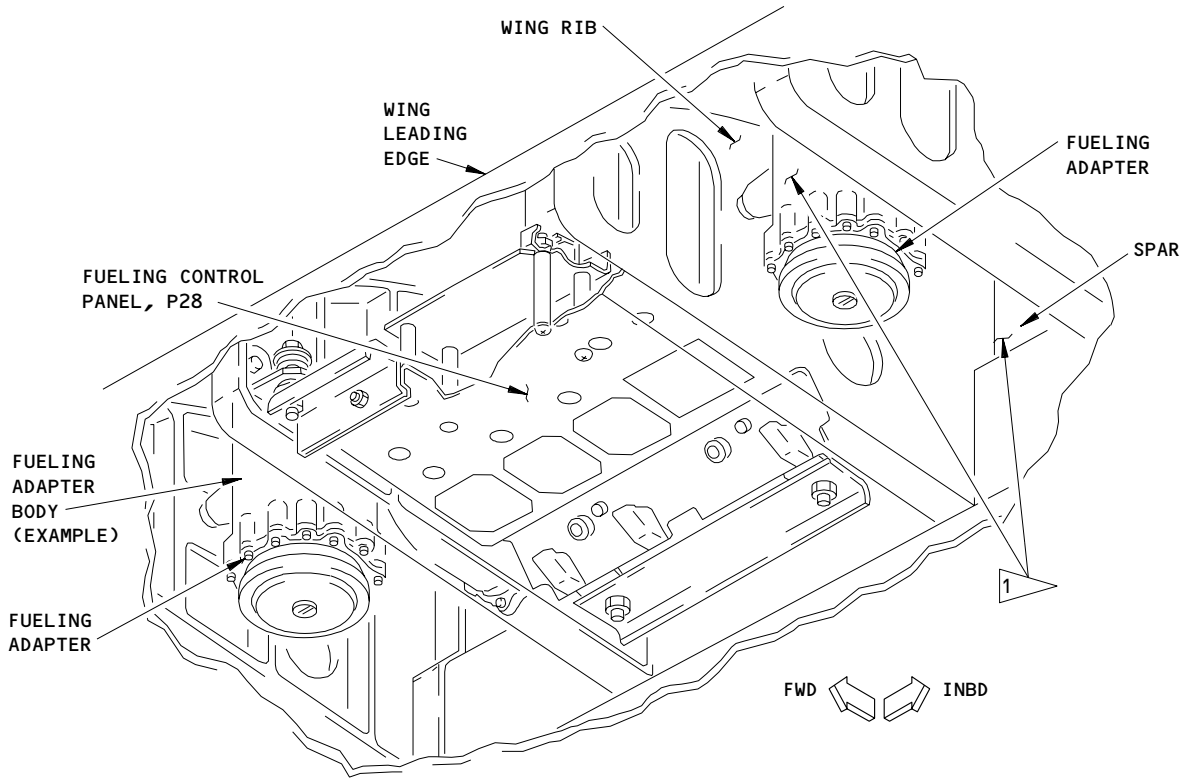
      S 866-006

      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SLATS, OR MOVE ALL PERSONNEL AND EQUIPMENT AWAY FROM THE SLATS. THE SLATS CAN MOVE QUICKLY. INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT CAN OCCUR.

      (2) Do the deactivation procedure of the leading edge slats (AMM 27-81-00/201).

      S 146-007
      (3) Open the fueling station door, 621GB (AMM 06-44-00/201).





FUELING STATION
A

1 THE RESISTANCE FROM THE FUELING ADAPTER TO THE SPAR IS 0.005 OHMS OR LESS

Fueling Adapter and Poppet Assembly Resistance Check
Figure 601

S 766-064

(4) Measure the bonding resistance between the fueling adapter and the front spar.

(a) Make sure the bonding resistance is 0.005 ohm (5.0 milliohms) or less.

S 416-017

(5) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 866-067

(6) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

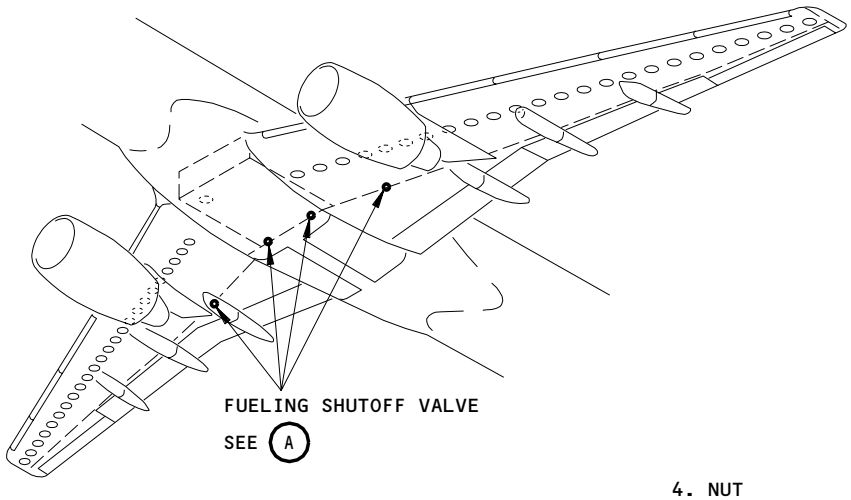
FUELING SHUTOFF VALVE - REMOVAL/INSTALLATION

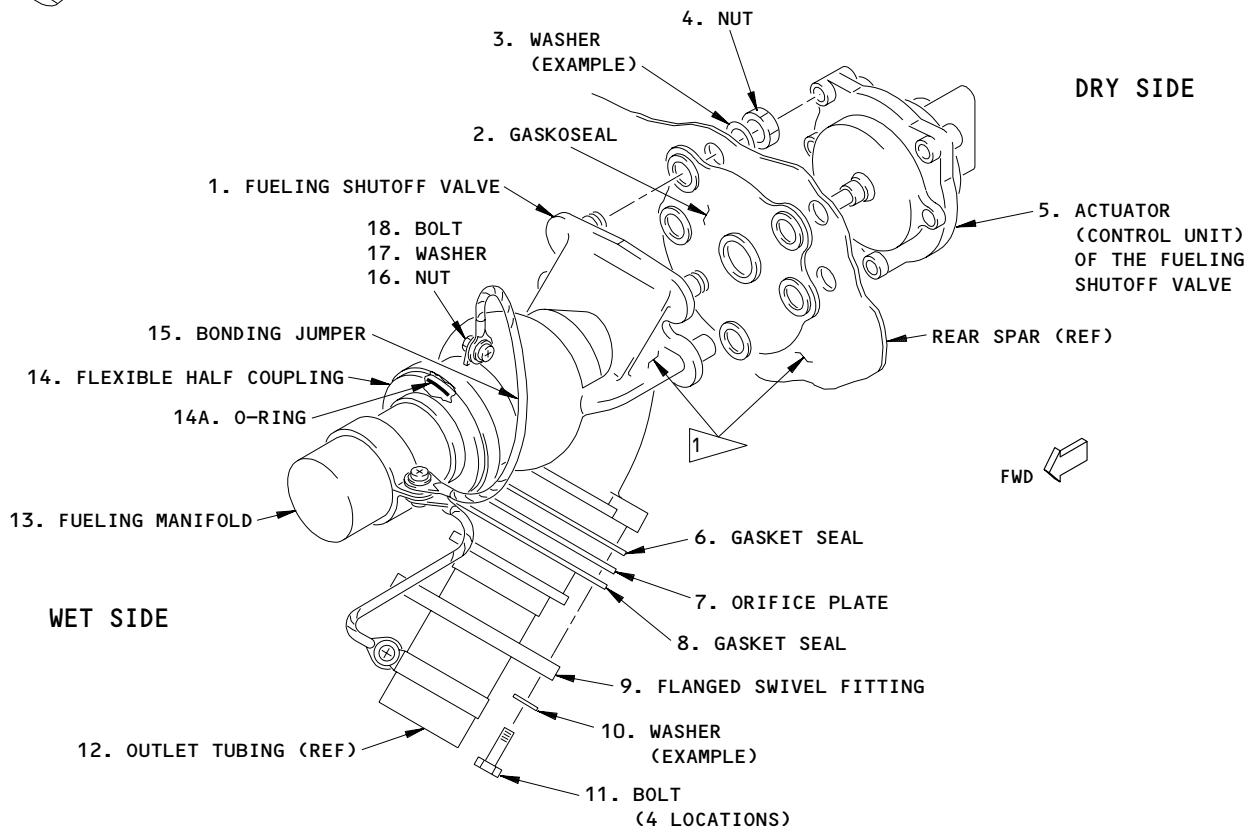
1. General
   A. Four pressure fueling shutoff valves are installed on the rear spar of the wing. One fueling shutoff valve is found outboard of each center tank end rib and one fueling shutoff valve is found approximately 4 feet to each side of the airplane centerline.
   B. The fueling shutoff valves let fuel flow freely from the fueling manifold to the fuel tanks.
   C. The removal/installation procedures are the same for all fueling shutoff valves.
   D. This procedure contains three tasks. The first task removes the fueling shutoff valve. The second task installs the fueling shutoff valve. The third task inspects the electrical bond from the valve body to the rear spar for the center tank fueling shutoff valve.

TASK 28-21-02-004-017

2. Remove the Fueling Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 24-22-00/201, Electric Power Control
      (3) AMM 28-11-00/201, Fuel Tanks
      (4) AMM 28-11-01/401, Main Tank Access Door
      (5) AMM 28-11-02/401, Center Tank Access Door
      (6) AMM 28-21-12/401, Fueling Shutoff Valve Actuator
      (7) AMM 28-25-05/401, APU Fuel Line and Shroud
      (8) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          134 Wing Center Section (Right)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door
          134CZ Baffle Door
          134DZ Baffle Door
          541AB Main Tank Access Door (Left)
          641AB Main Tank Access Door (Right)



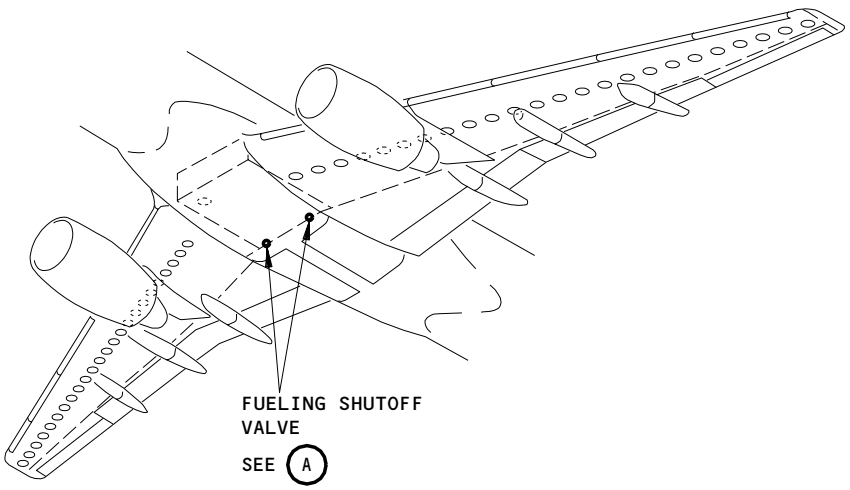


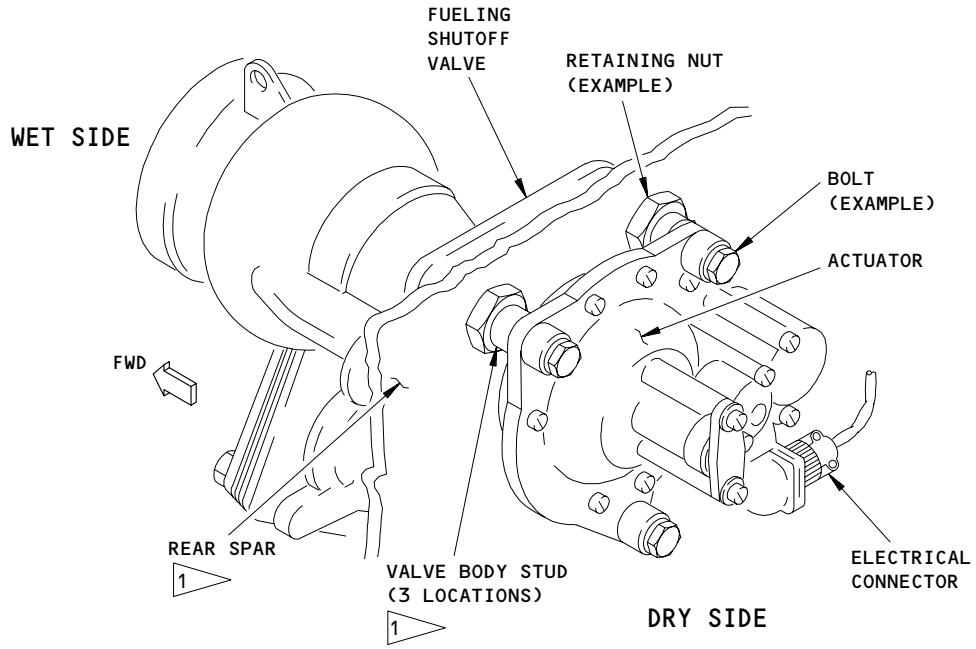
FUELING SHUTOFF VALVE

A

1 THE RESISTANCE FROM THE FUELING SHUTOFF VALVE TO THE REAR SPAR IS 0.0025 OHM OR LESS.

Fueling Shutoff Valve Installation
Figure 401





FUELING SHUTOFF VALVE

A

1 THE RESISTANCE FROM THE VALVE BODY STUD TO THE REAR SPAR IS 0.012 OHM OR LESS.

Fueling Shutoff Valve Resistance Inspection
Figure 402

C. Procedure

S 864-001
(1) Supply electrical power (AMM 24-22-00/201).

S 654-002
(2) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 034-003
(3) Remove the actuator (control unit) (5) of the fueling shutoff valve (AMM 28-21-12/401).

S 944-018

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-004
(5) To get access to the fueling shutoff valves in the center fuel tank, remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 014-005
(6) To get access to the fueling shutoff valves in the center fuel tank, remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 014-006
(7) To get access to the fueling shutoff valves in the main fuel tanks, remove the main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 034-007
(8) Remove the nuts (4) and the washers (3) which hold the fueling shutoff valve (1) in position.

S 034-008
(9) Remove the bolt (18), washer (17) and nut (16) to disconnect the bonding jumper (15) from the fueling shutoff valve (1).

S 034-009
(10) Hold the fueling shutoff valve (1).

S 034-010
(11) Disconnect the flexible half coupling (14) from the fueling manifold (13) (AMM 28-25-05/401).

S 034-011
(12) Remove the four bolts (11) and the washers (10) from the flanged swivel fitting (9) on the outlet tubing (12).

S 034-012
(13) Remove the orifice plate (7) and the two gasket seals (6, 8) from the fueling shutoff valve (1).

S 024-013
(14) Remove the fueling shutoff valve (1) from the rear spar.

S 034-019
(15) Remove the gaskoseal (2).

S 494-014
(16) Put covers on the holes in the outlet tubing (12) and fueling manifold (13) to keep unwanted materials out.

TASK 28-21-02-404-019

3. Install the Fueling Shutoff Valve (Fig. 401)
   A. Consumable Materials
      (1) C00064 Surface Treatment Coating - Alodine 1200
   B. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Fueling Shutoff Valve	28-21-02	01	155
				02	228
				02C	175
	2	Gaskoseal		01	195
				02	235
				02C	170
	6	Gasket	28-21-05	01	705
				01B	845
				01C	660
				01D	605
	7	Orifice Plate		01	709,713, 717
				01B	850,855
				01C	665,670
	8	Gasket		01	705
				01B	845
				01C	660
				01D	605
	14A	O-ring		01	585
				01B	595
				01C	510
				01D	400

C. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(3) AMM 24-22-00/201, Electric Power Control
(4) AMM 28-11-00/201, Fuel Tanks
(5) AMM 28-11-01/401, Main Tank Access Door
(6) AMM 28-11-02/401, Center Tank Access Door
(7) AMM 28-21-12/401, Fueling Shutoff Valve Actuator
(8) AMM 28-25-05/401, APU Fuel Line and Shroud
(9) AMM 28-26-00/201, Defueling
(10) AMM 51-21-04/701, Alodizing

D. Access
(1) Location Zones
134 Wing Center Section (Right)
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door
541AB Main Tank Access Door (Left)
641AB Main Tank Access Door (Right)

E. Procedure

S 944-015

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-016
(2) Go into the fuel tank.

S 094-020
(3) Remove the covers from the tubing and the fueling manifold.

S 214-021
(4) Make sure the surfaces where the fueling shutoff valve (1) and the rear spar touch are clean.

S 394-022
(5) Apply surface treatment coating on the rear spar surface where you put the gaskoseal (2) (AMM 51-21-04/701).

S 434-023
(6) Put the gaskoseal (2) on the fueling shutoff valve (1).

S 424-024
(7) Align the fueling shutoff valve (1) with the fueling manifold (13) and the outlet tubing (12).

S 424-025
(8) Install the fueling shutoff valve (1) on the rear spar.

NOTE: Make sure the threaded inserts on the fueling shutoff valve (1) go through the rear spar.

S 434-026
(9) Put the washers (3) and nuts (4) on the three threaded inserts.

S 434-027
(10) Tighten the nuts (4).

S 764-045
(11) Measure the resistance from the fueling shutoff valve to the rear spar.

NOTE: FUELING SHUTOFF VALVES IN THE CENTER TANK;
CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Make sure the resistance is 0.0025 ohm (2.5 milliohms) or less.

NOTE: FUELING SHUTOFF VALVES IN THE CENTER TANK;
CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 764-046
(12) Apply a fillet seal of BMS 5-45 sealant completely around the gaskoseal and the fueling shutoff valve.

NOTE: FUELING SHUTOFF VALVES IN THE CENTER TANK;
CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-028
(13) Install lockwire on the nuts (4).

S 434-029
(14) Put gasket seals (6, 8) on each side of the orifice plate (7).

S 434-030
(15) Align the orifice plate (7) on the fueling shutoff valve (1).

S 434-031
(16) Put washers on the four bolts (11).

S 434-032
(17) Install the bolts (11) through the flanged swivel fitting (9) to the fueling shutoff valve (1).

S 434-033
(18) Use a new O-ring (14A) and connect the flexible half coupling (14) between the fueling shutoff valve (1) and the fueling manifold (13) (AMM 28-25-05/401).

S 434-038
(19) Install the bolt (18), washer (17), and nut (16) to attach the bonding jumper (15) to the fueling shutoff valve (1).

S 434-039
(20) Install the actuator (control unit) (5) of the fueling shutoff valve (AMM 28-21-12/401).

S 414-040
(21) For the fueling shutoff valves in the center fuel tank, install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-034
(22) For the fueling shutoff valves in the center fuel tank, install the center tank access door, 134AZ (AMM 28-11-02/401).

S 414-035
(23) For the fueling shutoff valves in the main fuel tank, install the main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 654-036
(24) Refuel the applicable fuel tank (AMM 12-11-01/301).

S 214-037
(25) Make sure there are no fuel leaks at the fueling shutoff valve (1).
  (a) If there are fuel leaks at the fueling shutoff valve (1), do the steps that follow:
    1) Defuel the applicable fuel tank (AMM 28-26-00/201).
    2) Do the procedure again as it is necessary to align the gaskoseal again.

S 864-016
(26) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-21-02-764-047
4. Fueling Shutoff Valve Resistance Check (Fig. 402)

A. General
(1) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).
(2) This inspection applies to center tank fueling shutoff valves only.
(3) This inspection is not necessary if a fillet seal is installed around the perimeter of the gaskoseal and the valve body in the center tank and the bonding resistance from the valve body stud to the rear spar is 0.012 ohm (12 milliohms) or less.

B. Equipment
(1) Bonding meter - Use one of these:
(a) Bonding Meter - Model T477W
Avtron Manufacturing Inc.
Cleveland OH
(b) Bonding Meter - Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver Canada

C. Reference
(1) SWPM 20-20-00, Standard Wiring Practices Manual

D. Access
(1) Location Zone
134 Wing Center Section (Right)

E. Procedure

NOTE: Do this resistance check for each of the fueling shutoff valves in the center tank.

S 014-048
(1) Get access to each center tank fueling shutoff valve actuator.

S 764-050
(2) Measure the resistance from a valve body stud that goes through the rear spar to the rear spar (SWPM 20-20-00).
(a) Make sure the resistance is 0.012 ohm (12 milliohms) or less.

S 904-049

(3) If the resistance is more than 0.012 ohm (12 milliohms), do these steps to restore the electrical fay surface bond:

NOTE: These steps will make sure the electrical fay surface bond of the fuel shutoff valve is 0.0025 ohm (2.5 milliohms) or less and a fillet seal is around the perimeter of the gaskoseal and the fuel shutoff valve in the center tank.

(a) Remove the fueling shutoff valve per the task: Remove the Fueling Shutoff Valve (AMM 28-21-02/401).

(b) Re-install the fueling shutoff valve per the task: Install the Fueling Shutoff Valve (AMM 28-21-02/401).

NOTE: This will terminate the need for this inspection for the valve.

SURGE TANK FUEL LEVEL SENSOR - REMOVAL/INSTALLATION

1. General
   A. A fuel level sensor attaches to the rear spar of each surge tank, aft of the pressure relief valve of the surge tank. The fuel level sensor gives a signal to the control circuit of the fueling shutoff valve at a specified fuel tank level that causes the fueling shutoff valves to close.
   B. This procedure contains two tasks. The first task removes the fuel level sensor. The second task installs the fuel level sensor.

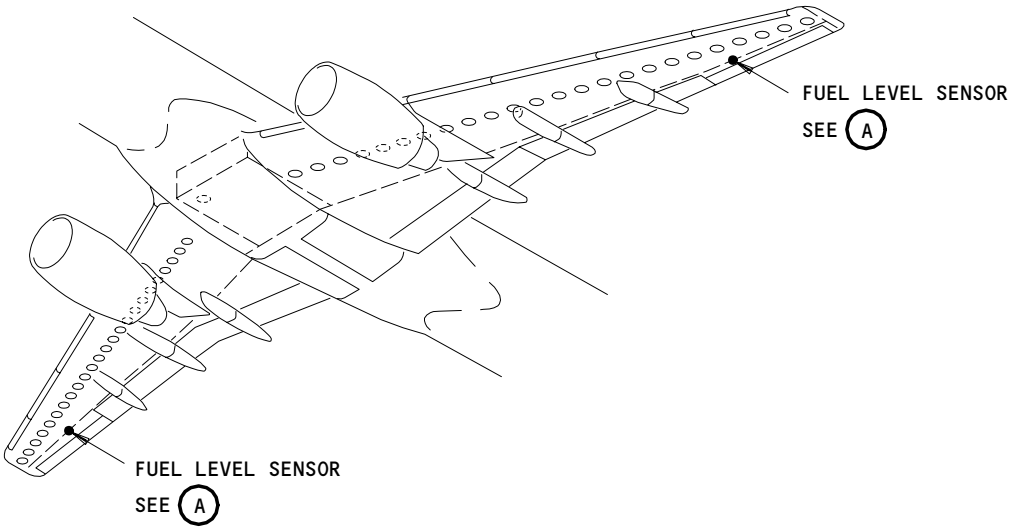
TASK 28-21-03-004-001

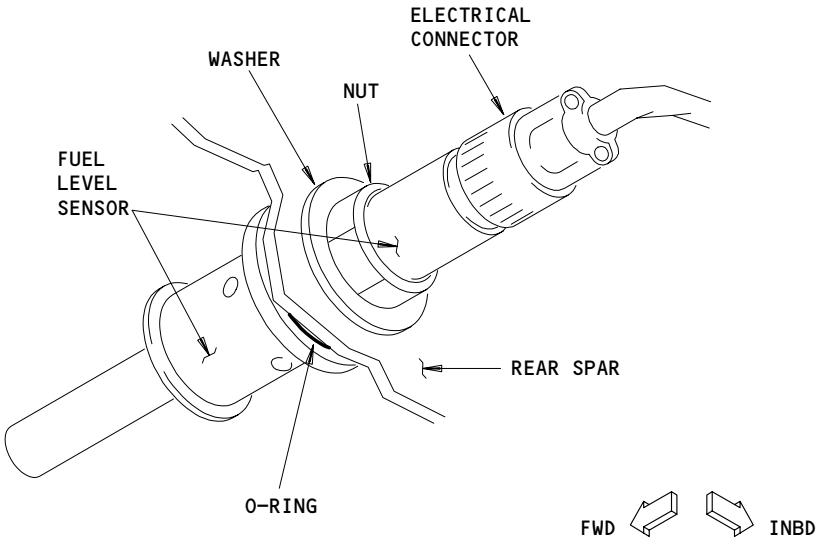
2. Remove the Fuel Level Sensor (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-03/401, Surge Tank Access Door
      (4) AMM 28-25-05/401, APU Fuel Line and Shroud
   B. Access
      (1) Location Zones
          543 Surge Tank - Rib No. 21 to No. 23 (Left)
          561 Rear Spar to Trailing Edge (Left)
          643 Surge Tank - Rib No. 21 to No. 23 (Right)
          661 Rear Spar to Trailing Edge (Right)

      (2) Access Panels
          543AB Surge Tank Access Door (Left)
          561BB Access Door (Left)
          643AB Surge Tank Access Door (Right)
          661BB Access Door (Right)

   C. Procedure

      S 864-002
      (1) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E5, FUELING CONTROL





FUEL LEVEL SENSOR

A

Surge Tank Fuel Level Sensor Unit Installation
Figure 401

814696

S 864-003
(2) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
(a) 34A11, FLNG CONT

S 014-004
(3) Remove the surge tank access door, 543AB or 643AB (AMM 28-11-03/401).

S 014-005
(4) Open the access door, 561BB or 661BB (AMM 06-44-00/201).

S 014-006
(5) Find the fuel level sensor on the rear spar.

S 034-007
(6) Remove the electrical connector from the fuel level sensor.

S 034-057
(7) Remove the screw, washers and the nut to disconnect the bonding jumper from the fuel level sensor.

S 034-008
(8) Remove the nut and the washer from the fuel level sensor.

S 944-009

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-010
(10) Go into the surge tank.

S 014-011
(11) Get access to the fuel level sensor.

S 024-013
(12) To remove the fuel level sensor pull it in the forward direction.

TASK 28-21-03-404-015

3. Install the Fuel Level Sensor (Fig. 401)

A. Consumable Materials

(1) C00064 Surface Treatment Coating - Alodine 1200

B. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 20-10-21/601, Electrical Bonding
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-03/401, Surge Tank Access Door
(5) AMM 28-25-05/401, APU Fuel Line and Shroud
(6) AMM 51-21-04/701, Alodine Coating
(7) SWPM 20-20-00

C. Access

(1) Location Zones

543 Surge Tank - Rib No. 21 to No. 23 (Left)
561 Rear Spar to Trailing Edge (Left)
643 Surge Tank - Rib No. 21 to No. 23 (Right)
661 Rear Spar to Trailing Edge (Right)

(2) Access Panels

543AB Surge Tank Access Door (Left)
561BB Access Door (Left)
643AB Surge Tank Access Door (Right)
661BB Access Door (Right)

D. Procedure

S 944-010

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-016

(2) Go into the surge tank.

S 034-019
(3) Put a new O-ring in the groove on the inner flange of the fuel level sensor.

S 214-020
(4) Make sure the flange on the fuel level sensor and the inner surface of the rear spar are clean.

S 394-021
(5) Apply the surface treatment coating on the inner surface of the rear spar (AMM 51-21-04/701).

S 424-022
(6) Put the end of the fuel level sensor that attaches to the electrical connector through the hole in the rear spar.

S 434-024
(7) From out of the surge tank, put the washer and the nut on the fuel level sensor.

S 434-025
(8) Tighten the nut on the fuel level sensor to 216-264 in-lbs.

S 434-058
(9) Install the screw, three washers and the nut to connect the bonding jumper to the fuel level sensor (SWPM 20-20-00).

S 224-026
(10) Make sure the bonding resistance between the fuel level sensor and the airplane structure is not more than 0.0025 ohm (AMM 20-10-21/601).

S 434-027
(11) Install the electrical connector on the fuel level sensor.

S 864-028
(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E5, FUELING CONTROL

S 864-029
(13) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A11, FLNG CONT

S 414-030
(14) Install the surge tank access door, 543AB or 643AB (AMM 28-11-03/401).

S 414-031
(15) Close the access door, 561BB or 661BB (AMM 06-44-00/201).

SURGE TANK FUEL LEVEL SENSOR - INSPECTION/CHECK

TASK 28-21-03-766-070

1. Surge Tank Fuel Level Sensor - Bonding Resistance Check (Fig. 601)

A. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels

(2) SWPM 20-20-00, Electrical Bonds and Grounds

B. Equipment

(1) Bonding Meter - Use one of these:

(a) Bonding Meter - Model T477W
Avtron Manufacturing Inc.
Cleveland OH

(b) Bonding Meter - Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver, Canada

C. Access

(1) Location Zones

561 Rear Spar to Trailing Edge (Left)
661 Rear Spar to Trailing Edge (Right)

(2) Access Panels

561BB Access Door (Left)
661BB Access Door (Right)

D. Procedure

S 016-005

(1) Open the access door, 561BB or 661BB (AMM 06-44-00/201).

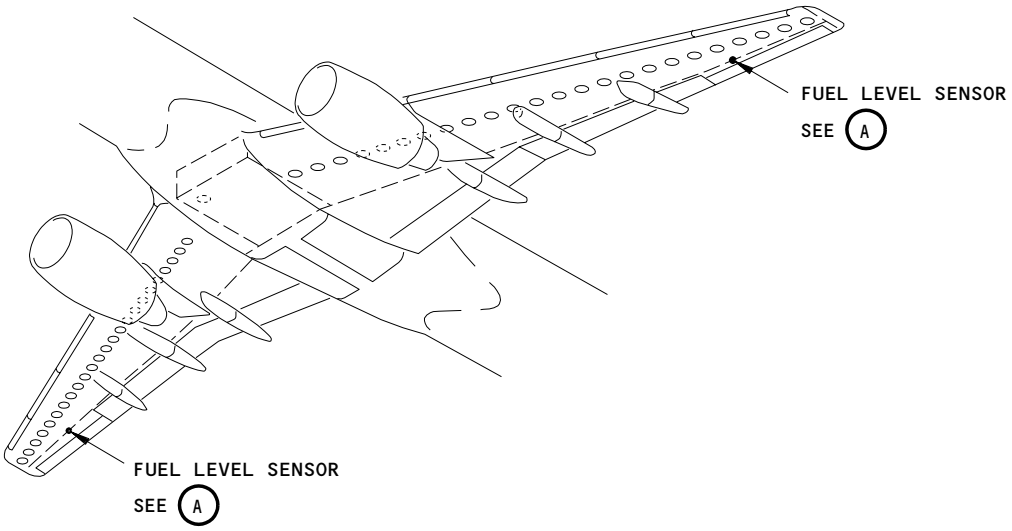
S 016-006

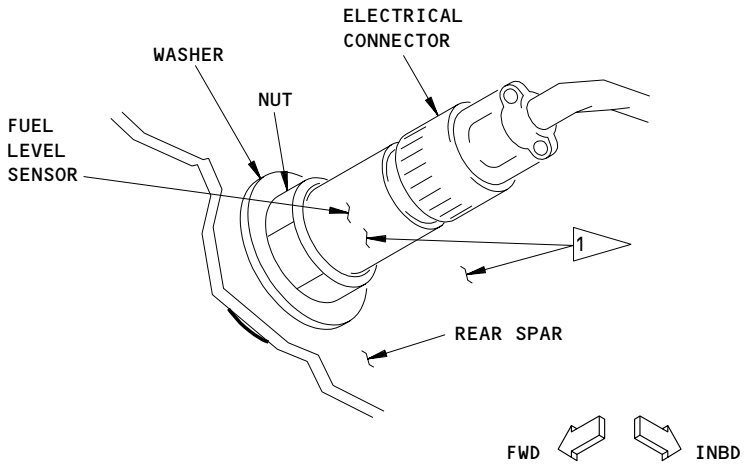
(2) Find the fuel level sensor on the rear spar.

S 766-071

(3) Measure the bonding resistance between the fuel level sensor and the rear spar (SWPM 20-20-00).

(a) Make sure the bonding resistance is 0.005 ohm (5.0 milliohms) or less.





FUEL LEVEL SENSOR
A

1 THE RESISTANCE FROM THE FUEL LEVEL SENSOR TO THE REAR SPAR IS 0.005 OHMS OR LESS

Surge Tank Fuel Level Sensor Unit Resistance Check
Figure 601

S 416-069

(4) Close the access door, 561BB or 661BB (AMM 06-44-00/201).

SURGE TANK FUEL LEVEL SENSOR CONTROL CARD - REMOVAL/INSTALLATION

1. General
   A. The control card of the fuel level sensor for the surge tank is installed in the electrical system card file, P50.
   B. This procedure contains two tasks. The first task removes the control card of the fuel level sensor. The second task installs the control card of the fuel level sensor.

TASK 28-21-04-004-001

2. Remove the Control Card of the Fuel Level Sensor (Fig. 401)
   A. Equipment
      (1) Safety Barrier - Electrical/Electronics Access Door, B52006-1
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices
   C. Access
      (1) Location Zones
          119 Main Equipment Center (Left)
          120 Main Equipment Center (Right)

      (2) Access Panel
          119BL Electrical/Electronics Access Door

   D. Procedure

      S 864-003
      (1) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A11, FLNG CONT

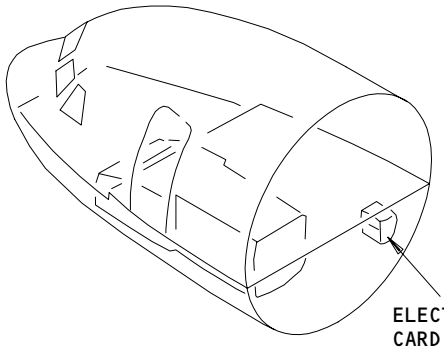
      S 864-002
      (2) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E5, FUELING CONTROL

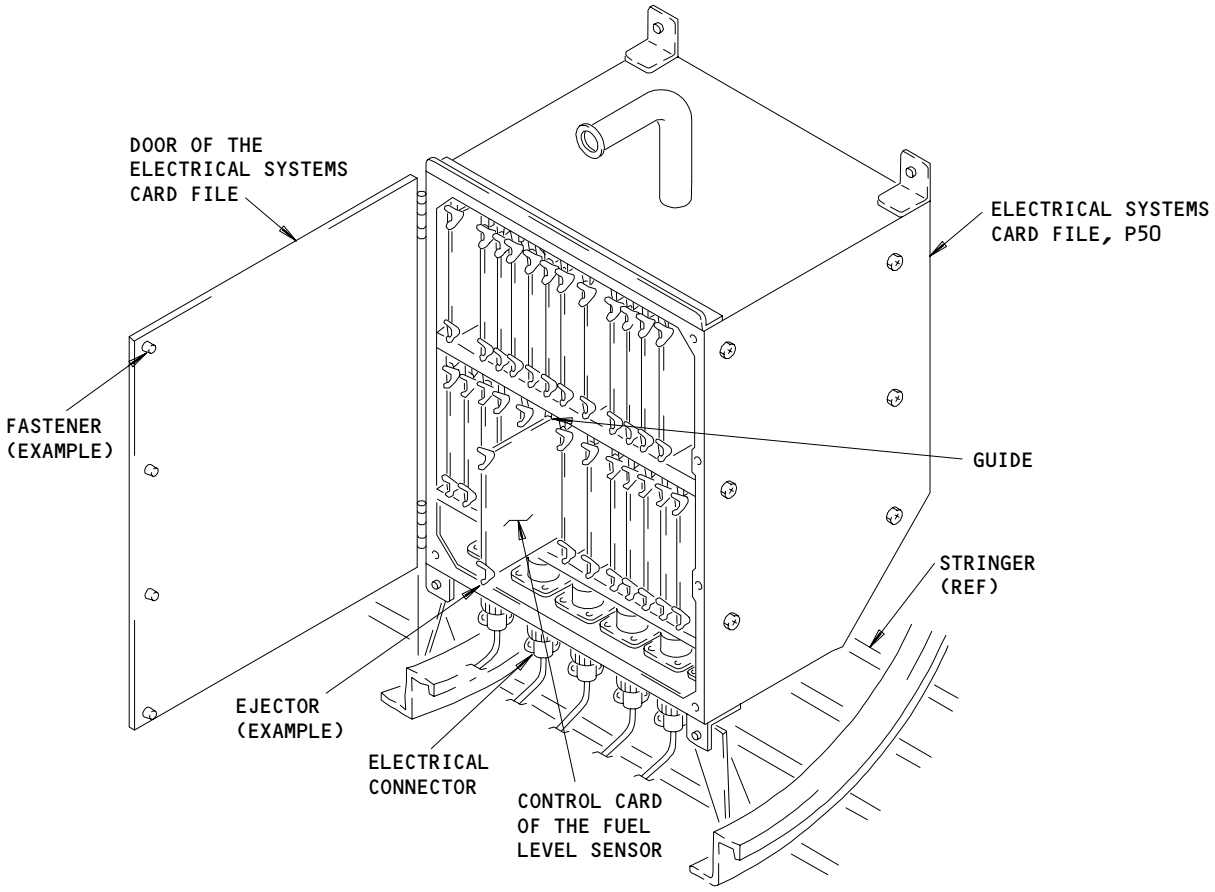
      S 014-004
      (3) Open the electrical/electronics access door, 119BL (AMM 06-41-00/201).

      S 014-005
      (4) Go into the main equipment center.

      S 494-006
      (5) Install the safety barrier across the opening for the electrical/electronics access door.

      S 014-007
      (6) Get access to the electronics system card file, P50.





ELECTRICAL SYSTEMS CARD FILE, P50

(A)

Surge Tank Fuel Level Sensor Control Card Installation
Figure 401

S 034-008
(7) Loosen the fasteners on the door of the electronics system card file, P50.

S 014-009
(8) Open the door of the card file.

S 014-010
(9) Find the control card of the fuel level sensor.

NOTE: A location diagram is attached to the inner surface of the door.

S 914-011

CAUTION: DO NOT TOUCH THE CONTROL CARD BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE CONTROL CARD.

(10) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 034-012
(11) Turn the ejectors on the control card until the control card is loose in the guides.

S 024-013
(12) Carefully slide the control card out along the guides.

S 024-014
(13) Remove the control card.

TASK 28-21-04-404-028

3. Install the Control Card of the Fuel Level Sensor (Fig. 401)

A. Equipment
(1) Safety Barrier - Electrical/Electronics Access Door, B52006-1

B. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(3) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices

C. Access
(1) Location Zones
119 Main Equipment Center (Left)
120 Main Equipment Center (Right)

(2) Access Panel
119BL Electrical/Electronics Access Door

D. Procedure

S 914-015

CAUTION: DO NOT TOUCH THE CONTROL CARD BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE CONTROL CARD.

(1) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 424-017
(2) Install the control card in the guides.

S 424-018
(3) Carefully push the control card in until the control card is tightly engaged in the electrical connector.

S 214-019
(4) Make sure the ejectors are level against the control card.

S 414-020
(5) Close the door of the electrical systems card file, P50.

S 434-021
(6) Tighten the fasteners on the door of the card file, P50.

S 094-022
(7) Remove the safety barrier from the opening of the electrical/electronics access door.

S 414-023
(8) Go out of the main equipment center.

S 414-024
(9) Close the electrical/electronics access door, 119BL (AMM 06-41-00/201).

S 864-025
(10) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E5, FUELING CONTROL

S 864-026
(11) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A11, FLNG CONT

S 654-027
(12) Refuel the fuel tanks if necessary and do the overfill test (AMM 12-11-01/301).

FUELING MANIFOLD DRAIN CHECK VALVE - REMOVAL/INSTALLATION

1. General
   A. Two drain check valves attach to the fueling manifold in the center fuel tank. One drain check valve is directly forward of the left center fueling shutoff valve. The second drain check valve is near the right side of the airplane body. The drain check valves let fuel drain from the fueling manifold but do not let fuel go into the fueling manifold from the fuel tank.
   B. This procedure contains two tasks. The first task removes the drain check valve of the fueling manifold. The second task installs the drain check walve of the fueling manifold.

TASK 28-21-05-004-001

2. Remove the Drain Check Valve of the Fueling Manifold (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zone
          134 Wing Center Section (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door (Right)
          134CZ Baffle Door (Right)
          134DZ Baffle Door (Right)

   C. Procedure

      S 654-002
      (1) Defuel the center fuel tank (AMM 28-26-00/201).

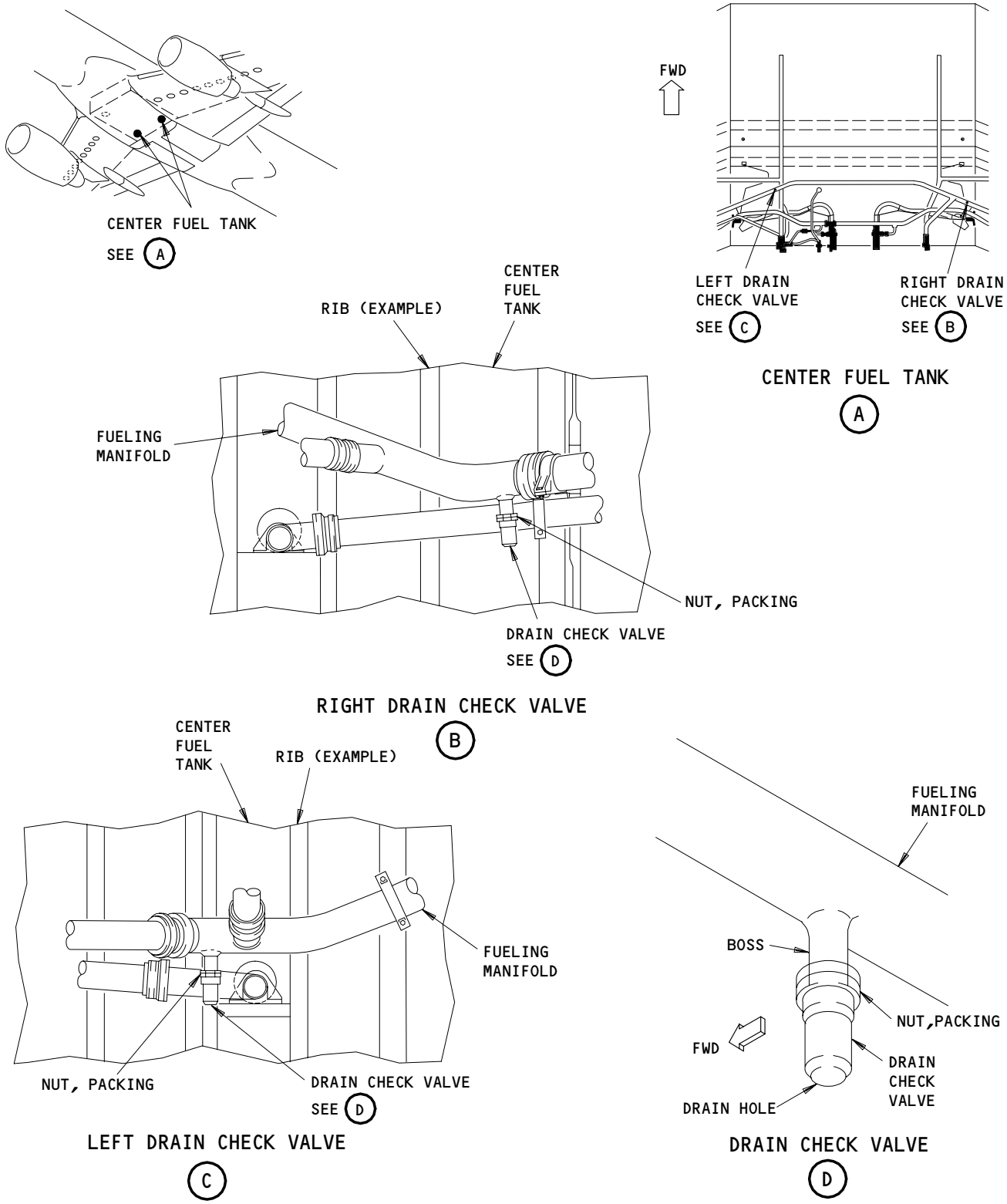
      S 014-003
      (2) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

      S 944-004

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Obey the fuel tank entry precautions (AMM 28-11-00/201).

      S 014-005
      (4) Go into the center fuel tank.



Fueling Manifold Drain Check Valve Installation
Figure 401

S 014-012
(5) Remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 024-006
(6) Remove the drain check valve.

S 034-007
(7) Remove the nut and packing.

S 034-008
(8) Discard the packing.

TASK 28-21-05-404-009

3. Install the Drain Check Valve of the Fueling Manifold (Fig. 401)

A. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-02/401, Center Tank Access Door

B. Access
(1) Location Zone
134 Wing Center Section (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door (Right)
134CZ Baffle Door (Right)
134DZ Baffle Door (Right)

C. Procedure

S 944-010

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-011
(2) Go into the center fuel tank.

S 434-011
(3) Install new packing on the drain check valve.

S 424-012
(4) Install the drain check valve into the boss.

S 414-013

(5) Install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-014

(6) Install the center tank access door, 134AZ (AMM 28-11-02/401).

FUELING CONTROL PANEL - REMOVAL/INSTALLATION

1. General
   A. The fueling control panel, P28, is found between the two fueling adapters. The fueling control panel contains switches and indicators for fueling and defueling operations.
   B. This procedure contains two tasks. The first task removes the fueling control panel. The second task installs the fueling control panel.

TASK 28-21-08-004-001

2. Remove the Fueling Control Panel (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 27-81-00/201, Leading Edge Slat System
   B. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door (Right)

   C. Procedure

      S 864-002
      (1) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
          (a) 6E4, FUELING QTY
          (b) 6E5, FUELING CONT

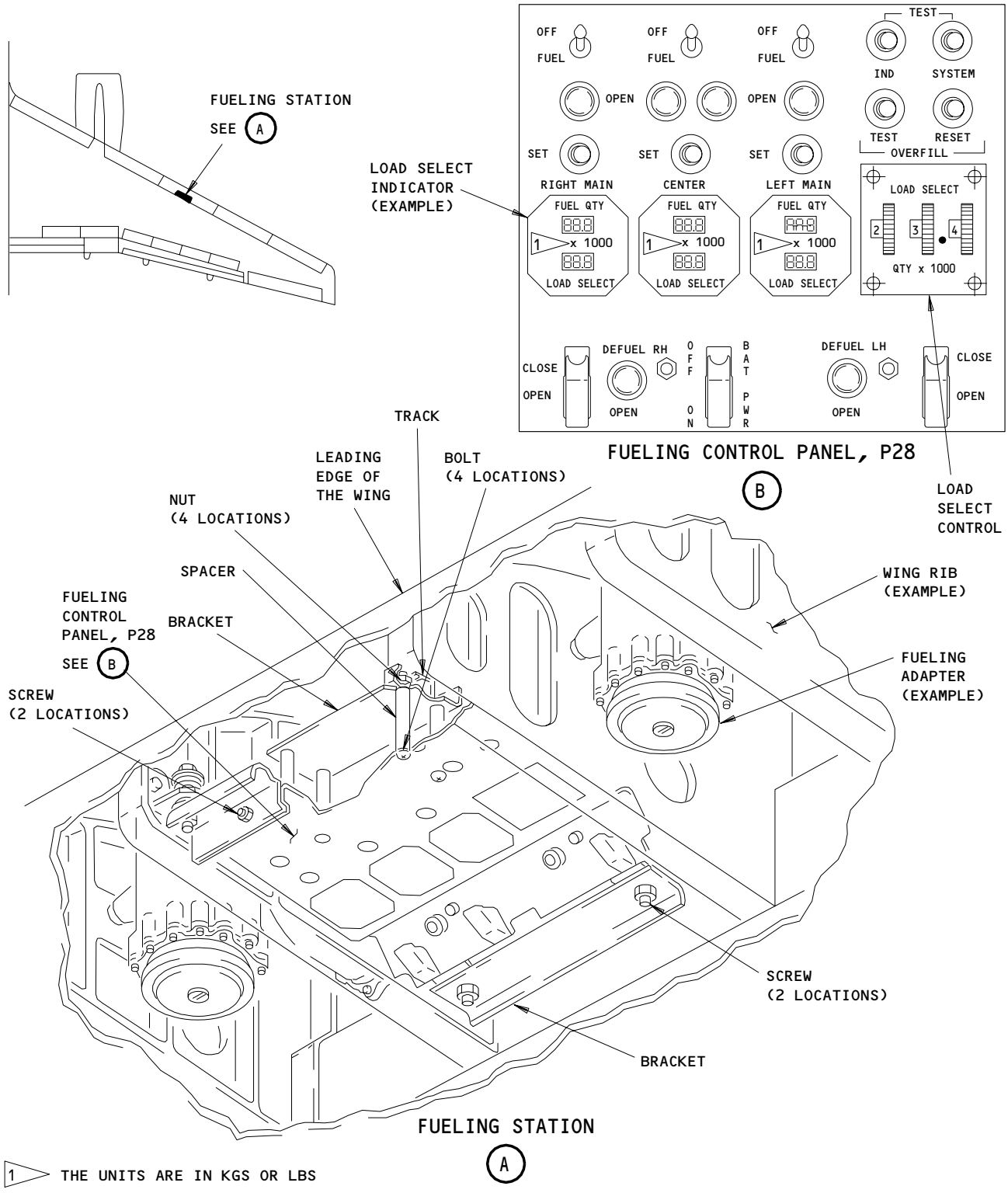
      S 864-003
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1 OR FUEL QTY L
          (b) 11L19, FUEL QTY 2 OR FUEL QTY R

      S 864-004
      (3) Open these circuit breakers on the APU external power panel, P34, and attach DO-NOT-CLOSE tags:
          (a) 34A10, FUEL QTY
          (b) 34A11, FLNG CONT

      S 864-005

      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLAT (AMM 27-81-00/201). FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLAT PROCEDURE COULD CAUSE INJURY TO PERSONS IF THE SLATS MOVE ACCIDENTALLY.

      (4) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).



Fueling Control Panel Installation
Figure 401

S 014-024
(5) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 034-025
(6) Remove the two screws and washers that attach the forward edge of the fueling control panel to the bracket (View A).

S 034-026
(7) Remove the two screws and washers that attach the aft edge of the fueling control panel to the bracket.

S 024-027
(8) Carefully lower the fueling control panel to get access to the electrical connectors on the indicators, lights and switches.

S 034-028
(9) Disconnect all the electrical connectors.

S 934-006
(10) Attach tags to the electrical connections to make the installation of the fueling control panel easier.

S 034-029
(11) Remove the wire bundle from the track and the wires from the holes in the bracket.

S 934-007
(12) Attach tags to the wires and wire bundle to make the installation of the fueling control panel easier.

S 034-030
(13) Remove the four bolts and spacers from behind the fueling control panel.

S 034-008
(14) Remove the bracket and the track from behind the fueling control panel.

TASK 28-21-08-404-031

3. Install the Fueling Control Panel (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels

(2) AMM 12-11-01/301, Pressure Fueling
(3) AMM 24-22-00/201, Electric Power Control
(4) AMM 27-81-00/201, Leading Edge Slat System

B. Access

(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Control Panel (Right)

C. Procedure

S 434-032
(1) Install four bolts and spacers on the face of the fueling control panel (View A).

S 434-033
(2) Align the bracket and track on the fueling control panel with spacers.

S 434-009
(3) Install the nuts on the bracket and track.

S 434-034
(4) Install the wire bundle in the track and put the wires through the holes in the bracket.

S 424-035
(5) Put and hold the fueling control panel near where it is to be installed.

S 434-010
(6) Remove the tags as you install the electrical connectors to the correct indicator, light or switch on the fueling control panel.

S 424-036
(7) Align the fueling control panel with the forward and aft brackets.

S 434-011
(8) Install washers on the four screws.

S 434-012
(9) Install the screws through the fueling control panel into the brackets.

S 864-013
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E4, FUELING QTY

(b) 6E5, FUELING CONT

S 864-014
(11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1 OR FUEL QTY L
(b) 11L19, FUEL QTY 2 OR FUEL QTY R

S 864-015
(12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P34 panel:
(a) 34A10, FUEL QTY
(b) 34A11, FLNG CONT

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

S 864-038
(14) Push and hold the IND TEST switch on the fueling control panel, P28 (View B).

S 214-016
(15) Make sure the top and bottom displays on the LOAD SELECT indicators show 88.8.

S 864-039
(16) Release the IND TEST switch.

S 214-017
(17) Make sure the top display of each LOAD SELECT indicator shows the applicable fuel tank quantity.

S 214-018
(18) Make sure the bottom display of each LOAD SELECT indicator goes off.

S 864-019
(19) Set the LOAD SELECT control to the quantity of fuel that you want.

S 864-040
(20) Push the RIGHT MAIN, CENTER, and LEFT MAIN SET switches.

S 214-020
(21) Make sure the bottom display on each LOAD SELECT indicator shows the quantity on the LOAD SELECT control.

S 864-041
(22) Put the BAT PWR switch in the ON position.

S 864-042
(23) Put the DEFUEL RH and DEFUEL LH switches to the OPEN position.

S 214-021
(24) Make sure the OPEN lights for the DEFUEL RH and DEFUEL LH switches come on.

S 864-043
(25) Put the DEFUEL RH and DEFUEL LH switches to the CLOSE position.

S 214-022
(26) Make sure the OPEN lights for the DEFUEL RH and DEFUEL LH lights go off.

S 654-044
(27) Refuel the fuel tank (AMM 12-11-01/301) and do these tests during the fueling operation.
  (a) After you put the fueling valve switches to the FUEL position, make sure all the fueling valve OPEN lights come on.
  (b) Push the SYSTEM TEST switch on the fueling control panel, P28.
  (c) Make sure the fueling valve OPEN lights go off sequentially then come on.
  (d) Push the OVERFILL TEST switch on the fueling control panel, P28.
  (e) Make sure the fueling valve OPEN lights go off.
  (f) Push the OVERFILL RESET switch on the fueling control panel, P28.
  (g) Make sure the fueling valve OPEN lights come on.

S 414-045

(28) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-023

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE LEADING EDGE SLAT ACTIVATION PROCEDURE (AMM 27-81-00/201). IF PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE LEADING EDGE SLAT ACTIVATION PROCEDURE, INJURY COULD OCCUR.

(29) Do the activation procedure for the leading edge slat (AMM 27-81-00/201).

FUELING MANIFOLD VENT VALVE - REMOVAL/INSTALLATION

1. General
   A. The vent valve in the fueling manifold lets fuel trapped in the fueling manifold drain.
   B. This procedure contains two tasks. The first task removes the vent valve. The second task installs the vent valve.

TASK 28-21-09-004-012

2. Remove the Vent Valve (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zone
          642 Main Tank - Rib No. 17 to No. 21 (Right)

      (2) Access Panel
          642AB Main Tank Access Door (Right)

   C. Procedure

      S 654-013
      (1) Defuel the right main fuel tank (AMM 28-26-00/201).

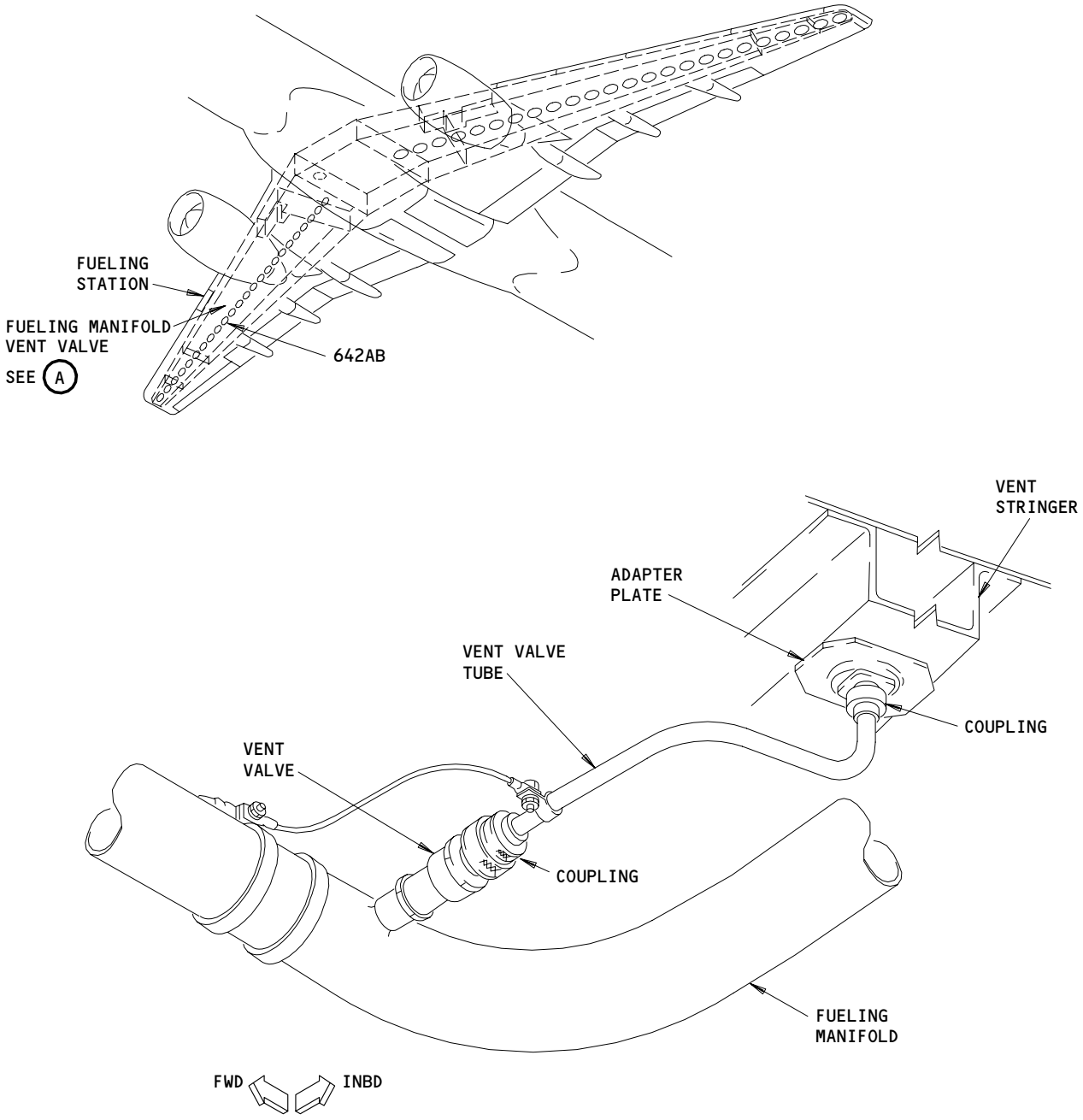
      S 654-014
      (2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

      S 014-001
      (3) Remove the main tank access door, 642AB (AMM 28-11-01/401).

      S 944-022

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (4) Obey the fuel tank entry precautions (AMM 28-11-00/201).



FUELING MANIFOLD VENT VALVE

A

Fueling Manifold Vent Valve
Figure 401

S 014-015
(5) Go into the fuel tank.

S 014-002
(6) Find the vent valve.

S 034-003
(7) Remove the coupling from the vent valve.

S 034-016
(8) Discard the O-ring.

S 034-004
(9) Loosen the coupling from the adapter plate.

S 034-017
(10) Turn the vent valve tube out of the way.

S 024-005
(11) Remove the vent valve.

TASK 28-21-09-404-006

3. Install the Vent Valve (Fig. 401)

A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door

B. Access
(1) Location Zone
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panel
642AB Main Tank Access Door (Right)

C. Procedure

S 944-018

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-019
(2) Go into the fuel tank.

S 434-007
(3) Install a new O-ring on the vent valve.

S 424-008
(4) Install the vent valve on the fueling manifold.

S 434-009
(5) Put the vent valve tube on the vent valve.

S 434-020
(6) Tighten the coupling on the vent valve.

S 434-021
(7) Install lockwire between the coupling and the vent valve.

S 434-010
(8) Tighten the coupling to the adapter plate.

S 434-019
(9) Install lockwire between the coupling and the adapter plate.

S 414-011
(10) Install the main tank access door, 642AB (AMM 28-11-01/401).

FUELING SHUTOFF VALVE ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. Four pressure fueling shutoff valves are installed on the rear spar of the wing. One fueling shutoff valve is found outboard of each center tank end rib and one fueling shutoff valve is found approximately four feet to each side of the airplane centerline.
   B. The actuators of the fueling shutoff valve are installed on the dry side of the rear spar.
   C. Removal/installation procedures are the same for all actuators.
   D. This procedure contains two tasks. The first task is to remove the actuator of the fueling shutoff valve. The second task is to install the actuator of the fueling shutoff valve.

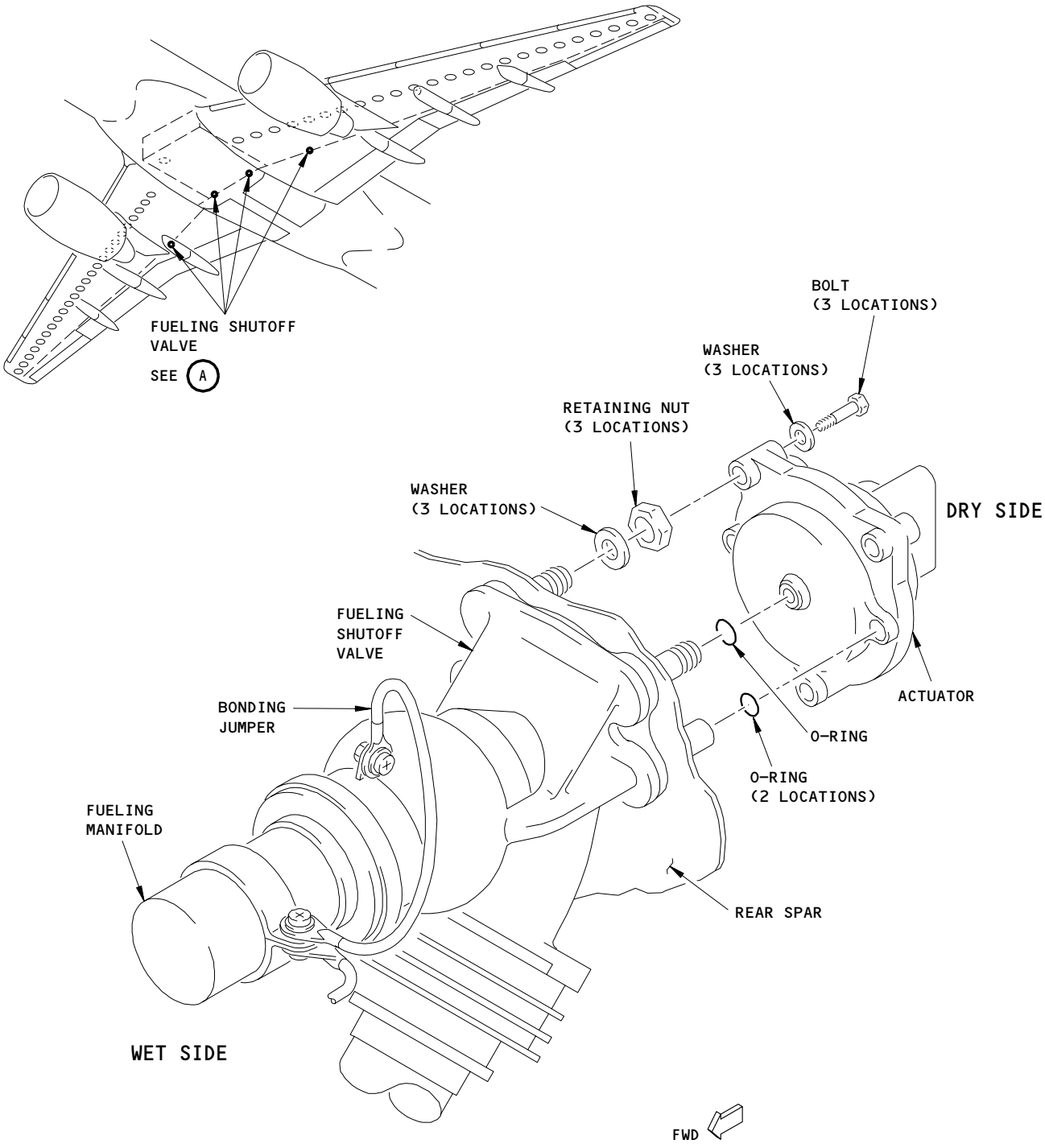
TASK 28-21-12-004-001

2. Remove the Actuator of the Fueling Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 24-22-00/201, Electric Power Control
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones
          551 Rear Spar to MLG Support Beam (Left)
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panels
          551EBX Access Door (Left)
          651EBX Access Door (Right)

   C. Procedure

      S 864-002
      (1) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach the DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1 OR FUEL QTY L
          (b) 11L19, FUEL QTY 2 OR FUEL QTY R



FUELING SHUTOFF VALVE

A

Fueling Shutoff Valve Actuator Installation
Figure 401

S 864-004
(2) Open these circuit breakers on the power distribution panel, P6, and attach the DO-NOT-CLOSE tags:
(a) 6E4, FUELING QTY
(b) 6E5, FUELING CONTROL
(c) 6E6, FUELING VALVE

S 864-003
(3) Open these circuit breakers on the APU external power panel, P34, and attach the DO-NOT-CLOSE tags:
(a) 34A9, FLNG VALVES
(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 214-005
(4) Make sure the landing gear downlocks for the nose and main landing gear are installed (AMM 32-00-20/201).

S 864-006
(5) Supply electrical power (AMM 24-22-00/201).

S 494-007

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 014-008
(7) Open the access door, 551EBX or 651EBX (AMM 06-44-00/201), or reach over the main landing gear door to get access to the actuator.

S 034-010
(8) Remove the electrical connector from the actuator.

S 034-011
(9) Remove the three bolts that attach the actuator to the fueling shutoff valve.

S 024-014
(10) Remove the actuator.

TASK 28-21-12-404-015

3. Install the Actuator of the Fueling Shutoff Valve (Fig. 401)

A. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 12-11-01/301, Pressure Fueling
(3) AMM 24-22-00/201, Electric Power Control
(4) AMM 32-00-15/201, Landing Gear Door Locks

B. Access
(1) Location Zones
551 Rear Spar to MLG Support Beam (Left)
651 Rear Spar to MLG Support Beam (Right)

(2) Access Panels
551EBX Access Panel (Left)
651EBX Access Panel (Right)

C. Procedure

S 424-016
(1) Align the actuator with the retaining nuts that attach to the fueling shutoff valve on the rear spar.

S 434-017
(2) Put the washers on the three bolts.

S 214-018
(3) Make sure the three O-rings are installed as shown in Fig. 401.

S 424-019
(4) Install the bolts on the actuator into the retaining nuts to attach the actuator to the fueling shutoff valve and torque to the applicable values:
(a) AN3C12A - 30-35 pound-inches (3.5-4 newton-meters)

(b) NAS6704U14 - 90-95 pound-inches (10-11 newton-meters)

S 434-020
(5) Attach the electrical connector to the actuator.

S 864-022
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1 OR FUEL QTY L
(b) 11L19, FUEL QTY 2 OR FUEL QTY R

S 864-023
(7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P34 panel:
(a) 34A9, FLNG VALVES
(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 864-024
(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E4, FUELING QTY
(b) 6E5, FUELING CONTROL
(c) 6E6, FUELING VALVE

S 864-025
(9) Supply electrical power (AMM 24-22-00/201).

S 654-026
(10) Refuel the fuel tank (AMM 12-11-01/301).

S 214-027
(11) Make sure the fueling shutoff valve operates correctly.

S 094-028

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(12) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 414-029
(13) Close the access door, 551EBX or 651EBX (AMM 06-44-00/201).

S 864-030
(14) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FUELING POWER CONTROL SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the fueling power control switch. The second task installs the fueling power control switch.

TASK 28-21-14-004-034

2. Remove the Fueling Power Control Switch (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wings - Access Doors and Panels
      (2) AMM 27-81-00/201, Leading Edge Slat System
   B. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door (Right)

   C. Procedure

      S 864-002
      (1) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E5, FUELING CONTROL

      S 864-003
      (2) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A11, FLNG CONT

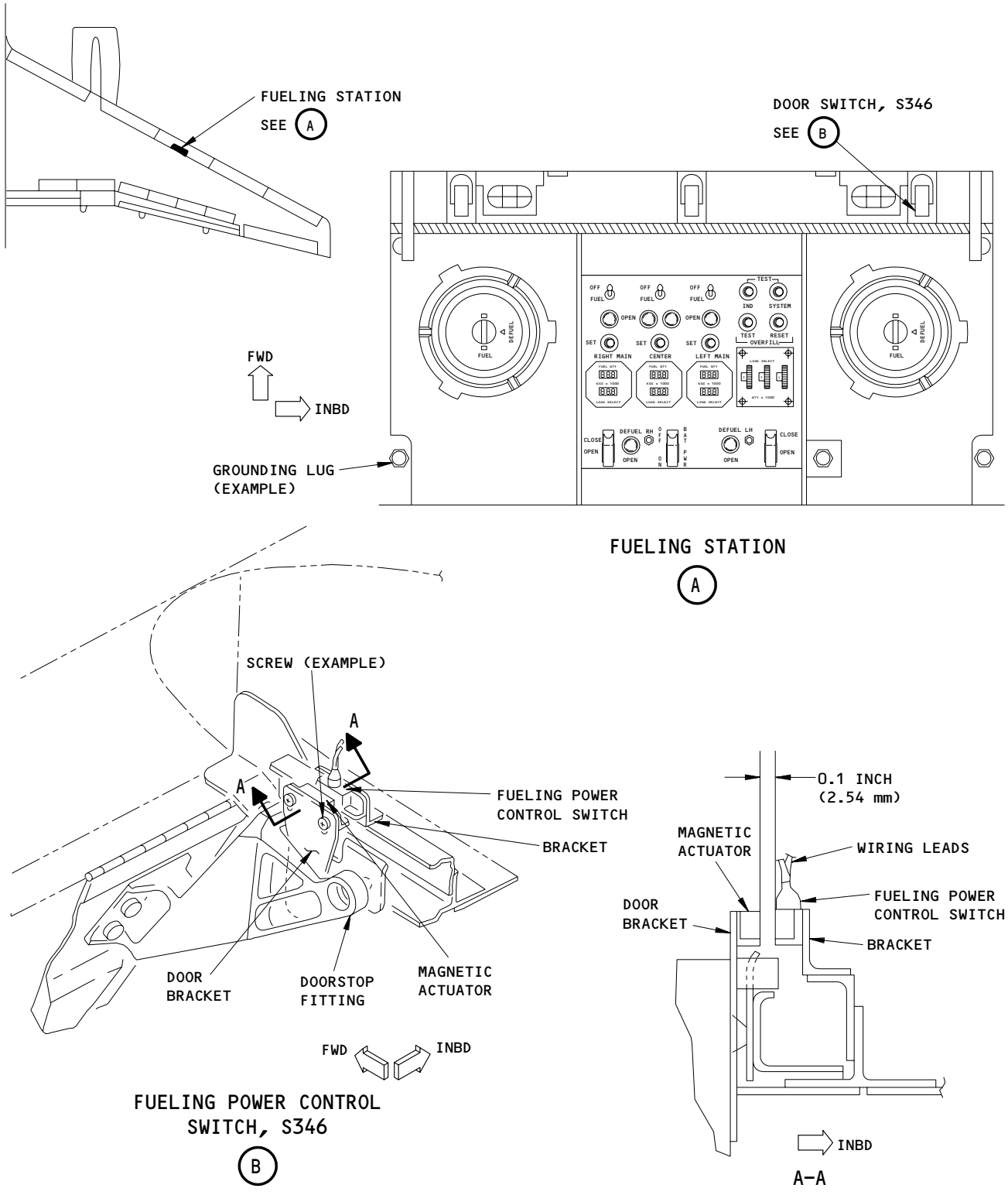
      S 044-035

      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY OR DAMAGE.

      (3) Do the Deactivation of the Leading Edge Slats procedure (AMM 27-81-00/201).

      S 014-036
      (4) Open the fueling station door, 621GB (AMM 06-44-00/201).

      S 034-037
      (5) Disconnect the wiring leads of the fueling power control switch from the airplane wiring leads (View A-A).



Fueling Power Control Switch Installation
Figure 401

S 034-038
(6) Remove the screws that attach the fueling power control switch to the bracket.

S 024-039
(7) Remove the fueling power control switch.

TASK 28-21-14-424-040

3. Install the Fueling Power Control Switch (Fig. 401)

A. References
(1) AMM 06-44-00/201, Wings - Access Doors and Panels
(2) AMM 20-10-21/601, Electrical Bonding
(3) AMM 20-10-22/701, Metal Surfaces
(4) AMM 27-81-00/201, Leading Edge Slat System

B. Access
(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

C. Procedure

S 424-041
(1) Put the fueling power control switch in position on the bracket (View A-A).

S 434-042
(2) Install the screws to attach the fueling power control switch to the bracket.

S 434-043
(3) Connect the wiring leads of the fueling control switch to the airplane wiring leads.

S 214-044
(4) Make sure the magnetic actuator is installed on the doorstop fitting.

S 324-045
(5) If the magnetic actuator is not installed on the door bracket, do the steps that follow.
(a) Remove the screws that attach the magnetic actuator to the door bracket if installed (View A-A).
(b) Clean the magnetic acutator and the faying surfaces of the door bracket (AMM 20-10-22/701).
(c) Put the magnetic actuator in position on the door bracket.
(d) Install the screws to attach the magnetic actuator to the door bracket.

(e) Make sure the bonding resistance between the magnetic actuator and the airplane structure is not more than 0.0025 ohms (AMM 20-10-21/601).

S 864-022

(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E5, FUELING CONTROL

S 864-023

(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A11, FLNG CONT

S 284-046

(8) Make sure the fueling power control switch operates correctly.
(a) Move the fueling station door from the not fully open positions to the full open position.
(b) Make sure the fueling panel lights come on when the fueling station door is in the full open position.

S 414-047

(9) Close the fueling station door, 621GB (AMM 06-44-00/201).

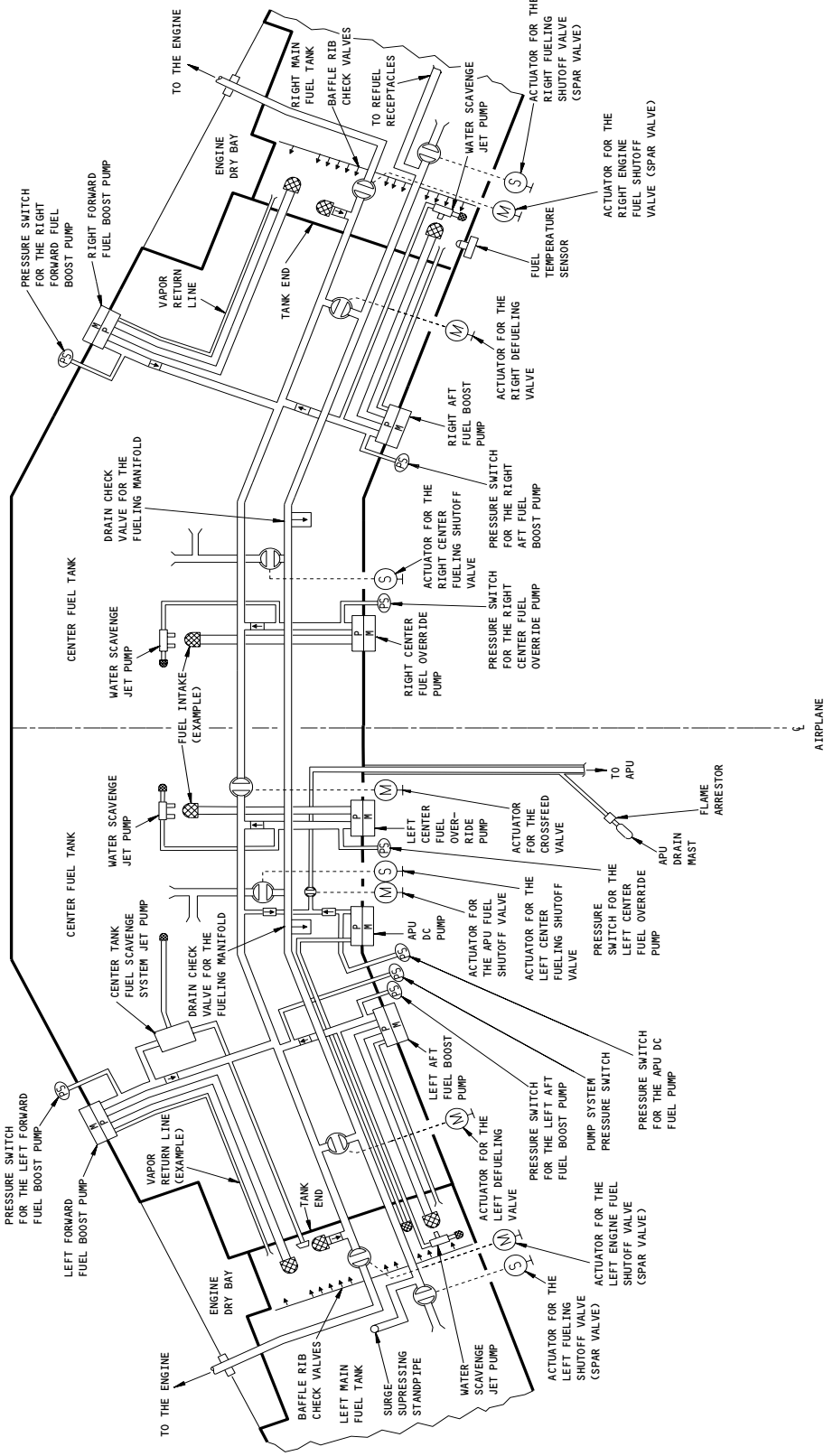
S 444-033

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLAT AND MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE LEADING EDGE SLATS. THE LEADING EDGE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Do the Activation of the Leading Edge Slat procedure (AMM 27-81-00/201).

ENGINE FUEL FEED SYSTEM - DESCRIPTION/OPERATION

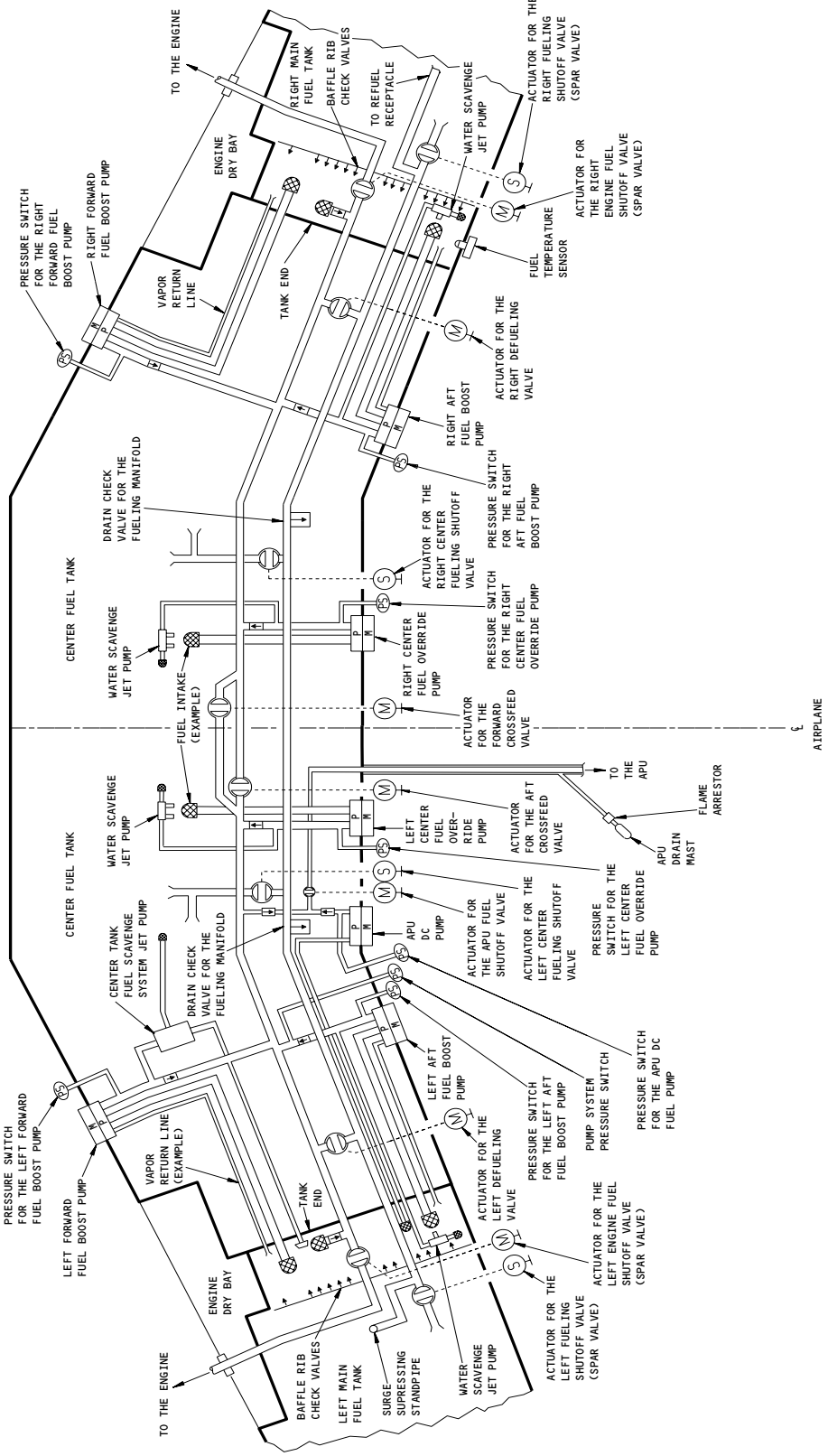
1. General (Fig. 1)
   A. Three fuel tanks (AMM 28-11-00/001) store fuel for operating the engine or APU (AMM 28-25-00/001).
   B. Each engine receives fuel from the left or right main fuel tank and the center fuel tank. Opening the crossfeed valve(s) permits either engine to be supplied by any tank. An engine fuel shutoff valve (spar valve) controls fuel flow from each fuel tank to each engine.
   C. Four electric motor driven fuel boost pumps supply fuel at pressure to the engines. Each main boost pump mounts to the forward or rear spar of the center wing fuel tank. These four boost pumps draw fuel from the main fuel tanks. In addition, each main engine fuel feed subsystem has a boost pump bypass valve to allow suction feed to the engine should a boost pump fail.
   D. Two override boost pumps allow fuel feed from the center fuel tank. The pumps provide fuel to the respective left or right halves of the engine fuel feed manifold at a pressure higher than the main boost pumps. This allows the center tank fuel to be used before fuel is used from the main fuel tanks.
      (1) AIRPLANES WITH THE AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082)
      The fuel override pumps have an auto shutoff function. The auto shutoff function can be tested with the fuel test switches on the E2 rack in the main equipment center.
   E. Automatic sumping jet pumps scavenge water/contaminants from the fuel tank sump areas. The jet pumps, powered by motive flow from the main boost pumps, direct the scavenged discharge to the inlet of the boost pump. The scavenge is mixed with fuel and sent to the engine.
   F. A fuel scavenge ejector pump, powered by motive flow from the left forward boost pump, transfers fuel from the center tank sump area through a float valve and discharges the fuel into the left main tank. The float valve allows fuel to be discharged into the left main tank when the left main tank is less than half full.
   G. The fuel management module, on the pilot's overhead panel P5, contains the control and indication for the engine fuel feed system. The Engine Indication and Crew Alerting System (EICAS) (AMM 31-41-00/001) also supplies indication of engine fuel feed system malfunctions. The fuel control panel on the quadrant stand P10 also has indications of engine fuel shutoff valve (spar valve) malfunction.
   H. Three phase 115 vac, 400 Hertz electrical current powers the boost pumps. Twenty-eight vdc powers the valves and control circuits.
2. Component Details
   A. Engine Fuel Shutoff Valve (Spar Valve) (Fig. 2)
      (1) The engine fuel shutoff valve (spar valve) is a motor actuated butterfly type valve. An engine fuel shutoff valve (spar valve) actuator attaches to the rear spar of each main fuel tank. The valve body (within the fuel tank) connects to the actuator (outside the fuel tank) by an adapter shaft. Access to the valve body requires defueling.



NOTE: SINGLE CROSSFEED CONFIGURATION

Pressure Fueling System
Figure 1

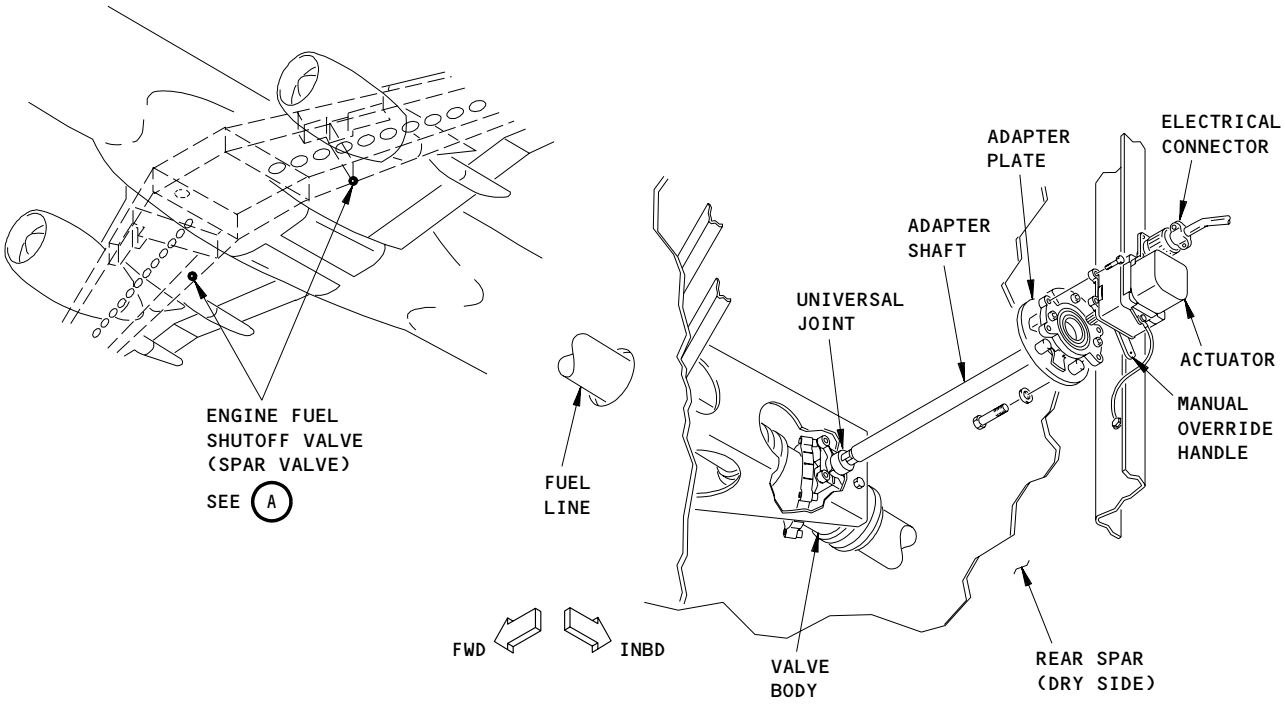
H44205



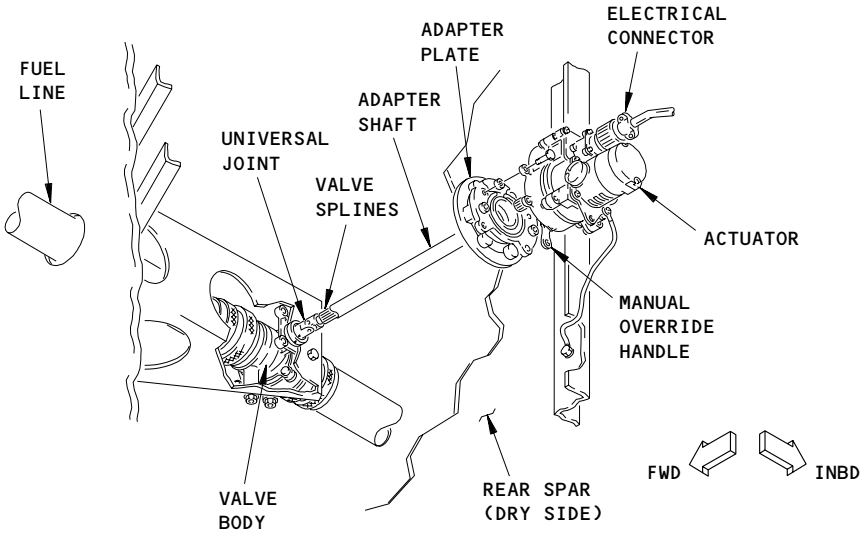
NOTE: DUAL CROSSFEED CONFIGURATION.

Pressure Fueling System
Figure 1A

H44194



ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)
A 1



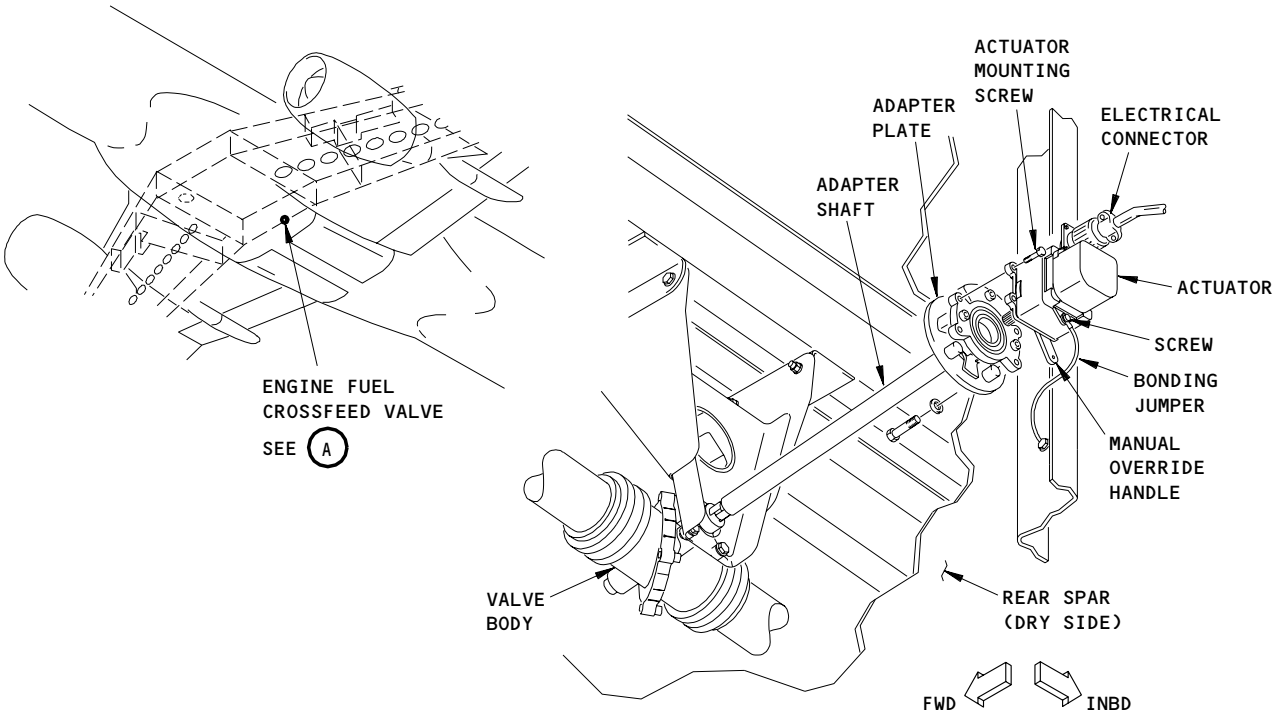
ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)
A 2

1 PREFERRED
2 ALTERNATE

Engine Fuel Shutoff Valve (Spar Valve)
Figure 2

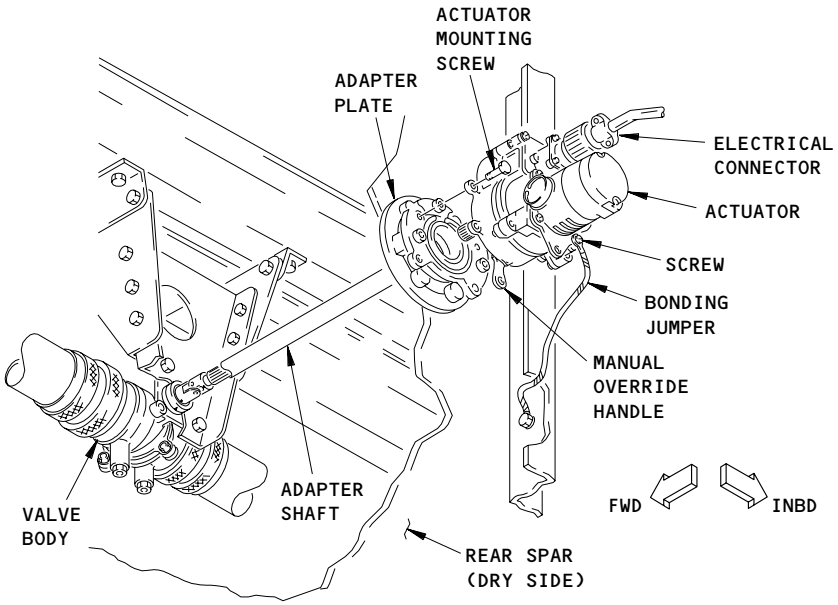
(2) The square (preferred) actuator, has a 28v dc permanent magnet motor, an electrical connector, "OPEN-CLOSED" limit switches, and a manual override handle. The manual override handle also shows the position of the engine fuel shutoff valve (spar valve).
(3) The round (alternate) actuator consists of a 28 vdc motor, an electrical connector, open-closed limit switches, and a manual override handle which also serves as a valve position indicator.
(4) The adapter shaft connects the actuator and the valve body. The adapter shaft consists of an adapter plate and a shaft with a universal joint. The adapter shaft has indexed splines at both ends. This ensures correct alignment between the actuator and the valve. Access to the adapter shaft requires defueling.
(5) The thermal relief valve on the valve body, cracks and reseats between 70 to 55 psig.
(6) Applying 28vdc power opens or closes the engine fuel shutoff valve (spar valve), depending upon the command. Upon reaching the open position, the butterfly plate contacts a stop pin to prevent over-travel. With the valve full OPEN, the open limit switch closes to deenergizing the actuator. Upon reaching the full CLOSED position, the butterfly plate contacts a stop pin to prevent over-travel. This closes the closed limit switch and deenergizes the actuator.
(7) The engine fuel shutoff valves (spar valves) permit or prevent fuel from flowing to the engines.

B. Engine Fuel Crossfeed Valve (Fig. 3, 3A)
(1) The engine fuel crossfeed valve(s) is (are) a motor actuated butterfly valve(s). The engine fuel crossfeed valve(s) mounts to the rear spar in the center wing fuel tank. The valve(s) body (within the fuel tank) attaches to the actuator (outside the fuel tank) by an adapter shaft. Access to the valve(s) body requires defueling.
(2) The square (preferred) actuator has a 28v dc permanent magnet motor, an electrical connector, "OPEN-CLOSED" limit switches, and a manual override handle. The manual override handle also shows the position of the engine fuel crossfeed valve.
(3) The round (alternate) actuator has a 28vdc motor, an electrical connector, open-closed limit switches, and a manual override handle which serves as a position indicator.
(4) The adapter shaft connects the actuator and the valve body. The adapter shaft consists of an adapter plate and a shaft with a universal joint. The adapter shaft has indexed splines in both ends. This ensures correct alignment of the actuator to the valve. Access to the adapter shaft requires defueling.
(5) The thermal relief valve on the valve body, cracks and reseats between 70 to 55 psig.



ENGINE FUEL CROSSFEED VALVE

A 1

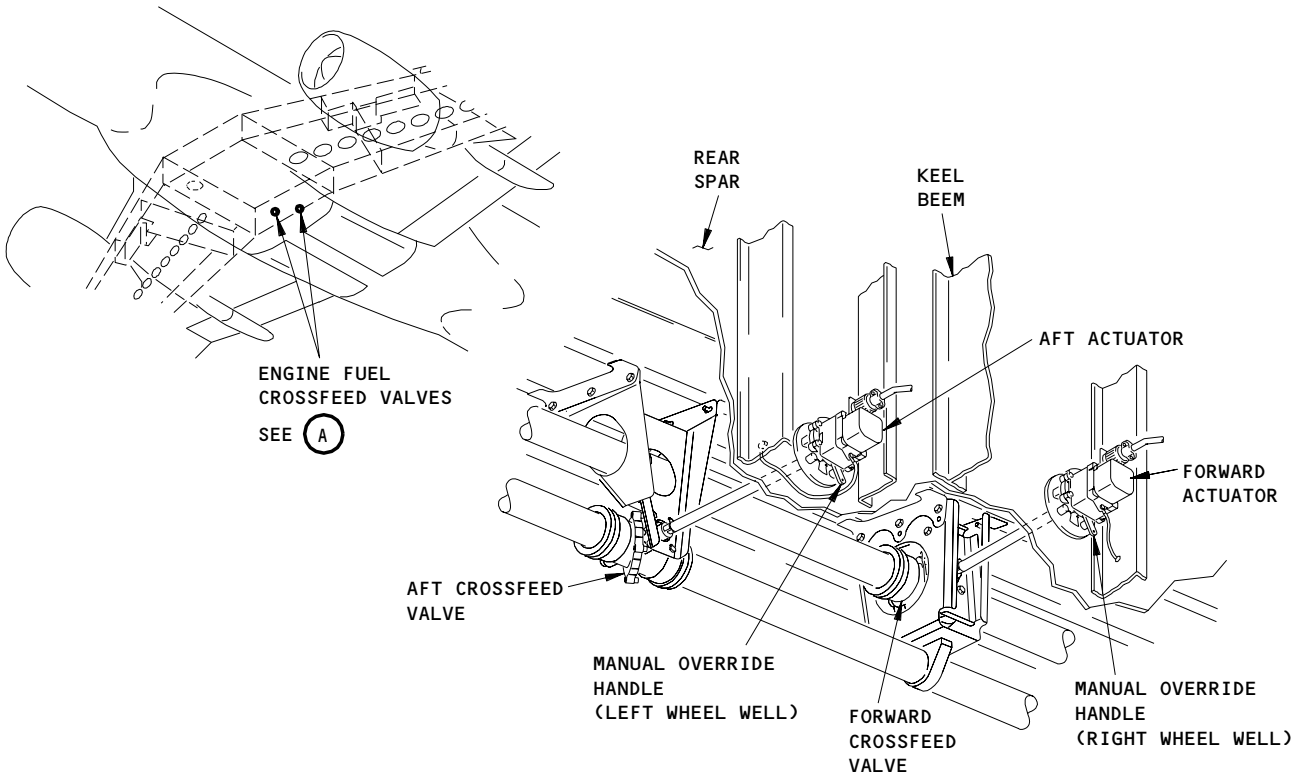


ENGINE FUEL CROSSFEED VALVE

A 2

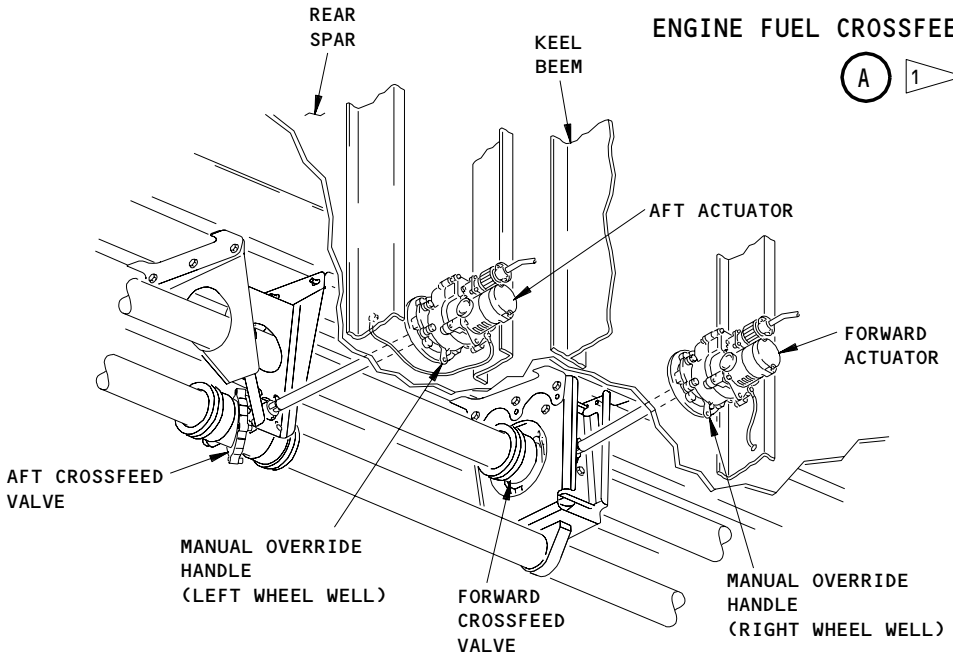
1 PREFERRED
2 ALTERNATE

Engine Fuel Crossfeed Valve
Figure 3



ENGINE FUEL CROSSFEED VALVES

A 1



ENGINE FUEL CROSSFEED VALVES

A 2

1 PREFERRED
2 ALTERNATE

Engine Fuel Crossfeed Valve
Figure 3A

(6) Applying 28vdc power opens or closes the valve, depending upon the command. Upon reaching the open position, the butterfly plate contacts a stop pin to prevent over-travel. With the valve full OPEN, the open limit switch closes to deenergizing the actuator. Upon reaching the full CLOSED position, the butterfly plate contacts a stop pin to prevent over-travel. This closes the closed limit switch and deenergizes the actuator.

(7) The valve isolates or connects the left and right fuel feed manifold sections allowing any fuel tank boost pump to pressure feed either engine.

C. Main Tank Fuel Boost Pump (Fig. 4)

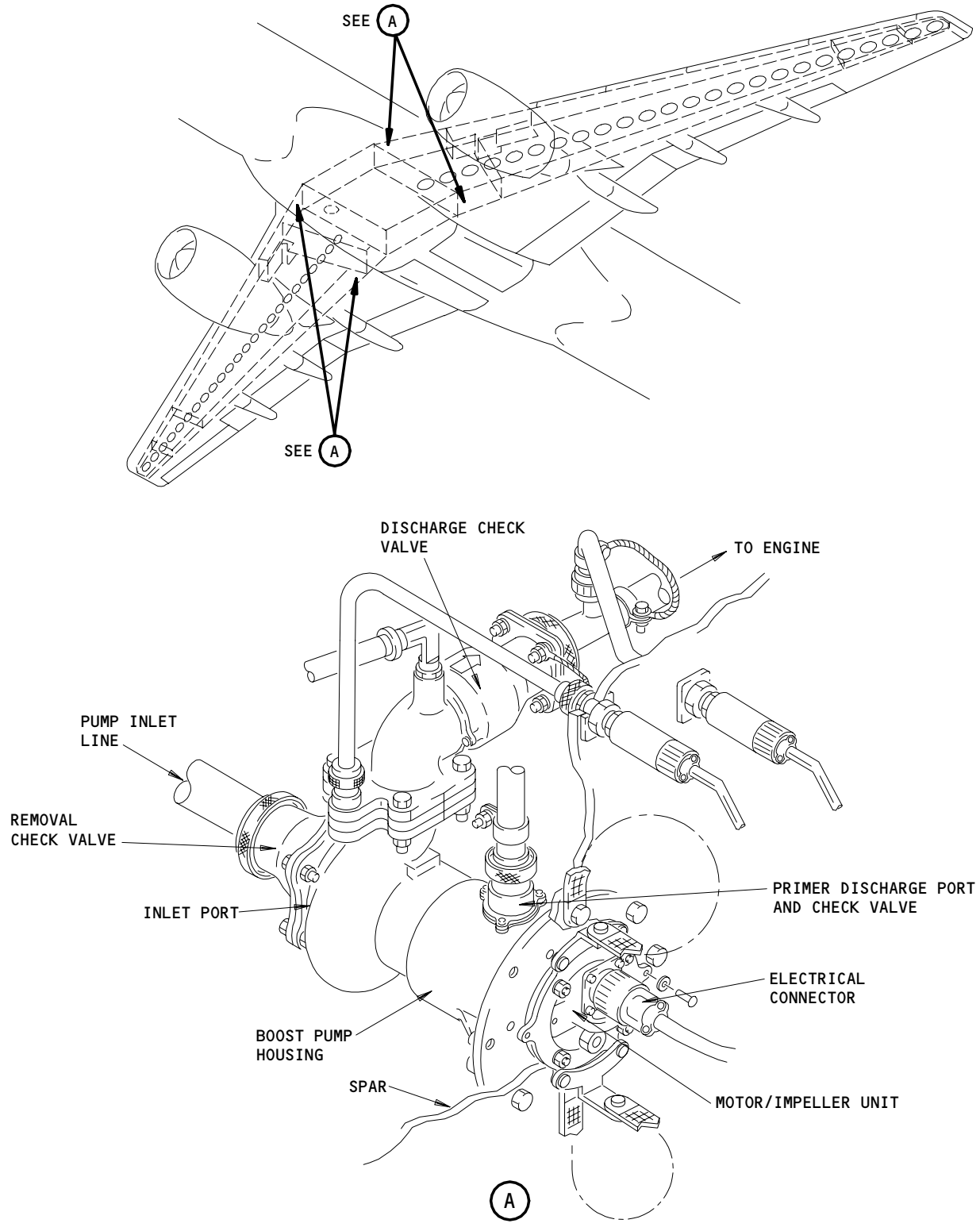
(1) Two main tank fuel boost pumps mount to the front and rear spars of the center wing fuel tank. Each pump consists of a motor/impeller unit installed within a housing. An inlet port, a discharge port, and a primer discharge port and check valve form part of the housing. A fuel boost pump discharge check valve mounts to the housing discharge port. A fuel boost pump removal check valve mounts to the housing inlet port. The removal check valve permits removal of the motor/impeller unit without defueling. The motor/impeller unit contains the motor, all electrical fittings, and the inlet and primer impellers mounted on a motor shaft.

(2) With the pump on and fuel available at the inlet port, the inlet impeller provides about 20,000 pounds of fuel per hour at 10 psi minimum. With the pump on and no fuel available at the inlet port, the primer impeller maintains reprime capabilities for up to 8 minutes and resumes pumping when fuel is again available. A thermal fuse in each winding of the 3 phase, AC motor protects the motor from overheating. The fuses open at 400°F.

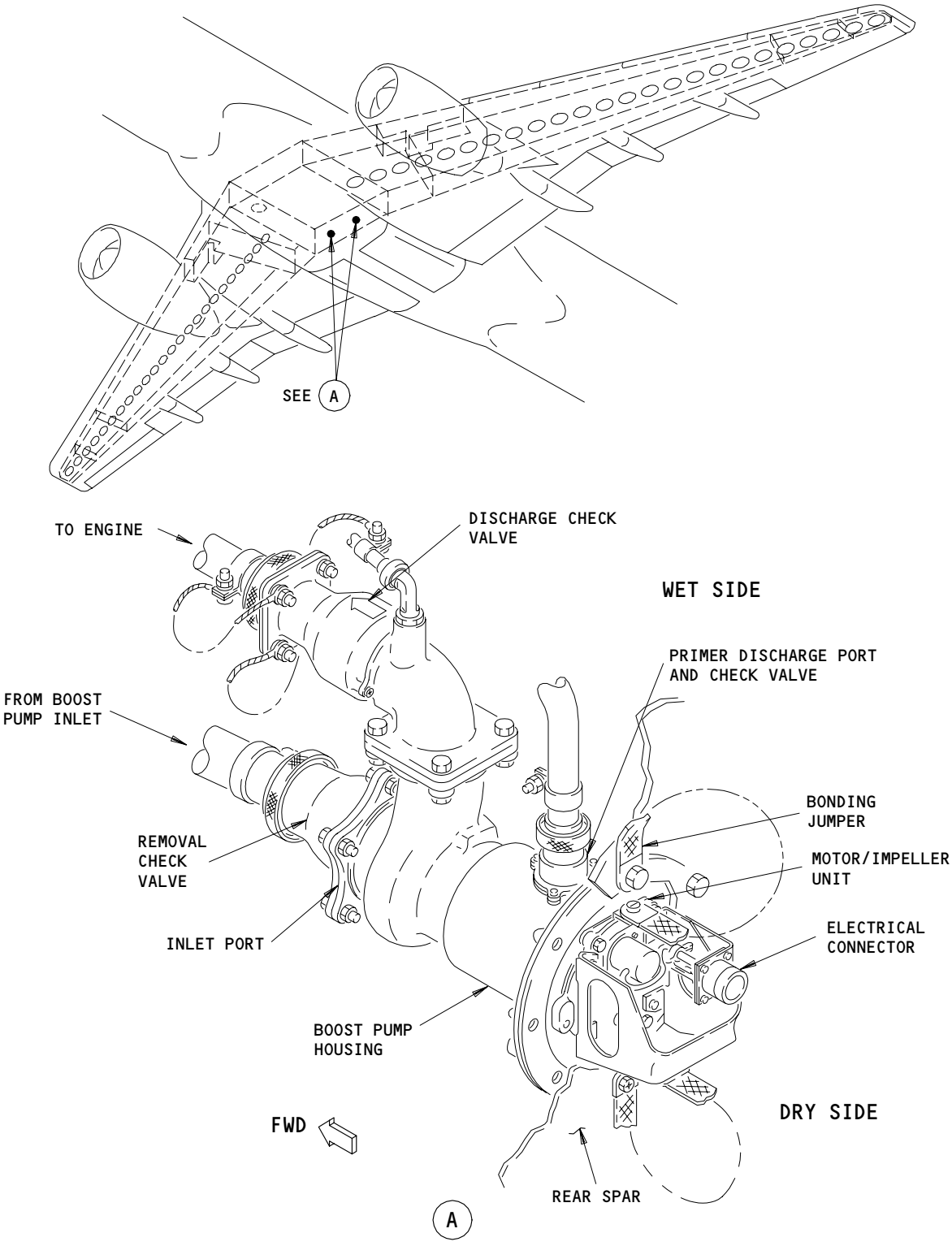
D. Center Tank Override Pump (Fig. 5)

(1) Two center tank override pumps mount to the rear spar of the center wing fuel tank. Each pump consists of a motor/impeller unit installed within a housing unit. An inlet port, a discharge port, and a primer discharge port and check valve form part of the housing. A fuel boost pump discharge check valve mounts to the housing discharge port. A fuel boost pump removal check valve mounts to the housing inlet port. With the fuel boost pump removal check valve in place, removal of the motor/impeller unit does not require defueling. The motor/impeller unit contains the motor, all electrical fittings, and the inducer and inlet impeller mounted on the motor shaft.

(2) With the pump on and fuel available at the inlet port, the inlet impeller provides about 28,000 pounds of fuel per hour at 27 psi minimum. With the pump on and no fuel available at the inlet port, the primer impeller maintains reprime capabilities up to 11 minutes and resumes pumping when fuel is again available. A thermal fuse in each winding of the 3 phase, AC motor protects the motor from overheating. The fuses open at 400°F.



Main Tank Fuel Boost Pump
Figure 4



Center Tank Override Pump
Figure 5

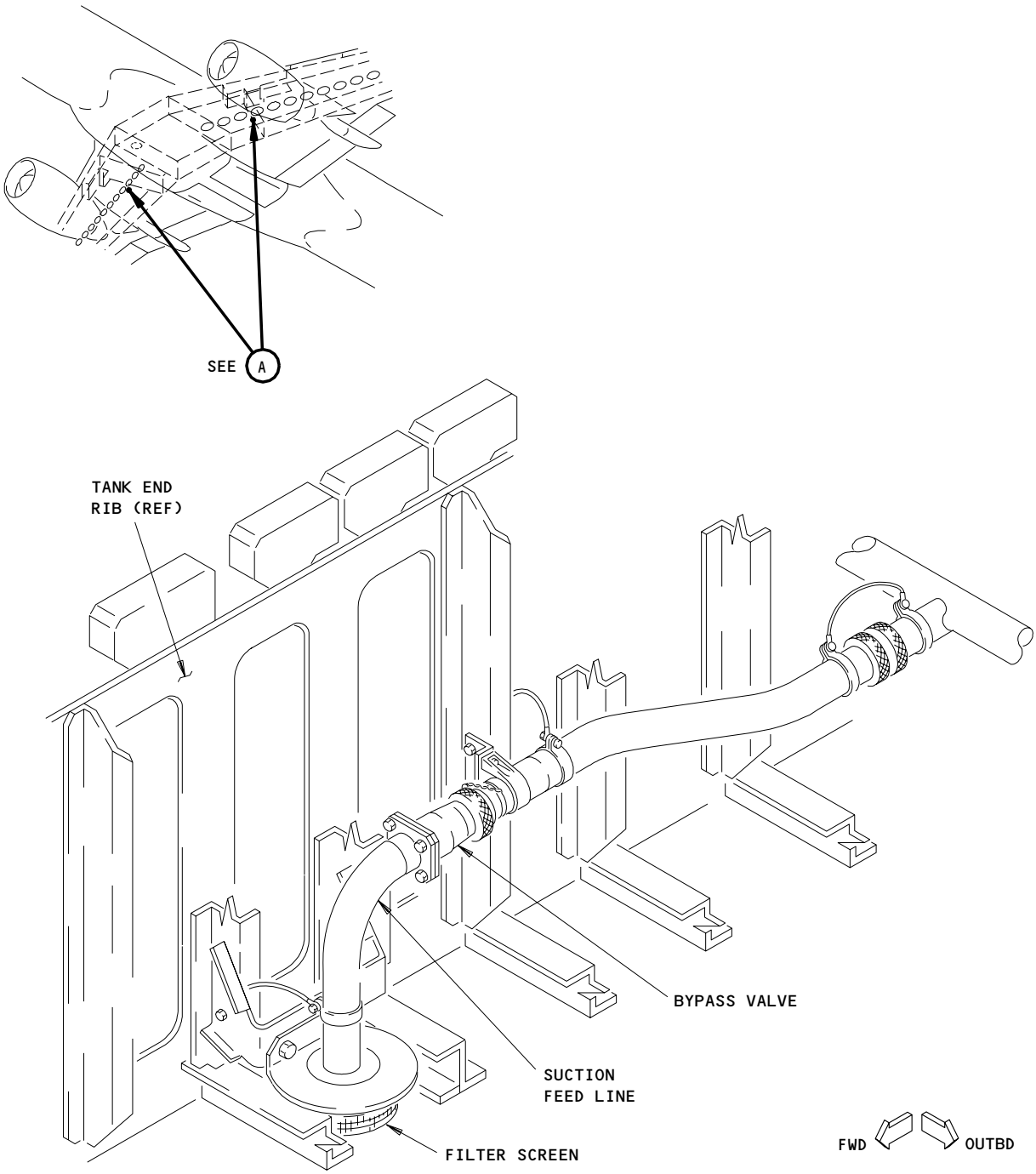
E. Fuel Boost Pump Discharge Check Valve
   (1) A fuel boost pump discharge check valve mounts to the discharge port of each main tank fuel boost pump and each center tank override pump. The check valve, a spring loaded closed flapper valve, allows normal fuel flow from the boost pump discharge to the engine and prevents reverse fuel flow through the pump.

F. Fuel Boost Pump Removal Check Valve
   (1) A fuel boost pump removal check valve mounts to the inlet port of each main tank fuel boost pump and each center tank override pump. The check valve, a spring loaded closed poppet valve, prevents fuel drainage through the boost pump housing when the motor/impeller unit is removed. Removal of the motor/impeller unit allows the spring to seal the poppet against the seat to close the fuel path. Reinstallation of the fuel boost pump forces the poppet open against the spring to open the fuel flow path.

G. Main Tank Fuel Boost Pump Bypass Valve (Fig. 6)
   (1) If the fuel boost pumps fail, the two bypass valves of the fuel boost pumps let suction fuel feed to the engines. The bypass valves contain a filter screen and a check valve body with a hinged flapper. One bypass valve connects to the engine fuel feed manifold for each engine.

H. Automatic Sumping Jet Pump (Fig. 7)
   (1) An automatic sumping jet pump at each aft fuel boost pump inlet, in the main fuel tanks, will scavenge water when the aft boost pump operates. An automatic sumping jet pump at each override pump inlet, in the center fuel tank, will scavenge water when the override pumps operate.
   (2) Each jet pump scavenges water from the low point of its respective fuel tank. The jet pump consists of a housing and a jet nozzle. The housing has three ports: a motive port, an induced port and a discharge port. The motive port connects to the boost pump primer discharge port. The induced port connects to an inlet screen sealed to the lower surface of the fuel tank. The discharge port is open to the boost pump inlet.
   (3) The operating boost pump pressurizes the motive port of the jet pump. Flow through the jet nozzle draws fuel and scavenged water through the inlet screen to the induced port and out through discharge port.

I. Fuel Scavenge System (Fig. 7A)
   (1) A fuel scavenge ejector pump in the center tank provides scavenging whenever the left main tank is below half full. The fuel scavenge system is controlled by a float operated shutoff valve in the left main tank that opens when the tank drops below half full.
   (2) The ejector pump consists of a housing with three ports: a motive port, an induced port, and a discharge port. The motive port connects to the left forward main boost pump primer discharge port. The induced port connects to an inlet screen sealed to the lower surface of the center fuel tank. The discharge port is connected by tubing to the float operated shutoff valve in the left main tank.



MAIN TANK FUEL BOOST PUMP BYPASS VALVE
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

A

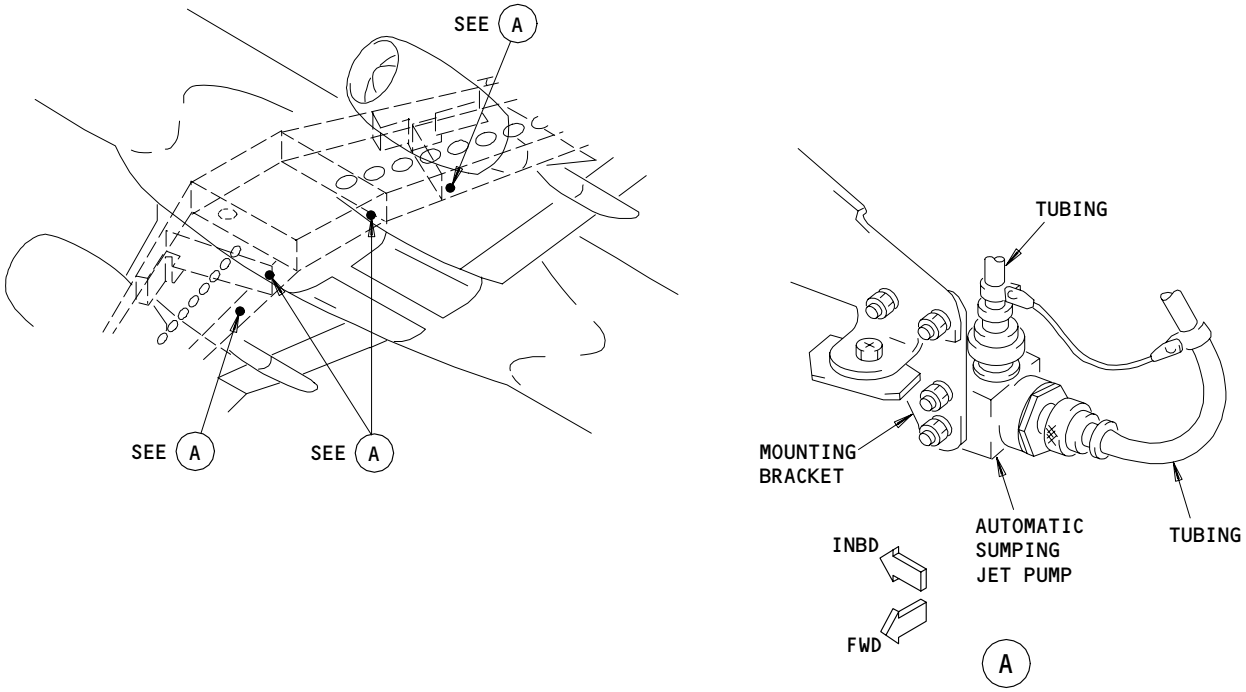
Main Tank Fuel Boost Pump Bypass Valve
Figure 6

(3) The float operated shutoff valve consists of a housing with an inlet port, discharge port, and a float. When the tank is more than half full, the float is raised to a position that closes the valve and prevents the scavenge system from operating. When the tank drops below half full, the float drops and lets the valve swing open allowing the scavenge system to discharge fuel into the left main tank.

3. Operation (Fig. 8 - Fig. 10)

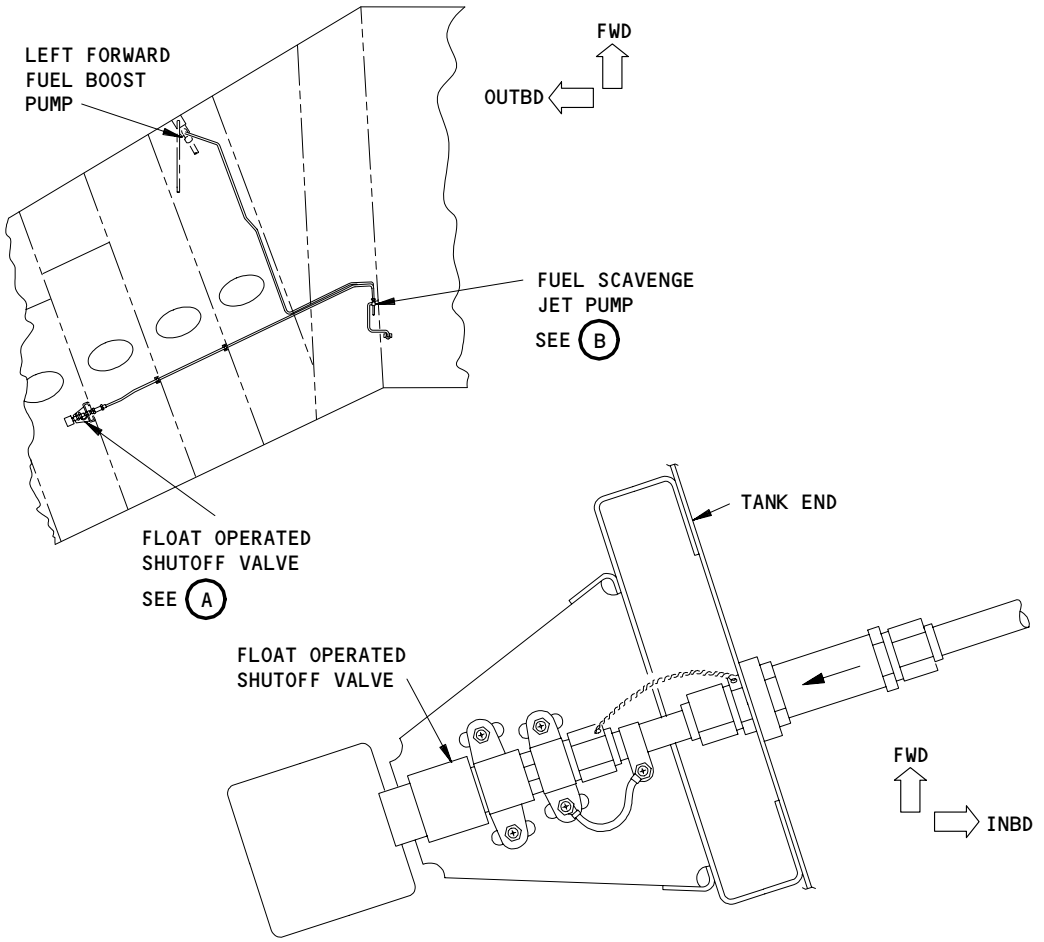
A. Functional Description

(1) The engine fuel feed system supplies fuel to each engine from the left or right fuel tanks. Normally the center wing fuel tank empties prior to the main fuel tanks. The right fuel override pump will supply fuel if both AC buses fail and the hydraulic motor generator comes on (airplanes with 8 KVA generator only). The engine fuel shutoff valves (spar valves) control fuel flow to each engine. The engine fuel crossfeed valve(s) allows any fuel tank to supply fuel to either engine.

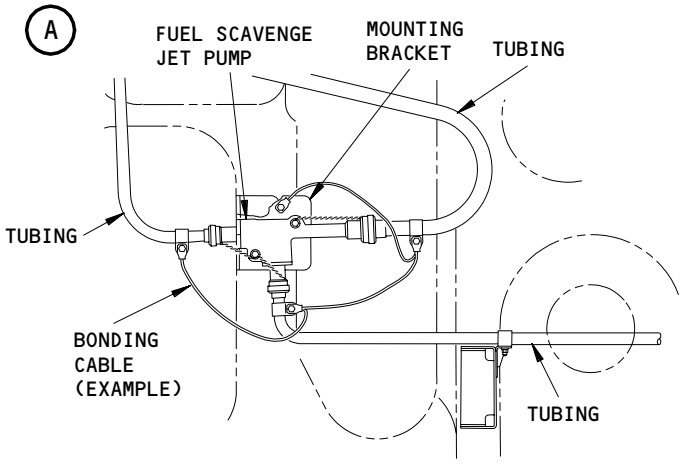


Automatic Sumping Jet Pump
Figure 7

188551



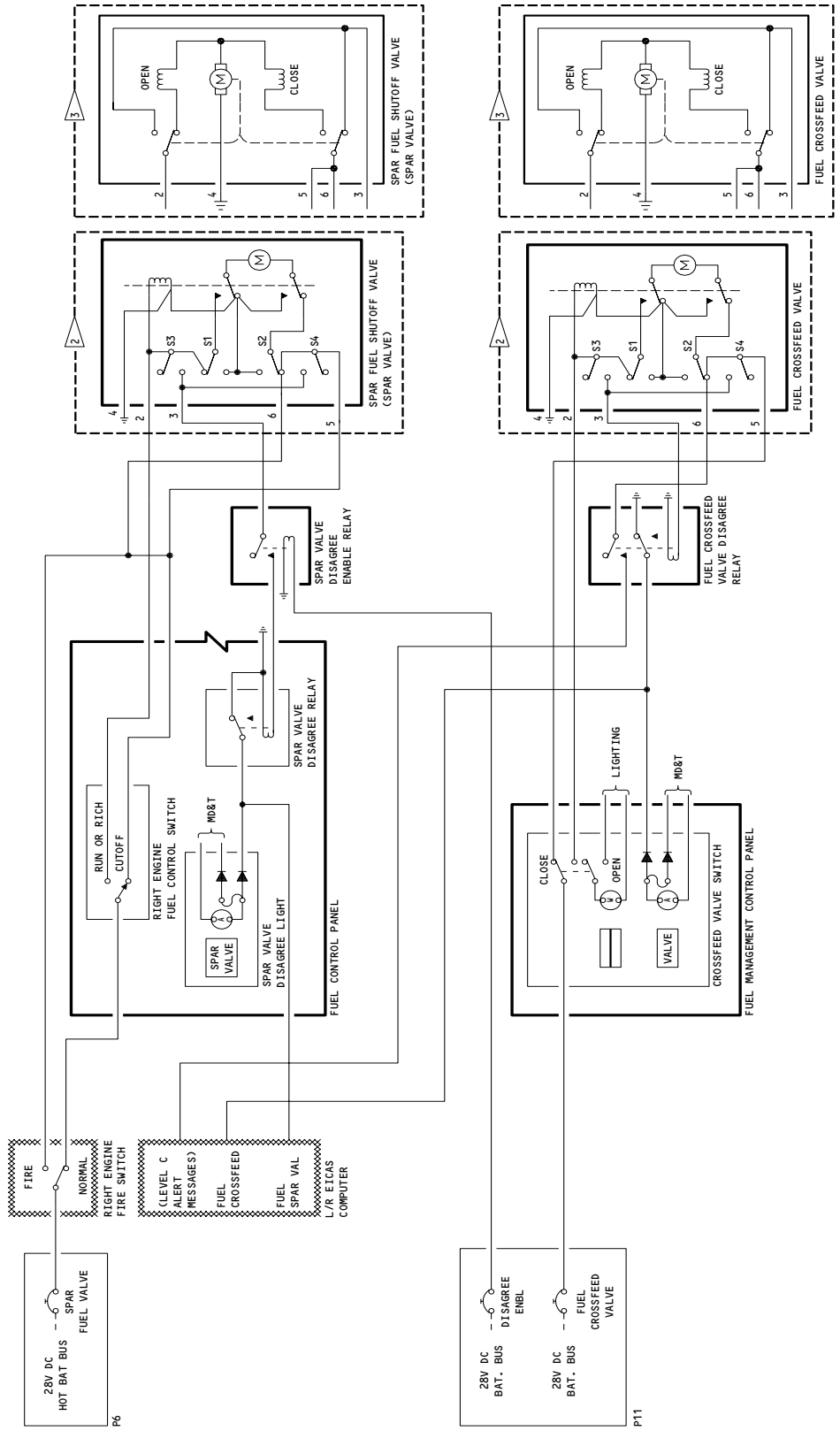
FLOAT OPERATED SHUTOFF VALVE INSTALLATION



FUEL SCAVENGE JET PUMP INSTALLATION

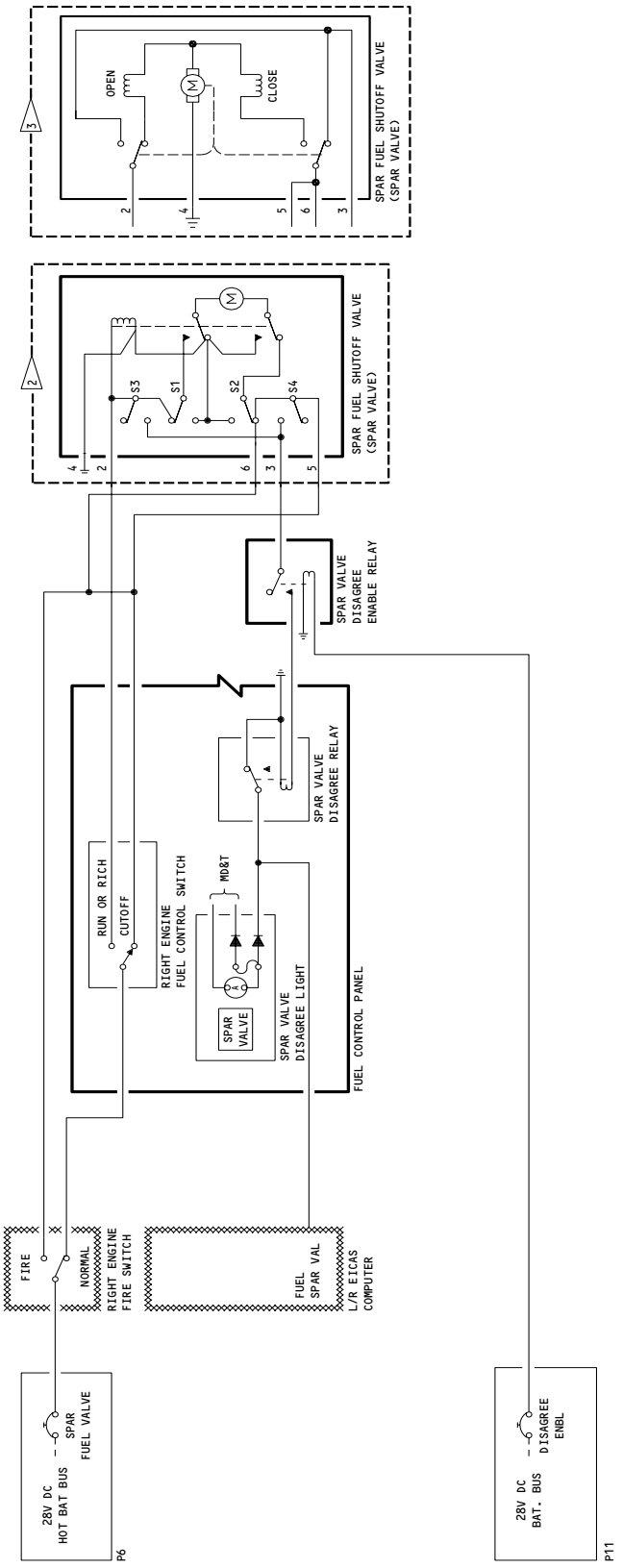
B

Fuel Scavenge System
Figure 7A



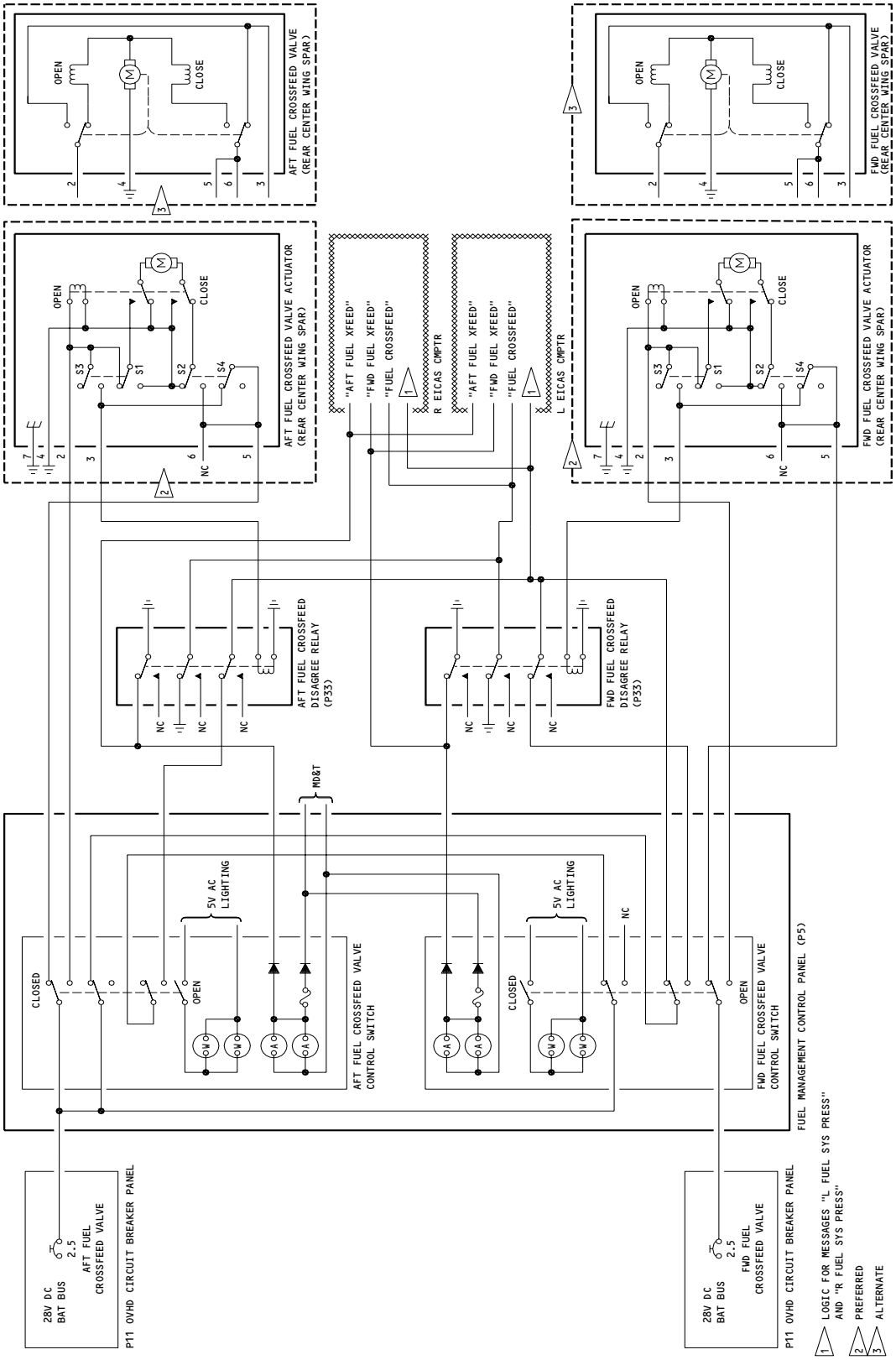
Engine Fuel Valve Control Schematic
Figure 8

832655



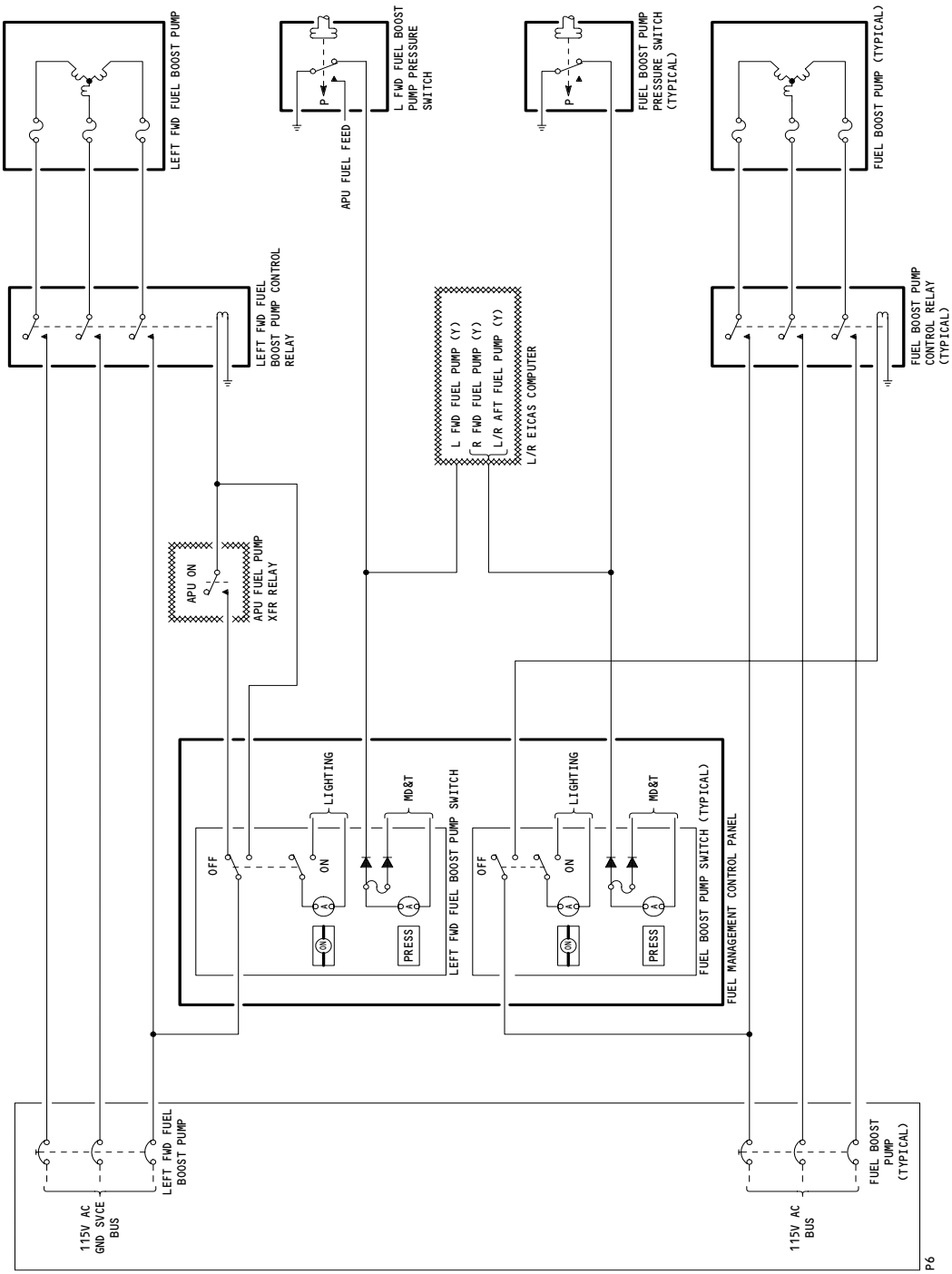
Engine Fuel Valve Control Schematic
Figure 8A

B20646

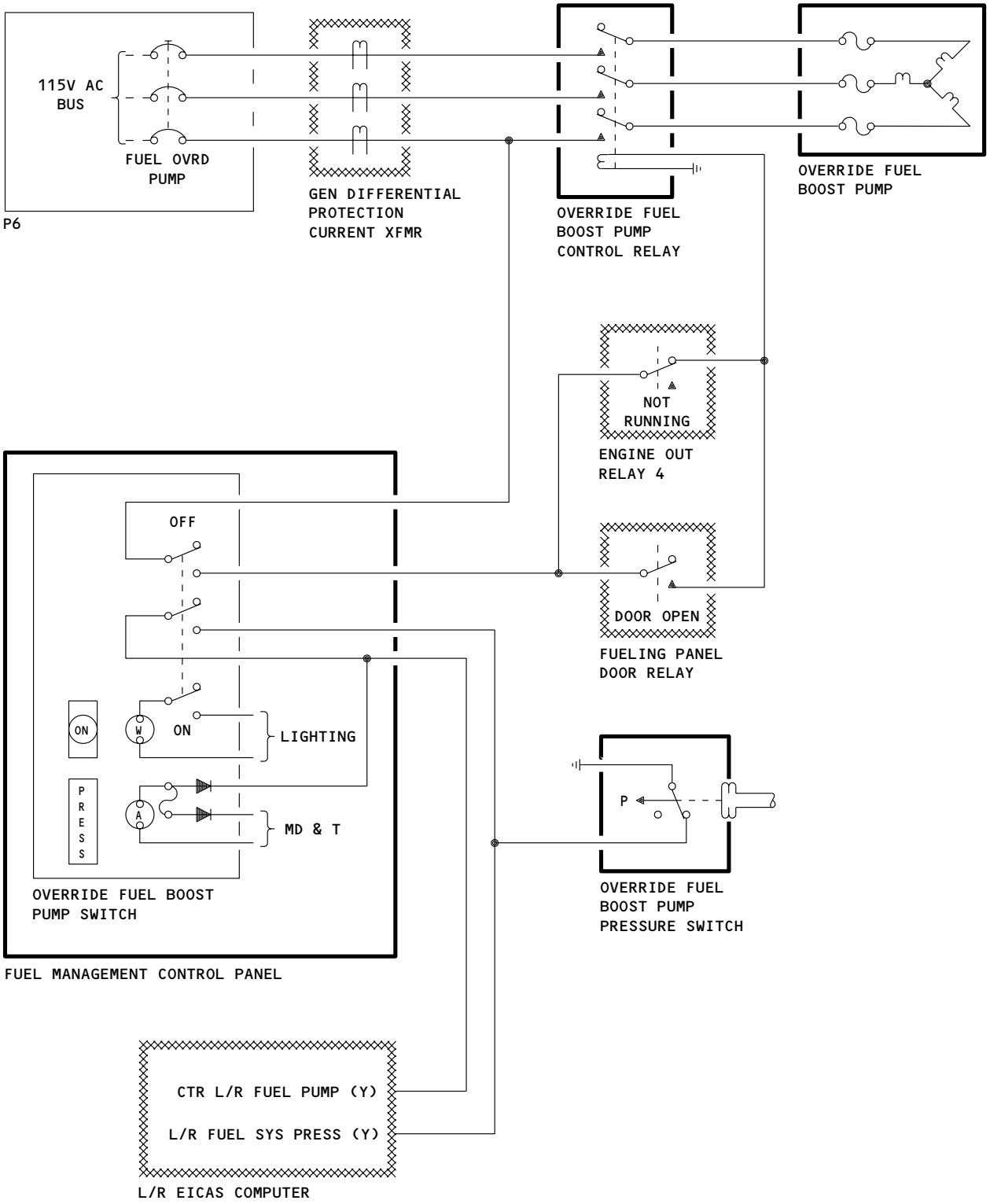


Fuel Crossfeed Valves
Figure 8B

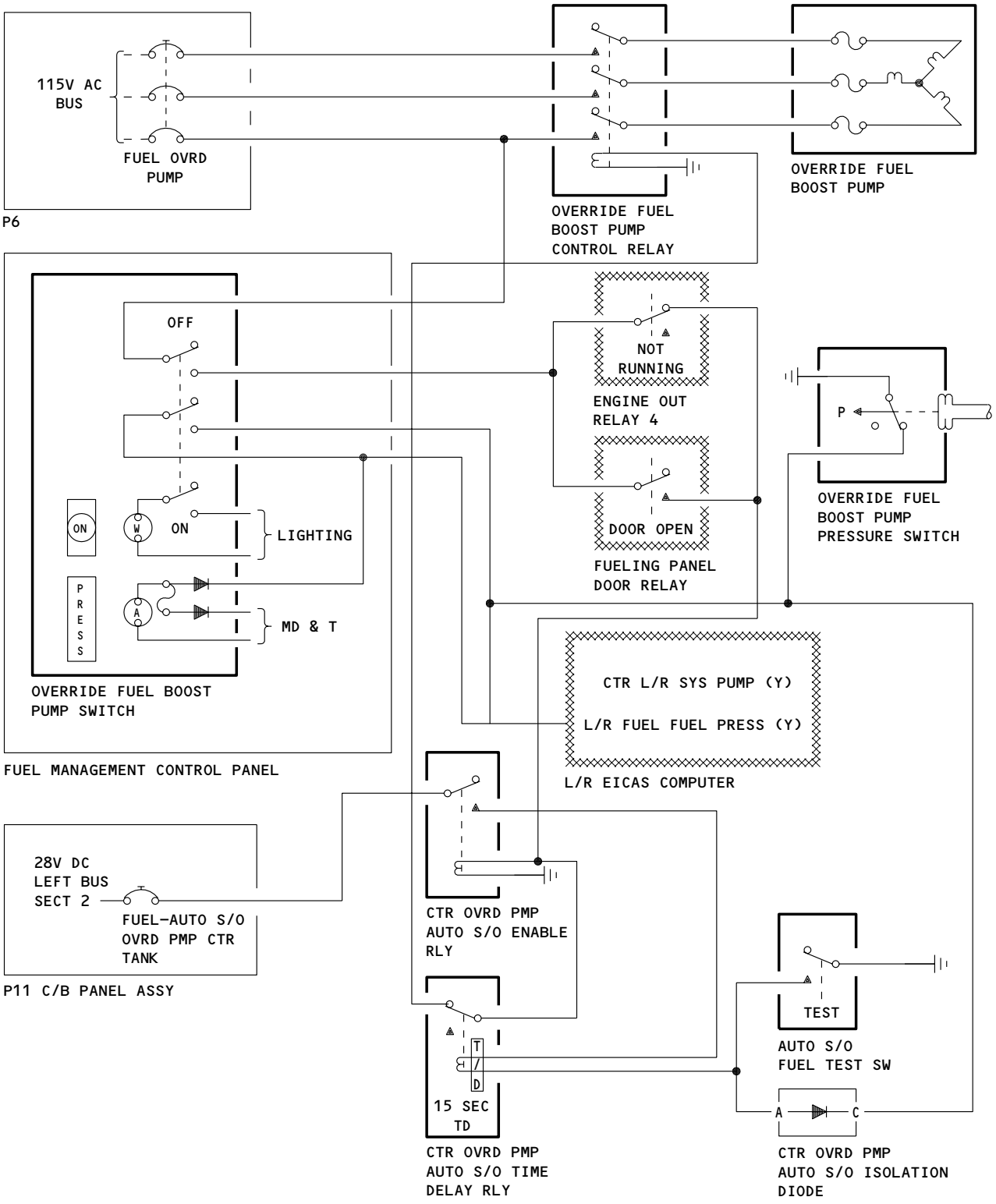
826643



Fuel Boost Pump Operation Schematic
Figure 9

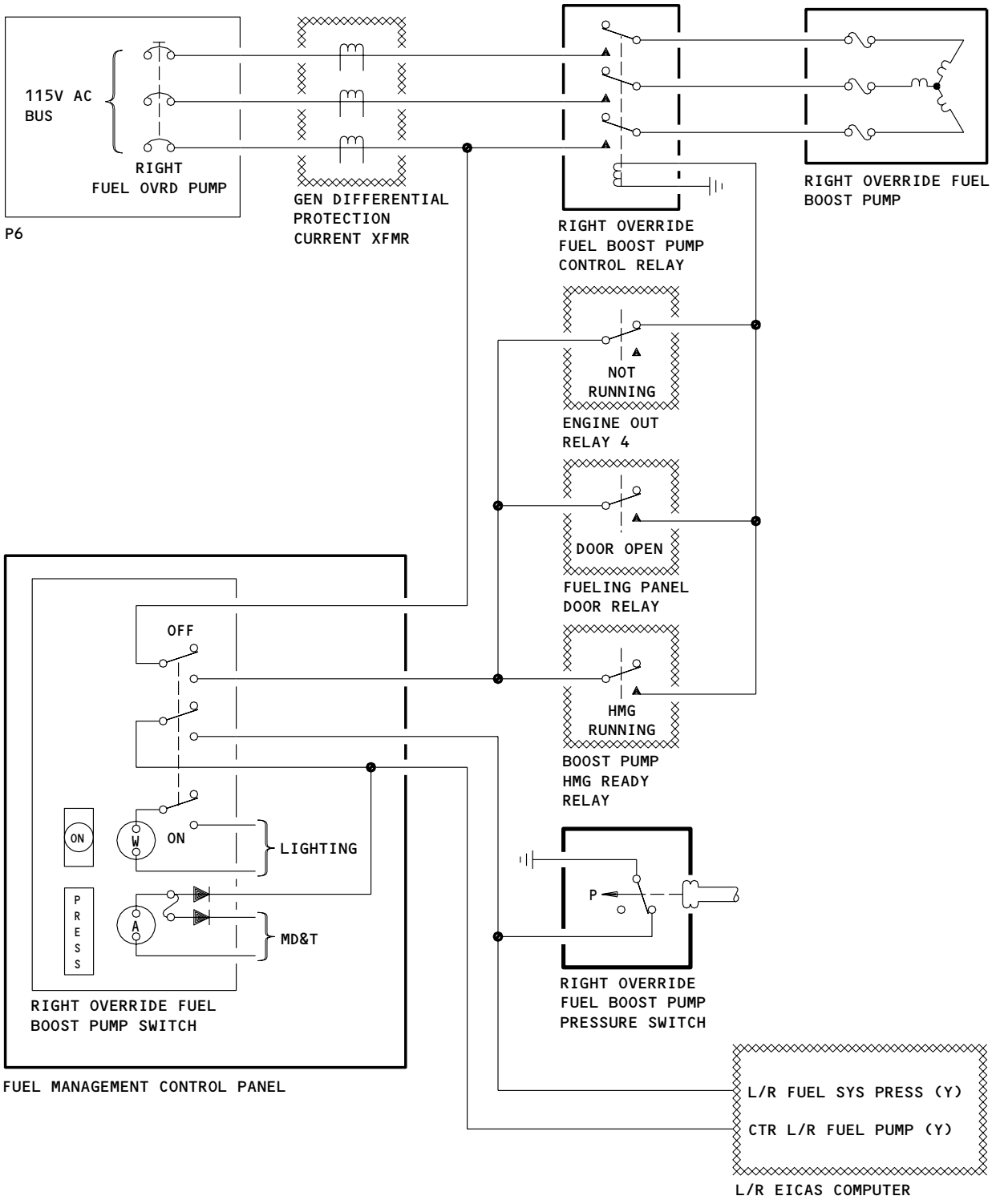


Override Fuel Boost Pump Operation Schematic
Figure 10 (Sheet 1)

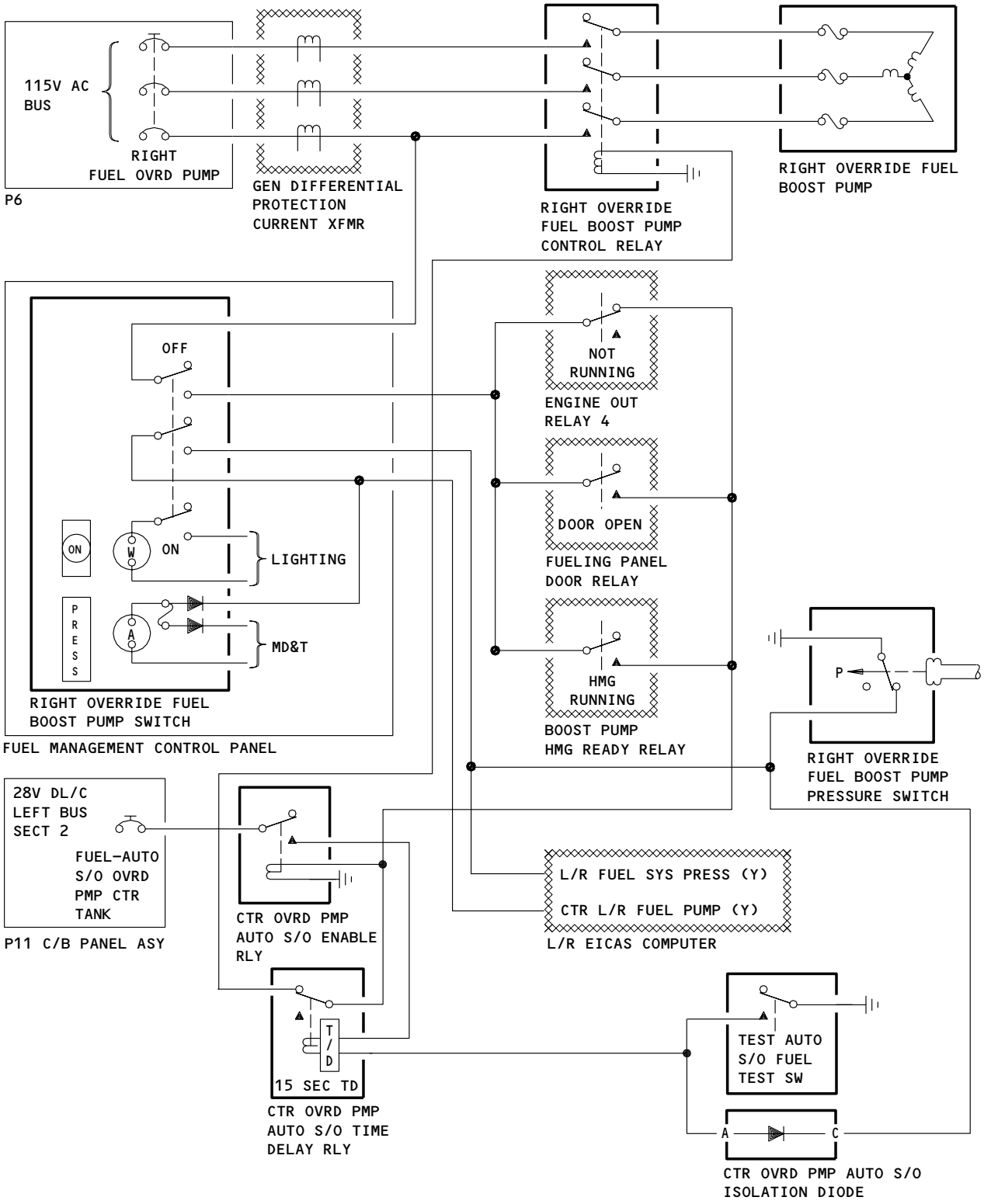


Override Fuel Boost Pump Operation Schematic
Figure 10 (Sheet 2)

497955



Override Fuel Boost Pump Operation Schematic
Figure 11 (Sheet 1)



Override Fuel Boost Pump Operation Schematic
Figure 11 (Sheet 2)

(2) Boost pump switchlights, on the pilot's overhead panel P5, control each boost pump through a control relay. Pressing the appropriate PUMP switchlight to ON energizes the corresponding control relay. The boost pump then receives 115 vac electrical power and begins to operate. The boost pump draws fuel from its fuel tank and pressure feeds the engine on the same side of the airplane unless the crossfeed valve is open. Each operating boost pump provides fuel flow through the motive port of the automatic sumping jet pump. Fuel flow through the motive port draws in fuel from the scavenge area and discharges it at the boost pump inlet.

(3) AIRPLANES WITH AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082)
The fuel override pumps have an auto shutoff function. The auto shutoff function will de-energize the applicable fuel override pump control relay after a time delay of 15 seconds when low fuel override pump pressure is detected. With the relay not energized, the fuel override pump no longer receives power.

(4) AIRPLANES POST-SB 28A0078 OR POST-SB 28A0079;
The fuel boost pumps and override pumps control relays have a ground fault interrupt (GFI) relay. The GFI relay will de-energize the applicable fuel pump if a ground fault is detected.

(5) Placing the engine fuel control switch, on the quadrant stand (P10), in the RICH or RUN position opens the corresponding engine fuel shutoff valve (spar valve). A SPAR VALVE disagreement light on the P10 panel provides indication of valve transition and failure. An EICAS level C advisory message L/R FUEL SPAR VALVE also provides indication of valve failure. The SPAR VALVE light remains on until the valve position agrees with its commanded position or until the valve fault disappears.

(6) Opening the engine fuel crossfeed valve(s) lets any fuel tank supply fuel to either engine. The crossfeed valve switchlight(s), on the overhead panel, P5, controls the crossfeed valve(s). Pushing the switchlight(s) to the open position commands the crossfeed valve(s) to open. A VALVE disagreement light on the P5 panel supplies indication of valve transition and failure. An EICAS level C advisory message FUEL CROSSFEED or FWD/AFT FUEL CROSSFEED also supplies indication of valve failure. The VALVE light stays on until the valve position agrees with its commanded position or until the valve fault does not show. For airplanes with FWD and AFT crossfeed valves the EICAS message XFEED IND can show if there is a interface failure with the EICAS computers.

(7) A boost pump bypass valve in each main fuel tank allows suction fuel feed to each engine if normal fuel feed is inhibited.

(8) The left forward fuel boost pump is also used for the APU fuel feed (AMM 28-25-00/001).

B. Control

(1) Make sure these circuit breakers are closed:

P6 Panel

R SPAR FUEL VALVE
L SPAR FUEL VALVE
LEFT FORWARD FUEL BOOST PUMP
LEFT AFT FUEL BOOST PUMP
RIGHT AFT FUEL BOOST PUMP
RIGHT FORWARD FUEL BOOST PUMP
R FUEL OVRD BOOST PUMP
L FUEL OVRD BOOST PUMP

P11 Panel

R DISAGREE ENBL
L DISAGREE ENBL
FUEL CROSSFEED (if installed)
FWD FUEL CROSSFEED (if installed)
AFT FUEL CROSSFEED (if installed)
XFEED IND
FUEL-AUTO S/O OVRD PMP CTR TANK L (if installed)
FUEL-AUTO S/O OVRD PMP CTR TANK R (if installed)

(2) Provide electrical power (AMM 24-22-00/201).
(3) Place engine fuel control switch in RUN position (P10).
(4) Press applicable BOOST PUMP switchlight on P5 panel to ON. Check the ON flow bar comes on.
(5) To provide crossfeed fueling:
    (a) Push CROSSFEED VALVE switchlight(s) to the open position. Make sure the switchlight(s) top flow bar light comes on.

ENGINE FUEL-FEED SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR - ENGINE FUEL CROSSFEED VALVE, V24	3	1	MAIN LANDING GEAR DOOR	28-22-12
ACTUATOR - ENGINE FUEL SHUTOFF VALVE (SPAR VALVE)	2	2	551BB, 651BB	28-22-11
CIRCUIT BREAKERS -			FLT COMPT, P6	
L AFT FUEL BOOST PUMP, C366		1	6H14	*
L FWD FUEL BOOST PUMP, C372		1	6H23	*
L FUEL OVRD PUMP, C369		1	6F14	*
L SPAR FUEL VALVE, C1061		1	6E1	*
R AFT FUEL BOOST PUMP, C371		1	6H20	*
R FWD FUEL BOOST PUMP, C368		1	6H17	*
R FUEL OVRD PUMP, C370		1	6F20	*
R SPAR FUEL VALVE, C1062		1	6E2	*
CIRCUIT BREAKERS -			FLT COMPT, P11	
FUEL - AUTO S/O OVRD PMP CTR TANK L, C4679 1>		1	11L13	*
FUEL - AUTO S/O OVRD PMP CTR TANK R, C4680 1>		1	11L25	*
FUEL CROSSFEED, C1051		1	11D36	*
L DISAGREE ENBL, C4133		1	11D33	*
R DISAGREE ENBL, C4132		1	11D34	*
LINE - FUEL AND FITTINGS		--	FUEL TANKS	28-22-07
PUMP - AUTOMATIC SUMPING JET	4	4	134AZ, 541AB, 641AB	28-22-06
PUMP - FUEL OVERRIDE	5	2	134AZ	28-22-05
PUMP - SCAVENGE EJECTOR	4	1	531AB	28-22-13
PUMP - FUEL BOOST	5	4	531AB, 631AB	28-22-03
RELAYS - (FIM 31-01-33/101)				
FUEL PANEL DOOR, K179				
FUEL QTY POWER TRANSFER, K356				
L AFT FUEL BOOST PUMP CONTROL, K187				
L CTR OVRD PMP AUTO S/O ENABLE, K10873 1>				
L CTR OVRD PMP AUTO S/O TIME DELAY, K10872 1>				
L OVERRIDE FUEL BOOST PUMP CONTROL, K10011				
L SECONDARY OVRD FUEL BOOST PUMP CONTROL, K10875 2>				
L SPAR VALVE DISAGREE ENBL, K10111				
R FWD FUEL BOOST PUMP CONTROL, K190				
R SPAR VALVE DISAGREE ENBL, K10110				
FUEL CROSSFEED VALVE DISAGREE, K10094				
RELAYS - (FIM 31-01-37/101)				
L FWD FUEL BOOST PUMP CONTROL, K188				
R AFT FUEL BOOST PUMP CONTROL, K189				
R CTR OVRD PMP AUTO S/O ENABLE, K10870 1>				
R CTR OVRD PMP AUTO S/O TIME DELAY, K10871 1>				
R OVERRIDE FUEL BOOST PUMP CONTROL, K10012				
R SECONDARY OVERRIDE FUEL BOOST PUMP CONTROL, K10874 2>				

* SEE THE WDM EQUIPMENT LIST

1> AIRPLANES WITH OVERRIDE PUMP AUTO SHUTOFF (POST-SB 28A0081 OR POST-SB 28A0082)

2> AIRPLANES WITH SECONDARY OVERRIDE FUEL BOOST PUMP CONTROL RELAYS (POST-SB 28A0105)

Engine Fuel-Feed System - Component Index
Figure 101 (Sheet 1)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SWITCH – L AUTO S/O FUEL TEST, S10712 1		1	119BL, MAIN EQUIP CTR, E2	*
SWITCH – R AUTO S/O FUEL TEST, S10711 1		1	119BL, MAIN EQUIP CTR, E2	*
VALVE – ENGINE FUEL CROSSFEED, V24	3	1	134AZ	28-22-02
VALVE – ENGINE FUEL SHUTOFF (SPAR VALVE)	2	2	541AB, 641AB	28-22-01
VALVE – FLOAT-OPERATED SHUTOFF	4	1	541AB	28-22-10
VALVE – DISCHARGE CHECK	3	6	531AB, 631AB, 134AZ	28-22-09
VALVE – REMOVAL CHECK	3	6	531AB, 631AB, 134AZ	28-22-08
VALVE – FUEL BOOST PUMP BYPASS	4	2	541AB, 641AB	28-22-04

* SEE THE WDM EQUIPMENT LIST

Engine Fuel-Feed System – Component Index
Figure 101 (Sheet 2)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR – AFT ENGINE FUEL CROSSFEED VALVE, V10139	3	1	LEFT, MAIN LANDING GEAR DOOR	28-22-12
ACTUATOR – ENGINE FUEL SHUTOFF VALVE (SPAR VALVE)	2	2	551BB, 651BB	28-22-11
ACTUATOR – FWD ENGINE FUEL CROSSFEED VALVE, V10138	3	1	RIGHT, MAIN LANDING GEAR DOOR	28-22-12
CIRCUIT BREAKER –			FLT COMPT, P6	
L AFT FUEL BOOST PUMP, C366		1	6H14	*
L FWD FUEL BOOST PUMP, C372		1	6H23	*
L FUEL OVRD PUMP, C369		1	6F14	*
L SPAR FUEL VALVE, C1061		1	6E1	*
R AFT FUEL BOOST PUMP, C371		1	6H20	*
R FWD FUEL BOOST PUMP, C368		1	6H17	*
R FUEL OVRD PUMP, C370		1	6F20	*
R SPAR FUEL VALVE, C1062		1	6E2	*
CIRCUIT BREAKER –			FLT COMPT, P11	
AFT FUEL CROSSFEED, C4477		1	11D25	*
FUEL – AUTO S/O OVRD PMP CTR TANK L, C4679 [1]		1	11L13	*
FUEL – AUTO S/O OVRD PMP CTR TANK R, C4680 [1]		1	11L25	*
FUEL XFEED IND, C4485		1	11D36	
FWD FUEL CROSSFEED, C4476		1	11D24	*
L DISAGREE ENBL, C4133		1	11D33	*
R DISAGREE ENBL, C4132		1	11D34	*
LINE – FUEL AND FITTINGS		--	FUEL TANKS	28-22-07
PUMP – AUTOMATIC SUMPING JET	4	4	134AZ, 541AB, 641AB	28-22-06
PUMP – FUEL BOOST	5	4	531AB, 631AB	28-22-03
PUMP – FUEL OVERRIDE	5	2	134AZ	28-22-05
PUMP – SCAVENGE EJECTOR	4	1	531AB	28-22-13
RELAY – (FIM 31-01-33/101)				
AFT FUEL CROSSFEED VALVE DISAGREE, K10714				
FUEL PANEL DOOR, K179				
FUEL QTY POWER TRANSFER, K356				
FWD FUEL CROSSFEED VALVE DISAGREE, K10715				
L AFT FUEL BOOST PUMP CONTROL, K187				
L CTR OVRD PMP AUTO S/O ENABLE, K10873 [1]				
L CTR OVRD PMP AUTO S/O TIME DELAY, K10872 [1]				
L OVERRIDE FUEL BOOST PUMP CONTROL, K10011				
L SECONDARY OVRD FUEL BOOST PUMP CONTROL, K10875 [2]				
L SPAR VALVE DISAGREE ENBL, K10111				
R FWD FUEL BOOST PUMP CONTROL, K190				
R SPAR VALVE DISAGREE ENBL, K10110				

* SEE THE WDM EQUIPMENT LIST

[1] AIRPLANES WITH OVERRIDE PUMP AUTO SHUTOFF (POST-SB 28A0081 OR POST-SB 28A0082)

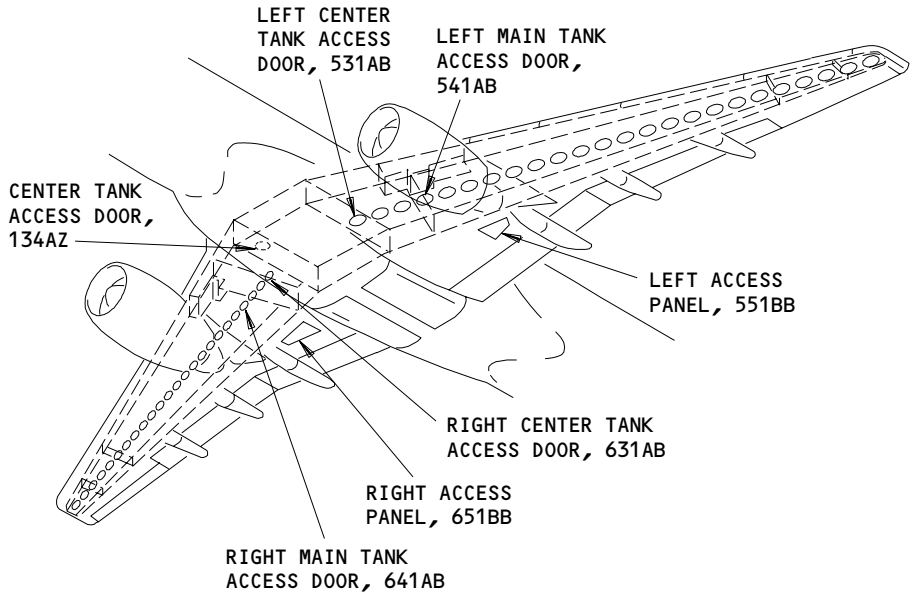
[2] AIRPLANES WITH SECONDARY OVERRIDE FUEL BOOST PUMP CONTROL RELAYS (POST-SB 28A0105)

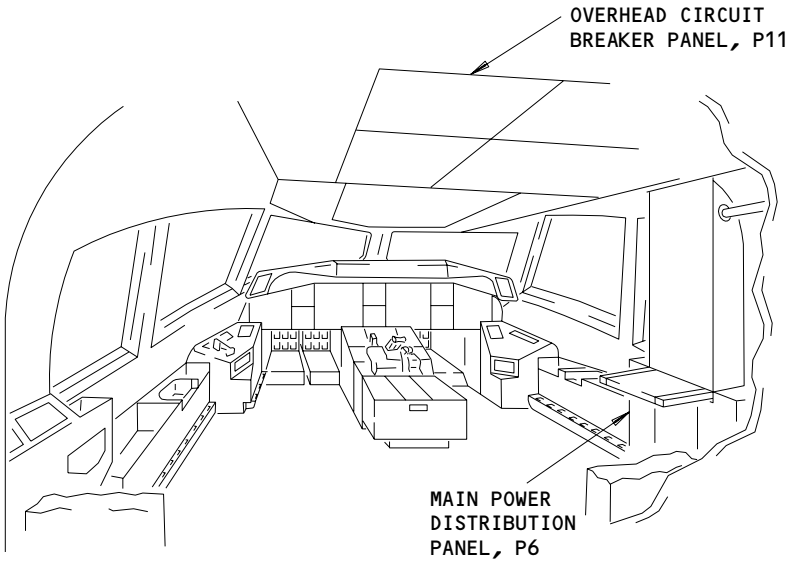
Engine Fuel-Feed System – Component Index
Figure 101 (Sheet 3)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
RELAY - (FIM 31-01-37/101)				
L FWD FUEL BOOST PUMP CONTROL, K188				
R AFT FUEL BOOST PUMP CONTROL, K189				
R CTR OVRD PMP AUTO S/O ENABLE, K10870 [1]				
R CTR OVRD PMP AUTO S/O TIME DELAY, K10871 [1]				
R OVERRIDE FUEL BOOST PUMP CONTROL, K10012				
R SECONDARY OVRD FUEL BOOST PUMP CONTROL, K10874 [2]				
SWITCH - L AUTO S/O FUEL TEST, S10712 [1]		1	119BL, MAIN EQUIP CTR, E2	*
SWITCH - R AUTO S/O FUEL TEST, S10711 [1]		1	119BL, MAIN EQUIP CTR, E2	*
VALVE - AFT ENGINE FUEL CROSSFEED, V10139	3	1	134AZ	28-22-02
VALVE - DISCHARGE CHECK	3	6	531AB, 631AB, 134AZ	28-22-09
VALVE - ENGINE FUEL SHUTOFF (SPAR VALVE)	2	2	541AB, 641AB	28-22-01
VALVE - FLOAT-OPERATED SHUTOFF	4	1	541AB	28-22-10
VALVE - FUEL BOOST PUMP BYPASS	4	2	541AB, 641AB	28-22-04
VALVE - FWD ENGINE FUEL CROSSFEED, V10138	3	1	134AZ	28-22-02
VALVE - REMOVAL CHECK	3	6	531AB, 631AB, 134AZ	28-22-08

* SEE THE WDM EQUIPMENT LIST

Engine Fuel-Feed System - Component Index
Figure 101 (Sheet 4)

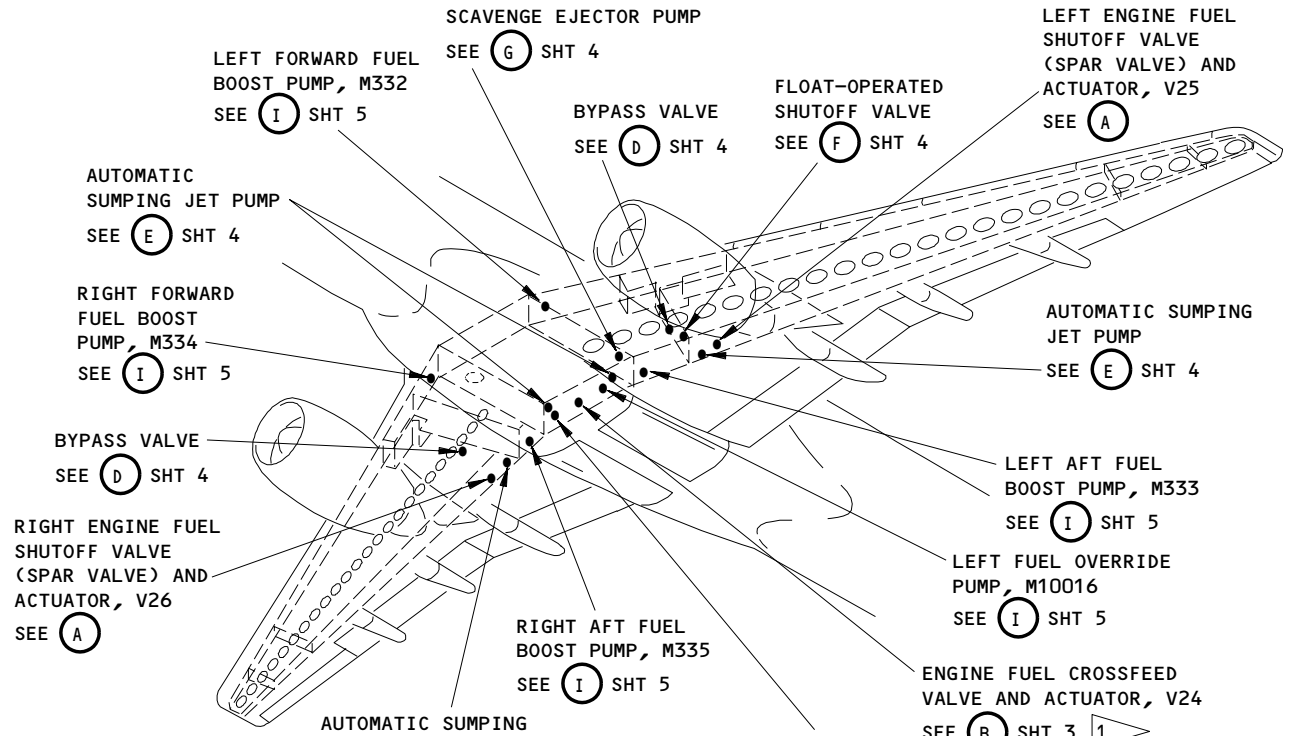


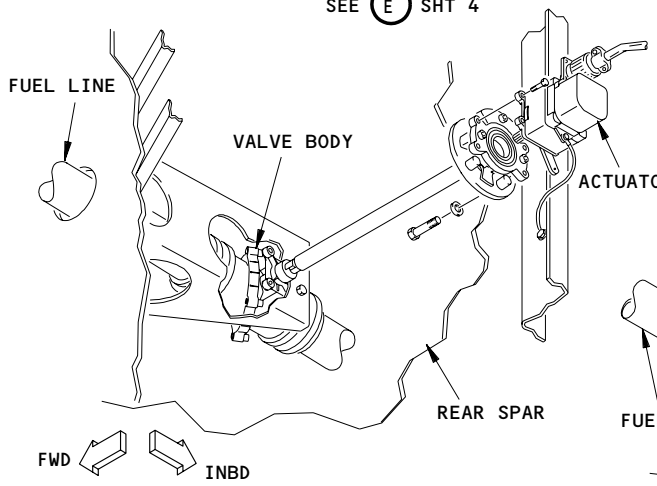


FLIGHT COMPARTMENT

Engine Fuel-Feed System - Component Location
Figure 102 (Sheet 1)

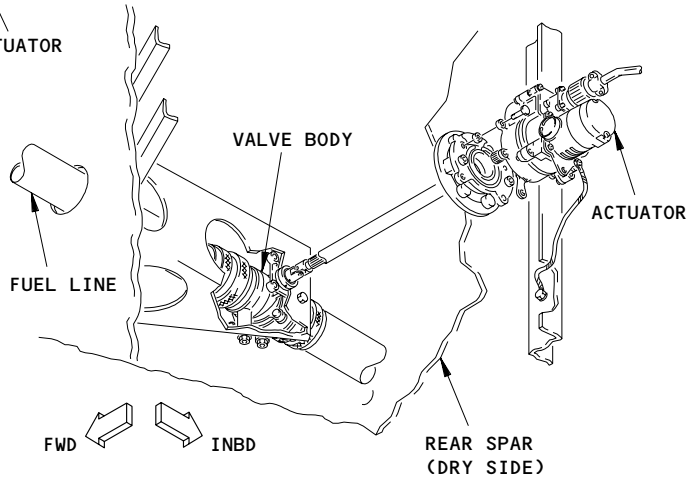
55684





ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) AND ACTUATOR

(A) 3



ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) AND ACTUATOR

(A) 4

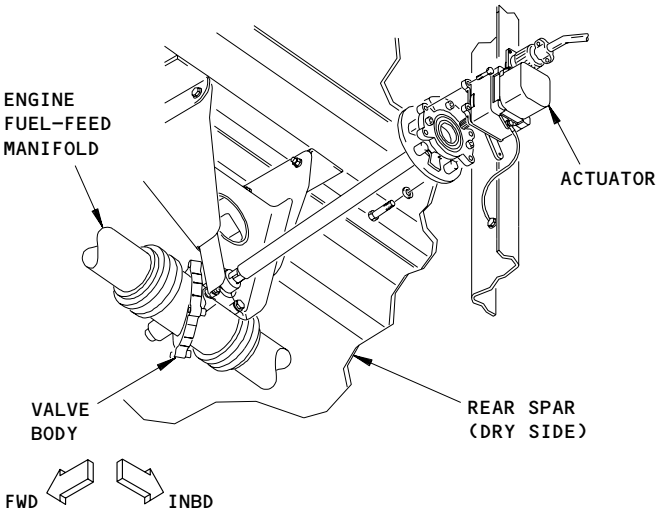
1 GUI 001-008 PRE-SB 28-29

2 GUI 001-008 POST-SB 28-29; GUI 009-999

3 PREFERRED

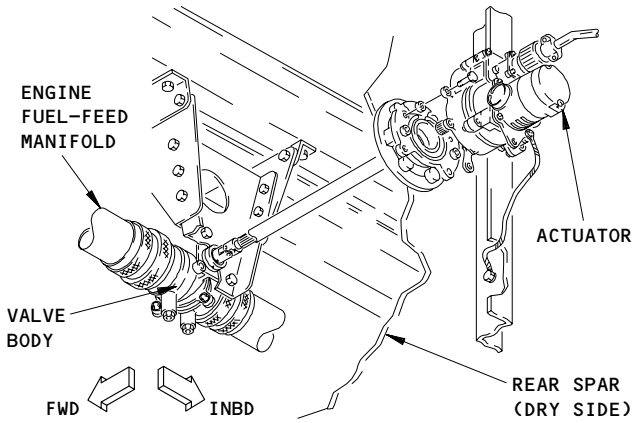
4 ALTERNATE

Engine Fuel-Feed System - Component Location
Figure 102 (Sheet 2)



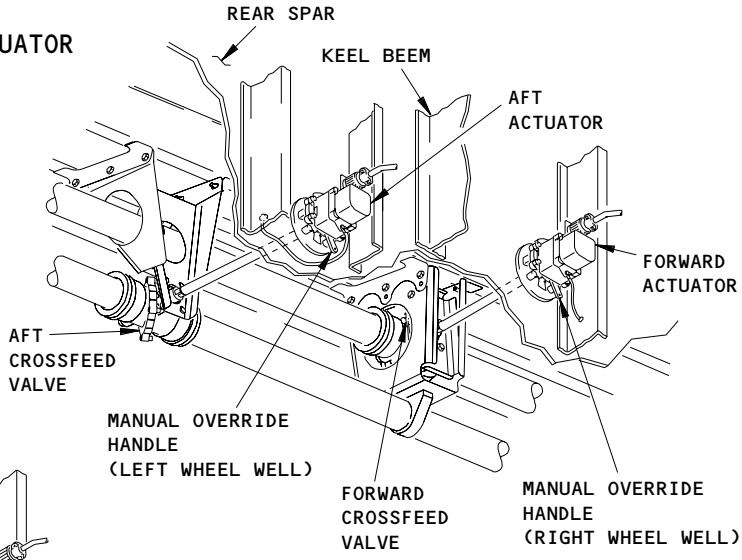
ENGINE FUEL CROSSFEED VALVE AND ACTUATOR

B 1 3



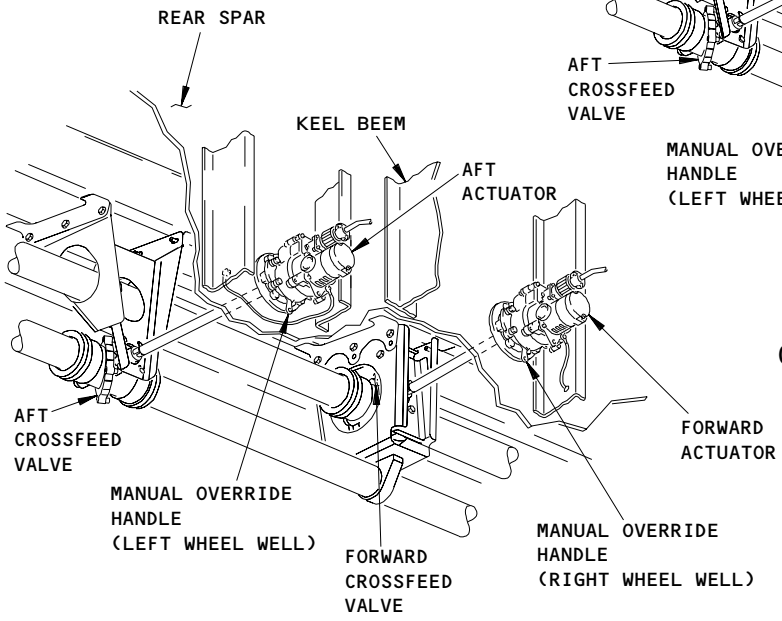
ENGINE FUEL CROSSFEED VALVE AND ACTUATOR

B 1 4



FORWARD AND AFT ENGINE FUEL
CROSSFEED VALVES AND ACTUATORS

B 2 3



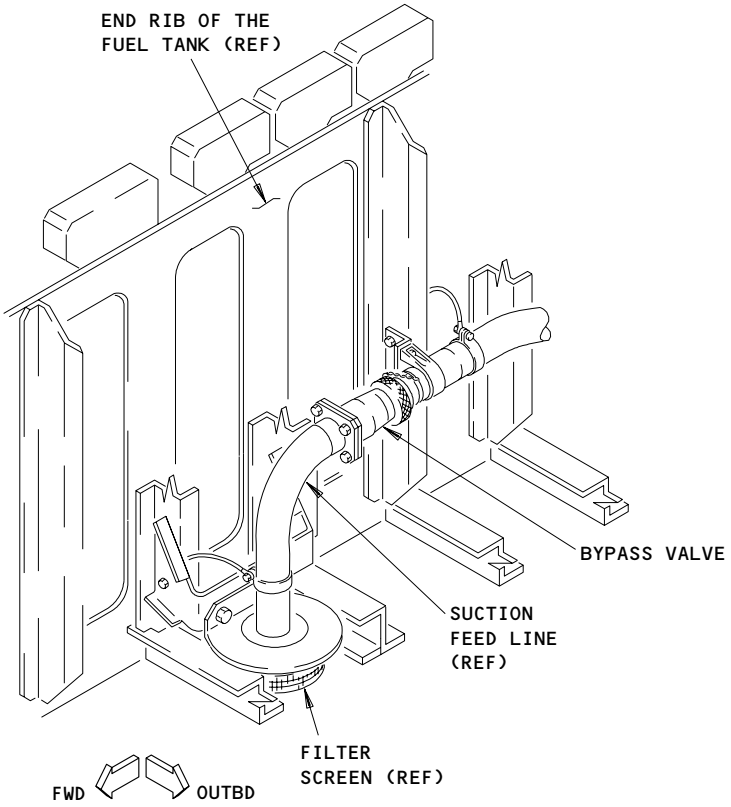
FORWARD AND AFT ENGINE FUEL
CROSSFEED VALVES AND ACTUATORS

B 2 4

NOT USED

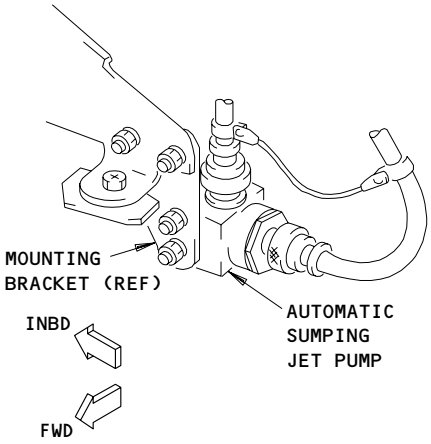
C

Engine Fuel–Feed System – Component Location (Detail from Sht 2)
Figure 102 (Sheet 3)



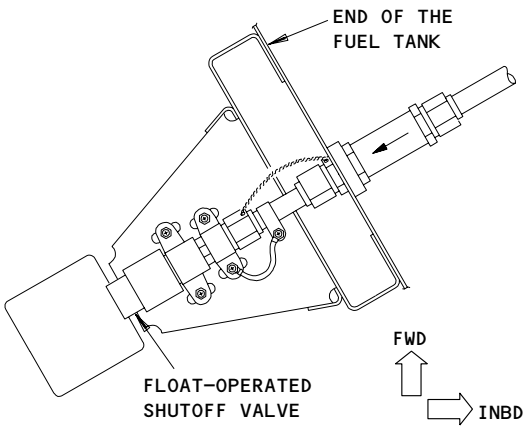
BYPASS VALVE

D



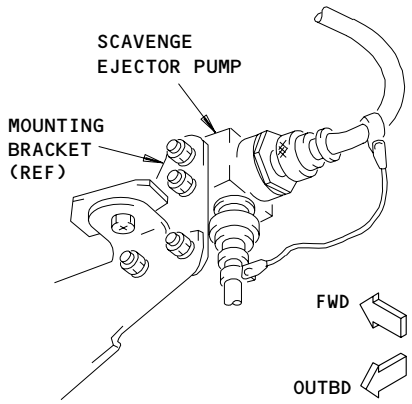
AUTOMATIC SUMPING JET PUMP

E



FLOAT–OPERATED SHUTOFF VALVE

F



SCAVENGE EJECTOR PUMP

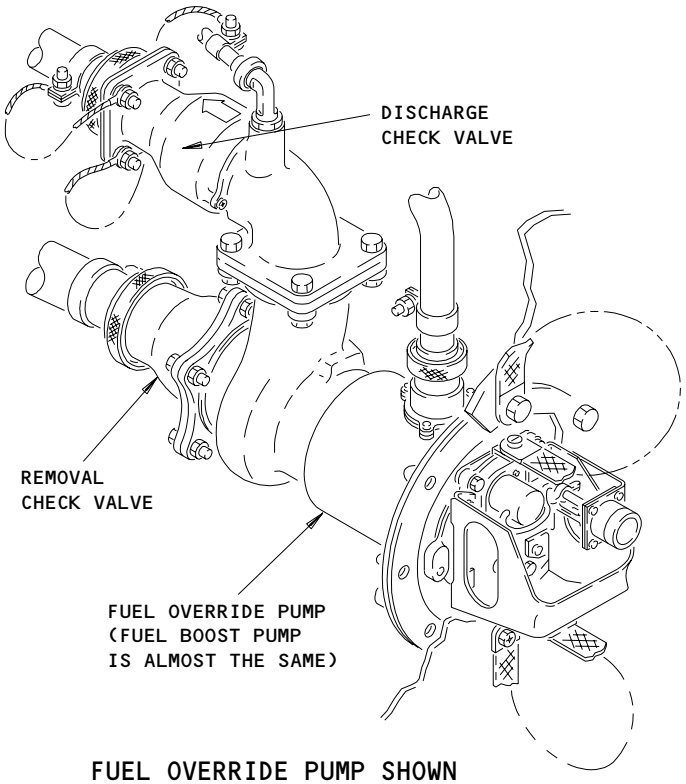
G

Engine Fuel–Feed System – Component Location (Details from Sht 2)
Figure 102 (Sheet 4)

334627

NOT USED

H



FUEL OVERRIDE PUMP SHOWN
(FUEL BOOST PUMP IS ALMOST THE SAME)

I

Engine Fuel-Feed System - Component Location (Detail from Sht 2)
Figure 102 (Sheet 5)

ENGINE FUEL FEED SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure gives a system test of each component within the engine fuel feed system.

TASK 28-22-00-735-001

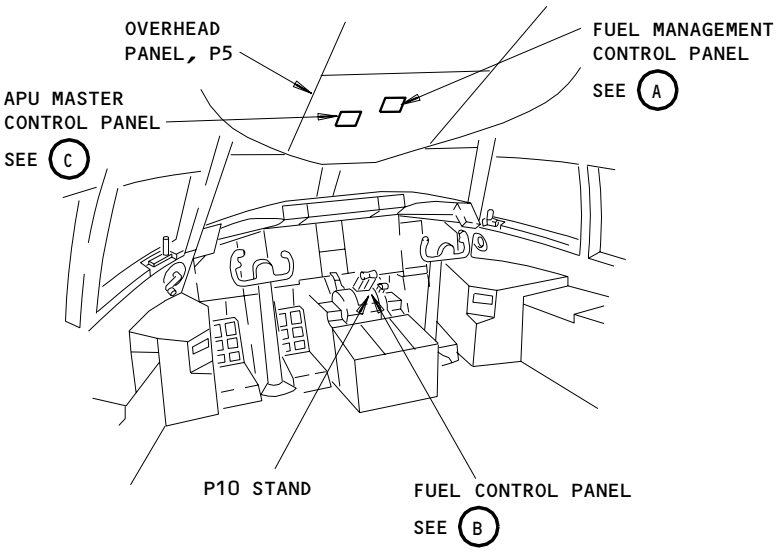
2. System Test - Engine Fuel Feed System
   A. References
      (1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 24-25-00/501, Hydraulic Motor Generator System
      (4) AMM 28-26-00/201, Defueling
      (5) AMM 32-00-15/201, Landing Gear Door Locks
      (6) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          512 Slat No. 5 (Left)
          531 Center Wing Tank (Left)
          551 Rear Spar to MLG Support Beam (Left)
          612 Slat No. 6 (Right)
          621 Leading Edge to Front Spar (Right)
          631 Center Wing Tank (Right)
          651 Rear Spar to MLG Support Beam (Right)

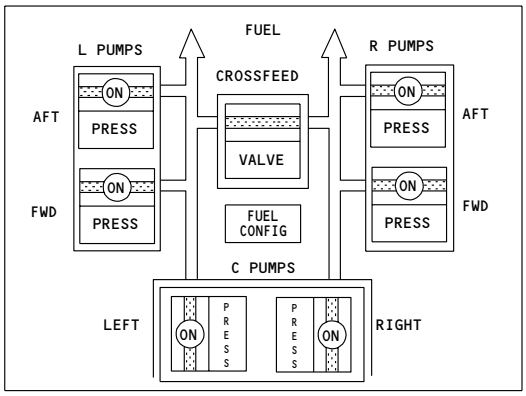
      (2) Access Panels
          551BB Access Panels (Left)
          621GB Fueling Station Door
          651BB Access Panels (Right)

   C. Prepare for Test

      S 865-397
      (1) Put each of the these switches into the position shown:

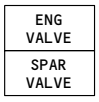
SWITCH	POSITION	LOCATION
FUEL CROSSFEED VALVE(S)	OPEN	P5 PANEL
L FWD FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL C PUMP	OFF	P5 PANEL
R AFT FUEL BOOST PUMP	OFF	P5 PANEL
R FUEL C PUMP	OFF	P5 PANEL
R FWD FUEL BOOST PUMP	OFF	P5 PANEL
L AFT FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL CONTROL	CUTOFF	P10 STAND
R FUEL CONTROL	CUTOFF	P10 STAND
L FIRE HANDLE	NORMAL	P8 STAND
R FIRE HANDLE	NORMAL	P8 STAND
APU FIRE SWITCH	NORMAL	P8 STAND

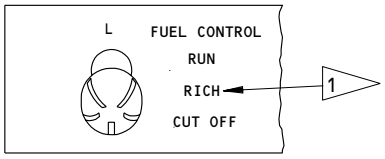




FUEL MANAGEMENT CONTROL PANEL

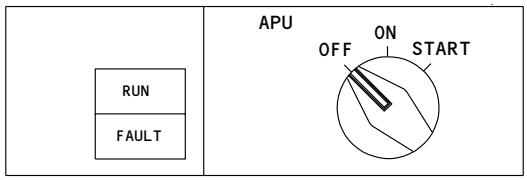
A





FUEL CONTROL PANEL

B



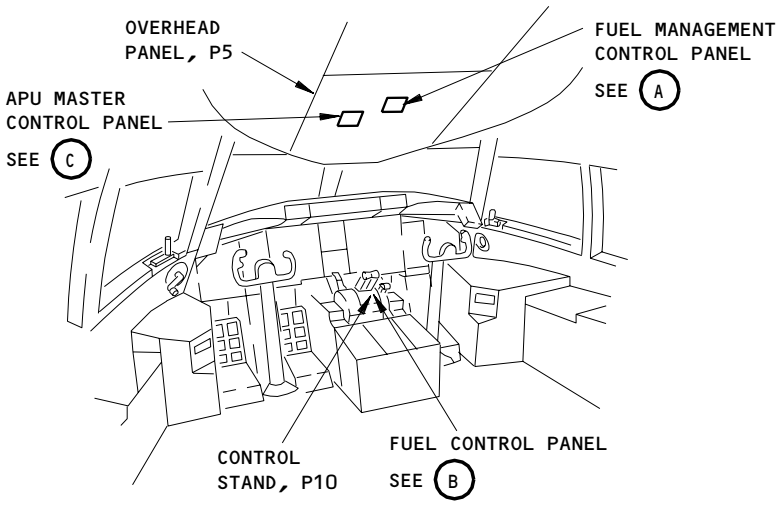
APU MASTER CONTROL PANEL

C

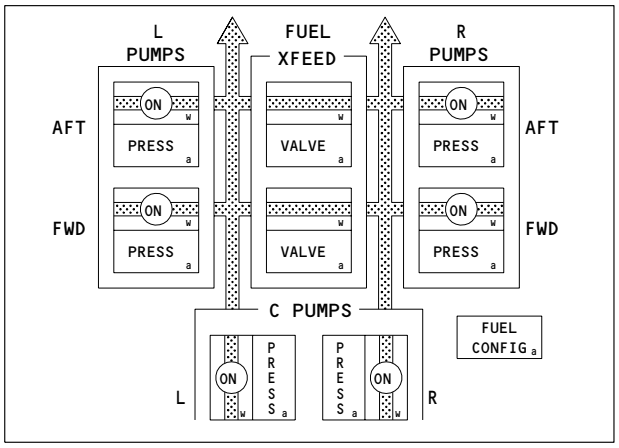
1 AIRPLANES WITH ROLLS ROYCE ENGINES

Flight Deck Controls and Indications
Figure 501

88669

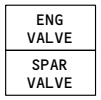


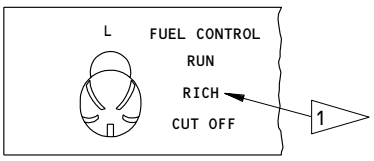
FLIGHT COMPARTMENT



FUEL MANAGEMENT CONTROL PANEL

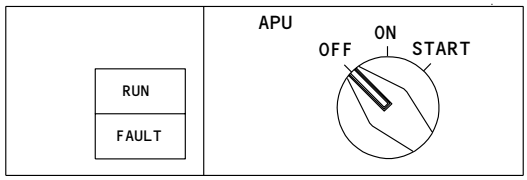
A





FUEL CONTROL PANEL

B

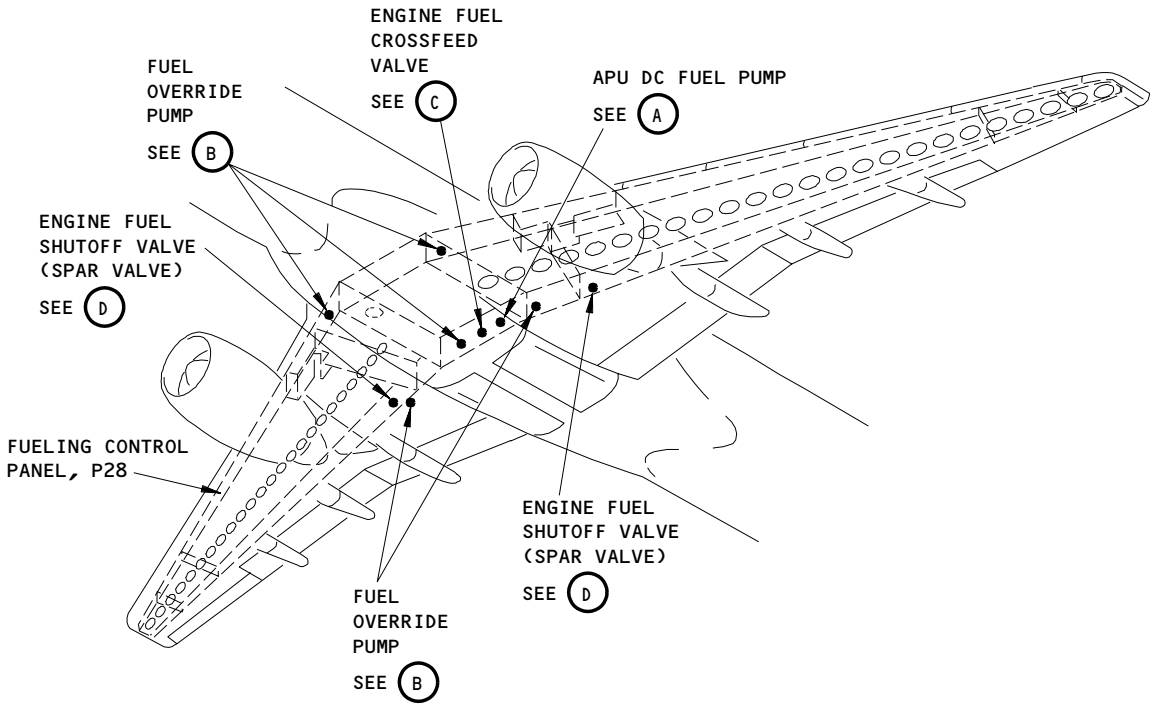


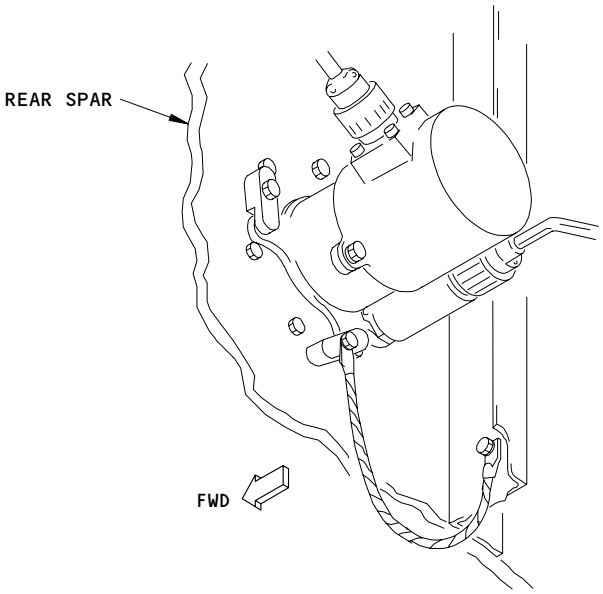
APU MASTER CONTROL PANEL

C

1 AIRPLANES WITH ROLLS ROYCE ENGINES

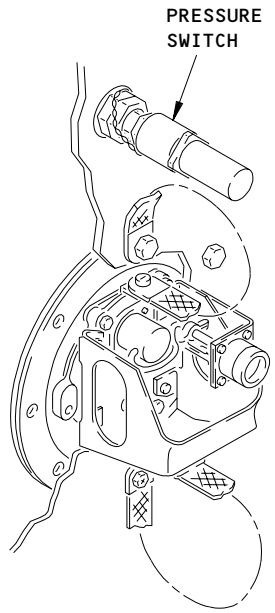
Flight Deck Controls and Indications
Figure 501A





APU DC FUEL PUMP

A

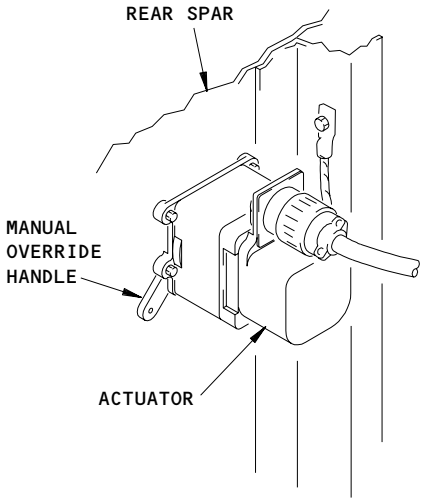


FUEL OVERRIDE PUMP IN THE CENTER FUEL TANK SHOWN (FUEL BOOST PUMPS IN THE MAIN FUEL TANK ARE ALMOST THE SAME)

B

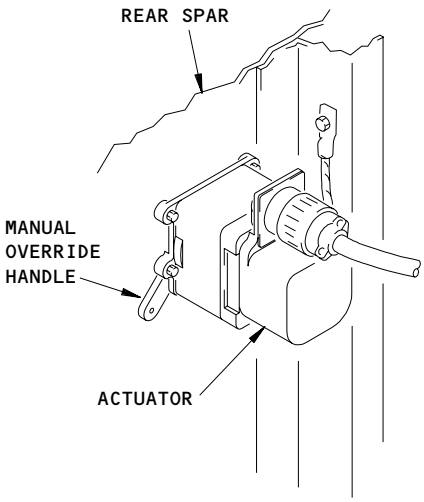
Engine Fuel Feed System
Figure 502 (Sheet 1)

A83027



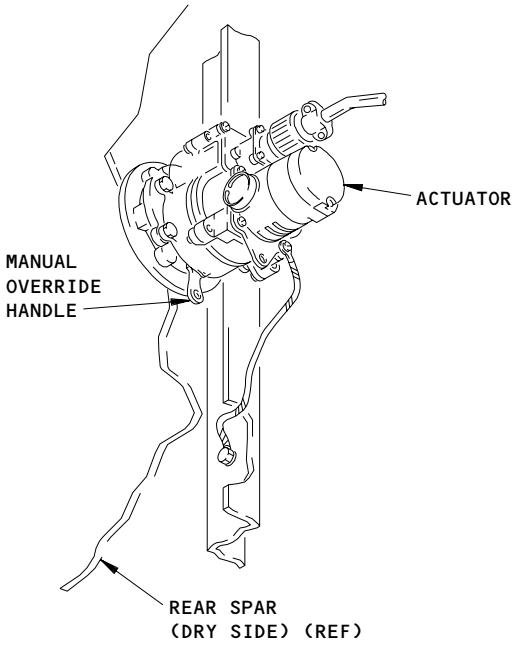
ENGINE FUEL CROSSFEED VALVE

C 1



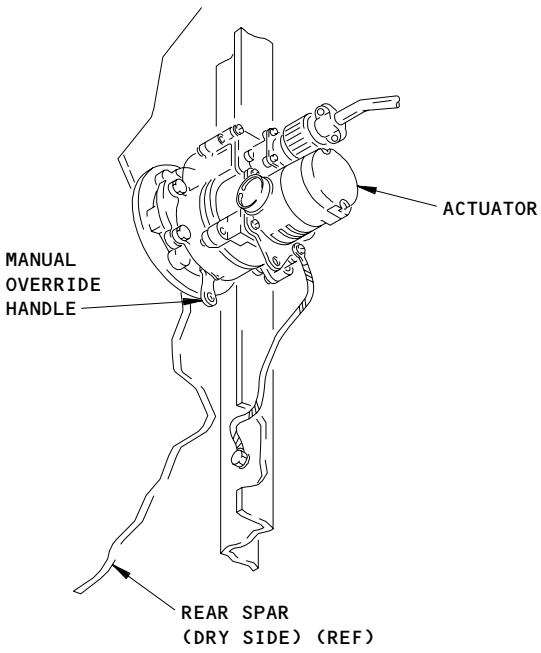
ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)

D 1



ENGINE FUEL CROSSFEED VALVE

C 2



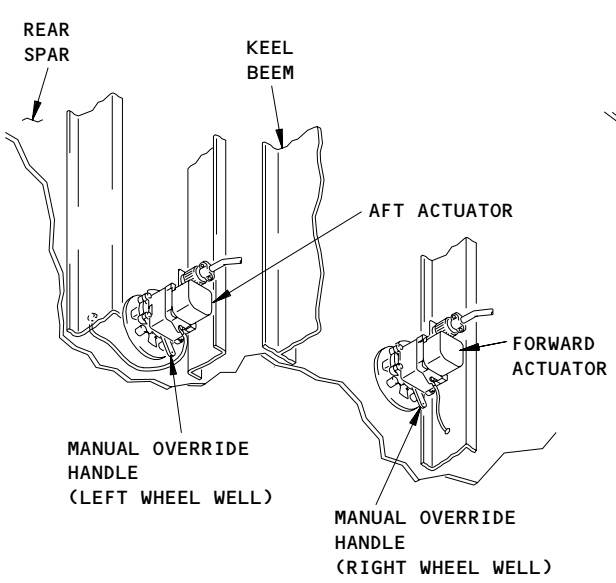
ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)

D 2

1 PREFERRED
2 ALTERNATE

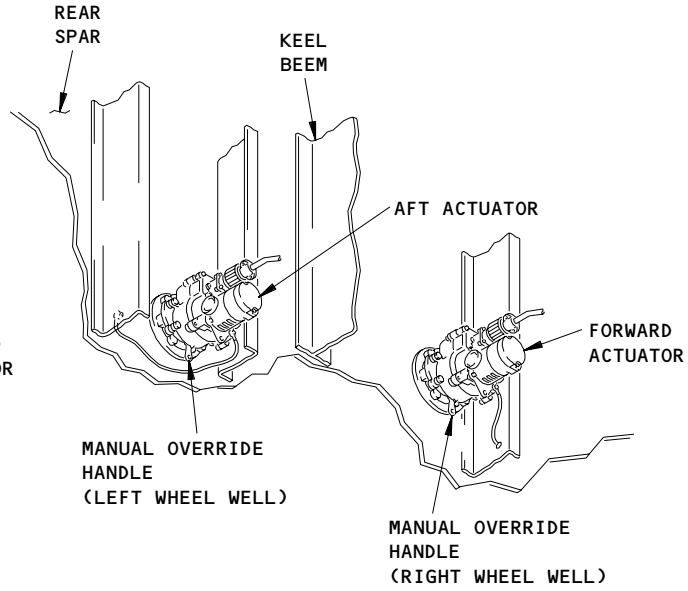
Engine Fuel Feed System
Figure 502 (Sheet 2)

B18669



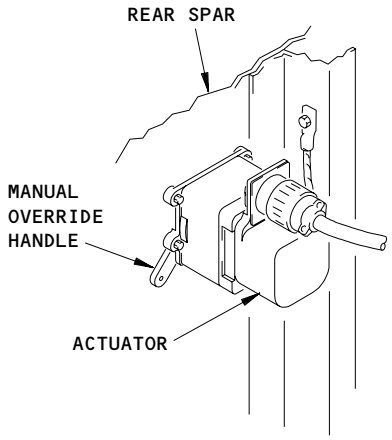
ENGINE FUEL CROSSFEED VALVES

A 1



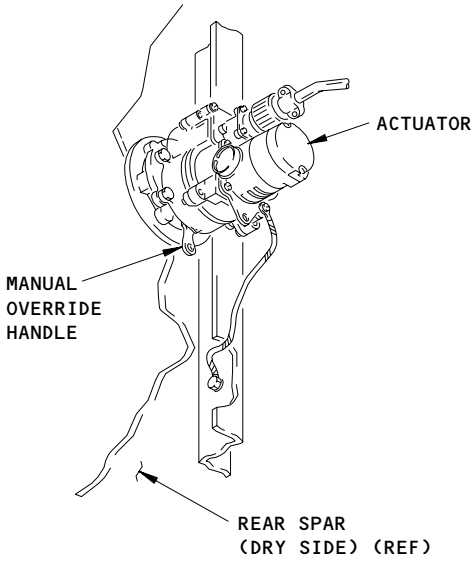
ENGINE FUEL CROSSFEED VALVES

A 2



ENGINE FUEL SHUTOFF VALVE (SPAR VALVE)

C 1



ENGINE FUEL SHUTOFF VALVE (SPAR VALVE)

C 2

1 PREFERRED
2 ALTERNATE

Engine Fuel Feed System
Figure 502 (Sheet 3)

S 865-003

(2) Open these circuit breakers on the power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E2, FUEL VALVES R SPAR
(c) 6E3, FUEL VALVES APU
(d) 6E4, FUELING QTY
(e) 6E5, FUELING CONTROL
(f) 6E6, FUELING VALVES
(g) 6F14, L FUEL OVRD PUMP
(h) 6F20, R FUEL OVRD PUMP
(i) 6H14, L AFT FUEL BOOST PUMP
(j) 6H17, R FWD FUEL BOOST PUMP
(k) 6H20, R AFT FUEL BOOST PUMP
(l) 6H23, L FWD FUEL BOOST PUMP

S 865-004

(3) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C33, FUEL DC PUMP PWR
(b) 11C34, FUEL QTY 1
(c) 11D35, FUEL DC PUMP CONT
(d) 11L19, FUEL QTY 2

S 865-005

(4) Open these circuit breakers on the APU external power panel, P34, and attach DO-NOT-CLOSE tags:
(a) 34A9, FLNG VALVES
(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 655-213

(5) Make sure the downlocks for the nose and main landing gear are installed (AMM 32-00-20/201).

S 415-006

WARNING: DO THE AMM 32-00-15/201 DOOR LOCK INSTALLATION PROCEDURE. IF THE MAIN GEAR DOORS MOVE QUICKLY THEY CAN CAUSE INJURY OR DAMAGE.

(6) Open the main landing gear doors and install the door locks (AMM 32-00-15/201).

D. GUI 001-008 PRE-SB 28-29;
Test the Engine Fuel Crossfeed Valve

S 865-008

(1) Close this circuit breaker on the P11 panel:
(a) 11D36, FUEL CROSSFEED

S 215-009
(2) Make sure these EICAS messages show on the top display:
(a) L FUEL SYS PRESS
(b) R FUEL SYS PRESS

S 035-010
(3) Remove the electrical connector from the pressure switch on the right fuel override pump (S10011).

S 215-011
(4) Make sure these EICAS messages do not show on the upper display:
(a) L FUEL SYS PRESS
(b) R FUEL SYS PRESS

S 215-012
(5) Make sure these EICAS messages show on the top display:
(a) L FWD FUEL PUMP
(b) R FWD FUEL PUMP
(c) L AFT FUEL PUMP
(d) R AFT FUEL PUMP

S 865-013
(6) Push the FUEL CROSSFEED VALVE switch-light of the fuel management control panel on the P5 panel to the close position.

S 865-480
(7) Do a check on the manual override handle position to make sure the engine fuel crossfeed valve is in the CLOSED position.

S 215-014
(8) Make sure these EICAS messages do not show on the top display:
(a) L FWD FUEL PUMP
(b) L AFT FUEL PUMP

S 215-015
(9) Make sure the EICAS message, L FUEL SYS PRESS, shows on the top display.

S 035-016
(10) Remove the electrical connector from the pressure switch on the left fuel override pump (S10010).

S 215-017
(11) Make sure the EICAS message, L FUEL SYS PRESS, does not show on the top display.

S 215-018
(12) Make sure these EICAS messages show on the top display:
(a) L FWD FUEL PUMP
(b) L AFT FUEL PUMP

S 435-019
(13) Install the electrical connector on the pressure switch of the right fuel override pump (S10011).

S 215-020
(14) Make sure these EICAS messages do not show on the top display:
(a) R FWD FUEL PUMP
(b) R AFT FUEL PUMP

S 215-021
(15) Make sure the EICAS message, R FUEL SYS PRESS, shows on the top display.

S 865-022
(16) Push the FUEL CROSSFEED VALVE switch-light on the P5 panel to the open position.

S 215-023
(17) Make sure the FUEL CROSSFEED VALVE disagreement light comes on until the engine fuel crossfeed valve opens fully.

S 215-024
(18) Do a check on the manual override handle position to make sure the engine fuel crossfeed valve is open.

NOTE: Access to the engine fuel crossfeed valve is through the main landing gear doors.

The engine fuel crossfeed valve is found approximately 12 inches to the left of the middle of the body on the center tank rear spar.

S 435-025
(19) Install the electrical connector on the pressure switch on the left fuel override pump (S10010).

S 215-026
(20) Make sure these EICAS advisory messages do not show on the top display:
(a) L FWD FUEL PUMP
(b) L AFT FUEL PUMP

S 215-027
(21) Make sure the EICAS message, L FUEL SYS PRESS, shows on the top display.

S 215-028
(22) Make sure these low pressure lights on the P5 panel come on:
(a) L FWD PUMPS PRESS

(b) L AFT PUMPS PRESS
(c) R FWD PUMPS PRESS
(d) R AFT PUMPS PRESS

S 865-029
(23) Open this circuit breaker on the P11 panel:
(a) 11D36, FUEL CROSSFEED

S 215-030
(24) Make sure the EICAS message, FUEL CROSSFEED, shows on the top display.

S 865-031
(25) Close this circuit breaker on the P11 panel:
(a) 11D36, FUEL CROSSFEED

S 215-032
(26) Make sure the EICAS message, FUEL CROSSFEED, does not show on the top display.

S 865-033
(27) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11D36, FUEL CROSSFEED

E. GUI 001-008 POST-SB 28-29;
GUI 009-999;
Test the Engine Fuel Crossfeed Valves

S 865-343
(1) Push the FUEL XFEED VALVE - AFT and FUEL XFEED VALVE - FWD switches to the on position.

S 865-344
(2) Open these circuit breakers on the P11 panel:
(a) 11D24, FWD FUEL CROSSFEED
(b) 11D25, AFT FUEL CROSSFEED
(c) 11D36, FUEL XFEED IND

S 215-345
(3) Make sure FUEL XFEED VALVE - AFT switch-light on the P5 panel is on.

S 215-346
(4) Make sure the FUEL XFEED VALVE - FWD switch-light on the P5 panel is on.

S 215-347
(5) Make sure these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FUEL SYS PRESS
(c) FWD FUEL X-FEED

(d) AFT FUEL X-FEED

NOTE: These messages show there is no pump pressure to the engines and the forward and aft crossfeed relays are not energized.

S 865-348
(6) Close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D24, FWD FUEL CROSSFEED

S 215-351
(7) Make sure the FUEL CROSSFEED VALVE - FWD switch-light is off.

S 215-352
(8) Make sure these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FUEL SYS PRESS
(c) AFT FUEL X-FEED

NOTE: The forward crossfeed relay is energized.

S 865-349
(9) Close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D25, AFT FUEL CROSSFEED

S 215-350
(10) Make sure the FUEL XFEED VALVE - AFT switch-light is off.

S 215-353
(11) Make sure these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FUEL SYS PRESS

NOTE: The FWD and AFT FUEL X-FEED messages do not show because the forward and aft crossfeed relays are energized.

S 865-354
(12) Open this circuit breaker on the P11 panel:
(a) 11D24, FWD FUEL CROSSFEED

S 215-355
(13) Make sure the FUEL XFEED VALVE - FWD switch-light on the P5 panel is on.

S 215-356
(14) Make sure the these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FUEL SYS PRESS
(c) FWD FUEL X-FEED

NOTE: The aft fuel crossfeed relay is energized.

S 865-357
(15) Close this circuit breaker on the P11 panel:
(a) 11D24, FWD FUEL CROSSFEED

S 215-358
(16) Make sure the FUEL XFEED VALVE - FWD switch-light is off.

S 215-359
(17) Make sure the FWD FUEL XFEED message does not show on the EICAS display.

S 035-360
(18) Remove the electrical connector (D1828) from the pressure switch on the right override pump, installed on the rear spar at RBL 13.

NOTE: This is equivalent to pressure at the right override pump.

S 215-361
(19) Make sure these EICAS messages show on the EICAS display:
(a) L FWD FUEL PUMP
(b) L AFT FUEL PUMP
(c) R FWD FUEL PUMP
(d) R AFT FUEL PUMP

NOTE: These messages show that there is center tank pressure, no main tank pressure, and the FWD and AFT crossfeed relays are energized.

S 865-362
(20) Push the FWD and AFT FUEL XFEED VALVE switch-lights to the off position.

S 215-363
(21) Make sure the ON flow bar on the FUEL XFEED VALVE - AFT switch-light goes off.

S 215-364
(22) Make sure the ON flow bar on the FUEL XFEED VALVE - FWD switch-light goes off.

S 865-365
(23) Close this circuit breaker on the P11 panel:
(a) 11D36, FUEL XFEED IND

S 215-366
(24) Make sure these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FWD FUEL PUMP
(c) R AFT FUEL PUMP

NOTE: These messages show that there is pressure for the right center pump.

S 865-398
(25) Open this circuit breaker on the P11 panel:
(a) 11D36, FUEL XFEED IND

S 215-367
(26) Make sure these EICAS messages show on the EICAS display:
(a) L FWD FUEL PUMP
(b) L AFT FUEL PUMP
(c) R FWD FUEL PUMP
(d) R AFT FUEL PUMP

S 865-368
(27) Push the FUEL XFEED VALVE - FWD switch-light on the P5 panel to on.

S 215-369
(28) Make sure the FUEL XFEED VALVE - FWD switch-light on the P5 panel comes on while the valve moves to open for 6 seconds and then goes off.

S 215-370
(29) Make sure the ON flow bar on the FUEL XFEED VALVE - FWD switch-light comes on.

S 215-371
(30) Make sure the manual override handle for the FUEL CROSSFEED VALVE - FWD is in the open position.

NOTE: The actuator for the forward fuel crossfeed valve is installed on the rear spar at RBL 4.

S 865-372
(31) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11D24, FWD FUEL CROSSFEED

S 035-373
(32) Remove the electrical connector (D7734) from the actuator for the FUEL CROSSFEED VALVE - FWD.

NOTE: The actuator for the forward fuel crossfeed valve is installed on the rear spar at RBL 4.

S 865-374
(33) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D24, FWD FUEL CROSSFEED

S 215-375
(34) Make sure the FUEL XFEED VALVE - FWD switch-light on the P5 panel is on.

S 865-376
(35) Close this circuit breaker on the P11 panel:
(a) 11D36, FUEL XFEED IND

S 215-377
(36) Make sure these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FWD FUEL PUMP
(c) R AFT FUEL PUMP
(d) FWD FUEL X-FEED

S 865-378
(37) Push the FUEL XFEED VALVE - AFT switch-light on the P5 panel to the on position.

S 215-379
(38) Make sure the ON flow bar on the FUEL XFEED VALVE - AFT switch-light is on.

S 215-380
(39) Make sure the FUEL XFEED VALVE - AFT switch-light on the P5 panel comes on while the valve moves to open for 6 seconds and then goes off.

S 865-381
(40) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11D24, FWD FUEL CROSSFEED

S 435-382
(41) Install the electrical connector (D7734) to the actuator for the FUEL CROSSFEED VALVE - FWD.

NOTE: The actuator for the forward fuel crossfeed valve is installed on the rear spar at RBL 4.

S 865-433
(42) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D24, FWD FUEL CROSSFEED

S 215-383
(43) Make sure the FUEL XFEED VALVE - FWD switch-light goes off.

S 215-384
(44) Make sure the manual override handle for the FUEL CROSSFEED VALVE - AFT is in the open position.

NOTE: The actuator for the aft fuel crossfeed valve is installed on the rear spar at LBL 13.

S 865-409
(45) Push the FUEL XFEED VALVE - FWD switch-light to the off position.

S 215-408
(46) Make sure the FUEL XFEED VALVE - FWD switch-light on the P5 panel comes on while the valve moves to close for 6 seconds and then goes off.

S 865-442
(47) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11D25, AFT FUEL CROSSFEED

S 035-386
(48) Remove the electrical connector (D7744) from the actuator for the FUEL CROSSFEED VALVE - AFT.

NOTE: The actuator for the aft fuel crossfeed valve is installed on the rear spar at LBL 13.

S 865-387
(49) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D25, AFT FUEL CROSSFEED

S 215-388
(50) Make sure the FUEL XFEED VALVE - AFT switch-light is on.

S 215-389
(51) Make sure these EICAS messages show on the EICAS display:
(a) L FUEL SYS PRESS
(b) R FWD FUEL PUMP
(c) R AFT FUEL PUMP
(d) AFT FUEL X-FEED

S 865-390
(52) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11D25, AFT FUEL CROSSFEED

S 435-391
(53) Install the electrical connector (D7744) to the actuator for the FUEL CROSSFEED VALVE - AFT.

NOTE: The actuator for the aft fuel crossfeed valve is installed on the rear spar at LBL 13.

S 865-392
(54) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D25, AFT FUEL CROSSFEED

S 215-393
(55) Make sure the FUEL XFEED VALVE - AFT switch-light goes off.

S 215-394
(56) Make sure the EICAS message AFT FUEL X-FEED does not show on the EICAS display.

S 435-395
(57) Install the electrical connector (D1828) to the pressure switch on the right override pump, installed on the rear spar at RBL 13.

S 865-411
(58) Push the FUEL XFEED VALVE - FWD switch-light on the P5 panel to the off position.

S 215-410
(59) Make sure the FUEL XFEED VALVE - FWD switch-light on the P5 panel comes on while the valve moves to the closed position for 6 seconds and then goes off.

S 865-434
(60) Push the FUEL XFEED VALVE - AFT switch-light on the P5 panel to the off position.

S 215-398
(61) Make sure the FUEL XFEED VALVE - AFT switch-light on the P5 panel comes on while the valve moves to the closed position for 6 seconds and then goes off.

S 865-399
(62) Open these circuit breakers on the P11 panel:
(a) 11D24, FWD FUEL CROSSFEED
(b) 11D25, AFT FUEL CROSSFEED
(c) 11D36, FUEL XFEED IND

F. Test the Fuel Boost Pumps and Fuel Override Pumps (WET) - Control and Indication

S 655-034
(1) Supply the electrical power to the airplane (AMM 24-22-00/201).

S 615-481
(2) Refuel the center or main fuel tanks (AMM 12-11-01/301).

S 655-487
(3) Make sure there is a minimum fuel quantity of 2000 pounds (900 kilograms) in the applicable main fuel tanks.

S 655-483
(4) Make sure there is a minimum fuel quantity of 20,000 pounds (9,000 kilograms) in the center wing tank.

S 775-484
(5) Before you operate a fuel pump, put a person at the applicable pump location, installed on the front or rear wing spar, to listen for its operation.

S 865-035
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 865-494

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(7) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
   (a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-036

(8) Push the L FWD PUMPS switch-light of the fuel management control panel on the P5 panel to the ON position.

S 215-037

(9) Make sure the ON flowbar on the L FWD PUMPS switch-light comes on.
   (a) If the L FWD PUMPS PRESS light stays on, push the L FWD PUMPS switch-light to the off position.

S 285-038

(10) Listen at the front spar, aft of the leading edge slat No. 5 to make sure the left forward fuel boost pump operates.

S 865-039

(11) Push the L FWD PUMPS switch-light on the P5 panel to the off position.

S 215-040

(12) Make sure that the ON flowbar on the L FWD PUMPS switch-light goes off.

S 865-041

(13) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
   (a) 6H23, L FWD FUEL BOOST PUMP

S 865-042

(14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
   (a) 6H17, R FWD FUEL BOOST PUMP

S 865-495

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(15) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
   (a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-043
(16) Push the R FWD PUMPS switch-light of the fuel management control on the P5 panel to the ON position.

S 215-044
(17) Make sure that the ON flowbar on the R FWD PUMPS switch-light comes on.

S 285-045
(18) Listen at the front spar, aft of the leading edge slat No. 5, to make sure the right forward fuel boost pump operates.

S 865-046
(19) Push the R FWD PUMPS switch-light on the P5 panel to the off position.

S 215-047
(20) Make sure that the ON flowbar on the R FWD PUMPS switch-light goes off.

S 865-048
(21) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
   (a) 6H17, R FWD FUEL BOOST PUMP

S 865-049
(22) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
   (a) 6H14, L AFT FUEL BOOST PUMP

S 865-496

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(23) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-050
(24) Push the L AFT PUMPS switch-light of the fuel management control panel on the P5 panel to the ON position.

S 215-051
(25) Make sure that the ON flowbar on the L AFT PUMPS switch-light comes on.

S 285-052
(26) Listen and make sure that the left aft fuel boost pump operates.

NOTE: Access to the left aft fuel boost pump is through the left main landing gear shock strut door.

S 865-053
(27) Push the L AFT PUMPS switch-light on the P5 panel to the off position.

S 215-055
(28) Make sure that the ON flowbar on the L AFT PUMPS switch-light goes off.

S 865-054
(29) Open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6H14, L AFT FUEL BOOST PUMP

S 865-194
(30) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H20, R AFT FUEL BOOST PUMP

S 865-497

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(31) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-193
(32) Push the R AFT PUMPS switch-light of the fuel management control panel on the P5 panel to the ON position.

S 215-192
(33) Make sure the ON flowbar on the R AFT PUMPS switch-light comes on.

S 285-191
(34) Listen and make sure the right aft fuel boost pump operates.

NOTE: Access to the right aft fuel boost pump is through the right main landing gear shock strut door.

S 865-190
(35) Push the R AFT PUMPS switch-light on the P5 panel to the off position.

S 215-189
(36) Make sure that the ON flowbar on the R AFT PUMPS switch-light goes off.

S 865-188
(37) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
(a) 6H20, R AFT FUEL BOOST PUMP

S 865-056
(38) Remove the DO-NOT-CLOSE tag and close this P34 panel circuit breaker:
(a) 34A11, FLNG CONT

S 865-057
(39) Remove the DO-NOT-CLOSE tag and close this P6 panel circuit breaker:
(a) 6F14, L FUEL OVRD PUMP

S 865-058
(40) Open the fueling station door, 621GB, on the right wing leading edge.

S 865-498

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(41) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-059
(42) Push the LEFT C PUMPS switch-light of the fuel management control panel on the P5 panel to the ON position.

S 865-060
(43) Make sure the ON flowbar on the LEFT C PUMPS switch-light comes on.

S 215-063
(44) Make sure the LEFT C PUMPS PRESS light on the P5 panel goes off.

S 285-061
(45) Listen at the inboard rear spar and make sure the left fuel override pump operates.

S 865-064
(46) Close the fueling station door, 621GB.

S 285-065
(47) Make sure the left fuel override pump goes off.

S 215-068
(48) Make sure the LEFT C PUMPS PRESS light on the P5 panel comes on.

S 865-069
(49) Push the LEFT C PUMPS switch-light to the off position.

S 865-070
(50) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
(a) 6F14, L FUEL OVRD PUMP

S 865-071
(51) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6F20, R FUEL OVRD PUMP

S 865-072
(52) Open the fueling station door, 621GB, on the right wing leading edge.

S 865-499

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(53) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-073
(54) Push the RIGHT C PUMPS switch-light of the fuel management control panel on the P5 panel to the ON position.

S 215-074
(55) Make sure the ON flowbar on the RIGHT C PUMPS switch-light comes on.

S 215-077
(56) Make sure the RIGHT C PUMPS PRESS light on the P5 panel go off.

S 285-075
(57) Listen at the right inboard rear spar and make sure the right fuel override pump operates.

S 865-078
(58) Close the fueling station door, 621GB.

S 285-079
(59) Make sure the right fuel override pump goes off.

S 215-082
(60) Make sure the RIGHT C PUMPS PRESS light on the P5 panel comes on.

S 865-083
(61) Push the RIGHT C PUMPS switch-light to the off position.

S 715-388
(62) GUI 003-114, 116-999;
Do the steps that follow:
(a) Do the Operational Test for the hydraulic motor generator (AMM 24-25-00/501) to supply power to the right override pump.

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(b) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
1) Immediately set the applicable fuel pump switch to the OFF if the LOW PRESSURE light comes on and stays on.
(c) Push the RIGHT C PUMPS switch-light to the on position.
(d) Listen at the right inboard rear spar and make sure the right override pump operates.
(e) Push the RIGHT C PUMPS switch-light to the off postion.
(f) Remove the hydraulic motor generator power.

S 865-084
(63) Open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6F20, R FUEL OVRD PUMP

S 865-085
(64) Open this circuit breaker on the E6 rack and attach a DO-NOT-CLOSE tag:
(a) E6, APU INLET DOOR ACT

S 865-086
(65) Close these circuit breakers on the E6 rack:
(a) E6, APU START
(b) E6, APU BAT-APU CONT UNIT

S 865-087
(66) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 865-088
(67) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B34, APU ALTN CONT
(b) 11D35, FUEL DC PUMP CONT

S 865-089
(68) Put the APU master control switch on the P5 panel to the ON position.
(a) If the L FWD PUMPS PRESS light stays on, put the APU master control switch to the off position.

S 285-090
(69) Listen at the front spar, aft of the leading edge slat No. 5, to make sure that the left forward fuel boost pump operates.

S 865-091
(70) Open this circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6H23, L FWD FUEL BOOST PUMP

S 865-092
(71) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11D35, FUEL DC PUMP CONT

S 285-093
(72) Listen and make sure that the APU DC fuel pump operates.

NOTE: The APU DC fuel pump is found approximately three feet left of the middle of the body on the center tank rear spar.

S 865-094
(73) Push the ECS MSG switch on the EICAS MAINT panel on the right side panel, P61.

S 215-095
(74) Make sure the EICAS message, DC FUEL PUMP ON, shows on the bottom display.

S 865-096
(75) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11D35, FUEL DC PUMP CONT

S 215-097
(76) Make sure the EICAS message, DC FUEL PUMP ON, does not show on the bottom display.

S 865-214
(77) Put the APU master control switch to the OFF position.

S 865-098
(78) Open these circuit breakers on the E6 rack and attach the DO-NOT-CLOSE tags:
(a) E6, APU START
(b) E6, APU BAT-APU CONT UNIT

S 865-099
(79) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B34, APU ALTN CONT

S 215-100

CAUTION: MAKE SURE ALL THE BOOST PUMP AND OVERRIDE PUMP SWITCHES ARE OFF. IF YOU OPERATE THE BOOST PUMPS OR OVERRIDE PUMPS FOR A LONG TIME, YOU CAN CAUSE DAMAGE TO THE PUMPS.

(80) Make sure that all the fuel boost pump and fuel override pump switches are in the off position.

S 655-101
(81) Refuel the fuel tank if no more work is necessary (AMM 12-11-01/301).

G. Test the Engine Fuel Shutoff Valves (Spar Valves)

S 865-102
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E2, FUEL VALVES R SPAR

S 865-103
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11D33, FUEL DISAGREE ENBL L
(b) 11D34, FUEL DISAGREE ENBL R

S 865-104
(3) Put the FUEL CONTROL switch on the P10 stand to the RICH-RUN position.

S 015-106
(4) Get access to the actuator on the left engine fuel shutoff valve (spar valve) through the access door 551BB.

S 215-107
(5) Make sure the manual override handle on the left engine fuel shutoff valve (spar valve) moves to the open position.

S 215-108
(6) Make sure the SPAR VALVE disagreement light comes on while the left engine fuel shutoff valve (spar valve) moves to the open position.

S 865-109
(7) Open these circuit breakers on the P6 panel and attach the DO-NOT-CLOSE tags:
(a) 6H1, FIRE EXTINGUISHING ENG L BTL 1

(b) 6H2, FIRE EXTINGUISHING ENG L BTL 2

S 865-110
(8) Pull the FIRE HANDLE for the left engine.

S 215-111
(9) Make sure the manual override handle on the left engine fuel shutoff valve (spar valve) moves to the closed position.

S 215-112
(10) Make sure the SPAR VALVE disagreement light comes on while the left engine fuel shutoff valve (spar valve) moves to the closed position.

S 865-113
(11) Put the FIRE HANDLE for left engine to the NORMAL position.

S 215-114
(12) Make sure the manual override handle on the left engine fuel shutoff valve (spar valve) moves to the OPEN position.

S 865-115
(13) Open this circuit breaker on the P11 panel:
(a) 11D33, FUEL DISAGREE ENBL L

S 215-116
(14) Make sure the EICAS message, L FUEL SPAR VAL, shows on the top display.

S 865-117
(15) Close this circuit breaker on the P11 panel:
(a) 11D33, FUEL DISAGREE ENBL L

S 215-118
(16) Make sure that the EICAS message, L FUEL SPAR VAL, does not show on the top display.

S 865-119
(17) Put the FUEL CONTROL switch on the P10 panel to the CUTOFF position.

S 215-120
(18) Make sure the manual override handle on the left engine fuel shutoff valve (spar valve) moves to the closed position.

S 865-121
(19) Put the FUEL CONTROL switch for the right engine on the P10 panel to the RICH-RUN position.

S 015-195
(20) Get access to the actuator on the right engine fuel shutoff valve (spar valve) through access door 651BB.

S 215-123
(21) Make sure the manual override handle on the right engine fuel shutoff valve (spar valve) moves to the open position.

S 215-124
(22) Make sure the SPAR VALVE disagreement light comes on while the right fuel shutoff valve (spar valve) moves to the open position.

S 865-125
(23) Open these circuit breakers on the P6 panel:
(a) 6H3, FIRE EXTINGUISHING ENG R BTL 1
(b) 6H4, FIRE EXTINGUISHING ENG R BTL 2

S 865-126
(24) Pull the FIRE HANDLE for the right engine.

S 215-127
(25) Make sure the manual override handle on the right engine fuel shutoff valve (spar valve) moves to the closed position.

S 215-128
(26) Make sure the SPAR VALVE disagreement light comes on while the right engine fuel shutoff valve (spar valve) moves to the closed position.

S 865-129
(27) Put the FIRE HANDLE for the right engine to the NORMAL position.

S 215-130
(28) Make sure the manual override handle on the right engine fuel shutoff valve (spar valve) moves to the open position.

S 865-131
(29) Open this circuit breaker on the P11 panel:
(a) 11D34, FUEL DISAGREE ENBL R

S 215-132
(30) Make sure the EICAS message, R FUEL SPAR VAL, shows on the top display.

S 865-133
(31) Close this circuit breaker on the P11 panel:
(a) 11D34, FUEL DISAGREE ENBL R

S 215-134
(32) Make sure the EICAS message, R FUEL SPAR VAL, does not show on the top display.

S 865-135
(33) Put the FUEL CONTROL switch for the right engine to the CUTOFF position.

S 215-136
(34) Make sure the manual override handle on the right engine fuel shutoff valve (spar valve) moves to the closed position.

H. Put the Airplane Back to its Usual Condition

S 095-243

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 655-244
(2) Refuel the fuel tank if no more work is necessary (AMM 12-11-01/301).

S 865-245
(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-22-00-725-547

3. Engine Fuel Suction Feed - Operational Test

A. General
(1) Do this task on the ground while the engines operate at an idle.

B. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 24-22-00/201, Electric Power - Control
(3) AMM 28-26-00/201, Defueling
(4) AMM 71-00-00/201, Power Plant - Maintenance Procedures
(5) FIM 28-22-00/101, Engine Fuel Feed System

C. Access
(1) Location Zones
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

D. Prepare for the Test

S 865-675
(1) Supply electrical power (AMM 24-22-00/201).

S 655-746
(2) Do this test with one of the two subsequent fuel quantity configurations.

E. Configuration 1

S 655-745
(1) Make sure that these quantities of fuel are in the fuel tanks:

NOTE: You can refuel the airplane by pressure fueling (AMM 12-11-01/301) or by tank to tank transfer (AMM 28-26-00/201).

(a) Refuel or defuel the fuel tanks so that each main fuel tank contains 4,200-4,600 lbs (1,900-2,100 kgs) of fuel.
(b) Defuel the fuel tank so the center fuel tank contains 0 lbs (0 kgs) of fuel.

S 215-750
(2) Make sure the switch-light(s) for the FUEL XFEED VALVE(s) on the fuel management panel (found on the overhead P5 panel) is (are) in the closed position.

