



# MAINTENANCE MANUAL

TEMPORARY REVISION NR. DFW 28-06

INSERT COVER PAGE OF THIS TR IN FRONT OF CHAPTER 28

REASON FOR CHANGE: SFAR88 and AD note 2008-04-11

INSTRUCTION: Insert the chapters of this TR following the original chapters:

CHAPTER OF THIS TR	ORIGINAL CHAPTER
28-1-6	28-1-0
28-1-71	28-1-51
28-6-1	28-6-1
28-7-11	28-7-11
28-21-21	28-21-21
28-7-71	28-7-71
28-7-81	28-7-81
28-7-21	28-7-21
28-7-31	28-7-31
28-22-12	28-22-12
28-22-0	28-22-0
28-41-0	28-41-0
28-99	28-41-21

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**NOTE:** The insertion of this TR has to be listed in the Record of Temporary Revisions at the beginning of Volume 1.

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**28-00-00**

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## MAINTENANCE MANUAL

### OVERWING FILL PORT - INSPECTION/CHECK

#### 1. General

- A. There are seven overwing fill ports, one for each fuel tank. This procedure contains instructions to do a bonding resistance check for each overwing fill port.

#### 2. Overwing Fill Port - Bonding Resistance Check

##### A. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH
- (2) Maintenance mats, commercially available

##### B. Consumable Materials

- (1) Sealant - BMS 5-26 Type II Class B
- (2) Alodine 600 - Type II Class D

##### C. Procedure

- (1) Defuel all the fuel tanks (AMM 28-0/201).
- (2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201).
- (3) Get access to the outside of the overwing fill ports (Figure 1).

**CAUTION** PUT MAINTENANCE MATS ON THE WING SURFACES WHERE MAINTENANCE PERSONS WORK. DAMAGE TO THE WING SURFACES CAN OCCUR.

**NOTE:** Do the bonding resistance inspection for one fuel tank and then repeat the inspection for the other fuel tanks.

- (4) Measure the electrical bonding resistance from the filler cap adapter to the wing upper skin for each overwing fill port (SWPM 20-20-00).
  - (a) If the resistance is less than 5 milliohm, do these steps:
    - 1) Remove the fuel tank access panel nearest to the applicable overwing fill port.
    - 2) Purge and go into the fuel tank (AMM 28-0/201).
    - 3) Get access to the overwing fill port in the fuel tank.
      - a) Clean the surfaces around the joint between the skin doubler and the retainer nut in the tank with solvent (SOPM 20-30-03).
      - b) If it is not applied, apply a fillet seal, BMS 5-26 Type II Class B, around the joint between the skin doubler and upper wing skin (SOPM 20-50-19).
      - c) If it is not applied, apply a fillet seal, BMS 5-26 Type II Class B, around the joint between the retainer nut and skin doubler (SOPM 20-50-19).



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- 4) Go out of the fuel tank and install the applicable fuel tank access panel (AMM 28-2-1/201).
- 5) Get access to the overwing fill port from outside of the fuel tank.
  - a) Clean the surfaces around the filler cap adapter and upper wing skin with solvent (SOPM 20-30-03).
  - b) If it is not applied, apply an aero smoother seal, BMS 5-26 Type II Class B, around the joint between the filler cap adapter and upper wing skin (SOPM 20-50-11).

(b) If the resistance is 5 milliohm or more, do these steps

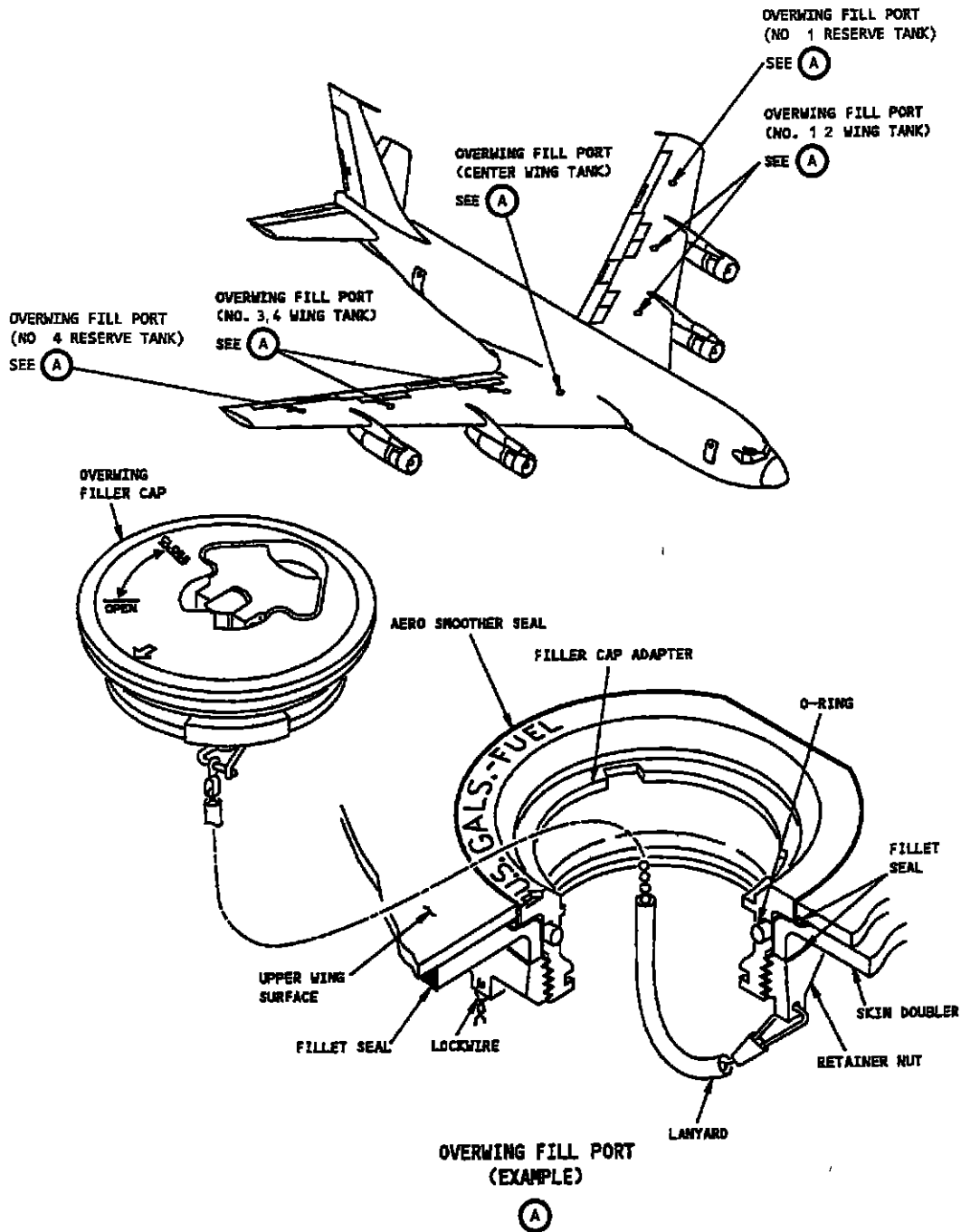
- 1) Remove the fuel tank access panel nearest to the applicable overwing fill port.
- 2) Purge and go into the fuel tank (AMM 28-0/201).
- 3) Have one person get access to the overwing fill port in the fuel tank and one person get access to the overwing fuel port from outside the fuel tank.
- 4) Disassemble the overwing filler cap, filler cap adapter and retainer nut.

NOTE: Do not remove the lanyard from the overwing filler cap.

