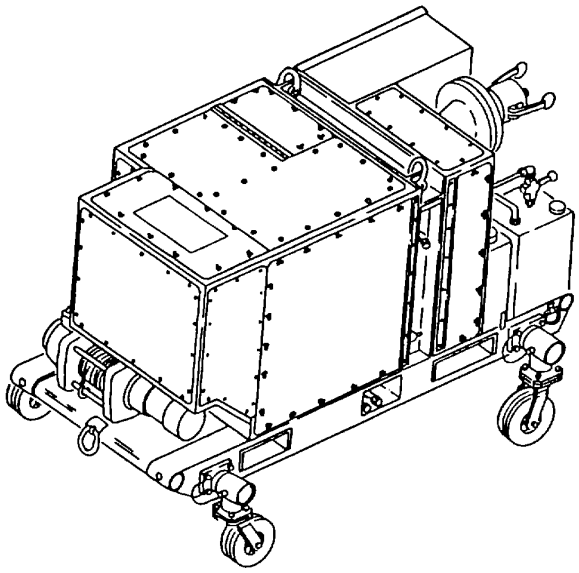
OPERATOR'S MANUAL



200 GPM FLAMMABLE LIQUID
LOW TEMPERATURE PUMP
MODEL: AFARE200GPMP
NSN 4320-01-327-4578
EIC: ODU

600 GPM FLAMMABLE LIQUID
LOW TEMPERATURE PUMP
MODEL: AFSSP600GPMP
NSN 4320-01-327-4579
EIC: ZDV

HEADQUARTERS, DEPARTMENT OF THE ARMY
30 July 1995

WARNING

CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU

Carbon monoxide is without color or smell, but can kill you. Breathing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no ventilation.

Precautions must be followed to ensure operator's safety when in operation.

- BE ALERT at all times during operating procedures for carbon monoxide poisoning. If exposure is present, IMMEDIATELY evacuate personnel to fresh air.
- BE AWARE the field protection mask used for nuclear-biological-chemical attack WILL NOT protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

WARNING

JEWELRY

Remove rings, bracelets, wristwatches, and neck chains before working around or on the equipment. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

WARNING

GROUNDING BEFORE OPERATION

Do not operate the unit until the ground terminal stud of the equipment has been connected to a suitable ground. Electrical faults in the equipment can cause death by electrocution from contact with an ungrounded system.

WARNING

COMPRESSED AIR

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 (211 kPa) or less. When working with compressed air always use chip guards, eye protection and other personnel protective equipment.

WARNING

FROSTBITE

Do not touch cold metal parts with bare hands. Frostbite can cause permanent injury to personnel.

WARNING

CLEANING

Do not direct high-pressure water hose nozzles or steam cleaner nozzles into electrical connections/junction boxes. Electrical shock can kill you.

WARNING

FLAMMABLE FUELS

Fuels are toxic and flammable. Wear protective goggles and refuel only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy, get fresh air immediately and get medical aid. If contact with eyes or skin is made, immediately flush with clean water and get medical aid for eyes immediately.

WARNING

EAR PROTECTION

Serious hearing loss or deafness could occur if this equipment is operated without professionally-fitted ear protection for operating and maintaining personnel. The noise level for this equipment exceeds the allowable limits for unprotected personnel. Unprotected / unnecessary personnel must be kept out of the immediate area. Hearing protection is required within fifteen (15) feet of equipment.

WARNING

HIGH VOLTAGE HAZARDS

Although this is primarily a low voltage 24 VDC system, high voltages as high as 10,000 volts are present in the engine ignition system. Never touch exposed contacts of the igniter, igniter cable or igniter unit.

Lifting or moving heavy equipment incorrectly can cause serious injury. Do not stand under lifted assembly or position where you could be pinned against another object. Death or serious injury may occur.

FIRST AID

FIRST AID instructions are given in FM 21-11, First Aid For Soldiers.

TECHNICAL MANUAL

NO. 10-4320-342-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 30 July 1995

Operator's Manual

200 GPM FLAMMABLE LIQUID LOW TEMPERATURE PUMP
MODEL: AFARE200GPMP, NSN 4320-01-327-4578
EIC: ODU

600 GPM FLAMMABLE LIQUID LOW TEMPERATURE PUMP
MODEL: AFSSP600GPMP, NSN 4320-01-327-4579
EIC: ZDV

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 these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798, or you may submit your recommended changes by E-mail directly to <daf2028@st-louis-emh7.army.mil> A reply will be furnished directly to you.

TABLE OF CONTENTS

TABLE OF CONTENTS- continued.

LIST OF ILLUSTRATIONS

LIST OF TABLES

HOW TO USE THIS MANUAL

Be sure to read all Warnings before using your equipment.

This manual contains operating and maintenance instructions for the operator of the 200/600 GPM Flammable Liquid Low Temperature Pump.

- General Introduction - On the title page of the manual are boxes near the right-hand edge with subject titles in them. Bend the pages of the manual and look for a black bar on the right side of the page that corresponds with the subject matter you want. At the beginning of each chapter, there is an index for quick reference for the subject matter of that chapter. The Table of Contents lists the Chapters and Sections of this manual for an easy index. A List of Illustrations follows the Table of Contents for easy reference to illustrations.

- Chapter 1 - Introduces you to the equipment and gives you information such as weight, height, length, generally used abbreviations and information on how the unit works. The chapter is preceded by a full page illustration of the equipment.

- Chapter 2 - Provides information necessary to identify and use the equipment's operating controls. Operating instructions in this chapter tell you how to use the equipment in both usual and unusual weather conditions. In addition, preventive maintenance instructions provide information needed to inspect and service the 200/600 GPM Flammable Liquid Low Temperature Pump.

- Chapter 3 - Provides operator troubleshooting procedures for identifying equipment malfunctions and maintenance instructions for performing operator maintenance tasks.

- Appendix A gives you a list of frequently used forms and publications referenced or used in this manual.

- Appendix B lists components that are not mounted on the equipment, but are required to make the unit functional. All components in the Components of End Item and Basic Issue Items Lists are illustrated for easy identification.

- Appendix C lists additional equipment authorized for your unit for use with the 200/600 GPM Flammable Liquid Low Temperature Pump, but which are not supplied as part of the system. This equipment list may include buckets, protective clothing, etc.

- Appendix D provides you with information about expendable supplies such as sealants, lubricants, chemicals, etc. that are used when operating or maintaining equipment.

- The Alphabetical Index can be found at the end of this manual for easy alphabetical reference.

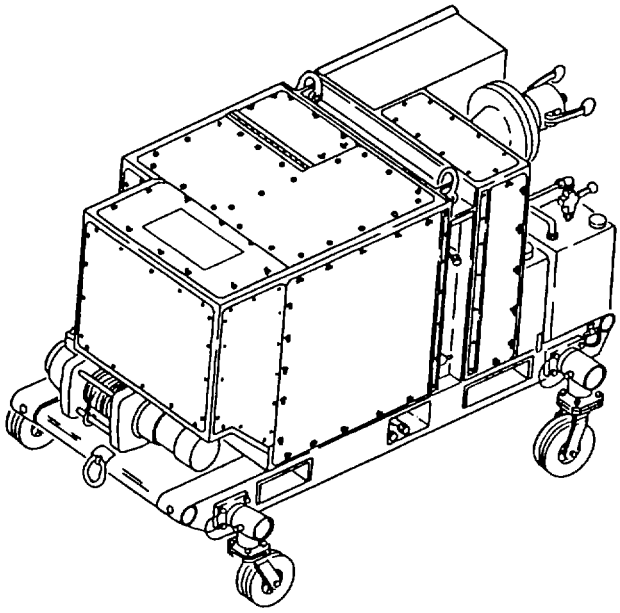


Figure 1-0. 200/600 GPM Flammable Liquid Low Temperature Pump

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

This operator's manual contains operating instructions and maintenance procedures required to operate and maintain the 200/600 GPM Flammable Liquid Low Temperature Pump (200/600 GPM Pump). The purpose of the 200/600 GPM Pump is to transfer and dispense petroleum products.

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 738-750 (The Army Maintenance Management System (TAMMS)).

1-3. CORROSION PREVENTION AND CONTROL (CPC).

a Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any problems with this item be reported so the problem can be corrected and improvements made to prevent the problem in future items.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

c. If a corrosion problem is identified, it can be reported using Standard Form (SF) 368, (Product Quality Deficiency Report). Check the box to indicate that the problem may be corrosion-related. Using key words such as "rust," "deterioration," "pitting," or "cracking" or even including color photos of the corroded area will aid problem diagnosis and solution.

d. Submit completed SF 368 to Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798.

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Methods and procedures for destruction of Army materiel to prevent enemy use are covered in TM 750-244-3.

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

If your 200/600 GPM 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 or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120- 1798. We will send you a reply.

1-6. NOMENCLATURE CROSS-REFERENCE LIST.

This paragraph includes the nomenclature cross-reference list.

Common Name	Official Nomenclature
Engine	Gas Turbine Engine
200/600 GPM Pump	Pump, Low Pressure, Flammable Liquid, 200/600
GPM	
ESU	Electronic Sequence Unit
Oil/Fuel Booster Pump	Fuel Booster

1-7. LIST OF ABBREVIATIONS.

This paragraph includes a list of abbreviations, consisting of all abbreviations, acronyms, signs, or symbols

Abbreviation	Nomenclature
°C	Degrees Centigrade
K	Kilo (Thousand)
°F	Degrees Fahrenheit
TM	Technical Manual
CCW	Counterclockwise
CPC	Corrosion Prevention & Control
DC	Direct Current
CW	Clockwise
IAW	In accordance with
ESU	Electronic Sequencing Unit
DS	Direct Support
GS	General Support
BITE	Built-In Test Equipment
VDC	Volt Direct Current
GPM	Gallons per Minute
psi	Pounds per square inch
kPA	Kilo Pascal
AH	Amp Hours
RPM	revolutions per minute
GTE	Gas Turbine Engine
kg	kilograms
cm	centimeters

1-8. GLOSSARY.

The glossary includes all terms that are not adequately defined in this manual.

Common Name	Nomenclature
Bleed Air	Compressed air produced by gas turbine engines as a by product. Bleed air on this system is used to prime the pump.
Priming	Prepare for operation. As applied to this system it means creating a vacuum in the discharge side of the pump assembly. This vacuum allows fuel from the fuel source to seep through the pump assembly and totally submerges the impeller with fuel.
Cranking	As applied to engines it means turning the main shaft of an engine by electrical or mechanical means with the intent to get the engine started.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

a. Characteristics. The 200/600 GPM Pump is to be used in the field to provide support units with capabilities for forward refueling. The 200/600 GPM Pump is mounted on four wheels/skids.

b. Capabilities and Features.

(1) Lightweight construction. Unit is built of lightweight materials.

(2) Portability. Because of its lightweight construction and compact shape, unit is easily emplaced and retrieved, using lifting device with sling, forklift truck or helicopter. Unit can also be moved short distances by the use of an integral electric winch. Portability components include the caster type wheels, lifting eyes, forklift pockets, the winch and the compact construction of the units.

(3) Ease of maintenance. Units have been designed for a low maintenance. Accessibility of components, use of quick disconnect fasteners are contributing factors in obtaining the required low maintenance ratio.

(4) Reliability/Durability. Pump assemblies have been designed for difficult environmental conditions, especially for extremely low temperatures encountered in the arctic regions. Many of the components are highly reliable under similar environmental conditions.

(5) Low weight/power ratio. Low weight/power ratio has been obtained by selecting a lightweight, high powered gas turbine engine and lightweight materials for the pumps, pump frames and other components.

(6) Temperature Extremes. Pump assemblies operate over wide temperature ranges. Although the system was designed and tested specifically for use in arctic regions it operates at ambient temperatures up to 95°F (37C°).

(7) Designed to operate from internal fuel. Pump is started from fuel in auxiliary 5 gallon fuel can.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

The following provides the location and a brief description of the operation and purpose of the 200/600 GPM Pump. Refer to Figure 1-1.

a. Priming Vent Drain Tank (1). Collects fuel and vapor during priming of the 200/600 GPM Pump.

b. Starter Generator (2). This unit is mounted to the gearbox of the engine and consists of several windings. It is constantly engaged with the gearbox of the engine. While cranking the engine, all starter coils in the dc starter-generator are used for maximum torque output. When the engine runs, the main starter coil is disabled by external means to convert unit for generator operation.

c. Exhaust Extension (3) and Muffler (4). Exhaust extension and muffler are used to reduce the noise level of the engine. Exhaust extension is removed and stored inside 200/600 GPM Pump during travel and storage.

d. Control Box (5). The control box is mounted to the side of the 200/600 GPM Pump It consists of a box, a door assembly, the components panel and most of the controls and indicators that are necessary to operate and monitor the 200/600 GPM Pump.

e. Battery and Battery Tray (6). A 24 vdc battery provides power to start the engine. Battery is also used to operate the electric winch and various electrical controls and indicators and is constantly recharged by the generator when engine is running. Battery is mounted in the battery box which swings outward, away from enclosure, for replacement or servicing of the battery.

f. 200/600 GPM Fuel Pump (7). 200/600 GPM fuel pump is driven by the engine output shaft thru a gear reducer. Its purpose is to pump fuel from storage devices to airplanes, helicopters, trucks, tanks, etc., and from bulk fuel vessels; i.e., railroad tank cars, fuel tankers, boats, etc., to system storage tanks.

g. Ball Valve (8). A ball valve at the discharge side of the 200/600 GPM Pump permits isolation of the fuel in the suction side from the discharge side. The purpose of this valve is to prevent flow back of fuel from the discharge side of the system to the suction side. This could occur when the fuel tanks of the vehicles being serviced are at a higher altitude than the supply tanks.

h. Wheels (9). There are four wheels located on the 200/600 GPM Pump that are used for moving or repositioning the pump.

i. Winch (10). Winch is electrically operated by the battery and/or from another vehicle when slave cable is deployed. Winch is useful to move 200/600 GPM Pump over short distances.

j. Engine (11). The engine is mounted to the engine mounts on the frame. Its purpose is to drive the 200/600 GPM fuel pump. It consists of a compressor, gearbox, turbine wheel, enclosure, combustion assembly and electronic sequencing unit.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - continued.

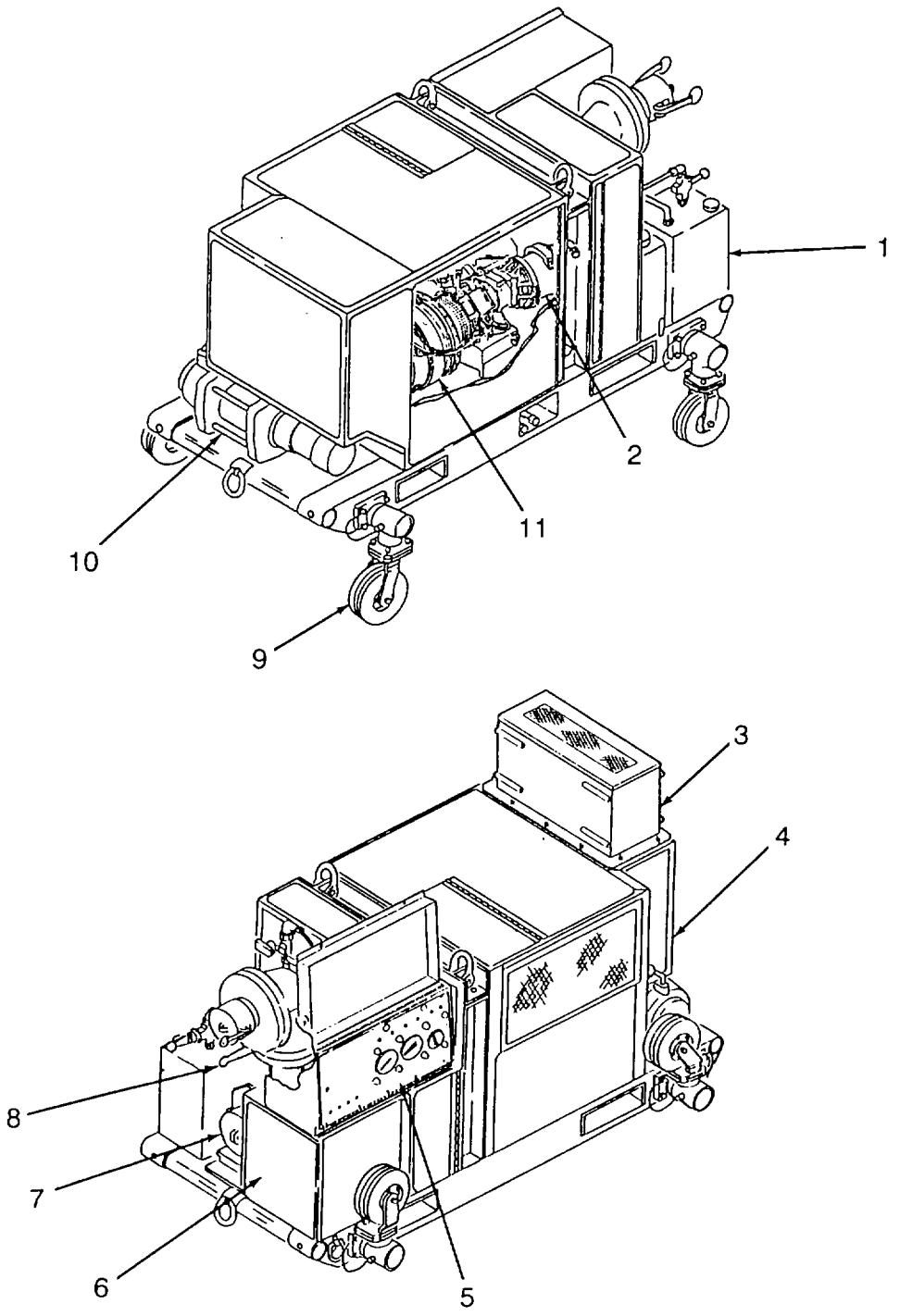


Figure 1-1. Location of Major Components of 200/600 GPM Pump

1-11. DIFFERENCE BETWEEN UNITS.

The difference between the 200 GPM pump and the 600 GPM pump is in the fuel pump assembly. The physical size as well as the internal components are different on the two pump/clutches. The 200 GPM pump has a 3-inch suction and a 2-inch discharge fitting. The 600 GPM pump has a 6-inch suction and a 4- inch discharge fitting. All other components on the two pumps remain the same. In addition, the operation of the pumps is identical.

1-12. EQUIPMENT DATA.

The following items are detailed information needed by the operator to maintain the equipment. See Table 1-1.

TABLE 1-1. EQUIPMENT SPECIFICATIONS

200/600 GPM Pump	
Model Number 200 GPM Pump	AFARE200GPMP
Model Number 600 GPM Pump	AFSSP60OGPMP
Weight:	
200 GPM Pump	1005 lbs (452 kg)
600 GPM Pump	1103 lbs (496 kg)
Height:	46 inches (117 cm)
Length:	76 inches (193 cm)
Width:	43 inches (109 cm)
Power Requirements	24 vdc
Fuel Requirements	JP4, JP5, JP8, DF1, DF2, DFA
Operating Temperature:	
MIL-T-5624	
JP-4	-65°F to + 130°F (-53°C to + 54°C)
JP-5	-40°F to + 130°F (-40°C to + 54°C)
MIL-T-83133	
JP-8	-40°F to + 130°F (-40°C to + 54°C)
V-F800	
DF-A	-40°F to + 130°F (-40°C to + 54°C)
DF-1	-25°F to + 130°F (-31°C to + 54°C)
DF-2	+ 25F to + 130°F (-3°C to + 54°C)
Engine	
Model Number	GTCP36-150(KM)
Weight	92 lbs (41 kg) (dry weight)
Type	Gas Turbine
RPM (Output Shaft):	12,000
Exhaust Gas Temperature	1080°F (582°C)
Horse Power	75

1-12. EQUIPMENT DATA - continued.

TABLE 1-1. EQUIPMENT SPECIFICATIONS- continued

200/600 GPM Fuel Pump/Clutch

Weight:	
200 GPM Pump/Clutch	82 lbs (37 kg)
600 GPM Pump/Clutch	180 lbs (81 kg)
Type:	Rotary, Impeller
Capacity:	200 GPM or 600 GPM
Clutch:	
Type	Electromagnetic/Friction
Voltage	24VDC

Winch

Model Number	H1150D1-01
Weight:	
Winch	80 lbs (36 kg)
Wire Rope	28 lbs (13 kg)
Voltage	24VDC

Starter - Generator

Model Number	23081-003
Weight	21.7 lbs (9.7 kg)
Output Voltage	30VDC
Rating	6 kilowatts
Continuous Load with Speed Range	200 amperes
Speed Range (Rated Load)	7,050 to 12,000 rpm
Direction of Rotation (Viewing) Drive End	Counterclockwise
Cooling	Self-cooled

Speed Reducer

Model Number	SN2107
Weight	45 lbs (20 kg) (dry weight)
Lube Pressure	20-25 psig
Temperature Switch Setting	135°F (570C)
Rating (continuous)	90 HP at 1,200 rpm

Battery

Amp Hours	30 AH
vdc	24 volts
Weight	80 lbs (36 kg)
Type	Nickel Cadmium

Section III. PRINCIPLES OF OPERATION

1-13. INTRODUCTION.

Although there are minor differences between the 200 GPM Pump and the 600 GPM Pump (all are confined to the 200/600 GPM fuel pumps) both pump assemblies operate in essentially the same manner.

1-14. PRINCIPLES OF OPERATION.

a. Output Fuel Flow.

(1) The engine-driven centrifugal pump utilizes an inducer and impeller. Fuel enters the pump through a screen and is discharged through a manually operated ball valve and out the discharge elbow. Pump incorporates an electromechanical clutch to allow engine to be started under no load conditions.

