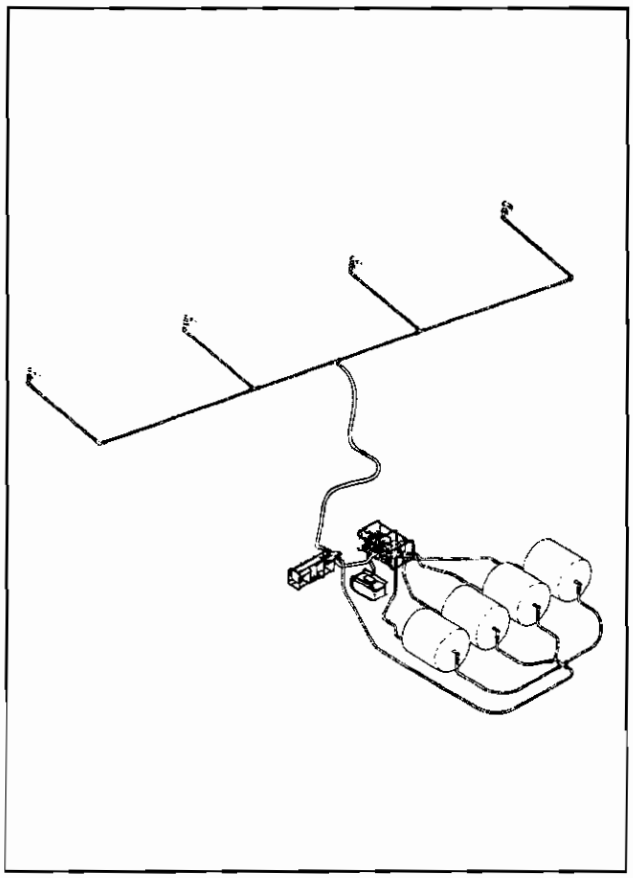
TM 10-4930-250-13&P

TECHNICAL MANUAL

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



ADVANCED AVIATION FORWARD AREA REFUELING SYSTEM (AAFARS) NSN 4930-01-380-4856

HEADQUARTERS, DEPARTMENT OF THE ARMY

1 MARCH 1999

WARNING SUMMARY

DEATH or serious injury may result if personnel fail to observe the following safety precautions.

FLAMMABLE FUEL

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

BEFORE OPERATION be certain all modules are correctly setup to avoid spillage of fuel. Do not allow any smoking within 50 feet (15.24 m) of the fuel servicing areas. Post NO SMOKING signs around the areas. Be certain a suitable fire extinguisher is present.

DURING OPERATION avoid spillage of fuel as much as possible. If spillage of fuel occurs, cover the areas with dry soil to reduce its rate of vaporization. Avoid getting fuel on the body or clothing. If clothing becomes saturated with fuel, remove the clothing immediately and wash the body with hot soapy water. Do not allow smoking within 50 feet (15.24 m) of the dispensing area. Post NO SMOKING signs around the areas. Be certain the nozzle is properly bonded to the vehicle being filled. The vehicle being filled and the dispensing pump must be grounded. Be certain a suitable fire extinguisher is present and has been properly filled. Never dispense fuel to a vehicle while its engine is operating.

MODULE MOVEMENT

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use the number of soldiers called for by the procedures to move or relocate the AAFARS euipment.

SOLVENT HAZARD

Dry cleaning solvent, PD-680, Type III, used to clean parts is potentially dangerous to personnel and property. Eye protection is required. Avoid repeated and prolonged skin contact by wearing rubber gloves or nonporous gloves when handling solvents or material wet with dry cleaning solvent. Wash hands immediately after exposure with soap and water and use a lanolin based skin cream to prevent skin drying. Do not use near open flame or excessive heat. Be sure there is good ventilation or the solvent vapors will build up in the air and become a poisonous mixture which can cause physical injury or even death.

PUMPAGE TOXICITY

AAFARS pumpage fuels and the engine lubricating oil contain additives that may be harmful to personnel and the environment. All leaks must be corrected as soon as possible. Wash fuel or oil from skin immediately. Remove and wash contaminated clothing immediately. Spills of fuel or oil must be cleaned up in accordance with local area direction to prevent harm to personnel or damage to the environment.

HOT COMPONENTS

The exhaust system will remain hot for some time after engine shut down. Avoid contact with exhaust system until the components have cooled enough for safe handling. Serious burns may occur from contact with hot metal.

STATIC DISCHARGE

A static discharge between the liquid fuel filter-separator and personnel could ignite the fuel or cause an explosion of fuel vapors. Do not operate until it has first been properly grounded.

FUEL SPILLAGE ON PERSONNEL

Serious eye and skin injury could occur from venting of fuel when filter vessel manual vent valve is open. Wear suitable protective clothing and eye protection.

Avoid getting fuel on your body or clothing. If clothing becomes saturated with fuel, remove clothing immediately and wash your body with hot soapy water.

ARCING

Radio transmitters can cause an arc at antennas. DO NOT ground nozzle to a radio antenna.

ELBOW VALVE STEM POSITION

The AAFARS suction and discharge hoses in the recirculation loop are connected to the fuel drums via elbow valves with integral camlock couplings. When the elbow coupling is closed, the valve stem is extended. The stem travel is opposite that of conventional valves and requires theoperator to double check valve position during the defueling procedure, since observation is misleading. Failure to heed this warning could result in death or serious injury.

FUEL SPILLAGE

Fuel spillage will occur if elbow valve coupling is opened before connection to a fuel drum. Ensure elbow valve coupling is closed before connection to fuel drum. Failure to heed this warning could result in death or serious injury.

FIRST AID

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

NOISE

Use single hearing protection within 22 feet. Hearing can be permanently damaged if exposed to constant high noise.

CARBON MONOXIDE

Carbon Monoxide (exhaust gas) can kill you. Operate system outdoors or duct system outdoors.

TECHNICAL MANUAL
NO. 10-4930-250-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 MARCH 1999

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

ADVANCED AVIATION FORWARD AREA REFUELING SYSTEM (AAFARS) NSN 4930-01-380-4856

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is http://aeps.ria.army.mil. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using, this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter, DA Form 2028, or DA Form 2028-2 direct to: Commander, U.S. Army Tank - automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, IL 61299-7630. The email address is amsta-ac-nml@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Continued)

HOW TO USE THIS MANUAL

Be sure you read all Warnings before using your equipment.

This manual incorporates a quick reference tab feature that allows you to quickly locate the most often referenced subjects and topics appearing in this manual. The reference tab feature is composed of the following components:

Cover Index Page

Index boxes are located on the right-hand edge of the cover page. Each index box contains a subject title, page number, and black index tab.

Table of Contents

The Table of Contents lists all the major subjects contained in this manual. Subjects that are surrounded by a black box correspond to those that appear on the cover page index.

Page Numbers and Index Tabs

Each page of this manual is identified with a page number. Pages that contain the subjects identified on the cover page index also contain a black tab on the right edge of the page that alines with the cover page index tab.

To use the quick reference tab feature, select the title of the subject you are trying to find from the cover page index. You can turn to the indicated page number or bend the pages back and locate the page tab that alines with the cover index tab.

If the cover page index is lost or badly worn, page numbers and index tabs can be located by referring to the Table of Contents.

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1.1 SCOPE.

Type of Manual:	Operator's and Unit Level Maintenance including Repair Parts and Special Tools List (RPSTL)
Model Number and Name:	Advanced Aviation Forward Area Refueling System (AAFARS)
Purpose of Equipment:	To provide a day or night, soldier-portable, four-point refueling system capable of providing filtered fuel at a rate of fifty-five gallons per minute to each of four nozzles separated by a distance of 100 feet (30.5 m), and to operate satisfactorily from 120°F(48.9°C) to -25°F (-31.7°C).

1.2 MAINTENANCE FORMS AND PROCEDURES.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

1.3 CORROSION PREVENTION AND CONTROL.

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

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

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of keywords such as "corrosion", "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA Pam 738-750.

1.4 SAFETY, CARE AND HANDLING.

The AAFARS may be used to pump various fuels. It must be assumed that residual fuel and fuel vapors are present in the AAFARS at all times, even after draining or purging. Therefore the equipment must always be handled with the same degree of caution as actual fuel. One or more fully charged fire extinguishers must be present at all times, not only during operation. In addition, fuels may contain toxic additives. Rubber gloves should always be worn when handling AAFARS components which are in regular contact with fuel.

A static electric charge is always present in all fuels. The charge increases when the fuel is being pumped, stirred, shook, or splashed. Any physical movement of the fuel will increase the static charge. If the charge is allowed to build sufficiently it will discharge, causing a spark which will ignite fuel vapors. The build up of a static electric charge is controlled by bonding and grounding of all fuel handling equipment. Ground rods and grounding cable assemblies are provided with the AAFARS and must be inspected, maintained and used consistently and conscientiously to prevent fuel ignition due to electrostatic discharge.

Fuels are dangerous under all conditions. Always observe fuel handling safety precautions.

1.5 DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE.

Refer to TM 750-244-3 for information and instructions covering destruction of Army Materiel.

1.6 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your AAFARS needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to:

Commander
U.S. Army Tank-Automotive and Armaments

Command, ATTN: AMSTA-TR-E/MPA Warren, Mi. 48397-50000. We will send you a reply.

We will send you a reply.

1.7 REFERENCE INFORMATION.

1.7.1 Nomenclature Cross-Reference.

Shortened nomenclature is used in this manual to make procedures easier for you to read. A cross-reference between the shortened nomenclature and the official nomenclature is shown in the following table.

Nomenclature Cross-Reference

Manual Nomenclature	Official Nomenclature
Liquid Fuel Filter-Separator	Filter-Separator, Water, Liquid-Fuel

1.7.2 List of Abbreviations.

AAFARS	Advanced Aviation Forward Area Refueling System
AMP	Ampere
C	Centigrade
CAGEC	Commercial and Government Entity Code
CCR	Closed Circuit Refueling
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	Direct Current
F	Fahrenheit
ft	foot
GFA	Gravity Fill Adapter
gpm	gallons per minute
HP	Horsepower
in	inch
IAW	In Accordance With
lb	pound
LED	Light Emitting Diode
lpm	liters per minute
Max	Maximum

m	meter
mm	millimeter
NPT	National Pipe Thread
PMCS	Preventive Maintenance Checks and Services
psi	pounds per square inch
PTO	Power Take Off
QD	Quick Disconnect
QTY	Quantity
RPM	Revolutions Per Minute
SMR code	Source, Maintenance and Recoverability Code
VDC	Volts, Direct Current

1.7.3 Glossary.

Ballooning	Localized area of swelling on a fuel hose under pressure, indicating a weak area which may burst.
Bonding	Electrically connecting units before operations begin in order to equalize any static potential that might exist and to provide a continuous path for any static potential that might be generated after operations begin. Static potential is eliminated or prevented by grounding one or more of the bonded units.
Coalesce	To grow together. To unite into a whole. To cause small droplets of water to unite into larger drops.
Coalescer Element	A filter element designed to remove solid contaminants, and to break the emulsion of water in the pumpage into large droplets. The pumpage flows from the inside to the outside of the element.
Defective	Condition of a part that prevents the part from performing its intended function, caused by normal aging, accident or manufacturing imperfection.
Deterioration	Condition of a part caused by weathering, excessive heat, excessive cold, chemical action, etc.
Differential pressure	Difference between inlet and outlet pressure at a filter or pump. An increase of differential pressure indicates a restriction or blockage in the unit (e.g., a build up of sediment in a filter).
Discharge Hose	Collapsible hose used on the output (discharge) side of the fuel transfer pump.
Dry break	Separation of couplings without loss of fuel.
Emulsion	A dispersion of fine water droplets in the pumpage.
Energize	Apply electrical power.
Grounding	Connecting single or bonded units to a ground rod so that any static potential will be discharged into the earth. If two or more units are bonded and one is grounded, the entire system is effectively grounded.
Malfunction	Failure to operate in a normal manner.
Monitor	To observe a condition or operation such as that indicated by an indicator light or meter.

Pumpage	The fluid being pumped by the fuel transfer pump.
Separator Element	A filter element that repels coalesced water droplets. The pumpage flows from the outside to the inside of the element.
Suction Hose	Non-collapsible fuel hose used on the input (suction) side of the fuel transfer pump.

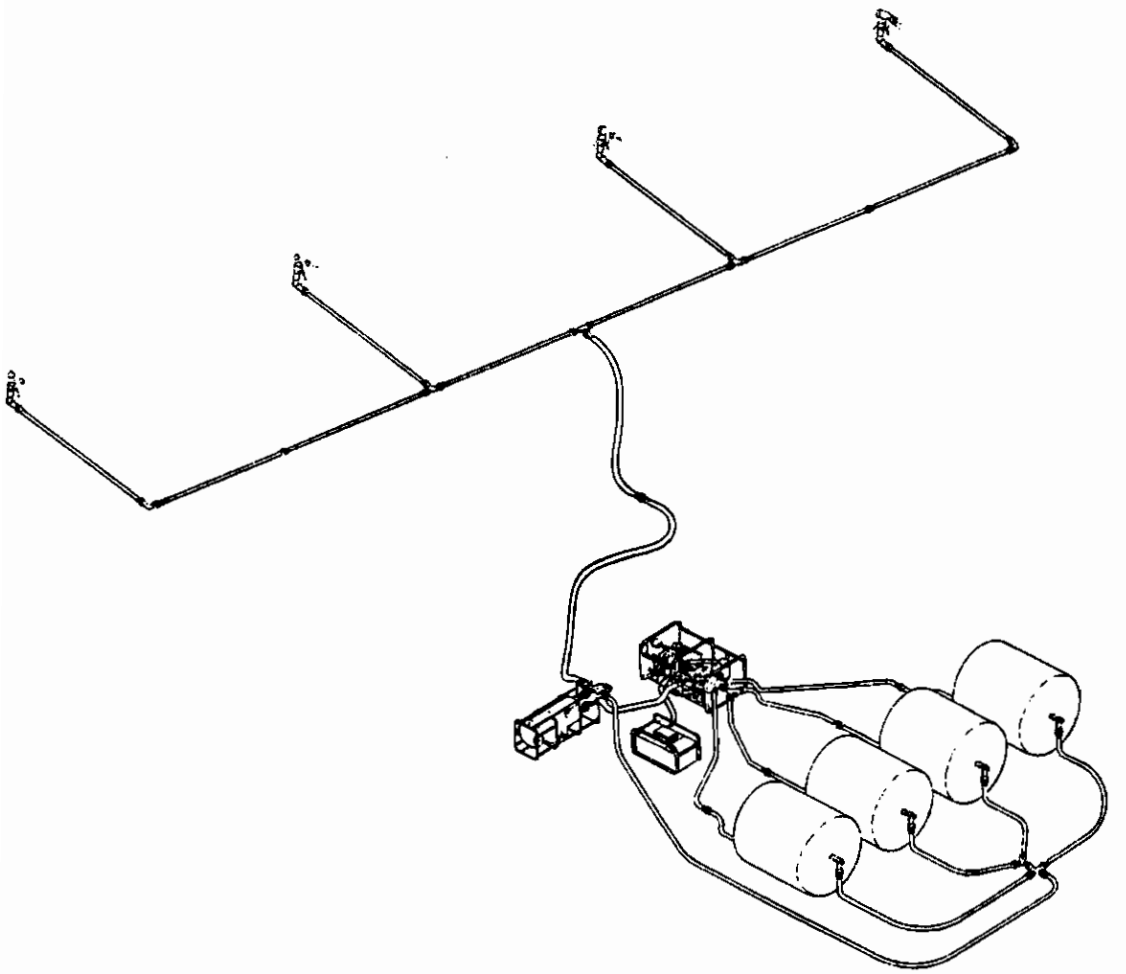


Figure 1-1. Advanced Aviation Forward Area Refueling System (AAFARS) - Normal Configuration

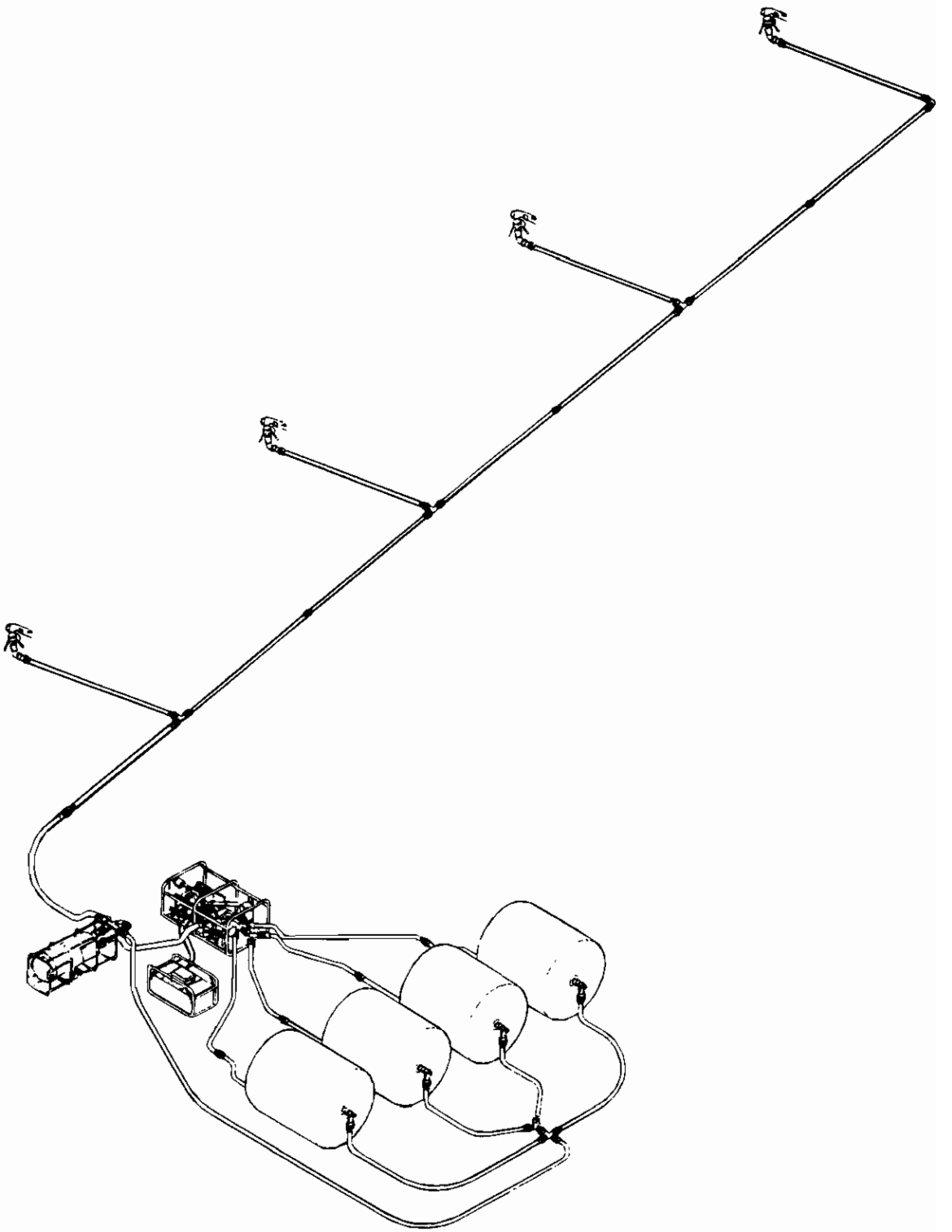


Figure 1-2. Advanced Aviation Forward Area Refueling System (AAFARS) - Alternate Configuration

Section II. EQUIPMENT DESCRIPTION

1.8 CHARACTERISTICS, CAPABILITIES AND FEATURES.

The AAFARS, figure 1-1, is a modular, four man portable, four-point refueling system. AAFARS provides filtered fuel at fifty-five gallons per minute to each of the four nozzles 100 feet (30.5 meters) apart. The system will operate satisfactorily from 120°F (48.9°C) to -25°F (-31.7°C).

The basic components of the AAFARS are the pump-engine module; the liquid fuel filter-separator; the accessory module; and the hoses, nozzles and fittings that deliver fuel from the fuel drums to the fueling points. The system allows a choice of three recirculation setups to filter the fuel during operation. Fuel recirculation also prevents pump overheating due to static pressure build.

All fuel delivery components (hoses, pump, filter, wyes, tees, elbows, nozzles, etc.) feature unisex dry-break couplings, with the exception of the valved camlock elbow couplings that connect the fuel hoses to the fuel drums. Valved unisex couplings are dry break fittings. They can be connected or disconnected only when the valves are closed. This allows components to be separated without spilling fuel. When connected (with valves open) the unisex couplings are locked together, preventing accidental separation.

The AAFARS is designed to operate normally from four 500-gallon fuel drums. The system includes an adapter kit that allows the AAFARS to be connected to any source which can be accessed through two-inch, three-inch, or four-inch camlock couplings. The adapters also allow connection of AAFARS components to any other fuel system components that use standard two-inch, three-inch, or four-inch camlock couplings.

A twenty-four VDC auxiliary pump is provided to defuel the system after a mission or operation. The auxiliary pump is also useful for pumping down a component before or after removal from the system due to operational reconfiguration or maintenance action.

a. Characteristics

- Modular construction
- Man portable
- Provides the capability to connect to any source that can be accessed through 2-inch, 3-inch, or 4-inch camlock couplings

b. Capabilities

- Provides filtered fuel at 55 gpm to each fueling point.
- Provides filtered fuel at 90 gpm to one fueling point
- Operates in a temperature range of +120°F (+48.9°C) to -25°F (-31.7°C)

c. Features

- Uses either a D-1, CCR or GFA nozzle
- Closed circuit recirculation
- Electrical power provided by a maintenance free 24 vdc battery
- All fuel discharge components feature valved unisex couplings with exception of the camlock couplings at the fuel drums

- Prime mover is a 2 cycle diesel engine
- Valved unisex couplings provide fuel discharge component isolation
- Manual Start

1.9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

The AAFARS, shown in it's normal configuration in figure 1-1, consists of the pump-engine module, the liquid fuel filter-separator, the accessory module, the auxiliary pump module, fire extinguishers and the fuel delivery equipment (nozzle kit, discharge hose kits, suction hose kit, drum fitting kit, discharge fitting kit, ground rod kit and drum adapter kit) required to deliver fuel from fuel drums to four fueling points. An alternative configuration, figure 1-2, uses an additional 3-inch discharge hose to allow an in-line setup. Use of the additional discharge hose will reduce flow to the farthest nozzle slightly below design requirements.

1.9.1 Pump-Engine Module.

The Pump-Engine module (1), figure 1-3, consists of a 19 HP diesel engine (2), fuel transfer pump (3) and associated components mounted in the main module frame (4). The engine module (5), fuel transfer pump (3) and inlet manifold (6) are mounted on a separate, shock mounted subframe (7) in the main module frame (4). The pump module (3) and engine module (5) are each designed for four soldier carry. The engine module (5) must be removed for seperate carry.

For more detailed information refer to TM 10-4320-351-14.

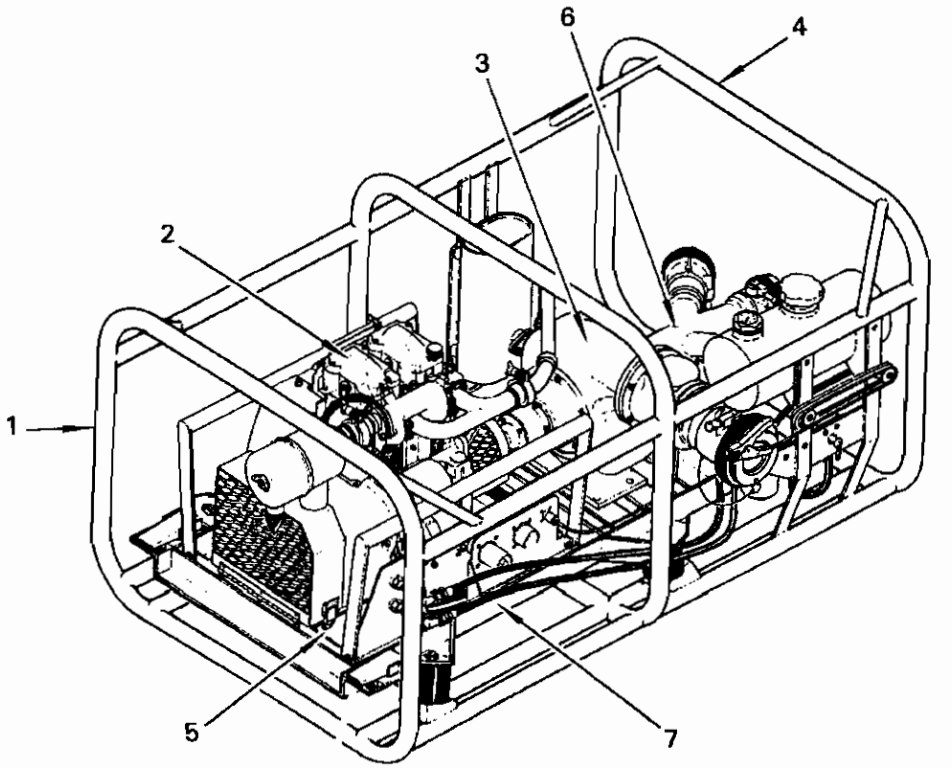


Figure 1-3. Pump-Engine Module

1.9.2 Liquid Fuel Filter-Separator.

The liquid fuel filter-separator (1), figure 1-4, is a filter (2) vessel with an integral frame (3) and is designed to house three coalescer elements and a separator element. For more detailed information refer to TM 10-4330-237-13&P.

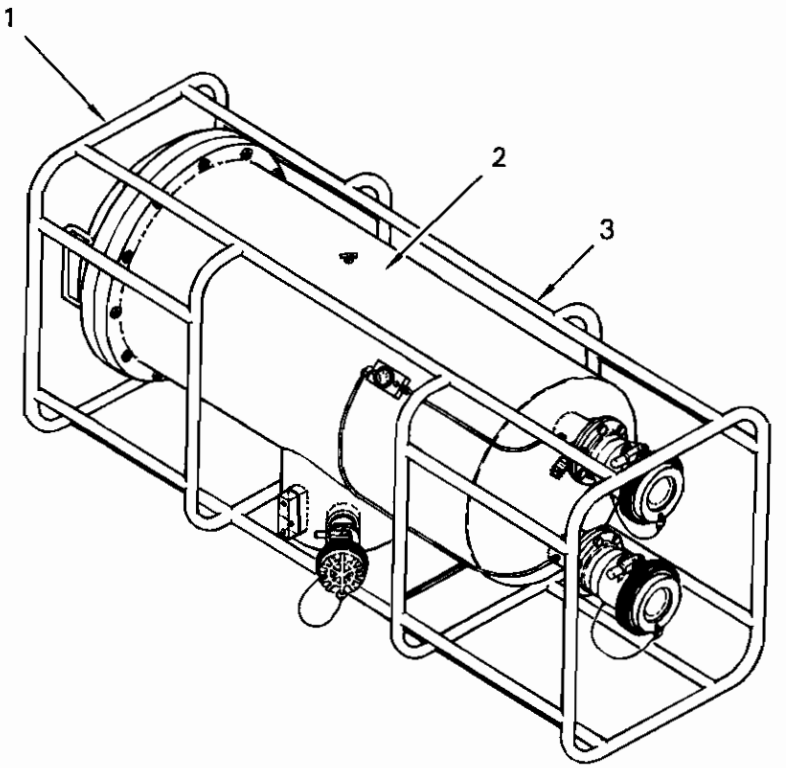


Figure 1-4. Liquid Fuel Filter-Separator

1.9.3 Accessory Module.

The accessory module (1), figure 1-5, houses a three compartment chest (2) in a 1.5 -inch tubular frame (3). A system control box (4) is located on top of the center compartment (5). The control box (4) is easily removable as a unit for maintenance. The system battery (6) is located inside the center compartment (5). A two conductor battery power cable (7) with an auxiliary pump leg (8) is normally connected to the battery and stowed in the right-hand compartment of the chest (9). A multi-conductor control cable (10) is normally connected to the control box (4) and also stowed in the right-hand compartment (9) of the chest. For more detailed information refer to TM 10-4320-351-14. The left-hand storage compartment (11) is used to stow the engine air filter assembly, spare flexible coupling and manual start rope during transport. A ground cable (12) is attached to a stud on the rear of the control box (4).

1.9.4 Fuel Delivery Equipment.

The fuel delivery equipment (nozzle kit, discharge hose kits, suction hose kit, drum fitting kit, discharge fitting kit, ground rod kit and drum adapter kit) presented here includes all the hoses, couplings, manifolds and nozzles required to carry fuel from the fuel drums to the four refueling points and to dispense the fuel to aircraft. Figure 1-6 is a pictorial representation of the AAFARS showing the fuel delivery equipment in the context of its use. Unisex couplings are used throughout with the exception of the fuel drum couplings, which are camlock to interface with the camlock couplings integral to the fuel drums. Individual components are described in the following paragraphs.

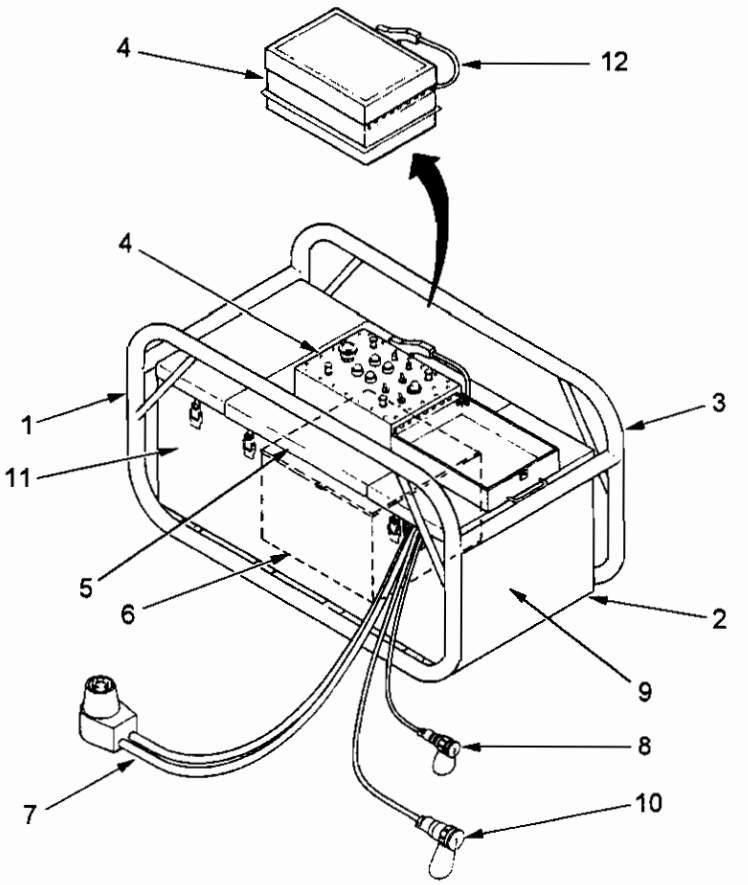


Figure 1-5. Accessory Module

1.9.4.1 Fuel Hoses.

AAFARS employs two different types of fuel hoses: collapsible and non-collapsible, figure 1-6. The only other distinction between hoses is their size: some are two-inch, some are three-inch. All AAFARS fuel hoses are light weight, elastomer hoses with an imbedded static wire which contacts the coupling at each end to provide electrical continuity from end to end. All the fuel hoses are terminated in valved unisex couplings which allow isolation of any hose length in case of emergency or failure. The unisex couplings are provided with dust caps to prevent entry of dirt or debris when any hose end is not coupled to another hose or fitting.

The suction hoses are two-inch diameter non-collapsible hoses. Non-collapsible hoses are used to ensure a free flow of fuel from the drums to the pump. Since the non-collapsible hoses are semi-rigid and cannot be rolled, their length is restricted to six feet to facilitate handling, transportation and storage. Two of the non-collapsible hoses also are used for fuel recirculation.

The fuel discharge hoses are three-inch diameter hoses to handle the volume of fuel required for four fueling points. Hose size is reduced to two-inch diameter at the tee that supplies the fuel discharge hoses. This reduction is accomplished by fitting a three-inch fifty-foot discharge hose with a three-inch unisex coupling at one end and a two-inch unisex coupling at the other end. This is the only hose in the system that can be connected only one way; all others have the same termination on either end.

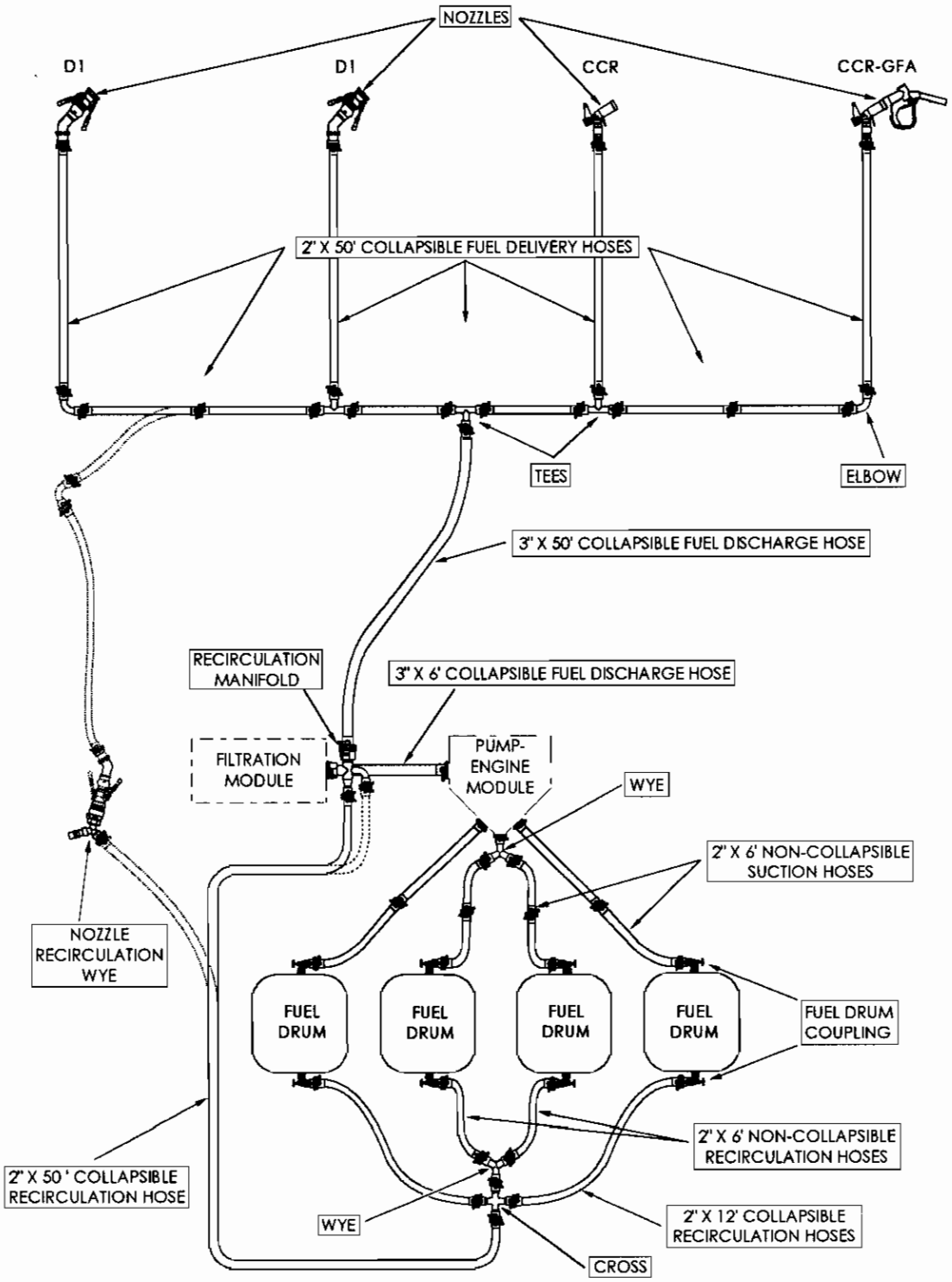


Figure 1-6. Fuel Delivery Equipment

1.9.4.2 D-1 Nozzle Assembly.

The D-1 nozzle assembly (1), figure 1-7, is a four part assembly: D-1 nozzle (2) with a ground cable assembly (3), 45 psi regulator (4), 45 degree inlet (5), and a two-inch, non-valved unisex coupling (6). All the component parts rotate around the inlet/outlet for easier connection to the aircraft receiver and fuel hose. For a detailed description refer to TM 10-4930-246-13&P.

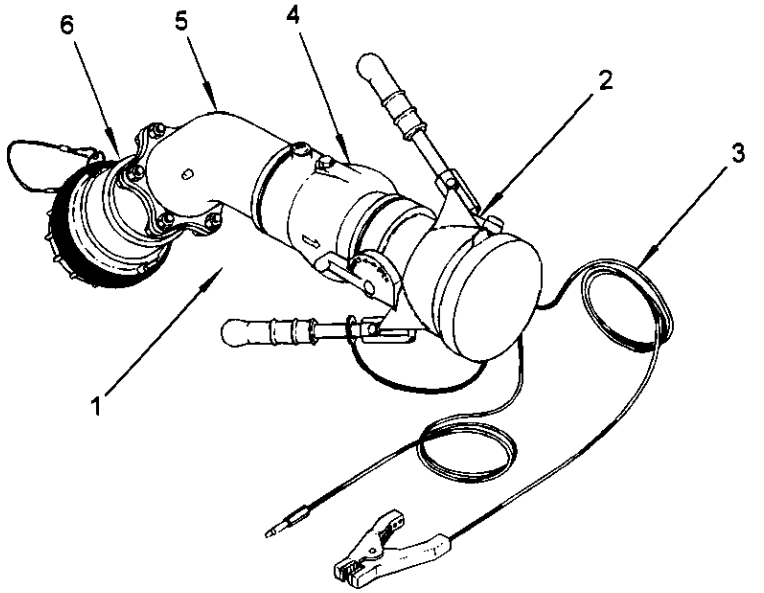


Figure 1-7. D-1 Nozzle Assembly

1.9.4.2 CCR Nozzle Assembly.

The CCR nozzle assembly (1), figure 1-8, consists of a standard CCR nozzle (2) fitted with a two-inch unisex coupling (3) and a grounding cable (4). A Gravity Fill Adapter (GFA) (5) is used in conjunction with the CCR nozzle assembly (1) to allow open port fueling of equipment not equipped with a standard CCR receiver. For a detailed description refer to TM 10-4930-248-13&P.

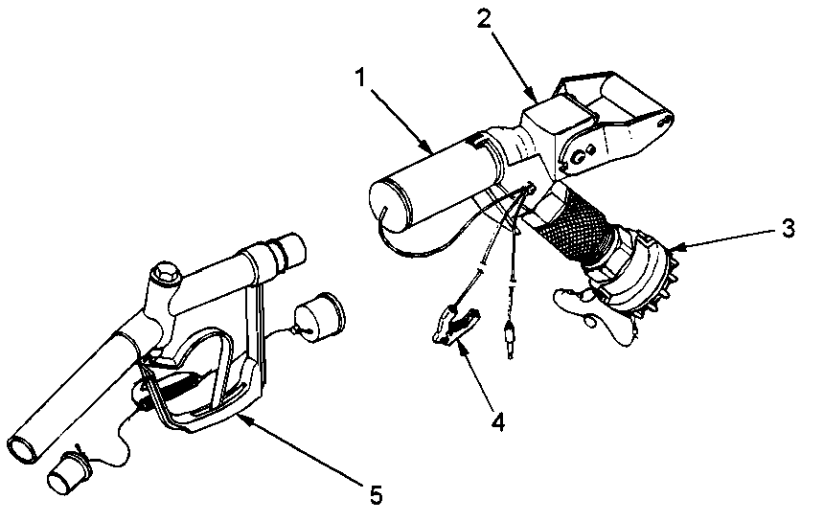


Figure 1-8. CCR Nozzle Assembly and Gravity Fill Adapter

1.9.4.3 Unisex Couplings.

All fuel delivery components are connected with unisex dry-break couplings. The use of valved unisex couplings allows any component to be isolated and removed from the system without defueling. The D-1 and CCR nozzles are subject to damage from fuel expansion and are fitted with non-valved unisex couplings to preclude trapping a quantity of fuel that could expand and damage a nozzle. Non-valved unisex couplings are used also on the fuel drum valved camlock elbow adapters because the elbow valve provides the necessary isolation.

Unisex couplings consist of two basic components: the coupling and the inlet. Figure 1-9 illustrates the types of inlets provided with the three-inch valved coupling. Figure 1-10 illustrates the types of 2-inch unisex coupling-inlet combinations. Figure 1-11 illustrates multiple unisex coupling-inlet combinations.

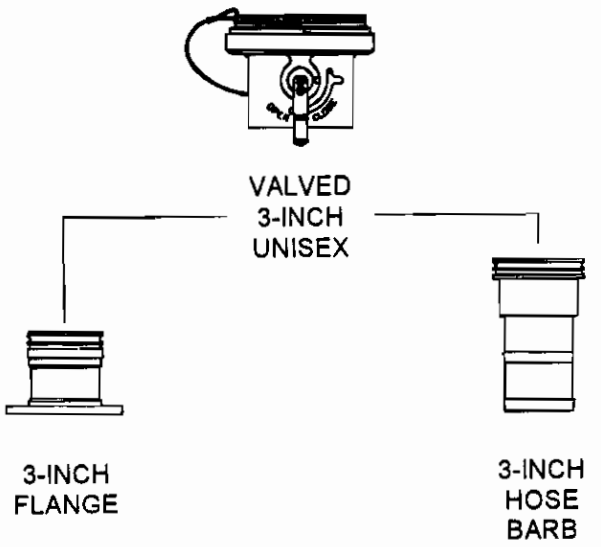


Figure 1-9. Three-Inch Unisex Coupling-Inlet Combinations

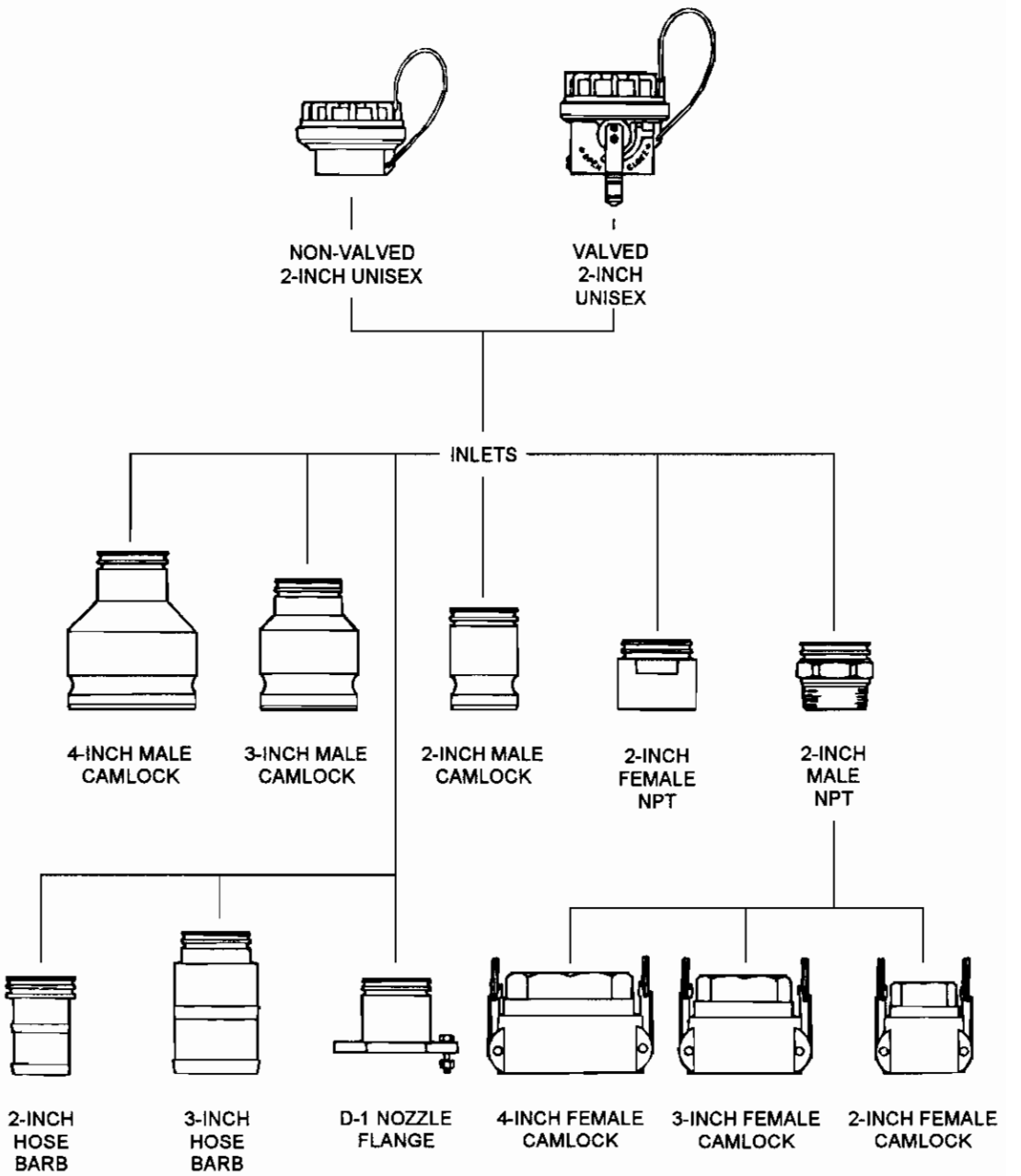


Figure 1-10. Single Two-Inch Unisex Coupling-Inlet Combinations

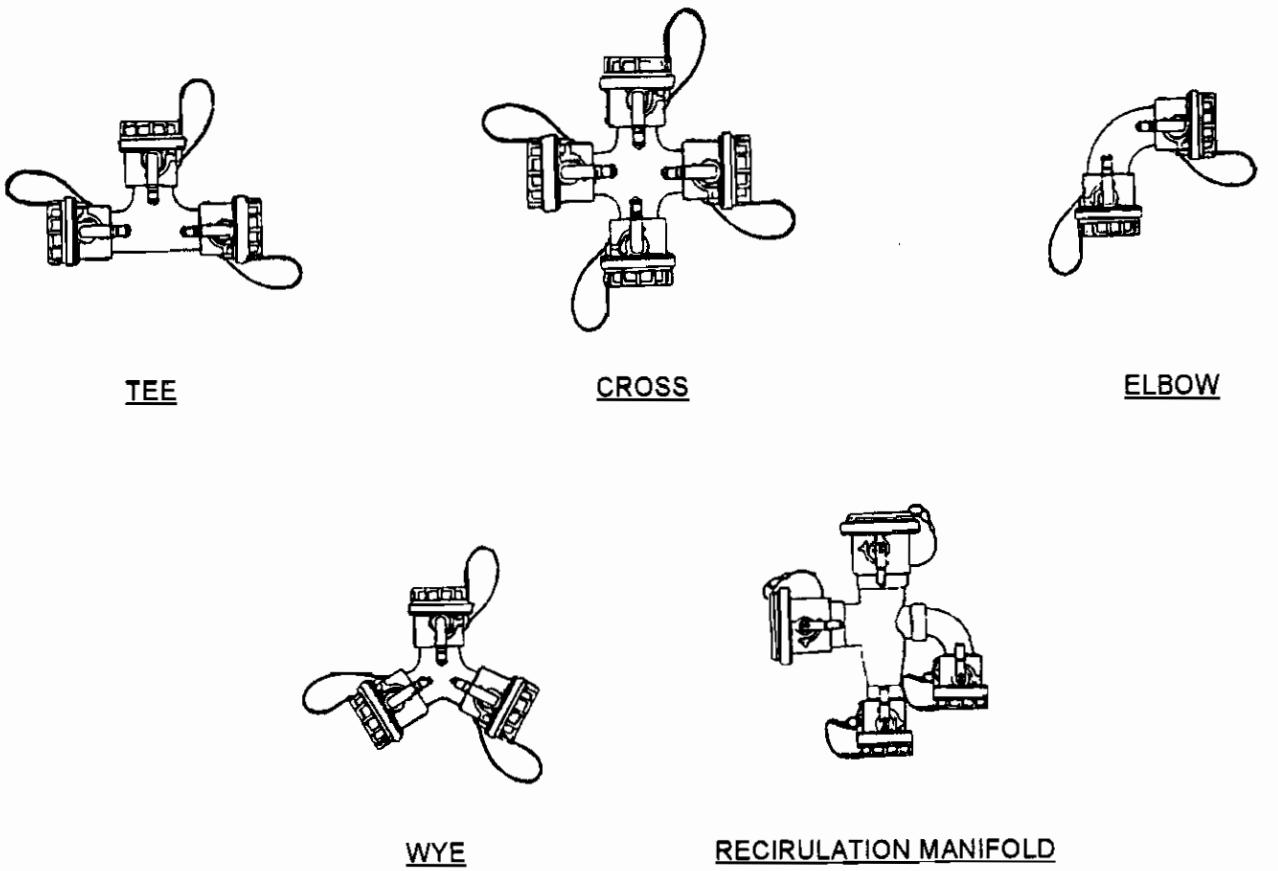


Figure 1-11. Multiple Unisex Coupling-Inlet Combinations

1.9.4.4 Recirculation Manifold.

The recirculation manifold (1), figure 1-12, is connected to the three-inch outlet port of the liquid fuel filter-separator during system setup by a three-inch unisex coupling (2). A three-inch discharge hose is connected to the second three-inch coupling (3) to supply pumpage to the fuel discharge hoses, and D-1 and CCR nozzles. A two-inch recirculation hose connects from the fuel drum inlets to two-inch unisex coupling (4) for full flow recirculation or to two-inch unisex coupling (5) for reduced flow (5 gpm) recirculation.

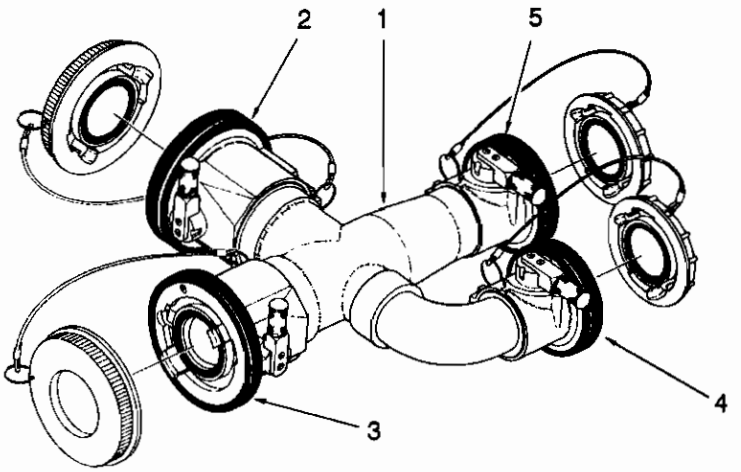


Figure 1-12. Recirculation Manifold

1.9.4.5 Nozzle Recirculation Manifold.

The nozzle recirculation manifold (1), figure 1-13, provides an alternate recirculation configuration. Rather than recirculating pumpage directly from the liquid fuel filter-separator, the nozzle recirculation manifold allows connection of a D-1 and/or a CCR nozzle into the recirculation line. The manifold is a two-inch wye (2) inlet fitted with a standard aircraft D-1 receiver(3), a standard aircraft CCR receiver (4) and a two-inch valved unisex coupling (5).

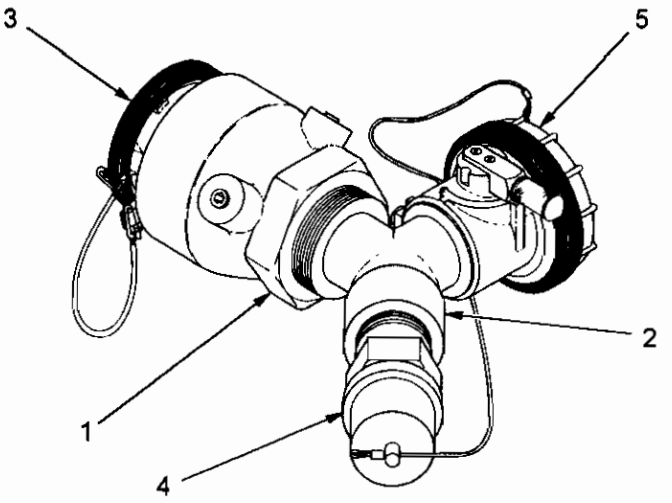


Figure 1-13. Nozzle Recirculation Manifold

1.9.4.6 Drum Coupling.

The AAFARS fuel hoses are connected to the fuel drums with elbow valved couplings, figure 1-14, with integral camlock couplers. The valve handle operates a poppet valve which, when opened, unseats and holds open the spring-loaded inlet or outlet valve in the fuel drum. Full travel (fully closed to fully open) requires approximately seven turns. When the poppet valve is closed, the valve stem is extended; when open, it is retracted. The stem travel is opposite that of conventional valves and requires the operator to double check valve position during system set up and tear down, since observation can be misleading.

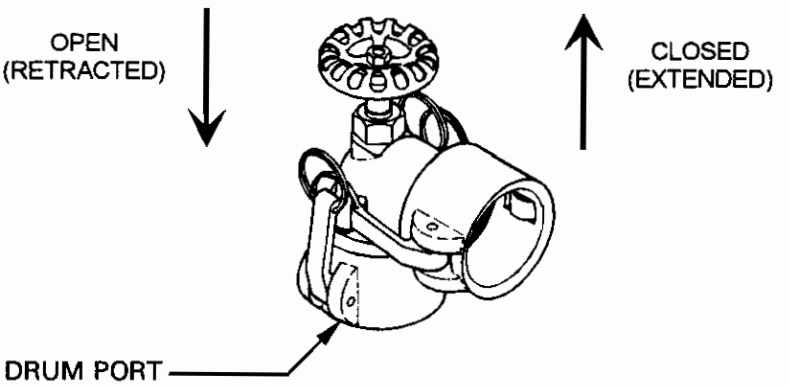


Figure 1-14. Elbow Coupler Valve

1.9.4.7 Auxiliary Pump Module.

The auxiliary pump module, figure 1-15, consists of a 24 vdc electric pump (1) mounted in a tubular frame (2). The pump is equipped with an on/off switch (3) and two-inch valved unisex couplings (4) at both inlet and outlet. An electrical power connector (5) allows the pump to be connected to the auxiliary power leg of the battery power cable (W202) from the accessory module. The auxiliary power cable is 50 ft. (15.24 meters) in length, allowing the auxiliary pump to be used anywhere within a 50 ft. (approx. 15 m) radius of the accessory module.

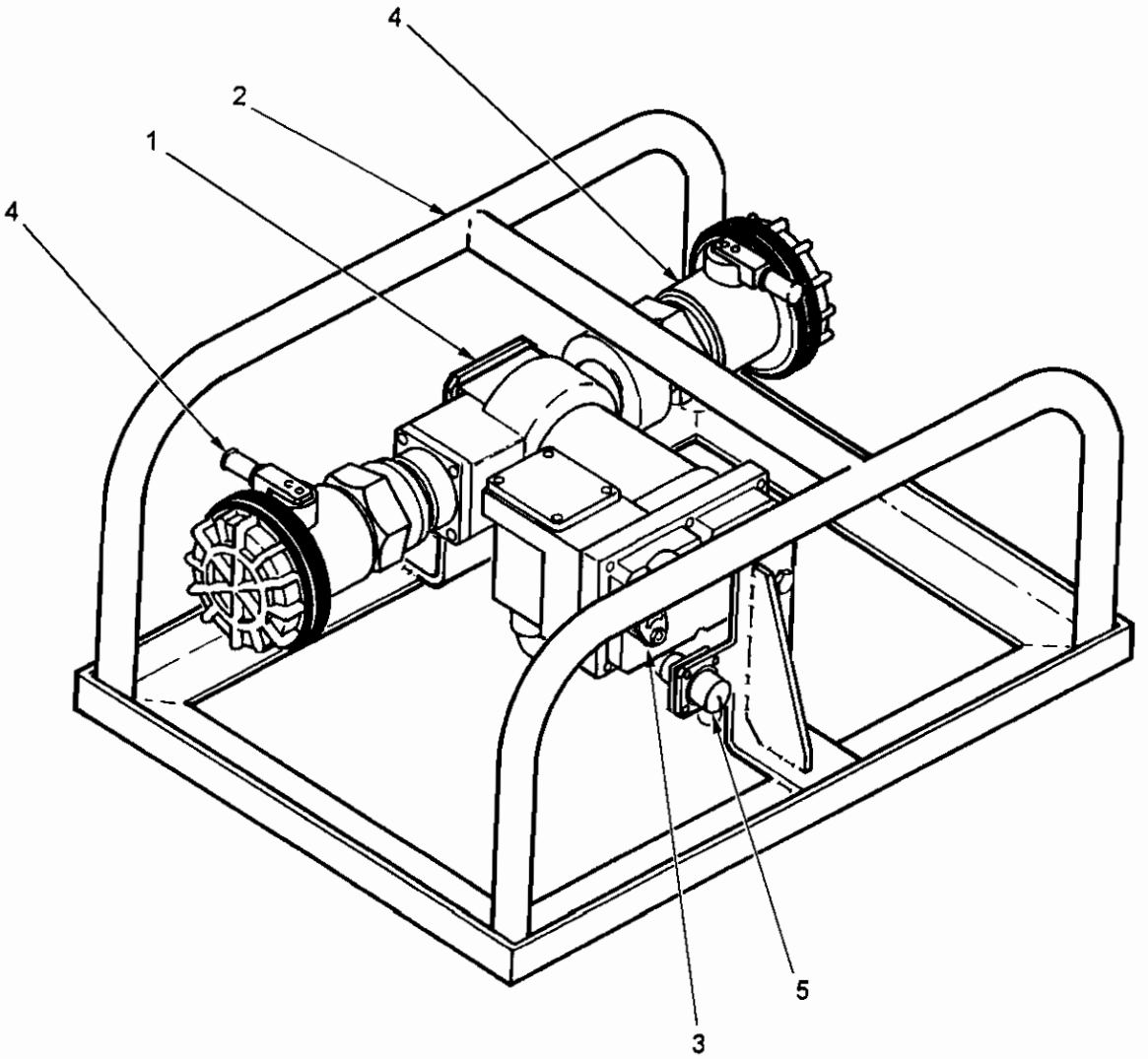


Figure 1-15. Auxiliary Pump Module

1.10 EQUIPMENT DATA.

The following is a tabular presentation of all physical and performance data required for operation and unit level maintenance.

