TM 5-5430-219-13

OPERATOR'S, UNIT, AND INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL

5KBBLCOLLAPSIBLEFABRICTANK
NSN 5430-01-I 60-3528

50,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-455-5676
NSN 5430-00-I 82-8181

20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-215-7525 (MODEL BA92-1 62)
20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-359-4943 (MODEL BA91 -140)
NSN 5430-01-414-9252 (MODEL BA91 -140A)

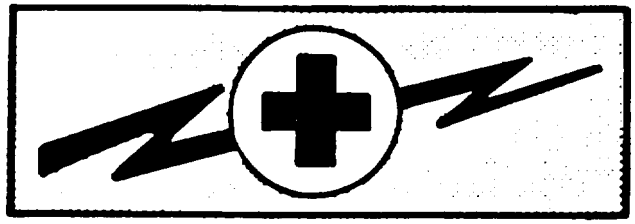
10,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-358-6157 (MODEL BA91-141)
NSN 5430-01-414-9251 (MODEL BA91-141A)

3,000-GALLON COLLAPSIBLE FABRIC TANK
NSN **5430-01-433-8528 (MODEL WTM3KF)**

HEADQUARTERS, DEPARTMENT OF THE ARMY

31 AUGUST 1987

WARNING



WARNING

Do not allow smoking within 100 feet (30.50 meters) of the storage area. Death or serious injury may result if personnel fail to strictly observe safety precautions.

WARNING

Avoid spillage of fuel. When spillage occurs, cover the affected area with dry soil to reduce its rate of vaporization. Position fire extinguishers at readily accessible positions around the tank(s). Failure to observe this warning may result in death or serious injury.

WARNING

Avoid getting fuel on the body or clothing. If clothing becomes saturated, remove it immediately and wash the body thoroughly with hot, soapy water. Failure to observe this warning may result in death or serious injury.

WARNING

Safety berms must have capacities of less than one and one-half times that of their tank capacities. Failure to construct a secure safety berm may result in death or serious injury.

WARNING

Cleaning solvent, P–D–680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F(38°C to 59°C).

WARNING

Sludge that accumulates in the bottom of the fuel tank gives off toxic and explosive vapors. Inhaling these vapors can cause lead poisoning. When cleaning tanks, provide ample ventilation to carry off harmful fumes.

WARNING

Always wear protective goggles, breathing apparatus, and other protective gear when cleaning the tank interior. Fuel vapors are toxic and can damage eyes, skin, and lungs.

WARNING

Fuel vapors are extremely flammable. Exercise care to prevent sparks when working near or in the tank. Death or severe personal injury can result if safety precautions are not strictly observed.

WARNING

Make certain that the berm gate valve is closed and locked after installation and after draining the berm. In the event of tank rupture, an open berm valve would permit fuel to drain from the berm. Undetected fuel leakage could result in an explosion and cause death, severe personal injury, and damage to equipment.

WARNING

Make sure that the gate valve handwheel has been rotated fully to the right to the closed position before filling the tank. Undetected draining of the tank could result in an explosion that can cause death or severe personal injury.

WARNING

Be careful when installing a sealing clamp in the tank. Fuel will pour out when a larger slit is made. Leaking fuel can cause personal injury and loss of Government property.

For first aid procedures, refer to FM 21–11.

CHANGE NO. 6

TM 5-5430-219-13

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DEPARTMENT THE ARMY
WASHINGTON DC, 12 July 1999

OPERATOR'S UNIT, AND INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL

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NSN 5430-01-160-3528
50,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-455-5676
NSN 5430-00-182-8181
20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-215-7525 (MODEL BA92-1 62)
20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-359-4943 (MODEL BA91 -140)
NSN 5430-01-414-9252 (MODEL BA91 -140A)
10,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-358-6157 (MODEL BA91-141)
NSN 5430-01-414-9251 (MODEL BA91-141A)
3,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-433-8528 (MODEL WTM3KF)

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2-l and 2-2	2-l and 2-2
	2-10.1 through 2-10.2
2-13 and 2-14	2-13 and 2-14
2-20.1/20.2 blank)	2-20.1/(2-20.2 blank)
3-5 through 3-8	3-5 through 3-8
C-l through C-6.1	C- 1 through C-6.1
D-l and D-2	D-l and D-2
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Cover	Cover

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NO. 5

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5K BBL COLLAPSIBLE FABRIC TANK
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50,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-00-i 82-8181
20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-215-7525 (MODEL BA92-162)
20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-W (MODEL BA91-140)
NSN 5430-01-414-9252 (MODEL BA91-140A)
10,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-358-6157 (MODEL BA91-141)
NSN 5430-01-414-9251 (MODEL BA91-141A)
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2-I and 2-2	2-I and 2-2
2-9 through 2-I 2	2-9 through 2-I 2
B-I and B-2	B-I and B-2
B-5 through B-7/(8-8 blank)	B-5 through B-7/(B-8 blank)
C-I through C-6	C-I through C-6
C-6.1/(C-6.2 blank)	C-6.1/C6.2 blank)
D-I and D-2	D-I and D-2
E-I and E-2	E-I and E-2

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20,000-GALLON COLLAPSIBLE FABRIC TANK NSN 5430-01-215-7525 (MODEL BA92-162)
20,000-GALLON COLLAPSIBLE FABRIC TANK NSN 5430-01-359-4943 (MODEL BA91-140) NSN 5430-01-414-9252 (MODEL BA91-140A)
1O,OOO-GALLON COLLAPSIBLE FABRIC TANK NSN 5430-01-358-6157 (MODEL BA91-141) NSN 5430-01-414-9251 (MODEL BA91-141A)

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2-19 and 2-20	2-19 and 2-20
----------	2-20.1/(2-20.2 blank)
2-25 and 2-26	2-25 and 2-26
3-3 and 3-4	3-3 and 3-4
----------	3-4.1/(3-4.2 blank)
3-8.1/(3-8.2 blank)	3-8.1 and 3-8.2
3-24.7/(3-24.8 blank)	3-24.7 and 3-24.8
B-5 and B-6	B-5 and B-6
C-5 and C-6	C-5 and C-6
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Operator's, Unit, and Intermediate Direct Support Maintenance Manual

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20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-215-7525 (MODEL BA92-162)
20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-359-4943 (MODEL BA91-140)
10,000-GALLON COLLAPSIBLE FABRIC TANK
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NSN 5430-00-182-8181

20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-215-7525 (MODEL BA92-162)

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NSN 5430-01-359-4943 (MODEL BA91-140)

10,000-GALLON COLLAPSIBLE FABRIC TANK
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2-19 through 2-22	2-19 through 2-22
2-25 through 2-28	2-25 through 2-28
3-3 through 3-6	3-3 through 3-6
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----	3-10.1/(3-10.2 blank)
3-23 and 3-24	3-23 and 3-24
----	3-24.1 through 3-24.7/(3-24.8 blank)
----	3-28.1 through 3-28.3/(3-28.4 blank)
A-1 and A-2	A-1 and A-2
B-1 and B-2	B-1 and B-2
B-5 through B-7/(B-8 blank)	B-5 through B-7/(B-8 blank)
C-1 through C-6	C-1 through C-6
----	C-6.1/(C-6.2 blank)
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Maintenance Manual

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NSN 5430-00-182-8181

20,000-GALLON COLLAPSIBLE FABRIC TANK
NSN 5430-01-215-7525

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2-1 and 2-2	2-1 and 2-2
2-9 through 2-12	2-9 through 2-12
A-1 and A-2	A-1 and A-2
B-1 and B-2	B-1 and B-2
B-5 through B-7/B-8	B-5 through B-7/B-8
C-1 through C-6	C-1 through C-6
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TECHNICAL MANUAL
NO. 5-5430-219-13

TM 5-5430-219-13

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 August 1987

OPERATOR'S, UNIT AND INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL

5K BBL COLLAPSIBLE FABRIC TANK
NSN 5430-01-160-3528
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NSN 5430-01-433-8528 (MODEL WTM3KF)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve these procedures, please let us know. 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, US 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.

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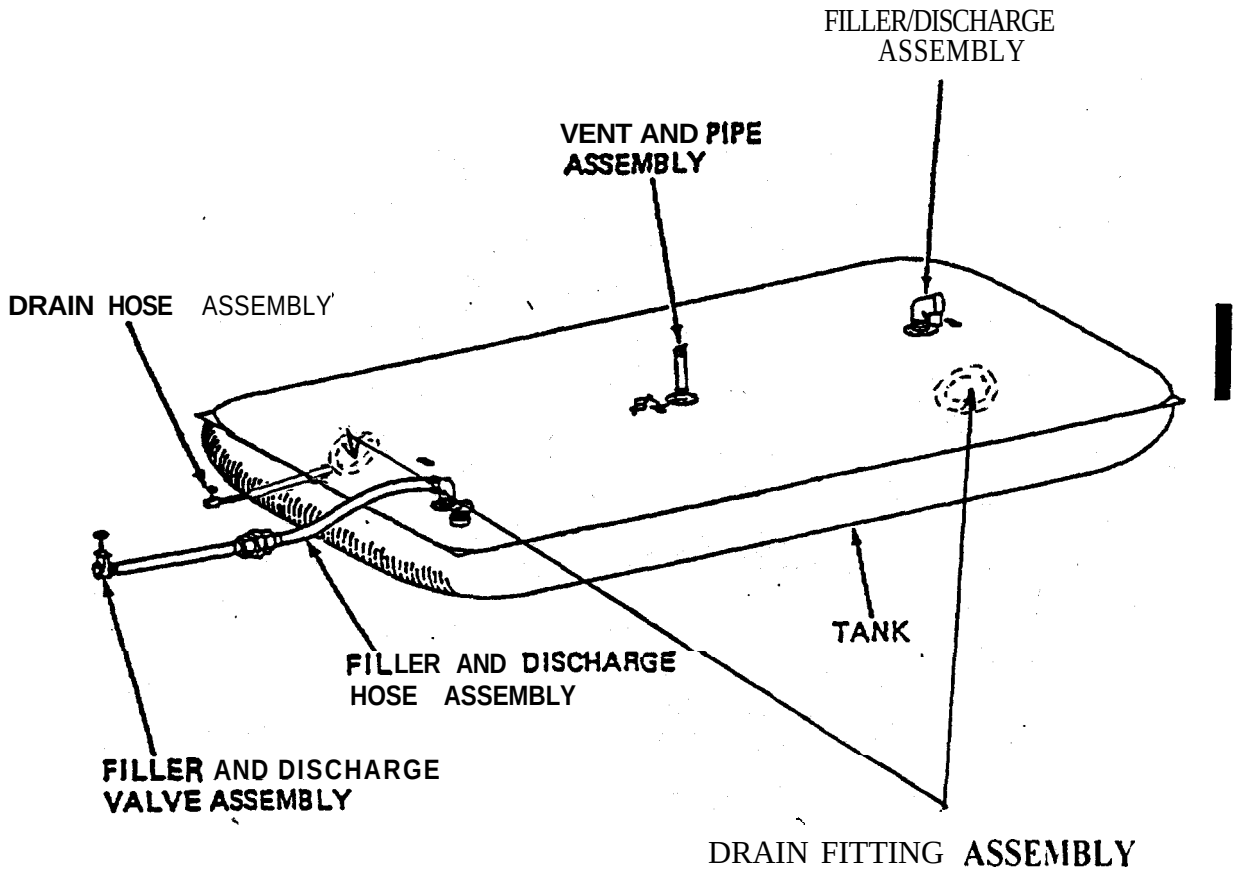
TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION



I

Figure 1-1 **3,000-Gallon, 10,000-Gallon, 20,000-Gallon,** or **50,000-Gallon** Collapsible Fabric Tank, typical.

I

l-l. SCOPE.

l-l. 1 Type of Manual. Operator, unit, and intermediate direct support maintenance manual.

l-l.2 Equipment Name 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon Collapsible Fabric Tank..

l-l .3 Purpose of Equipment. The 3,000-Gallon 10,000-Gallon, 20,000-Gallon, 50,000-Gallon Collapsible Fabric Tank is a container designed to store a variety of petroleum liquids. The tank will be used to store fuel as part of a bulk fuel terminal. Fuel will be available for use in a quick-response deployment operation.

l-l.4 Special Limitations on Equipment. The tank is made of tough polymer-coated nylon fabric. Care must be taken not to puncture or tear the material.

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

Department of the Army forms used for equipment maintenance will be those prescribed by DA Pam 738-750, the Army Maintenance Management System (TAMMS).

l-3. DESTRUCTION OF ARMY MATERIAL TO-PREVENT ENEMY USE.

Refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use, for destruction of this equipment.

l-4. PREPARATION FOR STORAGE OR SHIPMENT.

Refer to paragraph 3-2 1 for storage preparation or shipment procedures.