- 5) Clean the surfaces of all the parts and the surface between the skin doubler with the retainer nut and filler cap adapter per cleaning procedure 3 (SWPM 20-30-00).
  - a) Clean the surface of the filler cap adapter where it touches the wing to remove contamination or anodization that can prevent a good electrical bond.
  - b) Clean the upper wing skin to remove any contamination or anodization that can prevent a good electrical bond.
- 6) Install the filler cap adapter and electrically bond (SOPM 20-11-03).
  - a) Install a new O-ring in the groove on the filler cap adapter and skin doubler.
  - b) Install the retainer nut with a spanner wrench and tighten to a torque of 30-40 foot-pounds (41-54 Nm).
  - c) Install lockwire between the lug on the retainer nut and the tab attached to the airplane structure.
- 7) Apply a chemical film coating, Alodine 600 Type II Class D, to all cleaned surfaces that are exposed after the overwing fill port is installed (SOPM 20-43-03).
- 8) Measure the resistance from the filler cap adapter to the upper wing skin.
  - a) Make sure the resistance is less than 0.5 milliohm.
- 9) Measure the resistance from the retainer nut to the filler cap adapter in the fuel tank.
  - a) Make sure the resistance is less than 10.0 milliohm.

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- 10) Measure the resistance from the retainer nut to the skin doubler in the fuel tank.
    - a) Make sure the resistance is less than 10.0 milliohm.
  - 11) From inside the fuel tank, apply these fillet seals with BMS 5-26 Type II Class B sealant (SOPM 20-50-19).
    - a) Around the joint between the skin doubler and the upper wing skin.
    - b) Around the joint between the filler cap adapter and skin doubler.
    - c) Around the joint between the retainer nut and filler cap adapter and the retainer nut and skin doubler.
    - d) To the lockwire between the lug on the retainer nut and the tab attached to the airplane structure.
  - 12) Go out of the fuel tank and install the applicable fuel tank access panel (AMM 28-2-1/201).
  - 13) From outside of the fuel tank, apply an aero smoother seal, BMS 5-26 Type II Class B, around the joint between the filler cap adapter and the upper wing skin (SOPM 20-50-11).
  - 14) Remove all unwanted material from where the fay surfaces were applied.
- (5) Refuel all the fuel tanks (AMM 12-1-41/201).
  - (6) Make sure there are no fuel leaks (AMM 28-2-0/101).
  - (7) Put the airplane back to a serviceable condition.



Overwing Fill Port  
Figure 1



## MAINTENANCE MANUAL

### ELECTRICAL BONDING JUMPER - INSPECTION/CHECK

#### 1. General

- A. This task contains visual and mechanical inspections of the electrical bonding jumpers in the fuel system.
- B. 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.
- C. When you inspect the bonding jumpers you may see black or brown deposits on the wire braid. This can occur when there is a 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 contains broken strands. If the bonding jumper has broken strands, then you must replace the bonding jumper.
- D. When you inspect the bonding jumpers, inspect for loose clamps and corrosion.

#### 2. Electrical Bonding Jumper Inspection

##### A. References

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

##### B. Procedure

- (1) Defuel all the fuel tanks (AMM 28-0/201).
- (2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201).
- (3) Gain access to the fuel tank.
- (4) Visually inspect the bonding jumper and clamp for color and deterioration.
- (5) If the bonding jumper is silver in color and is free from black or brown deposits, then the bonding jumper is satisfactory.
- (6) If the wire braid has black or brown deposits, then inspect the bonding jumper for broken strands.
  - (a) If the wire braid does not have broken strands, then the bonding jumper is satisfactory.
  - (b) If the wire braid has broken strands, then do this task: "Electrical Bonding Jumpers Replacement".
- (7) Try to turn the bonding jumper lugs and tube clamps, if applicable, with light finger pressure.
  - (a) If the bonding jumper is loose, rework the electrical bond path (SWPM 20-20-00).



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### 3. Electrical Bonding Jumpers Replacement

#### A. References

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

#### B. Procedure

- (1) Remove the bonding jumper.
  - (a) Keep all the parts necessary for the installation of the bonding jumper.
- (2) For the bonding jumpers used to bond electrical equipment, follow the applicable installation procedure in the AMM.
- (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.

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

### 4. 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 system 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.

#### A. References

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

#### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

#### C. Procedure

- (1) For bonding jumper hardware installations, do the resistance measurement for electrical integrity (SWPM 20-20-00).
  - (a) Measure the bonding resistance from each bonding jumper terminal to the adjacent tube.
  - (b) Make sure the probes of the bonding meter touch each conductive surface through any protective finish.
  - (c) Make sure the resistance from each terminal to the adjacent tube is less than 0.001 ohm (1 milliohm).



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**NOTE:** SWPM 20-20-00 requires that each metal-to-metal faying surface have a resistance of less than 0.0005 ohm (0.5 milliohm). Each jumper terminal normally has two faying surfaces in series in its conductive path. (The jumper terminal to the washer and the washer to the tube.)

- (2) For the fuel system tubing or components, do the subsequent steps:
  - (a) Measure the total resistance from the tubing or component, to the adjacent primary structure.
  - (b) Make sure the resistance is 0.010 ohm (10 milliohm) or less.

### 5. Return the Airplane to Its Usual Condition

#### A. Procedure

- (1) Refuel all the fuel tanks (AMM 12-1-41/201).
- (2) Make sure there are no fuel leaks (AMM 28-2-0/101).
- (3) Put the airplane back to a serviceable condition.



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## MAINTENANCE MANUAL

### FUEL TANK VENT FLOAT VALVES - INSPECTION/CHECK

1. General

A. This procedure contains instructions to do a bonding resistance check for each fuel tank vent float valve.

2. Fuel Tank Vent Float Valves - Bonding Resistance Check

A. References

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

B. Equipment

(1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

C. Procedure

(1) Defuel all the tanks (AMM 28-0/201).

(2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201).

(3) Get access to the applicable float valves (Figure 1) using access panels and openings given below:

FLOAT VALVES	FUEL TANK ACCESS PANELS	RIB ACCESS OPENINGS
Reserve Tanks No. 1 or 4	No. 22	--
Main Tanks No. 1 or 4	No. 14	
Main Tanks No. 2 or 3	No. 2	No. 9
Center Wing Tank	No. 1	No. 2

NOTE: Do the bonding resistance inspection for one tank and then repeat the inspection for the other tanks.

(4) Measure the electrical bonding resistance from the float valve mounting base to the tank vent duct (SWPM 20-20-00).

(a) Make sure the bonding resistance is 0.100 ohm (100 milliohm) or less.

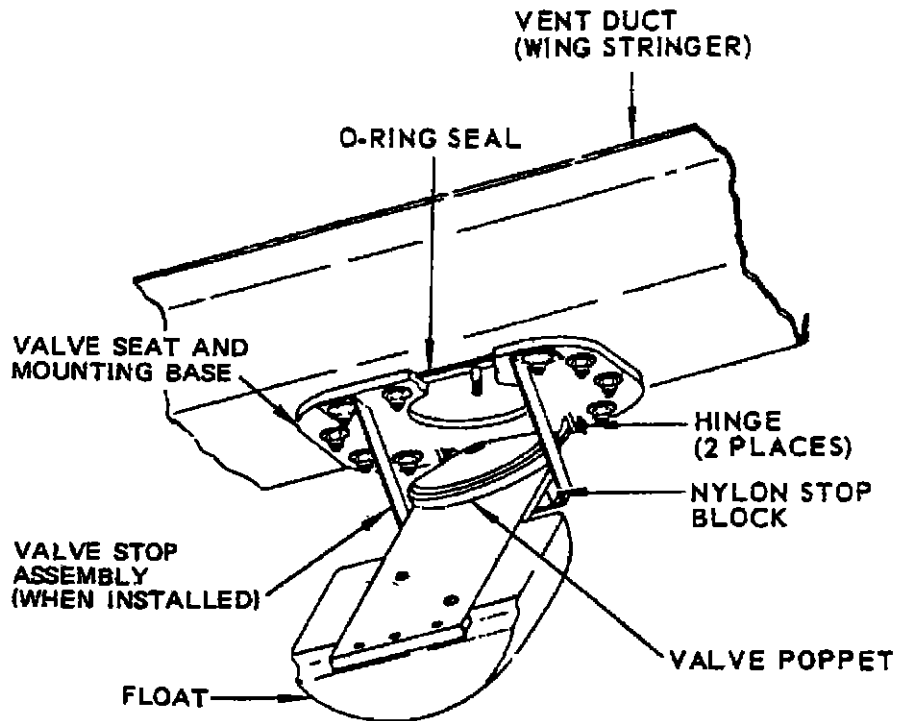
(5) Make sure the tank is clean.