Table 1-1. Equipment Data

DESCRIPTION	QUANTITY	LEADING PARTICULARS
Pump-Engine Module	1	Weight: 336 lb (152.4 kg) with engine module installed 170 lb (77.1 kg) with engine module removed Length: 56 in (1422.4 mm) Width: 36.25 in (920.8 mm) Height: 28 in (711.2 mm) Shipping volume: 32.89 cu. ft. (0.93 m^3)
Engine Module		Weight: 166 lb (75.3 kg) Length: 23 in (584.2 mm) Width: 20.5 in (520.7 mm) Height: 19.5 in (495.3 mm) Shipping volume: 5.32 cu. ft. (0.15 m^3)
Engine		Deutz Ruggerini Model 191 Four cycle, air cooled, direct-injected diesel 2 cylinder Displacement: 52 cu. in. (851 cm^3) Output (max): 19 HP (19.27 HP) @ 3400 RPM Torque (max): 29.9 ft. lbs. (40.5 nm) @ 2400 RPM Compression Ratio: 19:1 Dry Weight: 117 lb (53 kg) Oil capacity: 1.9 qts. (1.8 ltrs.) Fuel Capacity: 1.2 gal. (4.5 ltrs.)
Fuel Transfer Pump		Weight: 39 lb (17.7 kg) Operating Temperature Range: 120°F (48.9°C) to -25°F (-31.7°C) Flow Rate: 225 gpm (85.2 lpm) minimum
Accessory Module	1	Weight: 156 lb (70.76 kg) with battery installed w/o Battery: 78.02 lb (35.4 kg) Battery: 80.08 lb (36.4 kg) Length: 40.25 in (1022.4 mm) Width: 21.75 in (552.5 mm) Height: 22 in (558.8 mm) Shipping volume: 11.14 cu. ft. (0.32 m^3)
Liquid Fuel Filter-Separator	1	Weight (dry): approx. 137 lb (62.1 kg) Weight (drained): approx. 147 lb (66.7 kg) Weight (full): 170 lbs (71.18 kg) Length: 55 in (1397 mm) Width: 20 in (508 mm) Height: 24 in (609.6 mm) Shipping volume: 15.3 cu. ft. (0.47 m^3)

Table 1-1. Equipment Data

DESCRIPTION	QUANTITY	LEADING PARTICULARS
Auxiliary Pump Module	1	Weight: 32 lb (14.5 kg) Length: 22.5 in (571.5 mm) Width: 16.5 in (419.1 mm) Height: 10 in (254 mm) Shipping volume: 2.2 cu ft. (0.06 m^3)
Auxiliary Pump Assembly		2 in. valved unisex input and output couplings 24 vdc, 10 amp motor Flow rate: 13 gpm (49.2 lpm) maximum
Nozzle Kit P/N 13230E5892	4	Kit weight: 26 lbs (11.8 kg) Shipping volume: 1.12 cu. ft. (0.03 m^3)
CCR Nozzle Assembly	1	Weight: 10 lb (4.5 kg) Mil-Spec CCR nozzle with strainer and 2-inch, non-valved unisex inlet coupling Limits outlet pressure to 15 psi (1 kg/cm2)
Gravity Fill Adapter	1	Weight: 3.2 lbs (1.45 kg) Mates to CCR nozzle outlet for over wing (open port) fueling
D1 Nozzle Assembly	1	Weight : 12 lbs (5.4 kg) Mil-Spec D-1 nozzle with 45 psi (32 kg/cm2) regulator and 2-inch, non-valved unisex inlet coupling
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Discharge Hose Kit P/N 13230E5872	2	Kit weight: 88 lbs (39.9 kg) Shipping volume: 2.9 cu. ft. (0.09 m^3)
Hose, 2 in x 50 ft, Collapsible	2	Elastomer, light weight, collapsible fuel hose 2-inch valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 100 ohms
Hose Strap Assembly	2	Quick release buckle
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Discharge Hose Kit P/N 13230E5873	2	Kit weight: 96 lbs (43.58 kg) Shipping volume: 4.4 cu. ft. (0.13 m^3)
Hose, 2 in x 50 ft, Collapsible	2	Elastomer, light weight, collapsible fuel hose 2 in. valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 100 ohms

Table 1-1. Equipment Data

DESCRIPTION	QUANTITY	LEADING PARTICULARS
Hose, 2 in x 12 ft, Collapsible	1	Elastomer, light weight, collapsible fuel hose 2 in. valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 43 ohms
Hose Strap Assembly	3	Quick release buckle
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Discharge Hose Kit P/N 13230E5874	1	Kit weight: 122 lbs (55.3 kg) Shipping volume: 4.4 cu. ft. (0.13 m^3)
Hose, 2 in x 50 ft, Collapsible	3	Elastomer, light weight, collapsible fuel hose 2 in. valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 100 ohms
Hose Strap Assembly	3	Quick release buckle
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Discharge Hose Kit P/N 13230E5893	1	Kit weight: 78 lbs (35.4 kg) Shipping volume: 4.4 cu. ft. (0.13 m^3)
Hose, 3 in x 50 ft, Collapsible	1	Elastomer, light weight, collapsible fuel hose 2 in. valved unisex coupling at one end, 3 in. valved unisex coupling at other end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 100 ohms
Hose, 3 in x 6 ft, Collapsible	1	Elastomer, light weight, collapsible fuel hose 3 in. valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 34 ohms
Hose Strap Assembly	2	Quick release buckle
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3

Table 1-1. Equipment Data

DESCRIPTION	QUANTITY	LEADING PARTICULARS
Discharge Hose Kit P/N 13230E5939	1	Kit weight: 62 lbs (28.1 kg) Shipping volume: 2.5 cu. ft. (0.07 m^3)
Hose, 3 in x 50 ft, Collapsible	1	Elastomer, light weight, collapsible fuel hose 3 in. valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 34 ohms
Hose Strap Assembly	1	Quick release buckle
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Suction Hose Kit P/N 13230E5894	2	Kit weight: 58 lbs (26.3 kg) Shipping volume: 4.7 cu. ft. (0.13 m^3)
Hose, 2 in x 6 ft, Non-collapsible	5	Elastomer, light weight, non-collapsible fuel hose 2 in. valved unisex coupling at each end Working pressure: 75 psi (5.3 kg/cm2) Test pressure: 150 psi (10.5 kg/cm2) Electrical resistance across assembly: Not more than 34 ohms
Hose Strap Assembly	2	Quick release buckle
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Drum Fitting Kit P/N 13230E5897	1	Kit weight: 66 lbs (29.9 kg) Shipping volume: 2.02 cu. ft. (0.06 m^3)
Valve, Elbow Coupler	8	Weight: 2 lbs (0.9 kg) Test pressure: 150 psi (10.5 kg/cm2) 2 inch female camlock couplings on each end for coupling to 500 gal (1893 l) fuel drum
2 in. non-valved unisex to 2 in. male camlock adapter	8	Weight: 2 lbs. (0.9 kg) Non-valved 2 in. unisex coupling to 2 in. male coupling Connects 2 in. fuel hoses to valved elbow coupler at fuel drum Electrical resistance across assembly: not more than 25 ohms
2 in. Cross	1	Weight: 10 lbs. (4.5 kg) 2 in. valved unisex couplings Electrical resistance across assembly: not more than 25 ohms
2 in. Wye	2	Weight: 6 lbs. (2.7 kg) 2 in. valved unisex couplings Electrical resistance across assembly: not more than 25 ohms
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3

Table 1-1. Equipment Data

DESCRIPTION	QUANTITY	LEADING PARTICULARS
Discharge Fitting Kit P/N 13230E6050	1	Kit Weight: 54 lbs (24.5 kg) Shipping volume: 2.6 cu. ft. (0.08 m^3)
Tee	3	Weight: 6 lbs (2.7 kg) 2 in. valved unisex couplings Electrical resistance across assembly: not more than 25 ohms
Elbow	2	Weight: 4 lbs (1.8 kg) 2 in. valved unisex couplings Electrical resistance across assembly: not more than 25 ohms
Recirculation Manifold	1	Weight: 16 lbs (7.3 kg) Special Cross: Two 3 in. valved unisex couplings Two 2 in. valved unisex couplings One 2 in. leg has reduced bore to limit recirculation flow to 5 gpm (18.9 lpm) Electrical resistance across assembly: not more than 25 ohms
CCR/D1 Recirculation Wye	1	Weight: 6 lbs (2.7 kg) 3 leg assembly: CCR receiver D1 receiver 2 in. valved unisex coupling Electrical resistance across assembly: not more than 25 ohms
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Grounding Rod Kit	1	Kit Weight: 62 lbs (28.12 kg) Shipping volume: 0.32 cu. ft. (0.01 m^3)
Grounding Rod	5	Weight: 12 lbs (5.4 kg) Length: 67 in. (1701.8 mm)
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Drum Adapter Kit P/N 13230E5970	1	Kit Weight: 56 lbs (25.43 kg) Shipping volume: 2.02 cu. ft. (0.06 m^3)
2 in. Unisex to 2 in. Male Camlock Adapter	4	Weight: 2 lbs (0.9 kg)
2 in. Unisex to 2 in. Female Camlock Adapter	4	Weight: 4 lbs (1.8 kg)
2 in. Unisex to 3 in. Male Camlock Adapter	2	Weight: 4 lbs (1.8 kg)

Table 1-1. Equipment Data

DESCRIPTION	QUANTITY	LEADING PARTICULARS
2 in. Unisex to 3 in. Female Camlock Adapter	2	Weight: 6 lbs (2.7 kg)
2 in. Unisex to 4 in. Male Camlock Adapter	1	Weight: 4 lbs (1.8 kg)
2 in. Unisex to 4 in. Female Camlock Adapter	1	Weight: 6 lbs (2.7 kg)
Bag, Fuel System	1	Textured nylon duck cloth IAW MIL-C-43734, class 3
Fire Extinguisher Frame	2	Weight (empty): 18 lbs (8.2 kg) 3 extinguisher rack loaded: 131.7 lbs (59.74 kg) 2 extinguisher rack loaded: 93.8 lbs (42.55 kg) Both racks loaded: 225.5 lbs (102.37 kg) Length: 28 in. (711.2 mm) Width: 10 in. (254 mm) Height: 25 in. (635 mm) Capacity: 3 extinguishers per frame
Extinguisher	5	38 lbs (17.3 kg) Halon each

Section III. PRINCIPLES OF OPERATION

1.11 GENERAL (FUNCTIONAL) DESCRIPTION.

The AAFARS setup, figure 1-16, is composed of four functional subsystems: the pumping subsystem, the power subsystem, the electrical subsystem and the defueling subsystem. The four subsystems are described in detail in the following paragraphs.

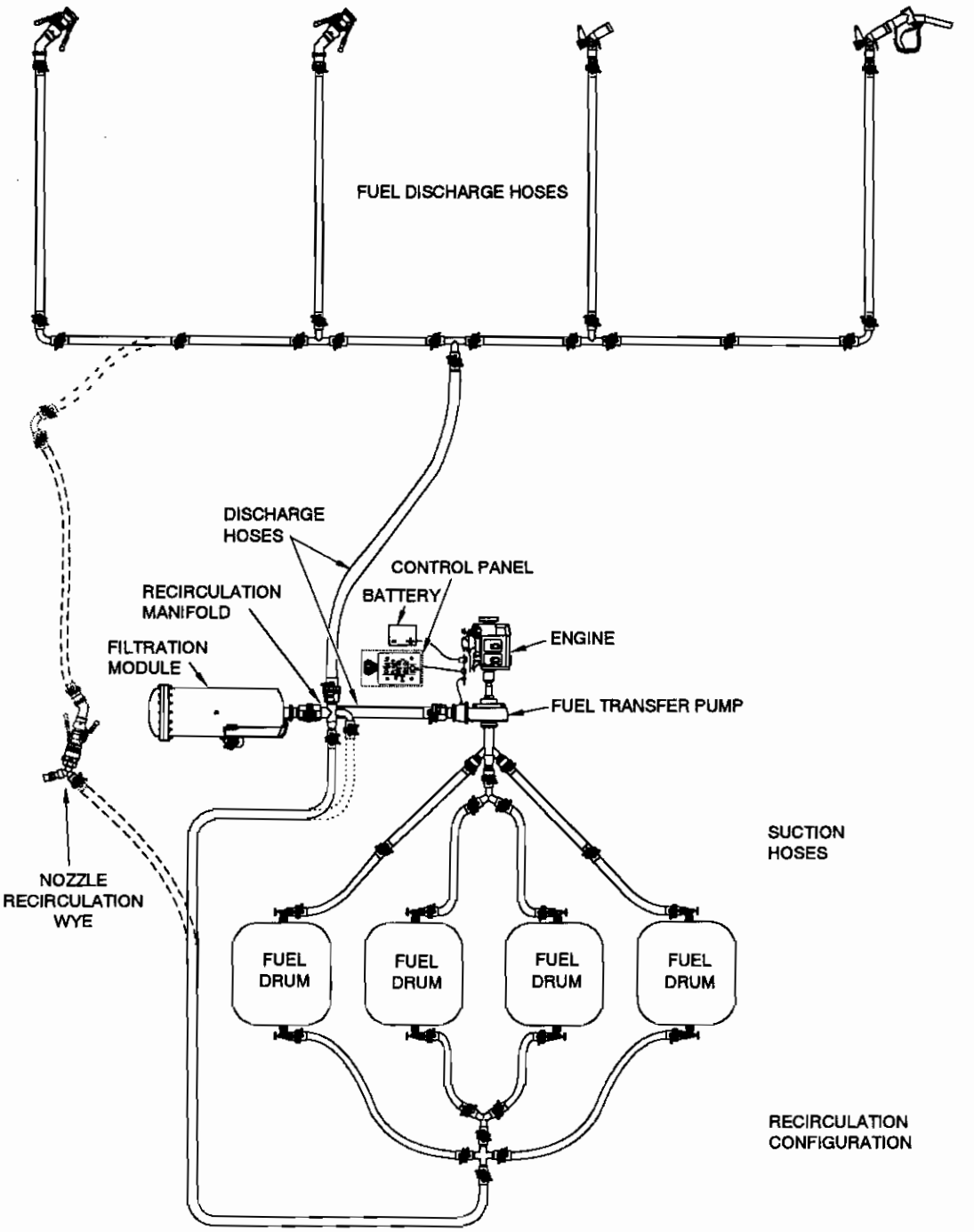


Figure 1-16. Typical AAFARS Setup

1.11.1 Pumping Subsystem.

The pumping subsystem, figure 1-17, performs the functions associated with pumpage flow from the fuel drums to the fueling points: suction, discharge, and recirculation. The primary component of the pumping subsystem is the

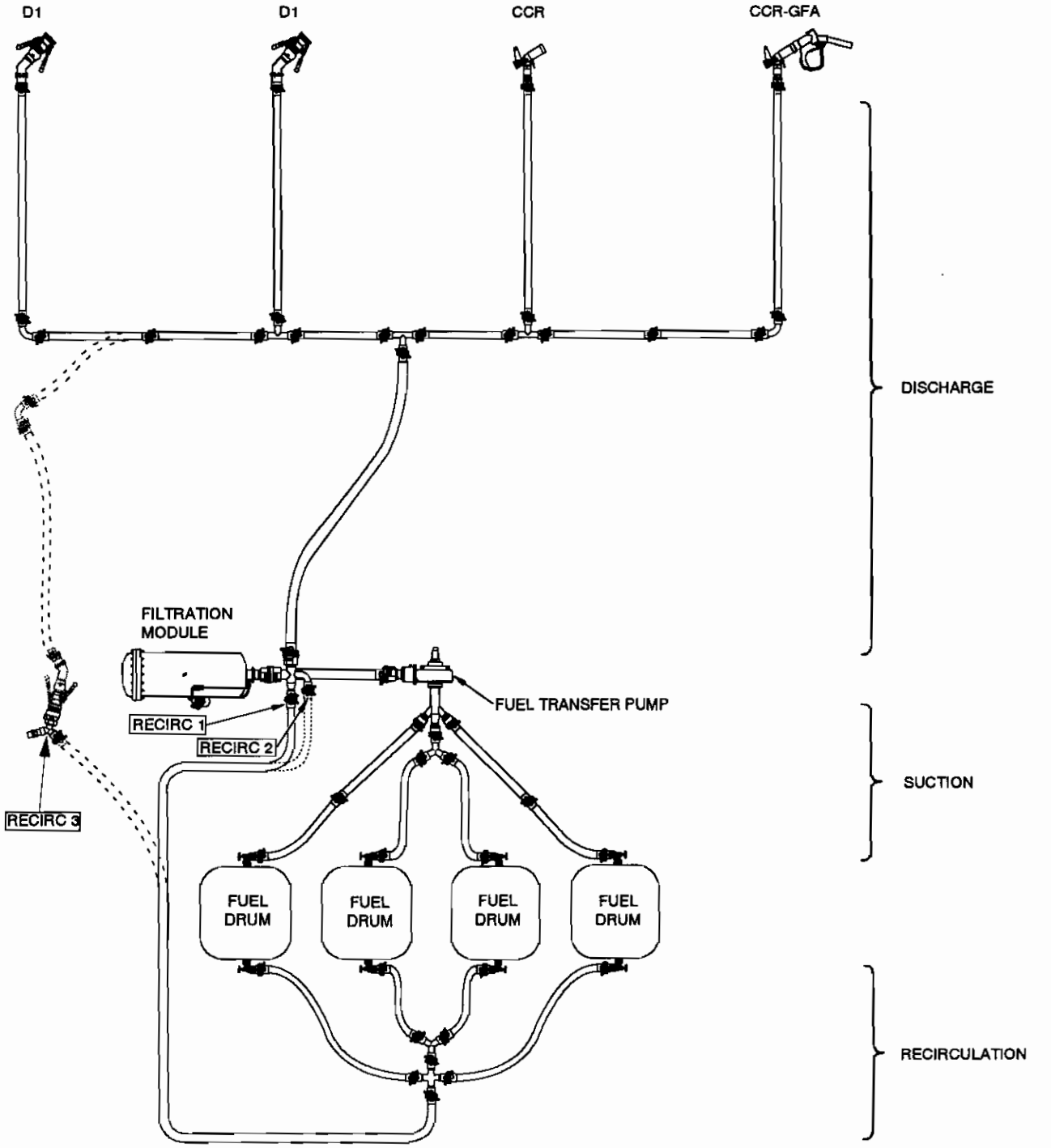


Figure 1-17. Pumping Subsystem

fuel transfer pump. The suction side of the pump is supplied by non-collapsible hoses connected in parallel to the outlet side of the fuel drums. Pumpage from the discharge side of the pump moves through the liquid fuel filter-separator to the fueling points. Fueling is accomplished at four fueling points, using any combination of D1, CCR or GFA nozzles. Fuel recirculation occurs continually during system operation.

The fuel transfer pump is a centrifugal pump with an impeller to move the pumpage. A positive displacement, rotary vane pump on the same shaft serves as a priming pump for the main impeller, allowing the pump to be started with a dry system. Fuel is drawn from the fuel drums through suction hoses into a three-way pump inlet manifold. The impeller rotation induces a swirling motion in the fuel in the body of the manifold which, if not corrected, would cause the pump to cavitate. To correct this situation, three equally spaced fins in the manifold outlet straighten the flow, reducing pump cavitation and increasing efficiency. The inlet manifold empties directly into the main impeller cavity of the fuel transfer pump which discharges the pumpage through a discharge housing to the liquid fuel filter-separator. A flapper-type check valve in the discharge housing prevents the flow of fuel back into the fuel transfer pump, enabling the integral vane pump to move fuel.

The liquid fuel filter-separator houses a horizontal filtration vessel containing three coalescer elements to remove particles from the pumpage and coalesce trapped water, and a separator to remove the water drops from the pumpage. The fuel flows through the separator to a recirculation manifold.

The recirculation manifold provides three outlet ports. A three-inch outlet passes pumpage to a three-inch, fifty-foot discharge hose and on to the delivery hoses and nozzles. Two-inch outlets are provided for recirculation of a portion of the pumpage. One of the two-inch outlets (figure 1-17, RECIRC 2) allows full flow recirculation; the other two-inch outlet (figure 1-17, RECIRC 1) has a reduced bore to limit recirculation to five gpm.

The pumping subsystem design incorporates a recirculation capability to continuously filter the pumpage, and maintain pumpage pressure and temperature within safe limits for continuous operation. The system provides three modes of recirculation: RECIRC 1 from the recirculation manifold limits recirculation to five gpm (normal fueling operation), RECIRC 2 allows full flow recirculation from the recirculation manifold; and RECIRC 3 provides the capability for full recirculation from a D1 nozzle, a CCR nozzle or both through a nozzle recirculation wye fitting. Each mode routes the pumpage through two-inch hoses and a cross-wye fitting assembly to the fuel drum inlets, figure 1-16.

1.11.2 Power Subsystem.

The diesel engine (1), fuel tank (2), fuel selector valve (3), fuel filter (4), and fuel supply line (5) and return line (6) comprise the diesel power subsystem, figure 1-18. A splined adapter flexible coupling (7) on the engine output shaft mates with a flexible coupling (8) attached to the input shaft of the fuel transfer pump to provide system power.

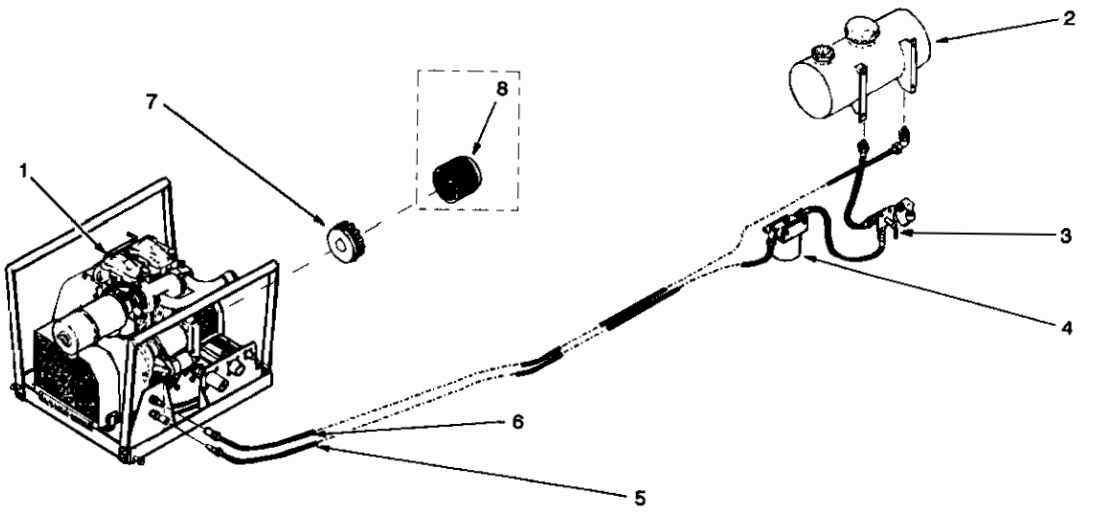


Figure 1-18. AAFARS Power Subsystem

The diesel is a compression ignition engine: ignition is achieved by compressing a fuel-air mixture in a cylinder until the heat generated by compression causes the mixture to ignite. The resulting combustion causes the mixture to expand, forcing the piston to move. The diesel engine is a two cylinder, direct injection engine. An individual fuel injector and injection pump supplies pressurized fuel alternately to each cylinder.

An on-board fuel tank is the normal fuel source for engine operation. However, a fuel selector valve allows selection of an external fuel source, if desired. A fuel filter/water coalescer in the supply line removes impurities and water from the fuel, regardless of source. The engine fuel pump continuously supplies fuel to the fuel injection pumps; a fuel return line allows surplus fuel to return to the fuel tank.

1.11.3 Electrical Subsystem.

All electrical power distribution, control and monitoring is performed by the electrical subsystem. The subsystem consists of the system battery, the control panel, the alternator, the voltage regulator, the engine starting motor, the auxiliary pump, various engine and pumpage sensors, controls, and the interconnecting cables.

1.11.4 Defueling Subsystem.

The defueling subsystem consists of the auxiliary pump module connected in the AAFARS to pump fuel from system components to the fuel drums. Figure 1-19 illustrates one common configuration. The auxiliary pump is a rotary vane, positive displacement pump capable of a maximum flow rate of 13 gpm. It is equipped with two-inch unisex couplings at inlet and outlet, allowing it to be connected directly to almost every system component. It may be used to defuel the entire system, or an individual component such as the liquid fuel filter-separator or even a single length of hose.

The auxiliary pump may also be used to evacuate air from a fuel bladder. Purging the fuel bladder of air is necessary to prevent cavitation in the fuel transfer pump during normal system operation.

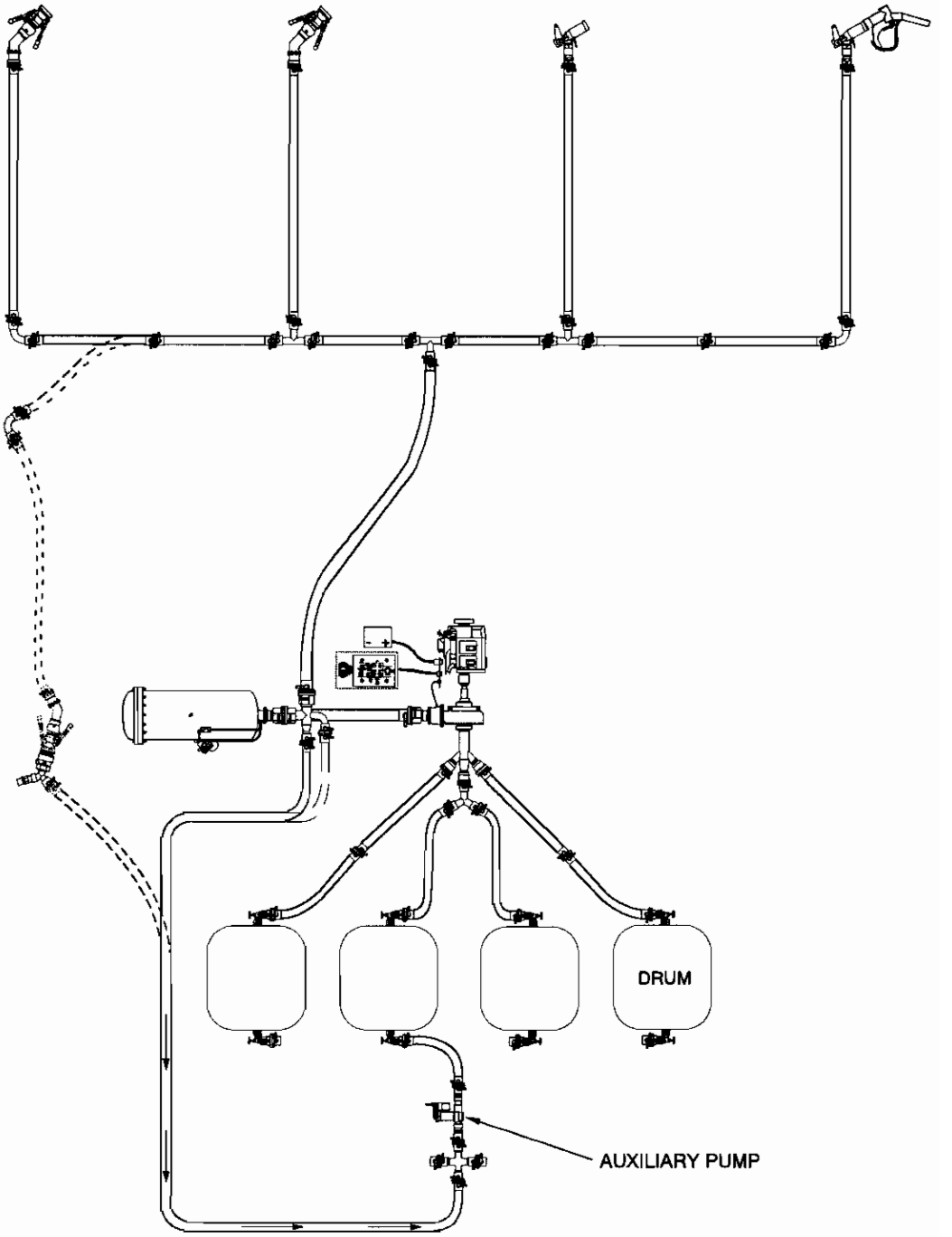


Figure 1-19. Defueling Subsystem

CHAPTER 2

OPERATING INSTRUCTIONS

Page

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

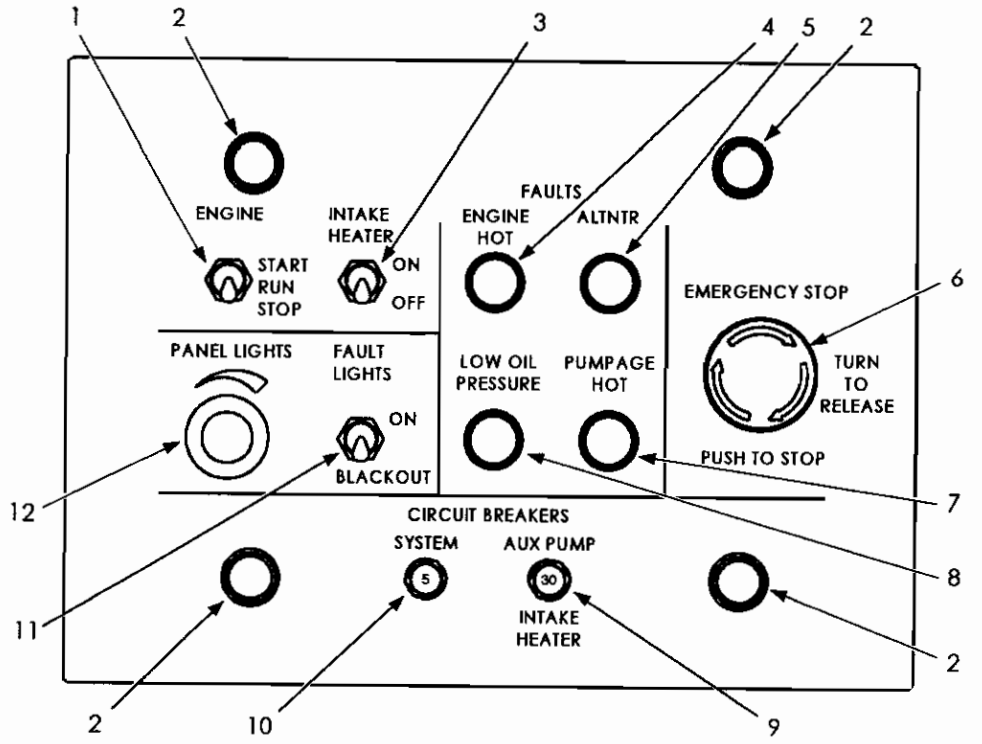


Figure 2-1. Control Panel

Table 2-1. Control Panel Controls and Indicators

No	Name	Function
1	ENGINE START/RUN/STOP toggle switch	Momentary START position operates engine starter; RUN position enables system operating power; STOP position stops engine.
2	Panel Light	Hooded LED's provide illumination for control panel.
3	INTAKE HEATER ON/OFF switch	Enables power to engine intake air heater.
4	ENGINE HOT indicator	Illuminates RED when engine oil temperature exceeds 275°F (135°C).
5	ALTNTR indicator	Illuminates YELLOW when alternator output is less than battery voltage.
6	EMERGENCY STOP operator	Stops engine when depressed; latches in stop position, must be rotated in direction of arrows to release.
7	PUMPAGE HOT indicator	Illuminates RED when pumpage temperature exceeds 175°F (79°C).
8	LOW OIL PRESSURE indicator	Illuminates RED when engine oil pressure decreases below safe limits.
9	AUX PUMP/INTAKE HEATER circuit breaker	30 amp, push-to-reset circuit breaker for auxiliary pump and engine intake heater.
10	SYSTEM circuit breaker	5 amp, push-to-reset circuit breaker for system electrical power.
11	FAULT LIGHTS ON/BLACKOUT switch	Enables/disables control panel fault lights and panel lights.
12	PANEL LIGHTS dimmer	Dims or brightens panel lights when rotated.

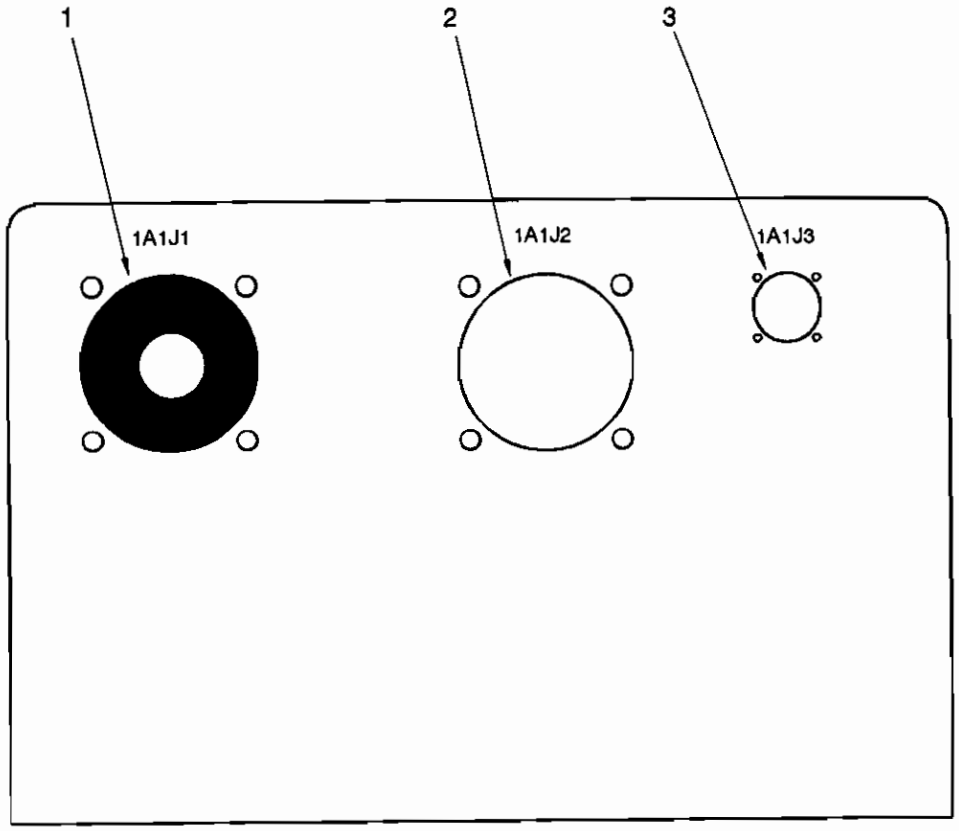


Figure 2-2. Engine Module Electrical Connection Panel

Table 2-2. Electrical Connection Panel Controls and Connectors

No.	Name	Function
1	NATO Connector J1	Battery input connector for cable or other external 28 VDC source.
2	Connector J2	Connector from accessory module.
3	Connector J3	Pumpage over temperature sensor cable connector.

Section II. OPERATOR'S PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2.1 GENERAL.

Preventive Maintenance Checks and Services (PMCS) involves systematic caring, inspection, and servicing of equipment to keep it in good condition and prevent breakdowns. Table 2-3 lists the AAFARS PMCS. Service intervals are divided into categories: Before Operation; During Operation; After Operation; and various other checks and services to be performed at prescribed hourly intervals. Table 2-3 organizes your PMCS tasks in chronological sequence. As the AAFARS operator, you should:

a. Perform your PMCS as scheduled in table 2-3. Always do your PMCS in the same order, so it gets to be a habit. Always assume explosive vapors are present at the AAFARS. Do not allow any smoking or spark producing equipment within fifty feet of the AAFARS while performing your PMCS.

b. Do your BEFORE PMCS prior to the equipment leaving its staging/service area or performing its intended mission. Keep in mind the WARNINGS and CAUTIONS.

c. Do your DURING PMCS during AAFARS operation. Leaks can be spotted only during operation. Keep in mind the WARNINGS and CAUTIONS.

d. Do your AFTER PMCS as soon as possible after the AAFARS has been taken out of its mission mode or returned to its containment area. Keep in mind the WARNINGS and CAUTIONS.

e. If your equipment fails to operate, perform the operator troubleshooting procedures presented in this manual. Report unresolved maintenance problems to unit maintenance personnel.

f. Cleanliness. Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Use dry cleaning solvent SD (P-D-680) or some other suitable cleaning solvent on all metal surfaces.

g. Bolts, Nuts and Screws. Check bolts, nuts and screws for obvious looseness and missing, bent or broken conditions. Look for chipped paint, bare metal or rust around bolt heads. If any part seems loose, tighten it or notify Unit Maintenance.

h. Welds. Look for loose or chipped paint, rust or gaps where parts are welded together. If a bad weld is found, notify Unit Maintenance.

i. Electric Wires and Connections. Look for cracked or broken insulation, bare wires and loose connectors. Tighten loose connectors and make sure bare wires are in a serviceable condition. If a bad wire or connector is found, notify Unit Maintenance.

2.2 LEAKAGE CRITERIA.

Wetness around seals, gaskets, fittings or connections indicates leakage. A stain also indicates leakage. If a fitting or connector is loose, tighten it. If it is broken or defective, report it. Definitions of the classes of leaks are listed below. Become familiar with each class of leak so that you are aware of the status of your equipment. When in doubt, notify your supervisor.

WARNING

AAFARS pumpage fuels and the engine lubricating oil contain additives that may be harmful to personnel and the environment. All leaks must be corrected as soon as possible. Wash fuel or oil from skin immediately. Remove and wash contaminated clothing immediately. Spills of fuel or oil must be cleaned up in accordance with local area direction to prevent harm to personnel or damage to the environment.

Any fuel spill or leakage is cause to stop the operation or maintenance task immediately.

CAUTION

Equipment operation is allowable with minor oil leakages (Class I or Class II). If leakage is present at the engine, check lubricating oil level more often than usual. Do not allow oil level to fall below the ADD OIL mark. When in doubt, notify your supervisor.

a. Class I - Leakage indicated by wetness or discoloration not great enough to form drops.

b. Class II - Leakage great enough to form drops but not enough to cause drops to drip from item being checked or inspected.

c. Class III - Leakage great enough to form drops that fall from item being checked or inspected.

2.3 PMCS PROCEDURES.

Table 2-3 lists the checks and services required to keep your AAFARS in good operating condition. They are listed in chronological order and should be performed in this order so they become a habit. An explanation of each column in provided below.

a. The "Item No." column provides the sequential identification number for each task.

b. The "Interval" column tells you when to do a certain check or service.

c. The "Location - Item to Check/Service" column tells you on which item the procedure is performed.

d. The "Procedure" column tells you how to do the required checks and services. Carefully follow these instructions. If you do not have the required tools, or if the procedure tells you to, notify your supervisor.

e. The "Not Fully Mission Capable If" column tells you the conditions under which your AAFARS is not capable of performing its intended mission.

Table 2-3. Operator's Preventive Maintenance Checks and Services for AAFARS

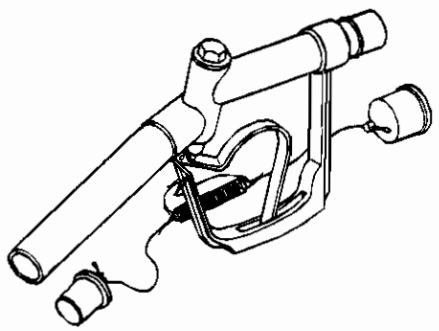
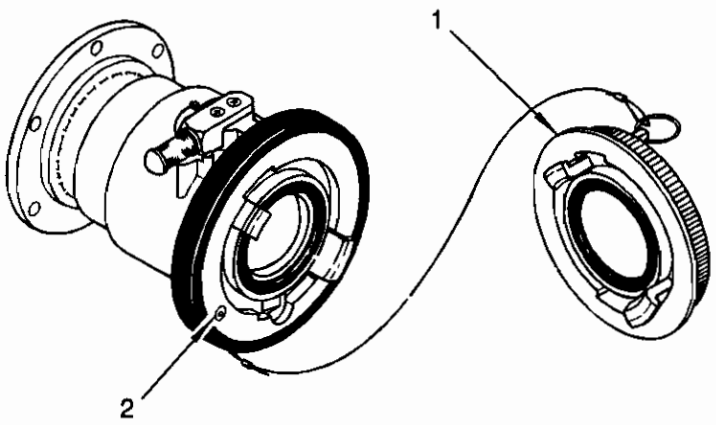
Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
			WARNING Fuel fumes are always present in the vicinity of the AAFARS. Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark. Do not permit any smoking, any open flame, or spark producing equipment within fifty (50) feet of the AAFARS.	
1	Before	Pumping Assembly	Pump engine module and accessory module. Refer to TM 10-4320-351-14.	
2	Before	Liquid Fuel Filter Separator	Refer to TM 10-4930-237-13&P	
3	Before	CCR Nozzle	Refer to TM 10-4930-248-13&P.	
4	Before	GFA	Inspect GFA for missing or damaged components and signs of leakage.	Any signs of leaks
				
5	Before	Auxiliary Pump	Inspect Auxiliary Pump for missing damaged components and signs of leakage.	Any signs of leaks
6	Before	Fire extinguishers	Inspect for fully charged bottles	Fire extinguishers are not fully charged.

Table 2-3. Operator's Preventive Maintenance Checks and Services for AAFARS (continued)

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
7	Before	Fuel Hoses	Inspect for damage, cuts, nicks, abrasions, blistering, or coupling slippage. Coupling slippage usually shows first as a misalignment of the hose and coupling or as a scored or freshly exposed part of the hose where the slippage has occurred. If a coupling is slipping or leaking remove the hose from service. Most hose failures occur within 12 inches of couplings. Check all the way around the hose. Press lightly and feel for soft spots. If a soft spot is found remove the hose from service.	Slippage, hoses are damaged. Soft spots.
8	Before	All unisex couplings	Remove dust cap (1), depress continuity ball (2) on valve seat, release and observe that ball pops back out. If ball does not pop back freely, electrical continuity is lost and static discharge is possible. The coupling must be replaced. Notify unit maintenance. 	Continuity ball does not pop back out.
9	Before	All ground cables	Inspect for cable clamps broken or frayed cable, plug missing or broken.	Cable clamp broken, cable plug damaged. Cable frayed or broken.
10	Before	Electrical cables	Pump engine module and accessory module. Refer to TM 10-4320-351-14.	
11	During	Leaks	Pump engine module and accessory module. Refer to TM 10-4320-351-14.	Class III oil leak and any fuel leak.

Section III. OPERATION UNDER USUAL CONDITIONS

2.4 SYSTEM ASSEMBLY AND PREPARATION FOR USE. (Refer to figure 2-3.)

Figure 2-3 illustrates a typical AAFARS emplacement. Actual emplacement may require a slightly different configuration due to terrain or mission constraints. Select a site that is flat and clear of rocks, stumps and debris.

WARNING

Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark, or to static discharge. Do not permit smoking, any open flame, or spark producing equipment within fifty (50) feet of AAFARS. Ensure all equipments are well grounded prior to commencing any operation or maintenance task. Always ensure the ground connection from the aircraft is complete prior to beginning any fueling operation.

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use four personnel to move or relocate the pump-engine module, liquid fuel filter-separator, and accessory module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

CAUTION

All couplings have caps that must be removed before a connection is made. Ensure the cap remains in place until just before connection to prevent contamination of the fueling system by foreignmaterials. Once the caps are removed, couple adjacent caps to reduce the probability of foreign materials contaminating the aircraft fuel.

a. Position fuel drums (1). Fuel drum (1) may roll. Insert chocks or dirt berms on both sides.

b. Inspect AAFARS for damage that may have occured during transport and ensure system is complete.

c. Unlatch and open all AAFARS bags.

d. Remove engine module from pump-engine module. (Refer to figure 2-4.)

(1) Unclamp exhaust pipe (1) from exhaust manifold (2).

(2) Disconnect pumpage over temperature cable (3) at engine module connection panel (4). Install dust caps on connectors. Wrap free end of cable around fuel transfer pump outlet (5).

(3) Disconnect fuel supply line (6) and return line (7) at engine module. Connect free ends of lines together.

(4) Unlatch (8) engine module (9) from pump-engine frame (10) and slide engine module out of frame.

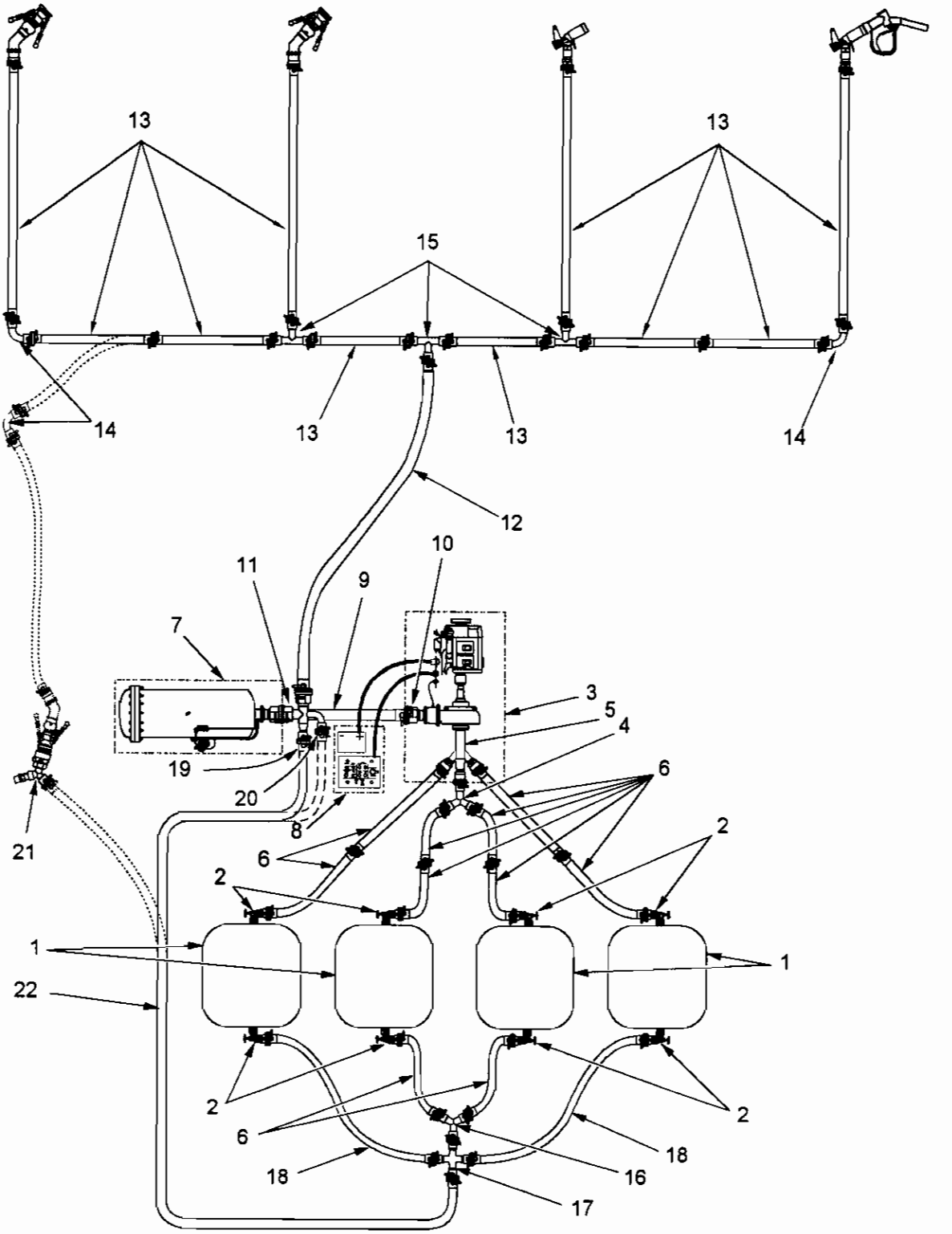


Figure 2-3. AAFARS Emplacement

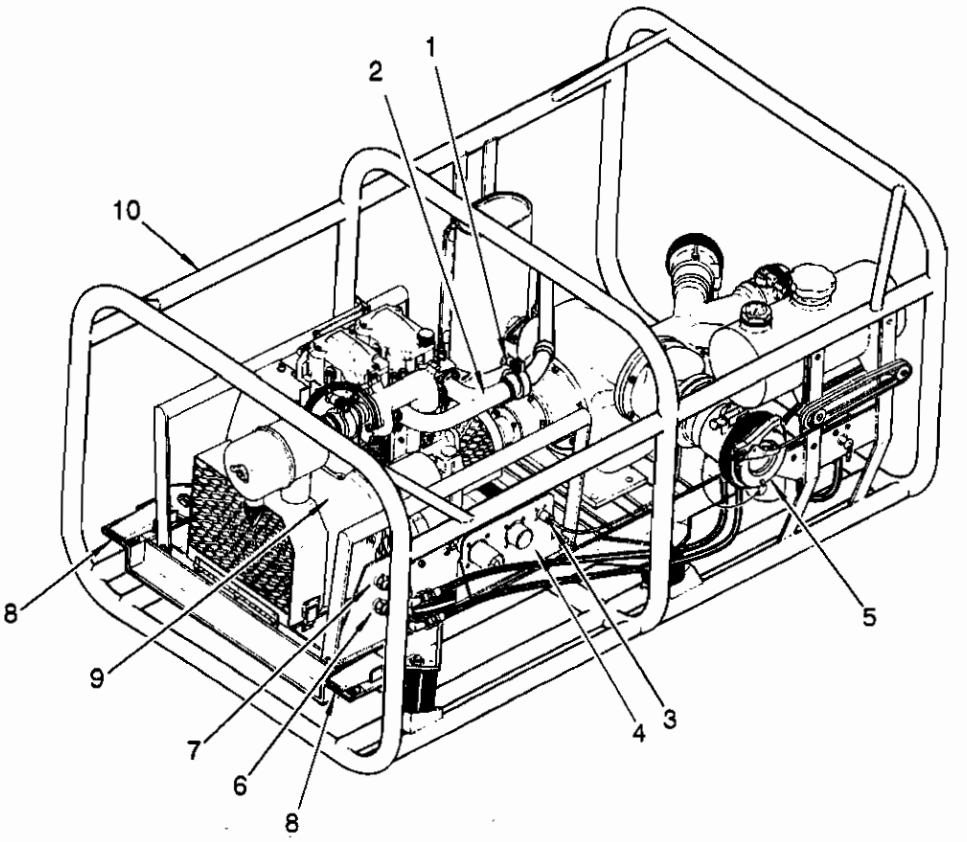


Figure 2-4. Pump-Engine Emplacement

WARNING

- The AAFARS suction and recirculation hoses are connected to the fuel drums via elbow valves with integral camlock couplers. When the elbow valve coupling is closed, the valve stem is extended; when open, it is retracted. The stem travel is opposite that of conventional valves and requires the operator to double check valve position during system set up and tear down, since observation can be misleading. Failure to heed this warning could result in death or serious injury.

- Fuel spillage will occur if elbow valve coupling is opened before connection to a fuel drum. Ensure elbow valve coupling closed before connection to fuel drum. Failure to heed this warning could result in death or serious injury.

NOTE

When connecting system components, open all valves as components are connected except fuel drum outlet elbow valves and filtration module inlet and outlet valves. Opening unisex coupling valves at time of connection will expedite system setup and latch couplings together. Fuel drum outlet elbow valves should remain closed until after engine is started so that engine does not have to start under load. Fuel drum inlet elbow valves may be opened after the unisex-to-camlock adapters are installed. The liquid fuel filter-separator inlet and outlet valves should remain closed until initial system flooding.

e. Inspect the eight fuel drum elbow valve (figure 2-3, 2) couplings to ensure that each elbow valve coupling is closed (valve stem fully extended).

NOTE

Do not open elbow valve couplings.

f. Install the elbow valve (2) couplings on the inlets and outlets of all four fuel drums.

NOTE

Whenever coupling together unisex couplings, depress continuity ball and observe that ball pops back out. Failure to check or failure of ball to pop back out could allow the buildup of static electric charge that could cause an explosion and death.

g. Install one adapter assembly (2" unisex non-valved coupling to 2" male camlock adapter) (figure 2-5) on each elbow valve coupling (figure 2-3, 2).

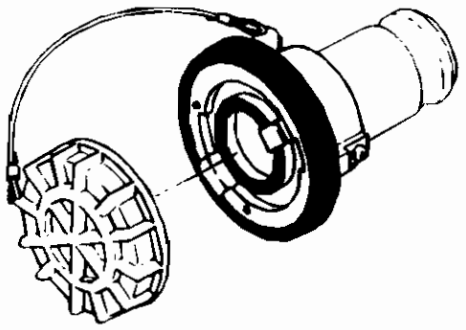


Figure 2-5. 2" Unisex Non-Valved Coupling to 2" Male Camlock Adapter Assembly

h. Position pump-engine module (3) 6-8 feet from fuel drums (1) with the pump inlet manifold facing fuel drum outlets.

i. Install a 2" wye (4) on the fuel transfer pump inlet manifold (5).

NOTE

Figure 2-3 indicates the use of eight suction hoses to connect four fuel drums to the fuel transfer pump inlet manifold. Actual set up may require fewer than eight suction hose lengths.

j. Install 2" x 6' suction hoses (6) as required to connect fuel drums (1) to inlet manifold (5). Reposition pump-engine module (3) as required. Open valved unisex coupling valves on suction hoses, wye, and inlet manifold.

k. Install engine module in pump-engine module. (Refer to figure 2-4.)

(1) Slide engine module (9) into pump-engine frame (10), PTO end first. If flexible coupling spline adapter will not engage it may be necessary to rotate the flex portion slightly to align with the spline flex coupling adapter.

(2) Latch (8) engine module (9) to pump-engine frame (10).

(3) Clamp exhaust pipe (1) to exhaust manifold (2).

(4) Connect pumpage over temperature cable (3) at engine module connection panel connector J3 (4). Couple together adjacent dust caps.

(5) Connect fuel supply line (6) and fuel return line (7) at engine module.

(6) Check that throttle control is at maximum position (fully right).

l. Position liquid fuel filter-separator (figure 2-3, 7) 4-5 feet from pump-engine module (3) with inlet facing fuel transfer pump.

m. Position the accessory module (8) between the pump-engine module (3) and the liquid fuel filter-separator (7) so that operator has a clear view and easy access to all system components.

n. Connect the 3" x 6' discharge hose (9) between fuel transfer pump discharge (10) and liquid fuel filter-separator (7) inlet (lower port). Rotate discharge hose as required to remove any kink or bend. Open shutoff valve and unisex coupling valves on discharge hose.

o. Connect the recirculation manifold (11) to the liquid fuel filter-separator (7) outlet (upper port) and open the manifold unisex coupling valve. Do not open 3" unisex coupling of liquid fuel filter-separator. Rotate manifold so that the 2" unisex couplings are facing the fuel drums and the unoccupied 3" unisex coupling is facing the area selected for the fueling points.

CAUTION

AAFARS fuel hoses are not supplied with scuff jackets. Therefore, hose handling directly affects the useful life of the hose. Do not drag hoses over an improved or abrasive surface. To the extent possible, hoses should be rolled and unrolled during setup or evacuation to prevent abrasion.

NOTE

The 3" x 50' discharge hose has a 3" coupling on one end and a 2" coupling on the other. This is the only hose in the system that can only be laid out one way.

p. On the 3" x 50' discharge hose (12), identify the 3" unisex coupling and connect the discharge hose to the 3" valved unisex coupling of the recirculation manifold. Open unisex coupling valves on recirculation manifold and discharge hose.

CAUTION

Figure 2-3 indicates the use of ten 2" x 50' fuel discharge hoses to supply four fueling points. This is the maximum number available but actual set up may require fewer. One hundred feet (100 ft [30.48 m]) of separation is required between fueling points.

q. Using 2" x 50' discharge hoses (13), elbows (14) and tees (15) as required, lay out discharge hoses to the selected fueling points. Open all unisex coupling valves as connections are made.

r. Establish recirculation path.

(1) At the fuel drums (1), connect two 2" x 6' suction hoses (6) to non-valved couplings (2) mounted on the

inlet of the 2 inner fuel drums.

(2) Connect the 2" x 6' suction hoses (6) to a wye fitting (16). Open 2" unisex coupling valves on wye fitting and suction hoses.

(3) Connect a unisex cross fitting (17) to the free leg of the wye fitting (16). Open 2" unisex coupling valve at wye-cross connection.

(4) Connect a 2" x 12' discharge hose (18) to the cross fitting (17) and the non-valved unisex coupling (2) mounted on the inlets of the two outer fuel drums. Open unisex coupling valves at cross discharge hose connections.

NOTE

Three recirculation paths are available for use as indicated on figure 1-17. RECIRC 1 (figure 2-3, 19) limits flow to 5 gpm from the recirculation manifold (RECIRC 1 is normal recirculation path during fueling operations); RECIRC 2 (20) allows full flow; and RECIRC 3 employs the nozzle recirculation wye (21) to recirculate fuel from a CCR or D-1 nozzle. The supervisor must select a method based on mission requirements.

s. Connect a 2" x 50' discharge hose (22) between the cross fitting (17) and RECIRC 1 coupler (19) on the recirculation manifold. Open 2" unisex coupling valves at each connection.

t. Open fuel drum inlet elbow valve couplings (2) and 2" unisex valve coupling and discharge hose.

u. Drive a grounding rod between the pump-engine module (3), accessory module (8) and the liquid fuel filter-separator (7) for grounding AAFARS.

v. Connect the pump-engine module (3), accessory module (8) and liquid fuel filter-separator (7) grounding cables to the grounding rod.

w. Position a fire extinguisher at each fueling point and pump-engine module (3).

x. Position one nozzle kit and one grounding rod at each fueling point.

y. Drive one grounding rod at each fueling point, approximately 10 ft (3 m) back from discharge hose end.

CAUTION

Never operate the flow actuating handle of the CCR nozzle unless nozzle diaphragm is wetted by fuel. Actuation of this handle when the diaphragm is dry may result in irreparable damage to the diaphragm, rendering the nozzle unusable.

z. At each fueling point, select the nozzle for use, connect to the discharge hose end and connect the nozzle grounding clamp to the ground rod.

aa. Remove the engine air filter from the storage cabinet in the accessory module. Remove dust cap from intake manifold and install engine air filter with center clamp facing up.

ab. Verify position of toggle switches on control panel (figure 2-1) as follows:

(1) Open control box cover.

(2) START-RUN-STOP switch in STOP position.

(3) INTAKE HEATER switch in OFF position.

(4) FAULT LIGHTS switch in ON position.

(5) EMERGENCY STOP switch released.

(6) Close control box cover.

ac. Remove multi-conductor control cable W201 from the storage cabinet in the accessory module, route through cutout on upper lip of stowage cabinet and connect to 1A1J2 on engine module. Connect adjacent dust caps together.

ad. Remove battery power cable W202, NATO connector end, from storage cabinet in the accessory module, route through cut out on upper lip of cabinet and connect to 1A1J1 on engine module. Connect adjacent dust cap together.

ae. Position ENGINE SWITCH to RUN position and observe PUMPAGE HOT flashes once, ALTNTR and LOW OIL PRESSURE illuminate and remain lit, and ENGINE HOT indicator does not illuminate. If the listed conditions do not occur, determine cause before operating AAFARS.

af. Place FAULT LIGHTS switch in BLACKOUT position.

ag. Restore ENGINE Switch to STOP position.

ah. Fill engine fuel tank or connect external fuel source.

ai. Install optional acoustic cover on pump-engine module, if provided with system, by placing acoustic cover over engine end of pump-engine module and fastening to module frame with attached straps.

2.5 OPERATING PROCEDURES.

WARNING

Death or personal injury may result from the explosion of fuel fumes exposed to an open flame, spark, or to static discharge. Do not permit smoking, any open flame, or spark producing equipment within fifty (50) feet (15.24 m) of AAFARS. Ensure all equipments are well grounded prior to commencing any operation or maintenance task. Always ensure the ground connection from the aircraft is complete prior to beginning any fueling operation.

CAUTION

System components are subject to damage from thermal expansion. As the temperature increases, the pumpage in any component will expand. If trapped in a component, the expanding pumpage may rupture seals and cause a leak or equipment malfunction. For this reason, all system valves should remain open as long as the system is flooded. With all valves open, the hoses will absorb the expansion and protect system seals. If any component must be isolated, it should be drained or defueled immediately to prevent damage.

NOTE

During operation, monitor the filter-separator differential pressure gauge. If a pressure differential of more than fifteen psi is observed, the fuel flow is being restricted and the coalescer elements should be replaced.

a. Conduct a visual inspection of the AAFARS setup to ensure the system is properly assembled and ready to pump fuel. Verify system grounding.

b. Verify/Position fuel selector valve in ON or EXTERNAL ON position, according to desired fuel source.

c. Verify that black start control is fully lowered.

d. At the fuel drums, open the fuel drum outlet elbow valve couplings allowing pumpage to flow.

NOTE

Step e describes an electric start of AAFARS. If a manual start is to be attempted proceed to step f.

e. Perform normal electric engine start.

(1) Unlatch and open control box cover.

(2) At the control panel, hold the ENGINE switch in the START position until the engine starts. If engine fails to start within 15 seconds, release switch and allow starter to cool for a minute before continuing. When the ambient temperature is below 20° F (-7° C), position and hold INTAKE HEATER switch in the ON position while ENGINE switch is in START position.

(3) Adjust the control panel lights to the desired brightness.

(4) Disconnect battery power cable from NATO connector 1A1J1 on engine module. Install dust caps on NATO connector and free end of battery power cable. Stow battery power cable in accessory module. Proceed to step g.

f. Perform manual engine start.

(1) Remove acoustic cover, if installed, by unbuckling straps and lifting from pump-engine module.

(2) Disconnect battery cable from engine module.

(3) Unlatch and lower pulley guard.

(4) Turn upper black start knob to the left until knob touched compression release lever.

(5) Align flywheel to timing mark.

(6) Position decompression lever toward pulley end of engine.

(7) Wind rope on start pulley.

WARNING

Serious personal injury could result from contact with rotating parts such as the engine pulley. Keep body well clear of pulley while rotating. Do not allow loose clothing near engine where it may be caught on rotating parts. Handle pulley guard by sides when raising and keep fingers clear of pulley. Stay clear of whipping rope. Stay clear of whipping rope. Wear goggles to protect eyes during rope start.

(8) Pull rope to start engine.

(9) Raise and latch pulley guard.

CAUTION

Equipment damage may occur if the fuel transfer pump is allowed to run dry. When the fuel tansfer pump primes and moves pumpage, the outlet hose will expand. If the hose remains flat, the fuel transfer pump has not primed and is running dry.

g. Verify that pump outlet hose pressurizes (hose expands). If hose has not pressurized after two minutes of operation, shut down system and determine why pump has not primed.

WARNING

Serious eye and skin injury could occur from venting of fuel when filter vessel manual vent valve is open. Wear suitable protective clothing and eye protection.

h. At the liquid fuel filter-separator, depress and latch open the manual vent valve.

CAUTION

The fuel transfer pump may be damaged if allowed to run dry. Any air in the system which reaches the fuel transfer pump will cause the pump to lose suction and run dry. The fuel transfer pump will pump air and regain suction if the air in the pump can be removed within a few minutes. However, a large volume of air will cause the pump to run dry too long and seize. The large volume of air initially in the filter vessel must be vented completely by filling the liquid fuel filter-separator as slowly as possible while venting to allow all the air to escape.

i. Crack open the liquid fuel filter-separator inlet valve. Allow fuel to slowly fill filter vessel, forcing air out the manual vent valve.

j. Close the manual vent valve at first appearance of fuel.

k. Open the liquid fuel filter-separator inlet and outlet valves fully.

l. Periodically monitor condition of the fuel transfer pump discharge hose. A flattened hose indicates a loss of prime. If hose remains flat for two minutes or more, shut down the system and determine why pump has lost prime. The most likely cause is a large air bubble in a fuel drum(s).

m. Periodically monitor differential pressure gauge on liquid fuel filter-separator. Normal reading with clean elements is 2-3 psid (1.41-2.11 gm/mm^2 differential) when operating at full flow. Lower flow rates will cause element clogging at lower differential pressures.

CAUTION

System components are subject to damage from thermal expansion. As the temperature increases, the pumpage in any component will expand. If trapped in a component, the expanding pumpage may rupture seals and cause a leak or equipment malfunction. For this reason, all system valves should remain open as long as the system is flooded. With all valves open, the hoses will absorb the expansion and protect system seals. If any component must be isolated, it should be drained or defueled immediately to prevent damage.

n. To change from use of a CCR nozzle to a D-1 nozzle during refueling operations:

(1) Close the discharge hose unisex coupling valve at the CCR inlet.

(2) Install the Gravity Fill Adapter (GFA) on the CCR nozzle.

(3) Open the CCR flow control handle, pause, then close handle. (This will relieve pressure in the CCR nozzle allowing some fuel into the GFA. Drain the GFA IAW local SOP.)

(4) Disconnect the GFA and CCR nozzle.

(5) Connect the D-1 nozzle to the discharge hose unisex coupling, open the unisex coupling valve and resume fueling operations.

o. To change from use of a D-1 nozzle to a CCR nozzle during refueling operations:

(1) Close the discharge hose unisex coupling valve at the D-1 inlet.

(2) Close open/close actuator.

(3) Disconnect D-1 nozzle and install dust caps.

(4) Connect the CCR nozzle to the discharge hose unisex coupling valve and resume fueling operation.

(5) Drain the D-1 nozzle IAW local SOP.

2.5.1 NORMAL SYSTEM SHUTDOWN.

a. After electrical start at accessory module, position engine switch to STOP position.

b. After manual start, position and hold engine fuel shut-off lever in off position until engine stops.

2.5.2 EMERGENCY SYSTEM SHUTDOWN.

a. At accessory module, press EMERGENCY STOP switch.

b. If emergency stop switch malfunctions, position and hold fuel shut off lever in off position until engine stops.