(2) Priming of pump is semiautomatic and is initiated when engine is operating, pump pressure switch is closed (indicating no discharge pressure), clutch engage switch is on and manually operated primer shut-off and ball-valves are open (turn on procedure). When these conditions are satisfied, the ejector solenoid and drain solenoid valves open and allow bleed air from the engine to flow through the compressor discharge solenoid valve, the check valve and the ejector to the fuel drain tank.

(3) The suction created by the ejector orifice evacuates a mixture of air and fuel vapor from the pump at the discharge elbow. The fuel and air mixture is discharged into the drain tank, where the air is vented thru the top opening while fuel is trapped in the tank.

(4) When sufficient vacuum exists in the pump and attached inlet and outlet hoses, fuel in suction line rises above level of impeller. When this occurs, pump is primed and begins to pump fuel.

(5) After the pump is primed, the priming system is deactivated by the pump discharge pressure switch, which causes the compressor discharge solenoid and the drain solenoid valves to close when pump discharge pressure reaches approximately 20 psi.

(6) When pump is primed and operating, the manually operated prime shutoff valve is closed and the tank suction valve is briefly opened to allow draining of drain tank by feeding it to the pump inlet.

b. Engine.

(1) The engine is essentially a self contained power unit requiring only fuel, ambient air and electrical power for operation.

(2) A single stage, rotary compressor delivers compressed ambient air to the combustion chamber. The compressed air is mixed with fuel and ignited by the igniter plug. The gases from this combustion process are then delivered to the turbine blades of a radial inward- flow turbine wheel and exhausted thru the exhaust tube.

1-14. PRINCIPLES OF OPERATION - continued.

(3) The turbine shaft is coupled to the engine gearbox which consists of various reduction gears. The main shaft rotates and is coupled to an auxiliary speed reducer for proper pump speed. Other items attached to the gearbox are the starter/generator and the fuel valve.

(4) Engine is electrically controlled through a variety of sensors, the fuel control assembly and the fuel solenoid valve. Engine protection is provided by an oil temperature switch, low oil pressure switch, a thermocouple and an Electronic Sequencing Unit (ESU).

c. Electrical System. Refer to Figure 1-2.

The diagram shows the electrical flow of components in the electrical system.

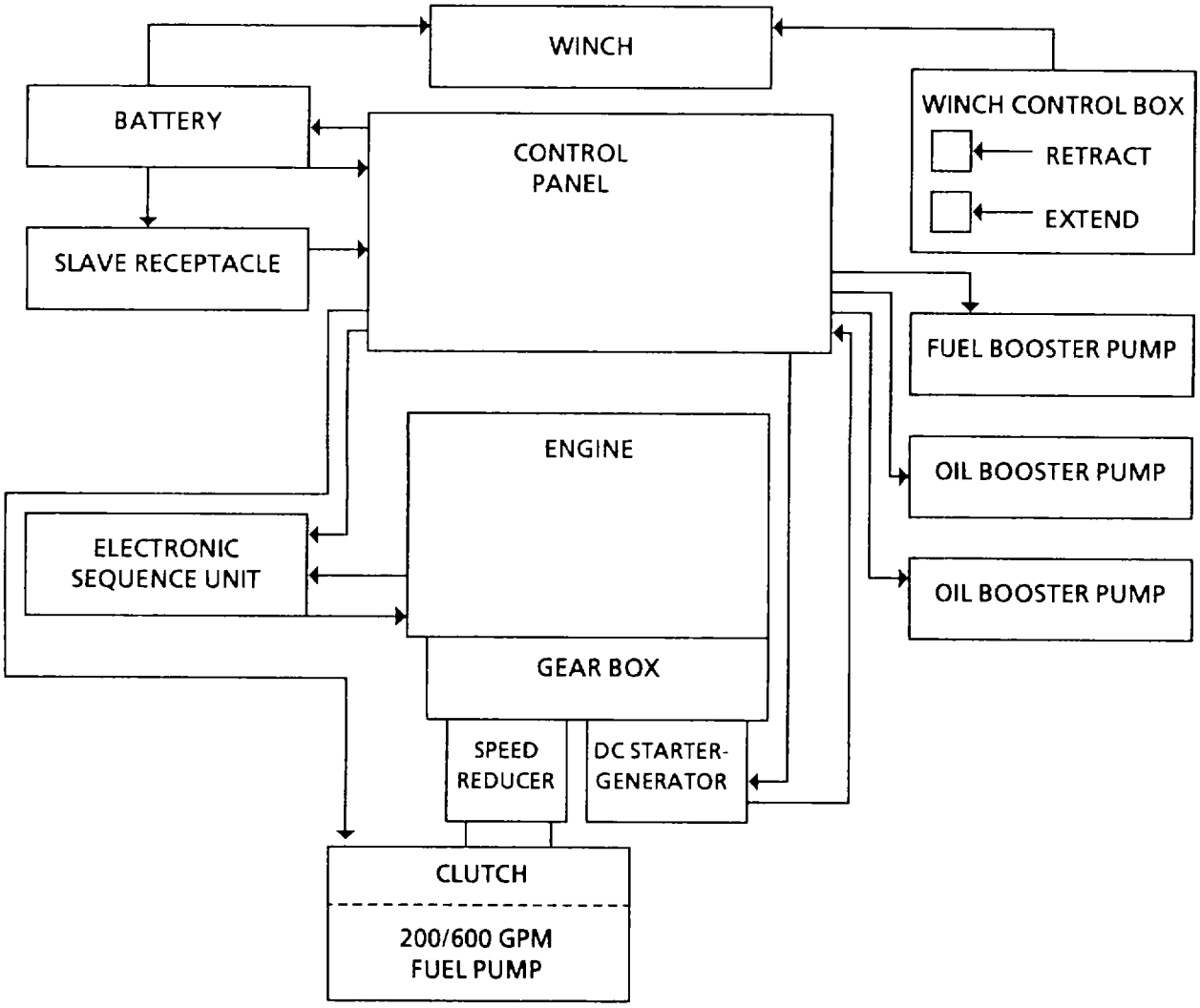


Figure 1-2. Electrical System Diagram

1-14. PRINCIPLES OF OPERATION - continued.

d. Winch. Refer to Figure 1-3.

The winch (1) is controlled by the winch control (2). The two switches (3) are used for retracting and extending the wire rope (4). A hook (5) is mounted on the end of the wire rope to attach to an object. The winch control handle (6) has two positions, freewheeling and engaged. In the engaged position, you can extend or retract the wire cable with the control; in the freewheeling position, you can pull the wire rope out as needed.

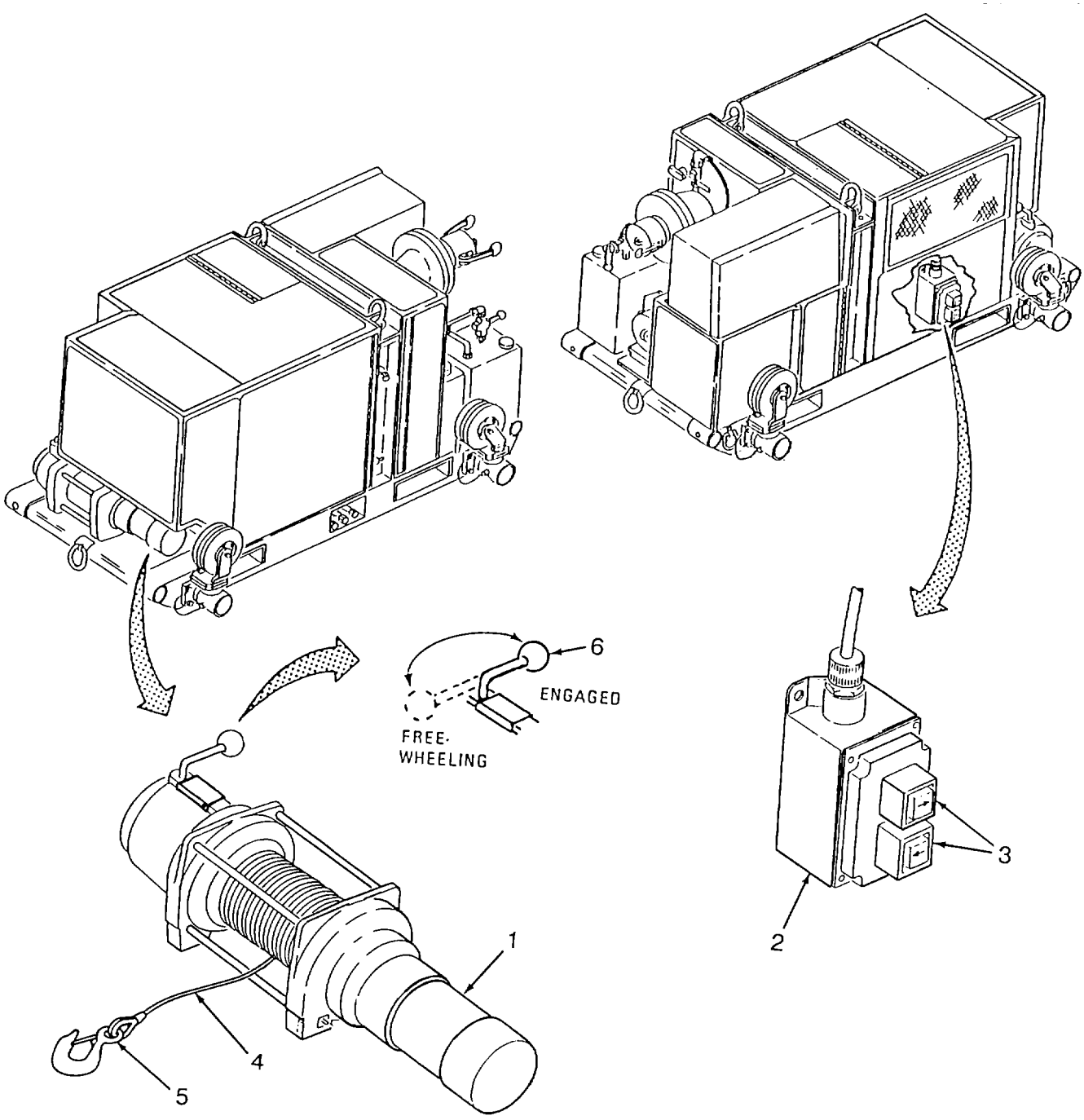


Figure 1-3. Winch

CHAPTER 2

OPERATING INSTRUCTIONS

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

2-1. INTRODUCTION.

This section provides the operator with information needed to locate, identify, and use the controls and indicators on the 200/600 GPM Pump.

2-2. LOCATION AND USE OF CONTROLS AND INDICATORS.

Refer to Figure 2-1.

Key	Control or Indicator	Function/Use
1	MASTER ON/OFF SWITCH	Applies 24 vdc to electrical system.
2	FUEL HEAT ON/OFF Switch	Fuel heat switch turns fuel heater on and off. Heating of engine fuel is required at temperatures below 10°F (-12°C).
3	ENGINE PUMPS ON/OFF Switch	Switch is used to turn gear reducer oil pumps (2 each) and engine fuel pump on and off. Pumps must be on before engine can be started.
4	START Switch	Switch is a two-position, toggle switch used to start and run engine. To start engine, switch is set to START position. Engine will stop when switch is set to STOP position.
5	PUMP CLUTCH ENGAGED/DISENGAGED Switch	Switch is used to engage or disengage clutch in 200/600 GPM fuel pump. Engine must be running before clutch can be engaged.
6	BATTERY Gage (Ammeter)	Ammeter indicates rate of current at which battery is being charged or discharged.
7	CLUTCH DISENGAGED Light	CLUTCH DISENGAGED Light illuminates if the PUMP CLUTCH switch is on and pump clutch disengaged. With power on, press to test-light illuminates.
8	Panel lights	Panel lights illuminate panel to facilitate operation and monitoring.
9	ENGINE Light	Engine light illuminates with problem in engine. With power on, press to test - light illuminates.
10	ENGINE OIL TEMP Light	Engine Oil temperature light illuminates if engine oil temperature is high. With power on, press to test - light illuminates.
11	Panel LIGHT Switch and Rheostat	Light switch and rheostat turns panel lights on and off and controls brightness of lamps.
12	DISCHARGE Pressure Gage	Indicates 200/600 GMP fuel pump outlet pressure in psi.
13	SUCTION Pressure Gage	Indicates vacuum/pressure in inches of mercury, and pressure in psi at the 200/600 GMP fuel pump inlet port.
14	Circuit Breakers	The circuit breakers provide overcurrent protection as follows. When an overcurrent condition exists, circuit breakers pop out. When overcurrent condition has been corrected circuit breakers must be reactivated (pushed in): (a) MAIN Circuit Breaker. Main circuit breaker opens if more than 15 Amperes are drawn by the entire electrical system.

2-2. LOCATION AND USE OF CONTROLS AND INDICATORS - continued.

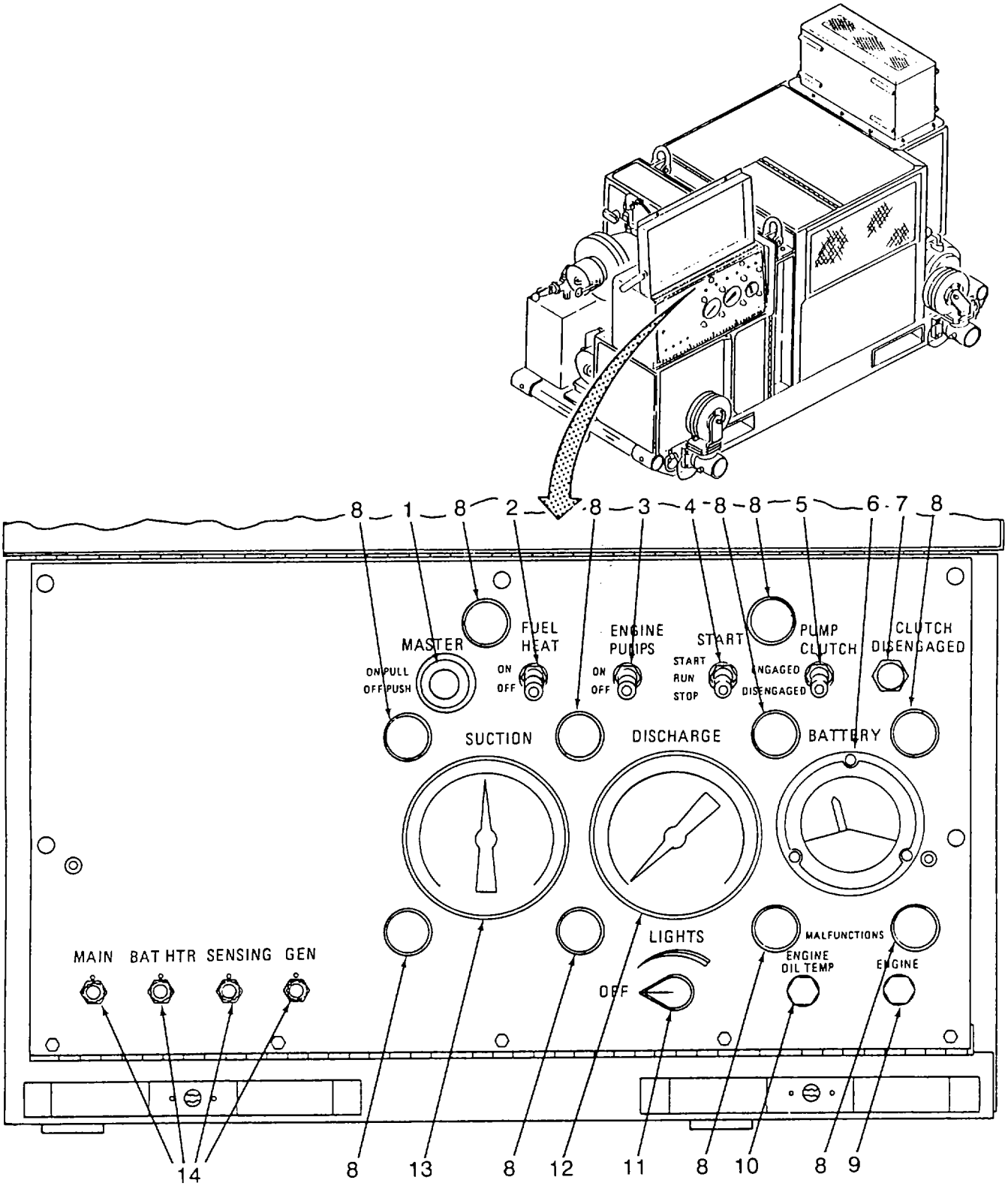


Figure 2-1. 200/600 GPM Pump Controls and Indicators (Sheet 1 of 2)

2-2. LOCATION AND USE OF CONTROLS AND INDICATORS - continued.

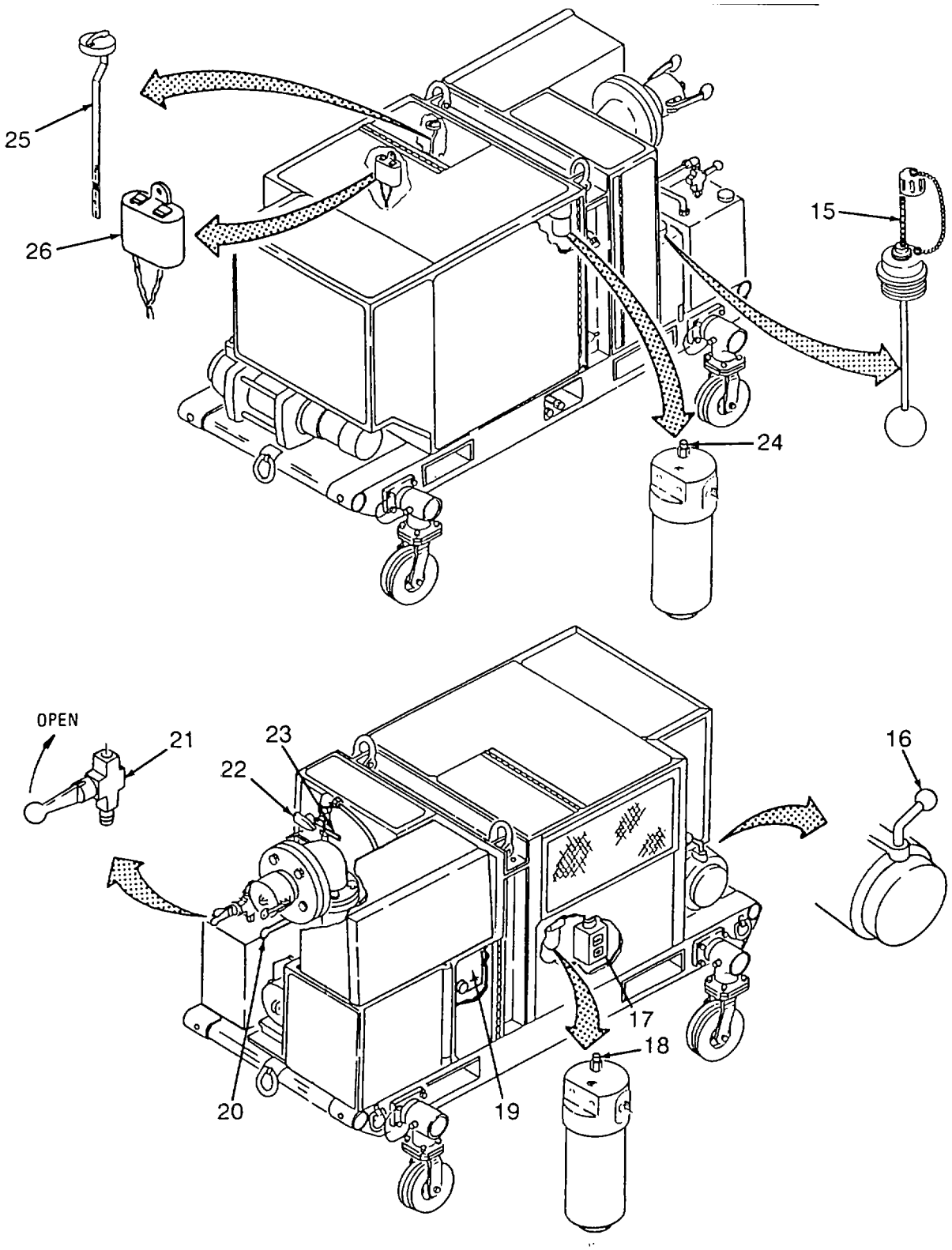


Figure 2-1. 200/600 GPM Pump Controls and Indicators (Sheet 2 of 2)

2-2. LOCATION AND USE OF CONTROLS AND INDICATORS - continued.

Key	Control or Indicator	Function/Use
14	Circuit Breakers (continued)	(b) BAT HTR Circuit Breaker. Battery heater circuit breaker opens if more then 50 amperes are drawn from the battery heater. (c) SENSING Circuit Breaker Circuit breaker opens if ESU draws more than 5 amperes. (d) GEN Circuit Breaker. Generator circuit breaker opens when generator provides more than 35 Amperes of output.
15	Oil Level Indicator (Speed Reducer)	Indicates level of oil in speed reducer oil reservoir.
16	Winch Control Handle	Handle is used to engage or disengage winch mechanically. Winch is disengaged (freewheeling) when handle is in forward position and engaged when handle knob points toward the control panel.
17	Winch Control Box	Winch box control with two directional control switches used to extend and retract winch cable.
18	Oil Filter Clogged Indicator	Red indicates when filter elements are clogged. Gold indicates filter is operating properly.
19	Electronic Sequence Unit	Controls electronics of engine for operating and for Built in Test Equipment (BITE). There are four indicators that define malfunctions.
20	200/600 GPM Fuel Pump BALL VALVE	Hand operated ball valve used to isolate fuel of the suction side (low pressure of the pump assembly) from the discharge side to prevent backflow when pump is shut down. Valve must be open to pump fuel.
21	Priming Vent Drain Tank Valve	Valve is used to return fuel, accumulated in tank during priming process, back to the system. When tank is empty, valve must be closed (vertical position). Fuel tank should be emptied after each startup to prevent overflow of tank.
22	FUEL SELECTOR VALVE	Valve for using external fuel or internal fuel (fuel in transfer lines) for engine.
23	PRIMING SHUT OFF VALVE	ON/OFF two-way ball valve used to prime 200/600 GPM fuel pump. Fuel valve must be open for priming. After priming, valve is shut off manually.

