

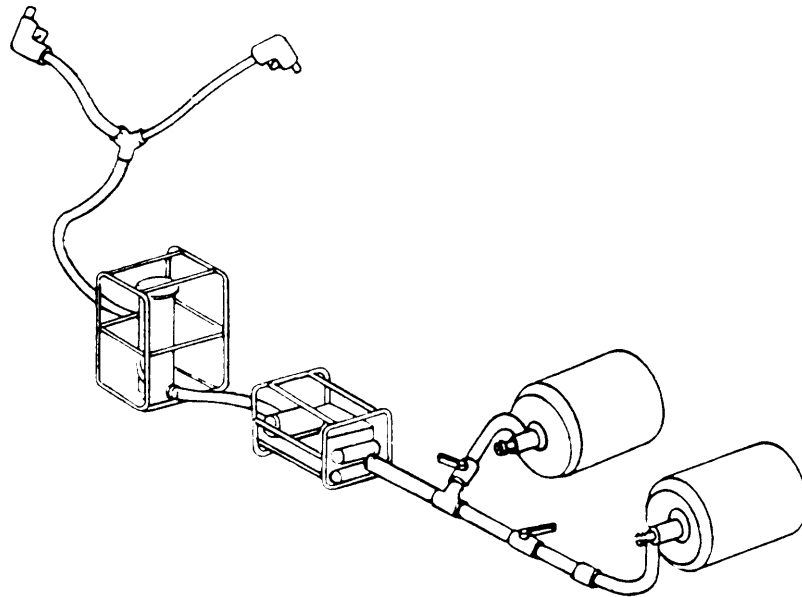
***TM 10-4930-229-12&P**

TECHNICAL MANUAL

**OPERATOR AND UNIT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FOR**

**FORWARD AREA REFUELING
EQUIPMENT (FARE)
(AMERICAN AIR FILTER MODEL RFE 1000)
NSN 4930-00-1 33-3041**

Approved for public release; Distribution is unlimited.



● This manual supersedes TM 5-4930-229-12&P, dated 7 January 1975, including all changes.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
26 SEPTEMBER 1991**

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 5 January 1996

Operator and Unit Maintenance Manual
(Including Repair Parts And Special Tools List)
For

FORWARD AREA REFUELING EQUIPMENT (FARE)
(AMERICAN AIR FILTER MODEL RFE 1000)
NSN 4930-00-133-3041

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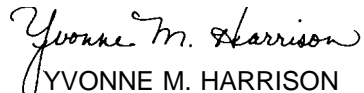
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WARNING

Make sure ground rod is inserted in ground and that ground wires are connected from pump and filter before starting fueling operations.

Connect a grounding wire from the closed circuit nozzle to a properly installed ground rod.

Connect bonding wire from nozzle to vehicle (by electrical clip or bonding jack) before touching nozzle to vehicle.

WARNING

Make sure all hoses have been drained of fuel before transporting system. Drain fuel tank and filter separator assembly before shipping. Leave vent valve and drain valve on filter-separator assembly open.

Fire extinguishers and other firefighting equipment must be operable and accessible.

WARNING

Gloves and other required protective clothing should be worn to prevent fuels from contacting the skin.

Frequent inspections of equipment, safety devices, and working areas, must be performed to insure personal and operational safety, and to correct potential or actual hazards that may exist.

WARNING

Weight of hose and component kits and pump assembly exceed limit for one-man lift, maximum height for two man lift is 2.8 feet.

WARNING

Make sure the wire in the suction hose is connected to the banding that holds the suction hose to the coupling. Ensure wire in suction hose is in contact with hose coupling and that electrical continuity exists.

WARNING

Do not smoke or use an open flame in vicinity of the Forward Area Refueling Equipment (FARE), failure to comply may result in personal injury.

WARNING

Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

FIRST AID

For First Aid treatment, refer to FM 21-11.

CHANGE
NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 February 1994

Operator and Unit Maintenance Manual
(Including Repair Parts and Special Tools List)
for

FORWARD AREA REFUELING EQUIPMENT (FARE)
(AMERICAN AIR FILTER MODEL RFE 1000,
NSN 4930-00-133-3041)

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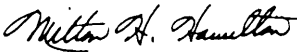
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OPERATOR'S, UNIT, AND DIRECT SUPPORT
MAINTENANCE MANUAL AND
REPAIR PARTS AND SPECIAL TOOLS LIST

**TANK AND PUMP UNIT, LIQUID DISPENSING,
FOR TRUCK MOUNTING
MIL DESIGN TANK AND PUMP UNIT
ELECTRIC MOTOR DRIVEN
MODEL (97403) 13226E2150
NSN 4930-01-274-0021**

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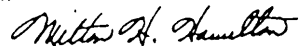
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CHANGE

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Operator and Unit Maintenance Manual
(Including Repair Parts and Special Tools List)
for

**FORWARD AREA REFUELING EQUIPMENT (FARE)
(AMERICAN AIR FILTER MODEL RFE 1000,
NSN 4930-00-133-3041)**

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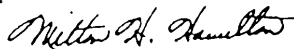
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**Operator and Unit Maintenance Manual
(including Repair Parts and Special Tools Lists)
for
FORWARD AREA REFUELING EQUIPMENT (FARE)
(MODEL RFE 1000, NSN 4930-00-133-3041)
Current as of date is 28 June 1991**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 631 20-1 798. A reply will be furnished to you.

Distribution STATEMENT A: Approved for public release; distribution is unlimited

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* This manual supersedes TM 5-4930-229-12&P, dated 7 January 1975, including all changes.

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CHAPTER 1

INTRODUCTION

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OVERVIEW

This chapter includes general information common to all Army equipment and specific information pertinent to the equipment covered in this manual.

Section I. GENERAL INFORMATION

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1-1. Scope. The scope of this manual is described in the following subparagraphs.

a. Type of Manual. This manual provides operator and unit and maintenance instructions for Forward Area Refueling Equipment (FARE) NSN 4930-00-133-3041. Included in these instructions are procedures forgetting up and operating the equipment under usual and unusual conditions as well as inspection, troubleshooting, repair and replacement of individual components and assemblies. This manual also provides a repair parts and special tools list in Appendix F.

b. Equipment Name. Forward Area Refueling Equipment, hereinafter referred to as FARE (figure 1-1)

c. Purpose of Equipment. FARE is used to transfer fuel from 500 gallon (1892.5 liter) collapsible drums to helicopters in forward combat areas. It can also be used to refuel fixed-wing aircraft and ground vehicles.

1-2. Maintenance Forms and Records. 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.

1-3. Destruction of Army Materiel to Prevent Enemy Use. For information and instructions on destruction of Army materiel to prevent enemy use, refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

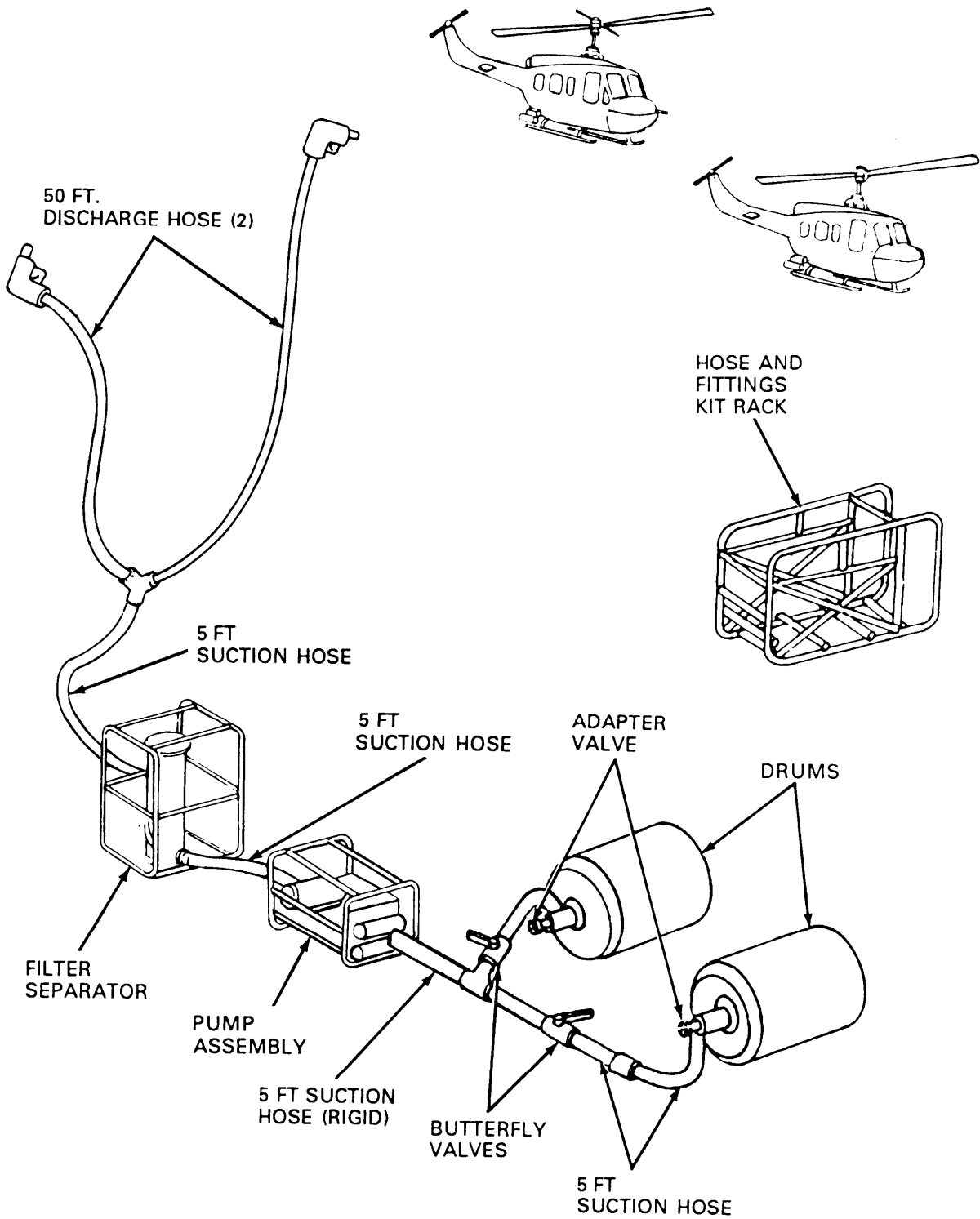


Figure 1-1. Typical Layout of FARE.

1-4. Preparation for Storage or Shipment. To prepare FARE for storage or shipment, refer to Chapter 4, Section VI of this manual.

1-5. Reporting of Equipment Improvement Recommendations (EIR). If the design of FARE 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 us at: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QP, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120-1798. We will send you a reply.

Section II. EQUIPMENT DESCRIPTION AND DATA

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1-7	Location and Description of Major Components 1-3
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1-6. Equipment Characteristics, Capabilities and Features. A summary of the characteristics, capabilities and features of the equipment is contained in the following subparagraphs.

a. *Characteristic* FARE (figure 1-1) consists of simple, lightweight refueling equipment that can be transported by fixed-wing and rotary wing utility and cargo aircraft. This equipment includes a pump/engine assembly (figure 1-2), a filter/separator assembly (figure 1-3), discharge hoses, fittings and frame assembly (figure 1-4) a suction hose kit (figure 1-5) and a collapsible fabric fuel drum (figure 1-6). (The drum is procured separately.) Each assembly is contained within a tubular aluminum framework and can be handled by two persons.

b. *Capabilities and Features.* FARE is versatile and has several fueling capabilities. The operator need only select the recommended combination of assemblies, nozzles and fittings for each fueling configuration. The capabilities and features may be summarized as follows:

(1) Primarily, the equipment is used to transfer fuel from 500-gallon (1892.5 liter) collapsible drums to helicopters in forward combat areas.

(2) Refueling fixed-wing aircraft and ground vehicles is a secondary function.

(3) The equipment is provided with two types of nozzles, a closed circuit nozzle and a gravity fill adapter nozzle, that will permit the operator to service aircraft or ground vehicles having either a gravity-feed or closed-circuit fuel system capability.

(4) A 4 in. x 2 in. (10.16 cm x 5.08 cm) adapter and a 3 in. x 2 in. (7.62 cm x 5.08 cm) adapter are included to allow acceptance of fuel from other sources.

1-7. Location and Description of Major Components. The major components of FARE are described in the following subparagraphs, Specifications and data for the components of FARE are provided in paragraph 1-8.

a. Pump/Engine Assembly. (See figure 1-2.)

(1) The pump/engine assembly is a 100-gallon/minute (378.5-liter/minute) centrifugal pump (1) (refer to TM 10-4320-256-14&P for pump details). The pump is driven by a 4-cycle, 2-cylinder, 3-horsepower gasoline engine (2).

(2) The inlet connection to the pump is a standard 2-inch (5.08 cm) female camlock fitting (3). The discharge port is fitted with a 2-inch male camlock fitting (4). The inlet and outlet ports are provided with a dust plug (5) and cap (6), respectively.

(3) A priming port (7) is located on top of the pump housing and a drain plug (8) is located at the lowest point of the housing.

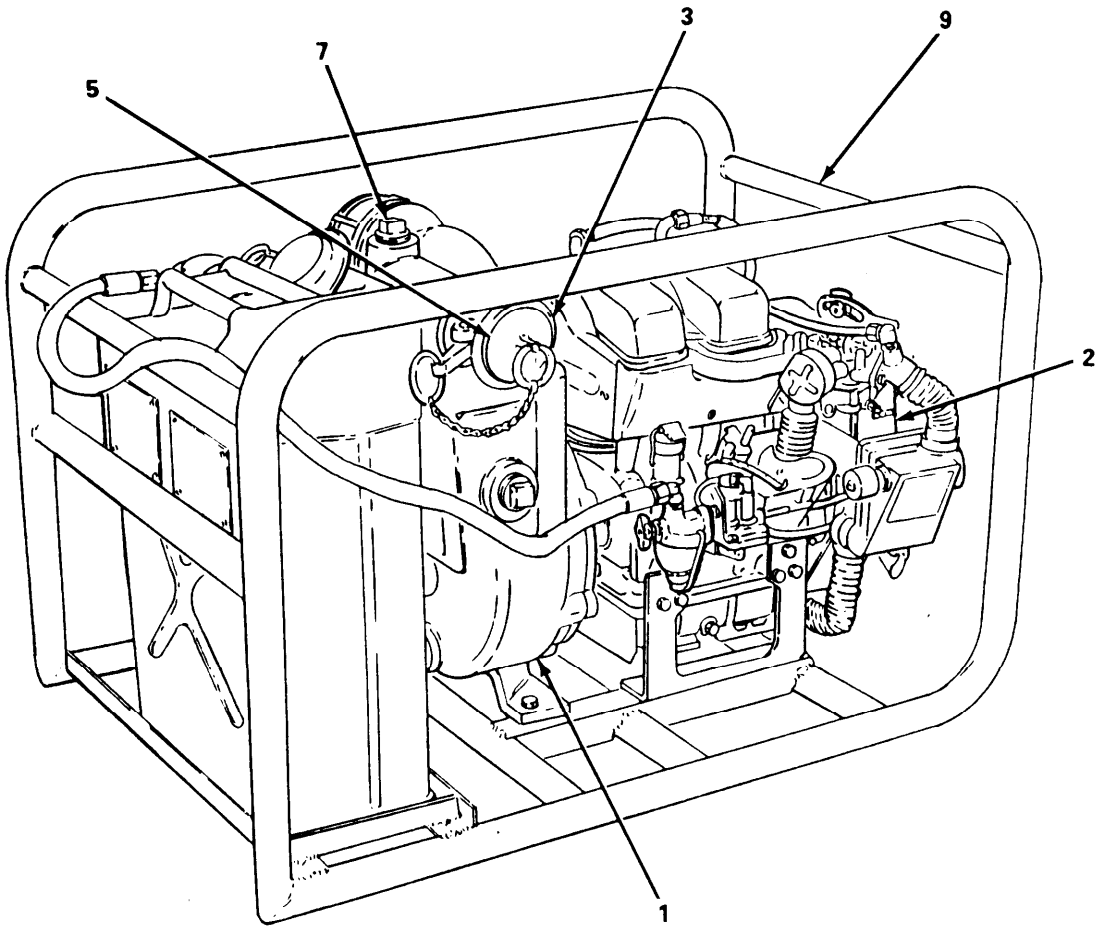


Figure 1-2. Pump/Engine Assembly (Sheet 1 of 2).

b. *Pump/Engine Frame and Components* (see figure 1-2) The pump/engine assembly is mounted in a welded tubular aluminum frame (9). The fuel tank (10) is a standard military 5-gallon (18.925-liter) can (jerry can). It is secured to the frame by a fabric webbing strap (11).

c. *Grounding Cable*. The pump is connected to a common ground rod through 8-foot (243.84-cm) ground cable (12) attached to the frame.

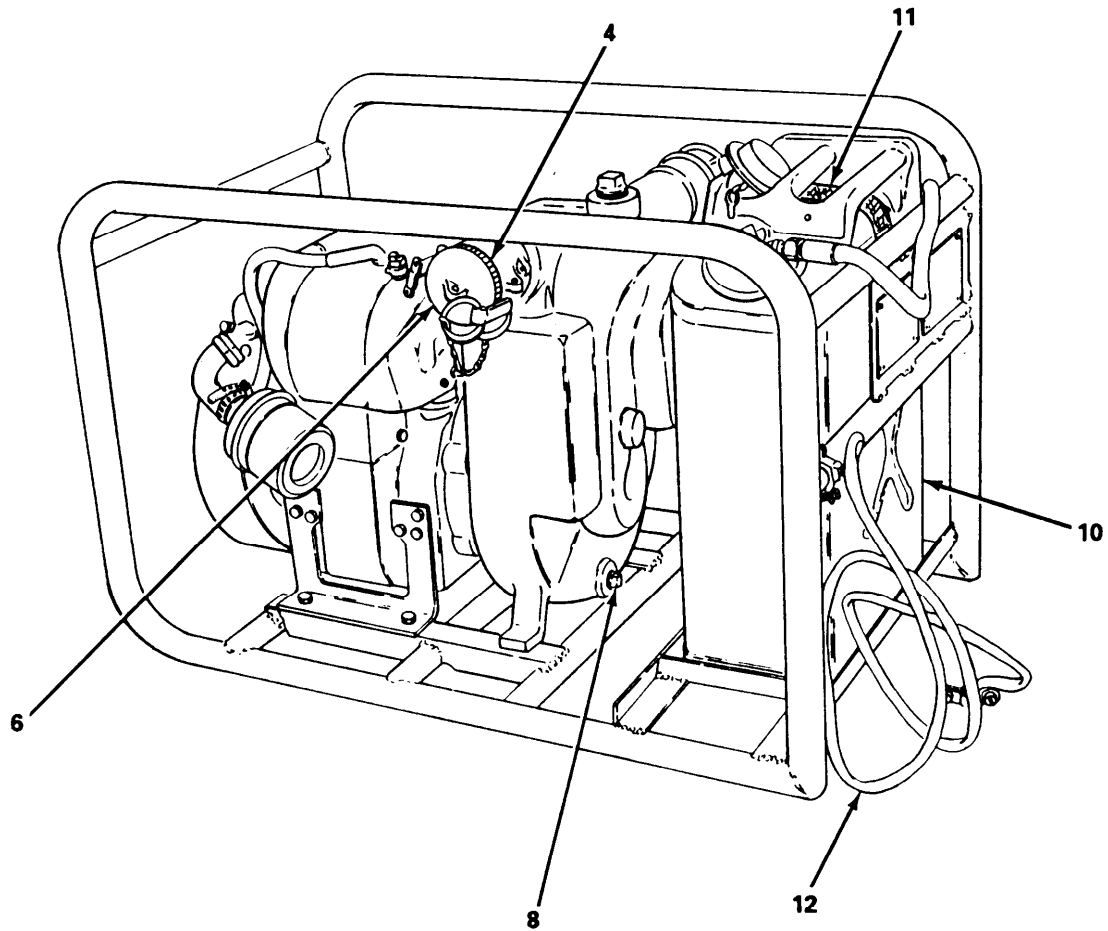


Figure 1-2. Pump/Engine Assembly (Sheet 2 of 2).

d. Filter/Separator Assembly. (See figure 1-3.)

(1) The filter/separator assembly consists of a vessel (1) capable of filtering fuel through replaceable filter elements at a rate of 100 gallons per minute (378.5 liters per minute).

(2) The filter/separator is connected to a common ground rod through an 8-foot ground cable (2) by a saddle clamp (3), to the frame (4).

e. Hoses, Fittings and Frames.

(1) Discharge hose assemblies and fittings (figure 1-4). There are two kits, a tee kit and a wye kit. Each kit consists of the following items, except for the items noted:

- (a) Two discharge hose assemblies (1) 50 feet (15.25 meters) long, 2 inches (5.08 cm) in diameter, male and female camlock end fittings with dust cap and plug.
- (b) One adapter, male to male (2), 2 inches (5.08 cm) in diameter.
- (c) One butterfly valve assembly (3), 2 inches (5.08 cm) in diameter, male and female camlock couplings with dust cap and plug.
- (d) One elbow coupler valve (4), 2 inches (5.08 cm) in diameter, with female camlock couplings.
- (e) One nozzle assembly, closed circuit refueling nozzle (5) and a gravity fill adapter nozzle (6) (per kit).

NOTE

There are three models of closed-circuit refueling nozzles that can be used with the FARE, as follows:

- (1) Wiggins Model CCN 101/14 (see TM 5-4930-226-12&P).
- (2) Aeroquip Model AE83206R (see TM 5-4930-234-13&P).
- (3) Model 125-1000 (see TM 5-4930-235-13&P).
- (f) Tee fitting assembly (7) (one per FARE), 2 inches (5.08 cm) in diameter, one male and two female camlock couplings with one dust cap and two plugs.
- (g) Coupling adapter (8) (one per FARE, in tee kit) 2-inch (5.08 cm) male by 3-inch (7.62 cm) female camlock couplings with dust cap and plug.
- (h) Wye fitting assembly (9) (one per FARE), 2 inches (5.8 cm) in diameter, one female and two male couplings with two dust caps and one plug.
- (i) Coupling adapter (10) (one per FARE, in wye kit), 2-inch (5.08 cm) male by 4-inch (10.16 cm) female camlock couplings with dust cap and plug.

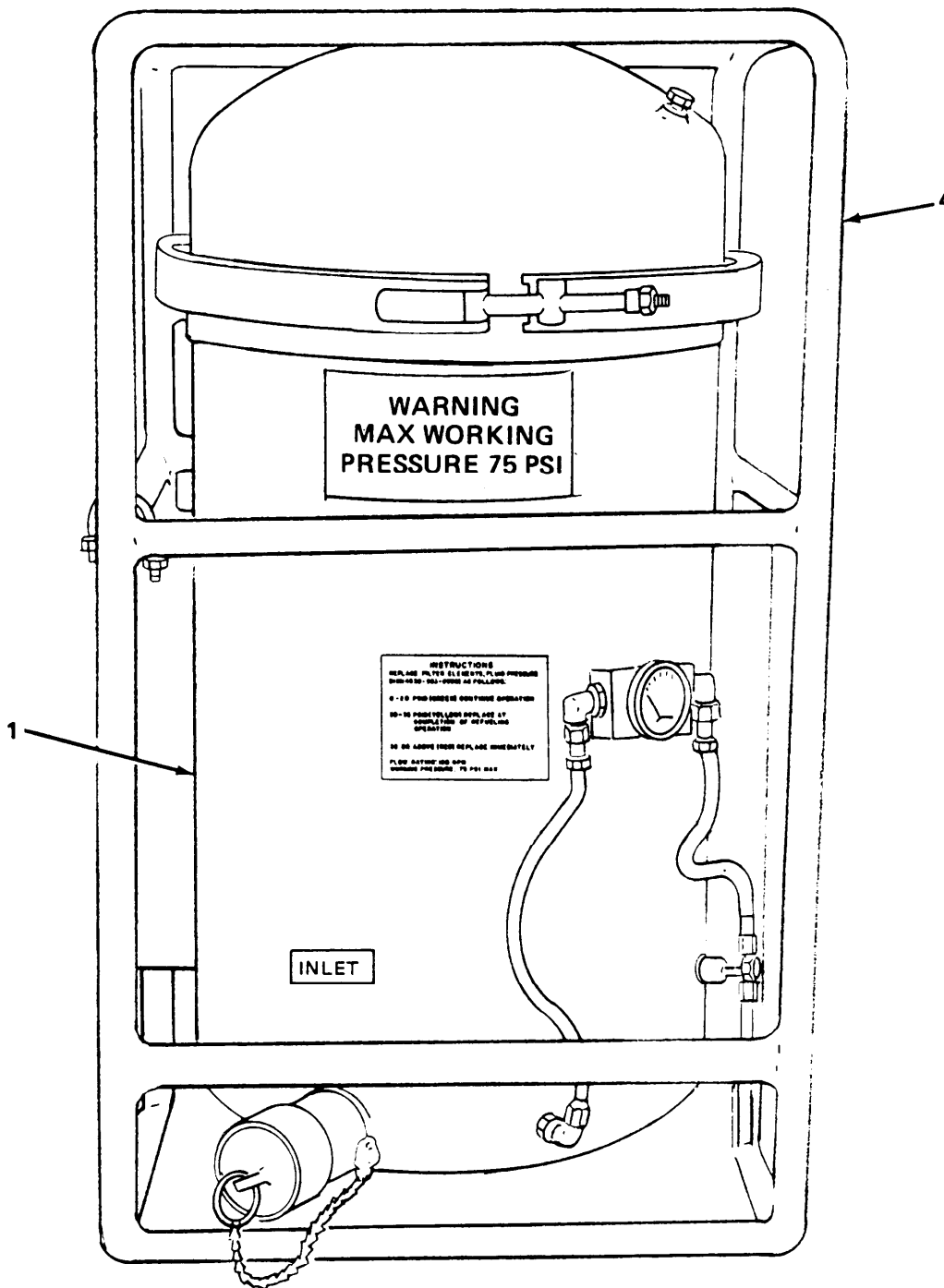


Figure 1-3. Filter/Separator Assembly (Sheet-1 of 2).