2.6 DECALS AND INSTRUCTION PLATES.

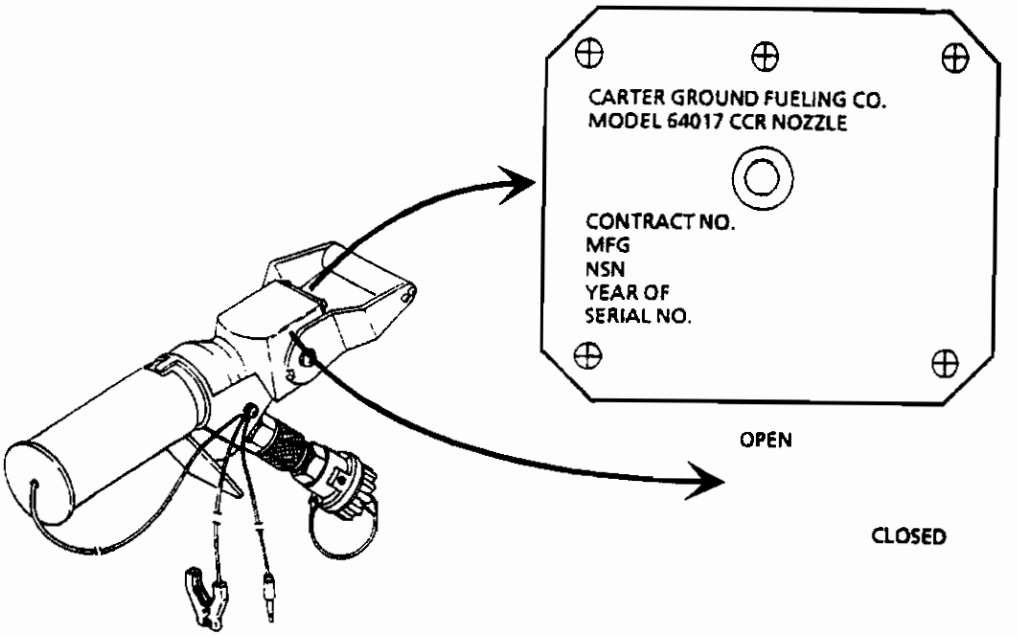


Figure 2-6. Decals and Instruction Plates - CCR Nozzle

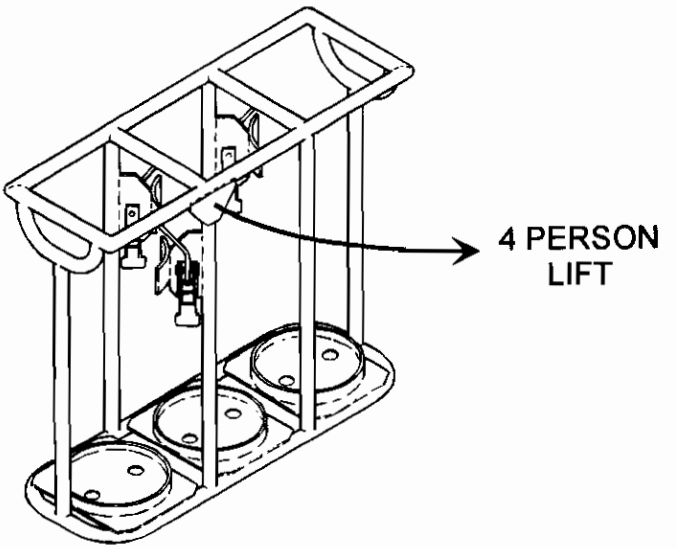


Figure 2-7. Decals - Fire Extinguisher Frame

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

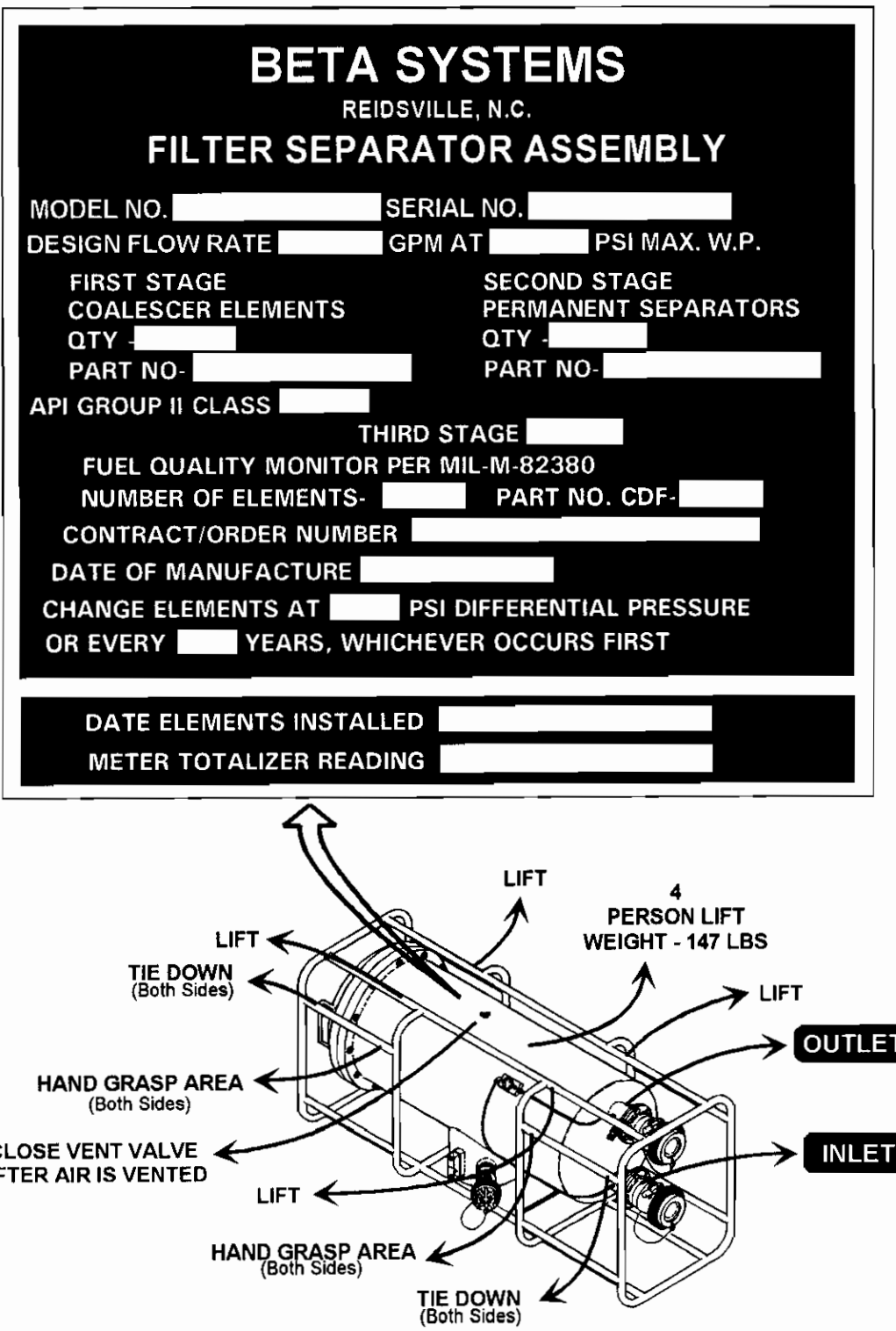


Figure 2-8. Decals and Instruction Plates - Liquid Fuel Filter-Separator

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

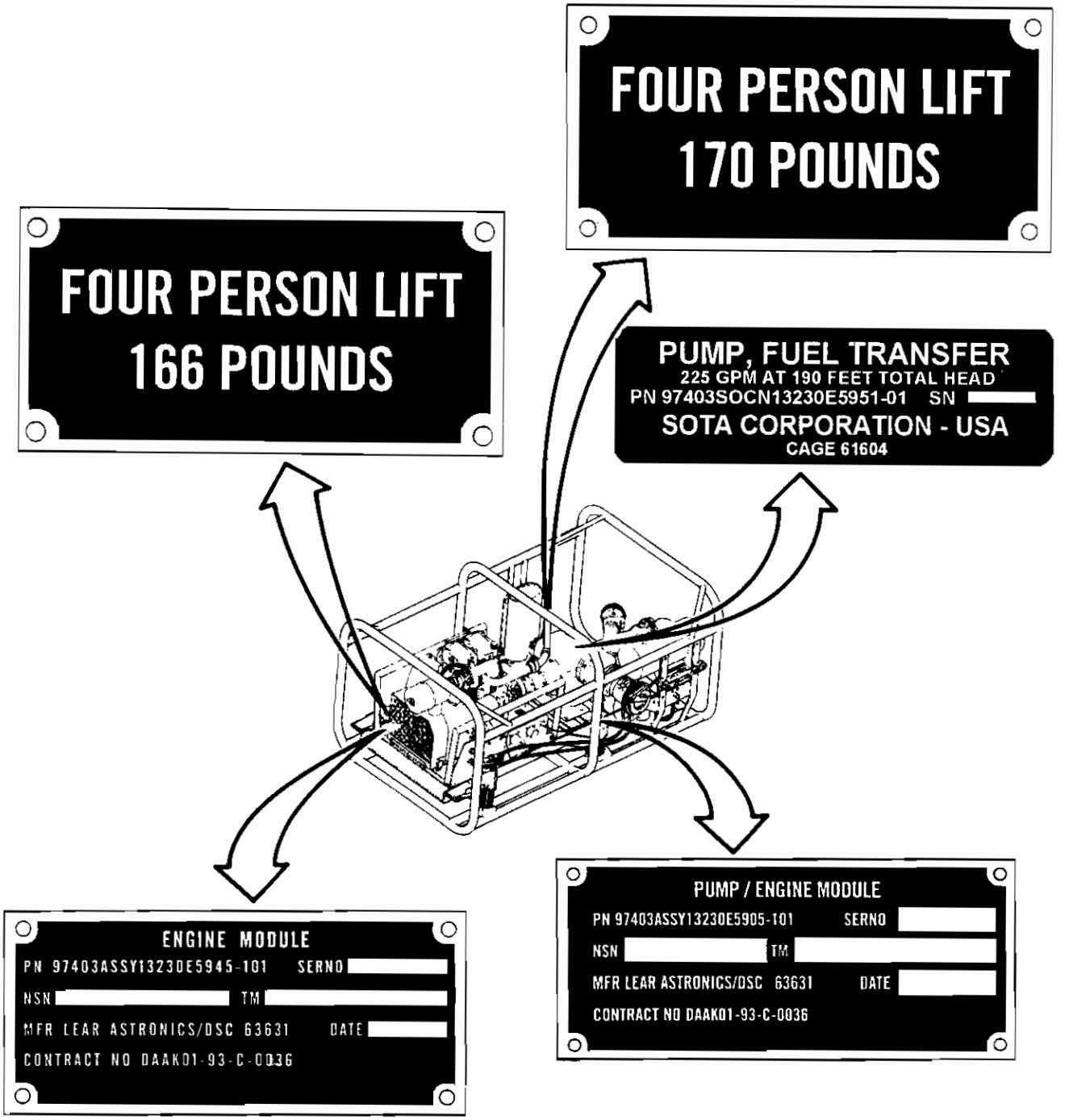


Figure 2-9. Instruction Plates - Pump-Engine Module

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

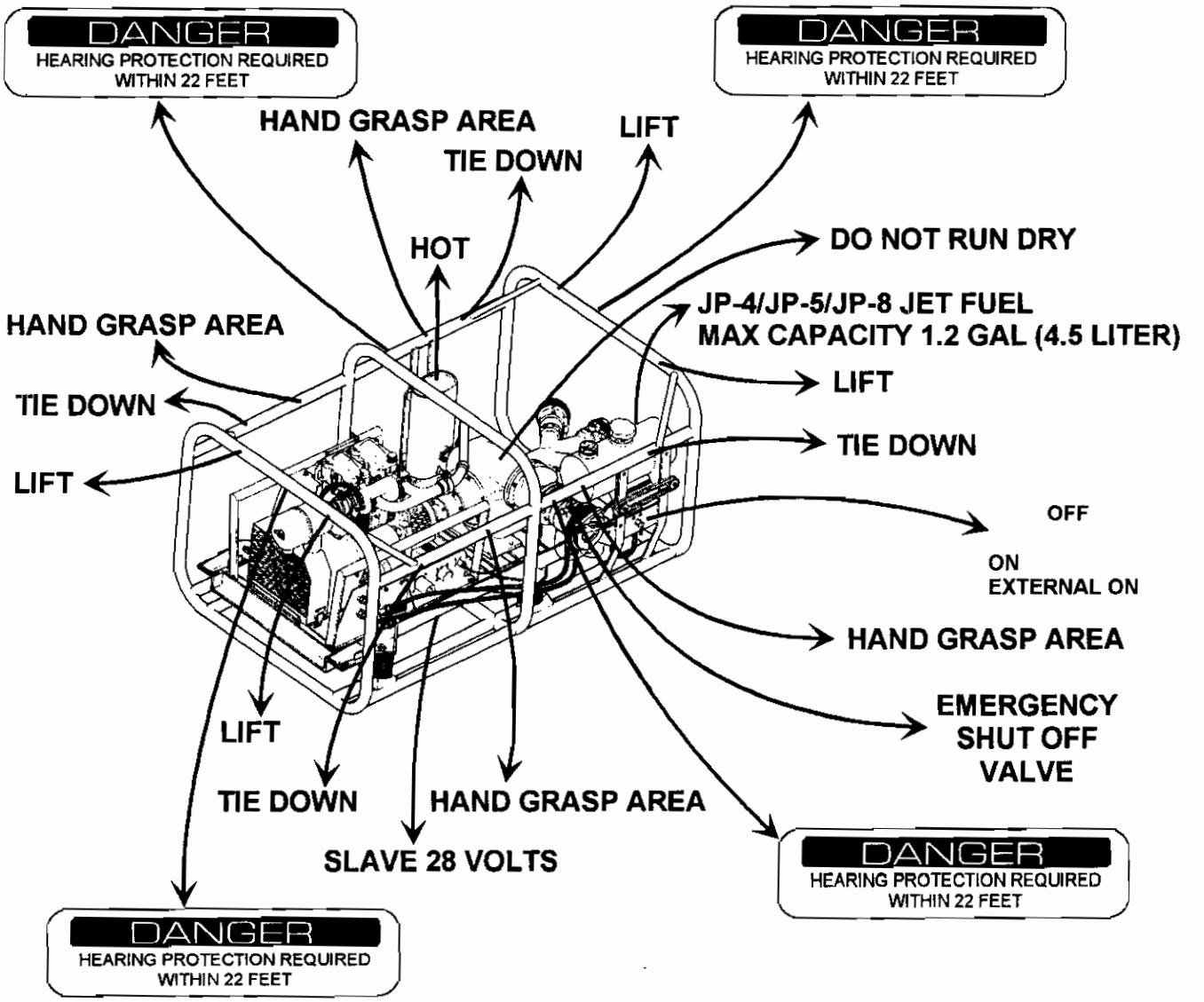


Figure 2-10. Decals - Pump-Engine Module

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

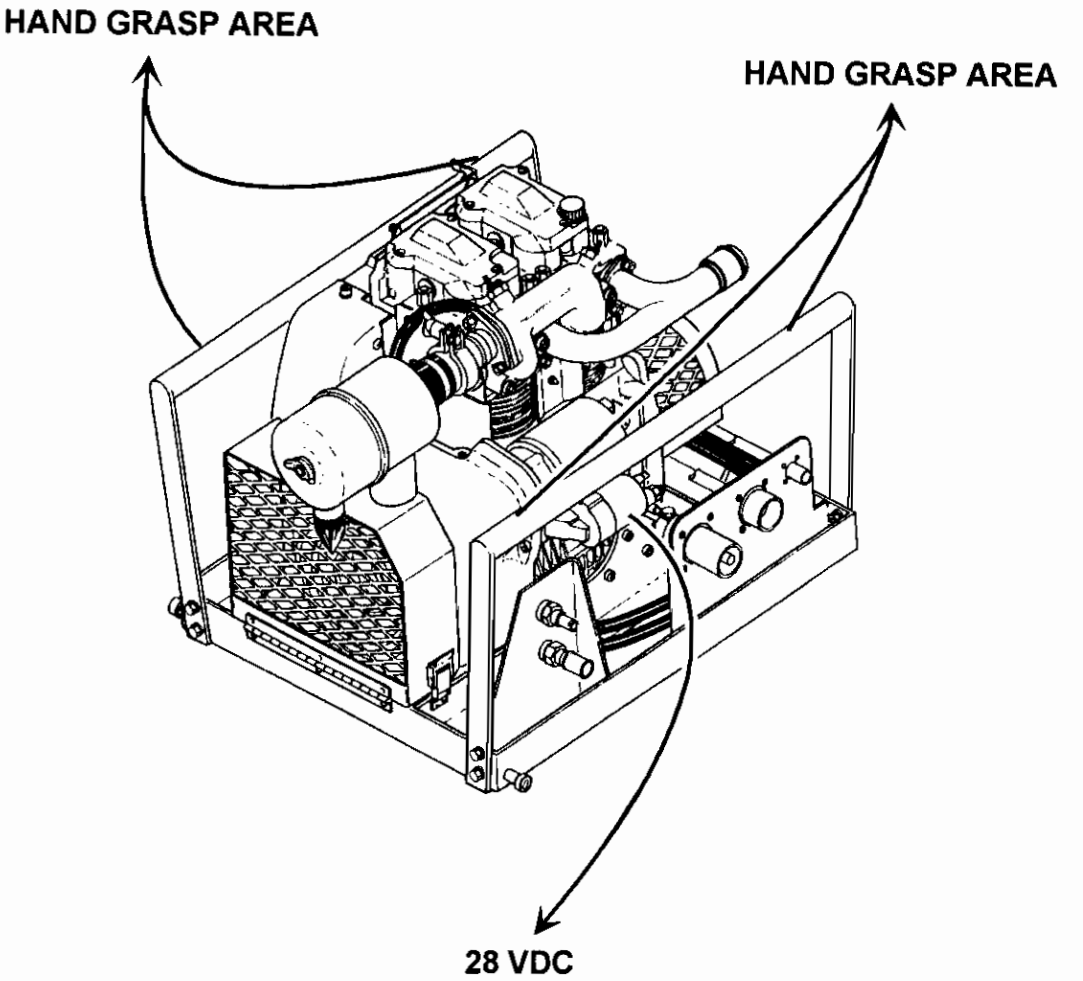


Figure 2-11. Decals - Engine Module

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

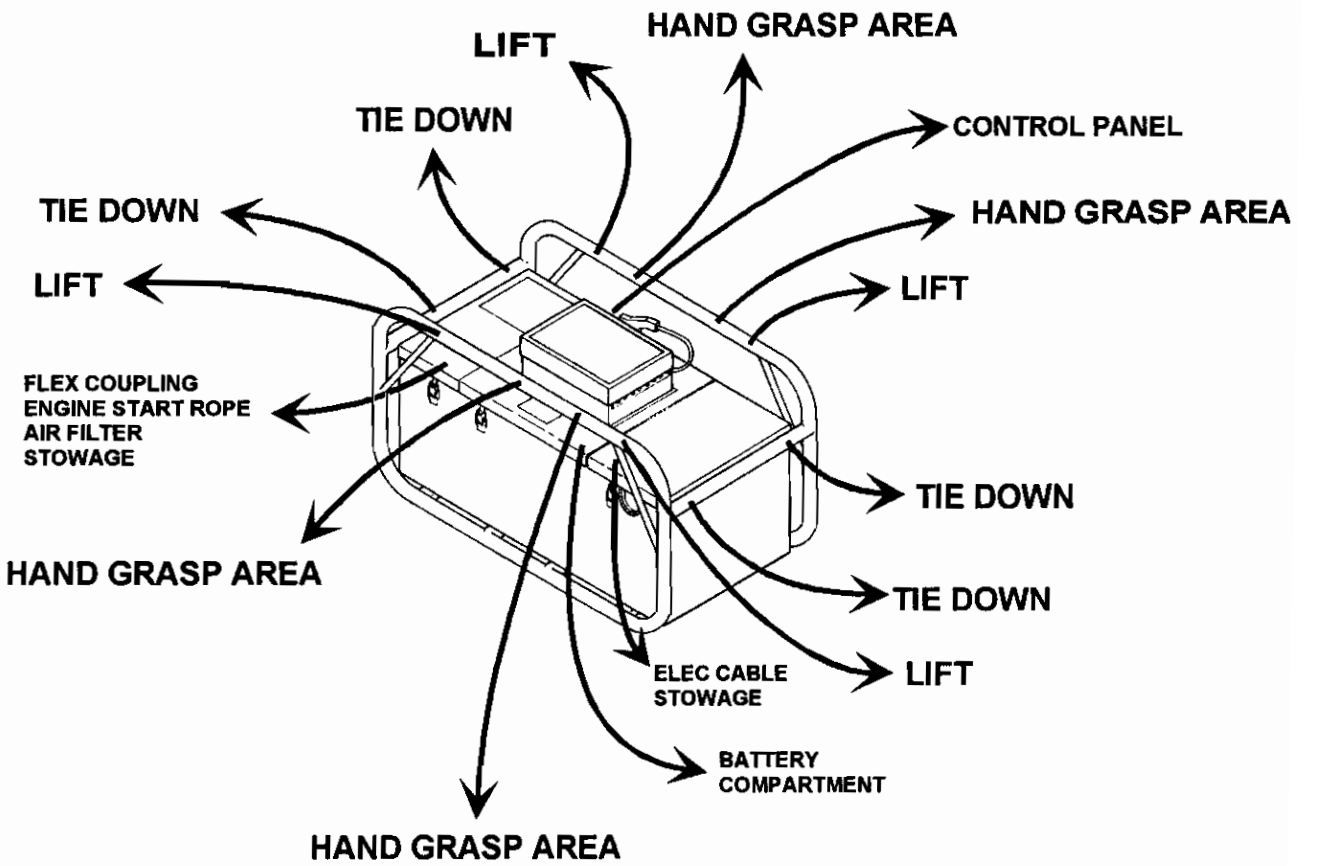
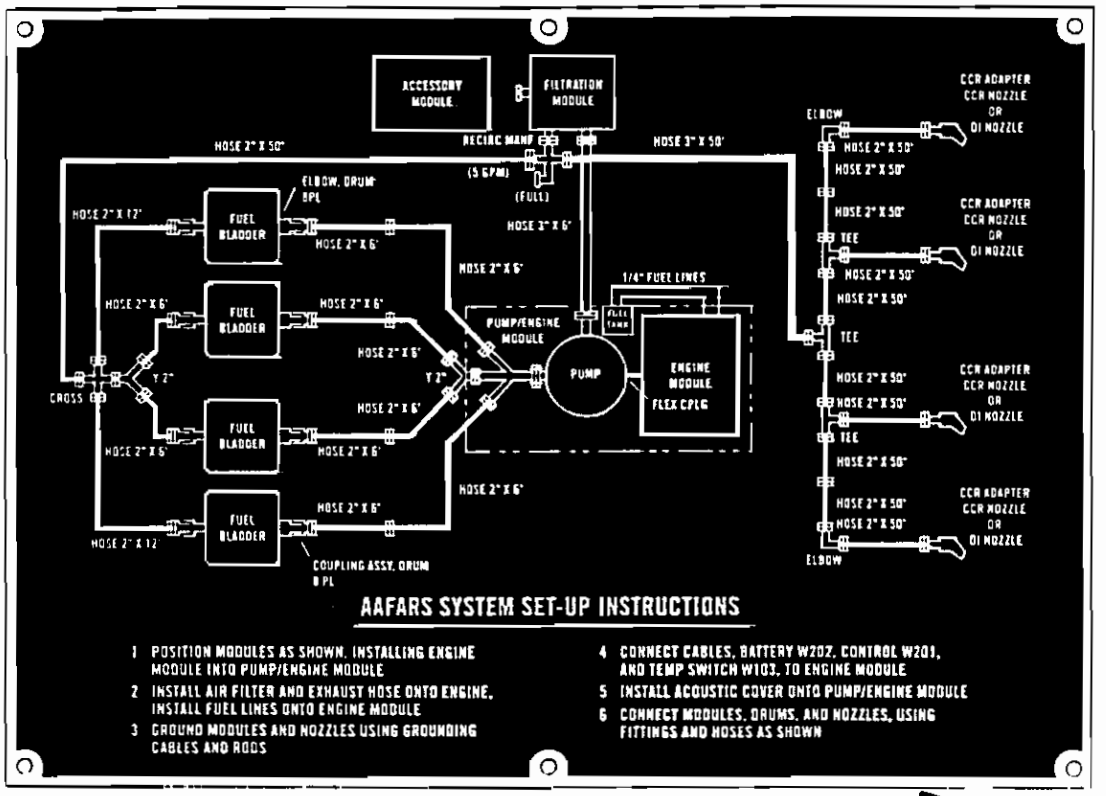
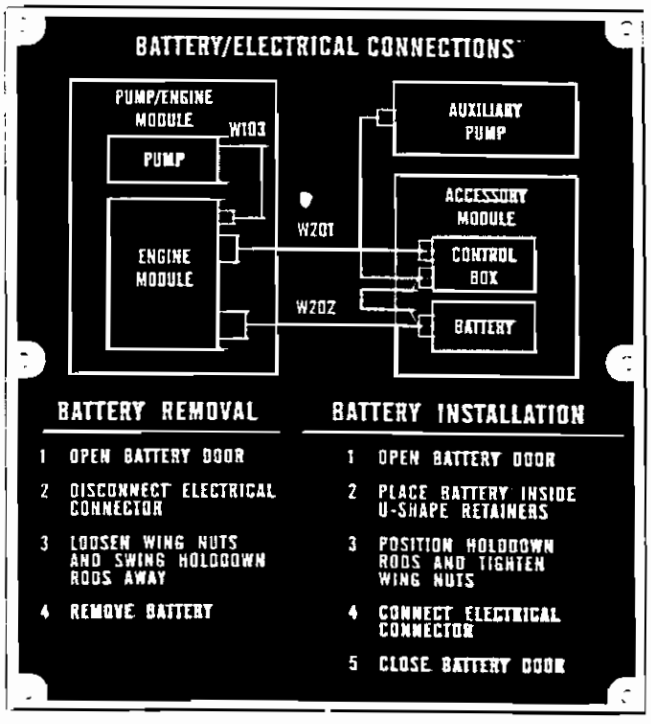


Figure 2-12. Decals - Accessory Module

2.6 DECALS AND INSTRUCTION PLATES. (Continued)





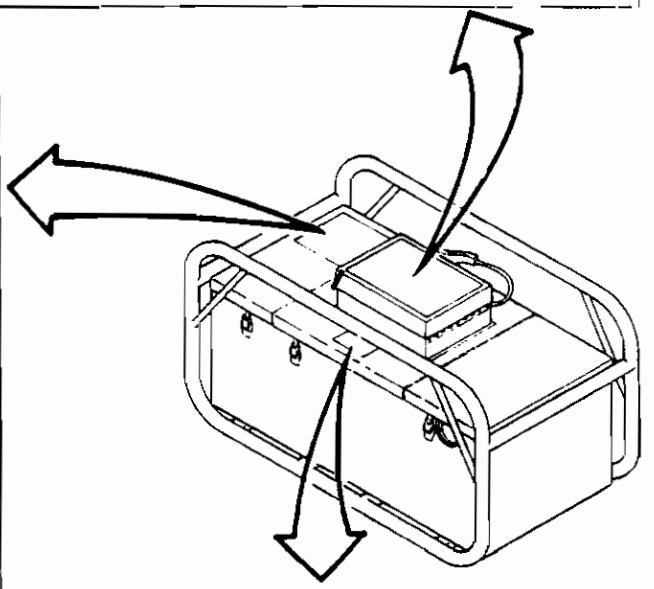


Figure 2-13. Instruction Plates - Accessory Module (Sheet 1 of 3)

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

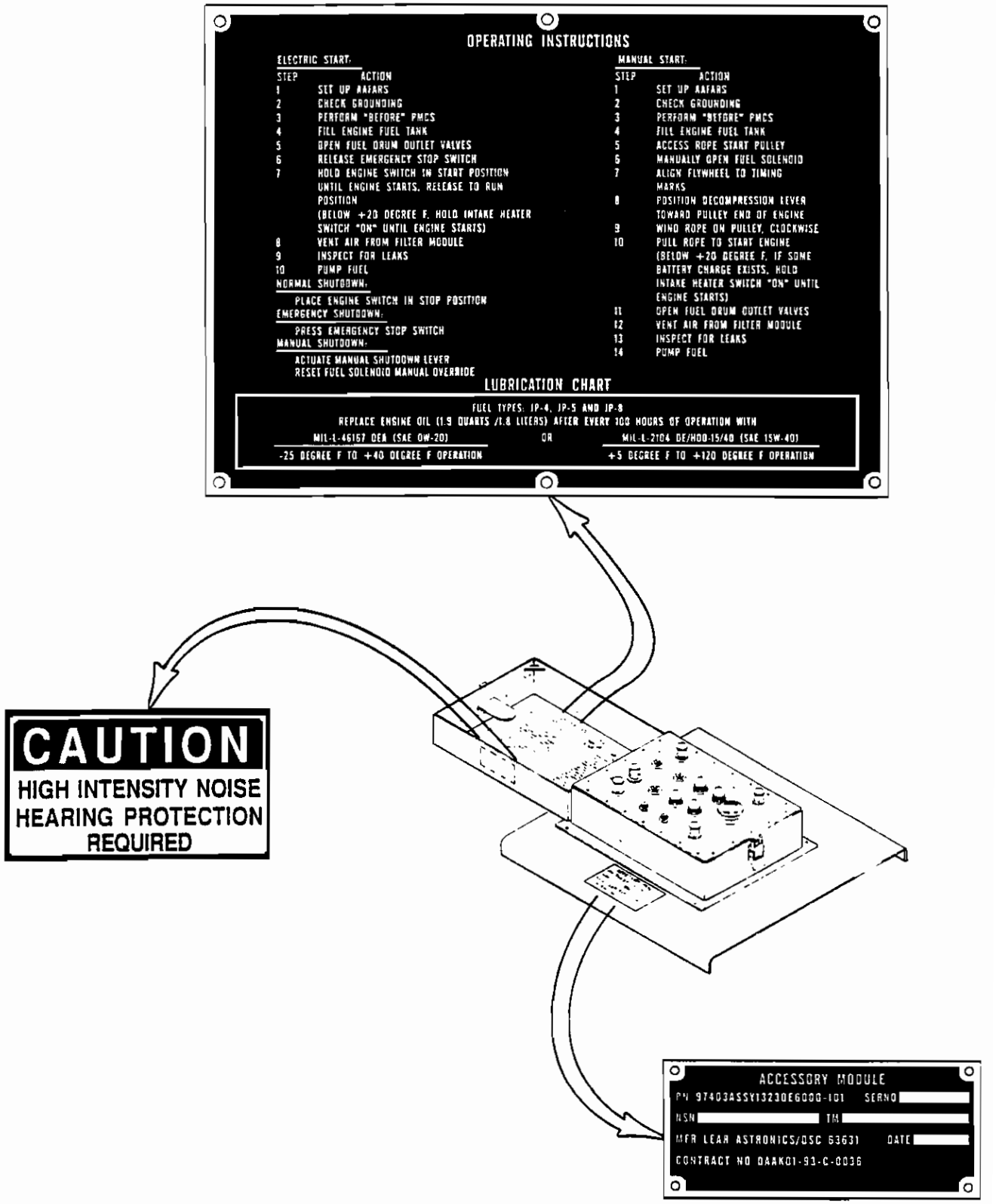


Figure 2-13. Instruction Plates - Accessory Module (Sheet 2 of 3)

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

DEFUELING PROCEDURE

WITH THE FUEL TRANSFER PUMP RUNNING:

CLOSE ALL FUEL DRUM OUTLET ELBOW VALVE COUPLINGS AND UNISEX COUPLINGS AT FUEL DRUM END OF SUCTION HOSES.

BEGINNING AT FUEL DRUMS, DISCONNECT SUCTION HOSES ONE AT A TIME. OPEN UNISEX COUPLING, HOLD HOSE END HIGHER THAN INTAKE MANIFOLD AND CLOSE UNISEX COUPLING AT FAR END(INTAKE MANIFOLD) OF SUCTION LEG. CLOSE UNISEX COUPLING AT FREE END OF LEG AND INSTALL DUST CAP.

REPEAT STEP FOR EACH OF THE THREE REMAINING SUCTION LEGS.

CLOSE 3 INCH EMERGENCY SHUT OFF VALVE AS SOON AS FUEL TRANSFER PUMP UNLOADS.

AT THE ACCESSORY MODULE CONTROL PANEL, POSITION ENGINE SWITCH TO STOP POSITION.

NOTE

IF NOZZLE RECIRCULATION WYE WAS IN USE, DISCONNECT AND DRAIN WYE. CONNECT 2 INCH DISCHARGE HOSE TO RECIRCULATION MANIFOLD FULL FLOW LEG.

CLOSE NOZZLE UNISEX COUPLING VALVES, AND DISCONNECT AND DRAIN NOZZLES.

DEFUEL LIQUID FUEL FILTER-SEPARATOR.

CLOSE UNISEX COUPLING ON LIQUID FUEL FILTER-SEPARATOR OUTLET VALVE.

DISCONNECT 2 INCH DISCHARGE HOSE FROM RECIRCULATION MANIFOLD.

DISCONNECT ONE OF THE SUCTION HOSES FROM FUEL TRANSFER PUMP INLET AND CONNECT TO THE LIQUID FUEL FILTER-SEPARATOR DEFUELING UNISEX COUPLING AND THE UNISEX COUPLING ON THE INLET SIDE OF THE AUXILIARY PUMP. OPEN UNISEX COUPLING VALVES.

CONNECT 2 INCH DISCHARGE HOSE TO AUXILIARY PUMP OUTLET SIDE AND OPEN UNISEX COUPLING VALVES.

CONNECT AUXILIARY POWER CABLE TO AUXILIARY PUMP.

OPEN LIQUID FUEL FILTER-SEPARATOR MANUAL VENT VALVE.

TURN ON AUXILIARY PUMP TO PUMP DOWN LIQUID FUEL FILTER-SEPARATOR AND 3 IN. X 6 FT. DISCHARGE HOSE FROM FUEL TRANSFER PUMP.

CLOSE LIQUID FUEL FILTER SEPARATOR INLET VALVE AND MANUAL VENT VALVE WHEN AIR IS SEEN IN THE SIGHT GAUGE.

TURN OFF AUXILIARY PUMP, AND CLOSE AUXILIARY PUMP UNISEX INLET AND OUTLET VALVES.

DISCONNECT DISCHARGE HOSE FROM AUXILIARY PUMP AND CONNECT TO RECIRCULATION MANIFOLD FULL FLOW UNISEX COUPLING.

DISCONNECT SUCTION HOSE FROM AUXILIARY PUMP AND LIQUID FUEL FILTER-SEPARATOR.

DEFUEL SYSTEM FUEL HOSES.

AT SELECTED FUEL DRUM, CLOSE INLET ELBOW VALVE AND UNISEX COUPLING VALVE ON DISCHARGE HOSE. DISCONNECT DISCHARGE HOSE FROM THE INLET ELBOW VALVE. CONNECT THE DISCHARGE HOSE TO THE INLET OF THE AUXILIARY PUMP, AND OPEN UNISEX COUPLING VALVES ON INLET OF AUXILIARY PUMP AND DISCHARGE HOSE.

CONNECT AUXILIARY PUMP OUTLET UNISEX COUPLING TO DRUM INLET ELBOW VALVE UNISEX COUPLING, AND OPEN UNISEX COUPLING VALVE AND INLET ELBOW VALVE.

CLOSE THE FUEL DRUM INLET ELBOW VALVE COUPLINGS ON THE REMAINING DRUMS.

TURN ON AUXILIARY PUMP.

ONE AT A TIME, OPEN UNISEX VALVES ON DISCHARGE HOSES AT FUELING POINTS. CLOSE UNISEX VALVE AS HOSE COLLAPSES.

ONE AT A TIME, DISCONNECT THE INLET ELBOW VALVE CAMLOCK COUPLER FROM THE OTHER THREE FUEL DRUM HOSES, ALLOW THE HOSE TO PUMP DOWN AND CLOSE UNISEX VALVE.

WHEN HOSES ARE COLLAPSED/DEFUELED, CLOSE INLET ELBOW VALVE ON LAST FUEL DRUM.

TURN OFF AUXILIARY PUMP.

DISCONNECT DISCHARGE HOSE FROM AUXILIARY PUMP.

DISCONNECT INLET ELBOW VALVE FROM FUEL DRUM.

HOLD AUXILIARY PUMP OVER CONTAINER AND DISCONNECT AUXILIARY PUMP FROM INLET ELBOW VALVE.

HOLD AUXILIARY PUMP OVER CONTAINER. OPEN UNISEX COUPLING VALVES AND DRAIN FUEL. CLOSE UNISEX COUPLING VALVES.

DISCONNECT AUXILIARY PUMP POWER CABLE FROM AUXILIARY PUMP MODULE.

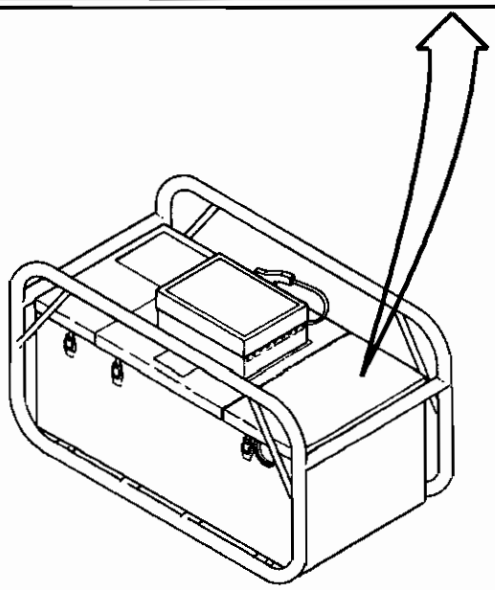


Figure 2-13. Instruction Plates - Accessory Module (Sheet 3 of 3)

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

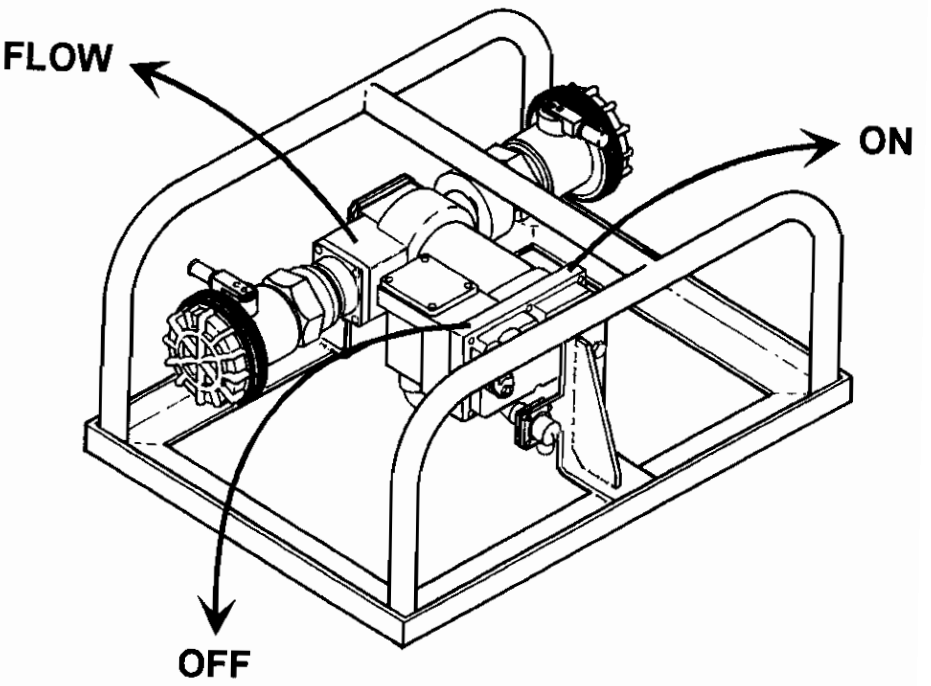


Figure 2-14. Decals - Auxiliary Pump

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

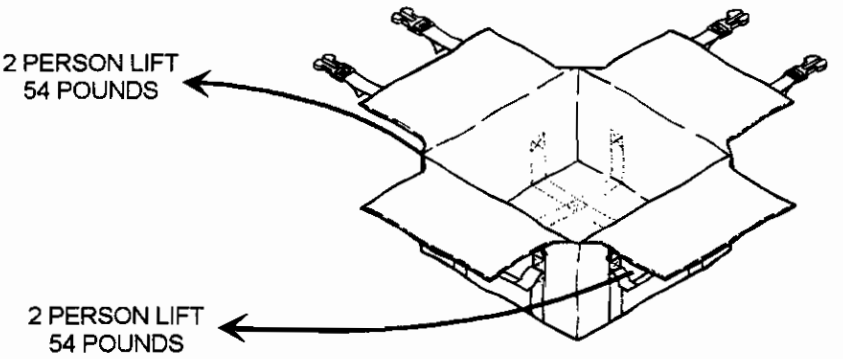


Figure 2-15. Decals - Discharge Fitting Kit, P/N 13230E6050-101

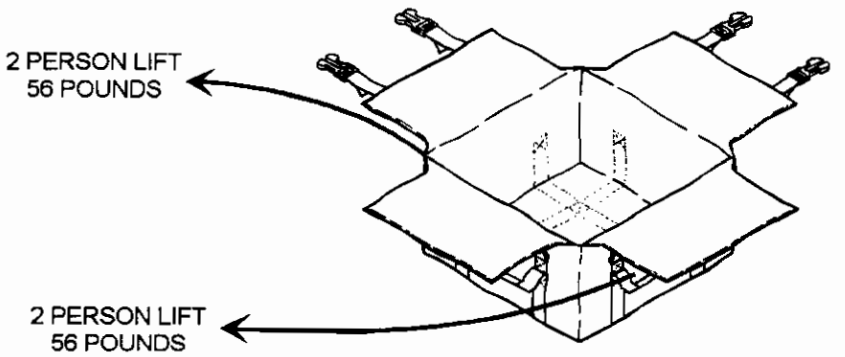


Figure 2-16. Decals - Drum Adapter Kit, P/N 13230E5970-101

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

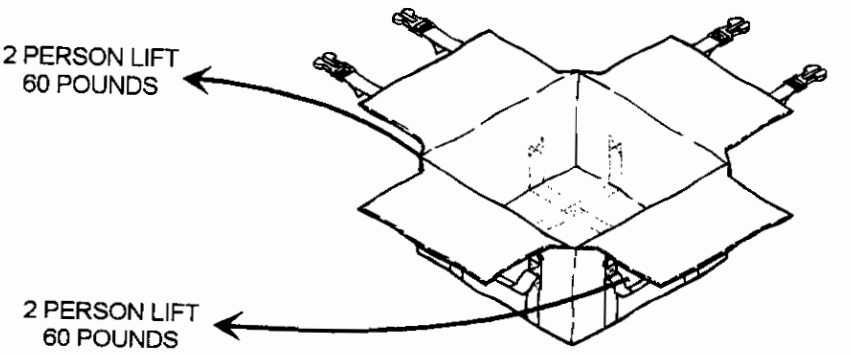


Figure 2-17. Decals - Discharge Hose Kit, P/N 13230E5939-101

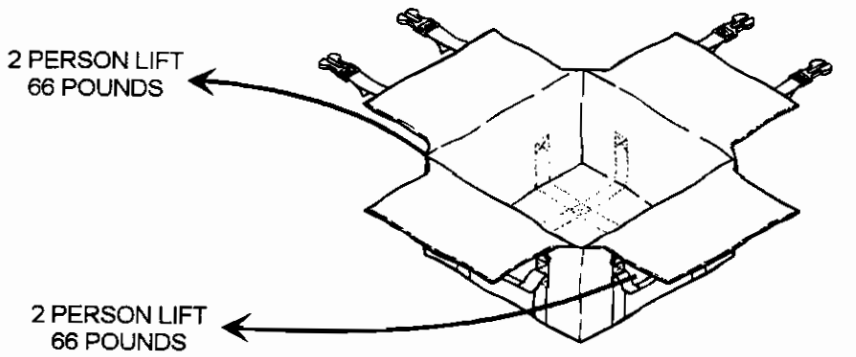


Figure 2-18. Decals - Drum Fitting Kit, P/N 13230E5897-101

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

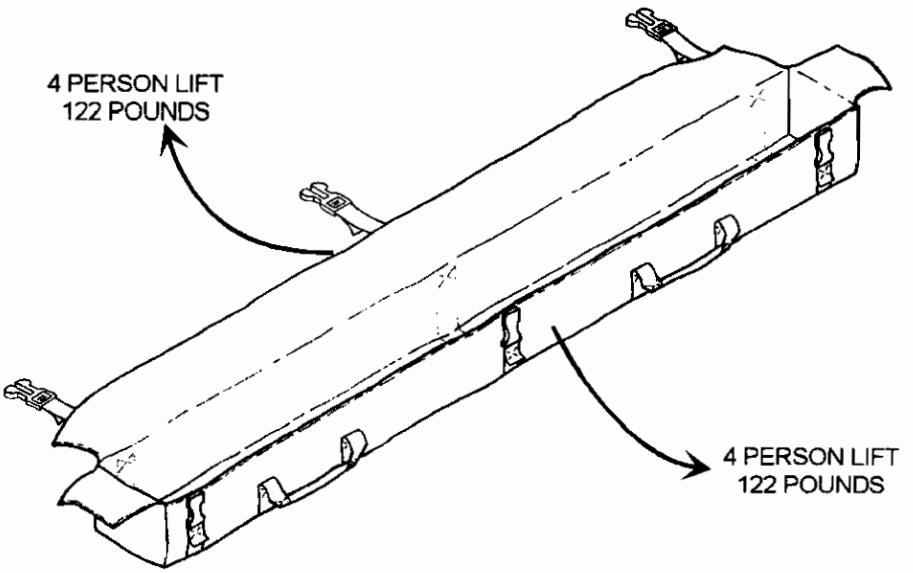


Figure 2-19. Decals - Suction Hose Kit, P/N 13230E5894-101

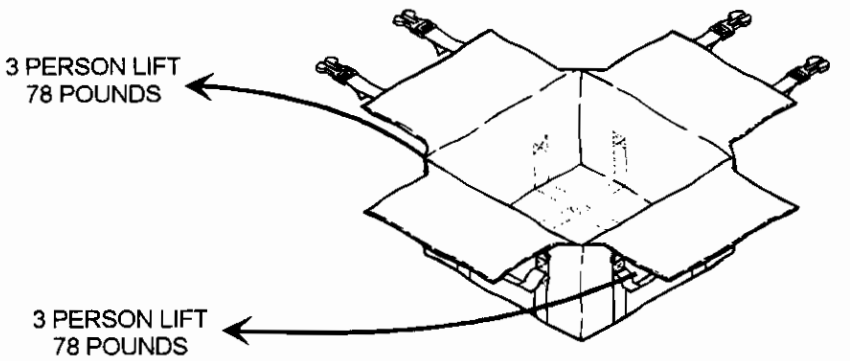


Figure 2-20. Decals - Discharge Hose Kit, P/N 13230E5893-101

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

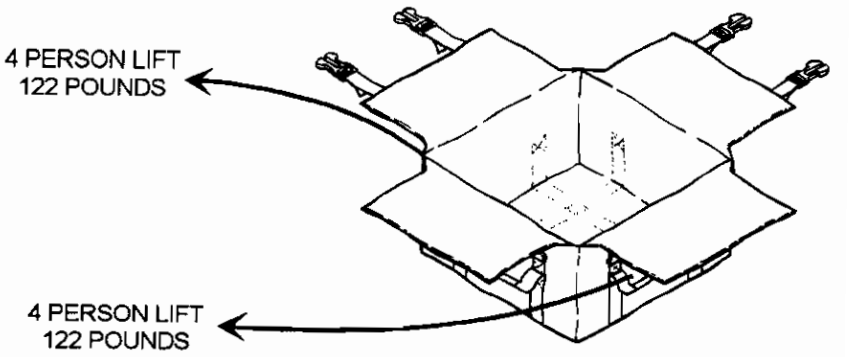


Figure 2-21. Decals - Discharge Hose Kit, P/N 13230E5874-101

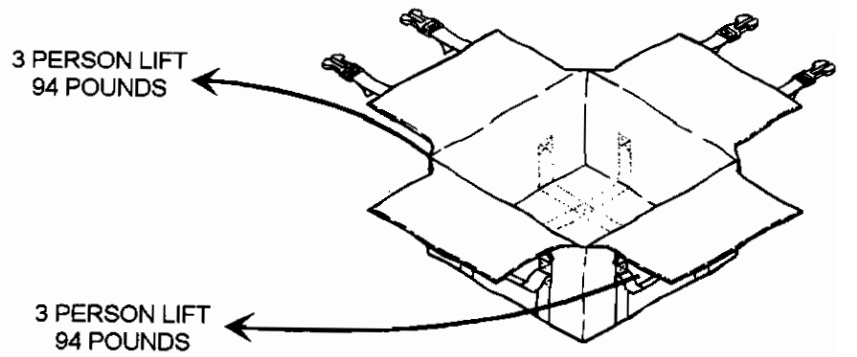


Figure 2-22. Decals - Discharge Hose Kit, P/N 13230E5873-101

2.6 DECALS AND INSTRUCTION PLATES. (Continued)

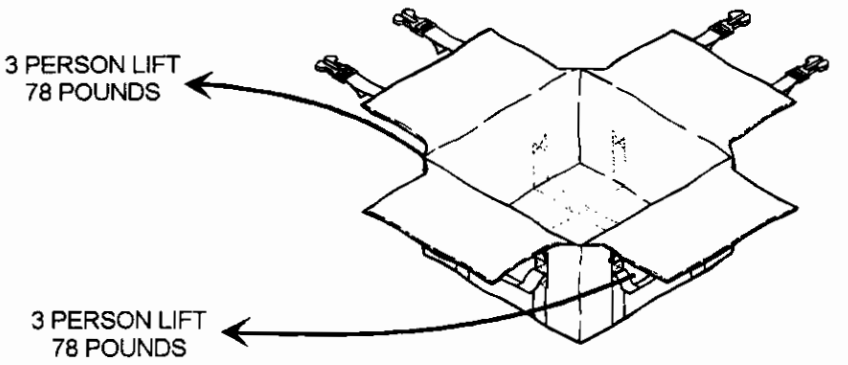


Figure 2-23. Decals - Discharge Hose Kit, P/N 13230E5872-101

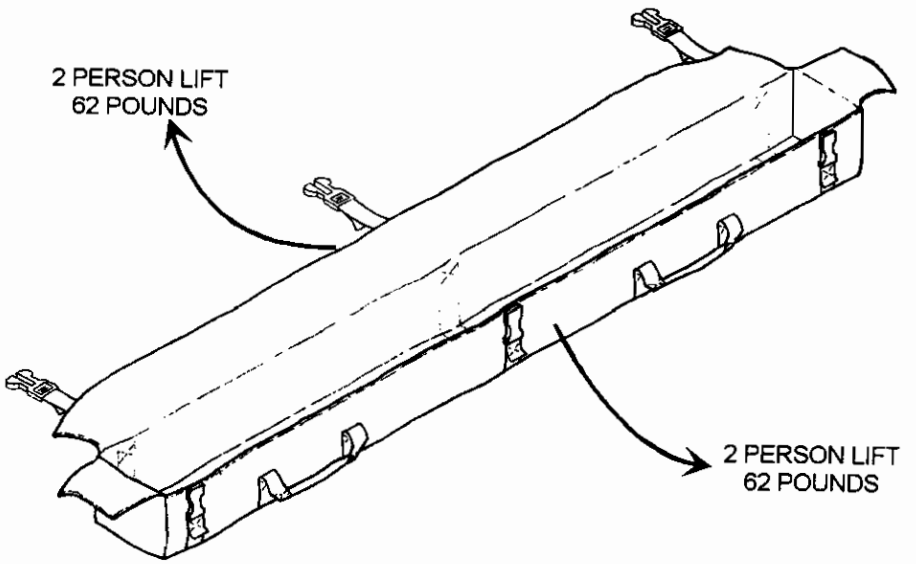


Figure 2-24. Decals - Ground Rod Kit, P/N 13230E5871-101

2.7 DEFUELING PROCEDURE. (Refer to figure 2-25.)

CAUTION

- System components are subject to damage from thermal expansion. To prevent damage to equipment, ensure all components are completely defueled prior to transportation or storage.
- Do not attempt defueling of more than one inlet hose at a time. Fuel spillage could occur and pose a hazard to personnel and the environment.

a. With the fuel transfer pump (1) running:

(1) Close all fuel drum (2) outlet elbow valve couplings (3).

(2) Close all unisex couplings (4) at fuel drum end of suction hoses (5).

(3) Beginning at fuel drums (2), disconnect suction hoses (5) one at a time, open unisex coupling (4), hold hose end higher than intake manifold and close unisex coupling (6) at far end (intake manifold) of suction leg. Close unisex coupling (4) at free end of leg and install dust cap.

(4) Repeat step (3) for each of the three remaining suction legs.

(5) Close emergency shutoff valve (7) as soon as fuel transfer pump (1) unloads.

b. At the accessory module control panel (8), position ENGINE SWITCH to STOP position.

CAUTION

- Do not run the fuel transfer pump dry. Running dry for more than 15 minutes will cause damage to the pump.
- Never subject nozzles to auxiliary pump suction. Seals will rupture.
- Drain nozzle immediately after disconnecting it from system. Trapped fuel can cause large internal pressure that can damage the nozzle when the temperature rises.

NOTE

If nozzle recirculation wye (9) was in use, disconnect and drain wye. Connect discharge hose (10) to recirculation manifold full flow leg (11).

c. Close discharge unisex coupling valves (12), and disconnect and drain all nozzles (13).

d. Defuel liquid fuel filter-separator (14).

(1) Close unisex coupling (15) on liquid fuel filter-separator (14) outlet valve.

(2) Disconnect discharge hose (10) from recirculation manifold (16).

(3) Disconnect one of the suction hoses (5) from fuel transfer pump (1) inlet for use in next step.

(4) Connect suction hose (17) removed from fuel transfer pump (1) inlet to the defueling unisex coupling (18) and the unisex coupling (19) on the flow side of the auxiliary pump (20). Open unisex coupling valves.

(5) Connect discharge hose (10) to auxiliary pump (20) and open unisex coupling valves.

(6) Connect auxiliary power cable to auxiliary pump (20).

(7) Open liquid fuel filter-separator (14) manual vent valve.

(8) Turn on auxiliary pump (20) to pump down liquid fuel filter-separator (14) and 3 in. x 6 ft discharge hose (21) from fuel transfer pump (1).

(9) Close liquid fuel filter-separator (14) inlet valve and manual vent valve when air is seen in the sight gauge.

(10) Turn off auxiliary pump (20), and close auxiliary pump unisex inlet and outlet valves.

(11) Disconnect discharge hose (10) from auxiliary pump (20) and connect to recirculation manifold full flow unisex coupling (11).

(12) Disconnect suction hose (17) from auxiliary pump (20) and liquid fuel filter-separator (14).

e. Defuel system fuel hoses. (Refer to figure 2-26.)

NOTE

Auxiliary pump (1) must be supported in the following steps.

(1) Select a fuel drum (2) to defuel into.

(2) At selected fuel drum (2), close inlet elbow valve (3) and unisex coupling valve on discharge hose (4), disconnect discharge hose (4) from inlet elbow valve (3), connect the discharge hose (4) to the flow side (5) of auxiliary pump (1), and open unisex coupling valves on flow side (5) of auxiliary pump and discharge hose (4).

(3) Connect auxiliary pump (1) unisex coupling to inlet elbow valve (3) unisex coupling, and open unisex coupling valve and inlet elbow valve (3).

(4) Close the fuel drum inlet elbow valve couplings (6) on the remaining drums (7).

WARNING

The AAFARS suction and recirculation hoses are connected to the fuel drums via elbow valves with integral camlock couplers. When the elbow valve coupling is closed, the valve stem is extended; when open, it is retracted. The stem travel is opposite that of conventional valves and requires the operator to double check valve position during system set up and tear down, since observation can be misleading. Failure to heed this warning could result in death or serious injury.

(5) Turn on auxiliary pump (1).

(6) One at a time, open unisex valves (8) on discharge hoses at fueling points. Close unisex valve (8) as hose collapses.

(7) One at a time, disconnect the inlet elbow valve camlock coupler (6) from the other three fuel drums hoses (9), allow the hose to pump down, and close unisex valve (10).

(8) When hoses are collapsed/defueled, close inlet elbow valve (3) on last fuel drum (2).

(9) Turn off auxiliary pump (1).

(10) Disconnect inlet elbow valve (3) from fuel drum (2).

(11) Disconnect discharge hose (4) from auxiliary pump (1).

(12) Hold auxiliary pump (1) over container. Open unisex coupling valve (5) and drain fuel. Close unisex coupling valve (5).

(13) Hold auxiliary pump (1) over container and disconnect auxiliary pump (1) from inlet elbow valve (3).

(14) Disconnect auxiliary pump power cable from auxiliary pump module (1).

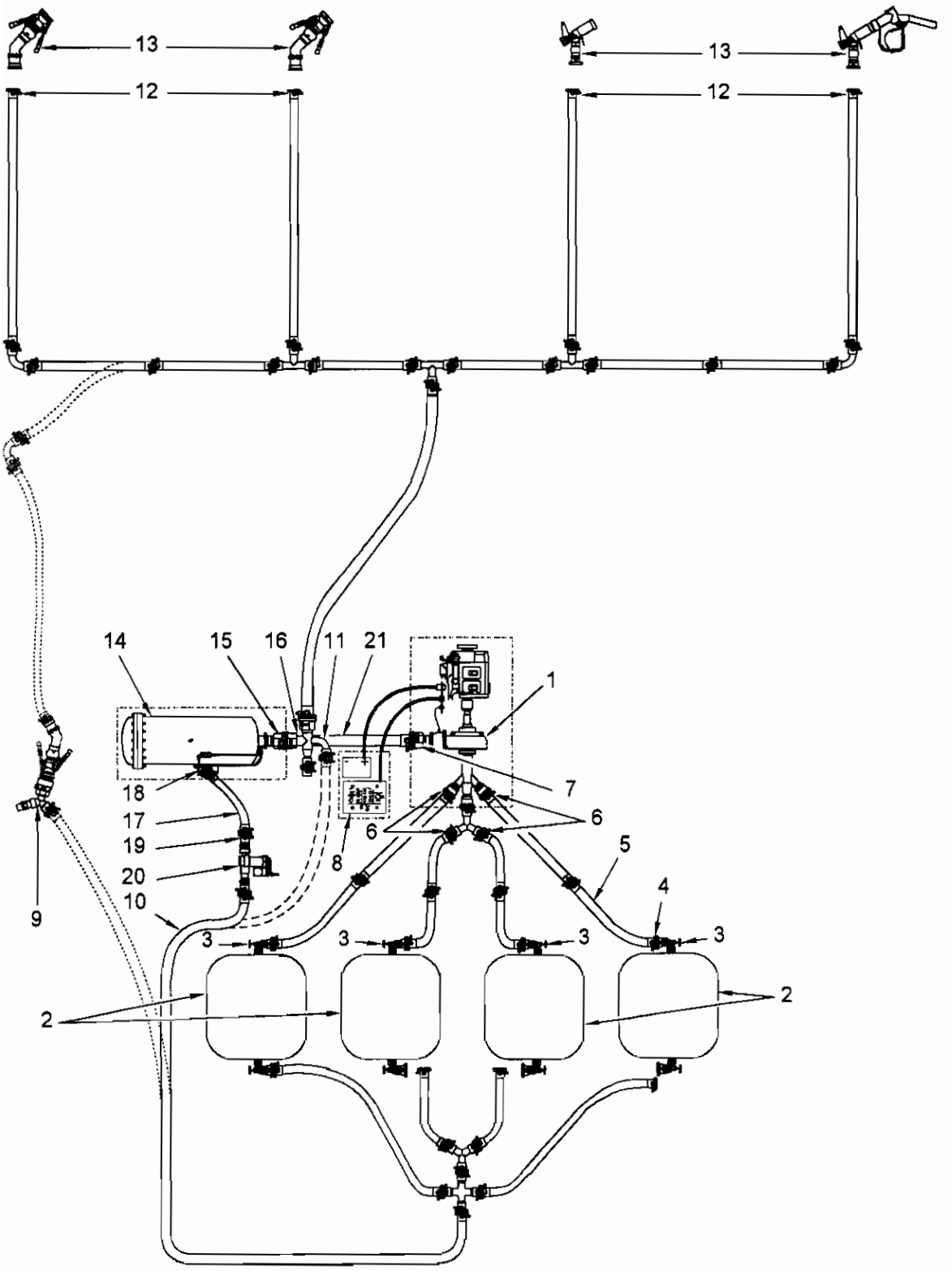


Figure 2-25. Defueling Liquid Fuel Filter-Separator

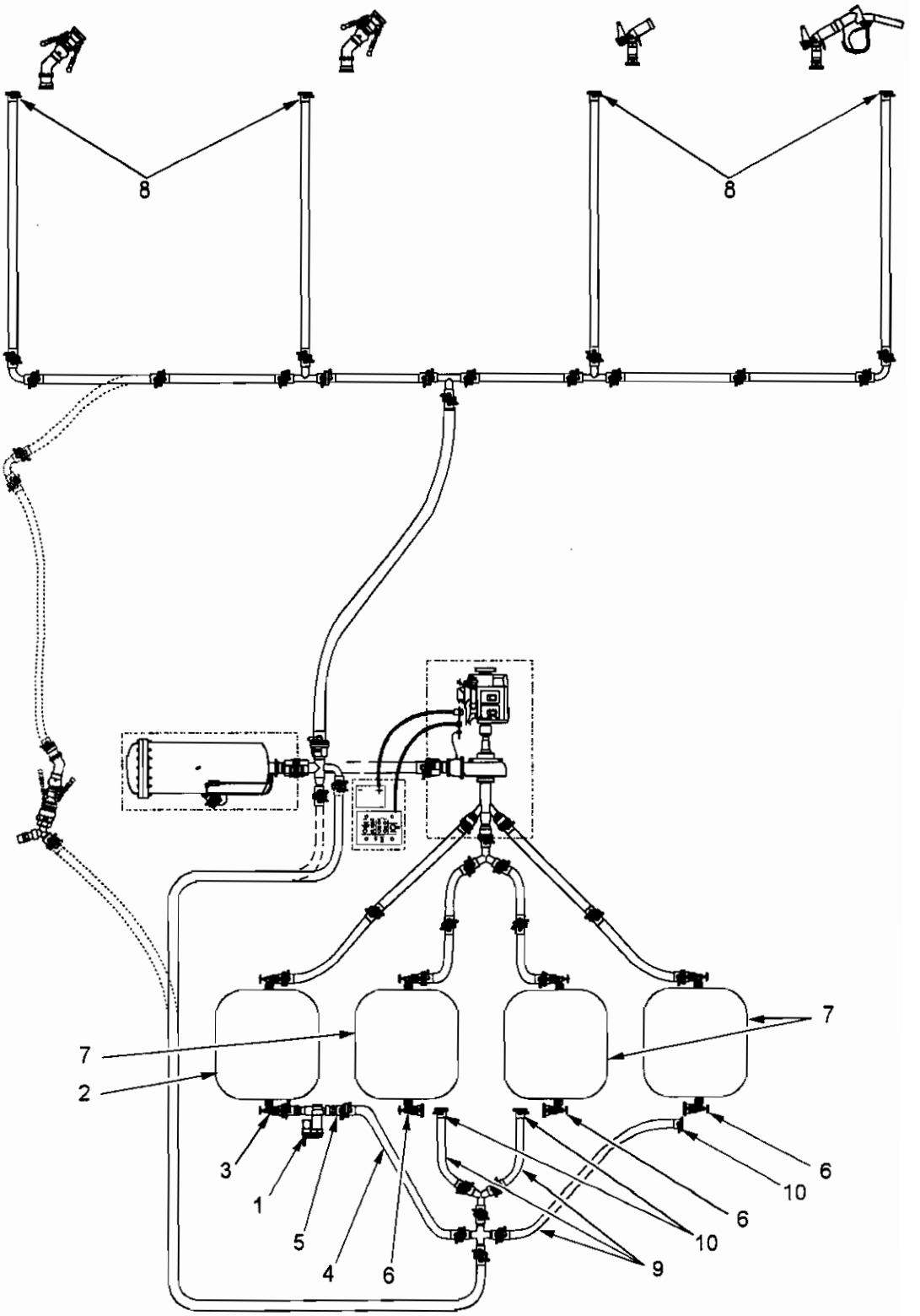


Figure 2-26. Defueling System Fuel Hoses

2.8 SYSTEM COMPONENT REPLACEMENT. (Refer to figure 2-27.)

The following procedures are provided to assist in the "hot" replacement of system components due to an operational casualty. System defueling is not required if the replacement component is immediately available. If the system will be shut down for an extended period of time, defueling IAW para. 2.7 is recommended, if the situation permits.

