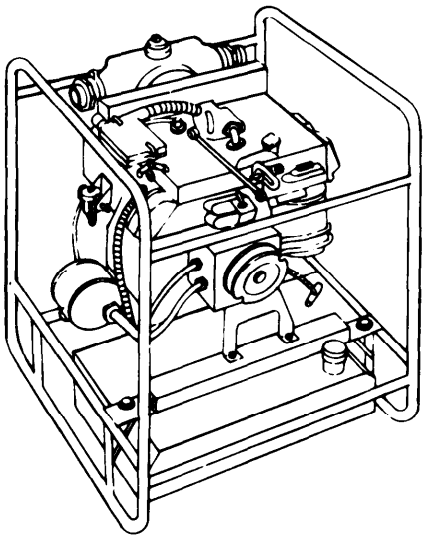
TM 5-4320-228-13&P

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, AND
DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND
SPECIAL TOOLS LIST)



PUMP, CENTRIFUGAL
GASOLINE ENGINE DRIVEN; FRAME MTD;
2-INCH, 170 GPM, 50-FOOT HEAD
(MILITARY DESIGN MODEL 2-170-50-G)
NSN 4320-00-082-6004

This manual supersedes TM 5-4320-228-14, 2 December 1968, including all changes.

HEADQUARTERS, DEPARTMENT OF THE ARMY
27 JANUARY 1982

CHANGE

NO. 1

**HEADQUARTERS,
DEPARTMENTS OF THE ARMY**
WASHINGTON, D. C., 28 September 1990

**Operator's, Organizational, Direct Support,
Maintenance Manual
(Including Repair Parts and Special Tools List)**

**Pump, Centrifugal: Gasoline Engine Driven, Frame Mtd;
2–Inch 170 GPM, 50-Foot Head (Military Design Model 2–170-50-G
NSN 4320-00-082-6004**

Approved for public release; distribution is unlimited

TM 5-4320-228-13&P, dated 27 January 1982, is changed as follows:

1. Remove and insert pages as indicated below, New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
2–3 through 2-6	2–3 through 2–6

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

THOMAS F. SIKORA
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12–25E, Operator, Unit, and Direct Support Maintenance Requirements for Pump, Centrifugal, Gas Driven, Frame Mounted, 125 GPM, 50 FT Head, 2 IN (2-125-50-G).

WARNING

- When filling the fuel tank, do not smoke or use open flame in the area. Always make metal-to-metal contact between the' container and the fuel tank. This will prevent a spark as fuel flows over metallic surfaces. Failure to observe this warning may result in death to personnel.

- Never operate the centrifugal pump in an enclosed area unless the exhaust gases are piped to the outside. Exhaust gases contain carbon monoxide which is a colorless, odorless, and poisonous gas.

- Make sure spark plug leads are disconnected before performing maintenance on the pump.

- Avoid breathing smoke when using a fire extinguisher.

- Do not fill the fuel tank while the engine is running. Gasoline spilled on a hot engine may explode and cause serious injury to personnel.

- Do not attempt to perform any maintenance on the pump while the engine is running.

- Make sure all gasoline fumes are removed from tank before starting welding operations. Fumes in tank can cause a severe explosion if ignited.

- Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100 F (38°C).

CAUTION

- Do not start pump without first priming with water. Dry operation will damage pump seals and cause pump to fail. After priming, do not run pump more than 3 to 5 minutes without water flowing through it.

- When tying centrifugal pump to carrier, install bands through frame. Do not secure by banding across channels.

TECHNICAL MANUAL

No. 5-4320-228-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY .
Washington, D. C., 27 January 1982

OPERATOR' S , ORGANIZATIONAL, AND DIRECT SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

PUMP, CENTRIFUGAL: GASOLINE ENGINE DRIVEN FRAME MTD; 2-INCH 170 GPM, 50-FOOT HEAD (MILITARY DESIGN MODEL 2-170-50-G)

NSN 4320-00-082-6004

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 tne 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 Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MTT, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. This manual covers Centrifugal Pump, Military Design Model 2-170-50-G. It contains operating instructions, and maintenance instructions for Operator, Organizational, and Direct Support Maintenance. The pump (figure 1-1) is used to pump fresh water.

b. The engine is covered in TM 5-2805-203-14.

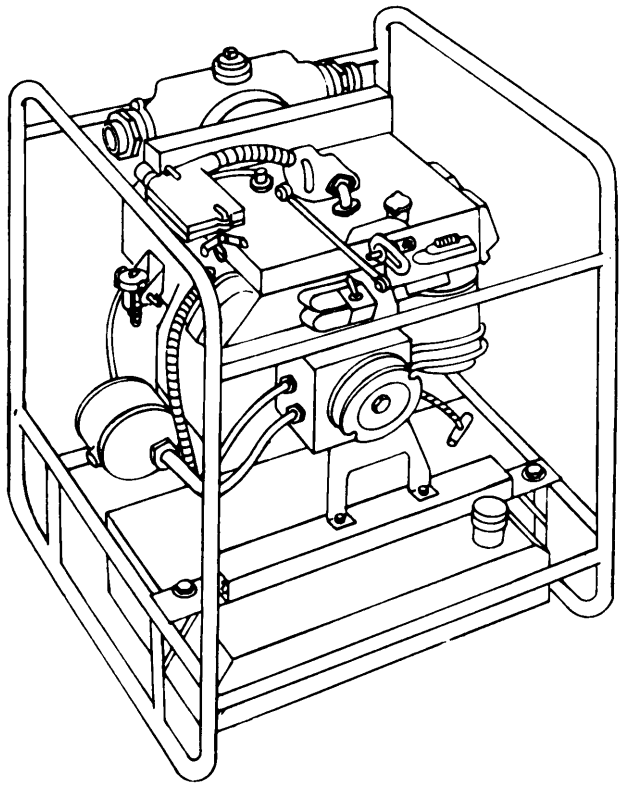


Figure 1-1. Centrifugal pump.
(right rear three-quarter view)

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Procedures for destroying Army materiel to prevent enemy use are listed in TM 750-224-1-4.

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

For administrative storage of equipment refer to TM 740-90-1 for instructions.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

Eir's can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, just simply tell why the design is unfavorable or why a procedure is difficult. Eir's may be submitted on SF 368 (Quality Deficiency Report). Mail directly to Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MPM, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished to you.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-6. DESCRIPTION AND DATA.

The pump is:

CENTRIFUGAL. Uses a high speed rotating motion that forces water away from the center.

SELF CONTAINED. Pump and engine are coupled together as one unit. No additional equipment is needed to run the pump.

FRAME MOUNTED. For ease of handling.

The pump can:

Pump 170 gallons of fresh water per minute at 50 foot head.

Operate in all weather conditions.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

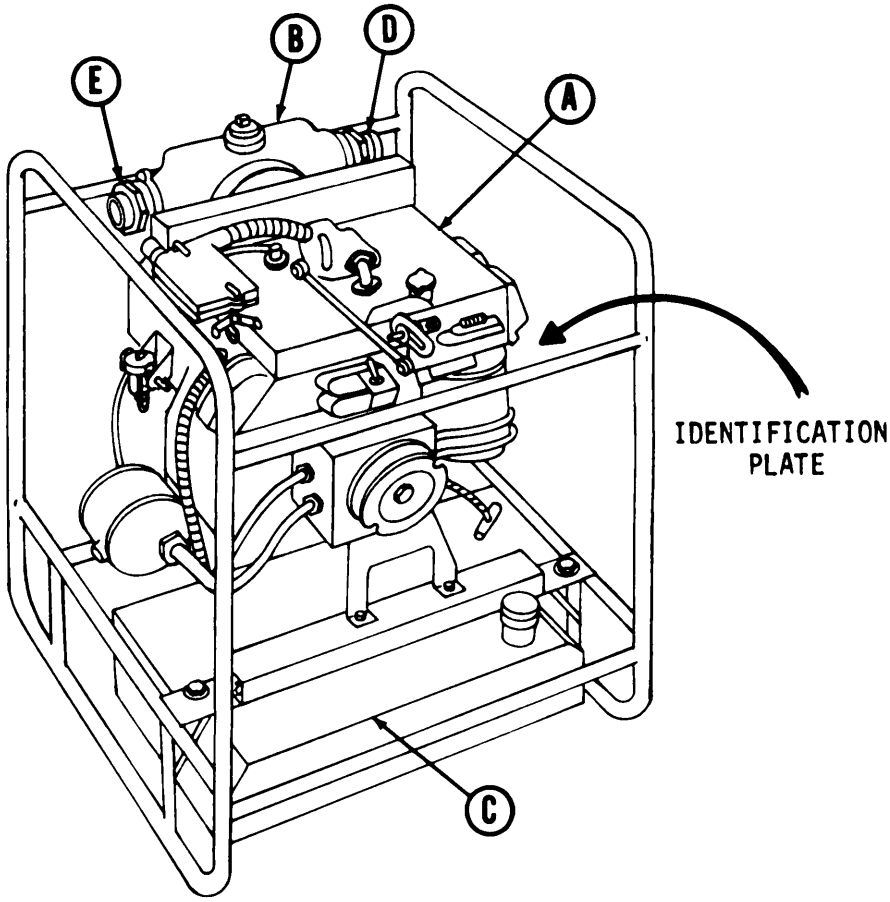
Major components are shown and described in figure 1-2.

1-8. DIFFERENCES BETWEEN MODELS.

This manual covers the Military Design Model 2-170-50-G Centrifugal Pump which is built to Military specifications from Military drawings. All components and parts are interchangeable no matter where they were made.

1-9. EQUIPMENT DATA.

NOMENCLATURE	pump, Centrifugal, Fresh Water, 170 gpm, 50-foot head.
STOCK NUMBER	NSN 4320-00-082-6004
MODEL	Military Model 2-170-50-G.
ENGINE MODEL	4A032-2
WEIGHTS AND DIMENSIONS	
Shipping Height	225 lb. (101.25 kg)
Length	36 in. (91.44 cm)
Width	25 in. 63.5 cm)
Height	26 in. 66.04 cm)
Cube	14 Cu ft.
CAPACITIES	
Fuel Tank	6 gal. (11.35 1)
Crankcase	1 5/8 qt. (1.53 1)
Oil Filter	1/2 qt. (0.47 1)
PERFORMANCE	
Engine	3600 RPM Continuous
Pump	170 Gallons Per Minute



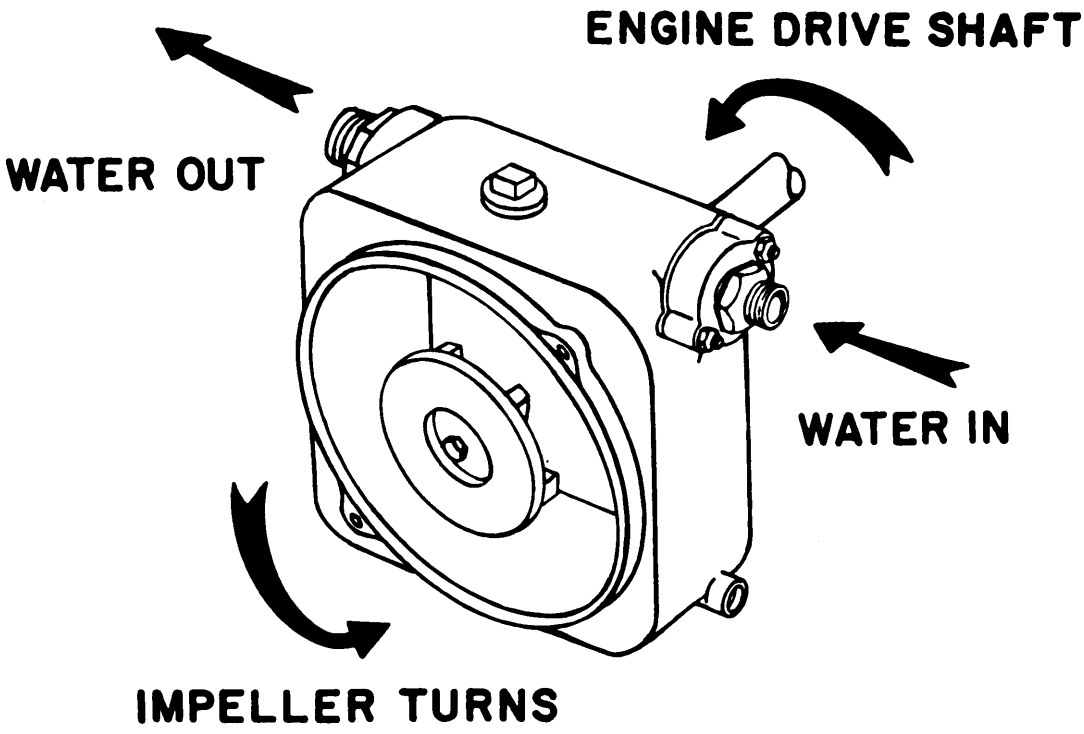
A. ENGINE. Supplies operating power to pump.
B. CENTRIFUGAL PUMP. (Direct coupled to engine), used for pumping water.
C. FUEL TANK. Contains fuel to operate engine.
D. INLET HOSE ADAPTER. Water inlet to pump.
E. OUTLET HOSE ADAPTER. Water outlet from pump.

Figure 1-2. Location and description of major components.

Section III. Principles of Operation

1-10. HOW IT WORKS.

When the engine is running a shaft with attached fins (impeller) turns inside the pump water chamber. This causes water to be sucked into the chamber thru an inlet opening (port). Water then is discharged thru an outlet opening (port). A check valve located in the suction port keeps water from running back out of the pump when it is stopped.



CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR's CONTROLS AND INDICATORS

2-1. GENERAL.

Figure 2-1 shows the location of the operator's controls. Before you operate the pump make sure you know the location and operation of all controls.