1-5 HAND RECEIPT (-HR) MANUALS

This paragraph has been deleted.

1-6 OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS.

The following list contains cross-references to nomenclature used in this manual.

Common Name	Official Nomenclature
Tank	Tank, Fabric, Collapsible, 3,000-Gallon Tank, Fabric, Collapsible, 10,000-Gallon Tank, Fabric, Collapsible, 20,000-Gallon Tank, Fabric, Collapsible, 50,000-Gallon

1-7 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS)

If your 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon Collapsible fabric tank 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 SF368 (Quality Deficiency Report). Mail it to us at: Commander, U. S. Tank-Automotive and Armaments Command, Attn: AMSTA-TR-E/MPA, Warren, MI 48397-5000. We'll send you a reply.

1-8 . WARRANTY INFORMATION.

The 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon Collapsible Fabric Tank is warranted by the Manufacturer for one year after acceptance of the equipment. The warranty starts on the date found in block 23, DA Form 2408-9, in the logbook. Report all defects in the material or workmanship to your supervisor, who will take appropriate action through your unit maintenance shop.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9 . EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES. (SEE FIGURE 1-1.)

1-9.1 Characteristics. The tank is made of tough polymer-coated nylon fabric. Chafing patches beneath all fitting and hardware locations provide triple-wall thickness protection. Handles on each tank are vulcanized for easy tank positioning. The various assemblies, except for the drain hose assembly, vent and pipe assembly, and drain gate valve, all attach to the hoses and related hardware using quick-disconnect mechanisms.

1-9.2 Capabilities and Features. The filled tank expands vertically. Internal pressure is vented. Water and residual fuel may be drained from the bottom of the tank.

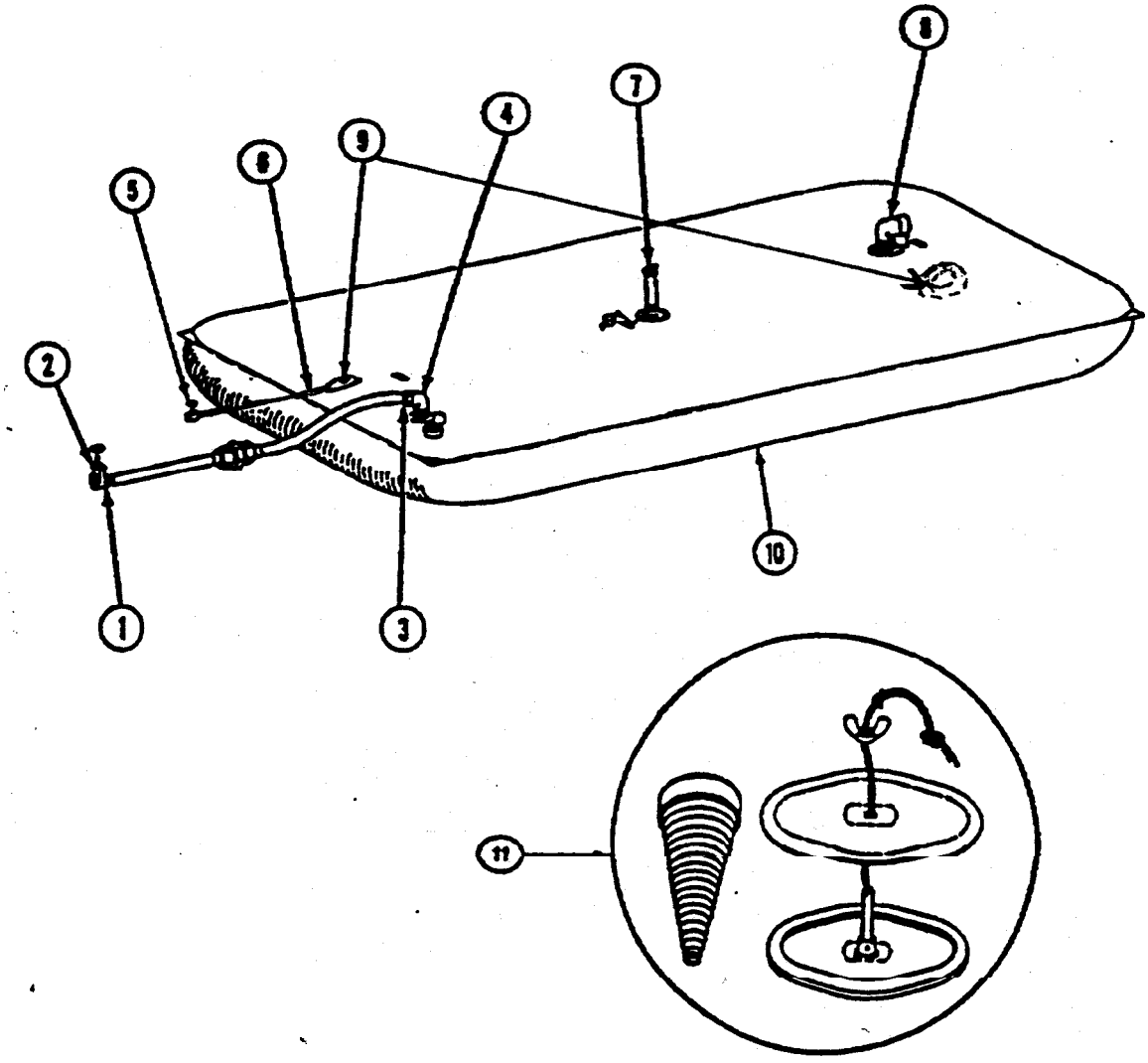


Figure 1-2 **3,000-Gallon,** lO,OOO-Gallon, **20,000-Gallon,** or **50,000-Gallon** Collapsible Fabric Tank, typical.

l-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (See fig. l-2)

FILLER AND DISCHARGE VALVE ASSEMBLY (1)	Allows fuel to flow to and from the tank. Valve is normally closed when tank is not being filled or fuel not being discharged from the tank.
GATE VALVE (2) BUTTERFLY VALVE, (MODELS BA9 1 - 14 1, BA91-140) BALL VALVE, (MODELS BA91-141A, BA91-140A)	Allows fuel flow to be started, stopped or regulated so that it moves in one direction only.
FILLER AND DISCHARGE HOSE ASSEMBLY (3)	Feeds fuel from source and valve to appropriate fitting on tank during fill. Allows fuel to flow from tank during discharge.
ELBOW (4), (8)	Directs fuel flow from hose assembly into tank when filling it. Directs fuel flow from tank during discharge. I
DRAIN BALL VALVE (5), (50K) DRAIN GATE VALVE DRAIN BALL VALVE, (MODELS BA9 1- 14 1, BA91-140)	Allows fuel, water and sludge to drain from the tank. Valve is normally closed when tank is not being drained or repacked. I
DRAIN HOSE ASSEMBLY (6)	Allows fuel, water, and sludge to drain from storage tank.
VENT PIPE AND ASSEMBLY (7)	Opens automatically when internal pressure reaches 0. lpsi (0.0068 atmospheres) to relieve pressure from inside the tank.
FILLER/DISCHARGE ASSEMBLIES (3), (4), AND (8)	Allows hose assembly to connect to tank. Discharge fitting requires female/male elbow. Filler fitting requires female/female elbow. I
DRAIN FITTING ASSEMBLIES (9)	Allow drain hose to be connected to tank. I
TANK (10)	3,000-Gallon, 1 O,OOO-Gallon, 20,000-Gallon or 50,000-Gallon, collapsible, polymer-coated nylon fabric tank. Used for fuel storage. Comes with emergency repair kit.
EMERGENCY REPAIR ITEMS (11)	Consists of sealing clamps and wood plugs used for emergency repairs when tank is in use. Gaskets, coated fabric, and preformed packing are also included. I

I-10. 1 DIFFERENCES BETWEEN MODELS

For 50K model PD52983-50, two 2 inch drain fitting assemblies are provided per tank, located diagonally opposite each other, as shown in fig. I-2.1. The Drain Hose Assembly has a swivel at the threaded nipple, to facilitate installation to Drain Fitting. Two 2" Drain Hose assemblies, one 4" Filler/Discharge hose assembly, one 2" Drain Ball Valve assembly, and one 4" Gate Valve assembly are provided with the tank. I

For Models M52983-50 and BA92-162, a gate valve is used to control fuel flow. Gate valves are used on the filler discharge and drain assembly, to control fuel flow to and from the tank and to allow drainage of the tank For Models BA9 1-140 and BA9 1- 14 1, a Butterfly valve is used to control fuel flow to and from tank and a Ball Valve is used for drainage of the tank. For Models BA9 1-140A and BA9 1-14 1 A, a Ball Valve is used on the Filler/discharge assembly.

l-l 1 EQUIPMENT DATA

I-11.1 Identification Marking: The tank is permanently marked with an identification marking. This marking includes the following information:

- Description
- National Stock Number (NSN)
- Manufacturer
- Manufacture date
- Contract number
- Lot
  - Weight empty
  - Crated weight
- Serial number

l-l 1.2 Dimensions and Weights (approximate)

For 50,000-GALLON TANK, FUEL, NSN 5430-01-455-5676, (per PD52983-50)

Dry (empty dimensions)	25 ft. 3 in. by 65 ft. 1 in.
Filled dimensions	24 ft. 9 in. by 64 ft 6 in. by 4 ft. 10 in.
Dry weight (tank only)	910 lb.
Crated weight	1,250 lb.
Crated dimensions, outside	94 in. x 63 in. x 25 in.
Temperature range, operating	-25°F to 125°F (-32°C to 52°C)

FOR 50,000-GALLON TANK, FUEL, NSN 5430-00-182-8181

Dry (empty dimensions)	25 ft. 6 in. by 65 ft. 6 in. (7.78 m. by 19.98 m.)
Filled dimensions	5 ft. 8 in. by 24 ft. by 64 ft. (1.73 m. by 7.32 m. by 19.52 m.)
Dry weight (tank only)	900 lb. (408.60 kg.)
Crated weight	1500 lb. (681.00 kg.).
Crated dimensions, outside	12 ft (l) by 3 ft. 4 in. (w) by 3 ft. 6 in. (h) (3.66 m. by 1.02 m, by 1.07 m.)
Temperature range, operating	-25°F to 125°F (-32°C to 52°C)

For 20,000-GALLON TANK:

Dry (empty) dimensions	28.0 ft. by 24.0 ft. (8.53 m. bv 7.31 m.)
Filled dimensions	5 ft. 6 in. by 27 ft. 11 in.(approximate) by 24 ft. 10 in. (1.676 m. by 8.50 m. by 7.56 m.)
Dry weight (tank only)	200 lb. (90.72 kg.)
Crated weight	5 IO lb. (2 13.33 kg.)
Crated dimensions, outside	40 in. by 47 in. by 32 in. (1.02 m. by 1. 19 m. by 0.8 1 m.)

FOR 3,000-GALLON TANK:

Dry (empty) dimensions	13 ft. 8 in. by l3 ft. S in. (4.16 m. by 4.16 m.)
Filled dimensions	13 fT. 2in. by 13ft. 2in. by 2ft. 4in. (4.01 m. by 4.01 m. by 0.71 m.)
Dry weight (tank only)	135 lb. (61.2 kg.)
Crated weight	235 lb. (1'06.6 kg.)
Crated dimensions, outside	88.75 in. by 35.25 in. by 28.875 in. (2.25 m. by 0.9 m. by 0.73 m.)

1-11 .3 Storage Data

Temperature Range	
Desired (5 years max.)	-25" to +1 20°F (-32°C to 49°C)
Peak (30 days max.)	-60° to +160°F (-51°C to 71°C)

SECTION III. PRINCIPLES OF OPERATION

I-12. FUNCTIONAL DESCRIPTION

1-12.I The tank is filled by connecting a hose from a fuel truck or other fuel source to the filler and discharge hose assembly. This assembly is connected, in turn, to the gate or butterfly valve that has been connected to the filler/discharge assembly. Gate or butterfly valves are used to control the flow of fuel.

1-12.2 Fuel is discharged by connecting the tiller and discharge hose assembly and gate or butterfly valve to the filler/discharge assembly. Water, sludge and residual fuel are drained through the drain hose assembly at the bottom of the tank. The fuels are extremely hazardous. and all safety procedures must be strictly followed.

CHAPTER 2

OPERATING INSTRUCTIONS

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

2-1. CONTROLS. (See figure 2-1.)

The operator should be thoroughly familiar with the location and function of every control before operating the system.