In the event the casualty results in fuel leakage, immediately isolate the leaking component by closing the nearest valves upstream and downstream of the failed component.

2.8.1 REPLACE ENGINE MODULE. (Refer to figure 2-27.)

WARNING

- The exhaust system will remain hot for some time after engine shut down. Avoid contact with exhaust system components until they have cooled sufficiently for safe handling. Serious personal injury may occur from contact with hot metal.

- Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use sufficient personnel to move or relocate the engine module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

a. Remove engine module (7) from pump-engine module IAW para. 2.4.d.
b. Install engine module in (7) pump-engine module IAW para. 2.4.k.

2.8.2 REPLACE PUMP-ENGINE MODULE. (Refer to figure 2-27.)

WARNING

- The exhaust system will remain hot for some time after engine shut down. Avoid contact with exhaust system components until they have cooled sufficiently for safe handling. Serious personal injury may occur from contact with hot metal.

- Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use four personnel to move or relocate the pump-engine module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

a. Shut down system IAW para. 2.5.1.
b. Close unisex coupling valves on pump inlet manifold (1) and inlet wye (2).
c. Close emergency fuel shutoff valve (3).
d. If installed, remove acoustic cover IAW para. 2.5f.
e. Remove air cleaner and install dust cap IAW para. 2.9m. Stow air cleaner in accessory module (4).
f. Disconnect cables W201 (5) and W202 (6) from engine module (7). Stow cables in accessory module (4).
g. Disconnect the inlet wye (2) from the pump inlet manifold (1).
h. Close unisex coupling valves on suction hoses (8) and disconnect the two suction hoses (8) from the pump inlet manifold (1).
i. Close unisex coupling valves on 3" x 6' discharge hose (9) and disconnect the 3" x 6' discharge hose (9) from the pump outlet (3).
j. Drain pump inlet manifold (1) of fuel.
k. Remove pump-engine module (10) and position replacement pump-engine module for connection to system IAW para. 2.4h.

l. Install inlet wye (2), suction hoses (8), and discharge hose (9) on pump-engine module.
m. Connect cables W201 (5) and W202 (6) to engine module (7).
n. Install air cleaner IAW para. 2.4aa and acoustic cover (if provided) IAW para. 2.4ai on engine module.
o. Open all inlet and outlet unisex coupling valves.
p. Start system IAW para. 2.5e.

2.8.3 REPLACE ACCESSORY MODULE. (Refer to figure 2-27.)

WARNING

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use four personnel to move or relocate the pump-engine module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

a. Shut down system IAW para. 2.5.1.
b. Disconnect cables W201 (5) and W202 (6) from engine module (7). Stow cables in accessory module (4).
c. Remove air cleaner from engine and install dust cap on intake manifold IAW with para. 2.9m. Stow air cleaner in accessory module (4).
d. Remove accessory module (4) and position replacement accessory module for connection to system.
e. Connect cables W201 (5) and W202 (6) to engine module (7).
f Remove air cleaner from accessory module and install on engine IAW para. 2.4aa.
g. Start system IAW para. 2.5e.

2.8.4 Replace Liquid Fuel Filter-Separator. (Refer to figure 2-27.)

WARNING

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use four personnel to move or relocate the pump-engine module, liquid fuel filter-separator, and accessory module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

a. Shut down system IAW para. 2.5.1.
b. Defuel liquid fuel filter-separator (11) IAW paragraph 2.7.d.
c. Disconnect 6' hose (9) from the inlet port.
d. Disconnect recirculation manifold (12) from the outlet port.
e. Remove liquid fuel filter-separator (11) and position replacement liquid fuel filter-separator for connection to system.
f. Install recirculation manifold (12) on outlet port.
g. Connect 6' hose (9) to the inlet port.
h. Open manual vent valve while liquid fuel filter-separator (11) is flooding. Close vent at first appearance of fuel.
i. Start system IAW para. 2.5e.

2.8.5 Replace Any Hose or Fitting.

a. Close valves to isolate hose or fitting.
b. Remove hose or fitting from system and drain into a suitable container.
c. Install replacement hose or fitting and open valves.
d. Continue mission.

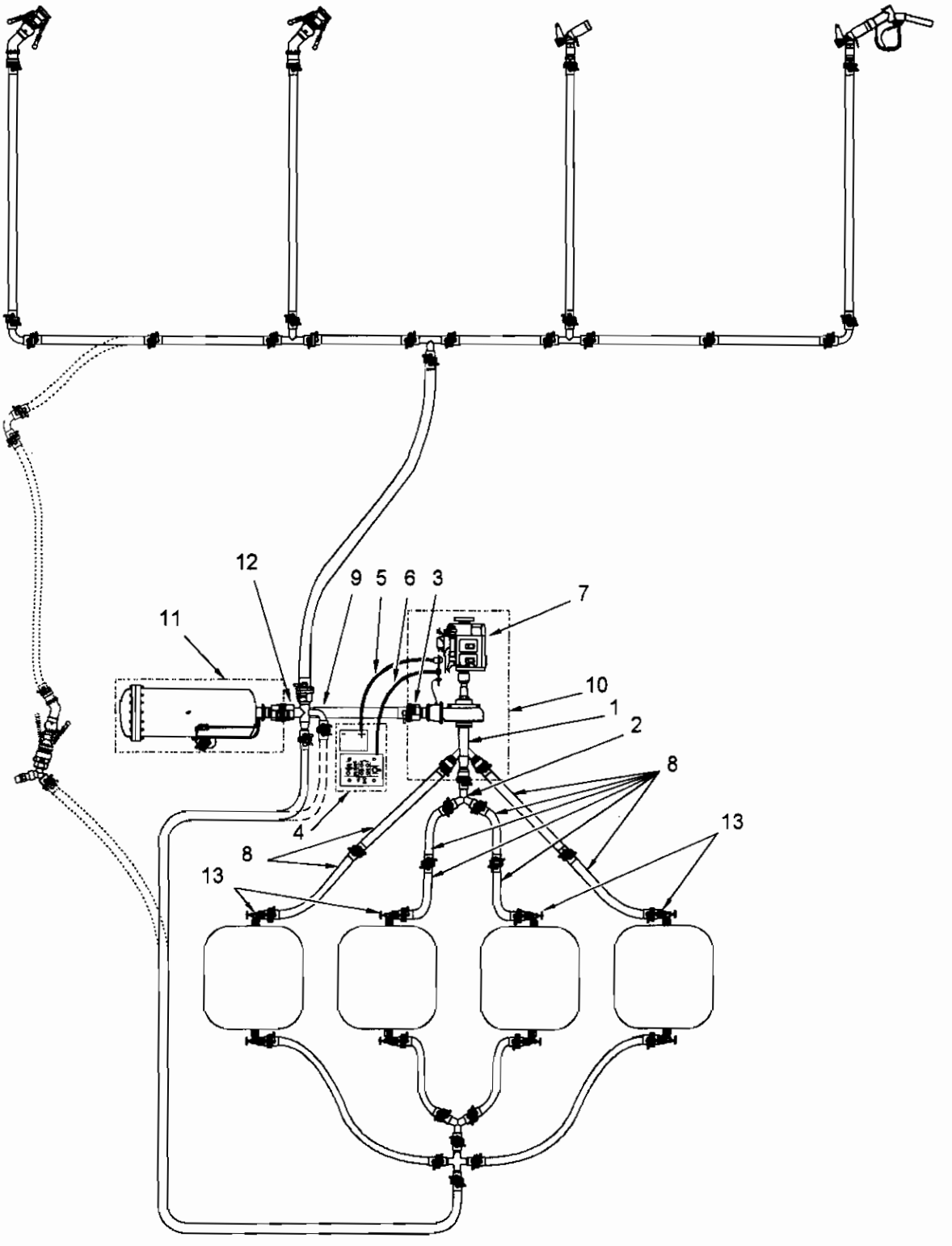


Figure 2-27. Replacement of System Components

2.9 PREPARATION FOR MOVEMENT.

WARNING

The exhaust system will remain hot for some time after engine shut down. Avoid contact with exhaust system components until they have cooled sufficiently for safe handling. Serious personal injury may occur from contact with hot metal.

CAUTION

- Drain nozzle immediately after disconnecting it from the system. Trapped fuel can cause large internal pressure that can damage nozzle when the temperature rises.
- During recovery ensure dust caps are installed on couplings immediately after disconnection. This practice will protect the couplings, and reduce fuel contamination and spills.

NOTE

This procedure assumes that defueling has been completed. Even after defueling, small amounts of residual fuel will remain in the system. Place a shallow container beneath each coupling to catch drainage when coupling is disconnected.

a. At fueling points, remove the ground rods, drain trapped fuel and bag the nozzles, and return the nozzle kits and ground rods to the recovery area.

b. At fueling points, start at end of discharge hose and roll discharge hose toward first fitting. Close disconnect unisex couplings and strap hoses. Continue process until all hoses are rolled and secured. Return discharge hoses to recovery area.

c. Disconnect suction hoses, strap and return to recovery area.

d. Return all wyes, tees, elbows and crosses to recovery area.

e. Disconnect and return recirculation manifold to recovery area and recirculation wye if used.

f. At each fuel drum, remove the inlet and outlet elbow valves and return valves to recovery area.

g. At recovery area, sort and bag all fuel handling AAFARS components.

h. Remove and stow ground cables on liquid fuel filter-separator, pump-engine module and accessory module.

i. Return auxiliary pump module to recovery area.

WARNING

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use sufficient personnel to move or relocate the liquid fuel filter-separator. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

j. Return liquid fuel filter-separator to recovery area.

k. Remove ground rod at pumping station and return to recovery area.

l. Disconnect and stow electrical cables in accessory module compartment. Install dust caps on connectors.

m. Remove air cleaner from engine and stow in accessory module. Install dust cap on intake manifold.

WARNING

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use sufficient personnel to move or relocate the accessory module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

n. Return accessory module to recovery area.

WARNING

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use sufficient personnel to move or relocate the engine module. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective clothing.

o. Remove engine module from pump-engine module.

(1) Unclamp exhaust pipe from exhaust manifold.

(2) Disconnect pumpage overtemperature cable at engine module connection panel. Install dust caps on connectors. Wrap free end of cable around fuel transfer pump outlet.

(3) Disconnect fuel supply and return lines at engine module. Connect free ends of lines together.

(4) Unlatch engine module from pump-engine frame and slide engine module out of frame.

p. Return engine module to recovery area.

q. Return pump-engine module to recovery area.

r. Install engine module in pump-engine module.

(1) Slide engine module into pump-engine module, PTO end first. If flex coupling will not engage it may be necessary to rotate the flex portion slightly to align with the engine adapter.

(2) Latch engine module to pump-engine frame.

(3) Clamp exhaust pipe to exhaust manifold.

(4) Connect pumpage overtemperature cable at engine module connection panel connector J3. Connect adjacent dust caps together.

(5) Connect fuel supply and return lines at engine module.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2.10 OPERATION UNDER EXTREME ENVIRONMENTAL CONDITIONS.

2.10.1 Operation in Extreme Heat.

Operation under conditions of high heat may cause equipment problems due to thermal expansion. Nozzle seals are especially subject to damage. Basic system operation is as described in paragraphs 2.4 and 2.5. The following additional steps and recommendations should be implemented to protect the system to the extent possible.

a. Protect the system from direct sunlight if possible.

(1) Position system components in the shade of trees, buildings, etc. If shade is available only part of the day, choose afternoon shade. Do not block air circulation.

(2) Use any material available to create shade. Do not block air circulation.

b. Do not connect the nozzles without opening the hose unisex coupling valve. Disconnect as soon as possible after closing unisex coupling valve to prevent rupture of seals due to expansion of fuel trapped in the nozzle.

c. System components are subject to damage from thermal expansion. As the temperature increases, the pumpage in any component will expand. If trapped in a component, the expanding pumpage may rupture seals and cause a leak or equipment malfunction. For this reason, all system valves should remain open as long as the system is flooded. With all valves open, the hoses will absorb the expansion and protect system seals. If any component must be isolated, it should be drained or defueled immediately to prevent damage.

2.10.2 Operation in Extreme Cold.

Operation under conditions of extreme cold may cause equipment problems due to loss of flexibility. Nozzle seals and coupling face seals are especially subject to damage. Basic system operation is as described in paragraphs 2.4 and 2.5. The following additional steps and recommendations should be implemented to protect the system to the extent possible.

a. General Recommendations.

(1) Fill engine crankcase with MIL-L-46167 OEA (SAE 0W-20) lubricating oil. Refer to unit maintenance.

(2) Set up system in area protected from wind, if possible.

(3) Handle all components with care to avoid cracking or fracture.

(4) Remove snow or ice from coupling ends before making connections to prevent entry of foreign material into system.

(5) Make and break unisex connections slowly and carefully to avoid cracking or splitting of face seals.

(6) Do not try to force open couplings that appear jammed. Work back and forth to break loose ice at coupling face.

b. Engine Cold Start.

NOTE

Under conditions of extreme cold, it is necessary to use the intake heaters to warm the intake manifold before attempting to start the engine. The amount of warming required increases as the temperature decreases. At 20° F (-7° C), holding the intake heaters on for 30 seconds is sufficient; at -25° F (31.7° C) approximately 2.5 minutes is required.

(1) Unlatch engine module from pump-engine module frame and slide engine module out far enough to disengage engine flexible coupling adapter from the flexible coupling (5-6 inches).

(2) Insert spare flexible coupling between the lower part of the engine module and the subframe to prevent the engine accidentally sliding back and engaging fuel transfer pump.

(3) At the control panel, hold the ENGINE switch in the START position for 30 seconds, then release. If engine starts, proceed to step 7.

(4) Hold INTAKE HEATER switch in the ON position for 2 minutes to heat intake air and allow battery time to thaw.

(5) At the control panel, hold INTAKE HEATER switch in the ON position and lift and hold the ENGINE switch in the START position until engine starts. If engine does not start within 2 minutes, release the ENGINE start switch and the INTAKE HEATER switch and allow system to rest for 5 minutes. (Battery will thaw and starter will cool.)

(6) Repeat steps 4 and 5 as required.

(7) Allow engine to run 2-3 minutes.

(8) Shut down engine IAW para. 2.6.

(9) Remove spare flexible coupling from subframe and stow in accessory module.

(10) Slide engine module into pump-engine module and engage engine adapter with flexible coupling.

(11) Latch engine module to pump-engine frame.

(12) Perform normal engine start IAW para. 2.5.

2.10.3 Operation in Strong Winds and Sandy or Dusty Conditions.

a. Bank soil around fuel drums, especially on down slope side, to a height that will prevent wind from rolling or shifting drums.

b. Shield couplings during connection or disconnection to prevent entry of foreign material into system.

c. Keep dust caps in place on all disconnected couplings.

d. Inspect and clean engine air filter frequently to avoid accumulation of sand or dust.

2.10.4 Operation in Rain.

Cover the pump-engine module and accessory module with some form of water repellant covering, taking care to avoid contact with hot exhaust components.

2.11 EMERGENCY OPERATING PROCEDURES.

2.11.1 Emergency Stop.

The EMERGENCY STOP button on the control panel provides a quick and positive method for stopping the engine in an emergency. When the button is depressed, it latches in position and removes electrical power from the system. Except for ease of operation, the EMERGENCY STOP button acts exactly the same as operating the ENGINE START/RUN/STOP switch.

2.11.2 Emergency Operation.

There are no provisions for "Battle Short" operation of the AAFARS. Emergency operation consists of continuing operation in spite of conditions such as noisy or erratic engine operation, indications of imminent fuel hose failure, illumination of FAULTS indicators on control panel, or other conditions which would normally require immediate shut down. Emergency operation only applies in a wartime situation where continued aircraft refueling is of paramount importance.

The consequences of ignoring FAULTS indicators are:

a. ENGINE HOT indicator - loss of power followed by engine seizure.

b. LOW OIL PRESSURE indicator - loss of power followed by engine seizure. ENGINE HOT indicator may illuminate.

c. ALTNTR - system will continue to operate until battery is depleted. If battery is not connected, engine will stop.

d. PUMPAGE HOT - engine will stop and may not be restarted until pumpage has cooled to 125°F (52°C).

2.12 NBC DECONTAMINATION.

Detailed decontamination procedures can be found in FM 3-3, FM 3-4 and FM 3-5.

CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3.1 LUBRICATION.

Lubrication by the operator/crew is limited to checking the engine oil level and adding oil as required by the PMCS schedule in TM 10-4320-351-14.

Section II. OPERATOR TROUBLESHOOTING PROCEDURES

3.2 OPERATOR TROUBLESHOOTING.

Troubleshooting Table 3-1 is provided to assist you in locating and correcting system faults. This table cannot list all the malfunctions that may occur, all the tests and inspections needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify your supervisor.

TABLE 3-1. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. Unisex coupling leaks at interface with dust cap or other coupling.

   Step 1. Inspect coupling face for foreign matter.

   Remove foreign matter from coupling face.

   Step 2. Inspect coupling and dust cap face seals for physical damage or wear.

   a. Replace damaged or worn face seal.
   b. Notify unit maintenance if unisex coupling continues to leak.

TABLE 3-1. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

2. Auxiliary pump will not prime.

   Step 1. Check that inlet and outlet unisex valves are open.

3. Auxiliary pump operates at low capacity.

   Step 1. Check for blockage.
   a. Disconnect lines from inlet and outlet unisex couplings.
   b. Open coupling valves and visually inspect for blockage. Remove any blockage.

4. Refer to TM 10-4320-351-14 for accessory module and pump-engine troubleshooting procedures.

5. Refer to TM 10-4330-237-13&P for liquid fuel filter-separator troubleshooting procedures.

6. Refer to TM 10-4930-248-13&P for CCR nozzle troubleshooting procedures.

7. Refer to TM 10-4930-246-13&P for D-1 nozzle troubleshooting procedures.

Section III. OPERATOR MAINTENANCE PROCEDURES

3.3 REPLACE UNISEX COUPLING FACE SEAL/DUST CAP SEAL. (Refer to figure 3-1.)

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools:
None

Materials/Parts Required:
Rags, Wiping (Appendix F, Section II, Item 7

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.
- Fuel is flammable. Do not smoke.

Equipment Condition:
AAFARS shutdown (NORMAL SYSTEM SHUT DOWN, para. 2.5.1)

This procedure applies to all AAFARS unisex couplings. All two-inch face seals are the same throughout the system, as are all three-inch face seals. The seal in the coupling face and the dust cap are identical, and may be interchanged as an emergency repair.

The face plate and dust cap of AAFARS unisex couplings employ a U-ring type seal which is designed to seat with pressure. The seal is slightly higher than the groove it sits in, so that the top protrudes above the surface. Pressurized fluid enters beneath this protrusion and expands the seal against the bottom of the seal groove and against the corresponding seal in the dust cap or other face plate. Special care must be taken during installation to ensure the seal is fully seated in the groove. If it is not, pressurized fluid will be forced under the seal and the coupling will leak.

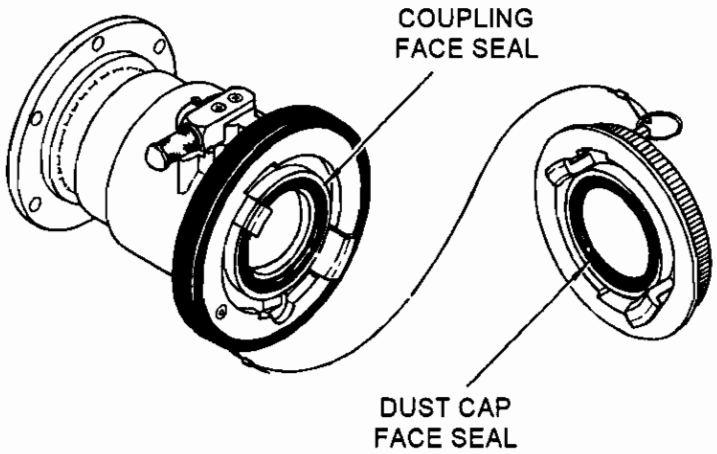


Figure 3-1. Face Seal and Dust Cap Seal

a. Removal.

(1) Remove seal by hand.

b. Installation.

(1) Wipe seal groove clean.

(2) Press seal in groove with a smoothing motion of fingertips. Note that when fully seated, the outer lip of the seal protrudes slightly above the surface. Ensure the seal is not twisted or kinked.

CHAPTER 4

UNIT MAINTENANCE

Section I. LUBRICATION INSTRUCTIONS

4.1 LUBRICATION.

Lubrication by unit maintenance is provided in TM 10-4320-351-14.

Section II. SERVICE UPON RECEIPT

4.2 UNPACKING. (Refer to figure 4-1.)

WARNING

Use two persons to remove the reusable crate top to avoid personnel injury and to preserve the reusable crate.

(1) Remove all screws on the top (1) of the reusable crate (2) and lift top (1) off.

(2) The front (3) of the reusable crate (2) is screwed on. Locate the front (3), remove all screws, and set the front to one side.

(3) Remove any packing material inside the reusable crate.

(4) The AAFARS is ready to be emplaced using the procedures contained in paragraph 2.4.

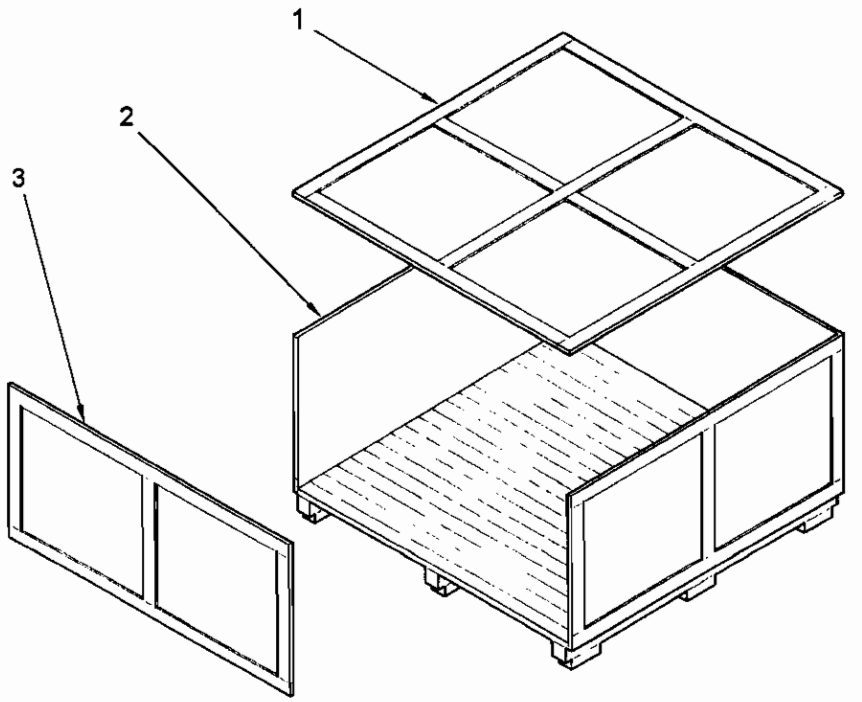


Figure 4-1. AAFARS Reusable Shipping Crate

4.3 INSPECTION.

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4.4 GENERAL.

Preventive Maintenance Checks and Services (PMCS) involves systematic caring, inspection, and servicing of equipment to keep it in good condition and prevent breakdowns. Table 4-1 lists the AAFARS System PMCS. Service intervals are divided into categories: Before Operation; After Operation; and various other checks and services to be performed at prescribed monthly interval. Table 4-1 organizes your PMCS tasks in chronological sequence. As the AAFARS operator, you should:

a. Perform your PMCS as scheduled in table 4-1. Always do your PMCS in the same order, so it gets to be a habit. Always assume explosive vapors are present at the AAFARS. Do not allow any smoking or spark producing equipment within fifty feet of the AAFARS while performing your PMCS.

b. Do your BEFORE PMCS prior to the equipment leaving its staging/service area or performing its intended mission. Keep in mind the WARNINGS and CAUTIONS.

c. Do your DURING PMCS during filter-separator liquid fuel operation. Leaks can be spotted only during operation. Keep in mind the WARNINGS and CAUTIONS.

d. Do your AFTER PMCS as soon as possible after the AAFARS has been taken out of its mission mode or returned to its containment area. Keep in mind the WARNINGS and CAUTIONS.

WARNING

Do not operate AAFARS if there is any indication of fuel leakage.

e. Cleanliness. Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Use dry cleaning solvent SD (P-D-680) or some other suitable cleaning solvent on all metal surfaces.

f. Bolts, Nuts and Screws. Check bolts, nuts and screws for obvious looseness and missing, bent or broken conditions. Look for chipped paint, bare metal or rust around bolt heads. If any part seems loose, tighten it.

g. Welds. Look for loose or chipped paint, rust or gaps where parts are welded together. If a bad weld is found, notify your supervisor.

h. Electric Wires and Connections. Look for cracked or broken insulation, bare wires and loose connectors. Tighten loose connectors and make sure bare wires are in a serviceable condition. If a bad wire or connector is found, replace it or notify your supervisor.

4.5 LEAKAGE CRITERIA.

Wetness around seals, gaskets, fittings or connections indicates leakage. A stain also indicates leakage. If a fitting or connector is loose, tighten it. If it is broken or defective, report it. Definitions of the classes of leaks are listed below. Become familiar with each class of leak so that you are aware of the status of your equipment. When in doubt, notify your supervisor.

WARNING

AAFARS pumpage fuels and the engine lubricating oil contain additives that may be harmful to personnel and the environment. All leaks must be corrected as soon as possible. Wash fuel or oil from skin immediately. Remove and wash contaminated clothing immediately. Spills of fuel or oil must be cleaned up in accordance with local area direction to prevent harm to personnel or damage to the environment.

CAUTION

Equipment operation is allowable with minor oil leakages (Class I or Class II). If leakage is present at the engine, check lubricating oil level more often than usual. Do not allow oil level to fall below the ADD OIL mark. When in doubt, notify your supervisor.

a. Class I - Leakage indicated by wetness or discoloration not great enough to form drops.

b. Class II - Leakage great enough to form drops but not enough to cause drops to drip from item being checked or inspected.

c. Class III - Leakage great enough to form drops that fall from item being checked or inspected.

4.6 PMCS PROCEDURES.

Table 4-1 lists the checks and services required to keep your AAFARS in good operating condition. They are listed in chronological order and should be performed in this order so they become a habit. An explanation of each column in provided below.

a. The "Item No." column provides the sequential identification number for each task.

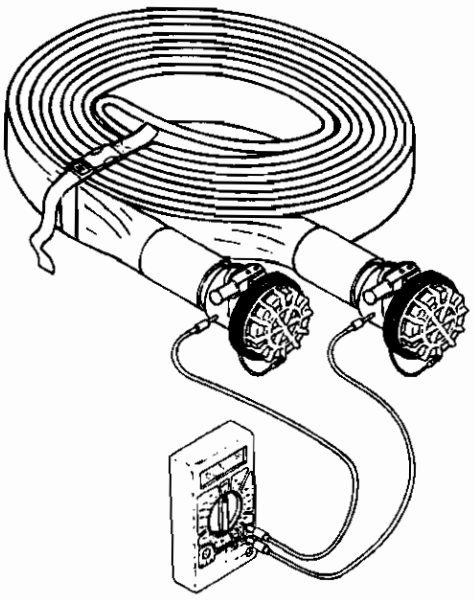
b. The "Interval" column tells you when to do a certain check or service.

c. The "Location - Item to Check/Service" column tells you on which item the procedure is performed.

d. The "Procedure" column tells you how to do the required checks and services. Carefully follow these instructions. If you do not have the required tools, or if the procedure tells you to, notify your supervisor.

e. The "Not Fully Mission Capable If" column tells you the conditions under which your AAFARS is not capable of performing its intended mission.

Table 4-1. Unit Level Preventive Maintenance Checks and Services for AAFARS

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
			WARNING Fuel fumes are always present in the vicinity of the AAFARS. Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark. Do not permit any smoking, any open flame, or spark producing equipment within fifty (50) feet (15.24 m) of the AAFARS.	
1		Pumping Assembly	Refer to TM 10-4230-351-14.	
2		D-1 Nozzle	Refer to TM 4930-246-13&P	
3	Monthly	All Fuel Hoses	Using a multimeter, test fuel hose for broken or disconnected internal ground cable as follows: 1. Place multimeter leads against metal surface of both couplings. 2. Check for continuity between couplings. Continuity must exist. If continuity does not exist, hose is defective. 	Hose fails continuity test

Section IV. UNIT TROUBLESHOOTING PROCEDURES

4.7 TROUBLESHOOTING.

Troubleshooting Table 4-2 is provided to assist you in locating and correcting system faults. This table cannot list all the malfunctions that may occur, all the tests and inspections needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify your supervisor.

Table 4-2. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SYSTEM

1. Unisex coupling leaks at interface with dust cap or other coupling.

   Step 1. Inspect coupling and dust cap face seals for physical damage or wear.

   a. Replace damaged or worn coupling face seal. If you cannot tell by visual inspection which seal is bad, replace both. The coupling face seal and the dust cap face seal are identical and may be interchanged as a temporary repair.

2. Unisex coupling leaks at inlet.

   Step 1. Replace two inch coupling (See para. 4.8.1 or 4.8.8) or three inch coupling inlet O-ring (See para. 4.8.2).

AUXILIARY PUMP

1. Unisex coupling leaks at interface with dust cap or other coupling.

   Step 1. Inspect coupling and dust cap face seals for physical damage or wear.

   a. Replace damaged or worn coupling face seal. If you cannot tell by visual inspection which seal is bad, replace both. The coupling face seal and dust cap face seal are identical and may be interchanged as a temporary repair.

2. Unisex coupling leaks at coupling inlet.

   Step 1. Disconnect coupling from inlet. Replace inlet O-ring.

3. Pump will not prime.

   Step 1. Check that inlet and outlet unisex valves are open.

4. Pump operates at low capacity.

   Step 1. Check for blockage.

      a. Disconnect lines from inlet and outlet unisex couplings.

      b. Open coupling valves and visually inspect for blockage. Remove any blockage.

   Step 2. Check for clogged strainer.

      a. Separate pump from inlet reducer.

      b. Remove and clean strainer.

   Step 3. Replace pump.

ENGINE
Refer to TM 10-4320-351-14.

FUEL TRANSFER PUMP
Refer to TM 10-4320-351-14.

FILTER-SEPARATOR, WATER, LIQUID FUEL
Refer to TM 10-4330-237-13&P.

D-1 NOZZLE
Refer to TM 10-4930-246-13&P.

CCR NOZZLE ASSEMBLY
Refer to TM 10-4930-248-13&P.

Section V. UNIT MAINTENANCE PROCEDURES

4.8 FUEL DELIVERY EQUIPMENT MAINTENANCE.

The AAFARS fuel delivery equipment includes all the hoses, couplings, manifolds and nozzles, and the auxiliary pump. Couplings include the elbows, tees, crosses and wyes used as fuel hose connection points; the various unisex to camlock adapters; and the recirculation manifold and recirculation wye. All these equipments are equipped with unisex couplings. The AAFARS uses two-inch, non-valved unisex couplings; two-inch, valved unisex couplings; and three-inch, valved unisex couplings. The following unisex coupling maintenance procedures apply to all unisex couplings throughout the system, including the CCR and D-1 nozzle assemblies. The two-inch suction hoses, the two-inch wyes and all three-inch unisex couplings have stainless steel long and short lugs in the coupling body; three-inch dust caps have aluminum lugs. The discharge hoses, tees, crosses, manifolds and elbows unisex couplings have aluminum long and short lugs. Refer to appendix C, Repair Parts and Special Tools List for the correct part number for lugs for the coupling under repair.

4.8.1 REPLACE TWO-INCH VALVED UNISEX COUPLING. (Refer to figure 4-2.)

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanics (Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves (Appendix B, Section III, Item 2)

Materials/Parts Required:
Petrolatum (Appendix F, Section II, Item 5)
Rag, Wiping (Appendix F, Section II, Item 7)
Seal (Appendix I, Item 5)
O-ring (Appendix I, Item 6)
O-ring (Appendix I, Item 8)
O-ring (Appendix I, Item 7)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.
- Fuel is flammable. Do not smoke.

Equipment Condition:
AAFARS shutdown (NORMAL SYSTEM SHUTDOWN, para. 2.5.1)

a. Removal.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove ball retaining screw (1) and O-ring (2). Discard O-ring (2).

(2) Position a wiping rag under coupling (3) and orient coupling (3) screw hole toward wiping rag. Push in and rotate unisex coupling (3) back and forth until all 41 balls (4) have collected in the wiping rag.

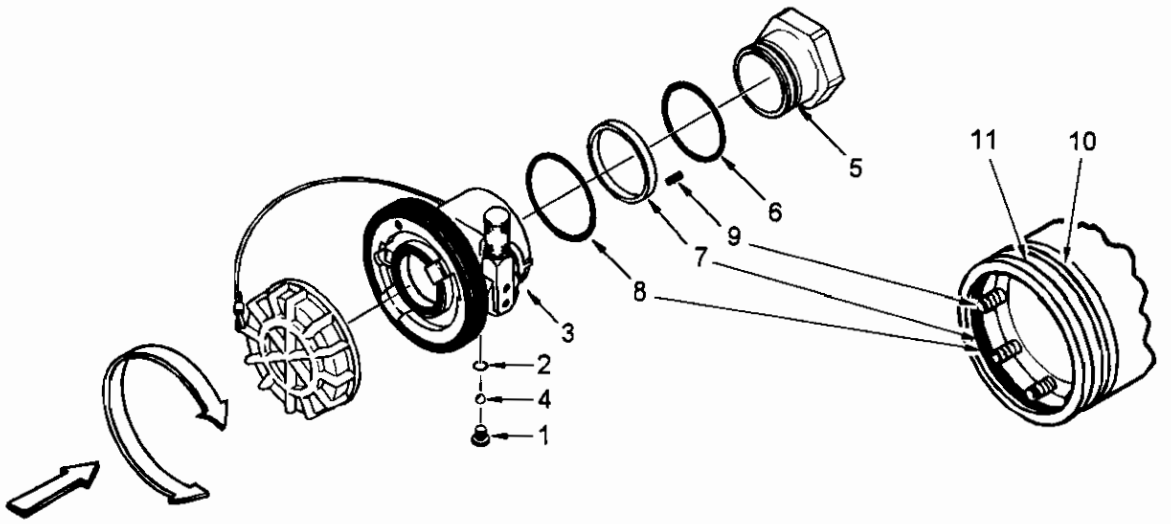


Figure 4-2. Two Inch Valved Unisex Coupling

(3) Pull unisex coupling (3) from inlet (5).

(4) Remove and discard outside O-ring (6) from inlet (5).

(5) Remove and discard nylon seal (7) and inside O-ring (8) from inlet (5).

(6) Remove and retain eight springs (9).

b. Installation.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

NOTE

When inserting balls in unisex coupling ball race, use caution to avoid dropping loose balls. Work over a wiping rag.

(1) Lightly lubricate outside O-ring (6) with petrolatum and install in second (square) groove (10) of inlet (5).

(2) Lightly lubricate inside O-ring (8) with petrolatum and install inside inlet (5).

(3) Place springs (9) in inlet (5).

(4) Install nylon seal (7) over inside O-ring (8) in inlet (5).

NOTE

Assembly of the unisex coupling on to the inlet requires two persons, one to hold the unisex coupling on the inlet against spring pressure and one to insert the balls. Alternatively, one person can perform the task if the unisex coupling is pressed against some object heavy enough to compress and hold the inlet springs while the balls are inserted in the race.

(5) Place a wiping rag under the unisex coupling (3). Slide the unisex coupling (3) onto the inlet (5) and adjust position until screw hole is facing up and ball race (rounded groove) (11) in inlet is centered under screw hole. Install balls (4) one at a time, rotating unisex coupling (3) back and forth until all 41 balls (4) have been inserted.

(6) Install ball retaining screw (1) and O-ring (2) in unisex coupling (3). Tighten retaining screw.

4.8.2 REPLACE THREE-INCH UNISEX COUPLING. (Refer to figure 4-3.)

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanics (Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves (Appendix B, Section III, Item 2)

Materials/Parts Required:
Petrolatum (Appendix F, Section II, Item 5)
Rag, Wiping (Appendix F, Section II, Item 7)
O-ring (Appendix I, Item 2)
O-ring (Appendix I, Item 3)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.
- Fuel is flammable. Do not smoke.

Equipment Condition:
AAFARS shutdown (NORMAL SYSTEM SHUTDOWN, para. 2.5.1)
Component removed from system (para. 2.8)

a. Removal.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove ball retaining screw (1) and O-ring (2). Discard O-ring (2).

(2) Position a wiping rag under coupling (3) and orient coupling (3) screw hole toward wiping rag. Rotate unisex coupling (3) back and forth to allow the 41 balls (4) to collect in the wiping rag.

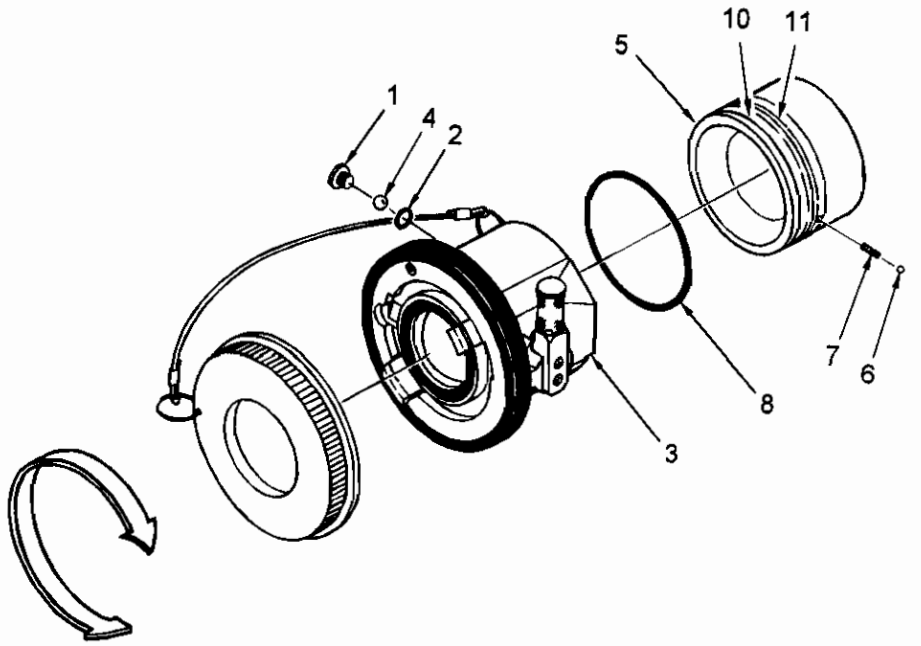


Figure 4-3. Three Inch Unisex Coupling

NOTE

There is a small ball and spring in the inlet that are used to maintain electrical continuity. The ball and spring will pop out when the coupling is separated from the inlet. Coupling removal must be performed in a way that captures the continuity ball and spring.

(3) Separate the unisex coupling (3) and inlet (5). Collect the continuity ball (6) and spring (7).

(4) Remove and discard inlet O-ring (8).

b. Installation.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

NOTE

When inserting balls in unisex coupling ball race, use caution to avoid dropping loose balls. Recommend working over a wiping rag.

(1) Lightly lubricate inlet O-ring (8) with petrolatum and install in second (square) groove (9) of inlet (5).

NOTE

Due to the possibility of losing the continuity ball and spring, the following step is best performed inside a container if possible.

(2) Start the unisex coupling (3) onto the inlet (5). Install continuity spring (7) and ball (6) into hole in inlet (5) and hold in the compressed position while completing installation of unisex coupling (3) onto inlet (5).

(3) Place a wiping rag beneath the unisex coupling (3). Adjust coupling position until screw hole is facing up and ball race (rounded groove) (10) in inlet is centered under screw hole. Insert the 41 balls (4) one at a time into the hole in the housing by rotating the unisex coupling (3) back and forth while installing the balls (4). Once all 41 balls (4) are installed, assemble O-ring (2) onto ball retaining screw (1) and install the assembly into the threaded hole to retain the joint. Tighten retaining screw (1).

4.8.3 REPLACE UNISEX COUPLING DUST CAP. (Refer to figure 4-4.)

This task consists of: a. Removal b. Assembly

INITIAL SET-UP:

Tools:
Tool kit, General Mechanic Automotive
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
None

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Coupling removed (para. 4.8.1 or 4.8.2)

a. Removal.

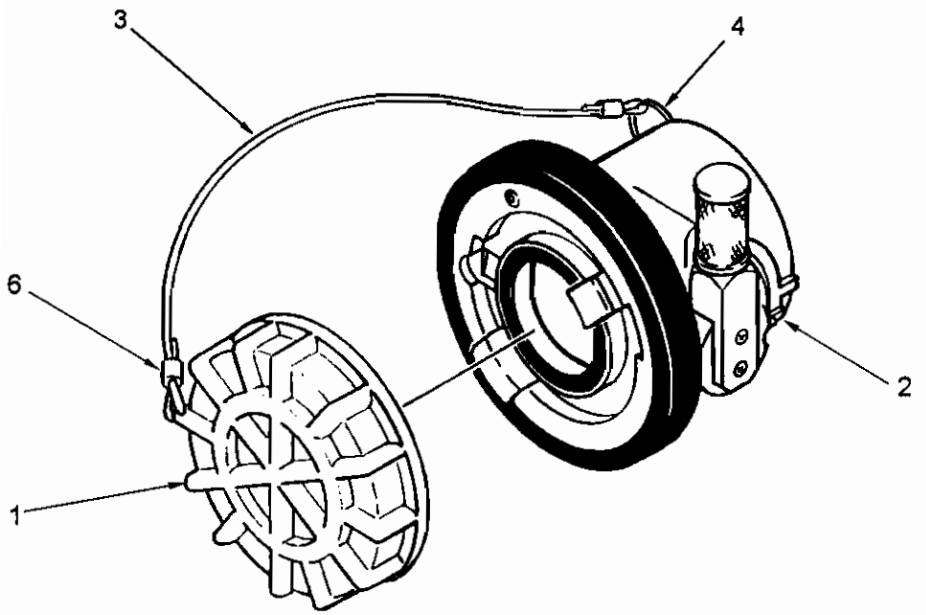
WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

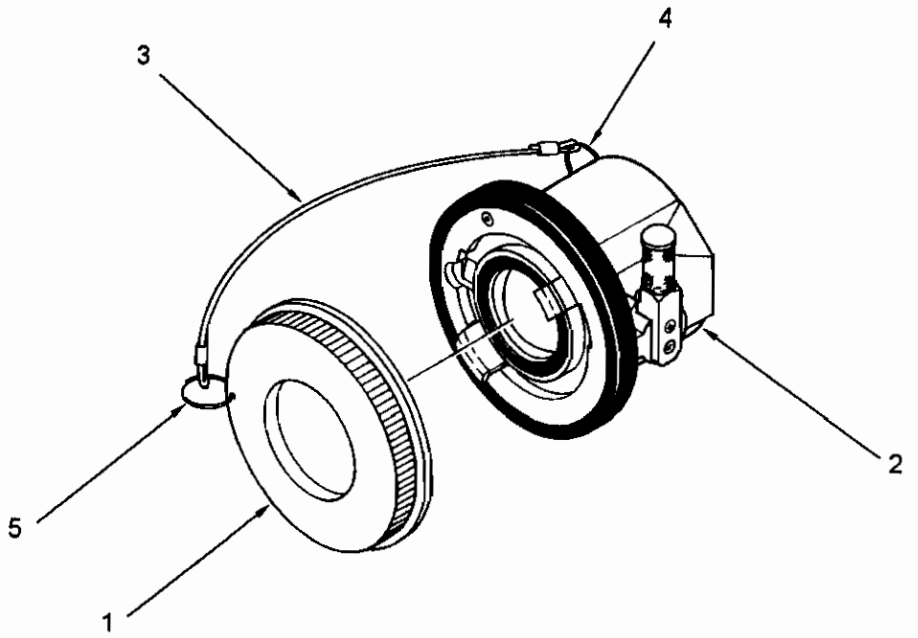
(1) Remove dust cap (1) from unisex coupling (2).

(2) Detach dust cap (1) and attaching cable (3) by unthreading attaching cable (3) through attaching split ring (4) on unisex coupling body.

(3) If necessary, remove attaching cable (3) from 2-inch unisex coupling dust cap (1) by cutting cable loop next to dust cap (1). If necessary, remove attaching cable (3) from 3-inch unisex coupling dust cap (1) by unthreading through split ring (5) on dust cap (1).



a. 2-Inch Unisex Coupling



b. 3-Inch Unisex Coupling

Figure 4-4. Unisex Coupling Dust Cap Replacement

b. Assembly.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) If necessary to install attaching cable (3) on 3-inch unisex coupling dust cap (1), thread attaching cable (3) through split ring (5) on dust cap (1). If necessary to install attaching cable (3) on 2-inch unisex coupling dust cap (1), thread attaching cable (3) through dust cap (1) forming a loop. Use a sleeve (6) and crimp loose end of cable to itself.

(2) Install dust cap (1) and attaching cable (3) to unisex coupling (2) by threading attaching cable (3) through split ring (4) on unisex coupling (2).

(3) Install dust cap (1) onto unisex coupling (2).

4.8.4 REPLACE UNISEX COUPLING BUMPER. (Refer to figure 4-5.)

This task consists of: a. Removal b. Assembly

INITIAL SET-UP:

Tools:
Tool kit, General Mechanic Automotive
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
None

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

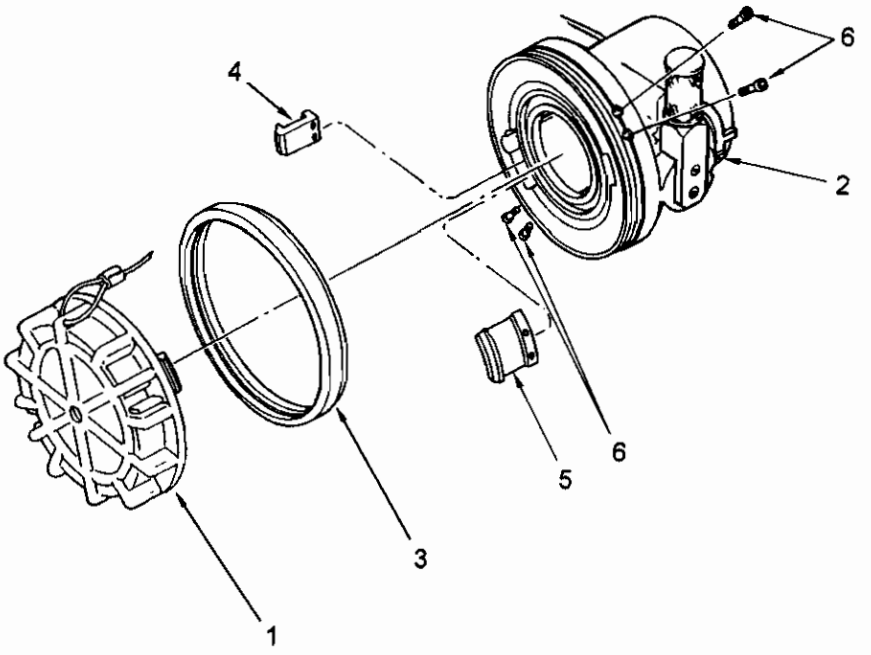
Equipment Condition:
Coupling removed (para. 4.8.1 or 4.8.2)

a. Removal.

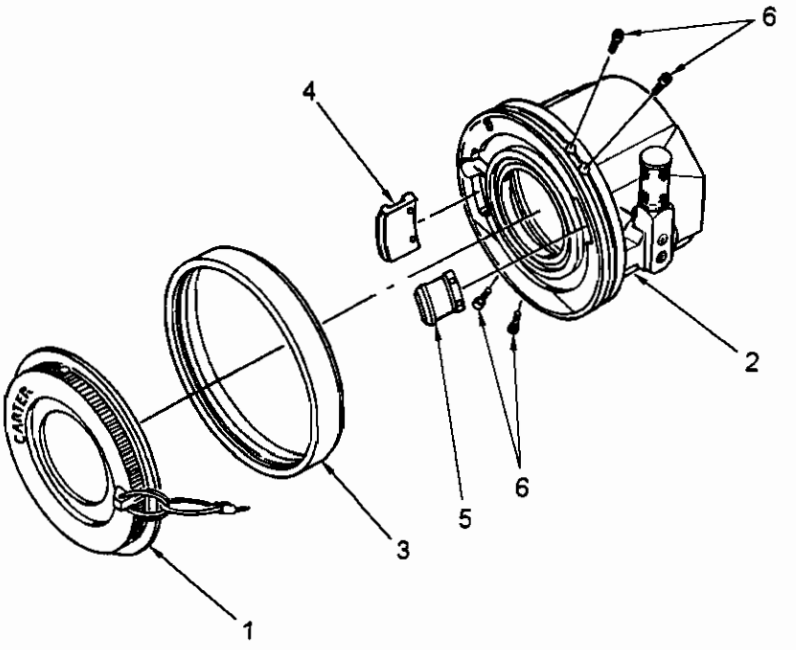
WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove dust cap (1) from unisex coupling (2).



a. 2-Inch Unisex Coupling



b. 3-Inch Unisex Coupling

Figure 4-5. Unisex Coupling Bumper and Lug Replacement

(2) Remove bumper (3) from unisex coupling (2) by hand.

b. Assembly.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Install bumper (3) on unisex coupling (2) such that the tapered edge is facing toward the coupling body.

(2) Install dust cap (1) on unisex coupling (2).

4.8.5 REPLACE UNISEX COUPLING LUGS. (Refer to figure 4-5.)

This task consists of: a. Removal b. Assembly

INITIAL SET-UP:

Tools:
Tool kit, General Mechanic Automotive
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
None

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Coupling removed (para. 4.8.1 or 4.8.2)

a. Removal.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove dust cap (1) from unisex coupling (2).

(2) Remove bumper (3) from unisex coupling (2) by hand.

(3) To remove lugs (4 and 5), remove screws (6).

b. Assembly.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

CAUTION

Do not interchange lugs between the coupling and the dust cap on the three-inch unisex coupling. Dust cap lugs are made of a different material and will fracture if used in coupling. Refer to appendix C for correct replacement parts.

(1) Install lugs (4 and 5) and screws (6).

(2) Install bumper (3) on unisex coupling (2) such that the tapered edge is facing toward the coupling body.

4.8.6 REPLACE THREE-INCH UNISEX COUPLING DUST CAP LUGS. (Refer to figure 4-6.)

This task consists of: a. Removal b. Assembly

INITIAL SET-UP:

Tools:
Tool kit, General Mechanic Automotive
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
None

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Coupling removed (para. 4.8.1 or 4.8.2)

a. Removal.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove dust cap (1) from unisex coupling (2).

(2) To remove lugs (3 and 4) from dust cap (1), remove screws (5).

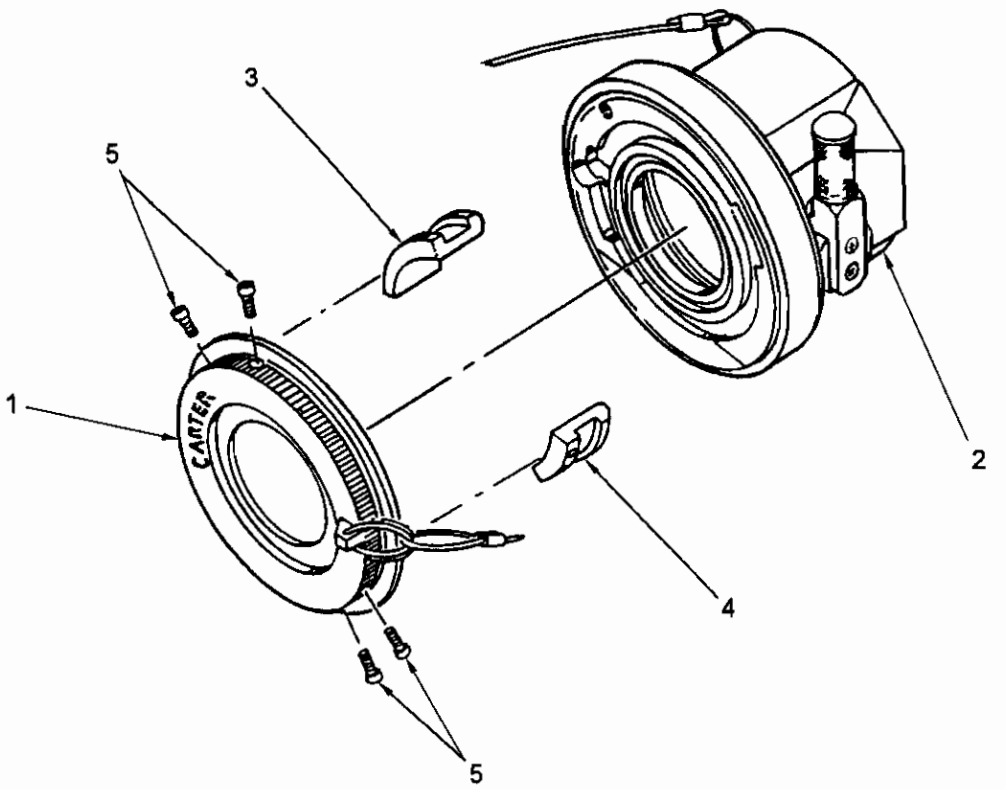


Figure 4-6. Three-Inch Unisex Coupling Dust Cap Lug Replacement

b. Assembly.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

CAUTION

Do not interchange lugs between the coupling and the dust cap on the three-inch unisex coupling. Dust cap lugs are made of a different material and will fracture if used in coupling. Refer to appendix C for correct replacement parts.

(1) To install lugs (3 and 4) on dust cap (1), install screws (5).

(2) Install dust cap (1) on unisex coupling (2).

4.8.7 FUEL HOSE ASSEMBLY REPAIR.

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanic Automotive
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)
Clamping Tool (Appendix B, Section III, Item 3)
Goggles (Appendix B, Section III, Item 2)

Materials/Parts Required:
Rag, wiping (Appendix F, Section II, Item 7)
Seals (4) (Appendix F, Section II Item 6)
Strapping (Appendix F, Section II, Item 4)
Solvent, Dry Cleaning
(Appendix F, Section II, Item 2)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Hose removed from system (para. 2.8)

NOTE

Ensure that all parts identified as mandatory replacement parts are discarded and replaced with new components. Disassemble hoses only to the level required to make repairs.

The following procedure applies to all fuel hoses in the AAFARS system.

a. Disassembly. (Figure 4-7)

WARNING

Rubber gloves should be worn when handling fueling system componenets due to the toxic effetcs of some additives.

(1) Slide rubber sleeve (1) from top of clamps (2 and 3).

(2) Cut clamps (2 and 3) from hose (4).

(3) Cut clamps (5 and 6) from hose (4).

(4) Remove unisex coupling assembly (7) from end of hose (4).

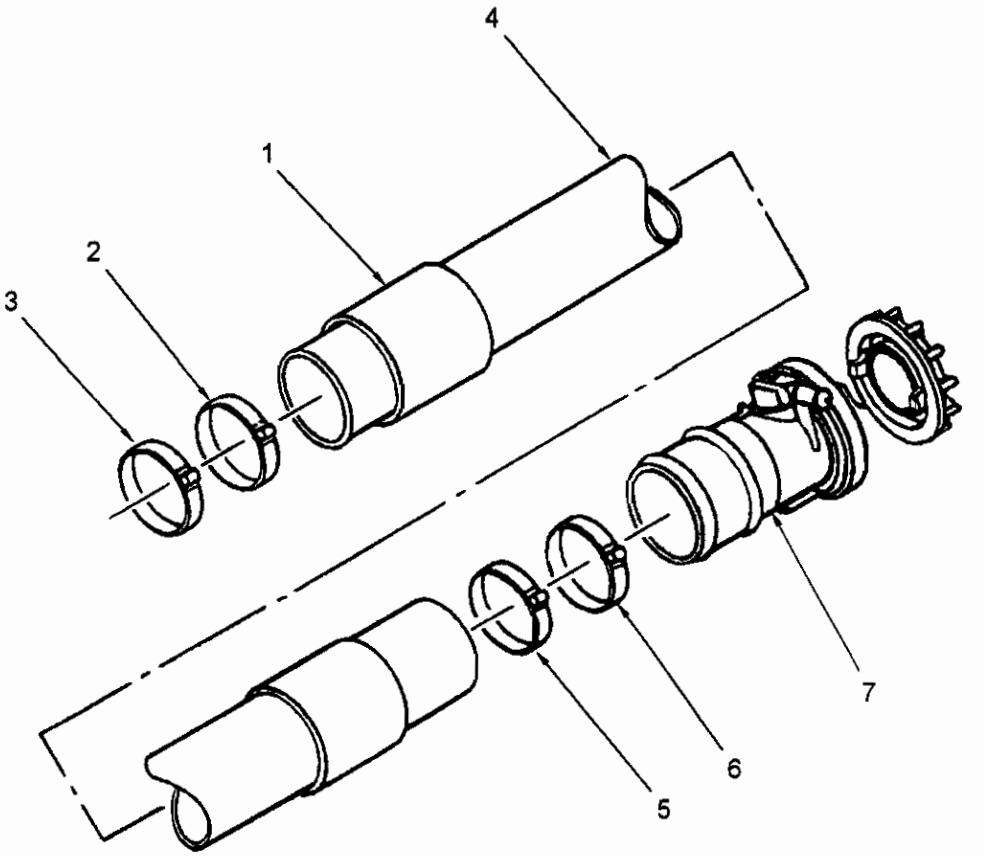


Figure 4-7. Fuel Hose Disassembly and Cleaning

b. Cleaning.

WARNING

- Dry cleaning solvent, P-D-680, Type III, is potentially dangerous to personnel and property. Eye and skin protection is required. Avoid repeated and prolonged skin contact. Wash hands immediately after exposure. Do not use near open flame or excessive heat. Use only in areas with good ventilation.
- Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives and the dry cleaning solvent.

Using wiping rags and dry cleaning solvent (P-D-680), remove dirt and contaminants from all components.

c. Inspection. (Figure 4-7)

(1) Inspect valved unisex coupling assembly (7) for cracks, corrosion and damaged coupling body.

(2) Inspect hose (4) for cuts, tears, punctures, bulges and delamination.

(3) Inspect ends of hose (4) for damaged or missing ground wires. Perform continuity test of ground wire from one end of hose to the other. Continuity must exist.

(4) Inspect ground wires at both ends of hose (4). At least 1/2 inch of wire must be exposed. If required, trim back hose material to obtain correct wire length.

d. Repair.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Replace damaged components and all mandatory replacement parts.

(2) Repair unisex valve coupling assembly (7) IAW para. 4.8.3 through 4.8.6 or refer to unit maintenance.

(3) Slide sleeve (1) onto hose (4) and position it about 12 inches back from end of hose.

(4) Fold ends of grounding wires into hose (4).

(5) Push unisex valved coupling assemblies (7) into ends of hose (4).

(6) Perform continuity test between unisex coupling assemblies (7) to ensure ground wires are firmly seated. Continuity must exist.

e. Assembly. (Figure 4-8)

(1) Wrap end of clamp (1) around hose (3) and through seal (2).

(2) Wrap another loop of clamp (1) around hose (3) and through seal (2).

(3) Position tag end of clamp (1) in slots of clamping tool (4). Tool nose (5) should fit snug against seal (2).

(4) Apply pressure to gripper lever (6) and turn handle (7) until clamp (1) is snug. Tool will lock in place when correct tension is applied. Reposition tool as required.

CAUTION

Strapping may break if operator does not release tension on handle when bending over seal.
Strapping can damage hose if over tightened.

(5) Turn handle (7) to the right (clockwise) to tighten strapping (1). Continue turning handle until strapping stops moving through seal (2).

(6) While reversing handle (7) 3/4 turn, roll tool (4) to opposite side of seal (2). (This will bend strapping and prevent it from slipping through seal when tool is removed).