(6) Install structural members at rib access openings if removed and install fuel tank access panels.

(7) Refuel all the fuel tanks (AMM 12-1-41/201).

(8) Make sure there are no fuel leaks (AMM 28-2-0/101).

(9) Put the airplane back to a serviceable condition.



Float Valve (Typical)  
Figure 1



# MAINTENANCE MANUAL

## ENGINE FUEL SHUTOFF VALVES - INSPECTION/CHECK

### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each engine fuel shutoff valve.

### 2. Engine Fuel Shutoff Valves - Bonding Resistance Check

#### A. References

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

#### B. Equipment

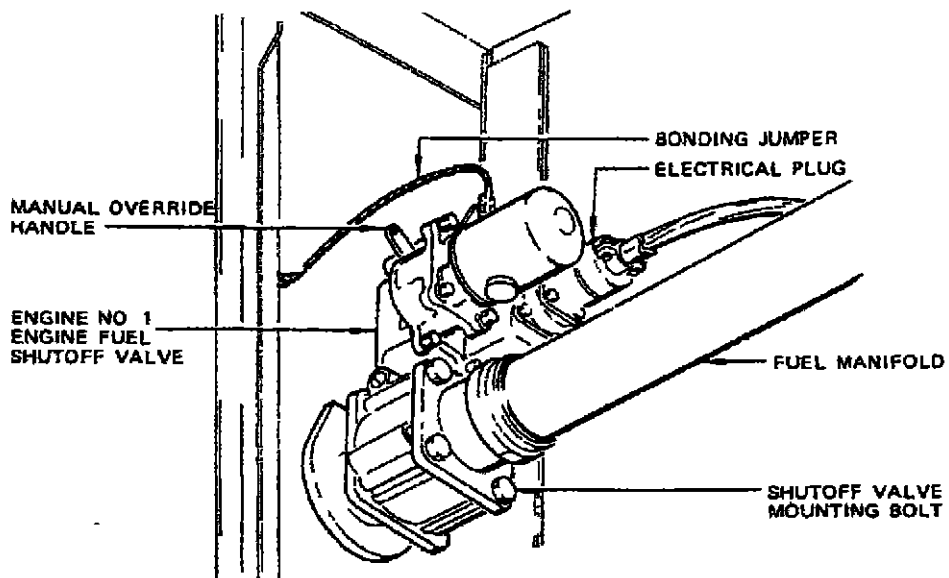
- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

#### C. Procedure

- (1) Get access to the engine fuel shutoff valves (Figure 1) in the locations given below:

ENGINE FUEL SHUTOFF VALVE	LOCATION
No. 1 and No. 4	Outboard Dry Bays
No. 2 and No. 3	Inboard Dry Bays

- (2) Measure the electrical bonding resistance between the bonding jumper terminal and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (3) Measure the electrical bonding resistance between the engine fuel shutoff valve housing and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (4) Put the airplane back to a serviceable condition.



Engine Fuel Shutoff Valve Installation - Outboard Dry Bay

Figure 1



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### FUELING RECEPTACLE - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each fueling receptacle.

#### 2. Fueling Receptacle - Bonding Resistance Check

##### A. References

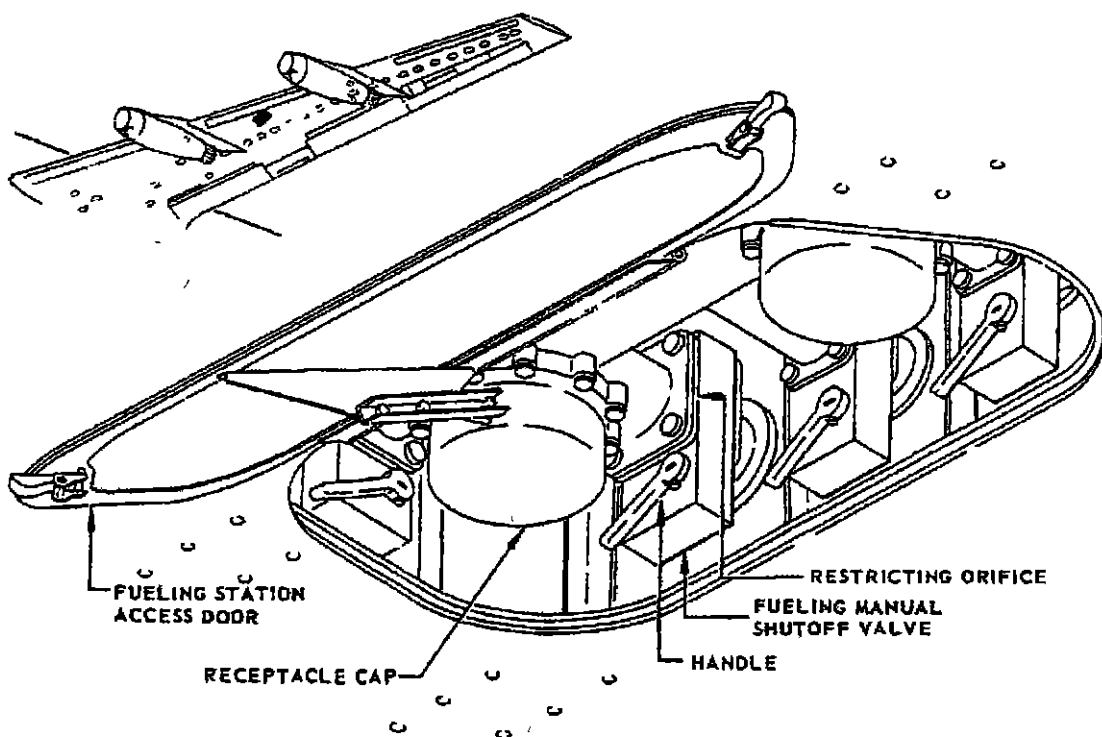
- (1) SWPM 20-20-00, Electrical Bonds and Grounds

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

##### C. Procedure

- (1) Open the applicable fueling station access door (Figure 1).
- (2) Measure the electrical bonding resistance between the fueling receptacle and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.010 ohm (10 milliohm) or less.
- (3) Close the fueling station access door.



Pressure Fueling Station  
Figure 1

## MAINTENANCE MANUAL

### FUEL BOOST PUMP - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each fuel boost pump.

#### 2. Fuel Boost Pump - Bonding Resistance Check

##### A. References

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

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH  
(2) Maintenance mats, commercially available

##### C. Procedure

- (1) Defuel all the fuel tanks (AMM 28-0/201).  
(2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201).  
(3) Gain access to the fuel tank.

**CAUTION** PUT MAINTENANCE MATS ON THE WING SURFACES WHERE MAINTENANCE PERSONS WORK. DAMAGE TO THE WING SURFACES CAN OCCUR.

