TECHNICAL MANUAL

AVIATION INTERMEDIATE
MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND
SPECIAL TOOLS LIST)

CENTRIFUGAL FUEL BOOST PUMP

P/N 1C64-1
NSN 2915-01-124-5222

"Approved for public release; distribution is unlimited."

HEADQUARTERS, DEPARTMENT OF THE ARMY

21 OCTOBER 1988

CHANGE

No. 2

HEADQUARTERS
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WASHINGTON, D.C., 29 April 1994

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CENTRIFUGAL FUEL BOOST PUMP

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WARNING

DEATH OR SERIOUS INJURY

could occur if compressed air is directed against the skin. Do not use compressed air for cleaning or drying unless the pressure is/has been reduced to 30 psi (207 kPa) or less. When working with compressed air, always use chip guards, eye protection, and other personal protective equipment.

HAZARDOUS SOLVENTS

Dry cleaning solvent P-D-680 and boost pump calibration fluid can be dangerous. When you use these solvents, be sure that your work area is well ventilated. Avoid prolonged breathing of solvent vapors, or skin contact with the liquid. WEAR GLOVES AND EYE PROTECTION.

IF YOU GET SOLVENT IN YOUR EYES OR ON YOUR SKIN, FLUSH THE SOLVENT AWAY WITH WATER FOR 15 MINUTES; THEN GET MEDICAL HELP.

Do not use solvent near an open flame, arcing equipment, or other ignition sources. The flash point of P-D-680 is 100° to 138°F (38° to 59°C).

Refer to FM-21-11 for artificial respiration or other first aid procedures.

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) or compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

WARNING

Do not use drill bits to open clogged ports in motor cover. Drilling may alter explosion-proof design of the cartridge and cause serious injury or death of personnel.

TECHNICAL MANUAL

NO. 55-2915-335-30&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 21 October 1988

TECHNICAL MANUAL

AVIATION INTERMEDIATE MAINTENANCE MANUAL
(Including REPAIR PARTS AND SPECIAL TOOLS LIST)

CENTRIFUGAL FUEL BOOST PUMP
MODEL 1C64-1 (NSN 2915-01-124-5222)

Current as of 24 March 1994

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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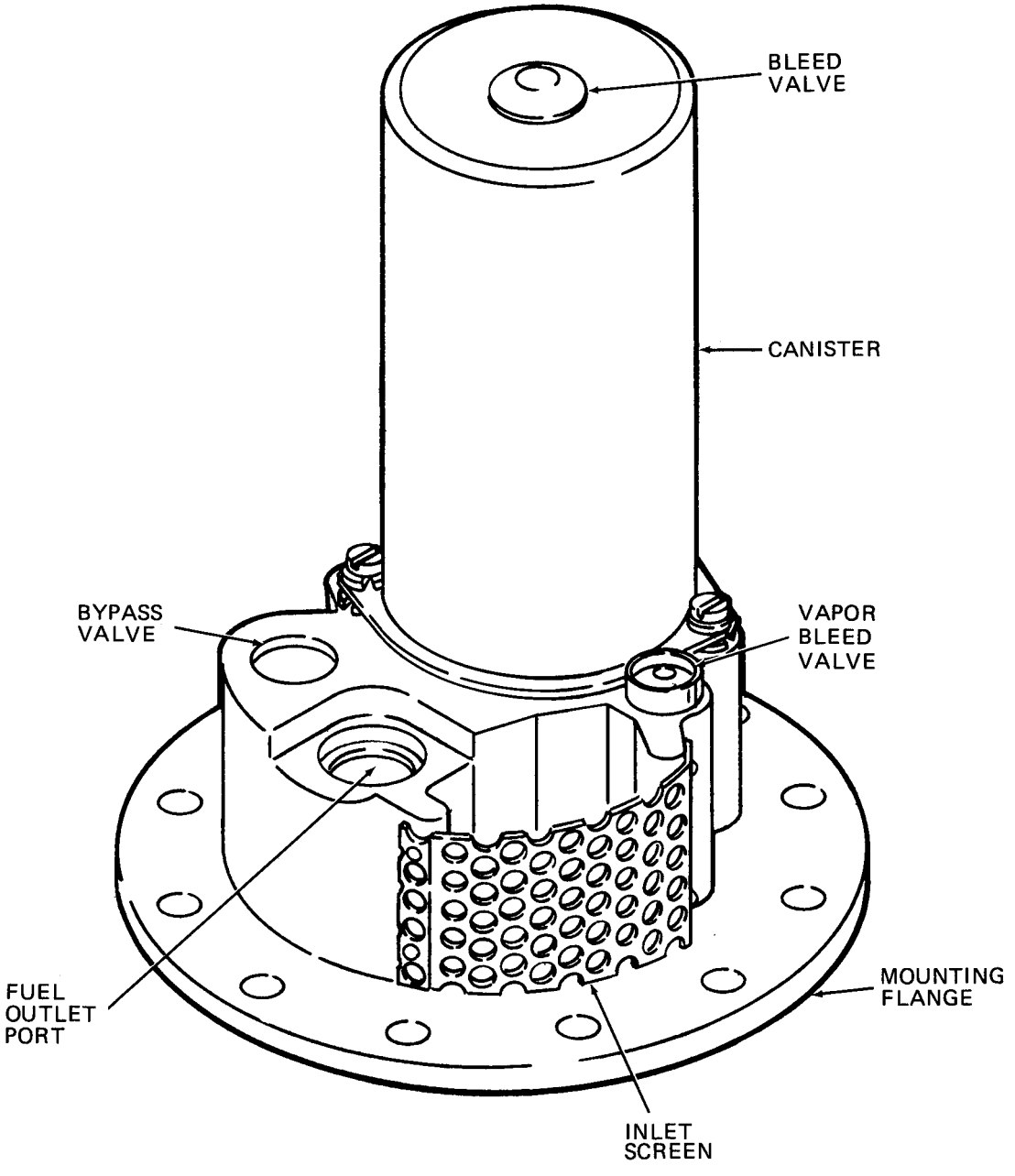
TABLE OF CONTENTS


BLEED VALVE
CANISTER
BYPASS VALVE
VAPOR BLEED VALVE
FUEL OUTLET PORT
MOUNTING FLANGE
INLET SCREEN

CHAPTER 1
INTRODUCTION

SECTION I. GENERAL INFORMATION

1-1. Scope.

a. Type of manual: Aviation Intermediate Maintenance.

b. Model number and equipment name: 1C64-1 Fuel Boost Pump, NSN 2915-01-124-5222 (Includes early and late pump cartridge configurations.)

c. Purpose of equipment: Provides added fuel pressure for takeoff, landing, and operation at high altitudes (above 2000 feet above sea level).

1-2. Maintenance Forms, Records, and Reports. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751, Function Users' Manual for The Army Maintenance Management System-Aviation (TAMMS-A).

1-3. Destruction of Army Material to Prevent Enemy Use. Procedures for destruction of Army material to prevent enemy use are listed in TM 750-244-1-5.

1-4. Preparation for Storage or Shipment. Instructions are provided in Chapter 2.

1-5. Reporting Equipment Improvement Recommendations (EIR). If your fuel boost pump needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We'll send you a reply.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1-6. Equipment Characteristics.

a. The fuel boost pump installs externally in the bottom of the fuel tank.

b. The fuel boost pump includes a removable cartridge-type motor and impeller. This enables the pump cartridge to be removed and changed without draining the fuel tank.

c. The pump motor runs on standard 28 volts DC.

d. A wet-motor design keeps motor cooled and lubricated by fuel during operation.

e. A thermal shutoff protects motor from severe overheating.

f. The pump circuits include a Radio-Frequency Interference (RFI) filter.

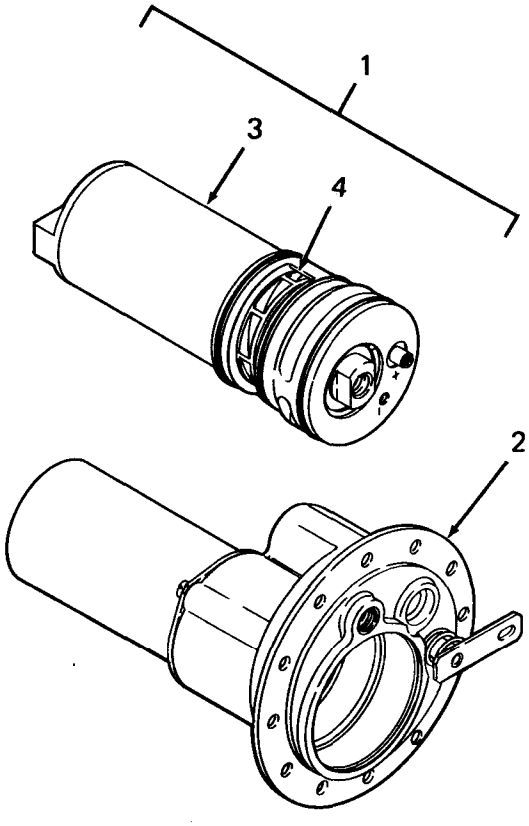
1-7. Location and Description of Major Components.

a. Pump cartridge: Model 2C27-3 pump cartridge is a removable, rotary pump module which houses the pump motor and impeller. Pump cartridge (1) provides the pumping action for the fuel boost pump assembly.

b. Pump housing Pump housing assembly (2) is a receptacle for the boost pump cartridge. The pump housing includes a system of ports and valves which control fuel flow to and from the cartridge. The pump housing also includes a mounting flange which bolts to the bottom of the aircraft fuel tank Together, the pump cartridge and housing form the fuel boost pump assembly, Model 1C64-1.

c. Pump motor: Pump motor (3) is a permanent-magnet type DC motor. The motor includes two sets of brushes and a wet-running armature. Motor cooling and lubrication is provided by fuel circulating through the motor chamber.

d. Impeller: A shrouded vane-type centrifugal impeller (4) is housed in the pump cartridge. The impeller is loose fitted over the end of the motor drive shaft. The impeller includes an inlet port with a flat seal surface. During pump operation, the impeller serves as one-half of a fluid seal in the pumping chamber.

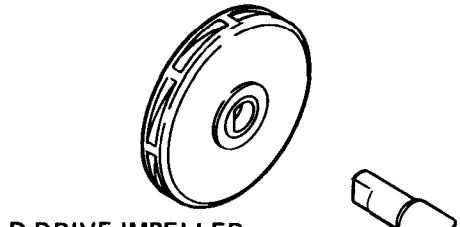


1-8. Differences Between Models.

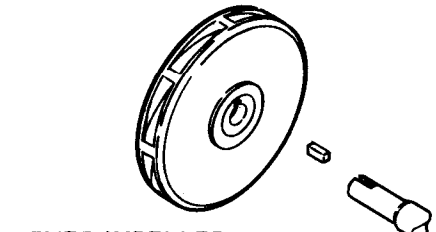
a. There are two versions of the fuel pump cartridge in use. Both versions carry the same model number, 2C27-3. The differences in the two versions are between the impellers and armature drive shafts.

b. The “early version” pumps use a square drive key that engages slots in the impeller and motor shaft. The “late version” pumps use a D-drive design. A flat on the shaft fits into a “D” shaped drive boss on the impeller. The late version motor does not need a square drive key to turn the impeller.

c. The early version cartridge is now obsolete. If either the early version armature or impeller needs to be replaced, both parts must be ordered. The replacement parts will be the late version, D-drive type. All other pump components are similar.



D-DRIVE IMPELLER
(LATE VERSION PUMPS)



KEYED IMPELLER
(EARLY VERSION PUMPS)

1-9. Equipment Data.

Manufacturer	Airborne Division, Parker-Hannifin Corporation
Part Number - Boost Pump Assembly	1C64-1
- Pump Cartridge	2C27-3
Type	Centrifugal
Service	Liquid Petroleum Fuel
Duty Cycle (Wet)	Continuous
Rated Flow (@ 28.0 volts DC)	Up to 1000 PPH (454 kg/hr) at 12.5 to 25 psi (86,2 to 172,4 kPa)
Voltage	+28.0 volts DC
Current (maximum)	6.0 amp
Rotation	Counterclockwise, viewed from pump end
Discharge Port	Port per MS 33555-1
Drain Port	Port per MS 33649-4, 0.4375-20 UNJF-3B
Blind Port	Port per MS 33649-4, 0.4375-20 UNJF-3B
Electrical Conductor	Per MIL-W-16878, 2-conductor 18 gage
Unit Weight	4.0 pounds (1,82 kg) maximum

1-10. Safety, Care, and Handling.

a. The boost pump may contain small amounts of fuel. Take appropriate safety precautions when unpacking or performing pump inspections or service.

b. The cartridge and housing can be badly damaged, if dropped. Keep the pump or cartridge in a container when not being serviced. Don't lay the pump or cartridge on a bare surface; they can roll off a table or bench easily. Place the pump or cartridge in a container or on a pile of cleaning rags to prevent rolling.

c. Don't use metal or glass to scrape pump surfaces. Scraping with metal or glass will remove thin protective coatings on the pump and cartridge.

WARNING

A bent inlet shutoff valve arm may prevent the shutoff valve from completely opening causing a restricted fuel flow.

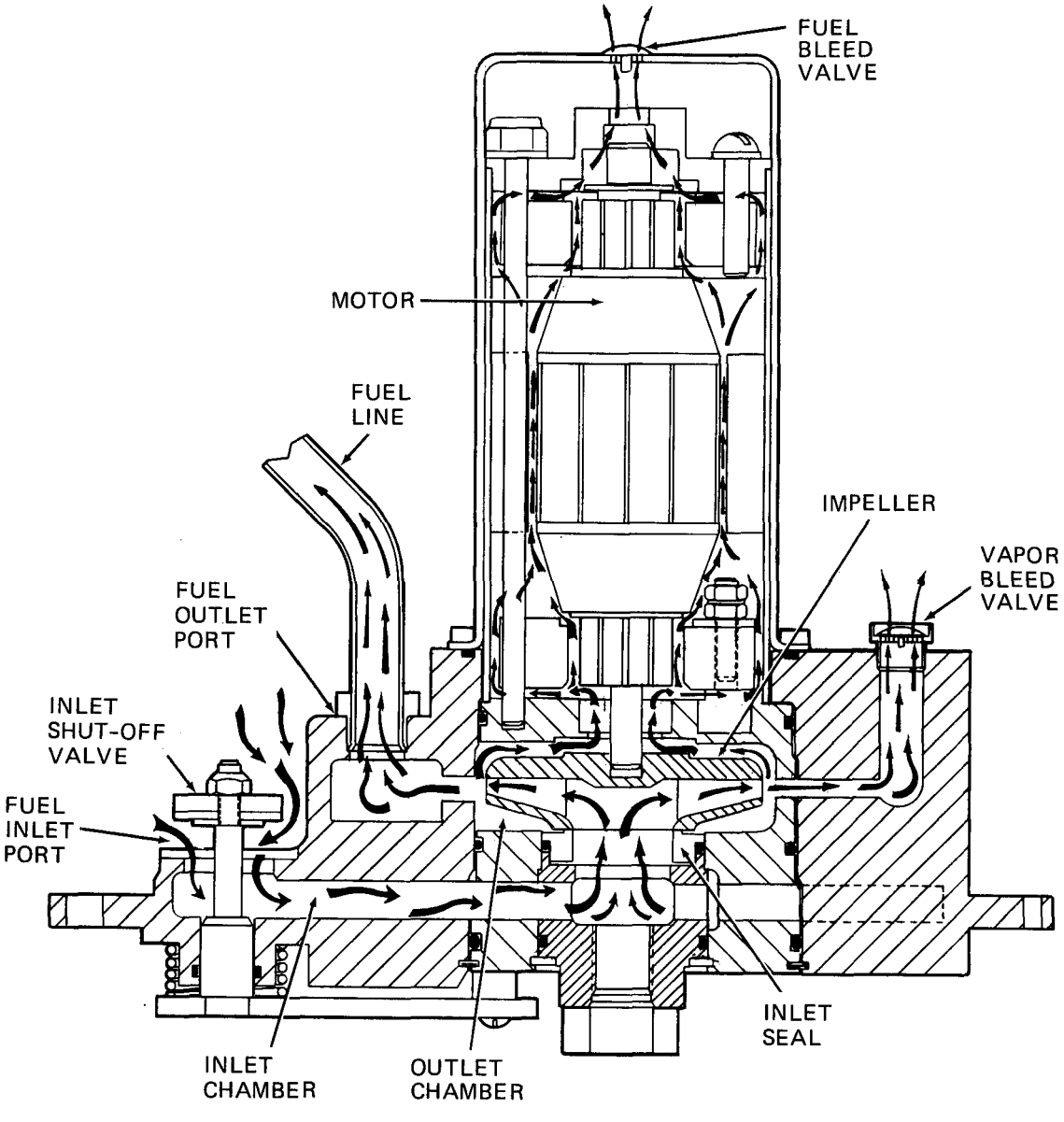
SECTION III. TECHNICAL PRINCIPLES OF OPERATION

1-11. Fuel Flow.

a. The boost pump mounts through the bottom of a fuel tank. When installed, the inlet shutoff valve is locked in the open position. Fuel flows into the open inlet valve to the pumping chamber.

b. When the boost pump is turned ON, the impeller pushes fuel from the inlet chamber to the outlet port. Impeller pumping action causes high fuel pressure at the fuel outlet port.

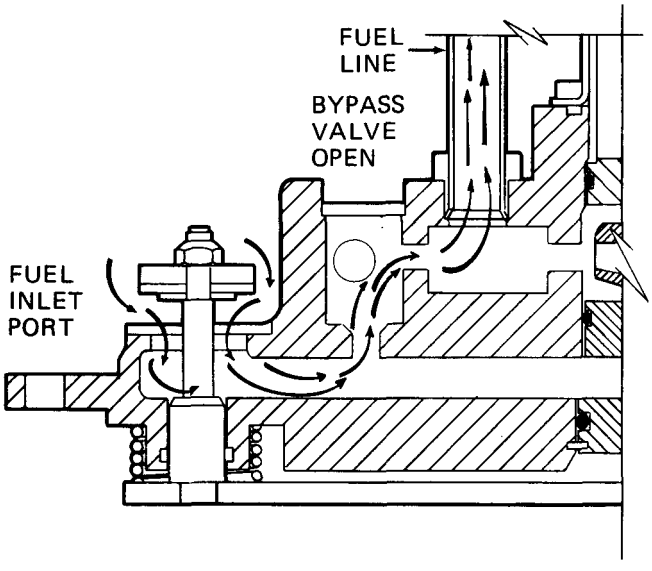
c. The fuel boost pump uses a floating impeller. The impeller is free to move up and down on the motor shaft. The force of fuel being pushed through the impeller causes a downward force on the impeller. The downward force causes the impeller to press against the pump inlet seal. This forms a pressure seal that separates the inlet chamber from the outlet chamber.

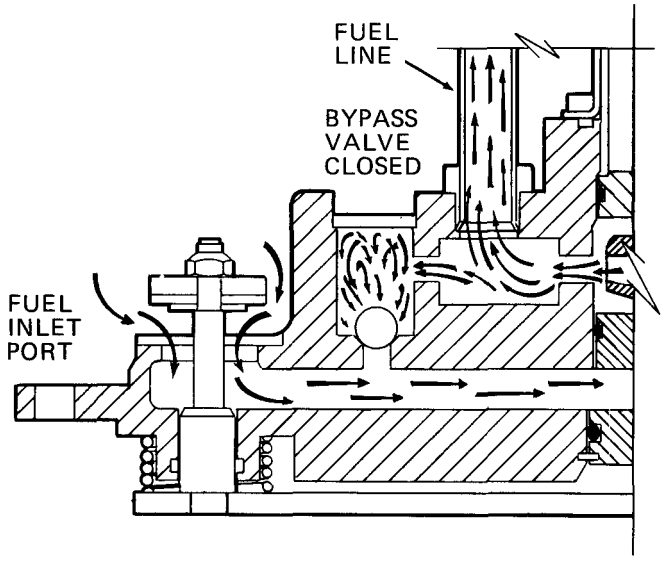


d. Most of the fuel pushed through the pump flows to the main fuel line. A small amount of fuel flows through the motor chamber to cool and lubricate moving motor parts. Fuel exits the motor chamber through fluid ports in the motor cover fuel bleed valves.

e. Vapor is formed when the impeller pumps fuel. The vapor formed is released through a vapor bleed valve, The bleed valve removes fuel vapor that would otherwise get into the main fuel line.

f. A fuel bypass valve allows fuel to flow directly from the inlet port to the fuel line while the boost pump is turned OFF. When the boost pump is turned ON, fuel pressure forces the valve ball down to close off the fuel bypass. Without the bypass valve, turning the boost pump OFF would partly block fuel flow through the pump.



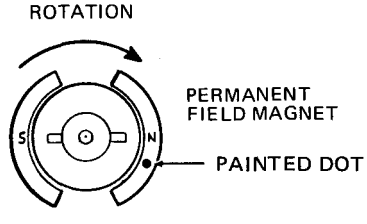


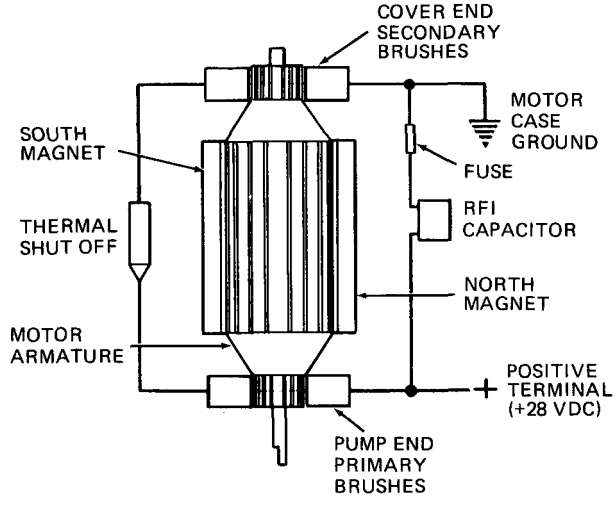
1-12. Electrical Circuit.

a. The pump motor circuit includes two sets of motor brushes connected in series. Applying 28 volts DC across the motor terminals drives the pump impeller counterclockwise when viewed from the impeller drive end. If the power leads or the permanent field magnets are reversed, the motor will run backwards.

b. A thermal shutoff opens the motor circuit if the motor overheats. Once open, the thermal shutoff will not reset, and must be replaced.

c. An RFI capacitor inhibits radio frequency interference. A fuse in series with the RFI capacitor protects motor wiring in case the capacitor shorts out.





CHAPTER 2
AVIATION INTERMEDIATE MAINTENANCE

SECTION I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-1. Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to the AVIM unit.

2-2. Special Tools. Special tools required for maintenance are listed in Appendix B, Section III of this manual.

2-3. Test, Measurement, and Diagnostic Equipment (TMDE). A fuel boost pump test tank is required to troubleshoot and test the boost pump assembly or cartridge. No special TMDE equipment is required.

2-4. Manufactured Items. Some special tools to include the fuel boost pump test tank must be fabricated. Instructions for making these items are covered in Appendix D of this manual.

2-5. Repair Parts. Repair parts are listed and illustrated in Appendix B of this manual.

SECTION II. SERVICE UPON RECEIPT

2-6. Inspecting Fuel Boost Pump.

a. Inspect for damage that may have occurred during shipment. If the pump has been damaged, report the damage on Form SF 364, Report of Discrepancy.

b. Check equipment received against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with instructions of DA PAM 738-751.

c. Before performing any troubleshooting or maintenance on the fuel boost pump, visually check the pump for cracks, dents, or obvious external damage.

SECTION III. TROUBLESHOOTING

2-7. General.

a. Troubleshooting of the fuel boost pump is broken into two separate functions: a fault isolation procedure and maintenance troubleshooting. Perform the fault isolation procedure, Table 2-1, to determine if a malfunction exists. If a malfunction exists, perform maintenance troubleshooting, Table 2-2, to find where the problem is located and how to correct the problem.

b. Either the entire boost pump assembly, or just the pump cartridge maybe received for maintenance. If just the pump cartridge is received, start with block 1 of Table 2-1, Fault Isolation. If the entire boost pump assembly is received, start with block 4 of Table 2-1, Fault Isolation.

c. Table 2-1 is in the logic tree format. Starting with either block 1 or block 4, perform the procedure described to determine the answers to the questions asked. If an answer is YES, proceed to the block listed after the word YES. Continue until a specific fault is isolated. If an answer is NO, refer to the listed malfunction number in Table 2-2. Troubleshoot that malfunction as instructed to find the problem; repair the pump per the maintenance paragraph listed.

d. Table 2-2 contains maintenance troubleshooting procedures for locating and correcting pump problems which are the responsibility of Aviation Intermediate Maintenance. Each malfunction for a pump assembly or pump cartridge includes tests and inspections. Performing the tests and inspections will help you to determine probable causes and corrective actions to take. Perform the tests/inspections and corrective actions in the order listed.

2-8. Tools and Test Equipment. To perform fault isolation and troubleshooting procedures, the following test equipment is required:

Fuel Pump Test Tank (Item 5, Appendix D)
28 volt DC Power Supply (adjustable to within 0.2 volts)
DC Voltmeter (accurate to within 0.2 volts)
Ammeter (accurate to within ±2%)

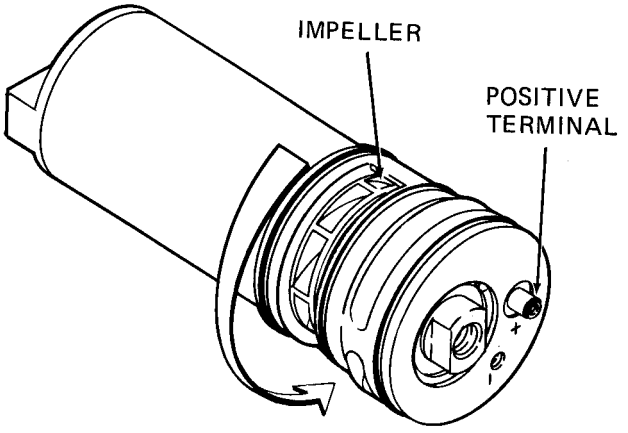
NOTE

Before performing fault isolation, read and become familiar with the final test procedure in paragraph 2-25.

NOTE

Troubleshooting procedures will not reveal a fault in the RFI circuit. If it is reported that fuel pump causes radio interference, inspect and/or replace RFI circuit per paragraph 2-23.

Table 2-1. Fault Isolation



1

NOTE

If checking fuel pump with cartridge installed, do not remove cartridge; proceed to Block 4.

- Check pump cartridge for jammed motor or stripped impeller.
  - Manually rotate impeller counterclockwise.

Does impeller and armature turn?

YES — NO → **2** If jammed, proceed to Malfunction Number 2, Step 1 of Table 2-2.

3 If impeller spins on armature shaft, proceed to Malfunction Number 3, Step 3 of Table 2-2.

4

CAUTION

Running motor over one minute without a flow of liquid may cause permanent damage to the motor.

NOTE

Motor circuit may be checked with cartridge in or out of housing.

- Check motor circuit.
  - Lay pump on its side on workbench.
  - Connect pump to 28 ±0.2 VDC power supply. Black lead is positive.
  - Turn pump power ON. Bring voltage up to 28 VDC.

Does motor run?

YES — NO → **5** Check current draw at ammeter:

If current draw is 0 amps, proceed to Malfunction Number 1 of Table 2-2.

If current draw is over 6 amps, proceed to Malfunction Number 2 of Table 2-2.

If current draw is between 0 and 6 amps, proceed to Malfunction Number 5 of Table 2-2.

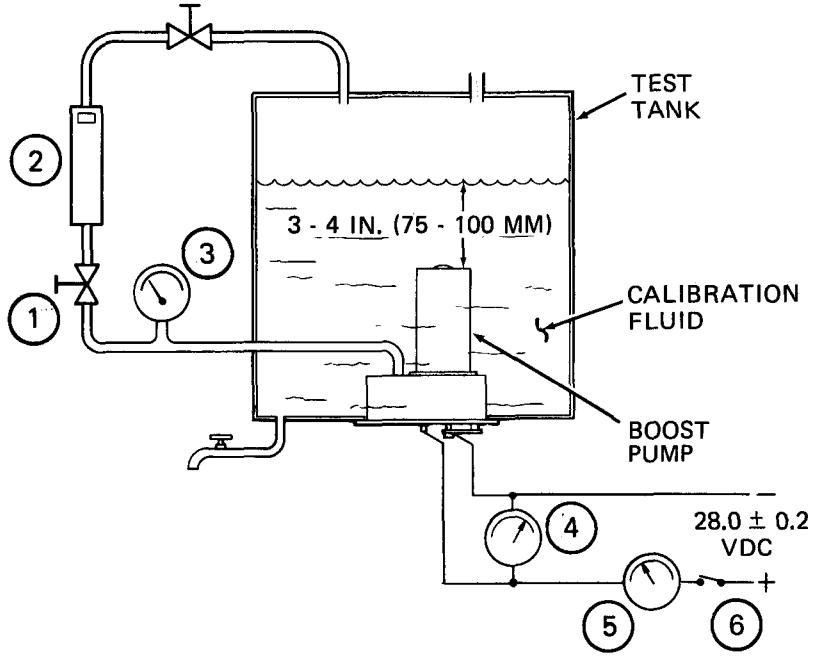
6 Does motor run smoothly?

YES — NO → **7** Proceed to Malfunction Number 7 of Table 2-2.

YES ↓

To block 8

Table 2-1. Fault Isolation - Continued



LEGEND

1. FLOW CONTROL VALVE
2. FLOWMETER
3. PRESSURE GAGE
4. VOLTMETER
5. AMMETER
6. POWER ON/OFF SWITCH

From block 6

8

- Check pump for maximum flow rate.

NOTE

After installing pump in test tank, DO NOT perform test procedures detailed in paragraph 2-25. Test pump as follows:

- Install pump or cartridge in test tank per final test procedure (paragraph 2-25). Set up for pressure and flow check as instructed.
- Turn power ON.
- Adjust voltage to 28 VDC.
- Open flow control valve (1).
- Observe fuel flow at flowmeter (2).

Does pump reach 1000 PPH (454 kg/hr) flow rate?

YES

To block 11

NO

9

If pressure reads 0 PPH (0 kg/hr), proceed to Malfunction Number 3 of Table 2-2.

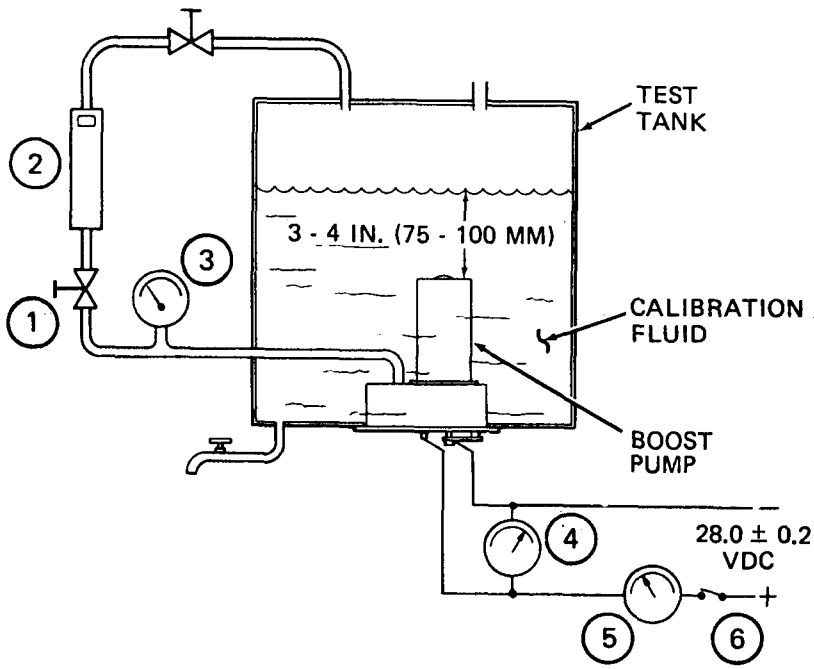
10

If pressure reads more than 0 PPH (0 kg/hr), proceed to Malfunction Number 4 of Table 2-2.

CAUTION

After completing fault isolation, and before proceeding to the malfunction test or inspection, the following is required: Close flow control valve, adjust voltage to 0 VDC, turn power OFF and if necessary remove complete pump assembly or pump cartridge from test tank per paragraph 2-25, step 6.

Table 2-1. Fault Isolation - Continued



LEGEND

1. FLOW CONTROL VALVE
2. FLOWMETER
3. PRESSURE GAGE
4. VOLTMETER
5. AMMETER
6. POWER ON/OFF SWITCH

From block 8

11 ● Observe discharge pressure at gage (3).

Is pressure reading more than 13.0 psig (89,6 kPa)?

YES

NO → **12** Proceed to Malfunction Number 4 of Table 2-2.

13 ● Observe current draw at ammeter (4).

Is current draw less than 6 amps?

YES

NO → **14** Proceed to Malfunction Number 6 of Table 2-2.

To block 15

Table 2-1. Fault Isolation - Continued

From block 13

15

- Check pump or cartridge for leaks.
  - Wipe face of pump assembly dry.
  - Turn pump ON.
  - Check pump face for solvent leaking from pump.

Does pump face stay dry?

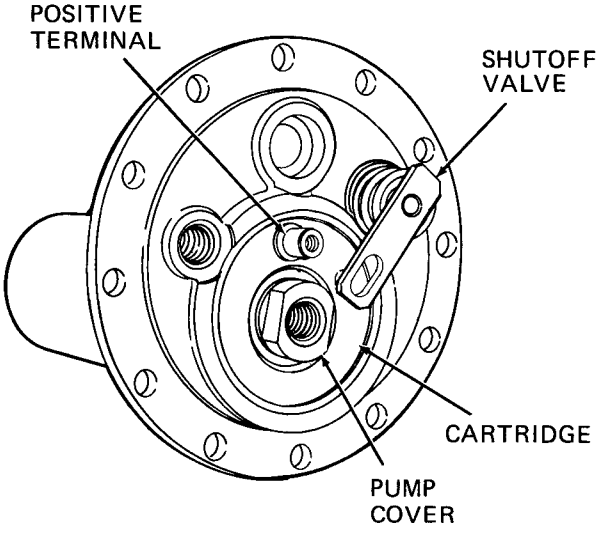
YES

NOTE

Perform the following check only if the complete pump assembly (housing and cartridge) is being serviced.

- Inspect vapor bleed valve and fuel bleed valve for blockage.
  - Drain calibration fluid from test tank and pump.
  - Remove pump assembly from test tank.
  - Wipe pump surfaces dry.
  - Inspect vapor bleed valve for blockage per instructions and illustrations in paragraph 2-12.
  - Inspect canister fuel bleed valve for blockage per instructions and illustrations in paragraph 2-11.

NO



16

Dry wet surfaces, and repeat checks to isolate source of leak. Check parting surfaces around positive terminal, pump cover, cartridge, and shutoff valve.

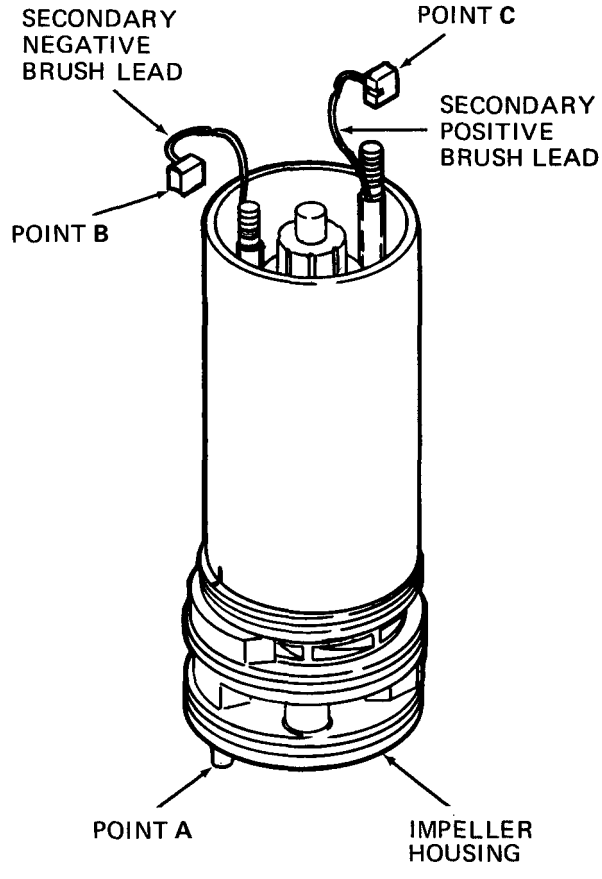
Proceed to Malfunction Number 8 of Table 2-2. When source of leak has been located, follow instructions in troubleshooting step that applies.

Table 2-2. Maintenance Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. MOTOR FAILS TO START, LOW OR NO CURRENT DRAW

Step 1. Check brush circuit: Remove pump cartridge from housing (paragraph 2-10). Isolate brush circuit by removing cover-end brushes from brush holder (paragraph 2-17). Use a multimeter to check for continuity between positive terminal, point A, and secondary positive brush, point C. If you have continuity, circuit is good; proceed to Step 2.



NOTE

Secondary positive brush lead is secured to motor stud on opposite side from positive terminal, point A.

If circuit is open, a solder joint between leads is probably open. Inspect and repair per instructions and illustrations in paragraph 2-23.

Step 2. Check circuit to secondary negative brush lead. Use multimeter to check for continuity between negative secondary brush, point B, and any point on the impeller housing. If you have continuity, circuit is good; proceed to Step 3.

If circuit is open, secondary lead to ground is broken. Inspect and repair per instructions and illustrations in paragraph 2-23.

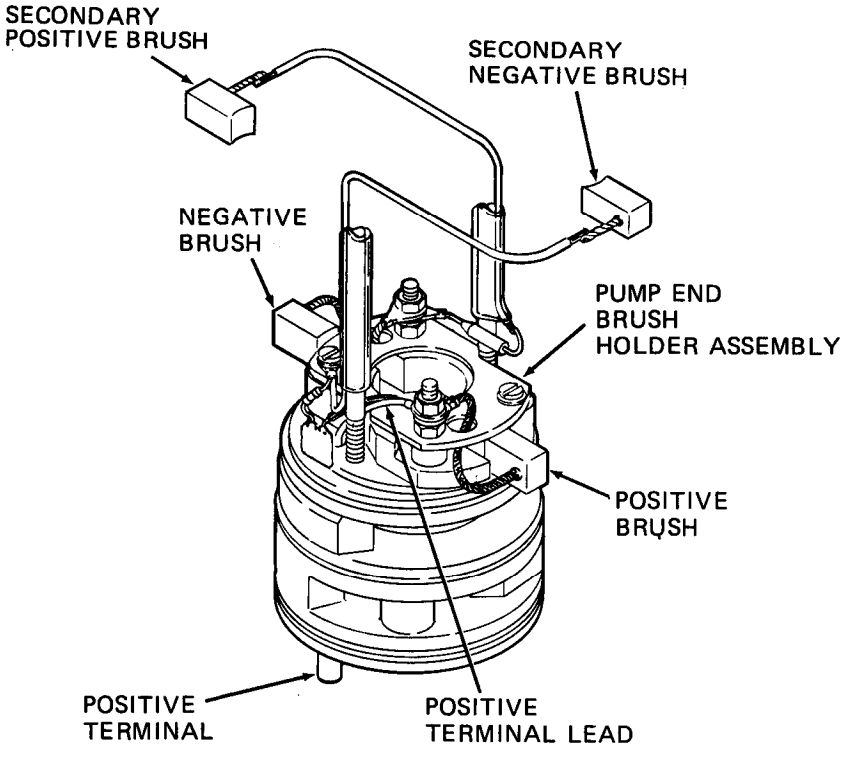
Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. MOTOR FAILS TO START, LOW OR NO CURRENT DRAW (Cont)

Step 3. Check lower brush holder wiring: Remove armature and field tube assembly (paragraph 2-18) to expose lower brush holder. Compare motor wiring with illustration. Check terminals on pump-end brush holder for a loose or broken connection. If electrical leads are good and no connections are loose or broken, proceed to Step 4.

If electrical wiring is bad or connections are loose or broken, repair wiring. Inspect and replace wiring and connectors per the instructions and illustrations in paragraph 2-23.



Step 4. Check condition of brushes. Check for shunt lead caught on spring. Inspect brush contact surface for wear and defects (paragraph 2-20). Check for brush springs out of place. Check both ends of springs. If brushes, springs and shunt leads are good, proceed to Step 5.

Inspect and replace worn, chipped, or cracked brushes per the instructions and illustrations in paragraphs 2-20 and 2-23.

Step 5. If brush connections and circuits are good, armature is defective.

Inspect armature per instructions and illustrations in paragraph 2-18. Replace if defective.

Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. MOTOR FAILS TO START, HIGH CURRENT DRAW

Step 1. Check for jammed motor or impeller. Remove pump cartridge from housing (paragraph 2-10). Try to rotate impeller by hand to check for motor jamming. Motor armature should turn with the impeller. If rotation is smooth, proceed to Step 2.

If motor is jammed or does not rotate smoothly, broken pieces from the field tube magnets may be lodged between the armature and field tube. Disassemble armature, field tube, and impeller per the instructions and illustrations in paragraphs 2-18 and 2-19. Check for debris and defects as shown. Replace parts, if defective.

If motor does not rotate smoothly, bearings may be damaged. Inspect and replace motor bearings per instructions and illustrations in paragraphs 2-16 and 2-22.