S 215-753
(3) Make sure the switch-light for the C PUMPS L on the fuel management panel (found on the overhead P5 panel) is in the off position.

S 215-754
(4) Make sure the switch-light for the C PUMPS R on the fuel management panel (found on the overhead P5 panel) is in the off position.

S 715-755

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(5) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication of the fuel pumps.
  (a) Immediately set the applicable fuel pump switch to off if the PRESS light comes on and stays on.

S 715-756
(6) Push the L PUMPS FWD switch-light on the fuel management panel (found on the P5 panel) to the ON position.
  (a) Make sure the L PUMPS PRESS - FWD switch-light on the P5 panel panel is off.
  (b) Make sure the ON flow bar on the L PUMPS FWD switch-light comes on.

S 715-757
(7) Push the L PUMPS AFT switch-light on the fuel management panel (found on the P5 panel) to the ON position.
  (a) Make sure the L PUMPS PRESS - AFT switch-light on the P5 panel is off.
  (b) Make sure the ON flow bar on the L PUMPS AFT switch-light comes on.

S 715-758
(8) Push the R PUMPS FWD switch-light on the fuel management panel (found on the P5 panel) to the ON position.
  (a) Make sure the R PUMPS PRESS - FWD switch-light on the P5 panel is off.

(b) Make sure the ON flow bar on the R PUMPS FWD switch-light comes on.

S 715-759

(9) Push the R PUMPS AFT switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   (a) Make sure the R PUMPS PRESS - AFT switch-light on the P5 panel is off.
   (b) Make sure the ON flow bar on the R PUMPS AFT switch-light comes on.

S 715-760

(10) Start the engines (AMM 71-00-00/201).

NOTE: Operate the engines at a minimum idle for this test.

S 715-761

(11) Make sure the APU master control switch on the P5 panel is in the off position.

S 715-762

(12) Let the engines operate at idle power with boost pumps on for a minimum of two minutes (this time is referred to as "the warm-up period").

NOTE: With ambient conditions of extreme cold, it can be necessary to permit the engine to warm up for more time.

S 715-763

(13) While the engines operate at a minimum idle, set all of the fuel pumps to the off position.

S 715-764

(14) Make sure the engines operate at idle for a minimum of five minutes.
   (a) If one or both of the engines stop in less than five minutes, do this procedure: Right (Left) Engine Fails the Suction Feed Test (FIM 28-22-00/101 Fig. 112).

S 715-765

(15) Stop the engines with the correct shutdown procedure (AMM 71-00-00/201).

S 865-766

(16) Remove electrical power if it is not necessary (AMM 24-22-00/201).

F. Configuration 2

S 655-747

(1) Make sure you do the two engine runs with the specified quantities of fuel in the fuel tanks.

NOTE: You can refuel the airplane by pressure fueling (AMM 12-11-01/301) or by tank to tank transfer (AMM 28-26-00/201).

It is necessary to do two Run 1 and Run 2 for this configuration.

(a) Run 1

1) Refuel or defuel the fuel tanks so that each main fuel tank has a minimum of 4,200 lbs (1,900 kgs) of fuel, and are within 1,000 lbs (450 kgs) of each other.
2) Defuel the fuel tank so the center fuel tank has 0 lbs (0 kgs) of fuel.

3) Make sure the switch-light(s) for the FUEL XFEED VALVE(s) on the fuel management panel (found on the overhead P5 panel) is (are) in the closed position.
4) Make sure the switch-light for the C PUMPS L on the fuel management panel (found on the overhead P5 panel) is in the off position.
5) Make sure the switch-light for the C PUMPS R on the fuel management panel (found on the overhead P5 panel) is in the off position.

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

6) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication of the fuel pumps.
   a) Immediately set the applicable fuel pump switch to off if the PRESS light comes on and stays on.
7) Push the L PUMPS FWD switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the L PUMPS PRESS - FWD switch-light on the P5 panel panel is off.

b) Make sure the ON flow bar on the L PUMPS FWD switch-light comes on.

8) Push the L PUMPS AFT switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the L PUMPS PRESS - AFT switch-light on the P5 panel is off.
   b) Make sure the ON flow bar on the L PUMPS AFT switch-light comes on.
9) Push the R PUMPS FWD switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the R PUMPS PRESS - FWD switch-light on the P5 panel is off.
   b) Make sure the ON flow bar on the R PUMPS FWD switch-light comes on.
10) Push the R PUMPS AFT switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the R PUMPS PRESS - AFT switch-light on the P5 panel is off.
   b) Make sure the ON flow bar on the R PUMPS AFT switch-light comes on.
11) Start the engines (AMM 71-00-00/201).

NOTE: Operate the engines at a minimum idle for this test.

12) Make sure the APU master control switch on the P5 panel is in the off position.
13) Let the engines operate at idle power with boost pumps on for a minimum of two minutes (this time is referred to as "the warm-up period").

NOTE: With ambient conditions of extreme cold, it can be necessary to let the engine warm up for more time.

14) While the engines operate at a minimum idle, set all of the fuel pumps to the off position.

15) Make sure the engines operate at idle for a minimum of five minutes.
    a) If one or both of the engines stop in less than five minutes, do this procedure: Right (Left) Engine Fails the Suction Feed Test (FIM 28-22-00/101 Fig. 112).
16) Stop the engines with the correct shutdown procedure (AMM 71-00-00/201).
17) Remove electrical power if it is not necessary (AMM 24-22-00/201).

(b) Run 2
1) Refuel or defuel the fuel tank so that each main fuel tank has 4,200-4,600 lbs (1,900-2,100 kgs) of fuel.
2) The center fuel tank can contain any quantity of fuel, there is no restriction.

3) Make sure the switch-light(s) for the FUEL XFEED VALVE(s) on the fuel management panel (found on the overhead P5 panel) is (are) in the closed position.
4) Make sure the switch-light for the C PUMPS L on the fuel management panel (found on the overhead P5 panel) is in the off position.
5) Make sure the switch-light for the C PUMPS R on the fuel management panel (found on the overhead P5 panel) is in the off position.

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

6) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication of the fuel pumps.
    a) Immediately set the applicable fuel pump switch to off if the PRESS light comes on and stays on.
7) Push the L PUMPS FWD switch-light on the fuel management panel (found on the P5 panel) to the ON position.
    a) Make sure the L PUMPS PRESS - FWD switch-light on the P5 panel panel is off.

b) Make sure the ON flow bar on the L PUMPS FWD switch-light comes on.

8) Push the L PUMPS AFT switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the L PUMPS PRESS - AFT switch-light on the P5 panel is off.
   b) Make sure the ON flow bar on the L PUMPS AFT switch-light comes on.
9) Push the R PUMPS FWD switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the R PUMPS PRESS - FWD switch-light on the P5 panel is off.
   b) Make sure the ON flow bar on the R PUMPS FWD switch-light comes on.
10) Push the R PUMPS AFT switch-light on the fuel management panel (found on the P5 panel) to the ON position.
   a) Make sure the R PUMPS PRESS - AFT switch-light on the P5 panel is off.
   b) Make sure the ON flow bar on the R PUMPS AFT switch-light comes on.
11) Start the engines (AMM 71-00-00/201).

   NOTE: Operate the engines at a minimum idle for this test.

12) Make sure the APU master control switch on the P5 panel is in the off position.
13) Let the engines operate at idle power with boost pumps on for a minimum of two minutes (this time is referred to as "the warm-up period").

   NOTE: With ambient conditions of extreme cold, it can be necessary to let the engine warm up for more time.

14) While the engines operate at a minimum idle, set all of the fuel pumps to the off position.

15) Make sure the engines operate at idle for a minimum of five minutes.
a) If one or both of the engines stop in less than five minutes, do this procedure: Right (Left) Engine Fails the Suction Feed Test (FIM 28-22-00/101 Fig. 112).
16) Stop the engines with the correct shutdown procedure (AMM 71-00-00/201).
17) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-22-00-725-233

4. Test the Fuel Scavenge System

A. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 28-26-00/201, Defueling

B. Access
(1) Location Zones
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

C. Prepare for Test

S 655-407
(1) Refuel or defuel the fuel tank so the left main fuel tank contains less than 5300 lbs (2400 kgs) of fuel and the center fuel tank contains between 500 lbs and 800 lbs (200 kgs and 400 kgs) of fuel.

NOTE: You can refuel the airplane by pressure fueling (AMM 12-11-01/301) or by tank-to-tank transfer (AMM 28-26-00/201).

S 865-431
(2) Put each of the switches into the position shown:

SWITCH	POSITION	LOCATION
FUEL CROSSFEED VALVE(S)	OPEN	P5 PANEL
L FWD FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL C PUMP	OFF	P5 PANEL
R AFT FUEL BOOST PUMP	OFF	P5 PANEL
R FUEL C PUMP	OFF	P5 PANEL
R FWD FUEL BOOST PUMP	OFF	P5 PANEL
L AFT FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL CONTROL	CUTOFF	P10 STAND
R FUEL CONTROL	CUTOFF	P10 STAND
L FIRE HANDLE	NORMAL	P8 STAND
R FIRE HANDLE	NORMAL	P8 STAND
APU FIRE SWITCH	NORMAL	P8 STAND

S 865-247
(3) Open these circuit breakers on the power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E2, FUEL VALVES R SPAR
(c) 6E3, FUEL VALVES APU
(d) 6F14, L FUEL OVRD PUMP
(e) 6F20, R FUEL OVRD PUMP
(f) 6H14, L AFT FUEL BOOST PUMP
(g) 6H17, R FWD FUEL BOOST PUMP
(h) 6H20, R AFT FUEL BOOST PUMP
(i) 6H23, L FWD FUEL BOOST PUMP

S 865-248
(4) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C33, FUEL DC PUMP PWR
(b) 11D35, FUEL DC PUMP CONT

D. Test the Fuel Scavenge System

S 865-137
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E4, FUELING QTY
(b) 6E5, FUELING CONTROL
(c) 6E6, FUELING VALVES

S 865-138
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 865-139
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P34 panel:
(a) 34A9, FLNG VALVES

(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 975-144
(4) Make a written record of the fuel quantity in the center fuel tank as shown on the fuel quantity indicator on the overhead panel, P5.

S 865-145
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 975-196
(6) Make a written record of the fuel quantity in the left main fuel tank as shown on the fuel quantity indicator on the overhead panel, P5.

S 865-500

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(7) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the OFF if the LOW PRESSURE light comes on and stays on.

S 865-146
(8) Push the L FWD PUMPS switch-light on the fuel management control panel to the ON position.

S 735-406
(9) Let the left forward fuel boost pump operate for 1 hour 45 minutes.

NOTE: Motive flow from the left forward fuel boost pump drives the scavenge ejector pump in the center fuel tank.

S 215-405

(10) Make sure that the fuel quantity in the center fuel tank decreases by 200 lbs (100 kgs) minimum, as shown on the fuel quantity indicator on the overhead panel, P5.

S 215-404

(11) Make sure that the fuel quantity in the left main fuel tank increases by 200 lbs (100 kgs) minimum, as shown on the fuel quantity indicator on the overhead panel, P5.

S 865-159

(12) Push the L FWD PUMPS switch-light on the fuel management control panel to the off position.

E. Put the Airplane Back to its Usual Condition

S 655-249

(1) Refuel the fuel tank if no more work is necessary (AMM 12-11-01/301).

S 865-160

(2) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-22-00-725-242

5. Test the Float-Operated Shutoff Valve

A. References

(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 28-26-00/201, Defueling

B. Access

(1) Location Zones

211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

C. Prepare for Test

S 655-439

(1) Adjust the fuel quantity so the left main fuel tank contains at least 9400 lbs (4300 kgs) of fuel and the center fuel tank contains a minimum of 500 lbs (200 kgs) of fuel.

NOTE: You can do this with the fuel transfer procedure (AMM 28-26-00/201) or with defueling and pressure fueling (AMM 12-11-01/301) as applicable.

S 865-432

(2) Put each of the switches into the position shown:

SWITCH	POSITION	LOCATION
FUEL CROSSFEED VALVE(S)	OPEN	P5 PANEL
L FWD FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL C PUMP	OFF	P5 PANEL
R AFT FUEL BOOST PUMP	OFF	P5 PANEL
R FUEL C PUMP	OFF	P5 PANEL
R FWD FUEL BOOST PUMP	OFF	P5 PANEL
L AFT FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL CONTROL	CUTOFF	P10 STAND
R FUEL CONTROL	CUTOFF	P10 STAND
L FIRE HANDLE	NORMAL	P8 STAND
R FIRE HANDLE	NORMAL	P8 STAND
APU FIRE SWITCH	NORMAL	P8 STAND

S 865-251

(3) Open these circuit breakers on the power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E2, FUEL VALVES R SPAR
(c) 6E3, FUEL VALVES APU
(d) 6F14, L FUEL OVRD PUMP
(e) 6F20, R FUEL OVRD PUMP
(f) 6H14, L AFT FUEL BOOST PUMP
(g) 6H17, R FWD FUEL BOOST PUMP
(h) 6H20, R AFT FUEL BOOST PUMP
(i) 6H23, L FWD FUEL BOOST PUMP

S 865-252

(4) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C33, FUEL DC PUMP PWR
(b) 11D35, FUEL DC PUMP CONT

D. Test the Float-Operated Shutoff Valve

S 865-161

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E4, FUELING QTY
(b) 6E5, FUELING CONTROL
(c) 6E6, FUELING VALVES

S 865-162

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 865-163

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P34 panel:
(a) 34A9, FLNG VALVES
(b) 34A10, FUEL QTY
(c) 34A11, FLNG CONT

S 975-168

(4) Make a written record of the fuel quantity in the center fuel tank as shown on the fuel quantity indicator on the overhead panel, P5.

S 975-198

(5) Make a written record of the fuel quantity in the left main fuel tank as shown on the fuel quantity indicator on the overhead panel, P5.

S 865-169

(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 865-501

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(7) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the OFF if the LOW PRESSURE light comes on and stays on.

S 865-170

(8) Push the L FWD PUMPS switch-light on the fuel management control panel to the ON position.

S 735-401

(9) Let the left forward fuel boost pump operate for 1 hour and 45 minutes.

NOTE: Motive flow from the left forward fuel boost pump operates the scavenge jet pump in the center fuel tank. The float-operated shutoff valve stops the scavenge flow from the center fuel tank to the main fuel tank when the left main fuel tank is over half full.

S 215-402
(10) Make sure that the fuel quantity in the center fuel tank does not decrease by more than 220 lbs (100 kgs), as shown on the fuel quantity indicator on the overhead panel, P5.

S 215-403
(11) Make sure that the fuel quantity in the left main fuel tank does not increase by more than 220 lbs (100 kgs), as shown on the fuel quantity indicator on the overhead panel, P5.

S 865-183
(12) Push the L FWD PUMPS switch-light on the fuel management control panel to the OFF position.

E. Put the Airplane Back to its Usual Condition

S 655-186
(1) Refuel the fuel tank if no more work is necessary (AMM 12-11-01/301).

S 865-187
(2) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-22-00-725-507

6. AIRPLANES WITH THE AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082);
Center Tank Fuel Override Pump Auto Shutoff Functional Test

A. General
(1) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling

C. Equipment
(1) Stopwatch - commercially available

D. Access
(1) Location Zones
119 Main Equipment Center (Left)
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)
621 Leading Edge to Front Spar (Right)

(2) Access Panels
119BL Electrical/Electronics Access Door
621GB Fueling Station Door

E. Prepare for the Functional Test

S 655-511
(1) Make sure there is minimum fuel quantity of 2000 pounds (900 kilograms) in the center fuel tank and a minimum fuel quantity of 2000 pounds (900 kilograms) each in the left and right main fuel tanks.

NOTE: If the fuel override pumps are not primed, there must be a minimum of 20,000 pounds (9100 kilograms) of fuel in the center tank.

(a) Refuel the fuel tank(s) if it is necessary (AMM 12-11-01/301).

S 725-585

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(2) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to the off position if the low PRESS light comes on and stays on.

S 865-508
(3) Put each of the these switches into the position shown:

SWITCH	POSITION	LOCATION
FWD FUEL CROSSFEED VALVE	OPEN	P5 PANEL
AFT FUEL CROSSFEED VALVE	OPEN	P5 PANEL
LEFT C PUMPS	OFF	P5 PANEL
RIGHT C PUMPS	OFF	P5 PANEL

S 865-509
(4) Make sure these circuit breakers are closed:
(a) On the power distribution panel, P6:
1) 6F14, L FUEL OVRD PUMP
2) 6F20, R FUEL OVRD PUMP

3) 6H14, L AFT FUEL BOOST PUMP
4) 6H17, R FWD FUEL BOOST PUMP
5) 6H20, R AFT FUEL BOOST PUMP
6) 6H23, L FWD FUEL BOOST PUMP

(b) On the overhead circuit breaker panel, P11:
1) 11L13, FUEL-AUTO S/O OVRD PMP CTR TANK L
2) 11L25, FUEL-AUTO S/O OVRD PMP CTR TANK R

S 015-510

(5) Open the fueling station door, 621GB, on the right wing leading edge.

S 725-575

(6) Push the L AFT FUEL BOOST PUMP switch on the P5 panel to the ON position.
(a) Make sure L FUEL SYS PRESS does not show on the EICAS display.

S 725-576

(7) Push the R AFT FUEL BOOST PUMP switch on the P5 panel to the ON position.
(a) Make sure R FUEL SYS PRESS does not show on the EICAS display.

F. Do the Auto Shutoff Functional Test for the Left Center Fuel Override Pump

S 725-513

(1) Make sure the LEFT C PUMPS switch-light of the fuel management control panel on the P5 panel is in the OFF position.

NOTE: This will make sure the auto shutoff system is reset.

S 725-514

(2) Make sure the LEFT C PUMPS PRESS light on the P5 panel is off.

S 725-515

(3) Push the LEFT C PUMPS switch-light on the P5 panel to the ON position.

S 725-516

(4) Make sure the ON flowbar on L FUEL C PUMPS switch-light comes on.

S 725-517

(5) Make sure the L FUEL C PUMPS PRESS light on the P5 panel comes on and then goes off.

S 725-518

(6) Put and hold, for 1 to 5 seconds, the test switch, S10712, on the E2 equipment rack to the L AUTO SHUTOFF position and release it.

S 725-519

(7) Make sure the L FUEL C PUMPS PRESS light on the P5 panel stays off.

S 725-520
(8) Set a stopwatch to zero.

S 725-521
(9) Start a stopwatch as you put and hold the test switch, S10712, on the E2 rack to the L AUTO SHUTOFF position.

S 725-577
(10) Make sure CTR L FUEL PUMP does not show on the EICAS display.

S 725-522
(11) When the LEFT C PUMPS PRESS light on the fuel management control panel comes on (in approximately 15 seconds), stop the stopwatch.

S 725-523
(12) Make sure the stopwatch show 15+/-3 seconds.

S 725-524
(13) Release the test switch, S10712.

S 725-525
(14) Make sure the LEFT C PUMPS PRESS light on the fuel management control panel stays on.

S 715-586
(15) Make sure CTR L FUEL PUMP shows on the EICAS display.

NOTE: This message shows approximately 10 seconds after the L FUEL C PUMPS PRESS light comes on.

S 725-526
(16) Push the LEFT C PUMPS switch-light on the P5 panel to the off position.

S 725-527
(17) Make sure the LEFT C PUMPS PRESS light on the P5 panel goes off.

S 725-579
(18) Make sure CTR L FUEL PUMP does not show on the EICAS display.

G. Do the Auto Shutoff Functional Test for the Right Center Fuel Override Pump

S 725-542
(1) Make sure the RIGHT C PUMPS switch-light of the fuel management control panel on the P5 panel is in the OFF position.

NOTE: This will make sure the right auto shutoff system is reset.

S 725-541
(2) Make sure the RIGHT C PUMPS PRESS light on the P5 panel is off.

S 725-540
(3) Push the RIGHT C PUMPS switch-light on the P5 panel to the ON position.

S 725-543
(4) Make sure the ON flowbar on RIGHT C PUMPS switch-light comes on.

S 725-539
(5) Make sure the RIGHT C PUMPS PRESS light on the P5 panel comes on and then goes off.

S 725-538
(6) Put and hold, for 1 to 5 seconds, the test switch, S10711, on the E2 equipment rack to the R AUTO SHUTOFF position and release it.

S 725-537
(7) Make sure the RIGHT C PUMPS PRESS light on the P5 panel stays off.

S 725-535
(8) Set a stopwatch to zero.

S 725-534
(9) Start the stopwatch as you put and hold the test switch, S10711, on the E2 rack to the R AUTO SHUTOFF position.

S 725-580
(10) Make sure CTR R FUEL PUMP does not show on the EICAS display.

S 725-533
(11) When the RIGHT C PUMPS PRESS light on the fuel management control panel comes on (in approximately 15 seconds), stop the stopwatch.

S 725-532
(12) Make sure the stopwatch show 15+/-3 seconds.

S 725-531
(13) Release the test switch, S10711.

S 725-530
(14) Make sure the RIGHT C PUMPS PRESS light on the fuel management control panel stays on.

S 725-581
(15) Make sure CTR R FUEL PUMP shows on the EICAS display.

NOTE: This message shows approximately 10 seconds after the R FUEL C PUMPS PRESS light comes on.

S 725-529
(16) Push the RIGHT C PUMPS switch-light on the P5 panel to the off position.

S 725-528
(17) Make sure the RIGHT C PUMPS PRESS light on the P5 panel goes off.

S 725-582
(18) Make sure CTR R FUEL PUMP does not show on the EICAS display.

H. Put the Airplane Back to Its Usual Condition

S 725-584
(1) Push the L AFT FUEL BOOST PUMP switch on the P5 panel to the off position.

S 725-583
(2) Push the R AFT FUEL BOOST PUMP switch on the P5 panel to the off position.

S 415-578
(3) Close the fueling station door, 621GB, on the right wing leading edge.

TASK 28-22-00-725-589

7. AIRPLANES POST-SB 28A0105;
Center Tank Fuel Pump Uncommanded On - Functional Test

A. General
(1) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling

(2) AMM 28-26-00/201, Defueling

C. Equipment
(1) Multimeter - Standard
(2) Voltmeter - Simpson, Model 260 or equivalent

D. Access
(1) Location Zones
119 Main Equipment Center
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

(2) Access Panels
119BL Electrical/Electronics Access Door

E. Prepare for Test

S 655-591
(1) Make sure these quantities of fuel are in the fuel tanks:

NOTE: You can refuel the airplane by pressure fueling (AMM 12-11-01/301) or by tank-to-tank transfer (AMM 28-26-00/201).

(a) Center fuel tank - 3,000 pounds (1,364 kilograms) of fuel or more
(b) Left and right fuel tanks 14,000 pounds (6,364 kilograms) of fuel or less

S 215-633
(2) Make sure the boost pump switches on the overhead P5 panel are in the OFF position.

S 865-632
(3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
(a) On the power distribution panel, P6:
1) 6F14, L FUEL OVRD PUMP
2) 6F20, R FUEL OVRD PUMP
(b) On the overhead circuit breaker panel, P11:
1) 11L13, FUEL - AUTO S/O OVRD PMP CTR TANK L
2) 11L25, FUEL - AUTO S/O OVRD PMP CTR TANK R

S 015-634
(4) Get access to the right secondary relay, K10874, in the P37 panel and the left secondary relay, K10875, in the P33 panel.

F. Test of the Left Center Tank Secondary Relay

S 865-592
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the P6 panel:
1) 6F14, L FUEL OVRD PUMP

(b) On the P11 panel:
1) 11L13, FUEL - AUTO S/O OVRD PMP CTR TANK L

S 865-594
(2) Push the LEFT C PUMPS switch-light of the fuel management control panel to the ON position.
(a) Make sure the LEFT C PUMPS PRESS light comes on and then goes off.

S 765-595
(3) Measure the voltage between each terminal A1, A2, B1, B2, C1, and C2 of the K10875 relay and the case ground with a voltmeter.
(a) Make sure the voltage is 105-125 volts AC.

S 865-596
(4) Push the LEFT C PUMPS switch-light of the fuel management control panel to the off position.

S 765-597
(5) Measure the voltage between each terminal A1, A2, B1, B2, C1, and C2 of the K10875 relay and the case ground with a voltmeter.
(a) Make sure the voltage is less than 10 volts AC.

S 765-598
(6) Measure the resistance between each terminal pair of the K10875 relay with a multimeter: A1 and A2, B1 and B2, and C1 and C2.
(a) Make sure the resistance is 1 Meg-ohm or more.

S 865-599
(7) Push the LEFT C PUMPS switch-light of the fuel management control panel to the ON position.
(a) Make sure the LEFT C PUMPS PRESS light comes on and then goes off.

S 865-600
(8) Push and hold the L FUEL TEST AUTO SHUTOFF test switch on the STA 440 Stanchion of the E2 equipment rack until the LEFT C PUMPS PRESS light comes on after approximately 15 seconds.

S 865-635
(9) Release the L FUEL TEST AUTO SHUTOFF test switch.

S 765-601
(10) Measure the voltage between each terminal A1, A2, B1, B2, C1, and C2 of the K10875 relay and the case ground with a voltmeter.
(a) Make sure the voltage is less than 10 volts AC.

S 765-602
(11) Measure the resistance between each terminal pair of the K10875 relay with a multimeter: A1 and A2, B1 and B2, and C1 and C2.
(a) Make sure the resistance is 1 Meg-ohm or more.

S 865-603
(12) Push the LEFT C PUMPS switch-light on the fuel management control panel to the off position.

S 865-604
(13) Push the LEFT C PUMPS switch-light of the fuel management control panel to the ON position.
(a) Make sure the LEFT C PUMPS PRESS light comes on and then goes off.

S 865-605
(14) Push the LEFT C PUMPS switch-light to the off position.

S 865-606
(15) Open these circuit breakers and attach a DO-NOT-CLOSE tags:
(a) On the P6 panel:
1) 6F14, L FUEL OVRD PUMP
(b) On the P11 panel:
1) 11L13, FUEL - AUTO S/O OVRD PMP CTR TANK L

G. Test of the Right Center Tank Secondary Relay

S 865-608
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the P6 panel:
1) 6F20, R FUEL OVRD PUMP
(b) On the P11 panel:
1) 11L25, FUEL - AUTO S/O OVRD PMP CTR TANK R

S 865-610
(2) Push the RIGHT C PUMPS switch-light of the fuel management control panel to the ON position.
(a) Make sure the RIGHT C PUMPS PRESS light comes on and then goes off.

S 765-611
(3) Measure the voltage between each terminal A1, A2, B1, B2, C1, and C2 of the K10874 relay and the case ground with a voltmeter.
(a) Make sure the voltage is 105-125 volts AC.

S 865-612
(4) Push the RIGHT C PUMPS switch-light of the fuel management control panel to the off position.

S 765-613
(5) Measure the voltage between each terminal A1, A2, B1, B2, C1, and C2 of the K10874 relay and the case ground with a voltmeter.
(a) Make sure the voltage is less than 10 volts AC.

S 765-614
(6) Measure the resistance between each terminal pair of the K10874 relay with a multimeter: A1 and A2, B1 and B2, and C1 and C2.
(a) Make sure the resistance is 1 Meg-ohm or more.

S 865-615
(7) Push the RIGHT C PUMPS switch-light of the fuel management control panel to the ON position.
(a) Make sure the RIGHT C PUMPS PRESS light comes on and then goes off.

S 865-616
(8) Push and hold the R FUEL TEST AUTO SHUTOFF test switch on the STA 440 Stanchion of the E2 equipment rack until the RIGHT C PUMPS PRESS light comes on after approximately 15 seconds.

S 865-636
(9) Release the R FUEL TEST AUTO SHUTOFF test switch.

S 765-617
(10) Measure the voltage between each terminal A1, A2, B1, B2, C1, and C2 of the K10874 relay and the case ground with a voltmeter.
(a) Make sure the voltage is less than 10 volts AC.

S 765-618
(11) Measure the resistance between each terminal pair of the K10874 relay with a multimeter: A1 and A2, B1 and B2, and C1 and C2.
(a) Make sure the resistance is 1 Meg-ohm or more.

S 865-619
(12) Push the RIGHT C PUMPS switch-light of the fuel management control panel to the off position.

S 865-620
(13) Push the RIGHT C PUMPS switch-light on the fuel management control panel to the ON position.
(a) Make sure the RIGHT C PUMPS PRESS light comes on and then goes off.

S 865-621

(14) Push the RIGHT C PUMPS switch-light to the off position.

S 865-622

(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  (a) On the P6 panel:
    1) 6F14, L FUEL OVRD PUMP
  (b) On the P11 panel:
    1) 11L13, FUEL - AUTO S/O OVRD PMP CTR TANK L

TASK 28-22-00-715-590

8. Pump Reversal - Operational Test

A. General
  (1) Do this test after the left secondary relay, K10875, the right secondary relay, K10874, or any GFI relay has been removed and replaced.

B. Access
  (1) Location Zones
    119 Main Equipment Center
    211 Control Cabin - Section 41 (Left)
    212 Control Cabin - Section 41 (Right)
  (2) Access Panels
    119BL Electrical/Electronics Access Door

C. Pump Reversal Operational Test

S 865-626

(1) Make sure these circuit breakers are closed:
  (a) On the power distribution panel, P6:
    1) 6F14, L FUEL OVRD PUMP
    2) 6F20, R FUEL OVRD PUMP
    3) 6E4, FUELING QTY
  (b) On the overhead circuit breaker panel, P11:
    1) 11C34, FUEL QTY 1
    2) 11L19, FUEL QTY 2

(c) On the APU external power panel, P34:
1) 34A10, FUEL QTY

S 215-637
(2) Make sure the boost pump switches on the overhead P5 panel are in the off position.

S 715-629
(3) Do these steps to do a test of the left fuel override pump to make sure there is enough pump pressure:
(a) Make a written record of the initial quantity of fuel in the center tank.
(b) Prepare to transfer fuel from the center tank to the left main tank with the left fuel override pump (Tank to Tank Transfer, AMM 28-26-00/201).
(c) Push the LEFT C PUMPS switch-light on the fuel management panel to the ON position.
1) Keep the LEFT C PUMPS switch-light in the ON position for two minutes.
(d) After two minutes, push the LEFT C PUMPS switch-light on the fuel management panel to the OFF position.
(e) Make a written record of the final quantity of fuel in the center tank.
(f) Calculate the quantity of fuel that was transferred from the center tank to the left main tank.
1) Subtract the final fuel quantity from the initial fuel quantity.
(g) Make sure the difference is 400 lbs (181 kgs) or more.
(h) If the difference is less than 400 lbs (181 kgs), do a check of the phase relationship of the wiring to the applicable K10875 (secondary) or K10011 (GFI) relay.

S 715-671
(4) Do these steps to do a test of the left aft fuel boost pump to make sure there is enough pump pressure:
(a) Make a written record of the initial quantity of fuel in the center tank.

(b) Prepare to transfer fuel from the left main tank to the center tank with the left aft fuel boost pump (Tank to Tank Transfer, AMM 28-26-00/201).
(c) Push the LEFT AFT PUMP switch-light on the fuel management panel to the ON position.
1) Keep the LEFT AFT PUMP switch-light in the ON position for two minutes.
(d) After two minutes, push the LEFT AFT PUMP switch-light on the fuel management panel to the OFF position.
(e) Make a written record of the final quantity of fuel in the center tank.
(f) Calculate the quantity of fuel that was transferred from the left main tank to the center tank.
1) Subtract the final fuel quantity from the initial fuel quantity.
(g) Make sure the difference is 200 lbs (100 kgs) or more.
(h) If the difference is less than 200 lbs (100 kgs), do a check of the phase relationship of the wiring to the K187 relay.

S 715-672

(5) Do these steps to do a test of the left forward fuel boost pump to make sure there is enough pump pressure:
(a) Make a written record of the initial quantity of fuel in the center tank.
(b) Prepare to transfer fuel from the left main tank to the center tank with the left forward fuel boost pump (Tank to Tank Transfer, AMM 28-26-00/201).
(c) Push the LEFT FWD PUMP switch-light on the fuel management panel to the ON position.
1) Keep the LEFT FWD PUMP switch-light in the ON position for two minutes.
(d) After two minutes, push the LEFT FWD PUMP switch-light on the fuel management panel to the OFF position.
(e) Make a written record of the final quantity of fuel in the center tank.
(f) Calculate the quantity of fuel that was transferred from the left main tank to the center tank.
1) Subtract the final fuel quantity from the initial fuel quantity.
(g) Make sure the difference is 200 lbs (100 kgs) or more.
(h) If the difference is less than 200 lbs (100 kgs), do a check of the phase relationship of the wiring to the K188 relay.

S 715-630

(6) Do these steps to do a test of the right fuel override pump to make sure there is enough pump pressure:
   (a) Make a written record of the initial quantity of fuel in the center tank.
   (b) Prepare to transfer fuel from the center tank to the right main tank with the right fuel override pump (Tank to Tank Transfer, AMM 28-26-00/201).
   (c) Push the RIGHT C PUMPS switch-light on the fuel management panel to the ON position.
      1) Keep the RIGHT C PUMPS switch-light in the ON position for two minutes.
   (d) After two minutes, push the RIGHT C PUMPS switch-light on the fuel management panel to the OFF position.
   (e) Make a written record of the final quantity of fuel in the center tank.
   (f) Calculate the quantity of fuel that was transferred from the center tank to the right main tank.
      1) Subtract the final fuel quantity from the initial fuel quantity.
   (g) Make sure the difference is 400 lbs (181 kgs) or more.
   (h) If the difference is less than 400 lbs (181 kgs), do a check of the phase relationship of the wiring to the applicable K10874 (secondary) or K10012 (GFI) relay.

S 715-674

(7) Do these steps to do a test of the right aft fuel boost pump to make sure there is enough pump pressure:
   (a) Make a written record of the initial quantity of fuel in the center tank.
   (b) Prepare to transfer fuel from the right main tank to the center tank with the right aft fuel boost pump (Tank to Tank Transfer, AMM 28-26-00/201).
   (c) Push the RIGHT AFT PUMP switch-light on the fuel management panel to the ON position.
      1) Keep the RIGHT AFT PUMP switch-light in the ON position for two minutes.

(d) After two minutes, push the RIGHT AFT PUMP switch-light on the fuel management panel to the OFF position.
(e) Make a written record of the final quantity of fuel in the center tank.
(f) Calculate the quantity of fuel that was transferred from the right main tank to the center tank.
1) Subtract the final fuel quantity from the initial fuel quantity.
(g) Make sure the difference is 200 lbs (100 kgs) or more.
(h) If the difference is less than 200 lbs (100 kgs), do a check of the phase relationship of the wiring to the K189 relay.

S 715-673

(8) Do these steps to do a test of the right forward fuel boost pump to make sure there is enough pump pressure:
(a) Make a written record of the initial quantity of fuel in the center tank.
(b) Prepare to transfer fuel from the right main tank to the center tank with the right forward fuel boost pump (Tank to Tank Transfer, AMM 28-26-00/201).
(c) Push the RIGHT FWD PUMP switch-light on the fuel management panel to the ON position.
1) Keep the RIGHT FWD PUMP switch-light in the ON position for two minutes.
(d) After two minutes, push the RIGHT FWD PUMP switch-light on the fuel management panel to the OFF position.
(e) Make a written record of the final quantity of fuel in the center tank.
(f) Calculate the quantity of fuel that was transferred from the right main tank to the center tank.
1) Subtract the final fuel quantity from the initial fuel quantity.
(g) Make sure the difference is 200 lbs (100 kgs) or more.
(h) If the difference is less than 200 lbs (100 kgs), do a check of the phase relationship of the wiring to the K190 relay.

TASK 28-22-00-715-645

9. AIRPLANE WITH POST-SB 28A0078 OR AIRPLANE WITH POST-SB 28A0079;
Ground Fault Interrupter (GFI) - Operational Test

A. General

(1) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References

(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 24-22-00/201, Manual Control

C. Access

(1) Location Zones

500	Main Tank (Left)
600	Main Tank (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

D. Prepare for Test

S 865-646

(1) Make sure that these circuit breakers are closed:
(a) On the main power distribution panel, P6:
1) 6F14, L FUEL OVRD PUMP
2) 6H14, L AFT FUEL BOOST PUMP
3) 6H23, L FWD FUEL BOOST PUMP
4) 6F20, R FUEL OVRD PUMP
5) 6H17, R FWD FUEL BOOST PUMP
6) 6H20, R AFT FUEL BOOST PUMP

S 865-647

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

S 215-648

(3) Put each of the these switches into the position shown:

SWITCH	POSITION	LOCATION
L FWD FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL C PUMP	OFF	P5 PANEL
R AFT FUEL BOOST PUMP	OFF	P5 PANEL
R FUEL C PUMP	OFF	P5 PANEL
R FWD FUEL BOOST PUMP	OFF	P5 PANEL
L AFT FUEL BOOST PUMP	OFF	P5 PANEL
L FUEL CONTROL	CUTOFF	P10 STAND
R FUEL CONTROL	CUTOFF	P10 STAND
L FIRE HANDLE	NORMAL	P8 STAND
R FIRE HANDLE	NORMAL	P8 STAND
APU FIRE SWITCH	NORMAL	P8 STAND

S 655-649

(4) Make sure that the center fuel tank contains a fuel quantity between 7,000 and 15,000 pounds (3,200 and 6,800 kilograms).

S 655-650

(5) Make sure that the applicable main fuel tank contains a fuel quantity between 3,000 and 5,000 pounds (1,400 and 2,300 kilograms).

S 865-651

(6) Make sure these valves are closed:
   (a) The engine fuel shutoff valve (spar valve) for the No. 1 tank
   (b) The engine fuel shutoff valve (spar valve) for the No. 2 tank
   (c) The engine fuel crossfeed valve
   (d) The defuel valve

S 015-652

(7) Open the fueling station door, 621GB (AMM 06-44-00/201).

E. Ground Fault Interrupter (GFI) Relay Operational Test

S 865-653

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(1) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
   (a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 865-654

(2) Push the applicable fuel boost pump or fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.

PUMP	SWITCH-LIGHT
Left aft fuel boost pump	L AFT PUMPS
Left forward fuel boost pump	L FWD PUMPS
Left fuel override pump *[1]	LEFT C PUMPS
Right aft fuel boost pump	R AFT PUMPS
Right forward fuel boost pump	R FWD PUMPS
Right fuel override pump *[1]	RIGHT C PUMPS

*[1] The fueling station door (621GB) must be open before the left or right override pump will operate.

S 285-655

(3) Listen and make sure the applicable fuel boost pump operates.

S 215-656

(4) Make sure the applicable LOW PRESSURE light on the P5 Overhead Panel goes off.

S 865-657

(5) Push the applicable ground fault interrupter (GFI) relay TEST button on either the P33 or P37 panel.
   (a) For the left aft fuel boost pump, the relay is K187, found on the P33 panel.
   (b) For the left forward fuel boost pump, the relay is K188, found on the P37 panel.
   (c) For the left override fuel boost pump, the relay is K10011, found on the P33 panel.
   (d) For the right aft fuel boost pump, the relay is K189, found on the P37 panel.
   (e) For the right forward fuel boost pump, the relay is K190, found on the P33 panel.
   (f) For the right override fuel boost pump, the relay is K10012, found on the P37 panel.

S 215-658
(6) Make sure the RESET button on the applicable GFI relay has moved up, showing a white band.

NOTE: The RESET button located at the top edge of the GFI relay moves up, to expose a narrow white band when the GFI circuit turns off the relay due to a ground fault, or results when you push the TEST button located at the top surface of the relay.

S 285-659
(7) Listen and make sure the applicable fuel boost pump does not operate.

S 215-660
(8) Make sure the applicable fuel boost pump LOW PRESSURE light comes on.

S 865-661
(9) Put the applicable fuel boost pump switch on the fuel management control panel on the P5 overhead panel to the OFF position.

S 715-662
(10) To make sure that the applicable fuel boost pump does not operate when the GFI circuit turns off the relay, do the subsequent steps:
  (a) Put the applicable fuel boost pump switch on the fuel management control panel on the P5 overhead panel to the ON position.
  (b) Listen and make sure the applicable fuel boost pump does not operate.
  (c) Make sure the applicable fuel boost pump LOW PRESSURE light comes on.
  (d) Put the applicable fuel boost pump switch on the fuel management control panel on the P5 overhead panel, to the OFF position.

S 865-663
(11) Push the applicable RESET button on the applicable GFI relay in.
  (a) Make sure the RESET button does not pop back out and the white band is not visible.

S 865-664
(12) Put the applicable fuel boost pump switch on the fuel management control panel on the P5 overhead panel to the ON position.

S 285-665
(13) Listen and make sure the applicable fuel boost pump operates.

S 215-666
(14) Make sure the applicable LOW PRESSURE light on the fuel management panel on the P5 overhead panel goes off.

S 865-667
(15) Put the applicable fuel boost pump switch on the fuel management control panel on the P5 overhead panel to the OFF position.

S 285-668
(16) Listen and make sure the applicable fuel boost pump does not operate.

S 215-669
(17) For the left or right main tank fuel boost pumps, make sure the applicable LOW PRESSURE light comes on.

S 215-670
(18) For the center tank fuel boost pumps, make sure the applicable LOW PRESSURE light stays off.

S 715-679
(19) If the relay K10874, K10875, or any GFI relay has been removed or replaced, then do the task: Pump Reversal - Operational Test (AMM 28-22-00/501).

ENGINE FUEL FEED SYSTEM - INSPECTION/CHECK

TASK 28-22-00-206-001

1. FUEL BOOST PUMP 60B92404-5, -6, OR -7;
FUEL OVERRIDE PUMP 60B89004-8, -10, OR -12;
Fuel Pumps - Insulation Resistance Check

A. General

(1) The Insulation Resistance Check is not required for all fuel pumps. Fuel boost pumps 60B92404-5, -6, OR -7, and fuel override pumps 60B89004-8, -10, OR -12 require the Insulation Resistance Check. Fuel boost pumps 60B92404-8 and subsequent, or fuel override pumps 60B89004-14 and subsequent do not require the Insulation Resistance Check.

(2) This task does a insulation resistance check of these fuel system pumps:

(a) Boost pumps for the main tanks

(b) Override/jettison pumps for the center tanks

(3) The insulation resistance checks can be done with the fuel pumps installed on the airplane or removed from the airplane. If the fuel pump is removed from the airplane, you must do the insulation resistance check within 2 hours.

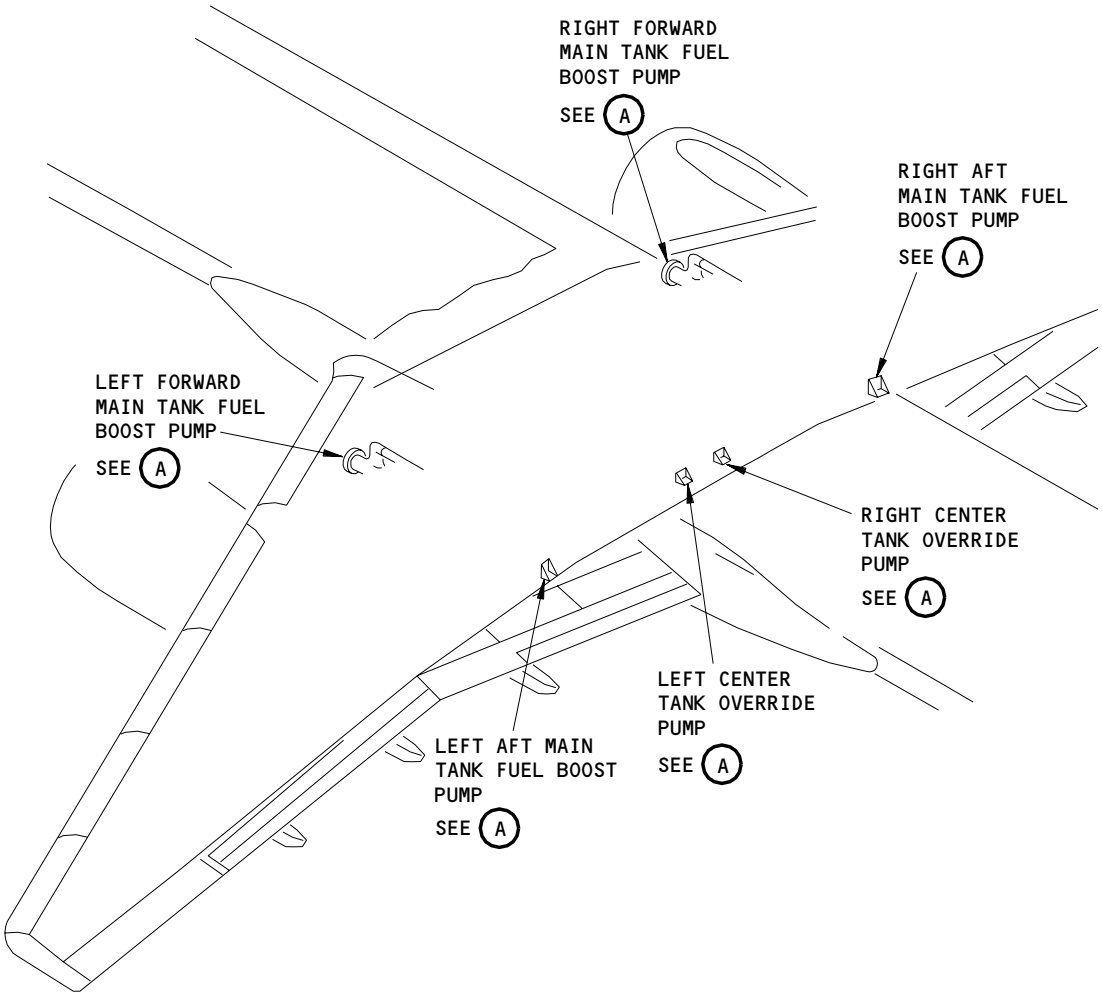
(4) When you use the QuadTech Type 1864 megohmmeter, it is recommended that the megohmmeter be insulated from any metal work stands. It is also recommended that protective clothing (rubber gloves, insulated shoes, etc.) be worn when you make these measurements. The megohmmeter should be plugged into a grounded receptacle to reduce the possibility of electrical shock.

B. Equipment

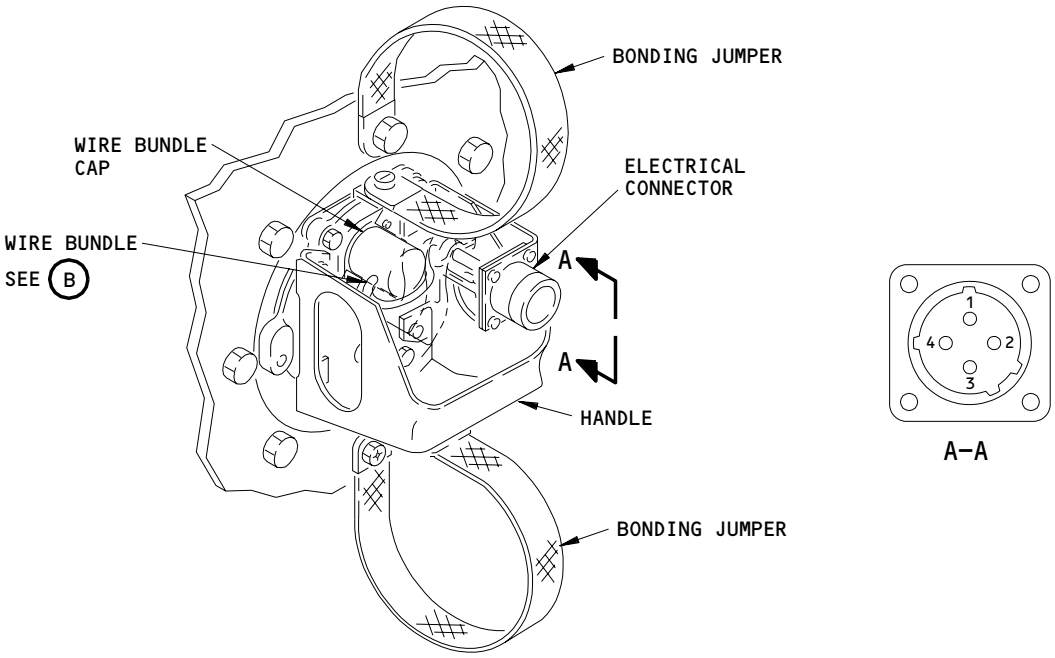
(1) Ohm Meter:

(a) Ohm Meter, Avtron T477W, (or equivalent):
Avtron Manufacturing Co.,
10409 Meech Ave., Cleveland, Ohio USA 44105

NOTE: The Avtron T477W Ohm Meter can only read a maximum of two ohms.

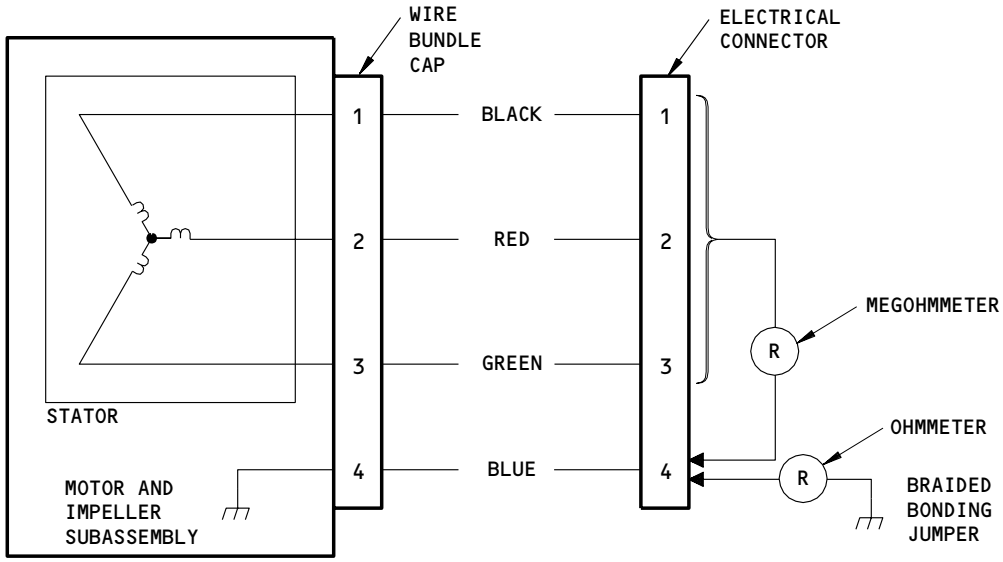


Boost Pump and Override Pump Inspection
Figure 601 (Sheet 1)



FUEL OVERRIDE PUMP
(FUEL BOOST PUMP IS ALMOST THE SAME)

A



B

Boost Pump and Override Pump Inspection
Figure 601 (Sheet 2)

757 FUEL PUMP INSPECTION DATA SHEET

AIRPLANE TAIL NUMBER: HOURS/CYCLES: DATE:

PUMP NAME	INSTALLED PUMP			RESISTANCE IN MEGOHMS								NEW PUMP (IF NEEDED)	
	PART NUMBER	SERIAL NUMBER	TSO/TSN OVHL/NEW	RESISTANCE IN OHMS	10V DC			500V DC				PART NO.	SERIAL NO.
				PIN 4	PIN 1	PIN 2	PIN 3	PIN 1	PIN 2	PIN 3			
LEFT FWD BOOST PUMP													
LEFT AFT BOOST PUMP													
RIGHT FWD BOOST PUMP													
RIGHT AFT BOOST PUMP													
LEFT OVERRIDE PUMP													
RIGHT OVERRIDE PUMP													

Fuel Pump Inspection Data Sheet
Figure 602 (Sheet 1)

PLEASE PROVIDE ADDITIONAL DATA HERE

PART NUMBER	SERIAL NUMBER	COMMENTS

Fuel Pump Inspection Data Sheet
Figure 602 (Sheet 2)

GD0269

(2) Megohmmeter:
(a) QuadTech 1864, (or equivalent):
A special megohmmeter is necessary to do the electrical check with the fuel pump installed on the airplane. The megohmmeter must have 10 VDC and 500 VDC voltage supply options with a maximum short circuit current of 5 milliamperes. The QuadTech model 1864 megohmmeter is recommended.

QuadTech (0PK96)
100 Nickerson Road
Marlborough, Massachusetts USA 01752-4696
Phone: (800) 253-1230

NOTE: Test equipment for the low voltage on-wing safety check (initial check) must be limited to a maximum short circuit power dissipation of 0.05 Watts. Test equipment for the high voltage on-wing check (final check) must be limited to a maximum short circuit power dissipation of 2.5 Watts.

C. References
(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(2) AMM 24-22-00/201, Manual Control
(3) AMM 27-81-00/201, Leading Edge Slat System
(4) AMM 28-22-03/401, Fuel Boost Pump
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks

D. Access
(1) Location Zones

133	Wing Center Section, Left
134	Wing Center Section, Right
511	Leading Edge To Front Spar, Left
611	Leading Edge To Front Spar, Right
531	Center Wing Tank, Left
631	Center Wing Tank, Right

(2) Access Panels

134AZ	Center Tank Access Door, Right
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel, Left
611FB	Leading Edge Access Panel, Right
531AB	Center Tank Access Door, Left
631AB	Center Tank Access Door, Right

E. Prepare for the Check

S 866-002
(1) Supply the electrical power if necessary (AMM 24-22-00/201).

S 866-003

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(2) Do the deactivation procedure for the inboard leading edge slats (AMM 27-81-00/201).

S 146-058

(3) For the forward fuel boost pump, remove the applicable left or right leading edge access panel, 511FB or 611FB (AMM 06-44-00/201).

S 866-037

(4) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 496-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-010

(6) Open the applicable circuit breakers and attach DO-NOT-CLOSE tags:
  (a) On the main power distribution panel, P6:
    1) 6F14, L FUEL OVRD PUMP
    2) 6H14, L AFT FUEL BOOST PUMP
    3) 6H17, R FWD FUEL BOOST PUMP
    4) 6F20, R FUEL OVRD PUMP
    5) 6H20, R AFT FUEL BOOST PUMP
    6) 6H23, L FWD FUEL BOOST PUMP

F. Calibrate the QuadTech Model 1864 Megohmmeter Procedure

NOTE: Do this procedure before you do the resistance checks and each time the megohmmeter is moved. This is necessary to make sure the megohmmeter is calibrated correctly and the adjustment knobs have not accidentally been moved.

S 826-059

(1) Do these steps to calibrate the megohmmeter:
  (a) Disconnect all of the leads from the megohmmeter (if necessary).
  (b) Make sure the megohmmeter is insulated from any metal work stands.

(c) Make sure that you wear protective clothes (rubber gloves, insulated shoes, etc.).
(d) Put the power switch to the POWER position.
(e) Put the function switch to the DISCHARGE position.
(f) Put the multiplier dial to any range setting.
(g) Adjust the SET "infinity symbol" dial until the meter shows the infinity symbol.
(h) Set the multiplier dial to the 10-1T range.
(i) Adjust the SET "infinity symbol" HIGHEST RANGE dial until the meter shows the infinity symbol.
(j) Connect the test probes to the megohmmeter.

G. Fuel Pump Wire Terminal Assembly Inspection

NOTE: It is necessary to do these four procedures at each applicable pump:
- Fuel Pump Wire Terminal Assembly Inspection
- Fuel Pump Continuity Check
- Initial Insulation Resistance Check
- Final Insulation Resistance Check

S 016-011
(1) Go out to the applicable fuel pump location.

S 216-013
(2) At the applicable pump, do a visual inspection of the wire terminal assembly, electrical connector and wire insulation (Fig. 601, View A).
(a) Look for these conditions:
1) Indication that fuel has leaked from the wire terminal assembly.
2) Indication that the terminal assembly or wire insulation is discolored because of too much heat.
a) Clean the wire bundle caps per SWPM 20-60-01.
3) Indication of damage to the wire terminal assembly, for example:
a) Bulges
b) Bent flanges
c) Broken screws
d) Medium to heavy corrosion damage (reference the 757 Corrosion Prevention Manual, CPM 20-40-00, Part I, General Information - Corrosion Removal Techniques, Paragraph 3.A).

S 216-060
(3) If the visual check shows that the fuel pump is OK, do this procedure: Fuel Pump Continuity Check.

S 216-014

(4) If the visual check shows that the fuel pump is not OK, do these steps:

(a) Replace the applicable fuel pump (AMM 28-22-03/401).

(b) Do the Continuity/Resistance Check on the replacement fuel pump.

1) Start with this procedure: Fuel Pump Continuity Check.

S 216-042

(5) If the visual inspection shows that the fuel pump is satisfactory, do this procedure: Fuel Pump Continuity Check.

H. Fuel Pump Continuity Check

S 016-015

(1) Disconnect the electrical connector from the fuel pump.

S 766-054

WARNING: MAKE SURE THE METER USED TO MEASURE BONDING JUMPER CONTINUITY IS RESISTANT TO EXPLOSION. IF NOT, IT IS POSSIBLE THAT AN EXPLOSION OR FIRE CAN OCCUR.

(2) Use the AVTRON Model T477W bonding meter or an equivalent ohmmeter (SWPM 20-20-00).

S 766-038

(3) Measure the resistance between pin 4 of the electrical connector on the pump and the braided bonding jumper on the fuel pump (Fig. 601, Sheet 2).

NOTE: The measurement between pin 4 and the bonding jumper is a continuity check, not a bonding resistance check.

S 976-045

(4) Record the resistance measured between pin 4 and the braided bonding jumper on the 757 Fuel Pump Inspection Data Sheet (Fig. 602, Sheet 1).

S 766-039

(5) If the resistance is equal to or more than 10 ohms, do these steps:

NOTE: The Avtron T477W ohm meter can only read a maximum of 2 ohms. You can use this ohm meter because the resistance you measure will usually be less than 2 ohms. If the resistance is more than 2 ohms, then you must use a different ohm meter or replace the applicable fuel pump.

(a) Replace the applicable fuel pump (AMM 28-22-03/401).

(b) Do the Fuel Pump Continuity Check on the replacement fuel pump.

S 766-040

(6) If the resistance is less than 10 ohms, continue procedure: Initial Insulation Resistance Check.

I. Initial Insulation Resistance Check

S 486-062

(1) Do this procedure: Calibrate the QuadTech Model 1864 Megohmmeter.

S 766-063

(2) RESISTANCE CHECK WITH THE FUEL PUMP REMOVED FROM THE AIRPLANE; (optional)
Do these steps to do a check of the insulation resistance:
(a) Remove the fuel pump unit(s) (AMM 28-22-03/401).
(b) Do this procedure on the removed pumps, within two hours: Final Insulation Resistance Check.

S 766-047

CAUTION: DO THE RESISTANCE CHECK AT 10 VDC FIRST. THE FUEL PUMPS ARE IN FLAMMABLE LEAKAGE ZONES. EACH PUMP IS TESTED AT 10 VDC BEFORE IT IS TESTED AT 500 VDC. THE INITIAL 10 VDC CHECK IS TO FIND OUT IF A FUEL PUMP HAS LOW INSULATION RESISTANCE WHICH CAN ARC OR OVERHEAT WHEN A HIGH VOLTAGE IS APPLIED. THE RESULTS OF THE 10 VDC CHECK WILL TELL YOU IF IT IS SAFE TO DO THE 500 VDC CHECK ON THE FUEL PUMP INSTALLED ON THE AIRPLANE.

(3) RESISTANCE CHECK WITH THE FUEL PUMP INSTALLED ON THE AIRPLANE;
Do these steps to do a check of the insulation resistance (initial check).

NOTE: These steps are done at 10 VDC to prevent arcing or overheat in a flammable leakage zone when high voltage is applied to a pump with low insulation resistance.

(a) Do this procedure: Calibrate the QuadTech Model 1864 Megohmmeter.
(b) Disconnect the electrical connector from the pump unit.

WARNING: MAKE SURE THE QUADTECH MODEL 1864 (OR EQUIVALENT) MEGOHMMETER IS USED TO MEASURE THE INSULATION RESISTANCE. IF NOT, IT IS POSSIBLE THAT AN EXPLOSION OR FIRE CAN OCCUR.

(c) Do these steps to connect the QuadTech Model 1864 megohmmeter for the 10 VDC check:
1) Plug the megohmmeter into a grounded receptacle.
2) Connect the +UNKNOWN probe to the pump connector pin 4 (ground).

3) Connect the -UNKNOWN probe to the pump connector pin 1.
4) Set the multiplier dial to the lowest range (100K).
5) Set the TEST VOLTAGE switches to 10V.
6) Set the measure switch to the MEASURE position.

(d) Do these steps to measure the resistance at the applicable pump:

1) Turn the multiplier switch until the meter reading is less than 5.

NOTE: The resistance is the meter reading multiplied by multiplier switch setting.

2) Measure the resistance between pin 4 and pin 1 of the electrical connector installed on the fuel pump (Fig. 601, View B).

NOTE: If the pump resistance is very high, the megohmmeter value will increase with time. For any resistance over 100 megohms it is not necessary to get the actual resistance value. Stop the measurement once the megohmmeter value is more than 100 megohms. Record the measurement on the data sheet as >100 megohms.

3) Record the resistance measured between pin 4 and pin 1 on the 757 Fuel Pump Inspection Data Sheet (Fig. 602).
4) Set the function switch to the DISCHARGE position.
5) Do these steps again to measure the resistance between pin 4 and the remaining pins on the fuel pump connector, pins 2 and 3.

(e) Make an analysis of the test results:

1) If any resistance measured between pin 4 and pins 1, 2 and 3 is less than 1 megohm, do these steps:
   a) Replace the applicable fuel pump (AMM 28-22-03/401).
   b) Do the Continuity/Resistance Check on the replacement fuel pump.
   c) Start with this procedure: Fuel Pump Continuity Check.
2) If each resistance measured between pin 4 and pins 1, 2 and 3 is equal to or more than 1 megohm, do this procedure: Final Insulation Resistance Check.

J. Final Insulation Resistance Check

S 766-050

WARNING: IF THE FUEL PUMP IS INSTALLED ON THE AIRPLANE, MAKE SURE THE QUADTECH MODEL 1864 (OR EQUIVALENT) MEGOHMMETER IS USED TO MEASURE THE INSULATION RESISTANCE. IF NOT, IT IS POSSIBLE THAT AN EXPLOSION OR FIRE CAN OCCUR.

(1) Do these steps to connect the QuadTech Model 1864 Megohmmeter for the 500 VDC check:
   (a) Calibrate the megohmmeter if it is necessary.
   (b) Plug the megohmmeter into a grounded receptacle.
   (c) Connect the +UNKNOWN probe to the pump connector pin 4 (ground).
   (d) Connect the --UNKNOWN probe to the pump connector pin 1.
   (e) Set the multiplier dial to the lowest range (1M).
   (f) Set the TEST VOLTAGE switches to 500V.
   (g) Set the measure switch to the MEASURE position.

S 766-066

(2) Do these steps to measure the resistance at the pump:
   (a) Turn the multiplier switch until the meter reading is less than 5.

      NOTE: The resistance is the meter reading multiplied by the multiplier switch setting.

   (b) Measure the resistance between pin 4 and pin 1 on the fuel pump electrical connector (Fig. 601, View B).

      NOTE: If the pump resistance is very high, the megohmmeter value will increase with time. For any resistance over 100 megohms it is not necessary to get the actual resistance value. Stop the measurement once the megohmmeter value is more than 100 megohms. Record the measurement on the data sheet as >100 megohms.

   (c) Record the resistance measured between pin 4 and pin 1 on the 757 Fuel Pump Inspection Data Sheet (Fig. 602).
   (d) Set the function switch to the DISCHARGE position.
   (e) Do these steps again to measure the resistance between pin 4 and the remaining pins on the fuel pump connector, pins 2 and 3.
   (f) Put the power switch to the OFF position and remove the test probes.

S 766-067

(3) Make an analysis of the test results:
   (a) If any resistance measured between pin 4 and pins 1, 2 and 3 is less than 1 megohms, do these steps:
      1) Replace the applicable fuel pump (AMM 28-22-03/401).

2) Do the Continuity/Resistance Check on the new fuel pump.
a) Start with this procedure: Fuel Pump Continuity Check.

(b) If any resistance measured between pin 4 and pins 1, 2 and 3 is equal to 1 to 5 megohms, replacement of the fuel pump is optional. Boeing recommends that the fuel pump be replaced.
1) If the fuel pump is replaced, do these steps:
a) Replace the applicable fuel pump (AMM 28-22-03/401).
b) Do the Continuity/Resistance Check on the new fuel pump (Start with this procedure: Fuel Pump Continuity Check).
2) If the fuel pump is not replaced, the insulation resistance test must be done on that fuel pump every "A Check", or an equivalent time.

NOTE: Do the checks of the fuel pumps at the maintenance interval in SB 757-28A0043, Revision 1 (every A-check or an equivalent time).

(c) If each resistance measured between pin 4 and pins 1, 2 and 3 is equal to or more than 5 megohms, the fuel pump resistance check is satisfactory.
1) If the insulation check is satisfactory, do these steps:
a) If the fuel boost pump was removed for the test, re-install the boost pump unit.
b) If the fuel boost pump was not removed for the test, connect the electrical connector for the boost pump unit.

S 716-072
(4) Test the appropriate fuel pump to make sure it operates correctly.
(a) For the main tank fuel boost pumps make sure there is a minimum fuel quantity of 2,000 pounds (900 kilograms) in the applicable main fuel tank.
(b) For the center tank fuel override pumps make sure there is a minimum fuel quantity of 20,000 pounds (9,000 kilograms) in the center fuel tank.
(c) Remove the applicable DO-NOT-CLOSE tag and close the applicable circuit breaker:
1) On the main power distribution panel, P6:
a) 6F14, L FUEL OVRD PUMP
b) 6H14, L AFT FUEL BOOST PUMP
c) 6H17, R FWD FUEL BOOST PUMP

d) 6F20, R FUEL OVRD PUMP
e) 6H20, R AFT FUEL BOOST PUMP
f) 6H23, L FWD FUEL BOOST PUMP

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(d) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
1) Immediately set the applicable fuel pump switch to the OFF if the LOW PRESSURE light comes on and stays on.
(e) Push the applicable fuel boost pump or fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.

PUMP	SWITCH-LIGHT
Left aft fuel boost pump	L AFT PUMPS
Left forward fuel boost pump	L FWD PUMPS
Left fuel override pump *[1]	LEFT C PUMPS
Right aft fuel boost pump	R AFT PUMPS
Right forward fuel boost pump	R FWD PUMPS
Right fuel override pump *[1]	RIGHT C PUMPS

*[1] The fueling station door (621GB) must be open before the left or right override pump will operate.

(f) Listen and make sure the applicable fuel boost pump or fuel override pump operates.
(g) Make sure the applicable PRESS light on the fuel management panel of the P5 panel goes off.
(h) Push the applicable fuel boost pump or fuel override pump switch-light to the off position.
(i) Listen and make sure the applicable fuel boost pump or fuel override pump does not operate.
(j) For the fuel boost pumps, make sure the applicable PRESS light comes on.

S 766-025
(5) Continue to do the visual and insulation resistance checks for the remaining fuel pumps.
(a) Start with this procedure: Fuel Pump Wire Terminal Assembly Inspection.

K. Put the Airplane Back to the Usual Condition

S 096-029

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS CAN OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 416-068
(2) For the forward fuel boost pumps, install the applicable left or right access panel, 511FB or 611FB (AMM 06-44-00/201).

S 866-030

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). THE SLATS CAN MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS.

(3) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 866-073
(4) Close the wing fueling station door, 621GB, on the right wing leading edge if it was opened.

S 866-035
(5) Remove the electrical power if it is not needed for another task (AMM 24-22-00/201).

ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) - REMOVAL/INSTALLATION

1. General
   A. The engine fuel shutoff valve (spar valve) has three parts: the actuator, the adapter shaft and the valve body.
   B. The engine fuel shutoff valve (spar valve) is installed on the rear spar, aft of each fuel measuring stick No. 3 (AMM 28-44-00/001).
   C. It is necessary to defuel the fuel tank to remove the adapter shaft or valve body.
   D. This procedure has these tasks:
      (1) Remove the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve)
      (2) Install the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve)
      (3) Adapter Shaft Alignment
      (4) Remove the Valve Body of the Engine Fuel Shutoff Valve (Spar Valve)
      (5) Install the Valve Body of the Engine Fuel Shutoff Valve (Spar Valve)
      (6) Leak Check for the Engine Fuel Shutoff Valve (Spar Valve).
   E. The procedure to remove and install the actuator of the engine fuel shutoff valve (spar valve) is in AMM 28-22-11/401.

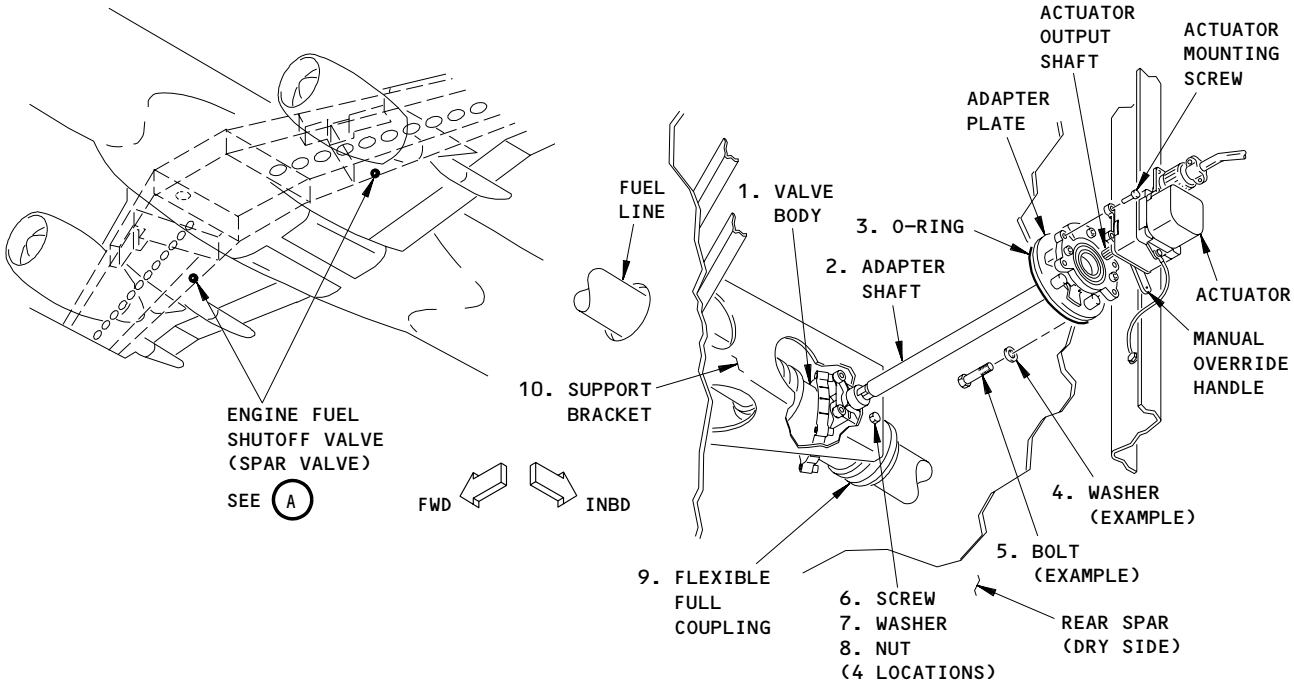
TASK 28-22-01-004-001

2. Remove the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve)
(Fig. 401, 401A)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-22-11/401, Engine Fuel Shutoff Valve (Spar Valve) Actuator
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

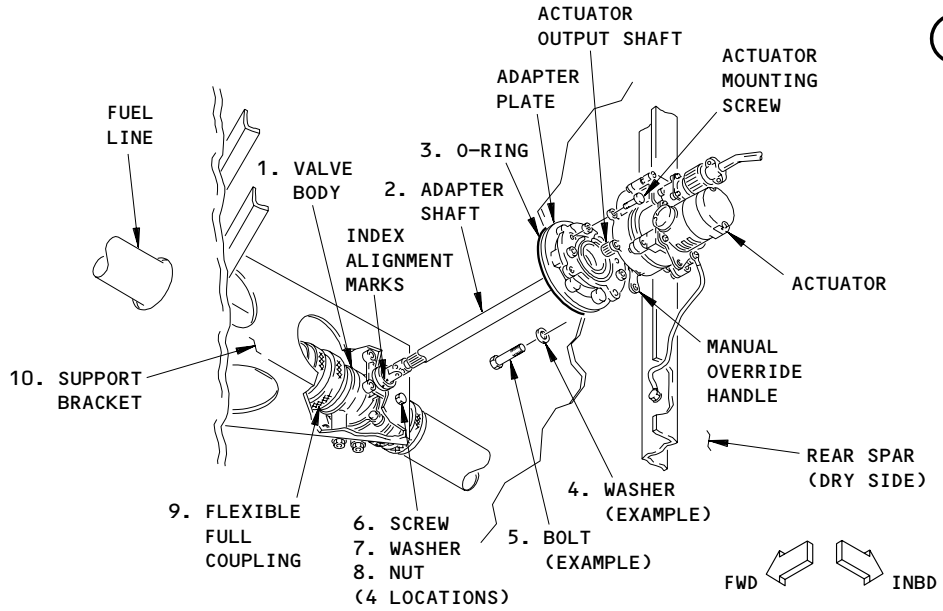
      (2) Access Panels
          541AB Main Tank Access Door (Left)
          641AB Main Tank Access Door (Right)

   C. Remove the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve)

      S 654-004
      (1) Defuel the applicable main fuel tank (AMM 28-26-00/201).



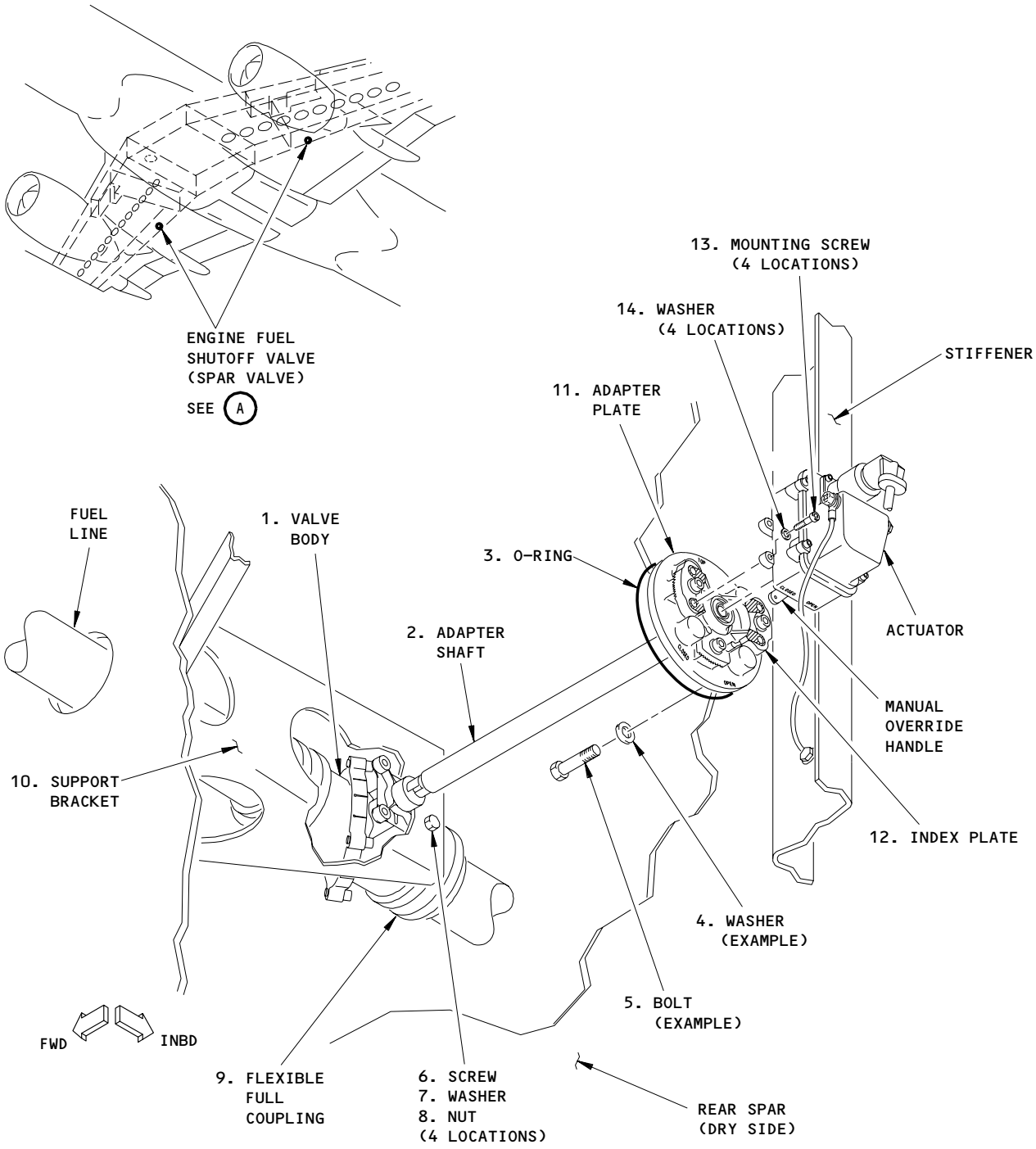
ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)
A 1



ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)
A 2

1 PREFERRED
2 ALTERNATE

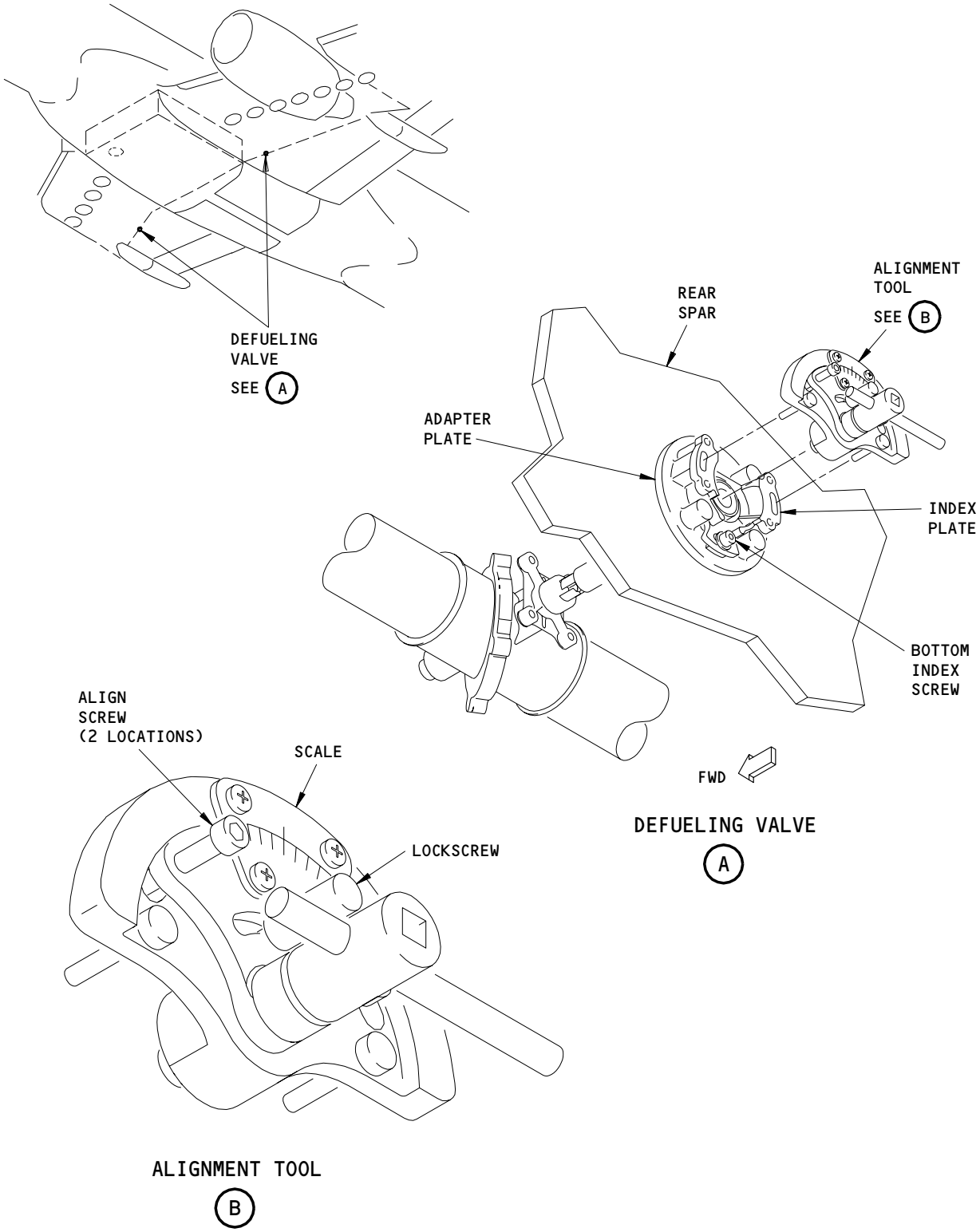
Engine Fuel Shutoff Valve (Spar Valve)
Figure 401



ENGINE FUEL SHUTOFF VALVE
(SPAR VALVE)
A

Engine Fuel Shutoff Valve (Spar Valve)
Figure 401A

1321773



Alignment Tool Installation
Figure 402

S 654-052
(2) Drain and purge the applicable main fuel tank (AMM 28-11-00/201).

S 034-006
(3) Remove the actuator of the applicable left or right engine fuel shutoff valve (spar valve) (AMM 28-22-11/401).

S 014-002
(4) Remove the applicable left or right main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 034-003
(5) Remove the four bolts (5) and washers (4) that attach the adapter shaft (2) to the rear spar.

S 024-007
(6) Disengage the adapter shaft (2) from the valve body (1).

S 024-004
(7) Pull on the adapter shaft (2) from out of the fuel tank to remove.

TASK 28-22-01-404-019

3. Install the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve) (Fig. 401, Fig. 401A)

A. References
(1) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(2) AMM 20-30-92/201, Airplane Structure Cleaning Solvents (Series 92)
(3) AMM 28-00-00/201, Fuel System
(4) AMM 28-11-00/201, Fuel Tanks
(5) AMM 28-11-00/701, Fuel Tanks
(6) AMM 28-11-01/401, Main Tank Access Door
(7) AMM 28-22-11/401, Engine Fuel Shutoff Valve (Spar Valve) Actuator
(8) AMM 51-31-01/201, Seals and Sealing
(9) SWPM 20-20-00, Electrical Bonding and Grounds

B. Consumable Materials
(1) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS 15-5
(2) G50021 Scotch-Brite 96W pad
(3) D00504 Petrolatum grease
(4) C00064 Coating - Chemical Conversion Coating for Aluminum or Aluminum Alloys, MIL-C-5541 (MIL-C-81706) - Alodine 600
(5) C00307 BMS 10-20, Type II Class A - Finish, Corrosion Resistant
(6) A00247 Chromate Type Sealant - BMS 5-95, Class B
(7) A00767 Sealant - Integral Fuel Tank BMS 5-45
(8) B01008 Solvent - Series 88
(9) B01012 Solvent - Series 92

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Adapter Shaft	28-22-11	01	605, 700, 705
	3	O-ring			820

D. Access
(1) Location Zones
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels
541AB Main Tank Access Door (Left)
641AB Main Tank Access Door (Right)

E. AIRPLANES WITH ACTUATOR MA20A1001-1 (PRE-SB 28A0088);
Install the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve) (Fig. 401)

S 944-020

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 434-008
(2) Install a new O-ring (3) on the adapter shaft (2) and align with the groove in the adapter plate.

S 424-021
(3) Put the adapter shaft (2) through the hole in the rear spar from out of the fuel tank.

S 424-022
(4) Engage the adapter shaft (2) with the valve body (1).

S 824-023
(5) Make sure the adapter plate moves freely in the opening of the rear spar.

S 424-009
(6) Install the four bolts (5) and washers (4) to attach the adapter shaft (2) to the rear spar.

S 394-024
(7) Apply the sealant to the bolt (5) (AMM 51-31-01/201).

S 824-069
(8) Do this task: Adapter Shaft Alignment.

S 394-016
(9) Apply a fillet seal around the adapter plate with the sealant (AMM 51-31-01/201).

S 414-017
(10) Install the applicable left or right the main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 204-131
(11) Do this task: Leak Check for the Engine Fuel Shutoff Valve (Spar Valve).

F. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the Adapter Shaft of the Engine Fuel Shutoff Valve (Spar Valve) (Fig. 401A)

S 124-135
(1) Remove the old sealant and clean the rear spar, adapter shaft (2), index plate (12), and fasteners (if reused).
(a) Use the sealant removal tool and sealant removal tool handle (or equivalent) to scrape away the old sealant from the rear spar.
(b) If new parts are to be installed, use an abrasive pad to remove the anodized finish from the faying surfaces of the adapter shaft (2) and index plate (12) (SWPM 20-20-00).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) To remove the remaining sealant, grease, oil, dirt, and other contamination from the components, use one of these items soaked with Series 92 solvent (AMM 20-30-92/201).
1) soft bristle brush
2) cotton wiper
3) Scotch-Brite 96W pad

S 114-136
(2) Do these steps to prepare the adapter shaft (2) and the rear spar for a fillet sealed electrical faying surface bond (SWPM 20-20-00):

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(a) Final clean the contact surfaces of the adapter shaft (2) and the rear spar with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
(b) Rub dry with a clean, dry cotton wiper.
(c) Continue to clean and dry the surface until the dry cotton wiper stays clean.

S 434-137

(3) While outside of the airplane fuel tank, do these steps:
(a) Put a thin layer of petrolatum grease on the new o-ring (3).
(b) Put the o-ring (3) in the o-ring groove of the adapter shaft (2).
(c) Put the shaft portion of the adapter shaft (2) through the hole in the rear spar.
(d) Make sure the shoulder of the adapter shaft (2) does not bind in the opening of the rear spar.

S 864-138

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-139

WARNING: DO THE PURGING AND FUEL TANK ENTRY PROCEDURE. FAILURE TO FOLLOW THE PURGING AND FUEL TANK ENTRY PROCEDURE COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Go into the fuel tank to the engine fuel shutoff valve location (AMM 28-11-00/201).

S 424-140

(6) Do these steps to install the adapter shaft (2):
(a) Make sure that the index marks on the valve body (1) and adapter shaft (2) are aligned.

NOTE: A small misalignment of the index marks is satisfactory.

(b) Engage the shaft of the adapter shaft (2) with the valve body (1).
(c) Apply sealant to the shank and the threads of the four bolts.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use BMS 5-45 Class B sealant for the wet installation of the bolts.
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.52 mm) thick.

(d) Install the bolts and washers to attach the adapter shaft (2) to the spar.
(e) Make sure the gap between the adapter shaft (2) and the valve body spline is 0.20 +/- 0.20 inch (5.1 +/- 5.1 mm).

NOTE: If you can not get the correct gap, loosen the support bracket for the valve body (1) and adjust its position to get the correct gap.

S 764-141

(7) On the outside of the fuel tank, measure the bonding resistance between the adapter plate and the rear spar.
(a) Make sure the resistance is 0.0005 ohm (0.5 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-142

(8) On the inside of the tank, apply a fillet seal of BMS 5-45 Class B sealant to these components (AMM 51-31-01/201):

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) The four bolts.
(b) The periphery of the rear spar penetration and the stationary part of the adapter shaft (2).

NOTE: Make sure the sealant does not touch any part of the adapter shaft (2) that rotates.

S 424-143

(9) On the outside of the fuel tank, apply a fillet seal of BMS 5-45 Class B sealant around the periphery of the adapter shaft (2) (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 414-144

CAUTION: MAKE SURE YOU REMOVE ALL UNWANTED PARTICLES FROM IN THE FUEL TANK. UNWANTED PARTICLES CAN CAUSE A BLOCKAGE OF THE PUMPS AND PREVENT THE SCAVENGE OF FUEL AND WATER.

(10) Remove all unwanted materials from the fuel tank.

S 414-146

(11) Install the applicable main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 824-149

(12) Do this task: Adapter Shaft Alignment.

G. Install the Index Plate

S 824-150

(1) Do this procedure after you have correctly aligned and marked the alignment position of the index plate and adapter plate per this task: Adapter Shaft Alignment.

S 024-151

(2) Remove the index plate (12) from the adapter shaft (2).

S 424-152

(3) Do these steps to prepare the index plate (12) and the adapter shaft (2) for a sealed electrical faying surface bond (SWPM 20-20-00).

(a) Protect the alignment reference mark when you clean the index plate (12) and the adapter shaft (2) for the electrical bond.

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).

(c) Rub dry with a clean, dry cotton wiper.
(d) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(e) Apply a thin continuous layer of sealant to the serrated surface of the index plate (12) (three locations).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.

(f) Apply sealant to the shank and the threads of the mounting screws (13).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the wet installation of the mounting screws (13).
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.52 mm) thick.

S 424-153

(4) Do these steps to install the index plate (12).
(a) Align the index plate (12) and the adapter shaft (2) with the alignment reference mark that you made during the spar valve alignment procedure.
(b) Install the two screws and washers in the top index mounting hole positions.
(c) Install the screw and washer in the bottom index mounting hole position.
(d) Tighten the screws to 22 +/- 1 in-lb (2.5 +/- 0.1 Nm).
(e) Make sure the sealant is continuously squeezed out along the edges of the contact surfaces.
(f) If there are gaps, bubbles or voids in the sealant squeeze out, then disassemble and apply more sealant.
(g) Shape the squeezed out sealant into a fillet seal (AMM 51-31-01/201).
(h) As an option, remove the extra squeezed out sealant.

NOTE: Make sure the sealant that remains is flush with the mating part edges.

S 764-154
(5) Measure the bonding resistance between the adapter plate (11) and the index plate (12).
(a) Make sure the bonding resistance is 0.0005 ohm (0.5 milliohm) or less.

S 424-155
(6) Lockwire the mounting screws (13) and the index plate (12) together.

S 794-156
(7) Do this task: Install the Engine Fuel Shutoff Valve (Spar Valve) Actuator (AMM 28-22-11/401).

S 374-157
(8) Do this task to apply protective finishes to the bare areas of the rear spar: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the rear spar where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating
2) BMS 10-20 coating

TASK 28-22-01-824-054

4. Adapter Shaft Alignment (Fig. 402)
A. Equipment
(1) B28009-1, Adapter Shaft Alignment Tool
(2) Torque meter - 0-15 inch-pounds, with a resolution of +/- 1 inch-pound (optional)
B. References
(1) AMM 28-22-11/401, Engine Fuel Shutoff Valve (Spar Valve) Actuator
C. Access
(1) Location Zones
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

541AB	Main Tank Access Door (Left)
641AB	Main Tank Access Door (Right)

D. Procedure

S 484-056

(1) Do these steps to install the alignment tool in the adapter plate (3):

(a) Remove the top two index screws from the index plate.

(b) Loosen the bottom index screw, but do not remove it.

(c) Install the alignment tool (Fig. 402):

(d) Put the alignment tool in its position with the two guide pins in the holes left by the two index screws that you removed (the scale should be on the top of the tool).

(e) Make sure the spline on the tool engages with the spline on the shaft.

S 824-057

(2) Do these steps to align the adapter shaft (Procedure 1, optional to Procedure 2):

NOTE: This procedure finds the point where the internal valve butterfly engages the valve seal. The torque required to turn the shaft increases as the butterfly engages the seal, then decreases again as the butterfly leaves the other side of the seal. Once the edge of the seal is found, the valve shaft will then be turned to center the butterfly on the seal.

(a) Put the tool handle in the extreme counterclockwise position.

(b) Turn the handle slowly in the clockwise direction at a constant rate while you note the changes in the torque necessary to turn the handle.

(c) Do the previous steps as many times as necessary to find the point in the rotation where the torque necessary to turn the handle increases significantly.

(d) If you cannot find the position in the rotation where the torque increases significantly, then use Procedure 2 below.
(e) Put the shaft in the extreme counterclockwise position again.
(f) Slowly and smoothly turn the handle of the tool clockwise until a distinct increase in torque is found and immediately stop turning the handle.
(g) Read the scale on the tool.

NOTE: This is the point where the valve butterfly starts to engage the edge of the seal.

(h) Turn the handle 13 degrees more in the clockwise direction (the scale on the tool is calibrated in degrees).

NOTE: The valve butterfly is now centered on the valve seal.

If you turn the handle past the target value, do not turn the handle back in the counterclockwise direction again. You must start the procedure again with the handle in the extreme counterclockwise position.

S 824-058

(3) Do these steps to align the adapter shaft (Procedure 2, optional to procedure 1):

NOTE: A torque meter is necessary to do this procedure.

(a) Put the tool handle in the extreme counterclockwise position.
(b) Slowly and smoothly turn the tool handle to the extreme clockwise position while you monitor the torque that you apply to the handle.
(c) Write down the maximum torque that you apply to the tool while you turn it from the extreme counterclockwise position to the extreme clockwise position.

(d) Turn the tool back to the extreme counterclockwise position.
(e) Turn the shaft clockwise again at approximately the same rate that you used before.
(f) Stop at the position where the torque increases to approximately two-thirds of the maximum torque that you wrote down before.
(g) Read the scale on the tool at this position.

NOTE: This is the position where valve butterfly starts to engage the edge of the seal.

(h) Turn the handle 13 more degrees in the clockwise direction past the reading from the previous step.

NOTE: The butterfly valve is now centered on the valve seal.

If you turn the valve past the target value, do not turn it back in the counterclockwise direction. You must start again with the tool handle in the extreme counterclockwise position.

S 034-059
(4) Tighten the lockscrew on the tool to keep the adapter shaft in its position.

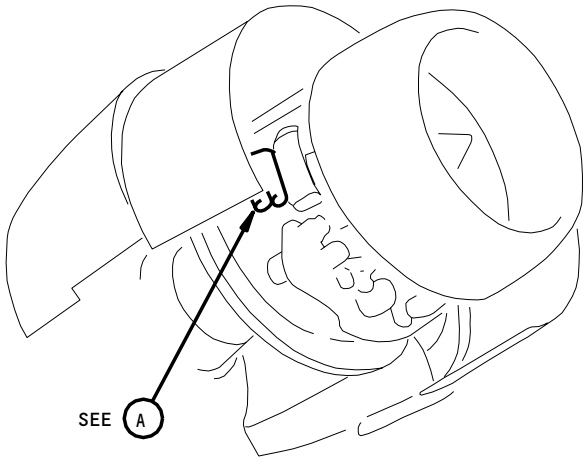
S 824-060
(5) Turn the index plate until the actuator mounting holes in the index plate are aligned with the two upper holes for the actuator mounting screws.

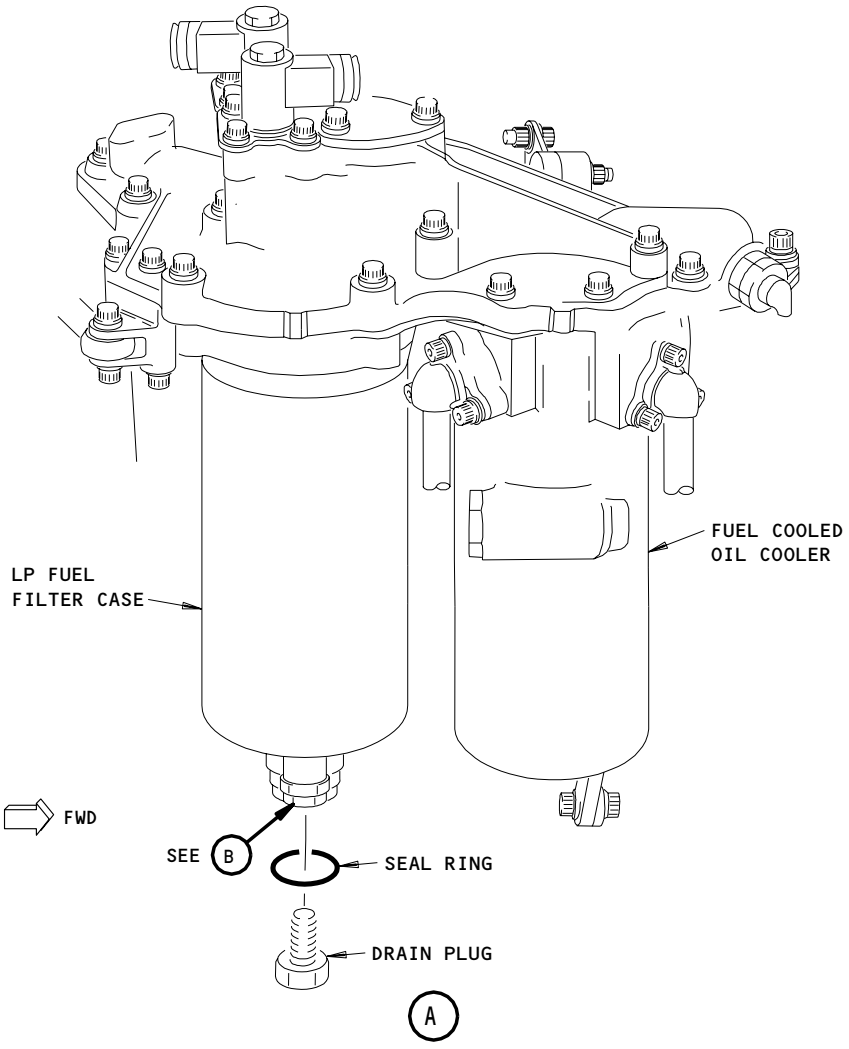
S 824-061
(6) Insert the two align screws into the holes for the actuator mounting screws to hold the index plate in alignment with the mounting plate (this is a final adjustment of the position of the index plate).

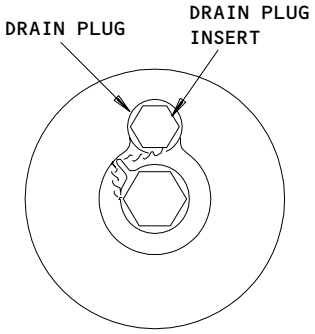
S 434-062
(7) Tighten the bottom index screw to a torque of 21-23 pound-inches.

S 034-063
(8) Carefully remove the align screws.

S 084-064
(9) Carefully remove the alignment tool from the index plate.







67151A

LP Fuel Filter Drain
Figure 403

S 034-065
(10) Install the top two index screws (13) in the index plate (4) and tighten them to a torque of 21-23 pound-inches.

S 434-066
(11) Attach the index screws with lockwire.

S 434-071
(12) Install the actuator of the engine fuel shutoff valve (spar valve) (AMM 28-22-11/401).

TASK 28-22-01-004-018

5. Remove the Valve Body of the Engine Fuel Shutoff Valve (Spar Valve) (Fig. 401, 401A)

A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door
(3) AMM 28-25-05/401, APU Fuel Supply Line and Shroud
(4) AMM 28-26-00/201, Defueling

B. Access
(1) Location Zones
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels
541AB Main Tank Access Door (Left)
641AB Main Tank Access Door (Right)

C. Remove the Valve Body of the Fuel Shutoff Valve (Spar Valve)

S 654-053
(1) Defuel the applicable left or right main fuel tank (AMM 28-26-00/201).

S 654-006
(2) Drain and purge the applicable left or right main fuel tank (AMM 28-11-00/201).

S 014-028
(3) Remove the applicable left or right main tank access door, 541AB or 641AB (AMM 28-11-00/201).

S 944-007

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-008
(5) Go into the fuel tank.

S 034-029
(6) Disconnect the flexible full couplings (9) from each side of the valve body (1) (AMM 28-25-05/401).

S 034-009
(7) Hold the valve body (1) and remove the screws (6), washers (7) and nuts (8) that attach the valve body (1) to the support bracket (10).

S 024-030
(8) Disengage the valve body (1) from the adapter shaft (2).

S 024-031
(9) Remove the valve body (1).

S 494-032
(10) Put the covers on the open ends of the fuel line to keep unwanted materials out.

TASK 28-22-01-404-033

6. Install the Valve Body of the Engine Fuel Shutoff Valve (Spar Valve)
(Fig. 401, 401A)
A. Consumable Materials
(1) A00767 Sealant - BMS 5-45 Class B
B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Valve Body	28-22-01	05	70

C. References
(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-01/401, APU Fuel Supply Line and Shroud
(5) AMM 28-25-05/401, APU Fuel Supply Line and Shroud
(6) AMM 51-31-01/201, Seals and Sealing

D. Access

(1) Location Zones

541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

541AB Main Tank Access Door (Left)
641AB Main Tank Access Door (Right)

E. Install the Valve Body of the Engine Fuel Shutoff Valve (Spar Valve)

S 944-043

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-044

(2) Go into the fuel tank.

S 094-034

(3) Remove the covers from the fuel line.

S 214-035

(4) Make sure the surfaces of the valve body (1) and the support bracket (10) that touch are clean.

S 424-045

(5) Put the shaft on the valve body (1) into the adapter shaft (2).

S 214-014

(6) Make sure "TOP" shows on the top of the valve body (1).

S 824-036

(7) Align the valve body (1) with the support bracket (10).

S 434-037

(8) Install the washers (7) on the screws (6).

S 434-046

(9) Put the screws (6) through the support bracket (10) into the valve body (1).

S 434-047

(10) Install the nuts (8) on the screws (6).

S 394-048
(11) Apply the sealant to the screws (6) (AMM 51-31-01/201).

S 224-038
(12) Make sure the bonding resistance between the valve body and the airplane structure is not more than 0.01 ohm (AMM 20-10-21/601).

S 434-039
(13) Connect the flexible full couplings (9) between the valve body (1) and the fuel line (AMM 28-25-05/401).

S 414-040
(14) Install the applicable left or right main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 864-041
(15) Supply electrical power (AMM 24-22-00/201).

S 714-049
(16) To do a test for the left engine fuel shutoff valve (spar valve), do the steps that follow:
   (a) Make sure the LEFT ENG FIRE switch on the pilot's aft control stand, P8, is in the NORMAL position.
   (b) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
      1) 6C1, FUEL COND CONT L
   (c) Put the L FUEL CONTROL switch on the P10 quadrant control stand to the RUN position.
   (d) Make sure the left SPAR VALVE disagreement light goes off when the left engine fuel shutoff valve (spar valve) opens.
   (e) Put the L FUEL CONTROL switch on the P10 quadrant control stand to the CUTOFF position.
   (f) Make sure the left SPAR VALVE disagreement light comes on.
   (g) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
      1) 6C1, FUEL COND CONT L

S 714-050
(17) To do a test for the right engine fuel shutoff valve (spar valve), do the steps that follow:
   (a) Make sure the RIGHT ENG FIRE switch on the pilot's aft control stand, P8, is in the NORMAL position.
   (b) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
      1) 6C2, FUEL COND CONT R
   (c) Put the R FUEL CONTROL switch on the P10 quadrant control stand in the RUN position.
   (d) Make sure the right SPAR VALVE disagreement light goes off after the right engine fuel shutoff valve (spar valve) opens.

(e) Put the R FUEL CONTROL switch on the P10 quadrant control panel in the CUTOFF position.
(f) Make sure the right SPAR VALVE disagreement light comes on.
(g) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6C2, FUEL COND CONT R

S 864-042
(18) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 204-130
(19) Do this task: Leak Check for the Engine Fuel Shutoff Valve (Spar Valve).

TASK 28-22-01-794-073

7. Leak Check for the Engine Fuel Shutoff Valve (Spar Valve)

A. General
(1) This procedure does a check for fuel leakage through the engine fuel shutoff valve (spar valve). It is done after the installation of the engine fuel shutoff valve body or the adapter shaft.

B. Equipment
(1) Container - Fuel-resistant, five U.S. gallon capacity

C. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 71-00-00/501, Power Plant
(3) AMM 71-00-03/201, Power Plant
(4) AMM 71-11-04/201, Fan Cowl Panels

D. Access
(1) Location Zones

410	No. 1 Power Plant (Left)
420	No. 2 Power Plant (Right)
512	Slat No. 5 (Left)
551	Rear Spar to MLG Support Beam (Left)
612	Slat No. 6 (Right)
651	Rear Spar to MLG Support Beam (Right)

(2) Access Panels

414AR	Left Engine Fan Cowl (Right)
424AR	Right Engine Fan Cowl (Right)
551BB	Access Panel (Left)
651BB	Access Panel (Right)

E. Preparation

S 944-076
(1) Make sure there is good communication between the flight compartment and the mechanic who works with the engine fuel.

S 864-077
(2) Make sure the applicable fuel tank has a minimum of 2,000 pounds (900 kilograms).

S 944-078

WARNING: BE CAREFUL WHEN YOU DO WORK ON THE ENGINE PARTS AFTER THE ENGINE IS STOPPED. THE ENGINE PARTS CAN STAY HOT FOR ALMOST ONE HOUR.

DO NOT TOUCH HOT PARTS WITHOUT APPLICABLE GLOVES. HOT PARTS CAN CAUSE AN INJURY.

DO 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.

(3) You must obey these warnings during the subsequent steps.

F. Procedure

S 864-075

(1) On the P10 panel on the control stand, move the applicable fuel control switch to CUTOFF and attach a DO-NOT-OPERATE tag.

S 864-079

(2) On the P10 panel on the control stand, make sure the applicable ENG VALVE and FUEL SPAR lights are off.

NOTE: This shows that the engine fuel shutoff valve (spar valve) is in the commanded position, bright lights show that the engine fuel shutoff valve (spar valve) is not in the commanded position.

S 014-080

(3) Open the applicable access panel, 551BB or 651BB, to get access to the engine fuel shutoff valve (spar valve) (AMM 06-44-00/201).

S 864-081

(4) Make sure the manual override handle on the engine fuel shutoff valve (spar valve) is in the closed position.

NOTE: Do not move the engine fuel shutoff valve (spar valve) to the closed position with your hand. The engine fuel shutoff valve (spar valve) must be closed electrically.

S 014-082

(5) Open the applicable fan cowl panel, 414AR or 424AR (AMM 71-11-04/201).

S 494-119

WARNING: MAKE SURE THE AREA IS CLEAR OF ALL FLAMMABLE MATERIAL AND EQUIPMENT OR DEVICES THAT CAN CAUSE FLAMES OR SPARKS. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Put a five-gallon fuel-resistant container below the drain plug for the LP fuel filter case on the applicable engine (Fig. 403).

S 034-084

(7) Remove the smaller of the two drain plugs for the LP fuel filter case (AMM 71-00-03/201).

S 684-085

(8) Permit the fuel to drain into the container until the quantity of fuel drainage becomes less than sixty drops per minute.

NOTE: If the fuel continues to drain after approximately 5 gallons (19 liters) has drained, re-install the drain plugs to stop the fuel flow. It is possible that the engine fuel shutoff valve (spar valve) is open because of a damaged adapter shaft or valve body. Replace the adapter shaft or valve body before you continue with this task.

S 364-086

(9) If the leakage does not decrease within ten minutes, do this procedure for the applicable valve: Adapter Shaft Alignment.

NOTE: The fuel shutoff valve (spar valve) has leakage.

S 864-087

(10) Make sure the fuel control switch is still set to the CUTOFF position.

S 864-132

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(11) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and low pressure indication in the fuel tank.
(a) Immediately push the applicable fuel pump switch-light to the off position if the PRESS light comes on and stays on.

S 794-088
(12) Push the applicable L(R) AFT and FWD PUMPS switch-lights to operate the two fuel boost pumps for the side of the airplane under inspection.

S 794-089
(13) Monitor the drainage from the fuel filter.
(a) Make sure the fuel drainage is not more than the rate you measured before with the boost pumps off.
(b) If the fuel drainage is more than the quantity you measured before, then monitor the fuel drainage for ten minutes.
(c) Make sure the drip rate is not more than the drip rate that you measured before with the boost pumps off.
(d) If the drip rate is more than the drip rate you measured before, then do this procedure: Adapter Shaft Alignment.

S 864-090
(14) Push the applicable fuel boost pump switch-lights to the off position.

G. Put the Airplane Back to Its Usual Condition

S 434-091
(1) Install a new seal ring for the drain plug.

S 434-092
(2) Install the drain plug again.

S 094-093
(3) Remove the fuel-resistant container from the area below the drain plug.

S 794-123
(4) Do this task: Test No. 2 - Fuel and Oil Leak (AMM 71-00-00/501).

S 414-094
(5) Close the applicable fan cowl AR panel, 414AR or 424AR, that you opened before (AMM 71-11-04/201).

S 414-095
(6) Close the applicable access panel, 551BB or 651BB, for the engine fuel shutoff valve (spar valve) that you opened before (AMM 06-44-00/201).

S 864-096
(7) On the P10 panel on the control stand, remove the DO-NOT-OPERATE tag that you installed before on the fuel control lever.

ENGINE FUEL SHUTOFF VALVE - INSPECTION/CHECK

1. General
   A. This task does an electrical bonding resistance check for the engine fuel shutoff valve.

   TASK 28-22-01-766-011

2. Engine Fuel Shutoff Valve - Bonding Resistance Check (Fig. 601)
   A. References
      (1) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Use one of these:
         (a) Bonding Meter - Model T477W
             Avtron Manufacturing Inc.
             Cleveland OH
         (b) Bonding Meter - Model M1
             (Serial Number A0000112 and subsequent)
             BCD Electronics Ltd.
             Vancouver Canada
   C. Access
      (1) Location Zones
          551 Rear Spar to MLG Support Beam (Left)
          651 Rear Spar to MLG Support Beam (Right)

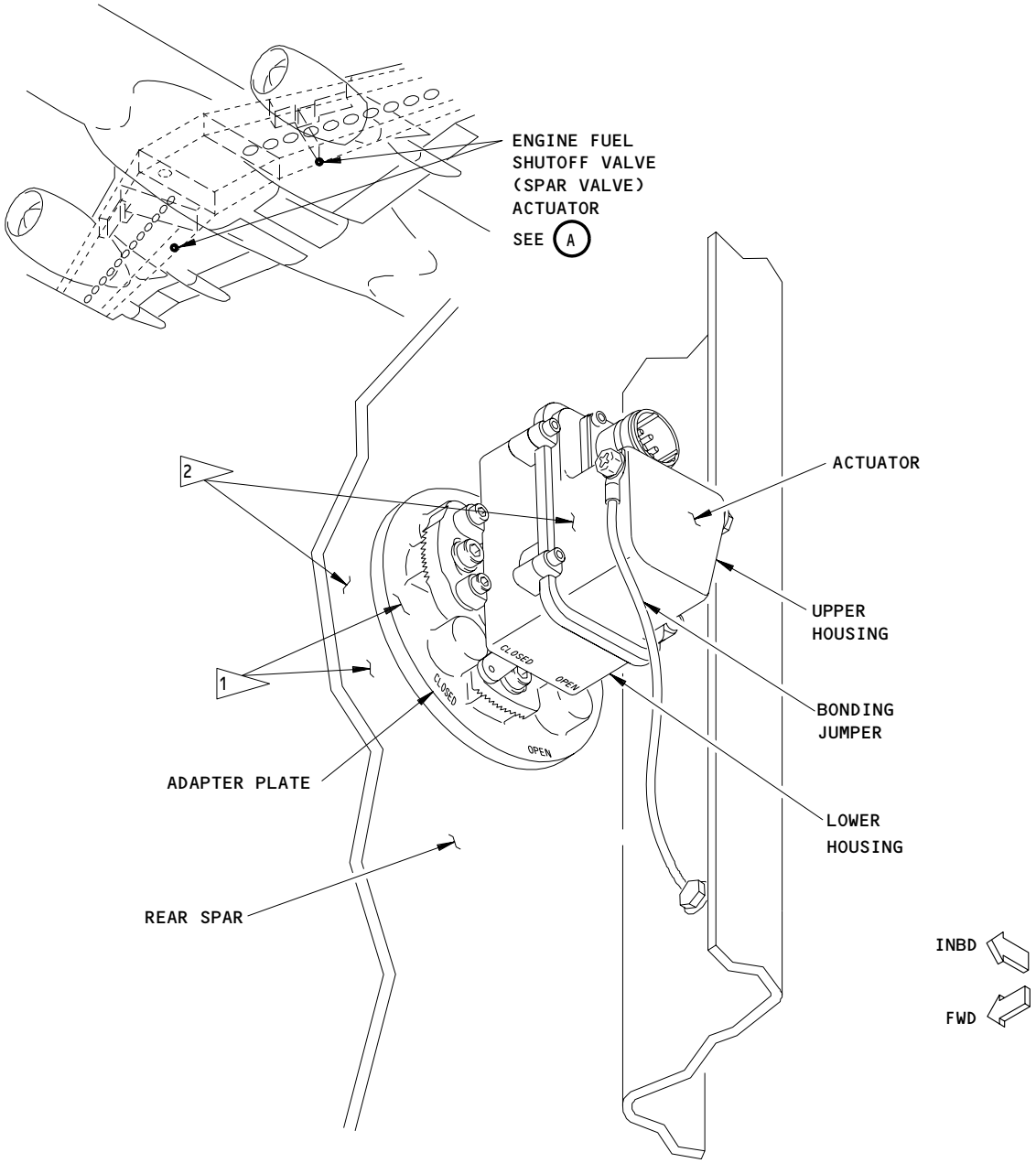
      (2) Access Panels
          551EBX Access Panel (Left)
          651EBX Access Panel (Right)

   D. Procedure

      S 016-002
      (1) Get access to the engine fuel shutoff valve actuator.

      S 016-003
      (2) Disconnect the electrical connector from the actuator.

      S 766-005
      (3) Measure the electrical bonding resistance between the adapter plate and the spar web (SWPM 20-20-00).
         (a) Make sure the bonding resistance is 0.003 ohm (3.0 milliohms) or less.



ENGINE FUEL SHUTOFF VALVE
(ELECTRICAL BONDING MEASUREMENT)

A

1 THE RESISTANCE FROM THE ADAPTER PLATE TO THE SPAR IS 0.003 OHMS OR LESS

2 THE RESISTANCE FROM THE UPPER HOUSING OF THE ACTUATOR TO THE SPAR IS 0.004 OHMS OR LESS

Engine Fuel Shutoff Valve (Spar Valve) Actuator Resistance Check
Figure 601

S 766-012

(4) Measure the electrical bonding resistance between the upper housing of the actuator and the spar web (SWPM 20-20-00).
   (a) Make sure the bonding resistance is 0.004 ohm (4.0 milliohms) or less.

S 436-010

(5) Install the electrical connector on the actuator.

ENGINE FUEL CROSSFEED VALVE - REMOVAL/INSTALLATION

1. General
   A. The engine fuel crossfeed valve(s) has (have) an actuator installed out of the fuel tank. The adapter shaft(s) and valve body(s) are installed in the fuel tank.
   B. The engine fuel crossfeed valve actuator(s) is (are) installed on the rear spar of the center fuel tank. It is not necessary to defuel the center fuel tank to remove the actuator(s) (AMM 28-22-12/401). It is necessary to defuel the center fuel tank to remove the adapter shaft(s). It is necessary to defuel all the fuel tanks to remove the valve bodies.
   C. This procedure removes and installs one engine fuel crossfeed valve, the other engine fuel crossfeed valve removal/installation is the same (if installed). This procedure contains six tasks. The first task removes the adapter shaft. The second task installs the adapter shaft. The third task aligns the adapter shaft. The fourth task removes the valve body. The fifth task installs the valve body. The sixth task does a test of the engine fuel crossfeed valve(s).
   D. The procedure to remove and install the engine fuel crossfeed valve actuator(s) is in AMM 28-22-12/401.

TASK 28-22-02-004-040

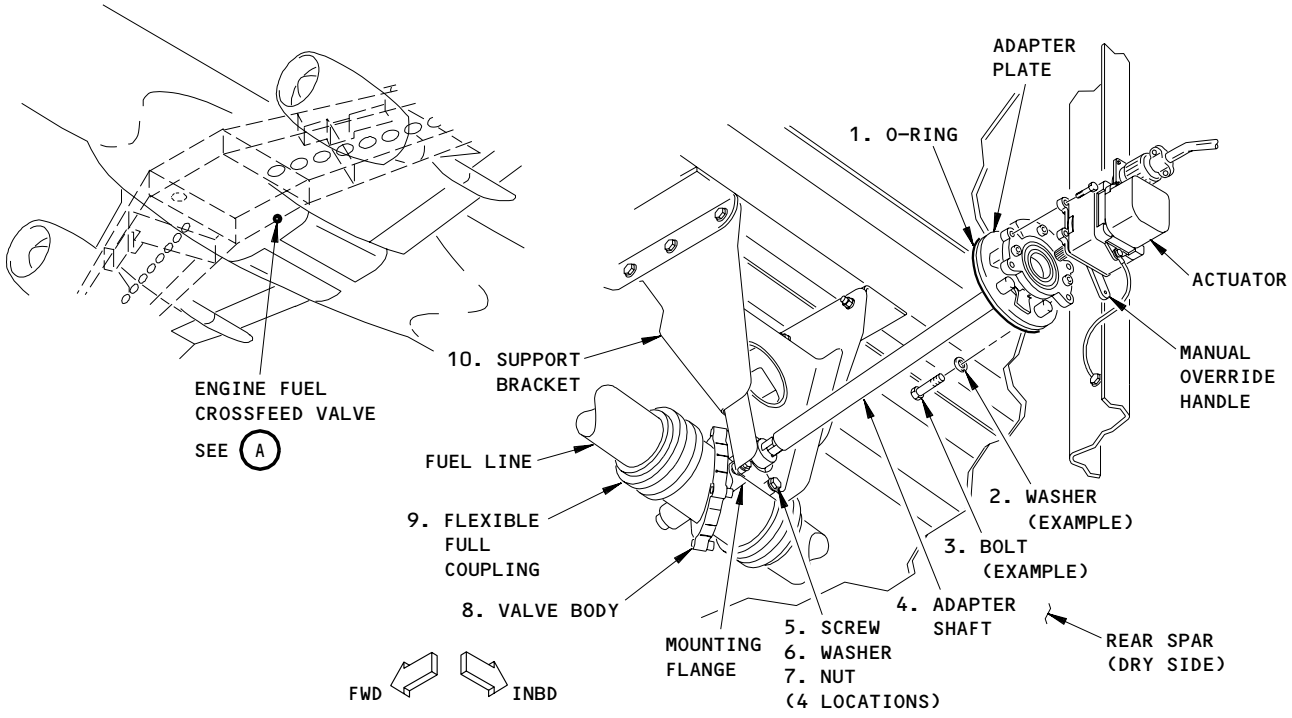
2. Remove the Engine Fuel Crossfeed Valve Adapter Shaft
(Fig. 401, Fig. 401A, Fig. 402, Fig. 402A)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-22-12/401, Engine Crossfeed Valve Actuator
      (5) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zone
          134 Wing Center Section (Right)

      (2) Access Panels
          134AZ Center Tank Access Door
          134BZ Baffle Door
          134CZ Baffle Door
          134DZ Baffle Door

   C. Procedure

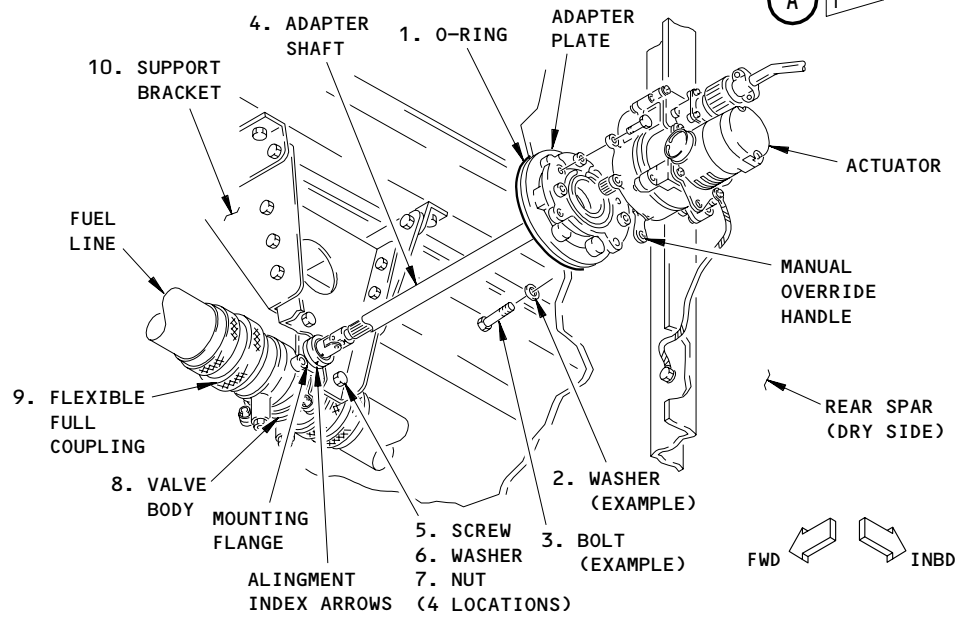
      S 654-045
      (1) Defuel the center fuel tank (AMM 28-26-00/201).

      S 034-002
      (2) Remove the engine fuel crossfeed valve actuator (AMM 28-22-12/401).



ENGINE FUEL CROSSFEED VALVE

A 1

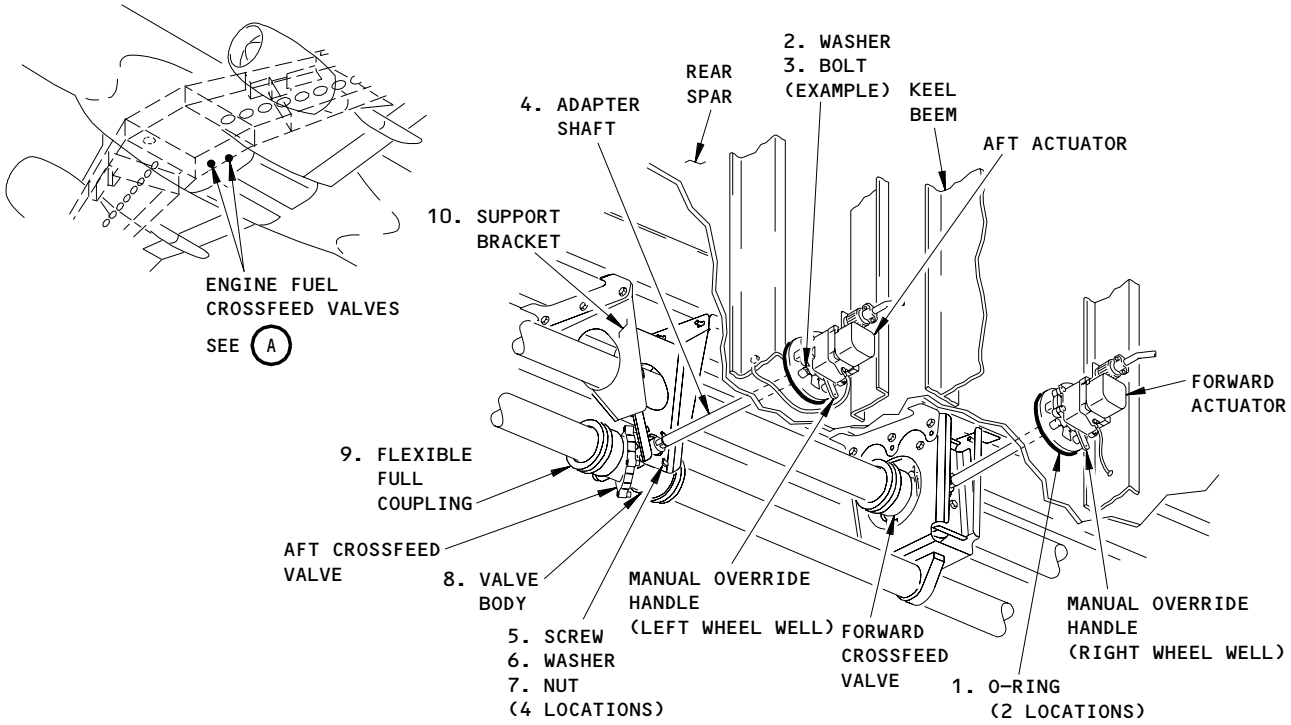


ENGINE FUEL CROSSFEED VALVE

A 2

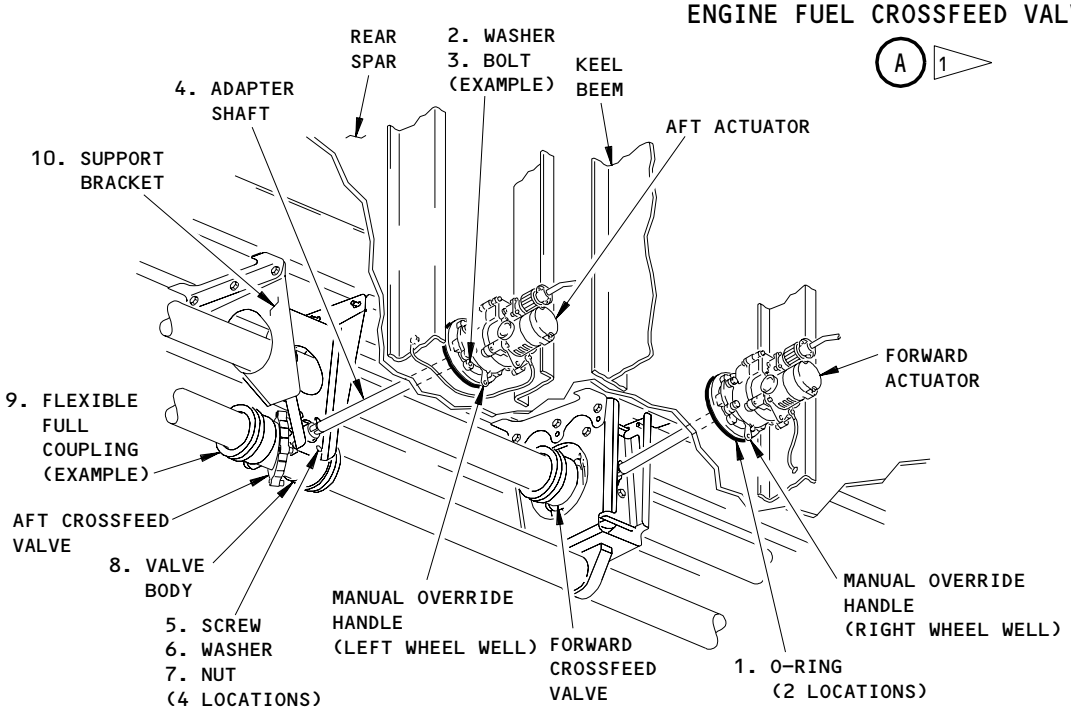
1 RECOMMENDED
2 ALTERNATE

Engine Fuel Crossfeed Valve Installation
Figure 401



ENGINE FUEL CROSSFEED VALVES

A 1

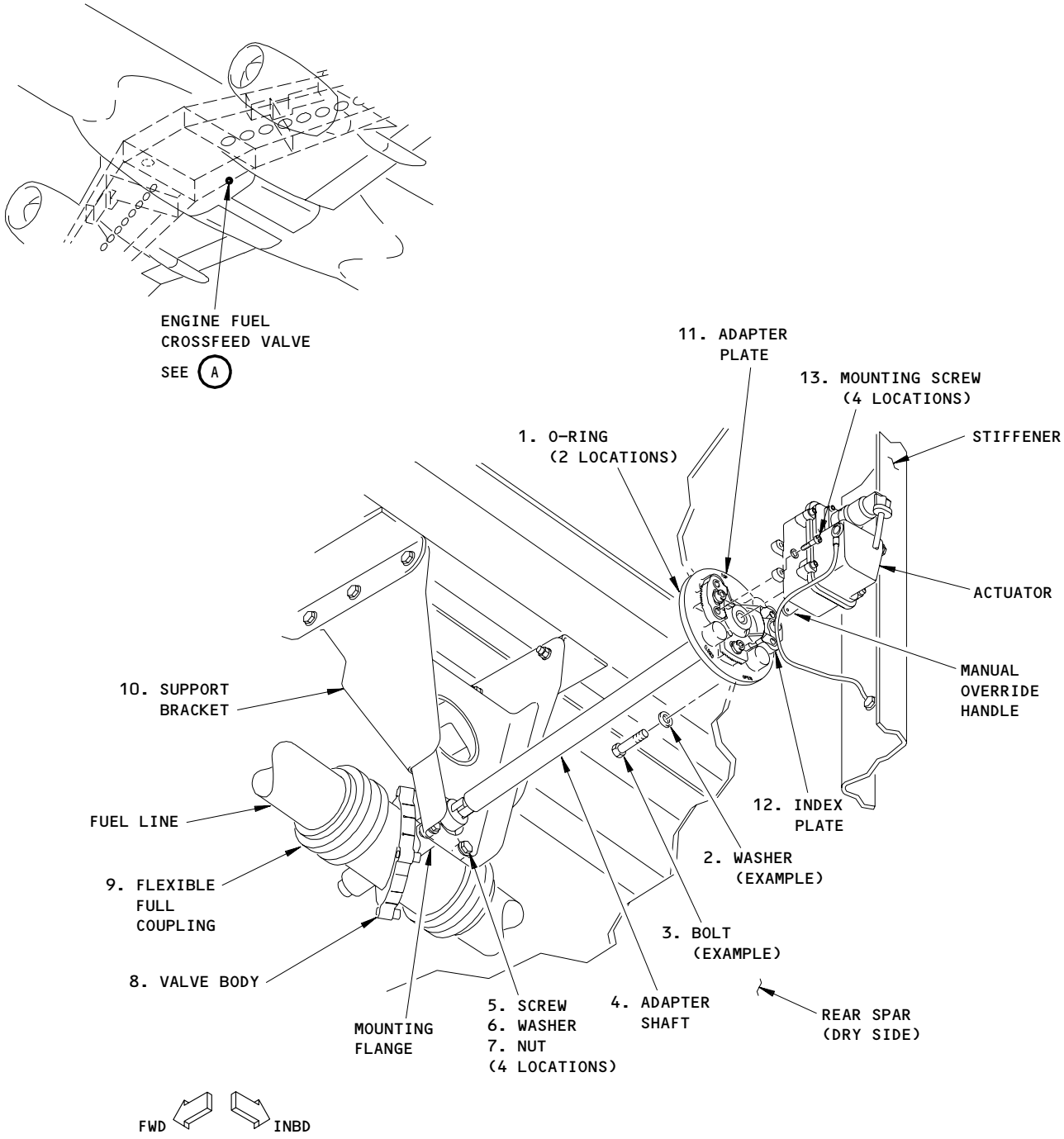


ENGINE FUEL CROSSFEED VALVES

A 2

1 RECOMMENDED
2 ALTERNATE

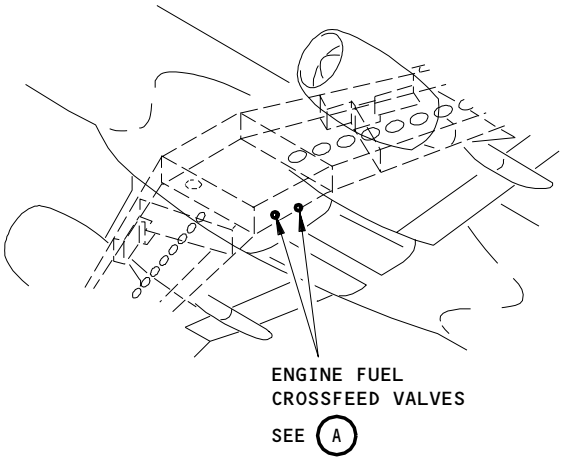
Engine Fuel Crossfeed Valve
Figure 401A

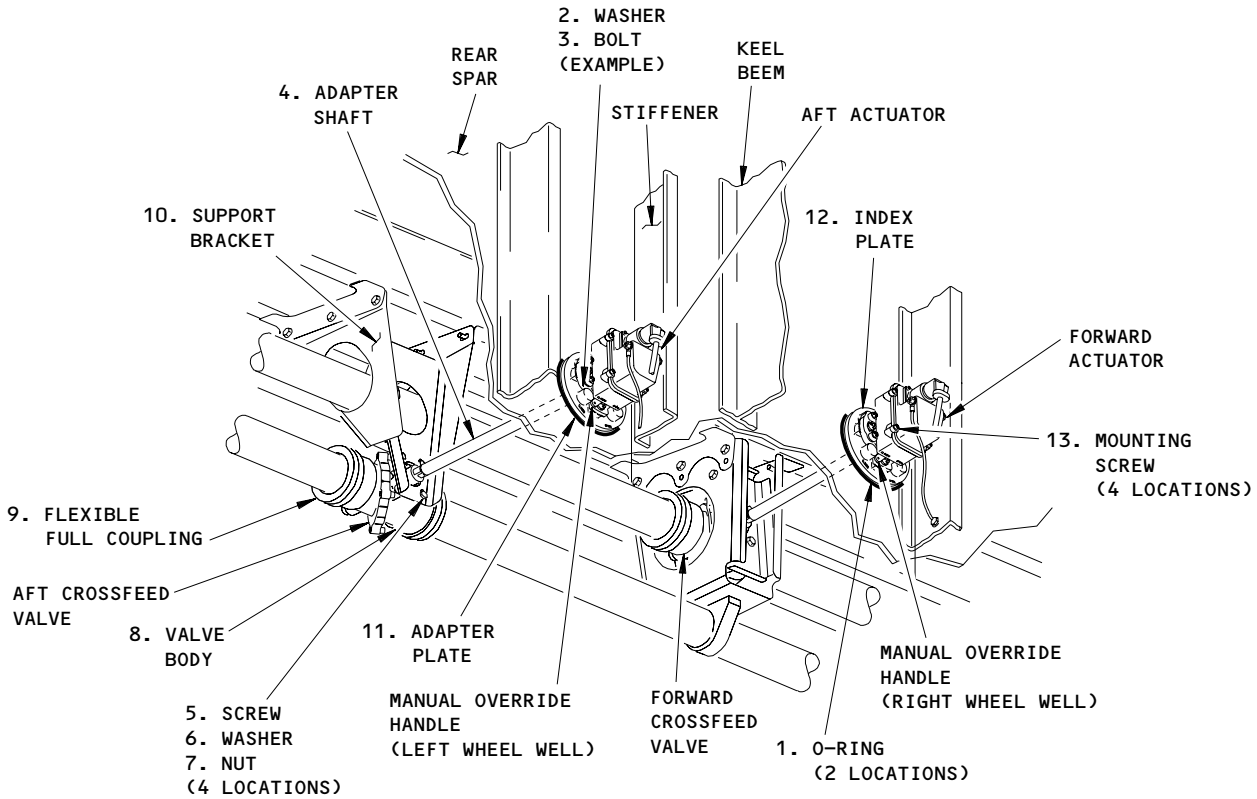


ENGINE FUEL CROSSFEED VALVE

A

Engine Fuel Crossfeed Valve Installation
Figure 402



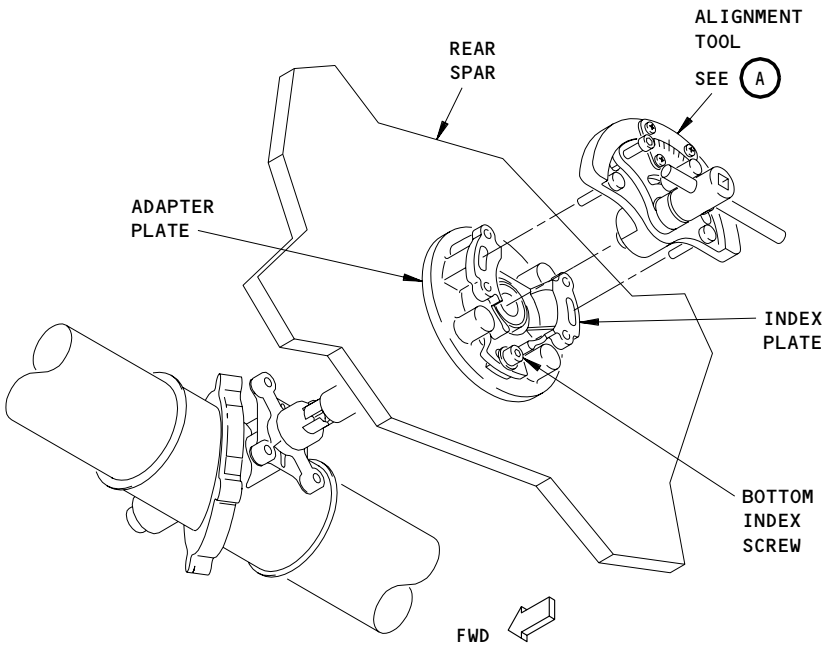


ENGINE FUEL CROSSFEED VALVES

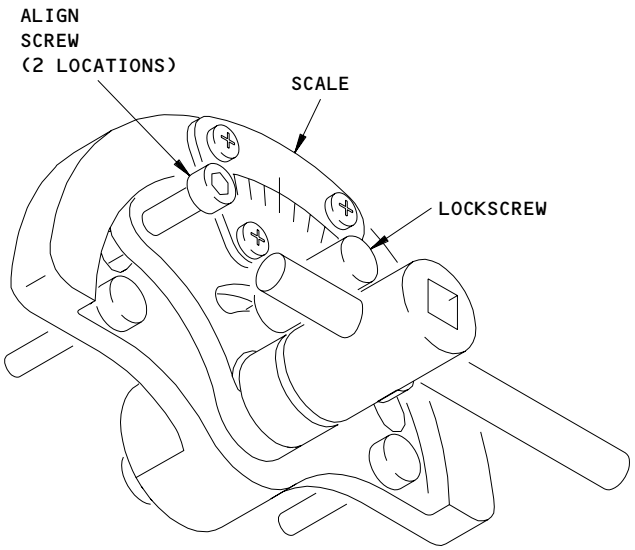
(A)

Engine Fuel Crossfeed Valve
Figure 402A

1321116



ENGINE FUEL CROSSFEED VALVE



ALIGNMENT TOOL

(A)

Alignment Tool Installation
Figure 403

S 014-003
(3) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 914-049

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-004
(5) Go into the center fuel tank.

S 014-005
(6) Remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-006
(7) Remove the four bolts (3) and washers (2) that attach the adapter shaft (4) to the rear spar.

S 024-007
(8) Pull the adapter shaft (4) from out of the fuel tank to remove.

TASK 28-22-02-404-041

3. Install the Engine Fuel Crossfeed Valve Adapter Shaft
(Fig. 401, Fig. 401A, Fig. 402, Fig. 402A)

A. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 20-10-19/401, O-rings
(3) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(4) AMM 20-30-92/201, Airplane Structure Cleaning Solvents (Series 92)
(5) AMM 28-00-00/201, Fuel System
(6) AMM 28-11-00/201, Fuel Tanks
(7) AMM 28-11-00/701, Fuel Tanks
(8) AMM 28-11-02/401, Center Tank Access Door
(9) AMM 28-22-12/401, Engine Crossfeed Valve Actuator
(10) AMM 51-31-01/201, Seals and Sealing
(11) SWPM 20-20-00, Electrical Bonding and Grounds

B. Consumable Materials
(1) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS 15-5
(2) G50021 Scotch-Brite 96W pad
(3) D00504 Petrolatum grease
(4) C00064 Coating - Chemical Conversion Coating for Aluminum or Aluminum Alloys, MIL-C-5541 (MIL-C-81706) - Alodine 600
(5) C00307 BMS 10-20, Type II Class A - Finish, Corrosion Resistant
(6) A00247 Chromate Type Sealant - BMS 5-95, Class B
(7) A00767 Sealant - Integral Fuel Tank BMS 5-45

(8) BO1008 Solvent - Series 88
(9) BO1012 Solvent - Series 92

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	O-ring	28-22-07	50	135
			28-22-12	01	685,860
	4	Adapter Shaft	28-22-07	01	490,493
					570,573
				01A	330,335
				50	01
			28-22-12	01	690,695

D. Access
(1) Location Zone
134 Wing Center Section (Right)

(2) Access Panels
134AZ Center Tank Access Door
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

E. AIRPLANES WITH ACTUATOR MA20A1001-1 (PRE-SB 28A0088);
Install the Adapter Shaft of the Engine Fuel Crossfeed Valve
(Fig. 401, Fig. 401A)

S 434-009
(1) Put a new O-ring (1) over the adapter shaft (4) and align with the groove in the adapter plate (AMM 20-10-19/401).

S 424-010
(2) Put the adapter shaft (4) through the opening in the rear spar from the dry side.

S 424-011
(3) Engage the adapter shaft (4) and the valve splines.

S 214-012
(4) Make sure the adapter plate is free to move in the opening in the rear spar.

S 434-013
(5) Install the washers (2) on the four bolts (3).

S 424-014
(6) Install the four bolts (3) to attach the adapter shaft (4) to the rear spar.

S 394-015
(7) Apply the sealant to the bolt fillets (AMM 51-31-01/201).

S 824-143
(8) Do this task: Adapter Shaft Alignment.

S 414-024
(9) Install the baffle doors 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-025
(10) Install the center tank access door, 134AZ (AMM 28-11-02/401).

S 394-027
(11) Use the sealant to install a fillet seal around the adapter plate (AMM 51-31-01/201).

F. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the Adapter Shaft of the Engine Fuel Crossfeed Valve
(Fig. 402, Fig. 402A)

S 124-186
(1) Remove the old sealant and clean the rear spar, adapter shaft (4), index plate (12), and fasteners (if reused).
(a) Use the sealant removal tool and sealant removal tool handle (or equivalent) to scrape away the old sealant from the rear spar.
(b) If new parts are to be installed, use an abrasive pad to remove the anodized finish from the faying surfaces of the adapter shaft (4) and index plate (12) (SWPM 20-20-00).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) To remove the remaining sealant, grease, oil, dirt, and other contamination from the components, use one of these items soaked with Series 92 solvent (AMM 20-30-92/201).
1) soft bristle brush
2) cotton wiper
3) Scotch-Brite 96W pad

S 114-187

(2) Do these steps to prepare the adapter shaft (4) and the rear spar for a fillet sealed electrical faying surface bond (SWPM 20-20-00):

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(a) Final clean the contact surfaces of the adapter shaft (4) and the rear spar with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
(b) Rub dry with a clean, dry cotton wiper.
(c) Continue to clean and dry the surface until the dry cotton wiper stays clean.

S 434-188

(3) While outside of the airplane fuel tank, do these steps:
(a) Put a thin layer of petrolatum grease on the new o-ring (1).
(b) Put the o-ring (1) in the o-ring groove of the adapter shaft (4).
(c) Put the shaft portion of the adapter shaft (4) through the hole in the rear spar.
(d) Make sure the shoulder of the adapter shaft (4) does not bind in the opening of the rear spar.

S 864-189

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-190

WARNING: DO THE PURGING AND FUEL TANK ENTRY PROCEDURE. FAILURE TO FOLLOW THE PURGING AND FUEL TANK ENTRY PROCEDURE COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Go into the center fuel tank to the engine fuel crossfeed valve location (AMM 28-11-00/201).

S 424-191

(6) Do these steps to install the adapter shaft (4):
   (a) Make sure that the index marks on the valve body (8) and adapter shaft (4) are aligned.

      NOTE: A small misalignment of the index marks is satisfactory.

   (b) Engage the shaft of the adapter shaft (4) with the valve body (8).
   (c) Apply sealant to the shank and the threads of the four bolts.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

      1) Use BMS 5-45 Class B sealant for the wet installation of the bolts.
      2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.52 mm) thick.
   (d) Install the bolts and washers to attach the adapter shaft (4) to the spar.
   (e) Make sure the gap between the adapter shaft (4) and the valve body spline is 0.20 +/- 0.20 inch (5.1 +/- 5.1 mm).

      NOTE: If you can not get the correct gap, loosen the support bracket for the valve body (10) and adjust its position to get the correct gap.

S 764-192

(7) On the outside of the fuel tank, measure the bonding resistance between the adapter plate (11) and the rear spar.
(a) Make sure the resistance is 0.0005 ohm (0.5 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-193

(8) On the inside of the tank, apply a fillet seal of BMS 5-45 Class B sealant to these components (AMM 51-31-01/201):

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) The four bolts.
(b) The periphery of the rear spar penetration and the stationary part of the adapter shaft (4).

NOTE: Make sure the sealant does not touch any part of the adapter shaft (4) that rotates.

S 424-194

(9) On the outside of the fuel tank, apply a fillet seal of BMS 5-45 Class B sealant around the periphery of the adapter shaft (4) (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 414-195

CAUTION: MAKE SURE YOU REMOVE ALL UNWANTED PARTICLES FROM IN THE FUEL TANK. UNWANTED PARTICLES CAN CAUSE A BLOCKAGE OF THE PUMPS AND PREVENT THE SCAVENGE OF FUEL AND WATER.

(10) Remove all unwanted materials from the fuel tank.

S 414-196

(11) Install the baffle doors 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-209
(12) Install the center tank access door, 134AZ (AMM 28-11-02/401).

S 824-200
(13) Do this task: Adapter Shaft Alignment.

G. Install the Index Plate

S 824-201
(1) Do this procedure after you have correctly aligned and marked the alignment position of the index plate and adapter plate per this task: Adapter Shaft Alignment.

S 024-202
(2) Remove the index plate (12) from the adapter shaft (4).

S 424-203
(3) Do these steps to prepare the index plate (12) and the adapter shaft (4) for a sealed electrical faying surface bond (SWPM 20-20-00).
(a) Protect the alignment reference mark when you clean the index plate (12) and the adapter shaft (4) for the electrical bond.

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
(c) Rub dry with a clean, dry cotton wiper.
(d) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(e) Apply a thin continuous layer of sealant to the serrated surface of the index plate (12) (three locations).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.

(f) Apply sealant to the shank and the threads of the mounting screws (13).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the wet installation of the mounting screws (13).
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.52 mm) thick.

S 424-204

(4) Do these steps to install the index plate (12).
(a) Align the index plate (12) and the adapter shaft (4) with the alignment reference mark that you made during the spar valve alignment procedure.
(b) Install the two screws and washers in the top index mounting hole positions.
(c) Install the screw and washer in the bottom index mounting hole position.
(d) Tighten the screws to 22 +/- 1 in-lb (2.5 +/- 0.1 Nm).
(e) Make sure the sealant is continuously squeezed out along the edges of the contact surfaces.
(f) If there are gaps, bubbles or voids in the sealant squeeze out, then disassemble and apply more sealant.
(g) Shape the squeezed out sealant into a fillet seal (AMM 51-31-01/201).
(h) As an option, remove the extra squeezed out sealant.

NOTE: Make sure the sealant that remains is flush with the mating part edges.

S 764-205

(5) Measure the bonding resistance between the index plate (12) and the adapter plate (11).
(a) Make sure the bonding resistance is 0.0005 ohm (0.5 milliohm) or less.

S 424-206

(6) Lockwire the mounting screws (13) and the index plate (12) together.

S 794-207

(7) Do this task: Install the Engine Crossfeed Valve Actuator (AMM 28-22-12/401).

S 374-208

(8) Do this task to apply protective finishes to the bare areas of the rear spar: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the rear spar where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating
2) BMS 10-20 coating

TASK 28-22-02-824-128

4. Adapter Shaft Alignment (Fig. 403)

A. Equipment

(1) B28009-1, Adapter Shaft Alignment Tool

(2) Torque meter - 0-15 inch-pounds, with a resolution of +/- 1 inch-pound (optional)

B. References

(1) AMM 28-22-12/401, Engine Crossfeed Valve Actuator

C. Access

(1) Location Zones

134 Wing Center Section (Right)

(2) Access Panels

134AZ Center Tank Access Door
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

D. Procedure

S 484-130

(1) Do these steps to install the alignment tool in the adapter plate (3):
(a) Remove the top two index screws from the index plate.
(b) Loosen the bottom index screw, but do not remove it.
(c) Install the alignment tool (Fig. 403):
(d) Put the alignment tool in its position with the two guide pins in the holes left by the two index screws that you removed (the scale should be on the top of the tool).
(e) Make sure the spline on the tool engages with the spline on the shaft.

S 824-131

(2) Do these steps to align the adapter shaft (Procedure 1, optional to Procedure 2):

NOTE: This procedure finds the point where the internal valve butterfly engages the valve seal. The torque required to turn the shaft increases as the butterfly engages the seal, then decreases again as the butterfly leaves the other side of the seal. Once the edge of the seal is found, the valve shaft will then be turned to center the butterfly on the seal.

(a) Put the tool handle in the extreme counterclockwise position.
(b) Turn the handle slowly in the clockwise direction at a constant rate while you note the changes in the torque necessary to turn the handle.
(c) Do the previous steps as many times as necessary to find the point in the rotation where the torque necessary to turn the handle increases significantly.
(d) If you cannot find the position in the rotation where the torque increases significantly , then use Procedure 2 below.
(e) Put the shaft in the extreme counterclockwise position again.
(f) Slowly and smoothly turn the handle of the tool clockwise until a distinct increase in torque is found and immediately stop turning the handle.
(g) Read the scale on the tool.

NOTE: This is the point where the valve butterfly starts to engage the edge of the seal.

(h) Turn the handle 13 degrees more in the clockwise direction (the scale on the tool is calibrated in degrees).

NOTE: The valve butterfly is now centered on the valve seal.

NOTE: If you turn the handle past the target value, do not turn the handle back in the counterclockwise direction again. You must start the procedure again with the handle in the extreme counterclockwise position.

S 824-132

(3) Do these steps to align the adapter shaft (Procedure 2, optional to procedure 1):

NOTE: A torque meter is necessary to do this procedure.

(a) Put the tool handle in the extreme counterclockwise position.

(b) Slowly and smoothly turn the tool handle to the extreme clockwise position while you monitor the torque that you apply to the handle.
(c) Write down the maximum torque that you apply to the tool while you turn it from the extreme counterclockwise position to the extreme clockwise position.
(d) Turn the tool back to the extreme counterclockwise position.
(e) Turn the shaft clockwise again at approximately the same rate that you used before.
(f) Stop at the position where the torque increases to approximately two-thirds of the maximum torque that you wrote down before.
(g) Read the scale on the tool at this position.

NOTE: This is the position where valve butterfly starts to engage the edge of the seal.

(h) Turn the handle 13 more degrees in the clockwise direction past the reading from the previous step.

NOTE: The butterfly valve is now centered on the valve seal.

If you turn the valve past the target value, do not turn it back in the counterclockwise direction. You must start again with the tool handle in the extreme counterclockwise position.

S 034-133
(4) Tighten the lockscrew on the tool to keep the adapter shaft in its position.

S 824-134
(5) Turn the index plate until the actuator mounting holes in the index plate are aligned with the two upper holes for the actuator mounting screws.

S 824-135
(6) Insert the two align screws into the holes for the actuator mounting screws to hold the index plate in alignment with the mounting plate (this is a final adjustment of the position of the index plate).

S 434-136
(7) Tighten the bottom index screw to a torque of 21-23 inch pounds.

S 034-137
(8) Carefully remove the align screws.

S 084-138
(9) Carefully remove the alignment tool from the index plate.

S 034-139
(10) Install the top two index screws (13) in the index plate (4) and tighten them to a torque of 21-23 inch-pounds.

S 434-140
(11) Attach the index screws with lockwire.

S 434-144
(12) Install the engine crossfeed valve actuator (AMM 28-22-12/401).

TASK 28-22-02-004-042

5. Remove the Engine Fuel Crossfeed Valve Body
(Fig. 401, Fig. 401A, Fig. 402, Fig. 402A)

A. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-02/401, Center Tank Access Door
(4) AMM 28-26-00/201, Defueling

B. Access
(1) Location Zone
134 Wing Center Section (Right)

(2) Access Panels
134AZ Center Tank Access Door
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

C. Procedure

S 654-046
(1) Defuel the center, left and right main fuel tanks (AMM 28-26-00/201).

S 014-029
(2) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 914-051

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(3) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-030
(4) Enter the center fuel tank.

S 014-031
(5) Remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-032
(6) Disconnect the flexible full couplings (9) from each side of the valve body (8).

S 034-033
(7) Hold the valve body (8) and remove the four screws (5) and washers (6) that attach the valve body (8) to the support bracket (10).

S 024-029
(8) Disengage the valve body (8) from the adapter shaft (4).

S 024-030
(9) Remove the valve body (8).

S 494-031
(10) Put the covers on the openings in the fuel line to keep unwanted materials out.

TASK 28-22-02-404-043

6. Install the Engine Fuel Crossfeed Valve Body
(Fig. 401, Fig. 401A, Fig. 402, Fig. 402A)
A. Consumable Materials
(1) A00767 - Sealant - BMS 5-45 Class B
B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	8	Valve Body	28-22-02 28-22-07	01 01 01A	5 475,555 290

C. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 20-10-21/601, Electrical Bonding
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 28-25-05/401, APU Fuel Line and Shroud
(6) AMM 51-31-01/201, Seals and Sealing
D. Access
(1) Location Zone
134 Wing Center Section (Right)

(2) Access Panels

134AZ	Center Tank Access Door
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door

E. Procedure

S 914-050

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-035

(2) Enter the center fuel tank.

S 034-036

(3) Remove the covers from the fuel lines.

S 424-037

(4) Put the valve body (8) on the adapter shaft (4).

S 214-083

WARNING: MAKE SURE THE PLACARD "TOP" SHOWS ON THE TOP SIDE OF THE VALVE BODY DURING INSTALLATION. FAILURE TO INSTALL THE VALVE BODY CORRECTLY CAN CAUSE INJURY OR DAMAGE.

(5) Make sure "TOP" shows on the top of the valve body (8).

S 424-038

(6) Align the valve body (8) with the mounting flange on the support bracket (10).

S 214-039

(7) Make sure the metal bonding surfaces on the support bracket (10) and the valve body (8) are clean.

S 434-040

(8) Install the four screws (5) and washers (6) to attach the mounting flange on the support bracket (10) to the valve body (8).

S 434-041

(9) Install the four nuts (7) on the screws (5).

S 394-042

(10) Apply the sealant to the screw fillets (AMM 51-31-01/201).

S 764-043
(11) Make sure the bonding resistance between the valve body and the airplane structure is not more than 0.01 ohms (AMM 20-10-21/601).

S 434-044
(12) Install the flexible full couplings (9) between the valve body (8) and the fuel line (AMM 28-25-05/401).

S 414-046
(13) Install the baffle doors 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-047
(14) Install the center tank access door (AMM 28-11-02/401).

S 714-048
(15) Do the Test of the Engine Fuel Crossfeed Valve Operation procedure.

TASK 28-22-02-714-106

7. AIRPLANES WITH A SINGLE ENGINE FUEL CROSSFEED VALVE (PRE-SB 28-29);
Test of the Engine Fuel Crossfeed Valve Operation

A. References
(1) AMM 24-22-00/201, Electrical Power Control

B. Access
(1) Location Zones
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

C. Procedure

S 864-048
(1) Supply electrical power (AMM 24-22-00/201).

S 864-049
(2) Close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D36, FUEL CROSSFEED

S 864-050
(3) Push the CROSSFEED VALVE switch-light on the overhead panel, P5 to the open position.

S 214-051
(4) Make sure the flowbar comes on.

S 214-052
(5) Make sure the VALVE light comes on and then goes off.

S 864-054
(6) Push the CROSSFEED VALVE switch-light on the P5 panel to the closed position and do the steps that follow:
(a) Make sure the flowbar goes off.
(b) Make sure the VALVE light comes on and then goes off.

S 864-039
(7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-22-02-714-116

8. AIRPLANES WITH DUAL ENGINE FUEL CROSSFEED VALVES (POST-SB 28-29);
Test of the Forward and Aft Engine Fuel Crossfeed Valves Operation

A. References
(1) AMM 24-22-00/201, Electrical Power Control

B. Access
(1) Location Zones
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

C. Procedure

S 864-056
(1) Supply electrical power (AMM 24-22-00/201).

S 864-057
(2) Close these circuit breakers:
(a) Overhead circuit breaker panel, P11:
1) 11D24, FWD FUEL CROSSFEED
2) 11D25, AFT FUEL CROSSFEED
3) 11D36, FUEL XFEED IND
4) 11D36, FUEL XFEED IND

S 864-058
(3) Push the FWD and AFT CROSSFEED VALVE switch-lights, on the overhead panel, P5, to the open position.

S 214-059
(4) Make sure the FWD and AFT flowbars come on.

S 214-060
(5) Make sure the FWD and AFT VALVE lights come on and then go off.

S 214-061
(6) Do a check on each manual override handle position to make sure the forward and aft engine fuel crossfeed valves are open.

NOTE: Access to the forward and aft engine fuel crossfeed valve actuators is in the right and left wheel wells repectively.

The forward engine fuel crossfeed valve is found approximately 4 inches to the right of the middle of the body on the center tank rear spar. The aft engine fuel crossfeed valve is installed approximately 12 inches to the left of the middle of the body on the rear spar.

S 864-062
(7) Push the FWD and AFT FUEL CROSSFEED VALVE switch-lights on the P5 panel to the closed positions.

S 214-063
(8) Make sure the FWD and AFT flowbars go off.

S 214-064
(9) Make sure the FWD and AFT VALVE lights come on and then go off.

S 214-099
(10) Do a check on each manual override handle position to make sure the forward and aft engine fuel crossfeed valves are closed.

NOTE: Access to the forward and aft engine fuel crossfeed valve actuators is in the right and left wheel wells repectively.

The forward engine fuel crossfeed valve is found approximately 4 inches to the right of the middle of the body on the center tank rear spar. The aft engine fuel crossfeed valve is installed approximately 12 inches to the left of the middle of the body on the rear spar.

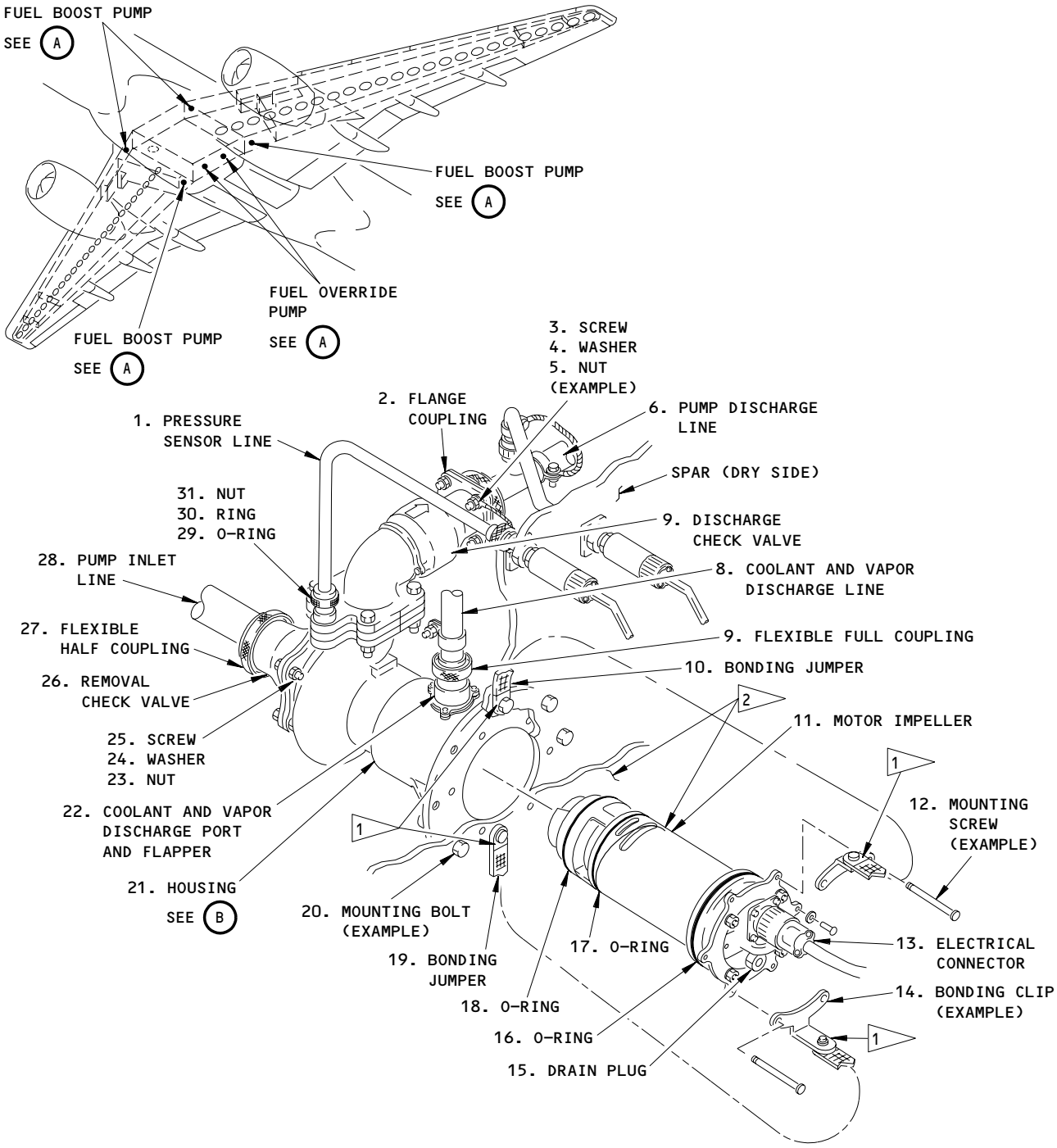
S 864-098
(11) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FUEL BOOST PUMP AND FUEL OVERRIDE PUMP - REMOVAL/INSTALLATION

1. General
   A. There is a left forward fuel boost pump and a left aft fuel boost pump which move fuel from the left main fuel tank. There is a right forward fuel boost pump and right aft boost pump which move fuel from the right main fuel tank. The left aft fuel boost pump and the right aft fuel boost pump are installed on the inboard rear spar, forward of each main landing gear door. The left forward fuel boost pump and right forward fuel boost pump are installed on the front spar, inboard of each dry bay and aft of the forward slat No. 5.
   B. There is a left and a right fuel override pump which move fuel from the center fuel tank. The left fuel override pump and the right fuel override pump are installed on the rear spar of the center fuel tank.
   C. Each fuel boost pump assembly or fuel override pump assembly contains four parts: the motor impeller, the housing, the discharge check valve and the removal check valve.
   D. It is necessary to defuel the center fuel tank to remove the housing, the discharge check valve and the removal check valve. It is not necessary to defuel the center fuel tank to remove the motor impeller.
   E. This procedure has these tasks:
      (1) Remove the fuel boost pump or fuel override pump
      (2) Install the fuel boost pump or fuel override pump
      (3) Remove the motor impeller
      (4) Install the motor impeller
      (5) Remove the housing
      (6) Install the housing.
   F. The removal and installation procedures for the fuel boost pumps and fuel override pumps are almost the same.
   G. The procedure to remove and install the removal check valve is in AMM 28-22-08/401. The procedure to remove and install the discharge check valve is in AMM 28-22-09/401.
   H. The Insulation Resistance Check is not required for all fuel pumps. Fuel boost pumps 60B92404-5, -6, -7, or -8 and fuel override pumps 60B89004-8, -10, -12, or 14 require the Insulation Resistance Check. Fuel boost pumps 60B92404-10 and subsequent, or fuel override pumps 60B89004-16 and subsequent do not require the Insulation Resistance Check.

TASK 28-22-03-024-092

2. Remove the Fuel Boost Pump Assembly or the Fuel Override Pump Assembly (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels

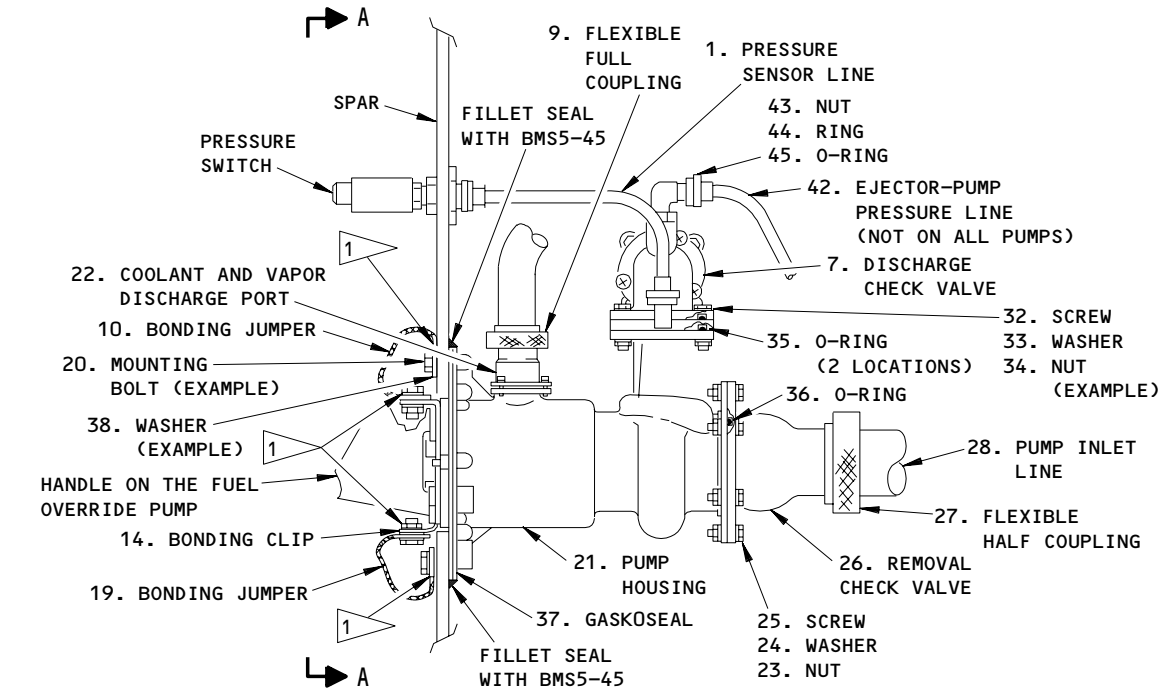


1 FILLET SEAL BONDING JUMPER EDGES AND CAP SEAL NUT AND BOLT WITH BMS5-142.

2 RESISTANCE FROM MOTOR IMPELLER TO STRUCTURE IS 0.0004 OHMS OR LESS.

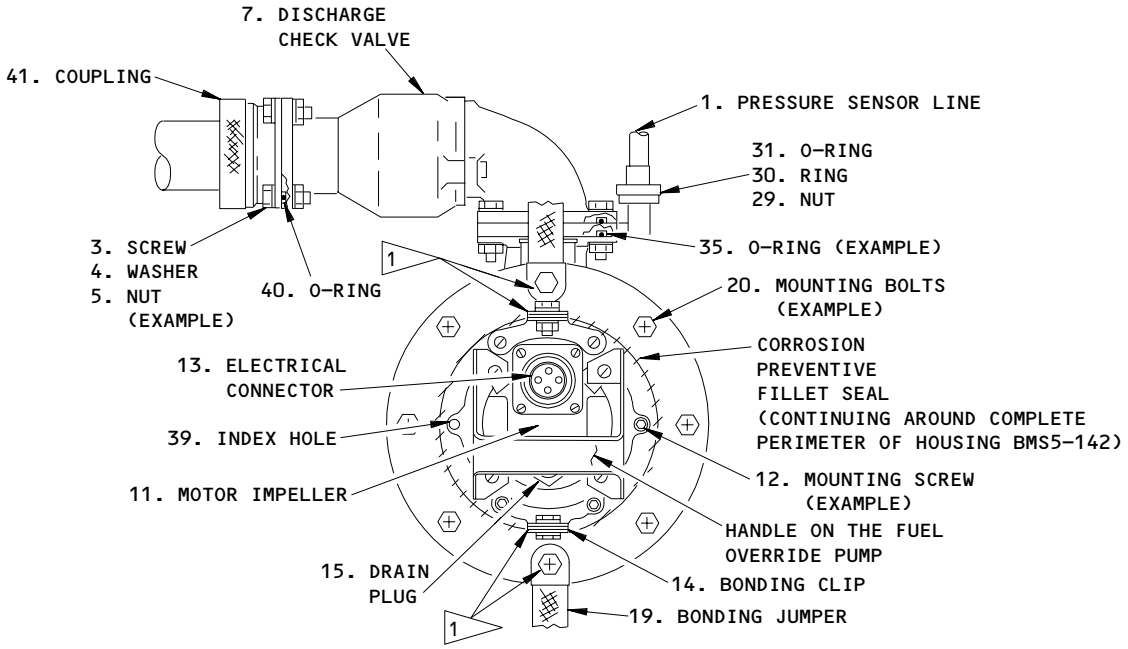
FUEL BOOST PUMP
(FUEL OVERRIDE PUMP IS ALMOST THE SAME)
A

Fuel Boost Pump Installation
Figure 401 (Sheet 1)



HOUSING

B



A-A

Fuel Boost Pump Installation
Figure 401 (Sheet 2)

(2) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(3) AMM 27-81-00/201, Leading Edge Slat System
(4) AMM 28-11-00/201, Fuel Tanks
(5) AMM 28-11-02/401, Center Tank Access Door
(6) AMM 28-26-00/201, Defueling
(7) AMM 32-00-15/201, Landing Gear Door Locks
(8) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
511	Leading Edge To Front Spar (Left)
611	Leading Edge To Front Spar (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel (Left)
611FB	Leading Edge Access Panel (Right)
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

C. Procedure

S 654-071
(1) Defuel the center fuel tank (AMM 28-26-00/201).

S 654-137
(2) For the right main tank boost pumps or the right override pump, defuel the right main tank (AMM 28-26-00/201).

NOTE: You can move the fuel to the left main fuel tank to do this if it has sufficient capacity for the fuel.

S 654-138
(3) For the left main tank boost pumps or the left override pump, defuel the left main tank (AMM 28-26-00/201).

NOTE: You can move the fuel to the right main fuel tank to do this if it has sufficient capacity for the fuel.

S 864-139
(4) Make sure the fuel crossfeed valve(s) are closed.

S 654-072
(5) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 864-073

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(6) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 144-158
(7) To remove the forward fuel boost pump, remove the applicable left or right leading edge access panel, 511FB or 611FB (AMM 06-44-00/201).

S 014-074
(8) To remove the forward or aft fuel boost pumps, remove the applicable left or right center tank access door, 531AB or 631AB (AMM 28-11-02/401).

S 014-075
(9) To remove the fuel override pumps, do the steps that follow:
(a) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).
(c) Remove the center tank access door 134AZ (AMM 28-11-02/401).

S 944-076

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-077
(11) Go into the center fuel tank.

S 014-078
(12) For the fuel override pumps, remove the baffle doors, 134BZ, 134CZ and 134DZ (AMM 06-41-00/201).

S 034-063
(13) Remove the screws (3), washers (4) and nuts (5) to disconnect the flange coupling (2) of the pump discharge line (9) downstream of the discharge check valve (7) (View A).

S 034-079
(14) Disconnect the pressure sensor line (1) at the discharge check valve (7).
(a) Make sure the pressure sense line (1) is drained.

NOTE: This will help to prevent the collection of water in the pressure sense line. Water can freeze and cause damage to the pressure sense line. You can loosen the connection for the pressure sense line at the pressure switch (AMM 28-42-01/401) to help remove the fuel and water from the pressure sense line. You may have to flush the pressure sense line to remove all the water.

S 034-066
(15) Disconnect the pump inlet line (28) at the flexible half coupling (27) nearest the removal check valve (26).

S 034-067
(16) Disconnect the coolant and vapor discharge line (8) at the coolant and vapor discharge port (22).

S 034-068
(17) Disconnect the electrical connector (13) at the motor impeller (11).

S 024-004
(18) Hold the fuel boost pump or fuel override pump in the fuel tank.

S 034-005
(19) Disconnect the bonding jumpers (10, 19) from out of the fuel tank.

S 034-129
(20) Remove the mounting bolts (20) from out of the fuel tank.

S 024-006
(21) Remove the fuel boost pump or fuel override pump from the center fuel tank.

TASK 28-22-03-404-007

3. Install the Fuel Boost Pump Assembly or the Fuel Override Pump Assembly (Fig. 401)

A. Equipment
   (1) Container - 5 gallon (19/liter) minimum capacity to hold fuel

B. Consumable Materials
   (1) G02272 - Fuel
   (2) A00767 - Sealant Integral Fuel Tank - BMS5-45.
   (3) A02315 - Sealant Chromate Type - BMS5-142.
   (4) D00504 VV-P-236, Petrolatum

C. References
   (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
   (2) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
   (3) AMM 12-11-01/301, Fuel Tank Pressure Fueling
   (4) AMM 20-10-22/701, Metal Surfaces
   (5) AMM 20-10-23/401, Lockwires
   (6) AMM 24-22-00/201, Electric Power - Control
   (7) AMM 24-25-00/501, Hydraulic Motor Generator System
   (8) AMM 27-81-00/201, Leading Edge Slat System
   (9) AMM 28-11-00/201, Fuel Tanks
   (10) AMM 28-11-02/401, Center Tank Access Door
   (11) AMM 28-25-05/401, APU Fuel Line and Shroud
   (12) AMM 32-00-15/201, Landing Gear Door Locks
   (13) AIPC 28-22-03-01, 28-22-03-01A, 28-22-03-01B, 28-22-03-01C, 28-22-03-02, 28-22-03-02A, 28-22-03-02B, 28-22-03-02C, 28-22-05-01, 28-22-05-02, 28-22-05-03, 28-22-07-07, 28-22-07-08, 28-22-07-09, 28-22-09-01, 28-22-09-01A, 28-22-09-01B, 28-22-09-01C

D. Access
   (1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
511	Leading Edge To Front Spar (Left)
611	Leading Edge To Front Spar (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel (Left)
611FB	Leading Edge Access Panel (Right)
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

E. Procedure

S 944-008

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 654-200

WARNING: MAKE SURE THE FUEL PUMPS YOU INSTALL ON THE AIRPLANE HAVE BEEN INSPECTED FOR CORRECT ROUTING OF THE STATOR LEAD WIRES. A FUEL PUMP THAT HAS NOT BEEN INSPECTED CAN HAVE AN INTERNAL CHAFING CONDITION, WHICH CAN CAUSE AN ELECTRICAL SHORT. AN ELECTRICAL SHORT INSIDE THE MOTOR/IMPELLER UNIT CAN CAUSE A FIRE OR AN EXPLOSION.

(2) Make sure the fuel pump has been inspected for the stator lead (or internal) wire chafing condition.

NOTE: The letter T will be stamped on the identification plate of the motor impeller after the serial number if the pump has been inspected. The pumps are subject to the inspection requirements of SB 28A70 or SB 28A71. An airworthiness directive (FAA AD 2002-19-52) expands the inspection requirement to all fuel pumps prior to installation.

NOTE: New motor-impellers, part number 60B92404-10 and subsequent (No. 1 or No. 2 tank) and part number 60B89004-16 and subsequent (center tank) can be installed, but do not have a letter T stamped on the identification plate of the motor impeller. These new motor-impellers have an internal retainer to prevent chafing of the wire bundle.

S 824-009
(3) Align the fuel boost pump or fuel override pump with the spar of the wing.

S 434-005
(4) Put a gaskoseal (37) between the housing (21) and the spar (View B).

S 424-010
(5) Hold the fuel boost pump or fuel override pump from in the fuel tank.

S 434-011
(6) From out of the fuel tank, install the mounting bolts (20) and the washers (38).

S 434-012
(7) Install the lockwire on the mounting bolts (20) (AMM 20-10-23/401).

S 434-202
(8) Apply a fillet seal of sealant, BMS5-45 to the surface inside the fuel tank where the pump housing (21) touches the spar.

S 434-205
(9) Apply a fillet seal of sealant, BMS5-142 to the surface outside the fuel tank where the pump housing (21) touches the spar.

S 164-011
(10) Clean the bonding surface (AMM 20-10-22/701).

S 434-013
(11) Connect the bonding jumpers (10, 19).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-189

(12) Measure the bonding resistance between the motor impeller (11) and the structure.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Make sure the resistance is less than 0.0004 ohm.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-191

(13) Make sure there is a fillet seal of sealant, BMS5-142 on the applicable locations of bonding jumpers (10, 19).
(a) The sealant must cover the area around each jumper terminal and the fastner head and nut to protect the conductive path between the spar the motor impeller (11).

S 434-130

(14) Connect the flexible half coupling (27) on the pump inlet line (28) to the removal check valve (26) (AMM 28-25-05/401).

S 434-131

(15) Connect the flange coupling (2) of the pump discharge line (6) to the discharge check valve (7).
(a) Install a new O-ring (40) in the groove of the flange coupling (2) (View A-A).
(b) Apply a thin layer of petrolatum to the O-ring (40).
(c) Align the flange coupling (2) with the flange of the discharge check valve (7).
(d) Put a washer (4) on each of the four screws (3).
(e) Put each screw (3) through the flange coupling (2), then through the flange of the discharge check valve (7).
(f) Install a washer (4) and a nut (5) on each screw (3).
(g) Tighten the coupling (41).

S 654-151

CAUTION: MAKE SURE YOU PRIME THE PUMP HOUSING WITH FUEL. IF YOU DO NOT PRIME THE PUMP HOUSING DAMAGE TO THE PUMP CAN OCCUR WHEN YOU START THE PUMP.

(16) Lift the flapper on the coolant and vapor discharge valve (22) and put 1/2 to 1 pint of fuel into the housing (21) (View A).

S 434-014
(17) Install the flexible full coupling (9) to connect the coolant and vapor discharge line (8) to the coolant and vapor discharge port (22) (AMM 28-25-05/401).

S 434-017
(18) Connect the pressure sensor line (1) at the discharge check valve (7).
(a) Install the ferrule on the pressure sensor line (1).
(b) Put the nut (31) on the ferrule.
(c) Put the ring (30) on the ferrule between the ferrule and the nut (31).
(d) Install a new O-ring (29) in the coupling body.
(e) Apply a thin layer of petrolatum to the O-ring (29).
(f) Install the nut (31) on the coupling body.
(g) Install the lockwire on the nut (31) (AMM 20-10-23/401).

S 764-167
(19) FUEL BOOST PUMP 60B92404-5, -6, -7 OR -8;
FUEL OVERRIDE PUMP 60B89004-8, -10, -12 OR -14;
Do the Fuel Pumps - Insulation Resistance Check (AMM 28-22-00/601).

NOTE: This insulation resistance check must be done on-wing each time you install a new or serviceable fuel pump.

S 434-147
(20) Connect the electrical connector (13) to the motor impeller (11).

S 414-016
(21) For the fuel override pumps, install the baffle doors, 134DZ, 134CZ and 134BZ (AMM 06-41-00/201).

S 414-017
(22) For the fuel override pumps, install the center tank access door, 134AZ (AMM 28-11-02/401).

S 414-018
(23) For the fuel boost pumps, install the applicable left or right center tank access door, 531AB or 631AB (AMM 28-11-02/401).

S 654-019

(24) Refuel the center or main fuel tanks (AMM 12-11-01/301).

(a) If it is not possible to fully refuel the tanks to the specified quantities, do one of these alternate procedures to prime the fuel boost pump or fuel override pump.

1) ALTERNATE PROCEDURE 1;
Do these steps to prime the fuel boost pump or fuel override pump through the drain hole:

a) Remove the drain plug (15) from the motor impeller (11).

b) Put approximately 1.5 pints (0.75 liters) of fuel into the drain hole.

c) Install the drain plug (15) on the motor impeller (11).

d) Tighten the drain plug (15) to a torque of 40-50 inch-pounds (5-6 Nm).

e) Install lockwire on the drain plug (15) (AMM 20-10-23/401).

2) ALTERNATE PROCEDURE 2;
Do these steps to prime the pump through the drain hole and slots:

a) Do the task: Remove the Motor Impeller.

b) Remove the drain plug (15).

c) Put the motor impeller (11) in a 5 gallon (19 liter) fuel resistant container of fuel, but keep the electrical connector (13) on the motor impeller (11) out of the fuel.

d) Install the drain plug (15) again.

e) Hold the motor impeller (11) in the correct direction with the open fuel slots on the top.

NOTE: This will make sure that the fuel does not drain out of the motor impeller (11) before you install it.

f) Make sure there is no fuel on the electrical connector (13) on the motor impeller (11).

g) Remove the motor impeller (11) from the fuel and immediately install the motor impeller (11) per the task: Install the Motor Impellor.

h) Tighten the drain plug (15) to a torque of 40-50 inch-pounds (5-6 Nm).

i) Install lockwire on the drain plug (15) (AMM 20-10-23/401).

(b) For the forward fuel boost pumps, refuel the main fuel tanks to 2000 pounds (900 kilograms) minimum.

(c) For the aft fuel boost pumps, refuel the main fuel tanks to 2000 pounds (900 kilograms) minimum.
(d) For the fuel override pumps, refuel the center fuel tanks to 20,000 pounds (9,000 kilograms) minimum.

S 214-018
(25) Make sure there are no fuel leaks at the spar for the fuel boost pump or the fuel override pump.

S 094-019

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(26) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-020
(27) Supply electrical power (AMM 24-22-00/201).

S 864-163
(28) Make sure these valves are closed:

NOTE: If you do this test with these valves open (for example during a fuel transfer operation), it is possible that the low pressure indicating light will not go off when you operate the pump.

(a) The engine fuel shutoff valve (spar valve) for the No. 1 tank
(b) The engine fuel shutoff valve (spar valve) for the No. 2 tank
(c) The crossfeed valve
(d) The defuel valve

S 864-196

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(29) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-080

(30) Push the applicable fuel boost pump or fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.

PUMP	SWITCH-LIGHT
Left aft fuel boost pump	L AFT PUMPS
Left forward fuel boost pump	L FWD PUMPS
Left fuel override pump *[1]	LEFT C PUMPS
Right aft fuel boost pump	R AFT PUMPS
Right forward fuel boost pump	R FWD PUMPS
Right fuel override pump *[1]	RIGHT C PUMPS

*[1] The fueling station door (621GB) must be open before the left or right override pump will operate.

S 284-081

(31) Listen and make sure the applicable fuel boost pump or fuel override pump operates.

S 214-082

(32) Make sure the applicable PRESS light on the fuel management panel of the P5 panel goes off.

S 864-083

(33) Push the applicable fuel boost pump or fuel override pump switch-light to the off position.

S 284-084

(34) Listen and make sure the applicable fuel boost pump or fuel override pump does not operate.

S 214-085

(35) For the fuel boost pumps, make sure the applicable PRESS light comes on.

S 714-112

(36) GUI 003-114, 116-999;
Do the steps that follow:

(a) Do the Operational Test for the hydraulic motor generator (AMM 24-25-00/501) to supply power for the right fuel override pump.

(b) Close the fueling station door, 621GB, on the right wing leading edge.

(c) Push the RIGHT C PUMPS switch-light to the on position.

NOTE: Someone must be in the flight compartment when you operate the right center override pump to continuously monitor for the PRESS light.

1) Push the RIGHT C PUMPS switch-light to the off position if the PRESS light stays on.

(d) Listen at the right inboard rear spar and make sure the right fuel override pump operates.

(e) Push the RIGHT C PUMPS switch-light to the off position.

(f) Remove the hydraulic motor generator power.

S 414-156

(37) For the forward fuel boost pumps, install the applicable left or right access panel, 511FB or 611FB (AMM 06-44-00/201).

S 864-086

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(38) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 864-022

(39) Remove electrical power if is not necessary (AMM 24-22-00/201).

TASK 28-22-03-004-027

4. Remove the Motor Impeller (Fig. 401)

A. Equipment

(1) Container - Fuel Resistant, 1 quart capacity to drain the pump
(2) MS35275-250 - Screws (2), Motor/Impeller retention
(3) Fuel Boost Pump Puller - B28003-1

B. References

(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(2) AMM 24-22-00/201, Electric Power-Control

(3) AMM 27-81-00/201, Leading Edge Slat System
(4) AMM 28-26-00/201, Defueling
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks

C. Access

(1) Location Zones

133	Center Wing Section (Left)
134	Center Wing Section (Right)
511	Leading Edge To Front Spar (Left)
611	Leading Edge To Front Spar (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)
733	Left MLG Oleo Door
743	Right MLG Oleo Door

D. Procedure

S 864-028

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(1) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 144-157

(2) To remove the forward fuel boost pump, remove the applicable left or right leading edge access panel, 511FB or 611FB (AMM 06-44-00/201).

S 014-029

(3) To get access to the motor impeller of the aft fuel boost pumps, go through the applicable left or right main shock strut door.

S 014-030

(4) To get access to the motor impeller of the fuel override pumps, do the steps that follow:
(a) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-023

(5) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) For the left aft fuel boost pump,
6H15, L AFT FUEL BOOST PUMP

(b) For the left forward fuel boost pump, 6H23, L FWD FUEL BOOST PUMP
(c) For the left fuel override pump, 6F14, L FUEL OVRD PUMP
(d) For the right aft fuel boost pump, 6H20, R AFT FUEL BOOST PUMP
(e) For the right forward fuel boost pump, 6H17, R FWD FUEL BOOST PUMP
(f) For the right fuel override pump, 6F20, R FUEL OVRD PUMP

S 034-024
(6) Disconnect the electrical connector (13) from the motor impeller (11) (View A).

S 034-025
(7) Loosen but do not remove the drain plug (15).

S 034-026
(8) Remove the bonding clips (14).

S 034-126
(9) Remove the two mounting screws (12), at the 1 0'clock and 7 0'clock positions, from the fuel boost pump or the fuel override pump.

S 434-127
(10) Install a MS35275-250 screw at the 1 0'clock and 7 0'clock positions of the fuel boost pump or the fuel override pump.

S 034-027
(11) Remove the mounting screws (12) that remain from the fuel boost pump or the fuel override pump.

S 494-028
(12) Put the container below the motor impeller (11) to catch fuel.

S 024-089
(13) Pull the motor impeller (11) out 1.5 inches (or to the MS35275-250 screws) from the housing (21) to let the removal check valve (26) close.

S 034-031

CAUTION: MAKE SURE FUEL DOES NOT CONTINUOUSLY DRAIN. IF FUEL CONTINUOUSLY DRAINS, THE REMOVAL CHECK VALVE (26) IS NOT CLOSED AND YOU MUST INSTALL THE MOTOR IMPELLER (11) AND DEFUEL THE FUEL TANK.

(14) Remove the drain plug (15).

S 654-150
(15) If fuel continuously drains, do the steps that follow:
(a) Install the motor impeller (11).
(b) Defuel the center fuel tank (AMM 28-26-00/201).
(c) Remove the motor impeller (11).

S 034-128
(16) After the motor impeller (11) drains, remove the two MS35275-250 screws.

S 024-033

CAUTION: HAVE A REPLACEMENT MOTOR IMPELLER (11) AVAILABLE. WHEN YOU REMOVE THE MOTOR IMPELLER (11), FUEL CAN FALL IN DROPS INTO THE HOUSING (21) FROM ORIFICES IN THE JET PUMP PRESSURE LINE.

(17) Remove the motor impeller (11) from the housing (21).
(a) For the fuel boost pumps, use the fuel boost pump puller to remove the motor impeller (11).

TASK 28-22-03-404-029

5. Install the Motor Impeller (Fig. 401)
A. Equipment
(1) Container - 5 gallon (19/liter) minimum capacity to hold fuel
B. Consumable Materials
(1) D00281 Fuel
(2) D00504 VV-P-236, Petrolatum
(3) BMS 3-33 Grease (Recommended)
(4) BMS 3-24 Grease (Aeroshell 16) (Alternate)
(5) A02315 - Sealant Chromate Type - BMS5-142.
C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	11	Motor Impeller (fuel boost pump)	28-22-03	51	1
		(fuel override pump)	28-22-05	04	1, 2
	16	O-ring (fuel boost pump)	28-22-03	51	15
		(fuel override pump)	28-22-05	04	15
	17	O-ring (fuel boost pump)	28-22-03	51	10
		(fuel override pump)	28-22-05	04	10
	18	O-ring (fuel boost pump)	28-22-03	51	5
		(fuel override pump)	28-22-05	04	5

D. References
(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(2) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(3) AMM 20-10-23/401, Lockwires
(4) AMM 24-22-00/201, Electric Power - Control
(5) AMM 24-25-00/501, Hydraulic Motor Generator System
(6) AMM 27-81-00/201, Leading Edge Slat System
(7) AMM 32-00-15/201, Landing Gear Door Locks

E. Access
(1) Location Zones
133 Center Wing Section (Left)
134 Center Wing Section (Right)
511 Leading Edge To Front Spar (Left)
611 Leading Edge To Front Spar (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)
733 Left MLG Oleo Door
743 Right MLG Oleo Door

F. Procedure

S 654-193

WARNING: MAKE SURE THE FUEL PUMPS YOU INSTALL ON THE AIRPLANE HAVE BEEN INSPECTED FOR CORRECT ROUTING OF THE STATOR LEAD WIRES. A FUEL PUMP THAT HAS NOT BEEN INSPECTED CAN HAVE AN INTERNAL CHAFING CONDITION, WHICH CAN CAUSE AN ELECTRICAL SHORT. AN ELECTRICAL SHORT INSIDE THE PUMP MOTOR CAN CAUSE A FIRE OR AN EXPLOSION.

(1) Make sure the fuel pump has been inspected for the stator lead wire chafing condition.

NOTE: The fuel pumps are subject to the requirements of SB 28A-70 or SB 28A-71. An airworthiness directive (FAA AD 2002-19-52) expands the inspection to all fuel pumps prior to installation.

S 164-030
(2) Clean all machined surfaces on the motor impeller (11) and the surfaces that touch on the housing (21) (View A).

S 434-031
(3) Install the new O-rings (16, 17, 18) in the grooves of the motor impeller (11).

S 644-034
(4) Apply a thin layer of petrolatum to the O-rings (16, 17, 18).

S 654-152

CAUTION: MAKE SURE YOU PRIME THE MOTOR IMPELLER WITH FUEL. IF YOU DO NOT PRIME THE MOTOR IMPELLER DAMAGE TO THE PUMP CAN OCCUR WHEN YOU START THE PUMP.

(5) Put 1/2 to 1 pint of fuel into two smaller slots in the upper side of the motor impeller (11).

S 984-036
(6) Turn the impeller to make sure fuel touches the internal parts of the fuel boost pump or fuel override pump.

S 214-034
(7) Make sure the drain plug (15) is installed.

S 424-176
(8) Make sure the lockwire on the drain plug (15) is installed.

NOTE: To install the lockwire on the drain plug, lockwire the hole before you install the motor impeller to the housing. Once the motor impeller is installed, complete the lockwire installation.

S 424-033
(9) Put the motor impeller (11) into the housing (21).

NOTE: Be careful not to damage the O-rings (16, 17, 18) when you put the motor impeller (11) into the housing (21).

S 824-035
(10) Turn the motor impeller (11) until the index hole (39) aligns with the index pin in the housing (21) (View A-A).

S 434-036
(11) Install the bonding clips (14) with the bonding jumpers (10, 19).

S 434-037
(12) Install the mounting screws (12) on the motor impeller (11).

S 434-190
(13) Measure the bonding resistance between the motor impeller (11) and the structure.
(a) Make sure the resistance is less than .0004 ohms.

S 434-203
(14) Make sure there is a fillet seal of sealant, BMS5-142 on the applicable locations of bonding jumpers (10, 19).
(a) The sealant must cover the area around each jumper terminal and the fastner head and nut to protect the conductive path between the spar the motor impeller (11).

S 644-177
(15) Apply BMS3-24 grease to the inside of insert of the mounting screws (12) and the motor impeller (11).

S 434-132
(16) Install the lockwire on the mounting screws (12).

S 764-166
(17) FUEL BOOST PUMP 60B92404-5, -6, -7 OR -8;
FUEL OVERRIDE PUMP 60B89004-8, -10, -12 OR -14;
Do the Fuel Pumps - Insulation Resistance Check (AMM 28-22-00/601).

NOTE: This insulation resistance check must be done on-wing each time you install a new or servicable fuel pump.

S 434-038
(18) Connect the electrical connector (13) to the motor impeller (11).

S 654-039
(19) Refuel the center or main fuel tanks (AMM 12-11-01/301).
(a) If it is not possible to fully refuel the tanks to the specified quantities, do one of these alternate procedures to prime the fuel boost pump or fuel override pump.
1) ALTERNATE PROCEDURE 1;
Do these steps to prime the fuel boost pump or fuel override pump through the drain hole:
a) Remove the drain plug (15) from the motor impeller (11).
b) Put approximately 1.5 pints (0.75 liters) of fuel into the drain hole.
c) Install the drain plug (15) on the motor impeller (11).
d) Tighten the drain plug (15) to a torque of 40-50 inch-pounds (5-6 Nm).
e) Install lockwire on the drain plug (15) (AMM 20-10-23/401).
2) ALTERNATE PROCEDURE 2;
Do these steps to prime the fuel boost pump or fuel override pump through the drain hole and slots:
a) Do the task: Remove the Motor Impeller.
b) Remove the drain plug (15).

c) Put the motor impeller (11) in a 5 gallon (19 liter) fuel resistant container of fuel, but keep the electrical connector (13) on the motor impeller (11) out of the fuel.
d) Install the drain plug (15) again.
e) Hold the motor impeller (11) in the correct direction with the open fuel slots on the top.

NOTE: This will make sure that the fuel does not drain out of the motor impeller (11) before you install it.

f) Make sure there is no fuel on the electrical connector (13) on the motor impeller (11).
g) Remove the motor impeller (11) from the fuel and immediately install the motor impeller (11) per the previous steps in this task.
h) Tighten the drain plug (15) to a torque of 40-50 inch-pounds (5-6 Nm).
i) Install lockwire on the drain plug (15) (AMM 20-10-23/401).

(b) For the forward fuel boost pumps, refuel the main fuel tanks to 2,000 lbs (900 kgs) minimum.
(c) For the aft fuel boost pumps, refuel the main fuel tanks to 2,000 lbs (900 kgs) minimum.
(d) For the fuel override pumps, refuel the center fuel tank to 20,000 lbs (9,000 kgs) minimum.

S 214-038

(20) Make sure there are no fuel leaks at the fuel boost pump or fuel override pump.

S 864-040

(21) Close this circuit breaker on the P6 panel and remove the DO-NOT-CLOSE tag:
(a) For the left aft fuel boost pump,
6H15, L AFT FUEL BOOST PUMP

(b) For the left forward fuel boost pump, 6H23, L FWD FUEL BOOST PUMP
(c) For the left fuel override pump, 6F14, L FUEL OVRD PUMP
(d) For the right aft fuel boost pump, 6H20, R AFT FUEL BOOST PUMP
(e) For the right forward fuel boost pump, 6H17, R FWD FUEL BOOST PUMP
(f) For the right fuel override pump, 6F20, R FUEL OVRD PUMP

S 864-041
(22) Supply electrical power (AMM 24-22-00/201).

S 864-165
(23) Make sure these valves are closed:

NOTE: If you do this test with these valves open (for example during a fuel transfer operation), it is possible that the low pressure indicating light will not go off when you operate the pump.

(a) The engine fuel shutoff valve (spar valve) for the No. 1 tank
(b) The engine fuel shutoff valve (spar valve) for the No. 2 tank
(c) The crossfeed valve
(d) The defuel valve

S 864-197

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(24) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-058
(25) Push the applicable fuel boost pump or fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.

PUMP	SWITCH-LIGHT
Left aft fuel boost pump	L AFT PUMPS
Left forward fuel boost pump	L FWD PUMPS
Left fuel override pump *[1]	LEFT C PUMPS
Right aft fuel boost pump	R AFT PUMPS
Right forward fuel boost pump	R FWD PUMPS
Right fuel override pump *[1]	RIGHT C PUMPS

*[1] The fueling station door (621GB) must be open before the left or right override pump will operate.

S 284-059
(26) Listen and make sure the applicable fuel boost pump or fuel override pump operates.

S 214-060
(27) Make sure the applicable PRESS light on the fuel management panel of the P5 panel goes off.

S 864-061
(28) Push the applicable fuel boost pump or fuel override pump switch-light to the off position.

S 284-062
(29) Listen and make sure the applicable fuel boost pump or fuel override pump does not operate.

S 214-063
(30) For the fuel boost pumps, make sure the applicable PRESS light comes on.

S 714-104
(31) GUI 003-114, 116-999;
Do the steps that follow:
(a) Do the Operational Test for the hydraulic motor generator (AMM 24-25-00/501) to supply power for the right fuel override pump.
(b) Close the fueling station door, 621GB, on the right wing leading edge.
(c) Push the RIGHT C PUMPS switch-light to the on position.

NOTE: Someone must be in the flight compartment when you operate the right center override pump to continuously monitor for the PRESS light.

1) Push the RIGHT C PUMPS switch-light to the off position if the PRESS light stays on.

(d) Listen at the right inboard rear spar and make sure the right fuel override pump operates.
(e) Push the RIGHT C PUMPS switch-light to the off position.
(f) Remove the hydraulic motor generator power.

S 414-170
(32) For the forward fuel boost pumps, install the applicable left or right access panel, 511FB or 611FB (AMM 06-44-00/201).

S 864-064

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(33) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 094-039

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(34) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-043

(35) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-22-03-004-040

6. Remove the Housing (Fig. 401)

A. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(3) AMM 27-81-00/201, Leading Edge Slat System
(4) AMM 28-11-00/201, Fuel Tanks
(5) AMM 28-11-02/401, Center Tank Access Door
(6) AMM 28-26-00/201, Defueling
(7) AMM 32-00-15/201, Landing Gear Door Locks
(8) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
511 Leading Edge To Front Spar (Left)
611 Leading Edge To Front Spar (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel (Left)
611FB	Leading Edge Access Panel (Right)
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

C. Procedure

S 654-058

(1) Defuel the center fuel tank (AMM 28-26-00/201).

S 654-159

(2) For the right main tank boost pumps or the right override pump, defuel the right main tank (AMM 28-26-00/201).

NOTE: You can move the fuel to the left main fuel tank to do this if it has sufficient capacity for the fuel.

S 654-160

(3) For the left main tank boost pumps or the left override pump, defuel the left main tank (AMM 28-26-00/201).

NOTE: You can move the fuel to the right main fuel tank to do this if it has sufficient capacity for the fuel.

S 864-161

(4) Make sure the fuel crossfeed valve(s) are closed.

S 654-059

(5) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 864-060

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(6) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 144-162

(7) To remove the forward fuel boost pump, remove the applicable left or right leading edge access panel, 511FB or 611FB (AMM 06-44-00/201).

S 014-061

(8) To remove the forward or aft fuel boost pumps, remove the applicable left or right center tank access door, 531AB or 631AB (AMM 28-11-02/401).

S 014-062

(9) To remove the fuel override pumps, do the steps that follow:
   (a) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

   WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

   (b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).
   (c) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-001

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-002
(11) Go into the center fuel tank.

S 014-003
(12) For the fuel override pumps, remove the baffle doors, 134BZ, 134CZ and 134DZ (AMM 06-41-00/201).

S 034-044
(13) Remove the motor impeller (11) per the Remove the Motor Impeller procedure.

S 034-045
(14) Disconnect the discharge check valve (7) from the housing (21) (View B).
(a) Remove the four screws (32), washers (33), and nuts (34) from the discharge check valve (7).
(b) Remove the O-rings (35).

S 214-046
(15) Disconnect the removal check valve (26) from the housing (21).
(a) Remove the six screws (25), washers (24), and nuts (23) from the removal check valve (26) (View A).
(b) Remove the O-ring (36) (View B).

S 034-047
(16) Disconnect the bonding jumpers (10, 19) from the spar on the wing (View B).

S 034-041
(17) Remove the flexible full coupling (9) and the two O-rings to disconnect the coolant and vapor discharge line (8) at the coolant and vapor discharge port (22).

S 034-042
(18) Remove the nut (31), ring (30) and O-ring (29) to remove the pressure sensor line (1) (View A-A).
(a) Make sure the pressure sense line (1) is drained.

NOTE: This will help to prevent the collection of water in the pressure sense line. Water can freeze and cause damage to the pressure sense line. You can loosen the connection for the pressure sense line at the pressure switch (AMM 28-42-01/401) to help remove the fuel and water from the pressure sense line. You may have to flush the pressure sense line to remove all the water.

S 024-044
(19) Hold the housing (21) from in the center fuel tank.

S 034-048
(20) Remove the mounting bolts (20) from out of the center fuel tank (View B).

S 034-133
(21) Remove the gaskoseal (37) (View B).

S 024-046
(22) Remove the housing (21) from the center fuel tank.

TASK 28-22-03-404-049

7. Install the Housing (Fig. 401)
   A. Consumable Materials
      (1) D00504 VV-P-236, Petrolatum
      (2) A00767 Sealant - Integral Fuel Tank - BMS5-45.
   B. Parts
   C. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (3) AMM 12-11-01/301, Fuel Tank Pressure Fueling
      (4) AMM 24-22-00/201, Electric Power - Control
      (5) AMM 24-25-00/501, Hydraulic Motor Generator System
      (6) AMM 27-81-00/201, Leading Edge Slat System
      (7) AMM 28-11-00/201, Fuel Tanks
      (8) AMM 28-11-02/401, Center Tank Access Door
      (9) AMM 28-25-05/401, APU Fuel Line and Shroud
      (10) AMM 32-00-15/201, Landing Gear Door Locks
      (11) AIPC 28-22-03-01, 28-22-03-01A, 28-22-03-01B, 28-22-03-01C, 28-22-03-02, 28-22-03-02A, 28-22-03-02B, 28-22-03-02C, 28-22-05-01, 28-22-05-02, 28-22-05-03, 28-22-07-07, 28-22-07-08, 28-22-07-09, 28-22-09-01, 28-22-09-01A, 28-22-09-01B, 28-22-09-01C

D. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
511	Leading Edge To Front Spar (Left)
611	Leading Edge To Front Spar (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
511FB	Leading Edge Access Panel (Left)
611FB	Leading Edge Access Panel (Right)
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

E. Procedure

S 944-047

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 824-048

(2) Align the housing (21) with the spar of the wing (View B).

S 434-049

(3) Put a new gaskoseal (37) between the housing (21) and the spar.

S 424-049

(4) Install the mounting bolts (20) and washers (38).

S 434-050
(5) Install the lockwire on the mounting bolts (20).

S 434-204
(6) Apply a fillet seal of sealant, BMS5-45 to the surface inside the fuel tank where the pump housing (21) touches the spar.

S 434-206
(7) Apply a fillet seal of sealant, BMS5-142 to the surface outside the fuel tank where the pump housing (21) touches the spar.

S 434-134
(8) Install the motor impeller (11) into the housing (21) per the Install the Motor Impeller procedure.

S 434-053
(9) Connect the pressure sensor line (1) at the discharge check valve (7).
   (a) Install the ferrule on the pressure sensor line (1).
   (b) Put the nut (31) on the ferrule.
   (c) Put the ring (30) on the ferrule between the ferrule and the nut (31).
   (d) Install a new O-ring (29) in the coupling body.
   (e) Apply a thin layer of petrolatum to the O-ring (29).
   (f) Install the nut (31) onto the coupling body.
   (g) Install the lockwire on the nut (31).

S 434-051
(10) Install the flexible full coupling (9) to attach the coolant and vapor discharge line (8) to the coolant and vapor discharge port (22) (AMM 28-25-05/401).

S 644-153
(11) Apply a thin layer of petrolatum to the O-rings (35, 36).

S 434-135
(12) Install a new O-ring (36) and the six screws (25), washers (24) and nuts (23) to attach the removal check valve (26) (View B).

S 434-136
(13) Install a new O-ring (35) and four screws (32), washers (33) and nuts (34) to attach the discharge check valve (7).

S 414-054
(14) For the fuel override pumps, install the baffle doors, 134DZ, 134CZ and 134BZ (AMM 06-41-00/201).

S 414-090
(15) For the fuel override pumps, install the center tank access door, 134AZ (AMM 28-11-02/401).

S 414-055
(16) For the fuel boost pumps, install the applicable left or right center tank access door, 531AB or 631AB (AMM 28-11-02/401).

S 654-091
(17) Refuel the center or main fuel tanks (AMM 12-11-01/301).
(a) For the forward fuel boost pumps, refuel the main fuel tanks to 2,000 lbs (900 kgs) minimum.
(b) For the aft fuel boost pumps, refuel the main fuel tanks to 2,000 lbs (900 kgs) minimum.
(c) For the fuel override pumps, refuel the center fuel tank to 20,000 lbs (9,000 kgs) minimum.

S 214-056
(18) Make sure there are no fuel leaks at the spar for the fuel boost pump or fuel override pump.

S 094-057

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(19) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-055
(20) Supply electrical power (AMM 24-22-00/201).

S 864-155
(21) Make sure these valves are closed:

NOTE: If you do this test with these valves open (for example during a fuel transfer operation), it is possible that the low pressure indicating light will not go off when you operate the pump.

(a) The engine fuel shutoff valve (spar valve) for the No. 1 tank
(b) The engine fuel shutoff valve (spar valve) for the No. 2 tank
(c) The engine fuel crossfeed valve
(d) The defuel valve

S 864-198

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(22) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-088
(23) Push the applicable fuel boost pump or fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.

PUMP	SWITCH-LIGHT
Left aft fuel boost pump	L AFT PUMPS
Left forward fuel boost pump	L FWD PUMPS
Left fuel override pump *[1]	LEFT C PUMPS
Right aft fuel boost pump	R AFT PUMPS
Right forward boost pump	R FWD PUMPS
Right fuel override pump *[1]	RIGHT C PUMPS

*[1] The fueling station door (621GB) must be open before the left or right override pump will operate.

S 284-065
(24) Listen and make sure the applicable fuel boost pump or fuel override pump operates.

S 214-066
(25) Make sure the applicable PRESS light on the fuel management panel of the P5 panel goes off.

S 864-067
(26) Push the applicable fuel boost pump or fuel override pump switch-light to the off position.

S 284-068
(27) Listen and make sure the applicable fuel boost pump or fuel override pump does not operate.

S 214-069
(28) For the fuel boost pumps, make sure the applicable PRESS light comes on.

S 714-096
(29) GUI 003-114, 116-999;
Do the steps that follow:
(a) Do the Operational Test for the hydraulic motor generator (AMM 24-25-00/501) to supply power for the right fuel override pump.
(b) Close the fueling station door, 621GB, on the right wing leading edge.
(c) Push the RIGHT C PUMPS switch-light to the on position.

NOTE: Someone must be in the flight compartment when you operate the right center override pump to continuously monitor for the PRESS light.

1) Push the RIGHT C PUMPS switch-light to the off position if the PRESS light stays on.

(d) Listen at the right inboard rear spar and make sure the right fuel override pump operates.
(e) Push the RIGHT C PUMPS switch-light to the off position.
(f) Remove the hydraulic motor generator power.

S 414-164

(30) For the forward fuel boost pumps, install the applicable left or right access panel, 511FB or 611FB (AMM 06-44-00/201).

S 864-070

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(31) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 864-057

(32) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FUEL BOOST PUMP AND FUEL OVERRIDE PUMP - INSPECTION/CHECK

1. General
   A. This task does an electrical bonding resistance check for the fuel boost pump and the fuel override pump.

TASK 28-22-03-766-001

2. Fuel Boost Pump and Fuel Override Pump - Bonding Resistance Check (Fig. 601)
   A. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 27-81-00/201, Leading Edge Slat System
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
      (5) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Use one of these:
         (a) Bonding Meter - Model T477W
             Avtron Manufacturing Inc.
             Cleveland OH
         (b) Bonding Meter - Model M1
             (Serial Number A0000112 and subsequent)
             BCD Electronics Ltd.
             Vancouver Canada
   C. Access
      (1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
511	Leading Edge To Front Spar (Left)
611	Leading Edge To Front Spar (Right)
733	Left MLG Oleo Door
743	Right MLG Oleo Door

      (2) Access Panels

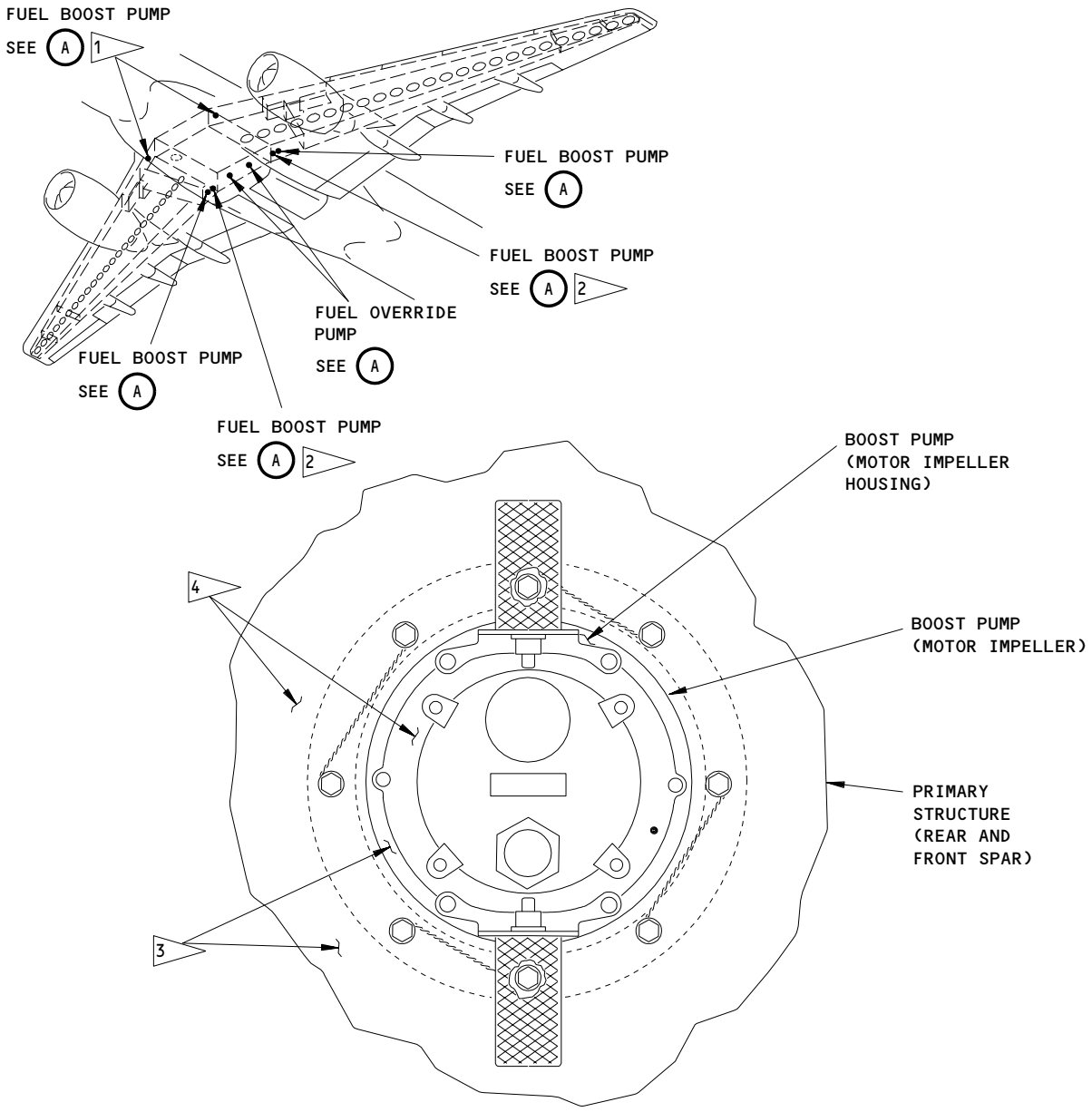
511FB	Leading Edge Access Panel (Left)
611FB	Leading Edge Access Panel (Right)

   D. Procedure

      S 046-005

      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

      (1) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).



FUEL BOOST OR FUEL OVERRIDE PUMP
(MOTOR IMPELLER)

A

1 AIRPLANES WITH LEFT AND RIGHT FORWARD FUEL BOOST PUMPS INSTALLED ON THE FRONT SPAR.

2 AIRPLANES WITH LEFT AND RIGHT FORWARD FUEL BOOST PUMPS INSTALLED ON THE REAR SPAR.

3 THE RESISTANCE FROM THE FUEL BOOST PUMP HOUSING TO THE SPAR IS 0.005 OHMS OR LESS.

4 THE RESISTANCE FROM THE BOOST PUMP MOTOR IMPELLER END CAP TO THE SPAR IS 0.001 OHMS OR LESS.

Fuel Boost Pump Resistance Check
Figure 601

S 016-009
(2) To get access to the forward fuel boost pump, remove the applicable left or right leading edge access panel, 511FB or 611FB (AMM 06-44-00/201).

S 016-011
(3) To get access to the aft fuel boost pumps, go through the applicable left or right main shock strut door.

S 016-010
(4) To get access to the fuel override pumps, do the steps that follow:
(a) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 026-012
(5) Disconnect the electrical connector from the motor impeller.

S 766-003
(6) Measure the bonding resistance between the fuel boost pump housings and the spar web, and between the fuel override pump housings and the spar web (SWPM 20-20-00).
(a) Make sure the bonding resistance is 0.005 ohm (5.0 milliohms) or less.

S 766-013
(7) Measure the bonding resistance between the fuel boost pump motor impeller caps and the spar web, and between the fuel override pump motor impeller caps and the spar web (SWPM 20-20-00).
(a) Make sure the bonding resistance is 0.001 ohm (1.0 milliohm) or less.

S 426-014
(8) Connect the electrical connector to the motor impeller.

S 416-015
(9) For the foward fuel boost pumps, install the applicable left or right access panel, 511FB or 611FB (AMM 06-44-00/201).

S 866-017

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. THE SLATS CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS.

(10) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 096-018

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(11) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

MAIN TANK FUEL BOOST PUMP BYPASS VALVE - REMOVAL/INSTALLATION

1. General
   A. There is one bypass valve of the fuel boost pump in each main fuel tank. The bypass valve lets suction fuel flow to the engine if a fuel boost pump does not operate. Each bypass valve is found between stringers 5 and 6 at WS 231.5. The bypass valve is installed in the suction feed line, downstream of the filter screen.
   B. This procedure contains two tasks. The first task removes the bypass valve of the fuel boost pump. The second task installs the bypass valve of the fuel boost pump.

TASK 28-22-04-004-036

2. Remove the Bypass Valve of the Fuel Boost Pump (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-22-07/401, Fuel Line and Fittings
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panels
          541AB Main Tank Access Door (Left)
          641AB Main Tank Access Door (Right)

   C. Procedure

      S 654-037
      (1) Defuel the applicable left or right main fuel tank (AMM 28-26-00/201).

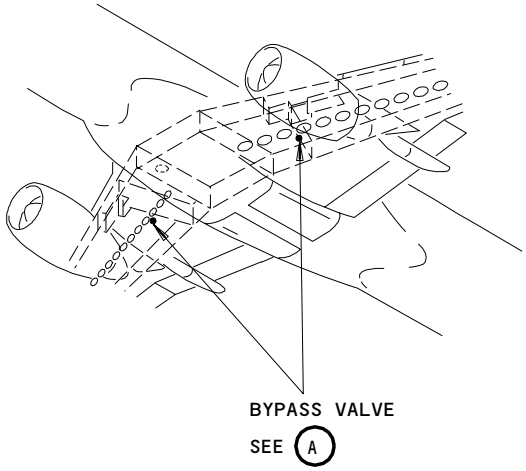
      S 654-038
      (2) Drain and purge the applicable left or right main fuel tank (AMM 28-11-00/201).

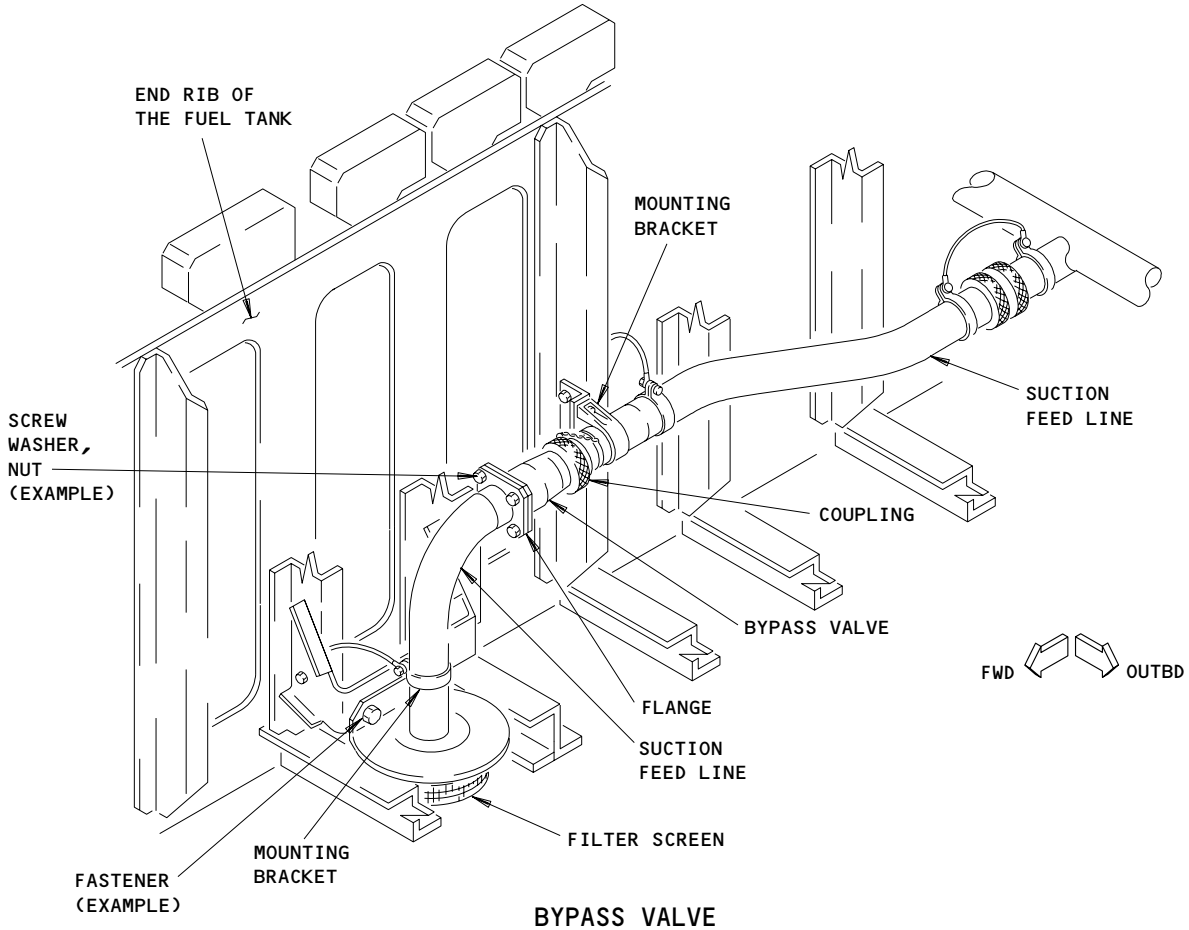
      S 014-001
      (3) Remove the applicable left or right main tank access door, 541AB or 641AB (AMM 28-11-01/401).

      S 944-039

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (4) Obey the fuel tank entry precautions (AMM 28-11-00/201).





BYPASS VALVE
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

(A)

Bypass Valve of the Fuel Boost Pump Installation
Figure 401

S 014-040
(5) Go into the fuel tank.

S 014-002
(6) Find the bypass valve.

S 024-041
(7) To remove the bypass valve, do the steps that follow:
(a) Remove the fasteners from the mounting brackets that attach the suction feed line to the end rib of the fuel tank.
(b) Remove the coupling between the bypass valve and the suction feed line (AMM 28-22-07/401).
(c) Remove the screws, washers and nuts on the flange that connects the bypass valve to the suction feed line.
(d) Remove the bypass valve.
(e) Put covers on the open ends of the suction feed line to keep unwanted materials out.

TASK 28-22-04-404-066

3. Install the Bypass Valve of the Fuel Boost Pump (Fig. 401)

A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door
(3) AMM 28-22-07/401, Fuel Line and Fittings

B. Access
(1) Location Zones
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels
541AB Main Tank Access Door (Left)
641AB Main Tank Access Door (Right)

C. Procedure

S 944-067

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-094
(2) Go into the fuel tank.

S 424-068

(3) To install the bypass valve, do the steps that follow:
   (a) Remove the covers from the open ends of the suction feed line.
   (b) Align the bypass valve with the suction feed line.
   (c) Put a new O-ring between the flange on the suction feed line and the flange of the bypass valve.
   (d) Install the screws, washers and nuts on the flanges to attach the bypass valve to the suction feed line.
   (e) Install the coupling between the bypass valve and the suction feed line (AMM 28-22-07/401).
   (f) Install the fasteners to attach the mounting brackets to the end rib of the fuel tank.

S 414-035

(4) Install the applicable left or right main tank access door, 541AB or 641AB (AMM 28-11-01/401).

CENTER TANK OVERRIDE PUMP - REMOVAL/INSTALLATION

TASK 28-22-05-964-001

1. Center Tank Override Pump Removal/Installation
   A. General
      (1) Two fuel override pumps are installed on the rear spar of the center fuel tank.
      (2) The fuel override pumps move fuel to the engines as necessary.
      (3) The removal and installation procedures for the fuel override pumps are contained in AMM 28-22-03/401.

AUTOMATIC SUMPING JET PUMP - REMOVAL/INSTALLATION

1. General
   A. There are four automatic sumping jet pumps. There is one in each main fuel tank and two in the center fuel tank. The automatic sumping jet pumps are referred to as jet pumps in this procedure.
   B. This procedure contains two tasks. The first task removes the jet pump. The second task installs the jet pump.

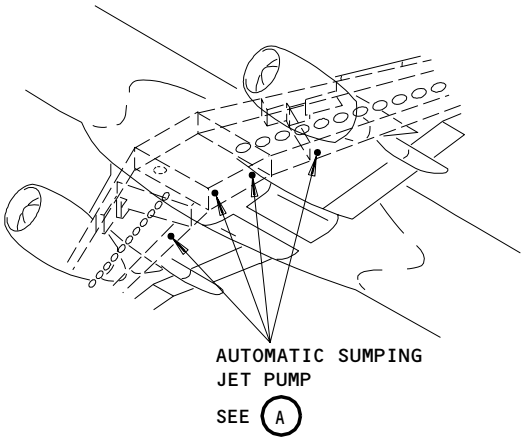
TASK 28-22-06-024-023

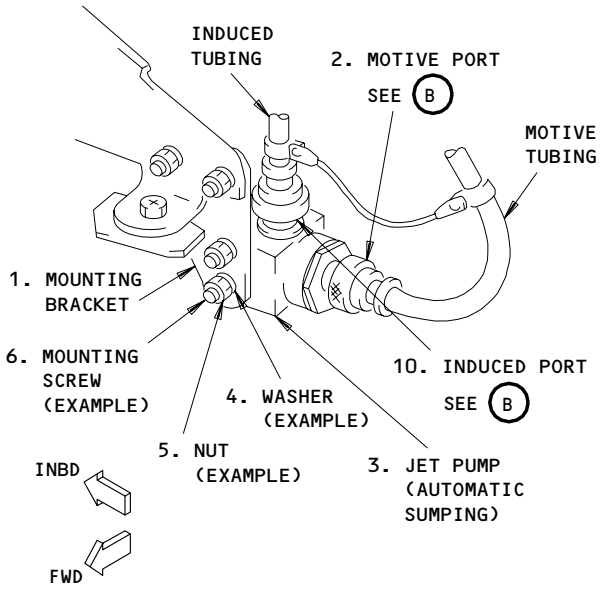
2. Remove the Jet Pump (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-01/401, Main Tank Access Door
      (4) AMM 28-11-02/401, Center Tank Access Door
      (5) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door
          134CA Baffle Door
          134DZ Baffle Door
          541AB Main Tank Access Door (Left)
          641AB Main Tank Access Door (Right)

   C. Procedure

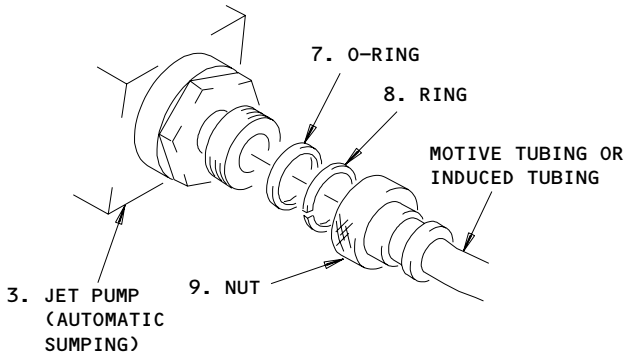
      S 654-002
      (1) Defuel the applicable fuel tank (AMM 28-26-00/201).





AUTOMATIC SUMPING JET PUMP

A



MOTIVE PORT OR INDUCED PORT

B

Automatic Sumping Jet Pump
Figure 401

S 654-001
(2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

S 014-003
(3) To remove the jet pumps in the main fuel tanks, remove the applicable main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 014-015
(4) To remove the jet pumps in the center fuel tank, remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-004

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-005
(6) Go into the applicable fuel tank.

S 014-016
(7) To remove the jet pumps in the center fuel tank, remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-017
(8) Remove the nut (9), the ring (8), and the O-ring (7) from the jet pump (3) at the motive port (2) and the induced port (10) (View B).

S 034-018
(9) Remove the mounting screws (6), washers (4), and nuts (5) from the jet pump (3) at the mounting bracket (1).

S 024-006
(10) Remove the jet pump (3).

TASK 28-22-06-404-019

3. Install the Jet Pump (Fig. 401)

A. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Jet Pump	28-22-03	01	270
				02	545
			28-22-13	01	25,45
				02	35
	7	O-ring	28-22-03	01	260
				01A	265

B. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels

(2) AMM 28-11-00/201, Fuel Tanks

(3) AMM 28-11-01/401, Main Tank Access Door

(4) AMM 28-11-02/401, Center Tank Access Door

C. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door
541AB Main Tank Access Door (Left)
641AB Main Tank Access Door (Right)

D. Procedure

S 944-007

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 424-008
(2) Put the jet pump (3) in position on the mounting bracket (1).

S 434-020
(3) Install the screws (6), washers (4), and nuts (5) to attach the jet pump (3) to the mounting bracket (1).

S 824-009
(4) Align the motive port (2) and the induced port (10) of the jet pump (3) with the motive tubing and the induced tubing.

S 434-010
(5) Put a new O-ring (7), a ring (8) and a nut (9) on the motive tubing (View B).

S 434-011
(6) Tighten the nut (9) to 170 pound-inches.

S 434-021
(7) Put a new O-ring (7), a ring (8), and a nut (9) on the induced tubing.

S 434-012
(8) Tighten the nut (9) to 170 pound-inches.

S 414-013
(9) For the jet pumps in the center fuel tank, install the center tank access door, 134AZ (AMM 28-11-02/401).

S 414-014

(10) For the jet pumps in the main fuel tank, install the applicable main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 414-022

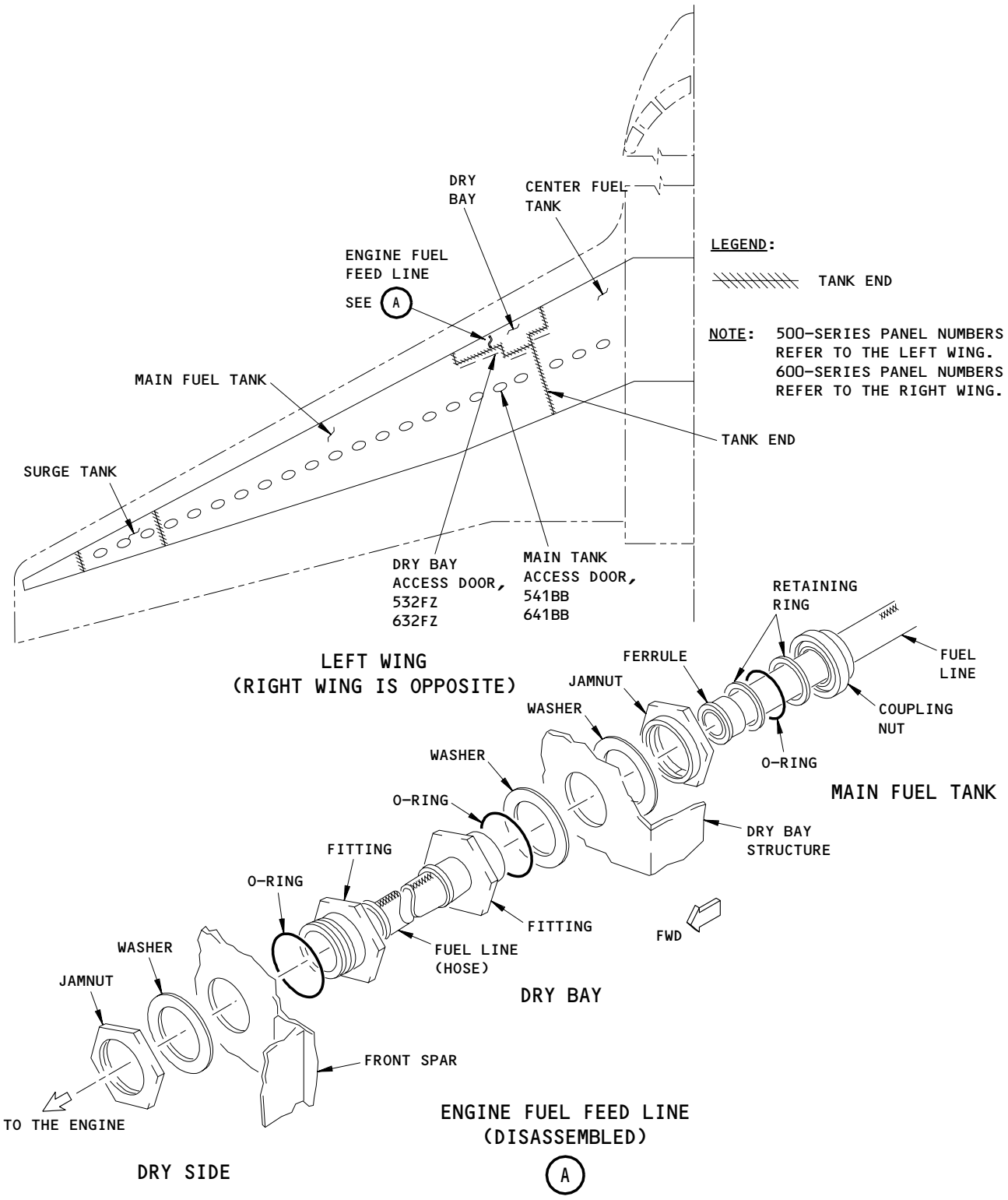
(11) For the jet pumps in the center fuel tank, install the baffle doors 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

FUEL LINE AND FITTINGS - REMOVAL/INSTALLATION

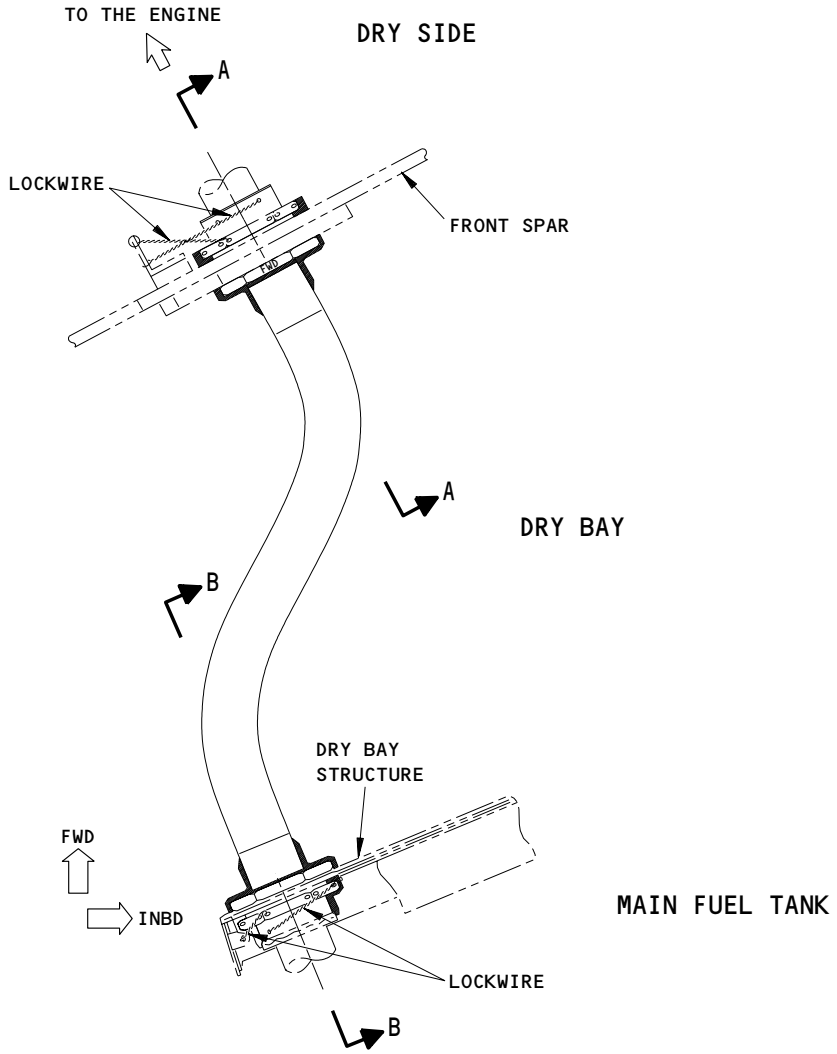
1. General
   A. This procedure gives examples of the removal and installation procedures for the fuel lines and fittings.
   B. This procedure contains two tasks. The first task removes the fuel lines and fittings. The second task installs the fuel lines and fittings.
   C. Refer to AMM 28-22-07/601 for acceptable damage limits for the fuel line and fittings.