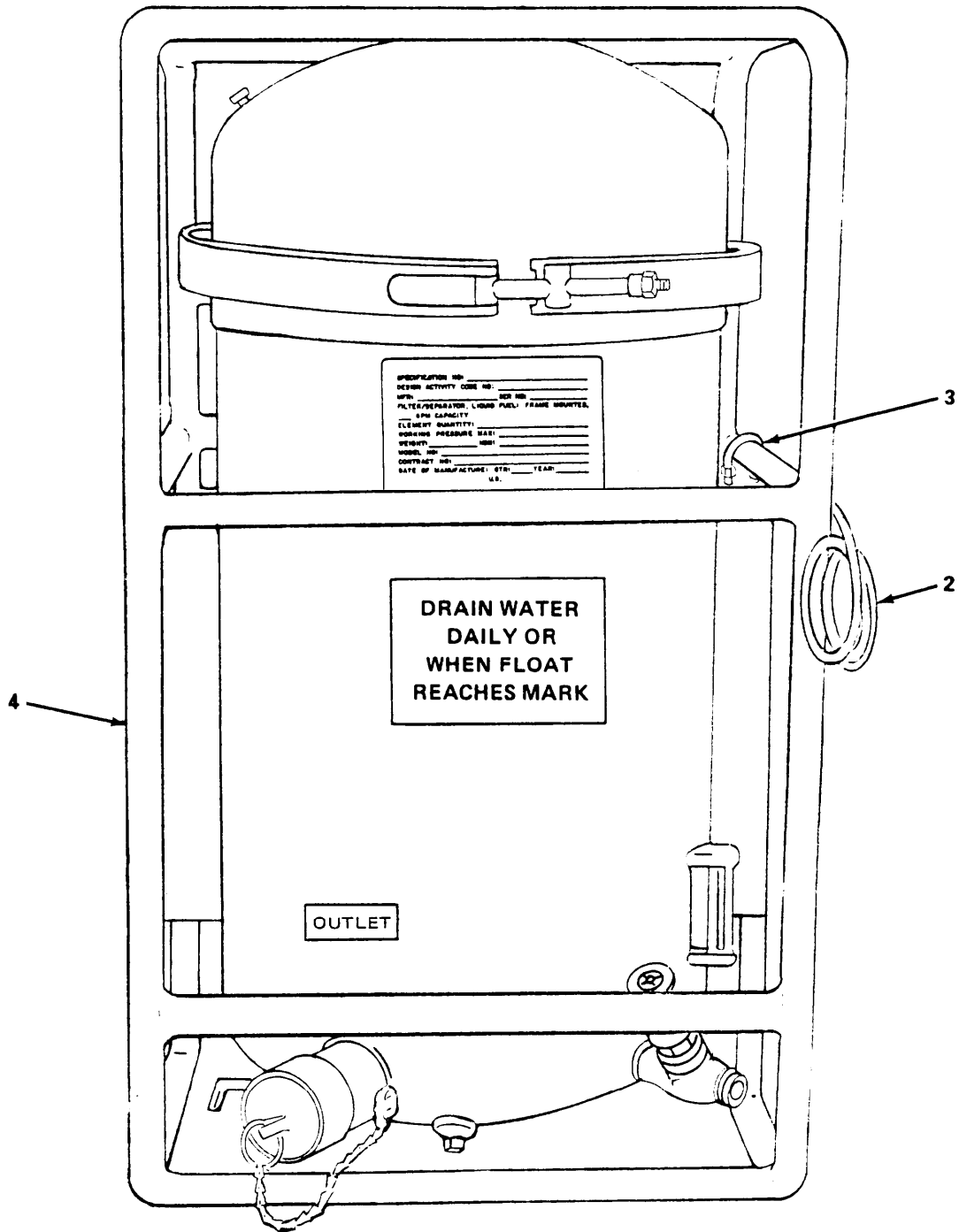
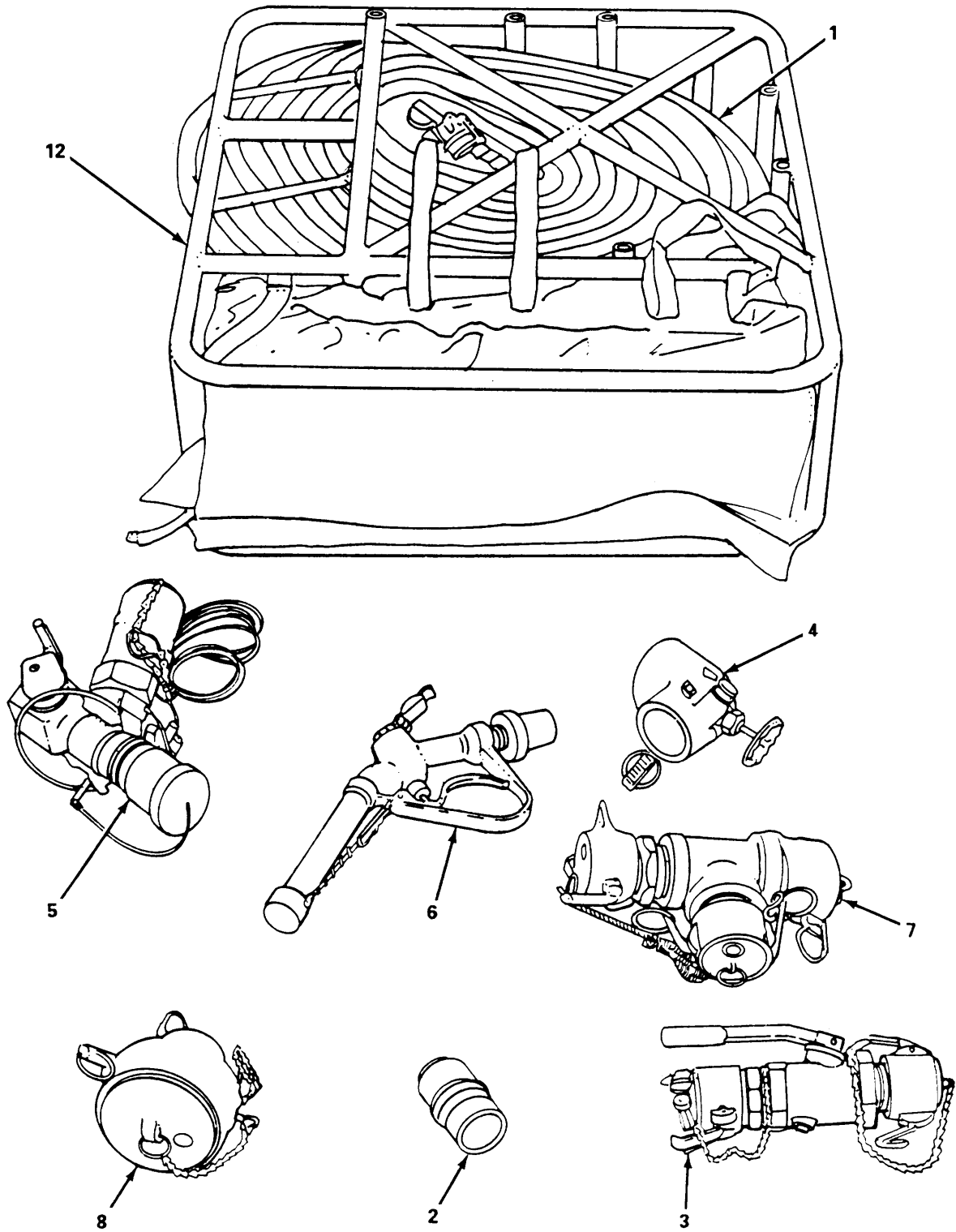
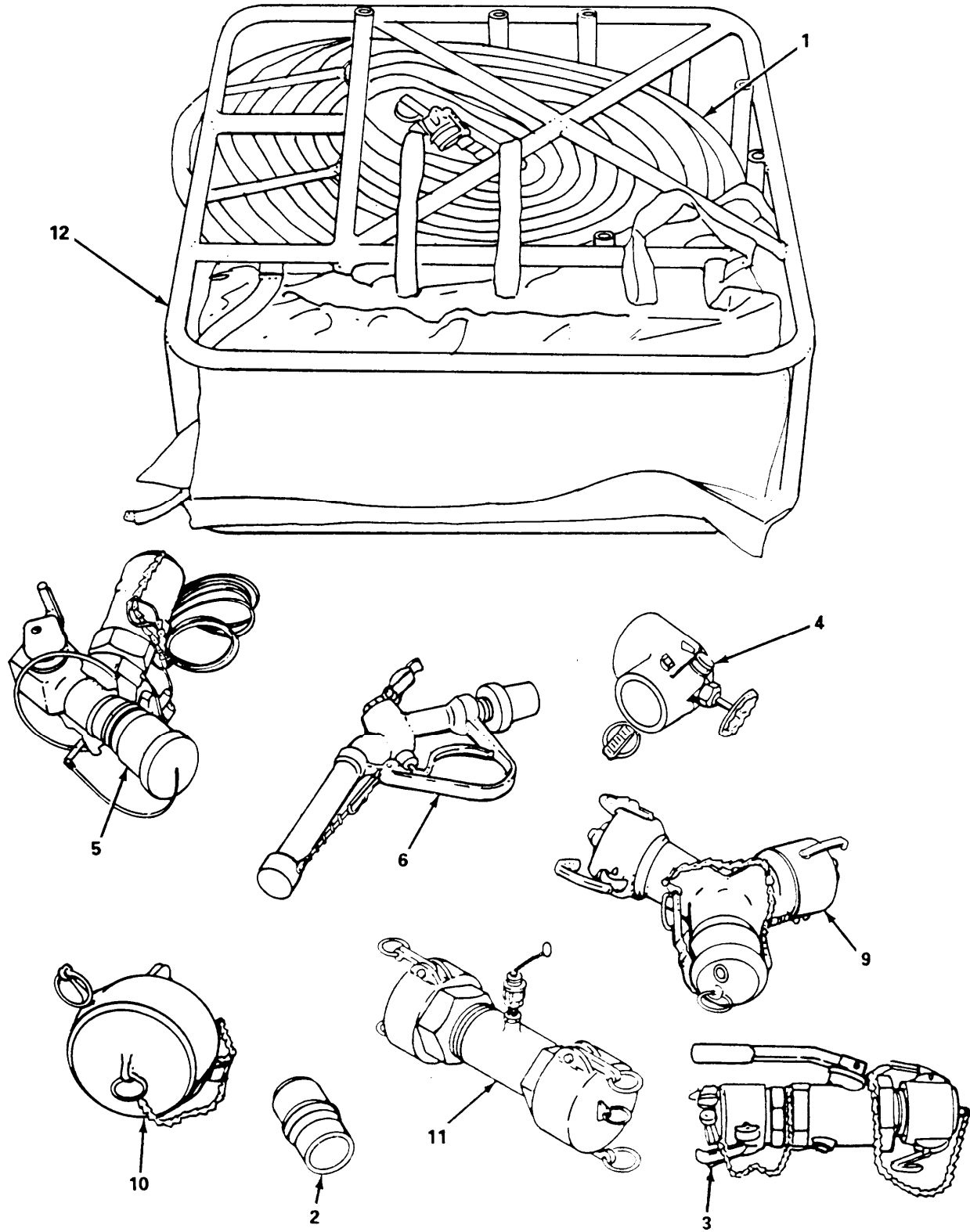


Figure 1-3. Filter/Separator Assembly (Sheet 2 of 2).



A. TEE KIT

Figure 1-4. Discharge Hoses, Fittings and Frame Assembly (Sheet 1 of 2).



B. WYE KIT

Figure 1-4. Discharge Hoses, Fittings and Frame Assembly (Sheet 2 of 2).

(j) Water detector kit adapter (11) (one per FARE in wye kit), male and female camlock couplings with dust cap and plug. It is required to attach fuel contamination test kit (NSN 6640-00-244-9478) at outlet of filter/separator. The test kit is used to determine if the filter/separator is filtering properly.

(k) One component kit frame (12).

(2) *Suction hose kit* (figure 1-5). There are two kits, each consisting of the following items:

(a) Six suction hose assemblies (1), 5 feet (1.524 meters) in length, 2 inches (5.08 cm) in diameter, male and female camlock couplings with dust cap and plug.

(b) Two ground rods (2).

(c) One suction hose container (3).

(3) *Collapsible drum* (figure 1-6). Refer to TM 10-8110-201-14&P for pertinent information on the collapsible drum. The collapsible drum (1) is issued separately and is not part of the FARE.

1-8. Equipment Data.

Tabulated Data. The following summarizes the specific capabilities and limitations of the equipment and other critical data needed by the operator and unit maintenance personnel for maintenance of the FARE components.

(1) *Discharge hose and fitting kits.*

Manufacturer	<i>American Air Filter, Inc.</i>
Part No.	13219E0503/13219E0504
Shipping Dimensions	
Length	39 in. (99 Cm)
Width	11 in. (28 cm)
Height	30 in. (76cm)
Weight	172 pounds (78.1 kilograms)

(2) *Suction hose kit.*

Manufacturer	American Air Filter Corp.
Part Number	13219E0501
Weight	170 pounds (77.2 kilograms)

(3) *Pump/engine assembly.* Refer to TM 10-4320-256-14&P.

(4) *Military standard engine.* Refer to TM 9-2805-257-14.

(5) *Filter/separator assembly.* Refer to TM 5-4330-217-12&P.

(6) *Closed circuit nozzle assemblies.* Refer to TM 5-4930-226-12&P, TM 5-4930-234-13&P and TM 5-4930-235-13&P.

(7) *Collapsible drum.* Refer to TM 10-8110-201-14&P.

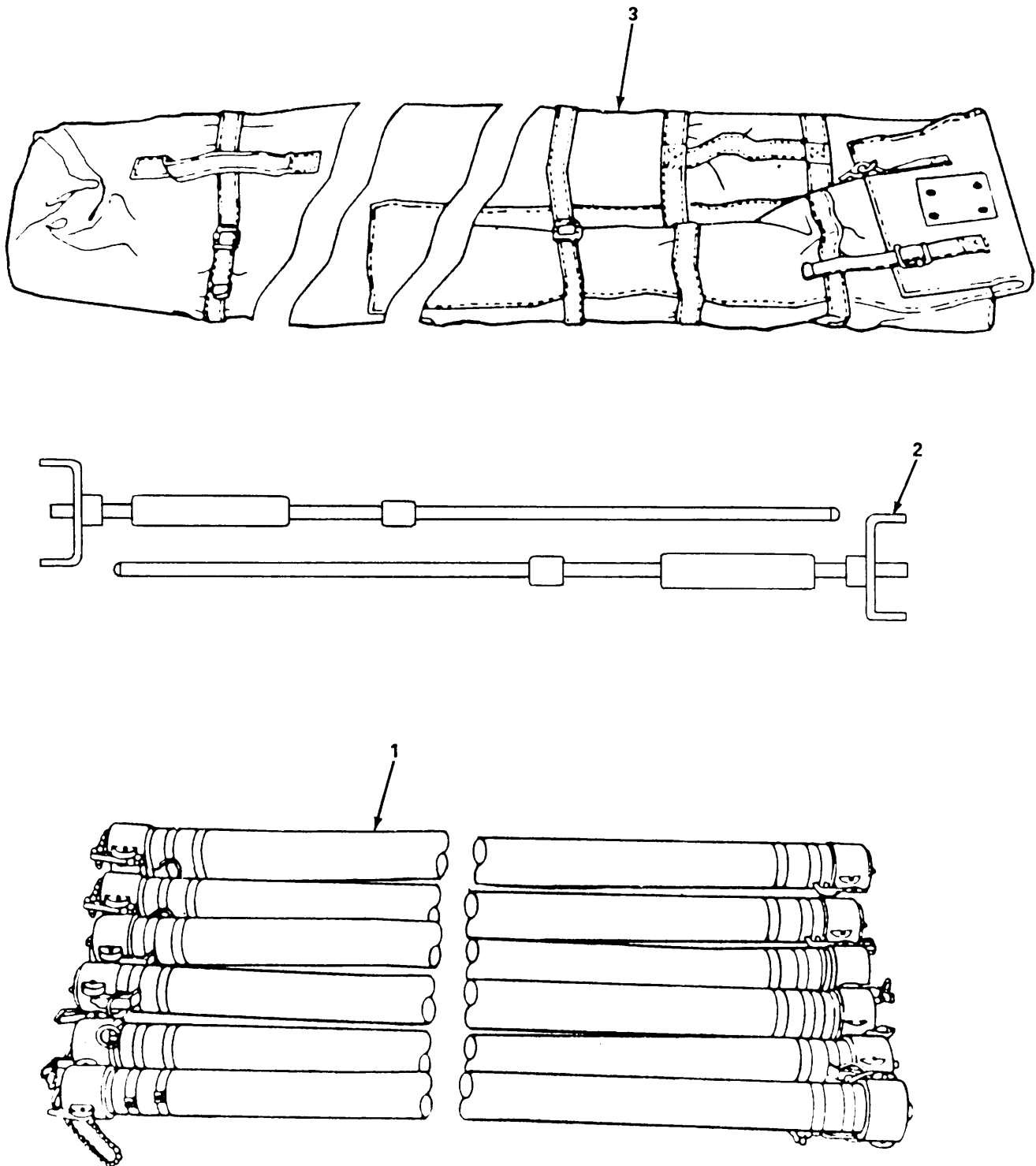


Figure 1-5. Suction Hose Kit.

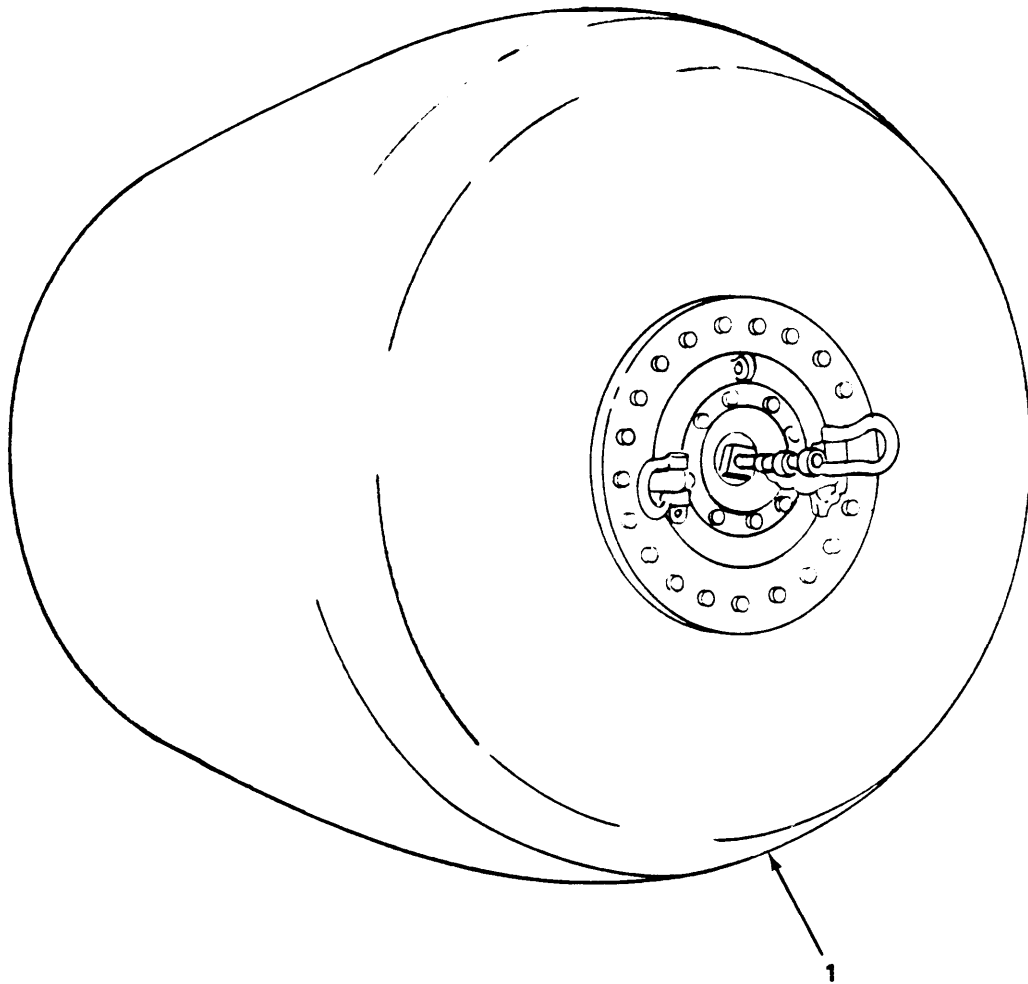


Figure 1-6. Collapsible Drum.

1-9. Safety, Care and Handling. The following paragraphs summarize the safety, care and handling requirements for the FARE.

a. Safety. It is imperative that you observe all safety precautions specified on the warning page in the front of this manual. You must also observe specific warnings and cautions specified throughout this manual. The warnings are provided to tell you how to protect yourself from death or serious injury.

b. *Care and Handling.* Observe the following precautions:

- (1) Use care in handling components of the FARE as metal parts could cause personal injury.
- (2) Use every effort to protect the FARE from the weather elements, dust, dirt, oil, grease, and acids.

Section III. PRINCIPLES OF OPERATION

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1-10 General	1-14
1-11 Principles of Operation	1-14

1-10. **General.** For a formal refueling operation, the FARE is set up as shown in figure 1-7. Fuel from a 500-gallon collapsible drum is fed through a series of connecting fittings suction hoses and a butterfly valve to a pump. The fuel then flows through a filter/separator, which filters out any impurities in the fuel. The filter-separator also separates out any water that may have become mixed with the fuel through condensation or contamination. The fuel then flows through a wye fitting to dispensing nozzles which are used to refuel aircraft.

1-11. **Principles Of operation.** (See figure 1-7.) For a two-point refueling operation:

- a. Fuel stored in a 500-gallon collapsible drum is directed through an elbow coupler valve (1) and a male-to-male adapter (2) into a 5-foot suction hose assembly (3).
- b. The hose directs the flow to a butterfly valve (4) which operates as a shutoff valve and a fuel control valve.
- c. When the valve is open, flow continues (through an additional 5-foot length of suction hose, if necessary) to a tee fitting (5) which enables two fuel supply legs to enter the refueling operation.
- d. Flow is then directed through an additional 5-foot suction hose to the engine-driven centrifugal pump assembly (6).
- e. The fuel under pressure from the pump is directed through a 5-foot suction hose assembly (3) to the filter/separator (8) where contaminants are filtered out and water, if present, is separated and collected. The engine/pump assembly and the filter/separator are connected by ground cables to a ground rod (7).
- f. The output of the filter/separator is directed through the water detection adapter kit (9) and suction hose (3) to a wye fitting (10).
- g. The wye fitting (10) directs the fuel flow to two refueling points through a 50-foot discharge hose assembly (11) and a closed-circuit nozzle (12). Each nozzle is connected through a ground cable to a ground rod. In addition, each nozzle is electrostatically bonded to the vehicle being fueled by a grounding clip or plug.

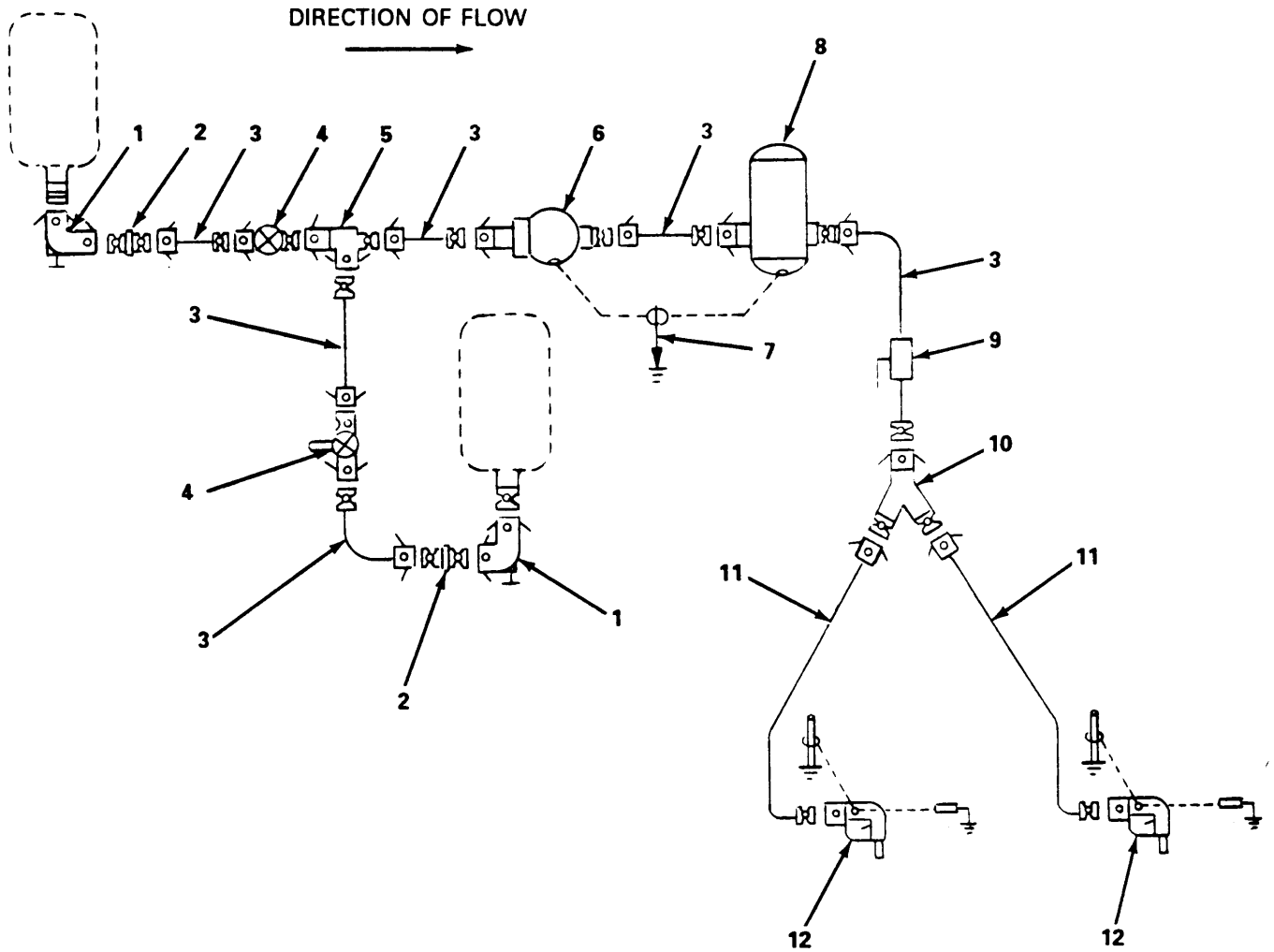


Figure 1-7. Flow Diagram.

CHAPTER 2

OPERATING INSTRUCTIONS

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Section I.	Description and Use of Operator Controls and Indicators	2-1
Section II.	Preventive Maintenance Checks and Services (PMCS)	2-5
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OVERVIEW

This chapter includes information on assembling and preparing the FARE to perform the specific mission for which the equipment is designed. This chapter also includes information on the controls and indicators, operating instructions, and preventive maintenance checks and services.

Section I. DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

Paragraph		Page
2-1	Operator Controls and Indicators	2-1
2-2	Elbow Coupler Valve and Butterfly Valve Assembly Controls and Indicators	2-1
2-3	Filter/Separator Controls and Indicators	2-3
2-4	Pump/Engine and Closed Circuit Refueling Nozzle	2-5

2-1. Operator Controls and Indicators. Many of the controls and indicators used with the FARE are located on the individual assemblies that make up the FARE system. The controls are described in the following paragraphs:

2-2. Elbow Coupler Valve and Butterfly Valve Assembly Controls and Indicators. (Refer to figures 2-1 and 2-2.)

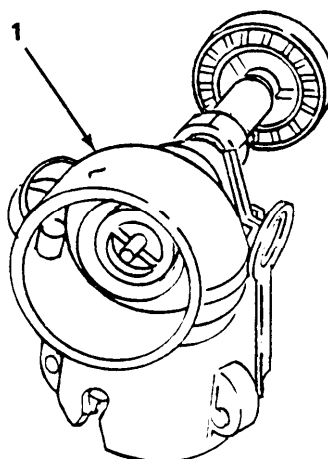


Figure 2-1. Elbow Coupler Valve Control.

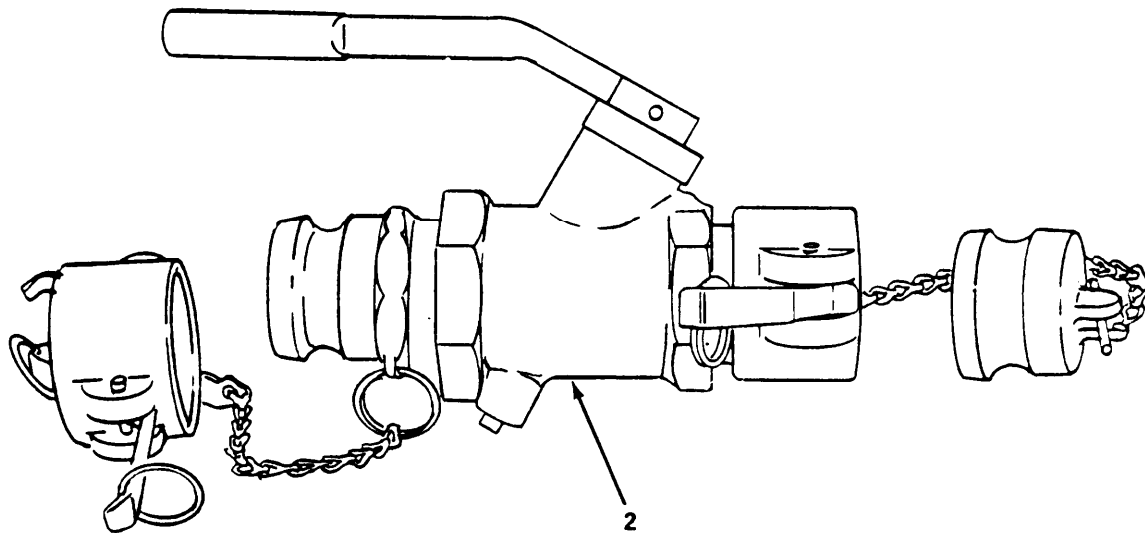
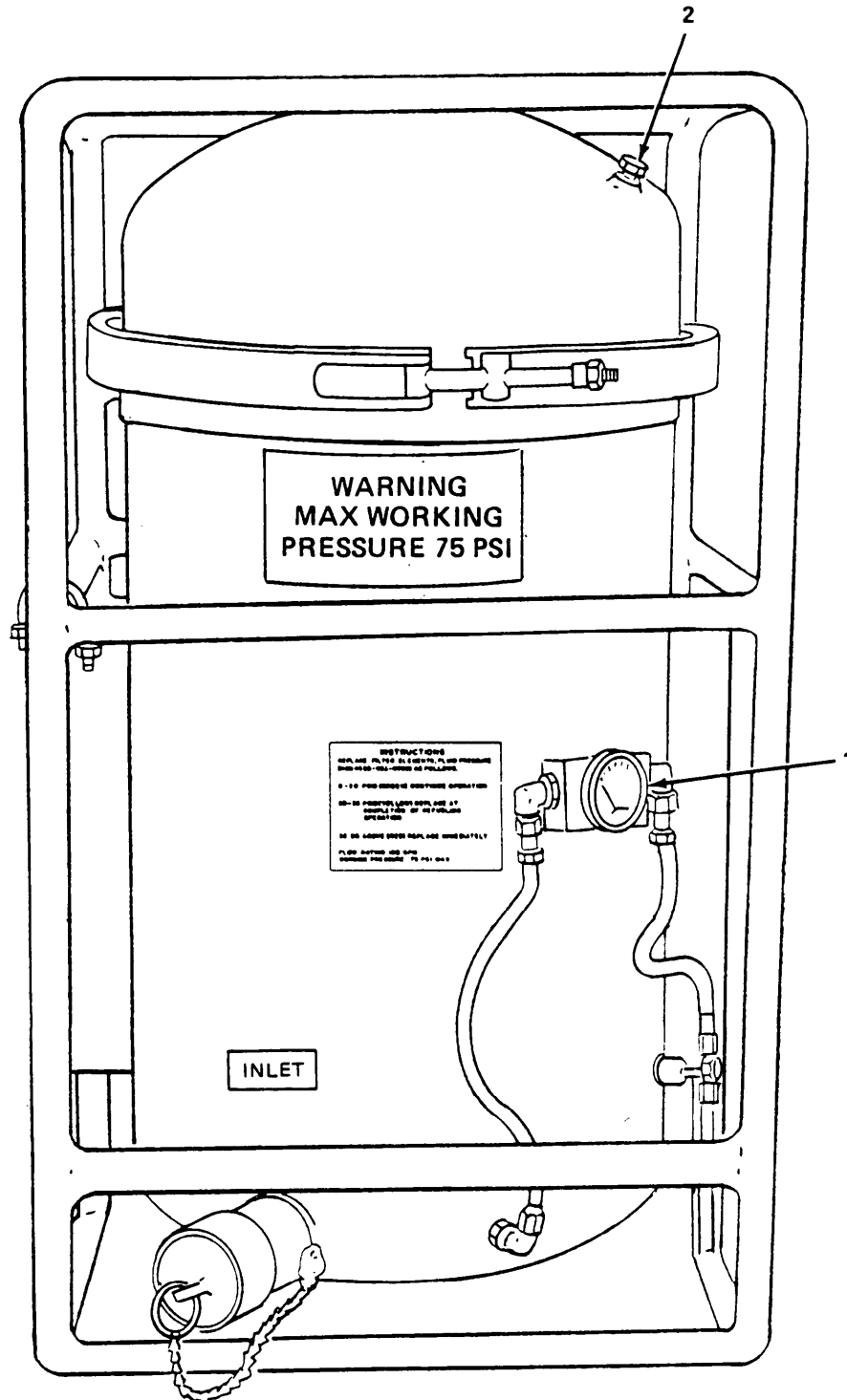


Figure 2-2. Butterfly Valve Control.