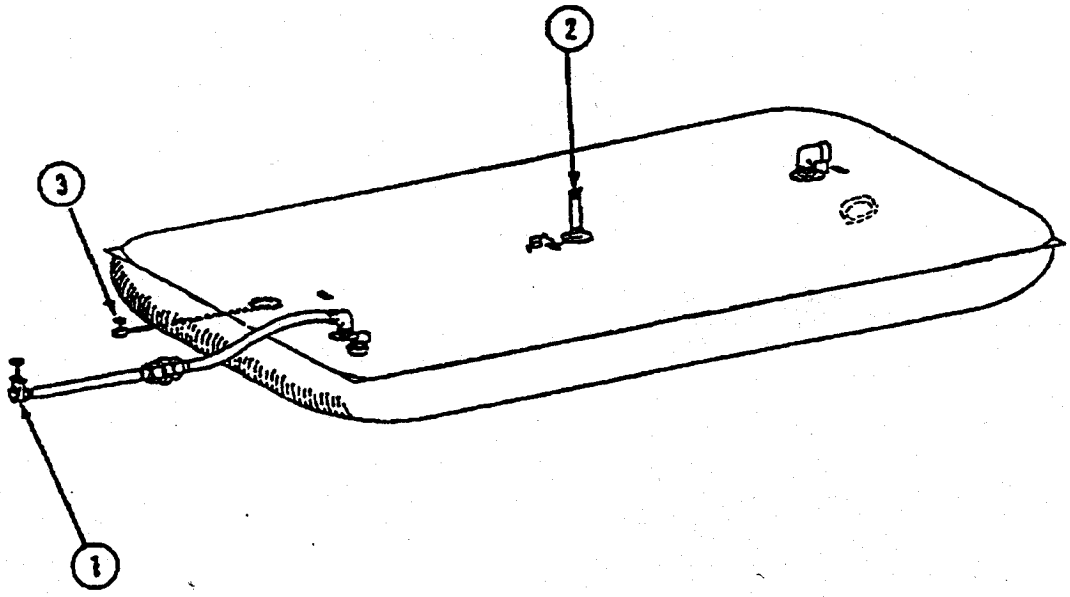


Figure 2-1 **Controls for 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon Collapsible Fabric Tank, typical.**

Key	Control or Indicator	Function
1	Gate, butterfly or ball valve	Shuts fuel flow on and off between the tank and any other portion of the system.
2	Vent and pipe assembly	Allows relief cap to open automatically when the tank vapor reaches an internal pressure of 0.1 psi (0.0068 atmospheres).
3	Drain gate or ball valve	Allows residual fuel, sludge, or water to be drained from the tank when needed.

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

2-2. GENERAL

I The 3,000-gallon, lO,OOO-gallon, 20,000-gallon, or 50,000-gallon collapsible fabric tank must be inspected regularly to find and correct defects (refer to table 2-l.)

2-2.1 Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) operation PMCS.

2-2.2 While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) operation PMCS.

2-2.3 After You Operate. Be sure to perform your after (A) operation PMCS.

2-2.4 If Your Equipment Fails to Operate. Refer to table 2-l and troubleshoot using correct equipment. Refer to DA Pam 738-750 and report any deficiencies using the correct forms.

2-3. PMCS PROCEDURES.

2-3.1 Your Preventive Maintenance Checks and Services (PMCS) (table 2-l) lists the inspections and care of your equipment required to keep it in good operating condition.

2-3.2 Use the "Item No." column of the PMCS table to supply the item number used in the "TM Number" column of DA Form 2404.

2-3-3 The interval column of your PMCS table tells you when to do a certain check or service.

2-3.4 Leakage definitions for operator/crew PMCS shall be classified as follows:

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

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

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

CAUTION

When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS. Report Class III leaks to your supervisor or unit maintenance. Failure to heed this caution can damage the equipment.

NOTE

Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

2-3.5 The procedure column of your PMCS table tells you how to do the required checks and services. Carefully follow these instructions. If you do-not have the tools, or if the procedure tells you to, have unit maintenance do the work.

2-3.6 If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting for possible problems. Report any malfunctions or failures on DA Form 2404, or refer to DA Pam 738-750.

2-4. EQUIPMENT IS NOT READY/AVAILABLE IF:

This column tells you when and why your equipment cannot be used.

NOTE

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

Table 2-1. Operator Preventive Maintenance Checks and Services

B - Before D - During A - After S - Semiannually

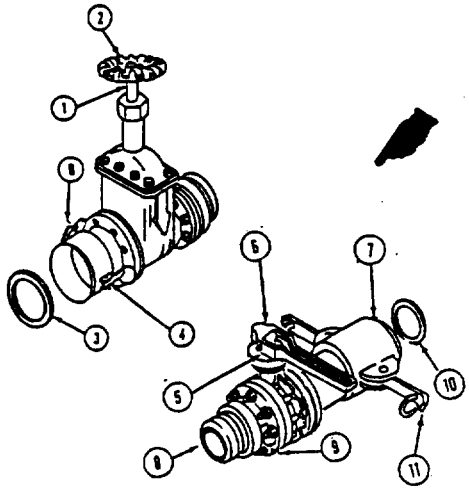
Item No.	Interval B	D	A	S	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
1	•	•			**INSTALLATION AREA.** Check for accumulation of stones, sticks, and other sharp objects that might cause punctures and leaks.	
2	•	•	•		**TANK.** Inspect for tears, punctures, or leaks.	Tank shows evidence of tears, punctures, or leaks. (Exclude damp spots, and weeping/wicking where tank seams are not involved and droplets do not form and run down side of tank.)
3				•	**TANK INTERIOR.** Check coating for cracking.	Coating is cracked and allows leaks.
4	•	•	•		**GATE VALVE.** Check for bent or binding stem (1), broken handwheel (2), and leakage. Check gasket (3) and cam-lever arms (4) for damage. 	Stem, handwheel, gasket, or cam-lever arms are damaged or missing or leakage occurs.
4.1	•	•	•		**Butterfly Valve Assembly.** Check for bent or binding stem (5), broken handle (6), and leakage. Check for missing/damaged couplings, (7),(8), & bolts. (9). Check gasket (10), and Cam-lever arms (11), for damage	Stem, handle, gasket, cam-lever arms are damaged or leakage occurs.

Table 2-1. Operator Preventive Maintenance checks & Services (Cont)

B - Before D - During A - After S - Semiannually

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure	Equipment is Not Ready/Available If:
4.2	●	●	●			BALL VALVE ASSEMBLY Check for bent or binding stem (1), broken handle (2), and leakage	Stem, handle are damaged or leaking.

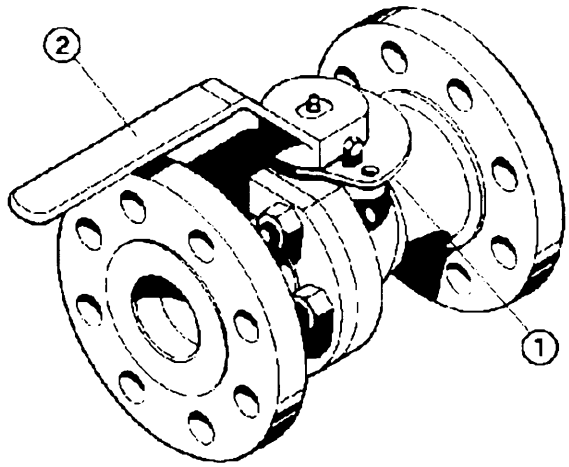


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually

Item No.	Interval B	D	A	S	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
5	•	•	•		**FILLER AND DISCHARGE HOSE ASSEMBLY.** Check for leaks, cuts, and tears. Check fittings (1) for distortion and damaged or missing gaskets (2).	Hose assembly leaks or is damaged. Gaskets are damaged or missing.

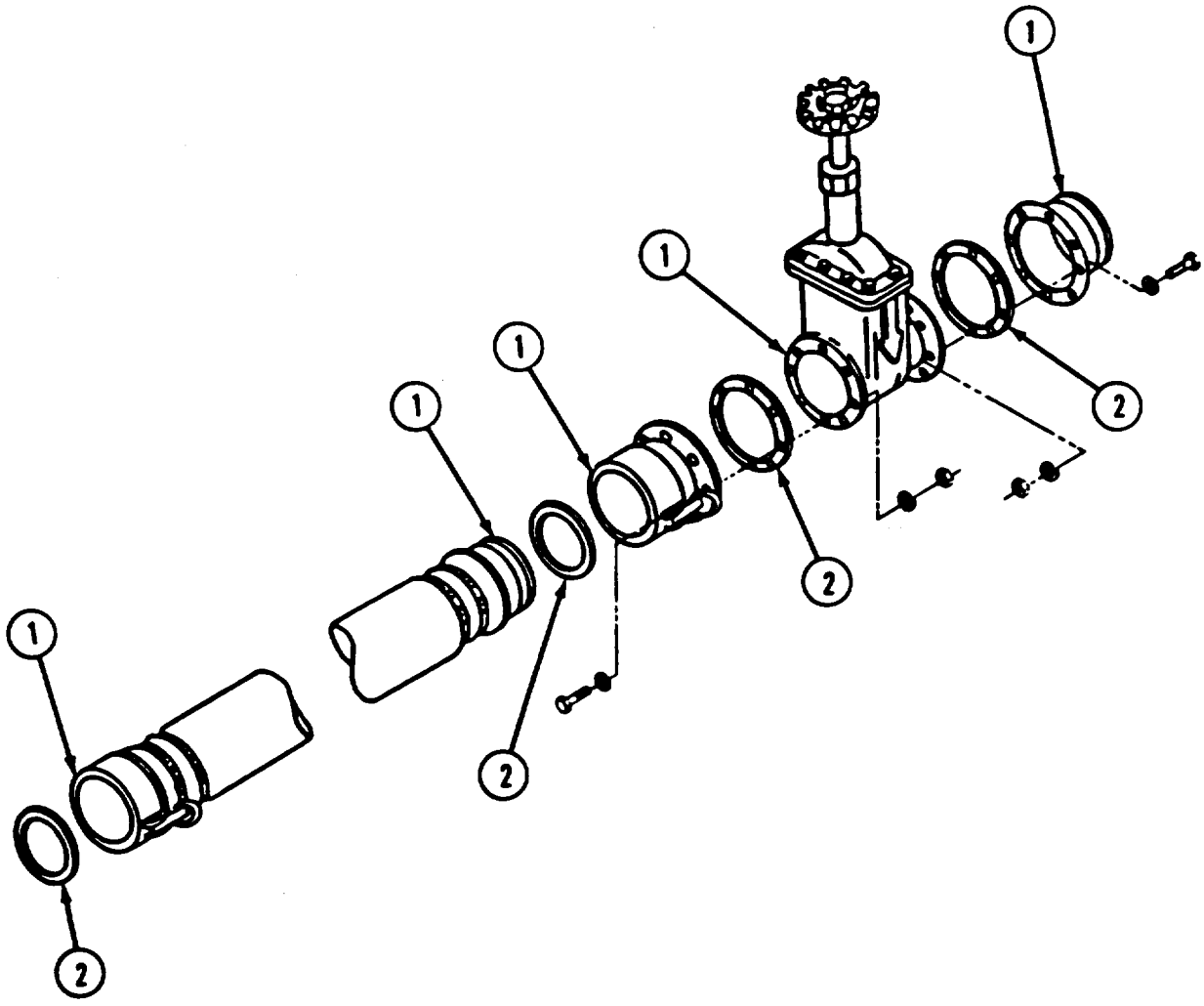
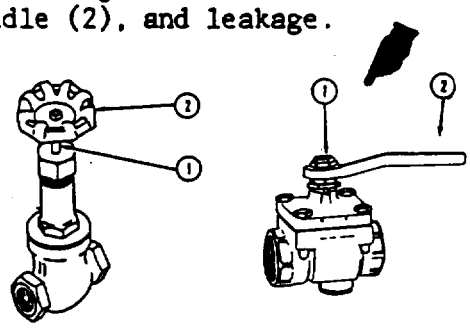


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually

Item No.	Interval B	D	A	S	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
6	•	•	•		DRAIN GATE VALVE. Check for bent or binding stem (1), broken handle (2), and leakage.  Gate Valve Ball Valve	Stem and/or handle are damaged or missing, or leakage occurs.
6.1	•	•	•		Ball Valve: Check for bent or binding stem (1), broken handle (2), and leakage.	Stem and/or handle are damaged or missing or leakage occurs
7	•	•	•		DRAIN HOSE ASSEMBLY. Check hose (1) for leaks, cuts, and tears. Check fittings (2) for distortion and damage.	Hose assembly leaks or is damaged.