TASK 28-22-07-004-001

2. Remove the Fuel Line and Fittings
   A. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-01/401, Main Tank Access Door
      (4) AMM 28-11-02/401, Center Tank Access Door
      (5) AMM 28-11-07/401, Dry Bay Access Door
      (6) AMM 28-25-05/401, APU Fuel Supply Line and Shroud
      (7) AMM 28-26-00/201, Defueling
      (8) AMM 54-53-01/401, Strut Pressure Relief and Access
      (9) AMM 73-11-07/401, Engine Main Fuel Supply Line
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          433 Nacelle Strut Mid Structure
          443 Nacelle Strut Mid Structure
          510 Wing Leading Edge - Left, Forward of Front Spar, Inboard of the Strut
          531 Center Wing Tank (Left)
          532 Dry Bay (Left)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          542 Main Tank - Rib No. 17 to No. 21 (Left)
          610 Wing Leading Edge - Right, Forward of Front Spar, Inboard of the Strut
          631 Center Wing Tank (Right)
          632 Dry Bay (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)
          642 Main Tank - Rib No. 17 to No. 21 (Right)



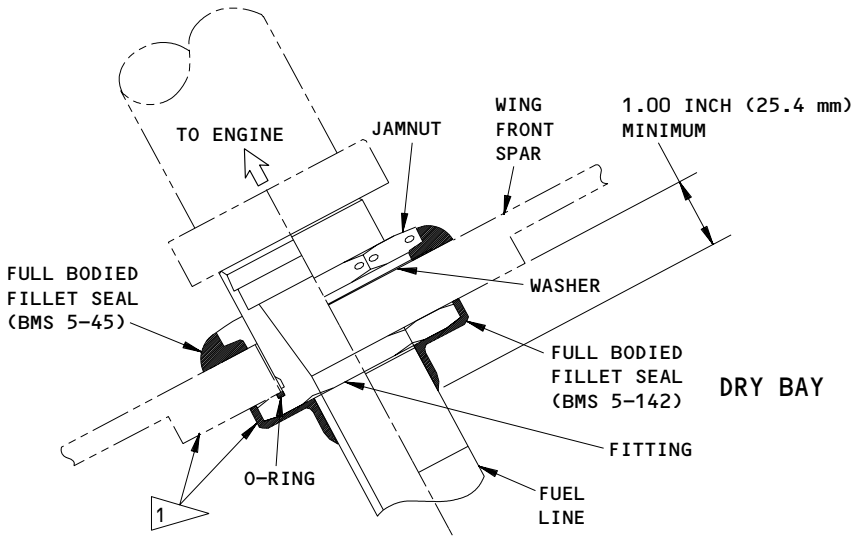
Dry Bay Fuel Line and Fittings Installation
Figure 401 (Sheet 1)



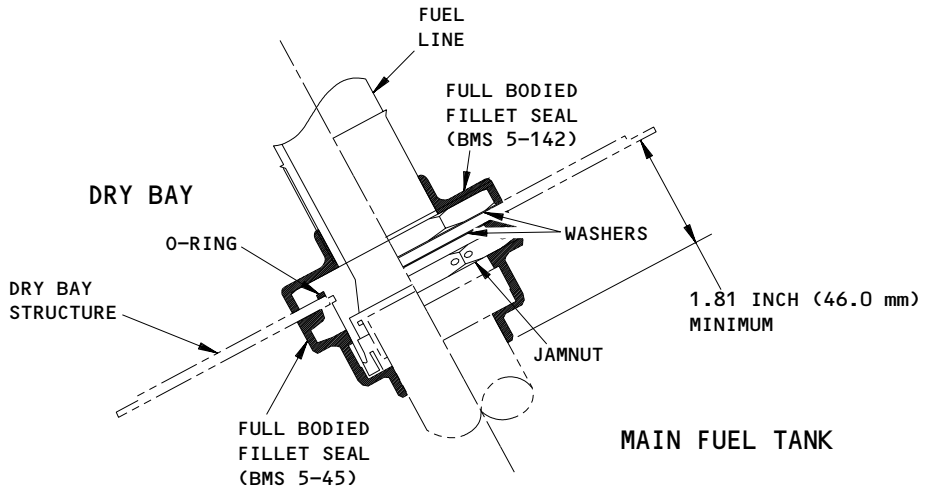
ENGINE FUEL FEED LINE
(ASSEMBLED)

A

Dry Bay Fuel Line and Fittings Installation
Figure 401 (Sheet 2)



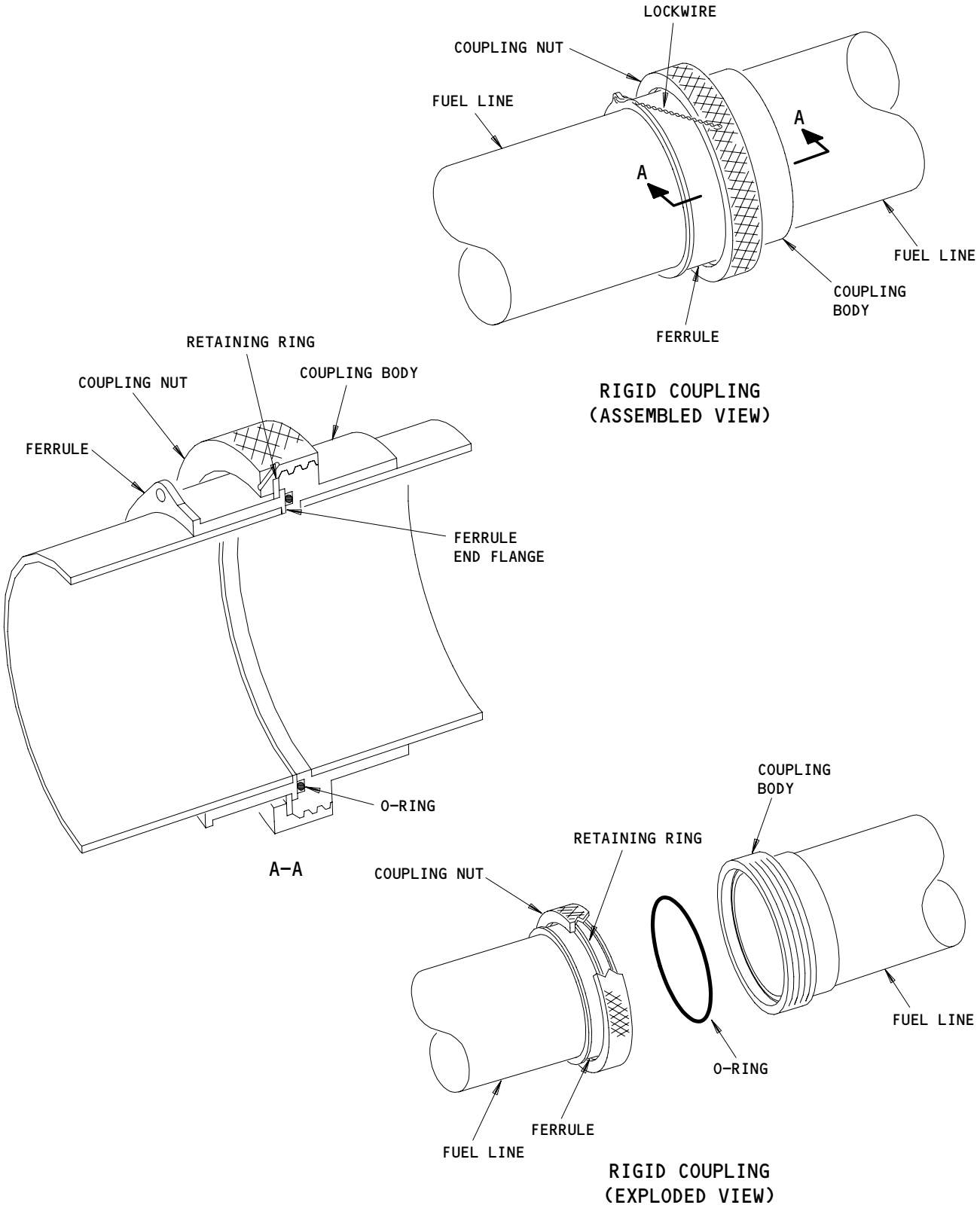
A-A



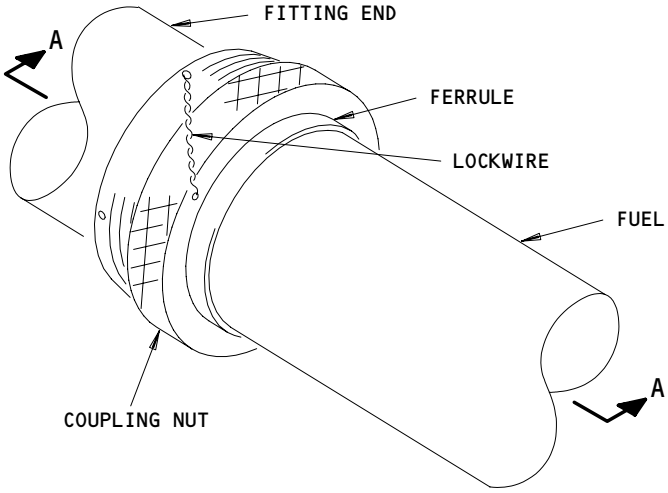
B-B

1 RESISTANCE FROM BULKHEAD FITTING TO FRONT SPAR IS 0.0005 OHM (0.5 MILLIOHM) OR LESS.

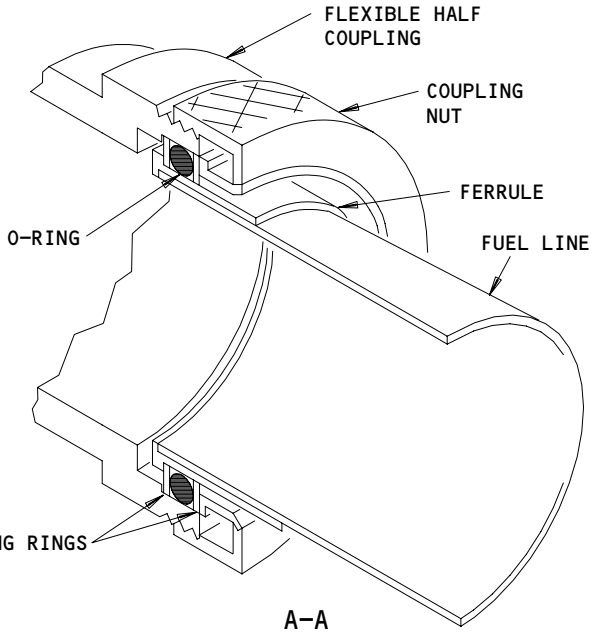
Dry Bay Fuel Line and Fittings Installation
Figure 401 (Sheet 3)



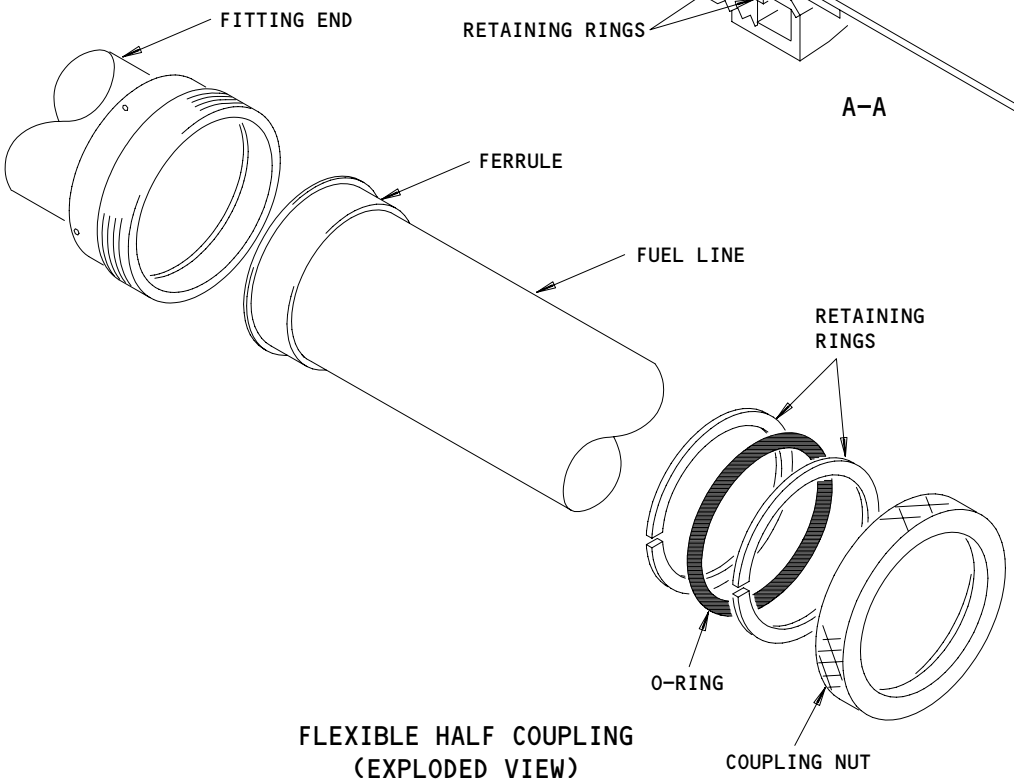
Rigid Coupling Installation
Figure 402



FLEXIBLE HALF COUPLING
(ASSEMBLED VIEW)

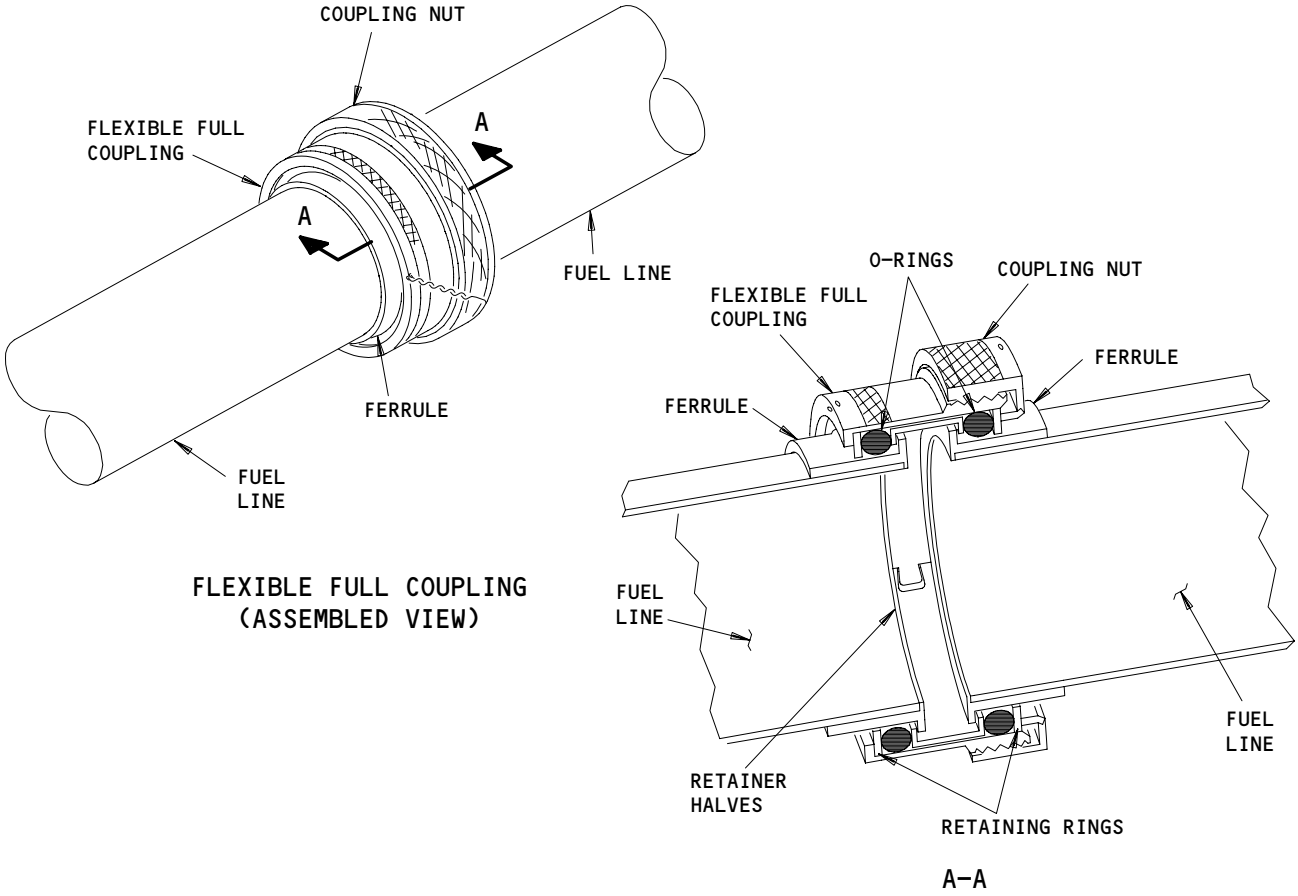


A-A

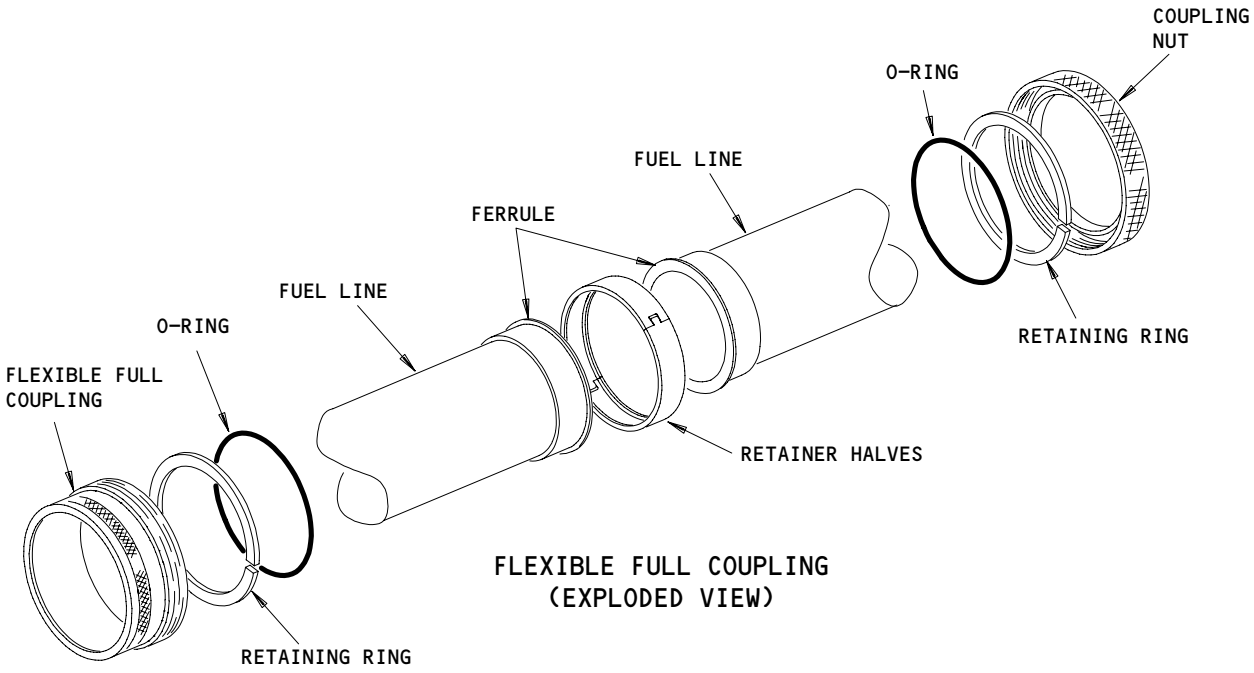


FLEXIBLE HALF COUPLING
(EXPLODED VIEW)

Flexible Half Coupling Installation
Figure 403

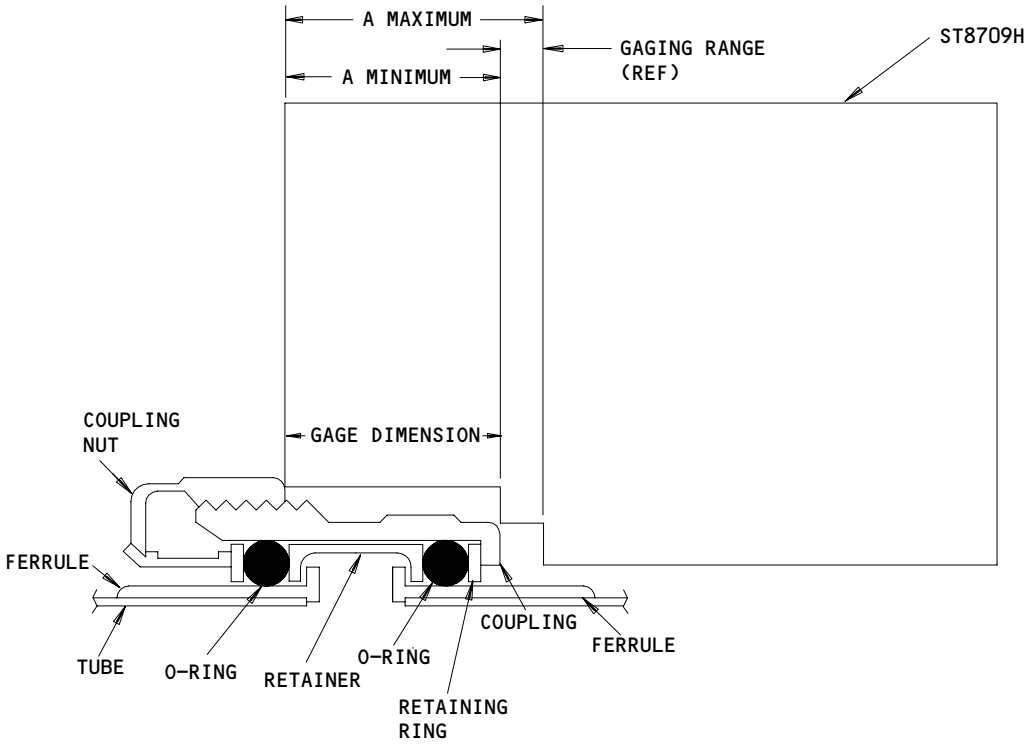


FLEXIBLE FULL COUPLING
(ASSEMBLED VIEW)



FLEXIBLE FULL COUPLING
(EXPLODED VIEW)

Flexible Full Coupling Installation
Figure 404



FLEXIBLE COUPLING WITH COUPLING GAGE

SIZE	MAX GAGE	MIN GAGE	GAGE NO. ST8709H
08	0.59	0.47	1
10	0.59	0.47	1
12	0.69	0.55	2
16	0.75	0.60	3
20	0.75	0.60	3
24	0.93	0.76	4
28	0.93	0.76	4
32	0.93	0.76	4

SIZE	MAX GAGE	MIN GAGE	GAGE NO. ST8709H
36	0.93	0.76	4
40	0.93	0.76	4
48	0.93	0.76	4
56	1.03	0.88	5
64	1.03	0.88	5
72	1.16	0.99	6
80	1.39	1.22	7
88	1.39	1.22	7

DIMENSIONAL REQUIREMENTS FOR ASSEMBLING FLEXIBLE FULL COUPLING

FLEXIBLE FULL COUPLING DIMENSIONS

Flexible Full Coupling Installation
Figure 405

(2) Access Panels

134AZ	Center Tank Access Door (Right)
511KT	Access Panel (Left)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
532FZ	Dry Bay Access Door (Left)
541BB	Main Tank Access Door (Left)
611KT	Access Panel (Right)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)
632FZ	Dry Bay Access Door (Right)
641BB	Main Tank Access Door (Right)

C. Procedure

S 654-011

(1) Defuel the applicable fuel tank(s) if it is not done (AMM 28-26-00/201).

S 654-031

(2) To drain the fuel in the fuel lines in the strut, do these steps:

(a) Do the applicable steps to drain the flexible fuel line in this task: Engine Main Fuel Supply Line Removal (AMM 73-11-07/401).

NOTE: Only do the steps necessary to remove the bottom end of the flexible fuel line and drain the fuel from the fuel line.

S 654-012

(3) Drain and purge the applicable fuel tank(s) if it is not done (AMM 28-11-00/201).

S 014-013

(4) To get access to the fuel line and fittings in the main fuel tank, remove the applicable main tank access door (AMM 28-11-01/401).

S 014-014

(5) To get access to the fuel line and fittings in the dry bay, do the steps that follow.

(a) Remove the applicable left or right main tank access door, 541BB or 641BB (AMM 28-11-01/401).

(b) Remove the applicable left or right dry bay access door 532FZ or 632FZ (AMM 28-11-07/401).

S 014-015

(6) To get access to the fuel line and fittings in the center fuel tank, remove the applicable center tank access door (AMM 28-11-02/401): 134AZ, 531AB, 531BB, 531CB, 631AB, 631BB or 631CB.

S 014-034

(7) To get access to the fuel lines in the strut, open or remove the applicable strut access doors or panels (AMM 54-53-01/401).

S 014-045

(8) To get access to the fuel line at the forward side of the front spar, remove the applicable left or right access panel, 511KT or 611KT (AMM 06-44-00/201).

S 944-016

WARNING: OBEY THE FUELING TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 024-017

(10) To remove the fuel line in the dry bay, do the steps that follow (Fig. 401):

NOTE: The fuel line in the dry bay is a hose with a fitting installed on each end.

(a) At the forward side of the front spar, do these steps:
1) Remove the lockwire (2 locations) that attaches to the coupling nut and the jamnut for the fuel line.
2) Remove the sealant around the jamnut and coupling nut at the forward side of the front spar.
3) Disconnect the coupling nut and fuel line from the front spar.
4) Remove and keep the jamnut and washer.

(b) At the aft side of the dry bay structure (in the fuel tank), do these steps:
1) Remove the lockwire (2 locations) that attaches to the coupling nut and jamnut.

2) Disconnect the coupling nut and fuel line from the dry bay structure.
3) Remove the retaining rings and O-ring from the fuel line.
a) Discard the O-ring.
4) Remove the sealant from the jamnut.
5) Remove the jamnut and washer.

(c) From in the dry bay, do these steps:
1) Remove the sealant (if applied) from around the fittings for the fuel line on the front spar and the dry bay structure.
2) Disconnect the fittings for the fuel line from the front spar and dry bay structure.
3) Remove the fuel line, washer and O-rings from the dry bay.
a) Discard the O-rings.

S 024-018

(11) Remove the bonding jumper clamps, saddle clamps and loop clamps from the fuel line as it is necessary (AMM 28-25-05/401).

S 024-026

(12) To remove the flexible half coupling (Fig. 403), do these steps:
(a) Remove the coupling nut.
(b) Remove the two retaining rings and one O-ring from the ferrule.
(c) Remove the ferrule.
(d) Remove the flexible half coupling.

S 024-027

(13) To remove the flexible full coupling (Fig. 404), do these steps:
(a) Remove the coupling nut from the flexible full coupling.
(b) Disconnect the retainer halves.
(c) Remove the two retaining rings.
(d) Remove the two O-rings.
(e) Remove the two ferrules.
(f) Remove the flexible full coupling.

S 024-019

(14) Remove the flange couplings from the fuel line as it is necessary.
(a) Remove the screws, washers and nuts from the flange coupling.

(b) Disconnect the flange couplings from the flange.
(c) Remove the O-ring.

S 024-002
(15) Remove the rigid tube couplings from the fuel line as it is necessary (Fig. 402).
(a) Loosen the coupling nut on the coupling body.
(b) Remove the O-ring from the coupling body.
(c) Remove the retaining ring from between the coupling nut and the ferrule.
(d) Remove the coupling nut from the ferrule.
(e) Remove the ferrule from the fuel line.

S 024-003
(16) Remove the support clamps, tees, adapters, and elbows as it is necessary.

S 024-004
(17) Remove the piece of the fuel line.

TASK 28-22-07-404-005

3. Install the Fuel Line and Fittings

A. Equipment
(1) Coupling Gage - ST8709 H (optional)

B. Consumable Materials
(1) A00767 - Sealant - BMS 5-45 Class A-2
(2) A00767 - Sealant - BMS 5-45 Class B-2
(3) A00247 Sealant - Chromate, Type BMS 5-95
(4) A00765 Sealant - Low Density Chromate Type, BMS 5-142
(5) A00767 Sealant - Integral Fuel Tank BMS 5-45

C. References
(1) AMM 06-24-00/201, Wing Station Diagram
(2) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(3) AMM 28-11-00/201, Fuel Tanks

(4) AMM 28-11-01/401, Main Tank Access Door
(5) AMM 28-11-02/401, Center Tank Access Door
(6) AMM 28-11-07/401, Dry Bay Access Door
(7) AMM 28-22-07/601, Engine Fuel Feed Line and Couplings
(8) AMM 28-25-05/401, APU Fuel Supply Line and Shroud
(9) AMM 51-31-01/201, Seals and Sealant
(10) AMM 54-53-01/401, Strut Pressure Relief and Access
(11) AMM 73-11-07/401, Engine Main Fuel Supply Line
(12) SWPM 20-20-00

D. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
433	Nacelle Strut Mid Structure
443	Nacelle Strut Mid Structure
510	Wing Leading Edge - Left, Forward of Front Spar, Inboard of the Strut
531	Center Wing Tank (Left)
532	Dry Bay (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
610	Wing Leading Edge - Right, Forward of Front Spar, Inboard of the Strut
631	Center Wing Tank (Right)
632	Dry Bay (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
511KT	Access Panel (Left)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
532FZ	Dry Bay Access Door (Left)
541BB	Main Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
611KT	Access Panel (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)
632FZ	Dry Bay Access Door (Right)
641BB	Main Tank Access Door (Right)

E. Procedure

S 944-010

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 424-006

(2) Align the fuel line in the fuel tank, dry bay or strut with the ends of fuel lines that are installed.

S 424-020

(3) Install the support clamps, tees, adapters and elbows on the fuel line as it is necessary.

S 424-021

(4) Install the bonding jumper clamps, saddle clamps and loop clamps on the fuel line as it is necessary (AMM 28-25-05/401).

S 424-028

(5) To install the flexible half coupling (Fig. 403), do these steps:
(a) Install one new retaining ring on the ferrule.
(b) Install a new O-ring on the ferrule.
(c) Install a second new retaining ring on the ferrule.

CAUTION: DO NOT USE TOOLS TO TIGHTEN THE FUEL LINE FITTINGS. DAMAGE TO THE FITTING COMPONENTS COULD OCCUR OR THE ADJACENT FITTINGS COULD LOOSEN.

(d) Tighten with your hand the coupling nut on the ferrule.
(e) Install the lockwire on the coupling nut.

S 424-029

(6) To install the flexible full coupling (Fig. 404), do these steps:

NOTE: Make sure the two ends of the fuel line are not out of alignment by more than four degrees. Make sure the offset between the two ends is not more than 0.06 inch.

(a) Put the coupling nut on the ferrule on the end of one fuel line.

(b) Put the flexible full coupling on the ferrule on the end of the adjacent fuel line.
(c) Install one new retaining ring on each ferrule.
(d) Install one new O-ring on each ferrule.
(e) Put the two fuel lines together with a space of 0.15 ± 0.05 inch between the ferrules.
(f) Connect the retainer halves together on the two fuel lines.

CAUTION: DO NOT USE TOOLS TO TIGHTEN THE FITTINGS ON THE FUEL LINE. DAMAGE TO THE FITTING COMPONENTS COULD OCCUR OR THE ADJACENT FITTINGS COULD LOOSEN.

(g) Install the coupling nut on the flexible full coupling with your hand.
(h) Install the lockwire on the coupling nut.

S 424-007
(7) Install the rigid tube coupling on the fuel line as it is neccessary (Fig. 402).
(a) Install the ferrule on the fuel line.
(b) Put the coupling nut on the ferrule.
(c) Put the new retaining ring on the ferrule between the ferrule end flange and the coupling nut.
(d) Install the new O-ring in the coupling body.

CAUTION: DO NOT USE TOOLS TO TIGHTEN THE FUEL LINE FITTINGS. DAMAGE TO THE FITTING COMPONENTS COULD OCCUR OR THE ADJACENT FITTINGS COULD LOOSEN.

(e) Install the coupling nut on the coupling body.
(f) Tighten the coupling nut with your hand.
(g) Install the lockwire between the coupling nut and the ferrule.

S 424-009
(8) Install the flange couplings on the fuel line if it is necessary.
(a) Install a new O-ring in the groove of the flange which touches the flange coupling.
(b) Align the flange coupling with the flange.
(c) Put a washer on each screw.
(d) Put each screw through the flange coupling, then the flange.
(e) Install a washer and nut on each screw.

S 224-008

(9) Make sure bonding resistance between the bonding jumpers and the airplane structure is 0.01 ohms or less (SWPM 20-20-00).

S 424-048

(10) To install the fuel line in the dry bay, do the steps that follow (Fig. 401):

(a) In the dry bay, do these steps:

1) Prepare the mating surface on the aft side of the front spar for an electrical bond with cleaning method 1, 2, or 3 (SWPM 20-20-00).

NOTE: The area that you clean should be a little larger than the area that the fitting on the fuel line touches.

2) Prepare the surface of the fuel line fitting that touches the front spar with cleaning method 1, 2, or 3 (SWPM 20-20-00).
   a) Make sure there is no finish on the forward side of the fitting.
   b) Do not clean the threaded area on the fitting.
3) Install a new O-ring on the fitting for the front spar.
4) Install the fuel line fitting in the hole in the front spar.

(b) At the forward side of the front spar, do these steps:

1) Install the washer with BMS 5-45 sealant (for a fay surface with the front spar) and jamnut on the fitting.
2) While someone holds the fitting and fuel line with a wrench in the dry bay, tighten the jamnut to a torque of 650-750 inch-pounds (73.4-84.7 Nm).
3) Connect the coupling nut and fuel line to the fitting on the forward side of the front spar.
4) Install lockwire between the jamnut and structure.

5) Install lockwire between the coupling nut and structure.
6) Do a check of the bonding resistance between the fitting and the forward side of the front spar (SWPM 20-20-00).
   a) Make sure the resistance is 0.0005 ohm (0.5 milliohm) or less.
7) Touch up the finish where you did the resistance check with Alodine 600.
8) Apply a full bodied fillet seal of BMS 5-45 sealant completely around the perimeter of the washer and jamnut (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: The minimum sealant thickness is 0.10 inch (2.5 mm).

(c) In the dry bay, do these steps:
1) Apply BMS 5-45 sealant on the outer diameter groove on the fitting of the fuel line for the aft side of the dry bay structure.
2) Install an O-ring on the fitting of the fuel line that will attach to the forward side of the dry bay structure.
3) Install a washer with BMS 5-45 sealant (for a fay surface with the dry bay structure) on the fitting (with the O-ring installed) that will attach to the dry bay structure.
4) Install the fuel line fitting (with O-ring and washer) through the hole in the dry bay structure.

(d) At the aft side of the dry bay structure (in the main fuel tank), do these steps:
1) Install the washer with BMS 5-45 sealant (for a fay surface with the dry bay structure) and jamnut on the fitting.
2) While someone holds the fitting and fuel line with a wrench in the dry bay, tighten the jamnut to a torque of 650-750 inch-pounds (73.4-84.7 Nm).
3) Install a new O-ring and the two retaining rings on the fuel line in the main fuel tank.
4) Connect the coupling nut to attach the fuel line to the fitting at the dry bay structure.
5) Install lockwire between the jamnut and structure.

6) Install lockwire between the jamnut and coupling nut.
7) Apply a full bodied fillet seal of BMS 5-45 sealant completely around the perimeter of the washer, jamnut, exposed area of the fitting, all of the coupling nut and onto the fuel line that attaches to the aft side of the dry bay structure (minimum distance of 1.81 inch/46.0 mm from the dry bay structure) (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: The minimum thickness of sealant is 0.10 inch (2.5 mm).

(e) In the dry bay, do these steps:
1) Do a check of the bonding resistance between the fitting on the fuel line and the front spar (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

a) Make sure the resistance is less than 0.0005 ohm (0.5 milliohm).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

b) Touch up the finish where you did the resistance check with Alodine 600.
2) Apply a full bodied fillet seal of BMS 5-142 (or BMS 5-95) sealant completely around the perimeter of the fitting and a minimum of 1.00 inch (25.4 mm) from the aft side of the front spar onto the fitting of the fuel line (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: The minimum sealant thickness is 0.10 inch (2.5 mm).

3) Apply a full bodied fillet seal of BMS 5-142 (or BMS 5-95) sealant completely around the perimeter of the washer and a minimum of 1.00 inch (25.4 mm) from the forward side of the dry bay structure onto the fitting of the fuel line (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: The minimum sealant thickness is 0.10 inch (2.5 mm).

(f) In the main fuel tank, aft of the dry bay structure, do these steps:

1) Make sure there is a bonding jumper installed between the fuel line that is immediately aft of the dry bay structure and the adjacent wing station 285.65 rib (AMM 06-24-00/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

a) Do a check of the bonding resistance between the fuel line and the rib (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

b) Make sure the bonding resistance is 0.01 ohm (10 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-033

(11) If it is necessary, install any parts that were removed to drain the fuel line from the strut to the engine fuel pump (AMM 73-11-07/401).

S 794-035

(12) If a test of the fuel line is necessary, do the applicable task to leak test the fuel line (AMM 28-22-07/601).

S 414-032
(13) For the fuel lines in the strut, close or install the applicable strut access doors or panels (AMM 54-53-01/401).

S 414-046
(14) For the fuel line and fittings at the forward side of the front spar, install the applicable left or right access panel, 511KT or 611KT (AMM 06-44-00/201).

S 414-023
(15) For the fuel line and fittings in the center fuel tank, install the applicable center tank access door (AMM 28-11-02/401): 134AZ, 531AB, 531BB, 531CB, 631AB, 631BB or 631CB.

S 414-024
(16) For the fuel line and fittings in the dry bay, do the steps that follow:
(a) Install the applicable left or right dry bay access door, 532FZ or 632FZ (AMM 28-11-07/401).
(b) Install the applicable left or right main tank access door, 541BB or 641BB (AMM 28-11-01/401).

S 414-025
(17) For the fuel line and fittings in the main fuel tank, install the applicable main tank access door (AMM 28-11-01/401).

FUEL LINE AND FITTINGS - INSPECTION/CHECK

1. General
   A. This procedure has these tasks:
      (1) A check for leaks in the engine fuel-feed manifold. Air pressure is applied to the engine fuel-feed manifold to do a check for leaks and the correct installation of the shutoff and crossfeed valves.
      (2) A leak check of the fuel lines in the strut while it is pressurized by the fuel pumps.
      (3) A check for dents in the fuel lines and couplings.
   B. The engine fuel pump inlet line is referred to as the inlet line in this procedure.

TASK 28-22-07-216-001

2. Engine Fuel-Feed Manifold Check
   A. Equipment
      (1) Air Pressure Source - 40 psig capacity
      (2) Pressure Check Equipment - locally made test equipment (Fig. 602).
      (3) B-28007-1 (Pratt and Whitney Engines) Adapter, Fuel Line Connector, (Quantity 2)
      (4) B-28007-2 (Rolls Royce Engines) Adapter, Fuel Line Connector, (Quantity 2)
   B. References
      (1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 28-11-00/201, Fuel Tanks
      (4) AMM 28-11-01/401, Main Tank Access Doors
      (5) AMM 28-11-02/401, Center Tank Access Door
      (6) AMM 28-22-07/401, Fuel Lines and Fittings
      (7) AMM 28-26-00/201, Defueling
      (8) AMM 71-11-04/201, Fan Cowl Panels
      (9) AMM 73-11-07/401, Fuel Feed Line
   C. Access
      (1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
532	Dry Bay (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
632	Dry Bay (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
532FZ	Dry Bay Access Door (Left)
541BB	Main Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631BB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)
632FZ	Dry Bay Access Door (Right)
641BB	Main Tank Access Door (Right)

D. Prepare for Inspection

S 656-002

(1) Defuel the airplane (AMM 28-26-00/201).

S 016-044

(2) Open the fan cowls to get access to the inlet fuel feed lines for each engine (AMM 71-11-04/201).

S 036-005

(3) Disconnect both flexible fuel feed lines for the left and right engines at the lower connect point (AMM 73-11-07/401).

S 656-043

(4) Put the inlet lines in suitable containers for fuel.

S 656-039

(5) To remove fuel from the fuel feed line and manifold do these steps:

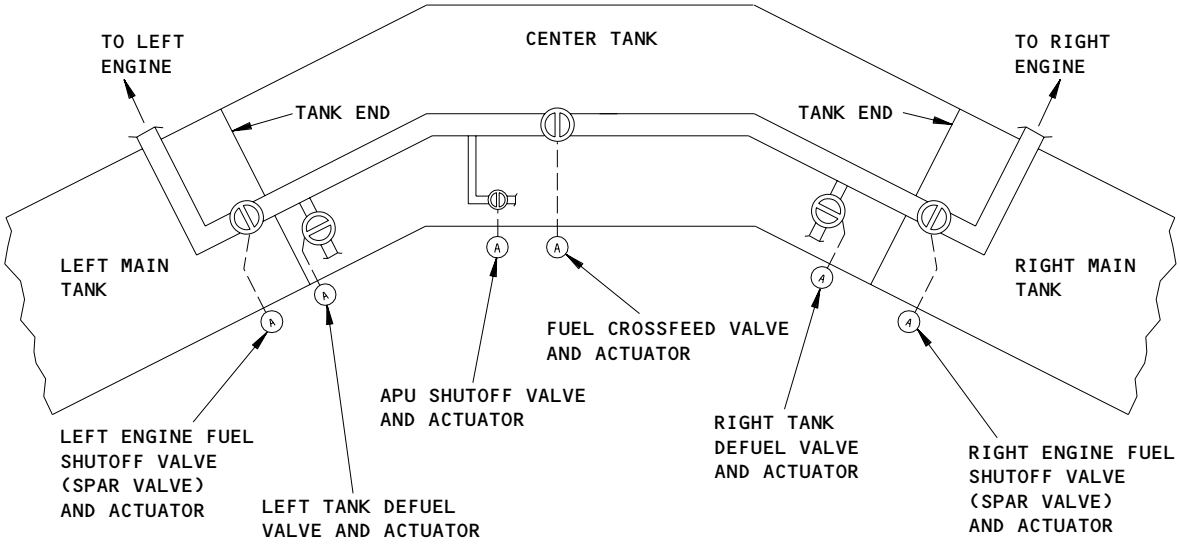
NOTE: To remove the fuel from the lower fuel line you can remove the drain for the low pressure fuel pump (AMM 73-11-01/401).

(a) Manually open the left and right defuel valves.
(b) Let the fuel drain into the fuel containers at each inlet line.

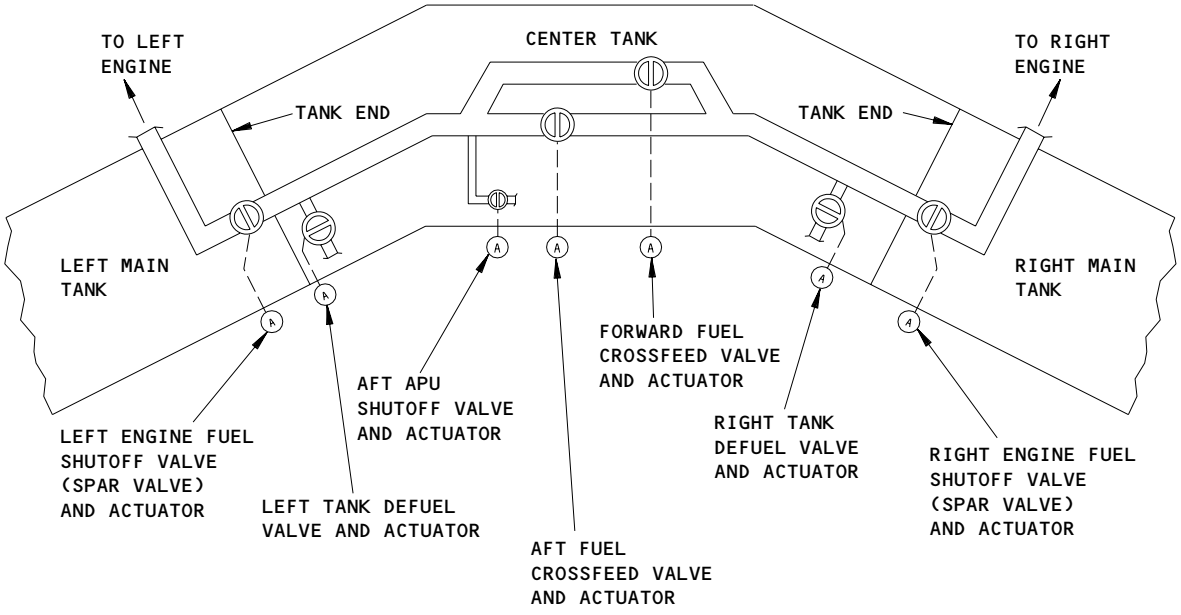
E. Procedure

S 486-008

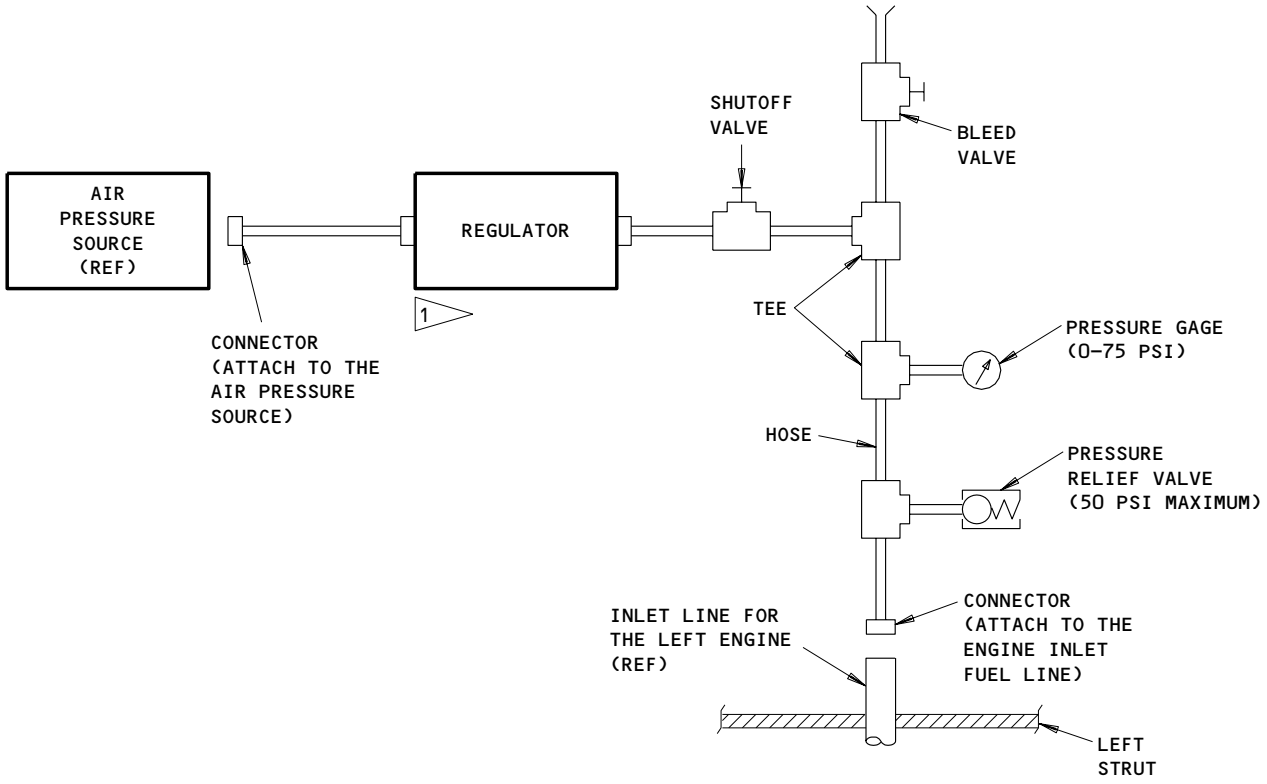
(1) Connect the pressure check equipment, as shown in Figure 602, to each inlet line.



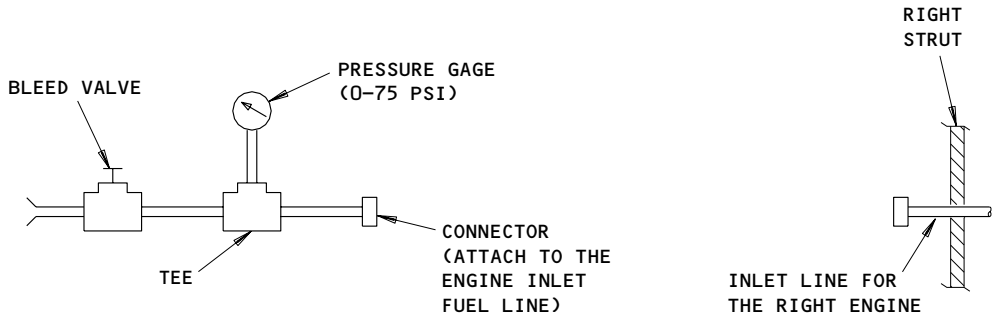
Fuel Feed Manifold – Simplified Schematic
Figure 601 (Sheet 1)



Fuel Feed Manifold – Simplified Schematic
Figure 601 (Sheet 2)



PRESSURE CHECK EQUIPMENT – LEFT ENGINE INLET LINE



PRESSURE CHECK EQUIPMENT – RIGHT ENGINE INLET LINE

1 REGULATOR WHICH CAN DECREASE AIR PRESSURE TO 40 PSIG.

Pressure Check Equipment
Figure 602

VALVES	VALVE POSITION 1							
	TEST 1		TEST 2		TEST 3		TEST 4	
	OPEN	CLOSED	OPEN	CLOSED	OPEN	CLOSED	OPEN	CLOSED
APU FUEL SHUTOFF VALVE (AMM 28-25-02/401)		X		X		X		X
CROSSFEED VALVE (AMM 28-22-02/401)	X		X			X	X	
LEFT DEFUEL VALVE (AMM 28-26-01/401)		X		X		X		X
LEFT ENGINE INLET LINE BLEED VALVE (FIG. 602)		X		X		X		X
LEFT ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) (AMM 28-22-01/401)	X			X	X		X	
RIGHT DEFUEL VALVE (AMM 28-26-01/401)		X		X		X		X
RIGHT ENGINE INLET LINE BLEED VALVE (FIG. 602)		X		X		X		X
RIGHT ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) (AMM 28-22-01/401)	X		X		X			X

1 ALL VALVES MUST BE OPEN/CLOSED MANUALLY

Fuel Feed Manifold Test
Figure 603 (Sheet 1)

VALVES	VALVE POSITION 1							
	TEST 1		TEST 2		TEST 3		TEST 4	
	OPEN	CLOSED	OPEN	CLOSED	OPEN	CLOSED	OPEN	CLOSED
APU FUEL SHUTOFF VALVE (AMM 28-25-02/401)		X		X		X		X
FORWARD CROSSFEED VALVE (AMM 28-22-02/401)	X		X			X	X	
AFT CROSSFEED VALVE (AMM 28-22-02/401)	X		X			X	X	
LEFT DEFUEL VALVE (AMM 28-26-01/401)		X		X		X		X
LEFT ENGINE INLET LINE BLEED VALVE (FIG. 602)		X		X		X		X
LEFT ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) (AMM 28-22-01/401)	X			X	X		X	
RIGHT DEFUEL VALVE (AMM 28-26-01/401)		X		X		X		X
RIGHT ENGINE INLET LINE BLEED VALVE (FIG. 602)		X		X		X		X
RIGHT ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) (AMM 28-22-01/401)	X		X		X			X

1 ALL VALVES MUST BE OPEN/CLOSED MANUALLY

Fuel Feed Manifold Test
Figure 603 (Sheet 2)

S 796-015

(2) To do a test of the engine fuel-feed manifold (Fig. 601), put the valves in the positions shown in Fig. 603 for Tests 1, 2, 3 and 4 respectively, and do the steps that follow:

NOTE: You must position these valves manually.

(a) Use the air pressure source to apply 40 psig air pressure to the inlet line for the left engine.
(b) Close the shutoff valve on the pressure check equipment for the left engine (Fig. 602).
(c) For Test 1 make sure the pressure at the left engine inlet does not decrease more than 1.5 psi in 10 minutes.
1) Make sure the pressure is 40 psi on the pressure gage for the right engine pressure check equipment during Test 1.

NOTE: If the pressure at the right engine inlet is 0 psi, one or more of these valves/actuators is closed and must be replaced.

Left Engine Shutoff Valve (Spar Valve)/Actuator
Crossfeed Valve/Actuator
Right Engine Shutoff Valve (Spar Valve)/Actuator

(d) For Tests 2, 3 and 4 make sure the pressure at the left engine inlet does not decrease more than 1.5 psi in 10 minutes; and make sure the pressure gage on the right engine inlet line shows 0 psi for the same 10 minutes (Fig. 602).

NOTE: If the pressure is not 0 psi on the pressure gage at the right engine inlet during tests 2, 3 and 4 the applicable valve or actuator is bad and must be replaced as follows:

Test 2 Left Engine Shutoff Valve (Spar Valve)/Actuator
Test 3 Crossfeed Valve/Actuator
Test 4 Right Engine Shutoff Valve (Spar Valve)/Actuator

(e) If the pressure does not decrease more than 1.5 psi in 10 minutes for test 1, 2, 3 and 4, the system is OK, go to step 2.F.
(f) If the pressure decreases more than 1.5 psi in 10 minutes for tests 1, 2, 3, or 4 there is a leak in the fuel feed manifold, go to step 3.

S 796-040

(3) To find the leak in the fuel manifold you must purge the fuel tanks and do the steps that follow (AMM 28-11-00/201).

(a) Put the valves in the postions shown in Fig. 603 for the applicable test (Test 1, 2, 3 or 4) where the pressure decreased more than 1.5 psi.

(b) Pressurize the fuel feed manifold at the inlet line for the left engine.

(c) Go into the applicable fuel tank to isolate the leak (AMM 28-11-00/201).

(d) Do a check of the applicable engine fuel shutoff valve (spar valve) or crossfeed valve as follows.

1) Make sure the placard "TOP" shows on the top of the applicable valve.

2) Make sure the index arrows on the adapter shaft and the valve body align correctly (AMM 28-22-01/401 and AMM 28-22-02/401).

(e) If the valve(s) is (are) installed correctly, do a leak check of the fuel feed lines and couplings between the left engine inlet and the applicable valve:

Test 1	Right Engine Inlet Line Bleed Valve
Test 2	Left Main Tank Engine Fuel Shutoff Valve (Spar Valve)
Test 3	Engine Fuel Crossfeed Valve
Test 4	Right Main Tank Engine Fuel Shutoff Valve (Spar Valve)

CAUTION: YOU CANNOT TIGHTEN THE FUEL LINE COUPLING AFTER THE INITIAL INSTALLATION. YOU MUST INSTALL NEW O-RINGS WHEN YOU TIGHTEN THE FUEL LINE COUPLING AGAIN OR A FUEL LEAK CAN OCCUR.

(f) If a coupling has a leak, disconnect the coupling, replace the O-rings, and then connect the coupling (AMM 28-22-07/401).

(g) If a fuel line has a leak, or has damage, remove and install a new fuel line (AMM 28-22-07/401).

S 796-041

(4) After you correct a leak you must do a fuel manifold leak check as follows (Fig 601, 603):

(a) Put the valves in the positions shown in Fig 603, Test 1.

(b) Pressurize the fuel feed manifold to 40 psi from the inlet fuel line for the left engine.
(c) If the pressure does not decrease by more than 1.5 psi in 10 minutes, the system is OK.

F. Put the Airplane Back to Its Usual Condition

S 876-019
(1) Open the two bleed valves on the pressure test equipment slowly and let the pressure in the lines bleed to zero.

S 416-020
(2) Install the access doors on the fuel tank(s) (AMM 28-11-01/401, AMM 28-11-02/401).

S 086-021
(3) Remove the pressure check equipment from the air pressure source and the inlet fuel feed lines.

S 436-042
(4) Connect the left and right engine inlet fuel feed lines (AMM 73-11-07/401).

S 796-029
(5) Do a test of the main fuel supply line that is shown in the Power Plant Test reference table (AMM 71-00-00).

TASK 28-22-07-796-046

3. Fuel Pressure Leak Check in Strut with Fuel Pumps

A. General
(1) This test will do a visual check for leakage in the fuel lines from the front spar to the engine fuel pump. The fuel spar valve is open and the fuel line is pressurized with fuel from the fuel system pumps.

B. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 24-22-00/201, Control (Supply Power)
(3) AMM 28-22-07/401, Fuel Line and Fittings

(4) AMM 54-53-01/401, Strut Pressure Relief and Access
(5) AMM 54-55-00/201, Strut Drains
(6) AMM 71-00-00/201, Power Plant
(7) AMM 73-11-07/401, Engine Main Fuel Supply Line
(8) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones
433/443 Nacelle strut - mid-structure

D. Prepare for the Test

S 866-072
(1) Make sure the L and R FUEL CONTROL switches are in the CUTOFF position.

S 866-047
(2) Supply the electrical power (AMM 24-22-00/201).

S 216-048
(3) Make sure the fuel line from the front spar to the engine fuel pump is completely installed.

S 656-049
(4) Refuel the center fuel tank with enough fuel to operate the override pumps (AMM 12-11-01/301):
(a) For the fuel override pumps, refuel the center fuel tanks to 20,000 pounds (9,000 kilograms) minimum.

S 866-050
(5) For the applicable engine, make sure these circuit breakers are closed:
(a) 6H15, L AFT FUEL BOOST PUMP
(b) 6H23, L FWD FUEL BOOST PUMP
(c) 6F14, L FUEL OVRD PUMP
(d) 6H20, R AFT FUEL BOOST PUMP
(e) 6H17, R FWD FUEL BOOST PUMP
(f) 6F20, R FUEL OVRD PUMP

S 866-067
(6) Open these circuit breakers and attach DO-NOT-CLOSE tags:
(a) On the main power distribution panel, P6:
1) For the left engine:
6C1, FUEL COND CONT L

2) For the right engine:
6C2, FUEL COND CONT R

(b) On the overhead circuit breaker panel, P11:
1) For the left engine:
11D7, ENGINE STBY IGNITION LEFT 1
11D8, ENGINE STBY IGNITION LEFT 2
11L1, LEFT ENGINE IGNITION 1
2) For the right engine:
11D9, ENGINE STBY IGNITION RIGHT 1
11D10, ENGINE STBY IGNITION RIGHT 2
11L28, RIGHT ENGINE IGN 1

S 046-051

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

(7) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 016-052

(8) Open or remove the applicable strut access doors or panels (AMM 54-53-01/401).

E. Procedure

S 866-053

(1) Push the CROSSFEED VALVE switch-light(s), on the overhead panel, P5, to the open position.

S 866-065

WARNING: DO NOT KEEP THE FUEL CONTROL SWITCH IN THE RUN POSITION FOR MORE THAN 30 MINUTES. FUEL LEAKAGE INTO THE COMBUSTION CHAMBER AND TURBINE CASE CAN OCCUR IF THE FUEL CONTROL SWITCH IS IN THE RUN POSITION FOR A LONG TIME. THIS COULD CAUSE A FIRE.

(2) Put the applicable FUEL CONTROL switch to the RUN position.

S 866-063

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(3) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 866-073

(4) Push the left or right fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.
   (a) Push the applicable fuel override pump switch-light to the off position if the PRESS light stays on.

S 796-056

(5) Do a visual inspection of the fuel line in the strut area and at the engine fuel pump with the fuel line pressurized.

NOTE: No fuel leaks are permitted.

S 796-057

(6) If there is a fuel leak, do these steps:
   (a) Put the applicable fuel override pump switch-light to the off position.
   (b) Put the applicable FUEL CONTROL switch to the CUTOFF position.
   (c) Do the applicable steps to drain the flexible fuel line in this task: Engine Main Fuel Supply Line Removal (AMM 73-11-07/401).

NOTE: Only do the steps necessary to remove the bottom end of the flexible fuel line and drain the fuel from the fuel line.

CAUTION: YOU CANNOT TIGHTEN THE FUEL LINE COUPLING AFTER THE INITIAL INSTALLATION. YOU MUST INSTALL A NEW O-RING WHEN YOU TIGHTEN THE FUEL LINE COUPLING OR A FUEL LEAK CAN OCCUR.

   (d) If a coupling has a leak, disconnect the coupling, replace the O-rings, and then connect the coupling again (AMM 28-22-07/401).
      1) Make sure the O-ring(s) are lubricated correctly.
   (e) If a fuel tube has a leak, replace the fuel tube (AMM 28-22-07/401).
   (f) Do the steps in this procedure again to pressurize the applicable fuel line and do a check for leaks.

S 796-058
(7) When the fuel line is satisfactory (no leaks), do these steps:
(a) Put the applicable fuel override pump switch-light to the off position.
(b) Put the FUEL CONTROL switch to the CUTOFF position.
(c) Push the CROSSFEED VALVE switch-light(s), on the overhead panel, P5, to the CLOSED position.

S 716-062
(8) Do this task: Examine/Test the Strut Drains (AMM 54-55-00/201).

NOTE: This will make sure any fuel leak will not collect in the strut but will drain away.

F. Put the Airplane Back to Its Usual Condition

S 216-059

CAUTION: MAKE SURE ALL TOOLS, AND UNWANTED MATERIALS, ARE REMOVED FROM THE STRUT CAVITIES BEFORE YOU INSTALL THE STRUT ACCESS DOORS. THE STRUT DRAINS CAN BE BLOCKED WITH UNWANTED MATERIALS WHICH CAN CAUSE DAMAGE TO THE STRUT AREA.

(1) Make sure you remove all tools and unwanted material from the strut.

S 416-060
(2) Close or install the strut access doors or panels (AMM 54-53-01/401).

S 446-061
(3) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 866-068
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the main power distribution panel, P6:
1) For the left engine:
6C1, FUEL COND CONT L

2) For the right engine:
6C2, FUEL COND CONT R

(b) On the overhead circuit breaker panel, P11:

1) For the left engine:
11D7, ENGINE STBY IGNITION LEFT 1
11D8, ENGINE STBY IGNITION LEFT 2
11L1, LEFT ENGINE IGNITION 1

2) For the right engine:
11D9, ENGINE STBY IGNITION RIGHT 1
11D10, ENGINE STBY IGNITION RIGHT 2
11L28, RIGHT ENGINE IGN 1

S 866-066

(5) Dry motor the applicable engine before the next engine start to purge all fuel that remains (AMM 71-00-00/201).

TASK 28-22-07-286-031

4. Fuel Lines and Couplings Dent Criteria Check

A. References

(1) AMM 28-22-07/401, Fuel Lines and Fittings

B. Procedure

S 216-032

(1) Visually examine all the fuel tubing to make sure it is tightly and correctly attached.

S 436-033

(2) Adjust the installation of the tubes which are not correctly attached (AMM 28-22-07/401).

S 216-034

(3) Visually examine all the fuel tubing for these types of damage and make sure the damage is within permitted limits:

(a) Make an inspection for cracks.

1) Make sure there are no cracks.

(b) Make an inspection for dents (areas that are pushed into the tubing).

1) All dents must have an area that is large compared to the depth of the dent.
2) No single dent in the tubing is permitted to decrease the diameter of the tube by more than 2.5 percent.
3) If there are multiple dents, the total dent depth (individual depths added together) in any section five times the tube diamter long, must be no more than ten percent of the tube diameter.
4) The dents in the tubing must be farther than one diameter of the tube from the end of the tube.
5) The dents in the tubing must not have an area of more than 0.125 square inches.

6) If the dent is on the outer part of a bend in the tube, the dent must not have a depth of more than 0.015 inches.

(c) Do an inspection for nicks.
1) The nicks in the tubing must have a rounded bottom.
2) The nicks in the tubing must not have a depth of more than 0.004 inch.
3) You must remove all the burrs from the nick if there are some burrs.

(d) Do an inspection for fretting.
1) Fretting must not have a depth of more than 0.004 inch.

(e) Do an inspection for scoring.
1) If you find some small scoring, you can make it smooth again, but obey these conditions:
a) The scoring must not be on the outer part of a bend.
b) You must not remove more than 0.004 inch of metal.

(f) Do an inspection for tubes with a cross section that is not fully circular (tubes with ovality).
1) Calculate the percent ovality with this formula:

$$\text{percent ovality} = \frac{\text{OD Max} - \text{OD Min}}{\text{OD Nominal}} \times 100\%$$

a) OD Max is the maximum outer diameter of the tube
b) OD Min is the minimum outer diameter of the tube
c) OD Nominal is the outer diameter of the tube at a position where the tube is circular or almost circular.
2) The percent ovality must not be more than 10%.
3) The percent ovality must not be more than 5% for tubes with a diameter of more than 2 inches.

(g) Wrinkles
1) The height of a wrinkle is the distance between a straight line that touches the high point of a wrinkle and a straight line that touches the low point of a wrinkle.
2) Wrinkles must not have a height larger than the applicable maximum wrinkle height:

Tube Diameter (inches)	Maximum Wrinkle Height (inches)
less than 1	0.020
1 to 1.99	0.030
2 to 2.99	0.040
3 or more	0.050

S 356-035
(4) Repair or replace all the tubes which have damage beyond the permitted limits (AMM 28-22-07/401).

S 216-036

(5) Visually examine all the couplings for external indications of these types of damage and make sure the damage is within permitted limits:
   (a) Do an inspection for cracks.
      1) No cracks are permitted.
   (b) Do an inspection for scratches.
      1) The scratches in the couplings must not have a depth of more than 0.004 inch.
   (c) Do an inspection for nicks.
      1) The nicks in the couplings must have rounded bottoms.
      2) The nicks in the couplings must not have a depth of more than 0.004 inch.
      3) You must remove all the burrs around the nick.
   (d) Do an inspection for worn areas (galling).
      1) No worn areas in the surfaces that have an O-ring seal are permitted.
      2) No worn areas in the surfaces that have an O-ring seal are permitted.

S 356-037

(6) Repair or replace all the couplings which have damage that is beyond permitted limits (AMM 28-22-07/401).

BOOST PUMP REMOVAL CHECK VALVE - REMOVAL/INSTALLATION

1. General
   A. A removal check valve attaches to each of the four fuel boost pumps and two fuel override pumps. The fuel boost pumps and fuel override pumps are installed on the front and rear spars. The removal check valve lets you remove the motor impeller without defueling the fuel tank.
   B. This procedure contains two tasks. The first task removes the removal check valve. The second task installs the removal check valve.

TASK 28-22-08-004-001

2. Remove the Removal Check Valve (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-22-07/401, Fuel Line and Fittings
      (5) AMM 28-25-05/401, APU Fuel Line and Shroud
      (6) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones

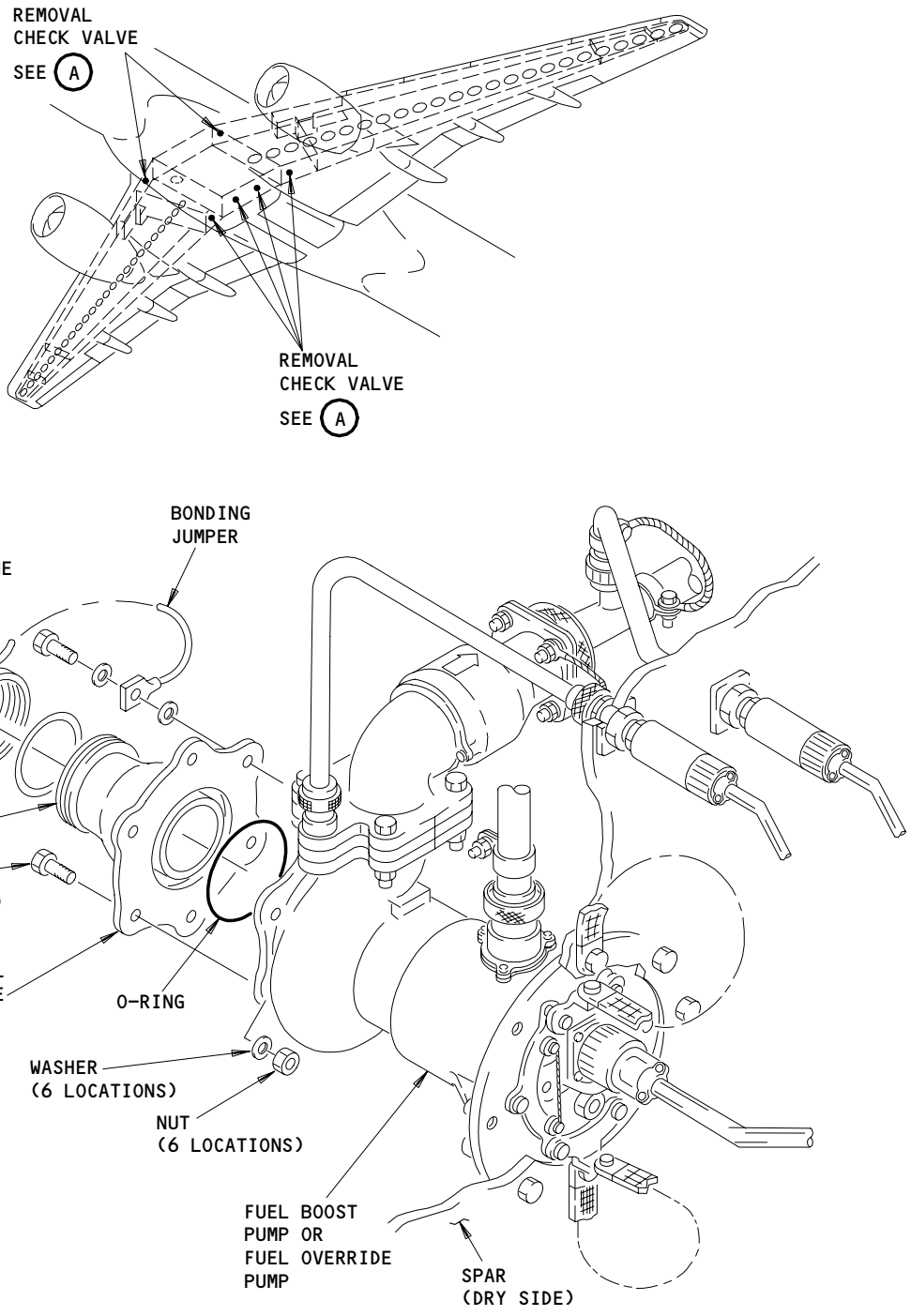
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
631	Center Wing Tank (Right)

      (2) Access Panels

134AZ	Center Tank Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

   C. Procedure

      S 654-013
      (1) Defuel the center fuel tank (AMM 28-26-00/201).



REMOVAL CHECK VALVE
(REMOVAL CHECK VALVE OF THE LEFT FORWARD FUEL BOOST PUMP SHOWN,
ALL OTHER REMOVAL CHECK VALVES ARE ALMOST THE SAME)

(A)

Removal Check Valve Installation
Figure 401

S 654-014
(2) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 014-015
(3) To remove the removal check valves of the fuel boost pumps, remove the applicable left or right center tank access door, 541AB or 641AB (AMM 28-11-02/401).

S 014-002
(4) To remove the removal check valves of the fuel override pumps, remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-016

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-003
(6) Go into the center fuel tank.

S 014-004
(7) To remove the removal check valves of the fuel override pumps, remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-005
(8) Disconnect the flexible half coupling between the removal check valve and pump inlet line (AMM 28-25-05/401).

S 034-006
(9) Remove all fittings from the length of the pump inlet line that connects to the removal check valve (AMM 28-22-07/401).

S 034-017
(10) Move the pump inlet line away from the removal check valve.

S 034-007
(11) Remove the six screws, washers, and nuts from the flange of the removal check valve.

S 034-018
(12) Remove the O-ring.

S 024-019
(13) Remove the removal check valve.

TASK 28-22-08-404-008

3. Install the Removal Check Valve (Fig. 401)

A. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-02/401, Center Tank Access Door
(4) AMM 28-22-07/401, Fuel Line and Fittins
(5) AMM 28-25-05/401, APU Fuel Line and Shroud

B. Access
(1) Location Zones
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door
531AB Center Tank Access Door (Left)
631AB Center Tank Access Door (Right)

C. Procedure

S 944-020

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 434-009

(2) Put a new O-ring in the groove on the flange of the removal check valve.

S 824-021

(3) Align the flange of the removal check valve with the flange of the fuel boost pump or fuel override pump.

S 434-022

(4) Install the six screws, washers and nuts with the bonding jumper on one of the screws.

S 424-010

(5) Install the flexible half coupling to attach the pump inlet line and the removal check valve (AMM 28-25-05/401).

S 434-011

(6) Install all the fittings on the pump inlet line (AMM 28-22-07/401).

S 414-012

(7) For the removal check valves of the fuel override pumps, install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-023

(8) For the removal check valves of the fuel override pumps, install the center tank access door, 134AZ (AMM 28-11-02/401).

S 414-024

(9) For the removal check valves of the fuel boost pumps, install the applicable center tank access door, 531AB or 631AB (AMM 28-11-02/401).

BOOST PUMP DISCHARGE CHECK VALVE - REMOVAL/INSTALLATION

1. General
   A. A discharge check valve is installed on each fuel boost pump and fuel override pump. The discharge check valve prevents the flow of fuel back through the fuel boost pump or fuel override pump.
   B. This procedure contains two tasks. The first task removes the discharge check valve. The second task installs the discharge check valve.

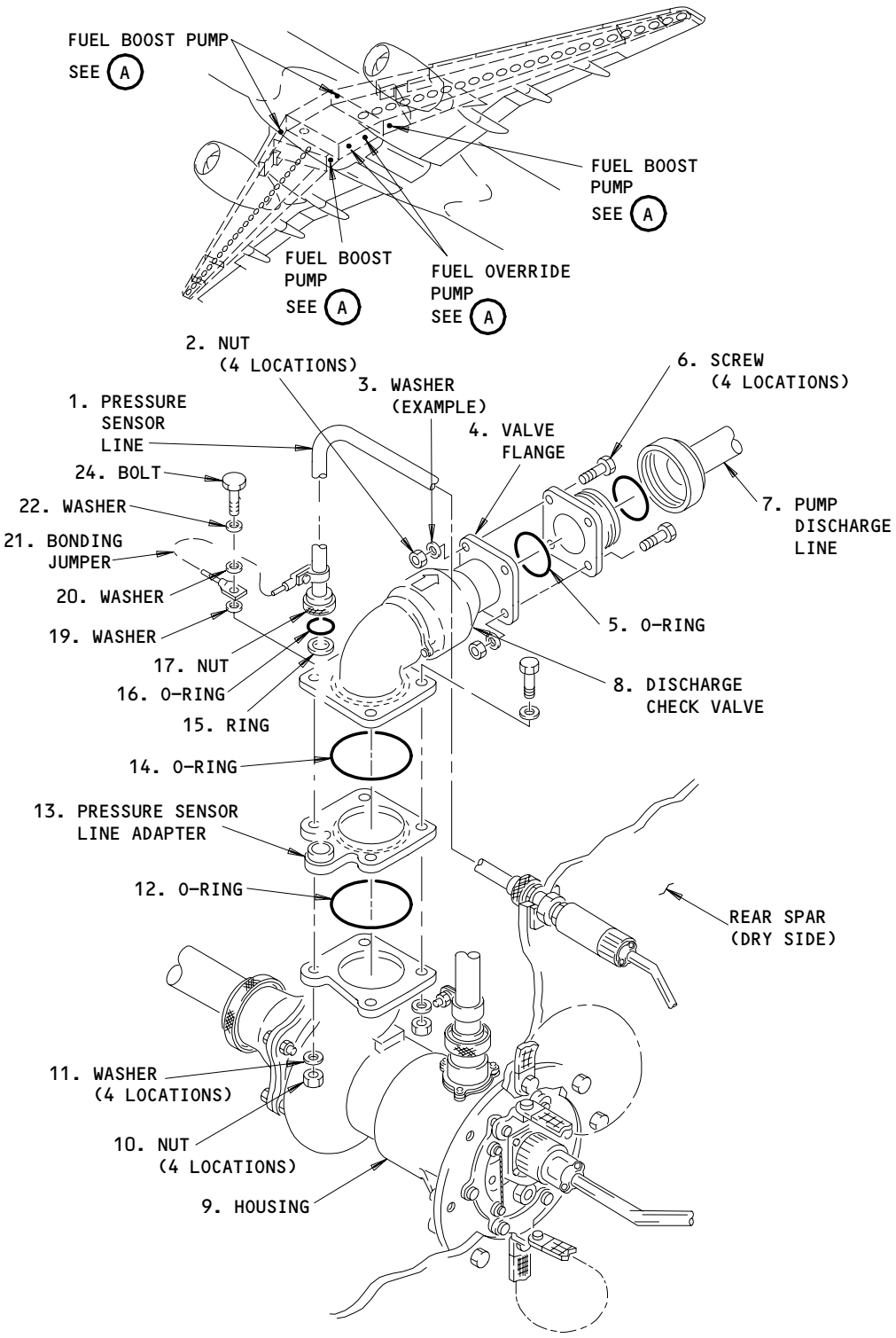
TASK 28-22-09-004-001

2. Remove the Discharge Check Valve (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          531 Center Wing Tank (Left)
          631 Center Wing Tank (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door
          134CZ Baffle Door
          134DZ Baffle Door
          531AB Center Tank Access Door (Left)
          631AB Center Tank Access Door (Right)

   C. Procedure

      S 654-002
      (1) Defuel the center fuel tank (AMM 28-26-00/201).



FUEL BOOST PUMP OR FUEL OVERRIDE PUMP

A

Discharge Check Valve Installation
Figure 401

S 654-029
(2) For the discharge check valve for the right main tank boost pumps or the right override pump, defuel the right main tank (AMM 28-26-00/201).

NOTE: You can move the fuel to the left main fuel tank to do this if it has sufficient capacity for the fuel.

S 654-031
(3) For the discharge check valve for the left main tank boost pumps or the left override pump, defuel the left main tank (AMM 28-26-00/201).

NOTE: You can move the fuel to the right main fuel tank to do this if it has sufficient capacity for the fuel.

S 864-030
(4) Make sure the crossfeed valve(s) are closed.

S 654-003
(5) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 014-004
(6) To remove the discharge check valve of the fuel boost pumps, remove the applicable center tank access door, 531AB or 631AB (AMM 28-11-02/401).

S 014-005
(7) To remove the discharge check valve of the fuel override pumps, remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-027

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECATUIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(8) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-006
(9) To remove the discharge check valves of the fuel override pumps, remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-009
(10) Remove the nut (17), the ring (15), and the O-ring (16) at the pressure sensor line (1).

S 034-010
(11) Remove the four screws (6), the washers (3), the nuts (2) and one O-ring (5) from the valve flange (4).

NOTE: This disconnects the discharge check valve (8) from the pump discharge line (7).

S 034-011
(12) Remove the four bolts (24), washers (11), and nuts (10) from the discharge check valve (8).

S 024-012
(13) Remove the discharge check valve (8).

S 034-013
(14) Remove the O-ring (14).

TASK 28-22-09-404-014

3. Install the Discharge Check Valve (Fig. 401)

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	5	O-ring (Packing)	28-22-09	01	25
				01A	25
				01B	25
	8	Discharge Check Valve		01	95
				01A	95
				01B	105
	12	O-ring (Packing)		01	75
				01A	75
				01B	75
	14	O-ring (Packing)		01	75
				01A	75
				01B	75
	16	O-ring (Packing)	28-22-03	01	260
				01A	345
				01B	205,210
				01C	210
				02	110,113
				02A	160
				02B	115
				02C	205
			28-22-07	07	145
				08	230
				09	80

B. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels

(2) AMM 28-11-00/201, Fuel Tanks

(3) AMM 28-11-02/401, Center Tank Access Door

C. Access

(1) Location Zones

133 Wing Center Section (Left)

134 Wing Center Section (Right)

531 Center Wing Tank (Left)

631 Center Wing Tank (Right)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
134BZ	Baffle Door
134CZ	Baffle Door
134DZ	Baffle Door
531AB	Center Tank Access Door (Left)
631AB	Center Tank Access Door (Right)

D. Procedure

S 944-028

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECATUIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 434-015

(2) Install the pressure sensor line adapter (13) and O-ring (12) on the housing (9) if moved.

S 434-016

(3) Put a new O-ring (14) in the groove of the discharge check valve (8) that attaches to the housing (9).

S 824-017

(4) Align the discharge check valve with the housing (9) and the pump discharge line (7).

S 424-018

(5) Install the four bolts (24), washers (11), and nuts (10) to attach the discharge check valve (8) to the housing (9).

S 434-019

(6) Put a new O-ring (5) in the valve flange (4) that attaches to the pump discharge line (7).

S 434-020

(7) Install the four screws (6), washers (3) and nuts (2) to attach the pump discharge line (7) to the discharge check valve (8).

S 434-023

(8) Connect the pressure sensor line (1) to the discharge check valve (8).
   (a) Install the ferrule on the pressure sensor line (1).
   (b) Put a nut (17) on the ferrule.
   (c) Put a ring (15) on the ferrule between the ferrule and the nut (17).
   (d) Install a new O-ring (16) in the coupling body.
   (e) Install the nut (17) on the coupling body.

(f) Install the lockwire on the nut (17).

S 414-024

(9) For the discharge check valves of the fuel override pumps, install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-025

(10) For the discharge check valve of the fuel override pumps, install the center tank access door, 134AZ (AMM 28-11-02/401).

S 414-026

(11) For the discharge check valves of the fuel boost pumps, install the center tank access door, 531AB or 631AB (AMM 28-11-02/401).

FLOAT-OPERATED SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the float-operated shutoff valve. The second task installs the float-operated shutoff valve.

   TASK 28-22-10-004-001

2. Remove the Float-Operated Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zone
          541 Main Tank - Rib No. 5 to No. 17 (Left)

      (2) Access Panel
          541AB Main Tank Access Door (Left)

   C. Procedure

      S 654-002
      (1) Defuel the left main fuel tank (AMM 28-26-00/201).

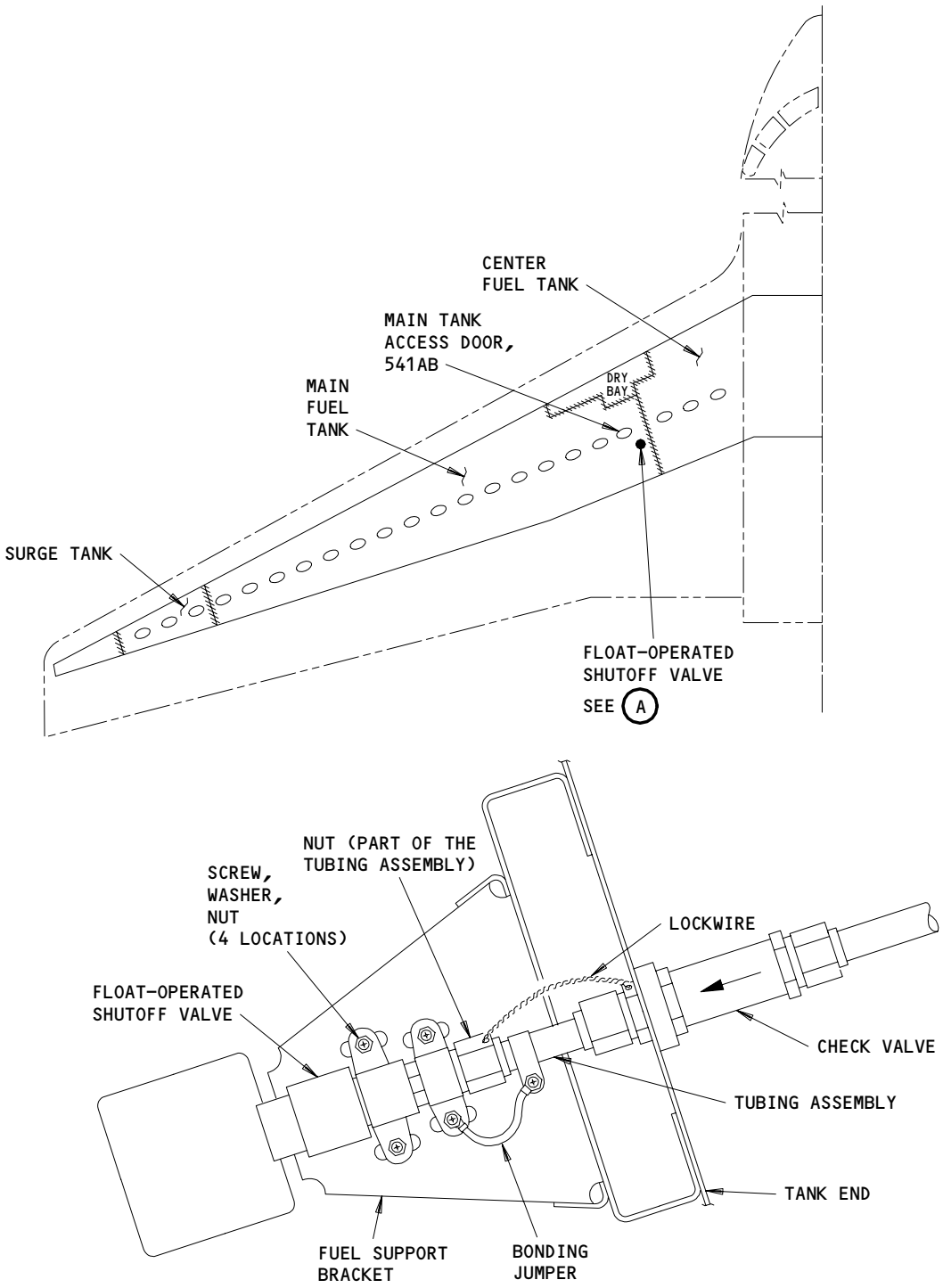
      S 654-003
      (2) Drain and purge the left main fuel tank (AMM 28-11-00/201).

      S 014-004
      (3) Remove the left main tank access door, 541AB (AMM 28-11-01/401).

      S 944-016

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (4) Obey the fuel tank entry precautions (AMM 28-11-00/201).



FLOAT-OPERATED SHUTOFF VALVE
(VIEW AS YOU LOOK DOWN)

A

Float-Operated Shutoff Valve Installation
Figure 401

S 014-017
(5) Go into the left main fuel tank.

S 014-020
(6) Find the float-operated shutoff valve.

S 034-005
(7) Remove the screws, washers and nuts that attach the float-operated shutoff valve to the fuel support bracket.

S 034-006

CAUTION: DO NOT DISCARD THE LOCKWIRE IN THE FUEL TANK. LOOSE LOCKWIRE THAT REMAINS IN THE FUEL TANK CAN BLOCK THE PUMPS AND PREVENT SUMPING.

(8) Cut the lockwire that holds the nut to the fuel support bracket.

S 024-007
(9) Loosen the nut to disconnect the float-operated shutoff valve from the tubing assembly.

S 024-008
(10) Remove the float-operated shutoff valve.

TASK 28-22-10-404-009

3. Install the Float-Operated Shutoff Valve (Fig. 401)

A. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 20-10-21/601, Electrical Bonding
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-01/401, Main Tank Access Door

B. Access
(1) Location Zone
541 Main Tank - Rib No. 5 to No. 17 (Left)

(2) Access Panel
541AB Main Tank Access Door (Left)

C. Procedure

S 944-018

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-019
(2) Go into the fuel tank.

S 424-010
(3) Tighten the nut to connect the float-operated shutoff valve to the tubing assembly.

S 424-011
(4) Install the screws, washers, and nuts to attach the bonding jumper and the float-operated shutoff valve.

S 434-012
(5) Install the lockwire to attach the nut (part of the tubing assembly) to the fuel support bracket.

S 224-013
(6) Make sure the bonding resistance between the float-operated shutoff valve and the airplane structure is not more than 0.010 ohms (AMM 20-10-21/601).

S 414-014
(7) Install the left main tank access door, 541AB (AMM 28-11-01/401).

S 654-015
(8) Refuel the left main fuel tank, if no more work is necessary (AMM 12-11-01/301).

ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. The actuator of the engine fuel shutoff valve (spar valve) is installed on the rear spar, out of the fuel tank. Each actuator is found aft of the fuel measuring stick No. 3 in each main fuel tank (AMM 28-44-00/001).
   B. It is not necessary to defuel the fuel tank to remove the actuator.
   C. This procedure has two tasks. The first task removes the actuator of the engine fuel shutoff valve (spar valve). The second task installs the actuator of the engine fuel shutoff valve (spar valve).
   D. The procedure to remove and install the adapter shaft and the valve body is contained in AMM 28-22-01/401.

TASK 28-22-11-004-001

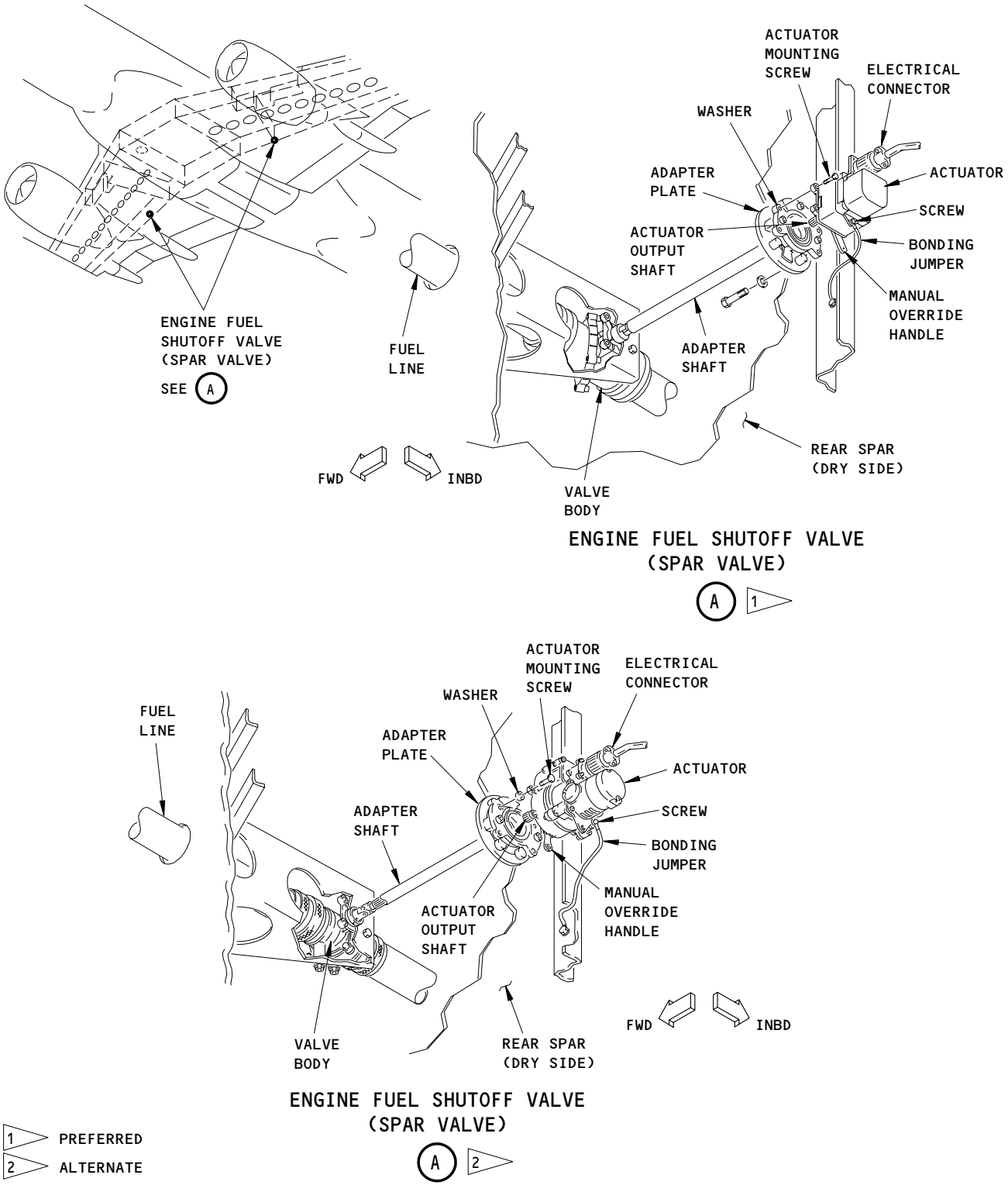
2. Remove the Actuator of the Engine Fuel Shutoff Valve (Spar Valve)
(Fig. 401, Fig. 401A)
   A. Equipment
      (1) Hex key wrench (9/64-inch) with 6 inch extension - commercially available
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
   C. Access
      (1) Location Zones
          551 Rear Spar to MLG Support Beam (Left)
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panels
          551EBX Access Panel (Left)
          651EBX Access Panel (Right)

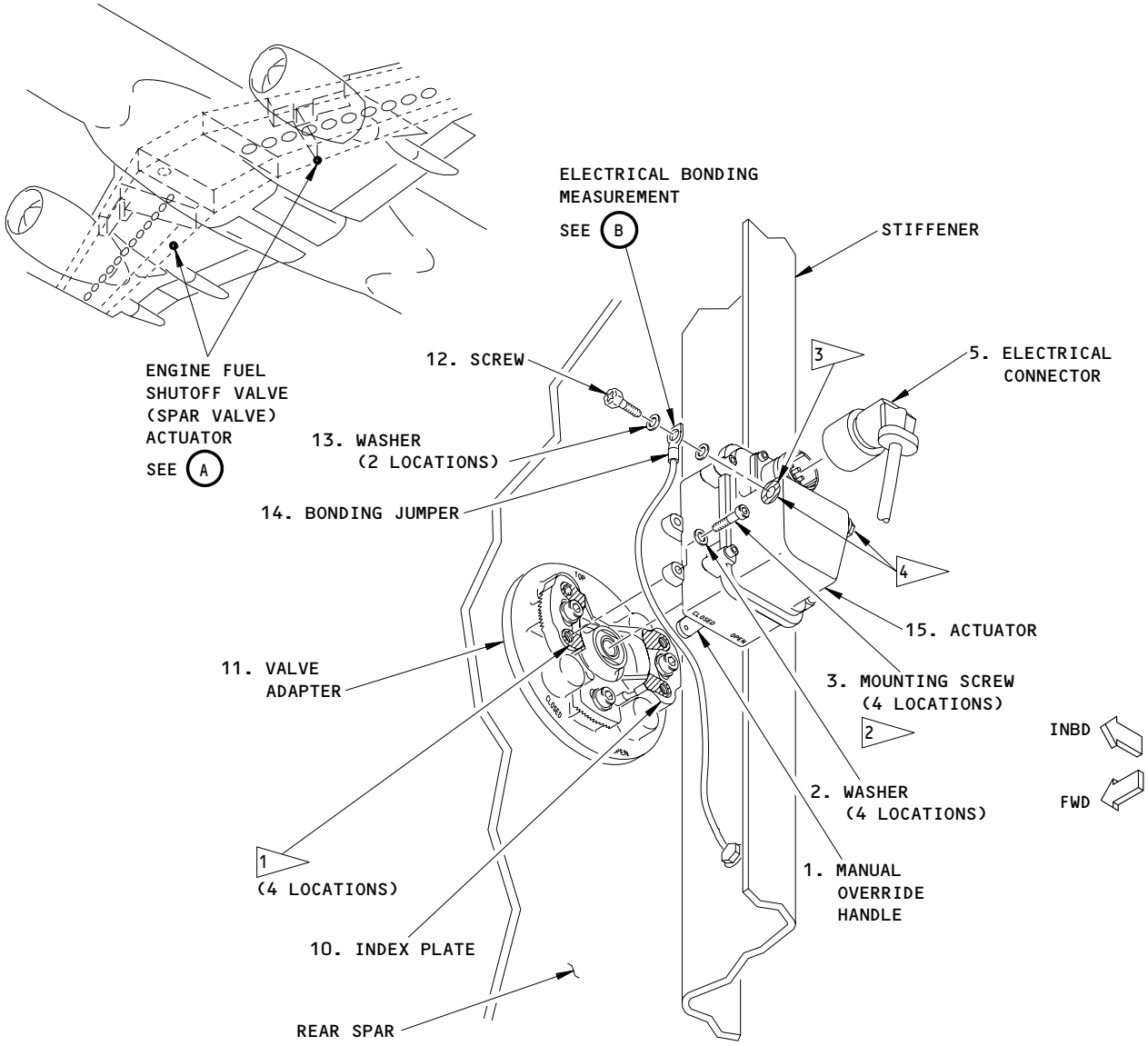
   D. Procedure

      S 864-015
      (1) For the left actuator, 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 864-016
      (2) For the right actuator, open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E2, FUEL VALVES R SPAR



Engine Fuel Shutoff Valve (Spar Valve) Actuator Installation
Figure 401



ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) ACTUATOR

(A)

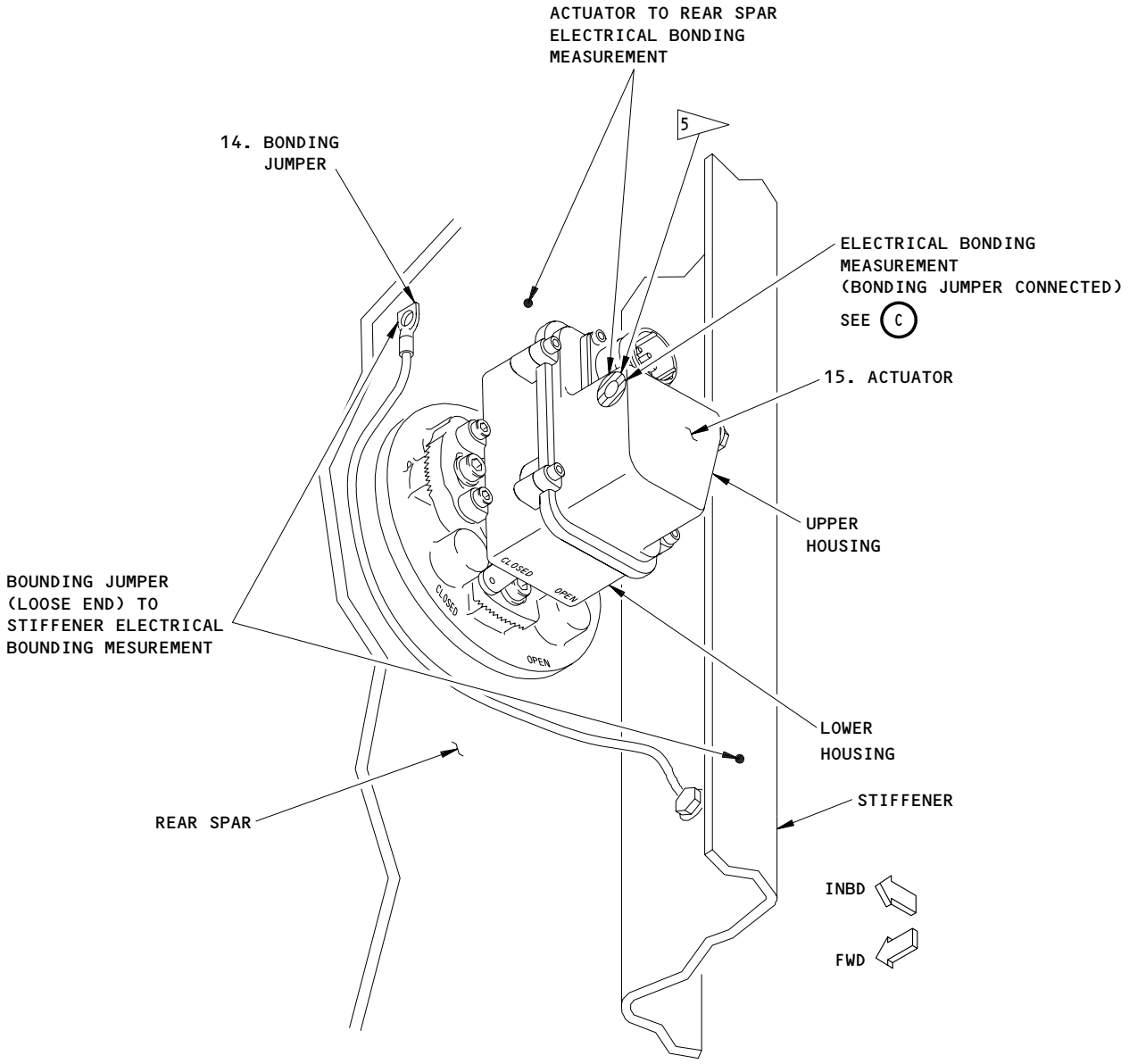
1. PREPARE AND INSTALL THE CONTACT SURFACES OF THE INDEX PLATE AND ACTUATOR FEET (4 LOCATIONS) WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00).

2. APPLY SEALANT TO THE SHANK AND THREADS OF THE MOUNTING SCREWS.

3. PREPARE AND INSTALL THE CONTACT SURFACES OF ACTUATOR AND BONDING JUMPER BUILD-UP WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00). AFTER INSTALLATION, APPLY A FILLET SEAL TO THE BONDING JUMPER INSTALLATION.

4. THE BONDING JUMPER MAY BE INSTALLED ON EITHER SIDE OF THE ACTUATOR.

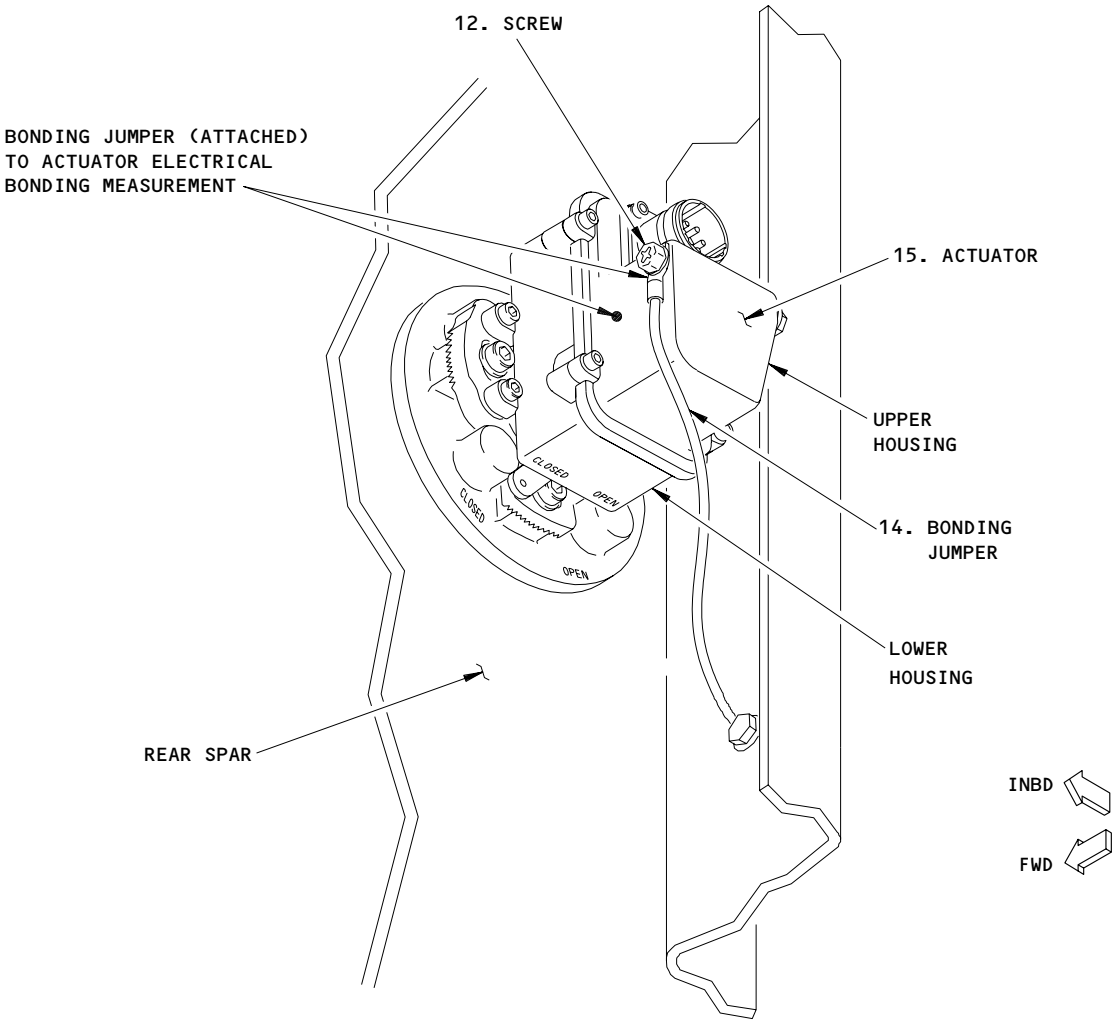
Engine Fuel Shutoff Valve (Spar Valve) Actuator Installation
Figure 401A (Sheet 1)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
B

5 BARE METAL CONTACT SURFACE OF THE ACTUATOR AT THE BONDING JUMPER INSTALLATION.

Engine Fuel Shutoff Valve (Spar Valve) Actuator Installation
Figure 401A (Sheet 2)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

C

Engine Fuel Shutoff Valve (Spar Valve) Actuator Installation
Figure 401A (Sheet 3)

S 014-002
(3) Open the applicable left or right panel, 551EBX or 651EBX (AMM 06-44-00/201).

S 984-003
(4) Move the manual override handle of the actuator to the CLOSED position.

S 034-004
(5) Disconnect the electrical connector from the actuator.

S 034-005
(6) Remove the screw to disconnect the bonding jumper from the actuator.

S 034-006
(7) Remove the four actuator mounting screws.

S 024-017
(8) Remove the actuator.

TASK 28-22-11-404-007

3. Install the Actuator of the Engine Fuel Shutoff Valve (Spar Valve)

A. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(3) AMM 20-30-92/201, Airplane Structure Cleaning Solvents (Series 92)
(4) AMM 24-22-00/201, Electric Power Control
(5) AMM 28-11-00/701, Fuel Tanks
(6) AMM 28-22-11/501, Engine Fuel Shutoff Valve (Spar Valve) Actuator
(7) AMM 51-21-04/701, Alodine Coating
(8) SWPM 20-20-00, Electrical Bonding and Grounds

B. Equipment
(1) Hex key wrench (9/64-inch) with 6 inch extension - commercially available

(2) Brush - Soft Bristle - STD-123
(3) BAC5000 - Sealant Removal Tool

C. Consumable Materials
(1) Alodine Coating - Chemical Conversion Coating for Aluminum or Aluminum Alloys, MIL-C-5541 (MIL-C-81706), BAC5719 Type II Class A - Alodine 600 and 1200
(2) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5
(3) C00307 BMS 10-20, Type II Class A - Finish, Corrosion Resistant
(4) G50021 - Scotch-Brite 96W pad
(5) A00249 Sealant - Seal 890A or PR-1440A
(6) B01008 Solvent - Series 88
(7) B01012 Solvent - Series 92

D. Access
(1) Location Zones
551 Rear Spar to MLG Support Beam (Left)
651 Rear Spar to MLG Support Beam (Right)

(2) Access Panels
551EBX Access Panel (Left)
651EBX Access Panel (Right)

E. AIRPLANES WITH ACTUATOR MA20A1001-1 (PRE-SB 28A0088);
Install the Engine Fuel Shutoff Valve (Spar Valve) Actuator (Fig. 401)

S 984-008
(1) Move the manual override handle of the actuator to the CLOSED position.

S 824-009
(2) Align the actuator output shaft with the adapter shaft.

S 214-018
(3) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.

S 424-026
(4) Put the actuator output shaft into the adapter shaft.

NOTE: The mounting feet on the actuator automatically align with the mounting points on the adapter plate.

S 424-010
(5) Install the four actuator mounting screws and washers to attach the actuator to the adapter plate.

S 434-019
(6) Install the lockwire on the actuator mounting screws.

S 434-020
(7) Install the screw to connect the bonding jumper to the actuator.

S 224-012
(8) Measure the bonding resistance between the bonding jumper and the airplane structure (SWPM 20-20-00).
(a) Make sure the resistance is 0.005 ohm (5 milliohms) or less.

S 434-063
(9) Install the electrical connector on the actuator.

F. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the Engine Fuel Shutoff Valve (Spar Valve) Actuator (Fig. 401A)

S 144-051
(1) Remove the old sealant and clean the actuator (15), index plate (10), and fasteners (if reused).
(a) Use the sealant removal tool and sealant removal tool handle (or equivalent) to remove old sealant from the actuator (15) and index plate (10).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) To remove the remaining sealant, grease, oil, dirt, and other contamination from the components, use one of these items soaked with Series 92 solvent (AMM 20-30-92/201).
1) soft bristle brush

2) cotton wiper
3) Scotch-Brite 96W pad

S 424-052

(2) Do these steps to prepare the actuator (15) and the index plate (10) for a sealed electrical faying surface bond (SWPM 20-20-00):

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
(b) Rub dry with a clean, dry cotton wiper.
(c) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(d) Apply a thin continuous layer of sealant to the actuator contact areas (four locations).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.

(e) Apply sealant to the shank and the threads of the mounting screws (3).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the wet installation of the mounting screws (3).
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.524 mm) thick.

S 424-053

(3) Do these steps to install the actuator (15) to the index plate (10).
(a) Make sure the manual override handle (1) is in the CLOSED position.
(b) Align the actuator output shaft with the adapter shaft.
(c) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.

(d) Put the actuator output shaft into the actuator shaft.

NOTE: The contact areas of the actuator automatically align with the mounting points on the index plate.

(e) Install the actuator mounting screws (3) and washers (2) that attach the actuator (15) to the index plate (10).

NOTE: Lockwire is not necessary for the actuator securing screws.

(f) Tighten the screws (3) to 20 in-lb (2.3 Nm).
(g) Make sure the sealant is continuously squeezed out along the edges of the contact surfaces.
(h) If there are gaps, bubbles or voids in the sealant squeeze out, then disassemble and apply more sealant.
(i) Shape the squeezed out sealant into a fillet seal.
(j) As an option, remove the extra squeezed out sealant.

NOTE: Make sure the sealant that remains is flush with the mating part edges.

S 764-054

(4) Measure the electrical bonding resistance between the upper housing of the actuator (at the bare metal bonding jumper installation location) and the rear spar (SWPM 20-20-00).
(a) Do this measurement with the bonding jumper (14) and the electrical connector (5) disconnected.
(b) Make sure the bonding jumper (14) does not touch the actuator (15) during the bonding measurement.
(c) Make sure the bonding resistance is 0.004 ohm (4.0 milliohms) or less.

NOTE: If you have replaced the valve adapter, then make sure the bonding resistance is 0.003 ohm (3.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 764-055

(5) Measure the electrical bonding resistance between the loose end of the bonding jumper (14) and the stiffener (SWPM 20-20-00).
   (a) Make sure the bonding resistance is 0.0015 ohm (1.5 milliohms) or less.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-056

(6) Do these steps to install the bonding jumper (14) to the actuator (15):
   (a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
      1) Rub dry with a clean, dry cotton wiper.
      2) Continue to clean and dry the surface until the dry cotton wiper stays clean.
   (b) Apply a thin continuous layer of sealant to both surfaces of the bonding jumper (14) and the washers (13).
      1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
      2) Make sure the sealant layer is approximately 0.005 in. (0.127 mm) thick.
   (c) Install the screw (12) and washers (13) to attach the bonding jumper (14) to the actuator (15).
   (d) Tighten the screw (12) to to 20 in-lb (2.3 Nm).
   (e) Measure the electrical bonding resistance between the upper housing of the actuator (15) and the attached bonding jumper (14) terminal (SWPM 20-20-00).
      1) Do not touch the screw (12) when you make the bonding measurement.
      2) Make sure the bonding resistance is 0.001 ohm (1 milliohm) or less.

         NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

   (f) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper (14) and screw (12).

S 374-057

(7) Do this task to apply protective finishes to the bare areas of the rear spar: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the rear spar where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating

NOTE: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 914-058

(8) Do this task to apply Alodine coating to any bare areas of the actuator (15): Apply the Alodine Coating (AMM 51-21-04/701).

NOTE: Re-apply the protective coating to the actuator (15) where the electrical bonding probe removed the finish and any bare metal areas around the bonding jumper installation that are not covered with sealant.

S 434-059

(9) Install the electrical connector (5) on the actuator (15).

G. Dual Path Wiring Check

S 724-031

WARNING: OBEY THE APPLICABLE SHOP PROCEDURES FOR MAINTENANCE ON ENERGIZED ELECTRICAL SYSTEMS. SHORT CIRCUIT AND ELECTRICAL SHOCK TO PERSONS CAN OCCUR.

(1) Do these steps to do a check of each of the two redundant wires that supply power to close the engine fuel shutoff valve (spar valve):
(a) Open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:
1) 6E1, L SPAR VALVE
2) 6E2, R SPAR VALVE
3) 6H1, FIRE EXTINGUISHING ENG L BTL1
4) 6H2, FIRE EXTINGUISHING ENG L BTL 2
5) 6H3, FIRE EXTINGUISHING ENG R BTL 1
6) 6H4, FIRE EXTINGUISHING ENG R BTL 2
(b) Put the left engine fuel control switch, found on the P10 quadrant panel, to the CUTOFF position.
(c) Put the right engine fuel control switch, found on the P10 quadrant panel, to the CUTOFF position.

(d) Put the left engine fire switch, found on the P8 quadrant panel, to the NORMAL position.
(e) Put the right engine fire switch, found on the P8 quadrant panel, to the NORMAL position.
(f) To do a check of the left engine fuel shutoff valve (spar valve), disconnect the connector for the left engine fuel shutoff valve (spar valve) actuator, D2142.
(g) To do a check of the right engine fuel shutoff valve (spar valve), disconnect the right engine fuel shutoff valve (spar valve) actuator, D2022.
(h) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
1) Main Power Distribution Panel, P6:
a) 6E1, L SPAR VALVE
b) 6E2, R SPAR VALVE
(i) For the left engine fuel shutoff valve (spar valve), do a check for 28VDC power (21.0 VDC minimum, 34.0 VDC maximum) between these pins on the connectors, D2142.

CONNECTOR D2142	
FROM	TO
pin 5 pin 6	pin 4 pin 4

(j) For the right engine fuel shutoff valve (spar valve) , do a check for 28 VDC power (21.0 VDC minimum, 34.0 VDC maximum) between these pins on the connector, D2022.

CONNECTOR D2022	
FROM	TO
pin 5 pin 6	pin 4 pin 4

(k) Open these circuit breakers and attach DO-NOT-CLOSE tags:
1) Main Power Distribution Panel, P6:
a) 6E1, L FUEL SPAR VALVE
b) 6E2, R FUEL SPAR VALVE
(l) For the left engine fuel shutoff valve (spar valve), re-connect the connector for the left engine fuel shutoff valve (spar valve) actuator, D2142.
(m) For the right engine fuel shutoff valve (spar valve), re-connect the connector for the right engine fuel shutoff valve (spar valve) actuator, D2022.
(n) For the left actuator, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6E1, L FUEL SPAR VALVE
2) 6H1, FIRE EXTINGUISHING ENG L BTL 1
3) 6H2, FIRE EXTINGUISHING ENG L BTL 2
(o) For the right actuator, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
1) 6E2, R FUEL SPAR VALVE
2) 6H3, FIRE EXTINGUISHING ENG R BTL 1
3) 6H4, FIRE ENTINGUISHING ENG R BTL 2
(p) Supply electrical power (AMM 24-22-00/201).

H. Do the Operational Test for the Spar Valve Actuator

S 714-061
(1) Do the operational test for the left engine shutoff valve (spar valve) actuator (AMM 28-22-11/501).

S 714-062
(2) Do the operational test for the right engine shutoff valve (spar valve) actuator (AMM 28-22-11/501).

I. Put the Airplane Back to its Usual Condition

S 864-014
(1) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-024
(2) Close the applicable left or right access panel, 551EBX or 651EBX (AMM 06-44-00/201).

ENGINE FUEL SHUTOFF VALVE (SPAR VALVE) ACTUATOR - ADJUSTMENT/TEST

1. General
   A. This procedure has an operational test for the left and right engine fuel shutoff valve (spar valve) actuators.
   B. The actuator of the engine fuel shutoff valve (spar valve) is installed on the rear spar, out of the fuel tank. Each actuator is found aft of the fuel measuring stick No. 3 in each main fuel tank (AMM 28-44-00/001).
   C. Two persons are necessary to do this task. One person must be in the flight compartment to do the test. The other person must be at the spar valve actuator to monitor the movement of the spar valve.

TASK 28-22-11-715-004

2. Engine Fuel Shutoff Valve (Spar Valve) Actuator - Operational Test
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
   B. Access
      (1) Location Zones
          551 Rear Spar to MLG Support Beam (Left)
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panels
          551EBX Access Panel (Left)
          651EBX Access Panel (Right)

   C. Prepare for the Test

      S 865-005
      (1) Make sure these circuit breakers are closed:
          (a) On the main power distribution panel, P6:
              1) 6E1, FUEL VALVES L SPAR
              2) 6E2, FUEL VALVES R SPAR

      S 015-003
      (2) Open the applicable left or right panel, 551EBX or 651EBX (AMM 06-44-00/201).
   D. Operational Test for the Left Engine Fuel Shutoff Valve (Spar Valve) Actuator

      S 715-001
      (1) Do the steps that follow to do a test of the left actuator:
          (a) Make sure the L ENG FIRE switch on the pilots aft control stand, P8, is in the NORMAL position.
          (b) Open this circuit breaker and attach a DO-NOT-CLOSE tag:
              1) On the main power distribution panel, P6:
                  a) 6C1, FUEL COND CONT - L

(c) Put the L FUEL CONTROL switch on the P10 quadrant control stand to the RUN position.
(d) Make sure the left SPAR VALVE disagreement light comes on and then goes off after the left engine fuel shutoff valve (spar valve) opens.
(e) Make sure the manual override handle on the left spar valve actuator moves to the open position.
(f) Put the L FUEL CONTROL switch on the P10 quadrant control stand to the CUTOFF position.
(g) Make sure the left SPAR VALVE disagreement light comes on and then goes off after the left spar valve closes.
(h) Make sure the manual override handle on the left spar valve actuator moves to the closed position.
(i) Remove the DO-NOT-CLOSE tag and close this circuit breaker:
1) On the P6 panel:
a) 6C1, FUEL COND CONT - L

E. Operational Test for the Right Engine Shutoff Valve (Spar Valve) Actuator

S 715-002
(1) Do the steps that follow to do a test of the right actuator:
(a) Make sure the R ENG FIRE switch on the pilots aft control stand, P8, is in the NORMAL position.
(b) Open this circuit breaker and attach a DO-NOT-CLOSE tag:
1) On the main power distribution panel, P6:
a) 6C2, FUEL COND CONT - R
(c) Put the R FUEL CONTROL switch on the P10 quadrant control stand to the RUN position.
(d) Make sure the right SPAR VALVE disagreement light comes on and then goes off after the right engine fuel shutoff valve (spar valve) opens.
(e) Make sure the manual override handle on the right spar valve actuator moves to the open position.
(f) Put the R FUEL CONTROL switch on the P10 quadrant control stand to the CUTOFF position.
(g) Make sure the right SPAR VALVE disagreement light comes on and then goes off after the right spar valve closes.
(h) Make sure the manual override handle on the right spar valve actuator moves to the closed position.
(i) Remove the DO-NOT-CLOSE tag and close this circuit breaker:
1) On the P6 panel:
a) 6C2, FUEL COND CONT - R

F. Put the Airplane Back to its Usual Condition

S 865-007
(1) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 415-008

(2) Close the applicable left or right access panel, 551EBX or 651EBX (AMM 06-44-00/201).

ENGINE FUEL SHUTOFF VALVE ACTUATOR - INSPECTION/CHECK

TASK 28-22-11-726-001

1. Engine Fuel Shutoff Valve Actuator - Bonding Resistance Check
(Fig. 601)

A. General

(1) This task does an electrical bonding resistance check for the engine fuel shutoff valve actuator.

(2) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References

(1) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(2) AMM 28-00-00/201, Fuel System
(3) AMM 28-11-00/701, Fuel Tanks
(4) AMM 51-21-04/701, Chemical Conversion Coating
(5) SWPM 20-20-00, Electrical Bonding Resistance and Grounds

C. Consumable Materials

(1) Alodine Coating - Chemical Conversion Coating for Aluminum and Aluminum Alloys, BAC5719 Class A - Alodine 600 and 1200

D. Access

(1) Location Zones

551	Rear Spar to MLG Support Beam (Left)
651	Rear Spar to MLG Support Beam (Right)

(2) Access Panels

551EBX	Access Panel (Left)
651EBX	Access Panel (Right)

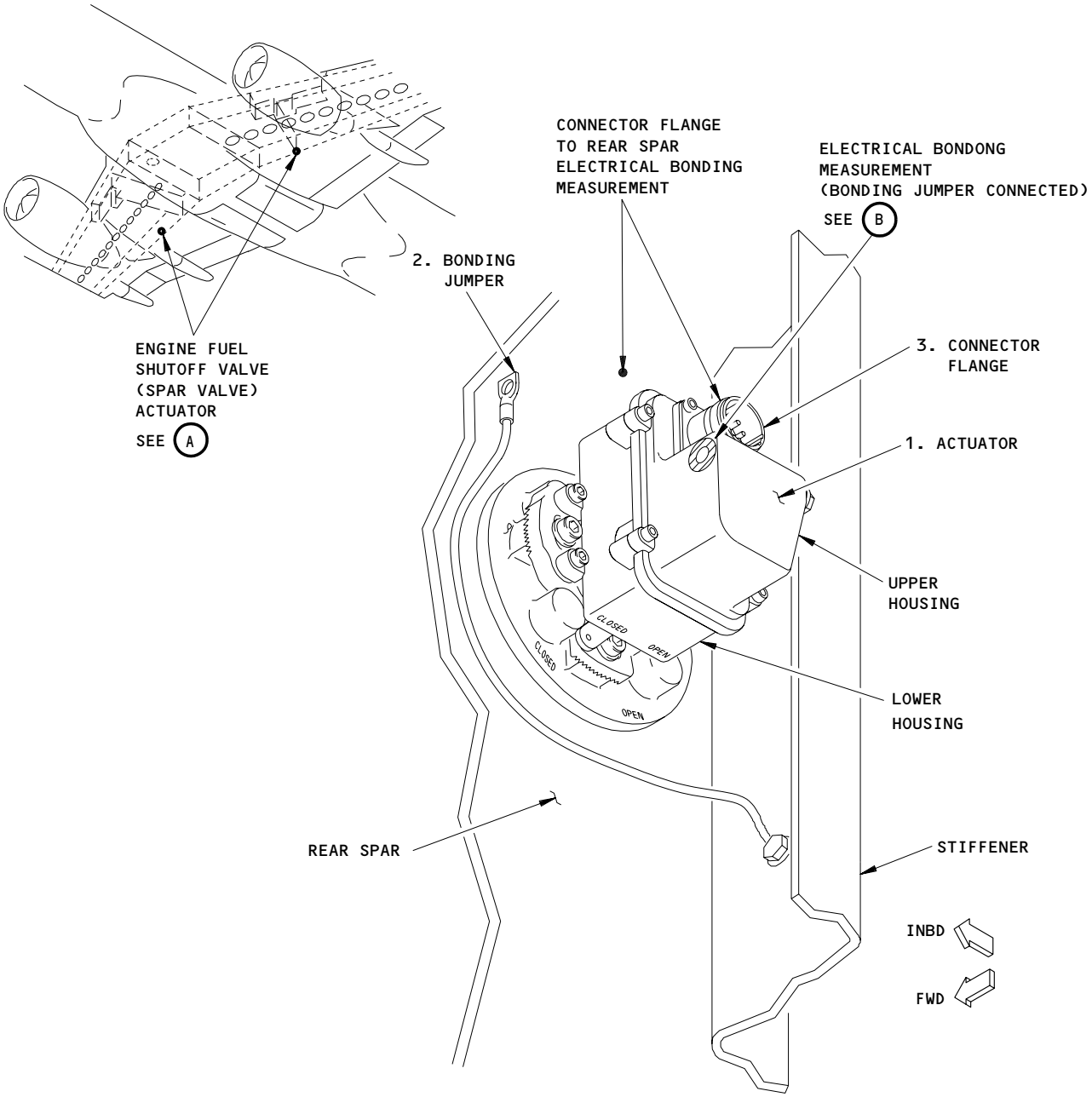
E. Procedure

S 016-002
(1) Get access to the engine fuel shutoff valve actuator.

S 016-003
(2) Disconnect the electrical connector from the actuator (1).

S 016-004
(3) Remove the screw, two washers, and bonding jumper (2) from the actuator (1).

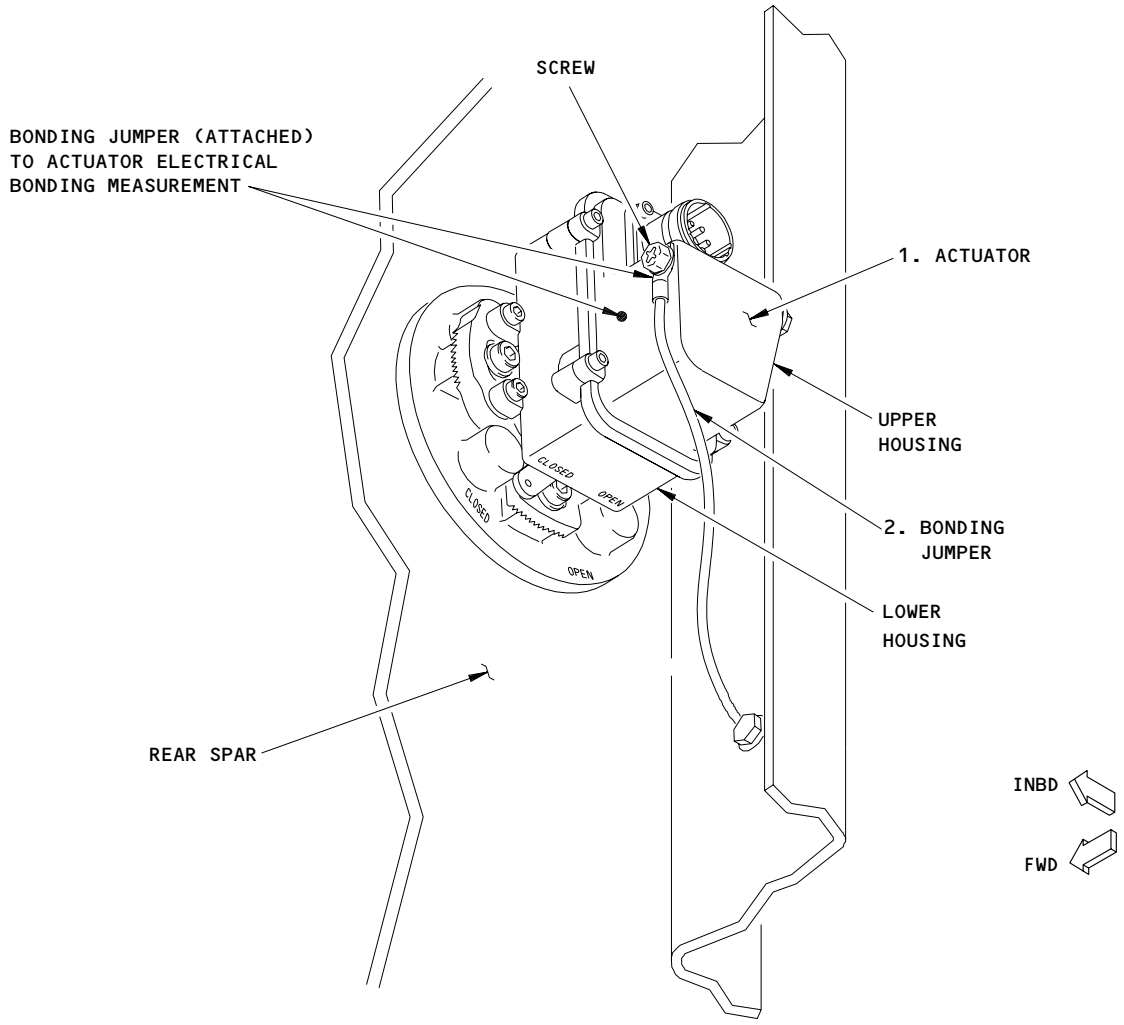
S 766-005
(4) Measure the electrical bonding resistance between the connector flange (3) and the spar web (SWPM 20-20-00).
(a) Do this measurement with the bonding jumper (2) and the electrical connector disconnected.
(b) Make sure the bonding jumper (2) does not touch the actuator (1) during the bonding measurement.



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)

A

Engine Fuel Shutoff Valve (Spar Valve) Actuator Bonding Resistance Check
Figure 601 (Sheet 1)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

B

Engine Fuel Shutoff Valve (Spar Valve) Actuator Bonding Resistance Check
Figure 601 (Sheet 2)

(c) Make sure the bonding resistance is 0.010 ohm (10.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 426-006

(5) Do these steps to install the bonding jumper (2) to the actuator:
(a) Clean the contact surfaces with a cotton wiper, G00034 soaked with Series 88 solvent, B01088 (AMM 20-30-88).
1) Rub dry with a clean, dry cotton wiper, G00034.
2) Continue to clean and dry the surface until the dry cotton wiper, G00034 stays clean.
(b) Apple a thin continuous layer of sealant to both surfaces of the bonding jumper terminal and the two washers.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant, A50105 for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 in (0.127 mm) thick.
(c) Install the screw, two washers, and bonding jumper (2) to the actuator (1).
(d) Tighten the screw to 20 in-lb (2.3 Nm).

S 766-010

(6) Measure the electrical bonding resistance between the upper housing of the actuator and the attached terminal of the bonding jumper (SWPM 20-20-00).
(a) Do not touch the screw when you make the bonding measurement.
(b) Make sure the bonding resistance is 0.001 ohm (1.0 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(c) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper and screw.

S 376-007

(7) Do this task to apply protective finishes to the bare areas of the spar web: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the spar web where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating

NOTE: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 916-008

(8) Do this task to apply Alodine coating to any bare areas of the actuator: Apply the Alodine Coating (AMM 51-21-04/701).

NOTE: Re-apply the protective coating to the actuator where the electrical bonding probe removed the finish and any bare metal areas around the bonding jumper installation that are not covered with sealant.

S 436-011

(9) Install the electrical connector on the actuator (1).

ENGINE CROSSFEED VALVE ACTUATOR - REMOVAL/INSTALLATION

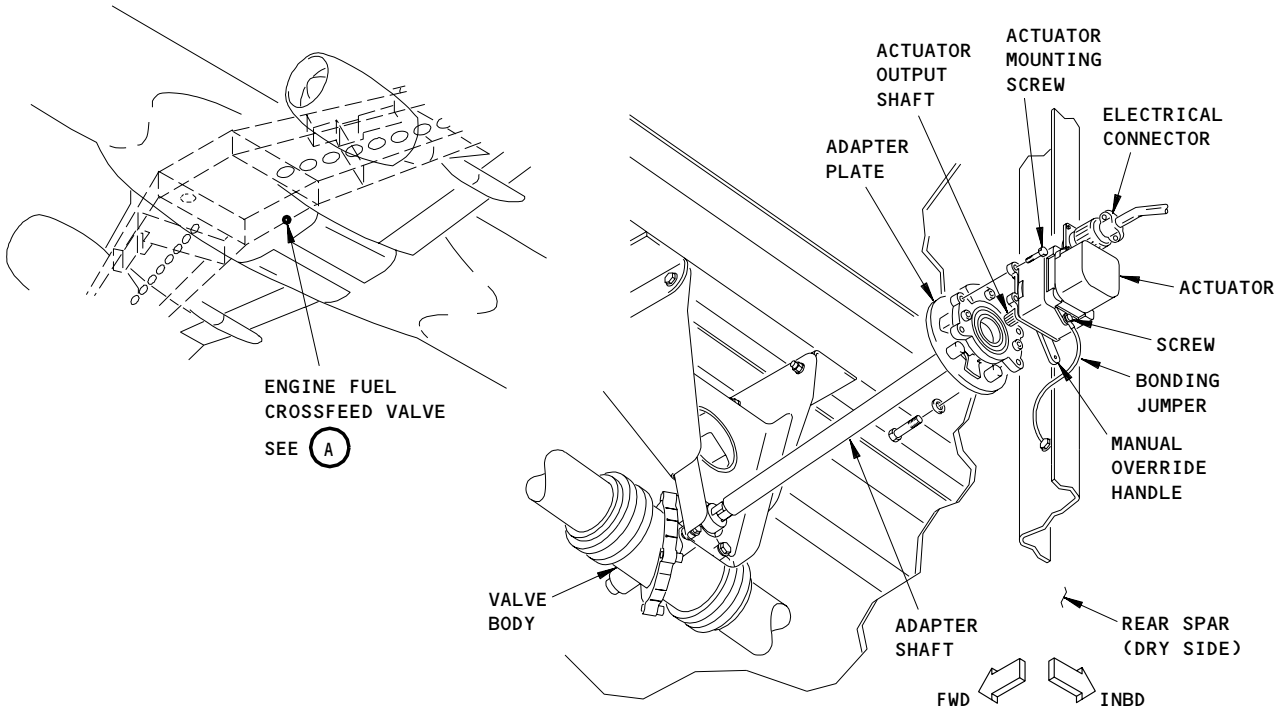
1. General
   A. The engine fuel crossfeed valve(s) contains three parts: an actuator, an adapter shaft and a valve body.
   B. The engine fuel crossfeed valve actuator(s) is (are) installed on the rear spar of the center fuel tank. It is not necessary to defuel the center fuel tank to remove the actuator(s). It is necessary to defuel the center fuel tank to remove the adapter shaft(s). It is necessary to defuel all the fuel tanks to remove the valve bodies.
   C. This procedure removes and installs one engine fuel crossfeed valve actuator, the removal and installation of the other actuator is the same. This procedure has two tasks. The first task removes the engine fuel crossfeed valve actuator. The second task installs the engine fuel crossfeed valve actuator.
   D. The procedure to remove and install the adapter shaft and valve body of the engine fuel crossfeed valve is contained in AMM 28-22-02/401.

TASK 28-22-12-004-023

2. Remove the Actuator of the Engine Fuel Crossfeed Valve
(Fig. 401, Fig. 401A, Fig. 402, Fig. 402A)
   A. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)

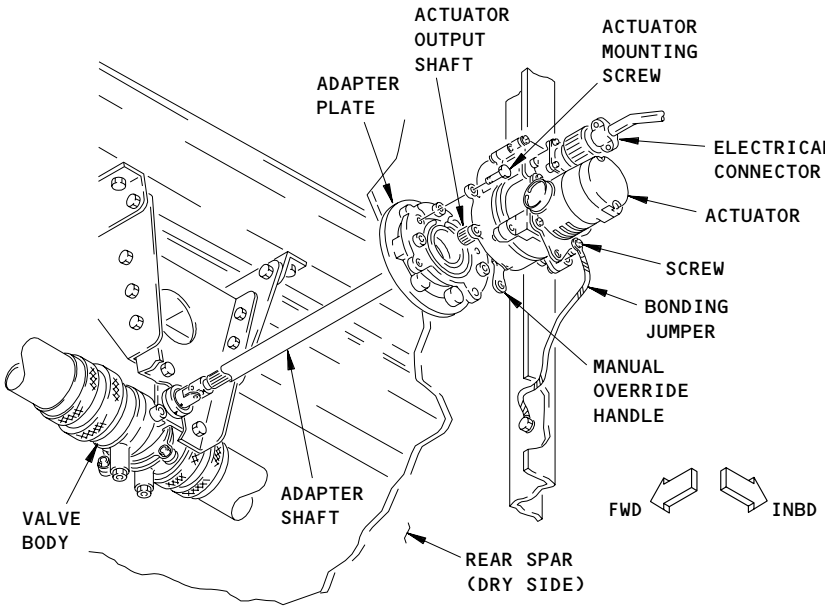
   C. Procedure

      S 864-070
      (1) GUI 001-008 PRE-SB 28-29;
      Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
      (a) 11D36, FUEL CROSSFEED



ENGINE FUEL CROSSFEED VALVE

A 1

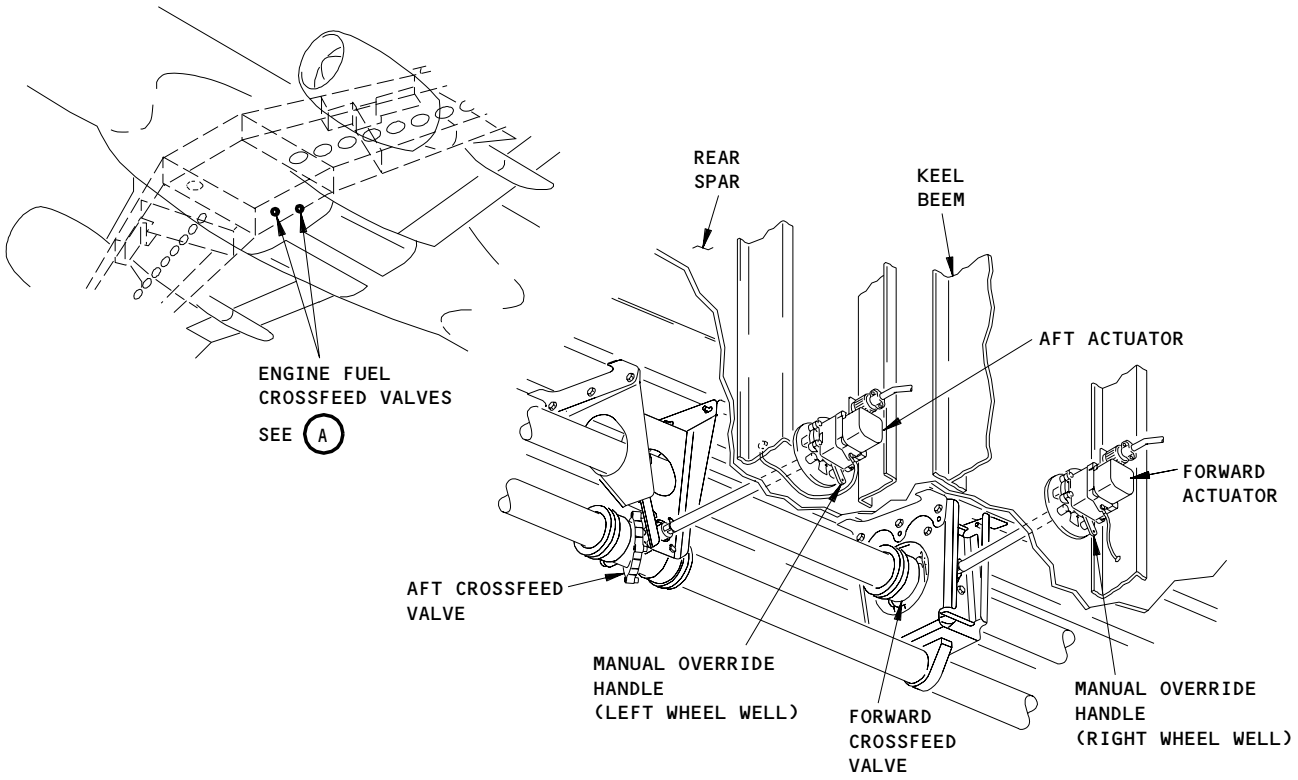


ENGINE FUEL CROSSFEED VALVE

A 2

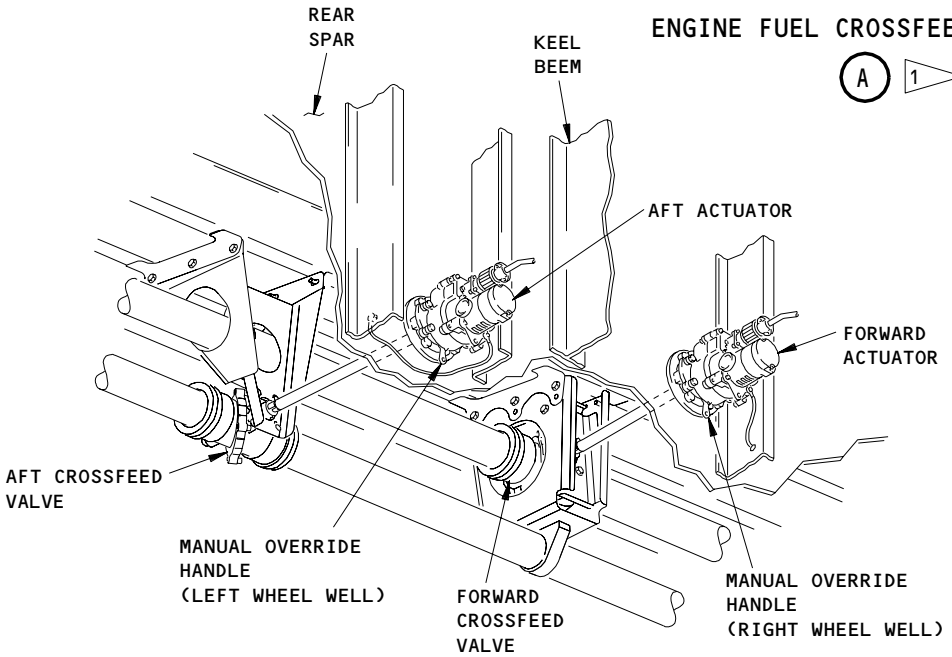
1 PREFERRED
2 ALTERNATE

Engine Fuel Crossfeed Valve Actuator Installation
Figure 401



ENGINE FUEL CROSSFEED VALVES

A 1

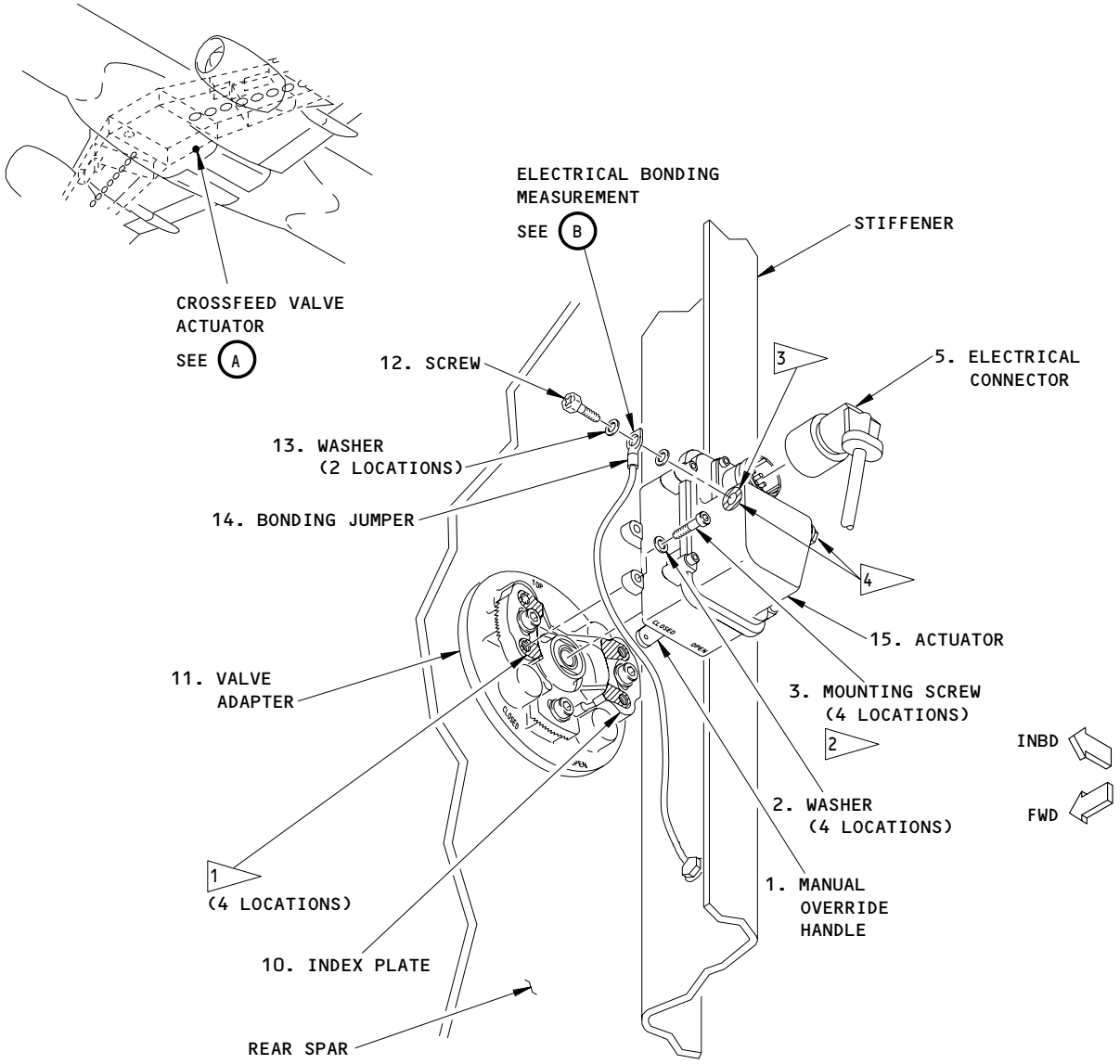


ENGINE FUEL CROSSFEED VALVES

A 2

1 PREFERRED
2 ALTERNATE

Engine Fuel Crossfeed Valve Actuator Installation
Figure 401A



CROSSFEED VALVE ACTUATOR

A

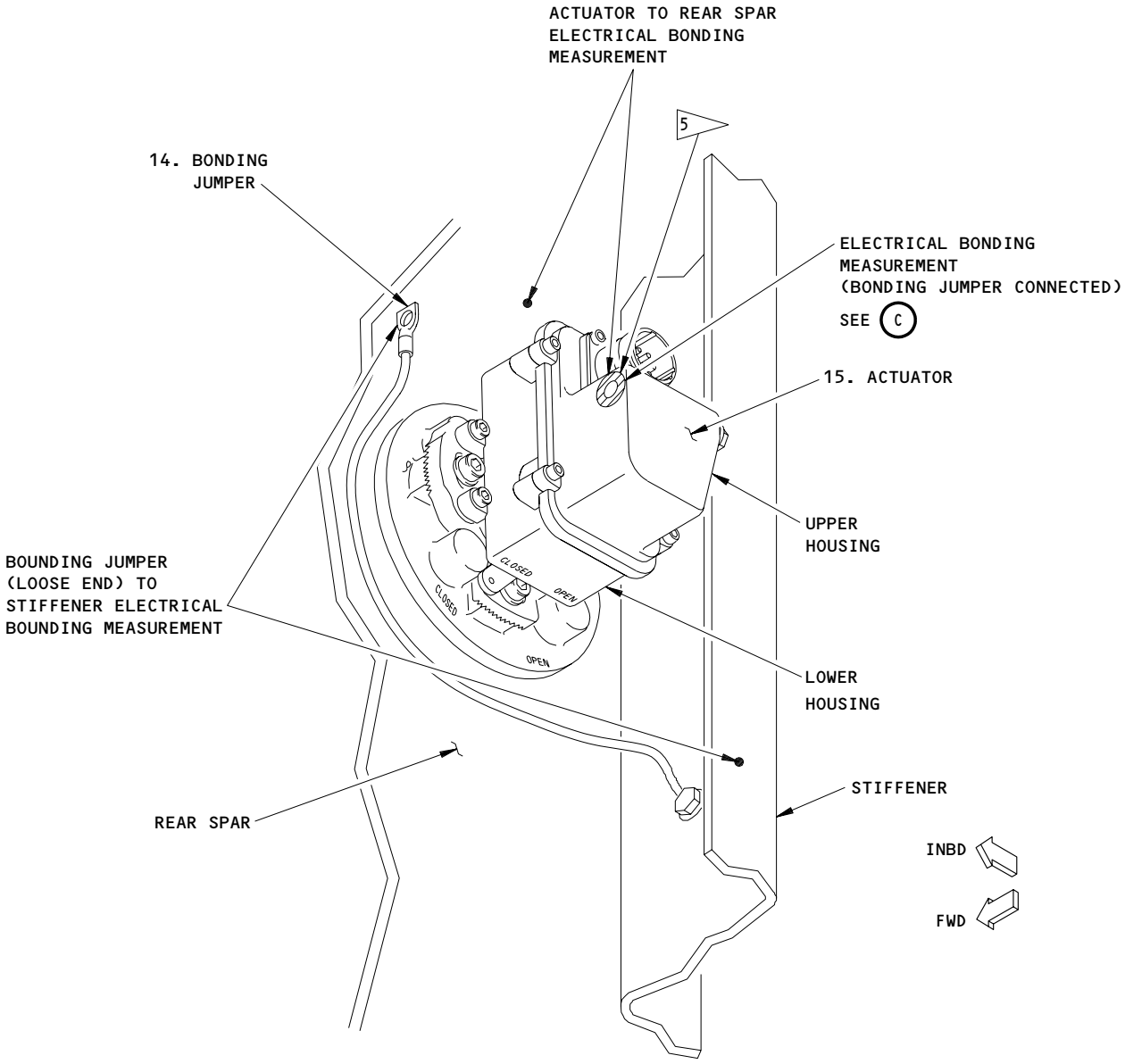
1 PREPARE AND INSTALL THE CONTACT SURFACES OF THE INDEX PLATE AND ACTUATOR FEET (4 LOCATIONS) WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00).

2 APPLY SEALANT TO THE SHANK AND THREADS OF THE MOUNTING SCREWS.

3 PREPARE AND INSTALL THE CONTACT SURFACES OF ACTUATOR AND BONDING JUMPER BUILD-UP WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00). AFTER INSTALLATION, APPLY A FILLET SEAL TO THE BONDING JUMPER INSTALLATION.

4 THE BONDING JUMPER MAY BE INSTALLED ON EITHER SIDE OF THE ACTUATOR.

Actuator of the Crossfeed Valve Installation
Figure 402 (Sheet 1)

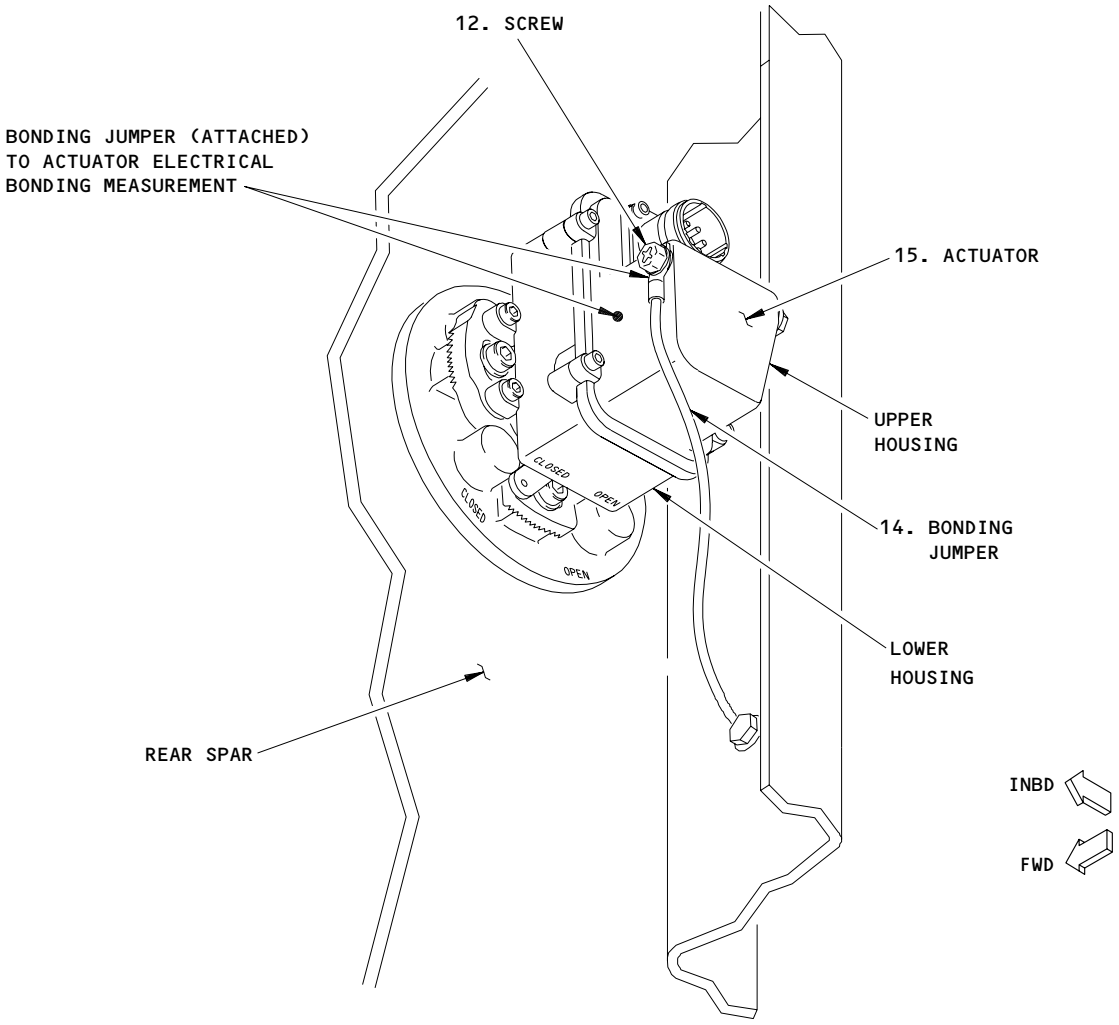


ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)

B

5 BARE METAL CONTACT SURFACE OF THE ACTUATOR AT THE BONDING JUMPER INSTALLATION.

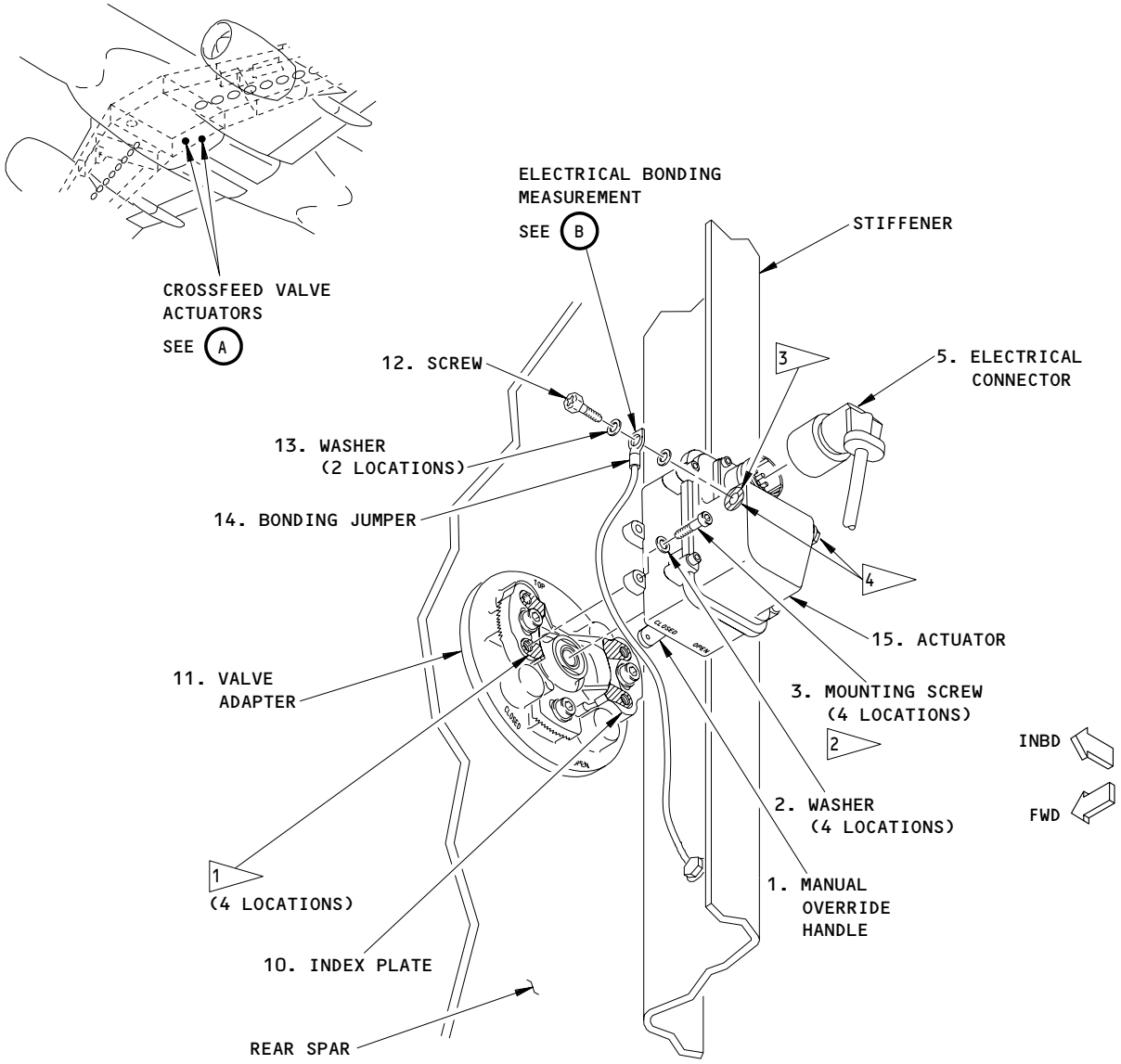
Actuator of the Crossfeed Valve Installation
Figure 402 (Sheet 2)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

C

Actuator of the Crossfeed Valve Installation
Figure 402 (Sheet 3)



CROSSFEED VALVE ACTUATOR

A

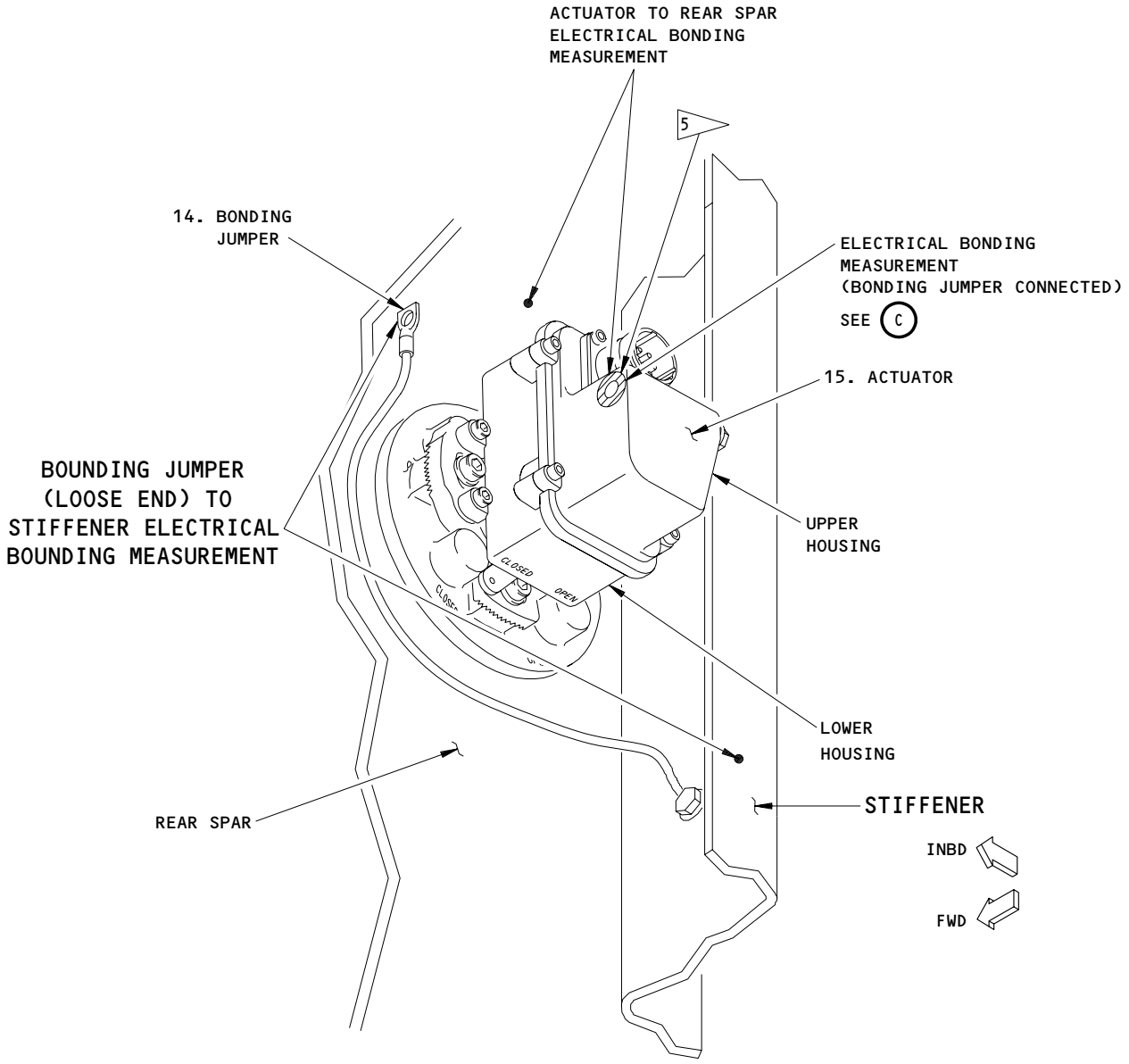
1 PREPARE AND INSTALL THE CONTACT SURFACES OF THE INDEX PLATE AND ACTUATOR FEET (4 LOCATIONS) WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00).

2 APPLY SEALANT TO THE SHANK AND THREADS OF THE MOUNTING SCREWS.

3 PREPARE AND INSTALL THE CONTACT SURFACES OF ACTUATOR AND BONDING JUMPER BUILD-UP WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00). AFTER INSTALLATION, APPLY A FILLET SEAL TO THE BONDING JUMPER INSTALLATION.

4 THE BONDING JUMPER MAY BE INSTALLED ON EITHER SIDE OF THE ACTUATOR.

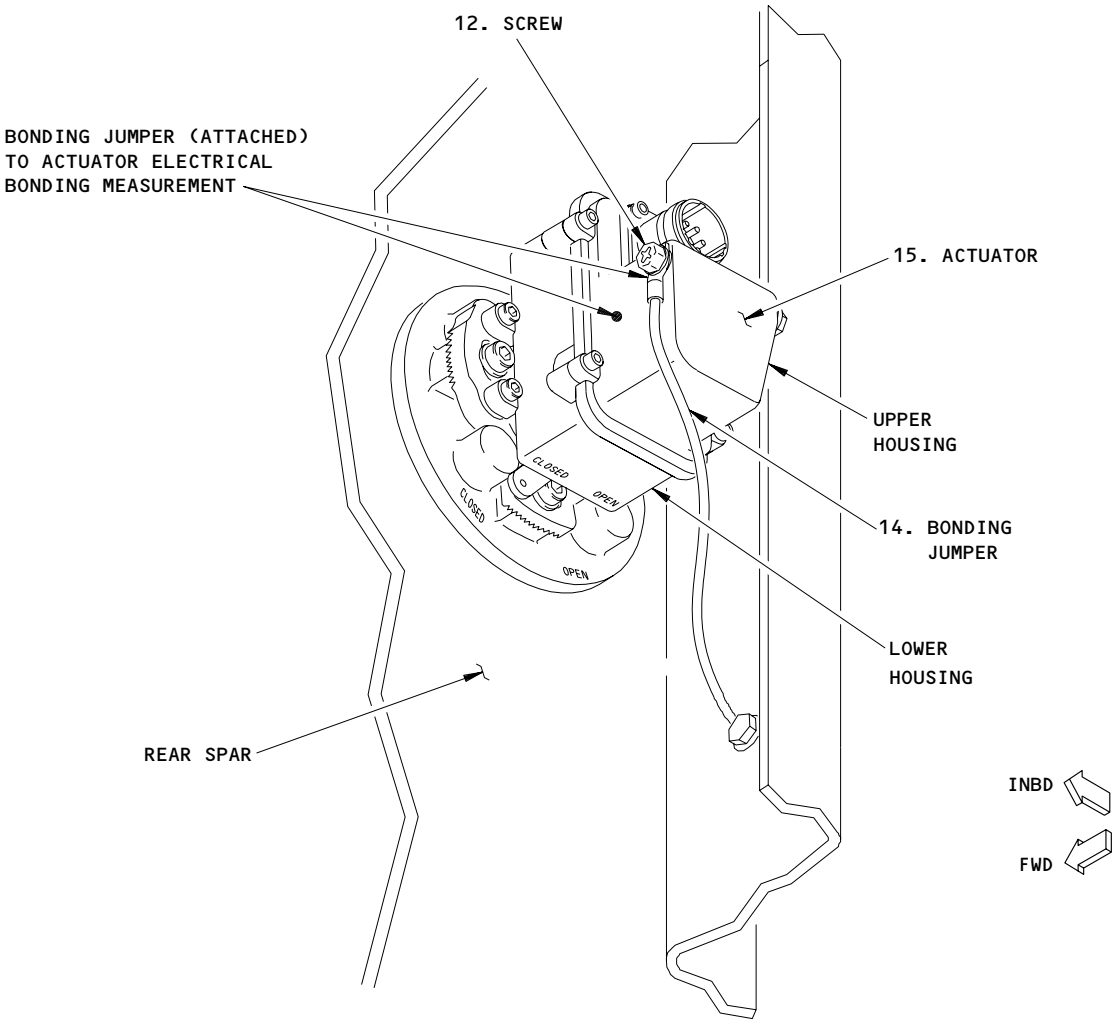
Actuator of the Crossfeed Valve Installation
Figure 402A (Sheet 1)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
B

5 BARE METAL CONTACT SURFACE OF THE ACTUATOR AT THE BONDING JUMPER INSTALLATION.

Actuator of the Crossfeed Valve Installation
Figure 402A (Sheet 2)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

C

Actuator of the Crossfeed Valve Installation
Figure 402A (Sheet 3)

S 864-076

(2) GUI 001-008 POST-SB 28-29;
GUI 009-999;
Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D24, FWD FUEL CROSSFEED
(b) 11D25, AFT FUEL CROSSFEED
(c) 11D36, FUEL XFEED IND

S 214-010

(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-012

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-002

(5) Move the manual override handle of the actuator to the CLOSED position.

S 034-003

(6) Remove the electrical connector from the actuator.

S 034-004

(7) Disconnect the bonding jumper from the actuator.

S 034-005

(8) Remove the four actuator mounting screws.

S 024-149

(9) Remove the actuator.

TASK 28-22-12-404-024

3. Install the Actuator of the Engine Fuel Crossfeed Valve
(Fig. 401, Fig. 401A, Fig. 402, Fig. 402A)

A. References
(1) AMM 24-22-00/201, Electric Power Control
(2) AMM 32-00-15/201, Landing Gear Door Locks

B. Consumable Materials
(1) Alodine Coating - Chemical Conversion Coating for Aluminum and Aluminum Alloys, BAC5719 Class A - Alodine 600 and 1200

C. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

D. AIRPLANES WITH ACTUATOR MA20A1001-1 (PRE-SB 28A0088);
Install the Engine Fuel Crossfeed Valve Actuator (Fig. 401, Fig. 401A)

S 864-007
(1) Move the manual override handle of the actuator to the CLOSED position.

S 864-008
(2) Align the actuator output shaft with the adapter shaft.

S 214-013
(3) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.

S 424-014
(4) Put the actuator output shaft into the adapter shaft.

NOTE: The mounting feet on the actuator should automatically align with the mounting points on the adapter plate.

S 424-015
(5) Install the four actuator mounting screws to attach the actuator to the adapter plate.

S 434-016
(6) Install the lockwire on the actuator mounting screws.

S 434-017
(7) Connect the bonding jumper to the actuator.

S 434-009

(8) Attach the electrical connector to the actuator.

E. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the Engine Fuel Crossfeed Valve Actuator (Fig. 402, Fig. 402A)

S 144-262

(1) Remove the old sealant and clean the actuator (15), index plate (10), and fasteners (if reused).

(a) Use the sealant removal tool and sealant removal tool handle (or equivalent) to remove old sealant from the actuator (15) and index plate (10).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) To remove the remaining sealant, grease, oil, dirt, and other contamination from the components, use one of these items soaked with Series 92 solvent (AMM 20-30-92/201).

1) soft bristle brush
2) cotton wiper
3) Scotch-Brite 96W pad

S 424-263

(2) Do these steps to prepare the actuator (15) and the index plate (10) for a sealed electrical faying surface bond (SWPM 20-20-00):

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).

(b) Rub dry with a clean, dry cotton wiper.
(c) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(d) Apply a thin continuous layer of sealant to the actuator contact areas (four locations).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.

(e) Apply sealant to the shank and the threads of the mounting screws (3).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the wet installation of the mounting screws (3).
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.524 mm) thick.

S 424-264

(3) Do these steps to install the actuator (15) to the index plate (10).
(a) Make sure the manual override handle (1) is in the CLOSED position.
(b) Align the actuator output shaft with the adapter shaft.
(c) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.
(d) Put the actuator output shaft into the actuator shaft.

NOTE: The contact areas of the actuator automatically align with the mounting points on the index plate.

(e) Install the actuator mounting screws (3) and washers (2) that attach the actuator (15) to the index plate (10).

NOTE: Lockwire is not necessary for the actuator securing screws.

(f) Tighten the screws (3) to 20 in-lb (2.3 Nm).
(g) Make sure the sealant is continuously squeezed out along the edges of the contact surfaces.
(h) If there are gaps, bubbles or voids in the sealant squeeze out, then disassemble and apply more sealant.
(i) Shape the squeezed out sealant into a fillet seal.

(j) As an option, remove the extra squeezed out sealant.

NOTE: Make sure the sealant that remains is flush with the mating part edges.

S 764-265

(4) Measure the electrical bonding resistance between the upper housing of the actuator (at the bare metal bonding jumper installation location) and the rear spar (SWPM 20-20-00).
(a) Do this measurement with the bonding jumper (14) and the electrical connector (5) disconnected.
(b) Make sure the bonding jumper (14) does not touch the actuator (15) during the bonding measurement.
(c) Make sure the bonding resistance is 0.004 ohm (4.0 milliohms) or less.

NOTE: If you have replaced the valve adapter, then make sure the bonding resistance is 0.003 ohm (3.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 764-266

(5) Measure the electrical bonding resistance between the loose end of the bonding jumper (14) and the stiffener (SWPM 20-20-00).
(a) Make sure the bonding resistance is 0.0015 ohm (1.5 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-267

(6) Do these steps to install the bonding jumper (14) to the actuator (15):
(a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
1) Rub dry with a clean, dry cotton wiper.
2) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(b) Apply a thin continuous layer of sealant to both surfaces of the bonding jumper (14) and the washers (13).
1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.

2) Make sure the sealant layer is approximately 0.005 in. (0.127 mm) thick.

(c) Install the screw (12) and washers (13) to attach the bonding jumper (14) to the actuator (15).

(d) Tighten the screw (12) to to 20 in-lb (2.3 Nm).

(e) Measure the electrical bonding resistance between the upper housing of the actuator (15) and the attached bonding jumper (14) terminal (SWPM 20-20-00).

1) Do not touch the screw (12) when you make the bonding measurement.

2) Make sure the bonding resistance is 0.001 ohm (1 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(f) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper (14) and screw (12).

S 374-268

(7) Do this task to apply protective finishes to the bare areas of the rear spar: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the rear spar where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:

1) Alodine 600 coating

NOTE: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 914-269

(8) Do this task to apply Alodine coating to any bare areas of the actuator (15): Apply the Alodine Coating (AMM 51-21-04/701).

NOTE: Re-apply the protective coating to the actuator (15) where the electrical bonding probe removed the finish and any bare metal areas around the bonding jumper installation that are not covered with sealant.

S 434-270

(9) Install the electrical connector (5) on the actuator (15).

S 864-099
(10) GUI 001-008 PRE-SB 28-29;
Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11D36, FUEL CROSSFEED

S 864-089
(11) GUI 001-008 POST-SB 28-29;
GUI 009-999;
Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11D24, FWD FUEL CROSSFEED
(b) 11D25, AFT FUEL CROSSFEED
(c) 11D36, FUEL XFEED IND

S 714-035
(12) Do the Operational Test of the Engine Fuel Crossfeed Valve(s) procedure (AMM 28-22-02/401).

ENGINE FUEL CROSSFEED VALVE ACTUATOR - INSPECTION/CHECK

TASK 28-22-12-726-010

1. Engine Fuel Crossfeed Valve Actuator - Bonding Resistance Check
(Fig. 601, Fig. 601A)

A. General

(1) This task does an electrical bonding resistance check for the engine fuel crossfeed valve actuator.

(2) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References

(1) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(2) AMM 28-00-00/201, Fuel System
(3) AMM 28-11-00/701, Fuel Tanks
(4) AMM 51-21-04/701, Chemical Conversion Coating
(5) SWPM 20-20-00, Electrical Bonding and Grounds

C. Consumable Materials

(1) Alodine Coating - Chemical Conversion Coating for Aluminum or Aluminum Alloys, BAC5719 Class A - Alodine 600 and 1200

D. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)

E. Procedure

S 016-002
(1) Get access to the engine fuel crosfeed valve actuator.

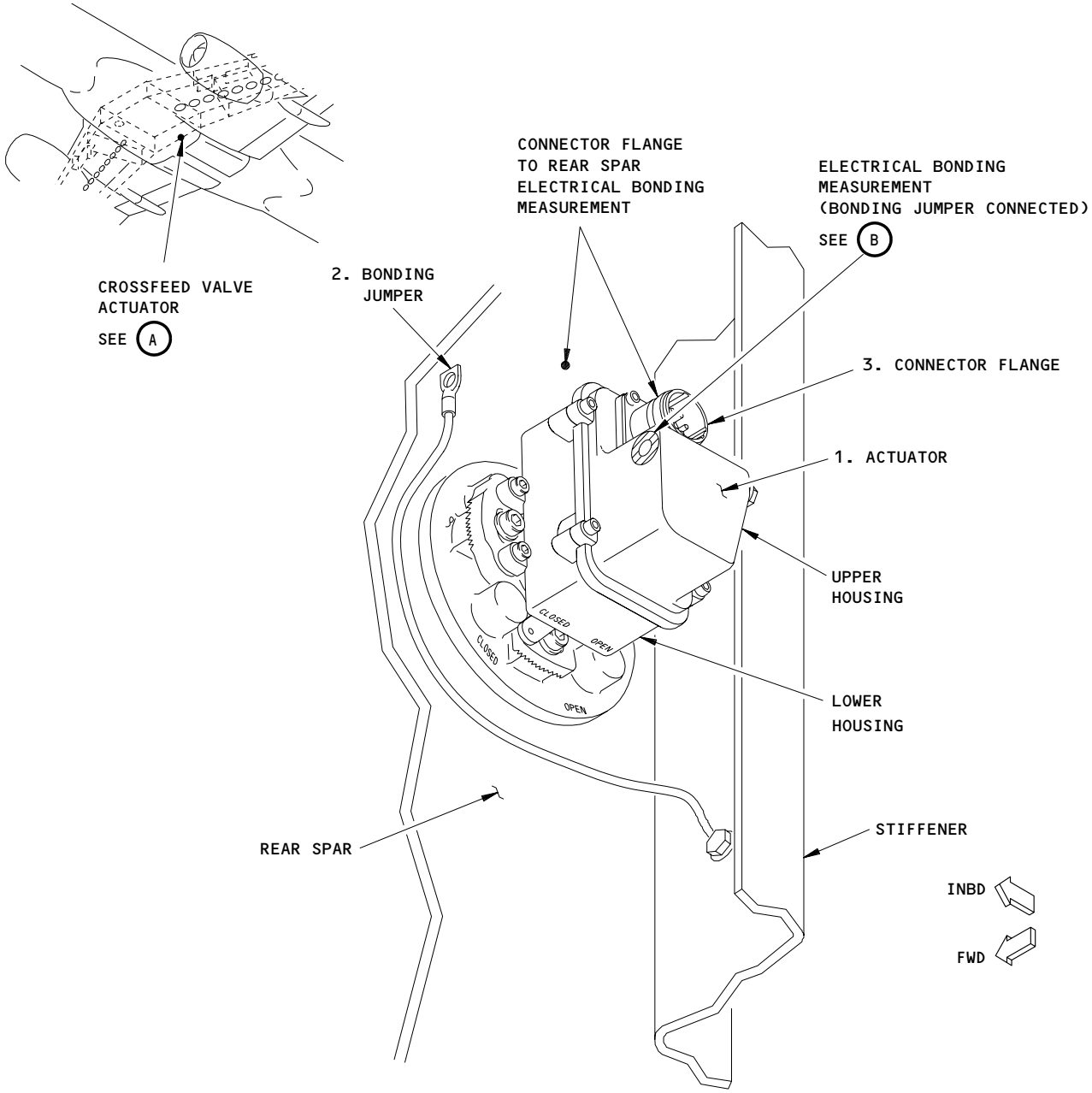
S 016-003
(2) Disconnect the electrical connector from the actuator (1).

S 016-004
(3) Remove the screw, two washers, and bonding jumper (2) from the actuator (1).

S 766-005
(4) Measure the electrical bonding resistance between the connector flange (3) and the spar web (SWPM 20-20-00).

(a) Do this measurement with the bonding jumper (2) and the electrical connector disconnected.

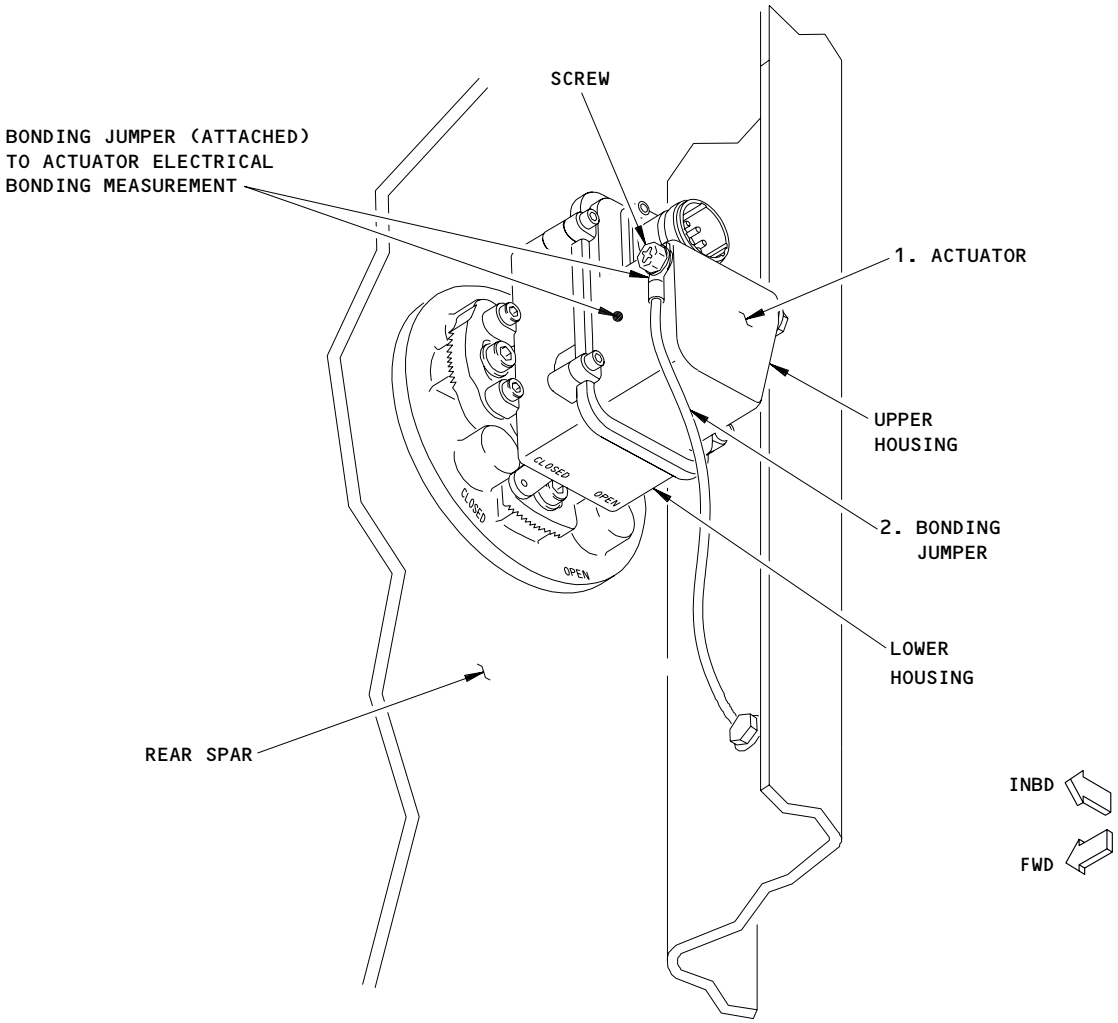
(b) Make sure the bonding jumper (2) does not touch the actuator (1) during the bonding measurement.



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)

A

Actuator of the Crossfeed Valve Bonding Resistance Check
Figure 601 (Sheet 1)

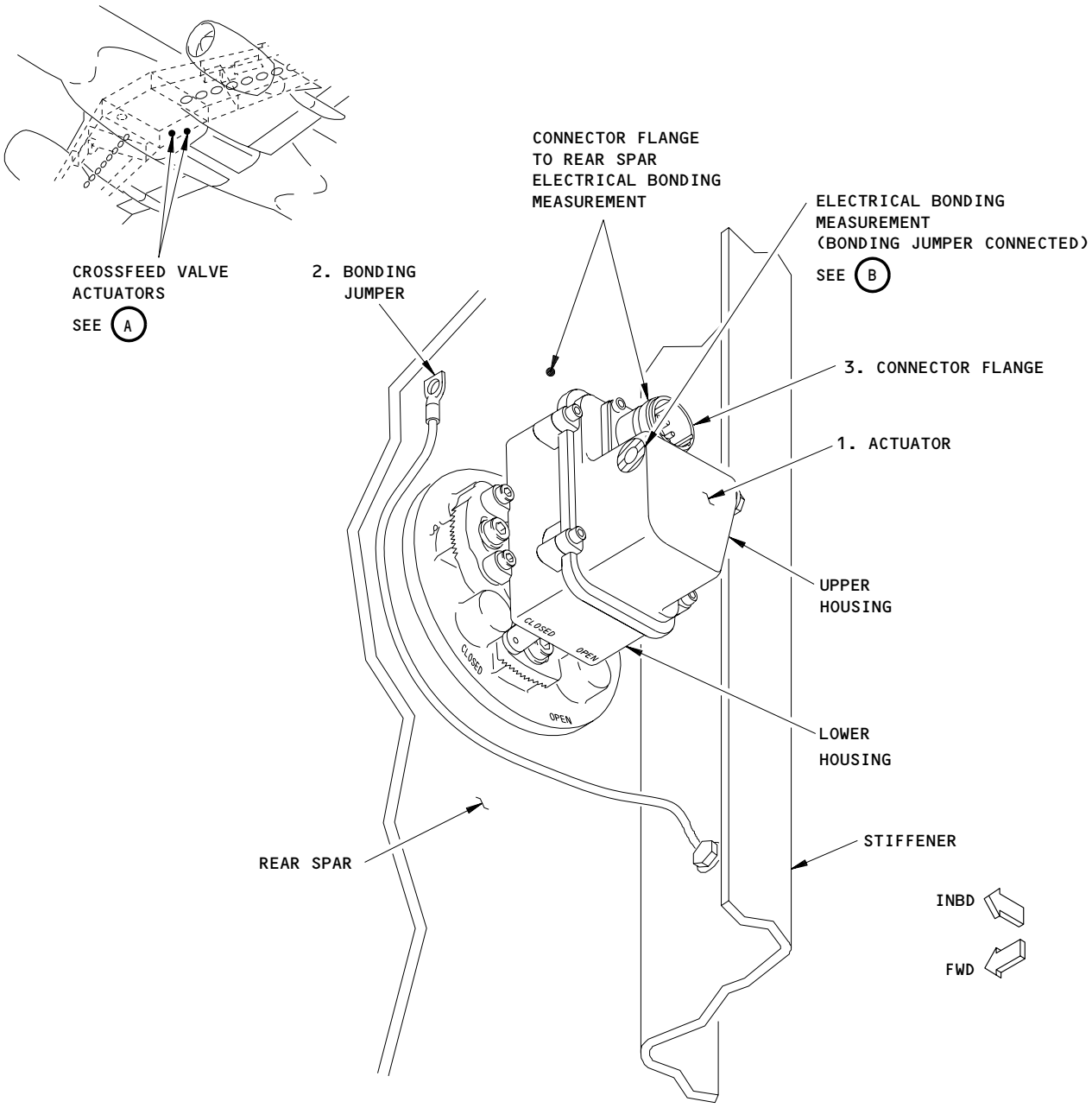


ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

B

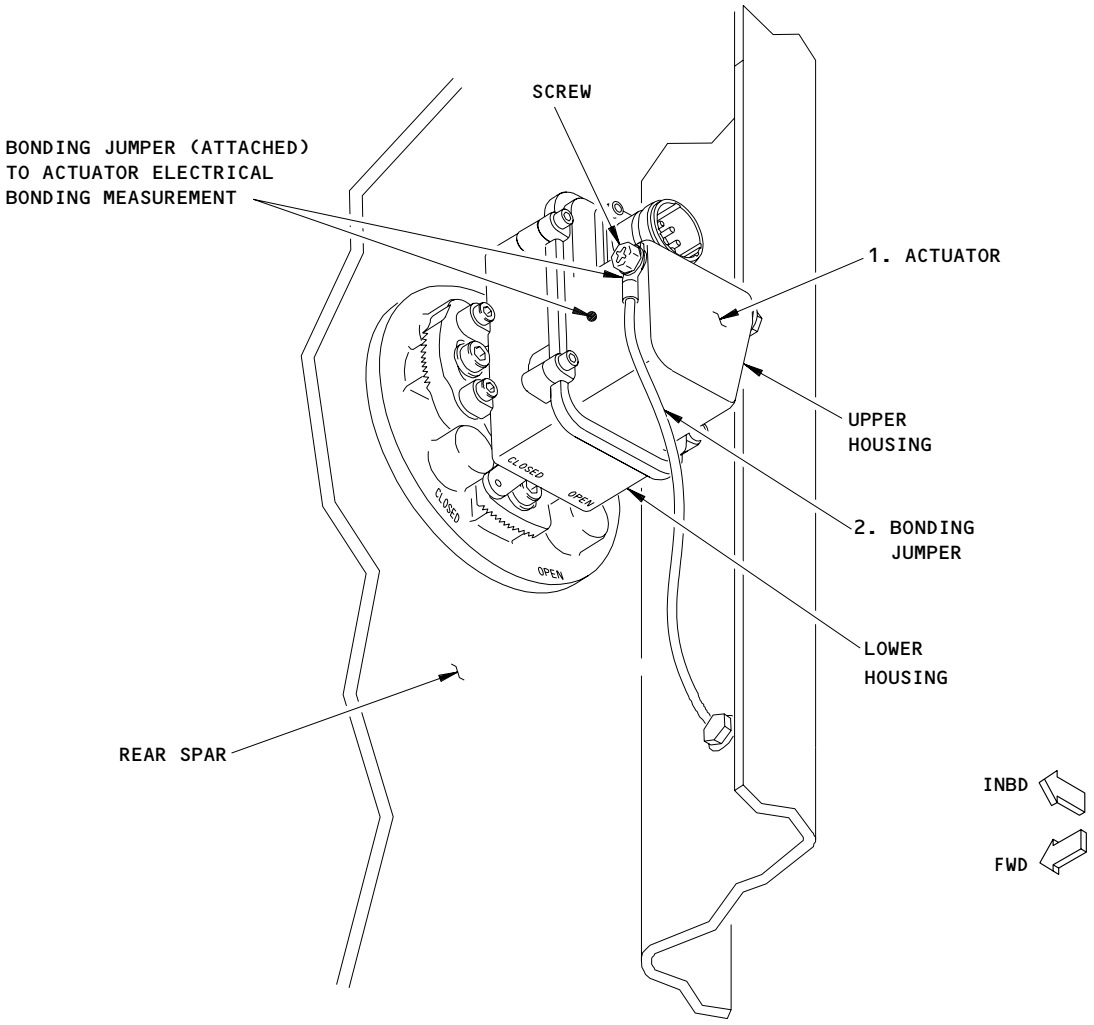
Actuator of the Crossfeed Valve Bonding Resistance Check
Figure 601 (Sheet 2)

1332576



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
A

Actuator of the Crossfeed Valve Bonding Resistance Check
Figure 601A (Sheet 1)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

B

Actuator of the Crossfeed Valve Bonding Resistance Check
Figure 601A (Sheet 2)

EFFECTIVITY
AIRPLANES WITH DUAL ENGINE FUEL
CROSSFEED VALVES (POST-SB 28-29) AND
POST-SB 28A0088

1332571

(c) Make sure the bonding resistance is 0.010 ohm (10.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 426-006

(5) Do these steps to install the bonding jumper (2) to the actuator:
(a) Clean the contact surfaces with a cotton wiper, G00034 soaked with Series 88 solvent, B01088 (AMM 20-30-88).
1) Rub dry with a clean, dry cotton wiper, G00034.
2) Continue to clean and dry the surface until the dry cotton wiper, G00034 stays clean.
(b) Apple a thin continuous layer of sealant to both surfaces of the bonding jumper terminal and the two washers.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant, A50105 for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 in (0.127 mm) thick.
(c) Install the screw, two washers, and bonding jumper (2) to the actuator (1).
(d) Tighten the screw to 20 in-lb (2.3 Nm).

S 766-011

(6) Measure the electrical bonding resistance between the upper housing of the actuator and the attached terminal of the bonding jumper (SWPM 20-20-00).
(a) Do not touch the screw when you make the bonding measurement.
(b) Make sure the bonding resistance is 0.001 ohm (1.0 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(c) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper and screw.

S 376-007

(7) Do this task to apply protective finishes to the bare areas of the spar web: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the spar web where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating

NOTE: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 916-008

(8) Do this task to apply Alodine coating to any bare areas of the actuator: Apply the Alodine Coating (AMM 51-21-04/701).

NOTE: Re-apply the protective coating to the actuator where the electrical bonding probe removed the finish and any bare metal areas around the bonding jumper installation that are not covered with sealant.

S 436-013

(9) Install the electrical connector on the actuator (1).

FUEL SCAVENGE EJECTOR PUMP - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the scavenge ejector pump. The second task installs the scavenge ejector pump.

TASK 28-22-13-004-001

2. Remove the Scavenge Ejector Pump (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-02/401, Center Tank Access Door
      (3) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zone
          531 Center Wing Tank (Left)

      (2) Access Panel
          531AB Center Tank Access Door (Left)

   C. Procedure

      S 654-008
      (1) Defuel the center fuel tank (AMM 28-26-00/201).

      S 654-018
      (2) Defuel the left main tank (AMM 28-11-00/201).

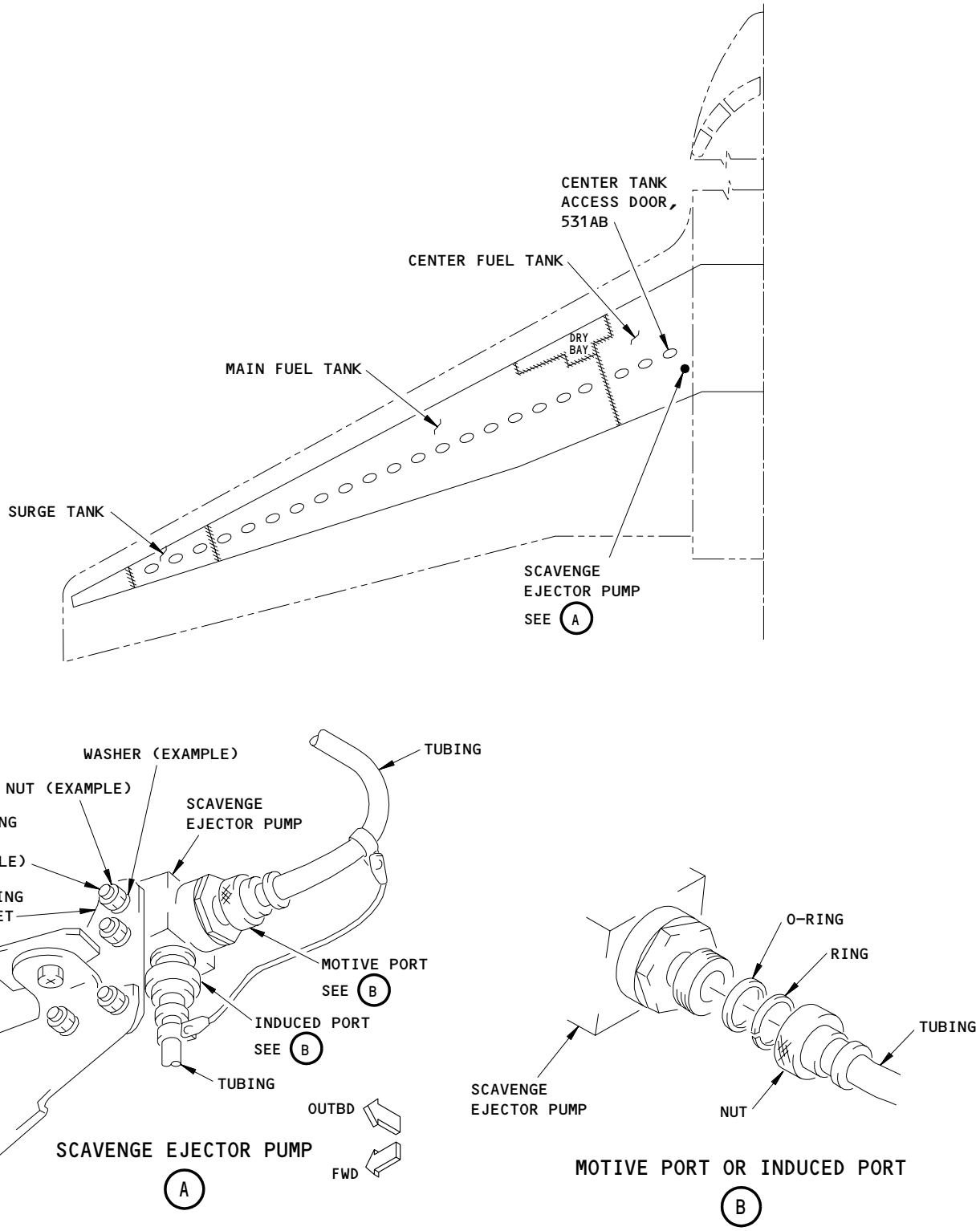
      S 654-009
      (3) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

      S 014-002
      (4) Remove the center tank access door, 531AB (AMM 28-11-02/401).

      S 944-010

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (5) Obey the fuel tank entry precautions (AMM 28-11-00/201).



Fuel Scavenge Ejector Pump
Figure 401

S 014-011
(6) Go into the center fuel tank and find the scavenge ejector pump.

S 034-003
(7) Remove the nut, ring, and O-ring from the scavenge ejector pump at the motive port and the induced port (View B).

S 034-004
(8) Remove the mounting screws, washers, and nuts from the scavenge ejector pump at the mounting bracket (View B).

S 024-012
(9) Remove the scavenge ejector pump.

TASK 28-22-13-404-005

3. Install the Scavenge Ejector Pump (Fig. 401)

A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-02/401, Center Tank Access Door

B. Access
(1) Location Zone
531 Center Wing Tank (Left)

(2) Access Panel
531AB Center Tank Access Door (Left)

C. Procedure

S 424-013
(1) Put the scavenge ejector pump in position on the mounting bracket (View A).

S 424-006
(2) Install the mounting screws, washers, and nuts to attach the scavenge ejector pump to the mounting bracket (View A).

S 824-014
(3) Align the tubing of the motive port and the induced port with the scavenge ejector pump (View B).

S 434-015
(4) Put a new O-ring, ring and nut on the tubing of the motive port and the induced port.

S 434-016
(5) Install the nuts on the scavenge ejector pump.

S 414-007

(6) Install the center tank access door, 531AB (AMM 28-11-02/401).

FUEL MANAGEMENT CONTROL PANEL - REMOVAL/INSTALLATION

1. General
   A. This procedure has these tasks:
      (1) Removal of the Fuel Management Control Panel, M10055
      (2) Installation of the Fuel Management Control Panel, M10055

TASK 28-22-14-004-001

2. Removal of the Fuel Management Control Panel, M10055
   A. Access
      (1) Location Zones
          211 Control Cabin - Section 41 (Left)
          212 Control Cabin - Section 41 (Right)

   B. Procedure

      S 864-002
      (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
          (a) Power Distribution Panel, P6:
              1) 6E4, FUELING QTY
              2) 6F14, L FUEL OVRD PUMP
              3) 6F20, R FUEL OVRD PUMP
              4) 6H14, L AFT FUEL BOOST PUMP
              5) 6H17, R FWD FUEL BOOST PUMP
              6) 6H20, R AFT FUEL BOOST PUMP
              7) 6H23, L FWD FUEL BOOST PUMP
          (b) Overhead Circuit Breaker Panel, P11:
              1) 11C33, FUEL DC PUMP PWR
              2) 11C34, FUEL QTY 1
              3) 11D35, FUEL DC PUMP CONT
              4) 11L19, FUEL QTY 2
              5) 11D36, FUEL CROSSFEED or FUEL XFEED IND
              6) 11D24, FWD FUEL CROSSFEED (as applicable)
              7) 11D25, AFT FUEL CROSSFEED (as applicable)
          (c) APU External Power Panel, P34:
              1) 34A10, FUEL QTY

      S 024-005
      (2) Remove the four fasteners on the baseplate of the fuel management control panel.

      S 024-006
      (3) Pull the fuel management control panel from the overhead panel, P5.

      S 494-007
      (4) Attach tags to the wiring for each of the electrical connectors to identify which electrical connector attaches to each receptacle.

S 024-008
(5) Disconnect the electrical connectors D3512, D3514, and D3516 from the rear of the fuel management control panel.

TASK 28-22-14-404-003

3. Installation of the Fuel Management Control Panel, M10055

A. Access

(1) Location Zones

211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

B. Procedure

S 424-009
(1) Move the fuel management control panel close to its position in the overhead panel, P5.

S 424-010
(2) Connect the electrical connectors D3512, D3514, and D3516 to the applicable receptacles on the rear of the fuel management control panel.

S 094-011
(3) Remove the tags from the electrical connectors.

S 424-012
(4) Put the fuel management control panel in its position in the P5 panel.

S 424-013
(5) Install the four fasteners to attach the fuel management control panel.

S 864-004
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) Power Distribution Panel, P6:
1) 6E4, FUELING QTY
2) 6F14, L FUEL OVRD PUMP
3) 6F20, R FUEL OVRD PUMP
4) 6H14, L AFT FUEL BOOST PUMP
5) 6H17, R FWD FUEL BOOST PUMP
6) 6H20, R AFT FUEL BOOST PUMP
7) 6H23, L FWD FUEL BOOST PUMP
(b) Overhead Circuit Breaker Panel, P11:
1) 11C33, FUEL DC PUMP PWR

2) 11C34, FUEL QTY 1
3) 11D35, FUEL DC PUMP CONT
4) 11L19, FUEL QTY 2
5) 11D36, FUEL CROSSFEED or FUEL XFEED IND
6) 11D24, FWD FUEL CROSSFEED (as applicable)
7) 11D25, AFT FUEL CROSSFEED (as applicable)

(c) APU External Power Panel, P34:
1) 34A10, FUEL QTY

TASK 28-22-14-714-014

4. Operational Test of the Fuel Management Control Panel, M10055

A. References
(1) AMM 24-22-00/201, Electrical Power Control

B. Access
(1) Location Zones
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

C. Procedure

S 864-015
(1) Supply electrical power (AMM 24-22-00/201).

S 714-021
(2) Do a check of the engine fuel crossfeed valve(s):
(a) AIRPLANES WITH A SINGLE ENGINE FUEL CROSSFEED VALVE (PRE-SB 28-29);
Do these steps:
1) Close this circuit breaker on the overhead circuit breaker panel, P11:
a) 11D36, FUEL CROSSFEED
2) Push the CROSSFEED VALVE switch-light, on the P5 overhead panel, to the open position.
3) Make sure the flowbar comes on.
4) Make sure the VALVE light comes on then goes off.
5) Push the CROSSFEED VALVE switch-light, on the P5 overhead panel, to the closed postion.

6) Make sure the flowbar goes off.
7) Make sure the VALVE light comes on and then goes off.

(b) AIRPLANES WITH DUAL ENGINE FUEL CROSSFEED VALVES (POST-SB 28-29);
Do these steps:
1) Close these circuit breakers on the overhead circuit breaker panel, P11:
a) 11D24, FWD FUEL CROSSFEED
b) 11D25, AFT FUEL CROSSFEED
c) 11D36, FUEL XFEED IND
d) 11D36, FUEL XFEED IND
2) Push the FWD and AFT CROSSFEED VALVE switch-lights, on the P5 overhead panel, to the open position.
3) Make sure the FWD and AFT flowbars come on.
4) Make sure the FWD and AFT VALVE lights come on then go off.
5) Push the FWD and AFT FUEL CROSSFEED VALVE switch-lights, on the P5 overhead panel, to the closed postions.
6) Make sure the FWD and AFT flowbars go off.
7) Make sure the FWD and AFT FUEL CROSSFEED VALVE switch-lights come on then go off.

S 714-031

(3) Do a check of the fuel pumps:
(a) Make sure these valves are closed:

NOTE: If you do this test with these valves open (for example during a fuel transfer operation), it is possible that the low pressure indicating light will not go off when you operate the pump.

1) The engine fuel shutoff valve (spar valve) for the No. 1 tank
2) The engine fuel shutoff valve (spar valve) for the No. 2 tank
3) The crossfeed valve(s)
4) The defuel valve

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL FUMES IN THE TANK CAN CAUSE A FIRE OR EXPLOSION.

(b) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
1) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

(c) Push the applicable fuel boost pump or fuel override pump switch-light of the fuel management control panel on the overhead panel, P5, to the ON position.

PUMP	SWITCH-LIGHT
Left aft fuel boost pump	L AFT PUMPS
Left forward fuel boost pump	L FWD PUMPS
Left fuel override pump *[1]	LEFT C PUMPS
Right aft fuel boost pump	R AFT PUMPS
Right forward fuel boost pump	R FWD PUMPS
Right fuel override pump *[1]	RIGHT C PUMPS

*[1] The fueling station door (621GB) must be open before the left or right override pump will operate.

(d) Listen and make sure the applicable fuel boost pump or fuel override pump operates.
(e) Make sure the applicable PRESS light on the fuel management panel of the P5 panel goes off.
(f) Push the applicable fuel boost pump or fuel override pump switch-light to the off position.
(g) Listen and make sure the applicable fuel boost pump or fuel override pump does not operate.
(h) For the fuel boost pumps, make sure the applicable PRESS light comes on.

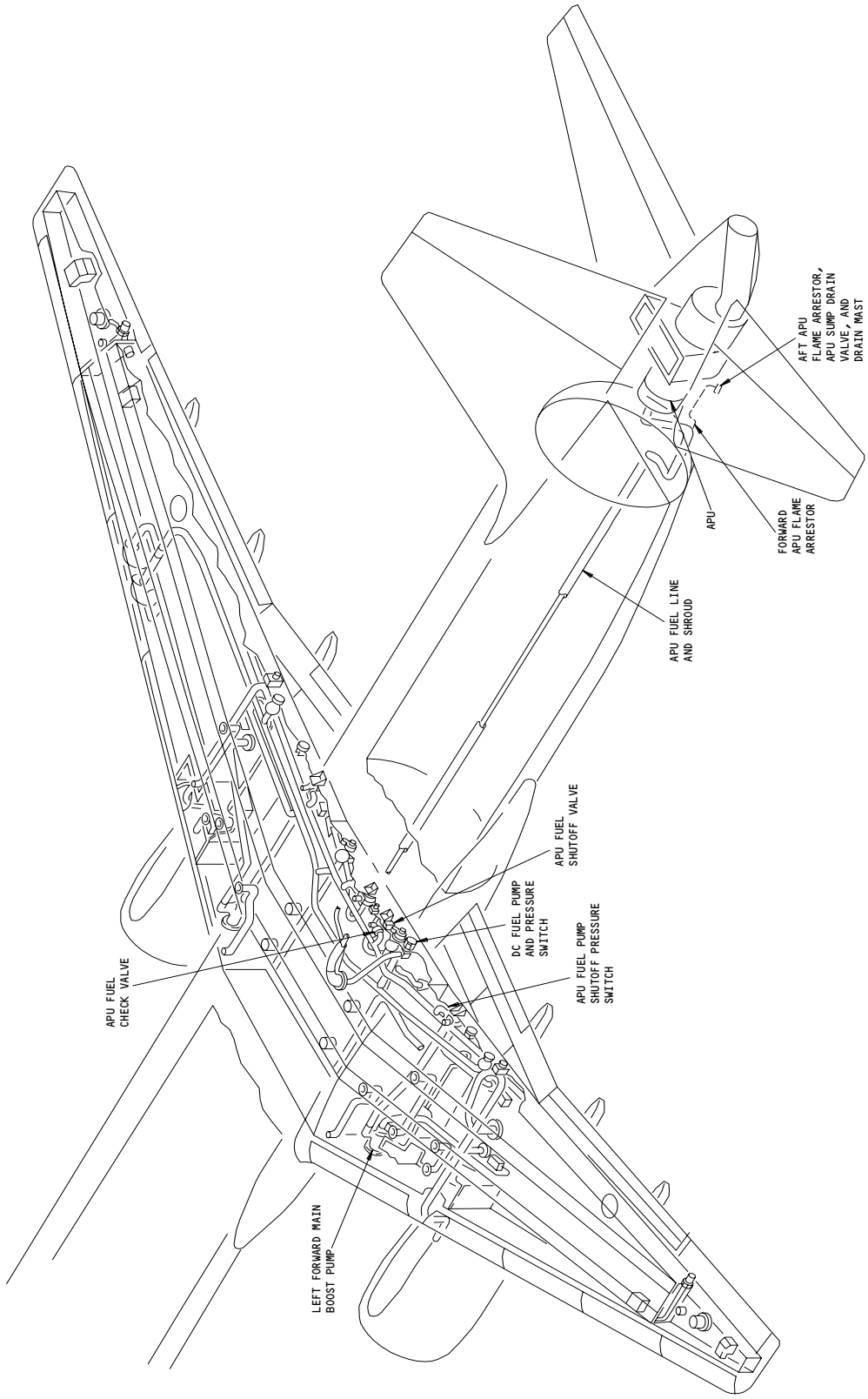
D. Put the Airplane Back to its Usual Condition

S 864-019

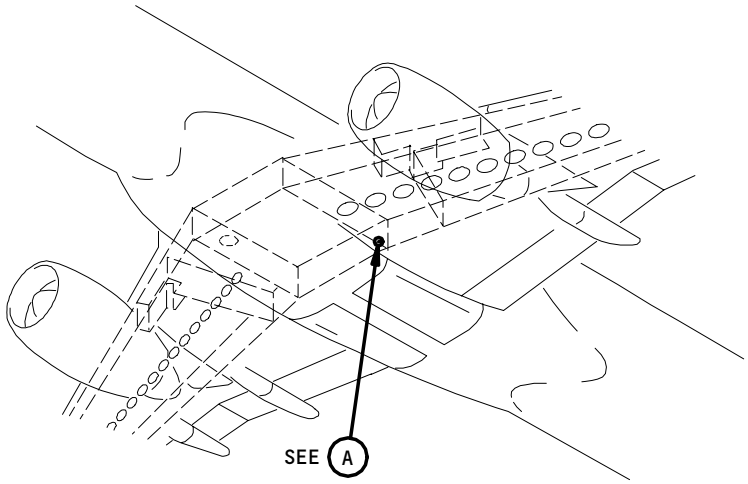
(1) Remove electrical power if it is not necessary (AMM 24-22-00/201).

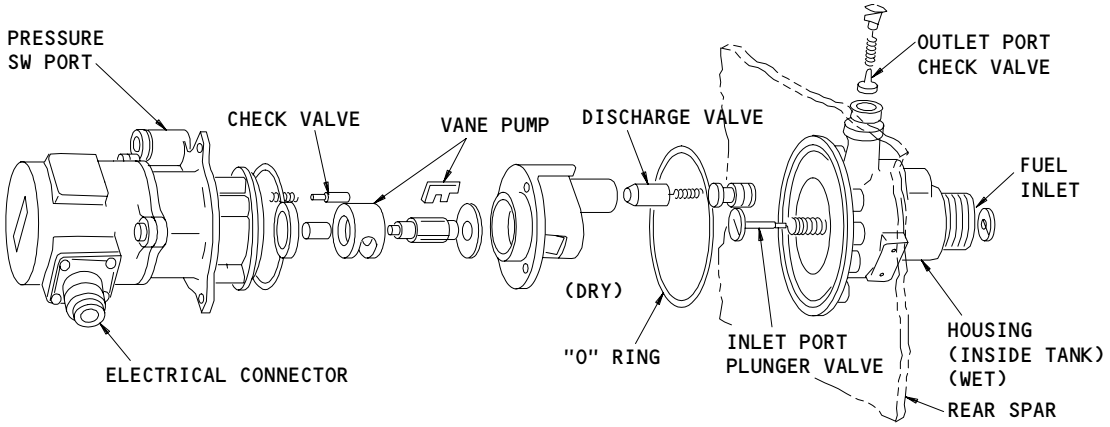
AUXILIARY POWER UNIT (APU) FUEL FEED SYSTEM - DESCRIPTION/OPERATION

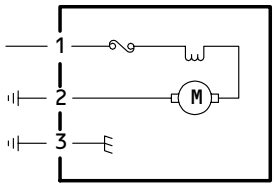
1. General
   A. The center fuel tank contains all APU fuel feed system components except the APU fuel supply line and shroud. The APU fuel supply line and shroud lies between the center fuel tank and the APU. The DC pump supplies the APU with fuel upon loss of AC power or boost pump failure.
   B. APU Fuel Feed System
      (1) The engine fuel feed system (Ref 28-22-00) normally supplies fuel to operate the APU whenever AC power is available on the airplane. The DC fuel pump takes over upon loss of AC power on the airplane or due to boost pump failure. The APU fuel feed system supplies the APU with fuel.
      (2) The APU fuel feed system consists of a DC fuel pump, check valve, fuel shutoff valve, DC fuel pump pressure switch, APU fuel shutoff pressure switch, two APU flame arrestors, an APU sump drain valve, and a fuel supply line surrounded by a shroud. The DC fuel pump draws fuel from the left main fuel tank and only operates on AC power loss or boost pump failure. The check valve allows the engine fuel feed system to supply the APU with fuel and prevents a back flow of fuel to the engine feed manifold when the DC pump operates. The shutoff valve controls fuel flow to the APU. The DC pump pressure switch senses pump output pressure. The shroud prevents any fuel vapor from the APU supply line from entering the airplane cabin.
      (3) The APU fuel shutoff pressure switch senses fuel pressure in the fuel feed manifold. The switch interrupts power to the dc fuel pump if the pressure in the manifold decreases below 4 psi.
      (4) The Engine Indicating and Crew Alerting System (EICAS) (AMM 31-41-00/001) provides caution and warning messages for selected system failures.
2. Component Details
   A. DC Fuel Pump (Fig. 2)
      (1) Description
         (a) The DC fuel pump, a positive displacement type, consists of a pump and driving motor within a housing. The pump housing, within the fuel tank, contains a check valve and a plunger valve. The housing outlet contains the check valve. The housing inlet contains the plunger valve. The driving motor, 28VDC powered, includes a thermal fuse, a check valve, a discharge valve, and a pressure switch. The pump and drive motor mount on the outside of the fuel tank. The motor turns at 6600 rpm and the pump provides a continuous flow of 3.1 GPM at 18 psi.



APU Fuel Feed System
Figure 1







DC FUEL PUMP

DC Fuel Pump
Figure 2

(2) Function

(a) The pump and drive motor draw fuel through the inlet port. The fuel circulates through the pump and drive motor and exits at the outlet port. The plunger valve controls the inlet port. Mounting the pump and drive motor on the housing opens the plunger valve. Detaching the pump and drive motor from the housing closes the plunger valve to allow removing the pump and drive motor without defueling.

(b) The outlet port check valve prevents back flow of fuel from the fuel tank into the pump and drive motor. Operating the pump and drive motor generates internal pressure, forcing the check valve open. The open check valve allows fuel delivery to the APU or main boost pumps.

(c) The discharge valve acts as a relief valve, controlling the pump output pressure. The fuel inlet receives bypassed fuel, from the outlet port, through the open discharge valve if outlet port pressure requires relief.

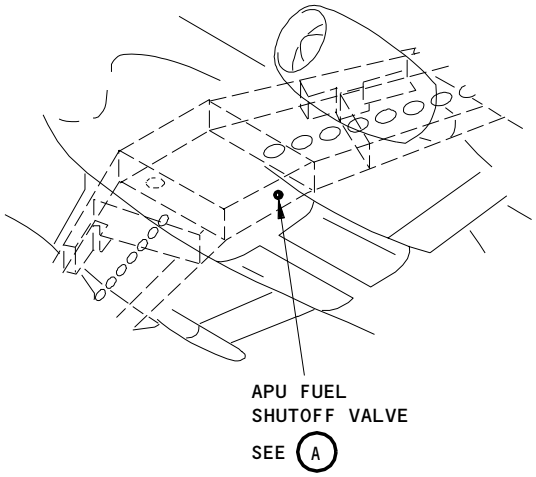
(d) Fuel enters the drive motor, to provide cooling and lubrication, through the check valve in the drive motor. The thermal fuse provides additional drive motor overheat protection. The fuse trips at 350°F ±14°F (177°C ±8°C).

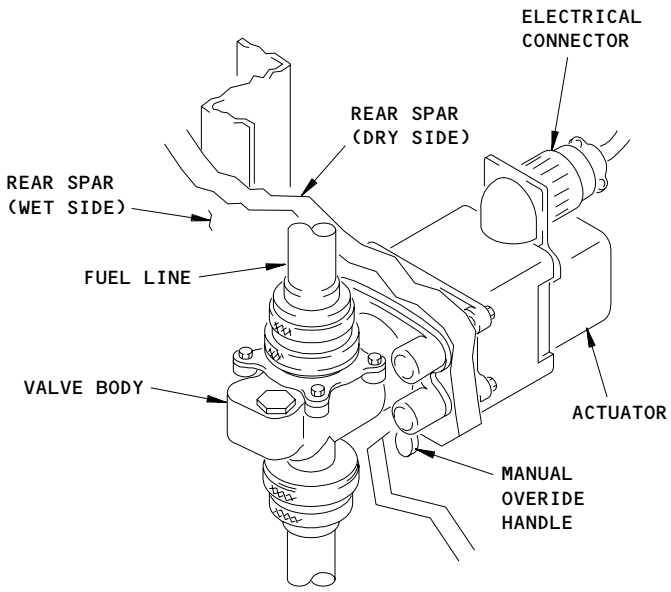
B. APU Shutoff Valve (Fig. 3)

(1) Description

(a) The APU fuel shutoff valve is a motor actuated ball valve. The shutoff valve mounts to the rear spar of the center wing fuel tank. The valve body (inside the fuel tank) attaches to the actuator (outside the fuel tank) so that defueling is not required for actuator removal. A thermal relief, ported to the tank side of the valve, cracks and reseats between 75 and 45 psig. A slotted ball within the valve body controls fuel flow through the valve.

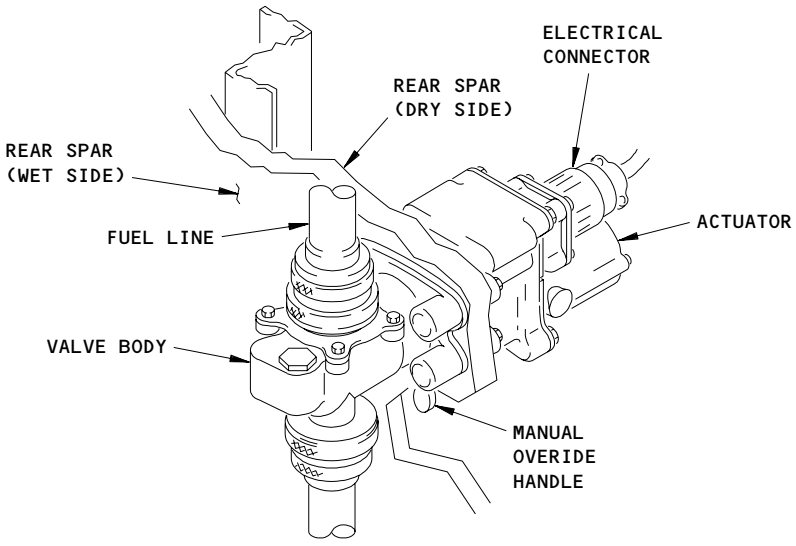
(b) The square (preferred) actuator of the APU fuel shutoff valve has a 28v dc permanent magnet motor, an electrical connector, OPEN - CLOSED limit switches, and a manual override handle. The manual override handle also shows the position of the APU fuel shutoff valve.





APU FUEL SHUTOFF VALVE

A 1



APU FUEL SHUTOFF VALVE

A 2

1 PREFERRED
2 ALTERNATE

APU Shutoff Valve
Figure 3

(c) The round (alternate) actuator consists of a 28vdc drive motor, an electrical connector, open-closed limit switches, and a manual override handle which also functions as a position indicator.

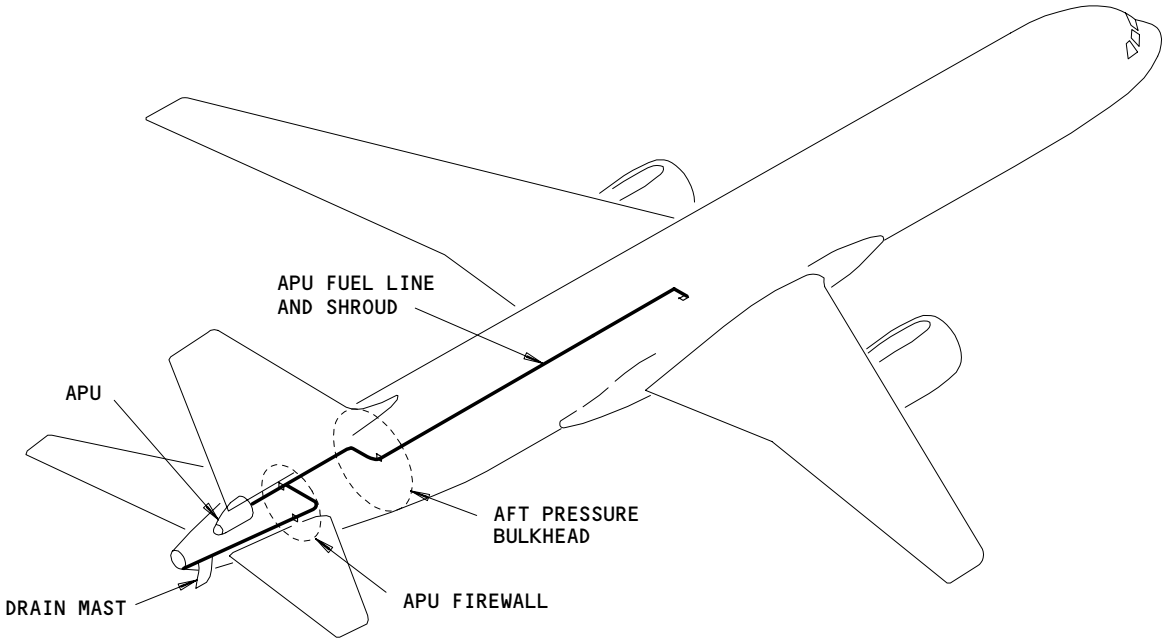
(2) Function

(a) Applying 28vdc power opens or closes the valve, depending upon the command. The actuator shaft engages the body shaft which inserts into the ball slot. During an open command the actuator shaft rotates turning the ball within the valve body to allow fuel to flow through the ball. Upon reaching the full open position, the actuator open limit switch actuates to shut off the actuator. During a close command the actuator shaft rotates, thus turning the ball to prevent fuel flow through the ball. Upon reaching the full closed position, the actuator closed limit switch actuates to shut off the actuator.

C. APU Fuel Line and Shroud (Fig. 1 and 3A)

(1) The APU fuel line connects from the DC fuel pump to the APU shutoff valve, and aft under the passenger compartment floor to the APU. The APU fuel line carries fuel from the left main fuel tank to the APU.

(2) A shroud surrounds the APU fuel line, between the dry side of the fuel tanks and the APU firewall. The shroud is to prevent leakage of fuel vapor.



APU Fuel Line and Drain Mast
Figure 3A

(3) The APU fuel line drain mast is on the right lower side of the tail cone. The drain line to the drain mast connects to the APU fuel line just forward of the APU firewall.

D. APU Flame Arrestor (Fig. 4)

(1) Two APU flame arrestors mount in the APU fuel line shroud drain tubing. One flame arrestor is installed in the drain tubing just above the APU fuel sump drain valve between the main gear wheel wells. The other flame arrestor mounts in the drain tubing just above the center fuel tank.

(2) The flame arrestors prevent external flame from entering the airplane through the APU fuel sump drain valve. Each flame arrestor acts as a heat sink to keep fuel vapor below the ignition point.

E. APU Sump Drain Valve.

(1) The APU sump drain valve is located between the main wheel well doors and mounts on the inside of the keel beam.

(2) The sump drain valve is a manually operated drain valve. It consists of two spring loaded poppets, a primary poppet and a secondary poppet.

(3) Pushing upward on the drain valve primary poppet opens the drain valve and allows fuel to drain from the drain lines. The secondary poppet closes to seal the valve during replacement of the primary poppet.

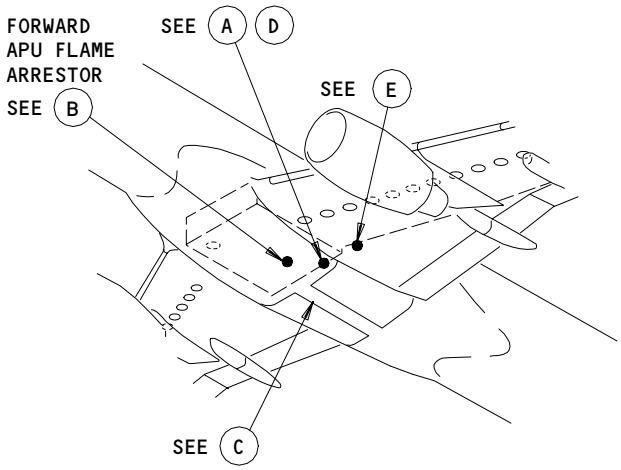
F. APU Fuel Check Valve

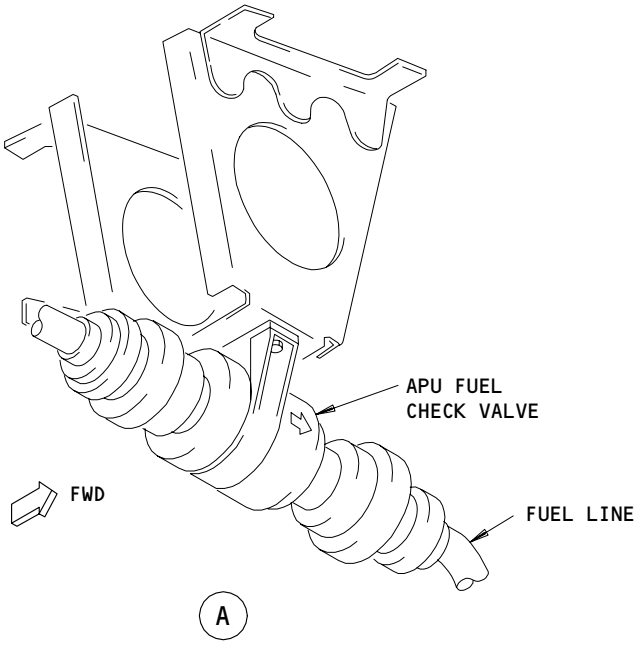
(1) The APU fuel check valve, a one way flapper valve, allows the engine fuel feed system to supply the APU with fuel. The valve prevents fuel flow to the engine feed manifold when the DC fuel pump operates.

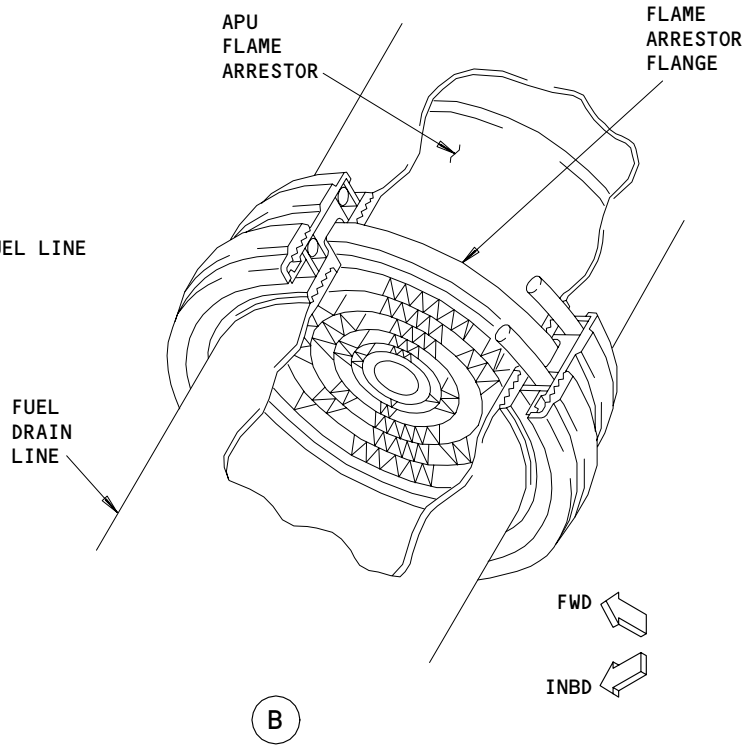
G. Pressure Switches

(1) Two identical pressure switches, a DC fuel pump pressure switch and an APU fuel pump shutoff pressure switch, provide APU fuel feed system indication and shutoff control, respectively. Both pressure switches are cylindrical in shape with a pressure port on one end and an electrical connector on the other end. The switches open at 4 psig.

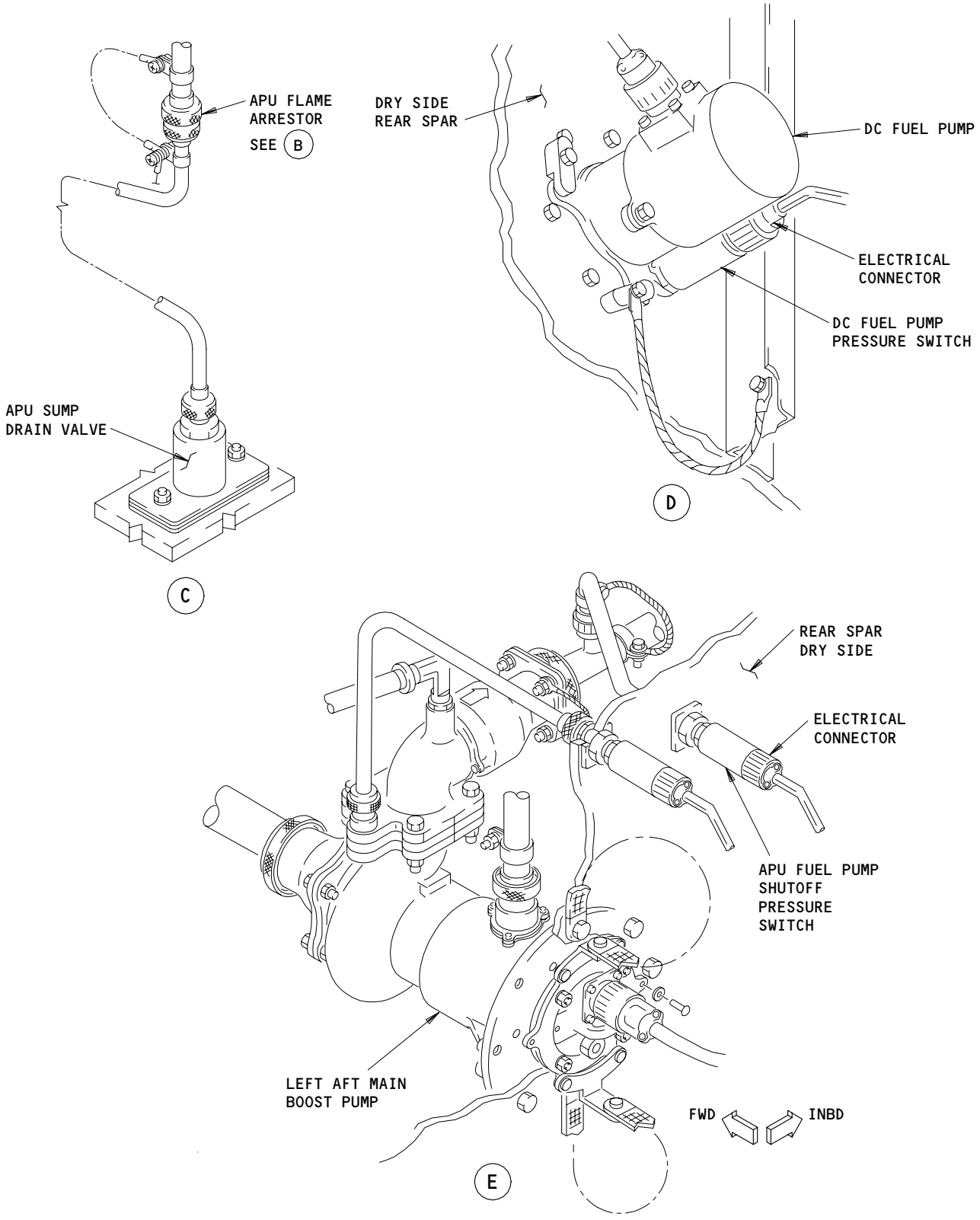
3. Operation (Fig. 5)



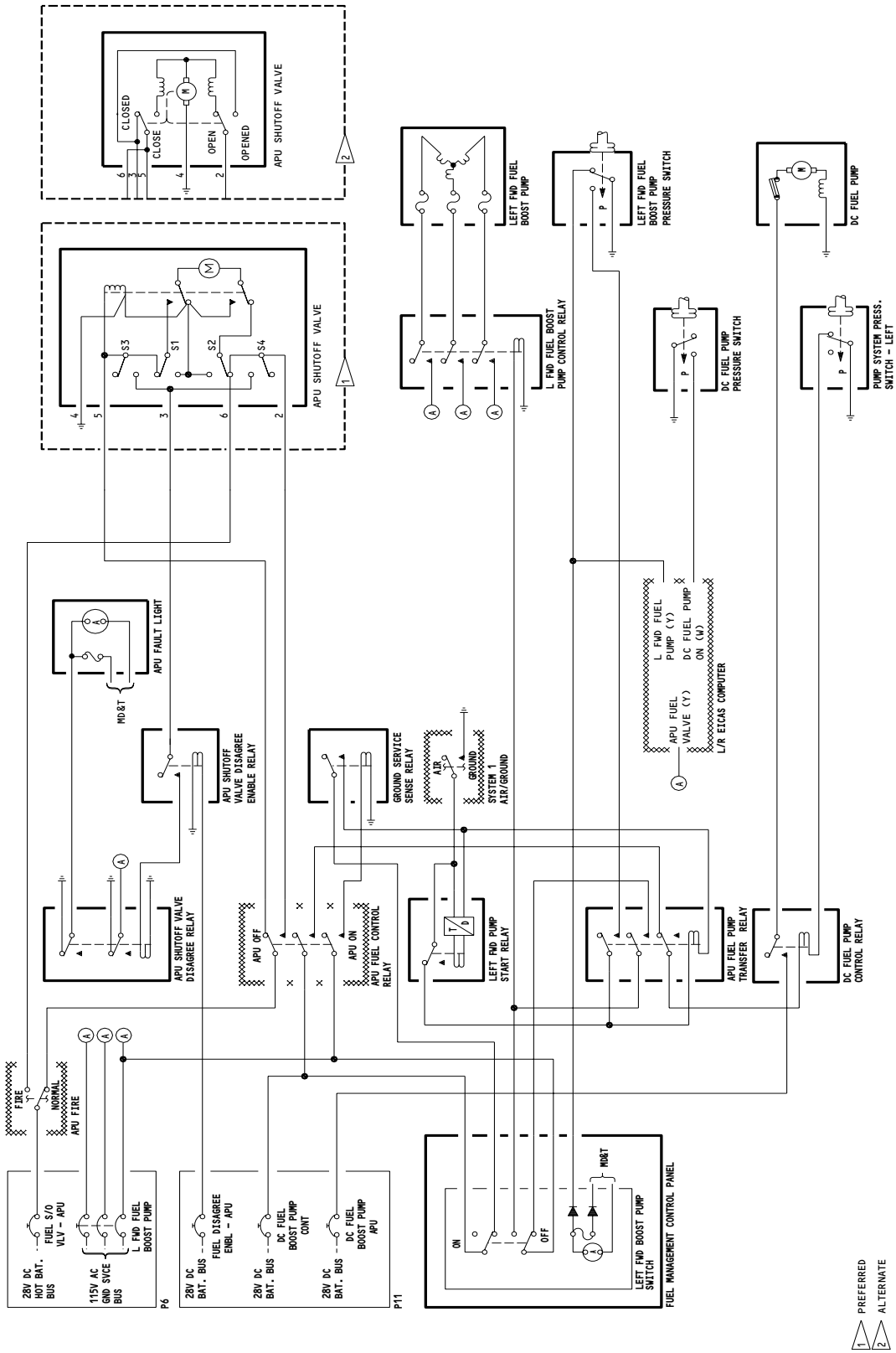




APU Fuel Feed System Components
Figure 4 (Sheet 1)



APU Fuel Feed System Components
Figure 4 (Sheet 2)



APU Fuel Feed System Schematic
Figure 5

832000

A. Functional Description
(1) APU Fuel Feed
(a) The APU fuel feed system supplies fuel for starting the APU. The engine fuel feed system normally feeds fuel to the APU. However, during AC power loss or faulty boost pump operation, the APU fuel feed system takes over. The APU fuel feed system uses the dc fuel pump to supply fuel to start or run the APU. With the APU switch selected to START, the APU fuel shutoff valve opens. The dc fuel pump draws fuel from the left main fuel tank and pumps it to the APU through the open APU shutoff valve. An APU fuel check valve prevents fuel pumped from the dc fuel pump from flowing into the engine feed manifold. When the APU starts, ac power is available and the dc fuel pump automatically shuts down, after the boost pumps begin to operate. The boost pump(s) then feed the APU. The APU fuel check valve allows fuel to flow from the engine feed manifold into the APU fuel supply line.
(2) DC Pump Operation - On Ground
(a) The left forward boost pump is dedicated for APU fuel feed. The L FWD PUMP switchlight, on the pilot's overhead panel P5, controls the left forward boost pump. With ac power on, the L FWD PUMP switch on, and the APU selector ON, the left forward boost pump supplies the APU with fuel. If the APU fuel shutoff pressure switch senses a pressure in the engine fuel feed manifold less than 4 psi, the dc fuel pump automaticaly comes on to supply fuel to the APU.
(b) With AC power on, the L FWD PUMP switchlight, on the P5 panel, off, and the APU selector ON, the left forward boost pump supplies the APU with fuel. A time delay in the left forward pump start relay allows the boost pump to produce enough pressure to supply fuel to the APU and then times out. The left forward boost pump pressure switch then provides the ground for the left forward boost pump to operate. If the boost pump did not produce enough pressure during the time delay (10 seconds) the dc fuel pump starts.
(c) With ac power lost or unavailable and the L FWD PUMP switchlight, on the P5 panel, in either the on or off position, and the APU selector ON, the dc pump starts.
(3) DC Pump Operation - In Air
(a) With the APU selector ON, the operating boost pumps supply fuel to the APU. The dc fuel pump starts upon loss of ac power.
(4) DC Pump Pressure Indication
(a) A dc pump pressure switch provides a ground for the Engine Indicating and Crew Alerting System (EICAS) for a pressure in the pump greater than 4 psi. A DC FUEL PUMP ON maintenance message results from the pressure in the pump. This message is available for recall on the lower EICAS display screen on the ground.

(5) APU Shutoff Valve Control
  (a) The APU command and the APU fire switch position determine shutoff valve position. With the APU fire switch, on the pilot's aft control stand P8, in NORMAL and the APU control selector ON or START, the APU shutoff valve opens. Placing the APU control selector to ON or START energizes the APU fuel control relay and the valve motor receives 28 vdc power to open. With the APU control switch OFF, the APU fuel control relay relaxes and 28 vdc power closes the valve. Pulling the APU fire switch closes the APU fuel shutoff valve by bypassing the 28 vdc power around the APU fuel control relay.

(6) APU Shutoff Valve Indication
  (a) The Engine Indication and Crew Alerting System (EICAS) provides indication of faulty valve operation. If the shutoff valve limit switch disagrees with the valve commanded position the APU FAULT light on the pilot's overhead panel P5 comes on and the EICAS level C caution message APU FUEL VALVE appears on the upper display screen. The caution message and the FAULT light go out when the valve position agrees with commanded position.

(7) Left Forward Main Boost Pump Ground Operation
  (a) With the airplane on the ground and the APU control selector ON the L FWD boost pump starts. If the boost pump generates sufficient pressure, the DC fuel pump remains off. The L FWD boost pump remains on regardless of its switch position as long as there is 115 vac power, the APU control selector is ON, and the boost pump is not faulty. Pulling the 115 vac circuit breaker for the L FWD boost pump shuts the pump off. The L FWD pump will also shut off if the APU control selector is positioned to OFF. The L FWD boost pump has an overheat switch in each of its 3 windings which trips at a maximum temperature of 400°F. The L FWD boost pump operation is tied into the air/ground system. If the air mode is simulated, for maintenance purposes while the airplane is on the ground, and the L FWD PUMP switch is in the off position, the dc fuel pump will fuel feed the APU. If the L FWD PUMP switch is in the on position, the L FWD boost pump will fuel feed the APU.