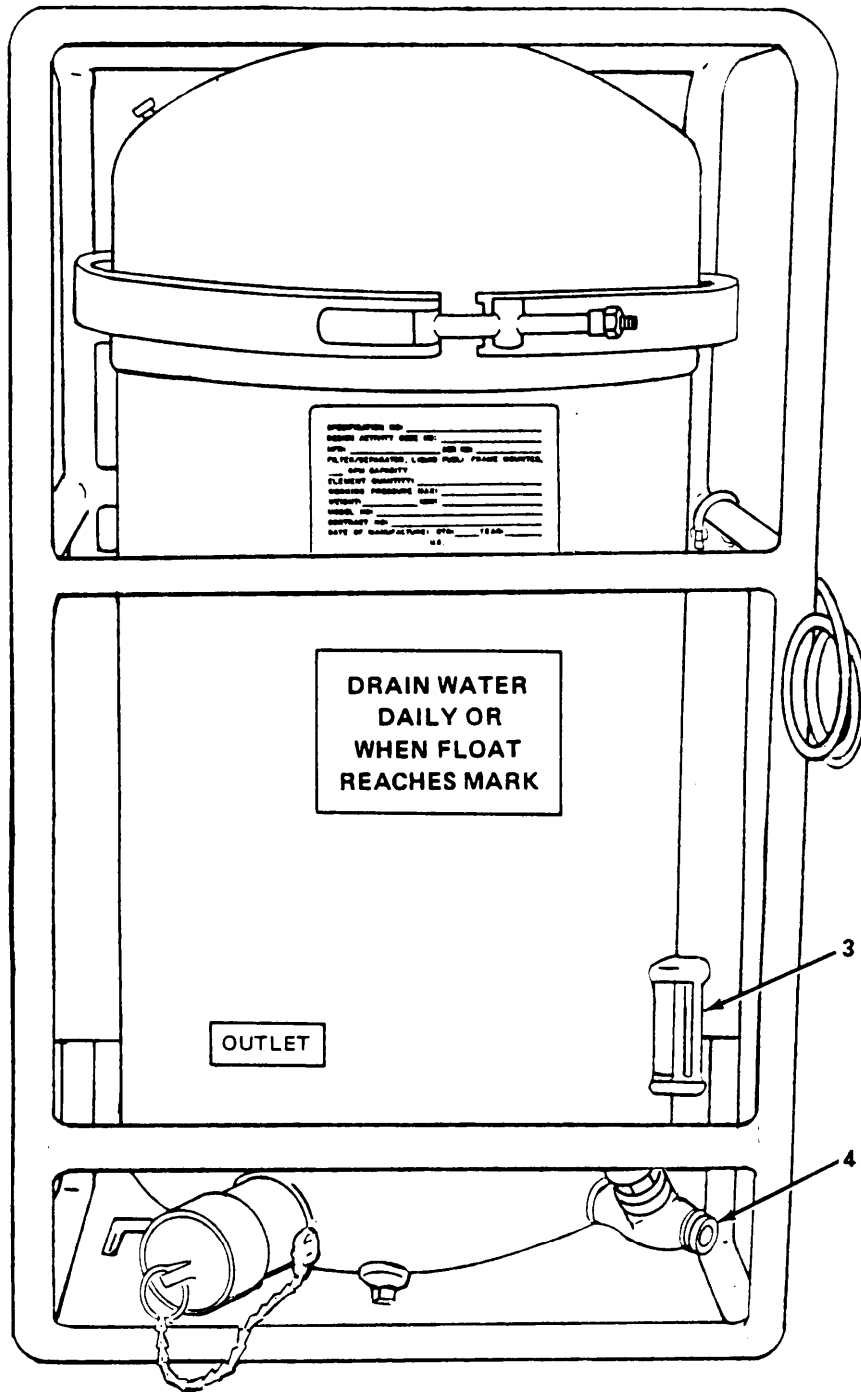
Key	Control or Indicator	Function
1	Elbow Coupler Valve	Manual control used to start and stop flow of fuel from the 500 gal. drum. Turn handwheel to the left (counterclockwise) to start fuel flow and to the right (clockwise) to stop fuel flow.
2	Butterfly Valve Assembly	Manual control used to control fuel flow. It also operates as a shutoff valve. Turn handle to the left (counterclockwise) to start fuel flow and continue to slowly turn handle until the desired fuel flow is obtained. Turn handle to the right (clockwise) to stop fuel flow.

2-3. **Filter/Separator Controls and Indicators.** (Refer to figure 2-3.)



A. INLET SIDE

Figure 2-3. Filter/Separator Controls and Indicators (Sheet 1 of 2).



B. OUTLET SIDE

Figure 2-3. Filter/Separator Controls and Indicators (Sheet 2 of 2).

Key	Control or Indicator	Function
1	Differential Pressure Indicator	Indicates back pressure caused by filter loading.
2	Vent Valve	Manually operated to vent air from the filter/separator.
3	Sight Gage	Monitors the amount of collected water in the system.
4	Drain Valve	Provides a way to manually drain collected water from the filter/separator tank.

2-4. Pump/Engine and Closed Circuit Refueling Nozzles.

a. Pump/Engine. Refer to TM 9-2805-257-14 for the location, purpose and normal settings of the engine controls.

b. Closed-Circuit Refueling Nozzles. As applicable to the refueling nozzle(s) used with your FARE system, refer to TM 5-4930-226-12&P (Model CCN101/14), TM 5-4930-234-13&P (Model AE83206R) or TM 5-4930-235-13&P (Model 125-1000) for the proper attachment, operation and detachment of the nozzle.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Paragraph		Page
2-5	General	2-5
2-6	Purpose of PMCS Table	2-6
2-7	Explanation of Columns	2-6
2-8	Reporting Deficiencies	2-6
2-9	Special instructions	2-6
2-10	PMCS Procedures	2-7

2-5. General. To insure that the FARE is mission ready, it must be inspected systematically so that defects may be rediscovered and corrected before they result in serious damage or failure. Defects discovered during operation of the equipment will be noted for future correction. Stop operation immediately if a deficiency is noted which would damage the equipment or create a hazard if operation were continued. Record all deficiencies and shortcomings are to be recorded, together with the corrective action taken on DA Form 2404 (Equipment Inspection and Maintenance Worksheet). Operator PMCS is performed to ensure that the filter/separator is ready for operation at all times. Perform the checks and services at the following specified intervals.

- a. Before you operate, perform your before (B) PMCS. Observe all CAUTIONS and WARNINGS.
- b. While you operate, perform your during (D) PMCS. Observe all CAUTIONS and WARNINGS.
- c. After you operate, be sure to perform your after (A) PMCS.
- d. If your equipment fails to operate, refer to paragraph 3-3.

2-6. Purpose of PMCS Table. The purpose of the PMCS table is to provide a systematic method of inspecting and servicing the equipment. In this way, small defects can be detected early before they become a major problem causing the equipment to fail to complete its mission. The PMCS table is arranged with the individual PMCS procedures listed in sequence under assigned intervals. The most logical time (before, during, or after operation) to perform each procedure determines the interval to which it is assigned. Make a habit of doing the checks in the same order each time and anything wrong will be seen quickly. See paragraphs 2-5 and 2-7 for an explanation of the columns in table 2-1.

2-7. Explanation of Columns. The following is a list of the PMCS table column headings with a description of the information found in each column.

a. Item No. This column shows the sequence in which the checks and services are to be performed, and is used to identify the equipment area on the Equipment Inspection and Maintenance Worksheet, DA Form 2404.

b. Interval. This column shows a dot, when each check is to be done.

c. Item to be Inspected/procedures. These columns identify the general area or specific part where the check or service is to be done, and explains how to do it.

NOTE

The terms ready/available and mission capable refer to the same status: Equipment is on hand and is able to perform its combat mission. Refer to DA Pam 738-750.

d. Equipment is Not Ready/Available If This column list conditions that make the equipment unavailable for use because it is unable to perform its mission, or because it would represent a safety hazard. Do not accept or operate equipment with a condition in the "Equipment is Not Ready/Available If" column.

2-8. Reporting Deficiencies. If any problem with the equipment is discovered during PMCS or while it is being operated that cannot be corrected at the operator/crew maintenance level, it must be reported. Refer to DA Pam 738-750 and report the deficiency using the proper forms.

2-9. Special Instructions. Preventive maintenance is not limited to performing the checks and services listed in the PMCS table.

WARNING

Dry cleaning solvent PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100- 138°F (38-60°C).

a. Keep it Clean. Dirt, grease, oil, and debris get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent on all metal surfaces. Use soap and water to clean rubber or plastic material.

b. Bolts, Nuts, and Screws. Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around boltheads. If you find one you think is loose, tighten it, or report it to unit maintenance if you can't tighten it.

c. Fluid Lines. Look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots and stains around a fitting or connector can mean a leak. If a leak comes from a loose connector, tighten it. If something is broken or worn out, report it to unit maintenance.

d. Leakage Definitions. It is necessary for you to know how fluid leakage affects the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them. When in doubt, NOTIFY YOUR SUPERVISOR.

CAUTION

Equipment operation is allowable with minor leakage (Class I or II) of any fluid except fuel. Of course, consideration must be given to the fluid capacity in the item being checked/inspected. When in doubt, notify your supervisor.

When operating with Class I or II leaks, continue to check fluid level more often than required in the PMCS.

Class III leaks should be reported to your supervisor or unit maintenance.

Leakage Definitions:

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

2-10. PMCS Procedures. Operator preventive maintenance checks and services are listed in table 2-1.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS).

NOTE

Within designated interval, these checks are to be performed in the order listed.

B - Before

D - During

A - After

Item No.	Interval			Item to be Inspected	Procedures	Equipment is Not Ready/Available if:
	B	D	A			
1	•			Forward Area Refueling Equipment (FARE) Assembly	<p>NOTE</p> <p>Perform lubrication of the engine prior to or in conjunction with Before PMCS. Refer to LO 9-2805-257-12. Keep engine and pump free of dirt and oil on all external surfaces.</p> <p>a. Make the following walk-around checks:</p> <ol style="list-style-type: none"> (1) Check for fuel and oil leakage. (2) Check that hoses and fuel lines are secure and properly installed. Check for leaks. Check for separation of material, blisters and cuts. (3) Check that nozzles and fittings are secure and properly installed. Check for damage, badly scored surfaces, and missing hardware. (4) Check grounding cables for loose connections, corrosion, and damage. (5) Check for loose or missing hardware, broken or cracked parts, and damage. 	<p>Class III oil or any fuel leakage.</p> <p>Hoses and fuel lines are not secure or separation of material, blisters or cuts are present.</p> <p>Nozzles or fittings are improperly installed, badly scored or missing hardware.</p> <p>Cable is missing or damaged.</p> <p>Hardware is missing or damaged.</p>

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) (cont).

Item No.	Interval			Item to be Inspected	Procedures	Equipment is Not Ready/Available if:
	B	D	A			
1 (cont)			•		b. Check that dust caps and plugs are installed after operation on any component where caps have been removed or where disassembly is required.	Caps or plugs are missing.
2		•		Pump Assembly	a. Check air cleaner restriction indicator on engine. b. During starting and operation , check for unusual noise, rough operation, lack of power, excessive smoke, or any indication of defective component.	Red band is visible on indicator. Noise, rough operation, low power, excessive smoke or indication of defective component.
3		•		Filter-Separator	Check sight gage for evidence of water. Ensure ball floats freely. Drain as required.	Water level is high or ball does not float.
4		•		Differential Pressure Gage	Check that pressure indication is below red band. If yellow, change elements after operation.	Pressure indication is in red band.

Section III. OPERATION UNDER USUAL CONDITIONS

Paragraph		Page
2-11	Assembly and Preparation for Use..	2-9
2-12	Operating Procedures	2-11
2-13	Preparation for Movement	2-14

2-11. Assembly and Preparation for Use.

a. Set up the equipment as shown in figure 2-4, and install as follows:

WARNING

Weight of hose and component kits and pump assembly exceed limit for one-man lift. Maximum height for two-man lift is 2.8 feet (84.0 cm).

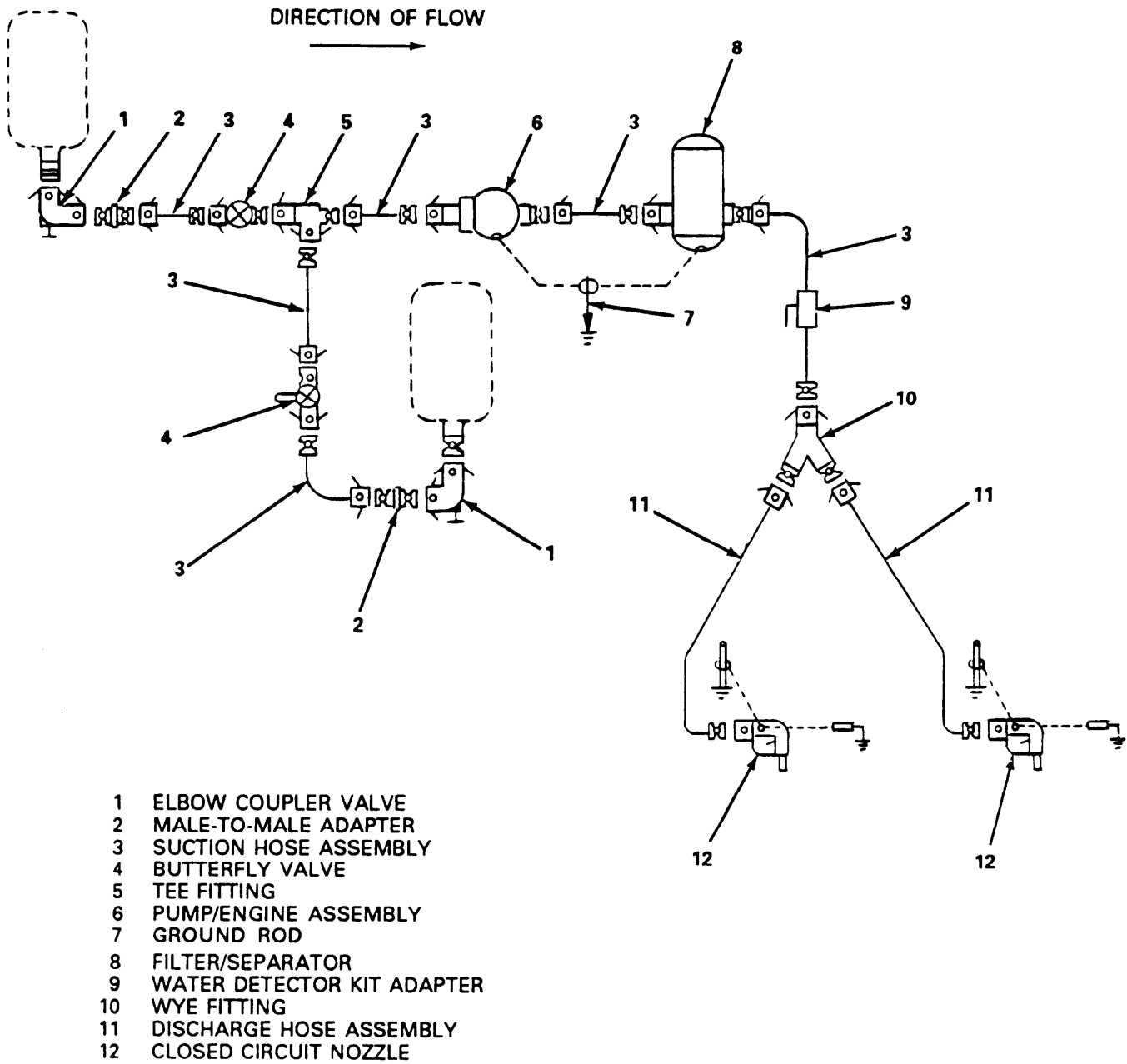


Figure 2-4. Two-Point Refueling Operation.

NOTE

The operational schematic in figure 2-4 shows the FARE pumping fuel from a 500-gallon (1892.5 liter) drum and distributing through two branch lines. Setup as shown, the system requires a minimum of two men for simultaneous two-point refueling and a third man or tender stationed at the pump and filter/separator. If manpower is critically short, it is possible for one man to operate the equipment with assistance of the crew from each helicopter being refueled. Many variations are possible, depending on specific need.

- (1) Select a site that will provide relatively level terrain. Clear away dry leaves, grass and brush from the site. The position and kind of accessory components is determined by the type of operation desired.

CAUTION

Join caps and plugs together at each mating connection to avoid contamination.

- (2) Position the pump/engine and filter/separator assemblies for the desired refueling operation. Remove the dust caps and plugs and complete the installation of hoses, valves and fittings. Install butterfly valves with arrows in the direction of flow.

b. Grounding Procedures.

WARNING

DEATH or serious injury may result if proper grounding procedures are not followed prior to operating the equipment.

Extreme care must be taken to prevent injury to fingers or hands when driving the ground rods. Do not place hands between the ram and drive collar. Gloves should be worn. Be sure all connections are tight to avoid a possible spark between the units and ground rod.

NOTE

Grounding of equipment is a means to provide a conductive path into the ground so a static charge isn't trapped on the surface of the equipment where it could discharge as a spark

- (1) Drive Grounding rod (2) into ground to the required depth (see table 2-2). Grounding rod (2) can be used as a nozzle hanger and/or a grounding rod.
- (2) Remove pumping assembly and filter separator grounding rod (7) from filter separator frame. Drive grounding rod into ground to the required depth (see table 2-2). Connect grounding cables from pumping assembly (6) and filter separator (8) to grounding rod (7). The refueler and system are now grounded and the fueling process may begin.
- (3) Prime the pump and start the engine (paragraph 2-12).

Table 2-2. Required Depths for Ground Rods

Type of soil	Depth of Ground Rod
Coarse ground, cohesionless sands and gravels	6 feet
Inorganic clay, claying gravels, gravel-sand-day, claying sands, sandy day, gravelly clay, and silty clay	4 feet
Silty gravel, gravel-sand-silt, silty sand, sand, silt, peat, muck, and swamp soil	3 feet

- (4) Methods of Grounding. There is no quick or easy way to test the adequacy of a ground. The testing procedures (See FM 10-68 Appendix E) are complex and the equipment is bulky and expensive; Therefore, several levels or methods of grounding and bonding are required to meet the various operational needs of the Army. The three methods/levels are listed in order of preference.

- (a) Method 1: equipment is grounded to a rod or rods that have measured resistance to ground equal to or less than 10,000 ohms. Ground the refueling system to this tested ground rod. Bond the nozzle to the vehicle/aircraft (see paragraph 2-12b). This method is required, unless conditions, as described below, prevent its use. This method is the only standard of grounding acceptable, without authorization, at any fixed airfield or refueling point. It is the safest method.
- (b) Method 2: if equipment is not available to test resistance to ground, use method 2. Method 2 uses an untested ground - a grounding system based on the knowledge that damp earth will accept and drain off an electrical charge. Use method 2 when the location, tactical situation, or type of operation makes it impossible to test ground rods. Ground equipment to a rod or rods driven a specific depth into the ground depending on the type of soil at the site (see table 2-2). The depth to which the rods must be driven is determined by the normal depth of permanent ground moisture in the various types of soils. The commander of the operating unit must authorize the use of method 2. This method is less desirable. Employ method 2 when impossible to use method 1.

WARNING

Death or serious injury may occur if proper bonding procedures are not followed (see paragraph 2-12b). While using method 3, an object with a different electrical potential (any object that is not part of the bonded system) should not come into contact with the bonded equipment when a flammable vapor-air mixture maybe present.

- (c) Method 3: When the climate, terrain, or tactical condition makes it impossible to secure a satisfactory ground rod, requirements to ground the fuel dispenser (system or refueler) maybe waived; however, the requirement to bond the fuel dispenser to the aircraft/vehicle may not be waived under any circumstances. Method 3 relies on bonding alone (see paragraph 2-12b). Bonding is made between the aircraft/vehicle and the refueling system or refueler along with the nozzle and the aircraft/vehicle. A contact between an unbanded object and the system could produce a spark that could set off an explosion or fire. Method 3 procedures are authorized by the commander of the unit one organizational level above the operating unit. This is the least desirable method since it involves bonding only.

2-12. Operating Procedures.

a. Refueling Operations.

- (1) Perform necessary Before PMCS (see table 2-1).
- (2) Fill fuel tank on pump assembly with 5 gallons (18.925 liters) of approved fuel.

CAUTION

Do not start engine with pump housing dry. Do not operate over 2 minutes without having fuel flow from the equipment.

- (3) Prime pump by removing plug from priming port (see figure 1-2) and filling the housing with fuel. Open elbow coupler valve (figure 2-1) on the fuel storage drum and butterfly valve (figure 2-2) before starting engine.
- (4) Open vent valve on filter/separator before starting the system (see figure 2-3).

CAUTION

if filter/separator should tip over during operation, stop pumping operation immediately. Set the assembly upright and drain. Check connections, filter elements, sight gage and valve for damage. Remove cover and inspect interior before resuming operation. Refer to TM 5-4330-217-12&P.

NOTE

Periodically during operation, check the differential pressure indicator (see figure 2-3). If reading is red, shutdown the equipment and replace filter elements (refer to TM 5-4330-217-12&P). Monitor the sight gage during and after pumping operation. Drain off water when ball float rises halfway up in gage.

c. Bonding and Grounding Procedures. Refer to figure 2-4.

WARNING

DEATH or serious injury may result if proper bonding and grounding procedures are not followed prior to operating the equipment.

NOTE

Bonding is the process that equalizes the charge on two unlike objects such as an aircraft and a refueling nozzle. It is done in order to prevent arcing, in the presence of flammable vapors, as the two objects are joined.

- (1) Extend the grounding cable from the nozzle so it can be inserted into the vehicle/aircraft receptacle (if present). Otherwise, attach the grounding clip to a bare metal surface of the receiving vehicle/aircraft. Bond before the dust cap or gas tank cap is removed to prevent a spark occurring when fuel vapor is present. Do not disconnect the bond until refueling is complete and the gas tank cap and nozzle dust cap are replaced.

NOTE

Aircraft equipped with closed-circuit refueling receivers are refueled by attaching the nozzle to the fitting mounted on the aircraft fuel tank. Aircraft and other vehicles not equipped with closed-circuit refueling receivers are refueled by connecting the gravity-fill adapter to the nozzle.

- (2) When refueling operations are completed, stop the engine in accordance with TM 9-2805-257-14. Hang nozzle and gravity-fill adapter on ground rod hangers. Do not lay nozzle or adapter on the ground.
- (3) Drain water from filter/separator. Leave vent open during shutdown unless possibility of contamination exists.
- (4) Perform necessary After (A) PMCS (paragraph 2-5).

d. Filling a 500-Gallon Collapsible Drum. The piping diagram (figure 2-5) shows the FARE pumping fuel from an alternate fuel source to a 500-gallon (1892.5 liter) collapsible drum. Set up as shown, the FARE requires a minimum of 2 men to operate, one man to act as a pump tender and a second man to dispense fuel into containers. Setting up the equipment for a filling operation is essentially the same as for a fueling operation, except for the specific selection of components for its configuration. Proceed as follows:

- (1) Position pump/engine (1, figure 2-5) and filter/separator (2) assembly, suction hoses (3) and adapter (4). Remove dust caps and plugs, ensure gasket is in place and connect components.

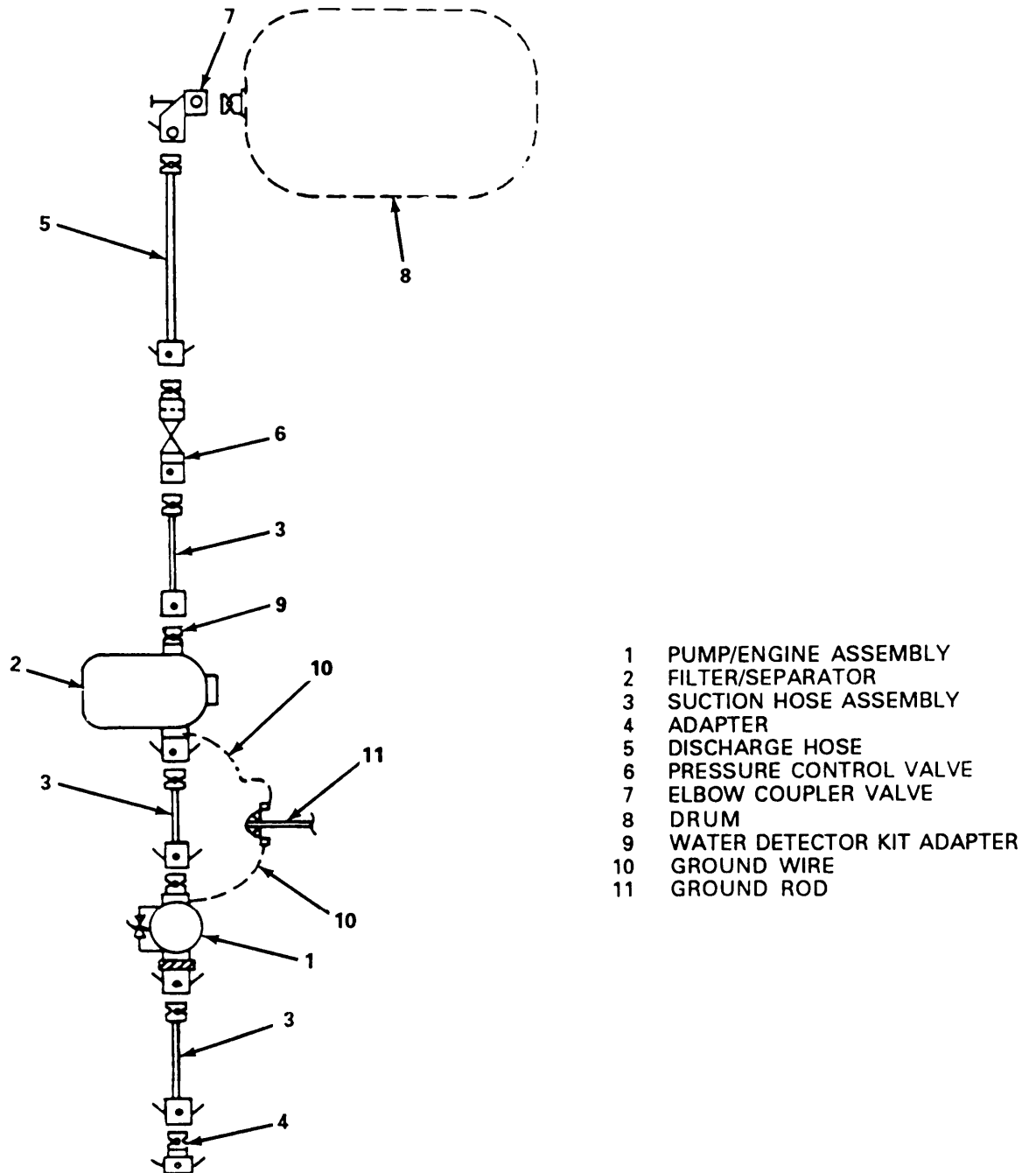


Figure 2-5. FARE Piping Diagram for Filling Operation.

- (2) Roll out one or more lengths of discharge hose (5) and connect the pressure control valve (6) between the filter/separator (2) and the discharge hose. Connect the hose through an elbow coupler valve (7) to the 500-gallon (1892.5 liter) drum (8).

NOTE

Refer to TM 10-8110-201-14&P for operation of the pressure control valve.

- (3) Secure all grounding cables (10) to ground rod (11) before starting a filling operation.
- (4) Prime the pump and start the engine (para. 2-4).
- (5) When fuel transfer operation is completed, stop the engine (para. 2-4).

c. **Fuel Sampling.** The water detector kit adapter contains a sampling probe which extends into the fuel flowing from the filter/separator outlet fitting. The Test Kit, Automotive and Aviation Fuels for Water and Solid Contamination (NSN 6640-00-244-9478) is attached to the adapter sampling probe. Install the adapter as follows:

NOTE

The Fuel Contamination Test Kit is not furnished with the FARE but is authorized to be used with it.

- (1) Referring to figure 1-4, look at the arrow on the hexagon nut to make certain the bevel on the probe faces into the fuel flow. The arrow should point in the direction of flow.
- (2) Remove the dust cap from the filter/separator outlet coupling (see figure 1-3).
- (3) Remove the dust plug from the adapter.
- (4) Install, or make certain, that the gasket has been installed in the female coupling (figure 1 -4) and attach the adapter to the filter/separator outlet coupling.

2-13. Preparation for Movement.

- a. Stop the gasoline engine (para 2-4).
- b. Close elbow coupling valve (1, figure 2-4) attached to the fuel tank.

WARNING

Do not smoke in area.

- c. Open vent valve in filter/separator assembly cover and open the drain valve. Drain the filter/separator vessel of all water and fuel (refer to TM 5-4330-217-12&P).
- d. Disconnect all suction hoses and fittings, allow fuel to drain into a proper container, then cap or plug all open fittings and suction hoses.

e. Disconnect discharge hoses, allow fuel to drain into a proper container; cap female end of hoses. Use the capped end as a reel and roll up hose (figure 1-4, sheet 2). Plug other end of hose and stow rolled hose in the frame.

f. Drain fuel from pump casing into a proper container. Cap and plug pump inlet and outlet.

g. Remove ground rods.

h. Upon completion of a mission, stow all accessory components of equipment in spaces and compartments provided in each frame and/or canvas container.