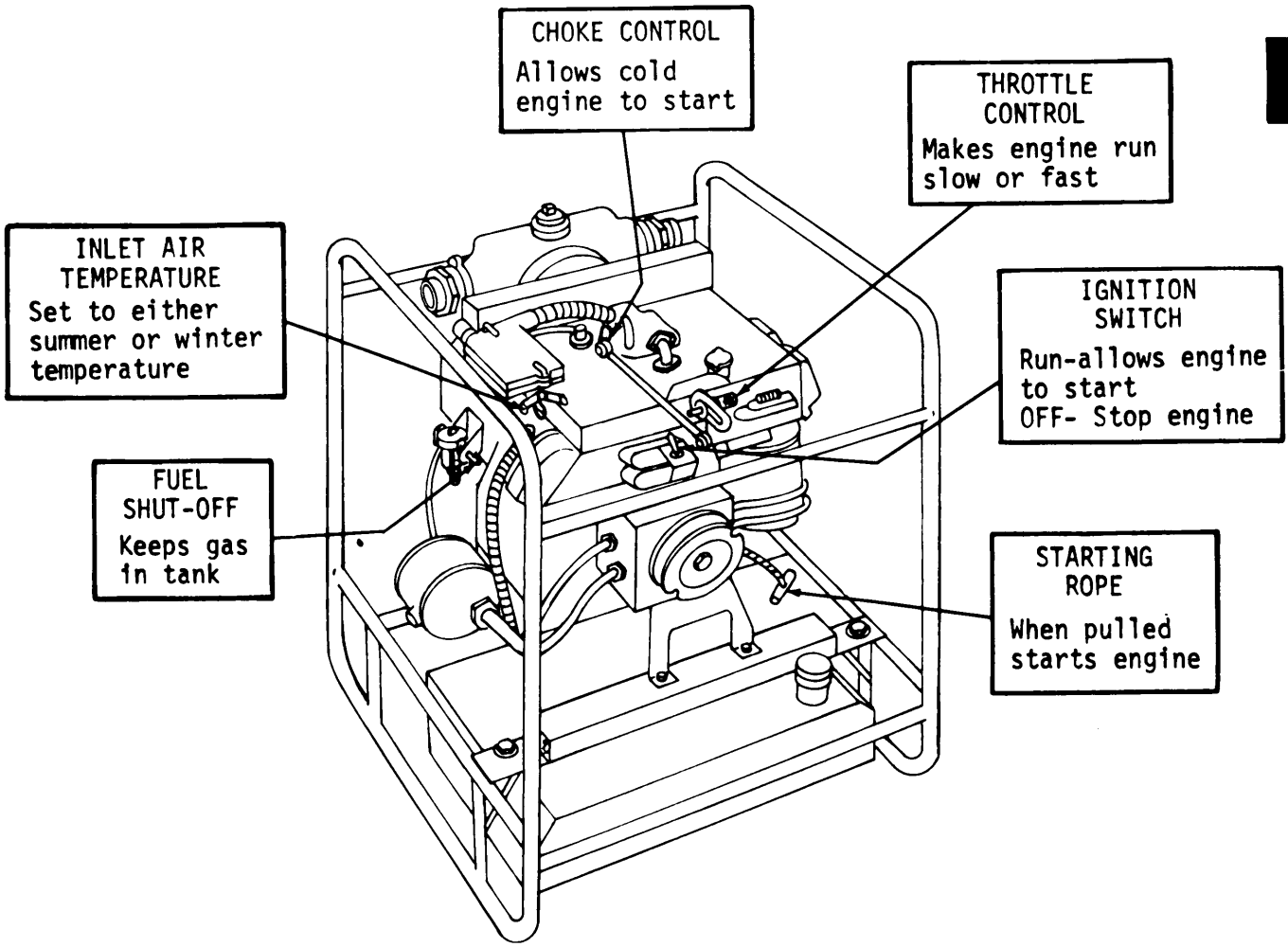


Figure 2-1. Operating controls.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-2. GENERAL.

Preventative Maintenance Checks and Services (PMSC, Table 2-1) are to be done to be sure the pump is ready to use at all times. These checks and services help you find and fix defects before the pump is damaged or fails.

b. Item numbers in the first column of Table 2-1 are the order in which things are to be done. Column two “Interval” lists when to do them and who should do them.

c. If minor defects are found when the pump is running take notes on what they are. Fix them or have them fixed after you have stopped running the pump.

NOTE

While the pump is running, if any defect develops that you think will damage the pump, stop it at once.

d. Record all defects and steps taken to fix them on DA Form 2404 (Equipment Inspection and Maintenance Work Sheet) as soon as possible.

Before you operate. Always keep in mind the WARNINGS and CAUTIONS located on the inside front cover. Perform your before (B) PMCS.

Table 2-1. Preventive Maintenance Checks and Services

B - Before operation
D - During operation
A - After operation
W - Weekly
M - Monthly
Q - Quarterly

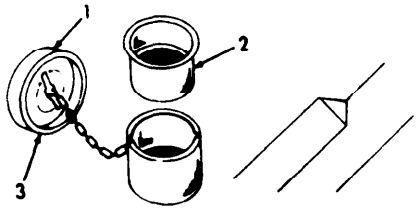
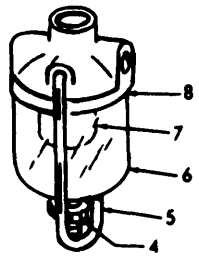
Item Number	Interval						ITEM TO BE INSPECTED PROCEDURE Check for and have repaired or adjusted as necessary.	Equipment Will Be Reported Not Ready (Red) If:
	Operator Daily				Org			
	B	D	A	W	M	Q		
							- FRONT -	
1	X					X	FUEL TANK ... Remove cap (1) and check cap, strainer (2) and gasket (3). Replace as required. 	Fuel Tank: Leaks, cap missing, missing gasket clogged or missing
2						X	SHOCK MOUNTS ... Inspect for cracks or deterioration. Replace as necessary.	Shock Mounts: Cracked, broken or deteriated.
3						X	FRAME ... Inspect for cracks, breaks, or damage. Repair or replace as necessary.	Frame: Cracks, broken.
							- REAR -	
4	X	X	X			X	PUMP ... Inspect pump for leaks, cracks, or other damage. Repair or replace as necessary.	Pump: Cracks leaks.
5						X	ADAPTERS ... Inspect inlet and outlet adapters for leaks or damage. Tighten or replace as necessary.	Adapters: Leaks damage.
							-LEFT SIDE-	
6	X		X			X	FUEL FILTER ... Loosen bail nut (4) and swing bail (5) to remove bowl (6). Clean bowl and replace filter (7) or gasket (8) as required. 	Fuel Filter: Leaks, clogged, missing gasket.

Table 2-1. Preventive Maintenance Checks and Services (Continued)

B - Before operation
D - During operation
A - After operation
W - Weekly
M - Monthly
Q - Quarterly

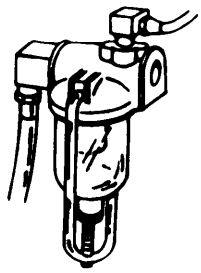
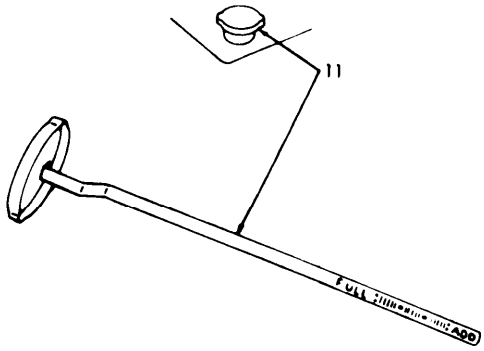
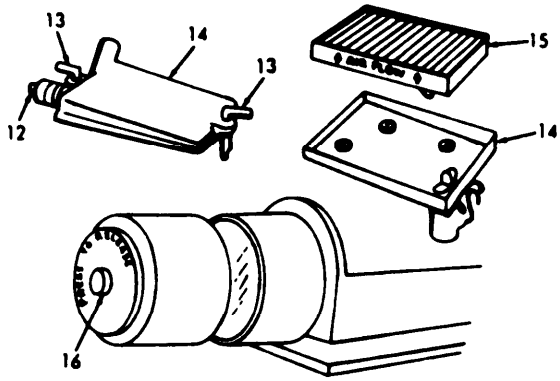
Item Number	Interval						ITEM TO BE INSPECTED PROCEDURE Check for and have repaired or adjusted as necessary.	Equipment Will Be Reported Not Ready (Red) If:
	Operator Daily				Org			
	B	D	A	W	M	Q		
7						X	FUEL LINES ... Inspect fuel line (9) and (10) for leaks, kinks, breaks, and loose connections. Replace as necessary. 	Fuel Lines: Leaks, kinks, brakes loose fittings.
8						X	MUFFLER ... Inspect for cracks, holes, and faulty connections. Tighten loose connections and replace as necessary. -TOP-	Muffler: Cracks holes, loose connections.
9	X		X				OIL LEVEL DIP STICK ... Remove oil level dip stick (11) and check for oil lever. Add oil if needed. 	Oil Level: No oil, low oil, no Dip Stick.

Table 2-1. Preventive Maintenance Checks and Services (Continued)

B - Before operation
D - During operation
A - After operation
W - Weekly
M - Monthly
Q - Quarterly

Item Number	Interval						ITEM TO BE INSPECTED PROCEDURE Check for and have repaired or adjusted as necessary.	Equipment Will Be Reported Not Ready (Red) If:
	Operator Daily				Org			
	B	D	A	W	M	Q		
10	X		X				AIR CLEANER ... Inspect air cleaner visual signal (12) to detemine if red SERVICE LEVEL signal is visable. If the signal is visible proceed as follows. Turn wing bolts (13) one quarter turn to loosen. Wipe out inside of element housings (14). To clean filter (15) element blow off element with compressed air - From clean to dirty side of element. To re-assemble insert new of cleaned element (15). Turn wing bolts (13) one quarter turn to tighten. DO NOT USE WRENCH. EMERGENCY - To clean gently tap element against hand. Do not tap against hard objects. Filter element (14) can be washed in soap and water. DO NOT use gasoline or other solvents. CAUTION - Use care when cleaning. Do not puncture filter element. Press button (16) in SERVICE LEVEL signal. NOTE Refer to lubrication order. LO 5-4320-228-13&P  	
11		X				X	OPERATIONAL TEST ... During operation, listen for any unusual noises or vibration.	
12						X	ADJUSTMENTS ... Make all necessary adjustments during operational test.	

Section III. OPERATION UNDER USUAL CONDITIONS

2-3. GENERAL.

The instructions in this section are for personnel who operate the pump. It describes how the pump is started and stopped in normal weather conditions.

2-4. ASSEMBLY AND PREPARATION FOR USE.

2-4.1. Unloading the Equipment.

The total weight of the crated centrifugal pump is 225 pounds. A handtruck, forklift, or manpower may be used to unload the crated unit. The crate must be kept in an upright position as shown on the crate while unloading.

2-4.2. Unpacking the Equipment.

General. For domestic shipping, the centrifugal pump is packed in a cardboard box.

b. Unpacking. Cut and remove all retaining straps from cardboard box. Remove centrifugal pump from its container.

CAUTION

Be careful while unpacking to avoid damaging equipment.

c. Removal of Protective Materials and Preservatives. Remove protective tape and coverings from inlet and outlet ends of centrifugal pump. Prepare engine for inspection and operation as outlined on DA Form 2258 (Depreservation Guide).

2-4.3. Inspecting and Servicing Equipment.

Check identification plate against packing bill for positive identification of equipment.

b. Visually inspect equipment for any damage which may have occurred during shipment. Make certain that all nuts and bolts are in place and secure.

For inspection and servicing of a new or used engine, refer to TM 5-2805-203-14.

d. Perform daily preventive maintenance services listed in paragraph 2-2.

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2-4.4 Installation or Setting-Up Instructions.

a. General. The pump is shipped assembled for operation.

b. Installation.

(1) Place pump on a base that is solid and strong enough to support weight of unit. Refer to 1-9 for dimensions of base.

(2) Select a level site where there will be enough space on all sides for servicing and operation of the unit.

(3) Place pump as close as possible to source of water. Avoid long suction lifts which reduce pumping efficiency.

(4) Connect hoses to inlet and outlet adapters. Make sure intake end of inlet hose is connected.

(5) If pump is operated in enclosed area, make certain that there is proper ventilation and exhaust gases are piped outside.

Never operate pump in enclosed areas unless exhaust gases are piped outside. Exhaust gases contain carbon monoxide, a colorless, odorless, and poisonous gas, which can cause serious illness or death.

2-5. STARTING THE EQUIPMENT.

Before you operate. Always keep in mind the CAUTIONS and WARNINGS.

a. Preparation for Starting.

(1) Do the before operation preventive maintenance services (para 2-2).

(2) Prime pump as described in figure 2-2, if pump is not full of water.

CAUTION

Do not start pump without first priming with water. Dry operation will damage pump seals and cause pump to fail. After priming, do not run pump more than 3 to 5 minutes without water flowing through it.