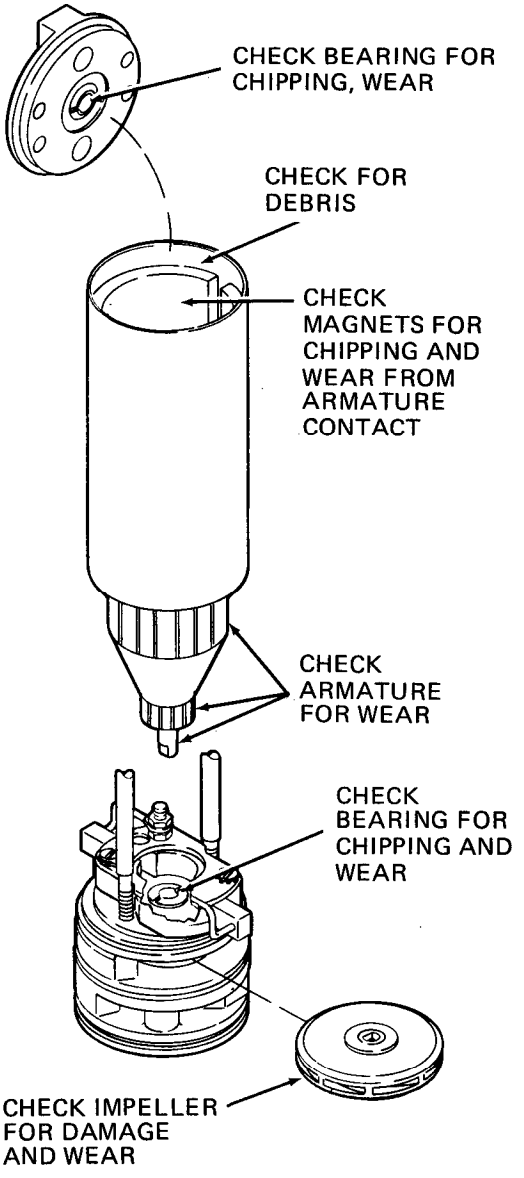


Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

2. MOTOR FAILS TO START, HIGH CURRENT DRAW (Cont)

Step 2. Check for shorted brush circuit. Remove brushes from cover-end brush holder (paragraph 2-17). Use a multimeter to check for continuity between positive terminal, point A, and any point on the impeller housing. If ohmmeter reads infinity, circuit is not shorted; proceed to Step 3.

If brush circuit is shorted, inspect and repair per instructions and illustrations in paragraph 2-23. If brush circuit wiring is good, inspect for shorted positive terminal and lead per instructions and illustrations in paragraph 2-23. Repair or replace defective components.

Step 3. If the motor assembly and wiring is good, then armature is defective.

Inspect armature per instructions and illustrations in paragraph 2-18. Replace if defective.

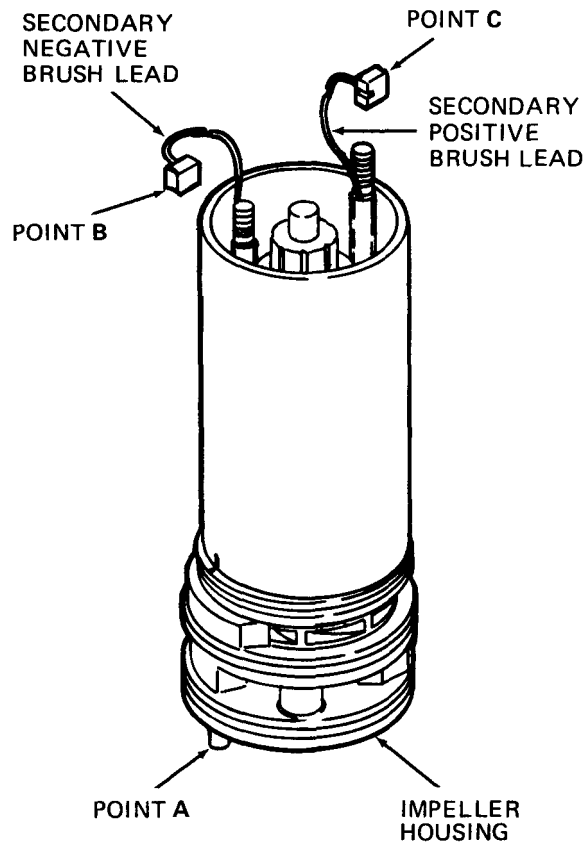


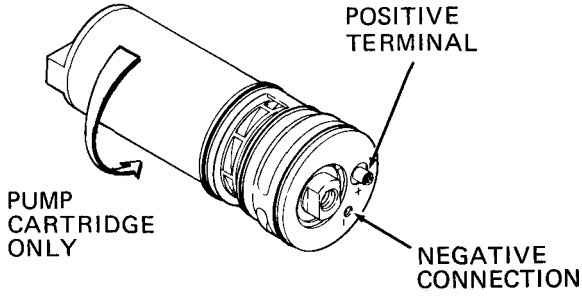
Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. MOTOR RUNS, NO FUEL FLOW OR PRESSURE

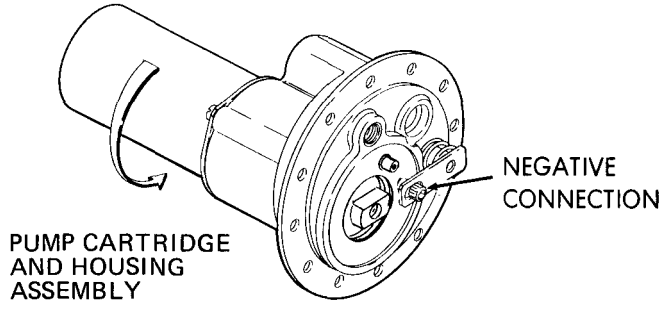
Step 1. Check for motor running backwards. Connect pump to 28 vdc power supply. Start pump and check that startup torque of motor is counterclockwise, as shown. If startup torque is clockwise, field tube is reversed on cartridge. If motor rotation is correct, go to Step 2.

Remove field tube and install correctly per instructions and illustrations in paragraph 2-18.



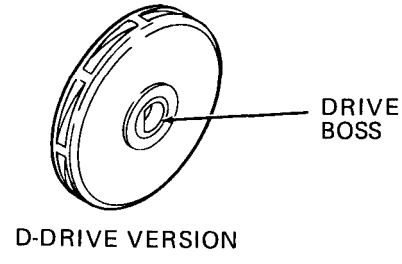
CAUTION

Running motor over one minute without a flow of liquid may cause permanent damage to the motor.



Step 2. Check for loose impeller on armature shaft. Remove field tube, armature, and impeller (paragraphs 2-18 and 2-19). Check impeller for worn or defective drive boss. If key-drive version, check for missing or broken drive key. If impeller is good, proceed to Step 3.

If impeller is defective, replace impeller per instructions and illustrations in paragraph 2-18.



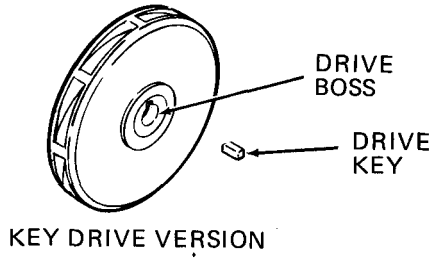


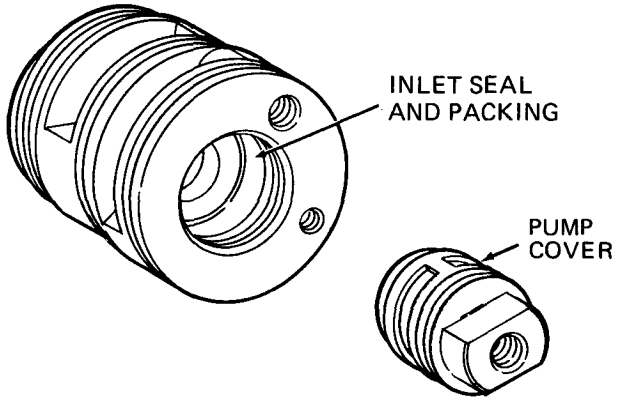
Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. MOTOR RUNS, NO FUEL FLOW OR PRESSURE (Cont)

Step 3. Check for missing inlet seal or packing. If inlet seal or seal packing is defective or missing, impeller will not take in fuel. Remove pump cover (paragraph 2-21). Check inlet seal and seal packing. If inlet seal and packing are good, proceed to Step 4.

If defective or missing, replace inlet seal and/or packing per the instructions and illustrations in paragraph 2-21.



Step 4. Check pump housing for faulty or jammed bypass valve.

Inspect ball and valve seat per instructions and illustrations in paragraph 2-13.

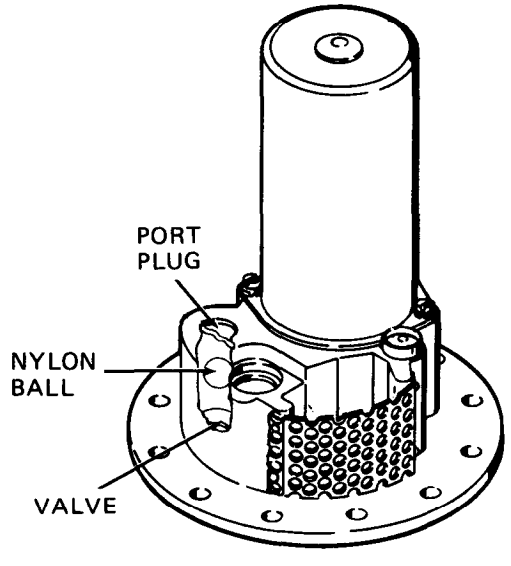


Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

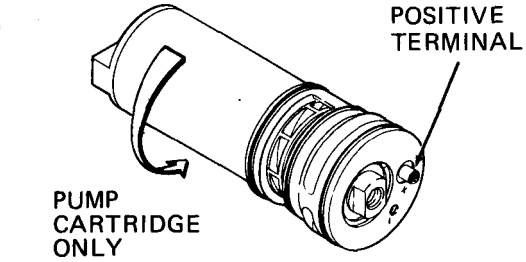
4. MOTOR RUNS, LOW FLOW AND/OR PRESSURE.

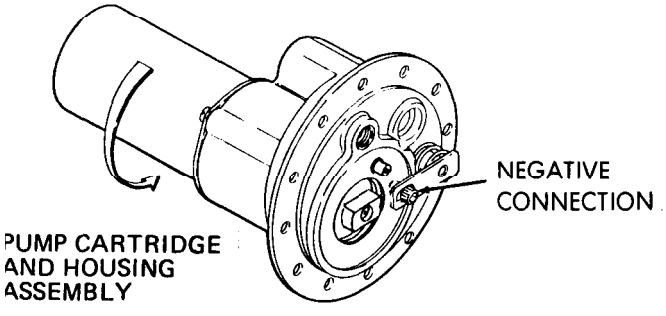
CAUTION

Running motor over one minute without a flow of liquid may cause permanent damage to the motor.

Step 1. Check for motor running backwards. Connect pump to 28 vdc power supply. Start pump and check that startup torque of motor is counterclockwise, as shown. If startup torque is clockwise, field tube is reversed on cartridge. If motor rotation is correct, go to Step 2 if checking assembled pump cartridge and housing assembly. If checking pump cartridge only go to Step 4.

Remove field tube and install correctly per instructions and illustrations in paragraph 2-18.

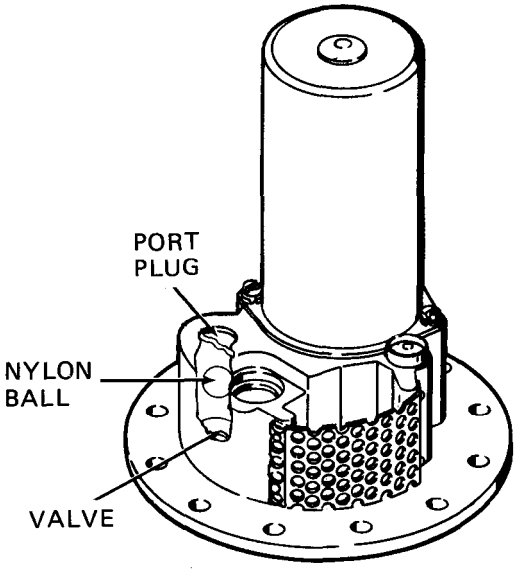




Step 2. Determine if low flow and/or pressure is due to malfunction in cartridge or housing assembly. Remove cartridge from housing per paragraph 2-10. Install cartridge in test tank per paragraph 2-25 and repeat flow test, Table 2-1, block 8 and pressure test Table 2-1, block 11.

If cartridge passes test, bypass valve in housing is defective. Inspect housing valve seat and ball per Step 3.

If cartridge fails test, isolate problem in cartridge; go to Step 4.



Step 3. Check for faulty or jammed bypass valve.

Inspect ball and valve seat per the instructions and illustrations in paragraph 2-13.

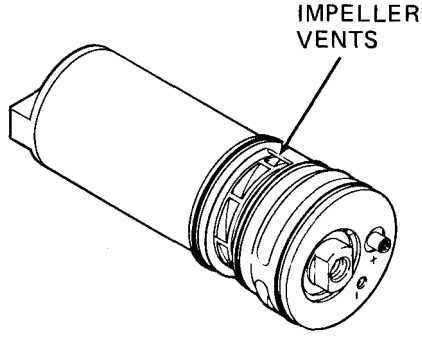
Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. MOTOR RUNS, LOW FLOW AND/OR PRESSURE (Cont)

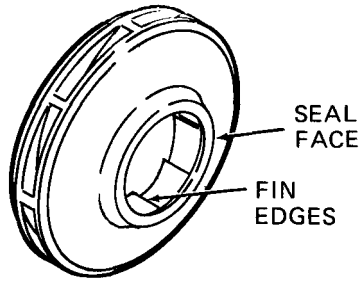
Step 4. Check for clogged impeller. Remove pump cartridge from housing (paragraph 2-10). Rotate impeller. Look for a buildup of slime in impeller vents. If no slime buildup is seen, proceed to Step 5.

If there is slime in the impeller vents, disassemble and clean pump components per paragraphs 2-11 through 2-24.



Step 5. Check impeller and seal face. Remove field tube, armature, and impeller (paragraphs 2-18 and 2-19). Look for grooved or dull seal face or worn impeller fins. If impeller and seal face is good, proceed to Step 6.

Inspect fin edges for damage. If defective, replace impeller per instructions and illustrations in paragraph 2-18. If impeller seal face looks grooved or dull, repair per instructions and illustrations in paragraph 2-19.



Step 6. Inlet seal or pump cover packings are damaged.

Replace preformed packings on inlet seal and pump cover packings per instructions and illustrations in paragraph 2-21.

5. PUMP STALLS UNDER LOAD

Step 1. Check for brushes not seating well on commutator. Remove pump cartridge from housing per paragraph 2-10. Check for shunt lead caught on spring. Inspect brush contact surface for wear and chips or cracks (secondary brushes paragraph 2-17; primary brushes paragraph 2-20). Check for brush springs out of place. If brushes, springs and shunt leads are good, proceed to Step 2.

If brush is not seating well on commutator, adjust shunt lead or spring positions, as needed. Inspect and replace worn, chipped, or cracked brushes per instructions and illustrations in paragraphs 2-17 and 2-20.

Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

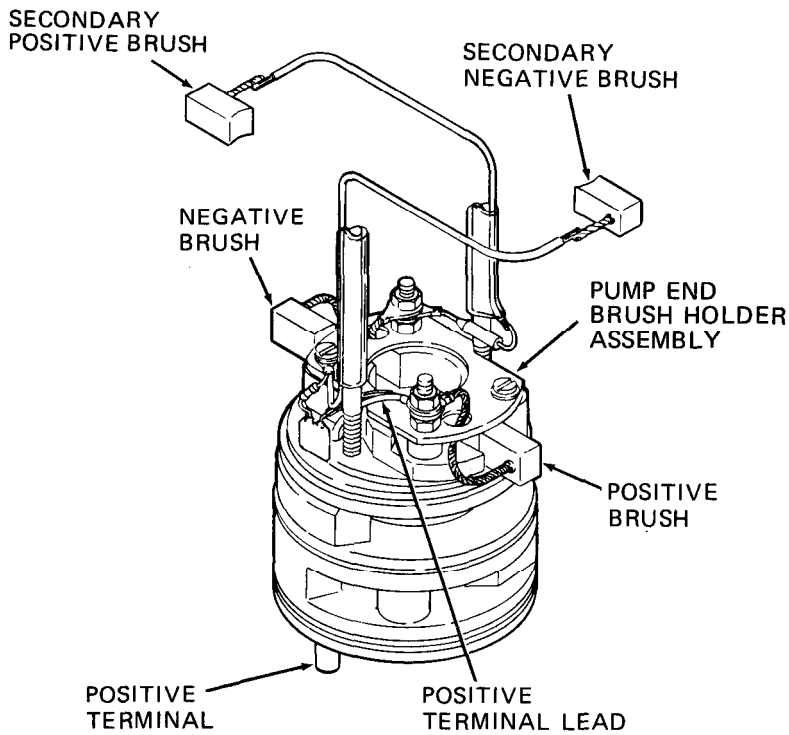
5. PUMP STALLS UNDER LOAD (Cont)

Step 2. Check for commutator arcing. Remove armature per paragraph 2-18. Check commutators for brown or gray buildup. Buildup is the result of bacteria in fuel. If buildup is seen, use 500 or 600 grit, wet or dry, emery paper to clean commutator (paragraph 2-18). Inspect commutator surfaces for pitting. If commutators are not pitted, proceed to Step 3.

If commutators are pitted, check other motor parts for pitting. Pitted components cannot be repaired and must be replaced.

Step 3. Check for worn or defective wiring. To check for incorrect wiring, compare wiring with illustration. Check terminals on pump-end brush holder assembly for loose or broken connections. Inspect for burned or worn leads. If wire and connections are good, proceed to Step 4.

Inspect and replace wiring and connectors per instructions and illustrations in paragraph 2-23.



Step 4. If brushes and wiring are good, armature is defective.

Inspect armature per instructions and illustrations in paragraph 2-18. If defective, replace armature.

Table 2-2. Maintenance Troubleshooting-Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. MOTOR DRAWS HIGH CURRENT

Step 1. Check pump cartridge assembly for binding. The field tube may be cocked on impeller housing. This would cause bearings to bind on the armature shaft. Use a thin piece of shim stock or fine paper to check for gaps. If no gaps are found, proceed to Step 2.

If a gap is found, the motor was not assembled properly. Motor bearings are probably damaged. Remove armature, field tube, and impeller from impeller housing (paragraphs 2-18 and 2-19). Inspect inside diameters of motor bearings for chipping or cracks per instructions and illustrations in paragraphs 2-16 and 2-22. Measure bearing bore diameters per inspection procedure. Replace bearings if damaged or not within dimensions.

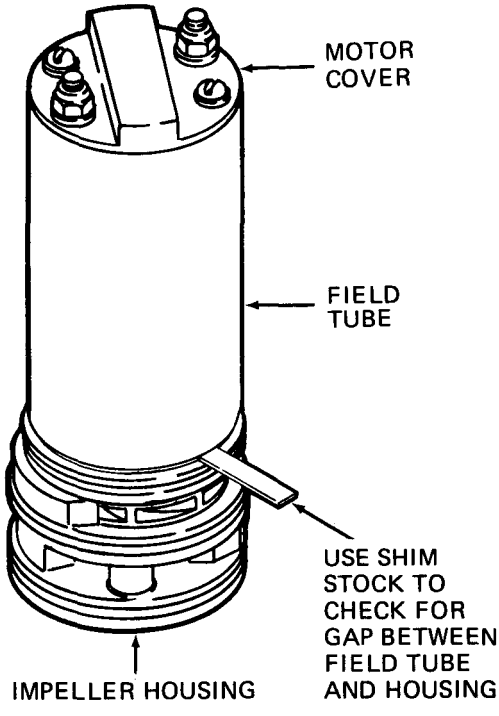


Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. MOTOR DRAWS HIGH CURRENT (Cont)

Step 2. Check for shorted brush circuit. Remove brushes from cover-end brush holder (paragraph 2-17). Use a multimeter to check for continuity between positive terminal, point A, and any point on the impeller housing. If circuit is not shorted; proceed to Step 3.

If brush circuit is shorted, inspect and repair per instructions and illustrations in paragraph 2-23. If brush circuit wiring is good, inspect for shorted positive terminal and lead per instructions and illustrations in paragraph 2-24. Repair or replace any defective components.

Step 3. If the motor assembly and wiring are good, armature is defective.

Inspect armature per instructions and illustrations in paragraph 2-18. Replace if defective.

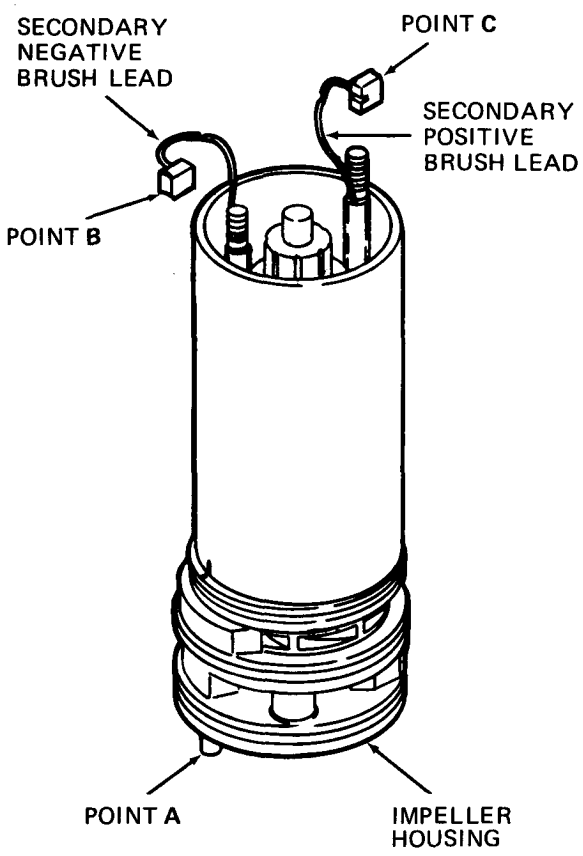


Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

7. MOTOR IS NOISY WHEN RUNNING

Step 1. Check motor housing for loose objects. Remove armature, field tube, and impeller (paragraphs 2-18 and 2-19). Check inside field tube for loose objects. Check for broken field tube magnets. If nothing is found, proceed to Step 2.

Loose objects within the cartridge are usually the result of broken field tube magnets. Inspect for damaged field tube, armature, and impeller per instructions and illustrations in paragraphs 2-18 and 2-19.

Step 2. If no loose objects were found in motor housing, the armature may be bent.

Inspect armature and field magnets for wear per instructions and illustrations in paragraph 2-18. Replace if defective.

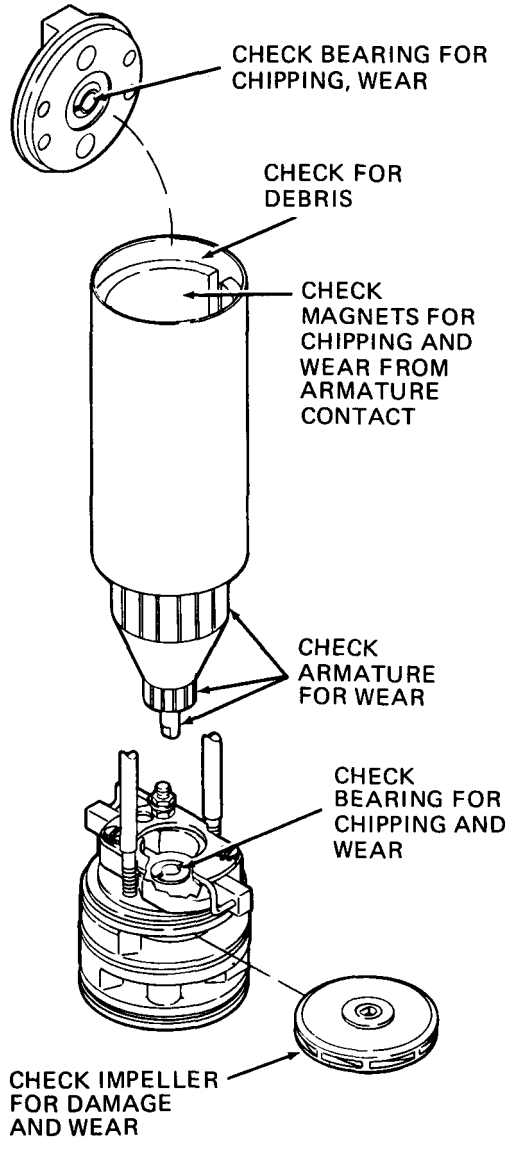


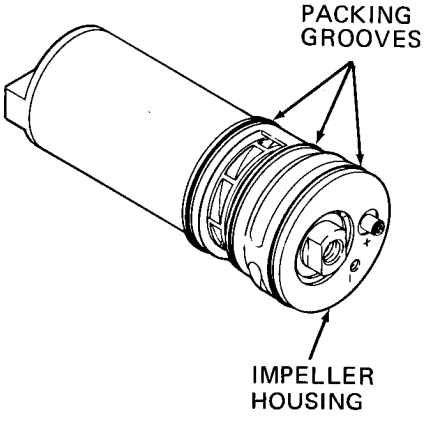
Table 2-2. Maintenance Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. PUMP ASSEMBLY LEAKS FUEL

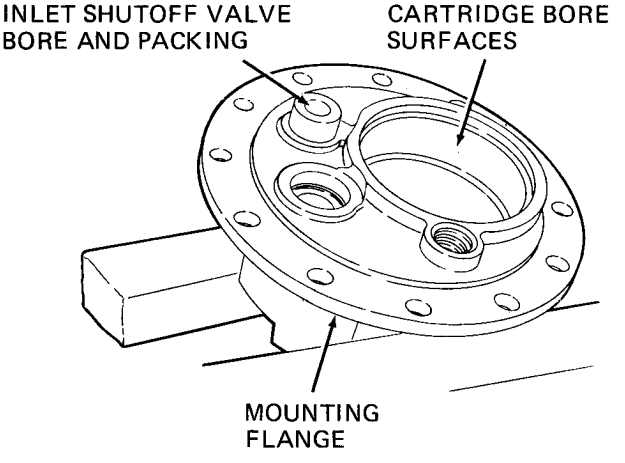
Step 1. Check packing grooves on cartridge. Remove pump cartridge from housing (paragraph 2-10). Remove preformed packings from packing grooves. Run your finger along the packing groove in the impeller housing. Feel for any scratches or sharp edges that may damage preformed packing. If no defects are found, go to Step 2.

Replace or repair damaged impeller housing per instructions and illustrations in paragraph 2-24.



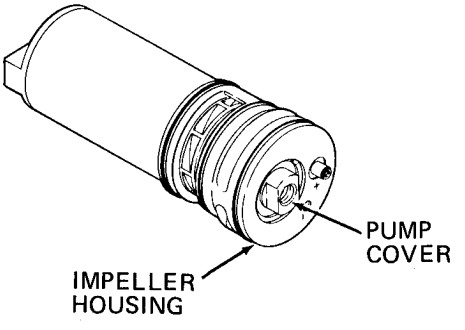
Step 2. Check cartridge bore surfaces in pump housing. Using a flashlight, visually inspect cartridge bore surfaces in pump housing for nicks, burrs, or scratches. Inspect exposed surfaces of housing for cracks. Visually check the mounting flange for nicks, burrs, or scratches. If no defects are found in pump housing/mounting flange, go to Step 3.

If damaged, inspect and repair pump housing/mounting flange per instructions and illustrations in paragraph 2-15.



Step 3. Check packing seal between inlet shutoff valve stem and pump housing. Remove and inspect shutoff valve (paragraph 2-14). Visually check valve stem and packing groove in pump housing for burrs or scratches. If not defective, go to Step 4.

If damaged, replace or repair pump housing or valve stem per instructions and illustrations in paragraph 2-14.



Step 4. Check for faulty seal between pump cover and impeller housing. Remove, clean, and inspect pump cover per paragraph 2-21. Check condition of packing groove.

If defective, repair or replace per instructions and illustrations in paragraph 2-21.

SECTION IV. MAINTENANCE PROCEDURES

2-9. General Maintenance Procedures.

a. Maintenance of the fuel boost pump is provided individually for the pump housing assembly and for the pump cartridge assembly. In most cases only the pump cartridge will be forwarded to AVIM for maintenance procedures. The housing will remain installed on the aircraft. In the case where the pump cartridge and housing assembly are forwarded as a complete assembly, the cartridge and housing must be separated before maintenance procedures are performed on either one.

b. When a maintenance procedure is required, instructions will usually be limited to removal of the part being repaired or replaced. The equipment must meet the condition requirements before the task is started. This will usually mean disassembling the component as described in the referenced task to uncover the items referenced by your maintenance task.

c. Before beginning the task, read and become familiar with the task. Bring all the tools, materials, and parts listed to the work site before you begin the task.

MAINTENANCE TASK INDEX

2-10. PUMP AND HOUSING ASSEMBLY - INSPECT/REPLACE/REPAIR 2-10

This task covers: Removal and installation of the pump cartridge in the housing. It also covers repair of the pump electrical cable assembly.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Brush, Soft Bristle, Cleaning
Multimeter, NSN 6625-00-168-0585, or equivalent
Cartridge Pulling Tool (Item 4, Appendix D)

Personnel Required:
68F Aircraft Electrician

Material/Parts:
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
White Petrolatum, NSN 6505-00-133-8025
Preformed Packing, 2req, NSN 5330-00-435-9355
Preformed Packing, NSN 5330-00-410-4887

NOTE

No inspection or repair of the pump cartridge or housing is covered in this task. Procedures are limited to removal and installation of the pump cartridge in the housing and repair of the pump cable assembly. For inspection and repair of either the cartridge or housing, refer to the applicable maintenance task.

1. CLEANING

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Wash fuel boost pump (1) in dry cleaning solvent (Item 7, Appendix C). Use soft bristle brush to remove dirt from recessed areas. Use non-woven cleaning cloth (Item 1, Appendix C) to wash outside surfaces.

GO TO NEXT PAGE

b. Drain any excess fuel and solvent from drain port (2).

c. Blow-dry outer surfaces of pump with compressed air, 30 psi (207 KPa) maximum.

2. REMOVAL

a. If cable assembly (3) is attached, lift rubber insulator boot from positive terminal. Unscrew connector from positive terminal.

CAUTION

Apply pressure directly over valve spring when opening or closing valve stem assembly. Trying to compress valve spring from free end of valve arm will cause valve arm to bend. When removing or installing shoulder screw, keep valve arm depressed.

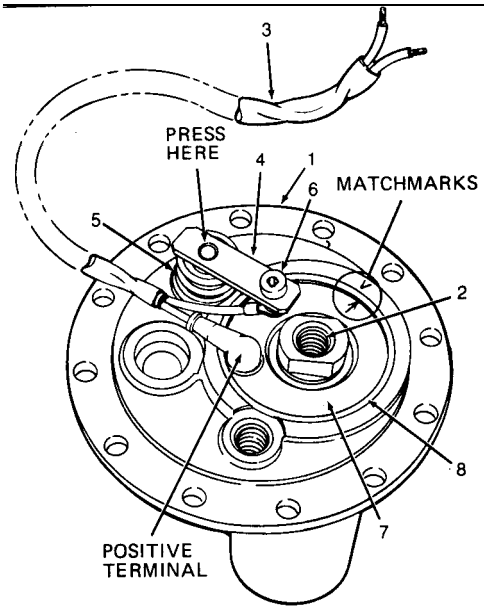
b. Place thumb on valve stem assembly (4), above spring (5). Press valve stem assembly (4) in toward pump housing.

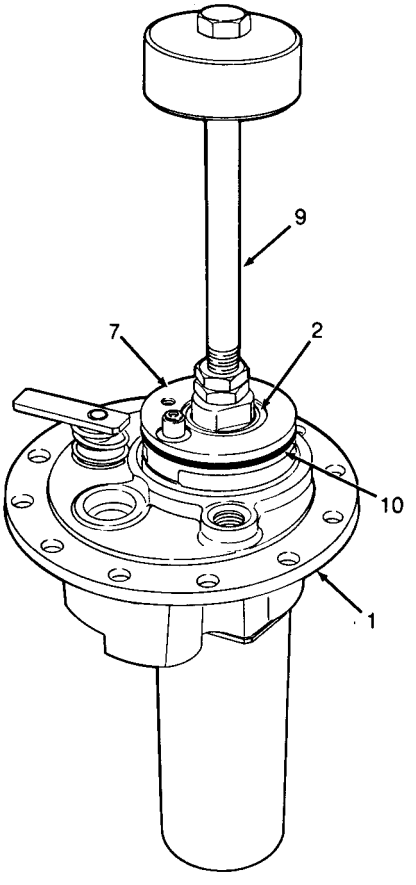
c. Unscrew shoulder screw (6). Remove cable assembly (3). Rotate valve stem assembly (4) away from cartridge (7).

d. Using a small screwdriver, pry end of retaining ring (8) from seat in pump housing (1). Place screwdriver tip between retaining ring and pump housing. Rotate pump housing counterclockwise to remove retaining ring.

e. Screw cartridge pulling tool (9) (Appendix D) into drain port (2). Slide hammer of pulling tool (9) against bolt head to remove cartridge (7) from fuel boost pump (1). Unscrew pulling tool from cartridge.

f. Use a wooden or plastic probe to remove packings. Do not use a screwdriver or other sharp metal tool. Remove three preformed packings (10) from pump cartridge (7). Discard packings; they cannot be reused.





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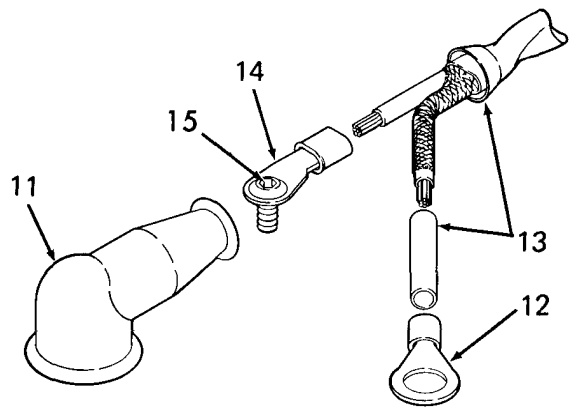
3. INSPECT/REPAIR CABLE ASSEMBLY

a. Remove insulator boot (11) from positive lead. Visually inspect insulator boot (11) for cuts, cracking, or other damage. Replace damaged boot.

b. Using a multimeter, check for continuity between lug terminal (12), and end of white negative wire lead. If open, replace ground wire terminal and heat shrink tube (13) (Item 1, Appendix B, Bulk Items List). Crimp both cable shield wire and ground wire in new lug terminal (12).

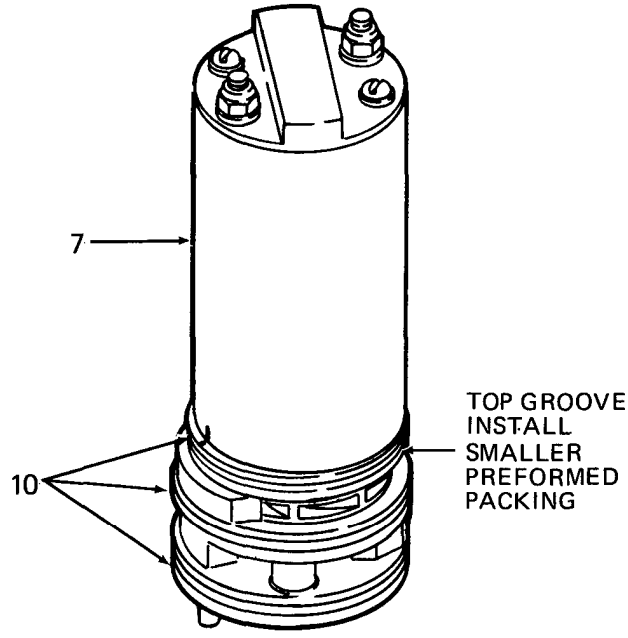
c. Using multimeter, check between terminal (14) and end of black positive wire lead. If open, replace terminal (14).

d. Check general condition of all wiring. If wiring or heat-shrink tubing is cracked, broken, or otherwise damaged, repair as necessary.



4. INSTALLATION

a. Apply a thin coating of petrolatum (Item 6, Appendix C) to preformed packings (10). Install smaller preformed packing into top groove, and remaining packings in lower two grooves in cartridge (7).



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CAUTION

Do not use cartridge pulling tool for cartridge installation. Use thumb pressure only.

b. Slide cartridge (7) half way into pump housing (1). Align matchmarks on pump housing and cartridge. Using thumb pressure only, push firmly on cartridge until it is fully seated on housing.

c. Install one end of retaining ring (8) into ring groove in pump housing (1). Hold end of retaining ring in groove. Use index finger to spiral retaining ring into groove, a little at a time.

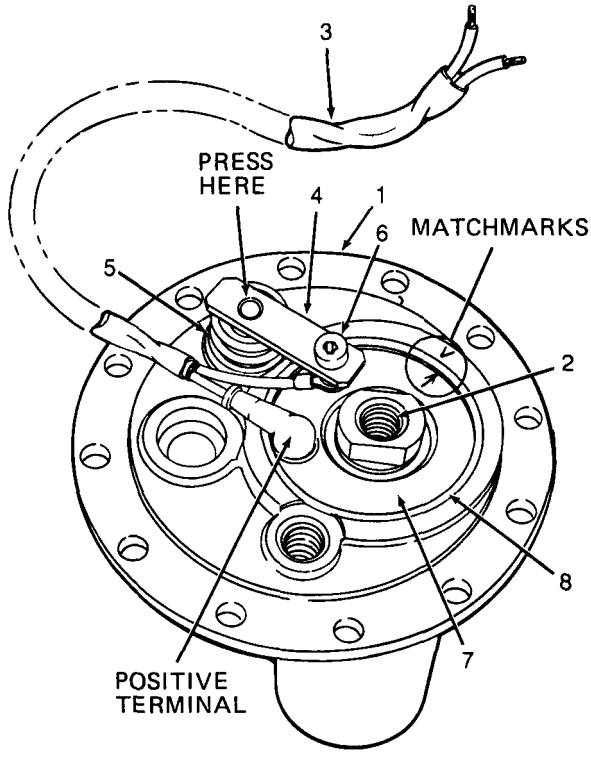
CAUTION

Apply pressure directly over valve spring when opening or closing valve stem assembly. Trying to compress valve spring from free end of valve arm will cause valve arm to bend. When removing or installing shoulder screw, keep valve arm depressed.

d. Place thumb on valve stem assembly (4) above spring (5). Press valve stem assembly (4) in toward pump housing.

e. Insert lug terminal (12) of cable assembly (3) between valve arm and cartridge. Install shoulder screw (6) and tighten.

f. Connect ring terminal (14) to cartridge positive terminal with screw (15). Slip insulator boot (11) over terminal.



NOTE

FOLLOW-ON MAINTENANCE: Perform final testing (paragraph 2-25).

END OF TASK

2-11. PUMP CANISTER - INSPECT/REPLACE 2-11

This task covers: Inspection and replacement of the pump housing canister.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Wire Brush, NSN 7920-00-291-5815

Personnel Required:
68F Aircraft Electrician

Ecquipment Condition:
Pump cartridge removed from housing PARA 2-10

Material/Parts:
Thread Locking Compound, NSN 8030-00-111-2762
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
500 or 600 grit, wet or dry, emery paper
White Petrolatum, NSN 6505-00-133-8025
Preformed Packing, NSN 5330-00-476-7406
Umbrella Check Valve, NSN 4510-01-070-5681

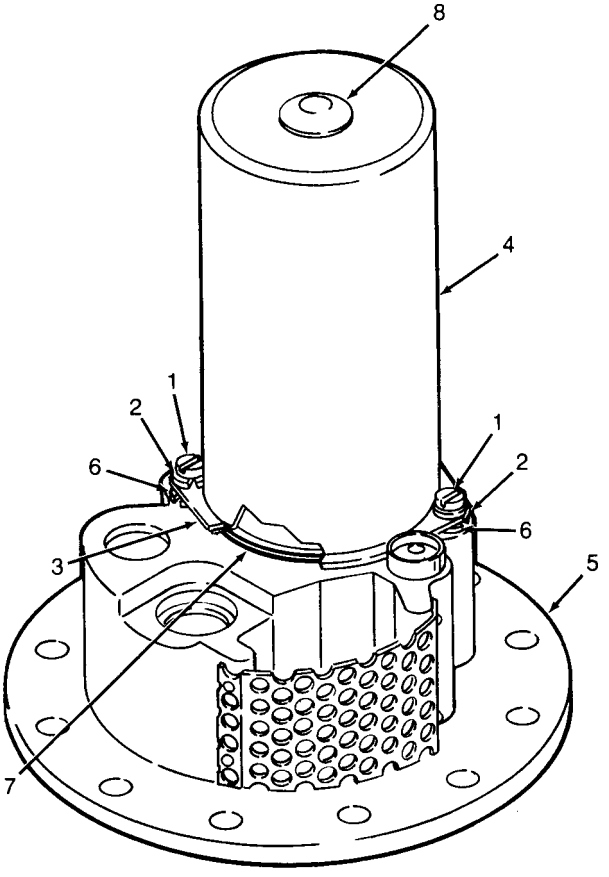
1. REMOVAL

a. Remove machine screws (1) and lockwashers (2).

b. Lift canister flange (3) and pump canister (4) from pump housing (5).

c. Remove spacer washers (6). Remove preformed packing (7) from packing groove in pump housing. Discard preformed packing.

d. Remove umbrella check valve (8) from pump canister (4) and discard check valve.



2. CLEANING

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Rinse pump canister (4), canister flange (3), and spacer washers (6) in dry cleaning solvent (Item 7, Appendix C). Wipe off and dry parts with nonwoven cleaning cloth (Item 1, Appendix C).