NOTE

Procedures for installation after moving the system are the same as those procedures covered in paragraph 2-11.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

Paragraph	Page
2-14	Operation in Extreme Cold2-15
2-15	Operation in Extreme Heat2-15
2-16	Operation in Dusty or Sandy Areas.....2-15
2-17	Operation Under Rainy or Humid Conditions2-15
2-18	Operation in Salt Water Areas2-16
2-19	Operation at High Altitudes2-16

2-14. Operation in Extreme Cold. The FARE will operate satisfactorily in extreme cold weather. Use proper precautions when handling fuel. Protect hose connections and nozzles from ice and snow. Inspect sight gage more frequently for moisture. The low temperature operational limit is -25 degrees F. (-32 degrees C.).

CAUTION

A hose full of fuel and closed at both ends must not be exposed to the sun for extended periods. Expansion of the fuel will damage the hose. Open vent valve on filter/separator when not in use. Provide adequate shade when possible.

2-15. Operation in Extreme Heat. The FARE will operate in extreme heat when ordinary precautions are taken. The high temperature limit is 125 degrees F. (52 degrees C.).

2-16. Operation in Dusty or Sandy Areas. The FARE is adversely affected by dusty or sandy conditions. The nozzle spouts should be cleaned immediately before refueling operations start. Keep all dust caps in place except when in use.

2-17. Operation Under Rainy or Humid Conditions. Keep nozzle spouts capped except when in use. Dry nozzles thoroughly before refueling aircraft.

2-18. Operation in salt Water Areas. Operation in salt water areas presents corrosion problems. Keep exposed metal parts clean by washing with fresh water and drying thoroughly.

2-19. Operation at High Altitudes. Pump output may fall off slightly due to lower horsepower output of the Military Standard engine at high altitudes.

CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

		Page
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Section I.	Lubrication Instructions	3-1
Section II.	Operator Troubleshooting	3-1
Section III.	Operator Maintenance	3-4

OVERVIEW

This chapter contains operator level maintenance instructions. It includes Lubrication instructions for the gasoline engine, troubleshooting procedures to isolate a malfunction to a specific component and maintenance procedures for the hoses, fittings and adapters, frame assembly, pump and engine assembly, filter/separator, collapsible drums and the closed-circuit refueling nozzles.

Section I. LUBRICATION INSTRUCTIONS

		Page
Paragraph		
3-1	General	3-1

3-1. General. Lubrication instructions for the Military Standard Engine (Mode 12A016-3) which is part of the FARE are contained in L0 9-2805-257-12. No other lubrication of system is required.

Section II OPERATOR TROUBLESHOOTING

		Page
Paragraph		
3-2	General	3-1
3-3	Operator Troubleshooting Procedures	3-1

3-2. General. This section lists the common malfunctions you may find during operation of the FARE or its components. Perform each test/inspection and corrective action in the order listed.

3-3. Operator Troubleshooting Procedures. Refer to the symptom index to locate the troubleshooting procedure for the observed malfunction. Malfunctions which may occur during operation are listed in Table 3-1. This manual cannot list all malfunctions which may occur nor all of the probable causes and corrective actions. If a malfunction is not listed or is not corrected by listed corrective action, notify your supervisor.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

SYMPTOM INDEX

Symptom	Page
Engine assembly does not operate properly	3-2
Pump fails to operate	3-2
Filter/separator in operative....	3-2
Nozzle (closed-circuit) inoperative	3-2
Improper fuel flow	3-2
Fuel leaks at coupling	3-3
Butterfly valve leaks	3-3
Elbow coupler valve leaks	3-3
Tee fitting leaks	3-3
Wye fitting leaks	3-3
Water detector ki tadapter leaks.	3-4
Hose leaks	3-4
Sudden decrease in differential pressure indicator	3-4

Table 3-1. Operator Troubleshooting.

Malfunction	Test or Inspection	Corrective Action
1. ENGINE ASSEMBLY DOES NOT OPERATE PROPERLY.		
		(Refer to TM 9-2805-257-14).
2. PUMP FAILS TO OPERATE.		
		(Refer to TM 10-4320-256-14&P).
3. FILTER/SEPARATOR INOPERATIVE.		
		(Refer to TM 5-4330-217-12&P).
4. NOZZLE (CLOSED-CIRCUIT) INOPERATIVE.		
		(Refer to TM 5-4930-226-12&P, TM 5-4930-234-13&P or TM 5-4930-235-13&P).
5. IMPROPER FUEL FLOW.		
	Step 1. Ensure elbow coupler valve and butterfly valve are open.	
	Open valves.	
	Step 2. Check if filter/separator differential pressure indicator is in red.	
	Notify unit maintenance.	

Table 3-1. Operator Troubleshooting (cont).

Malfunction	Test or Inspection	Corrective Action
5. IMPROPER FUEL FLOW (cont).	Step 3. Check pump/engine for proper operation. (Refer to TM 10-4320-256-14&P).	Step 4. Check closed circuit refueling nozzle for proper operation. (Refer to TM 5-4930-226-12&P, TM 5-4930-234-13&P or TM 5-4930-235-13& P.)
6. FUEL LEAKS AT COUPLING.	Check for defective gasket. Replace gasket.	
7. BUTTERFLY VALVE LEAKS.	Check for defective valve. Replace valve.	
8. ELBOW COUPLER VALVE LEAKS.	Check for defective valve. Replace valve.	
9. TEE FITTING LEAKS.	Check for defective fitting. Replace fitting.	
10. WYE FITTING LEAKS	Check for defective fitting. Replace fitting.	

Table 3-1. Operator Troubleshooting (cont).

Malfunction	Test or Inspection	Corrective Action
11. WATER DETECTOR KIT ADAPTER LEAKS		Check for defective components. Replace adapter.
12. HOSE LEAKS		Check for damaged hose. Replace hose.
13. SUDDEN DECREASE IN DIFFERENTIAL PRESSURE INDICATOR.		Check for contaminated fuel. Notify unit maintenance.

Section III. OPERATOR MAINTENANCE

Paragraph		Page
3-4	General	3-4
3-5	Discharge Hose Assembly	3-5
3-6	Suction Hose Assembly	3-6
3-7	Fittings and Adapter	3-7
3-8	Hose Frame Assembly	3-8
3-9	Pump and Engine Assembly	3-8
3-10	Fitter/Separator	3-8
3-11	Collapsible Drum	3-8
3-12	Closed Circuit Refueling Nozzle	3-8

3-4. **General.** Operator maintenance of the FARE, consists primarily of inspection of components for defects in accordance with the MAC, Section II, Appendix B. These procedures are described in the following paragraphs.

3-5. Discharge Hose Assembly.

This task covers: Inspection

INITIAL SETUP

Tools:

None

Materials/Parts:

None

Equipment Condition:

Assembled for operation.

Inspection.

WARNING

Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

- (1) Inspect hose for leaks, separation of material, blisters and cuts.
- (2) Inspect hose clamps (4 per hose) for damage.
- (3) Inspect couplings and dust covers for cleanliness, badly scored surfaces and for missing dust caps and plugs. Inspect for damaged camlocks and loose and/or missing washers.
- (4) Clean any foreign matter away from coupling. Replace hose assembly, as required, with like item from stock.

3-6. Suction Hose Assembly.

This task covers: Inspection

INITIAL SETUP

Tools: Equipment Condition:
None Assembled for operation.

Materials/Parts:

None

Inspection.

WARNING

Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

- (1) Inspect hose for leaks, separation of material, blisters and cuts.
- (2) Inspect hose clamps (4 per hose) for damage.
- (3) Inspect couplings and dust covers for cleanliness, badly scored surfaces and for missing dust caps and plugs. Inspect for damaged camlocks and loose and/or missing washers.
- (4) Clean any foreign matter away from coupling. Replace hose assembly, as required, with like item from stock.

3-7. Fittings and Adapter.

This task covers: Inspection

INITIAL SETUP

Tools:

None

Equipment Condition:

Assembled for operation.

Materials/Pads:

None

Inspection.

WARNING

Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

- (1) inspect all fittings, coupling valves and water detector kit adapter for leaks.
- (2) Inspect couplings, dust plugs and dust covers for cleanliness, badly scored surfaces and for missing hardware.
- (3) Inspect for damaged camlocks and loose or missing gaskets.
- (4) Inspect water detector kit adapter probe for damage and clean as required.
- (5) Replace any defective components with like items from stock.

CHAPTER 4

UNIT MAINTENANCE INSTRUCTIONS

		Page
	OVERVIEW	4-1
Section I	Repair Parts, Special Tools, Test, Measurement and Diagnostic Equipment (TMDE) and Support Equipment	4-1
Section II	Service Upon Receipt	4-1
Section III	Unit Preventive Maintenance Checks and Services (PMCS)	4-2
Section IV	Unit Troubleshooting	4-3
Section V	Unit Maintenance Procedures	4-6
Section VI	Preparation for Shipment or Storage	4-35

OVERVIEW

This chapter contains unit level maintenance instructions for the FARE. It includes references to the Repair Parts and Special Tools List in Appendix F, service upon receipt, unit PMCS and unit troubleshooting procedures. It also includes unit maintenance procedures for the discharge and suction hoses, fittings and adapters, and hose frame assembly. Refer to TM 5-4930-235-13&P for repair of closed circuit nozzles. Refer to TM 5-4320-256-14&P for repair of pump assembly. Refer to TM9-2805-257-14 for repair of engine assembly. Refer to TM5-4330-217-12&P for repair of filter/separators assembly. Refer to TM 10-8110-201-14&P for repair of the drum. Section VI which describes preparation for storage or shipment, includes procedures for administrative, short term and intermediate term storage.

Section I. REPAIR PARTS, SPECIAL TOOLS, TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE) AND SUPPORT EQUIPMENT

Paragraph		Page
4-1	Special Tools, TMDE and Support Equipment	4-1
4-2	Repair Parts	4-1

4-1. Special Tools, TMDE and Support Equipment. No special tools are required for unit maintenance of the FARE. TMDE and support equipment are listed in the Maintenance Allocation Chart (MAC).

4-2. Repair parts. Repair parts required for maintenance of the FARE are listed in the Repair Parts and Special Tools List (RPSTL), Appendix F of this manual.

Section II. SERVICE UPON RECEIPT

Paragraph		Page
4-3	Unloading	4-2
4-4	Unpacking	4-2
4-5	Inspection and Service	4-2

4-3. Unloading. Take care when unloading equipment from transport vehicle to avoid damage.

WARNING

Weight of hose and component kits and pump/engine assembly exceed limit for one-man lift. Maximum height for two-man lift is 2.8 feet (84.0 cm).

4-4. Unpacking. Carefully unpack each carton taking care to examine all packing material before discarding. Check equipment against the packing slip to see if shipment is complete. Report all discrepancies in accordance with DA PAM 738-750.

4-5. Inspection and Service.

- a. Inspect equipment for damage incurred during shipment and for missing parts. Carefully inspect hose assemblies for damaged couplings and inspect hoses for cuts and excessive wear. If equipment has been damaged, report damage on SF Form 368, Product Quality Deficiency Report.
- b. Check that ground cables are securely fastened to pump/engine assembly and filter/separator assembly. Make sure that grounding clip and plug at free ends of nozzle grounding cables are securely fastened to ground cable and that cable is attached to nozzle. Inspect all ground cables for broken or damaged condition.
- c. Perform unit level PMCS and operator Before (B) PMCS before operating equipment.

Section III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Paragraph	Page
4-6 General	4-2

4-6. General. To ensure that FARE is ready for operation at all times, it must be inspected systematically so defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services are listed in table 4-1. Defects discovered during operation of system shall be noted for future correction to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation, which would damage the equipment if operation were continued. If equipment fails to operate, troubleshoot with the proper equipment. Report any deficiencies using the proper forms. (See DA PAM 738-750).

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS).

M – Monthly

Item No.	Interval	Item to be Inspected	Procedures	Equipment is not Ready/Available If:
	M			
1	•	Suction Hose	Check for continuity between coupling ends.	Resistance is greater than 5 ohms.
2		Engine	Refer to TM 9-2805-257-14.	
3		Pump	Refer to TM 10-4320 -256-14&P.	
4		Filter/Separator	Refer to TM 5-4330-217-12&P.	
5		Closed Circuit Refueling Nozzle	Refer to TM 5-4930-226-12&P, TM 5-4930-234-13&P and TM 5-4930-235-13&P.	
6		500 gl Collapsible Drum	Refer to TM 10-8110-201-14&P.	

Section IV. UNIT TROUBLESHOOTING

Paragraph		Page
4-7	General	4-3
4-8	Unit Troubleshooting Procedures	4-3

4-7. **General.** This section contains troubleshooting procedures to determine the probable cause of observed equipment malfunctions. Tests or inspections are provided to isolate the fault component and corrective actions are provided to eliminate the malfunction.

4-8. Unit Troubleshooting Procedures. Refer to the symptom index to locate the troubleshooting procedure for the observed malfunction. The table lists the common malfunctions that may occur during the operation or maintenance of the FARE. Perform the tests or inspections, and the recommended corrective action in the order listed in the troubleshooting table. If the malfunction is not corrected by the listed corrective actions, notify your supervisor.

SYMPTOM INDEX

Symptom	Page
Engine assembly does not operate properly	4-4
Pump fails cooperate	4-4
Filter/separator inoperative.....	4-4
Nozzle (closed-circuit) inoperative	4-4
Improper fuel flow	4-4
Fuel leaks at coupling	4-5
Butterfly valve leaks	4-5
Elbow coupler valve leaks	4-5
Tee fitting leaks	4-5
Wye fitting leaks	4-5
Water detector kit adapter leaks.	4-5
Hose leaks	4-6
Sudden decrease in differential pressure indicator and/or contaminated fuel	4-6

Table 4-2. Unit Troubleshooting.

Malfunction	Test or Inspection	Corrective Action
1. ENGINE ASSEMBLY DOES NOT OPERATE PROPERLY.		
		(Refer to TM 9-2805-257-1 4.)
2. PUMP FAILS TO OPERATE.		
		(Refer to TM 10-4320-256-14&P.)
3. FILTER/SEPARATOR INOPERATIVE.		
		(Refer to TM 5-4330-217-12&P.)
4. NOZZLE (CLOSED-CIRCUIT) INOPERATIVE.		
		(Refer to TM 5-4930-226-12&P, TM 5-4930-234-13&P, or TM 5-4930-235-13&P.)
5. IMPROPER FUEL FLOW.		
	Step 1. Check if filter/separator differential pressure indicator is in red.	
	Replace filter elements.	
	Step 2. Check pump/engine for proper operation.	
	(Refer to TM 10-4320-256-14&P and TM 9-2805-257-1 4.)	

Table 4-2. Unit Troubleshooting (cont).

Malfunction	Test or Inspection	Corrective Action
5. IMPROPER FUEL FLOW (cont).		<p>Step 3. Check closed circuit refueling nozzle for proper operation.</p> <p>(Refer to TM 5-4930 -226-12&P, TM 5-4930-234-13&P or TM 5-4930-235-13&P.)</p>
6. FUEL LEAKS AT COUPLING.		<p>Check for defective coupling.</p> <p>Replace coupling (see para. 4-10 or 4-11).</p>
7. BUTTERFLY VALVE LEAKS.		<p>Check for defective valve.</p> <p>Repair valve (see para. 4-13).</p>
8. ELBOW COUPLER VALVE LEAKS.		<p>Check for defective valve.</p> <p>Repair valve (see para. 4-14).</p>
9. TEE FITTING LEAKS.		<p>Check for defective fitting.</p> <p>Repair fitting (see para. 4-15).</p>
10. WYE FITTING LEAKS.		<p>Check for defective fitting,</p> <p>Repair fitting (see para. 4-18).</p>
11. WATER DETECTOR KIT ADAPTER LEAKS.		<p>Check for defective components.</p> <p>Repair adapter (see para. 4-19).</p>

Table 4-2. Unit Troubleshooting (cont).

Malfunction	Test or Inspection	Corrective Action
12.	HOSE LEAKS.	<p>Check for damaged hose.</p> <p>Repair hose (see para. 4-10 or 4-11).</p>
13.	SUDDEN DECREASE IN DIFFERENTIAL PRESSURE INDICATOR AND/OR CONTAMINATED FUEL.	<p>Check for damaged fuel filter elements.</p> <p>Replace filter elements.</p>

Section V. UNIT MAINTENANCE PROCEDURES

Paragraph		Page
4-9	General	4-6
4-10	Hose Assembly, Discharge	4-8
4-11	Hose Assembly, Suction	4-11
4-12	Ground Rod	4-13
4-13	Valve Assembly, Butterfly	4-14
4-14	Valve, Elbow Coupler	4-18
4-15	Tee Fitting Assembly	4-21
4-16	Adapter Assembly	4-23
4-17	Adapter, Nozzle	4-25
4-18	Wye Fitting Assembly	4-27
4-19	Adapter, Water Detector Kit....	4-30
4-20	Frame Assembly	4-33

4-9. General. This section contains unit maintenance information for the discharge and suction hose assemblies, the butterfly valve assembly, elbow coupler valve, tee and wye fitting assemblies. Unit maintenance information for other components and accessories of the FARE can be found in the following publications:

- a. For removal of military standard engine, refer to TM 10-4320-256-14&P.
- b. For repair and overhaul of the military standard engine, refer to TM 9-2805-257-14.
- c. For repair of the pump/engine frame assembly, refer to TM 10-4320-256-14&P.
- d. For overhaul of the pump assembly, refer to TM 10-4320-256-14&P.

- e. For repair of the filter/separator refer to TM 5-4330-217-12&P.
- f. For repair of the closed-circuit nozzle assemblies refer to TM 5-4930-226-12&P (Model CCN 101/14), TM 5-4930-234-13&P (Model AE83206R) and TM 5-4930-235-13&P (Model 125-1000).
- g. For repair of the canvas accessory containers, refer to FM 10-16.

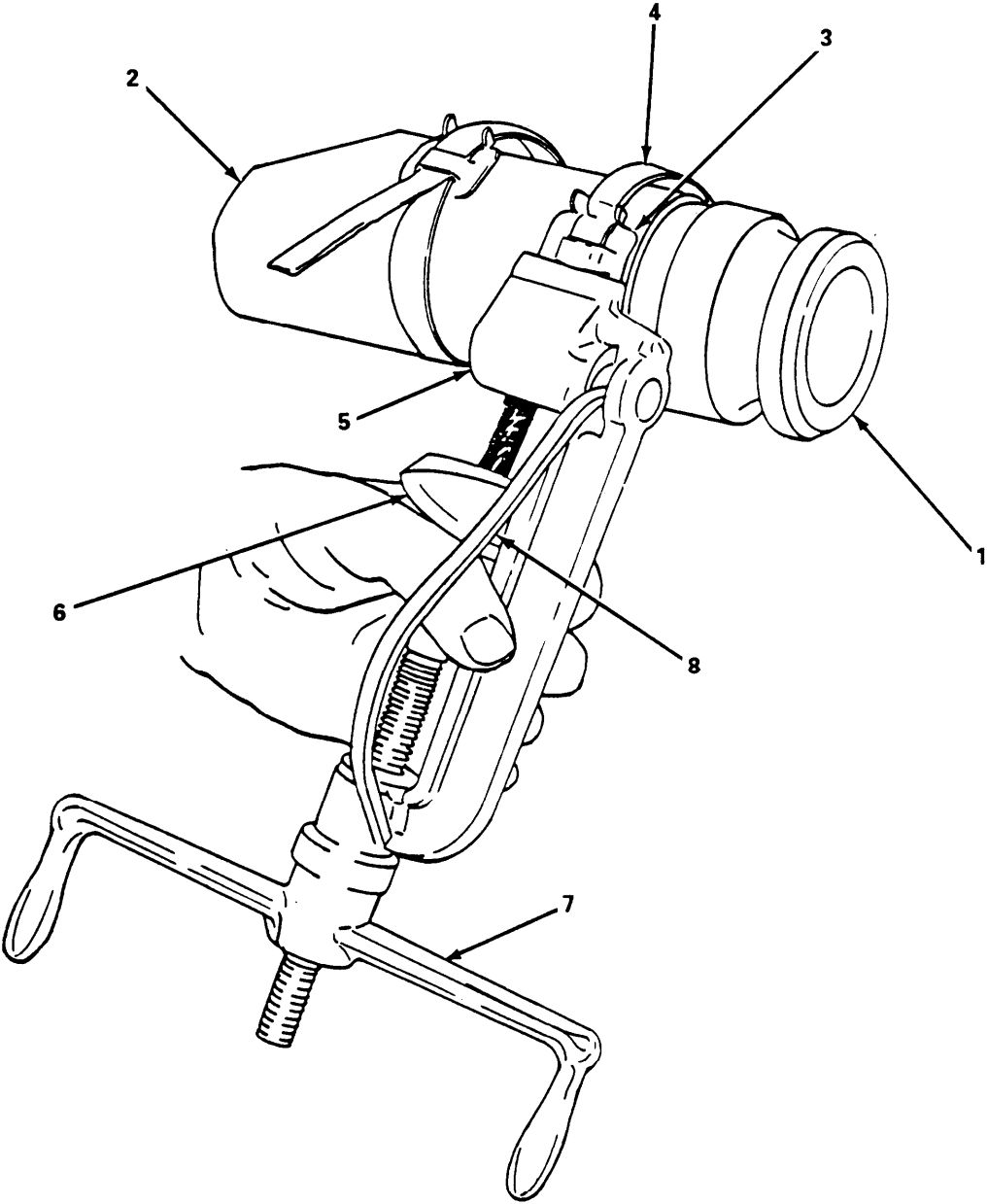


Figure 4-1. Installing Band on Hose Assembly.

4-10. Hose Assembly, Discharge (cont).

- (h) Roll tool over buckle, backing off with tension handle throughout entire rolling operation.
 - (i) Pull cutting handle (8) to cut band.
 - (j) Remove tool, holding stub of band down with thumb. Clinch stub by hammering down buckle ears.
 - (k) Repeat steps (d) through (j); positioning band approximately 2 in. from shoulder clamp.
- (2) Discharge hose. Repair a damaged discharge hose as follows:
- (a) Cut hose to remove damaged section.
 - (b) If damaged area is within 10 feet (304.8 cm) of end of hose, remove fitting from short length of hose and reinstall in longer section using procedure in (1), above.
 - (c) If damaged section is more than 10 feet (304.8 cm) from end of hose, replace with like item from stock.

b. Replace.

(1) *Removal.*

- (a) Pull upon camlock levers on discharge hoses and closed circuit nozzle.
- (b) Remove discharge hoses from wye fitting and closed circuit nozzle.

(2) *Installation.*

- (a) Connect discharge hoses to wye fitting and closed circuit nozzle.
- (b) Push down on camlock levers to secure discharge hoses.

4-11. Hose Assembly, Suction.

This task covers: a. Repair b. Test c. Replace

INITIAL SETUP

Tools:

Banding Tool, Item 2, Section III, Appendix B
 Tool Kit, General Mechanic's, Item 1, Section III, Appendix B
 Multimeter, Digital, Item 3, Section III, Appendix B

Materials/Parts:

Seals, 1/2 In., Item 1, Appendix E
 Strapping, 1/2 In., Item 2, Appendix E

Equipment Condition:

FARE shutdown per para. 2-12.

General Safety Instructions:

WARNING

- Do not smoke or use an open flame in the vicinity of the FARE, failure to comply may result in personnel injury.
- Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

a. *Repair.* (figure 4-1)

(1) Couplings. To replace a defective coupling, proceed as follows:

- (a) Cut band and remove damaged coupling (1).
- (b) Ensure static wire extends beyond end of hose (2) a minimum of 1/4 in. Install barbed end of new coupling in hose end. Ensure static wire is in contact with coupling.
- (c) Slide buckle (3) on banding material (4), bend approximately 1 in. of banding material under buckle. Wrap banding material around hose twice running end through each time.
- (d) Place band in open slot of banding tool nose (5) and in slide.
- (e) With thumb on band gripper lever (6), apply tension by turning handle (7) of tool clockwise. After tension is created, it is no longer necessary to hold band gripper lever as it locks itself under tension.
- (f) Place finger on banding material (4) at buckle bridge while tensioning with tool handle (7) in a clockwise direction.
- (g) When banding material stops moving through buckle (3) as handle (7) turns, stop turning. Maximum tension is exerted by banding material around hose.

WARNING

Failure to back off with tension handle throughout entire course of roll may result in breaking of band, and injury to personnel.

4-11. Hose Assembly, Suction (cont).

- (h) Roll tool over buckle, backing off with tension handle throughout entire rolling operation.
- (i) Pull cutting handle (8) to cut band.
- (j) Remove tool, holding stub of band down with thumb. Clinch stub by hammering down buckle ears.
- (k) Repeat steps (d) through (j); positioning band approximately 2 in. from shoulder of coupling.
- (l) Perform test as outlined in (b) above.

(2) Suction hose. Repair a damaged suction hose as follows:

- (a) If hose is damaged within one foot (30.48 cm) of end, cut off damaged portion and install coupling as in (1) above. Make sure static wire extends 1/4 inch beyond cut end.
- (b) If damaged section is more than one foot from end, replace complete hose and reinstall couplings as in (1) above.

b. Test.

NOTE

Suction hose assembly should be tested every thirty days or whenever hose has been damaged.

- (1) Touch each probe of multimeter to opposite end hose coupling half. Use a multimeter and perform a continuity test on the suction hose to insure the wires in the suction hose are not broken.
- (2) The resistance reading should be 5 ohms or less. Repair hose assembly if resistance is greater than 5 ohms.
- (3) No hydrostatic test is required on the discharge hose and suction hose.

c. Replace.

(1) Removal.

- (a) Pull up on camlock levers on butterfly valve and suction hoses.
- (b) Remove suction hoses.

(2) Installation.

- (a) Connect suction hose to butterfly valve.
- (b) Push down on camlock levers to secure suction hose.

4-12. Ground Rod.

This task covers: a. Removal

b. Installation

INITIAL SETUP

Equipment Conditions:

FARE shutdown, para. 2-12.

a. Removal. (figure 4-2.)

- (1) Unbuckle two straps (1) and open flap (2).
- (2) Remove two ground rods (3) from container (4).

b. Installation.

- (1) Insert two ground rods (3) into container (4).
- (2) Close flap (2) and buckle two straps (1).

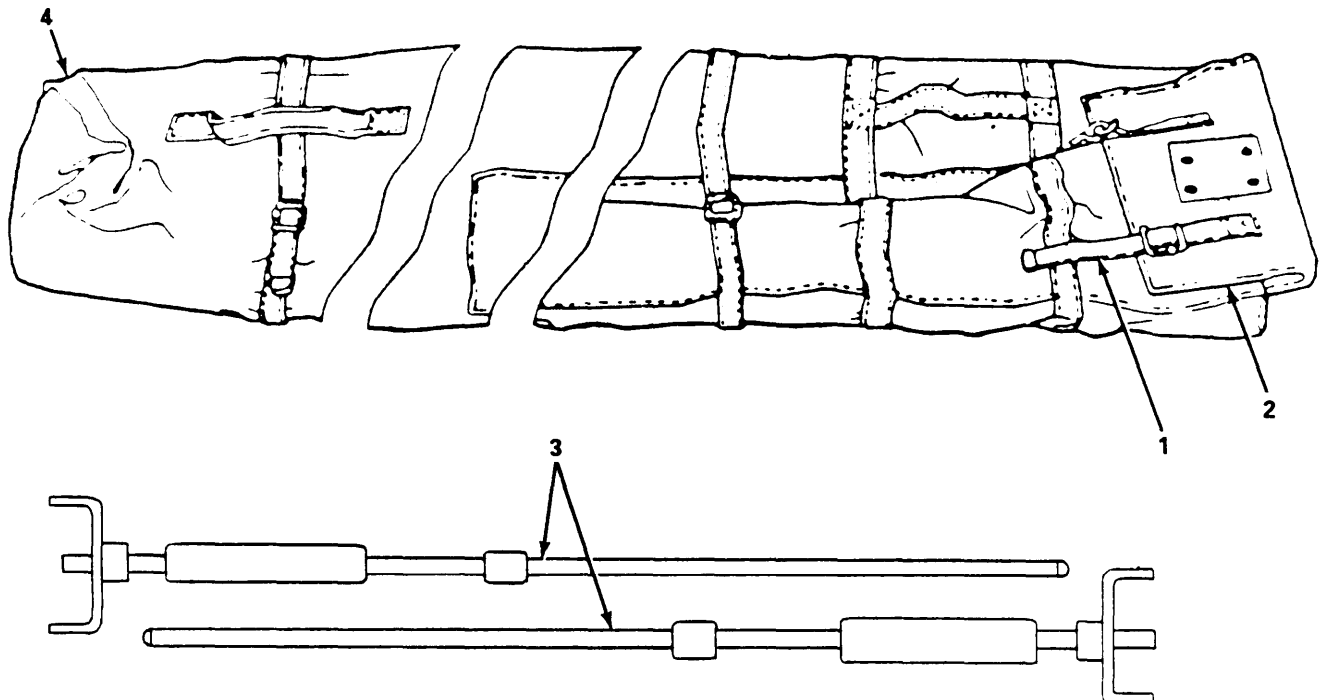
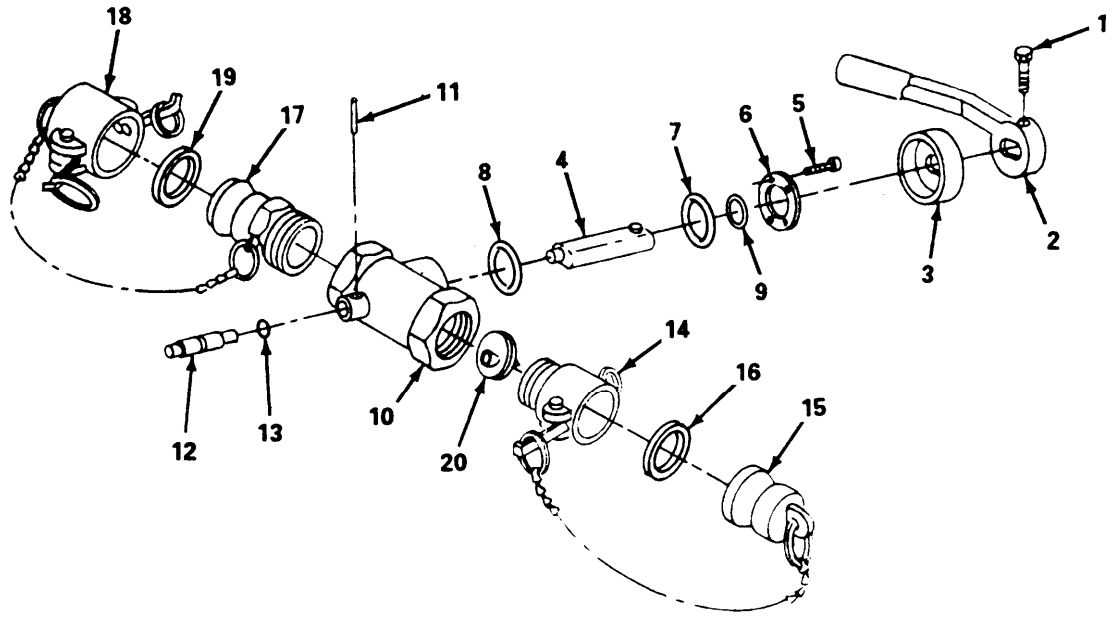


Figure 4-2. Ground Rod, Removal/installation.