B. Control

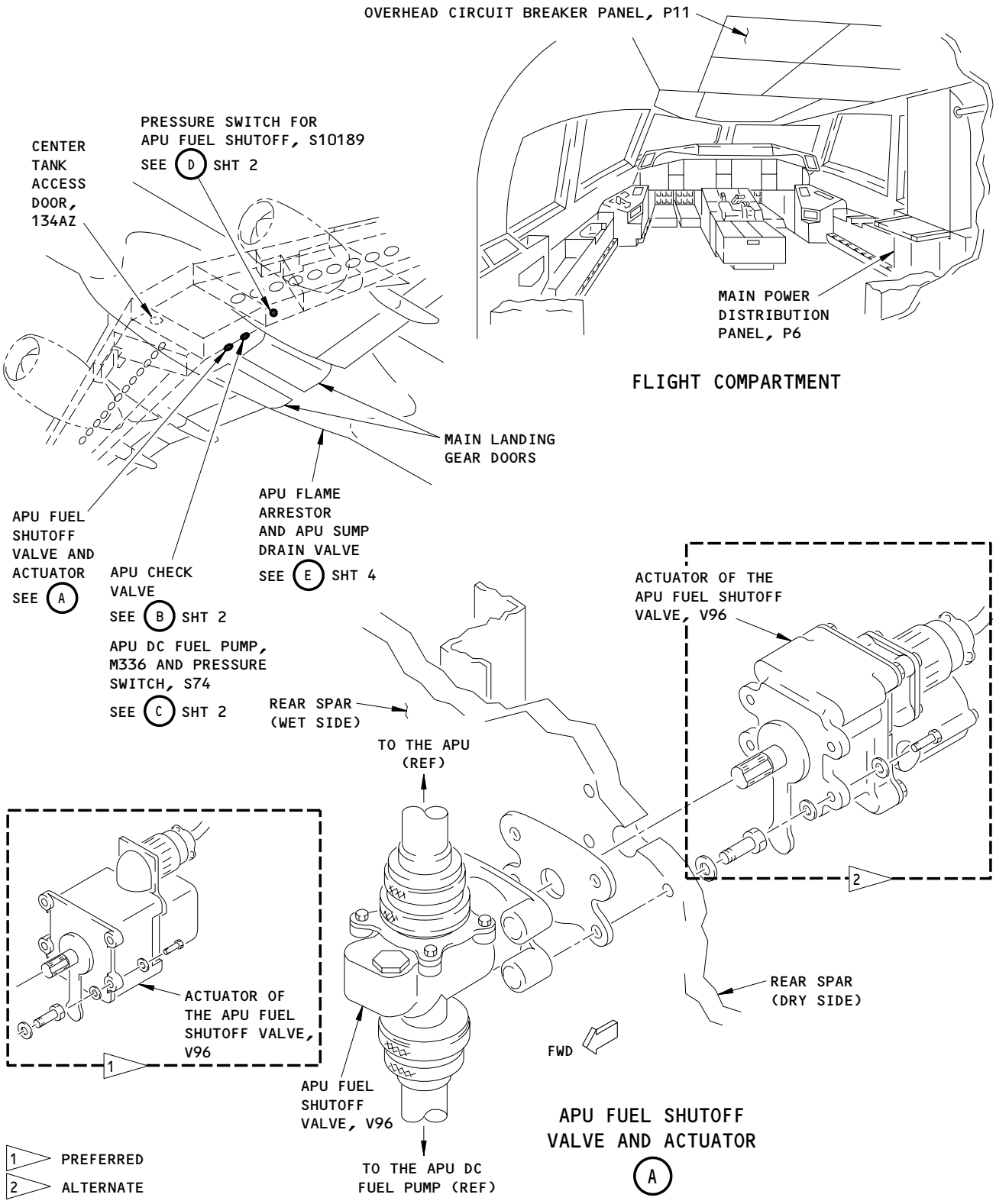
(1) In order for the APU DC PUMPS to operate, the subsequent circuit breakers and switches must be in these positions:
  (a) APU DC PUMP, on overhead circuit breaker panel P11, is closed.
  (b) DC PUMP CONT, on the P11 panel, is closed.
  (c) L FWD FUEL BOOST PUMP, on the main power distribution panel P6, is closed.
  (d) Electrical power is supplied (AMM 24-22-00/201).
  (e) The APU control selector, on the pilot's overhead panel P5, is in the ON position.

APU FUEL-FEED SYSTEM

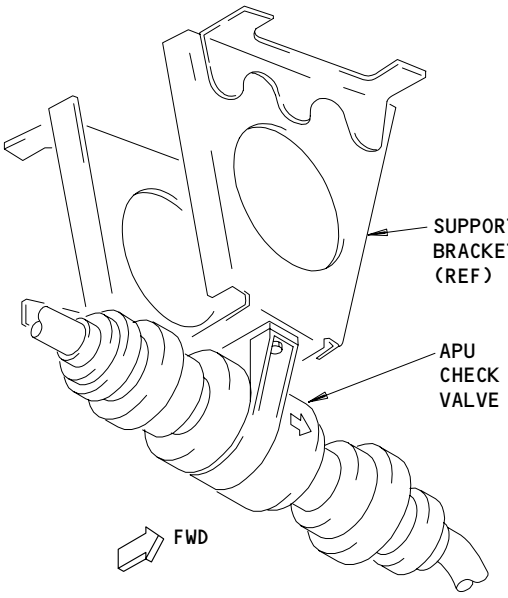
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR - APU FUEL SHUTOFF VALVE, V96	1	1	MAIN GEAR DOORS	28-25-11
ARRESTOR - APU FLAME	4	2	MAIN GEAR DOORS	28-25-07
CIRCUIT BREAKERS	1		FLT COMPT, P6	
APU FUEL VALVE, C1063		1	6E3	*
L FWD FUEL BOOST PUMP, C372		1	6H23	*
CIRCUIT BREAKERS	1		FLT COMPT, P11	
APU DC PUMP, C1058		1	11C33	*
APU FUEL DISAGREE ENBL, C4175		1	11D32	*
DC PUMP CONT, C1052			11D35	*
CIRCUIT BREAKERS			119BL, MAIN EQUIP CTR, P37	
APU GND SERVICE PWR SENSE, C4174		1		*
LINE - APU FUEL AND SHROUD	3		AIRPLANE FUSELAGE	28-25-05
PUMP - APU DC FUEL, M336	2	1	134AZ, MAIN GEAR DOORS	28-25-01
RELAYS - (REF 31-01-70, FIG. 101)				
APU FUEL PUMP TRANSFER, K505				
DC FUEL PUMP CONTROL, K191				
GND SERVICE SENSE RELAY, K10159				
L FWD PUMP START, K512				
RELAYS - (REF 31-01-86, FIG. 101)				
APU FUEL CONTROL, K175				
APU SOV DISAGREE, K10160				
APU SOV DISAGREE ENABLE, K10162				
SWITCH - APU DC FUEL PUMP PRESSURE, S74	2	1	MAIN GEAR DOORS	28-25-03
SWITCH - APU FUEL SHUTOFF PRESSURE, S10189	2	1	MAIN GEAR DOORS	*
VALVE - APU CHECK	2	1	134AZ	28-25-06
VALVE - APU FUEL SHUTOFF, V96	1	1	134AZ	28-25-02
VALVE - APU SUMP DRAIN	4	1	MAIN GEAR DOORS	28-25-09

* SEE THE WDM EQUIPMENT LIST

APU Fuel-Feed System - Component Index
Figure 101

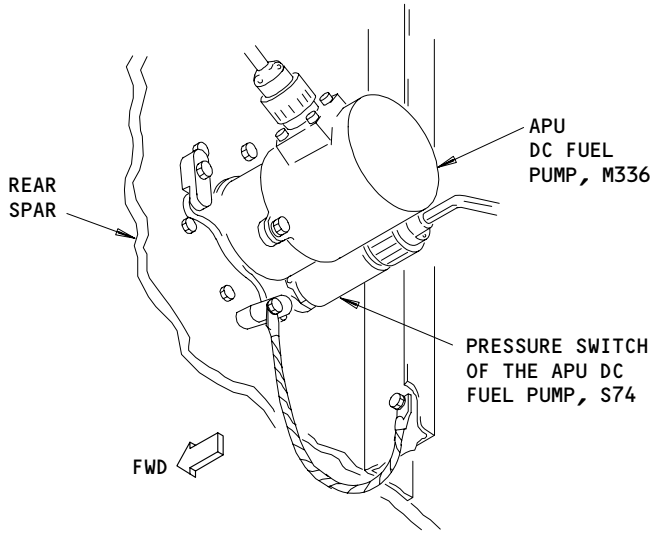


APU Fuel-Feed System - Component Location
Figure 102 (Sheet 1)



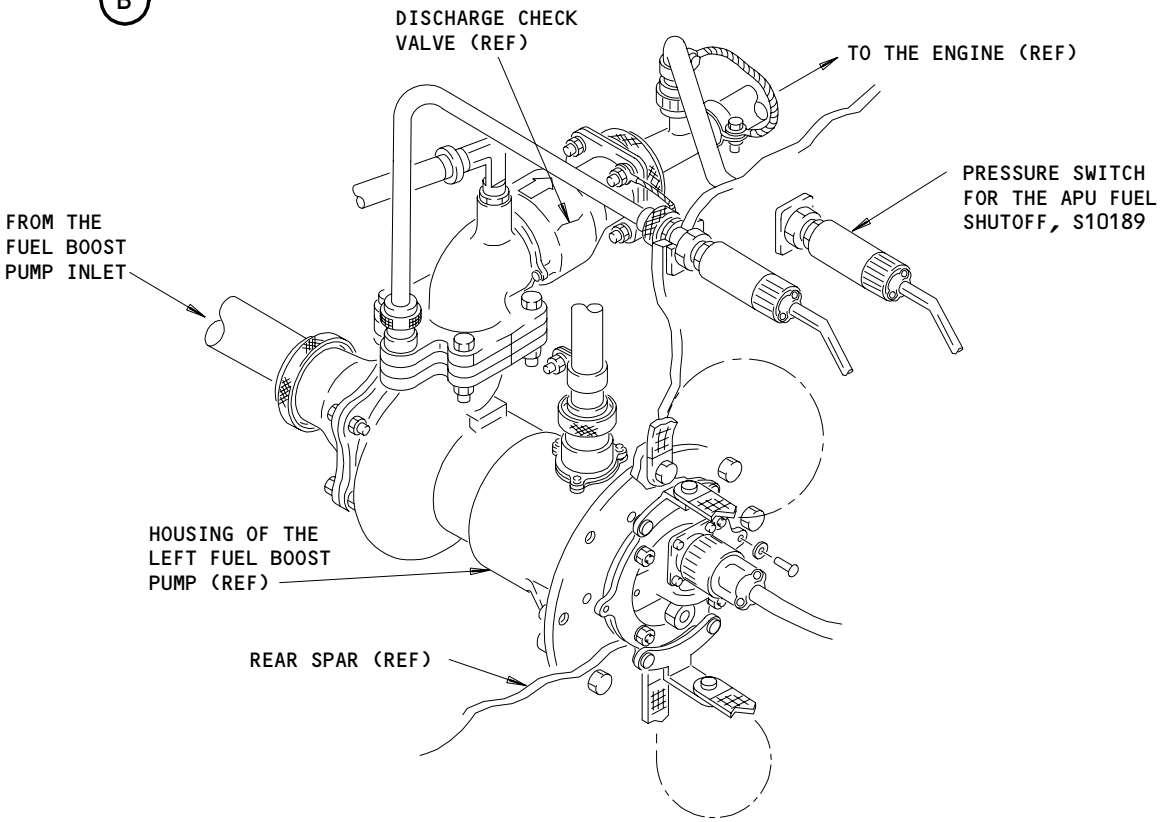
APU CHECK VALVE

B



APU DC FUEL PUMP, M336 AND
PRESSURE SWITCH, S74

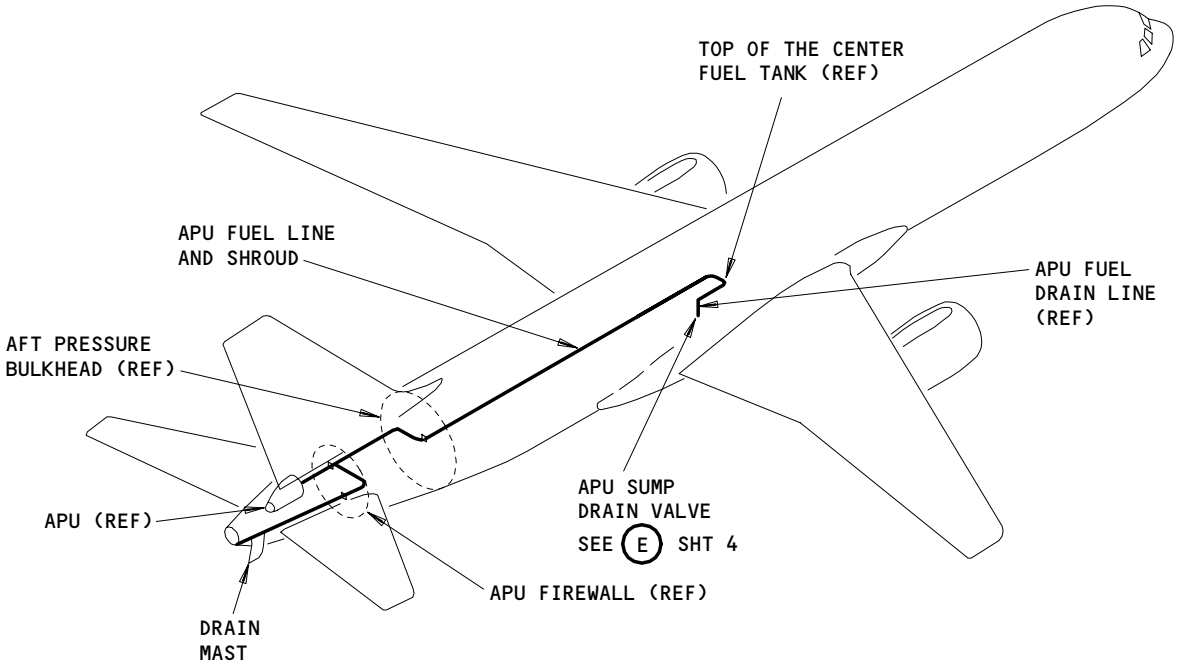
C



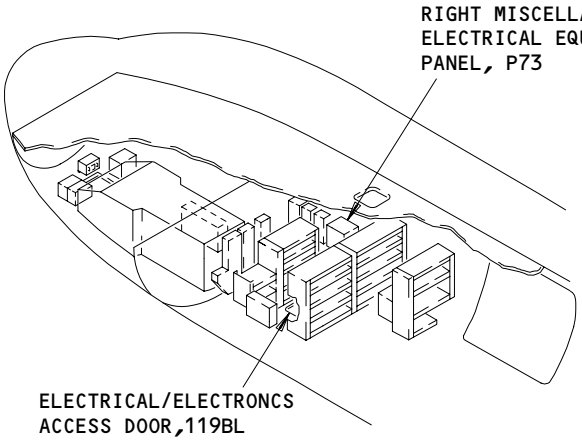
PRESSURE SWITCH FOR APU FUEL SHUTOFF, S10189

D

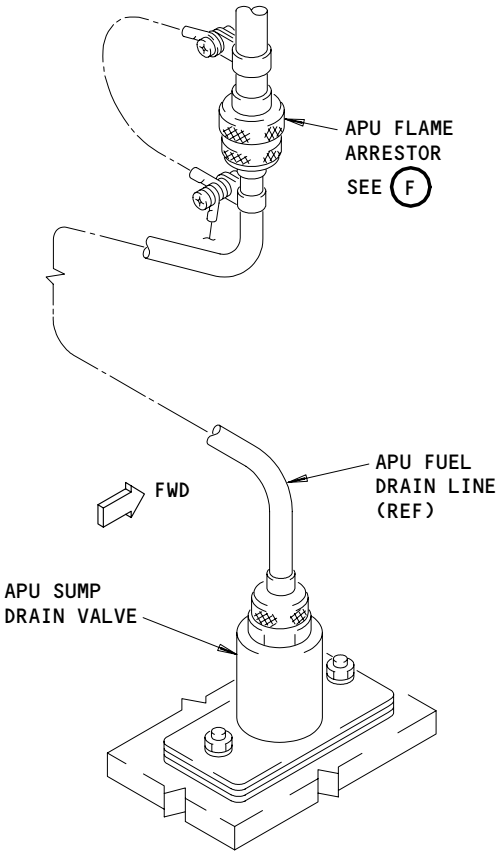
APU Fuel-Feed System - Component Location (Details from Sht 1)
Figure 102 (Sheet 2)



APU Fuel-Feed System - Component Location
Figure 102 (Sheet 3)

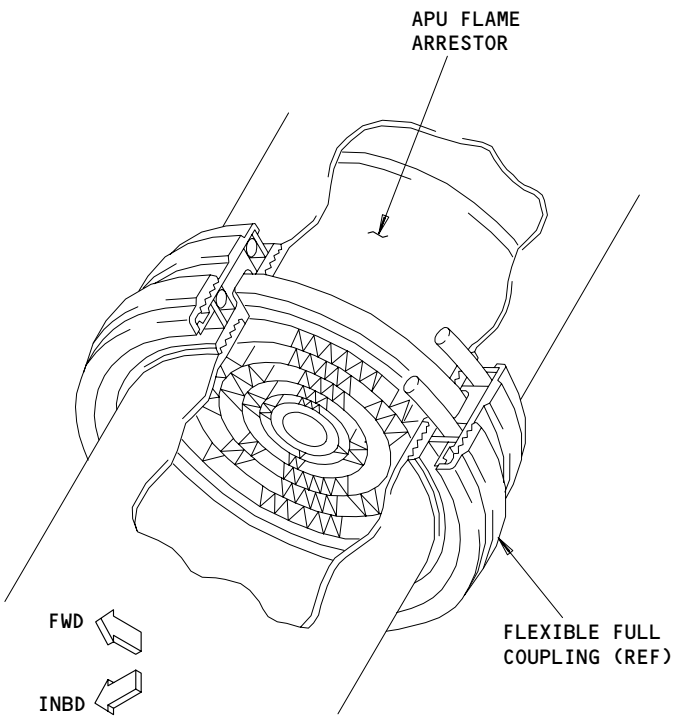


MAIN EQUIPMENT CENTER



APU FLAME ARRESTOR
AND APU SUMP DRAIN VALVE

E



APU FLAME ARRESTOR

F

APU Fuel-Feed System - Component Location
Figure 102 (Sheet 4)

APU FUEL FEED SYSTEM - MAINTENANCE PRACTICES (PURGING)

1. General
   A. The APU fuel feed system should be purged of air when you defuel the left main tank. Loosen the connector on the APU fuel inlet line and pressurize the APU fuel inlet line to purge the APU fuel feed system.

TASK 28-25-00-872-001

2. Purge the Air from the APU Fuel Supply Line (Fig. 201)
   A. Equipment
      (1) Container - 5 gallon for fuel
   B. References
      (1) AMM 06-42-00/201, Empennage (Major Zone 300) Access Doors and Panels
      (2) AMM 24-22-00/201, Electric Power Control
      (3) AMM 49-11-00/201, Auxiliary Power Unit (APU)
   C. Access
      (1) Location Zones
          315 APU Compartment (Left)
          316 APU Compartment (Right)

      (2) Access Panels
          315AL APU Access Doors (Left)
          316AR APU Access Doors (Right)

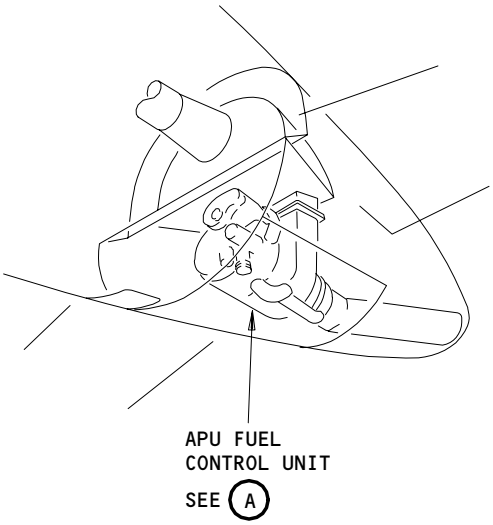
   D. Procedure

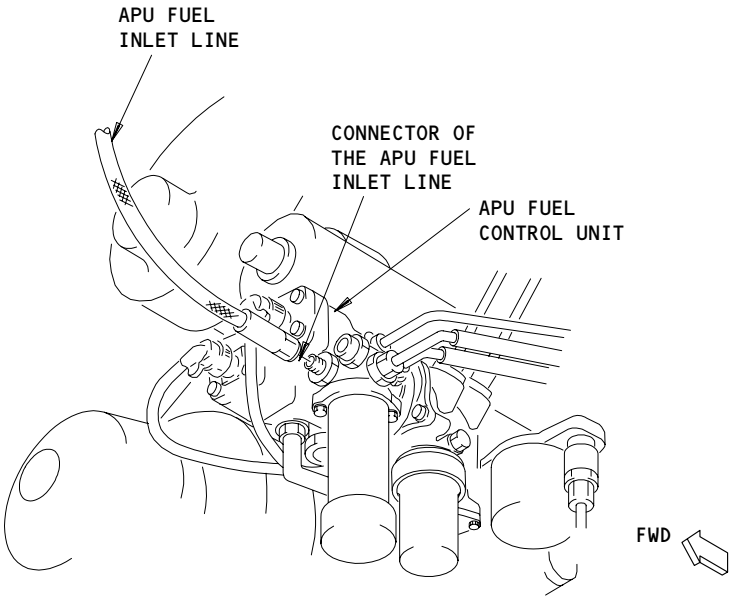
      S 212-002
      (1) Make sure the APU master control switch on the overhead panel, P5, is in the OFF position and attach a DO-NOT-OPERATE tag.

      S 012-003
      (2) Open the APU access doors, 315AL and 316AR, and install the hold-open rods (AMM 06-42-00/201).

      S 032-005
      (3) Disconnect the connector of the fuel inlet line at the APU fuel control unit (View B).

      S 862-007
      (4) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6H23, L FWD FUEL BOOST PUMP





APU FUEL CONTROL UNIT
A

APU Fuel Inlet Line and Starter Motor Cables Location
Figure 201

S 212-008
(5) Make sure all the switch-lights of the fuel boost pumps on the P5 panel are in the OFF position.

S 862-009
(6) Supply electrical power (AMM 24-22-00/201).

S 032-006
(7) Remove the DO-NOT-OPERATE tag from the APU master control switch on the P5 panel.

S 862-021

WARNING: DO NOT PUT THE APU START SWITCH TO THE START POSITION. IF YOU PUT THE APU START SWITCH TO THE START POSITION, THE APU CAN START AND CAUSE INJURIES TO PERSONS.

(8) Put the APU master control switch on the P5 panel to the ON position to operate the APU DC fuel pump.

S 492-011
(9) Put the container in position to catch the fuel from the APU fuel inlet line.

S 872-012
(10) Operate the APU DC fuel pump until a minimum of 3 gallons of fuel drains into the container (AMM 49-11-00/201).

NOTE: This purges air from the APU fuel inlet line.

(a) If the low pressure indication light comes on for the APU DC fuel pump, immediately shut down the APU (AMM 49-11-00/201) so the pump will shut off.

NOTE: The switch for the APU DC fuel pump will not shut off the pump if the APU is operating.

S 862-022

WARNING: DO NOT PUT THE APU START SWITCH TO THE START POSITION. IF YOU PUT THE APU START SWITCH TO THE START POSITION, THE APU CAN START AND CAUSE INJURIES TO PERSONS.

(11) Put the APU master control switch on the P5 panel to the OFF position and attach a DO-NOT-OPERATE tag.

S 432-014
(12) Connect the connector of the APU fuel inlet line to the APU fuel control unit.

S 412-020
(13) Remove the hold-open rods and close the APU access doors, 315AL and 316AR (AMM 06-42-00/201).

S 862-016
(14) Remove the DO-NOT-OPERATE tag from the APU master control switch on the P5 panel.

S 862-017
(15) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 862-018
(16) Remove electrical power (AMM 24-22-00/201).

S 712-019
(17) Operate the APU (AMM 49-11-00/201).

APU FUEL FEED SYSTEM - ADJUSTMENT TEST

1. General
   A. This procedure gives an operational test for the APU fuel feed system and a leakage test for the APU fuel line shroud and drain tubing.

TASK 28-25-00-715-001

2. Operational Test - APU Fuel Feed System
   A. References

      (1) AMM 24-22-00/201, Electric Power - Control
      (2) AMM 32-00-15/201, Landing Gear Door Locks
      (3) AMM 32-00-20/201, Landing Gear Downlocks

   B. Access
      (1) Location Zones
          133 Wing center section (Left)

   C. Prepare for Test

      S 865-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 865-003
      (2) Put the APU FIRE switch on the pilots aft control stand, P8, to the NORMAL position.

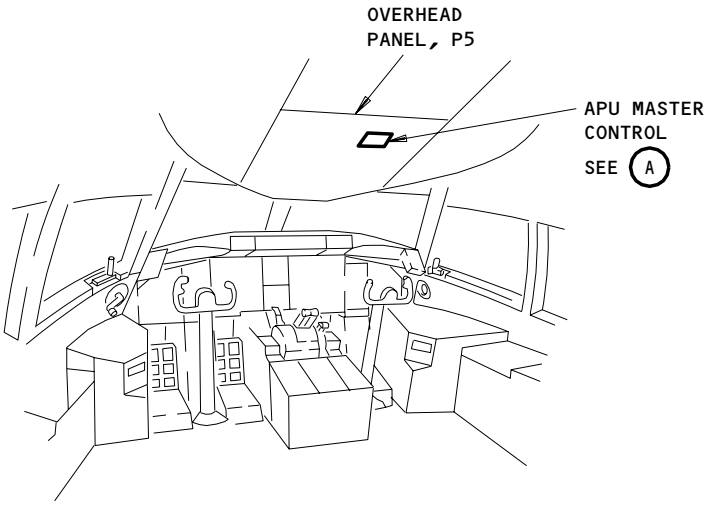
      S 865-004
      (3) Put the APU master control switch on the overhead panel, P5, to the OFF position (View A, Fig. 501).

      S 865-005
      (4) Open these circuit breakers on the power distribution panel, P6, and attach DO-NOT-CLOSE tags:
          (a) 6E3, FUEL VALVES APU
          (b) 6G1, FIRE EXT APU

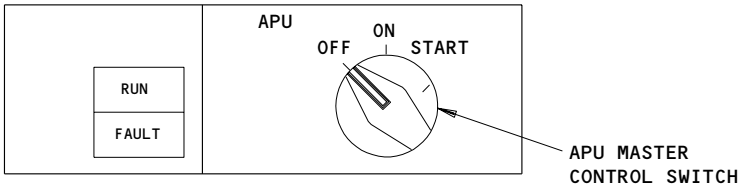
      S 865-006
      (5) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11C33, FUEL DC PUMP PWR

   D. Test APU Fuel Feed System

      S 215-007
      (1) Make sure the landing gear downlocks for the nose and main landing gear are installed (AMM 32-00-20/201).



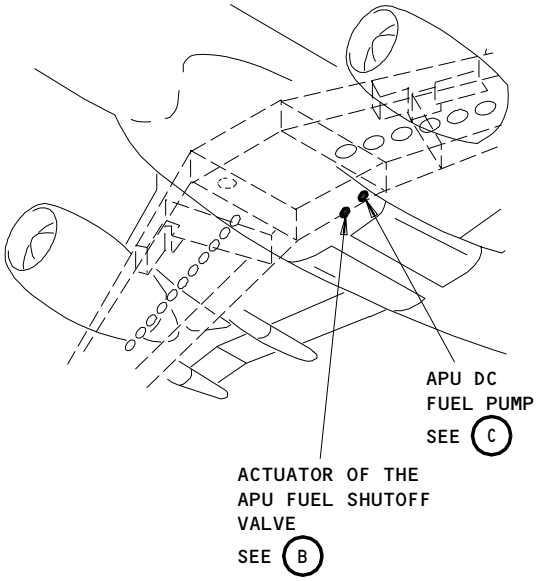
FLIGHT COMPARTMENT

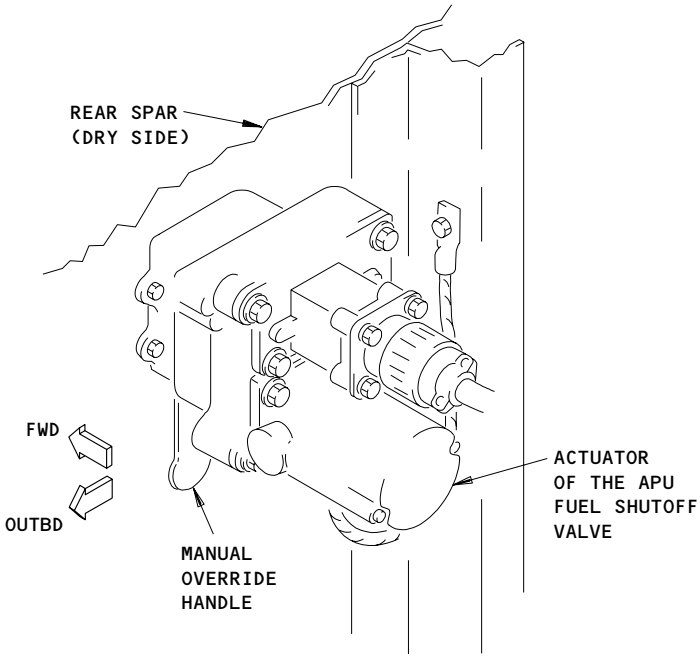


APU MASTER CONTROL

A

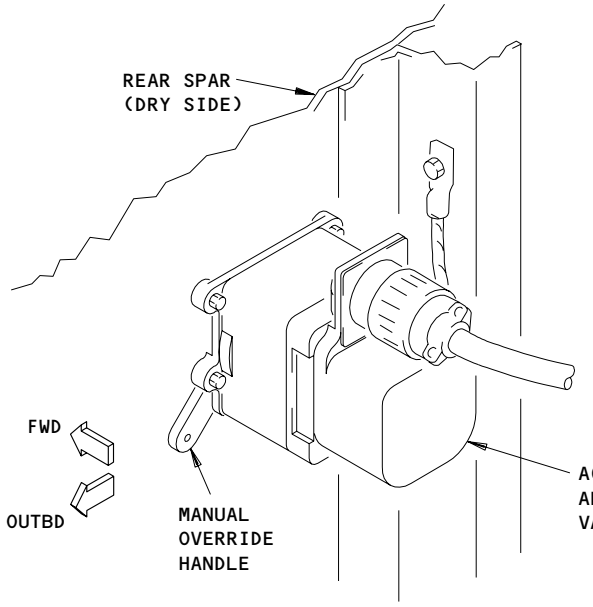
APU Fuel System
Figure 501 (Sheet 1)

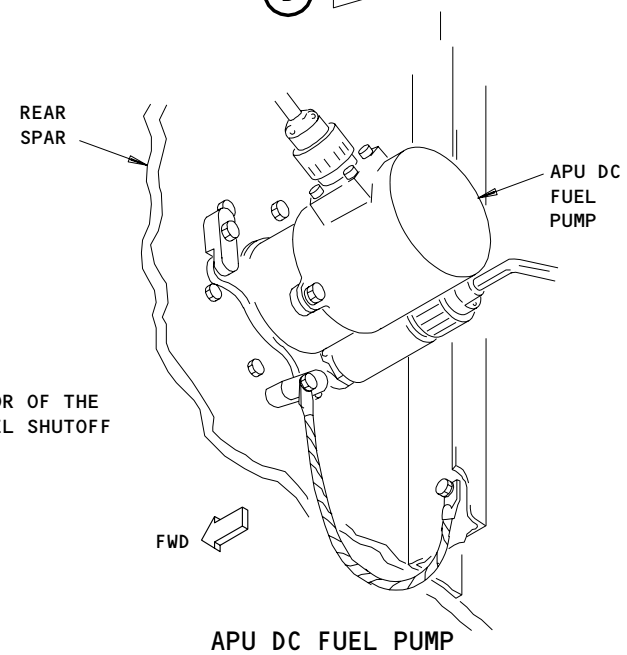




ACTUATOR OF THE APU FUEL SHUTOFF VALVE

B 2





ACTUATOR OF THE APU FUEL SHUTOFF VALVE

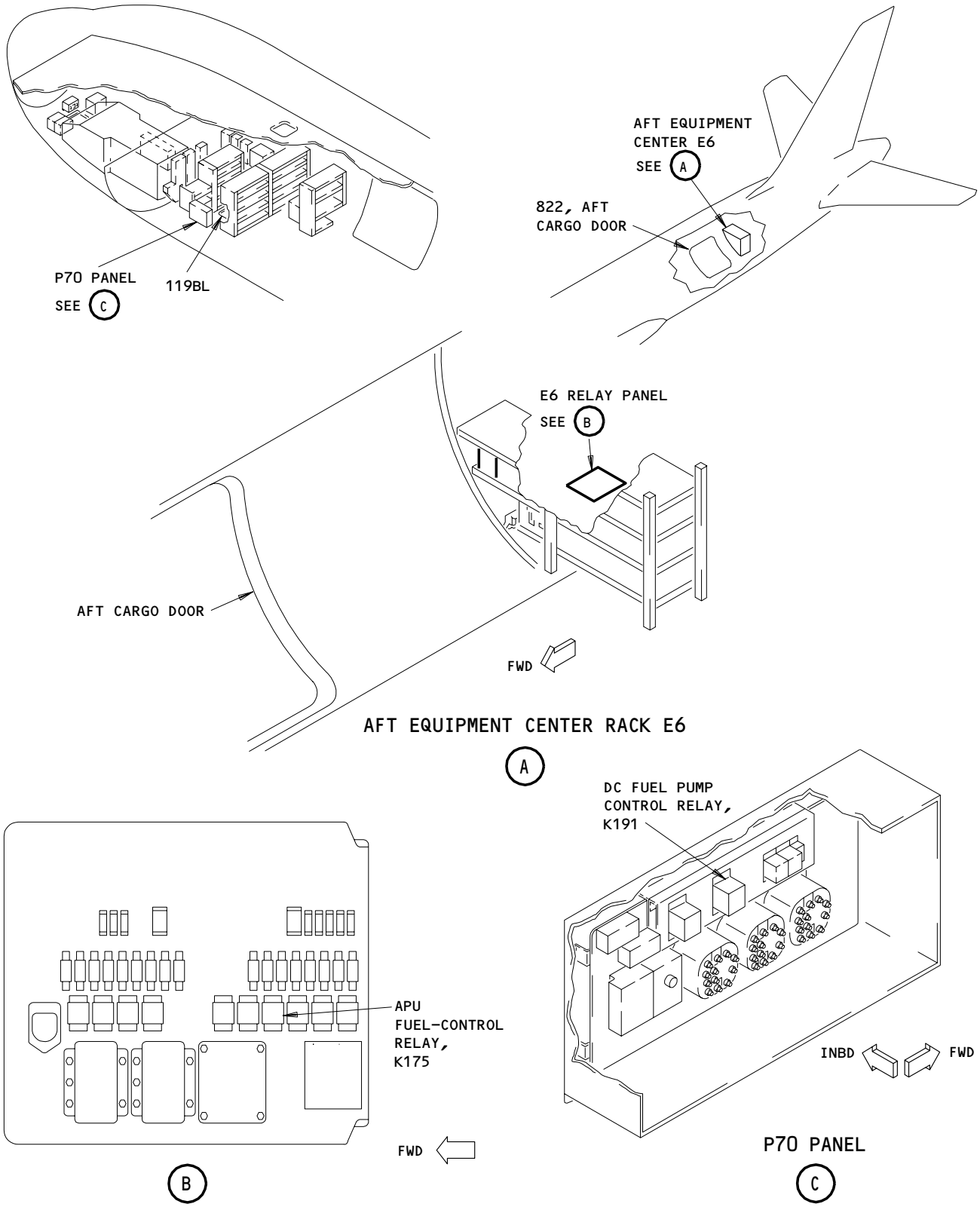
B 1

APU DC FUEL PUMP

C

1 PREFERRED
2 ALTERNATE

APU Fuel System
Figure 501 (Sheet 2)



Relay Locations
Figure 502

S 915-008

WARNING: REFER TO AMM 32-00-15/201 FOR DOOR LOCK INSTALLATION PROCEDURE. IF THE DOOR LOCKS ARE NOT INSTALLED IN THE MAIN GEAR DOORS, THE MAIN GEAR DOORS CAN MOVE QUICKLY AND CAUSE INJURY OR DAMAGE.

(2) Open the main gear doors and install the door locks (AMM 32-00-15/201).

S 865-009

(3) Move the manual override handle on the actuator of the APU fuel shutoff valve to the CLOSED position (View B, Fig. 501).

NOTE: The actuator is installed on the rear spar of the center fuel tank, at approximately two feet to the left of the airplane centerline.

S 035-010

(4) Remove the control relay (K191) of the APU DC fuel pump on the miscellaneous electrical equipment panel, P70 (View C, Fig. 502).

NOTE: If the control relay (K191) has exposed terminals, it is not necessary to remove the control relay (K191).

S 495-012

(5) Install the jumper wire between the wires connected to the terminals A1 and A2 of the control relay (K191) of the APU DC fuel pump.

S 865-013

CAUTION: DO NOT OPERATE THE BOOST PUMP FOR MORE THAN 30 SECONDS. IF YOU OPERATE THE BOOST PUMP FOR A LONG TIME, YOU CAN DAMAGE THE BOOST PUMP.

(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11C33, FUEL DC PUMP PWR

S 215-014

(7) Make sure this circuit breaker on the P11 panel is closed:
(a) 11D32, FUEL DISAGREE ENBL APU

S 285-015
(8) Listen for the APU DC fuel pump operation at the rear spar of the center fuel tank, at approximately 3 feet to the left of the middle of the airplane centerline.
(a) If the low pressure indication light comes on during the APU DC fuel pump operation, immediately shut down the APU (AMM 49-11-00/201) so the pump will shut off.

NOTE: The switch for the APU DC fuel pump will not shut off the pump if the APU is operating.

S 865-016
(9) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11C33, FUEL DC PUMP PWR

S 095-017
(10) Remove the jumper wire from the wires connected to the terminals A1 and A2 of the control relay (K191) of the APU DC fuel pump.

S 435-018
(11) Install the control relay (K191) of the APU DC fuel pump in the P70 panel.

S 035-020
(12) Remove the APU fuel-control relay (K175) from the electrical connector in the E6 rack (View B, Fig. 502).

S 495-021
(13) Install a jumper wire between the sockets B1 and B2 of the electrical connector on the APU fuel-control relay (K175).

S 865-022
(14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 215-023
(15) Make sure the manual override handle on the APU fuel shutoff valve moves to the OPEN position.

S 215-024
(16) Make sure the APU FAULT light on the P5 panel comes on while the APU fuel shutoff valve moves to the open position.

S 865-025

CAUTION: DO NOT TURN THE FIRE SWITCH. IF YOU TURN THE FIRE SWITCH, THE CONTENTS OF THE FIRE BOTTLE CAN ACCIDENTALLY RELEASE AND CAUSE DAMAGE.

(17) Pull the APU FIRE switch on the P8 stand to the FIRE position.

S 215-026

(18) Make sure the manual override handle on the APU fuel shutoff valve moves to the CLOSED position.

S 865-027

(19) Push the APU FIRE switch to the NORMAL position.

S 215-028

(20) Make sure the manual override handle on the APU fuel shutoff valve moves to the OPEN position.

S 215-029

(21) Make sure the APU FAULT light on the P5 panel comes on while the APU fuel shutoff valve moves to the open position.

S 865-030

(22) Open this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 095-031

(23) Remove the jumper wire from the socket B1 of the electrical connector (D2378).

S 495-032

(24) Install the jumper wire in the socket B3 of the electrical connector (D2378).

S 865-033

(25) Close this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 215-034

(26) Make sure the manual override handle on the APU fuel shutoff valve moves to the CLOSED position.

S 865-035

(27) Open this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 215-036

(28) Make sure the EICAS advisory message, APU FUEL VAL, shows on the top display.

S 865-037
(29) Close this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 215-038
(30) Make sure the EICAS advisory message, APU FUEL VAL, does not show on the top display.

S 095-039
(31) Remove the jumper wire from the sockets B2 and B3 of the electrical connector (D2378).

S 435-040
(32) Install the APU fuel-control relay (K175) in the E6 rack.

S 915-041

WARNING: REFER TO AMM 32-00-15/201 FOR DOOR LOCK REMOVAL PROCEDURE. THE MAIN GEAR DOORS CAN MOVE QUICKLY AND CAUSE INJURY OR DAMAGE.

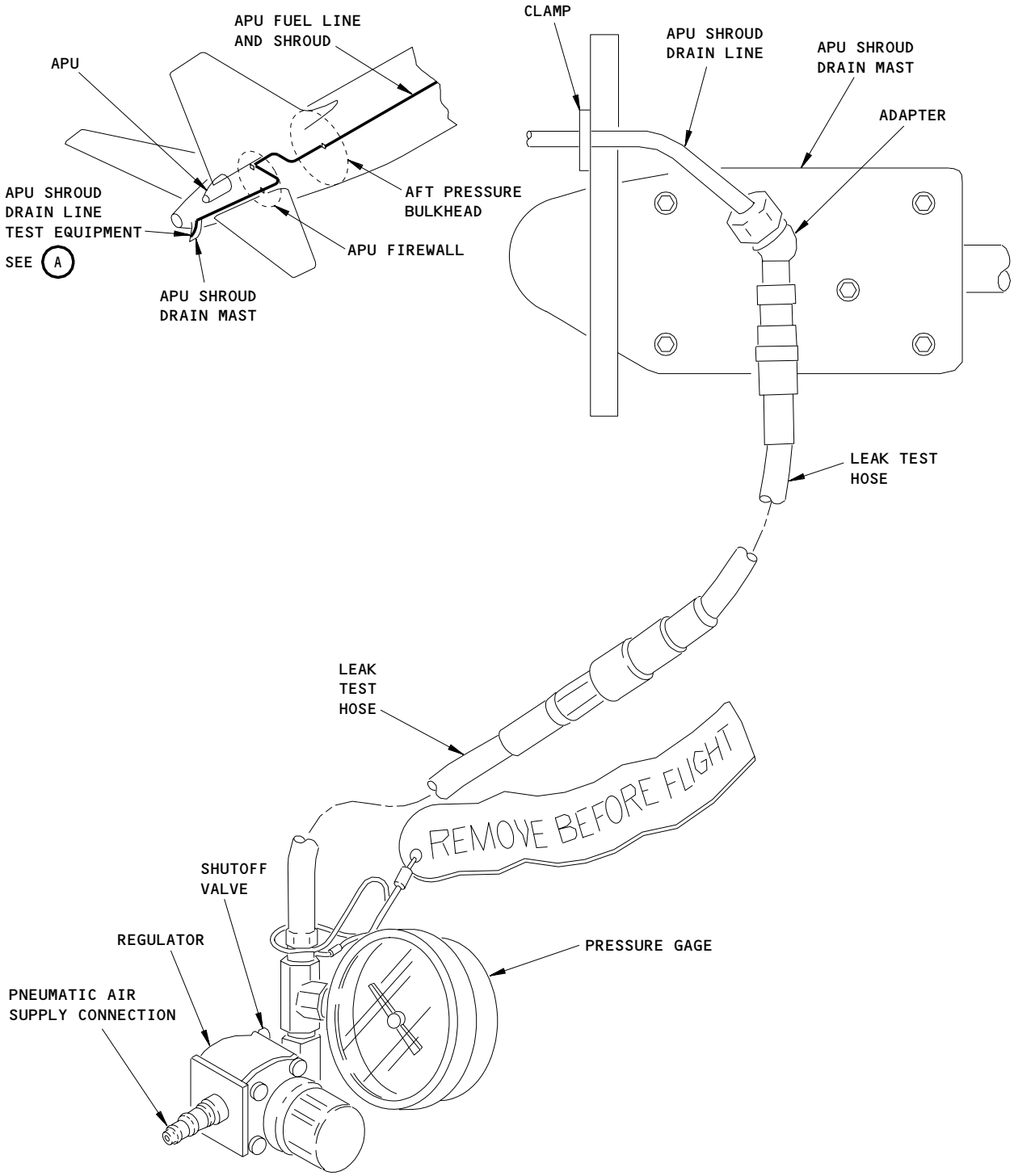
(33) Remove the main gear door locks and close the main gear doors (AMM 32-00-15/201).

S 865-042
(34) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-25-00-735-043

3. System Test - APU Shroud and Drain Tubing (Fig. 503)
A. General
(1) This procedure does a pressure decay check of the APU fuel line shroud.
B. Equipment
(1) Leak Test Adapter, A28005-53
(2) Hose assembly A28005-50
(3) Pneumatic Air Supply, That can supply 20 psig pressure - Commercially Available
C. References
(1) AMM 06-42-00/201, Empennage and Section 48 Access Doors and Panels
(2) AMM 28-25-05/401, APU Fuel Line and Shroud
D. Access
(1) Location Zones
316 APU Compartment (Right)

(2) Access Panels
316AR APU Access Door (Right)



APU SHROUD DRAIN LINE TEST EQUIPMENT

A

APU Fuel Shroud Drain Line
Figure 503

E. Test the APU Shroud

S 215-044
(1) Make sure the APU master control switch on the overhead panel, P5, is in the OFF position.

S 865-045
(2) Attach a DO-NOT-OPERATE tag to the APU master control switch.

S 015-046
(3) Open the right APU access door, 316AR, and find the APU shroud drain line (AMM 06-42-00/201).

S 025-061
(4) Remove the lockwire from the APU shroud drain line coupling next to the drain mast inside the right APU access door, 316AR (AMM 06-42-00/201).

S 025-065
(5) Remove the bonding clamp inside the APU access door, 316AR (AMM 06-42-00/201) next to the drain mast coupling.

S 025-062
(6) Disconnect the APU shroud drain line coupling.

S 495-063
(7) Attach the leak test adapter with the production seal installed on the APU shroud drain coupling.

S 495-049
(8) Connect the pneumatic air supply to the leak test hose.

S 785-050

CAUTION: DO NOT APPLY PRESSURE OF MORE THAN 20 PSIG. TOO MUCH PRESSURE CAN CAUSE THE APU FUEL LINE TO CLOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(9) Slowly and continuously apply pressure to the APU shroud until the presssure is 18 ± 1 psig (124 ± 7kPa).

NOTE: Make sure the pressure is stable at 18 ± 1 psig (124 ± 7kPa).

S 785-066
(10) After the pressure is stable, remove the air pressure source and make sure the pressure does not decrease more that 0.1 psi (0.7 kPa) in 5 minutes.

S 785-052
(11) Slowly and continuously decrease the pressure to zero.

S 095-053
(12) Disconnect the pneumatic air supply.

S 085-054
(13) Removed the leak test adapter from the APU shroud drain line coupling.

S 415-060
(14) Connect the APU shroud drain line coupling (AMM 28-25-05/401).

S 425-064
(15) Install lockwire on the shroud drain line coupling.

S 415-056
(16) Close the right APU access door, 316AR (AMM 06-42-00/201).

S 865-057
(17) Remove DO-NOT-OPERATE tag from the APU master control switch on the P5 panel.

DC FUEL PUMP - REMOVAL/INSTALLATION

1. General
   A. An APU DC fuel pump is installed on the rear spar of the center fuel tank, approximately three feet to the left of the body centerline. The APU DC fuel pump supplies the APU with fuel during an electrical power failure or a fuel boost pump failure.
   B. This procedure contains four tasks. The first task removes the motor impeller of the APU DC fuel pump. The second task installs the motor impeller of the APU DC fuel pump. The third task removes the housing of the APU DC fuel pump. The fourth task installs the housing of the APU DC fuel pump.

TASK 28-25-01-004-052

2. Remove the Motor Impeller of the APU DC Fuel Pump (View B, Fig. 401)
   A. References
      (1) AMM 28-25-03/401, APU Fuel Pump Pressure Switch
      (2) AMM 32-00-15/201, Landing Gear Door Locks
      (3) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)

   C. Procedure

      S 214-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 494-003

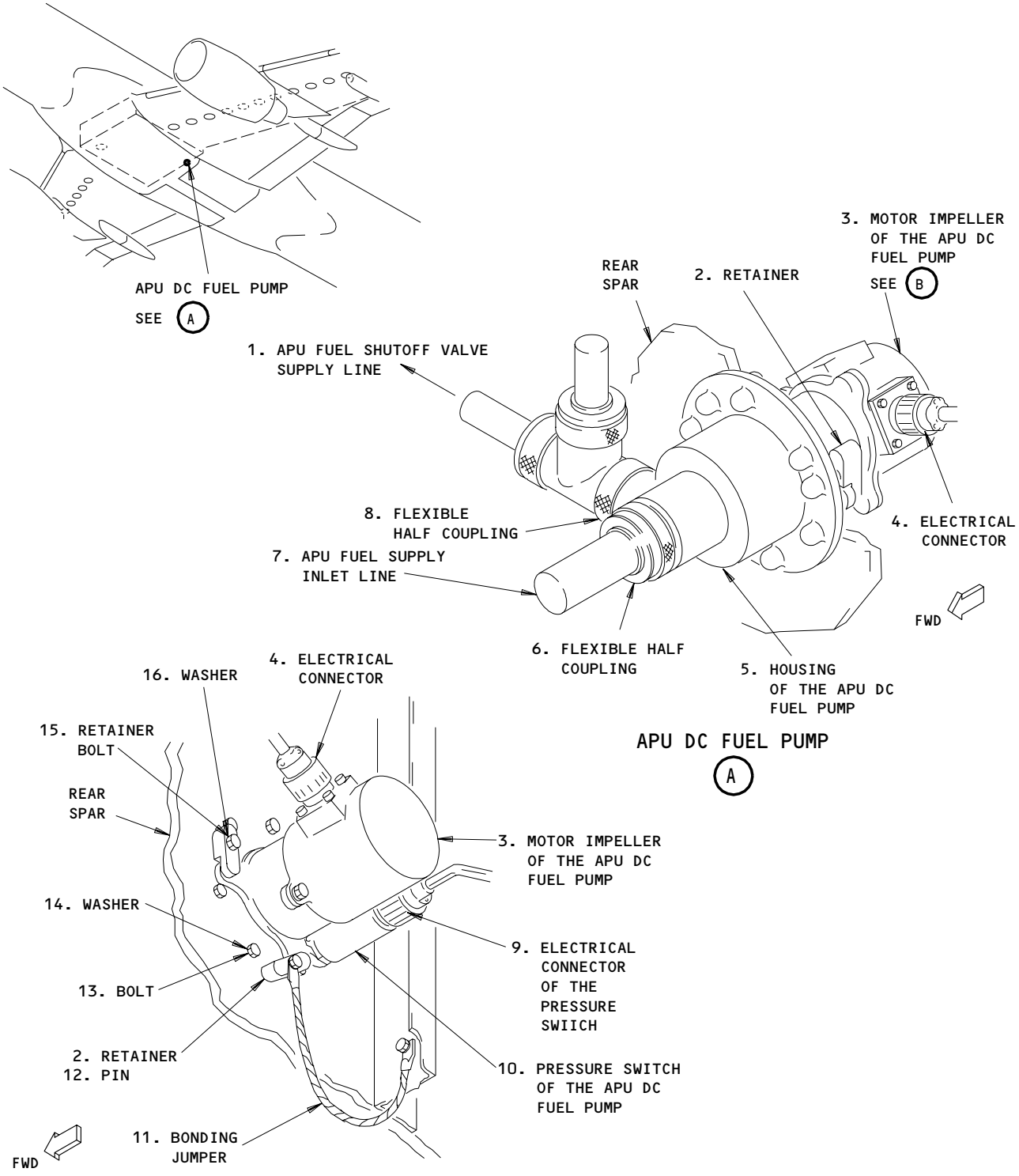
      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 034-004
      (3) Remove the pressure switch of the APU DC fuel pump (10) (AMM 28-25-03/401).

      S 034-005
      (4) Remove the electrical connector (4) from the motor impeller (3) of the APU DC fuel pump.

      S 034-006
      (5) Disconnect the bonding jumper (11) from the retainer (2).



APU DC Fuel Pump Installation
Figure 401

S 494-007
(6) Put the container below the motor impeller (3) to collect all fuel remaining in the housing (5).

S 034-008
(7) Remove the retainer bolts (15) and washers (16).

S 034-009
(8) Remove the retainers (2) and pins (12).

S 024-010
(9) Remove the motor impeller of the APU DC fuel pump (3).

S 094-011
(10) Remove the container.

TASK 28-25-01-404-053

3. Install the Motor Impeller of the APU DC Fuel Pump (View B, Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Motor Impeller	28-25-01	01 02	244 205

B. References
(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 28-25-03/401, APU Fuel Pump Pressure Switch
(4) AMM 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

D. Procedure

S 424-029
(1) Align the motor impeller of the APU DC fuel pump (3) with the housing of the APU DC fuel pump (5) on the rear spar out of the fuel tank.

S 434-030
(2) Put the pins (12) into the retainers (2).

S 434-031
(3) Install the retainers (2) and pins (12) in the motor impeller (3).

S 434-045
(4) Attach the bonding jumper (11) to the lower retainer (2).

S 434-046
(5) Put washers (16) on the retainer bolts (15).

S 434-032
(6) Install the retainer bolts (15) and washers (16) in the retainers (2).

S 224-047
(7) Make sure the bonding resistance between the retainer (2) and the APU DC fuel pump is not more than 0.002 ohm (AMM 20-10-21/601).

S 434-048
(8) Connect the electrical connector (4) to the motor impeller of the APU DC fuel pump (3).

S 434-049
(9) Install the pressure switch of the APU DC fuel pump (10) (AMM 28-25-03/401).

S 864-033
(10) Supply electrical power (AMM 24-22-00/201).

S 714-050

CAUTION: DO NOT OPERATE THE APU DC FUEL PUMP FOR MORE THAN 30 SECONDS. IF YOU OPERATE THE APU DC FUEL PUMP FOR A LONG TIME, DAMAGE TO THE PUMP WILL OCCUR.

(11) Do the steps that follow to do a test of the APU DC fuel pump:
  (a) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
    1) 6H23, L FWD FUEL BOOST PUMP
  (b) Put the APU master control switch on the overhead panel, P5, to the ON position.
  (c) Listen and make sure the APU DC fuel pump operates.
  (d) Put the APU master control switch on the P5 panel to the OFF position.
  (e) Remove the DO-NOT-CLOSE tag and close this P6 panel circuit breaker:
    1) 6H23, L FWD FUEL BOOST PUMP

S 094-035

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(12) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-051

(13) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-25-01-004-001

4. Remove the Housing of the APU DC Fuel Pump (View A, Fig. 401)
  A. Equipment
    (1) Container - 1 gallon capacity, to hold fuel.
      Commercially available

B. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-02/401, Center Tank Access Door
(4) AMM 28-25-05/401, APU Fuel Line and Shroud
(5) AMM 28-26-00/201, Defueling

C. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

D. Procedure

S 034-012
(1) Do the Remove the Motor Impeller of the APU DC Fuel Pump procedure.

S 654-013
(2) Defuel the center fuel tank and the left main fuel tank (AMM 28-26-00/201).

S 654-014
(3) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 014-036
(4) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-016

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS AMM 28-11-00/201. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-017
(6) Go into the center fuel tank.

S 014-037
(7) Remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-038
(8) Disconnect the flexible half coupling (6) that attaches the APU fuel supply inlet line (7) to the housing of the APU DC fuel pump (5) (AMM 28-25-05/401) (View A).

S 034-018
(9) Remove the O-ring (17) from the flexible half coupling (5).

S 034-039
(10) Disconnect the flexible half coupling (8) from the APU fuel shutoff valve supply line (1) (AMM 28-25-05/401).

S 024-019
(11) Hold the housing of the APU DC fuel pump (5).

S 034-020
(12) Remove the O-ring (18) from the flexible half coupling (8).

S 034-040
(13) From out of the fuel tank, remove the six bolts (13) and washers (14) that attach the housing (5) to the rear spar.

S 024-021
(14) Remove the housing of the APU DC fuel pump (5).

TASK 28-25-01-404-041
5. Install the Housing of the APU DC Fuel Pump (View A, Fig. 401)
A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	5	Housing	28-25-01	01	346
				02	520
	17	O-ring (Packing)		01	110,130
				02	120
	18	O-ring (Packing)		01	275
				02	445
	19	O-ring (Packing)		01	376
				02	585

B. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-02/401, Center Tank Access Door
(4) AMM 28-25-05/401, APU Fuel Line and Shroud

C. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

D. Procedure

S 944-022

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-023
(2) Go into the fuel tank.

S 424-024
(3) Put the housing of the APU DC fuel pump (5) in position on the rear spar with a new O-ring (19) in between.

S 424-025
(4) Align the housing (5) with the APU fuel shutoff valve supply line (1) and the APU fuel supply inlet line (7).

S 424-042
(5) From out of the fuel tank, install the washers (14) and the bolts (13) through the rear spar into the housing (5).

S 434-043
(6) From in the fuel tank, with a new O-ring (17), connect the flexible half coupling (6) between the APU fuel supply inlet line (7) and the housing (5) (AMM 28-25-05/401).

S 434-044
(7) With a new O-ring (18), connect the flexible half coupling (8) between the APU fuel shutoff valve supply line (1) and the housing (5) (AMM 28-25-05/401).

S 414-026
(8) Install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-027
(9) Install the center tank access door, 134AZ (AMM 28-11-02/401).

S 434-028
(10) Do the Install the Motor/Impeller of the APU DC Fuel Pump procedure.

DC FUEL PUMP - INSPECTION/CHECK

1. General
   A. This task does an electrical bonding resistance check for the APU DC fuel pump.

TASK 28-25-01-766-052

2. APU DC Fuel Pump - Bonding Resistance Check (Fig. 601)
   A. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
      (3) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Use one of these:
         (a) Bonding Meter - Model T477W
             Avtron Manufacturing Inc.
             Cleveland OH
         (b) Bonding Meter - Model M1
             (Serial Number A0000112 and subsequent)
             BCD Electronics Ltd.
             Vancouver Canada
   C. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)

   D. Procedure

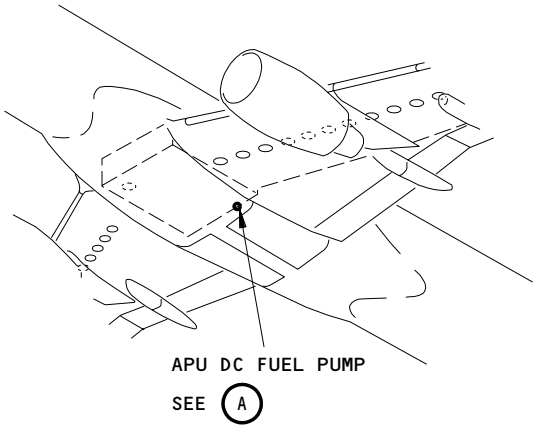
      S 216-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

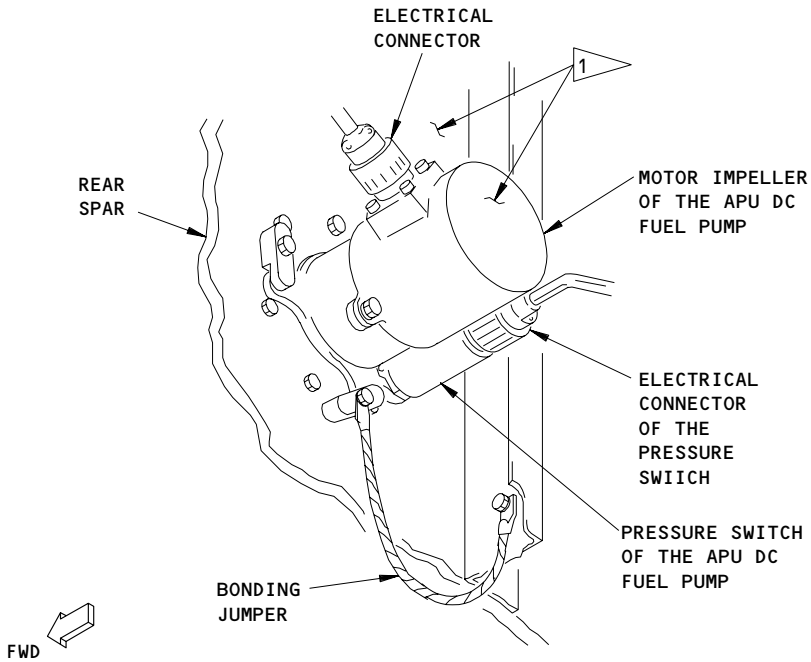
      S 496-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 036-005
      (3) Remove the electrical connector from the motor impeller of the APU DC fuel pump.





APU DC FUEL PUMP
(A)

1 THE RESISTANCE FROM THE APU BOOST PUMP MOTOR TO THE SPAR IS 0.002 OHMS OR LESS

APU DC Fuel Pump Resistance Check
Figure 601

S 766-053

(4) Measure the electrical bonding resistance between the APU boost pump motor and the spar web (SWPM 20-20-00).
   (a) Make sure the bonding resistance is 0.002 ohm (2.0 milliohms) or less.

S 436-020

(5) Connect the electrical connector to the motor impeller of the APU DC fuel pump.

S 096-024

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

APU FUEL SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. An APU fuel shutoff valve is installed on the rear spar of the center fuel tank, approximately 2 feet to the left of the body centerline. The APU fuel shutoff valve lets the APU DC fuel pump pump fuel to the APU but does not let fuel pump to the APU when the APU does not operate.
   B. This procedure contains two tasks. The first task removes the APU fuel shutoff valve. The second task installs the APU fuel shutoff valve.

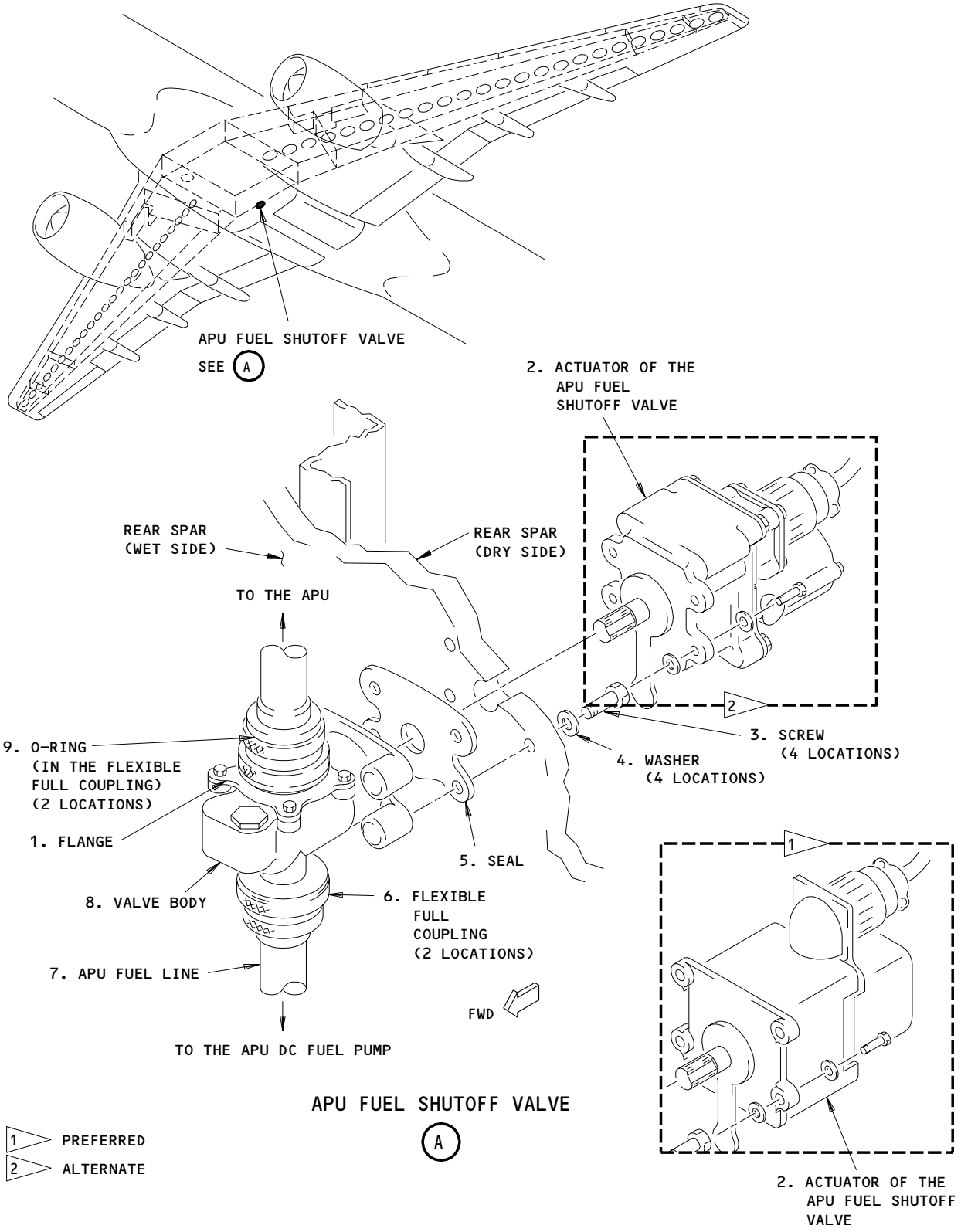
TASK 28-25-02-004-001

2. Remove the APU Fuel Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-25-05/401, APU Fuel Line and Shroud
      (5) AMM 28-25-11/401, APU Fuel Shutoff Valve Actuator
      (6) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zone
          134 Wing Center Section (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door
          134CZ Baffle Door
          134DZ Baffle Door

   C. Procedure

      S 034-002
      (1) Remove the actuator of the APU fuel shutoff valve (2) (AMM 28-25-11/401).



APU FUEL SHUTOFF VALVE

A

APU Fuel Shutoff Valve Installation
Figure 401

S 654-005
(2) Defuel all the fuel tanks (AMM 28-26-00/201).

S 654-006
(3) Drain and purge the fuel tanks (AMM 28-11-00/201).

S 014-003
(4) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

S 944-007

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-008
(6) Go into the fuel tank.

S 014-004
(7) Remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-009
(8) Disconnect the flexible full coupling (6) from the two sides of the valve body (8) (AMM 28-25-05 401).

S 024-010
(9) Hold the valve body (8).

S 034-011
(10) From out of the fuel tank, remove the four screws (3) that attach the valve body (8) to the rear spar.

S 024-012
(11) Remove the valve body (8) and the seal (5).

TASK 28-25-02-404-013

3. Install the APU Fuel Shutoff Valve (Fig. 401)

A. Consumable Materials

(1) A00247 Chromate Type Sealant - BMS 5-95

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Seal	28-25-01	01	190
				02	140
	6	Flexible Full Coupling		01	113
				02	100
	8	Valve Body		01	225
				02	175
	9	O-ring (Packing)		01	120
				02	105

C. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 20-10-21/601, Electrical Bonding
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 28-25-05/401, APU Fuel Line and Shroud
(6) AMM 28-25-11/401, APU Fuel Shutoff Valve Actuator
(7) AMM 51-31-01/201, Seals and Sealing

D. Access

(1) Location Zone

134 Wing Center Section (Right)

(2) Access Panels

134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

E. Procedure

S 944-014

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 214-018

(2) Make sure the two sides of the rear spar are clean at each bolt hole location.

S 434-019

(3) Put a new seal (5) between the rear spar and the valve body (8).

S 424-015

(4) Put the valve body (8) in position between the APU fuel lines (7) with the flange (1) on the top side of the valve body (8).

S 434-020

(5) From out of the fuel tank, put the washers (4) on the four screws (3).

S 434-016

(6) Install the screws (3) through the rear spar into the valve body (8).

S 434-028

(7) Tighten the four screws (3) to 50-75 pound-inches (5.7-8.4 newton-meters).

S 434-017

(8) Install the lockwire on the screws (3).

S 224-021

(9) Make sure the bonding resistance between the valve body (8) and the airplane structure is not more than 0.005 ohms (AMM 20-10-21/601).

S 394-022
(10) From out of the fuel tank, apply chromate type sealant (BMS 5-95) around all four screws (3) (AMM 51-31-01/201).

S 434-023
(11) From in the fuel tank, use new O-rings (9) and connect the flexible full couplings (6) on the two sides of the valve body (8) (AMM 28-25-05/401).

S 414-024
(12) Install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-025
(13) Install the center tank access door, 134AZ (AMM 28-11-02/401).

S 434-026
(14) Install the actuator of the APU fuel shutoff valve (2) (AMM 28-25-11/401).

APU FUEL SHUTOFF VALVE - INSPECTION/CHECK

1. General
   A. This task does an electrical bonding resistance check for the APU fuel shutoff valve.

TASK 28-25-02-766-028

2. APU Fuel Shutoff Valve - Bonding Resistance Check (Fig. 601)
   A. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
      (3) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Use one of these:
         (a) Bonding Meter - Model T477W
             Avtron Manufacturing Inc.
             Cleveland OH
         (b) Bonding Meter - Model M1
             (Serial Number A0000112 and subsequent)
             BCD Electronics Ltd.
             Vancouver Canada
   C. Access
      (1) Location Zone
          134 Wing Center Section (Right)

   D. Procedure

      S 216-029
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

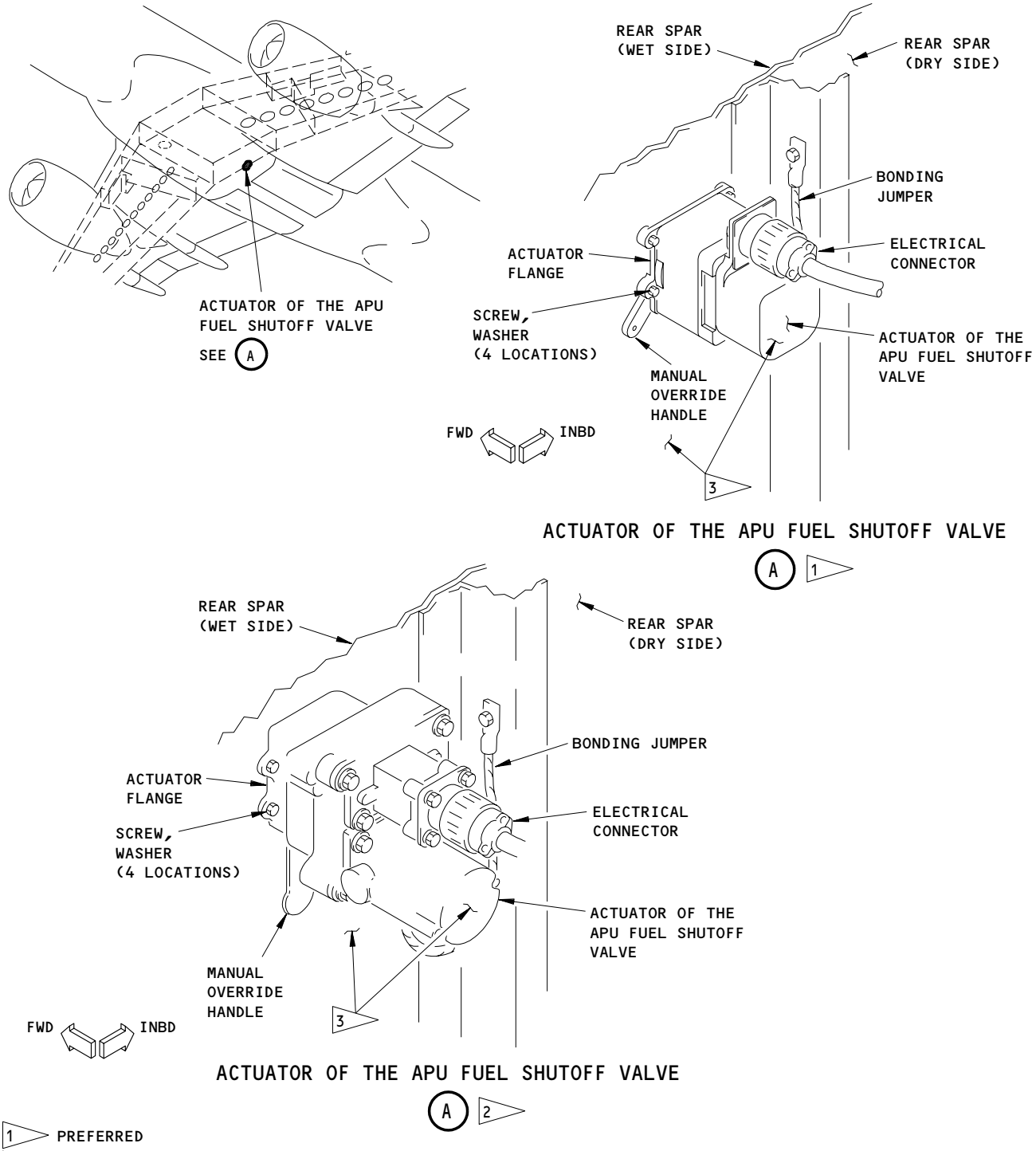
      S 426-034

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 016-031
      (3) Get access to the APU fuel shutoff valve on the rear spar of the center fuel tank.

      S 026-033
      (4) Remove the electrical connector from the actuator.



1 PREFERRED

2 ALTERNATE

3 THE RESISTANCE FROM THE UPPER HOUSING OF THE ACTUATOR TO THE SPAR IS 0.005 OHMS OR LESS

APU Fuel Shutoff Valve Resistance Check
Figure 601

S 766-035

(5) Measure the electrical bonding resistance between the upper housing of the actuator and the spar web (SWPM 20-20-00).
   (a) Make sure the bonding resistance is 0.005 ohm (5.0 milliohms) or less

S 426-036

(6) Connect the electrical connector to the actuator.

S 866-037

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

APU FUEL PUMP PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. The pressure switch of the APU DC fuel pump is installed on the rear spar of the center fuel tank. The pressure switch is found approximately 3 feet to the left of the body centerline. It provides a ground for the Engine Indicating and Crew Alerting System (EICAS) for a pressure in the pump greater than 4 psi. A DC FUEL PUMP ON maintenance message results from the pressure in the pump. This message is available for recall on the lower EICAS display screen on the ground.
   B. This procedure contains two tasks. The first task removes the pressure switch of the APU DC fuel pump. The second task installs the pressure switch of the APU DC fuel pump.

TASK 28-25-03-024-014

2. Remove the Pressure Switch of the APU DC Fuel Pump (Fig. 401)
   A. Equipment
      (1) Container - for fuel
   B. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)

   D. Procedure

      S 864-001
      (1) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11C33, FUEL DC PUMP PWR

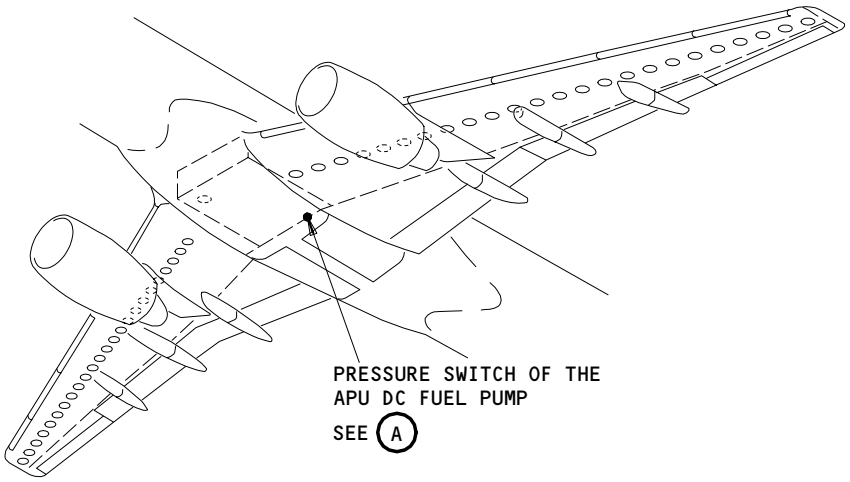
      S 214-008
      (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

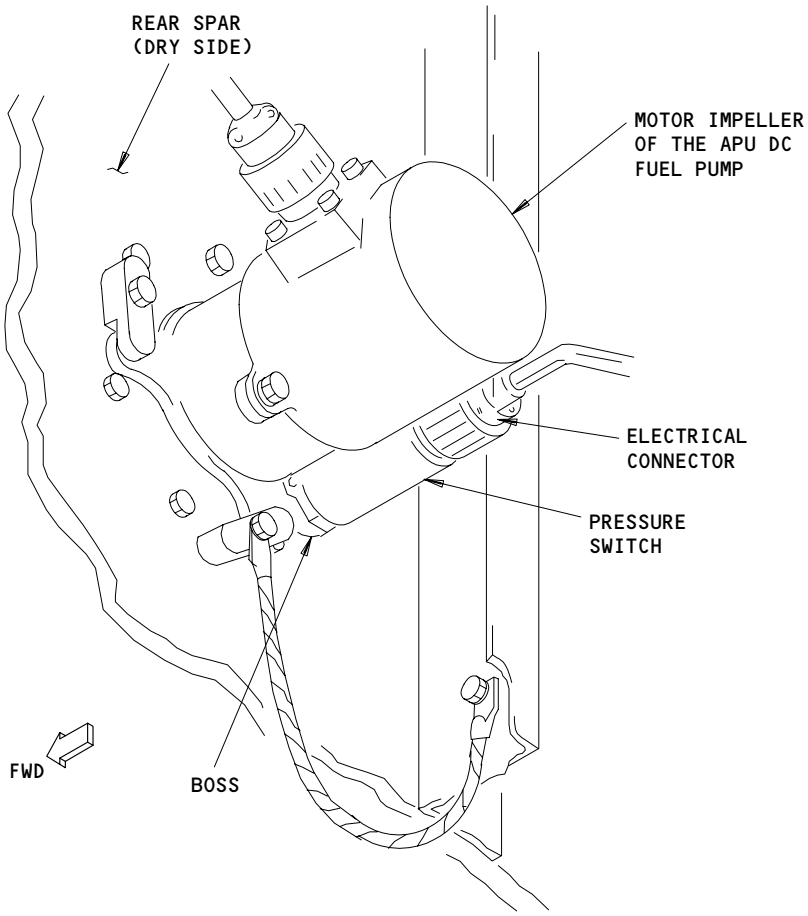
      S 494-009

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 034-002
      (4) Disconnect the electrical connector from the pressure switch.





PRESSURE SWITCH OF THE APU DC FUEL PUMP

(A)

APU DC Fuel Pump Pressure Switch Installation
Figure 401

S 494-010

CAUTION: PUT A CONTAINER BELOW THE PRESSURE SWITCH TO CATCH ALL FUEL REMAINING IN THE APU DC FUEL PUMP. THE FUEL COULD CAUSE DAMAGE TO EQUIPMENT.

(5) Put a container below the pressure switch to catch all fuel remaining in the APU DC fuel pump.

S 024-003

(6) Remove the pressure switch from the boss.

S 094-011

(7) Remove the container.

TASK 28-25-03-404-004

3. Install the Pressure Switch of the APU DC Fuel Pump (Fig. 401)

A. References

(1) AMM 32-00-15/201, Landing Gear Door Locks

B. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)

C. Procedure

S 434-005

(1) Install a new O-ring on the threads of the pressure switch.

S 424-012

(2) Install the pressure switch in the boss of the APU DC fuel pump.

S 434-006

(3) Connect the electrical connector to the pressure switch.

S 864-007

(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:

(a) 11C33, FUEL DC PUMP PWR

S 094-013

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

APU FUEL SHUTOFF PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. The pressure switch for the APU fuel shutoff is on the rear spar of the left center fuel tank.
      (1) The pressure switch measures the fuel pressure in the fuel feed manifold.
      (2) The pressure switch causes the dc fuel pump to operate when the pressure in the manifold is below 4 psi.
   B. This procedure has two tasks:
      (1) A task for the removal of the APU fuel shutoff pressure switch
      (2) A task to install the APU fuel shutoff pressure switch.

TASK 28-25-04-024-018

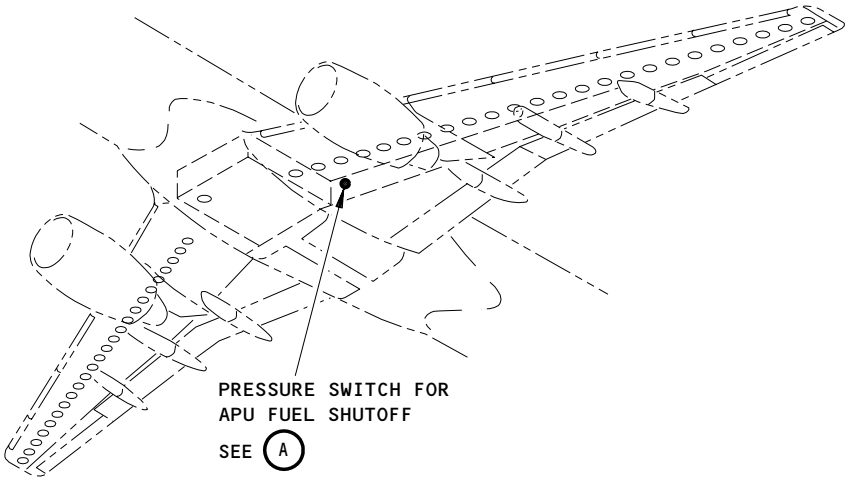
2. Remove the Pressure Switch for the APU Fuel Shutoff (Fig. 401)
   A. Equipment
      (1) Container - for fuel
   B. Consumable Materials
      (1) G00034, Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS 15-5
   C. Access
      (1) Location Zones
          531 Center Wing Tank (Left)

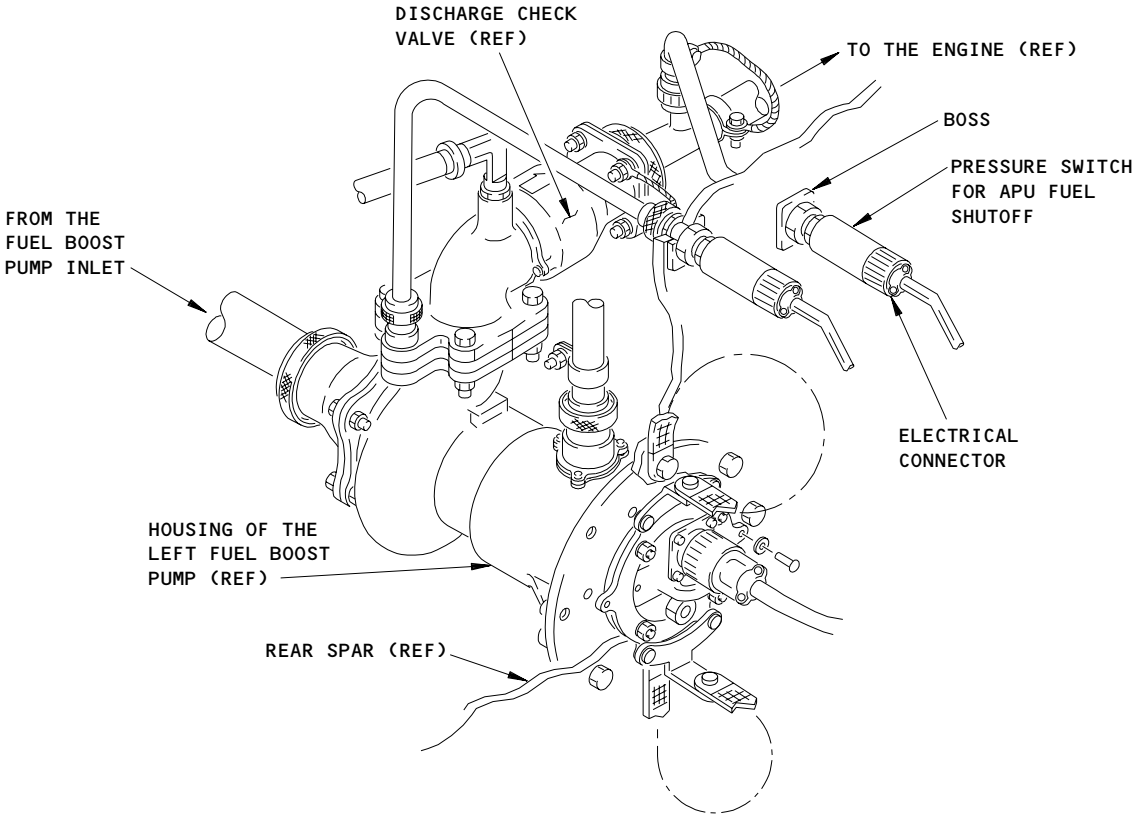
   D. Procedure

      S 014-015
      (1) Get access to the pressure switch through the left shock strut door of the main landing gear.

      S 864-002
      (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
          (a) P6 Main Power Distribution Panel:
              1) 6E3, FUEL S/O VLV - APU
              2) 6H23, L FWD FUEL BOOST PUMP
          (b) P11 Overhead Circuit Breaker Panel:
              1) 11C33, DC FUEL BOOST PUMP APU
              2) 11D32, FUEL DISAGREE ENBL - APU
              3) 11D35, DC FUEL BOOST PUMP CONT

      S 034-005
      (3) Remove the electrical connector from the pressure switch (Fig. 401).





PRESSURE SWITCH FOR APU FUEL SHUTOFF

(A)

Pressure Switch for APU Fuel Shutoff Installation
Figure 401

S 214-024

CAUTION: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK. THE FUEL CAN CAUSE DAMAGE TO EQUIPMENT.

(4) Put a container below the pressure switch to catch all fuel remaining in the pressure switch and fuel line.

S 024-007

(5) Remove the pressure switch from the boss on the rear spar (Fig. 401).

TASK 28-25-04-424-017

3. Install the Pressure Switch for the APU Fuel Shutoff (Fig. 401)

A. References

(1) AMM 24-22-00/201, Electrical Power Control

B. Access

(1) Location Zones

531 Center Wing Tank (Left)

C. Procedure

S 424-019

(1) Install the pressure switch in the boss on the rear spar.

S 434-020

(2) Install lockwire on the pressure switch.

S 434-012

(3) Install the electrical connector on the pressure switch.

S 864-013

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

S 214-021

(5) Make sure the L FWD PUMPS PRESS light of the fuel management panel on the overhead panel, P5, is on.

S 864-026

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P6 Main Power Distribution Panel:

1) 6E3, FUEL S/O VLV - APU

2) 6H23, L FWD FUEL BOOST PUMP

(b) P11 Overhead Circuit Breaker Panel:
1) 11C33, DC FUEL BOOST PUMP APU
2) 11D32, FUEL DISAGREE ENBL - APU
3) 11D35, DC FUEL BOOST PUMP CONT

S 214-027

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL FUMES IN THE TANK CAN CAUSE A FIRE OR EXPLOSION.

(7) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 714-023
(8) Do the steps that follow to make sure the pressure switch operates correctly.
(a) Make sure there is enough fuel in the tank to operate either left fuel boost pump.
(b) Open these circuit breakers:
1) P6 Main Power Distribution Panel:
a) 6H15, L AFT FUEL BOOST PUMP
b) 6H23, L FWD FUEL BOOST PUMP
(c) Set the APU master control switch on the overhead panel, P5, to the ON position.
(d) Make sure the EICAS message DC FUEL PUMP ON shows on the EICAS display.
(e) Close these circuit breakers:
1) P6 Main Power Distribution Panel:
a) 6H15, L AFT FUEL BOOST PUMP
b) 6H23, L FWD FUEL BOOST PUMP
(f) Make sure the EICAS message DC FUEL PUMP ON does not show.
(g) Set the APU master control switch on the P5 panel to the OFF position.
(h) Remove electrical power if it is not necessary (AMM 24-22-00/201).

APU FUEL LINE AND SHROUD - REMOVAL/INSTALLATION

1. General
   A. The APU fuel line connects the APU fuel shutoff valve to the APU and supplies the APU with fuel (Fig. 401). A shroud is on all sides of the APU fuel line and extends from the dry side of the center fuel tank to the APU firewall to prevent all external leakage of fuel vapor.
   B. It is not necessary to replace the aluminum tubing for the fuel system (Types 2024, 5052, and 6061) if the damage is not more than the approved limits in the task: Fuel Lines and Couplings Dent Criteria Check (AMM 28-22-07/601).
   C. For approved repair of fuel systems aluminum tubing, refer to AMM 20-10-09/801.
   D. This procedure has these tasks:
      (1) Remove the fittings on the fuel line
      (2) Install the fittings on the fuel line
      (3) Remove the APU fuel line in the fuel tanks
      (4) Install the APU fuel line in the fuel tanks
      (5) Remove the APU fuel line and shroud between the center fuel tank and the APU firewall
      (6) Install the APU fuel line and shroud between the center fuel tank and the APU firewall
      (7) Remove the APU fuel drain line
      (8) Install the APU fuel drain line.
      (9) Leakage test of the APU fuel line and shroud.
      (10) Remove the APU Fuel Line Drain Mast
      (11) Install the APU Fuel Line Drain Mast

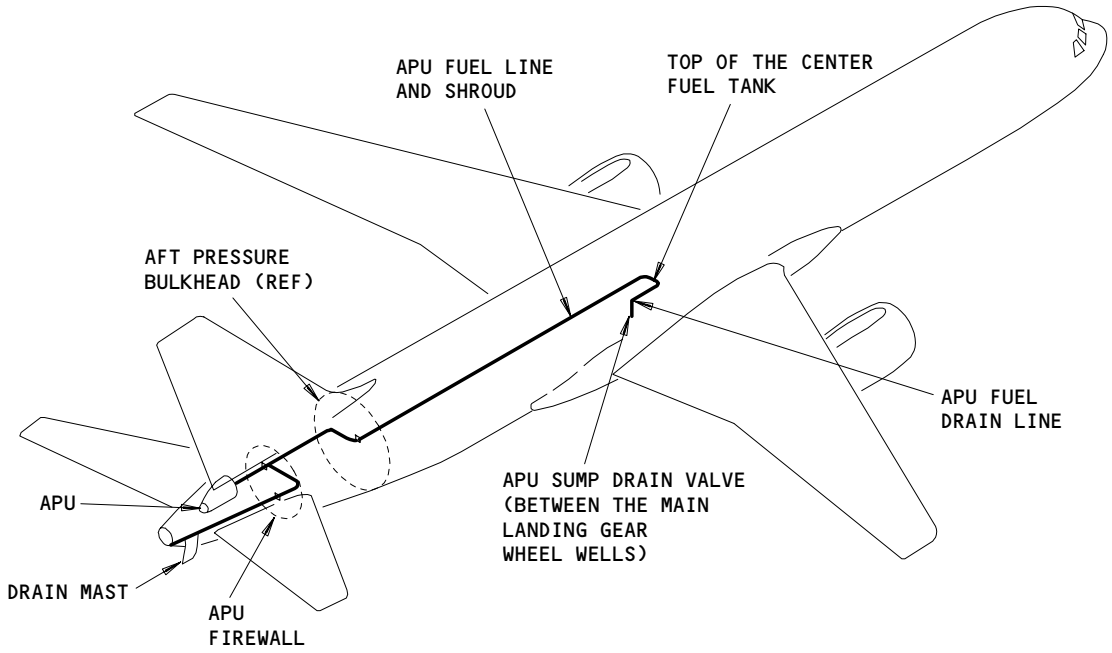
TASK 28-25-05-004-087

2. Remove the Fittings on the Fuel Line
   A. General
      (1) This procedure gives examples of the removal procedure for fittings on the fuel line.
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          241 Passenger Cabin - Section 44 (Left)
          242 Passenger Cabin - Section 44 (Right)
          251 Passenger Cabin - Section 46 (Left)
          252 Passenger Cabin - Section 46 (Right)
          311 Area Aft of Pressure Bulkhead to BS 1787.45 (Left)
          312 Area Aft of Pressure Bulkhead to BS 1787.45 (Right)
          313 Stabilizer Center Section Compartment (Left)
          314 Stabilizer Center Section Compartment (Right)
          315 APU Compartment (Left)
          316 APU Compartment (Right)
          531 Center Wing Tank (Left)
          541 Main Tank - Rib No. 5 to No. 17 (Left)

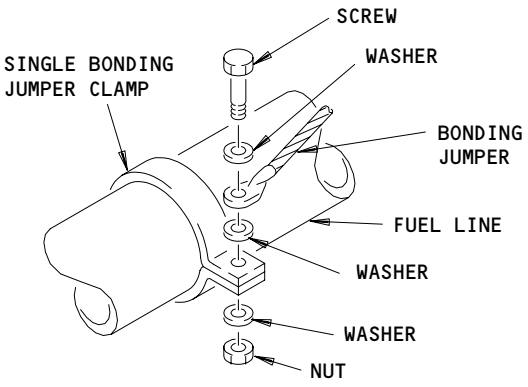
C. Remove the Fittings on the Fuel Line.

S 024-001

(1) To remove the single bonding jumper clamp (View A, Fig. 402), do the steps that follow.
   (a) Remove the screw, washers and nut from the single bonding jumper clamp on the fuel line.
   (b) Move the bonding jumper away from the single bonding jumper clamp.

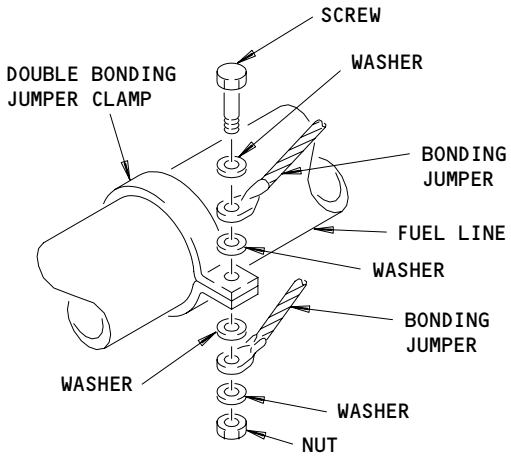


APU Fuel Line and Shroud Installation
Figure 401



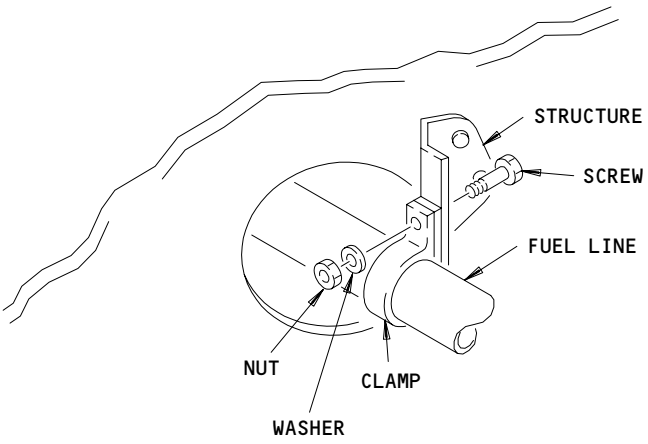
SINGLE BONDING JUMPER CLAMP

A



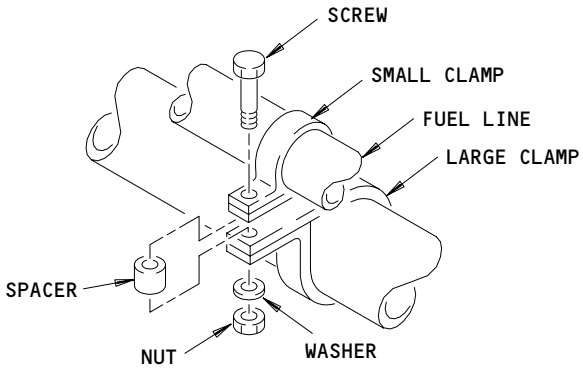
DOUBLE BONDING JUMPER CLAMP

B



LOOP CLAMP

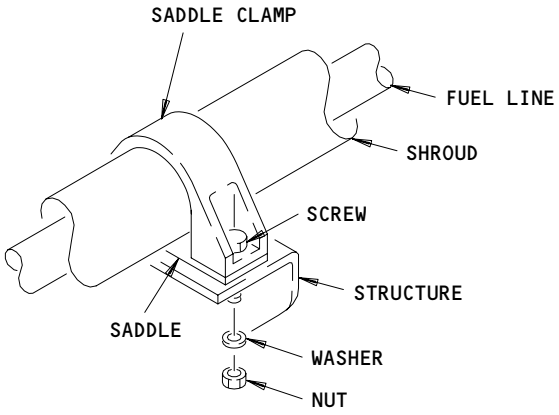
C



DOUBLE LOOP CLAMP

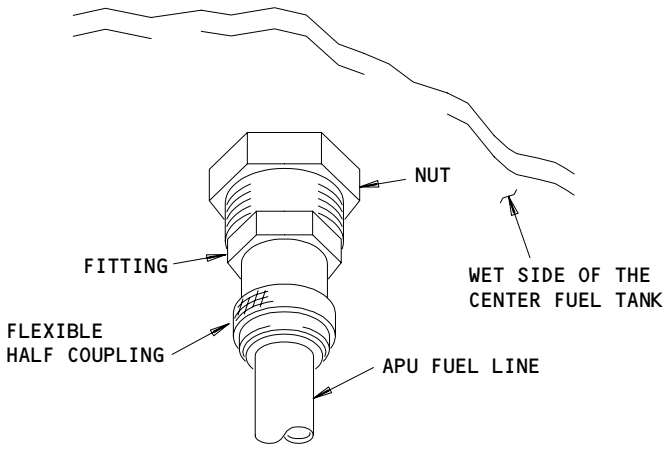
D

Examples of Fittings on the Fuel Line
Figure 402 (Sheet 1)



SADDLE CLAMP

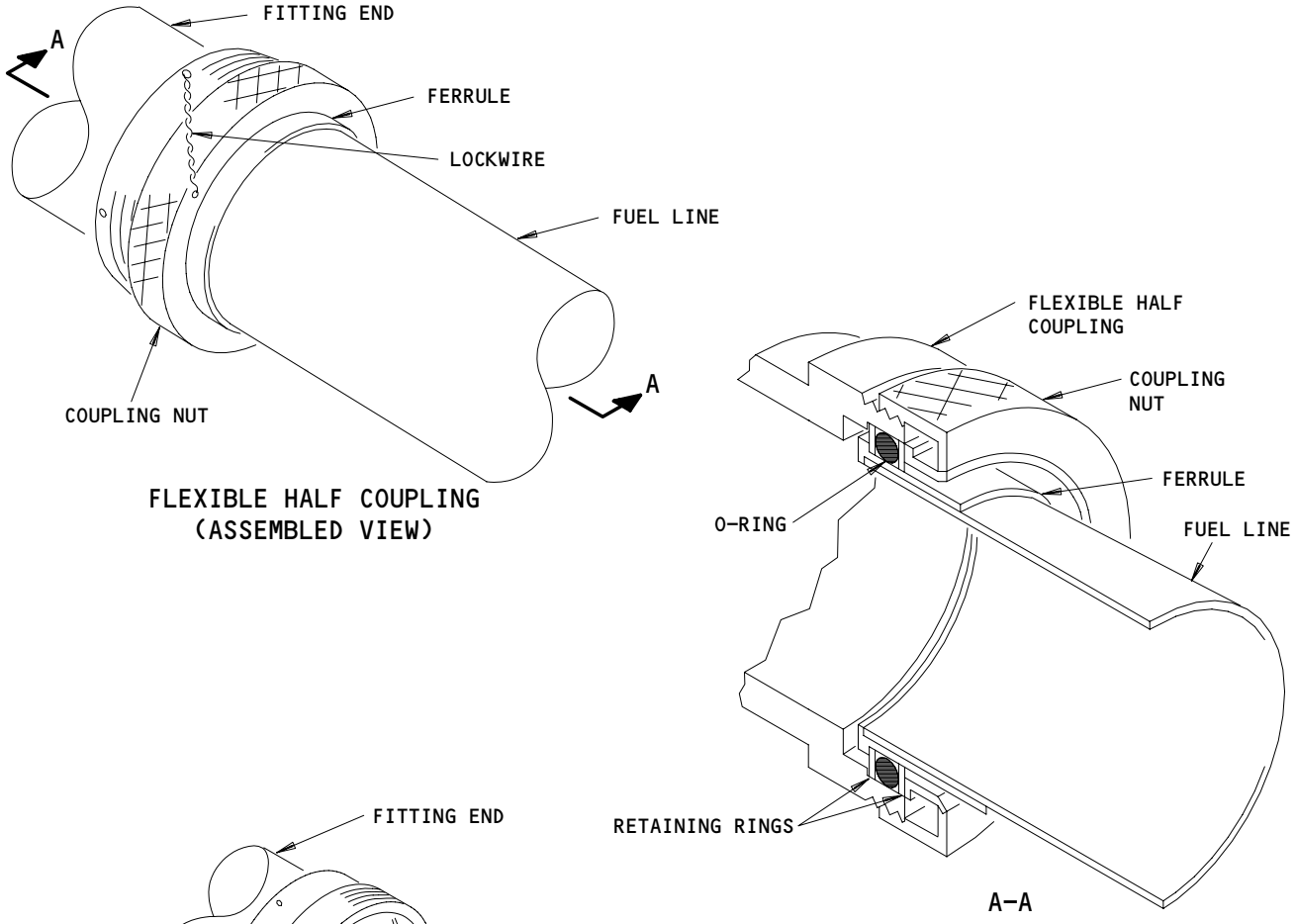
E



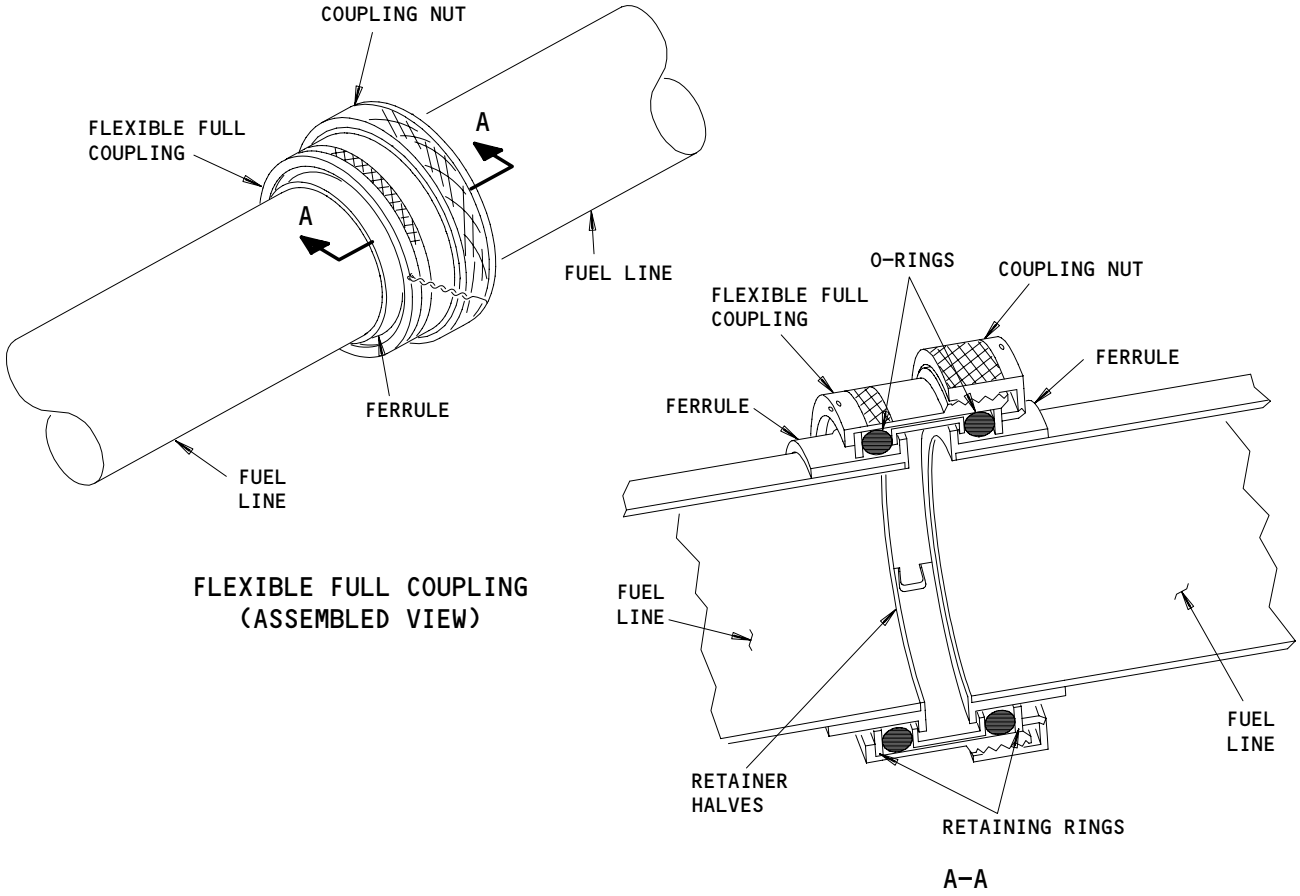
FITTING OF THE APU FUEL LINE IN THE CENTER FUEL TANK

F

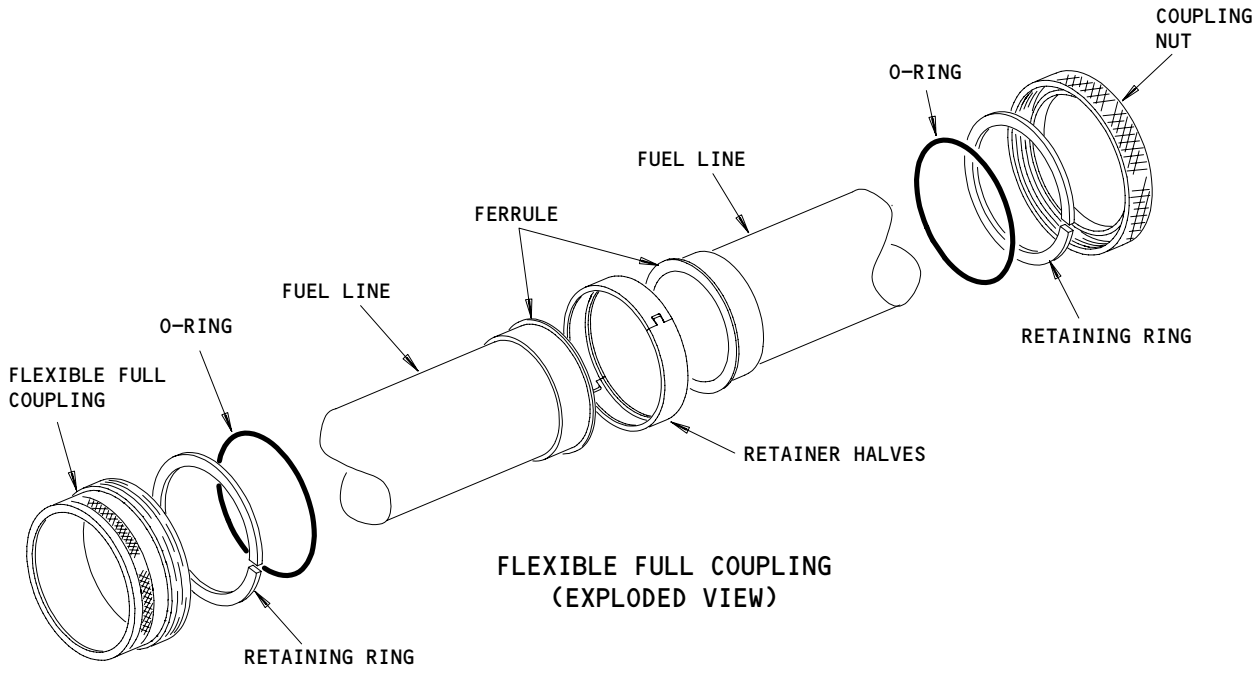
Examples of Fittings on the Fuel Line
Figure 402 (Sheet 2)



Flexible Half Coupling Installation
Figure 403

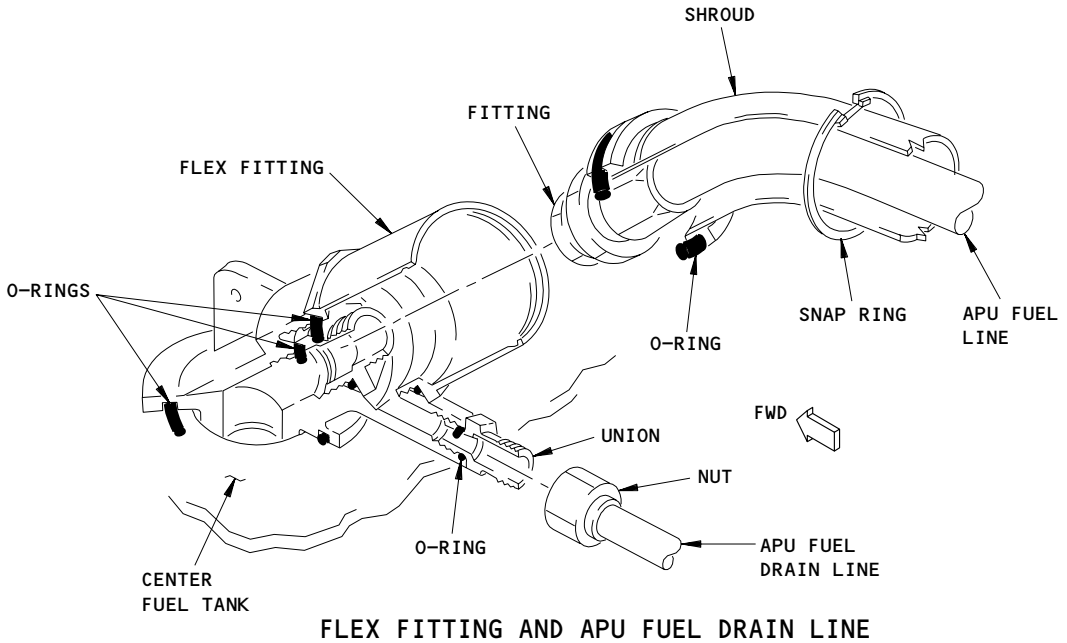


FLEXIBLE FULL COUPLING
(ASSEMBLED VIEW)



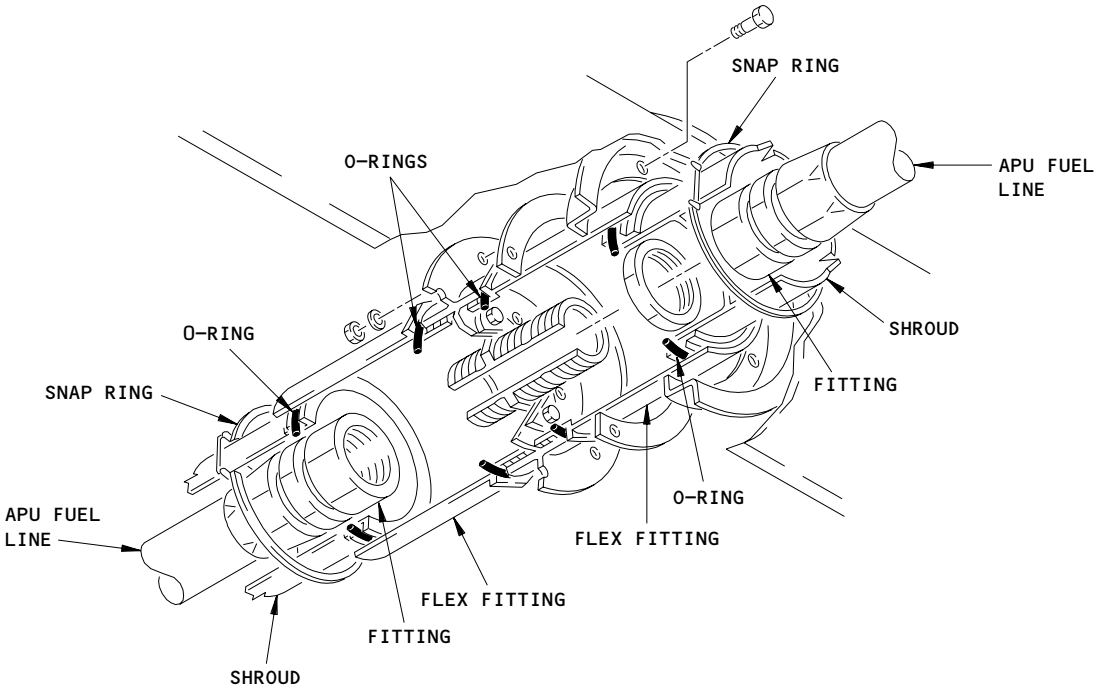
FLEXIBLE FULL COUPLING
(EXPLODED VIEW)

Flexible Full Coupling Installation
Figure 404



FLEX FITTING AND APU FUEL DRAIN LINE
OUT AND ABOVE THE CENTER FUEL TANK

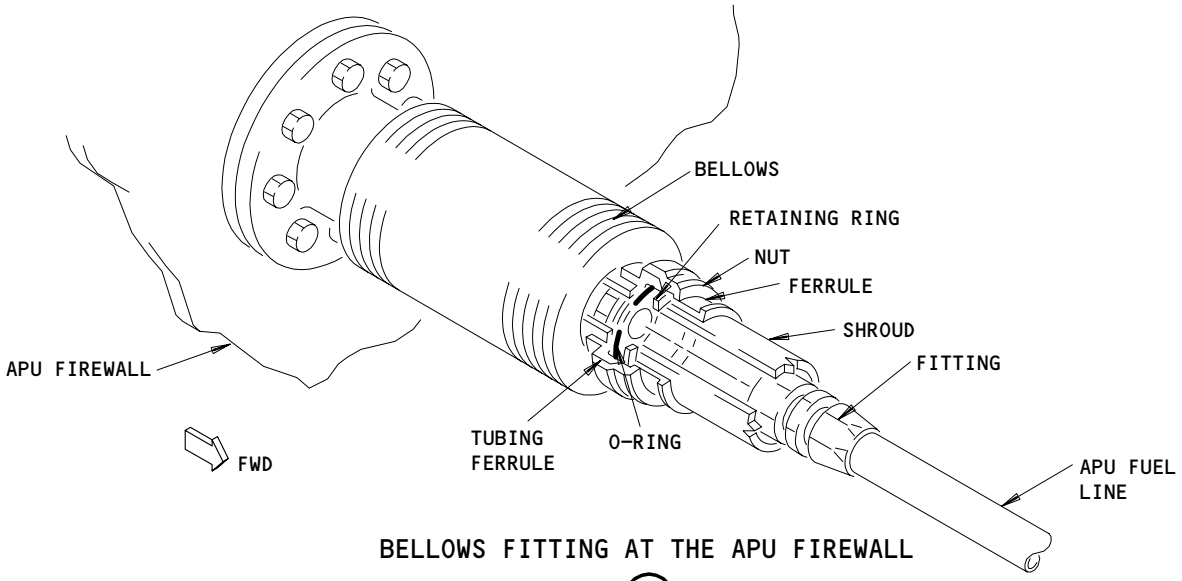
A



FLEX FITTINGS AT THE AFT PRESSURE BULKHEAD

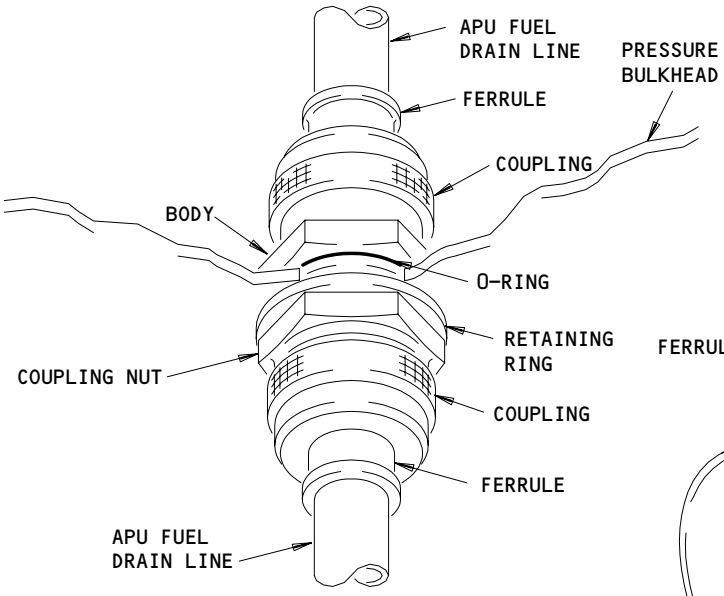
B

Fittings of the APU Fuel and Drain Lines
Figure 405 (Sheet 1)



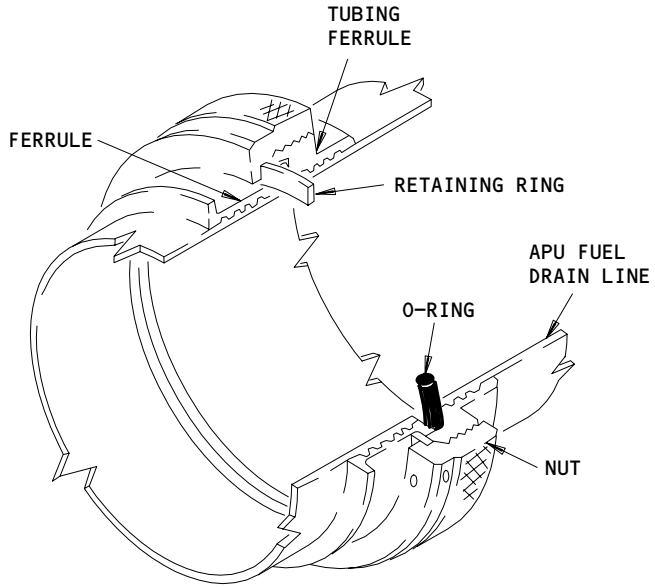
BELLOWS FITTING AT THE APU FIREWALL

C



PRESSURE BULKHEAD FITTING

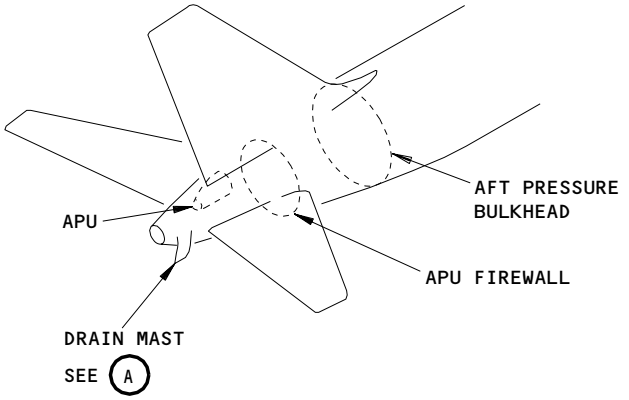
D

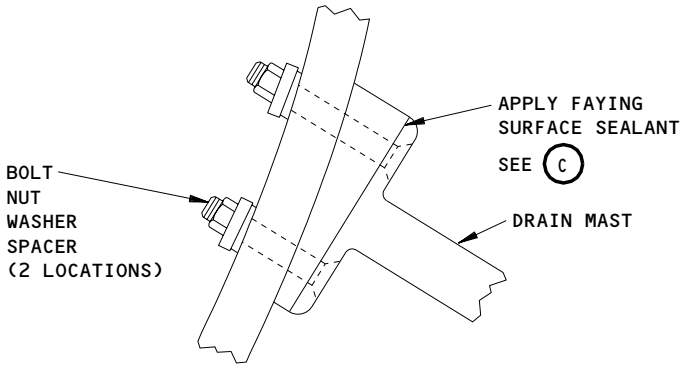


NUT ASSEMBLY

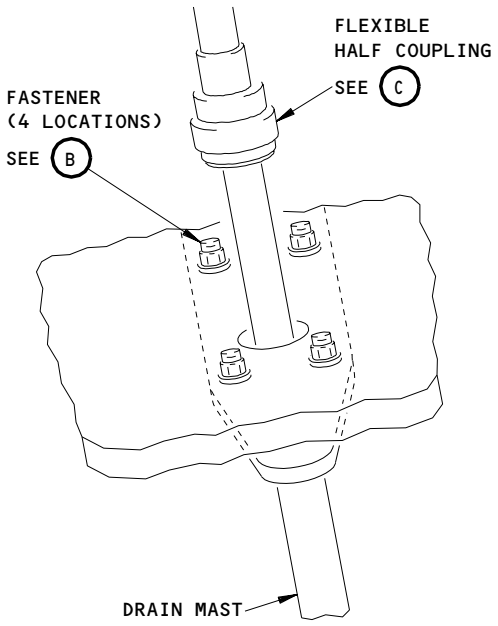
E

Fittings of the APU Fuel and Drain Lines
Figure 405 (Sheet 2)

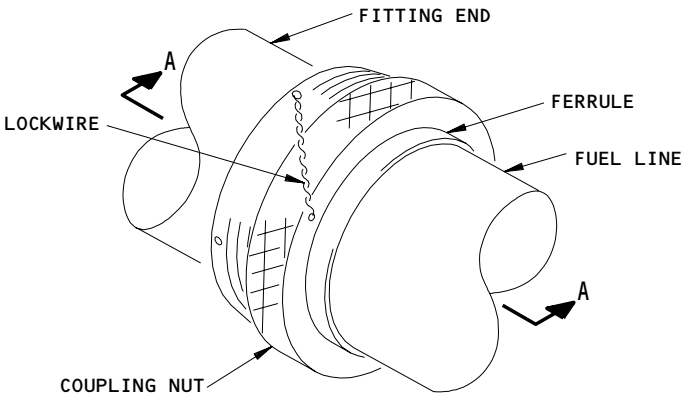




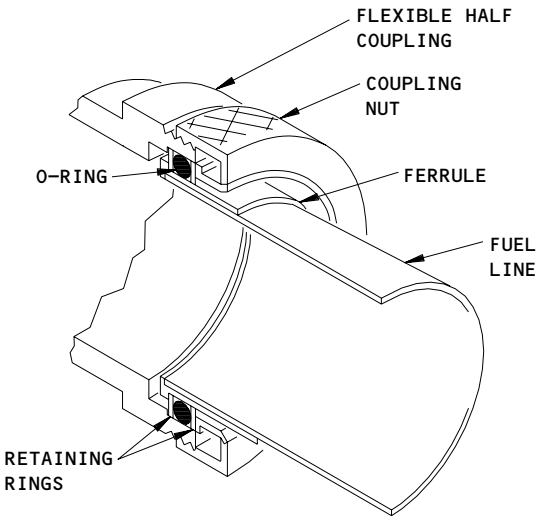
FASTENER
(EXAMPLE)
B



DRAIN MAST
A



FLEXIBLE HALF COUPLING
(ASSEMBLED VIEW)
C



A-A

APU Fuel Drain Mast
Figure 406

(c) Remove the single bonding jumper clamp from the fuel line.

S 024-002

(2) To remove the double bonding jumper clamp (View B, Fig. 402), do the steps that follow:
(a) Remove the screw, washers and nut from the double bonding jumper clamp on the fuel line.
(b) Move the two bonding jumpers away from the double bonding jumper clamp.
(c) Remove the double bonding jumper clamp from the fuel line.

S 024-003

(3) To remove the loop clamp (attached to the structure) (View C, Fig. 402), to the steps that follow:
(a) Remove the screw, washer and nut that attach the loop clamp to the structure.
(b) Remove the loop clamp from the structure and the fuel line.

S 024-088

(4) To remove the double loop clamp (View D, Fig. 402), do the steps that follow:
(a) Remove the screw, washer, nut and spacer from the double loop clamp.
(b) Remove the small clamp of the double loop clamp from the fuel line.
(c) Remove the large clamp of the double loop clamp from the adjacent tubing.

S 024-004

(5) To remove the saddle clamp (attached to the structure) (View E, Fig. 402), do the steps that follow:
(a) Remove the screw, washer and nut that attaches the saddle clamp to the structure.
(b) Remove the saddle clamp from the structure and the fuel line.

S 024-005

(6) To remove the flexible half coupling (Fig. 403), do the steps that follow:
(a) Remove the coupling nut.
(b) Remove the two retaining rings and one O-ring from the ferrule.
(c) Remove the ferrule.
(d) Remove the flexible half coupling.

S 024-006

(7) To remove the flexible full coupling (Fig. 404), do the steps that follow:
(a) Remove the coupling nut from the flexible full coupling.
(b) Disconnect the retainer halves.
(c) Remove the two retaining rings.

(d) Remove the two O-rings.
(e) Remove the two ferrules.
(f) Remove the flexible full coupling.

TASK 28-25-05-404-089

3. Install the Fittings on the Fuel Line

A. General
(1) This procedure gives examples of the installation procedure for fittings on the fuel line.

B. Consumable Materials
(1) A00767 - Sealant - BMS 5-45 Class B

C. References
(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 51-31-01/201, Seals and Sealant

D. Access
(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
241	Passenger Cabin - Section 44 (Left)
242	Passenger Cabin - Section 44 (Right)
251	Passenger Cabin - Section 46 (Left)
252	Passenger Cabin - Section 46 (Right)
311	Area Aft of Pressure Bulkhead to BS 1787.45 (Left)
312	Area Aft of Pressure Bulkhead to BS 1787.45 (Right)
313	Stabilizer Center Section Compartment (Left)
314	Stabilizer Center Section Compartment (Right)
315	APU Compartment (Left)
316	APU Compartment (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)

E. Install the Fittings on the Fuel Line

S 424-007
(1) To install the single bonding jumper clamp (View A, Fig. 402), do the steps that follow:
(a) Put the single bonding jumper clamp on the fuel line and slide along the fuel line until the clamp is close enough to the bonding jumper to install the bonding jumper.
(b) Put the washer, then the bonding jumper, then the washer on the screw.
(c) Put the screw through the clamp.
(d) Install the washer, and the nut on the screw.
(e) Apply a fillet seal with the sealant (BMS 5-45) on the single bonding jumper clamp (AMM 51-31-01/201).
(f) Make sure the bonding resistance between the jumper and the airplane structure is not more than 0.01 ohms (AMM 20-10-21/601).

S 424-008

(2) To install the double bonding jumper clamp (View B, Fig. 402), do the steps that follow:
   (a) Put the double bonding jumper clamp on the fuel line and slide the clamp along the fuel line until clamp is between the two bonding jumpers.
   (b) Put the washer, then the bonding jumper, and then the washer on the screw.
   (c) Put the screw through the clamp.
   (d) Put the washer, then the bonding jumper, then the washer, and then the nut on the screw.
   (e) Tighten the nut on the screw.
   (f) Apply a fillet seal with the sealant (BMS 5-45) on the double bonding jumper clamp (AMM 51-31-01/201).
   (g) Make sure the bonding resistance between the bonding jumper and the airplane structure is not more than 0.01 ohms (AMM 20-10-21/601).

S 424-009

(3) To install the loop clamp (attached to the structure) (View C, Fig. 402), do the steps that follow:
   (a) Put the loop clamp on the APU fuel line and align with the holes in the structure.
   (b) Install the screw through the structure, then the clamp.
   (c) Put the washer and the nut on the screw.

S 424-090

(4) To install the double loop clamp (View D, Fig. 402), do the steps that follow:
   (a) Put the small clamp of the double loop clamp on the fuel line.
   (b) Put the large clamp of the double loop clamp on the tubing adjacent to the fuel line.
   (c) Put the screw through the small clamp.
   (d) Put the spacer on the screw.
   (e) Move the large clamp up onto the screw.
   (f) Install the washer and nut on the screw.

S 424-010

(5) To install the saddle clamp (attached to the structure) (View E, Fig. 402), do the steps that follow:
   (a) Put the saddle of the saddle clamp against the fuel line and align with the structure.
   (b) Put the saddle clamp on the fuel line and align with the saddle.
   (c) Put the screw through the saddle clamp, saddle and the structure.
   (d) Install the washer and nut on the screw.

S 424-011

(6) To install the flexible half coupling (Fig. 403), do the steps that follow:
   (a) Install one new retaining ring on the ferrule.
   (b) Install a new O-ring on the ferrule.
   (c) Install a second new retaining ring on the ferrule.

   CAUTION: DO NOT USE TOOLS TO TIGHTEN THE FITTINGS OF THE FUEL LINE. DAMAGE TO THE FITTING COMPONENTS COULD OCCUR OR THE ADJACENT FITTINGS COULD LOOSEN.

   (d) Tighten with your hand the coupling nut on the ferrule.
   (e) Install the lockwire on the coupling nut.

S 424-012

(7) To install the flexible full coupling (Fig. 404), do these steps:

   NOTE: Make sure the two ends of the fuel line are not out of alignment by more than four degrees. Make sure the offset between the two ends is not more than 0.06 inches.

   (a) Put the coupling nut on the ferrule on the end of one fuel line.
   (b) Put the flexible full coupling on the ferrule on the end of the adjacent fuel line.
   (c) Install one new retaining ring on each ferrule.
   (d) Install one new O-ring on each ferrule.
   (e) Put the two fuel lines together with a space of 0.15 $\pm$ 0.05 inches between the ferrules.
   (f) Connect the retainer halves together on the two fuel lines.

   CAUTION: DO NOT USE TOOLS TO TIGHTEN THE FITTINGS ON THE FUEL LINE. DAMAGE TO THE FITTING COMPONENTS COULD OCCUR OR THE ADJACENT FITTINGS COULD LOOSEN.

   (g) Install the coupling nut onto the flexible full coupling with your hand.
   (h) Install the lockwire on the coupling nut.

TASK 28-25-05-004-013

4. Remove the APU Fuel Line in the Fuel Tanks

A. References
   (1) AMM 28-11-00/201, Fuel Tanks
   (2) AMM 28-11-01/401, Main Tank Access Door
   (3) AMM 28-11-02/401, Center Tank Access Door
   (4) AMM 28-26-00/201, Defueling

B. Equipment
   (1) Container - for use with fuel, commercialy available.

C. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)

(2) Access Panels

134AZ Center Tank Access Door (Right)
531AB Center Tank Access Door (Left)
531BB Center Tank Access Door (Left)
531CB Center Tank Access Door (Left)
541AB Main Tank Access Door (Left)

D. Remove the APU Fuel Line in the Fuel Tanks

S 654-091

(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 834-180

(2) Make sure the APU fuel shutoff valve is closed.

S 834-181

(3) Make sure the APU master control switch on the overhead panel, P5 is in the OFF position and attach a DO-NOT OPERATE tag.

S 834-182

(4) Remove the electrical power from the airplane.

S 834-183

(5) Open these circuit breakers and attach DO-NOT CLOSE tags:

(a) On the main power distribution panel, P6:

1) 6E3, APU FUEL VALVE
2) 6H23, L FWD FUEL BOOST PUMP

(b) On the overhead circuit breaker panel, P11:

1) 11C33, APU DC PUMP.

S 654-092

(6) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

S 014-014

(7) To remove the APU fuel line in the center fuel tank, open the applicable center tank access door, 134AZ, 531AB, 531BB, or 531CB (AMM 28-11-02/401).

S 014-015

(8) To remove the APU fuel line in the left main fuel tank, open the left main tank access door, 541AB (AMM 28-11-01/401).

S 944-093

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-094

(10) Go into the fuel tank.

S 034-095

(11) Remove the applicable fittings from the APU fuel line per the Remove the Fittings on the Fuel Line procedure.

S 684-179

(12) Drain all fuel remaining in the APU fuel line into a container.

S 034-016

(13) Remove the fitting where the APU fuel line goes out of the center fuel tank (View F, Fig. 402).

S 024-096

(14) Remove the APU fuel line.

TASK 28-25-05-404-097

5. Install the APU Fuel Line in the Fuel Tanks

A. References

(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-01/401, Main Tank Access Door
(3) AMM 28-11-02/401, Center Tank Access Door

B. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)

(2) Access Panels

134AZ	Center Tank Access Door (Right)
531AB	Center Tank Access Door (Left)
531BB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)

C. Install the APU Fuel Line in the Fuel Tanks

S 944-098

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 424-099

(2) Install the APU fuel line in the fuel tank.

S 434-017

(3) Put a new O-ring on the fitting where the APU fuel line goes out of the center fuel tank (View F, Fig. 402).

S 434-100

(4) Install the fitting where the APU fuel line goes out of the center fuel tank.

S 434-101

(5) Install the applicable fittings on the APU fuel line per the Install the Fittings on the Fuel Line procedure.

S 414-018

(6) Install the center tank access door, 134AZ, 531AB, 531BB, or 531CB, if removed (AMM 28-11-02/401).

S 414-019

(7) Install the left main tank access door, 541AB, if removed (AMM 28-11-01/401).

S 834-184

(8) Remove the DO-NOT-OPERATE tag on the APU master control switch on the overhead panel, P5.

S 834-185

(9) Remove the DO-NOT-CLOSE tag and close these circuit breakers:
   (a) On the main power distribution panel, P6:
      1) 6E3, APU FUEL VALVE
      2) 6H23, L FWD FUEL BOOST PUMP
   (b) On the overhead circuit breaker panel, P11:
      1) 11C33, APU DC PUMP

TASK 28-25-05-004-020

6. Remove the APU Fuel Line and Shroud Between the Center Fuel Tank and the APU Firewall

A. References

(1) AMM 06-42-00/201, Empennage Access Doors and Panels

(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 25-50-01/401, Cargo Compartment Ceiling Lining
(4) AMM 25-50-03/401, Bulkhead Lining
(5) AMM 53-01-01/401, Floor Panels

B. Equipment
(1) Container - for use with fuel, commercialy available.

C. Access
(1) Location Zones
153 Aft Cargo Compartment (Left)
241 Passenger Cabin - Section 44 (Left)
242 Passenger Cabin - Section 44 (Right)
251 Passenger Cabin - Section 46 (Left)
252 Passenger Cabin - Section 46 (Right)
311 Area Aft of Pressure Bulkhead to BS 1787.45 (Left)
312 Area Aft of Pressure Bulkhead to BS 1787.45 (Right)
313 Stabilizer Center Section Compartment (Left)
314 Stabilizer Center Section Compartment (Right)

(2) Access Panel
311AL Access Door (Left)

D. Remove the APU Fuel Line and Shroud between the Center Fuel Tank and the APU Firewall

S 864-173
(1) Make sure the APU fuel shutoff valve is closed.

S 864-174
(2) Make sure the APU master control switch on the overhead panel, P5, is in the OFF position and attach a DO-NOT-OPERATE tag.

S 084-175
(3) Remove the electrical power from the airplane (AMM 24-22-00/201).

S 864-176
(4) Open these circuit breakers and attach DO-NOT-CLOSE tags:
(a) On the main power distribution panel, P6:
1) 6E3, APU FUEL VALVE
2) 6H23, L FWD FUEL BOOST PUMP
(b) On the overhead circuit breaker panel, P11:
1) 11C33, APU DC PUMP

S 014-021
(5) To remove the APU fuel line and shroud between the center fuel tank and the aft pressure bulkhead, remove the applicable floor panel (AMM 53-01-01/401) or remove the applicable left ceiling lining in the aft cargo compartment (AMM 25-50-01/401) and bulkhead lining (AMM 25-50-03/401).

S 014-022

(6) To remove the APU fuel line and shroud between the aft pressure bulkhead and the APU firewall, open the access door 311AL (AMM 06-42-00/201).

S 034-023

(7) To remove the APU fuel line from out and above the center fuel tank (View A, Fig. 405), and at the aft pressure bulkhead (View B, Fig. 405), do the steps that follow:
   (a) Disconnect and move the flex fitting until it is against the reducing ferrule on the shroud.
   (b) Disconnect the APU fuel line at the fitting.
   (c) Drain all the fuel that remains in the APU fuel line into a container.
   (d) Remove the snap ring.
   (e) Connect the flex fitting.
   (f) Remove the APU fuel line and shroud from in the flex fitting.
   (g) Put a container below the APU shroud drain to collect the fuel remaining in the flexible APU fuel line.

S 034-024

(8) To remove the APU fuel line and shroud at the APU firewall (View C, Fig. 405), do the steps that follow:
   (a) Remove the nut that connects the shroud to the bellows.
   (b) Disconnect the fitting of the APU fuel line, forward of the bellows.
   (c) Move the APU fuel line and the shroud away from the APU firewall.

S 034-104

(9) Remove the applicable fittings from the APU fuel line per the Remove the Fittings on the Fuel Line procedure.

S 024-105

(10) Remove the APU fuel line and shroud.

TASK 28-25-05-404-106

7. Install the APU Fuel Line and Shroud between the Center Fuel Tank and the APU Firewall

A. Consumable Material
   (1) D00250 VV-P236, Petrolatum (Petroleum Jelly)

B. References
   (1) AMM 06-42-00/201, Empennage Access Doors and Panels

(2) AMM 25-50-01/401, Cargo Compartment Ceiling Lining
(3) AMM 25-50-03/401, Bulkhead Lining
(4) AMM 53-01-01/401, Floor Panels

C. Access

(1) Location Zones

153 Aft Cargo Compartment (Left)
241 Passenger Cabin - Section 44 (Left)
242 Passenger Cabin - Section 44 (Right)
251 Passenger Cabin - Section 46 (Left)
252 Passenger Cabin - Section 46 (Right)
311 Area Aft of Pressure Bulkhead to BS 1787.45 (Left)
312 Area Aft of Pressure Bulkhead to BS 1787.45 (Right)
313 Stabilizer Center Section Compartment (Left)
314 Stabilizer Center Section Compartment (Right)

(2) Access Panel

311AL Access Door (Left)

D. Install the APU Fuel Line and Shroud between the Center Fuel Tank and the APU Firewall

S 424-025

(1) Put the APU fuel line and shroud through the holes in the structure.

S 434-026

(2) To install the APU fuel line out and above the center fuel tank (View A, Fig. 405) and at the aft pressure bulkhead (View B, Fig. 405), do the steps that follow:
(a) Apply petrolatum grease on the new O-ring.
(b) Install a new O-ring in the groove of the shroud.
(c) Put the APU fuel line and shroud into the flex fitting.
(d) Disconnect the flex fitting.
(e) Connect and tighten the APU fuel line at fitting.
(f) Apply petrolatum grease on the new O-ring.
(g) Install the new O-ring in the groove of the flex fitting.
(h) Connect the flex fitting and torque to 630-770 inch-pounds (71-87 N.m).
(i) Install the snap ring.

S 434-027

(3) To install the APU fuel line and shroud at the APU firewall (View C, Fig. 405), do the steps that follow:
(a) Connect the APU fuel line at the fitting, forward of the bellows.
(b) Install a new O-ring in the tubing ferrule.
(c) Put the retaining ring on the ferrule.
(d) Install the ferrule in the tubing ferrule.
(e) Install the nut and tighten to a torque of 630-770 inch-pounds (71-87 Nm) on the tubing ferrule to connect the shroud to the bellows.

S 434-028
(4) Install the applicable fittings on the APU fuel line per the Install the Fittings on the Fuel Line procedure.

S 024-186
(5) Remove the DO-NOT OPERATE tag from the APU master control switch on the overhead panel, P5.

S 024-187
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the main power distribution panel, p6:
1) 6E3, APU FUEL VALVE
2) 6H23, L FWD FUEL BOOST PUMP
(b) On the overhead circuit breaker panel, P11:
1) 11C33, APU DC PUMP

S 794-141
(7) Do this task: "Leakage Test of the APU Fuel Line and Shroud".

S 414-029
(8) Install the applicable floor panels (AMM 53-01-01/401) or ceiling linings (AMM 25-50-01/401) and bulkhead lining (AMM 25-50-03/401).

S 414-030
(9) Close the access door, 311AL, if opened (AMM 06-42-00/201).

TASK 28-25-05-004-031
8. Remove the APU Fuel Drain Line
A. References
(1) AMM 53-01-01/401, Floor Panels
B. Access
(1) Location Zones
241 Passenger Compartment - Section 44 (Left)
242 Passenger Compartment - Section 44 (Right)

C. Remove the APU Fuel Drain Line

S 014-032
(1) To remove the APU fuel drain line between the center fuel tank and the main gear wheel well, remove the applicable floor panel (AMM 53-01-01/401).

S 034-034
(2) Remove the nut to disconnect the APU fuel drain line out and above the center fuel tank from the union (View A, Fig. 405).

S 034-035
(3) Remove the coupling nut to disconnect the APU fuel drain line at the pressure bulkhead, forward of the main gear wheel well (View D, Fig. 405).

S 034-054
(4) Remove the nut assembly above the APU sump drain valve (View E, Fig. 405).

S 034-109
(5) Remove the applicable fittings from the APU fuel drain line per the Remove the Fittings on the Fuel Line procedure.

S 024-110
(6) Remove the APU fuel drain line.

TASK 28-25-05-404-111

9. Install the APU Fuel Drain Line

A. Consumable Materials
(1) D00064 Lubricant - Krytox 240 AC

B. References
(1) AMM 53-01-01/401, Floor Panels

C. Access
(1) Location Zones
241 Passenger Compartment - Section 44 (Left)
242 Passenger Compartment - Section 44 (Right)

D. Install the APU Fuel Drain Line

S 424-055
(1) Put the APU fuel drain line in position through the holes in the structure.

S 434-056
(2) To install the nut assembly above the APU sump drain valve (View E, Fig. 405), do the steps that follow:
(a) Install a new O-ring in the tubing ferrule flange.
(b) Put the retaining ring on the ferrule.
(c) Install the ferrule in the tubing ferrule.
(d) Install the nut on the tubing ferrule.

S 434-074
(3) To install the couplings to connect the APU fuel drain line at the pressure bulkhead (View D, Fig. 405), forward of the wheel well, do the steps that follow:
(a) Install the ferrules on the APU fuel drain lines.
(b) Apply thread lubricant on the thread of the tubing ferrule.
(c) Put the coupling nut on the ferrule.
(d) Install the retaining ring on the ferrule between the coupling nut and the flange of the ferrule which connects with the body.
(e) Install the O-ring in the groove of the body.
(f) Install the coupling on the body.
(g) Install the lockwire on the coupling.

S 434-075
(4) Install the nut on the union out and above the center fuel tank to connect the APU fuel drain line (View A, Fig. 405).

S 434-114
(5) Install the applicable fittings on the APU fuel drain line per the Install the Fittings on the Fuel Line procedure.

S 794-140
(6) Do this task: Leakage Test of the APU Fuel Line and Shroud.

S 414-076
(7) Install the floor panels (AMM 53-01-01/401).

TASK 28-25-05-794-139

10. Leakage Test of the APU Fuel Line and Shroud

A. General
(1) Do this test to make sure there is no leakage after you install a section of the APU fuel line.

B. References
(1) AMM 12-11-04/301, APU Fuel Line Shroud Draining
(2) AMM 24-22-00/201, Manual Control

C. Access
(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
241	Passenger Cabin - Section 44 (Left)
242	Passenger Cabin - Section 44 (Right)
251	Passenger Cabin - Section 46 (Left)
252	Passenger Cabin - Section 46 (Right)
311	Area Aft of Pressure Bulkhead to BS 1787.45 (Left)
312	Area Aft of Pressure Bulkhead to BS 1787.45 (Right)
313	Stabilizer Center Section Compartment (Left)
314	Stabilizer Center Section Compartment (Right)
315	APU Compartment (Left)
316	APU Compartment (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)

D. Procedure

S 684-128
(1) Open the sump drain valve to make sure there is no fuel or water in the APU fuel line shroud (AMM 12-11-04/301).

S 864-129
(2) Supply electrical power (AMM 24-22-00/201).

S 864-130
(3) Make sure these circuit breakers are closed:
(a) On the main power distrbution panel, P6:
1) 6E3, APU FUEL VALVES
2) 6H23, L FWD FUEL BOOST PUMP

S 864-131
(4) Make sure the APU fire switch on the pilot's aft control stand, P8, is in the NORMAL position.

S 864-132
(5) Set the MAIN BATTERY switch on the battery standby power panel, on the P5 panel, to the ON position.

S 864-142

CAUTION: DO NOT PUT THE APU MASTER CONTROL SWITCH TO THE "START" POSITION. THE APU COULD START AND CAUSE DAMAGE.

(6) Set the APU start switch to the ON position.

NOTE: This step opens the APU shutoff valve and operates the left forward fuel boost pump. This will pressurize the APU fuel line.

(a) Make sure someone is in the flight compartment when the fuel boost pump operates to continuously monitor for the PRESS light.
(b) Make sure the L PUMP FWD PRESS light on the P5 panel goes off.
1) If the L PUMP FWD PRESS light stays on, push the L PUMP FWD switch-light to the OFF position.

S 794-134
(7) Operate the left forward boost pump for a minimum of two minutes.

S 864-135
(8) Set the APU start switch to the OFF position.

S 864-136
(9) Set the MAIN BATTERY switch to the OFF position.

S 794-135
(10) Examine the applicable flex fittings on the APU fuel line and shroud for indications of fuel leakage.

NOTE: Examine the flex fittings on the part(s) of the fuel line and shroud that you replaced. (For example, the flex fitting at the center tank, the APU firewall, and the aft pressure bulkhead).

S 794-136
(11) After a minimum of five minutes, open the sump drain valve for the APU shroud drain line and do a check for fuel (AMM 12-11-04/301).

S 794-137
(12) If there is fuel in the shroud drain line, there is fuel leakage in the APU fuel line.
(a) Find the source of the leak and repair it.

S 864-138
(13) Remove the electrical power if it is not necessary for other tasks (AMM 24-22-00/201).

TASK 28-25-05-004-153

11. Remove the APU Fuel Line Drain Mast (Fig. 406)

A. Access

(1) Location Zones
315 APU Compartment (Left)
316 APU Compartment (Right)

(2) Access Panel
316AR APU Compartment (Right)

B. Remove the APU Fuel Line Drain Mast

S 034-154
(1) Make sure the APU master control switch on the overhead panel, P5, is in the OFF position.

S 044-155
(2) Attach a DO-NOT-OPERATE tag to the APU master control switch.

S 014-156
(3) Open the right APU access door, 316AR, and find the APU shroud drain line.

S 024-157
(4) Disconnect the coupling from the APU shroud drain line immediately upstream of the APU drain mast per the Remove the Fittings on the Fuel Line procedure (Fig. 406).

S 024-158
(5) Remove the nuts, washers and bolts.

S 024-159
(6) Remove the APU drain mast.

S 024-161
(7) Remove the sealant from the airplane surface at the APU drain mast.

NOTE: Use a plastic scraper to make sure you do not damage the airplane surface.

TASK 28-25-05-404-162

12. Install the APU Fuel Line Drain Mast (Fig. 406)

A. Consumable Materials
(1) A00490 Sealant - BMS 5-95

B. References
(1) AMM 51-31-01/201, Seal and Sealant
(2) AIPC 28-25-05-02

C. Access
(1) Location Zones
315 APU Compartment (Left)
316 APU Compartment (Right)

(2) Access Panel
316AR APU Compartment (Right)

D. Install the APU Fuel Line Drain Mast

S 394-163
(1) Make sure the airplane surface where the APU drain mast attaches is clean and does not have sealant.

S 394-164
(2) Apply the sealant on the airplane surface (AMM 51-31-01/201).

S 424-165
(3) Put the APU drain mast in position on the airplane surface.

S 424-166
(4) Install the spacers, bolts, washers, and nuts on the APU drain mast.
(a) Make sure you install the bolts with wet sealant.

S 424-167
(5) Install a new O-ring and connect the coupling to the APU shroud drain line per the Install the Fittings on the Fuel Line procedure.

S 424-168
(6) Install the lockwire on the coupling.

S 414-169

(7) Close the right APU access door, 316AR.

S 434-170

(8) Remove the DO-NOT-OPERATE tag from the APU master control switch on the P5 panel.

APU FUEL CHECK VALVE - REMOVAL/INSTALLATION

1. General
   A. The APU check valve is found in the center fuel tank. The APU check valve lets fuel go into the APU DC fuel pump but does not let fuel into the fueling manifold.
   B. This procedure contains two tasks. The first task removes the APU check valve. The second task installs the APU check valve.

TASK 28-25-06-004-001

2. Remove the APU Check Valve (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-02/401, Center Tank Access Doors
      (4) AMM 28-25-05/401, APU Fuel Line and Shroud
      (5) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          133 Center Wing Tank (Left)
          134 Center Wing Tank (Right)

      (2) Access Panels
          134AZ Center Tank Access Door (Right)
          134BZ Baffle Door
          134CZ Baffle Door
          134DZ Baffle Door

   C. Procedure

      S 654-002
      (1) Defuel the center fuel tank (AMM 28-26-00/201).

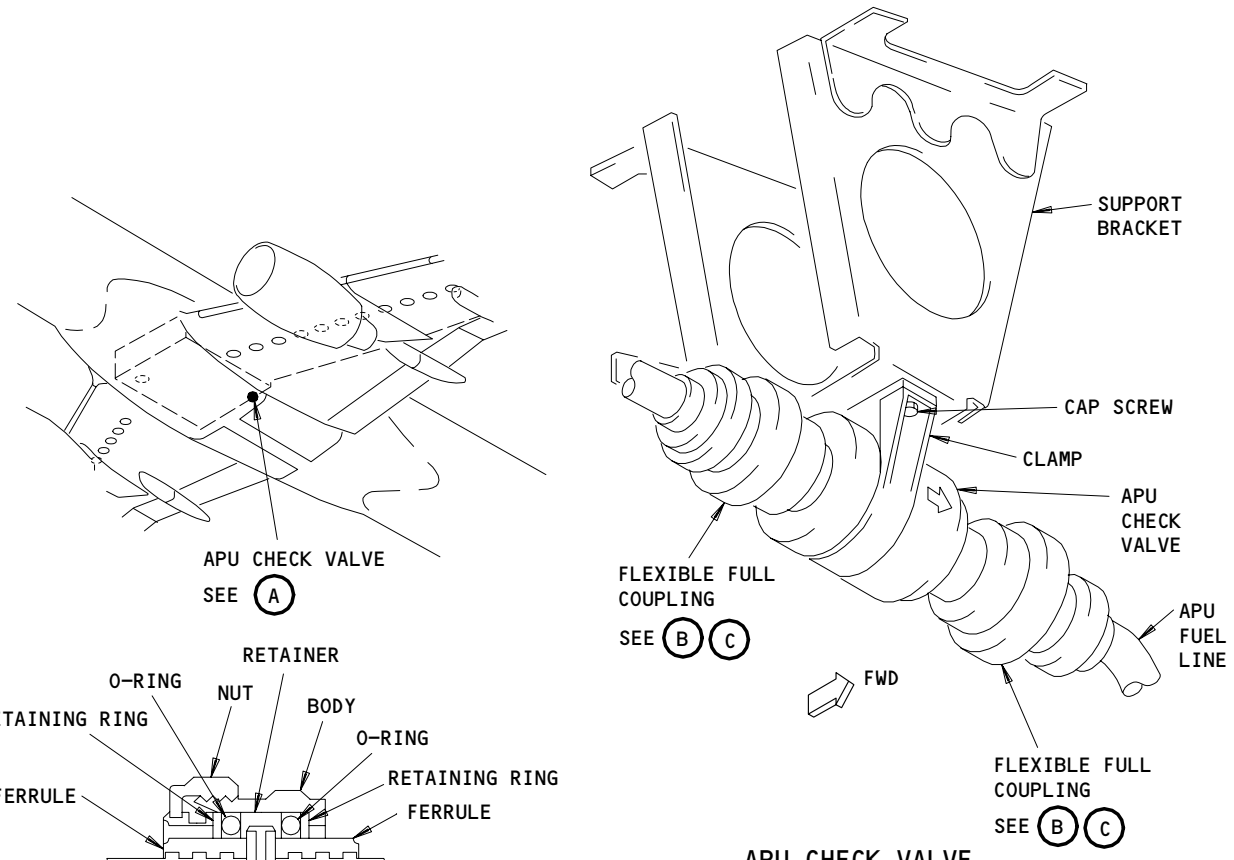
      S 654-022
      (2) Drain and purge the center fuel tank (AMM 28-11-00/201).

      S 014-010
      (3) Remove the center tank access door, 134AZ (AMM 28-11-02/401).

      S 944-003

      WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (4) Obey the fuel tank entry precautions (AMM 28-11-00/201).



APU Fuel Check Valve Installation
Figure 401

S 014-004
(5) Go into the fuel tank.

S 014-011
(6) Remove the baffle doors, 134BZ, 134CZ, and 134DZ (AMM 06-41-00/201).

S 034-012
(7) Remove the two cap screws, washers, and nuts to disconnect the clamp from around the APU check valve.

S 034-013
(8) Disconnect the flexible full couplings on each end of the APU check valve (AMM 28-25-05/401).

S 024-005
(9) Remove the APU check valve.

S 494-014
(10) Install caps on the APU fuel lines to prevent entry of unwanted materials.

TASK 28-25-06-404-015

3. Install the APU Check Valve (Fig. 401)

A. References
(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-02/401, Center Tank Access Doors
(4) AMM 28-25-05/401, APU Fuel Line and Shroud

B. Access
(1) Location Zones
133 Center Wing Section (Left)
134 Center Wing Section (Right)

(2) Access Panels
134AZ Center Tank Access Door (Right)
134BZ Baffle Door
134CZ Baffle Door
134DZ Baffle Door

C. Procedure

S 944-006

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-007
(2) Go into the center fuel tank.

S 094-016
(3) Remove the caps from the APU fuel lines.

S 424-017
(4) Align the APU check valve with the APU fuel lines.

S 214-008
(5) Make sure the flow arrow on the APU check valve points in the outboard direction.

S 434-018
(6) Use new O-rings and connect the flexible full couplings on each end of the APU check valve (AMM 28-25-05/401).

S 434-019
(7) Put the clamp around the APU check valve.

S 434-009
(8) Install the two cap screws, washers and nuts to attach the clamp to the bracket.

S 414-020
(9) Install the baffle doors, 134DZ, 134CZ, and 134BZ (AMM 06-41-00/201).

S 414-021
(10) Install the center tank access door, 134AZ (AMM 28-11-02/401).

APU FLAME ARRESTOR - REMOVAL/INSTALLATION

1. General
   A. Two APU flame arrestors are installed in the drain tubing of the APU fuel line. One flame arrestor is installed in the drain tubing above the APU sump drain valve between the wheel wells. This flame arrestor is the upper aft APU flame arrestor. The other APU flame arrestor is installed in the drain tubing above the center fuel tank. This flame arrestor is the forward APU flame arrestor.
   B. This procedure contains four tasks. The four tasks are:
      (1) Remove the upper aft APU flame arrestor
      (2) Install the upper aft APU flame arrestor
      (3) Remove the forward APU flame arrestor
      (4) Install the forward APU flame arrestor.

TASK 28-25-07-004-101

2. Remove the Upper Aft APU Flame Arrestor (Fig. 401)
   A. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zone
          149 Aft Section of Keel Beam

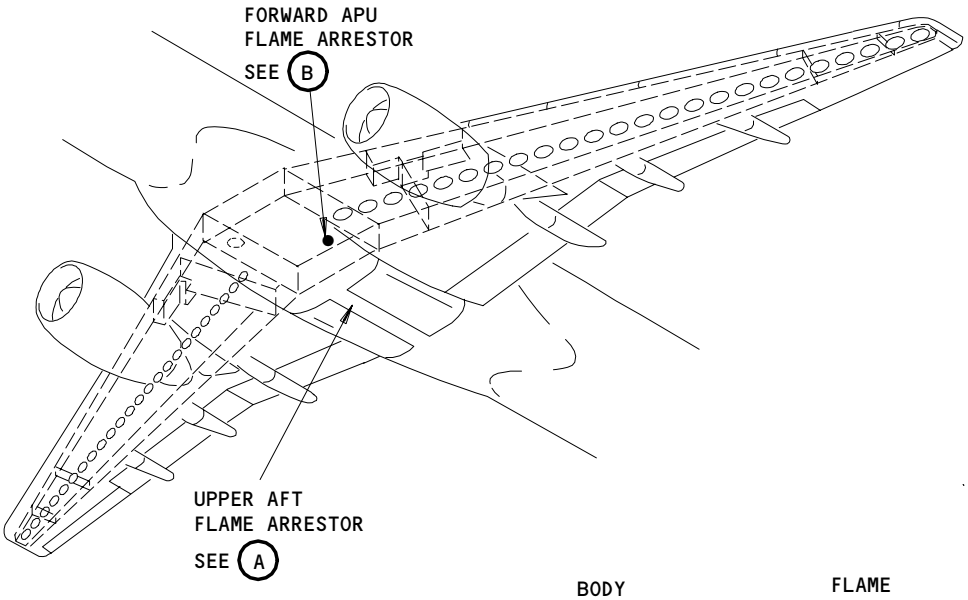
   C. Procedure

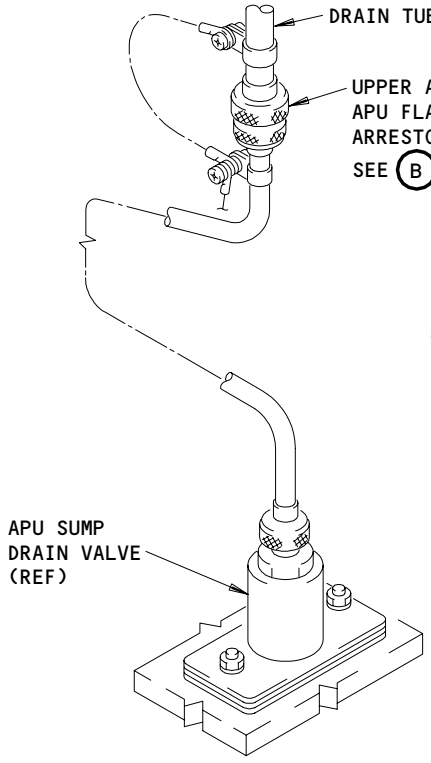
      S 214-053
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 494-054

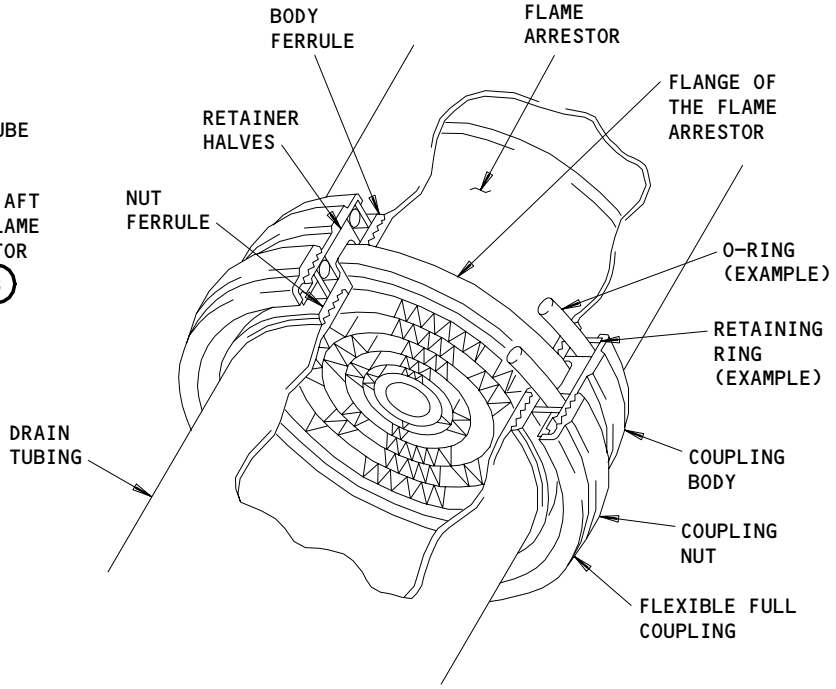
      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).





UPPER AFT APU FLAME ARRESTOR
A



FORWARD AND UPPER AFT
APU FLAME ARRESTOR
B

APU Flame Arrestor Installation
Figure 401

S 034-008
(3) Remove the coupling nut from the coupling body and slide the coupling nut and the coupling body away from the joint.

S 034-009
(4) Disconnect the two retainer halves.

S 034-010
(5) Remove and discard the two O-rings.

S 024-011
(6) Hold the flange of the upper aft APU flame arrestor and remove the upper aft APU flame arrestor from the drain tubing.

TASK 28-25-07-404-012

3. Install the Upper Aft APU Flame Arrestor (Fig. 401)

A. References
(1) AMM 32-00-15/201, Landing Gear Door Locks

B. Access
(1) Location Zone
149 Aft Section of Keel Beam

C. Procedure

S 424-013
(1) Install the upper aft APU flame arrestor in the drain tubing between the coupling nut and the coupling body.

S 434-014
(2) Install one retaining ring on the body ferrule and the other retaining ring on the nut ferrule.

S 434-015
(3) Install two new O-rings, one on the body ferrule and one on the nut ferrule.

S 434-016
(4) Connect the retainer halves.

S 434-017
(5) Install the coupling nut on the coupling body.

S 434-062
(6) Install lockwire on the coupling nut.

S 094-112

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

TASK 28-25-07-004-040

4. Remove the Forward APU Flame Arrestor (Fig. 401)
   A. References
      (1) AMM 53-01-01/401, Floor Panels
   B. Access
      (1) Location Zones
          241 Passenger Cabin - Section 44 (Left)
          242 Passenger Cabin - Section 44 (Right)

   C. Procedure

S 014-041
(1) Remove the applicable floor panel on the left side approximately 12 windows aft of the No. 2 passenger door (AMM 53-01-01/401).

S 034-042
(2) Remove the coupling nut from the coupling body and slide the coupling nut and the coupling body away from the joint.

S 034-043
(3) Disconnect the two retainer halves.

S 034-044
(4) Remove and discard the two O-rings.

S 024-045
(5) Hold the flange of the forward APU flame arrestor and remove the forward APU flame arrestor from the drain tubing.

TASK 28-25-07-404-046

5. Install the Forward APU Flame Arrestor (Fig. 401)

A. References
(1) AMM 53-01-01/401, Floor Panels

B. Access
(1) Location Zones
241 Passenger Cabin - Section 44 (Left)
242 Passenger Cabin - Section 44 (Right)

C. Procedure

S 424-047
(1) Install the forward APU flame arrestor in the drain tubing between the coupling nut and the coupling body.

S 434-048
(2) Install one retaining ring on the body ferrule and the other retaining ring on the nut ferrule.

S 434-049
(3) Install two new O-rings, one on the body ferrule and one on the nut ferrule.

S 434-050
(4) Connect the retainer halves.

S 434-051
(5) Install the coupling nut on the coupling body.

S 434-092
(6) Install lockwire on the coupling nut.

S 414-052
(7) Install the floor panel (AMM 53-01-01/401).

APU SUMP DRAIN VALVE - REMOVAL/INSTALLATION

1. General
   A. The APU sump drain valve is found between the main wheel well doors and is installed on the keel beam.

TASK 28-25-09-004-028

2. Remove the APU Sump Drain Valve (Fig. 401)
   A. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zone
          149 Aft Section of Keel Beam

   C. Remove the APU Sump Drain Valve

      S 214-005
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 494-006

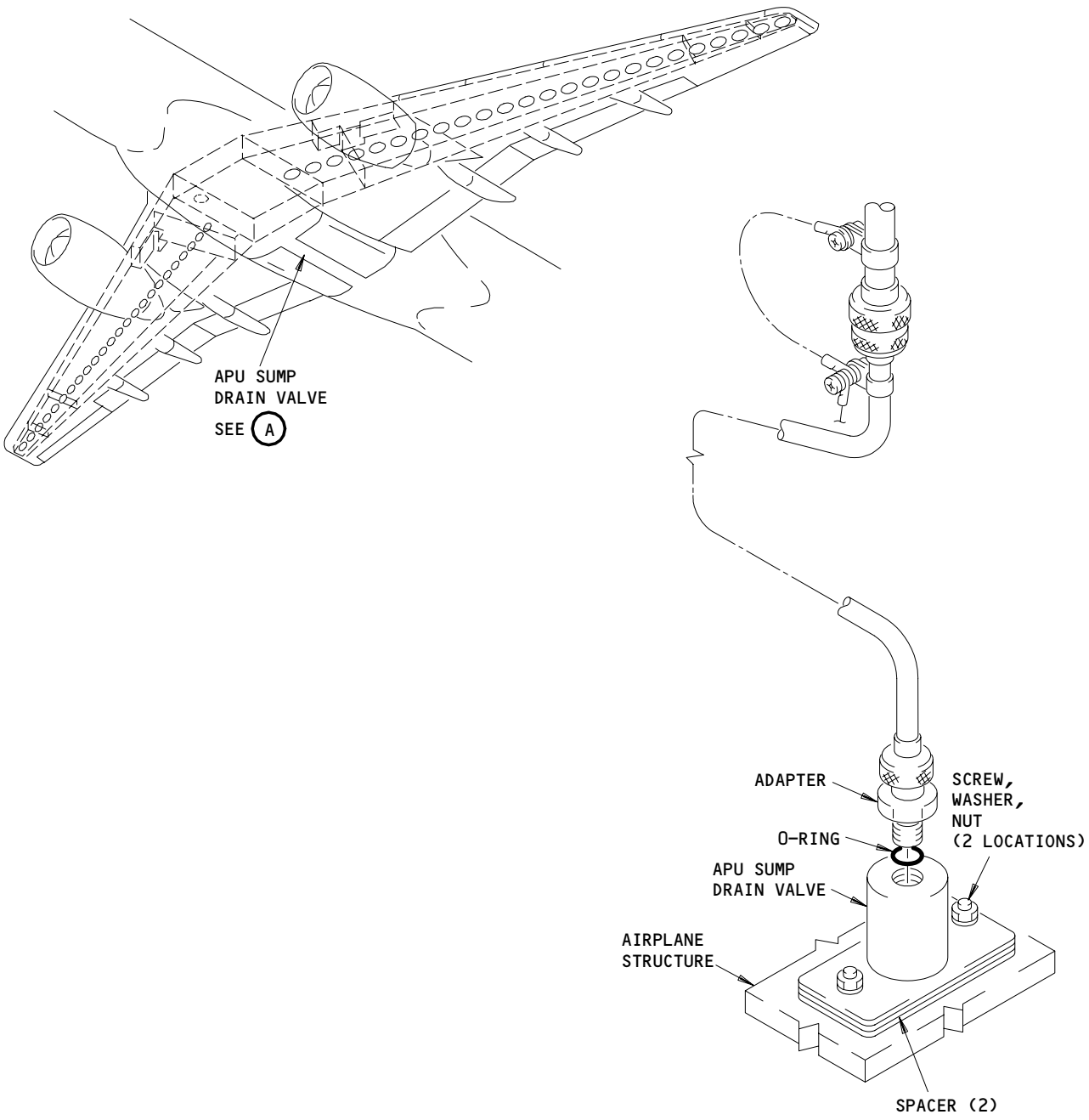
      WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY. THE MOVEMENT OF THE DOORS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 014-007
      (3) Get access to the APU sump drain valve on the keel beam.

      S 034-041
      (4) Remove the screws, washers and nuts from the APU sump drain valve.

      NOTE: Do not discard the washers and nuts.



APU Sump Drain Valve Installation
Figure 401

S 024-032
(5) Disconnect the APU sump drain valve from the adapter.

S 034-008
(6) Remove and discard the O-ring.

S 024-009
(7) Remove the APU sump drain valve.

TASK 28-25-09-404-033

3. Install the APU Sump Drain Valve (Fig. 401)
   A. Consumable Materials
      (1) A00247 Sealant (BMS 5-95)
   B. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 51-31-01/201, Seals and Sealing
   C. Access
      (1) Location Zone
          149 Aft Section of Keel Beam

   D. Install the APU Sump Drain Valve

S 434-017
(1) Install a new O-ring on the APU sump drain valve.

S 424-018
(2) Connect the APU sump drain valve to the adapter.

S 214-019
(3) Make sure the screw holes of the APU sump drain valve align with the holes in the airplane structure.

S 434-020
(4) Put spacers between the APU sump drain valve and the keel beam.

S 394-021
(5) Apply sealant in the space between the APU sump drain valve and the keel beam (AMM 51-31-01/201).

S 424-022
(6) Install the screws, washers, and nuts to attach the APU sump drain valve to the keel beam.

S 864-023
(7) Push up on the poppet of the APU sump drain valve.

S 214-024
(8) Make sure the poppet opens.

S 864-025

(9) Release the poppet.

S 214-026

(10) Make sure the poppet closes.

S 094-027

WARNING: OBEY THE REMOVAL PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY. THE MOVEMENT OF THE DOORS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(11) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

APU FUEL SHUTOFF VALVE ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. The actuator of the APU fuel shutoff valve is installed on the rear spar of the center fuel tank. The actuator is found approximately two feet to the left of the body centerline. It is not necessary to defuel the fuel tank to remove the actuator of the APU fuel shutoff valve.
   B. This procedure contains two tasks. The first task removes the actuator of the APU fuel shutoff valve. The second task installs the actuator of the APU fuel shutoff valve.

TASK 28-25-11-004-002

2. Remove the Actuator of the APU Fuel Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 32-00-15/201, Landing Gear Door Locks
      (2) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)

   C. Procedure

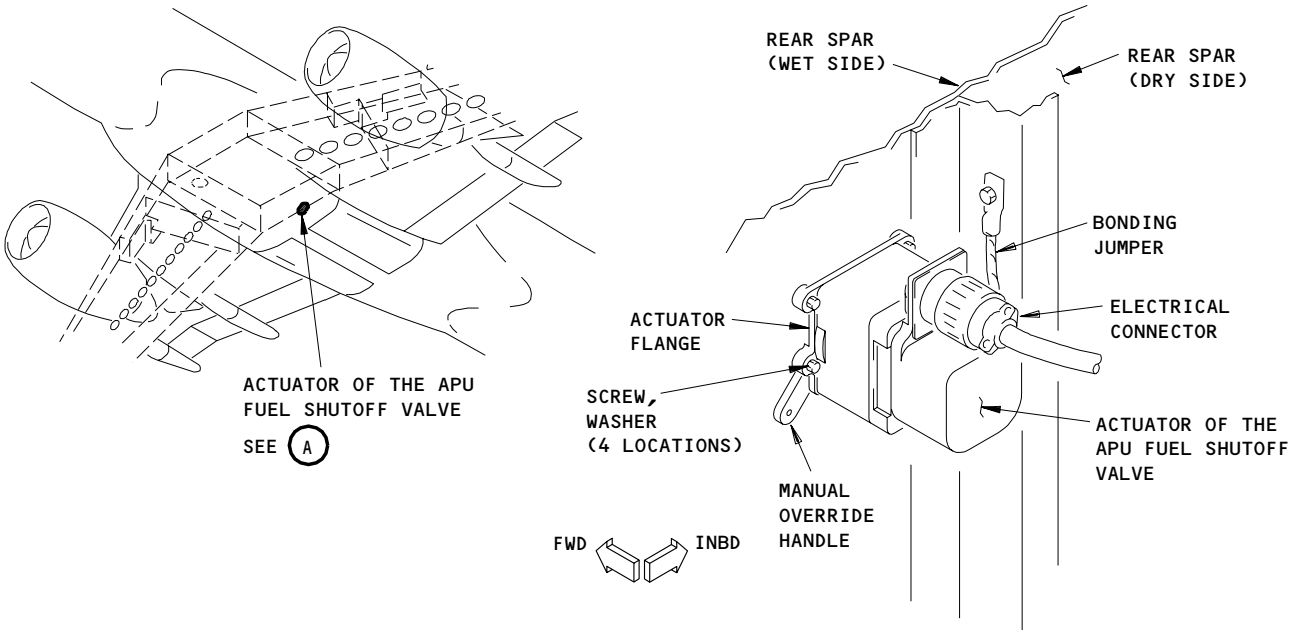
      S 864-003
      (1) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E3, FUEL VALVES APU

      S 214-004
      (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 494-005

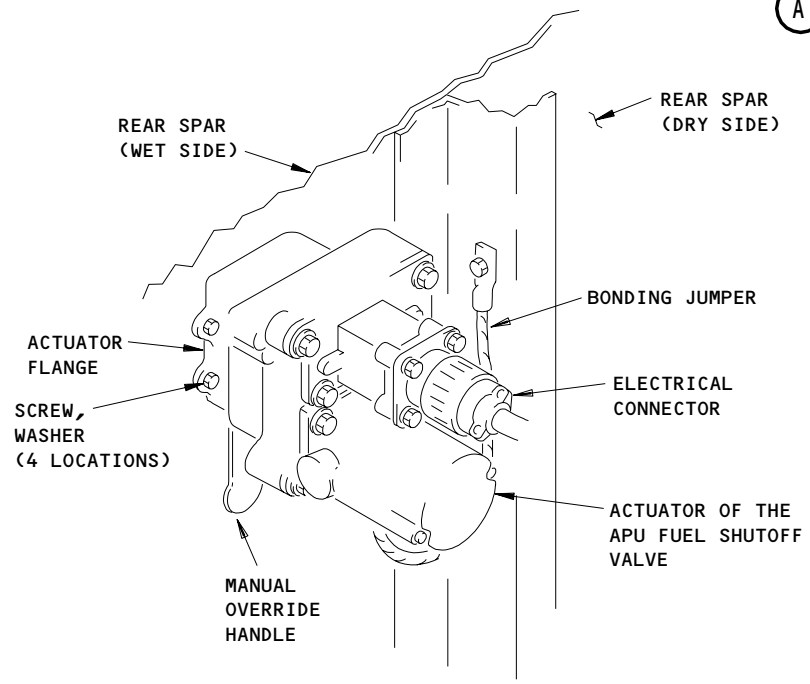
      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).



ACTUATOR OF THE APU FUEL SHUTOFF VALVE

A 1

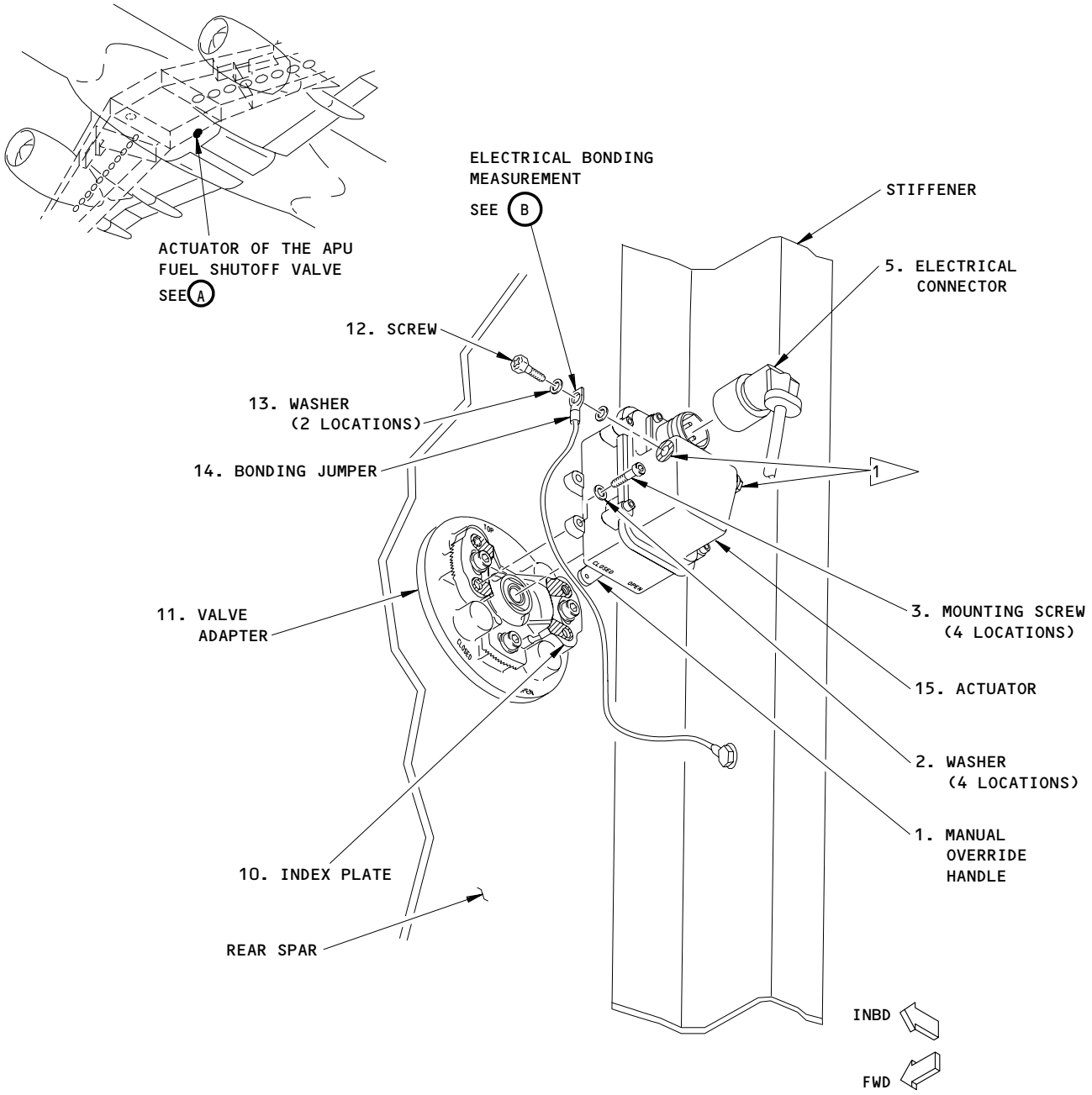


ACTUATOR OF THE APU FUEL SHUTOFF VALVE

A 2

1 PREFERRED
2 ALTERNATE

APU Fuel Shutoff Valve Actuator Installation
Figure 401

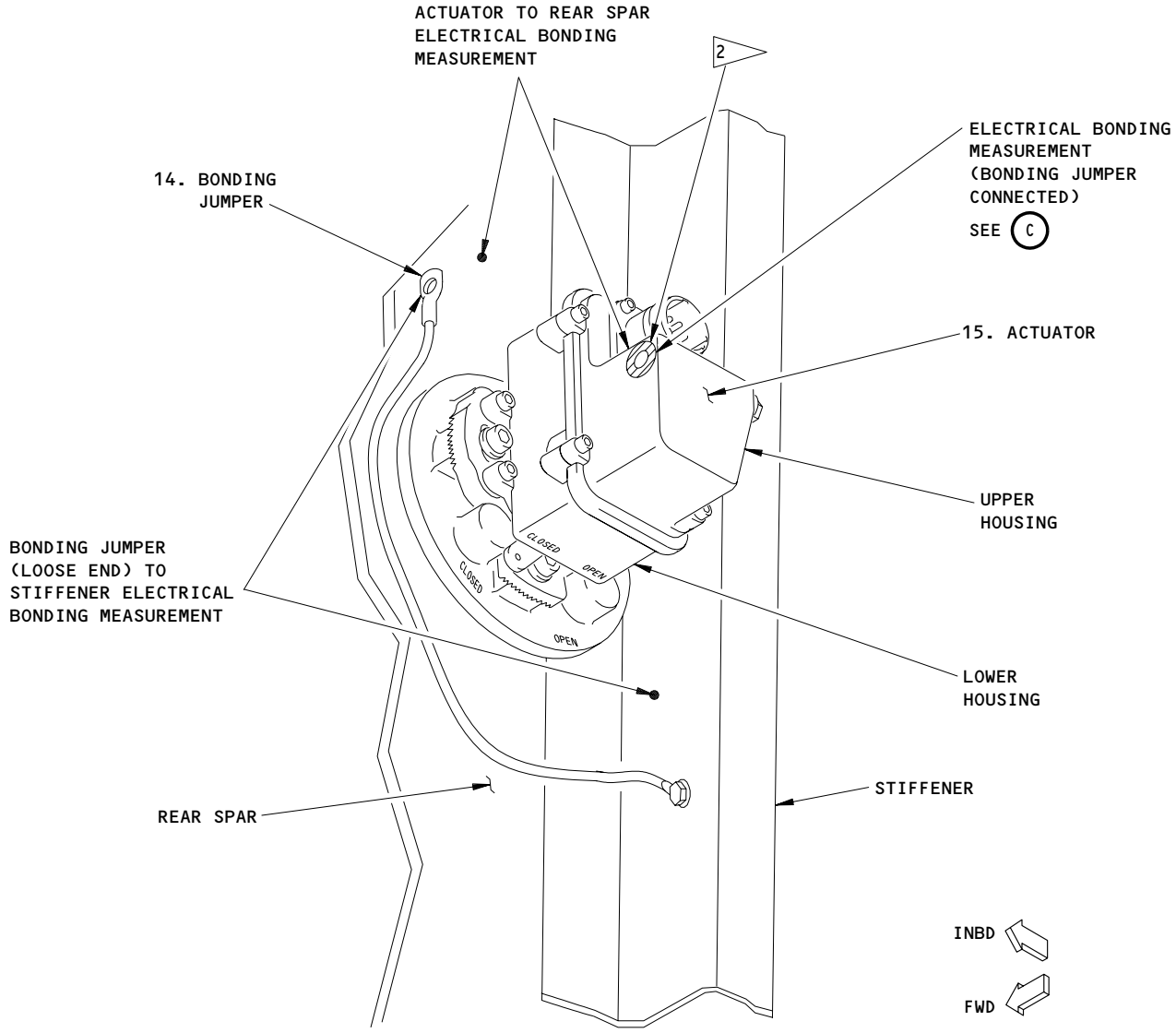


APU FUEL SHUTOFF VALVE ACTUATOR

A

1 THE BONDING JUMPER MAY BE INSTALLED ON EITHER SIDE OF THE ACTUATOR.

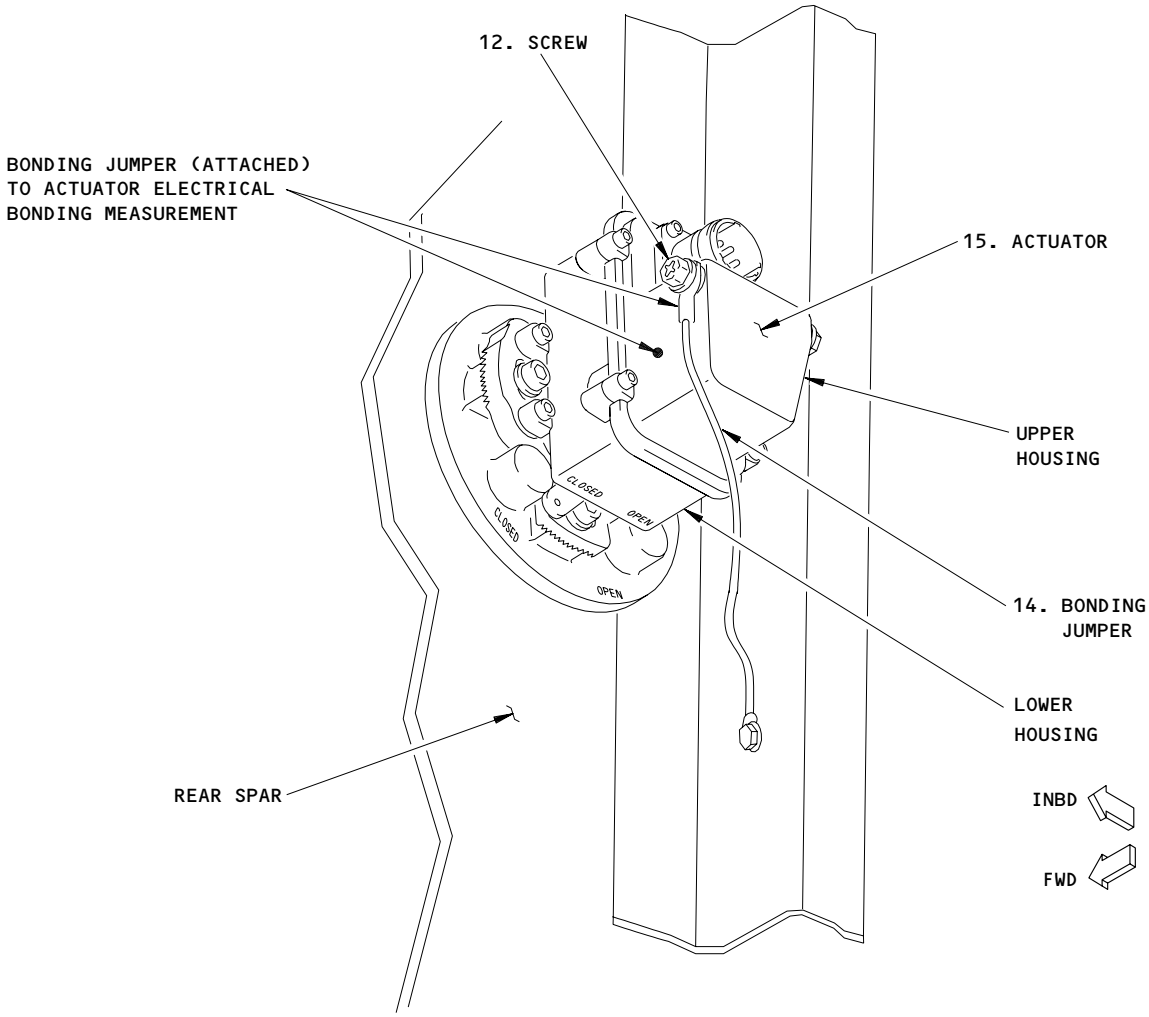
APU Fuel Shutoff Valve Actuator Installation
Figure 401A (Sheet 1)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
B

2 BARE METAL CONTACT SURFACE OF THE ACTUATOR AT THE BONDING JUMPER INSTALLATION.

APU Fuel Shutoff Valve Actuator Installation
Figure 401A (Sheet 2)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

(C)

APU Fuel Shutoff Valve Actuator Installation
Figure 401A (Sheet 3)

EFFECTIVITY
AIRPLANES POST-SB 28A0088

1323324

S 014-006
(4) Get access to the actuator of the APU fuel shutoff valve on the rear spar of the center fuel tank.

S 034-007
(5) Remove the electrical connector from the actuator.

S 034-033
(6) Disconnect the bonding jumper from the actuator.

S 864-008
(7) Put the manual override handle to the CLOSED position.

S 024-009
(8) Remove the four screws and washers that attach the actuator to the rear spar.

S 024-023
(9) Remove the actuator of the APU fuel shutoff valve.

TASK 28-25-11-404-010

3. Install the Actuator of the APU Fuel Shutoff Valve (Fig. 401, Fig. 401A)

A. References
(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 20-10-23/401, Lockwires
(3) AMM 24-22-00/201, Electrical Power Control
(4) AMM 32-00-15/201, Landing Gear Door Locks

B. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

C. AIRPLANES WITH ACTUATOR MA20A1001-1 (PRE-SB 28A0088);
Install the APU Fuel Shutoff Valve Actuator (Fig. 401)

S 434-011
(1) Put a washer on each screw.

S 434-024
(2) Put the screws through the actuator flange.

S 434-025
(3) Put a second washer on each screw.

S 864-012
(4) Move the manual override handle of the actuator to the CLOSED position.

S 424-013
(5) Align the actuator with the bolts on the rear spar.

S 214-026
(6) Make sure the teeth on the splined shaft of the actuator align with the shaft in the valve body.

S 424-027
(7) Install the screws into the bolts.

S 434-028
(8) Install the lockwire on the screws (AMM 20-10-23/401).

S 434-014
(9) Attach the bonding jumper to the actuator below the electrical connector.

S 224-015
(10) Make sure the bonding resistance between the APU fuel shutoff valve and the airplane structure is not more than 0.005 ohms (AMM 20-10-21/601).

S 434-016
(11) Connect the electrical connector to the actuator.

S 864-029
(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 864-017
(13) Supply electrical power (AMM 24-22-00/201).

S 864-030
(14) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6H23, L FWD FUEL BOOST PUMP

S 214-018
(15) Make sure the APU fire switch on the pilots aft control stand, P8, is in the NORMAL position.

S 864-019
(16) Put the APU master control switch on the overhead panel, P5, to the ON position.

S 214-020
(17) Make sure the manual override handle on the actuator moves to the OPEN position.

S 864-021
(18) Put the APU master control switch on the P5 panel to the OFF position.

S 214-060
(19) Make sure the manual override handle on the actuator moves to the CLOSED position.

S 864-031
(20) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 094-032

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(21) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-022
(22) Remove electrical power if it is not necessary (AMM 24-22-00/201).

D. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the APU Fuel Shutoff Valve Actuator (Fig. 401A)

S 424-037
(1) Do these steps to install the actuator (15) to the index plate (10).
(a) Make sure the manual override handle (1) is in the CLOSED position.

(b) Align the actuator output shaft with the adapter shaft.
(c) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.
(d) Put the actuator output shaft into the actuator shaft.

NOTE: The contact areas of the actuator automatically align with the mounting points on the index plate.

(e) Install the actuator mounting screws (3) and washers (2) that attach the actuator (15) to the index plate (10).

NOTE: Lockwire is not necessary for the actuator securing screws.

(f) Tighten the screws (3) to 20 in-lb (2.3 Nm).

S 764-044
(2) Measure the electrical bonding resistance between the loose end of the bonding jumper (14) and the rear spar (SWPM 20-20-00).
(a) Do this measurement with the electrical connector (5) disconnected.
(b) Make sure the bonding resistance is 0.004 ohm (4.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-040
(3) Do these steps to install the bonding jumper (14) to the actuator (15):
(a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
1) Rub dry with a clean, dry cotton wiper.
2) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(b) Apply a thin continuous layer of sealant to both surfaces of the bonding jumper (14) and the washers (13).
1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 in. (0.127 mm) thick.
(c) Install the screw (12) and washers (13) to attach the bonding jumper (14) to the actuator (15).
(d) Tighten the screw (12) to to 20 in-lb (2.3 Nm).

S 764-047
(4) Measure the electrical bonding resistance between the upper housing of the actuator (15) and the rear spar (SWPM 20-20-00).
(a) Make sure the bonding resistance is 0.005 ohm (5.0 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-043
(5) Install the electrical connector (5) on the actuator (15).

S 864-048
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E3, FUEL VALVES APU

S 864-049
(7) Supply electrical power (AMM 24-22-00/201).

S 864-051
(8) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6H23, L FWD FUEL BOOST PUMP

S 214-052
(9) Make sure the APU fire switch on the pilots aft control stand, P8, is in the NORMAL position.

S 864-053
(10) Put the APU master control switch on the overhead panel, P5, to the ON position.

S 214-054
(11) Make sure the manual override handle on the actuator moves to the OPEN position.

S 864-055
(12) Put the APU master control switch on the P5 panel to the OFF position.

S 214-058
(13) Make sure the manual override handle on the actuator moves to the CLOSED position.

S 864-056
(14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 094-050

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(15) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-057
(16) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

APU FUEL SHUTOFF VALVE ACTUATOR - INSPECTION/CHECK

TASK 28-25-11-726-008

1. APU Fuel Shutoff Valve Actuator - Bonding Resistance Check
(Fig. 601)

A. General
(1) This task does an electrical bonding resistance check for the APU fuel shutoff valve actuator.
(2) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References
(1) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(2) AMM 28-00-00/201, Fuel System
(3) AMM 28-11-00/701, Fuel Tanks
(4) AMM 51-21-04/701, Chemical Conversion Coating
(5) SWPM 20-20-00, Electrical Bonding and Grounds

C. Consumable Materials
(1) Alodine Coating - Chemical Conversion Coating for Aluminum and Aluminum Alloys, BAC51719 Class A - Alodine 600 and 1200

D. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)

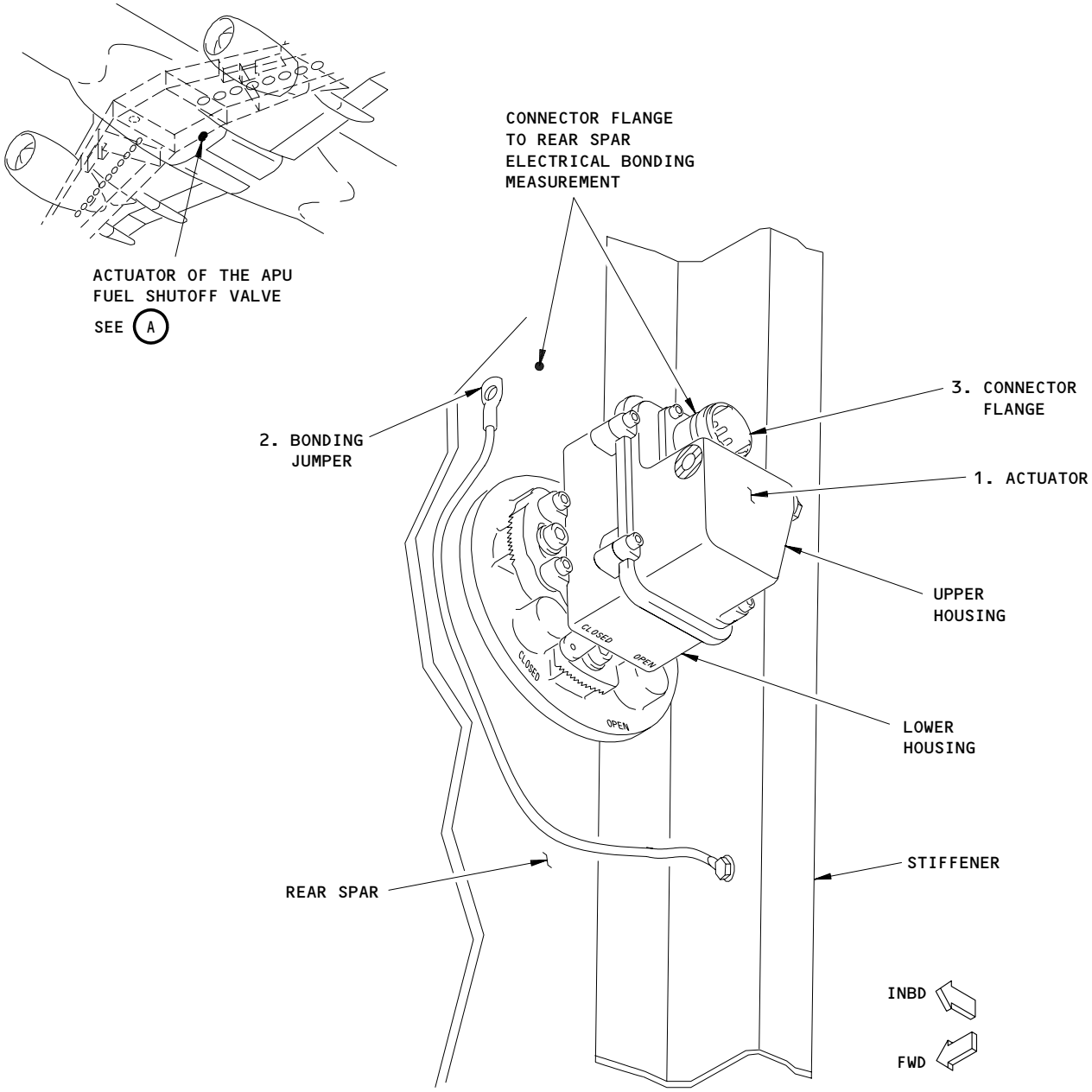
E. Procedure

S 016-009
(1) Get access to the APU fuel shutoff valve actuator.

S 016-010
(2) Disconnect the electrical connector from the actuator (1).

S 016-011
(3) Remove the screw, two washers, and bonding jumper (2) from the actuator (1).

S 766-012
(4) Measure the electrical bonding resistance between the connector flange (3) and the spar web (SWPM 20-20-00).
(a) Do this measurement with the bonding jumper (2) and the electrical connector disconnected.
(b) Make sure the bonding jumper (2) does not touch the actuator (1) during the bonding measurement.



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
A

APU Fuel Shutoff Valve Actuator Bonding Resistance Check
Figure 601

(c) Make sure the bonding resistance is 0.010 ohm (10.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 426-013

(5) Do these steps to install the bonding jumper (2) to the actuator:
(a) Clean the contact surfaces with a cotton wiper, G00034 soaked with Series 88 solvent, B01088 (AMM 20-30-88/201).
1) Rub dry with a clean, dry cotton wiper, G00034.
2) Continue to clean and dry the surface until the dry cotton wiper, G00034 stays clean.
(b) Apple a thin continuous layer of sealant to both surfaces of the bonding jumper terminal and the two washers.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant, A50105 for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.
(c) Install the screw, two washers, and bonding jumper (2) to the actuator (1).
(d) Tighten the screw to 20 in-lb (2.3 Nm).
(e) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper and screw.

S 376-014

(6) Do this task to apply protective finishes to the bare areas of the spar web: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Apply the protective finishes to the spar web where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating

Note: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 916-015

(7) Do this task to apply Alodine coating to any bare areas of the actuator: Apply the Alodine Coating (AMM 51-21-04/701).

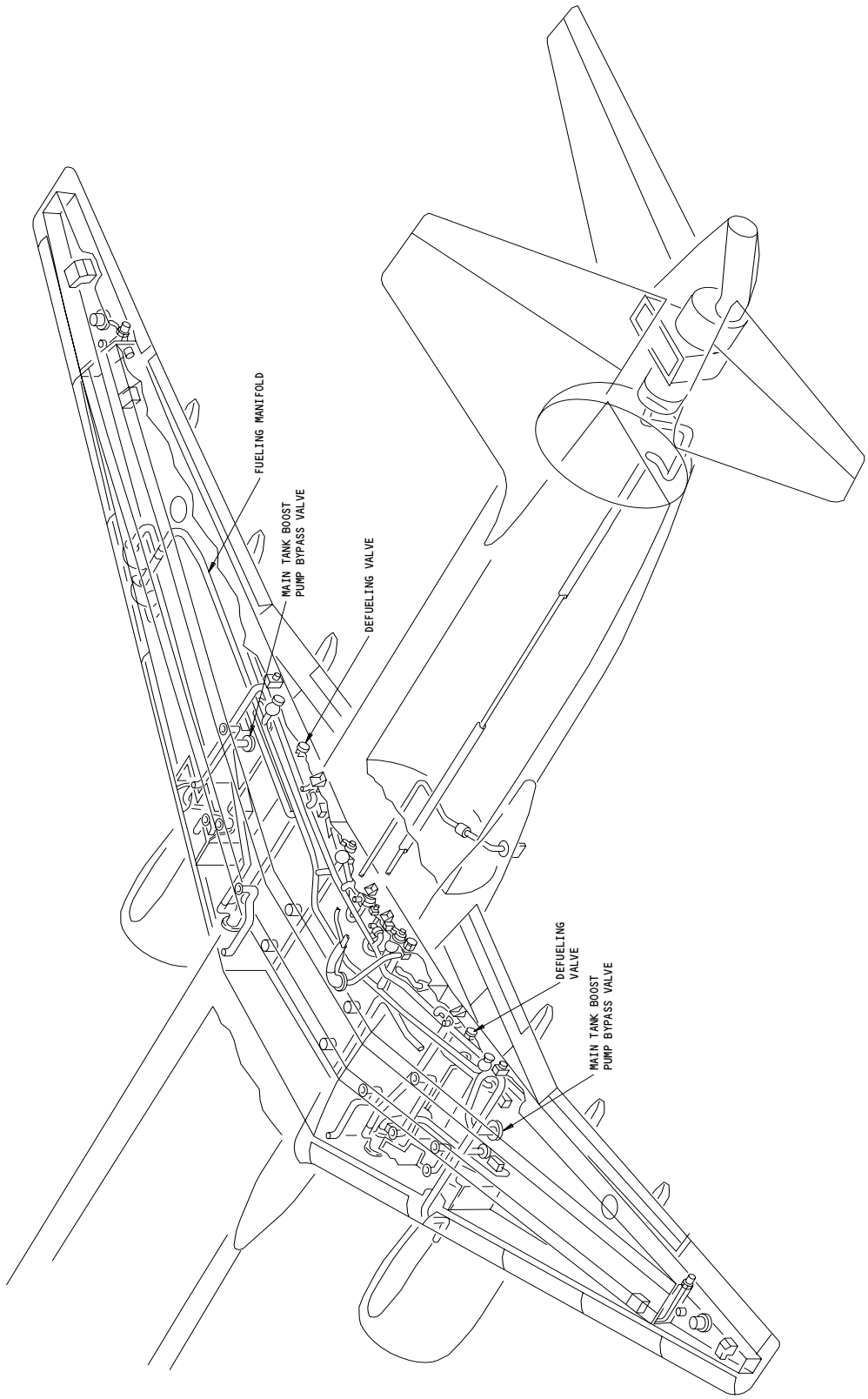
NOTE: Apply the coating to the actuator where the electrical bonding probe removed the finish, and all bare metal areas around the bonding jumper installation where there is no sealant.

S 436-016

(8) Install the electrical connector on the actuator (1).

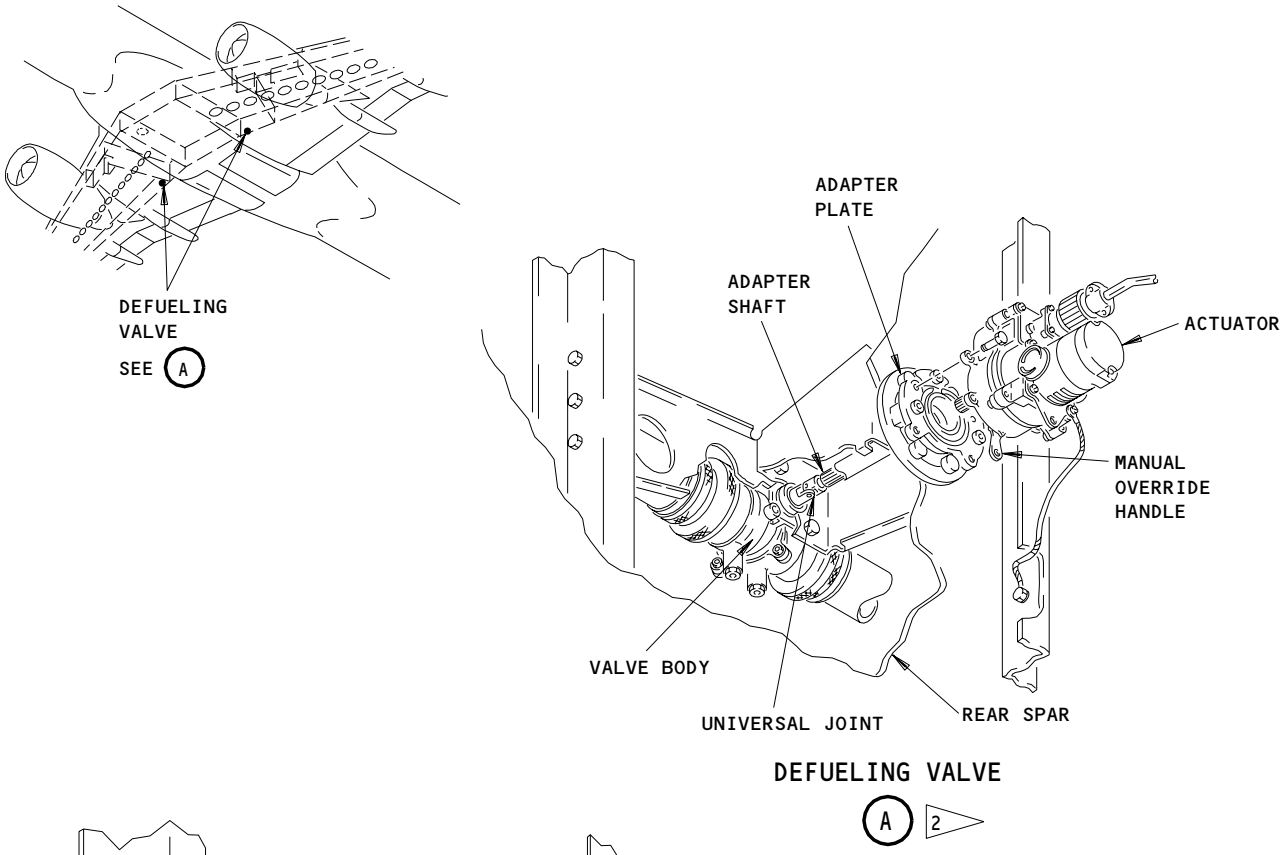
DEFUELING - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The defueling system consists mainly of defueling valves. Other necessary components include the boost pumps, The boost pump bypass valves, the fueling valves, and the crossfeed valve (AMM 28-22-00/001). Three methods for defueling a fuel tank include pressure defueling, suction defueling, and tank-to-tank transfer.
   B. Defueling
      (1) The defueling system consists of a defueling valve at the left and right ends of the center fuel tank connecting the fuel feed manifold to the main fueling manifold. Fuel extraction takes place at the fueling station through fueling adapters (AMM 28-21-00/001).
      (2) Pressure defueling and suction defueling provide the means for defueling the fuel tanks. A boost pump bypass suction line connects each main fuel tank to the fuel feed manifold. Suction defueling draws fuel into the boost pump bypass through the fuel feed manifold and main fueling manifold and out of the fueling adapters. Only the main fuel tanks may be suction defueled. Pressure defueling uses the boost pumps to pump the fuel out of the tanks through the same fuel path.
      (3) Only on-ground defueling is possible. Airborne fuel jettisoning is not possible. Fueling station controls regulate defueling.
   C. Tank-To-Tank Fuel Transfer
      (1) Defueling of a fuel tank by transferring the fuel to the other fuel tank requires use of defueling valves, fueling valves, the crossfeed valve, and the boost pumps (AMM 28-22-00/001).
      (2) Only on-ground tank-to-tank fuel transfer is possible. Fueling station controls and the crossfeed valve switchlight on the pilot's overhead panel P5 control tank-to-tank fuel transfer.
2. Component Details
   A. Defuel Valve (Fig. 2)
      (1) Description
         (a) The defueling valve is a motor actuated butterfly valve. The defueling valve mounts to the rear spar of the center wing fuel tank. The valve body (within the fuel tank) connects to the actuator (outside the fuel tank) by an adapter/shaft. Access to the valve body requires defueling.



Defueling System
Figure 1

42691



Defueling Valve
Figure 2

(b) The defueling valve square (preferred) actuator has a 28v dc permanent magnet motor, an electrical connector, OPEN - CLOSED limit switches, and a manual override handle. The manual override handle also shows the position of the defueling valve.

(c) The defueling valve round (alternate) actuator has a 28v dc drive motor, an electrical connector, OPEN - CLOSED limit switches, and a manual override handle. The manual override handle also shows the position of the defueling valve.

(d) The adapter/shaft connects the actuator and the valve body. The adapter/shaft consists of an adapter plate and a shaft with a universal joint. The adapter/shaft, with indexed splines in both ends, ensures correct alignment of the actuator to the valve. Access to the adapter/shaft requires defueling.

(e) The thermal relief valve on the valve body, cracks and reseats between 70 to 55 psig.

(2) Function

(a) Applying 28VDC power opens or closes the valve, depending upon the command. Upon reaching open position, the butterfly plate contacts a stop pin to prevent over-travel. With the valve full OPEN, the open limit switch actuates de-energizing the actuator. Upon reaching the full closed position, the butterfly plate contacts a stop pin which prevents over-travel. With the valve full CLOSED, the closed limit switch closes de-energizing the actuator.

(b) The defueling valve position determines whether the main fueling manifold is connected to the fuel feed manifold.

3. Operation (Fig. 3)

A. Functional Description

(1) Defueling

(a) Pressure Defueling

1) For pressure defueling the fuel system must be configured as follows:

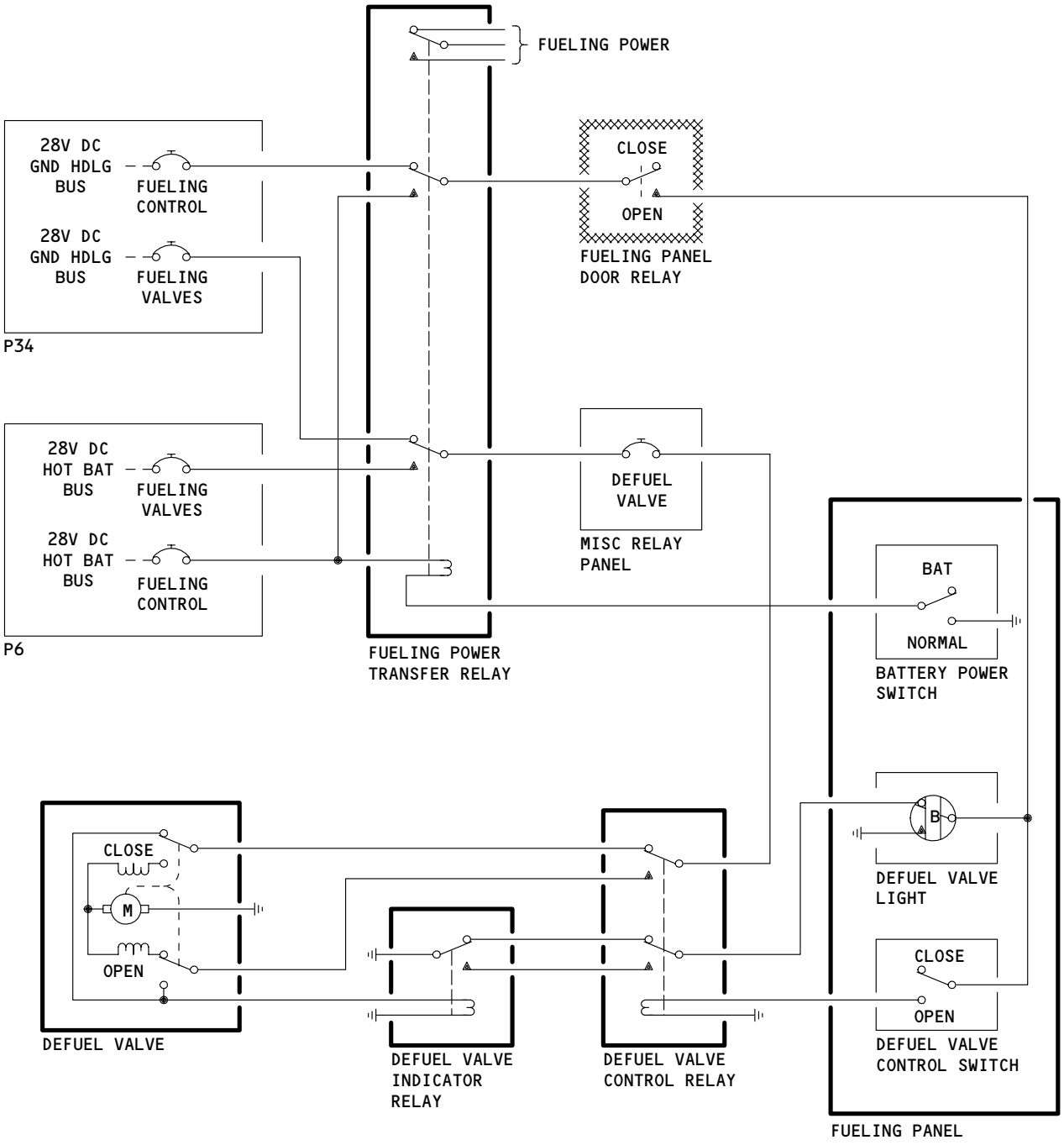
a) At least one boost pump for the tank being defueled must be on (AMM 28-22-00/001).

b) At least one defueling valve must be open.

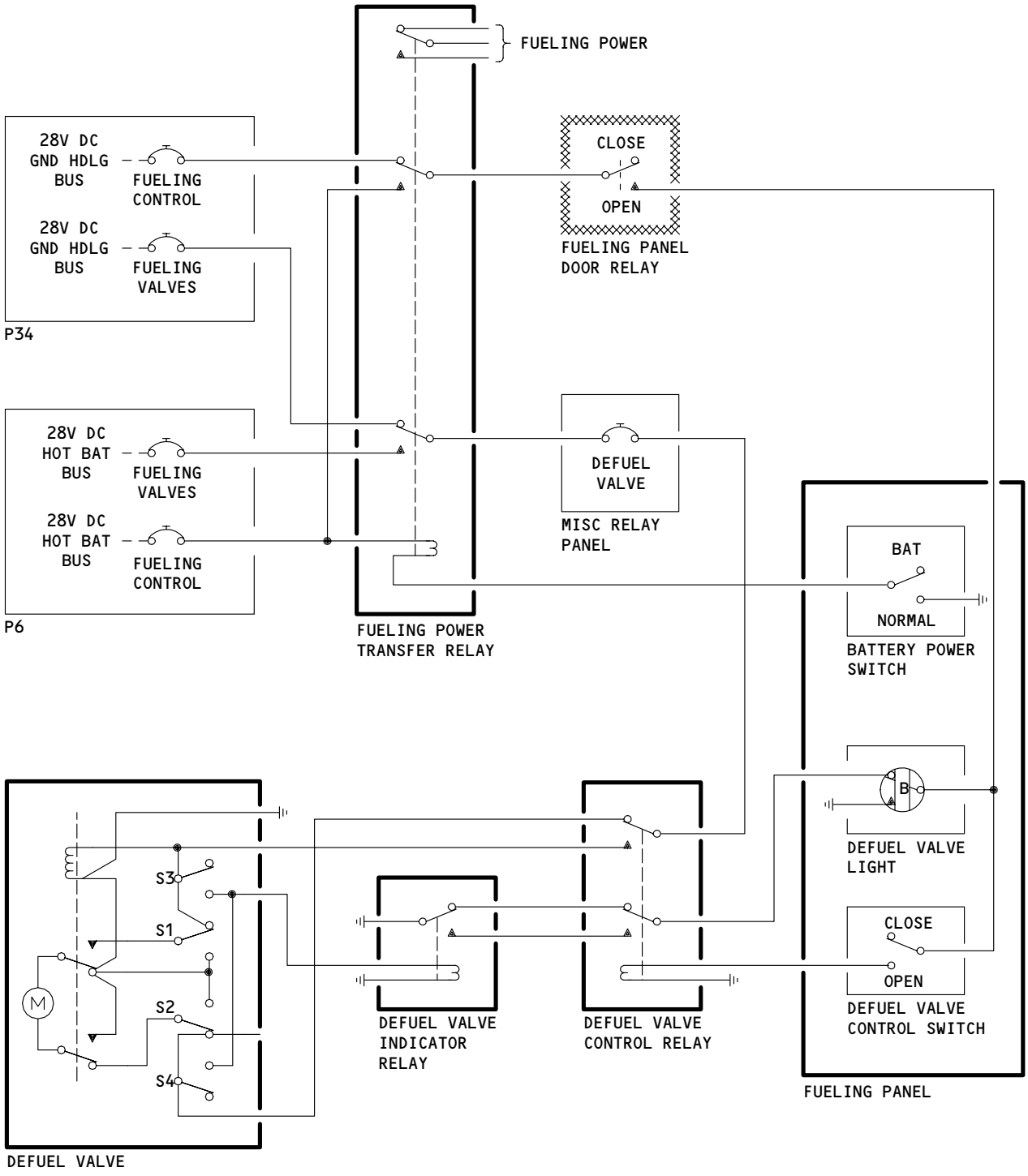
c) The fueling adapters must be placed in the defuel mode before connecting the fueling nozzles (AMM 28-21-00/001).

(2) Suction Defueling

(a) Suction defueling requires a configuration of the fuel system similar to pressure defueling except that the boost pumps for the tank being defueled must be off.



Defueling Schematic
Figure 3 (Sheet 1)



Defueling Schematic
Figure 3 (Sheet 2)

(b) Only the main fuel tanks may be suction defueled.

(3) Tank-To-Tank Fuel Transfer

(a) For transfer of fuel between tanks the fuel system must be configured as follows:

1) At least one supplier tank boost pump must be operating.
2) The LH or RH defueling valve must be open as applicable.
3) The receiving tank pressure fueling shutoff valves must be open.

(b) If either defueling valve fails closed and cannot be manually opened, opening the crossfeed valve and the second defueling valve will allow defueling.

(c) The fuel quantity indicating system (AMM 28-41-00/001) allows monitoring of defueling.

(4) Defuel Valve Operation

(a) Switches at the fueling station control the defueling valves. The gound handling bus or the hot battery bus provides 28vdc power. Opening the fueling control panel door energizes the fueling panel door relay. Twenty-eight volt dc power passes through the fueling panel door relay to the defuel valve control switch. Opening the switch sends 28vdc power through the control switch to energize the defuel valve control relay. The valve actuator receives 28vdc power through the defuel valve control relay to open the valve.

(b) The defuel valve control relay relaxes with the fuel valve control switch closed. The relaxed valve control relay provides a direct path for 28vdc power to the valve actuator to close the valve. Closing the fueling panel door before switching the defuel valve CLOSED switch causes the direct flow of 28vdc power to the valve actuator to close the valve.

(5) Defueling Valve Indication

(a) A blue DEFUEL VALVE light on the fueling station control panel provides defuel valve position indication. When the defuel valve reaches full open, the limit switch directs 28vdc power to energize the defuel valve indication relay. The DEFUEL VALVE lamp lights when the valve reaches full open. When the defuel valve reaches full closed, the limit switch directs 28vdc power to energize the defuel valve indication relay. The full closed valve shuts off the DEFUEL VALVE light.

B. Control

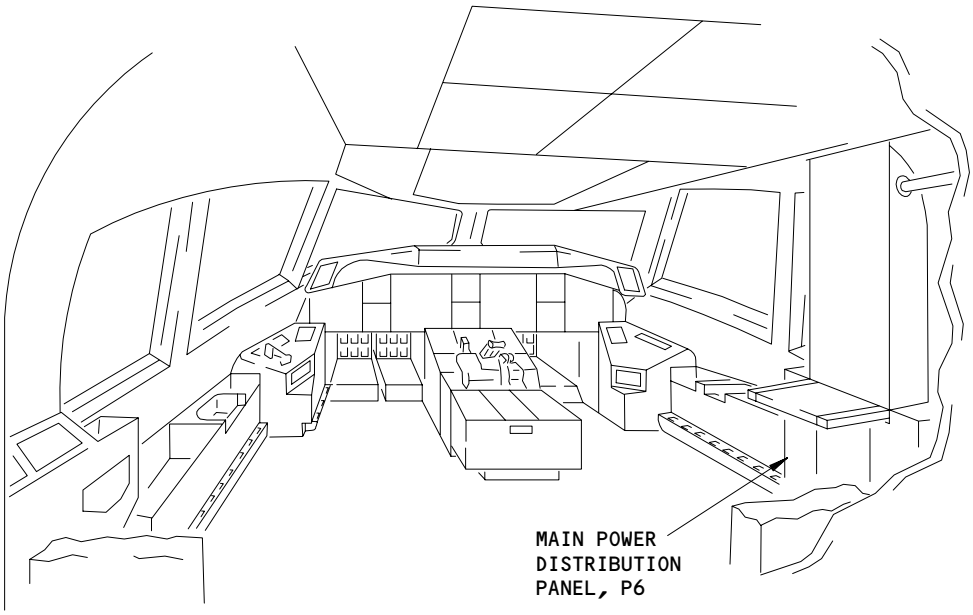
(1) For defueling control refer to AMM 28-26-00/201 defueling.

DEFUELING

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR – LEFT DEFUELING VALVE, V108	1	1	733, LEFT MLG OLEO DOOR	28-26-02
ACTUATOR – RIGHT DEFUELING VALVE, V109	1	1	743, RIGHT MLG OLEO DOOR	28-26-02
CIRCUIT BREAKER –	1		FLT COMPT, P6	
FUELING VALVE, C1046		1	6E6	*
CIRCUIT BREAKER –	2		119BL,MAIN EQUIP CTR, P34	
FLNG VALVE, C1047		1	34A9	*
RELAY – (FIM 31-01-33/101)				
FUELING PANEL DOOR, K179				
FUELING PWR TRANSFER, K357				
L DEFUEL VALVE CONT, K452				
L DEFUEL VALVE IND, K449				
R DEFUEL VALVE CONT, K453				
R DEFUEL VALVE IND, K450				
SWITCH – LEFT DEFUELING VALVE, S350	2	1	621GB, FUELING CONTROL PANEL, P28	28-26-00
SWITCH – RIGHT DEFUELING VALVE, S351	2	1	621GB, FUELING CONTROL PANEL, P28	28-26-00
VALVE BODY – LEFT DEFUELING, V108	1	1	531CB	28-26-01
VALVE BODY – RIGHT DEFUELING, V109	1	1	631CB	28-26-01

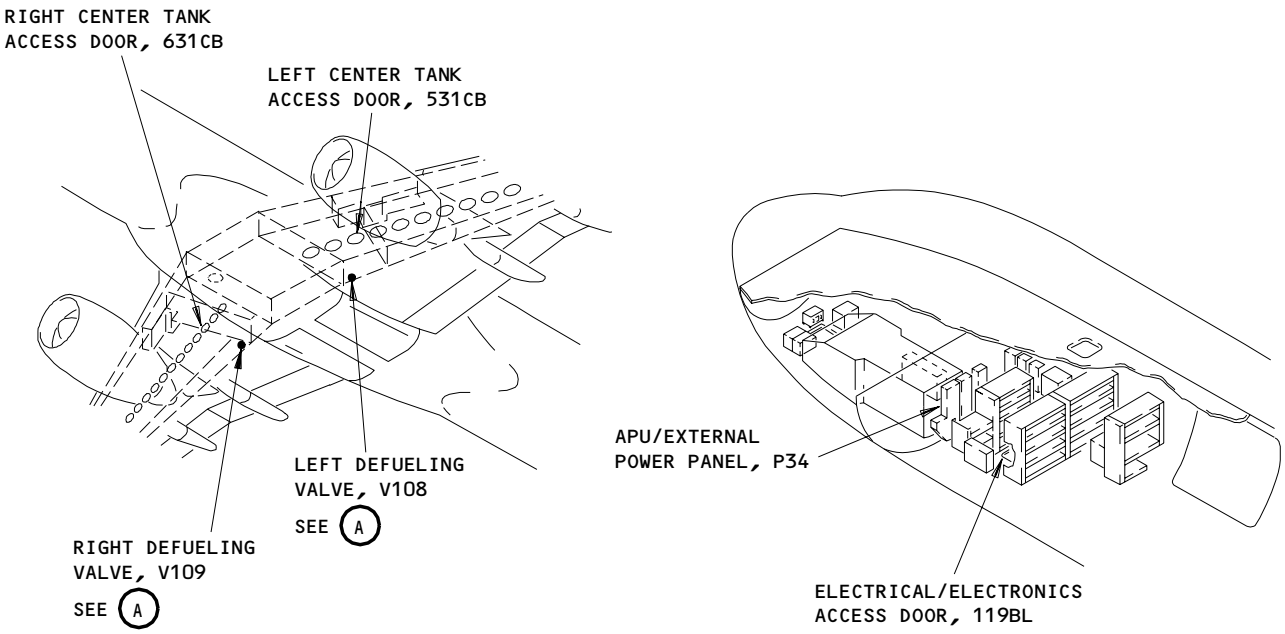
* SEE THE WDM EQUIPMENT LIST

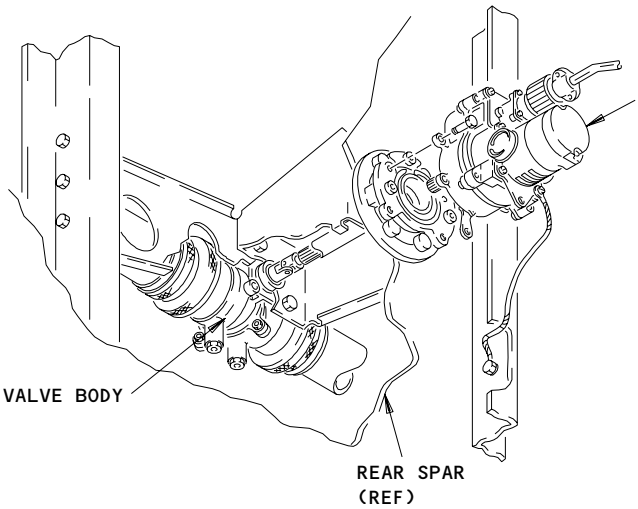
Defueling – Component Index
Figure 101



FLIGHT COMPARTMENT

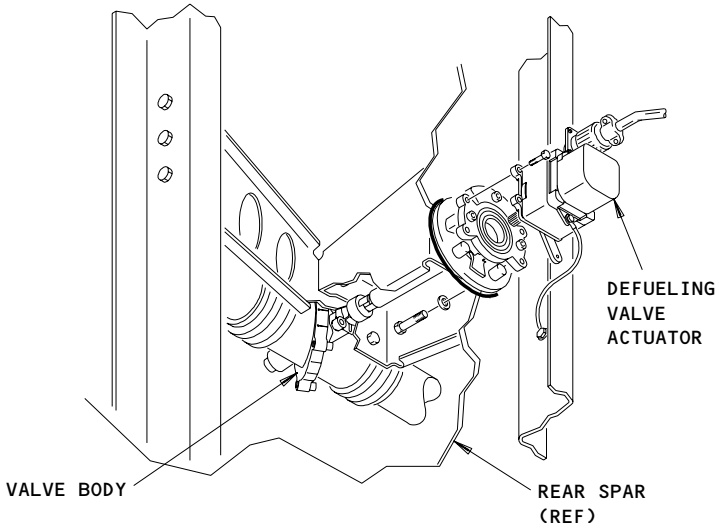
Defueling - Component Location
Figure 102 (Sheet 1)





LEFT OR RIGHT DEFUELING
VALVE, V108 OR V109

A 2

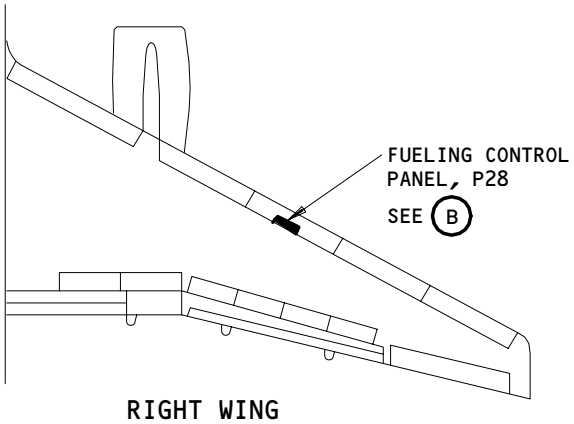


LEFT OR RIGHT DEFUELING
VALVE, V108 OR V109

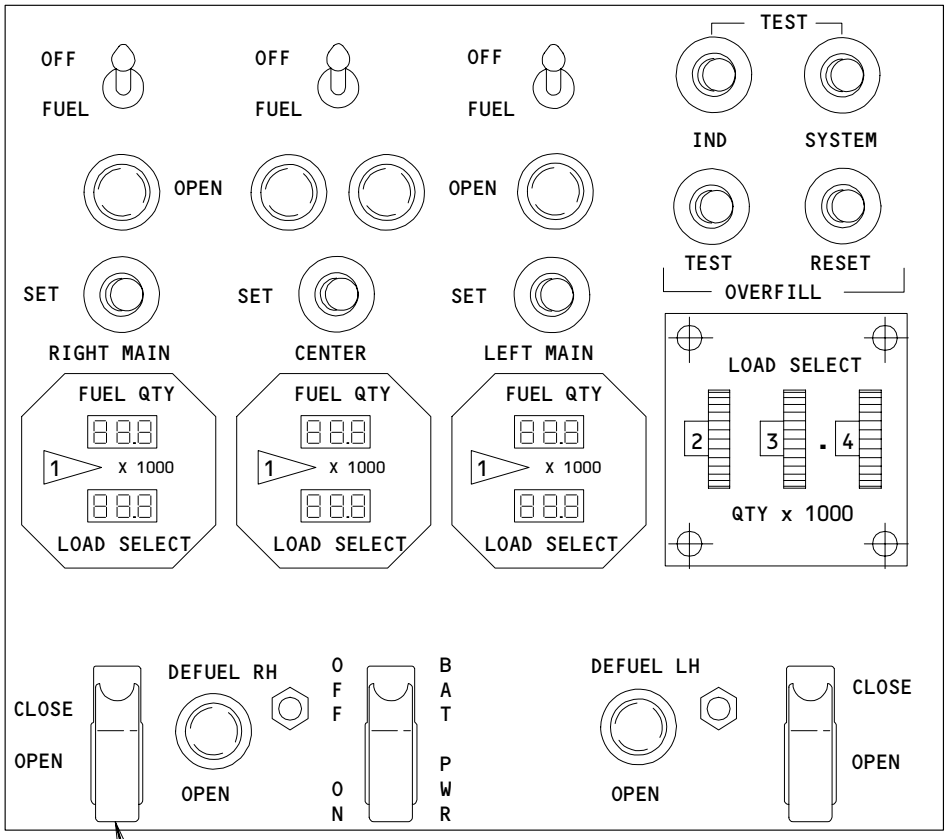
A 1

1 PREFERRED
2 ALTERNATE

Defueling - Component Location
Figure 102 (Sheet 2)



RIGHT WING



FUELING CONTROL PANEL, P28

(B)

1 THE UNITS ARE IN LBS OR KGS.

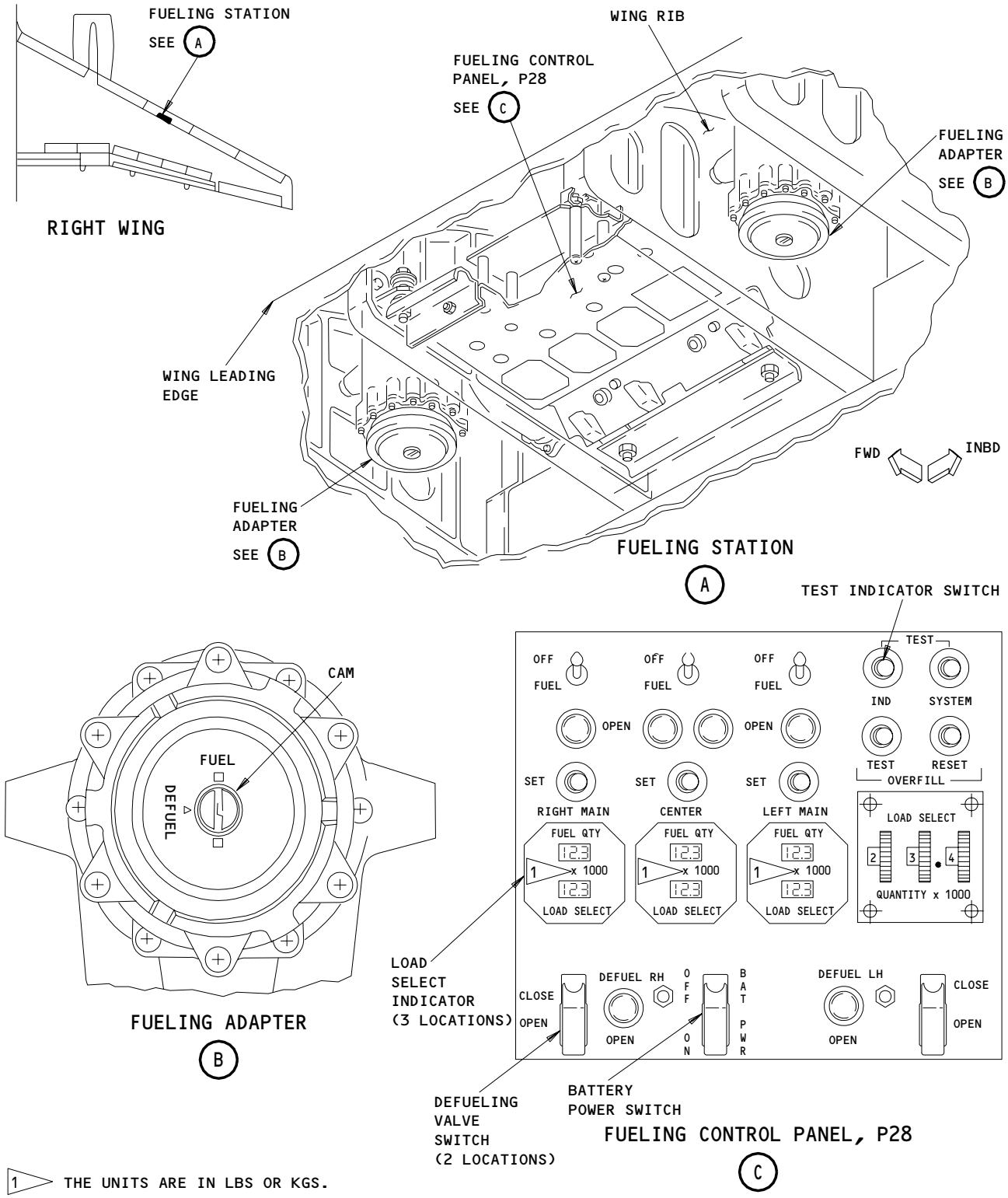
Defueling - Component Location
Figure 102 (Sheet 3)

DEFUELING - MAINTENANCE PRACTICES

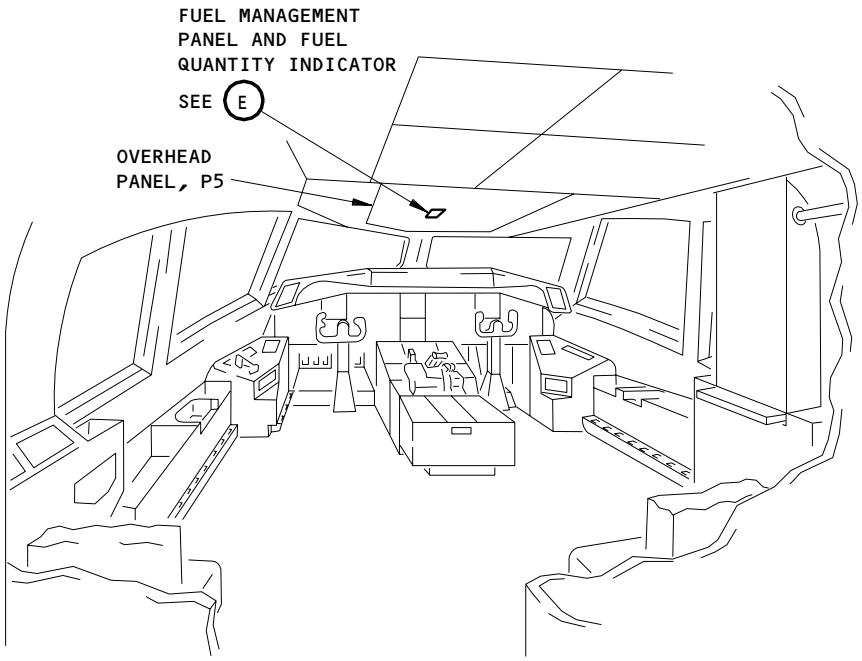
1. General
   A. There are three different procedures to defuel the fuel tank; pressure defueling, suction defueling and tank to tank transfer.
      (1) The pressure defueling procedure uses the fuel boost pump or fuel override pump to remove fuel from the fuel tank. The fuel flows through the engine fuel feed manifold through the defueling valve into the fueling manifold, and out the fueling adapter to the fuel truck.
      (2) Suction defueling applies to the main fuel tanks only. Suction from the fuel truck causes fuel from the main fuel tank to flow through the bypass valve of the fuel boost pump into the engine fuel feed manifold. It then goes through the defueling valve, fueling manifold, and the fueling adapter to the fuel truck.
      (3) To defuel a fuel tank with the tank to tank transfer procedure it is necessary to use the defueling valves, fueling shutoff valves, fuel boost pumps and fuel override pumps. To move the fuel between the fuel tanks the fuel system must be in the subsequent configuration:
         (a) One pump must operate in the fuel tank that supplies fuel.
         (b) The applicable left or right defueling valve must be open.
         (c) The fueling shutoff valve in the fuel tank that gets the fuel must be open.
      (4) If you cannot open one of the defueling valves, open the engine fuel crossfeed valve(s) and the other defueling valve to do the defueling.
      (5) The fuel quantity indicating system (AMM 28-41-00/001) lets you monitor the defueling at the fueling control panel, P28.
   B. If a fuel tank must be fully defueled, drain the remaining fuel through the drain valve of the fuel sump (AMM 12-11-03/301).
   C. When thunderstorms or lightening are within a 10 mile (16 kilometer) radius of the immediate area, the defueling procedure should stop.
   D. Strong wind conditions can cause a build-up of static electricity. Large charges of static electricity can develop on support equipment while parked as a result of the movement of dust particles and air currents during strong wind conditons. Strong wind conditions can also cause the unwanted movement of items or equipment which can hit the airplane or injure persons. Wind gusts can damage the airplane structure. Fueling procedures should stop if strong wind conditions are present.