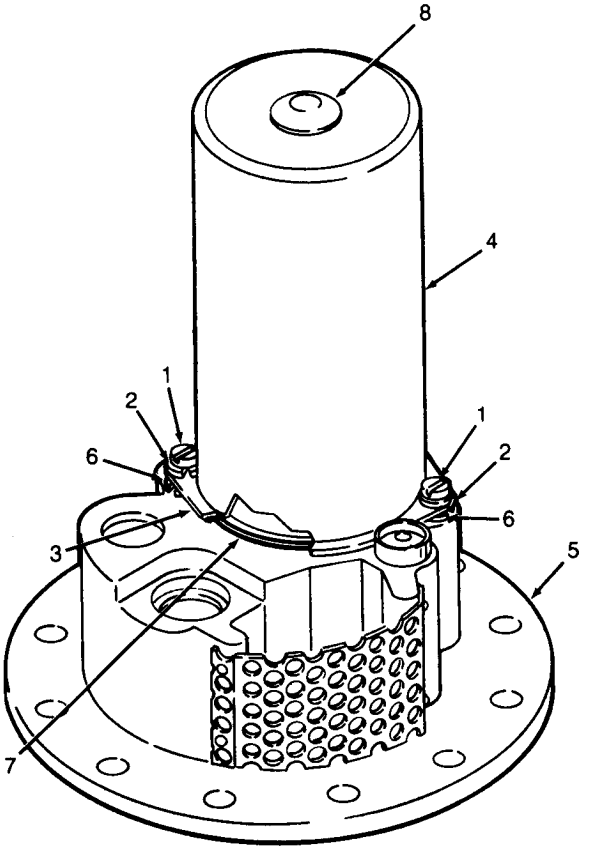
GO TO NEXT PAGE

b. Locking compound was used to secure machine screws (1) in housing. Use wire brush to clean locking compound residue from screw threads.

CAUTION

Do not use glass or metal tools to scrape dirt or locking compound from pump housing surfaces. Scraping with metal or glass will destroy the thin, protective coating on the housing. This could lead to leaks or early failure of the pump.

c. Clean packing groove in pump housing using a non-woven cleaning cloth dipped in dry cleaning solvent. Remove all deposits from packing groove. If any scraping is required, do not use metal scrapers. Use only plastic or wood to scrape pump housing surfaces.



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2-11. PUMP CANISTER - INSPECT/REPLACE (Cont) 2-11

3. INSPECTION

a. Run your finger along the packing groove in the pump housing. Feel for any scratches or sharp edges that may damage preformed packing. Remove sharp edges of nicks or scratches using a 500 or 600 grit, wet or dry, emery paper. After sanding, clean surface with solvent.

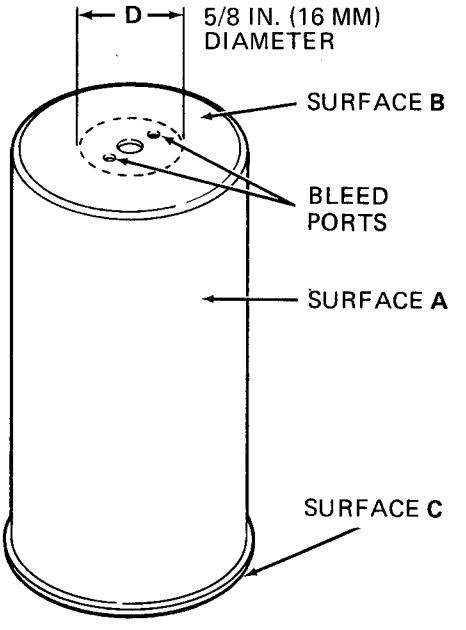
b. If edge of packing groove is broken off replace pump housing per the instructions and illustrations in paragraph 2-15.

c. Visually inspect canister wall (surface A) and top (surface B) for dents. If there is any dentin surface, discard canister.

d. Place canister with flange down, on a flat surface. Check for any twisting, warping or damage that would prevent flange seating flush on surface. If any portion of flange surface C is raised from flat surface, discard canister.

e. Inspect umbrella seating surface, area D, for nicks or scratches. If nick or scratches cannot be completely removed by polishing with 500 or 600 grit, wet or dry emery paper, replace canister. When polishing sealing surface, moisten emery paper with water. Wipe surface clean with solvent.

f. Inspect canister bleed ports for blockage. Remove any blockage using a wooden toothpick, or similar object.



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2-11. PUMP CANISTER - INSPECT/REPLACE (Cont) 2-11

4. INSTALLATION

a. Lubricate stem of new umbrella check valve (8) with petrolatum (Item 6, Appendix C).

b. Insert umbrella stem in center hole, over canister bleed ports. Use needle-nose pliers to reach inside canister and grip umbrella stem.

c. While pushing on top of umbrella with index finger, pull umbrella stem gently with pliers, working the stem from side to side. Pull until stem bulb pulls through.

CAUTION

Be sure to cut off the stem of the canister bleed port umbrella. If not removed, the umbrella stem may block a motor cover bleed port and cause the motor to overheat.

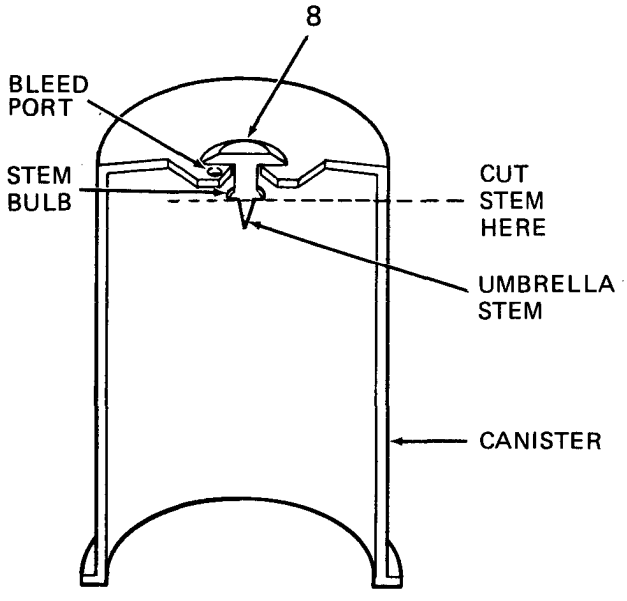
d. Use scissors or long nose cutters to cut off umbrella stem, just below bulb. Don't cut off the stem bulb; the bulb holds umbrella check valve (8) in place.

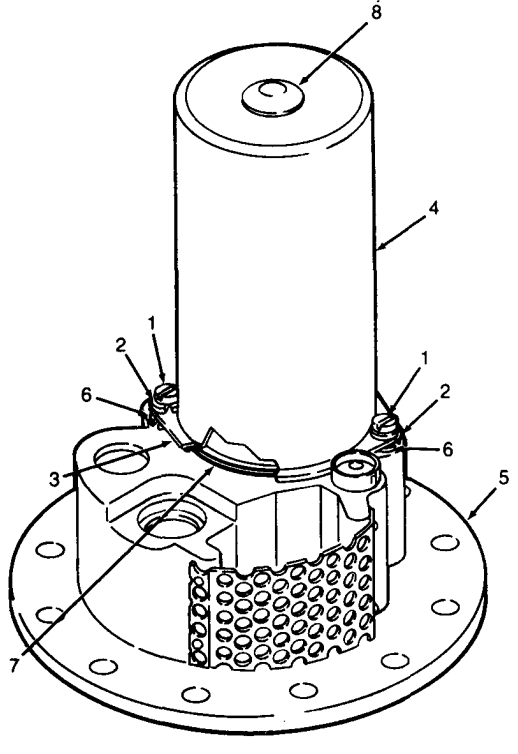
e. Lubricate new preformed packing (7) with petrolatum (Item 6, Appendix C). Apply a thin, even coating. Install packing in packing groove.

f. Place spacer washers (6) over flange mounting holes. Position with cut-out part of spacer facing preformed packing (7).

g. Place pump canister (4) on housing. Install canister flange (3) over canister, with beveled edge down, Align screw holes.

h. Check for proper position of spacer washers (6). Apply one drop of thread locking compound (Item 3, Appendix C) to threads of machine screws (1). Install lockwashers (2) and machine screws (1), and tighten.





NOTE

FOLLOW-ON MAINTENANCE: Install pump cartridge in housing (paragraph 2-10).

END OF TASK

2-12. VAPOR BLEED VALVE - INSPECT/REPLACE 2-12

This task covers Inspection and replacement of the vapor bleed valve.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Press Arbor, Hand Operated. 1/2 Ton Pressure, NSN 3444-00-243-2654, or equivalent

Personnel Required:
68F Aircraft Electrician
68D Powertrain Repairer

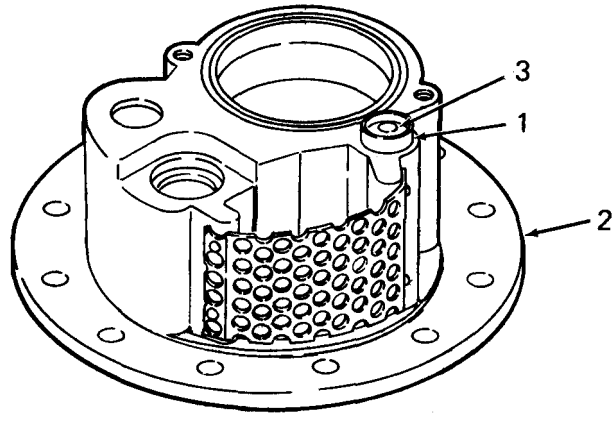
Equipment Condition:
Canister removed from pump housing PARA 2-11

Material/Parts:
Thread Locking Compound, NSN 6505-00-133-8025
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
White Petrolatum, NSN 6505-00-133-8025
500 or 600 grit, wet or dry emery paper
Dry Cleaning Solvent, NSN 6850-00-274-5421
Umbrella Check Valve, NSN 4510-01-170-5681

1. REMOVAL

CAUTION

Do not replace umbrella check valve without removing vapor bleed valve adapter plug from pump housing. Pulling umbrella check valve without removing adapter plug may lead to pump failure due to vapor bleed hole blockage.



a. Use a screwdriver with cloth or other padding over the blade. Keep screwdriver blade fully under shoulder of adapter plug. Be careful not to damage adapter plug or housing. Pry a little on one side, then the other to remove adapter plug (1) from pump housing (2).

b. Remove and discard umbrella check valve (3).

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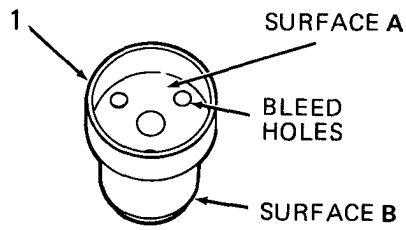
2. CLEANING

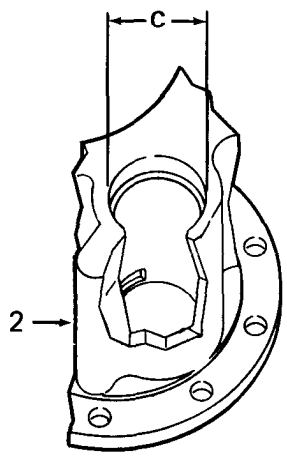
CAUTION

Do not use glass or metal tools to scrape dirt or locking compound from pump housing surfaces. Scraping with metal or glass will destroy the thin, protective coating on the housing. This could lead to leaks or early failure of the pump.



a. Locking compound was used to seal adapter plug (1) in pump housing (2). Scrape residue from sleeve of adapter plug. Use plastic or wood scraper to remove residue from adapter plug sleeve.

b. Use a wooden or plastic scraper and remove any locking compound from bleed valve bore.



WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

c. Wash adapter plug (1) and pump housing (2) in dry cleaning solvent (Item 7, Appendix C). Take care to clean adapter plug bleed holes thoroughly.

d. Using compressed air, 30 psi (207 kPa) maximum, blow valve bore out and rinse with cleaning solvent.

GO TO NEXT PAGE

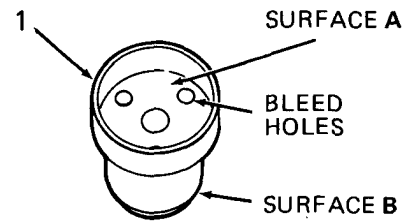
e. Using a clean cloth moistened with cleaning solvent, wipe inside of adapter seat. Make sure all contamination and dirt is removed from valve bore.

3. INSPECTION

a. Inspect bleed holes in adapter plug (1) for blockage.

b. Visually inspect umbrella check valve seating surface A for any scratches or nicks. Use 500 or 600 grit, wet or dry emery paper and polish out any defects. Surface must be visually free of any scratches or nicks.

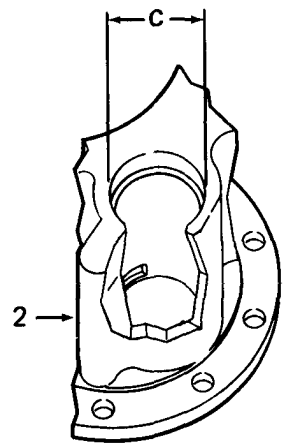
c. Visually inspect adapter sleeve surface B for any dents, nicks, or scratches. If dented discard. If nicked or scratched, polish surface with 500 or 600 grit, wet or dry emery paper to remove any sharp or raised edges.



d. Visually inspect diameter C of bleed valve bore in housing. Finish must be free of any scratches or nicks with raised edges that would interfere with adapter seating. If scratched, polish with 500 or 600 grit, wet or dry emery paper to remove any raised edges.

e. After sanding, clean with a clean cloth and solvent.

f. Check fit of adapter plug in seat. If adapter plug slides in and out of bore by hand, replace adapter plug. If new adapter still slides in and out of bore by hand replace housing.



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4. INSTALLATION

a. Lubricate stem of umbrella check valve **(3)** with petrolatum (Item 6, Appendix C).

b. Gently pull umbrella stem and bulb through center hole of adapter plug (1). Be careful not to break stem from umbrella. Check that umbrella lies flat against bleed holes in adapter plug.

CAUTION

Place housing support block close to valve bore when pressing adapter plug (l). Failure to place support blocks correctly may lead to warping of housing mounting flange.

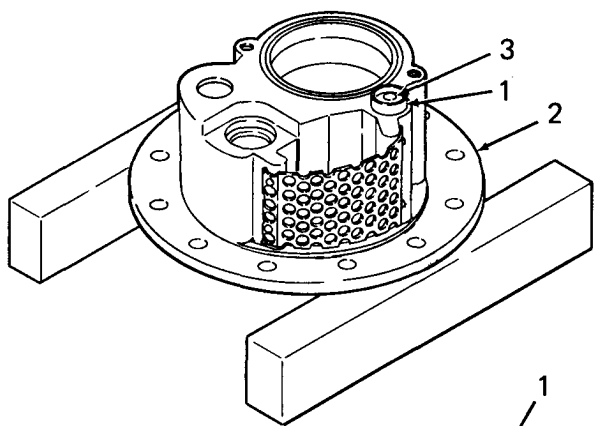
c. Place pump housing (2) on hand operated arbor press. Use parallel blocks under the pump mounting flange to support housing.

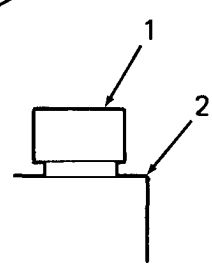
d. Apply locking compound (Item 5, Appendix C) to adapter plug (1). Place one drop on beveled edge of insert sleeve.

CAUTION

Adapter plug must be pressed straight into plug seat. If adapter plug is allowed to tilt, damage may result to both the adapter plug and valve bore.

e. Position adapter plug (1) over seat in pump housing (2). Bring arbor down to meet adapter plug, Square top edge of adapter plug with arbor face. Gently press adapter plug into bore until fully seated.





PRESS ADAPTER PLUG (1) GENTLY INTO HOUSING (2) UNTIL FULLY SEATED ONLY. ADAPTER WILL NOT PRESS FLUSH INTO HOUSING.

NOTE

FOLLOW-ON MAINTENANCE: Install canister on pump housing (paragraph 2-11).

END OF TASK

2-13. BYPASS VALVE - REPLACE 2-13

This task covers: Removal and replacement of bypass valve.

INITIAL SETUP

Tools
Aircraft Electrician's Tool Kit,NSN 5180-00-323-4915
Drill, Hand Electric, 1/4 Inch Size,
NSN 5130-00-889-8994, or equivalent
Twist Drill, No. 4, NSN 5133-00-189-9249
Die And Tap Set, NSN 5136-00-357-7504
Cartridge Pulling Tool, Item 4, Appendix D
Pulling Tool Adapter, Item 3, Appendix D
Cold Chisel, 1/4 Inch Cut, NSN 5110-00-234-1927
Press Arbor, Hand Operated, 1/2 Ton Pressure,
NSN 3444-00-243-2654, or equivalent
Center Punch, NSN 5120-00-223-1015

Material/Parts:
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
500 or 600 grit, wet or dry emery paper
Tape
Disk, Solid, NSN 2040-01-170-6502
Nylon Ball, NSN 2040-01-170-6502

Equipment Condition:
Canister removed from pump housing PARA 2-11

Personnel Required:
68F Aircraft Electrician
68D Powertrain Repairer

1. REMOVAL

a. Plug all open ports in pump housing (l). Clean rags can be used as packing material. Cover small openings with tape.

CAUTION

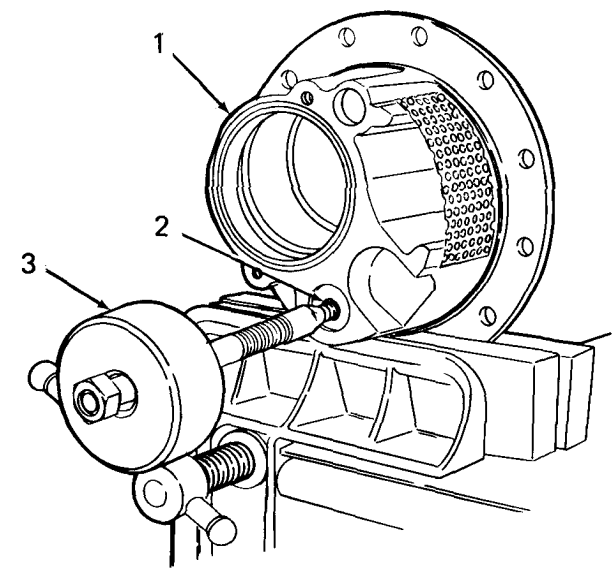
Always use plastic jaws or padding to hold pump housing in vise. Failure to use soft jaws may damage the housing.

b. Secure flange of pump housing in soft-jawed vise. Support housing by mounting near the bypass valve port, as shown.

c. Using a center punch, lightly punch drill starting point at about center of solid disk (2).

d. Use a number 4 drill bit and drill through center of solid disk (2). Gently drill until drill bit just breaks through disk. Tap hole with 1/4-28 tap.

e. Install pull tool adapter (Figure 3, Appendix D) on cartridge pulling tool (Figure 4, Appendix D). Thread pulling tool (3) into port plug solid disk (2). Slide hammer of pulling tool against bolt head to remove disk. Remove and discard port plug disk. Remove nylon ball from pump housing.



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f. Use a small round fine tooth file to remove staking burrs from plug bore. Remove only enough of the burrs to smooth-out the bore diameter.

2. CLEANING

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well-ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Remove packing materials from housing ports. Be careful that metal chips do not fall into open ports of pump housing.

b. Wash pump housing in dry cleaning solvent (Item 7, Appendix C). Blow-dry with compressed air, 30 psi (207 kPa) maximum. Take care that all metal chips are washed from pump housing.

3. INSPECTION

a. Visually inspect nylon ball seating surface. Replace housing if nicked or chipped.

b. If scratches cannot be removed using 500 or 600 grit, wet or dry emery paper, replace housing.

c. Visually inspect nylon ball. If ball is nicked or damaged, replace nylon ball.

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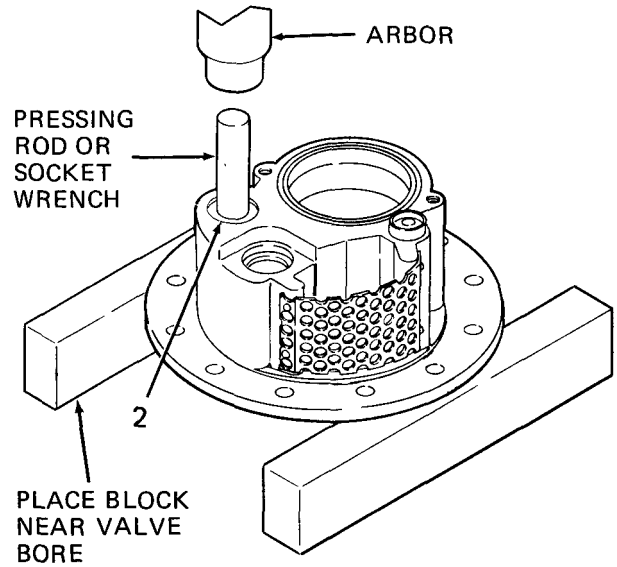
4. INSTALLATION

CAUTION

Place housing support block close to valve bore when pressing and staking solid disk (2). Failure to place support blocks correctly may lead to warping of housing mounting flange.



a. Place nylon ball in valve bore. Position pump housing (1) on hand operated arbor press. Place parallel blocks under mounting flange to support housing evenly.

b. Position new port plug solid disk (2) over valve bore. Gently press port plug disk into bore until seated. If necessary, use a round dowel or socket slightly smaller than port plug disk to press disk into housing.

c. Use a 1/4 inch cold chisel or similar tool to lightly stake port plug disk (2) in valve bore. Stake in three places, equal in distance from one-another. Locate new staking points away from old staking points.

d. Shake housing to check that ball is free to move in valve bore.

NOTE

FOLLOW-ON MAINTENANCE: Install canister on pump housing (paragraph 2-11).

END OF TASK

2-14. INLET SHUTOFF VALVE - INSPECT/REPLACE 2-14

This task covers Inspection and replacement of inlet shutoff valve.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Square, Combination, NSN 5210-00-078-8949, or equivalent
Torque Wrench, 30-150 inch lb., NSN 5120-00-542-4489, or equivalent

Personnel Required:
68F Aircraft Electrician

Material/Parts:
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
White Petrolatum, NSN 6505-00-133-8025
500 or 600 grit, wet or dry emery paper
Self Locking Nut, NSN 5310-00-934-9747
Preformed Packing, NSN 5330-00-248-3836

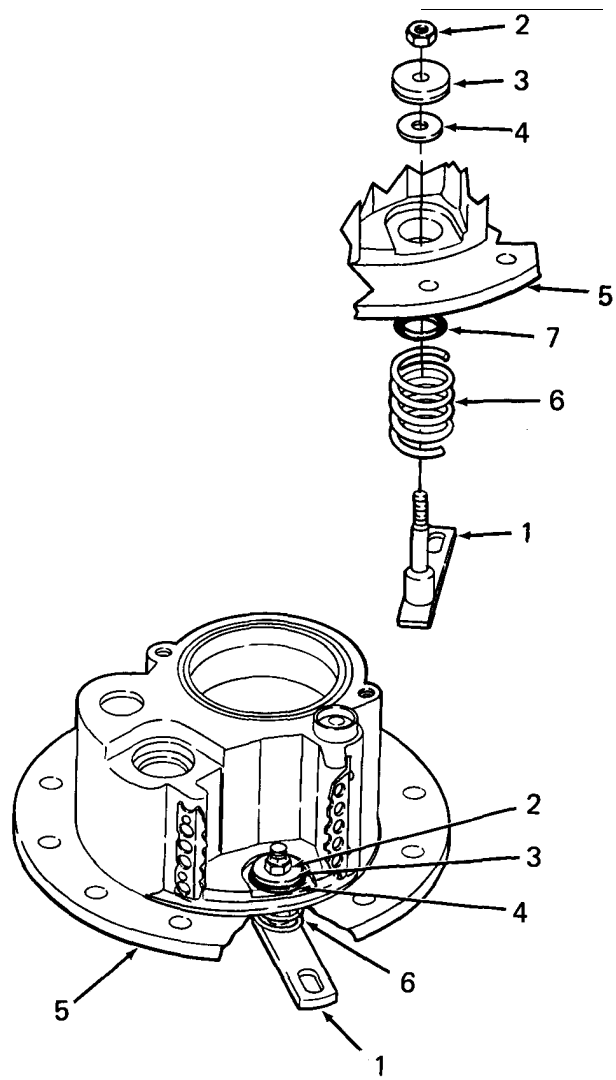
Equipment Condition
Canister removed from pump housing PARA 2-11

1. REMOVAL

a. Hold arm of valve stem assembly (1) and remove self-locking nut (2).

b. Remove seal disk assembly (3) and washer (4) from valve stem.

c. Remove valve stem assembly (1) from pump housing (5). Remove spring (6).



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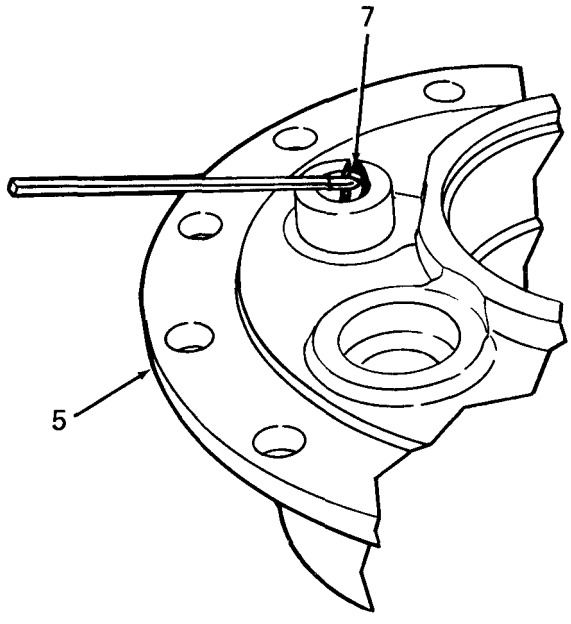
CAUTION

Do not use metal probe to remove preformed packing from valve stem bore. Scratching or scoring valve stem bore may cause pump to leak fuel.

d. Remove preformed packing (7) from valve stem bore in pump housing (5). Use sharpened lead pencil, toothpick, or plastic probe to remove packing from seat. Do not use any metal probe that might score packing seat.



2. CLEANING

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Wash pump housing and valve parts in dry cleaning solvent (Item 7, Appendix C).

b. Blow-dry valve stem bore with compressed air, 30 psi (207 kpa) maximum.

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3. INSPECTION

a. Place valve stem in a combination square as shown. Visually check that stem is at an approximate 90° angle with valve arm. If valve stem is not parallel with arm of square, replace valve stem assembly.

b. Check valve arm. If valve arm is bent, straighten it.

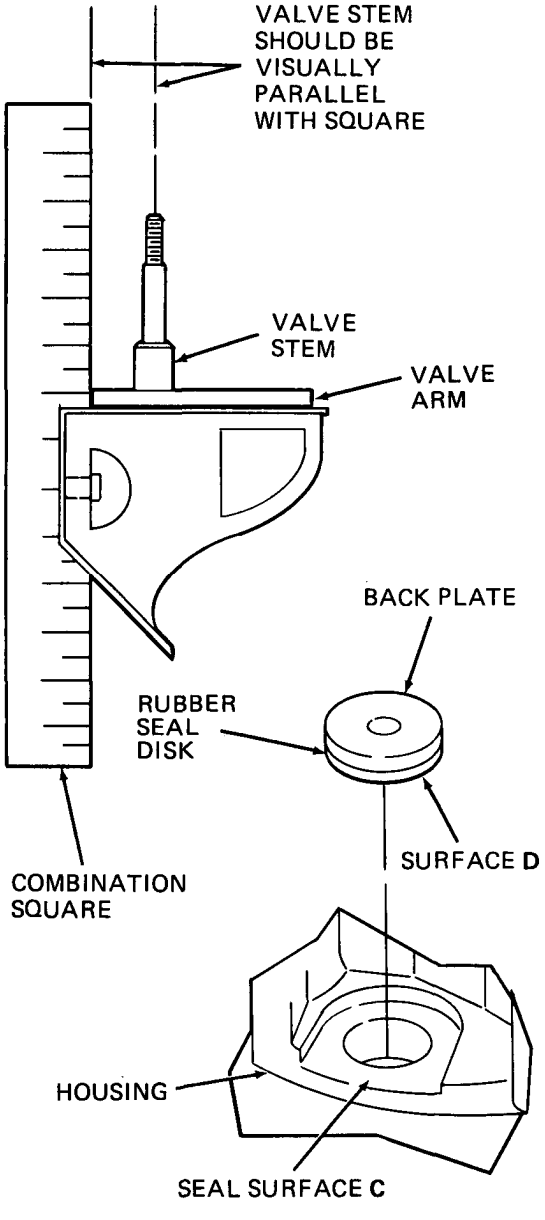
c. Visually inspect valve seal surface C for scratches or burrs. If sharp edges cannot be removed from scratches or burrs using 500 or 600 grit, wet or dry emery paper, replace pump housing.

d. Visually check valve stem for crossed, stripped, or flattened threads. If damaged, replace valve stem.

e. Check rubber seal disk, surface D, for cracks, glazing, or uneven surface. A glazed surface is hard and shiny. If surface D is cracked, uneven, or glazed, replace seal disk assembly.

f. Check bond between rubber seal disk and backplate. If seal disk is separated from backplate, replace seal disk assembly.

g. Using a flashlight visually check packing groove in valve stem bore for any appearance of nicks or damage. If packing groove is damaged, replace housing.



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4. INSTALLATION

a. Apply a thin coating of petrolatum (Item 6, Appendix C) to preformed packing (7). Install packing in valve stem bore of pump housing (5). Make sure packing is fully seated in packing groove.

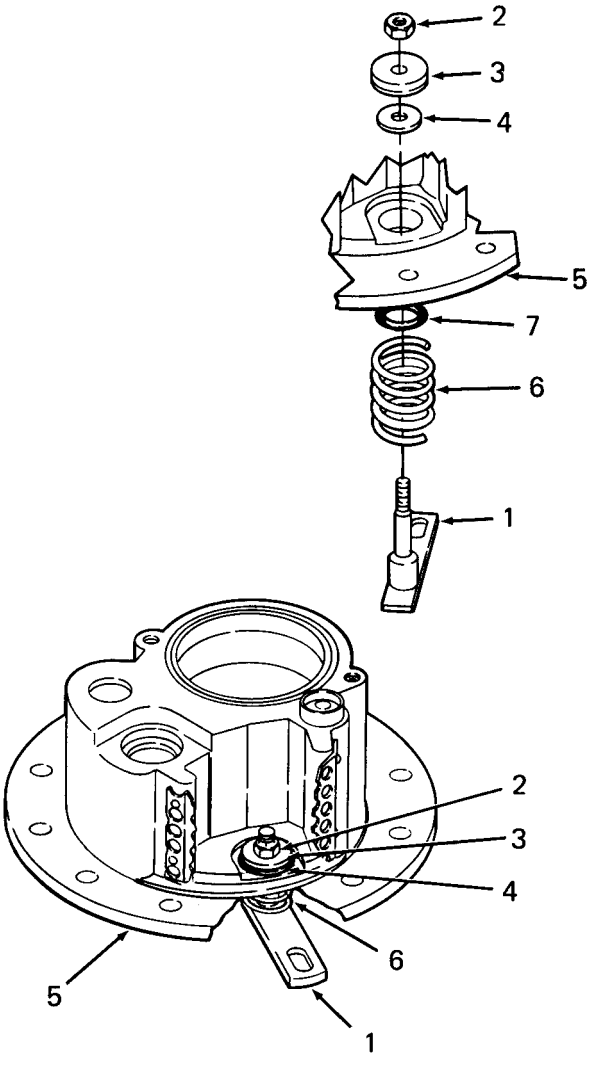
b. Apply a thin coating of petrolatum to valve stem. Install spring (6) over valve stem assembly (1). Insert valve stem into pump housing (5). Rotate valve stem when installing to avoid pinching preformed packing.

CAUTION

When pushing valve stem into bore, apply pressure at base of valve stem, only. Applying pressure at free end of valve arm will cause valve arm to bend.

c. Depress valve stem and spring (6). Apply pressure to base of valve stem. Keep valve stem assembly (1) fully pressed into pump housing (5).

d. Install washer (4) on threaded end of valve stem assembly (l). Install seal disk assembly (3) over washer (4). Install self-locking nut. Torque plain nut (2) to 6 inch-pounds (0.678 N·m).



NOTE

FOLLOW-ON MAINTENANCE: Install canister on pump housing (paragraph 2-11).

END OF TASK

2-15. PUMP HOUSING / MOUNTING FLANGE - INSPECT/REPAIR 2-15

This task covers Inspection and repair of the housing mounting flange, cartridge bore, and inlet screen.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit,
NSN 5180-00-323-4915
Cold Chisel, 1/4 Inch Cut, NSN 5110-00-234-1927
Twist Drill, No. 43, NSN 5133-00-189-9288
Drill, Hand Electric, 1/4 inch size,
NSN 5130-00-889-8994, or equivalent

Personnel Required:
68F Aircraft Electrician

Material/Parts:
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
500 or 600 Grit, Wet or Dry Emery Paper
Dry Cleaning Solvent, NSN 6850-00-274-5421
Locking Compound, NSN 8030-00-180-6222

Equipment Condition
Canister removed from pump housing PARA 2-11

1. CLEANING

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Wash pump housing in dry cleaning solvent (Item 7, Appendix C). Use non-woven cleaning cloth (Item 1, Appendix C) to wash outside of pump housing.

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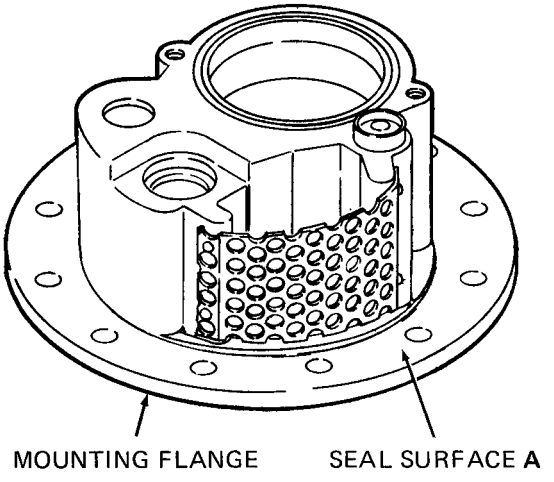
CAUTION

Do not use glass or metal tools to scrape dirt or locking compound from pump housing surfaces. Scraping with metal or glass will destroy the thin, protective coating on the housing. This could lead to leaks or early failure of the pump.

b. Remove all residue from mounting flange seal surface A. Use plastic scraper, if needed, to scrape away residue. Do not use glass or metal scrapers on seal surfaces. Scraping with metal or glass will destroy the thin, protective coating on housing.

c. Make sure all preformed packing grooves are clean. If necessary use a wooden or plastic scraper to clean grooves.



2. INSPECTION AND REPAIR OF HOUSING

NOTE

Inspection of the pump housing in this task is limited to the mounting flange and cartridge bore. Also covered is the inspection of the inlet screen. For inspection of all other items refer to the individual tasks.

a. Visually inspect all surfaces of pump housing for cracks. If any cracks are found, replace pump housing mounting flange.

b. Visually inspect mounting flange seal surface A for scratches, nicks, or burrs. Run your finger lightly over any defects; if sharp edges are felt they must be removed. Polish off sharp edges of scratches, nicks, and burrs using 500 or 600 grit, wet or dry, emery paper. Moisten emery paper with water.

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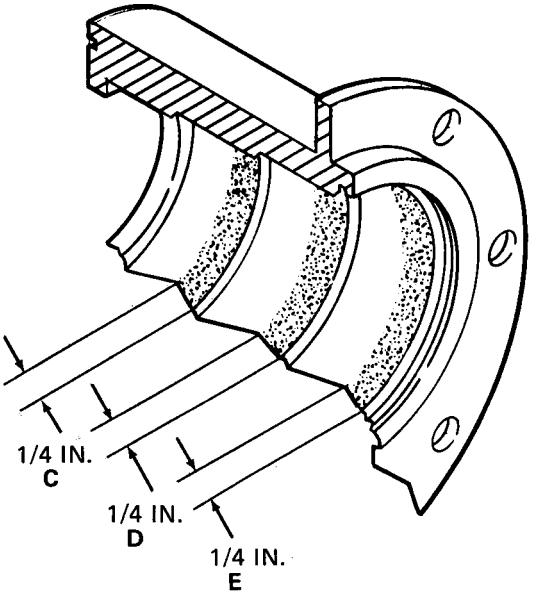
2-15. PUMP HOUSING / MOUNTING FLANGE - INSPECT/REPAIR (Cont) 2-15

c. Using a flashlight visually inspect cartridge bore surfaces in pump housing for burrs, scratches, or nicks. Preformed packings seat at three bore locations C, D, and E. Each one is 1/4 inch (6,4 mm) from edge of bore chamfer as shown in illustration. If a defect is found on any of the three sealing surfaces the defect must be removed flush with surrounding surface. Repair and inspect cartridge bore as follows



(1) On outside of surfaces C, D, or E it is only necessary to remove sharp edges from defects. This will prevent packings from being cut or damaged when cartridge is inserted.

(2) Within sealing areas C, D, or E defect must be completely removed flush with surrounding area.

(3) Use 500 or 600 grit, wet or dry, emery paper moistened with water and polish bore diameter until either the sharp edges or entire raised portion of defect is removed.

(4) Lightly run your finger around the entire bore area and make sure you do not feel any defects per steps (1) and (2) above. After you are satisfied with the finish use a clean cloth moistened in cleaning solvent to clean inside of bore.

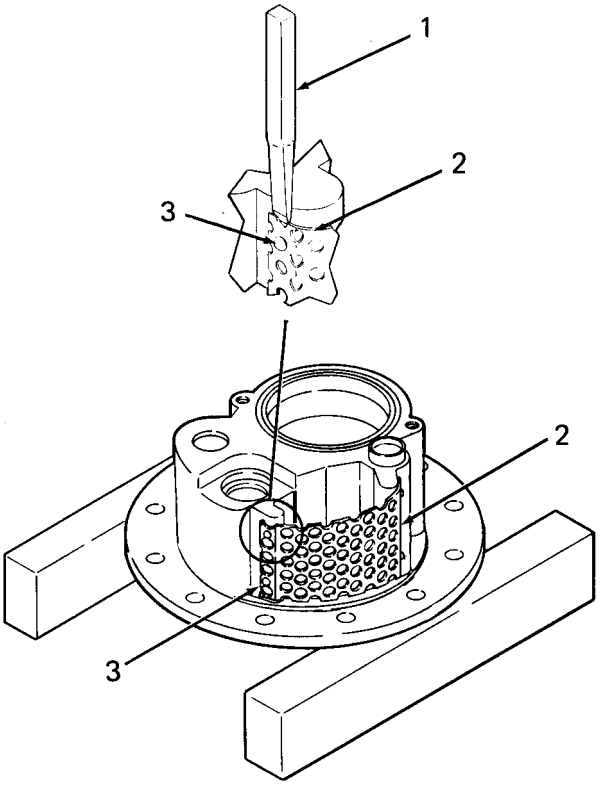
d. Inspect for torn or dented inlet strainer. If torn, replace strainer as instructed in the following paragraphs. If dented, open and close shutoff valve. Check that dented strainer does not contact shutoff valve. If shutoff valve touches dented strainer, replace strainer.

GO TO NEXT PAGE

3. REPLACE INLET STRAINER

NOTE

Remove strainer only if found defective in inspection procedure, paragraph 2.d.



a. Place parallel blocks under mounting flange to support housing.

b. Position tip of 1/4 inch cold chisel (1) or small sharp screwdriver between inlet screen (2) and housing next to drive screw head (3). Tap chisel with hammer to force drive screw out of housing.

c. Push inlet screen (2) back and grip screw head (3) with small diagonal cutters. Turn drive screw (3) counterclockwise. Remove and discard drive screws.

d. New inlet screens (2) are flat. Form new inlet screen to fit pump housing. Hold one end in place on housing. Apply thumb pressure to form bottom edge of screen to mounting surface.

e. Align inlet screen (2) with mounting holes in pump housing. Bottom edge of screen must meet or extend below shutoff valve seating surface. If mounting holes do not line up with screen holes, drill new mounting holes in housing. Use No. 43 drill. Drill mounting holes 1/4 inch (6,4 mm) deep.

f. Apply one drop of locking compound (Item 5, Appendix C) to drive screw (3) threads. Lineup inlet screen (2) with housing. Place drive screws in mounting holes. Tap drive screws into housing until seated.

NOTE

FOLLOW-ON MAINTENANCE: Install canister on pump housing (paragraph 2-11).

END OF TASK

2-16. MOTOR COVER - INSPECT/REPLACE 2-16

This task covers: Removal and installation of the motor cover. It also covers replacement of the motor cover bearing.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Bearing Installation Tool, See Appendix D
Reamer (Item 1, Appendix B, Section III)
Pin Punch, Straight, 5/16" Dia., NSN 5120-00-293-0793
Torque Wrench, 30-150 in-lb, NSN 5120-00-542-4489, or equivalent
Press Arbor, Hand Operated, 1/2 Ton Pressure, NSN 3444-00-243-2654, or equivalent
Brush, Soft Bristle, Cleaning
Drill Press, Bench Type, 1/2 inch capacity, NSN 3413-00-529-0809, or equivalent
Plug Gage, Reversible, Cylindrical (Item 2, Appendix B, Section III)

Materials/Parts:
White Petrolatum, NSN 6505-00-133-8025
Dry Cleaning Solvent, NSN 6850-00-274-5421
Nut, Self-Locking, NSN 5310-01-210-7300

Personnel Required:
68F Aircraft Electrician
68D Aircraft Powertrain Repairer
66-Series Technical Inspector

Equipment Condition:
Pump cartridge removed from pump and housing assembly PARA 2-10

1. REMOVAL

NOTE

To make sure that cartridge goes back together correctly, matchmark the assembly before loosening hex nuts. Do not use scribe on sealing surfaces.

a. Matchmark motor cover (1) to field tube (2) with scribe. Matchmark field tube (2) to cartridge housing (3).