(7) Pull cutting handle (8) on tool to cut strapping (1).

(8) Remove tool (4) while holding strapping stub down on seal (2) with thumb.

(9) Clinch end of clamp (1) by hammering down tag end of clamp over seal (2).

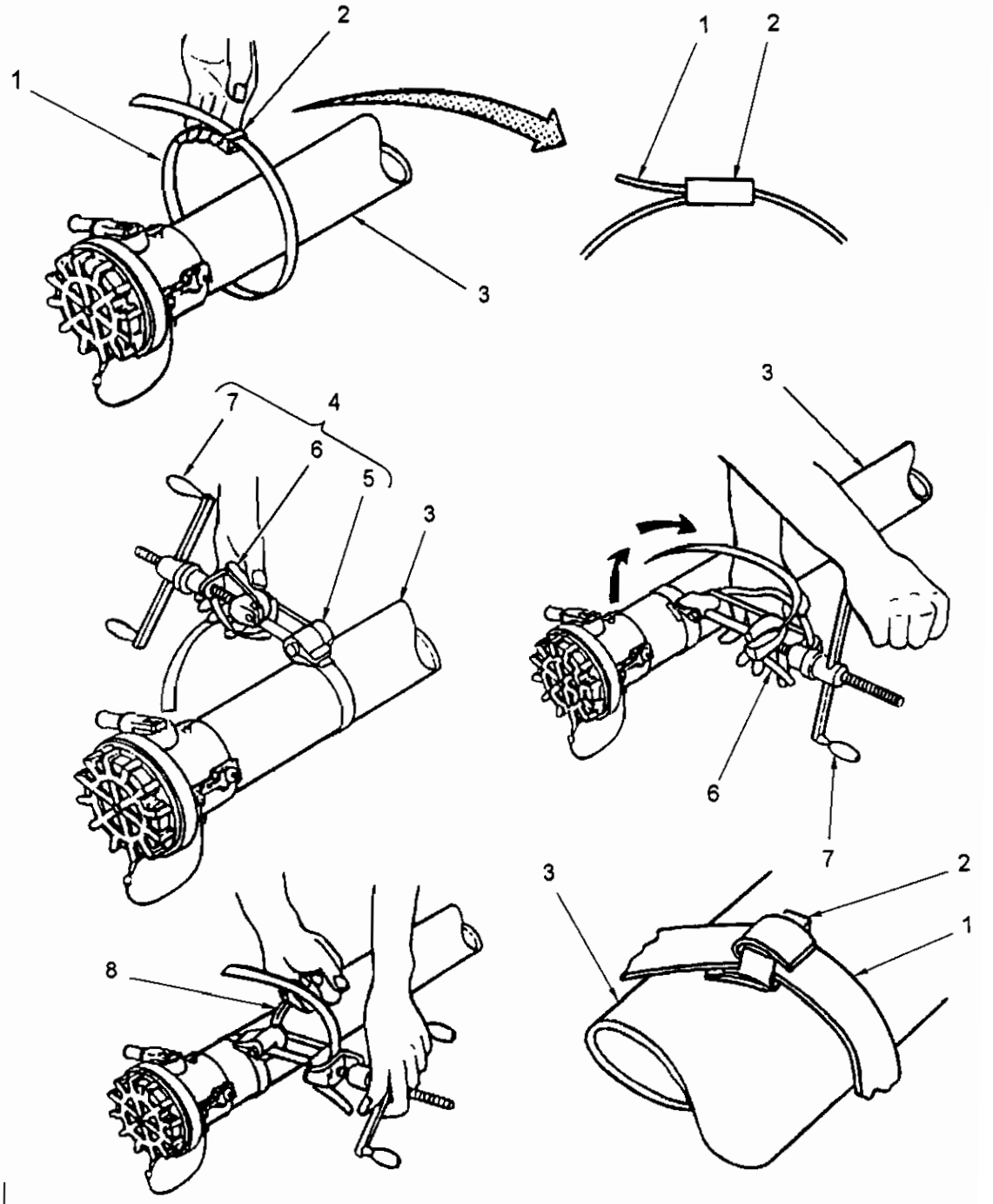


Figure 4-8. Assembly of Repaired Fuel Hose

(10) Repeat steps (1) through (7) for remaining clamps. Clamps should be 1 inch from end of hose and 2 inches apart.

(11) Refer to Figure 4-7 and slide sleeve (1) over clamps (2 and 3).

(12) Start up fuel system and observe repaired hose for leaks.

4.8.8 REPLACE TWO-INCH NON-VALVED UNISEX COUPLING. (Refer to figure 4-9.)

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanics
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
O-Ring (Appendix I, Item 8)
Petrolatum (Appendix F, Section II, Item 5)
O-Ring (Appendix I, Item 6)
Rag, Wiping (Appendix F, Section II, Item 7)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.
- Fuel is flammable. Do not smoke.

Equipment Condition:
AAFARS shutdown (NORMAL SYSTEM SHUTDOWN, para. 2.5.1)
Component removed from system (para. 2.8)

a. Removal.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove ball retaining screw (1) and O-ring (2).

(2) Position a wiping rag under the coupling (3) with screw hole oriented toward wiping rag. Push in and rotate unisex coupling (3) back and forth until all 41 balls (4) have collected in the wiping rag.

(3) Pull unisex coupling (3) from inlet (5).

(4) Remove and discard O-ring (6) from inlet (5).

(5) Remove and retain spring (7) from unisex coupling.

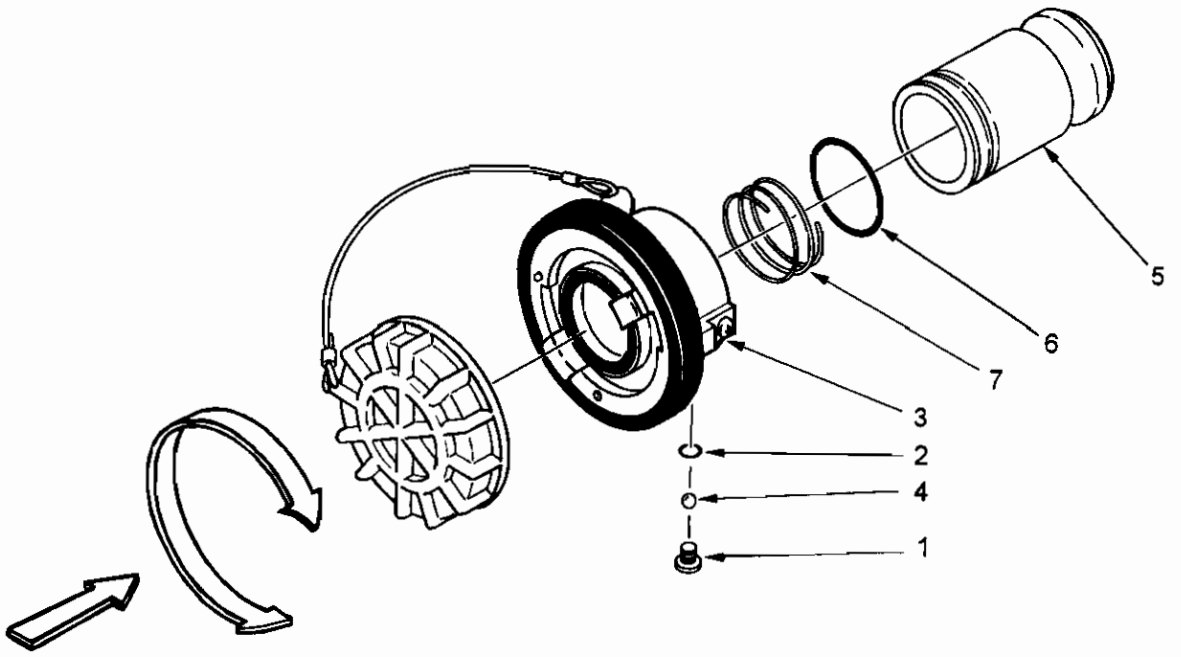


Figure 4-9. Removal and Installation of Two-Inch Non-Valved Unisex Coupling.

b. Installation.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

NOTE

When inserting balls in unisex coupling ball race, use caution to avoid dropping loose balls. Work over a wiping rag.

(1) Lightly lubricate inlet O-ring (6) with petrolatum and install in second (square) groove of inlet (5).

(2) Place spring (7) in unisex coupling.

(3) Slide the unisex coupling (3) onto the inlet (5). Hold unit over a wiping rag with screw hole facing up and adjust position until ball race (rounded groove) is centered under screw hole. Install balls (4) one at a time, rotating unisex coupling back and forth until all 41 balls (4) have been inserted.

(4) Install ball retaining screw (1) and O-ring (2) in unisex coupling (3). Tighten retaining screw.

4.8.9 REPAIR TWO-INCH NON-VALVED UNISEX COUPLING. (Refer to figure 4-10.)

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanics
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
None

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.

Equipment Condition:
Component removed from system.
(para. 4.8.8.)

NOTE

Inspect the coupling components as they are disassembled. Repair is limited to replacement of unserviceable components discovered during disassembly.

a. Disassembly and Inspection.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove spring (1) from unisex coupling (2).

(2) If the dust cap (3) or cable (4) is to be replaced, cut cable (4) to remove.

(3) The ring (5) attaching cable (4) to unisex coupling (2) may be removed from the cable (4) by rotating it through the split portion of the ring (5).

(4) Remove the bumper (6) only if it is to be replaced or the lugs (7 and/or 8) must be replaced.

(5) Remove screws (9) to remove lugs (7 and/or 8).

(6) Remove locking pin (10) and spring (11).

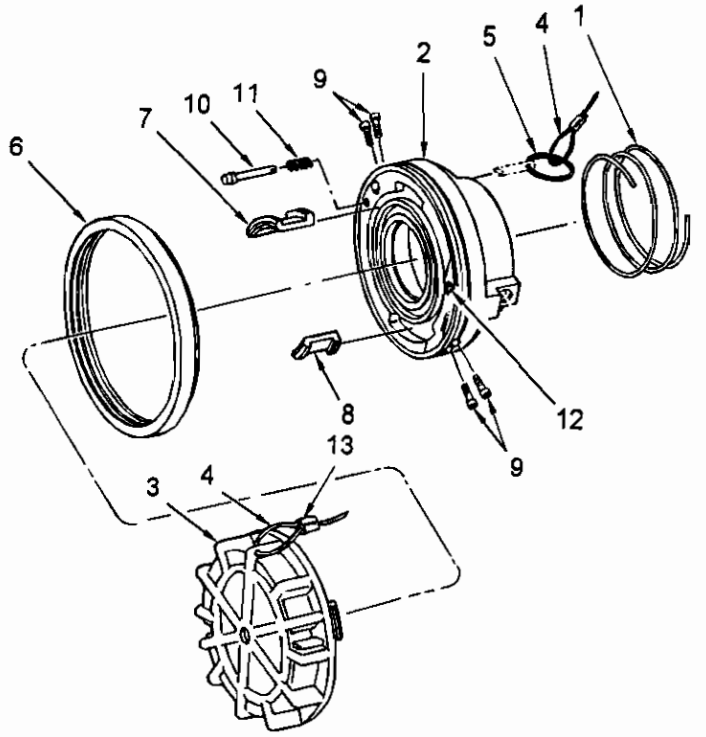


Figure 4-10. Repair of Two Inch Non-Valved Unisex Coupling

NOTE

Do not remove continuity ball (12) from unisex coupling body. If continuity ball requires replacement, the entire unisex coupling must be replaced.

b. Assembly.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Install locking pin (10) and spring (11).

(2) Install lugs (7 and/or 8) with screws (9).

(3) Install bumper (6) onto coupling body such that the tapered edge is facing the unisex coupling (2) body.

(4) Attach cable (4) to dust cap (3) by looping about 6 inches of cable through the hole in dust cap (3) forming a loop back on the cable (4). Install and crimp a sleeve (13) over the two sections of cable (4).

(5) If cable (4) was cut, attach cable (4) to split ring (5) by looping about 6 inches of cable through the ring (5) forming a loop back on the cable (4). Install and crimp a sleeve (13) over the two sections of cable (4). If cable (4) was not cut, attach to split ring (5) by rotating split ring (5) through cable (4) loop.

(6) Install spring (1) in unisex coupling (2).

4.8.10 REPLACE AUXILIARY PUMP. (Refer to figure 4-11.)

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools:
Tool kit, General Mechanic Automotive (Appendix B, Section III, Item 1)
Machinist's Vise (Appendix B, Section III, Item 2)
Wash Pan (Appendix B, Section III, Item 2)
Chemical and Oil Protective Gloves (Appendix B, Section III, Item 2)

Materials/Parts Required:
Rag, Wiping (Appendix F, Section II, Item 7)
Thread Sealant (Appendix F, Section II, Item 1)
Teflon Tape (Appendix F, Section II, Item 9)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Auxiliary pump removed from system. (para. 2-7)

WARNING

- Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark, or to static discharge. Do not permit smoking, any open flame, or spark producing equipment within fifty (50) feet (15.24 m) of the auxiliary pump module during maintenance.
- Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

NOTE

This procedure assumes that the auxiliary pump module has been defueled. However, some residual fuel may remain due to normal drainage after defueling.

a. Removal.

(1) Remove the four screws (1), nuts (2) and washers (3) that attach the power cable connector (4) and the dust cap lanyard (5) to the module frame (6).

(2) Remove the two hex head bolts (7), lock washers (8) and flat washers (9) that attach the motor end of the pump assembly (10) to the frame (6).

(3) Support the pump assembly (10) and remove the four hex head bolts (11), lock washers (12) and flat washers (13) that attach the pump assembly end to the frame (6). Remove the pump assembly (10) from the frame (6). Install four bolts (11), washers (12 and 13) in the pump assembly (10).

(4) Hold the pump assembly (10) over a wash pan, remove the dust cap (14) from one of the unisex couplings, open the unisex coupling valve and drain all residual fuel. Close the unisex coupling valve, install the dust cap (14) and repeat the procedure with the other unisex coupling.

(5) Place the pump end of the pump assembly (10) in a vise.

(6) Remove outlet reducer (15) and outlet coupling (16) as an assembly.

(7) Remove the inlet unisex coupling (17) from the pump assembly (10).

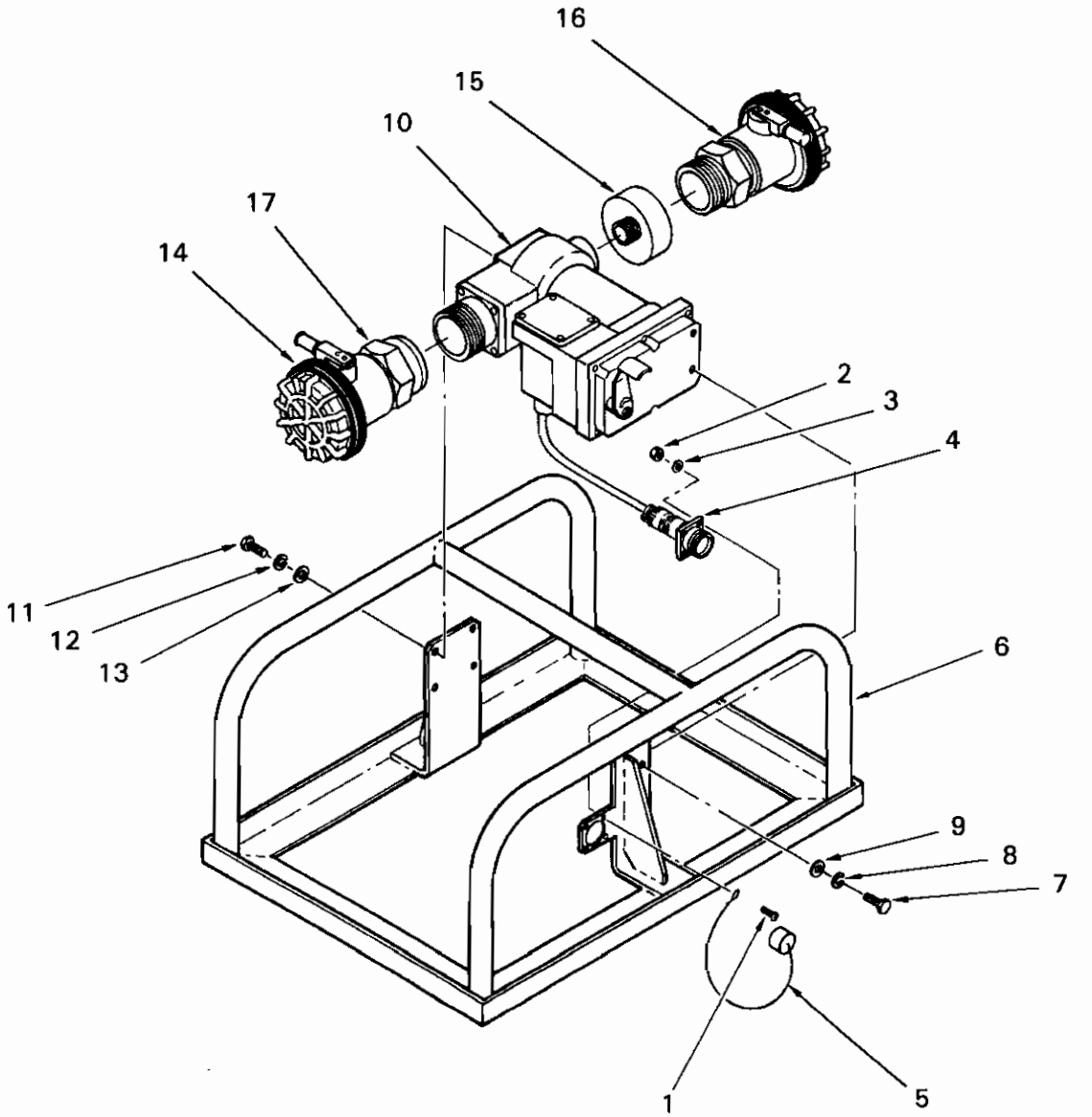


Figure 4-11. Auxiliary Pump Module

b. Installation.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Clean the threads on the outlet reducer (15) and pump assembly (10) inlet coupling as required.

(2) Place the pump end of the pump assembly (10) in a vise.

(3) Wrap three or four complete layers of teflon tape on the threads of the pump inlet coupling (17). Apply a bead of thread sealant over the teflon tape and install and tighten the pump inlet coupling (17) on the pump assembly (10).

(4) Wrap three or four complete layers of teflon tape on the threads of the outlet reducer (15). Apply a bead of thread sealant over the teflon tape and install and tighten the reducer/outlet coupling assembly on the pump assembly (10).

(5) Remove the pump assembly (10) from the vise and remove four bolts (11), lock washers (12) and flat washers (13) from pump assembly (10), position pump assembly in the frame (6) and loosely install the four bolts (11), lock washers (12) and flat washers (13) that hold the pump end to the frame (6).

(6) Install and tighten the two bolts (7), lock washers (8) and flat washers (9) that hold the motor end to the frame (6).

(7) Tighten the four pump end bolts (11).

(8) Use the four screws (1), nuts (2) and washers (3) to attach the power cable connector (4) to the module frame (6). Install the dust cap lanyard (5) to the upper left mounting screw (1).

4.8.11 CLEAN AND REPLACE AUXILIARY PUMP INLET COMPONENTS. (Refer to figure 4-12.)

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanic Automotive (Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves (Appendix B, Section III, Item 2)

Materials/Parts Required:
Gasket, Inlet Flange (Appendix I, Item 9)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Auxiliary Pump Module removed from system. (para. 2.7)

WARNING

Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark, or to static discharge. Do not permit smoking, any open flame, or spark producing equipment within fifty (50) feet (15.24 m) of the auxiliary pump during repair.

NOTE

This procedure assumes that the auxiliary pump has been defueled. However, some residual fuel may remain due to normal drainage after defueling.

Inspect all components as they are disassembled. Repair is limited to replacement of unserviceable components discovered during disassembly.

a. Disassembly and Inspection.

(1) Remove the four bolts (1) that attach inlet flange (2) to pump housing (3).

(2) Remove and discard inlet flange gasket (4).

(3) Remove and clean inlet screen (5).

(4) Remove inlet check valve (6) from pump housing (3).

(5) Operate the check valve (6) by hand to ensure freedom of movement. Inspect for wear or damage. If the check valve (6) is worn or damaged or does not move freely, replace the check valve (6).

b. Assembly.

(1) Position inlet check valve (6) in pump housing (3).

(2) Position inlet screen (5) on pump housing (3).

(3) Position inlet flange gasket (4) on pump housing (3).

(4) Install inlet flange (2) on pump housing (3) using the four bolts (1).

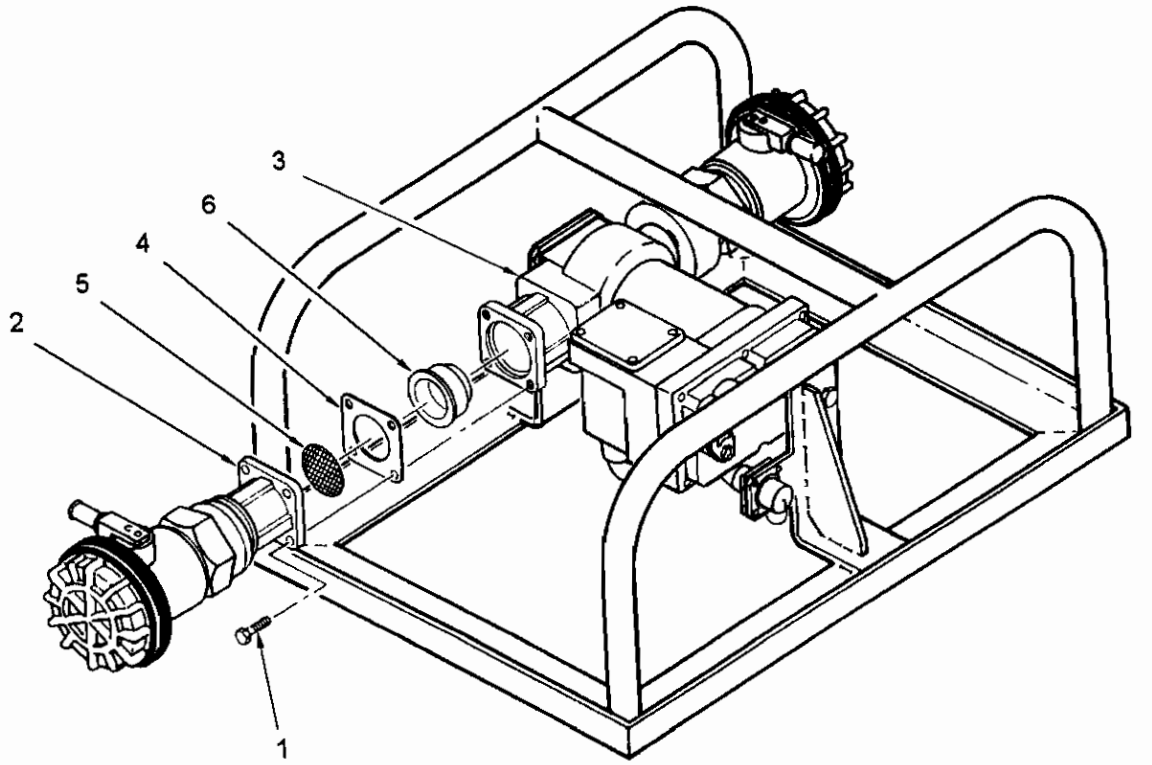


Figure 4-12. Auxiliary Pump Inlet Components

4.8.12 REPLACE AUXILIARY PUMP ROTOR VANES. (Refer to figure 4-13.)

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanic Automotive
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)

Materials/Parts Required:
Gasket, Rotor Cover (Appendix I, Item 18)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Auxiliary Pump removed from Auxiliary Pump Module (para. 4.8.10)

WARNING

- Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark, or to static discharge. Do not permit smoking, any open flame, or spark producing equipment within fifty (50) feet (15.24 m) of the auxiliary pump during repair.
- Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

NOTE

- This procedure assumes that the auxiliary pump has been defueled. However, some residual fuel may remain due to normal drainage after defueling.
- Inspect all components as they are disassembled. Repair is limited to replacement of unserviceable components discovered during disassembly.

a. Disassembly and Inspection.

(1) Remove four bolts (1) that attach pump rotor cover (2). Remove cover (2).

(2) Remove and discard rotor cover gasket (3).

NOTE

A new pump rotor vane is 7/16 in. high. Replace vane if height is 9/32 in. or less. A vane that does not make good contact with pump chamber will cause loss of suction.

(3) Remove the five vanes (4) from rotor (5). Inspect vanes (4) for damage and wear.

(4) Remove rotor key (6). Inspect for damage or deformation. Replace if damaged or deformed.

(5) Remove rotor (5). Inspect for damage. Scratches will not affect the rotor; however, burrs should be removed.

b. Assembly.

(1) Slide rotor (5) on armature shaft over shaft seal assembly.

(2) Align slots in rotor (5) with slot (7) on armature shaft. Install rotor key (6).

(3) Install the five rotor vanes (4), with smooth side of vanes facing direction of rotor (5) rotation (clockwise).

(4) Install rotor cover gasket (3) in pump housing (8) groove (9).

(5) Position rotor cover (2) on pump housing. Install the four bolts (1) that attach pump rotor cover (2) to pump housing (8). Do not over tighten the four bolts (1).

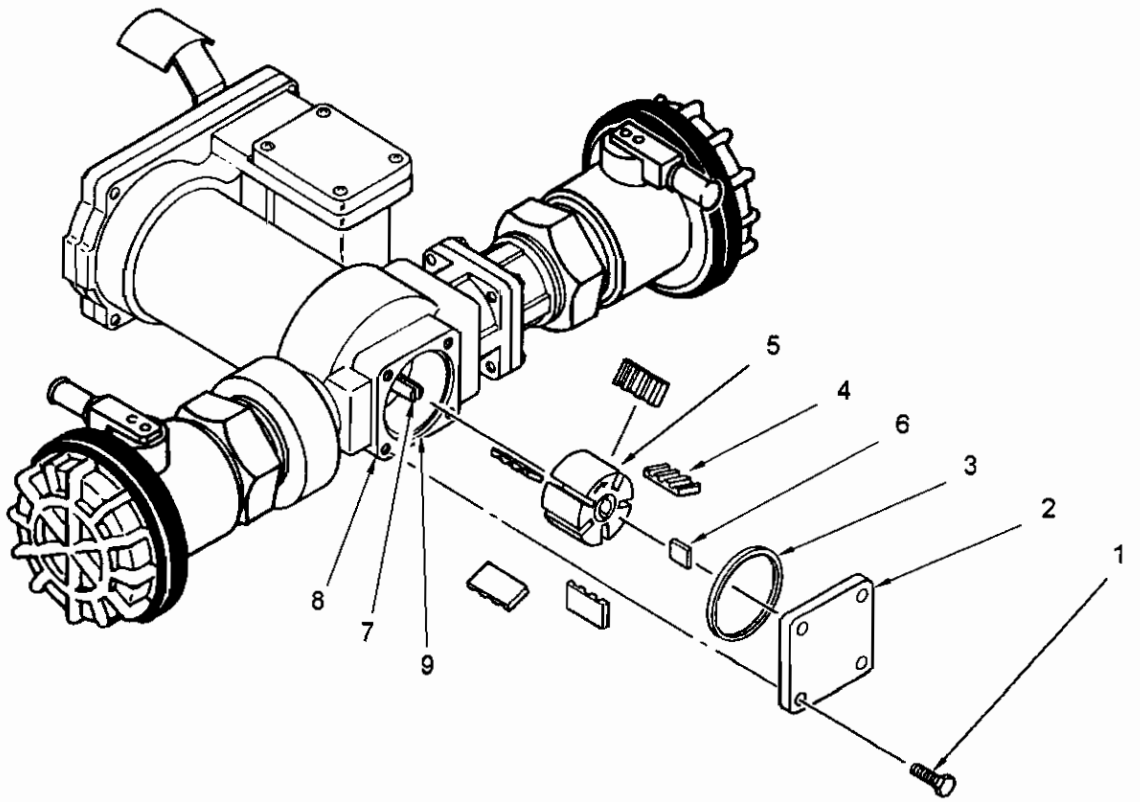


Figure 4-13. Auxiliary Pump Rotor Vane Replacement

4.9 SPECIAL INSTRUCTIONS FOR 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.

Before placing the equipment in administrative storage, current preventative maintenance should be completed, shortcomings and deficiencies should be corrected, and all Modification Work Orders (MWO) should be applied.

Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, truck, vans, codex containers, and other containers may be used.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE

Section I. DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

5.1 INTRODUCTION.

The repair procedures provided in this chapter assume that unit troubleshooting has been performed and isolated the malfunction to a level of repair beyond their capabilities. No additional troubleshooting is required, only repair of the malfunctioning assembly.

Section II. DIRECT SUPPORT MAINTENANCE PROCEDURES

5.2 REPAIR THREE-INCH VALVED UNISEX COUPLING. (Refer to figure 5-1)

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
- Screwdriver, Cross Tip, Size 2 (Appendix B, Section III, Item 2)
- Key, Socket Head Screw, 7/64 in. (Appendix B, Section III, Item 2)
- Key, Socket Head Screw, 9/64 in. (Appendix B, Section III, Item 2)
- Key, Socket Head Screw, 7/32 in. (Appendix B, Section III, Item 2)
- Punch (Drift Pin), (Appendix B, Section III, Item 2)
- Pick (or machinist's scribe) (Appendix B, Section III, Item 2)
- Chemical and Oil protective gloves, (Appendix B, Section III, Item 2)
- Goggles (Appendix B, Section III, Item 2)

Materials/Parts Required:
- Solvent, dry cleaning (Appendix F, Section II, Item 2)
- Cloth, lint free (Appendix F, Section II, Item 3)
- Petrolatum (Appendix F, Section II, Item 5)
- O-ring (Appendix I, Item 10)
- O-ring (Appendix I, Item 11)
- Grit paper (Appendix F, Section II, Item 8)
- Bushing (Appendix I, Item 12)
- Bushing (Appendix I, Item 13)
- Seal (Appendix I, Item 14)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.
- Fuel is flammable. Do not smoke.

Equipment Condition:
Three-inch valved unisex coupling removed from inlet (para. 4.8.1)

a. Disassembly.

WARNING

Rubber gloves should be worn when handling fueling system componenets due to the toxic effetcs of some additives.

(1) Unthread dust cap attaching cable (1) from split rings (2).

(2) Place handle assembly (3) in closed position, rotate and remove dust cap (4) from coupling. then place handle assembly (3) in open position.

(3) Remove screws (5) and handle assembly (3).

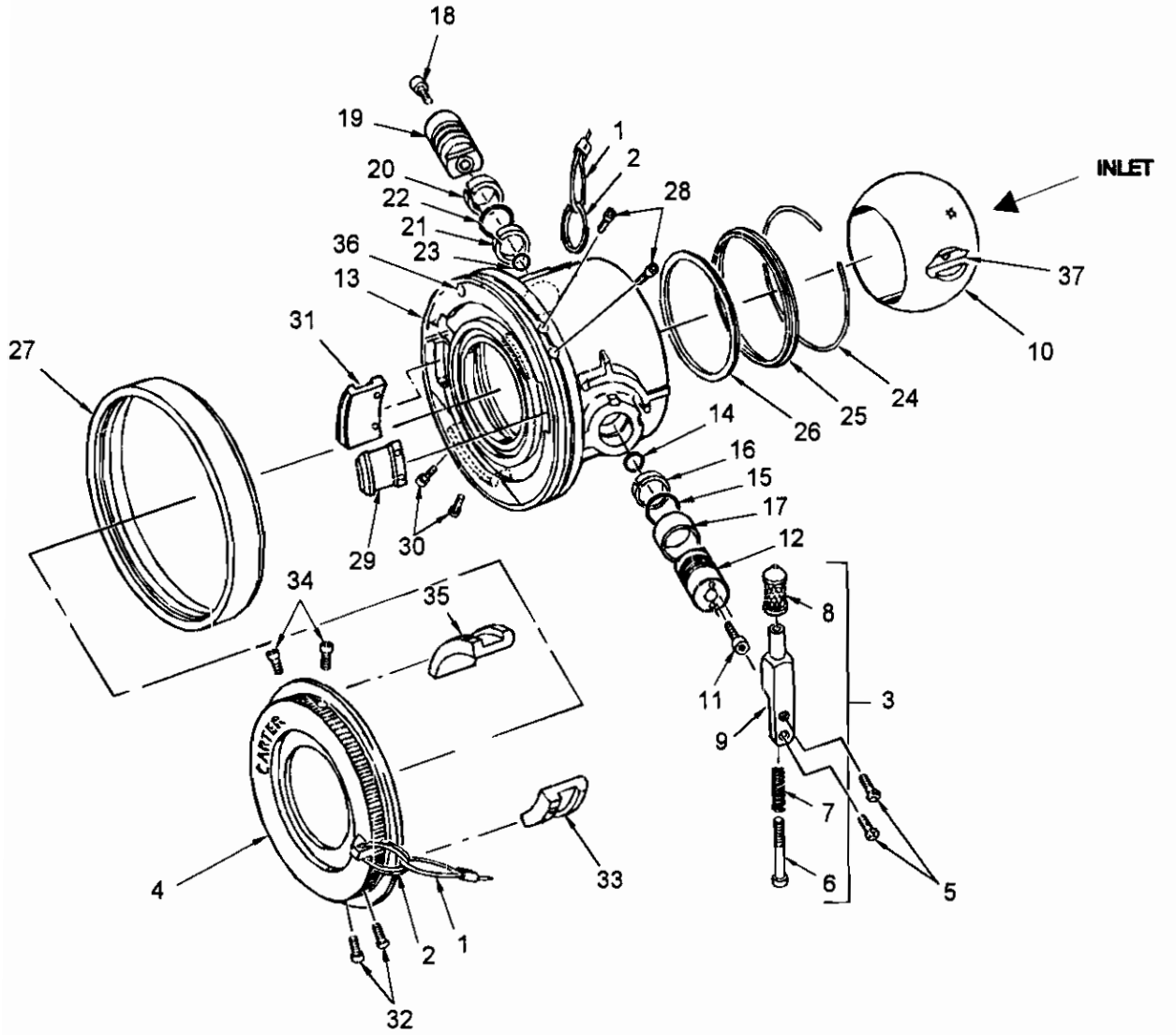


Figure 5-1. Three Inch Valved Unisex Coupling

(4) If handle assembly (3) requires repair, remove socket head screw (6), spring (7), and knob (8) from handle (9).

(5) Hold valve ball (10) with thumb and remove socket head screw (11) from handle-side shaft (12).

(6) Install one screw (5) in the handle-side shaft (12) and pull shaft (12) from housing (13). Remove and discard O-ring (14).

(7) Remove and discard O-ring (15) and bushings (16) and (17).

(8) Hold valve ball (10) with thumb and remove socket head screw (18) from attaching-cable-side shaft (19).

(9) Reaching in the inlet end, rotate the valve ball (10) by hand and remove it from the housing (13).

(10) Push out the attaching-cable-side shaft (19). Remove and discard bushings (20) and (21) and O-rings (22) and (23).

(11) Use pick or scribe to remove seal wire (24).

CAUTION

Avoid scratching or gouging beveled edge of seal retainer (25) under seal wire (24), or any sealing surface. Gouges or burrs may cause the valve to malfunction.

(12) Use pick (or scribe) to remove seal retainer (25). Insert pick between inner edge of retainer and seal, work down to bottom of retainer, rotate under retainer and lift to unseat and remove retainer. Repeat this process all around inner edge of the retainer until it is free.

(13) Remove and discard seal (26).

(14) Remove the bumper (27) by hand.

(15) Remove screws (28) and lug (29).

(16) Remove screws (30) and lug (31).

(17) Remove screws (32) and lug (33).

(18) Remove screws (34) and lug (35).

b. Inspection.

(1) Inspect all metal parts for dings, gouges, abrasions etc. On all parts except the ball (10), use 320 grit paper to smooth and remove sharp edges. If ball (10) is damaged (scratched, gouged, etc.) it should be replaced.

(2) Check the groove (round bottom) in the inlet for burrs on the corners. If groove is worn such that burrs exist, use 320 grit paper to smooth and remove sharp edges.

(3) Inspect the small spring-loaded continuity ball (36) located in the face of the unit. Push the ball in and be sure that it pops back into place. Replace entire coupling if continuity ball does not pop back out.

(4) Inspect screw (6) and handle (9) for damage. If either part is bent, replace it.

WARNING

Dry cleaning solvent, P-D-680, Type III, is potentially dangerous to personnel and property. Eye and skin protection is required. Avoid repeated and prolonged skin contact. Wash hands immediately after exposure. Do not use near open flame or excessive heat. Use only in areas with good ventilation.

Rubber gloves should be worn when handling fueling system componenets due to the toxic effetcs of some fuel additives and the dry cleaning solvent.

(5) Make certain all components are clean and free from oil, grease, or dirt. Wash all parts with an approved dry cleaning solvent and dry thoroughly with a clean, lint-free cloth.

c. Assembly.

(1) Place seal (26) into housing (13) with the flat surface inserted into the housing. Press into place with fingers.

(2) Insert seal retainer (25). Work into place with fingers to seat seal (26) and clear groove for seal wire (24).

CAUTION

Avoid damage (scratching, gouging, etc.) to housing surfaces and seal retainer (25) during installation of wire seal. Gouges or burrs may cause valve to malfunction.

(3) Install open end of seal wire (24) into housing (13) at an angle and slide seal wire down into groove.

CAUTION

Do not interchange lugs between the coupling and the dust cap on the three-inch unisex coupling. Dust cap lugs are made of a different material and will fracture if used in coupling. Refer to appendix C for correct replacement parts.

(4) Install screws (28) and lug (29).

(5) Install screws (30) and lug (31).

(6) Instal screws (32) and lug (33).

(7) Instal screws (34) and lug (35).

(8) Install bumper (27) onto housing (13) such that the tapered edge is facing toward the housing.

(9) Insert valve ball (10) into housing (13) with shaft flats (37) on ball aligned with shaft holes in housing.

(10) Lightly lubricate replacement O-ring (22) with petrolatum and install bushings (20) and (21) and O-ring (22) onto attaching-cable-side shaft (19).

(11) Place O-ring (23) into groove in inside end of attaching-cable-side shaft (19) and insert attaching-cable-side shaft (19) into housing (13) and ball (10).

NOTE

It is normally possible to install the valve ball without regard to left-right or front-rear position. Occasionally, however, a ball will not be perfectly machined and the operating shafts will engage in one position only. If this problem occurs when installing the shafts, it will be necessary to remove the valve ball and install in a different position to allow the shafts to align properly for engagement with the valve ball.

(12) Install bushing (17) onto the handle-side shaft (12). Lightly lubricate O-ring (15) with petrolatum and install bushing (16) and O-ring (15) onto handle-side shaft (12). Place O-ring (14) into inside groove in handle-side shaft (12) and insert handle-side shaft (12) into housing (13) and valve ball (10). If handle-side shaft (12) will not mate with valve ball (10), remove handle-side shaft (12), rotate valve ball (10) and insert handle-side shaft (12). Install retaining screw (11) to secure handle-side shaft (12) to valve ball (10). Hold valve ball (10) with fingers while tightening screw (11).

(13) Install screw (18) to attach attaching-cable-side shaft (19) to valve ball. Hold valve ball with fingers while tightening screw (18).

(14) If removed, install spring (7) and socket head screw (6) into handle (9), place knob (8) on handle and tighten.

(15) Install handle assembly (3) to housing (13) using screws (5).

(16) Open and close coupling valve twice to be sure it operates properly.

(17) Place handle assembly (3) to housing (13) using screws (5).

(18) Thread attaching cable (1) through split rings (2).

5.3 REPAIR TWO-INCH VALVED UNISEX COUPLING. (Refer to figure 5-2)

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanics
(Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves
(Appendix B, Section III, Item 2)
Goggles (Appendix B, Section III, Item 2)

Materials/Parts Required:
Solvent, dry cleaning
(Appendix F, Section II, Item 2)
Lint free cloth (Appendix F, Section II, Item 3)
Petrolatum (Appendix F, Section II, Item 5)
O-ring (Appendix I, Item 15)
O-ring (Appendix I, Item 16)
Seal (Appendix I, Item 17)
Grit paper (Appendix F, Section II, Item 8)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.
- Using dry cleaning solvents incorrectly can cause injury or even death.
- Fuel is flammable. Do not smoke.

Equipment Condition:
Two-inch valved unisex coupling removed from inlet (para. 4.8.1)

WARNING

Rubber gloves should be worn when handling fueling system componenets due to the toxic effetcs of some additives.

NOTE

Inspect the coupling components as they are disassembled. Repair is limited to replacement of unserviceable components discovered during disaseembly. Removed O-rings and seals shall be replaced

a. Disassembly.

(1) Place handle assembly (1) in closed position and remove dust cap (2) from 2 inch valved unisex coupling (3).

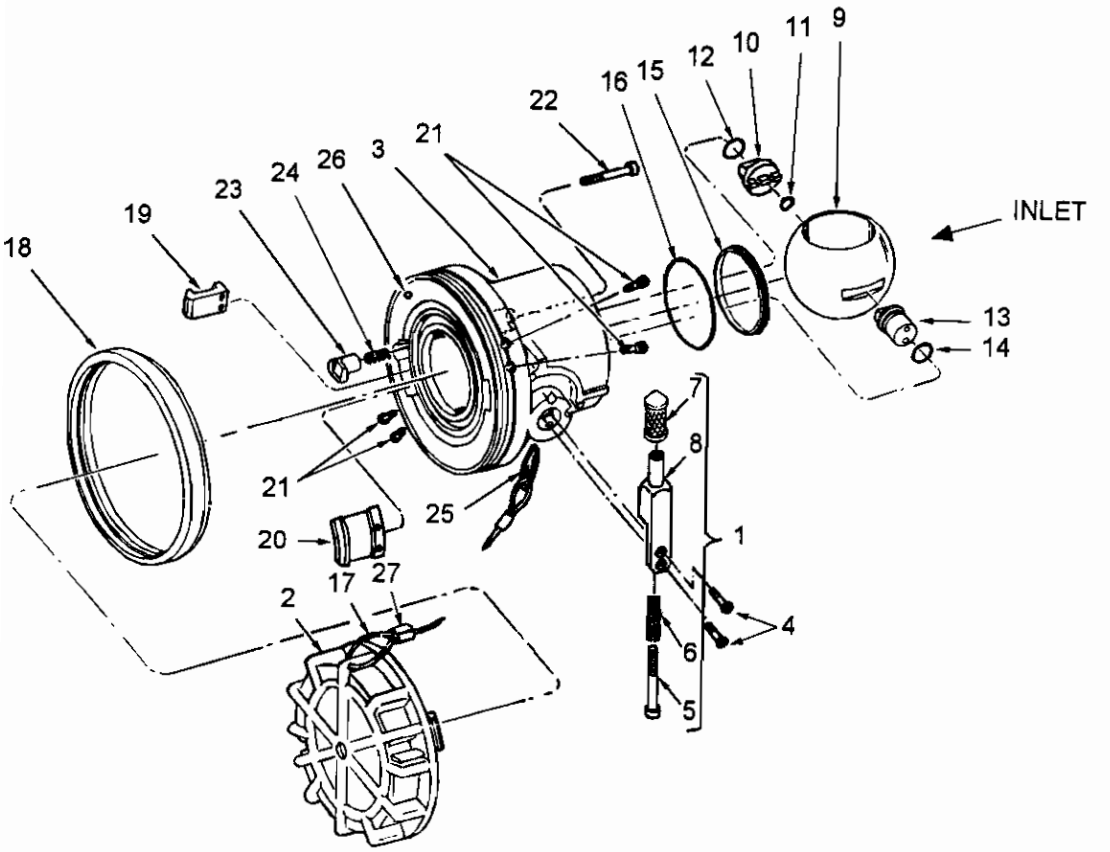


Figure 5-2. Two Inch Valved Unisex Coupling

(2) Remove screws (4) from handle assembly (1). Remove handle assembly (1).

(3) If necessary to disassemble handle assembly (1), remove screw (5), spring (6) and grip (7) from handle (8).

(4) Remove ball (9) from 2 inche valved unisex coupling (3).

(5) Remove stop pin (10) and wave washer (11) along with O-ring (12). Discard O-ring.

(6) Remove shaft (13) from inside 2 inch valved unisex coupling (3). Remove and discard O-ring (14).

(7) Remove downsteam seal (15) and O-ring (16) from 2 inch valved unisex coupling (3).

(8) If the dust cap (2) or attaching cable (17) is to be replaced, cut the cable (17).

(9) Remove bumper (18) only if it is to be replaced or it is necessary to remove lugs (19 or 20).

(10) To remove lugs (19 or 20), remove screws (21).

(11) If interlock mechanism removal is necessary, remove screw (22), lockout pin (23) and spring (24).

(12) If cable (17) is to be removed from 2 inch valved unisex coupling (3) remove split ring (25) from 2 inch unisex coupling (3).

b. Inspection.

(1) Inspect all metal parts for dings, gouges, abrasions etc. On all parts except the ball (9), use 320 grit paper to smooth and remove sharp edges. If ball (9) is damaged (scratched, gouged, etc.) it should be replaced.

(2) Check the groove (round bottom) in the inlet for burrs on the corners. If groove is worn such that burrs exist, use 320 grit paper to smooth and remove sharp edges.

(3) Inspect the small spring-loaded continuity ball (26) located in the face of the unit. Push the ball in and be sure that it pops back into place. Replace entire coupling if continuity ball does not pop back out.

(4) Inspect screw (5) and handle (8) for damage. If either part is bent, replace it.

WARNING

Dry cleaning solvent, P-D-680, Type III, is potentially dangerous to personnel and property. Eye and skin protection is required. Avoid repeated and prolonged skin contact. Wash hands immediately after exposure. Do not use near open flame or excessive heat. Use only in areas with good ventilation.

Rubber gloves should be worn when handling fueling system componenets due to the toxic effetcs of some fuel additives and the dry cleaning solvent.

(5) Make certain all components are clean and free from oil, grease, or dirt. Wash all parts with an approved dry cleaning solvent and dry thoroughly with a clean, lint-free cloth.

c. Assembly.

NOTE

During assembly, apply a light coat of petrolatum to O-rings before installation.

(1) If interlock mechanism was removed, install lockout pin (23), spring (24) and screw (22) in 2 inch valved unisex coupling (2).

CAUTION

The lugs used in AAFARS unisex couplings are made of two different materials, stainless steel and aluminum. The two-inch suction hoses, two-inch wyes and all three-inch unisex couplings have stainless steel long and short lugs in the coupling body; three-inch dust caps have aluminum lugs. The discharge hoses, tees, crosses, manifolds and elbow unisex couplings have aluminum long and short lugs. Verify the correct lugs by using the parts listing in Appendix C of this manual.

(2) If lugs (19 or 20) were removed, install lugs (19 or 20) and screws (21).

(3) If removed, install bumper (18) such that tapered edge is facing toward the housing.

(4) If dust cap cable (17) was cut to remove it from dust cap (2), thread cable through dust cap (2) forming a loop. Use a sleeve (27) and crimp loose end of cable to itself.

(5) Install O-ring (16) and downstream seal (15) in 2 inch valved unisex coupling (3).

(6) Install O-ring (14) on shaft (13) and install shaft from inside 2 inch valved unisex coupling (3).

(7) Using screws (4) install handle assembly (1) on shaft (13). Rotate handle assembly to closed position.

NOTE

When installing stop pin, position the coupling body with the inlet toward you and rotated so hole for stop pin is at the bottom. Install the stop pin in the hole with the half shaft to your left. After stop pin installation, depress lock pin to ensure it can be fully depressed into the cavity.

(8) Install O-ring (12) in groove on stop pin (10).

(9) Position wave washer (11) on stop pin and install stop pin (10).

NOTE

When installing the ball in the valve body some movement of the ball and valve lever arm may be necessary align the stop pin, lever arm shaft and the ball.

(10) Install ball (9) in 2 inch valved unisex coupling (3).

(11) Install dust cap (2) on 2 inch valved unisex coupling (3).

5.4 REPAIR AUXILIARY PUMP. (Refer to figure 5-3.)

The auxiliary pump is composed of two major components; a pump and 24 vdc electric motor.

This task consists of: a. Disassembly b. Inspection c. Assembly

INITIAL SET-UP:

Tools:
Tool kit, General Mechanic Automotive (Appendix B, Section III, Item 1)
Chemical and Oil Protective Gloves (Appendix B, Section III, Item 2)

Materials/Parts Required:
Gasket, inlet flange (Appendix I, Item 9)

General Safety Requirements:

WARNING

- Fuels are toxic and flammable. Do not get on person or clothing. Work in well ventilated area. Do not smoke. Ensure equipment is well grounded.

Equipment Condition:
Auxiliary Pump removed from Auxiliary Pump Module (para. 4.8.10)

WARNING

Death or personal injury may result from the explosion of fuel fumes exposed to an open flame or spark, or to static discharge. Do not permit smoking, any open flame, or spark producing equipment within fifty (50) feet (15.24 m) of the auxiliary pump during repair.

NOTE

This procedure assumes that the auxiliary pump has been defueled. However, some residual fuel may remain due to normal drainage after defueling.

Inspect all components as they are disassembled. Repair is limited to replacement of unserviceable components discovered during disassembly.

a. Pump Disassembly and Inspection.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Remove four bolts (1) that attach pump rotor cover (2). Remove cover (2).

(2) Remove rotor cover gasket (3) and inspect for damage. Replace if damaged.

NOTE

A new pump rotor vane is 7/16 in. high. Replace vane if height is 9/32 in. or less. A vane that does not make good contact with pump chamber will cause loss of suction.

(3) Remove the five vanes (4) from rotor (5). Inspect vanes (4) for damage and wear.

(4) Remove rotor key (6). Inspect for damage or deformation. Replace if damaged or deformed.

(5) Remove rotor (5). Inspect for damage. Scratches will not affect the rotor; however, burrs should be removed.

NOTE

Carefully examine shaft seal assembly (7) for signs of fluid leakage at the shaft weep hole. Note arrangement of components of the shaft seal assembly.

(6) Remove snap ring (8) that secures seal assembly (7) to armature (9) shaft.

(7) Remove shaft seal assembly (7), noting position of assembly components. Discard shaft seal assembly (7).

NOTE

If electrical disassembly procedures are to be performed refer to the procedures beginning with paragraph c. of this repair procedure.

(8) Inspect pump cavity for damage and foreign material. Clean cavity as required. Replace pump housing (10) if cavity wall is damaged.

(9) Remove bypass valve cap (11). Inspect valve cap gasket (12), replace if damaged.

(10) Remove bypass spring (13) and bypass valve (14). Inspect bypass valve (14) seat for damage or deterioration. Replace bypass valve (14) if damaged or worn.

(11) Clean bypass valve cavity of pump housing (10).

(12) Remove the four bolts (15) that attach inlet flange (16) to pump housing (10).

(13) Remove and discard inlet flange gasket (17).

(14) Remove and clean inlet screen (18).

(15) Remove inlet check valve (19) from pump housing (10).

(16) Operate the check valve (19) by hand to ensure freedom of movement. Inspect for wear or damage. If the check valve (19) is worn or damaged or does not move freely, replace the check valve (19).

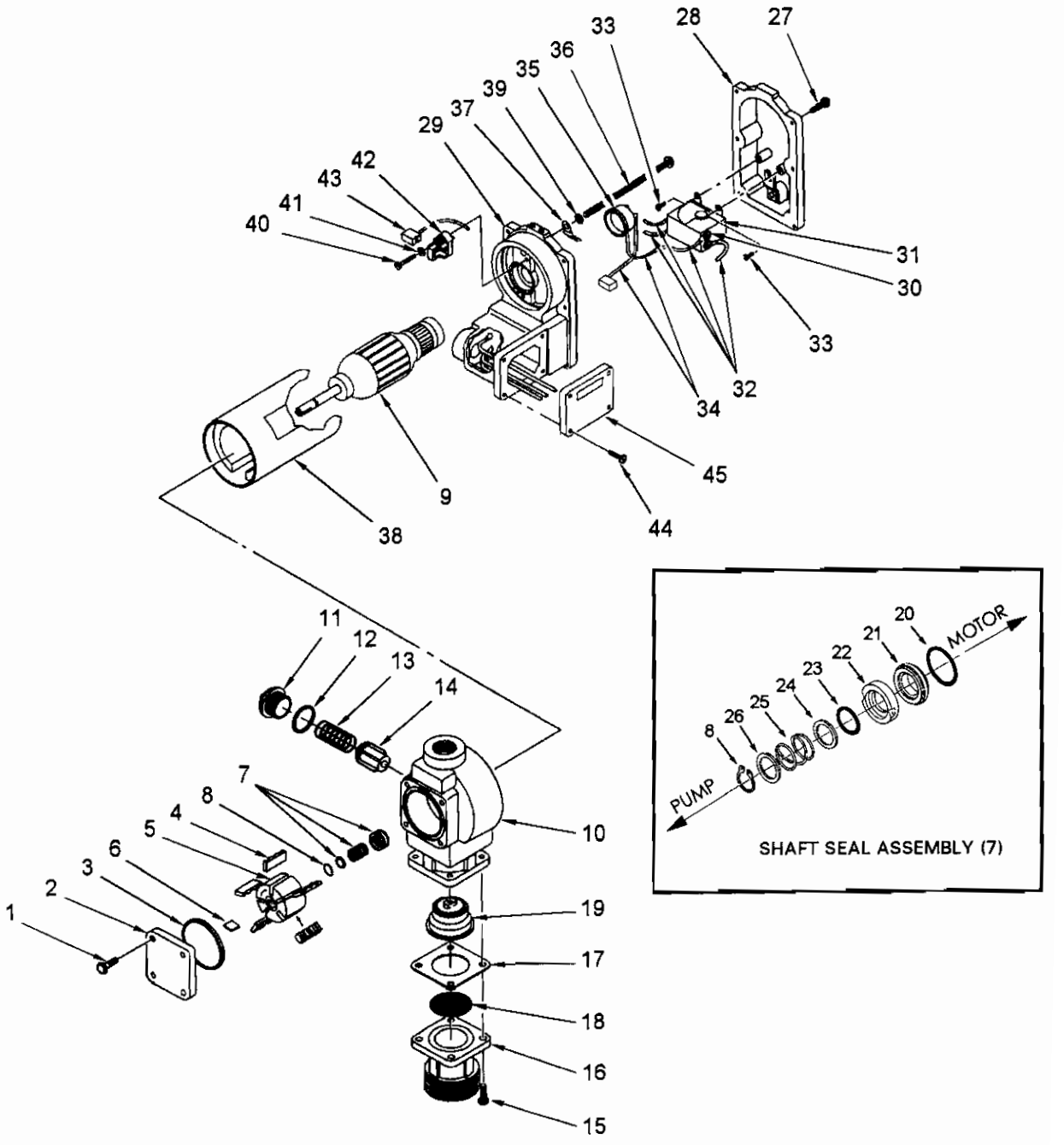


Figure 5-3. Auxiliary Pump

b. Pump Assembly.

WARNING

Rubber gloves should be worn when handling fueling system components due to the toxic effects of some fuel additives.

(1) Position inlet check valve (19) in pump housing (10).

(2) Position inlet screen (18) on pump housing (10).

(3) Position inlet flange gasket (17) on pump housing (10).

(4) Install inlet flange (16) on pump housing (10) using the four bolts (15).

(5) Install bypass valve (14) in pump housing (10).

(6) Install bypass spring (13) in pump housing (10).

(7) Install bypass valve cap gasket (12) on bypass valve cap (11).

(8) Install bypass valve cap (11) in pump housing (10).

CAUTION

Do not allow components of the shaft seal assembly (7) or the snap ring (8) to drop into pump cavity as components are installed. During installation of shaft seal assembly note the exploded view of the shaft seal assembly included as an inset on figure 5-3.

(9) Install shaft seal assembly (7) on armature (9) shaft as follows.

(a) Install large O-ring (20) on armature (9) shaft, seating large O-ring (20) against rear wall of pump housing (10)

(b) Install black carbon ring (21) with flat surface facing out.

(c) Install white ceramic ring (22) with notched surface facing out.

(d) Install small O-ring (23).

(e) Install washer (24).

(f) Install spring (25).

(g) Install washer (26).

(10) Install snap ring (8) that secures shaft seal assembly (7) to armature (9) shaft.

(11) Slide rotor (5) on armature (9) shaft over shaft seal assembly (7).

(12) Align slots in rotor (5) with slot on armature (9) shaft. Install rotor key (6).

(13) Install the five rotor vanes (4), with smooth side of vanes facing direction of rotor (5) rotation (clockwise).

(14) Install rotor cover gasket (3) in pump housing (10) groove.

(15) Position rotor cover (2) on pump housing (10). Install the four bolts (1) that attach pump rotor cover (2) to pump housing (10). Do not over tighten the four bolts (1).

c. Electrical Disassembly and Inspection.

NOTE

The electrical disassembly procedures cannot be performed until after pump disassembly paragraph a., steps 1 through 7 have been completed (removal of shaft seal assembly).

(1) Remove the six screws (27) that attach switch plate (28) to motor casting (29).

CAUTION

A toothed lock washer (30) is located between each wire lug and the line switch (31) body. Do not allow a lock washer to fall into the armature and permanent magnets of the motor casting.

(2) Tag and remove the four electrical leads (32) attached to the line switch (31). Retain mounting hardware.

(3) Remove the two screws (33) attaching the line switch (31) to the switch plate (28).

(4) Remove the line switch (31).

(5) Tag the two leads (34) attached to the thermal protector (35). Remove the two leads from the thermal protector (35).

(6) Loosen the motor thru-bolts (36) enough to lift the thermal protector (35) retainer clips (37) out of the way. Do not remove the motor thru-bolts (36) at this point.

(7) Remove the thermal protector (35).

(8) Place alignment marks on the motor frame (38)-to-pump housing (10) and motor frame (38)-to-motor casting (29) for positioning of components during reassembly.

(9) Remove the two motor thru-bolts (36), retainer clips (37) and lock washers (39) from motor frame (38).

CAUTION

The motor frame will usually separate from the motor casting as an assembly with the armature held in the motor frame by the permanent magnets. The armature will resist removal due to the permanent magnets. Remove the armature with a strong and steady pull. Avoid damaging the armature. Do not get foreign material on the armature commutator or the motor brushes.

(10) Using a gear puller, separate the motor casting (29) from the pump housing (10). Remove the armature (9). Inspect the armature (9) for damaged components.

(11) Separate the motor frame (38) and motor casting (29) using a ball peen hammer to gently tap around the perimeter of the motor casting (29).

NOTE

The brush holders and electrical leads are not interchangeable. Ensure they are marked for correct reassembly. Note installed position of each brush holder relative to the motor casting.

(12) Remove the screw (40) and fiber washer (41) attaching each brush holder (42) to the motor casting (29).

(13) Inspect the brushes (43) and brush holders (42) for damage or deterioration. Replace as required.

(14) Remove screws (44) to remove junction box cover (45) if access to internal wiring is required.

d. Electrical Assembly.

(1) If removed, position junction box cover (45) and attach using screws (44).

(2) Position brushes (43) in brush holders (42) and attach brush holders to motor casting (29) using screw (40) and fiber washer (41).

NOTE

It is not necessary to fully seat the motor frame in the motor casting at this point. Slip the two components together sufficiently to hold together. The two components will seat fully when the motor thru-bolts are installed.

(3) While observing the alignment markings applied during disassembly, slip motor frame (38) into motor casting (29).

CAUTION

When installing the armature in the motor frame and motor casting, the strong permanent magnets in the motor frame will tend to pull the armature off center. Exercise caution during installation in order to prevent damage to the armature and brushes. Install the armature in small increments, continuously pushing the brushes back into the brush holders as the armature is being installed until the brushes are fully supported by the commutator.

(4) Install the armature (9) in the motor frame (38) and motor casting (29) while guiding the armature commutator over the brushes (43) and into the motor casting (29). Seat the armature bearing in the motor casting (29).

(5) Install the lock washers (39) and retainer clips (37) on thru-bolts (36) and start the two thru-bolts (36).

(6) Position and seat by hand the pump housing (10) on the motor frame (38).

(7) Position the thermal protector (35) in the notches of the motor casting (29). Secure in place with the retainer clips (37). Evenly tighten the thru-bolts (36) securing the thermal protector (35) and retainer clips (37), pulling the pump housing (10) and motor casting (29) together. Do not over tighten the thru-bolts (36).

(8) Install shaft seal assembly (7) and snap ring (8) in accordance with paragraph b. steps 9 and 10.

(9) Install rotor (5), rotor key (6), rotor vanes (4), rotor cover gasket (3), and rotor cover (2) in accordance with paragraph b. steps 11 through 15.

NOTE

When installing line switch, ensure switch lever is in the slot in the switch shaft assembly.

(10) Attach line switch (31) in switch plate (28) using two screws (33).

(11) Attach the previously tagged four electrical leads (32) to line switch (31). Ensure lock washer (30) is between each wire terminal lug and line switch (31). Remove the wire tags.

(12) Position the switch plate (28) on the motor casting (29) and attach using the six screws (27). Do not over tighten screws (27).

APPENDIX A

REFERENCES

A.1 Scope.

This appendix lists all forms, field manuals, technical manuals and miscellaneous publications referenced in this manual. Also listed are publications that should be consulted for additional information.

A.2 Forms.

Equipment Inspection and Maintenance Worksheet . . . . . DA Form 2404
Equipment Log Assembly (Records) . . . . . DA Form 2408-9
Maintenance Request . . . . . DA Form 5504
Quality Deficiency Report . . . . . SF 368
Recommended Changes to Publications and Blank Forms . . . . . DA Form 2028
Recommended Changes to Equipment Technical Publications . . . . . DA Form 2028-2
Report of Discrepancy . . . . . SF 364

A.3 Field Manuals.

Aircraft Refueling . . . . . FM 10-68
Basic Cold Weather Manual . . . . . FM 31-70
First Aid for Soldiers . . . . . FM 21-11
NBC Contamination Avoidance . . . . . FM 3-3
NBC Protection . . . . . FM 3-4
NBC Decontamination FM-3-5
Organizational Maintenance of Military Petroleum Pipelines, Tanks and Related Equipment . . . . . FM 10-20
Petroleum Supply Point Equipment and Operations . . . . . FM 10-69
Rigging, Loading and Dropping Procedures . . . . . FM 10-564
Tactics, Techniques, and Procedures for Forward Arming and Refueling Points . . . . . FM 1-104
Northern Operations . . . . . FM 31-71

A.4 Technical Manuals.