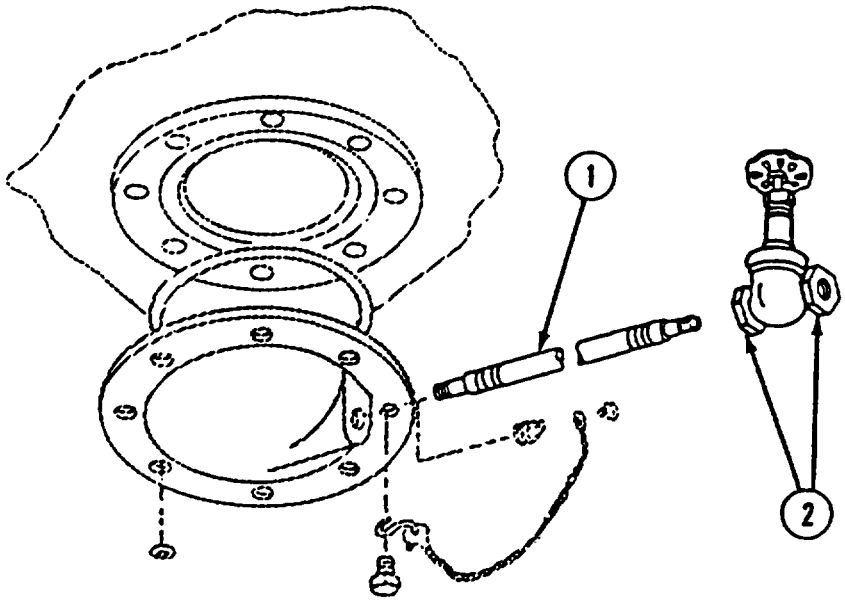


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually

Item No.	Interval B	D	A	S	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
8	•	•	•		**VENT AND PIPE ASSEMBLY.** Check relief cap (1), flame arrestor (2), cap gasket (3), gasket (4), and cam-lever arms (5) for evidence of leakage, damage, or missing parts. Check relief cap for cleanliness and freedom of operation. Check for damaged or missing gaskets.	Relief cap or flame arrestor is damaged or missing. Relief cap gasket, flat rubber gasket, or cam-lever arms are damaged or missing.

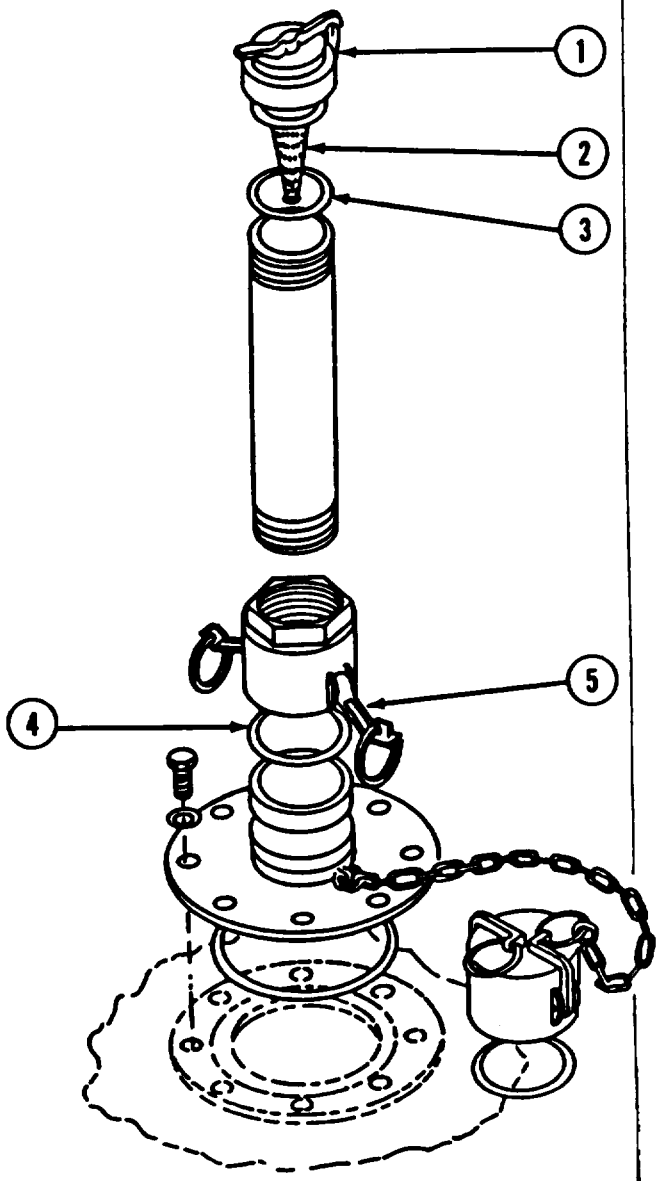
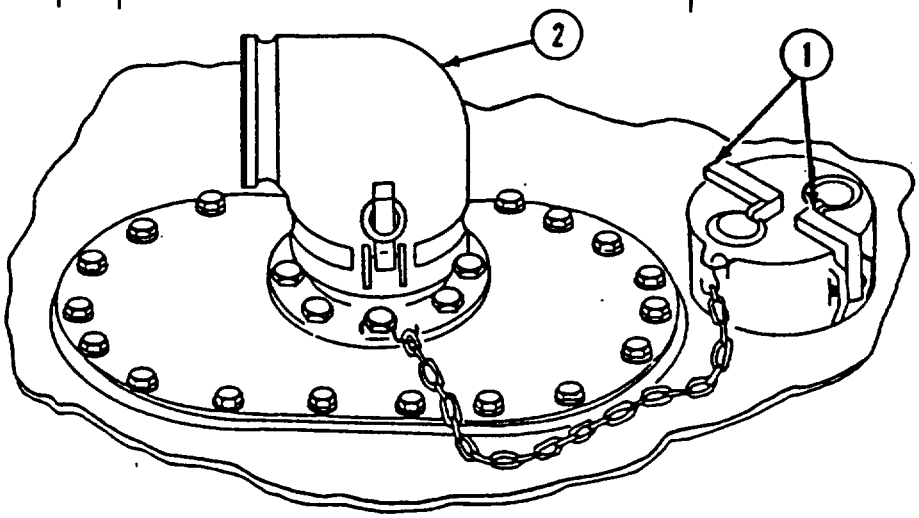


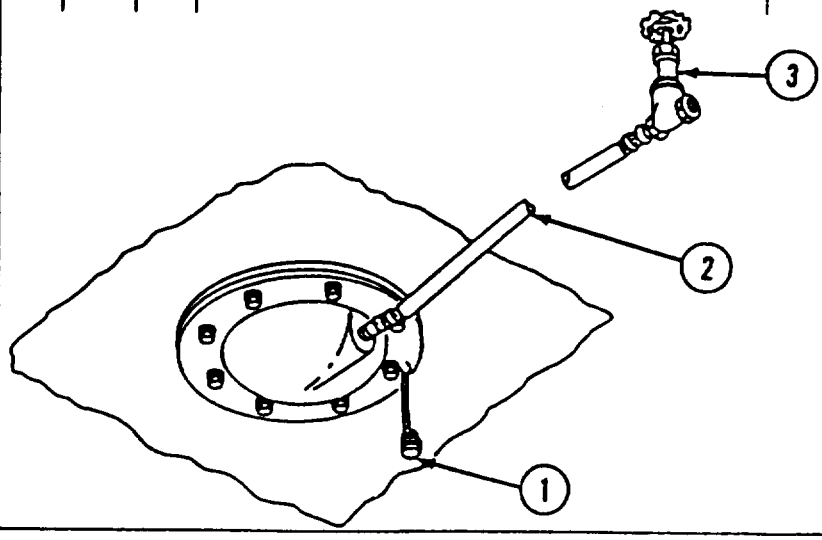
Table 2-1. Operator Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually

Item No.	Interval B	D	A	S	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
9	•	•	•		**FILLER/DISCHARGE ASSEMBLY.** Check cam-lever arms (1) or elbow body (2) for evidence of damage or leakage.	Cam-lever arms are damaged or missing. Elbow body is cracked. Elbow sealing surface is badly dented.

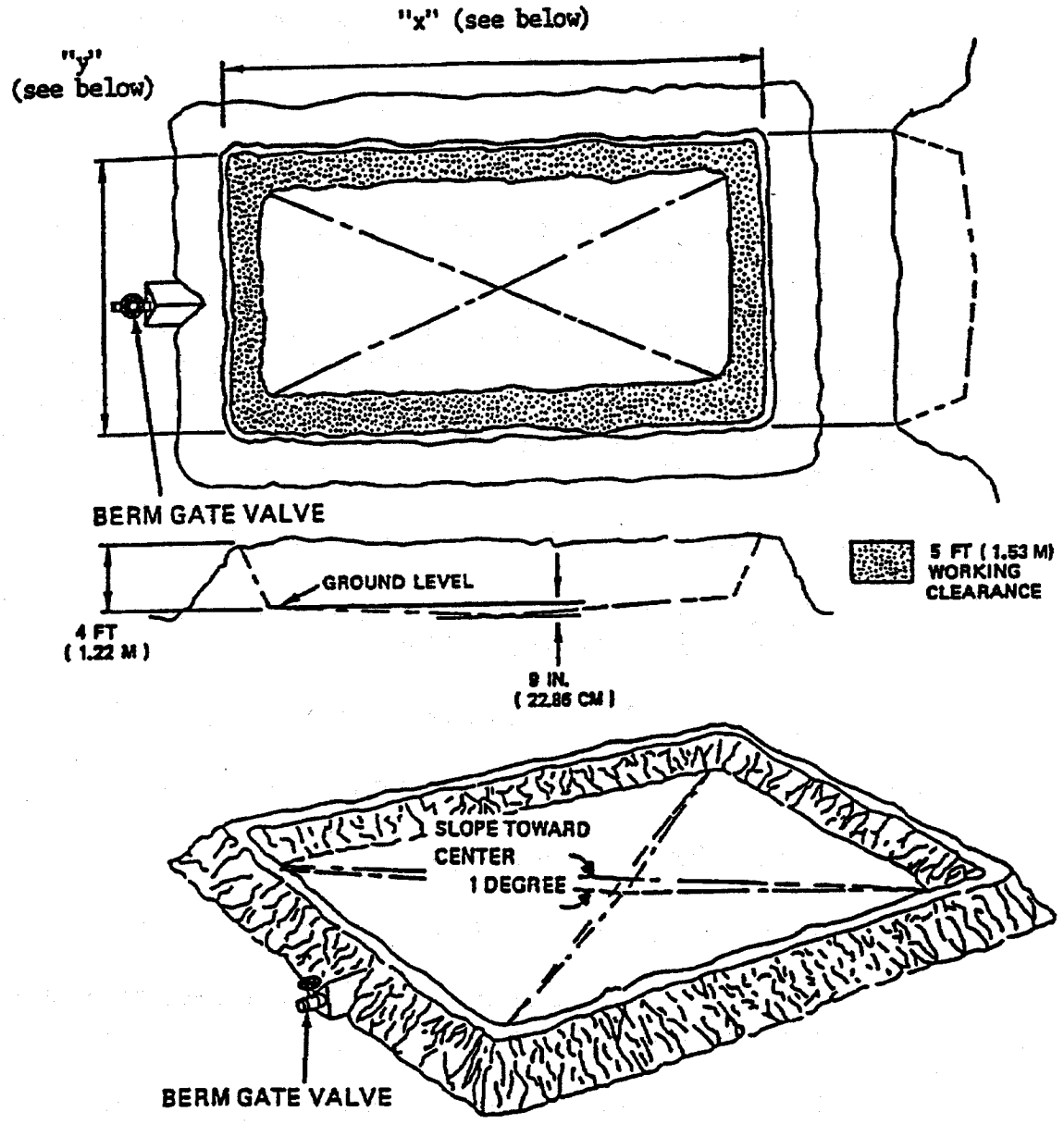


10	•	•	•		**DRAIN FITTING ASSEMBLY.** Check nearby area for evidence of leakage. Check drain plug (1), drain hose (2), drain gate or ball valve (3) for damaged or missing parts.	Drain plug, drain hose, and/or drain gate or ball valve are missing, not properly connected, or damaged.



Section III. OPERATION UNDER USUAL CONDITIONS

2-5. ASSEMBLY AND PREPARATION FOR USE.



Berm Dimensions ("x" and "y" above)

3,000-Gallon Tank:			10,000-Gallon Tank:			20,000-Gallon Tank:			50,000-Gallon Tank:		
"x"	24 ft.	7.32 m	"x"	38 ft	11.59m	"x"	38 ft	11.59m	"x"	74 ft	22.57 m
"y"	24 ft	7.32 m	"y"	31 ft	9.46m	"y"	34 ft	10.37m	"y"	34 ft	10.37m

Figure 2-2. Berm Construction

WARNING

Make certain that the berm gate valve is closed and locked after installing and draining the berm. In the event of a tank rupture, an open berm gate valve would permit fuel to drain from the berm. Undetected fuel leakage can result in an explosion and cause death, severe personal injury, and damage to equipment.