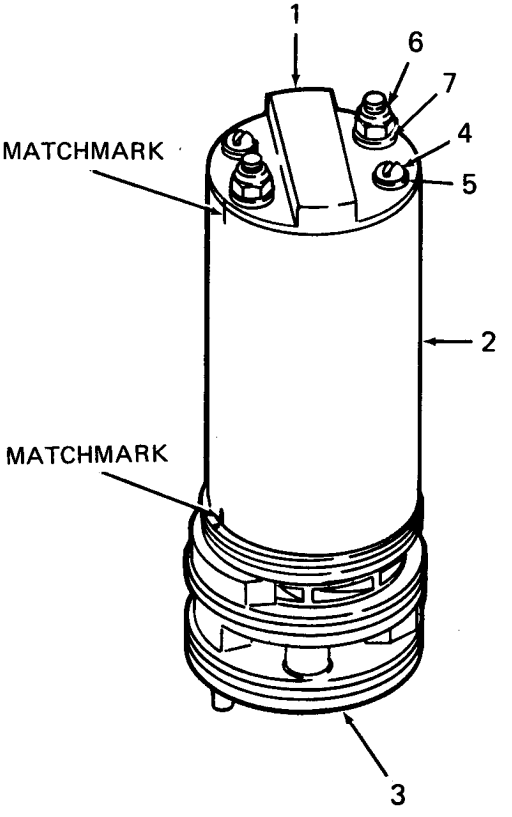
b. Remove machine screws (4) and lockwashers (5).

c. Remove and throw away self-locking nuts (6). Remove flat washers (7).

CAUTION

If cover bearing is chipped during cover removal, chip may fall into motor. This may cause binding or failure of pump motor.

d. To prevent chipping cover bearing, lift motor cover (1) straight up from field tube (2). Rocking cover may cause bearing to chip.



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2. CLEANING

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. If inside of cover looks dark gray or black, scrub with soft bristled brush in cleaning solvent.

WARNING

Do not use drill bits to open clogged ports in motor cover. Drilling may alter explosion-proof design of the cartridge and cause serious injury or death of personnel.

b. Clean dirt or sludge from fluid ports in cover with a fine lockwire, 0.020 inch (0,508 mm) Dia. maximum, and cleaning solvent. If dirt cannot be removed with wire, replace cover. Dry cover with compressed air, 30 psi (207 kPa) maximum.

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2-16. MOTOR COVER - INSPECT/REPLACE (Cont) 2-16

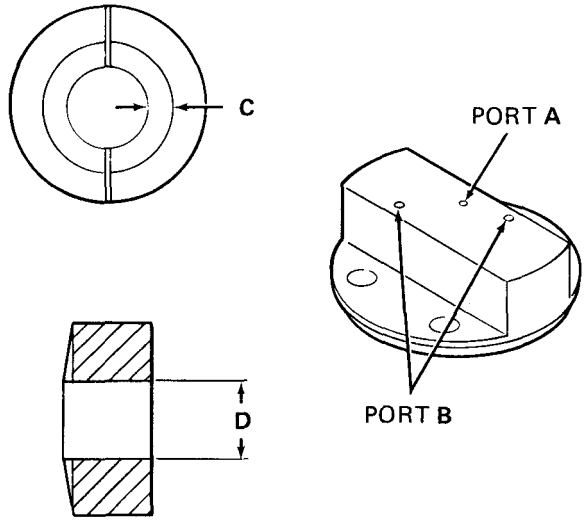
3. INSPECTION

a. Inspect cover for breaks or cracks. If cover is cracked or an edge is broken off, replace cover.

b. Hold motor cover up to light source to check that fluid ports are open. Pass a 0.020 inch (0,508 mm) diameter wire through Port A. Pass a 0,032 inch (0,81 mm) diameter wire through Port B.

c. With 6 inch (15 cm) scale, check width C of bearing thrust face. If thrust face is more than 5/64 inch (1,60 mm) wide, replace bearing. If bearings are cracked or chipped, replace bearing.

d. Using plug gage (Item 2, Appendix B, Section III) check bearing bore diameter D. If 0.3145 NO GO gage passes through bearing, replace bearing.

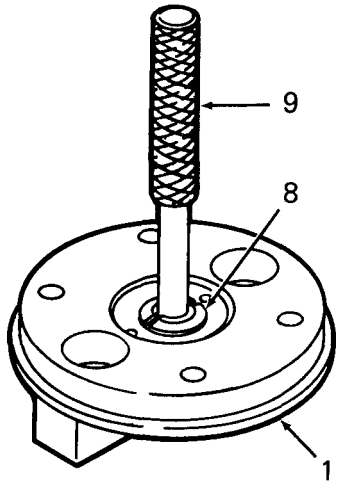


4. BEARING REPLACEMENT

a. Remove Bearing

(1) Place motor cover (1) on flat work surface, as shown.

(2) Fill bearing bore (8) with petrolatum (Item 6, Appendix C).



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CAUTION

Care must be taken to avoid damage to cover when removing bearing. Use sharp fast hammer blows. Keep bearing filled with petrolatum. Increase strength of hammer blows until bearing starts to lift from cover. Hydraulic action from grease forced under bearing will force bearing from cover.

(3) Place 5/16 inch (7 mm) diameter pin punch (9) in bearing bore. Using 12 ounce or heavier hammer make a sharp fast blow to drive punch into the bearing bore. Some petrolatum will escape from fluid ports, but most will fill cavity below the bearing.

(4) Refill bearing bore with grease and drive grease into bearing bore. Continue to add grease as needed, and don't give up on this removal procedure. Hydraulic pressure buildup in bottom of cover will force bearing up. Repeat until bearing is out.

(5) Wipe excess grease from bearing cover and wash with solvent.

b. Install Bearing

CAUTION

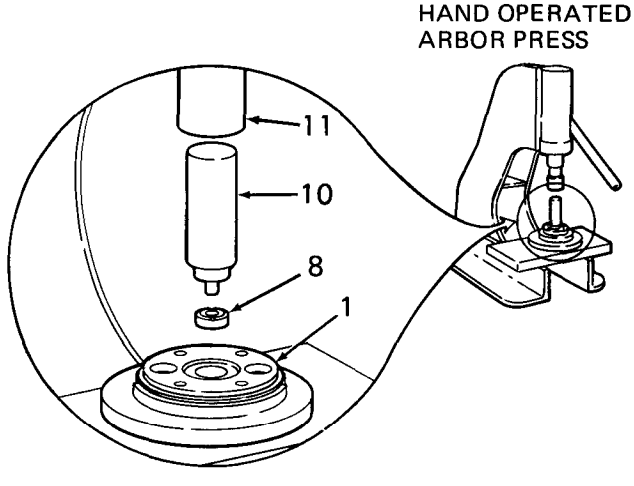
Failure to press bearing straight into seat may damage motor cover. Make sure top of bearing installation tool is square with arbor before pressing.

(1) Slotted face of bearing (8) must be up. Center bearing over seat in cover (1). Position bearing installation tool (10) (Figure 1, Appendix D) onto bearing.

(2) Bring hand operated arbor (11) down to meet top of tool (10).

(3) Square-up top of tool with arbor. Double check that bearing is in line with seat.

(4) Press bearing into seat until it bottoms in motor cover. Make sure bearing bottoms fully in seat.



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c. Check Bearing I.D. Using plug gage (Item 2, Appendix B, Section III) check bearing bore. If 0.3135 GO gage does not pass through bearing, ream bearing as follows:

(1) Install reamer (Item 1, Appendix B, Section III) in drill press. Set drill press spindle speed to between 560 and 690 RPM.

(2) Lay motor cover flat on support plate of drill press. With drill OFF, bring reamer down to bearing. Center bearing bore to reamer.

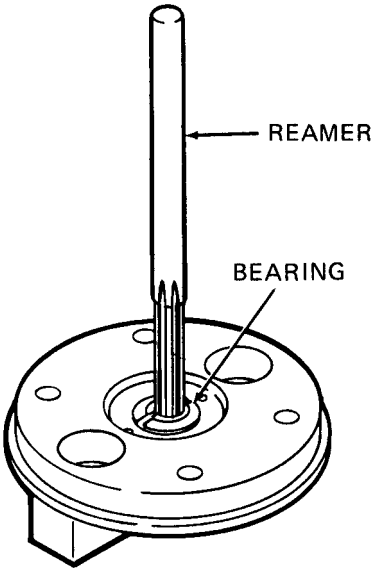
NOTE

Make only one quick pass in and out of bearing bore. If reamer is allowed to dwell in bore, too much bearing material will be removed.

(3) Hold cover in place on support plate. Turn drill press ON. Bring reamer down slowly to top of bearing. Ream bearing to size with one quick pass in and out of bearing bore.

(4) Using plug gage (Item 2, Appendix B, Section III) check bearing bore diameter D. If 0.3145 NO GO gage passes through bearing, replace bearing.

d. TI INSPECT bearing and motor cover. Make sure bearing diameter D is within dimensions specified, and visually check to make sure bearing is fully seated and not chipped or damaged.

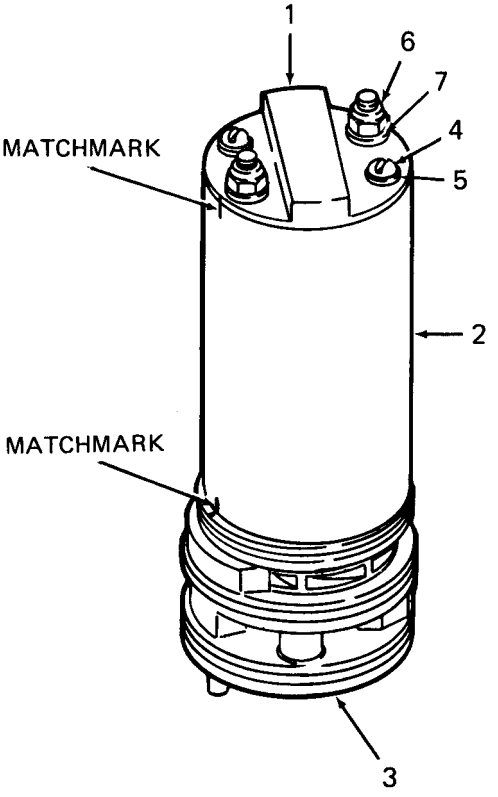


5. COVER INSTALLATION

a. Position pump cartridge up, as shown.

b. If reinstalling old cover on field tube, make sure that matchmarks between field tube (2) and cartridge housing (3) are in-line.

c. Hold cover (1) above field tube (2) with matchmarks in-line. Turn brush holder to line up screw holes in brush card with holes in cover.



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CAUTION

Be sure to slide cover straight down over armature shaft. If you bring the cover down on an angle and force it onto the bearing, you may damage the bearing. This may cause pump failure or damage to motor.

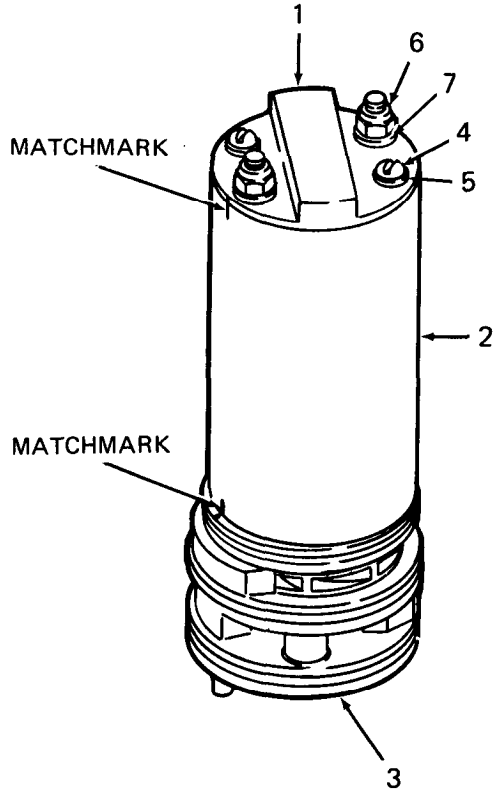
d. Install cover on cartridge. Do not tilt cover when installing. Try to keep the same gap all the way around.

e. Use a probe to line up screw holes. Install lockwashers (5) and machne screws (4). Tighten screws.

NOTE

Turn the field tube clockwise on the housing. The field tube magnets should rest against the motor mounting studs. If the magnet does not rest against the stud the motor life may be shortened and the pump performance may be affected. If reassembling pump that has been matchmarked and matchmarks are no longer in line, disregard matchmarks. Magnet must rest against stud.

f. Install flat washers (7). Put new nuts (6) on studs. Torque nuts (6) to 35 in-lbs (3,9 N·m).



NOTE

FOLLOW-ON MAINTENANCE: If removed, install pump cover and inlet seal in cartridge (paragraph 2-21). Install cartridge in pump housing (paragraph 2-10).

END OF TASK

2-17. COVER-END BRUSH HOLDER ASSEMBLY - INSPECT/REPAIR 2-17

This task covers: Repair of the brush holder assembly.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915

Materials/Parts
Thread Locking Compound, NSN 8030-00-111-2762

Personnel Required:
68F Aircraft Electrician
66-Series Technical Inspector

Equipment Condition:
Motor cover removed from pump cartridge PARA 2-16

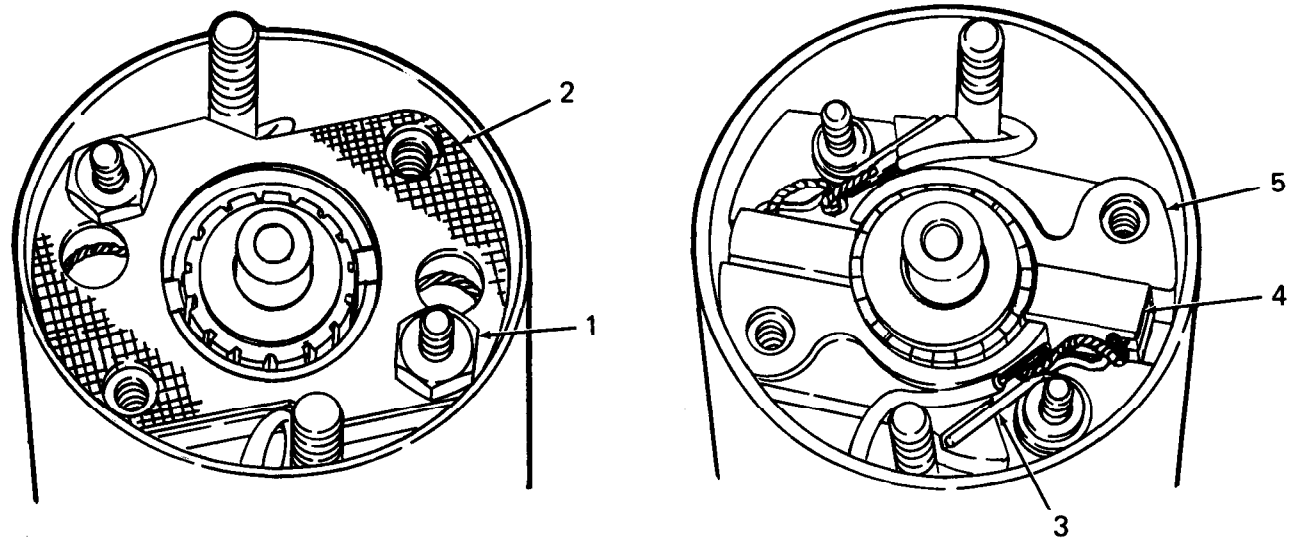
L DISASSEMBLY

a. Remove nuts (1) and brush holder cover (2).

b. Pry tangs of brush springs (3) off ridge in brush holder.

c. Remove brush springs and brushes (4) from brush holder (5). Leave brushes attached to lead wires.

d. Lift brush holder (5) from cartridge.



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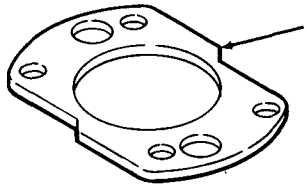
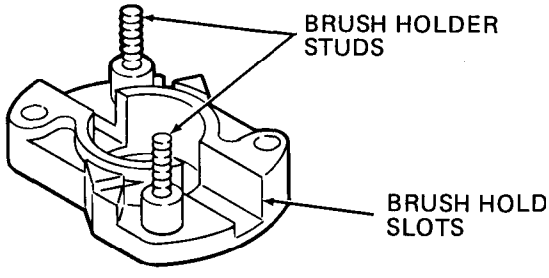
2. INSPECTION

a. Visually inspect brush holder slots for cracks or browning. If browned or cracked, replace brush holder.

b. Visually inspect brush holder studs for thread damage. Make sure studs are tight in brush holder. If studs are loose or damaged, replace brush holder.

c. Check brush holder cover for breaks or cracks. Replace broken or cracked brush holder cover.





NOTE

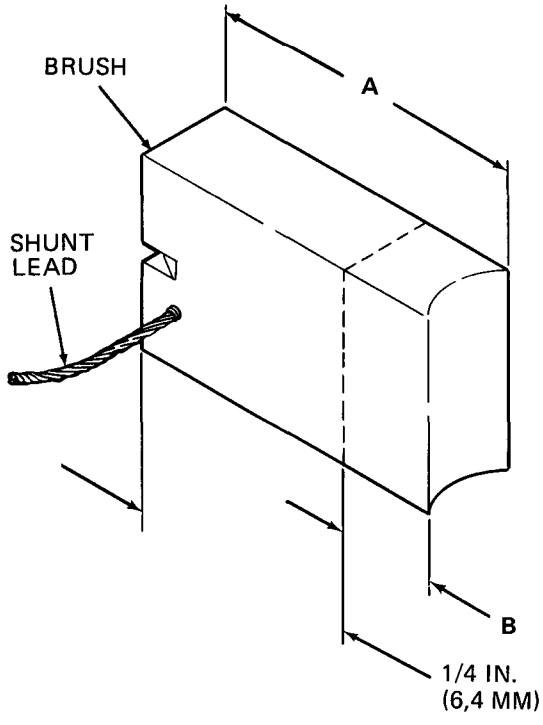
If brushes are damaged, refer to paragraph 2-23 for replacement of brush and secondary leads.

d. Use 6 inch (152,4 cm) rule to measure brush length A. If length A is less than 1/4 inch (6,4 mm) replace both brushes.

e. Inspect contact area B of brushes for cracks or chipping. Replace brushes if cracks or chips are found on any surface in area B.

f. Inspect shunt leads for fraying. If frayed, replace brush.

g. Check to make sure shunt lead is tight in brush. If shunt lead is loose in brush, replace brush.



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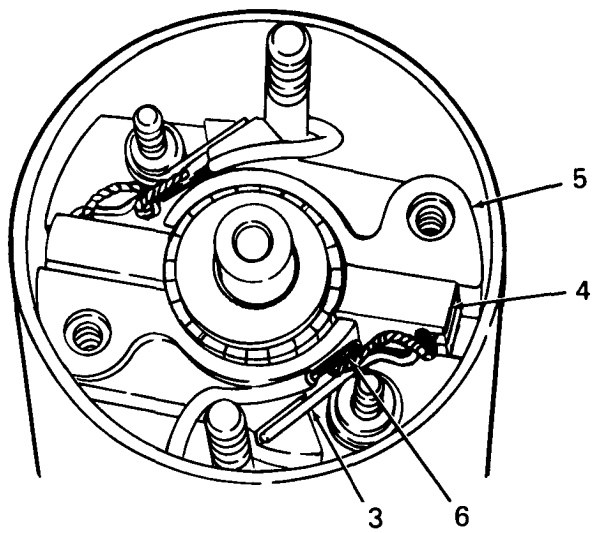
3. ASSEMBLY

a. Install brush holder (5) in cartridge.

b. Position brush (4) in brush holder. Slide brush against commutator. Hold brush in place with index finger.

c. Place brush spring (3) over stud. Insert hooked tang into spring slot at back of brush. Use needle-nose pliers to grasp straight tang of spring. Twist straight tang counterclockwise around stud. Place spring tang behind keeper ridge of brush holder, as shown. Push tang down to assure that spring is fully seated.



CAUTION

Bare brush leads must not be allowed to contact field tube when motor is in use. Leaving brush leads exposed may damage the pump motor.

d. Hold installed brush (4) and spring tang (3) in place. Place brush lead in wire trench. Place solder joint (6) and shunt lead into gap between spring and brush. Shunt lead must not hang out beyond edge of brush holder (5). Shunt lead must be free to move with brush in holder.

e. Repeat Steps a through d to install opposite brush set. Be careful not to move the brush holder too much. Hold down on installed brush and spring tang while installing second brush set.

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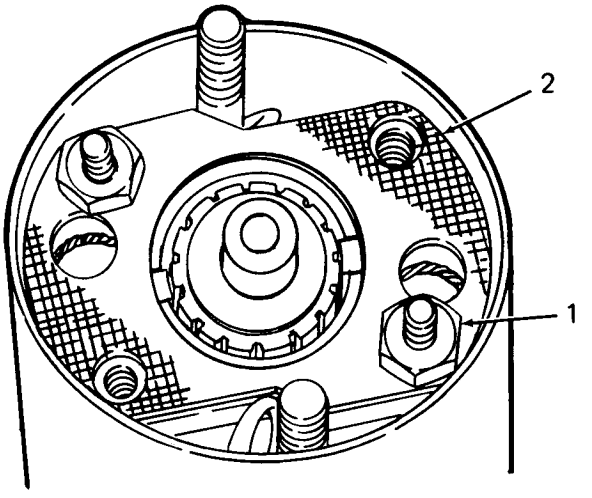
2-17. COVER-END BRUSH HOLDER ASSEMBLY - INSPECT/REPAIR (Cont) 2-17

f. TI INSPECT. Check that brush, springs, and leads are correctly positioned in the holder. Make sure the brush leads are not wedged in place and that the brushes are free to move.

g. Place brush holder cover (2) over studs. Make sure that brush leads are not wedged between cover and brush holder. Hold cover down. Install and tighten nuts (1).

h. Apply one drop of thread locking compound (Item 3, Appendix C) to each stud, just above hex nut. Use cloth to soak up excess locking compound from brush holder studs.



NOTE

FOLLOW-ON TASK Install motor cover (paragraph 2-16).

END OF TASK

2-18. ARMATURE AND FIELD TUBE ASSEMBLY - INSPECT/REPLACE 2-18

This task covers: Removal and replacement of armature, field tube, and impeller.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Brush, Soft Bristle, Cleaning
Caliper Set, Micrometer, Outside, 0 to 6 inch, NSN 5210-00-554-7134, or equivalent
Multimeter, NSN 6625-00-168-0585, or equivalent
Feeler Gage, NSN 5210-00-221-1999; or No. 50 Twist Drill, NSN 5133-00-189-9295; or equivalent

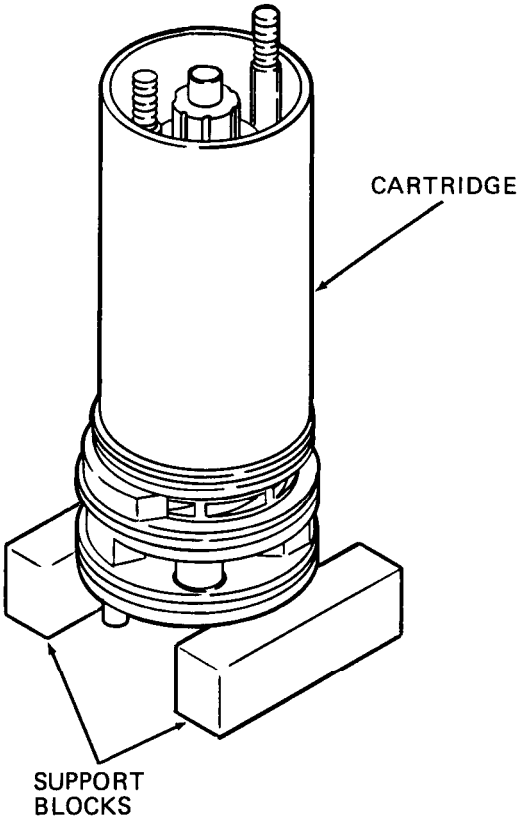
Materials/Parts:
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
600 Grit, Wet or Dry Emery Paper

Personnel Required:
68F Aircraft Electrician
66-Series Technical Inspector

Equipment Condition:
Cover-end brush holder assembly removed from cartridge PARA 2-17

1. REMOVE FIELD TUBE

a. Place cartridge in upright position. Use support blocks under cartridge to keep terminal off of work surface.



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2-18. ARMATURE AND FIELD TUBE ASSEMBLY - INSPECT/REPLACE (Cont) 2-18

CAUTION

Do not allow field tube magnets to lift armature out of cartridge. Lifting armature with brushes under load may result in damage to brushes.

Do not beat on field tube to loosen it from impeller housing. Beating or tapping with any tool may cause field magnets to separate from field tube wall.

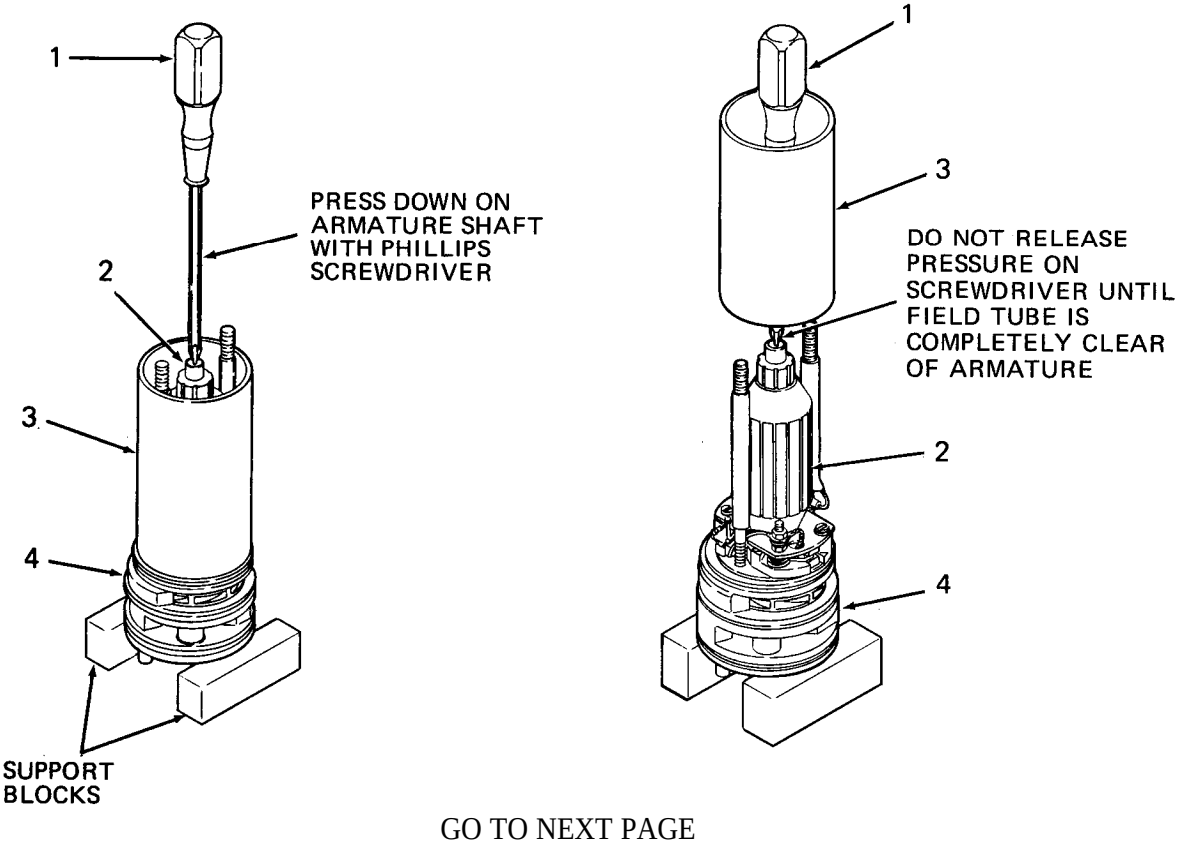
b. Place the top of a long shaft phillips head screwdriver (1) into hole on end of armature (2) shaft. Press down firmly on armature (2) shaft.

NOTE

If field tube is tight on impeller housing, use knife blade between field tube and impeller housing to open an even gap all the way around.

c. While holding armature (2) down, lift field tube (3) up from impeller housing (4). Do not release pressure on armature (2) until field tube (3) is lifted clear of armature.

d. Let go of armature (2) and remove field tube (3).



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2. REMOVE ARMATURE AND IMPELLER

a. Insert a small sharp screwdriver (5) behind brush (6) shunt lead. While applying pressure gently against brush (6), pry brush out of holder (7) slot until spring tang (8) rests against side of brush (6) to hold it in place.

b. With spring (8) held back, slide brush (6) halfway out of brush slot.

c. With brush (6) halfway out of brush slot, let spring (8) rest against exposed side of brush. Be careful not to bump brush when handling.

d. Repeat procedure for opposite brush.

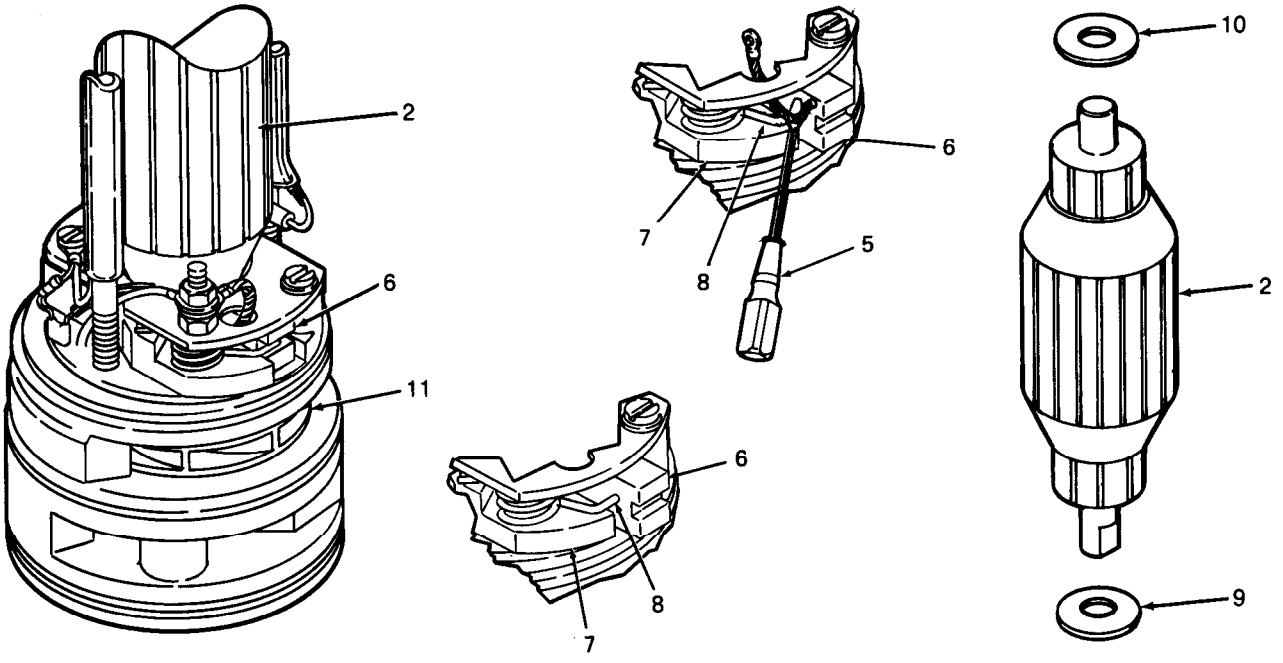
NOTE

Early model cartridges use a square key in the armature shaft to drive the impeller. If your cartridge is a key-drive type, be sure not to lose square key.

e. Lift armature (2) straight up out of pump end bearing bore. Be careful not to lose washers (9 and 10), located at both ends of armature.

NOTE

Lower thrust washer may remain on lower bearing. Make sure you locate and remove lower thrust washer.



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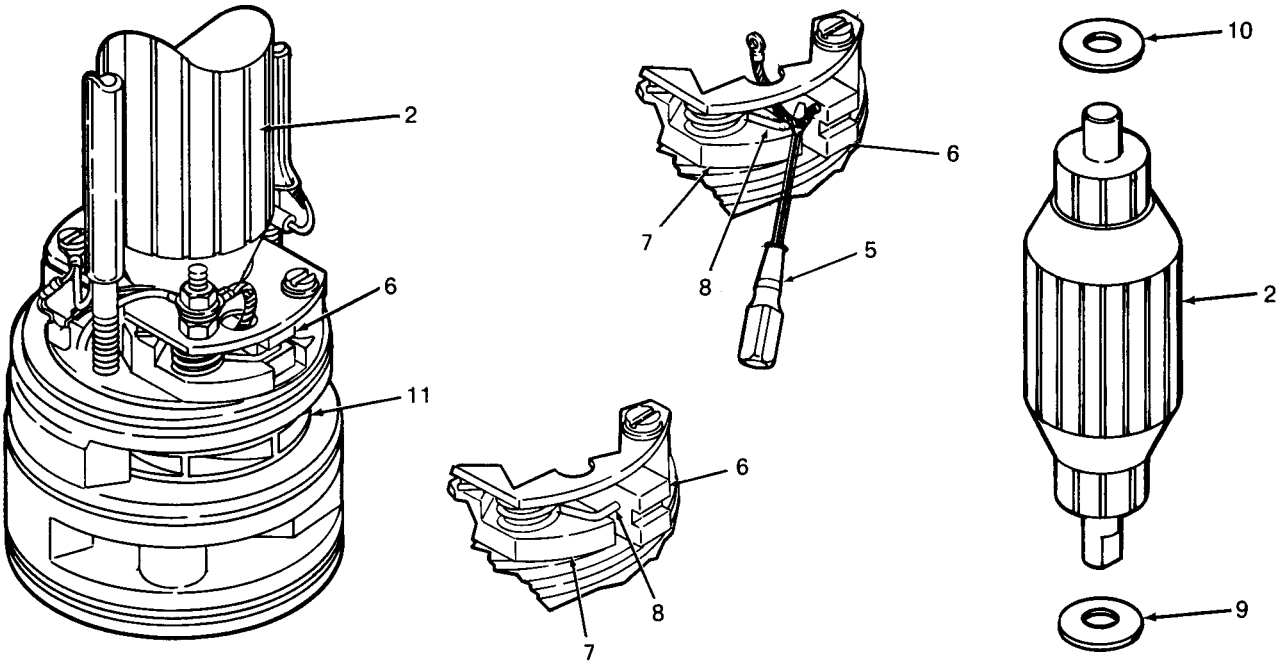

f. Remove washers (9 and 10) from ends of armature (2) shaft.

g. Slide impeller (11) from housing. Be careful not to damage impeller seal surface.

3. CLEANING

a. Clean Armature

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

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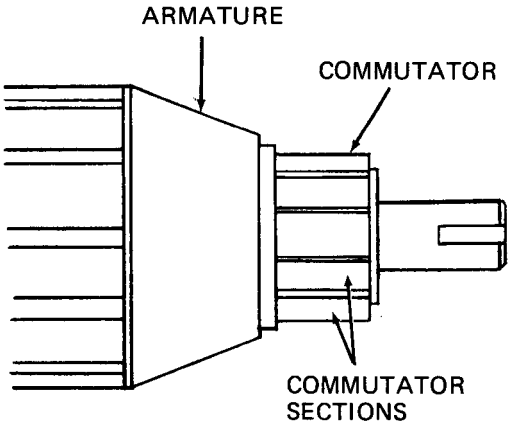
CAUTION

Do not dig into resin which bonds commutator sections together. Removal of resin may cause permanent damage to armature.



(1) Use soft wire probe, such as a paper clip, to scrape between commutator sections. Remove only soft debris. Do not dig into hard resin core.

(2) Wash armature with dry cleaning solvent (Item 7, Appendix C) and nonwoven cloth (Item 1, Appendix C). Use soft bristled brush to scrub armature, if needed. Dry armature with compressed air at 30 psi (207 kPa) maximum.

(3) Dark areas may be seen on commutator sections. To remove, polish commutators with 600 grit, wet or dry emery paper.

b. Clean Field Tube

(1) Scrub inside of field tube with soft bristle brush and solvent. Remove all sludge or deposits from around magnets.

(2) Wipe clean with nonwoven cloth dipped in solvent. Dry with compressed air, 30 psi (207 kPa) maximum.

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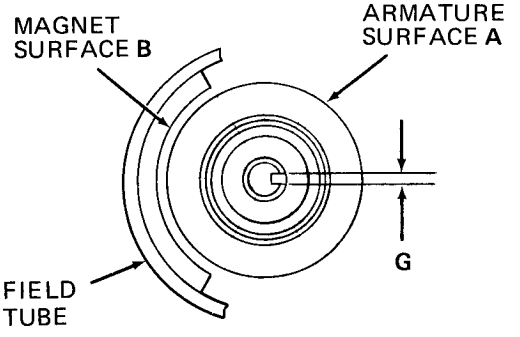
4. INSPECTION

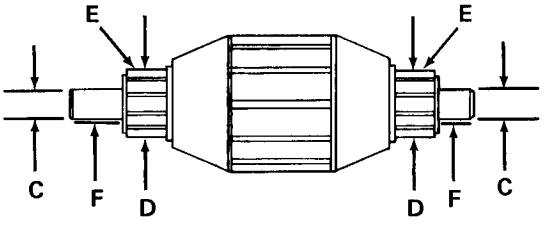
a. Inspect Armature

(1) A bent armature shaft will cause armature to rub on field tube magnets. Check for shiny spots on armature surface A. Use a flashlight to check for scoring or loss of material on field tube magnet surfaces B. If signs of wear between armature and field tube magnets are found, replace both armature and field tube.



(2) Using a caliper set, measure diameters C of armature shaft journals. If either measurement is less than 0.312 inch (7,92 mm) replace armature.

(3) Using a caliper set, measure commutator diameters D. If less than 0.700 inch (17,78 mm) replace armature.



(4) Check roughness of commutator surfaces E. Run your finger nail lightly over the surface of each commutator bar. Commutator surface should be smooth with no nicks or scratches to catch your finger nail. Surface can be polished to remove any defects by using 600 grit emery paper moistened with a light weight oil. After polishing wipe clean with a lint free cloth moistened in cleaning solvent (Item 7, Appendix C).

(5) Check commutator surfaces E for pitting. If pitting can not be removed using 600 grit emery paper and light oil, discard armature.

(6) Shaft surface F should be smooth and free of any scratches and nicks. Polish with 600 grit emery paper and a lightweight oil. Visually check surface with a light, and spin armature while gently holding the shaft between your finger tips. Shaft should feel smooth.

(7) Inspect armature keyways if key-drive type is used. Measure keyway width G. Using a feeler gage, take measurement at outside diameter of shaft. If width G is more than 0.067 inch (1,70 mm), replace both armature and impeller. The key slot width can also be checked using a No. 50 drill. If the shank of a No. 50 drill can be inserted into the keyway, the keyway is worn.

GO TO NEXT PAGE

(8) Check for shorted armature. Place one multimeter probe on the laminations, point H. Place the opposite probe at points J. Check each commutator section for continuity. If any reading shows continuity, replace the armature.

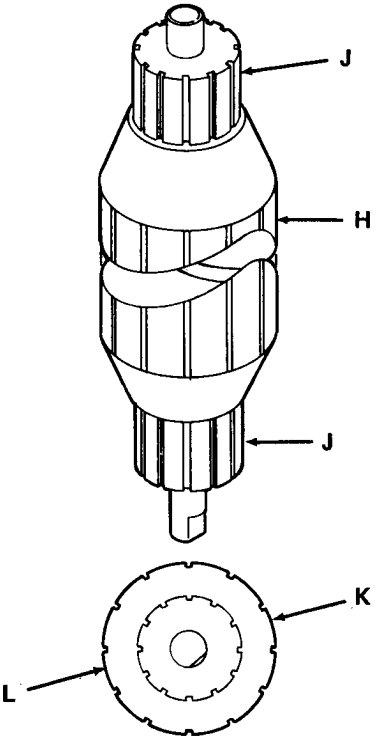
(9) Check for open commutator sections. Check from point K to point L of each commutator pair for continuity. Check each commutator pair. Check both commutators. If an open commutator pair is found, replace the armature.

b. Inspect Field Tube Assembly

(1) Inspect field tube magnets for chips or cracks. Replace if magnets are chipped or cracked.

(2) Check magnets for loose bonding to field tube. If loose, replace field tube.

c. Inspect Impeller (Paragraph 2-19)



COMMUTATOR

5. INSTALL IMPELLER AND ARMATURE

NOTE

If impeller and armature have key-type drives, apply dab of grease to square key. Insert key into keyway of impeller drive boss.

NOTE

If impeller and armature have key-type drives, pump cover and inlet seal must be in place before impeller is installed. See paragraph 2-21 for pump cover and inlet seal installation.

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2-18. ARMATURE AND FIELD TUBE ASSEMBLY - INSPECT/REPLACE (Cont) 2-18

a. Slide impeller (11) into housing. Make sure drive boss is up. Do not damage seal surface at bottom of impeller.

CAUTION

Before installing armature, make sure brushes are positioned out in electrical holder slots away from commutator. Failure to do so may damage brushes.

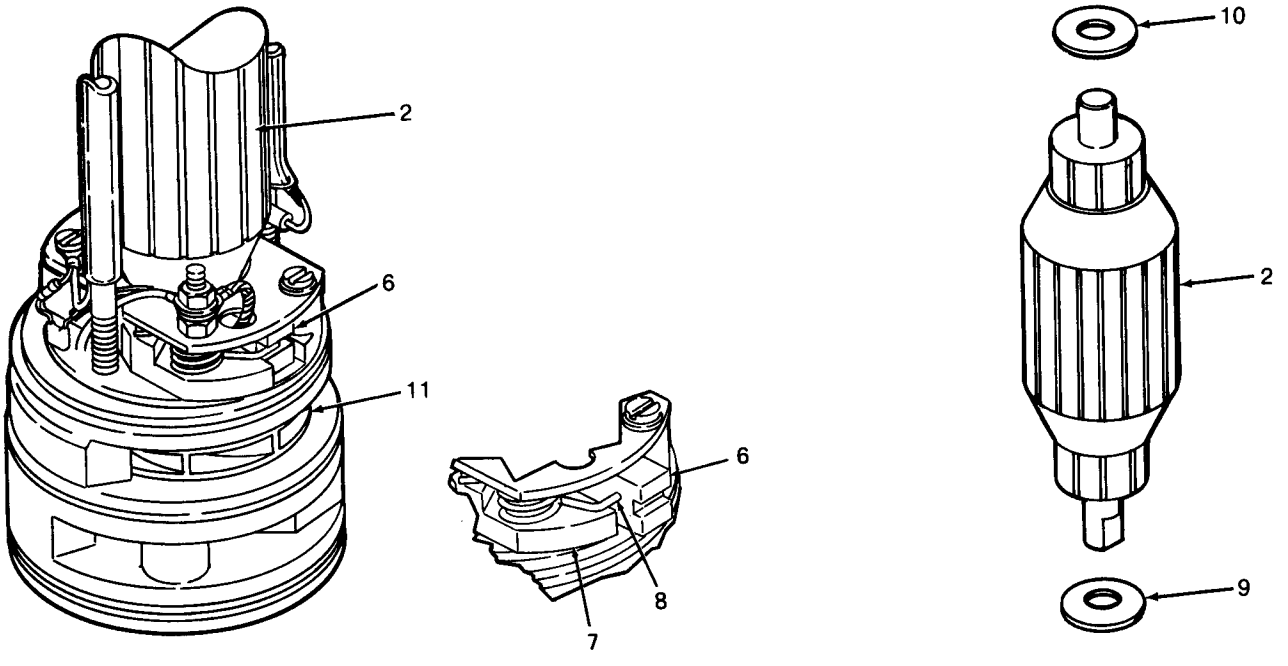
b. Make sure brushes (6) are positioned out in holder (7) slots, away from commutator, and held in place by spring end (8).

c. Install one washer (9) onto armature drive shaft.

d. Insert armature (2) drive shaft part way into pump-end bearing. Drive shaft must slide straight down into bearing bore.

e. Turn impeller (11) and armature (2) until armature shaft engages impeller drive boss.,

f. Insert drive shaft into impeller boss.