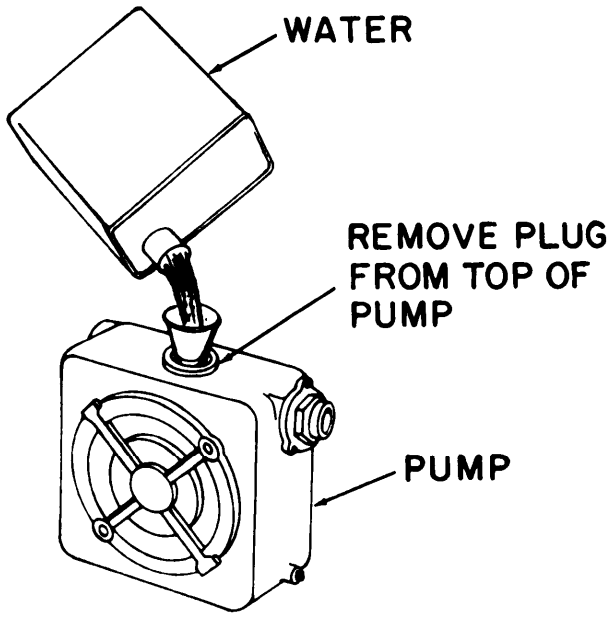


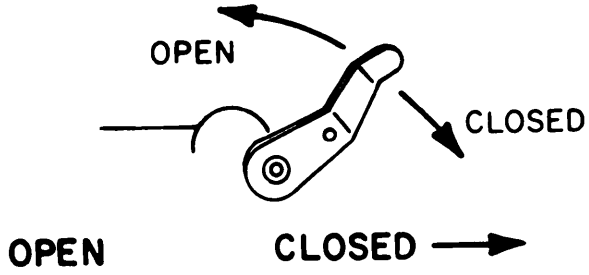
Figure 2-2. Priming pump.

b. Starting. Start pump as shown below:

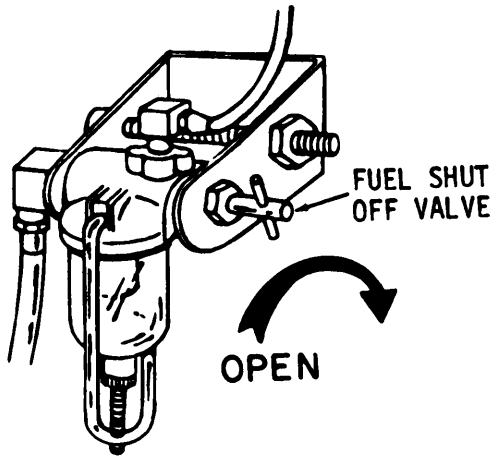
NOTE

Allow engine sufficient warm up time before starting pumping operations. (See caution in para 2-5a(2).)

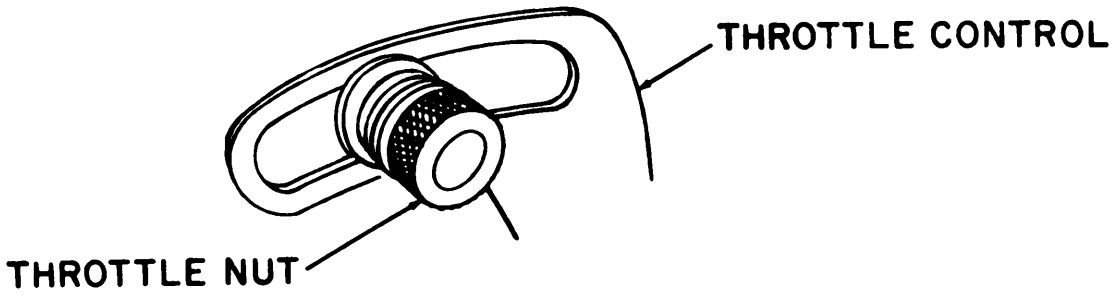
1 - Move choke control to CLOSE.



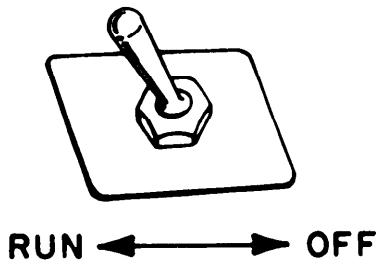
2 - Turn Fuel Shut off valve to OPEN.



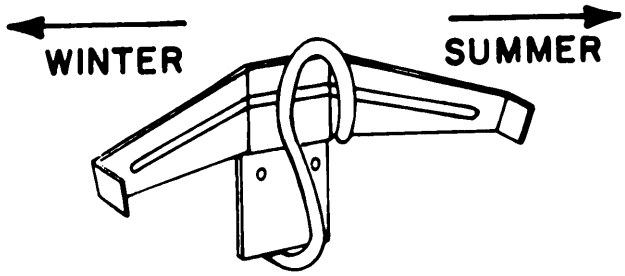
3 - Move throttle control to half throttle and tighten.



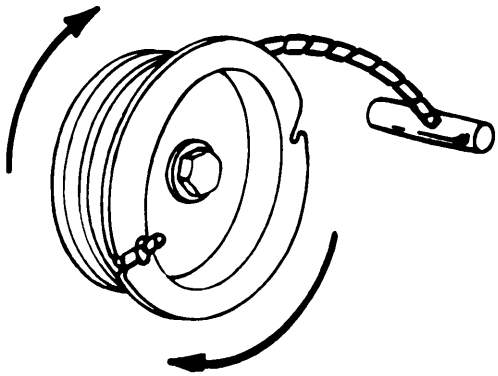
4 - Set ignition switch to RUN.



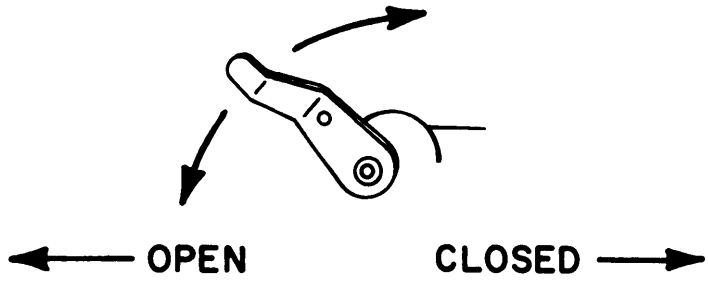
5 - Place the Inlet Air Temperature Control in the SUMMER position.



6 - Wind starter rope as shown around starter pull rope sharply.

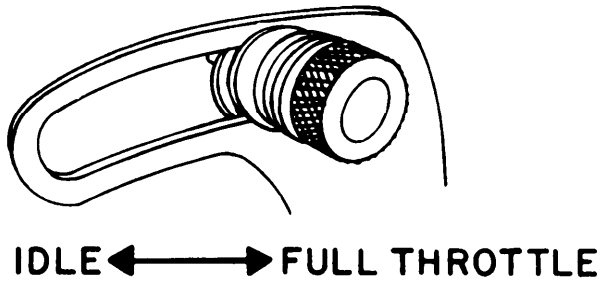


7 - When engine starts and warms up, slowly open choke. Maintain smooth operation until choke is fully open.



8 - Let engine run at about one-half throttle until it reaches operating temperature.

9 - When operating temperature is readied, move throttle control to full throttle for maximum pumping rate. If less than maximum pumping rate is desired, adjust throttle control position to the required speed setting.



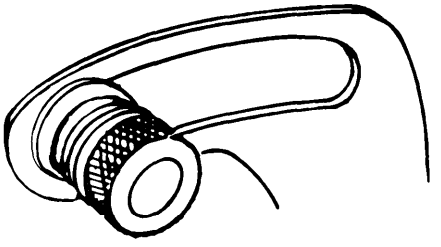
10 - To stop pumping without stopping engine, move throttle control to idle position and allow engine to idle.

11 - To resume pumping operation move throttle control to desired speed setting.

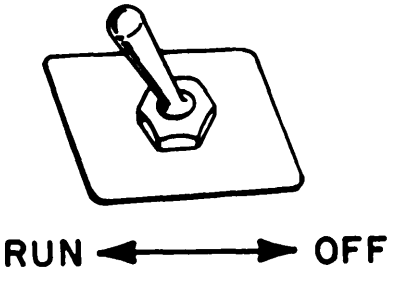
2-6. STOPPING THE EQUIPMENT.

To stop pumping operation:

1 - Place the throttle control in the idle position, and let the engine idle for 3 to 5 minutes. This will allow the engine to cool.



2 - Set the Ignition Switch to OFF.



2-7. DISMANTLING FOR MOVEMENT.

The pump is completely self-contained and can be moved over short, distances manually by lifting at the ends of the pump frame. If the pump is to be transported by carrier, block or tie it to the carrier to prevent it from shifting while being transported.

CAUTION

When tying pump to carrier, install bands through frame. Do not secure by banding across channels.

a. Disconnect inlet and outlet hoses from inlet and outlet adapters.

b. Disconnect exhaust pipe extension if used.

c. Remove plug from bottom of fuel tank and drain fuel into suitable container.

d. Cover openings of inlet and outlet adapters to protect adapter threads and prevent foreign matter from entering pump.

2-8. REINSTALLATION AFTER MOVEMENT.

Refer to paragraph 2-4.4 for installation and setting up procedures.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-9. GENERAL.

This section contains instructions for operation of the equipment in the following conditions: extreme cold, extreme heat, dusty or sandy areas, rainy or humid conditions, salt water areas, and high altitudes.

2-10. OPERATION IN EXTREME COLD.

a. Keep fuel tank full to prevent condensation. Drain and service fuel filter more frequently than under normal conditions paragraph 3-5.2).

b. Before starting engine, remove any accumulated ice or snow from spark plugs and wiring.

c. Make sure Inlet Air Temperature shutter on engine is set for winter operation.

d. Run engine at low speed to warm to operating temperature before applying full load.

Lubricate engine in accordance with current lubrication order LO 5-2805-203-14.

f. Fill pump with warm water to prevent freezing at starting.

g. Drain pump immediately after operation as shown in figure 2-3.

2-11. OPERATION IN EXTREME HEAT.

a. Make sure Inlet Air Temperature shutter is set for summer operation.

b. Keep pump clean and free of dust. If pump is operated indoors, allow sufficient room around unit for air circulation. Make sure exhaust is vented outside.

Inspect shrouding and cooling fins of engine for dust or foreign matter which might stop flow of air.

d. Lubricate engine in accordance with current Lubrication Order LO 5-2805-203-14 and TM 5-2805-203-14.

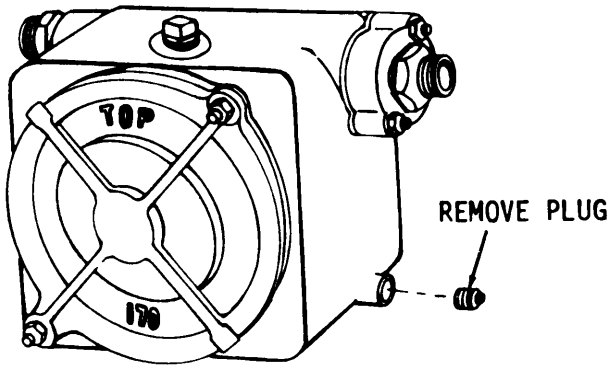


Figure 2-3. Pump draining instructions.

2-12. OPERATION IN DUSTY OR SANDY AREAS.

a. If installation is permanent, erect protective shield for pump. If installation is temporary, take advantage of natural barriers which offer protection from dust and sand.

b. Service air cleaner daily to keep fuel system free from sand and dirt (TM 5-2805-203-14).

Strain all fuel before adding to fuel tank. Drain and service fuel filter more frequently than under normal conditions (3-5.2).

d. Clean pump frequently. Wipe it with a cloth dampened in approved cleaning solvent.

Lubricate engine in accordance with current lubrication order LO 5-2805-203-14 and TM 5-2805-203-14.

2-13. OPERATION UNDER RAINY OR HUMID CONDITIONS.

a. If unit is outside and not operating, cover unit with canvas or other waterproof material during damp, rainy weather. Remove cover during dry weather to allow unit to dry out.

b. Keep fuel tank full all times to prevent condensation. Drain and service fuel filter frequently (paragraph 3-5.2).

c. Humid conditions can cause corrosion and deterioration of electrical components. Keep electrical components clean and dry.

d. Lubricate engine in accordance with current lubrication order LO 5-2805-203-14 and TM 2805-203-14.

2-14. OPERATION IN SALT WATER AREAS.

a. Salt water causes corrosive action on metal. Care must be taken to avoid contact with salt water. After contact with salt water, wash unit with clean, fresh water.

b. Coat exposed metal with rustproofing material. Remove any rust immediately and cover exposed surface with a coat of paint.

c. Clean lubrication surfaces prior to lubricating. Lubricate engine in accordance with current lubrication order LO 5-2805-203-14 and and TM 5-2805-203-14.

2-15. OPERATION AT HIGH ALTITUDES.

Because of thinner air at higher altitudes, the carburetor may require an adjustment providing a leaner mixture. If this condition exists, refer to TM 5-2805-203-14.

CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. GENERAL LUBRICATION INFORMATION.

The engine is the only component of the centrifugal pump that requires lubrication. The pump uses prelubricated, sealed ball bearings that require no further lubrication.

3-2. DETAILED LUBRICATION INFORMATION.

Refer to the current lubrication order LO 5-2805-203-14 and to TM 5-2805-203-14 for engine lubrication instructions.

CAUTION

When OES oil is used, it will be checked more often.

Section II. TROUBLESHOOTING

3-3. GENERAL.

The table lists the common malfunctions which you may find during the operation or maintenance of the pump or it's components. You should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor. Refer to TM 5-2805-203-14 for engine troubleshooting.

Table 3-1. OPERATOR TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. PUMP FAILS TO PUMP TO RATED CAPACITY.
Step 1 - Check for low engine speed. Adjust engine speed.
Step 2 - Check for sufficient fuel. Adjust fuel control valve.
Step 3 - Check position of Choke Control. Readjust.
Step 4 - Check position of Inlet Air Temperature Control. Readjust.
Step 5 - Check that pump is located close to source of supply. Relocate pump.
Step 6 - Check pump for leaks, cracks, or other damage. Notify maintenance activity.
2. PUMP FAILS TO PRIME.
Step 1 - Check pump for leaks, cracks or other damage. Notify maintenance activity.
Step 2 - Check pump for sufficient prime. Reprime pump.
Step 3 - Check drain plug. Repair or replace.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

4-1. GENERAL.

This chapter contains the removal, cleaning, inspection, and installation procedures for Organizational Maintenance. Refer to TM 5-2850-203-14 for engine maintenance.

Before maintenance always keep in mind the WARNINGS and CAUTIONS located on the inside front cover.

4-2. FUEL SYSTEM.

This section contains the maintenance instructions for the engine fuel system components which are not described in TM 5-2850-203-14. It includes coverage of the fuel tank, fuel filter, and fuel lines and fittings.

4-2.1. Fuel Tank.

a. Removal.

(1) Refer to figure 4-1. Remove drain plug (1) and drain fuel into a suitable container.

(2) Disconnect fuel line (2) at fuel filter (3).

(3) Remove screws (4) that attach fuel tank to frame.

(4) Remove fuel tank cap (5) and strainer (6).

b. Cleaning and Inspection.