500 Gallon Fuel Drum . . . . . TBS
D-1 Nozzle Assembly . . . . . TM 10-4930-246-13&P
Destruction of Army Materiel to Prevent Enemy Use . . . . . TM 750-244-3
Operator's, Unit and Direct Support Maintenance Manual including Repair Parts and Special Tools List for CCR Nozzle for Advanced Aviation Forward Area Refueling System (AAFARS) . . . . . TM 10-4930-248-13&P
Operators, Unit and Direct Support Maintenance Manual including Repair Parts and Special Tools List for Filter-Separator, Water, Liquid Fuel for Advanced Aviation Forward Area Refueling System (AAFARS) . . . . . TM 10-4330-237-13&P
Operators, Unit and Direct Support and General Support Maintenance Manual including RPSTL for Pumping Assemblies for Advanced Aviation Forward Area Refueling System (AAFARS) . . . . . TM 10-4320-351-14

A.5 Miscellaneous.

Maintenance Management Update . . . . . DA PAM 738-750
Packing of Army Materiel for Shipment and Storage . . . . . AR 746-1
Security Procedures . . . . . AR 190-11, Ar 190-13

APPENDIX B

MAINTENANCE ALLOCATION CHART (MAC)

Section I. INTRODUCTION

B-1. The Army Maintenance System MAC

a. This introduction (section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit - includes two subcolumns, C (operator/crew) and O (unit) maintenance.

Direct Support - includes an F subcolumn.

General Support - includes an H subcolumn.

Depot - includes a D subcolumn.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instruction and explanatory notes for a particular maintenance function.

B-2. Maintenance Functions. Maintenance functions are 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 by measuring the mechanical, pneumatic, hydraulic or electrical characteristics of an end item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids or gases.

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

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

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring and diagnostic equipment used in precise measurement. Consists of comparisons 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. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating or fixing onto position a spare, repair part or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the SMR code.

i. Repair. The application of maintenance services[1] including fault location/troubleshooting[2], removal/installation, disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, faults, malfunction or failure in a part, subassembly, module (component or assembly), end item or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to 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 (e.g., hours/miles) considered in classifying Army equipment/components.

B-3 Explanation of Columns in the MAC, Section II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules to the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Level. Column 4 specifies each level of maintenance authorized to perform each function listed in column 3 by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate subcolumn. This work-time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work-time figures are shown for each level. The work-time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows.

C .....Operator or crew maintenance
O .....Unit maintenance
F .....Direct support maintenance

---

[1]Services - Inspect, test, service, adjust, align, calibrate and/or replace.

[2]Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunction. The act of isolating a fault within a system or unit under test.

[3]Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component that is assigned a SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

[4]Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

L .....Specialized Repair Activity (SRA)[5]
H .....General support maintenance
D .....Depot maintenance

e. Column 5, Tools and Test Equipment reference code. Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE, and special tools, special TMDE, and special support equipment required to perform the designated function. Codes are keyed to tools and test equipment in section III.

f. Column 6, Remarks. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in section IV.

B-4 Explanation of Columns in Tool and Test Equipment Requirements, Section III

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2, Maintenance Level. The lowest level 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 Stock Number. The National Stock Number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number, model number, or type number.

B-5. Explanation of Columns in Remarks, Section IV

a. Column 1, Remarks 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.

[5]This maintenance level is not included in section II, column (4) of the MAC. Functions to this level of maintenance are identified by a work-time figure in the "H" column of section II, column (4) and an associated reference code is used in the Remarks column (6). This code is keyed to section IV, Remarks, and SRA complete repair application is explained there.

SECTION II. MAINTENANCE ALLOCATION CHART FOR AAFARS

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
00	AAFARS								
01	Nozzle Kit								
0101	Nozzle Assembly, CCR								A
0102	Nozzle Assembly, D-1								B
02	Discharge Hose Kit, PN 13230E5872								
0201	Hose, 2 in. x 50 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G
03	Discharge Hose Kit, PN 13230E5874								
0301	Hose, 2 in. x 50 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G
04	Discharge Hose Kit, PN 13230E5893								
0401	Hose, 3 in x 50 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
AAFARS

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0402	Hose, 3 in. x 6 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G
05	Discharge Hose Kit, PN 13230E5939								
0501	Hose, 3 in x 50 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G
06	Discharge Hose Kit, PN 13230E5873								
0601	Hose, 2 in. x 50 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G
0602	Hose, 2 in. x 12 ft. collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1,3	C
		Replace		0.1					G
07	Discharge Fitting Kit								
0701	Tee	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
0702	Elbow	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G

SECTION II. MAINTENANCE ALLOCATION CHART FOR AAFARS

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0703	Manifold, Recirculation	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
0704	Wye Assembly, Recirculation, CCR/D-1	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
08	Filter-Separator, Liquid Fuel								D
09	Pumping Assembly								E
10	Suction Hose Kit								
1001	Hose, 2 in. x 6 ft., non-collapsible	Inspect	0.1						
		Test		0.3				1	
		Repair	0.1	0.3	0.5			1, 3	C
		Replace		0.1					G
11	Drum Fitting Kit								
1101	Cross	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1102	Wye	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1103	Coupling, non-valved, 2 in. unisex to 2 in. male camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
AAFARS

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
12	Pump Assembly, Auxiliary	Inspect	0.1						
		Repair	0.1	0.3	1.5			1,2	C
13	Drum Adapter Kit								
1301	2 in. unisex to 2 in. male camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1302	2 in. unisex to 2 in. female camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1303	2 in. unisex to 3 in. male camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1304	2 in. unisex to 3 in. female camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1305	2 in. unisex to 4 in. female camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
1306	2 in. unisex to 4 in. male camlock	Inspect	0.1						
		Repair	0.1	0.3	0.5			2	C
		Replace		0.1					G
14	Grounding Rod Kit	Inspect	0.1						
		Repair		0.1					F

Section III. TOOLS AND TEST EQUIPMENT FOR AAFARS

Tool or Test Equipment Ref Code	Maintenance Level	Nomenclature	National stock number	Tool Number
1	O	Tool Kit, General Mechanics: Automotive	5180-00-177-7033	SC5180-90-N26
2	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance Common NO 1	4910-00-754-0654	SC4910-95-A74
3	O	Clamping Tool, Strap, Hose	5120-00-278-9925	C001 (70847)

Section IV. REMARKS FOR AAFARS

Remarks Code	Remarks
A	Refer to TM 10-4930-248-13&P, CCR Nozzle
B	Refer to TM 10-4930-246-13&P, D-1 Nozzle
C	Operator replace unisex coupling face seal
D	Refer to TM 10-4330-237-13&P, Filter Separator, Water, Liquid Fuel
E	Refer to TM 10-4320-351-14, Pumping Assembly for AAFARS
F	Repair is limited to replacement of defective or damaged components
G	Replace defective assembly during mission

APPENDIX C

UNIT AND DIRECT SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)

Section I. INTRODUCTION

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 AAFARS. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

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 lists 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 in FIG. BULK at the end of the section. Repair kits are listed separately in their own functional group within Section II. Items are shown in the associated illustration.

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

c. Section IV. Cross-Reference Index. There are two cross reference indexes in this RPSTL: The National Stock Number Index, listed in the National Item Identification Number sequence and Part Number Index, listed in alphanumeric sequence of part numbers appearing in the listing. National stock numbers and part numbers are cross referenced to each illustration figure and item number appearance.

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

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

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

Source Code	Maintenance Code		Recoverability Code
↓	↓		↓
XX	XX		X
↓	↓		↓
1st two 2 positions	3rd position	4th position	5th position
↓	↓	↓	↓
How you get an item	Who can install, replace or use the item	Who can do complete repair* on the item	Who determines disposition action on an unserviceable item

*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 follow:

Source Code		Application/Explanation
PA PB PC** PD PE PF PG		Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code. **NOTE: Items coded PC are subject to deterioration.
KD KF KB		Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
MO	(Made at Unit/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/AVIM Level)	
MH	(Made at GS Level)	
ML	(Made at Specialized Repair Activity [SRA])	
MD	(Made at Depot)	
AO	(Assembled by Unit/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 item is assembled at a higher level, order the item from the higher level of maintenance.
AF	(Assembled by DS/AVIM Level)	
AH	(Assembled by GS Level)	
AL	(Assembled by SRA)	
AD	(Assembled by Depot)	

XA Do not requisition an "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.

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

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

NOTE

Cannibalization or controlled exchange, when authorized, may be 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 tell you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

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

Maintenance Code	Application/Explanation
C	Crew or operator maintenance done within unit/AVUM maintenance.
O	Unit level/AVUM maintenance can remove, replace and use the item.
F	Direct support/AVIM maintenance can remove, replace and use the item.
H	General support maintenance can remove, replace and use the item.
L	Specialized repair activity can remove, replace and use the item.
D	Depot 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 and SMR code.

Maintenance Code	Application/Explanation
O	Unit/AVUM is the lowest level that can do complete repair of the item.
F	Direct support/AVIM 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 shown in the fifth position of SMR code as follows:

Recoverability Code	Application/Explanation
Z	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the 3rd position of the SMR code.
O	Reparable item. When uneconomically reparable, condemn and dispose of the item at the unit or AVUM level.
F	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or AVIM 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 the item is 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. NSN (Column [3]). The national stock number for the item is listed in this column.

d. CAGEC (Column [4]). The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

e. PART NUMBER (Column [5]). 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 number listed.

f. DESCRIPTION AND USABLE ON CODE (UOC) (Column [6]). This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.
(2) Part numbers of bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.
(3) The statement "END OF FIGURE" appears just below the last item description in column (6) for a given figure in both section II and section III.

g. QTY (Column [7]). 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 instead of a quantity indicates that the quantity is variable and may vary from application to application.

4. EXPLANATION OF INDEX FORMAT AND COLUMNS (SECTION IV).

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) STOCK NUMBER Column. This column lists the NSN IN National Item Identification Number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

NSN
(E.G., 5305-01-574-1467)
NIIN

When using this column to locate an item, ignore the first four digits of the NSN. Use the complete NSN (13 digits) when requisitioning items by stock number.

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

(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) PART NUMBER Column. Indicates the primary number assigned to the item 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.

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

(3) 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.

5. SPECIAL INFORMATION.

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

b. INDEX NUMBERS. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number/Part Number Index and the bulk material list in section II.

c. ASSOCIATED PUBLICATIONS. The publications listed below pertain to the AAFARS and its components.

Publication	Short Title
TM 10-4320-351-14	Operator's, Unit, Direct Support and General Support Maintenance Manual
TM 10-4330-237-13&P	Operator's, Unit, and Direct Support Maintenance Manual
TM 10-4930-248-13&P	Operator's, Unit, and Direct Support Maintenance Manual
TM 10-4930-246-13&P	Operator's, Unit, and Direct Support Maintenance Manual

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 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 functional group or subfunctional group to which the item belongs.

(3) Third. Identify the item on the figure and note the Figure and Item Number to find the NSN.

(4) Fourth. Look in the repair parts list for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

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

(1) First. If you have the national stock number, look in the STOCK NUMBER column of the National Stock Number index. The NSN index is arranged in National Item Identification Number (NIIN) sequence (see 4.a). Note the figure and item number next to the NSN.

(2) Second. Turn to the figure and locate the item number. Verify the item is the one you are looking for.

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

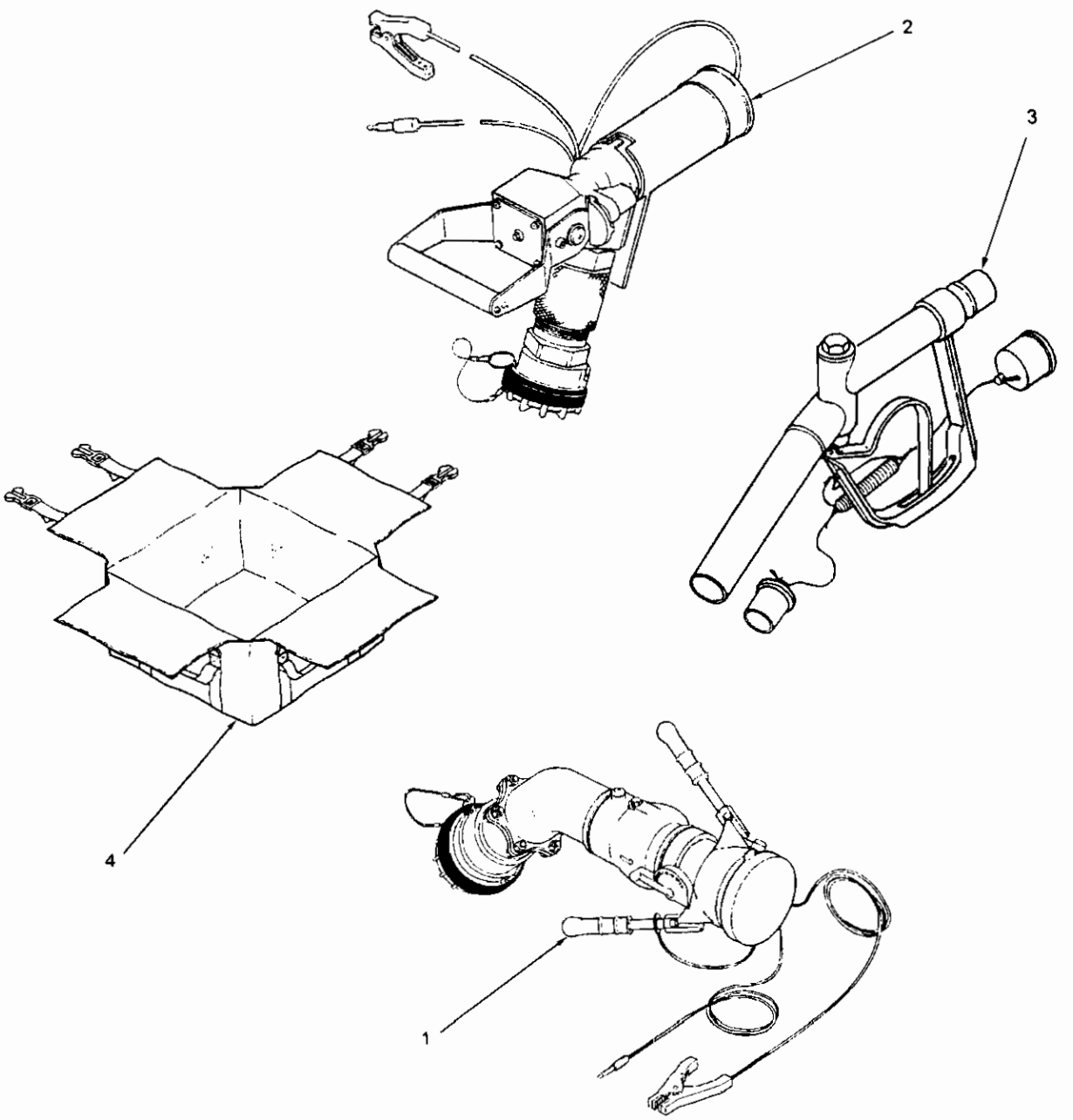


Figure C-1. Nozzle Kit (P/N 13230E5892)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-1. NOZZLE KIT (P/N) 13230E5892)	
0	PAOFF		97403	13230E5892-101	NOZZLE KIT.....	4
1	PAOFF	4930014401085	0DT23	64349CF4HXY	.NOZZLE,FUEL AND OIL SEE TM 10-4930-246-13&P FOR PARTS BREAKOUT....	4
2	PAOFF	4930013839467	0DT23	64017B	.CLOSED CIRCUIT,REFU SEE TM 10-4930-248-13&P FOR PARTS BREAKOUT....	1
3	PAOZZ		97403	13230E5896-101	.PRESSURE,FUEL SERVI.....	1
4	XDOZZ		97403	13230E5880-03	.BAG,FUEL SYSTEM 3" X 6' (1), 3" X 50' (1) DISCHARGE HOSE.....	1

END OF FIGURE

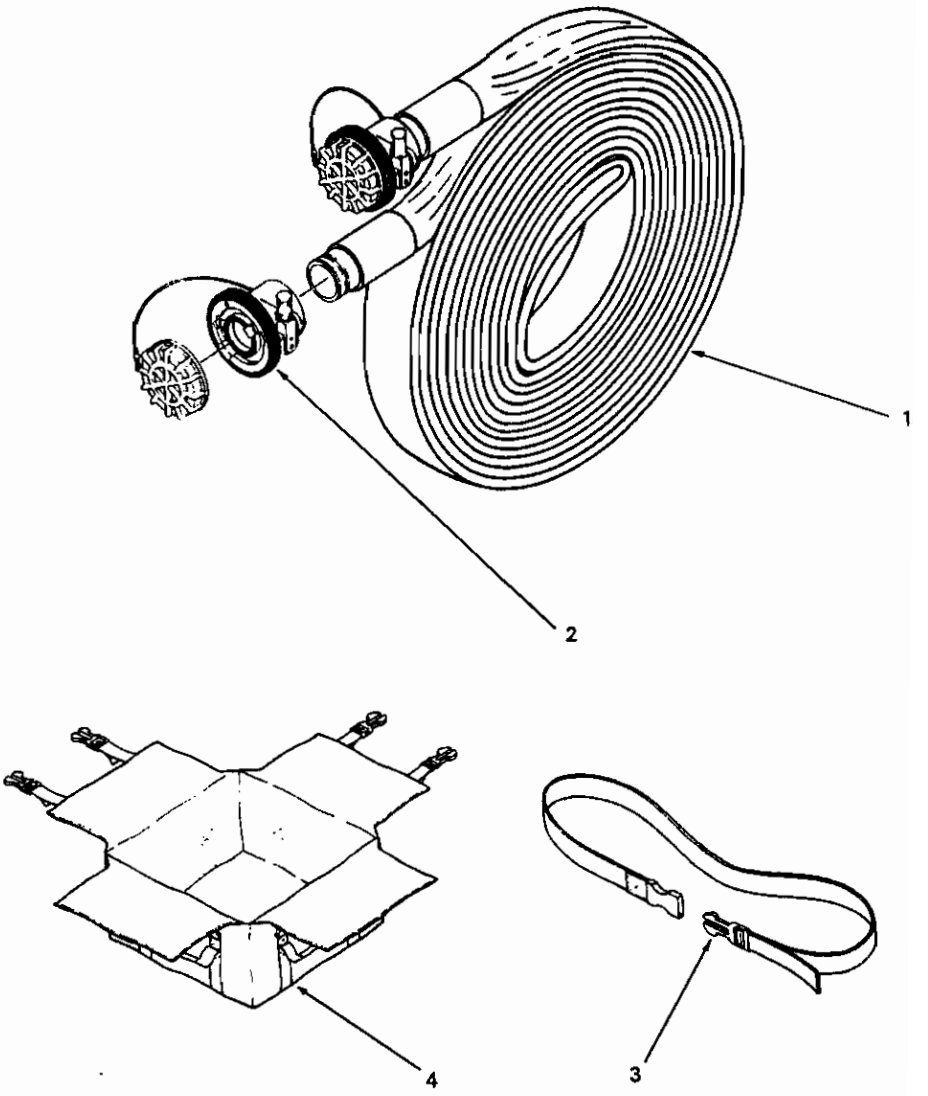


Figure C-2. Discharge Hose Kit (P/N 13230E5872)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-2. DISCHARGE HOSE KIT (P/N 13230E5872)	
0	PAOFF		97403	13230E5872-101	DISCHARGE HOSE KIT.....	2
1	PAOFF		97403	13230E6053-01	.HOSE,NONMETALLIC 2" X 50' (2) DISCHARGE HOSE.....	2
2	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	2
3	XDOZZ		97403	13230E5899-01	.STRAP ASSEMBLY,HOSE.....	1
4	XDOZZ		97403	13230E5880-08	.BAG,FUEL SYSTEM.....	2

END OF FIGURE

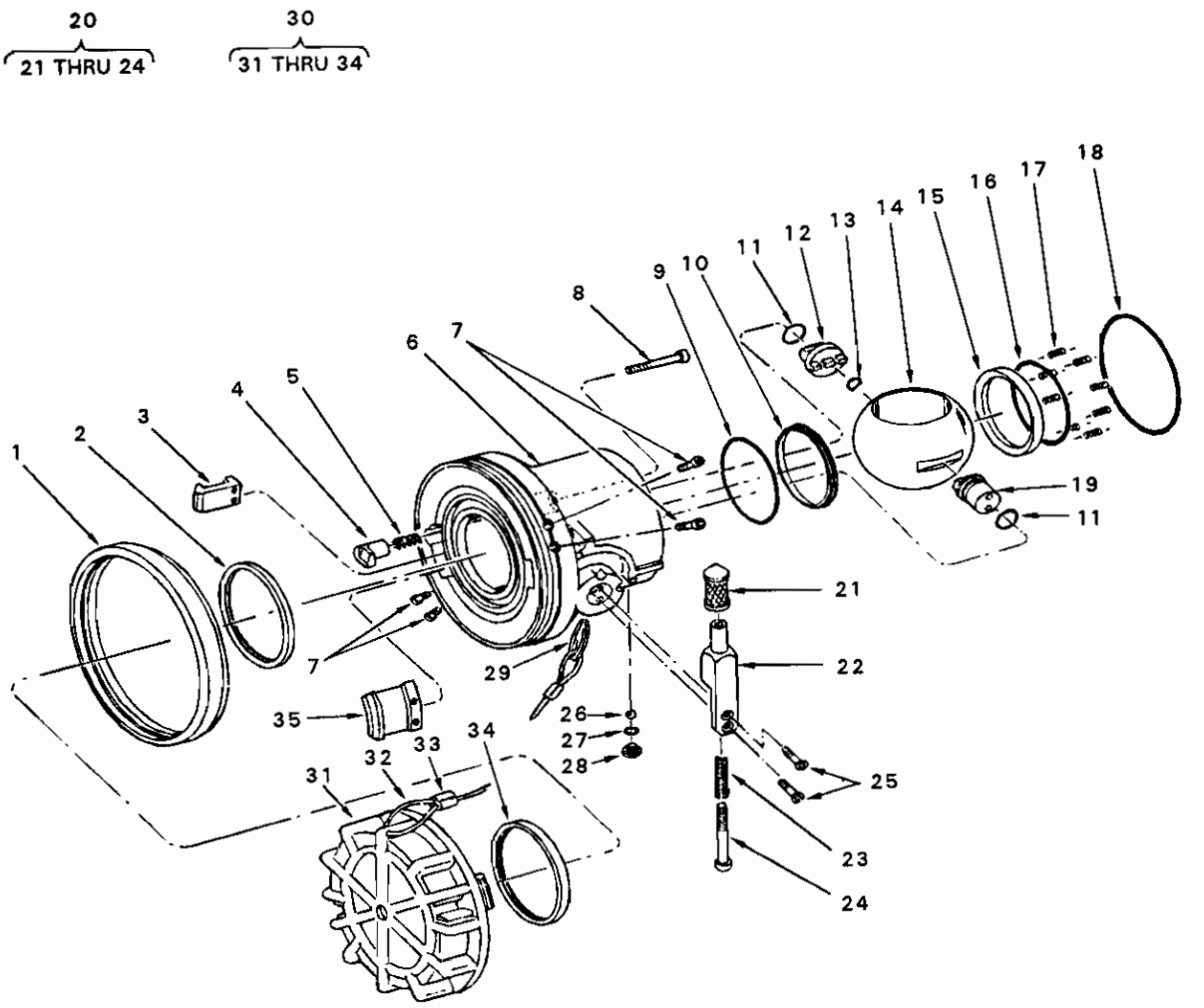


Figure C-3. Coupling, Unisex, 2-Inch, Valved

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-3. COUPLING, UNISEX, 2-INCH VALVED	
1	XDOZZ	2510014567850	ODT23	220161	...CAP,BUMPER	1
2	PAOZZ	5330014339203	ODT23	220146	...SEAL,PLAIN PART OF KIT P/N KD64020-1	1
3	XDOZZ		ODT23	220159-2	...CLAMP,SYNCHRO	1
4	XDFZZ		ODT23	220151	...PIN,QUICK RELEASE	1
5	PAFZZ	5360014541830	ODT23	220149	...PIN,SPRING	1
6	XBFZZ		ODT23	220163-2	...BODY (GREEN)	1
7	PAOZZ	5305011914578	96906	MS16997-20L	...SCREW,CAP,SOCKET HE	4
8	PAFZZ	5305014561139	96906	MS16997-24L	...SCREW	1
9	PCFZZ	5331006410119	96906	MS29513-134	...O-RING PART OF KIT P/N KD64020-1.	1
10	XDFZZ		ODT23	220158	...SEAL,PLAIN PART OF KIT P/N KD64020-1	1
11	PCFZZ	5331002483840	96906	MS29513-014	...O-RING PART OF KIT P/N KD64020-1.	2
12	XDFZZ		ODT23	220150	...PIN,QUICK RELEASE	1
13	PAFZZ	5310006053789	83553	W0367-006-S	...WASHER,SPRING TENSI	1
14	XDFZZ		ODT23	220152	...BALL,VALVED PORTED	1
15	XDFZZ		ODT23	220157	...SEAL,PLAIN PART OF KIT P/N KD64020-1	1
16	PCFZZ	5331002917384	96906	MS29513-133	...O-RING PART OF KIT P/N KD64020-1.	1
17	XDOZZ		ODT23	220153	...SPRING	8
18	PCFZZ	5331002609338	96906	MS29513-227	...O-RING PART OF KIT P/N KD64020-1.	1
19	XDFZZ		ODT23	220154	...CONTROL SHAFT ASSEM	1
20	XDOOZ		ODT23	47085	...HANDLE,MANUAL ASSEM	1
21	XDOZZ		ODT23	220142	....GRIP	1
22	XDOZZ		ODT23	220147	....ARM	1
23	XDOZZ		ODT23	220145	....SPRING	1
24	XDOZZ		ODT23	220204	....SCREW	1
25	PAFZZ	5305000795835	96906	MS24693C50	...SCREW,MACHINE	2
26	XDFZZ		ODT23	220265	...BALL	41
27	PCFZZ	5331002483835	96906	MS29513-010	...O-RING PART OF KIT P/N KD64020-1.	1
28	PAFZZ	5305009881720	96906	MS35206-276	...SCREW,MACHINE	1
29	XDFZZ		ODT23	220482	...RING	1
30	PAOOO	2910014562273	ODT23	47062	...CAP,DUST	1
31	XDOZZ		ODT23	220162	....BUMPER	1
32	XDOZZ		ODT23	220201-1-18	....WIRE ROPE	1
33	XDOZZ		ODT23	28-2-G	....SLEEVE	2
34	PAOZZ	5330014339203	ODT23	220146	....SEAL,PLAIN	1
35	XDOZZ		ODT23	220159-1	...CLAMP,SYNCHRO	1

END OF FIGURE

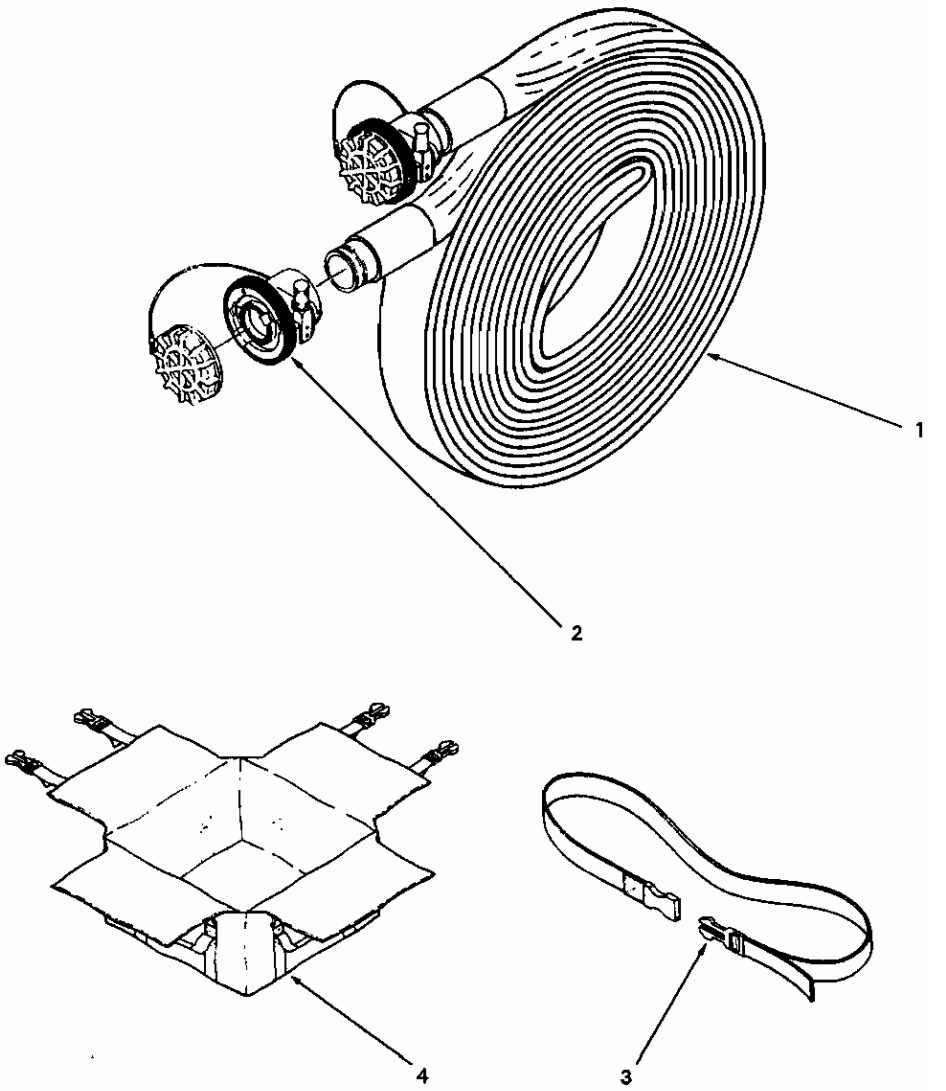


Figure C-4. Discharge Hose Kit (P/N 13230E5874)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-4. DISCHARGE HOSE KIT (P/N 13230E5874)	
0	PAOFZ	4720014558174	97403	13230E5874-101	DISCHARGE HOSE KIT.....	1
1	PAOFF		97403	13230E6053-01	.HOSE,NONMETALLIC.....	3
2	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	2
3	XDOZZ		97403	13230E5899-01	.STRAP ASSEMBLY,HOSE.....	3
4	XDOZZ		97403	13230E5880-10	.BAG,FUEL SYSTEM 2" X 50' (3) DISCHARGE HOSE.....	1

END OF FIGURE

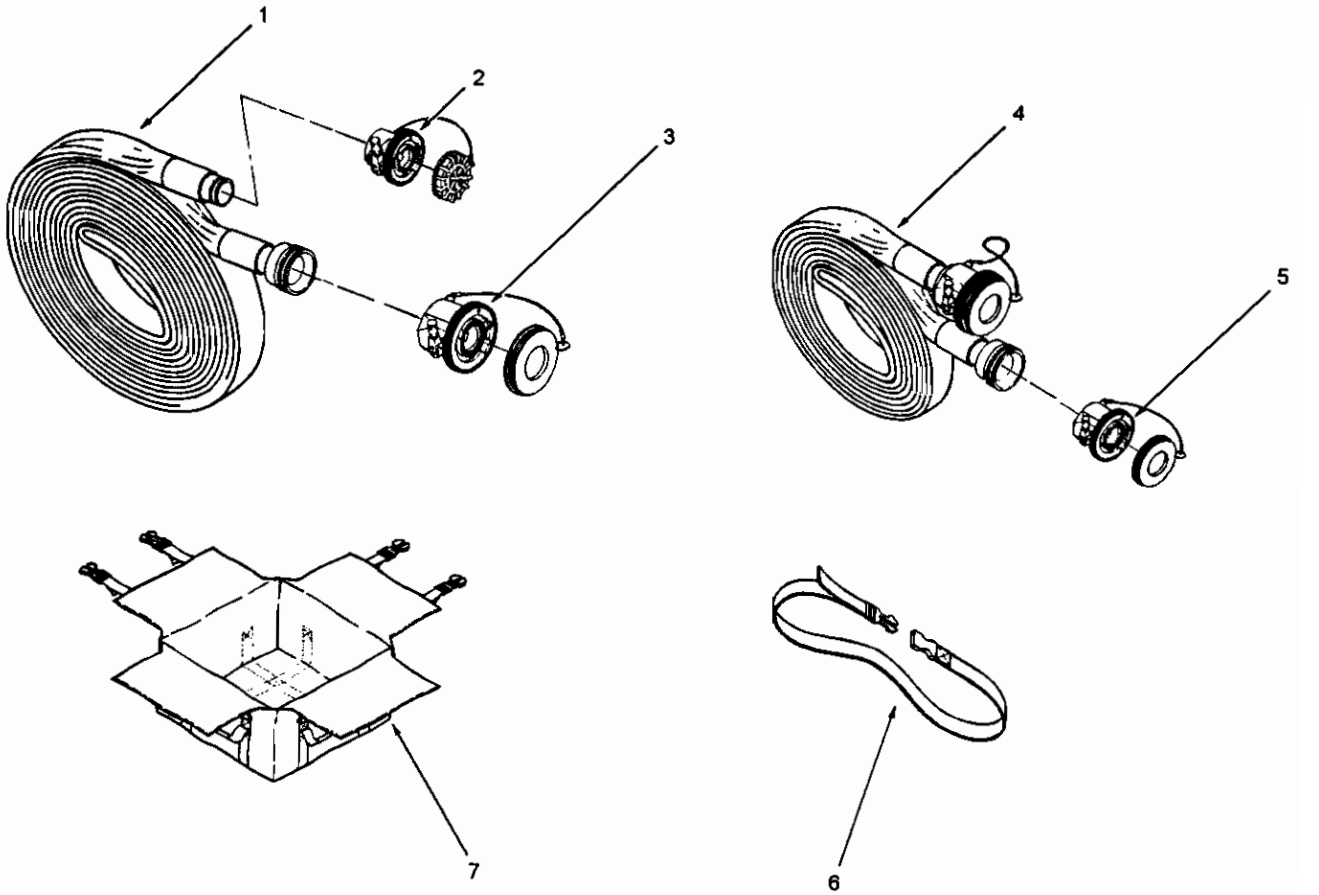


Figure C-5. Discharge Hose Kit (P/N 13230E5893)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-5. DISCHARGE HOSE KIT (P/N 13230E5893)	
0	PAOFF		97403	13230E5893-101	DISCHARGE HOSE KIT.....	1
1	PAOFF		97403	13230E6051-01	.HOSE,NONMETALLIC.....	1
2	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
3	XAOFF		0DT23	64031VZ	..COUPLING,UNISEX,3" SEE FIGURE C-6 FOR PARTS BREAKOUT.....	1
4	PAOFF		97403	13230E6061-01	.HOSE ASSEMBLY, NONM.....	1
5	PAOFF		0DT23	64031VZ	..COUPLING,UNISEX,3" SEE FIGURE C-6 FOR PARTS BREAKOUT.....	2
6	XDOZZ		97403	13230E5899-01	.STRAP ASSEMBLY,HOSE.....	2
7	XDOZZ		97403	13230E5880-02	.BAG,FUEL SYSTEM 3" X 50' (1),3" X 6' (1) DISCHARGE HOSE.....	1

END OF FIGURE

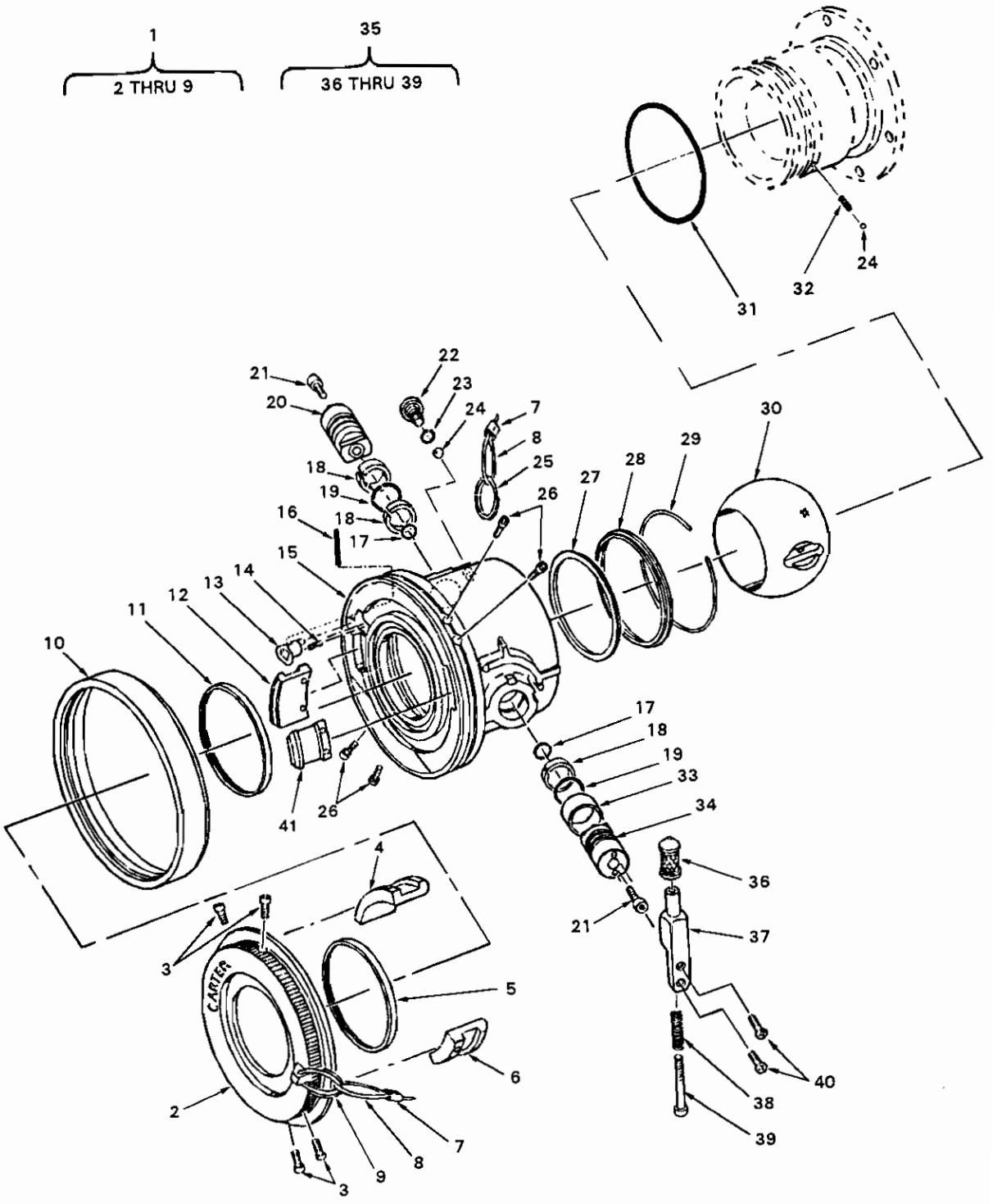


Figure C-6. Coupling, Unisex, 3-Inch, Valved

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-6. COUPLING, UNISEX, 3-INCH VALVED	
1	PA00Z		0DT23	470121-2	...SLEEVE SEAL COUPLER	1
2	XD0ZZ		0DT23	220469-2	....CAP,GREEN	1
3	PA0ZZ	5305011914578	96906	MS16997-20L	....SCREW,CAP,SOCKET HE	4
4	XD0ZZ		0DT23	220446-1	....CLAMP,SYNCHRO	1
5	PA0ZZ		0DT23	220467	....SEAL,3",UNISEX	1
6	XD0ZZ		0DT23	220446-2	....CLAMP,SYNCHRO	1
7	XD0ZZ		0DT23	28-2-G	....SLEEVE	2
8	XD0ZZ		0DT23	220201-1-20	....ROPE,WIRE	1
9	XD0ZZ		0DT23	220482	....RING	1
10	PA0ZZ	2910014562274	0DT23	220468	...CAP,BUMPER	1
11	PA0ZZ		0DT23	220467	...SEAL,3",UNISEX	1
12	XD0ZZ		0DT23	220800-1	...CLAMP,SYNCHRO	1
13	XDFZZ		0DT23	220457	...PIN,QUICK RELEASE	1
14	XDFZZ		0DT23	LC030D-8	...SPRING,HELICAL	1
15	XBFZZ		0DT23	220429-2	...HOUSING,GREEN	1
16	XDFZZ		0DT23	0.094X1.000LDP	...PIN,SPRING	1
17	PCFZZ		96906	MS29513-009	...O-RING	2
18	XDFZZ		0DT23	220464	...BUSHING,SLEEVE	3
19	PCFZZ	5331002483845	96906	MS29513-016	...O-RING	2
20	XDFZZ		0DT23	220432	...CONTROL,SHAFT ASSEM	1
21	PAFZZ	5305012101648	96906	MS16997-32L	...SCREW,CAP,SOCKET HE	2
22	PAFZZ		0DT23	220484	...SCREW,CAP	1
23	PCFZZ	5331002638011	96906	MS29512-03	...O-RING	1
24	XDFZZ		0DT23	220265	...BALL	42
25	XDFZZ		0DT23	220482	...RING	1
26	PA0ZZ	5305011914578	96906	MS16997-20L	...SCREW,CAP,SOCKET HE	4
27	XDFZZ		0DT23	220465	...SEAL,PLAIN	1
28	PAFZZ		0DT23	220459	...RETAINER,SEAL	1
29	XDFZZ		0DT23	220470	...WIRE,SEAL	1
30	XDFZZ		0DT23	220449	...BALL,VALVED PORTED	1
31	PCFZZ	5331002519367	96906	MS29513-234	...O-RING	1
32	PAFZZ		0DT23	220153	...SPRING	1
33	PAFZZ	3120014563926	0DT23	220466	...BEARING SLEEVE	1
34	XDFZZ		0DT23	220430	...SHAFT,UPPER	1
35	PA00Z	5340014561334	0DT23	47119	...HANDLE,MANUAL CONTR	1
36	XD0ZZ		0DT23	220142	....GRIP	1
37	XD0ZZ		0DT23	220435	....HANDLE,LEVER CONTRO	1
38	XD0ZZ		0DT23	220145	....SPRING	1
39	XD0ZZ		0DT23	220204	....SCREW	1
40	PAFZZ	5305000795835	96906	MS24693C50	...SCREW,MACHINE	2
41	XD0ZZ		0DT23	220800-2	...CLAMP,SYNCHRO	1

END OF FIGURE

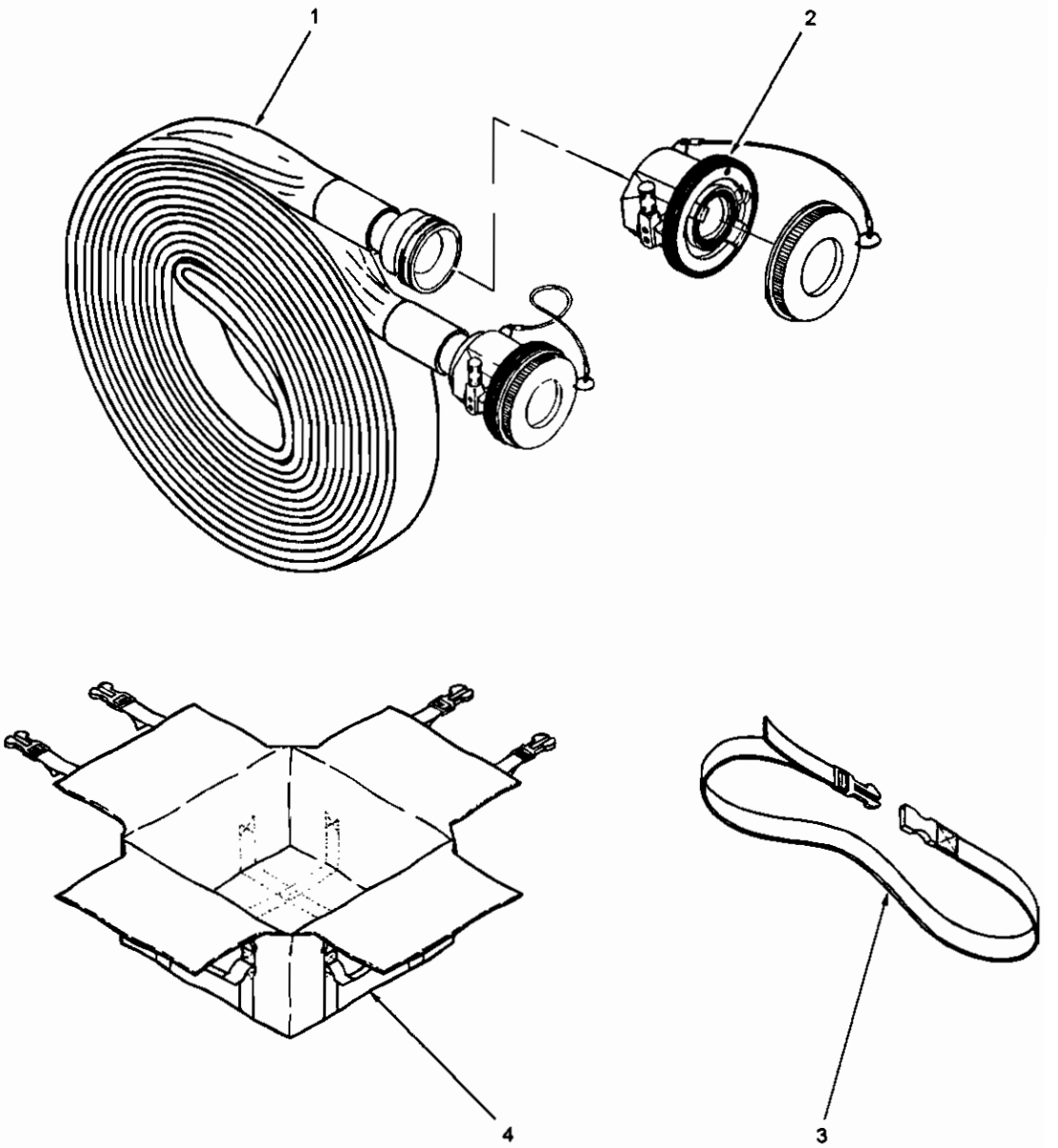


Figure C-7. Discharge Hose Kit (P/N 13230E5939)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-7. DISCHARGE HOSE KIT (P/N 13230E5939)	
0	PAOFF		97403	13230E5939-01	DISCHARGE HOSE KIT.....	1
1	PAOFF		97403	13230E5968-01	.HOSE,NONMETALLIC.....	1
2	XAOFF		0DT23	64031VZ	..COUPLING,UNISEX,3" SEE FIGURE C-6 FOR PARTS BREAKOUT.....	1
3	XDOZZ		97403	13230E5899-01	.STRAP ASSEMBLY,HOSE.....	1
4	XDOZZ		97403	13230E5880-11	.BAG,FUEL SYSTEM 3" X 50' (1) DISCHARGE HOSE.....	1

END OF FIGURE

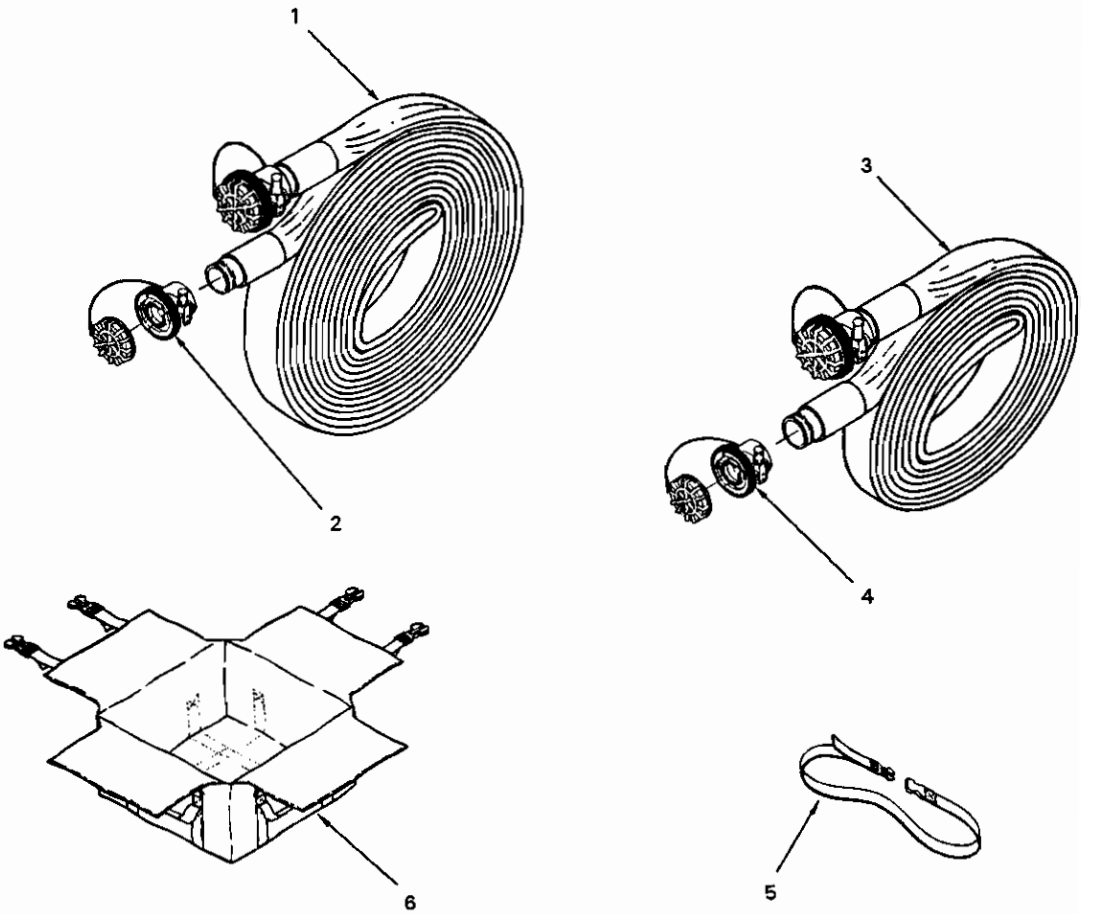


Figure C-8. Discharge Hose Kit (P/N 13230E5873)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-8. DISCHARGE HOSE KIT (P/N 13230E5873)	
0	PAOFF		97403	13230E5873-101	DISCHARGE HOSE KIT.....	2
1	PAOFF		97403	13230E6053-01	.HOSE,NONMETALLIC.....	2
2	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	2
3	PAOFF		97403	13230E6053-02	.HOSE,NONMETALLIC.....	1
4	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	2
5	XDOZZ		97403	13230E5899-01	.STRAP ASSEMBLY,HOSE.....	3
6	XDOZZ		97403	13230E5880-09	.BAG,FUEL SYSTEM 2" X 50' (2), 2" X 12' (1) DISCHARGE HOSE.....	1

END OF FIGURE

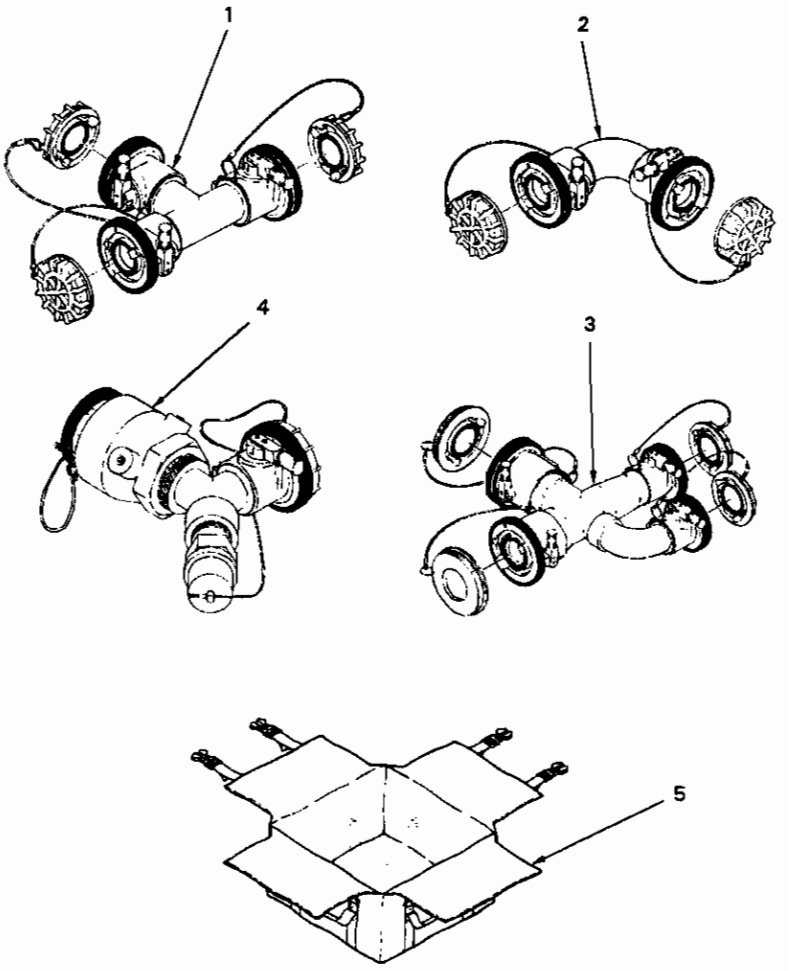


Figure C-9. Discharge Fitting Kit

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-9. DISCHARGE FITTING KIT	
0	PAOFF		97403	13230E6050-101	ACCESSORY KIT,PUMP KIT.....	1
1	PAOFF		00624	AE82111R	.TEE,2 IN X 2 IN X 2 SEE FIGURE C-10 FOR BREAKOUT.....	3
2	XDOFF		97403	13230E6056-01	.ELBOW,HOSE SEE FIGURE C-11 FOR BREAKOUT.....	2
3	PAOFF		97403	13230E6059-01	.RECIRCULATION, MANI SEE FIGURE C-12 FOR BREAKOUT.....	1
4	PAOFF		97403	13230E6064-101	.WYE ASSY,RECIRC.CCR SEE FIGURE C-14 FOR BREAKOUT.....	1
5	XDOZZ		97403	13230E5880-04	.BAG,FUEL SYSTEM DISCHARGE FITTINGS (7).....	1

END OF FIGURE

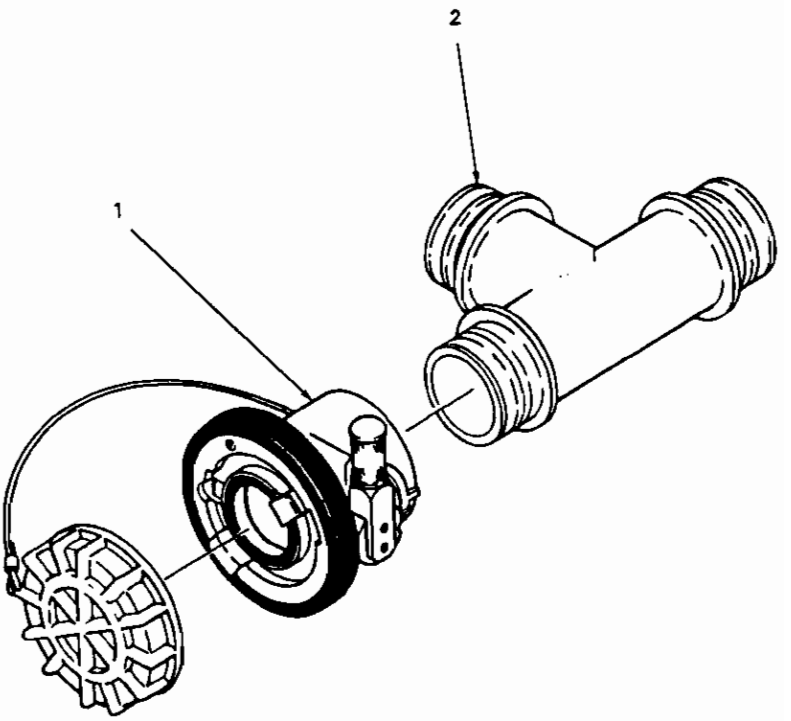


Figure C-10. Tee, 2-Inch x 2-Inch

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-10. TEE, 2-INCH X 2-INCH	
1	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	3
2	XAOFF		ODT23	220165-2	..TEE.....	1

END OF FIGURE

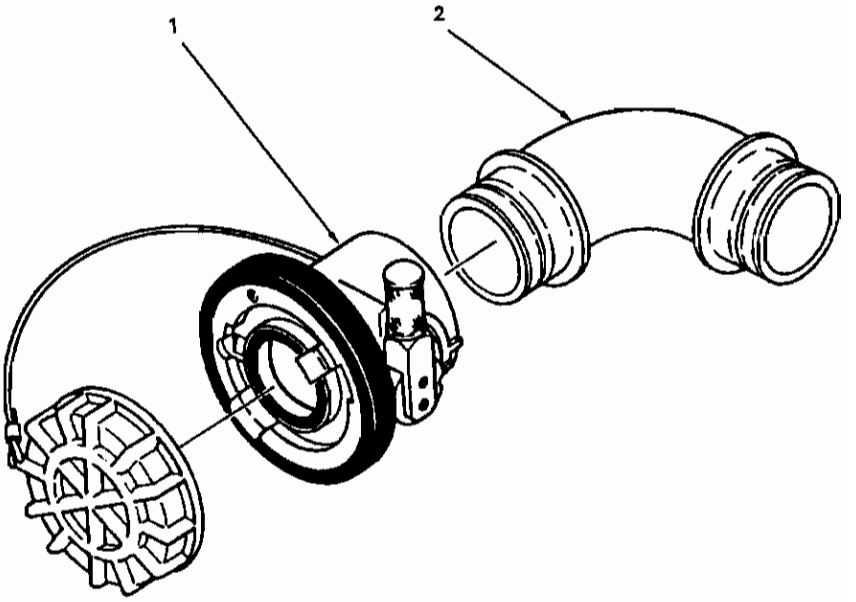


Figure C-11. Elbow, 2-Inch x 2-Inch

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-11. ELBOW, 2-INCH X 2-INCH	
1	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR BREAKOUT.....	2
2	XAOFF		ODT23	220166-2	..ELBOW,90 DEG.....	1

END OF FIGURE

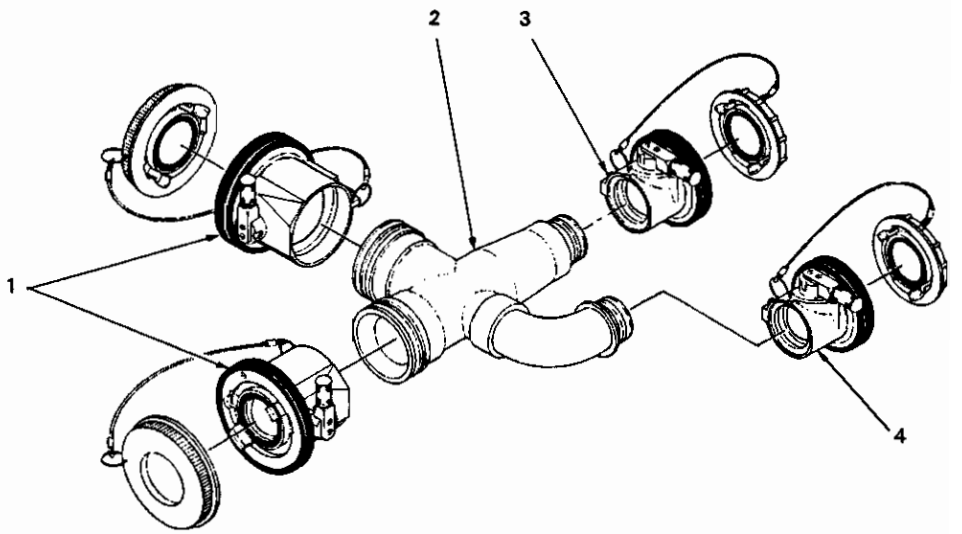


Figure C-12. Manifold, Recirculation

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-12. MANIFOLD, RECIRCULATION	
1	XAOFF		ODT23	64031VZ	..COUPLING,UNISEX,3" SEE FIGURE C-6 FOR BREAKOUT.....	2
2	XBFZZ		ODT23	220504-2	..MANIFOLD.....	1
3	XAOFF		ODT23	47114-2	..COUPLING,UNISEX SEE FIGURE C-13 FOR PARTS BREAKOUT. WITH REDUCED BORE.....	1
4	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR BREAKOUT.....	1
					END OF FIGURE	