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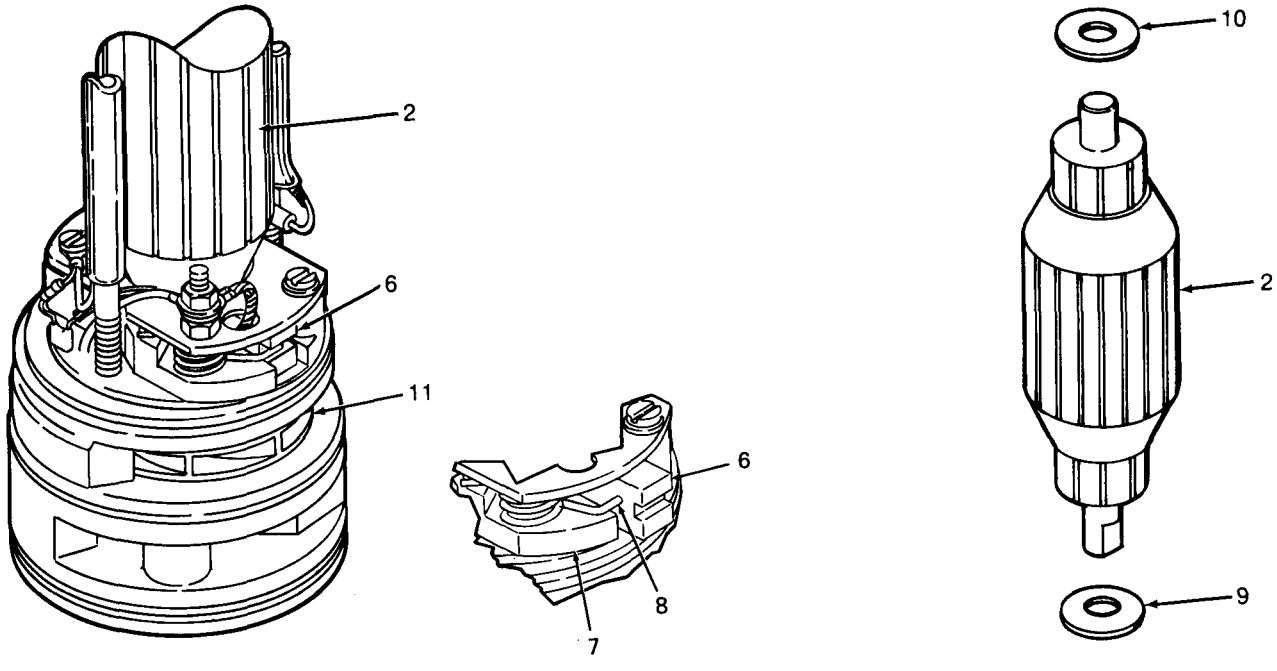
2-18. ARMATURE AND FIELD TUBE ASSEMBLY - INSPECT/REPLACE (Cont) 2-18



CAUTION

Key-drive type impeller - Failure to check for key position may result in damage to impeller.

g. For key-drive type impeller, turn impeller to check that key is in place. There will be some slop normally. But, there must be no doubt that impeller and shaft are keyed together.

h. Install top washer (10) on armature shaft.

i. Using hooked wire, pull and hold electrical spring (8) away from one brush (6). With spring (8) held back, slide brush (6) in against commutator. Rest spring (8) in slot of brush (6). Repeat the procedure for the opposite brush.

CAUTION

Bare brush leads must not be allowed to contact field tube when motor is in use. Leaving brush leads exposed may damage the pump motor.

j. Carefully tuck brush shunt leads into the holder cavities. Maintain free movement of the brushes, but make sure brush leads do not touch field tube.

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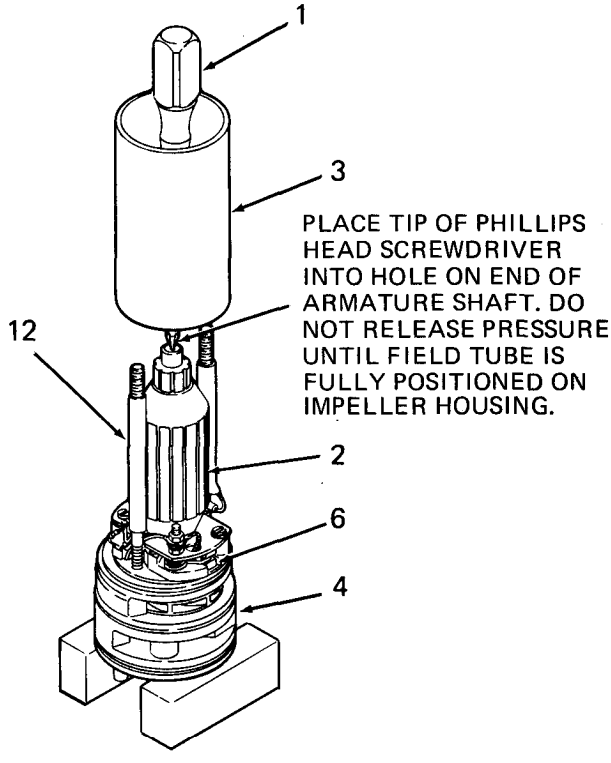
k. TI INSPECT. Visually inspect that brush leads are positioned in holders properly. Check that springs are resting in brush and holder slots and brushes are positioned against commutator. Make sure that impeller turns armature and that both thrust washers are in place.

6. INSTALL FIELD TUBE ASSEMBLY

CAUTION

Keep armature seated when installing field tube. Allowing armature to slide out of brush housing may cause permanent damage to brushes.



a. Find the paint mark on the end of one magnet. This is the "north" field magnet.

b. Position field tube (3) so that paint mark is up when field tube is installed on impeller housing (4) and the north magnet is over the positive brush. Positive brush (6) is on same side of housing as impeller opening.

c. Insert long shaft phillips head screwdriver through center of field tube (3).

d. Place tip of long shaft phillips head screwdriver (1) into hole on end of armature (2) shaft.

e. Position field tube (3) so that mounting studs (12) will slide between field magnets.

f. While holding down on armature (2) with phillips screwdriver (1), slide field tube (3) down over armature onto impeller housing (4). Do not release pressure on armature until field tube (3) is fully positioned on impeller housing (4).

g. Rotate field tube (3) clockwise. Magnets must rest against mounting studs (12) for proper motor operation. If using field tube removed previously, check field tube (3) to housing (4) matchmarks. They should be lined up. If they are on opposite sides, double check the assembly before proceeding.

NOTE

FOLLOW-ON MAINTENANCE: Install cover-end brush holder assembly (paragraph 2-17).

END OF TASK

2-19. IMPELLER - INSPECT/REPAIR 2-19

This task covers: Repair of the impeller.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Caliper Set, Micrometer, Outside, 0 to 6 inch, NSN 5210-00-554-7134, or equivalent
Vernier Caliper, Inside 0 to 6 inch, NSN 6210-00-277-7549, or equivalent
Feeler Gage, NSN 5210-00-221-1999; or No. 50 Drill, NSN 5133-00-189-9295; or equivalent

Materials/Parts:
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
600 grit, Wet or Dry Emery Paper

Equipment Condition:
Armature, field tube, and impeller removed from housing PARA 2-17

Personnel Required:
68F Aircraft Electrician

1. CLEANING

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

CAUTION

Do not attempt to clean seal surface of impeller. Scrubbing of seal surface may cause permanent damage.

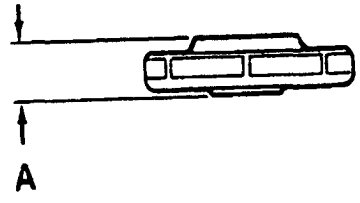
a. Wash impeller with cleaning solvent (Item 7, Appendix C) using a nonwoven cloth (Item 1, Appendix C). Do not use a brush or any rough material to scrub impeller seal surface.

b. Blow out impeller passages with compressed air, 30 psi (207 kPa) maximum. Direct air blasts from outer vents, in toward center. Blow out each fluid passage. Rinse impeller in solvent and wipe dry with a clean cloth.

GO TO NEXT PAGE

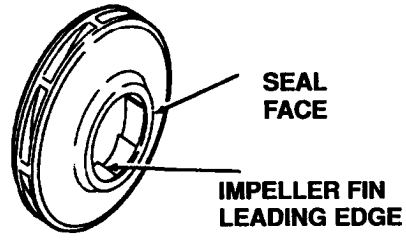
2. INSPECTION

a. Use an outside caliper to inspect impeller height, dimension A. If impeller height is less than 0.585 inch (14,85 mm), replace impeller.



b. DELETE.

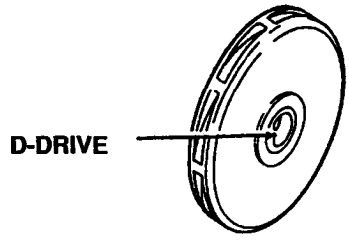
c. Visually inspect leading edges of impeller fins. Leading edges should be sharp. A small amount of chipping on leading edges is acceptable. Replace impeller if fin edges are blunt or damaged.



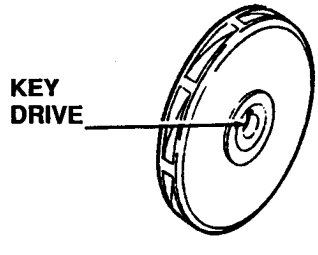
NOTE

If key-drive type impeller is being inspected, inspect drive boss per Step e below. Key-drive type impeller and armature are obsolete. If key-drive type impeller is defective, both impeller and armature must be replaced.

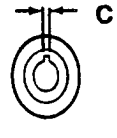
d. Visually check impeller D-drive. If flat edge of "D" is curved or deformed, replace impeller.



e. Measure impeller key slot width, dimension C. Using a feeler gage, take measurement at inside edge of slot near the shaft bore. If key slot width exceeds 0.067 inch (1,70 mm), replace both armature and impeller. The key slot width can also be checked with a No. 50 drill. If shank of a No. 50 drill can be inserted into key slot, impeller slot is worn. Replace both impeller and armature.



f. Inspect impeller seal face surface for wear. If surface is worn dull or grooved, lap impeller as instructed in REPAIR procedures.



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3. REPAIR

a. Place a sheet of 600 grit wet or dry emery paper on an inspection surface plate or pane of glass. Place impeller seal surface down on emery paper.

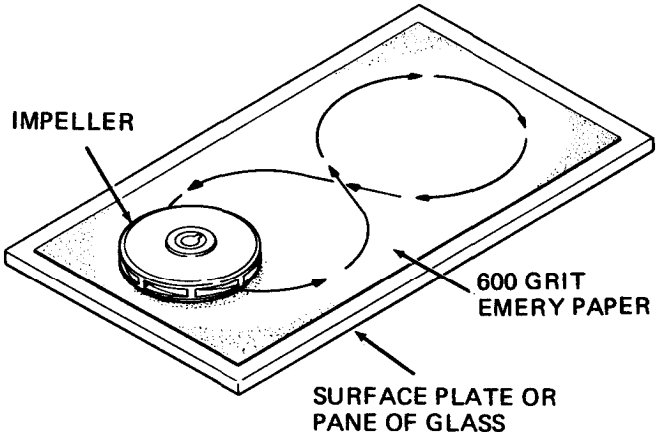
b. Apply light and even pressure on impeller drive boss with index finger.

c. Lap seal surface by sliding impeller across emery paper in a figure 8 path. Make only 3 or 4 passes before checking surface.

d. When grooves are gone, wipe off surface plate with a clean cloth. Replace sandpaper with plain bond paper. Repeat lapping operation on paper to polish the seal surface to a mirror finish.

e. Visually check seal surface condition. Surface must reflect light evenly.

f. After lapping, check impeller height with an outside caliper per Step 1 of INSPECTION. If impeller height is less than 0.585 inch (14,85 mm), impeller cannot be reused.



NOTE

FOLLOW-ON Maintenance: Install impeller, armature, and field tube assembly (paragraph 2-18).

END OF TASK

2-20. PUMP-END BRUSH HOLDER ASSEMBLY - INSPECT/REPLACE/REPAIR 2-20

This task covers: Removal, repair, and replacement of pump end brush holder.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Wire Brush, NSN 7920-00-291-5815
Brush Holder Centering Tool, Item 1, Appendix D
Pull Scale, 0-4 lb., NSN 6670-00-618-5662

Equipment Condition:
Armature, field tube, and impeller removed from housing PARA 2-18

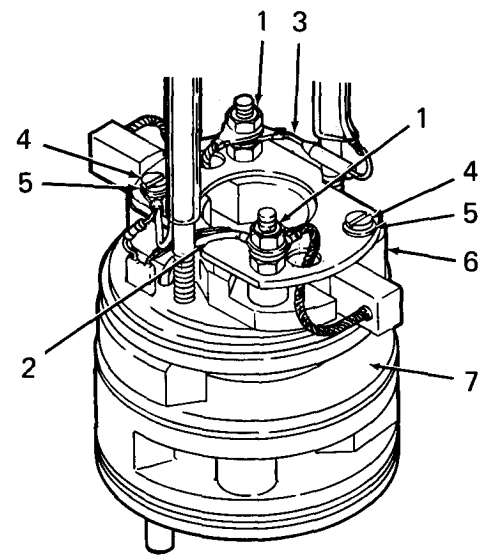
Material/Parts:
Thread Locking Compound, NSN 8030-00-111-2762
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
500 or 600 Grit, Wet or Dry Emery Paper
Dry Cleaning Solvent, NSN 6850-00-274-5421
Brush, Soft Bristle, Cleaning

Personnel Required:
68F Aircraft Electrician

1. REMOVAL

a. Remove nuts (1). Remove positive lead terminal lug (2) and secondary lead terminal lug (3) from brush holder studs.

b. Remove machine screws (4) and lockwashers (5). Remove brush holder assembly (6) from impeller housing (7).



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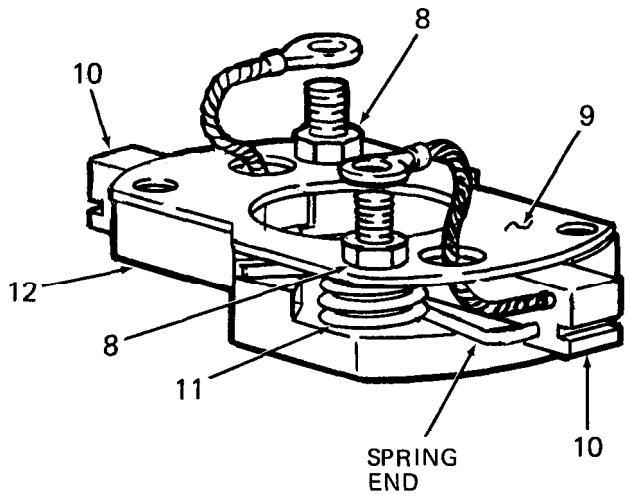
2-20. PUMP-END BRUSH HOLDER ASSEMBLY - INSPECT/REPLACE/REPAIR (Cont) 2-20

2. DISASSEMBLY

a. Remove hex nuts (8) and brush holder cover (9) from brush holder.

b. Remove brushes (10) and springs (11) from brush holder (12).



3. CLEANING

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Locking compound is used to secure nuts to brush holder studs. Use wire brush to clean brush holder studs. Be sure to remove all locking compound residue.

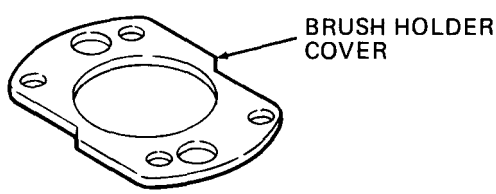
b. Clean brush holder assembly parts with a soft bristle brush and dry cleaning solvent (Item 7, Appendix C).

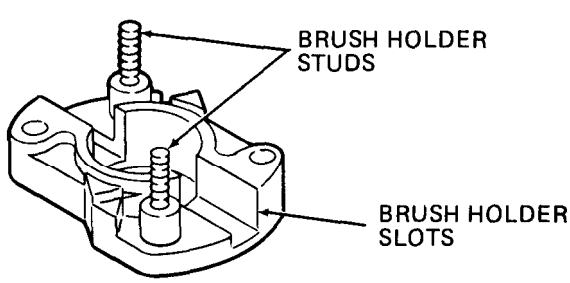
4. INSPECTION

a. Visually inspect brush holder slots for cracks or browning. If browned or cracked, replace the entire brush card assembly.

b. Visually inspect brush holder studs for thread damage. Make sure studs are tight in holder. If studs are loose or damaged, replace holder.

c. Check brush holder cover for breaks or cracks. Replace broken or cracked brush holder cover.





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2-20. PUMP-END BRUSH HOLDER ASSEMBLY - INSPECT/REPLACE/REPAIR (Cont) 2-20

d. Use a 6 inch (152,4 cm) rule to measure brush length A. If length A is less than 1/4 inch (6,4 mm), replace both brushes. Refer to paragraph 5 for brush assembly instructions.

e. Inspect contact area B of brushes for cracks or chipping. Replace brushes if cracks or chips are found on any surface in area B.

f. Inspect shunt leads for fraying. If frayed, replace brush.

g. Check to make sure shunt lead is tight in brush. If shunt lead is loose in brush, replace brush.

h. Check shunt lead terminal lug to make sure it is tight on shunt lead. If terminal lug is loose, replace both brush and terminal lug per paragraph 5.

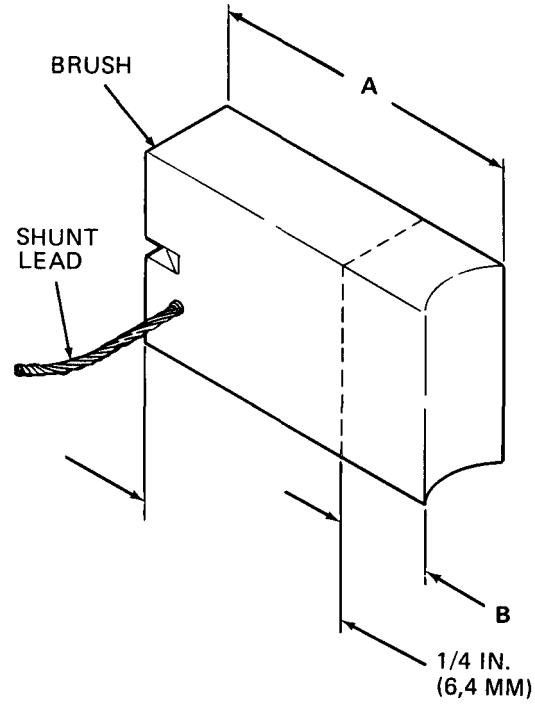
i. Inspect springs for broken links or obvious signs of damage. Replace broken or damaged springs.

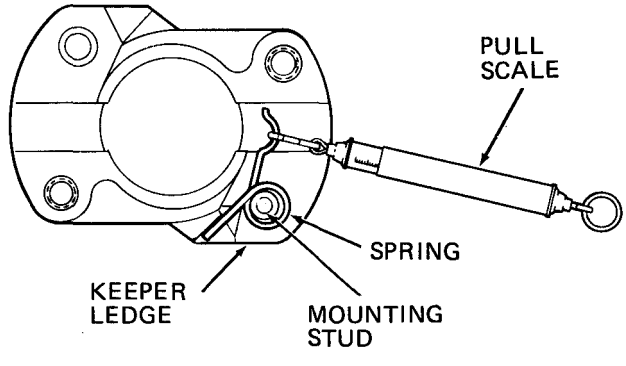
j. Inspect tension of brush springs.

(1) Place spring over brush holder mounting stud. Set straight end of spring behind keeper ledge on brush holder. Place brush holder on flat surface and hold tightly to keep it from moving.

(2) Hook pull scale to brush end of spring. Pull brush end of spring until it is in-line with opposite end of spring. Read the spring tension in ounces on the pull scale. If spring tension is less than 21 ounces or more than 33 ounces, replace spring.

(3) Repeat spring tension test on other spring.





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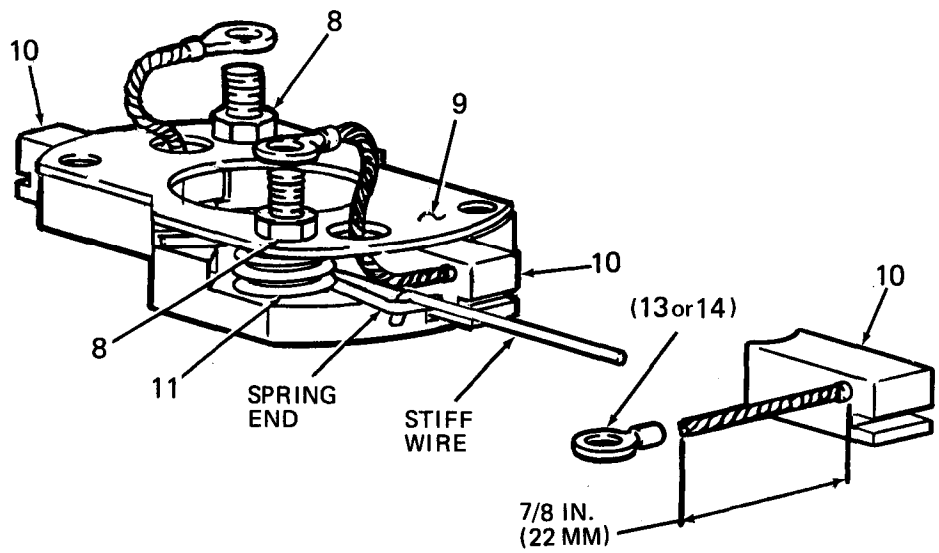
5. ASSEMBLY

a. New brushes (10) are not equipped with terminal lugs (13 or 14). If replacing brushes, install new terminal lugs before assembling brush holder assembly. Cut brush shunt leads off at 7/8 inch (22 mm) from brush body, Crimp on new terminal lugs.

b. Install brush springs (11) on brush holder studs. Place straight spring end on keeper ledge. Install brush holder cover (9). Install and tighten nuts (8).

c. Using a hooked wire, pull spring end out of brush holder slot. Slide brush (10) halfway into brush holder slot. Allow hooked end of brush spring to rest against side of brush, as shown. Be careful not to chip or damage brush.

Insert brush shunt lead terminal lugs up through holes in cover (9).



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2-20. PUMP-END BRUSH HOLDER ASSEMBLY - INSPECT/REPLACE/REPAIR (Cont) 2-20

6. INSTALLATION

a. Place brush holder assembly (6) on impeller housing (7).

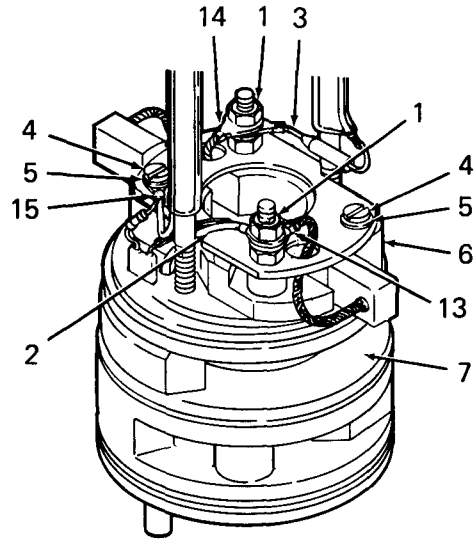
b. Install brush holder centering tool (Figure 1, Appendix D) in center of brush holder assembly (6).

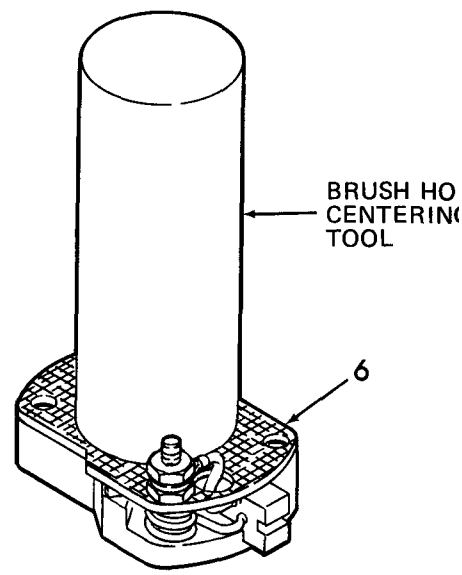
c. Carefully insert nipple of centering tool in pump-end bearing. Turn brush holder assembly to line up screw holes with housing.

d. Install secondary terminal lug (15), lockwashers (5), and machine screws (4). Install second screw (4) and lockwasher (5) on opposite corner. Tighten brush holder assembly to housing. Remove centering tool.

e. Place brush lead terminal lug (13) and positive lead terminal lug (2) over mounting stud, as shown. Apply one drop of thread locking compound (Item 3, Appendix C) to threads of nut (l). Thread nut on mounting stud and tighten.

f. Place brush lead terminal lug (14) and secondary lead terminal lug (3) over mounting stud, as shown. Apply one drop of thread locking compound (Item 3, Appendix C) to threads of nut (1). Thread nut on mounting stud and tighten.





NOTE

FOLLOW-ON MAINTENANCE: Install impeller, armature, and field tube (paragraph 2-18).

END OF TASK

2-21. PUMP COVER AND INLET SEAL - INSPECT/REPAIR/REPLACE 2-21

This task covers: Replacement of pump cover and repair of inlet seal.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Cartridge Pulling Tool, Item 4, Appendix D
Caliper Set, Micrometer, Outside, 0 to 6 inch, NSN 5210-00-554-7134, or equivalent

Equipment Condition:
Armature, field tube, and impeller removed from housing PARA 2-18 (See NOTE below)

Materials/Parts:
Dry Cleaning Solvent, NSN 6850-00-274-5421
White Petrolatum, NSN 6505-00-133-8025
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
500 or 600 Grit, Wet or Dry, Emery Paper
Preformed Packing (2req) NSN 5330-00-807-9638

Personnel Required:
68F Aircraft Electrician

1. REMOVAL

a. Remove retaining ring (1) from seat in impeller housing (2).

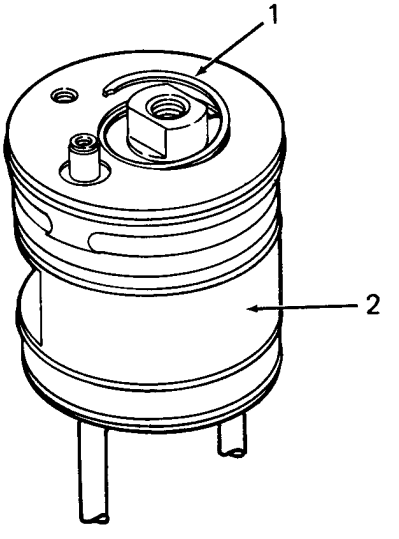
CAUTION

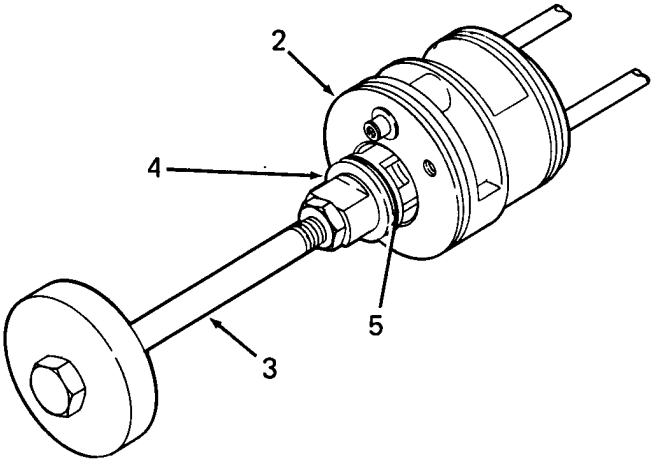
Do not use metal tool to remove preformed packing from packing groove. Metal probe or screwdriver may score packing groove.

NOTE

If pump cover seal is leaking, the seal may be replaced without disassembling the pump cartridge. If only replacing cover seal, keep pump cover and impeller housing pointed up to keep impeller from dropping off of shaft.

b. Screw cartridge pulling tool (3) (Item 4, Appendix D) into pump cover (4). Slide pulling tool slide hammer against bolt head to remove pump cover from housing (2). Unscrew pump cover from pulling tool. Remove and discard performed packing (5), Use plastic or wood probe to remove packing.





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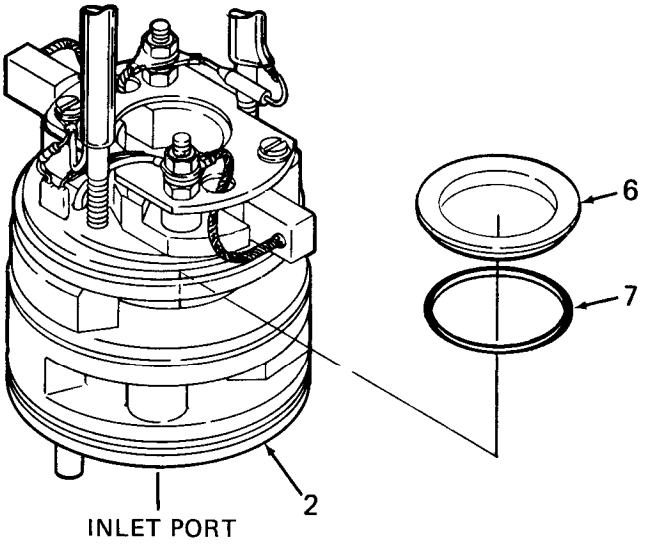
2-21. PUMP COVER AND INLET SEAL - INSPECT/REPAIR/REPLACE (Cont) 2-21

c. Reach index finger into inlet port of housing (2) and push inlet seal (6) up. Remove inlet seal from impeller chamber. Remove and discard preformed packing (7).



WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

d. Wash impeller housing (2), pump cover (4), and inlet seal (6) with non-woven cleaning cloth (Item 1, Appendix C) and dry cleaning solvent (Item 7, Appendix C).

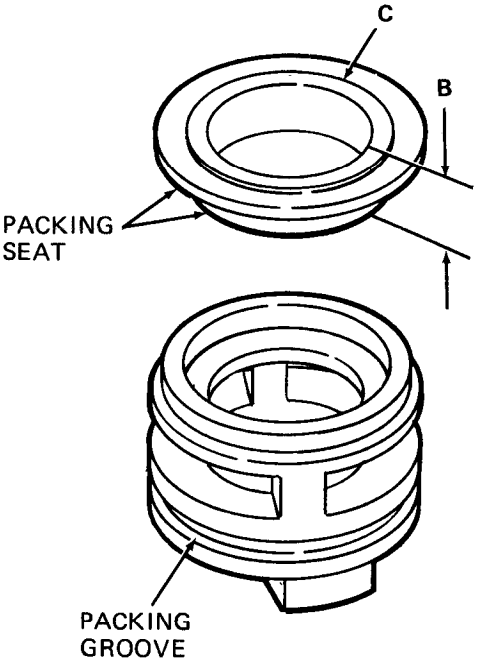
2. INSPECTION

a. Run your finger along the packing groove edges of the pump cover. Feel for any scratches or sharp edges that may damage preformed packing. Remove sharp edges of nicks or scratches using 500 or 600 grit, wet or dry emery paper. After sanding, clean surface with solvent.

b. If edges of packing groove is chipped or broken, replace pump cover.

c. Visually check drain port threads. If damaged, replace pump cover.

d. Run your finger along the packing seat of inlet seal (6). Feel for any scratches or sharp edges that may damage preformed packing. Remove sharp edges of nicks or scratches using 500 or 600 grit, wet or dry emery paper.



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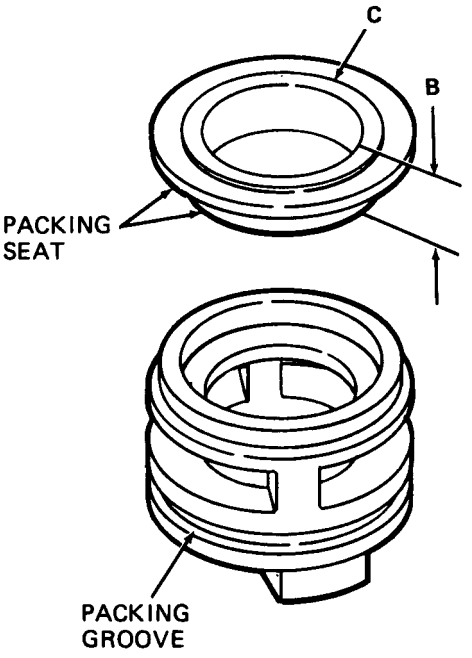
e. Use outside caliper to measure seal height, dimension B. If seal height is less that 0.201 inch, replace seal.

f. Visually check condition of inlet seal seat surface C. If wear grooves can be seen, or if surface looks dull, lap seat per paragraph 3.



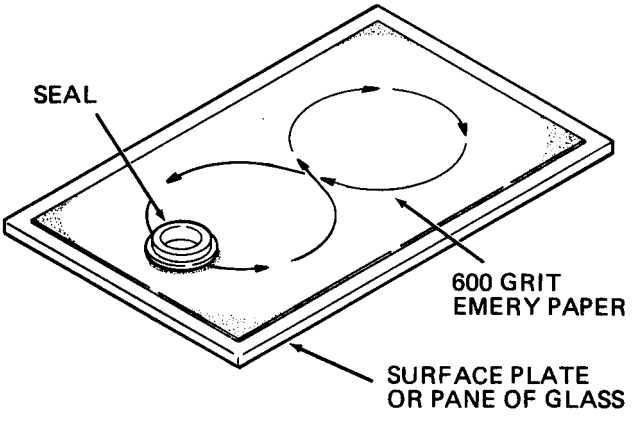
3. REPAIR INLET SEAL SEAT

a. Place sheet of 600 grit, wet or dry emery paper on inspection surface plate or pane of glass. Place seal (6) on emery paper with seal seat down, as shown. With light and even pressure, move seal in figure-8 path. Make only three or four passes.

b. Check seal surface condition. If necessary, make three or four more passes and recheck seal surface. Repeat lapping operation until grooves are gone.

c. Wipe off surface plate with clean cloth and replace emery paper with plain white bond paper. Repeat figure-8 pattern on paper to polish seal surface to a mirror finish.

d. Visually check seal surface condition. Surface must reflect light evenly.



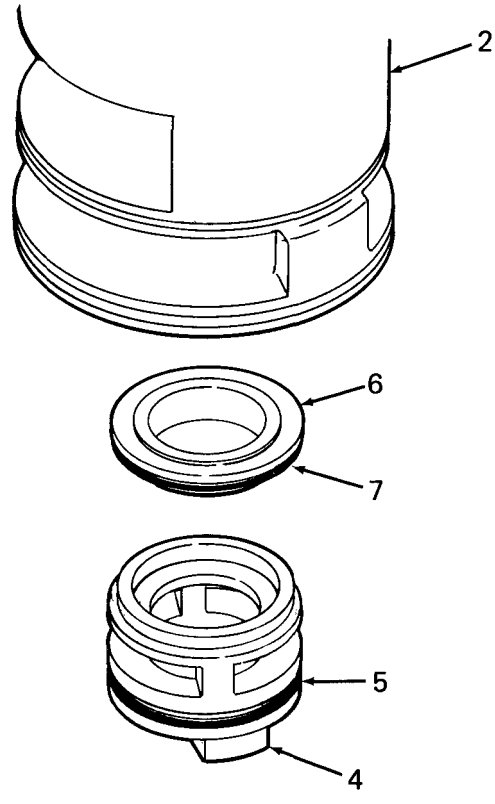
e. Measure seal height B per paragraph 2.e, INSPECTION. If seal height is less than 0.201 inch, replace seal.

GO TO NEXT PAGE

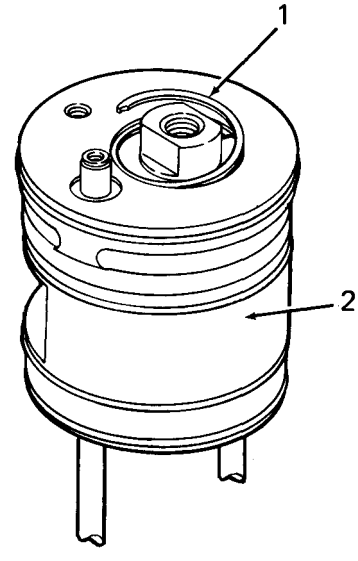
4. INSTALLATION

a. Install new packings (5 and 7) on pump cover (4) and inlet seal (6). Apply a thin, even coating of white petrolatum (Item 6, Appendix C) to packings.

b. Place inlet seal (6) on pump cover (4). Slide pump cover and inlet seal into inlet port of housing (2). Rotate pump cover while installing. Insert pump cover and inlet seal until fully seated. Once seated, be careful not to disturb position of pump cover or inlet seal.



c. Install retaining ring (1). Place one end of retaining ring in groove. Hold end in place. Use index finger to spiral ring into groove.



NOTE

FOLLOW-ON MAINTENANCE: Clean, visual inspect, and install impeller, armature, and field tube (paragraph 2-18).

END OF TASK

2-22. PUMP-END MOTOR BEARING - INSPECT/REPLACE 2-22

This task covers: Replacement of pump cartridge impeller housing motor bearing.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Bearing Installation Tool, Item 1, Appendix D
Pin Punch, Straight, 3/8 inch Dia., NSN 5120-00-273-0001
Reamer (Item 1, Appendix B, Sec. III)
Press, Arbor, Hand Operated, 1/2 Ton Pressure, NSN 3444-00-243-2654, or equivalent
Drill Press, Bench Type, 1/2 inch capacity, NSN 3413-00-529-0809, or equivalent
Plug Gage, Reversible, Cylindrical (Item 2, Appendix B, Sec. III)

Material/Parts:
Dry Cleaning Solvent, NSN 6850-00-274-5421

Personnel Required:
66-Series Technical Inspector
68D Powertrain Repairer

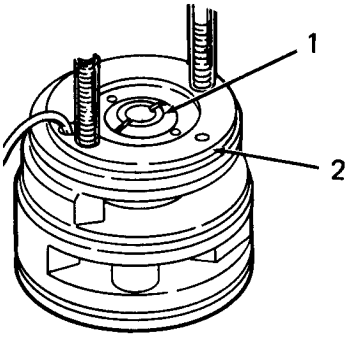
Equipment Condition:
Brush holder assembly removed from impeller housing PARA 2-20
Pump cover and inlet seal removed from impeller housing PARA 2-21

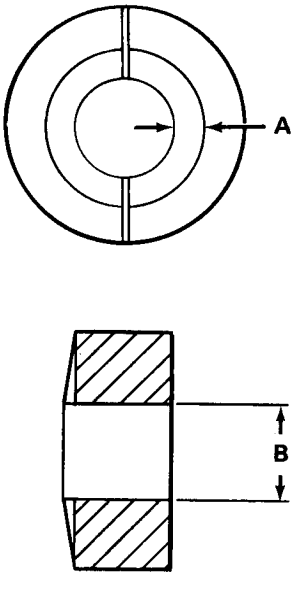
1. INSPECTION

a. Check pump-end bearing (1) in impeller housing (2) for cracks or chips. If bearing is cracked or chipped, replace bearing.

b. With 6 inch (152,4 mm) scale measure width A of bearing thrust face. If thrust face is more than 1/16 inch (1,60 mm), replace bearing.

c. Using plug gage (Item 2, Appendix B, Section III) check bearing bore diameter B. If 0.3145 NO GO gage passes through bearing, replace bearing.





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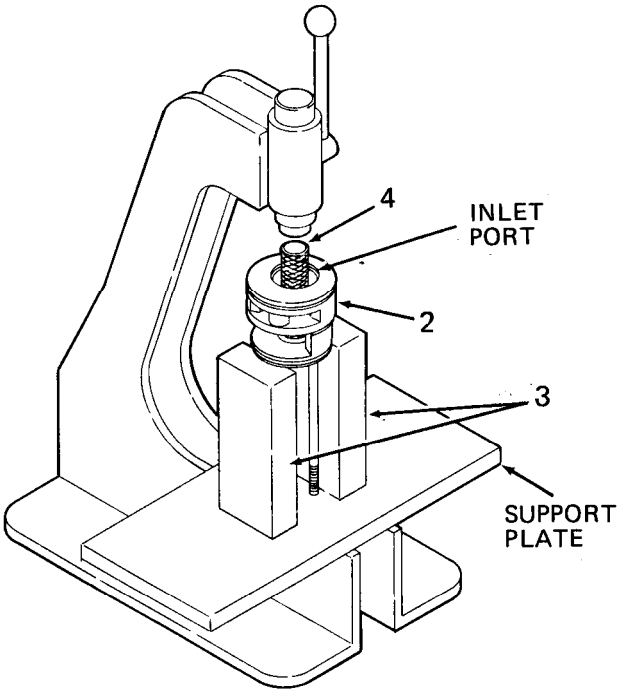
2-22. PUMP-END MOTOR BEARING - INSPECT/REPLACE (Cont) 2-22

2. REMOVAL

a. Set impeller housing (2) on arbor press, as shown. Use spacer blocks (3) to keep motor mounting studs off of support plate. Spacer blocks must not prevent bearing (1) from being pushed out of housing. Look underneath housing (2) to check for clearance between blocks and bearing.