(1) Thoroughly clean fuel tank.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100°F (38°C).

(2) Clean fuel strainer and cap with approved cleaning solvent; shake dry.

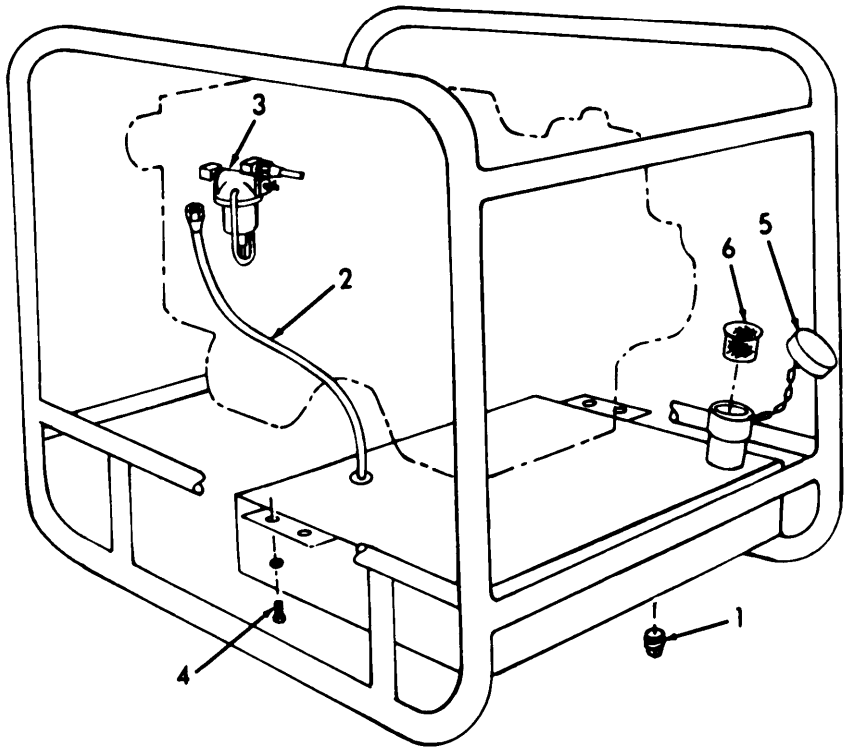


Figure 4-1. Fuel tank removal

(3) Inspect for cracks, breaks, or other damage.

(4) Repair cracks and breaks, using approved arc welding methods.

WARNING

Make sure all gasoline fumes are removed from tank before starting welding operations. Fumes in tank can cause a severe explosion if ignited.

c. Installation.

(1) Repeat the removal procedure in reverse sequence.

4-2.2. Fuel Lines, Filter.

a. Removal.

(1) Refer to figure 4-2. Loosen finger nut (1) on yoke (2) of fuel filter. Swing yoke upward and remove fuel bowl (3) and filter (4).

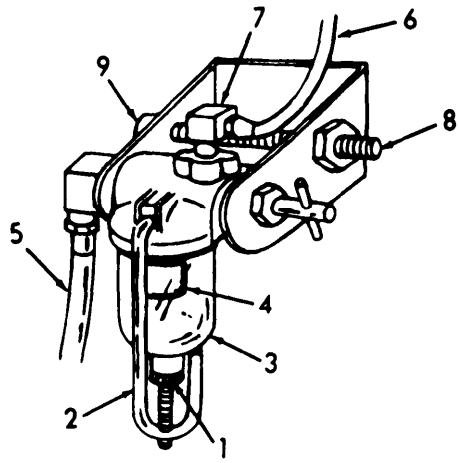


Figure 4-2. Fuel line and filter removal.

(2) Disconnect fuel line (5) to fuel tank. Disconnect fuel line (6) to engine.

(3) Remove elbow (7).

(4) Remove nut (8) and screw (9).

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100°F (38°C).

b. Cleaning and Inspection.

(1) Clean fuel filter, bowl assembly and fuel lines with approved cleaning solvent and dry thoroughly.

(2) Inspect fuel filter, connector threads, bowl, and bowl gasket for cracks, breaks, and other damage.

(3) Inspect fuel lines for cracks, distortion, or other damage.

(4) Replace all damaged or defective parts.

c. Installation.

(1) Using figure 4-2 repeat the removal procedure in reverse sequence.

4-3. EXHAUST SYSTEM.

The exhaust system maintenance and inspection procedures, with the exception of the mufflers, are listed and illustrated in TM 5-2805-203-14. This section covers maintenance of the mufflers.

a. Removal.

(1) Refer to figure 4-3. Remove screws (1), muffler (2), and gasket (3).

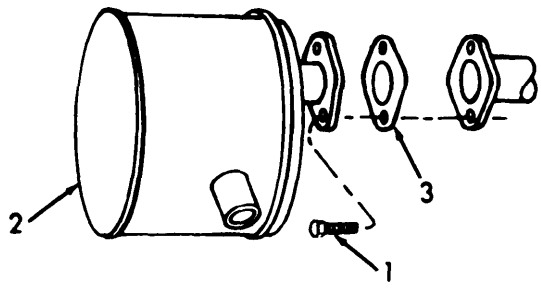


Figure 4-3. Exhaust system removal.

b. Cleaning and Inspection.

(1) Clean exterior of mufflers with wire brush.

(2) Inspect mufflers for cracks, holes, or other damage.

(3) Replace mufflers if defective.

c. Installation.

(1) Refer to figure 4-3. Repeat the removal procedure in reverse sequence.

4-4. ENGINE.

This section contains the engine removal procedures. All engine maintenance procedures and instructions are described and illustrated in TM 5-2805-203-14.

a. Removal.

(1) Remove exhaust system as per 4-3.

(2) Remove fuel lines and filter as per 4-2.2.

(3) Remove centrifugal pump as per 4-6.2.

(4) Refer to figure 4-4. Install sling (1) and support engine weight.

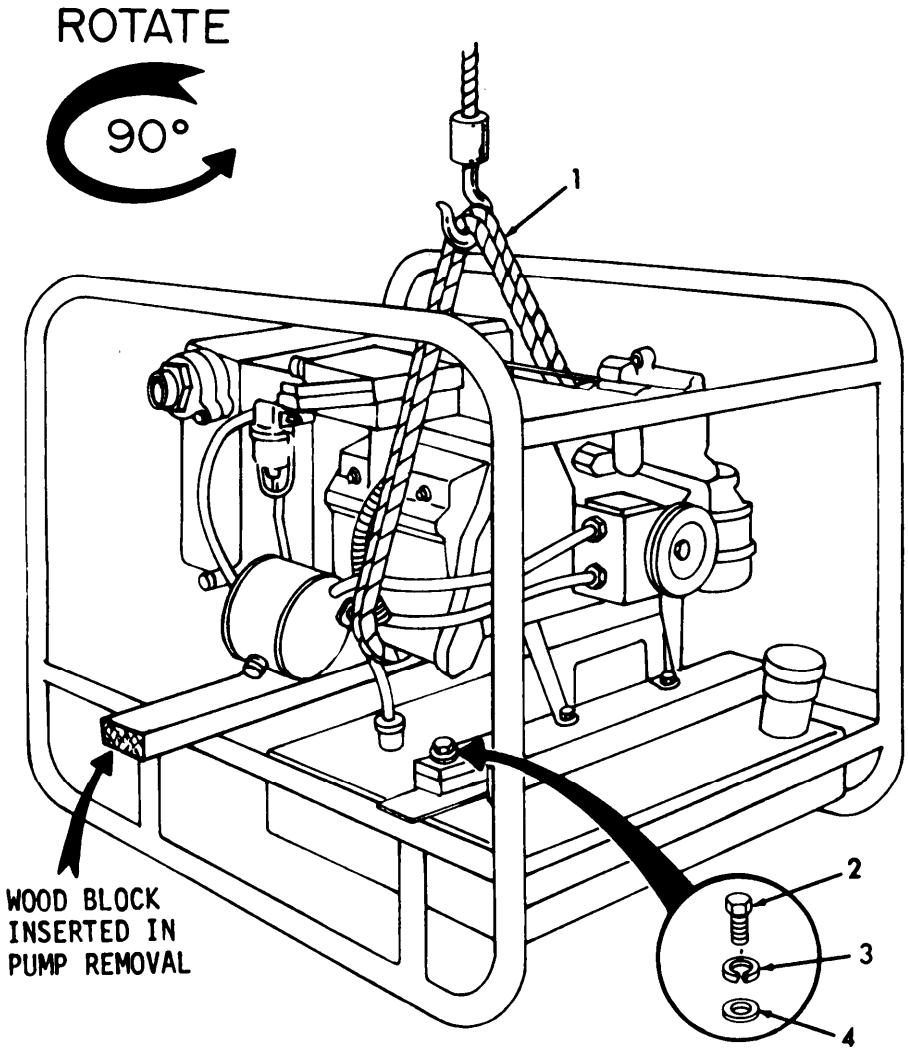


Figure 4-4. Engine removal.

(5) Remove cap screws (2), lock washers (3), and washers (4).

(6) Rotate engine 90° in sling to clear frame as engine is hoisted.

b. Cleaning and Inspection.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100°F (38°C).

(1) Clean exterior of engine with approved cleaning solvent and dry thoroughly.

(2) Inspect engine for any external damage, tag engine, noting any defects or damage, and return it to depot maintenance.

c. Installation.

(1) Refer to figure 4-4. Repeat the removal procedure in reverse sequence.

4-5. FRAME.

Two channels mounted on the frame with shock mounts support the engine and pump and absorb the shock and vibration of the pump while in operation. The tubular frame supports and protects the pump and engine.

a. Removal.

(1) Remove exhaust system as per 4-4.

(2) Remove fuel lines and filter as per 4-2.1.

(3) Remove centrifugal pump as per 4-6.1.

(4) Remove engine as per 4-5.

(5) Remove fuel tank as per 4-2.1.

(6) Refer to figure 4-5. Remove capscrews (1), lock washers (2), and flat washers (3).

(7) Remove channels (4) and shock mounts (5).

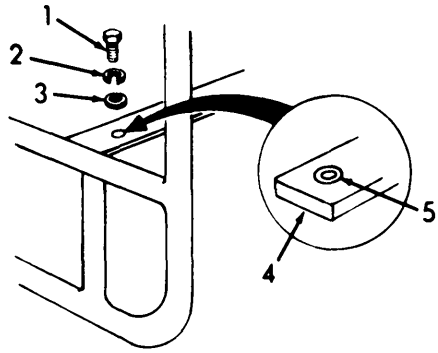


Figure 4-5. Channel removal.

b. Cleaning and Inspection.

WARNING

Drycleaning solvent P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100°F (38°C).

(1) Clean channels and frame with approved cleaning solvent or wire brush as required.

(2) Inspect channels and frame for cracks or bends.

(3) Inspect shock mounts for cracks, wear, and deterioration.

c. Installation.

(1) Refer to figure 4-5. Repeat the removal procedure in reverse sequence.

4-6. CENTRIFUGAL PUMP.

The centrifugal pump is coupled to the engine with a flexible coupling. The pump case houses the impeller, wear plate, and seal and serves as a water chamber with suction and discharge ports. The volute, which bolts to the front of the pump case, completely encircles the impeller. A check valve prevents water backflow through the pump. The bearing housing mounts the pump bearings and shaft.

4-6.1. Troubleshooting.

Table 4-1 is used for organizational maintenance activity troubleshooting. This table is to be used in conjunction with the preventive maintenance troubleshooting table contained in 2-1.

Table 4-1. Maintenance Activity Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. PUMP FAILS TO PUMP TO RATED CAPACITY.
Step 1 - Check if check valve is defective. Replace check valve. (Refer to 4-6.4)
Step 2 - Check if impeller is clogged or broken. Flush pump case or replace impeller. (Refer to 4-6.2)
Step 3 - Check pump case for leaks, cracks, or damage. Repair or replace case. (Refer to 4-6.2)
Step 4 - Check if packing seals are worn or defective. Replace packing seals. (Refer to 4-6.2)
Step 5 - Check if clearance between wear plate and impeller is excessive. Install shims as required. (Refer to 4-6.2)
2. PUMP FAILS TO PRIME.
Step 1 - Check if check valve is defective. Replace check valve. (Refer to 4-6.2)
Step 2- Check if suction flange is loose or defective. Tighten mounting nuts or replace suction flange. (Refer to 4-6.4)
Step 3 - Check if packing seals are worn or defective. Replace impeller. (Refer to 4-6.2)
Step 4 - Check if impeller is damaged. Replace impeller. (Refer to 4-6.2)
3. PUMP NOISY.
Step 1 - Check if pump mounting hardware is loose. Tighten pump mounting hardware. (Refer to 4-6.2)

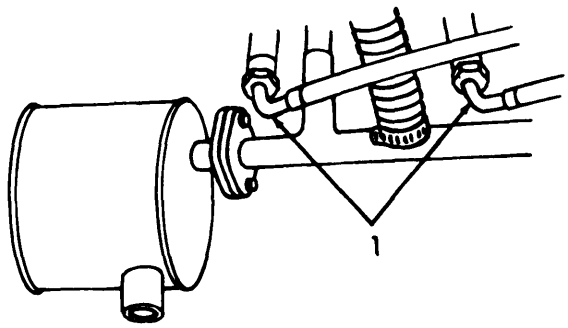
Table 4-1. Maintenance Activity Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 2 - Check if impeller is broken. Replace impeller. (Refer to 4-6.2)
Step 3 - Check if impeller shaft is defective. Replace impeller shaft. (Refer to 4-6,2)
Step 4 - Check if bearings are worn or burned. Replace bearings. (Refer to 4-6.2)
Step 5 - Check if coupling is loose or damaged. Replace coupling. (Refer to 4-6.3)

4-6.2 Pump.

a. Removal.