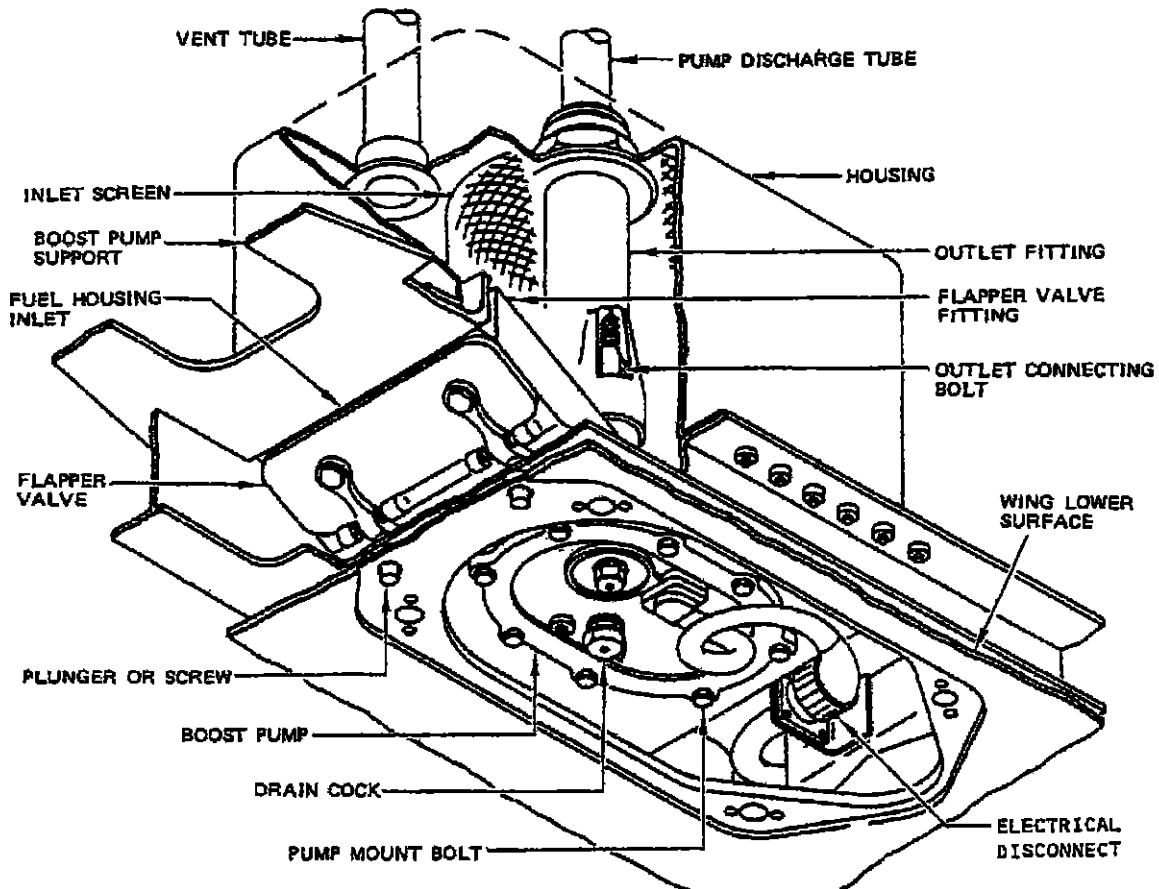
**NOTE:** Do the bonding resistance inspection for one fuel tank and then repeat the inspection for the other fuel tanks.

- (4) Get access to the fuel boost pump (Figure 1) from inside the fuel tank.
- (5) Measure the electrical bonding resistance between the fuel boost pump wire conduit and the structure (SWPM 20-20-00).  
(a) Make sure the resistance is 0.005 ohm (5 milliohm) or less.
- (6) Get access to the fuel boost pump from outside the fuel tank.
- (7) Measure the electrical bonding resistance between the fuel boost pump and the structure (SWPM 20-20-00).  
(a) Make sure the bonding resistance between the pump motor housing and structure is 0.0004 ohm (0.4 milliohm) or less.  
(b) Make sure the bonding resistance between the pump housing and structure is 0.0006 ohm (0.6 milliohm) or less.
- (8) Make sure the tank is clean.
- (9) Remove the maintenance mats.
- (10) Install structural members at rib access openings if removed and install fuel tank access panels.
- (11) Refuel all the fuel tanks (AMM 12-1-41/201).

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(12) Make sure there are no fuel leaks (AMM 28-2-0/101).

(13) Put the airplane back to a serviceable condition.



Fuel Boost Pump  
 Figure 1



## MAINTENANCE MANUAL

### FUEL BOOST OVERRIDE PUMP - INSPECTION/CHECKV

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each fuel boost override pump.

#### 2. Fuel Boost Override Pump - Bonding Resistance Check

##### A. References

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

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH  
(2) Maintenance mats, commercially available

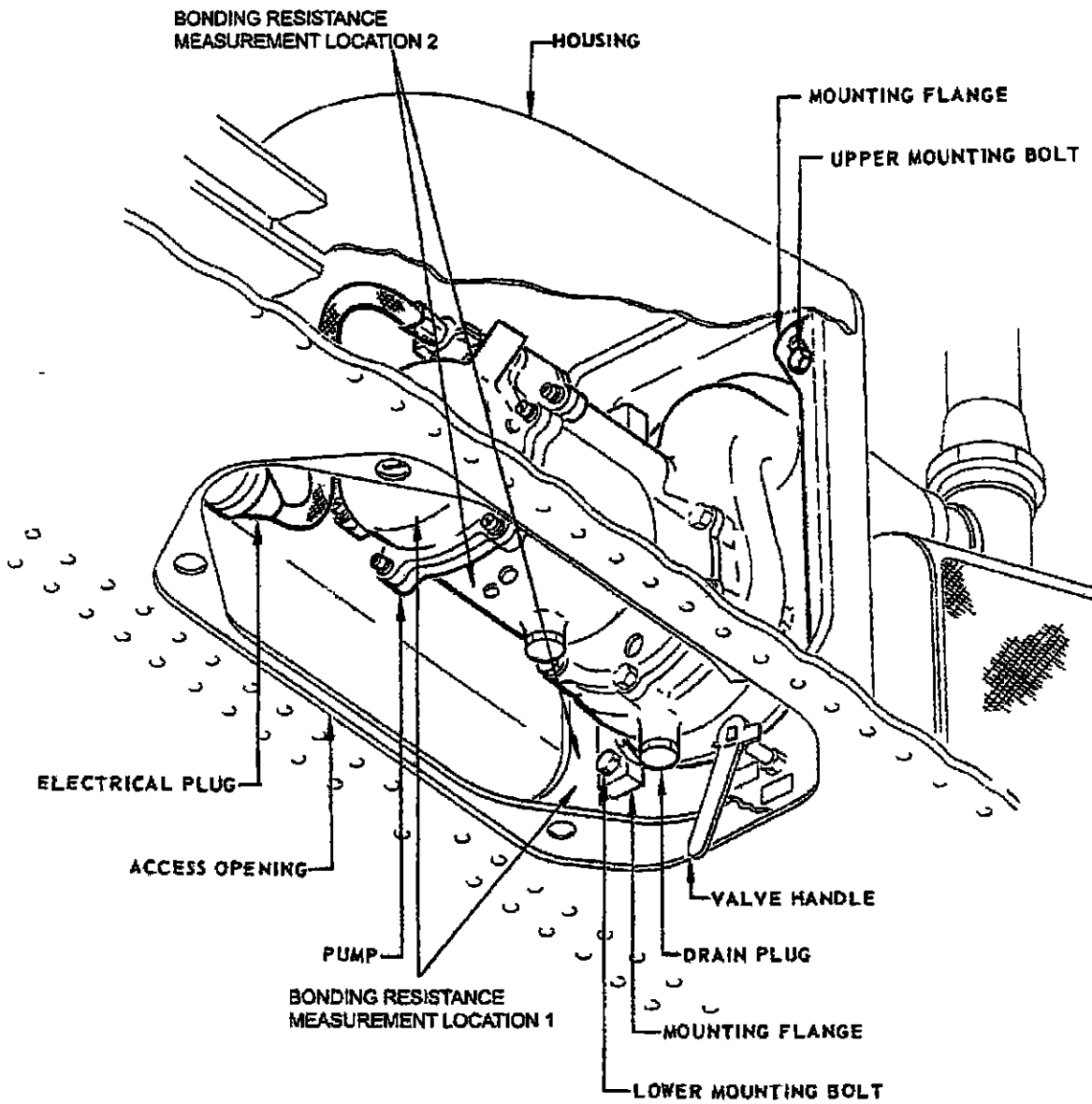
##### C. Procedure

- (1) Defuel all the fuel tanks (AMM 28-0/201).  
(2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201).  
(3) Gain access to the fuel tank.

**CAUTION** PUT MAINTENANCE MATS ON THE WING SURFACES WHERE MAINTENANCE PERSONS WORK. DAMAGE TO THE WING SURFACES CAN OCCUR.

**NOTE:** Do the bonding resistance inspection for one fuel tank and then repeat the inspection for the other fuel tanks.