- | | | | |
|----|--------------------|----|----------------------|
| 1 | SET SCREW | 11 | PIN |
| 2 | HANDLE | 12 | SHAFT |
| 3 | CAP | 13 | O-RING |
| 4 | SHAFT | 14 | FEMALE COUPLING HALF |
| 5 | SCREW | 15 | DUST PLUG |
| 6 | DISC | 16 | GASKET |
| 7 | NONMETALLIC WASHER | 17 | MALE COUPLING HALF |
| 8 | METALLIC WASHER | 18 | DUST CAP |
| 9 | O-RING | 19 | GASKET |
| 10 | VALVE BODY | 20 | BUTTERFLY |

Figure 4-3. Butterfly Valve Disassembly/Assembly.

4-13. Valve Assembly, Butterfly (cont).

- (i) Unscrew female coupling half (14) from valve body (10), then remove dust plug (15) and gasket (16). Discard gasket and remove sealing compound from threads.
 - (j) unscrew male coupling half (17) from valve body (10), then remove dust cap (18) and gasket (19). Discard gasket and remove sealing compound from threads.
 - (k) Remove butterfly (20) from valve body (10).
 - (l) Replace any parts found to be defective with new parts from stock.
- (2) Reassembly.
- (a) Install O-ring (13) on shaft (12).
 - (b) Insert butterfly (20) into valve body (10) and position it so that shaft (12) can be inserted into pivot point on butterfly (20). Install shaft (12) and secure in housing with pin (11).
 - (c) Assemble O-ring (9) in valve body (10).
 - (d) Assemble metallic washer (8) and non-metallic washer (7) and disc (6) on shaft (4).
 - (e) Insert shaft (4) and assembled washers and disc into valve body (10) to engage butterfly (20).
 - (f) Secure disc (6) to valve body (10) with two screws (5).
 - (g) Install cap (3) and handle (2) On shaft (4). Ensure handle will operate in Position installed and secure handle with setscrew (1).
 - (h) Install new gasket (16) and dust plug (15) into female coupling half (14).
 - (i) Apply sealing compound to threads and screw female coupling half (14) into inlet side of valve body (10).
 - (j) Install new gasket (19) in dust cap (18) and secure on male coupling half (17).
 - (k) Apply sealing compound to threads and screw male coupling half (17) into outlet side of valve body (10).
- b. Replace (figure 4-4.)
- (1) Removal.
 - (a) Pull up camlock lever rings.
 - (b) Remove butterfly valve assembly (1) from suction hose assembly (2) and tee assembly (3).
 - (c) Install dust cap and dust plug. Secure dust cap and dust plug with camlock lever.

4-13. Valve Assembly, Butterfly (cont).**(2) Installation.**

- (a) Pull upon camlock lever and remove dust cap and dust plug.
- (b) Position butterfly valve (1) on tee assembly (3) and secure by pushing down on camlock levers.
- (c) Connect suction hose assembly (2) to butterfly valve and secure by pushing down on camlock levers.

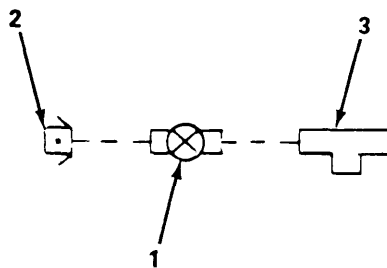


Figure 4-4. Butterfly Valve Removal/Installation.

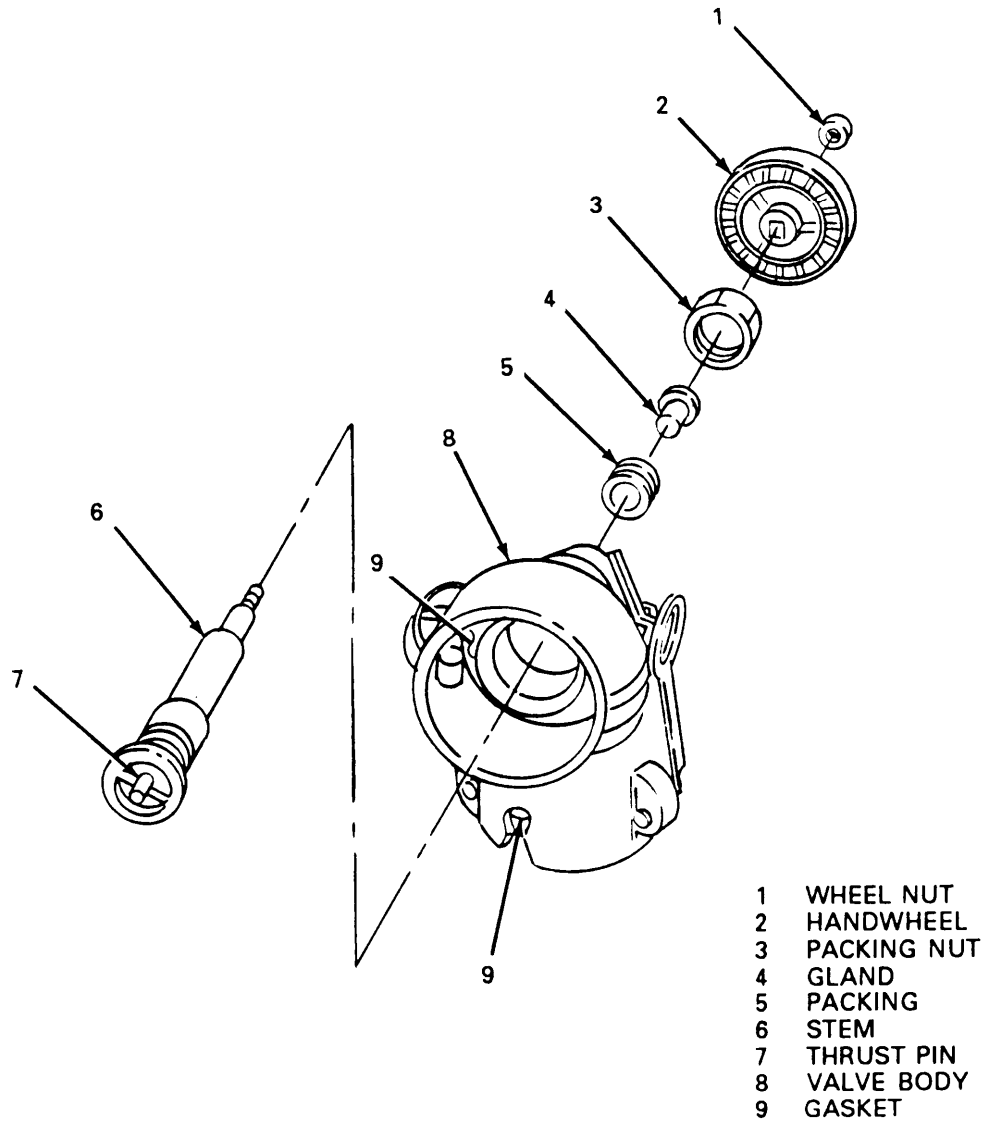


Figure 4-5. Elbow Coupler Valve, Disassembly/Assembly.

(2) Reassembly.

- (a) Install new gaskets (9) in valve body (8).
- (b) Screw stem (6) with thrust pin (7) into valve body (8).
- (c) Slip new packing (5) and gland (4) over shaft of stem (6) and slide down to valve body (8).

4-14. Valve, Elbow Coupler (cont).

(d) Apply sealing compound to packing nut threads, install packing nut (3) over stem (6) and thread onto mating threads in valve body (8).

(e) Install handwheel (2) on stem (6) and secure with wheel nut (1).

b. Replace. (figure 4-6)

(1) Removal.

WARNING

Ensure elbow coupler valve is closed to avoid potential hazard that may exist.

(a) Turn handwheel clockwise to close elbow coupler valve.

(b) Pull upon camlock levers on valve (1).

(c) Remove valve from fuel drum (2) and adapter (3).

(2) Installation.

WARNING

Ensure elbow coupler valve is closed to avoid potential hazard that may exist.

(a) Turn handwheel clockwise to close elbow coupler valve.

(b) Position valve (1) on fuel drum (2) and secure by pushing down on camlock levers.

(c) Position adapter (3) in valve (1) and secure by pushing down on camlock levers.

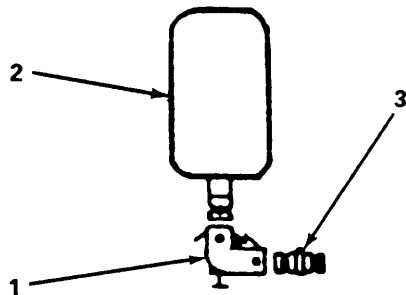


Figure 4-6. Elbow Coupler Valve, Removal/Installation.

4-15. Tee Fitting Assembly (cont).

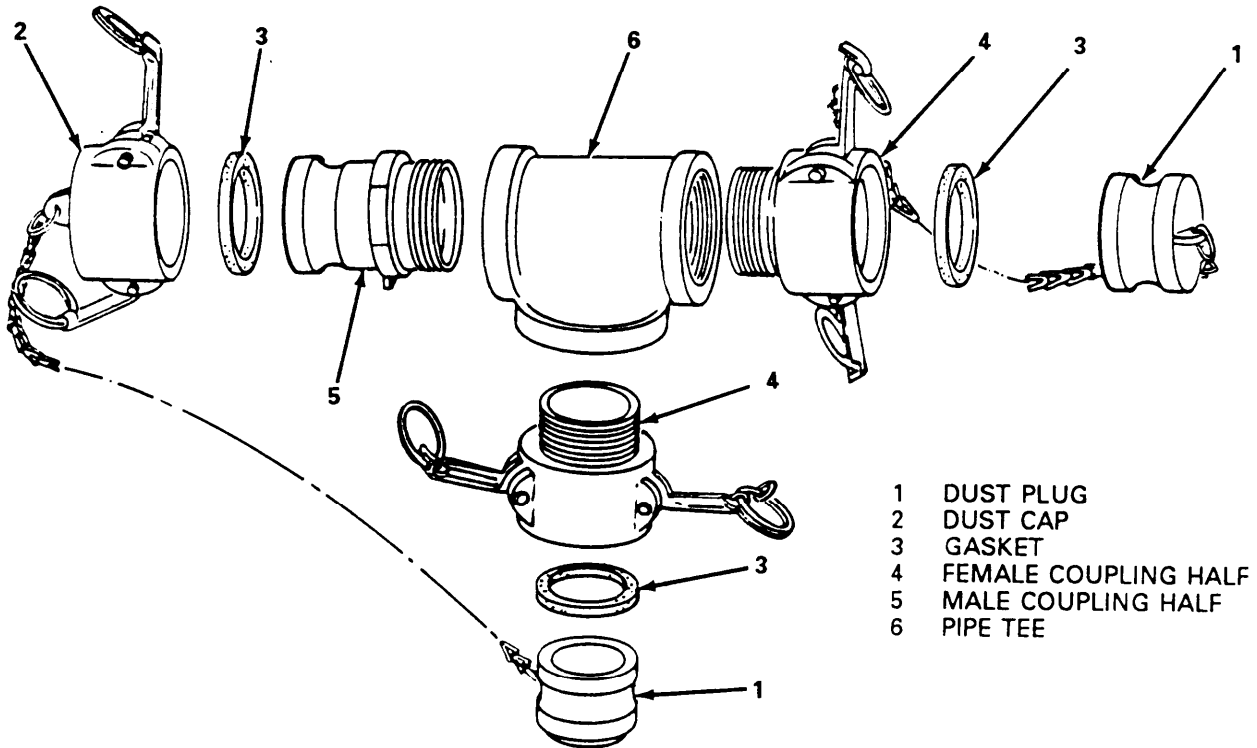


Figure 4-7. Tee Fitting Disassembly/Assembly.

(2) Reassembly.

- (a) Apply sealing compound to threads and screw each coupling half into tee (6).
- (b) Install new gaskets (3) in coupling halves.
- (c) Install dust plugs (1) in female coupling halves (4) and install dust cap (2) on male coupling half (5).

b. Replace.

(1) Removal.

- (a) Pull upon camlock levers on two suction hoses and remove suction hoses from tee assembly.
- (b) Pull upon camlock levers on tee assembly and remove tee assembly.

(2) Installation.

- (a) Position tee assembly on suction hose, and secure by pushing down on camlock levers.
- (b) Position tee assembly, and secure by pushing down on camlock levers.

4-16. Adapter Assembly (cont).

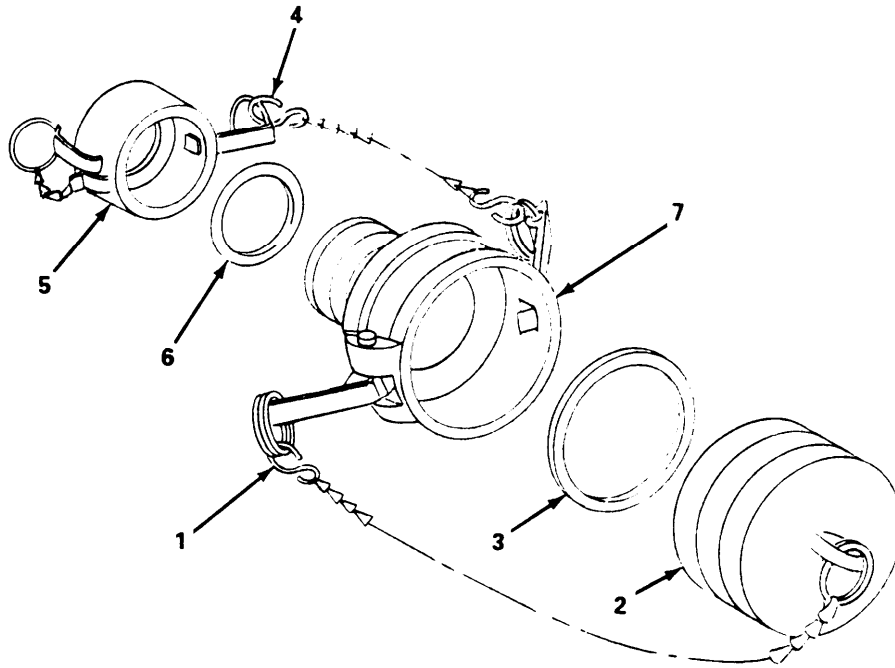


Figure 4-8. Adapter Assembly, Disassembly/Assembly.

b. Replace. (figure 4-9)

(1) Removal.

- (a) Pull upon suction hose assembly (1) camlock levers and remove suction hose.
- (b) Pull upon adapter camlock levers and remove adapter assembly (2) from fuel source.

(2) Installation.

- (a) Position adapter assembly (2) on fuel source and secure by pushing down on camlock levers.
- (b) Install suction hose assembly (1) and secure by pushing down on camlock levers.

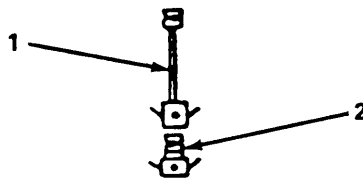


Figure 4-9. Adapter Assembly, Removal/Installation.

4-17. Adapter, Nozzle (cont).

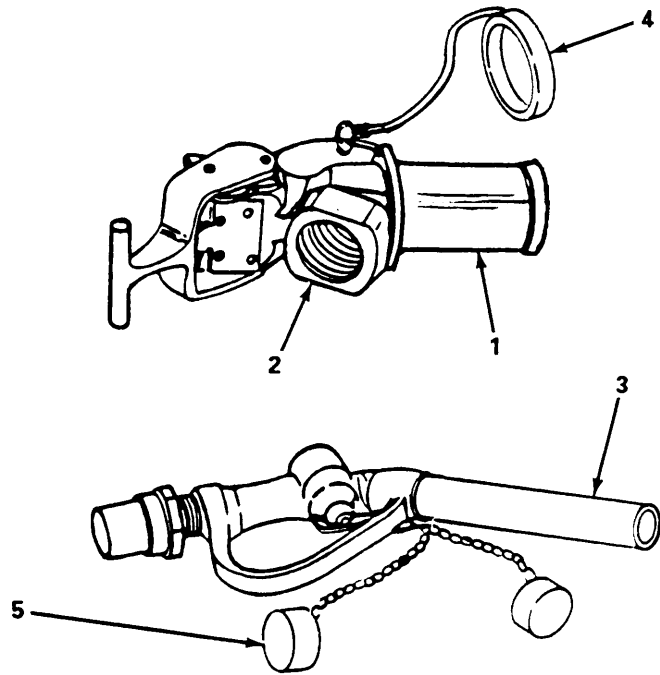


Figure 4-10. Adapter Nozzle, Removal/Installation.

4-18. Wye Fitting Assembly.

This task covers: a. Repair

b. Replace

INITIAL SETUP

Tools:

General Safety Instructions:

None

WARNING

Materials/Parts:

Cleaning Solvent, Item 4, Appendix E

Rags, Wiping, Item 5, Appendix E

Gaskets, P/N MS27030-6, Appendix F

Equipment Conditions:

FARE shutdown, para 2-12.

. Do not smoke or use an open flame in the vicinity of the FARE, failure to comply may result in personnel injury.

. Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

a. Repair. (figure 4-11)

(1) Disassembly.

- (a) Inspect wye fitting assembly for leaks, and damaged or missing parts.

WARNING

Cleaning solvent, Federal Specification PD-680, is toxic and flammable. Use only in a well-ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts. Avoid skin contact.

- (b) Clean wye fitting assembly with cleaning solvent. Allow to dry.
- (c) Disconnect two chains (1) and remove two dust caps (2) and two gaskets (3). Discard gaskets.
- (d) Disconnect chain (4) and remove dust plug (5) and gasket (6) from wye fitting (7). Discard gasket.
- (e) Replace any part found to be defective with new parts from stock.

(2) Reassembly.

- (a) Install new gasket (6) and dust plug (5) in wye fitting (7). Connect chain (4).
- (b) Install two new gaskets (3) and two dust caps (2). Connect two chains (1).

4-18. Wye Fitting Assembly (cont).

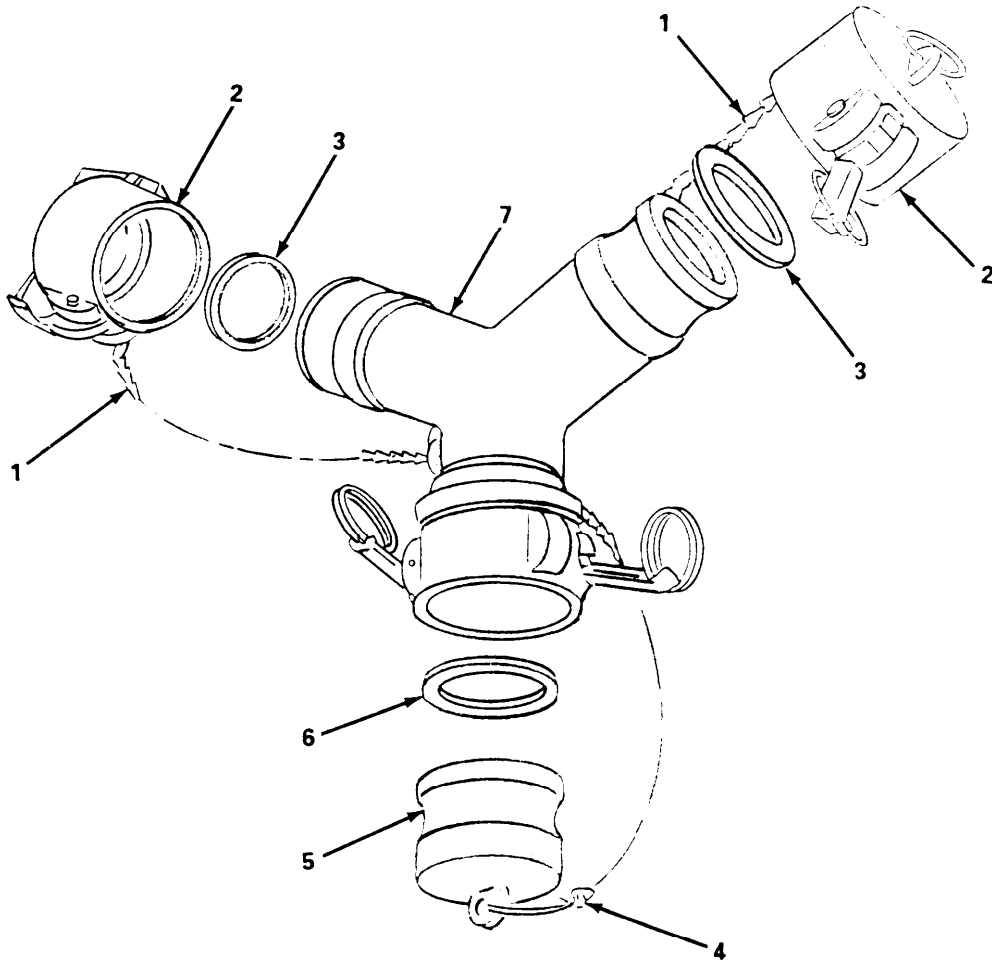


Figure 4-11. Wye Fitting Assembly, Disassembly/Assembly.

4-18. Wye Fitting Assembly (cont).

b. Replace. (figure 4-12)

(1) Removal.

(a) Pull upon discharge hose camlock levers and remove two discharge hose assemblies (1).

(b) Pull upon wye fitting (2) camlock levers and remove fitting from suction hose assembly (3).

(2) Installation.

(a) Position wye fitting (2) on suction hose assembly (3) and secure by pushing down on camlock levers.

(b) Install two discharge hose assemblies (1) and secure by pushing down on camlock levers.

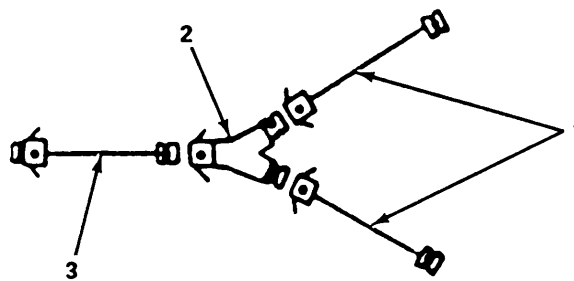


Figure 4-12. Wye Fitting Assembly, Removal/installation.

4-19. Adapter, Water Detector Kit (cont).**(2) Reassembly.**

- (a) Apply sealing compound to threads and install male coupling half (9) and female coupling half (8) on nipple (10).
- (b) Apply sealing compound to threads and install probe assembly (7). Ensure beveled side of probe faces female coupling half (8).
- (c) Install new gasket (6) and dust cap (5). Secure with camlock levers (4).
- (d) Install new gasket (3) and dust plug (2). Secure with camlock levers (1).

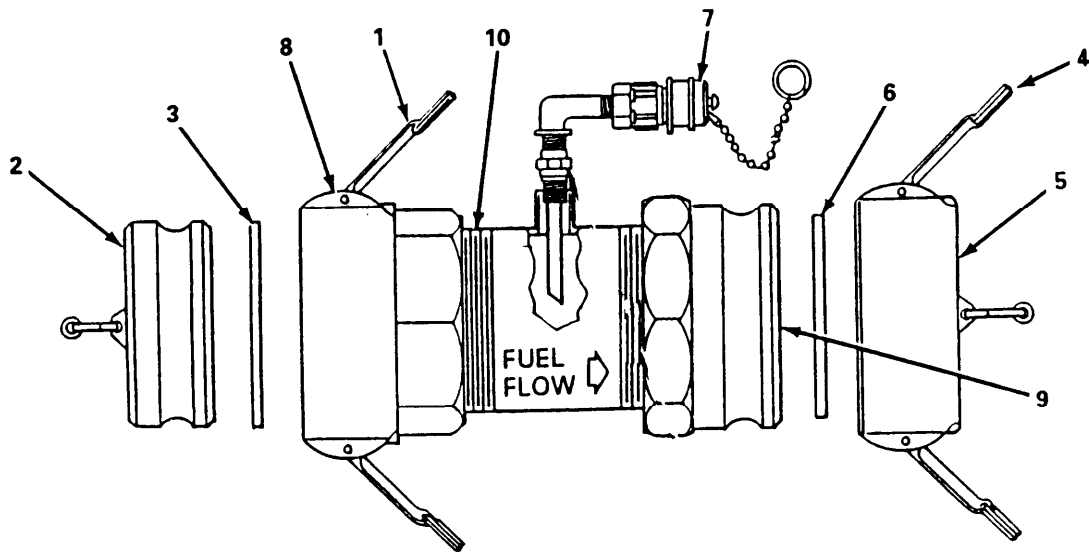


Figure 4-13. Water Detector Kit Adapter, Disassembly/Assembly.

4-19. Adapter, Water Detector Kit (cont)

b. Replace. (figure 4-14)

(1) Removal.

(a) Pull upon suction hose camlock levers and remove hose assembly (1).

(b) Pull upon adapter camlock levers and remove adapter (2) from filter/separator (3).

(2) Installation.

(a) Pull upon camlock levers and remove dust plug and dust cap.

(b) Position adapter (2) on filter/separator (3) outlet fitting. Secure by pushing down on camlock levers.

(c) Install suction hose (1) and secure by pushing down on camlock levers.

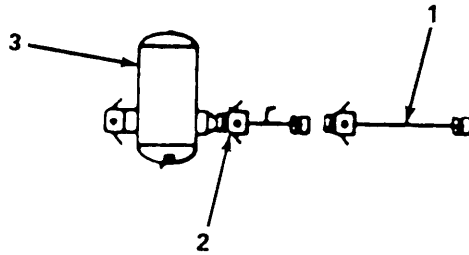


Figure 4-14. Water Detector Kit Adapter, Removal/Installation.

4-20. Frame Assembly.

This task covers: a. Repair

b. Replace

INITIAL SETUP

Tools:

General Safety Instructions:

Tool Kit, General Mechanic's, Item 1, Section III,
Appendix B

WARNING

Equipment Conditions:

. Do not smoke or use an open flame in the vicinity of the FARE, failure to comply may result in personnel injury.

FARE shutdown, para. 2-12

. Drain any fuel into suitable container. Clean up any fuel spills to prevent fire or environmental hazard.

a. Repair. (figure 4-15)

- (1) Inspect frame for crack, damaged or missing parts.

WARNING

Cleaning solvent, Federal Specification PD-680, is toxic and flammable. Use only in a well-ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts. Avoid skin contact.

NOTE

Do not apply solvent to container.

- (2) Clean frame with cleaning solvent, allow to dry.
- (3) If container (2) is damaged, remove twenty-eight screws (3), fourteen loops (4) and remove container (2). Position new container (2) on frame (1) and secure with fourteen loops (4) and twenty-eight screws (3).
- (4) If any straps (5 or 6) are damaged, remove two screws (3) and one loop (4) per strap. Remove damaged strap(s). Position new strap(s) (5 or 6) on frame (1) and secure with loop (4) and two screws (3) per strap.
- (5) Repair frame (1) by straightening or painting frame. Refer to TM 43-0139 for painting.

b. Replace. (figure 4-15)

- (1) Removal.

- (a) Remove discharge hoses from frame (1).

4-20. Frame Assembly (cont).

(b) Remove contents from container (2).

(2) Installation.

(a) Install contents in container (2).

(b) Install discharge hoses on frame (1).