TASK 28-26-00-652-044

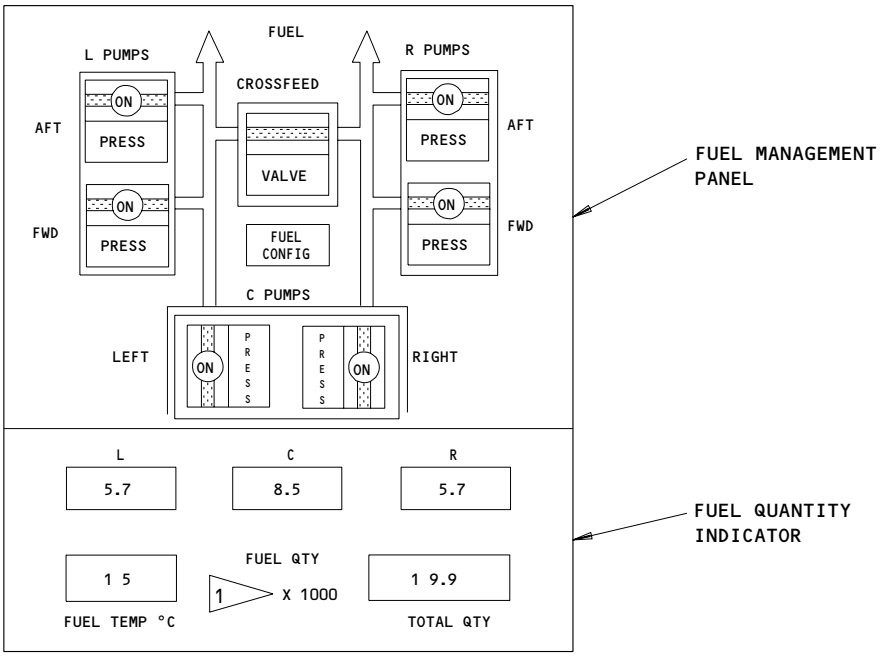
2. Pressure Defueling (Fig. 201)
   A. References
      (1) AMM 06-44-00/201, Wings Access Doors and Panels



Defueling
Figure 201 (Sheet 1)



FLIGHT COMPARTMENT



FUEL MANAGEMENT PANEL AND FUEL
QUANTITY INDICATOR

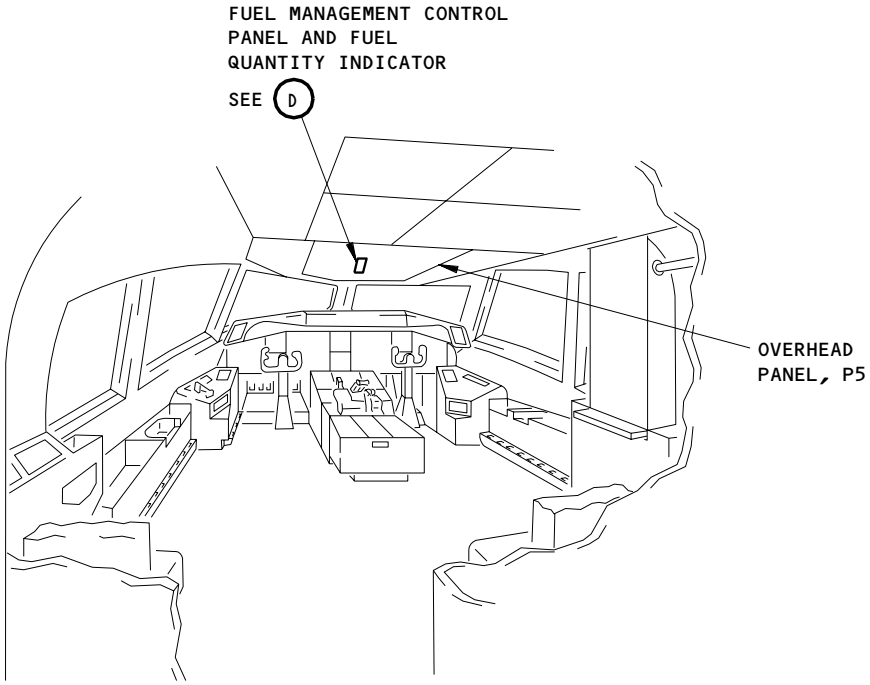
1 THE UNITS ARE IN LBS OR KGS

E

Defueling
Figure 201 (Sheet 2)

EFFECTIVITY
AIRPLANES WITH A SINGLE CROSSFEED VALVE
(PRE-SB 28-29)

819442



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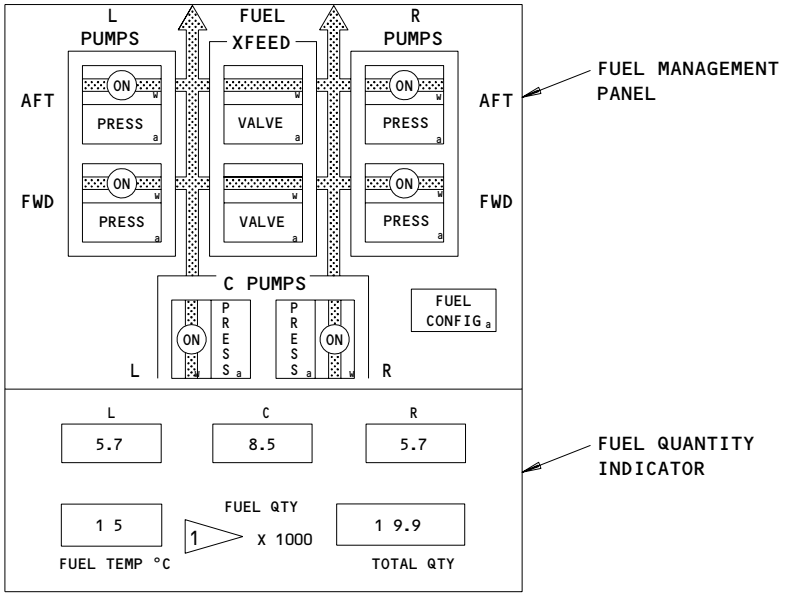


FUEL MANAGEMENT CONTROL PANEL AND
FUEL QUANTITY INDICATOR

D

1 THE UNITS ARE IN LBS OR KGS

Defueling
Figure 201 (Sheet 3)

(2) AMM 12-11-03/301, Fuel Sump Draining
(3) AMM 20-41-00/201, Static Grounding
(4) AMM 24-22-00/201, Electrical Power Control
(5) AMM 27-81-00/201, Leading Edge Slat System

B. Access

(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

C. Procedure

S 212-045

WARNING: DO NOT OPERATE THE HF COMMUNICATION SYSTEM DURING THE DEFUELING OPERATIONS. THE HF COMMUNICATION SYSTEM COULD CAUSE AN EXPLOSION TO OCCUR.

CAUTION: DO NOT OPERATE THE HYDRAULIC SYSTEM IF THERE IS LESS THAN 600 US GALLONS OF FUEL IN EITHER MAIN FUEL TANK. THE HYDRAULIC SYSTEM CAN BECOME TOO HOT IF THE HEAT EXCHANGER IS NOT IN FUEL.

(1) Make sure the fuel truck is bonded to the airplane (AMM 20-41-00/201).

S 862-046

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

S 862-047

(3) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
(a) 6E4, FUELING QTY
(b) 6E5, FUELING CONTROL
(c) 6E6, FUELING VALVE
(d) 6F14, L FUEL OVRD PUMP
(e) 6F20, R FUEL OVRD PUMP
(f) 6H14, L AFT FUEL BOOST PUMP
(g) 6H17, R FWD FUEL BOOST PUMP
(h) 6H20, R AFT FUEL BOOST PUMP
(i) 6H23, L FWD FUEL BOOST PUMP

S 862-048

(4) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
(a) 11C34, FUEL QTY 1 or FUEL QTY L
(b) 11L19, FUEL QTY 2 or FUEL QTY R

S 862-049
(5) Make sure these circuit breakers on the APU external power panel, P34, are closed:
(a) 34A9, FLNG VALVES
(b) 34A10, FUELING QTY
(c) 34A11, FLNG CONT

S 862-100
(6) AIRPLANES WITH AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082);
Open these circuit breakers and install DO-NOT-CLOSE tags:
(a) On the overhead circuit breaker panel, P11:
1) 11L13, FUEL-AUTO S/O OVRD PMP CTR TANK L
2) 11L25, FUEL-AUTO S/O OVRD PMP CTR TANK R

S 862-002

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(7) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 012-050
(8) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 212-003
(9) Make sure the fueling panel light comes on.

NOTE: This shows there is 28v dc.

S 862-052
(10) Set the cams of the fueling adapters to the DEFUEL position (View B).

S 492-097

CAUTION: BEFORE DEFUEL OPERATIONS, MAKE SURE THE HOSE NOZZLE AND HOSE-END CONTROL VALVE (IF USED) ARE CONFIGURED PER THE SUPPLIER'S MAINTENANCE MANUAL. FAILURE TO DO SO CAN CAUSE DAMAGE TO THE AIRPLANE.

(11) Connect the fueling nozzles to one or two of the fueling adapters.

S 862-054
(12) Set the power source at the battery power switch on the fueling control panel, P28 (View C).

S 862-004
(13) Push the TEST IND switch to do a test on the load select indicators.

S 212-005
(14) Make sure 88.8 shows on the top and bottom displays of the load select indicators.

S 862-006
(15) Push and release the DEFUELING LH OPEN light.
(a) Make sure the DEFUELING LH OPEN light comes on, then goes off.

S 862-007
(16) Push and release the DEFUEL RH OPEN light.
(a) Make sure the DEFUEL RH OPEN light comes on, then goes off.

S 862-008
(17) Put the DEFUEL LH and DEFUEL RH switches to the OPEN position.

S 212-009
(18) Make sure the DEFUEL LH and DEFUEL RH OPEN lights come on.

S 862-099

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(19) Obey these fuel pump limitations during the defueling operation:
(a) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
1) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

NOTE: When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for the low pressure light(s) to come on. In this case, monitor tank quantity and set the pump switch to OFF if the tank quantity is not changing.

(b) If it is necessary to defuel the airplane with passengers on board, do these steps:
1) Monitor the applicable tank fuel quantity.

2) Put the pump switch(es) to the off position at or above 2,000 lbs (900 kgs).

S 862-055

(20) Push the applicable fuel boost pump, or fuel override pump switch of the fuel management panel on the overhead panel, P5, to the ON position (View D).

NOTE: This starts the defueling operation.

S 212-010

(21) Monitor the quantity of fuel in the fuel tanks on the load select indicators of the fueling control panel, P28 (View C).

S 862-011

(22) Push the applicable fuel boost pump or fuel override pump switch-light to the off position when the necessary quantity of fuel is defueled.

NOTE: You can stop the defueling operation when necessary, if you put the applicable DEFUEL LH or DEFUEL RH switch to the CLOSE position.

S 862-012

(23) Put the applicable DEFUEL LH or DEFUEL RH switch to the CLOSE position.

S 652-056

(24) If the fuel tank must be fully defueled, drain the remaining fuel through the drain valve of the fuel sump (AMM 12-11-03/301).

S 092-013

(25) Disconnect the fueling nozzles from the fueling adapters (View B).

S 092-014

(26) Disconnect the cable that you used to bond the airplane to the fuel source.

S 862-015

(27) If the battery power switch is in the BAT position, put the battery power switch to the PWR position (View C).

S 412-058

(28) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 862-016

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(29) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 862-102

(30) AIRPLANES WITH AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082);
Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the overhead circuit breaker panel, P11:
1) 11L13, FUEL-AUTO S/O OVRD PMP CTR TANK L
2) 11L25, FUEL-AUTO S/O OVRD PMP CTR TANK R

S 862-059

(31) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-26-00-652-060

3. Suction Defueling (Fig. 201)

A. References
(1) AMM 06-44-00/201, Wings - Access Doors and Panels
(2) AMM 12-11-03/301, Fuel Sump Draining
(3) AMM 20-41-00/201, Static Grounding
(4) AMM 24-22-00/201, Electrical Power Control
(5) AMM 27-81-00/201, Leading Edge Slat System

B. Access
(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

C. Procedure

S 212-061

WARNING: DO NOT OPERATE THE HF COMMUNICATION SYSTEM DURING THE DEFUELING OPERATIONS. THE HF COMMUNICATION SYSTEM COULD CAUSE AN EXPLOSION TO OCCUR.

CAUTION: DO NOT OPERATE THE HYDRAULIC SYSTEM IF THERE IS LESS THAN 600 US GALLONS OF FUEL IN EITHER MAIN FUEL TANK. THE HYDRAULIC SYSTEM CAN BECOME TOO HOT IF THE HEAT EXCHANGER IS NOT IN FUEL.

(1) Make sure the airplane and the defueling truck are grounded and bonded (AMM 20-41-00/201).

S 862-062
(2) Supply electrical power (AMM 24-22-00/201).

S 862-063
(3) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
(a) 6E4, FUELING QTY
(b) 6E5, FUELING CONTROL
(c) 6E6, FUELING VALVE

S 862-064
(4) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
(a) 11C34, FUEL QTY 1 or FUEL QTY L
(b) 11L19, FUEL QTY 2 or FUEL QTY R

S 862-065
(5) Make sure these circuit breakers on the APU external power panel, P34, are closed:
(a) 34A9, FLNG VALVES
(b) 34A10, FUELING QTY
(c) 34A11, FLNG CONT

S 862-017

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(6) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 012-066
(7) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 212-018
(8) Make sure the fueling panel light comes on.

NOTE: This shows there is 28v dc.

S 492-067
(9) Connect the grounding cable at the fueling station (View A).

S 862-068
(10) Set the cams of the fueling adapters to the DEFUEL position (View B).

S 492-098

CAUTION: BEFORE DEFUEL OPERATIONS, MAKE SURE THE HOSE NOZZLE AND HOSE-END CONTROL VALVE (IF USED) ARE CONFIGURED PER THE SUPPLIER'S MAINTENANCE MANUAL. FAILURE TO DO SO CAN CAUSE DAMAGE TO THE AIRPLANE.

(11) Connect the fueling nozzles to one or two of the fueling adapters.

S 862-070
(12) Set the power source at the battery power switch at the fueling control panel, P28 (View C).

S 862-019
(13) Push the TEST IND switch to do a test on the load select indicators.

S 212-020
(14) Make sure 88.8 shows on the top and bottom displays of the load select indicators.

S 862-021
(15) Push and release the DEFUEL LH OPEN light.
(a) Make sure the DEFUEL LH OPEN light comes on, then goes off.

S 862-087
(16) Push and release the DEFUEL RH OPEN light.
(a) Make sure the DEFUEL RH OPEN light comes on, then goes off.

S 862-022
(17) Put the DEFUEL LH and DEFUEL RH switches to the OPEN position.

S 212-023
(18) Make sure the DEFUEL LH and DEFUEL RH OPEN lights come on.

S 652-071
(19) Start the defueling truck.

NOTE: This starts the suction defueling operation.

S 212-024
(20) Monitor the quantity of fuel in the fuel tanks on the load select indicators of the fueling control panel, P28 (View C).

S 862-025
(21) Put the applicable DEFUEL LH or DEFUEL RH switch to the CLOSE position when the necessary quantity of fuel is defueled.

S 652-072
(22) Stop the defueling truck.

S 652-073
(23) If the main fuel tank must be fully defueled, drain the remaining fuel through the drain valve of the fuel sump (AMM 12-11-03/301).

S 092-026
(24) Disconnect the fueling nozzles from the fueling adapters (View B).

S 092-027
(25) Disconnect the cable that you used to bond the airplane to the fuel source.

S 862-028
(26) If the battery power switch is in the BAT position, put the battery power switch to the PWR position (View C).

S 412-074
(27) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 862-029

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(28) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 862-075
(29) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 28-26-00-652-076

4. Tank to Tank Transfer (Fig. 201)

A. References
(1) AMM 06-44-00/201, Wings - Access Doors and Panels
(2) AMM 12-11-03/301, Fuel Sump Draining
(3) AMM 20-41-00/201, Static Grounding
(4) AMM 24-22-00/201, Electrical Power Control
(5) AMM 27-81-00/201, Leading Edge Slat System

B. Access
(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

C. Procedure

S 212-077

WARNING: DO NOT OPERATE THE HF COMMUNICATIONS SYSTEM DURING THE DEFUELING OPERATIONS. THE HF COMMUNICATIONS SYSTEM COULD CAUSE AN EXPLOSION TO OCCUR.

CAUTION: DO NOT OPERATE THE HYDRAULIC SYSTEM IF THERE IS LESS THAN 600 US GALLONS OF FUEL IN EITHER MAIN FUEL TANK. THE HYDRAULIC SYSTEM CAN BECOME TOO HOT IF THE HEAT EXCHANGER IS NOT IN FUEL.

(1) Make sure the airplane is grounded (AMM 20-41-00/201).

S 862-078

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

S 862-079

(3) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
   (a) 6E4, FUELING QTY
   (b) 6E5, FUELING CONTROL
   (c) 6E6, FUELING VALVE
   (d) 6F14, L FUEL OVRD PUMP
   (e) 6F20, R FUEL OVRD PUMP
   (f) 6H14, L AFT FUEL BOOST PUMP
   (g) 6H17, R FWD FUEL BOOST PUMP
   (h) 6H20, R AFT FUEL BOOST PUMP
   (i) 6H23, L FWD FUEL BOOST PUMP

S 862-080

(4) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
   (a) 11C34, FUEL QTY 1 or FUEL QTY L
   (b) 11L19, FUEL QTY 2 or FUEL QTY R
   (c) AIRPLANES WITH SINGLE CROSSFEED VALVE;
       11D36, FUEL CROSSFEED VALVE
   (d) AIRPLANES WITH FORWARD AND AFT CROSSFEED VALVES;
       These circuit breakers on rows A, C or D of the panel:
       1) FWD FUEL CROSSFEED
       2) AFT FUEL CROSSFEED
       3) FUEL XFEED IND

S 862-081

(5) Make sure these circuit breakers on the APU external power panel, P34, are closed:
   (a) 34A9, FLNG VALVES
   (b) 34A10, FUELING QTY
   (c) 34A11, FLNG CONT

S 862-101
(6) AIRPLANES WITH AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082);
Open these circuit breakers and install DO-NOT-CLOSE tags:
(a) On the overhead circuit breaker panel, P11:
1) 11L13, FUEL-AUTO S/O OVRD PMP CTR TANK L
2) 11L25, FUEL-AUTO S/O OVRD PMP CTR TANK R

S 862-030

WARNING: MAKE SURE YOU DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(7) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 012-082
(8) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 862-083
(9) Set the power source at the battery power switch at the fueling control panel, P28, (View C).

S 862-031
(10) Push the TEST IND switch to do a test on the load select indicators.

S 212-032
(11) Make sure 88.8 shows on the top and bottom displays of the load select indicators.

S 862-033
(12) Push and release each fueling valve OPEN light: LEFT MAIN, L CENTER, R CENTER and RIGHT MAIN.
(a) Make sure each fueling valve OPEN light comes on and then goes off.

S 862-034
(13) Push and release the DEFUEL LH OPEN light.
(a) Make sure the DEFUEL LH OPEN light comes on and then goes off.

S 862-035
(14) Push and release the DEFUEL RH OPEN light.
(a) Make sure the DEFUEL RH OPEN light comes on and then goes off.

S 862-093
(15) Put the fueling valve switch of the fuel tank that gets the fuel to the FUEL position.

S 862-036

(16) If the left or right main fuel tank supplies the fuel, do the steps that follow:

(a) Put the applicable DEFUEL LH or DEFUEL RH switch to the OPEN position.

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(b) Obey these fuel pump limitations during the fuel transfer operation:

1) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.

a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

NOTE: When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for the low pressure light(s) to come on. In this case, monitor tank quantity and set the pump switch to OFF if the tank quantity is not changing.

2) If it is necessary to transfer fuel from tank to tank with passengers on board, do these steps:

a) Monitor the applicable tank fuel quantity.

b) Put the pump switch(es) to the off position at or above 2,000 lbs (900 kgs).

(c) Push the applicable fuel boost pump switch-light on the fuel management panel of the overhead panel, P5, to the ON position (View D).

NOTE: This starts the tank to tank transfer of fuel.

S 862-088

(17) If the center fuel tank supplies the fuel, do the steps that follow:

(a) For the main fuel tank that gets the fuel, put the applicable DEFUEL LH or DEFUEL RH switch to the OPEN position.

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(b) Obey these fuel pump limitations during the fuel transfer operation:
1) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

NOTE: When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for the low pressure light(s) to come on. In this case, monitor tank quantity and set the pump switch to OFF if the tank quantity is not changing.

2) If it is necessary to transfer fuel from tank to tank with passengers on board, do these steps:
a) Monitor the applicable tank fuel quantity.
b) Put the pump switch(es) to the off position at or above 2,000 lbs (900 kgs).

(c) Push the applicable LEFT C PUMPS or RIGHT C PUMPS switch-light on the fuel management panel to the ON position (View D).

NOTE: This starts the tank to tank transfer of fuel.

S 862-091

(18) If you move fuel from one main fuel tank to the other main fuel tank and the applicable defueling valve does not operate or you want to transfer fuel at a higher rate, push the FUEL CROSSFEED switch-light(s) to the open position and put the other DEFUEL (LH or RH) switch to the OPEN position also.

NOTE: Airplanes with dual crossfeed valves will have two switch-lights.

S 212-038
(19) Monitor the quantity of fuel in the fuel tanks on the load select indicators of the fueling control panel, P28 (View C).

S 862-039
(20) Push the applicable fuel boost pump or fuel override pump to the off position when the necessary quantity of fuel is moved (View D).

S 862-040
(21) Put the applicable DEFUEL LH or DEFUEL RH switch to the CLOSE position (View C).

S 862-041
(22) Put the fueling valve switch of the fuel tank that got the fuel to the OFF position (View C).

S 862-089
(23) Push the FUEL CROSSFEED switch-light(s) on the fuel management panel to the off position (View D), if applicable.

S 652-084
(24) If the fuel tank must be fully defueled, drain the remaining fuel through the drain valve of the fuel sump (AMM 12-11-03/301).

S 412-085
(25) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 862-043

WARNING: DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). ACCIDENTAL SLAT OPERATION COULD CAUSE INJURY TO PERSONS.

(26) Do the activation procedure for the leading edge slat (AMM 27-81-00/201).

S 862-103

(27) AIRPLANES WITH AUTO SHUTOFF SYSTEM (POST-SB 28A0081 OR POST-SB 28A0082);
Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the overhead circuit breaker panel, P11:
1) 11L13, FUEL-AUTO S/O OVRD PMP CTR TANK L
2) 11L25, FUEL-AUTO S/O OVRD PMP CTR TANK R

S 862-086

(28) Remove electrical power if it is not necessary (AMM 24-22-00/201).

DEFUELING - ADJUSTMENT/TEST

1. General
   A. This procedure contains an operational test of the defueling system. The test makes sure the electrical defueling components operate correctly.

TASK 28-26-00-735-001

2. System Test - Defueling
   A. References
      (1) AMM 06-44-00/201, Wing Access Panels and Doors
      (2) AMM 24-22-00/201, Electrical Power Control
      (3) AMM 27-81-00/201, Leading Edge Slat System
   B. Access
      (1) Location Zones
          621 Leading Edge to Front Spar (Right)
          738 Left MLG Oleo Door
          744 Right MLG Oleo Door

      (2) Access Panel
          621GB Fueling Station Door (Right)

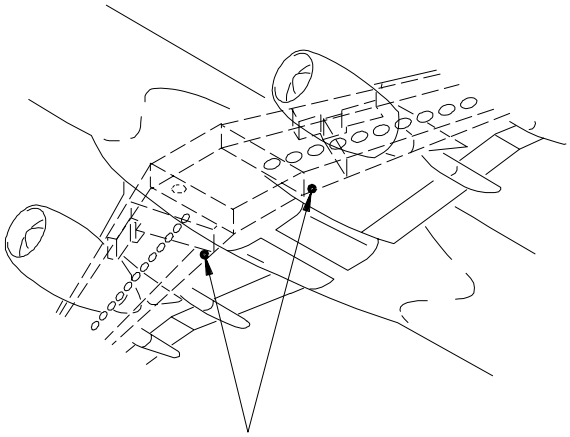
   C. Prepare for the Test

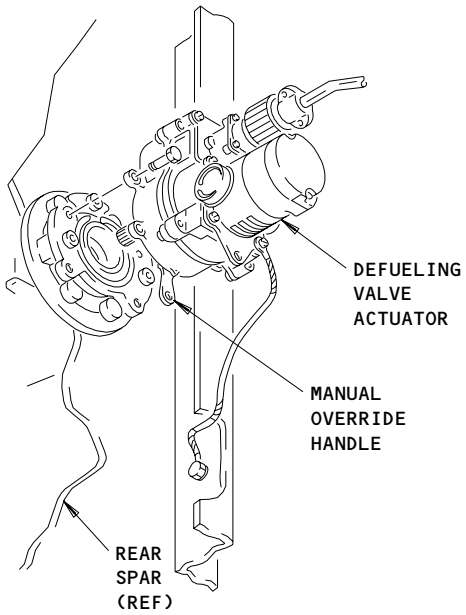
      S 865-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 865-003
      (2) Close these circuit breakers on the main power distribution panel, P6:
          (a) 6E5, FUELING CONTROL
          (b) 6E6, FUELING VALVE

      S 865-004
      (3) Close these circuit breakers on the APU external power panel, P34:
          (a) 34A9, FLNG VALVES
          (b) 34A11, FLNG CONT

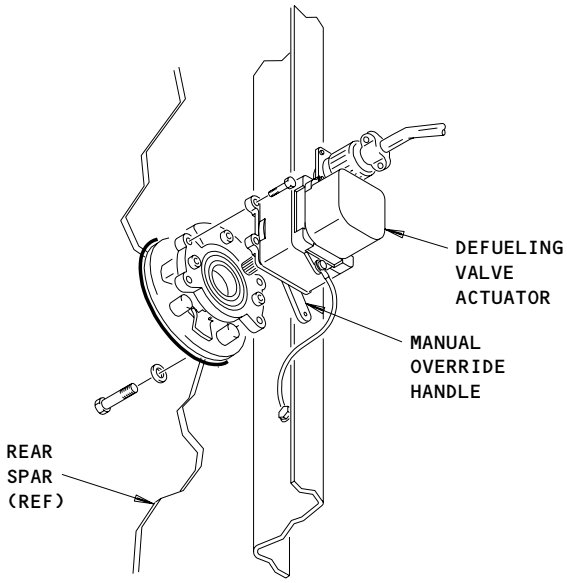
      S 865-005
      (4) Close these circuit breakers on the miscellaneous electrical equipment panel, P70:
          (a) 70B14, L TANK DEFUEL VALVE
          (b) 70B15, R TANK DEFUEL VALVE





DEFUELING VALVE ACTUATOR

A 2

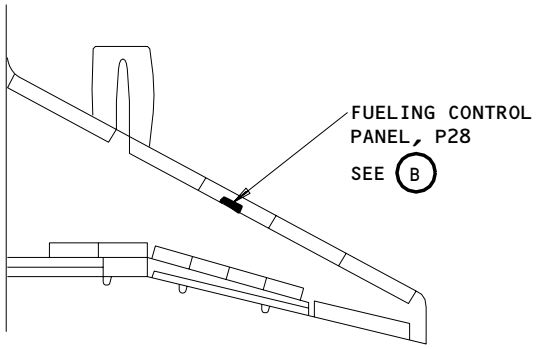


DEFUELING VALVE ACTUATOR

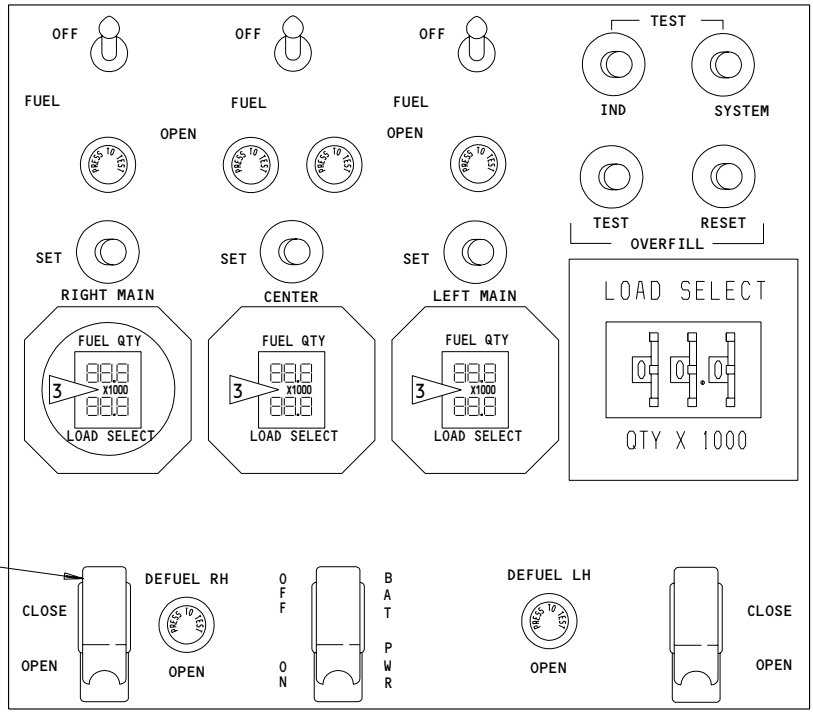
A 1

1 PREFERRED
2 ALTERNATE

Defueling System Components
Figure 501 (Sheet 1)



RIGHT WING



FUELING CONTROL PANEL, P28

B

3 THE UNITS ARE IN LBS OR KGS.

Defueling System Components
Figure 501 (Sheet 2)

S 865-024

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). FAILURE TO DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

S 015-006

(6) Open the fueling station door, 621GB (AMM 06-44-00/201).

D. Test of the Defueling System

S 865-007

(1) Put the RH DEFUEL switch on the fueling control panel, P28, to the OPEN position (View B, Fig. 501).

S 215-020

(2) Make sure the manual override handle on the right defueling valve actuator moves to the OPEN position (View A).

NOTE: Access to the right defueling valve actuator is through the right shock strut door for the main landing gear.

S 215-008

(3) Make sure the DEFUEL RH OPEN light on the P28 panel comes on (View B).

S 865-009

(4) Put the RH DEFUEL switch to the CLOSE position.

S 215-010

(5) Make sure the DEFUEL RH OPEN light goes off.

S 215-011

(6) Make sure the manual override handle on the right defueling valve actuator moves to the CLOSED position (View A).

S 865-012

(7) Put the LH DEFUEL switch on the P28 panel to the OPEN position (View B).

S 215-013

(8) Make sure the DEFUEL LH OPEN light comes on.

S 215-021

(9) Make sure the manual override handle on the left defueling valve actuator moves to the OPEN position (View A).

NOTE: Access to the left defueling valve actuator is through the left shock strut door for the main landing gear.

S 865-014

(10) Put the LH DEFUEL switch on the P28 panel to the CLOSED position.

S 215-015

(11) Make sure the LH DEFUEL OPEN light goes off (View B).

S 215-016

(12) Make sure the manual override handle on the left defueling valve actuator moves to the CLOSED position (View A).

S 415-017

(13) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 865-022

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE, INJURY COULD OCCUR.

(14) Do the activation procedure for the leading edge slat (AMM 27-81-00/201).

S 865-018

(15) Remove electrical power if it is not necessary (AMM 24-22-00/201).

DEFUELING VALVE - REMOVAL/INSTALLATION

1. General
   A. A defueling valve is found on the rear spar in the center fuel tank. The defueling valve is inboard of each end rib in the center fuel tank. The defueling valve contains three parts: the adapter shaft, the valve body and the actuator. The adapter shaft connects the valve body to the actuator. The actuator is found out of the fuel tank on the rear spar.
   B. This procedure contains five tasks. The first task removes the adapter shaft of the defueling valve. The second task installs the adapter shaft of the defueling valve. The third task aligns the adapter shaft. The fourth task removes the valve body of the defueling valve. The fifth task installs the valve body of the defueling valve.
   C. The procedure to remove and install the defueling valve actuator is in AMM 28-26-02/401.

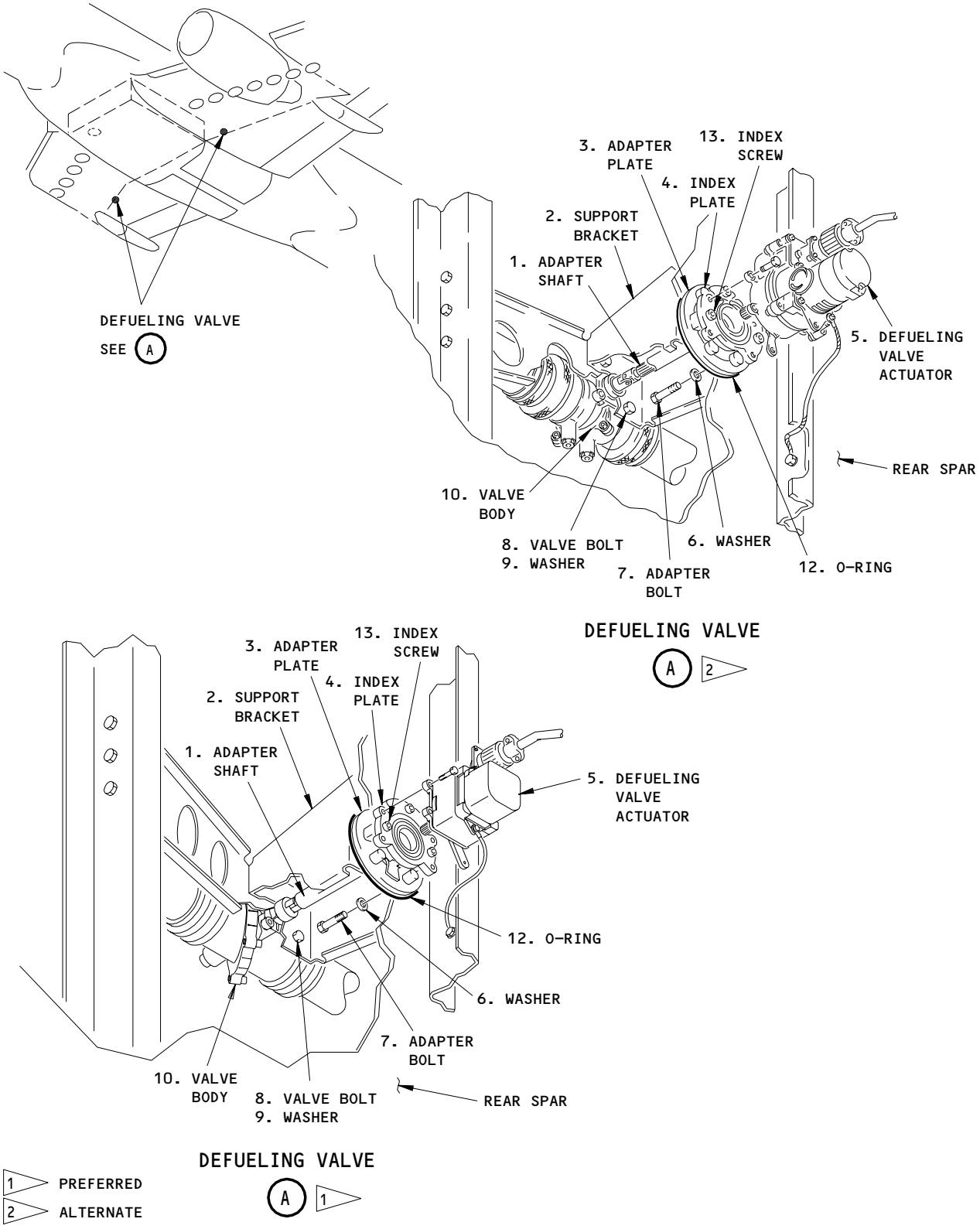
TASK 28-26-01-004-029

2. Remove the Adapter Shaft of the Defueling Valve
   (Fig. 401, Fig. 401A)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-02/401, Center Tank Access Door
      (3) AMM 28-26-00/201, Defueling
      (4) AMM 28-26-02/401, Defueling Valve Actuator
   B. Access
      (1) Location Zones
          531 Center Wing Tank (Left)
          631 Center Wing Tank (Right)

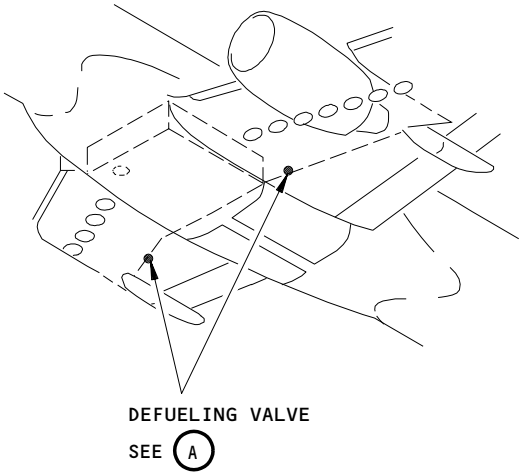
      (2) Access Panels
          531BB Center Tank Access Door (Left)
          631BB Center Tank Access Door (Right)

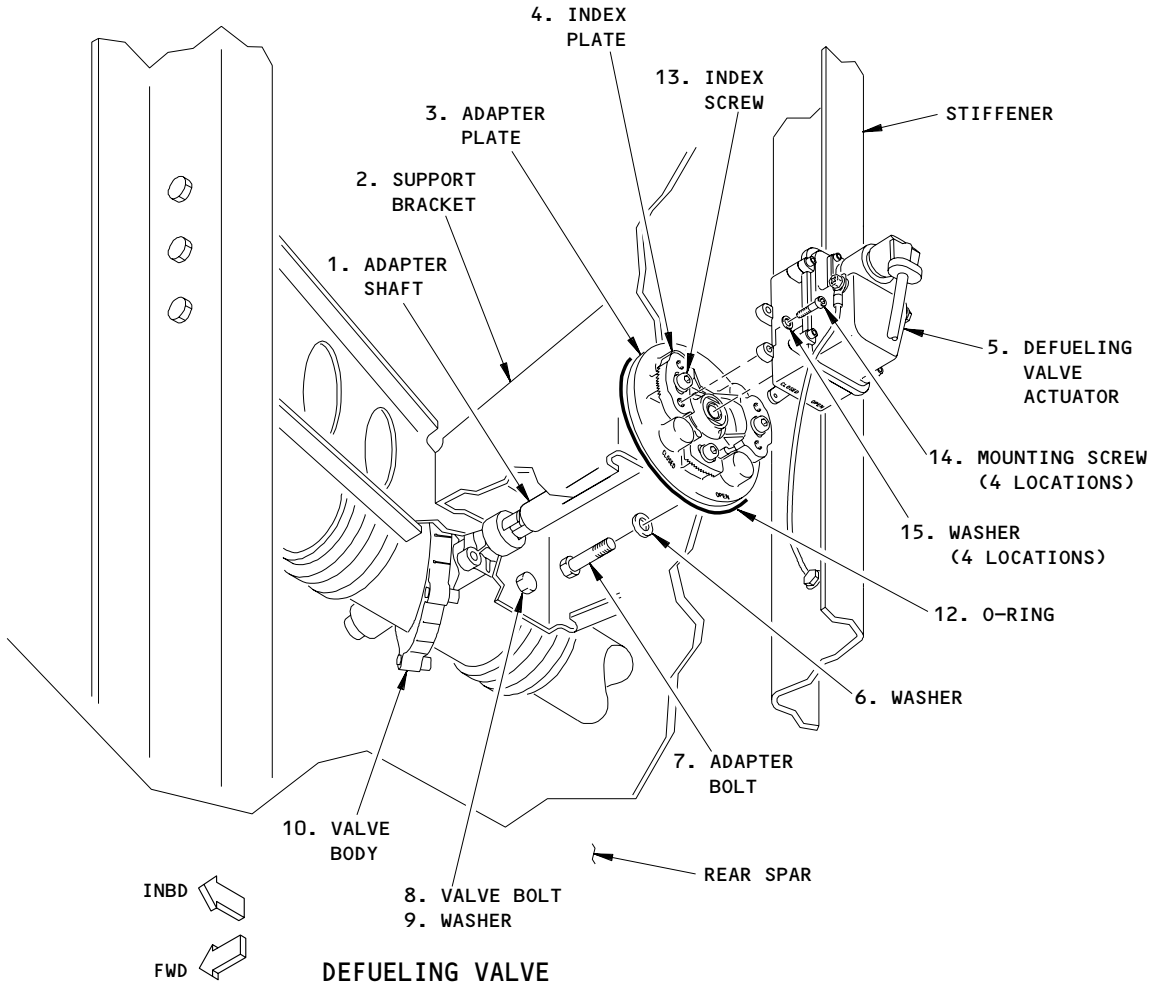
   C. Procedure

      S 654-030
      (1) Defuel the center fuel tank (AMM 28-26-00/201).



Defueling Valve Installation
Figure 401

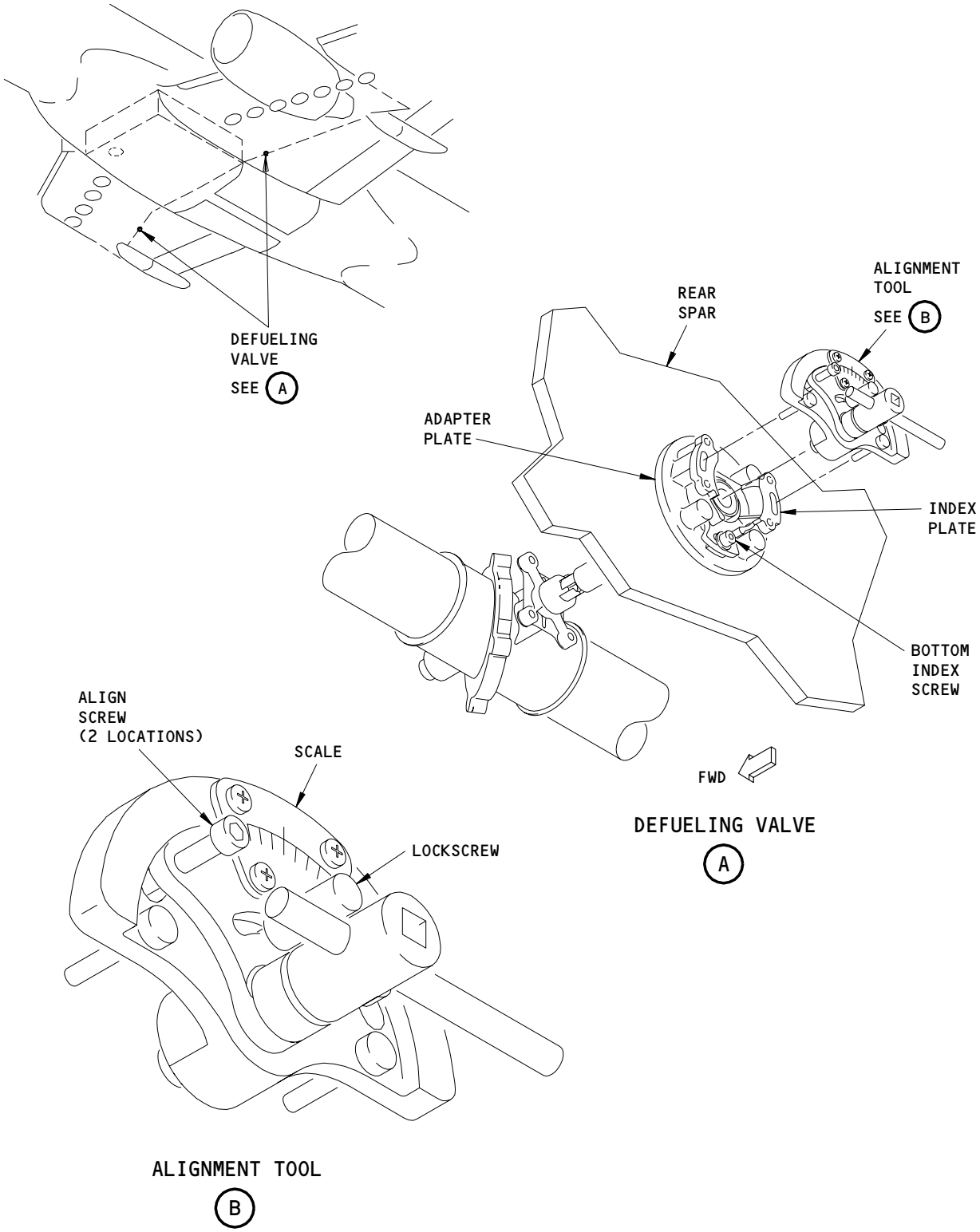




DEFUELING VALVE
(A)

Defueling Valve Installation
Figure 401A

1321195



Alignment Tool Installation
Figure 402

S 654-031
(2) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 034-002
(3) Remove the defueling valve actuator (AMM 28-26-02/401).

S 014-001
(4) Remove the applicable left or right center tank access door, 531CB or 631CB (AMM 28-11-02/401).

S 944-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-032
(6) Go into the center fuel tank.

S 014-059
(7) Find the defueling valve.

S 034-004
(8) Remove the four adapter bolts (7) that attach the adapter plate (3) to the rear spar.

S 024-033
(9) Disengage the adapter shaft (1) from the valve body (10).

S 024-034
(10) Pull the adapter shaft (1) through the hole in the rear spar from out of the fuel tank to remove it.

TASK 28-26-01-404-035

3. Install the Adapter Shaft of the Defueling Valve
(Fig. 401, Fig. 401A)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Adapter shaft	28-26-01	01 02	165,235 250 55
	12	O-ring (Packing)		01	230

B. References
(1) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(2) AMM 20-30-92/201, Airplane Structure Cleaning Solvents (Series 92)
(3) AMM 28-00-00/201, Fuel System
(4) AMM 28-11-00/201, Fuel Tanks
(5) AMM 28-11-00/701, Fuel Tanks
(6) AMM 28-11-01/401, Main Tank Access Door
(7) AMM 28-11-02/401, Center Tank Access Door
(8) AMM 28-11-07/401, Wing Dry Bay Access Door
(9) AMM 28-26-02/401, Defueling Valve Actuator
(10) AMM 51-31-01/201, Seals and Sealing
(11) SWPM 20-20-00, Electrical Bonding and Grounds

C. Consumable Materials
(1) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS 15-5
(2) G50021 Scotch-Brite 96W pad
(3) D00504 Petrolatum grease
(4) C00064 Coating - Chemical Conversion Coating for Aluminum or Aluminum Alloys, MIL-C-5541 (MIL-C-81706) - Alodine 600
(5) C00307 BMS 10-20, Type II Class A - Finish, Corrosion Resistant
(6) A00247 Chromate Type Sealant - BMS 5-95, Class B
(7) A00767 Sealant - Integral Fuel Tank BMS 5-45
(8) B01008 Solvent - Series 88
(9) B01012 Solvent - Series 92

D. Access
(1) Location Zones
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

(2) Access Panels
531BB Center Tank Access Door (Left)
631BB Center Tank Access Door (Right)

E. AIRPLANES WITH ACTUATOR MA20A1001-1 (PRE-SB 28A0088);
Install the Adapter Shaft of the Defueling Valve (Fig. 401)

S 034-036
(1) Install a new O-ring (12) in the groove on the adapter plate (3).

S 424-037
(2) Put the adapter shaft (1) through the hole in the rear spar.

S 944-038

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-039
(4) Go into the center fuel tank.

S 424-040
(5) Engage the adapter shaft (1) with the valve body (10).

S 214-041
(6) Make sure the adapter plate (3) moves freely in the opening of the rear spar.

S 434-005
(7) Install the four adapter bolts (7) and washers (6) to attach the adapter plate (3) and adapter shaft (1) to the rear spar.

S 224-006
(8) Measure the bonding resistance between the adapter bolts (7) and the airplane structure (SWPM 20-20-00).
(a) Make sure the resistance is 0.015 ohm (1.5 milliohms) or less.

S 824-097
(9) Do this task: Adapter Shaft Alignment.

S 414-011
(10) Close the applicable left or right center tank access door, 531CB or 631CB (AMM 28-11-02/401).

F. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the Adapter Shaft of the Defueling Valve (Fig. 401A)

S 124-118
(1) Remove the old sealant and clean the rear spar, adapter shaft (1), index plate (4), and fasteners (if reused).
(a) Use the sealant removal tool and sealant removal tool handle (or equivalent) to scrape away the old sealant from the rear spar.

(b) If new parts are to be installed, use an abrasive pad to remove the anodized finish from the faying surfaces of the adapter shaft (1) and index plate (4) (SWPM 20-20-00).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) To remove the remaining sealant, grease, oil, dirt, and other contamination from the components, use one of these items soaked with Series 92 solvent (AMM 20-30-92/201).
1) soft bristle brush
2) cotton wiper
3) Scotch-Brite 96W pad

S 114-119

(2) Do these steps to prepare the adapter shaft (1) and the rear spar for a fillet sealed electrical faying surface bond (SWPM 20-20-00):

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Final clean the contact surfaces of the adapter shaft (1) and the rear spar with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
(b) Rub dry with a clean, dry cotton wiper.
(c) Continue to clean and dry the surface until the dry cotton wiper stays clean.

S 434-120

(3) While outside of the airplane fuel tank, do these steps:
(a) Put a thin layer of petrolatum grease on the new o-ring (12).
(b) Put the o-ring (12) in the o-ring groove of the adapter shaft (1).
(c) Put the shaft portion of the adapter shaft (1) through the hole in the rear spar.
(d) Make sure the shoulder of the adapter shaft (1) does not bind in the opening of the rear spar.

S 864-121

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-122

WARNING: DO THE PURGING AND FUEL TANK ENTRY PROCEDURE. FAILURE TO FOLLOW THE PURGING AND FUEL TANK ENTRY PROCEDURE COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Go into the center fuel tank to the defuel valve location (AMM 28-11-00/201).

S 424-123

(6) Do these steps to install the adapter shaft (1):
   (a) Make sure that the index marks on the valve body (10) and adapter shaft (1) are aligned (Fig. 402, View E).

      NOTE: A small misalignment of the index marks is satisfactory.

   (b) Engage the shaft of the adapter shaft (1) with the valve body (10).
   (c) Apply sealant to the shank and the threads of the four bolts.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

      1) Use BMS 5-45 Class B sealant for the wet installation of the bolts.
      2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.52 mm) thick.

   (d) Install the bolts and washers to attach the adapter shaft (1) to the spar.
   (e) Make sure the gap between the adapter shaft (1) and the valve body spline is 0.20 +/- 0.20 inch (5.1 +/- 5.1 mm).

      NOTE: If you can not get the correct gap, loosen the support bracket for the valve body (10) and adjust its position to get the correct gap.

S 764-124

(7) On the outside of the fuel tank, measure the bonding resistance between the adapter plate and the rear spar.
(a) Make sure the resistance is 0.0005 ohm (0.5 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-125

(8) On the inside of the tank, apply a fillet seal of BMS 5-45 Class B sealant to these components (AMM 51-31-01/201):

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) The four bolts.
(b) The periphery of the rear spar penetration and the stationary part of the adapter shaft (1).

NOTE: Make sure the sealant does not touch any part of the adapter shaft (13) that rotates.

S 424-126

(9) On the outside of the fuel tank, apply a fillet seal of BMS 5-45 Class B sealant around the periphery of the adapter shaft (1) (AMM 51-31-01/201).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 414-127

CAUTION: MAKE SURE YOU REMOVE ALL UNWANTED PARTICLES FROM IN THE FUEL TANK. UNWANTED PARTICLES CAN CAUSE A BLOCKAGE OF THE PUMPS AND PREVENT THE SCAVENGE OF FUEL AND WATER.

(10) Remove all unwanted materials from the fuel tank.

S 414-128

(11) Install the applicable left or right center tank access door, 531BB or 631BB (AMM 28-11-02/401).

S 824-132

(12) Do this task: Adapter Shaft Alignment.

G. Install the Index Plate

S 824-133

(1) Do this procedure after you have correctly aligned and marked the alignment position of the index plate and adapter plate per this task: Adapter Shaft Alignment.

S 024-134

(2) Remove the index plate (4) from the adapter shaft (1).

S 424-135

(3) Do these steps to prepare the index plate (4) and the adapter shaft (1) for a sealed electrical faying surface bond (SWPM 20-20-00).

(a) Protect the alignment reference mark when you clean the index plate (4) and the adapter shaft (1) for the electrical bond.

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).

(c) Rub dry with a clean, dry cotton wiper.

(d) Continue to clean and dry the surface until the dry cotton wiper stays clean.

(e) Apply a thin continuous layer of sealant to the serrated surface of the index plate (4) (three locations).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.

2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.

(f) Apply sealant to the shank and the threads of the mounting screws (14).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the wet installation of the mounting screws (14).
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.52 mm) thick.

S 424-136

(4) Do these steps to install the index plate (4).
(a) Align the index plate (4) and the adapter shaft (1) with the alignment reference mark that you made during the spar valve alignment procedure.
(b) Install the two screws and washers in the top index mounting hole positions.
(c) Install the screw and washer in the bottom index mounting hole position.
(d) Tighten the screws to 22 +/- 1 in-lb (2.5 +/- 0.1 Nm).
(e) Make sure the sealant is continuously squeezed out along the edges of the contact surfaces.
(f) If there are gaps, bubbles or voids in the sealant squeeze out, then disassemble and apply more sealant.
(g) Shape the squeezed out sealant into a fillet seal (AMM 51-31-01/201).
(h) As an option, remove the extra squeezed out sealant.

NOTE: Make sure the sealant that remains is flush with the mating part edges.

S 764-137

(5) Measure the bonding resistance between the index plate (4) and the adapter plate (3).
(a) Make sure the bonding resistance is 0.0005 ohm (0.5 milliohm) or less.

S 424-138

(6) Lockwire the mounting screws (14) and the index plate (4) together.

S 794-139

(7) Do this task: Install the Defueling Valve Actuator (AMM 28-26-02/401).

S 374-140

(8) Do this task to apply protective finishes to the bare areas of the rear spar: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the rear spar where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating
2) BMS 10-20 coating

TASK 28-26-01-824-083

4. Adapter Shaft Alignment (Fig. 402)

A. Equipment

(1) B28009-1, Adapter Shaft Alignment Tool

(2) Torque meter - 0-15 inch-pounds, with a resolution of +/- 1 inch-pound (optional)

B. References

(1) AMM 28-26-02/401, Defueling Valve Actuator

C. Access

(1) Location Zones

531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

D. Procedure

S 014-084

(1) Remove the defueling valve actuator if it is not removed (AMM 28-26-02/401).

S 484-085

(2) Do these steps to install the alignment tool in the adapter plate (3):

(a) Remove the top two index screws from the index plate.

(b) Loosen the bottom index screw, but do not remove it.

(c) Install the alignment tool (Fig. 402):

(d) Put the alignment tool in its position with the two guide pins in the holes left by the two index screws that you removed (the scale should be on the top of the tool).

(e) Make sure the spline on the tool engages with the spline on the shaft.

S 824-086

(3) Do these steps to align the adapter shaft (Procedure 1, optional to Procedure 2):

NOTE: This procedure finds the point where the internal valve butterfly engages the valve seal. The torque required to turn the shaft increases as the butterfly engages the seal, then decreases again as the butterfly leaves the other side of the seal. Once the edge of the seal is found, the valve shaft will then be turned to center the butterfly on the seal.

(a) Put the tool handle in the extreme counterclockwise position.
(b) Turn the handle slowly in the clockwise direction at a constant rate while you note the changes in the torque necessary to turn the handle.
(c) Do the previous steps as many times as necessary to find the point in the rotation where the torque necessary to turn the handle increases significantly.
(d) If you cannot find the position in the rotation where the torque increases significantly , then use Procedure 2 below.
(e) Put the shaft in the extreme counterclockwise position again.
(f) Slowly and smoothly turn the handle of the tool clockwise until a distinct increase in torque is found and immediately stop turning the handle.
(g) Read the scale on the tool.

NOTE: This is the point where the valve butterfly starts to engage the edge of the seal.

(h) Turn the handle 13 degrees more in the clockwise direction (the scale on the tool is calibrated in degrees).

NOTE: The valve butterfly is now centered on the valve seal.

NOTE: If you turn the handle past the target value, do not turn the handle back in the counterclockwise direction again. You must start the procedure again with the handle in the extreme counterclockwise position.

S 824-096

(4) Do these steps to align the adapter shaft (Procedure 2, optional to procedure 1):

NOTE: A torque meter is necessary to do this procedure.

(a) Put the tool handle in the extreme counterclockwise position.

(b) Slowly and smoothly turn the tool handle to the extreme clockwise position while you monitor the torque that you apply to the handle.
(c) Write down the maximum torque that you apply to the tool while you turn it from the extreme counterclockwise position to the extreme clockwise position.
(d) Turn the tool back to the extreme counterclockwise position.
(e) Turn the shaft clockwise again at approximately the same rate that you used before.
(f) Stop at the position where the torque increases to approximately two-thirds of the maximum torque that you wrote down before.
(g) Read the scale on the tool at this position.

NOTE: This is the position where valve butterfly starts to engage the edge of the seal.

(h) Turn the handle 13 more degrees in the clockwise direction past the reading from the previous step.

NOTE: The butterfly valve is now centered on the valve seal.

NOTE: If you turn the valve past the target value, do not turn it back in the counterclockwise direction. You must start again with the tool handle in the extreme counterclockwise position.

S 034-087
(5) Tighten the lockscrew on the tool to keep the adapter shaft in its position.

S 824-088
(6) Turn the index plate until the actuator mounting holes in the index plate are aligned with the two upper holes for the actuator mounting screws.

S 824-089
(7) Insert the two align screws into the holes for the actuator mounting screws to hold the index plate in alignment with the mounting plate (this is a final adjustment of the position of the index plate).

S 434-090
(8) Tighten the bottom index screw to a torque of 21-23 pound-inches.

S 034-091
(9) Carefully remove the align screws.

S 084-092
(10) Carefully remove the alignment tool from the index plate.

S 034-093
(11) Install the top two index screws (13) in the index plate (4) and tighten them to a torque of 21-23 pound-inches.

S 434-094
(12) Attach the index screws with lockwire.

S 414-095
(13) Install the defueling valve actuator (AMM 28-26-02/401).

TASK 28-26-01-004-012

5. Remove the Valve Body of the Defueling Valve

(Fig. 401, Fig. 401A)

A. References
(1) AMM 28-11-00/201, Fuel Tanks
(2) AMM 28-11-02/401, Center Tank Access Door
(3) AMM 28-25-05/401, APU Fuel Line and Shroud
(4) AMM 28-26-00/201, Defueling

B. Access
(1) Location Zones
531 Center Wing Tank (Left)
631 Center Wing Tank (Right)

(2) Access Panels
531BB Center Tank Access Door (Left)
631BB Center Tank Access Door (Right)

C. Procedure

S 654-047
(1) Defuel the center, left and right main fuel tanks (AMM 28-26-00/201).

S 654-048
(2) Drain and purge the center fuel tank (AMM 28-11-00/201).

S 014-013
(3) Open the applicable left or right center tank access door, 531BB or 631BB (AMM 28-11-02/401).

S 944-014

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 014-049
(5) Go into the center fuel tank and find the valve body (10).

S 034-015
(6) Disconnect the flexible full coupling (11) from each side of the valve body (10) (AMM 28-25-05/401).

S 034-016
(7) Hold the valve body (10) and remove the four valve bolts (8) that attach the valve body (10) to the support bracket (2).

S 024-017
(8) Disengage the valve body (10) from the adapter shaft (1).

S 024-050
(9) Remove the valve body (10).

S 494-018
(10) Put covers on the holes in the fuel line to keep unwanted materials out.

TASK 28-26-01-404-052

6. Install the Valve Body of the Defueling Valve
(Fig. 401, Fig. 401A)
A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	10	Valve body	28-26-01	01 02	90 105

B. References
(1) AMM 06-44-00/201, Wings Access Panels and Doors
(2) AMM 24-22-00/201, Electric Power Control
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 28-25-05/401, APU Fuel Line and Shroud
C. Access
(1) Location Zones
531 Center Wing Tank (Left)
621 Leading Edge to Front Spar (Right)
631 Center Wing Tank (Right)

(2) Access Panels

531BB	Center Tank Access Door (Left)
621GB	Fueling Station Door (Right)
631BB	Center Tank Access Door (Right)

D. Procedure

S 944-051

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 094-019

(2) Remove the covers from the fuel line.

S 824-020

(3) Align the index marks on the valve body (10) and the adapter shaft (1).

S 214-060

(4) Make sure "TOP" shows on the top of the valve body (10).

S 424-053

(5) Engage the valve body (10) and the adapter shaft (1).

S 214-021

(6) Make sure the surfaces that touch on the support bracket (2) and the valve body (10) are clean.

S 824-022

(7) Align the valve body (10) with the support bracket (2).

S 434-054

(8) Install the four washers (9) and bolts (8) through the support bracket (2) to attach to the valve body (10).

S 434-023
(9) Connect the flexible full couplings (11) that attach the valve body (10) to the fuel line (AMM 28-25-05/401).

S 414-024
(10) Install the applicable left or right center tank access door, 531BB or 631BB (AMM 28-11-02/401).

S 864-025
(11) Supply electrical power (AMM 24-22-00/201).

S 014-055
(12) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 864-026
(13) Put the applicable DEFUEL RH or DEFUEL LH switch on the fueling control panel, P28, to the OPEN position.

S 214-056
(14) Make sure the applicable DEFUEL RH or DEFUEL LH OPEN light comes on.

S 864-027
(15) Put the applicable DEFUEL RH or DEFUEL LH switch on the P28 panel to the CLOSE position.

S 214-057
(16) Make sure the applicable DEFUEL RH or DEFUEL LH OPEN light goes off.

S 414-058
(17) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-028
(18) Remove electrical power if it is not necessary (AMM 24-22-00/201).

DEFUELING VALVE - INSPECTION/CHECK

1. General
   A. This task does an electrical bonding resistance check for the defueling valve.

TASK 28-26-01-766-011

2. Defueling Valve - Bonding Resistance Check (Fig. 601)
   A. References
      (1) SWPM 20-20-00, Electrical Bonds and Grounds
   B. Equipment
      (1) Bonding Meter - Use one of these:
         (a) Bonding Meter 0 Model T477W
             Avtron Manufacturing Inc.
             Cleveland, OH
         (b) Bonding Meter - Model M1
             (Serial Number A000012 and subsequent)
             BCD Electronics Ltd.
             Vancouver, Canada
   C. Access
      (1) Location Zones
          733 Left MLG Oleo Door
          743 Right MLG Oleo Door

   D. Procedure

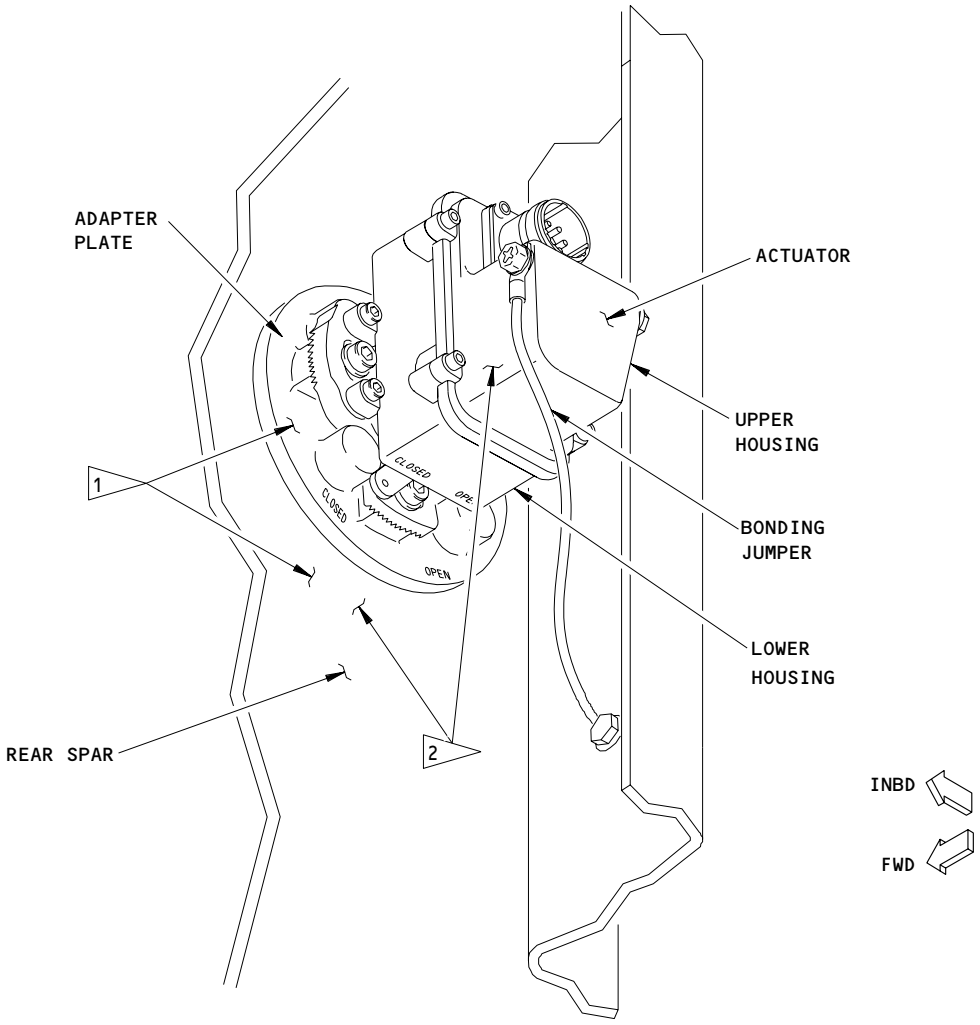
      S 016-002
      (1) Get access to the defueling valve.

      S 016-003
      (2) Disconnect the electrical connector from the actuator.

      S 766-005
      (3) Measure the electrical bonding resistance between the adapter plate and the spar web (SWPM 20-20-00).
         (a) Make sure the bonding resistance is 0.003 ohm (3.0 milliohms) or less.

      S 766-007
      (4) Measure the electrical bonding resistance between the upper housing of the actuator and the spar web (SWPM 20-20-00).
         (a) Make sure the bonding resistance is 0.004 ohm (4.0 milliohms) or less.

      S 436-010
      (5) Install the electrical connector on the actuator.



ELECTRICAL BONDING MEASUREMENT

A

1 THE RESISTANCE FROM THE ADAPTER PLATE TO THE SPAR IS 0.003 OHMS OR LESS

2 THE RESISTANCE FROM THE UPPER HOUSING OF THE ACTUATOR TO THE SPAR IS 0.004 OHMS OR LESS

Defueling Valve Resistance Check
Figure 601

DEFUELING VALVE ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. The defueling valve actuator is found on the dry side of the rear spar. The defueling valve actuator is installed inboard of each end rib in the center fuel tank. Access to the defueling valve actuator is through the shock strut door of the main landing gear.
   B. It is not necessary to defuel the fuel tank to get access to the defueling valve actuator.
   C. This procedure contains two tasks. The first task removes the defueling valve actuator. The second task installs the defueling valve actuator.
   D. The procedure to remove and install the defueling valve is in AMM 28-26-01/401.

TASK 28-26-02-004-009

2. Remove the Defueling Valve Actuator (Fig. 401, Fig. 401A)
   A. Access
      (1) Location Zones
          733 Left MLG Oleo Door
          743 Right MLG Oleo Door

   B. Procedure

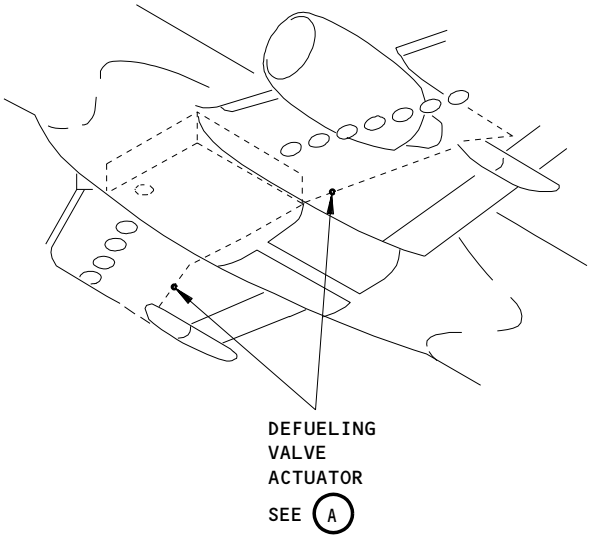
      S 864-010
      (1) Open this circuit breaker on the right miscellaneous electrical equipment panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A9, FLNG VALVES

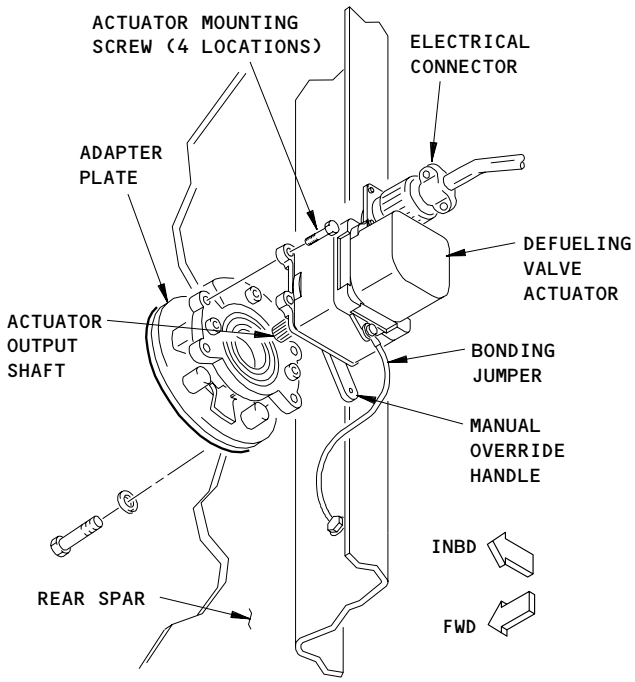
      S 984-011
      (2) Move the manual override handle on the defueling valve actuator to the CLOSED position.

      S 034-012
      (3) Remove the electrical connector from the defueling valve actuator.

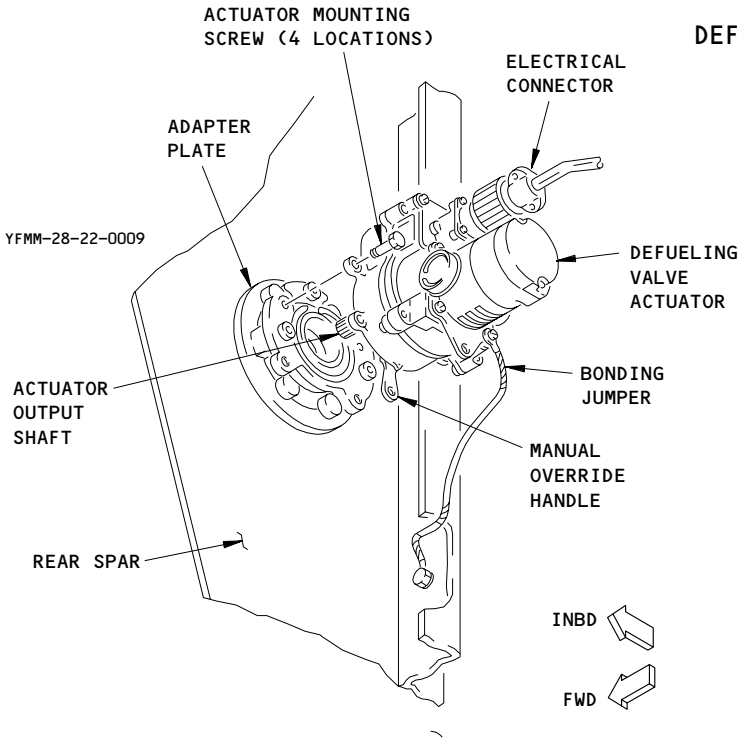
      S 034-013
      (4) Remove the bonding jumper from the defueling valve actuator.

      S 034-014
      (5) Remove the four actuator mounting screws.



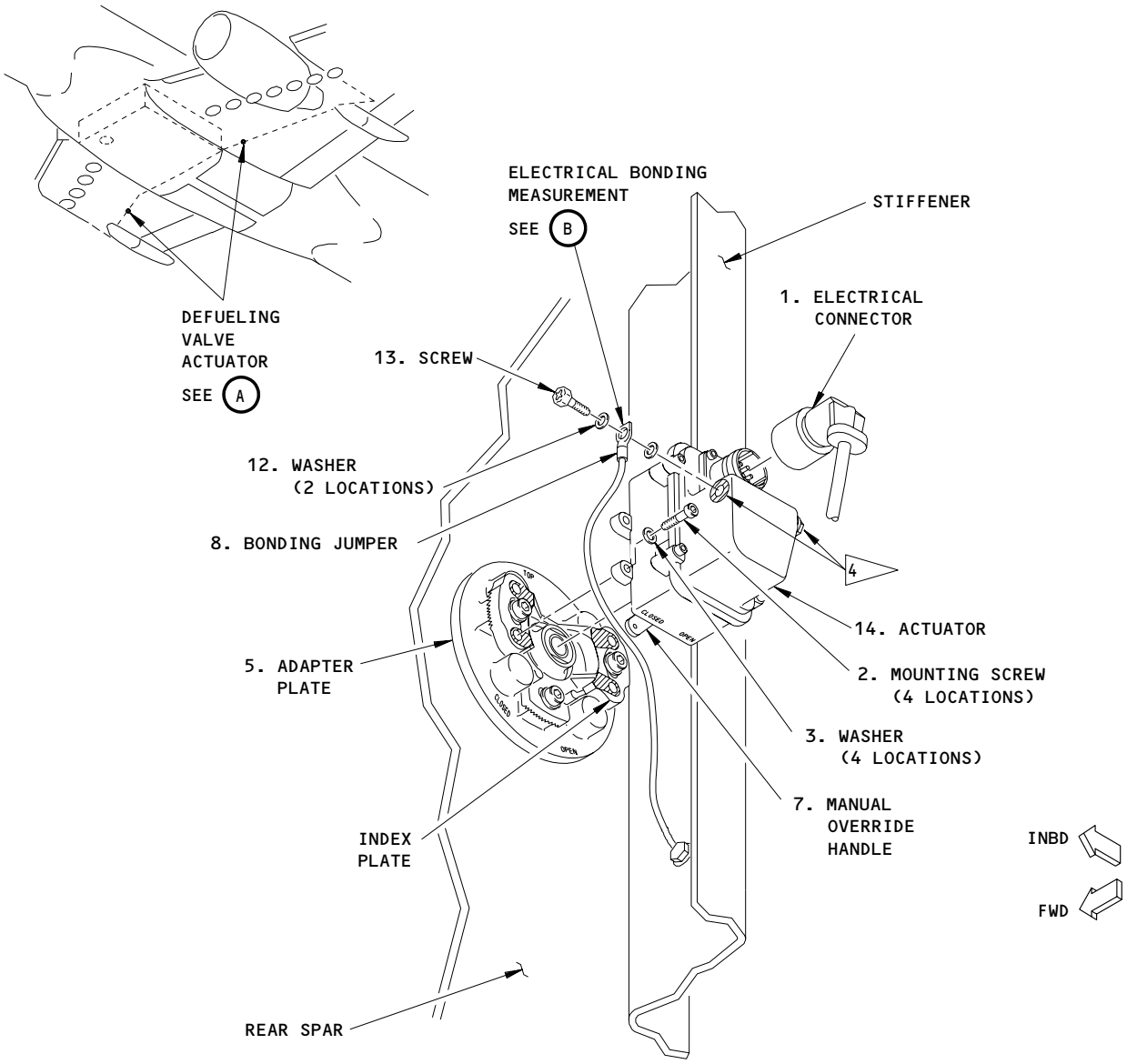


DEFUELING VALVE ACTUATOR
(PREFERRED)
A



DEFUELING VALVE ACTUATOR
(ALTERNATE)
A

Defueling Valve Actuator Installation
Figure 401



DEFUELING VALVE ACTUATOR

A

1 > PREPARE AND INSTALL THE CONTACT SURFACES OF THE INDEX PLATE AND ACTUATOR FEET (4 LOCATIONS) WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00).

2 > APPLY SEALANT TO THE SHANK AND THREADS OF THE MOUNTING SCREWS.

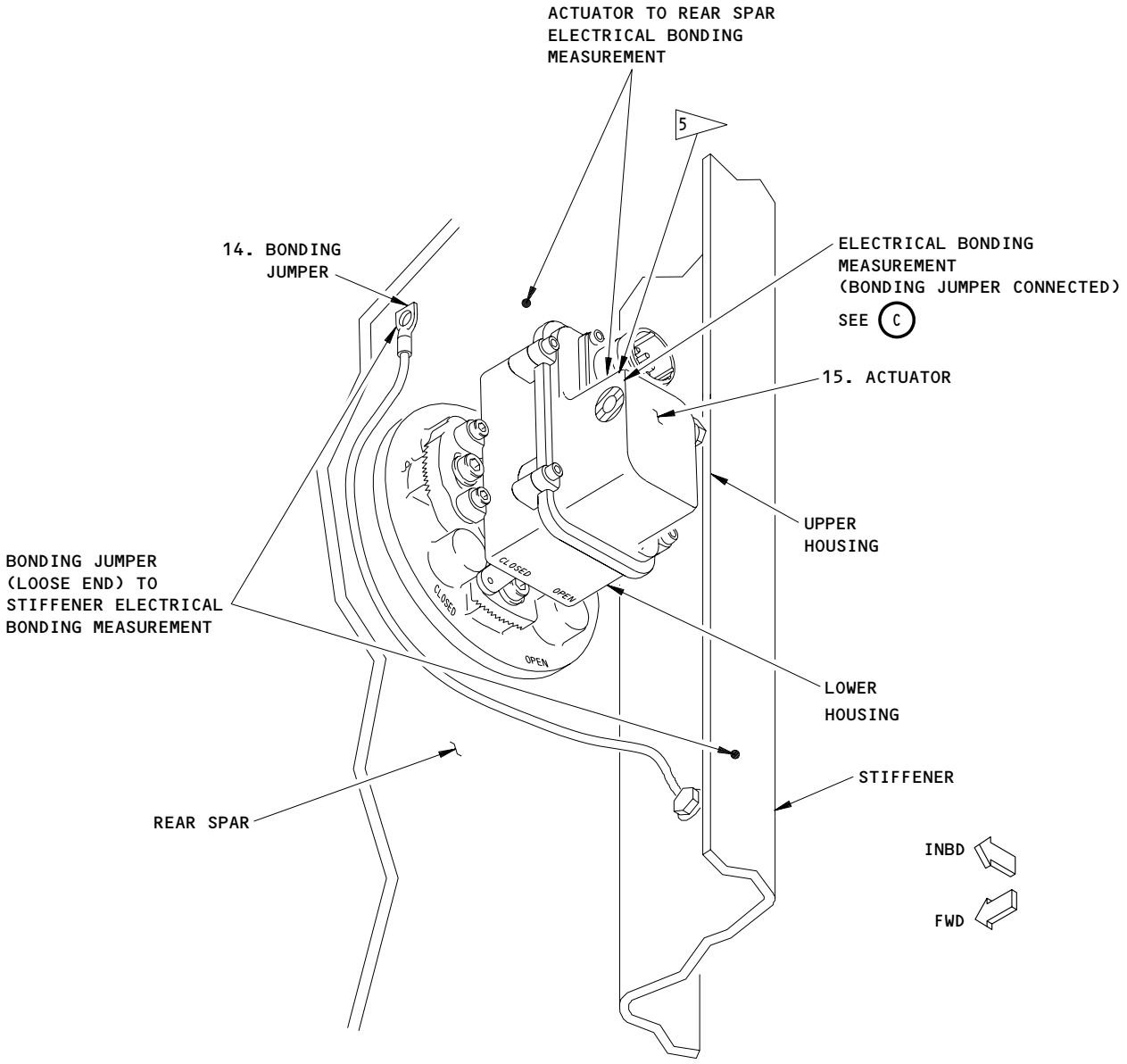
3 > PREPARE AND INSTALL THE CONTACT SURFACES OF ACTUATOR AND BONDING JUMPER BUILD-UP WITH A SEALED ELECTRICAL FAYING SURFACE BOND (SWPM 20-20-00). AFTER INSTALLATION, APPLY A FILLET SEAL TO THE BONDING JUMPER INSTALLATION.

4 > THE BONDING JUMPER MAY BE INSTALLED ON EITHER SIDE OF THE ACTUATOR.

Defueling Valve Actuator Installation
Figure 401A (Sheet 1)

EFFECTIVITY
AIRPLANES POST-SB 28A0088

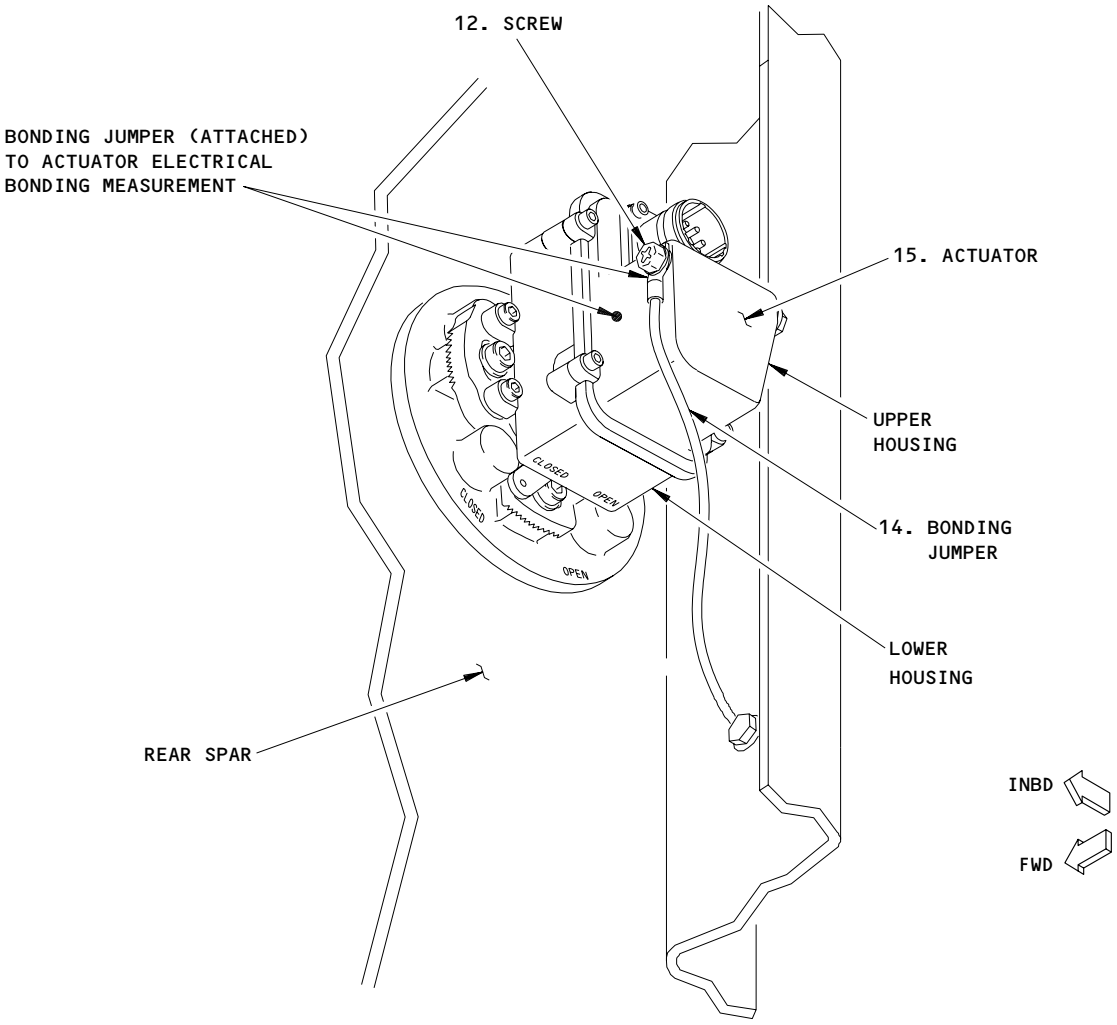
U60839



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
B

5 BARE METAL CONTACT SURFACE OF THE ACTUATOR AT THE BONDING JUMPER INSTALLATION.

Defueling Valve Actuator Installation
Figure 401A (Sheet 2)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

C

Defueling Valve Actuator Installation
Figure 401A (Sheet 3)

S 024-001
(6) Remove the defueling valve actuator.

TASK 28-26-02-404-015

3. Install the Defueling Valve Actuator

A. References
(1) AMM 06-44-00/201, Wings Access Panels and Doors
(2) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(3) AMM 20-30-92/201, Airplane Structure Cleaning Solvents (Series 92)
(4) AMM 24-22-00/201, Electric Power Control
(5) AMM 28-11-00/701, Fuel Tanks
(6) AMM 51-21-04/701, Alodine Coating
(7) SWPM 20-20-00, Electrical Bonding and Grounds

B. Equipment
(1) Brush - Soft Bristle - STD-123
(2) BAC5000 - Sealant Removal Tool

C. Consumable Materials
(1) Alodine Coating - Chemical Conversion Coating for Aluminum or Aluminum Alloys, MIL-C-5541 (MIL-C-81706), BAC5719 Type II Class A - Alodine 600 and 1200
(2) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5
(3) C00307 BMS 10-20, Type II Class A - Finish, Corrosion Resistant
(4) G50021 - Scotch-Brite 96W pad
(5) A00249 Sealant - Seal 890A or PR-1440A
(6) B01008 Solvent - Series 88
(7) B01012 Solvent - Series 92

D. Access
(1) Location Zones
621 Leading Edge to Front Spar (Right)
733 Left MLG Oleo Door
743 Right MLG Oleo Door

(2) Access Panel
621GB Fueling Control Panel (Right)

E. AIRPLANES WITH ACTUATOR MA2OA1OO1-1 (PRE-SB 28AOO88);
Install the Defueling Valve Actuator (Fig. 401)

S 984-016
(1) Move the manual override handle on the defueling valve actuator to the CLOSED position.

S 424-002
(2) Put the mating shaft of the defueling valve actuator on the adapter shaft of the defueling valve.

S 214-004
(3) Make sure the two teeth spaces on the adapter shaft align with the mating shaft of the defueling valve actuator.

NOTE: The mounting feet on the defueling valve actuator automatically align with the mounting points on the adapter plate.

S 424-017
(4) Attach the defueling valve actuator to the adapter plate with the actuator mounting screws.

S 434-003
(5) Install the lockwire on the actuator mounting screws.

S 434-018
(6) Attach the electrical connector to the defueling valve actuator.

S 434-019
(7) Attach the bonding jumper to the defueling valve actuator.

S 224-020
(8) Meassure the bonding resistance between the defueling valve actuator and the airplane structure (SWPM 20-20-00).
(a) Make sure the resistance is 0.010 ohm (10 milliohms) or less.

S 864-021
(9) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A9, FLNG VALVES

S 864-022
(10) Supply electrical power (AMM 24-22-00/201).

F. AIRPLANES WITHOUT ACTUATOR MA20A1001-1 (POST-SB 28A0088);
Install the Defueling Valve Actuator (Fig. 401A)

S 144-027

(1) Remove the old sealant and clean the actuator (15), index plate (10), and fasteners (if reused).
   (a) Use the sealant removal tool and sealant removal tool handle (or equivalent) to remove old sealant from the actuator (15) and index plate (10).

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

   (b) To remove the remaining sealant, grease, oil, dirt, and other contamination from the components, use one of these items soaked with Series 92 solvent (AMM 20-30-92/201).
      1) soft bristle brush
      2) cotton wiper
      3) Scotch-Brite 96W pad

S 424-028

(2) Do these steps to prepare the actuator (15) and the index plate (10) for a sealed electrical faying surface bond (SWPM 20-20-00):

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE. OBEY THE MATERIAL SAFETY DATA SHEETS (MSDS) FOR SOLVENTS. OBEY LOCAL REGULATIONS FOR THE CORRECT PROCEDURES TO USE OR DISCARD SOLVENTS. SOLVENTS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

   (a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
   (b) Rub dry with a clean, dry cotton wiper.
   (c) Continue to clean and dry the surface until the dry cotton wiper stays clean.

(d) Apply a thin continuous layer of sealant to the actuator contact areas (four locations).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 inch (0.127 mm) thick.

(e) Apply sealant to the shank and the threads of the mounting screws (3).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant for the wet installation of the mounting screws (3).
2) Make sure the sealant applied to the fasteners is approximately 0.060 inch (1.524 mm) thick.

S 424-029

(3) Do these steps to install the actuator (15) to the index plate (10).

(a) Make sure the manual override handle (1) is in the CLOSED position.
(b) Align the actuator output shaft with the adapter shaft.
(c) Make sure the two spaces for teeth on the adapter shaft align with the actuator output shaft.
(d) Put the actuator output shaft into the actuator shaft.

NOTE: The contact areas of the actuator automatically align with the mounting points on the index plate.

(e) Install the actuator mounting screws (3) and washers (2) that attach the actuator (15) to the index plate (10).

NOTE: Lockwire is not necessary for the actuator securing screws.

(f) Tighten the screws (3) to 20 in-lb (2.3 Nm).
(g) Make sure the sealant is continuously squeezed out along the edges of the contact surfaces.
(h) If there are gaps, bubbles or voids in the sealant squeeze out, then disassemble and apply more sealant.
(i) Shape the squeezed out sealant into a fillet seal.

(j) As an option, remove the extra squeezed out sealant.

NOTE: Make sure the sealant that remains is flush with the mating part edges.

S 764-030

(4) Measure the electrical bonding resistance between the upper housing of the actuator (at the bare metal bonding jumper installation location) and the rear spar (SWPM 20-20-00).
(a) Do this measurement with the bonding jumper (14) and the electrical connector (5) disconnected.
(b) Make sure the bonding jumper (14) does not touch the actuator (15) during the bonding measurement.
(c) Make sure the bonding resistance is 0.004 ohm (4.0 milliohms) or less.

NOTE: If you have replaced the valve adapter, then make sure the bonding resistance is 0.003 ohm (3.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 764-031

(5) Measure the electrical bonding resistance between the loose end of the bonding jumper (14) and the stiffener (SWPM 20-20-00).
(a) Make sure the bonding resistance is 0.0015 ohm (1.5 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-032

(6) Do these steps to install the bonding jumper (14) to the actuator (15):
(a) Final clean the contact surfaces with a cotton wiper soaked with Series 88 solvent (AMM 20-30-88/201).
1) Rub dry with a clean, dry cotton wiper.
2) Continue to clean and dry the surface until the dry cotton wiper stays clean.
(b) Apply a thin continuous layer of sealant to both surfaces of the bonding jumper (14) and the washers (13).
1) Use Pro Seal 890A or PR-1440A sealant for the faying surface seal.

2) Make sure the sealant layer is approximately 0.005 in. (0.127 mm) thick.

(c) Install the screw (12) and washers (13) to attach the bonding jumper (14) to the actuator (15).

(d) Tighten the screw (12) to to 20 in-lb (2.3 Nm).

(e) Measure the electrical bonding resistance between the upper housing of the actuator (15) and the attached bonding jumper (14) terminal (SWPM 20-20-00).

1) Do not touch the screw (12) when you make the bonding measurement.

2) Make sure the bonding resistance is 0.001 ohm (1 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(f) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper (14) and screw (12).

S 374-033

(7) Do this task to apply protective finishes to the bare areas of the rear spar: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the rear spar where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:

1) Alodine 600 coating

NOTE: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 914-034

(8) Do this task to apply Alodine coating to any bare areas of the actuator (15): Apply the Alodine Coating (AMM 51-21-04/701).

NOTE: Re-apply the protective coating to the actuator (15) where the electrical bonding probe removed the finish and any bare metal areas around the bonding jumper installation that are not covered with sealant.

S 434-035

(9) Install the electrical connector (5) on the actuator (15).

S 864-036
(10) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A9, FLNG VALVES

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

G. Do a Test of the Defueling Valve Actuator

S 014-005
(1) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 864-023
(2) Put the applicable DEFUEL RH or DEFUEL LH switch, on the fueling control panel, P28, to the OPEN position.

S 214-006
(3) Make sure the applicable DEFUEL RH or DEFUEL LH OPEN light comes on.

S 864-024
(4) Put the applicable DEFUEL RH or DEFUEL LH switch on the P28 panel to the CLOSE position.

S 214-007
(5) Make sure the applicable DEFUEL RH or DEFUEL LH OPEN light goes off.

S 414-008
(6) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-025
(7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

DEFUELING VALVE ACTUATOR - INSPECTION/CHECK

TASK 28-26-02-726-012

1. Defueling Valve Actuator - Bonding Resistance Check
(Fig. 601)

A. General
(1) This task does an electrical bonding resistance check for the defueling valve actuator.
(2) ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on airworthiness limitation instructions (ALIs).

B. References
(1) AMM 20-30-88/201, Airplane Structure Cleaning Solvents (Series 88)
(2) AMM 28-00-00/201, Fuel System
(3) AMM 28-11-00/701, Fuel Tanks
(4) AMM 51-21-04/701, Chemical Conversion Coating
(5) SWPM, 20-20-00, Electrical Bonding and Grounds

C. Consumable Materials
(1) Alodine Coating - Chemical Conversion Coating for Aluminum and Aluminum Alloys, BAC5719 Class A - Alodine 600 and 1200

D. Access
(1) Location Zones
733 Left MLG Oleo Door
743 Right MLG Oleo Door

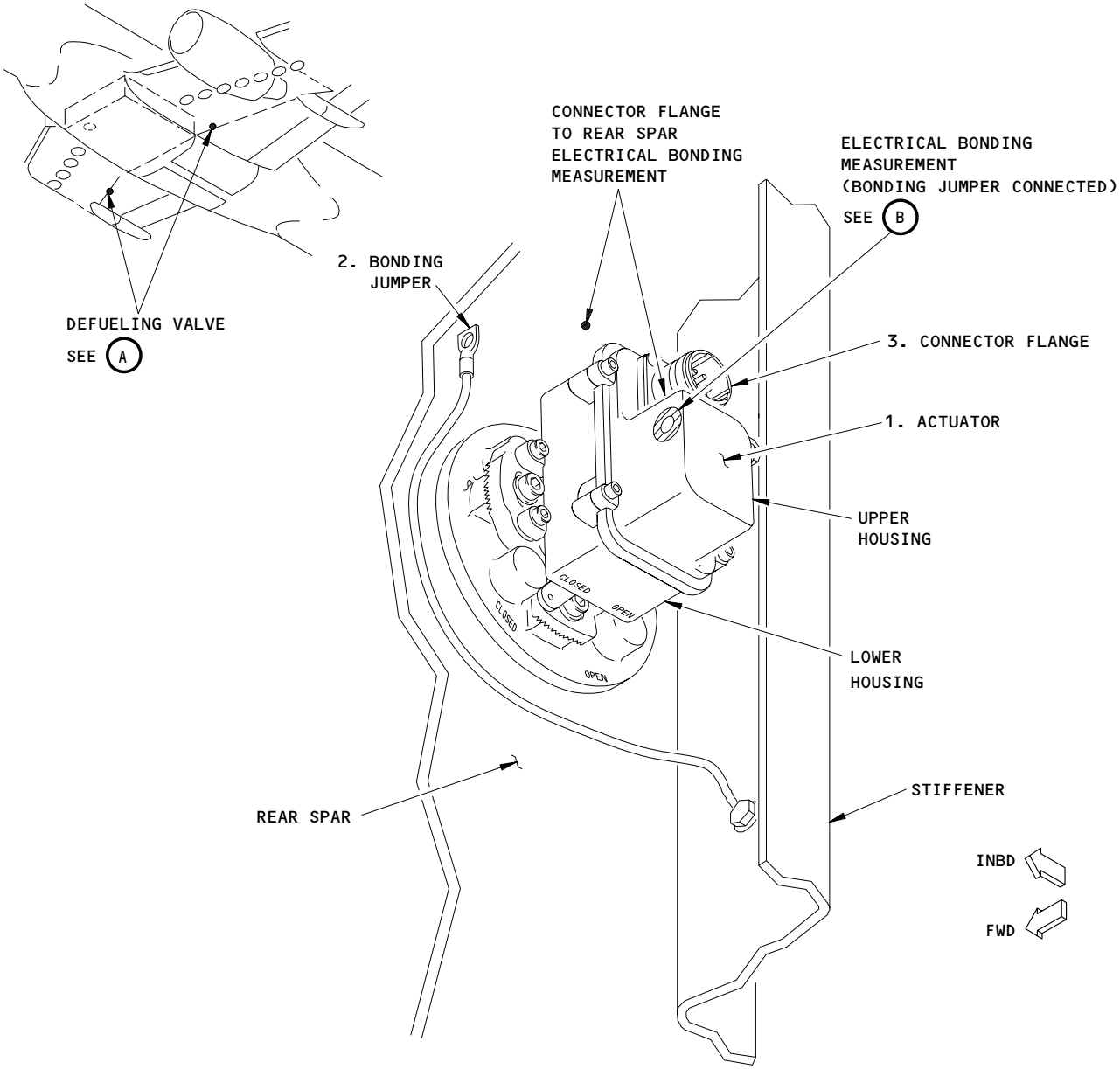
E. Procedure

S 016-002
(1) Get access to the defueling valve actuator.

S 016-003
(2) Disconnect the electrical connector from the actuator (1).

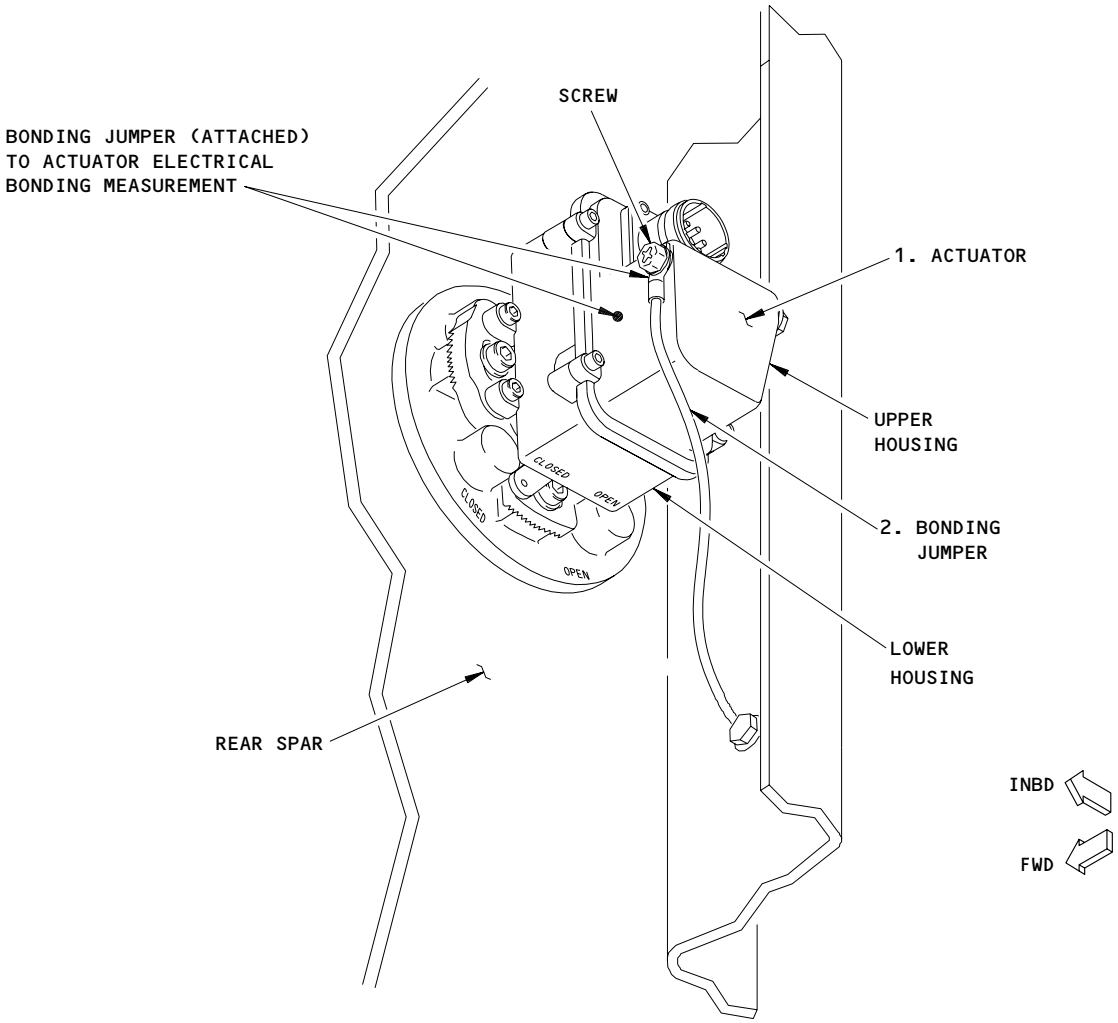
S 016-004
(3) Remove the screw, two washers, and bonding jumper (2) from the actuator (1).

S 766-005
(4) Measure the electrical bonding resistance between the connector flange (3) and the spar web (SWPM 20-20-00).
(a) Do this measurement with the bonding jumper (2) and the electrical connector disconnected.
(b) Make sure the bonding jumper (2) does not touch the actuator (1) during the bonding measurement.



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER DISCONNECTED)
A

Defueling Valve Actuator Bonding Resistance Check
Figure 601 (Sheet 1)



ELECTRICAL BONDING MEASUREMENT
(BONDING JUMPER CONNECTED)

B

Defueling Valve Actuator Bonding Resistance Check
Figure 601 (Sheet 2)

(c) Make sure the bonding resistance is 0.010 ohm (10.0 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 426-006

(5) Do these steps to install the bonding jumper (2) to the actuator:
(a) Clean the contact surfaces with a cotton wiper, G00034 soaked with Series 88 solvent, B01088 (AMM 20-30-88).
1) Rub dry with a clean, dry cotton wiper, G00034.
2) Continue to clean and dry the surface until the dry cotton wiper, G00034 stays clean.
(b) Apple a thin continuous layer of sealant to both surfaces of the bonding jumper terminal and the two washers.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) Use Pro Seal 890A or PR-1440A sealant, A50105 for the faying surface seal.
2) Make sure the sealant layer is approximately 0.005 in (0.127 mm) thick.
(c) Install the screw, two washers, and bonding jumper (2) to the actuator (1).
(d) Tighten the screw to 20 in-lb (2.3 Nm).

S 766-010

(6) Measure the electrical bonding resistance between the upper housing of the actuator and the attached terminal of the bonding jumper (SWPM 20-20-00).
(a) Do not touch the screw when you make the bonding measurement.
(b) Make sure the bonding resistance is 0.001 ohm (1.0 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(c) Apply a cap seal of Pro Seal 890A or PR-1440A sealant over the terminal of the bonding jumper and screw.

S 376-007

(7) Do this task to apply protective finishes to the bare areas of the spar web: Apply the Corrosion Resistant Finish (Topcoat) (AMM 28-11-00/701).

NOTE: Re-apply the protective finishes to the spar web where the electrical bonding probes removed the finishes.

(a) These are the protective finishes:
1) Alodine 600 coating

NOTE: Alodine 600 must be used when in combination with BMS 10-20.

2) BMS 10-20 coating

S 916-008

(8) Do this task to apply Alodine coating to any bare areas of the actuator: Apply the Alodine Coating (AMM 51-21-04/701).

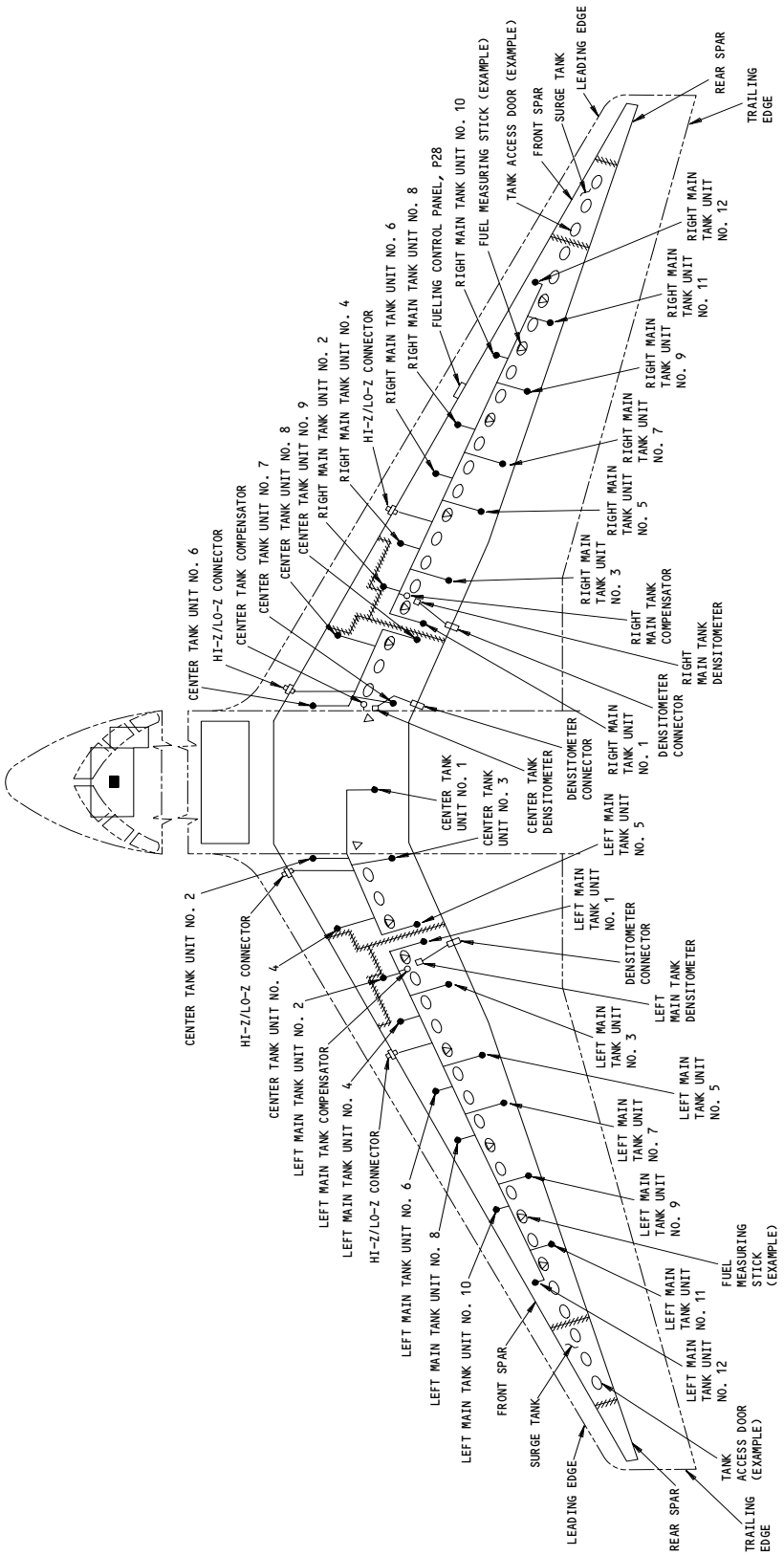
NOTE: Re-apply the protective coating to the actuator where the electrical bonding probe removed the finish and any bare metal areas around the bonding jumper installation that are not covered with sealant.

S 436-009

(9) Install the electrical connector on the actuator (1).

FUEL QUANTITY INDICATING SYSTEM (FQIS)- DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The fuel quantity indicating system (FQIS) supplies fuel quantity measurement, calculation, and indication. The system contains tank units, compensators, densitometers, indicators, and a fuel quantity processor unit. The fuel quantity processor unit (FQPU, referred to as "the processor") does quantity computation and fault isolation for the FQIS system. The processor also controls pressure fueling for the airplane (AMM 28-21-00).
   B. The fuel quantity indicating system is a microcomputer controlled system that uses the variable capacitance principle for fuel quantity measurement. The capacitance measured by the tank units is approximately proportional to the quantity of fuel in the fuel tank.
   C. The FQIS contains the processor (FQPU), a fuel quantity indicator module (FQIM), 3 load select indicators (LSI), a load select control unit (LSCU), 3 compensators, 3 densitometers, 7 tank wiring harnesses, and 33 tank units.
      (1) AIRPLANES POST-SB 28A0085;
      There is hot short protector installed for the center tank densitometer.
   D. The processor (FQPU) is the principle component of the FQIS. It is a microprocessor based computer, found in the main equipment center on the rack E3-4. The processor has an independent channel for each fuel tank so that a component failure or contamination in one fuel tank does not affect the quantity measurement for the other fuel tanks.
   E. The processor transmits excitation signals to and reads signals from the tank units, the compensators, and the densitometer. The processor uses this data to calculate the fuel volume and weight. The processor includes its own failure monitoring, and built-in test equipment (BITE). Fault isolation is supplied for all sensors and the fuel quantity indicator. Faults are kept in a non-volatile memory, for recall on demand by the maintenance crew. The processor supplies these outputs:
      (1) Signals to EICAS and the FUEL CONFIG light to warn of low fuel, fuel imbalance or fuel in the center fuel tank with the fuel override pumps off, or system faults.
      (2) Digital fuel quantity (primary and total) shown on the fuel quantity indicator module (FQIM) on the overhead panel, P5.
      (3) Digital fuel load selected, shown on the load select indicators (LSI's) on the fueling control panel, P28.
      (4) Volumetric and fuel quantity shutoff signals sent to the fueling shutoff valves for automatic shutoff.
   F. The tank units and compensators are almost the same in construction and installation provisions. Both tank units and compensators are capacitance type sensors but the tank units sense the height of fuel in the tank and the compensators measure the dielectric constant of the fuel.
   G. The densitometer senses fuel density. Knowing the density and the volume of fuel lets the processor calculate the mass or weight of the fuel.
   H. A FUEL QTY test switch makes sure the flight compartment displays including EICAS messages can operate. This switch only does a check of the displays and does not show the condition of the FQIS system.



Fuel Quantity Indicating System (FQIS)
Figure 1

871693

I. The FQIS accuracy is 1% of tank fuel capacity at any fuel level on the ground and 0.75% of tank fuel capacity below 33% full at nominal flight attitudes.

2. Component Details

A. Tank Units (Fig. 2)

(1) There are 12 tank units in each main fuel tank, and 9 tank units in the center fuel tank. All the tank units are the same, except for their length. The length depends on the depth of the tank at that particular location.

(2) Each tank unit consists of two concentric aluminum tubes, a terminal block, two end caps, and two brackets.

(a) The aluminum tubes are anodized and polyurethane coated to protect against corrosion. The tubes are factory calibrated. The distance between the tubes is relatively widely spaced to avoid electrical short circuiting, due to water in the fuel or fungus coating on the tubes.

(b) The tank wiring harness attaches to the tank unit at the terminal block. The wiring terminals on the tank wiring harness and the terminal posts on the terminal block have different dimensions to prevent errors in installation.

(c) The end caps are insulated to help prevent the tank unit from shorting to the ground. They also supply capacitance fringing control.

(d) Two brackets made of nonferrous glass-filled nylon, attach each tank unit to the wing structure.

(3) The tank unit measures the fuel level in the fuel tank. It is a linear, capacitance type sensor. Tank geometry is accounted for by computer software. The concentric aluminum tubes of the tank unit act as plates of a capacitor, and the dielectric is air and/or fuel depending on the quantity of fuel in the fuel tank. This air to fuel ratio gives a capacitance value which is used to calculate the volume of fuel.

B. Compensator (Fig. 3)

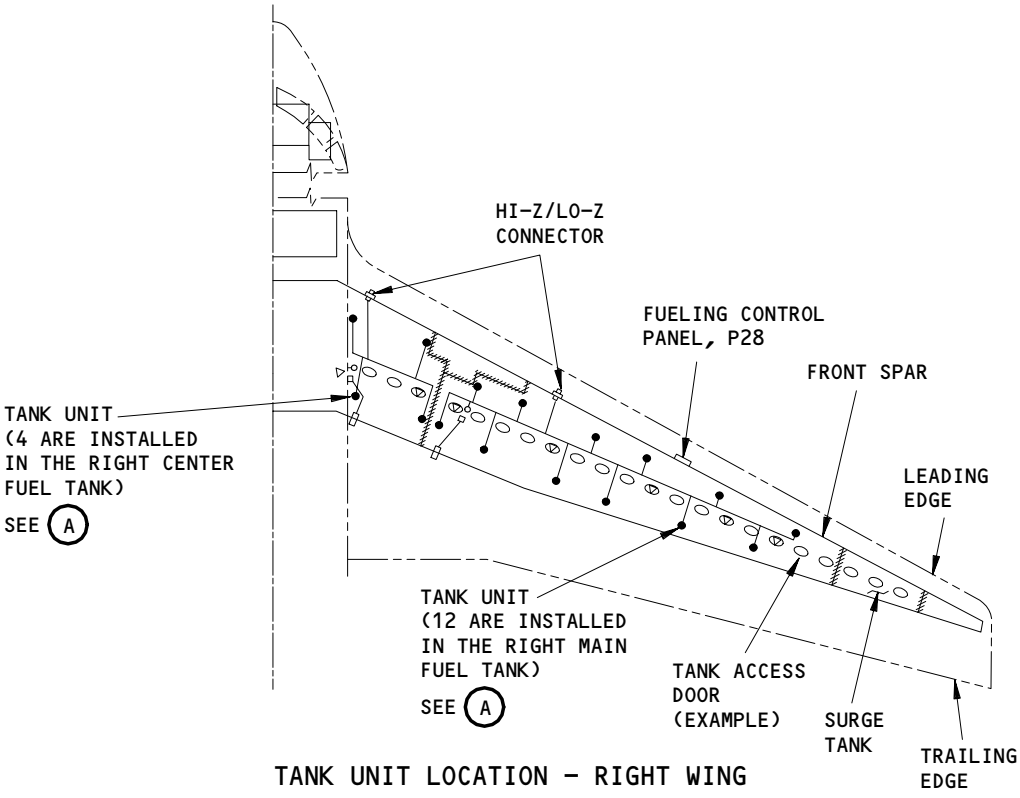
(1) One compensator is installed in each fuel tank. All compensators are the same. The compensators are almost the same in construction and installation provisions as the tank units.

(2) Each compensator contains four metallic tubes, or electrodes, which attach to the support tube, a terminal block and two brackets. The four electrodes form a capacitor.

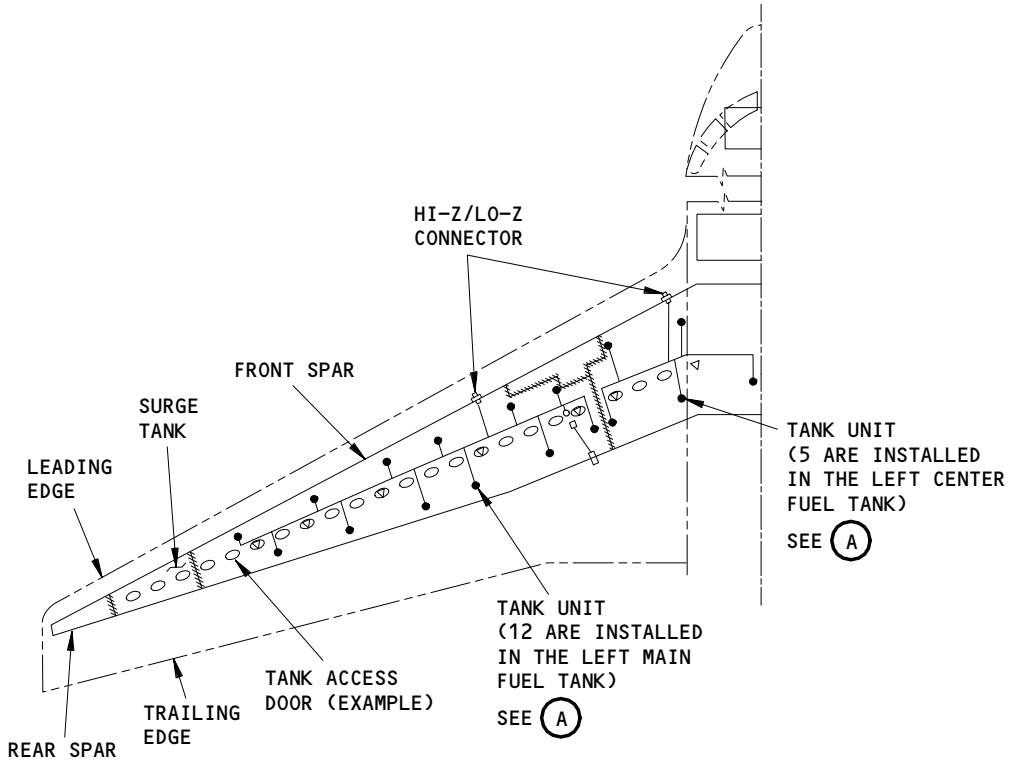
(3) The compensator senses the dielectric constant of the fuel. It is a capacitance sensing device almost the same as the tank unit. The compensator is installed at the bottom of the fuel tank, completely covered by fuel until the fuel tank is almost empty. As a result, the compensator capacitance is affected only by changes in the dielectric constant of the fuel.

C. Densitometer (Fig. 4)

(1) One densitometer is installed in each fuel tank. The densitometer measures the fuel density.

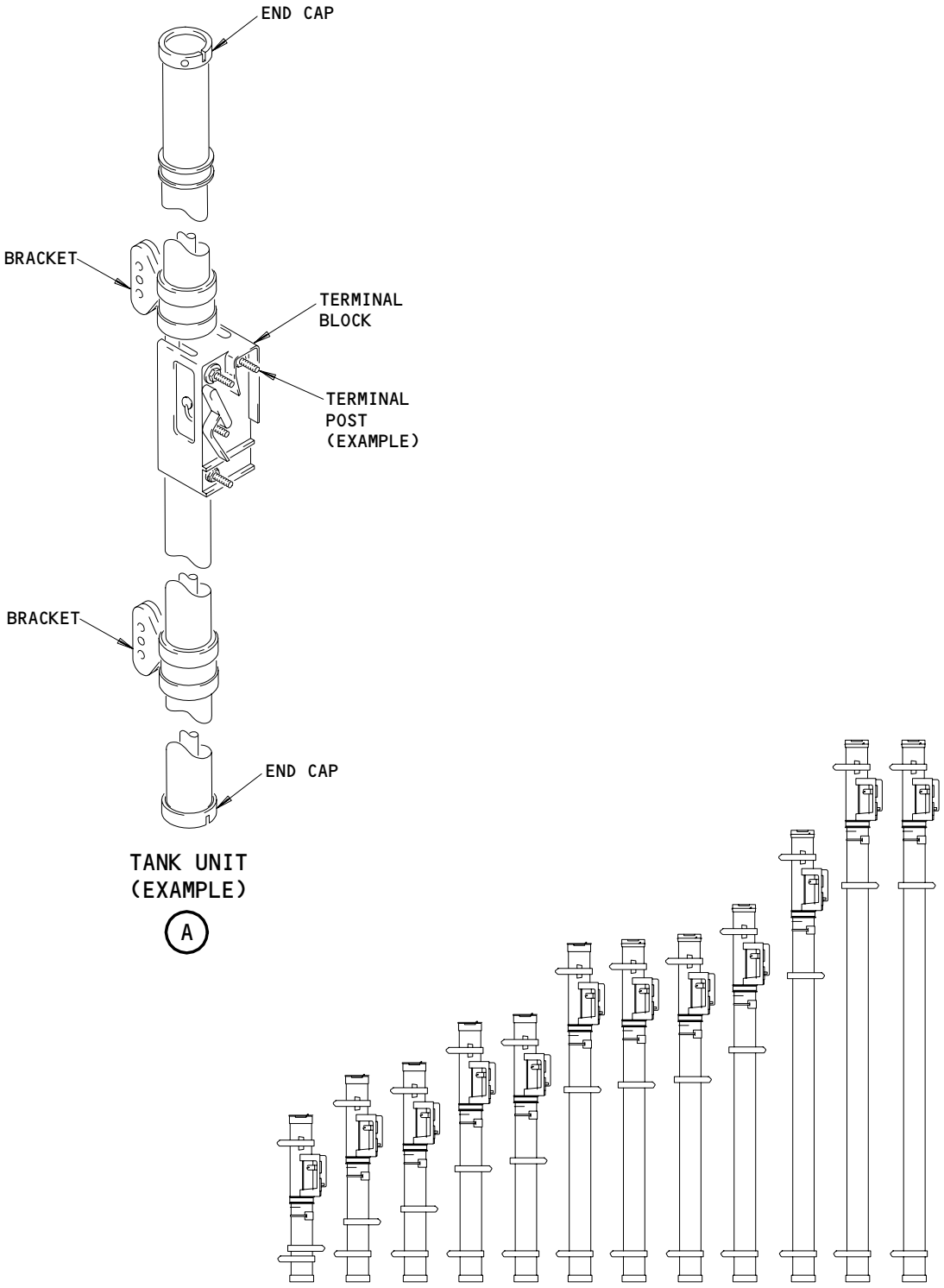


TANK UNIT LOCATION - RIGHT WING

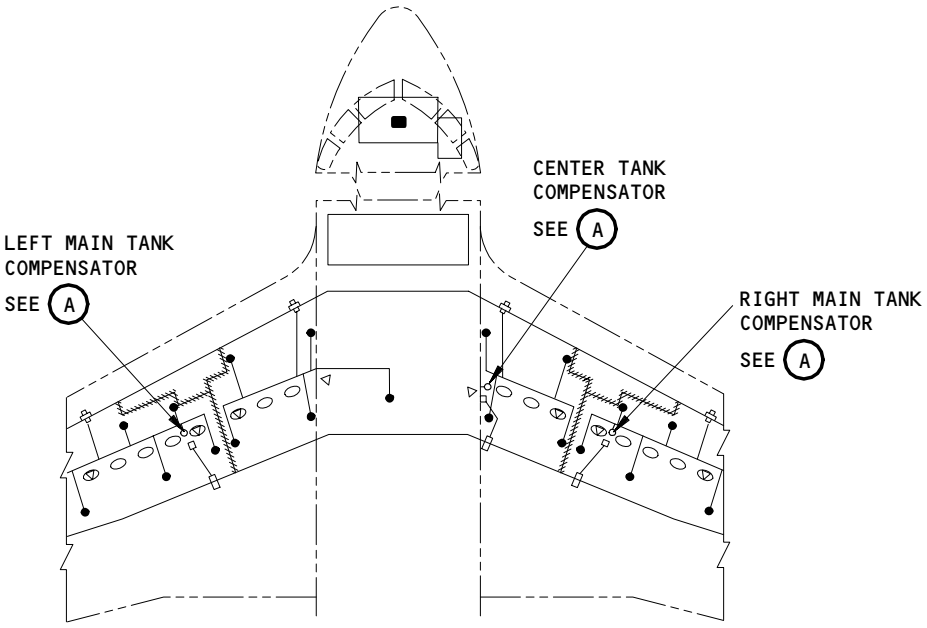


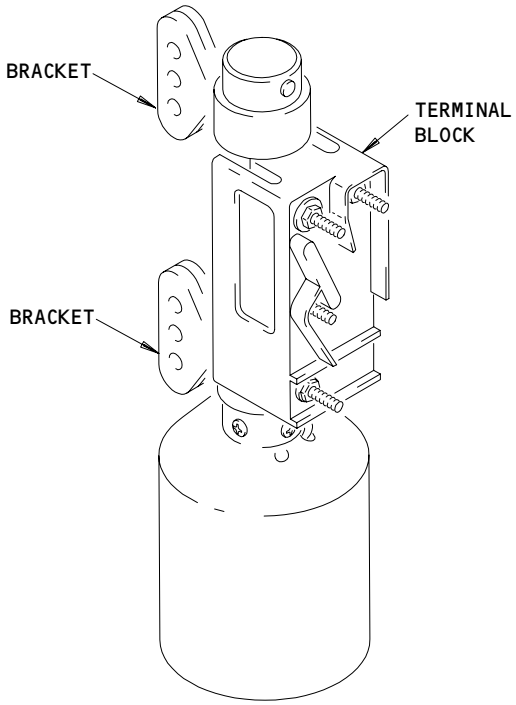
TANK UNIT LOCATION - LEFT WING

FQIS Tank Units
Figure 2 (Sheet 1)



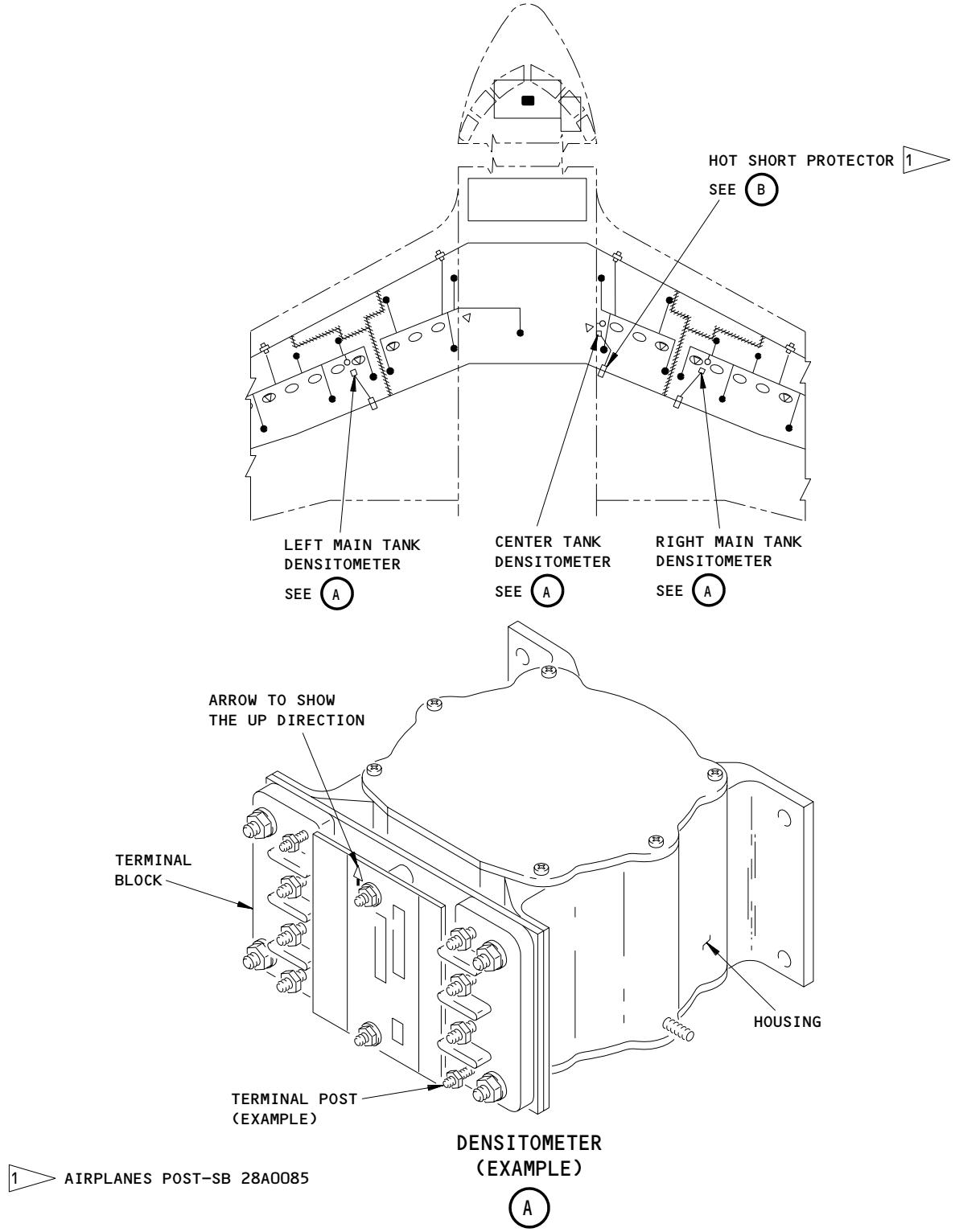
FQIS Tank Units
Figure 2 (Sheet 2)



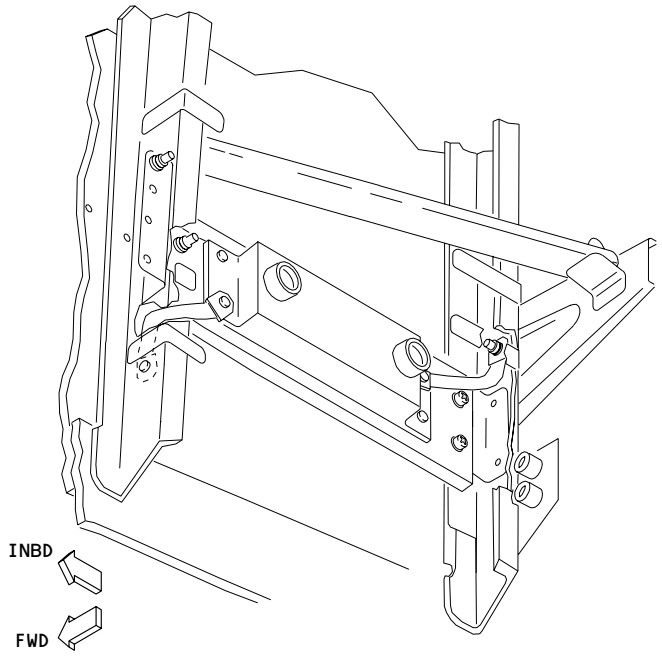


COMPENSATOR
(EXAMPLE)
A

FQIS Compensator
Figure 3

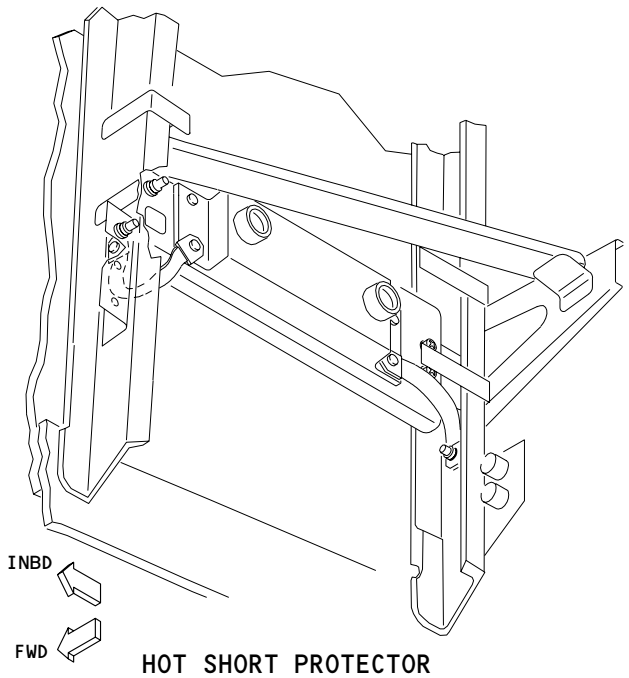


FQIS Densitometer
Figure 4 (Sheet 1)



HOT SHORT PROTECTOR

B 1



HOT SHORT PROTECTOR

B 1

1 AIRPLANES POST-SB 28A0085 AS APPLICABLE

FQIS Densitometer
Figure 4 (Sheet 2)

(2) The densitometer is installed at the bottom of the fuel tank, aft of the compensator. A tank wiring harness attaches to each densitometer. The tank wiring harness for the densitometer goes through the rear spar.

(3) The densitometer contains a nickel alloy, wiring-wrapped, vibrating spool, an excitation coil, a sensing coil, and eight calibration resistors, all installed in a cylindrical, vented housing. The vents in the housing let fuel go into the housing to cover the spool and let air escape.

(4) The processor sends an AC signal through a coil to excite the spool, which then vibrates. The processor reads the frequency of the vibration and changes the frequency of the excitation signal until the spool vibrates at its maximum frequency. The maximum "resonant" frequency is a function of the fuel density only. The processor calculates the fuel density from the resonant frequency.

(5) The densitometer also gives a check on the specific gravity data from the compensator. This increases the accuracy of the FQIS.

D. AIRPLANES POST-SB 28A0085;
Hot Short Protector (Fig. 4)

(1) A hot short protector is installed on the rear spar outside of the right center fuel tank.

(2) The hot short protector prevents wire to wire hot short voltages from the densitometer wiring for the center fuel tank from entering the tank.

(3) A hot short protector (safe-side) wire harness connects the hot short protector to the tank wiring harness for the densitometer in the right center fuel tank at the rear spar.

E. Fuel Quantity Indicator Module (FQIM) (Fig. 5)

(1) A fuel quantity indicator module (FQIM) is installed on the overhead panel, P5. It supplies digital liquid crystal displays of individual tank, and total fuel quantities; and fuel temperature.

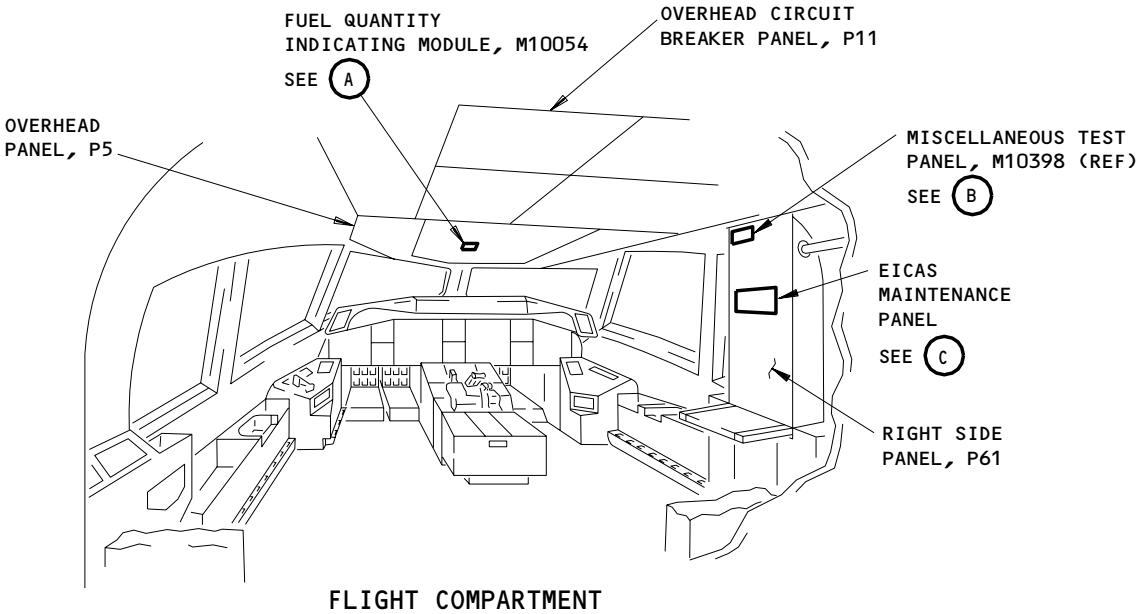
(2) The FQIM is contained in an aluminum housing with a front panel which has high contrast, dual-cell liquid crystal displays (LCD). The FQIM's electronic circuits use a "brickwall architecture" to prevent a failure in one display from affecting the operation of the other fuel tank displays.

(3) 28V dc is supplied to the FQIM from the P11 circuit breaker panel through the processor (FQPU). 5V ac for internal lighting is supplied from the aircraft lighting circuits.

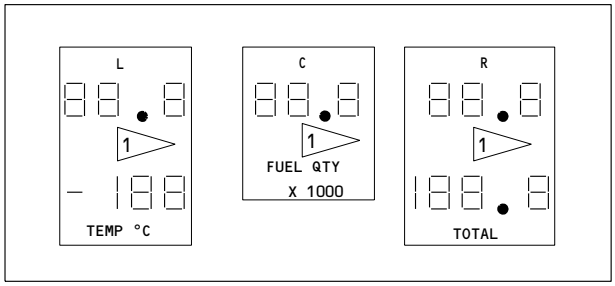
NOTE: There is a BRIGHT(BRT)/DIM switch (S3) on the Flight Deck, Overhead Panel (P5). The BRT/DIM switch supplies "Bright" override for the panel light of the FQIM, when the "IND LTS" is put in the "Bright" mode. The BRT/DIM switch improves the visibility of the FQIM in daylight.

F. FUEL QTY Test Switch (Fig. 5)

(1) The FUEL QTY test switch is found on the right side panel, P61 in the flight compartment.

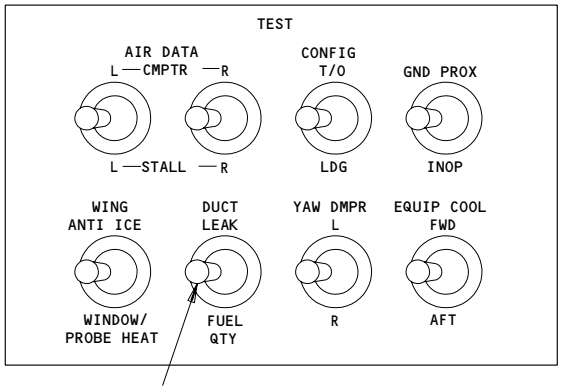


FLIGHT COMPARTMENT



FUEL QUANTITY INDICATING MODULE, M10054

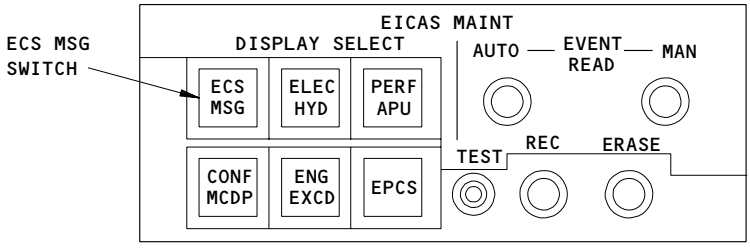
A



FUEL QUANTITY
TEST SWITCH, S6

MISCELLANEOUS TEST PANEL, M10398 (REF)
(EXAMPLE PANEL SHOWN)

B



EICAS MAINTENANCE PANEL

C

1 THE UNITS ARE IN LBS OR KGS.

Fuel Quantity Indicating Module (FQIM)
Figure 5

(2) When you put the FUEL QTY test switch in the FUEL QTY position and release:
   (a) The left, center, and right fuel quantity indicators on the overhead panel, P5 will show 88.8.
   (b) The total fuel quantity indicator on the P5 panel will show 188.8.
   (c) The fuel temperature indicator on the P5 panel will show -188.
   (d) The FUEL CONFIG light on the P5 panel will come on.
   (e) The EICAS caution message, LOW FUEL, will show on the top display.
   (f) The EICAS status message, FUEL QTY IND, will show on the bottom display.
   (g) The EICAS status message, FUEL QTY CHANNEL, will show on the bottom display.
   (h) The EICAS maintenance message, FUEL QTY BITE, will show on the bottom display.

   NOTE: In order to view the EICAS maintenance message FUEL QTY BITE, you must put the FUEL QTY test switch in the FUEL QTY position and release. Then you must immediately push and release the ECS MSG switch on the right side panel, P61.

(3) The FUEL QTY test switch also does a test of the two ARINC buses A and B. The fuel quantity indicator gets the fuel quantity information from one of the two ARINC buses A and B. If one or two of the ARINC busses is inactive, "-A.-", "-b.-" or "-A.b" will show on the displays of the fuel quantity indicators before the displays show the quantity of usable fuel in the fuel tanks if only one bus is bad. If both busses are bad "-A.b" will show and then the indicators will blank.

(4) If one of the fuel quantity indicators is blank because there is a fault in the FQIS, the indicator will go off again after you use the fuel quantity test switch. Do the BITE procedure (FIM 28-41-00/101) to find the fault and do the corrective action.

(5) Once the FUEL QTY test switch is used, if you use the the FUEL QTY test switch again, before the test is complete, nothing will occur.

G. Load Select Indicator (LSI) (Fig. 6)

(1) One load select indicator (LSI), found on the fueling control panel, P28, monitors each fuel tank (three total).

(2) There are two light-on-dark LCD's for each load select indicator. The top display shows the fuel quantity in each fuel tank in LBS (KGS) x 1000. The bottom display shows the fuel quantity selected to be put into the fuel tank in LBS (KGS) x 1000. A 7-1/2 watt, automatically controlled heater makes sure the LCD's will operate correctly in cold weather. Power is applied to the load select indicators whenever the fueling station door is opened, unless the power is supplied by the battery.

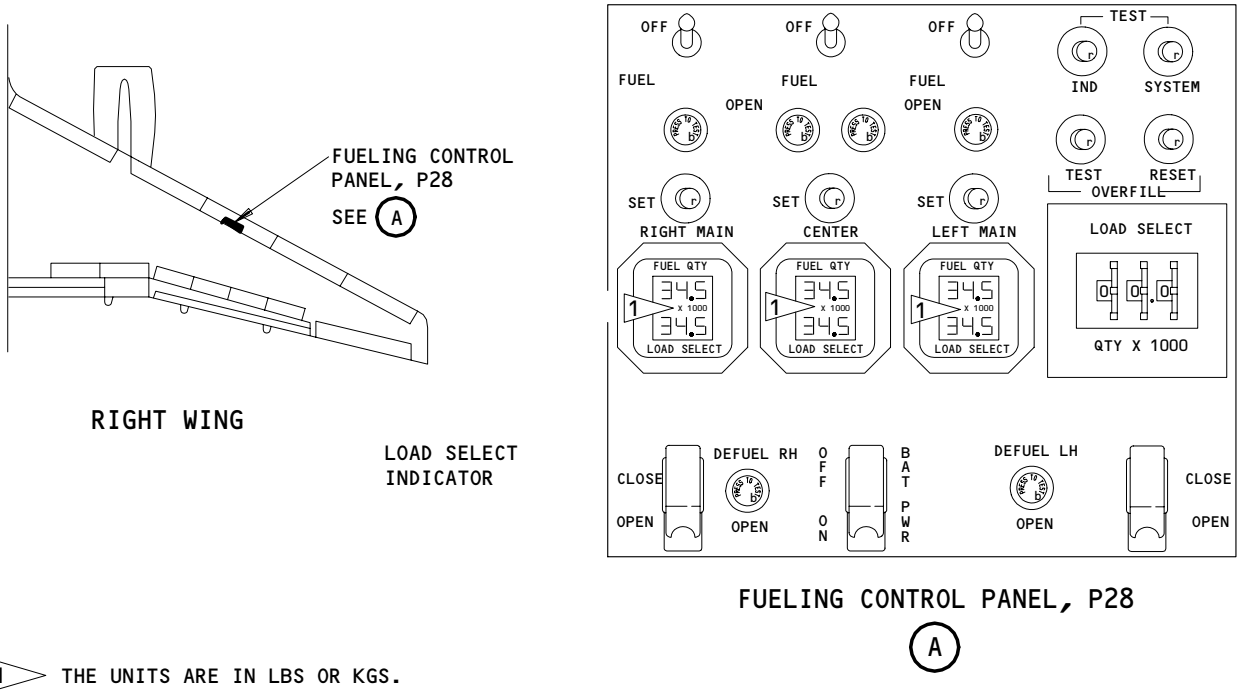
(3) To test the load select indicators, push the TEST IND switch on the fueling control panel, P28. The top and bottom displays should show 888.8.
   (a) The TEST IND switch also does a test of the two ARINC buses A and B. The LSI gets the fuel quantity information from one of the two ARINC busses A and B. If one or two of the ARINC busses is inactive, "-A.-", "-b.-" or "-A.b" will show on the displays of the LSI before the displays show the quantity of usable fuel in the fuel tanks if only one bus is bad. If both busses are bad "-A.b" will show and then the displays will blank.

(4) If during the fueling operation there is a FQIS failure, the load select indicator will show the message PUSH SET and the fuel shutoff valve will close. To continue fueling, you must push the set button and fuel manually without the automatic fuel shutoff capability. If fuel quantity indication is available, it is possible that it is not accurate. To continue automatic fueling, you must correct the failure by doing the Fuel Quantity Bite "SELF TEST?" and corrective action (FIM 28-41-00/101).

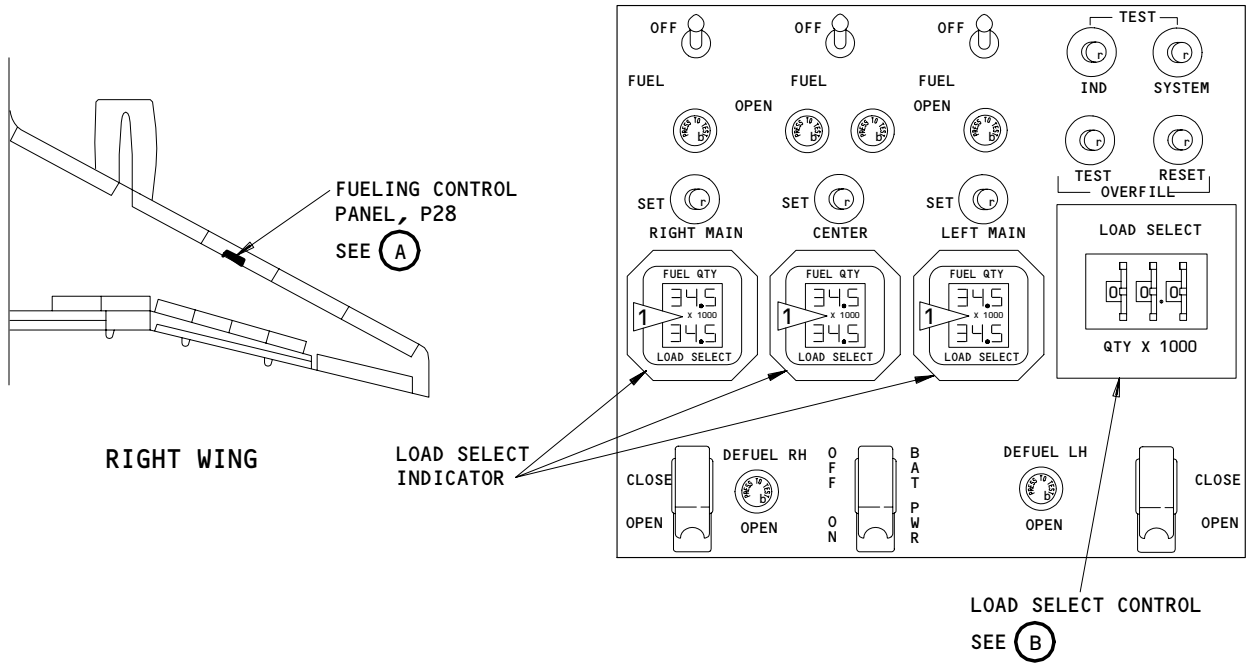
H. Load Select Control Unit (Fig. 7)

(1) The load select control unit is found on the fueling control panel, P28.

(2) The load select control unit is a hermetically sealed unit. The case houses three thumbwheel type switches, three resistor boards, and an electrical connector.

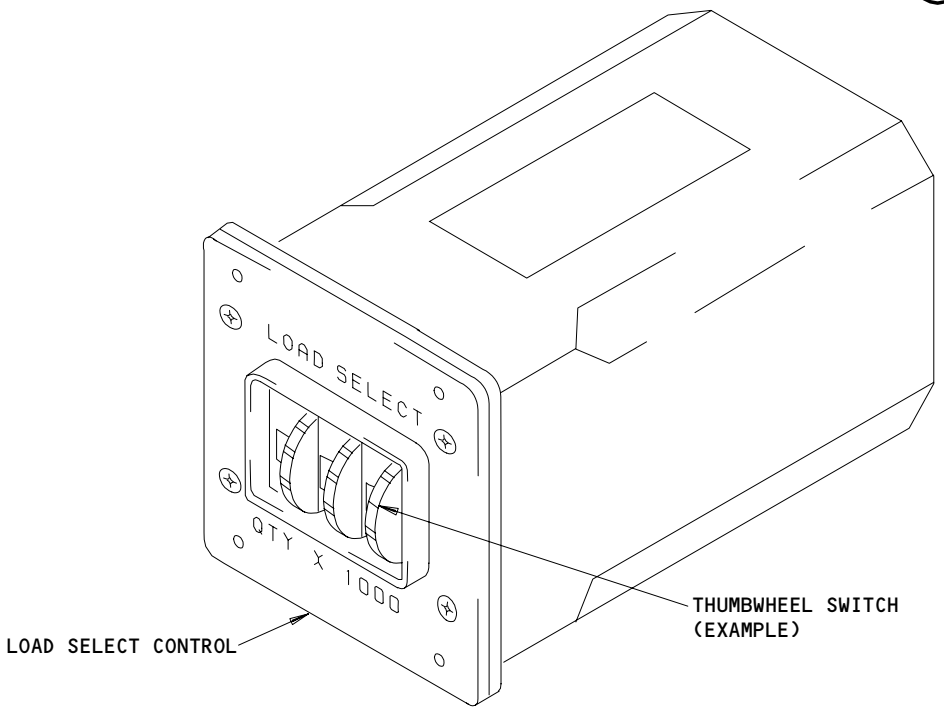


Load Select Indicator (LSI)
Figure 6



FUELING CONTROL PANEL, P28

A



LOAD SELECT CONTROL

B

1 THE UNITS ARE IN LBS OR KGS.

Load Select Indicator (LSI)
Figure 7

(3) The load select control unit lets the fueling crew select the quantity of fuel to be put into each fuel tank. To do this you set the thumbwheel switches then push the SET switch for the applicable fuel tank. The processor (FQPU) reads the resistance set at the load select control unit to determine the fuel quantity to be loaded.

I. Fuel Quantity Processor Unit (FQPU) (Fig. 8)

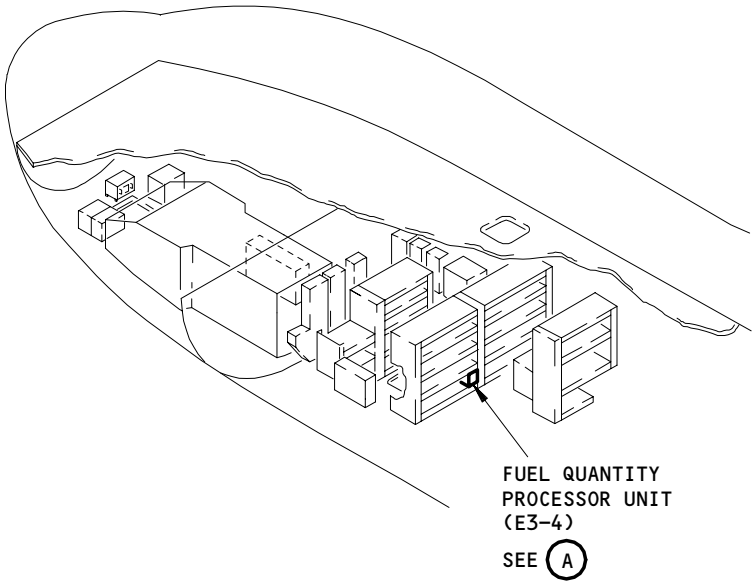
(1) The fuel quantity processor unit (referred to as "the processor") is the principle component of the fuel quantity indicating system. The processor calculates fuel quantity and sends the data for display in the flight compartment and at the fueling control panel, P28. The processor also controls the pressure fueling operations and does BITE functions.

(2) The processor is found in the main equipment center on the E3-4 shelf. There are connectors on the front face of the processor for the ARINC channels A, B and C. The connectors, found at the back of the processor, connect it with the other components of the FQIS. On the front face of the processor are a 32 character LED display, a BIT procedure placard, a MENU button, a YES button, a NO button, an ON/OFF button and UP and DOWN arrow buttons.

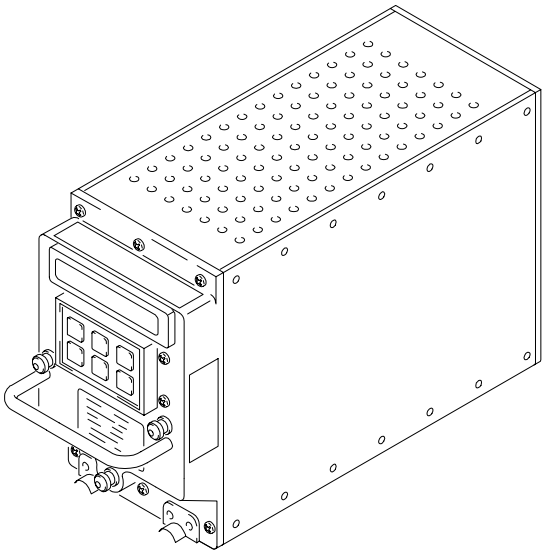
(3) The processor needs 28 volts dc power to operate.

(4) Two separate and redundant power supplies supply each of the six circuit boards. Only one power supply is necessary for normal operation. The circuit boards are electrically and physically separated. During normal operation all the circuit boards have power.

(a) Each Individual Fuel Quantity Channel (IFQC) circuit board is assigned to one fuel tank. If a component is bad or there is contamination in one fuel tank, it does not affect the other fuel tanks. The IFQC circuit boards supply excitation signals to the tank units, compensators and densitometers. The IFQC circuit boards also measure the return signals and calculate fuel weight and density. The fuel quantity, built-in-test, and other calculated information for each fuel tank is sent through a redundant serial data bus to each Input/Output Channel (IOC) circuit board internal to the processor.



MAIN EQUIPMENT CENTER



FUEL QUANTITY PROCESSOR UNIT

A

Fuel Quantity Processor Unit (FQPU)
Figure 8

(b) Each of the two Input/Output Channel (IOC) circuit boards adds the fuel quantity data. The IOC circuit boards also send fuel quantity data, through the ARINC busses A and B, to the fuel quantity indicator module, load select indicators, EICAS and FMC. The IOC, through the BITE circuit card, sends control signals to close the fueling shutoff valves at Volumetric Top Off (VTO) or at the load select quantity. The IOC circuit cards also supply outputs for low fuel and fuel configuration indication. They also receive inputs for the fueling station door position, air/ground relay position, system test, indicator tests, load select set data and fuel override pump status.

(c) The BITE circuit card keeps FQIS faults and has an interface with the BITE controls on the front face of the processor to show the faults. The drivers for the fueling shutoff valves are found on the BITE circuit card. The BITE circuit card has ARINC bus C which transmits fuel system information and fuel quantity data from the IOC's to the EICAS for message logic.

(5) The processor receives signals from the tanks units, compensators, densitometers, load select control, and air/ground relay, and performs computations as programmed. Output signals of fuel quantity go to the fuel quantity indicator module, and the load select indicators. A signal is also sent to the EICAS computers and FUEL CONFIG light on P5, warning of low fuel, fuel imbalance, or system faults. Fueling valve control signals are available during the fueling operation. The processor also provides failure monitoring, and built-in-test.

(6) The six buttons on the front face of the processor operate as follows:

(a) ON/OFF button - causes the BITE display control come on or go off.

(b) MENU button - goes to the menu level and shows different menus.

(c) YES button - goes to the menu item shown on the display.

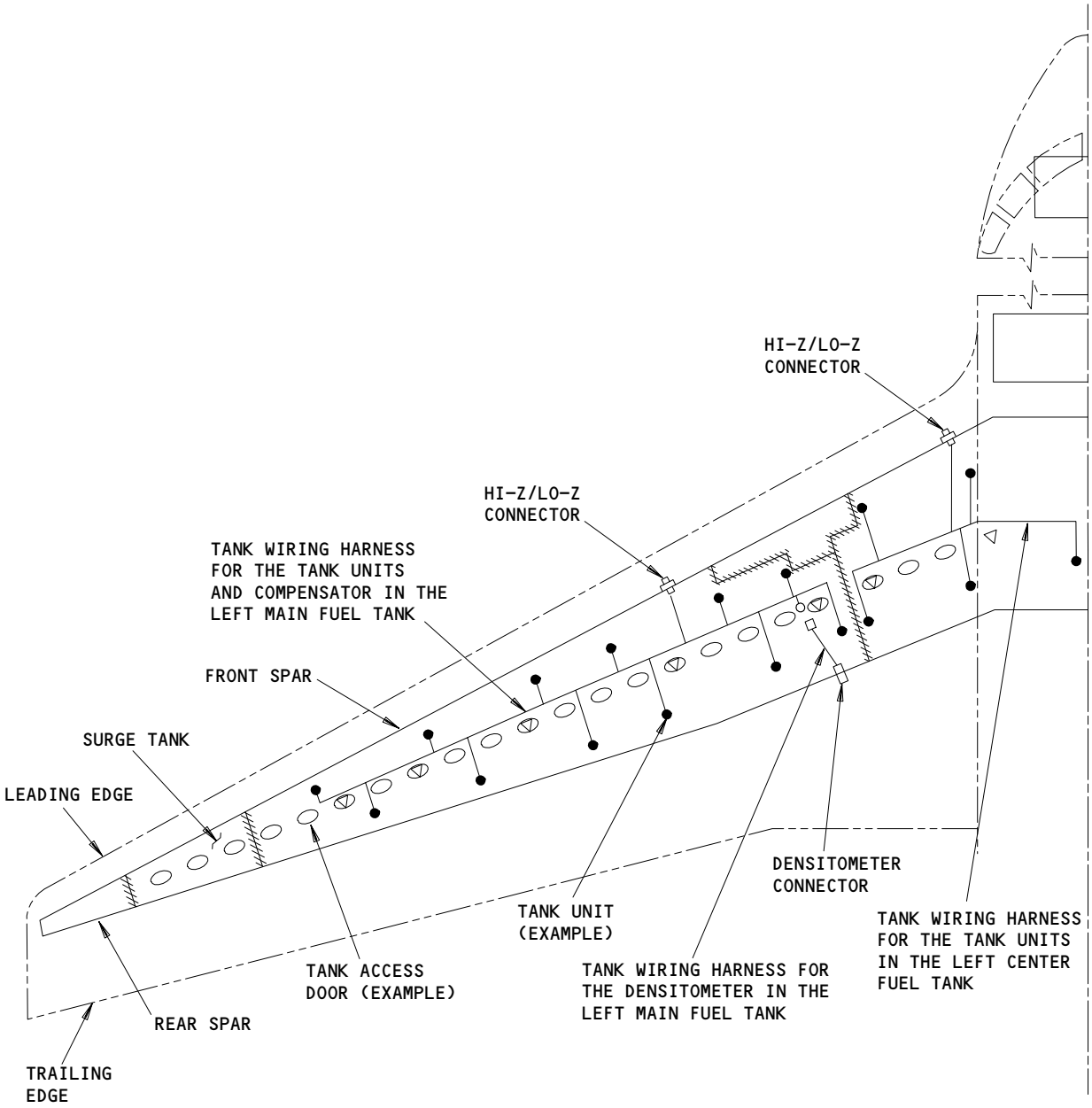
(d) NO button - goes to the next menu item on the display.

(e) The UP arrow button - shows the last data item shown.

(f) The DOWN arrow button - shows the next data item.

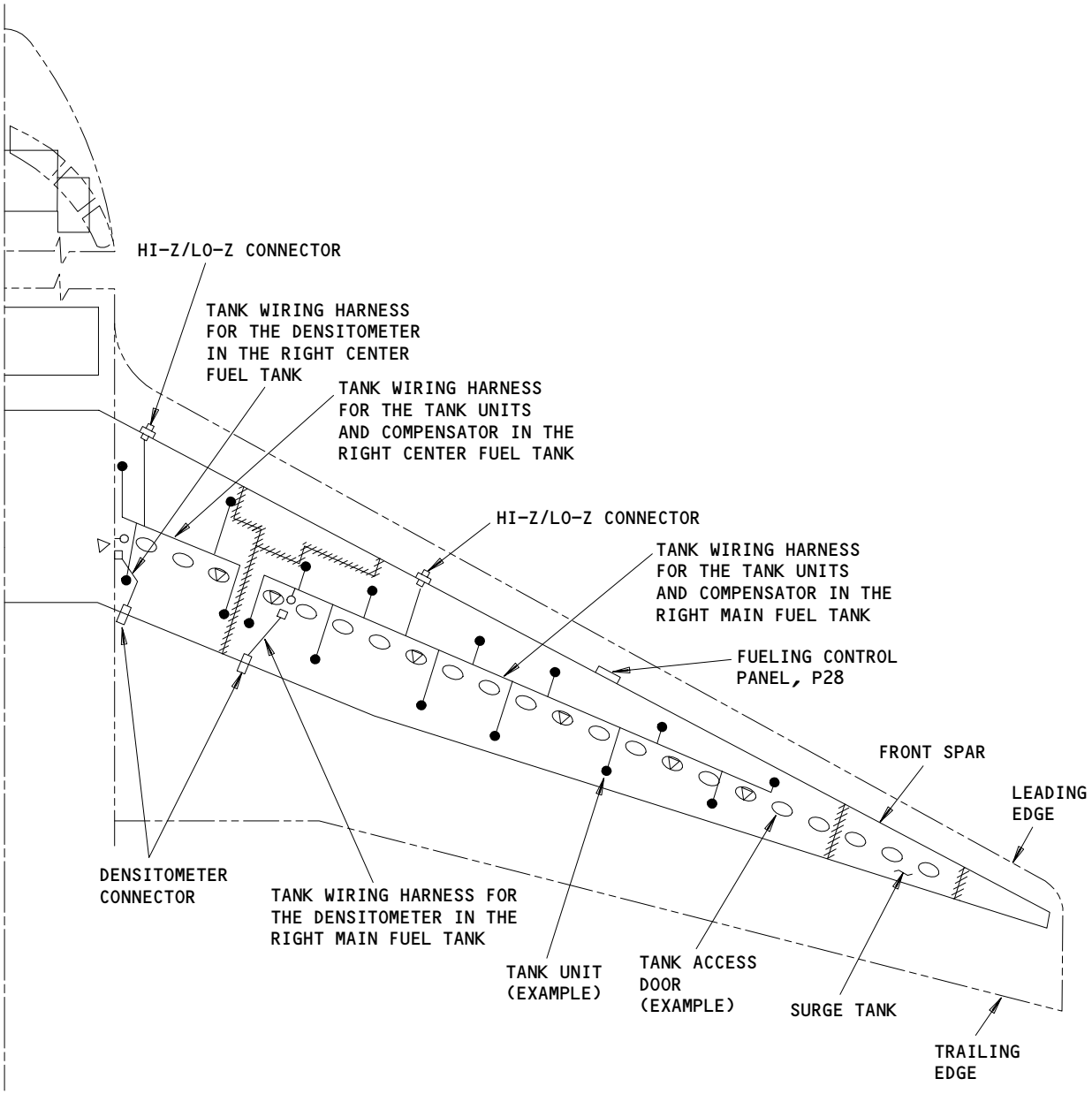
J. Tank Wiring Harness (Fig. 9 and 10)

(1) The location of the tank wiring harnesses are shown in Fig. 9.



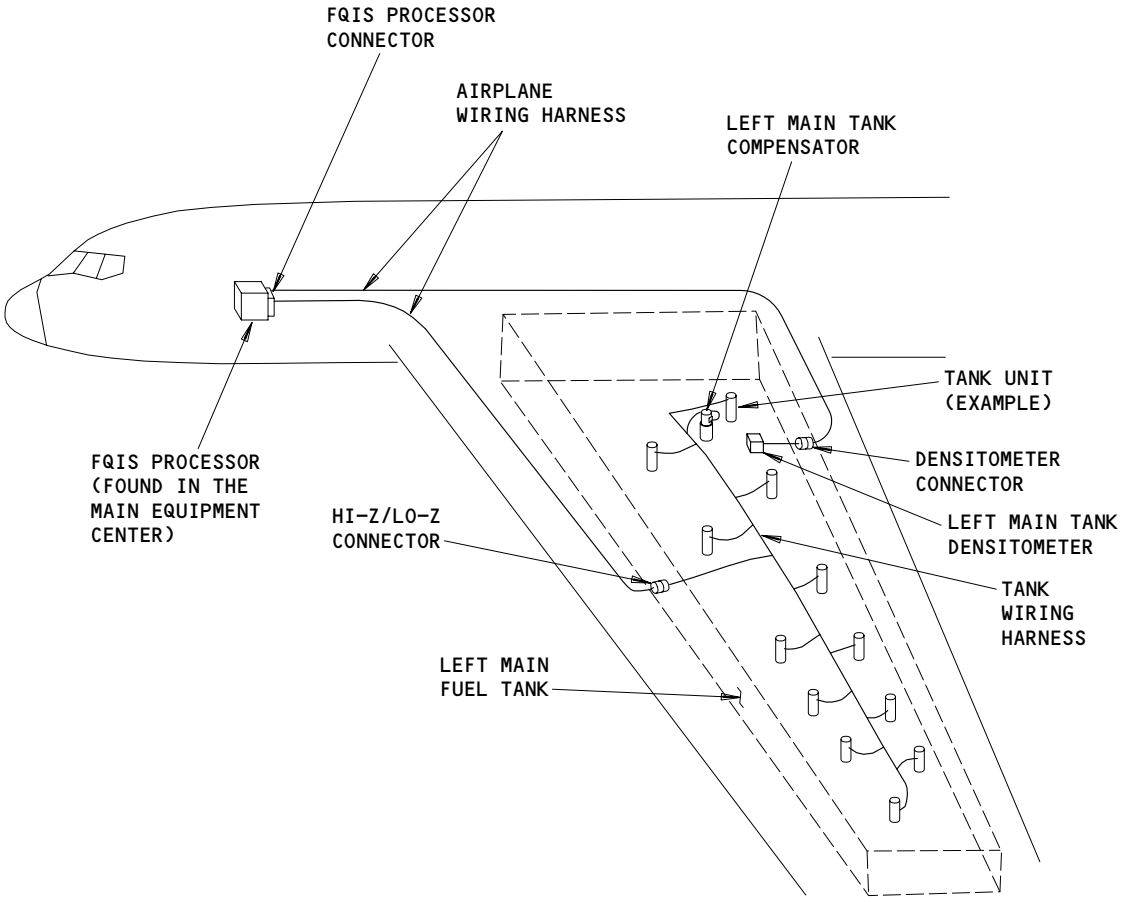
TANK WIRING HARNESS LOCATION - LEFT WING

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 1)



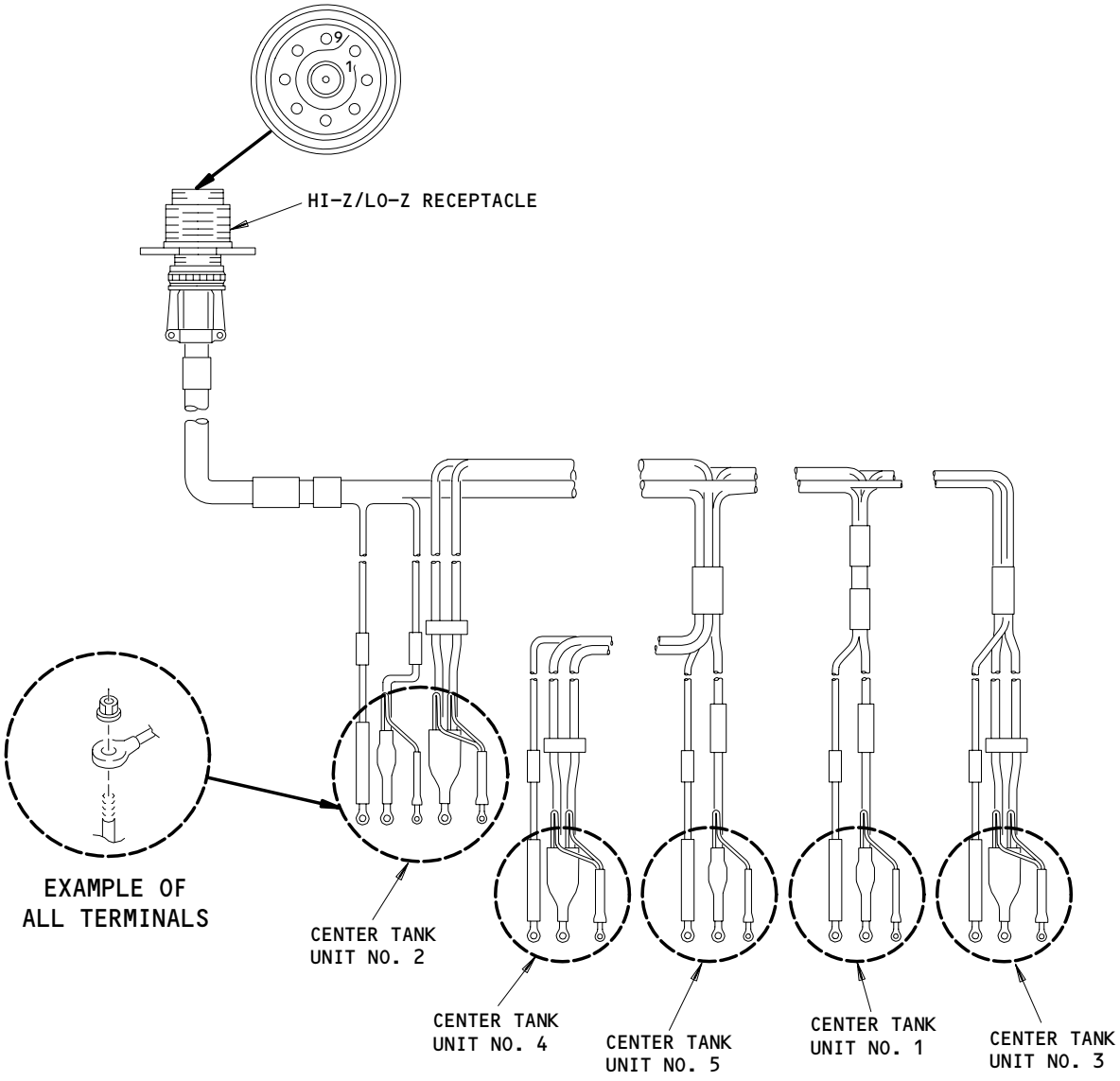
TANK WIRING HARNESS LOCATION - RIGHT WING

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 2)



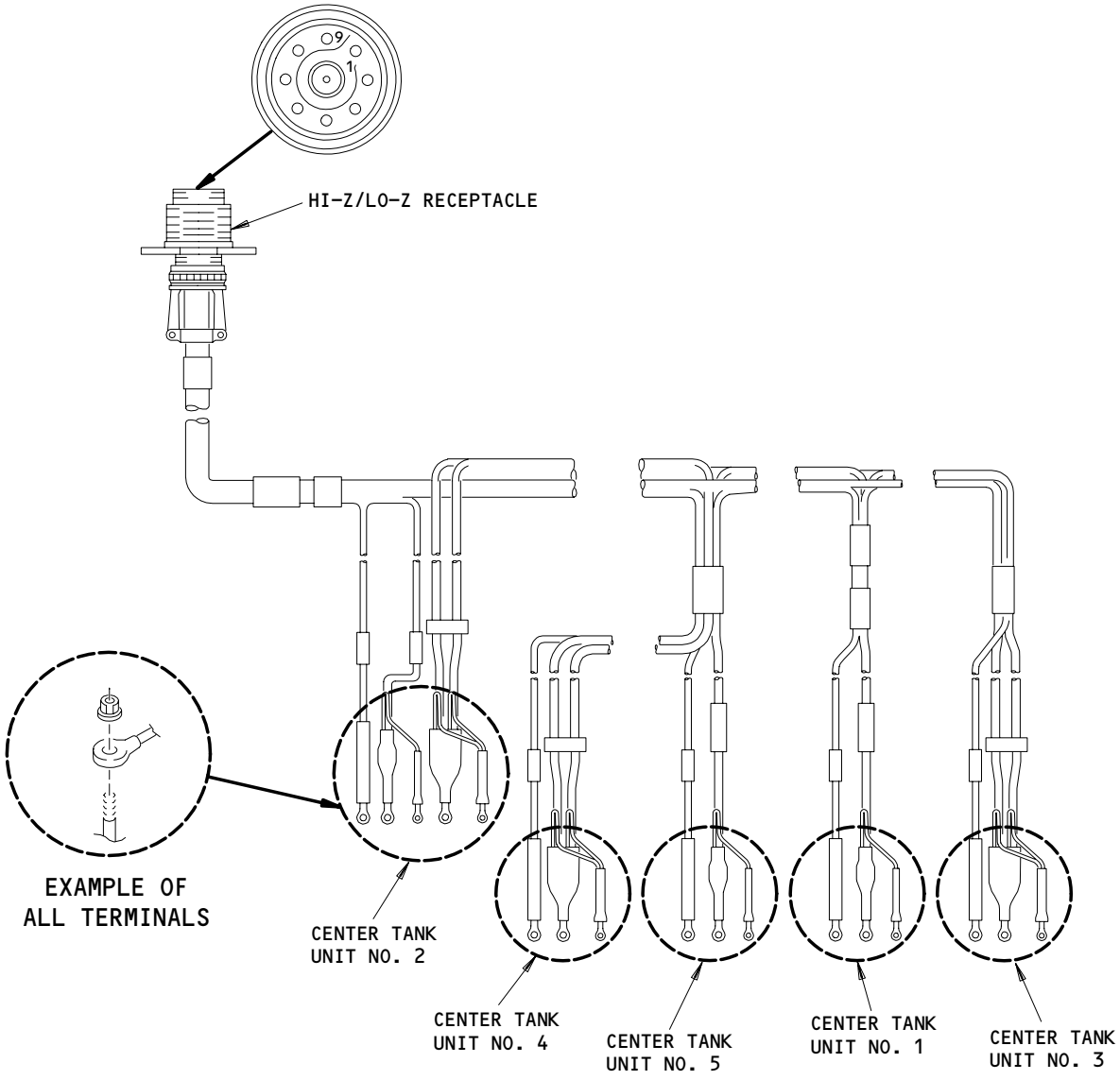
AIRPLANE WIRING HARNESSES AND TANK WIRING HARNESSES FOR THE LEFT MAIN FUEL TANK

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 3)

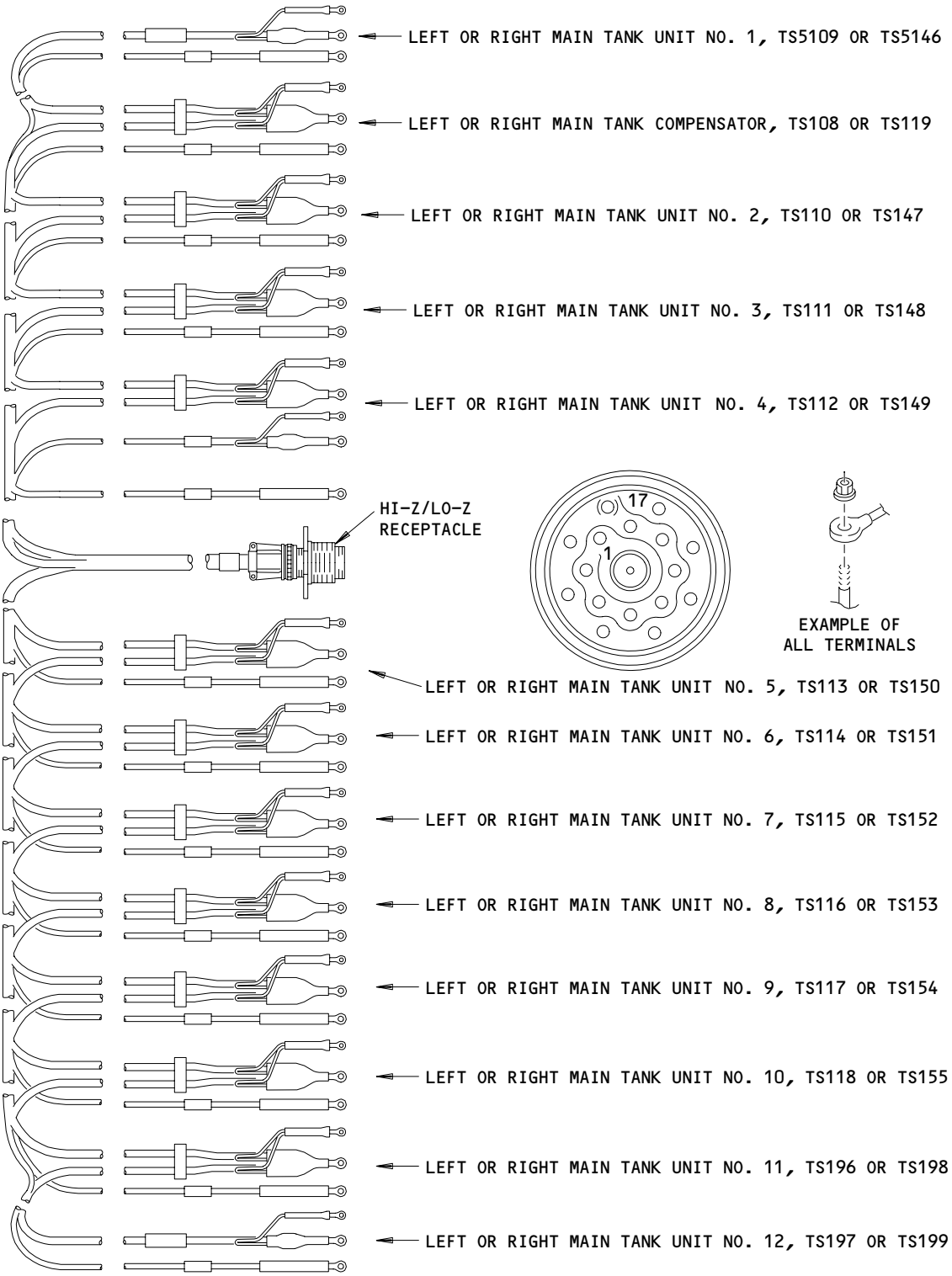


LEFT CENTER TANK WIRING HARNESS

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 4)

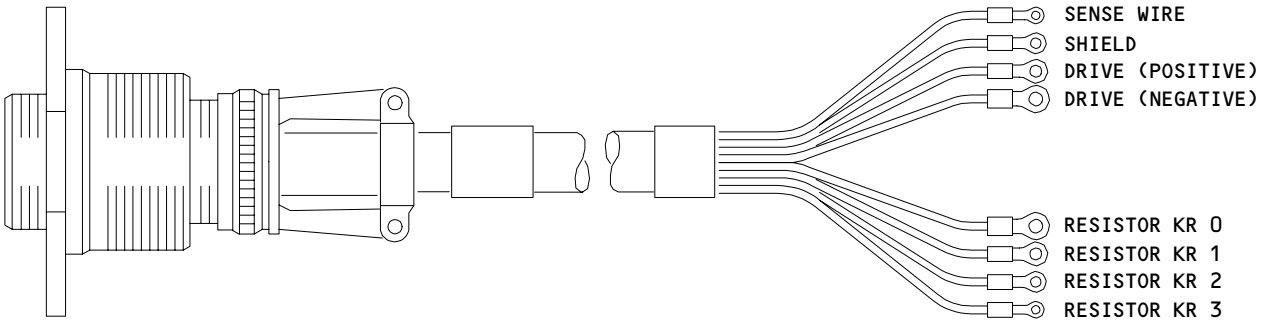


Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 5)



TANK WIRING HARNESS FOR THE TANK UNITS AND COMPENSATOR
IN THE LEFT OR RIGHT MAIN FUEL TANK

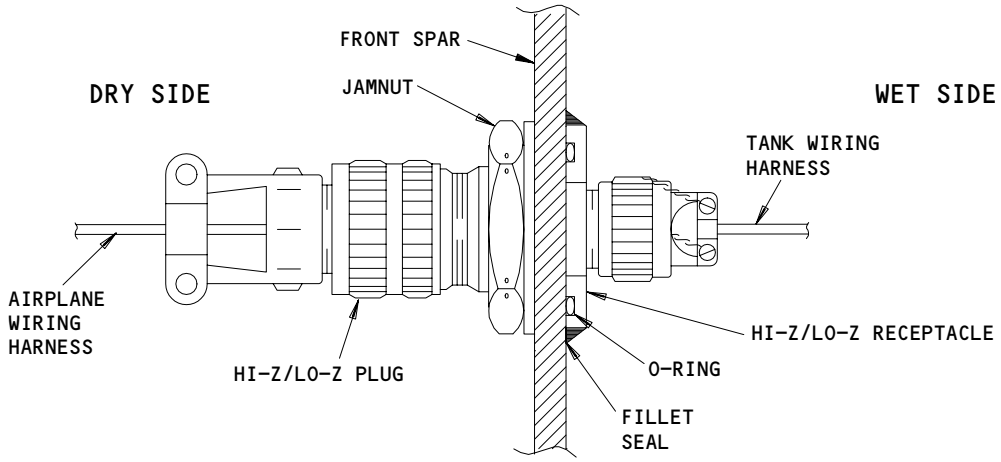
Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 6)



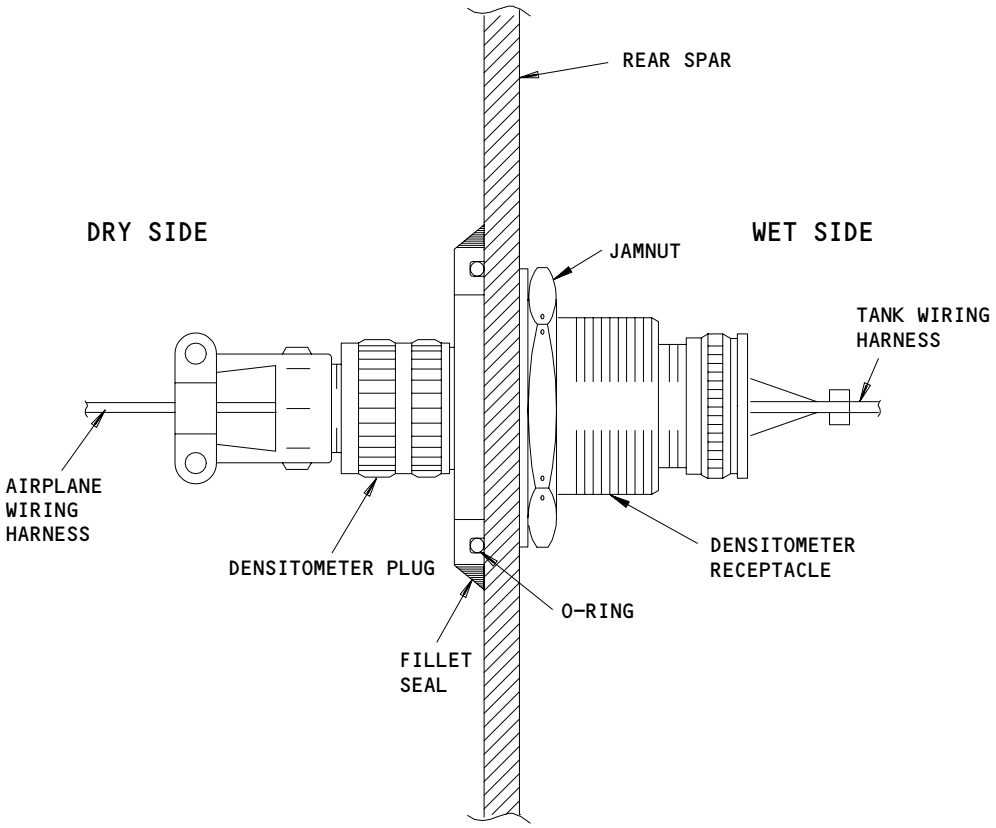
TANK WIRING HARNESS FOR THE DENSITOMETER
IN THE LEFT OR RIGHT MAIN OR CENTER FUEL TANK

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 7)

878591

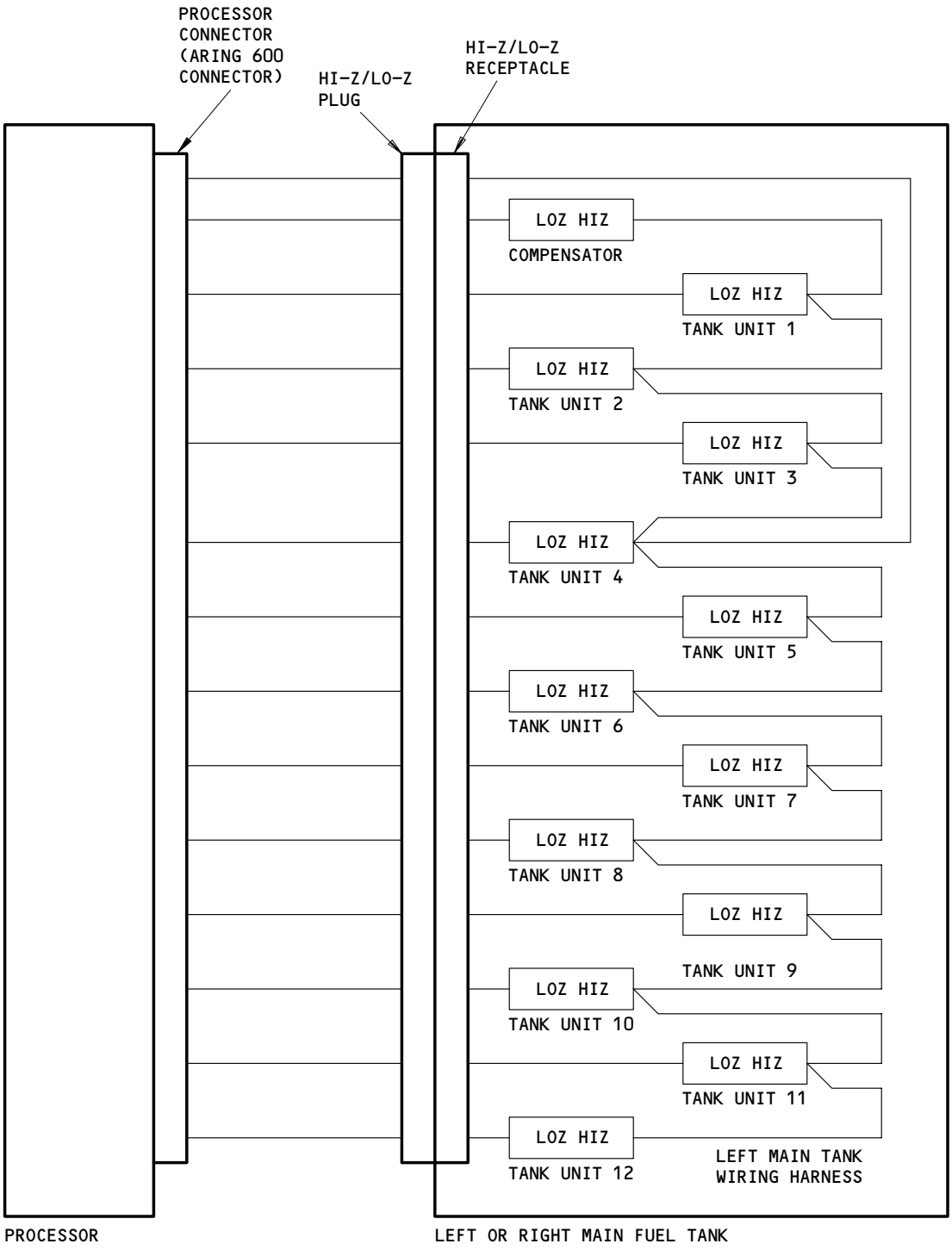


HI-Z/LO-Z CONNECTOR



DENSITOMETER CONNECTOR

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 8)



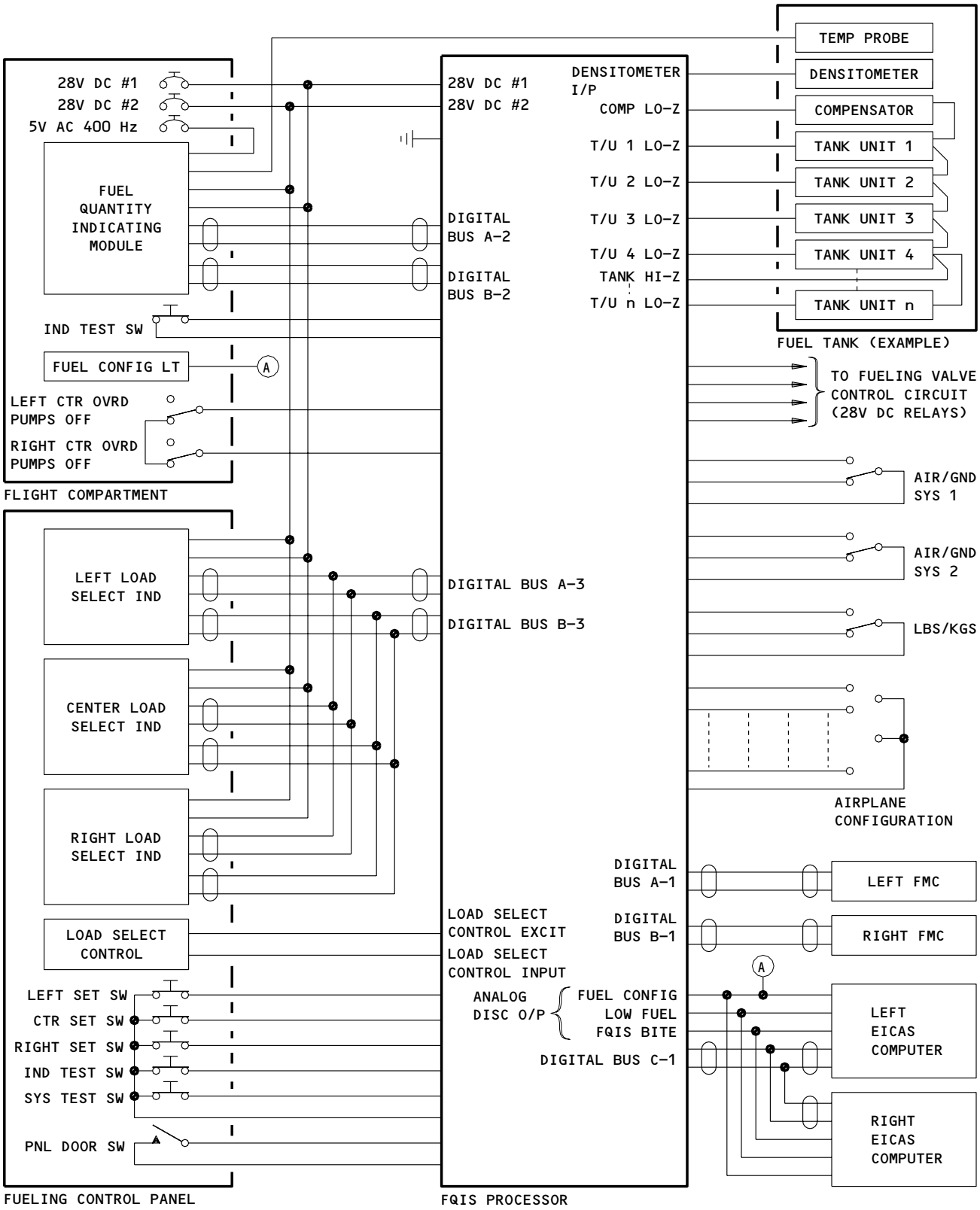
LO-Z AND HI-Z WIRING FOR THE LEFT OR RIGHT MAIN FUEL TANK

Fuel Quantity Indicating System Wiring
(Simplified Schematic)
Figure 9 (Sheet 9)

878623

(2) The breakdown between the airplane wiring harnesses and the tank wiring harnesses for the left main fuel tank are shown in Fig. 9 (Sheet 3).
(3) The left center tank wiring harness is shown in Fig. 9 (Sheet 4).
(4) The right center tank wiring harnesses are shown in Fig. 9 (Sheet 5).
(5) The left main tank wiring harnesses and the right main tank wiring harnesses are shown in Fig. 9 (Sheet 6).
(6) The HI-Z/LO-Z connector and densitometer connector are shown in Fig. 9 (Sheet 8).
(7) A simplified schematic for the LO-Z and HI-Z wiring for the left main fuel tank is shown in Fig. 9 (Sheet 9).
(8) The term LO-Z means low impedance.
(9) The term HI-Z means high impedance.
(10) The airplane wiring harness is found external to the fuel tank. The airplane wiring harness begins at the processor connector and ends at the HI-Z/LO-Z plug or densitometer plug. The HI-Z/LO-Z plugs are found on the dry side of the front spar of the fuel tank. The densitometer plugs are found on the dry side of the rear spar.
(11) The tank wiring harnesses are installed in the applicable fuel tank. The tank wiring harness begins at the HI-Z/LO-Z receptacle or densitometer receptacle and ends at the wiring terminals on the tank units and compensator or densitometer.
(12) The HI-Z/LO-Z plug connects with the HI-Z/LO-Z receptacle of the tank wiring harness.
(13) The densitometer plug connects with the densitometer receptacle of the tank wiring harness.
(14) The tank wiring harnesses are installed in their applicable fuel tanks.
(15) The processor (FQPU) sends an excitation signal to the tank units and compensators through the LO-Z wiring.
(16) The HI-Z wiring carries the return signal from the tank units and compensators to the processor.
(17) The LO-Z wiring is individually routed from the processor to the tank units and compensators.
(18) The HI-Z wiring is connected in "daisy chain" between the tank units and compensator with only one HI-Z wire terminal at the HI-Z/LO-Z connector. One HI-Z wire goes from the HI-Z/LO-Z connector to the processor.
(19) The tank wiring harness does not require FQIS field calibration.
(20) All repairs of the tank wiring harness must be done per SWPM 20-14-12.
(21) Any corrosion or damage to the airplane wiring harness or the tank wiring harness can result in unknown accuracy fault for the applicable fuel tank. This can cause the fuel quantity indicator displays for the applicable tank and total to go off.

3. Operation (Fig. 10)



Fuel Quantity Indicating System (FQIS) Schematic
Figure 10

A. Functional Description
(1) Fuel Quantity Processor Unit Operation
(a) The processor operates whenever the system has power. No flight crew operator actions are necessary for the processor to calculate and show fuel quantity.
(b) Power requirements for the processor, 28 volt dc, normally comes from the battery bus, and the right main bus. Alternate power sources for the processor come from the ground handling bus and the hot battery bus.
(c) The battery bus normally supplies power to power supply 1 in the processor, and the right main bus supplies power to power supply 2.
(d) The processor will operate even with only one power source available.
(2) Tank Unit Signals and Programming
(a) Strategically located tank units measure the fuel quantity in each fuel tank. Each fuel tank also contains a compensator, which measures the dielectric of the fuel. Both the tank units and the compensator are used to calculate the fuel quantity.
(b) With power applied to the processor, an excitation signal is sent to the tank units to measure their capacitance value. This is accomplished by comparing the tank unit against a rebalance capacitor of known value, which increments or de-increments until a balance is reached. This operation is carried out for each tank unit, and a computation of tank volume made by the microcomputer as follows:
1) The computer program divides each tank unit into equal sections, and assigns a value proportional to tank shape. Wetted sections of the tank units are summed, and the value of unusable fuel kept in the computer memory is subtracted from the total. Fuel quantity indicators show the quantity of usable fuel.
2) The values assigned tank unit sections change with airplane attitude. The computer program contains four different characterizations for the ground conditions and four for the air condition.
(3) EICAS Messages
(a) The processor sends signals of low fuel, fuel configuration, and system faults to the EICAS computer.
1) The EICAS computer will supply and show a LOW FUEL caution message and the FUEL CONFIG light will come on during this condition:
a) When the quantity of fuel in either one of the two main fuel tanks is less than 2200 pounds (1000 kgs). The message goes off when the quantity becomes more than 3000 pounds (1400 kgs).
2) The EICAS computer will supply and show a FUEL CONFIG advisory message and the FUEL CONFIG light on the P5 panel will come on during one of these conditions:
a) A fuel imbalance of more than 1800 pounds (800 kgs) between the left and right main fuel tanks.

b) Both center tank override switches in the off position with over 1200 pounds (500 kgs) of fuel remaining in the center fuel tank. The message and light are reset when the fuel remaining in the center fuel tank drops below 1000 pounds (400 kgs) or the center tank override switches are turned on.

(b) The processor sends a maintenance required signal to EICAS when the processor finds a fault.

1) These messages are shown:

a) FUEL QTY BITE (maintenance message) - Shown when one or more faults are recorded in the processor present faults. On processor S345N001-030, this message also shows when one or more faults are recorded in fault history. To show this message you must push the ECS MSG switch on the EICAS MAINT module (P61 panel).

b) FUEL QTY CHANNEL (status message) - Automatically shown when the ARINC bus A or B becomes inactive. Only one of the two ARINC busses is necessary for FQIS operation. If the ARINC bus A becomes inactive, the last received value is shown until the processor switches to the ARINC bus B. This message will show when the processor has a fault in either channel with valid digital data. This message is inhibited by the FUEL QTY BITE status message.

c) FUEL QTY BITE (status message) - Shown in addition to the FUEL QTY BITE maintenance message if the EICAS computer does not receive valid ARINC data from the FQIS.

(4) Indicator Signals

(a) The processor calculates the weight of fuel in each fuel tank. The processor also calculates the total fuel quantity, by adding the quantity of fuel in each fuel tank.

(b) The quantity of fuel is shown digitally on the fuel quantity indicator found on the overhead panel, P5. The fuel quantity indicator has individual displays for each fuel tank and for the total fuel quantity. The fuel quantity indicator also shows the fuel temperature (Ref 28-43-00).

(c) If the processor determines that there is unknown accuracy in a fuel quantity indicator, the individual indicator in the flight compartment and on the fueling control panel, P28, will go off. If this occurs during refueling, the message PUSH SET will show on the load select indicator. The total fuel quantity indicator on the P5 panel and on the flight management computer will also go off.

(d) With the fueling station door open, the top half of the individual load select indicators show the quantity of fuel in their applicable fuel tanks.

(5) FQIS Fueling Control

(a) With power supplied to the FQIS and the load select control set to the quantity of fuel that is necessary, an analog signal proportional to that quantity, is sent to the FQIS processor. The processor digitizes the signal and stores it in memory. The processor also sends a digital signal of the same value to the load select indicator, to be shown on the bottom display. As the airplane is fueled, the fuel quantity is shown on the top display. When the selected quantity of fuel shown on the bottom display is reached, the fueling shutoff valves close for the applicable fuel tank.

(6) FQIS Fault Recovery

(a) To read the faults kept in the processor you use the 32-character LED display and six buttons on the front face of the processor. The processor shows present and past faults. For past faults (shown in Fault History) there is an intermittent fault indication that shows the number of times the fault occured on a specific flight leg (maximum of 99) and if the fault occurred on the ground or in the air. When you read the Present Faults menu the Air or Ground indication is shown (intermittent fault data is not shown), indicating the fault occurred in the air or on the ground. When you read the faults from the Fault History menu, only the flight leg numbers for which faults were recorded will show. When you erase the fault history, only the flight legs 11 thru 64 are erased.

NOTE: In the Fault History menu, flight leg 00 is the flight leg you are currently on. Each flight leg starts at airplane takeoff.

(7) FQIS Fault Detection

(a) The processor does almost all fault detection on the FQIS automatically. The processor continuously does a test on the system and its components, while the FQIS functions. If a fault is found, an EICAS maintenance message, FUEL QTY BITE, is shown and the fault is kept in the computer memory for recall by the maintenance crew.

(b) Faults are recorded by flight leg from the current flight leg (0) to 99. The transition from one flight leg to another is at the GND-AIR transition on airplane takeoff. Each time the flight leg changes from ground to air, all flight leg numbers are increased by one.

(c) To recall faults from memory, operate the built-in-test controls on the front panel of the processor.

(d) There are six primary BIT menu options on the processor. The six buttons on the processor are used to get access to the six menus.

1) PRESENT FAULTS menu - shows all present system faults.
2) FAULT HISTORY menu - shows past faults by flight leg (for a minimum of 64 flight legs).

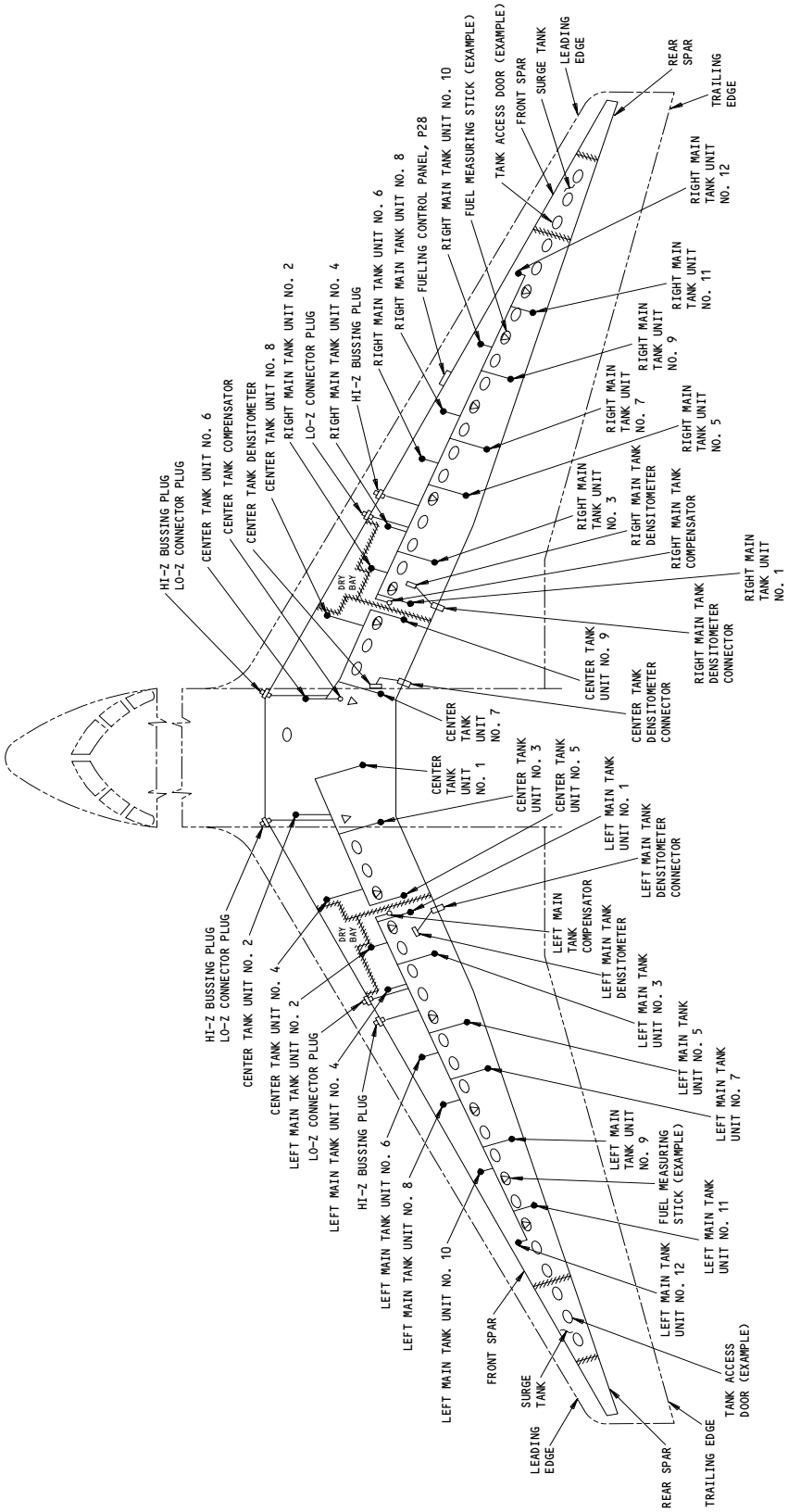
3) SYSTEM DATA menu - shows uplift, main and center fuel tank data (fuel mass, density, volume, capacitance).
4) SELF TEST menu - does a test of the FQIS system.
5) SYSTEM CONFIG menu - shows the status of all six circuit cards in the processor.
6) ERASE FAULT HISTORY menu - removes fault history for flight legs 11-64.

FUEL QUANTITY INDICATING SYSTEM (FQIS)- DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The fuel quantity indicating system (FQIS) supplies fuel quantity measurement, calculation, and indication. The system contains tank units, compensators, densitometers, indicators, and a fuel quantity processor unit. The fuel quantity processor unit (FQPU, referred to as "the processor") does quantity computation and fault isolation for the FQIS system. The processor also controls pressure fueling for the airplane (AMM 28-21-00).
   B. The fuel quantity indicating system is a microcomputer controlled system that uses the variable capacitance principle for fuel quantity measurement. The capacitance measured by the tank units is approximately proportional to the quantity of fuel in the fuel tank.
   C. The FQIS contains the processor (FQPU), a fuel quantity indicator module (FQIM), 3 load select indicators (LSI), a load select control, 3 compensators, 3 densitometers, 7 tank wiring harnesses, and 33 tank units.

      NOTE: The Simmonds Retrofit FQIS system uses the original Honeywell airplane wiring harness and tank wiring harness for the tank units and compensators. The densitometer and wiring is all new Simmonds hardware.

      (1) AIRPLANES POST-SB 28A0085;
      There is a hot short protector installed for the center tank densitometer.
   D. The processor (FQPU) is the principle component of the FQIS. It is a microprocessor based computer, found in the main equipment center on the rack E3-4. The processor has an independent channel for each fuel tank so that a component failure or contamination in one fuel tank does not affect the quantity measurement for the other fuel tanks.
   E. The processor transmits excitation signals to and reads signals from the tank units, the compensators, and the densitometer. The processor uses this data to calculate the fuel volume and weight. The processor includes its own failure monitoring, and built-in test equipment (BITE). Fault isolation is supplied for all sensors and the fuel quantity indicator. Faults are kept in a non-volatile memory, for recall on demand by the maintenance crew. The processor supplies these outputs:
      (1) Signals to EICAS and the FUEL CONFIG light to warn of low fuel, fuel imbalance or fuel in the center fuel tank with the fuel override pumps off, or system faults.
      (2) Digital fuel quantity (primary and total) shown on the fuel quantity indicator on the overhead panel, P5.
      (3) Digital fuel load selected, shown on the load select indicators on the fueling control panel, P28.
      (4) Volumetric and fuel quantity shutoff signals sent to the fueling shutoff valves for automatic shutoff.



Fuel Quantity Indicating System (FQIS)
Figure 1

AD9921

F. The tank units and compensators are almost the same in construction and installation provisions. Both tank units and compensators are capacitance type sensors but the tank units sense the height of fuel in the tank and the compensators measure the dielectric constant of the fuel.

G. The densitometer senses fuel density. Knowing the density and the volume of fuel lets the processor calculate the mass or weight of the fuel.

H. A FUEL QTY test switch makes sure the flight compartment displays including EICAS messages can operate. This switch only does a check of the displays and does not show the condition of the FQIS system.

2. Component Details

A. Tank Units (Fig. 2)

(1) There are 12 tank units in each main fuel tank, and 9 tank units in the center fuel tank. All the tank units are the same, except for their length. The length depends on the depth of the tank at that particular location.

(2) Each tank unit consists of two concentric aluminum tubes, a terminal block, two end caps, and two brackets.

(a) The aluminum tubes are anodized and polyurethane coated to protect against corrosion. The tubes are factory calibrated. The distance between the tubes is relatively widely spaced to avoid electrical short circuiting, due to water in the fuel or fungus coating on the tubes.

(b) The tank wiring harness attaches to the tank unit at the terminal block. The wiring terminals on the tank wiring harness and the terminal posts on the terminal block have different dimensions to prevent errors in installation.

(c) The end caps are insulated to help prevent the tank unit from shorting to the ground. They also supply capacitance fringing control.

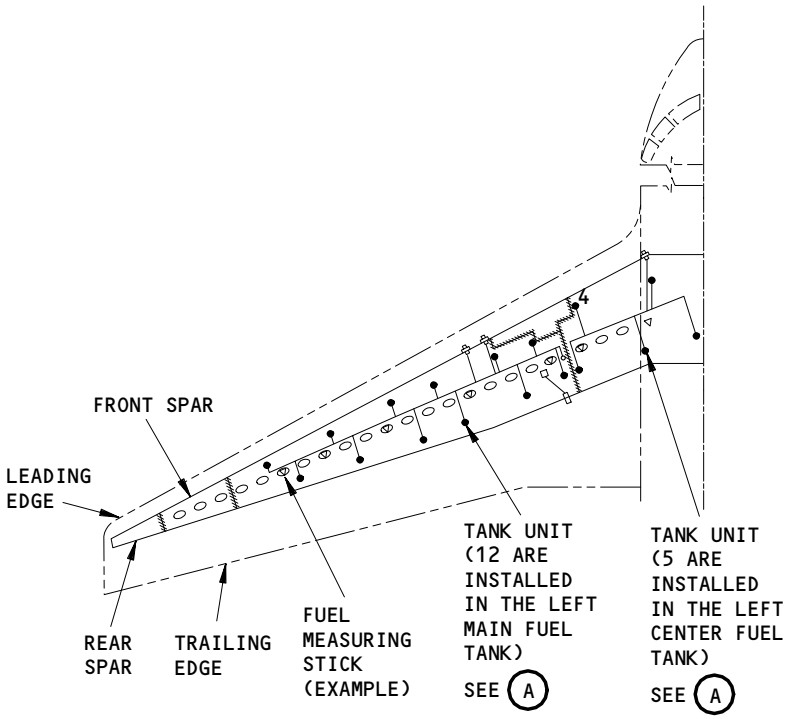
(d) Two brackets made of nonferrous glass-filled nylon, attach each tank unit to the wing structure.

(3) The tank unit measures the fuel level in the fuel tank. It is a linear, capacitance type sensor. Tank geometry is accounted for by computer software. The concentric aluminum tubes of the tank unit act as plates of a capacitor, and the dielectric is air and/or fuel depending on the quantity of fuel in the fuel tank. This air to fuel ratio gives a capacitance value which is used to calculate the volume of fuel.

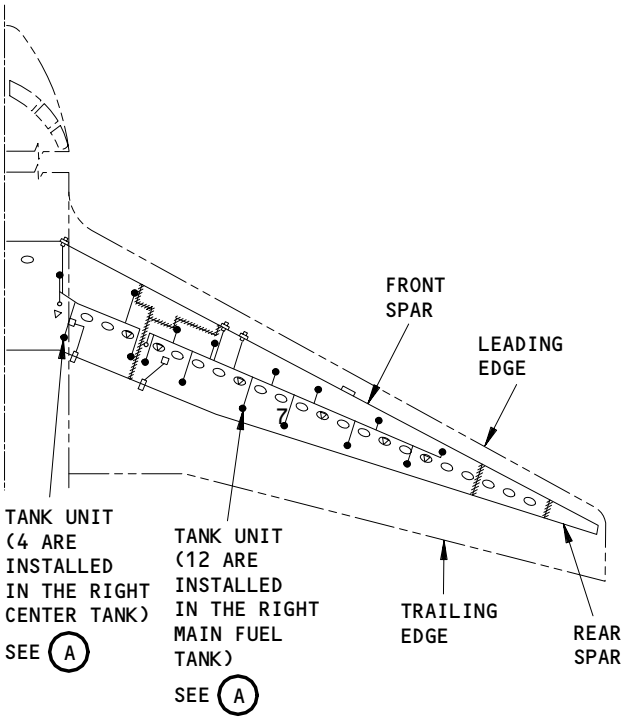
B. Compensator (Fig. 3)

(1) One compensator is installed in each fuel tank. All compensators are the same. The compensators are almost the same in construction and installation provisions as the tank units.

(2) Each compensator contains four metallic tubes, or electrodes, which attach to the support tube, a terminal block and two brackets. The four electrodes form a capacitor.



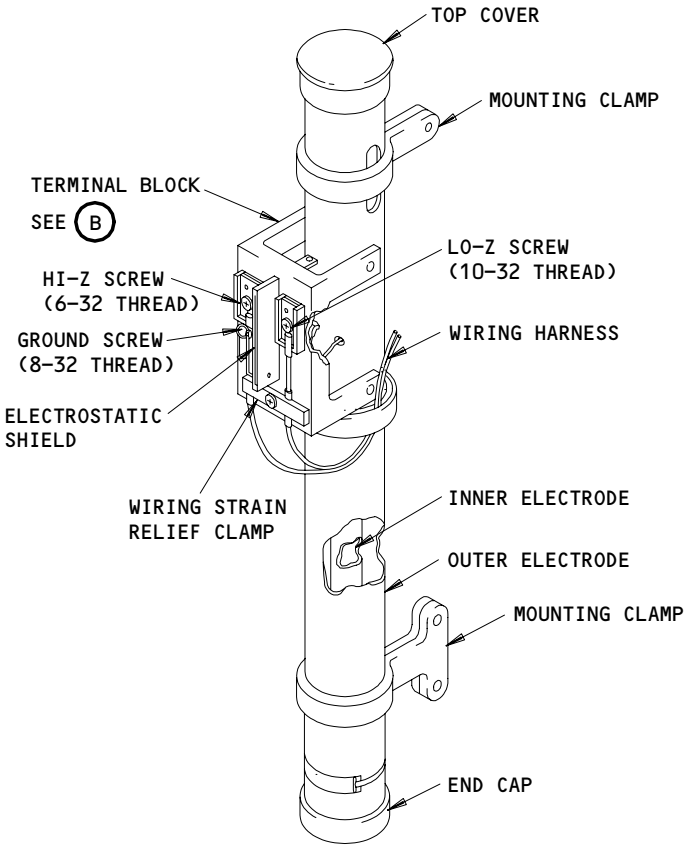
LEFT WING



RIGHT WING

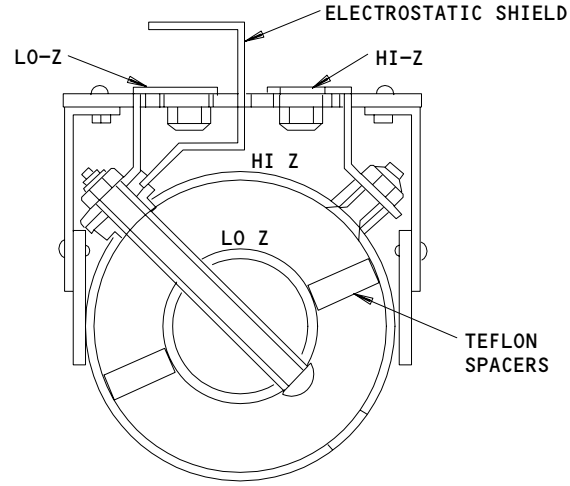
FQIS Tank Units
Figure 2 (Sheet 1)

A09929



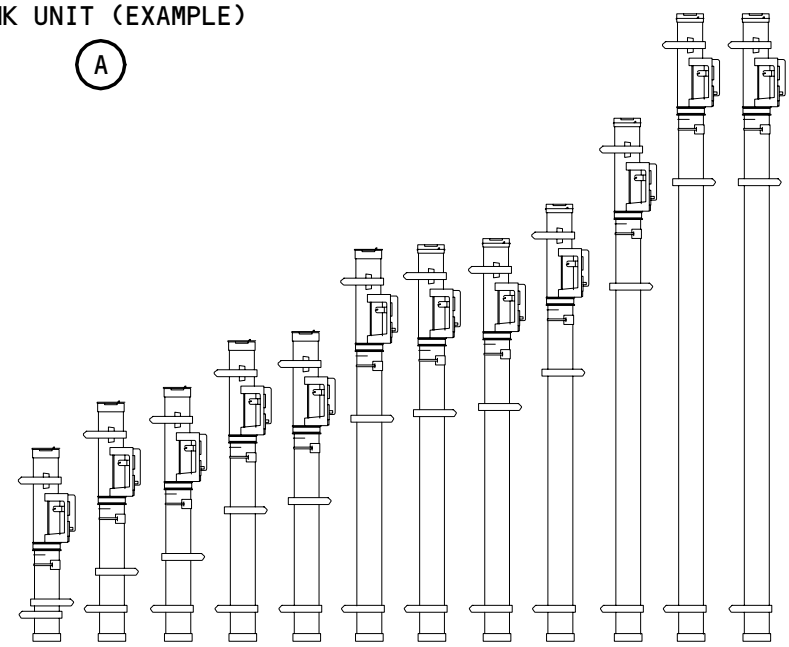
TANK UNIT (EXAMPLE)

(A)

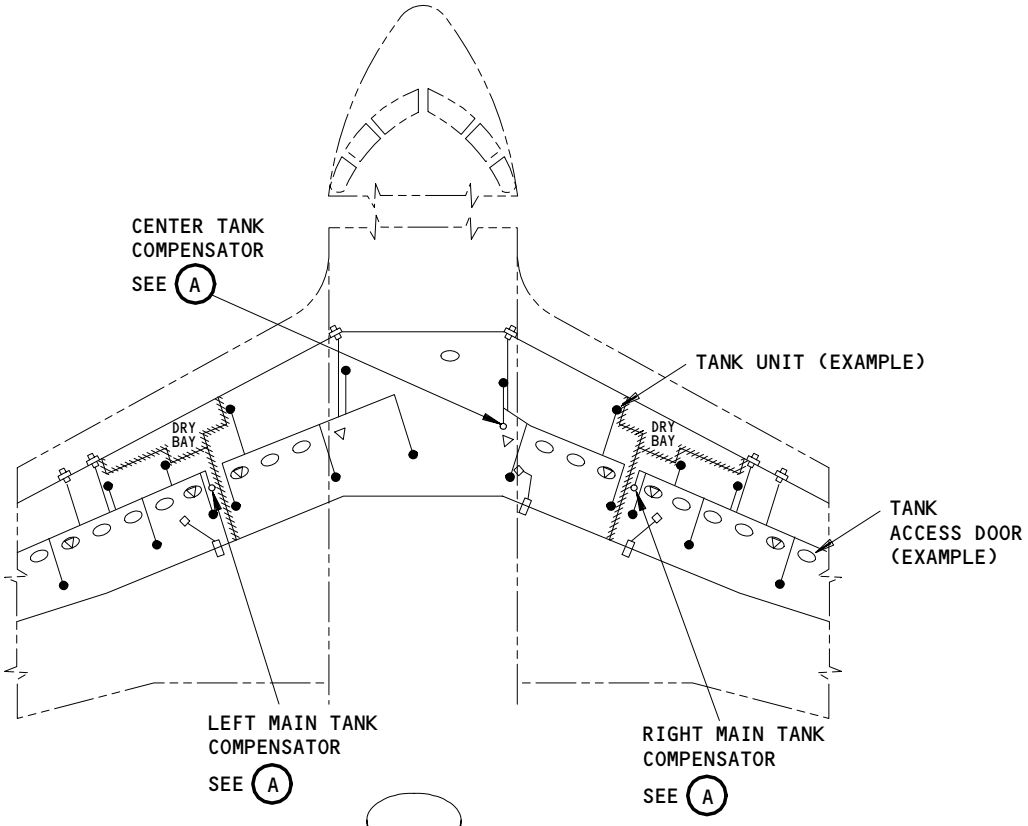


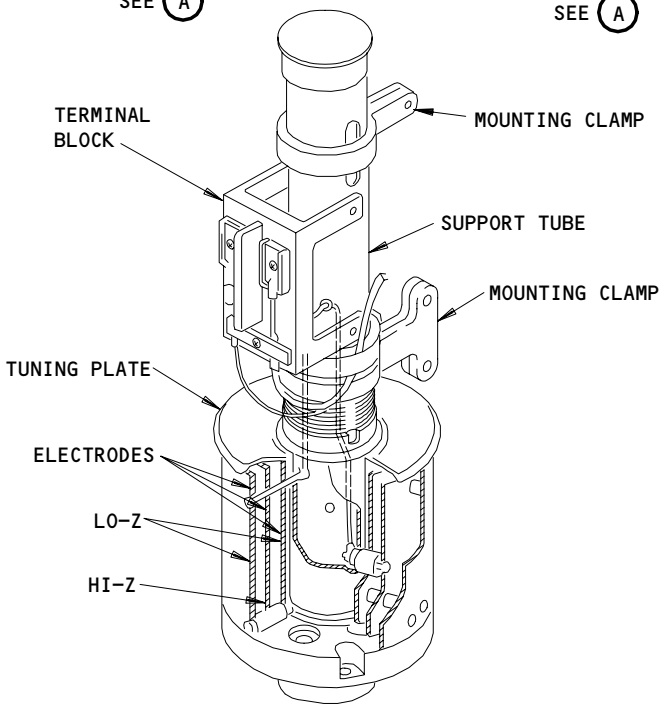
TERMINAL BLOCK
(TOP VIEW)

(B)



FQIS Tank Units
Figure 2 (Sheet 2)





COMPENSATOR

A

FQIS Compensator
Figure 3

A09934

(3) The compensator senses the dielectric constant of the fuel. It is a capacitance sensing device almost the same as the tank unit. The compensator is installed at the bottom of the fuel tank, completely covered by fuel until the fuel tank is almost empty. As a result, the compensator capacitance is affected only by changes in the dielectric constant of the fuel.

C. Densitometer (Fig. 4)

(1) One densitometer is installed in each fuel tank. The densitometer measures the fuel density.

(2) The densitometer is installed at the bottom of the fuel tank, aft of the compensator. A tank wiring harness attaches to each densitometer. The tank wiring harness for the densitometer goes through the rear spar.

(3) The densitometer contains a nickel alloy, wiring-wrapped, vibrating spool, an excitation coil, a sensing coil, and eight calibration resistors, all installed in a cylindrical, vented housing. The vents in the housing let fuel go into the housing to cover the spool and let air escape.

(4) The processor sends an AC signal through a coil to excite the spool, which then vibrates. The processor reads the frequency of the vibration and changes the frequency of the excitation signal until the spool vibrates at its maximum frequency. The maximum "resonant" frequency is a function of the fuel density only. The processor calculates the fuel density from the resonant frequency.

(5) The densitometer also gives a check on the specific gravity data from the compensator. This increases the accuracy of the FQIS.

D. AIRPLANES POST-SB 28A0085;
Hot Short Protector (Fig. 4)

(1) A hot short protector is installed on the rear spar outside of the right center fuel tank.

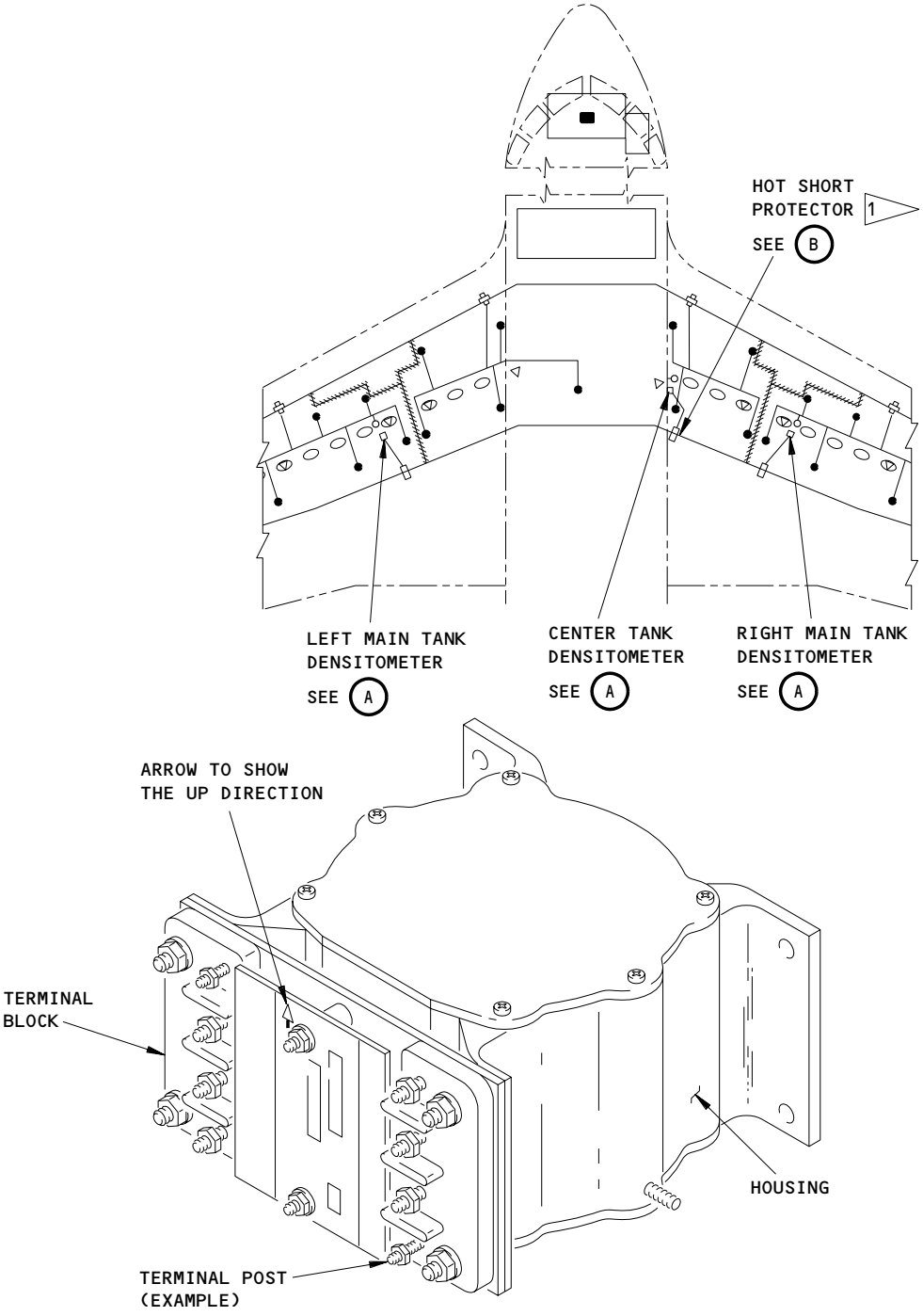
(2) The hot short protector prevents wire to wire hot short voltages from the densitometer wiring for the center fuel tank from entering the tank.

(3) A hot short protector (safe-side) wire harness connects the hot short protector to the tank wiring harness for the densitometer in the right center fuel tank at the rear spar.

E. Fuel Quantity Indicator Module (FQIM) (Fig. 5)

(1) A fuel quantity indicator module (FQIM) is installed on the overhead panel, P5. It supplies digital liquid crystal displays of individual tank, and total fuel quantities; and fuel temperature.

(2) The fuel quantity indicator is contained in an aluminum housing with a front panel which has high contrast, dual-cell liquid crystal displays (LCD). The fuel quantity indicator's electronic circuits use a "brickwall architecture" to prevent a failure in one display from affecting the operation of the other fuel tank displays.

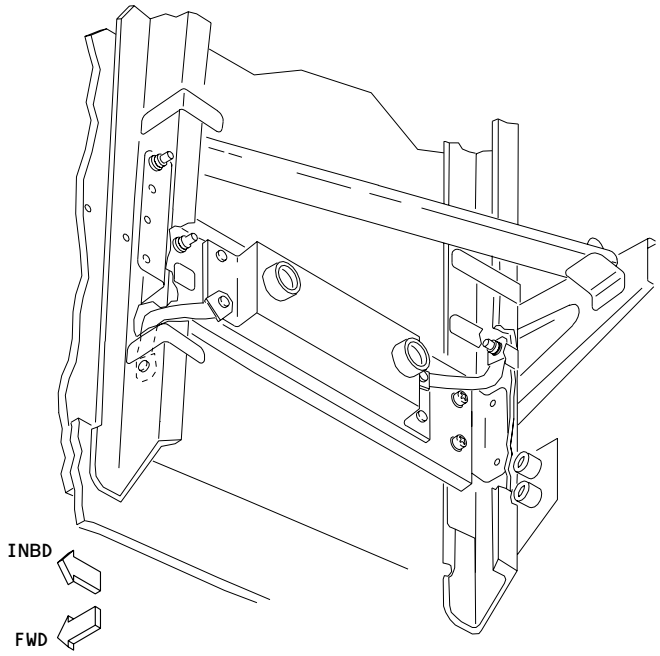


DENSITOMETER
(EXAMPLE)

A

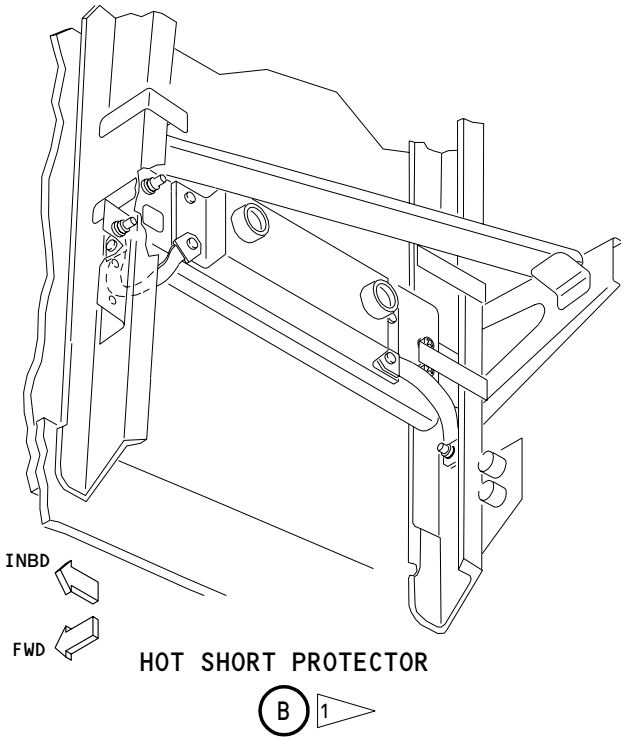
1 AIRPLANES POST-SB 28A0085

FQIS Densitometer
Figure 4 (Sheet 1)



HOT SHORT PROTECTOR

B 1

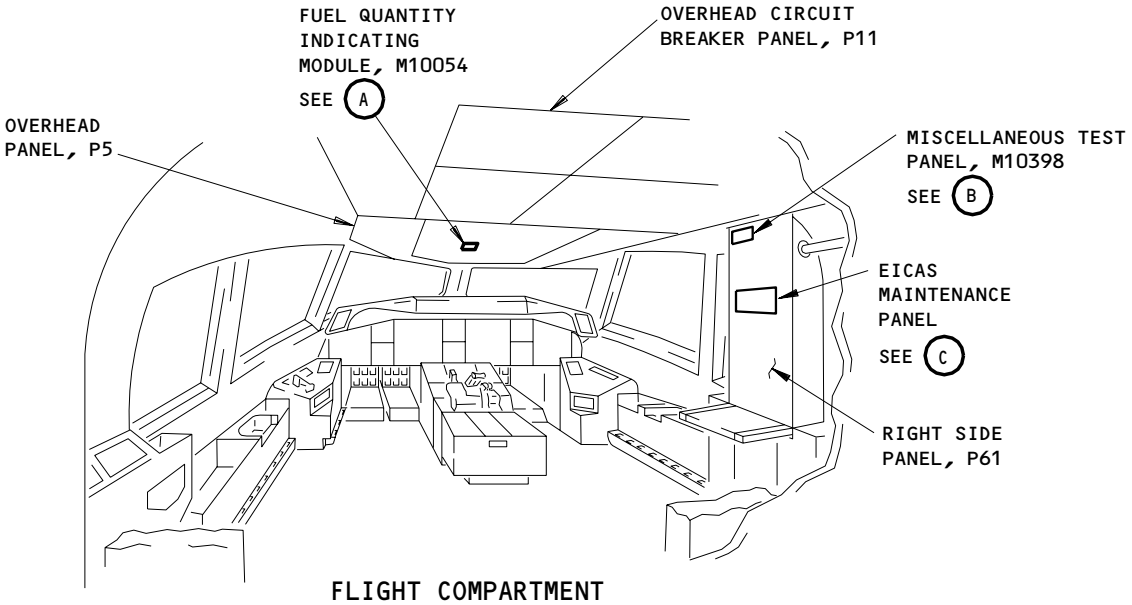


HOT SHORT PROTECTOR

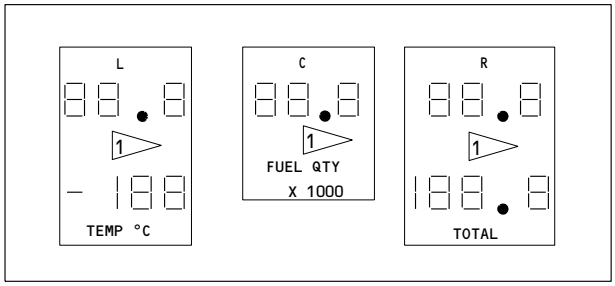
B 1

1 AIRPLANES POST-SB 28A0085, AS APPLICABLE

FQIS Densitometer
Figure 4 (Sheet 2)

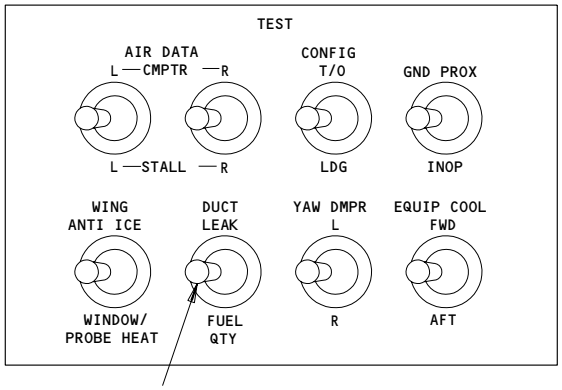


FLIGHT COMPARTMENT



FUEL QUANTITY INDICATING MODULE, M10054

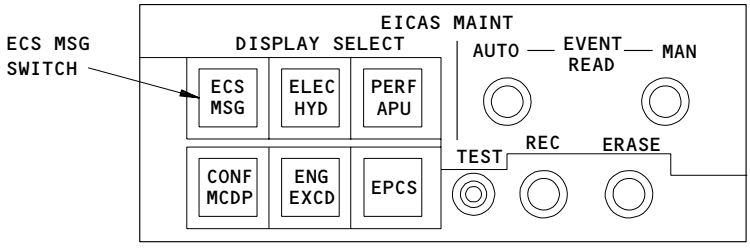
A



FUEL QUANTITY TEST SWITCH, S6

MISCELLANEOUS TEST PANEL, M10398
(EXAMPLE PANEL SHOWN)

B



EICAS MAINTENANCE PANEL

C

1 THE UNITS ARE IN LBS OR KGS.

Fuel Quantity Indicating Module (FQIM)
Figure 5

(3) 28V dc is supplied to the FQIM from the P11 circuit breaker panel through the processor (FQPU). 5V ac for internal lighting is supplied from the aircraft lighting circuits.

NOTE: There is a BRIGHT(BRT)/DIM switch (S3) on the Flight Deck, Overhead Panel (P5). The BRT/DIM switch supplies "Bright" override for the panel light of the FQIM, when the "IND LTS" is put in the "Bright" mode. The BRT/DIM switch will improve the visibility of the FQIM in daylight.

F. FUEL QTY Test Switch (Fig. 5)

(1) The FUEL QTY test switch is found on the right side panel, P61 in the flight compartment.

(2) When you put the FUEL QTY test switch in the FUEL QTY position and release:

(a) The left, center, and right fuel quantity indicators on the overhead panel, P5 will show 88.8.

(b) The total fuel quantity indicator on the P5 panel will show 188.8.

(c) The fuel temperature indicator on the P5 panel will show -188.

(d) The FUEL CONFIG light on the P5 panel will come on.

(e) The EICAS caution message, LOW FUEL, will show on the top display.

(f) The EICAS status message, FUEL QTY IND, will show on the bottom display.

(g) The EICAS status message, FUEL QTY CHANNEL, will show on the bottom display.

(h) The EICAS maintenance message, FUEL QTY BITE, will show on the bottom display.

NOTE: In order to view the EICAS maintenance message FUEL QTY BITE, you must put the FUEL QTY test switch in the FUEL QTY position and release. Then you must immediately push and release the ECS MSG switch on the right side panel, P61.

(3) The FUEL QTY test switch also does a test of the two ARINC buses A and B. The fuel quantity indicator gets the fuel quantity information from one of the two ARINC buses A and B. If one or two of the ARINC busses is inactive, "-A.-", "-b.-" or "-A.b" will show on the displays of the fuel quantity indicators before the displays show the quantity of usable fuel in the fuel tanks if only one bus is bad. If both busses are bad "-A.b" will show and then the indicators will blank.

(4) If one of the fuel quantity indicators is blank because there is a fault in the FQIS, the indicator will go off again after you use the fuel quantity test switch. Do the FQIS BITE procedure (FIM 28-41-00/101) to find the fault and do the corrective action.

(5) Once the FUEL QTY test switch is used, if you use the the FUEL QTY test switch again, before the test is complete, nothing will occur.

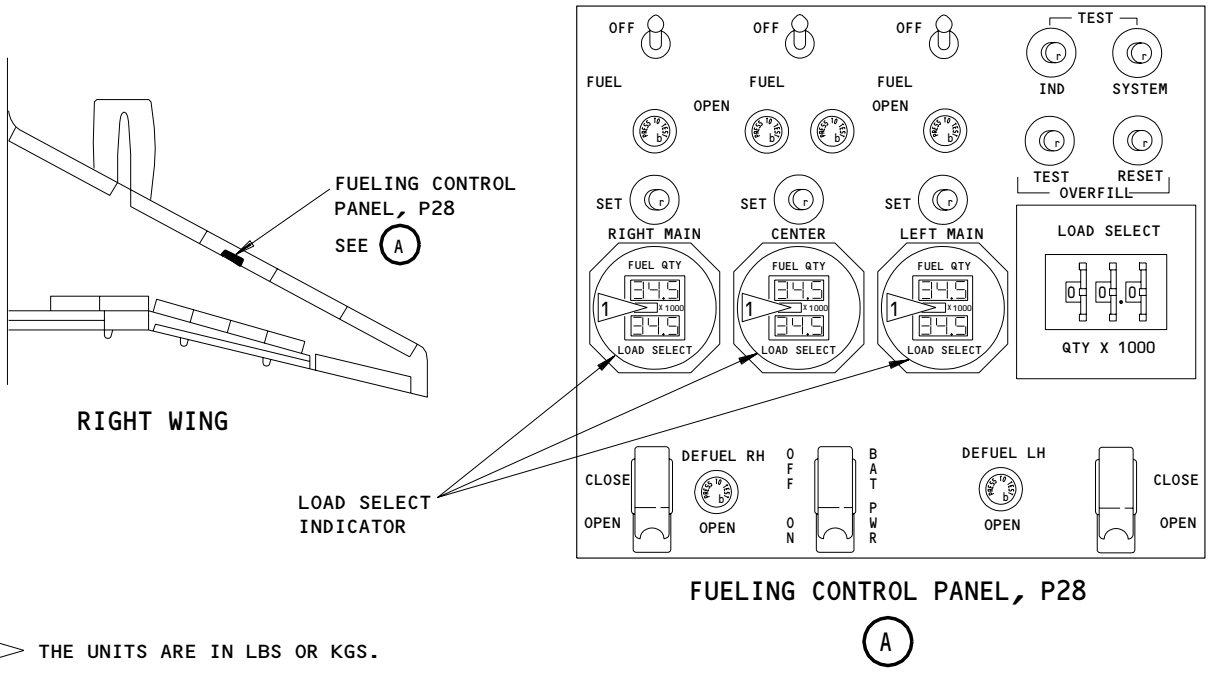
G. Load Select Indicator (Fig. 6)

(1) One load select indicator, found on the fueling control panel, P28, monitors each fuel tank (three total).