CAUTION

Check that pin punch is not in contact with impeller housing when pressing bearing out. Failure to position punch correctly may result in permanent damage to impeller housing.



b. Place 3/8 inch (10 mm) diameter drive pin punch (4) in housing inlet port. Position drive end of punch on back side of bearing (1). Make sure that punch passes through center bore of bearing seat.

c. Bring arbor down to meet pin punch (4). Line up pin punch to drive bearing (1) straight out of bearing seat. Double check placement of punch. Press out bearing.

3. INSTALLATION

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 KPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.

a. Blow out debris from bearing seat with compressed air, 30 psi (207 kPa) maximum. Wipe out bearing bore with dry cleaning solvent (Item 7, Appendix C) and a clean soft cloth.

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2-22. PUMP-END MOTOR BEARING - INSPECT/REPLACE (Cont) 2-22

CAUTION

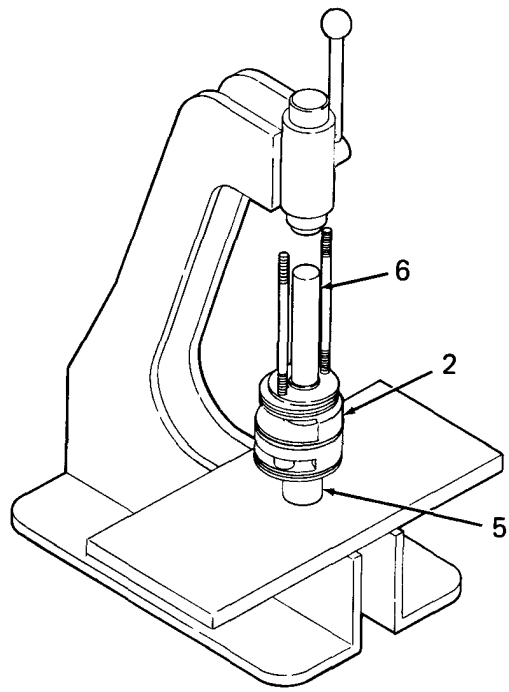
When pressing in the pump-end motor bearing, the impeller housing must have solid support just below the bearing seat, Failure to support the housing as instructed may result in permanent damage to the impeller housing.

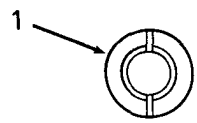
b. Carefully insert round bar press fixture (5) into housing inlet port. Place bar fixture against top surface of impeller chamber. Do not attempt to press bearing into impeller housing without support directly below bearing seat.

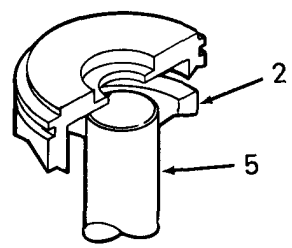
c. Stand impeller housing (2) and press fixture (5) on arbor press, as shown. Center bearing (1) over seat in housing. Slotted face of bearing must be up. Center bearing installation tool (6) (Figure 1, Appendix D) in bearing.

d. Bring arbor down to meet installation tool (6). Square-up top of installation tool with arbor. Double check that bearing (1) is in line with seat.

e. Press bearing (1) into seat until it bottoms in housing (2). Make sure bearing bottoms fully in seat. Remove bearing installation tool and support fixture.







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f. Check bearing I.D. Using plug gage (Item 2, Appendix B, Section III) check bearing bore. If 0.3135 GO gage does not pass through bearing, ream bearing as follows

(1) Install reamer (7, Item 1, Appendix B, Section III) in drill press. Set drill press spindle speed to between 560 and 690 RPM.

(2) A 3/8 inch (10 mm) spacer block is required between impeller housing and drill press. This is to protect the positive terminal.

(3) Place impeller housing (2) on support plate of drill press, as shown. Make sure housing is not resting on the positive terminal. With drill press OFF, bring reamer down to bearing. Center bearing bore to reamer.

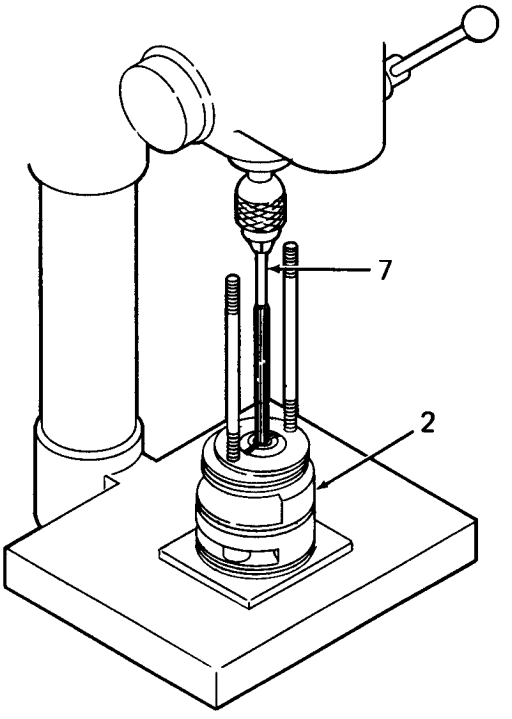
NOTE

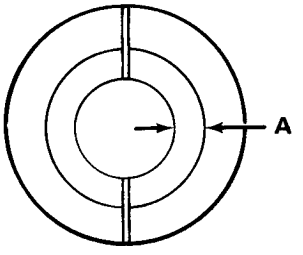
Make only one quick pass in and out of bearing bore. If reamer is allowed to dwell in bore, too much material will be removed from bearing.

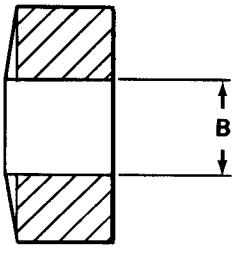
(4) Hold housing (2) in place on support plate. Turn drill press ON. Bring reamer down slowly to top of bearing. Ream bearing to size with one quick pass in and out of bearing bore.

(5) Using plug gage (Item 2, Appendix B, Section III) check bearing bore diameter B. If 0.3145 NO GO gage passes through bearing, replace bearing.

4. TI INSPECT. Inspect bearing to make sure diameter is within dimensions specified. Visually inspect to make sure bearing is fully seated and not chipped or damaged.







NOTE

FOLLOW-ON MAINTENANCE: Install pump cover and inlet seal (paragraph 2-21). Install pump-end brush holder assembly (paragraph 2-20).

END OF TASK

2-23. ELECTRICAL CIRCUITS - INSPECT/REPLACE 2-23

This task covers: Replacement of negative and positive secondary brush circuits.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Soldering Iron NSN 3439-00-853-8760, or equivalent
Heater Gun, 200 to 500 deg F,
NSN 4940-00-785-1162, or equivalent
Brush Holder Centering Tool, Item 1, Appendix D

Personnel Required:
68F Aircraft Electrician
66-Series Inspector

Equipment Condition:
Pump-end brush holder assembly removed from housing PARA 2-20.

Material/Parts:
Solder, Rosin-Core, QQS-571E
Electrical Wire, 18 AWG,
NSN ___ - ___ - ___
Heat Shrink Tubing 0.250 Inch I.D.
NSN 5970-00-935- 0082
Heat Shrink Tubing, 0.062 Inch I.D.,
NSN 5970-00- 935-0083
Thread Locking Compound, NSN 8030-00-111-2762

1. INSPECTION

a. Check for continuity between points A and B. If open, replace negative secondary brush circuit.

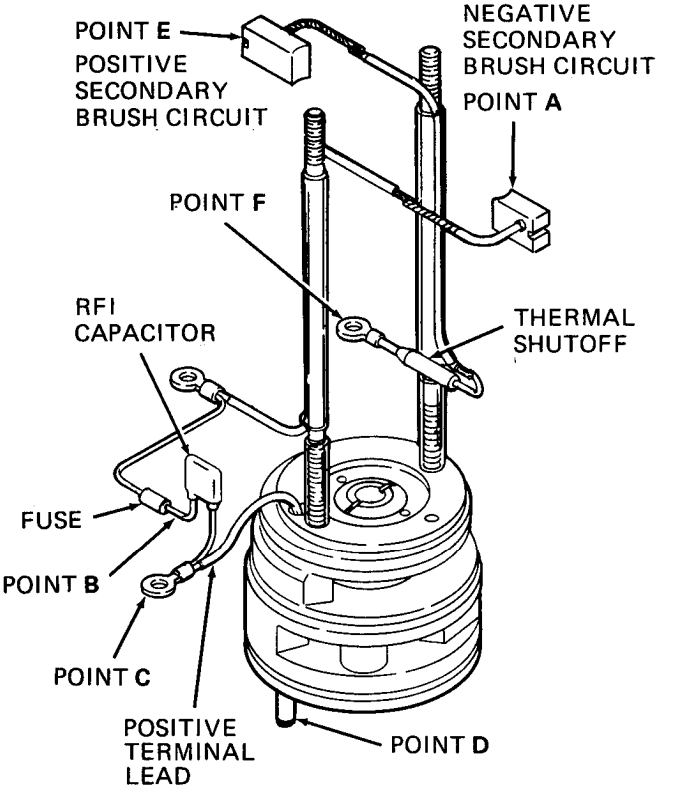
b. Check for continuity between points B and C. If zero ohms, RFI capacitor is shorted. If shorted, replace negative secondary brush circuit.

c. Check for continuity between points C and D. If open, replace positive terminal lead per the instructions and illustrations in paragraph 2-24.

d. Check for continuity between point D and impeller housing. If zero ohms, positive terminal is shorted to the housing. If shorted, replace positive terminal per instructions and illustrations in paragraph 2-24.

e. Check for continuity between points E and F. If open, replace positive secondary brush circuit.

f. Check general condition of all wiring. If insulation or shrink tubing is cracked or charred, replace circuit. Check brush solder joints for loose fit or cracking. Resolder loose or cracked brush solder joints.



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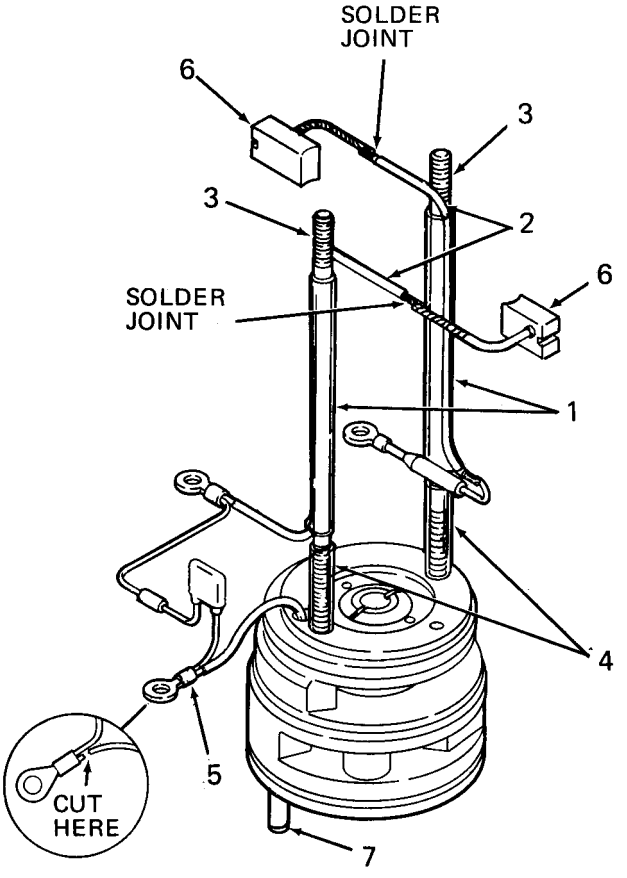
2. REMOVAL

a. Remove defective brush circuit only. Use knife to cut shrink tube (1) and secondary lead (2) from mounting stud (3). If worn through or cracked, remove short piece of shrink tube (4) from base of mounting stud (3). If replacing negative secondary brush circuit, cut positive terminal lead wire and lug terminal (5) from primary lead.

b. If secondary brushes (6) are good, unsolder defective secondary lead from brush. Discard defective secondary lead and attached components.

c. If positive terminal lead circuit is defective, remove and replace positive terminal (7) per the instructions and illustrations in paragraph 2-24.



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3. INSTALLATION

a. Install Pump-End Brush Holder Assembly. Screw brush holder assembly (8) loosely in place on housing with machine screws (9).

NOTE

To prevent short circuits, all electrical leads must be cut to fit closely.

b. Install Positive Secondary Brush Circuit

(1) Pre-cut leads of thermal cutoff (10). Cut lead on insulated (pointed) end to 1/4 inch (6,4 mm). Cut lead on opposite end to 3/8 inch (9,5 mm).

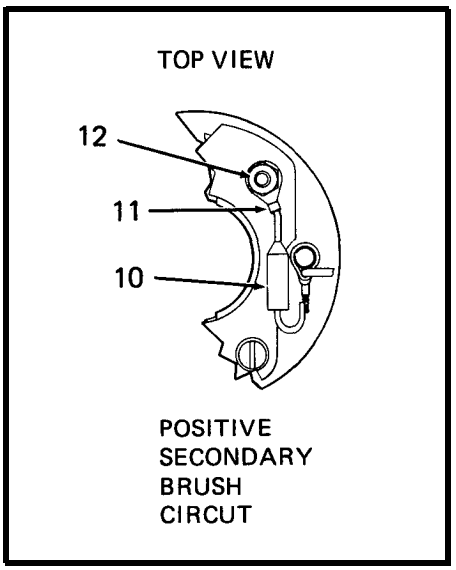
(2) Crimp terminal (11) to insulated end of thermal cutoff.

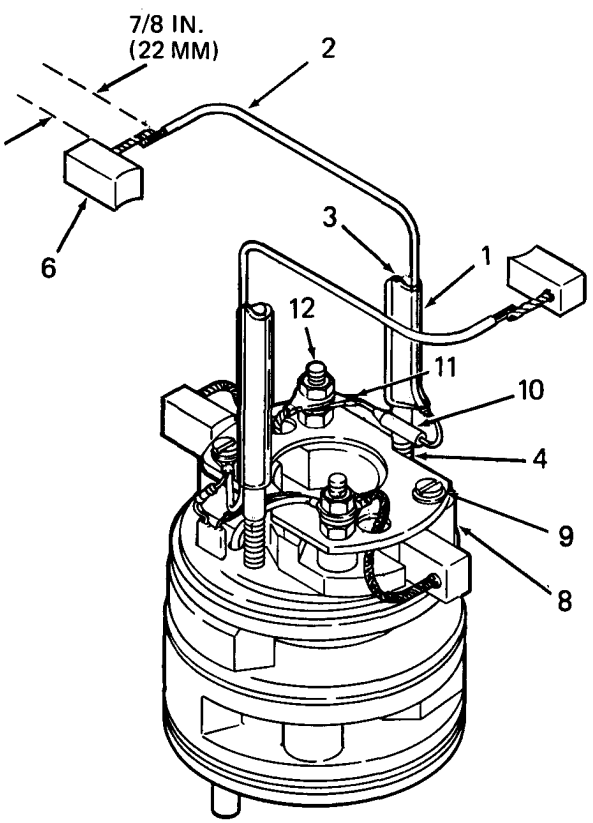
(3) Cut about 6 inches (150 mm) of new lead wire (Item 3, Appendix B, Bulk Items List). Strip 1/4 inch (6,4 mm) of insulation from one end. Tin with solder (Item 8, Appendix c).

(4) Use heat sink to protect thermal cutoff. Overlap tinned lead wire 1/4 inch (6,4 mm) on bare lead of thermal cutoff. Solder leads together.

(5) Attach terminal (11) to brush holder stud (12), as shown. Bend secondary lead toward motor mounting stud (3).

(6) If shrink tube (4) was removed from negative side stud (3), replace it. Install a 3/4 inch (19 mm) length of shrink tube over base of stud. Use 1/4-inch shrink tube (Item 2, Appendix B, Bulk Items List).





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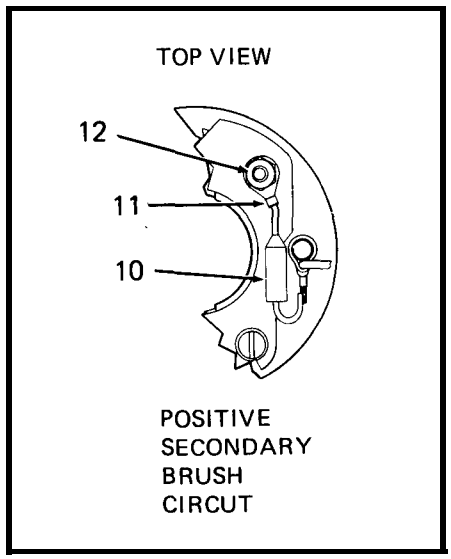
CAUTION

Position lead wire on mounting stud as instructed. Failure to position lead correctly will cause improper alignment of the field tube. This could lead to early pump failure.

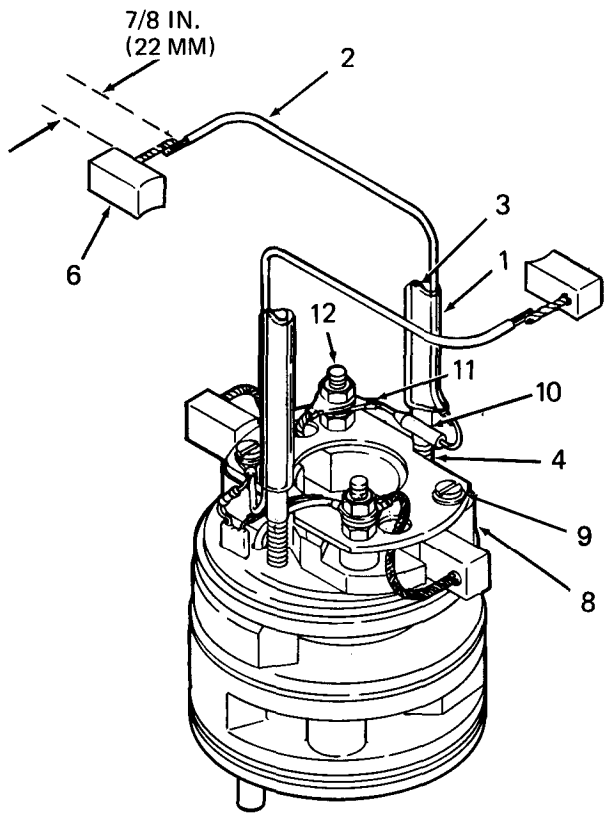
(7) Install a 2-1/4 inch (57 mm) length of shrink tube (1) over mounting stud and lead wire. Use 1/4-inch shrink tube (Item 2, Appendix B, Bulk Items List). Position lead wire exactly as shown in top view of negative side circuit. Push shrink tube down to about 1/4 inch from shrink tube (4). Use heat gun to shrink lead wire in place on stud.



NOTE

If reusing secondary brush, do not trim shunt leads. Brush away used solder and re-tin lead.

(8) Cut off lead wire (2) even with top of stud (3). Strip 1/4 inch (6,4 mm) of insulation from wire end. Cut shunt lead of new brush (6) to about 7/8 inch (22 mm). Tin ends of shunt lead and lead wire. Overlap leads 1/4 inch (6,4 mm) and solder. Use rosin-core solder (Item 8, Appendix C).



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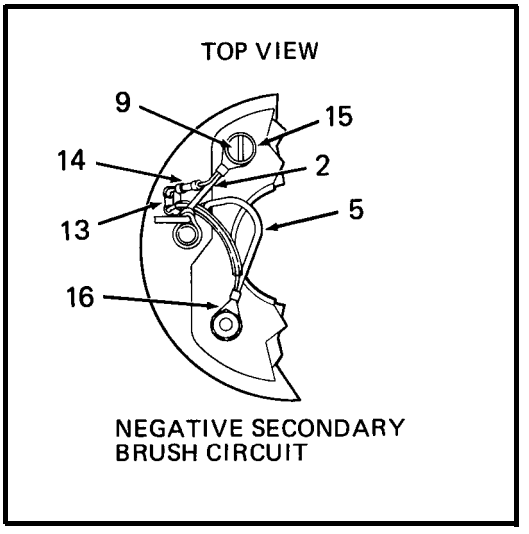
c. Install Negative Secondary Brush Circuit

(1) Pre-cut leads of capacitor (13) and fuse (14). For both capacitor and fuse, cut one lead off at 3/8 inch (9,5 mm). Cut the other off at 7/8 inch (22 mm).

(2) Twist short leads of capacitor and fuse together. Use heat sinks on both sides of solder joint. Solder leads together with rosin-core solder (Item 8, Appendix C).

(3) Cut about 6 inches (152,4 mm) of new lead wire (2) (Item 3, Appendix B, Bulk Items List). Strip 1/4 inch (6,4 mm) of insulation from one end. Crimp long lead of fuse (14) and lead wire (2) together in terminal (15). Secure terminal to brush card with screw (9) as shown.

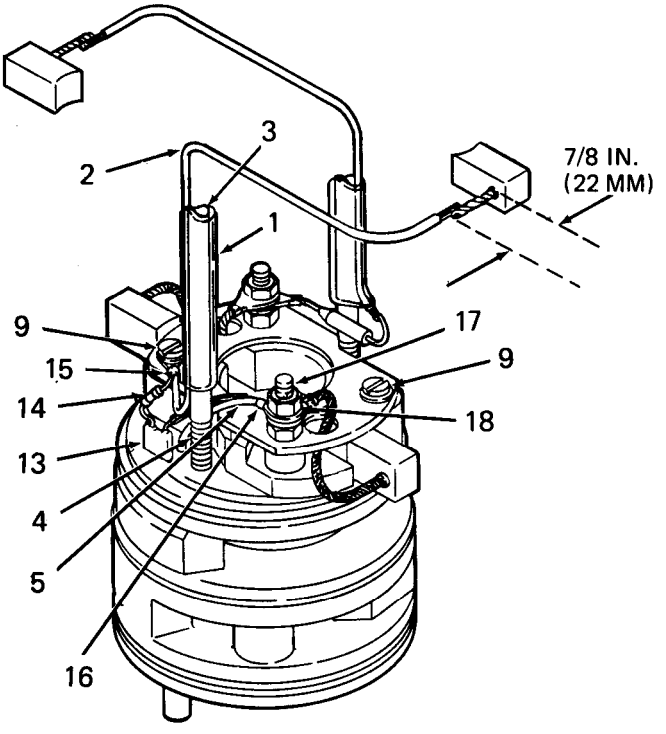


(4) If shrink tube (4) was removed, replace it. Install a 3/4 inch (19 mm) length of shrink tube over base of stud. Use l/4-inch shrink tube (Item 2, Appendix B, Bulk Items List).

CAUTION

Position lead wire on mounting stud as instructed. Failure to position lead correctly will cause improper alignment of the field tube. This could lead to early pump failure.

(5) Install a 2-1/4 inch (57 mm) length of shrink tube (1) over mounting stud and lead wire. Use 1/4-inch shrink tube (Item 2, Appendix B, Bulk Items List). Position lead wire exactly as shown in top view of negative secondary brush circuit. Push shrink tube down to about 1/4 inch from shrink tube (4). Use heat gun to shrink lead wire in place on stud.



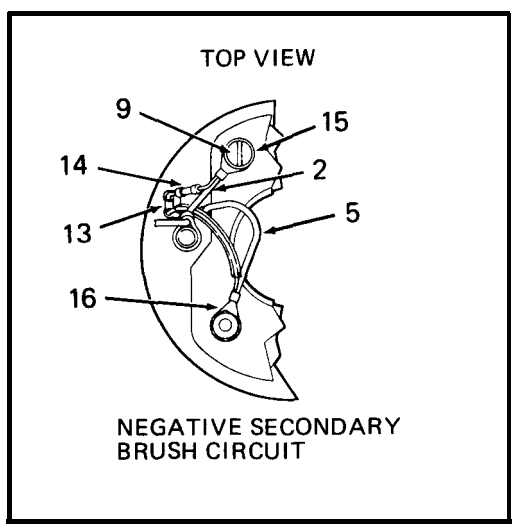
NOTE

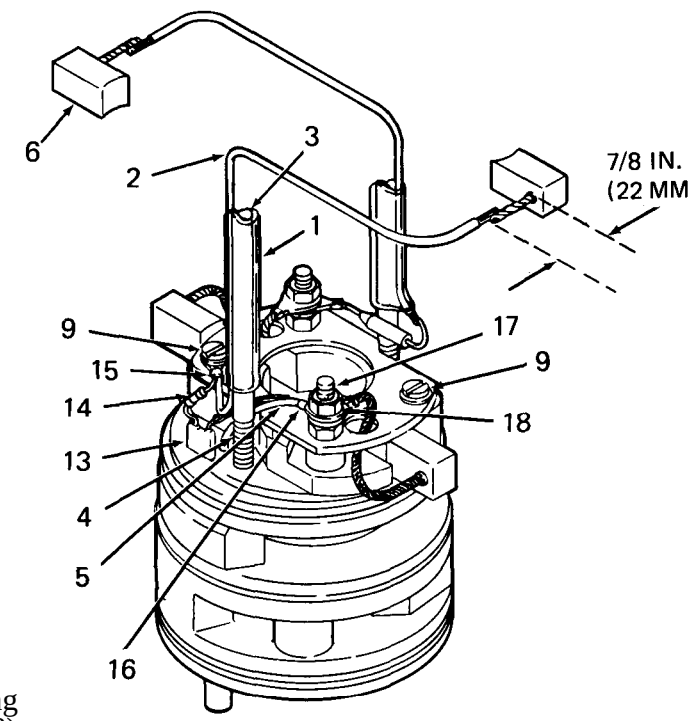
If reusing secondary brush, do not trim shunt leads. Brush away used solder and re-tin lead.

GO TO NEXT PAGE

(6) Cut off lead wire (2) even with top of stud (3). Strip 1/4 inch (6,4 mm) of insulation from wire end. Cut shunt lead of new brush (6) to about 7/8 inch (22 mm). Tin ends of shunt lead and lead wire. Overlap leads 1/4 inch (6,4 mm) and solder. Use rosin-core solder (Item 8, Appendix C).

(7) Install 3/4 inch (19 mm) length of shrink tube over long lead of capacitor (13). Use 0.062-inch diameter shrink tube (Item 4, Appendix B, Bulk Items List). Use heat gun to shrink tubing to lead wire.

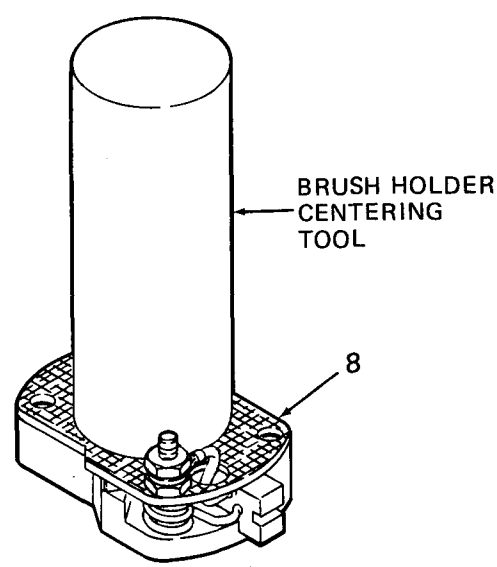




(8) Route primary lug terminal (5) and long capacitor lead between mounting stud (3) and brush holder (8). Both leads must pass below brush lead (2). Place new terminal (16) on stud (17). Place positive lead wire (5) along side terminal (16). Cut positive lead to reach the terminal with minimum slack in lead wire.

(9) Strip positive lead end 1/4 inch (6,4 mm). Crimp positive lead wire (5) and capacitor lead (13) lead together in terminal lug (16).

d. Loosen screws (9). Install terminal lug (15) under screw (9) as shown in top view. Make sure washers are in place under screws. Install brush holder centering tool (Figure 1, Appendix D) in center of brush holder assembly (8). Carefully insert nipple of centering tool in pump end bearing. Tighten screws (9). Remove centering tool.



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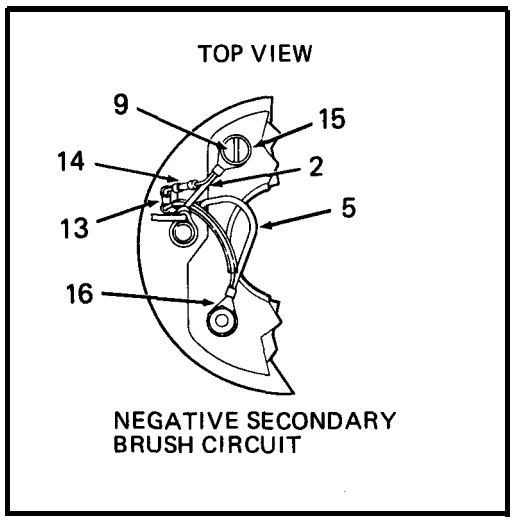
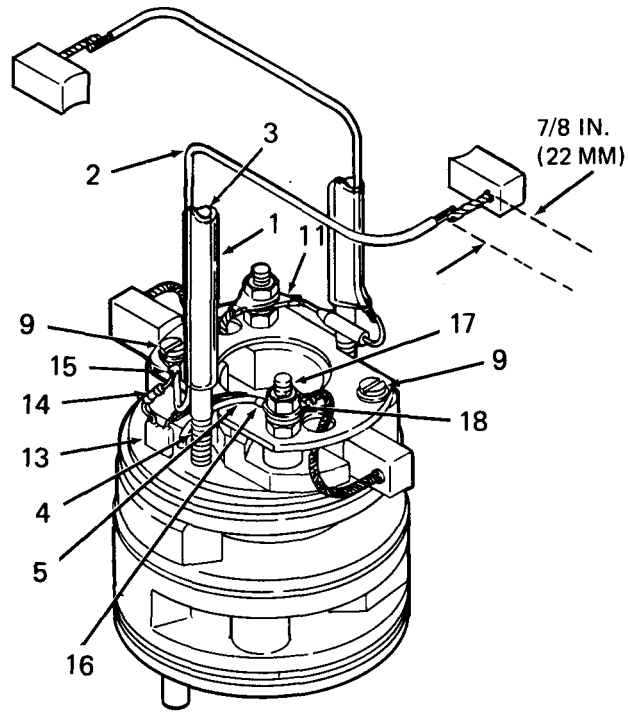




e. Remove nuts (18) from studs (17). Install terminal lugs (11 and 16) onto studs. Make sure brush lead terminal lugs are in place on studs.

f. Apply one drop of thread locking compound (Item 3, Appendix C) to threads of nuts (18). Thread nuts on mounting studs (17) and tighten.

g. TI INSPECT. Inspect all wiring, and location of components for proper positioning. Check solder joints to make sure they are secure. Make sure thermal cutoff (10) is facing in the right direction. Measure brush leads and make sure they are the correct length.

NOTE

FOLLOW-ON MAINTENANCE Install pump-end brush holder assembly (paragraph 2-20).

END OF TASK

2-24. IMPELLER HOUSING - INSPECT/REPLACE 2-24

This task covers: Replacement of primary lead terminal and studs. It also covers repair of the housing.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Cartridge Pulling Tool, Item 4, Appendix D
Pull Tool Adapter, #6-32, Item 2, Appendix D
Tap, Thread Cutting, NSN 5136-00-555-8096
Press, Arbor, Hand Operated, 1/2 Ton Pressure, NSN 3444-00-243-2654, or equivalent
Brush, Soft Bristle, Cleaning
Heater Gun, 200 to 500 deg. F, NSN 4940-00-785-1162
Vise, Machinist's, 4 inch Jaw, NSN 5120-00-293-1439, or equivalent
Cap, Vise Jaw, Plastic, NSN 5120-00-221-1506, or equivalent
Soldering Iron, NSN 3439-00-853-8760, or equivalent

Material/Parts:
Thread Locking Compound, NSN 8030-00-148-9833
Thread Locking Compound, NSN 8030-00-180-6222
Cleaning Cloth, Nonwoven, NSN 8305-00-753-2967
Dry Cleaning Solvent, NSN 6850-00-274-5421
Solder, Rosin Core, QQ-S-571E
Electrical Wire, 18 AWG, NSN_____-___-____-_____
500 or 600 Grit, Wet or Dry Emery Paper

Personnel Required:
68F Aircraft Electrician
66-Series Technical Inspector
68D Powertrain Repairer

Equipment Condition:
Electrical wiring removed from housing PARA 2-23.

1. REMOVAL

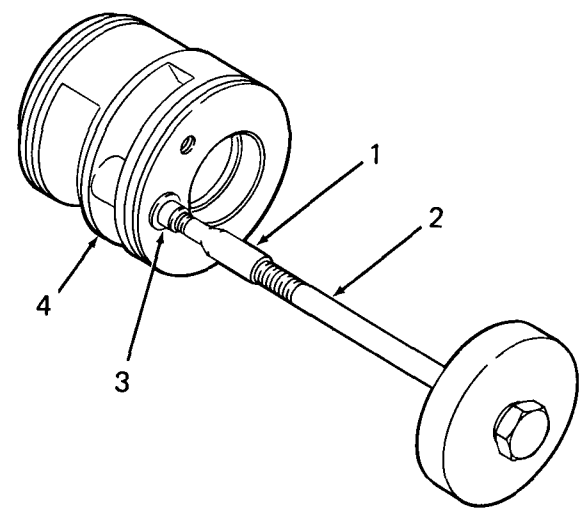
NOTE

Remove and replace defective components only.

a. Remove Positive Terminal Assembly

(1) Install pull tool adapter (1) (Figure 2, Appendix D) on cartridge pulling tool (Figure 4, Appendix D).

(2) Thread adapter (1) of pulling tool into terminal assembly (3). Hold impeller housing (4) firmly in one hand. Slide hammer of pulling tool adapter (1) against bolt head to force terminal assembly (3) from impeller housing.



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b. Remove Mounting Stud

CAUTION

Always use plastic jaws or padding to hold impeller housing in vise. Failure to use soft jaws may damage the impeller housing.

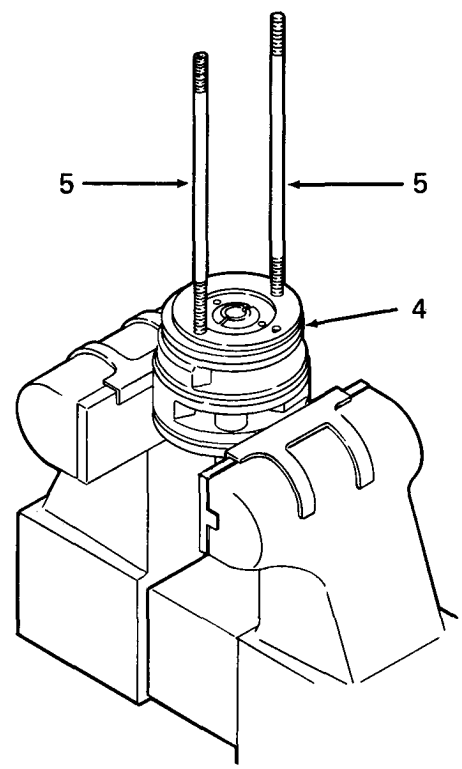
(1) Secure impeller housing (4) in vise. Use plastic vise caps or leather in vise jaws to avoid damage to housing. Do not over-tighten vise jaws.

(2) Thread locking compound was used to secure mounting studs (5) in housing. Use a heat gun to melt thread locking compound. Apply 300 to 400°F (185 to 240°C) hot air blast to base of mounting stud.

CAUTION

Do not force mounting stud to turn in impeller housing. Forcing stud may strip out screw threads in housing.

(3) Keep heat on mounting stud (5). Grip smooth surface of stud with slip joint pliers. Apply light torque with pliers. Do not try to force stud to turn. Be patient. When locking compound gets hot enough, the stud will turn easily.



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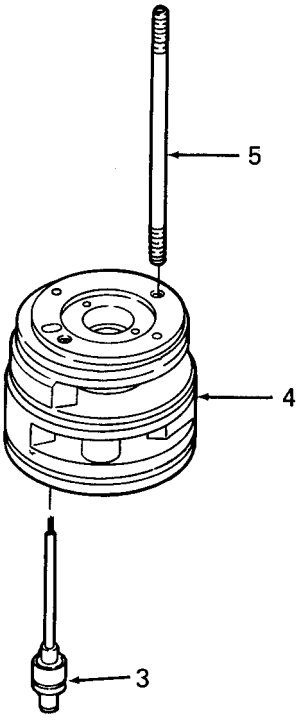
2. CLEANING

WARNING

Compressed air aimed at the skin can cause serious injury or death. Wear goggles and never use over 30 psi (207 kPa) of compressed air for cleaning.

WARNING

Cleaning solvent can be hazardous to your health. Use solvent only in well-ventilated areas. Avoid breathing solvent vapors. Do not use solvent near an open flame or other source of high heat. Always wear gloves, apron, and goggles when using cleaning solvent. Store solvent in approved metal container only.



CAUTION

Do not use metal or glass tools to scrape dirt or locking compound from impeller housing surfaces. Scraping with metal or glass will destroy the thin, protective coating on the housing. This could lead to leaks or early failure of the pump.

a. Clean Housing. Wash impeller housing (4) with non-woven cloth (Item 1, Appendix C) and dry cleaning solvent (Item 7, Appendix C). Clean debris from all exposed surfaces. Use soft-bristled brush to scrub packing grooves. If needed, use plastic or wood scraping tool to scrape away hardened deposits. Do not use metal or glass scraping tools to clean housing surfaces.

b. Clean Positive Terminal Bore. Locking compound was used to seal positive terminal assembly (3) in housing (4). Use a plastic or wooden tool to scrape residue from bore.

c. Clean Threaded Holes. If replacing stud (5), use #10-32 tap to clean threads in housing (4). Run tap in and out of threads two or three times to remove all locking compound residue.

d. Rinse impeller housing (4) in solvent (Item 7, Appendix C). Wipe down all surfaces with cleaning cloth (Item 1, Appendix C). Be sure to drain solvent from primary lead wire port. Blow-dry all ports and surfaces with compressed air, 30 psi (207 kPa) maximum.

GO TO NEXT PAGE

3. INSPECTION

a. Run your finger along the packing grooves in the impeller housing. Feel for any sharp edges, nicks, or scratches that may damage preformed packings. Remove sharp edges, nicks, or scratches, using 500 or 600 grit, wet or dry emery paper. After sanding, clean surface with a cloth moistened with dry cleaning solvent.

b. If edge of packing groove is broken off, replace impeller housing.

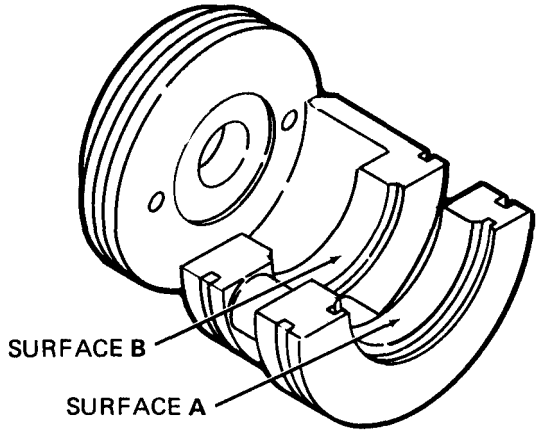
c. Using a flashlight, visually inspect pump cover and inlet seal packing seats, surfaces A and B, for nicks, burrs, or scratches. If a defect is found on either sealing surface, it must be completely removed flush with the surrounding surface as follows:

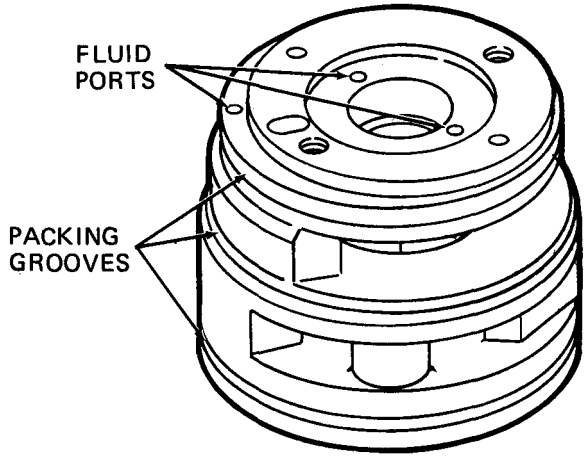
(1) Use 500 or 600 grit, wet or dry emery paper moistened with water. Polish the bore diameter until the sharp edges and the entire raised portion of defect is removed.

(2) Lightly run your finger along the entire bore area of surfaces A and B and make sure you do not feel any defects. After you are satisfied with the finish, use a clean cloth moistened in cleaning solvent to clean the inside of the bore.

(3) Use a flashlight to check the reflected surface to make sure the raised portion of the defect is removed.

d. Check each of the three fluid ports on motor end of housing for blockage. Clear any blockage found with wire probe, 0.035 inch (0,89 mm) diameter maximum. If fluid port blockage cannot be removed, replace impeller housing.





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4. REPLACE POSITIVE TERMINAL

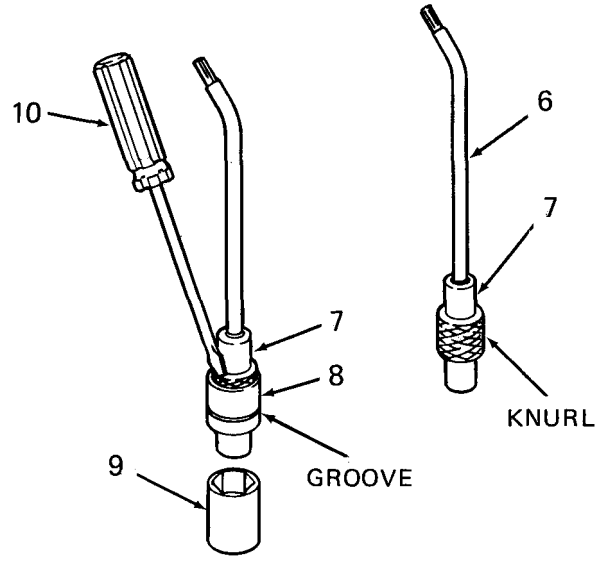
a. Cut a 4-inch (100 mm) length of lead wire (6) (Item 3, Appendix B, Bulk Items List). Strip insulation back about 1/4 inch (6 mm) at one end. Tin bare end with solder (Item 8, Appendix C).