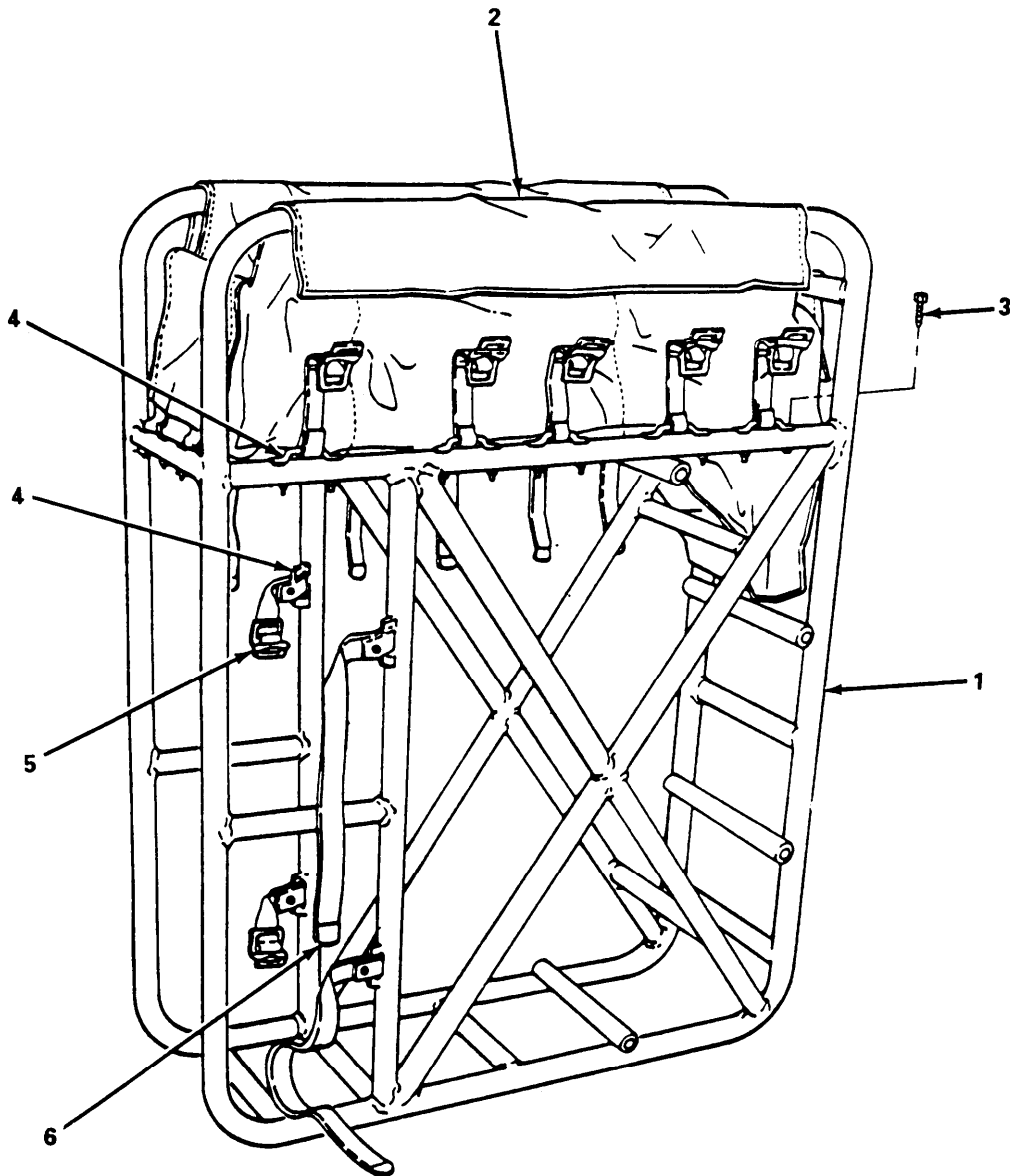


Figure 4-15. Frame Assembly, Removal/Installation.

Section VI. PREPARATION FOR SHIPMENT OR STORAGE

Paragraph	Page
4-21 General	4-35
4-22 Administrative Storage	4-35

4-21. General. This section describes administrative storage procedures and the preparation for shipment or short term/intermediate term storage of components of the FARE. Procedures for short term and intermediate term storage are identical.

4-22. Administrative Storage.

a. Placement of Equipment in Administrative Storage. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

b. Before Placing Equipment in Administrative Storage. Before placing equipment in administrative storage, current maintenance services and equipment serviceable criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.

c. Storage Site Selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

d. Storage Tanks. The storage tank shall be dusted with talc or other anti-sticking compound to prevent adhesion to itself. Permanently attached fittings shall be cushioned with material conforming to PPP-C-795, or equivalent, and secured in place with tape conforming to PPP-T-97. Tank shall be packed in a PPP-B-601 overseas style optional wood box, or equivalent, as applicable to the weight of the complete tank. The box shall be loosely lined with polyethylene material conforming to L-P-378, Type I, Class 1, having a minimum thickness of .006 inch to prevent abrasion. The tank shall be cushioned, blocked and braced as needed for safe shipment to destination.

e. Pump/Engine Assembly and Hose Kits. Interior surfaces of the pump engine assembly shall be coated with lubricating oil conforming to MIL-L-21260, Grade 30, with excess of oil drained. Draincock shall be left open. Inlet and outlet shall have dust caps and plugs installed. Exterior surfaces, when required, shall have P-1 type preservative applied. All internal engine components shall be preserved with oil conforming to Grade 10,30, or 50, as applicable, in MIL-L-21260. All openings into the engine shall be sealed with plastic caps, plugs or tape. The pump/engine assembly and hose kits shall be prepared for mobile shipment. A plywood housing shall be placed over the components. Block and brace as needed for safe shipment. The housing shall be secured in place by the use of lumber dunnage, using strapping as required for safe shipment to destination.

f. Filter/separator. The filter-separator with canisters and filter elements shall not require preservation; however, the water drain valve shall be opened with dust plug and cap installed. Each filter-separator shall be packed in a box conforming to PPP-B-601 overseas, Style A or B. Blocking and bracing to prevent movement of contents shall be accomplished as needed for safe shipment to destination.

g. Other Components. All other components not addressed in d. through f., above, shall be packed with cushioning, blocking and bracing, as necessary, in an overseas wood box, style optional, conforming to PPP-B-601.

APPENDIX A

REFERENCES

A-1. Scope. This appendix lists all forms, technical manuals, and miscellaneous publications referenced in this manual.

A-2. Publication Indexes. The following publication indexes should be consulted frequently for the latest changes or revisions of references given in this appendix and for new publications relating to the material covered in this manual:

Consolidated Index of Army Publications and Blank Forms DA PAM 25-30
 The Army Maintenance Management System (TAMMS). DA PAM 738-750

A-3. Technical Manuals.

Painting instructions for Field Use... TM 43-0139

Engine, Gasoline, 3 HP, Military Standard. TM 9-2805-257-14

Pump Assembly, Flammable Liquid, Centrifugal, 100 GPM, Frame Mounted TM 10-4320-256-14&P

Filter/Separator, Liquid Fuel, Optimum Performance, Lightweight,
 100 GPM, Frame Mounted TM 5-4330-217-12&P

Nozzle Assembly, Closed-Circuit Refueling with Strainer Assembly. TM 5-4930-226-12&P

Closed Circuit Refueling Nozzle TM 5-4930-234-13&P

Closed Circuit Refueling Nozzle Assembly TM 5-4930-235-13&P

Drum, Fabric, Collapsible, Non-Vented, 500-Gallon Liquid Fuel; 250 Gallon,
 Portable Water and 55-Gallon, Portable Water TM 10-8110-201-14&P

Administrative Storage of Equipment. TM 740-90-1

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

Preservation, Packaging, Packing of Military Supplies and Equipment
 (Vols. 1 and 2) TM 38-230-1 and
 TM 38-230-2

A-4. Field Manuals.

General Fabric Repair TM 10-16

First Aid for Soldiers FM 21-11

A-5. Lubricants and Lubrication Orders (LO).

Fuels, Lubricants, Oil and Waxes..... C9100-IL
Engine, Gasoline, 3HP, Military Standard LO 9-2805-257-12

A-6. Technical Bulletins.

Hand Portable Fire Extinguishers Approved for Army Users TB 5-4200-200-10
Preservation of USAMEC Mechanical Equipment for Shipment and Storage. TB 740-97-2

A-7. Army Regulations.

Dictionary of United States, Army Terms AR 310-25
Authorized Abbreviations and Brevity Codes AR 310-50
Army Materiel Maintenance Concepts and Policies AR 750-1
Packaging of Material AR 700-15

A-8. Forms.

Recommended Changes to Publications and Blank Forms DA Form 2028
The Army Maintenance Management System (TAMMS) DA Form 738-750
Product Quality Deficiency Report SF-368
Equipment inspection and Maintenance Worksheet DA Form 2404

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. **Maintenance Allocation Chart (MAC).** This MAC assigns maintenance functions in accordance with the Three Level Maintenance Concept.

B-2. **Use of the Maintenance Allocation Chart, Section II**

a. The MAC assigns maintenance functions based on the following considerations:

- (1) Skills available.
- (2) Work time required.
- (3) Tools and test equipment required and/or available.

b. If a lower level of maintenance identified in column (4) of the MAC cannot perform all tasks of a single maintenance function (e.g., test, repair), then the higher level that can perform other tasks of that function is also indicated.

c. Higher maintenance levels are automatically authorized to perform maintenance functions assigned to a lower maintenance level.

d. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the Commander who has authority to direct such tasking.

e. Assignment of a maintenance function in the MAC does not carry automatic authorization to carry the related spare or repair parts in stock. Information to requisition or secure parts will be as specified in the associated Repair Parts and Special Tools List (RPSTL).

f. Normally, there is no deviation from the assigned level of maintenance. However, in cases of operational necessity, maintenance functions assigned to a higher level may be assigned to a lower level on a one-time basis, with authorization from the higher level maintenance officer. Transfer of a function to a lower level does not relieve the higher level of responsibility. The higher level will provide technical supervision and inspection of the function being performed.

B-3. **Maintenance Functions.** Maintenance functions will be limited to and defined as follows:

a. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

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.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate), to preserve, to drain, 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 the specified parameters.

e. Aline. 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 equipment used in precision measurement. Consists of comparison of two instruments, one of which is a certified standard of known accuracy, to detect and 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 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, a subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, aline, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable operational condition as prescribed by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul does not normally return an item to a like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-4. Explanation of Columns in the MAC, Section II.

a. Column (1). Group Number. Column 1 lists functional group code numbers which are assigned to identify maintenance significant components, assemblies, subassemblies, and modules to their next higher assembly.

b. Column (2). Component/Assembly. Column 2 contains the item names of components, assemblies, subassemblies, and modules for which group numbers (column 1) are assigned and for which maintenance is authorized.

c. Column (3). Maintenance Function. Column 3 lists the functions to be performed on items listed in Column 2. (Function definitions are contained in paragraph B-3.)

d. Column (4). Maintenance Level. The maintenance levels, Unit, Intermediate, and Depot, are allotted separate subcolumns within column 4. Entry of a work time figure (such as 1.0, 0.2) in a subcolumn indicates that that level is authorized to perform the function listed in column 3, and the average time required to do the function is the work time figure. If the number or complexity of tasks within a maintenance function varies from one maintenance level to another, the applicable work time figure for each level will be entered for that function. The work time figure represents the average time it takes to restore a component/assembly to a serviceable condition under a typical field operating environment.

e. Column (5). Tools and Equipment. Column 5 specifies, by code, common tool sets (not individual tools from those sets), common TMDE, and special tools, TMDE, and support equipment required to perform a designated function. The code in Column 5 keys to the listing in Section III of the MAC.

f. Column (6). This column when applicable, contains a letter code which is keyed to an explanation of the code contained in Section IV of the MAC.

B-5. Explanation of Columns in the MAC, Section III.

a. Column (1). Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column (2). Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column (3). Nomenclature. Name or identification of the tool or test equipment.

d. Column (4) National/NATO Stock Number. The National stock number of the tool or test equipment,

e. Column (5). Tool Number. The manufacturer's part number.

B-6. Explanation of Columns in the MAC, Section IV.

a. Column (1). Reference Code. The code recorded in column 6, Section II.

b. Column (2). Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

**Section II. MAINTENANCE ALLOCATION CHART FOR FORWARD
AREA REFUELING EQUIPMENT**

(1) Group number	(2) Component/ assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and eqpt.	(6) Remarks
			Unit		Intermediate		Depot		
			c	0	F	H	D		
01	Hose and Fitting Assemblies								
0101	Discharge Hose	Inspect Repair Replace	0.1	1.0 0.5			2		
0102	Suction Hose	Inspect Test Repair Replace	0.1	0.5 1.0 0.5			1, 2		
0103	Fittings and Adapters	Inspect Repair Replace	0.1	1.0 0.5			1		
02	Frame Assembly	Inspect Repair Replace	0.1	1.0 0.5					
03	Pump and Engine Assembly							A	
04	Filter/Separator							B	
05	Fabric Drums							C	
06	Closed Circuit Refueling Nozzle							D	

**Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS FOR
FORWARD AREA REFUELING EQUIPMENT**

Tool or test equipment ref code (1)	Maintenance category (2)	Nomenclature (3)	National NATO stock number (4)	PN Tool number (5)
1	O	Tool Set, General Mechanic's	5180-00-177-7033	
2	O	Banding Tool	5120-00-278-9925	
3	O	Multimeter, Digital	6625-01-145-2430	

Section IV. REMARKS

Reference code	Remarks
A	Refer to TM 10-4320 -256-14&P and TM 9-2805-257-14 for maintenance information on the pump and engine assembly.
B	Refer to TM 5-4330-217-12&P for maintenance information on the filter/separator.
C	Refer to TM 10-8110-201-14&P for maintenance information on the fabric drum.
D	Refer to TM 5-4930 -226-12&P, TM 5-4930-234-13&P and TM 5-4930-235-13&P for maintenance information on the closed-circuit refueling nozzles.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. **Scope.** This appendix lists components of end item and basic issue items for the FARE to help you inventory items required for safe and efficient operation.

C-2. **General.** The Components of End Item and Basic Issue Items Lists 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 end item, 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 FARE in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the FARE 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 TOE/MTOE authorization of the end item.

C-3. **Explanation of Columns.**

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

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

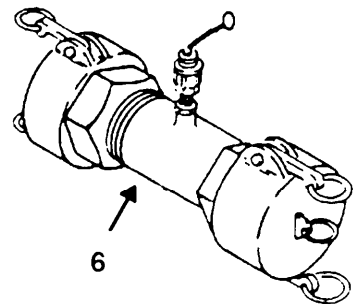
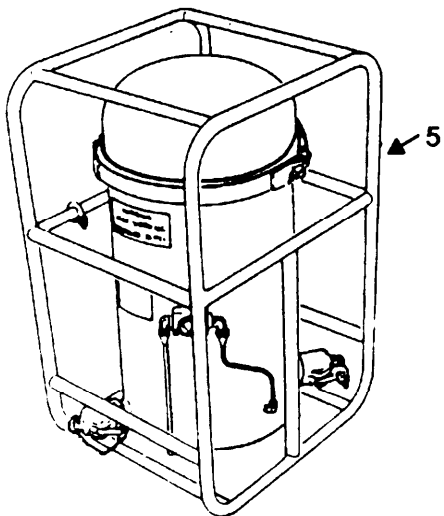
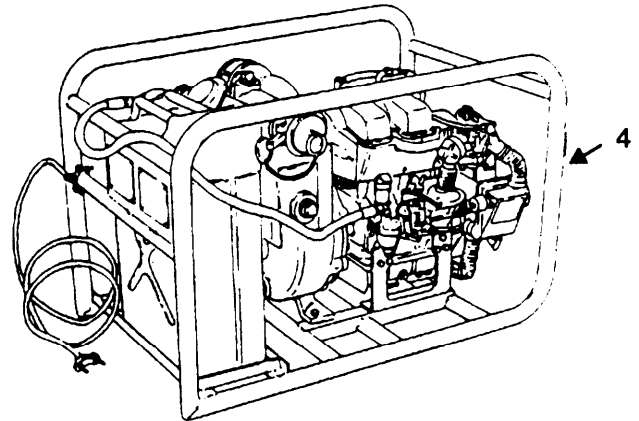
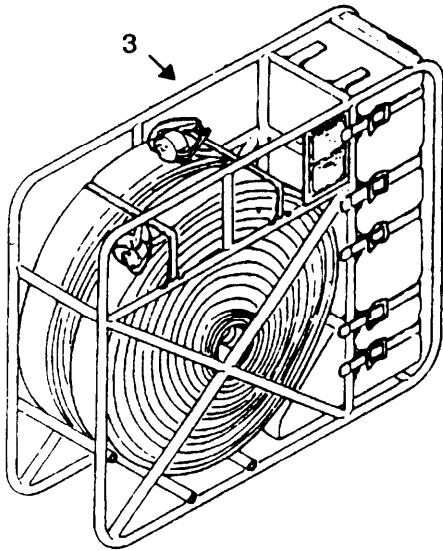
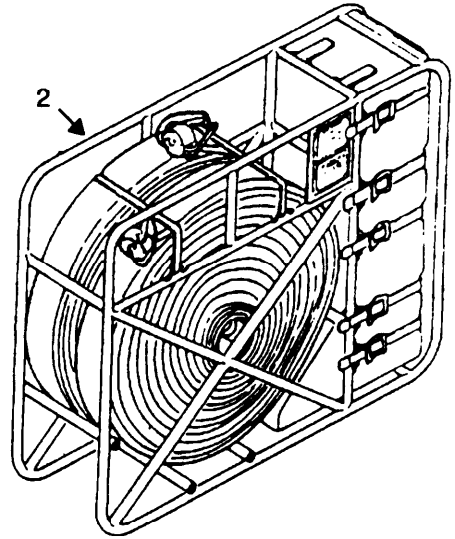
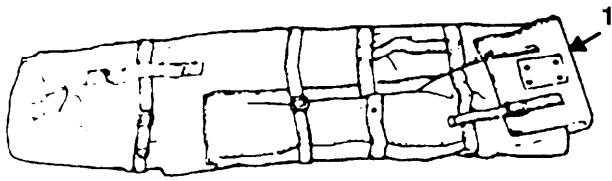
c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the Commercial and Government Entity code (CAGEC) (in parentheses) followed by the part number.

d. Column (4) - Unit of Measure (U/M) . Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity required (qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

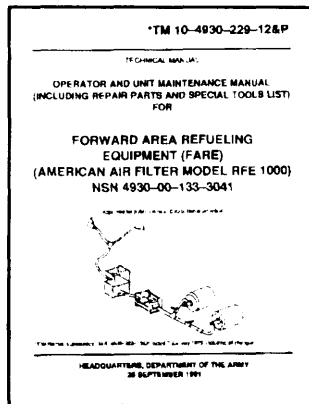
SECTION II. COMPONENTS OF END ITEM LIST

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION USABLE CAGEC AND PART NUMBER ON CODE	(4) U/M	(5) QTY REQ'D
1	4930-00-513-9906	KIT,SUCTION HOSE (97403) 13219E0501 CONSISTING OF THE FOLLOWING:	EA	2
		CONTAINER,SUCTION HOSE (97403) 13219E0461	EA	1
		SUCTION HOSE ASSY (97403) 13219E0464	EA	6
		GROUND ROD (97403) 13219E0462	EA	2
2	4930-00-475-3057	KIT,HOSE AND COMPONENTS (TEE) (97403) 13219E0503 CONSISTING OF THE FOLLOWING:	EA	1
		DISCHARGE HOSE ASSEMBLY (97403) 13219E0465	EA	2
		BUTTERLY VALVE (97403) 13219E0467	EA	1
		TEE ASSEMBLY (97403) 13219E0476	EA	1
		FRAME ASSEMBLY(97403) 13219E0470	EA	1
		VALVE, ELBOW COUPLER (97403) 13219E0491	EA	1
		ADAPTER, MALE TO MALE (96906) MS39352-9	EA	1
		NOZZLE ADAPTER (97403) 13219E0498	EA	1
		NOZZLE ASSEMBLY (97403) 13219E0486	EA	1
		ADAPTER ASSEMBLY (97403) 13219E0493	EA	1
3	4930-00-483-3849	KIT,HOSE AND COMPONENTS (WYE) (97403) 13219E0504 CONSISTING OF THE FOLLOWING:	EA	1
		DISCHARGE HOSE ASEMBLY (97403) 13219E0465	EA	2
		ADAPTER ASSEMBLY (97403) 13219E0466	EA	1
		BUTTERFLY VALVE (97403) 13219E0467	EA	1
		Y-FITTING ASSEMBLY (97403) 13219E0475	EA	1
		FRAME ASSEMBLY (97403) 13219E0470	EA	1
		VALVE,ELBOW COUPLER (97403) 13219E0491	EA	1
		ADAPTER,MALE BY MALE QUICK DISCONNECT, CAM LOCKING TYPE (96906) MS39352-2	EA	1
		NOZZLE ADAPTER (97403) 13219E0498	EA	1
		NOZZLE ASSEMBLY (97403) 13219E0486	EA	1
4	4320-00-427-0002	PUMP ASSEMBLY (97403) 13219E5350	EA	1
5	4330-00-491-4957	FILTER SEPARATOR (97403) 13217E5350	EA	1
6	4930-01-017-3639	ADAPTER, WATER DETECTOR KIT (97403) 13220E9406-1	EA	1



Section III. BASIC ISSUE ITEMS LIST

(1) Illus No.	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) Usable on Code	(5) Qty req'd
1		Operator and Unit Maintenance Manual (Including Repair Parts and Special Tools List) for Forward Area Refueling Equipment (FARE) (American Filter Model RFE 1000, NSN 4930-00-133-3041)	EA	1



← 1

APPENDIX D ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. Scope. This appendix lists additional items you are authorized for the support of the Forward Area Refueling Equipment (FARE).

D-2. General. This list identifies items that do not have to accompany the equipment and that do have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, OR JTA.

D-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.

Section II. ADDITIONAL AUTHORIZATION ITEMS LIST

(1) National Stock Number	(2) Description CAGEC and Part Number	(3) Usable on Code U/M	(4) Qty Auth
6640-00-244-9478	Test Kit, Fuel Contamination (32218) Model GTP 323 Series II	EA	1
8415-00-641-4601	Gloves, Chemical and Oil Protective (81348) ZZ-G-381	PR	2
4240-00-052-3776	Goggles, Industrial (58536) A-A-1110	PR	2
4240-00-022-2946	Protector, Aural (40635) 95635	EA	2

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. Scope. This appendix lists expendable supplies and materials you need to operate and maintain the Forward Area Refueling Equipment (FARE). These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. Explanation of Columns.

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use Sealing Compound, Item 5, App. E").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item. (Enter as applicable).

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

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name, and, if required, a description to identify the item.

e. Column (5) - Unit of Measure U/M. Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1)	(2)	(3)	(4)	(5)
ITEM		NATIONAL		
NUMBER	LEVEL	STOCK NUMBER	DESCRIPTION	U/M
1	O	5340-00-244-7325	SEALS, 1/2 IN. STRAPPING	EA
2	O	5340-00-245-9438	STRAPPING, 1/2 IN.	RL
3	O	8030-00-543-4384	SEALING COMPOUND (81349) MIL-S-7916	TU
4	O	6850-00-664-5685	SOLVENT, CLEANING (81346) ASTM D 235 TY 1	QT
5	O	7920-00-205-1711	RAGS, WIPING (58536) A-A531	LB

APPENDIX F UNIT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

F-1. SCOPE. This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of unit, direct support, and general support maintenance of the Forward Area Refueling Equipment. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the source, maintenance and recoverability (SMR) codes.

F-2. GENERAL. In addition to this section, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. **Section II. Repair Parts List.** A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. This list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed in item name sequence. Repair parts kits are listed separately in their own functional group within Section 11. Repair parts for repairable special tools are also listed in this section. Items are shown in the associated illustration(s) /figure(s).

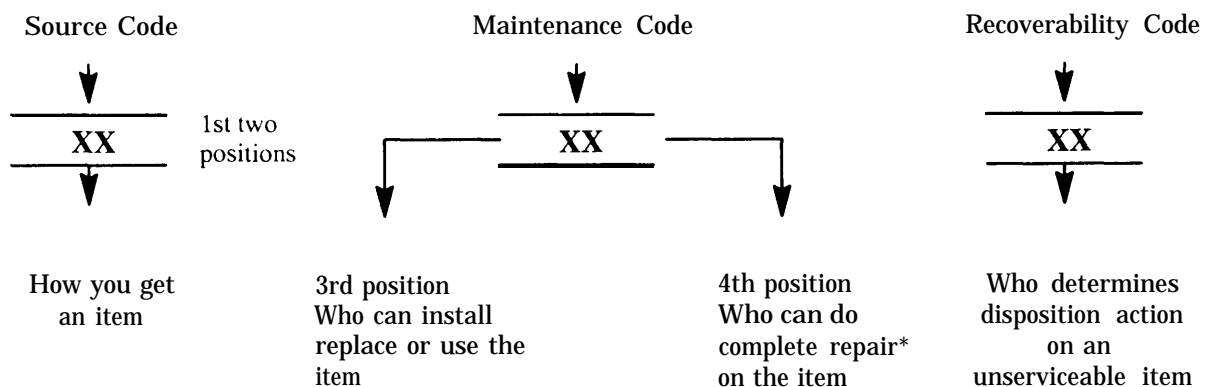
b. **Section III. Special Tools List.** A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE column) for the performance of maintenance.

c. **Section IV. Cross—references Indexes.** A list, in National Item Identification Number (NIIN) sequence, of all National stock numbered items appearing in the listing, 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. The figure and item number index lists figure and item number in alphanumeric sequence and cross references NSN, CAGEC and part number.

F-3. EXPLANATION OF COLUMNS (SECTIONS II AND III).

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

b. **SMR Code (Column (2)).** The Source, Maintenance, and Recoverability (SMR) code is a 5—position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



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

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follows:

Code Explanation

PA	}	Stocked items; use the applicable NSN to requested/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code.
PB		
PC**		
PD		
PE		
PF		
PG	}	NOTE: Items coded PC are subject to deterioration.
KD	}	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied
KF		
KB		

MO - (Made at org/AVUM Level)	}	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION and USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
MF - (Made at DS/AVUM Level)		
MH - (Made at GS Level)		
ML - (Made at Specialized Repair Activity (SRA))		
MD - (Made at Depot)		

AO - (Assembled by org/AVUM Level)	}	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the items are assembled at a higher level, order the item from the higher level of maintenance.
AF - (Assembled by DS/AVIM Level)		
AH - (Assembled by GS Category)		
AL - (Assembled by SRA)		
AD - (Assembled by Depot)		

XA - Do not requisition "XA"-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)

XB - If an "XB" item is not available from salvage, order it using the CAGEC and part number given.

XC - Installation drawing, diagram, instruction sheet, field service drawing, that is identified by Reciprocating Compressor manufacturer's part number.

XD - Item is not stocked. Order an "XD"-coded item through normal supply channels using the CAGEC and part number given if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, maybe used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

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

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

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

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

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

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

Recoverability

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

c. **CAGEC (Column (3)).** The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

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

NOTE

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

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

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

(2) The physical security classification of the item is indicated by the parenthetical entry, e.g., PhySec C1 – Confidential, Phy Sec C1 (S) – Secret, Phy Sec C1 (T) – Top Secret.

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

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

(5) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.

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

(7) The usable encode, when applicable (see paragraph 5, Special information).

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

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

(10) The indenture, shown as dots appearing before the repair part, indicates that the item is a repair part of the next higher assembly.

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

F-4. EXPLANATION OF COLUMNS (SECTION IV).

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) **STOCK NUMBER column.** This column lists the NSN by National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN, i.e.

NSN

5305-01-574-1467
NIIN

When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) **FIG. column.** This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and Section III.

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

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

(1) **CAGEC column.** The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

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

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

(4) FIG. column. This column lists the number of the figure where the item is identified/located in Sections II and III.

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

c. FIGURE AND ITEM NUMBER INDEX.

(1) FIG. column. This column lists the number of the figure where the item is identified/located in Section II and III.

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

(3) STOCK NUMBER column. This column lists the NSN for the item.

(4) CAGEC column. The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

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

F-5. SPECIAL INFORMATION. USABLE ON CODE. The usable on code appears in the lower corner of the Description column heading. Usable on codes are shown as UOC:” in the Description Column (justified left) on the last line applicable item description/nomenclature. Uncoded items are applicable to all models.

F-6. HOW TO LOCATE REPAIR PARTS.

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

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

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

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

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

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

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

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National Stock Number or Part Number. The NSN index is in National Item Identification Number (NIIN) sequence (see c-4a.(1)). The part numbers in the Part Number index are listed in ascending alphanumeric sequence (see paragraph c-4.b). Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.

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

7. **ABBREVIATIONS.** Abbreviations used in this manual are listed in MIL-STD-12.