(2) There are two light-on-dark LCD's for each load select indicator. The top display shows the fuel quantity in each fuel tank in LBS (KGS) x 1000. The bottom display shows the fuel quantity selected to be put into the fuel tank in LBS (KGS) x 1000. A 7-1/2 watt, automatically controlled heater makes sure the LCD's will operate correctly in cold weather. Power is applied to the load select indicators whenever the fueling station door is opened unless the power is supplied by the battery.

(3) To test the load select indicators, push the TEST IND switch on the fueling control panel, P28. The top and bottom displays should show 888.8.

(a) The TEST IND switch also does a test of the two ARINC buses A and B. The load select indicator gets the fuel quantity information from one of the two ARINC busses A and B. If one or two of the ARINC busses is inactive, "-A.-", "-b.-" or "-A.b" will show on the displays of the load select indicators before the displays show the quantity of usable fuel in the fuel tanks if only one bus is bad. If both busses are bad "-A.b" will show and then the load select indicators will blank.



Load Select Indicator (LSI)
Figure 6

(4) If during the fueling operation there is a FQIS failure, the load select indicator will show the message PUSH SET and the fuel shutoff valve will close. To continue fueling, you must push the set button and fuel manually, or you must correct the failure by doing the Fuel Quantity Bite "SELF TEST?" and corrective action (FIM 28-41-00/101).

H. Load Select Control Unit (Fig. 7)

(1) The load select control unit is found on the fueling control panel, P28.

(2) The load select control unit is a hermetically sealed unit. The case houses three thumbwheel type switches, three resistor boards, and an electrical connector.

(3) The load select control unit lets the fueling crew select the quantity of fuel to be put into each fuel tank. To do this you set the thumbwheel switches then push the SET switch for the applicable fuel tank. The load select control then sends an analog signal to the processor (FQPU) representive of the fuel to be loaded.

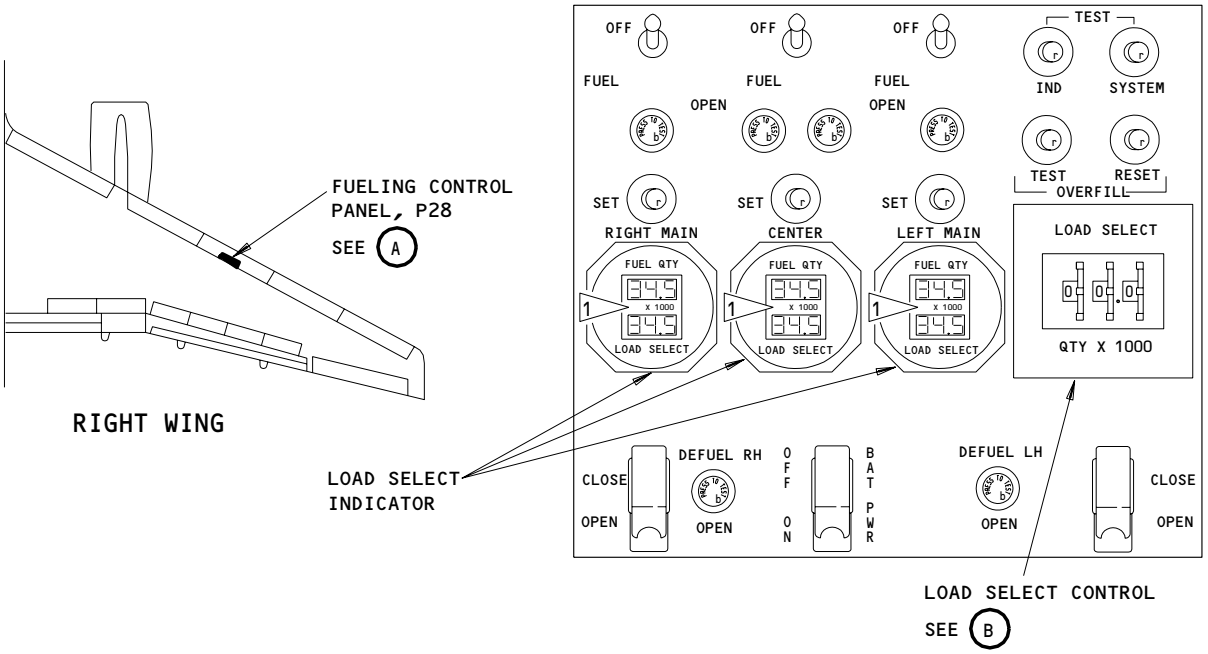
I. Fuel Quantity Processor Unit (FQPU) (Fig. 8)

(1) The fuel quantity processor unit (referred to as "the processor") is the principle component of the fuel quantity indicating system. The processor calculates fuel quantity and sends the data for display in the flight compartment and at the fueling control panel, P28. The processor also controls the pressure fueling operations and does BITE functions.

(2) The processor is found in the main equipment center on the E3-4 shelf. There are connectors on the front face of the processor for the ARINC channels A, B and C. The connectors, found at the back of the processor, connect it with the other components of the FQIS. On the front face of the processor are a 32 character LED display, a BIT procedure placard, a MENU button, a YES button, a NO button, an ON/OFF button and UP and DOWN arrow buttons.

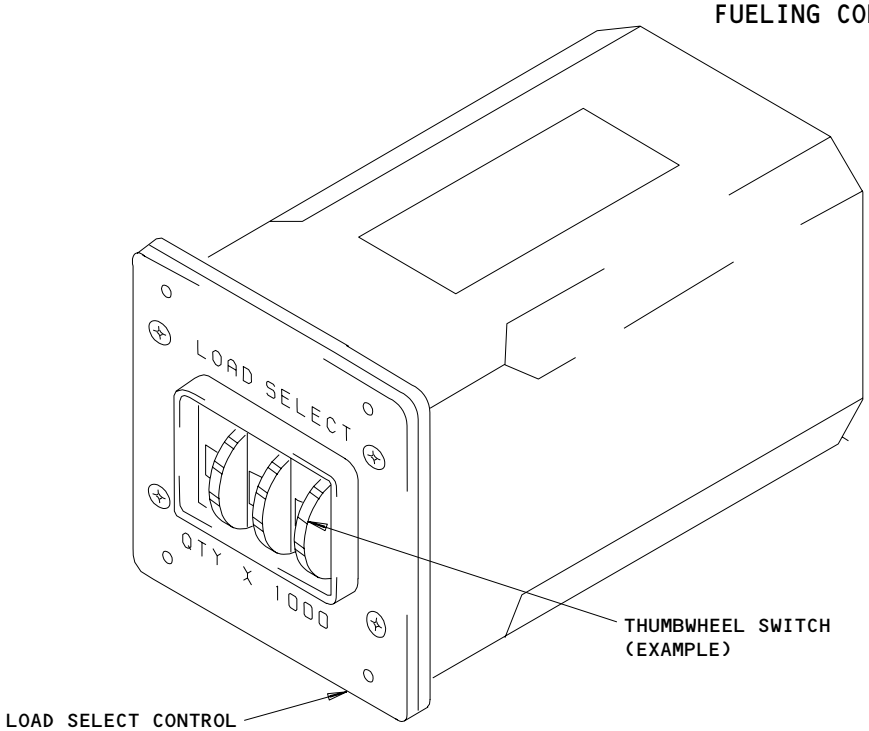
(3) The processor needs 28 volts dc power to operate.

(4) The processor has three separate and independent channels; one for each fuel tank. Each channel has one Individual Fuel Quantity Channel (IFQC) circuit board. In the processor there are also two Input/Output Channel (IOC) circuit boards and one BITE circuit board.



FUELING CONTROL PANEL, P28

A

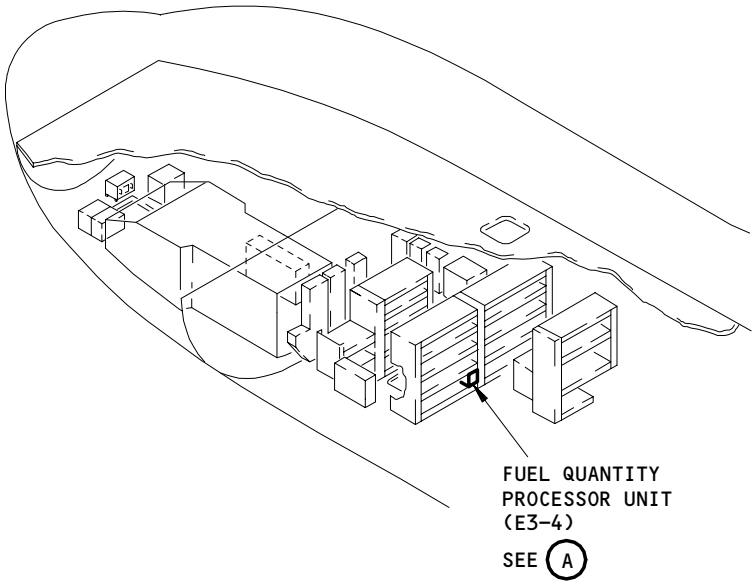


LOAD SELECT CONTROL

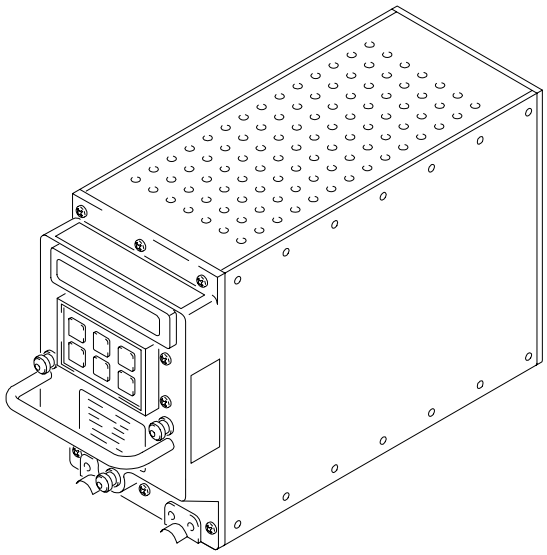
B

1 THE UNITS ARE IN LBS OR KGS.

Load Select Indicator (LSI)
Figure 7



MAIN EQUIPMENT CENTER



FUEL QUANTITY PROCESSOR UNIT

A

Fuel Quantity Processor Unit (FQPU)
Figure 8

(5) Two separate and redundant power supplies supply each of the six circuit boards. Only one power supply is necessary for normal operation. The circuit boards are electrically and physically separated. During normal operation all the circuit boards have power.

(a) Each Individual Fuel Quantity Channel (IFQC) circuit board is assigned to one fuel tank. If a component is bad or there is contamination in one fuel tank, it does not affect the other fuel tanks. The IFQC circuit boards supply excitation signals to the tank units, compensators and densitometers. The IFQC circuit boards also measure the return signals and calculate fuel weight and density. The fuel quantity, built-in-test, and other calculated information for each fuel tank is sent through a redundant serial data bus to each Input/Output Channel (IOC) circuit board internal to the processor.

(b) Each of the two Input/Output Channel (IOC) circuit boards adds the fuel quantity data. The IOC circuit boards also send fuel quantity data, through the ARINC busses A and B, to the fuel quantity indicator, load select indicators, EICAS and FMC. The IOC, through the BITE circuit card, sends control signals to close the fueling shutoff valves at Volumetric Top Off (VTO) or at the load select quantity. The IOC circuit cards also supply outputs for low fuel and fuel configuration. They also receive inputs for the fueling station door position, air/ground relay position, system test, indicator tests, load select set data and fuel override pump status.

(c) The Individual Fuel Quantity Channel (IFQC) measures and calculates the fuel weight for each of the tank unit areas in the applicable fuel tank. Each IFQC supplies an excitation (LO-Z) signal which is sent in sequence to each of the tank units and the compensator in the applicable fuel tank. The return (HI-Z) signal is characterized for the shape of each tank unit's area. The fuel density is calculated from the densitometer. The fuel weight is the product of fuel volume and density. Discrete inputs to the IFQC also enable and disable some fueling control panel functions. The air/ground relay supplies different fuel tank shapes on the ground and in the air. The fueling station door signal enables and disables the load select indicator and the load select "SET" functions.

(d) Each of the three IFQC's send signals to the two Input/Output Cards (IOC's). All the tank units weights are added by each IOC and also the total weight for each fuel tank and the total quantity for all the fuel tanks. Each IOC has an ARINC bus (A or B). Fuel quantity data is sent over the ARINC busses to the fuel quantity indicator module and the load select indicators. The IOC's also send signals to the BITE card. The IOC's supply excitation to fueling control panel to control the fueling shutoff valves. Discrete outputs for low fuel and fuel configuration indication are also generated. There are discrete inputs to the IOC's for fueling station door position, air/ground relay positon, system test request, indicator test request, load set requests and fuel override pump status.

(e) The BITE circuit card keeps FQIS faults and has an interface with the BITE controls on the front face of the processor to show the faults. The drivers for the fueling shutoff valves are found on the BITE circuit card. The BITE circuit card has ARINC bus C which transmits fuel system information and fuel quantity data from the IOC's to the EICAS for message logic.

(6) The processor receives signals from the tanks units, compensators, densitometers, load select control, and air/ground relay, and performs computations as programmed. Output signals of fuel quantity go to the fuel quantity indicator module, and the load select indicators. A signal is also sent to the EICAS computers and FUEL CONFIG light on P5, warning of low fuel, fuel imbalance, or system faults. Fueling valve control signals are available during the fueling operation. The processor also provides failure monitoring, and built-in-test.

(7) The six buttons on the front face of the processor operate as follows:

(a) ON/OFF button - causes the BITE display control on or off.

(b) MENU button - goes to the menu level and puts on different menus.

(c) YES button - goes to the menu item shown on the display.

(d) NO button - goes to the next menu item on the display.

(e) The UP arrow button - shows the last menu item shown.

(f) The DOWN arrow button - shows the next menu item.

J. Tank Wiring Harness (Fig. 9, and 10)

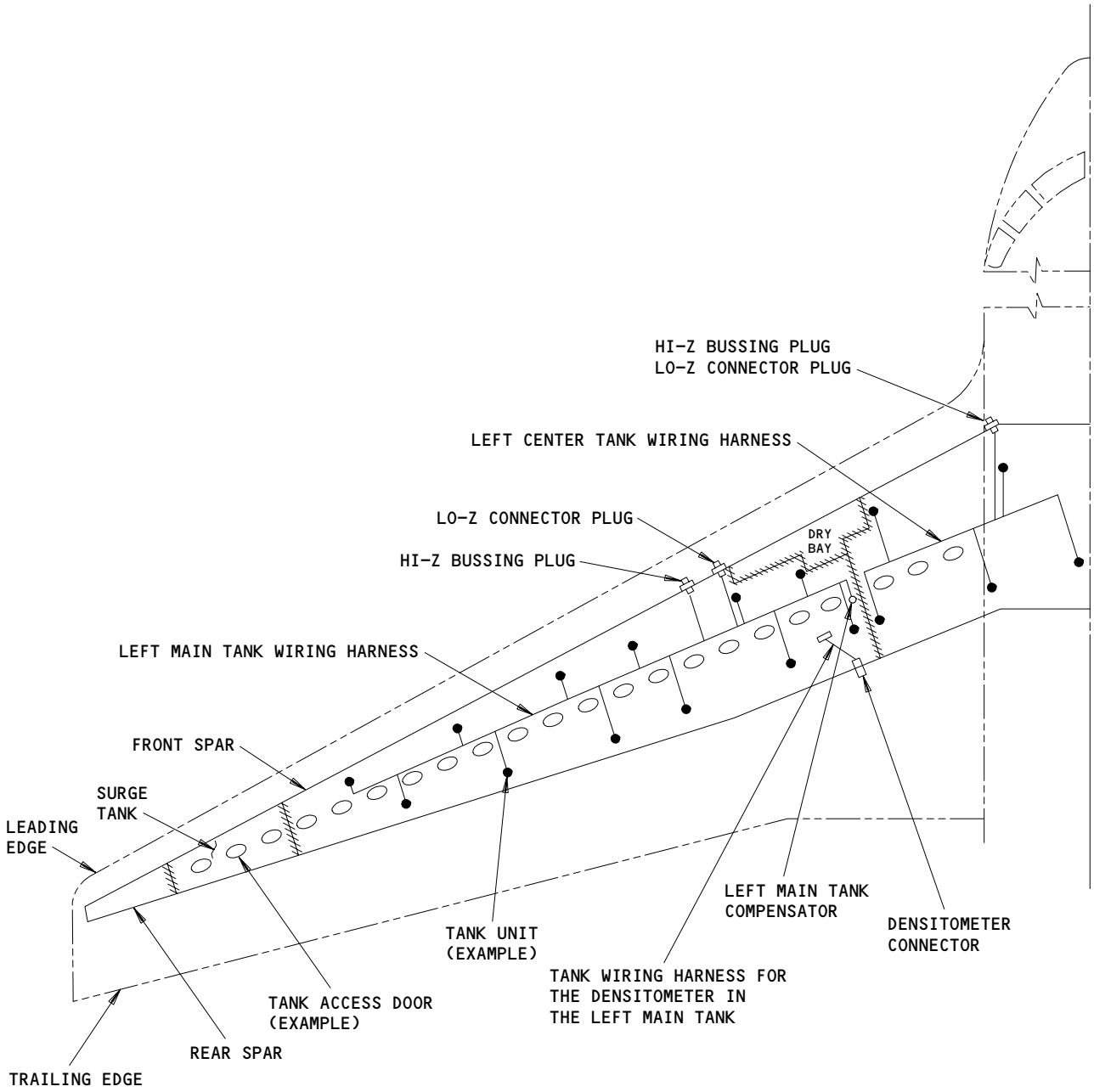
(1) The location of the tank wiring harnesses are shown in Fig. 9.

(2) The term LO-Z means low impedance.

(3) The term HI-Z means high impedance.

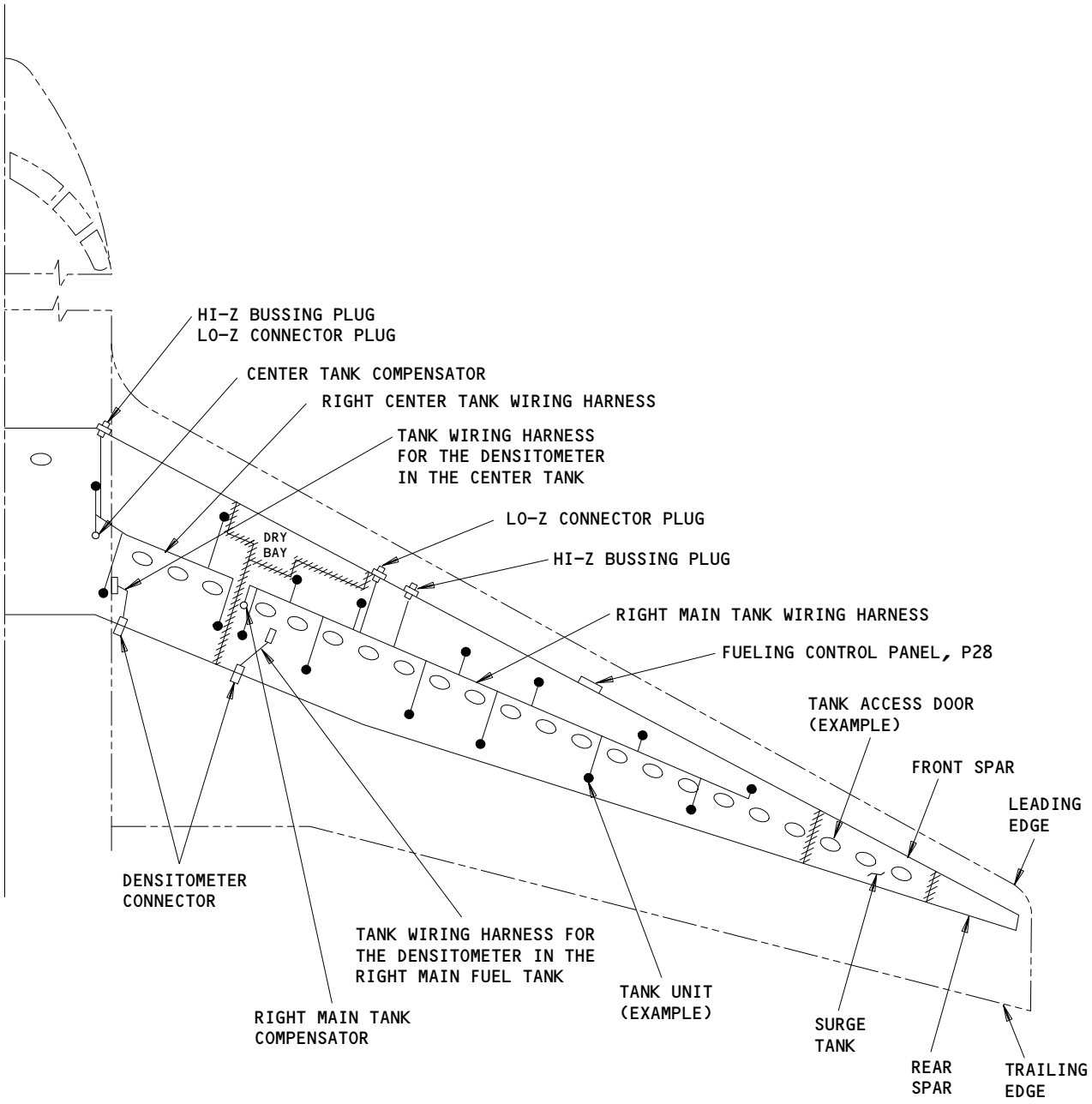
(4) The airplane wiring harnesses are found external to the fuel tank. The airplane wiring harnesses begin at the processor connector and end at the HI-Z, LO-Z, or densitometer plug. The HI-Z and LO-Z plugs are found on the dry side of the front spar of the fuel tank. The densitometer plugs are found on the dry side of the rear spar.

(5) The tank wiring harnesses are installed in the applicable fuel tank. The tank wiring harness begins at the HI-Z and LO-Z receptacles or at the densitometer receptacle and ends at the wiring terminals on the tank units and compensator or the densitometer.



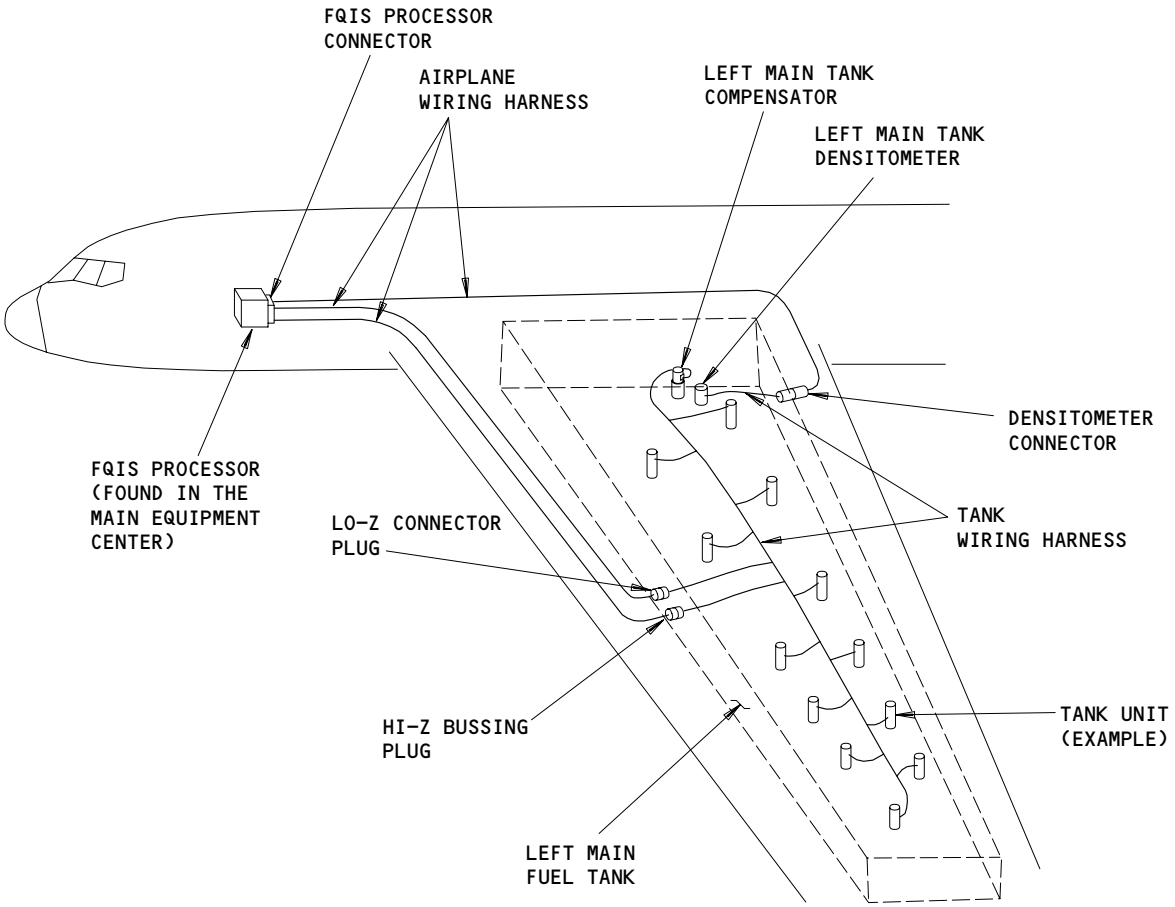
TANK WIRING HARNESS LOCATION - LEFT WING

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 1)



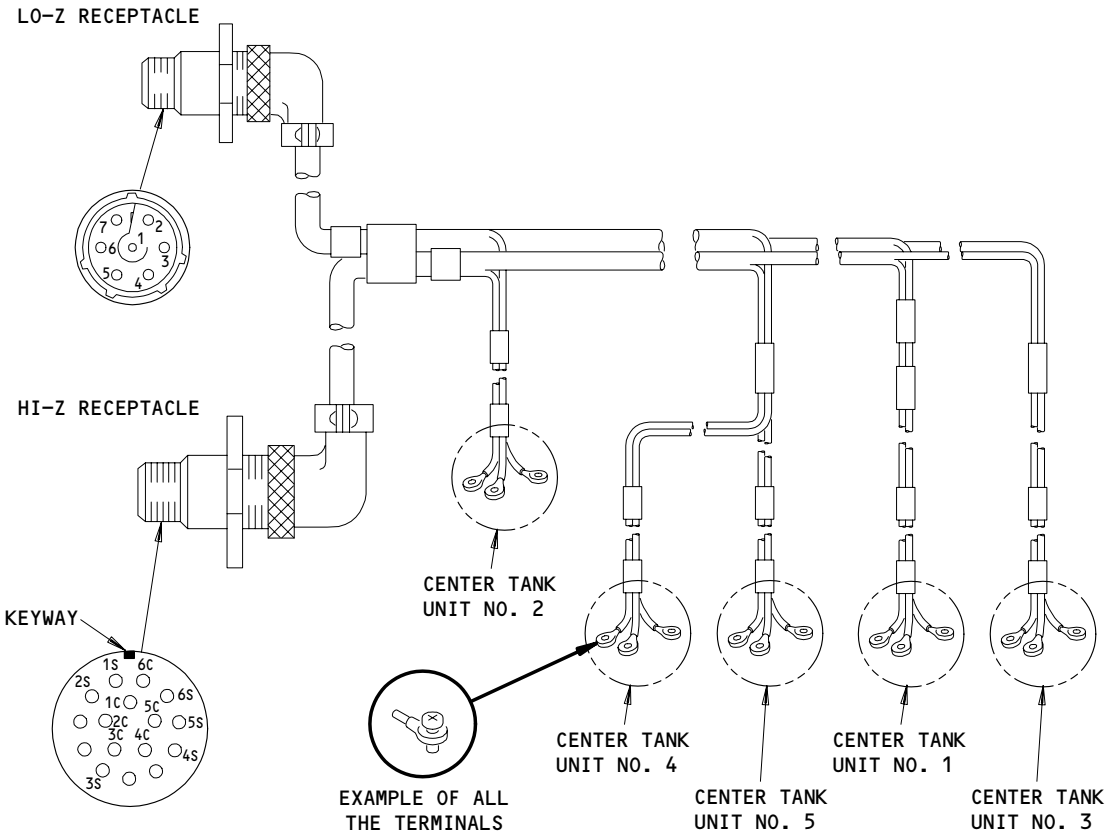
TANK WIRING HARNESS LOCATION - RIGHT WING

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 2)



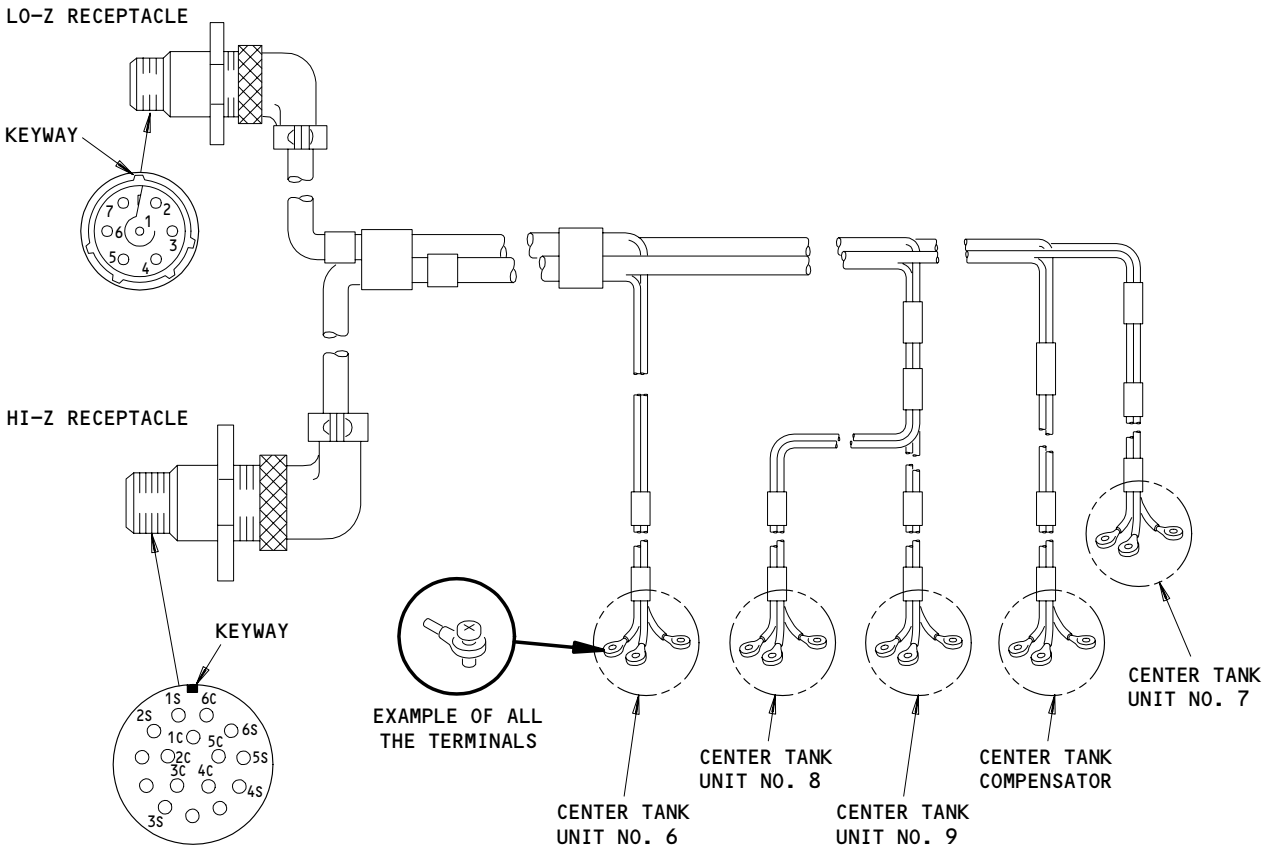
AIRPLANE WIRING HARNESS AND TANK WIRING HARNESS FOR THE LEFT MAIN FUEL TANK

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 3)



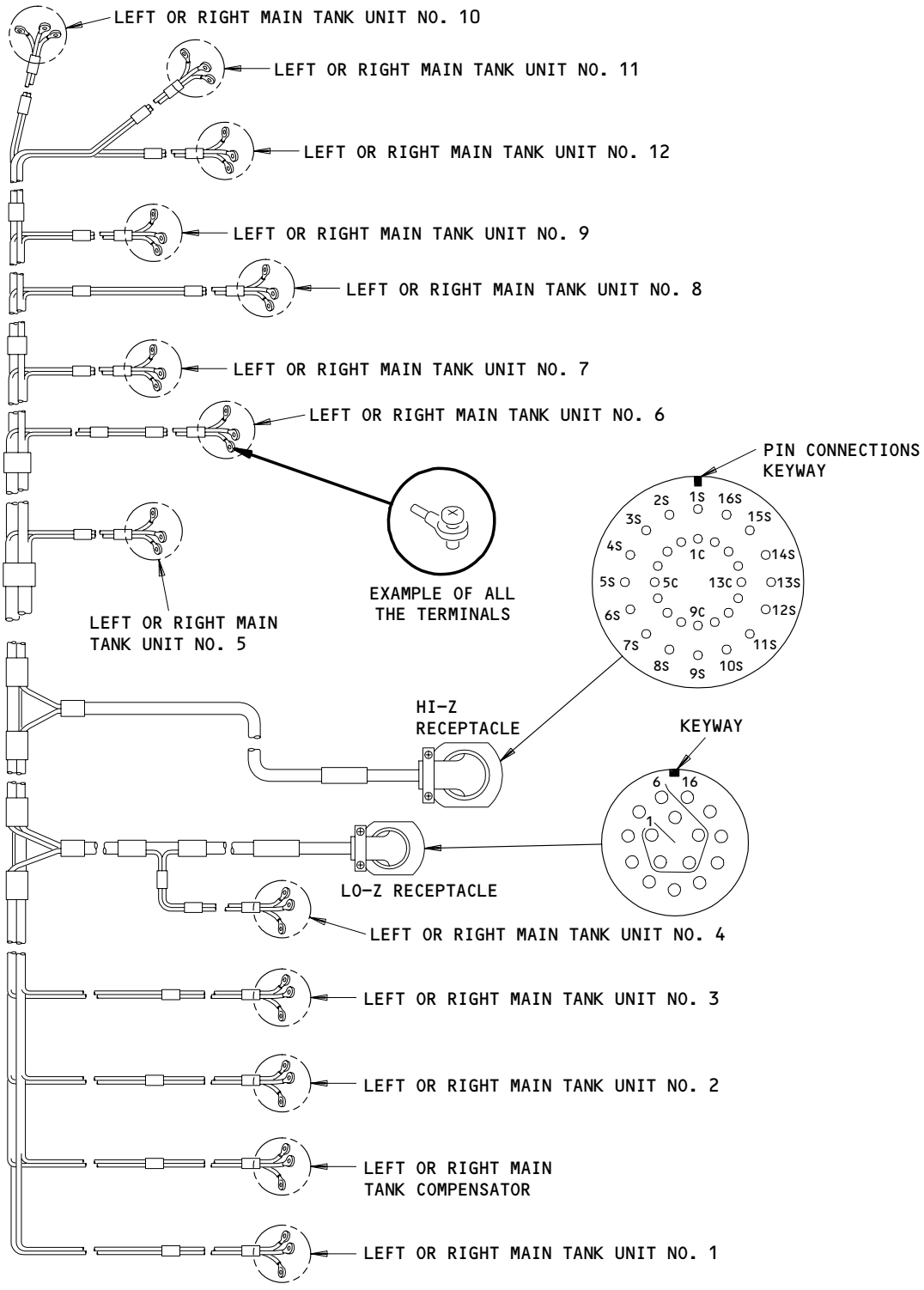
TANK WIRING HARNESS FOR THE TANK UNITS AND
COMPENSATOR IN THE LEFT CENTER FUEL TANK

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 4)



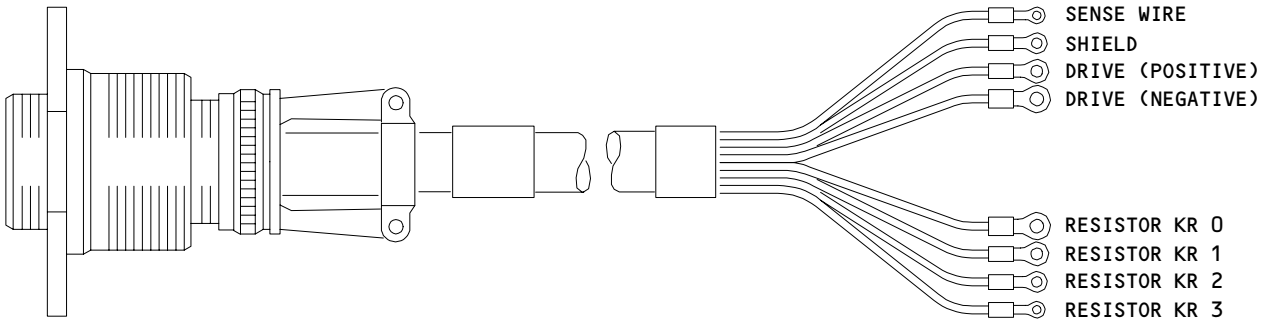
TANK WIRING HARNESS FOR THE TANK UNITS AND
COMPENSATOR IN THE RIGHT CENTER FUEL TANK

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 5)



LEFT OR RIGHT MAIN TANK WIRING HARNESS

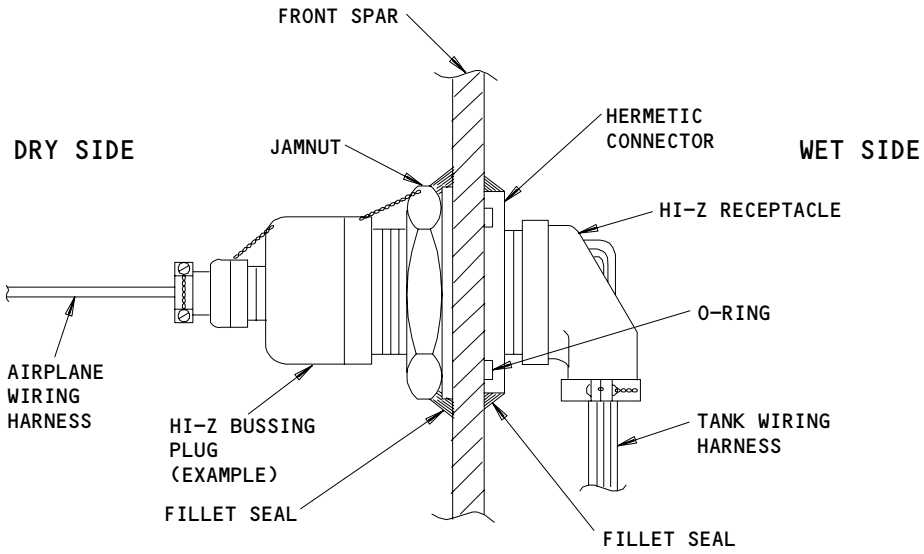
Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 6)



TANK WIRING HARNESS FOR THE DENSITOMETER
IN THE LEFT OR RIGHT MAIN OR CENTER FUEL TANK

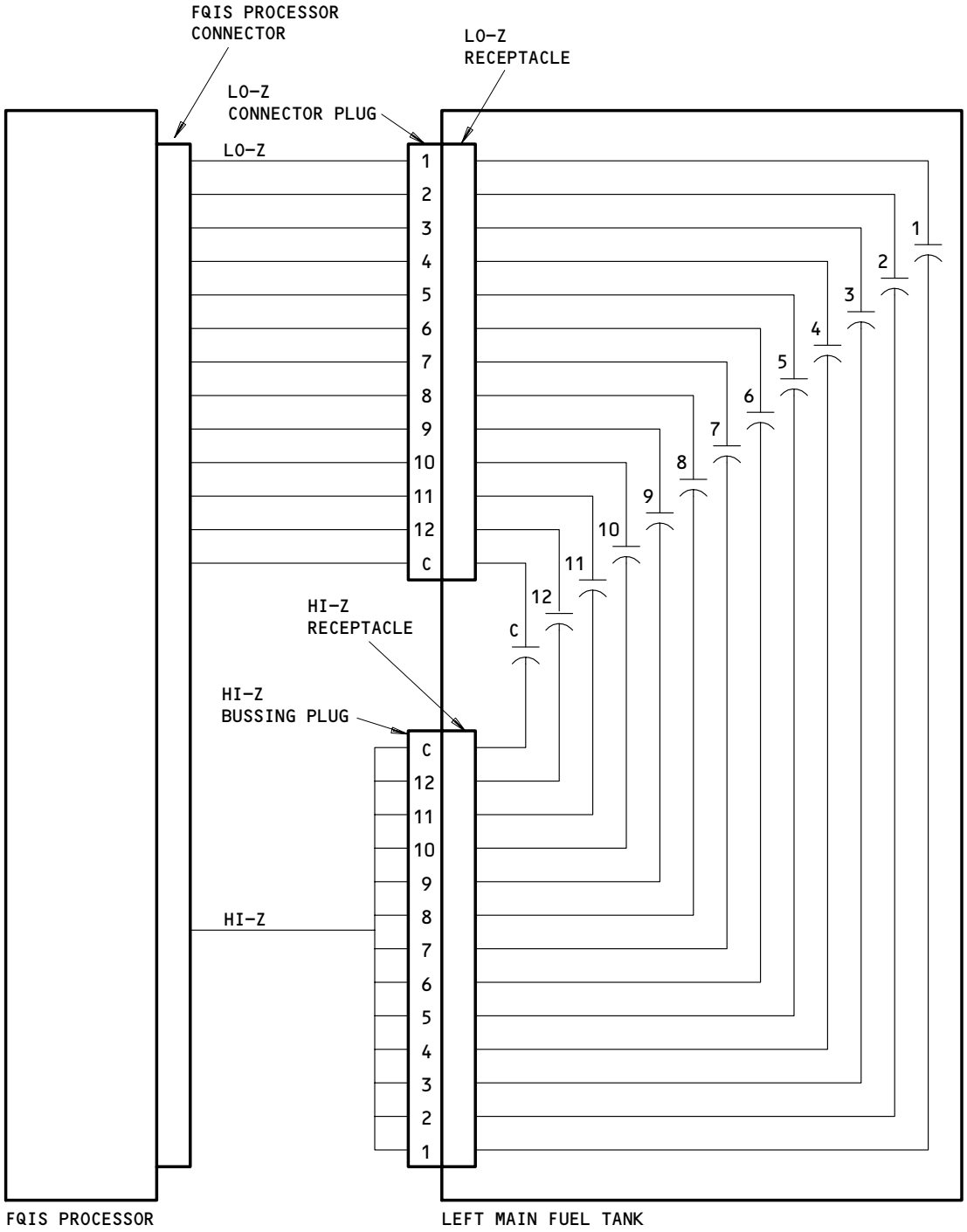
Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 7)

(6) The HI-Z Bussing plug and the LO-Z plug connect with the HI-Z receptacle and the LO-Z receptacle of the tank wiring harness respectively.
(7) The densitometer plug connects with the densitometer receptacle of the densitometer tank wiring harness.
(8) The processor (FQPU) sends an excitation signal to the tank units and compensators through the LO-Z wiring.
(9) The HI-Z wiring carries the return signal from the tank units and compensators to the processor.
(10) The LO-Z wiring is individually routed from the processor to the tank units and compensators.
(11) The HI-Z wiring is connected in series between the tank units and compensator at the HI-Z Bussing plug. Only one HI-Z wire goes to the processor.
(12) The tank wiring harness does not require FQIS field calibration.
(13) All repairs of the tank wiring harness must be done per Boeing SWPM20-14-12.
(14) Any corrosion or damage to the airplane wiring harness or the tank wiring harness can result in an unknown accuracy fault for the applicable fuel tank. This can cause the fuel quantity indicator displays for the applicable tank and total to go off.



HI-Z BUSSING PLUG OR LO-Z CONNECTOR PLUG

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 8)



LO-Z AND HI-Z WIRING FOR THE LEFT MAIN FUEL TANK
(SIMPLIFIED SCHEMATIC)

Fuel Quantity Indicating System Wiring
Figure 9 (Sheet 9)

(15) The tank wiring harnesses must be carefully installed and secured. An improperly installed, loose, or damaged tank wiring harness can introduce stray capacitance which would affect system accuracy.

(16) Improper installation of a tank wiring harness can result in fault messages. For instance, a poorly secured connection of the tank wiring harness to the LO-Z, HI-Z shield, and HI-Z terminals of a tank unit or compensator can result in fault messages.

3. Operation (Fig. 10)

A. Functional Description

(1) Fuel Quantity Processor Unit Operation

(a) The processor operates whenever the system has power. No flight crew operator actions are necessary for the processor to calculate and show fuel quantity.

(b) Power requirements for the processor, 28 volt dc, normally comes from the battery bus, and the right main bus. Alternate power sources for the processor come from the ground handling bus and the hot battery bus.

(c) The battery bus normally supplies power to power supply 1 in the processor, and the right main bus supplies power to power supply 2.

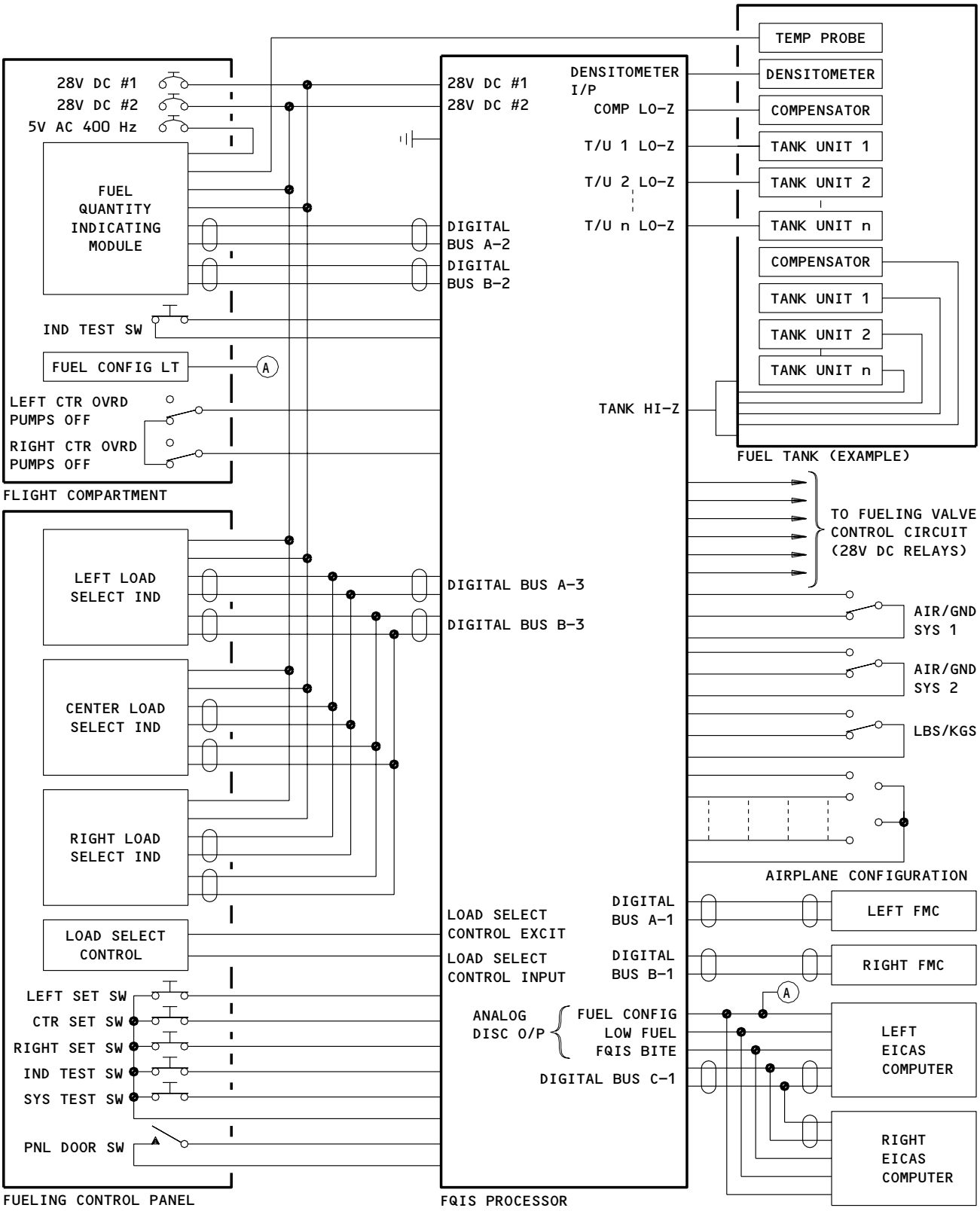
(d) The processor will operate even with only one power source available.

(2) Tank Unit Signals and Programming

(a) Strategically located tank units measure the fuel quantity in each fuel tank. Each fuel tank also contains a compensator, which gets input on the dielectric of the fuel. Both the tank units and the compensator are used to calculate the fuel quantity.

(b) With power applied to the processor, an excitation signal is sent to the tank units to measure their capacitance value. This is accomplished by comparing the tank unit against a rebalance capacitor of known value, which increments or de-increments until a balance is reached. This operation is carried out for each tank unit, and a computation of tank volume is made by the microcomputer as follows:

1) The computer program divides each tank unit into equal sections, and assigns a value proportional to tank shape. Wetted sections of the tank units are summed, and the value of unusable fuel kept in the computer memory is subtracted from the total. Fuel quantity indicators show the quantity of usable fuel.



Fuel Quantity Indicating System (FQIS) Schematic
Figure 10

2) The values assigned tank unit sections change with airplane attitude. The computer program contains four different characterizations for the ground conditions and four for the air condition.

(3) EICAS Messages

(a) The processor sends signals of low fuel, fuel configuration, and system faults to the EICAS computer.

1) The EICAS computer will supply and show a LOW FUEL caution message and the FUEL CONFIG light will come on during this condition:

a) When the quantity of fuel in either one of the two main fuel tanks is less than 2200 lbs (1000 kgs). The message goes off when the quantity becomes more than 3000 pounds (1400 kgs).

2) The EICAS computer will supply and show a FUEL CONFIG advisory message and the FUEL CONFIG light on the P5 panel will come on during one of these conditions:

a) A fuel imbalance of more than 1800 pounds (800 kgs) between the left and right main fuel tanks. The message goes off when the fuel imbalance becomes less than 1660 pounds (750 kgs).

b) Both center tank override switches in the off position with over 1200 pounds (500 kgs) of fuel remaining in the center fuel tank. The message and light are reset when the fuel remaining in the center fuel tank drops below 1000 pounds (400 kgs) or the center tank override switches are turned on.

(b) The processor sends a maintenance required signal to EICAS when the processor finds a fault.

1) These messages are shown:

a) FUEL QTY BITE (maintenance message) - Shown when one or more faults are recorded in the processor present faults. To show this message you must push the ECS MSG switch on the EICAS MAINT module (P61 panel).

b) FUEL QTY CHANNEL (status message) - Automatically shown when the ARINC bus A or B becomes inactive. Only one of the two ARINC busses is necessary for FQIS operation. If the ARINC bus A becomes inactive, the last received value is shown until the processor switches to the ARINC bus B. This message will show when the processor has a fault in either channel with valid digital data. This message is inhibited by the FUEL QTY BITE status message.

c) FUEL QTY IND (status message) - Automatically displayed when there is unknown accuracy in one or two fuel tank quantity indicators with valid digital data. This message is inhibited by the FUEL QTY BITE status message.

d) FUEL QTY BITE (status message) - Shown in addition to the FUEL QTY BITE maintenance message if the EICAS does not receive valid ARINC data from the FQIS.

(4) Indicator Signals
  (a) The processor calculates the weight of fuel in each fuel tank. The processor also calculates the total fuel quantity, by adding the quantity of fuel in each fuel tank.
  (b) The quantity of fuel is shown digitally on the fuel quantity indicator found on the overhead panel, P5. The fuel quantity indicator has individual displays for each fuel tank and for the total fuel quantity. The fuel quantity indicator also shows the fuel temperature (Ref 28-43-00).
  (c) If the processor determines that there is unknown accuracy in a fuel quantity indicator, the individual indicator in the flight compartment and on the fueling control panel, P28, will go off. The total fuel quantity indicator on the P5 panel and on the flight management computer will also go off.
  (d) With the fueling station door open, the top half of the individual load select indicators show the quantity of fuel in their applicable fuel tanks.

(5) FQIS Fueling Control
  (a) With power supplied to the FQIS and the load select control set to the quantity of fuel that is necessary, an analog signal proportional to that quantity, is sent to the processor. The processor digitizes the signal and stores it in memory. The processor also sends a digital signal of the same value to the load select indicator, to be shown on the bottom display. As the airplane is fueled, the fuel quantity is shown on the top display. When the selected quantity of fuel shown on the bottom display is reached, the fueling shutoff valves close for the applicable tank.

(6) FQIS Fault Recovery
  (a) To read the faults kept in the processor you use the 32-character LED display and six buttons on the front face of the processor. The data shown in the processor shows present and past faults. For past faults (shown in Fault History) an intermittent fault is shown with the number of times the fault occured on a specific flight leg (maximum of 99) and if the fault occurred on the ground or in the air. When you read the present faults the Air or Ground indication is shown for the fault (intermittent fault data is not shown), indicating the fault occurred in the air or on the ground. When you read the fault messages from the Fault History menu, only the flight leg numbers for which faults were recorded will show. When you erase the fault history, only the flight legs 11 thru 64 are erased.

    NOTE: In the Fault History menu, flight leg 0 is the flight leg you are currently on. Each flight leg starts at airplane takeoff.

(7) FQIS Fault Detection

(a) The processor does almost all fault detection on the FQIS automatically. The processor continuously does a test on the system and its components, while the FQIS functions. If a fault is found, an EICAS maintenance message, FUEL QTY BITE, is shown and the fault is kept in the computer memory for recall by the maintenance crew.

(b) Faults are recorded by flight leg from the current flight leg (0) to 99. The transition from one flight leg to another is at the GND-AIR transition on airplane takeoff. Each time the flight leg changes from ground to air, all flight leg numbers are increased by one.

(c) To recall faults from memory, operate the built-in-test controls on the front panel of the processor.

(d) There are six primary BIT menu options on the processor. The six buttons on processor are used to get access to the six menus.

1) PRESENT FAULTS menu - shows all present system faults.
2) FAULT HISTORY menu - shows past faults by flight leg (for a minimum of 64 flight legs).
3) SYSTEM DATA menu - shows uplift, main and center fuel tank data (fuel mass, density, volume, capacitance).
4) SELF TEST menu - does a test of the FQIS system.
5) SYSTEM CONFIG menu - shows the status of all six circuit cards in the processor.
6) ERASE FAULT HISTORY menu - removes fault history.

FUEL QUANTITY INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER –			119BL, MAIN EQUIP CTR, P34	
FUEL QTY, C1040		1	34A10	*
CIRCUIT BREAKER –			FLT COMPT, P11	
FUEL QTY – L, C1048		1	11C34	*
FUEL QTY – R, C1053		1	11L19	*
CIRCUIT BREAKER –			FLT COMPT, P6	
FUELING QTY, C1045		1	6E4	*
COMPENSATOR – CENTER TANK, TS5010	8	1	631AB, CENTER FUEL TANK	28-41-02
COMPENSATOR – L MAIN TANK, TS108	8	1	541AB, L MAIN FUEL TANK	28-41-02
COMPENSATOR – R MAIN TANK, TS119	8	1	641AB, R MAIN FUEL TANK	28-41-02
COMPUTER – (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
DENSITOMETER – CENTER TANK, M10903	12	1	631AB, CENTER FUEL TANK	28-41-03
DENSITOMETER – L MAIN TANK, M10901	12	1	541AB, L MAIN FUEL TANK	28-41-03
DENSITOMETER – R MAIN TANK, M10902	12	1	641AB, R MAIN FUEL TANK	28-41-03
HARNESS – CENTER DENSITOMETER TANK WIRING, M10917	13	1	CENTER MAIN FUEL TANK	28-41-09
HARNESS – L CENTER TANK WIRING, M10910 AND M10911	9	1	CENTER FUEL TANK	28-41-09
HARNESS – L MAIN TANK WIRING, M10908 AND M10909	11	1	L MAIN FUEL TANK	28-41-09
HARNESS – LEFT MAIN DENSITOMETER TANK WIRING, M10916	13	1	L MAIN FUEL TANK	28-41-09
HARNESS – R CENTER TANK WIRING, M10912 AND M10913	10	1	CENTER FUEL TANK	28-41-09
HARNESS – R MAIN TANK WIRING, M10914 AND M10915	11	1	R MAIN FUEL TANK	28-41-09
HARNESS – RIGHT MAIN DENSITOMETER TANK WIRING, M10918	13	1	R MAIN FUEL TANK	28-41-09
HOT SHORT PROTECTOR, M11872 1>	15	1	651, R REAR SPAR	28-41-24
INDICATOR – CENTER TANK LOAD SELECT (LSI), N10039	5	1	FUELING CONTROL PANEL, P28	28-41-06
INDICATOR – L MAIN TANK LOAD SELECT (LSI), N10040	5	1	FUELING CONTROL PANEL, P28	28-41-06
INDICATOR – R MAIN TANK LOAD SELECT (LSI), N10038	5	1	FUELING CONTROL PANEL, P28	28-41-06
MODULE – FUEL QUANTITY INDICATING (FQIM), M10054	3	1	FLT COMPT, P5	28-41-04
RELAY – (FIM 31-01-33/101)				
FUEL QTY PWR XFR, K356				
FUELING PANEL DOOR, K179				
FUELING POWER TRANSFER, K357				
RELAY – (FIM 31-01-36/101)				
SYS 1 AIR/GND, K10691				
RELAY – (FIM 31-01-37/101)				
SYS 2 AIR/GND, K10203				

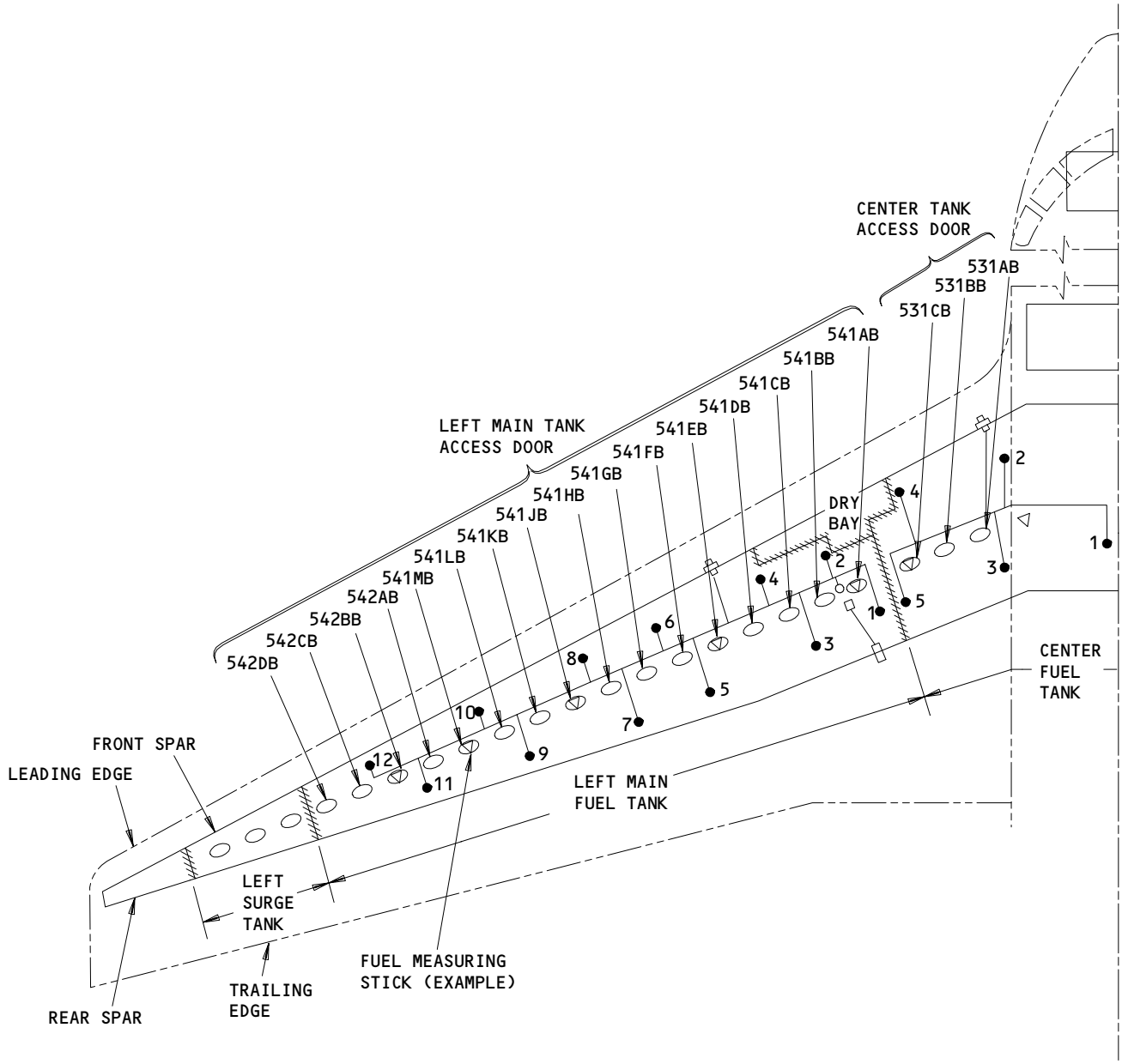
* SEE THE WDM EQUIPMENT LIST

1> AIRPLANES POST-SB 28A0085

Fuel Quantity Indicating System – Component Index
Figure 101 (Sheet 1)

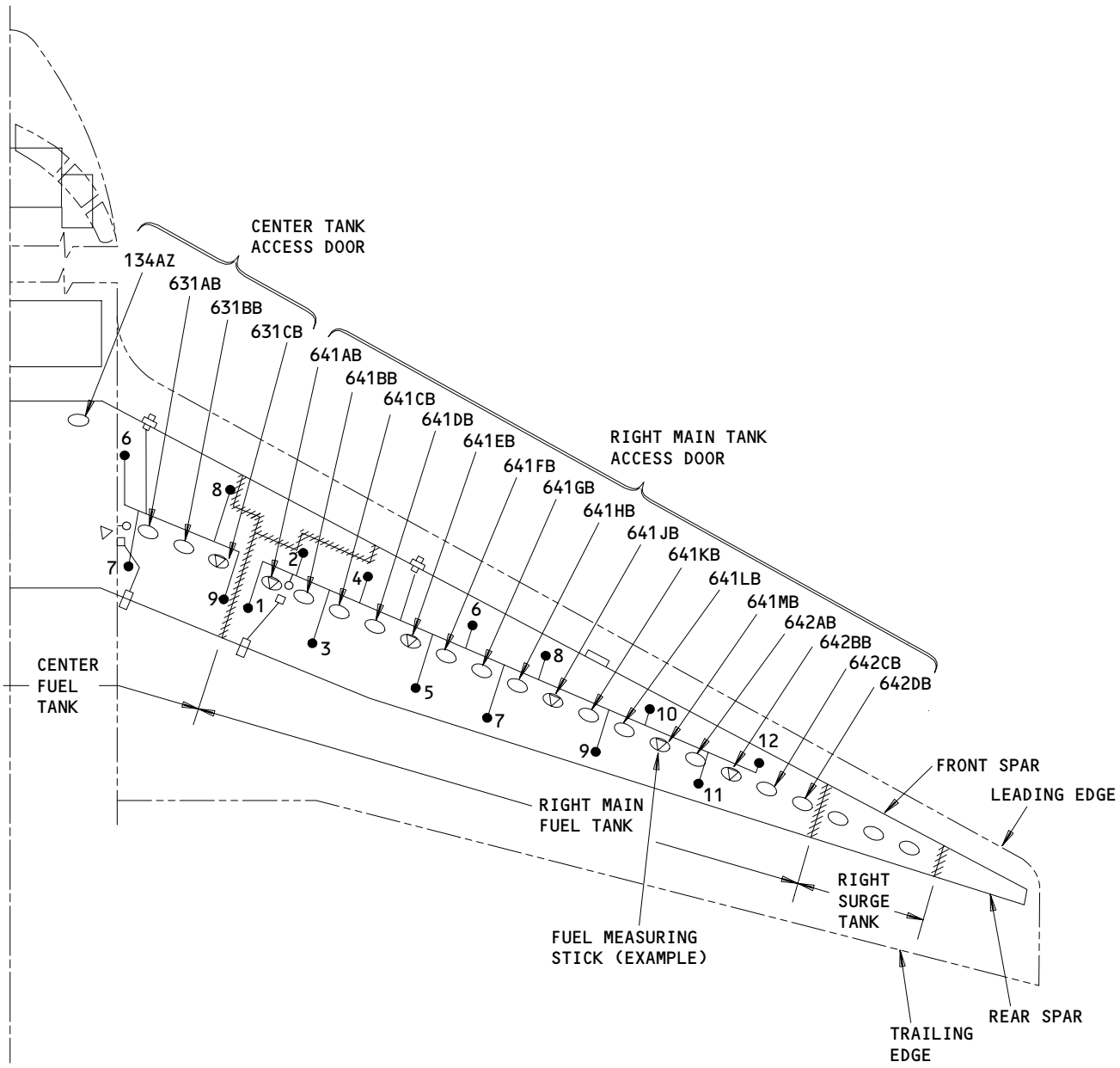
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH – FUEL QUANTITY TEST, S6	3	1	FLT COMPT, P61	*
SWITCH – TEST INDICATOR, S457	5	1	FUELING CONTROL PANEL, P28	*
UNIT – FUEL QUANTITY PROCESSOR (FQPU), M121	4	1	119BL, MAIN EQUIP CTR, E3-4	28-41-08
UNIT – TANK	8	–	LEFT OR RIGHT WING	28-41-01
CENTER TANK NO. 1, TS5011		1	134AZ	
CENTER TANK NO. 2, TS5012		1	531AB	
CENTER TANK NO. 3, TS5013		1	531AB	
CENTER TANK NO. 4, TS5014		1	531BB	
CENTER TANK NO. 5, TS5015		1	531CB	
CENTER TANK NO. 6, TS5016		1	631AB	
CENTER TANK NO. 7, TS5017		1	631AB	
CENTER TANK NO. 8, TS5075		1	631BB	
CENTER TANK NO. 9, TS5076		1	631CB	
L MAIN TANK NO. 1, TS109		1	541AB	
L MAIN TANK NO. 2, TS110		1	541BB	
L MAIN TANK NO. 3, TS111		1	541CB	
L MAIN TANK NO. 4, TS112		1	541DB	
L MAIN TANK NO. 5, TS113		1	541FB	
L MAIN TANK NO. 6, TS114		1	541GB	
L MAIN TANK NO. 7, TS115		1	541HB	
L MAIN TANK NO. 8, TS116		1	541JB	
L MAIN TANK NO. 9, TS117		1	541LB	
L MAIN TANK NO. 10, TS118		1	541MB	
L MAIN TANK NO. 11, TS5196		1	542AB	
L MAIN TANK NO. 12, TS5197		1	542CB	
R MAIN TANK NO. 1, TS146		1	641AB	
R MAIN TANK NO. 2, TS147		1	641BB	
R MAIN TANK NO. 3, TS148		1	641CB	
R MAIN TANK NO. 4, TS149		1	641DB	
R MAIN TANK NO. 5, TS150		1	641FB	
R MAIN TANK NO. 6, TS151		1	641GB	
R MAIN TANK NO. 7, TS152		1	641HB	
R MAIN TANK NO. 8, TS153		1	641JB	
R MAIN TANK NO. 9, TS154		1	641LB	
R MAIN TANK NO. 10, TS155		1	641MB	
R MAIN TANK NO. 11, TS5198		1	642AB	
R MAIN TANK NO. 12, TS5199		1	642CB	

Fuel Quantity Indicating System – Component Index
Figure 101 (Sheet 2)



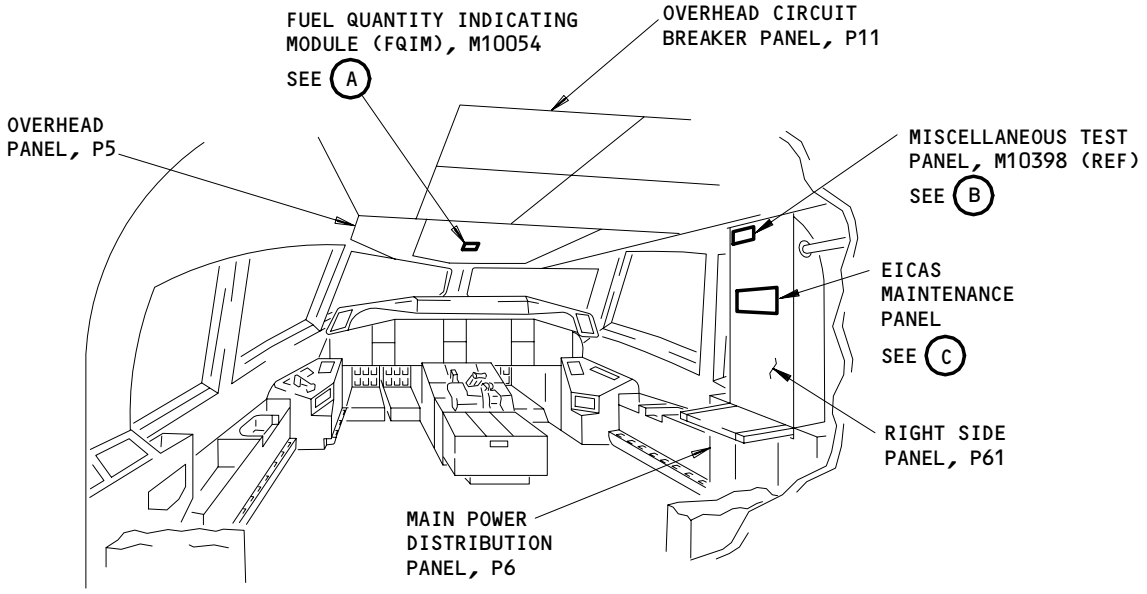
LEFT WING

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 1)

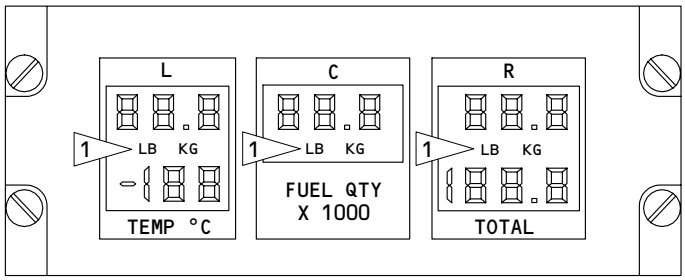


RIGHT WING

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 2)

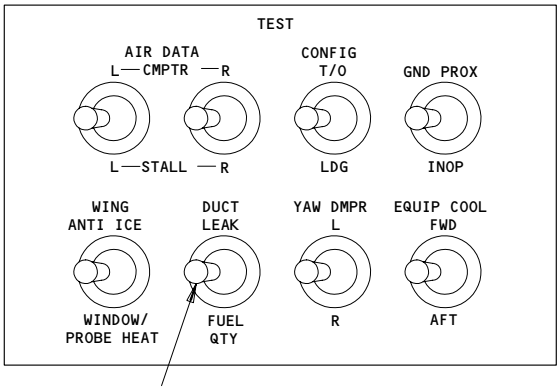


FLIGHT COMPARTMENT



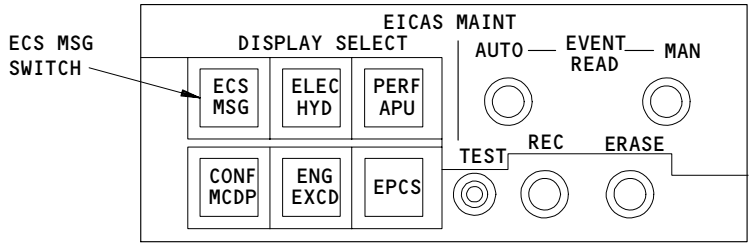
FUEL QUANTITY INDICATING MODULE (FQIM), M10054

A



MISCELLANEOUS TEST PANEL, M10398 (REF)
(EXAMPLE PANEL SHOWN)

B

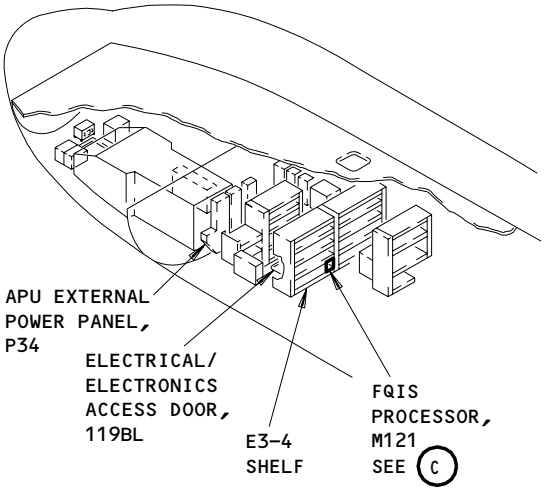


EICAS MAINTENANCE PANEL

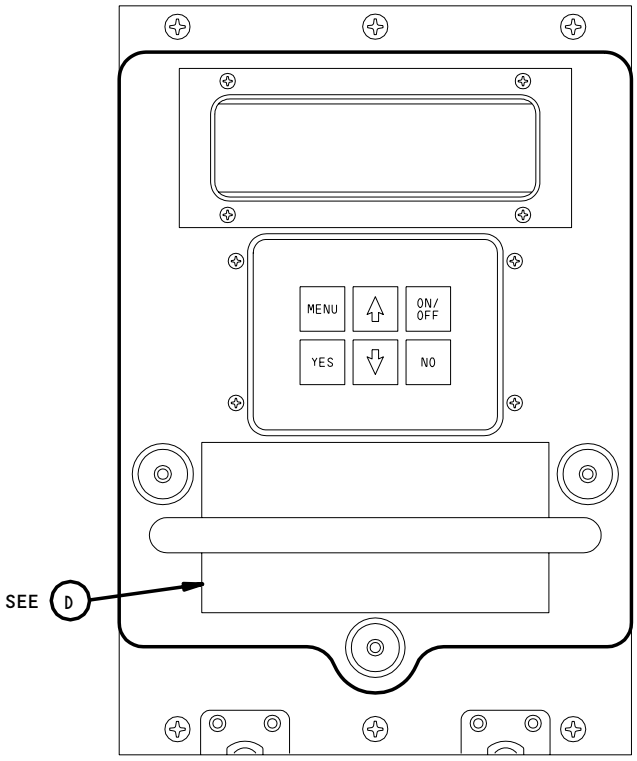
C

1 THE UNITS ARE IN KGS OR LBS.

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 3)



MAIN EQUIPMENT CENTER



FQIS PROCESSOR, M121

C

INSTRUCTIONS:

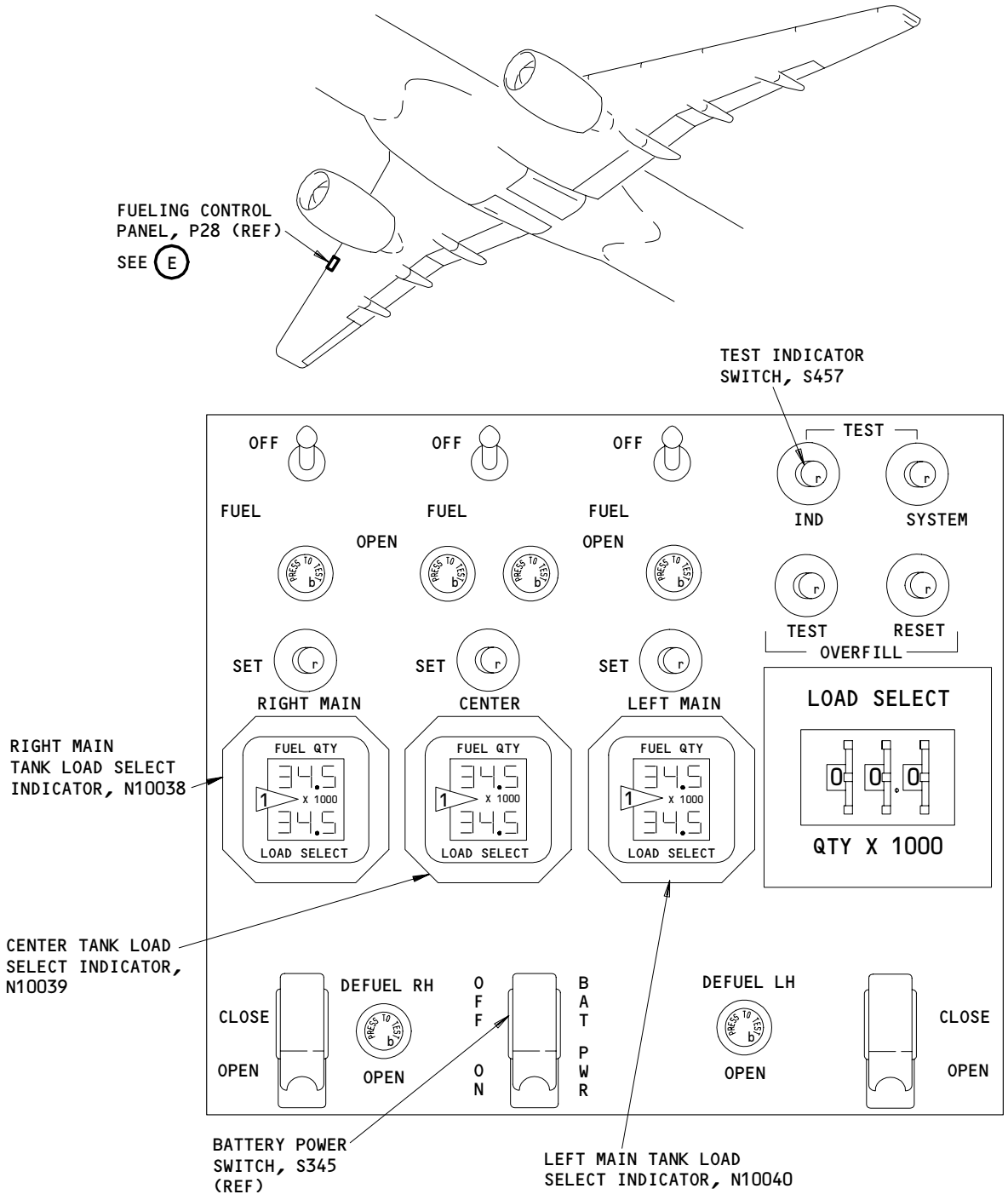
Press ON to start BITE display
Press YES or NO in response to questions (?)
Press ⇧ to display next result
Press ⇩ to display previous result
Press MENU to return to current menu
Press OFF to stop BITE display

PRIMARY BITE MENU OPTIONS:

FAULT HISTORY: Displays past faults by flight leg
SYSTEM DATA: Displays system/LRU Data
SELF TEST: Tests system/LRUs interfaces
SYSTEM CONFIG: Displays system configuration
ERASE FAULT HISTORY:

D

Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 4)

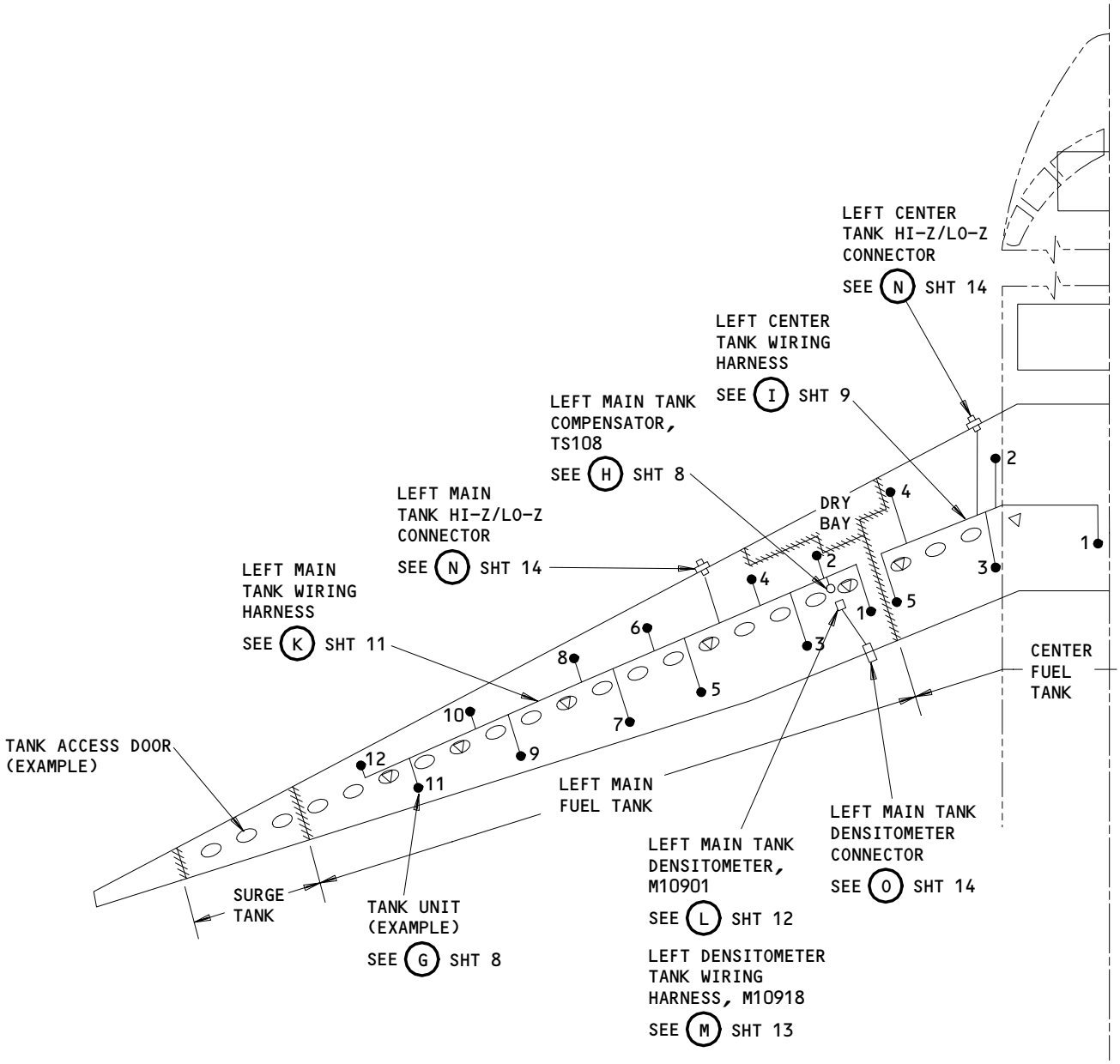


FUELING CONTROL PANEL, P28

(E)

1 THE UNITS ARE IN KGS OR LBS.

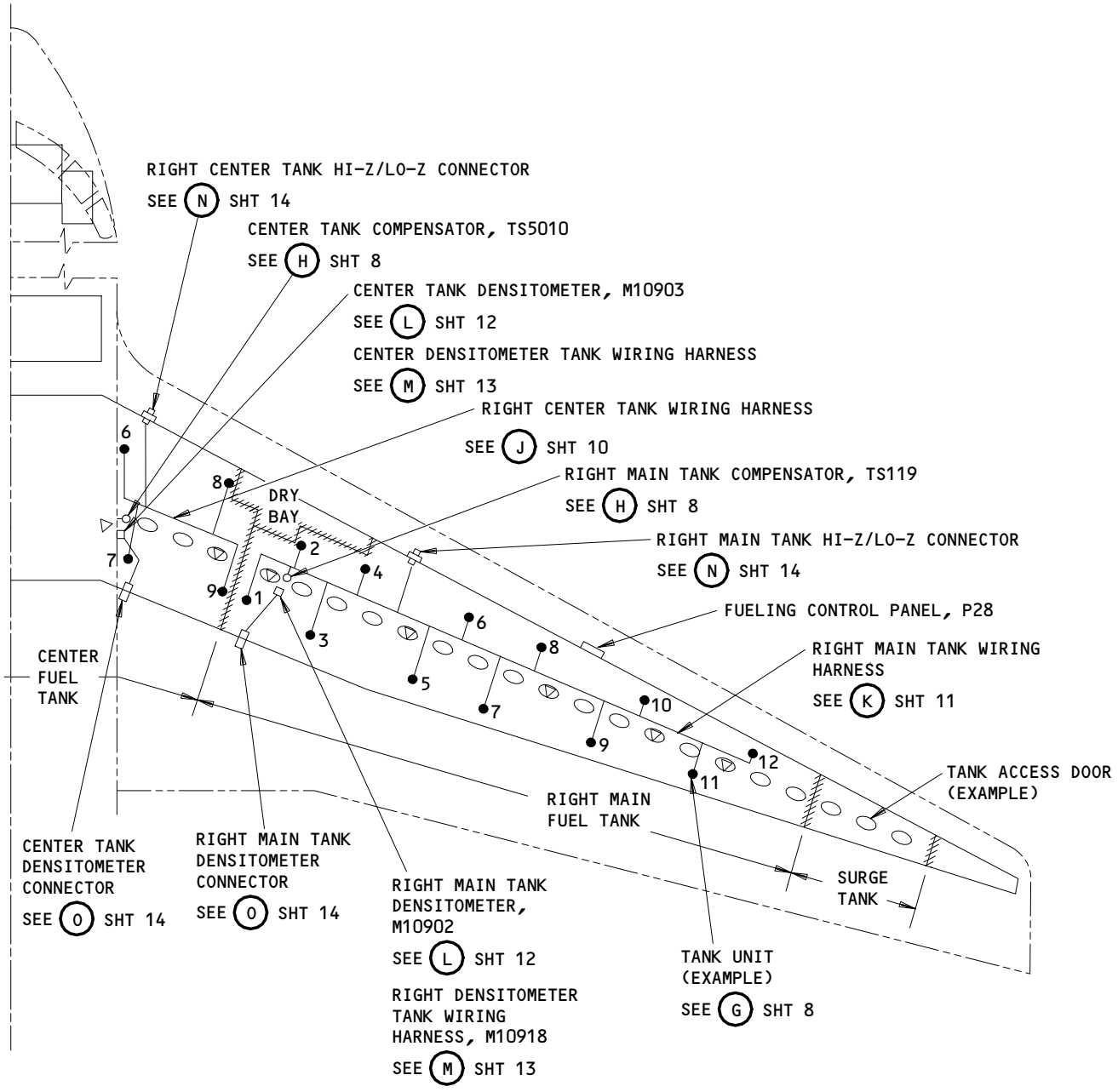
Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 5)



LEFT WING

Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 6)

892365



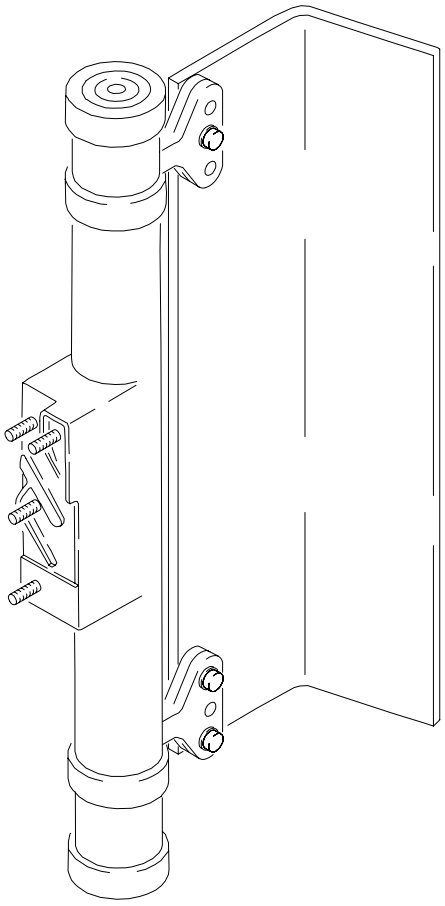
RIGHT WING

Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 7)

892366

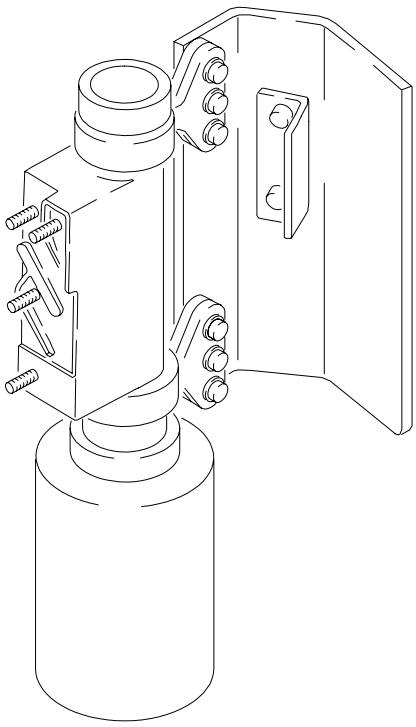
NOT USED

F



TANK UNIT
(EXAMPLE)

G

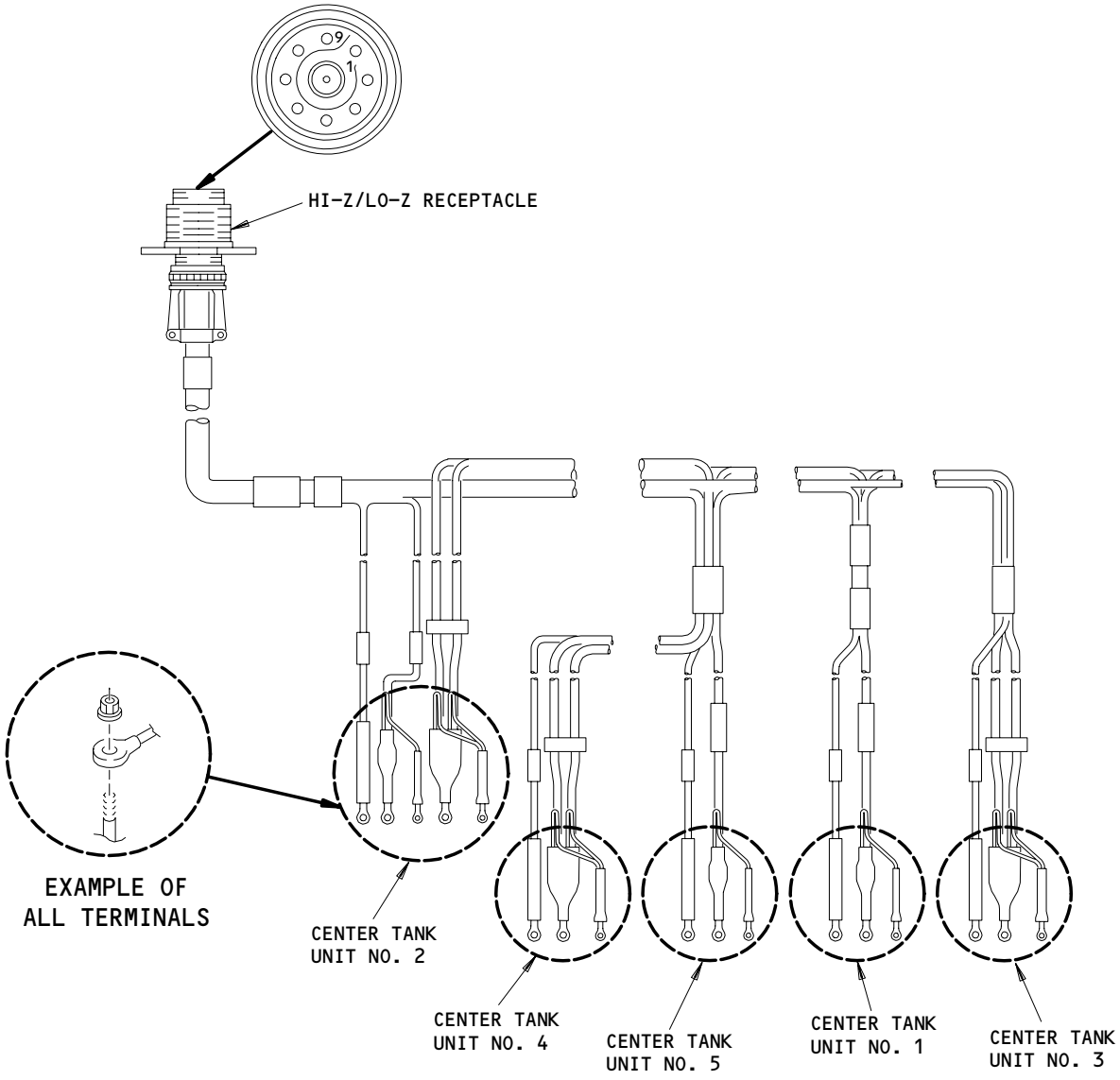


LEFT MAIN TANK COMPENSATOR, TS108
CENTER TANK COMPENSATOR, TS5010
RIGHT MAIN TANK COMPENSATOR, TS119

H

Fuel Quantity Indicating System – Component Location
(Details from Shts 6 and 7)
Figure 102 (Sheet 8)

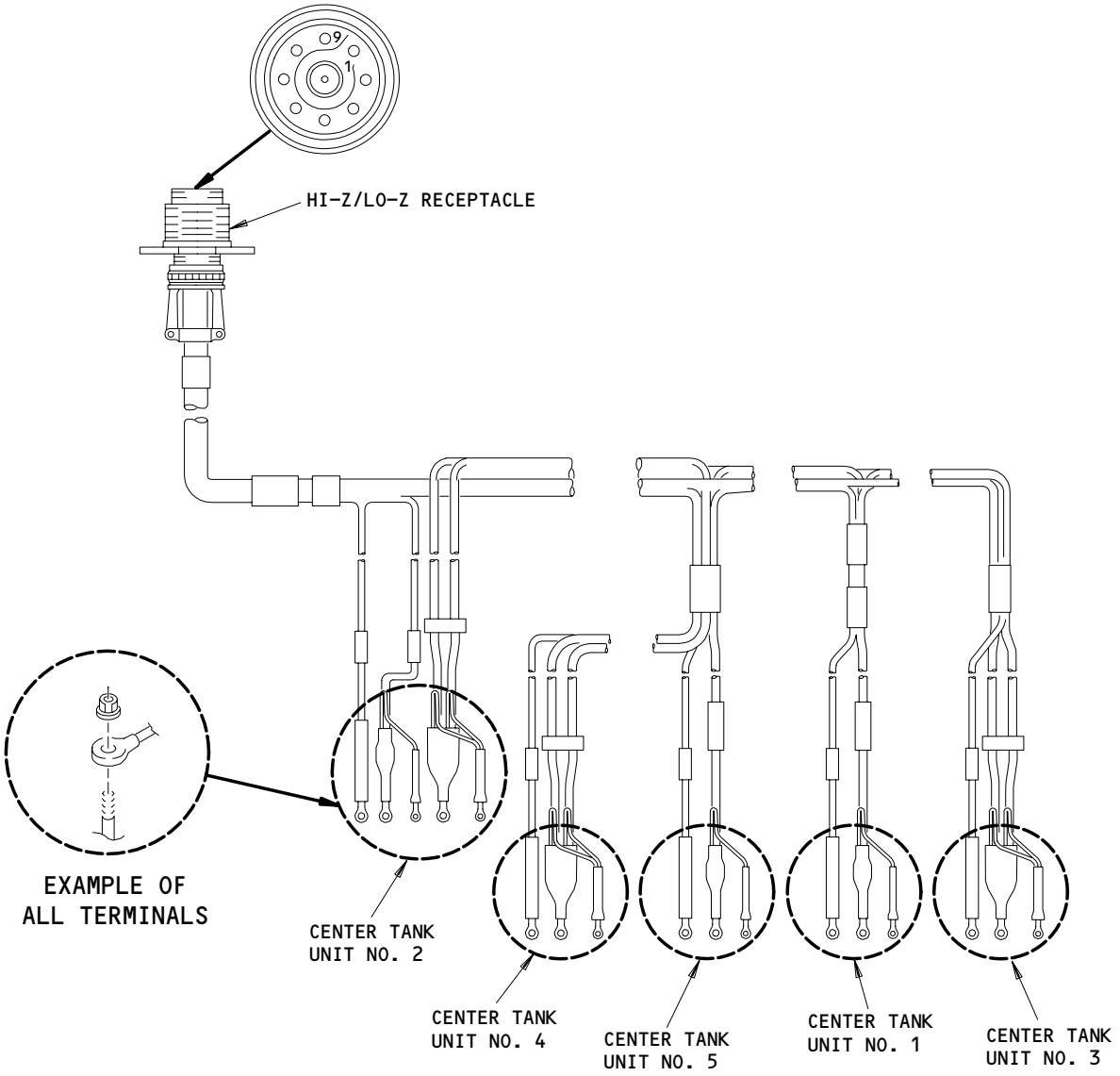
892367



LEFT CENTER TANK WIRING HARNESS

(I)

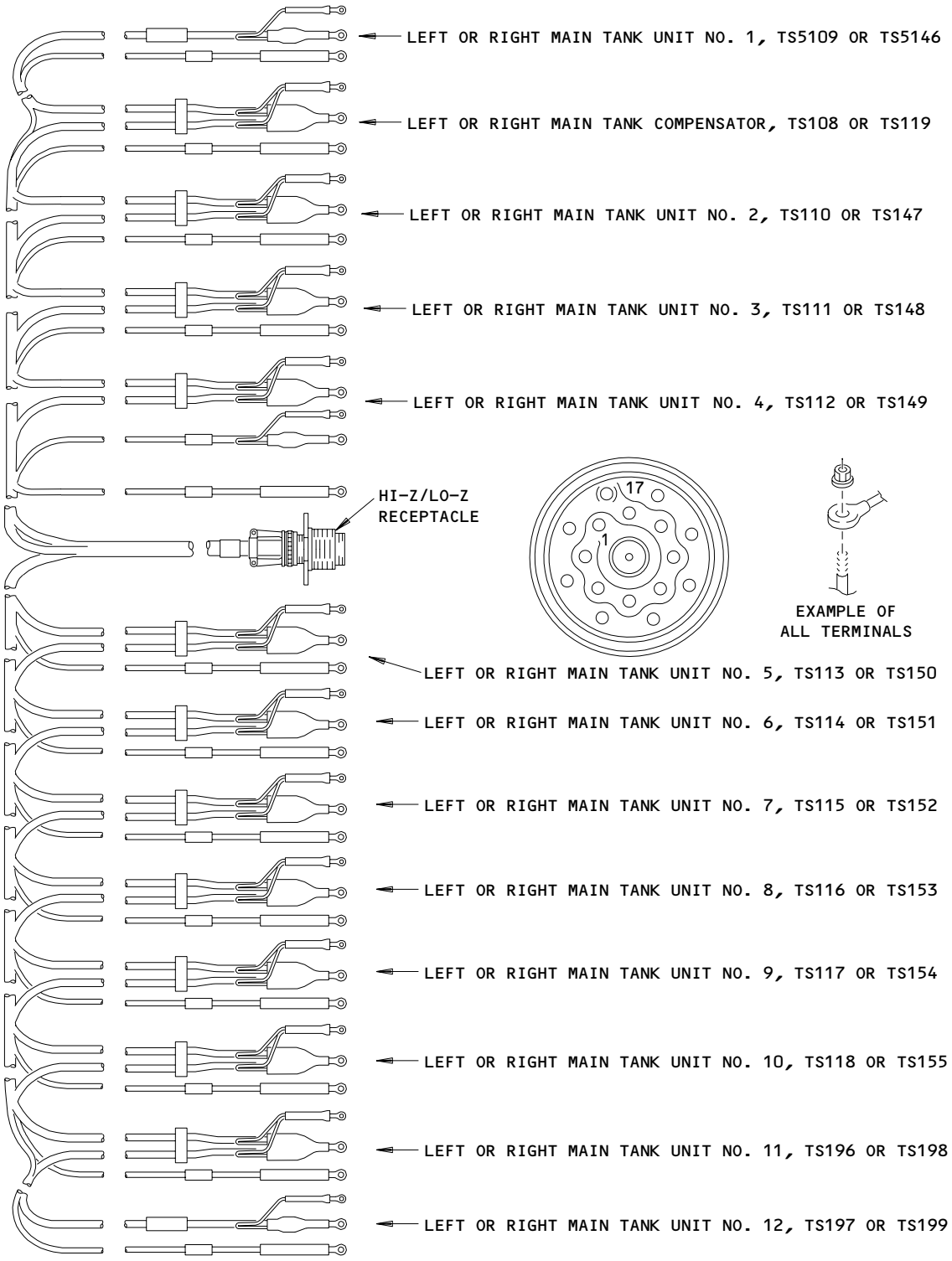
Fuel Quantity Indicating System - Component Location
(Detail from Sht 6)
Figure 102 (Sheet 9)



RIGHT CENTER TANK WIRING HARNESS

(J)

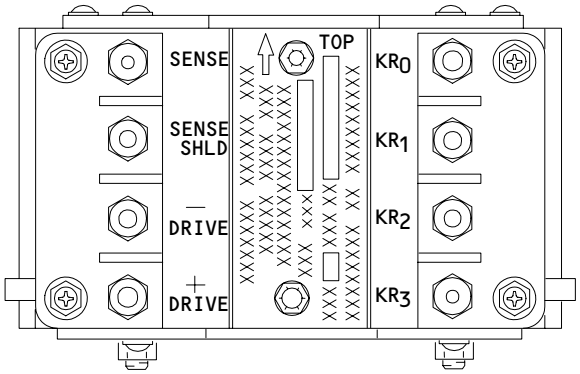
Fuel Quantity Indicating System – Component Location
(Detail from Sht 7)
Figure 102 (Sheet 10)



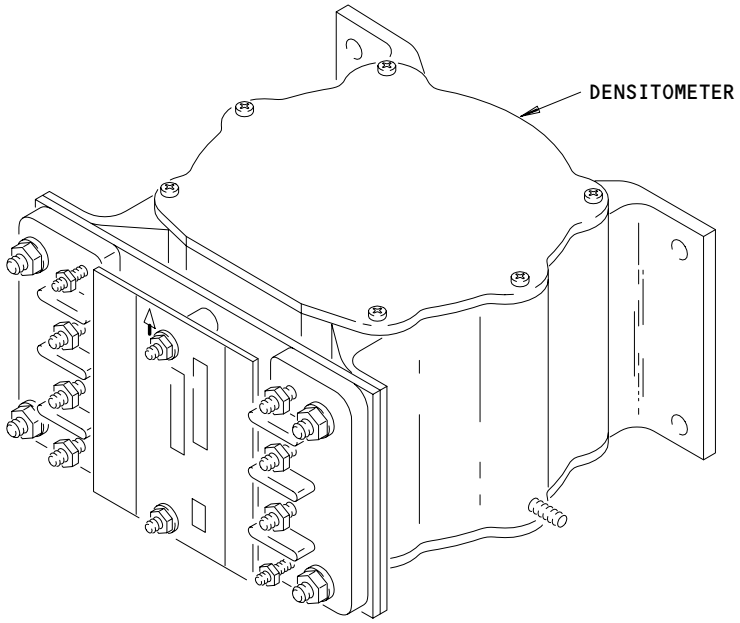
LEFT OR RIGHT MAIN TANK WIRING HARNESS

(K)

Fuel Quantity Indicating System - Component Location
(Detail from Sht 6 and 7)
Figure 102 (Sheet 11)



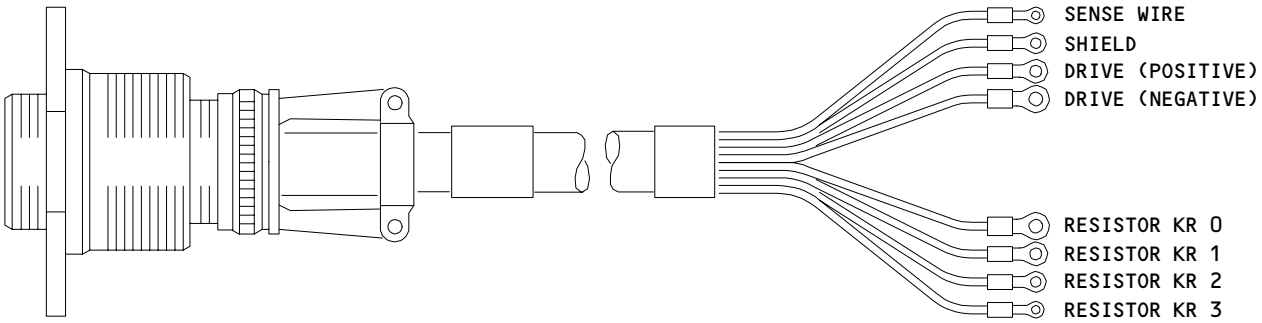
FRONT VIEW



LEFT MAIN, CENTER OR RIGHT MAIN DENSITOMETER, M10901,M10903 OR M10902

(L)

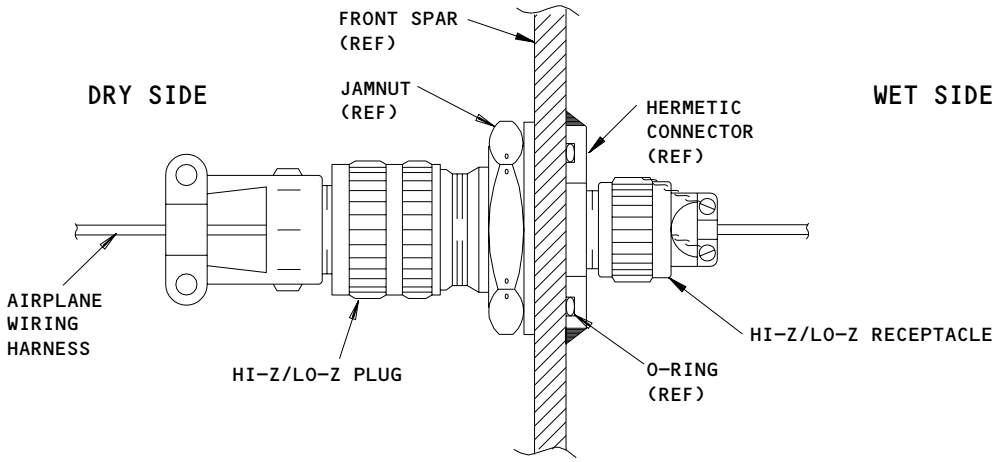
Fuel Quantity Indicating System – Component Location
(Detail from Sht 6 and 7)
Figure 102 (Sheet 12)



LEFT MAIN, RIGHT MAIN OR CENTER DENSITOMETER TANK WIRING HARNESS,
M10916,M10918, OR M10917

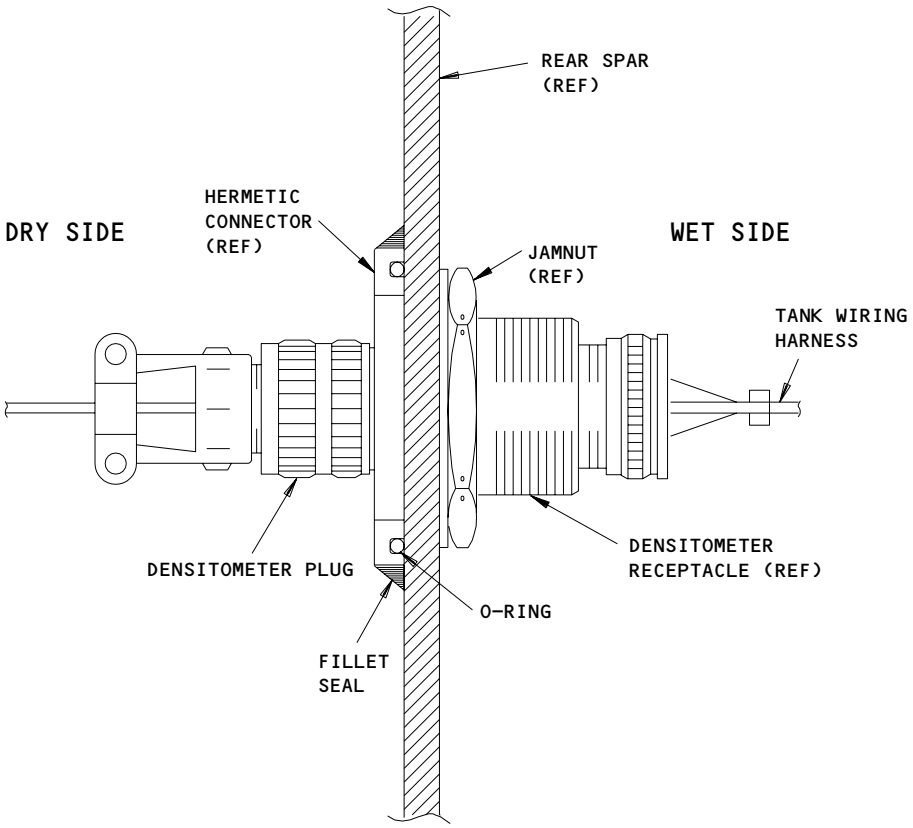
M

Fuel Quantity Indicating System - Component Location
(Detail from Sht 6 and 7)
Figure 102 (Sheet 13)



HI-Z/LO-Z CONNECTOR

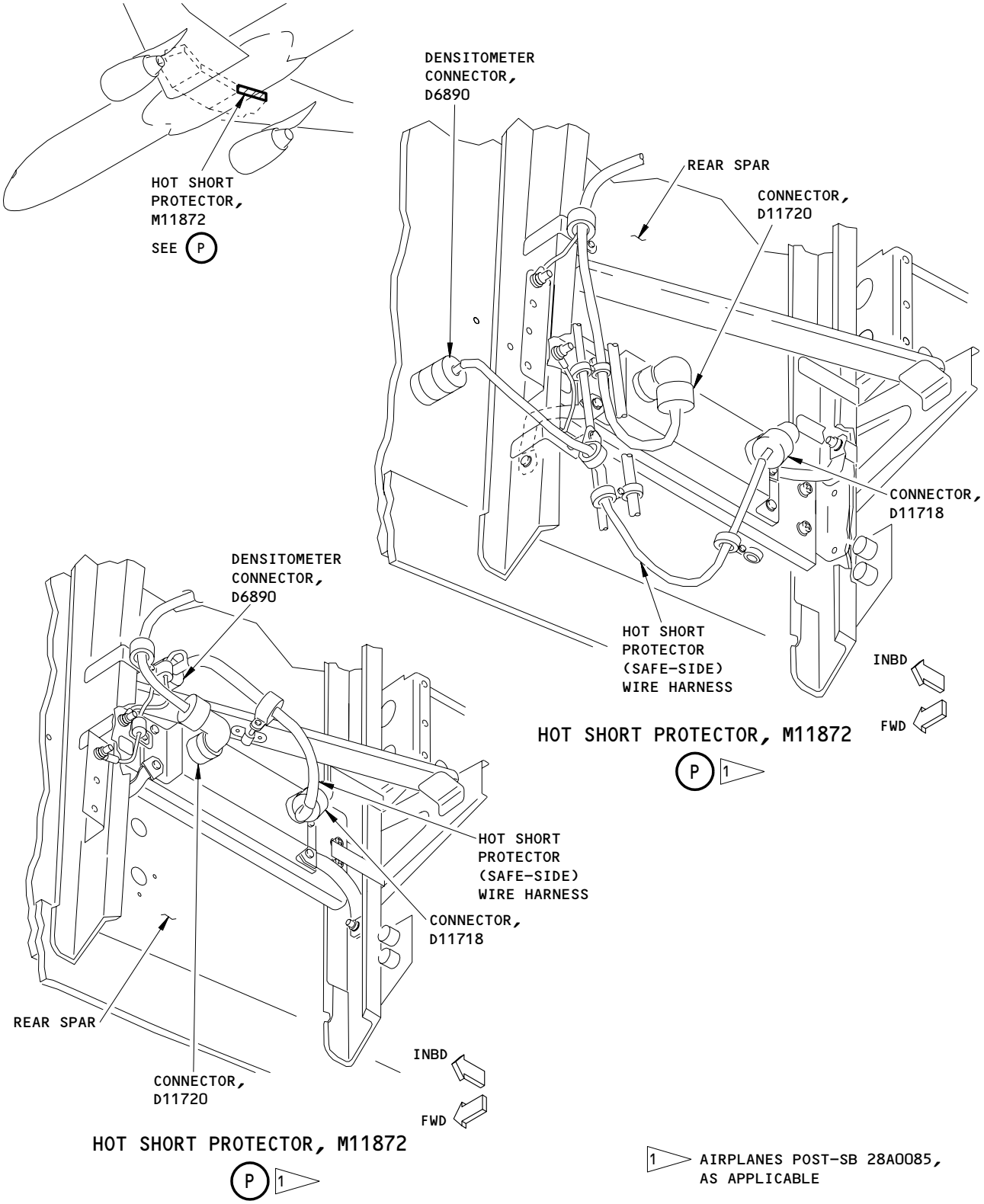
N



DENSITOMETER CONNECTOR

O

Fuel Quantity Indicating System - Component Location
(Details from Sht 6 and 7)
Figure 102 (Sheet 14)



Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 15)

U43999

FUEL QUANTITY INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER –			119BL, MAIN EQUIP CTR, P34	
FUEL QTY, C1040		1	34A10	*
CIRCUIT BREAKER –			FLT COMPT, P11	
FUEL QTY – L, C1048		1	11C34	*
FUEL QTY – R, C1053		1	11L19	*
CIRCUIT BREAKER –			FLT COMPT, P6	
FUELING QTY, C1045		1	6E4	*
COMPENSATOR – CENTER TANK, TS5010	8	1	631AB, CENTER FUEL TANK	28-41-02
COMPENSATOR – L MAIN TANK, TS108	8	1	541AB, L MAIN FUEL TANK	28-41-02
COMPENSATOR – R MAIN TANK, TS119	8	1	641AB, R MAIN FUEL TANK	28-41-02
COMPUTER – (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
DENSITOMETER – CENTER TANK, M10903	12	1	631AB, CENTER FUEL TANK	28-41-03
DENSITOMETER – L MAIN TANK, M10901	12	1	541AB, L MAIN FUEL TANK	28-41-03
DENSITOMETER – R MAIN TANK, M10902	12	1	641AB, R MAIN FUEL TANK	28-41-03
HARNESS – CENTER DENSITOMETER TANK WIRING, M10917	13	1	CENTER MAIN FUEL TANK	28-41-09
HARNESS – L CENTER TANK WIRING, M10294	9	1	CENTER FUEL TANK	28-41-09
HARNESS – L MAIN TANK WIRING, M726	11	1	L MAIN FUEL TANK	28-41-09
HARNESS – LEFT MAIN DENSITOMETER TANK WIRING, M10916	13	1	L MAIN FUEL TANK	28-41-09
HARNESS – R CENTER TANK WIRING, M10137	10	1	CENTER FUEL TANK	28-41-09
HARNESS – R MAIN TANK WIRING, M727	11	1	R MAIN FUEL TANK	28-41-09
HARNESS – RIGHT MAIN DENSITOMETER TANK WIRING, M10918	13	1	R MAIN FUEL TANK	28-41-09
HOT SHORT PROTECTOR, M11872 1>	14	1	651, R REAR SPAR	28-41-24
INDICATOR – CENTER TANK LOAD SELECT (LSI), N10039	5	1	FUELING CONTROL PANEL, P28	28-41-06
INDICATOR – L MAIN TANK LOAD SELECT (LSI), N10040	5	1	FUELING CONTROL PANEL, P28	28-41-06
INDICATOR – R MAIN TANK LOAD SELECT (LSI), N10038	5	1	FUELING CONTROL PANEL, P28	28-41-06
MODULE – FUEL QUANTITY PROCESSOR (FQPU), M10054	3	1	FLT COMPT, P5	28-41-04
RELAY – (FIM 31-01-33/101)				
FUEL QTY PWR XFR, K356				
FUELING PANEL DOOR, K179				
FUELING POWER TRANSFER, K357				
RELAY – (FIM 31-01-36/101)				
SYS 1 AIR/GND, K140				
RELAY – (FIM 31-01-37/101)				
SYS 2 AIR/GND, K200				

* SEE THE WDM EQUIPMENT LIST

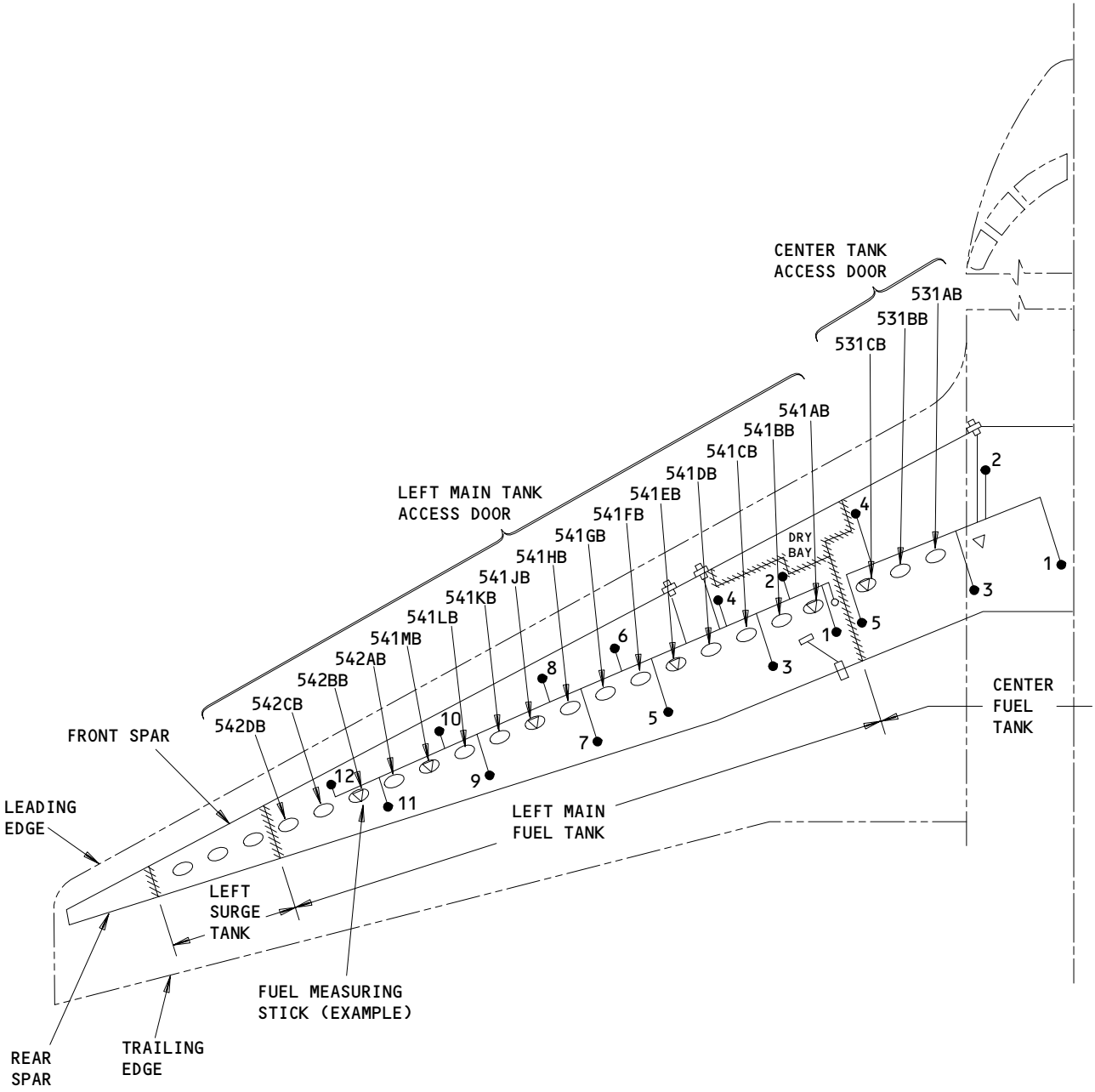
1> AIRPLANES POST-SB 28A0085

Fuel Quantity Indicating System – Component Index
Figure 101 (Sheet 1)

1421784

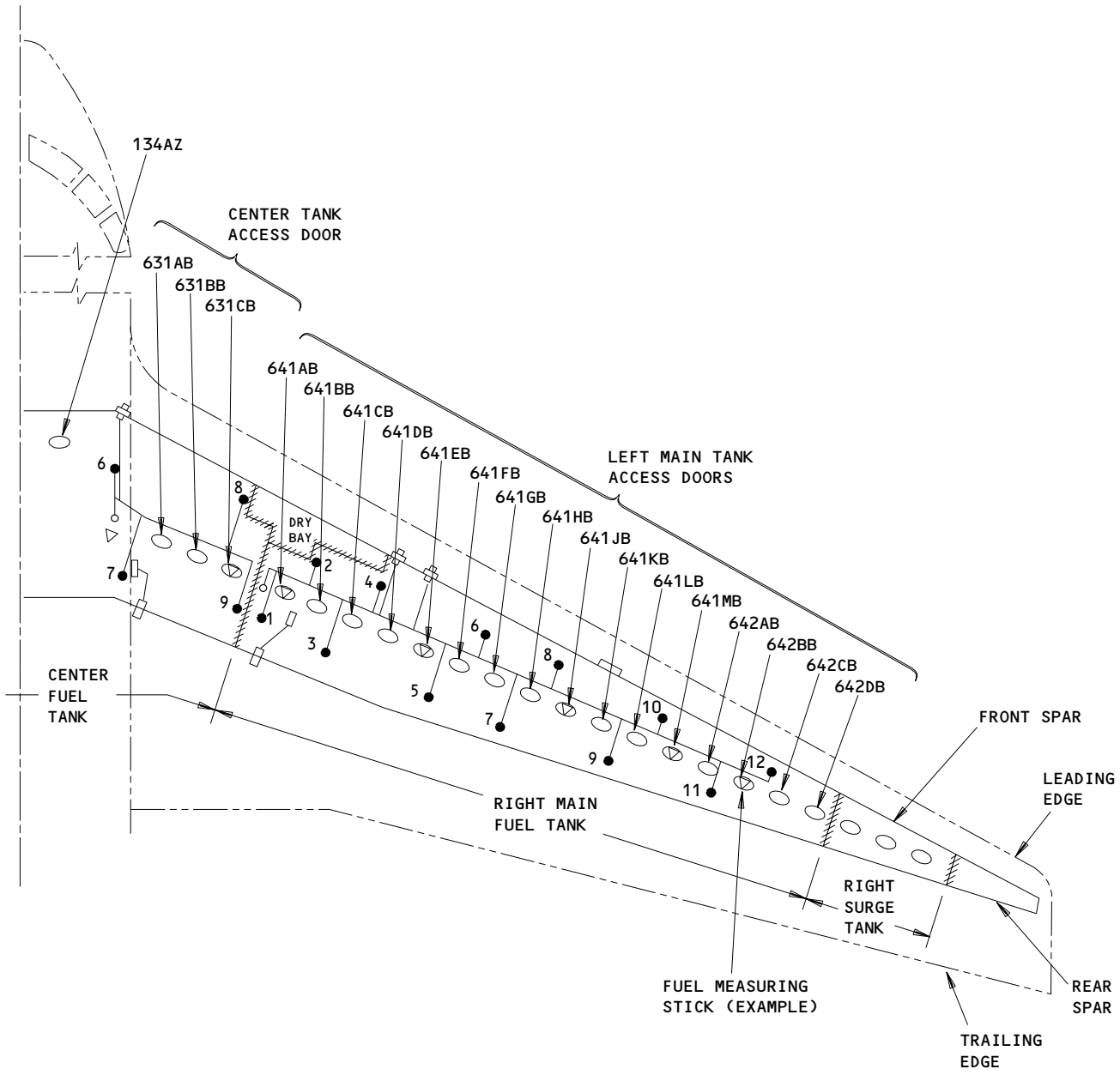
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
UNIT - TANK	8	-	LEFT OR RIGHT WING	28-41-01
CENTER TANK NO. 1, TS5011		1	134AZ	
CENTER TANK NO. 2, TS5012		1	531AB	
CENTER TANK NO. 3, TS5013		1	531AB	
CENTER TANK NO. 4, TS5014		1	531BB	
CENTER TANK NO. 5, TS5015		1	531CB	
CENTER TANK NO. 6, TS5016		1	631AB	
CENTER TANK NO. 7, TS5017		1	631AB	
CENTER TANK NO. 8, TS5075		1	631BB	
CENTER TANK NO. 9, TS5076		1	631CB	
L MAIN TANK NO. 1, TS109		1	541AB	
L MAIN TANK NO. 2, TS110		1	541BB	
L MAIN TANK NO. 3, TS111		1	541CB	
L MAIN TANK NO. 4, TS112		1	541DB	
L MAIN TANK NO. 5, TS113		1	541FB	
L MAIN TANK NO. 6, TS114		1	541GB	
L MAIN TANK NO. 7, TS115		1	541HB	
L MAIN TANK NO. 8, TS116		1	541JB	
L MAIN TANK NO. 9, TS117		1	541LB	
L MAIN TANK NO. 10, TS118		1	541MB	
L MAIN TANK NO. 11, TS5196		1	542AB	
L MAIN TANK NO. 12, TS5197		1	542CB	
R MAIN TANK NO. 1, TS146		1	641AB	
R MAIN TANK NO. 2, TS147		1	641BB	
R MAIN TANK NO. 3, TS148		1	641CB	
R MAIN TANK NO. 4, TS149		1	641DB	
R MAIN TANK NO. 5, TS150		1	641FB	
R MAIN TANK NO. 6, TS151		1	641GB	
R MAIN TANK NO. 7, TS152		1	641HB	
R MAIN TANK NO. 8, TS153		1	641JB	
R MAIN TANK NO. 9, TS154		1	641LB	
R MAIN TANK NO. 10, TS155		1	641MB	
R MAIN TANK NO. 11, TS5198		1	642AB	
R MAIN TANK NO. 12, TS5199		1	642CB	

Fuel Quantity Indicating System - Component Index
Figure 101 (Sheet 2)



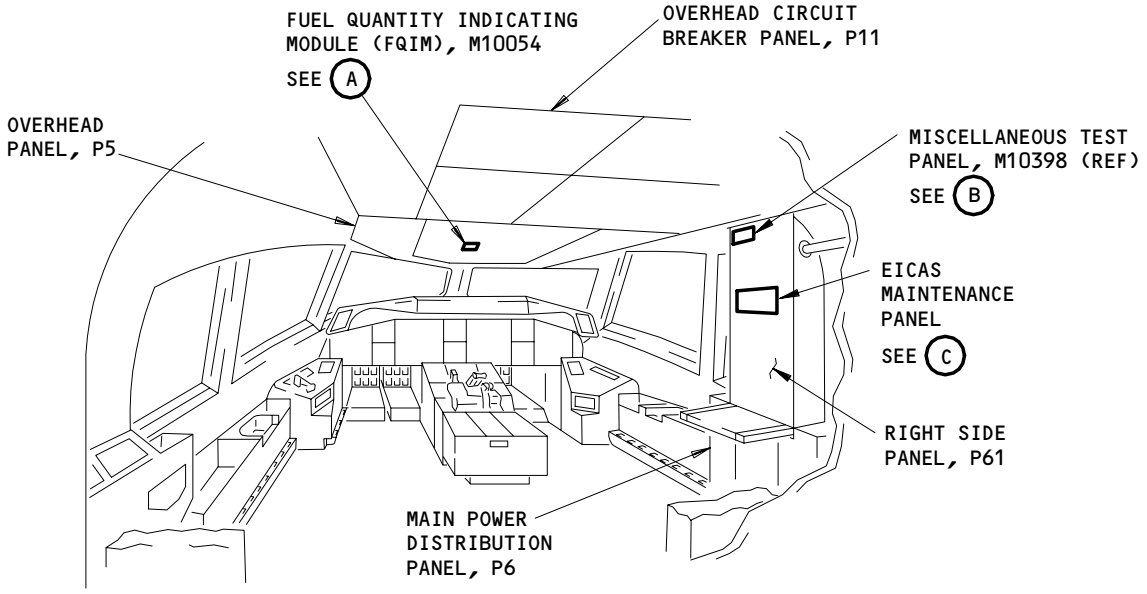
LEFT WING

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 1)

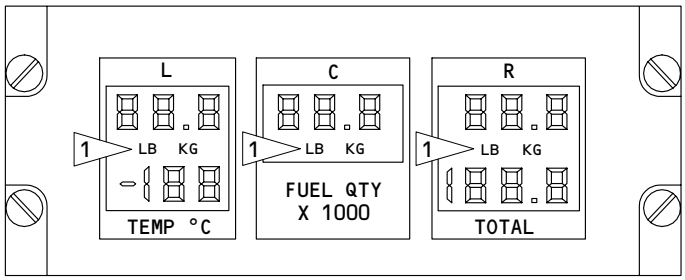


RIGHT WING

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 2)

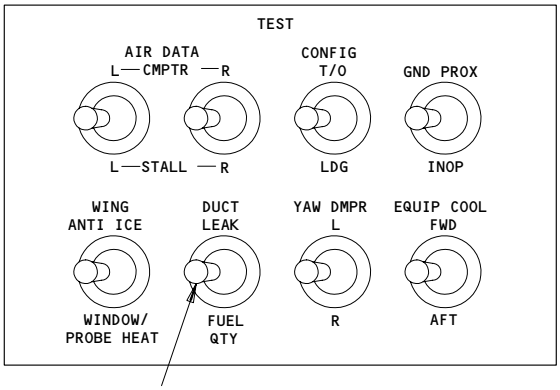


FLIGHT COMPARTMENT



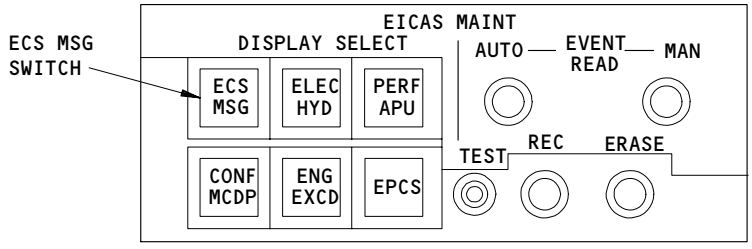
FUEL QUANTITY INDICATING MODULE (FQIM), M10054

A



MISCELLANEOUS TEST PANEL, M10398 (REF)
(EXAMPLE PANEL SHOWN)

B



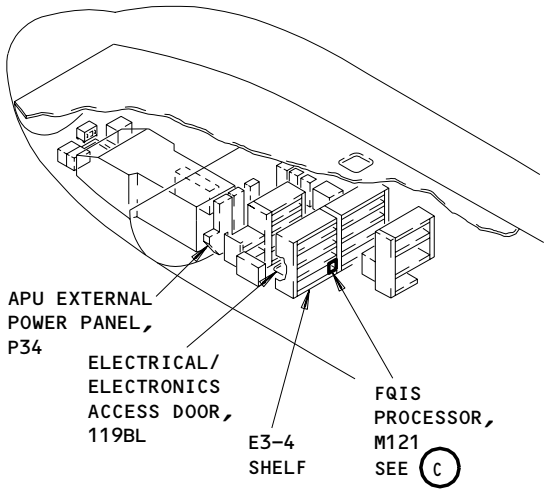
EICAS MAINTENANCE PANEL

C

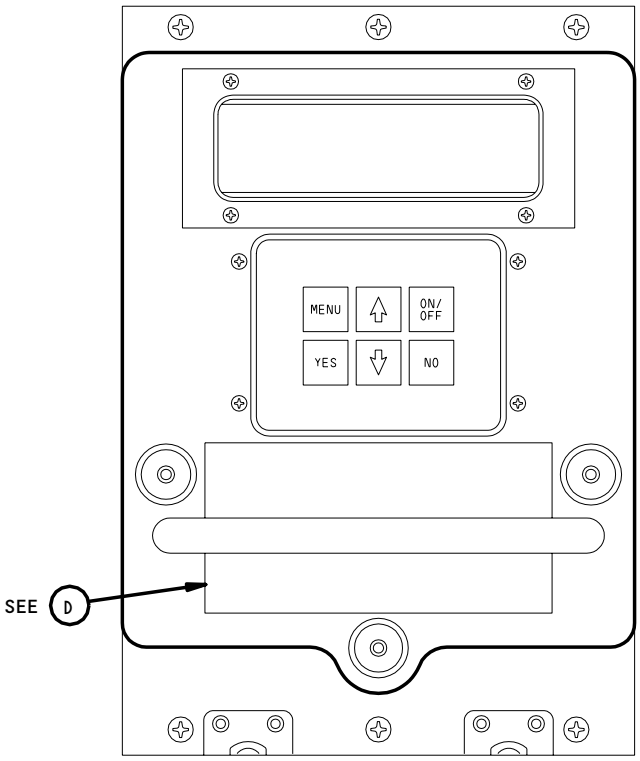
1 THE UNITS ARE IN KGS OR LBS.

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 3)

F76606



MAIN EQUIPMENT CENTER



FQIS PROCESSOR, M121

C

INSTRUCTIONS:

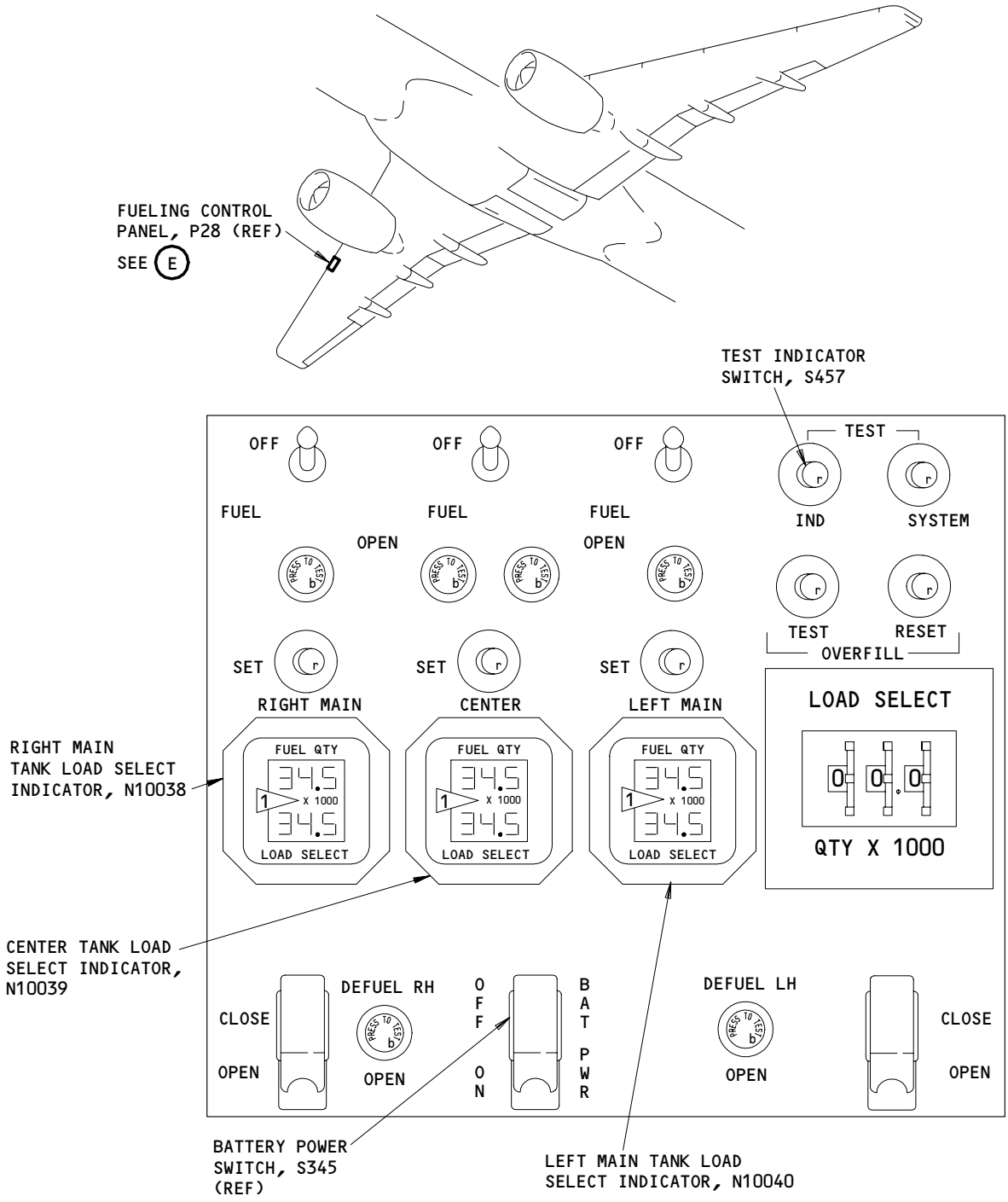
Press ON to start BITE display
Press YES or NO in response to questions (?)
Press ⇧ to display next result
Press ⇩ to display previous result
Press MENU to return to current menu
Press OFF to stop BITE display

PRIMARY BITE MENU OPTIONS:

FAULT HISTORY: Displays past faults by flight leg
SYSTEM DATA: Displays system/LRU Data
SELF TEST: Tests system/LRUs interfaces
SYSTEM CONFIG: Displays system configuration
ERASE FAULT HISTORY:

D

Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 4)

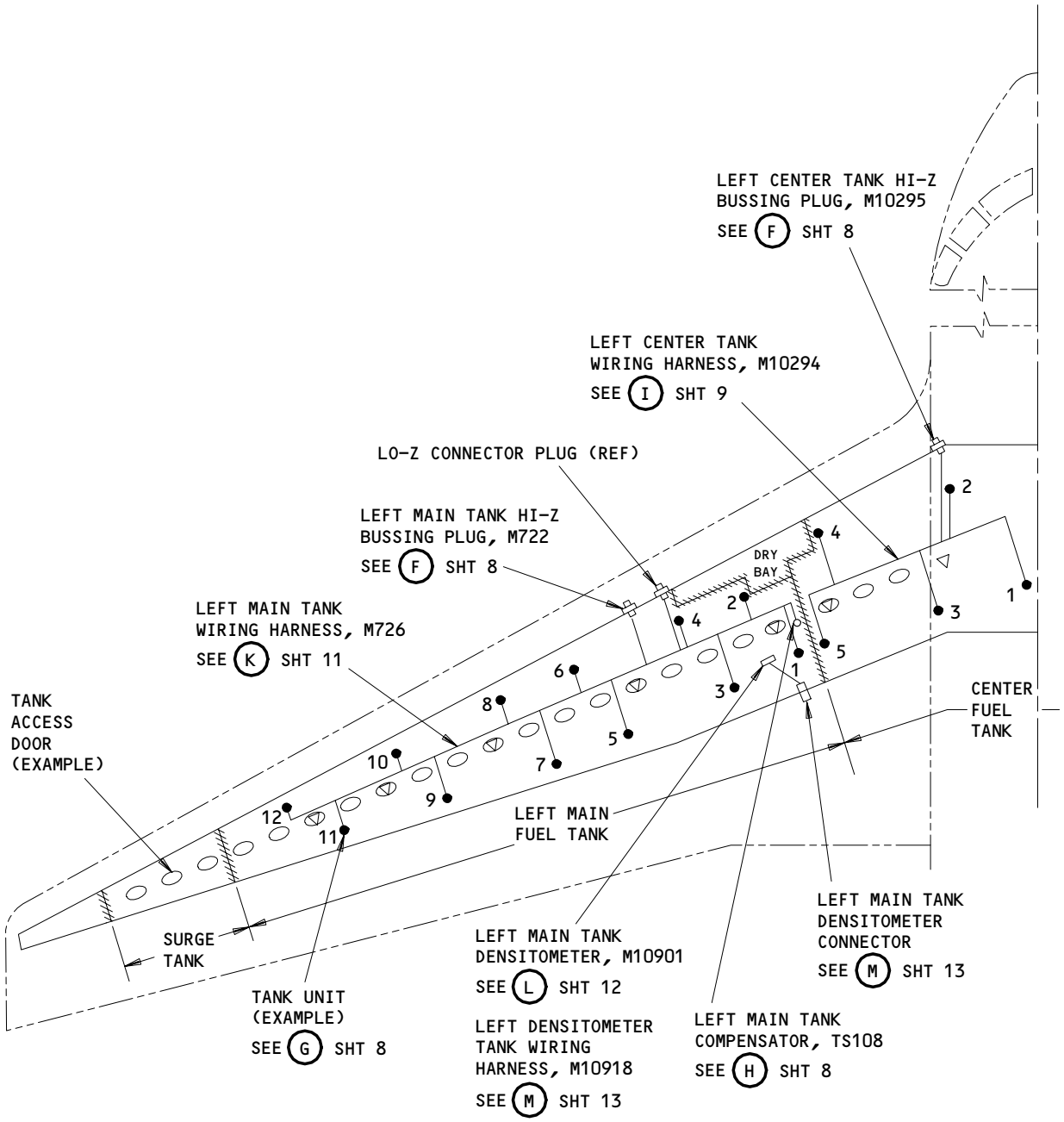


FUELING CONTROL PANEL, P28

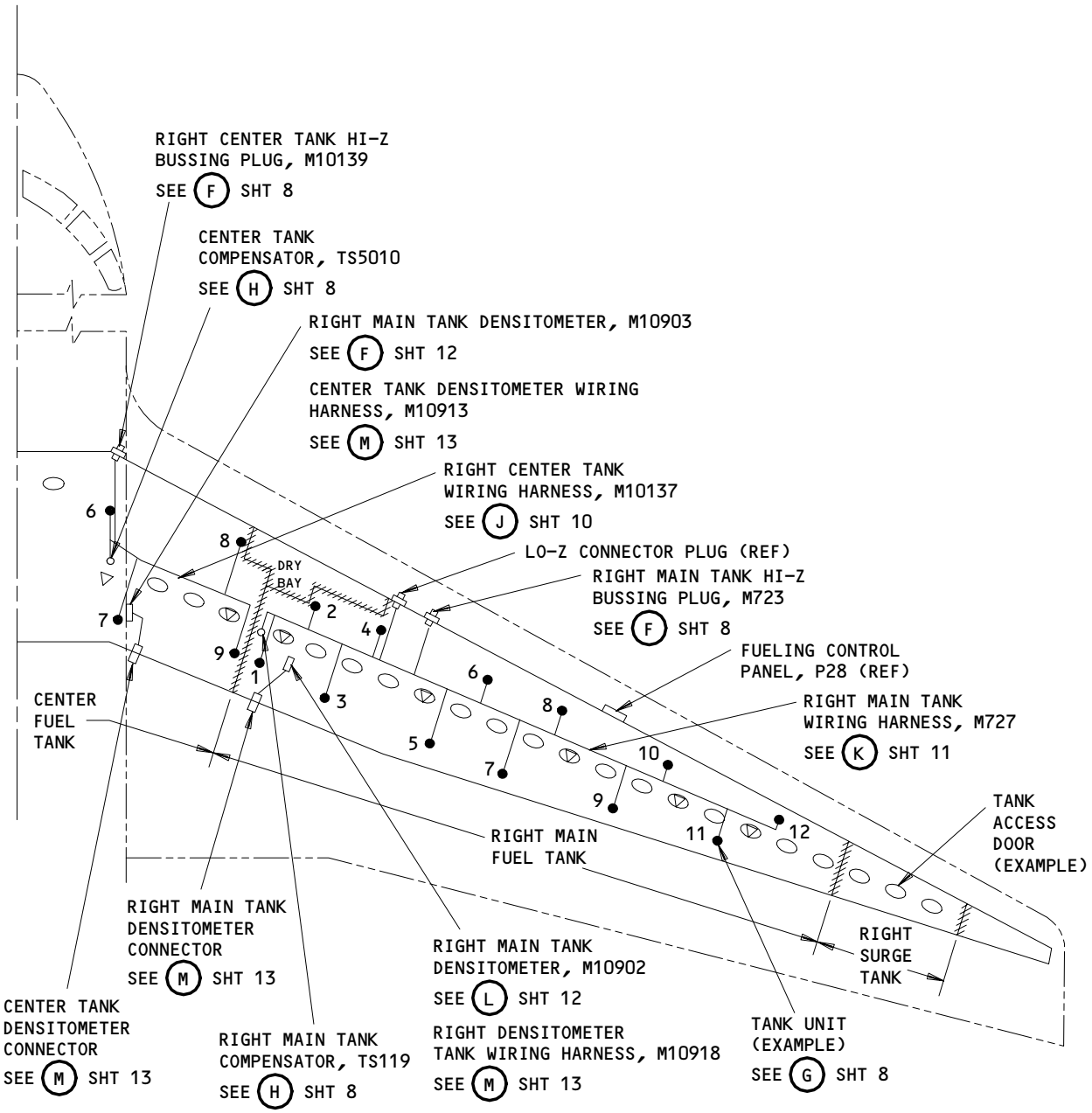
(E)

1 THE UNITS ARE IN KGS OR LBS.

Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 5)

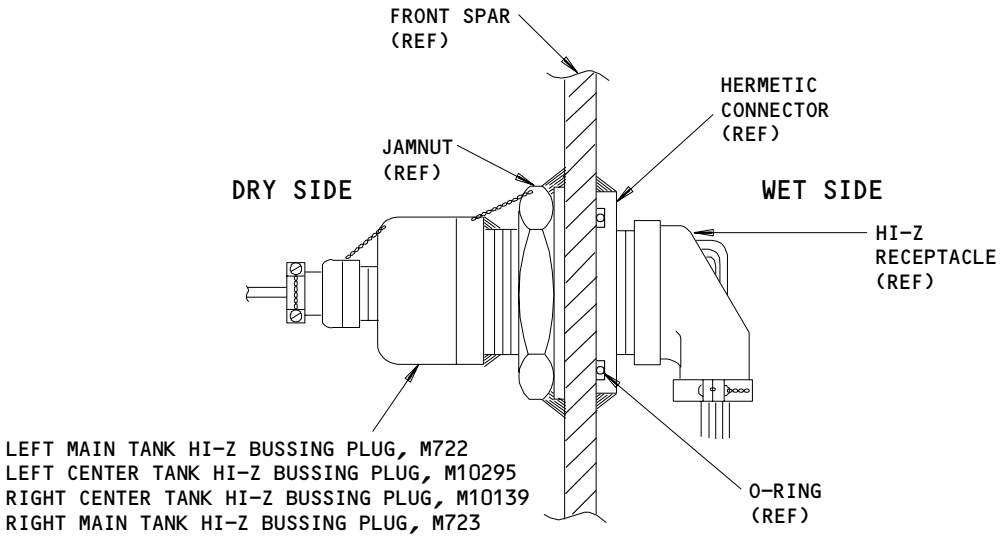


Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 6)



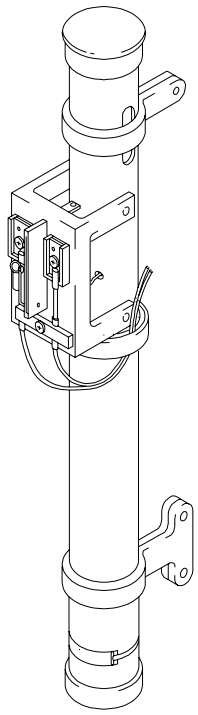
RIGHT WING

Fuel Quantity Indicating System - Component Location
Figure 102 (Sheet 7)



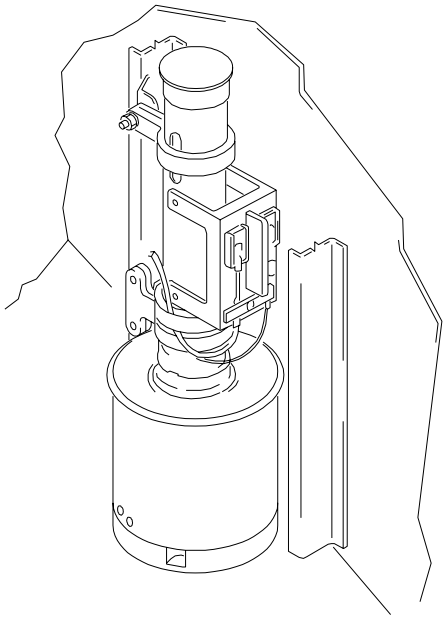
HI-Z BUSSING PLUG OR LO-Z CONNECTOR

F



TANK UNIT
(EXAMPLE)

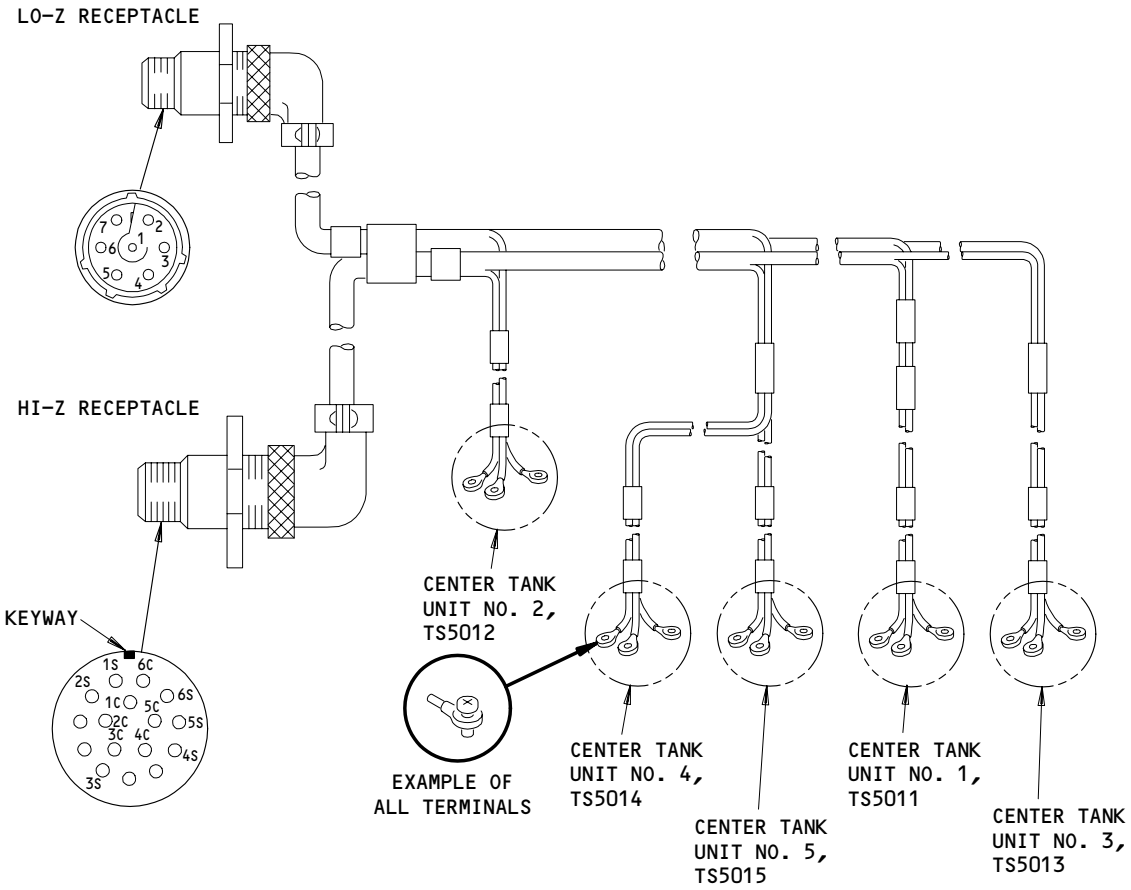
G



LEFT MAIN TANK COMPENSATOR, TS108
CENTER TANK COMPENSATOR, TS5010
RIGHT MAIN TANK COMPENSATOR, TS119

H

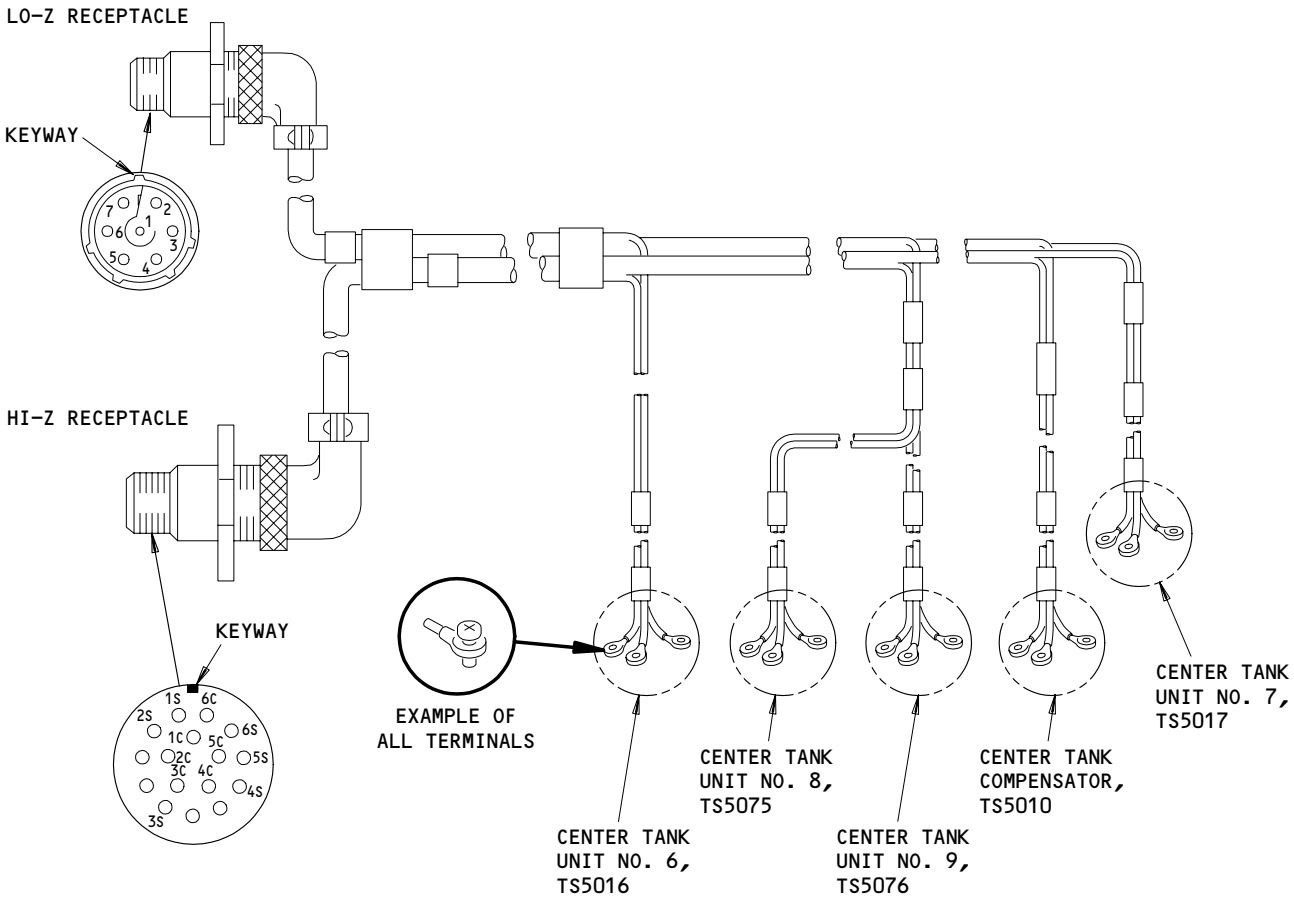
Fuel Quantity Indicating System - Component Location (Details from Sht 6 and 7)
Figure 102 (Sheet 8)



LEFT CENTER TANK WIRING HARNESS, M10294

(I)

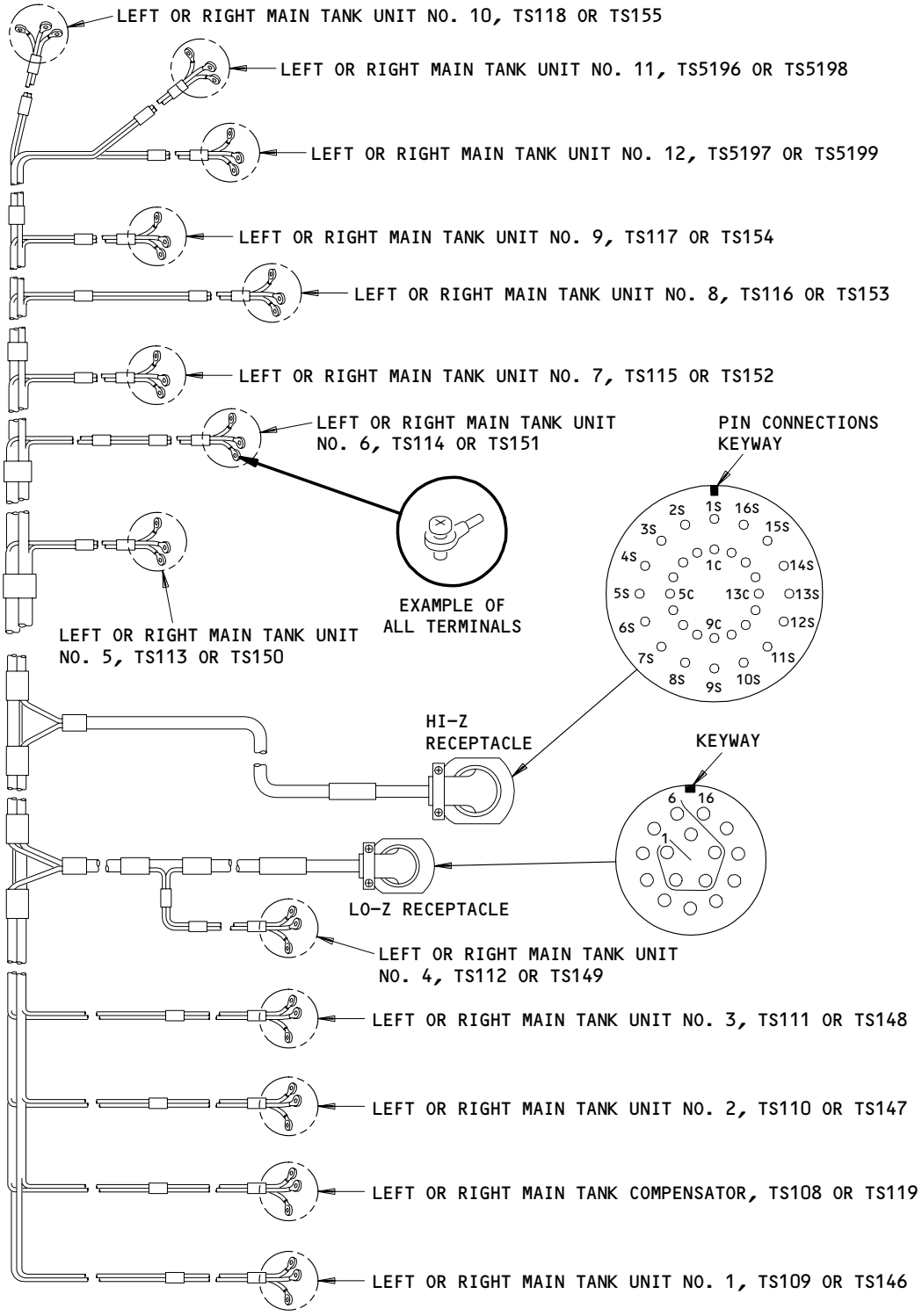
Fuel Quantity Indicating System - Component Location (Detail from Sht 6)
Figure 102 (Sheet 9)



RIGHT CENTER TANK WIRING HARNESS, M10137

(J)

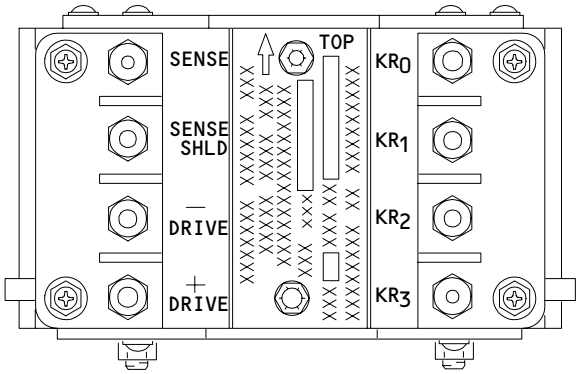
Fuel Quantity Indicating System - Component Location (Detail from Sht 7)
Figure 102 (Sheet 10)



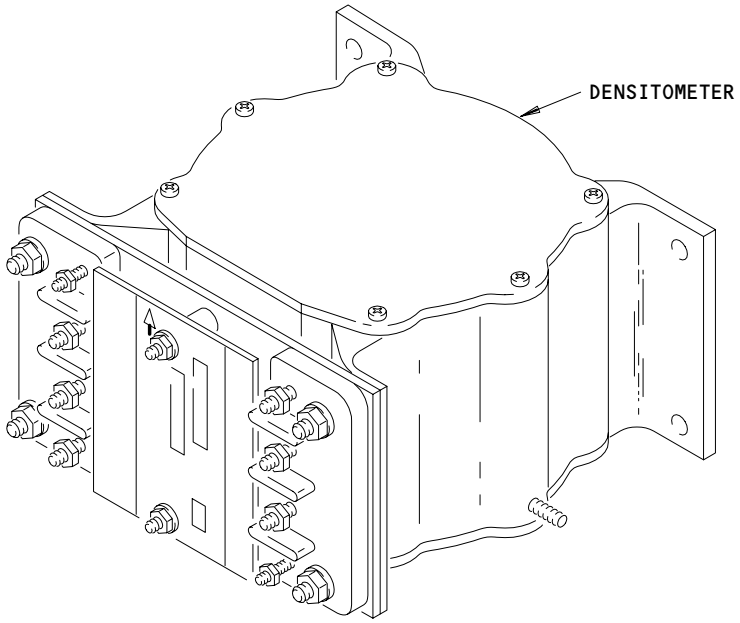
LEFT OR RIGHT MAIN TANK WIRING HARNESS, M726 OR M727

(K)

Fuel Quantity Indicating System - Component Location (Detail from Sht 6 and 7)
Figure 102 (Sheet 11)



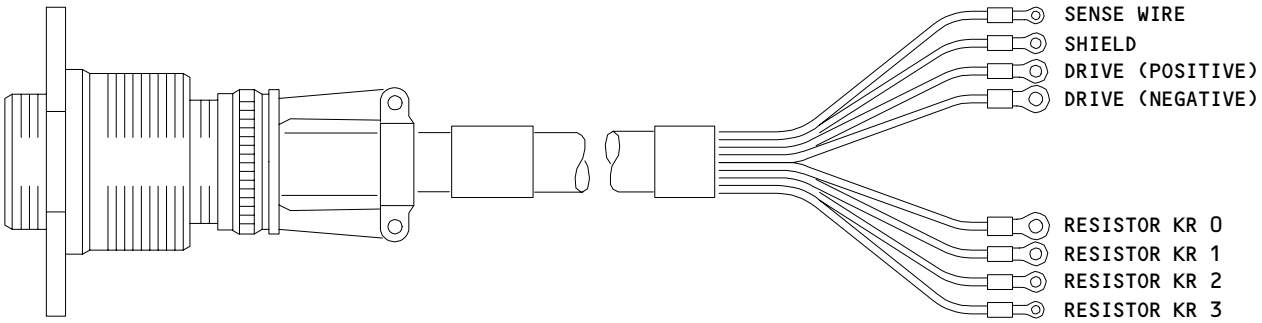
FRONT VIEW



LEFT MAIN, CENTER OR RIGHT MAIN DENSITOMETER, M10901,M10903 OR M10902

(L)

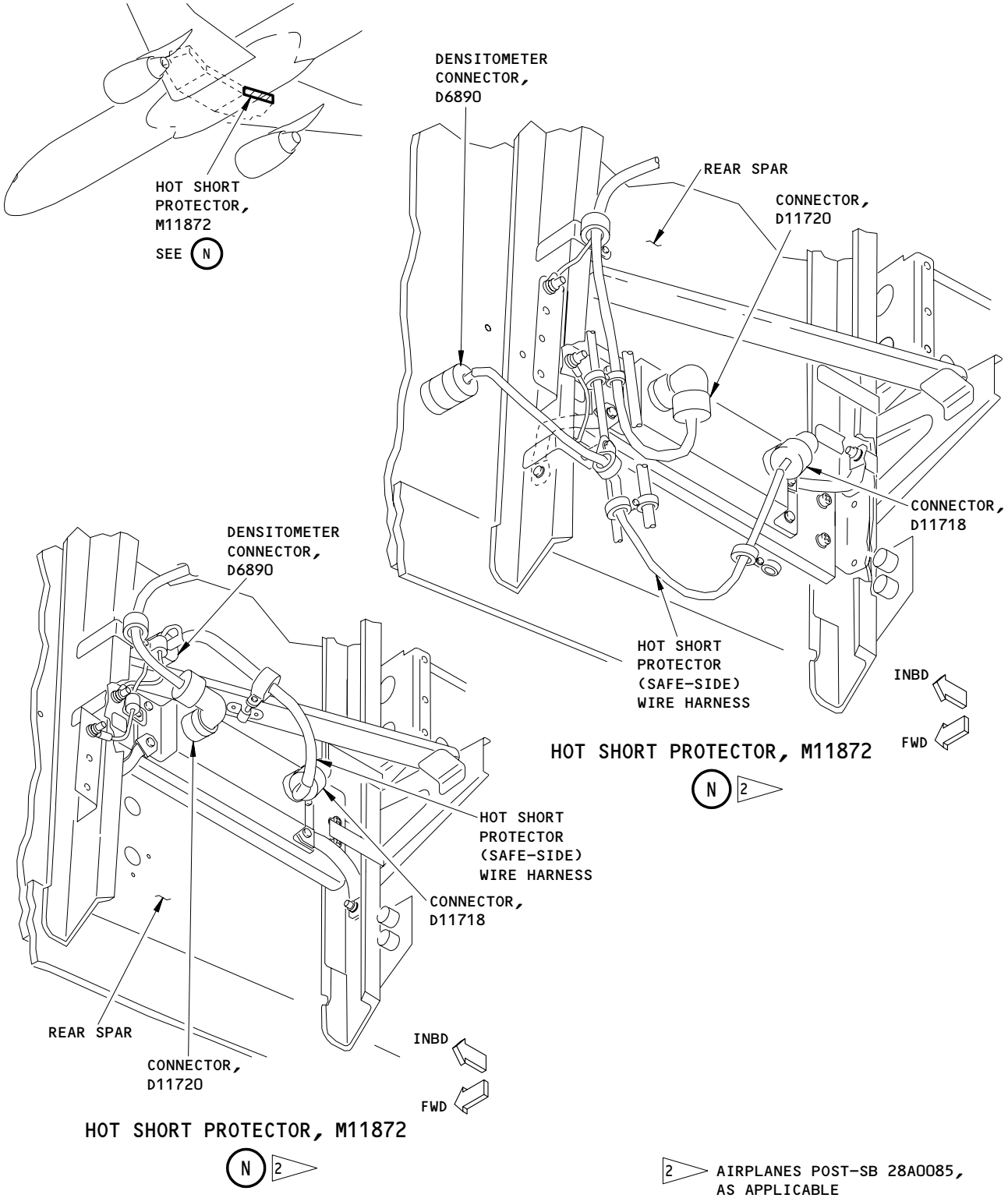
Fuel Quantity Indicating System – Component Location (Detail from Sht 6 and 7)
Figure 102 (Sheet 12)



LEFT MAIN, RIGHT MAIN OR CENTER DENSITOMETER TANK WIRING HARNESS,
M10916,M10918, OR M10917

(M)

Fuel Quantity Indicating System - Component Location
(Detail from Sht 6 and 7)
Figure 102 (Sheet 13)



Fuel Quantity Indicating System – Component Location
Figure 102 (Sheet 14)

FUEL QUANTITY INDICATING SYSTEM (FQIS) - ADJUSTMENT/TEST

1. General
   A. This procedure has four tasks. The first task is an operational test of the fuel quantity indicating system (FQIS). The second task is a comparison check of the FQIS with the fuel measuring sticks. The third task is a system test of the FQIS. The fourth task is a insulation resistance test.
   B. The operational test makes sure the FQIS operates correctly.
   C. The comparison check makes sure the fuel quantity shown agrees with the correct quantity of fuel in the fuel tanks.
   D. The system test makes sure the capacitance values for the tank units and the compensators are in the permitted limits for the FQIS precision.
   E. The insulation resistance test makes sure the insulation resistance values for the FQIS wiring are within acceptable limits.

TASK 28-41-00-715-082-002

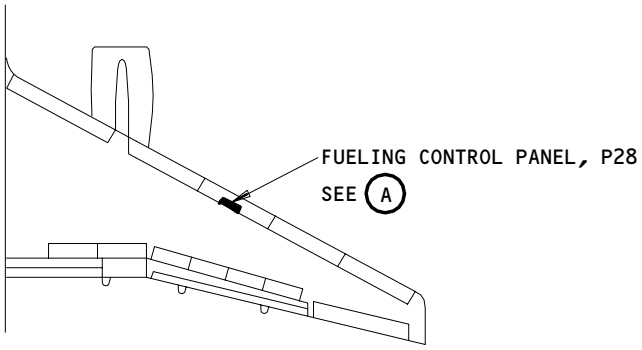
2. Operational Test - Fuel Quantity Indicating System
   A. General
      (1) This procedure contains:
         (a) A check of the load select indicators on the fueling control panel, P28.
         (b) A check of the fuel quantity indicator module (FQIM) in the flight compartment.
         (c) A fuel quantity BITE procedure at the fuel quantity processor unit (FQPU, referred to as "the processor").
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 06-44-00/201, Wing Access Doors and Panels
      (3) AMM 24-22-00/201, Electric Power Control
      (4) FIM 28-41-00/101, Fuel Quantity Indicating System (FQIS)
   C. Access
      (1) Location Zones
         119 Main Equipment Center (Left)
         621 Leading Edge to Front Spar (Right)

      (2) Access Panels
         119BL Electrical/Electronics Access Door
         621GB Fueling Station Door

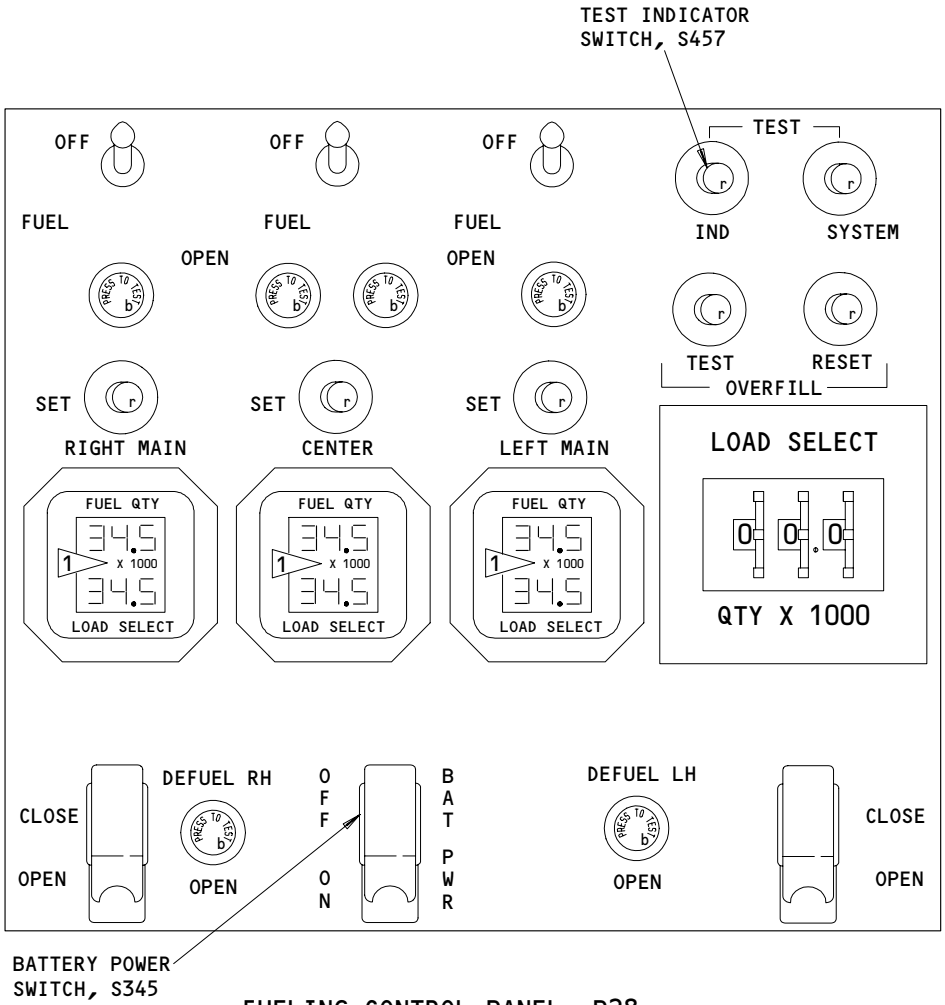
   D. Prepare for Checks

      S 865-002-002
      (1) Supply electrical power (AMM 24-22-00/201).
   E. Check of the Load Select Indicators (Fig. 501)

      S 015-083-002
      (1) Open the fueling station door, 621GB (AMM 06-44-00/201).



RIGHT WING

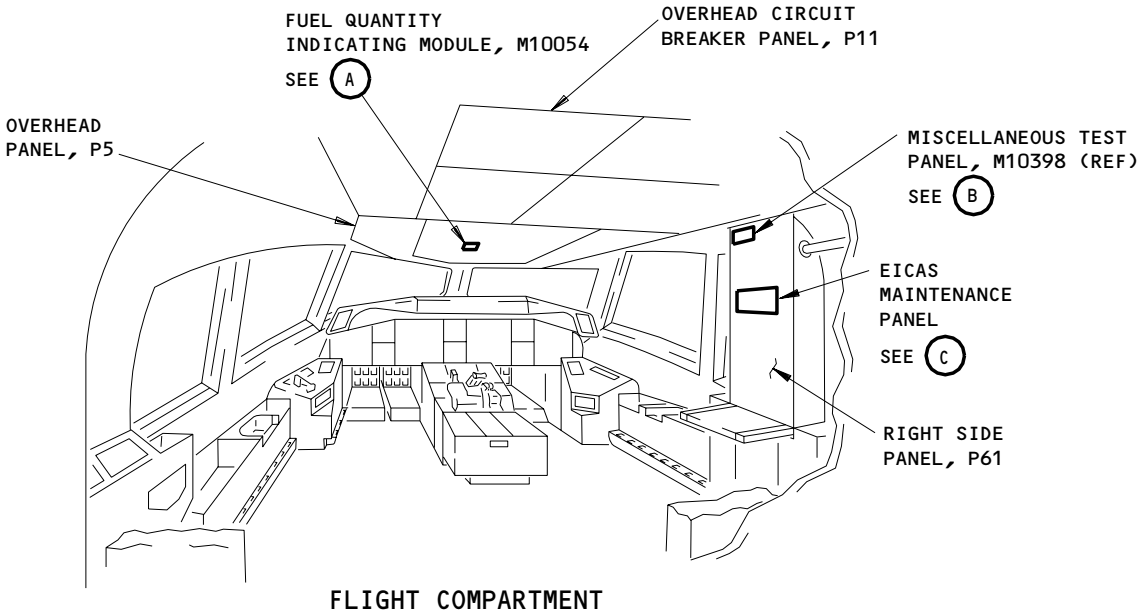


FUELING CONTROL PANEL, P28

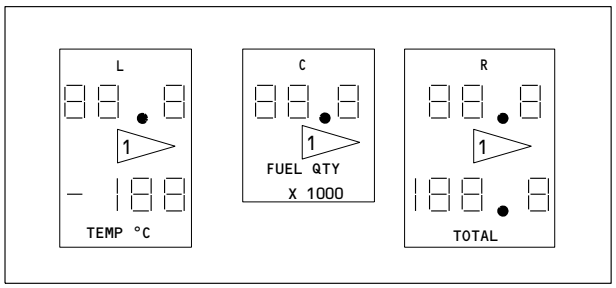
A

1 THE UNITS ARE IN LBS OR KGS.

Fueling Control Panel
Figure 501

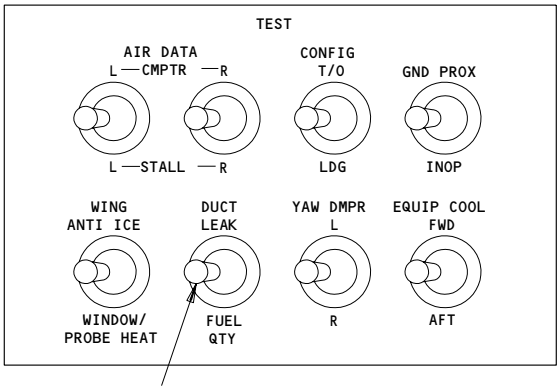


FLIGHT COMPARTMENT



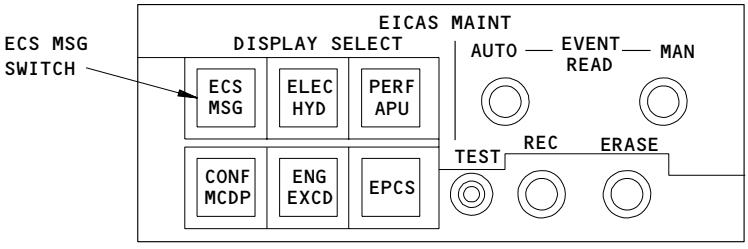
FUEL QUANTITY INDICATING MODULE, M10054

A



MISCELLANEOUS TEST PANEL, M10398 (REF)
(EXAMPLE PANEL SHOWN)

B

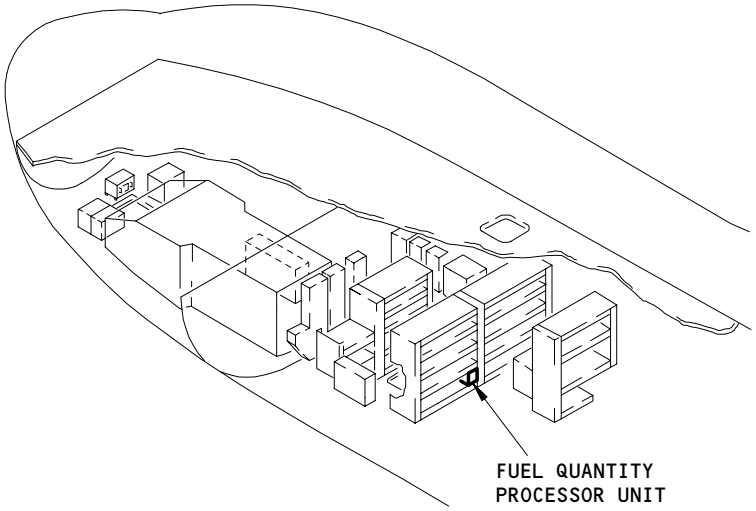


EICAS MAINTENANCE PANEL

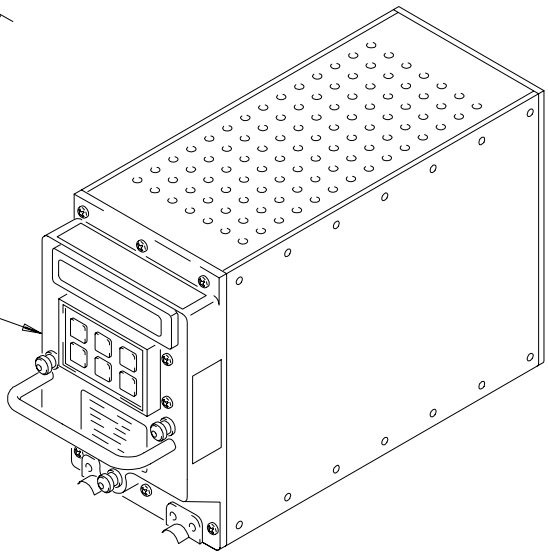
C

1 THE UNITS ARE IN LBS OR KGS.

Fuel Quantity Indicating Module (FQIM)
Figure 502

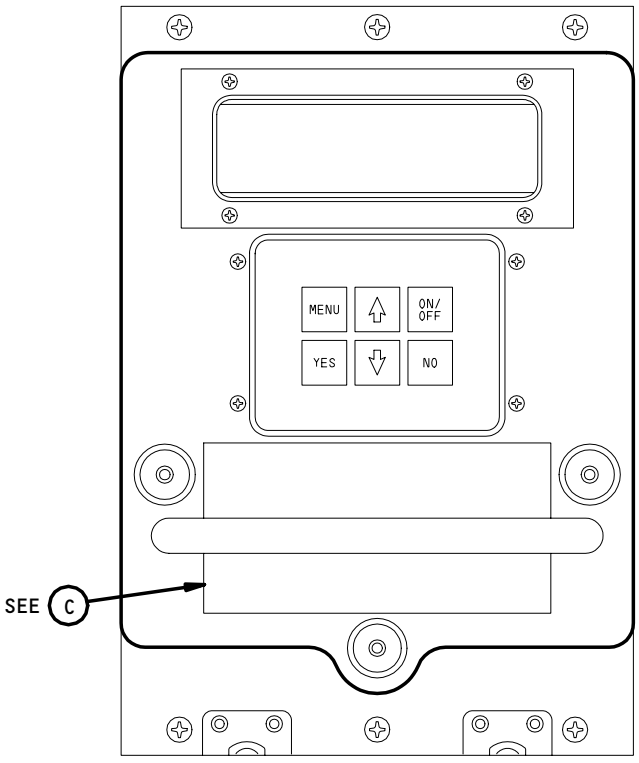


MAIN EQUIPMENT CENTER



FUEL QUANTITY PROCESSOR UNIT

A



FRONT PANEL

B

INSTRUCTIONS:

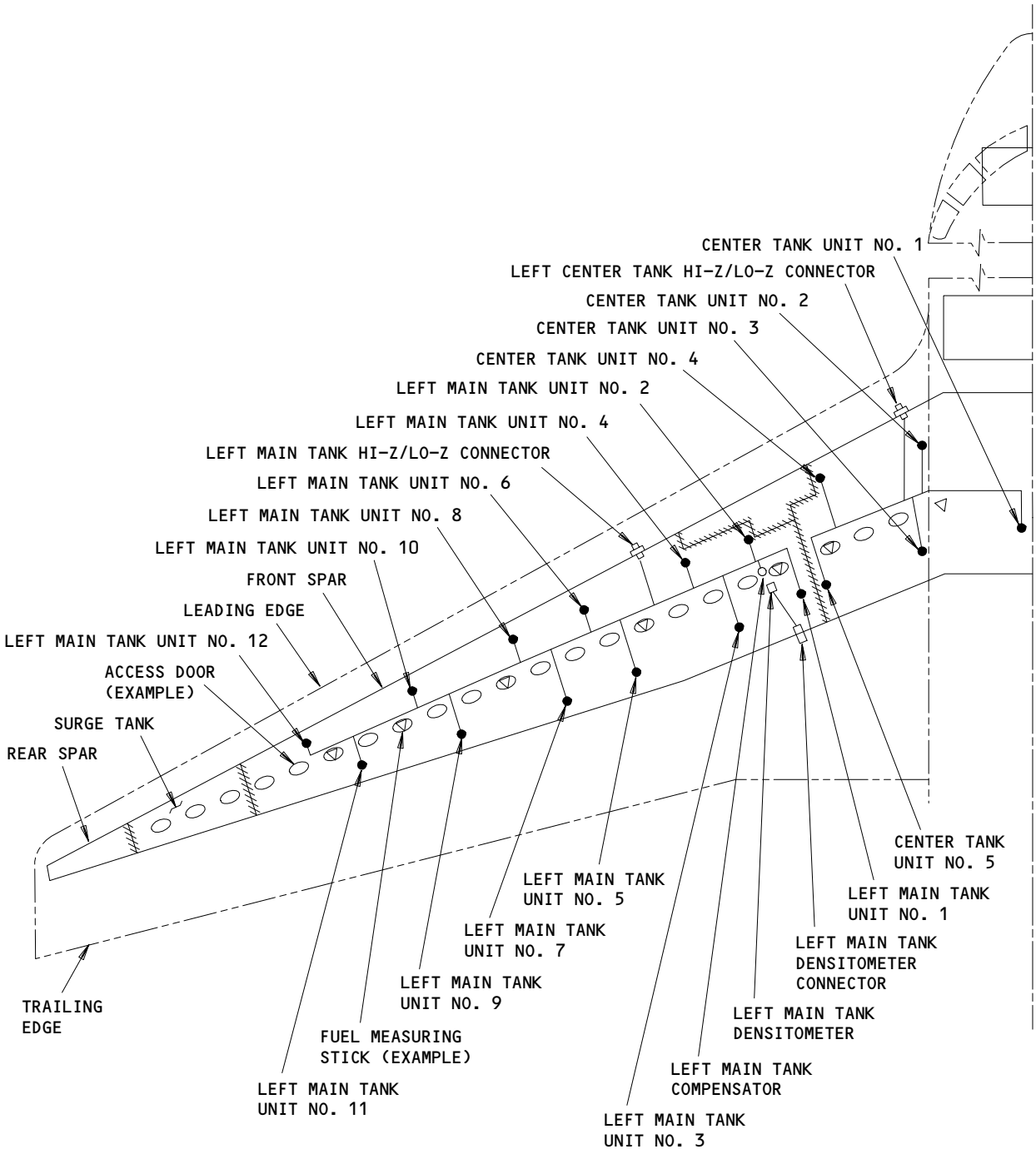
Press ON to start BITE display
Press YES or NO in response to questions (?)
Press ⇧ to display next result
Press ⇩ to display previous result
Press MENU to return to current menu
Press OFF to stop BITE display

PRIMARY BITE MENU OPTIONS:

FAULT HISTORY: Displays past faults by flight leg
SYSTEM DATA: Displays system/LRU Data
SELF TEST: Tests system/LRUs interfaces
SYSTEM CONFIG: Displays system configuration
ERASE FAULT HISTORY:

C

Fuel Quantity Processor Unit (FQPU)
Figure 503

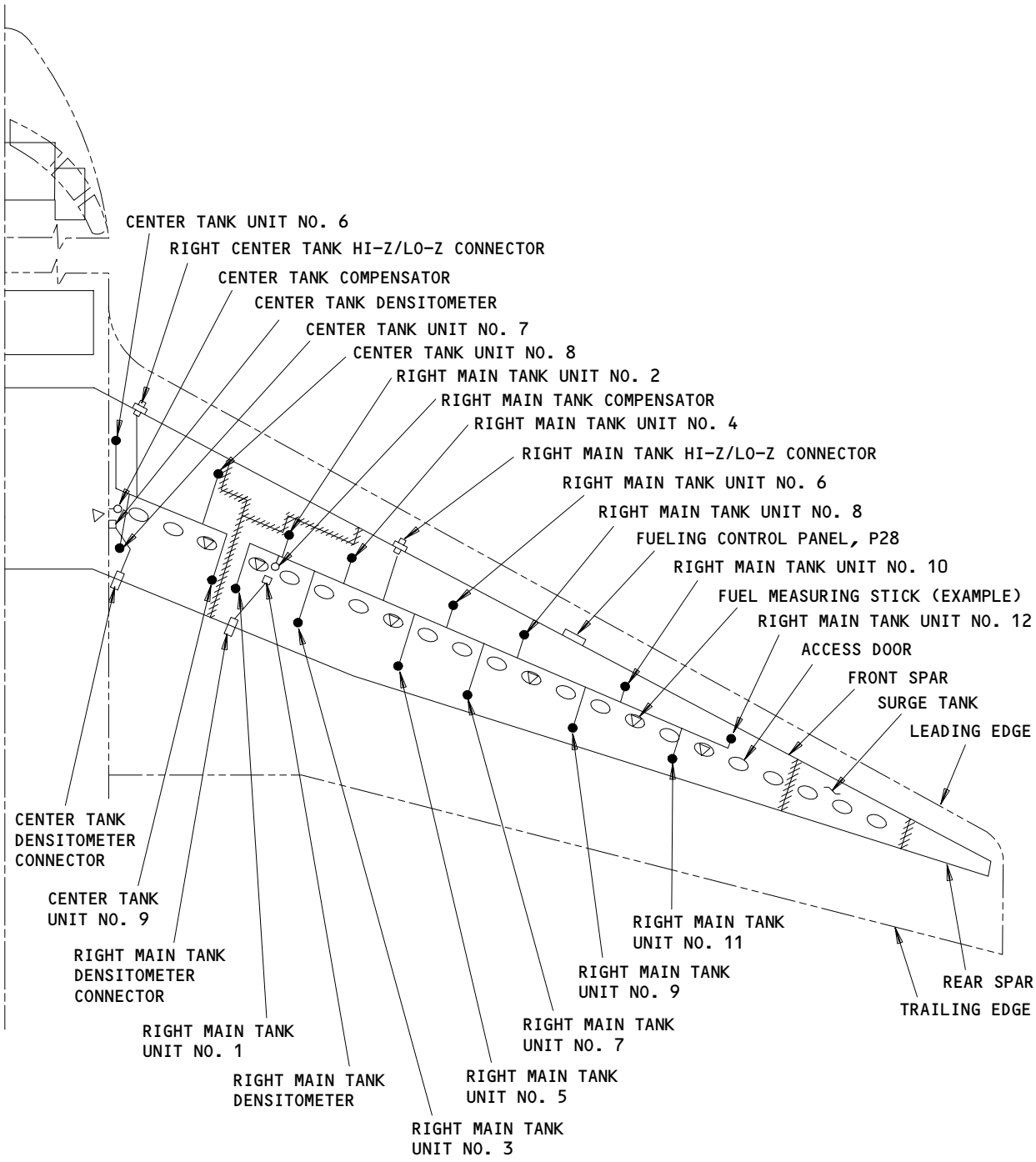


LEFT WING

Fuel Quantity Indicating System
Figure 504 (Sheet 1)

878574

EFFECTIVITY
GUI 001-114, 116-999



RIGHT WING

Fuel Quantity Indicating System
Figure 504 (Sheet 2)

TANK UNIT OR COMPENSATOR UNDER TEST	MINIMUM CAPACITANCE (PICOFARADS)	MAXIMUM CAPACITANCE (PICOFARADS)	EQUIP. NO.
CENTER TANK UNIT NO. 1	81.23	82.61	TS5011
CENTER TANK UNIT NO. 2	90.04	91.56	TS5012
CENTER TANK UNIT NO. 3	70.12	71.36	TS5013
CENTER TANK UNIT NO. 4	57.07	58.09	TS5014
CENTER TANK UNIT NO. 5	54.97	55.87	TS5015
CENTER TANK UNIT NO. 6	90.04	91.56	TS5016
CENTER TANK UNIT NO. 7	70.12	71.36	TS5017
CENTER TANK UNIT NO. 8	57.07	58.09	TS5075
CENTER TANK UNIT NO. 9	54.97	55.87	TS5076
COMPENSATOR - CENTER TANK	50.8	51.4	TS5010
COMPENSATOR - LEFT MAIN TANK	50.8	51.4	TS108
COMPENSATOR - RIGHT MAIN TANK	50.8	51.4	TS119
LEFT MAIN TANK UNIT NO. 1	53.47	54.35	TS109
LEFT MAIN TANK UNIT NO. 2	51.42	52.28	TS110
LEFT MAIN TANK UNIT NO. 3	42.86	43.60	TS111
LEFT MAIN TANK UNIT NO. 4	41.16	41.84	TS112
LEFT MAIN TANK UNIT NO. 5	32.68	33.18	TS113
LEFT MAIN TANK UNIT NO. 6	32.62	33.12	TS114
LEFT MAIN TANK UNIT NO. 7	28.91	29.37	TS115
LEFT MAIN TANK UNIT NO. 8	28.20	28.66	TS116
LEFT MAIN TANK UNIT NO. 9	26.81	27.25	TS117
LEFT MAIN TANK UNIT NO. 10	23.52	23.90	TS118
LEFT MAIN TANK UNIT NO. 11	20.35	20.69	TS5196
LEFT MAIN TANK UNIT NO. 12	20.35	20.69	TS5197
RIGHT MAIN TANK UNIT NO. 1	53.47	54.35	TS146
RIGHT MAIN TANK UNIT NO. 2	51.42	52.28	TS147
RIGHT MAIN TANK UNIT NO. 3	42.86	43.60	TS148
RIGHT MAIN TANK UNIT NO. 4	41.16	41.84	TS149
RIGHT MAIN TANK UNIT NO. 5	32.68	33.18	TS150
RIGHT MAIN TANK UNIT NO. 6	32.62	33.12	TS151
RIGHT MAIN TANK UNIT NO. 7	28.91	29.37	TS152
RIGHT MAIN TANK UNIT NO. 8	28.20	28.66	TS153
RIGHT MAIN TANK UNIT NO. 9	26.81	27.25	TS154
RIGHT MAIN TANK UNIT NO. 10	23.52	23.90	TS155
RIGHT MAIN TANK UNIT NO. 11	20.35	20.69	TS5198
RIGHT MAIN TANK UNIT NO. 12	20.35	20.69	TS5199

Dry Capacitance Test in the Main Equipment Center (No Fuel in the Tank)
Figure 505

MEASUREMENT TANK UNIT	PROBE SELECT POSITION (E/E BAY)	PROBE SELECT POSITION (WING SPAR)	LO-Z TO HI-Z	LO-Z TO SHLD	LO-Z TO GND	HI-Z TO GND	HI-Z TO SHLD	SHLD TO GND
L MAIN TANK UNIT NO. 1	B	A						
L MAIN TANK UNIT NO. 2	C	B						
L MAIN TANK UNIT NO. 3	D	C						
L MAIN TANK UNIT NO. 4	E	D						
L MAIN TANK UNIT NO. 5	F	E						
L MAIN TANK UNIT NO. 6	G	F						
L MAIN TANK UNIT NO. 7	H	G						
L MAIN TANK UNIT NO. 8	I	H						
L MAIN TANK UNIT NO. 9	J	I						
L MAIN TANK UNIT NO. 10	K	J						
L MAIN TANK UNIT NO. 11	L	K						
L MAIN TANK UNIT NO. 12	M	L						
COMPENSATOR	A	O						

Insulation Resistance Values for the Left Main Tank Wiring
Figure 506

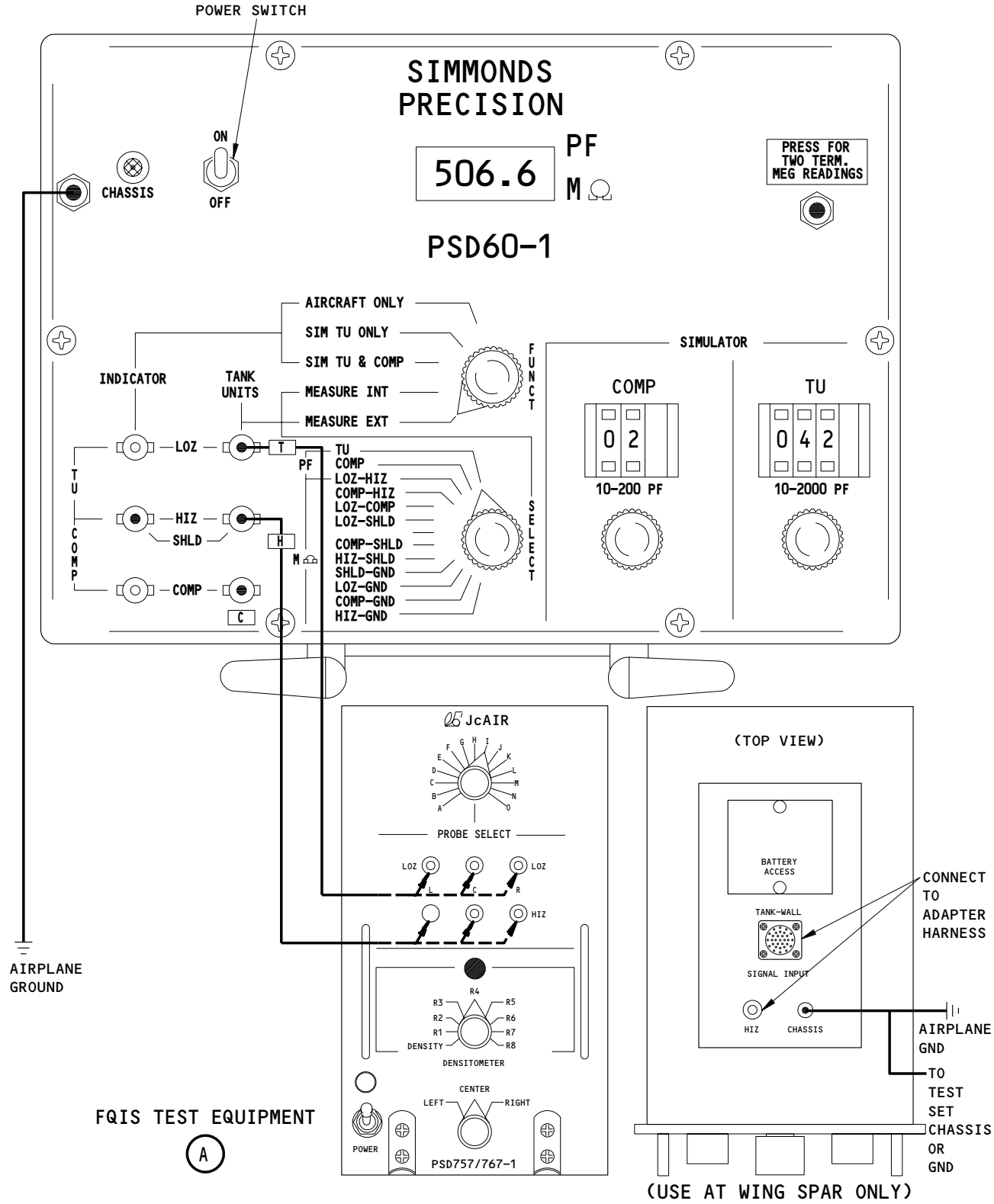
M45088

MEASUREMENT TANK UNIT	PROBE SELECT POSITION (E/E BAY)	PROBE SELECT POSITION (WING SPAR)	LO-Z TO HI-Z	LO-Z TO SHLD	LO-Z TO GND	HI-Z TO GND	HI-Z TO SHLD	SHLD TO GND
CENTER TANK UNIT NO. 1	A	A						
CENTER TANK UNIT NO. 2	B	B						
CENTER TANK UNIT NO. 3	C	C						
CENTER TANK UNIT NO. 4	D	D						
CENTER TANK UNIT NO. 5	E	E						
CENTER TANK UNIT NO. 6	F	A						
CENTER TANK UNIT NO. 7	H	B						
CENTER TANK UNIT NO. 8	I	C						
CENTER TANK UNIT NO. 9	J	D						
CENTER TANK COMPENSATOR	G	E						

Insulation Resistance Values for the Left and Right Center Tank Wiring
Figure 507

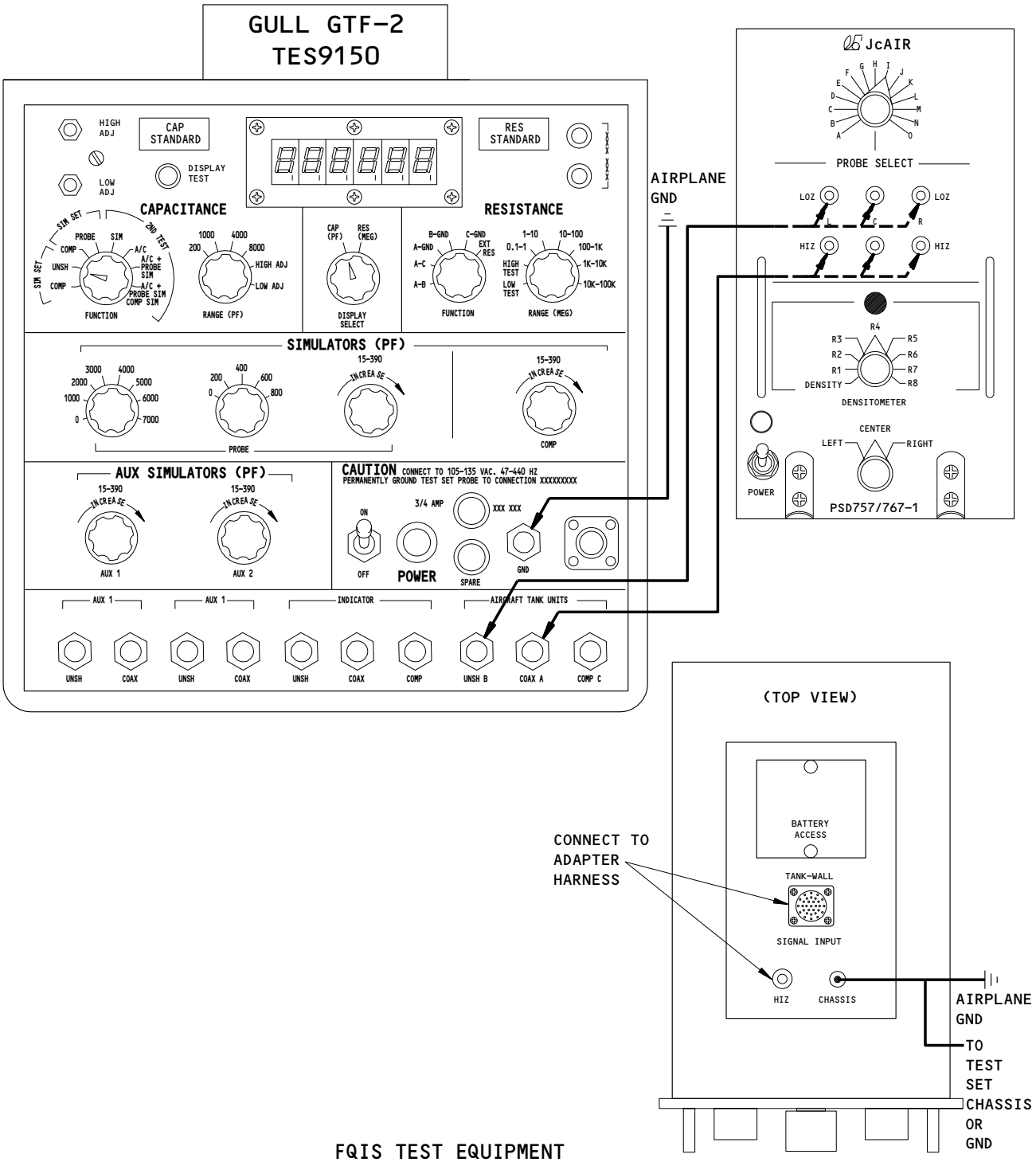
MEASUREMENT TANK UNIT	PROBE SELECT POSITION (E/E BAY)	PROBE SELECT POSITION (WING SPAR)	LO-Z TO HI-Z	LO-Z TO SHLD	LO-Z TO GND	HI-Z TO GND	HI-Z TO SHLD	SHLD TO GND
R MAIN TANK UNIT NO. 1	B	A						
R MAIN TANK UNIT NO. 2	C	B						
R MAIN TANK UNIT NO. 3	D	C						
R MAIN TANK UNIT NO. 4	E	D						
R MAIN TANK UNIT NO. 5	F	E						
R MAIN TANK UNIT NO. 6	G	F						
R MAIN TANK UNIT NO. 7	H	G						
R MAIN TANK UNIT NO. 8	I	H						
R MAIN TANK UNIT NO. 9	J	I						
R MAIN TANK UNIT NO. 10	K	J						
R MAIN TANK UNIT NO. 11	L	K						
R MAIN TANK UNIT NO. 12	M	L						
COMPENSATOR	A	O						

Insulation Resistance Values for the Right Main Tank Wiring
Figure 508



FQIS Test Equipment
Figure 509 (Sheet 1)

M41397



FQIS TEST EQUIPMENT

(B)

(USE AT WING SPAR ONLY)

FQIS Test Equipment
Figure 509 (Sheet 2)

S 865-111-002
(2) Push and release the TEST IND switch on the fueling control panel, P28.

NOTE: The upper and lower displays will go off for 4 seconds.

S 215-112-002
(3) Make sure the upper and lower displays on all the load select indicators show 888.8.

S 215-086-002
(4) Make sure the lower display on each load select indicator goes back to its last indication.

S 215-087-002
(5) Make sure the upper display on each load select indicator shows the quantity of fuel in each fuel tank.

NOTE: If the message "-A.-", or "-b.-", or "-A.b" show on the displays, see FIM 28-41-00/101, Fig. 118. If the message "PUSH SET" shows on the display, see AMM 12-11-01/301.

S 415-088-002
(6) Close the fueling station door, 621GB (AMM 06-44-00/201).

F. Check of the Fuel Quantity Indicator Module (FQIM) (Fig. 502)

S 215-089-002
(1) Make sure the six EICAS circuit breakers are closed.

S 865-118-002
(2) Push the EICAS Status Display switch on the pilot's control stand, P9.

S 865-113-002
(3) Push the ECS MSG switch on the EICAS MAINT panel on the right side panel, P61.

S 215-091-002
(4) Make sure the EICAS maintenance message, FUEL QTY BITE, does not show on the bottom display.

S 215-092-002

(5) Push and release the FUEL QTY test switch on the right side panel, P61, to the FUEL QTY position, and do these checks:

NOTE: The upper and lower displays on each fuel quantity indicator will go off for 4 seconds.

(a) Make sure the FUEL CONFIG light on the P5 panel comes on.
(b) Make sure the fuel quantity indicators on the overhead panel, P5, show 88.8.
(c) Make sure the total fuel quantity indicator on the P5 panel shows 188.8.
(d) Make sure the fuel temperature indicator on the P5 panel shows -188.
(e) Make sure the EICAS caution message, LOW FUEL, shows on the top display.
(f) Make sure the EICAS status message, FUEL QTY CHANNEL, shows on the bottom display.
(g) Make sure the EICAS status message, FUEL QTY IND, shows on the bottom display.

S 215-081-002

(6) Make sure all the displays go back to their usual condition.

NOTE: If the messages "-A.-", or "-b.-", or "-A.b" show on the display for the fuel quantity indicators, see FIM 28-41-00/101, Fig. 119.

S 865-093-002

(7) Push and release the FUEL QTY test switch on the right side panel, P61, in the FUEL QTY position.

S 865-094-002

(8) Push and release the ECS MSG switch on the EICAS MAINT panel on the right side panel, P61.

S 215-095-002

(9) Make sure the EICAS maintenance message, FUEL QTY BITE, shows on the bottom display.

S 215-096-002

(10) Make sure all the displays go back to their normal condition.

G. Fuel Quantity BITE Procedure (Fig. 503)

S 015-097-002

(1) Open the electrical/electronics access door, 119BL (AMM 06-41-00/201).

S 015-098-002

(2) Go into the main equipment center.

NOTE: The BITE Display Board on the processor will come on during airplane power-up. The menu will be inactive when you push the ON button on the front panel of the processor during the power-up condition for approximately 90 seconds.

S 715-099-002

(3) FQIS "SELF TEST ?" procedure

(a) On the fuel quantity processor unit (FQPU), push and release the "ON/OFF" button for a minimum of one second.

(b) Make sure the processor display shows "PRESENT_FAULTS_?"

(c) Push and release the "NO" button until the "SELF_TEST_?" message shows.

(d) Push and release the "YES" button.

(e) When the message "BEGIN_SELF_TEST_?" shows, push and release the "YES" button.

NOTE: The self test will use 90 seconds, and the message "TEST_IN_PROGRESS" will show.

(f) Make sure "TEST_COMPLETE_SELF_TEST_PASS" shows on the display.

NOTE: If "TEST_COMPLETE_LIST_FAULTS_?" shows on the display, push and release the "YES" button first and the "DOWN" button next to see the faults. Continue to push and release the "DOWN" button until all the fault messages are shown. Make a written record of the fault messages shown. See the FIM 28-41-00/101 for correction of the fault messages.

(g) Push and release the "DOWN" button.

(h) Make sure the message "END_OF_SELF_TEST" shows on the display.

(i) Push and release the "ON/OFF" button.

(j) Make sure the processor display goes off.

S 415-100-002

(4) Go out of the main equipment center and close the electrical/electronics access door, 119BL.

H. Put the Airplane Back to Its Usual Condition

S 865-101-002

(1) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 28-41-00-725-102-002

3. Comparison Check - Fuel Quantity Indicating System (FQIS) with the Fuel Measuring Sticks

A. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electric Power Control
(3) AMM 28-44-00/201, Fuel Measuring Sticks

B. Access

(1) Location Zones

531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
621	Leading Edge to Front Spar (Right)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panel

621GB	Fueling Station Door

C. Comparison Check of the Fuel Quantity Indicating System (FQIS) with the Fuel Measuring Sticks

S 865-103-002
(1) Supply electrical power (AMM 24-22-00/201).

S 015-104-002
(2) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 975-105-002
(3) Use the fuel measuring sticks to calculate the fuel quantity for each fuel tank (AMM 28-44-00/201).

S 225-106-002
(4) Make sure the difference between the calculated fuel quantity (with the fuel measuring sticks) for each tank and the fuel quantity shown on the load select indicators on the P28 panel and the fuel quantity indicator module (FQIM) on the P5 panel is in the subsequent range:
(a) Main tank +/- 450 lbs or +/- 204 kgs

(b) Center tank +/- 1000 lbs or +/- 454 kgs

S 415-107-002
(5) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 865-033-002
(6) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 28-41-00-735-080-002

4. System Test - Fuel Quantity Indicating System

A. General

(1) The fuel quantity processor unit, M121, (referred to as "the processor") will do a capacitance test of the tank units and compensators.

NOTE: This test is a dry capacitance test (no fuel in the tank).

B. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-26-00/201, Defueling

C. Access
(1) Location Zones
119 Main Equipment Center (Left)
133 Wing Center Section (Left)
134 Wing Center Section (Right)
541 Main Tank - Rib No. 5 to No. 17 (Left)
641 Main Tank - Rib No. 5 to No. 17 (Right)

D. Dry Capacitance Test in the Main Equipment Center (No Fuel in the Tank) (Fig. 503)

S 655-108-002
(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 655-078-002
(2) Drain the fuel from the applicable fuel tank (AMM 28-11-00/201).

S 865-079-002
(3) Push and release the "ON/OFF" button on the processor.

S 215-080-002
(4) Make sure the processor shows "PRESENT_FAULTS_?" on the display.

S 865-081-002
(5) Push and release the "NO" button until "SYSTEM_DATA_?" shows in the display.

S 865-082-002
(6) Push and release the "YES" button.

S 215-083-002
(7) Make sure "UPLIFT_DATA_?" shows in the display.

S 865-114-002
(8) Push and release the "NO" button.

S 215-115-002
(9) Make sure the "MAIN_TANKS_DATA_?" message shows in the display.

S 865-086-002
(10) Push and release the "YES" button to see the left and right fuel tank data.

S 865-087-002
(11) Push and release the "DOWN" button until the message "LEFT_HIZ_RIGHT" shows in the display.

S 975-088-002
(12) Make a written record of the capacitance values.

S 975-089-002
(13) Continue to push and release the "DOWN" button while you make a written record of the capacitance values.

S 865-116-002
(14) When the message "CENTER_DATA_?" shows on the display push and release the "YES" button.

S 865-091-002
(15) Push and release the "DOWN" button until the message "CENTER_HIZ____PF" shows on the display.

S 975-092-002
(16) Make a written record of the capacitance values.

S 975-093-002
(17) Continue to push and release the "DOWN" button while you make a written record of the capacitance values.

S 975-076-002
(18) When the message "END_OF_SYSTEM_DATA" shows on the display make sure all the capacitance values are within the limits in Fig. 505.

S 865-077-002
(19) Push and release the "ON/OFF" button on the processor.

S 215-078-002

(20) Make sure the processor display is off.

NOTE: The processor will go off if no buttons are pushed in 10 minutes or less.

S 655-109-002

(21) Refuel the applicable fuel tank, if no more tests are necessary (AMM 12-11-01/301).

TASK 28-41-00-765-121-002

5. Insulation Resistance Test

A. General

(1) This task has three procedures for the measurement of insulation resistance for FQIS wiring:
(a) Insulation resistance test for the left main tank.
(b) Insulation resistance test for the left and right center tank.
(c) Insulation resistance test for the right main tank.

(2) Each of these tests does a test of the insulation resistance for the in-tank wiring and the out-of-tank wiring together and then separately.

B. Equipment

(1) Test Box, FQPU Breakout - PSD757/767-1
JcAir, Inc.,
400 Industrial Parkway
Industrial Airport, KS 66031

(2) Adapter Harness - PSD757/767-101 (Left/Right Main Fuel Tank)
JcAir, Inc.,
400 Industrial Parkway
Industrial Airport, KS 66031

(3) Adapter Harness - PSD757/767-102 (Center Fuel Tank)
JcAir, Inc.,
400 Industrial Parkway
Industrial Airport, KS 66031

(4) Test Set, FQIS Capcitance/Resistance (one of these):
(a) Model GTF-2, P/N 361-012-001, Gull Airborne Instruments, Inc., 55 Engineers Road, Smithtown, N.Y. 11787
(b) Model 8000, Barfield Instrument Corp., Miami, FL 33142
(c) P/N 472090-007, or 472090-009, or PSD 40-1, 60-1, 60-2, or 60-2R
JcAir, Inc.,
400 Industrial Parkway
Industrial Airport, KS 66031

(5) Multimeter (for testing wiring out of the fuel tanks only)

C. References
(1) AMM 24-22-00/201, Electrical Power Control
(2) AMM 27-81-00/201, Leading Edge Slats
(3) AMM 28-26-00/201, Defueling
(4) AMM 28-41-08/401, FQIS Processor
(5) AMM 28-41-09/401, FQIS Tank Wiring Harness

D. Access
(1) Location Zones
119 Main Equipment Center (Left)
133 Center Wing Section (Left)
134 Center Wing Section (Right)
521 Leading Edge to Front Spar (Left)
621 Leading Edge to Front Spar (Right)

E. Prepare for the Insulation Resistance Test

S 655-166-002
(1) Defuel the applicable fuel tanks (AMM 28-26-00/201).

F. Insulation Resistance Test for the Left Main Tank

S 765-122-002
(1) Do these steps to do a test of the insulation resistance at the E/E bay:

NOTE: These steps measure the insulation resistance of the in-tank and out-of-tank wiring together.

(a) Remove the fuel quantity processor unit (FQPU) (AMM 28-41-08/401).
(b) Install the Test Box in the location of the FQPU in the E3-4 shelf.
(c) Connect the Test Set to the airplane ground.
(d) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the left main tank (Fig. 509).
(e) Put the power switches on the Test Box and Test Set to on.

(f) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and the compensator in the left main tank (Fig. 506).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.

(g) Disconnect the test equipment.

(h) Remove the Test Box from the E3-4 shelf.

(i) Install the fuel quantity processor unit (FQPU) in the E3-4 shelf (AMM 28-41-08/401).

S 765-123-002

(2) Do these steps to do an insulation resistance test at the wing spar for the left main tank:

NOTE: These steps measure the insulation resistance of the in-tank wiring and equipment only.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. FAILIURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

(b) Connect the Test Box to the airplane ground (Fig. 509).

NOTE: Use the CHASSIS jack on the top of the Test Box.

(c) Connect the applicable Adapter Harness (part of the Test Box) to the SIGNAL connector and HIZ connector on the top of the Test Box.

(d) Disconnect the HI-Z/LO-Z plug (D6880) at the wing spar.

1) Attach the HI-Z/LO-Z plug to the airplane structure to make it secure.

NOTE: This will prevent damage to the HI-Z/LO-Z plug and wiring while you do the test.

(e) Connect the Adapter Harness to the HI-Z/LO-Z receptacle at the wing spar (Fig. 504).

(f) Connect the Test Set CHASSIS or GND to the Test Box CHASSIS jack.
(g) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the left main tank (Fig. 509).
(h) Put the power switches on the test equipment to on.
(i) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and the compensator in the left main tank (Fig. 506).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.
(j) Disconnect the test equipment.
(k) Disconnect the Adapter Harness from the HI-Z/LO-Z receptacle at the wing spar.
(l) Connect the HI-Z/LO-Z plug (D688O) at the wing spar again (WDM 28-41-21).

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING ACTIVATION OF THE LEADING EDGE SLATS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(m) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 765-124-002
(3) Do these steps use the insulation resistance test results to find problems:
(a) Do these checks of the insulation resistance values:
1) Minimum resistance check:
a) Make sure each resistance value is 20 megohms or more.

NOTE: Insulation resistance values of less than 20 megohms are shown as 0 megohms on PSD 40 and PSD 60 test units.

b) If one or more of the resistance values is less than 20 megohms, the applicable tank wiring harness can affect the FQIS system accuracy and should be replaced (AMM 28-41-09/401).

NOTE: Insulation resistance values less than 100 megohms can show a developing wire fault or degrading wiring. If the fuel quantity indicator is fluctuating and one or more of the insulation resistance values are less than 100 megohms, replacement of the applicable tank wiring harness may prevent subsequent problems.

2) Relative comparison resistance check:

NOTE: This check is a relative check. If a BITE message continues to show and the results of this test are negative, and all other troubleshooting recommendations have been tried, replacement of the applicable tank wiring harness may fix the problem.

a) Compare all wire resistance values to make sure that one or more values are not more than 20 percent lower in resistance than the other wires.
b) Replace the applicable tank wiring harness if the fault continues to show and all other fault isolation has been tried (AMM 28-41-09/401).

G. Insulation Resistance Test for the Left and Right Center Fuel Tank

S 765-126-002

(1) Do these steps to do an insulation resistance test at the E/E bay for the center fuel tank:

NOTE: These steps do a test of the insulation resistance of the out-of-tank wiring and the in-tank wiring together.

(a) Remove the fuel quantity FQIS processor unit (FQPU) (AMM 28-41-08/401).
(b) Install the Test Box in the location of the FQPU in the E3-4 shelf.

(c) Connect the Test Set to the airplane ground.
(d) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the center tank (Fig. 509).
(e) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and the compensator in the center tank (Fig. 507).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.
(f) Disconnect the test equipment.
(g) Remove the Test Box from the E3-4 shelf.
(h) Install the fuel quantity processor unit (FQPU) in the E3-4 shelf (AMM 28-41-08/401).

S 765-127-002
(2) Do these steps to do an insulation resistance test at the wing spar for the center fuel tank:

NOTE: These steps do an insulation test of the in-tank wiring and equipment only.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).
(b) Connect the Test Box to the airplane ground (Fig. 509).

NOTE: Use the CHASSIS jack on the top of the Test Box.

(c) Connect the applicable Adapter Harness (part of the Test Box) to the SIGNAL connector and HIZ connector on the top of the Test Box.
(d) Disconnect the left and right center HI-Z/LO-Z plugs (D6892 and D6888) at the wing spar (WDM 28-41-41).
1) Attach the HI-Z/LO-Z plugs to the airplane structure to make them secure.

NOTE: This will prevent damage to the HI-Z/LO-Z plugs and wiring while you do the test.

(e) Connect the Adapter Harness to the HI-Z/LO-Z receptacle for the left center tank at the wing spar (Fig. 504).
(f) Connect the Test Set CHASSIS or GND to the Test Box CHASSIS jack.

(g) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the center tank (Fig. 509).
(h) Put the power switches on the test equipment to on.
(i) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units in the left center tank (Fig. 507).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.
(j) Disconnect the Adapter Harness from the HI-Z/LO-Z receptacle for the left center tank at the wing spar (Fig. 504).
(k) Connect the left center HI-Z/LO-Z plug (D6892) at the wing spar again (WDM 28-41-41).
(l) Connect the Adapter Harness to the HI-Z/LO-Z receptacle for the right center tank at the wing spar (Fig. 504).
(m) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and the compensator in the right center tank (Fig. 507).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.
(n) Disconnect the Adapter Harness from the HI-Z/LO-Z receptacle for the right center tank at the wing spar (Fig. 504).
(o) Connect the right center HI-Z/LO-Z plug (D6888) at the wing spar again (WDM 28-41-41).
(p) Disconnect the test equipment.

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING ACTIVATION OF THE LEADING EDGE SLATS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(q) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 765-128-002

(3) Do these steps use the insulation resistance test results to find problems:

(a) Do these checks of the insulation resistance values:

1) Minimum resistance check:

a) Make sure each resistance value is 20 megohms or more.

NOTE: Insulation resistance values of less than 20 megohms are shown as 0 megohms on PSD 40 and PSD 60 test units.

b) If one or more of the resistance values is less than 20 megohms, the applicable tank wiring harness can affect the FQIS system accuracy and should be replaced (AMM 28-41-09/401).

NOTE: Insulation resistance values less than 100 megohms can show a developing wire fault or degrading wiring. If the fuel quantity indicator is fluctuating and one or more of the insulation resistance values are less than 100 megohms, replacement of the applicable tank wiring harness may prevent subsequent problems.

2) Relative comparison resistance check:

NOTE: This check is a relative check. If a BITE message continues to show and the results of this test are negative, and all other troubleshooting recommendations have been tried, replacement of the applicable tank wiring harness may fix the problem.

a) Compare all wire resistance values to make sure that one or more values are not more than 20 percent lower in resistance than the other wires.

b) Replace the applicable tank wiring harness if the fault continues to show and all other fault isolation has been tried (AMM 28-41-09/401).

H. Insulation Resistance Test for the Right Main Tank

S 765-130-002

(1) Do these steps to do an insulation resistance test at the E/E bay for the right main tank:

NOTE: These steps do an insulation resistance test of the out-of-tank and the in-tank wiring together.

(a) Remove the fuel quantity processor unit (FQPU) (AMM 28-41-08/401).
(b) Install the Test Box in the location of the FQPU in the E3-4 shelf.
(c) Connect the Test Set to the airplane ground.
(d) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the right main tank (Fig. 509).
(e) Put the power switches on the Test Box and Test Set to on.
(f) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and the compensator in the right main tank (Fig. 508).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.

(g) Disconnect the test equipment.
(h) Remove the Test Box from the E3-4 shelf.
(i) Install the fuel quantity processor unit (FQPU) in the E3-4 shelf (AMM 28-41-08/401).

S 765-131-002

(2) Do these steps to do an insulation resistance test at the wing spar for the right main tank:

NOTE: These steps do an insulation test of the in-tank wiring and equipment only.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).
(b) Connect the Test Box to the airplane ground (Fig. 509).

NOTE: Use the CHASSIS jack on the top of the Test Box.

(c) Connect the applicable Adapter Harness (part of the Test Box) to the SIGNAL connector and HIZ connector on the top of the Test Box.
(d) Disconnect the HI-Z/LO-Z plug (D6884) for the right main tank at the wing spar (Fig. 504).
1) Attach the HI-Z/LO-Z plug to the airplane structure to make it secure.

NOTE: This will prevent damage to the HI-Z/LO-Z plug and wiring while you do the test.

(e) Connect the Adapter Harness to the HI-Z/LO-Z receptacle at the wing spar.
(f) Connect the Test Set CHASSIS or GND to the Test Box CHASSIS jack.
(g) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the right main tank (Fig. 509).
(h) Put the power switches on the test equipment to on.
(i) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and the compensator in the right main tank (Fig. 508).

NOTE: Turn the PROBE SELECT switch on the Test Box to the corresponding position for each measurement.

1) Make a written record of each resistance measurement.
(j) Disconnect the test equipment.
(k) Disconnect the Adapter Harness from the HI-Z/LO-Z receptacle at the wing spar.
(l) Connect the HI-Z/LO-Z plug (D6884) at the wing spar again (WDM 28-41-31).

WARNING: MAKE SURE THAT NO PERSONS ARE THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING ACTIVATION OF THE LEADING EDGE SLATS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT COULD OCCUR.

(m) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 765-132-002

(3) Do these steps use the insulation resistance test results to find problems:

(a) Do these checks of the insulation resistance values:

1) Minimum resistance check:

a) Make sure each resistance value is 20 megohms or more.

NOTE: Insulation resistance values of less than 20 megohms are shown as 0 megohms on PSD 40 and PSD 60 test units.

b) If one or more of the resistance values is less than 20 megohms, the applicable tank wiring harness can affect the FQIS system accuracy and should be replaced (AMM 28-41-09/401).

NOTE: Insulation resistance values less than 100 megohms can show a developing wire fault or degrading wiring. If the fuel quantity indicator is fluctuating and one or more of the insulation resistance values are less than 100 megohms, replacement of the applicable tank wiring harness may prevent subsequent problems.

2) Relative comparison resistance check:

NOTE: This check is a relative check. If a BITE message continues to show and the results of this test are negative, and all other troubleshooting recommmendations have been tried, replacement of the applicable tank wiring harness may fix the problem.

a) Compare all wire resistance values to make sure that one or more values are not more than 20 percent lower in resistance than the other wires.

b) Replace the applicable tank wiring harness if the fault continues to show and all other fault isolation has been tried (AMM 28-41-09/401).

FUEL QUANTITY INDICATING SYSTEM (FQIS) - ADJUSTMENT/TEST

1. General
   A. This procedure has four tasks. The first task is an operational test of the fuel quantity indicating system (FQIS). The second task is a comparison check of the FQIS with the fuel measuring sticks. The third task is a system test of the FQIS. The fourth task is an insulation resistance test of the wiring for the FQIS.
   B. The operational test makes sure the FQIS operates correctly.
   C. The comparison check makes sure the fuel quantity shown agrees with the correct quantity of fuel in the fuel tanks.
   D. The system test makes sure the capacitance values for the tank units and the compensators are in the permitted limits for the FQIS precision.
   E. The insulation resistance test makes sure the insulation resistance values for the FQIS wiring are in acceptable limits.

TASK 28-41-00-715-001-003

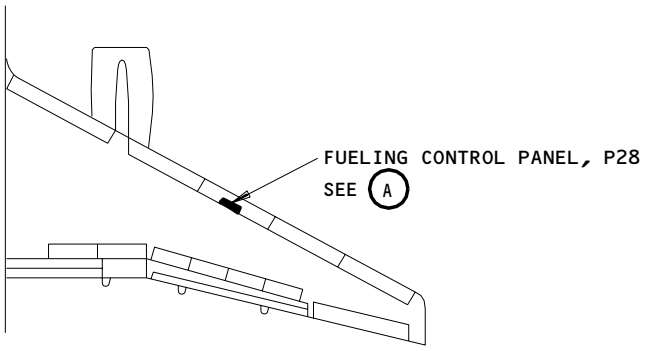
2. Operational Test - Fuel Quantity Indicating System
   A. General
      (1) This procedure contains:
         (a) A check of the load select indicators on the fueling control panel, P28.
         (b) A check of the fuel quantity indicator module (FQIM) in the flight compartment.
         (c) A fuel quantity BITE procedure at the fuel quantity processor unit (FQPU, referred to as "the processor").
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 06-44-00/201, Wing Access Doors and Panels
      (3) AMM 24-22-00/201, Electric Power Control
      (4) FIM 28-41-00/101, Fuel Quantity Indicating System (FQIS)
   C. Access
      (1) Location Zones
         119 Main Equipment Center (Left)
         621 Leading Edge to Front Spar (Right)

      (2) Access Panels
         119BL Electrical/Electronics Access Door
         621GB Fueling Station Door

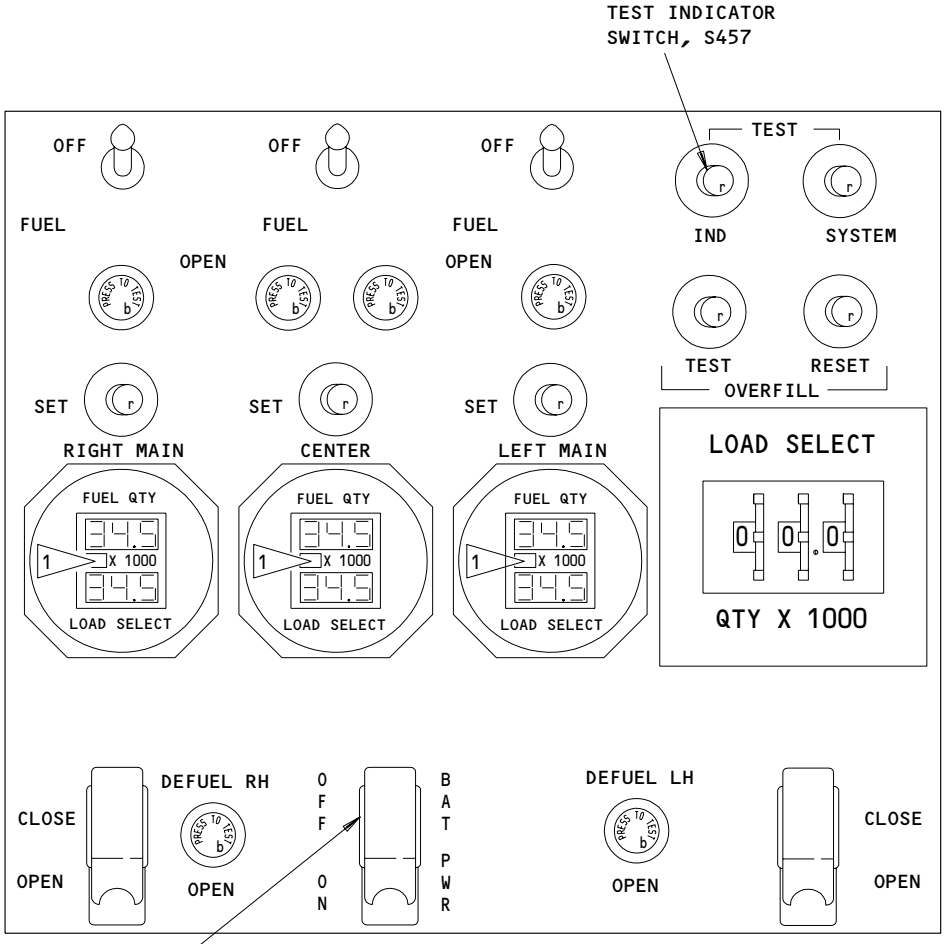
   D. Prepare for Checks

      S 865-002-003
      (1) Supply electrical power (AMM 24-22-00/201).
   E. Check of the Load Select Indicators (Fig. 501)

      S 015-003-003
      (1) Open the fueling station door, 621GB (AMM 06-44-00/201).