2-2. LOCATION AND USE OF CONTROLS AND INDICATORS - continued.

Key	Control or Indicator	Function/Use
24	Fuel Filter logged Indicator	Red indicates when filter elements are clogged. Gold indicates filter is operating properly.
25	Dipstick (Engine Oil)	Indicates oil level in gas turbine engine gear box.
26	Hourmeter	Measure number of events (starts) and total hours of operation.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. INTRODUCTION.

a. General. Your Preventive Maintenance Checks and Services Table lists the inspections and care your equipment requires to keep it in good operating condition and ready for its primary mission.

(1) Before, During and After You Operate - Always keep in mind the WARNINGS and CAUTIONS. Perform your Before, During and After PMCS.

(2) If Your Equipment Fails To Operate - If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting for possible problems. Report any malfunctions or failures on the proper DA Form 2404, or refer to DA PAM 738-750, The Army Maintenance Management System (TAMMS).

b. PMCS Columnar Entries. See Table 2-1.

(1) Item number column. Numbers in this column are for reference. When completing DA Form 2404 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

(2) Interval column. This column tells you when you must do the procedure in the procedure column. BEFORE procedures must be done before you operate or use the equipment for its intended mission. DURING procedures must be done during the time you are operating or using the equipment for its intended mission. AFTER procedures must be done immediately after you have operated or used the equipment.

(3) Location item to check/service column. This column provides the location and the item to be checked or serviced. The item location is underlined.

(4) Procedure column. This column gives the procedure you must do to check or service the item listed in the Check/Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

(5) Not fully mission capable if: column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

c. Special Instructions.

(1) Perform Weekly, as well as Before, operations PMCS if:

(a) You are the assigned operator and have not operated the item since the last weekly check.

(b) You are operating the item for the first time.

2-3. INTRODUCTION - continued.

c. Special Instructions - continued.

(2) Leakage definitions for operator/crew PMCS shall be classified as follows:

WARNING

Avoid spillage of fuel. Drain fuel in an adequate container, otherwise a fire hazard or environmental contamination could result. Dispose of contaminated fuel in accordance with FM 10-20 and local regulations.

a. Class I. Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

b. Class II. Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

c. Class III. Leakage of fluid great enough to form drops that fall from item being checked/inspected.

2-4. GENERAL MAINTENANCE PROCEDURES.

As you perform your PMCS, keep in mind the following:

a. Cleanliness. Dirt, grease, oil, and debris only get in the way and may cover up a serious problem.

b. Bolts, Nuts, and Screws. Check them all for obvious looseness and missing, bent, or broken condition. Look for chipped paint, bare metal, or rust around bolt heads. If you find a problem, report it to your supervisor.

c. Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.

d. Electrical Wires and Connections. Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connections and make sure the wires are in good condition. If you find a bad wire or connector, report it to your supervisor.

e. Fuel Lines and Fittings. Look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, or if something is broken or worn out, report it to your supervisor.

2-5. PMCS TABLE.

a. See Table 2-1 for PMCS.

b. Routing Diagram. Refer to Figure 2-2.

Routing will be of help to complete Before, During, After or Weekly PMCS. It shows 200/600 GPM Pump PMCS routing track which matches the sequence of PMCS to be performed.

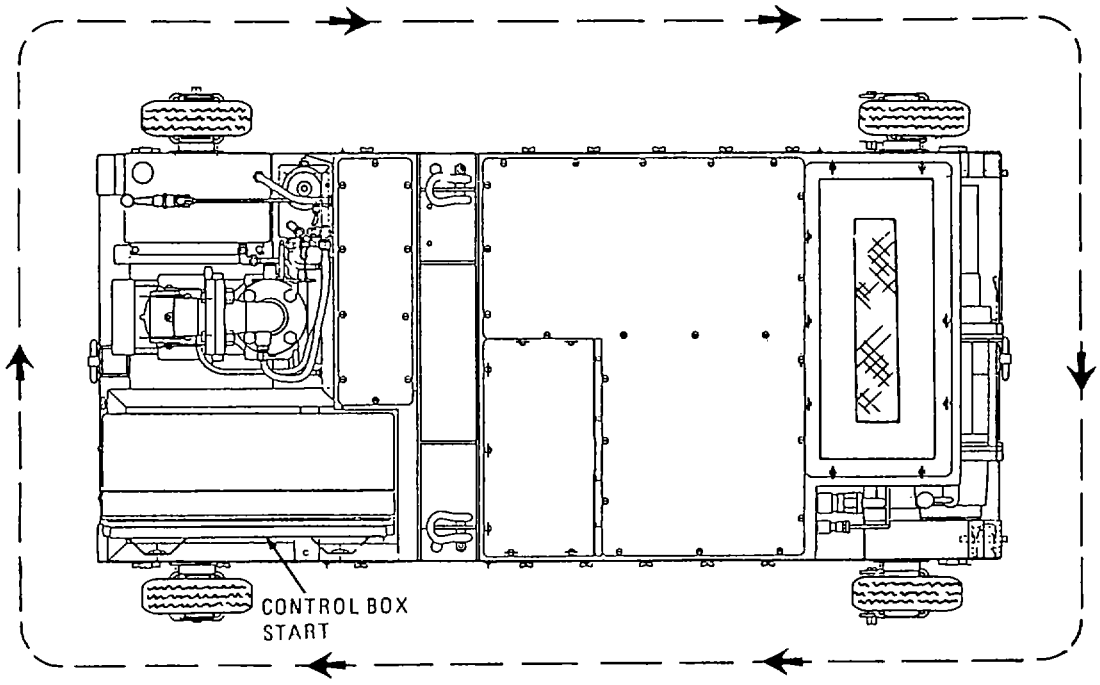


Figure 2-2. PMC Routing Diagram

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

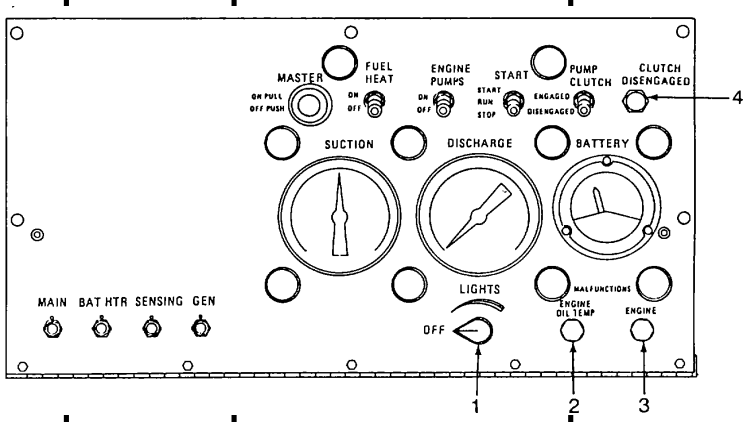
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
			CAUTION To prevent foreign object damage (FOD) to the 200/600 GPM pump, do not allow any dirt or debris into the engine compartment when opening access doors.	
				
1	Before	Control Box	a. Inspect for damaged, missing, and/or loose controls and indicators.	Damaged, loose or missing control box and/or indicator.
			b. Turn LIGHTS (1) on to make sure working properly and all bulbs are lit.	
			c. Press ENGINE OIL TEMP (2), ENGINE (3), and CLUTCH DIS-ENGAGED (4) lights and make sure lights light.	Lights don't light.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

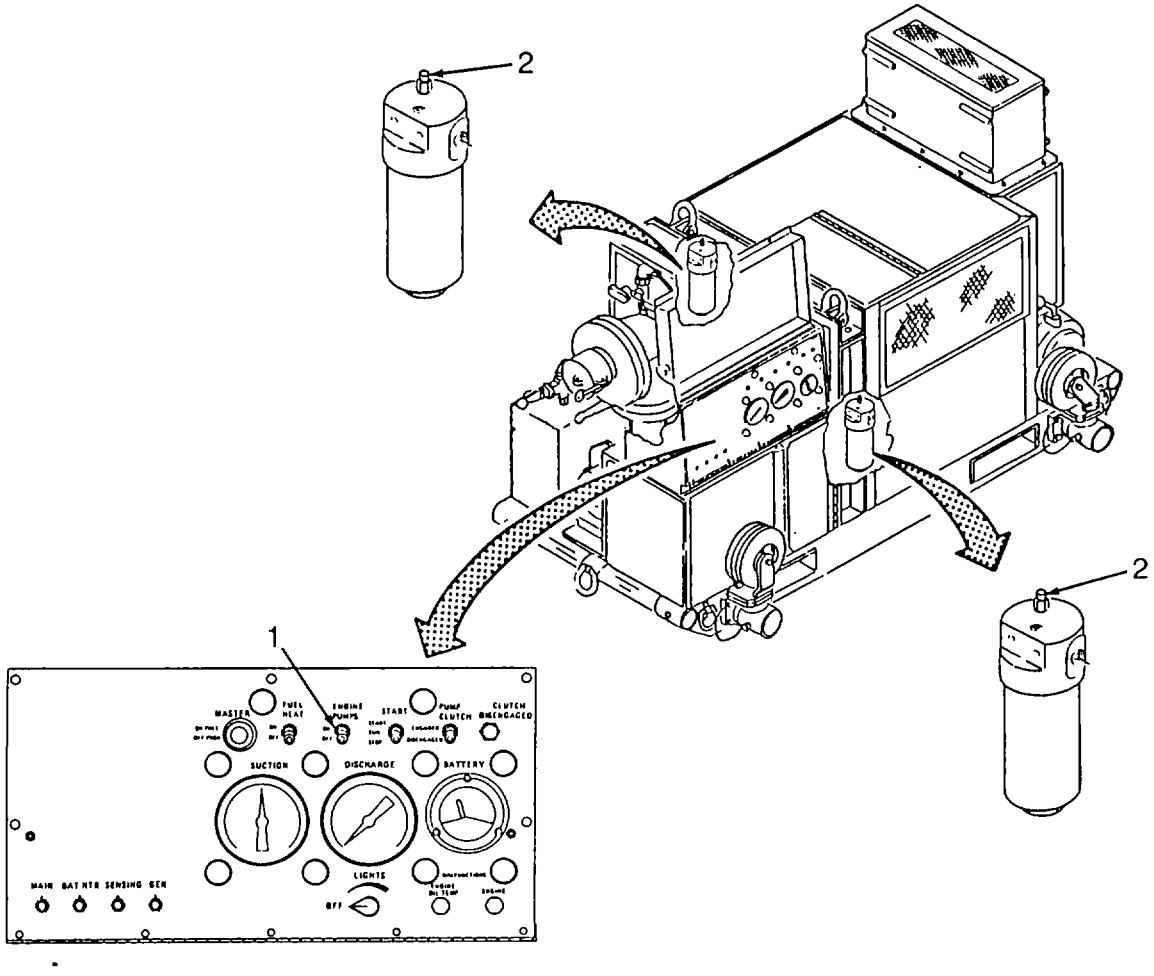
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
2	Before	Oil and Fuel Filters	a. Open doors to oil and fuel filters.	
			b. Turn Engine Pump Switch (1) on and check pop-up indicators (2) on oil and fuel filters.	Pop-up indicators red.
			c. Check for leaks	Leaks present.
			d. Turn Engine Pump Switch (2) off.	

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

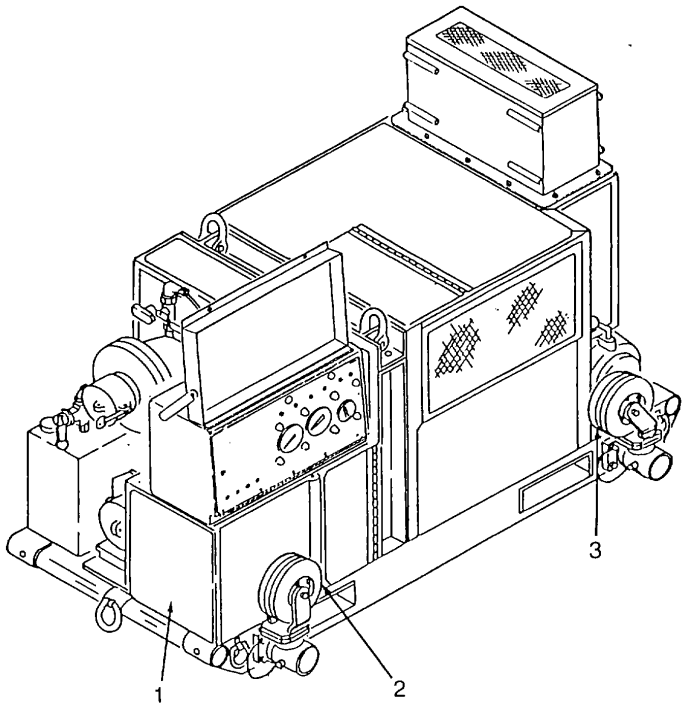
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
3	Before	Battery and Battery Tray	Inspect Battery and Battery Tray (1) for loose connectors on battery, wire chafing and corrosion in battery tray. Battery clamps securing battery.	Battery connector loose, wire chafing and/or corrosion in battery box.
4	Before	Rigid Wheels and Swivel Wheels	Inspect Rigid Wheels (2) and Swivel Wheels (3) for loose, broken and/or missing hardware and flat tires.	

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

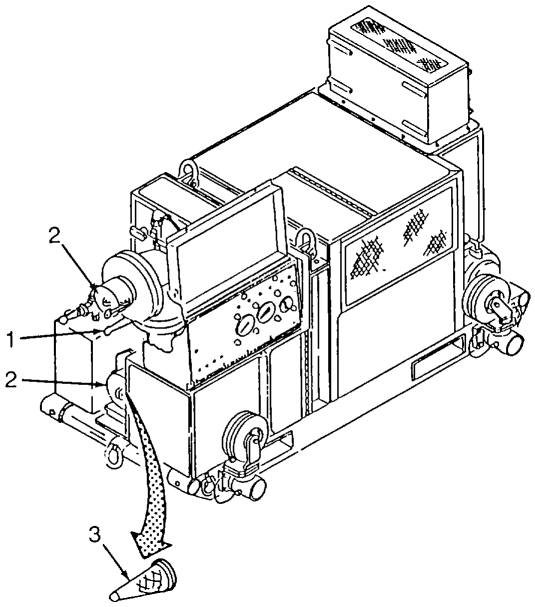
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
5	Before	Pump Assembly	a. Inspect for loose or missing bolts, gaskets or hardware.	Loose or missing bolts, gaskets or hardware.
			b. Check ball valve (1) for operation.	Ball valve inoperable.
			c. Check quick disconnect couplings (2) for cracks, broken cam lock arms, damage or missing gaskets.	Coupling cracked, lock arms damaged, gaskets damaged or missing.
			d. Check suction strainer (3) for clogged. clogs or debris.	Suction strainer

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

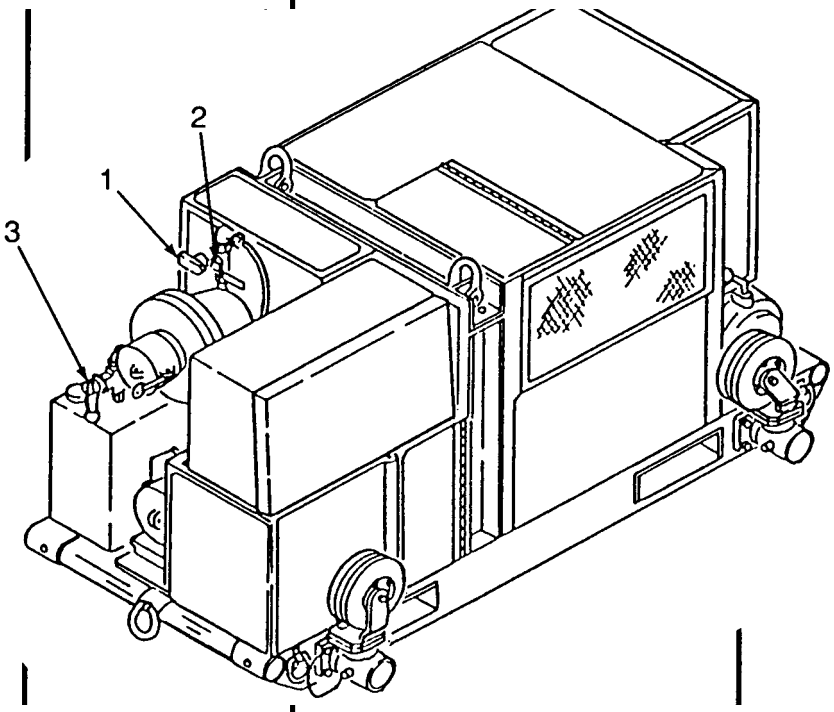
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
6	Before	Fuel valves, hoses and lines	a. Check fuel lines and hoses for loose connection, leaks and serviceability.	Fuel lines or hoses leak, loose or not serviceable.
			b. Check fuel selector valve (1), fuel priming valve (2) and drain tank valve (3) for operation.	Valves inoperable.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

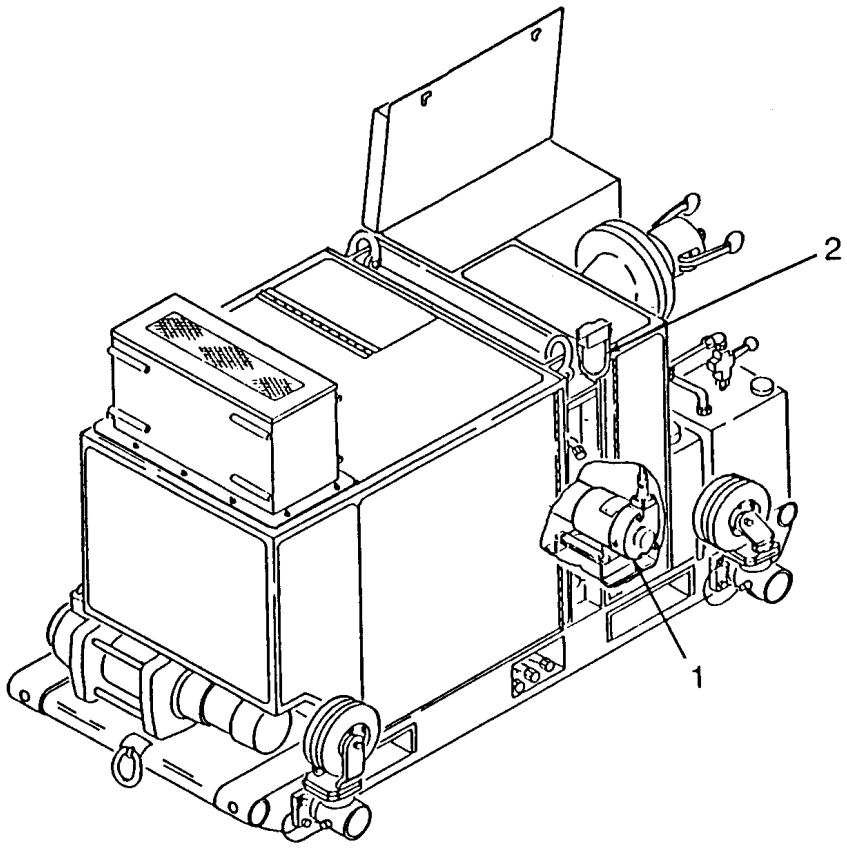
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
7	Before	Fuel Transfer Pump (1) attaching hardware. leaks, or hardware is loose.	Inspect Fuel Transfer Pump (1) for loose connections, leaks, and loose connections,	Fuel transfer pump has loose
8	Before	Fuel Filter and Tubes (2)	Inspect Fuel Filter and Tubes (2) for loose connections, leaks, and loose attaching hardware.	Fuel filter has loose connections, leaks, or hardware is loose.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

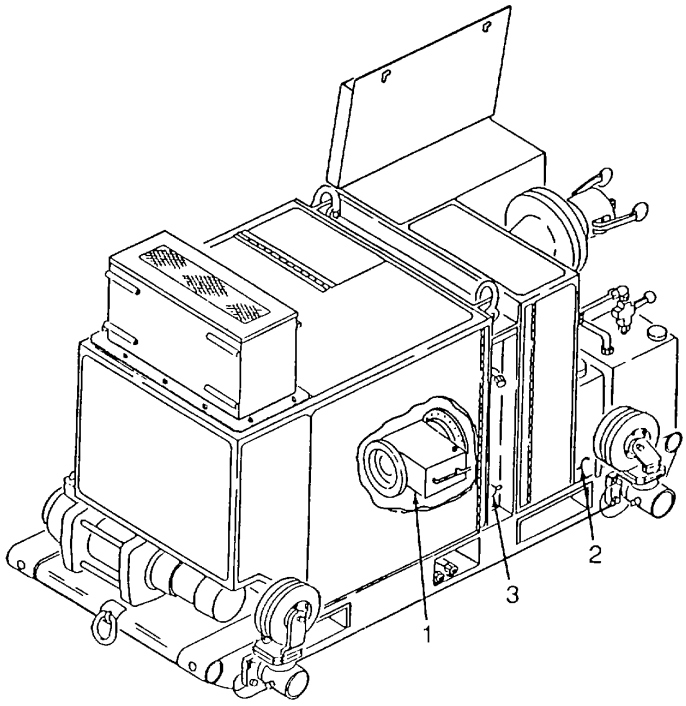
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
9	Before	Speed Reducer	a. Inspect Speed Reducer (1) for cracks, oil leaks and loose mounting hardware.	Cracked, oil leaks and/or loose mounting hardware.
			b. Check lubricant in speed reducer oil reservoir (2) refer to LO 10-4320-342-12.	Lubricant low.
10	Before	Ground Stud	Check Ground Stud (3) for damage or missing hardware.	Damaged or missing hardware.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