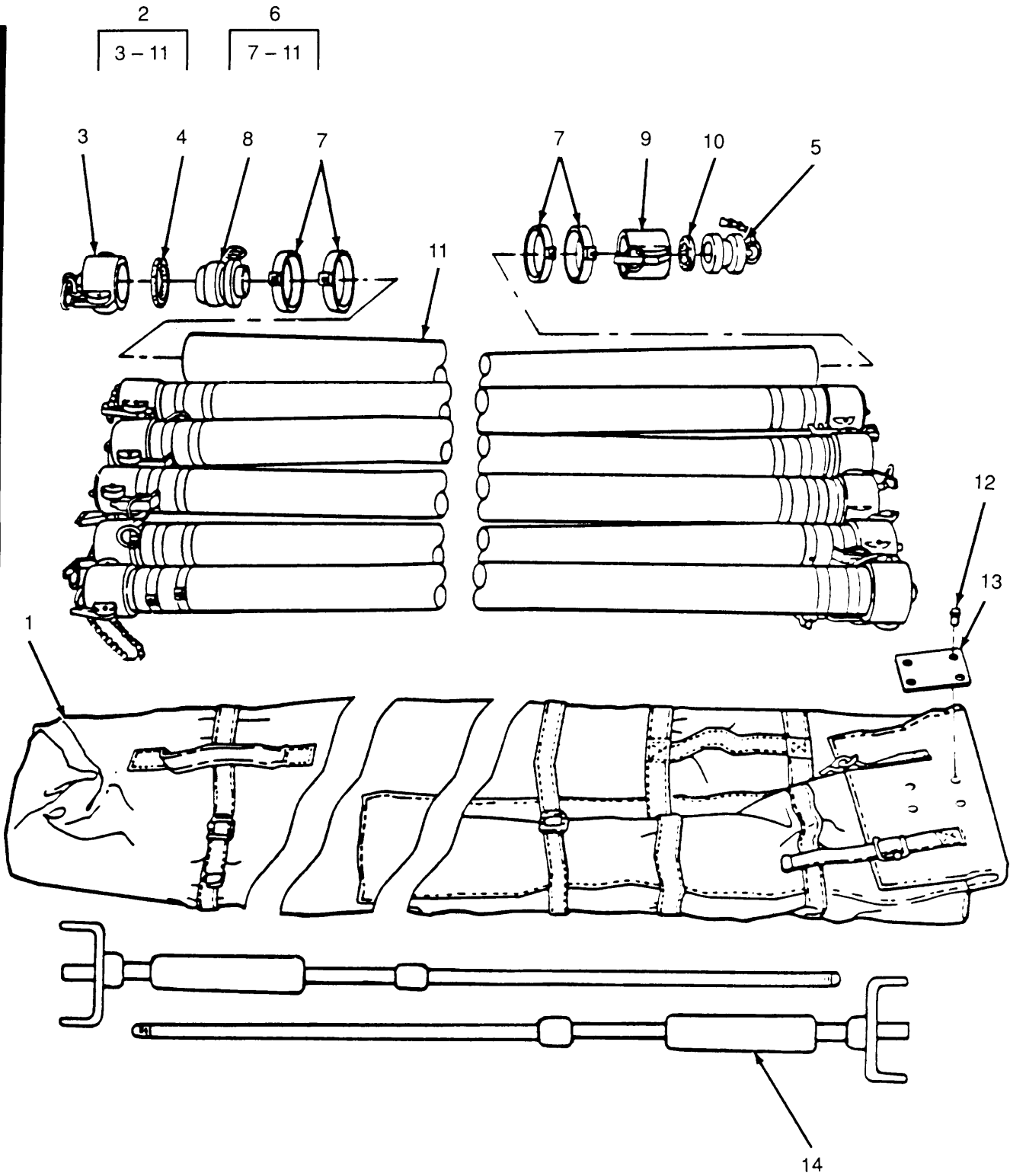


Figure F-1. Suction Hose Kit.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTINGS ASSEMBLIES					
FIG. F-1 SUCTION HOSE KIT					
	PDOOO	97403	13219E0501	SUCTION HOSE KIT	2
1	PAOZZ	97403	13219E0461	.CONTAINER, SUCTION H	2
2	PAOZZ	97403	13219E0464	.HOSE ASSEMBLY, NONME	6
3	PAOZZ	96906	MS27028-11	..CAP, PROTECTIVE, DUST	1
4	PAOZZ	96906	MS27030-6	..WASHER, FLAT	2
5	PAOZZ	96906	MS27029-11	..PLUG, QUICK DISCONNE	1
6	XDOZZ	97403	13217E9444	..HOSE ASSEMBLY, NONME	6
7	XDOZZ	97403	13217E9444-3	...CLAMP, HOSE	4
8	XDOZZ	96906	MS27021-11	...COUPLING HALF, QUICK	1
9	XDOZZ	96906	MS27025-11	...COUPLING HALF, QUICK	1
10	PAOZZ	96906	MS27030-6	...GASKET	1
11	XDOZZ	97403	13217E9444-1	...HOSE, NONMETALIC	1
12	PAOZZ	96906	MS20470A4-5	.RIVET, SOLID	8
13	XBOZZ	97403	13219E0496	.PLATE, IDENTIFICATIO	1
14	PAOZZ	97403	13219E0462	.ROD, GROUND	2

END OF FIGURE

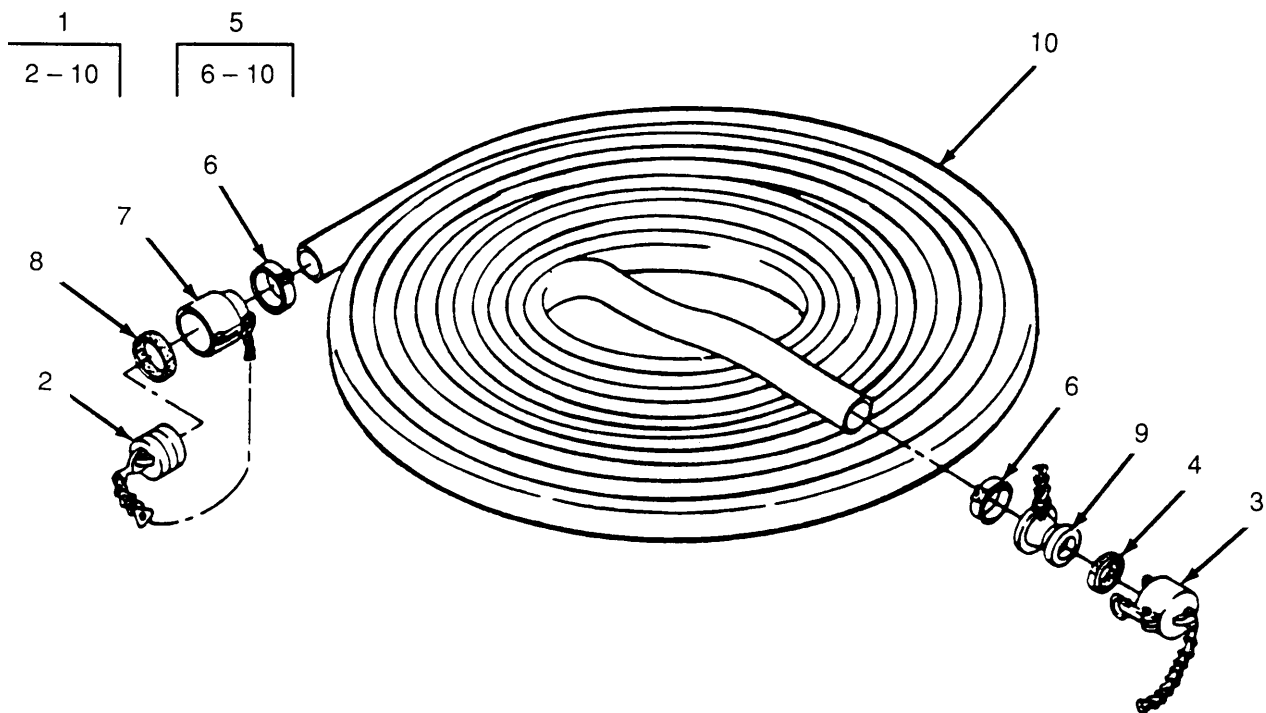


Figure F-2. Hose and Component Kit.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTING ASSEMBLIES					
FIG. F-2 HOSE AND COMPONENT KITS					
1	A000Z	97403	13219E0465	HOSE ASSEMBLY, DISCH	4
2	PAOZZ	96906	MS27029-11	. PLUG, QUICK DISCONN	21
3	PAOZZ	96906	MS27028-11	. CAP, PROTECTIVE, DUST	23
4	PAOZZ	96906	MS27030-6	. WASHER, FLAT	39
5	XDOZZ	97403	13219E0463	. HOSE ASSEMBLY, NONME	4
6	XDOZZ	00624	NE100802-0138	.. CLAMP, HOSE	4
7	XDOZZ	96906	MS27025-11	.. COUPLING HALF, QUICK	16
8	PAOZZ	96906	MS27030-6	.. GASKET	1
9	XDOZZ	96906	MS27021-11	.. COUPLING HALF, QUICK	16
10	XDOZZ	97403	13219E0463-1	.. HOSE, DISCHARGE	1

END OF FIGURE

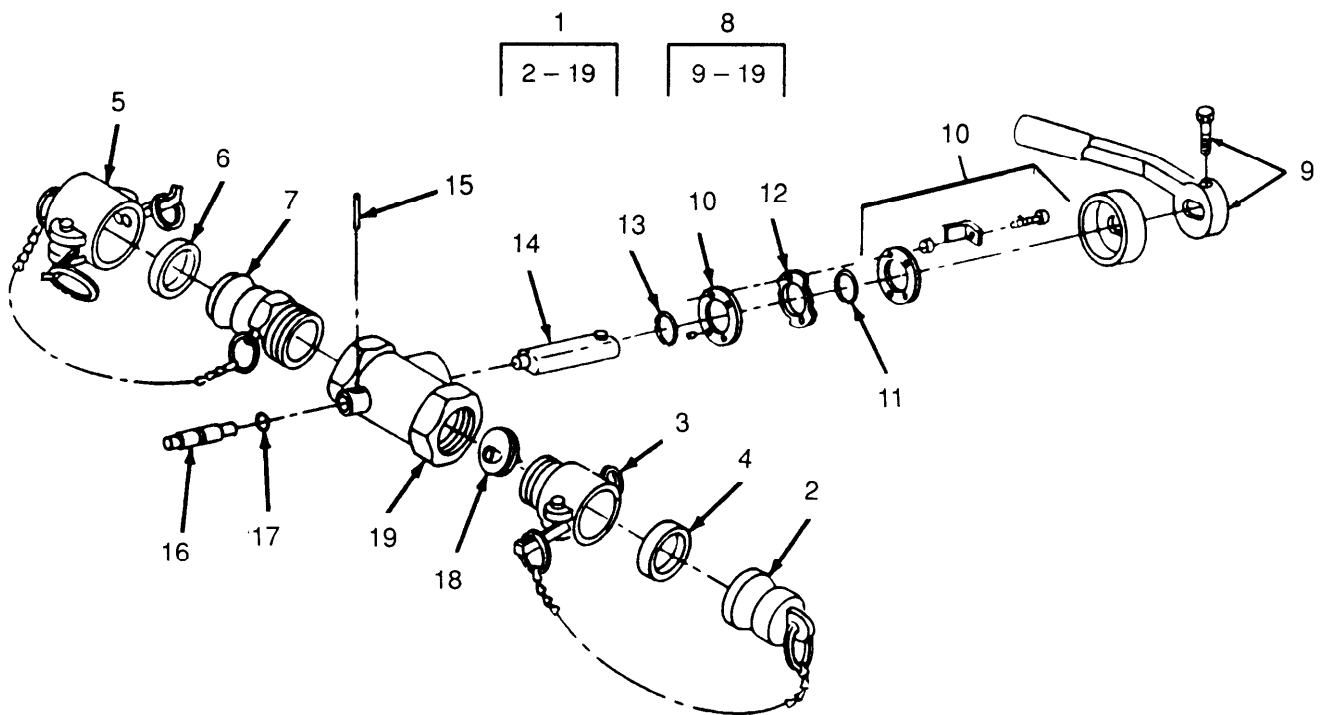


Figure F-3. Butterfly Valve Assembly.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTING ASSEMBLIES					
FIG. F-3 BUTTERFLY VALVE ASSEMBLY					
1	A0000	97403	13219E0467	VALVE ASSY,BUTTERFLY	2
2	PAOZZ	96906	MS27029-11	.PLUG,QUICK DISCONN	1
3	PAOZZ	96906	MS27026-11	.COUPLING HALF,QUICK	2
4	PAOZZ	96906	MS27030-6	.WASHER,FLAT	2
5	PAOZZ	96906	MS27028-11	.CAP,PROTECTIVE,DUST	1
6	PAOZZ	96906	MS27030-6	.GASKET	2
7	PAOZZ	96906	MS27022-11	.COUPLING HALF,QUICK	1
8	PAOZZ	97403	13219E0468	.VALVE,BUTTERFLY	1
9	XDOZZ	91363	51410A191	..LEVER,MANUAL CONTRO	1
10	XDOZZ	91363	55760B013	..KIT,CONTROL, TOP	1
11	XDOZZ	91363	52561A224	..PACKING, PREFORMED	1
12	XBOZZ	91363	5130C164	..DISC VALVE	1
13	PAOZZ	91363	52561A115	..PACKING, PREFORMED	1
14	XBOZZ	91363	51740A302	..SHAFT,HANDLE	1
15	XBOZZ	91363	52325B005	..PIN,BOTTOM SHAFT	1
16	XAOZZ	91363	51740A292	..SHAFT,BOTTOM	1
17	XDOZZ	91363	52561A012	..PACKING, PREFORMED	1
18	XBOZZ	19099	NPN0001	..DISC,BUTTERFLY	1
19	XBOZZ	91363	51100E140	..BODY,VALVE	1

END OF FIGURE

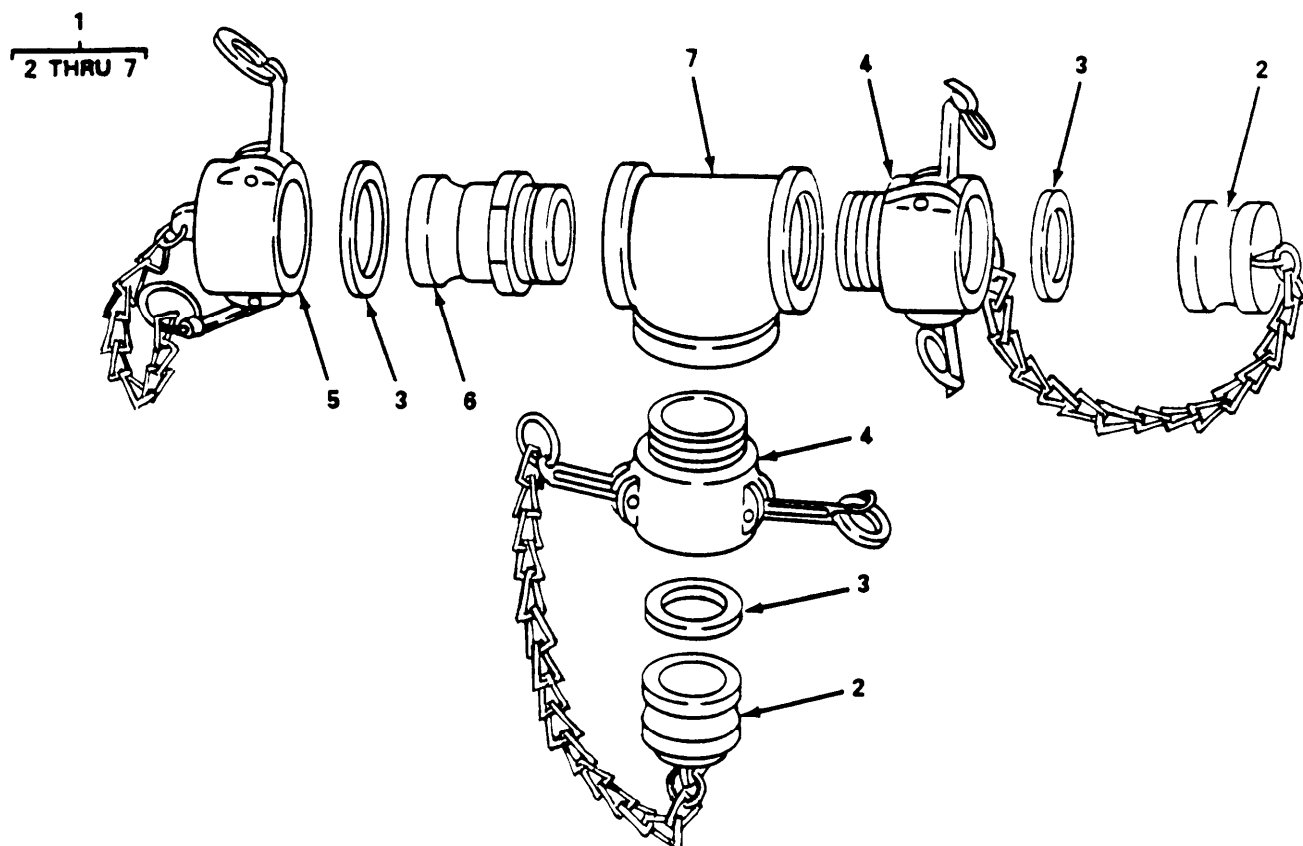


Figure F-4. Tee Assembly.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTINGS ASSEMBLIES					
FIG. F-4 TEE ASSEMBLY					
1	A0000	97403	13219E0476	TEE FITTING ASSY	1
2	PAOZZ	96906	MS27029-11	.PLUG, QUICK DISCONN	2
3	PAOZZ	96906	MS27030-6	.WASHER, FLAT	3
4	PAOZZ	96906	MS27026-11	.COUPLING HALF, QUICK	1
5	PAOZZ	96906	MS27028-11	.CAP, PROTECTIVE, DUST	1
6	PAOZZ	96906	MS27022-11	.COUPLING HALF, QUICK	1
7	PAOZZ	81349	M52618/1B09X	.TEE, PIPE	1

END OF FIGURE

1
2 THRU 14

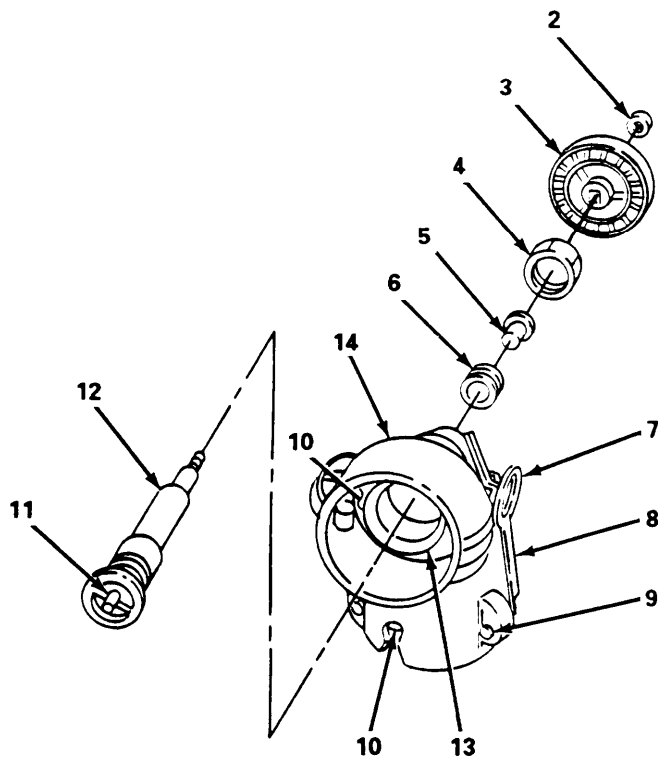


Figure F-5. Elbow Coupler Valve.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTING ASSEMBLIES					
FIG. F-5 ELBOW COUPLER VALVE					
1	PAOZZ	97403	13219E0491	VALVE,ANGLE	1
2	XBOZZ	81718	H500RB	.NUT,WHEEL	1
3	XBOZZ	81718	H11A	.HANDWHEEL	1
4	XBOZZ	81718	H776B	.NUT,PACKING	1
5	XAOZZ	81718	H185RB	.GLAND,VALVE	1
6	PAOZZ	81718	H234M	.PACKING,PREFORMED	1
7	XBOZZ	81718	H6451M	.RING,VALVE	4
8	XBOZZ	81718	C1802B	.CAM,VALVE	4
9	XBOZZ	81718	H6458RE	.PIN,STRAIGHT	4
10	PAOZZ	96906	MS27030-6	.WASHER,FLAT	2
11	XBOZZ	81718	H407RE	.PIN,THRUST	1
12	XAOZZ	81718	H403B	.STEM,VALVE	1
13	XAOZZ	81718	H441B	.RING,SEAT	1
14	XAOZZ	81718	D263A	.BODY,VALVE	1

END OF FIGURE

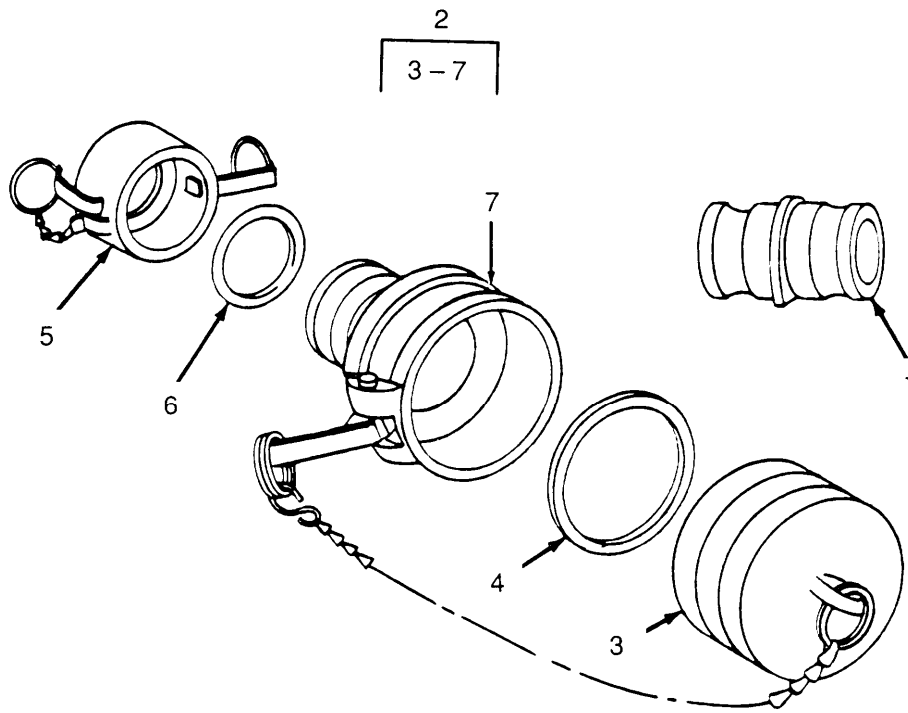


Figure F-6. Adapter Assembly, 3 In. x 2 In. and Adapter Assembly, Male x Male.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 01 HOSE AND FITTING ASSEMBLIES

FIG.F-6 ADAPTER ASSEMBLY, 3IN.X
2 IN. AND ADAPTER ASSEMBLY,
MALE X MALE

1	PAOZZ	96906	MS39352-9	NIPPLE,QUICK-DISCON	2
2	A000Z	97403	13219E0493	ADAPTER ASSEMBLY	1
3	PAOZZ	96906	MS27029-15	.PLUG,QUICK DISCONNE	1
4	PAOZZ	96906	MS27030-8	.GASKET	1
5	PAOZZ	96906	MS27028-11	.CAP,PROTECTIVE,DUST	1
6	PAOZZ	96906	MS27030-6	.WASHER,FLAT	1
7	XAOZZ	96906	MS49000-3	.COUPLING HALF,QUICK	1

END OF FIGURE

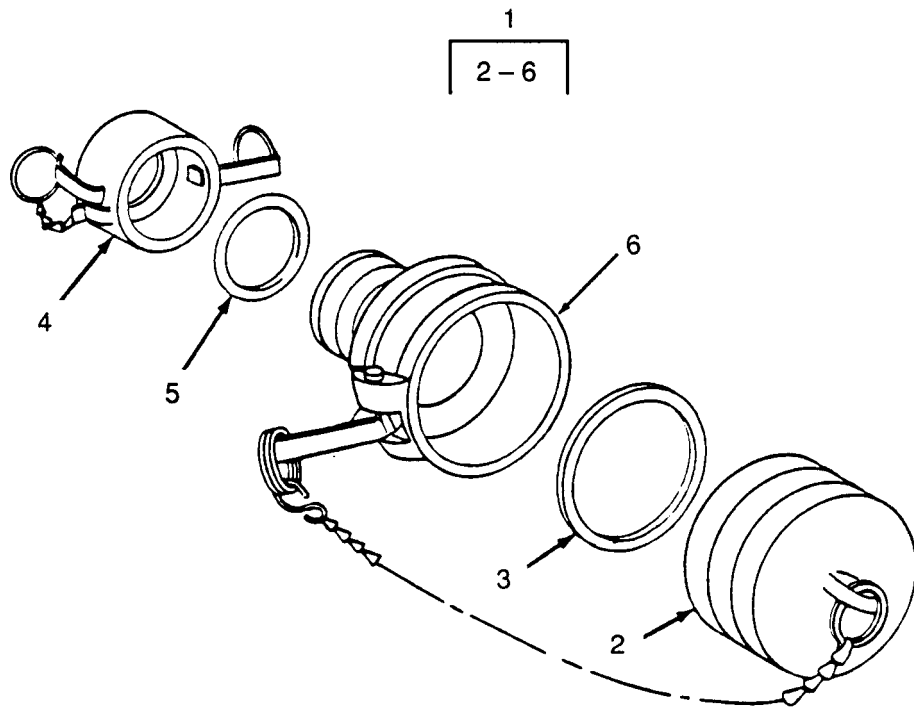
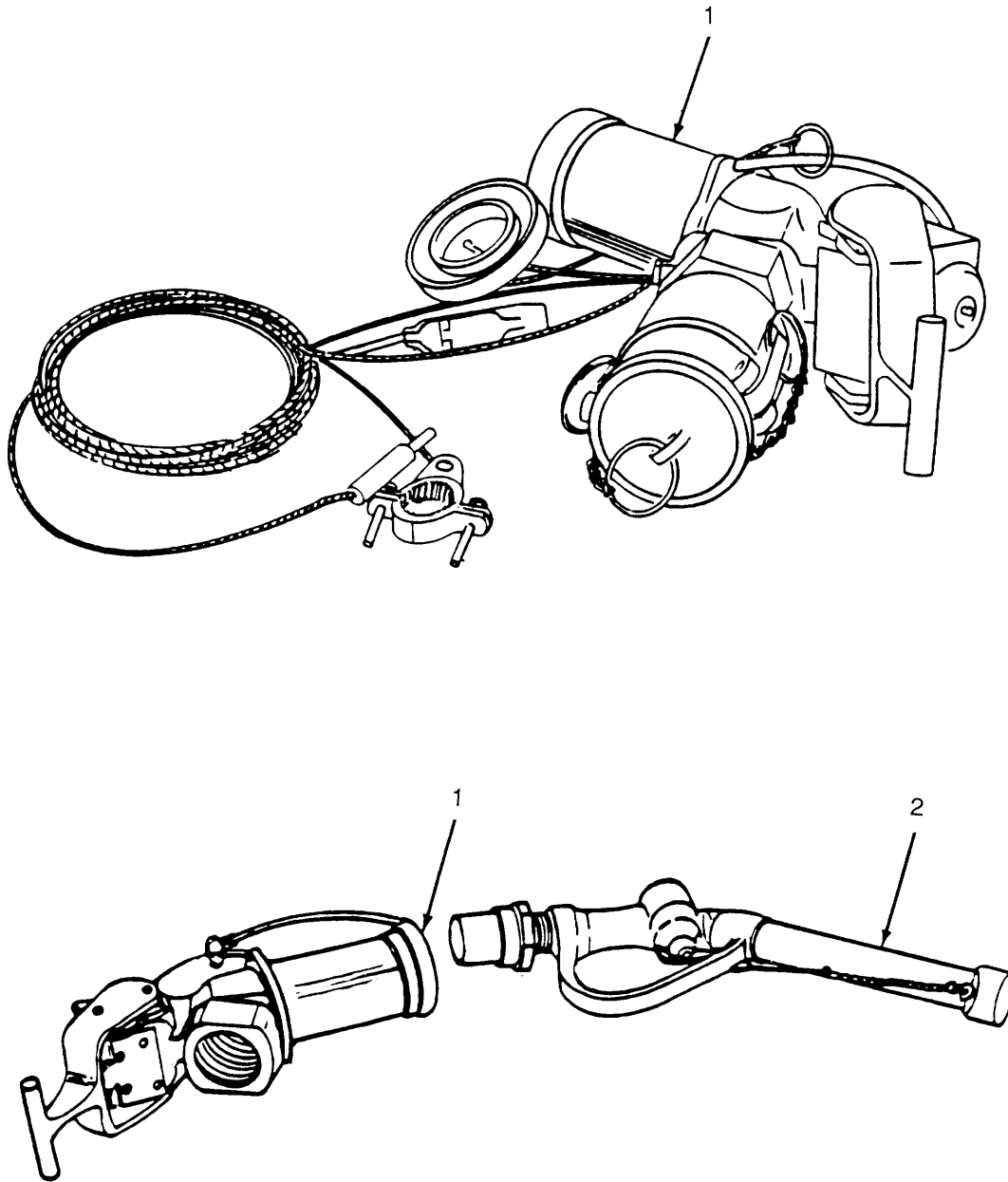


Figure F-7. Adapter Assembly, 4 In. x 2 In.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTING ASSEMBLIES					
FIG. F-7 ADAPTER ASSEMBLY, 4 IN. X 2 IN.					
1	A0000	97403	13219E0466	ADAPTER ASSEMBLY 4IN.FEMALE X 2IN.MALE	1
2	PAOZZ	96906	MS27029-17	.PLUG,QUICK DISCONN	1
3	PAOZZ	96906	MS27030-9	.GASKET	1
4	PAOZO	96906	MS27028-11	.CAP,QUICK DISCONN	1
5	PAOZZ	96906	MS27030-6	.GASKET	1
6	XAOZZ	96906	MS49000-17	.REDUCER,QUICK DISCO	1

END OF FIGURE



NOTE

SEE TM 5-4930-226-12&P FOR PARTS BREAKOUT FOR THE NOZZLE ASSEMBLY (1) AND ADAPTER (2).