NOTE

A minimum of 5 ft. (1.53 m) working clearance is necessary between the side of the tank and the berm on all four sides.

a. For 50,000-gallon tank, clear and level an area 34 ft. by 74 ft. (10.37 m x 22.57 m). For 20,000-gallon tank, clear and level an area 38 ft. by 34 ft. (11.58 m x 10.37 m). For 10,000-gallon tank, clear and level an area 31 ft. by 31 ft. (9.44 m x 9.44 m). For 3,000-gallon tank, clear and level an area 24 ft. by 24 ft. (7.93 m x 6.71 m). Retain slight incline for draining surface water.

b. Inspect area closely. Remove all sharp objects from leveled area.

c. Slope all four sides of leveled area in toward center (figure 2-2). Center should be no more than 9 in. (22.86 cm) below ground level.

d. If possible provide sand bottom approximately 4 in.(10.16 cm) thick.

e. Erect 4 ft. (1.22 m) high earth berm around outside of sloped area.

f. Provide means of draining accumulated water.

(1) Position drain assembly at lowest point of slope to aid in draining water or sludge.

(2) Place 2 in. (5.08 cm) pipe, with gate valve through bottom of discharge end of berm, at depth equal to lowest point of slope.

(3) Keep gate valve closed normally; open gate valve to drain water from bermed area.

g. Install cloth, if provided, in berm.

2-5.1 Unpacking Instructions For 50,000-GALLON TANK, NSN 5430-01-455-5676, P/N PD 52983-50 (See figures 2-2.1 and 2-2.2)

a. Unload crate (1) with tank (2) near point of installation.

b. Unscrew bolts in crate lid, and remove lid from crate.

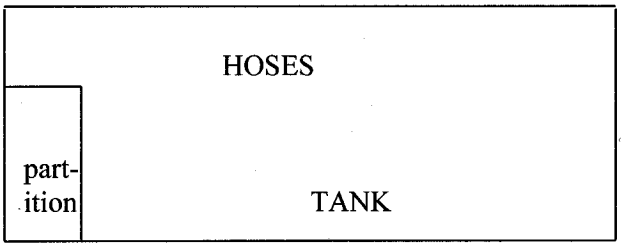
c. Familiarize yourself with the contents of crate by reviewing following Bill of Material:

Items inside the wooden crate are listed sequentially from the top of the crate to the bottom:

ITEM	QUANTITY
Hoses	3 each
Tank, with two lifting straps	1 each
Partition in the box containing accessories and repair items	1 each

d. Review the packing lay-out shown below:

TOP VIEW



d. Remove hoses from the crate: drain fitting hoses, 2 in. x 8 ft. (2 each) and filler/discharge hose 4 in. x 8 ft. (1 each). Contents of partition may be removed as needed during installation.

f. Locate lifting straps (2 each) around tank. Carefully insert a lifting bar, strong enough to lift 2000 lb., through the loops of the lifting straps, (lifting bar is not provided).

g. Transport tank to center of desired installation site. Place tank such that the long side of the folded tank is parallel with the long side of the installation site.

2-5.1A Unfolding the tank

a. Unfold half of tank along the length of the installation site; unfold other half in opposite direction. Then locate handles along length of the tank; grasping handles, pull folded sides of tank towards side of the installation site; do the same on the opposite side.

b. Proceed to Paragraph 2-5.4. to continue with installation of fittings.

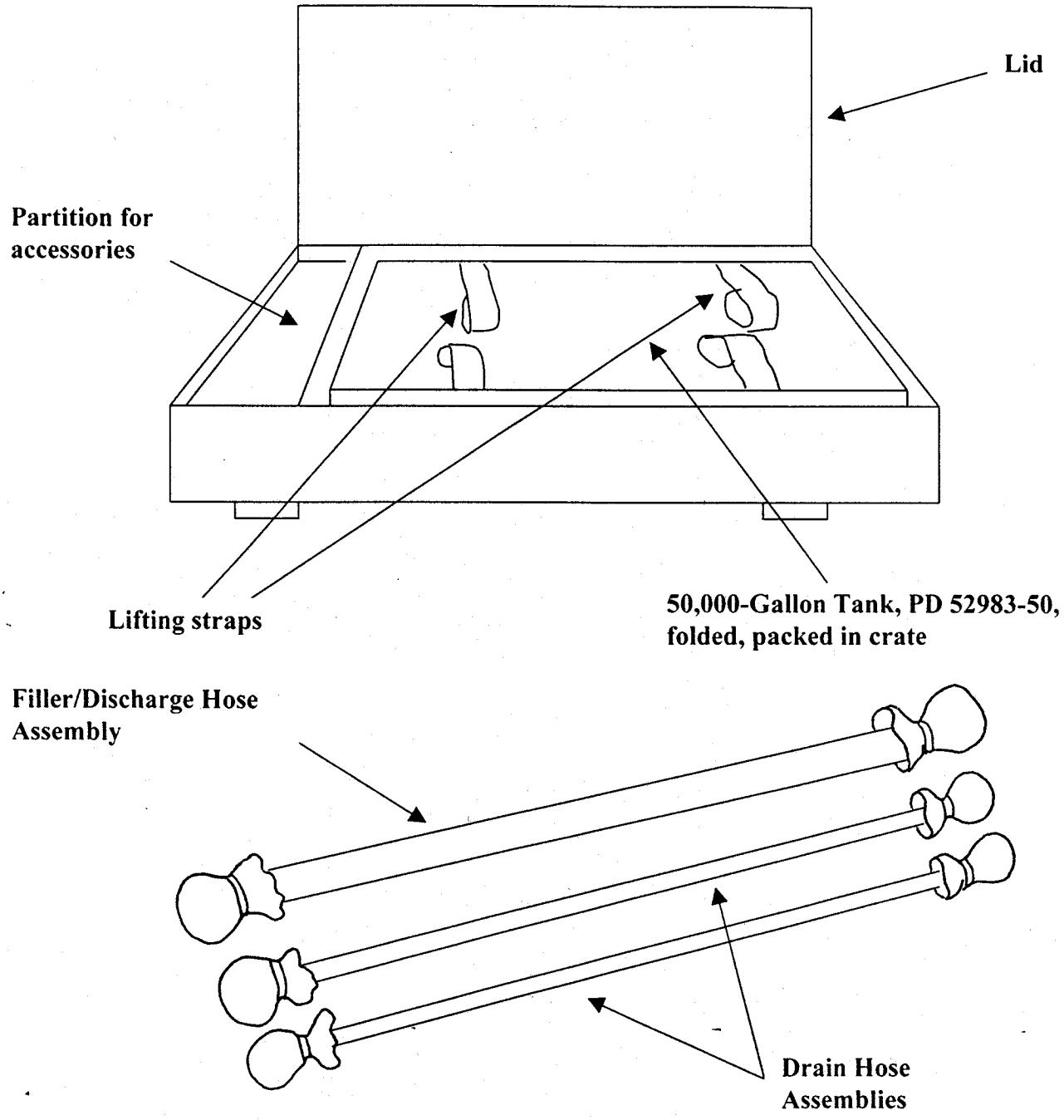


Figure 2-2.2 **Crated Assembly of 50,000-Gallon Tank (189,250 Liter), Part Number PD 52983-50**

NOTE

Figure 2-3 below shows a typical berm.

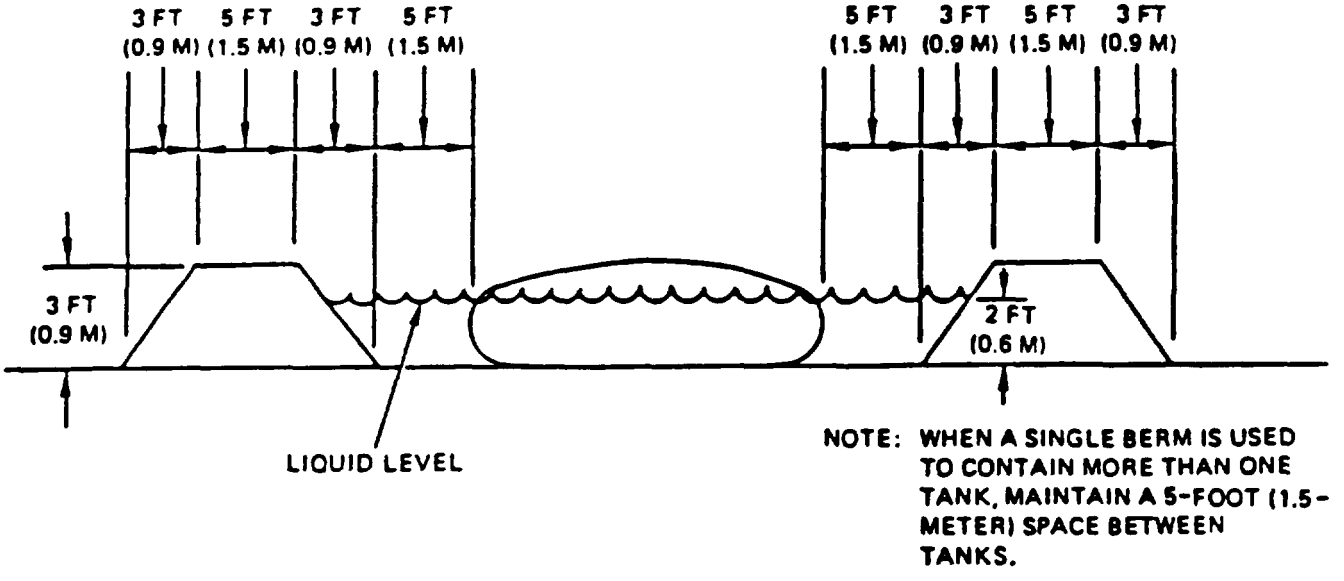


Figure 2-3. Typical Berm Cross-Section

2-5.2 Unpacking the Tank. (See figure 2-4.)

CAUTION

Unfold collapsible fabric tanks with care. Coated surfaces may tend to stick together, and excessive force may pull coating from tank fabric. A light application of petroleum jelly will prevent recurrence.

Remove all protruding nails and other objects before attempting to remove the tank from the container. This is necessary to avoid puncturing the tank.

a. Unload crate (1) with tank (2) near point of installation.

b. Remove nails and bolts from the crate cover (3); remove crate cover from crate (1).

c. Remove nails from crate sides (4) that hold retaining boards (5) in place; remove retaining boards.

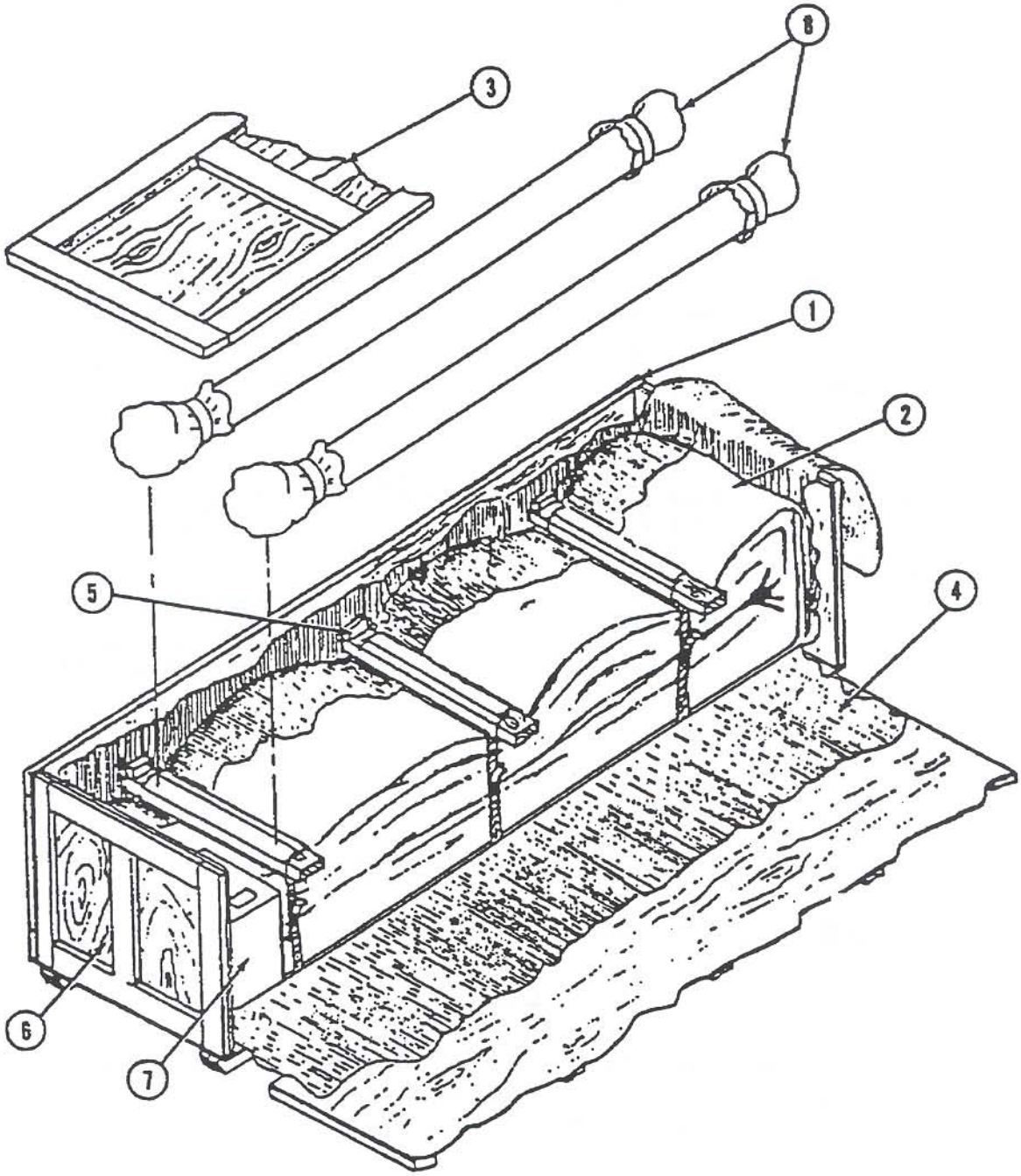


Figure 2-4. Crated assembly of 3,000-Gallon (11,355 Liter), 10,000-Gallon (37,853 Liter), 20,000-Gallon (76,000 Liter, or 50,000-Gallon (189,250 Liter) Tank.

d. Remove nails and bolts from crate side and crate ends (6); remove crate sides and ends.

e. Remove all accessories (7), including two hoses (8), from around folded tank (2).