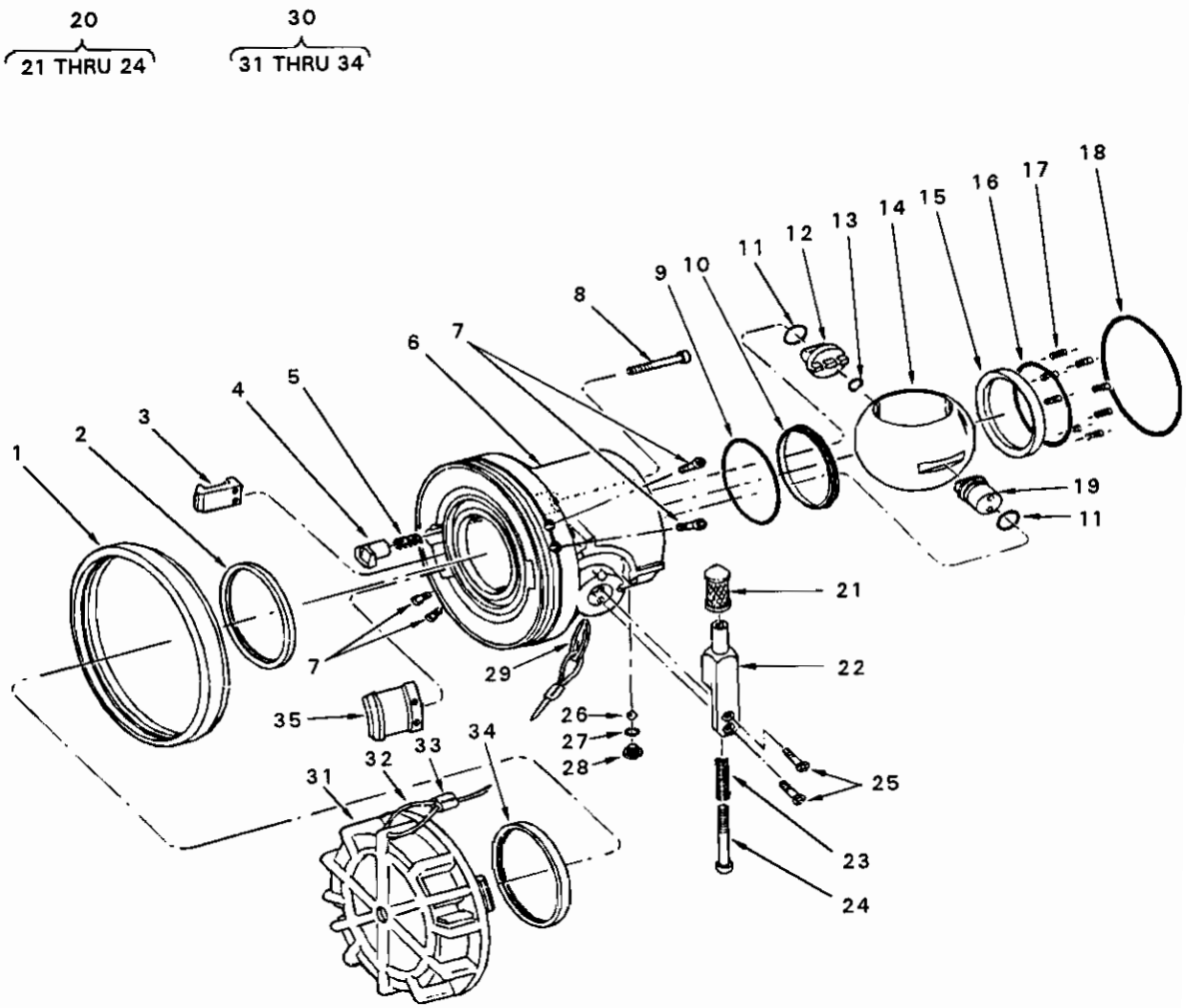


Figure C-13. Coupling, Unisex, Valved, 2-Inch, Reduced Bore

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-13. COUPLING, UNISEX, VALVED, 2-INCH, REDUCED BORE	
1	XDOZZ	2510014567850	0DT23	220161	...CAP,BUMPER	1
2	PAOZZ	5330014339203	0DT23	220146	...SEAL,PLAIN	1
3	XDOZZ		0DT23	220159-2	...CLAMP,SYNCHRO	1
4	XDFZZ		0DT23	220151	...PIN,QUICK RELEASE	1
5	PAFZZ	5360014541830	0DT23	220149	...PIN,SPRING	1
6	XBFZZ		0DT23	220163-2	...BODY (GREEN)	1
7	PAOZZ	5305011914578	96906	MS16997-20L	...SCREW,CAP,SOCKET HE	4
8	PAFZZ	5305014561139	96906	MS16997-24L	...SCREW	1
9	PCFZZ	5331006410119	96906	MS29513-134	...O-RING	1
10	PAFZZ		0DT23	220158	...SEAL,PLAIN	1
11	PCFZZ	5331002483840	96906	MS29513-014	...O-RING	2
12	XDFZZ		0DT23	220150	...PIN,QUICK RELEASE	1
13	PAFZZ	5310006053789	83553	W0367-006-S	...WASHER,SPRING TENSI	1
14	XDFZZ		0DT23	220578	...BALL,,VALVEPORTED	1
15	PAFZZ		0DT23	220157	...SEAL,PLAIN	1
16	PCFZZ	5331002917384	96906	MS29513-133	...O-RING	1
17	XDFZZ		0DT23	220153	...SPRING	8
18	PCFZZ	5331002609338	96906	MS29513-227	...O-RING	1
19	XDFZZ		0DT23	220154	...CONTROL SHAFT ASSEM	1
20	PAOOZ		0DT23	47085	...HANDLE,MANUAL ASSEM	1
21	XDOZZ		0DT23	220142	....GRIP	1
22	XDOZZ		0DT23	220147	....ARM	1
23	XDOZZ		0DT23	220145	....SPRING	1
24	XDOZZ		0DT23	220204	....SCREW	1
25	PAFZZ	5305000795835	96906	MS24693C50	...SCREW,MACHINE	2
26	XDFZZ		0DT23	220265	...BALL	41
27	PCFZZ	5331002483835	96906	MS29513-010	...O-RING	1
28	PAFZZ	5305009881720	96906	MS35206-276	...SCREW,MACHINE	1
29	XDFZZ		0DT23	220482	...RING	1
30	PAOOO	2910014562273	0DT23	47062	...CAP,DUST	1
31	XDOZZ		0DT23	220162	....BUMPER	1
32	XDOZZ		0DT23	220201-1-18	....WIRE ROPE	1
33	XDOZZ		0DT23	28-2-G	....SLEEVE	2
34	PAOZZ	5330014339203	0DT23	220146	....SEAL,PLAIN	1
35	XDOZZ		0DT23	220159-1	...CLAMP,SYNCHRO	1
					END OF FIGURE	

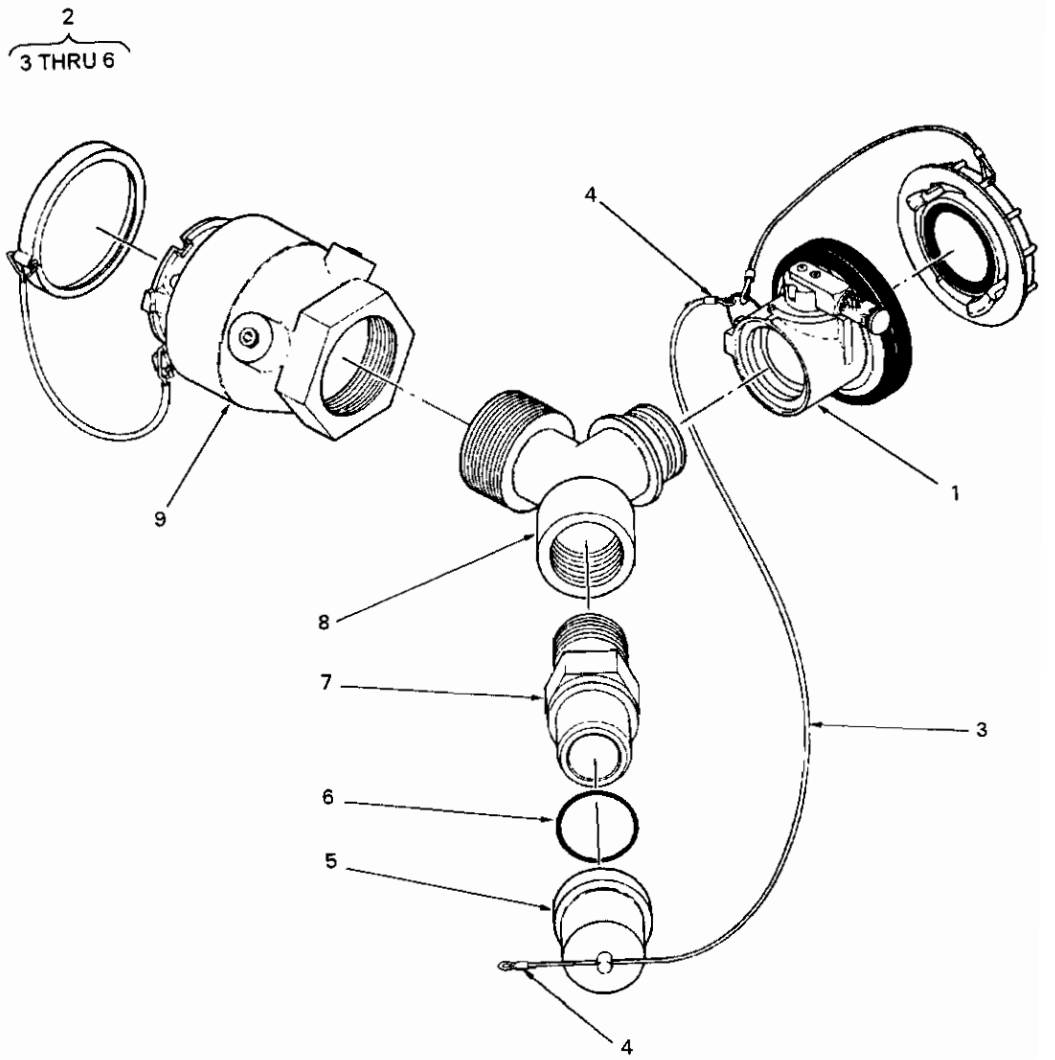


Figure C-14. Wye Assembly, Recirculation

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-14. RECIRCULATION WYE ASSEMBLY	
1	XA0FF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR BREAKOUT.....	1
2	PA000		0DT23	47069-4	..DUST CAP ASSY.....	1
3	XD0ZZ		0DT23	220201-1-15	...WIRE,ROPE(0.06IN).....	1
4	PA0ZZ	4030011420456	96906	MS51844-63	...SWAGING SLEEVE,WIRE.....	2
5	PA0ZZ		0DT23	220224-2	...CAP,DUST,INLET.....	1
6	PC0ZZ	5331002526050	96906	MS29513-138	...O-RING.....	1
7	PA0ZZ		0DT23	64028G	..ADAPTER,RECIRCULATI.....	1
8	PA0ZZ		0DT23	220706-2	..Y-2 INCH.....	1
9	PA0ZZ		0DT23	47133-2	..ADAPTER,2 INCH.....	1

END OF FIGURE

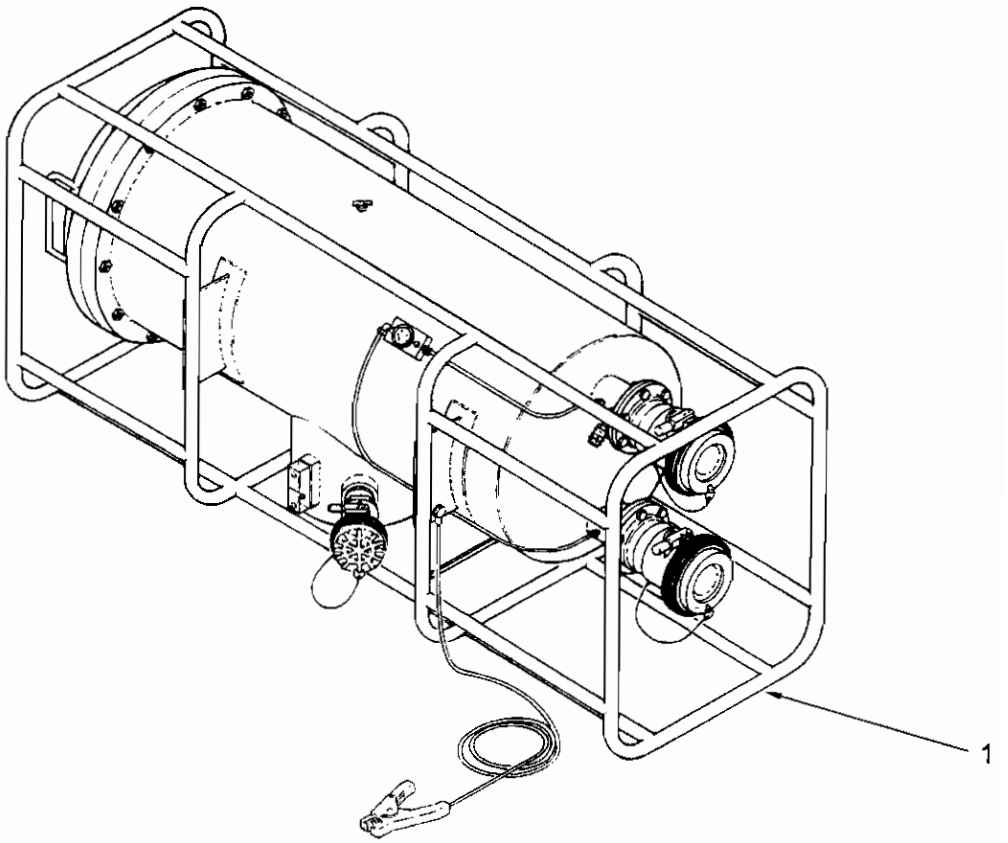


Figure C-15. Filter-Separator, Water, Liquid Fuel

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-15. FILTER SEPARATOR, WATER LIQUID FUEL	
1	PAOFF		97403	13230E5875-102	FILTER,UNIT PURIFIC LIQUID FUEL SEE TM10-4930-237-13&P FOR PARTS BREAKDOWN.....	1

END OF FIGURE

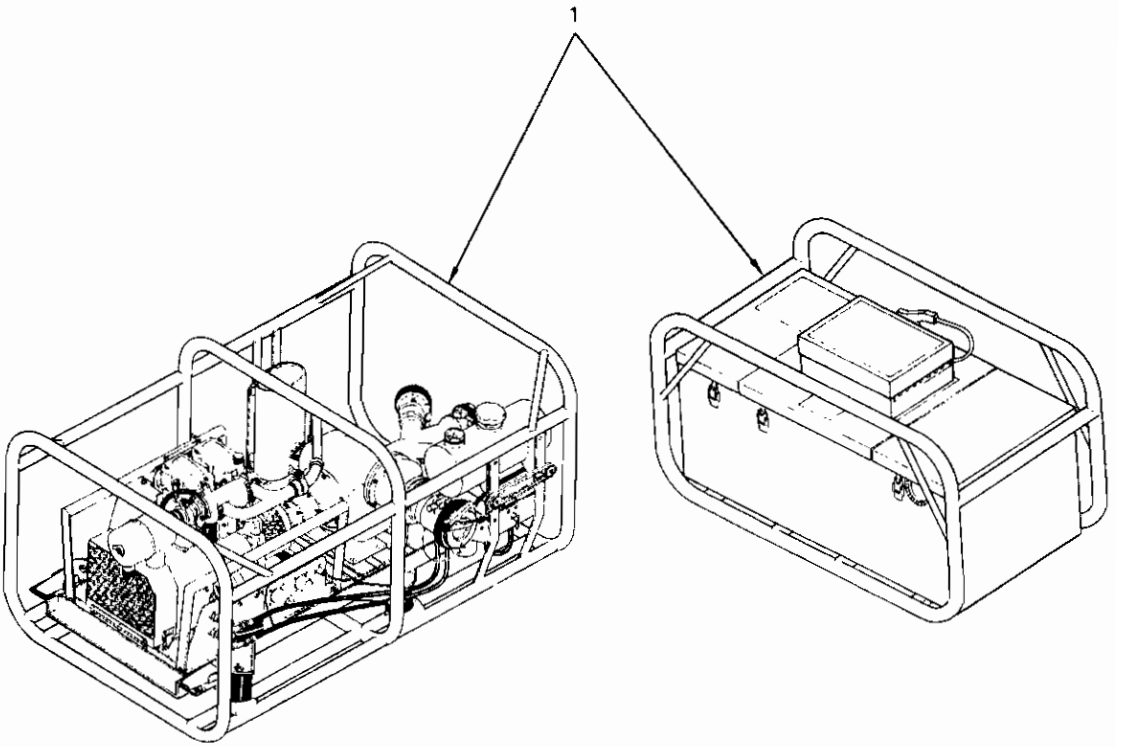


Figure C-16. Pumping Assembly

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-16. PUMPING ASSEMBLY	
1	PAOHH		97403	13230E5870-101	PUMPING ASSEMBLY SEE TM10-4320-351-24P FOR PARTS BREAKDOWN.....	1
					END OF FIGURE	

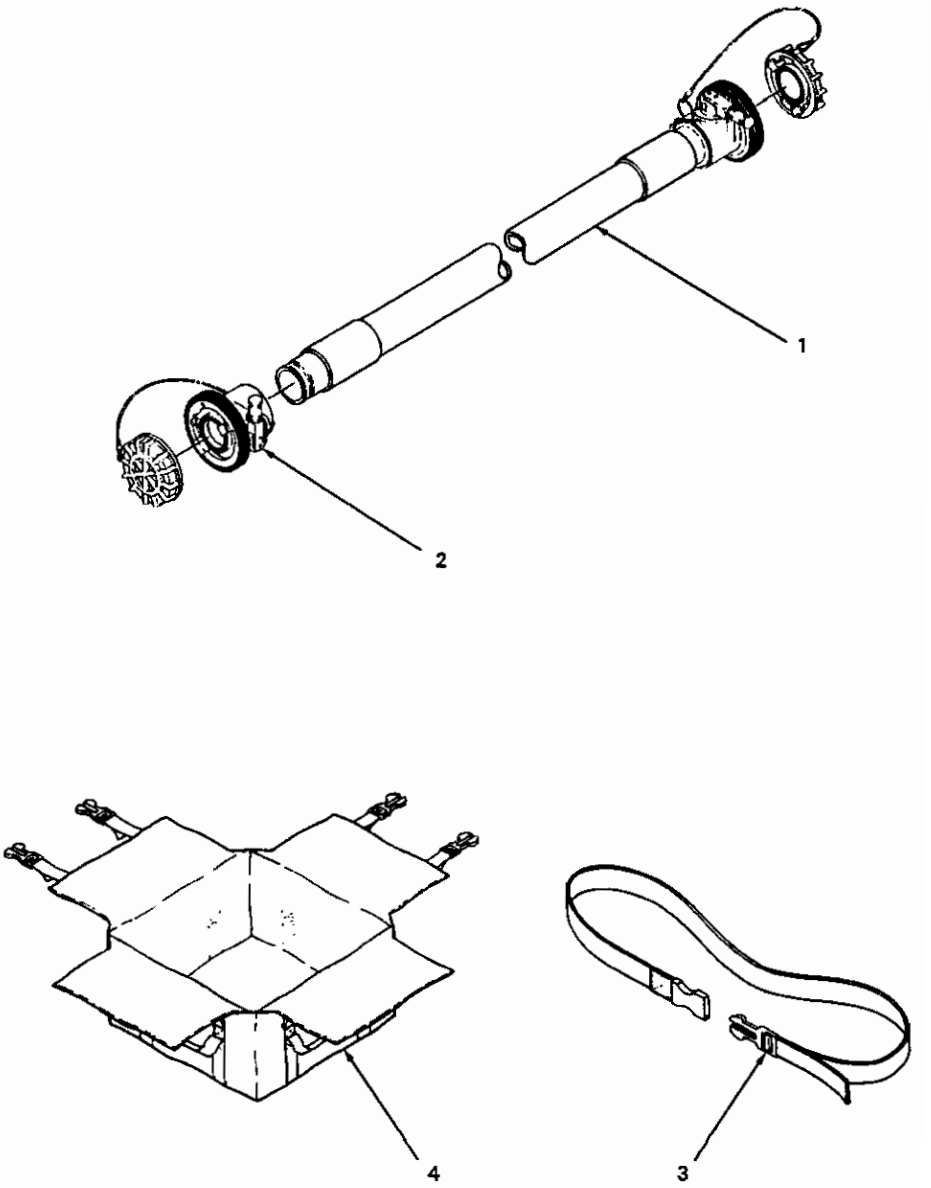


Figure C-17. Suction Hose Kit

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-17. SUCTION HOSE KIT	
0	PAOFF		97403	13230E5894-101	SUCTION HOSE KIT.....	1
1	PAOFF		97403	13230E6054-01	.HOSE ASSEMBLY,NONME.....	5
2	XAOFF		ODT23	64020VZ	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	2
3	XDOZZ		97403	13230E5899-01	.STRAP ASSEMBLY,HOSE.....	2
4	XDOZZ		97403	13230E5880-07	.BAG,FUEL SYSTEM 2" X 6' (5) DISCHARGE HOSE.....	1
					END OF FIGURE	

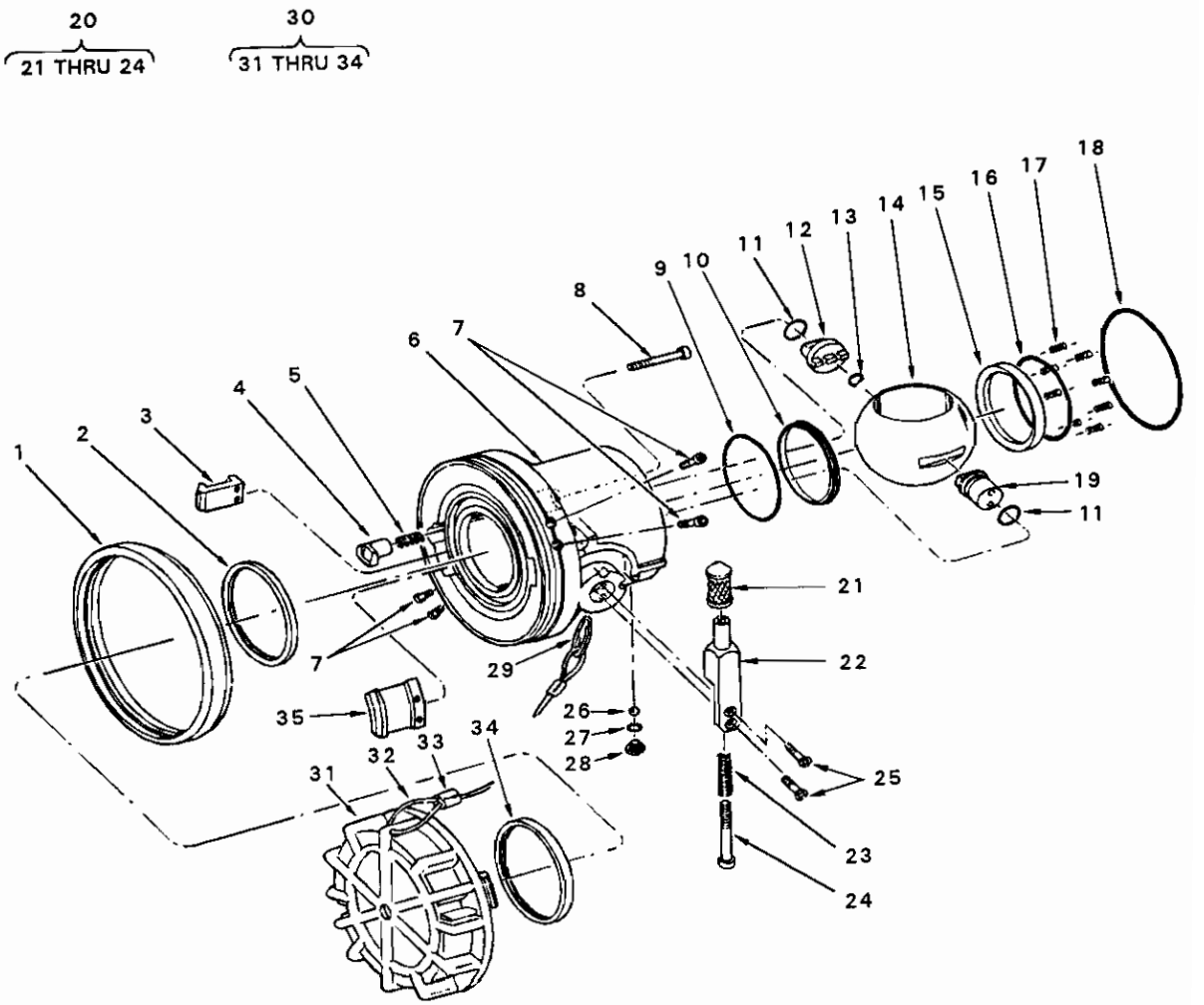


Figure C-18. Coupling, Unisex, 2-Inch, Valved

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-18. COUPLING, UNISEX, 2-INCH, VALVED	
1	XDOZZ	2510014567850	ODT23	220161	...CAP,BUMPER	1
2	PAOZZ	5330014339203	ODT23	220146	...SEAL,PLAIN PART OF KIT P/N KD64020-1	1
3	XDOZZ		ODT23	220805-2	...LUG,SHORT	1
4	XDFZZ		ODT23	220151	...PIN,QUICK RELEASE	1
5	PAFZZ	5360014541830	ODT23	220149	...PIN,SPRING	1
6	XBFZZ		ODT23	220163-2	...BODY (GREEN)	1
7	PAOZZ	5305011914578	96906	MS16997-20L	...SCREW,CAP,SOCKET HE	4
8	PAFZZ	5305014561139	96906	MS16997-24L	...SCREW	1
9	PCFZZ	5331006410119	96906	MS29513-134	...O-RING PART OF KIT P/N KD64020-1.	1
10	PAFZZ		ODT23	220158	...SEAL,PLAIN PART OF KIT P/N KD64020-1	1
11	PCFZZ	5331002483840	96906	MS29513-014	...O-RING PART OF KIT P/N KD64020-1.	2
12	XDFZZ		ODT23	220150	...PIN,QUICK RELEASE	1
13	PAFZZ	5310006053789	83553	W0367-006-S	...WASHER,SPRING TENSI	1
14	XDFZZ		ODT23	220152	...BALL,VALVED PORTED	1
15	PAFZZ		ODT23	220157	...SEAL,PLAIN PART OF KIT P/N KD64020-1	1
16	PCFZZ	5331002917384	96906	MS29513-133	...O-RING PART OF KIT P/N KD64020-1.	1
17	XDFZZ		ODT23	220153	...SPRING	8
18	PCFZZ	5331002609338	96906	MS29513-227	...O-RING PART OF KIT P/N KD64020-1.	1
19	XDFZZ		ODT23	220154	...CONTROL SHAFT ASSEM	1
20	PAOOZ		ODT23	47085	...HANDLE,MANUAL ASSEM	1
21	XDOZZ		ODT23	220142	....GRIP	1
22	XDOZZ		ODT23	220147	....ARM	1
23	XDOZZ		ODT23	220145	....SPRING	1
24	XDOZZ		ODT23	220204	....SCREW	1
25	PAFZZ	5305000795835	96906	MS24693C50	...SCREW,MACHINE	2
26	XDFZZ		ODT23	220265	...BALL	41
27	PCFZZ	5331002483835	96906	MS29513-010	...O-RING PART OF KIT P/N KD64020-1.	1
28	PAFZZ	5305009881720	96906	MS35206-276	...SCREW,MACHINE	1
29	XDFZZ		ODT23	220482	...RING	1
30	PAOOO	2910014562273	ODT23	47062	...CAP,DUST	1
31	XDOZZ		ODT23	220162	....BUMPER	1
32	XDOZZ		ODT23	220201-1-18	....WIRE ROPE	1
33	XDOZZ		ODT23	28-2-G	....SLEEVE	2
34	PAOZZ	5330014339203	ODT23	220146	....SEAL,PLAIN PART OF KIT P/N KD64020-1	1
35	XDOZZ		ODT23	220805-1	...LUG,LONG	1
					END OF FIGURE	

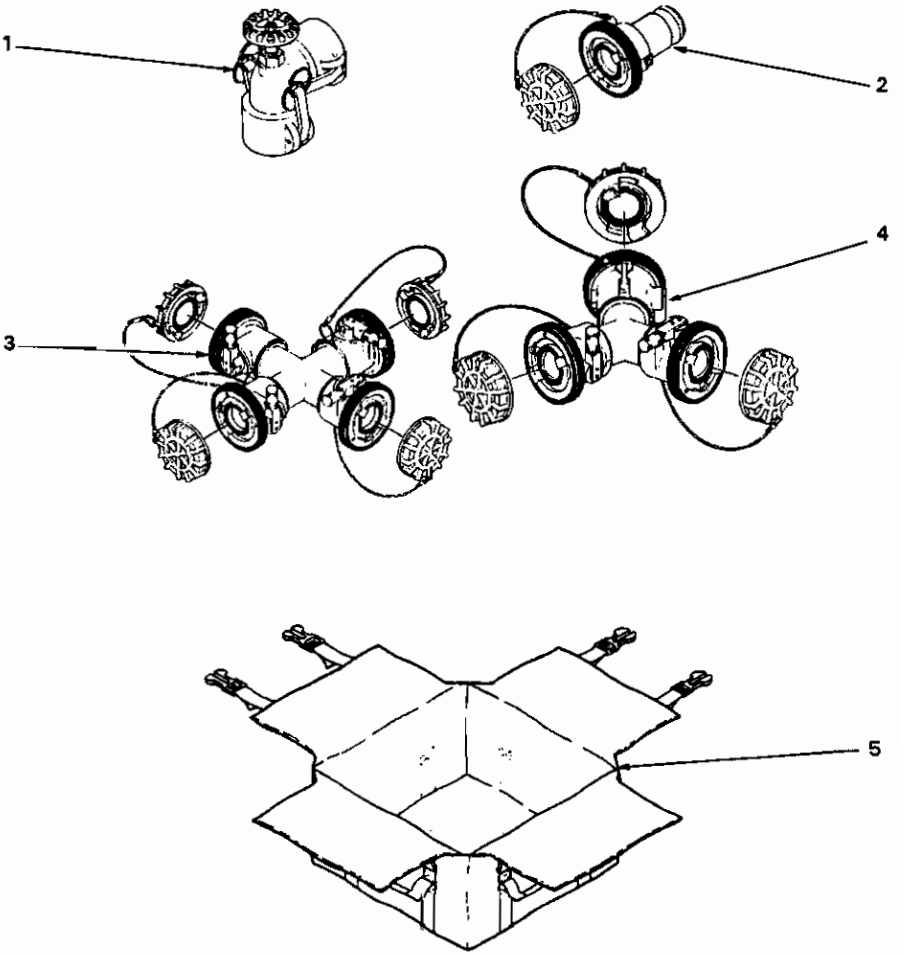


Figure C-19. Drum Fitting Kit

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-19. DRUM FITTING KIT	
0	PAOFF		97403	13230E5897-101	DRUM FITTING KIT.....	1
1	PAOZZ	4820011676550	97403	13219E0491	.VALVE,ANGLE.....	8
2	PAOFF		97403	13230E5961-01	..CPLG NONVALVE,2" UN.....	1
3	PAOFF		97403	13230E6057-01	.UNISEX CROSS SEE FIGURE C-22 FOR PARTS BREAKOUT.....	1
4	PAOFF		97403	13230E6062-01	.WYE,2" SEE FIGURE C-23 FOR PARTS BREAKOUT.....	2
5	XDOZZ		97403	13230E5880-05	.BAG,FUEL SYSTEM UNISEX CROSS (1), WYE, 2" (2), COUPLING, NONVALVED, 2" (8).....	1

END OF FIGURE

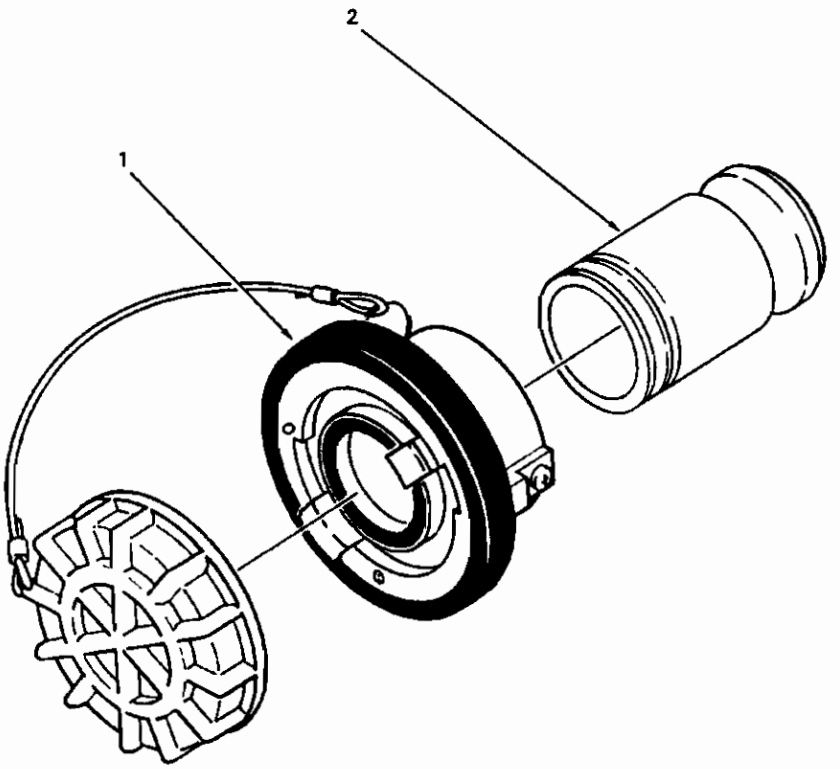


Figure C-20. Coupling, Non-Valved, 2-Inch Unisex to 2-Inch Male Camlock

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-20. COUPLING, NON-VALVED, 2-INCH UNISEX TO 2-INCH MALE CAMLOCK	
1	XAFZZ		0DT23	64019V	..COUPLING,2" UNISEX,.....	1
2	PAOZZ		0DT23	220140-2	..INLET,2" MALE,CAMLO.....	1

END OF FIGURE

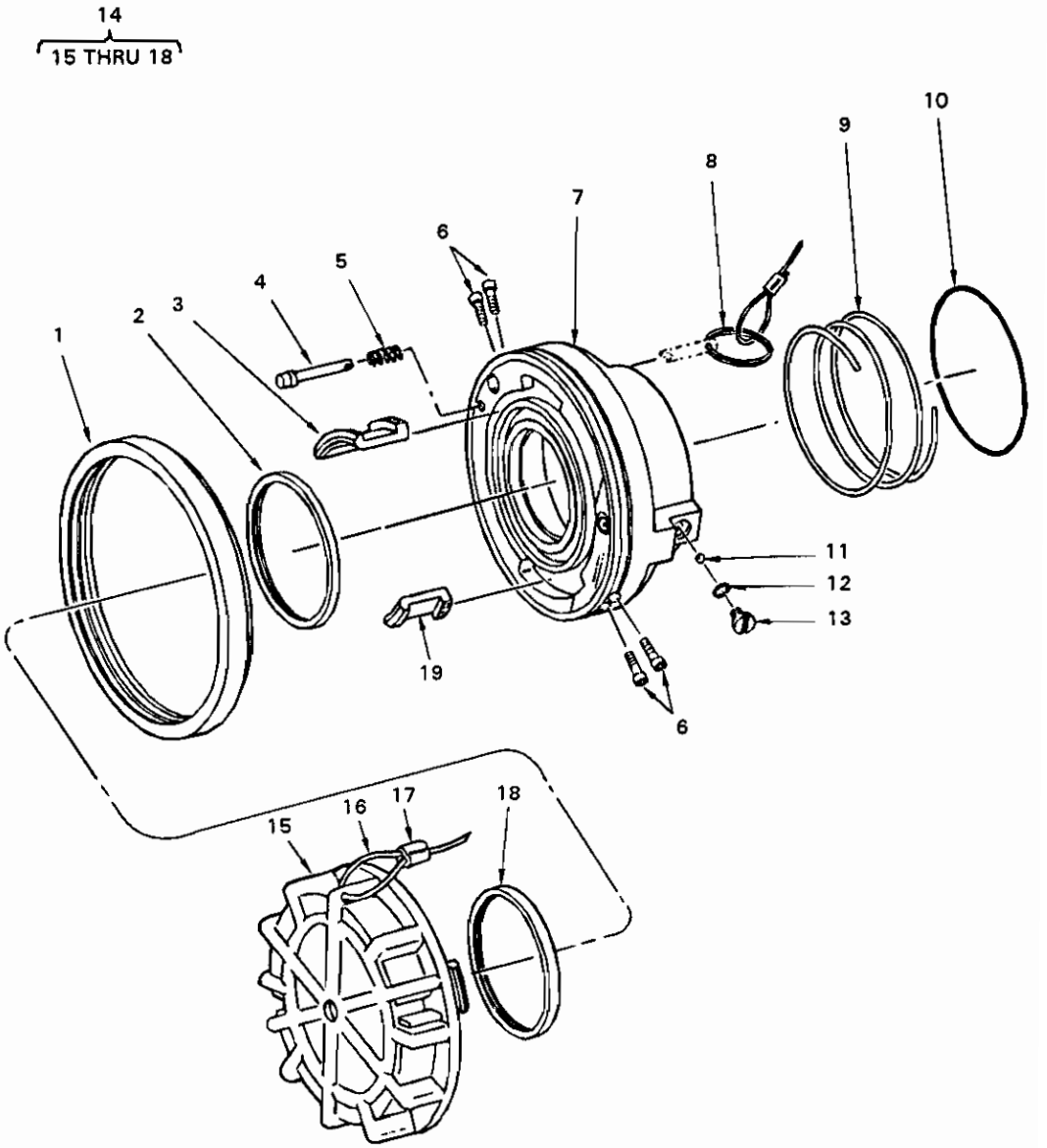


Figure C-21. Coupling, Unisex, 2-Inch, Non-Valved

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-21. COUPLING, UNISEX, 2-INCH, NON-VALVED	
1	XDOZZ	2510014567850	0DT23	220161	...CAP,BUMPER.....	1
2	PAOZZ	5330014339203	0DT23	220146	....SEAL,PLAIN PART OF KIT P/N KD64019-1.....	1
3	XDOZZ		0DT23	220159-1	...CLAMP,SYNCHRO.....	1
4	XDFZZ		0DT23	220148	...PIN,LOCKOUT.....	1
5	XDFZZ		0DT23	220301	...SPRING.....	1
6	PAOZZ	5305011914578	96906	MS16997-20L	...SCREW,CAP,SOCKET HE.....	4
7	XBFZZ		0DT23	220164-2	...BODY.....	1
8	XDFZZ		60808	8K1	...WIRE RING.....	1
9	XDFZZ		0DT23	220330	...SPRING.....	1
10	PCFZZ	5331002609338	96906	MS29513-227	...O-RING PART OF KIT P/N KD64019-1.	1
11	XDFZZ		0DT23	220265	...BALL.....	41
12	PCFZZ	5331002483835	96906	MS29513-010	...O-RING PART OF KIT P/N KD64019-1.	1
13	PAFZZ	5305009881720	96906	MS35206-276	...SCREW,MACHINE PART OF KIT P/N KD64019-1.....	1
14	PAOOO	2910014562273	0DT23	47062	...CAP,DUST.....	1
15	XDOZZ		0DT23	220162	....BUMPER.....	1
16	XDOZZ		0DT23	220201-1-18	....WIRE ROPE.....	1
17	XDOZZ		0DT23	28-2-G	....SLEEVE.....	2
18	PAOZZ	5330014339203	0DT23	220146	...SEAL,PLAIN PART OF KIT P/N KD64019-1.....	1
19	XDOZZ		0DT23	220159-2	...CLAMP,SYNCHRO.....	1

END OF FIGURE

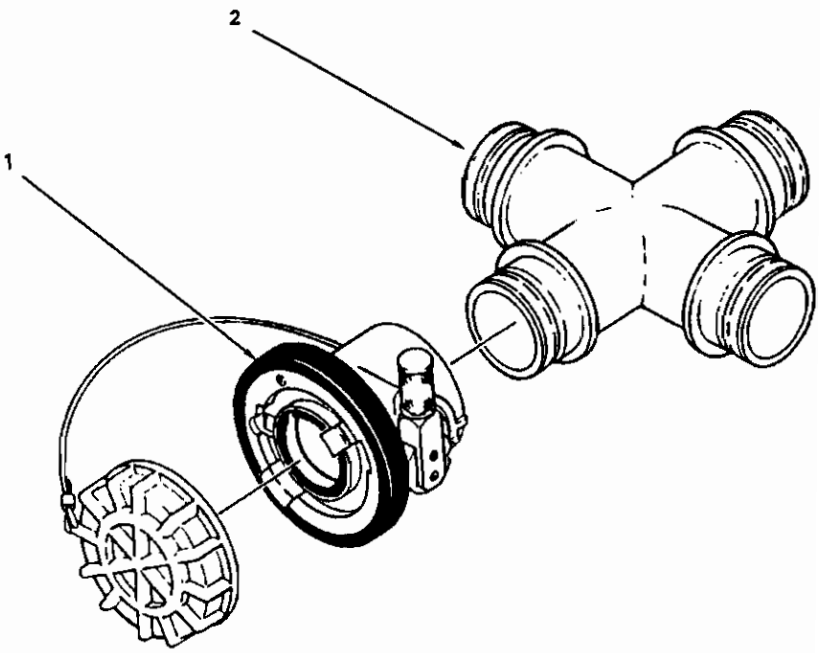


Figure C-22. Cross, 2-Inch Unisex

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-22. CROSS, 2-INCH UNISEX	
1	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	4
2	XAOFF		ODT23	220168-2	..CROSS.....	1
					END OF FIGURE	

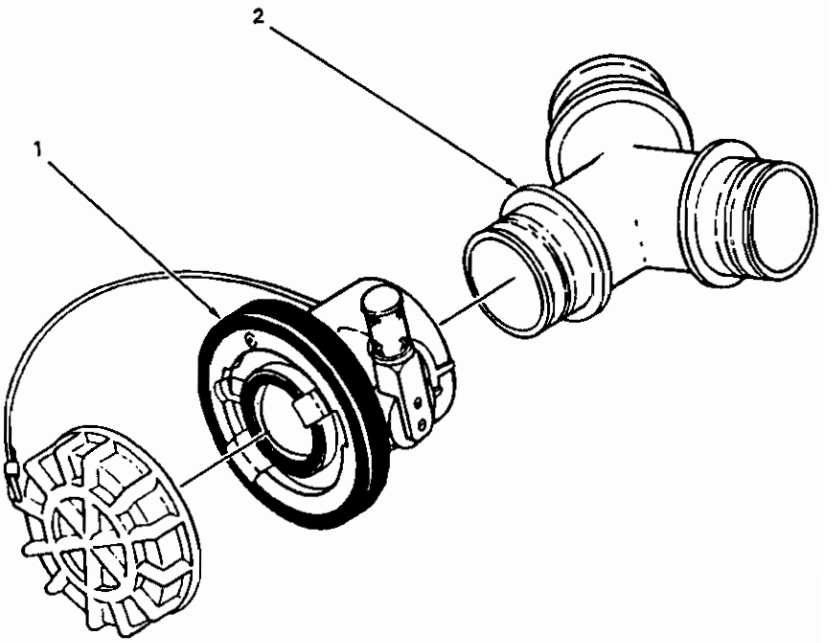


Figure C-23. Wye, 2-inch Unisex

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-23. WYE, 2-INCH UNISEX	
1	XAOFF		0DT23	64020VZ	..COUPLING,UNISEX,2" SEE FIGURE C-18 FOR PARTS BREAKOUT.....	3
2	XAOFF		0DT23	220167-2	..WYE,2".....	1

END OF FIGURE

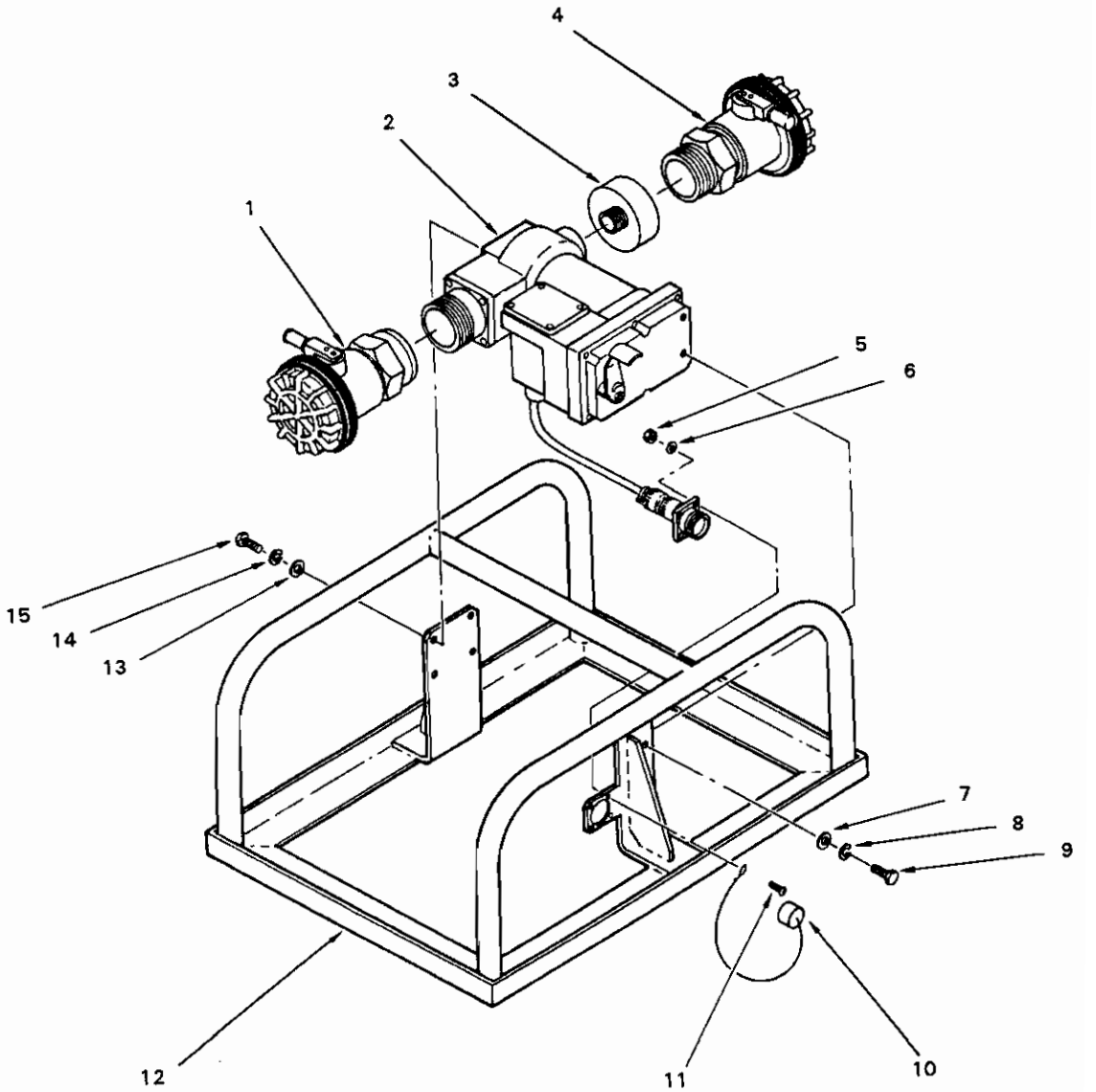


Figure C-24. Pump Assembly, Auxiliary

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-24. PUMP ASSEMBLY, AUXILIARY	
0	PAOFF		97403	13230E5890-101	PUMPING ASSEMBLY DEFUELING.....	1
1	PAOFF		97403	13230E5886-01	.COUPLING,UNISEX SEE FIGURE C-25 FOR PARTS BREAKOUT VALVED 2 IN FNPT.....	1
2	PAOFF		97403	13230E6060-102	.PUMPING ASSEMBLY,FL SEE FIGURE C-26 FOR PARTS BREAKOUT.....	1
3	PAOZZ		97403	13230E5885-01	.REDUCER.....	1
4	PAOFZ	4730014567469	97403	13230E6063-01	.COUPLING HALF,QUICK SEE FIGURE C-27 FOR PARTS BREAKOUT VALVED 2 IN MNPT.....	1
5	PAOZZ	5310009824999	96906	MS21044C04	.NUT,SELF-LOCKING,HE.....	1
6	PAOZZ	5310013384121	80205	NAS1149CN432R	.WASHER,FLAT.....	1
7	PAOZZ	5310001670814	80205	NAS1149C0532R	.WASHER,FLAT NO. 5/16.....	2
8	PAOZZ	5310009746623	96906	MS35338-140	.WASHER,LOCK NO. 5/16.....	2
9	PAFZZ	5305014354132	08915	F2220	...SCREW,CAP,HEXAGON H.....	2
10	PAOZZ	5935012810051	81349	D38999/33W17R	.COVER,ELECTRICAL CO.....	1
11	PAOZZ	5305000545651	96906	MS51957-17	.SCREW,MACHINE.....	4
12	PAOZZ		97403	13230E5889-101	.FRAME ASSEMBLY.....	1
13	PAOZZ	5310013529592	80205	NAS1149C0432R	.WASHER,FLAT NO. 1/4.....	4
14	PAOZZ	5310009338121	96906	MS35338-139	.WASHER,LOCK NO. 1/4.....	4

END OF FIGURE

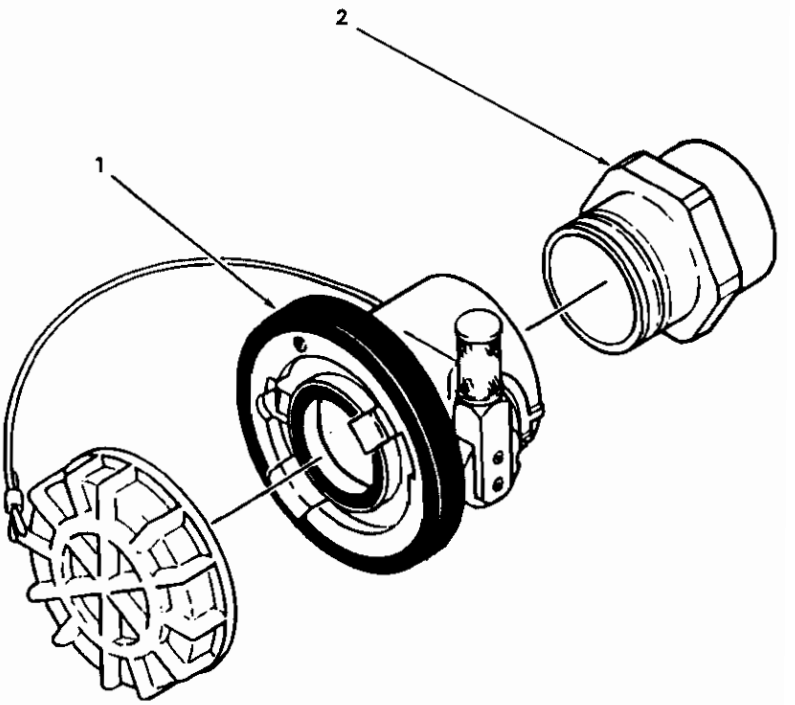


Figure C-25. Coupling, Unisex, Valved 2-inch, Female NPT Inlet

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-25. COUPLING, UNISEX, VALVED, 2-INCH, FEMALE NPT INLET	
1	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR BREAKOUT.....	1
2	PAOZZ		0DT23	220498-2	..NIPPLE,QUICK-DISC.....	1

END OF FIGURE

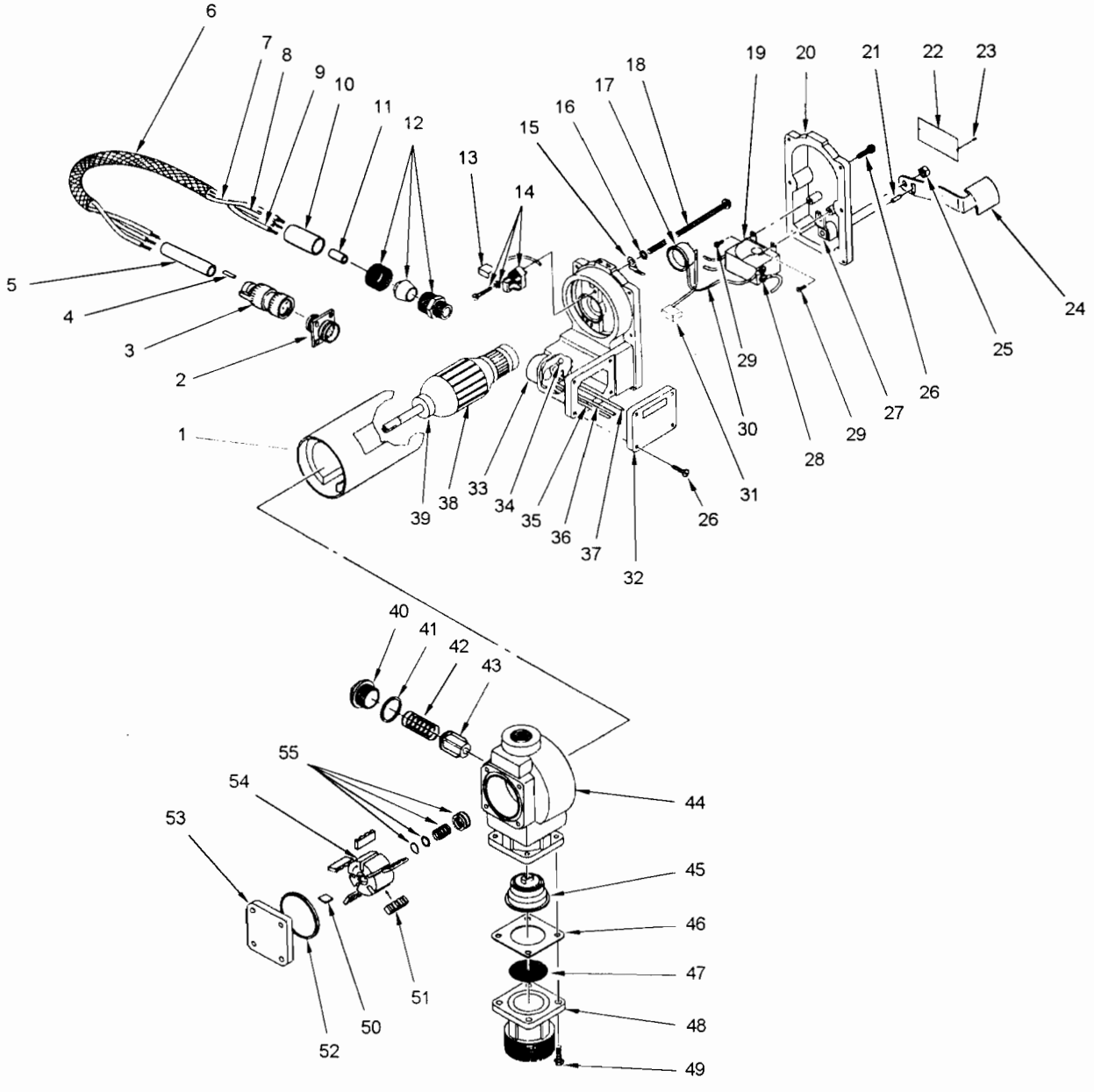


Figure C-26. Pump Assembly

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-26. PUMP ASSEMBLY	
1	PAFZZ	6150014351437	08915	F6526	..HOUSING,ELECTRICAL	1
2	PAFZA	5935011906724	81349	D38999/20WE6PN	..CONNECTOR,RECEPTACL	1
3	PAFZZ		81349	M85049/18-17W04	..BACKSHELL	1
4	PAFZZ	5935010970399	96906	MS27488-12	..PLUG,END SEAL,ELECT	1
5	PAFZZ		96960	MS3420-6	..BUSHING,RUBBER	1
6	PAFZZ		97403	13230E5946-02	..SLEEVING,BRAIDED	V
7	PAFZA	6145010579413	81349	M22759/16-12-0	..WIRE,ELECTRICAL	1
8	PAFZZ	6145010607868	81349	M22759/16-12-9	..WIRE,ELECTRICAL	V
9	PAFZZ	6145011731389	81349	M22759/16-12-5	..WIRE,ELECTRICAL	V
10	PAFZZ		81349	M23053/18-307-0	..SLEEVING,INSUL	3
11	PAFZZ	5940002668425	81349	M81824/1-3	..SPLICE,CONDUCTOR	V
12	PAFZZ		08915	F6690	..CONNECTOR,CABLE	1
13	PAFZZ	5977014348702	08915	F6542	..BRUSH,ELECTRICAL CO	1
14	PAFZZ	5977014348706	08915	F6535	..HOLDER,ELECTRICAL C	2
15	XDFZZ		08915	F6695	..CLIP,RETAINER	2
16	XDFZZ		08915	F3300	..WASHER,LOCK	2
17	PAFZZ		08915	F6602	..THERMAL PROTECTOR,1	1
18	PAFZZ	5306014352850	08915	F6475	..BOLT,MACHINE	2
19	PAFZZ		08915	F3124	..SWITCH,LINE	1
20	PAFZZ		08915	F6414	..SWITCH PLATE W/BUSH	1
21	PAFZZ	5315014348096	08915	F6650	...PIN,STRAIGHT,HEADLE	1
22	XBFZZ		08915	N/A	..NAMEPLATE,24V	1
23	PAFZZ	5320014348645	08915	G1906	...RIVET,BLIND	2
24	PAFZZ		94703	13230E5940-101	..HANDLE,SWITCH LEVER	1
25	XDFZZ		08915	F2950	..NUT,LOCK	1
26	PAFZZ	5305014352855	08915	F6480	..SCREW,MACHINE	10
27	PAFZZ		08915	F6625	..SWITCH SHAFT ASSY	1
28	XDFZZ		08915	F3990	..WASHER,LOCK	4
29	PAFZZ	5305014352853	08915	F4000	..SCREW,MACHINE	2
30	PAFZZ	6150014351441	08915	F6605	..LEAD,ELECTRICAL	1
31	PAFZZ	5977014348704	08915	F6541	..BRUSH,ELECTRICAL CO	1
32	PAFZZ		08915	F6495	..COVER,JUNCTION BOX	1
33	XDFZZ		08915	F6410	..MOTOR CASTING	1
34	PAFZZ	5305014352851	08915	F6727	...SCREW,DRIVE	1
35	PAFZZ	6150014351439	08915	F6726	...LEAD,ELECTRICAL	1
36	PAFZZ	6150014351440	08915	F6612	...LEAD,ELECTRICAL	1
37	PAFZZ	6150014351442	08915	F6611	...LEAD,ELECTRICAL	1
38	PAFZZ	6105014351559	08915	F6533	..ARMATURE ASSEMBLY	1
39	PAFZZ	3110014359835	08915	F6545	...BEARING,BALL,ANNULA	2
40	PAFZZ	5365014351566	08915	F6464	..PLUG,MACHINE THREAD	1
41	PAFZZ	5330014353783	08915	F6455	..GASKET	1
42	PAFZZ		08915	F2770	..BYPASS SPRING	1
43	PAFZZ	4820014355887	08915	F2756	..DISK,VALVE	1
44	PAFZZ		08915	F6405	..HOUSING,FUEL PUMP	1
45	PAFZZ	4820014355886	08915	F6510	..VALVE,CHECK	1
46	PAFZZ	5330014353780	08915	F0790	..GASKET	1
47	PAFZZ	4730014354619	08915	F0760	..STRAINER ELEMENT,SE	1
48	PAFZZ		08915	F6465	INLET FLANGE	1
49	PAFZZ	5305014352856	08915	F6721	SCREW,CAP,HEXAGON H	4
50	PAFZZ	5315014354833	08915	F6440	KEY,MACHINE	1

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
51	XDFZZ		08915	F6431	..VANE,CARBON.....	5
52	PAFZZ	5330014353786	08915	F6505	..GASKET.....	1
53	PAFZZ	5340014352428	08915	F6435	..COVER,ACCESS.....	1
54	PAFZZ	4320014364595	08915	F6437	..ROTOR,PUMP.....	1
55	PAFZZ	5330014353782	08915	F6446	..PARTS KIT,SEAL REPL.....	1

END OF FIGURE

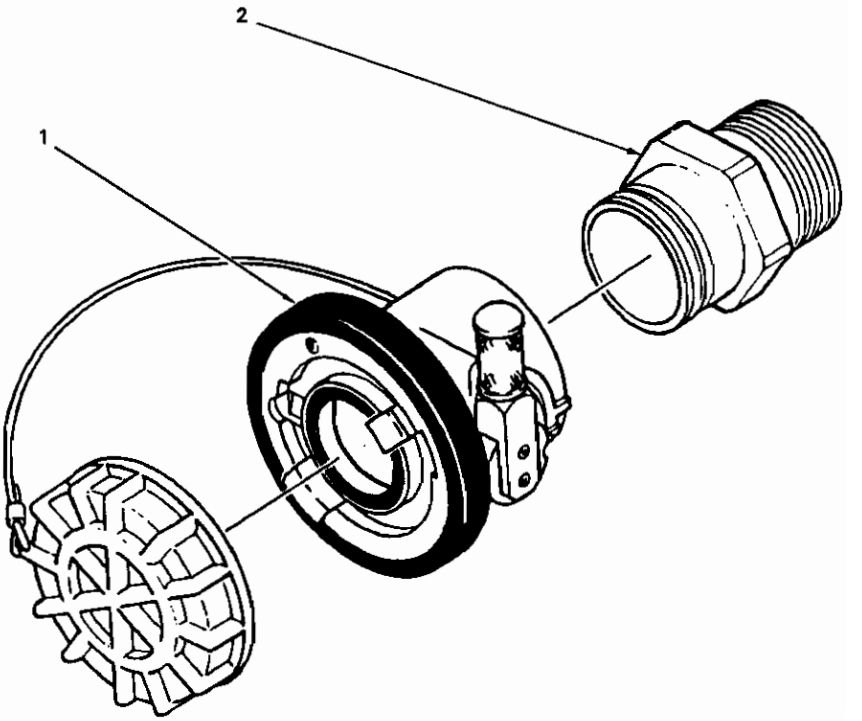


Figure C-27. Coupling, Unisex, Valved, 2-Inch, Male NPT Inlet

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-27. COUPLING, UNISEX, VALVED, 2-INCH, MALE NPT INLET	
1	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	PAOZZ	4730014563895	0DT23	220132-2	..NIPPLE,QUICK DISCON.....	1
					END OF FIGURE	