Figure F-8. Closed-Circuit Refueling Nozzle and Gravity-Feed Adapter.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 01 HOSE AND FITTING ASSEMBLIES	
				FIG. F-8 CLOSED-CIRCUIT REFUELING NOZZLE AND GRAVITY-FEED ADAPTER	
1	PAOFF	79326	CCN101/14	NOZZLE ASSEMBLY,CLO (SEE TM5-4930-226-12&P FOR PARTS BREAKDOWN)	2
2	PBOZZ	97403	13219E0498	NOZZLE AND ADAPTER	1
				END OF FIGURE	

1
2 THRU 5

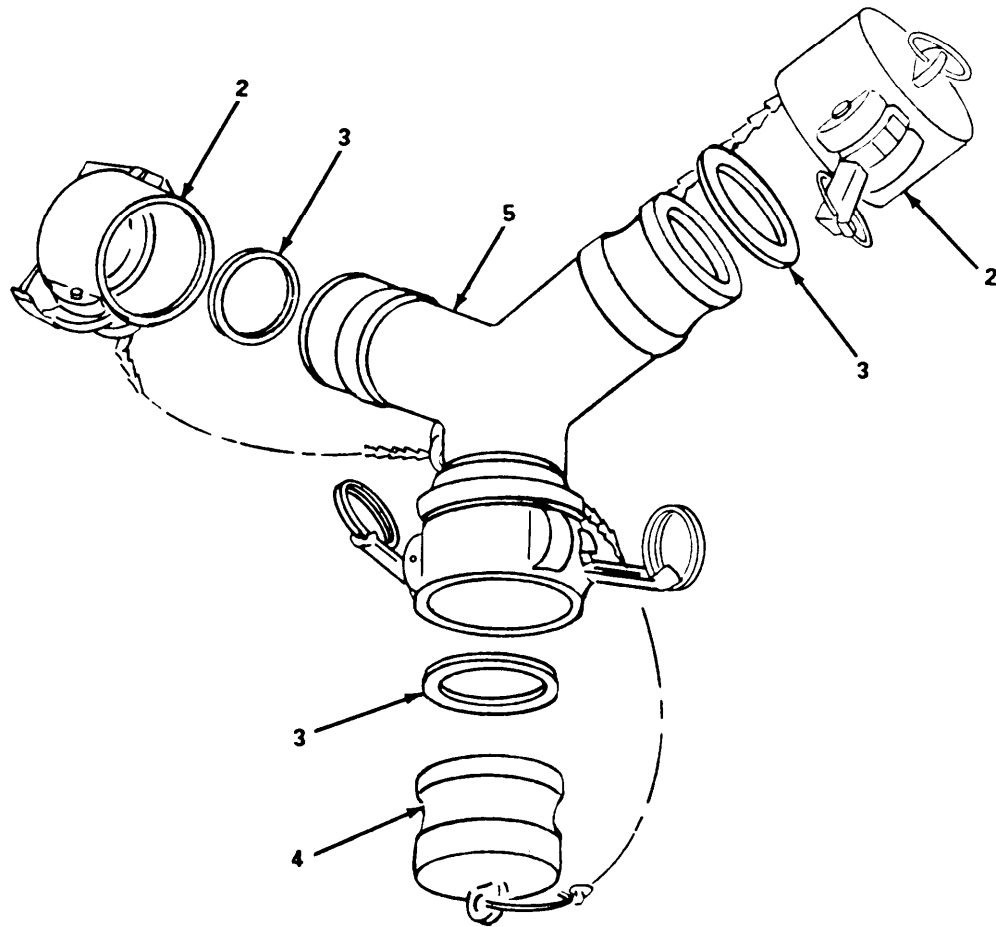


Figure F-9. Wye Fitting Assembly.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 01 HOSE AND FITTING ASSEMBLIES	
				FIG. F-9 WQYE FITTING ASSEMBLY	
1	A0000	97403	13219E0475	WYE, TRUE, PIPE	1
2	PAOZZ	96906	MS27028-11	.CAP, PROTECTIVE, DUST	2
3	PAOZZ	96906	MS27030-6	.WASHER, FLAT	3
4	PAOZZ	96906	MS27029-11	.PLUG, QUICK DISCONN	1
5	PAOZZ	97403	13219E0477	.WYE, QUICK DISCONN	1

END OF FIGURE

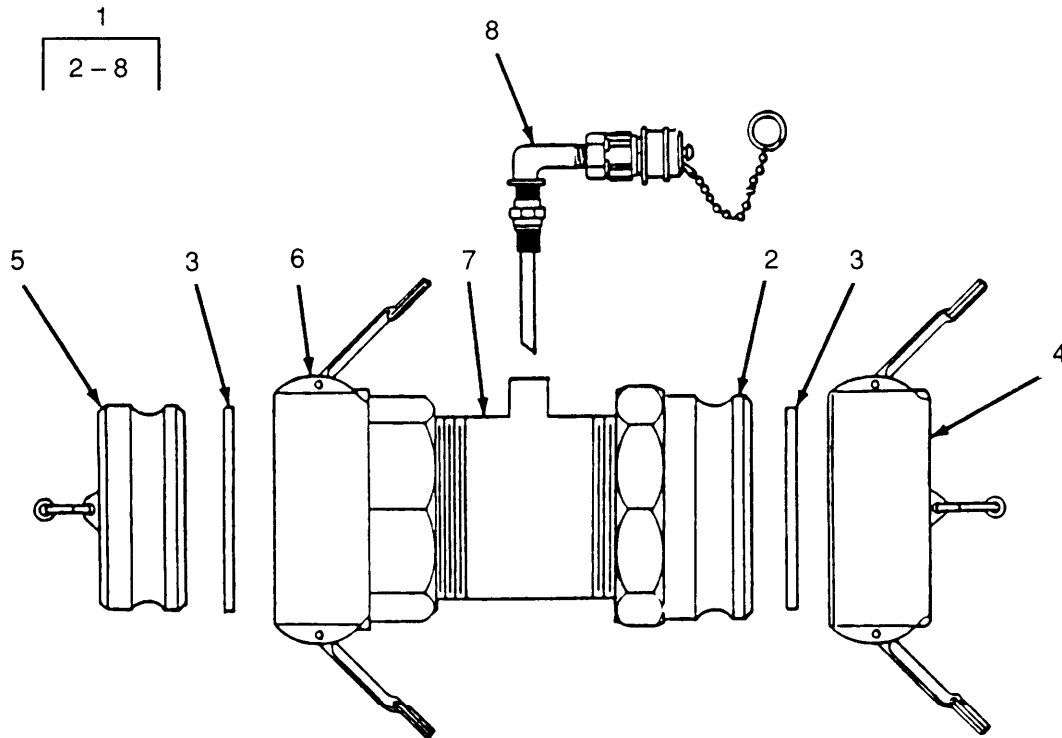


Figure F- 10. Water Detector Kit Adapter.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 01 HOSE AND FITTING ASSEMBLIES					
FIG. F-10 WATER DETECTOR KIT ADAPTER					
1	PAOZZ	97403	13220E9406-1	ADAPTER ASSEMBLY,WA	1
2	PAOZZ	96906	MS27020-11	.COUPLING HALF,QUICK	1
3	PAOZZ	96906	MS27030-6	.WASHER,FLAT	2
4	PAOZZ	96906	MS27028-11	.CAP,PROTECTIVE,DUST	1
5	PAOZZ	96906	MS27029-11	.PLUG,QUICK DISCONNE	1
6	PAOZZ	96906	MS27024-11	.COUPLING HALF,QUICK	1
7	XBOZZ	81349	MILP25995TYPE,II	.PIPE,NIPPLE	1
8	PAOZZ	32218	13220E9914-1	.PROBE ASSEMBLY,WATE	1

END OF FIGURE

1
2 THRU 8

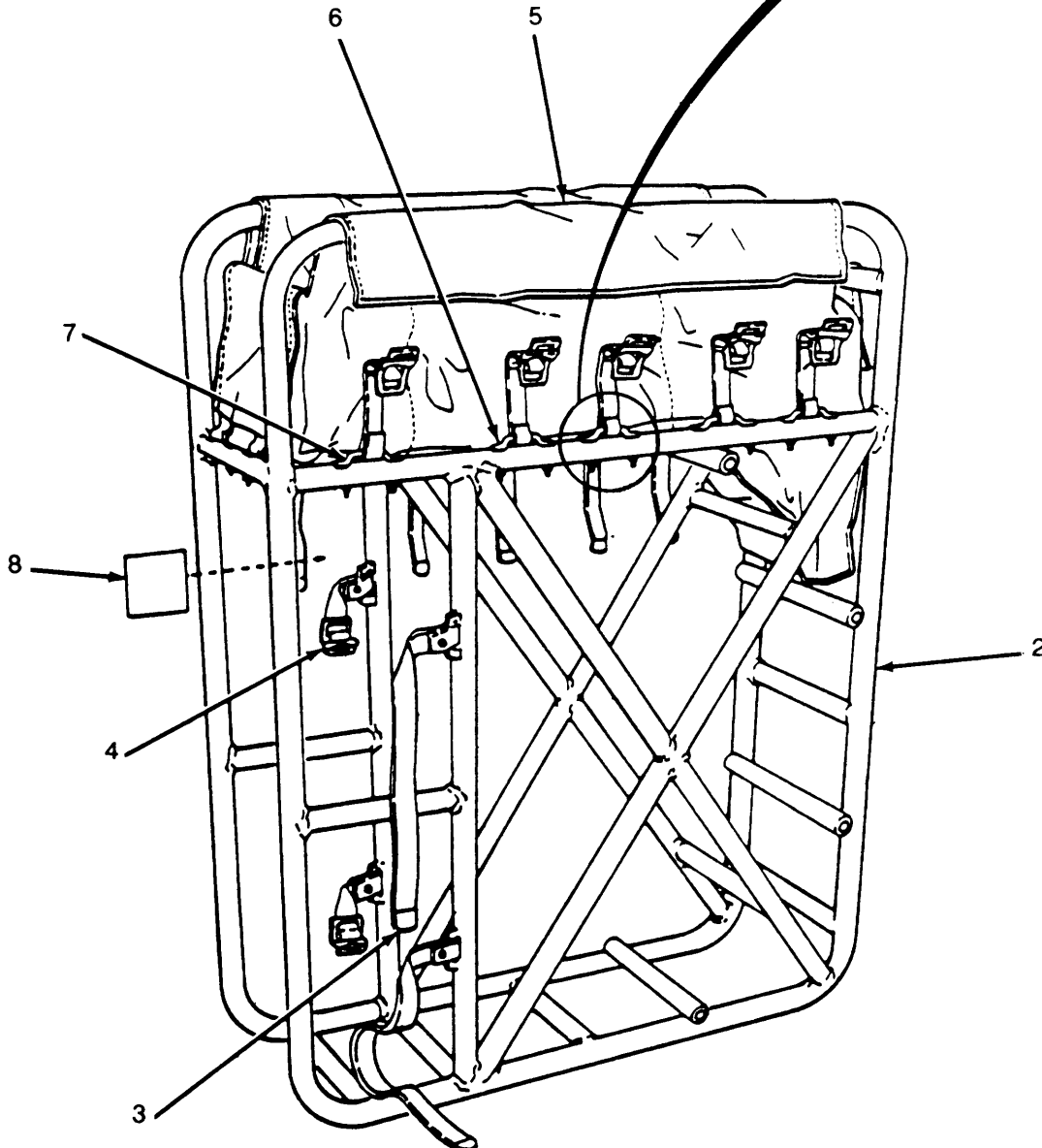
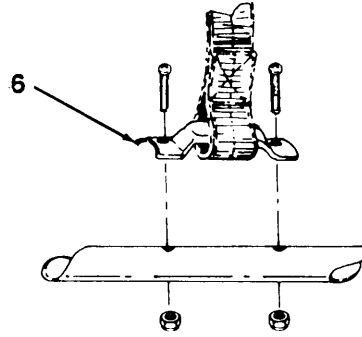


Figure F-11. Frame Assembly.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
-------------------	--------------------	--------------	-----------------------	--	------------

GROUP 02 FRAME ASSEMBLY

FIG. F-11 FRAME ASSEMBLY

1	XDOZZ	97403	13219E0470	FRAME ASSEMBLY,COMP	1
2	XAOZZ	97403	13219E0471	.FRAME	1
3	PAOZZ	97403	13219E0473	.STRAP,WEBBING	2
4	PAOZZ	97403	13219E0472	.STRAP,WEBBING	2
5	PBOZZ	97403	13219E0474	.CONTAINER,COMPONENT	1
6	PAOZZ	96906	MS51960-67	.SCREW,MACHINE	40
7	PAOZZ	97403	13219E0506	.LOOP,STRAP FASTENER	20
8	XDOZZ	97403	13219E0505	.PLATE, IDENT,T-KIT	1
8	XDOZZ	97403	13219E0506	.PLATE,IDENT,Y-KIT	1

END OF FIGURE

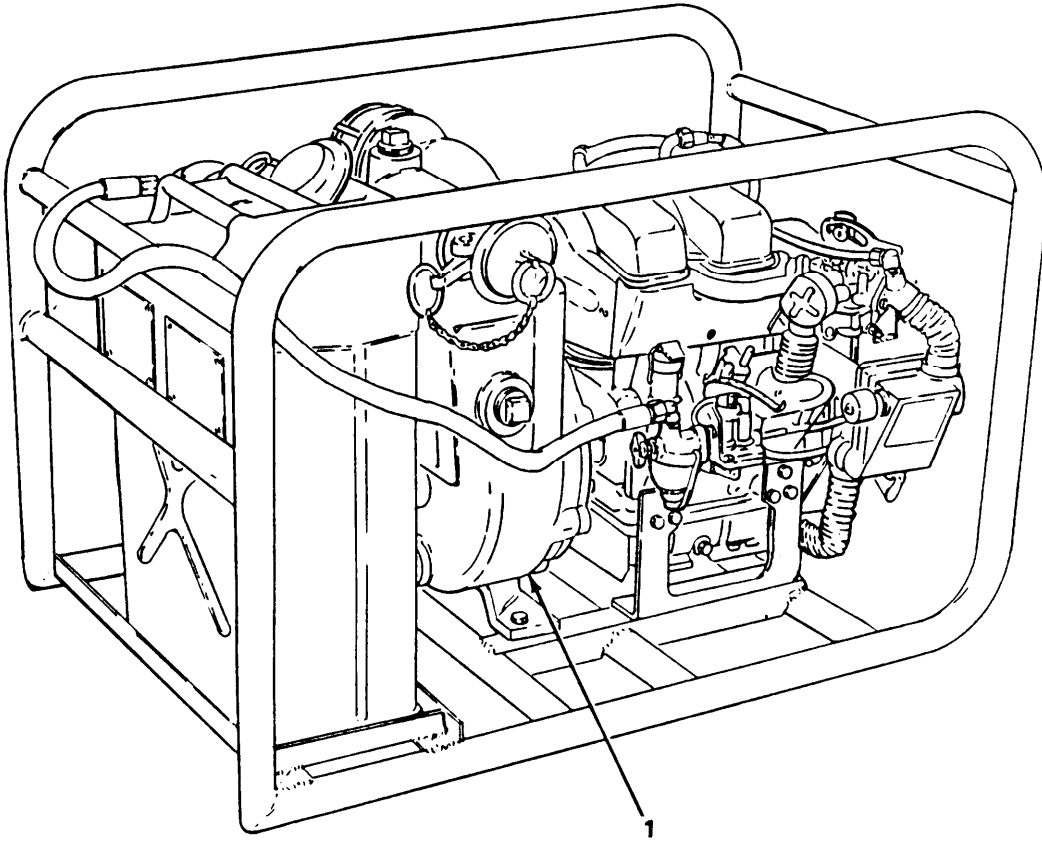


Figure F-12. Pump/Engine Assembly.

SECTION II

TM10-4930-229-12&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
-------------------	--------------------	--------------	-----------------------	--	------------

GROUP 03 PUMP AND ENGINE ASSEMBLY

FIG. F-12 PUMP AND ENGINE ASSEMBLY

1	PDOFH	97403	13219E3950	PUMPING ASSEMBLY, FL (SEE TM10-4320-256-14&P FOR PARTS BREAKDOWN)	1
---	-------	-------	------------	---	---

END OF FIGURE

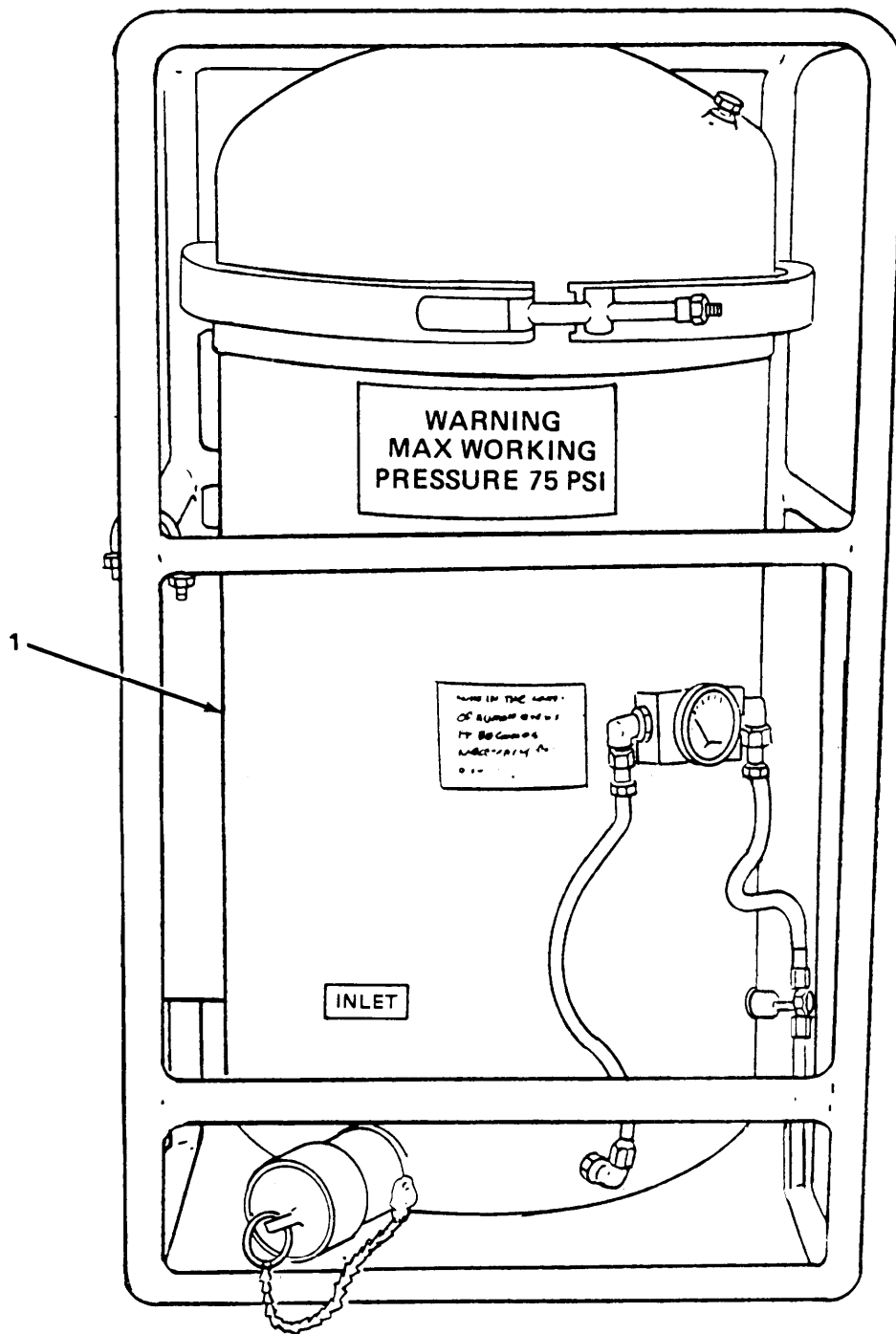


Figure F-13. Filter-Separator Assembly.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
-------------------	--------------------	--------------	-----------------------	--	------------

GROUP 04 FILTER/SEPARATOR

FIG. F-13 FILTER-SEPARATOR ASSEMBLY

1	PAOFF	97403	13217E5350	FILTER-SEPARATOR,LI (SEE TM5-4330-217-12 FOR PARTS BREAKDOWN)	1
---	-------	-------	------------	---	---

END OF FIGURE

SECTION III. SPECIAL TOOLS LIST

NOT APPLICABLE

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NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5305-00-071-1324	F-11	6	5330-01-007-6981	F-3	13
4730-00-079-1362	F-10	2	4730-01-009-1735	F-6	1
5330-00-088-9166	F-6	4	4930-01-017-3638	F-10	8
4730-00-088-9285	F-3	3	4930-01-017-3639	F-10	1
	F-4	7	5975-01-050-5707	F-1	14
4930-00-117-4726	F-8	1	4730-01-068-5070	F-9	5
4730-00-263-5262	F-4	4	4720-01-068-8273	F-1	2
4320-00-427-0002	F-12	1	4930-01-069-9054	F-1	1
4330-00-491-4957	F-13	1	4820-01-167-6550	F-5	1
4930-00-503-0380	F-11	5			
4820-00-507-0114	F-3	8			
4930-00-513-9906	F-1				
4930-00-516-0839	F-8	2			
5330-00-612-2414	F-1	4			
	F-1	10			
	F-2	4			
	F-2	8			
	F-3	4			
	F-3	6			
	F-4	3			
	F-5	10			
	F-6	6			
	F-7	5			
	F-9	3			
	F-10	3			
4730-00-640-6188	F-7	2			
4730-00-649-9100	F-1	3			
	F-2	3			
	F-3	5			
	F-4	5			
	F-6	5			
	F-7	4			
	F-9	2			
	F-10	4			
4730-00-649-9103	F-10	6			
5320-00-721-5210	F-1	12			
5330-00-860-2326	F-5	6			
5330-00-899-4509	F-7	3			
4730-00-915-5127	F-1	5			
	F-2	2			
	F-3	2			
	F-4	2			
	F-9	4			
	F-10	5			
4730-00-929-0790	F-6	3			
4730-00-938-7997	F-3	7			
	F-4	6			
5340-01-003-7714	F-11	4			
5340-01-003-7715	F-11	3			
5340-01-003-7718	F-11	7			

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CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
		STOCK NUMBER			
79326	CCN101/14	4930-00-117-4726		F-8	1
81718	C1802B			F-5	8
81718	D263A			F-5	14
81718	H11A			F-5	3
81718	H185RB			F-5	5
81718	H234M	5330-00-860-2326		F-5	6
81718	H403B			F-5	12
81718	H407RE			F-5	13
81718	H441B			F-5	2
81718	H500RB			F-5	2
81718	H6451M			F-5	7
81718	H6458RE			F-5	9
81718	H776B			F-5	4
81349	MILP25995TYPE,II			F-10	7
96906	MS20470A4-5	5320-00-721-5210		F-1	12
96906	MS27020-11	4730-00-079-1362		F-10	2
96906	MS27021-11			F-1	8
				F-2	9
96906	MS27022-11	4730-00-938-7997		F-3	7
				F-4	6
96906	MS27024-11	4730-00-649-9103		F-10	6
96906	MS27025-11			F-1	9
				F-2	7
96906	MS27026-11	4730-00-088-9285		F-3	3
				F-4	4
96906	MS27028-11	4730-00-649-9100		F-1	3
				F-2	3
				F-3	5
				F-4	5
				F-6	5
				F-7	4
				F-9	2
				F-10	4
96906	MS27029-11	4730-00-915-5127		F-1	5
				F-2	2
				F-3	2
				F-4	2
				F-9	4
				F-10	5
96906	MS27029-15	4730-00-929-0790		F-6	3
96906	MS27029-17	4730-00-640-6188		F-7	2
96906	MS27030-6	5330-00-612-2414		F-1	4
				F-1	10
				F-2	4
				F-2	8
				F-3	4
				F-3	6
				F-4	3
				F-5	10
				F-6	6
				F-7	5

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		STOCK NUMBER			
96906	MS27030-6	5330-00-612-2414		F-9	3
				F-10	3
96906	MS27030-8	5330-00-088-9166		F-6	4
96906	MS27030-9	5330-00-899-4509		F-7	3
96906	MS39352-9	4730-01-009-1735		F-6	1
96906	MS49000-17			F-7	6
96906	MS49000-3			F-6	7
96906	MS51960-67	5305-00-071-1324		F-11	6
81349	M52618/1B09X	4730-00-263-5262		F-4	7
00624	NE100802-0138			F-2	6
19099	NPN0001			F-3	18
97403	13217E5350	4330-00-491-4957		F-13	1
97403	13217E9444			F-1	6
97403	13217E9444-1			F-1	11
97403	13217E9444-3			F-1	7
97403	13219E0461	4930-01-069-9054		F-1	1
97403	13219E0462	5975-01-050-5707		F-1	14
97403	13219E0463			F-2	5
97403	13219E0463-1			F-2	10
97403	13219E0464	4720-01-068-8273		F-1	2
97403	13219E0465			F-2	1
97403	13219E0466			F-7	1
97403	13219E0467			F-3	1
97403	13219E0468	4820-00-507-0114		F-3	8
97403	13219E0469	5340-01-003-7718		F-11	7
97403	13219E0470			F-11	1
97403	13219E0471			F-11	2
97403	13219E0472	5340-01-003-7714		F-11	4
97403	13219E0473	5340-01-003-7715		F-11	3
97403	13219E0474	4930-00-503-0380		F-11	5
97403	13219E0475			F-9	1
97403	13219E0476			F-4	1
97403	13219E0477	4730-01-068-5070		F-9	5
97403	13219E0491	4820-01-167-6550		F-5	1
97403	13219E0493			F-6	2
97403	13219E0496			F-1	13
97403	13219E0498	4930-00-516-0839		F-8	2
97403	13219E0501	4930-00-513-9906		F-1	
97403	13219E0505			F-11	8
97403	13219E0506			F-11	8
97403	13219E3950	4320-00-427-0002		F-12	1
97403	13220E9406-1	4930-01-017-3639		F-10	1
32218	13220E9914-1	4930-01-017-3638		F-10	8
91363	51100E140			F-3	19
91363	5130C164			F-3	12
91363	51410A191			F-3	9
91363	51740A292			F-3	16
91363	51740A302			F-3	14
91363	52325B005			F-3	15
91363	52561A012			F-3	17
91363	52561A115	5330-01-007-6981		F-3	13

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91363	52561A224		F-3 11
91363	55760B013		F-3 10

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F-1	1	4930-01-069-9054	97403	13219E0461
F-1	2	4720-01-068-8273	97403	13219E0464
F-1	3	4730-00-649-9100	96906	MS27028-11
F-1	4	5330-00-612-2414	96906	MS27030-6
F-1	5	4730-00-915-5127	96906	MS27029-11
F-1	6		97403	13217E9444
F-1	7		97403	13217E9444-3
F-1	8		96906	MS27021-11
F-1	9		96906	MS27025-11
F-1	10	5330-00-612-2414	96906	MS27030-6
F-1	11		97403	13217E9444-1
F-1	12	5320-00-721-5210	96906	MS20470A4-5
F-1	13		97403	13219E0496
F-1	14	5975-01-050-5707	97403	13219E0462
F-2	1		97403	13219E0465
F-2	2	4730-00-915-5127	96906	MS27029-11
F-2	3	4730-00-649-9100	96906	MS27028-11
F-2	4	5330-00-612-2414	96906	MS27030-6
F-2	5		97403	13219E0463
F-2	6		00624	NE100802-0138
F-2	7		96906	MS27025-11
F-2	8	5330-00-612-2414	96906	MS27030-6
F-2	9		96906	MS27021-11
F-2	10		97403	13219E0463-1
F-3	1		97403	13219E0467
F-3	2	4730-00-915-5127	96906	MS27029-11
F-3	3	4730-00-088-9285	96906	MS27026-11
F-3	4	5330-00-612-2414	96906	MS27030-6
F-3	5	4730-00-649-9100	96906	MS27028-11
F-3	6	5330-00-612-2414	96906	MS27030-6
F-3	7	4730-00-938-7997	96906	MS27022-11
F-3	8	4820-00-507-0114	97403	13219E0468
F-3	9		91363	51410A191
F-3	10		91363	55760B013
F-3	11		91363	52561A224
F-3	12		91363	5130C164
F-3	13	5330-01-007-6981	91363	52561A115
F-3	14		91363	51740A302
F-3	15		91363	52325B005
F-3	16		91363	51740A292
F-3	17		91363	52561A012
F-3	18		19099	NPN0001
F-3	19		91363	51100E140
F-4	1		97403	13219E0476
F-4	2	4730-00-915-5127	96906	MS27029-11
F-4	3	5330-00-612-2414	96906	MS27030-6
F-4	4	4730-00-088-9285	96906	MS27026-11
F-4	5	4730-00-649-9100	96906	MS27028-11
F-4	6	4730-00-938-7997	96906	MS27022-11
F-4	7	4730-00-263-5262	81349	M52618/1B09X

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F-5	2		81718	H500RB
F-5	3		81718	H11A
F-5	4		81718	H776B
F-5	5		81718	H185RB
F-5	6	5330-00-860-2326	81718	H234M
F-5	7		81718	H6451M
F-5	8		81718	C1802B
F-5	9		81718	H6458RE
F-5	10	5330-00-612-2414	96906	MS27030-6
F-5	11		81718	H407RE
F-5	12		81718	H403B
F-5	13		81718	H441B
F-5	14		81718	D263A
F-6	1	4730-01-009-1735	96906	MS39352-9
F-6	2		97403	13219E0493
F-6	3	4730-00-929-0790	96906	MS27029-15
F-6	4	5330-00-088-9166	96906	MS27030-8
F-6	5	4730-00-649-9100	96906	MS27028-11
F-6	6	5330-00-612-2414	96906	MS27030-6
F-6	7		96906	MS49000-3
F-7	1		97403	13219E0466
F-7	2	4730-00-640-6188	96906	MS27029-17
F-7	3	5330-00-899-4509	96906	MS27030-9
F-7	4	4730-00-649-9100	96906	MS27028-11
F-7	5	5330-00-612-2414	96906	MS27030-6
F-7	6		96906	MS49000-17
F-8	1	4930-00-117-4726	79326	CCN101/14
F-8	2	4930-00-516-0839	97403	13219E0498
F-9	1		97403	13219E0475
F-9	2	4730-00-649-9100	96906	MS27028-11
F-9	3	5330-00-612-2414	96906	MS27030-6
F-9	4	4730-00-915-5127	96906	MS27029-11
F-9	5	4730-01-068-5070	97403	13219E0477
F-10	1	4930-01-017-3639	97403	13220E9406-1
F-10	2	4730-00-079-1362	96906	MS27020-11
F-10	3	5330-00-612-2414	96906	MS27030-6
F-10	4	4730-00-649-9100	96906	MS27028-11
F-10	5	4730-00-915-5127	96906	MS27029-11
F-10	6	4730-00-649-9103	96906	MS27024-11
F-10	7		81349	MILP25995TYPE,II
F-10	8	4930-01-017-3638	32218	13220E9914-1
F-11	1		97403	13219E0470
F-11	2		97403	13219E0471
F-11	3	5340-01-003-7715	97403	13219E0473
F-11	4	5340-01-003-7714	97403	13219E0472
F-11	5	4930-00-503-0380	97403	13219E0474
F-11	6	5305-00-071-1324	96906	MS51960-67
F-11	7	5340-01-003-7718	97403	13219E0469
F-11	8		97403	13219E0505
F-11	8		97403	13219E0506

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F-13	1	4330-00-491-4957	97403	13217E5350

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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 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

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 2 910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER

JOHN DOE, PFC (268) 317.7111

SIGN HERE

JOHN DOE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 1, 1 Nov 80

PS --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

FILL IN YOUR
UNIT'S ADDRESS



FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY TROOP SUPPORT COMMAND
ATTN: AMSTR-MMTS
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

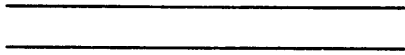
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TEAR ALONG PERFORATED LINE

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 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	grams	gallons	.264
pounds	kilograms	.454	ounces	ounces	.035
short tons	metric tons	.907	pounds	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

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