- (4) Get access to the fuel boost override pump (Figure 1) from inside the fuel tank.
- (5) Measure the electrical bonding resistance between the fuel boost override pump wire conduit and the structure (SWPM 20-20-00).  
(a) Make sure the resistance is 0.005 ohm (5 milliohm) or less.
- (6) Get access to the fuel boost pump from outside the fuel tank.
- (7) Measure the electrical bonding resistance between the fuel boost override pump and the structure (SWPM 20-20-00).  
(a) Make sure the bonding resistance between the override pump motor housing and structure is 0.0004 ohm (0.4 milliohm) or less.  
(b) Make sure the bonding resistance between the override pump housing and structure is 0.0006 ohm (0.6 milliohm) or less.
- (8) Make sure the tank is clean.
- (9) Remove the maintenance mats.
- (10) Install structural members at rib access openings if removed and install fuel tank access panels.
- (11) Refuel all the fuel tanks (AMM 12-1-41/201).
- (12) Make sure there are no fuel leaks (AMM 28-2-0/101).
- (13) Put the airplane back to a serviceable condition.



Fuel Boost Override Pump  
Figure 1



## MAINTENANCE MANUAL

### ENGINE FUEL MANIFOLD VALVE - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each engine fuel manifold valve.

#### 2. Engine Fuel Manifold Valve - Bonding Resistance Check

##### A. References

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

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

##### C. Procedure

- (1) Get access to the engine fuel manifold valves in the inboard dry bays.
- (2) Measure the electrical bonding resistance between the bonding jumper terminal and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (3) Measure the electrical bonding resistance between the engine fuel manifold valve housing and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (4) Put the airplane back to a serviceable condition.



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## MAINTENANCE MANUAL

### RESERVE TANK TRANSFER VALVE - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each reserve tank transfer valve.

#### 2. Reserve Tank Transfer Valve - Bonding Resistance Check

##### A. References

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

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

##### C. Procedure

- (1) Get access to the reserve tank transfer valves found on the rear spar.
- (2) Measure the electrical bonding resistance between the bonding jumper terminal and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (3) Measure the electrical bonding resistance between the reserve tank transfer valve housing and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (4) Put the airplane back to a serviceable condition.

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## MAINTENANCE MANUAL

### FUEL DUMP VALVE - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each fuel dump valve. Access is gained by raising the inboard spoiler, lowering the flaps and lowering the inboard cove lip door on the applicable side of the airplane.

#### 2. Fuel Dump Valve - Bonding Resistance Check

##### A. References

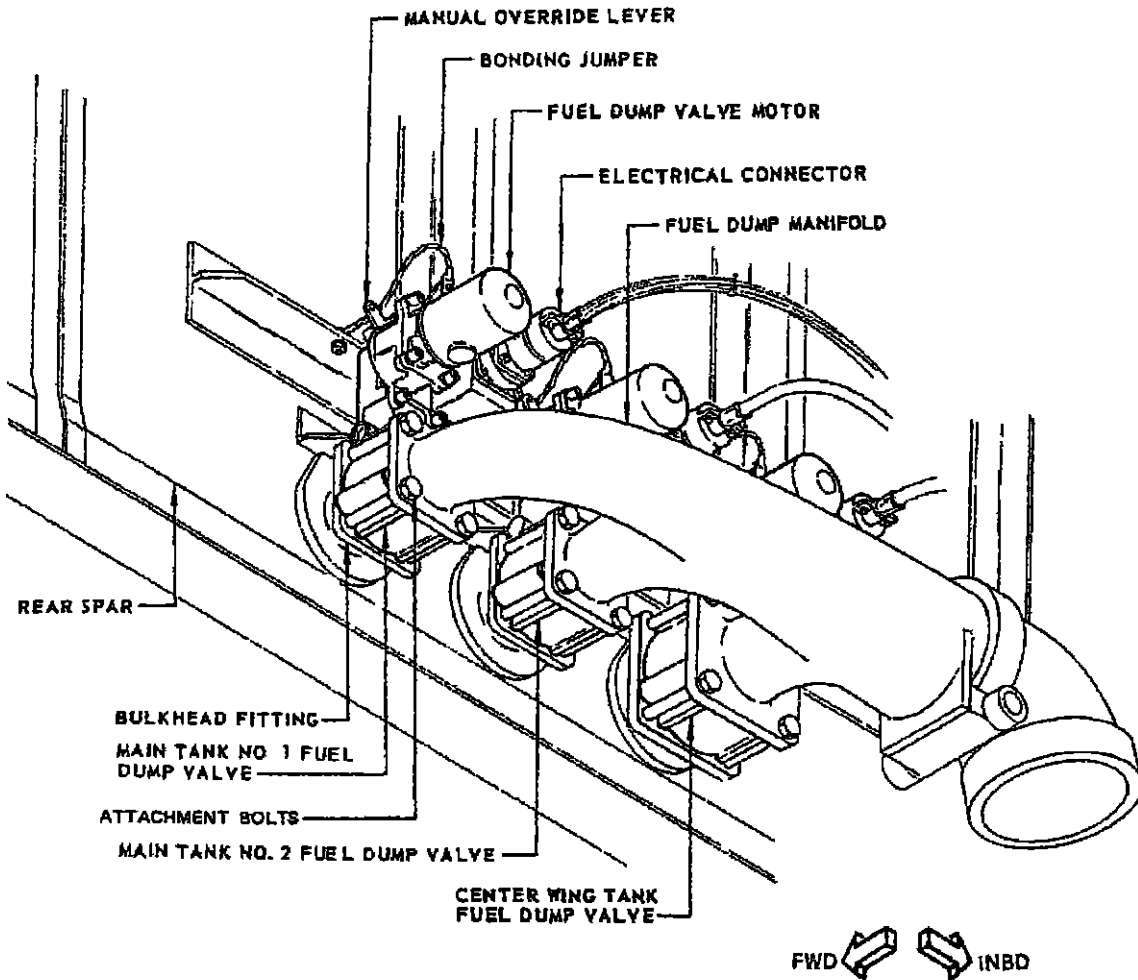
- (1) SWPM 20-20-00, Electrical Bonds and Grounds

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

##### C. Procedure

- (1) Get access to the fuel dump valves (Figure 1).
- (2) Measure the electrical bonding resistance between the bonding jumper terminal and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.005 ohm (5 milliohm) or less.
- (3) Measure the electrical bonding resistance between the fuel dump valve housing and the structure (SWPM 20-20-00).
- (a) Make sure the resistance is 0.002 ohm (2 milliohm) or less.
- (4) Put the airplane back to a serviceable condition.



Fuel Dump Chute Manifold and Valves  
 Figure 1



## MAINTENANCE MANUAL

### FUEL DUMP NOZZLE - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a bonding resistance check for each fuel dump nozzle. Access is gained by raising the inboard spoiler, lowering the flaps and lowering the inboard cover lip door on the applicable side of the airplane.