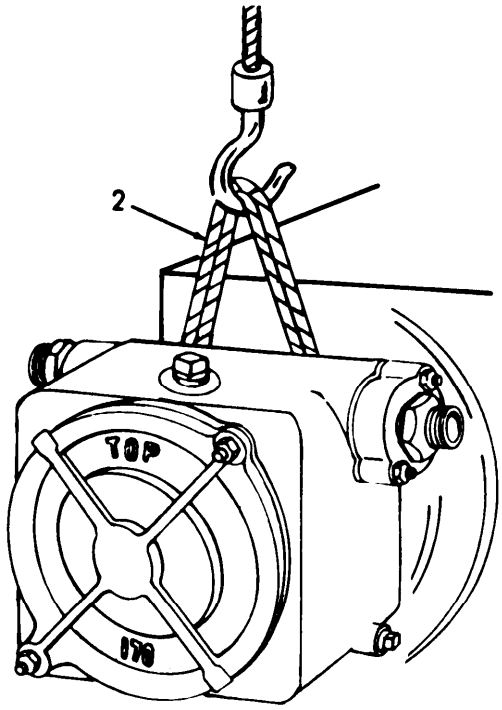
(1) Disconnect four spark plug leads (1).



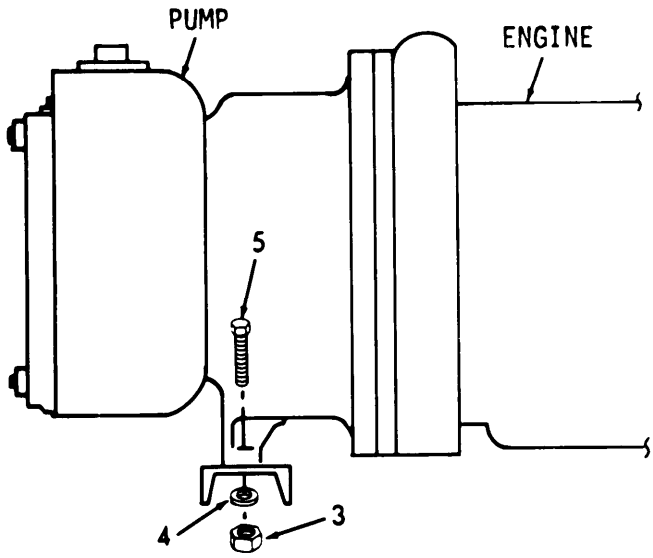
WARNING

Make sure spark plug leads are disconnected before performing maintenance on the pump.

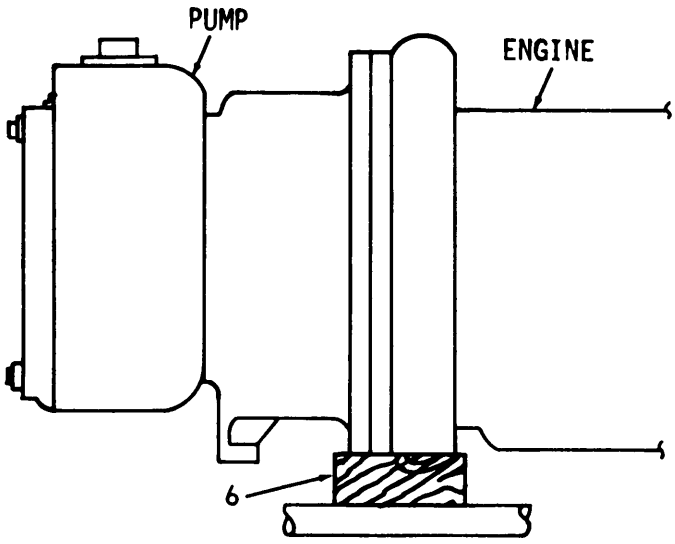
(2) Install sling (2) to support weight of pump with hoist.



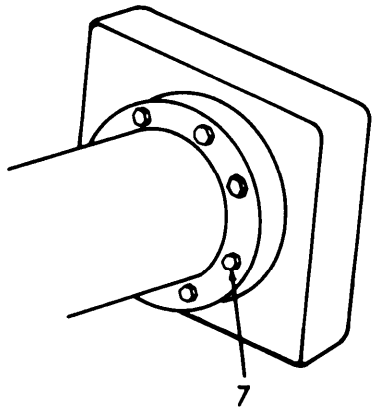
(3) Remove nuts (3), washers (4), and bolts (5).



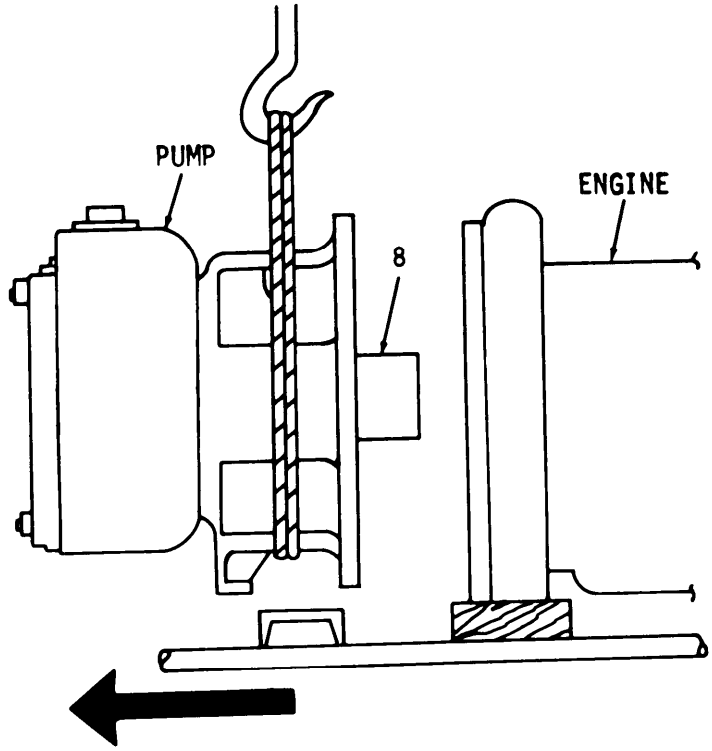
(4) Place support block (6) between engine and frame.

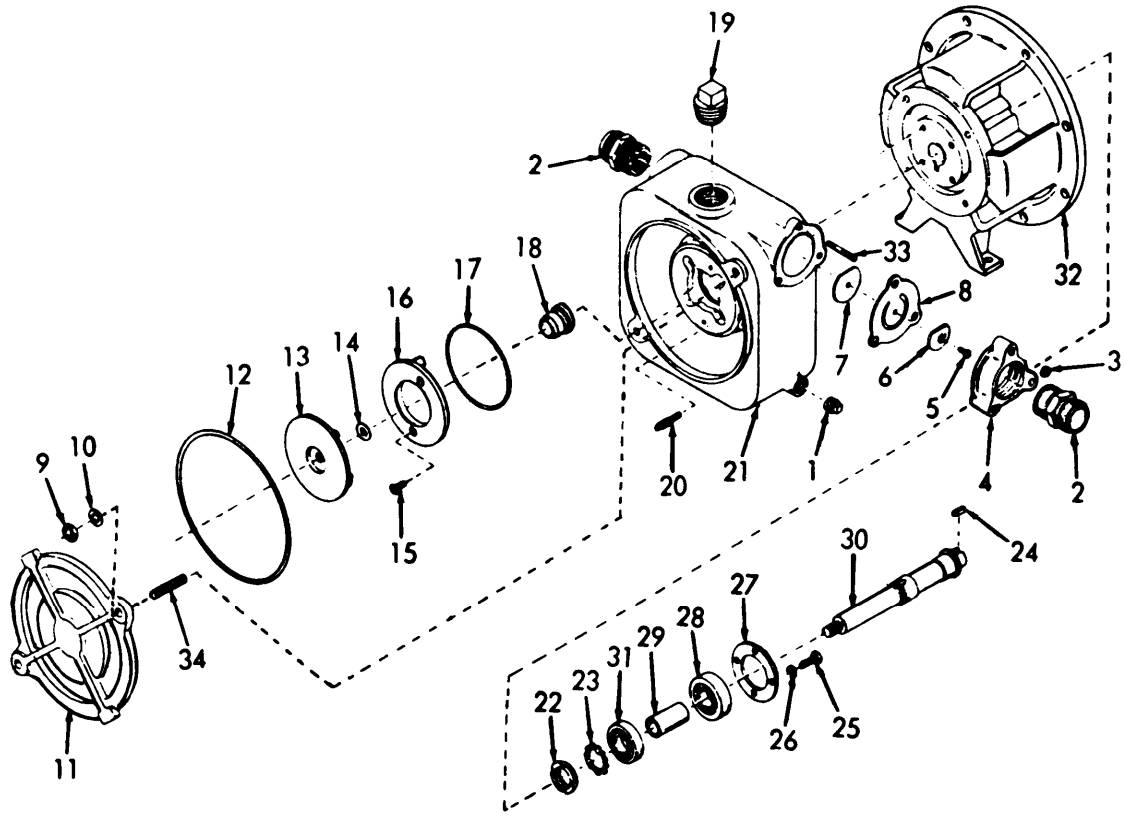


(5) Remove cap screws (7).



(6) Pull pump away from engine to disengage coupling (8).





1. Plug pipe, 1/2 in.
2. Adapter, hose, 2-NPT (M) x 2-NRSH (M)
3. Nut, plain, hex, 5/16-24 (3 reqd)
4. Flange, suction
5. Screw, pan-hd, 1/4-20 x 1/2 in.
6. Weight, small, check valve
7. Weight, large, check valve
8. Gasket, check valve
9. Nut, plain, hex, 1/2 x 20 (2 reqd)
10. Washer, flat, 1/2 in. (2 reqd)
11. Volute
12. Packing, preformed, No. 10 x 1/8 in.
13. Impeller
14. Shim, impeller, 0.010 in. (as req'd); 0.030 in. (1 reqd)
15. Screw, machine, 1/4-20 x 3/8 in. (2 reqd)
16. Plate, wear
17. Packing, preformed, 5-5/8 x 1/8 in.
18. Seal , shaft assy.
19. Plug, pipe, 1-1/2 in.
20• Screw, safelok, cap, 5/16-24 x 7/8 in. (4 reqd)
21. Case, pump
22. Nut, bearing, 1.173-18
23. Washer, bearing, 1.193 in. ID
24. Key, machine, 1/4 x 1/4 x 7/8
25. Screw, cap, hex, 1/4-20 x 5/8 in. (4 reqd)
26. Washer, split, lock, 1/4 in. (4 reqd)
27. Bearing, cap
28. Bearing, ball
29. Bearing, sleeve
30• Shaft
31. Bearing, ball
32. Housing, bearing
33. Stud, plain, 5/16-18 and 24 x 2-1/4 in. (3 reqd)
34. Stud, plain, 1/2-13 and 20 x 2-3/8 in. (2 reqd)

Figure 4-6. Pump, disassembly and reassembly.

(7) Disassemble pump in numerical sequence as shown in figure 4-6.

NOTE

Be careful when removing impeller (13) so as not to damage vanes.

b. Cleaning and Inspection.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100°F (38° C).

(1) Clean all parts with approved cleaning solvent and dry thoroughly.

(2) Inspect housings, impeller, wear plate, seals, bearings, and shaft, and shaft coupling for cracks, breaks, wear, leaky seals, burned bearings, and other damage.

(3) Repair cracks and breaks in housings using approved arc welding methods, provided repair does not upset critical pump tolerances.

(4) Replace all damaged or defective parts.

c. Installation.

(1) Refer to figure 4-6, reassemble pump in reverse sequence.

(2) Torque screw self-sealing (20) to 32 - 35 ft. lbs.

(3) Install shims (14) as needed to provide .010 to .015 inch clearance between impeller (13) and wear plate (16).

(4) Align coupling halves (1, figure 4-7) and spider (2) by reaching through holes in pump bearing housing (3).

(5) Torque cap head screws (4) to 24 - 26 ft. lbs.

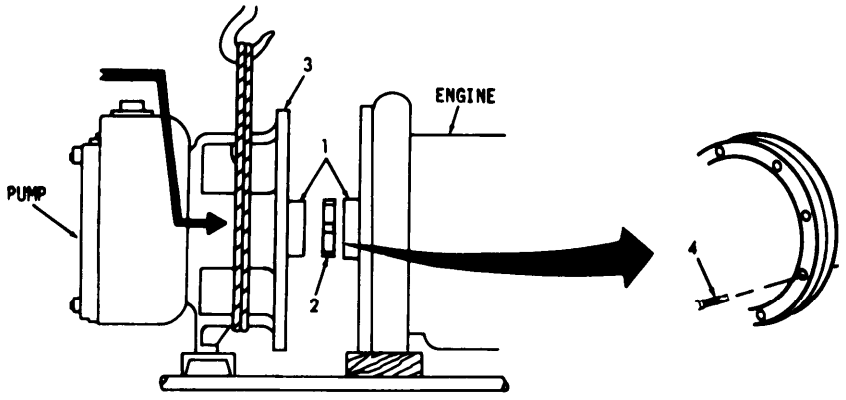


Figure 4-7 Pump alignment.

4-6.3. Coupling.

The rotational force of the engine is transferred to the centrifugal pump through a flexible coupling which joins the engine flywheel and the pump shaft. The coupling consists of a driving half which is keyed to the pump shaft, and a resilient spider through which the torque is transferred. The resilience of the spider permits a free transfer of torque even though slight misalignment may exist between the driving parts.

a. Removal.

(1) Remove centrifugal pump as per 4-6.2.

(2) Refer to figure 4-8. Remove spider (1). Remove cap head screws (2), then remove drive half of coupling (3). Remove key (4), set screws (5), then remove driven half of coupling (6).

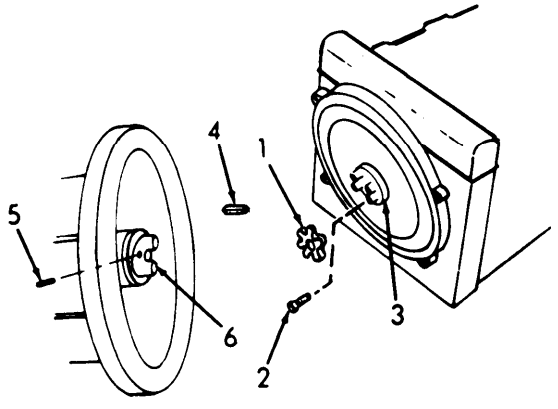


Figure 4-8. Flexible coupling, removal and installation.

b. Cleaning and Inspection.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well ventilated area away from open flame or excessive heat. Flash point is 100°F (38°C).