NOTE

The tank lifting device must have a minimum lifting capacity of 2,000 lb (908 kg).

f. Carefully roll folded tank (2) onto lifting device.

g. Transport tank and position for installation.

2-5.3 Unfolding the Task

NOTE

The tank is folded toward the center and rolled along the length dimension.

a. Place folded tank at one end of lengthwise prepared surface. Center folded tank in widthwise direction.

b. Remove ties that hold folded tank together.

c. Unroll tank along lengthwise dimension.

d. Unfold tank sides from center.

2-5.4 Remove of Drain Assembly Plug and Installation of Drain Hose Assembly. (See figure 2-5.)

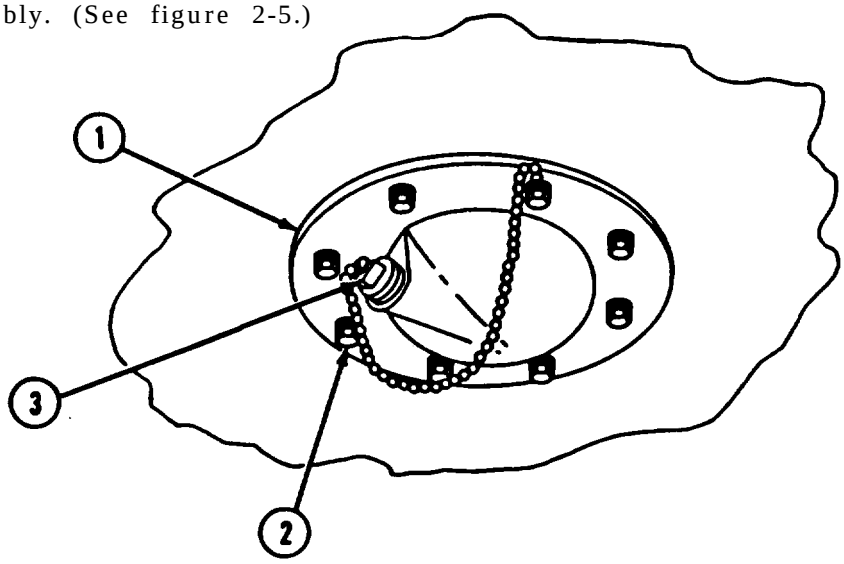


Figure 2-5. Installed Drain Plug

WARNING

When filling the tank with fuel, verify that the drain gate handwheel or ball valve handle is rotated fully to the right (closed position) before fuel is introduced into the tank. Unobserved drainage of fuel can result in an explosion or fire. Failure to heed this warning can cause death or severe personal injury.

a. Fold tank to expose drain fitting (1). (See figure 2-5.)

(1) Torque screws (2) on cover plate to 30 in-lb (3.41 N·m).

(2) Remove drain plug (3).

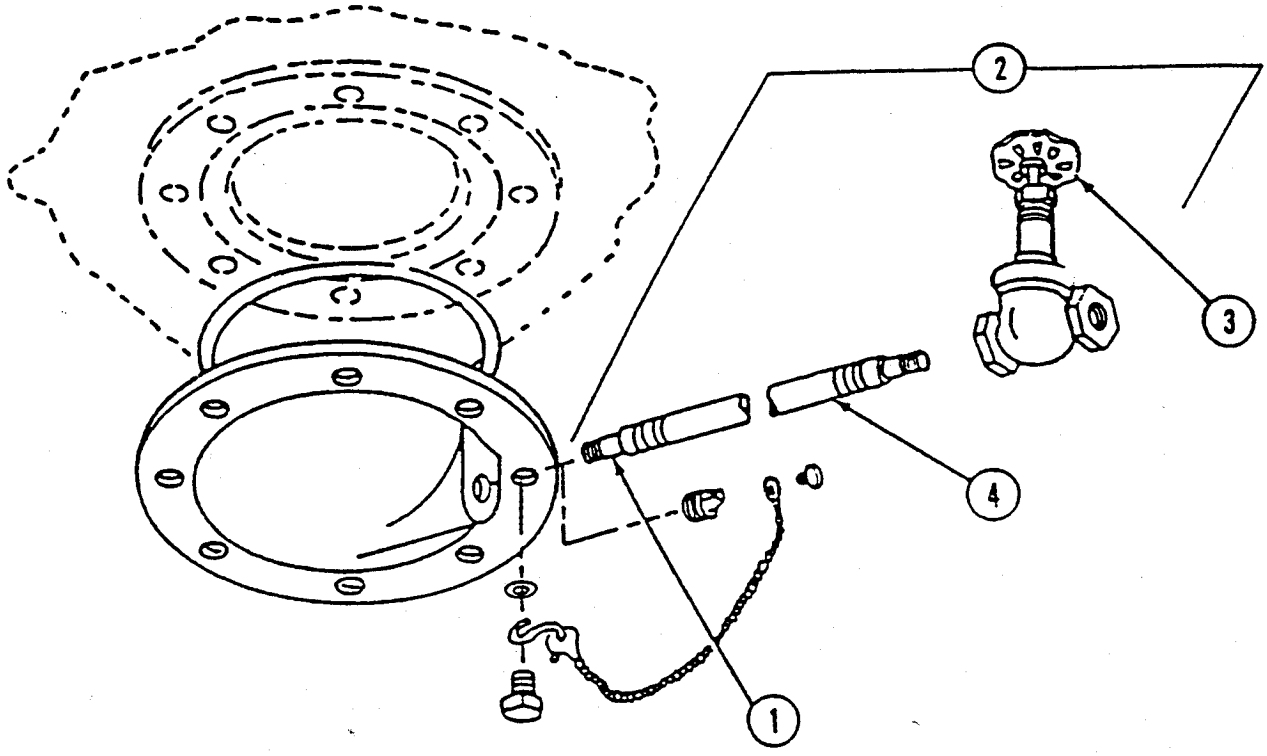


Figure 2-6 . Drain Fitting Assembly

b. Apply pipe joint compound or teflon tape to threads (1) of drain hose fitting; install drain hose assembly (2). (See figure 2-6 .)

c. Apply sealing compound or antiseize tape to threads. If not already assembled, install the drain gate or ball valve (3) on end of drain hose (4).

d. Dig shallow and narrow trench to outer edge and away from tank for extension of drain hose and drain gate or ball valve.

e. Return tank end to flat position; lay drain hose and drain gate or ball valve in trench.

2–5.5 Installation of Vent Pipe Assembly. (See figure 2-7.)

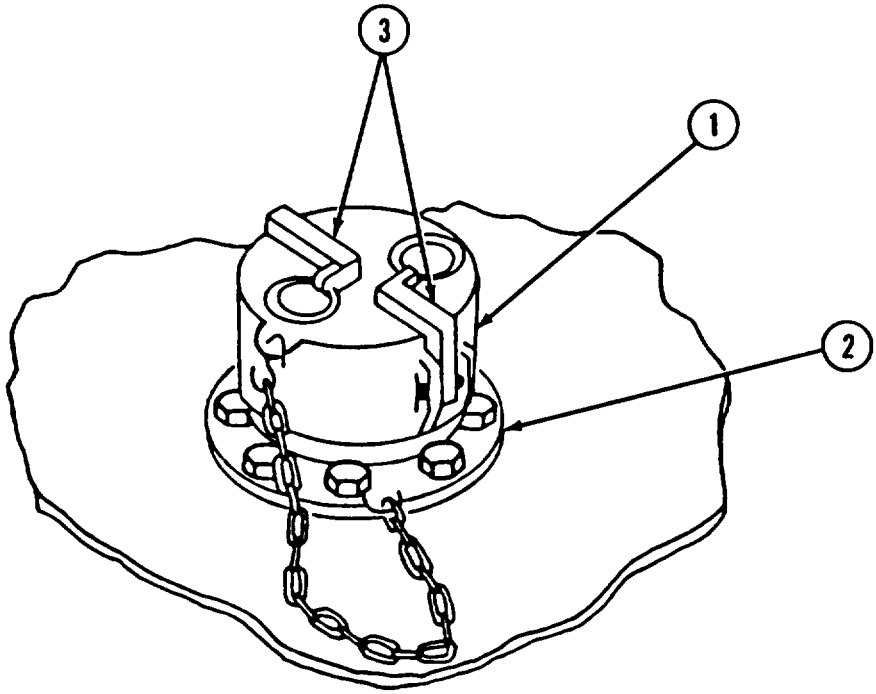


Figure 2-7. Vent Fitting Dust Cap

NOTE

Dust cap is chain–attached to prevent loss.

a. Remove 2 in. (5.08 cm) dust cap (1) from vent fitting (2) in center of tank.

(1) Pull cam-lever arms (3) outward to open.

(2) Disconnect dust cap (1).

b. Torque screws to 30 in-lb (3.41 N•m).

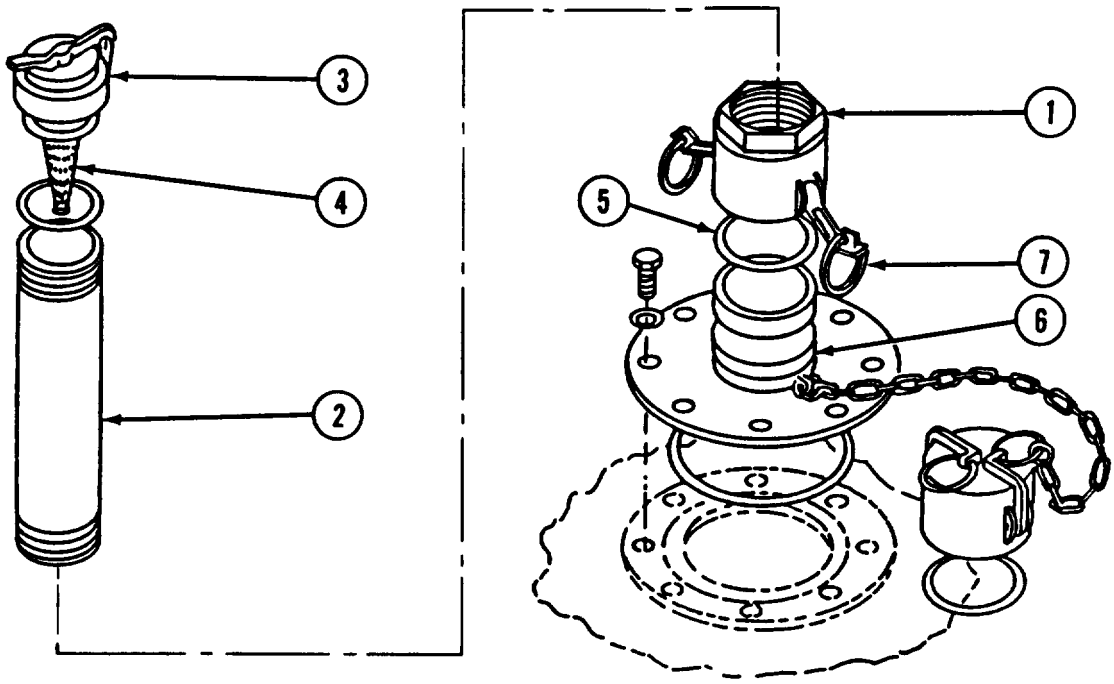


Figure 2-8. Vent and Pipe Assembly

c. Inspect female coupling half (1) and vent pipe (2) for cleanliness. (See figure 2-8.)