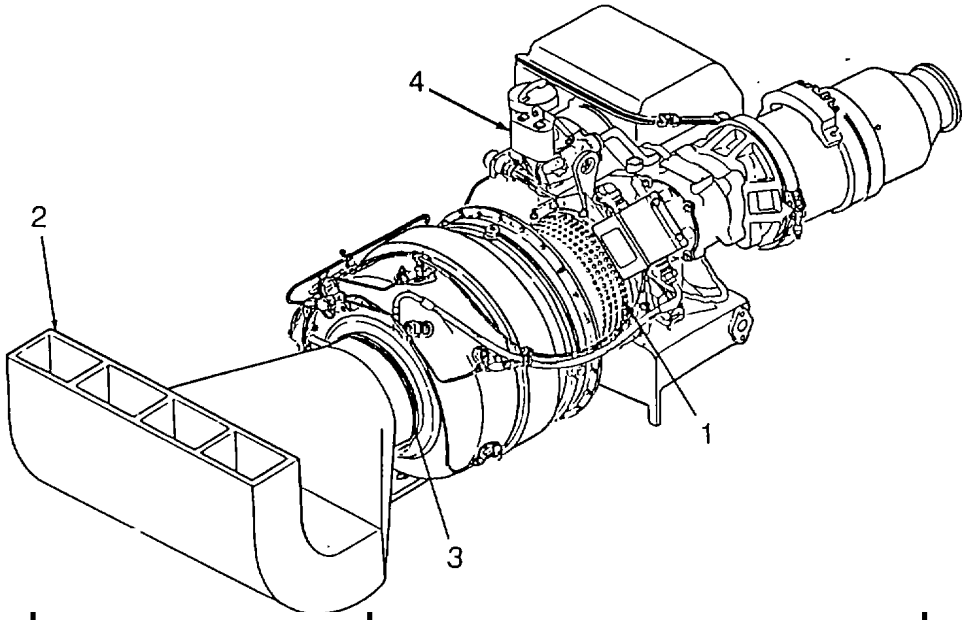
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
11	Before	Engine	a. inspect tor loose mounting hardware and attaching hardware.	engine has loose mounting/attaching hardware.
			b. Inspect wiring for chafing.	Wiring chafing.
			c. Inspect air intake (1) for obstruction.	Air intake obstructed.
			d. Inspect exhaust duct (2) and exhaust coupling clamp (3) for looseness.	Exhaust duct and exhaust coupling clamp loose.
			e. Record on DA Form 2404 the hours and events on the hourmeter (4).	
			f. Check lubricant, refer to LO 10-4320-342-12.	Lubricant low.
			g. Inspect for broken safety wire.	
			h. Inspect for fuel and oil leaks.	Fuel or oil is leaking.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

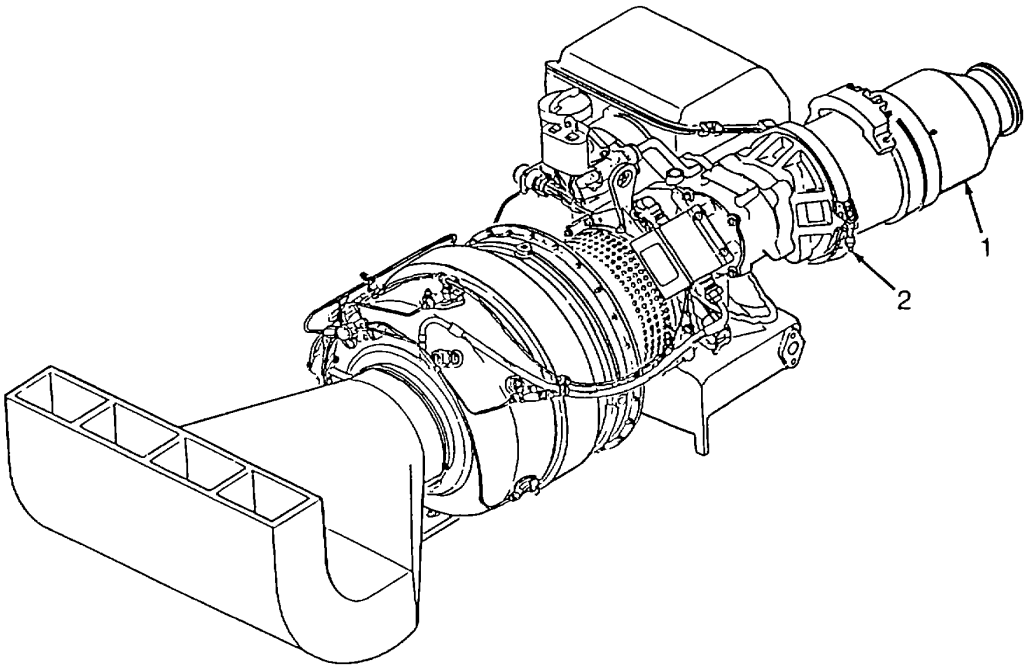
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
12	Before	Starter-Generator wire chafing.	a. Inspect starter-generator (1) for looseness, wiring connections and is chafing. b. Inspect clamp (2) for looseness, damage and broken safety wire.	Connections are loose, and/or wire Clamp loose, damaged or safety wire broken.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

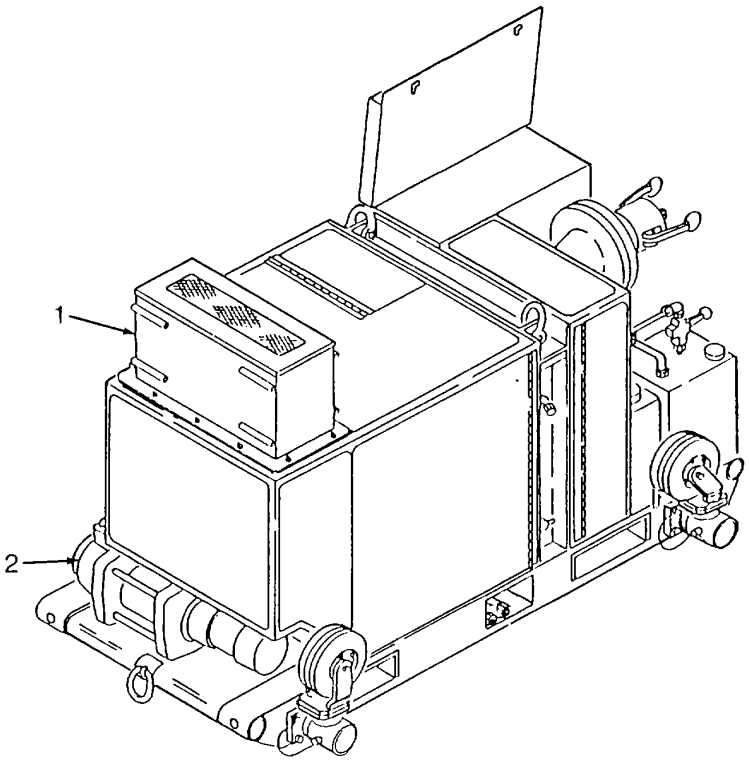
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
13	Before	Muffler Extension	Inspect Muffler Extension (1) for cracks, broken welds, and missing insulation.	Cracked and/or damaged insulation.
14	Before	Winch	a. Inspect Winch (2) for loose hardware. b. Inspect wire rope and hook for corrosion, frayed and broken strands of wire. c. Inspect for frayed electrical wires. d. Inspect connectors for damage or loose or missing hardware.	Frayed electrical wires.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

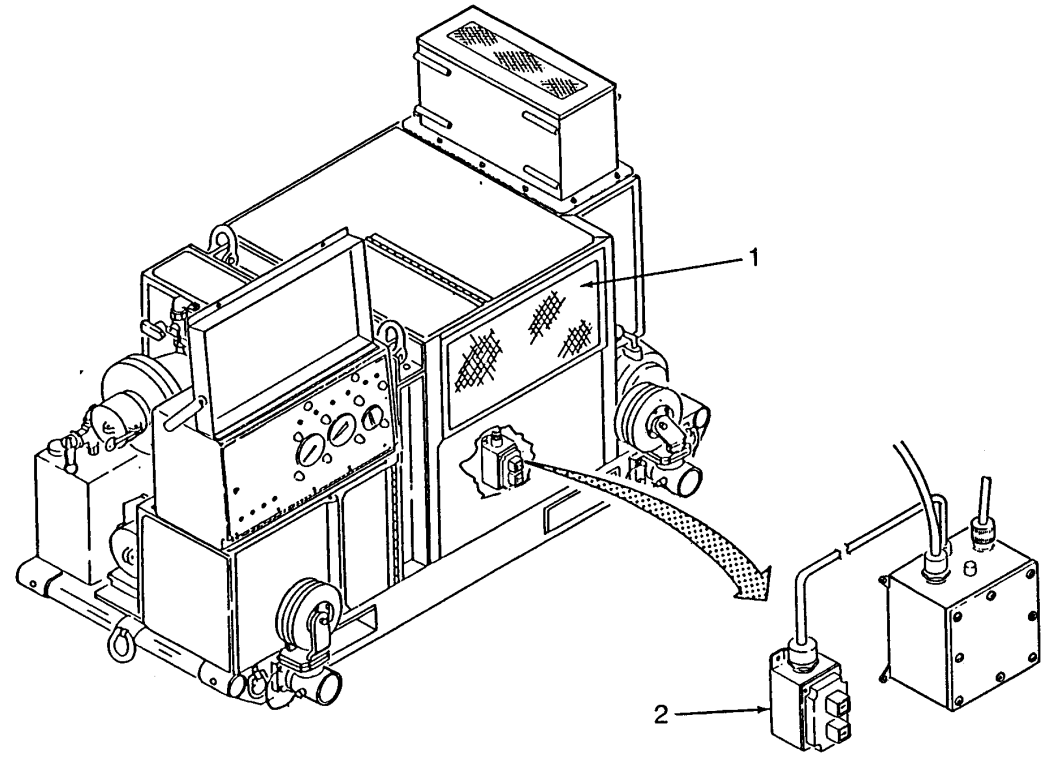
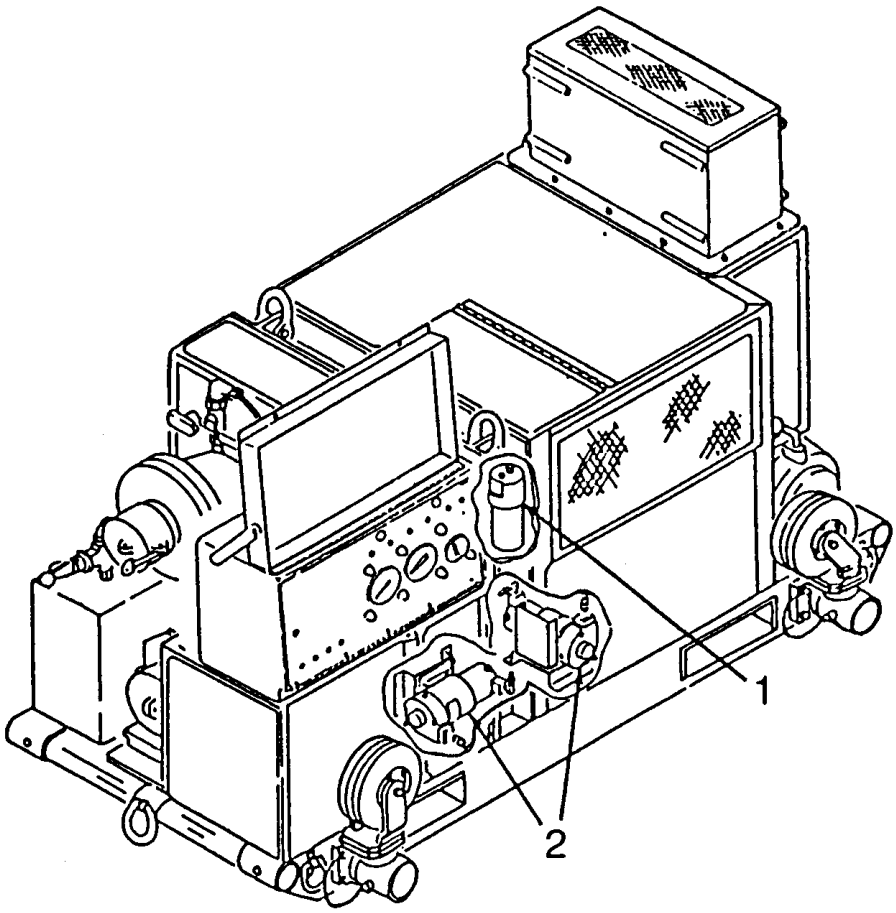
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
15	Before	Air Inlet Metal Grill	Inspect Air Inlet Metal Grill (1) for air restriction.	Air is restricted.
16	Before	Winch Control	Inspect Winch Control (2) for frayed wiring, and damaged switch and switch box.	Frayed wire or damaged switch or switch box.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

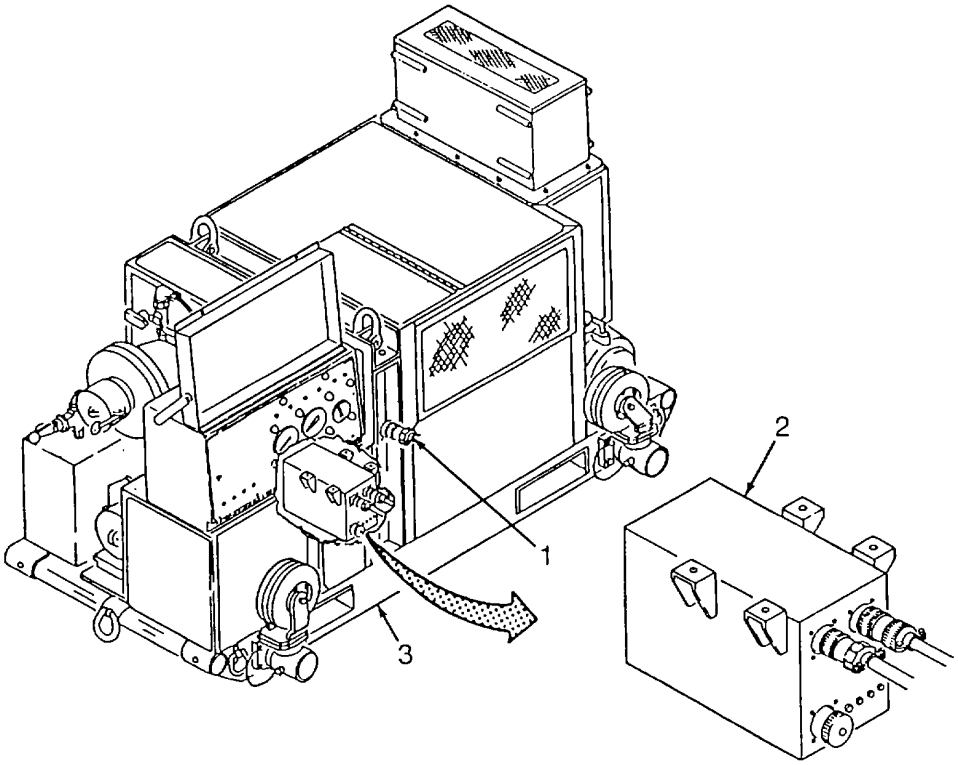
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:



17	Before	Oil Filter and Tubing	Inspect Oil Filter and Tubing (1) for loose connections, leaks, and/or loose attaching hardware. loose attaching hardware.	Loose connections, leaks, and/or
18	Before	Oil Booster Pump Inspect (2 each)	Oil Booster Pump (2) for loose connections, leaks, and/or loose attaching hardware.	loose connections, leaks, and/or loose attaching hardware.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:



19	Before	Slave Receptacle	Inspect Slave Receptacle (1) for loose, damaged or missing hardware.	Receptacle loose or damaged.
20	Before	Electronic Sequence Unit	Inspect Electronic Sequence Unit (2) for loose or missing mounting hardware and/or loose or chafing wiring.	Loose mounting hardware and/or chafing wiring.
21	Before	Frame	a. Inspect Frame (3) for loose, missing, cracked or broken attaching hardware and weldments. b. Inspect for missing or unserviceable lifting shackles.	

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

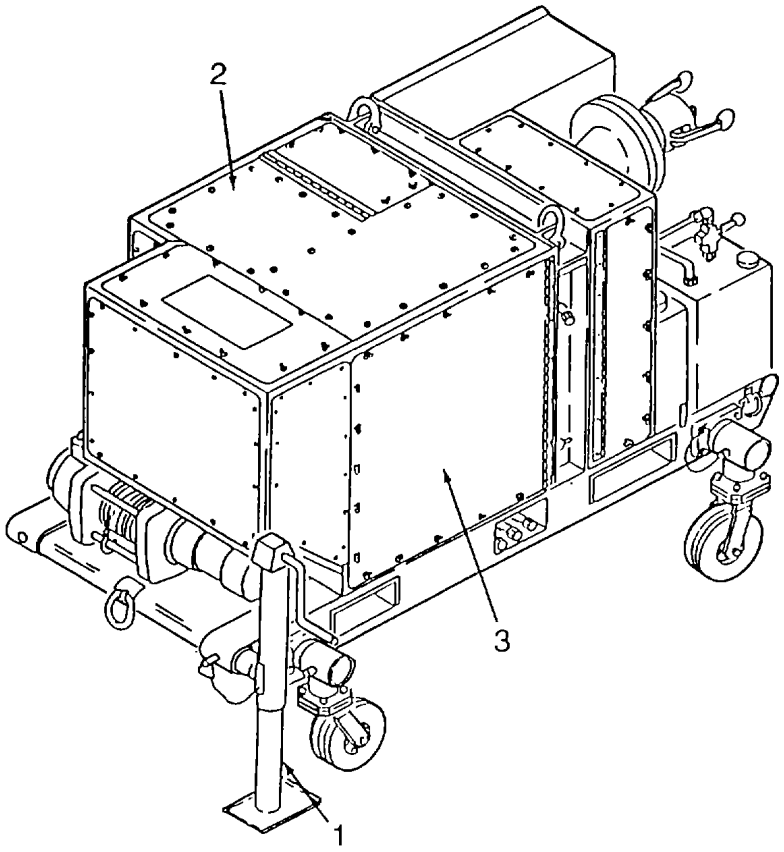
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable
				
22	Before	Screw Jack	Inspect Screw Jack (1) for proper operation and attaching hardware.	
23	Before	Panels and Doors	a. Inspect for bent or damaged panels (2) and/or doors (3).	Panels and/or doors damaged.
			b. Inspect for missing or damaged turn-lock fasteners and mounting hardware.	Turn lock fasteners missing or damaged.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP60OGPM

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable
24	During	Control Box	a. Inspect ENGINE OIL TEMP (1), ENGINE (2) and CLUTCH DISENGAGED (3) lights being illuminated.	Lights are on.
			b. Check BATTERY gauge (4).	Battery discharging or charging over 28 VDC.
			c. Check SUCTION (5) and DISCHARGE (6) gauges.	Suction or discharge gauges fluctuating.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

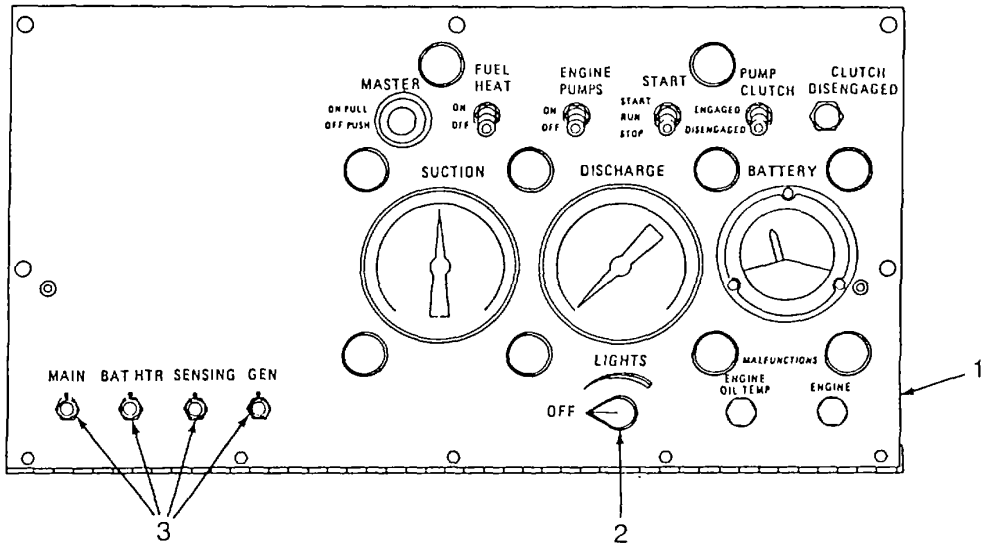
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
25	After	Control Box	a. Inspect Control Box (1) for damage, missing and/or loose controls and indicators. b. Turn off panel lights (2). c. Pull circuit breakers (3) out and disconnect battery.	Damaged, loose or missing control box and/or indicators.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
26	After	Pump Assembly	a. Inspect Pump Assembly (1) for damaged, loose or missing hardware. b. Inspect for evidence of leaks.	Damaged, loose or missing hardware. Leaks present.