(1) Clean all metallic parts with approved cleaning solvent; dry thoroughly.

(2) Wipe spider with a clean cloth.

(3) Inspect all metallic parts for cracks, distortion, worn mounting surfaces, damaged keyways, and other damage.

(4) Inspect spider for cracks, wear, deterioration, or other damage.

(5) Replace all damaged parts.

c. Installation.

(1) Refer to figure 4-7, reassemble coupling in reverse sequence.

NOTE

Keep the setscrews (5) on the driven half (6) of the flexible coupling loose when the bearing housing is bolted to the engine flywheel housing. Next adjust the driven half of the coupling and tighten the setscrews.

(2) Torque cap head screws (2) to 15 - 20 ft. lb.

(3) Proceed with the installation instructions in 4-6.2.

4-6.4. Check Valve.

a. Removal.

(1) Refer to figure 4-6. Remove nuts (3), then suction flange (4).

(2) Remove gasket (8), consisting of small weight (6) and large weight (7).

(3) Remove screw (5) separating items (6), (7), and (8).

b. Installation.

(1) Reverse the above procedure.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

5-10 GENERAL .

This chapter contains maintenance instructions for Direct Support personnel. Refer to TM 5-2805-203-14 for engine maintenance.

5-2. FRAME l

a. Removal.

Remove all components from frame (para 4-5a).

b. Cleaning and Inspection.

Clean and inspect frame (para 4-5b).

c. Repair.

(1) Repair cracks and broken welds using approved arc welding methods.

(2) Straighten bends with hammer, anvil or vise.

(3) Replace shock mounts if required.

d. Installation.

Refer to paragraph 4-5. Repeat removal procedure in reverse sequence.

APPENDIX A
REFERENCES

A-1. Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Users.

A-2. Lubrication

LO 5-2805-203-14	Engine, Gasoline; 6 HP; Military Standard Model 4A032-1 and model 4A032-11.
C91OO-IL	FSC Group 91; Fuels, Lubricants, Oils, and Waxes

A-3. Painting

TM 9-213	Painting Instructions for Field Use.

A-4. Radio Interference Suppression

TM 11-483	Radio Interference Suppression.

A-5. Maintenance

TM 5-2805-203-14	Engine, Gasoline; 6 HP; Military Standard Models (model 4A032-1) FSN 2805-776-0483 and (model 4A032-2) FSN 2805-068-7512.
TM 5-2805-203-24P	Organizational, DS and GS Maintenance Repair Parts and Special Tool Lists, Engine Gasoline, Military Standard Models (model 4A032-1 FSN 2805-776-0483) (model 4A032-2 FSN 2805-068-7512).
TB ENG 347	Winterization Techniques for Engineer Equipment.
TM 5-764	Electric Motor and Generator Repair.
TM 9-207	Operation and Maintenance of Army Materiel in Extreme Cold Weather (O° to -65° F).
TM 9-6140-200-15	Operation and Organizational Field and Depot Maintenance: Storage Batteries, Lead-Acid Type.
TM 38-750	Army Equipment Record Procedures.

A-6. Shipment and Storage.

TB 740-93-2	Preservation of USAMEC Mechanical Equipment for Shipment and Storage.
TM 740-90-1	Administrative Storage of Equipment.

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. Introduction

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. The Maintenance Allocation Chart (MAC) in section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment requi for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions on explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is certified standard of known accuracy, to detect one adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), and item, or system.

j. Overhaul. The maintenance effort (services/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return item to like new condition.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
01	Engine								
0100	Engine	Inspect	0.2						
		Service		1.0					
		Replace		1.0					A
02	Fuel System								
0200	Tank, Lines and Fittings	Inspect	0.1						
		Service	0.2						
		Replace		0.5				3	
03	Frame								
0300	Frame Assembly	Inspect	0.1						
		Replace		1.0				3	
		Repair			2.0			5	
04	Accessory Items								
0400	Data Plates	Inspect	0.1						
		Replace		2.0				4	
05	Pump								
0500	Pump Assembly	Inspect	0.1						
		Service	0.4					3	
		Replace		2.0				1,2,4	B
		Repair		2.0				3	
0501	Impeller Assembly								
	Impeller	Inspect		0.2					
		Service	0.1					3	
		Replace		0.3				3	
	Seal	Inspect	0.1					3	
		Replace		0.				3	
0502	Discharge and Suction Valve, Check	Inspect	0.1						
		Replace		0.3				3	
	Adaptors	Replace		0.3				4	
	Gasket, Flange	Replace	0.1					3	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS.

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O, F	Tool Kit, General Mechanics Automotive (W33004) or equivalent	5180-00-177-7033	
2	O	Shop Equipment Automotive maintenance and repair; organizational maintenance or equivalent (W32593)	4910-00-754-0654	
3		Shop Set, Fuel and Electrical System: Fuel Maintenance, Basic (T30414) or equivalent	4910-00-390-7774	
4	F	Welding Shop, trailer mounted (Y48323) or equivalent	3431-00-935-7821	

Section IV. REMARKS

Maintenance Allocation Chart

Reference Code	Remarks
A	Maintenance allocation chart for engine is in TM 5-2805-203-14.
B	Special tools required to torque pump mounting screws (32-35 FT-LBS)

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists additional items you are authorized for the support of the Centrifugal Pump

C-2. GENERAL.

This list identifies items that do not have to accompany the Centrifugal Pump and that do not have to be turned in with it.

C-3. EXPLANATION OF LISTING.

National stock numbers, descriptions, and quantities are provided to help you identify and request the-additional items you require to support this equipment.

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER & FSCM USABLE ON CODE	(3) U/M	(4) QTY. AUTH
7520-00-559-9618	CASE: Operator Maintenance	ea	1
2990-00-972-7950	ROPE: Starting	ea	1
4210-00-555-8837	EXTINGUISHER: Fire	ea	1

APPENDIX D
REPAIR PARTS AND SPECIAL TOOLS LIST

(Current as of 4 August 1981)

Section I. INTRODUCTION

D-1. Scope.

This manual lists repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of organization, and depot maintenance of the Centrifugal Pump. It authorizes the requisitioning and issue of repair parts as indicated by the source and maintenance codes.

D-2. General.

This Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of repair parts authorized 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 numeric sequence, with the parts in each group listed in figure and item number sequence. Bulk materials are listed in NSN sequence.

b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized for the performance of maintenance (Not Applicable.)

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. This index is followed by a cross-reference list of reference designators to figure and item numbers.

D-3. Explanation of Columns.

a. Illustration. This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration of which the item is shown.

(2) Item Number. The number used to identify item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1) Source Code. Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items.

Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA	Item procured and stocked for anticipated or known usage.
PB	Item procured and stocked for insurance purposes because essentiality dictates that a minimum quantity be available in the supply system.
PC	Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
PD	Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or outfittings. Not subbject to automatic replenishment.
PE	Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.
PF	Support equipment which will not be stocked but which will centrally procured on demand.
PG	Item procured and stocked to provide for sustained support for life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later date.
KD	An item of depot overhaul/repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.
KF	An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
KB	Item included in both a depot overhaul/repair kit and a maintenance kit.
MO	Item to be manufactured or fabricated at organizational level.

Code	Definition
MF	Item to be manufactured or fabricated at the direct support maintenance level.
MH	Item to be manufactured or fabricated at general maintenance support level.
MD	Item to be manufactured or fabricated at depot maintenance level.
AO	Item to be assembled at organizational level.
AF	Item to be assembled at direct support maintenance level.
AH	Item to be assembled at general support maintenance level.
AD	Item to be assembled at depot maintenance level.
XA	Item is not procured or stocked because the requirements for the item will result in replacement of the next higher assembly.
XB	Item not procured or stocked. If not available through salvage, requisition.
XD	A support item that is not stocked. When required, item will be procurd through normal supply channels.

NOTE

Cannibalization or salvage may be used as a source of supply for any items coded above except those coded XA and support items restricted by AR 700-42.

(2) Maintenance Code. Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

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

Code	Application/Explanation
C -	Crew or operator maintenance performed within organizational maintenance
O -	Support item is removed, replaced, used at the organizational level.
I -	Support item is removed , replaced, used by the direct support element of integrated direct support maintenance.
F -	Support item is removed, replaced used at the direct support
H -	Support item is removed, replaced, used at the general support level.
D -	Support items that are removed, replaced, used at depot, mobile depot, or specialized repair activity only.

NOTE

Codes I and F will be considered the same by direct support units.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

Code	Application/Explanation
O -	The lowest maintenance level capable of complete repair of the support item is the organization level.
F -	The lowest maintenance level capable of complete repair of the support item is the direct support level.
H -	The lowest maintenance level capable of complete repair of the support item is the general support level.
D -	The lowest maintenance level capable of complete repair of the support item is the depot level.
L -	Repair restricted to designated, Specialized Repair Activity.
Z -	Nonreparable. No repair is authorized.
B -	No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item.

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

Recoverability Code	Definition
Z	Non-repairable item. When unserviceable, condemn and dispose at the level indicated in position three (3).
O	Repairable item. When uneconomically repairable, condemn and dispose at organizational level.
F	Repairable item. When uneconomically repairable, condemn and dispose at direct support level.
H	Repairable item. When uneconomically repairable, condemn and dispose at general support level.
D	Repairable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.
L	Repairable item. Repair, condemnation, and disposal not authorized below depot/specialized repair activity level.
A	Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

d. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which control 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 a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42; which is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the items. Items that are included in kits and sets are listed below the name of the kit or set with the quantity of each item in the kit or set indicated in the quantity incorporated in unit column.

g. Unit of Measure (U/M). Indicates the standard or basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g.: ea, in, pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable, (e.g., shims spacers, etc).

D-4. Special Information.

a. Repair parts kits and gasket sets appear as the last entries in the repair parts listing for the figure in which its parts are listed as repair parts.

Code	Used On
BEC	Model M59
BED	Model M2 and M2A
BZZ	Accessory Outfit with Baking Rack

D-5. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Unknown:

(1) Using the table of contents determine the assembly group within which the repair part belongs. This is necessary since illustrations are prepared for assembly groups, and listings are divided into the same group.

(2) Find the illustration covering the assembly group to which the repair part belongs.

(3) Identify the repair part on the illustration and note the illustration figure number and item number of the repair part.

(4) Using the repair parts listing, find the assembly group to which the repair part belongs and locate the illustration figure and item number noted on the illustration.

b. When National Stock Number of 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. This index is in NIIN sequence followed by a list of part numbers in alphanumeric sequence, cross-referenced to the illustration figure number and item number.

(2) Second. After finding the figure and item number, locate the figure and item number in the repair parts list.

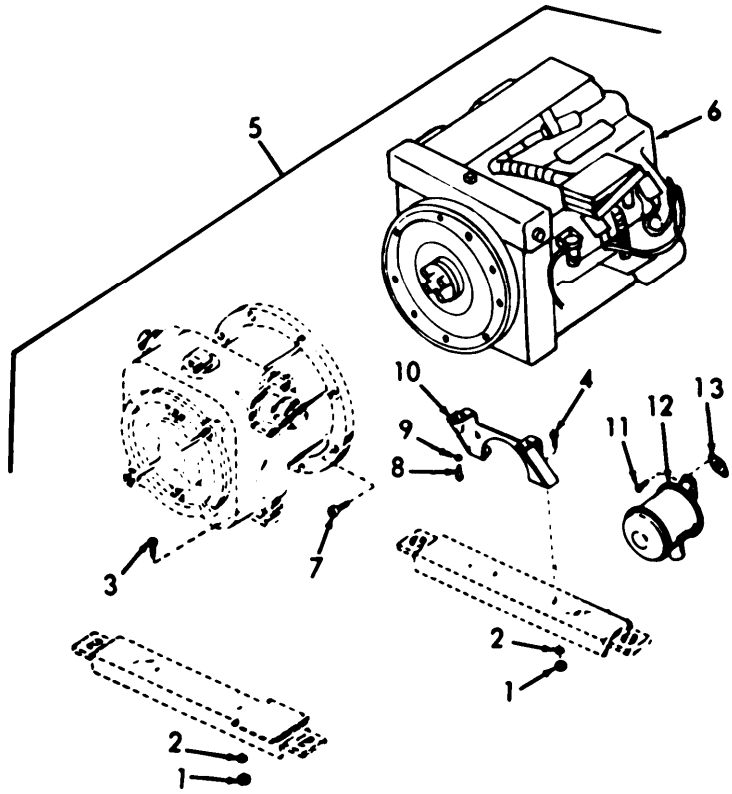


Figure D-1. Engine Assembly.