NOTE

Normally the vent pipe and female coupling half will be received preassembled.

d. Check to see that relief cap (3) operates freely.

e. Check to see that flame arrestor (4) is installed.

f. Check to see that relief cap (3) is installed tightly on vent pipe (2).

g. Check to see that gasket (5) is in place and correctly seated.

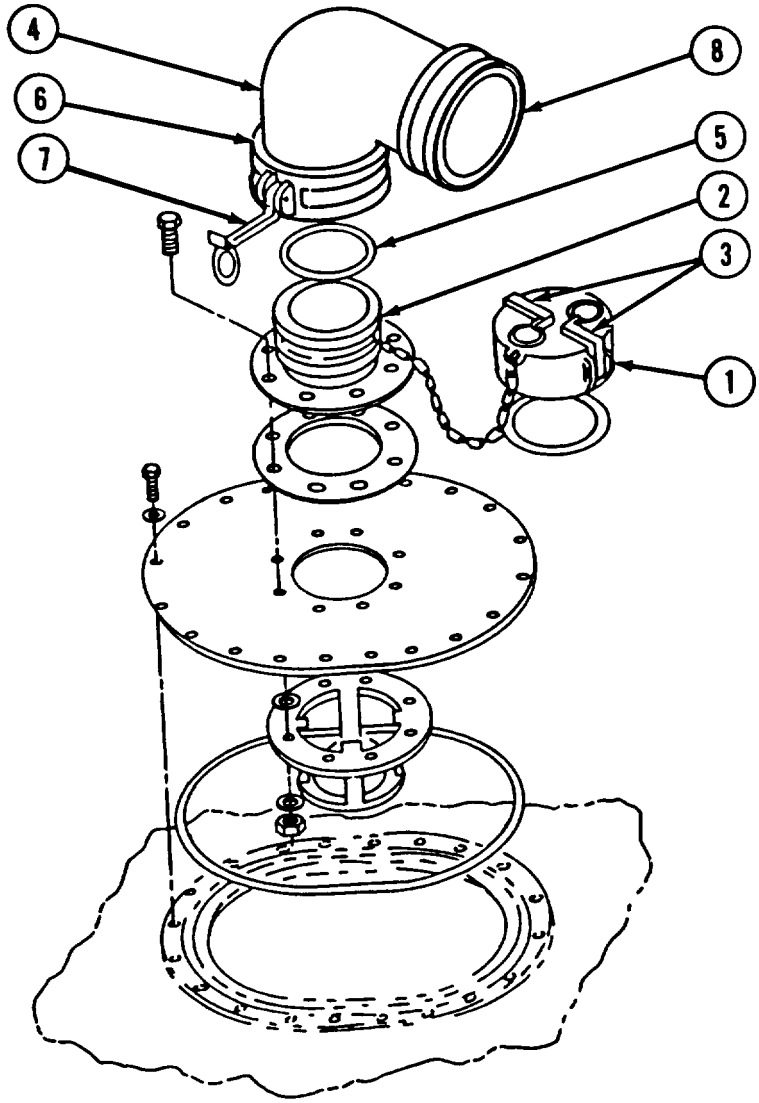
h. Insert female coupling half (1) over flanged adapter (6) with cam-lever arms (7) in outward position.

i. Press cam-lever arms (7) upward and inward to lock vent pipe assembly into operating position.

2-5.6 Installation of Filler/Discharge Elbow Assembly. (See figure 2-9.)

NOTE

The dust cap is attached to the flanged adapter to prevent it from being lost. The filler/discharge elbow on the discharge end requires a female/male elbow; whereas, the filler/discharge elbow used on the intake end requires a female/female elbow.



NOTE

A female/male (discharge) elbow is shown.

Figure 2-9. Filler/Discharge Elbow Assembly

a. Remove dust cap (1) from flanged adapter (2).

(1) Pull cam-lever arms (3) outward.

(2) Disconnect dust cap.

b. Inspect elbow (4) for cleanliness.

c. Check to see that gasket (5) is in place and is properly seated.

NOTE

Cam-lever arms must be pulled inward to lock and outward to unlock the elbow.

d. Place female end (6) of elbow (4) over flanged adapter (2) with cam-lever arms (7) in outward position.

e. Rotate elbow (4) so that open end (8) points to nearest end of tank.

f. Lift cam-lever arms (7) and lock elbow (4) in place.

2-5.7 Installation of Filler and Discharge Hose Assembly and Filler and Discharge Valve Assembly. (See figure 2-10.)

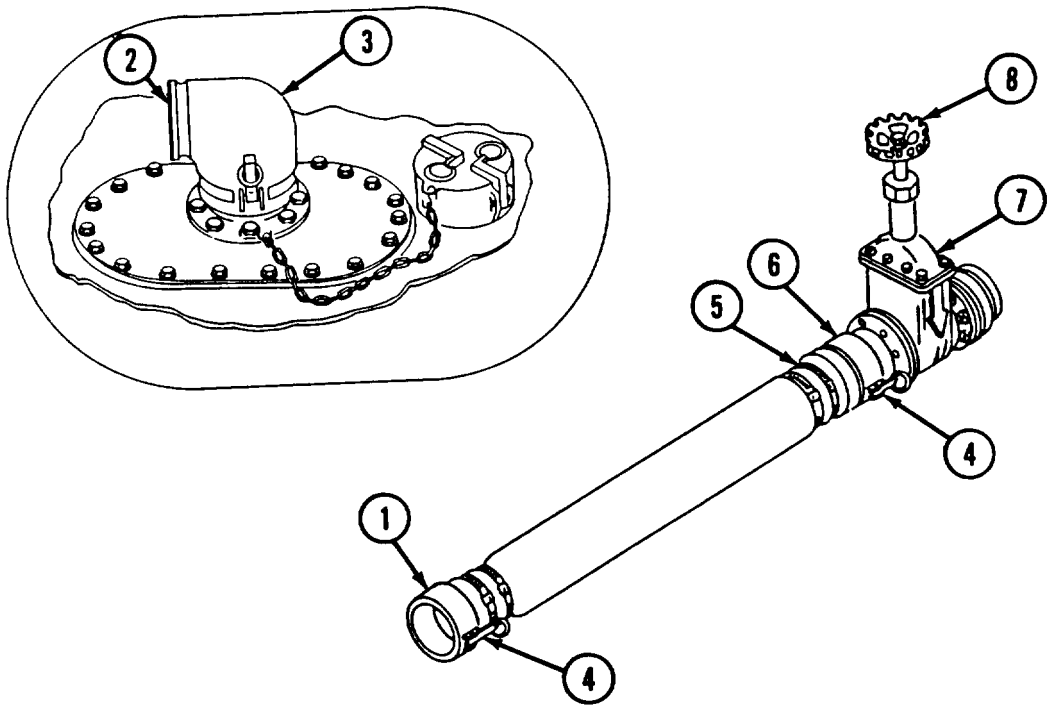


Figure 2-10. Filler and Discharge Hose Assembly and Filler and Discharge Valve Assembly

NOTE

The filler and discharge hose assembly is fitted with a quick-disconnect female coupling on one end and a quick-disconnect male adapter on the other end.

a. Place female coupling (1) on male adapter (2) end of filler and discharge elbow (3); push coupling cam-lever arms (4) to lock hose assembly in place.

b. Place male adapter (5) end of hose into female coupling (6) of gate or butterfly valve (7); push coupling cam-lever arms (4) to lock hose assembly in place.

c. Be sure gate or butterfly valve (7) is closed; turn handle (8) to the right until it stops.

NOTE

The gate valve is full opened by rotating the handwheel to the left and backing off one-quarter turn. The gate valve is fully closed by rotating the handwheel to the right and backing off one-quarter turn. Note the difference in exposure of the handle stem between the closed and open positions as shown in figure 2-11.

Be sure the butterfly valve on tank models BA91-141 and BA91-140 (9), is closed. Press down on the end of the handle to release locking pin and turn until handle is 90° to valve body and stops. Release handle.

The butterfly valve is fully opened by pressing down on the end of the handle and turning counter clockwise to a parallel position in line with the valve body or hose assembly.

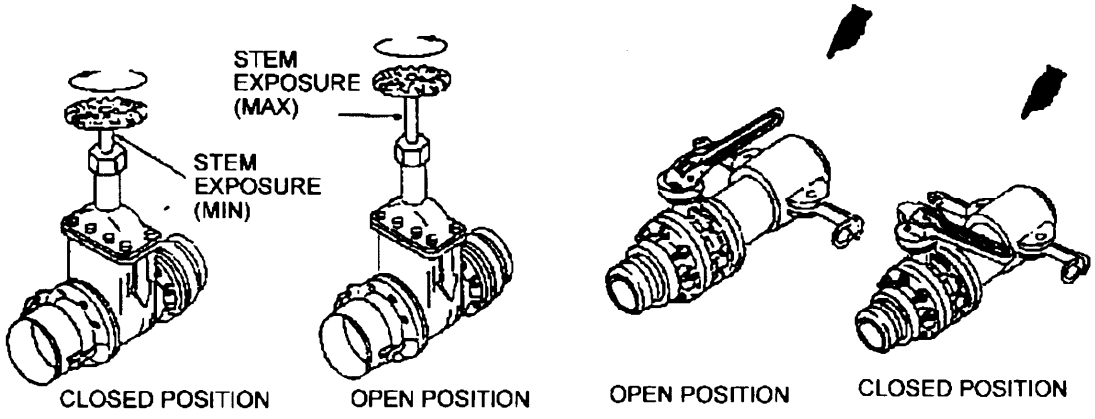


Figure 2-11. Gate Valve or Butterfly Valve in Closed and Open Positions.

NOTE

The ball valve is fully opened by rotating the handle until the handle is parallel to the valve body or hose assembly. The ball valve is fully closed by rotating the handle until the handle is perpendicular to the valve body or hose assembly.

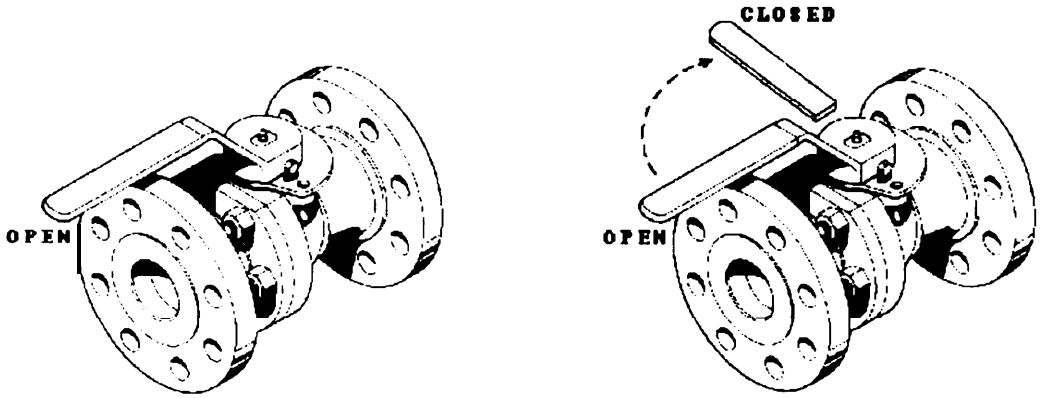


Figure 2-11.1 Ball Valve in Closed and Open Positions

2-6. INITIAL ADJUSTMENTS, DAILY CHECKS, AND SELF-TESTS.

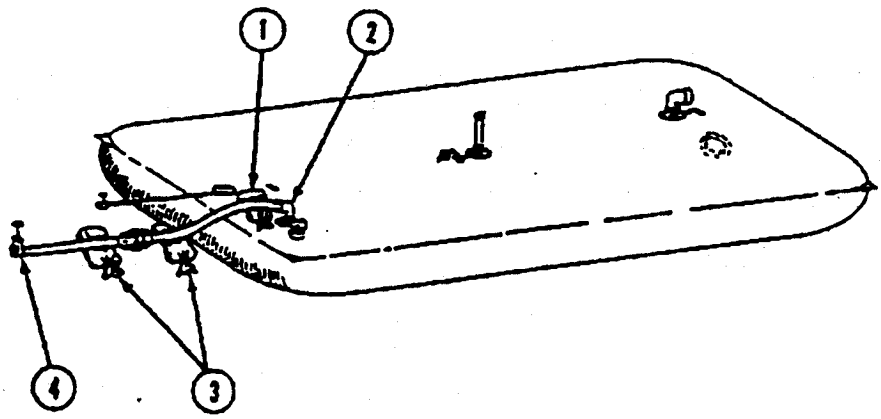


Figure 2-12. Elevated Connections for Easy Leak Detection

2-6.1 Initial Adjustments. (See figure 2-12)

a. Place fitted sandbag (1) under hose near filler/discharge elbow (2). This support will reduce stress on tank fitting, gasket in hose coupling, and filler/discharge elbow coupling.

b. Place sandbags (3) or wood blocks on ground near hose connections so that bad or leaking connection is easier to see and fire hazard can be avoided.