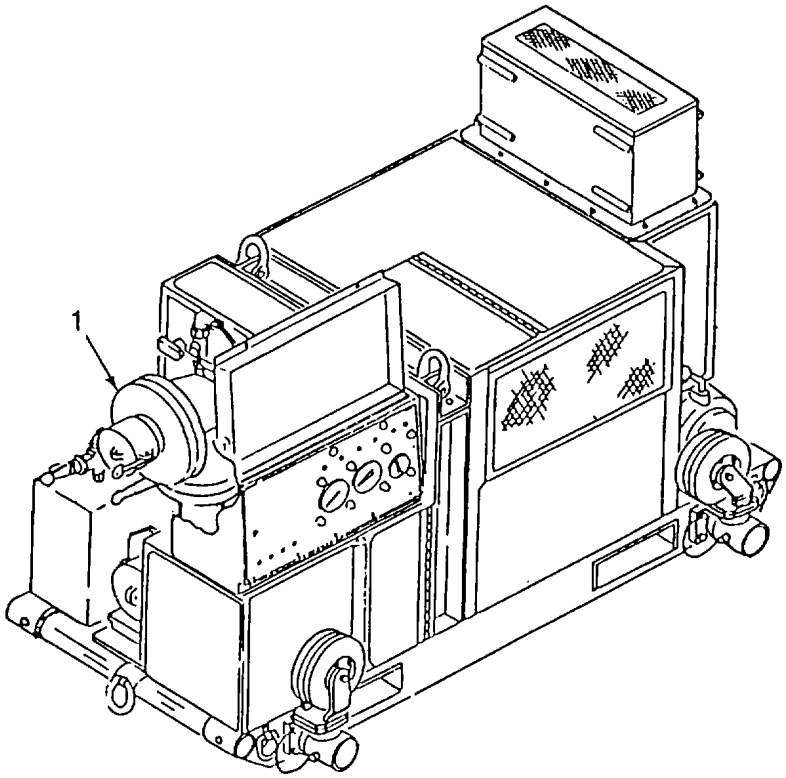


Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

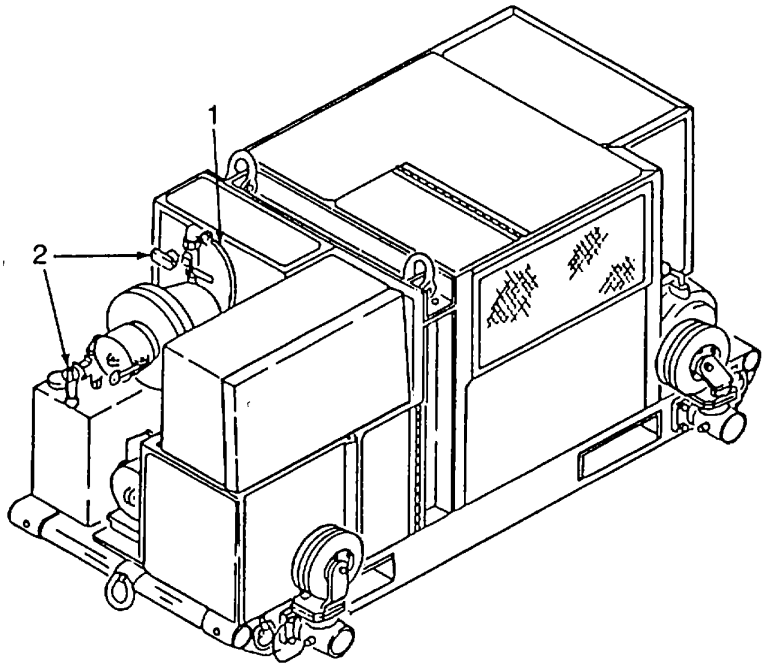
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
27	After	Fuel Hoses, Lines and Valves	a. Inspect Fuel Hoses and Lines (1) for damaged or loose connections. connections. b. Inspect Fuel Hoses, Lines (1) and Valves (2) for evidence of leaking.	Damaged or loose Leaks present.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

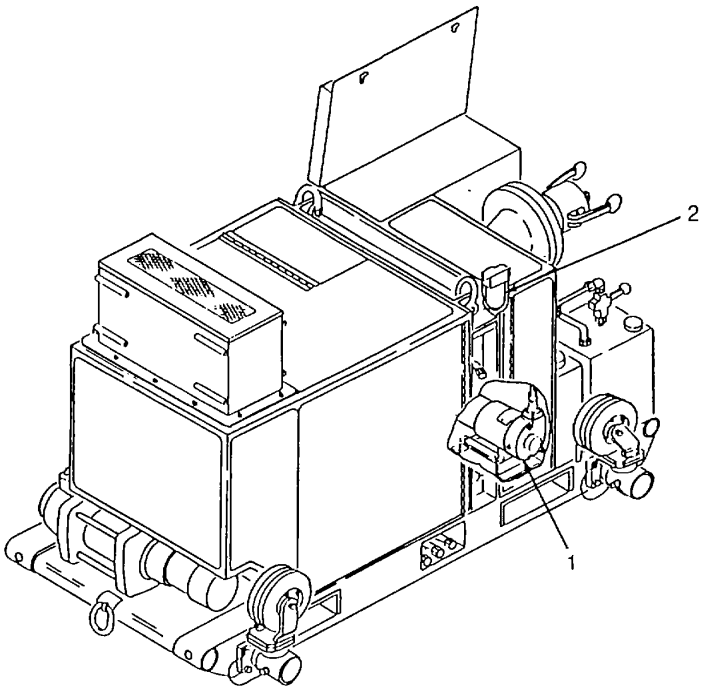
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
28	After	Fuel Transfer Pump leaks.	Inspect Fuel Transfer (1) Pump for loose connections or evidence of leaks present.	Loose connections or
29	After	Fuel Filters and Tubes	a. Inspect Fuel Filters and Tubes (2) for damage or loose connections. connections.	Damaged or loose
			b. Inspect Fuel Filters and Tubes (2) for evidence of leaks.	Leaks present.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

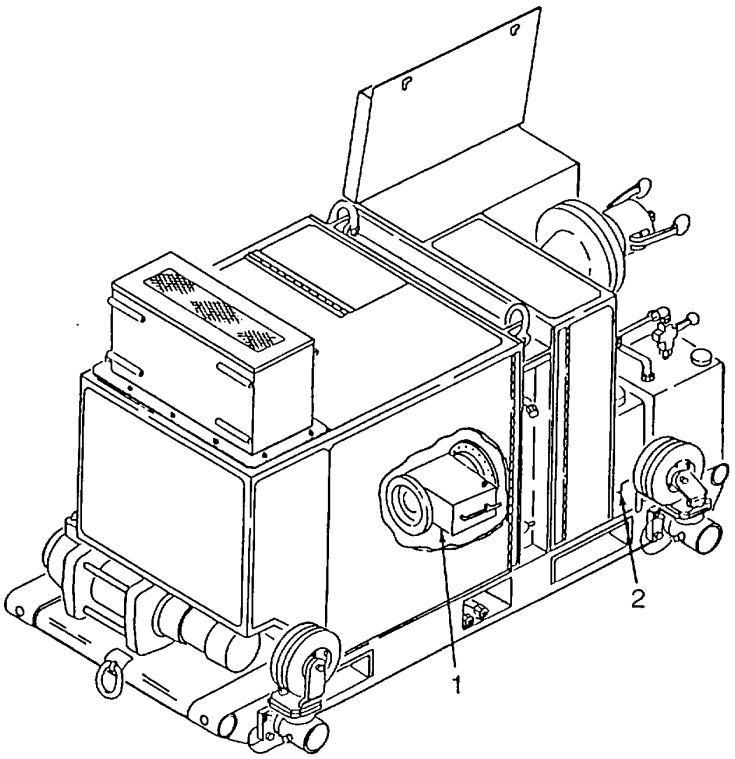
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
30.	After	Speed Reducer	a. Inspect Speed Reducer (1) for cracks, oil leaks and loose mounting hardware. b. Check lubricant in Speed Reducer oil reservoir (2). Refer to LO 10-4320-342-12.	Cracked, oil leaks or loose mounting hardware. Lubricant low.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
31	After	Engine	a. Inspect Engine wiring (1) for chafing. b. Inspect Air Intake (2) for obstruction. c. Inspect Engine for evidence of fuel or oil leaks. d. Check lubricant. Refer to LO 10-4320-342-12.	 Air Intake obstructed. Fuel or oil leaks present. Lubricant low.

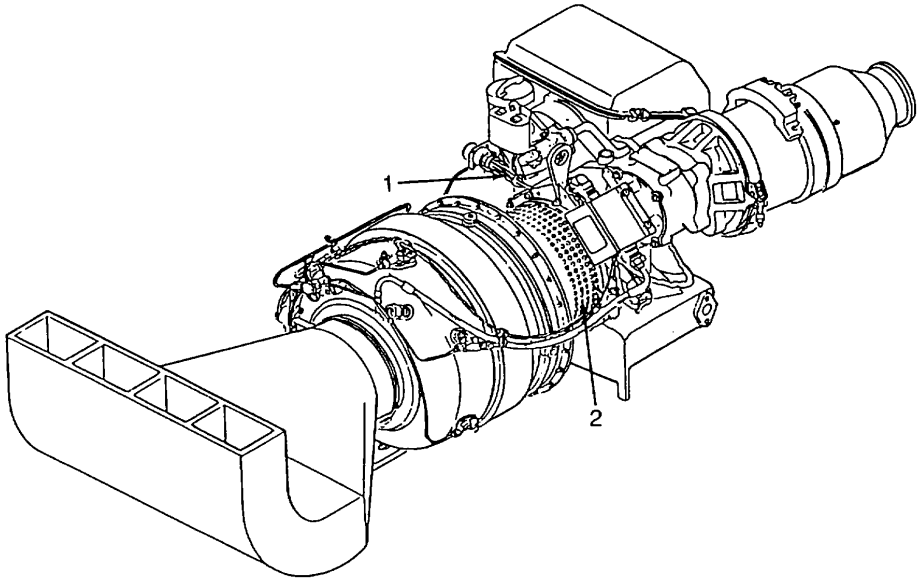


Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

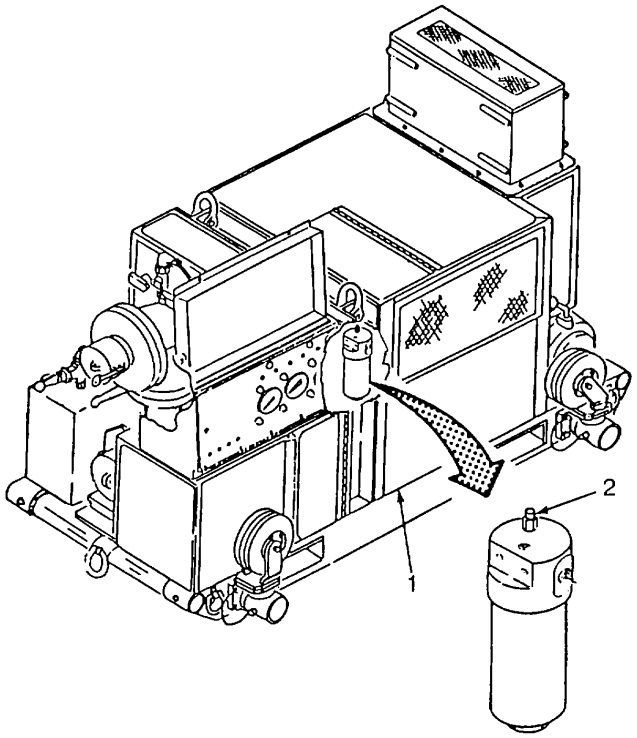
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
32	After	Oil Filter and Tubing	a. Inspect Oil Filter and Tubing (1) for damage or loose connection.	Damaged or loose connections.
			b. Inspect Oil Filter and Tubing (1) For evidence of leaks.	Oil leak present.
			c. Inspect Indicator (2), gold indication is normal.	Indicator is red.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

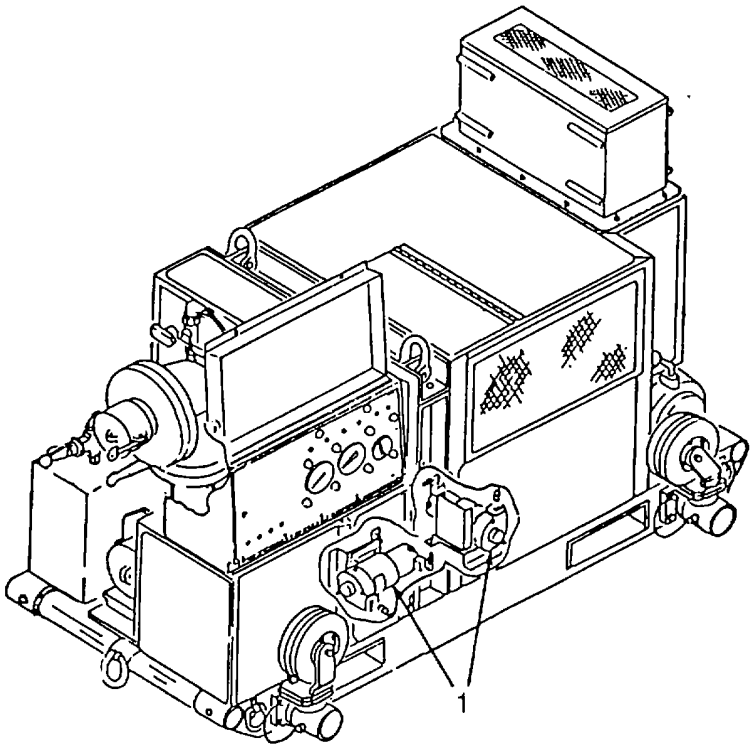
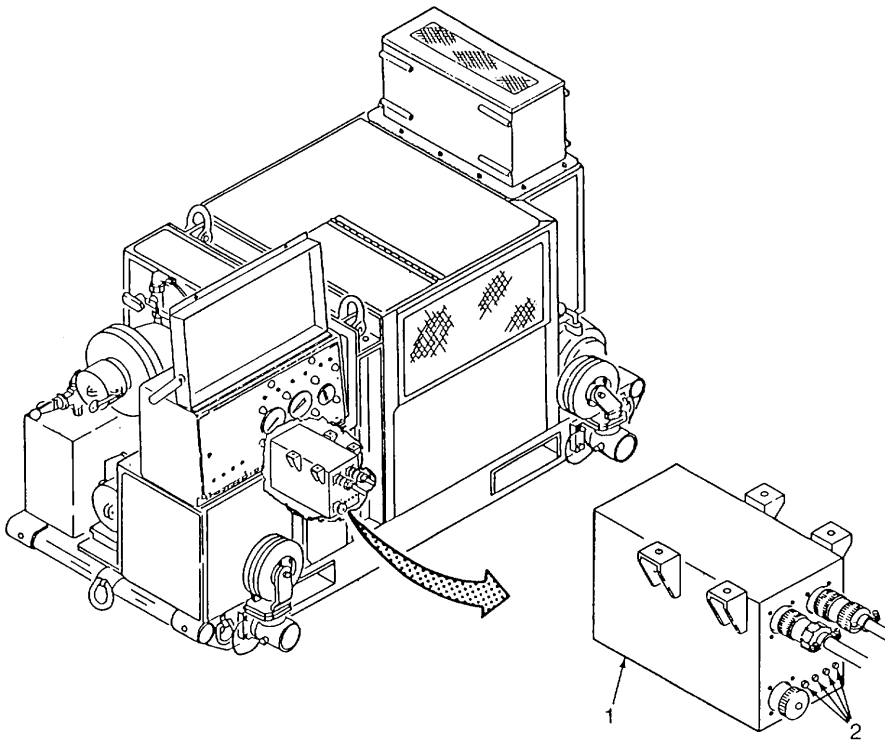
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
33	After	Oil Booster Pumps	a. Inspect Oil Booster Pumps (1) for damage or loose connections. connections. b. Inspect for evidence of oil leaks.	Damaged or loose Oil leaks present.

Table 2-1. Preventive Maintenance Checks and Services for Models AFARE200GPM and AFSSP600GPM - continued

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
34	After	Electronic Sequence Unit	a. Inspect Electronic Sequence Unit (1) for loose hardware. b. Inspect Electronic Sequence Unit (1) for loose connections. c. Inspect Fault Lights (2) being illuminated.	Loose hardware. Loose connections. Light(s) are on.

Section III. OPERATION UNDER USUAL CONDITIONS

2-6. ASSEMBLY AND PREPARATION FOR USE.

a. Selection and Preparation of Site.

Site selected for 200/600 GPM Pump must be relatively level and free from rocks and vegetation. Consideration must be given to the location and distances to other components of the fueling system, length of available hose line and elevations at which other components are to be located. Refer to system manual and Petroleum Supply Point Equipment and Operations FM 10-69.

b. Positioning 200/600 GPM Pump on Selected Site.

(1) Wheels positioning (wheels up). Refer to Figure 2-3.

WARNING

When raising the 200/600 GPM Pump, turn the jack screw crank handles evenly or the pump could tip over and cause injury to personnel or equipment damage.

(a) Install two screw jacks (1) on winch end of 200/600 GPM (2) and install detent pins (3).

(b) Using two people, crank two screw jacks (1) at same time until wheels (4) are off the ground.

(c) Remove detent pins (5) from wheels (4) and rotate wheels (4) to up position and install detent pins (5).

(d) Lower unit until frame (6) is on the ground.

(e) Remove two detent pins (3) and remove two screw jacks (1).

(f) To raise other wheels repeat steps (a) thru (e).

2-6. ASSEMBLY AND PREPARATION FOR USE - continued.

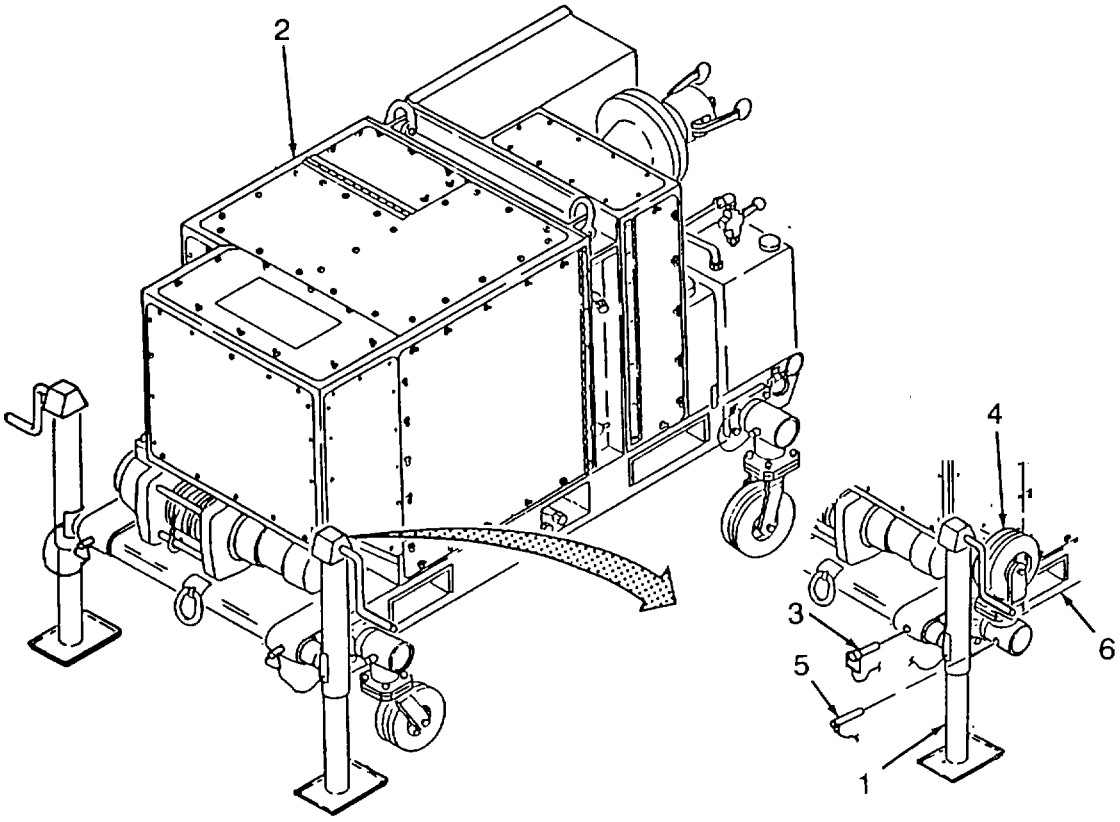


Figure 2-3. Wheel Positioning (Wheels Up)

2-6. ASSEMBLY AND PREPARATION FOR USE - continued.

(2) Sling positioning (wheels up). Refer to Figure 2-4.

CAUTION

Be careful when using a lifting device or damage to equipment could result if not properly handled.

(a) Connect sling (1) to lifting shackle anchors (2) of 200/600 GPM Pump (3).

WARNING

Lifting or moving heavy equipment incorrectly can cause serious injury. Do not stand under lifted assembly or position where you could be pinned against another object. Death or serious injury may occur.

(b) Attach sling (1) to lifting device and lift.

(c) Position 200/600 GPM Pump (3) in designated site and lower it to the ground.

(d) Disconnect sling (1) from lifting shackle anchors (2).

(3) Forklift positioning (wheels up or down). Refer to Figure 2-4.

CAUTION

Be careful when using a forklift or damage to equipment could result if not properly handled.