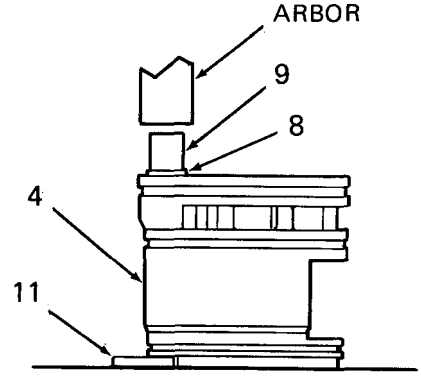
b. Install tinned end of wire (6) in terminal pin (7), as shown. Heat terminal with soldering iron to bond lead wire to terminal. Check for good bond by tugging on lead wire.

c. Apply one drop of locking compound (Item 5, Appendix C) to knurl of terminal pin (7). Place terminal pin (7) in terminal housing (8). Place terminal housing (8) into a 5/16 inch socket (9) or equivalent. Press terminal pin (7) into terminal housing (8) using a small screw driver (10). Terminal pin (7) is fully inserted into terminal housing when end of pin protrudes through housing.

d. TI INSPECT. Inspect solder joint to make sure it is secure. Check that terminal pin is fully positioned in terminal housing.

e. Insert primary lead wire (6) into terminal bore in impeller housing (4) and through wire port in impeller housing. Place impeller housing on hand operated arbor press, as shown. Make sure area under primary terminal bore is supported. It may be necessary to place a flat metal washer (11) between impeller housing and arbor plate to support the outer edge below the terminal.





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CAUTION

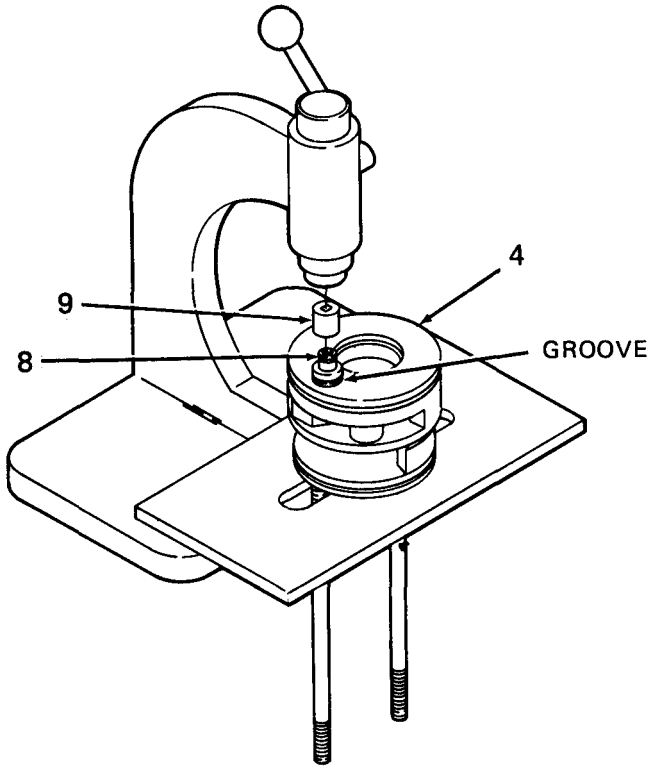
When pressing terminal housing into impeller housing bore, use only enough pressure to seat terminal housing into bore. Excessive pressure will smash nylon terminal housing.

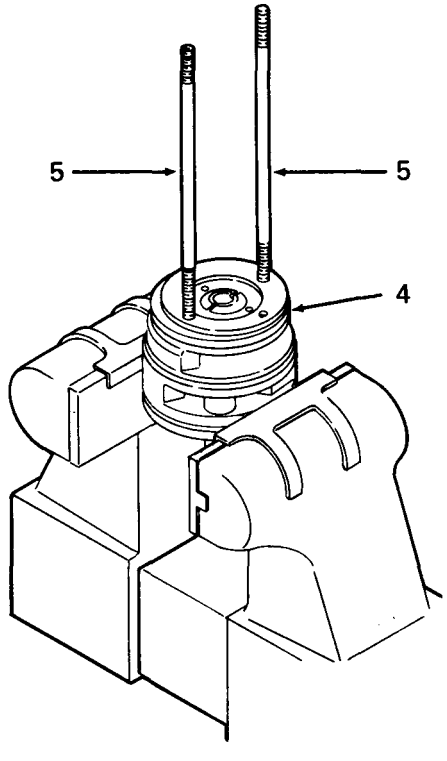
f. Apply one drop of locking compound (Item 5, Appendix C) to groove in terminal housing (8). Lineup terminal assembly with bore. Slowly press terminal assembly into impeller housing bore until fully seated. Use a 5/16 inch socket (9), or equivalent, as a driver tool between terminal housing (8) and arbor. This will prevent arbor from pressing terminal pin (7) end back into terminal housing.

5. REPLACE MOUNTING STUD

a. Apply one drop of thread locking compound (Item 4, Appendix C) to leading threads of stud (5).

b. Screw stud into impeller housing (4). Measure stud height above housing. Adjust stud height to between 4.073 and 4.113 inches (between 103,45 and 104,47 mm).





NOTE

FOLLOW-ON MAINTENANCE Install positive and negative secondary electrical circuits (paragraph 2-23).

END OF TASK

2-25. FUEL BOOST PUMP / CARTRIDGE - FINAL TEST 2-25

This task covers: Final acceptance and flow testing of boost pump cartridge; or assembled cartridge and pump housing.

INITIAL SETUP

Tools:
Aircraft Electrician's Tool Kit, NSN 5180-00-323-4915
Fuel Pump Test Tank, Item 5, Appendix D
Cartridge Pulling Tool, Item 4, Appendix D

Equipment Condition:
Assembled Pump Cartridge; or pump cartridge installed in pump housing.

Material/Parts:
Calibration Fluid, NSN 6850-00-264-5771
White Petrolatum, NSN 6505-00-133-8025
Preformed Packing (2req) NSN 5330-00-435-9355
Preformed Packing, NSN 5330-00-410-4887

Personnel Required:
68F Aircraft Electrician

NOTE

The boost pump may be final acceptance tested either as a complete cartridge and housing assembly, or as the pump cartridge alone. When testing the assembled cartridge and housing, the dummy housing installed in the test tank must be removed from the tank. When testing the pump cartridge, the cartridge is installed in the dummy housing.

NOTE

When performing the test procedures, follow only the instructions that apply to your boost pump model. Procedures applying to the cartridge will be identified as BOOST PUMP CARTRIDGE. Procedures applying to the assembled cartridge and housing will be identified as ASSEMBLED CARTRIDGE AND HOUSING. Procedures applying to both the cartridge alone and the assembly will be identified BOOST PUMP, CARTRIDGE AND ASSEMBLY.

NOTE

The boost pump drain port must be plugged for final testing. Reference the aircraft manual for the proper plug and preformed packing required.

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2-25. FUEL BOOST PUMP /CARTRIDGE - FINAL TEST (Cont)

1. INSPECTION - ASSEMBLED CARTRIDGE AND HOUSING

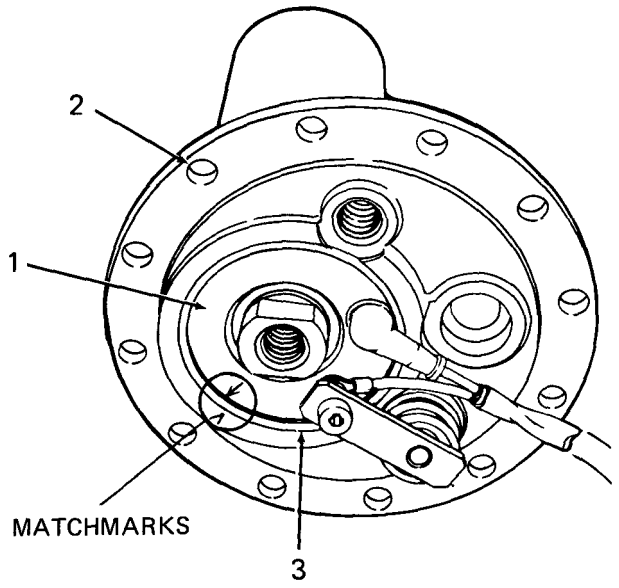
   a. Check that matchmarks on pump cartridge (1) and pump housing (2) are in line.

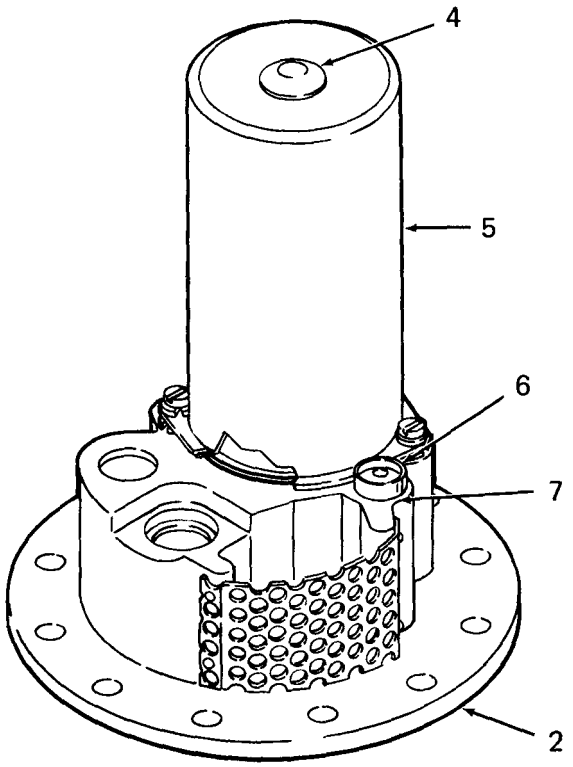
   b. Check that cartridge retaining ring (3) is installed in housing. If retaining ring is not installed, refer to paragraph 2-10.

   c. Check that umbrella check valve (4) is installed on canister (5). Check that umbrella check valve (6) is installed in adapter plug (7). If umbrella check valve (4) is not in place, refer to paragraph 2-11. If umbrella check valve (6) is not installed, refer to paragraph 2-12.

   d. Check that pump canister (5) is secured tight to pump housing (2) and that all attaching hardware is secure.

   e. Make sure there are no dents or nicks in the canister. If canister is dented, refer to paragraph 2-11.





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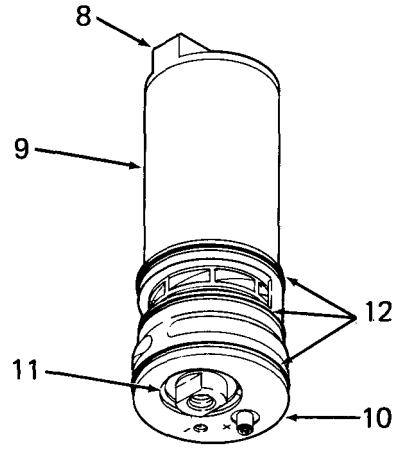
NOTE

The following paragraph applies to inspection of boost pump cartridge only. If testing assembled cartridge and housing, continue with paragraph 3.



2. INSPECTION - BOOST PUMP CARTRIDGE

a. Check that motor cover (8) and field tube (9) are secured tight to impeller housing (10). Check for gaps between motor cover and field tube, and field tube and housing.

b. Check that pump cover retaining ring (11) is installed in impeller housing (10).

c. If there are preformed packings (12) in the impeller housing (10), remove them.

NOTE

The following paragraph applies to testing of assembled cartridge and pump housing. If testing boost pump cartridge only, continue with paragraph 4.

3. INSTALLATION IN TEST TANK - ASSEMBLED CARTRIDGE AND HOUSING

a. Empty all calibration fluid from test tank.

b. Remove test pump dummy housing from test tank and disconnect fuel discharge line.

c. Install fuel discharge line on assembled cartridge and housing being tested.

d. Install new mounting flange gasket on pump housing and install assembled cartridge and housing in test tank.

GO TO NEXT PAGE

e. Make sure that a drain plug is installed in the cartridge drain port. If none is present, reference the aircraft manual for correct plug with packing.

f. When installing plug, hold pump cover (13) with a wrench to keep it from turning.

NOTE

The following paragraph applies to installation procedures for boost pump cartridge only. If installing an assembled cartridge and housing, continue to paragraph 5.

4. INSTALLATION IN TEST TANK - BOOST PUMP CARTRIDGE

CAUTION

Apply pressure directly over valve spring when opening or closing valve stem assembly. Trying to compress valve spring from free end of valve arm will cause valve arm to bend, When removing or installing shoulder screw, keep valve arm depressed.

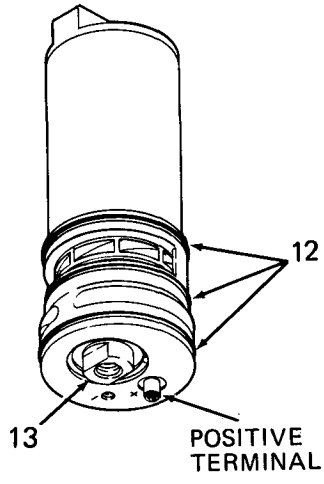
a. Apply a thin, even coating of petrolatum (Item 6, Appendix C) to preformed packings (12). Install smaller preformed packing into top groove, and remaining packings in lower grooves.

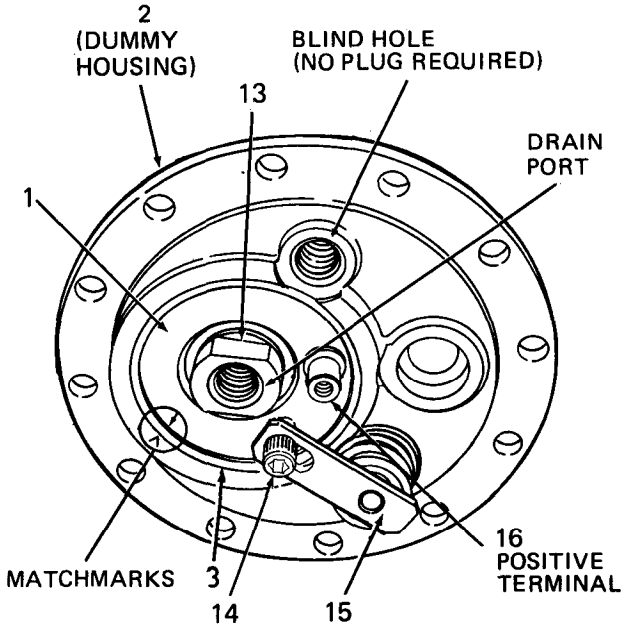
b. Slide pump cartridge (1) half way into test tank dummy housing. Align matchmarks on cartridge and test tank housing. Using thumb presure only, press cartridge into housing until seated.

c. Install retaining ring (3) in ring groove. Press retaining ring into groove, a little at a time, with index finger.

d. Remove shoulder screw (14) from cartridge. Line up inlet valve stem (15) with shoulder screw hole. Place thumb on inlet valve stem (15) above spring. Press valve stem in toward pump housing. Install shoulder screw (14) to secure stem in place and keep inlet valve open.

e. Make sure that drain plug is installed in the cartridge drain port. If none is present reference the aircraft manual for correct plug with packing.





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5. FLOW TESTING PUMP - BOOST PUMP, CARTRIDGE AND ASSEMBLY

a. Test Equipment Setup.

CAUTION

Apply pressure directly over valve spring when opening or closing valve stem assembly. Trying to compress valve spring from free end of valve arm will cause valve arm to bend. When removing or installing shoulder screw, keep valve arm depressed.

NOTE

Calibration fluid temperature must be from 68° to 78°F (20 to 25°C) to get accurate test results.

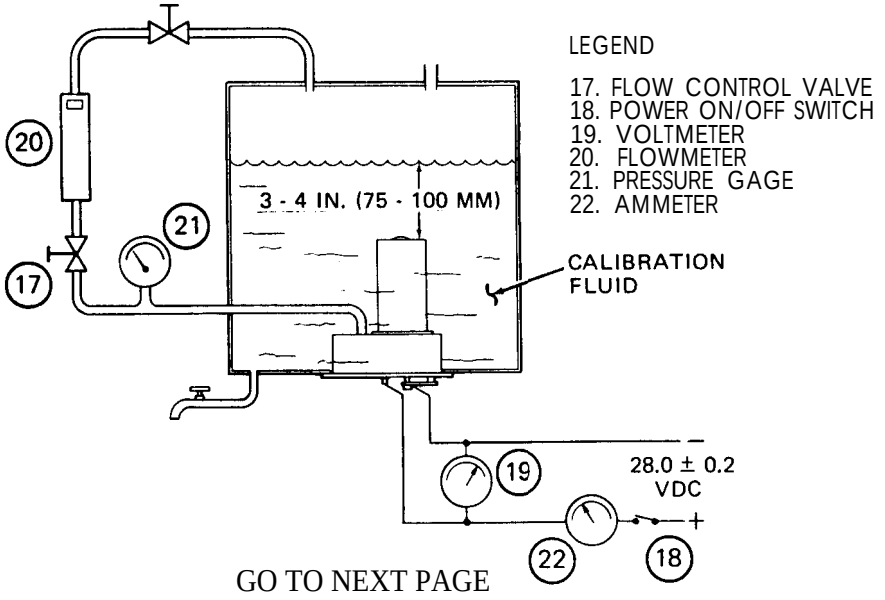
(1) Fill test tank with calibration fluid (Item 2, Appendix C). Fluid level must be from 3 to 4 inches (76 to 102 mm) above the top surface of the pump canister.

(2) Check that DC power supply switch is OFF. Connect positive power supply lead to positive terminal (16). Connect negative power supply lead to valve stem (15).

NOTE

If harness is installed on pump and housing assembly, black lead is positive and white lead is negative.

(3) Check outside of pump, around housing and boost cartridge. Make sure there is no evidence of test fluid leakage. Outside of pump should be dry.



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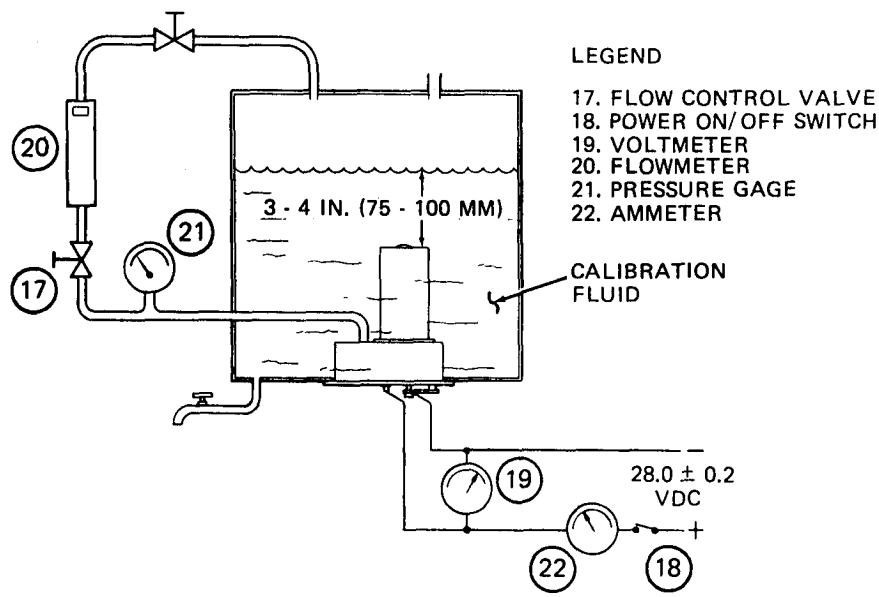
FLUID FLOW	PRESSURE	CURRENT DRAW
1000 PPH	ACTUAL: _____ ACCEPTABLE: 13.0 - 25.0 psig (89,6 - 172,4 kPa gage)	ACTUAL: _____ ACCEPTABLE: 6.0 amps, maximum
300 PPH	ACTUAL: _____ ACCEPTABLE 12.5 - 25.0 psig (86,2 - 172,4 kPa gage)	ACTUAL: _____ ACCEPTABLE: 5.0 amps, maximum
0 PPH	ACTUAL: _____ ACCEPTABLE 25.0 psig, maximum (172,4 kPa gage)	ACTUAL: _____ ACCEPTABLE: 6.0 amps, maximum

b . Break-In Run. Open flow control valve (17), Turn power switch (18) ON. Adjust voltage output to 28.0 VDC. Allow pump to run for approximately 30 seconds at this setting. Turn power switch (18) OFF. Close flow control valve (17).

c. Pressure and Flow Test.

(1) Turn power switch (18) ON. Adjust DC voltage output for a reading of 28.0 ±0.2 volts at voltmeter (19).

(2) Adjust flow control valve (17) for a reading of 1000 PPH at flowmeter (20).



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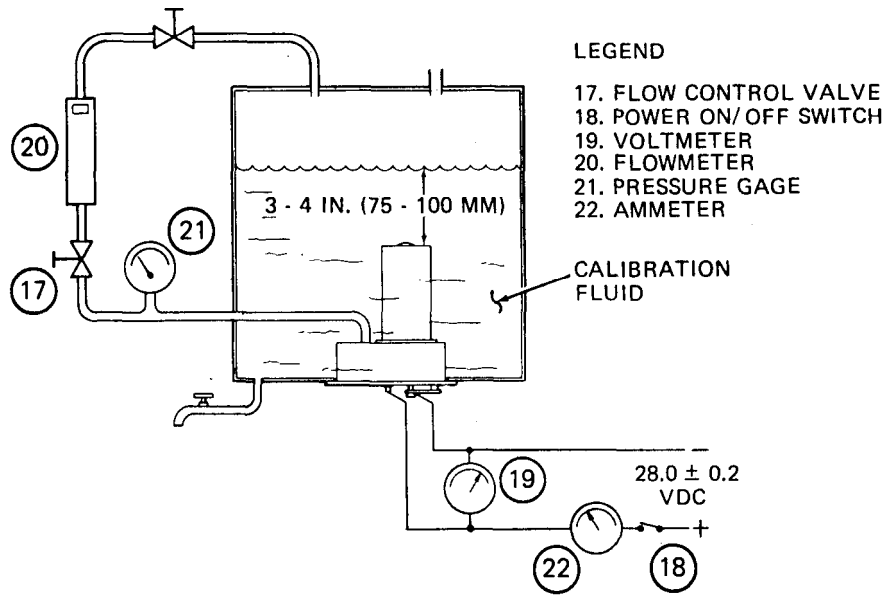

(3) Read and record fluid pressure at pressure gage (21). Read and record current draw at ammeter (22). Cartridge is acceptable if fluid pressure is from 13 to 25 psig (89 to 172 kPa gage), and current draw is no more than 6.0 amps.

(4) Adjust fluid flow to 300 PPH. Record fluid pressure and current draw. Cartridge is acceptable if fluid pressure is from 12.5 to 25.0 psig (86 to 172 kPa gage), and current draw is no more than 5.0 amps.

(5) Close flow control valve (17). Check that flowmeter (20) reads 0 PPH. Record fluid pressure and current draw. Cartridge is acceptable if fluid pressure is no more than 25 psig (172 kPa gage), and current draw is no more than 6.0 amps.

(6) Reduce voltage setting to 0 volts. Turn power switch (18) OFF. Disconnect power supply leads from pump cartridge.

d. Shutoff Valve Leakage Test - Assembled Cartridge and Housing Only

(1) Place catch basin below cartridge. When cartridge is removed from pump housing, a small amount of leakage will occur from the pump housing.

(2) Remove cartridge from pump housing. Refer to paragraph 6.b.

(3) Some leakage from the pump housing may occur. If pump housing does not leak a steady flow of fluid, the housing is acceptable. A steady flow or fluid leaking from the housing indicates a defect in the pump housing.

(4) Reinstall the cartridge into the pump housing using new preformed packings.

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6. REMOVE PUMP FROM TEST TANK

a. Assembled Cartridge and Housing.

(1) Drain test tank.

(2) Remove plug from cartridge drain port and drain fluid from pump. Hold pump cover with wrench to keep it from turning.

(3) Disconnect DC power supply from pump.

(4) Remove pump from test tank and disconnect fuel discharge line.

b. Boost Pump Cartridge.

CAUTION

Apply pressure directly over valve spring when opening or closing valve stem assembly. Trying to compress valve spring from free end of valve arm will cause valve arm to bend. When removing or installing shoulder screw, keep valve arm depressed.

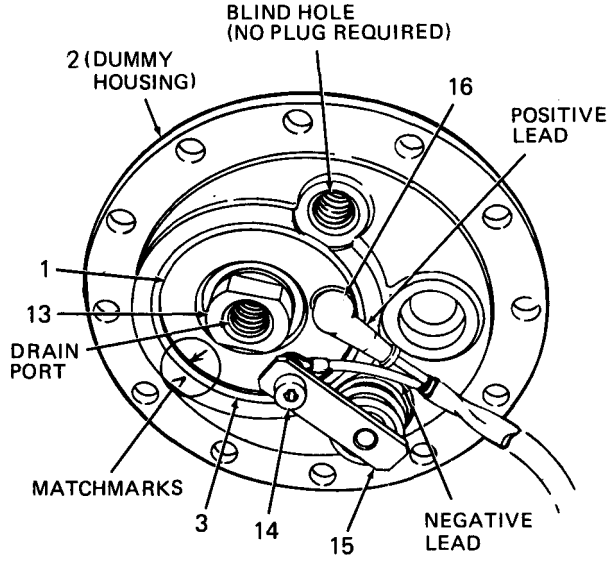
(1) Remove drain plug from cartridge pump cover and drain fluid from pump.

(2) Disconnect power supply from boost pump.

(3) Place thumb on inlet valve stem (15), above spring. Press valve stem in toward pump housing.

(4) Unscrew shoulder screw (14). Rotate inlet valve stem (15) away from pump cartridge.

(5) Using a small screwdriver, pry end of retaining ring (3) from seat in pump housing.



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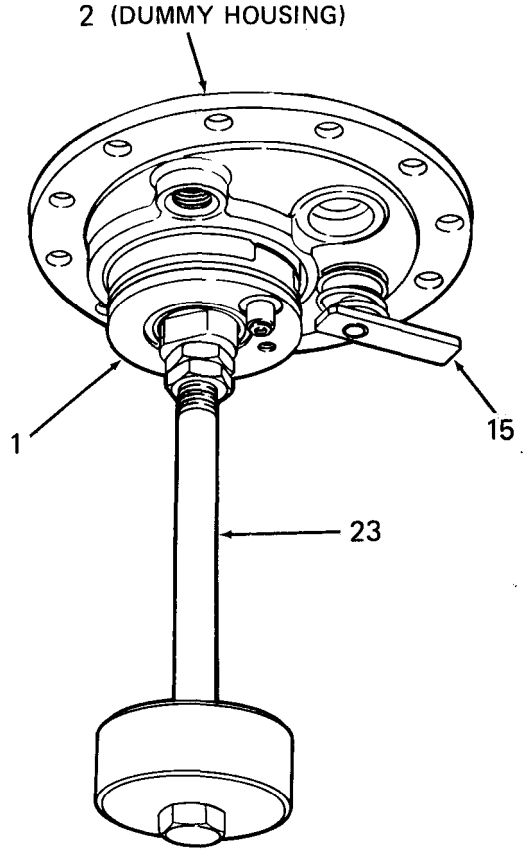
(6) Screw cartridge pulling tool (23) (Appendix D) into drain port. Slide hammer of pulling tool against bolt head to remove cartridge from pump housing. Unscrew pulling tool from cartridge.

(7) Remove cartridge (1) from pump housing (2). Some leakage from pump housing may occur. If pump housing does not leak a steady flow of fluid, the housing is acceptable. A steady flow of fluid leaking from the housing indicates a defect in the pump housing.



NOTE

Upon successful completion of this test the boost pump is fully qualified to be returned to service.

END OF TASK

SECTION V. PREPARATION FOR STORAGE OR SHIPMENT

2-26. General. This section provides information for preparing the fuel boost pump, or pump cartridge, for storage or shipment.

2-27. Administrative Storage. Administrative storage shall be in accordance with AR 750-1, Army Material Maintenance Concepts and Policies.

2-28. Storage or Shipment. Upon completion of repairs and final acceptance testing, prepare the boost pump or cartridge for storage or shipment as follows:

a. If boost pump has been run in jet fuel, flush by running in calibration fluid (Item 2, Appendix C).

b. Drain all excess calibration fluid.

c. Package pump in accordance with ASTM-D3951-82. Attach maintenance reports and forms, as required.

d. Mark storage or shipping container for identification. All container markings shall be as required by MIL-STD-129J.

APPENDIX A
REFERENCES

A-1. Dictionaries of Terms and Abbreviations

AR 310-25	Dictionary of United States Army Terms
AR 310-50	Authorized Abbreviations and Brevity Codes

A-2. Publication Indexes.

DA PAM25-30	Consolidate Index of Army Publications and Blank Forms

A-3. Logistics and Storage.

ASTM D3951-82	Commercial Packaging
MIL-STD-129J	Marking for Storage of Equipment
TM 743-200-1	Storage and Materials Handling

A-4. Maintenance of Supplies and Equipment.

AR 750-1	Army Material Maintenance Concepts and Policies
DA PAM 738-751	Functional Users Manual for The Army Maintenance Management System-Aviation (TAMMS-A)
TM 1-1500-204-23 (Series)	General Aircraft Maintenance Manual

A-5. Other Publications.

AR 420-90	Fire Prevention and Protection
AR 55-38	Reporting of Transportation Discrepancies in Shipments
AR 700-58	Packaging Improvement Report
DA PAM 310-13	Military Publications Posting and Filing
FM-21-11	First Aid for Soldiers
TB 43-180	Calibration Requirements for the Maintenance of Army Material
TM 750-244-1-5	Procedures for the Destruction of Aircraft and Associated Equipment to Prevent Enemy Use.

APPENDIX B
REPAIR PARTS AND SPECIAL TOOL LIST

SECTION I. INTRODUCTION

B-1. Scope. This manual lists and authorizes spares and repair parts; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of Aviation Intermediate Maintenance of the Fuel Boost Pump. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the Source, Maintenance and Recoverability (SMR) codes.

B-2. General. In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. Section II - Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence. Bulk materials are listed separately in their own functional group within Section II.

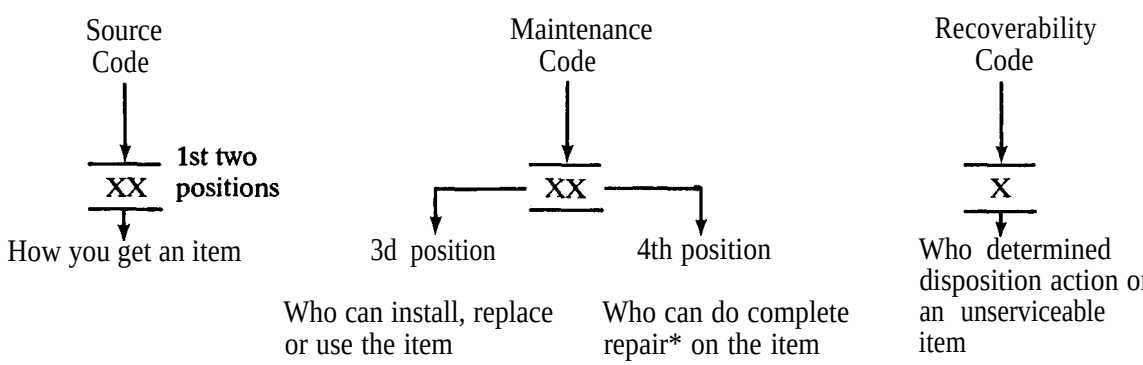
b. Section III - Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL [as indicated by Basis of Issue (BOI) in DESCRIPTION AND USABLE ON CODE (UOC) column] for the performance of maintenance.

c. Section IV - National Stock Number and Part Number Index. A list, in National Item Identification Number (NIIN) sequence, of all National stock numbers (NSN) appearing in the listings, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

B-3. Explanation of Columns (Sections II and III).

a. ITEM NO. [Column (1)]. Indicates the number used to identify items called out in the illustration.

b. SMR CODE [Column (2)]. Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instructions, as shown in the following breakout:



*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Source codes are always the first two positions of the SMR code. Explanations of source codes follow:

Code	Explanation
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code. **NOTE: Items coded PC are subject to deterioration
KD KF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
MO - (Made at org/ AVUM Level) MF - (Made at DS/ AVUM Level) MH - (Made at GS Level) ML - (Made at specialized Repair Act (SRA) MD - (Made at Depot)	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
AO - (Assembled by org/AVUM Level) AF - (Assembled by DS/AVIM Level) AH - (Assembled by GS Category) AL - (Assembled by SRA) AD - (Assembled by Depot)	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.

XA - Do not requisition an "XA''-coded item. Order its next higher assembly. (Also refer to the NOTE below.)
XB - If an "XB''-coded item is not available from salvage, order it using FSCM and part number given.
XC - Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD - Item is not stocked. Order an "XD''-coded item through normal supply channels using the FSCM and part number given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, maybe used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

(2) Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR Code as follows:

(a) The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

Code	Application/Explanation
C	Crew or operator maintenance done within organizational or aviation unit maintenance.
O	Organizational or aviation unit category can remove, replace, and use the item.
F	Direct support or aviation intermediate level can remove, replace, and use the item.
H	General support level can remove, replace, and use the item.
L	Specialized repair activity can remove, replace, and use the item.
D	Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair [i.e., perform all authorized repair functions.) (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.] This position will contain one of the following maintenance codes:

Code	Application/Explanation
O	Organizational or aviation unit is the lowest level that can do complete repair of the item.
F	Direct support or aviation intermediate is the lowest level that can do complete repair of the item.
H	General support is the lowest level that can do complete repair of the item.
L	Specialized repair activity is the lowest level that can do complete repair of the item.
D	Depot is the lowest level that can do complete repair of the item.
Z	Nonrepairable. No repair is authorized.
B	No repair is authorized. (No parts or special tools are authorized for the maintenance of a “B” coded item). However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR code as follows:

Recoverability Code	Application/Explanation
Z	Nonrepairable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3rd position of the SMR code.
O	Repairable item. When uneconomically repairable, condemn and dispose of the item at organizational or aviation unit level.
F	Repairable item. When uneconomically repairable, condemn and dispose of the item at direct support or aviation intermediate level.
H	Repairable item. When uneconomically repairable, condemn and dispose of the item at the general support level.
D	Repairable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	Repairable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
A	Item requires special handling or condemnation procedures because of specific reasons (e.g., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. FSCM [Column (3)]. The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

d. PART NUMBER [Column (4)]. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the part ordered.

e. DESCRIPTION AND USABLE ON CODE (UOC) [Column (5)]. This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) The physical security classification of the item is indicated by the parenthetical entry.

(3) Items that are included in kits and sets are listed below the name of the kit or set.

(4) Spare/repair parts that make up an assembly item are listed immediately following the assembled item line entry.

(5) Part numbers for bulk materials are referenced in this column in the line entry for the item to be manufactured/fabricated. Bulk materials required to manufacture items are listed in the Bulk Material Functional Group of this RPSTL.

(6) When the item is not used with all serial numbers of the same model, the effective serial numbers are shown on the last line(s) of the description (before UOC).

(7) The usable on code, when applicable.

(8) In the Special Tools List section, the basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipment supported exceeds density spread indicated in the basis of issue, the total authorization is increased proportionately.

(9) The statement "END OF FIGURE" appears just below the last item description in Column 5 for a given figure in both Section II and Section III.

f. QTY [Column (6)]. The Qty (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity may vary from application to application.

B-4. Explanation of Columns (Section IV).

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) STOCK NUMBER Column. This column lists the NSN by National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN (i.e., 5305-01-674-1467). When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and III. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number and the material list in Section H.

(3) ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. PART NUMBER INDEX. Part numbers in this index are listed by part number in ascending alphanumeric sequence (i.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

(1) FSCM Column. The Federal Supply Code for Manufacturers (FSCM) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(2) PART NUMBER Column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

(3) STOCK NUMBER Column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and FSCM columns to the left.

(4) FIG. Column. This column lists the number of the figure where the item is identified/located in Section II and III. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the Part Number Index and the bulk material list in Section II.

(5) ITEM Column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

B-5. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Not Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure and note the item number.

(4) Fourth. Refer to the Repair Parts List for the figure to find the part number for the item number noted on the figure.

(5) Fifth. Refer to the Part Number Index to find the NSN, if assigned.

b. When National Stock Number or Part Number is known.

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National Stock Number or Part Number. The NSN index is in National Item Identification Number (NIIN) sequence. The part numbers in the Part Number index are listed in ascending alphanumeric sequence. Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.

(2) Second. After finding the figure and item number, verify that the item is the one you're looking for, then locate the item number in the repair parts list for the figure.

B-6. Abbreviations. Not Applicable.