#### 2. Fuel Dump Nozzle - Bonding Resistance Check

##### A. References

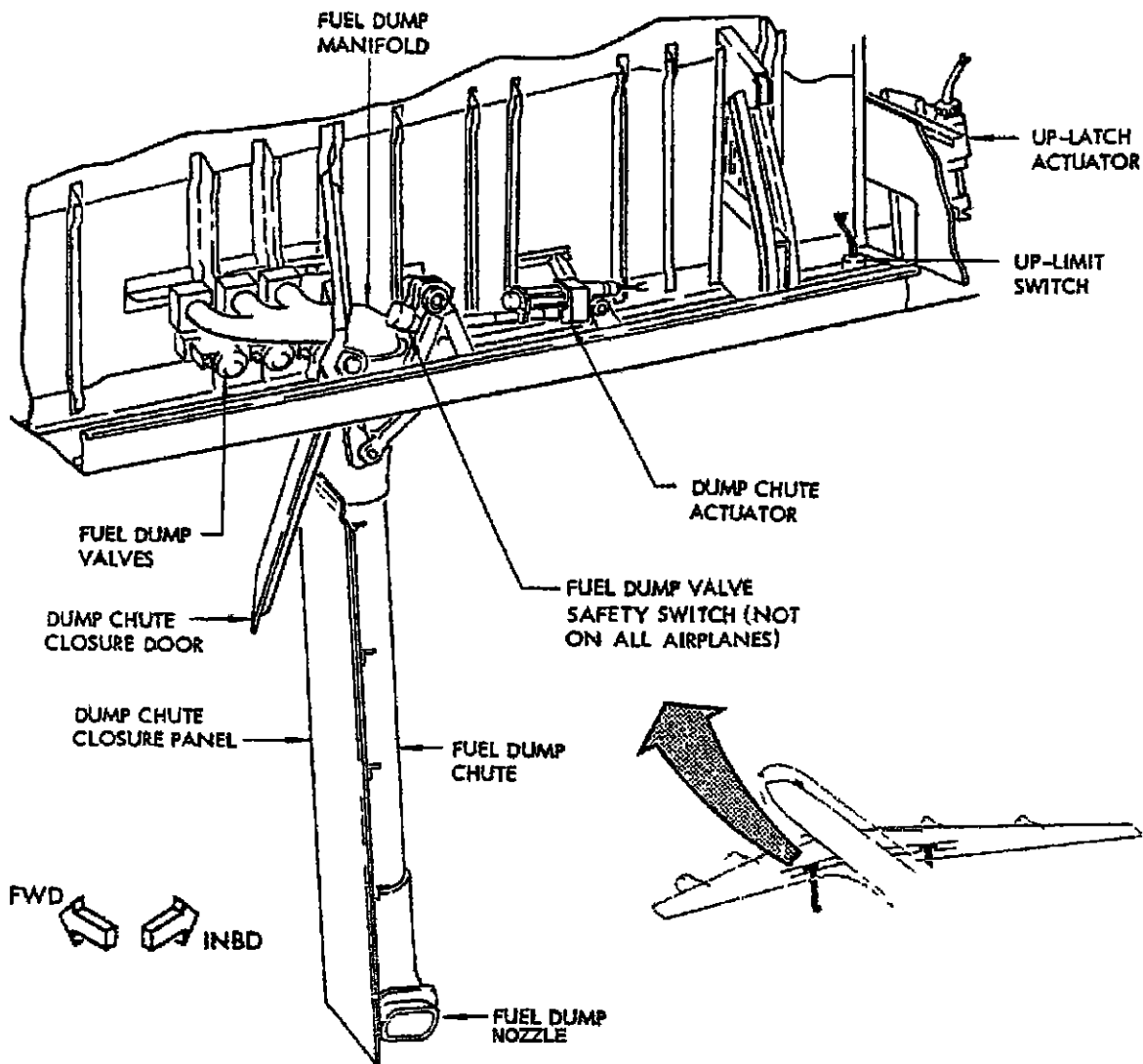
- (1) SWPM 20-20-00, Electrical Bonds and Grounds

##### B. Equipment

- (1) Bonding Meter, Model T477W, Avtron Manufacturing, Cleveland OH

##### C. Procedure

- (1) Extend the fuel dump chute to the down position.
- (2) Gain access to the fuel dump chute (Figure 1) by removing access panel No.1352.
- (3) Measure the electrical bonding resistance between the fuel dump nozzle and the structure.
- (a) Make sure the resistance is 0.005 ohm (5 milliohm) or less.
- (4) Install access panel No. 1352.
- (5) Put the airplane back to a serviceable condition.



Fuel Dump System Equipment Location  
 Figure 1



## MAINTENANCE MANUAL

### FUEL QUANTITY INDICATING SYSTEM - INSPECTION/CHECK

#### 1. General

- A. This procedure contains instructions to do a visual inspection of the fuel quantity indicating system.

#### 2. Fuel Quantity Indicating System - Inspection

##### A. References

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

##### B. Equipment

- (1) Maintenance mats, commercially available

##### C. Procedure

- (1) Defuel all the fuel tanks (AMM 28-0/201).
- (2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201).
- (3) Gain access to the fuel tank.
- (4) Visually inspect the in-tank FQIS wire harness for the following:
- (a) Abraded or cracked insulation.
  - (b) Broken, loose, or missing support clamps and bonding jumpers.
  - (c) Incorrectly routed wiring.
  - (d) Loose or bent connectors.
  - (e) Corrosion at wire terminals and connectors.
  - (f) Inspect electrical connectors and seals for damage, wear or fuel leakage.
- (5) Visually inspect the in-tank FQIS tank units and compensators for the following:
- (a) Missing end caps on the tank units or compensators.
  - (b) Tank units or compensators contacting structure.
  - (c) Loose or corroded mounting brackets and hardware.
  - (d) Bent terminals.
  - (e) Compensator flapper valve touching the compensator.
- (6) Make sure the fuel tank is clean.



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- (7) Install structural members at rib access openings if removed and install fuel tank access panels.
- (8) Refuel all the fuel tanks (AMM 12-1-41/201).
- (9) Make sure there are no fuel leaks (AMM 28-2-0/101)
- (10) Put the airplane back to a serviceable condition.



## MAINTENANCE MANUAL

### AIRWORTHINESS LIMITATION PRECAUTIONS - MAINTENANCE PRACTICES

#### 1. 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:

**NOTE:** CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 28-99/201), 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 the 707/720 Airworthiness Limitations document, D6-7552-AWL. 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 conditions 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 Limitations 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:

**NOTE:** ALI - Refer to the task: Airworthiness Limitation Precautions (AMM 28-99/201), 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 the 707/720 Airworthiness Limitations document, D6-7552-AWL. 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



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be changed or deleted without the approval of the FAA office that 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. Critical Design Configuration Control Limitations (CDCCLs)

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

**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 RISK OF A FUEL TANK IGNITION SOURCE.

### C. Airworthiness Limitation Instructions (ALIs)

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

**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



## MAINTENANCE MANUAL

TEMPORARY REVISION NR. DFW 28-08

INSERT COVER PAGE OF THIS TR IN FRONT OF CHAPTER 28

REASON FOR CHANGE: SFAR88 and AD note 2008-04-11

INSTRUCTION: Insert following pages of this TR in front of the original page:

CHAPTER	PAGE OF THIS TR	ORIGINAL PAGE
28-0	3, 4, 5, 6	203
28-7-0	7, 8	15
28-7-0	9, 10	201
28-7-111	11, 12	203

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NOTE: The insertion of this TR has to be listed in the Record of Temporary Revisions at the beginning of Volume 1.

TCA: LX-N20199

RTCA: LX-N19997, LX-N20000

**28-0-0**

TR-Nr. 28-08

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## MAINTENANCE MANUAL

### FUEL SYSTEM - MAINTENANCE PRACTICES

#### 1. Defueling

##### A. General

- (1) Defueling can be done from both sides (wings) of the airplane, simultaneously if desired. On turbofan airplanes, rapid partial defueling can be accomplished through the pressure fueling receptacles by suction from fuel truck defueling pump.
- (2) Complete defueling can be accomplished through the defueling valves in one of the two ways - under pressure from the boost or override pumps in the tank to be defueled, or by suction from fuel truck defueling pump. The most rapid means for defueling is, however, when the two methods are combined. Suction defueling alone through the defueling valves is extremely slow and should only be used as a last resort.

**WARNING** OBSERVE AIRLINE AND AIRPORT STANDARD FUELING/DEFUELING PRECAUTIONS.

##### B. Equipment and Materials

- (1) Fuel Truck
- (2) External Power Cart
- (3) Fuel Sump Drain Cock Wrench Assembly - F65831-500, or equivalent.

##### C. Defueling Precautions

- (1) Ensure that defueling the required tank or tanks will not cause tipping of the airplane. When necessary, defuel other tanks first to prevent tip back.
- (2) Do not drain full reserve tank into adjacent main tank unless main tank fuel level is below 5450 kilograms.
- (3) Do not remove a tank exterior filler port cap before making sure fuel level is below level of cap. In some airplane attitudes with full fuel tanks, removal of filler cap will result in fuel flowing out through filler port onto wing.
- (4) Observe standard defueling precautions.