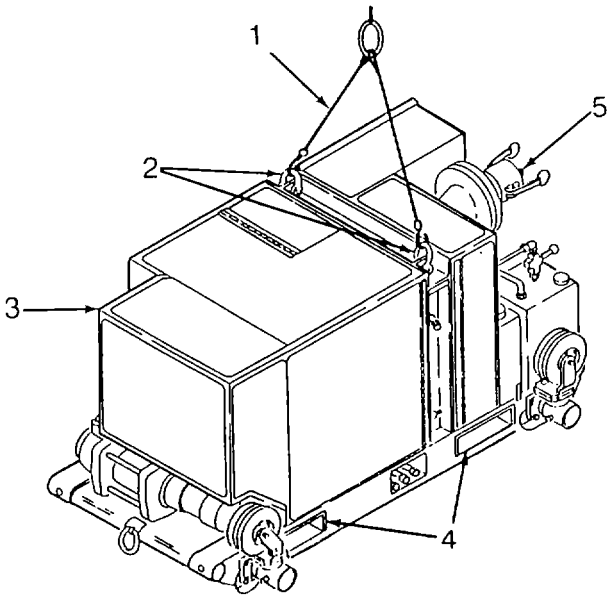


Figure 2-4. Sling and Forklift Positioning (Setup)

2-6. ASSEMBLY AND PREPARATION FOR USE - continued.

NOTE

The ground stud side is the preferred lifting side.

(a) Guide forklift tongs into forklift guides (4) on the 200/600 GPM Pump (3) and lift.

(b) Position 200/600 GPM Pump (3) in designated site and lower it to the ground.

(4) Winch positioning (wheels up or down). Refer to Figure 2-5.

WARNING

Do not touch cold metal parts with bare hands when operating under arctic conditions. Frostbite could cause permanent injury.

(a) Lift up on lock (1) and turn winch control handle (2) to freewheeling position.

CAUTION

When extending wire rope, leave a minimum of five wraps on the drum or damage to equipment could occur.

(b) Grasp winch hook (3) and pull to object to be connected and connect.

(c) Lift up on lock (1) and turn winch control handle (2) to the engaged position.

(d) On door (4) release 13 turn-lock fasteners (5) and open door (4).

CAUTION

When winch is in operation, be careful not to damage door or electrical cord. Move 200/600 pump slowly.

(e) Remove winch control box (6) from 200/600 GPM Pump (7) and extend electrical cord (8).

WARNING

Keep a safe distance from wire rope and path of load during operation. Wire rope failure could cause personnel injury or death.

(f) On winch control box (6) press retract switch (9) and walk along with the 200/600 GPM Pump (7) to required position.

(g) When 200/600 GPM Pump (7) is at required position, release the retract switch (9).

(h) On winch control box (6) press extend switch (10) and remove hook (3).

(i) With one person holding hook (3) to keep tension on wire rope and rewind wire rope evenly on winch (11). Press retract switch (9).

(j) Place winch control box (6) in 200/600 GPM Pump (7).

(k) Close door (4) and lock 13 turn-lock fasteners (5).

2-6. ASSEMBLY AND PREPARATION FOR USE - continued.

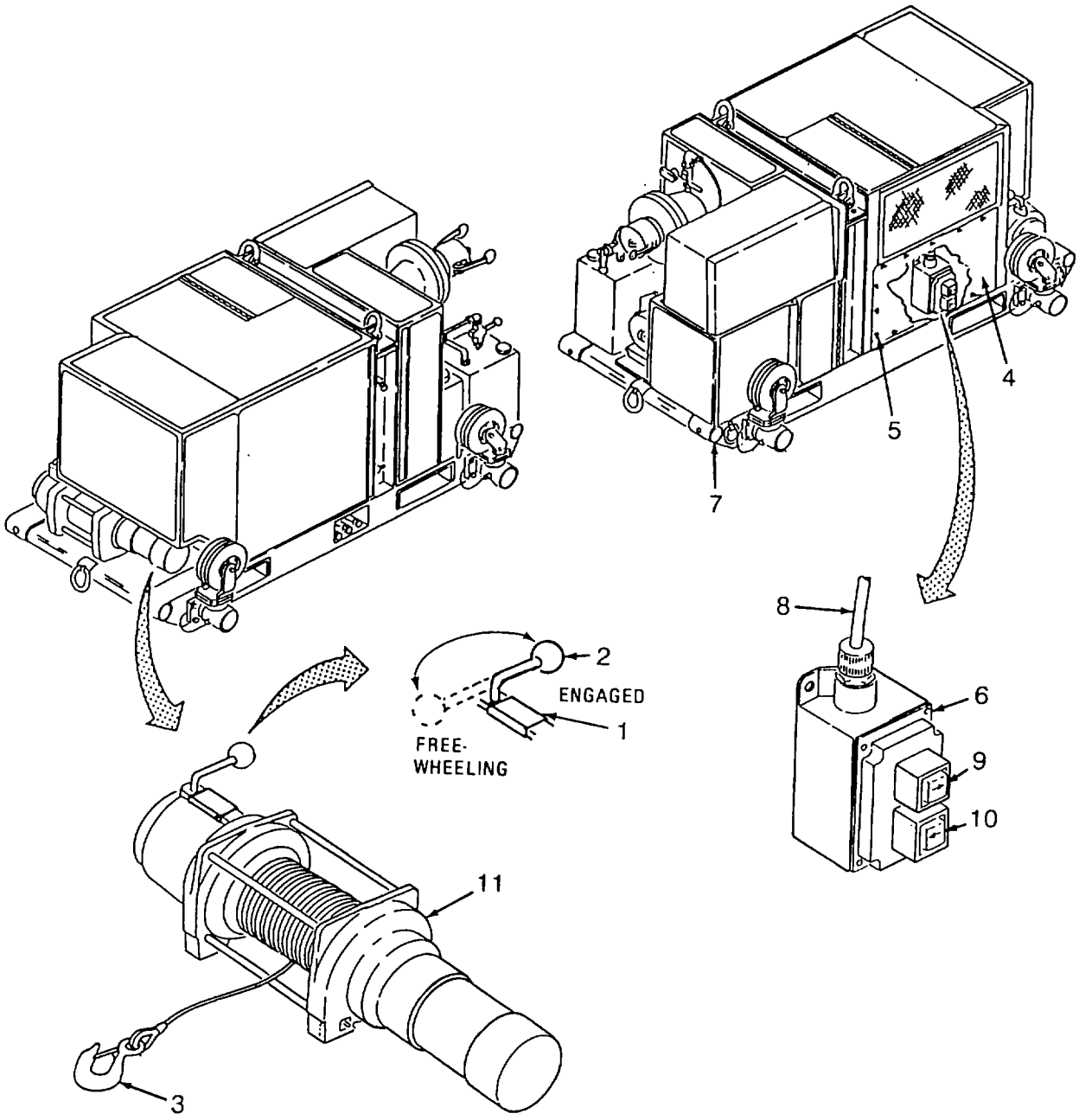


Figure 2-5. Winch Positioning

2-6. ASSEMBLY AND PREPARATION FOR USE - continued.

(5) Exhaust extension. Refer to Figure 24.

(a) On panel (1) release ten turn-lock fasteners (2) and remove panel (1). Retain panel (1) for future use.

(b) On door (3) release 15 turn-lock fasteners (4) and open door.

(c) Remove exhaust extension (5) from mounting bracket (6).

(d) Position exhaust extension (5) on muffler (7) and lock ten turn-lock fasteners (8).

(e) Remove handles (9) from muffler extension (5). Retain handles (9) for future use.

(f) Close door (3) and lock 15 turn-lock fasteners (4).

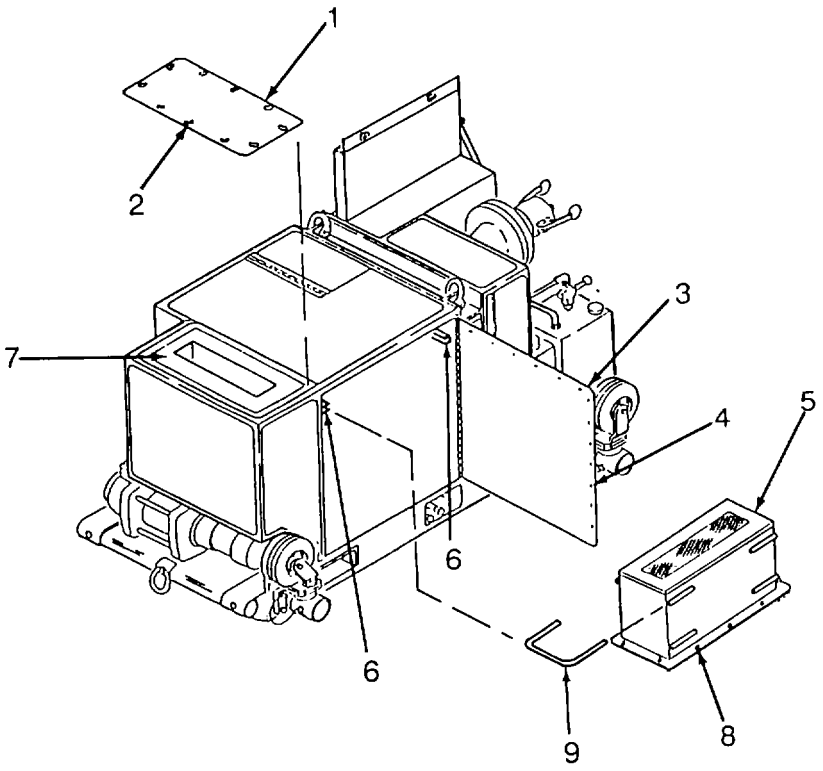


Figure 2-6. Exhaust Extension Installation

2-6. ASSEMBLY AND PREPARATION FOR USE - continued.

(6) Control panel. Refer to Figure 2-7.

(a) On control panel (1) release two turn-lock fasteners (2) and lift up.

(b) Rotate door latch (3) and position it on mounting lug (4).

WARNING

Make sure ground rod is installed. Failure to observe this warning may result in injury to personnel or death.

(7) Install ground rod. Refer to applicable system TM.

(8) Install 200/600 GPM fuel pump suction and discharge hose. Refer to applicable system TM.

(9) External fuel supply. Refer to applicable system TM.

(10) Place suitable container under drain and remove drain cap (5).

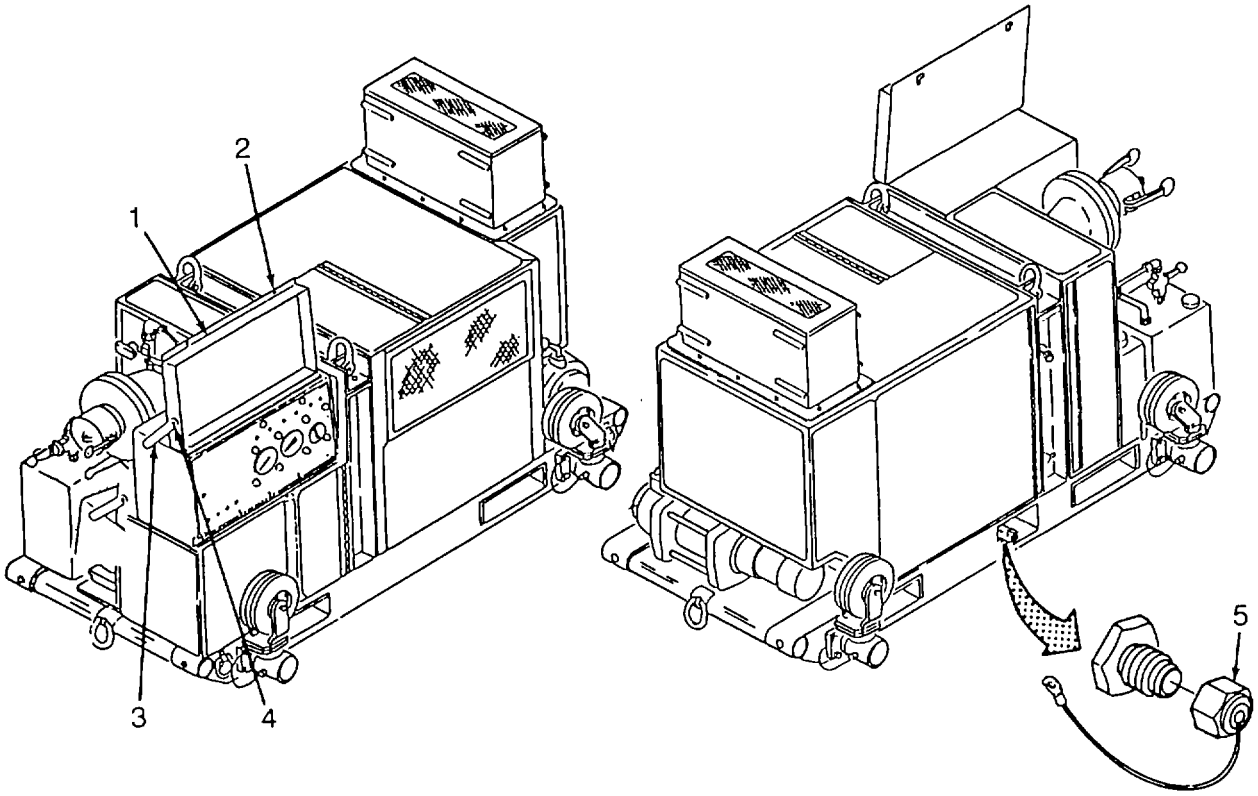


Figure 2-7. 200/600 GPM Pump Preparation for Use

2-7. OPERATING PROCEDURES.

a. Starting. Refer to Figure 2-8.

CAUTION

All doors and panels must be installed and turn-lock fastners locked. Failure to observe this may result in damage to equipment.

NOTE

If panel lights are required, turn panel lights on.

(1) Connect battery (1) and push in circuit breakers (2).

(2) PRIMING SHUT OFF VALVE (3) turn handle to on.

(3) FUEL SELECTOR VALVE (4) turn handle to external.

(4) On 200/600 GPM fuel pump (5) loosen T-handle (6) and rotate handle (7) in open position (vertical position). Tighten T-handle (6).

(5) Priming vent drain tank valve (8) set handle to close (vertical position).

(6) On the control panel (7) position PUMP CLUTCH switch (10) to disengaged.

(7) START switch (11) set to stop.

(8) Engine pump (12) and fuel heat switches (13) set to off.

(9) Pull MASTER switch (14) on.

(10) If temperature is below 0°F (-32°C), set FUEL HEAT switch (13) to on and wait approximately 30 seconds. If below -20°F (-28°C), set FUEL HEAT switch (13) to on and wait approximately 1 minute and 30 seconds. After approximate time, turn fuel heat switch (13) to off.

(11) ENGINE PUMPS switch (12) set to on for fifteen seconds before starting engine.

WARNINGS

- If emergency shutdown is required, push in MASTER switch to turn off the on 200/600 GPM Pump. Failure to observe this warning may result in serious injury or death to personnel.

- Ear protection is required when operating the 200/600 GPM Pump. Serious hearing loss could occur if operated without ear protection.

2-7. OPERATING PROCEDURES - continued.

NOTE

If 200/600 GPM Pump fails to start due to low battery power, a slave cable receptacle is provided.

(12) START switch (12) set to start/run.

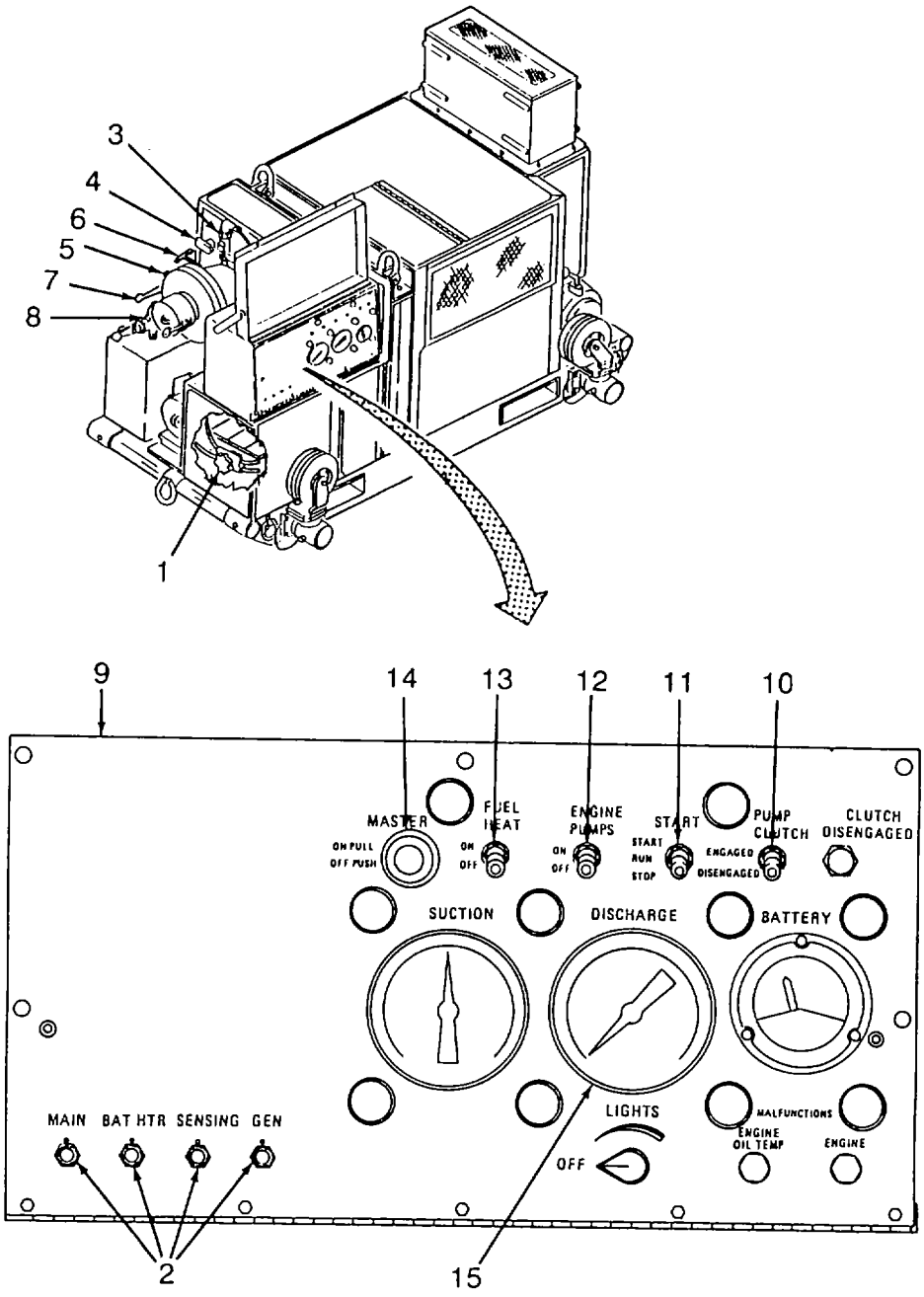


Figure 2-8. 200/600 GPM Pump Starting, Operating and Shutdown Procedures

2-7. OPERATING PROCEDURES - continued.

b. Operate. Refer to Figure 2-8.

NOTE

Engine reaches operating speed in one minute on the 200/600 GPM Pump and is ready for operation.

(1) Set PUMP CLUTCH switch (10) to engaged.

(2) When DISCHARGE pressure gage (15) reads 20 psi, turn PRIMING SHUT OFF VALVE (1) handle to off.

(3) FUEL SELECTOR VALVE (4) turn handle to internal.

(4) On priming vent drain tank handle (8), set handle to open (horizontal position) for one minute then close (vertical position).

c. Shutdown. Refer to Figure 2-8.

(1) On the control panel (9) set PUMP CLUTCH switch (10) to disengaged.

(2) START switch (11) set to stop.

CAUTION

Do not turn engine pumps off until engine stops rotating (approximately one minute). Damage to turbine could occur.

(3) ENGINE PUMPS switch (12) set to off when engine stops rotating.

(4) Push MASTER switch (14) off.

(5) FUEL SELECTOR VALVE (4) turn handle to off.

(6) Loosen T-handle (6) and rotate handle (7) to closed position (horizontal position). Tighten T-handle (6).

(7) Disconnect battery (1) and pull out circuit breakers (2).

2-8. DECALS AND INSTRUCTION PLATES.

Decals and instruction plates are used on the 200 and 600 GPM pumps to advise the operators of proper operating and maintenance procedures, to inform them of the equipments characteristics, features and capabilities and to warn him of unsafe and dangerous operations and conditions. Data plates on this equipment with location and data are illustrated in Figure 2-9.