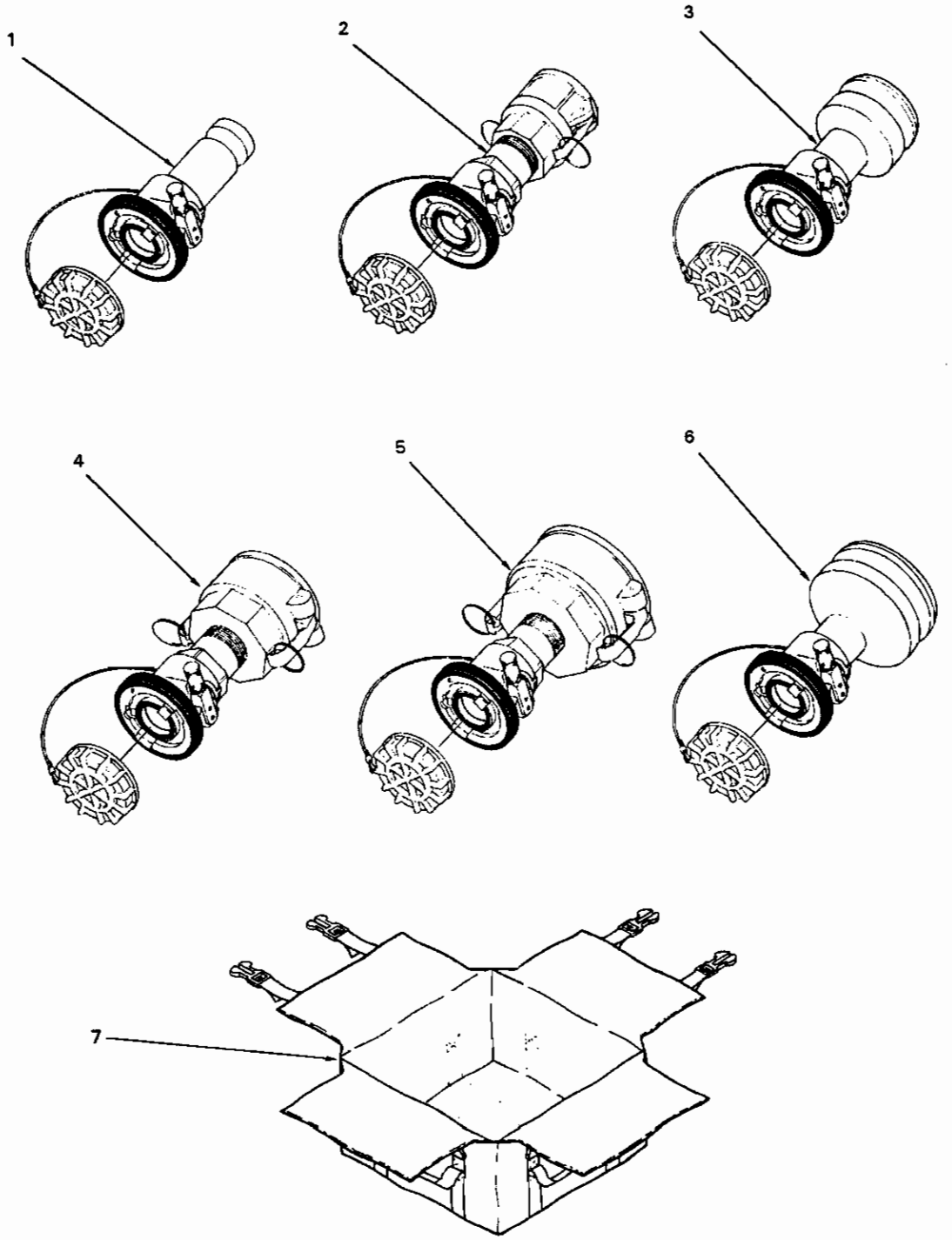


Figure C-28. Drum Adapter Kit

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-28. DRUM ADAPTER KIT	
0	PAOFF		97403	13230E5970-101	DRUM ADAPTER KIT.....	1
1	PAOFF		00624	AE82093R	.CPLG HALF,2" UNISEX SEE FIGURE C-29 FOR PARTS BREAKOUT.....	4
2	PAOFF		00624	AE82090R	.CPLG HLAF,2" UNISEX SEE FIGURE C-30 FOR PARTS BREAKOUT.....	4
3	PAOFF		97403	13230E5964-01	.CPLG HALF,2" UNISEX SEE FIGURE C-31 FOR PARTS BREAKOUT.....	2
4	PAOFF		97403	13230E5965-01	.CPLG HALF,2" UNISEX SEE FIGURE C-32 FOR PARTS BREAKOUT.....	2
5	PAOFF		97403	13230E5966-01	.CPLG HALF,2" UNISEX SEE FIGURE C-33 FOR PARTS BREAKOUT.....	1
6	PAOFF		00624	AE82093R	.CPLG HALF,2" UNISEX SEE FIGURE C-34 FOR PARTS BREAKOUT.....	1
7	XDOZZ		97403	13230E5880-06	.BAG,FUEL SYSTEM COUPLING AHLF, UNISEX (14).....	1

END OF FIGURE

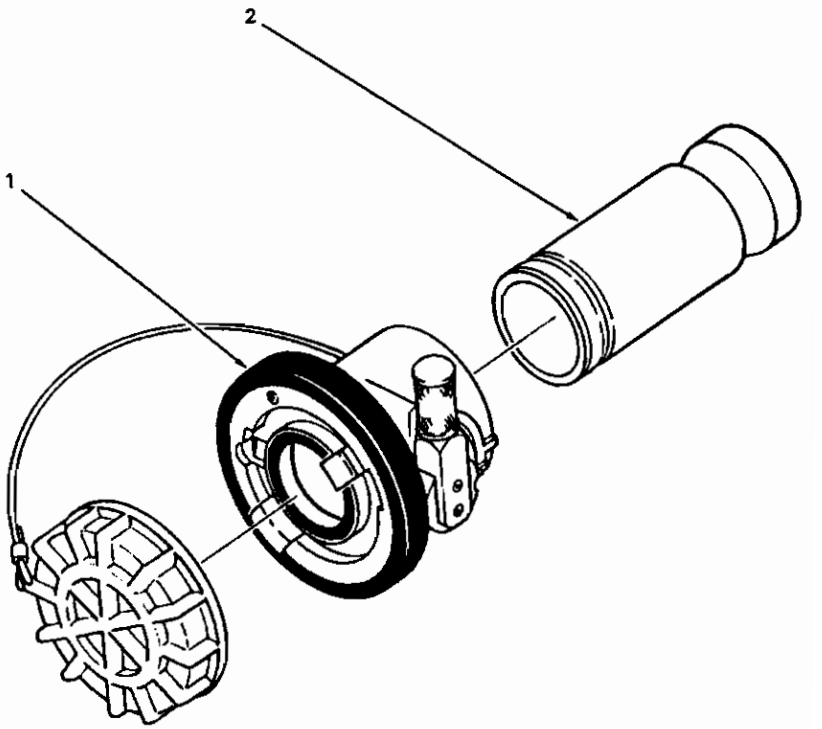


Figure C-29. Adapter, 2-Inch Unisex to 2-Inch Male Camlock

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-29. ADAPTER, 2-INCH, UNISEX TO 2-INCHMALE CAMLOCK	
1	XAOFF		ODT23 64020V		..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	PAOZZ		ODT23 220124-2		..NIPPLE,QUICKDISC.....	1

END OF FIGURE

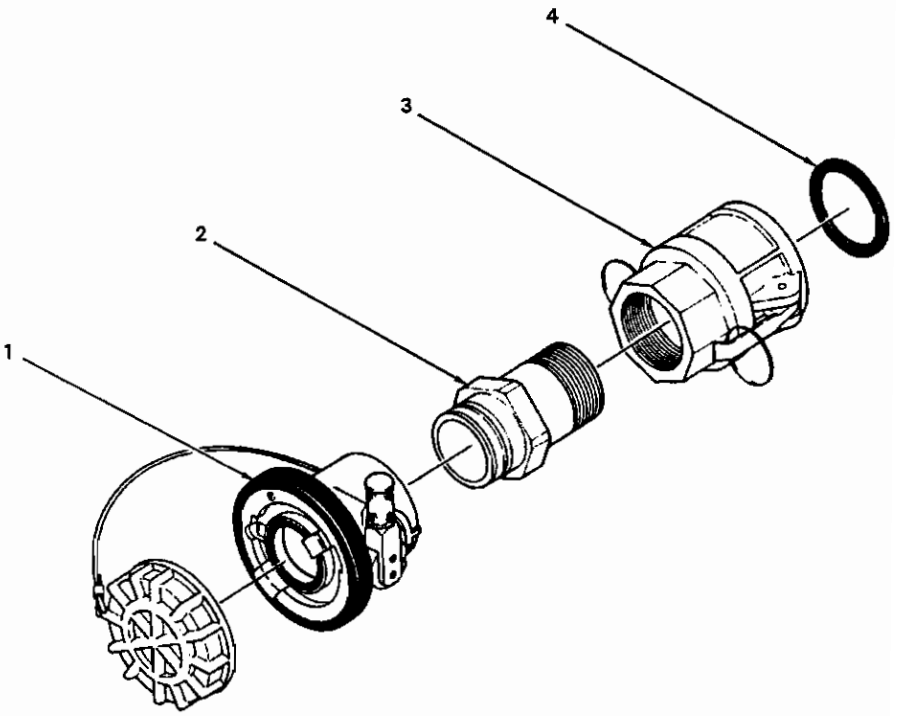


Figure C-30. Adapter, 2-Inch Unisex to 2-Inch Female Camlock

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-30. ADAPTER, 2-INCH UNISEX TO 2-INCH FEMALE CAMLOCK	
1	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	PAOZZ	4730014563895	0DT23	220132-2	..NIPPLE,QUICK DISCON.....	1
3	PA000		0DT23	20D-AL-GR	..NIPPLE,QUICK-DISC.....	1
4	PAOZZ	5330006122414	96906	MS27030-6	...GASKET.....	1
					END OF FIGURE	

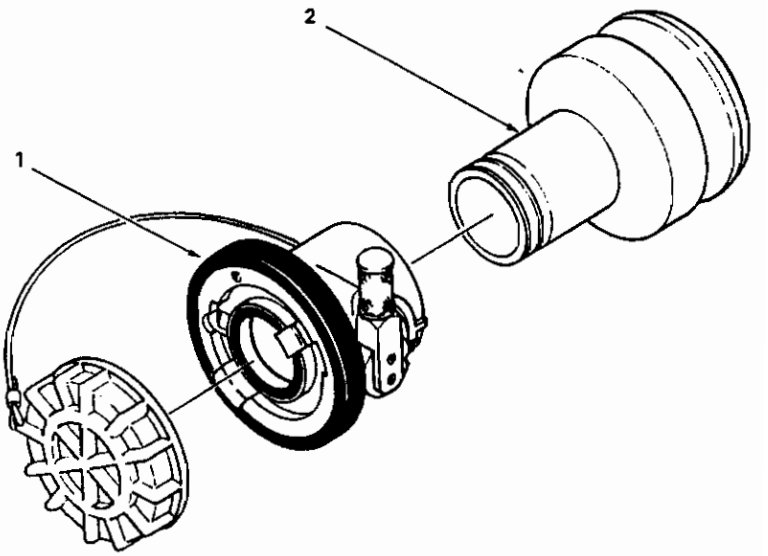


Figure C-31. 2-Inch Unisex to 3-Inch Male Camlock Adapter

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-31. 2-INCH UNISEX TO 3-INCH MALE CAMLOCK ADAPTER	
1	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	PAOZZ		0DT23	220134-2	..INLET,3" MALE CAMLO.....	1
					END OF FIGURE	

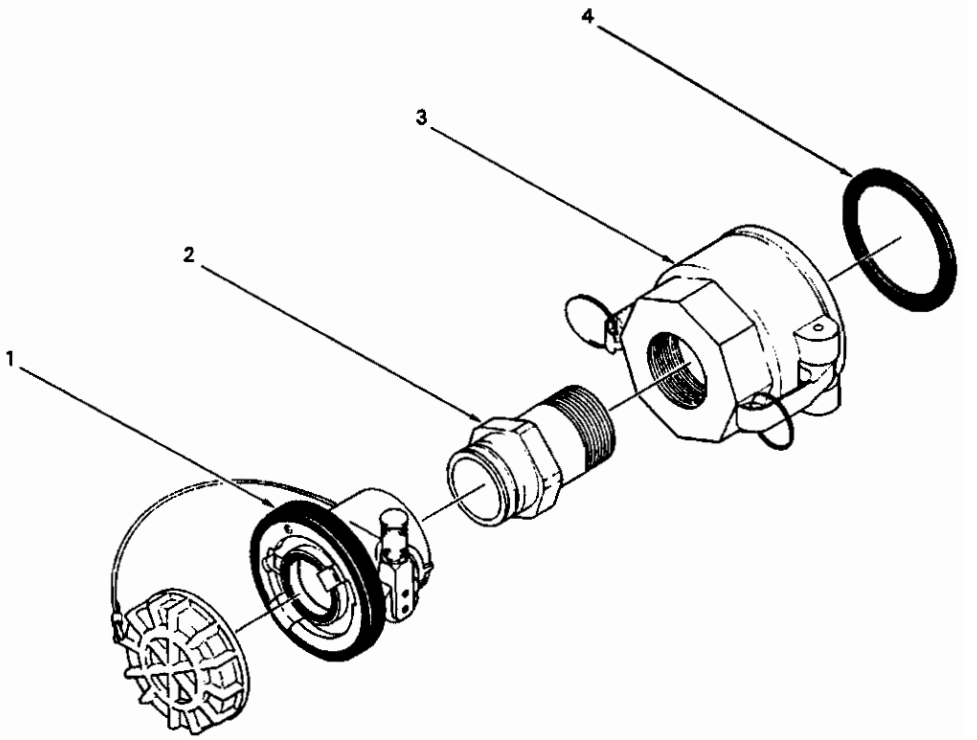


Figure C-32. 2-Inch Unisex to 3-Inch Female Camlock Adapter

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-32. 2-INCH UNISEX TO 3-INCH FEMALE CAMLOCK ADAPTER	
1	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	XBOFF		ODT23	220132-2	..INLET,2" MALE NPT.....	1
3	PAOOO		ODT23	3020D-AL-GR	..NIPPLE,QUICKDISC.....	1
4	PAOZZ	5330000889166	96906	MS27030-8	...GASKET.....	1

END OF FIGURE

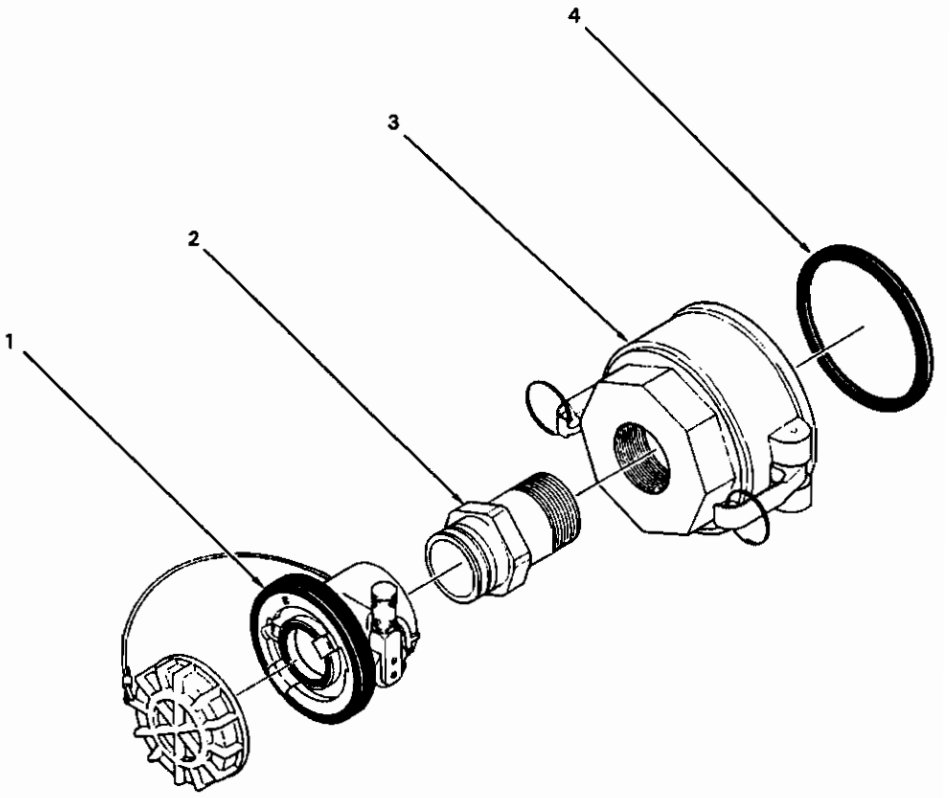


Figure C-33. 2-Inch Unisex to 4-Inch Female Camlock Adapter

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-33. 2-INCH UNISEX TO 4-INCH FEMALE CAMLOCK ADAPTER	
1	XAOFF		0DT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	PAOZZ	4730014563895	0DT23	220132-2	..NIPPLE,QUICK DISCON.....	1
3	PA000		0DT23	4020D-AL-GR	..INLET,4" FEMALE CAM.....	1
4	PAOZZ	5330008994509	96906	MS27030-9	...GASKET.....	1

END OF FIGURE

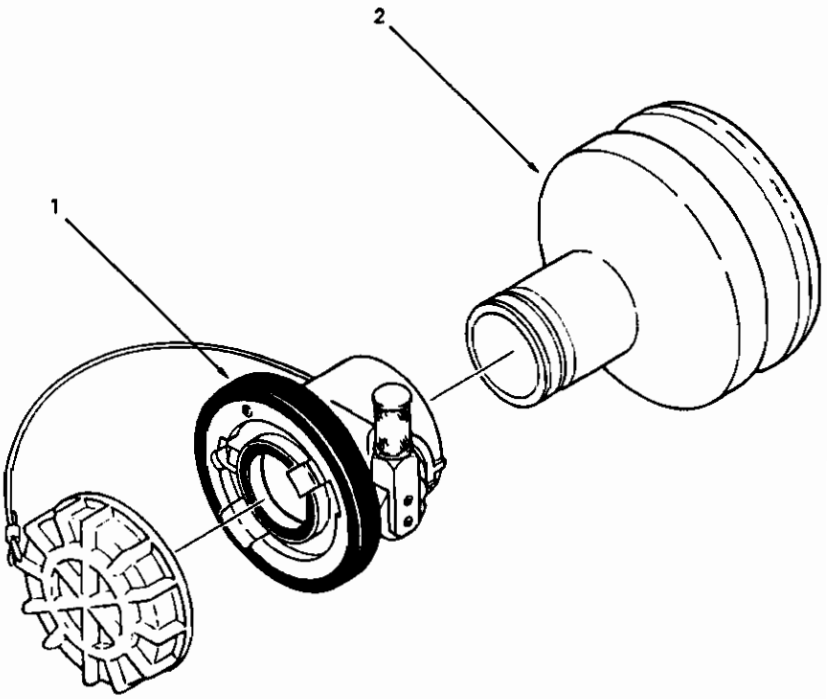


Figure C-34. 2-Inch Unisex to 4-Inch Male Camlock Adapter

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-34. 2-INCH UNISEX TO 4-INCH MALE CAMLOCK ADAPTER	
1	XAOFF		ODT23	64020V	..COUPLING,UNISEX,2" SEE FIGURE C-3 FOR PARTS BREAKOUT.....	1
2	PAOZZ		ODT23	220137-2	..NIPPLE,QUICKDISC.....	1

END OF FIGURE

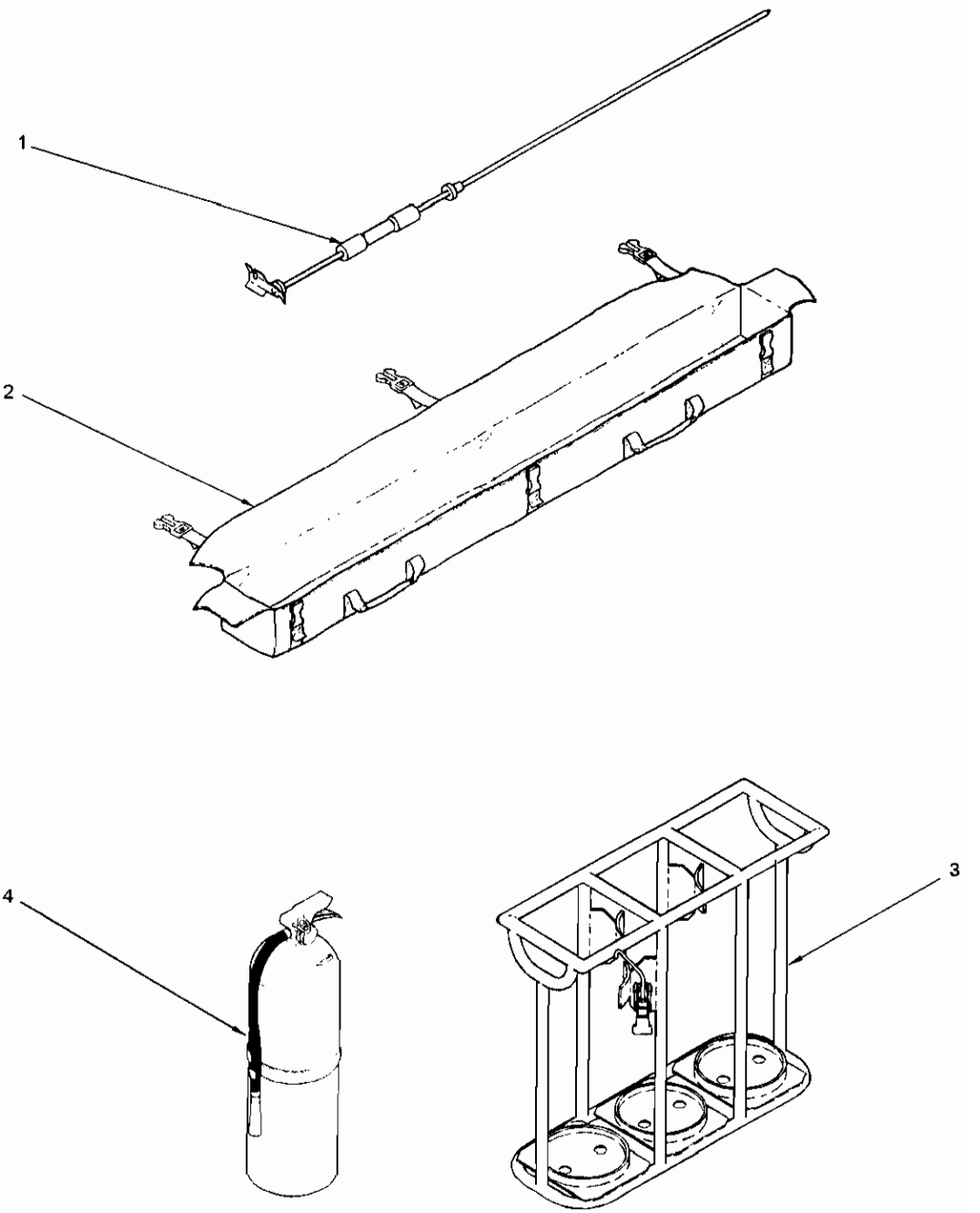


Figure C-35. Grounding Rod Kit and Fire Extinguishers

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					FIGURE C-35. GROUNDING ROD KIT AND FIRE EXTINGUISHER	
0	PA000		97403	13230E5871-101	GROUNDING ROD KIT.....	1
1	PA0ZZ	5975010505707	97403	13219E0462	.ROD,GROUND.....	5
2	XD0ZZ		97403	13230E5880-01	.BAG,FUEL SYSTEM GROUND RODS (5)...	1
3	PA0ZZ		97403	13229E2400	FRAME,FIRE EXT,20 L.....	2
4	PA000		97403	13230E5904-01	EXTINGUISHER,FIRE.....	5

END OF FIGURE

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 9401. KITS	
	PAFZZ		0DT23	KD64020-1	PARTS KIT,SEAL REPL.....	
					O-RING (1) C-3-27	
					O-RING (1) C-3-16	
					O-RING (1) C-3-18	
					O-RING (2) C-3-11	
					O-RING (1) C-3-9	
					O-RING (1)C-18-27	
					O-RING (1)C-18-16	
					O-RING (1)C-18-18	
					O-RING (2)C-18-11	
					O-RING (1)C-18-9	
					SEAL,PLAIN (1) C-3-15	
					SEAL,PLAIN (1) C-3-10	
					SEAL,PLAIN (1) C-3-2	
					SEAL,PLAIN (1)C-18-15	
					SEAL,PLAIN (1)C-18-10	
					SEAL,PLAIN (1)C-18-2	
					SEAL,PLAIN (1)C-18-34	
	PAFZZ		0DT23	KD64019-1	KIT,REPAIR PARTS.....	
					O-RING (1)C-21-12	
					O-RING (1)C-21-10	
					SCREW,MACHINE (1)C-21-13	
					SEAL,PLAIN (1)C-21-18	
					SEAL,PLAIN (1)C-21-2	

END OF FIGURE

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					BULK ITEMS	
BULK	XDFZZ		97403	13230E6034-01	COATING,ELECTRICAL.....	1
BULK	XDOZZ		97403	13230E5929	.SEALING COMPOUND APPLY TO PIPE THREADS AS REQUIRED.....	V
BULK	XDOZZ		97403	13230E5936-01	.TAPE TEFLON.....	V

END OF FIGURE

Section III. Special Tools List
(Not Applicable)

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5305-00-054-5651	C-24	11	5305-01-191-4578	C-3	7
5305-00-079-5835	C-3	25		C-6	3
	C-6	40		C-6	26
	C-13	25		C-13	7
	C-18	25		C-18	7
5330-00-088-9166	C-32	4		C-21	6
5310-00-167-0814	C-24	7	5305-01-210-1648	C-6	21
5330-00-248-3834	C-6	17	4730-01-214-0993	C-28	1
5331-00-248-3835	C-3	27		C-28	6
	C-13	27	4730-01-214-0996	C-9	1
	C-18	27	5935-01-281-0051	C-24	10
	C-21	12	5310-01-338-4121	C-24	6
5331-00-248-3840	C-3	11	5310-01-352-9592	C-24	13
	C-13	11	4930-01-383-9467	C-1	2
	C-18	11	5330-01-433-9203	C-3	2
5331-00-248-3845	C-6	19		C-3	34
5331-00-251-9367	C-6	31		C-13	2
5331-00-252-6050	C-14	6		C-13	34
5331-00-260-9338	C-3	18		C-18	2
	C-13	18		C-18	34
	C-18	18		C-21	2
	C-21	10		C-21	18
5331-00-263-8011	C-6	23	5315-01-434-8096	C-26	21
5940-00-266-8425	C-26	11	5320-01-434-8645	C-26	23
5331-00-291-7384	C-3	16	5977-01-434-8702	C-26	13
	C-13	16	5977-01-434-8704	C-26	31
	C-18	16	5977-01-434-8706	C-26	14
5310-00-605-3789	C-3	13	6150-01-435-1437	C-26	1
	C-13	13	6150-01-435-1439	C-26	35
	C-18	13	6150-01-435-1440	C-26	36
5330-00-612-2414	C-30	4	6150-01-435-1441	C-26	30
5331-00-641-0119	C-3	9	6150-01-435-1442	C-26	37
	C-13	9	6105-01-435-1559	C-26	38
	C-18	9	5365-01-435-1566	C-26	40
5330-00-899-4509	C-33	4	5340-01-435-2428	C-26	53
5310-00-933-8121	C-24	14	5306-01-435-2850	C-26	18
5310-00-974-6623	C-24	8	5305-01-435-2851	C-26	34
5310-00-982-4999	C-24	5	5305-01-435-2853	C-26	29
5305-00-988-1720	C-3	28	5305-01-435-2855	C-26	26
	C-13	28	5305-01-435-2856	C-26	49
	C-18	28	5330-01-435-3780	C-26	46
	C-21	13	5330-01-435-3782	C-26	55
5975-01-050-5707	C-35	1	5330-01-435-3783	C-26	41
6145-01-057-9413	C-26	7	5330-01-435-3786	C-26	52
6145-01-060-7868	C-26	8	5305-01-435-4132	C-24	9
5935-01-097-0399	C-26	4	4730-01-435-4619	C-26	47
4030-01-142-0456	C-14	4	5315-01-435-4833	C-26	50
4820-01-167-6550	C-19	1	4820-01-435-5886	C-26	45
6145-01-173-1389	C-26	9	4820-01-435-5887	C-26	43
5935-01-190-6724	C-26	2	4320-01-436-4595	C-26	54

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM
4930-01-440-1085	C-1	1
5360-01-454-1830	C-3	5
	C-13	5
	C-18	5
4720-01-455-8174	C-4	0
5305-01-456-1139	C-3	8
	C-13	8
	C-18	8
5340-01-456-1334	C-6	35
2910-01-456-2273	C-3	30
	C-13	30
	C-18	30
	C-21	14
2910-01-456-2274	C-6	10
4730-01-456-3895	C-27	2
	C-30	2
	C-33	2
3120-01-456-3926	C-6	33
5360-01-456-5629	C-26	42
4730-01-456-7469	C-24	4
5330-01-456-8757	C-6	28
4610-01-456-9428	C-15	1
4320-01-456-9509	C-24	0
4320-01-456-9511	C-24	2
5330-01-456-9662	C-13	15
	C-18	15
5330-01-456-9663	C-13	10
	C-18	10
5330-01-456-9666	C-6	1
4320-01-456-9790	C-9	0
4720-01-457-0662	C-5	1
4720-01-457-0681	C-8	0
4720-01-457-0687	C-2	0
4720-01-457-1133	C-5	0
4930-01-457-1191	C-17	0
4210-01-457-1410	C-35	4
5330-01-457-1822	KITS	
4320-01-457-3520	C-24	12
4720-01-457-3526	C-17	1
4720-01-457-3710	C-5	4
4720-01-457-3714	C-8	3
4930-01-457-8355	C-1	3
5340-01-458-2202	C-14	2
5970-01-458-2900	C-26	10
5330-01-458-5113	KITS	
5935-01-458-6530	C-26	3
5975-01-458-7640	C-26	32
5340-01-458-7788	C-14	5
5340-01-458-7790	C-26	20
5340-01-458-8470	C-13	20
5340-01-458-8470	C-18	20
4730-01-459-0005	C-34	2
4730-01-459-0007	C-32	3
4730-01-459-0010	C-29	2
4730-01-459-0018	C-25	2
4730-01-459-0020	C-30	3
4730-01-459-0039	C-14	7
4210-01-459-0409	C-35	3
4730-01-459-1080	C-33	3
4930-01-459-2034	C-1	0
5930-01-459-2268	C-26	12
5930-01-459-2271	C-26	27
5930-01-459-2272	C-26	19
4730-01-459-3094	C-5	5
5935-01-459-3224	C-28	0
4730-01-459-3320	C-26	48
4930-01-459-3625	C-19	0
5305-01-459-4210	C-6	22
4730-01-459-4354	C-19	4
4730-01-459-4360	C-9	4
4730-01-459-4365	C-14	8
4730-01-459-4383	C-19	3
4730-01-459-4405	C-19	2
4730-01-459-4416	C-28	3
4730-01-459-4424	C-28	4
4730-01-459-4434	C-28	5
4730-01-459-4473	C-14	9
4730-01-459-4489	C-24	1
4730-01-459-4521	C-24	3
4730-01-459-4525	C-20	2
4730-01-460-5833	C-31	2
5330-01-460-8998	C-6	5
	C-6	11
5360-01-461-5852	C-6	32

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
00624	AE82090R		C-28	2
00624	AE82093R	4730-01-214-0993	C-28	1
			C-28	6
00624	AE82111R	4730-01-214-0996	C-9	1
81349	D38999/20WE6PN	5935-01-190-6724	C-26	2
81349	D38999/33W17R	5935-01-281-0051	C-24	10
08915	F0760	4730-01-435-4619	C-26	47
08915	F0790	5330-01-435-3780	C-26	46
08915	F2220	5305-01-435-4132	C-24	9
08915	F2756	4820-01-435-5887	C-26	43
08915	F2770	5360-01-456-5629	C-26	42
08915	F2950		C-26	25
08915	F3124	5930-01-459-2272	C-26	19
08915	F3300		C-26	16
08915	F3990		C-26	28
08915	F4000	5305-01-435-2853	C-26	29
08915	F6405		C-26	44
08915	F6410		C-26	33
08915	F6414	5340-01-458-7790	C-26	20
08915	F6431		C-26	51
08915	F6435	5340-01-435-2428	C-26	53
08915	F6437	4320-01-436-4595	C-26	54
08915	F6440	5315-01-435-4833	C-26	50
08915	F6446	5330-01-435-3782	C-26	55
08915	F6455	5330-01-435-3783	C-26	41
08915	F6464	5365-01-435-1566	C-26	40
08915	F6465	4730-01-459-3320	C-26	48
08915	F6475	5306-01-435-2850	C-26	18
08915	F6480	5305-01-435-2855	C-26	26
08915	F6495	5975-01-458-7640	C-26	32
08915	F6505	5330-01-435-3786	C-26	52
08915	F6510	4820-01-435-5886	C-26	45
08915	F6526	6150-01-435-1437	C-26	1
08915	F6533	6105-01-435-1559	C-26	38
08915	F6535	5977-01-434-8706	C-26	14
08915	F6541	5977-01-434-8704	C-26	31
08915	F6542	5977-01-434-8702	C-26	13
08915	F6545		C-26	39
08915	F6602		C-26	17
08915	F6605	6150-01-435-1441	C-26	30
08915	F6611	6150-01-435-1442	C-26	37
08915	F6612	6150-01-435-1440	C-26	36
08915	F6625	5930-01-459-2271	C-26	27
08915	F6650	5315-01-434-8096	C-26	21
08915	F6690	5930-01-459-2268	C-26	12
08915	F6695		C-26	15
08915	F6721	5305-01-435-2856	C-26	49
08915	F6726	6150-01-435-1439	C-26	35
08915	F6727	5305-01-435-2851	C-26	34
08915	G1906	5320-01-434-8645	C-26	23
ODT23	KD64019-1	5330-01-457-1822	KITS	

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
0DT23	KD64020-1	5330-01-458-5113	KITS	
0DT23	LC030D-8		C-6	14
96906	MS16997-20L	5305-01-191-4578	C-3	7
			C-6	3
			C-6	26
			C-13	7
			C-18	7
			C-21	6
96906	MS16997-24L	5305-01-456-1139	C-3	8
			C-13	8
			C-18	8
96906	MS16997-32L	5305-01-210-1648	C-6	21
96906	MS21044C04	5310-00-982-4999	C-24	5
96906	MS24693C50	5305-00-079-5835	C-3	25
			C-6	40
			C-13	25
			C-18	25
96906	MS27030-6	5330-00-612-2414	C-30	4
96906	MS27030-8	5330-00-088-9166	C-32	4
96906	MS27030-9	5330-00-899-4509	C-33	4
96906	MS27488-12	5935-01-097-0399	C-26	4
96906	MS29512-03	5331-00-263-8011	C-6	23
96906	MS29513-009	5330-00-248-3834	C-6	17
96906	MS29513-010	5331-00-248-3835	C-3	27
			C-13	27
			C-18	27
			C-21	12
96906	MS29513-014	5331-00-248-3840	C-3	11
			C-13	11
			C-18	11
96906	MS29513-016	5331-00-248-3845	C-6	19
96906	MS29513-133	5331-00-291-7384	C-3	16
			C-13	16
			C-18	16
96906	MS29513-134	5331-00-641-0119	C-3	9
			C-13	9
			C-18	9
96906	MS29513-138	5331-00-252-6050	C-14	6
96906	MS29513-227	5331-00-260-9338	C-3	18
			C-13	18
			C-18	18
			C-21	10
96906	MS29513-234	5331-00-251-9367	C-6	31
96960	MS3420-6		C-26	5
96906	MS35206-276	5305-00-988-1720	C-3	28
			C-13	28
			C-18	28
			C-21	13
96906	MS35338-139	5310-00-933-8121	C-24	14
96906	MS35338-140	5310-00-974-6623	C-24	8
96906	MS51844-63	4030-01-142-0456	C-14	4

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS51957-17	5305-00-054-5651	C-24	11
81349	M22759/16-12-0	6145-01-057-9413	C-26	7
81349	M22759/16-12-5	6145-01-173-1389	C-26	9
81349	M22759/16-12-9	6145-01-060-7868	C-26	8
81349	M23053/18-307-0	5970-01-458-2900	C-26	10
81349	M81824/1-3	5940-00-266-8425	C-26	11
81349	M85049/18-17W04	5935-01-458-6530	C-26	3
08915	N/A		C-26	22
80205	NAS1149CN432R	5310-01-338-4121	C-24	6
80205	NAS1149C0432R	5310-01-352-9592	C-24	13
80205	NAS1149C0532R	5310-00-167-0814	C-24	7
83553	W0367-006-S	5310-00-605-3789	C-3	13
			C-13	13
			C-18	13
0DT23	0.094X1.000LDP		C-6	16
97403	13219E0462	5975-01-050-5707	C-35	1
97403	13219E0491	4820-01-167-6550	C-19	1
97403	13229E2400	4210-01-459-0409	C-35	3
97403	13230E5870-101		C-16	1
97403	13230E5871-101		C-35	0
97403	13230E5872-101	4720-01-457-0687	C-2	0
97403	13230E5873-101	4720-01-457-0681	C-8	0
97403	13230E5874-101	4720-01-455-8174	C-4	0
97403	13230E5875-102	4610-01-456-9428	C-15	1
97403	13230E5880-01		C-35	2
97403	13230E5880-02		C-5	7
97403	13230E5880-03		C-1	4
97403	13230E5880-04		C-9	5
97403	13230E5880-05		C-19	5
97403	13230E5880-06		C-28	7
97403	13230E5880-07		C-17	4
97403	13230E5880-08		C-2	4
97403	13230E5880-09		C-8	6
97403	13230E5880-10		C-4	4
97403	13230E5880-11		C-7	4
97403	13230E5885-01	4730-01-459-4521	C-24	3
97403	13230E5886-01	4730-01-459-4489	C-24	1
97403	13230E5889-101	4320-01-457-3520	C-24	12
97403	13230E5890-101	4320-01-456-9509	C-24	0
97403	13230E5892-101	4930-01-459-2034	C-1	0
97403	13230E5893-101	4720-01-457-1133	C-5	0
97403	13230E5894-101	4930-01-457-1191	C-17	0
97403	13230E5896-101	4930-01-457-8355	C-1	3
97403	13230E5897-101	4930-01-459-3625	C-19	0
97403	13230E5899-01		C-2	3
			C-4	3
			C-5	6
			C-7	3
			C-8	5
			C-17	3
97403	13230E5904-01	4210-01-457-1410	C-35	4

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
97403	13230E5929		C-24	BULK
97403	13230E5936-01		C-24	BULK
97403	13230E5939-01		C-7	0
94703	13230E5940-101		C-26	24
97403	13230E5946-02		C-26	6
97403	13230E5961-01	4730-01-459-4405	C-19	2
97403	13230E5964-01	4730-01-459-4416	C-28	3
97403	13230E5965-01	4730-01-459-4424	C-28	4
97403	13230E5966-01	4730-01-459-4434	C-28	5
97403	13230E5968-01		C-7	1
97403	13230E5970-101	5935-01-459-3224	C-28	0
97403	13230E6034-01		C-24	BULK
97403	13230E6050-101	4320-01-456-9790	C-9	0
97403	13230E6051-01	4720-01-457-0662	C-5	1
97403	13230E6053-01		C-2	1
			C-4	1
			C-8	1
97403	13230E6053-02	4720-01-457-3714	C-8	3
97403	13230E6054-01	4720-01-457-3526	C-17	1
97403	13230E6056-01		C-9	2
97403	13230E6057-01	4730-01-459-4383	C-19	3
97403	13230E6059-01		C-9	3
97403	13230E6060-102	4320-01-456-9511	C-24	2
97403	13230E6061-01	4720-01-457-3710	C-5	4
97403	13230E6062-01	4730-01-459-4354	C-19	4
97403	13230E6063-01	4730-01-456-7469	C-24	4
97403	13230E6064-101	4730-01-459-4360	C-9	4
ODT23	20D-AL-GR	4730-01-459-0020	C-30	3
ODT23	220124-2	4730-01-459-0010	C-29	2
ODT23	220132-2	4730-01-456-3895	C-27	2
			C-30	2
			C-32	2
			C-33	2
ODT23	220134-2	4730-01-460-5833	C-31	2
ODT23	220137-2	4730-01-459-0005	C-34	2
ODT23	220140-2	4730-01-459-4525	C-20	2
ODT23	220142		C-3	21
			C-6	36
			C-13	21
			C-18	21
ODT23	220145		C-3	23
			C-6	38
			C-13	23
			C-18	23
ODT23	220146	5330-01-433-9203	C-3	2
			C-3	34
			C-13	2
			C-13	34
			C-18	2
			C-18	34
			C-21	2

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
ODT23	220146	5330-01-433-9203	C-21	18
ODT23	220147		C-3	22
			C-13	22
			C-18	22
ODT23	220148		C-21	4
ODT23	220149	5360-01-454-1830	C-3	5
			C-13	5
			C-18	5
ODT23	220150		C-3	12
			C-13	12
			C-18	12
ODT23	220151		C-3	4
			C-13	4
			C-18	4
ODT23	220152		C-3	14
			C-18	14
ODT23	220153		C-3	17
		5360-01-461-5852	C-6	32
			C-13	17
			C-18	17
ODT23	220154		C-3	19
			C-13	19
			C-18	19
ODT23	220157		C-3	15
		5330-01-456-9662	C-13	15
			C-18	15
ODT23	220158		C-3	10
		5330-01-456-9663	C-13	10
			C-18	10
ODT23	220159-1		C-3	35
			C-13	35
			C-21	3
ODT23	220159-2		C-3	3
			C-13	3
			C-21	19
ODT23	220161		C-3	1
			C-13	1
			C-18	1
			C-21	1
ODT23	220162		C-3	31
			C-13	31
			C-18	31
			C-21	15
ODT23	220163-2		C-3	6
			C-13	6
			C-18	6
ODT23	220164-2		C-21	7
ODT23	220165-2		C-10	2
ODT23	220166-2		C-11	2
ODT23	220167-2		C-23	2
ODT23	220168-2		C-22	2

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
ODT23	220201-1-15		C-14	3
ODT23	220201-1-18		C-3	32
			C-13	32
			C-18	32
			C-21	16
ODT23	220201-1-20		C-6	8
ODT23	220204		C-3	24
			C-6	39
			C-13	24
			C-18	24
ODT23	220224-2	5340-01-458-7788	C-14	5
ODT23	220265		C-3	26
			C-6	24
			C-13	26
			C-18	26
			C-21	11
ODT23	220301		C-21	5
ODT23	220330		C-21	9
ODT23	220429-2		C-6	15
ODT23	220430		C-6	34
ODT23	220432		C-6	20
ODT23	220435		C-6	37
ODT23	220446-1		C-6	4
ODT23	220446-2		C-6	6
ODT23	220449		C-6	30
ODT23	220457		C-6	13
ODT23	220459	5330-01-456-8757	C-6	28
ODT23	220464		C-6	18
ODT23	220465		C-6	27
ODT23	220466	3120-01-456-3926	C-6	33
ODT23	220467	5330-01-460-8998	C-6	5
			C-6	11
ODT23	220468	2910-01-456-2274	C-6	10
ODT23	220469-2		C-6	2
ODT23	220470		C-6	29
ODT23	220482		C-3	29
			C-6	9
			C-6	25
			C-13	29
			C-18	29
ODT23	220484	5305-01-459-4210	C-6	22
ODT23	220498-2	4730-01-459-0018	C-25	2
ODT23	220504-2		C-12	2
ODT23	220578		C-13	14
ODT23	220706-2	4730-01-459-4365	C-14	8
ODT23	220800-1		C-6	12
ODT23	220800-2		C-6	41
ODT23	220805-1		C-18	35
ODT23	220805-2		C-18	3
ODT23	28-2-G		C-3	33
			C-6	7

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
ODT23	28-2-G		C-13	33
			C-18	33
			C-21	17
ODT23	3020D-AL-GR	4730-01-459-0007	C-32	3
ODT23	4020D-AL-GR	4730-01-459-1080	C-33	3
ODT23	470121-2	5330-01-456-9666	C-6	1
ODT23	47062	2910-01-456-2273	C-3	30
			C-13	30
			C-18	30
			C-21	14
ODT23	47069-4	5340-01-458-2202	C-14	2
ODT23	47085		C-3	20
		5340-01-458-8470	C-13	20
			C-18	20
ODT23	47114-2		C-12	3
ODT23	47119	5340-01-456-1334	C-6	35
ODT23	47133-2	4730-01-459-4473	C-14	9
ODT23	64017B	4930-01-383-9467	C-1	2
ODT23	64019V		C-20	1
ODT23	64020V		C-2	2
			C-4	2
			C-5	2
			C-8	2
			C-8	4
			C-10	1
			C-11	1
			C-12	4
			C-14	1
			C-22	1
			C-25	1
			C-27	1
			C-29	1
			C-30	1
			C-31	1
			C-32	1
			C-33	1
			C-34	1
ODT23	64020VZ		C-17	2
			C-23	1
ODT23	64028G	4730-01-459-0039	C-14	7
ODT23	64031VZ		C-5	3
		4730-01-459-3094	C-5	5
			C-7	2
			C-12	1
ODT23	64349CF4HXY	4930-01-440-1085	C-1	1
60808	8K1		C-21	8

APPENDIX D

COMPONENTS OF END ITEM AND BASIC ISSUE ITEM LIST

Section I. INTRODUCTION

D-1. Scope.

This appendix lists components of the end item and basic issue items for the AAFARS to help you inventory the items for safe and efficient operation of the equipment.

D-2. General.

The Components of End Item (COEI) and Basic Issue Items (BII) Lists are divided into the following sections.

a. Section II, Components of End Item. This listing is for information purposes only and is not authority to requisition replacements. These items are part of the AAFARS. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

b. Section III, Basic Issue Items. These essential items are required to place the AAFARS System in operation, operate it, and to do emergency repairs. Although shipped separately, BII must be with the AAFARS during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

D-3. Explanation of Columns.

a. Column (1), Illus Number, gives you the number of the item illustrated.

b. Column (2), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes.

c. Column (3), Description and Usable On Code, identifies the Federal item name followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC) and the part number.

d. Column (4), U/I (Unit of Issue) indicates how the item is issued for National Stock Number shown in column two.

e. Column (5), Qty Rqd, indicates the quantity required.

Section II. COMPONENTS OF END ITEM

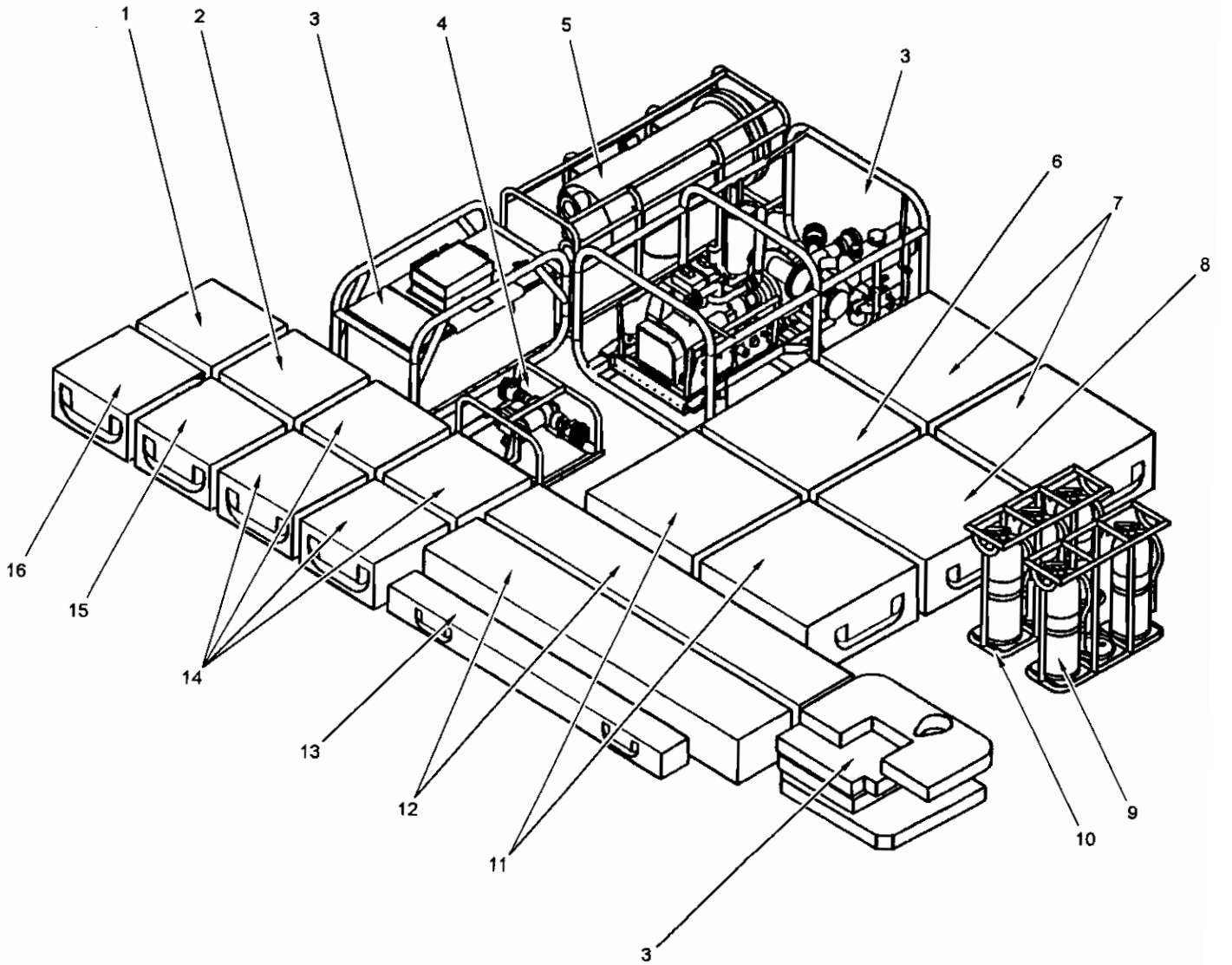
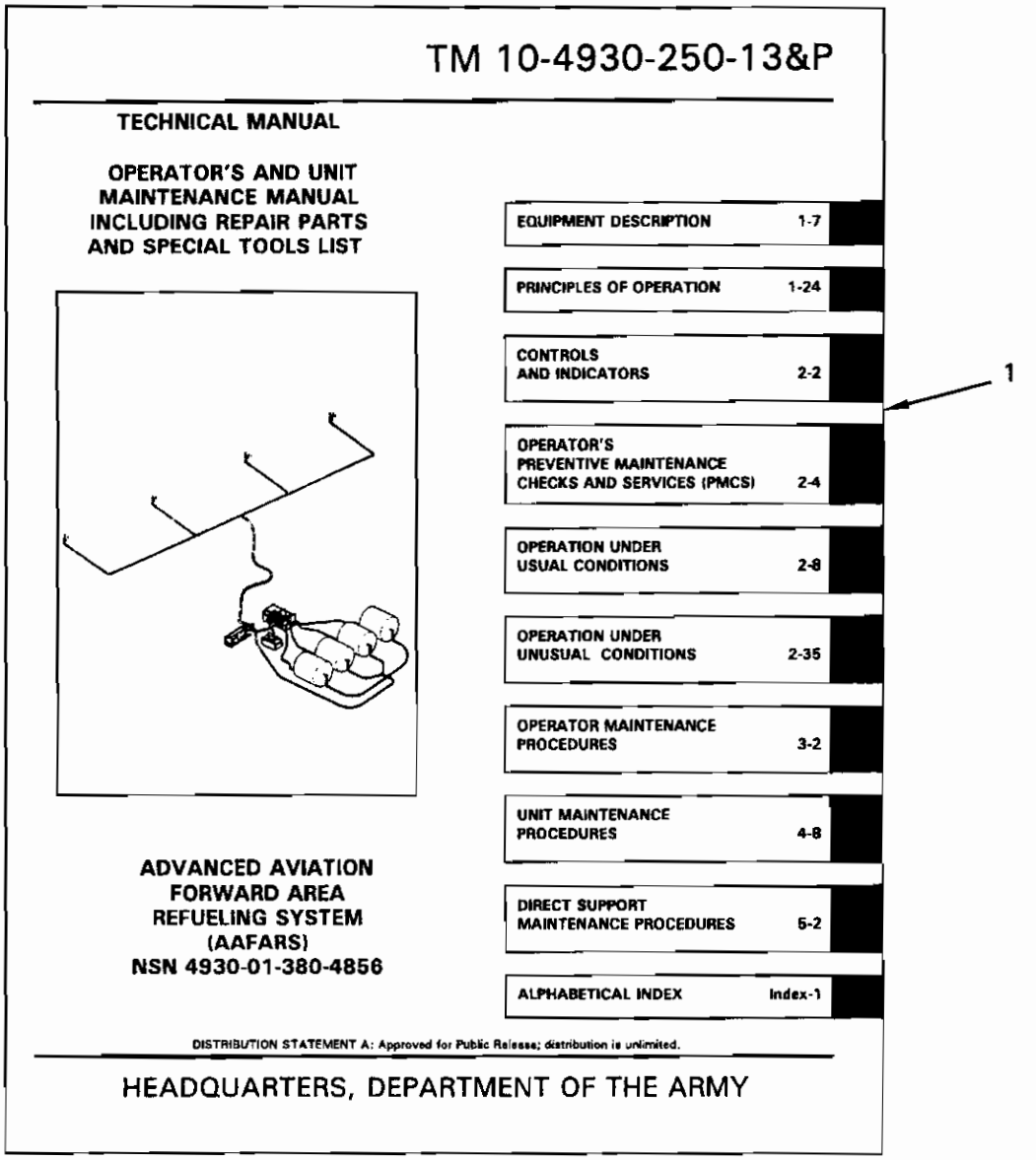


Figure D-1. AAFARS System

(1) ILLUS. NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER	(4) U/I	(5) QTY RQD
1		DRUM ADAPTER KIT (97403) 13230E5970	EA	1
2		DRUM FITTING KIT (97403) 13230E5897	EA	1
3	4320-01-434-4653	PUMPING ASSEMBLY (97403) 13230E5870	EA	1
4		PUMP ASSEMBLY, AUXILIARY (97403) 13230E5890	EA	1
5	4330-01-434-1824	FILTER-SEPARATOR, WATER, LIQUID FUEL (97403) 13230E5875	EA	1
6		DISCHARGE HOSE KIT (97403) 13230E5893	EA	1
7		DISCHARGE HOSE KIT, (97403) 13230E5872	EA	2
8		DISCHARGE HOSE KIT (97403) 13230E5874	EA	1
9		FIRE EXTINGUISHER (97403) 13230E5904	EA	5
10		FRAME, FIRE EXTINGUISHER (97403) 13229E2400	EA	2
11		DISCHARGE HOSE KIT (97403) 13230E5873	EA	2
12		SUCTION HOSE KIT (97403) 13230E5894	EA	2
13		GROUNDING ROD KIT (97403) 13230E5871	EA	1
14		NOZZLE KIT (97403) 13230E5892	EA	4
15		DISCHARGE HOSE KIT (97403) (13230E5939)	EA	1
16		DISCHARGE FITTING KIT (97403) 13230E6050	EA	1
		END OF FIGURE		

Section III. BASIC ISSUE ITEMS



Item Number	National Stock Number	Description CAGEC and Part Number	U/I	Qty. Reqd
1		Operator's and Unit Maintenance Manual Including Repair Parts and Special Tools List for Advanced Aviation Forward Area Refueling System (AAFARS). TM 10-4930-250-12&P	EA .	1

APPENDIX E

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

E.1 SCOPE.

This appendix lists additional items that you are authorized for the support of the AAFARS.

E.2 GENERAL.

This list identifies items that do not have to accompany the AAFARS and that do not have to be turned in with it. These items are authorized to you by MTOE, TDA, CTA or JTA.

E.3 EXPLANATION OF LISTING.

National Stock Numbers, description and quantities are provided to help you identify and request the additional items you require to support this equipment.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Descripton CAGEC & Part Number	(3) (U/M)/ (U/I)	(4) QTY REQ
8110-00-824-1444	Drum, Fabric, Collapsible (97403) TA13216E9170 Rev L	EA	4

APPENDIX F

EXPENDABLE/DURABLE ITEMS LIST

Section I. INTRODUCTION

F.1. Scope.

This appendix lists expendable and durable items that you will need to operate and maintain the AAFARS. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50790, Expendable/Durable Items (except medical, class V repair parts, and heraldic items) or CTA 8-100, Army Medical Department Expendable/Durable Items.

F.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 item (e.g., "Use cleaning compound, item 5, appendix F).

b. Column (2), Level. This column identifies the lowest level of maintenance that requires the item.

c. Column (3), National Stock Number. This is the national stock number assigned to the item, which you can use to requisition it.

d. Column (4), Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number. This provides additional information you can use to identify the item.

e. Column (5), Unit of Measure (U/M). This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Section II. EXPENDABLE/DURABLE ITEMS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) (U/M)/ (U/I)
1	O		Sealant, Thread, Multipurpose (97403) 13230E5929	EA
2	O	6850-01-377-1809	Solvent, Dry Cleaning (81348) SD(P-D-680)	GL
3	O	7920-00-401-8034	Cloth, Lint Free (81348) CCC-C-46	LB
4	O	5340-00-245-9438	Strapping, 1/2" X 100', 201 stainless (70847) C204	RL
5	O	9150-00-250-0926	Petrolatum (81348) VV-P-236	LB
6	O	8135-00-060-2509	Seal, Strapping, 100 count (70847) C254	BX
7	O	7920-00-295-1711	Rags, Wiping (58536) A-A-531	LB
8	F	5350-00-867-7665	Grit Paper, 320 grain (06565) DURITE320A	SH
9	O		Tape, Teflon (3A054) 6802K55	RL

APPENDIX G

ILLUSTRATED LIST OF MANUFACTURED ITEMS

There are no items authorized for manufacture for the AAFARS.

APPENDIX H

TORQUE LIMITS

Refer to the following list of technical manuals for torque limits applicable to the AAFARS.

TM 10-4930-246-13&P	D-1 Nozzle
TM 10-4930-248-13&P	CCR Nozzle
TM 10-4330-237-13&P	Filter Separator, Water, Liquid Fuel
TM 10-4320-351-14	Pumping Assembly

APPENDIX I

MANDATORY REPLACEMENT PARTS

ITEM NO.	PART NUMBER/CAGEC	NSN	NOMENCLATURE	QTY
1	220467 (0DT23)		SEAL	1
2	MS29512-03 (96906)	5330-00-263-8011	O-RING	1
3	MS29513-234 (96906)	5330-00-251-9367	O-RING	1
4	200146 (0DT23)	5330-01-433-9203	SEAL	1
5	220157 (0DT23)		SEAL	1
6	MS29513-010 (96906)	5330-00-004-3096	O-RING	1
7	MS29513-133 (96906)	5330-00-291-7384	O-RING	1
8	MS29513-227 (96906)	5330-00-269-9338	O-RING	1
9	100-13 (08915)	5330-01-435-3780	GASKET, INLET FLANGE	1
10	MS29513-009 (96906)	5330-00-248-3834	O-RING	2
11	MS29513-016 (96906)	5330-00-248-3845	O-RING	2
12	220464 (0DT23)		BUSHING	3
13	220466 (0DT23)		BUSHING	1
14	220465 (0DT23)		SEAL	1
15	MS29513-014 (96906)	5330-00-003-9159	O-RING	2
16	MS29513-134 (96906)	5330-00-641-0119	O-RING	1
17	220158 (0DT23)		SEAL	1
18	F6507 (08915)		GASKET, ROTOR COVER	1
19	F6446 (08915)		SEAL ASSEMBLY	1

INDEX

INDEX

INDEX

INDEX

By Order of the Secretary of the Army:

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

Official:

JOEL B. HUDSON
Administrative Assistant to the
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COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

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BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Clenge the manual to show 4 Cylende

Figure 4-3 is a bolt. In key 4-3, item 16 is called rim - Please Correct on the Other.

I ordered a gasket, item 19 on figure B-16 key NSN 2910-00-762-3001. I got a gasket bit 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
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TEAR ALONG PERFORATED LINE

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meter = 0.3937 Inch
1 Decimeter = 10 Centimeters = 3.94 Inches
1 Meter = 10 Decimeters = 100 Centiimeters
= 1000 Millimeters = 39.37 Inches
1 Dekameter = 10 Meters = 32.8 Feet
1 Hectometer = 10 Dekameters = 328.08 Feet
1 Kilometer = 10 Hectometers = 1000 Meters
= 0.621 Mile = 3,280.8 Feet
Millimeters = Inches times 25.4
Inches = Millimeters divided by 25.4

WEIGHTS

1 Centigram = 10 Milligrams = 0.154 Grain
1 Decigram = 10 Centigrams = 1.543 Grains
1 Gram = 0.001 Kilogram = 10 Decigrams
= 1000 Milligrams = 0.035 Ounce
1 Dekagram = 10 Grams = 0.353 Ounce
1 Hectogram = 10 Dekagrams = 3.527 Ounces
1 Kilogram = 10 Hectograms = 1000 Grams = 2.205 Pounds
1 Quintal = 100 Kilograms = 220.46 Pounds
1 Metric Ton = 10 Quintals = 1000 Kilograms = 1.102 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liter = 0.034 Fluid Ounce
1 Centiliter = 10 Milliliters = 0.34 Fluid Ounce
1 Deciliter = 10 Centiliters = 3.38 Fluid Ounces
1 Liter = 10 Deciliters = 1000 Millileters = 33.82 Fluid 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 = 0.155 Sq Inch
1 Sq Decimeter = 100 Sq Centimeters = 15.5 Sq Inches
1 Sq Meter (Centare) = 100 Sq Decimeters
= 10,000 Sq Centimeters = 10.764 Sq Feet
1 Sq Dekameter (Are) = 100 Sq Meters = 1,076.4 Sq Feet
1 Sq Hectometer (Hectare) = 100 Sq Dekameters = 2.471 Acres
1 Sq Kilometer = 100 Sq Hectometers = 1,000,000 Sq Meters
= 0.386 Sq Mile

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.061 Cu Inch
1 Cu Decimeter = 1000 Cu Centimeters = 61.02 Cu Inches
1 Cu Meter = 1000 Cu Decimeters = 1,000,000 Cu Centimeters
= 35.31 Cu Feet

TEMPERATURE

5/9 (°F – 32°) = °C
9/5 (°C+ 32°) = °F
–35° Fahrenheit is equivalent to –37° Celsius
0° Fahrenheit is equivalent to –18° Celsius
32° Fahrenheit is equivalent to 0° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
100° Fahrenheit is equivalent to 38° Celsius
212° Fahrenheit is equivalent to 100° Celsius

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.452
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.574
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.350
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound–Feet	Newton–Meters	1.356
Pounds–Inches	Newton–Meters	0.11298
Pounds per Square Inch	Kilopascals	6.895
Ounce–Inches	Newton–Meters	0.007062
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609
Centimeters	Inches	0.394

TO CHANGE	TO	MULTIPLY BY
Meters	Feet	3.281
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton–Meters	Pound–Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.352
Kilometers per Hour	Miles per Hour	0.621
°Fahrenheit	°Celsius	°C = (°F–32)x5/9
°Celsius	°Fahrenheit	°F = (9/5x°C)+32

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