##### D. Rapid Partial Defueling Through Pressure Fueling Receptacles

- (1) Turn all unnecessary electrical equipment off.
- (2) Ground airplane and fuel truck(s). Refer to Chapter 13, Static Grounding.
- (3) Open pressure fueling station access doors, and remove receptacle caps.



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- (4) Install defueling hose nozzle grounding jacks and connect nozzles to fueling receptacles in that order.
  - (5) Manually close fueling manifold vent shutoff valve.
  - (6) Open fueling shutoff valve of one of the tanks to be defueled. Do not open reserve tank shutoff valves. Reserve tanks defuel by gravity flow into adjacent main tank only, there being no defueling check valves in the reserve tanks.
  - (7) To defuel reserve tanks, defuel adjacent main tanks to below 5450 kilograms of fuel, position reserve tank transfer valve switch to open valve and continue defueling adjacent tank until reserve tank is empty. Then position reserve tank transfer valve switch to close valve.
  - (8) Start fuel truck defueling pump.
  - (9) Continue defueling until flow ceases.
  - (10) Close fueling shutoff valve and open shutoff valve of next tank to be defueled and again continue defueling until flow ceases, then close shutoff valve.
  - (11) Stop fuel truck defueling pump.
  - (12) Manually open fueling manifold vent shutoff valve.
  - (13) Disconnect defueling hose nozzles and grounding jacks, in that order.
  - (14) Replace receptacle caps and close fueling station access doors.
- E. Defueling Through Defueling Valve With Fuel Tank Boost or Override Pumps and Fueling Truck Defueling Pump Operating.
- (1) Turn all unnecessary electrical equipment off.
  - (2) Ground airplane and fuel truck(s). Refer to Chapter 13, Static Grounding.
  - (3) Connect external electrical power to airplane.
  - (4) Check that engine fuel shutoff valve switches are in CLOSE position.
  - (5) Position fuel manifold valve switches to open valves for tanks to be defueled.
  - (6) Remove inboard dry bay access panels to gain access to defueling valves.
  - (7) Connect defueling hose ground wires to nearest bonding jumper, and then connect defueling hose to defueling connection.
  - (8) Manually position defueling valves to OPEN.
  - (9) Position applicable tank boost or override pump switch to ON.
  - (9a) Monitor any fuel pump low pressure indication light during pump operation and immediately put the fuel pump switch to OFF when a low pressure light(s) comes on and stays on.



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When operating the APU unattended for an extended period of time, follow Airplane Maintenance Manual 49-00-2 and 49-00-3 page 201 instructions regarding necessary fuel quantity based on APU fuel burn rate.

When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for a pump low pressure light to illuminate before all fuel is transferred. In one pump fuel tank configurations, monitor the tank quantity and put the pump to OFF if the tank quantity does not change. In two pump fuel tank configurations, put the pump to OFF and continue, and if the remaining pump's low pressure light illuminates, then monitor tank quantity and put that pump to OFF if tank quantity does not change. If each pump's low pressure light illuminates simultaneously, put the aft pump to OFF and continue while monitoring tank quantity and put the forward pump to OFF if tank quantity does not change.

**NOTE:** Forward pumps can usually supply more fuel on the ground compared to aft pumps.

Only one pump per fuel tank can be operated when a low pressure light is illuminated for that tank and that pump should be put to OFF when the tank quantity does not change.

- (10) Start fuel truck defueling pump.
- (11) Reserve tanks defuel by gravity flow only, there being no boost or override pumps in these tanks. To defuel reserve tanks, defuel adjacent main tanks to below 5450 kilograms of fuel, position reserve tank transfer valve switch to open valve and continue defueling. When reserve tank(s) is empty, position reserve tank transfer valve switch to close valve.
- (12) When applicable fuel low pressure warning lights illuminate, position their respective pump switches to OFF.

**CAUTION** DO NOT ALLOW BOOST PUMPS TO OPERATE IN EMPTY TANKS.

- (13) Stop fuel truck defueling pump.
- (14) Manually close defueling valves.
- (15) Position fuel manifold valves switches to close valves.
- (16) Remove defueling hoses and ground wires, in that order. Replace valve caps, and replace inboard dry bay access panels.
- (17) Drain sump fuel from defueled tanks at fuel sump drain cocks.

**WARNING** DRAIN SUMP FUEL INTO PROPERLY MARKED CONTAINERS. GROUND FUNNEL AND CONTAINERS TO AIRPLANE.

- (18) Drain boost pumps at drain plug on bottom of pumps.
- (19) Determine whether there is any further need for electrical power on airplane, if not, remove external power.



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F. Defueling through Defueling Valve With Fuel Tank Boost or Override Pumps Operating.

- (1) Follow the same steps given in paragraph 1.E. with the exception that fuel truck defueling pump is not used.

G. Defueling Through Defueling Valve With Fuel Truck Defueling Pump Operating.

**NOTE:** This method is extremely slow and should only be used as a last resort.

- (1) Follow the same steps given in paragraph 1.E. with the exception that electrical power is not used, and valve positioning must be done manually. Also instead of positioning the boost or override pump switches to ON, the truck defueling pump switch must be positioned to ON.

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### 11. Operation

- A. The engine fuel feed system controls are located on the flight engineer's lower panel (detail A, figure 2) which is laid out in the form of a flow diagram. The controls consist of four lock toggle switches for the engine fuel shutoff valves, ten ON-OFF toggle switches for the fuel pumps and six rotary type switches for the fuel manifold and reserve tank transfer valves.

**NOTE:** Monitor any fuel pump low pressure indication light during pump operation and immediately put the fuel pump switch to OFF when a low pressure light(s) comes on and stays on.

When operating the APU unattended for an extended period of time, follow Airplane Maintenance Manual 49-00-2 and 49-00-3 page 201 instructions regarding necessary fuel quantity based on APU fuel burn rate.

When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for a pump low pressure light to illuminate before all fuel is transferred. In one pump fuel tank configurations, monitor the tank quantity and put the pump to OFF if the tank quantity does not change. In two pump fuel tank configurations, put the pump to OFF and continue, and if the remaining pump's low pressure light illuminates, then monitor tank quantity and put that pump to OFF if tank quantity does not change. If each pump's low pressure light illuminates simultaneously, put the aft pump to OFF and continue while monitoring tank quantity and put the forward pump to OFF if tank quantity does not change.

**NOTE:** Forward pumps can usually supply more fuel on the ground compared to aft pumps.

Only one pump per fuel tank can be operated when a low pressure light is illuminated for that tank and that pump should be put to OFF when the tank quantity does not change.

- B. All of the valves are operated by 26-volt d-c motors which receive their power through circuit breakers on the essential 28-volt circuit breaker panel (P6). All the pumps are driven by 115/200-volt three-phase 400-cycle power which is supplied through circuit breakers on panels P1, P2, P3 and P4. Pumps in the same tank do not receive power from the same bus. The pump power supply has been arranged so that loss of power to one bus will affect a maximum of three pumps, two boost and one override. The two boost pumps lost will be on opposite sides of the airplane. (See figures 10 and 11.)
- C. Operation of the system is accomplished by opening the desired manifold valves, opening the engine fuel shutoff valves, and starting the pumps. Each pump has a fuel low pressure warning light which is on when the pump is off or below normal pressure, and goes off when the pump is delivering normal pressure. Each valve has a light which comes on while the valve slide is being repositioned.



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- D. When the boost pumps are operating, fuel is pumped from the tanks via the fuel feed lines where it is distributed through fuel manifold valves and engine fuel shutoff valves to the engines. The reserve tank transfer valves are kept closed until the fuel quantity in the adjoining main tank is less than 12,000 pounds (5443 kilograms). When this value is reached the fuel transfer valves may be opened.
- E. Control of the engine fuel shutoff valves is assumed by fire switches on the pilots' light shield panel. When the switches are pulled to the "FIRE" position, the engine fuel shutoff valve switches are overridden and the valves close. (See figure 10.)