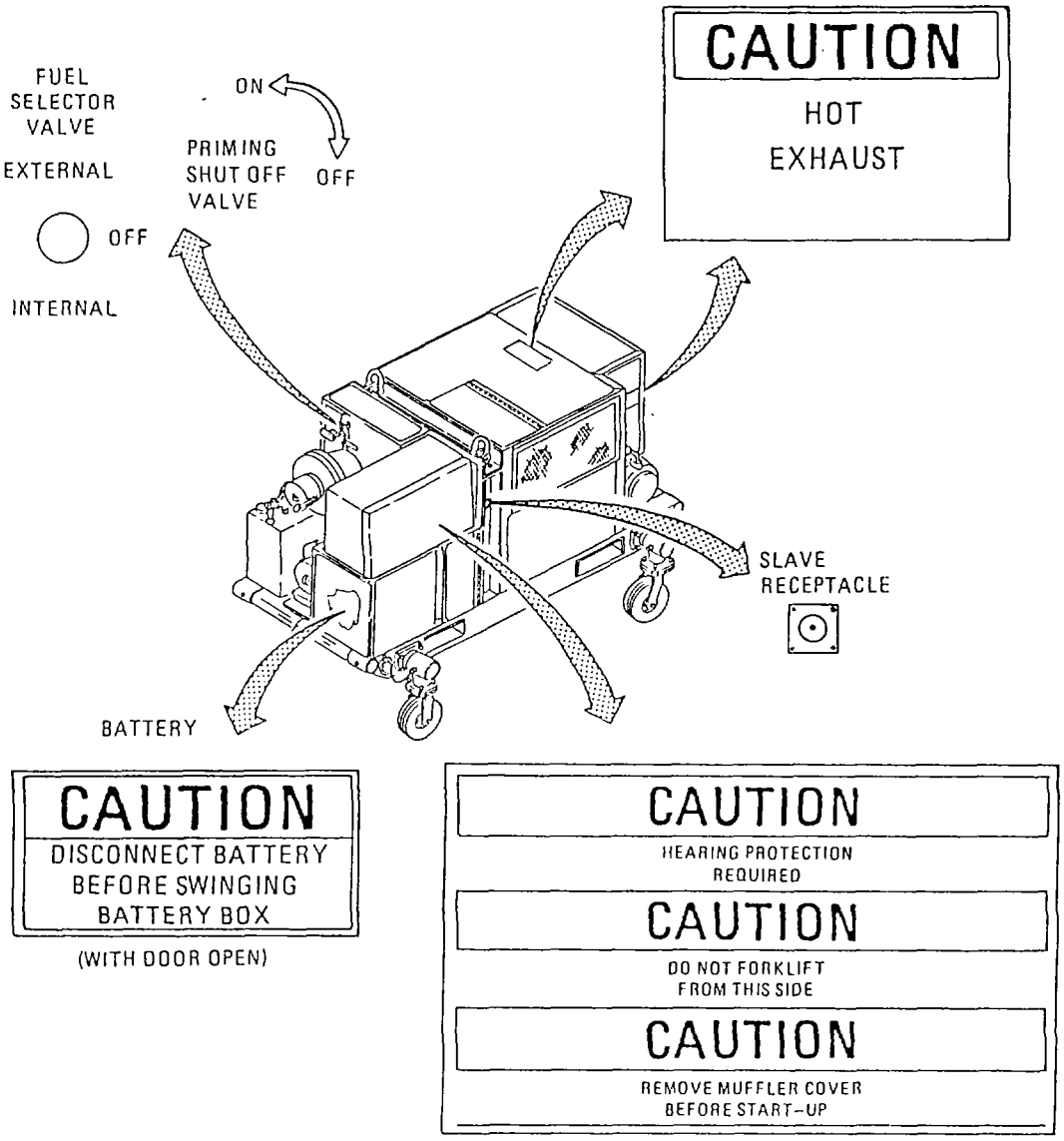


Figure 2-9. Decals and Instruction Plates (Sheet 1 of 2)

2-8. DECALS AND INSTRUCTION PLATES - continued.

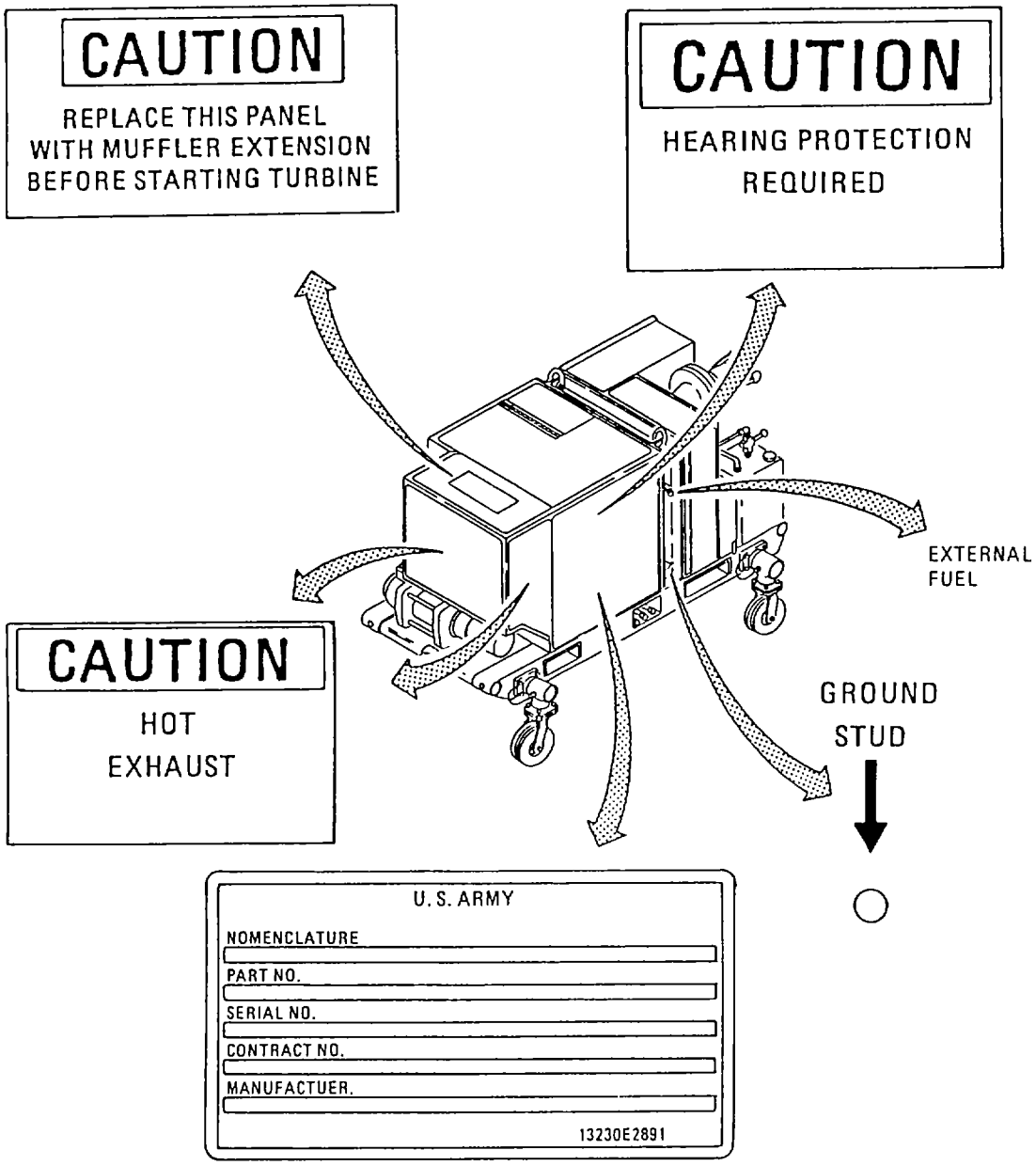


Figure 2-9. Decals and Instruction Plates (Sheet 2 of 2)

2-9. PREPARATION FOR MOVEMENT.

a. The following prepares the 200/600 GPM Pump for movement. Refer to Figure 2-10.

(1) Shutdown 200/600 GPM Pump. Refer to paragraph 2-7 shutdown.

(2) Disconnect external fuel supply. Refer to applicable system TM.

(3) Disconnect 200/600 GPM fuel pump hoses. Refer to applicable system TM.

(4) Remove ground rod. Refer to applicable systems TM.

(5) On the control panel door (1). Remove door latch(2) from mounting lug (3).

(6) Close control panel door (1) and lock two turn-lock fasteners (4).

WARNING

To avoid burns, wear hand protection when removing muffler extension. The muffler extension may be very hot.

(7) Insert handles (5) in exhaust extension (6).

WARNING

Lifting or moving equipment incorrectly may cause serious injury. Do not try to lift or move more than 50 pounds by yourself. Get an assistant. Do not support weight with your back.

(8) On exhaust extension (6) release ten turn-lock fasteners (7) and remove exhaust extension(6) from muffler (8).

(9) On door (9) release 15 turn-lock fasteners (10) and open door.

(10) Install handle (5) in mounting brackets (11) and slide exhaust extension (6) inward on 200/600 GPM Pump (8).

(11) Close door (9)and lock 15 turn-lock fasteners (10).

(12) Install panel (12) on muffler (8) and lock ten turn-lock fasteners (13).

2-9. PREPARATION FOR MOVEMENT - continued.

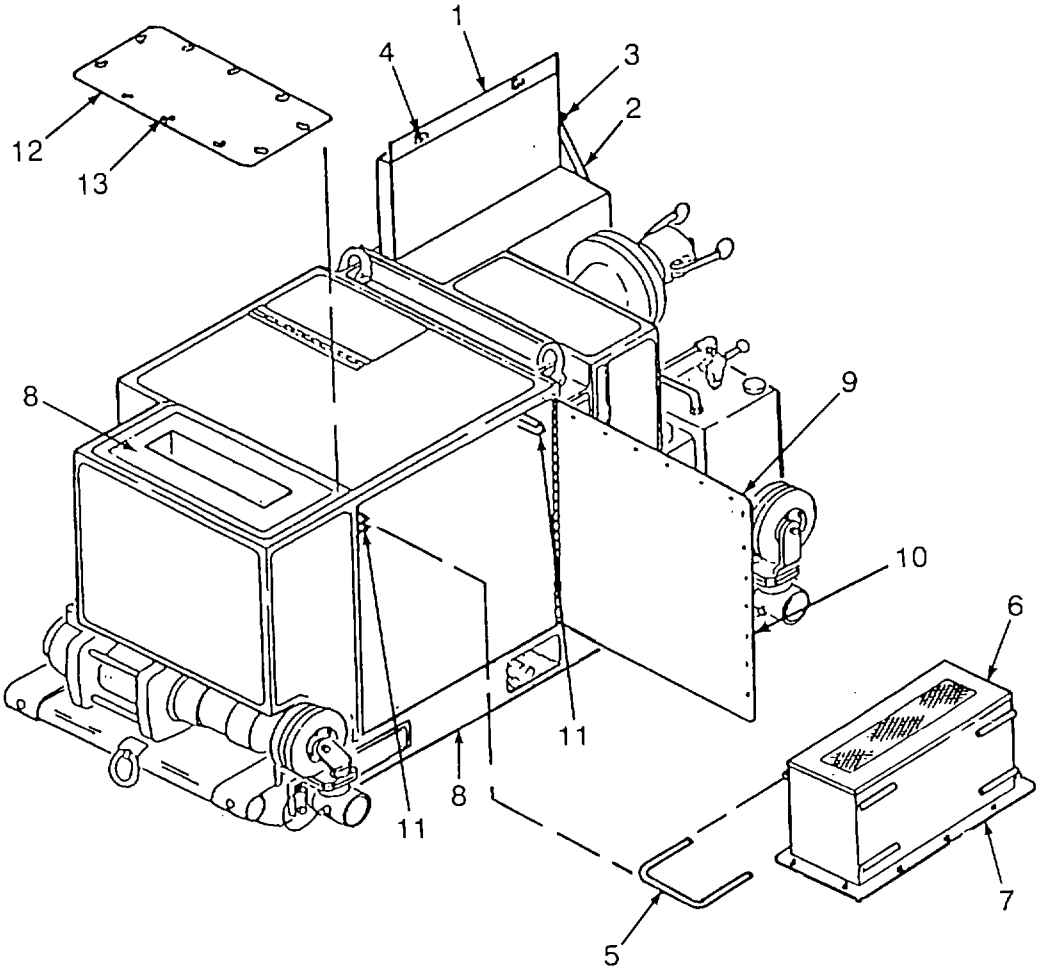


Figure 2-10. Preparation for Movement (Packing Up)

2-9. PREPARATION FOR MOVEMENT - continued.

(13) Sling positioning (wheels up). Refer to Figure 2-11.

CAUTION

Be careful when using a lifting device or damage to equipment could result if not properly handled.

(a) Connect sling (1) to lifting shackle anchors (2) of 200/600 GPM Pump (3).

WARNING

Lifting or moving heavy equipment incorrectly can cause serious injury. Do not stand under lifted assembly or position where you could be pinned against another object. Death or serious injury may occur.

(b) Attach sling (1) to lifting device and lift.

(c) Position 200/600 GPM Pump (3) in designated site and lower it to the ground.

(d) Disconnect sling (1) from lifting shackle anchors (2).

(14) Forklift positioning (wheels up or down). Refer to Figure 2-11.

CAUTION

Be careful when using a forklift or damage to equipment could result if not properly handled.

NOTE

The ground stud side is the preferred lifting side.

(a) Guide forklift tongs into forklift guides (4) on the 200/600 GPM Pump (3) and lift.

(b) Position 200/600 GPM Pump (3) to designated site and lower it to the ground.

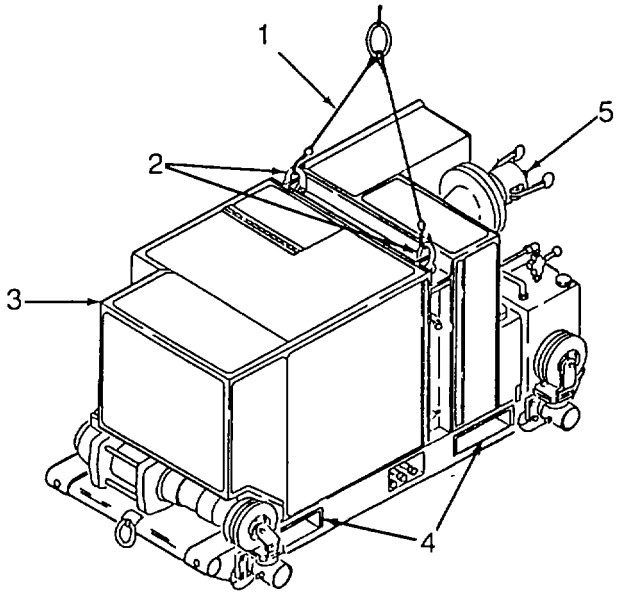


Figure 2-11. Sling and Forklift Positioning (Movement)

2-9. PREPARATION FOR MOVEMENT - continued.

(15) Wheels positioning (wheels down). Refer to Figure 2-12.

WARNING

When raising the 200/600 GPM Pump, turn the jack screw crank handles evenly or the pump could tip over and cause injury to personnel or equipment damage.

(a) Install two screw jacks (1) on winch end of 200/600 GPM Pump (2) and install detent pins (3).

(b) Using two people, crank two screw jacks (1) at same time until the 200/600 GPM Pump (2) is approximately 12 inches (30.48 cm) off the ground.

(c) Remove detent pins (4) from wheels (5) and rotate wheels (5) to down position and install detent pins (5).

(d) Lower 200/600 GPM Pump (2) until wheels (5) are on the ground.

(e) Remove two detent pins (3) and remove two screw jacks (1).

(f) To lower other wheels repeat steps (1) thru (5).

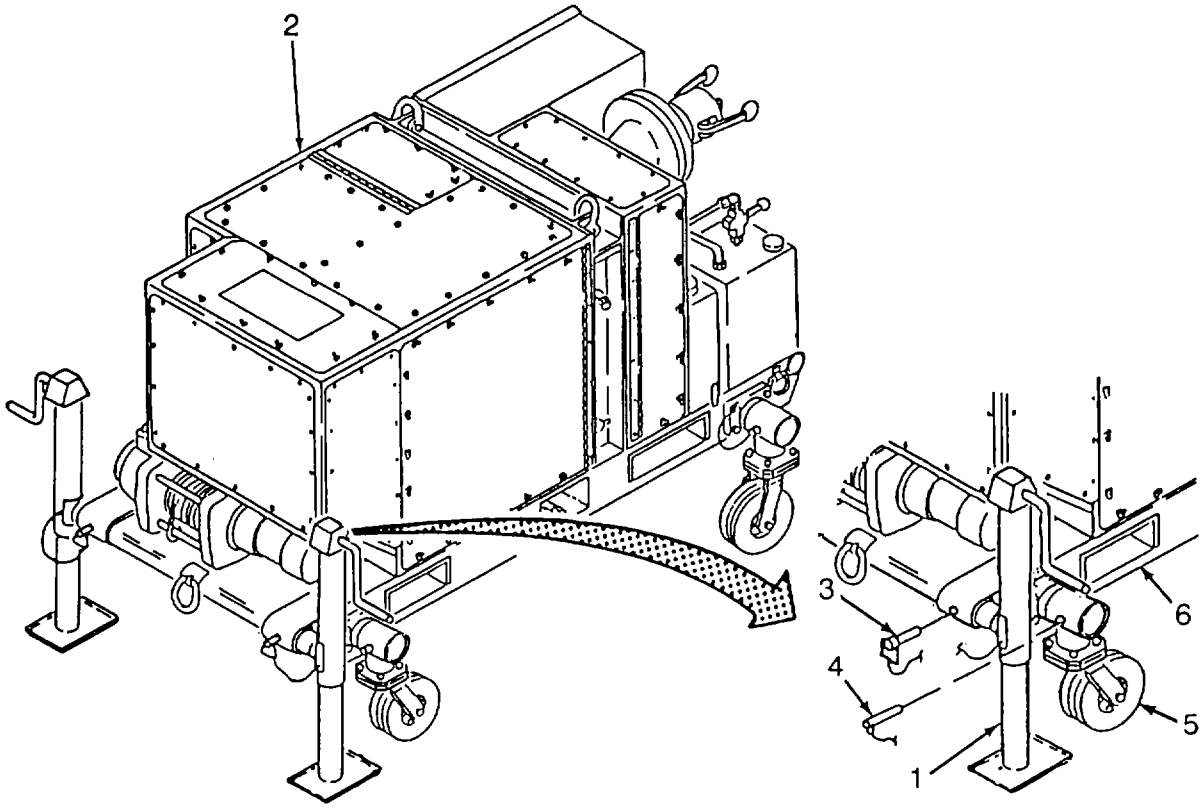


Figure 2-12. Wheel Positioning (Wheels Down)

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

12-10. OPERATION IN EXTREME HEAT.

CAUTION

In extreme heat, do not operate 200/600 GPM Pump or damage could occur to unit.

Do not operate 200/600 GPM Pump if temperature is above 95°F (35°C).

2-11. OPERATION IN SALT WATER AREAS.

Operation in salt water areas accelerates corrosion on bare metal surfaces. Observe the following precautions when operating 200/600 GPM Pump in this environment.

CAUTION

Do not rinse intake or exhaust areas; damage to equipment may occur.

a. Position pump in a manner to minimize salt spray from entering air intake.

CAUTION

Do not rinse intake or exhaust areas; damage to equipment may occur.

b. Following operation in salt water areas, rinse components with clean fresh water to remove salt spray and/or salt deposits.

2-12. OPERATION IN DUSTY AREAS.

Shutdown 200/600 GPM Pump during dust storms and cover or store unit in shelter.

2-13. EMERGENCY PROCEDURES.

a. Push Master Switch to shutdown 200/600 GPM Pump.

b. Close all valves.

2-14. DECONTAMINATION PROCEDURES.

a. General.

The following emergency procedures can be performed until field NBC DECON facilities are available. Refer to FM 3-3, FM 3-4, FM 3-5.

12-14. DECONTAMINATION PROCEDURES.

b. Emergency Procedures.

If NBC attack is suspected or known do the following:

(1) Stop pumping fuel.

(2) Shutdown the 200/600 GPM Pump and reduce the risk of introducing contamination into the system.

(3) Do not connect or disconnect components from 200/600 GPM Pump. System integrity must be maintained until decontamination of equipment is complete.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. LUBRICATING INSTRUCTIONS

3-1. LUBRICATION ORDERS.

200/600 GPM Pump. Refer to LO 10-4320-342-12 for Lubrication Order.

Section II. TROUBLESHOOTING PROCEDURES

3-2. INTRODUCTION.

The Malfunction Index lists the common malfunctions which you may find during operation of the 200/600 GPM Pump or its components. You should perform test/inspections and corrective actions in the order listed. This manual cannot list all malfunctions that may occur nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

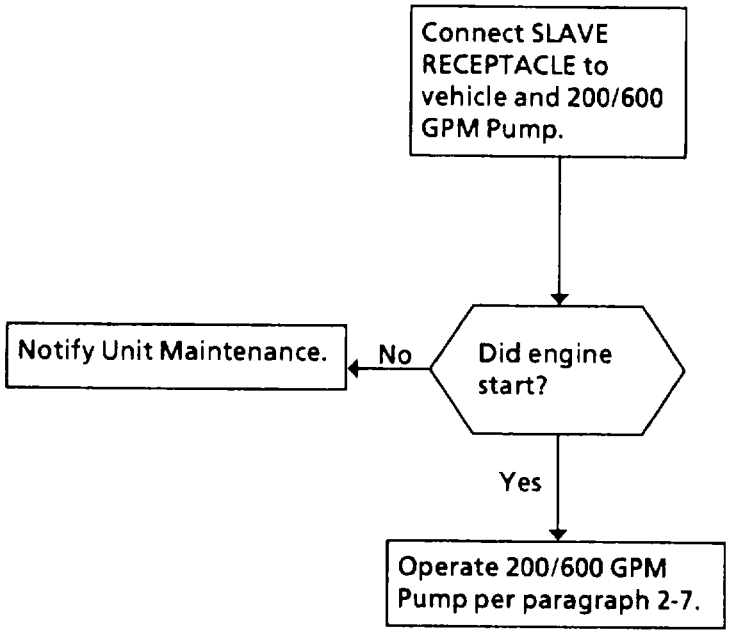
3-2. INTRODUCTION - continued.

MALFUNCTION INDEX

3-3. TROUBLESHOOTING PROCEDURES.