(1) ILLUSTRATION (a) FIG NO	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						01 ENGINE		
D1	1	PAOZZ	5310-00-880-7744	96906	MS51967-5	NUT,PLAIN,HEXAGON BRACKET TO RAIL	EA	2
D1	2	PAOZZ	5310-00-407-9566	96906	MS35338-45	WASHER,LOCK BRACKET TO RAIL	EA	2
D1	3	PAOZZ	5306-00-225-8498	96906	MS90725-33	BOLT,MACHINE	EA	2
D1	4	PAOZZ	5306-00-225-8498	96906	MS90725-33	BOLT,MACHINE BRACKET TO RAIL	EA	2
D1	5	XBFFF		97403	13200E8851	PUMP ASSEMBLY	EA	1
D1	6	PAFFD	2805-00-068-7512	97403	4A032-2	ENGINE ASSEMBLY	EA	1
D1	7	PAOZZ	5305-00-978-9394	96906	MS16997-99	SCREW,CAP,SOCKET HEAD	EA	8
D1	8	PAOZZ	5306-00-225-8495	96906	MS35291-30	BOLT,MACHINE ENGINE SUPPORT	EA	4
D1	9	PAOZZ	5310-00-407-9566	96906	MS35338-45	WASHER,LOCK PUMP HOUSING TO RAIL	EA	2
D1	10	XBOZZ	5315-00-999-9221	97403	13200E0452	SUPPORT,ENGINE	EA	1
D1	11	PAOZZ	5315-00-068-0505	96906	MS90726-5	SCREW,CAP,HEXAGON HEAD	EA	2
D1	12	PAOZZ	2990-00-936-8172	97403	13200E8867	MUFFLER,EXHAUST	EA	2
D1	13	PAOZZ	5330-00-797-3506	97403	9786E50-2	GASKET EXHAUST MUFFLER	EA	2

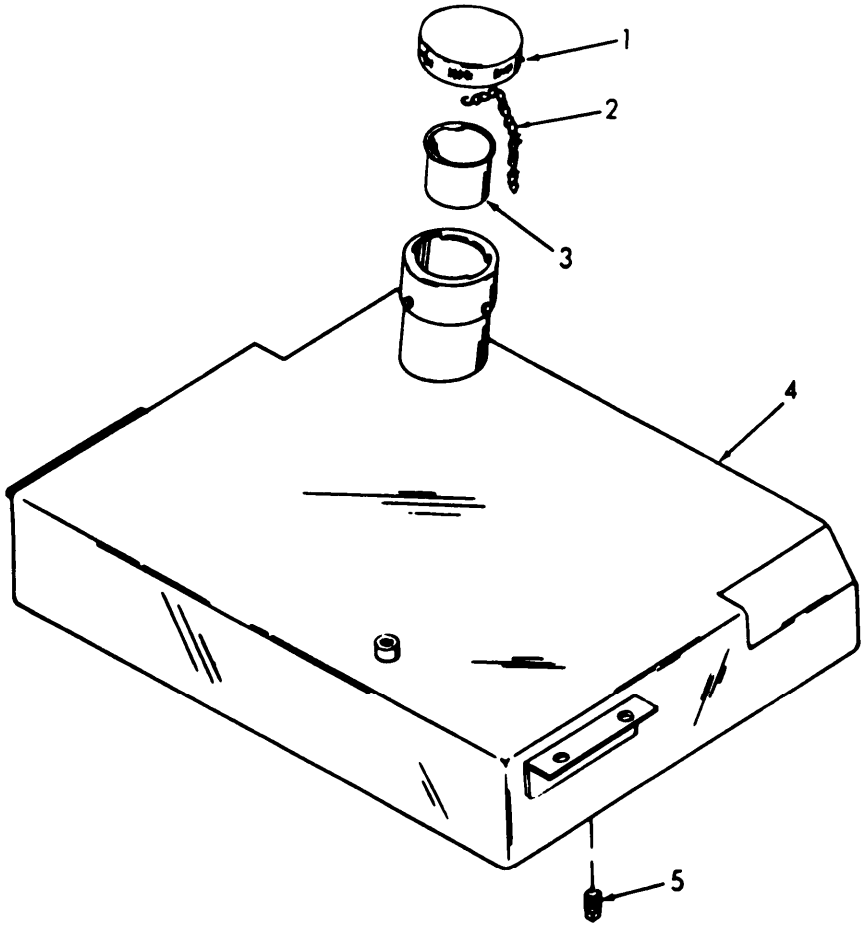


Figure D-2. Fuel Tank.

(1) ILLUSTRATION (a) FIG NO	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						02 FUEL SYSTEM		
D2	1	PAJZZ	2910-00-605-1353	97403	13200E8826	CAP,FUEL TANK	EA	1
D2	2	XAJZZ		97403	13200E8860-16	CHAIN FUEL TANK CAP	FT	1
D2	3	PBOZZ		05748	18327	STRAINER, ELEMENT	EA	1
D2	4	PAJZZ		97403	13200E8860	TANK,FUEL	EA	1
D2	5	PBJZZ		97403	13218E0121-62	PLUG,PIPE FUEL TANK DRAIN	EA	1

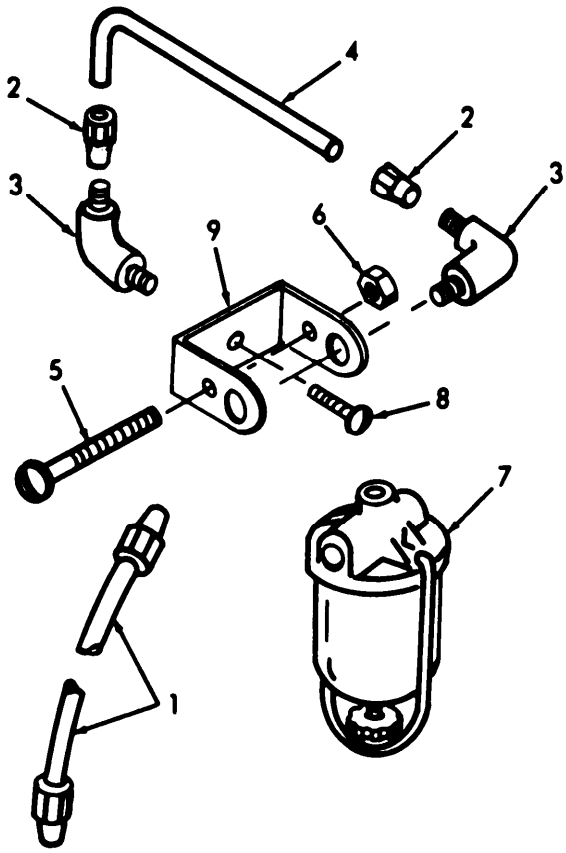


Figure D-3. Fuel Lines and Fittings.

(1) ILLUSTRATION (a) FIG NO	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
D3	1	PAOZZ	4720-00-678-5382	81349	MILH13444TYPE2	HOSE ASSEMBLY	EA	1
D3	2	PAOZZ	4730-00-014-4307	96906	MS39166-2	NUT,FLARE TUBE	EA	2
D3	3	PAOZZ	4730-00-231-5632	96906	MS39162-3	ELBOW,PIPE TO TUBE FILTER AND FUEL PUMP TO FUEL LINE	EA	2
D3	4	PAJZZ	4710-00-867-8784	97403	13206E0410	TUBE ASSEMBLY	EA	1
D3	5	PAJZZ	5305-00-984-7364	96906	MS35206-273	SCREW,MACHINE FILTER TO BRACKET	EA	1
D3	6	PAOZZ	5310-00-934-5758	96906	MS35649-202	NUT,PLAIN,HEXAGON	EA	1
D3	7	PBOOZ	2910-00-905-9792	96906	MS51086-1	STRAINER,SEDIMENT	EA	1
D3	8	PAJZZ	5305-00-432-4163	96906	MS51861-24	SCREW, TAPPING, THREAD FORMING	EA	1
D3	9	XBOZZ		97403	13200E8868	BRACKET,FUEL FILTER	EA	1

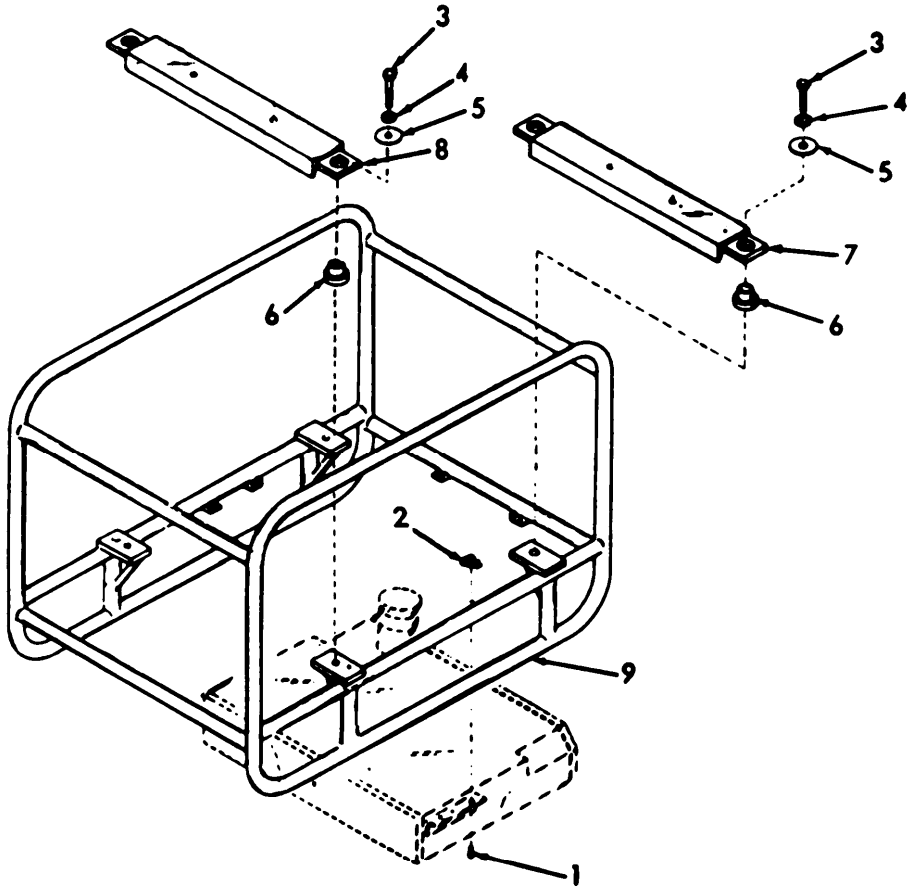


Figure D-4. Frame.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						03 FRAME ASSEMBLY		
D4	1	PAOZZ	5305-00-989-7435	96906	MS35207-264	SCREW,MACHINE FUEL TANK TO FRAME	EA	6
D4	2	XBOZZ		97403	13200E8870	WASHER,LOCK FUEL TANK TO FRAME	EA	6
D4	3	PAOZZ	5305-00-042-9477	96906	MS90725-91	SCREW,CAP,HEXAGON HEAD	EA	4
D4	4	PAOZZ	5310-00-209-0965	96906	MS35338-47	WASHER,LOCK	EA	4
D4	5	PAOZZ	5310-00-167-0769	88044	AN970-7	WASHER,FLAT	EA	4
D4	6	PAOZZ	5340-00-633-3608	97403	1328E0804	MOUNT,RESILIENT	EA	4
D4	7	XBOZZ		97403	13200E8869-1	RAIL,FRONT	EA	1
D4	8	XBOZZ		97403	1320DE8869-2	RAIL,REAR	EA	1
D4	9	XBOZZ		97403	13200E8865	FRAME	EA	1

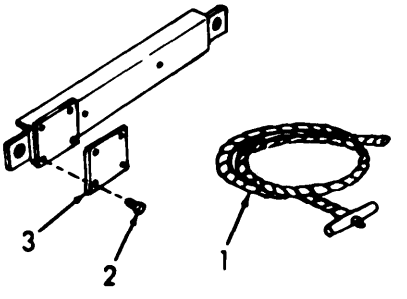


Figure D-5. Accessory Items and Data Plates.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						04 ACCESSORY ITEMS		
D5	1	PAOZZ	2990-00-972-7950	97403	9786E121	STARTER ROPE,ENGINE	EA	4
D5	2	PAOZZ	5320-00-005-6279	96906	MS20470AD4-4-5	RIVIT,SOLID IDENTIFICATION PLATE MOUNTING	EA	4
D5	3	XBOZZ		97403	13217E1975-2	PLATE,IDENTIFICATION	EA	1

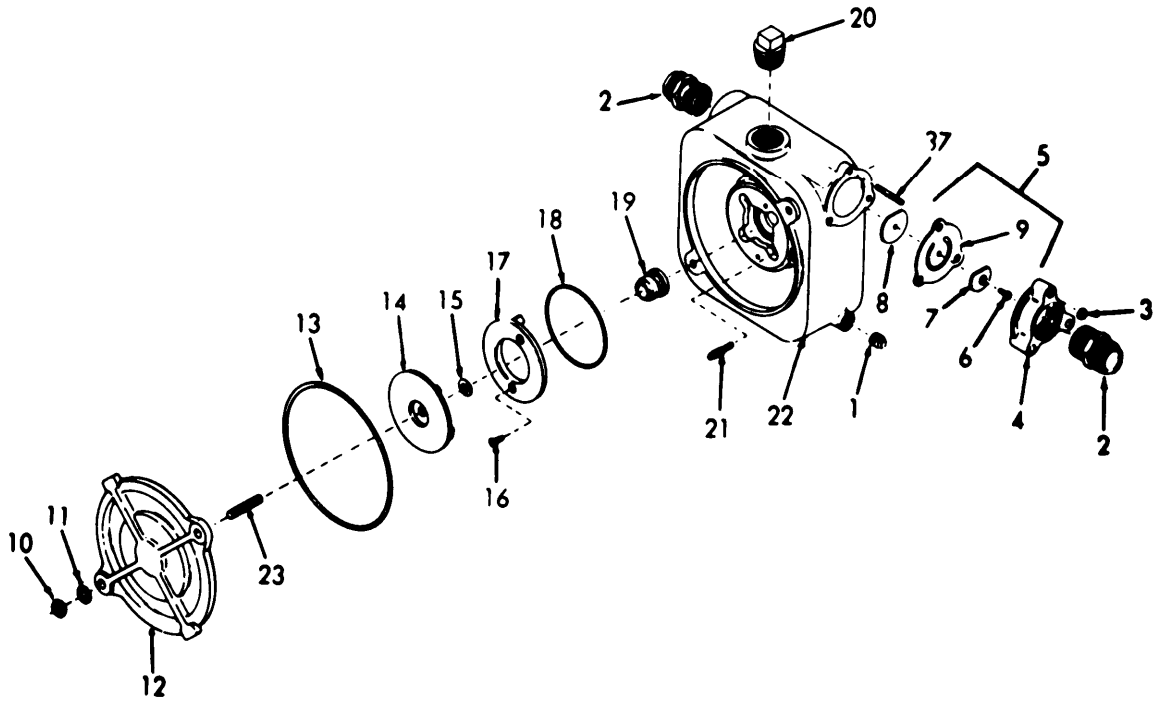


Figure D-6. Pump Assembly.