SECTION II. REPAIR PARTS LIST

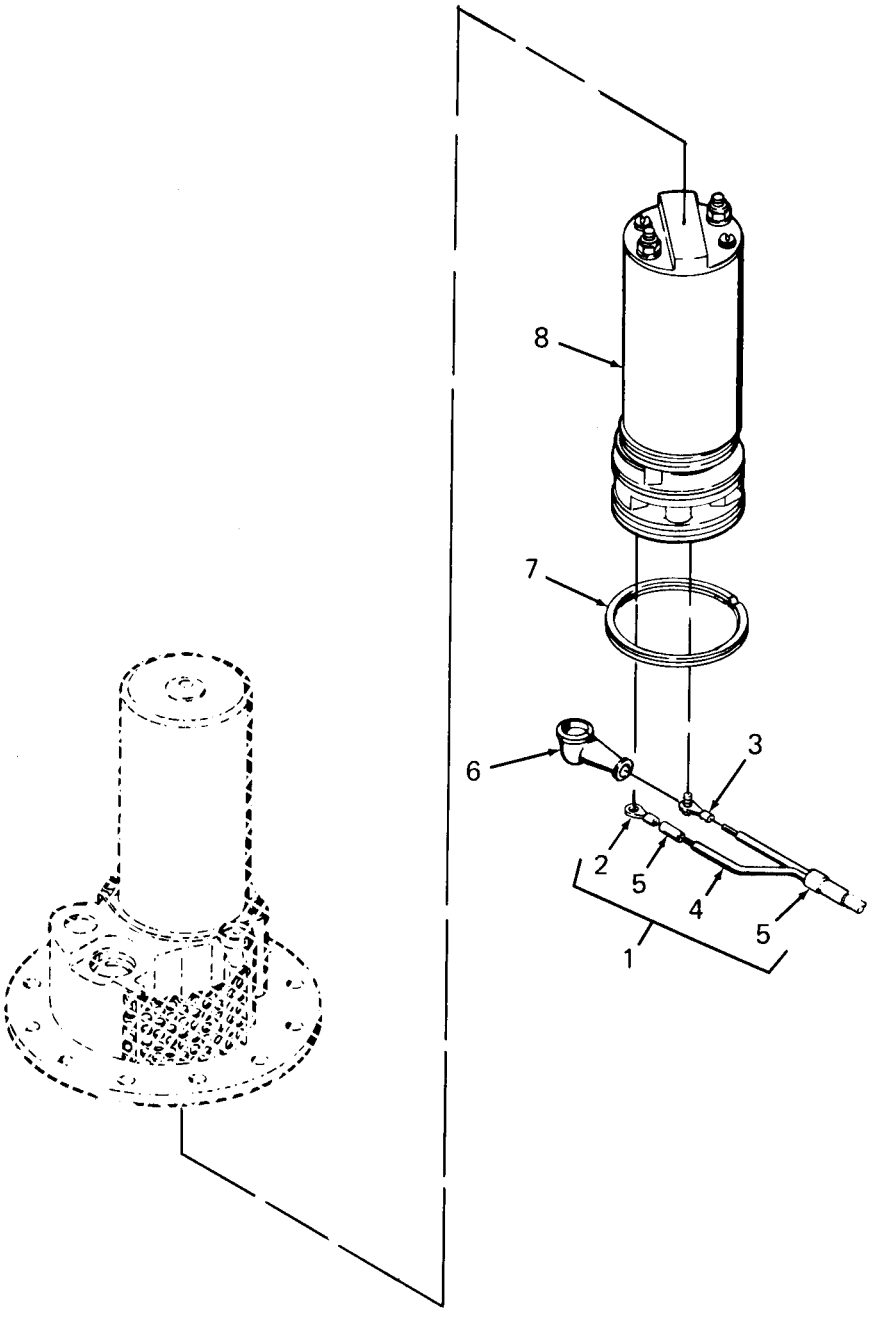


Figure B-1. Boost Pump

(1) ITEM NO.	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODE (UOC)	(6) QTY
				GROUP 01. BOOST PUMP ASSY	
				FIGURE B-1. BOOST PUMP	
1	PAOFF	26433	F5-41-1	CABLE ASSEMBLY,SP	1
2	PAFZZ	96906	MS25036-108	.TERMINAL,LUG	1
3	PAFZZ	14726	XR1885S	.TERMINAL,RING TONGU	1
4	PAFZZ	26433	112A10012-03	.WIRE,ELECTRICAL	V
5	PAFZZ	81349	M23053/-106-0	.INSULATION,SLEE	V
6	PAOZZ	96906	MS25171-1S	CABLE NIPPLE,ELECTR	1
7	PAOZZ	51814	WH-237S	RING,RETAINING	1
8	PAOFF	26433	2C27-3	CARTRIDGE,FUEL PUMP (SEE FIG. B-3 FOR BRKDWN)	1
				END OF FIGURE	

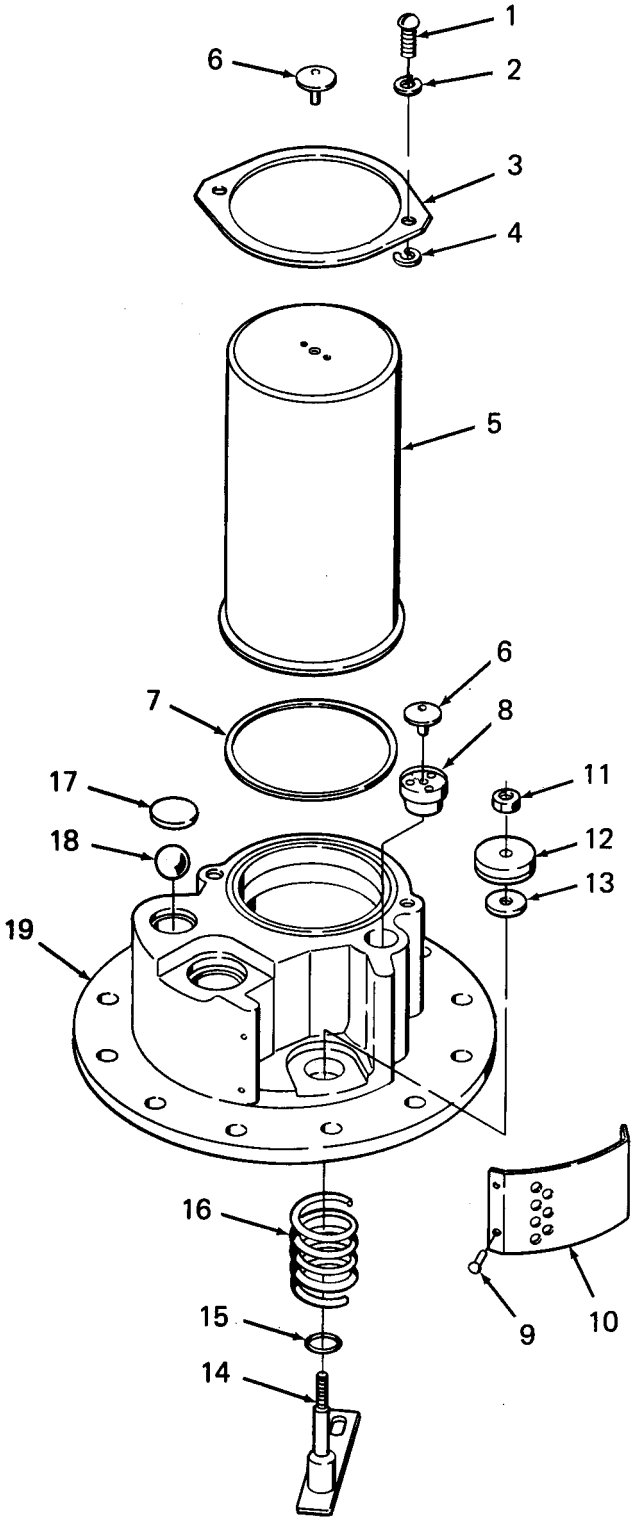


Figure B-2. Housing Assembly

(1) ITEM NO.	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODE (UOC)	(6) QTY
				GROUP 02. HOUSING ASSY	
				FIGURE B-2. HOUSING ASSEMBLY	
1	PAFZZ	26433	103A10003-23	SCREW,MACHINE	2
2	PRFZZ	26433	107A10002-06	WASHER,SPLIT	2
3	PAFZZ	26433	A2-80-1	CANNISTER FLANGE	1
4	PAFZZ	26433	C5-79-1	WASHER,SPLIT	2
5	PAFZZ	26433	A3-177-2	PUMP CANNISTER	1
6	PAFZZ	26433	E6-34-1	UMBRELLA,CHECK VALV	1
7	PAFZZ	96906	MS29513-035	PACKING,PREFORMED	1
8	PAFZZ	26433	B9-60-2	PLUG,ADAPTOR	1
9	PAFZZ	96906	MS21318-15	SCREW,DRIVE	4
10	PAFZZ	26433	D9-78-1	INLET SCREEN	1
11	PAFZZ	96906	MS21083N06	NUT,PLAIN,SINGLE BA	1
12	PAFZZ	26433	C6-29-1	SEAL DISK ASSEMBLY	1
13	PAFZZ	26433	C5-2-32	WASHER,FLAT	1
14	PAFZZ	26433	E6-66-1	INLET VALVE STEM AS	1
15	PAFZZ	96906	MS29513-012	PACKING,PREFORMED	1
16	PAFZZ	26433	D1-154-1	SPRING,HELICAL,COMP	1
17	PAFZZ	26433	B9-32-1	DISK,SOLID,PLAIN	1
18	PAFZZ	26433	D7-1-14	NYLON BALL	1
19	XDFZZ	26433	A1-402-1	PUMP HOUSING	1
				END OF FIGURE	

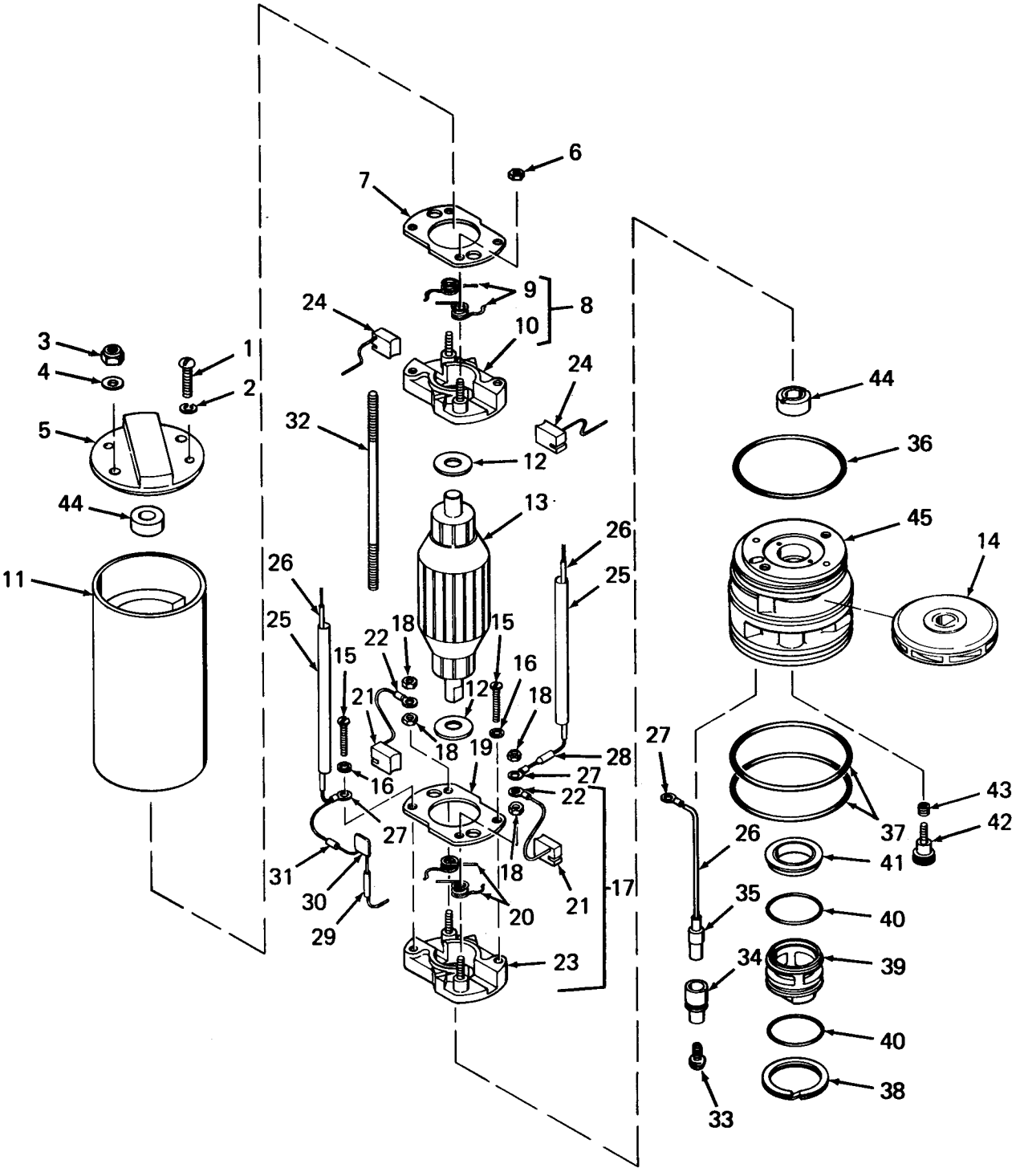


Figure B-3. Pump Cartridge

(1) ITEM NO.	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODE (UOC)	(6) QTY
				GROUP 03. PUMP CARTRIDGE	
				FIGURE B-3. PUMP CARTRIDGE	
1	PAFZZ	26433	103A10001-14	SCREW,MACHINE	2
2	PAFZZ	26433	107A10002-07	WASHER,LOCK	2
3	PAFZZ	96906	MS21044N3	NUT,SELF-LOCKING,HE	2
4	PAFZZ	26433	C5-1-42	WASHER,FLAT	2
5	PAFZZ	26433	A3-172-1	MOTOR COVER	1
6	PAFZZ	26433	104A10003-08	NUT,PLAIN,HEXAGON	4
7	PAFZZ	26433	A3-245-1	COVER,BRUSH HOLDER	1
8	AFFFF	26433	F4-16-2	BRUSH CARD ASSY	1
9	PAFZZ	26433	D1-111-1	.SPRING,ELECTRICAL C	2
10	PAFZZ	26433	F4-29-2	.HOLDER,ELECTRIAL C	1
11	PAFZZ	26433	F3-16-1	FIELD TUBE/MAGNET A	1
12	PAFZZ	26433	C5-64-1	WASHER,FLAT	2
13	PAFFF	26433	F2-32-10	ARMATURE ASSY	1
14	PAFFF	26433	B7-71-1	IMPELLER ASSY	1
15	PAFZZ	26433	103A10005-05	SCREW,MACHINE	2
16	PAFZZ	34895	1041571-5	WASHER,LOCK	2
17	AFFFF	26433	F4-16-3	BRUSH CARD ASSY	1
18	PAFZZ	26433	104A10003-08	.NUT,PLAIN,HEXAGON	2
19	PAFZZ	26433	A3-245-1	.COVER,BRUSH HOLDER	1
20	PAFZZ	26433	D1-111-1	.SPRING,ELECTRICAL C	2
21	PAFZZ	26433	F4-9-5	.BRUSH,ELECTRICAL CO	2
22	PAFZZ	00779	31661	.TERMINAL,LUG	2
23	PAFZZ	26433	F4-29-1	.HOLDER,ELECTRICAL C	1
24	PAFZZ	26433	F4-9-5	BRUSH,ELECTRICAL BR	2
25	PAFZZ	81349	M23053/8-006-C	INSULATION SLEEVING	V
26	PAFZZ	81349	M16878/12BHE9	WIRE,ELECTRICAL	V
27	PAFZZ	00779	31661	TERMINAL,LUG	3
28	PAFZZ	26433	F7-22-1	THERMAL CUT-OFF	1
29	PAFZZ	81349	M23053/8-002-C	INSULATION SLEEVING	V
30	PAFZZ	81349	M39014/20-0109	CAPACITOR,FIXED,CER	1
31	PAFZZ	75915	276002	FUSE,CARTRIDGE	1
32	XDFZZ	26433	C7-10-6	STUD,CONTINUOUS THR	2
33	PAOZZ	80205	NAS1635-06LE4	SCREW,SELF-LOCKING	1
34	PAFZZ	26433	C2-18-1	TERMINAL HOUSING	1
35	PAFZZ	26433	F6-11-1	TERMINAL PIN	1
36	PAOZZ	96906	MS29513-033	PACKING,PREFORMED	1
37	PAOZZ	96906	MS29513-034	PACKING,PREFORMED	2
38	PAFZZ	80756	RR-125S	RING,RETAINING	1
39	PAFZZ	26433	A3-143-1	PUMP COVER	1
40	PAFZZ	96906	MS29561-022	PACKING,PREFORME	2
41	PAFZZ	26433	C6-32-1	SEAL,PLAIN	1
42	PAOZZ	26433	103A10013-03	SCREW,SHOULDER	1
43	PAFZZ	96906	MS21209C1-15	INSERT,SCREW THREAD	1
44	PAFZZ	26433	C9-6-1	BEARING,BALL	2
45	XDFZZ	26433	A1-405-1	HOUSING,PUMP CARTRI	1
				END OF FIGURE	

(1) ITEM NO.	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODE (UOC)	(6) QTY
				GROUP 04. BULK ITEMS	
1	PAFZZ	81349	M23053/-106-0	INSULATION,SLEE	V
2	PAFZZ	81349	M23053/8-006-C	INSULATION SLEEVING	V
3	PAFZZ	81349	M16878/12BHE9	WIRE,ELECTRICAL	V
4	PAFZZ	81349	M23053/8-002-C	INSULATION SLEEVING	V
				END OF FIGURE	

SECTION III. SPECIAL TOOL LIST

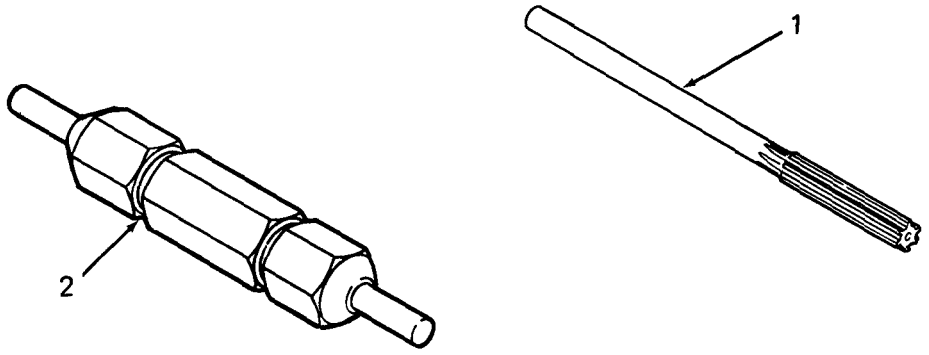


Figure B-4. Special Tools

(1) ITEM NO.	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODE (UOC)	(6) QTY
				GROUP 05. SPECIAL TOOLS	
				FIGURE B-4. SPECIAL TOOLS	
1	PAFZZ	13130	4001-25664	REAMER,MACHINE	1
2	PAFZZ	47410	0.3135-0.3145 CL ASS X	GAE, REV PL PLUG	1
				END OF FIGURE	

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5310-00-045-3296	B-3	2	5340-01-189-9692	B-2	8
5305-00-054-6656	B-3	15	5330-01-190-5518	B-2	12
5920-00-059-3544	B-3	31	5940-01-192-6331	B-1	3
5940-00-113-3137	B-3	22	5306-01-193-9441	B-3	42
	B-3	27	6145-01-196-1678	B-1	4
5940-00-143-4780	B-1	2	5977-01-197-1722	B-3	9
5330-00-248-3836	B-2	15		B-3	20
5305-00-253-5612	B-2	9	6150-01-197-1727	B-1	1
5310-00-264-1337	B-3	16	5305-01-198-3891	B-2	1
5330-00-410-4887	B-3	36	5310-01-208-1865	B-3	6
5330-00-435-9355	B-3	37	5310-01-208-1865	B-3	18
5330-00-476-7406	B-2	7	5307-01-209-6136	B-3	32
5365-00-527-1987	B-1	7	5905-01-210-4568	B-3	28
5975-00-553-6995	B-1	6	5310-01-210-7309	B-2	2
5305-00-575-5514	B-3	33	2915-01-245-8016	B-3	7
5365-00-598-6266	B-3	38		B-3	19
5340-00-680-3762	B-3	43	1650-01-323-0347	B-2	5
5970-00-815-1295	B-1	5	5977-01-325-9889	B-3	10
5330-00-824-8584	B-3	40	5999-01-333-4178	B-3	11
5310-00-877-5797	B-3	3	5340-01-342-0211	B-3	5
5310-00-905-8451	B-2	11	6125-01-325-9890	B-3	13
5970-00-935-0082	B-3	25	2930-01-325-6158	B-3	14
	BULK	2	5220-01-325-3036	B-4	2
5970-00-935-0083	B-3	29	5977-01-324-6322	B-3	23
	BULK	4	2910-01-338-2737	B-3	39
4510-01-070-5681	B-2	6			
5110-01-090-7424	B-4	1			
5910-01-095-6373	B-3	30			
2915-01-131-4998	B-1	8			
6145-01-139-2150	B-3	26			
5970-01-169-4611	B-3	34			
5940-01-169-6390	B-3	35			
3120-01-169-8295	B-3	44			
5310-01-169-9629	B-3	12			
2915-01-170-3856	B-2	10			
5310-01-170-6267	B-3	4			
2040-01-170-6502	B-2	18			
2915-01-171-1467	B-2	3			
5305-01-172-0514	B-3	1			
5340-01-172-2797	B-2	17			
5310-01-172-3311	B-2	4			
5360-01-172-7151	B-2	16			
5330-01-173-5066	B-3	41			
5977-01-176-0142	B-3	21			
5977-01-176-0142	B-3	24			
4820-01-181-9246	B-2	14			

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
26433	A1-402-1		B-2	19
26433	A1-405-1		B-3	45
26433	A2-80-1	2915-01-171-1467	B-2	3
26433	A3-143-1	2910-01-338-2737	B-3	39
26433	A3-172-1	5340-01-342-0211	B-3	5
26433	A3-177-2	1650-01-323-0347	B-2	5
26433	A3-245-1	2915-01-245-8016	B-3	7
		2915-01-245-8016	B-3	19
26433	B7-71-1	2930-01-325-6158	B-3	14
26433	B9-32-1	5340-01-172-2797	B-2	17
26433	B9-60-2	5340-01-189-9692	B-2	8
26433	C2-18-1	5970-01-169-4611	B-3	34
26433	C5-1-42	5310-01-170-6267	B-3	4
26433	C5-2-32		B-2	13
26433	C5-64-1	5310-01-169-9629	B-3	12
26433	C5-79-1	5310-01-172-3311	B-2	4
26433	C6-29-1	5330-01-190-5518	B-2	12
26433	C6-32-1	5330-01-173-5066	B-3	41
26433	C7-10-6	5307-01-209-6136	B-3	32
26433	C9-6-1	3120-01-169-8295	B-3	44
26433	D1-111-1	5977-01-197-1722	B-3	9
			B-3	20
26433	D1-154-1	5360-01-172-7151	B-2	16
26433	D7-1-14	2040-01-170-6502	B-2	18
26433	D9-78-1	2915-01-170-3856	B-2	10
26433	E6-34-1	4510-01-070-5681	B-2	6
26433	E6-66-1	4820-01-181-9246	B-2	14
26433	F2-32-10	6125-01-325-9890	B-3	13
26433	F3-16-1	5999-01-333-4178	B-3	11
26433	F4-16-2		B-3	8
26433	F4-16-3		B-3	17
26433	F4-29-1	5977-01-324-6322	B-3	23
26433	F4-29-2	5977-01-325-9889	B-3	10
26433	F4-9-2	5977-01-176-0142	B-3	21
26433	F4-9-2	5977-01-176-0142	B-3	24
26433	F5-41-1	6150-01-197-1727	B-1	1
26433	F6-11-1	5940-01-169-6390	B-3	35
26433	F7-22-1	5905-01-210-4568	B-3	28
96906	MS21044N3	5310-00-877-5797	B-3	3
96906	MS21083N06	5310-00-905-8451	B-2	11
96906	MS21209C1-15	5340-00-680-3762	B-3	43
96906	MS21318-15	5305-00-253-5612	B-2	9
96906	MS25036-108	5940-00-143-4780	B-1	2
96906	MS25171-15	5975-00-553-6995	B-1	6
96906	MS29513-012	5330-00-248-3836	B-2	15
96906	MS29513-033	5330-00-410-4887	B-3	36
96906	MS29513-034	5330-00-435-9355	B-3	37
96906	MS29513-035	5330-00-476-7406	B-2	7

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS29561-022	5330-00-824-8584	B-3	40
81349	M16878/12BHE9		B-3	26
			BULK	3
81349	M23053/-106-0	5970-00-815-1295	B-1	5
81349	M23053/8-002-C	5970-00-935-0083	B-3	29
			BULK	4
81349	M23053/8-006-C	5970-00-935-0082	B-3	25
			BULK	2
81349	M39014/20-0109	5910-01-095-6373	B-3	30
80205	NAS1635-06LE4	5305-00-575-5514	B-3	33
80756	RR-125S	5365-00-598-6266	B-3	38
51814	WH-237S	5365-00-527-1987	B-1	7
14726	XR1885S	5940-01-192-6331	B-1	3
47410	0.3135-0.3145 CL ASS X	5220-01-325-3036	B-4	2
26433	103A10001-14	5305-01-172-0514	B-3	1
26433	103A10003-23	5305-01-198-3891	B-2	1
26433	103A10005-05	5305-00-054-6656	B-3	15
26433	103A10013-03	5306-01-193-9441	B-3	42
26433	104A10003-08	5310-01-208-1865	B-3	6
			B-3	18
34895	1041571-5	5310-00-264-1337	B-3	16
26433	107A10002-06	5310-01-210-7309	B-2	2
26433	107A10002-07	5310-00-045-3296	B-3	2
26433	112A10012-03	6145-01-196-1678	B-1	4
26433	2C27-3	2915-01-131-4998	B-1	8
75915	276002	5920-00-059-3544	B-3	31
00779	31661	5940-00-113-3137	B-3	22
			B-3	27
63005	6899909	5110-01-090-7424	B-4	1

CROSS-REFERENCE INDEXES

FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
B-1	1	6150-01-197-1727	26433	F5-41-1
B-1	2	5940-00-143-4780	96906	MS25036-108
B-1	3	5940-01-192-6331	14726	XR1885S
B-1	4	6145-01-196-1678	26433	112A10012-03
B-1	5	5970-00-815-1295	81349	M23053/-106-0
B-1	6	5975-00-553-6995	96906	MS25171-1S
B-1	7	5365-00-527-1987	51814	WH-237S
B-1	8	2915-01-131-4998	26433	2C27-3
B-2	1	5305-01-198-3891	26433	103A10003-23
B-2	2	5310-01-210-7309	26433	107A10002-06
B-2	3	2915-01-171-1467	26433	A2-80-1
B-2	4	5310-01-172-3311	26433	C5-79-1
B-2	5	1650-01-323-0347	26433	A3-177-2
B-2	6	4510-01-070-5681	26433	E6-34-1
B-2	7	5330-00-476-7406	96906	MS29513-035
B-2	8	5340-01-189-9692	26433	B9-60-2
B-2	9	5305-00-253-5612	96906	MS21318-15
B-2	10	2915-01-170-3856	26433	D9-78-1
B-2	11	5310-00-905-8451	26433	104A10001-01
B-2	12	5330-01-190-5518	26433	C6-29-1
B-2	13		26433	C5-2-32
B-2	14	4820-01-181-9246	26433	E6-66-1
B-2	15	5330-00-248-3836	96906	MS29513-012
B-2	16	5360-01-172-7151	26433	D1-154-1
B-2	17	5340-01-172-2797	26433	B9-32-1
B-2	18	2040-01-170-6502	26433	D7-1-14
B-2	19		26433	A1-402-1
B-3	1	5305-01-172-0514	26433	103A10001-14
B-3	2	5310-00-045-3296	26433	107A10002-07
B-3	3	5310-00-877-5797	96906	MS21044N3
B-3	4	5310-01-170-6267	26433	C5-1-42
B-3	5	5340-01-342-0211	26433	A3-172-1
B-3	6	5310-01-208-1865	26433	104A10003-08
B-3	7	2915-01-245-8016	26433	A3-245-1
B-3	8		26433	F4-16-2
B-3	9	5977-01-197-1722	26433	D1-111-1
B-3	10	5977-01-325-9889	26433	F4-29-2
B-3	11	5999-01-333-4178	26433	F3-16-1
B-3	12	5310-01-169-9629	26433	C5-64-1
B-3	13	6125-01-325-9890	26433	F2-32-10
B-3	14	2930-01-325-6158	26433	B7-71-1

CROSS-REFERENCE INDEXES

FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
B-3	15	5305-00-054-6656	26433	103A10005-05
B-3	16	5310-00-264-1337	34895	1041571-5
B-3	17		26433	F4-46-3
B-3	18	5310-01-208-1865	26433	104A10003-08
B-3	19	2915-01-245-8016	26433	A3-245-1
B-3	20	5977-01-197-1722	26433	D1-111-1
B-3	21	5977-01-176-0142	26433	F4-9-2
B-3	22	5940-00-113-3137	00779	31661
B-3	23	5977-01-324-6322	26433	F4-29-1
B-3	24	5977-01-176-0142	26433	F4-9-2
B-3	25	5970-00-935-0082	81349	M23053/8-006-C
B-3	26	6145-01-139-2150	81349	M16878/12BHE9
B-3	27	5940-00-113-3137	00779	31661
B-3	28	5905-01-210-4568	26433	F7-22-1
B-3	29	5970-00-935-0083	81349	M23053/8-002-C
B-3	30	5910-01-095-6373	81349	M39014/20-0109
B-3	31	5920-00-059-3544	75915	276002
B-3	32	5307-01-209-6136	26433	C7-10-6
B-3	33	5305-00-575-5514	80205	NAS1635-06LE4
B-3	34	5970-01-169-4611	26433	C2-18-1
B-3	35	5940-01-169-6390	26433	F6-11-1
B-3	36	5330-00-410-4887	96906	MS29513-033
B-3	37	5330-00-435-9355	96906	MS29513-034
B-3	38	5365-00-598-6266	80756	RR-125S
B-3	39	2910-01-338-2737	26433	A3-143-1
B-3	40	5330-00-824-8584	96906	MS29561-022
B-3	41	5330-01-173-5066	26433	C6-32-1
B-3	42	5306-01-193-9441	26433	103A10013-03
B-3	43	5340-00-680-3762	96906	MS21209C1-15
B-3	44	3120-01-169-8295	26433	C9-6-1
B-3	45		26433	A1-405-1
B-4	1	5110-01-090-7424	13130	4001-25664
B-4	2	5220-01-325-3030	47410	0.3135-0.3145 CL ASS X
BULK	1	5970-00-815-1295	81349	M23053/-106-0
BULK	2	5970-00-935-0082	81349	M23053/8-006-C
BULK	3	6145-01-139-2150	81349	M16878/12BHE9
BULK	4	5970-00-935-0083	81349	M23053/8-002-C

APPENDIX C
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

C-1. Scope.

This listing is for informational purposes only and is not the authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

C-2. Explanation of Columns.

a. Column 1, Item Number. Column 1 is the number assigned to the entry in the listing and is referenced in the narrative instructions to identify the materiel (e.g., “Use cleaning solvent, Item 7, App C”).

b. Column 2, Level. Column 2 identifies the lowest level of maintenance that requires the listed item.

c. Column 3, National Stock Number. Column 3 is the National Stock Number assigned to the item; use it to request or requisition the item.

d. Column 4, Description. Column 4 indicates the Federal item name, and if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column 5, Unit of Measure (U/M). Column 5 indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

(1) ITEM NUMBER	LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	AVIM	8305-00-753-2967	CLOTH,CLEANING,NON-WOVEN FABRIC CCC-C-46D,50 YARD ROLL	YD
2	AVIM	6850-00-264-5771	CALIBRATION FLUID,FUEL PUMP MIL-C-7024C,TYPE II WITH ANTI- OXIDANT AND CORROSION INHIBITOR, 50 GALLON DRUM	GL
3	AVIM	8030-00-111-2762	COMPOUND,THREAD LOCKING MIL-S-46163A,TYPE III,GRADE R, 50 CC BOTTLE	CC
4	AVIM	8030-00-148-9833	COMPOUND,THREAD LOCKING MIL-S-46163A,TYPE I,GRADE K, 10 CC BOTTLE	CC
5	AVIM	8030-00-180-6222	COMPOUND,THREAD LOCKING MIL-R-46082A,TYPE I, 50 CC BOTTLE	CC
6	AVIM	6505-00-133-8025	PETROLATUM,WHITE TECHNICAL MIL-P-37649,1 POUND CAN	LB
7	AVIM	6850-00-274-5421	SOLVENT,DRY CLEANING P-D-680,5 GALLON CAN	GL
8	AVIM		SOLDER,TIN-LEAD ALLOY,SB5, TYPE RMA,WITH CORE CONDITION P3 QQ-S-571E	LB

APPENDIX D
ILLUSTRATED LIST OF MANUFACTURED ITEMS

D-1. Scope.

This appendix includes simplified line drawings for making items authorized to be manufactured at Aviation Intermediate Maintenance.

D-2. General.

a. Each drawing includes instructions and a list of bulk materials needed.

b. Dimensions given are U.S. Standard measures.

c. Part numbers have been assigned to each tool for reference,

D-3. Reference Index.

PART NUMBER	NOMENCLATURE	FIG. NO.
	Bearing Installation and Brush Card Centering Tool	1
	#6-32 Pull Tool Adapter	2
E2-14-1	1/4-28 Pull Tool Adapter	3
E2-10-1	Cartridge Pulling Tool	4
	Test Tank	5

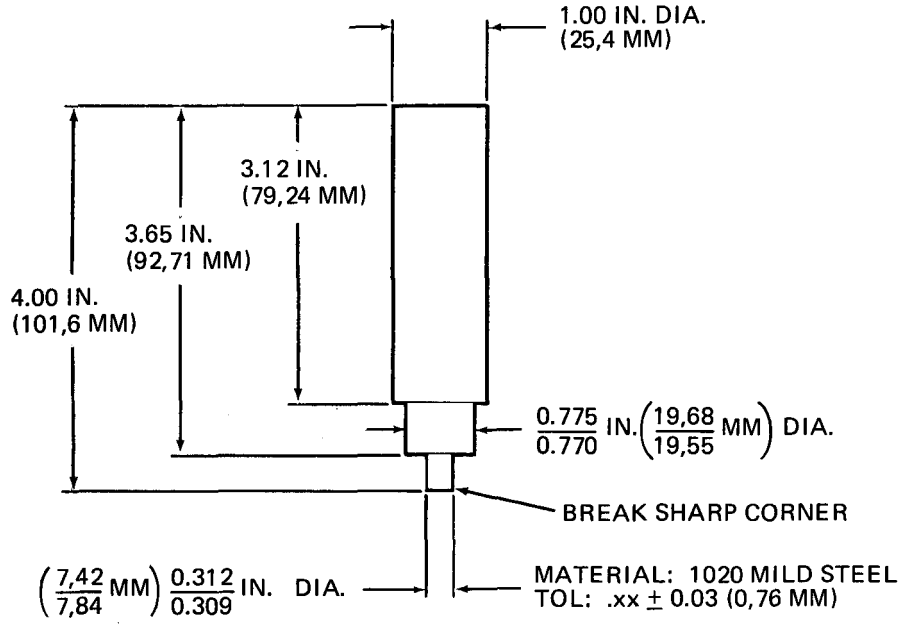


Figure 1. Bearing Installation/Brush Holder Centering Tool

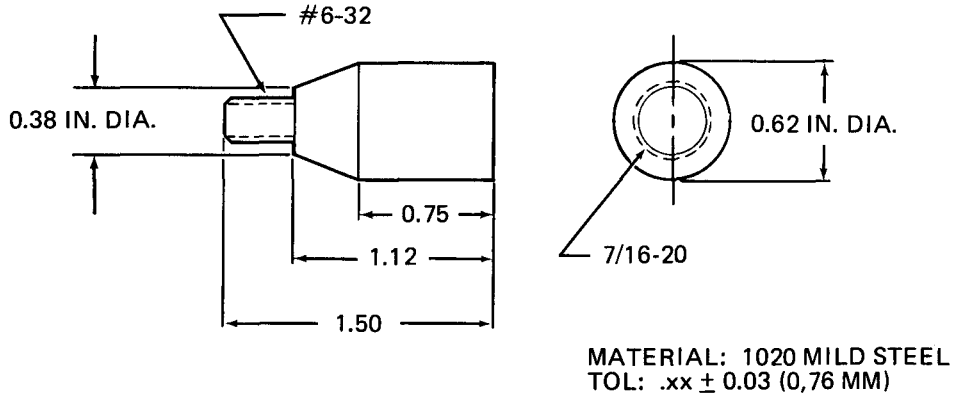


Figure 2. #6-32 Pull Tool Adapter

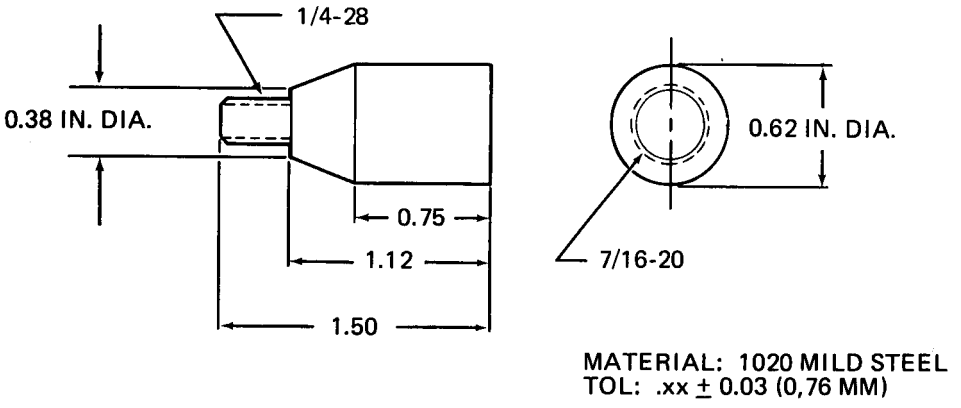


Figure 3. 1/4-28 Pull Tool Adapter
P/N E2-14-1

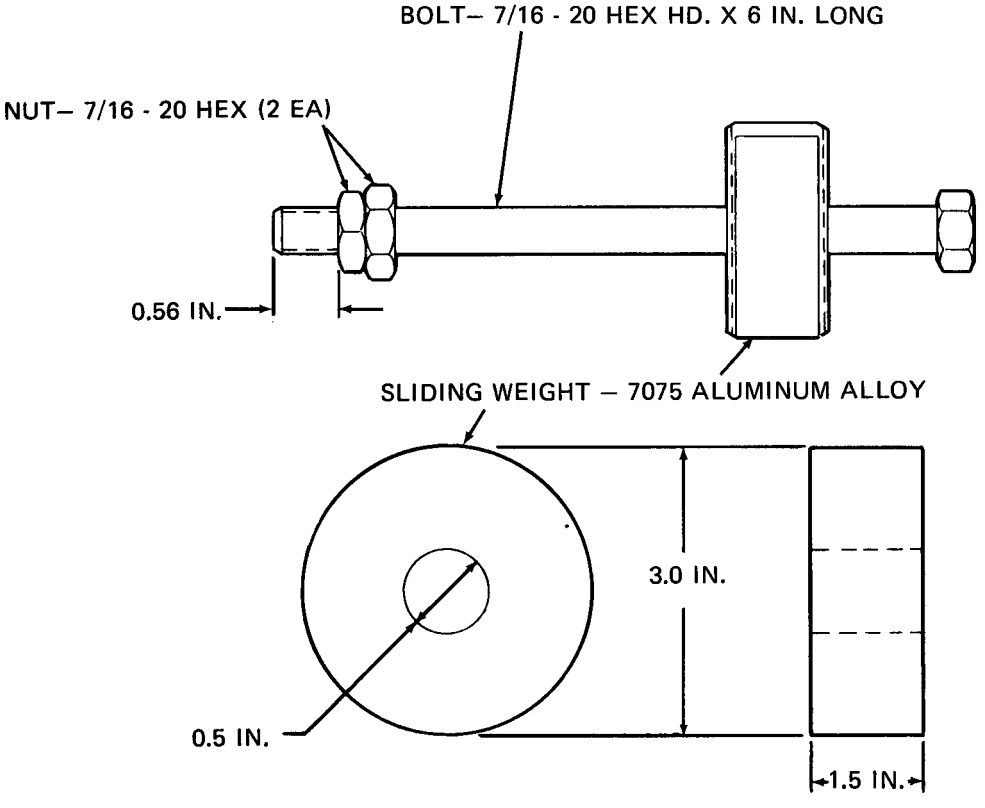
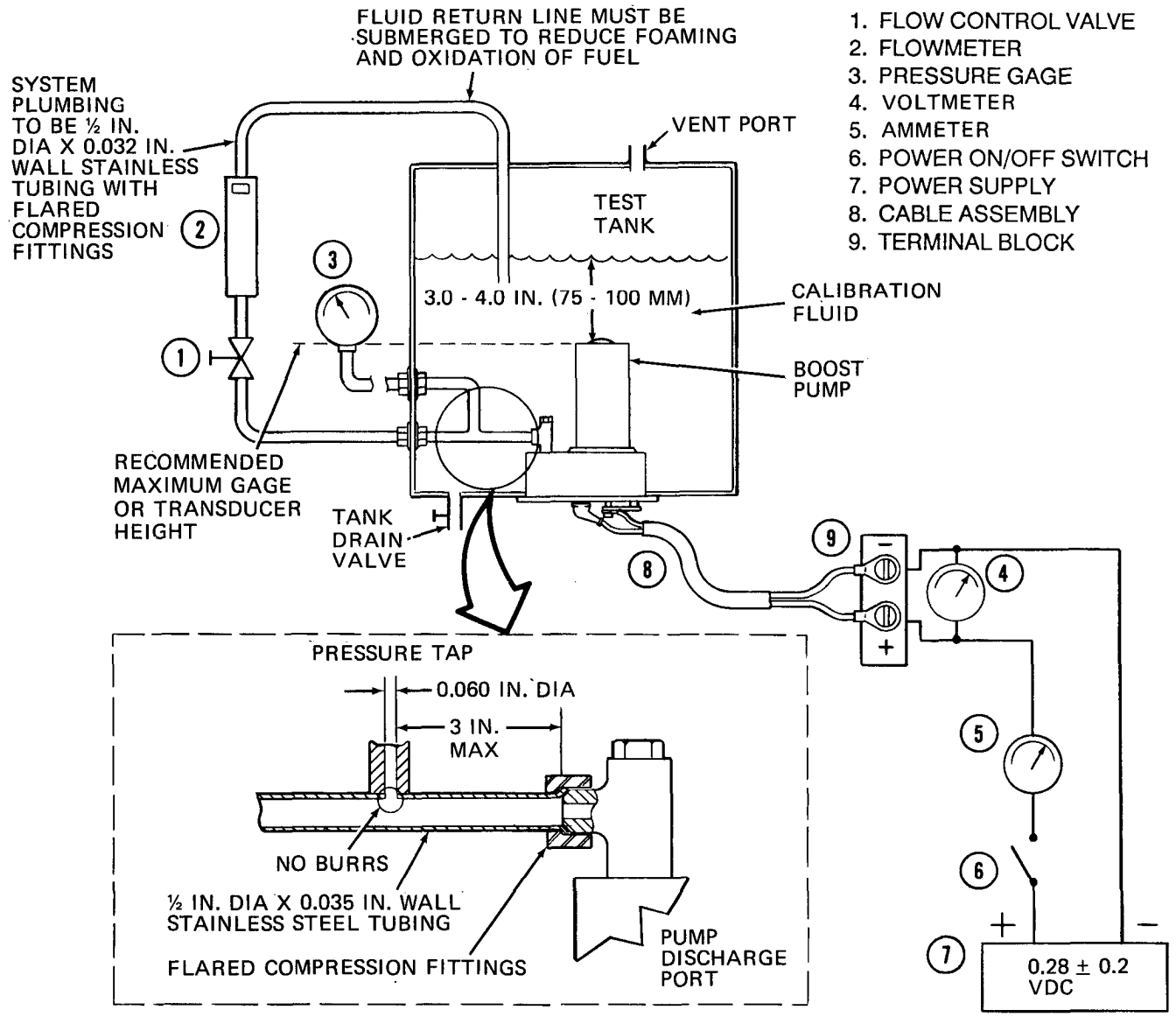


Figure 4. Cartridge Pulling Tool
P/N E2-10-1



EQUIPMENT REQUIREMENTS AND CONSTRUCTION NOTES

1. Flowmeter (2) can be analog rotometer or turbine type with digital readout. 0 to 1000 PPH readouts must be accurate to ±2%. Always calibrate flowmeter (2) with the test tank-calibration fluid.

2. Range of digital or analog pressure gage (3) should be 0-30 psi, with readouts accurate to ±0.5%. Pressure gage or transducer should not be positioned above pump level. (If located above tank fluid level, use clear plastic tubing to allow static head to be measured for adjustment of pressure readout.)

3. Power supply (7) output must be regulated to ±0.02 VDC with current draw at 3 to 6 amperes. Readouts must be accurate within ±0.02 VDC at 28.0 voltage level. For accurate readout of motor supply voltage, voltmeter (4) must be connected across terminal block (9). Use cable assembly (8), (Item 1, Fig. B-1), to connect pump motor to terminal block (9).

Figure 5. Test Tank

APPENDIX E
TORQUE LIMITS

NUT SIZE	TENSION LOADING
#6-32	6 inch-pounds (0,678 N·m)
#10-32	35 inch-pounds (3,955 N·m)

Use above torques only where specific torque is required in the manual. Torques listed apply to self-locking hex nuts.

ALPHABETICAL INDEX

ALPHABETICAL INDEX (Cont)

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, AVIM Maintenance requirements for AH-1G, AH-1S, AH–1F, AH-1P/E Helicopter, Attack; EH-1H Helicopter, Electronic Countermeasure, EH–1X Helicopter, Electronic Countermeasure & Intercept; OH-58A, OH-58C, OH-58D Helicopter, Observation; TH–1G Trainer, Helicopter and All UH-1 series Aircraft.

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TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-2915-335-30&P	21 Oct 88	Centrifugal Fuel Boost Pump

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Clenge the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please Correct one or the Other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered. so the NSN is Wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE: John Doe
JOHN DOE

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DRSTS-M Overprint 1, 1 Nov 80

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

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TEAR ALONG PERFORATED LINE

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 064960-000