Table 3-1. Operator Troubleshooting

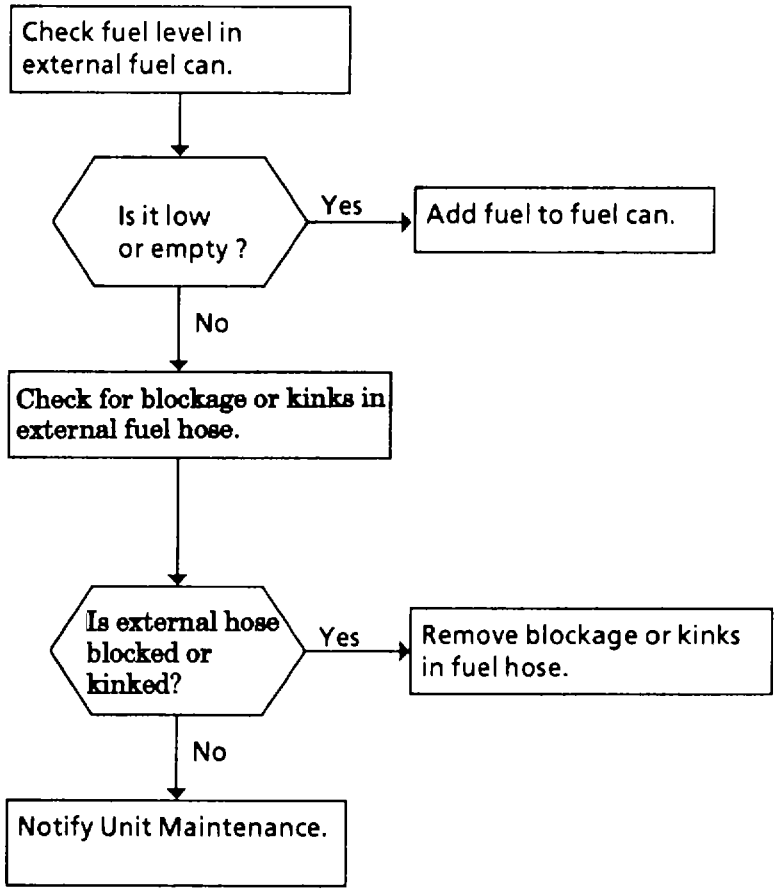
1. ENGINE FAILS TO CRANK.



3-3. TROUBLESHOOTING PROCEDURES - continued.

Table 3-1. Operator Troubleshooting- continued.

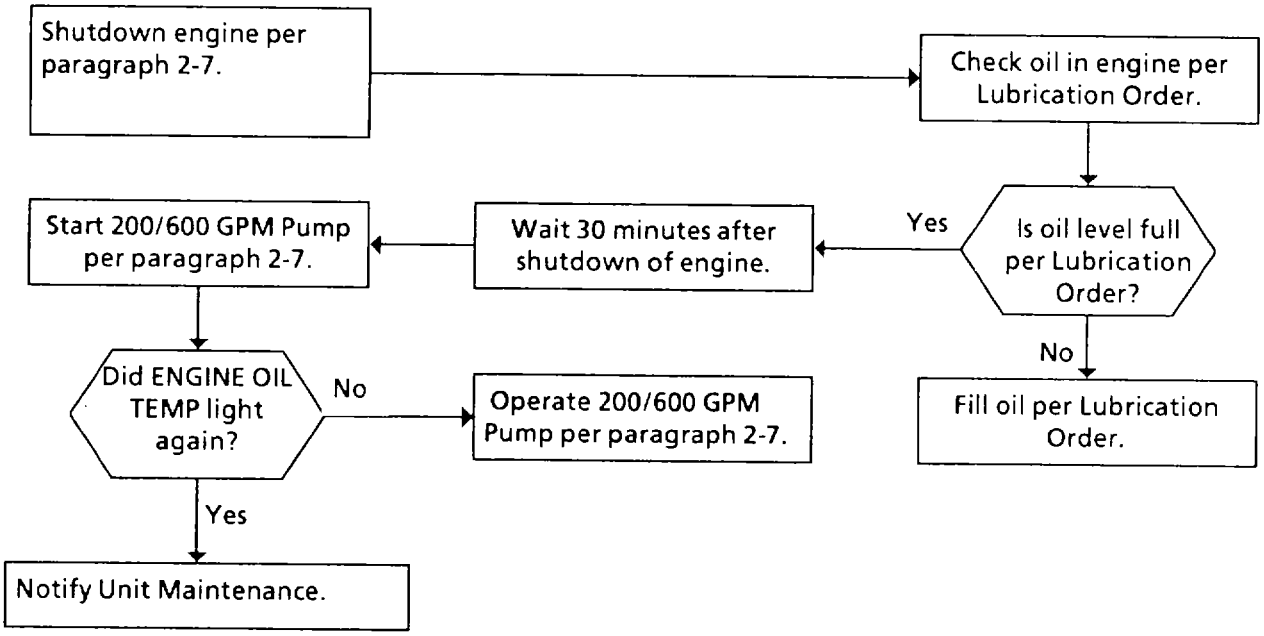
2. ENGINE CRANKS BUT FAILS TO START.



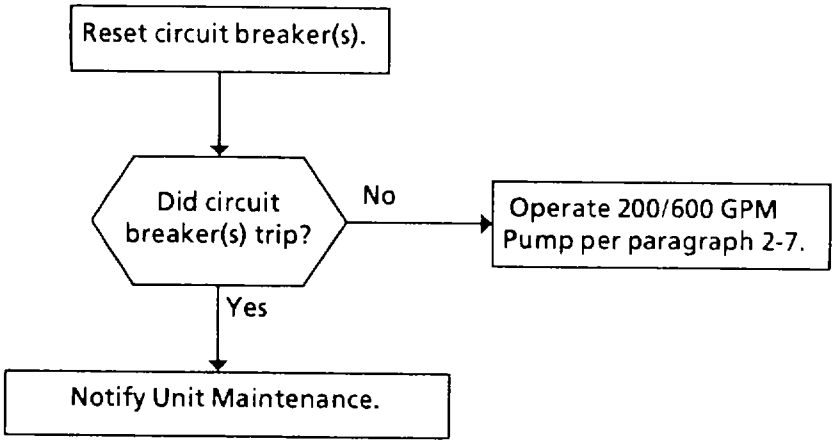
3-3. TROUBLESHOOTING PROCEDURES - continued.

Table 3-1. Operator Troubleshooting- continued.

3. ENGINE OIL TEMP LIGHT ILLUMINATES.



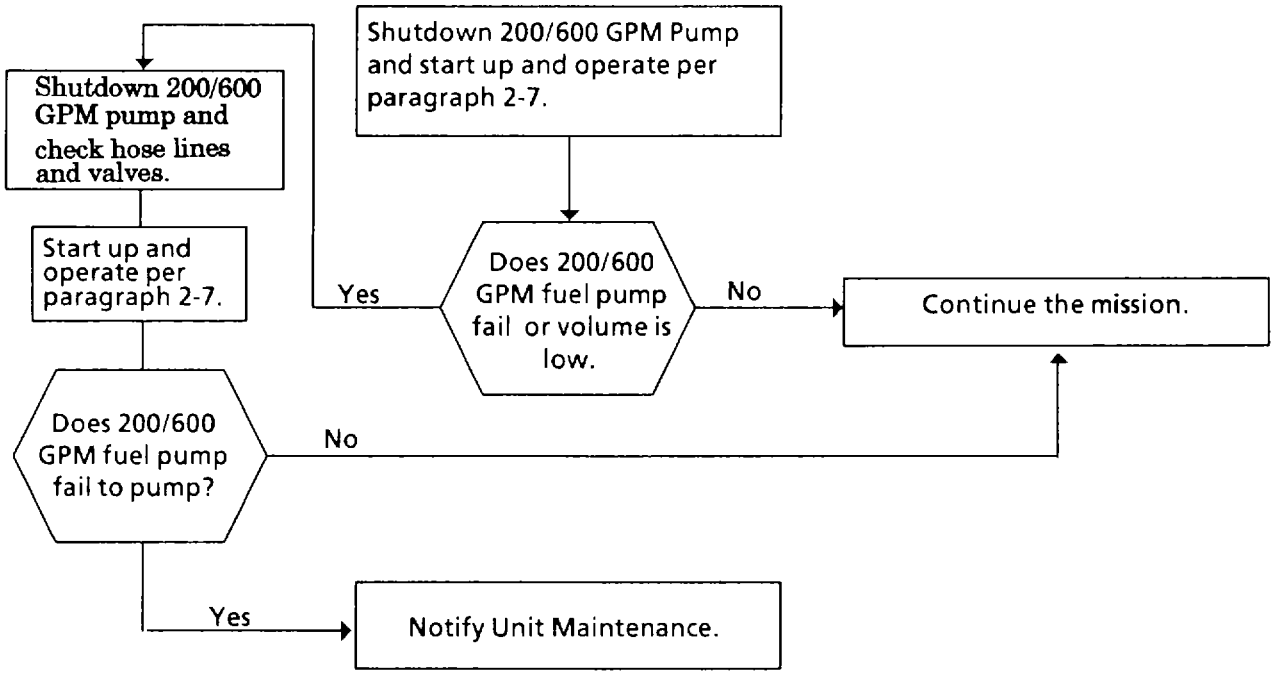
4. CIRCUIT BREAKER(S) TRIPPED.



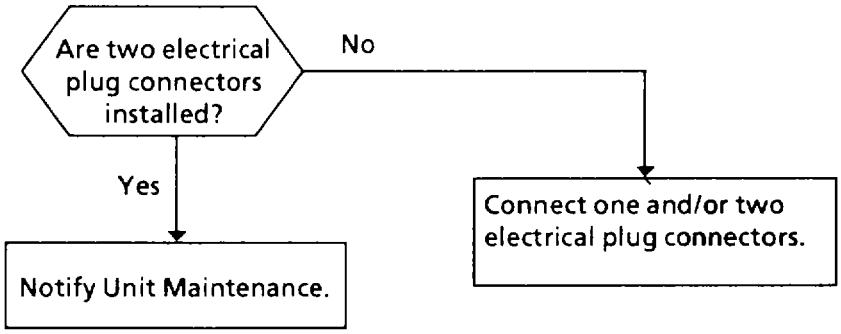
3-3. TROUBLESHOOTING PROCEDURES - continued.

Table 3-1. Operator Troubleshooting- continued.

5. 200/600 GPM FUEL PUMP FAILS TO PUMP OR PUMPS LOW VOLUME.



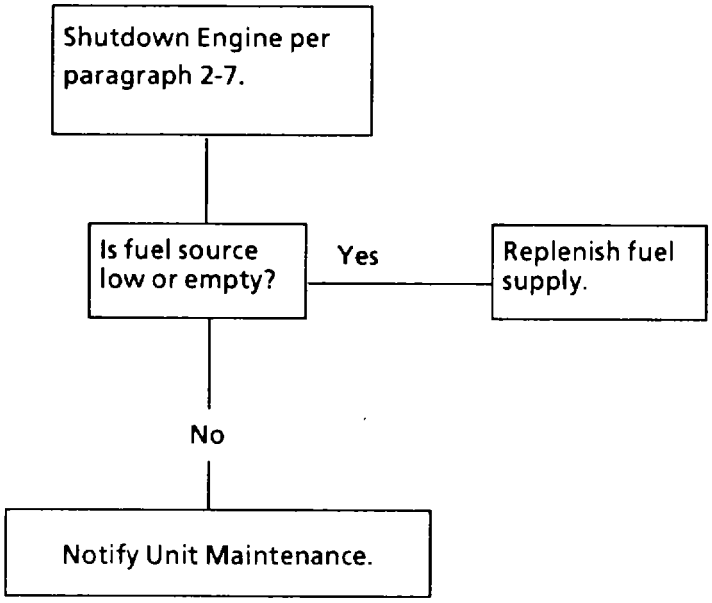
6. WINCH INOPERABLE.



3-3. TROUBLESHOOTING PROCEDURES - continued.

Table 3-1. Operator Troubleshooting - continued.

7. CLUTCH DISENGAGED LIGHT ILLUMINATES.



Section III. MAINTENANCE PROCEDURES

3-4. INTRODUCTION.

There are no operator maintenance procedures for the 200/600 GPM Pump.

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual. Also listed are those publications that should be consulted for additional information about the 200/600 GPM Pump and its major components.

A-2. FORMS.

Recommended Changes to Publications and Blank Forms ..... DA FORM 2028

Recommended Changes to Equipment Technical Publications ..... DA FORM 2028-2

Equipment Inspection and Maintenance Worksheet ..... DA FORM 2404

Equipment Control Record ..... DA FORM 2408-9

Product Quality Deficiency Report ..... SF 368

Report of Discrepancy (RO) ..... SF 364

A-3. FIELD MANUALS.

Operation and Maintenance of Ordinance Material in Cold Weather ..... FM 9-207

First Aid for Soldiers ..... FM 21-11

Basic Cold Weather Manual ..... FM 31-70

Northern Operations ..... FM 31-71

NBC Decontamination Manual ..... FM 3-3

Protection Manual ..... FM 3-4

Decontamination Manual FM3-5

Aircraft Refueling ..... FM 10-68

Petroleum Supply Point Equipment and Operations ..... FM 10-69

Petroleum Tank Vehicle Operations ..... FM 10-71

A-4. TECHNICAL MANUALS.

Procedures for Destruction of Equipment to Prevent Enemy Use ..... TM 750-244-3

A-5. LUBRICATION ORDER.

Lubricating Order, 200/600GPM Pump ..... LO 10-4320-342-12

A-6. MISCELLANEOUS PUBLICATIONS.

The Army Maintenance Management System (TAMMS) ..... DA PAM 738-750

Consolidated Index of Army Publications and Blank Forms ..... DA PAM 25-30

APPENDIX B
COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

Section I. INTRODUCTION

B-1. SCOPE.

This appendix lists components of end item and basic issue items for the 200/600 GPM Pump to help you inventory items required for safe and efficient operation.

B-2. GENERAL.

The Components of End Item and Basic Issue Items List are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the 200/600 GPM Pump, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the 200/600 GPM Pump in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the 200/600 GPM Pump during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard to-identify items. This manual is your authority to request/requisition replacement BII, based on authorization of the end item by the TOE/MTOE.

B-3. EXPLANATION OF COLUMNS.

The following provides an explanation of columns found in the tabular listing:

a. ILLUS NUMBER Column. This column gives you the number of the item illustrated.

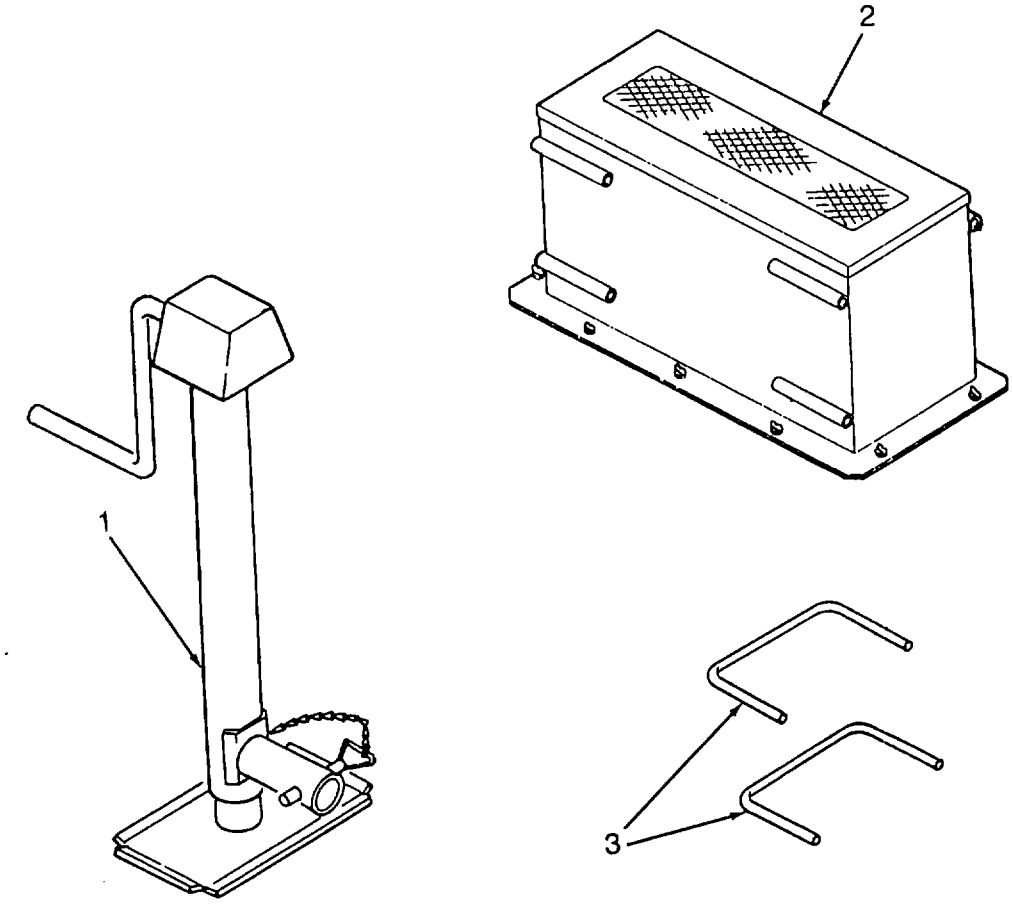
b. NATIONAL STOCK NUMBER Column. Indicates the stock number of the item to be used for requisitioning purposes.

c. DESCRIPTION AND USABLE ON CODE Column. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the CAGEC (Commercial and Government Entity Code) (in parenthesis) and the part number.

d. UNIT OF ISSUE Column. Indicates how the item is issued for the National Stock Number shown in column two.

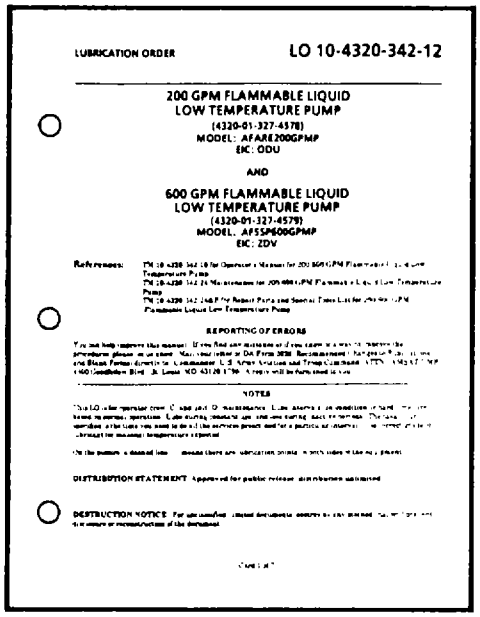
e. QTY REQD Column. Indicates the quantity required.

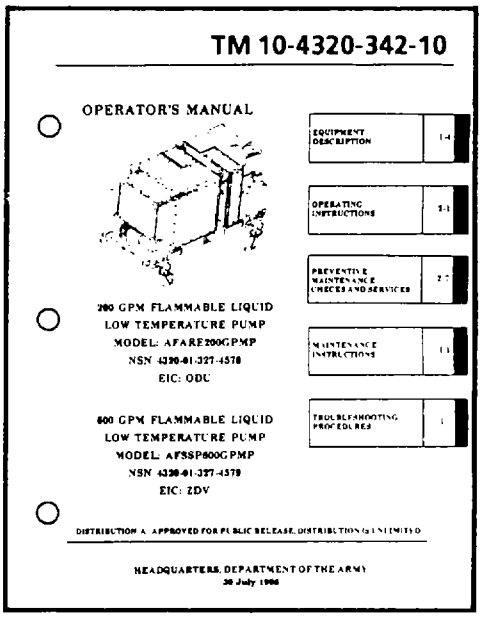
Section II. COMPONENTS OF END ITEM-continued.



(1) ILLUS	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER* (Usable on Code)	(4) U/I	(5) QTY REQD
1		JACK, SCREW (97403) 13230E2987	EA	2
2		MUFFLER, EXTENSION (97403) 13230E3040	EA	1
3		HANDLE (97403) 13230E3048	EA	2

Section III. BASIC ISSUE ITEMS-continued.





(1) ILLUS	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER* (Usable on Code)	(4) U/I	(5) QTY REQD
1		LUBRICATION ORDER LO 10-4320-342-12	EA	1
2		OPERATOR'S MANUAL TM 10-4320-342-10	EA	1

APPENDIX C
ADDITIONAL AUTHORIZATION LIST (AAL)

Section I. INTRODUCTION.

C-1. SCOPE.

This list identifies items that do not have to accompany the 200/600 GPM Pump and do not have to be turned in with it. These items are all authorized for use by CTA, MTOE, TDA, or JTA.

Section II. ADDITIONAL AUTHORIZATION ITEMS LIST.

There are no additional authorization items for the 200/600 GPM Pump.

APPENDIX D
EXPENDABLE/ DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE.

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the 200/600 GPM Pump. This listing is for informational purposes only and is not 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.

D-2. EXPLANATION OF COLUMNS.

a. ITEM NUMBER Column. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material; e.g., "Use Cleaning Compound (Item 5, APP D)."

b. LEVEL Column. This column identifies the lowest level of maintenance that requires the listed item:

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. NATIONAL STOCK NUMBER Column. This is the national stock number assigned to the item; use it to request or requisition the item.

d. ITEM NAME, DESCRIPTION, CAGE CODE, PART NUMBER Column. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the Commercial And Government Entity (CAGE) Code for Manufacturer in parentheses, followed by the part number.

e. UNIT OF ISSUE (U/I) Column. 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 rest of the issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE ITEMS LIST

(1) ITEM NO. NUMBER	(2) LEVEL	(3) NATIONAL STOCK	(4) DESCRIPTION	(5) U/M
1	C	7930-00-985-6911	Detergent, General Purpose (81349) MIL-D-16791	GL
2	C	7920-00-205-1711	Rags, Wiping (58536)	LB
3	C	6850-01-331-3349	Cleaning Solvent, Federal Specifications P-D-680, Type III	GL

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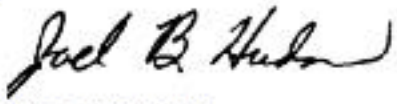
By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Acting Administrative Assistant to the
Secretary of the Army
00604

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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 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 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	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

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

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