SECTION II

(1) ILLUSTRATION (a) FIG NO	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						05 PUMP		
D6	1	PAJZZ		81348	WWP471	BUSHING,TANK	EA	1
D6	2	PAJZZ	4730-00-277-6845	97403	13218E0479-37	ADAPTER,PIPE TO HOSE	EA	2
D6	3	PAJZZ	5310-00-880-7746	96906	MS51968-5	NUT,PLAIN,HEXAGON	EA	3
D6	4	PBJZZ	4730-00-991-6516	97403	13200E8814	FLANGE PUMP INTAKE SUCTION	EA	1
D6	5	PAJZZ	4820-00-991-6517	97403	13200E8810	VALVE ASSEMBLY CHECK	EA	1
D6	6	PAQZZ	5305-00-637-1119	96906	MS35214-69	SCREW,MACHINE	EA	1
D6	7	XAJZZ		97403	13200E8812	WEIGHT,SMALL CHECK VALVE	EA	1
D6	8	XAJZZ		97403	13200E8811	WEIGHT,LARGE CHECK VALVE	EA	1
D6	9	XAJZZ		97403	13200E8813	GASKET CHECK VALVE	EA	1
D6	10	PAJZZ	5310-00-732-0560	96906	MS51968-14	NUT,PLAIN,HEXAGON	EA	2
D6	11	PAJZZ	5310-00-809-5698	96906	MS27183-18	WASHER,FLAT	EA	2
D6	12	PBFZZ	4320-00-933-0979	05748	17843	VALVE,PLATE	EA	1
D6	13	PAQZZ	5330-00-263-8015	96906	MS29513-273	PACKING,PREFORMED VOLUTE SEAL	EA	1
D6	14	PBFZZ	4320-00-880-4953	97403	13200E8855	IMPELLER,PUMP	EA	1
D6	15	PAFZZ	5365-00-712-5972	97403	13200E8807-1	SHIM IMPELLER	EA	2
D6	16	PAJZZ	5305-00-957-6652	96906	MS35198-67	SCREW,MACHINE SUCTION FLANGE MOUNTING	EA	2
D6	17	PAFZZ	4320-00-792-6290	97403	13200E8854	PLATE,WEAR	EA	1
D6	18	PAJZZ	5330-00-551-3963	96906	MS29513-253	PACKING,PREFORMED WEAR RING	EA	1
D6	19	PAFZZ	4320-00-790-6357	97403	13200E8806	SEAL,SHAFT ASSEMBLY	EA	1
D6	20	PBJZZ		81348	WWP471	BUSHING,TANK	EA	1
D6	21	PAFZZ	5305-01-072-9137	97403	13200E8861	SCREW,CAP,HEXAGON HEAD	EA	4
D6	22	PBJZZ	4320-00-991-6514	97403	13200E8803	BODY,PUMP	EA	1
D6	23	PAFZZ	5307-01-016-4423	96906	MS51864-106-20	STUD,PLAIN	EA	2
D6	24	PAJZZ	5307-01-013-7888	96906	MS51864-103-18	STUD VOLUTE MOUNTING	EA	3

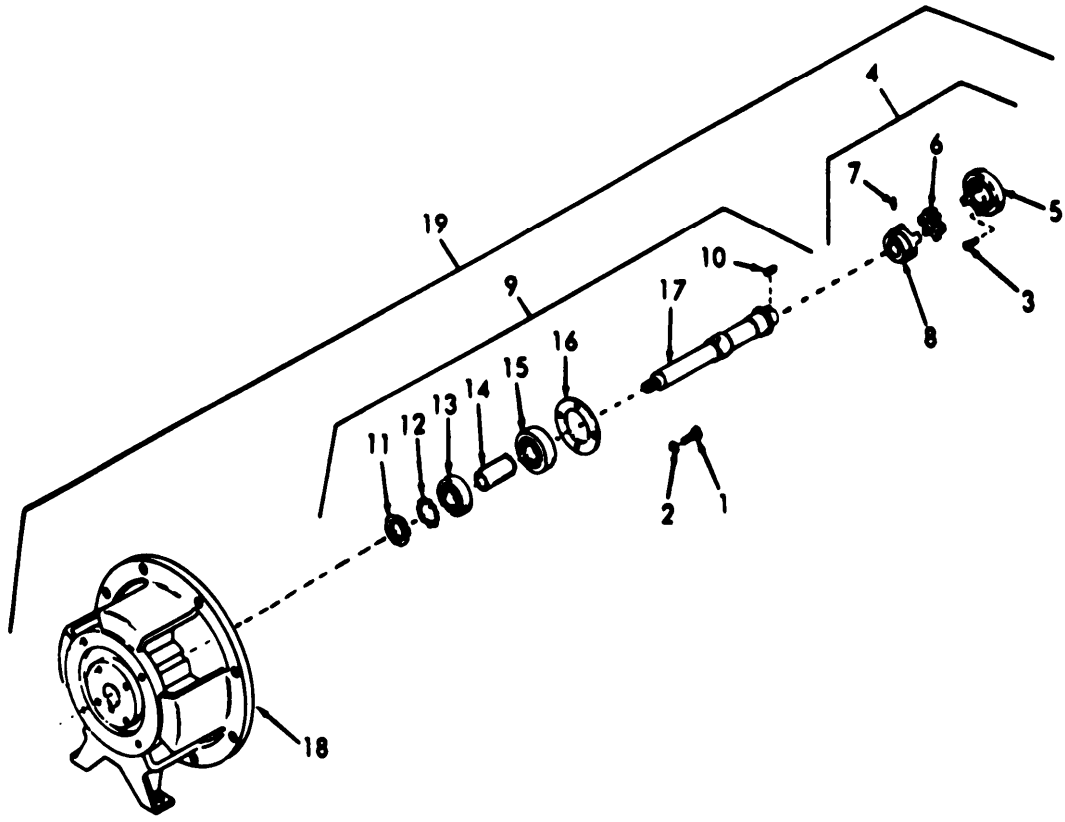


Figure D-7. Bearing Housing Assembly.

(1) ILLUSTRATION (a) FIG NO	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
D7	1	PAOZZ	5305-00-068-7837	96906	MS90728-5	SCREW,CAP,HEXAGON HEAD	EA	4
D7	2	PAOZZ	5310-00-582-5965	96906	MS35338-44	WASHER,LOCK	EA	4
D7	3	PBFZZ		96906	MS21295-45	SCREW,SELF-LOCKING	EA	4
D7	4	PBFZZ		97403	13200E8864	COUPLING,SHAFT,FLEX	EA	1
D7	5	XBFZZ		97403	13200E8864-1	DRIVING,HALF,COUPLING ASSEMBLY	EA	1
D7	6	PAFZZ	3010-00-594-9236	97403	13200E8864-3	SPIDER COUPLING ASSEMBLY	EA	1
D7	7	PAFZZ	5305-00-723-9387	96906	MS51963-63	SETSCREW,HEADLESS,SOCKET DRIVE	EA	2
D7	8	XBFZZ		97403	13200E8864-2	COUPLING,DRIVEN HALF	EA	1
D7	9	XBFZZ		97403	13200E8856	SHAFT ASSEMBLY	EA	1
D7	10	PBFZZ	5315-00-809-9641	96906	MS20066-251	KEY,MACHINE	EA	1
D7	11	PBFZZ	5310-00-208-3446	96906	MS172242	NUT,PLAIN,ROUND	EA	1
D7	12	PBFZZ	5310-00-566-8869	96906	MS172207	BEARING,BALL,ANNULAR	EA	1
D7	13	PBFZZ		81348	FF-B-171TYPE3	BEARING,BALL,ANNULAR	EA	1
D7	14	XDFZZ	3120-00-483-2218	97403	13200E8863	BEARING,SLEEVE	EA	1
D7	15	PBFZZ		91348	FF-B-171TYPE3	BEARING,BALL,ANNULAR	EA	1
D7	16	XBFZZ		97403	13200E8858	BEARING,CAP	EA	1
D7	17	PBFZZ	4320-00-880-3214	97403	13200E8862	SHAFT,SHOULDERED	EA	1
D7	18	XBFZZ		97403	13200E8853	HOUSING	EA	1
D7	19	XBFFF		97403	13200E8852	HOUSING ASSEMBLY	EA	1

STOCK NUMBER	FIGURE NO.	ITEM NO.
5320-00-005-6279	D5	2
4730-00-014-4307	D3	2
5305-00-042-9477	D4	3
5305-00-068-0505	D1	11
2805-00-068-7512	D1	6
5305-00-068-7837	D7	1
5310-00-167-0769	D4	5
5310-00-208-3446	D7	11
5310-00-209-0965	D4	4
5306-00-225-8495	D1	8
5306-00-225-8498	D1	4
4730-00-231-5632	D3	3
5330-00-263-8015	D6	13
4730-00-277-6845	D6	2
5310-00-407-9566	D1	2
5310-00-407-9566	D1	9
5305-00-432-4163	D3	8
3120-00-483-2218	D7	14
5330-00-551-3963	D6	18
5310-00-566-8869	D7	12
5310-00-582-5965	D7	2
3010-00-594-9236	D7	6
2910-00-605-1353	D2	1
5340-00-633-3608	D4	6
5305-00-637-1119	D6	6
4720-00-678-5382	D3	1
5365-00-712-5972	D6	15
5305-00-723-9387	D7	7
5310-00-732-0560	D6	10
4320-00-790-6357	D6	19
4320-00-792-6290	D6	17
5330-00-797-3506	D1	13
5310-00-809-5998	D6	11
5315-00-809-9641	D7	10
4710-00-867-8784	D3	4
4320-00-880-3214	D7	17
4320-00-880-4953	D6	14
5310-00-880-7744	D1	1
5310-00-880-7746	D6	3
2910-00-905-9792	D3	7
4320-00-933-0979	D6	12
5310-00-934-9758	D3	6
2990-00-936-8172	D1	12
5305-00-957-6652	D6	16
2990-00-972-7950	D5	1
5305-00-978-9394	D1	7
5305-00-984-7364	D3	5
5305-00-989-7435	D4	1
4320-00-991-6514	D6	22
4730-00-991-6516	D6	4
4820-00-991-6517	D6	5
5315-00-999-9221	D1	10
5307-01-013-7888	D6	24
5307-01-016-4423	D6	23
5305-01-072-9137	D6	21

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
88044	AN970-7	D4	5
81348	FF-B-171TYPE3	D7	13
91348	FF-B-171TYPE3	D7	15
81349	MILM13444TYPE2	D3	1
96906	MS16997-99	D1	7
96906	MS172207	D7	12
96906	MS172242	D7	11
96906	MS20066-251	D7	10
96906	MS20470AD4-4-5	D5	2
96906	MS21295-45	D7	3
96906	MS27183-18	D6	11
96906	MS29513-253	D6	18
96906	MS29513-273	D6	13
96906	MS35198-67	D6	16
96906	MS35206-273	D3	5
96906	MS35207-264	D4	1
96906	MS35214-69	D6	6
96906	MS35291-30	D1	8
96906	MS35338-44	D7	2
96906	MS35338-45	D1	2
96906	MS35338-45	D1	9
96906	MS35338-47	D4	4
96906	MS35649-202	D3	6
96906	MS39162-3	D3	3
96906	MS39166-2	D3	2
96906	MS51086-1	D3	7
96906	MS51861-24	D3	8
96906	MS51864-103-18	D6	24
96906	MS51864-106-20	D6	23
96906	MS51963-63	D7	7
96906	MS51967-5	D1	1
96906	MS51968-14	D6	10
96906	MS51968-5	D6	3
96906	MS90725-33	D1	4
96906	MS90725-91	D4	3
96906	MS90726-5	D1	11
96906	MS90728-5	D7	1
81348	WWP471	D6	
81348	WWP471	D6	20
97403	13200E8869-2	D4	8
97403	13200E8803	D6	22
97403	13200E8806	D6	14
97403	13200E8807-1	D6	15
97403	13200E8810	D6	5
97403	13200E8811	D6	8
97403	13200E8812	D6	7
97403	13200E8813	D6	9
97403	13200E8814	D6	4
97403	13200E8826	D2	1
97403	13200E8851	D1	5
97403	13200E8852	D7	19
97403	13200E8853	D7	18
97403	13200E8854	D6	17
97403	13200E8855	D6	14
97403	13200E8856	D7	9
97403	13200E8858	D7	16
97403	13200E8860	D2	4
97403	13200E8860-16	D2	2
97403	13200E8861	D6	21
97403	13200E8862	D7	17
97403	13200E8863	D7	14
97403	13200E8864	D7	4
97403	13200E8864-2	D7	8
97403	13200E8864-3	D7	6
97403	13200E8865	D4	9
97403	13200E8867	D1	12
97403	13200E8868	D3	9
97403	13200E8869-1	D4	7
97403	13200E8870	D4	2
97403	13206E0410	D3	4
97403	13217E1975-2	D5	3
97403	13218E0121-62	D2	5
97403	13218E0479-37	D6	2
97403	1328E0804	D4	6
05748	17843	D6	12
05748	18327	D2	3
97403	4A032-2	D1	6
97403	9786E121	D5	1
97403	9786E50-2	D1	13

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION :
To be distributed in accordance with DA Form 12-25A, Operator Maintenance requirements for Pumps, Fresh Water.

*U.S. GOVERNMENT PRINTING OFFICE: 1989 242 466/03800

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. LEAVENWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-4320-228-13&P	27 Jan 82	Pump, Centrifugal: Gasoline Engine Driven; Frame Mtd

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	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. Change 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

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

DA FORM 1 JUL 79 2028-2

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DRSTS-M Overprint 1, 1 Nov 80

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 1, 1 Nov 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

_____

_____

COMMANDER
U S ARMY SUPPORT AND AVIATION MATERIEL READINESS COMMAND
ATTN: DRSTS-MPSD
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120

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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 milliters = .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	1.365	metric tons	short tons	1.102
pound-inches	mewton-meters	.11375			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN : 050755-000