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### ENGINE FUEL FEED SYSTEM - MAINTENANCE PRACTICES

#### 1. Adjustment/Test Engine Fuel Feed System

##### A. General

- (1) Testing of the engine fuel feed system is accomplished in two parts. First all control valves are tested for proper operation, then second, all fuel boost pumps and fuel boost override pumps are tested for proper operation.

##### B. Test Valves

- (1) With external power connected and the fuel dump valve switches on the flight engineer's auxiliary panel in the "CLOSE" position, close the circuit breakers for the four engine fuel shutoff valves, the four fuel manifold valves and the two reserve tank transfer valves.
- (2) Open and close each of the four engine fuel shutoff valves by operating each engine fuel shutoff valve switch. Verify that the valve position coincides with the valve switch position as noted by the position indicator on each valve.
- (3) On A/C LX-N20198 and LX-N20199, the engine start lever must be in IDLE. Verify that the blue position light for each engine fuel shutoff valve is on during valve transition period. Verify that the light goes out when the valve has completed the opening or closing cycle. On A/C LX-N19997 and LX-N20000, the fuel shutoff valve position light is blue; this light will illuminate bright momentarily when the corresponding valve is in transit. The light will illuminate dim when the respective valve has attained the closed position.
- (4) With each engine fuel shutoff valve open, pull the engine fire switch for each engine. Verify that the engine fuel shutoff valve for each engine closes.
- (5) Close each engine fire switch. Verify that the corresponding engine fuel shutoff valve opens.
- (6) Open and close each of the four fuel manifold valves by operating each fuel manifold valve switch. Verify that the switch position coincides with the valve position as noted by the position indicator on each valve.
- (7) Verify for each valve that the blue position light for each fuel manifold valve is on during the valve transition period, and that the light goes out when the valve has completed the opening or closing cycle.
- (8) Open and close each reserve tank transfer valve, which connects the reserve tank with the adjacent tank, by operating each reserve transfer valve switch. Verify that the valve position coincides with the switch position indicator on each valve.

**CAUTION** FUEL WILL FLOW FROM RESERVE TANK TO ADJACENT MAIN TANK WHEN TRANSFER VALVE IS OPEN. VERIFY THAT ADJACENT MAIN TANK WILL HOLD QUANTITY OF FUEL TRANSFERRING DURING VALVE CHECK.

- (9) Verify for each valve that the blue position light for each reserve tank transfer valve is on during the transition period, and that the light goes out when the valve has completed the opening or closing cycle.

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### C. Test Pumps

- (1) With external power connected, close the circuit breakers for the fuel low pressure warning light, all boost pumps and both fuel boost override pumps. All fuel low pressure warning lights will be on when the pump switches are in the OFF position.
- (2) Close all engine fuel shutoff valves and fuel manifold valves.
- (3) With fuel in each of the main tanks, position main tank no. 1 forward boost pump switch to ON. Verify that its respective fuel low pressure warning light goes out.
- (3a) Monitor any fuel pump low pressure indication light during pump operation and immediately put the fuel pump switch to OFF when a low pressure light(s) comes on and stays on.

When operating the APU unattended for an extended period of time, follow Airplane Maintenance Manual 49-00-2 and 49-00-3 page 201 instructions regarding necessary fuel quantity based on APU fuel burn rate.

When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for a pump low pressure light to illuminate before all fuel is transferred. In one pump fuel tank configurations, monitor the tank quantity and put the pump to OFF if the tank quantity does not change. In two pump fuel tank configurations, put the pump to OFF and continue, and if the remaining pump's low pressure light illuminates, then monitor tank quantity and put that pump to OFF if tank quantity does not change. If each pump's low pressure light illuminates simultaneously, put the aft pump to OFF and continue while monitoring tank quantity and put the forward pump to OFF if tank quantity does not change.

**NOTE:** Forward pumps can usually supply more fuel on the ground compared to aft pumps.

Only one pump per fuel tank can be operated when a low pressure light is illuminated for that tank and that pump should be put to OFF when the tank quantity does not change.

- (4) Repeat step (3) for the aft boost pump in main tank no. 1 with the forward boost pump not operating.
- (5) Repeat steps (3) and (4) for the remaining six boost pumps in the other main tanks.
- (6) With fuel in the center wing tank, position the right fuel boost override pump switch to ON. Verify that its respective fuel low pressure warning light goes out.
- (7) Repeat step (6) for the left fuel boost override pump with the right fuel boost override pump not operating.
- (8) With the left fuel boost override pump still operating, open all fuel manifold and engine fuel shutoff valves and check for any evidence of leakage from the valves and lines in the struts and dry bays.
- (9) Shut off all valves and pumps.

END



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- (5) Connect external power to airplane.
- (6) Close applicable circuit breakers and observe that fuel low pressure warning lights come on.
- (7) Position applicable fuel boost pump or override pump switch to ON, and observe that applicable fuel low pressure warning light goes out.
- (7a) Monitor any fuel pump low pressure indication light during pump operation and immediately put the fuel pump switch to OFF when a low pressure light(s) comes on and stays on.

When operating the APU unattended for an extended period of time, follow Airplane Maintenance Manual 49-00-2 and 49-00-3 page 201 instructions regarding necessary fuel quantity based on APU fuel burn rate.

When defueling or transferring fuel with minimum backpressure to the pumps, it is possible for a pump low pressure light to illuminate before all fuel is transferred. In one pump fuel tank configurations, monitor the tank quantity and put the pump to OFF if the tank quantity does not change. In two pump fuel tank configurations, put the pump to OFF and continue, and if the remaining pump's low pressure light illuminates, then monitor tank quantity and put that pump to OFF if tank quantity does not change. If each pump's low pressure light illuminates simultaneously, put the aft pump to OFF and continue while monitoring tank quantity and put the forward pump to OFF if tank quantity does not change.

**NOTE:** Forward pumps can usually supply more fuel on the ground compared to aft pumps.

Only one pump per fuel tank can be operated when a low pressure light is illuminated for that tank and that pump should be put to OFF when the tank quantity does not change.

- (8) Reposition switch to OFF and warning light should come on.
- (9) Disconnect external power from airplane.

END

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OVERWING FILL PORTS - INSPECTION/CHECK1 General

- A There are seven overwing fill ports, one for each tank. This procedure inspects the overwing fill ports for the No. 1, No. 4, and center wing tanks
- (1) The inspection does a resistance test of the overwing fill ports
  - (2) If the resistance is 5.0 milliohms or more, the overwing fill port must be disassembled and the filler cap adapter bonded to the upper wing skin
- B It is recommended that this bonding resistance inspection be repeated at every 14,000 flight hour check

2 Overwing Fill Port Bonding Resistance Inspection (Fig 601)A Equipment

- (1) Bonding Meter  
Use one of these
  - (a) M1  
BCD Electronics Ltd (VL002)  
200-4170 Still Creek Drive  
Burnaby, BC CAN V5C 6C6
  - (b) T477W  
AVTRON Manufacturing Inc (V6J744)  
10409 Meech Ave  
Cleveland, OH 44105-4166

B Consumable Materials

- (1) Sealant - BMS 5-26 Type II Class B
- (2) Alodine 600 - Type II Class D

C Bonding Resistance Inspection

- (1) Defuel all the tanks (AMM 28-0/201)
- (2) Do the "Purging (Air Ventilating)" procedure (AMM 28-0/201)
- (3) Get access to the outside of the overwing fill ports for the No. 1, No. 4 and center wing tanks

**CAUTION** PUT MAINTENANCE MATS ON THE WING SURFACES WHERE MAINTENANCE PERSONS WORK. DAMAGE TO THE WING SURFACES CAN OCCUR

**NOTE** Do the bonding resistance inspection for one tank and then repeat the inspection for the other tanks

- (4) Measure the resistance from the filler cap adapter to the wing upper skin for overwing fill ports for the No. 1, No. 4 and center wing tanks (SWPM 20-20-00)

**NOTE** No. 1 overwing fill port is at WBL 497 76 on the left wing. No. 4 overwing fill port is at WBL 497 76 on the right wing. Center wing overwing fill port is at WBL 41 15 on the right wing