RIGHT WING

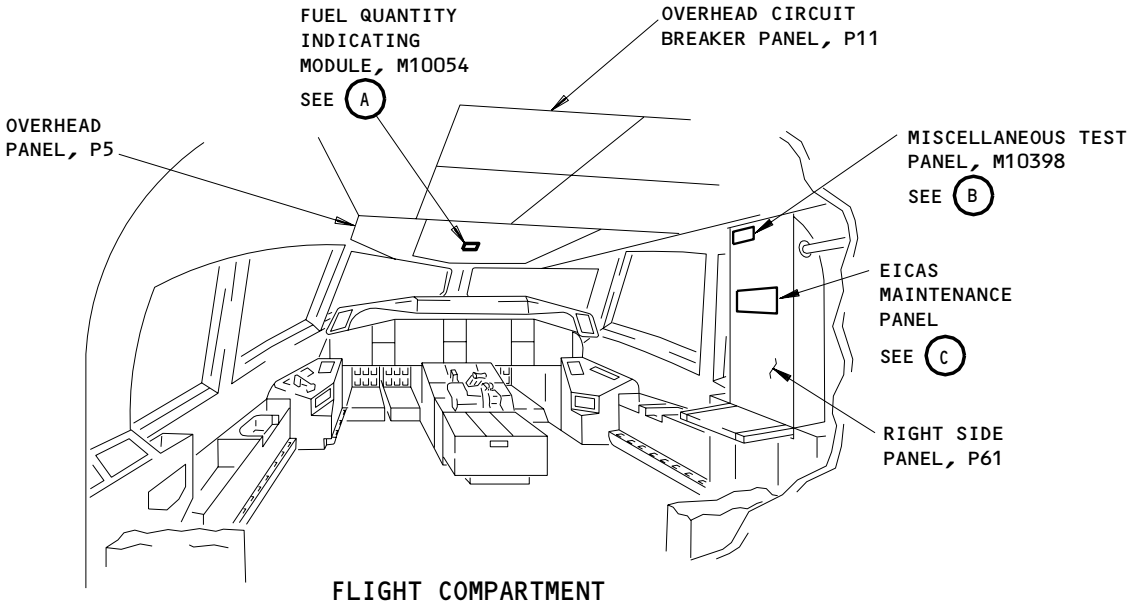


FUELING CONTROL PANEL, P28

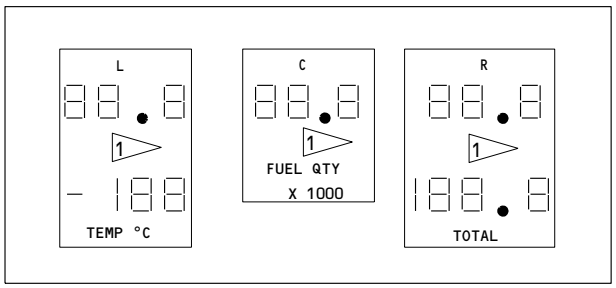
A

1 THE UNITS ARE IN LBS OR KGS.

Fueling Control Panel
Figure 501

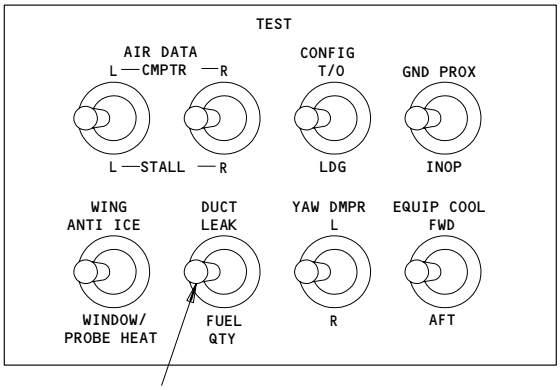


FLIGHT COMPARTMENT



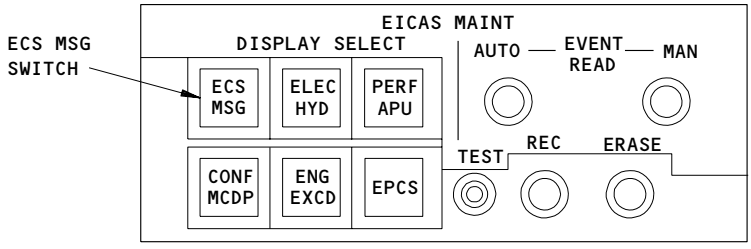
FUEL QUANTITY INDICATING MODULE, M10054

A



MISCELLANEOUS TEST PANEL, M10398
(EXAMPLE PANEL SHOWN)

B

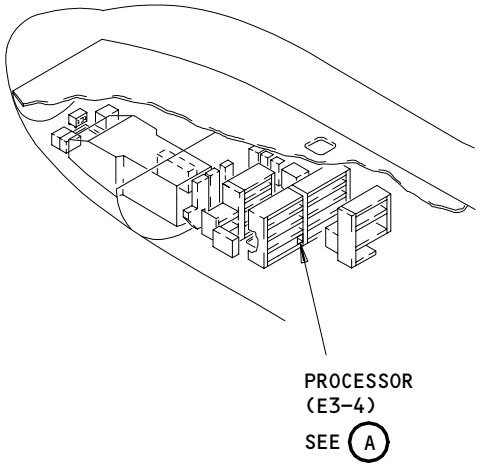


EICAS MAINTENANCE PANEL

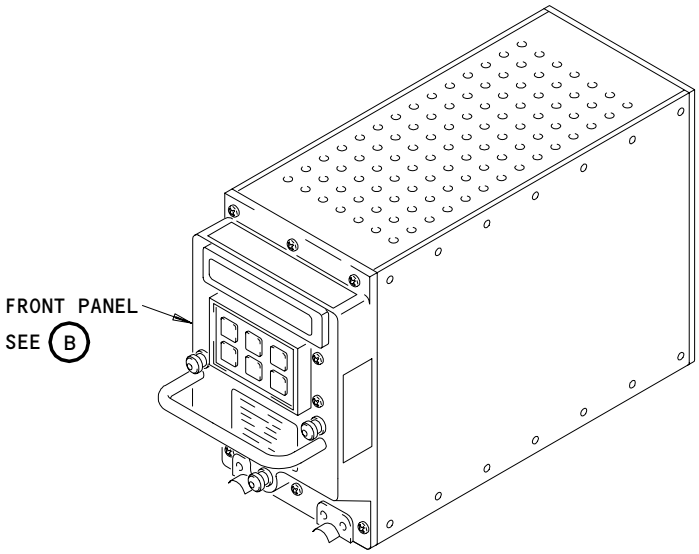
C

1 THE UNITS ARE IN LBS OR KGS.

Fuel Quantity Indicating Module (FQIM)
Figure 502

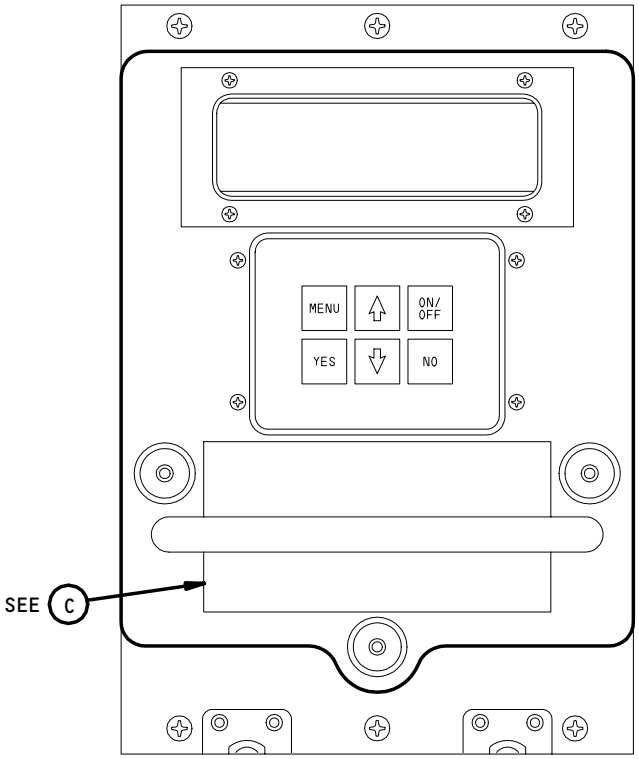


MAIN EQUIPMENT CENTER



PROCESSOR

A



FRONT PANEL

B

INSTRUCTIONS:

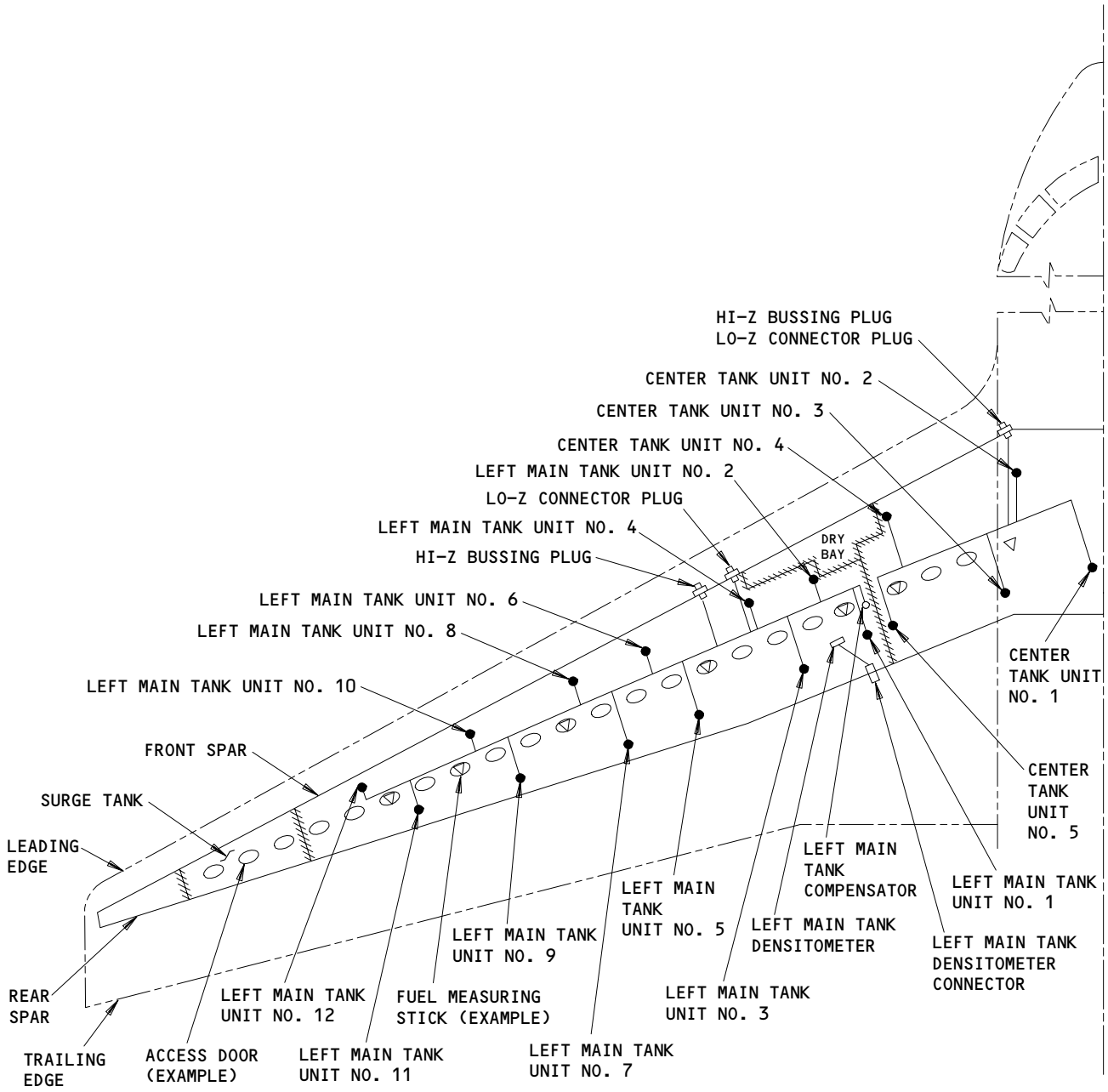
Press ON to start BITE display
Press YES or NO in response to questions (?)
Press ⇧ to display next result
Press ⇩ to display previous result
Press MENU to return to current menu
Press OFF to stop BITE display

PRIMARY BITE MENU OPTIONS:

FAULT HISTORY: Displays past faults by flight leg
SYSTEM DATA: Displays system/LRU Data
SELF TEST: Tests system/LRUs interfaces
SYSTEM CONFIG: Displays system configuration
ERASE FAULT HISTORY:

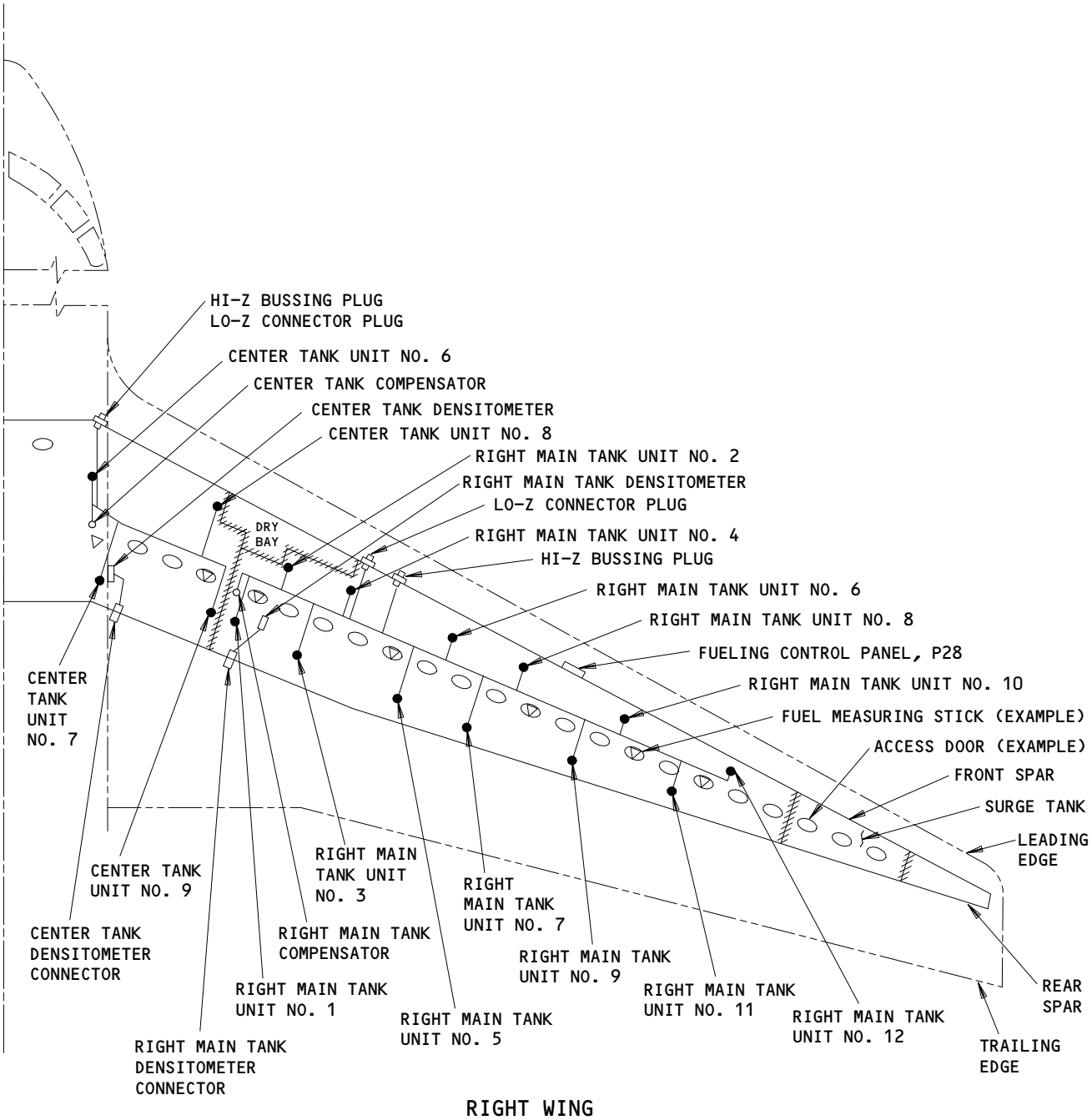
C

Fuel Quantity Processor Unit
Figure 503



LEFT WING

Fuel Quantity Indicating System
Figure 504 (Sheet 1)



RIGHT WING

Fuel Quantity Indicating System
Figure 504 (Sheet 2)

DRY CAPACITANCE TEST IN THE MAIN EQUIPMENT CENTER (NO FUEL IN THE TANK)			
TANK UNIT OR COMPENSATOR UNDER TEST	MINIMUM CAPACITANCE (PICOFARADS)	MAXIMUM CAPACITANCE (PICOFARADS)	EQUIP. NO.
L MAIN TANK UNIT NO. 1	60.55	61.25	TS109
L MAIN TANK UNIT NO. 2	58.25	58.95	TS110
L MAIN TANK UNIT NO. 3	48.70	49.30	TS111
L MAIN TANK UNIT NO. 4	46.80	47.40	TS112
L MAIN TANK UNIT NO. 5	37.20	37.70	TS113
L MAIN TANK UNIT NO. 6	37.20	37.70	TS114
L MAIN TANK UNIT NO. 7	32.95	33.45	TS115
L MAIN TANK UNIT NO. 8	32.15	32.65	TS116
L MAIN TANK UNIT NO. 9	30.65	31.15	TS117
L MAIN TANK UNIT NO. 10	27.00	27.50	TS118
L MAIN TANK UNIT NO. 11	23.35	23.95	TS5196
L MAIN TANK UNIT NO. 12	23.40	23.90	TS5197
CENTER TANK UNIT NO. 1	91.60	92.60	TS5011
CENTER TANK UNIT NO. 2	101.50	102.60	TS5012
CENTER TANK UNIT NO. 3	79.20	80.20	TS5013
CENTER TANK UNIT NO. 4	64.65	65.35	TS5014
CENTER TANK UNIT NO. 5	62.30	63.00	TS5015
CENTER TANK UNIT NO. 6	101.50	102.60	TS5016
CENTER TANK UNIT NO. 7	79.20	80.20	TS5017
CENTER TANK UNIT NO. 8	64.65	65.35	TS5075
CENTER TANK UNIT NO. 9	62.30	63.00	TS5076
R MAIN TANK UNIT NO. 1	60.55	61.25	TS146
R MAIN TANK UNIT NO. 2	58.25	58.95	TS147
R MAIN TANK UNIT NO. 3	48.70	49.30	TS148
R MAIN TANK UNIT NO. 4	46.80	47.40	TS149
R MAIN TANK UNIT NO. 5	37.20	37.70	TS150
R MAIN TANK UNIT NO. 6	37.20	37.70	TS151
R MAIN TANK UNIT NO. 7	32.95	33.45	TS152
R MAIN TANK UNIT NO. 8	32.15	32.65	TS153
R MAIN TANK UNIT NO. 9	30.65	31.15	TS154
R MAIN TANK UNIT NO. 10	27.00	27.50	TS155
R MAIN TANK UNIT NO. 11	23.35	23.95	TS5198
R MAIN TANK UNIT NO. 12	23.40	23.90	TS5199
L MAIN TANK COMPENSATOR	50.20	50.70	TS108
CENTER TANK COMPENSATOR	50.20	50.70	TS5010
R MAIN TANK COMPENSATOR	50.20	50.70	TS119

Dry Capacitance Test in the Main Equipment Center (No Fuel in the Tank)
Figure 505

MEASUREMENT TANK UNIT	LO-Z TO HI-Z	LO-Z TO SHLD	LO-Z TO GND	HI-Z TO GND	HI-Z TO SHLD	SHLD TO GND
L MAIN TANK UNIT NO. 1						
L MAIN TANK UNIT NO. 2						
L MAIN TANK UNIT NO. 3						
L MAIN TANK UNIT NO. 4						
L MAIN TANK UNIT NO. 5						
L MAIN TANK UNIT NO. 6						
L MAIN TANK UNIT NO. 7						
L MAIN TANK UNIT NO. 8						
L MAIN TANK UNIT NO. 9						
L MAIN TANK UNIT NO. 10						
L MAIN TANK UNIT NO. 11						
L MAIN TANK UNIT NO. 12						
COMPENSATOR						

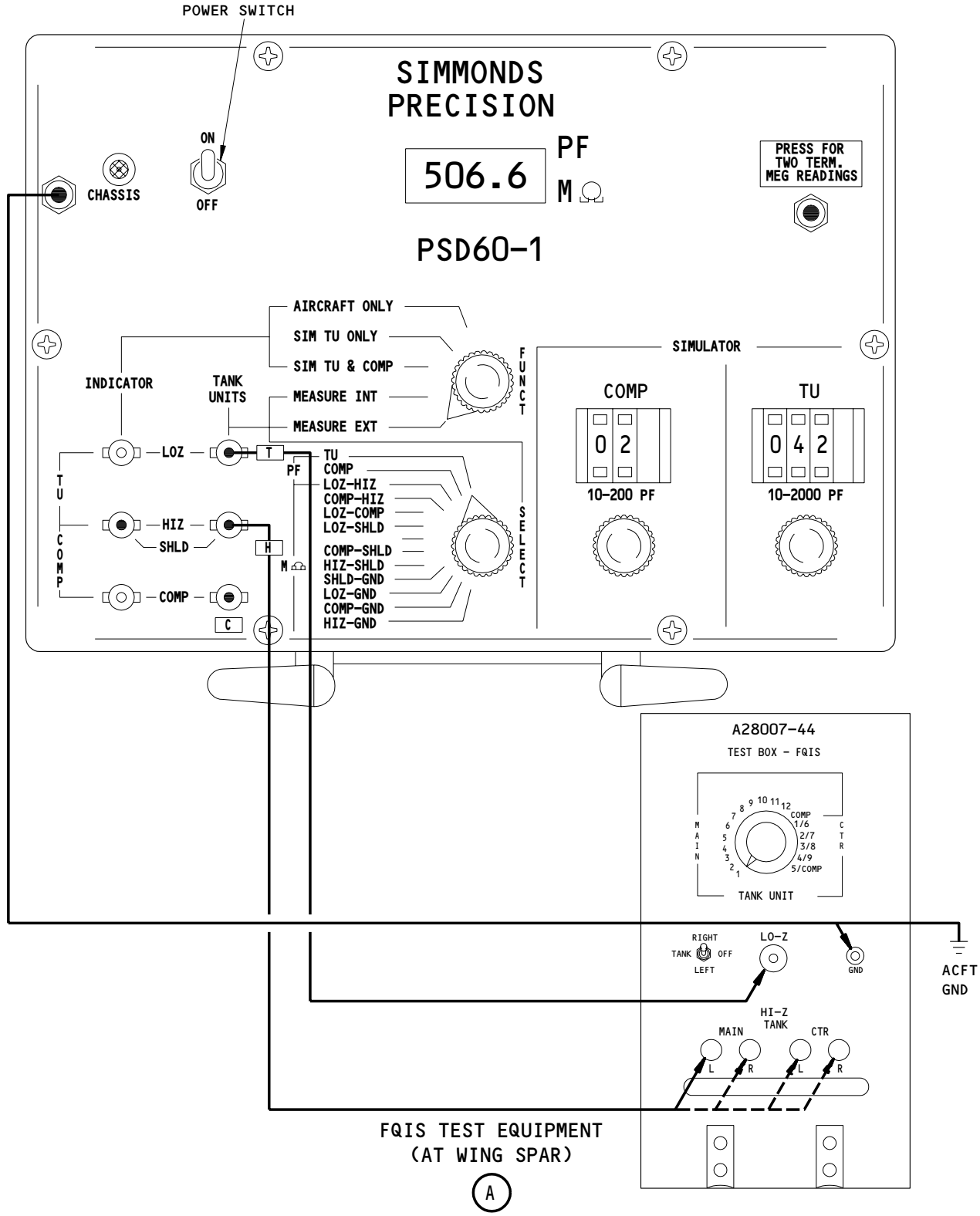
Insulation Resistance Values for the Left Main Tank Wiring
Figure 506

MEASUREMENT TANK UNIT	LO-Z TO HI-Z	LO-Z TO SHLD	LO-Z TO GND	HI-Z TO GND	HI-Z TO SHLD	SHLD TO GND
CENTER TANK UNIT NO. 1						
CENTER TANK UNIT NO. 2						
CENTER TANK UNIT NO. 3						
CENTER TANK UNIT NO. 4						
CENTER TANK UNIT NO. 5						
CENTER TANK UNIT NO. 6						
CENTER TANK UNIT NO. 7						
CENTER TANK UNIT NO. 8						
CENTER TANK UNIT NO. 9						
CENTER TANK COMPENSATOR						

Insulation Resistance Values for the Left and Right Center Tank Wiring
Figure 507

MEASUREMENT TANK UNIT	LO-Z TO HI-Z	LO-Z TO SHLD	LO-Z TO GND	HI-Z TO GND	HI-Z TO SHLD	SHLD TO GND
R MAIN TANK UNIT NO. 1						
R MAIN TANK UNIT NO. 2						
R MAIN TANK UNIT NO. 3						
R MAIN TANK UNIT NO. 4						
R MAIN TANK UNIT NO. 5						
R MAIN TANK UNIT NO. 6						
R MAIN TANK UNIT NO. 7						
R MAIN TANK UNIT NO. 8						
R MAIN TANK UNIT NO. 9						
R MAIN TANK UNIT NO. 10						
R MAIN TANK UNIT NO. 11						
R MAIN TANK UNIT NO. 12						
COMPENSATOR						

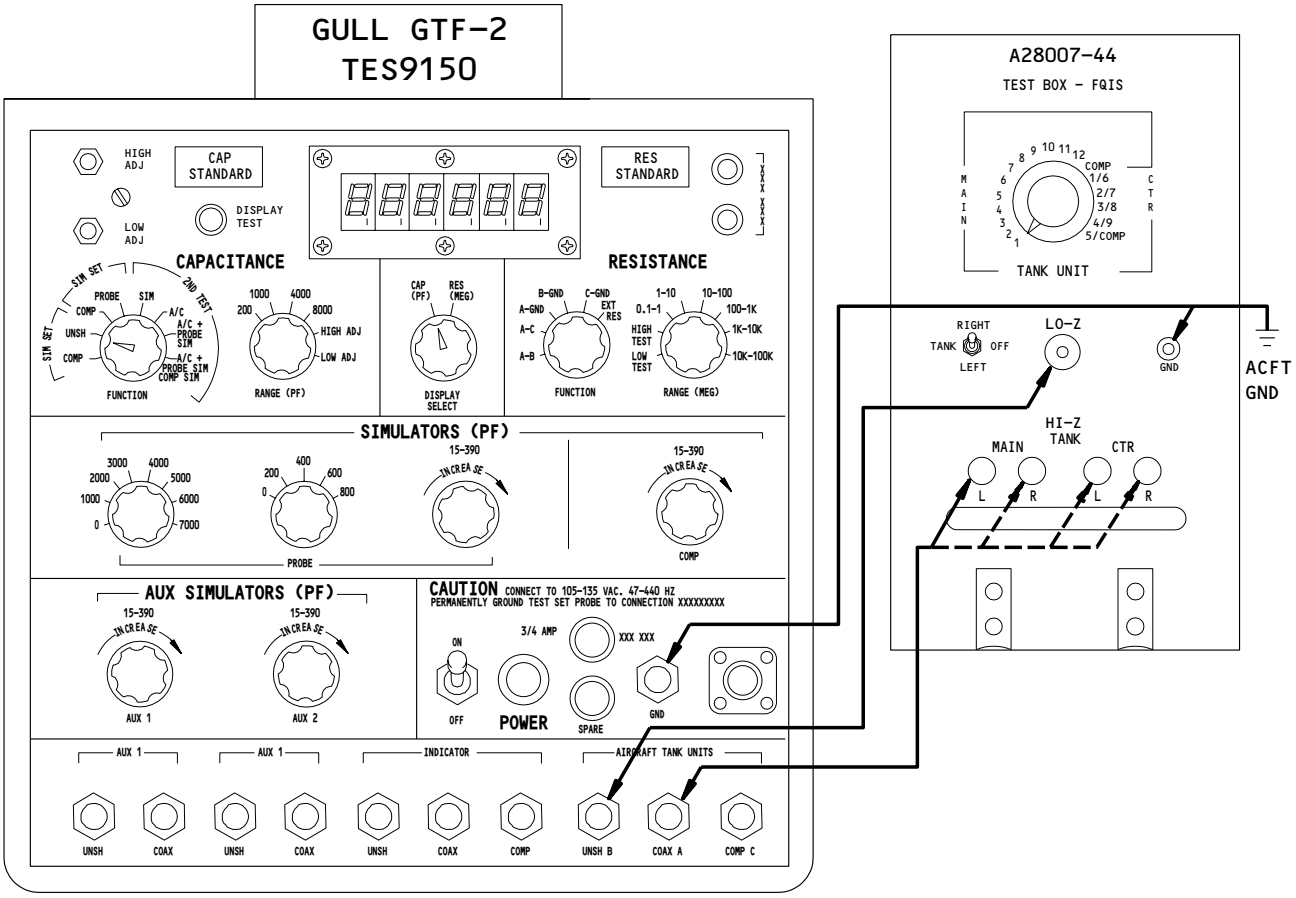
Insulation Resistance Values for the Right Main Tank Wiring
Figure 508



FQIS Test Equipment
Figure 509 (Sheet 1)

EFFECTIVITY
GUI 115

432901



FQIS TEST EQUIPMENT
(AT WING SPAR)

B

FQIS Test Equipment
Figure 509 (Sheet 2)

S 865-004-003
(2) Push and release the TEST IND switch on the fueling control panel, P28.

NOTE: The top and bottom displays will go off for 4 seconds.

S 215-005-003
(3) Make sure the top and bottom displays on all the load select indicators show 888.8.

S 215-006-003
(4) Make sure the bottom display on each load select indicator goes back to its last indication.

S 215-007-003
(5) Make sure the top display on each load select indicator shows the quantity of fuel in each fuel tank.

NOTE: If the message "-A.-", or "-b.-", or "-A.b" shows on the displays, do this procedure: FUEL QUANTITY INDICATING SYSTEM (FIM 28-41-00/101, Fig. 110). If the message "PUSH SET" shows on the display, do this procedure: FUEL TANK PRESSURE FUELING (AMM 12-11-01/301).

S 415-008-003
(6) Close the fueling station door, 621GB (AMM 06-44-00/201).

F. Check of the Fuel Quantity Indicator Module (FQIM) (Fig. 502)

S 215-009-003
(1) Make sure the six EICAS circuit breakers are closed.

S 865-054-003
(2) Push the EICAS Status Display switch on the pilot's control stand, P9.

S 865-010-003
(3) Push the ECS MSG switch on the EICAS MAINT panel on the right side panel, P61.

S 215-011-003
(4) Make sure the EICAS maintenance message, FUEL QTY BITE, does not show on the bottom display.

S 215-012-003

(5) Push and release the FUEL QTY test switch on the right side panel, P61, to the FUEL QTY position, and do these checks:

NOTE: The top and bottom displays will go off for 4 seconds.

(a) Make sure the FUEL CONFIG light on the P5 panel comes on.
(b) Make sure the fuel quantity indicators on the overhead panel, P5, show 88.8.
(c) Make sure the total fuel quantity indicator on the P5 panel shows 188.8.
(d) Make sure the fuel temperature indicator on the P5 panel shows -188.
(e) Make sure the EICAS caution message, LOW FUEL, shows on the top display.
(f) Make sure the EICAS status message, FUEL QTY CHANNEL, shows on the bottom display.
(g) Make sure the EICAS status message, FUEL QTY IND, shows on the bottom display.

S 215-052-003

(6) Make sure all the displays go back to their usual condition.

NOTE: If the message "-A.-", or "-b.-", or "-A.b" shows on the displays, do this procedure: FUEL QUANTITY INDICATING SYSTEM (FIM 28-41-00/101, Fig. 111).

S 865-013-003

(7) Push and release the FUEL QTY test switch on the right side panel, P61, in the FUEL QTY position.

S 865-014-003

(8) Push and release the ECS MSG switch on the EICAS MAINT panel on the right side panel, P61.

S 215-015-003

(9) Make sure the EICAS maintenance message, FUEL QTY BITE, shows on the bottom display.

S 215-016-003

(10) Make sure all the displays go back to their normal condition.

G. Fuel Quantity BITE Procedure (Fig. 503)

S 015-017-003

(1) Open the electrical/electronics access door, 119BL (AMM 06-41-00/201).

S 015-018-003

(2) Go into the main equipment center.

NOTE: The BITE Display Board on the processor will come on during airplane power-up. The menu will be inactive if you push the menu buttons on the processor while in the power-up mode (approximately 90 seconds).

S 715-019-003

(3) FQIS "SELF TEST ?" procedure

(a) On the fuel quantity processor unit (FQPU), push and release the "ON/OFF" button for a minimum of one second.

(b) Make sure the processor display shows "PRESENT_FAULTS_?"

(c) Push and release the "NO" button until the "SELF_TEST_?" message shows.

(d) Push and release the "YES" button.

(e) When the message "BEGIN_SELF_TEST_?" shows, push and release the "YES" button.

NOTE: The self test will use 90 seconds, and the message "TEST_IN_PROGRESS" will show.

(f) Make sure "TEST_COMPLETE_SELF_TEST_PASS" shows on the display.

NOTE: If "TEST_COMPLETE_LIST_FAULTS_?" shows on the display, push and release the "YES" button first and the "DOWN" button next to see the faults. Continue to push and release the "DOWN" button until all the fault messages are shown. Make a written record of the fault messages shown. See the FIM 28-41-00/101 for correction of the fault messages.

(g) Push and release the "DOWN" button.

(h) Make sure the message "END_OF_SELF_TEST" shows on the display.

(i) Push and release the "ON/OFF" button.

(j) Make sure the processor display goes off.

S 415-020-003
(4) Go out of the main equipment center and close the electrical/electronics access door, 119BL.

H. Put the Airplane Back to Its Usual Condition

S 865-021-003
(1) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 28-41-00-725-022-003

3. Comparison Check - Fuel Quantity Indicating System (FQIS) with the Fuel Measuring Sticks

A. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electric Power Control
(3) AMM 28-44-00/201, Fuel Measuring Sticks

B. Access
(1) Location Zones

531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
621	Leading Edge to Front Spar (Right)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panel

621GB	Fueling Station Door

C. Comparison Check of the Fuel Quantity Indicating System (FQIS) with the Fuel Measuring Sticks

S 865-023-003
(1) Supply electrical power (AMM 24-22-00/201).

S 015-024-003
(2) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 975-025-003
(3) Use the fuel measuring sticks to calculate the fuel quantity for each fuel tank (AMM 28-44-00/201).

S 225-026-003

(4) Make sure the difference between the calculated fuel quantity (with the fuel measuring sticks) for each tank and the fuel quantity shown on the load select indicators on the P28 panel and the fuel quantity indicator module (FQIM) on the P5 panel is in the subsequent range:
(a) Main tank +/- 450 lbs (+/- 204 kgs)
(b) Center tank +/- 1000 lbs (+/- 454 kgs)

S 415-027-003

(5) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 865-028-003

(6) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 28-41-00-735-029-003

4. System Test - Fuel Quantity Indicating System

A. General

(1) The FQIS processor, M121, will do a capacitance test of the tank units and compensators.

NOTE: This test is a dry capacitance test (no fuel in the tank).

B. References

(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-26-00/201, Defueling

C. Access

(1) Location Zones

119	Main Equipment Center (Left)
133	Wing Center Section (Left)
134	Wing Center Section (Right)
541	Main Tank - Rib No. 5 to No. 17 (Left)
641	Main Tank - Rib No. 5 to No. 17 (Right)

D. Dry Capacitance Test in the Main Equipment Center (No Fuel in the Tank) (Fig. 503)

S 655-031-003

(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 655-032-003

(2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

S 865-033-003

(3) Push and release the "ON/OFF" button on the processor.

S 215-034-003
(4) Make sure the processor shows "PRESENT_FAULTS_?" on the display.

S 865-035-003
(5) Push and release the "NO" button until "SYSTEM_DATA_?" shows in the display.

S 865-036-003
(6) Push and release the "YES" button.

S 215-037-003
(7) Make sure "UPLIFT_DATA_?" shows in the display.

S 865-038-003
(8) Push and release the "NO" button.

S 215-039-003
(9) Make sure the "MAIN_TANKS_DATA_?" message shows in the display.

S 865-040-003
(10) Push and release the "YES" button to see the left and right fuel tank data.

S 865-041-003
(11) Push and release the "DOWN" button until the message "LEFT_HIZ_RIGHT" shows in the display.

S 975-042-003
(12) Make a written record of the capacitance values.

S 975-043-003
(13) Continue to push and release the "DOWN" button while you make a written record of the capacitance values.

S 865-044-003
(14) When the message "CENTER_DATA_?" shows on the display push and release the "YES" button.

S 865-045-003
(15) Push and release the "DOWN" button until the message "CENTER_HIZ____PF" shows on the display.

S 975-046-003
(16) Make a written record of the capacitance values.

S 975-047-003
(17) Continue to push and release the "DOWN" button while you make a written record of the capacitance values.

S 975-048-003
(18) When the message "END_OF_SYSTEM_DATA" shows on the display make sure all the capacitance values are within the limits in Figure 505.

S 865-049-003
(19) Push and release the "ON/OFF" button on the processor.

S 215-050-003
(20) Make sure the processor display is off.

NOTE: The processor will go off if no buttons are pushed in 10 minutes or less.

S 655-051-003
(21) Refuel the applicable fuel tank, if no more tests are necessary (AMM 12-11-01/301).

TASK 28-41-00-765-056-003

5. Insulation Resistance Test

A. General

(1) This task has three procedures for the measurement of insulation resistance for FQIS wiring:
(a) Insulation resistance test for the left main tank.
(b) Insulation resistance test for the left and right center tank.
(c) Insulation resistance test for the right main tank.
(2) Each of these tests does a test of the insulation resistance for the in-tank wiring and the out-of-tank wiring together and then the in-tank wiring separately.

B. Equipment

(1) Adapter Harness, FQIS Wing Spar (one of these):
(a) P/N 370-044-001, Gull Airborne Instruments, Inc., Engineers Road, Smithtown, NY 11787

NOTE: Use with fuel quantity test set Gull model GTF-2, P/N 361-012-001.

(b) P/N 101-00543, Barfield Instrument Corp., Miami, FL 33142

NOTE: Can be used with fuel quantity test set Barfield model 8000 or fuel quantity test set Gull model GTF-2, P/N 361-012-001.

(c) P/N PSD 60-510/511, JcAir, Inc., 400 Industrial Parkway, Industrial Airport, KS 66031

NOTE: Use with fuel quantity test set Simmonds P/N 472090-007, or P/N 471090-009, or PSD 40-1, 60-1, 60-2, or 60-2R.

(2) Test Box, FQPU Breakout (one of these - for wing spar)
(a) A28007-44 (Part of A28007-41)
(b) PSD757-1, JcAir, Inc.
(3) Test Box, FQPU Breakout - PSD 757/767-1 (for E/E bay), JcAir, Inc., 400 Industrial Parkway, Industrial Airport, KS 66031
(4) Test Set, FQIS Capacitance/Resistance (one of these):
(a) Model GTF-2, P/N 361-012-001, Gull Airborne Instruments, Inc., 55 Engineers Road, Smithtown, NY 11787
(b) Model 8000, Barfield Instrument Corp., Miami, FL 33142
(c) P/N 472090-007, or 472090-009, or PSD 40-1, 60-1, 60-2, or 60-2R, JcAir, Inc., 400 Industrial Parkway, Industrial Airport, KS 66031
(5) Multimeter (for testing wiring out of the fuel tanks only)

C. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 27-81-00/201, Leading Edge Slats
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-26-00/201, Defueling
(5) AMM 28-41-08/401, Fuel Quantity Processor Unit (FQPU)
(6) AMM 28-41-09/401, FQIS Tank Wiring Harness

D. Access
(1) Location Zones
119 Main Equipment Center (Left)
133 Center Wing Section (Left)
134 Center Wing Section (Right)
521 Leading Edge to Front Spar (Left)
621 Leading Edge to Front Spar (Right)

E. Prepare for the Insulation Resistance Test

S 655-057-003

(1) Defuel the applicable fuel tanks (AMM 28-26-00/201).

F. Insulation Resistance Test for the Left Main Tank

S 765-058-003

(1) Do these steps to do a test of the insulation resistance at the E/E bay:

NOTE: These steps measure the insulation resistance of the in-tank and out-of-tank wiring together.

(a) Remove the fuel quantity processor unit (FQPU) (AMM 28-41-08/401).
(b) Install the Test Box in the location of the FQPU in the E3-4 shelf.
(c) Connect the Test Set to the airplane ground.
(d) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the left main tank (Fig. 509).
(e) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and compensator in the left main tank (Fig. 506).
1) Make a written record of each resistance measurement.
(f) Disconnect the test equipment.
(g) Remove the Test Box from the E3-4 shelf.
(h) Install the fuel quantity processor unit (FQPU) in the E3-4 shelf (AMM 28-41-08/401).

S 765-059-003

(2) Do these steps to do an insulation resistance test at the wing spar for the left main tank:

NOTE: These steps measure the insulation resistance of the in-tank wiring and equipment only.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). IF THE LEADING EDGE SLATS MOVE, IT CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Do the leading edge deactivation procedure (AMM 27-81-00/201).

(b) Disconnect the HI-Z bussing plug M722 and the LO-Z connector D2788 at the wing spar.
1) Attach the bussing plug to the airplane structure to make it secure.

NOTE: This will prevent damage to the bussing plug and HI-Z wiring while you do the test.

(c) Connect the Test Set and the Adapter Harness to the HI-Z and LO-Z receptacles at the wing spar (Fig. 509).
(d) Measure each of the resistances shown in Fig. 506 and make a written record of each resistance.
(e) Disconnect the test equipment.
(f) Connect the HI-Z bussing plug, M722, and the LO-Z connector, D2788, at the wing spar again (WDM 28-41-21).

WARNING: DO THE REACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). IF THE LEADING EDGE SLATS MOVE, IT CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(g) Do the leading edge reactivation procedure (AMM 27-81-00/201).

S 765-060-003
(3) Do these steps to use the insulation resistance test results to find problems:
(a) Do these checks of the insulation resistance values:
1) Minimum resistance check:
a) Make sure each resistance value is 20 megohms or more.

NOTE: Insulation resistance values of less than 20 megohms are shown as 0 megohm on PSD 40 and PSD 60 test units.

b) If one or more of the resistance values is less than 20 megohms, the applicable tank wiring harness can affect the FQIS system accuracy and should be replaced (AMM 28-41-09/401).

NOTE: Insulation resistance values less than 100 megohms may indicate a developing wire fault or degrading wiring. If the fuel quantity indicator is fluctuating and one or more of the insulation resistance values are less than 100 megohms, replacement of the applicable tank wiring harness may prevent subsequent problems.

2) Relative comparison resistance check:

NOTE: This check is a relative check. If a BITE message continues to show and the results of this test are negative, and all other troubleshooting recommendations have been tried, replacement of the applicable tank wiring harness may fix the problem.

a) Compare all wire resistance values to make sure that one or more values are not more than 20 percent lower in resistance than the other wires.
b) Replace the applicable tank wiring harness if the fault continues to show and all other fault isolation has been tried (AMM 28-41-09/401).

G. Insulation Resistance Test for the Left and Right Center Fuel Tank

S 765-061-003

(1) Do these steps to do an insulation resistance test at the E/E bay for the left and right auxiliary fuel tanks:

NOTE: These steps do a test of the insulation resistance of the out-of-tank wiring and the in-tank wiring together.

(a) Remove the fuel quantity processor unit (FQPU) (AMM 28-41-08/401).
(b) Install the Test Box in the location of the FQPU in the E3-4 shelf.
(c) Connect the Test Set to the airplane ground.
(d) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the center tank.
(e) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and compensator in the center tank (Fig. 507).
1) Make a written record of each resistance measurement.
(f) Disconnect the test equipment.
(g) Remove the Test Box from the E3-4 shelf.
(h) Install the fuel quantity measurement (FQPU) in the E3-4 shelf (AMM 28-41-08/401).

S 765-062-003

(2) Do these steps to do an insulation resistance test at the wing spar for the left and right center tanks:

NOTE: These steps do an insulation test of the in-tank wiring and equipment only.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). IF THE LEADING EDGE SLATS MOVE, IT CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Do the leading edge deactivation procedure (AMM 27-81-00/201).
(b) Disconnect the HI-Z bussing plugs, M10139 and M10295, and the LO-Z connectors, D2808 and D2784, at the wing spar (WDM 28-41-41).
    1) Attach the bussing plug to the airplane structure to make sure it is secure.

        NOTE: This will prevent damage to the bussing plug and HI-Z wiring while you do the test.

(c) Connect the Test Set and the Adapter Harness to the HI-Z and LO-Z receptacles for the left center tank at the wing spar (Fig. 509).
(d) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units in the left center tank (Fig. 507).
    1) Make a written record of each resistance measurement.
(e) Connect the Test Set and the Adapter Harness to the HI-Z and LO-Z receptacles for the right center tank at the wing spar (Fig. 509).
(f) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and compensator in the right center tank (Fig. 507).
    1) Make a written record of each resistance measurement.
(g) Disconnect the test equipment.
(h) Connect the HI-Z bussing plugs, M10139 and M10295, and the LO-Z connectors, D2808 and D2784, at the wing spar again (WDM 28-41-41).

WARNING: DO THE REACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). IF THE LEADING EDGE SLATS MOVE, IT CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(i) Do the leading edge reactivation procedure (AMM 27-81-00/201).

S 765-063-003

(3) Do these steps to use the insulation resistance test results to find problems:

(a) Do these checks of the insulation resistance values:

1) Minimum resistance check:

a) Make sure each resistance value is 20 megohms or more.

NOTE: Insulation resistance values of less than 20 megohms are shown as 0 megohm on PSD 40 and PSD 60 test units.

b) If one or more of the resistance values is less than 20 megohms, the applicable tank wiring harness can affect the FQIS system accuracy and should be replaced (AMM 28-41-09/401).

NOTE: Insulation resistance values of less than 100 megohms may indicate a developing wire fault or degrading wiring. If the fuel quantity indicator is fluctuating and one or more of the insulation resistance values are less than 100 megohms, replacement of the applicable tank wiring harness may prevent subsequent problems.

2) Relative comparison resistance check:

NOTE: This check is a relative check. If a BITE message continues to show and the results of this test are negative, and all other troubleshooting recommendations have been tried, replacement of the applicable tank wiring harness may fix the problem.

a) Compare all wire resistance values to make sure that one or more values are not more than 20 percent lower in resistance than the other wires.

b) Replace the applicable tank wiring harness if the fault continues to show and all other fault isolation has been tried (AMM 28-41-09/401).

H. Insulation Resistance Test for the Right Main Tank

S 765-064-003

(1) Do these steps to do an insulation resistance test at the E/E bay for the right main tank:

NOTE: These steps do an insulation resistance test of the out-of-tank and the in-tank wiring together.

(a) Remove the fuel quantity processor unit (FQPU) (AMM 28-41-08/401).
(b) Install the Test Box in the location of the FQPU in the E3-4 shelf.
(c) Connect the Test Set to the airplane ground.
(d) Connect the Test Set to the HI-Z and LO-Z connectors on the Test Box (FQPU Breakout) for the right main tank (Fig. 509).
(e) Connect the ground for the Test Set to the ground for the Test Box (FQPU Breakout).
(f) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and compensator in the right main tank (Fig. 508).
1) Make a written record of each resistance measurement.
(g) Disconnect the test equipment.
(h) Remove the Test Box from the E3-4 shelf.
(i) Install the fuel quantity measurement (FQPU) in the E3-4 shelf (AMM 28-41-08/401).

S 765-065-003

(2) Do these steps to do an insulation resistance test at the wing spar for the right main tank:

NOTE: These steps do an insulation resistance test of the in-tank wiring and equipment only.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). IF THE LEADING EDGE SLATS MOVE, IT CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Do the leading edge deactivation procedure (AMM 27-81-00/201).
(b) Disconnect the HI-Z bussing plugs, M723, and the LO-Z connector, D2814, at the wing spar (WDM 28-41-31).
    1) Attach the bussing plug to the airplane structure to make it secure.

        NOTE: This will prevent damage to the bussing plug and HI-Z wiring while you do the test.

(c) Connect the Test Set and the Adapter Harness to the HI-Z and LO-Z receptacles at the wing spar.
(d) Measure the resistance at each setting of the Test Set (LO-Z to HI-Z, LO-Z to SHLD, LO-Z to GND, HI-Z to GND, HI-Z to SHLD, SHLD to GND) for each of the tank units and compensator in the right main tank (Fig. 508).
    1) Make a written record of each resistance measurement.
(e) Disconnect the test equipment.
(f) Connect the HI-Z bussing plug, M723, and the LO-Z connector, D2814, at the wing spar (WDM 28-41-31) again.

WARNING: DO THE REACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS (AMM 27-81-00/201). IF THE LEADING EDGE SLATS MOVE, IT CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(g) Do the leading edge reactivation procedure (AMM 27-81-00/201).

S 765-066-003

(3) Do these steps to use the insulation resistance test results to find problems:
    (a) Do these checks of the insulation resistance values:
        1) Minimum resistance check:
            a) Make sure each resistance value is 20 megohms or more.

                NOTE: Insulation resistance values of less than 20 megohms are shown as 0 megohm on PSD 40 and PSD 60 test units.

b) If one or more of the resistance values is less than 20 megohms, the applicable tank wiring harness can affect the FQIS system accuracy and should be replaced (AMM 28-41-09/401).

NOTE: Insulation resistance values less than 100 megohms may indicate a developing wire fault or degrading wiring. If the fuel quantity indicator is fluctuating and one or more of the insulation resistance values are less than 100 megohms, replacement of the applicable tank wiring harness may prevent subsequent problems.

2) Relative comparison resistance check:

NOTE: This check is a relative check. If a BITE message continues to show and the results of this test are negative, and all other troubleshooting recommendations have been tried, replacement of the applicable tank wiring harness may fix the problem.

a) Compare all wire resistance values to make sure that one or more values are not more than 20 percent lower in resistance than the other wires.
b) Replace the applicable tank wiring harness if the fault continues to show and all other fault isolation has been tried (AMM 28-41-09/401).

FQIS TANK UNIT - REMOVAL/INSTALLATION

1. General
   A. Twelve tank units are installed in each main fuel tank, and nine in the center fuel tank (Fig. 401). All tank units are the same except for length. Tank unit length depends on the fuel tank depth at each location.
   B. This procedure contains two tasks. The first task removes the tank unit. The second task installs the tank unit.

TASK 28-41-01-004-026-002

2. Remove the Tank Unit
   A. References
      (1) AMM 28-11-00/201, Fuel Tank (Purging and Entry)
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

   C. Procedure

S 864-027-002

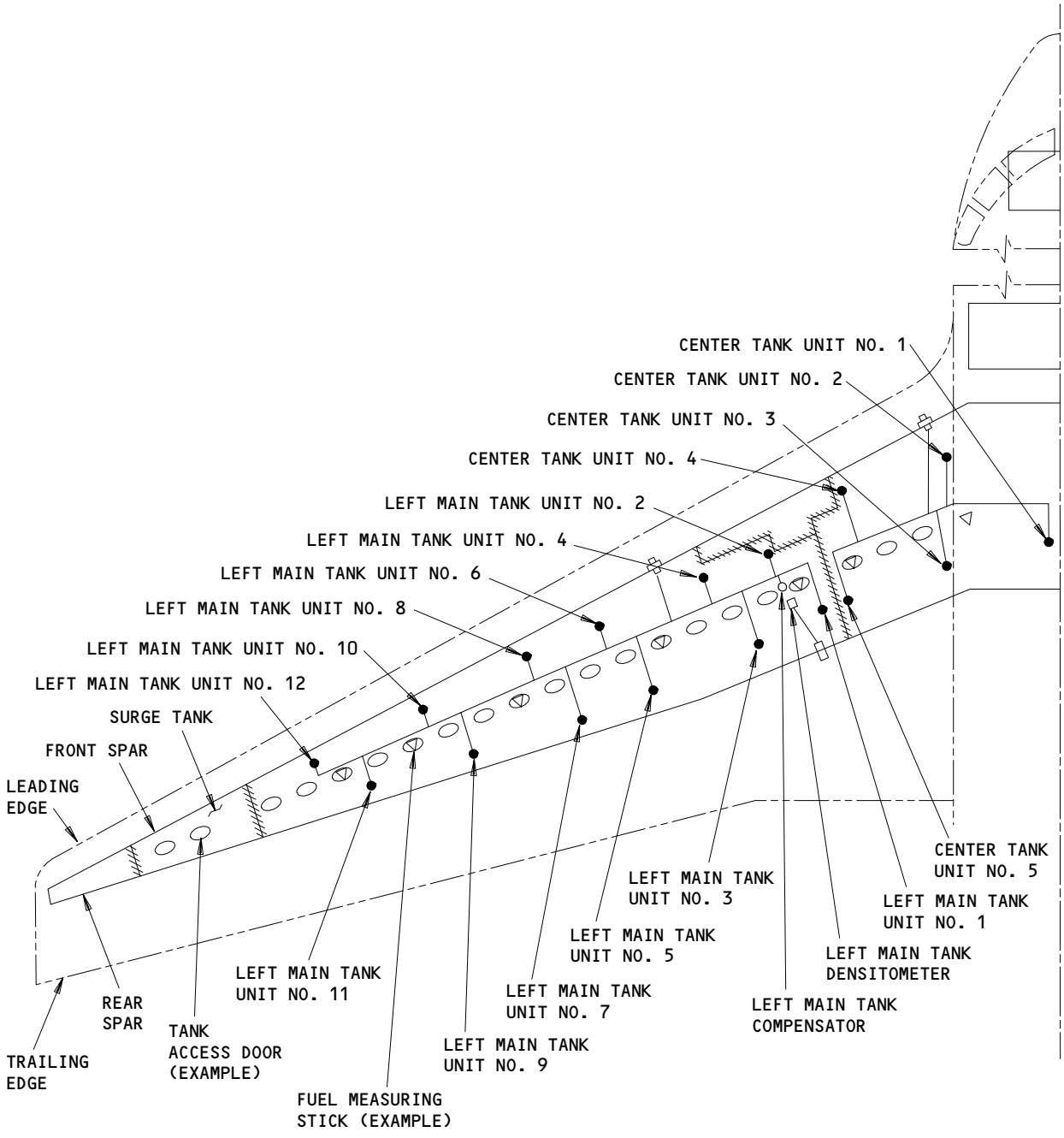
(1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
   (a) 6E4, FUELING QTY

S 864-028-002

(2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11C34, FUEL QTY 1
   (b) 11L19, FUEL QTY 2

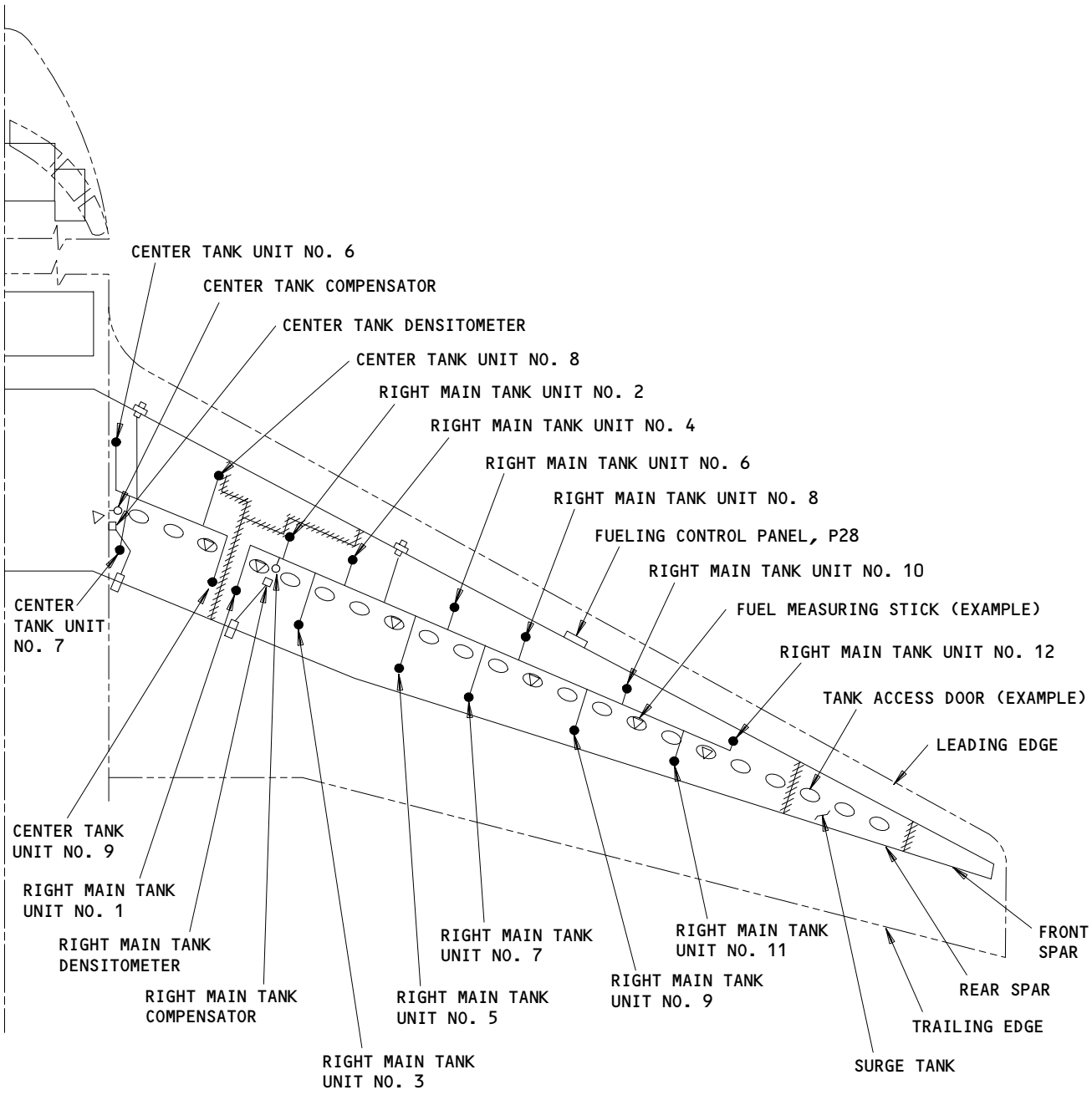
S 864-029-002

(3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
   (a) 34A10, FUEL FUEL QTY



LEFT WING

Tank Unit Location
Figure 401 (Sheet 1)



RIGHT WING

Tank Unit Location
Figure 401 (Sheet 2)

EFFECTIVITY
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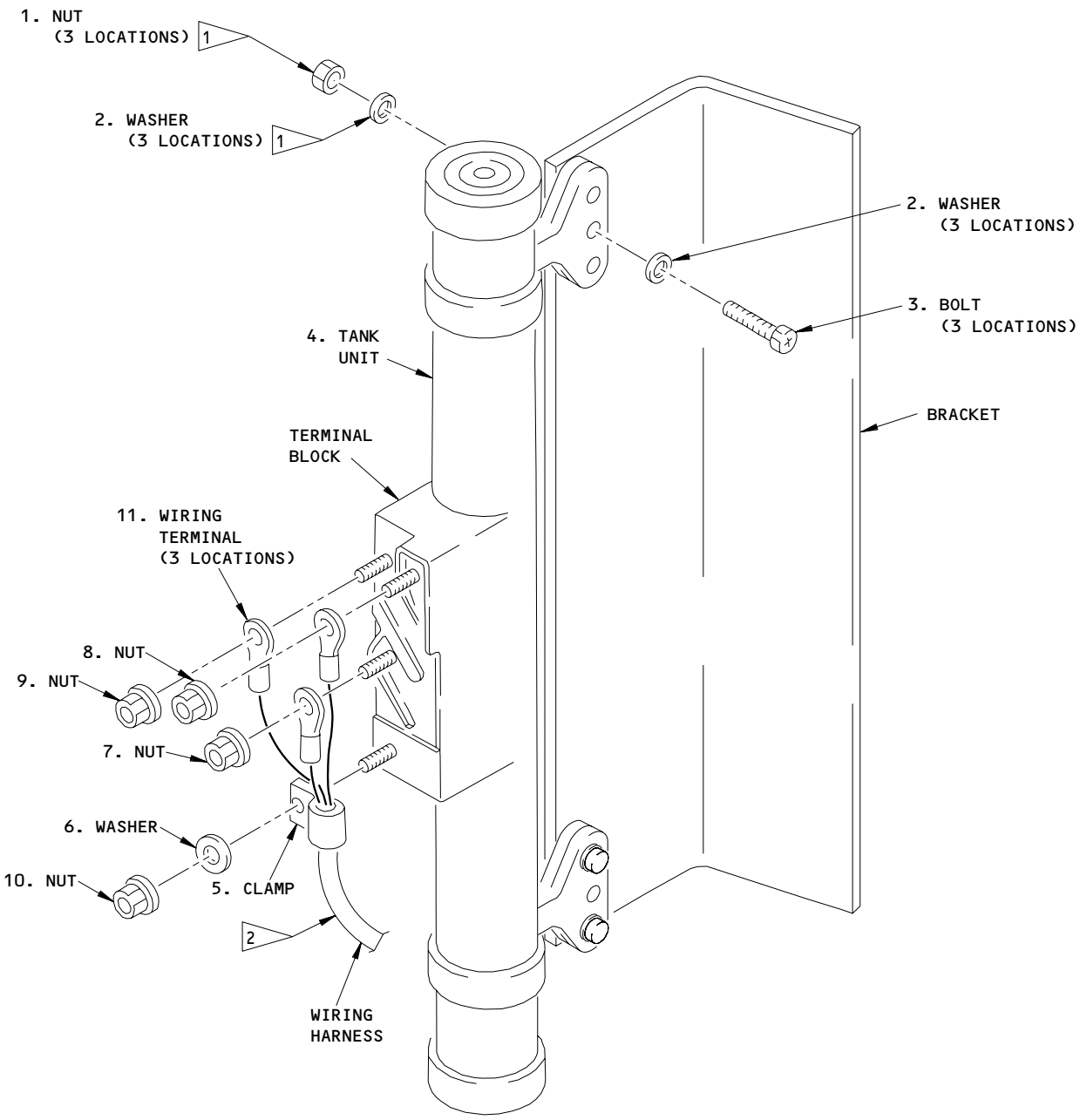


TANK UNIT INSTALLATION
(EXAMPLE)

1 NOT INSTALLED ON ALL AIRPLANES

2 ADJUST WIRE SLACK TO MAINTAIN A CLEARANCE OF 0.5 INCH BETWEEN WIRE AND COMPONENTS OR STRUCTURE. IF 0.5 INCH CLEARANCE IS NOT POSSIBLE YOU MUST MAINTAIN A MINIMUM OF 0.125 INCH.

Tank Unit Installation
Figure 402

TANK UNIT	EQUIPMENT NO.	MAIN OR CENTER TANK ACCESS DOOR
L MAIN TANK UNIT NO. 1	TS109	541AB
L MAIN TANK UNIT NO. 2	TS110	541BB
L MAIN TANK UNIT NO. 3	TS111	541CB
L MAIN TANK UNIT NO. 4	TS112	541DB
L MAIN TANK UNIT NO. 5	TS113	541FB
L MAIN TANK UNIT NO. 6	TS114	541GB
L MAIN TANK UNIT NO. 7	TS115	541HB
L MAIN TANK UNIT NO. 8	TS116	541JB
L MAIN TANK UNIT NO. 9	TS117	541LB
L MAIN TANK UNIT NO. 10	TS118	541MB
L MAIN TANK UNIT NO. 11	TS5196	542AB
L MAIN TANK UNIT NO. 12	TS5197	542CB
CENTER TANK UNIT NO. 1	TS5011	134AZ
CENTER TANK UNIT NO. 2	TS5012	531AB
CENTER TANK UNIT NO. 3	TS5013	531AB
CENTER TANK UNIT NO. 4	TS5014	531BB
CENTER TANK UNIT NO. 5	TS5015	531CB
CENTER TANK UNIT NO. 6	TS5016	631AB
CENTER TANK UNIT NO. 7	TS5017	631AB
CENTER TANK UNIT NO. 8	TS5075	631BB
CENTER TANK UNIT NO. 9	TS5076	631CB
R MAIN TANK UNIT NO. 1	TS146	641AB
R MAIN TANK UNIT NO. 2	TS147	641BB
R MAIN TANK UNIT NO. 3	TS148	641CB
R MAIN TANK UNIT NO. 4	TS149	641DB
R MAIN TANK UNIT NO. 5	TS150	641FB
R MAIN TANK UNIT NO. 6	TS151	641GB
R MAIN TANK UNIT NO. 7	TS152	641HB
R MAIN TANK UNIT NO. 8	TS153	641JB
R MAIN TANK UNIT NO. 9	TS154	641LB
R MAIN TANK UNIT NO. 10	TS155	641MB
R MAIN TANK UNIT NO. 11	TS5198	642AB
R MAIN TANK UNIT NO. 12	TS5199	642CB

Tank Unit Reference Table
Figure 403

S 654-030-002
(4) Defuel the applicable fuel tank (Ref 28-26-00).

S 944-031-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(5) Do the Purging and Fuel Tank Entry procedure (AMM 28-11-00/201).

S 014-032-002
(6) Remove the main or center tank access door nearest to the applicable tank unit (AMM 28-11-01/401, AMM 28-11-02/401) (Fig. 403).

S 014-033-002
(7) Go into the applicable fuel tank.

S 034-034-002
(8) Remove the nuts (7, 8, 9) that attach the wiring terminals (11) to the terminal block on the tank unit (4) (Fig. 402).

S 034-035-002
(9) Remove the nut (10) and washer (6) that attach clamp (5) to the terminal block of of the tank unit (4).

S 034-036-002
(10) Move the clamp (5) and wiring terminals (11) away from the tank unit (4).

S 034-037-002
(11) Remove the bolts (3), washers (2) and nuts (1) that attach the tank unit (4) to the brackets at the top and bottom of the fuel tank.

NOTE: Not all tank units (4) have a washer (2) and nut (1).

S 024-038-002
(12) Remove the tank unit (4).

TASK 28-41-01-404-039-002

3. Install the Tank Unit

A. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
402	4	Tank Unit	28-41-01	10	
		L or R Main Tank Unit No. 1			40
		L or R Main Tank Unit No. 2			65
		L or R Main Tank Unit No. 3			70
		L or R Main Tank Unit No. 4			75
		L or R Main Tank Unit No. 5			110
		L or R Main Tank Unit No. 6			80
		L or R Main Tank Unit No. 7			45
		L or R Main Tank Unit No. 8			85
		L or R Main Tank Unit No. 9			90
		L or R Main Tank Unit No. 10			95
		L or R Main Tank Unit No. 11			130
		L or R Main Tank Unit No. 12			130
		Center Tank Unit No. 1			450
		Center Tank Unit No. 2			455
		Center Tank Unit No. 3			460
		Center Tank Unit No. 4			480
		Center Tank Unit No. 5			500
		Center Tank Unit No. 6			455
		Center Tank Unit No. 7			460
		Center Tank Unit No. 8			480
		Center Tank Unit No. 9			500

B. References

(1) AMM 24-22-00/201, Electrical Power Control

(2) AMM 28-11-00/201, Fuel Tank (Purging and Entry)
(3) AMM 28-11-01/401, Main Tank Access Door
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)
(6) SWPM 20-10-11, Installation of Electrical Wires and Wire Harnesses
(7) SWPM 20-10-12, Wire Harness Supports
(8) SWPM 20-10-19, Wire Separation

C. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

D. Procedure

S 944-040-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(1) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 424-052-002

(2) Put the tank unit (4) in position on the bracket (Fig. 402).

S 434-041-002

(3) Install the bolts (3), washers (2), and nuts (1) to attach the tank unit (4) to the bracket.

NOTE: At the locations where a nutplate is installed, the washer (2) and nut (1) are not necessary.

S 434-042-002

(4) Install the wiring terminals (11) on the terminal posts with the correct dimensions, on the terminal block of the tank unit (4).

NOTE: The terminal posts have different dimensions to prevent errors in installation.

S 434-043-002
(5) Install the nuts (7, 8, 9) to attach the wiring terminals (11) to the terminal block.

S 434-044-002
(6) Tighten the nuts (7, 8, 9) to these limits:

NUT	TORQUE VALUE
HI-Z	12-15 pound-inches
LO-Z	25-35 pound-inches
SHIELD	15-20 pound-inches

S 434-053-002
(7) Put the clamp (5) around the wiring harness (SWPM 20-10-11, SWPM 20-10-12, SWPM 20-10-19).

S 434-054-002
(8) Install the washer (6) and nut (7) to attach the clamp (5) to the terminal block.

NOTE: Adjust wire slack to maintain a clearance of 0.5 inch between wire and components or structure. If 0.5 inch clearance is not possible, you must maintain a minimum of 0.125 inch clearance.

S 224-055-002
(9) Make sure there is a 0.10-inch minimum clearance between the tank unit (4) and all fuel tank structure.

S 214-045-002

CAUTION: MAKE SURE ALL UNWANTED MATERIALS ARE REMOVED FROM IN THE FUEL TANK. UNWANTED MATERIALS CAN CAUSE A BLOCKAGE IN A PUMP.

(10) Make sure you remove all unwanted materials from the fuel tank.

S 414-046-002
(11) Install the main or center tank access door (AMM 28-11-01/401 or AMM 28-11-02/401) (Fig. 403).

S 864-047-002
(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-048-002
(13) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-049-002
(14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 744-050-002
(15) Do the fuel quantity BITE procedure "Self Test ?" (AMM 28-41-00/501).

S 864-051-002
(16) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS TANK UNIT - REMOVAL/INSTALLATION

1. General
   A. Twelve tank units are installed in each main fuel tank, and nine in the center fuel tank (Fig. 401). All tank units are the same except for length. Tank unit length depends on the fuel tank depth at each location.
   B. This procedure contains two tasks. The first task removes the tank unit. The second task installs the tank unit.

TASK 28-41-01-004-001-003

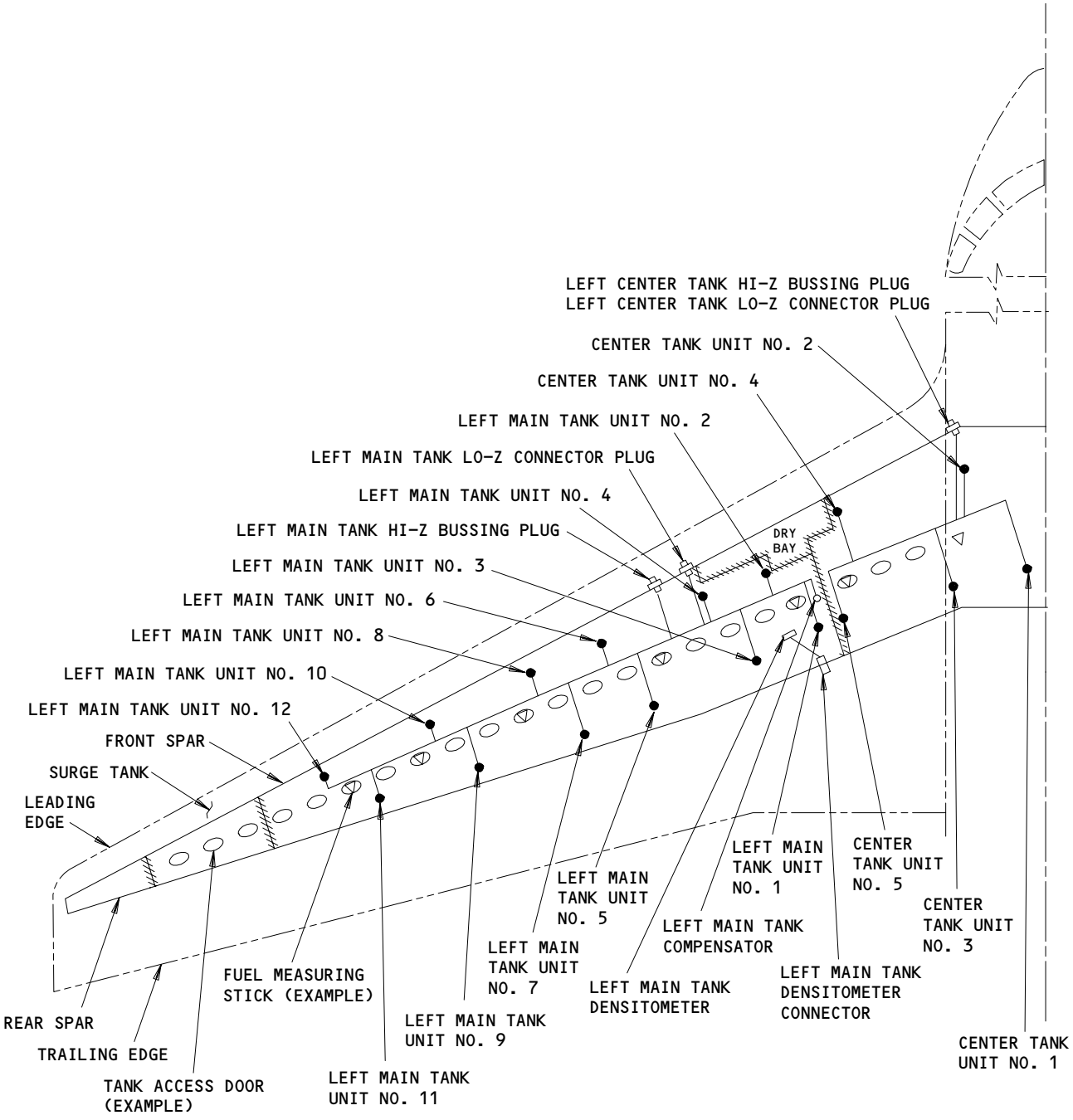
2. Remove the Tank Unit
   A. References
      (1) 28-11-00/201, Fuel Tank (Purging and Entry)
      (2) 28-11-01/401, Main Tank Access Door
      (3) 28-11-02/401, Center Tank Access Door
      (4) 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          531 Center Wing Tank (Left)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          542 Main Tank - Rib No. 17 to No. 21 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)
          642 Main Tank - Rib No. 17 to No. 21 (Right)

   C. Procedure

      S 864-002-003
      (1) Open this circuit breaker on the power distribution panel, P6, and attach DO-NOT-CLOSE tag:
          (a) 6E4, FUELING QTY

      S 864-003-003
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1
          (b) 11L19, FUEL QTY 2

      S 864-004-003
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A10, FUEL FUEL QTY



LEFT WING

Tank Unit Location
Figure 401 (Sheet 1)

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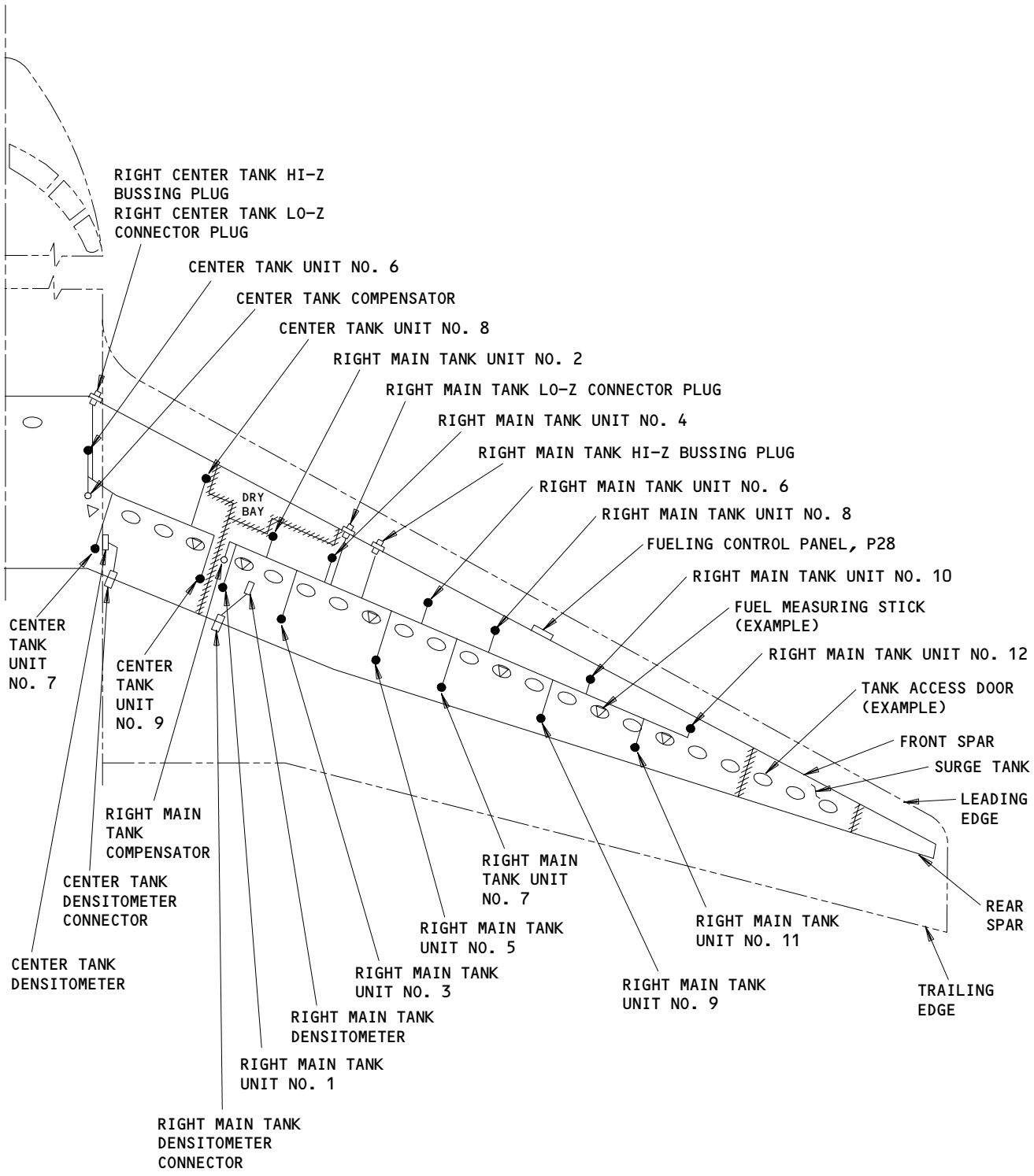

RIGHT WING

Tank Unit Location
Figure 401 (Sheet 2)

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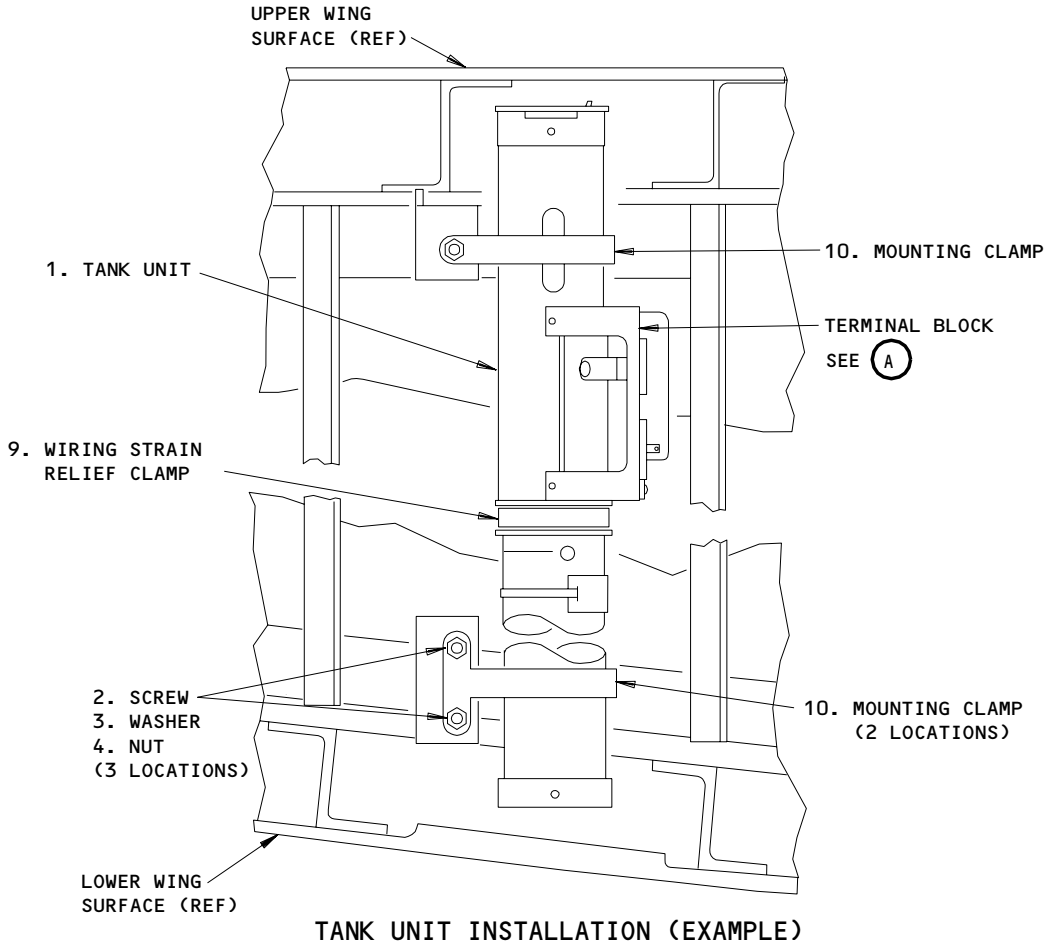
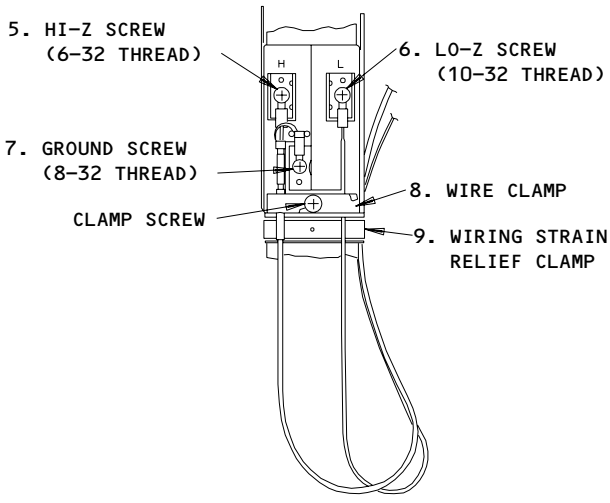


TANK UNIT INSTALLATION (EXAMPLE)



TERMINAL BLOCK
(A)

Tank Unit Installation
Figure 402

TANK UNIT	EQUIPMENT NO.	MAIN OR CENTER TANK ACCESS DOOR
L MAIN TANK UNIT NO. 1	TS109	541AB
L MAIN TANK UNIT NO. 2	TS110	541BB
L MAIN TANK UNIT NO. 3	TS111	541CB
L MAIN TANK UNIT NO. 4	TS112	541DB
L MAIN TANK UNIT NO. 5	TS113	541FB
L MAIN TANK UNIT NO. 6	TS114	541GB
L MAIN TANK UNIT NO. 7	TS115	541HB
L MAIN TANK UNIT NO. 8	TS116	541JB
L MAIN TANK UNIT NO. 9	TS117	541LB
L MAIN TANK UNIT NO. 10	TS118	541MB
L MAIN TANK UNIT NO. 11	TS5196	542AB
L MAIN TANK UNIT NO. 12	TS5197	542CB
CENTER TANK UNIT NO. 1	TS5011	134AZ
CENTER TANK UNIT NO. 2	TS5012	531AB
CENTER TANK UNIT NO. 3	TS5013	531AB
CENTER TANK UNIT NO. 4	TS5014	531BB
CENTER TANK UNIT NO. 5	TS5015	531CB
CENTER TANK UNIT NO. 6	TS5016	631AB
CENTER TANK UNIT NO. 7	TS5017	631AB
CENTER TANK UNIT NO. 8	TS5075	631BB
CENTER TANK UNIT NO. 9	TS5076	631CB
R MAIN TANK UNIT NO. 1	TS146	641AB
R MAIN TANK UNIT NO. 2	TS147	641BB
R MAIN TANK UNIT NO. 3	TS148	641CB
R MAIN TANK UNIT NO. 4	TS149	641DB
R MAIN TANK UNIT NO. 5	TS150	641FB
R MAIN TANK UNIT NO. 6	TS151	641GB
R MAIN TANK UNIT NO. 7	TS152	641HB
R MAIN TANK UNIT NO. 8	TS153	641JB
R MAIN TANK UNIT NO. 9	TS154	641LB
R MAIN TANK UNIT NO. 10	TS155	641MB
R MAIN TANK UNIT NO. 11	TS5198	642AB
R MAIN TANK UNIT NO. 12	TS5199	642CB

Tank Unit Reference Table
Figure 403

S 654-005-003
(4) Defuel the applicable fuel tank (Ref 28-26-00).

S 944-006-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(5) Do the Purging and Fuel Tank Entry Procedure (Ref 28-11-00).

S 014-028-003
(6) Remove the main or center tank access door nearest to the applicable tank unit (Ref 28-11-01, 28-11-02) (Fig. 403).

S 014-007-003
(7) Go into the applicable fuel tank.

S 034-008-003
(8) Remove the HI-Z screw (5), LO-Z screw (6), and ground screw (7) to disconnect the wiring terminals at the tank unit (1) (Fig. 402).

S 034-009-003
(9) Loosen the wire clamp (8) from the terminal block of the tank unit.

S 034-010-003
(10) Loosen the wiring strain relief clamp (9) at the tank unit (1).

S 434-011-003
(11) Move the wiring away from the tank unit (1).

S 034-012-003
(12) Remove the screws (2), washers (3) and nuts (4) that attach the tank unit (1) to the mounting clamps (10) at the top and bottom of the fuel tank.

NOTE: Not all tank units (1) have a washer (3) and nut (4).

S 024-013-003
(13) Remove the tank unit (1).

TASK 28-41-01-404-014-003

3. Install the Tank Unit

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
402	1	Tank Unit	28-41-01	01	
		L or R Main Tank Unit No. 1			95
		L or R Main Tank Unit No. 2			100
		L or R Main Tank Unit No. 3			105
		L or R Main Tank Unit No. 4			110
		L or R Main Tank Unit No. 5			115
		L or R Main Tank Unit No. 6			115
		L or R Main Tank Unit No. 7			120
		L or R Main Tank Unit No. 8			125
		L or R Main Tank Unit No. 9			126
		L or R Main Tank Unit No. 10			127
		L or R Main Tank Unit No. 11			131
		L or R Main Tank Unit No. 12			131
		Center Tank Unit No. 1			200
		Center Tank Unit No. 2			195
		Center Tank Unit No. 3			190
		Center Tank Unit No. 4			185
		Center Tank Unit No. 5			180
		Center Tank Unit No. 6			195
		Center Tank Unit No. 7			190
		Center Tank Unit No. 8			185
		Center Tank Unit No. 9			180
	2	Screw			60,201
	3	Washer			65,202
	4	Nut			70,203

B. References

(1) 24-22-00/201, Electrical Power Control
(2) 28-11-00/201, Fuel Tank (Purging and Entry)
(3) 28-11-01/401, Main Tank Access Door
(4) 28-11-02/401, Center Tank Access Door
(5) 28-41-00/501, Fuel Quantity Indicating System (FQIS)

C. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

D. Procedure

S 944-015-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(1) Obey the Purging and Fuel Tank Entry Precautions (Ref 28-11-00).

S 424-016-003

(2) Put the tank unit (1) in position and install the mounting screws (2, Fig. 402), washers (3), and nuts (4).

NOTE: At the locations where a nutplate is installed, the washer (3) and nut (4) are not necessary.

S 434-017-003

(3) Install the HI-Z screw (5), LO-Z screw (6), and ground screw (7) to connect the wiring terminals to the tank unit (1).

NOTE: The HI-Z screw (5), LO-Z screw (6), and ground screw (7) have different dimensions to prevent errors in installation.

S 434-018-003

(4) Put and hold the wiring on the terminal block.

S 434-019-003

(5) Tighten the wire clamp (8) on the terminal block.

S 434-020-003

(6) Tighten the wiring strain relief clamp (9).

S 214-021-003

CAUTION: MAKE SURE ALL UNWANTED MATERIALS ARE REMOVED FROM IN THE FUEL TANK. UNWANTED MATERIALS CAN CAUSE A BLOCKAGE IN A PUMP.

(7) Make sure you remove all unwanted materials from the fuel tank.

S 414-022-003

(8) Install the main or center tank access door (Ref 28-11-01 or 28-11-02) (Fig. 403).

S 864-023-003

(9) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-024-003

(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-025-003

(11) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 744-026-003

(12) Do the fuel quantity BITE procedure (Ref 28-41-00).

S 864-027-003

(13) Remove electrical power if it is not necessary (Ref 24-22-00).

FQIS COMPENSATOR - REMOVAL/INSTALLATION

1. General
   A. The compensator senses the change in the fuel dielectric.
   B. There are three compensators: one in each main fuel tank and one in the center fuel tank. The compensators are found at the low point in the fuel tank, forward of the densitometers.
   C. This procedure contains two tasks. The first task removes the compensator. The second task installs the compensator.

TASK 28-41-02-004-008-002

2. Remove the Compensator (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tank (Purging and Entry)
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

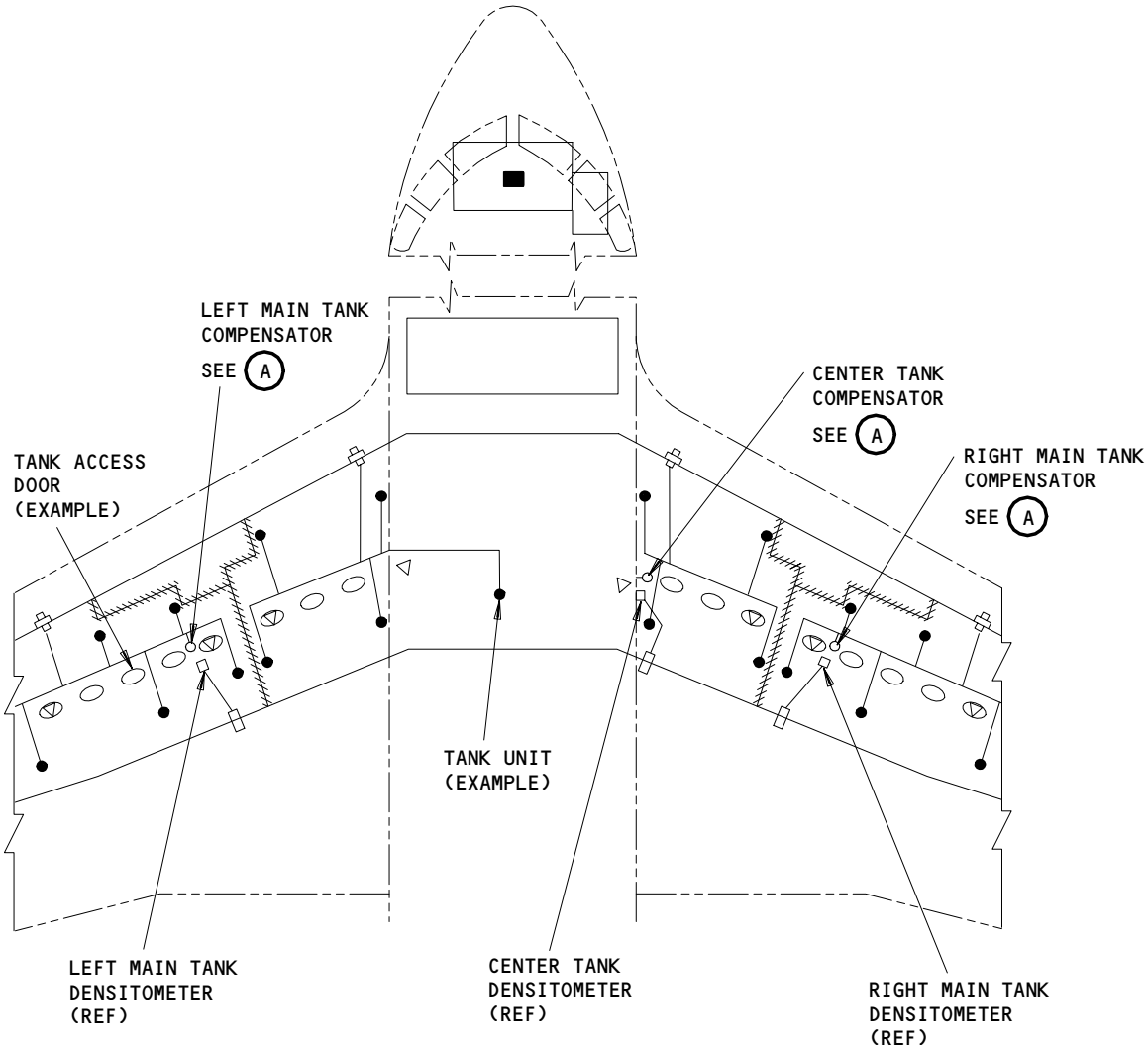
      (2) Access Panels
          541AB Main Tank Access Door (Left)
          631AB Center Tank Access Door (Right)
          641AB Main Tank Access Door (Right)

   C. Procedure

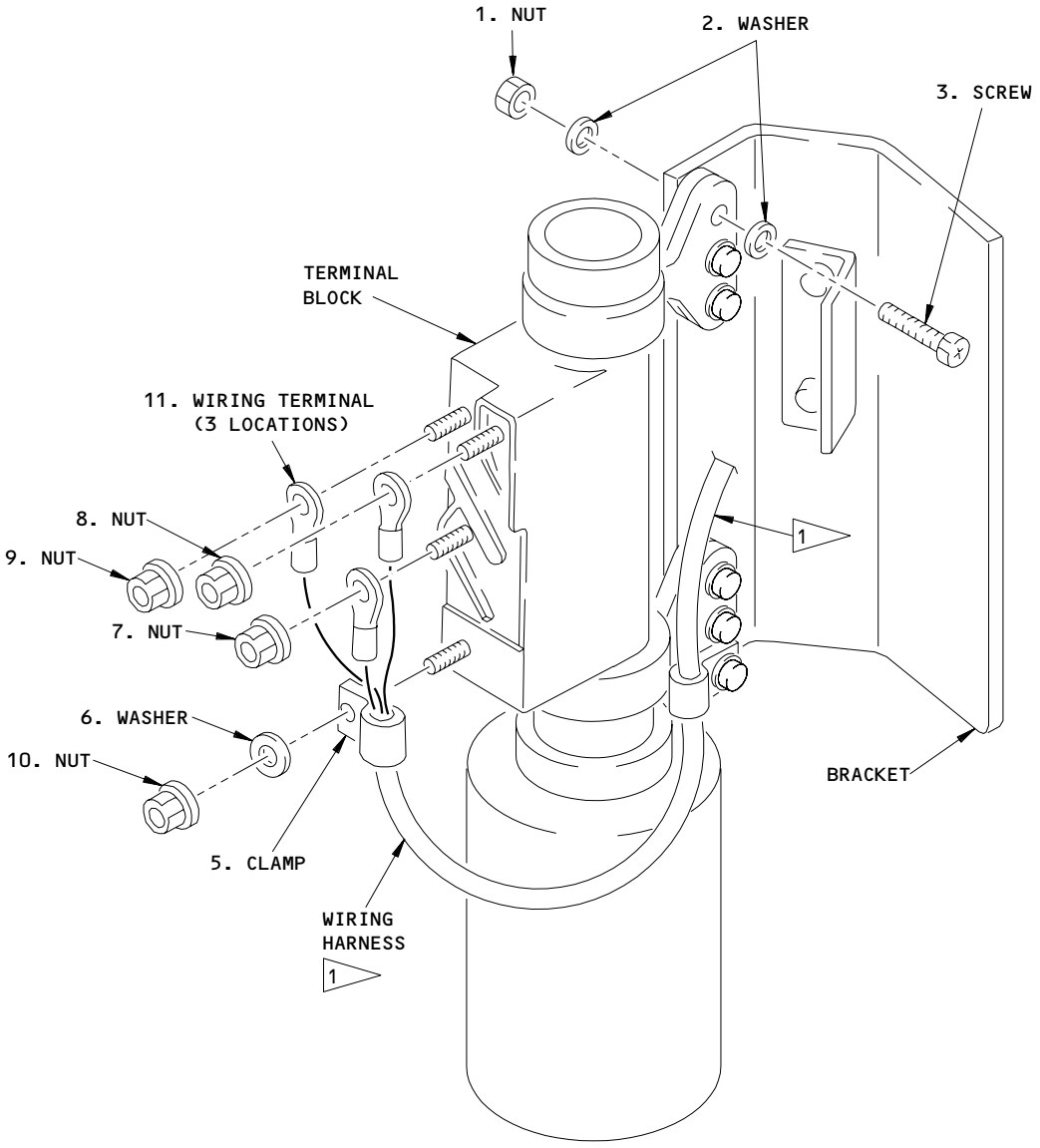
      S 864-009-002
      (1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E4, FUELING QTY

      S 864-010-002
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1
          (b) 11L19, FUEL QTY 2

      S 864-011-002
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A10, FUEL FUEL QTY



Compensator Installation
Figure 401 (Sheet 1)



LEFT MAIN, CENTER OR RIGHT MAIN TANK COMPENSATOR

(A)

1 ADJUST WIRE SLACK TO MAINTAIN A CLEARANCE OF 0.5 INCH BETWEEN WIRE AND COMPONENTS OR STRUCTURE. IF 0.5 INCH CLEARANCE IS NOT POSSIBLE YOU MUST MAINTAIN A MINIMUM OF 0.125 INCH.

Compensator Installation
Figure 401 (Sheet 2)

S 654-012-002

(4) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 654-043-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(5) Do the Purging and Fuel Tank Entry procedure (AMM 28-11-00/201).

S 014-038-002

CAUTION: BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOOR, 541AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(6) For the left main tank compensator (4), remove the left main tank access door, 541AB (AMM 28-11-01/401).

S 014-039-002

CAUTION: BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOOR, 641AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(7) For the right main tank compensator (4), remove the right main tank access door, 641AB (AMM 28-11-01/401).

S 014-014-002

(8) For the center tank compensator (4), remove the center tank access door, 631AB (AMM 28-11-02/401).

S 944-015-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(9) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 014-016-002

(10) Go into the applicable fuel tank.

S 034-017-002
(11) Remove the nuts (7, 8, 9) to disconnect the wiring terminals (11) from the terminal block on the compensator (4) (View A, Fig. 401).

S 034-018-002
(12) Remove the nut (10) and washer (6) that attach the clamp (5) to the terminal block on the compensator (4).

S 034-019-002
(13) Remove the clamp (5) and wiring terminals (11) from the compensator (4).

S 034-020-002
(14) Remove the screws (3), washers (2), and nuts (1) that attach the compensator (4) to the bracket.

S 024-021-002
(15) Remove the compensator (4) from the fuel tank.

TASK 28-41-02-404-022-002

3. Install the Compensator (Fig. 401)

A. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	4	Compensator	28-41-02	03	10,205

B. References
(1) AMM 24-22-00/201, Electrical Power Control
(2) AMM 28-11-00/201, Fuel Tank (Purging and Entry)
(3) AMM 28-11-01/401, Main Tank Access Door
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

(6) SWPM 20-10-11, Installation of Electrical Wires and Wire Harnesses
(7) SWPM 20-10-12, Wire Harness Support
(8) SWPM 20-10-19, Wire Seperation

C. Access

(1) Location Zones

541	Main Tank - Rib No. 5 to No. 17 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

541AB	Main Tank Acces Door (Left)
631AB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)

D. Procedure

S 944-023-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(1) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 424-024-002

(2) Put the compensator (4) in position on the bracket (View A, Fig. 401).

S 434-040-002

(3) Install the screws (3), washers (2) and nuts (1) to attach the compensator (4) to the bracket.

S 434-025-002

(4) Install the wiring terminals (11) on the terminal posts with the correct dimensions, on the terminal block of the compensator (4).

NOTE: The terminal posts have different dimensions to prevent errors in installation.

S 434-026-002

(5) Install the nuts (7, 8, 9) to attach the wiring terminals (11) to the terminal block.

S 434-027-002

(6) Tighten the nuts (7, 8, 9) to these limits:

NUT	TORQUE VALUE
HI-Z	12-15 pound-inches
LO-Z	25-35 pound-inches
SHIELD	15-20 pound-inches

S 434-041-002

(7) Put the clamp (5) around the wiring harness (SWPM 20-10-12).

S 434-028-002

(8) Install the washer (6) and nut (10) to attach the clamp (5) to the terminal block.

NOTE: Adjust wire slack to maintain a clearance of 0.5 inch between the wire and components or structure. If 0.5 inch clearance is not possible, you must maintain a minimum of 0.125 inch clearance.

S 224-042-002

(9) Make sure there is a 0.10-inch minimum clearance between the compensator (4) and all fuel tank structure.

S 214-029-002

CAUTION: MAKE SURE ALL UNWANTED MATERIALS ARE REMOVED FROM THE FUEL TANK. UNWANTED MATERIALS CAN CAUSE A BLOCKAGE IN A PUMP.

(10) Make sure you remove all unwanted materials from the fuel tank.

S 414-030-002

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOOR, 541AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(11) For the left main tank compensator (4), install the left main tank access door, 541AB (AMM 28-11-01/401).

S 414-031-002

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOOR, 641AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(12) For the right main tank compensator (4), install the right main tank access door, 641AB (AMM 28-11-01/401).

S 414-032-002

(13) For the center tank compensator (4), install the center tank access door, 631AB (AMM 28-11-02/401).

S 864-033-002

(14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-034-002

(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-035-002

(16) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 744-036-002

(17) Do the fuel quantity BITE procedure "Self Test ?" (AMM 28-41-00/501).

S 864-037-002

(18) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS COMPENSATOR - REMOVAL/INSTALLATION

1. General
   A. A compensator is installed at the bottom of each fuel tank, where it senses the change in the fuel dielectric.
   B. This procedure contains two tasks. The first task removes the compensator. The second task installs the compensator.

TASK 28-41-02-004-001-003

2. Remove the Compensator (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tank (Purging and Entry)
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panels
          541AB Main Tank Access Door (Left)
          631AB Center Tank Access Door (Right)
          641AB Main Tank Access Door (Right)

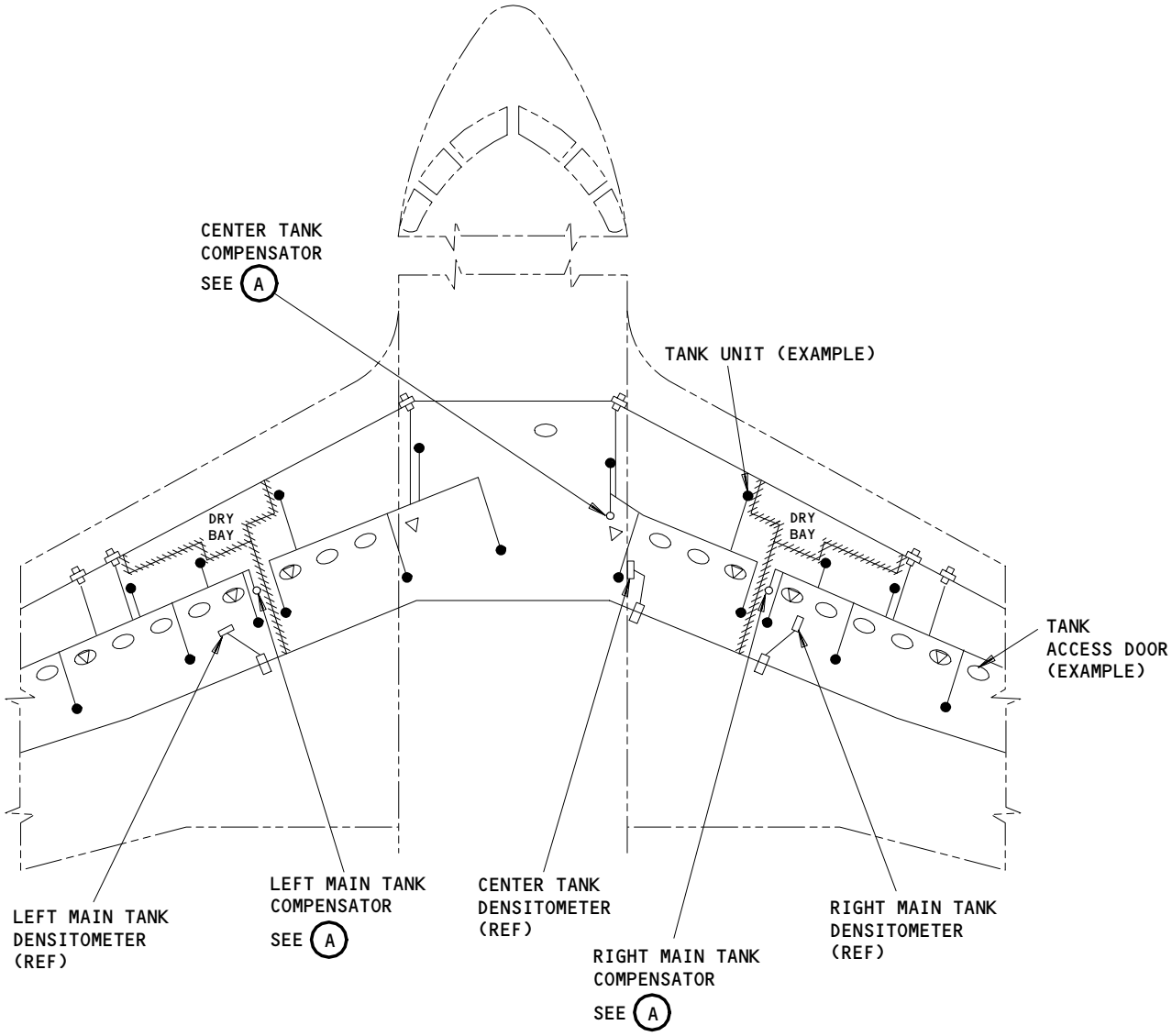
   C. Procedure

      S 864-002-003
      (1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E4, FUELING QTY

      S 864-003-003
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1
          (b) 11L19, FUEL QTY 2

      S 864-004-003
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A10, FUEL FUEL QTY

      S 654-005-003
      (4) Defuel the applicable fuel tank (AMM 28-26-00/201).



Compensator Installation
Figure 401 (Sheet 1)

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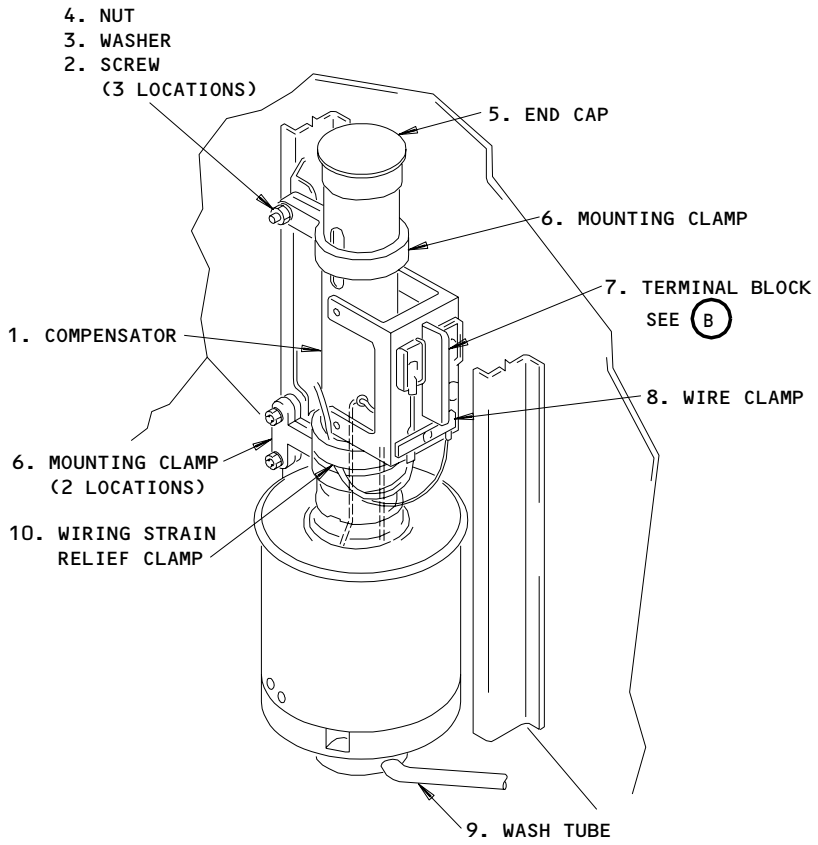
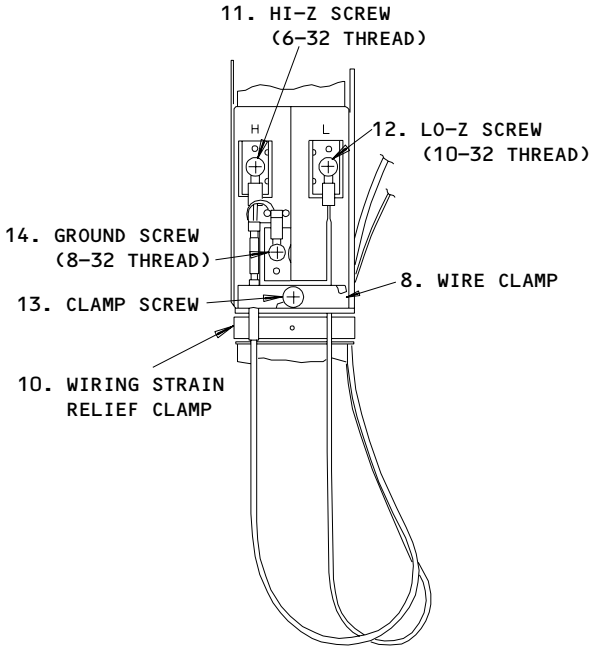


LEFT MAIN, CENTER OR RIGHT MAIN TANK
COMPENSATOR
A



TERMINAL BLOCK
B

Compensator Installation
Figure 401 (Sheet 2)

S 654-006-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(5) Do the Purging and Fuel Tank Entry procedure (AMM 28-11-00/201).

S 014-007-003

(6) For the main tank compensator (1), remove the left or right main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 014-008-003

(7) For the center tank compensator (1), remove the center tank access door, 631AB (AMM 28-11-02/401).

S 944-009-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(8) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 014-010-003

(9) Go into the applicable fuel tank.

S 034-011-003

(10) Remove the HI-Z screw (11), LO-Z screw (12) and ground screw (14) to disconnect the wiring terminals from the terminal block (7).

S 034-012-003

(11) Loosen the wire clamp (8) at the terminal block (7) of the compensator (1).

S 034-013-003

(12) Loosen the wiring strain relief clamp (10) on the compensator (1).

S 034-014-003

(13) Move the wiring away from the compensator (1).

S 034-015-003

(14) Remove the screws (2), washers (3), and nuts (4) that attach the compensator mounting clamps (6) to the support structure.

S 024-016-003

(15) Remove the compensator (1).

TASK 28-41-02-404-017-003

3. Install the Compensator (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Compensator	28-41-02	02	25,105

B. References

(1) AMM 24-22-00/201, Electrical Power Control
(2) AMM 28-11-00/201, Fuel Tank (Purging and Entry)
(3) AMM 28-11-01/401, Main Tank Access Door
(4) AMM 28-11-02/401, Center Tank Access Door
(5) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

C. Access

(1) Location Zones

541 Main Tank - Rib No. 5 to No. 17 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

541AB Main Tank Acces Door (Left)
631AB Center Tank Access Door (Right)
641AB Main Tank Access Door (Right)

D. Procedure

S 944-018-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY OR DAMAGE.

(1) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 424-019-003
(2) Put the compensator (1) in position and align the mounting clamps (6) with the support structure.

S 434-020-003
(3) Install the screws (2), washers (3), and nuts (4) to attach the mounting clamps (6) to the support structure.

S 434-021-003
(4) Install the HI-Z screw (11), LO-Z screw (12) and ground screw (14) to connect the wiring terminals to the terminal block (7) of the compensator (1).

NOTE: The HI-Z screw (11), LO-Z screw (12) and ground screw (14) have different dimensions to prevent errors in installation.

S 434-022-003
(5) Put and hold the wiring on the terminal block (7).

S 434-023-003
(6) Tighten the wire clamp (8) on the terminal block (7).

S 434-024-003
(7) Tighten the wiring strain relief clamp (10) on the compensator (1).

S 214-025-003

CAUTION: MAKE SURE ALL UNWANTED MATERIALS ARE REMOVED FROM THE FUEL TANK. UNWANTED MATERIALS CAN CAUSE A BLOCKAGE IN A PUMP.

(8) Make sure you remove all unwanted materials from the fuel tank.

S 414-026-003
(9) For the main tank compensator (1), install the left or right main tank access door, 541AB or 641AB (AMM 28-11-01/401).

S 414-027-003
(10) For the center tank compensator (1), install the center tank access door, 631AB (AMM 28-11-02/401).

S 864-028-003
(11) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-029-003
(12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-030-003
(13) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 744-031-003
(14) Do the fuel quantity BITE procedure (AMM 28-41-00/501).

S 864-032-003
(15) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS DENSITOMETER - REMOVAL/INSTALLATION

1. General
   A. The densitometer gives fuel density information to the FQIS processor for fuel quantity calculation.
   B. There are three densitometers. One in each main fuel tank, and one in the center fuel tank. The densitometers are found at the low point in the fuel tank, aft of the compensators.
   C. This procedure contains two tasks. The first task removes the densitometer. The second task installs the densitometer.

TASK 28-41-03-004-001-002

2. Remove the Densitometer (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panels
          541AB Main Tank Access Door (Left)
          631AB Center Tank Access Door (Right)
          641AB Main Tank Access Door (Right)

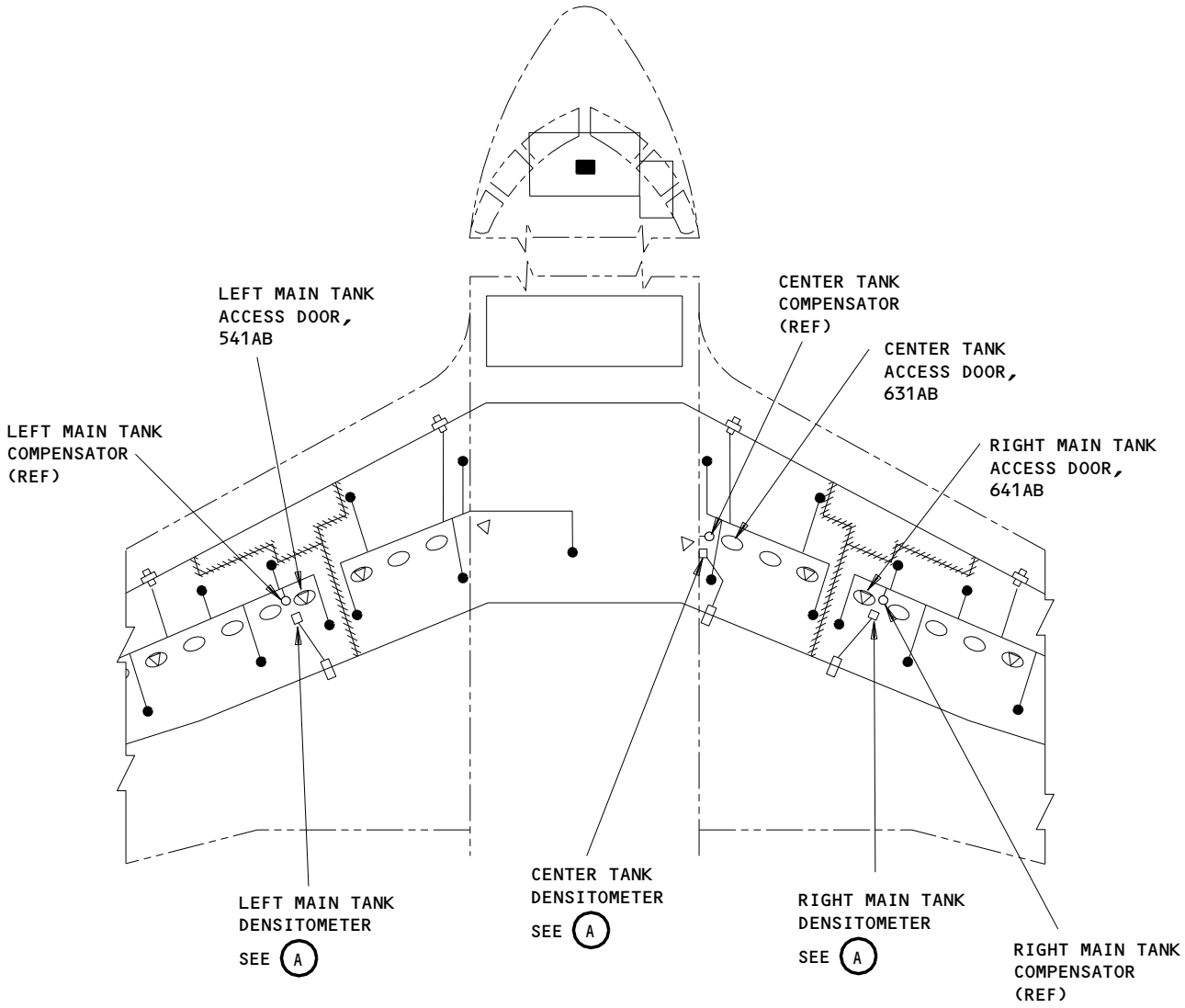
   C. Procedure

      S 654-002-002
      (1) Defuel the applicable fuel tank (AMM 28-26-00/201).

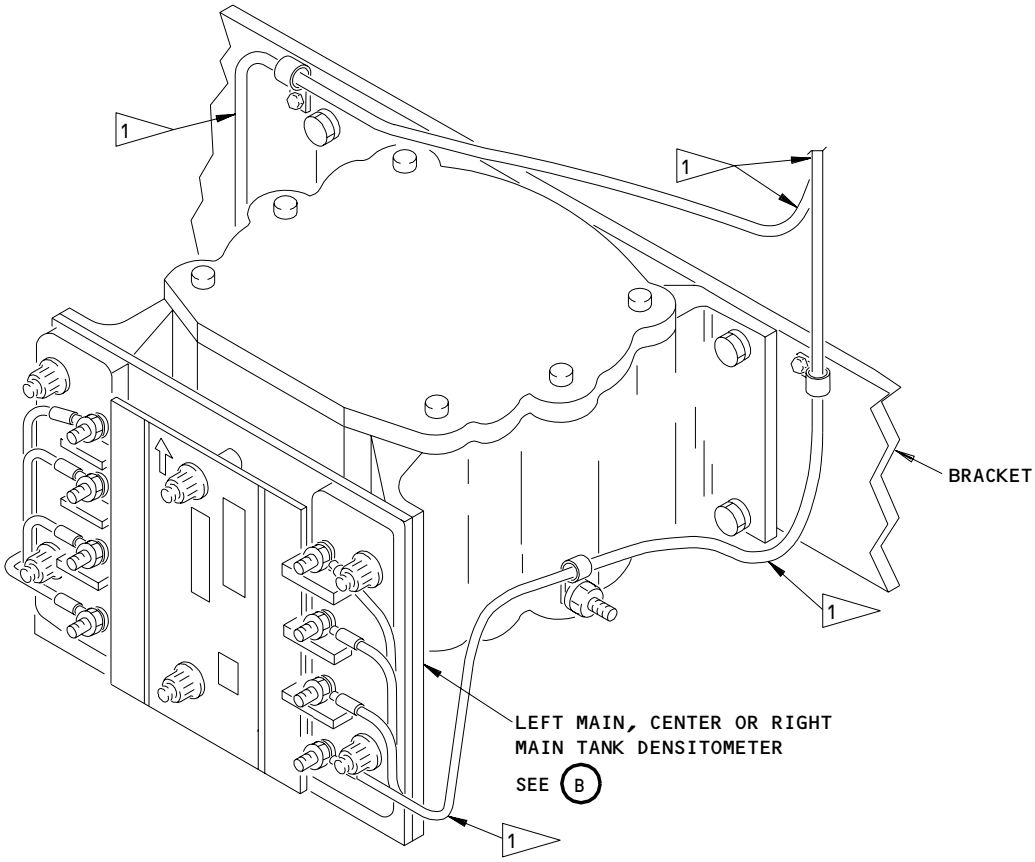
      S 654-003-002

      WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PRECAUTIONS COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Do the Purging and Fuel Tank Entry procedure for the applicable fuel tank (AMM 28-11-00/201).



Densitometer Installation
Figure 401 (Sheet 1)

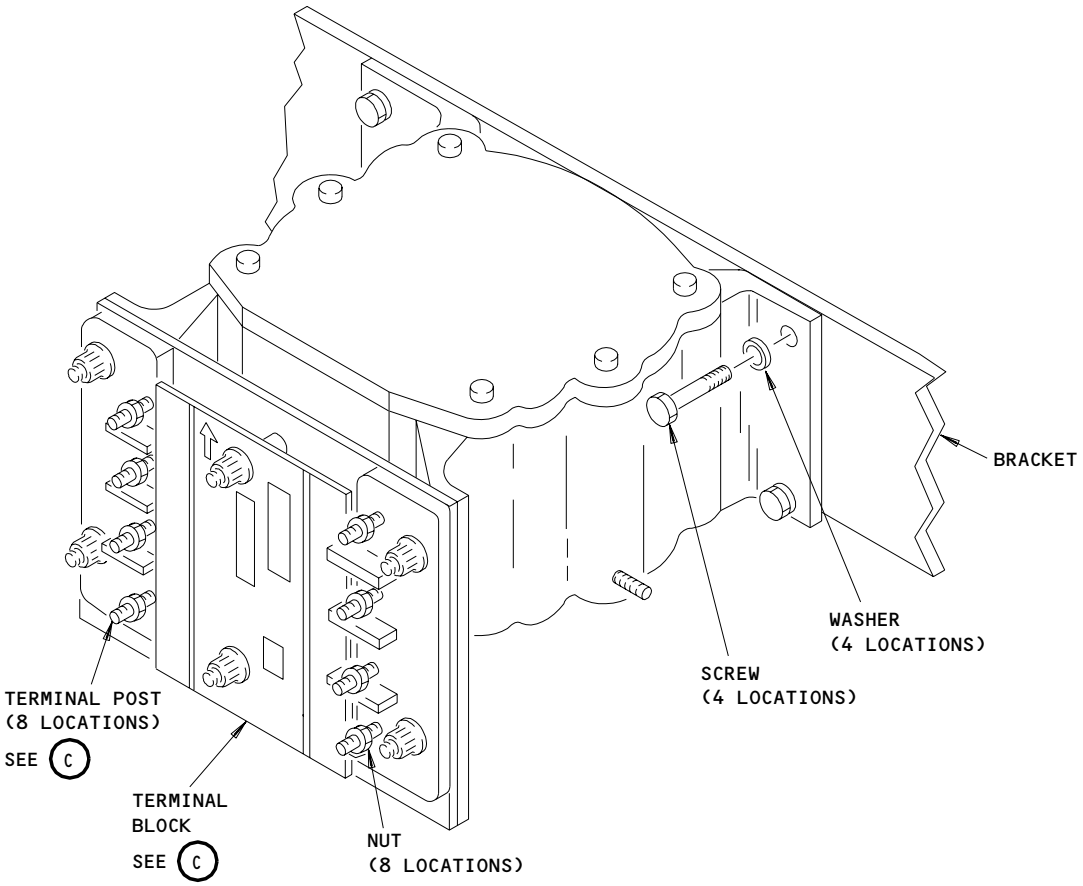


LEFT MAIN, CENTER OR RIGHT MAIN TANK DENSITOMETER

A

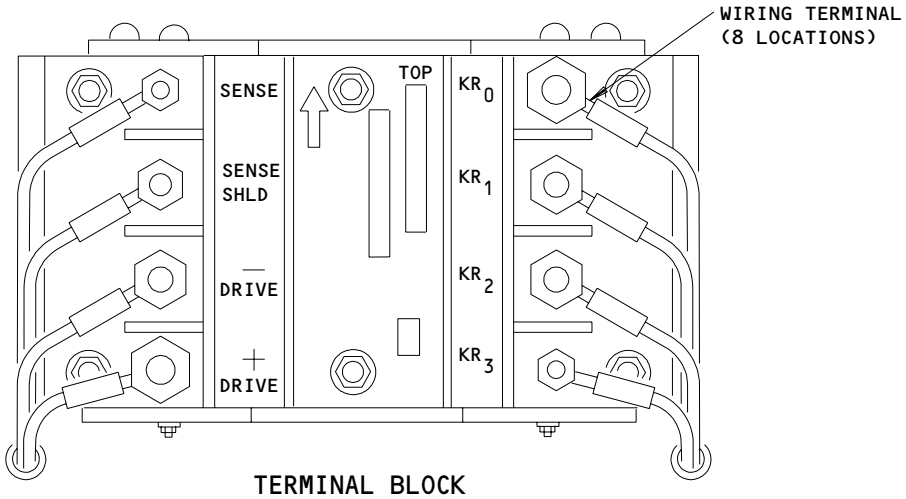
1 ADJUST WIRE SLACK TO MAINTAIN A CLEARANCE OF 0.5 INCH BETWEEN WIRE AND COMPONENTS OR STRUCTURE. IF 0.5 INCH CLEARANCE IS NOT POSSIBLE YOU MUST MAINTAIN A MINIMUM OF 0.125 INCH.

Densitometer Installation
Figure 401 (Sheet 2)



LEFT MAIN, CENTER OR RIGHT MAIN TANK DENSITOMETER

B



TERMINAL BLOCK

C

Densitometer Installation
Figure 401 (Sheet 3)

K14834

S 864-004-002
(3) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E4, FUELING QTY

S 864-005-002
(4) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-006-002
(5) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
(a) 34A10, FUEL FUEL QTY

S 014-007-002

CAUTION: BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOOR, 541AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK CAN OCCUR.

(6) For the densitometer in the left main fuel tank, remove the left main tank access door, 541AB (AMM 28-11-01/401.

S 014-008-002

CAUTION: BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOOR, 641AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK CAN OCCUR.

(7) For the densitometer in the right main fuel tank, remove the right main tank access door, 641AB (AMM 28-11-01/401).

S 014-009-002
(8) For the densitometer in the center fuel tank, remove the center tank access door, 631AB (AMM 28-11-02/401).

S 014-010-002

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PRECAUTIONS COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Go into the applicable fuel tank (AMM 28-11-00/201).

S 034-011-002
(10) Remove the nuts that attach the wiring terminals to the terminal posts, on the terminal block of the densitometer.

S 034-012-002
(11) Move the wiring terminals away from the densitometer.

S 034-013-002
(12) Remove the screws and washers that attach the densitometer to the bracket.

S 024-014-002
(13) Remove the densitometer from the fuel tank.

TASK 28-41-03-404-015-002

3. Install the Densitometer (Fig. 401)

A. References
(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-01/401, Main Tank Access Door
(4) AMM 28-11-02/401, Center Tank Access Door
(5) SWPM 20-10-11, Installation of Electrical Wires and Wire Harnesses
(6) SWPM 20-10-12, Wire Harness Support
(7) SWPM 20-10-19, Wire Separation

B. Access
(1) Location Zones
541 Main Tank - Rib No. 5 to No. 17 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels
541AB Main Tank Access Door (Left)
631AB Center Tank Access Door (Right)
641AB Main Tank Access Door (Right)

C. Procedure

S 014-016-002

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PRECAUTIONS COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Go into the fuel tank (AMM 28-11-00/201).

S 424-017-002
(2) Put the densitometer in position on the bracket (View A).

S 434-018-002
(3) Install the screws and washers to attach the densitometer to the bracket.

S 434-028-002

(4) Put the wiring terminals on the terminal posts with the correct dimensions, found on the terminal block of the densitometer.

NOTE: The terminal posts have different dimensions to prevent errors in installation.

S 434-029-002

CAUTION: MAKE SURE YOU INSTALL EACH NUT ON THE WIRING TERMINALS TO THE CORRECT TORQUE. IF YOU TIGHTEN THE NUTS TO MORE THAN THE SPECIFIED TORQUE, DAMAGE TO THE DENSITOMETER TERMINAL BLOCK CAN OCCUR.

(5) Install the nuts to the wiring terminals and tighten the nuts to these limits:

TERMINAL	TORQUE VALVE	NUT SIZE
SENSE	6-8 POUND-INCHES	0.112-40
SENSE SHIELD	12-15 POUND-INCHES	0.138-32
DRIVE -	15-20 POUND-INCHES	0.164-32
DRIVE +	25-30 POUND-INCHES	0.190-32
KR0	25-30 POUND-INCHES	0.190-32
KR1	15-20 POUND-INCHES	0.164-32
KR2	12-15 POUND-INCHES	0.138-32
KR3	6-8 POUND-INCHES	0.112-40

S 404-034-002

(6) Install the screws and washers to attach the clamps to the side of the densitometer (SWPM 20-10-11, SWPM 20-10-12, SWPM 20-10-19).

NOTE: Adjust wire slack to maintain a clearance of 0.5 inch between the wire and components or structure. If 0.5 inch clearance is not possible, you must maintain a minimum clearance of 0.125 inch.

S 404-035-002

(7) Install the screws and washers to attach the clamps to the bracket. (SWPM 20-10-11, SWPM 20-10-12, SWPM 20-10-19).

NOTE: Adjust wire slack to maintain a clearance of 0.5 inch between wire and components or structure. If 0.5 inch clearance is not possible, you must maintain a minimum clearance of 0.125 inch.

S 214-021-002

(8) Before you go out of the fuel tank, make sure there are no unwanted materials in the fuel tank.

S 414-022-002

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOOR, 541AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(9) For the densitometer in the left main fuel tank, install the left main tank access door, 541AB (AMM 28-11-01/401).

S 414-023-002

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOOR, 641AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(10) For the densitometer in the right main fuel tank, install the right main tank access door, 641AB (AMM 28-11-01/401).

S 414-024-002

(11) For the densitometer in the center fuel tank, install the center tank access door, 631AB (AMM 28-11-02/401).

S 864-025-002

(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-030-002

(13) Remove the DO-NOT-CLOSE tag and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-026-002

(14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY
(b) Do the fuel quantity BITE procedure "Self Test ?" (AMM 28-41-00/501).

S 654-027-002

(15) Refuel the applicable fuel tank if no more work is necessary (AMM 12-11-01/301).

FQIS DENSITOMETER - REMOVAL/INSTALLATION

1. General
   A. The densitometer gives fuel density information to the FQIS processor for fuel quantity calculation.
   B. There are three densitometers. One in each main fuel tank, and one in the center fuel tank. The densitometers are found at the low point in the fuel tank, aft of the compensators.
   C. This procedure contains two tasks. The first task removes the densitometer. The second task installs the densitometer.

TASK 28-41-03-004-001-003

2. Remove the Densitometer (Fig. 401)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks
      (2) AMM 28-11-01/401, Main Tank Access Door
      (3) AMM 28-11-02/401, Center Tank Access Door
      (4) AMM 28-26-00/201, Defueling
   B. Access
      (1) Location Zones
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank - Rib No. 5 to No. 17 (Right)

      (2) Access Panels
          541AB Main Tank Access Door (Left)
          631AB Center Tank Access Door (Right)
          641AB Main Tank Access Door (Right)

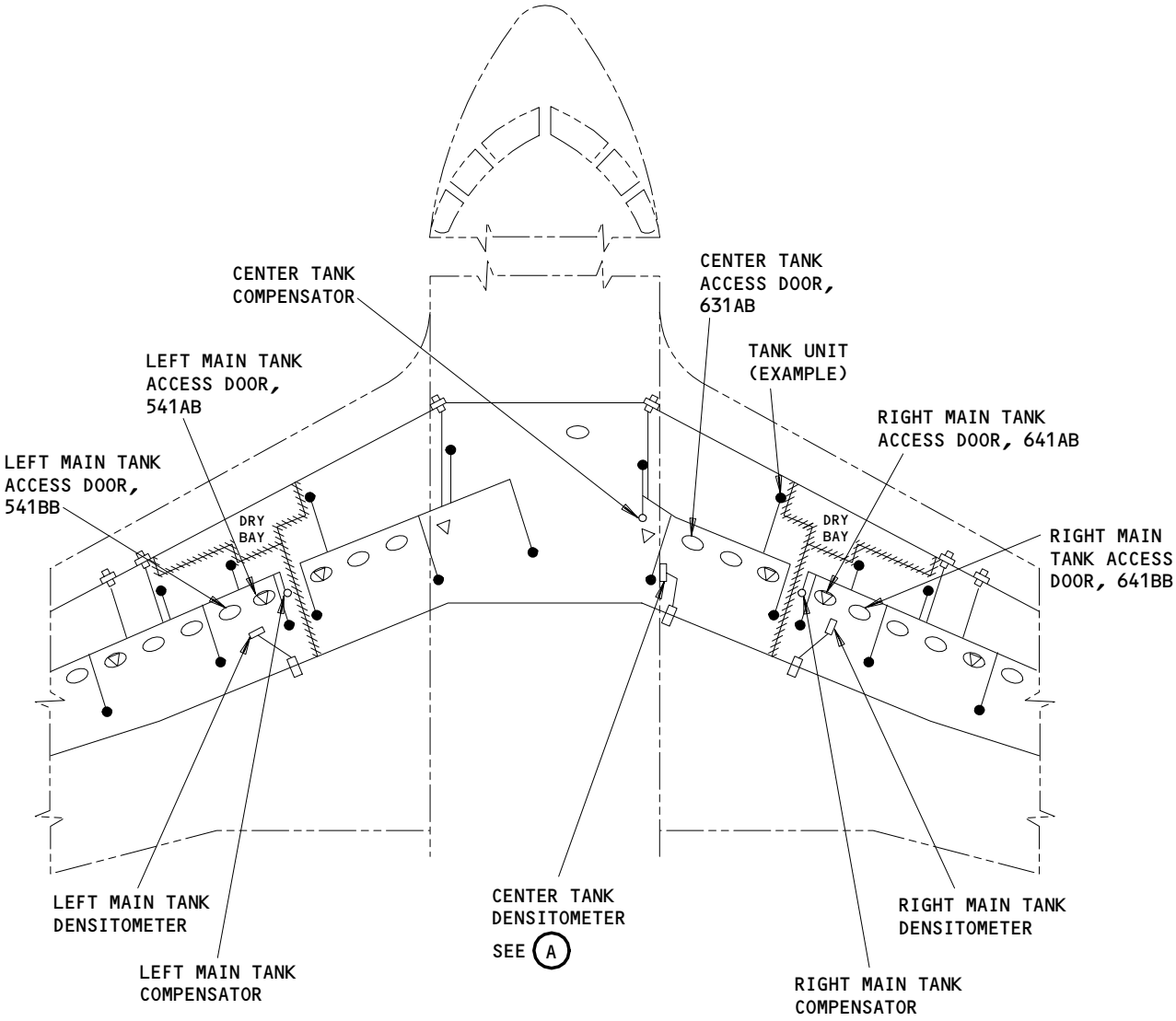
   C. Procedure

      S 654-002-003
      (1) Defuel the applicable fuel tank (AMM 28-26-00/201).

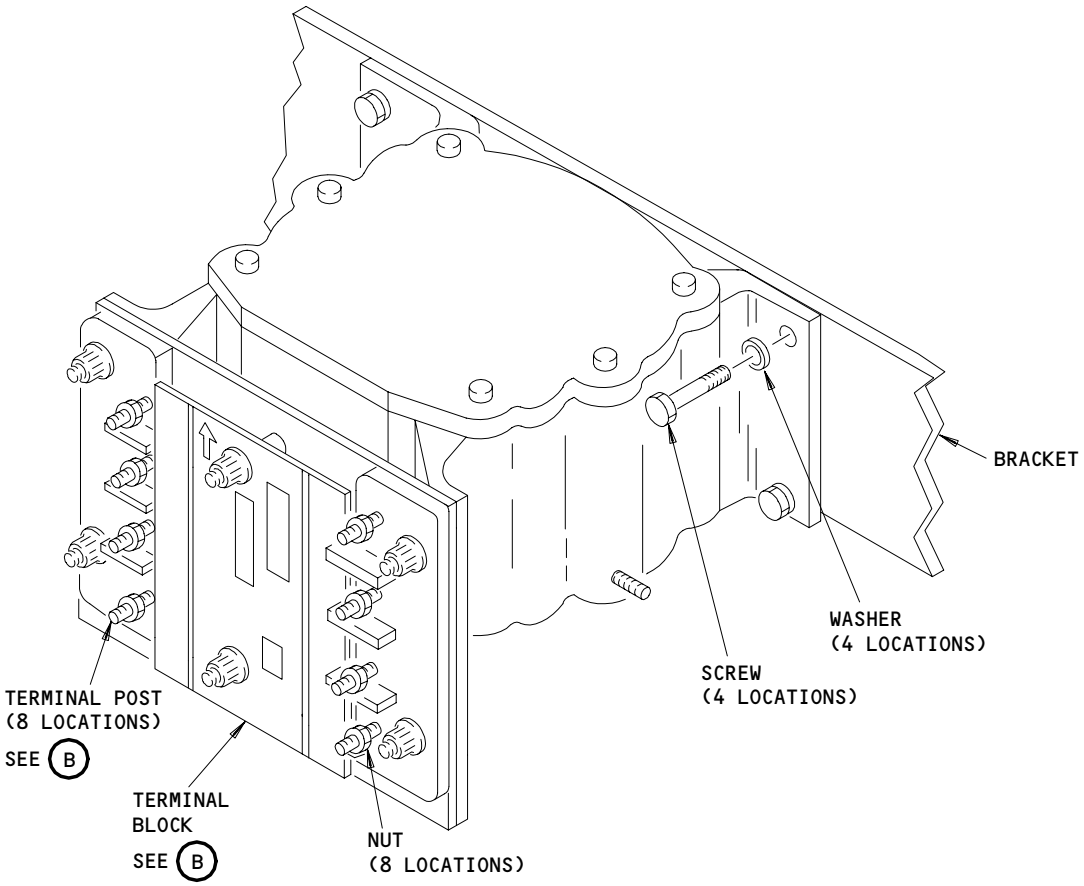
      S 654-003-003

      WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PRECAUTIONS COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Do the Purging and Fuel Tank Entry procedure for the applicable fuel tank (AMM 28-11-00/201).

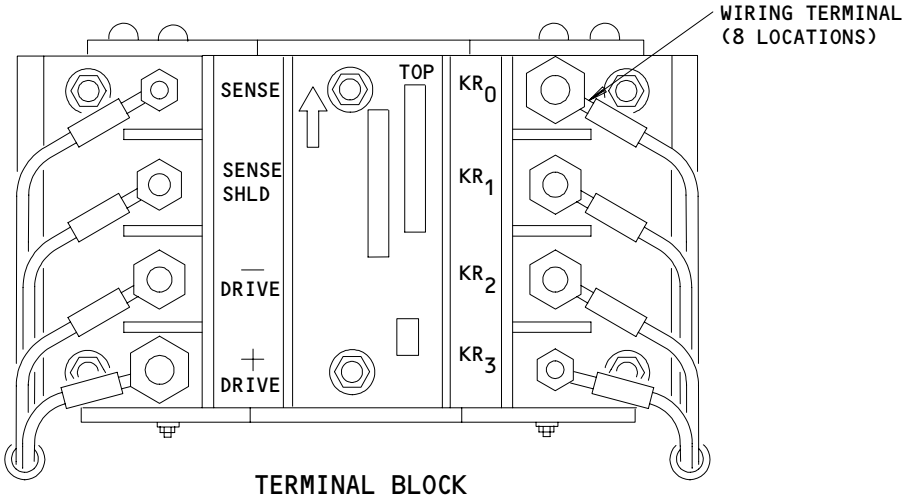


Densitometer Installation
Figure 401 (Sheet 1)



LEFT MAIN, CENTER OR RIGHT MAIN TANK DENSITOMETER

A



TERMINAL BLOCK

B

Densitometer Installation
Figure 401 (Sheet 2)

S 864-004-003
(3) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E4, FUELING QTY

S 864-005-003
(4) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-006-003
(5) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
(a) 34A10, FUEL FUEL QTY

S 014-007-003

CAUTION: BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOOR, 541AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK CAN OCCUR.

(6) For the densitometer in the left main fuel tank, remove the left main tank access door, 541AB (AMM 28-11-01/401).

S 014-008-003

CAUTION: BE CAREFUL WHEN YOU REMOVE THE MAIN TANK ACCESS DOOR, 641AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK CAN OCCUR.

(7) For the densitometer in the right main fuel tank, remove the right main tank access door, 641AB (AMM 28-11-01/401).

S 014-009-003
(8) For the densitometer in the center fuel tank, remove the center tank access door, 631AB (AMM 28-11-02/401).

S 014-010-003

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PRECAUTIONS COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Go into the applicable fuel tank (AMM 28-11-00/201).

S 034-011-003

(10) Remove the nuts that attach the wiring terminals to the terminal posts, on the terminal block of the densitometer.

S 034-012-003

(11) Move the wiring terminals away from the densitometer.

S 034-013-003

(12) Remove the screws and washers that attach the densitometer to the bracket.

S 024-014-003

(13) Remove the densitometer from the fuel tank.

TASK 28-41-03-404-015-003

3. Install the Densitometer (Fig. 401)

A. References

(1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-01/401, Main Tank Access Door
(4) AMM 28-11-02/401, Center Tank Access Door

B. Access

(1) Location Zones

541 Main Tank - Rib No. 5 to No. 17 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)

(2) Access Panels

541AB Main Tank Access Door (Left)
631AB Center Tank Access Door (Right)
641AB Main Tank Access Door (Right)

C. Procedure

S 014-016-003

WARNING: OBEY THE PURGING AND FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE PRECAUTIONS COULD CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Go into the fuel tank (AMM 28-11-00/201).

S 424-017-003

(2) Put the densitometer in position on the bracket (View A).

S 434-018-003

(3) Install the screws and washers to attach the densitometer to the bracket.

S 434-019-003

(4) Put the wiring terminals on the terminal posts with the correct dimensions, found on the terminal block of the densitometer.

NOTE: The terminal posts have different dimensions to prevent errors in installation.

S 434-029-003

CAUTION: MAKE SURE YOU INSTALL EACH NUT ON THE WIRING TERMINALS TO THE CORRECT TORQUE. IF YOU TIGHTEN THE NUTS TO MORE THAN THE SPECIFIED TORQUE, DAMAGE TO THE DENSITOMETER TERMINAL BLOCK CAN OCCUR.

(5) Install the nuts to the wiring terminals and tighten the nuts to these limits:

TERMINAL	TORQUE VALVE	NUT SIZE
SENSE	6-8 POUND-INCHES	0.112-40
SENSE SHIELD	12-15 POUND-INCHES	0.138-32
DRIVE -	15-20 POUND-INCHES	0.164-32
DRIVE +	25-30 POUND-INCHES	0.190-32
KR0	25-30 POUND-INCHES	0.190-32
KR1	15-20 POUND-INCHES	0.164-32
KR2	12-15 POUND-INCHES	0.138-32
KR3	6-8 POUND-INCHES	0.112-40

S 214-022-003

(6) Before you go out of the fuel tank, make sure there are no unwanted materials in the fuel tank.

S 414-023-003

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOOR, 541AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(7) For the densitometer in the left main fuel tank, install the left main tank access door, 541AB (AMM 28-11-01/401).

S 414-024-003

CAUTION: BE CAREFUL WHEN YOU INSTALL THE MAIN TANK ACCESS DOOR, 641AB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE FUEL MEASURING STICK COULD OCCUR.

(8) For the densitometer in the right main fuel tank, install the right main tank access door, 641AB (AMM 28-11-01/401).

S 414-025-003

(9) For the densitometer in the center fuel tank, install the center tank access door, 631AB (AMM 28-11-02/401).

S 864-026-003

(10) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-030-003

(11) Remove the DO-NOT-CLOSE tag and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-027-003

(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 744-032-003

(13) Do the fuel quantity BITE procedure "Self Test ?" (AMM 28-41-00/501).

S 654-028-003

(14) Refuel the applicable fuel tank if no more work is necessary (AMM 12-11-01/301).

FUEL QUANTITY INDICATOR - REMOVAL/INSTALLATION

1. General
   A. A fuel quantity indicator module (referred to as "the fuel quantity indicator") is installed on the overhead panel, P5. The fuel quantity indicator shows the fuel quantity in each fuel tank, the total fuel quantity and the fuel temperature in the right main fuel tank.

TASK 28-41-04-004-001

2. Remove the Fuel Quantity Indicator (Fig. 401)
   A. Access
      (1) Location Zones
          211 Control Cabin - Section 41 (Left)
          212 Control Cabin - Section 41 (Right)

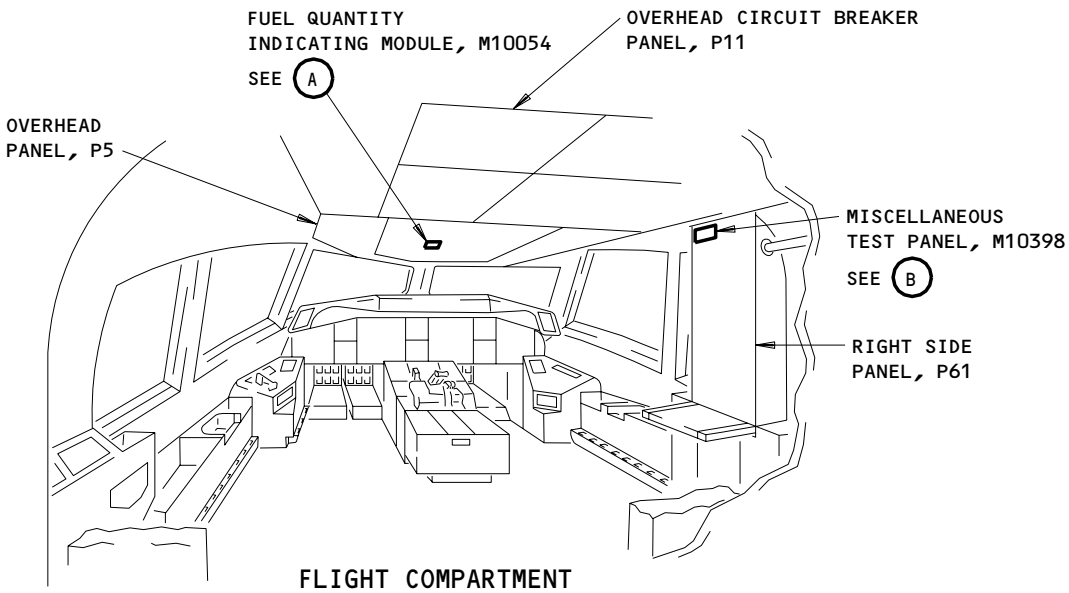
   B. Procedure

      S 864-002
      (1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E4, FUELING QTY

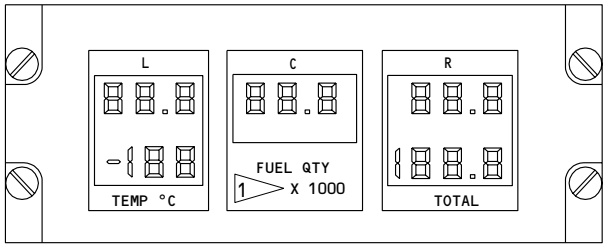
      S 864-003
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1 or FUEL QTY L
          (b) 11L12, FUEL TEMP IND (if installed)
          (c) 11L19, FUEL QTY 2 or FUEL QTY R

      S 864-004
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A10, FUEL FUEL QTY

      S 034-005
      (4) Remove the four fasteners from the front of the fuel quantity indicator.

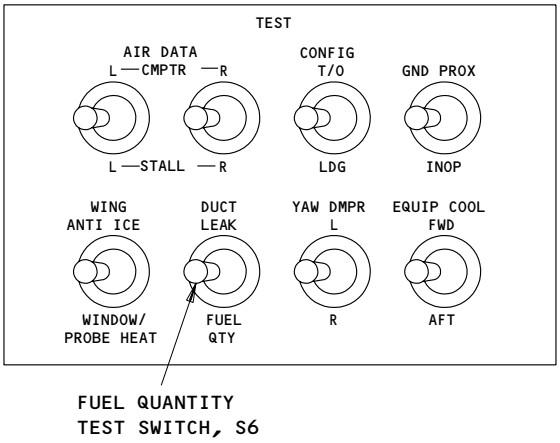


FLIGHT COMPARTMENT



FUEL QUANTITY INDICATING MODULE, M10054
(EXAMPLE)

A



MISCELLANEOUS TEST PANEL, M10398

B

1 THE UNITS ARE IN LBS OR KGS

Fuel Quantity Indicating Module Installation
Figure 401

S 024-017
(5) Remove the fuel quantity indicator from the overhead panel, P5.

S 034-019
(6) Disconnect the electrical connectors at the rear of the fuel quantity indicator.

TASK 28-41-04-404-007

3. Install the Fuel Quantity Indicator (Fig. 401)

A. References
(1) AMM 24-22-00/201, Electrical Power Control
(2) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

B. Access
(1) Location Zones
211 Control Cabin - Section 41 (Left)
212 Control Cabin - Section 41 (Right)

C. Procedure

S 434-021
(1) Connect the electrical connectors at the rear of the fuel quantity indicator.

S 424-009
(2) Put the fuel quantity indicator in the P5 panel.

S 434-018
(3) Install the four fasteners in the fuel quantity indicators.

S 864-010
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-011
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1 or FUEL QTY L

(b) 11L12, FUEL TEMP IND (if installed)
(c) 11L19, FUEL QTY 2 or FUEL QTY R

S 864-012
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 864-013
(7) Supply electrical power (AMM 24-22-00/201).

S 724-014
(8) Do a test on the fuel quantity indicator as follows:
(a) Put and release the FUEL QTY test switch on the right side panel, P61, in the FUEL QTY position in 2 seconds.
(b) Make sure the L, C and R FUEL QTY displays of the fuel quantity indicator on the overhead panel, P5, show 88.8.
(c) Make sure the TOTAL QTY display of the fuel quantity indicator on the P5 panel shows 188.8.
(d) Make sure the FUEL TEMP display of the fuel quantity indicator on the P5 panel shows -188.
(e) Release the FUEL QTY test switch in 8 seconds.
(f) Make sure all displays on the fuel quantity indicator go back to their usual condition.

S 744-024
(9) Do the fuel quantity BITE procedure "Self Test ?" (AMM 28-41-00/501).

S 864-016
(10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS LOAD SELECT INDICATOR - REMOVAL/INSTALLATION

1. General
   A. A load select indicator for each fuel tank, is installed on the fueling control panel, P28, at the fueling station on the right wing. If there is moisture the load select indicator or if the glass on the load select indicator is broken, replace the load select indicator.
   B. This procedure contains two tasks. The first task removes the load select indicator. The second task installs the load select indicator.

TASK 28-41-06-004-020

2. Remove the Load Select Indicator (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
   B. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door

   C. Procedure

      S 864-001
      (1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:

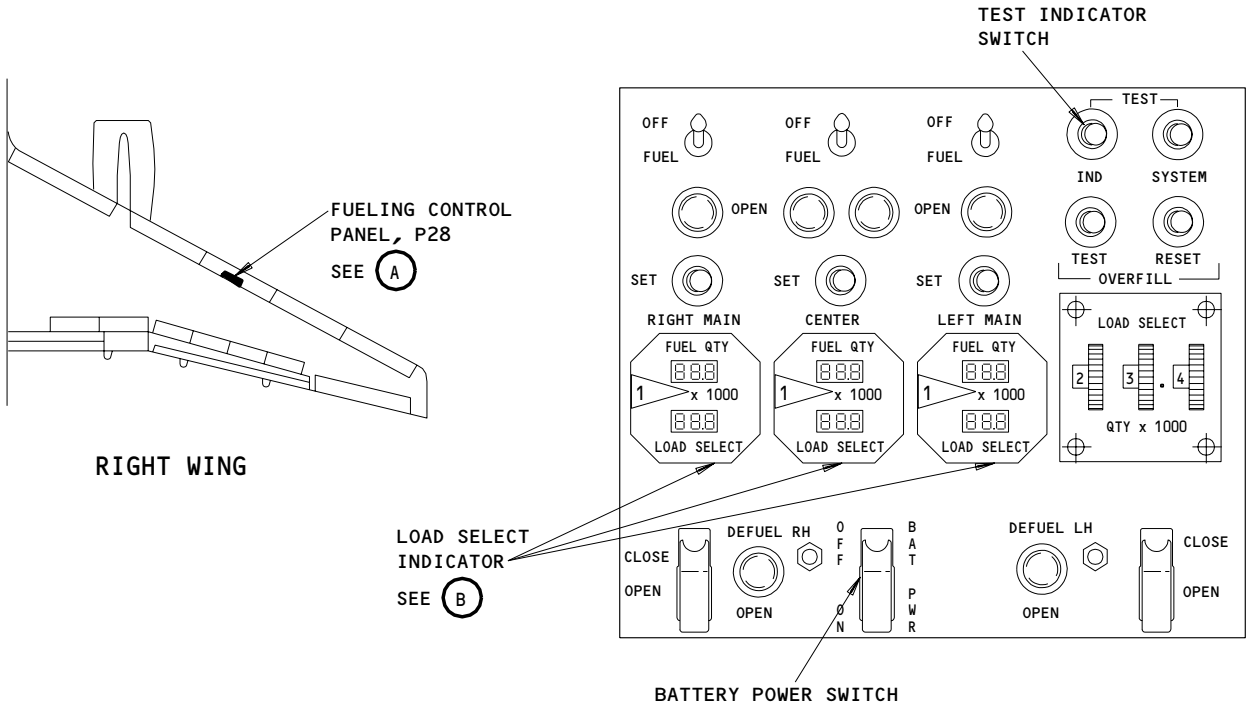
      NOTE: If you remove more than one indicator at the same time be sure to record the fuel quantity shown on each indicator.

      (a) 6E4, FUELING QTY

      S 864-002
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
      (a) 11C34, FUEL QTY 1 or L
      (b) 11L19, FUEL QTY 2 or R

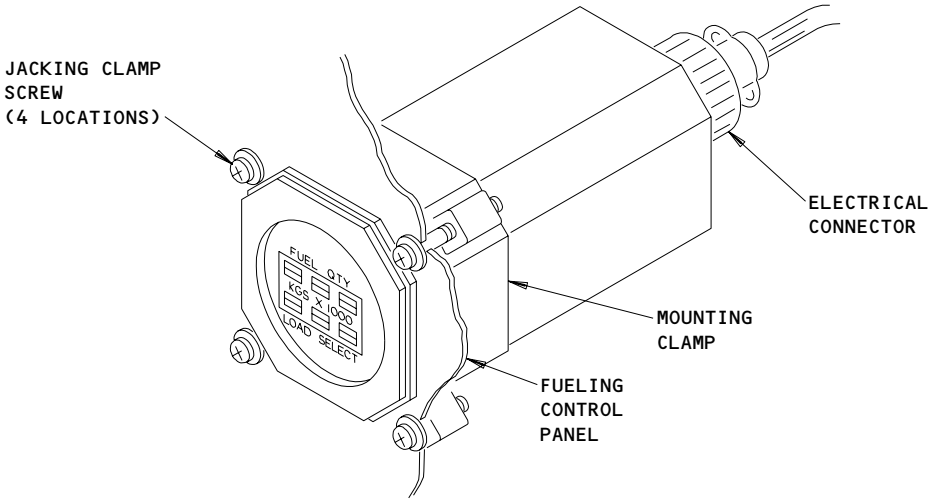
      S 864-003
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
      (a) 34A10, FUEL FUEL QTY

      S 014-004
      (4) Open the fueling station door, 621GB (AMM 06-44-00/201).



FUELING CONTROL PANEL, P28

A



LOAD SELECT INDICATOR

B

1 THE UNITS ARE IN LBS OR KGS.

Load Select Indicator Installation
Figure 401

S 034-005
(5) Loosen the jacking clamp screws (View B).

NOTE: If you remove more than one indicator at the time put a tag on each matching indicator and connector to make sure they are reconnected correctly.

S 024-006
(6) Carefully remove the load select indicator from the fueling control panel, P28 (View A).

S 034-007
(7) Disconnect the electrical connector at the rear of the load select indicator (View B).

TASK 28-41-06-404-008

3. Install the Load Select Indicator (Fig. 401)

A. References
(1) AMM 06-44-00/201, Wing Doors and Panels
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

B. Access
(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door

C. Procedure

S 434-009
(1) Connect the electrical connector to the load select indicator (View B).

NOTE: Remove all the tags attached to the indicators and the matching connectors.

S 424-010
(2) Put the load select indicator in the fueling control panel, P28.

S 434-011
(3) Tighten the jacking clamp screws.

S 864-012
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-013
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1 or L
(b) 11L19, FUEL QTY 2 or R

S 864-014
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 864-015
(7) Supply electrical power (AMM 24-22-00/201).

S 724-016
(8) Do the steps that follow to make sure the load select indicator operates correctly:
(a) Put the BAT PWR switch on the fueling control panel, P28, to the ON position.
(b) Make sure the fueling panel light comes on.
(c) Push the TEST IND switch on the fueling control panel, P28.
(d) Make sure that 88.8 shows in the top and bottom displays of each load select indicator.

NOTE: If you remove more than one indicator at the same time, make sure that the fuel quantity shown on the indicator returns to the same quantity as it was before the indicator was removed.

(e) Put the BAT PWR switch on the fueling control panel, P28, to the OFF position.

S 414-017
(9) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 744-018
(10) Do the fuel quantity BITE procedure (AMM 28-41-00/501).

S 864-019
(11) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS LOAD SELECT CONTROL - REMOVAL/INSTALLATION

1. General
   A. The load select control is installed on the fueling control panel, P28, at the fueling station on the right wing.
   B. This procedure contains two tasks. The first task removes the load select control. The second task installs the load select control.

TASK 28-41-07-004-002

2. Remove the Load Select Control (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
   B. Access
      (1) Location Zone
          621 Leading Edge to Front Spar (Right)

      (2) Access Panel
          621GB Fueling Station Door

   C. Procedure

      S 864-003
      (1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E4, FUELING QTY

      S 864-004
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1 or L
          (b) 11L19, FUEL QTY 2 or R

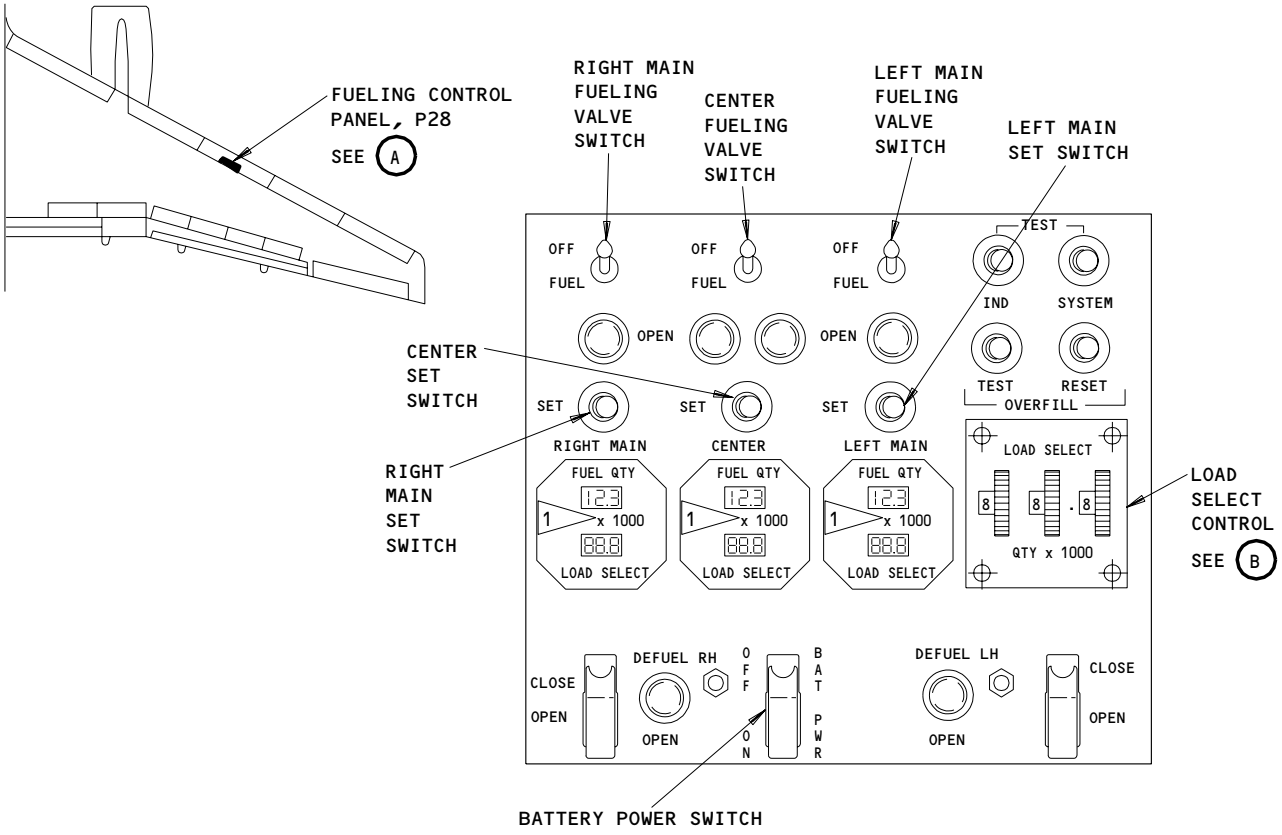
      S 864-005
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A10, FUEL FUEL QTY

      S 014-006
      (4) Open the fueling station door, 621GB (AMM 06-44-00/201).

      S 034-007
      (5) Remove the mounting screws and washers from the load select control (View B).

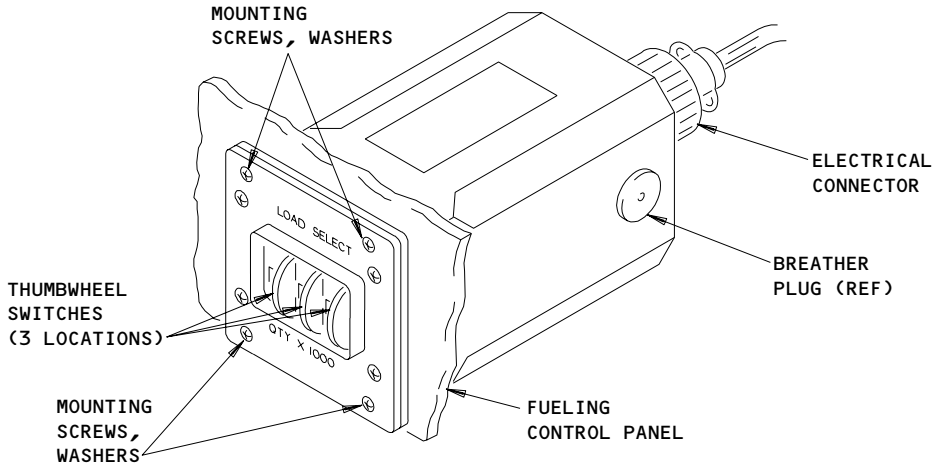
      S 024-008
      (6) Carefully remove the load select control from the fueling control panel, P28 (View A).

      S 034-009
      (7) Disconnect the electrical connector at the rear of the load select control (View B).



FUELING CONTROL PANEL, P28

A



LOAD SELECT CONTROL

B

1 THE UNITS ARE IN LBS OR KGS.

Load Select Control Installation
Figure 401

TASK 28-41-07-404-010

3. Install the Load Select Control (Fig. 401)

A. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

B. Access

(1) Location Zone
621 Leading Edge to Front Spar (Right)

(2) Access Panel
621GB Fueling Station Door

C. Procedure

S 434-011
(1) Connect the electrical connector to the load select control (View B).

S 424-012
(2) Put the load select control in the fuel control panel, P28 (View A).

S 434-001
(3) Install the mounting screws and washers to attach the load select control to the fueling control panel, P28.

S 864-013
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-014
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1 or L
(b) 11L19, FUEL QTY 2 or R

S 864-015
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 864-016
(7) Supply electrical power (AMM 24-22-00/201).

S 724-017
(8) Do a test of the load select control as follows (View A):
(a) Put the BAT PWR switch on the fueling control panel, P28, to the ON position.

(b) Make sure the fueling panel light comes on.
(c) Make sure all the fueling valve switches on the fueling control panel, P28, are in the OFF position.
(d) Turn the thumbwheel switches on the load select control until 88.8 shows on the display.
(e) Push and hold the RIGHT MAIN SET switch for 1 second.
(f) Make sure 88.8 shows on the bottom display of the RIGHT MAIN LOAD SELECT indicator.
(g) Push and hold the RIGHT MAIN SET switch for 1 second to cause the bottom display of the RIGHT MAIN LOAD SELECT indicator to go off.
(h) Push and hold the CENTER SET switch for 1 second.
(i) Make sure 88.8 shows on the bottom display of the CENTER LOAD SELECT indicator.
(j) Push and hold the CENTER SET switch for 1 second to cause the bottom display of the CENTER LOAD SELECT indicator to go off.
(k) Push and hold the LEFT MAIN SET switch for 1 second.
(l) Make sure 88.8 shows on the bottom display of the LEFT MAIN LOAD SELECT indicator.
(m) Push and hold the LEFT MAIN SET switch for 1 second to cause the bottom display of the LEFT MAIN LOAD SELECT indicator to go off.
(n) Turn the thumbwheel switches on the load select control until 00.0 shows on the load select control.
(o) Put the BAT PWR switch on the fueling control panel, P28, to the OFF position.

S 414-018
(9) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 744-019
(10) Do the fuel quantity BITE procedure (AMM 28-41-00/501).

S 864-020
(11) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS PROCESSOR - REMOVAL/INSTALLATION

1. General
   A. The fuel quantity processor unit (FQPU, referred to as "the processor") collects signals from all FQIS system components, calculates the fuel quantity in each fuel tank and transmits this information to the fuel quantity indicators. The processor is installed on the E3-4 rack in the main equipment center.
   B. This procedure contains two tasks. The first task removes the processor. The second task installs the processor.

TASK 28-41-08-004-001

2. Remove the Processor (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-10-01/401, E/E Rack Mounted Components
      (3) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices
   B. Access
      (1) Location Zone
          119 Main Equipment Center (Left)

      (2) Access Panel
          119BL Electrical/Electronics Access Door

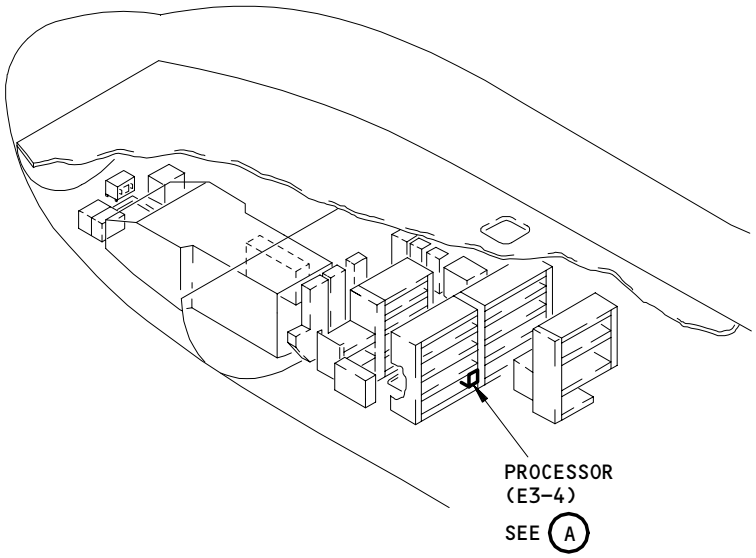
   C. Procedure

      S 864-002
      (1) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6E4, FUELING QTY

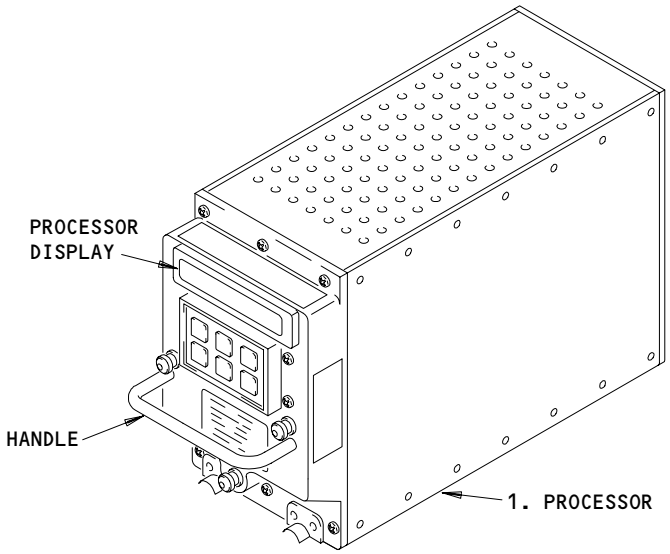
      S 864-003
      (2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C34, FUEL QTY 1 or L
          (b) 11L19, FUEL QTY 2 or R

      S 864-004
      (3) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
          (a) 34A10, FUEL FUEL QTY

      S 014-005
      (4) Open the electrical/electronics access door, 119BL (AMM 06-41-00/201).



MAIN EQUIPMENT CENTER



PROCESSOR
A

Fuel Quantity Processor Unit Installation
Figure 401

S 014-018

(5) Go into the main equipment center.

S 914-016

CAUTION: DO NOT REMOVE THE FQIS PROCESSOR UNLESS A HARD FAULT CODE SHOWS THAT IT IS FAULTY. FREQUENT REMOVALS AND INSTALLATIONS OF THE FQIS PROCESSOR CAN ACCIDENTALLY DAMAGE THE CONNECTOR PINS AND CAUSE NUISANCE FAULT CODES AND NUISANCE STATUS CODES.

CAUTION: DO NOT TOUCH THE FQIS PROCESSOR BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE FQIS PROCESSOR.

(6) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 024-006

(7) Remove the processor (1) from the E3-4 rack in the main equipment center (AMM 20-10-01/401).

TASK 28-41-08-404-007

3. Install the Processor (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Processor Unit Assy	28-41-08	01 01B 08	10, 35 20 5

B. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 20-10-01/401, E/E Rack-Mounted Components
(3) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices
(4) AMM 24-22-00/201, Electrical Power Control
(5) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

C. Access

(1) Location Zone
119 Main Equipment Center (Left)

(2) Access Panel
119BL Electrical/Electronics Access Door

D. Procedure

S 214-008
(1) Make sure the connector pins for the processor in the E3-4 rack are not damaged.

S 914-017

CAUTION: DO NOT DAMAGE THE CONNECTOR PINS WHEN YOU INSTALL THE FQIS PROCESSOR. DAMAGE TO THE CONNECTOR PINS CAN CAUSE NUISANCE FAULT CODES AND NUISANCE STATUS CODES.

CAUTION: DO NOT TOUCH THE PROCESSOR BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE PROCESSOR.

(2) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 414-009
(3) Install the processor (1) in the E3-4 rack in the main equipment center (AMM 20-10-01/401).

S 864-010
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, LING QTY

S 864-011
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1 or L
(b) 11L19, FUEL QTY 2 or R

S 864-012
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 864-013
(7) Supply electrical power (AMM 24-22-00/201).

S 744-015
(8) Do the fuel quantity BITE procedure (AMM 28-41-00/501).

S 414-014
(9) Go out of the main equipment center and close the electrical/electronics access door, 119BL (AMM 06-41-00/201).

S 864-016

(10) Remove electrical power if it is not neccessary (AMM 24-22-00/201).

FQIS TANK WIRING HARNESS - REMOVAL/INSTALLATION

1. General
   A. The tank wiring harness is part of the fuel quantity indicating system (FQIS).
   B. There are seven tank wiring harnesses (Fig. 401).
      (1) In the left main fuel tank there is one tank wiring harness for the densitometer and one tank wiring harness for the tank units and compensator.
      (2) In the right main fuel tank there is one tank wiring harness for the densitometer and one tank wiring harness for the tank units and compensator.
      (3) In the center fuel tank there is one tank wiring harness for the densitometer, one for the tank units in the left half of the center fuel tank and one for the tank units and compensator in the right half of the center fuel tank.
   C. Repair and overhaul of the FQIS tank wiring harness must be per SWPM 20-14-12.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

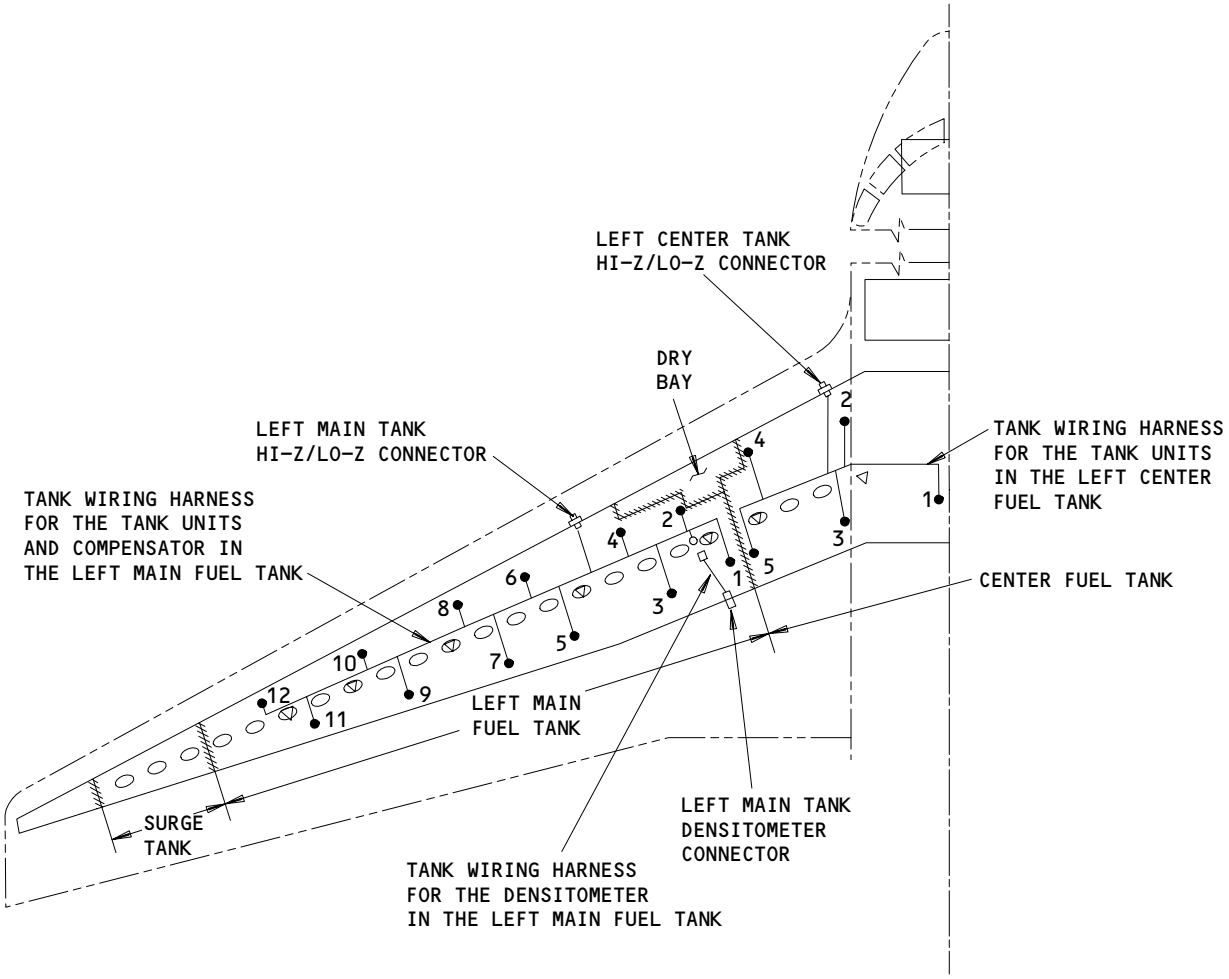
   D. This procedure contains two tasks. The first task removes the tank wiring harness. The second task installs the tank wiring harness.

   TASK 28-41-09-004-046-002

2. Remove the Tank Wiring Harness
   A. Equipment
      (1) Strap Wrench, electrical connector - Model TG70, Glenair, Inc., Glendale, CA

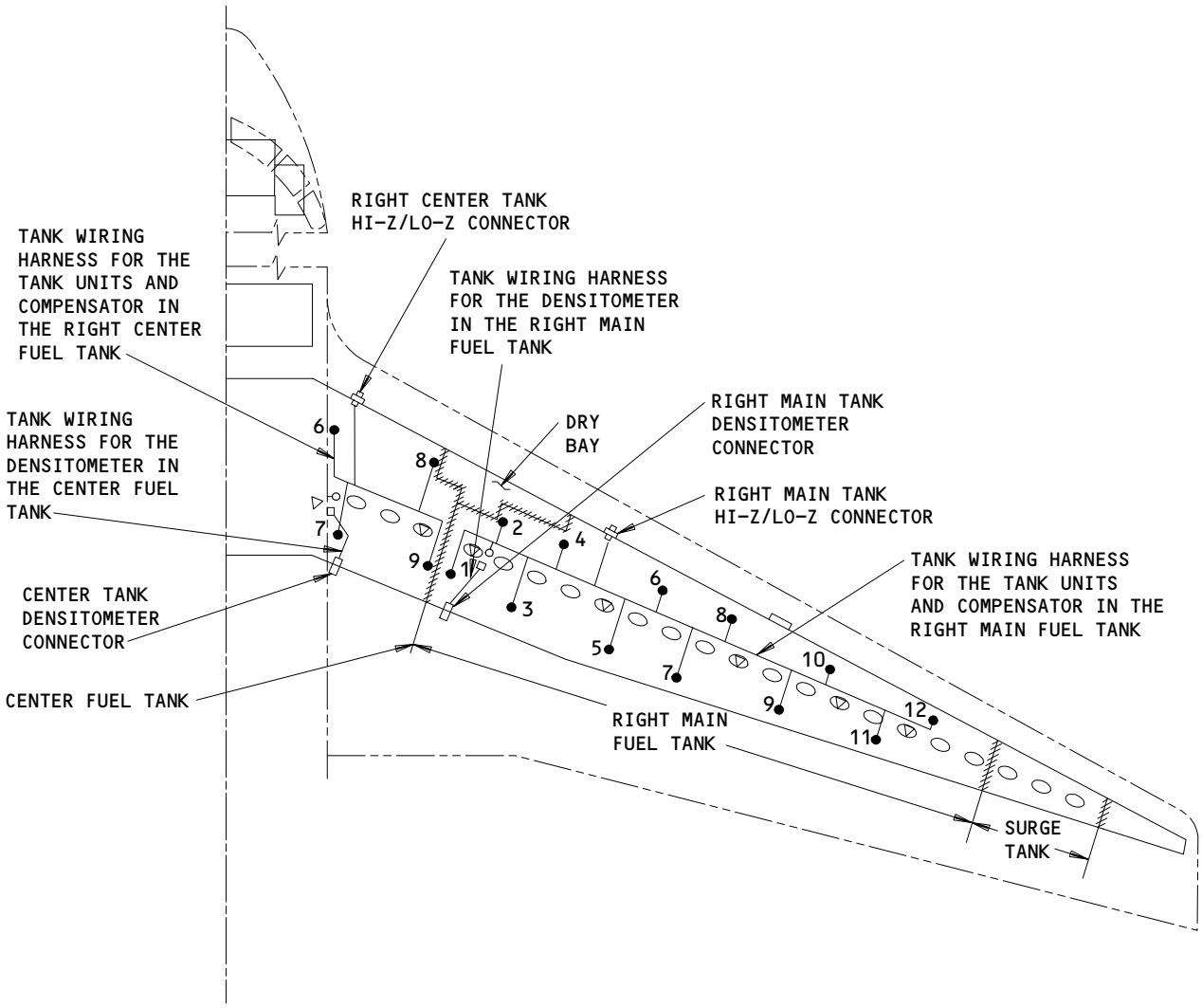
          NOTE: This model lets you get access to the HI-Z/LO-Z plug.

   B. References
      (1) AMM 27-81-00/201, Leading Edge Slat System
      (2) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
      (3) AMM 28-11-01/401, Main Tank Access Doors
      (4) AMM 28-11-02/401, Center Tank Access Doors
      (5) AMM 28-26-00/201, Defueling



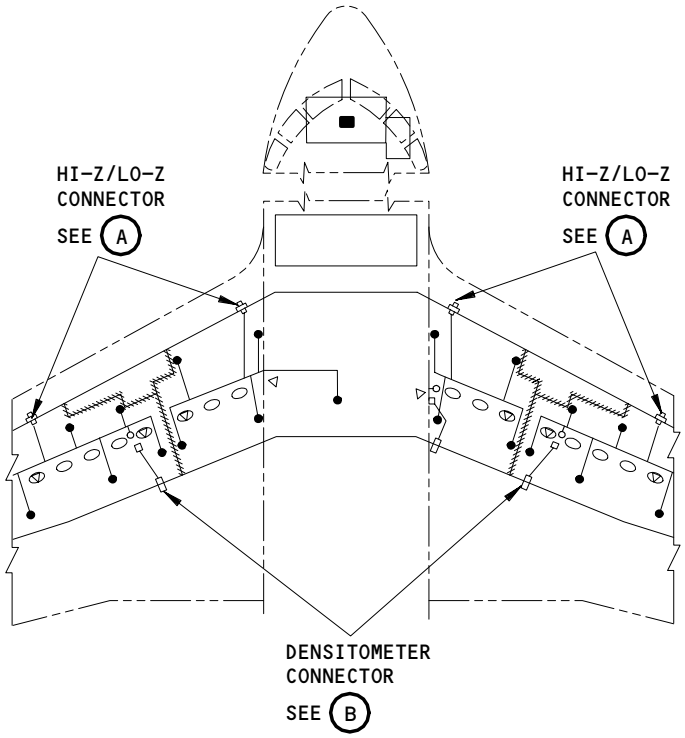
LEFT WING

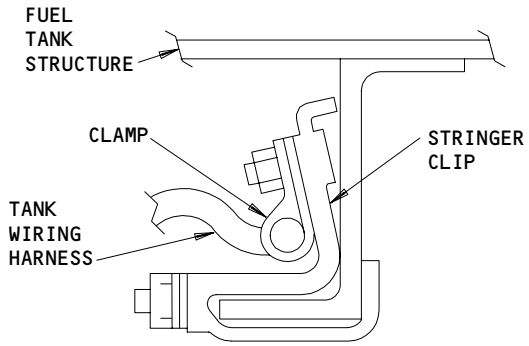
Tank Wiring Harness Installation
Figure 401 (Sheet 1)



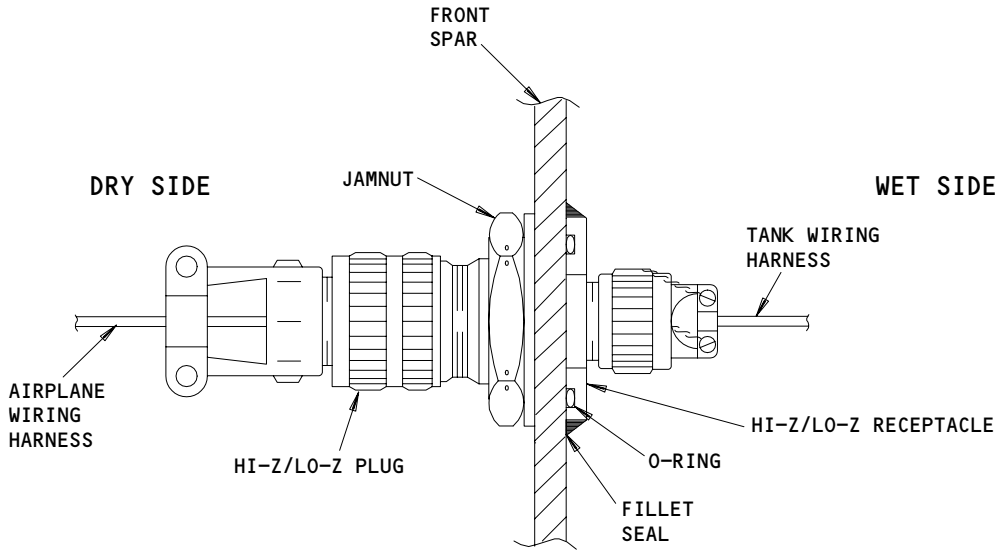
RIGHT WING

Tank Wiring Harness Installation
Figure 401 (Sheet 2)



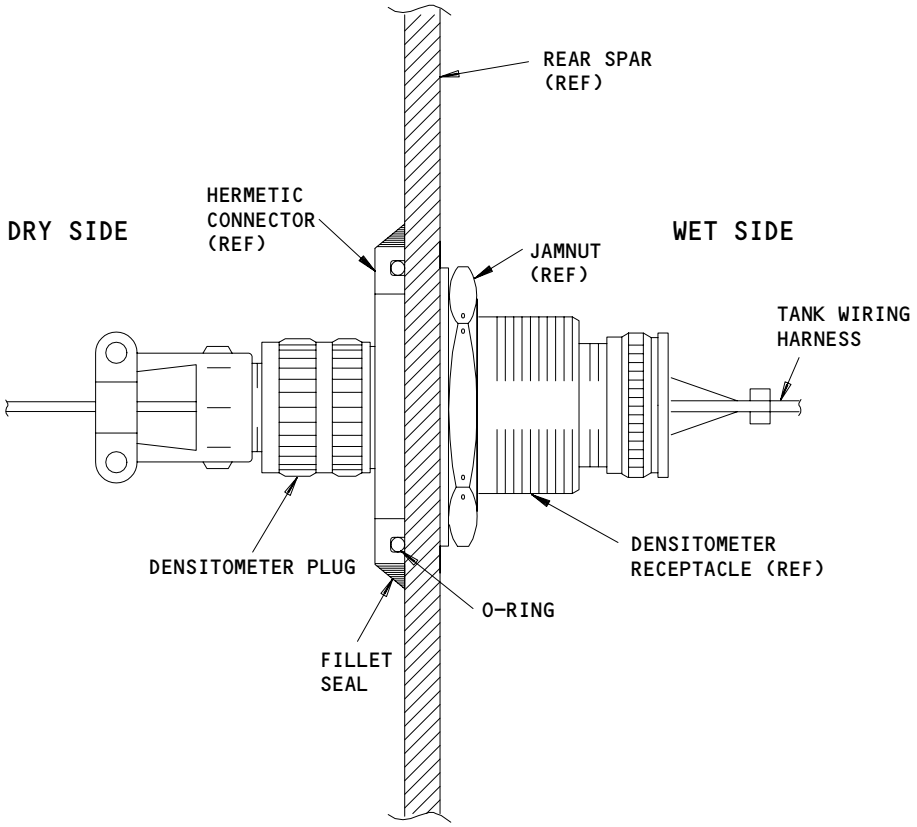


CLAMP (EXAMPLE)
(FOUND IN THE FUEL TANK,
USED TO SECURE THE TANK
WIRING HARNESS)



HI-Z/LO-Z CONNECTOR
(EXAMPLE)
A

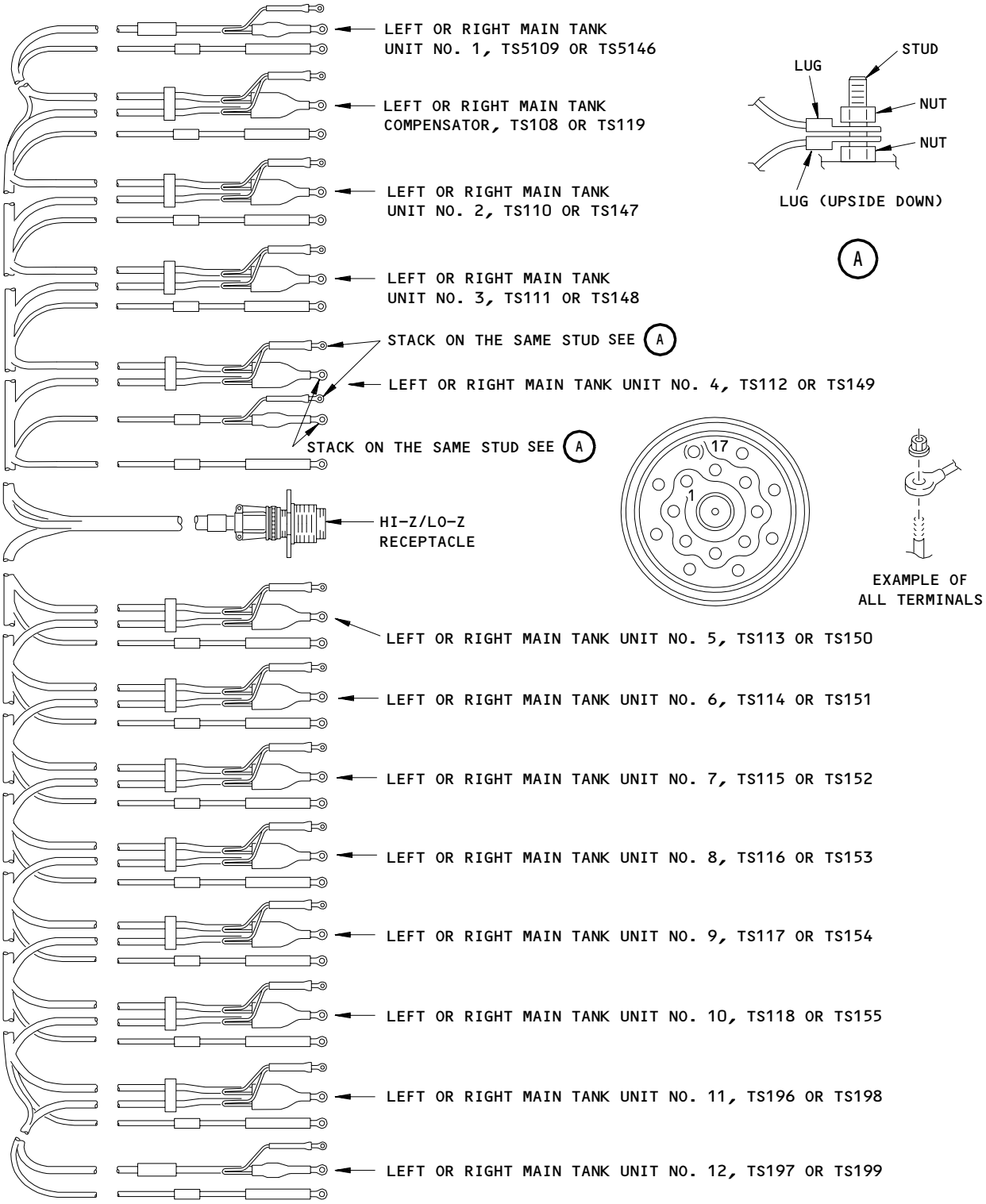
Tank Wiring Harness Connectors
Figure 402 (Sheet 1)



DENSITOMETER CONNECTOR
(EXAMPLE)

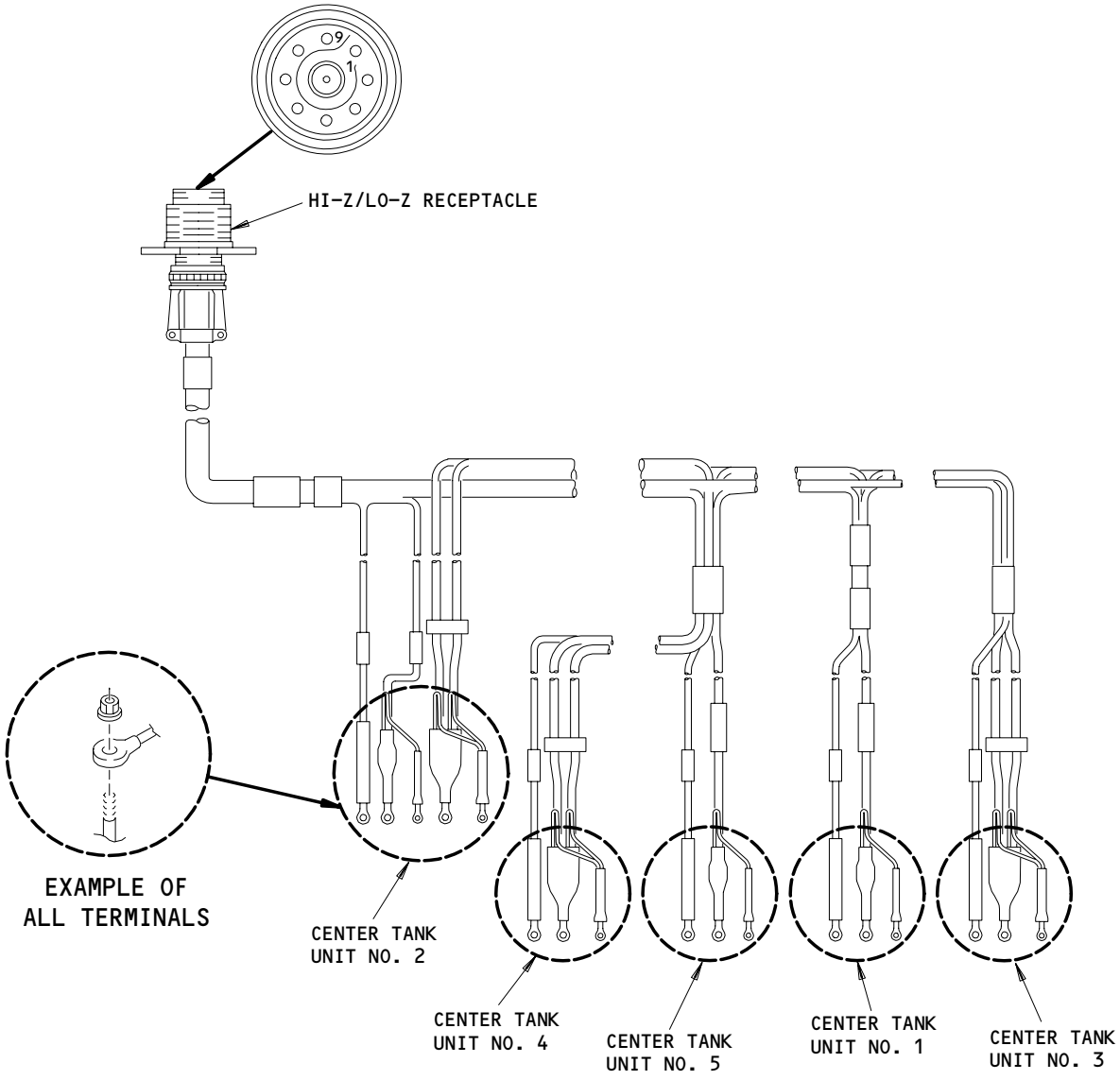
B

Tank Wiring Harness Connectors
Figure 402 (Sheet 2)

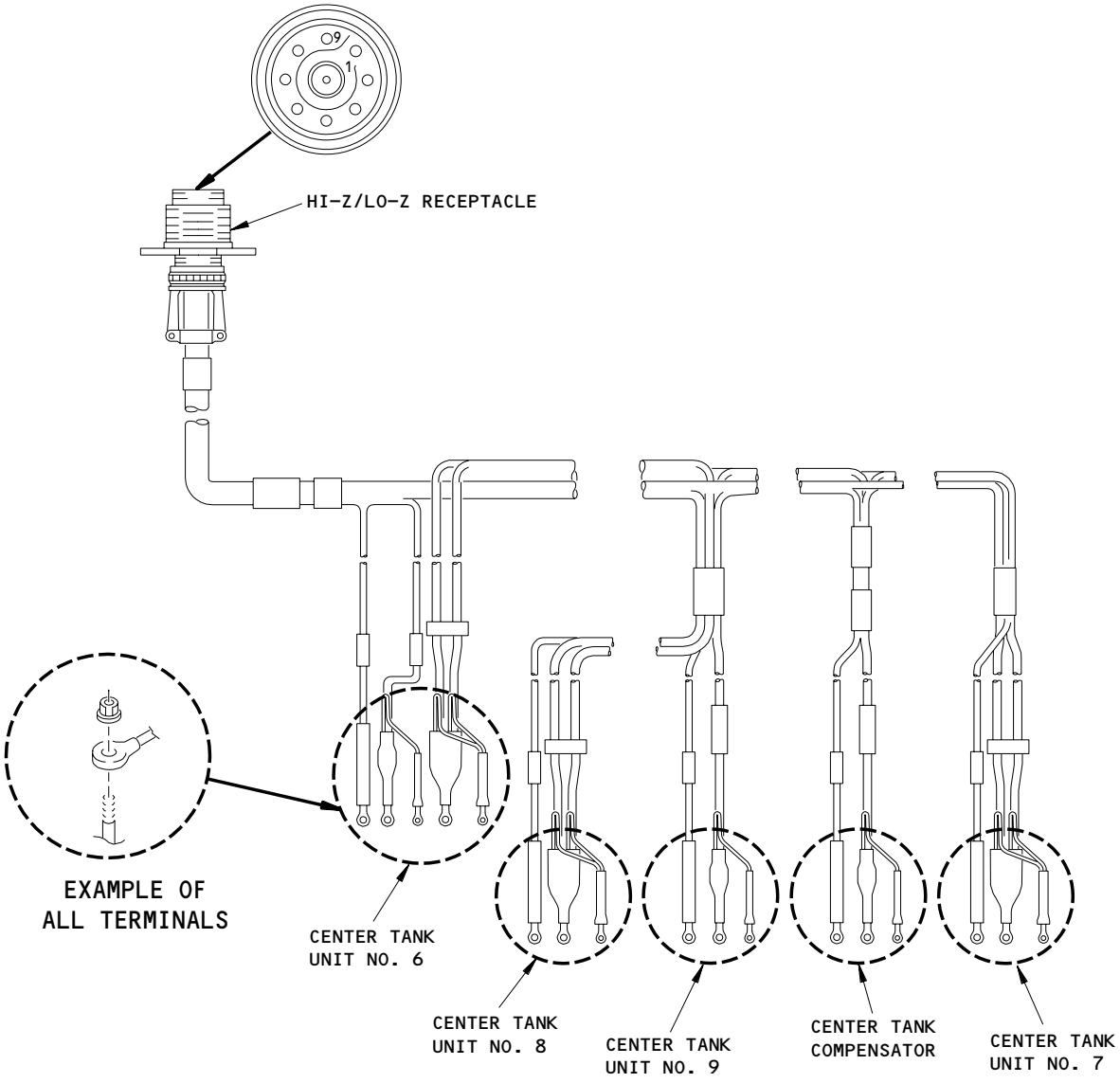


TANK WIRING HARNESS FOR THE TANK UNITS AND COMPENSATOR
IN THE LEFT OR RIGHT MAIN FUEL TANK

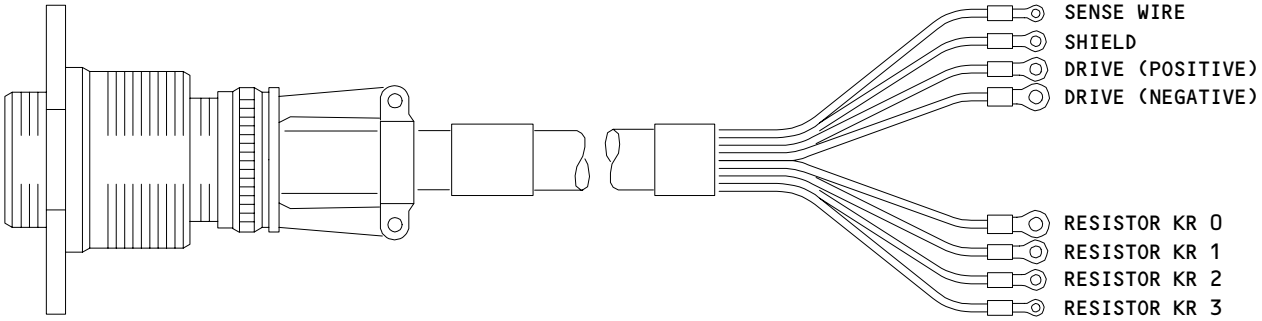
Left or Right Main Tank Wiring Harness for the Tank Units and Compensator
Figure 403



Left Center Tank Wiring Harness
Figure 404



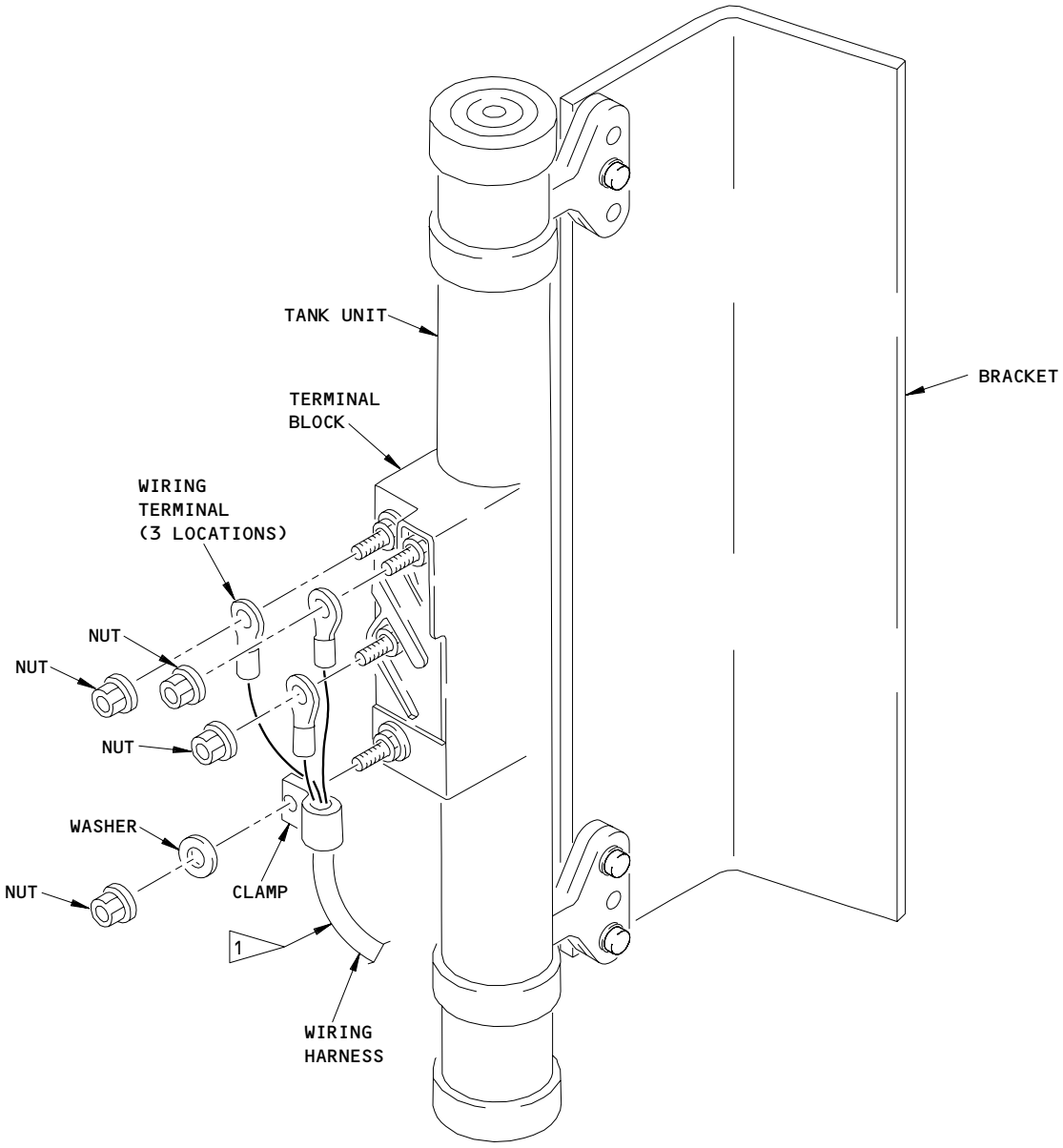
Right Center Tank Wiring Harness
Figure 405



TANK WIRING HARNESS FOR THE DENSITOMETER
IN THE LEFT OR RIGHT MAIN OR CENTER FUEL TANK

Left or Right Main or Center Tank Wiring Harnesses
Figure 406

966859

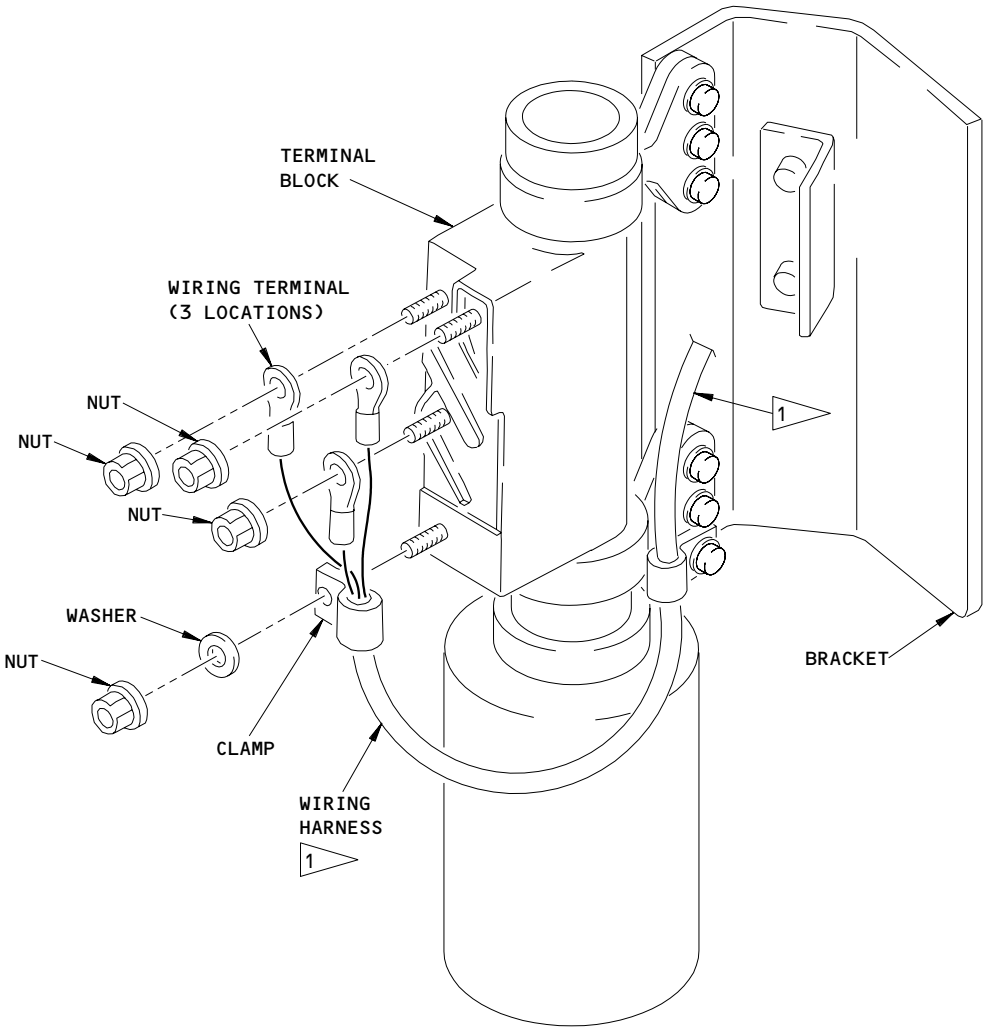


TANK UNIT WIRING HARNESS INSTALLATION
(EXAMPLE)

1 ADJUST WIRE SLACK TO MAINTAIN A CLEARANCE OF 0.5 INCH (12.7mm) BETWEEN WIRE AND COMPONENTS OR STRUCTURE. IF 0.5 INCH (12.7mm) CLEARANCE IS NOT POSSIBLE YOU MUST MAINTAIN A MINIMUM OF 0.125 INCH (12.7mm).

Tank Unit Wiring Harness Installation
Figure 407

K14996

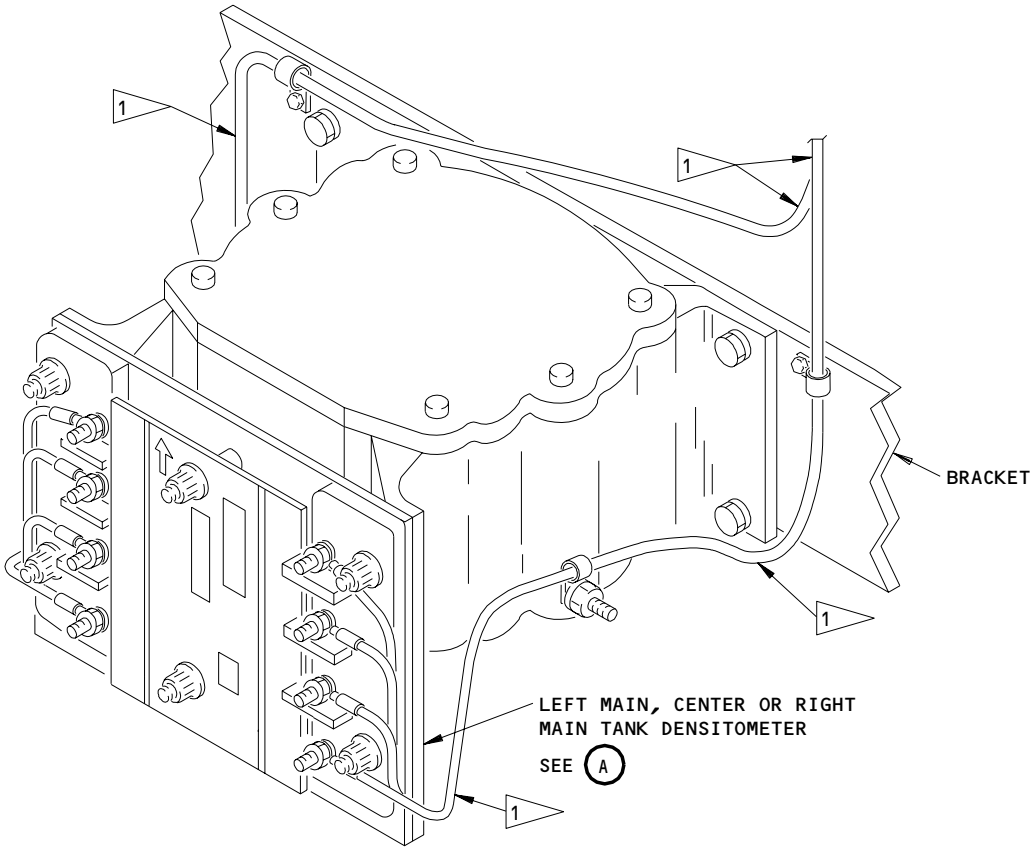


LEFT MAIN, CENTER OR RIGHT MAIN TANK COMPENSATOR

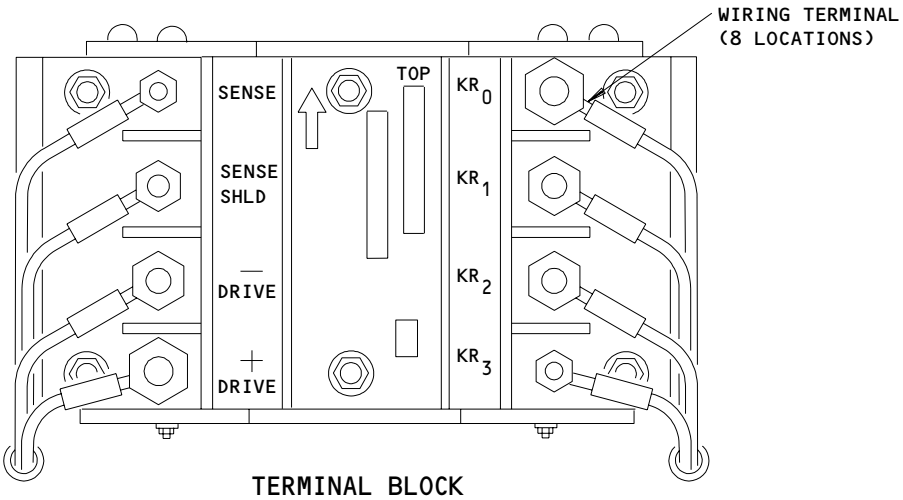
(A)

1 ADJUST WIRE SLACK TO MAINTAIN A CLEARANCE OF 0.5 INCH BETWEEN WIRE AND COMPONENTS OR STRUCTURE. IF 0.5 INCH CLEARANCE IS NOT POSSIBLE YOU MUST MAINTAIN A MINIMUM OF 0.125 INCH.

Compensator Wiring Harness Installation
Figure 408



LEFT MAIN, CENTER OR RIGHT MAIN TANK DENSITOMETER



TERMINAL BLOCK

A

1 ADJUST WIRE SLACK TO MAINTAIN A CLEARANCE OF 0.5 INCH BETWEEN WIRE AND COMPONENTS OR STRUCTURE. IF 0.5 INCH CLEARANCE IS NOT POSSIBLE YOU MUST MAINTAIN A MINIMUM OF 0.125 INCH.

Densitometer Wiring Harness Installation
Figure 409

C. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

D. Procedure

S 654-047-002

(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 654-048-002

(2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

S 864-049-002

(3) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E4, FUELING QTY

S 864-050-002

(4) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-051-002

(5) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
(a) 34A10, FUEL FUEL QTY

S 014-052-002

(6) Remove the applicable main or center tank access door (AMM 28-11-01/401 or AMM 28-11-02/401).

S 034-089-002

(7) For the tank wiring harnesses for the tank units and compensators, do the steps that follow:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE COULD CAUSE INJURY OR DAMAGE.

(a) Do the deactivation procedure for the leading edge slats (AMM 27-81-00/201).

(b) Disconnect the HI-Z/LO-Z plug from the front spar (View A, Fig. 402).
1) For the HI-Z/LO-Z plugs in the main fuel tanks, use a strap wrench and a torque wrench with a 3/8 inch square drive, if it is necessary to disconnect the plugs.

S 034-090-002

(8) For the tank wiring harnesses for the densitometers, disconnect the densitometer plug from the rear spar.

S 034-060-002

(9) Remove the jamnut and washer that hold each tank wiring harness in position on the spar.

NOTE: Do not discard the washer.

S 944-053-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 014-054-002

(11) Go into the applicable fuel tank.

S 024-055-002

(12) Disconnect the wiring terminals at the terminal block of the applicable tank unit, compensator or densitometer.

S 034-056-002

(13) Loosen the clamps at the terminal blocks.

S 034-057-002

(14) Move the wiring clear of the terminal blocks.

S 034-058-002

(15) Remove all the clamps that secure the tank wiring harness to the structure in the fuel tank (Fig. 402).

S 024-061-002

(16) Remove the tank wiring harness from the spar.

S 034-062-002

(17) Discard the O-ring.

S 024-063-002

(18) Remove the tank wiring harness from the fuel tank.

TASK 28-41-09-404-064-002

3. Install the Tank Wiring Harness

A. General

(1) CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

B. Equipment

(1) Strap Wrench, electrical connector - Model TG70, Glenair, Inc., Glendale, CA

NOTE: This model lets you get access to the HI-Z/LO-Z plug.

C. Consumable Materials

(1) A00767 Sealant - BMS 5-45 Class B-2

D. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
402	1	Harness Assy - L or R Main Tank Wiring	28-41-09	01	110
	2	Harness Assy - Left Center Tank Wiring			95
	3	Harness Assy - Right Center Tank Wiring			100
	4	Harness Assy - L or R Main Tank Densitometer Wiring			240
	5	Harness Assy - Center Tank Densitometer Wiring			260
	6	Jamnut - Center Tank			52,54
	7	Jamnut - Main Tank			60
	8	Jamnut - Densitomter Connector			57
	9	Washer - Center Tank Connector			77,79
	10	Washer - Main Tank Connector			73
	11	Washer - Densitomter Connector			77
	12	O-ring - Center Tank Connector			92,94
	13	O-ring - Main Tank Connector			87
	14	O-ring - Densitometer Connector			92

E. References

(1) AMM 24-22-00/201, Electrical Power Control
(2) AMM 27-81-00/201, Leading Edge Slat System
(3) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
(4) AMM 28-11-01/401, Main Tank Access Doors
(5) AMM 28-11-02/401, Center Tank Access Doors
(6) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)

(7) AMM 51-31-01/201, Seals and Sealing
(8) SWPM 20-10-11, Installation of Electrical Wires and Wire Harnesses
(9) SWPM 20-10-12, Wire Harness Supports
(10) SWPM 20-10-19, Wire Separation
(11) DWG 288N1108 Wire Bundle Installation-Wing Center Section
(12) DWG 288N1211 Wire Bundle Installation-Left Inspar
(13) DWG 288N1213 Wire Bundle Installation-Left Outboard Inspar
(14) DWG 288N1212 Wire Bundle Installation-Right Inspar
(15) DWG 288N1214 Wire Bundle Installation-Right Outboard Inspar

F. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

G. Procedure

S 944-065-002

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Obey the Purging and Fuel Tank Entry Precautions (AMM 28-11-00/201).

S 414-066-002
(2) Go into the applicable fuel tank.

S 214-067-002
(3) Make sure the mating surface of the tank wiring harness on the front spar is clean (View A, Fig. 402).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-070-002
(4) Install a new O-ring in the groove on the mating surface of the tank wiring harness.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-069-002
(5) Install the tank wiring harness from in the fuel tank, through the hole in the spar.

S 434-071-002
(6) Install the washer and the jamnut on the tank wiring harness from out of the fuel tank.

S 434-072-002
(7) Tighten the jamnut to 15-20 pound-feet.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 394-095-002
(8) Apply the sealant (BMS 5-45 Class B-2) around the mating surface of the tank wiring harness in the fuel tank (AMM 51-31-01/201) (Fig. 402).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-075-002
(9) Put the tank wiring harness in position and install the clamps (SWPM 20-10-11, SWPM 20-10-12, SWPM 20-10-19).

NOTE: Adjust wire slack to maintain a clearance of 0.5 inch between the wire and components or structure. If 0.5 inch clearance is not possible, you must maintain a minimum clearance of 0.125 inch.

(a) To install the tank wiring harness and clamps, refer to these Boeing Drawings:
1) For the center fuel tank:
Drawing No. 288N1108
2) For the left main fuel tank:
Drawing No.s 288N1211 or 288N1213
3) For the right main fuel tank:
Drawing No.s 288N1212 or 288N1214

S 424-076-002
(10) Put the wiring terminals on the terminal block of each tank unit, compensator and densitometer (Fig. 407, Fig. 408, Fig. 409).

S 434-092-002
(11) Install the nuts and washers on the terminal posts of the terminal block.

NOTE: The terminal posts have different dimensions to prevent errors in installation.

S 434-093-002
(12) For the tank units and compensators, tighten the nuts to these limits:

TERMINAL	TORQUE VALVE
HI-Z	12-15 pound-inches
LO-Z	25-35 pound-inches
SHIELD	15-20 pound-inches

S 434-091-002
(13) For the densitometer, tighten the nuts to these limits:

TERMINAL	TORQUE VALVE	NUT SIZE
SENSE	6-8 pound-inches	0.112-40
SENSE SHIELD	12-15 pound-inches	0.138-32
DRIVE -	15-20 pound-inches	0.164-32
DRIVE +	25-30 pound-inches	0.190-32
KR0	25-30 pound-inches	0.190.32
KR1	15-20 pound-inches	0.164-32
KR2	12-15 pound-inches	0.138-32
KR3	6-8 pound-inches	0.112-40

S 434-094-002
(14) From out of the fuel tank, connect the HI-Z/LO-Z plug to the HI-Z/LO-Z receptacle or the densitometer plug to the densitometer receptacle for the tank wiring harness.

S 434-073-002
(15) For the HI-Z/LO-Z plugs in the main fuel tanks, use a strap wrench and torque wrench with the 3/8 inch square drive to tighten the HI-Z/LO-Z plug to 70 pound-inches.

S 434-074-002
(16) Install the lockwire between each plug and its jamnut.

S 094-080-002
(17) Remove the purging and ventilating equipment (AMM 28-11-00/201).

S 414-081-002
(18) Install the applicable main or center tank access door (AMM 28-11-01/401 or AMM 28-11-02/401).

S 864-082-002

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA DURING THE ACTIVATION OF THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING THE ACTIVATION OF THE LEADING EDGE SLATS, INJURY TO PERSONS COULD OCCUR.

(19) Do the activation procedure for the leading edge slats if it is necessary (AMM 27-81-00/201).

S 864-083-002
(20) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-084-002
(21) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-085-002
(22) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 864-086-002
(23) Supply electrical power (Ref 24-22-00).

S 744-087-002
(24) Do the fuel quantity BITE procedure "Self Test ?" (AMM 28-41-00/501).

S 864-088-002
(25) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FQIS TANK WIRING HARNESS - REMOVAL/INSTALLATION

1. General
   A. The in-tank wiring harnesses are part of the fuel quantity indicating system (FQIS). There are seven in-tank wiring harnesses (Fig. 401), one in each main fuel tank (Fig. 403), one in each half of the center fuel tank (Fig. 404, 405), and three densitometer tank wiring harness, one in each fuel tank. The tank wiring harnesses in the left and right main fuel tanks are the same. The differences between the two tank wiring harnesses in the center fuel tank are the identification tags and provisions for the compensator. Each fuel tank contains one compensator. The three densitometer tank wiring harnesses are almost the same.
   B. Repair and overhaul of the FQIS tank wiring harness must be per SWPM 20-14-12.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on CriticalDesign Configuration Control Limitations (CDCCLs).

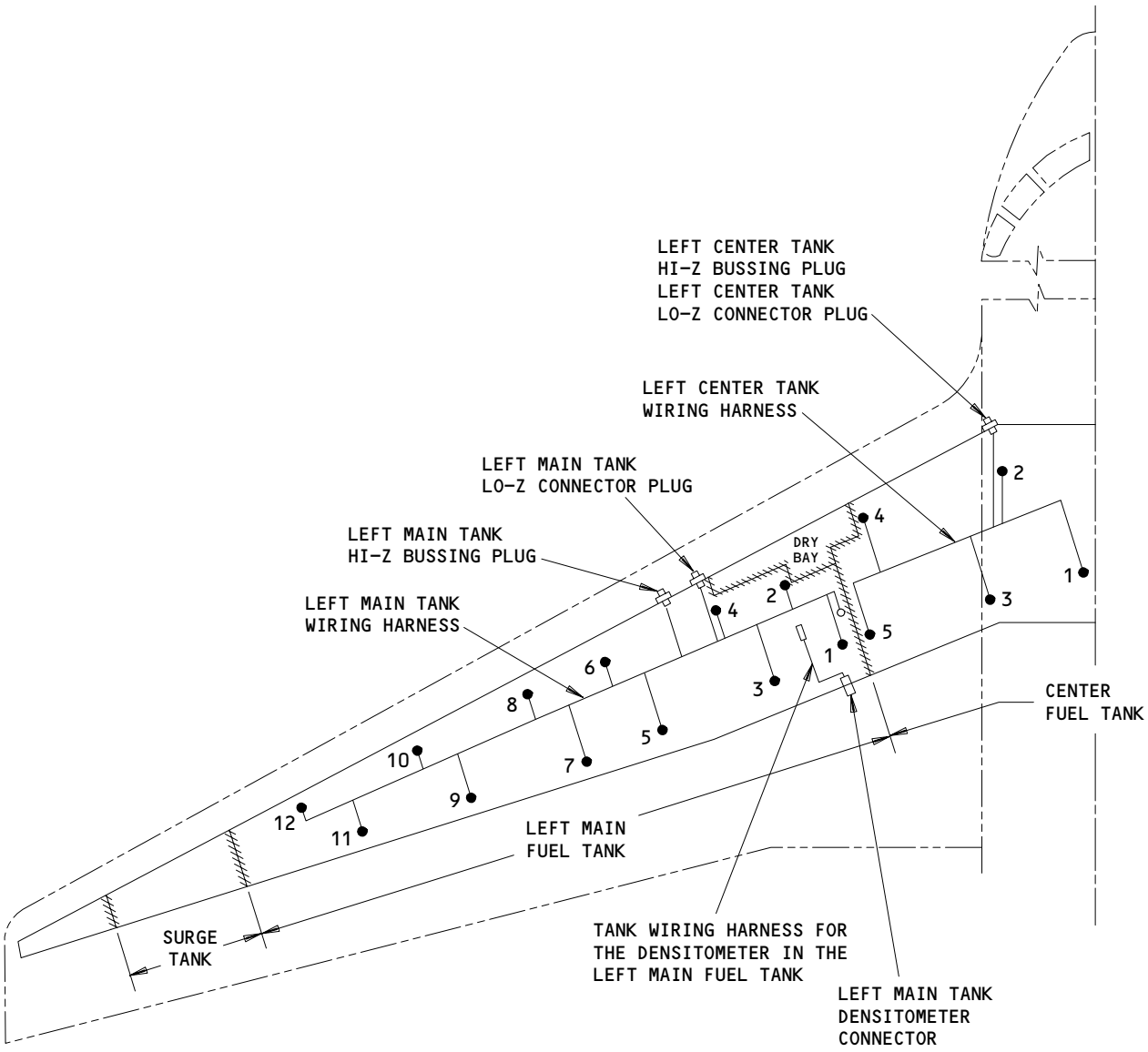
   C. This procedure contains two tasks. The first task removes the tank wiring harnesses and the densitometer tank wiring harness. The second task installs the tank wiring harnesses and the densitometer tank wiring harness.

   TASK 28-41-09-004-001-003

2. Remove the Tank Wiring Harness
   A. Equipment
      (1) Strap Wrench, electrical connector - Model TG70, Glenair, Inc., Glendale, CA

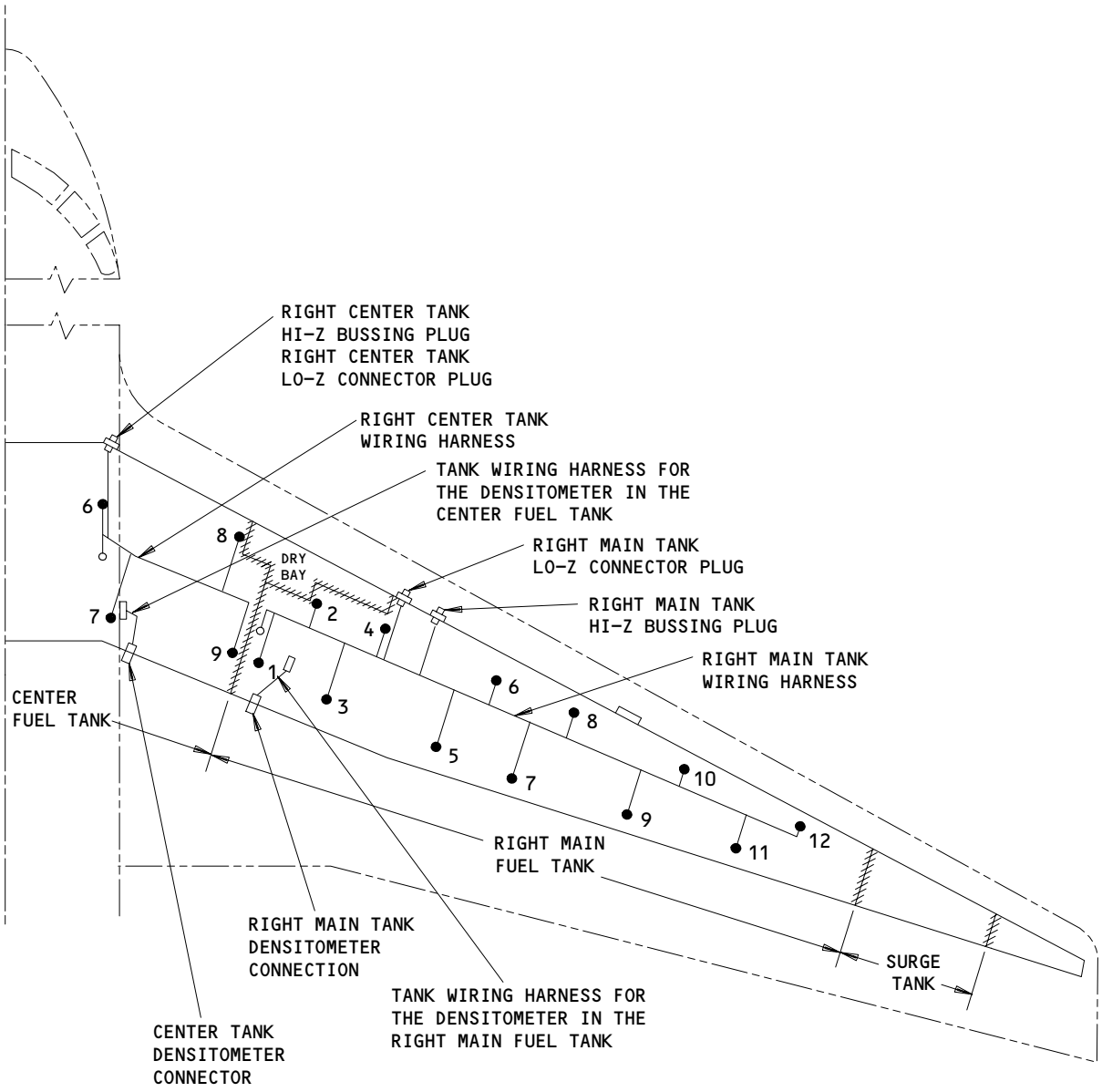
         NOTE: This model lets you get access to the HI-Z bussing plug and the LO-Z connector plug.

   B. References
      (1) 27-81-00/201, Leading Edge Slat System
      (2) 28-11-00/201, Fuel Tanks (Purging and Entry)
      (3) 28-11-01/401, Main Tank Access Doors
      (4) 28-11-02/401, Center Tank Access Doors
      (5) 28-26-00/201, Defueling
   C. Access
      (1) Location Zones
         133 Wing Center Section (Left)
         134 Wing Center Section (Right)
         531 Center Wing Tank (Left)
         541 Main Tank - Rib No. 5 to No. 17 (Left)
         542 Main Tank - Rib No. 17 to No. 21 (Left)
         631 Center Wing Tank (Right)
         641 Main Tank - Rib No. 5 to No. 17 (Right)
         642 Main Tank - Rib No. 17 to No. 21 (Right)



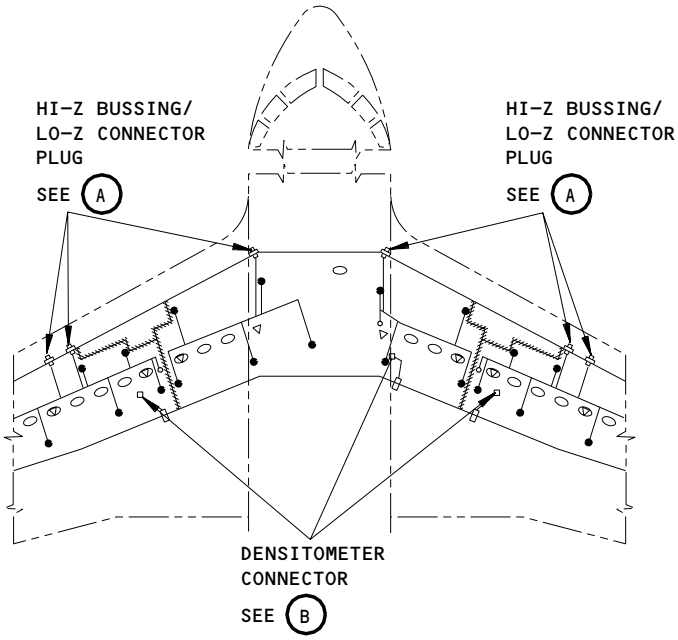
LEFT WING

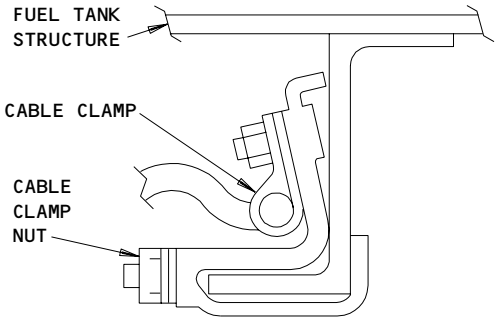
Tank Wiring Harness Installation
Figure 401 (Sheet 1)



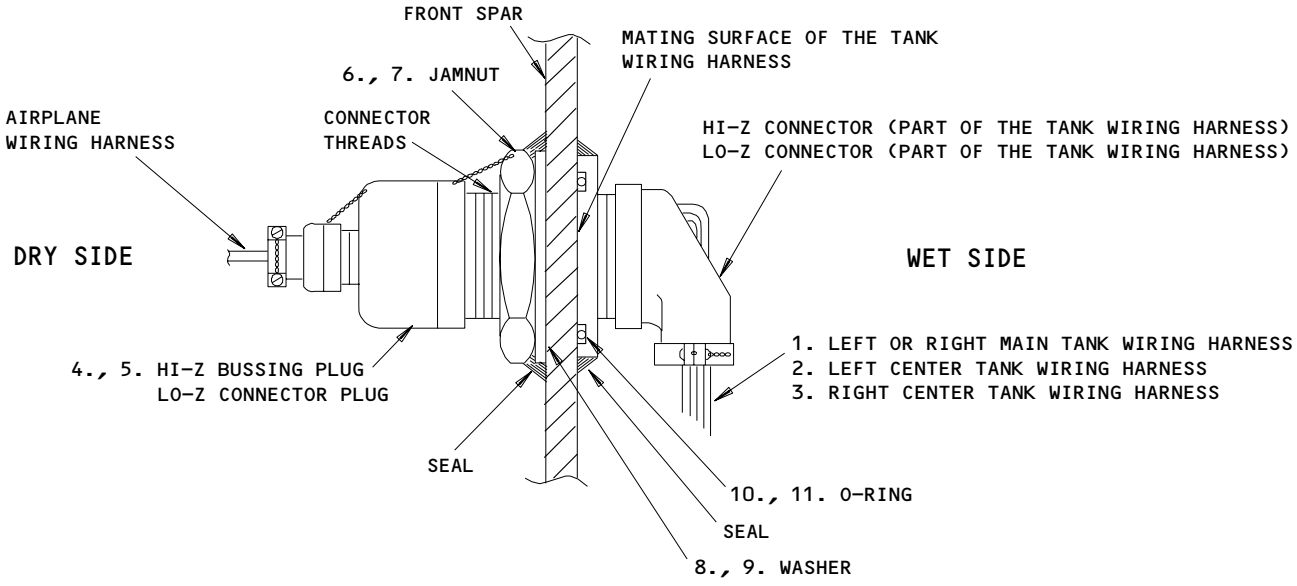
RIGHT WING

Tank Wiring Harness Installation
Figure 401 (Sheet 2)





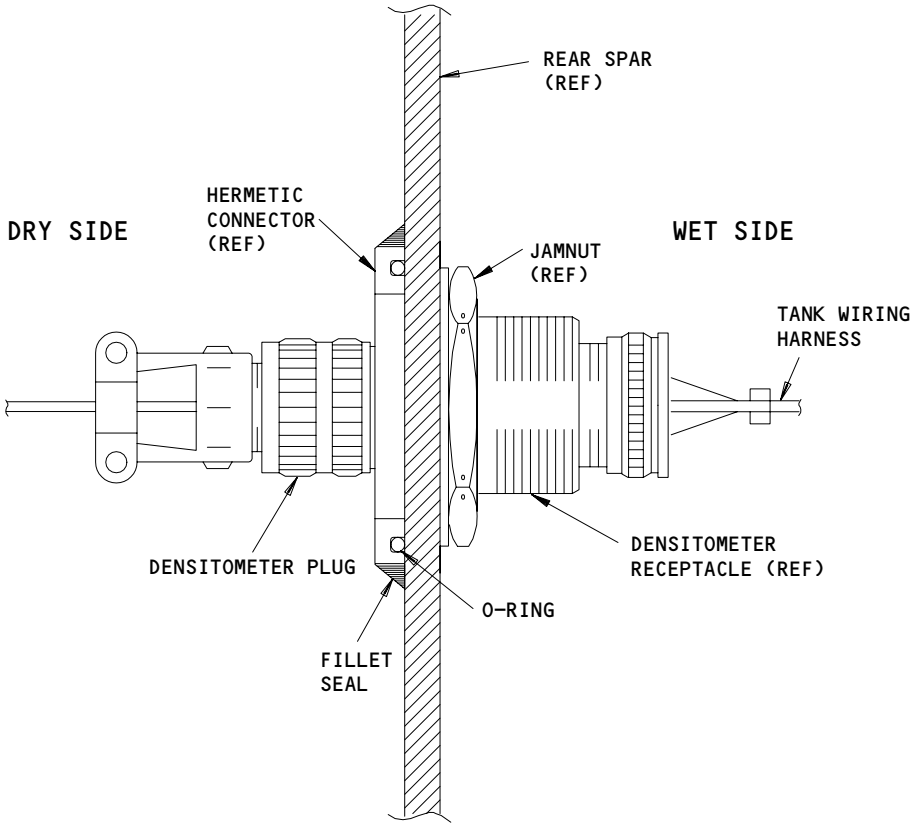
CABLE CLAMP (EXAMPLE)
(FOUND IN THE FUEL TANK,
USED TO SECURE THE TANK
WIRING HARNESS)



HI-Z BUSSING/LO-Z CONNECTOR PLUG

(A)

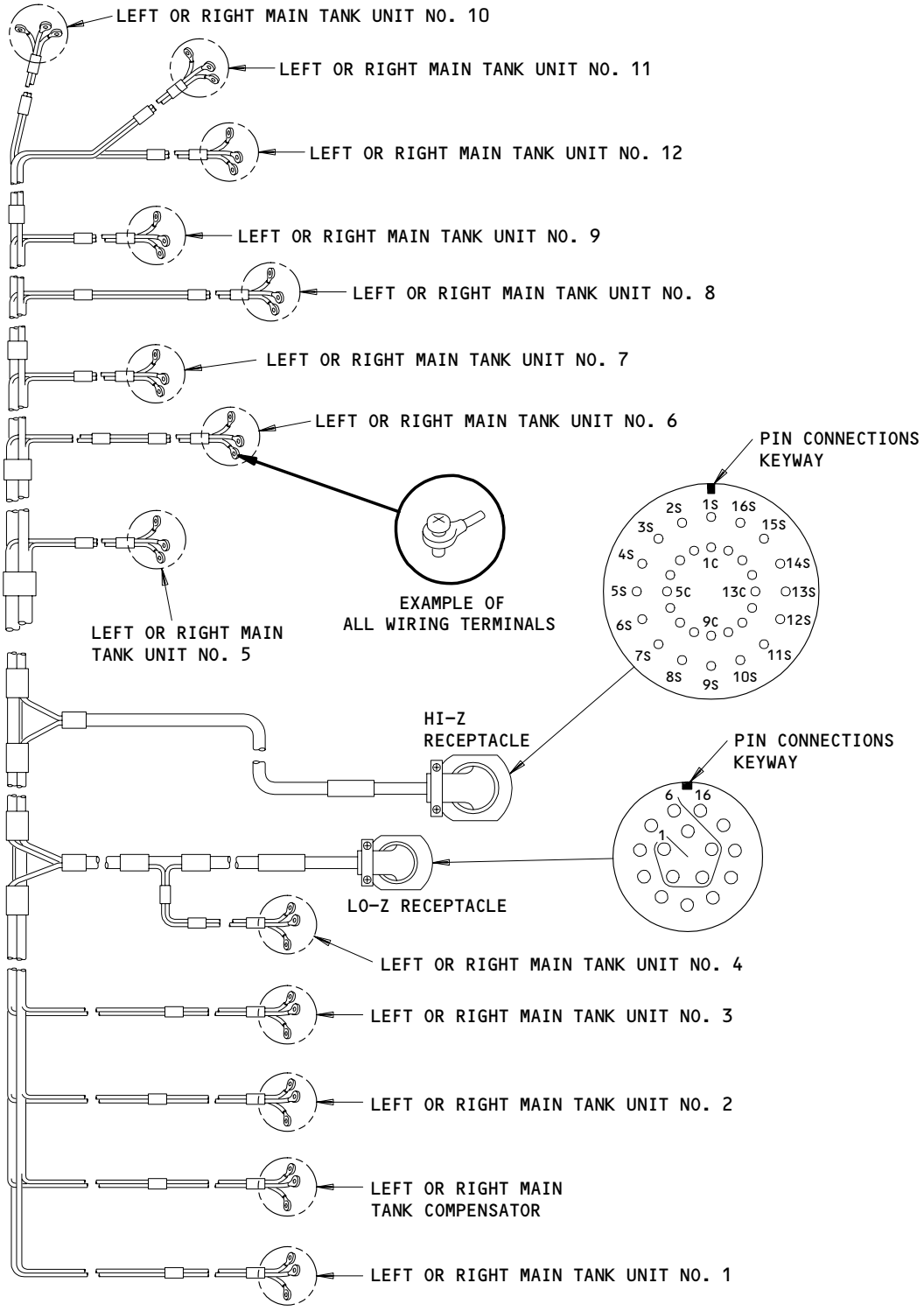
Tank Wiring Harness Connectors
Figure 402 (Sheet 1)



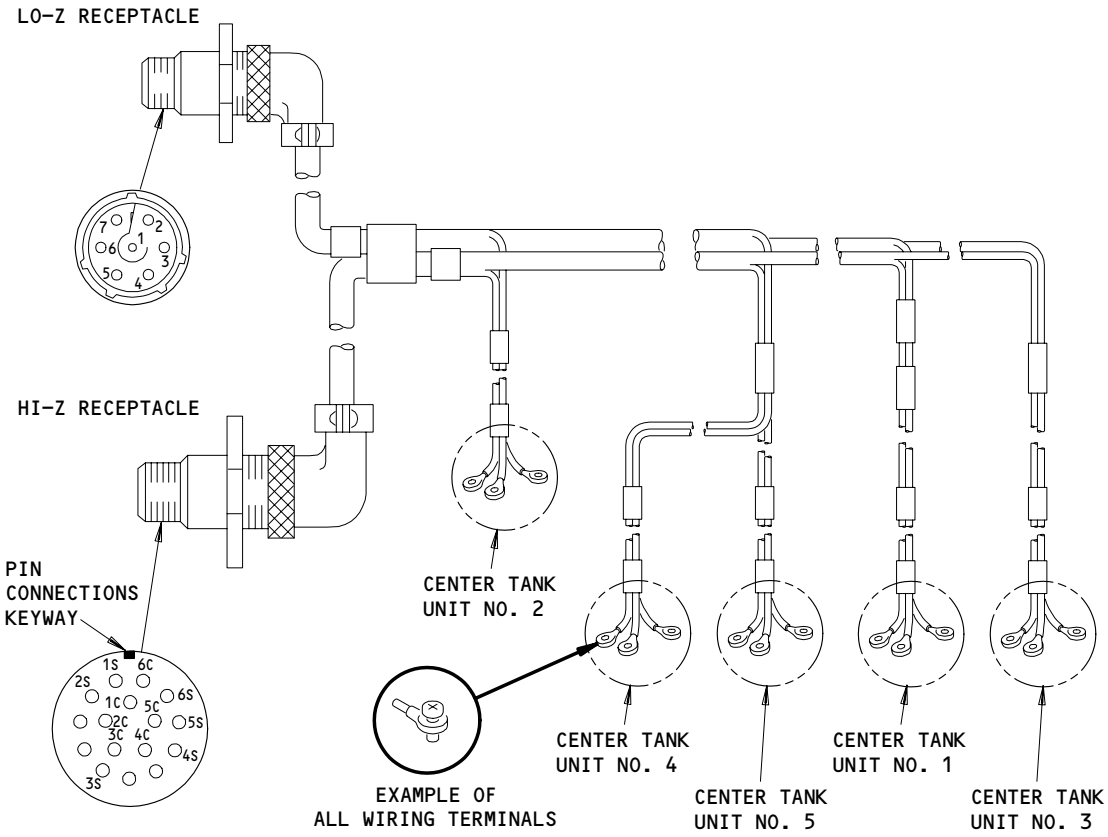
DENSITOMETER CONNECTOR
(EXAMPLE)

B

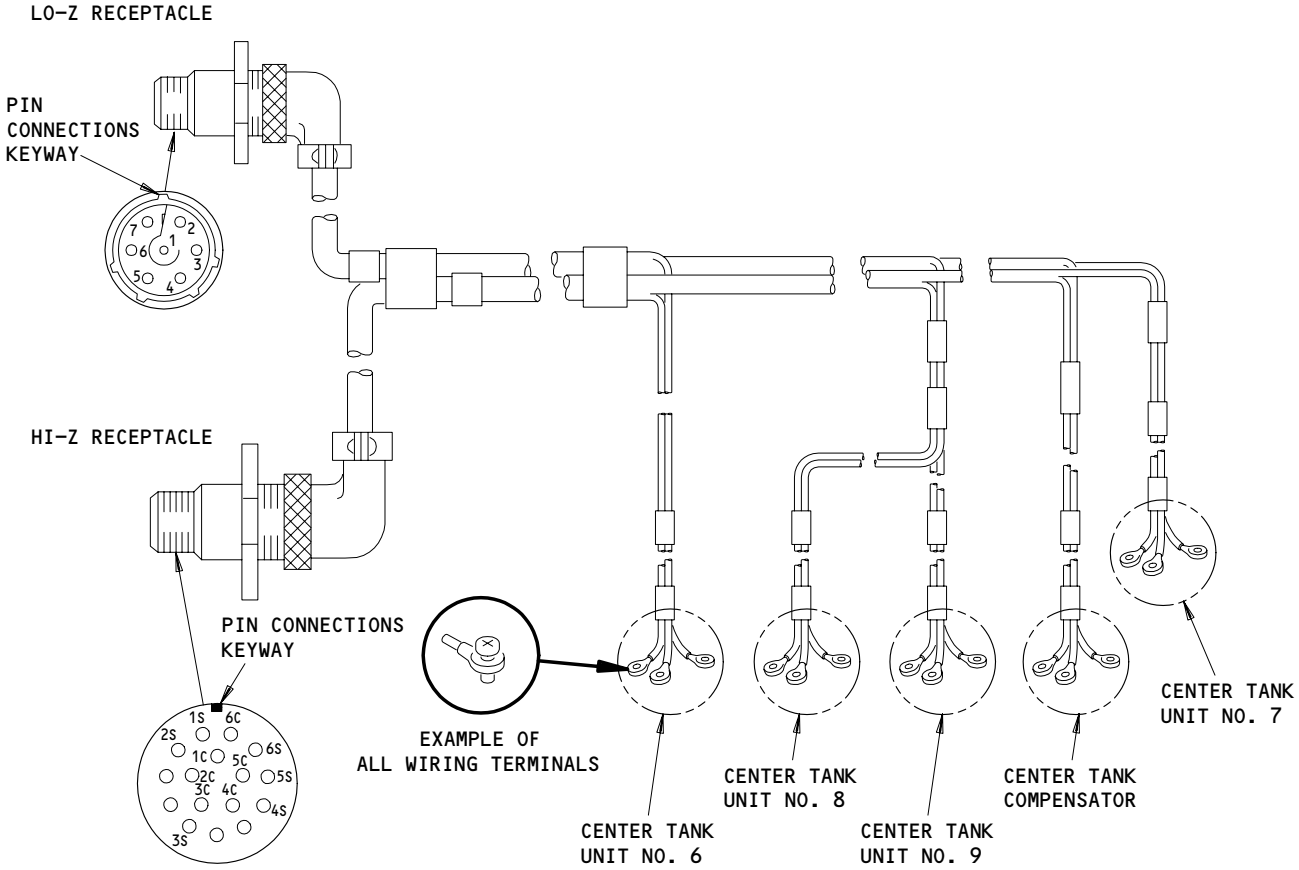
Tank Wiring Harness Connectors
Figure 402 (Sheet 2)



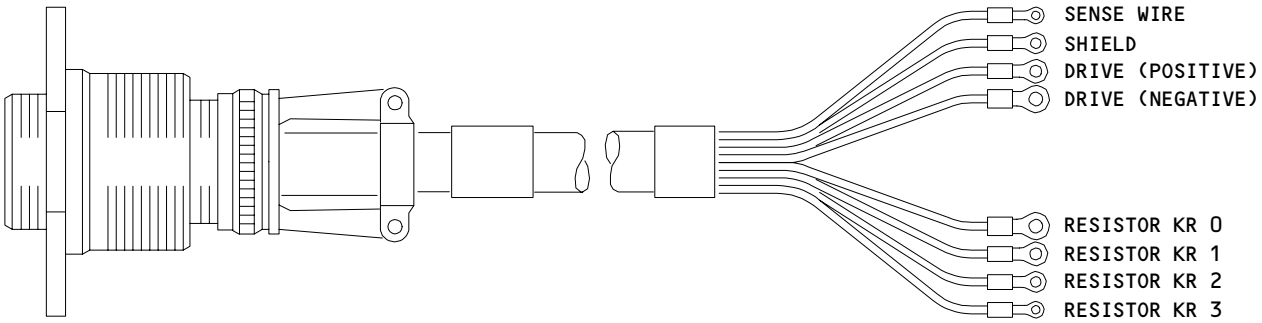
Left or Right Main Tank Wiring Harness
Figure 403



Left Center Tank Wiring Harness
Figure 404



Right Center Tank Wiring Harness
Figure 405



TANK WIRING HARNESS FOR THE DENSITOMETER
IN THE LEFT OR RIGHT MAIN OR CENTER FUEL TANK

Left or Right Main or Center Tank Wiring Harnesses
Figure 406

D. Procedure

S 654-002-003
(1) Defuel the applicable fuel tank (Ref 28-26-00).

S 654-003-003
(2) Drain and purge the applicable fuel tank (Ref 28-11-00).

S 864-004-003
(3) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6E4, FUELING QTY

S 864-005-003
(4) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-006-003
(5) Open this circuit breaker on the APU external power panel, P34, and attach a DO-NOT-CLOSE tag:
(a) 34A10, FUEL FUEL QTY

S 014-007-003
(6) Remove the applicable main or center tank access door (Ref 28-11-01 or 28-11-02).

S 944-008-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Obey the fuel tank entry precautions (Ref 28-11-00).

S 014-009-003
(8) Go into the applicable fuel tank.

S 024-077-003
(9) To remove the applicable tank wiring harness for the tank units and compensator, do the steps that follow:
(a) Disconnect the wiring terminals of the tank wiring harness at the terminal block of each tank unit.
(b) Loosen the wire clamp at the terminal block of each tank unit.
(c) Loosen the wiring strain relief clamp at the tank units.
(d) Move the wiring clear of the tank units.
(e) Disconnect the wiring terminals at the terminal block of the compensator.
(f) Loosen the wire clamp at the terminal block of the compensator.
(g) Loosen the wiring strain relief clamp at the compensator.

(h) Move the wiring clear of the compensator.
(i) Remove all the cable clamps that secure the tank wiring harness to the structure in the fuel tank (Fig. 402).

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS.

FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE COULD CAUSE INJURY OR DAMAGE.

(j) Do the deactivation procedure for the leading edge slats (Ref 27-81-00).
(k) Disconnect the HI-Z bussing plug (4, 5) and the LO-Z connector plug from the front spar (View A, Fig. 402).
1) For the HI-Z bussing plugs (5) and LO-Z connector plugs in the main fuel tanks, use a strap wrench and a torque wrench with a 3/8 inch square drive, if it is necessary to disconnect the plugs.
(l) Remove the jamnut (6, 7) and washer (8, 9) that hold each tank wiring harness (1, 2, 3) in position on the front spar.

NOTE: Do not discard the washer (8, 9).

(m) Remove the tank wiring harness (1, 2, 3) from the front spar.
1) Discard the O-ring (10, 11).
(n) Remove the tank wiring harness (1, 2, 3) from the fuel tank.

S 024-076-003
(10) To remove the tank wiring harness for the applicable densitometer, do the steps that follow:
(a) Disconnect the densitometer plug from the rear spar.
(b) Remove the jamnut and washer that hold each tank wiring harness for the densitometer in position on the rear spar.

NOTE: Do not discard the washer.

(c) Disconnect the wiring terminals at the terminal block of the applicable densitometer.
(d) Disconnect the wiring cable clamps from the wiring harness.
(e) Remove the tank wiring harness from the rear spar.
1) Discard the O-ring.
(f) Remove the tank wiring harness from the fuel tank.

TASK 28-41-09-404-025-003

3. Install the Tank Wiring Harnesses

A. General

(1) CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

B. Equipment

(1) Strap Wrench, electrical connector - Model TG70, Glenair, Inc., Glendale, CA

NOTE: This model lets you get access to the HI-Z bussing plug and the LO-Z connector plug.

C. Consumable Materials

(1) A00247 Chromate Type Sealant - BMS 5-95
(2) A00767 Sealant - BMS 5-45 Class B-2

D. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	1	Harness Assy - L or R Main Tank Wiring	28-41-09	01	110
	2	Harness Assy - Left Center Tank Wiring			95
	3	Harness Assy - Right Center Tank Wiring			100
	4	Center Tank HI-Z Bussing Plug			105
	5	Main Tank HI-Z Bussing Plug			115
	6	Jamnut - Center Tank			50,55
	7	Jamnut - Main Tank			60,55
	8	Washer - Center Tank Connector			70,65
	9	Washer - Main Tank Connector			75,70
	10	O-ring - Center Tank Connector			80,85
	11	O-ring - Main Tank Connector			90,85
	12	Harness Assembly - Densitometer left, right or center tank			TBF
	13	Jamnut - L, R or Center tank			TBF
	14	Washer - L, R or Center tank			TBF
	15	O-ring - L, R or Center tank			TBF

E. References

(1) AMM 24-22-00/201, Electrical Power Control
(2) AMM 27-81-00/201, Leading Edge Slat System
(3) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
(4) AMM 28-11-01/401, Main Tank Access Doors

(5) AMM 28-11-02/401, Center Tank Access Doors
(6) AMM 28-41-00/501, Fuel Quantity Indicating System (FQIS)
(7) AMM 51-31-01/201, Seals and Sealing

F. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)

G. Procedure

S 944-026-003

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY OR DAMAGE.

(1) Obey the fuel tank entry precautions (Ref 28-11-00).

S 414-027-003

(2) Go into the applicable fuel tank.

S 424-075-003

(3) To install the applicable tank wiring harness for the tank units and compensator, do the steps that follow:

(a) Make sure the mating surface of the tank wiring harness (1, 2, 3) on the front spar is clean (View A, Fig. 402).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) Install a new O-ring (10, 11) in the groove on the mating surface of the tank wiring harness (1, 2, 3).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(c) Install the tank wiring harness (1, 2, 3) from in the fuel tank, through the hole in the front spar.
(d) Install the washer (8, 9) and the jamnut (6, 7) on the tank wiring harness (1, 2, 3) from out of the fuel tank.

(e) Tighten the jamnut (6, 7) to 15-20 pound-feet.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(f) Apply the sealant (BMS 5-45 Class B-2) around the mating surface of the tank wiring harness (1, 2, 3) in the fuel tank (AMM 51-31-01/201) (Fig. 402).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(g) Connect the HI-Z bussing plug (4, 5) and the LO-Z connector plug to the HI-Z and LO-Z connectors of the tank wiring harness (1, 2, 3).
(h) Tighten the HI-Z bussing plugs (5), LO-Z connector plugs and the densitometer plugs with a strap wrench (and a torque wrench with a 3/8 inch square drive) to 70 pound-inches.
(i) Install the lockwire between each plug and its jamnut (6, 7).
(j) Apply the chromate type sealant (BMS 5-95) around the jamnut (6, 7) (Ref 51-31-01).

CAUTION: APPLY CHROMATE TYPE SEALANT UP TO THE COLOR BANDS ON THE CONNECTOR THREADS. IF YOU APPLY MORE CHROMATE TYPE SEALANT, INCORRECT ELECTRICAL CONTACT CAN OCCUR.

(k) Apply chromate type sealant (BMS 5-95) around the HI-Z bussing plug, the LO-Z connector plug (Ref 51-31-01).

NOTE: Make sure the chromate type sealant does not extend to the color bands on the connector threads.

(l) Put the tank wiring harness (1, 2, 3) in position and install the cable clamps.
(m) Put the wiring terminals on the terminal block of each tank unit and install the terminal screws.

NOTE: The terminal screws have different dimensions to prevent errors in connection.

(n) Put and hold the wiring on the terminal block of each tank unit.
(o) Install the wiring clamp on the terminal block of each tank unit.
(p) Install the wiring strain relief clamp on each tank unit.

(q) Put the wiring terminals on the terminal block of each compensator and install the terminal screws.

NOTE: The terminal screws have different dimensions to prevent errors in connection.

(r) Put and hold the wiring on the terminal block of the compensator.
(s) Install the wiring clamp on the terminal block of the compensator.
(t) Install the wiring strain relief clamp at the compensator.

S 424-073-003

(4) To install the tank wiring harness for the applicable densitometer, do the steps that follow:
(a) Install the densitometer plug at the rear spar.
(b) Apply the chromate type sealant (BMS 5-95) around the jamnut (Ref 51-31-01).

CAUTION: APPLY CHROMATE TYPE SEALANT UP TO THE COLOR BANDS ON THE CONNECTOR THREADS. IF YOU APPLY MORE CHROMATE TYPE SEALANT, INCORRECT ELECTRICAL CONTACT CAN OCCUR.

(c) Apply chromate type sealant (BMS 5-95) around the densitometer plug.

NOTE: Make sure the chromate type sealant does not extend to the color bands on the connector threads.

(d) Put the tank wiring harness in position and install the cable clamps.
(e) Put the wiring terminals on the terminal block of the densitometer and install the terminal nuts.

NOTE: The terminal screws have different dimensions to prevent errors in connection (Ref 28-41-03/401).

S 724-074-003

(5) Do the "Dry Capacitance Test at the Front Spar of the Wing (No Fuel in the Tank)" or "Dry Capacitance Test in the Main Equipment Center (No Fuel in the Tank)" procedure for the installed tank wiring harness (Ref 28-41-00).

S 094-049-003

(6) Remove the purging and ventilating equipment (Ref 28-11-00).

S 414-050-003

(7) Install the applicable main or center tank access door (Ref 28-11-01 or 28-11-02).

S 864-051-003

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA DURING THE ACTIVATION OF THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING THE ACTIVATION OF THE LEADING EDGE SLATS, INJURY TO PERSONS COULD OCCUR.

(8) Do the activation procedure for the leading edge slats (Ref 27-81-00).

S 864-052-003

(9) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6E4, FUELING QTY

S 864-053-003

(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C34, FUEL QTY 1
(b) 11L19, FUEL QTY 2

S 864-054-003

(11) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P34 panel:
(a) 34A10, FUEL FUEL QTY

S 864-055-003

(12) Supply electrical power (Ref 24-22-00).

S 744-056-003

(13) Do the fuel quantity BITE procedure (Ref 28-41-00).

S 864-057-003

(14) Remove electrical power if it is not necessary (Ref 24-22-00).

FQIS TANK WIRING HARNESS - INSPECTION/CHECK

1. General
   A. This task does an inspection of the FQIS tank wiring harness and in-tank FQIS components.

TASK 28-41-09-766-001

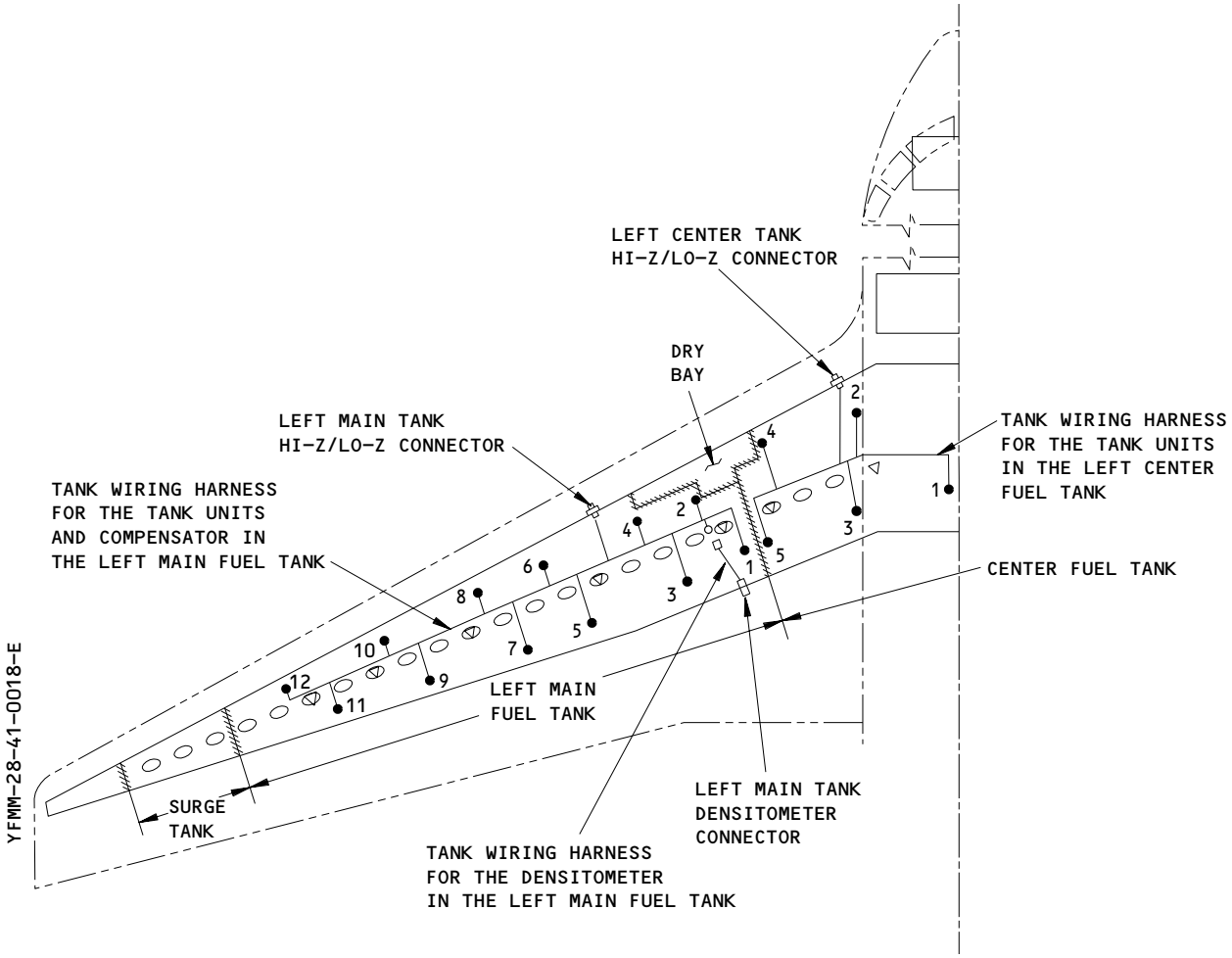
2. FQIS Tank Wiring Harness and In-Tank FQIS Components - Inspection
(Fig. 601, 602, 603)
   A. References
      (1) AMM 28-11-00/201, Fuel Tanks (Purging and Entry)
      (2) AMM 28-11-01/401, Main Tank Access Doors
      (3) AMM 28-11-02/401, Center Tank Access Doors
      (4) AMM 28-26-00/201, Defueling
      (5) AMM 28-41-02/401, FQIS Compensator
   B. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          531 Center Wing Tank (Left)
          541 Main Tank - Rib No. 5 to No. 17 (Left)
          542 Main Tank - Rib No. 17 to No. 21 (Left)
          631 Center Wing Tank (Right)
          641 Main Tank Rib No. 5 to No. 17 (Right)
          642 Main Tank - Rib No. 17 to No. 21 (Right)

   C. Procedure

      S 656-010
      (1) Defuel the applicable fuel tank (AMM 28-26-00/201).

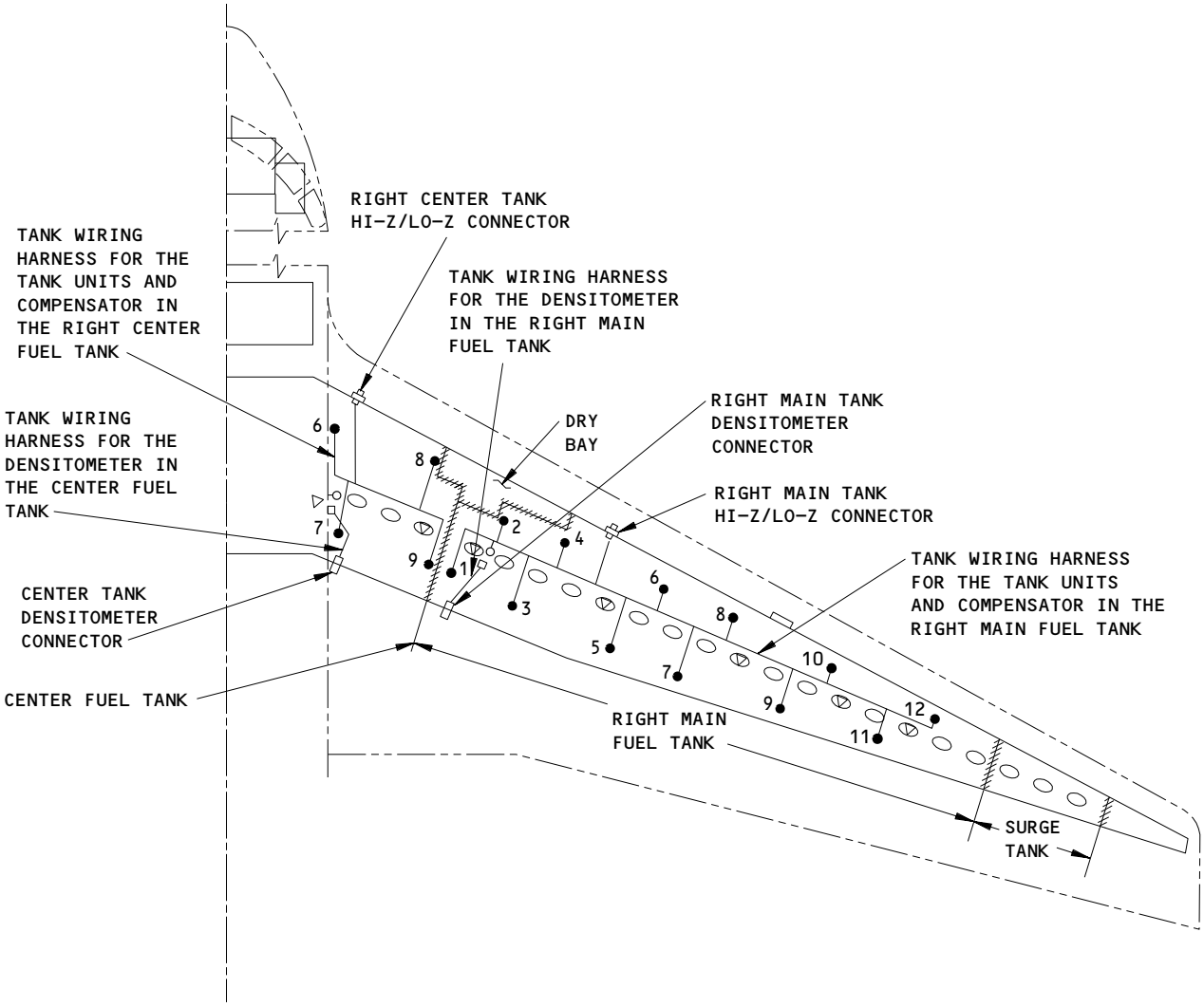
      S 656-011
      (2) Drain and purge the applicable fuel tank (AMM 28-11-00/201).

      S 016-012
      (3) Remove the applicable main or center tank access door (AMM 28-11-01/401 or AMM 28-11-02/401).



LEFT WING

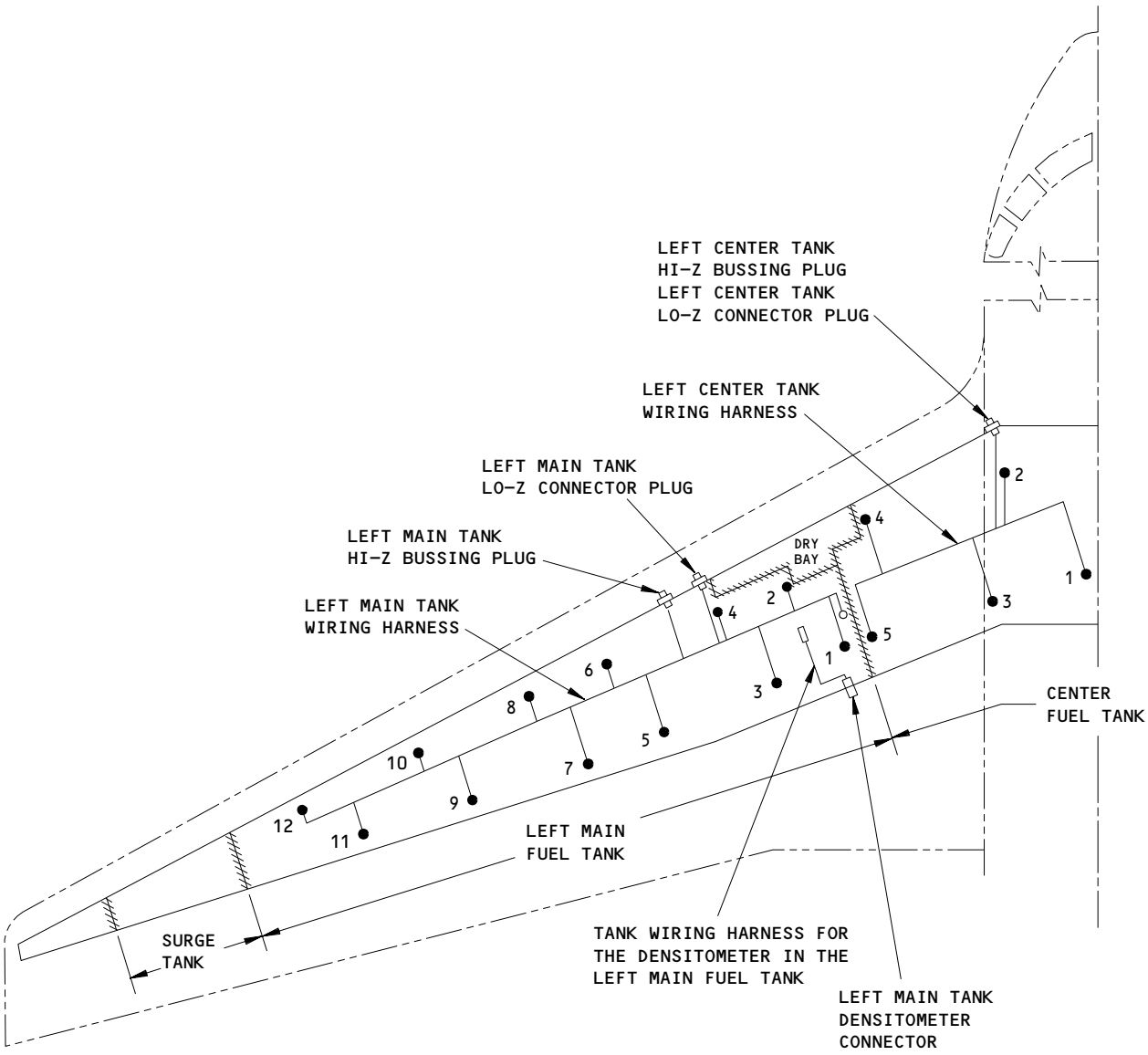
Tank Wiring Harness Installation
Figure 601 (Sheet 1)



RIGHT WING

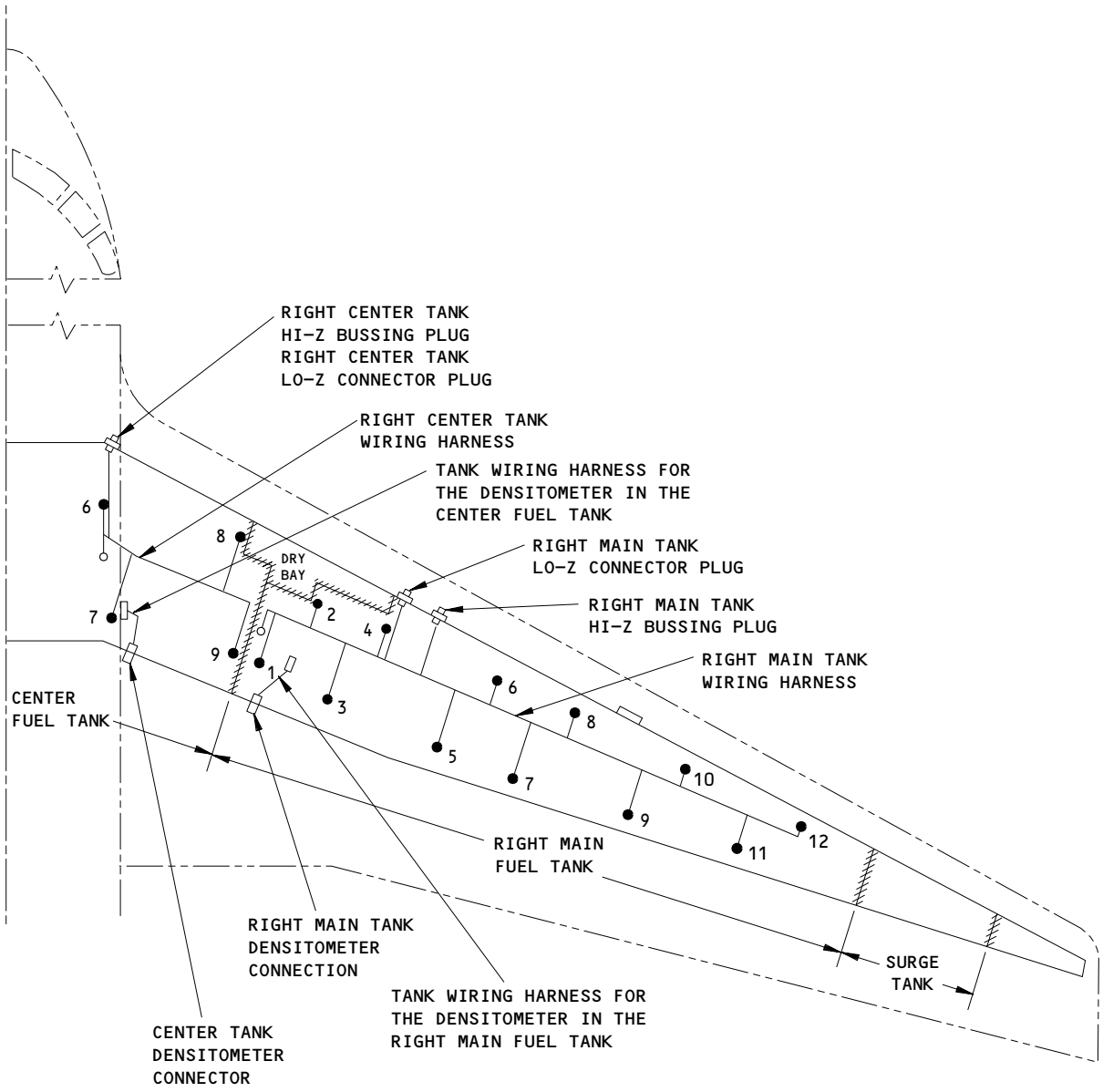
Tank Wiring Harness Inspection
Figure 601 (Sheet 2)

1376096



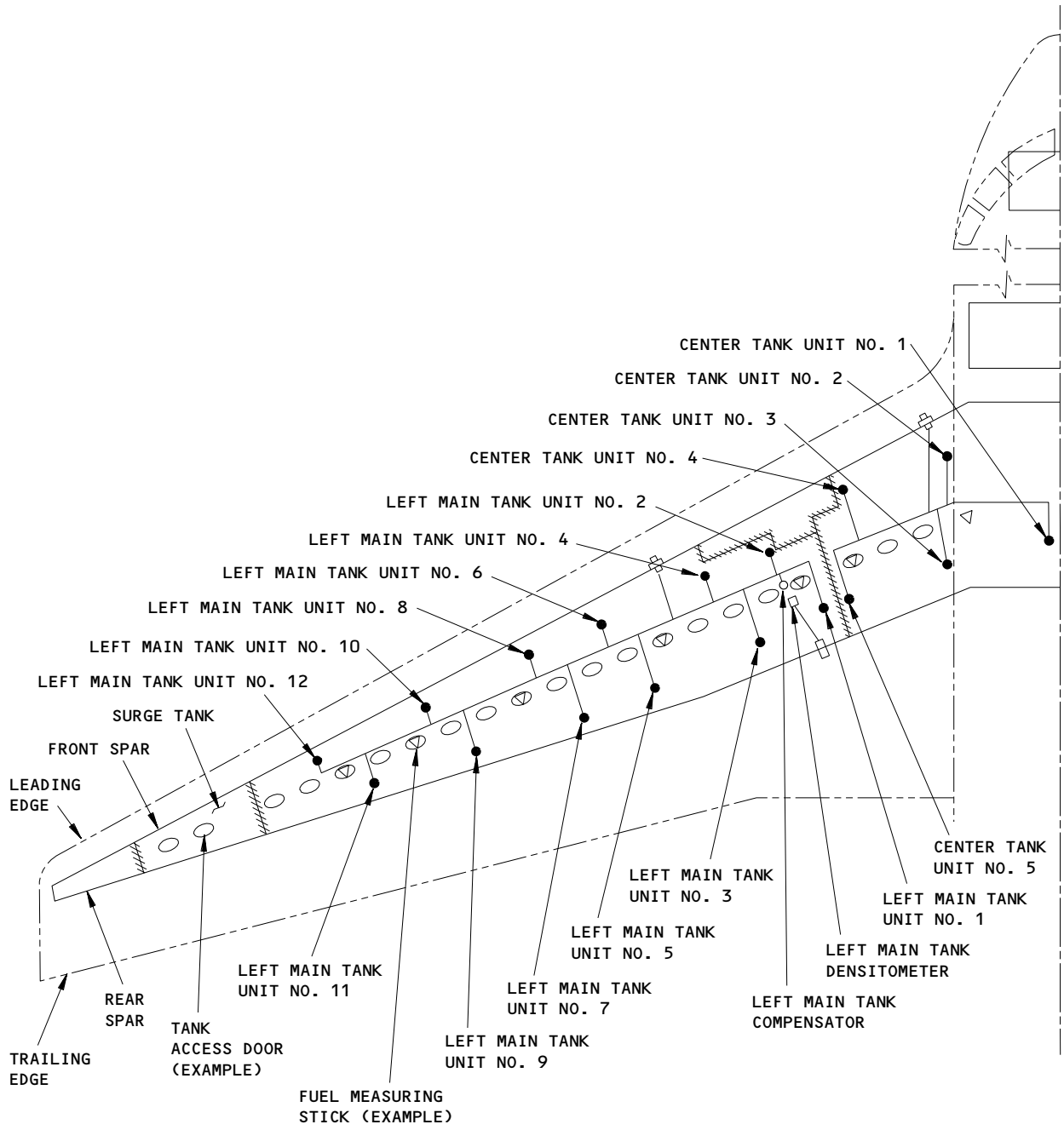
LEFT WING

Tank Wiring Harness Inspection
Figure 601 (Sheet 3)



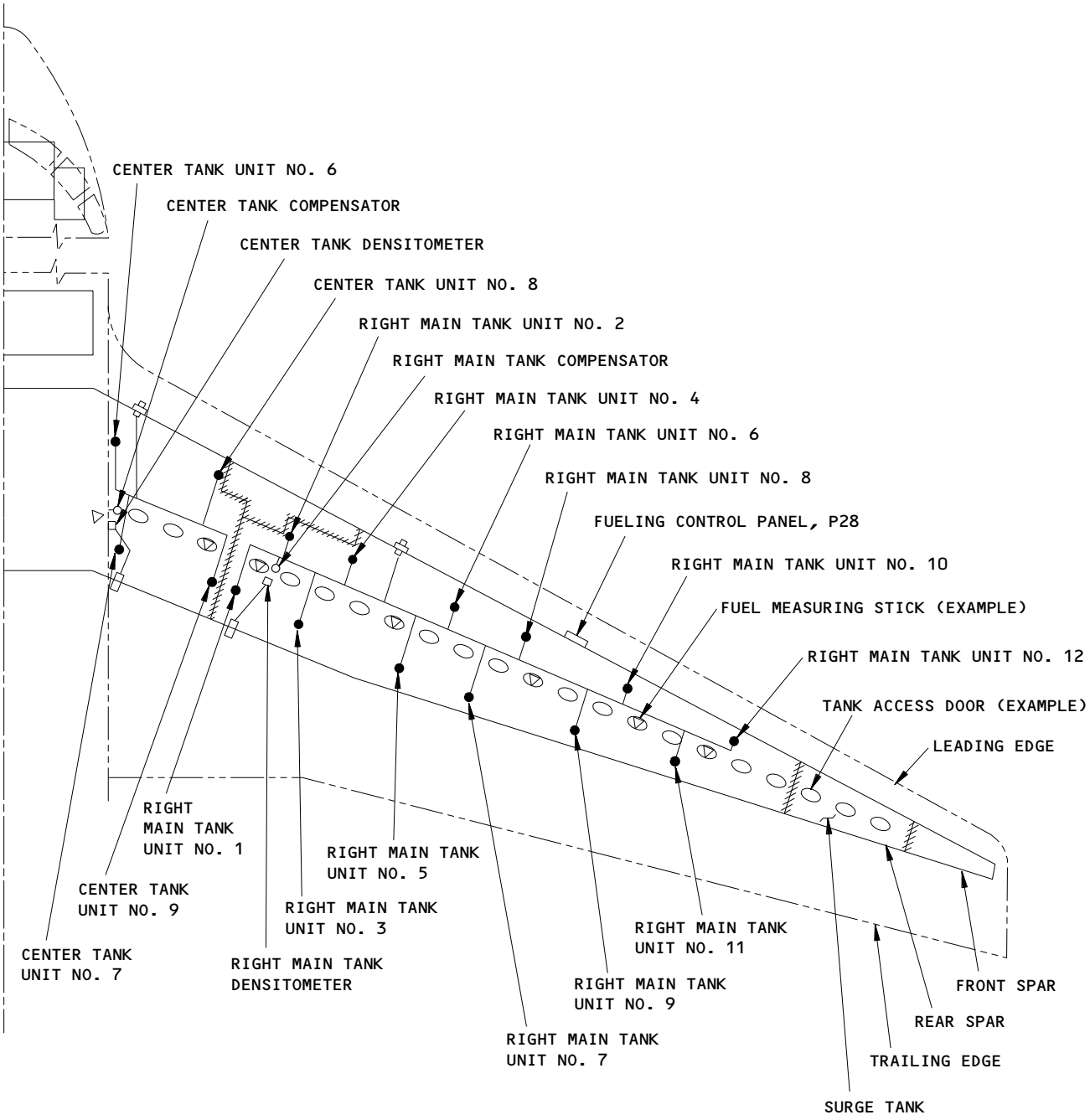
RIGHT WING

Tank Wiring Harness Inspection
Figure 601 (Sheet 4)



LEFT WING

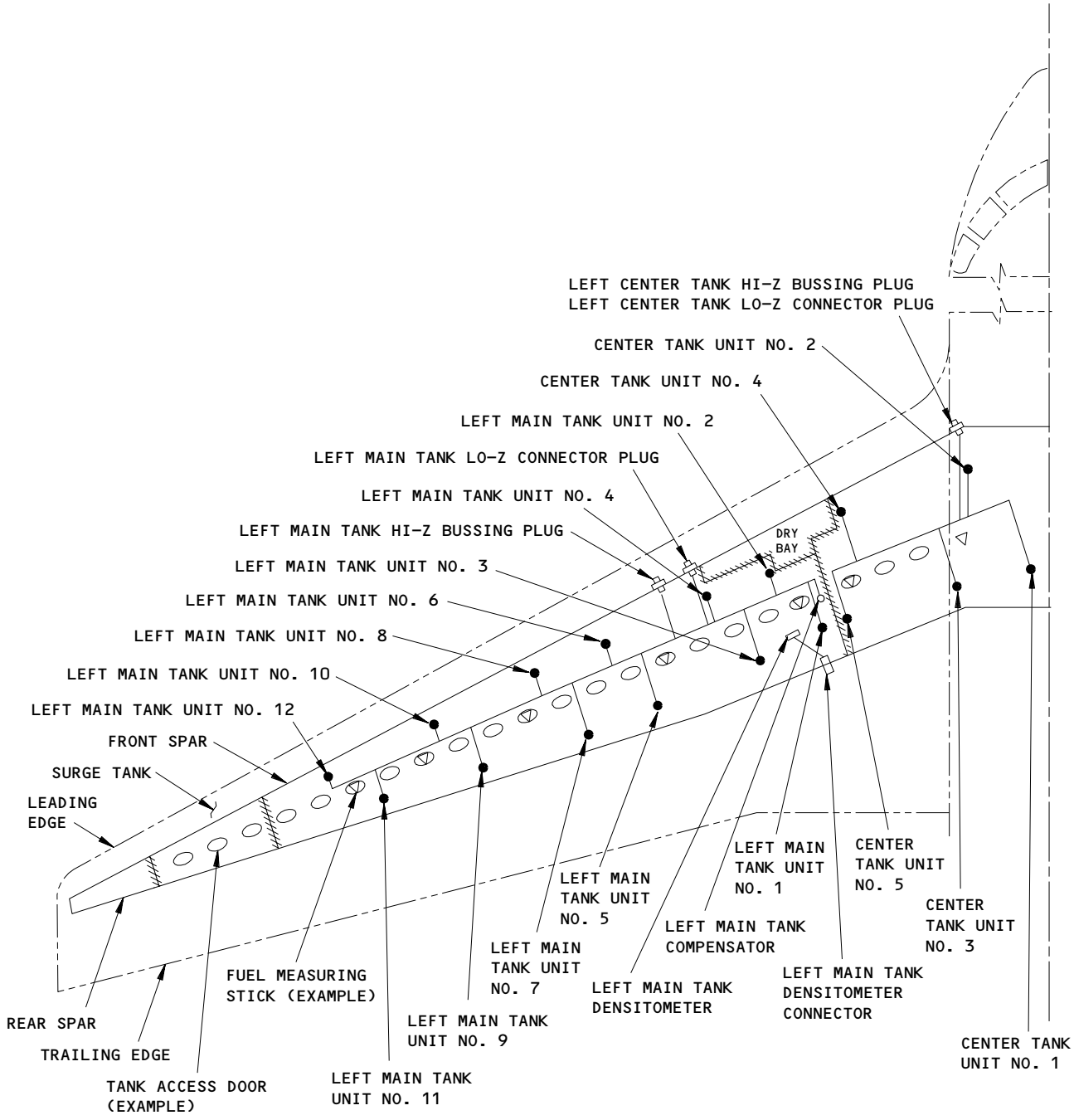
Tank Unit Location
Figure 602 (Sheet 1)



RIGHT WING

Tank Unit Location
Figure 602 (Sheet 2)

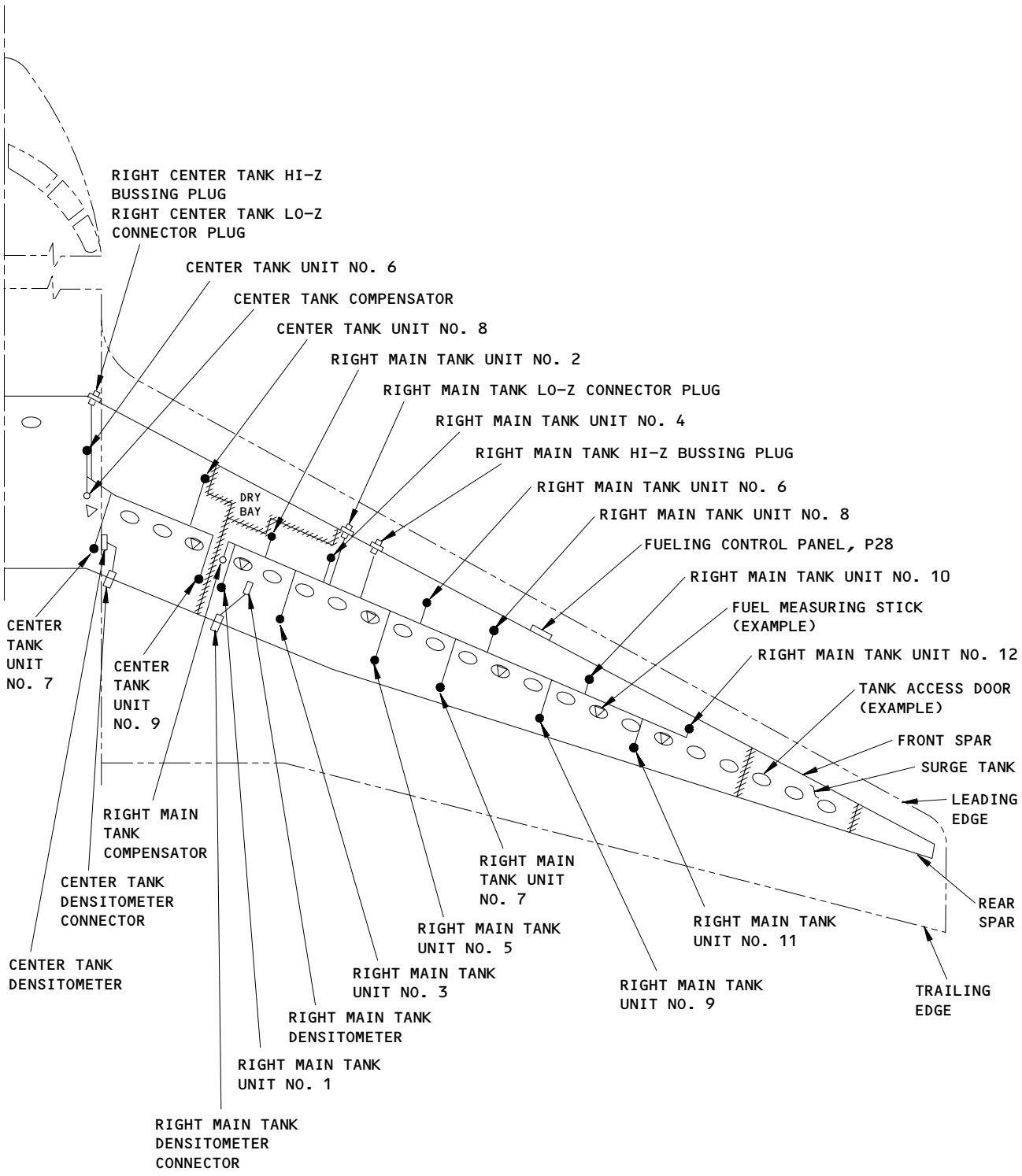
1376031



LEFT WING

Tank Unit Location
Figure 602 (Sheet 3)

1376037



RIGHT WING

Tank Unit Location
Figure 602 (Sheet 4)

EFFECTIVITY
AIRPLANES WITH SIMMONDS RETROFIT FQIS

1376056

TANK UNIT	EQUIPMENT NO.	MAIN OR CENTER TANK ACCESS DOOR
L MAIN TANK UNIT NO. 1	TS109	541AB
L MAIN TANK UNIT NO. 2	TS110	541BB
L MAIN TANK UNIT NO. 3	TS111	541CB
L MAIN TANK UNIT NO. 4	TS112	541DB
L MAIN TANK UNIT NO. 5	TS113	541FB
L MAIN TANK UNIT NO. 6	TS114	541GB
L MAIN TANK UNIT NO. 7	TS115	541HB
L MAIN TANK UNIT NO. 8	TS116	541JB
L MAIN TANK UNIT NO. 9	TS117	541LB
L MAIN TANK UNIT NO. 10	TS118	541MB
L MAIN TANK UNIT NO. 11	TS5196	542AB
L MAIN TANK UNIT NO. 12	TS5197	542CB
CENTER TANK UNIT NO. 1	TS5011	134AZ
CENTER TANK UNIT NO. 2	TS5012	531AB
CENTER TANK UNIT NO. 3	TS5013	531AB
CENTER TANK UNIT NO. 4	TS5014	531BB
CENTER TANK UNIT NO. 5	TS5015	531CB
CENTER TANK UNIT NO. 6	TS5016	631AB
CENTER TANK UNIT NO. 7	TS5017	631AB
CENTER TANK UNIT NO. 8	TS5075	631BB
CENTER TANK UNIT NO. 9	TS5076	631CB
R MAIN TANK UNIT NO. 1	TS146	641AB
R MAIN TANK UNIT NO. 2	TS147	641BB
R MAIN TANK UNIT NO. 3	TS148	641CB
R MAIN TANK UNIT NO. 4	TS149	641DB
R MAIN TANK UNIT NO. 5	TS150	641FB
R MAIN TANK UNIT NO. 6	TS151	641GB
R MAIN TANK UNIT NO. 7	TS152	641HB
R MAIN TANK UNIT NO. 8	TS153	641JB
R MAIN TANK UNIT NO. 9	TS154	641LB
R MAIN TANK UNIT NO. 10	TS155	641MB
R MAIN TANK UNIT NO. 11	TS5198	642AB
R MAIN TANK UNIT NO. 12	TS5199	642CB

Tank Unit Reference Table
Figure 603

S 946-013

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS (AMM 28-11-00/201). FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Obey the fuel tank entry precautions (AMM 28-11-00/201).

S 016-014

(5) Go into the applicable fuel tank.

S 216-015

(6) Visually inspect the FQIS tank wiring harness for these problems:
   (a) Insulation that is abraded, cracked or over-stressed.
   (b) Conductors or shields that are broken or exposed.
   (c) Clearance from the structure or fuel tubing that is not sufficient.
   (d) Support clamps that are broken, loose or missing.
   (e) Wiring that is routed incorrectly.

S 216-016

(7) Visually inspect the compensators, tank units, and densitometers for these problems:
   (a) Wiring that is not correctly attached to the terminals.
   (b) Wiring to the terminal HI-Z or LO-Z that has damage or is incorrectly routed.
   (c) An end cap that is missing (tank unit or compensator).
   (d) Clearance from the structure that is not sufficient.
   (e) Mounting brackets and hardware that are loose.
   (f) Terminals that are bent.

S 216-020

(8) Inspect the electrical connectors and seals for damage, wear, or fuel leakage.

S 216-021

(9) Inspect the main tank compensator for signs that the baffle rib check valve can open sufficiently without making contact with the compensator.
   (a) If the baffle rib check valve is unable to sufficiently open without making contact with the compensator, then replace the compensator (AMM 28-41-02/401).

S 096-017

(10) Go out of the fuel tank (AMM 28-11-00/201).

S 416-018

(11) Install the applicable main or center tank access door (AMM 28-11-01/401 or AMM 28-11-02/401).

DENSITOMETER HOT SHORT PROTECTOR - REMOVAL/INSTALLATION

1. General
   A. The hot short protector provides protection from hot shorts to the center fuel tank densitometer. It is found on rear spar of the center tank.
   B. This procedure contains two tasks. The first task removes the hot short protector. The second task installs the hot short protector.
   C. The Hot Short Protector unit is not repairable. A new unit must be used.

      NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

TASK 28-41-24-004-001

2. Densitometer Hot Shot Protector Removal (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
   B. Access
      (1) Location Zones
          651 Rear Spar to Main Landing Gear Support Beam - Right Wing

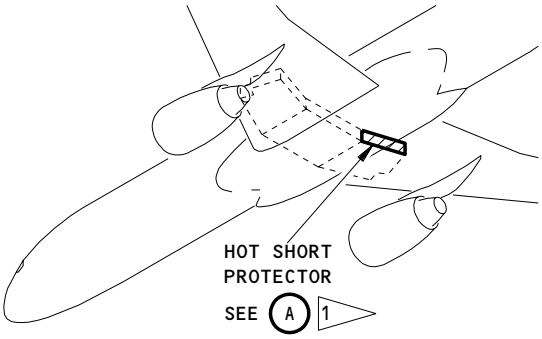
   C. Procedure

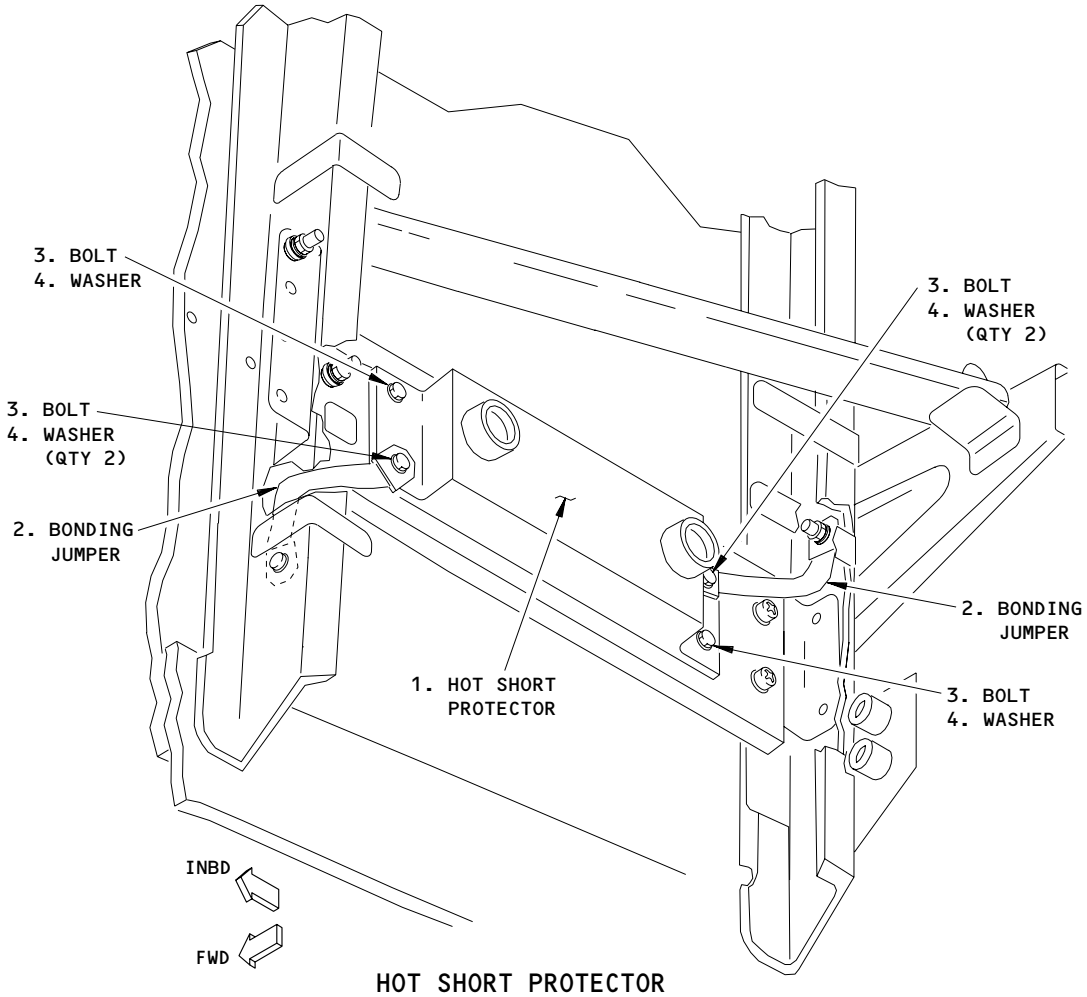
      S 864-002
      (1) Open these circuit breakers and attach a DO-NOT-CLOSE tags:
          (a) Main Power Distribution Panel, P6:
              1) 6E4, FUELING QTY
          (b) Overhead Circuit Breaker Panel, P11:
              1) 11C34, FUEL QTY 1 or L
              2) 11L19, FUEL QTY 2 or R
          (c) APU External Power Panel, P34:
              1) 34A10, FUEL FUEL QTY

      S 014-018
      (2) Get access to the hot short protector through the right shock strut door of the main landing gear (AMM 06-44-00/201).

      S 014-003
      (3) Disconnect the FQPU SIDE and TANK SIDE connectors from the hot short protector (1).

      S 014-004
      (4) Do these steps for the bolt and screw locations:
          (a) Remove the sealant.
          (b) Remove the bolts (3) and washers (4).



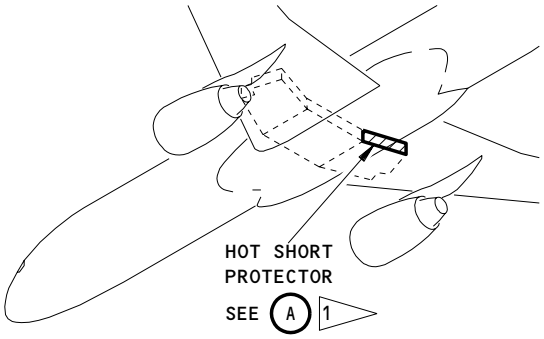


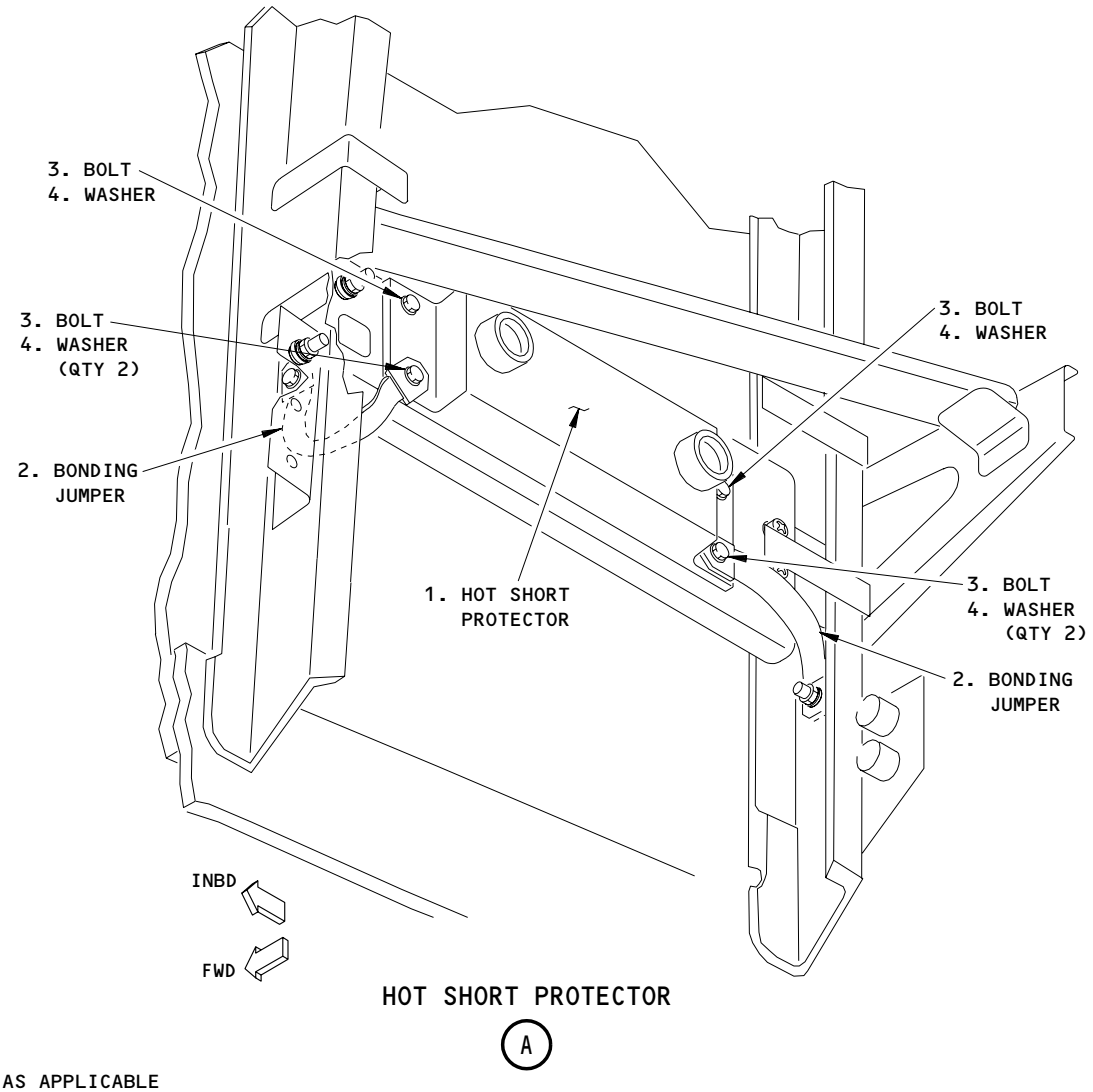
HOT SHORT PROTECTOR

A

1 AS APPLICABLE

Hot Short Protector Installation
Figure 401 (Sheet 1)





HOT SHORT PROTECTOR

A

1 AS APPLICABLE

Hot Short Protector Installation
Figure 401 (Sheet 2)

S 014-014
(5) Do these steps for the bonding jumper locations:
(a) Remove the sealant.
(b) Remove the bolts (3), washers (2), and bonding jumpers (2).

S 034-005
(6) Remove the hot short protector (1) from its position on the bracket.

TASK 28-41-24-404-006

3. Densitometer Hot Short Protector Installation (Fig. 401)

A. Consumable Materials
(1) A00247 Chromate Type Sealant - BMS 5-95

B. Equipment
(1) Bonding meter

C. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 51-31-01/201, Seals and Sealing
(3) SWPM 20-20-00, Electrical Bonds and Grounds

D. Access
(1) Location Zones
651 Rear Spar to Main Landing Gear Support Beam - Right Wing

E. Procedure

S 424-007
(1) Put a new hot short protector (1) in position on the bracket.

NOTE: The HSP unit is not repairable.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 424-008
(2) Install the fasteners:
(a) For the bonding jumper fasteners, install the bolts (3), washers (4), and bonding jumpers (2) (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(b) For the remaining fasteners, wet install the bolt (3) and washers (4) with sealant.

S 764-016
(3) For the two bonding jumpers, do a check of the electrical bond between the jumper lug and the hot short protector.
(a) Make sure the resistance is 0.001 ohm or less.

S 764-017
(4) For the two bonding jumpers, do a check of the electrical bond between the jumper lug and the airplane structure.
(a) Make sure the resistance is 0.001 ohm or less.

S 764-015
(5) For the two bonding jumpers, do a check of the electrical bond between the hot short protector fasteners and the airplane structure (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

(a) Make sure the resistance is 0.0025 ohm or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 434-010
(6) Do these steps to seal the fasteners:
(a) Seal the fasteners and the nutplates with sealant (AMM 51-31-01/201).

S 424-011
(7) Connect the FQPU SIDE and TANK SIDE connectors to the hot short protector (1).

S 414-019
(8) Go out of and close the right shock strut door of the main landing gear (AMM 06-44-00/201).

S 864-012
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) Main Power Distribution panel, P6:
1) 6E4, FUELING QTY
(b) Overhead Circuit Breaker Panel, P11:
1) 11C34, FUEL QTY 1 or L
2) 11L19, FUEL QTY 2 or R
(c) APU External Power Panel, P34:
1) 34A10, FUEL FUEL QTY

S 734-013

(10) Do these steps to make sure you installed the hot short protector (1) correctly:

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

(b) Do the Operational Test - Fuel Quantity Indicating System (AMM 28-41-00/501).

(c) Remove electrical power if it is not necessary (AMM 24-22-00/201).

HOT SHORT PROTECTOR (SAFE-SIDE) WIRE HARNESS - REMOVAL/INSTALLATION

1. General
   A. This procedure has instructions to remove and install the hot short protector (safe-side) wire harness.
   B. The hot short protector wire harness connects the hot short protector to the tank wiring harness for the densitometer in the center fuel tank. The wire harness is installed on the rear spar outside of the right center fuel tank.
   C. The hot short protector (safe-side) wire harness is referred to as the HSP wire harness in this procedure.

TASK 28-41-25-004-001

2. Hot Short Protector (Safe-Side) Wire Harness Removal (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 20-41-00/201, Static Grounding
   B. Access
      (1) Location Zone
          651 Rear Spar to MLG Support Beam (Right)

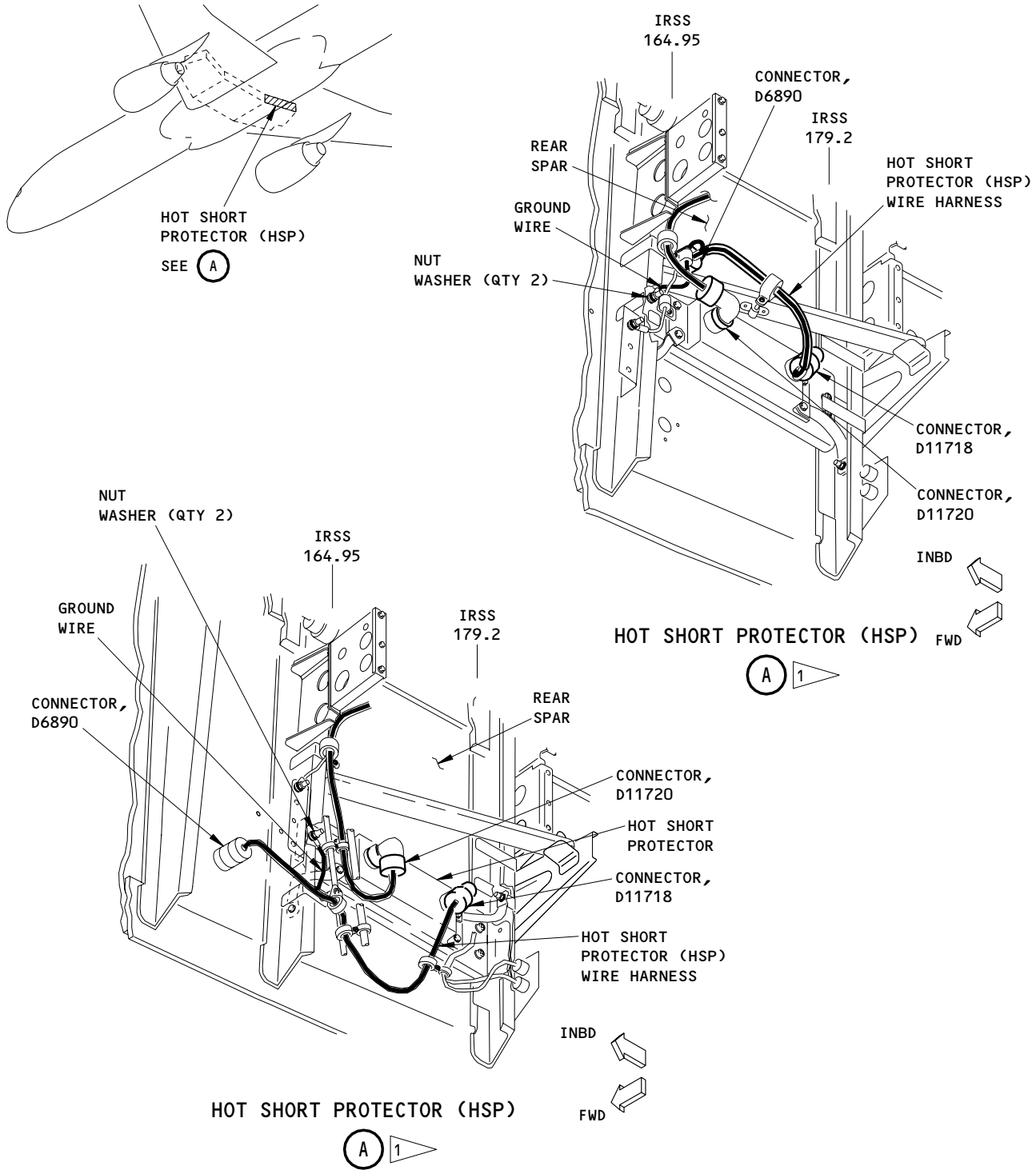
   C. Prepare to Remove the HSP Wire Harness

      S 914-002
      (1) Make sure the airplane is static grounded (AMM 20-41-00/201).

      S 914-004
      (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
          (a) P6 Main Power Distribution Panel:
              1) 6E4, FUELING QTY
          (b) P11 Overhead Circuit Breaker Panel:
              1) 11C34, FUEL QTY 1 or L
              2) 11L19, FUEL QTY 2 or R
          (c) P34 APU External Power Panel:
              1) 34A10, FUEL FUEL QTY

      S 024-005
      (3) Get access to the HSP wire harness through the right shock strut door of the main landing gear (AMM 06-44-00/201).
   D. HSP Wire Harness Removal

      S 024-006
      (1) Remove or loosen all the clamps from the HSP wire harness.



Hot Short Protector (Safe-Side) Wire Harness
Figure 401

S 024-007
(2) Remove the nut and two washers to disconnect the ground wire on the HSP wire harness from the rear spar.

S 024-008
(3) Disconnect the HSP wire harness at the hot short protector.

NOTE: The HSP wire harness connector is labeled TANK SIDE.

S 024-009
(4) Disconnect the HSP wire harness at the densitometer connector for the center tank densitometer.

S 024-010
(5) Remove the HSP wire harness.

TASK 28-41-25-404-011

3. Hot Short Protector (Safe-Side) Wire Harness Installation (Fig. 401)

A. References
(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
(2) AMM 28-41-00/501, Fuel Quantity Indicating System
(3) SWPM 20-10-11
(4) SWPM 20-10-15

B. Access
(1) Location Zone
651 Rear Spar to MLG Support Beam (Right)

C. HSP Wire Harness Installation

S 214-014
(1) Make sure the HSP wire harness has a Teflon sleeve and an identification sleeve installed on it.

NOTE: The identification sleeve should state: FQIS WIRE MAINTAIN SEPARATION PER MAINTENANCE MANUAL CHAPTER 28.

S 424-015
(2) Connect the HSP wire harness connector to the hot short protector.
(a) Make sure the HSP wire harness has a drip loop at the connector to the hot short protector (SWPM 20-10-11).
(b) Make sure the drip loop does not touch the airplane structure.

S 424-016
(3) Route the the HSP wire harness and install and tighten the clamps (SWPM 20-10-11).
(a) Make sure the HSP wire harness is not twisted and has a smooth turn from the clamps to the connectors.

S 424-017
(4) Connect the HSP wire harness to the densitometer connector.
(a) Make sure the HSP wire harness has a drip loop or is angled down at the densitometer connector (SWPM 20-10-11).
(b) Make sure the drip loop does not touch the airplane structure.

S 424-018
(5) Install the two washers and nut to connect the ground wire to the rear spar (SWPM 20-10-15).

NOTE: Make sure one washer is installed on each side of the terminal lug for the ground wire.

S 224-022
(6) Make sure you keep a minimum of 0.5 inch (12.7 mm) of separation between the HSP wire harness and the airplane wiring harness that attaches to the hot short protector.

NOTE: CDCCL - Refer to the task: Airworthiness Limitations Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 224-019
(7) Make sure you keep a minimum of 2 inches (51 mm) of separation between the HSP wire harness and all other wiring.

NOTE: CDCCL - Refer to the task: Airworthiness Limitations Precautions (AMM 28-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

D. Put the Airplane Back To Its Usual Condition

S 414-020
(1) Close the right shock strut door of the main landing gear (AMM 06-44-00/201).

S 864-012

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P6 Main Power Distribution Panel:

1) 6E4, FUELING QTY

(b) P11 Overhead Circuit Breaker Panel:

1) 11C34, FUEL QTY 1 or L

2) 11L19, FUEL QTY 2 or R

(c) P34 APU External Power Panel:

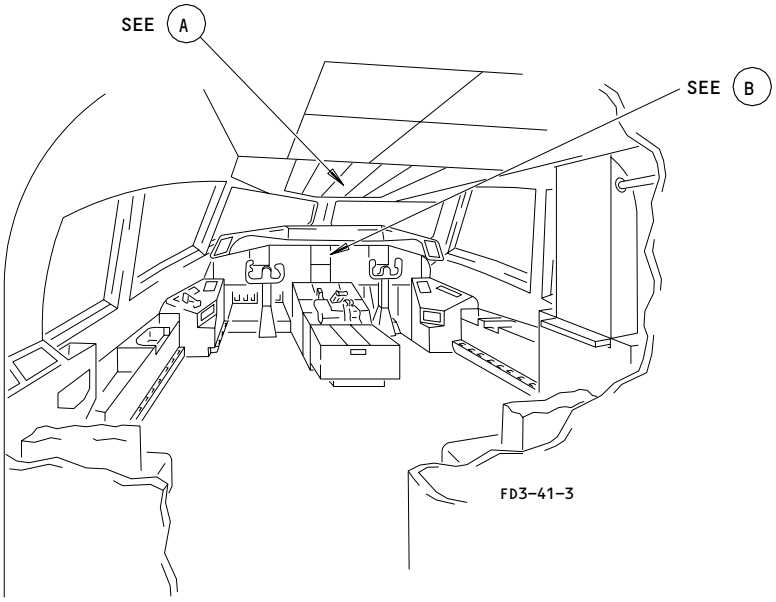
1) 34A10, FUEL FUEL QTY

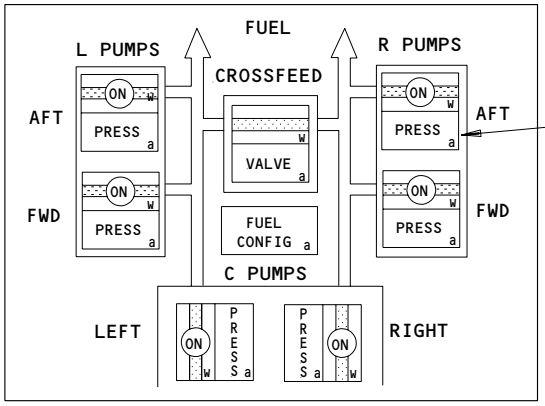
S 724-013

(3) Do the task: Operational Test - Fuel Quantity Indicating System (AMM 28-41-00/501).

FUEL PRESSURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

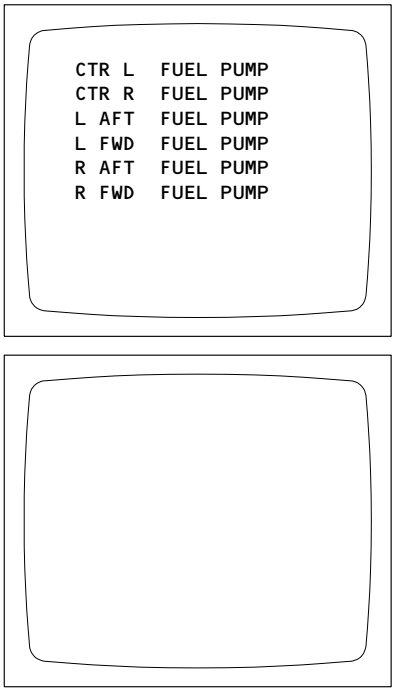
1. General (Fig. 1)
   A. The fuel pressure indicating system provides low fuel pressure warning to the flight crew. The system monitors engine fuel feed main tank boost pump pressure and engine fuel feed center tank override pump pressure (AMM 28-22-00/001).
2. Component Details (Fig. 2)
   A. Four boost pump and two override pump pressure switches attach to the front or rear spars near each of their respective pumps. Each pressure switch connects to a pressure sense line which provides fuel pump discharge pressure to the switch.
   B. The pressure switches provide the ground for the pressure indicating lights and the EICAS messages. Each switch consists of a cylindrical housing containing a diaphragm, a switch, and an inlet pressure sensing port.
3. Operation
   A. Center Tank Pressure Indication (Fig. 4)
      (1) Fuel pressure indication for the center tank consists of the C PUMPS PRESS lights on the pilot's overhead panel P5 and the EICAS messages CTR L FUEL PUMP and CTR R FUEL PUMP.
      (2) Pressure indication is controlled by the position of the C PUMPS switchlight, the amount of fuel in the center tank and the output pressure from the override pumps as sensed by the override pump pressure switch. If the switchlight is on and the boost pump cannot supply a sufficient pressure the PRESS light will come on and the EICAS message CTR (L, R) FUEL PUMP will show on the EICAS display. If the switchlight is on and the pressure is sufficient, no indications will show.
   B. Main Tank Pressure Indication (Fig. 4)
      (1) Fuel pressure indication for the main tanks consists of the L, R PUMPS PRESS lights on the pilot's overhead panel P5 and the EICAS messages L, R FWD FUEL PUMP and L, R AFT FUEL PUMP.
      (2) Pressure indication depends upon the output pressure of the boost pumps in the main tank. If the pressure sensed by a boost pump pressure switch is inadequate, the switch remains in its initially grounded position. The ground completes the circuit for the respective PRESS light and EICAS message. When the output pressure of the boost pump exceeds the pressure switch switching pressure, the ground becomes an open and all indications go out.





FUEL MANAGEMENT CONTROL PANEL (P5)

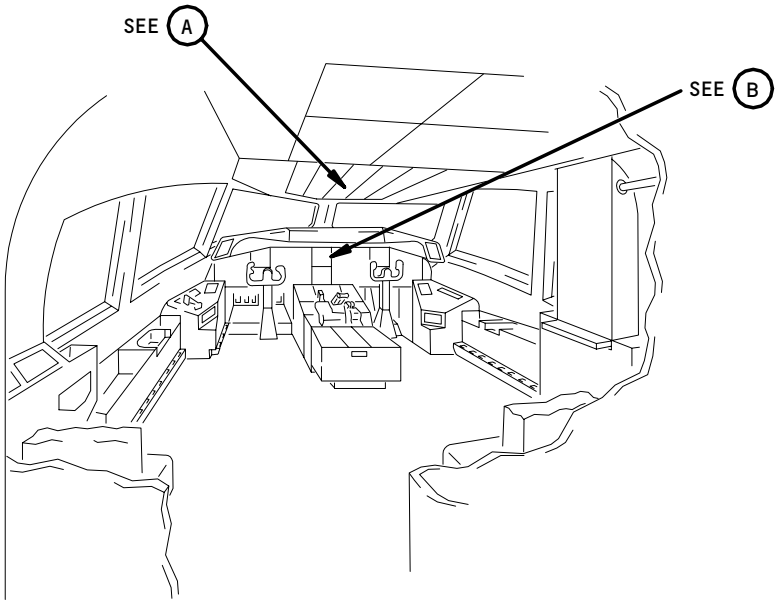
A



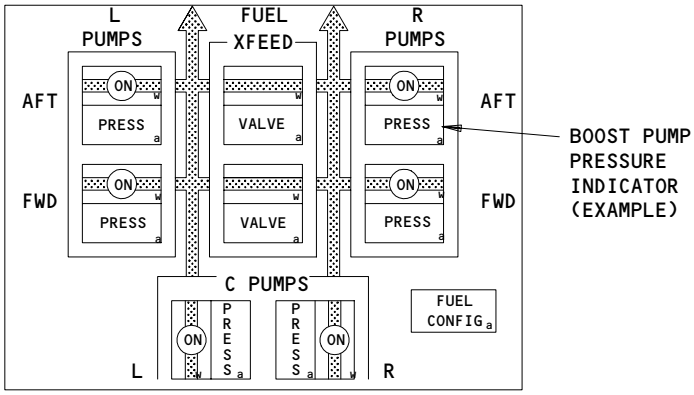
EICAS DISPLAY UNIT (P2)

B

Fuel Pressure Indicators
Figure 1

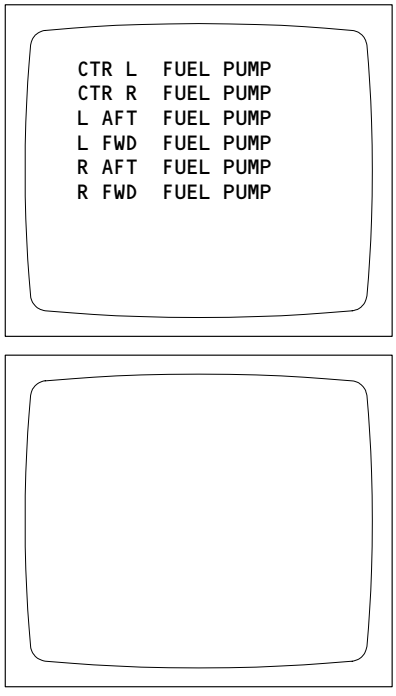


FLIGHT COMPARTMENT



FUEL MANAGEMENT CONTROL PANEL (P5)

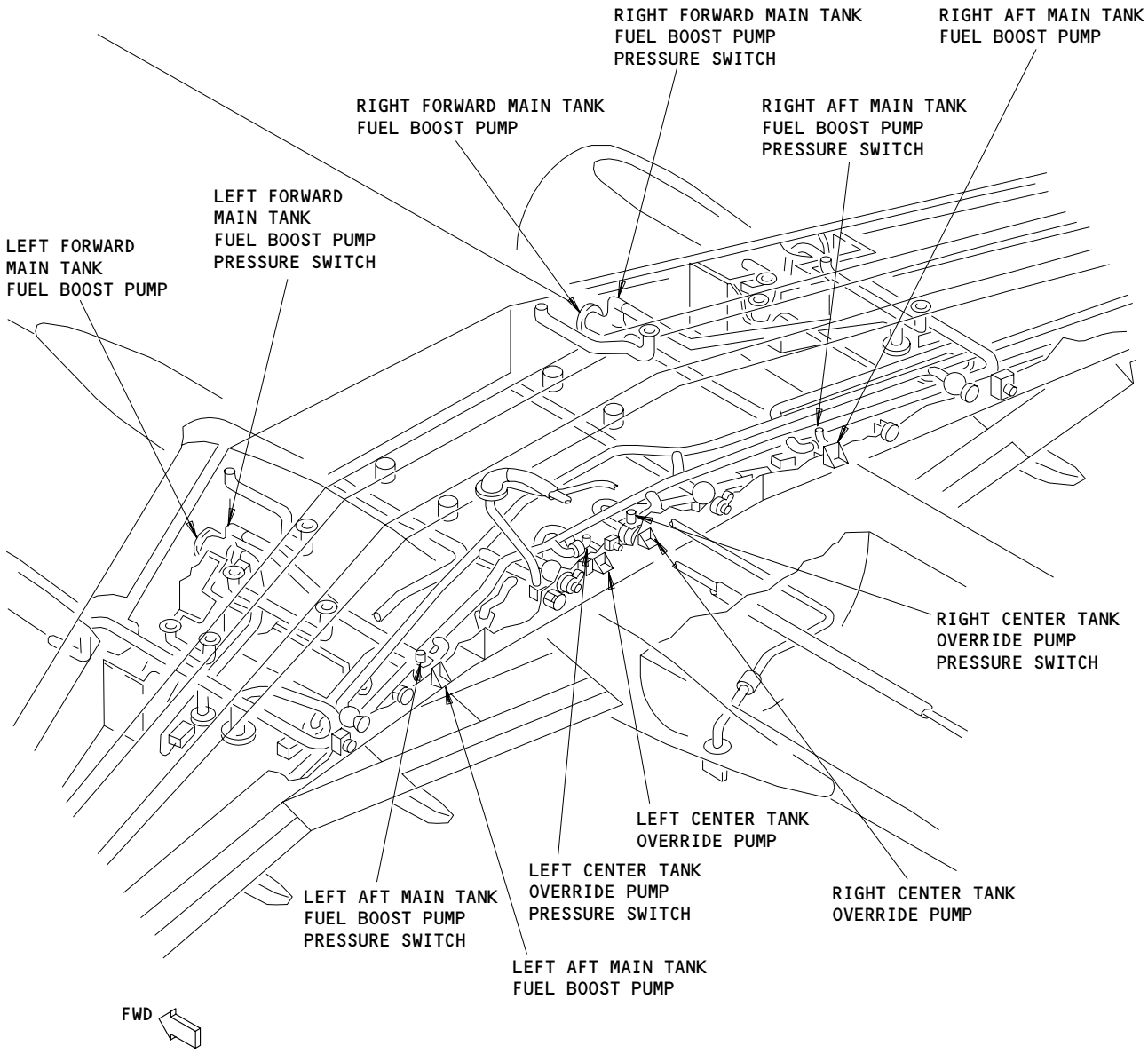
A



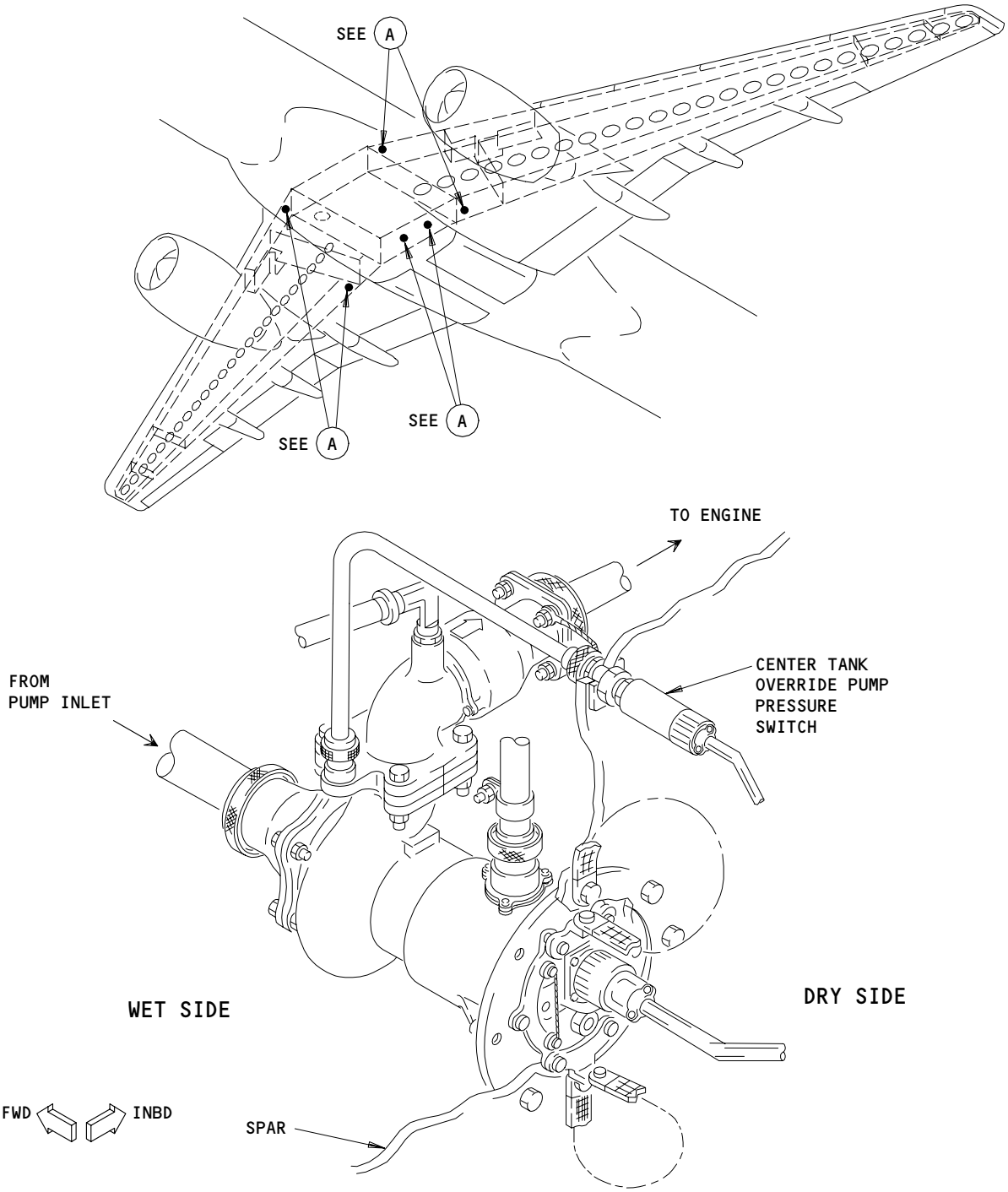
EICAS DISPLAY UNIT (P2)

B

Fuel Pressure Indicators
Figure 1A



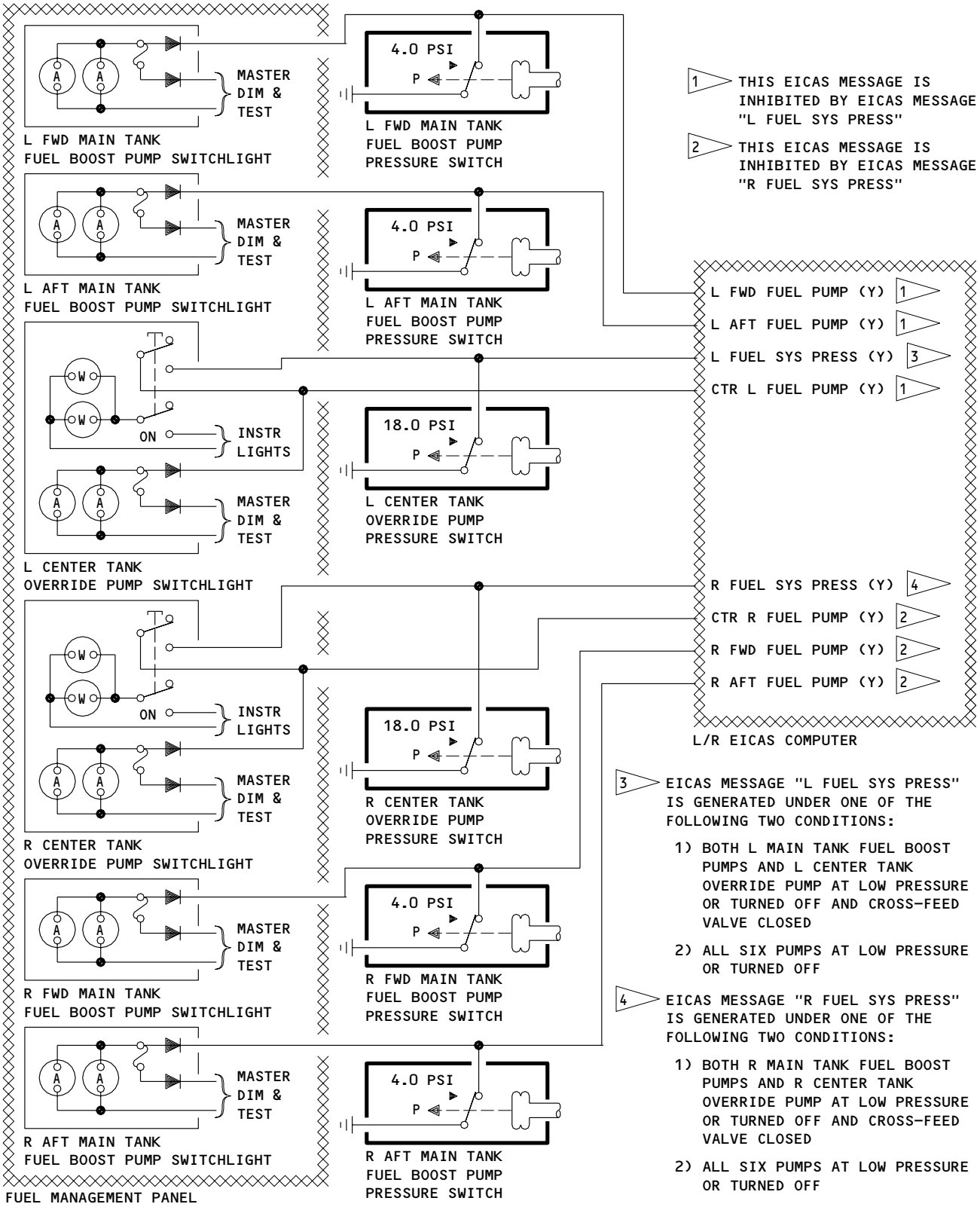
Fuel Boost Pumps, Override Pumps, and Pressure Switches
Figure 2



CENTER TANK OVERRIDE PUMP PRESSURE SWITCH SHOWN
(MAIN TANK FUEL BOOST PUMP PRESSURE SWITCH SIMILAR)

A

Pressure Switch
Figure 3



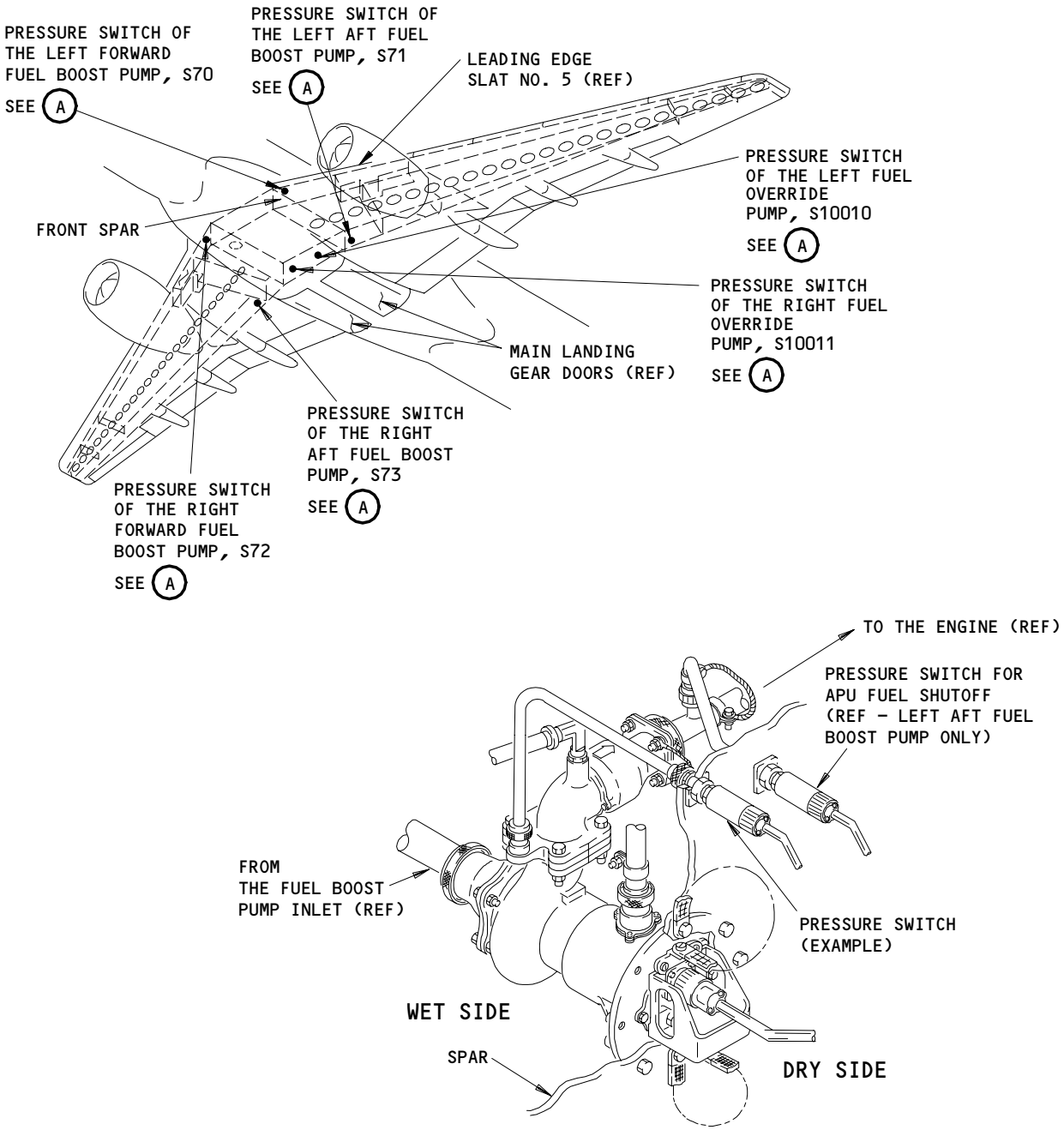
Fuel Pressure Indicating System Schematic
Figure 4

FUEL PRESSURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SWITCH – L AFT FUEL BOOST PUMP PRESSURE, S71	--	1	MAIN LANDING GEAR DOORS	28-42-01
SWITCH – L FUEL OVERRIDE PUMP PRESSURE, S10010	--	1	MAIN LANDING GEAR DOORS	28-42-01
SWITCH – L FWD FUEL BOOST PUMP PRESSURE, S70	--	1	FRONT SPAR	28-42-01
SWITCH – R AFT FUEL BOOST PUMP PRESSURE, S73	--	1	MAIN LANDING GEAR DOORS	28-42-01
SWITCH – R FUEL OVERRIDE PUMP PRESSURE, S10011	--	1	MAIN LANDING GEAR DOORS	28-42-01
SWITCH – R FWD FUEL BOOST PUMP PRESSURE, S72	--	1	FRONT SPAR	28-42-01

Fuel Pressure Indicating System – Component Index
Figure 101

E44535



PRESSURE SWITCH OF THE LEFT AFT, LEFT FORWARD, RIGHT AFT OR RIGHT FORWARD FUEL BOOST PUMP, S71, S70, S73, OR S72, SHOWN (PRESSURE SWITCH OF THE LEFT AND RIGHT FUEL OVERRIDE PUMP, S10010 AND S10011, ALMOST THE SAME)

A

Fuel Pressure Indicating System – Component Location
Figure 102

FUEL BOOST PUMP PRESSURE SWITCH - REMOVAL/INSTALLATION

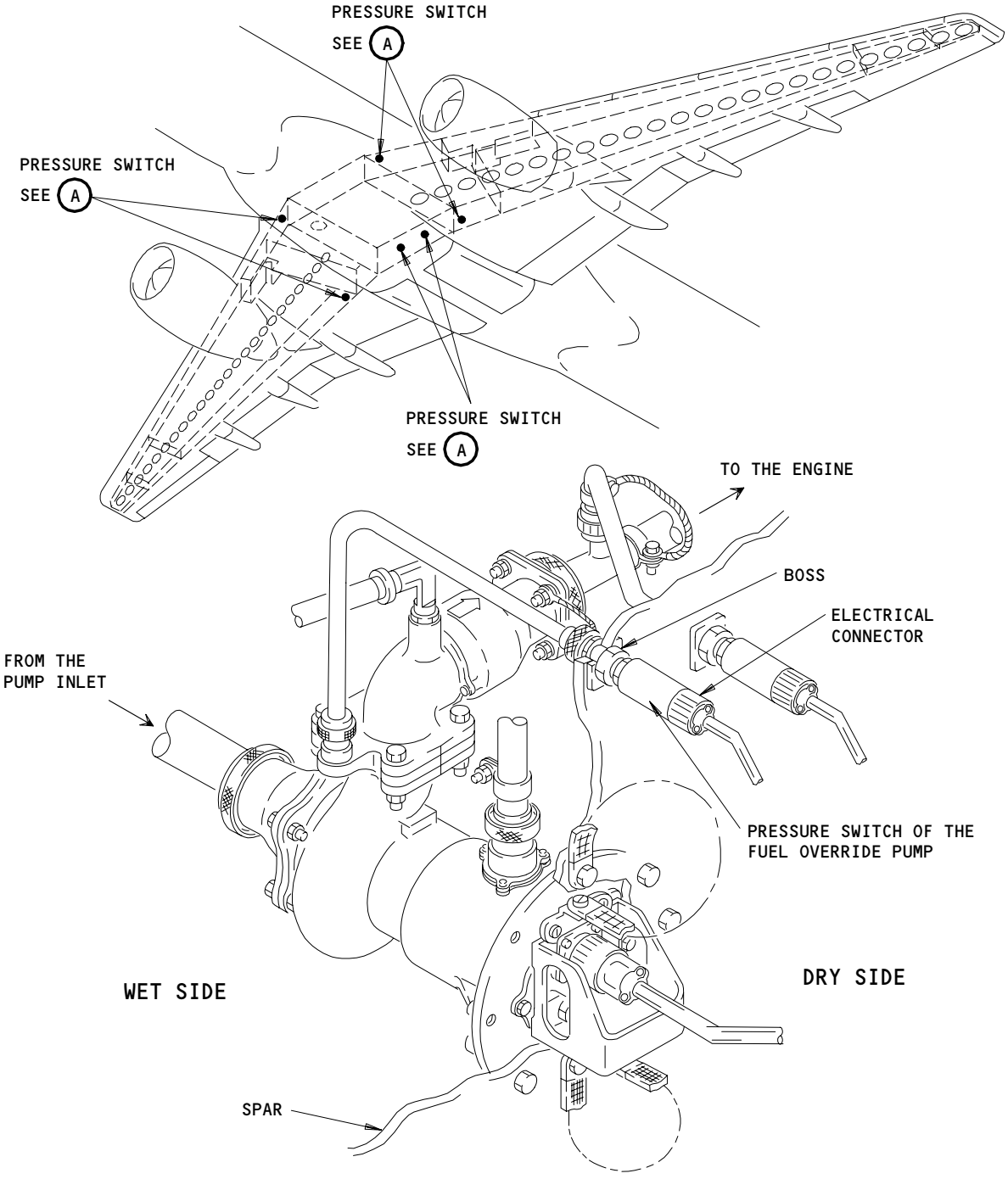
1. General
   A. There are six pressure switches, one for each of the subsequent pumps:
      (1) Left aft fuel boost pump
      (2) Left forward fuel boost pump
      (3) Left fuel override pump
      (4) Right aft fuel boost pump
      (5) Right forward fuel boost pump
      (6) Right fuel override pump
   B. This procedure contains two tasks. The first task removes the pressure switch. The second task installs the pressure switch.

TASK 28-42-01-004-001

2. Remove the Pressure Switch
   A. Equipment
      (1) Container - Fuel Resistant 1 gallon
      (2) Bonding Meter
   B. Consumable Materials
      (1) G00034 Cotton Wiper, Process Cleaning Absorbent Wiper (cheesecloth, gauze) BMS15-5
   C. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 27-81-00/201, Leading Edge Slat System
      (3) AMM 28-26-00/201, Defueling
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
   D. Access
      (1) Location Zones
          133 Wing Center Section (Left)
          134 Wing Center Section (Right)
          511 Leading Edge to Front Spar (Left)
          531 Center Wing Tank (Left)
          611 Leading Edge to Front Spar (Right)
          631 Center Wing Tank (Right)

   E. Remove the Pressure Switch of the Left Aft Fuel Boost Pump

      S 014-002
      (1) Get access to the pressure switch through the left shock strut door of the main landing gear.



PRESSURE SWITCH
(PRESSURE SWITCH OF THE FUEL OVERRIDE PUMP SHOWN;
PRESSURE SWITCH OF THE FUEL BOOST PUMPS ARE ALMOST THE SAME)

A

Pressure Switch Installation
Figure 401

LOCATION	RAMP CONDITION	FUEL QUANTITY (GAL)	FUEL QUANTITY (LITERS)	FUEL QUANTITY (LBS)	FUEL QUANTITY (KGS)
PRESSURE SWITCH OF THE LEFT OR RIGHT FORWARD FUEL BOOST PUMP	2.3° NOSE DOWN	140	530	926	420
	1.7° NOSE UP	460	1,741	3,043	1,381
	0.3°	260	984	1,720	780
PRESSURE SWITCH OF THE LEFT OR RIGHT FUEL OVER-RIDE PUMP	2.3° NOSE DOWN	3,350	12,681	22,160	10,056
	1.7° NOSE UP	2,660	10,069	17,596	7,885
	0.3°	3,010	11,394	19,911	9,035
PRESSURE SWITCH OF THE LEFT OR RIGHT AFT FUEL BOOST PUMP	2.3° NOSE DOWN	73	276	483	219
	1.7° NOSE UP	69	261	456	207
	0.3°	70	265	463	210

Fuel Tank Maximum Quantities for Pressure Switch Removal/Installation
Figure 402

S 864-003
(2) Open this circuit breaker on the power distribution panel, P6, and attach DO-NOT-CLOSE tag:
(a) 6H15, L AFT FUEL BOOST PUMP

S 034-004
(3) Remove the electrical connector from the pressure switch (Fig. 401).

S 214-005

WARNING: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK.

(4) Make sure the fuel quantity in the left main fuel tank is in the limits shown for the applicable pressure switch (Fig. 402).

NOTE: The fuel quantity is shown on the fuel quantity indicator on the overhead panel, P5.

S 484-118
(5) If you must remove the pressure switch with fuel above the limits in Figure 402, do these steps:
(a) Put a fuel resistant container (1 gallon/4 liters) and cotton wipers (BMS15-5) at the pressure switch.
(b) Get a new pressure switch so you can quickly install it after you remove the old pressure switch.

NOTE: This will minimize the quantity of fuel that drains from the tank.

S 024-006
(6) Remove the pressure switch from the boss on the rear spar (Fig. 401).

F. Remove the Pressure Switch of the Left Forward Fuel Boost Pump

S 864-007

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING SLATS. FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE COULD CAUSE INJURY OR DAMAGE.

(1) Do the deactivation procedure for the leading edge slats to get access to the pressure switch (AMM 27-81-00/201).

S 864-008
(2) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6H23, L FWD FUEL BOOST PUMP

S 434-009
(3) Remove the electrical connector from the pressure switch (Fig. 401).

S 214-010

WARNING: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK.

(4) Make sure the fuel quantity in the left main fuel tank is in the limits shown for the applicable pressure switch (Fig. 402).

NOTE: The fuel quantity is shown on the fuel quantity indicator on the overhead panel, P5.

S 484-127
(5) If you must remove the pressure switch with fuel above the limits in Figure 402, do these steps:
(a) Put a fuel resistant container (1 gallon/4 liters) and cotton wipers (BMS15-5) at the pressure switch.
(b) Get a new pressure switch so you can quickly install it after you remove the old pressure switch.

NOTE: This will minimize the quantity of fuel that drains from the tank.

S 024-011
(6) Remove the pressure switch from the boss on the front spar (Fig. 401).

G. Remove the Pressure Switch of the Left Fuel Override Pump

S 214-012
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 864-116

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-013
(3) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6F15, L FUEL OVRD PUMP

S 034-014
(4) Remove the electrical connector from the pressure switch (Fig. 401).

S 214-015

WARNING: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK.

(5) Make sure the fuel quantity in the center fuel tank is in the limits shown for the applicable pressure switch (Fig. 402).

NOTE: The fuel quantity is shown on the fuel quantity indicator on the overhead panel, P5.

S 484-120
(6) If you must remove the pressure switch with fuel above the limits in Figure 402, do these steps:
(a) Put a fuel resistant container (1 gallon/4 liters) and cotton wipers (BMS15-5) at the pressure switch.
(b) Get a new pressure switch so you can quickly install it after you remove the old pressure switch.

NOTE: This will minimize the quantity of fuel that drains from the tank.

S 024-016
(7) Remove the pressure switch from the boss on the rear spar (Fig. 401).

H. Remove the Pressure Switch of the Right Aft Fuel Boost Pump

S 014-017
(1) Get access to the pressure switch through the right shock strut door of the main landing gear.

S 864-018
(2) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6H20, R AFT FUEL BOOST PUMP

S 034-019
(3) Remove the electrical connector from the pressure switch (Fig. 401).

S 214-020

WARNING: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK.

(4) Make sure the fuel quantity in the right main fuel tank is in the limits shown for the applicable pressure switch (Fig. 402).

NOTE: The fuel quantity is shown on the fuel quantity indicator on the overhead panel, P5.

S 484-121

(5) If you must remove the pressure switch with fuel above the limits in Figure 402, do these steps:
(a) Put a fuel resistant container (1 gallon/4 liters) and cotton wipers (BMS15-5) at the pressure switch.
(b) Get a new pressure switch so you can quickly install it after you remove the old pressure switch.

NOTE: This will minimize the quantity of fuel that drains from the tank.

S 024-021

(6) Remove the pressure switch from the boss on the rear spar (Fig. 401).

I. Remove the Pressure Switch of the Right Forward Fuel Boost Pump

S 864-022

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE LEADING SLATS. FAILURE TO DO THE DEACTIVATION OF THE LEADING EDGE SLATS PROCEDURE COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do the deactivation procedure for the leading edge slats to get access to the pressure switch (AMM 27-81-00/201).

S 864-023

(2) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6H17, R FWD FUEL BOOST PUMP

S 034-024

(3) Remove the electrical connector from the pressure switch (Fig. 401).

S 214-025

WARNING: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK.

(4) Make sure the fuel quantity in the right main fuel tank is in the limits shown for the applicable pressure switch (Fig. 402).

NOTE: The fuel quantity is shown on the fuel quantity indicator on the overhead panel, P5.

S 484-122

(5) If you must remove the pressure switch with fuel above the limits in Figure 402, do these steps:
(a) Put a fuel resistant container (1 gallon/4 liter) and cotton wipers (BMS15-5) at the pressure switch.
(b) Get a new pressure switch so you can quickly install it after you remove the old pressure switch.

NOTE: This will minimize the quantity of fuel that drains from the tank.

S 024-026

(6) Remove the pressure switch from the boss on the front spar (Fig. 401).

J. Remove the Pressure Switch of the Right Fuel Override Pump

S 214-028

(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 864-027

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-029

(3) Open this circuit breaker on the power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6F20, R FUEL OVRD PUMP

S 034-030

(4) Remove the electrical connector from the pressure switch (Fig. 401).

S 214-031

WARNING: BE CAREFUL WHEN YOU REMOVE THE PRESSURE SWITCH. IF YOU ARE NOT CAREFUL, FUEL CAN DRAIN FROM THE FUEL TANK.

(5) Make sure the fuel quantity in the center fuel tank is in the limits shown for the applicable pressure switch (Fig. 402).

NOTE: The fuel quantity is shown on the fuel quantity indicator on the overhead panel, P5.

S 484-123

(6) If you must remove the pressure switch with fuel above the limits in Figure 402, do these steps:
(a) Put a fuel resistant container (1 gallon/4 liters) and cotton wipers (BMS15-5) at the pressure switch.
(b) Get a new pressure switch so you can quickly install it after you remove the old pressure switch.

NOTE: This will minimize the quantity of fuel that drains from the tank.

S 024-032

(7) Remove the pressure switch from the boss on the rear spar (Fig. 401).

TASK 28-42-01-424-115

3. Install the Pressure Switch (Fig. 401)

A. References

(1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Door and Panels
(2) AMM 24-22-00/201, Electrical Power Control
(3) AMM 27-81-00/201, Leading Edge Slat System
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Downlocks

B. Equipment
(1) Container - Fuel Resistant 1 gallon
(2) Bonding Meter

C. Access
(1) Location Zones
133 Wing Center Section (Left)
134 Wing Center Section (Right)
511 Leading Edge to Front Spar (Left)
531 Center Wing Tank (Left)
611 Leading Edge to Front Spar (Right)
621 Leading Edge to Front Spar (Right)
631 Center Wing Tank (Right)

(2) Access Panel
621GB Fueling Station Door (Right)

D. Install the Pressure Switch of the Left Aft Fuel Boost Pump

S 424-033
(1) Install the pressure switch in the boss on the rear spar.

S 434-034
(2) Install lockwire on the pressure switch.

S 224-134
(3) Make sure the bonding resistance between the pressure switch and the airplane structure is 0.050 ohm or less (AMM 20-10-21/601).

S 434-035
(4) Install the electrical connector on the pressure switch.

S 864-036
(5) Supply electrical power (AMM 24-22-00/201).

S 214-037
(6) Make sure the L AFT PUMPS PRESS light of the fuel management panel on the overhead panel, P5, comes on.

S 864-038
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H15, L AFT FUEL BOOST PUMP

S 864-128

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(8) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
   (a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-039
(9) Push the L AFT PUMPS switch-light of the fuel management panel on the P5 panel to the ON position.

S 214-040
(10) Make sure the L AFT PUMPS PRESS light goes off in 15 seconds or less.

S 864-041
(11) Push the L AFT PUMPS switch-light to the off position.

S 214-042
(12) Make sure the L AFT PUMPS PRESS light comes on.

S 864-043
(13) Remove electrical power if it is not necessary (AMM 24-22-00/201).

E. Install the Pressure Switch of the Left Forward Fuel Boost Pump

S 024-044
(1) Install the pressure switch in the boss on the front spar.

S 034-045
(2) Install lockwire on the pressure switch.

S 224-135
(3) Make sure the bonding resistance between the pressure switch and the airplane structure is 0.050 ohm or less (AMM 20-10-21/601).

S 034-046
(4) Install the electrical connector on the pressure switch.

S 864-047
(5) Supply electrical power (AMM 24-22-00/201).

S 214-048
(6) Make sure the L FWD PUMPS PRESS light of the fuel management panel on the overhead panel, P5, comes on.

S 864-049
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H23, L FWD FUEL BOOST PUMP

S 864-129

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(8) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-050
(9) Push the L FWD PUMPS switch-light of the fuel management panel on the P5 panel to the ON position.

S 214-051
(10) Make sure the L FWD PUMPS PRESS light goes off in 15 seconds or less.

S 864-052
(11) Push the L FWD PUMPS switch-light to the off position.

S 214-053
(12) Make sure the L FWD PUMPS PRESS light comes on.

S 864-054

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING ACTIVATION OF THE LEADING EDGE SLATS INJURY COULD OCCUR.

(13) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 864-055
(14) Retract the leading edge slats if extended (AMM 27-81-00/201).

S 864-056
(15) Remove electrical power if it is not necessary (AMM 24-22-00/201).

F. Install the Pressure Switch of the Left Fuel Override Pump

S 024-057
(1) Install the pressure switch in the boss on the rear spar.

S 034-058
(2) Install lockwire on the pressure switch.

S 224-136
(3) Make sure the bonding resistance between the pressure switch and the airplane structure is 0.050 ohm or less (AMM 20-10-21/601).

S 034-059
(4) Install the electrical connector on the pressure switch.

S 864-060
(5) Supply electrical power (AMM 24-22-00/201).

S 214-061
(6) Make sure the LEFT C PUMPS PRESS light of the fuel management panel on the overhead panel, P5, is off.

S 864-062
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6F15, L FUEL OVRD PUMP

S 014-063
(8) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 864-130

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(9) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-064
(10) Push the LEFT C PUMPS switch-light of the fuel management panel on the P5 panel to the ON position.

S 214-065
(11) Make sure the LEFT C PUMPS PRESS light comes on, then goes off in 15 seconds or less.

S 864-066
(12) Push the LEFT C PUMPS switch-light to the off position.

S 214-067
(13) Make sure the LEFT C PUMPS PRESS light is off.

S 414-068
(14) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-069

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(15) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-070
(16) Remove electrical power if it is not necessary (AMM 24-22-00/201).

G. Install the Pressure Switch of the Right Aft Fuel Boost Pump

S 424-071
(1) Install the pressure switch in the boss on the rear spar.

S 434-072
(2) Install lockwire on the pressure switch.

S 224-137
(3) Make sure the bonding resistance between the pressure switch and the airplane structure is 0.050 ohm or less (AMM 20-10-21/601).

S 434-073
(4) Install the electrical connector on the pressure switch.

S 864-074
(5) Supply electrical power (AMM 24-22-00/201).

S 214-075
(6) Make sure the R AFT PUMPS PRESS light of the fuel management panel on the overhead panel, P5, comes on.

S 864-076
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H20, R AFT FUEL BOOST PUMP

S 864-131

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(8) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-077
(9) Push the R AFT PUMPS switch-light of the fuel management panel on the P5 panel to the ON position.

S 214-078
(10) Make sure the R AFT PUMPS PRESS light goes off in 15 seconds or less.

S 864-079
(11) Push the R AFT PUMPS switch-light to the off position.

S 214-080
(12) Make sure the R AFT PUMPS PRESS light comes on.

S 864-081
(13) Remove electrical power if it is not necessary (AMM 24-22-00/201).

H. Install the Pressure Switch of the Right Forward Fuel Boost Pump

S 024-082
(1) Install the pressure switch in the boss on the front spar.

S 034-083
(2) Install lockwire on the pressure switch.

S 224-138
(3) Make sure the bonding resistance between the pressure switch and the airplane structure is 0.050 ohm or less (AMM 20-10-21/601).

S 034-084
(4) Install the electrical connector on the pressure switch.

S 864-085
(5) Supply electrical power (AMM 24-22-00/201).

S 214-086
(6) Make sure the R FWD PUMPS PRESS light of the fuel management panel on the overhead panel, P5, comes on.

S 864-087
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6H17, R FWD FUEL BOOST PUMP

S 864-132

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(8) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-088
(9) Push the R FWD PUMPS switch-light of the fuel management panel on the P5 panel to the ON position.

S 214-089
(10) Make sure the R FWD PUMPS PRESS light goes off in 15 seconds or less.

S 864-090
(11) Push the R FWD PUMPS switch-light to the off position.

S 214-091
(12) Make sure the R FWD PUMPS PRESS light comes on.

S 864-092

WARNING: MAKE SURE NO PERSONS ARE IN THE SLAT AREA WHEN YOU DO THE ACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS. IF PERSONS ARE IN THE SLAT AREA DURING ACTIVATION OF THE LEADING EDGE SLATS INJURY COULD OCCUR.

(13) Do the activation procedure for the leading edge slats (AMM 27-81-00/201).

S 864-093
(14) Retract the leading edge slats if extended (AMM 27-81-00/201).

S 864-094
(15) Remove electrical power if it is not necessary (AMM 24-22-00/201).

I. Install the Pressure Switch of the Right Fuel Override Pump

S 024-095
(1) Install the pressure switch in the boss on the rear spar.

S 034-096
(2) Install lockwire on the pressure switch.

S 224-139
(3) Make sure the bonding resistance between the pressure switch and the airplane structure is 0.050 ohm or less (AMM 20-10-21/601).

S 034-097
(4) Install the electrical connector on the pressure switch.

S 864-098
(5) Supply electrical power (AMM 24-22-00/201).

S 214-099
(6) Make sure the RIGHT C PUMPS PRESS light of the fuel management panel on the overhead panel, P5, is off.

S 864-100
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6F20, R FUEL OVRD PUMP

S 014-101
(8) Open the fueling station door, 621GB (AMM 06-44-00/201).

S 864-133

WARNING: DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

(9) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the fuel tank.
(a) Immediately set the applicable fuel pump switch to OFF if the LOW PRESSURE light comes on and stays on.

S 864-102
(10) Push the RIGHT C PUMPS switch-light of the fuel management panel on the P5 panel to the ON position.

S 214-103
(11) Make sure the RIGHT C PUMPS PRESS light comes on, then goes off in 15 seconds or less.

S 864-104
(12) Push the RIGHT C PUMPS switch-light to the off position.

S 214-105
(13) Make sure the RIGHT C PUMPS PRESS light is off.

S 414-106
(14) Close the fueling station door, 621GB (AMM 06-44-00/201).

S 864-107

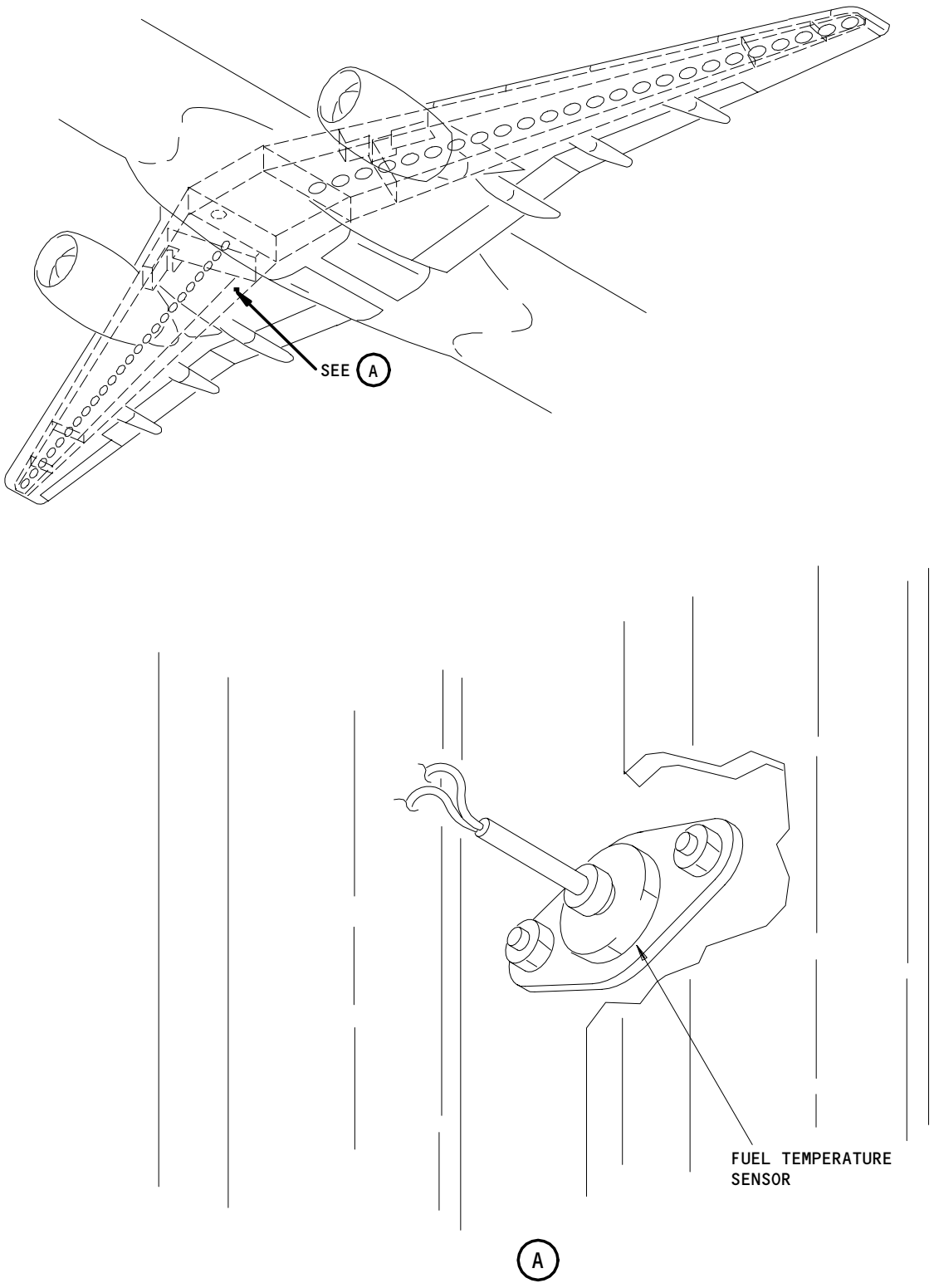
WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(15) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

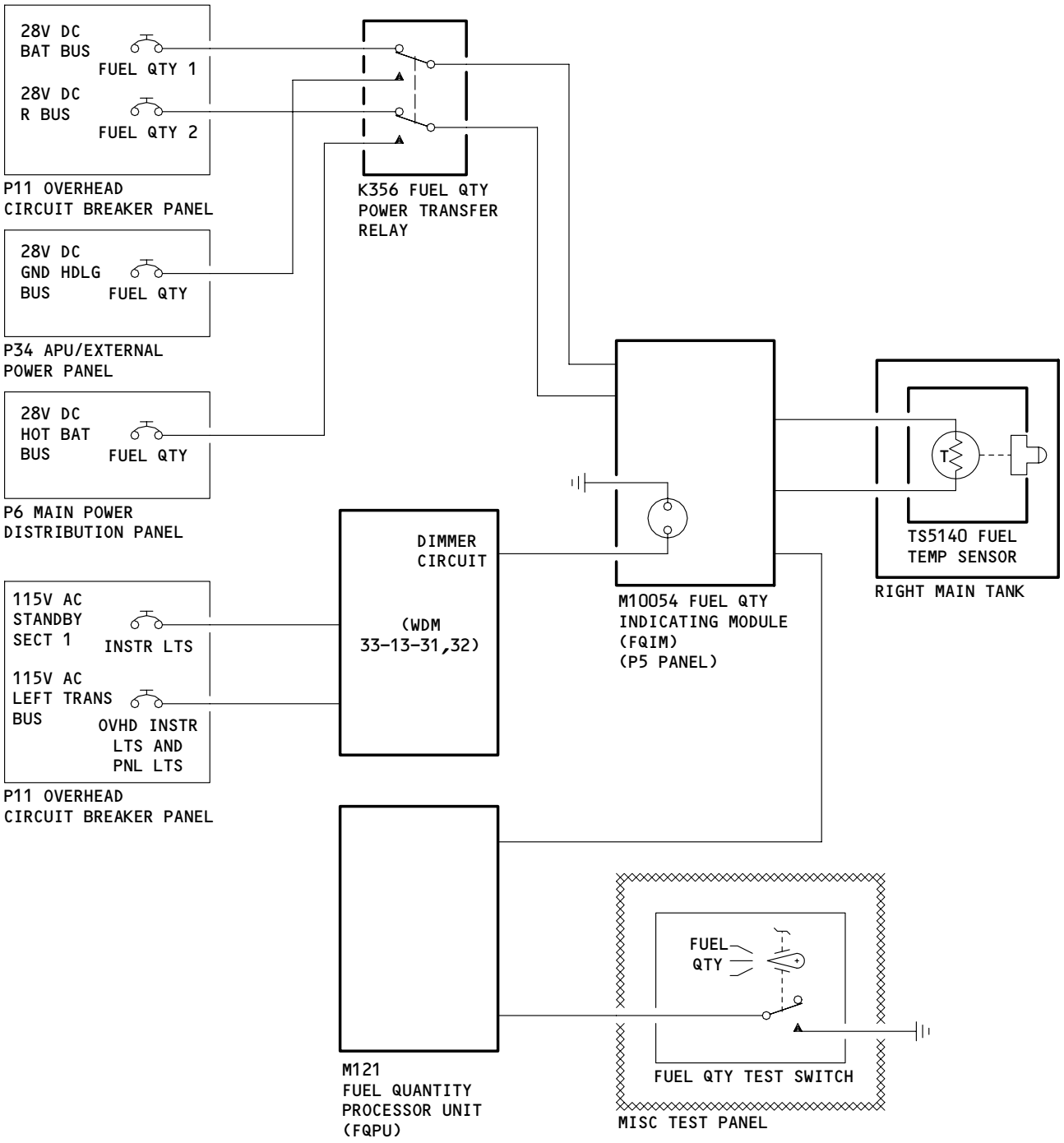
S 864-108
(16) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FUEL TEMPERATURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The fuel temperature and indicating system measures the fuel temperature and supplies visual indication of the temperature on the overhead panel, P5. The system has a fuel tank sensor and a temperature indicator.
2. Component Details (Fig. 1)
   A. Fuel Temperature Sensor
      (1) The sensor is a bulb type with a temperature sensitive resistor. The resistance increases with increasing temperature. The fuel temperature sensor is attached on the rear spar of the right main fuel tank. The bulb is installed in a housing so it can be replaced without draining fuel.
   B. Fuel Temperature Indicator
      (1) The fuel temperature indicator is a liquid crystal display contained within the fuel quantity indicating module (FQIM). The fuel temperature indicator supplies a digital readout of the fuel temperature in the right main fuel tank. The fuel quantity indicator module is installed in the overhead panel, P5.
3. Operation
   A. The sensor and lead resistance form two legs of an input bridge circuit. The resulting signal from the bridge circuit is amplified, converted from analog to digital, and shown as a digital readout.
   B. To test the fuel temperature indicator, put the fuel quantity test switch on the right side panel, P61, to FUEL QTY. The fuel temperature indicator should show -188.



Fuel Temperature Sensor
Figure 1



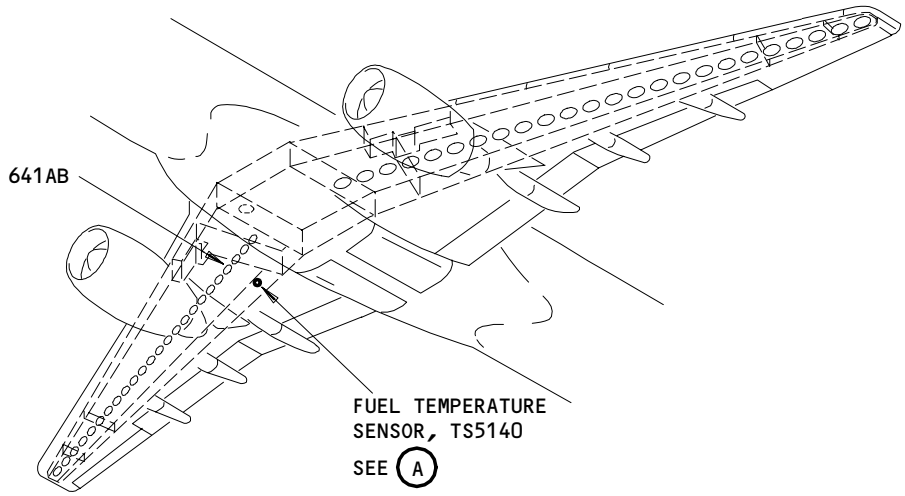
Fuel Temperature Indicating System Schematic
Figure 2

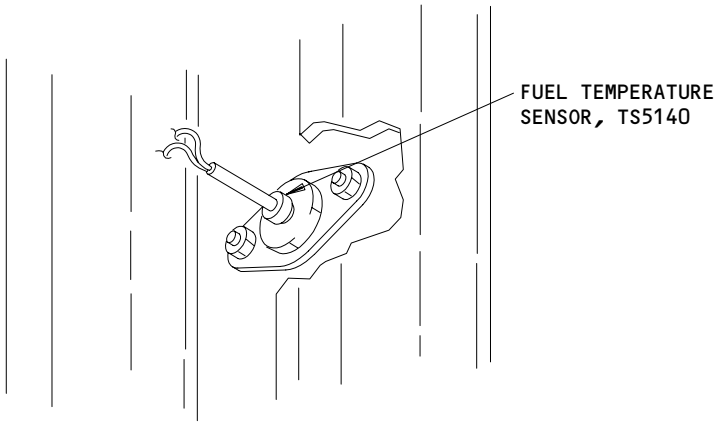
FUEL TEMPERATURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKER –			FLT COMPT, P6	
FUELING QTY, C1045	--	1	6E4	*
CIRCUIT BREAKERS –			FLT COMPT, P11	
FUEL QTY 1, C1048	--	1	11C34	*
FUEL QTY 2, C1053	--	1	11L19	*
INSTR LTS, C1246	--	1	11B7	*
OVHD INSTR LTS AND PANEL LTS, C1241	--	1	11N4	*
CIRCUIT BREAKER –			FLT COMPT, P34	
FUEL QTY, C1040	--	1	34AA10	*
SENSOR – FUEL TEMPERATURE, TS5140	1	1	641AB	28-43-01

* SEE THE WDM EQUIPMENT LIST

Fuel Temperature Indicating System – Component Index
Figure 101

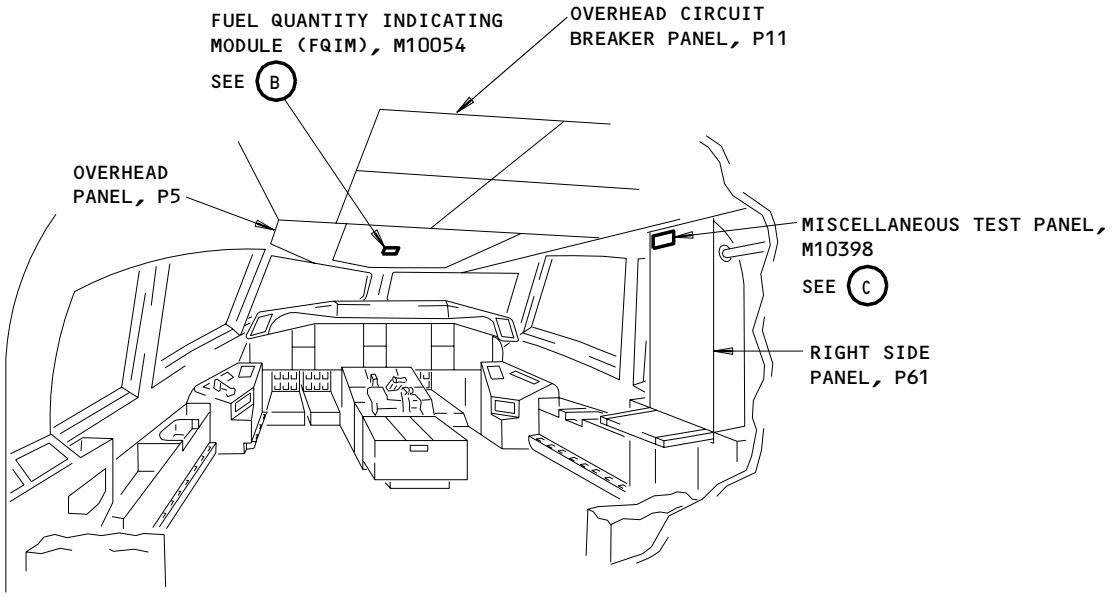




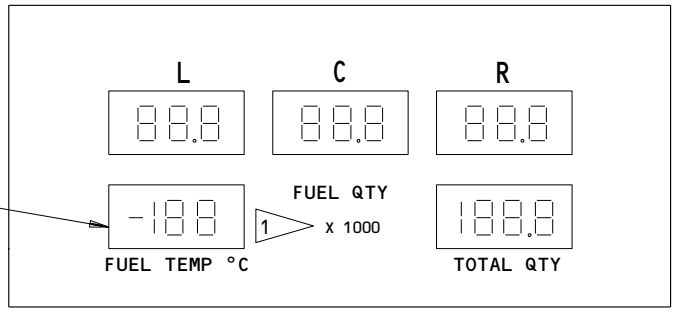
FUEL TEMPERATURE SENSOR, TS5140

A

Fuel Temperature Indicating System - Component Location
Figure 102 (Sheet 1)

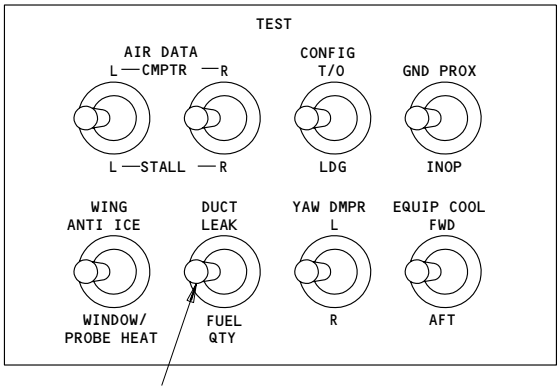


FLIGHT COMPARTMENT



FUEL QUANTITY INDICATING MODULE (FQIM), M10054

B



MISCELLANEOUS TEST PANEL, M10398
(EXAMPLE PANEL SHOWN)

C

1 THE UNITS ARE IN LBS OR KGS.

Fuel Temperature Indicating System - Component Location
Figure 102 (Sheet 2)

FUEL TEMPERATURE INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks for the fuel temperature indicating system:
      (1) The first task is an ambient temperature operational test which does a check to make sure the fuel temperature indicating system operates in ambient temperature.
      (2) The second task is a cold weather operational test which does a check to make sure the fuel temperature indicating system operates in very cold temperatures.

TASK 28-43-00-715-001

2. Fuel Temperature Indication System Ambient Temperature Operational Test
   A. Standard Tools and Equipment
      (1) Container, 1/2 gallon (2 liter) capacity
      (2) Thermometer - mercury
   B. References
      (1) AMM 28-43-01/401, Fuel Temperature Sensor
   C. Access
      (1) Location Zone
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panel
          651BB Trailing Edge Access Panel (Right)

   D. Procedure

      S 025-002
      (1) Remove the fuel temperature sensor from the right main tank (AMM 28-43-01/401).

          NOTE: Do not disconnect the fuel temperature sensor from the airplane wiring for this test.

      S 865-003
      (2) Make sure these circuit breakers are closed:
          (a) On the overhead circuit breaker panel, P11:
              1) 11C34, FUEL QTY NO. 1
              2) 11L19, FUEL QTY NO. 2
          (b) On the main power distribution panel, P6:
              1) FUELING QTY, 6E4
          (c) On the APU/external power panel, P34:
              1) 34AA10, FUEL QTY

S 485-004
(3) Fill the container with water.

NOTE: The water must approximately be at ambient temperature. The specific water temperature is not important for this procedure.

S 485-005
(4) At the same time, put the fuel temperature bulb and the mercury thermometer into the water.

S 215-006
(5) Look at the mercury thermometer temperature.

S 215-007
(6) Compare the temperature on the mercury thermometer with the temperature shown on the main EICAS display.

S 975-008
(7) Make sure the temperature shown on the main EICAS display is in ± 4°C the temperature shown on the mercury thermometer.

S 425-009
(8) Install the fuel temperature bulb (AMM 28-43-01/401).

TASK 28-43-00-715-010

3. Fuel Temperature Indicating System Cold Weather Operational Test

A. Standard Tools and Equipment
(1) Container, 1/2 gallon (2 liter) capacity, suitable for antifreeze/dry ice mixture
(2) Thermometer - Mercury, -30 F (-40 C) capability

B. Consumable Materials
(1) G00065 Antifreeze - Ethylene Glycol
(2) G00263 Dry Ice

C. References
(1) AMM 28-43-01/401, Fuel Temperature Sensor

D. Access
(1) Location Zone
651 Rear Spar to MLG Support Beam (Right)

(2) Access Panel
651BB Trailing Edge Access Panel (Right)

E. Procedure

S 025-011
(1) Remove the fuel temperature bulb from the right main tank (AMM 28-43-01/401).

NOTE: Do not disconnect the fuel temperature sensor from the airplane wiring for this test.

S 865-012
(2) Make sure this circuit breaker is closed:
(a) On the overhead circuit breaker panel, P11:
1) 11C34, FUEL QTY NO. 1
2) 11L19, FUEL QTY NO. 2
(b) On the main power distribution panel, P6:
1) FUELING QTY, 6E4
(c) On the APU/external power panel, P34:
1) 34AA10, FUEL QTY

S 865-013
(3) Slowly add the small pieces of dry ice to approximately one quart of ethylene glycol (anti-freeze) in an applicable container.

S 485-014
(4) While the same time, put the fuel temperature bulb and the mercury thermometer into the ethylene glycol and dry ice mixture.

S 215-015

CAUTION: MONITOR THE TEMPERATURE OF THE MIXTURE. ETHYLENE GLYCOL BECOMES SOLID (FREEZES) AT APPROXIMATELY -40°F (-40°C). DAMAGE TO THE EQUIPMENT COULD OCCUR IF THE ETHYLENE GLYCOL BECOMES SOLID (FREEZES).

(5) As the temperature on the mercury thermometer shows -22°F (-30°C), compare the temperature of the mercury thermometer to the temperature shown on the main EICAS display.

S 975-016
(6) Make sure the temperature shown on the main EICAS display is in ± 4°C the temperature shown on the mercury thermometer.

S 425-017
(7) Install the fuel temperature bulb (AMM 28-43-01/401).

TASK 28-43-00-715-018

4. Fuel Temperature Bulb Resistance Test

A. Standard Tools and Equipment

(1) Thermometer - Mercury Type, calibrated in °C, to compare with the temperature indicator

(2) Ohmmeter

B. References

(1) WDM 28-43-11

C. Access

(1) Location Zone

651 Rear Spar to MLG Support Beam (Right)

(2) Access Panel

651BB Trailing Edge Access Panel (Right)

D. Procedure

S 865-019

(1) Open these circuit breakers and attach DO-NOT-CLOSE tags:

(a) On the overhead circuit breaker panel, P11:

1) 11C34, FUEL QTY NO. 1

2) 11L19, FUEL QTY NO. 2

(b) On the main power distribution panel, P6:

1) FUELING QTY, 6E4

(c) On the APU/external power panel, P34:

1) 34AA10, FUEL QTY

S 035-020

(2) Remove the fuel temperature bulb from the adapter but do not disconnect it (AMM 28-43-01/401).

NOTE: The fuel temperature bulb is on the rear spar of the left main fuel tank.

S 975-021

(3) Measure the temperature in the bulb housing.

(a) Put the thermometer in the bulb housing.

(b) Permit the temperature to become stable.

(c) Write the temperature shown on the thermometer.

S 035-022

(4) Disconnect connector D6870 from the fuel quantity indicating module in the flight compartment (WDM 28-43-11).

S 975-023
(5) Measure the resistance from pin 8 to pin 9 on connector D6870.

S 975-024
(6) Use Table 501 to compare the resistance measurement with the temperature of the sensor.

NOTE: The resistance measured by this procedure includes the resistance of the wiring between the indicator and the sensor, approximately 0.8 ohms for 100 feet of wiring.

TABLE 501
Temperature-Resistance Values for Temperature Sensor, T434

TEMPERATURE (degrees Celsius)	RESISTANCE (ohms)
-30	80.56 +/- 0.40
-20	83.77 +/- 0.40
-10	87.04 +/- 0.40
0	90.38 +/- 0.40
10	93.80 +/- 0.40
20	97.31 +/- 0.40
30	100.91 +/- 0.40
40	104.60 +/- 0.40
50	108.39 +/- 0.40
60	112.28 +/- 0.50

S 435-025
(7) Connect connector D6870 to the fuel temperature indicator in the flight compartment again (WDM 28-43-11).

S 435-026
(8) Install the temperature bulb in the adapter again (AMM 28-43-01/401).

S 865-027

(9) Close these circuit breakers and remove the DO-NOT-CLOSE tags:

(a) On the overhead circuit breaker panel, P11:

1) 11C34, FUEL QTY NO. 1

2) 11L19, FUEL QTY NO. 2

(b) On the main power distribution panel, P6:

1) FUELING QTY, 6E4

(c) On the APU/external power panel, P34:

1) 34AA10, FUEL QTY

FUEL TEMPERATURE SENSOR - REMOVAL/INSTALLATION

1. General
   A. The fuel temperature sensor is installed in an adapter on the rear spar of the right wing. The adapter is not removed.
   B. This procedure contains two tasks. The first task removes the fuel temperature sensor. The second task installs the fuel temperature sensor.

TASK 28-43-01-004-001

2. Remove the Fuel Temperature Sensor (Fig. 401)
   A. References
      (1) 06-44-00/201, Wings Access Doors and Panels
   B. Access
      (1) Location Zone
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panel
          651BB Trailing Edge Access Panel (Right)

   C. Procedure

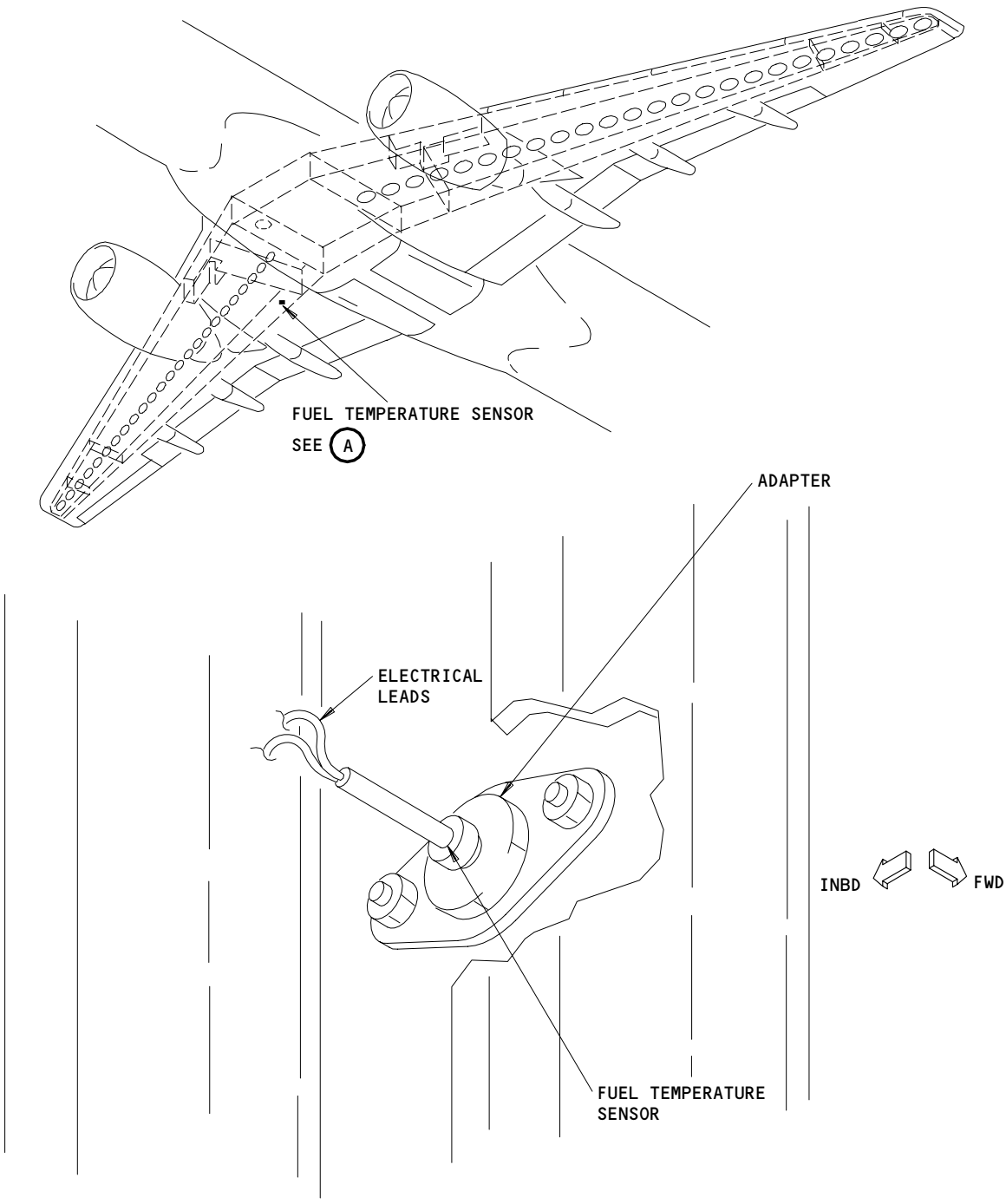
      S 864-002
      (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
          (a) On the miscellaneous equipment panel, P6:
              1) 6E4, FUELING QTY
          (b) On the overhead circuit breaker panel, P11:
              1) 11C34, FUEL QTY 1
              2) 11L19, FUEL QTY 2
              3) 11B7, INSTR LTS
              4) 11N4, INSTR AND PANEL OVHD LTS
          (c) On the APU external power panel, P34:
              1) 34AA10, FUEL QTY

      S 014-003
      (2) Remove the trailing edge skin panel, 651BB (Ref 06-44-00/201) on the lower surface of the wing.

      S 034-004
      (3) Disconnect the electrical leads at the fuel temperature sensor from the airplane leads at the splice.

      S 934-005
      (4) Put tags on the airplane leads for installation of the fuel temperature sensor.

      S 024-006
      (5) Remove the fuel temperature sensor bulb from the adapter.



FUEL TEMPERATURE SENSOR
A

Fuel Temperature Sensor Installation
Figure 401

TASK 28-43-01-404-007

3. Install the Fuel Temperature Sensor (Fig. 401)

A. Consumable Materials

(1) D00254 - Grease, Silicone, Dow Corning No.4

B. References

(1) 06-44-00/201, Wings Access Doors and Panels

C. Access

(1) Location Zone

651 Rear Spar to MLG Support Beam (Right)

(2) Access Panel

651BB Trailing Edge Access Panel (Right)

D. Procedure

S 424-014

(1) For the fuel temperature sensor bulb (Part Number 57B28A), fill the bulb housing with grease.

S 424-008

(2) Install the fuel temperature sensor in the adapter.

S 434-009

(3) Connect the electrical leads of the fuel temperature sensor to the airplane leads.

S 414-010

(4) Install the trailing edge skin panel, 651BB (Ref 06-44-00/201).

S 864-011

(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) On the P6 panel:

1) 6E4, FUELING QTY

(b) On the P11 panel:

1) 11C34, FUEL QTY 1
2) 11L19, FUEL QTY 2
3) 11B7, INSTR LTS
4) 11N4, INSTR AND PANEL OVHD LTS

(c) On the P34 panel:

1) 34AA10, FUEL QTY

S 214-012

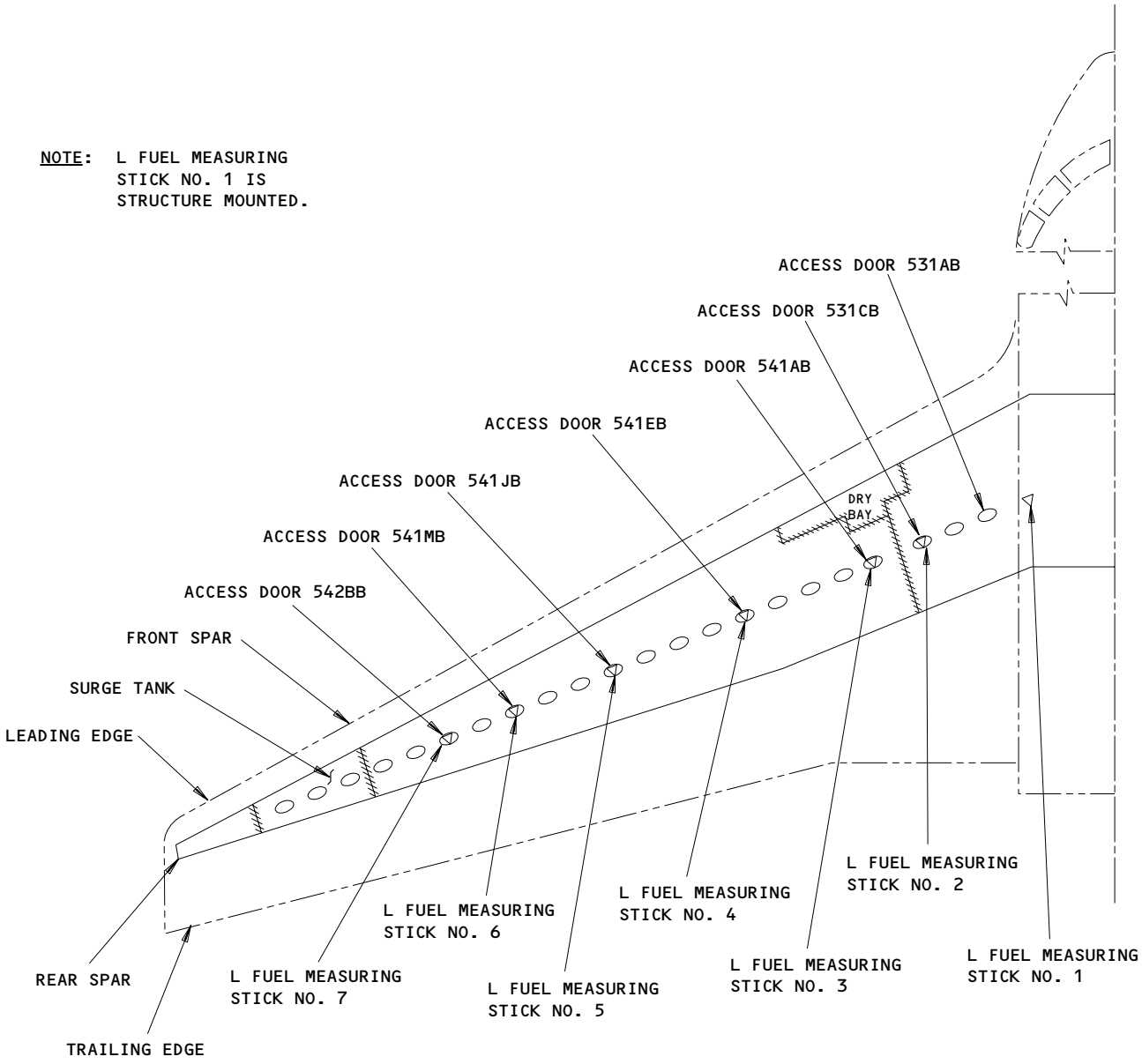
(6) Make sure the fuel temperature indicator on the overhead panel, P5, shows the fuel temperature.

FUEL MEASURING STICKS - DESCRIPTION AND OPERATION

1. General
   A. The fuel measuring sticks allow manual measurement of fuel quantity in the fuel tanks. The fuel measuring sticks should be used when the fuel quantity indicator in the flight compartment is not operating correctly.
   B. Upon delivery of any new airplane, a fuel measuring stick document is provided along with the airplane. The fuel measuring stick document provides instructions for the determination of fuel quantity by using the fuel measuring sticks. The main body of this document is a set of conversion tables relating fuel measuring stick readings and airplane attitude readings to obtain the fuel quantity.

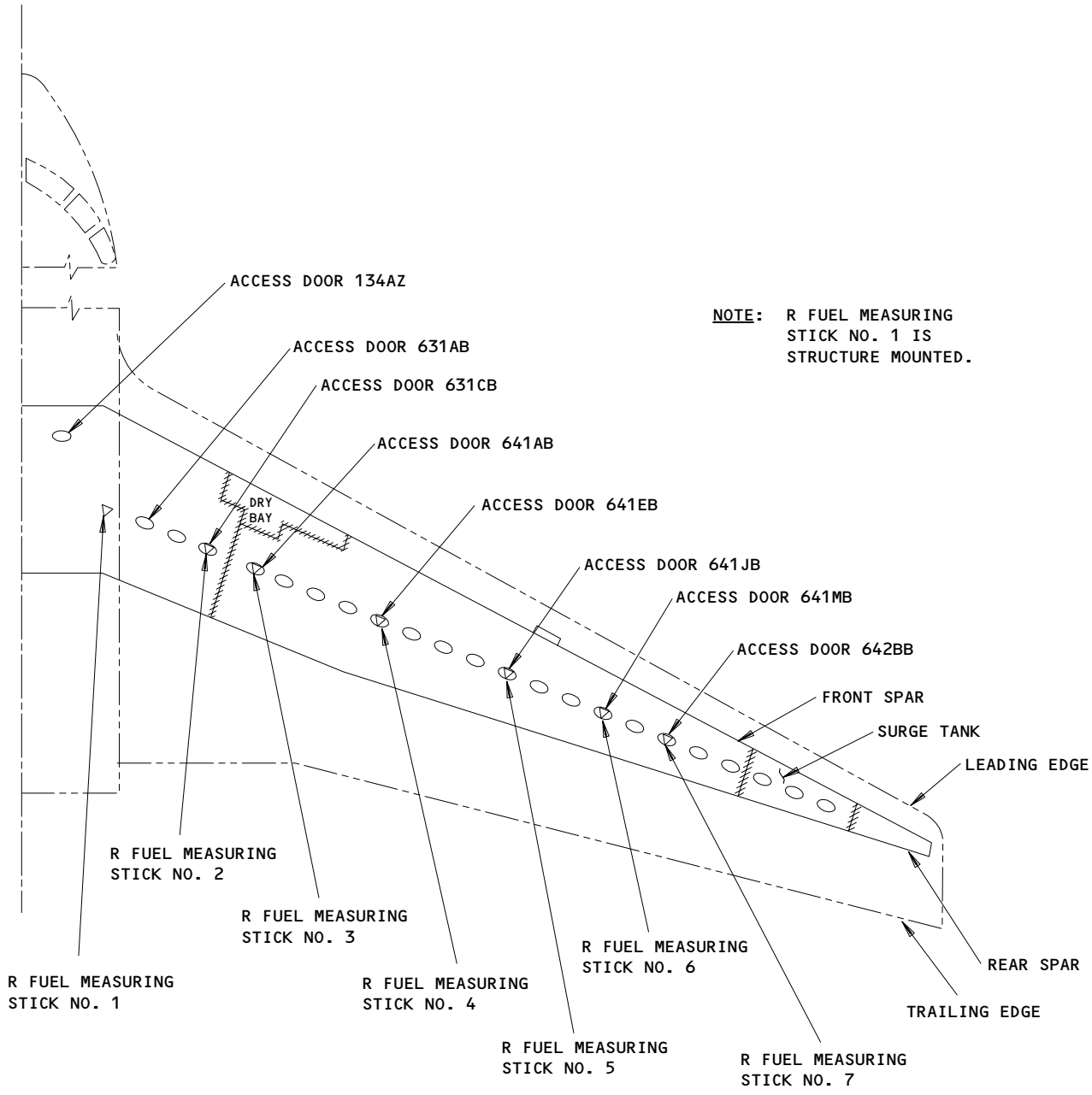
      NOTE: Distribution and storage of the fuel measuring stick documents are determined by each individual airline.

2. Component Details (Fig. 1 and 2)
   A. Fuel Measuring Sticks
      (1) Each main tank has five fuel measuring sticks on the lower wing surface. All fuel measuring sticks located in the main tank are mounted to a main tank access door. The center tank contains four fuel measuring sticks. Two center tank fuel measuring sticks mount to center tank access doors. The remaining two fuel measuring sticks mount to the structure of the center tank lower surface.
      (2) The fuel measuring stick assembly contains a housing, magnet and float, and a stick sub assembly. The housing, with magnet and float, is sealed and mounted to the inside of the lower wing surface. A float stop prevents the float from coming off the housing. The stick sub assembly fits into the housing from outside the airplane. Rotating the latch in a counterclockwise direction releases the stick sub assembly from the housing, allowing it to fall. Depending on the fuel level, the magnet in the float attracts the steel armature at the top of the stick sub assembly.
      (3) The calibrated marks on the stick sub assembly show fuel quantity in Liters, Inches, Kilograms or Pounds.
      (4) Refer to 28-44-00/201 to determine the fuel quantity by using the fuel measuring sticks.



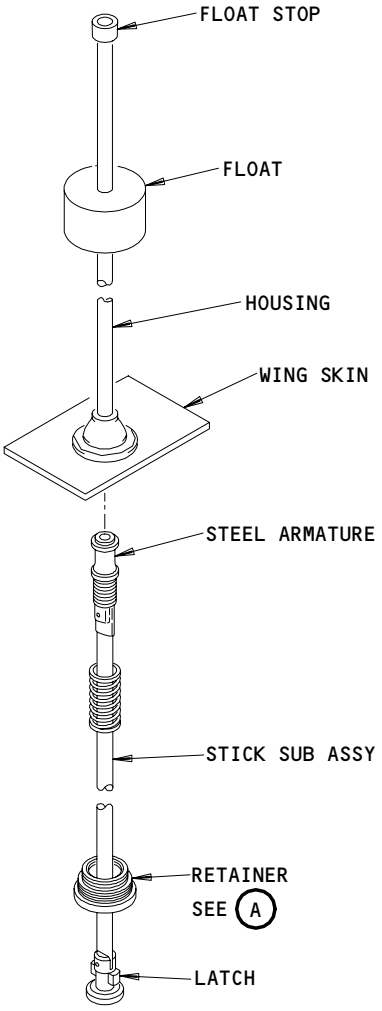
LEFT WING

Fuel Measuring Stick Locations
Figure 1 (Sheet 1)

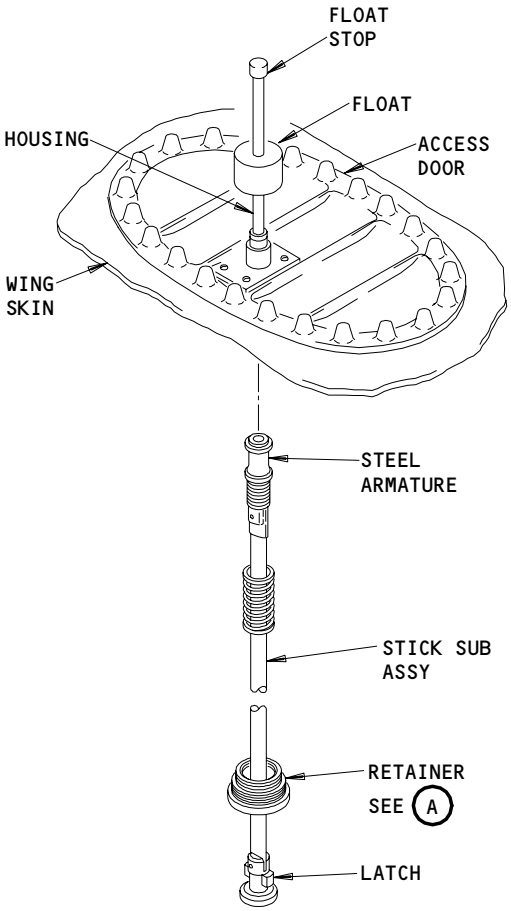


RIGHT WING

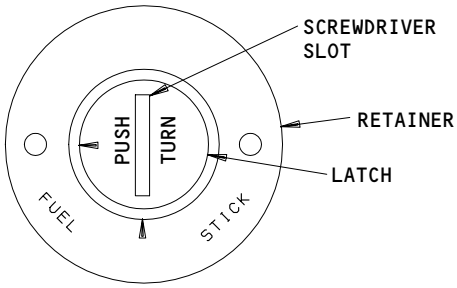
Fuel Measuring Stick Locations
Figure 1 (Sheet 2)



L OR R FUEL MEASURING STICK NO. 1
(STRUCTURE MOUNTED)



L OR R FUEL MEASURING STICK
NO. 2,3,4,5,6,7
(ACCESS DOOR MOUNTED)



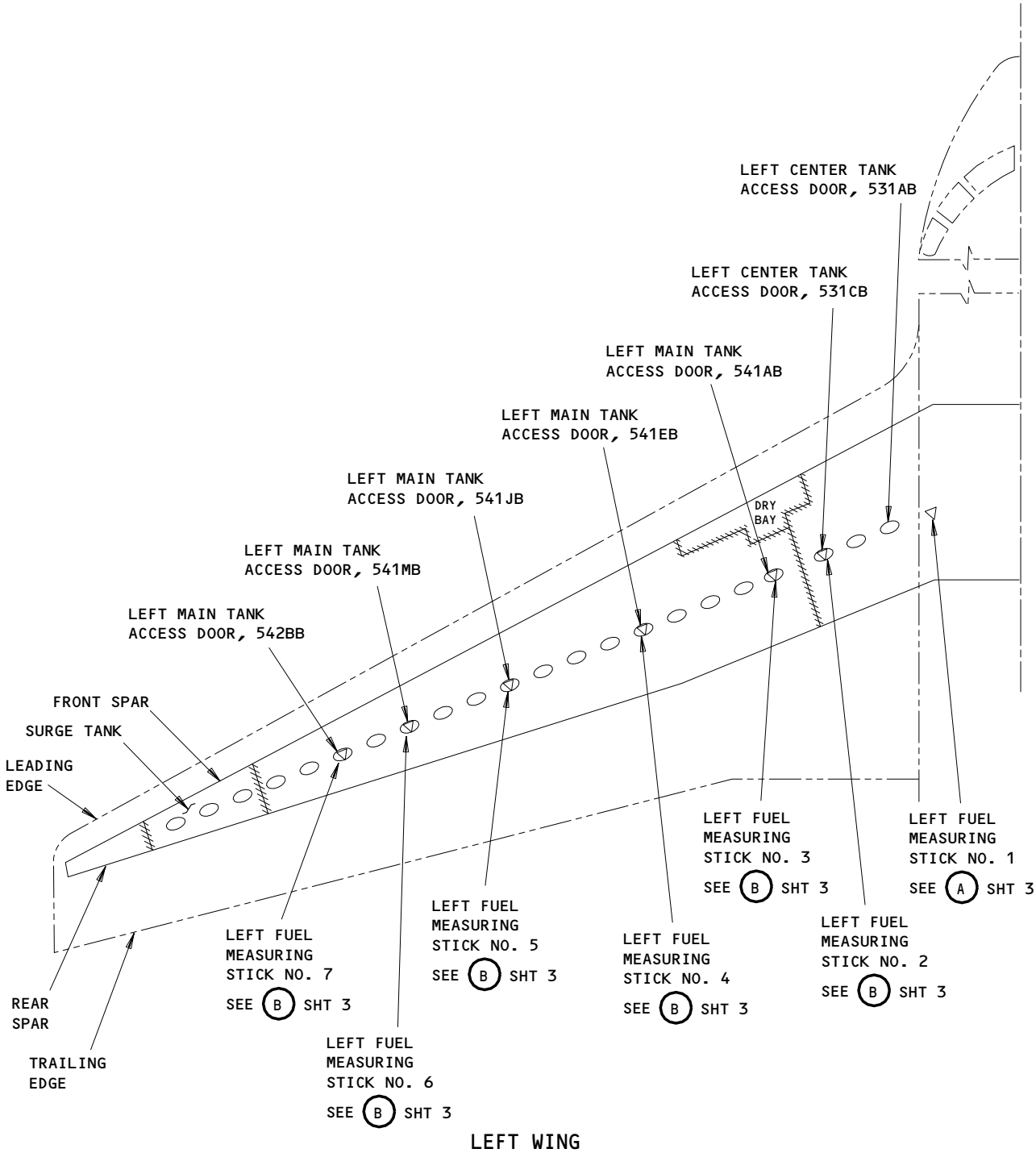
VIEW FROM UNDER WING
A

Fuel Measuring Stick
Figure 2

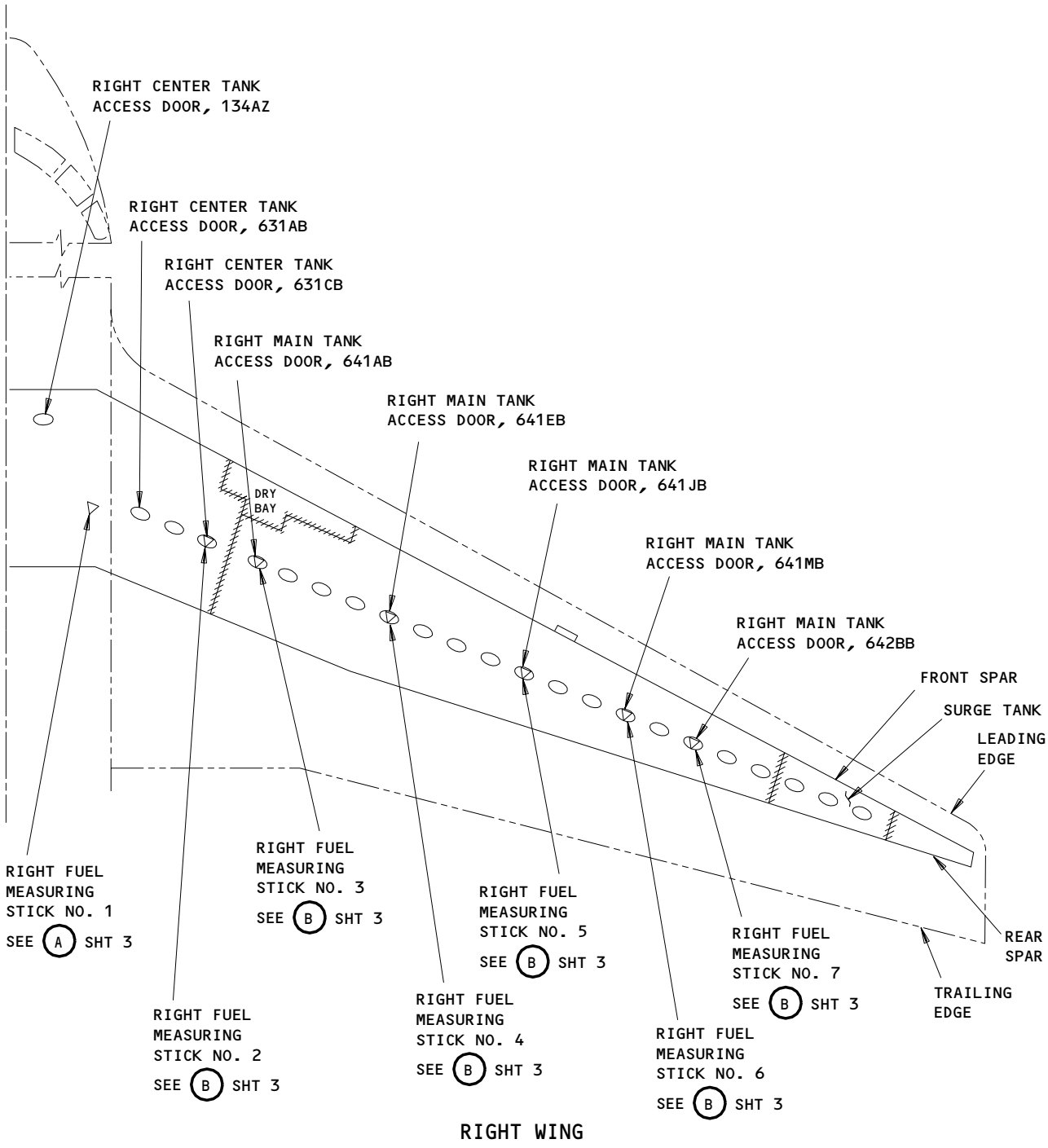
FUEL MEASURING STICK ASSEMBLY

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
L FUEL MEASURING STICK NO. 1	1	1	531AB	28-44-01
L FUEL MEASURING STICK NO. 2	1	1	531CB	28-44-01
L FUEL MEASURING STICK NO. 3	1	1	541AB	28-44-01
L FUEL MEASURING STICK NO. 4	1	1	541EB	28-44-01
L FUEL MEASURING STICK NO. 5	1	1	541JB	28-44-01
L FUEL MEASURING STICK NO. 6	1	1	541MB	28-44-01
L FUEL MEASURING STICK NO. 7	1	1	542BB	28-44-01
R FUEL MEASURING STICK NO. 1	2	1	631AB	28-44-01
R FUEL MEASURING STICK NO. 2	2	1	631CB	28-44-01
R FUEL MEASURING STICK NO. 3	2	1	641AB	28-44-01
R FUEL MEASURING STICK NO. 4	2	1	641EB	28-44-01
R FUEL MEASURING STICK NO. 5	2	1	641JB	28-44-01
R FUEL MEASURING STICK NO. 6	2	1	641MB	28-44-01
R FUEL MEASURING STICK NO. 7	2	1	642BB	28-44-01

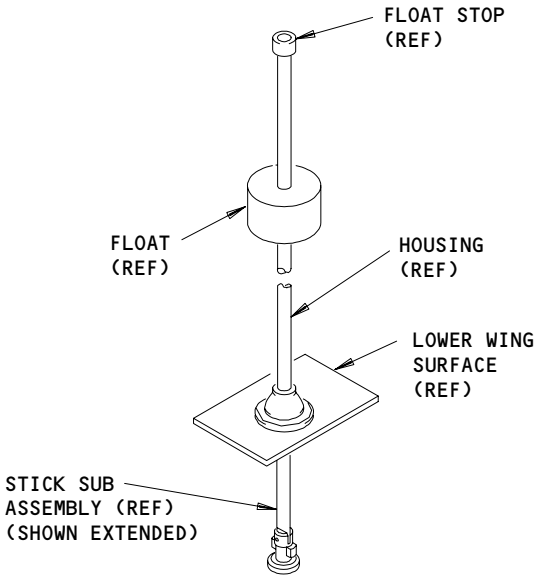
Fuel Measuring Stick Assembly - Component Index
Figure 101



Fuel Measuring Stick Assembly - Component Location
Figure 102 (Sheet 1)

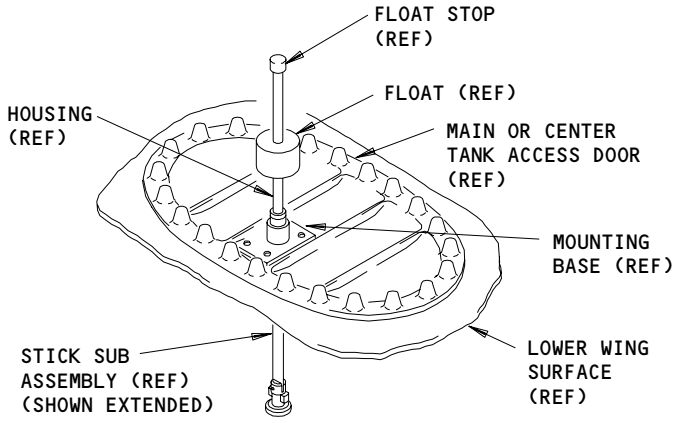


Fuel Measuring Stick Assembly – Component Location
Figure 102 (Sheet 2)



LEFT OR RIGHT FUEL MEASURING STICK NO. 1
(INSTALLED ON THE AIRPLANE STRUCTURE)

A



LEFT OR RIGHT FUEL MEASURING STICK NO. 2,3,4,5,6,7
(INSTALLED ON THE MAIN OR CENTER TANK ACCESS DOOR)

B

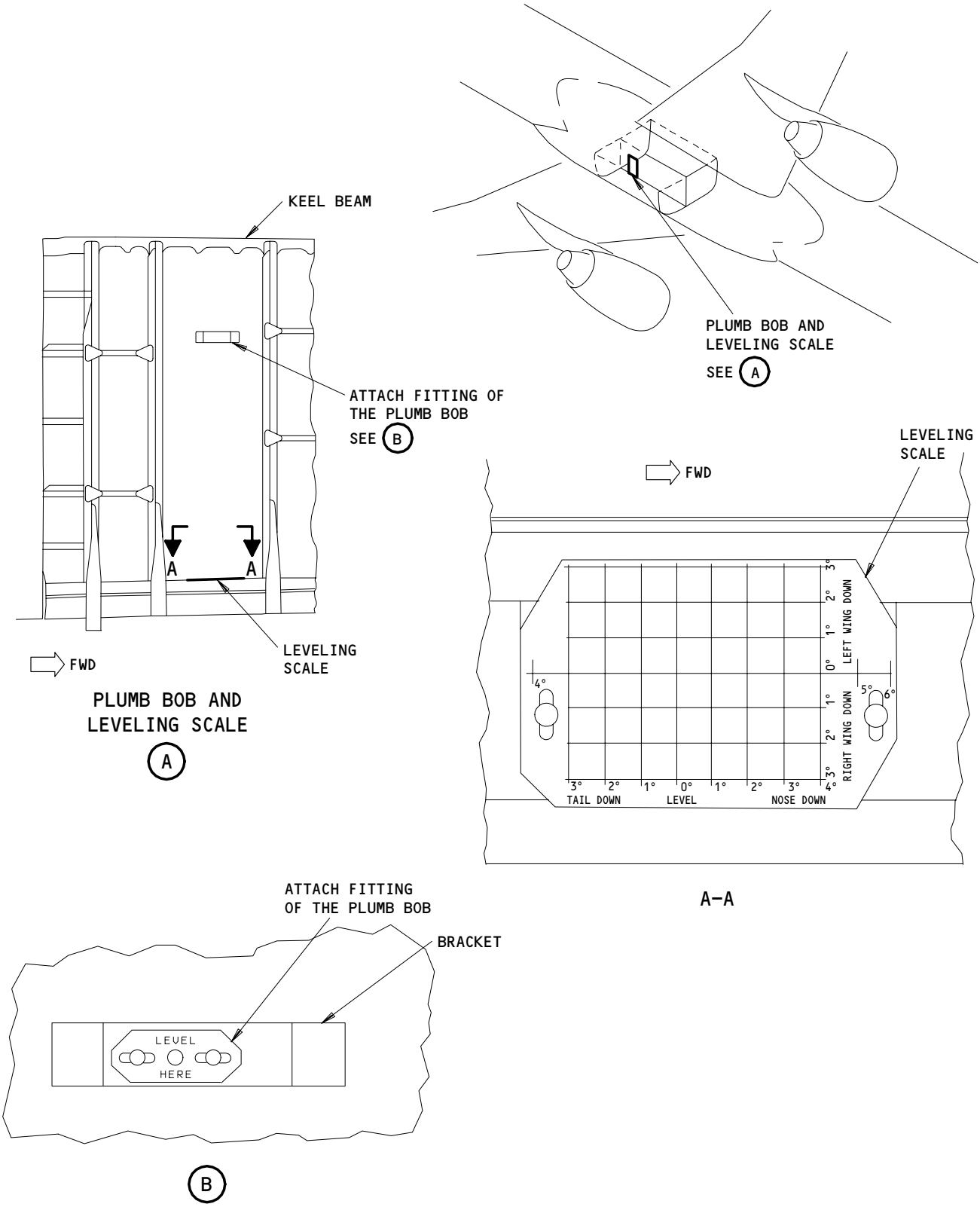
Fuel Measuring Stick Assembly - Component Location (Details from Sht 1 and 2)
Figure 102 (Sheet 3)

FUEL MEASURING STICKS - MAINTENANCE PRACTICES

1. General
   A. The airplanes have magnetic-type dripless fuel measuring sticks. The fuel measuring sticks let you manually measure the fuel quantity in the fuel tanks. The fuel measuring sticks are used when the fuel quantity indicator in the flight compartment does not operate correctly. You must use the fuel measuring sticks with the fuel measuring stick document.
   B. On delivery of all new airplanes, a fuel measuring stick document is supplied along with the airplane. The fuel measuring stick document gives instructions to find the fuel quantity with the fuel measuring sticks. The largest part of this document is a set of conversion tables that use the fuel measuring stick values and the airplane attitude to get the fuel quantity.

      NOTE: How the fuel measuring stick documents are divided and kept is determined by each airline.

   C. The ranges for the quantity of fuel that each fuel measuring stick can measure are shown in the fuel measuring stick document.
   D. The fuel measuring stick document supersedes all information in this procedure.
   E. To find the fuel quantity in a fuel tank, you must know the airplane attitude and the fuel level.
      (1) Each airplane has a leveling scale and a plumb bob to hang in the right main wheel well. The airplane attitude is found by the position of the plumb bob across the leveling scale. The vertical axis of the leveling scale measures the airplane wing roll. The horizontal axis of the leveling scale measures the airplane pitch. When the airplane roll is positive for one wing, it is negative for the other wing. When the airplane pitch is positive, it means that the airplane nose is up. When the airplane pitch is negative, it means that the airplane nose is down. The plumb bob gives the most accurate dimensions of airplane pitch and roll. Fig. 201 shows the plumb bob and the leveling scale.
      (2) The fuel level in each fuel tank is measured by the fuel measuring sticks. The location of the fuel measuring sticks are shown in Fig. 202.
      (3) The components of the fuel measuring stick are shown in Fig. 203. Figure 203 also shows how to read the fuel level from the fuel measuring stick.



Airplane Plumb Bob and Leveling Scale
Figure 201

(4) To find the fuel level, use a fuel measuring stick that is not fully wet or not fully dry. This is because the graduations on the fuel measuring sticks can only measure a specified range of fuel level.

NOTE: If a fuel measuring stick is fully wet (put fully into fuel), the fuel measuring stick will fully retract up when caught by the magnet on the float.

If a fuel measuring stick is fully dry (not put into fuel), the fuel measuring stick will fully extend down when caught by the magnet on the float.

F. This procedure contains two tasks. The first task finds the airplane attitude. The second task finds the fuel quantity.

TASK 28-44-00-222-006

2. Find the Airplane Attitude

A. General

(1) The airplane attitude must be in the limits of ±2° pitch and ±2° roll. You cannot measure the fuel quantity accurately if the airplane attitude is not in these limits. If the airplane attitude is more than the limits, you must make the airplane level in the limits of ±2° pitch and ±2° roll.

B. Equipment

(1) Plumb Bob - commercially available

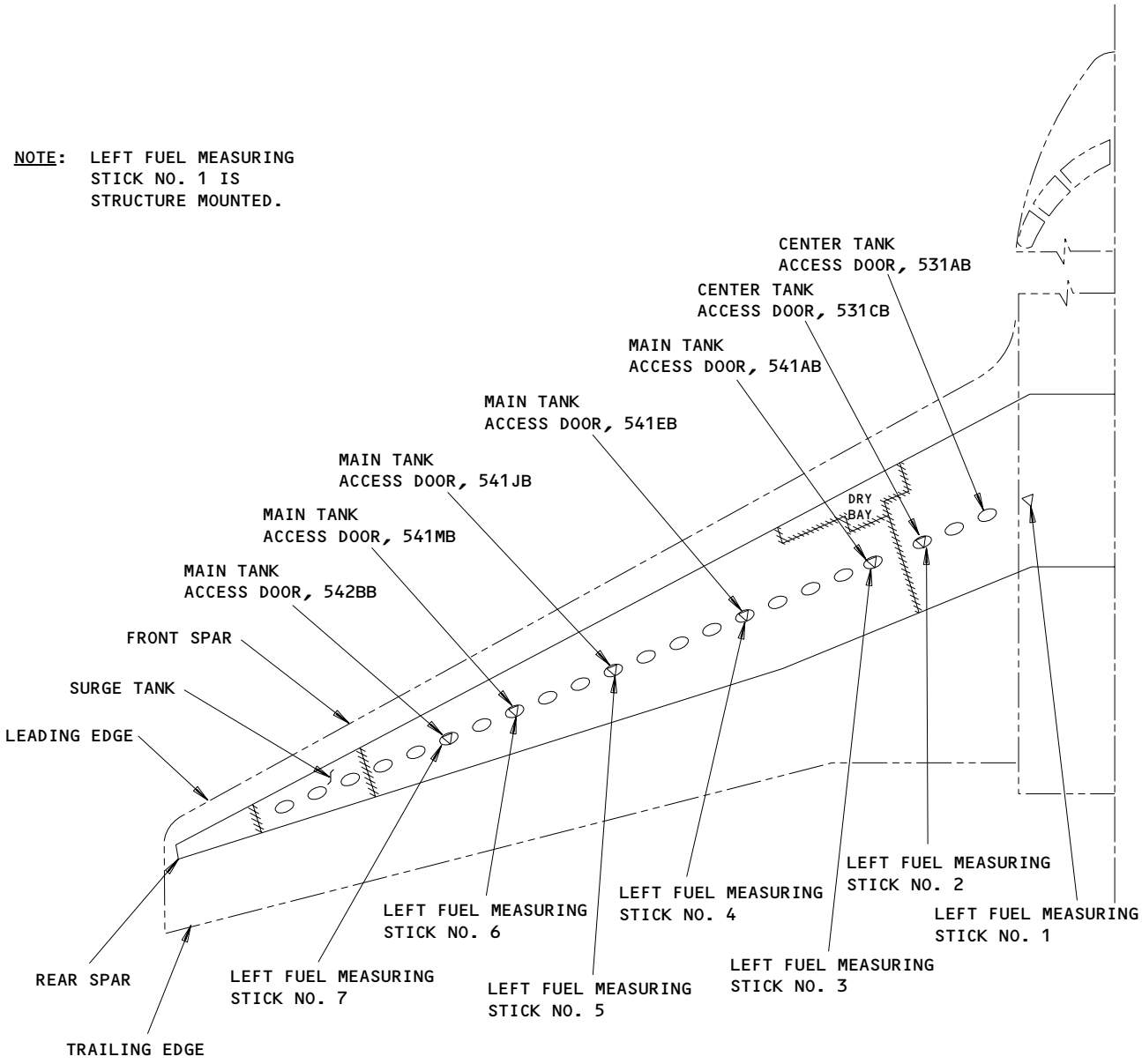
C. References

(1) AMM 07-11-01/201, Jacking Airplane
(2) AMM 10-11-01/201, Normal Parking
(3) AMM 12-15-01/301, Main Gear Shock Strut
(4) AMM 12-15-02/301, Nose Gear Shock Strut
(5) AMM 32-00-15/201, Landing Gear Door Ground Operations and Locking Procedure
(6) AMM 32-00-20/201, Landing Gear Downlocks

D. Access

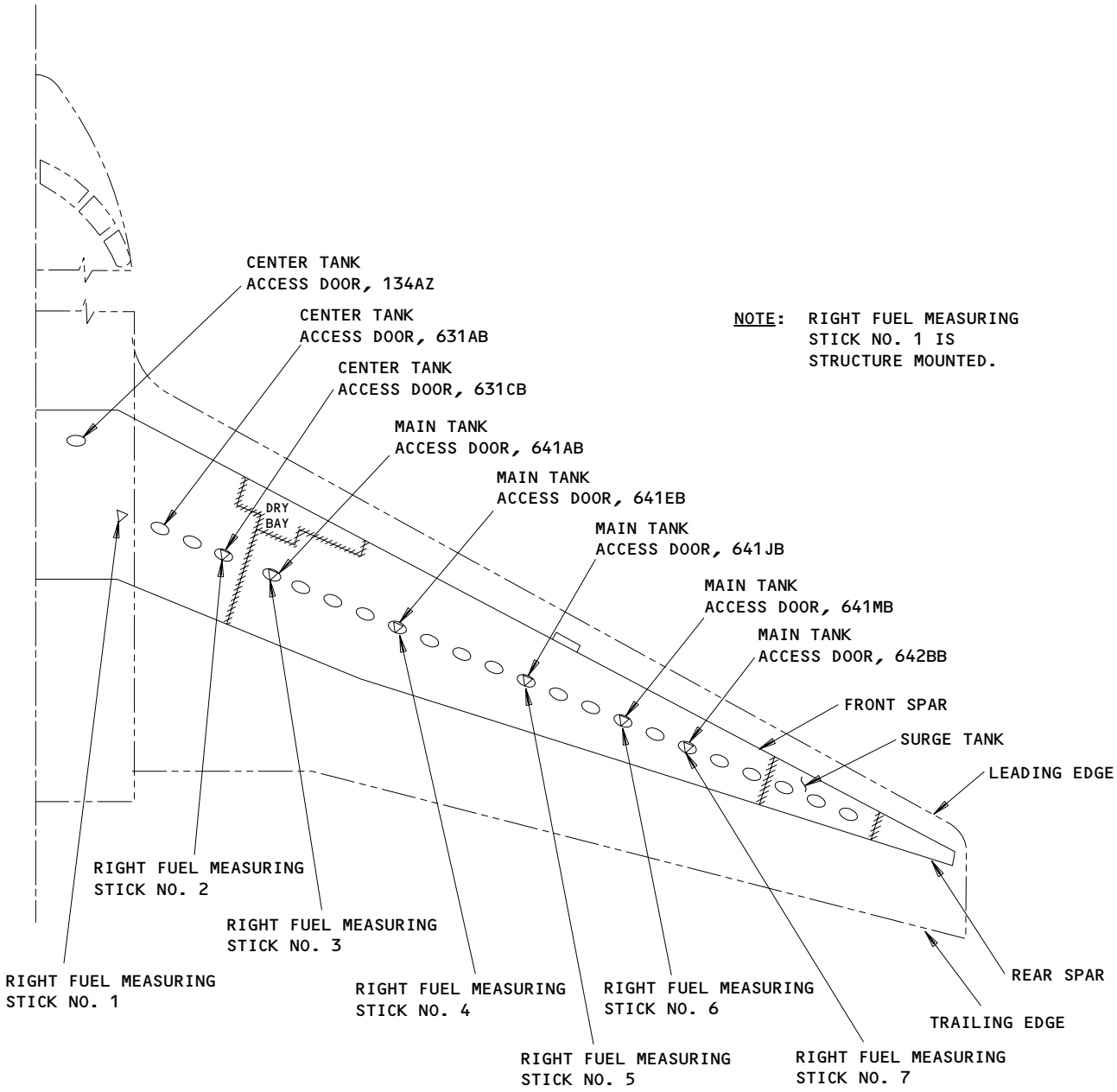
(1) Location Zones

115 NLG Wheel Well (Left)
116 NLG Wheel Well (Right)
143 MLG Wheel Well (Left)
144 MLG Wheel Well (Right)
149 Aft Section of Keel Beam



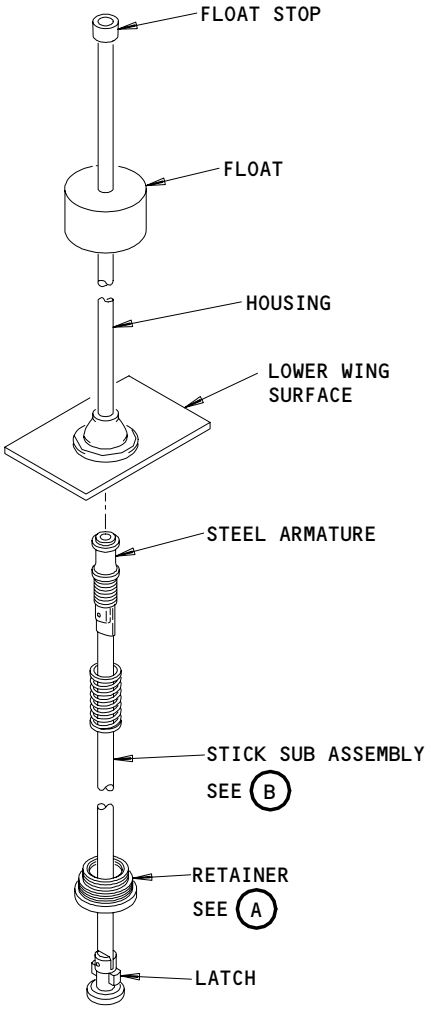
LEFT WING

Fuel Measuring Stick Locations
Figure 202 (Sheet 1)

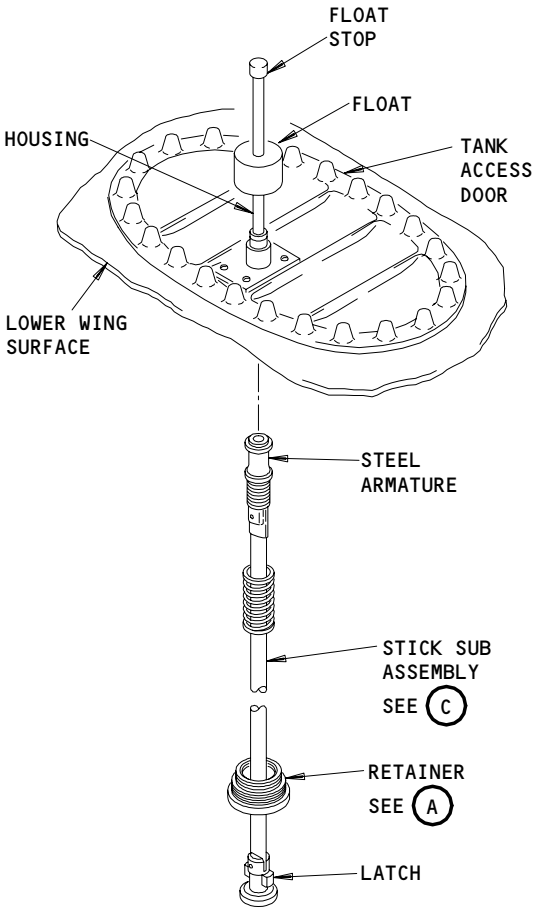


RIGHT WING

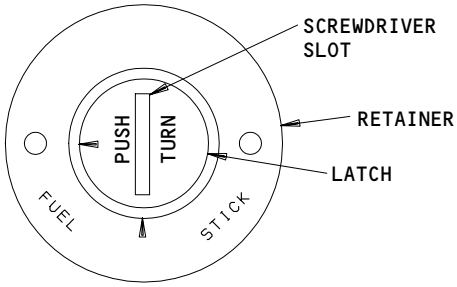
Fuel Measuring Stick Locations
Figure 202 (Sheet 2)



FUEL MEASURING STICK
(INSTALLED ON THE AIRPLANE STRUCTURE)



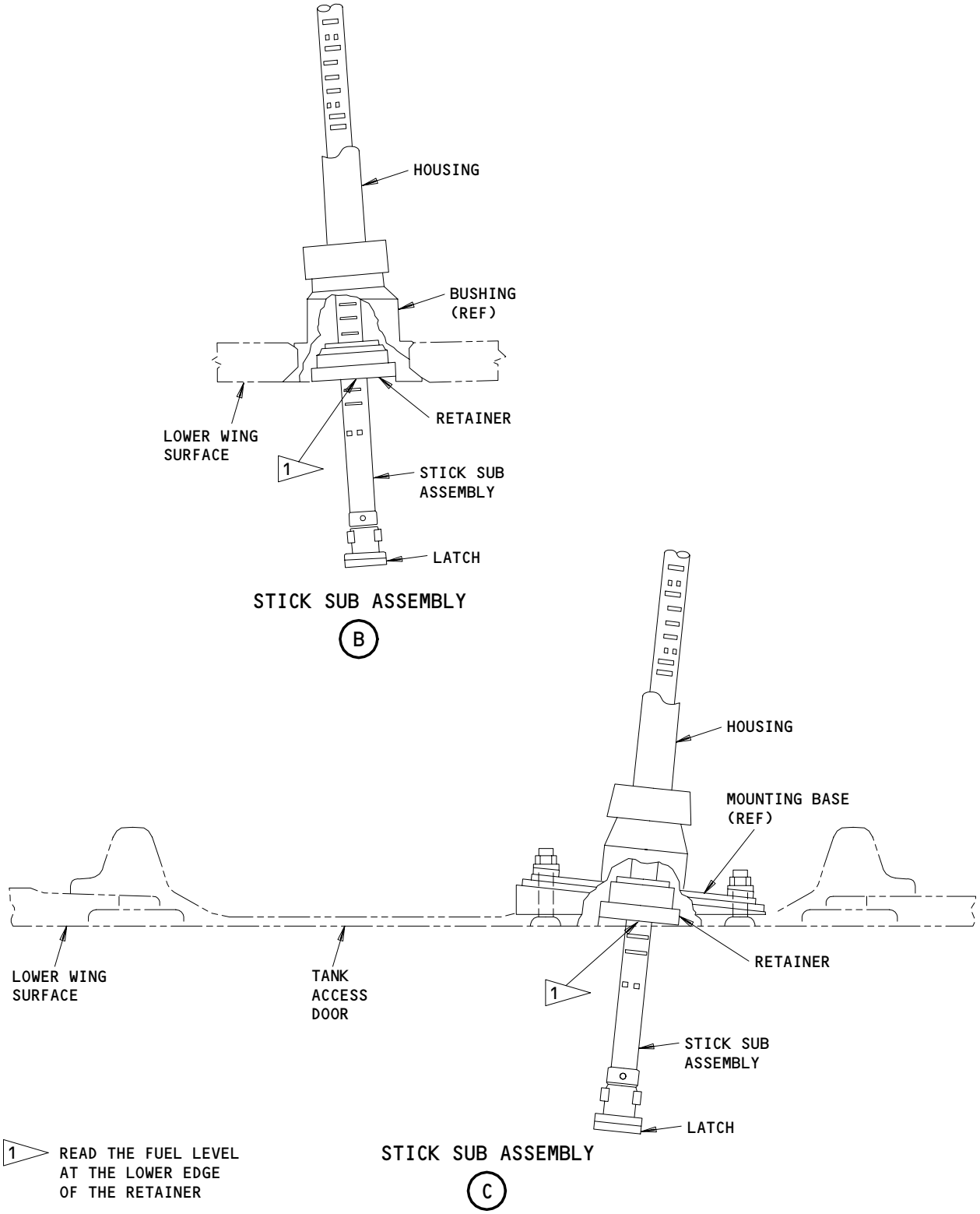
FUEL MEASURING STICK
(INSTALLED ON THE TANK ACCESS DOOR)



RETAINER
(VIEW FROM BELOW THE WING)

A

Fuel Measuring Stick Installation
Figure 203 (Sheet 1)



Fuel Measuring Stick Installation
Figure 203 (Sheet 2)

E. Procedure

S 582-007

(1) Park the airplane in a position as level as is available (AMM 10-11-01/201).

S 212-002

(2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 492-001

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 222-008

(4) To find the airplane attitude, do the steps that follow:

(a) Hang a plumb bob on the attach fitting in the right main wheel well (Fig. 201).

NOTE: The bracket for the attach fitting is attached to the keel beam structure above the leveling scale.

(b) Look at the position of the plumb bob when it does not move.

(c) If the airplane attitude is not in the limits of ±2° pitch and ±2° roll, then use one of the methods that follow to make the airplane level in the airplane attitude limits.

NOTE: The fuel measuring stick document has airplane pitch shown in the subsequent 0.50° increments: -2.30, -1.80, or -1.30, -0.80, -0.30, 0.20, 0.70, 1.20, 1.70 (Positive is nose high).

The fuel measuring stick document has airplane roll shown in the subsequent 0.25° increments: -2.00, -1.75, or -1.50, -1.25, -1.00, -0.75, -0.50, -0.25, 0.00, 0.25, or 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00 (Positive is wing high).

The fuel measuring stick document is centered around the nominal ground attitude of -0.3° pitch and 0° roll.

If you make the airplane level to these pitch and roll increments it will make it easier to use the fuel measuring stick document.

1) Inflate or deflate the applicable landing gear shock struts until the plumb bob is in the airplane attitude limits (AMM 12-15-01/301, Main Gear Shock Strut; AMM 12-15-02/301, Nose Gear Shock Strut).
2) Lift the airplane on jacks (AMM 07-11-01/201) until the plumb bob is in the airplane attitude limits.

(d) Remove the plumb bob from the attach fitting.

FUEL MEASURING STICK NUMBER STICK NUMBER 7 MAIN TANK

PITCH ATTITUDE = -1.80 DEGREES (POSITIVE IS NOSE HIGH)

MEASURING STICK LEVEL IN 1	USABLE FUEL IN 2							
	ROLL ATTITUDE IN DEGREES (POSITIVE IS WING HIGH)							
	-2.00	-1.75	-1.50	-1.25	-1.00	-0.75	-0.50	-0.25	0.00
	X	XX							

NOTE: SEE TABLES LISTED IN EQUIPMENT, TO SELECT THE CORRECT DOCUMENT. USE THE CORRECT DOCUMENT TO FIND THE FUEL QUANTITY, USING FUEL MEASURING STICKS.

1 FUEL STICKS CAN BE MARKED IN:
INCHES, POUNDS, KILOGRAMS OR LITERS

2 USABLE FUEL CAN BE MEASURED IN:
US GALLONS, POUNDS, KILOGRAMS

Fuel Measuring Stick Document
Figure 204

TASK 28-44-00-222-011

3. Find the Fuel Quantity

A. Equipment

(1) Select the applicable stick measuring document from the subsequent chart. These documents are for 757-200 airplanes with fuel measuring sticks numbered from inboard to outboard: 1, 2, 3, 4, 5, 6, 7.

DOCUMENT NUMBER	STICKS	TABLES
D345N011	Inches	Pounds
D345N014	Inches	Kilograms
D345N015	Kilograms	Kilograms
D345N016	Liters	Kilograms
D345N017	Inches	US Gallons
D345N018	Pounds	Pounds

(2) Hydrometer - Able to measure the specific gravity of fuel - commercially available

B. References

(1) AMM 12-11-03/301, Fuel Sump Draining

C. Access

(1) Location Zones

193 Wing to Body - Forward Lower Half (Left)
194 Wing to Body - Forward Lower Half (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

D. Procedure

S 222-012

(1) If the approximate fuel quantity in the fuel tank is known, refer to the fuel measuring stick document to find which fuel measuring stick to use.

NOTE: Each fuel measuring stick has a range of minimum and maximum fuel quantity that you can measure.

S 222-013

(2) If the approximate fuel quantity in the fuel tank is not known, use the fuel measuring stick that is the largest distance outboard on the fuel tank to be measured.

S 032-014

(3) Use a screwdriver and push up lightly on the latch of the fuel measuring stick and turn the screwdriver slot 90° counterclockwise to release the stick.

S 032-015

(4) Carefully, lower the stick to its fully extended length.

S 432-016

(5) Use a fingertip or flat palm and slowly lift the fuel measuring stick until some resistance is felt.

NOTE: Resistance occurs when the float magnet catches the steel armature of the fuel measuring stick. The fuel measuring stick is held in this position by the magnet on the float.

S 032-017

(6) Release the fuel measuring stick.

S 972-003
(7) Read the fuel level at the lower edge of the retainer.
(a) If the fuel level is not in the range of the graduation on the fuel measuring stick, use the next inboard fuel measuring stick until you find one with the fuel level in the correct range.

S 972-004
(8) Lower and read the fuel measuring stick three times to make sure the fuel level you read is accurate.

S 432-018
(9) Push the fuel measuring stick up into the housing.

S 432-019
(10) Use a screwdriver and push up lightly on the latch of the fuel measuring stick and turn the screwdriver slot 90° clockwise until the fuel measuring stick locks into position.

S 652-030
(11) Drain a small quantity of fuel from the sump drain valve (AMM 12-11-03/301).

NOTE: You must get the fuel sample from the fuel tank that you measure.

S 972-020
(12) Use a hydrometer to find the specific gravity of the fuel sample.

S 972-021
(13) Multiply the specific gravity of the fuel with the density of water to calculate the density of the fuel.
DENSITY OF FUEL = (SPECIFIC GRAVITY OF FUEL) x (DENSITY OF WATER)

NOTE: The density of the fuel can change the fuel quantity value you get from the fuel measuring stick document.

S 972-022
(14) Get the correct fuel measuring stick table from the fuel measuring stick document for the applicable fuel measuring stick number and the airplane pitch attitude.

S 972-023
(15) In the first column of the fuel measuring stick table (Fig. 204), find the fuel level that was read from the fuel measuring stick.

S 972-024
(16) Find the correct column for the wing roll attitude that was measured before (Fig. 204).

S 972-025
(17) Read across from the fuel level and read down from the correct wing roll attitude (Fig. 204).

S 222-029
(18) Refer to the sample problem in the fuel measuring stick document for more information.

FUEL MEASURING STICK ASSEMBLY - REMOVAL/INSTALLATION

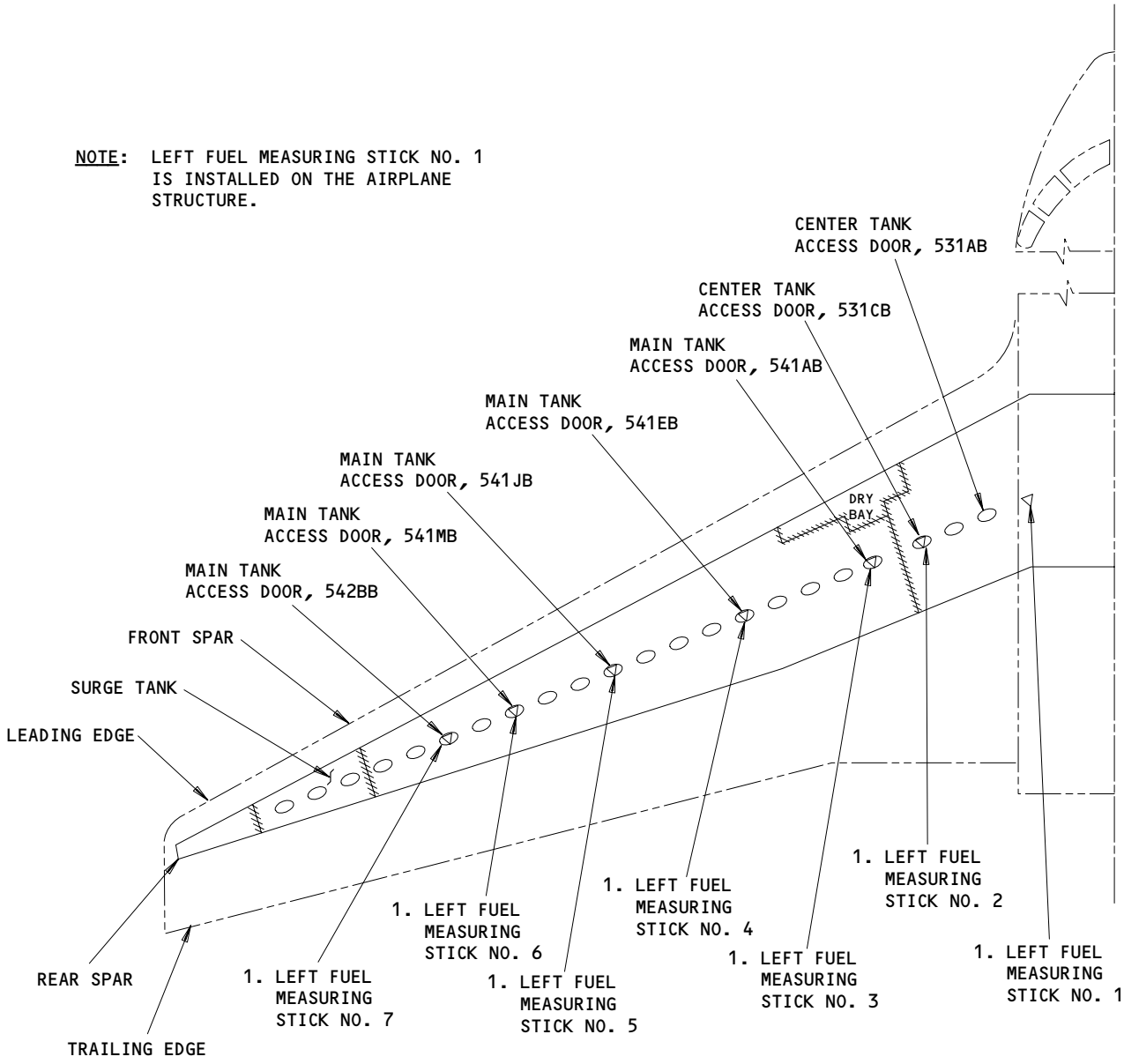
1. General
   A. Fourteen fuel measuring sticks are installed in the airplane, five in each main fuel tank, and four in the center fuel tank. Each fuel measuring stick has a housing, which contains a stick sub assembly, and a float fitted around the housing.
   B. On delivery of all new airplanes, a fuel measuring stick document is supplied along with the airplane. The fuel measuring stick document gives instructions to find the fuel quantity with the fuel measuring sticks. The largest part of this document is a set of conversion tables that use the fuel measuring stick values and the airplane attitude to get the fuel quantity.

      NOTE: How the fuel measuring stick documents are divided and kept is determined by each airline.

   C. This procedure contains six tasks. The first task removes the fuel measuring stick. The second task installs the fuel measuring stick. The third task removes the housing of the fuel measuring stick. The fourth task installs the housing of the fuel measuring stick. The fifth task removes the mounting base of the fuel measuring stick. The sixth task installs the mounting base of the fuel measuring stick.
   D. Refer to AMM 28-44-00/201 to find the fuel quantity with the fuel measuring sticks.

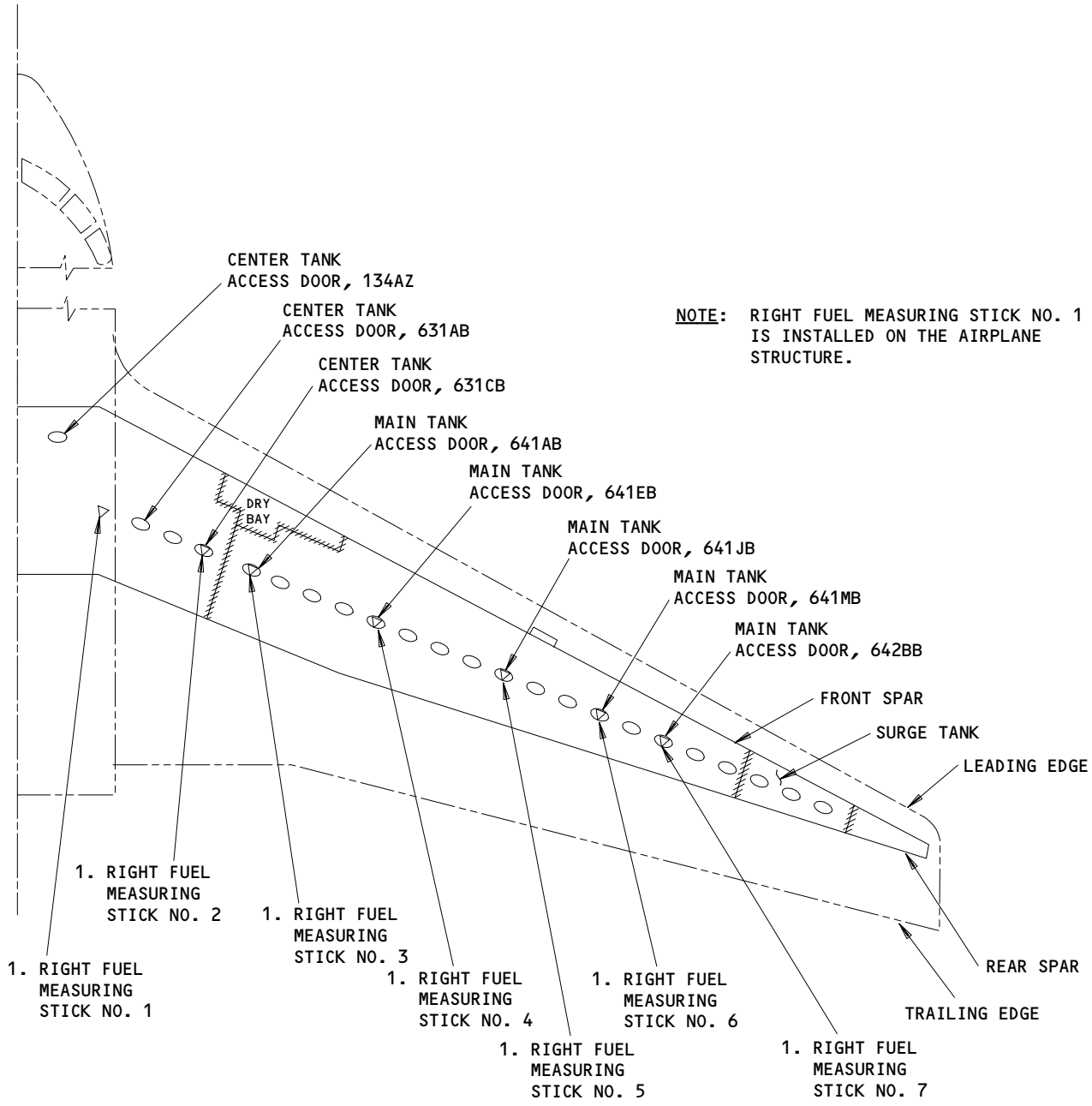
TASK 28-44-01-004-001

2. Remove the Fuel Measuring Stick
   A. Access
      (1) Location Zones
         133 Wing Center Section (Left)
         134 Wing Center Section (Right)
         531 Center Wing Tank (Left)
         541 Main Tank - Rib No. 5 to No. 17 (Left)
         542 Main Tank - Rib No. 17 to No. 21 (Left)
         631 Center Wing Tank (Right)
         641 Main Tank - Rib No. 5 to No. 17 (Right)
         642 Main Tank - Rib No. 17 to No. 21 (Right)



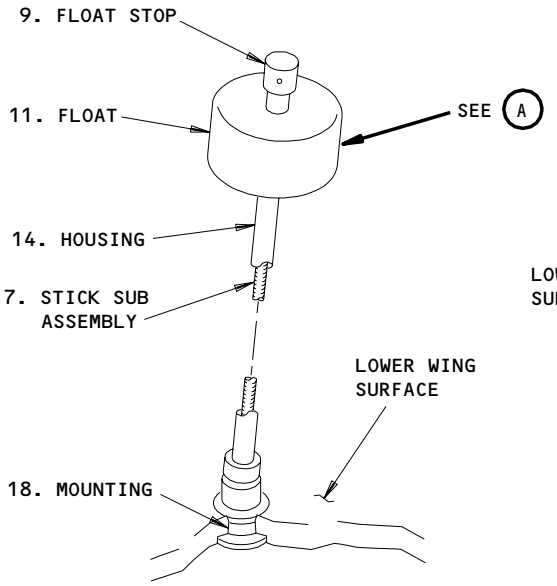
LEFT WING

Fuel Measuring Stick Locations
Figure 401 (Sheet 1)

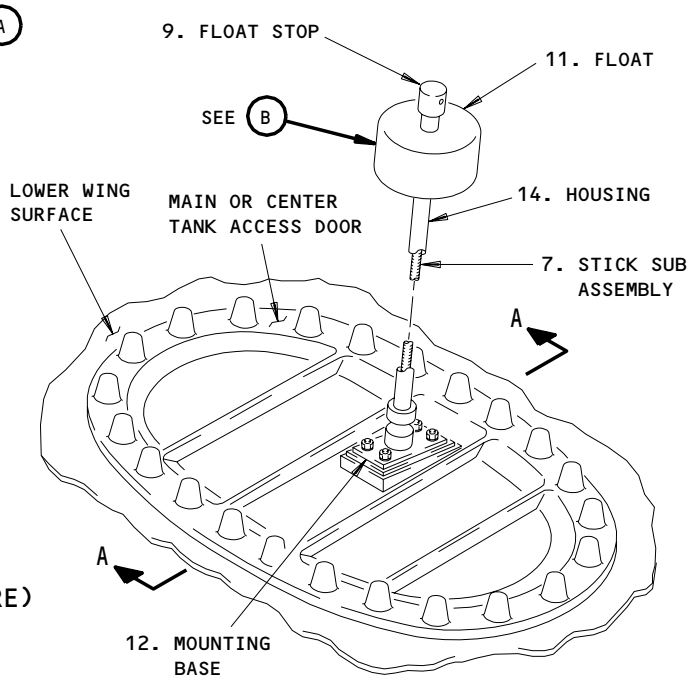


RIGHT WING

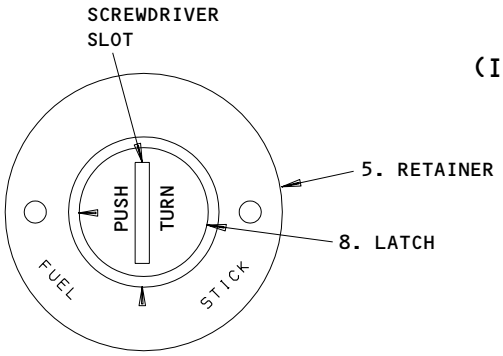
Fuel Measuring Stick Locations
Figure 401 (Sheet 2)



LEFT OR RIGHT
FUEL MEASURING STICK NO. 1
(INSTALLED ON THE AIRPLANE STRUCTURE)

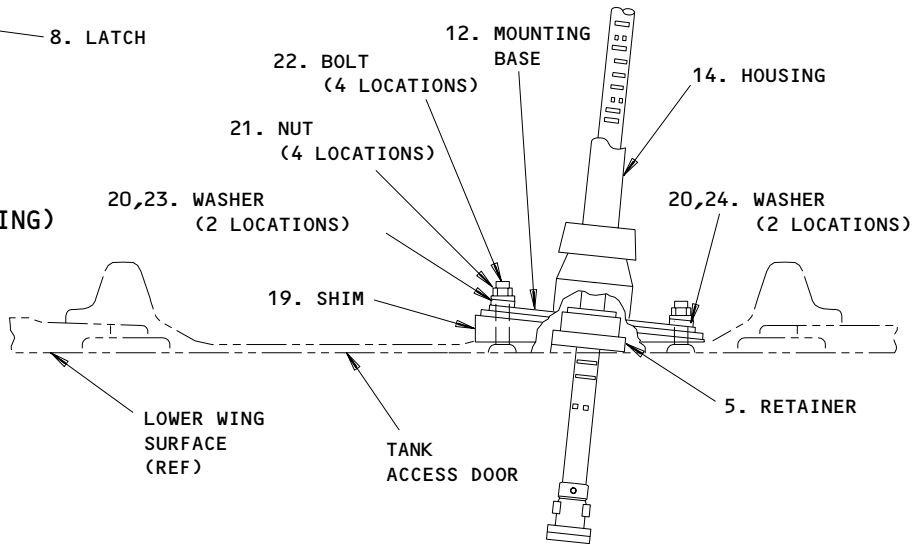


LEFT OR RIGHT
FUEL MEASURING STICK NO. 2,3,4,5,6,7
(INSTALLED ON THE MAIN OR CENTER TANK ACCESS DOOR)



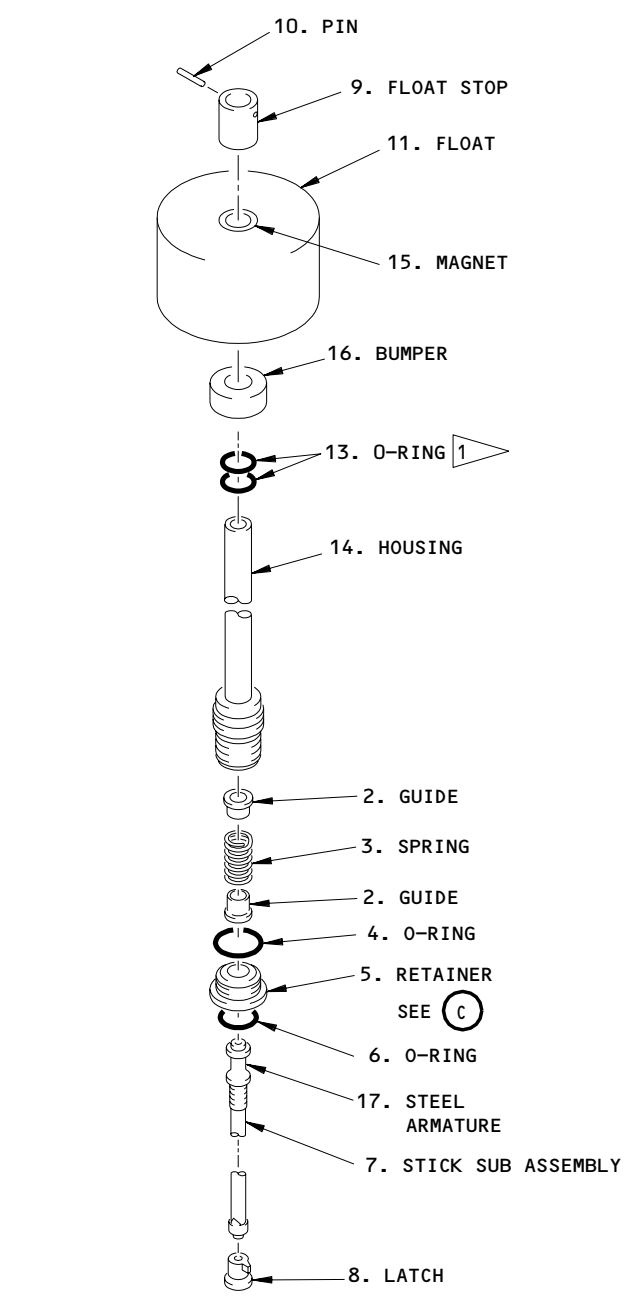
RETAINER
(VIEW FROM BELOW THE WING)

C



A-A

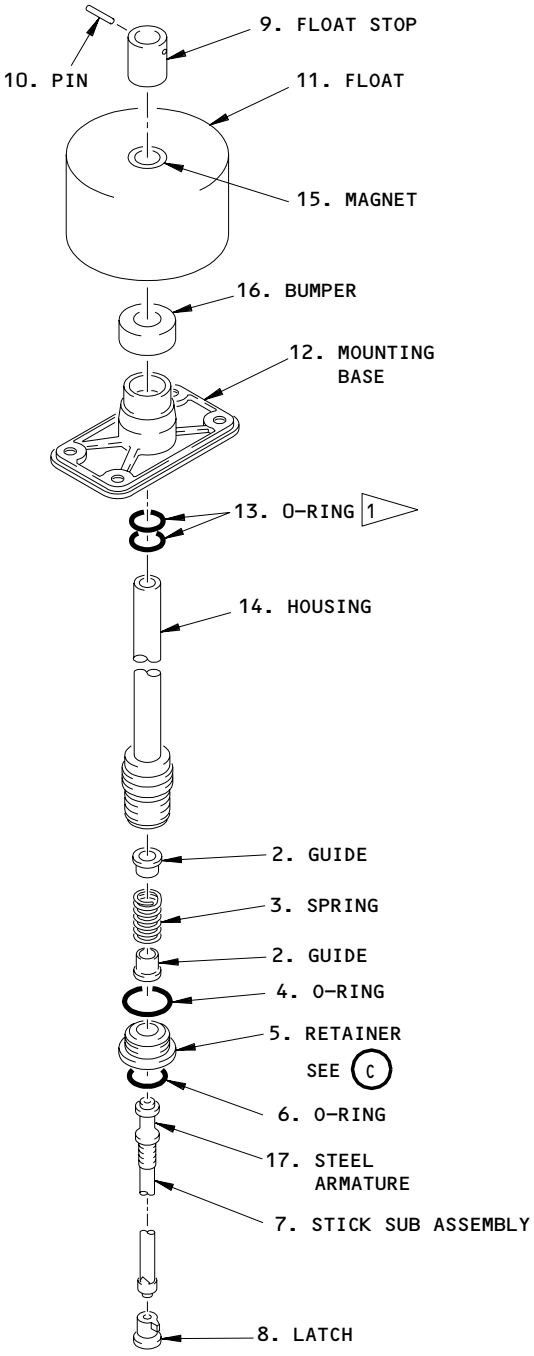
Fuel Measuring Stick Installation
Figure 402 (Sheet 1)



LEFT OR RIGHT
FUEL MEASURING STICK NO. 1

A

1 ONLY ONE O-RING IS INSTALLED IN THIS LOCATION ON FUEL MEASURING STICKS MADE AFTER OCTOBER, 1990.



LEFT OR RIGHT
FUEL MEASURING STICK NO. 2,3,4,5,6,7

B

Fuel Measuring Stick Installation
Figure 402 (Sheet 2)

(2) Access Panels

531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

B. Procedure

S 014-027

(1) Get access to the applicable fuel measuring stick (1) (Fig. 401).

S 034-083

(2) Use snap ring pliers and remove the retainer (5) from the mounting base (12) or the mounting (18) (Fig. 402).

S 024-002

(3) Pull the stick sub assembly (7) from the housing (14) with the retainer (5), spring (3), and two guides (2).

NOTE: You can feel a small force as the steel armature (17) on the stick sub assembly (7) goes through the magnet (15) in the float (11).

S 034-003

(4) Remove the latch (8) from the stick sub assembly (7).
(a) Keep the latch (8) for installation of the fuel measuring stick.

TASK 28-44-01-404-004

3. Install the Fuel Measuring Stick

A. Equipment

(1) T5-0497K - spanner wrench, to install the retainer in the housing - Kaiser Electroprecision, 17000 South Red Hill Avenue, Irvine, CA 92714

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	L Fuel Measuring Stick No. 1	28-44-01	02	85
		L Fuel Measuring Stick No. 2			80
		L Fuel Measuring Stick No. 3			75
		L Fuel Measuring Stick No. 4			70
		L Fuel Measuring Stick No. 5			65
		L Fuel Measuring Stick No. 6			60
		L Fuel Measuring Stick No. 7			90
		R Fuel Measuring Stick No. 1			85
		R Fuel Measuring Stick No. 2			80
		R Fuel Measuring Stick No. 3			75
		R Fuel Measuring Stick No. 4			70
		R Fuel Measuring Stick No. 5			65
		R Fuel Measuring Stick No. 6			60
		R Fuel Measuring Stick No. 7			90
	2	Guide			110
	3	Spring			115
	4	O-ring			125
	5	Retainer			135
	6	O-ring			120
	7	Stick Sub Assembly			140
	7	Stick Sub Assembly			141
	8	Latch			130

C. Access

(1) Location Zones

133 Wing Center Section (Left)
134 Wing Center Section (Right)
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

D. Procedure

S 434-005

(1) Install the new O-rings (4, 6) on the retainer (5) (Fig. 402).

S 424-006

(2) With the latch (8) of the stick sub assembly (7) removed, install the stick sub assembly (7) in the housing (14).

S 434-007

(3) Install the guide (2), spring (3), guide (2), and retainer (5) in the housing (14).

S 434-008

(4) Tighten the retainer (5) in the housing (14) to 75-85 pound-inches.

S 434-009

(5) Lower the stick sub assembly (7), and install the latch (8) on the stick sub assembly (7).

S 424-010

(6) Push the stick sub assembly (7) into the housing (14).

S 424-029

(7) Turn the screwdriver slot on the latch (8) in the clockwise direction to lock the fuel measuring stick (1) into position (View C, Fig. 402).

TASK 28-44-01-004-026

4. Remove the Housing of the Fuel Measuring Stick

A. References

(1) AMM 28-11-00/201, Fuel Tanks

(2) AMM 28-11-01/401, Main Tank Access Door

(3) AMM 28-11-02/401, Center Tank Access Door
(4) AMM 28-26-00/201, Defueling

B. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

531AB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

C. Procedure

S 654-024
(1) Defuel the applicable fuel tank (AMM 28-26-00/201).

S 014-011

(2) Remove the main or center tank access door shown for the applicable fuel measuring stick (Fig. 401).

FUEL MEASURING STICK	MAIN OR CENTER TANK ACCESS DOOR	REFERENCE PROCEDURE
L Fuel Measuring Stick No. 1	531AB	28-11-02
L Fuel Measuring Stick No. 2	531CB	28-11-02
L Fuel Measuring Stick No. 3	541AB	28-11-01
L Fuel Measuring Stick No. 4	541EB	28-11-01
L Fuel Measuring Stick No. 5	541JB	28-11-01
L Fuel Measuring Stick No. 6	541MB	28-11-01
L Fuel Measuring Stick No. 7	542BB	28-11-01
R Fuel Measuring Stick No. 1	631AB	28-11-02
R Fuel Measuring Stick No. 2	631CB	28-11-02
R Fuel Measuring Stick No. 3	641AB	28-11-01
R Fuel Measuring Stick No. 4	641EB	28-11-01
R Fuel Measuring Stick No. 5	641JB	28-11-01
R Fuel Measuring Stick No. 6	641MB	28-11-01
R Fuel Measuring Stick No. 7	642BB	28-11-01

S 944-025

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS COULD CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) To remove the housing (14) of the fuel measuring stick No. 1, obey the fuel tank entry precautions (AMM 28-11-00/201).

S 034-012
(4) Remove the stick sub assembly (7) from the housing (14) per the Remove the Fuel Measuring Stick procedure.

S 034-013
(5) Remove the pin (10) that holds the float stop (9) to the housing (14) (Fig. 402).

S 034-014
(6) Remove the float stop (9) and the float (11) from the housing (14).

S 024-015
(7) Use a 9/16 inch hex-head wrench and remove the housing (14) from the mounting base (12) or the mounting (18).

TASK 28-44-01-404-016

5. Install the Housing of the Fuel Measuring Stick

A. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	9	Float Stop	28-44-01	02	155
	10	Pin			175
	11	Float			160
	12	Mounting Base			145
	13	O-ring			170
	14	Housing			180
	14	Housing			185

B. Consumable Materials
(1) D00421 - Grease MIL-S-8660

C. References
(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 28-11-00/201, Fuel Tanks
(3) AMM 28-11-01/401, Main Tank Access Door
(4) AMM 28-11-02/401, Center Tank Access Door

D. Access

(1) Location Zones

133	Wing Center Section (Left)
134	Wing Center Section (Right)
531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

531AB	Center Tank Access Door (Left)
531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631AB	Center Tank Access Door (Right)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

E. Procedure

S 434-017

(1) Install two new O-rings (13) on the housing (14) (Fig. 402).

NOTE: Only one O-ring is installed in this location on fuel measuring sticks made after October, 1990.

(a) Apply a thin layer of MIL-S-8660 grease to the end fitting of the tube assembly where it will touch the O-ring.

S 424-019

(2) To install the housing (14) for the fuel measuring stick No. 1, do the steps that follow:

(a) Put the housing (14) through the mounting (18) from out of the center fuel tank.

(b) Tighten the internal hex head on the housing (14) to 55-60 pound-inches.

WARNING: OBEY THE FUEL TANK ENTRY PRECAUTIONS. FAILURE TO OBEY THE FUEL TANK ENTRY PRECAUTIONS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(c) Obey the fuel tank entry precautions (AMM 28-11-00/201).

(d) Install the float (11) and the float stop (9) on the housing (14).
(e) Install the pin (10) through the float stop (9) and the housing (14).
(f) Make sure the float (11) moves freely on the housing (14).

S 424-021
(3) To install the housing (14) for the fuel measuring stick No. 2 thru No. 7, do the steps that follow:
(a) Install the lower end of the housing (14) through the mounting base (12) on the main or center tank access door.
(b) Tighten the internal hex head on the housing (14) to 55-60 pound-inches.
(c) Install the float (11) and the float stop (9) on the housing (14).
(d) Install the pin (10) through the float stop (9) and the housing (14).
(e) Make sure the float (11) moves freely on the housing (14).

S 434-022
(4) Install the stick sub assembly (7) in the housing (14) per the Install the Fuel Measuring Stick procedure.

S 414-023

(5) Install the main or center tank access door shown for the applicable fuel measuring stick (Fig. 401).

FUEL MEASURING STICK	MAIN OR CENTER TANK ACCESS DOOR	REFERENCE PROCEDURE
L Fuel Measuring Stick No. 1	531AB	28-11-02
L Fuel Measuring Stick No. 2	531CB	28-11-02
L Fuel Measuring Stick No. 3	541AB	28-11-01
L Fuel Measuring Stick No. 4	541EB	28-11-01
L Fuel Measuring Stick No. 5	541JB	28-11-01
L Fuel Measuring Stick No. 6	541MB	28-11-01
L Fuel Measuring Stick No. 7	542BB	28-11-01
R Fuel Measuring Stick No. 1	631AB	28-11-02
R Fuel Measuring Stick No. 2	631CB	28-11-02
R Fuel Measuring Stick No. 3	641AB	28-11-01
R Fuel Measuring Stick No. 4	641EB	28-11-01
R Fuel Measuring Stick No. 5	641JB	28-11-01
R Fuel Measuring Stick No. 6	641MB	28-11-01
R Fuel Measuring Stick No. 7	642BB	28-11-01

TASK 28-44-01-004-027

6. For Fuel Measuring Sticks No. 2 thru No. 7,
Remove the Mounting Base of the Fuel Measuring Stick

A. Access

(1) Location Zones

531	Center Wing Tank (Left)
541	Main Tank - Rib No. 5 to No. 17 (Left)
542	Main Tank - Rib No. 17 to No. 21 (Left)
631	Center Wing Tank (Right)
641	Main Tank - Rib No. 5 to No. 17 (Right)
642	Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

B. Procedure - Remove the Mounting Base for the Fuel Measuring Sticks No. 4 thru No. 7.

S 034-084

(1) Remove the applicable fuel measuring stick (1) per the Remove the Fuel Measuring Stick procedure.

S 034-029

(2) Remove the applicable housing (14) of the fuel measuring stick per the Remove the Housing of the Fuel Measuring Stick procedure.

S 034-030

(3) Remove the nuts (21), washers (20), bolts (22) and shim (19) that attach the mounting base (12) to the tank access door (View A-A, Fig. 402).

S 024-031

(4) Remove the mounting base (12) from the tank access door.

S 034-044

(5) Remove the applicable fuel measuring stick (1) per the Remove the Fuel Measuring Stick procedure.

C. Procedure - Remove the Mounting Base for the Fuel Measuring Sticks No. 2 and No. 3.

S 034-045

(1) Remove the applicable housing (14) of the fuel measuring stick per the Remove the Housing of the Fuel Measuring Stick procedure.

S 034-046

(2) Remove the nuts (21), washers (23, 24), bolts (22) and shim (19) that attach the mounting base (12) to the tank access door (View A-A, Fig. 402).

NOTE: Look at the position of the shim (19).

S 024-048

(3) Remove the mounting base (12) from the tank access door.

S 034-049

(4) Remove the fay seal from the shim (19), washers (23, 24) and mounting base (12).

TASK 28-44-01-404-033

7. For Fuel Measuring Sticks No. 2 thru No. 7, Install the Mounting Base of the Fuel Measuring Stick

A. Consumable Materials

(1) A00767 Sealant - BMS 5-45 Class A-2

B. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	L Fuel Measuring Stick No. 1	28-44-01	02	85
		L Fuel Measuring Stick No. 2			80
		L Fuel Measuring Stick No. 3			75
		L Fuel Measuring Stick No. 4			70
		L Fuel Measuring Stick No. 5			65
		L Fuel Measuring Stick No. 6			60
		L Fuel Measuring Stick No. 7			90
		R Fuel Measuring Stick No. 1			85
		R Fuel Measuring Stick No. 2			80
		R Fuel Measuring Stick No. 3			75
		R Fuel Measuring Stick No. 4			70
		R Fuel Measuring Stick No. 5			65
		R Fuel Measuring Stick No. 6			60
		R Fuel Measuring Stick No. 7			90
	14	Housing			180
					185
	19	Shim			45
					50
					55
	20	Washer			20
	21	Nut			35
					40
	22	Bolt			5
					10
					15
	23	Washer			25
	24	Washer			30

C. References
(1) AMM 20-10-21/601, Electrical Bonding
(2) AMM 28-11-00/801, Fuel Tanks

D. Access
(1) Location Zones
531 Center Wing Tank (Left)
541 Main Tank - Rib No. 5 to No. 17 (Left)
542 Main Tank - Rib No. 17 to No. 21 (Left)
631 Center Wing Tank (Right)
641 Main Tank - Rib No. 5 to No. 17 (Right)
642 Main Tank - Rib No. 17 to No. 21 (Right)

(2) Access Panels

531CB	Center Tank Access Door (Left)
541AB	Main Tank Access Door (Left)
541EB	Main Tank Access Door (Left)
541JB	Main Tank Access Door (Left)
541MB	Main Tank Access Door (Left)
542BB	Main Tank Access Door (Left)
631CB	Center Tank Access Door (Right)
641AB	Main Tank Access Door (Right)
641EB	Main Tank Access Door (Right)
641JB	Main Tank Access Door (Right)
641MB	Main Tank Access Door (Right)
642BB	Main Tank Access Door (Right)

E. Procedure - Install the Mounting Base for the Fuel Measuring Sticks No. 4 thru No. 7.

S 434-050
(1) Install the shim (19) on the tank access door (View A-A, Fig. 402).

S 424-051
(2) Install the mounting base (12) on the shim (19).

S 434-052
(3) Install the bolts (22), washers (20) and nuts (21) to attach the mounting base (12).

S 224-053
(4) Make sure the bonding resistance between the mounting base (12) and the tank access door is not more than 0.01 ohms (Ref 20-10-21).

S 394-054
(5) Apply a fillet seal on the bolts (22), nuts (21), washers (20), shim (19) and mounting base (12) per the Repair of Sealant Leaks in the Fuel Tank paragraph (Ref 28-11-00).

S 434-055
(6) Install the housing (14) on the tank access door per the Install the Housing of the Fuel Measuring Stick procedure.

S 434-056
(7) Install the fuel measuring stick (1) per the Install the Fuel Measuring Stick procedure.

F. Procedure - Install the Mounting Base for the Fuel Measuring Sticks No. 2 thru No. 3.

S 394-034
(1) Apply a fay seal where the shim (19) will touch the tank access door per the Repair of Sealant Leaks in the Fuel Tank paragraph (AMM 28-11-00/801).

S 434-035
(2) Install the shim (19) on the tank access door (View A-A, Fig. 402).

S 394-036
(3) Apply a fay seal on the top of the shim (19) per the Repair of Sealant Leaks in the Fuel Tank paragraph (AMM 28-11-00/801).

S 424-037
(4) Install the mounting base (12) on the shim (19).

S 394-038
(5) Remove all excess sealant from the bolt holes on the mounting base (12).

S 434-057
(6) Install the bolts (22) on the mounting base (12).

NOTE: Make sure the bolts (22) are installed vertically.

S 434-058
(7) Install the washers (24) on the bolts (22) that are on the lower edge of the slope of the shim (19).

S 434-059
(8) Install the washers (23) on the bolts (22) that are on the higher edge of the slope of the shim (19).

S 214-060
(9) Make sure the notches on the washers (23, 24) point, at a right angle, to the longer side of the mounting base (12) with the slope in the down direction.

S 434-039
(10) Install the nuts (21) to attach the mounting base (12).

S 224-040
(11) Make sure the bonding resistance between the mounting base (12) and the tank access door is not more than 0.0005 ohms (AMM 20-10-21/601).

S 394-041
(12) Apply a fillet seal on the bolts (22), nuts (21), washers (23, 24), shim (19) and mounting base (12) per the Repair of Sealant Leaks in the Fuel Tank paragraph (AMM 28-11-00/801).

S 434-042
(13) Install the housing (14) on the tank access door per the Install the Housing of the Fuel Measuring Stick procedure.

S 434-043

(14) Install the fuel measuring stick (1) per the Install the Fuel Measuring Stick procedure.