2-6.2 Self-Tests.

a. Inspect tank to verify setup as shown in figure 2-12.

b. Check drain gate or ball valve (4) to verify it is in closed position.

c. Check vent pipe assembly relief cap (item 2, figure 2-8 to verify freedom of operation.

d. Check filler/discharge gate, butterfly, or ball valve (figure 2-11) to verify closed position.

2-7 OPERATING PROCEDURES.

2-7.1 Filing Tank.

a. After performing adjustments and self-test (para 2-6) attach fuel source to gate or butterfly valve.

b. Activate fuel source.

c. Open gate or butterfly valve by rotating handwheel or handle to left.

CAUTION

Do not exceed maximum fill height. Tank will burst if it is overfilled.

d. Close gate or butterfly valve when tank is filled by rotating handwheel or handle to right.

e. Deactivate fuel source.

f. Disconnect fuel source from gate or butterfly valve.

2-7.2 Emptying Tank.

a. Inspect tank to verify that it is set up correctly.

b. Attach emptying source to gate or butterfly valve.

c. Open gate or butterfly valve by rotating handwheel or handle to left.

d. Activate emptying source.

e. Close gate or butterfly valve when tank is empty by rotating handwheel or handle to right.

f. Deactivate emptying source.

9. Disconnect emptying source from gate or butterfly valve.

2-7.3 Draining Tank.

WARNING

Sludge that accumulates in the bottom of the fuel tank gives off toxic and explosive vapors. Inhaling these vapors can cause lead poisoning. When cleaning tanks, provide ample ventilation to carry off harmful fumes.

a. Squeeze excess fuel from tank by rolling ends of tank toward drain fitting.

b. Open drain fitting gate or ball valve to allow remaining fuel to drain from tank.

c. Clean tank of residual sludge that accumulates in bottom of storage tank; dispose of sludge in compliance with EPA and local regulations.

2-8. PREPARATION FOR MOVEMENT.

Prior to moving the tank, fuel must be drained, tank disassembled, and components wrapped. Follow these steps.

CAUTION

Always handle the tank carefully. Components stored with the tank should be padded to avoid chafing during movement. Rough handling of the tank or components will result In damage.

a. Drain fuel from tank (para 2-7.2 and 2-7.3).

b. Remove drain hose assembly from drain fitting and install drain plug.

c. Remove filler/discharge elbows from filler and discharge adapters and install dust caps; push In cam-lever arms to lock.

d. Remove vent pipe assembly from flanged adapter and install dust cap; push in cam-lever arms to lock.

e. Brush off stones or debris clinging to tank.

f. Fold tank from both sides toward middle.

g. Roll tank from end opposite drain fitting.

h. Place tank in suitable shipping container or on skid.

i. Plug exposed hose assembly openings with suitable, clean materials to keep them dirt-free.

j. Pad or wrap components before placing them in separate shipping containers or storing with tank. This prevents chafing tank during movement.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-9. GENERAL.

The tank is designed to operate in extreme temperature conditions ranging from –25°F to +125°F (–320C to +52°C).

2-10. OPERATION IN EXTREME COLD.

a. Try to deploy tank only when temperature is above -25°F (-32°C).

b. Keep snow and ice from building up on top of tank or on vent and pipe assembly.

c. Keep snow and ice from couplings to ensure proper assembly and disassembly.

d. Avoid unnecessary folding, unfolding, or rolling of tank that might cause flaking, cracking, or delamination of coating material.

2-11. OPERATION IN EXTREME HEAT.

Avoid unnecessary handling of tank that might cause coating material separation.

2-12. OPERATION INDUSTY OR SANDY AREAS.

a. Keep tank clean. Make sure vent and pipe assembly and filler and discharge valve assemblies are clean.

b. Cover all hoses and fittings with dust caps when not in use.

c. Wipe all couplings clean before assembling.

Section V. OPERATOR MAINTENANCE

2-13. MAINTENANCE OF FILLER AND DISCHARGE VALVE ASSEMBLY.

This task covers: a. Disassembly b. Inspection c. Assembly

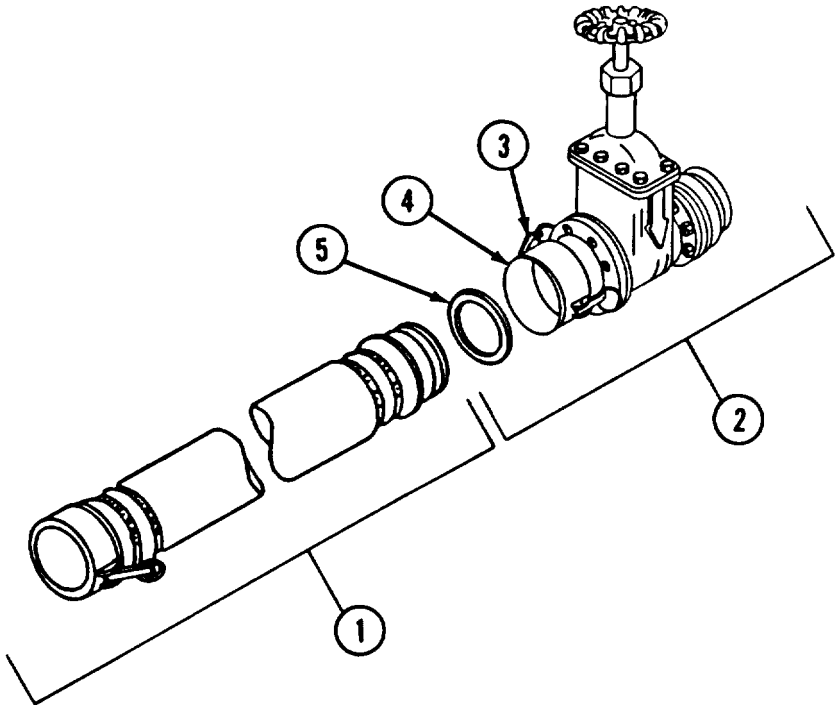


Figure 2-13. Filler and Discharge Valve Assembly

DISASSEMBLY (See figure 2-13.)

1 Disconnect hose assembly (1) from filler and discharge valve assembly (2).

a. Pull cam-lever arms (3) outward on female quick-disconnect coupling (4).

b. Withdraw hose assembly (l).

2 When serviceability is doubtful, remove coupling gasket (5) from inside of quick–disconnect coupling (4) on filler and discharge valve assembly (2).

INSPECTION

Carefully inspect gasket for deterioration, distortion, cracks, or breaks.

ASSEMBLY (See figure 2-13)

1. Install coupling gasket (5), if damaged, on inside of female quick-disconnect coupling (4).

2. Connect hose assembly (1) to filler and discharge valve assembly (2).

   a. Install hose assembly (1) on filler and discharge valve assembly (2).

   b. Push in cam-lever arms (3) on female quick-disconnect coupling (4).

2-14 MAINTENANCE OF FILLER AND DISCHARGE HOSE ASSEMBLY.

This task covers: a. Removal b. Repair* c. Installation

*Repair is limited to quick-disconnect gasket replacement which is included in removal and installation steps.

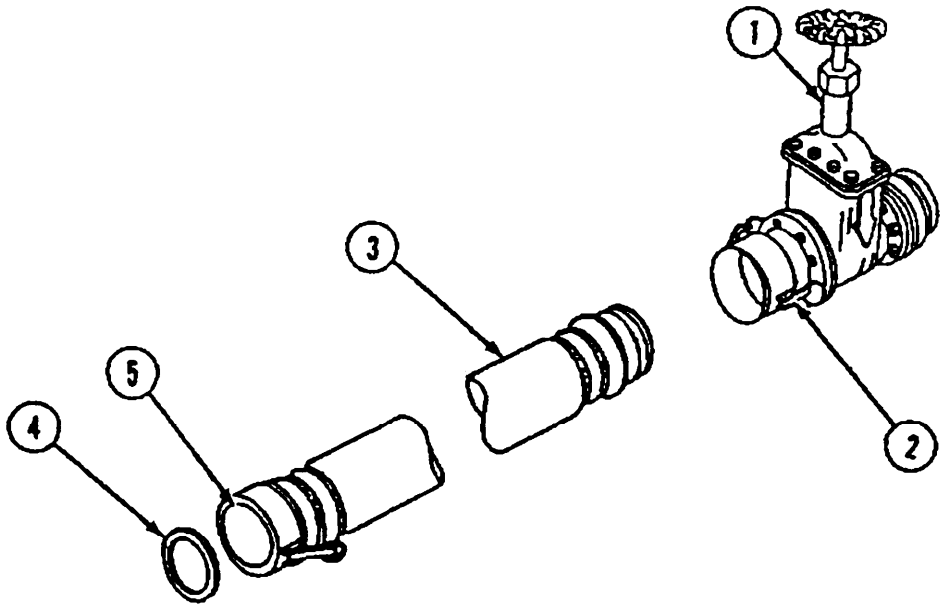


Figure 2-14. Filler and Discharge Hose Assembly

NOTE

The filler and discharge hose is fitted with a female quick-disconnect coupling on one end and a quick-disconnect male adapter on the other end.

REMOVAL (See figure 2-14)

1. Be sure gate, butterfly, or ball valve (1) is closed.

2. Release cam-lever arms (2) from locked position on filler and discharge hose (3) end.

3. Remove filler and discharge hose (3).

4. Remove hose coupling gasket (4) if damaged.

INSTALLATION (See figure 2-14.)

1. Install new hose coupling gasket (4) in female quick-disconnect coupling (5) on filler and discharge hose (3).

2. Connect filler and discharge hose (3) to gate or butterfly valve (1) assembly.

3. Push in cam-lever arms (2) to locked position on gate or butterfly valve (1) assembly.

2-15. MAINTENANCE OR DRAIN HOSE ASSEMBLY.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26, NSN 5180-00-177-7033

Materials/Parts

Sealing compound, item 2, appendix E

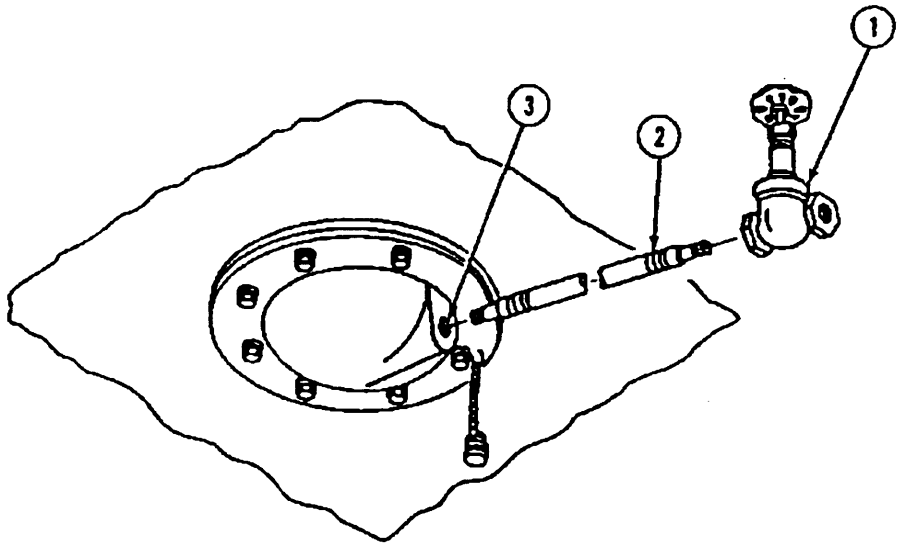


Figure 2-15. Drain Hose Assembly

REMOVAL (See figure 2-15.)

1 Remove gate or ball valve (1) from end of drain hose (2).

2 Remove drain hose (2) from drain hose fitting (3).

3 Clean off pipe joint compound or teflon tape from threads of drain hose fitting (3). -

INSTALLATION (See figure 2-15.)

1 Apply sealing compound to threads on each end of drain hose fitting (3).

2 Install drain hose (2) on drain hose fitting (3).

3 Install gate or ball valve (1) on drain hose (2).

2-16. MAINTENANCE OF VENT AND PIPE ASSEMBLY.

This task covers: a. Disassembly b. Inspection c. Assembly

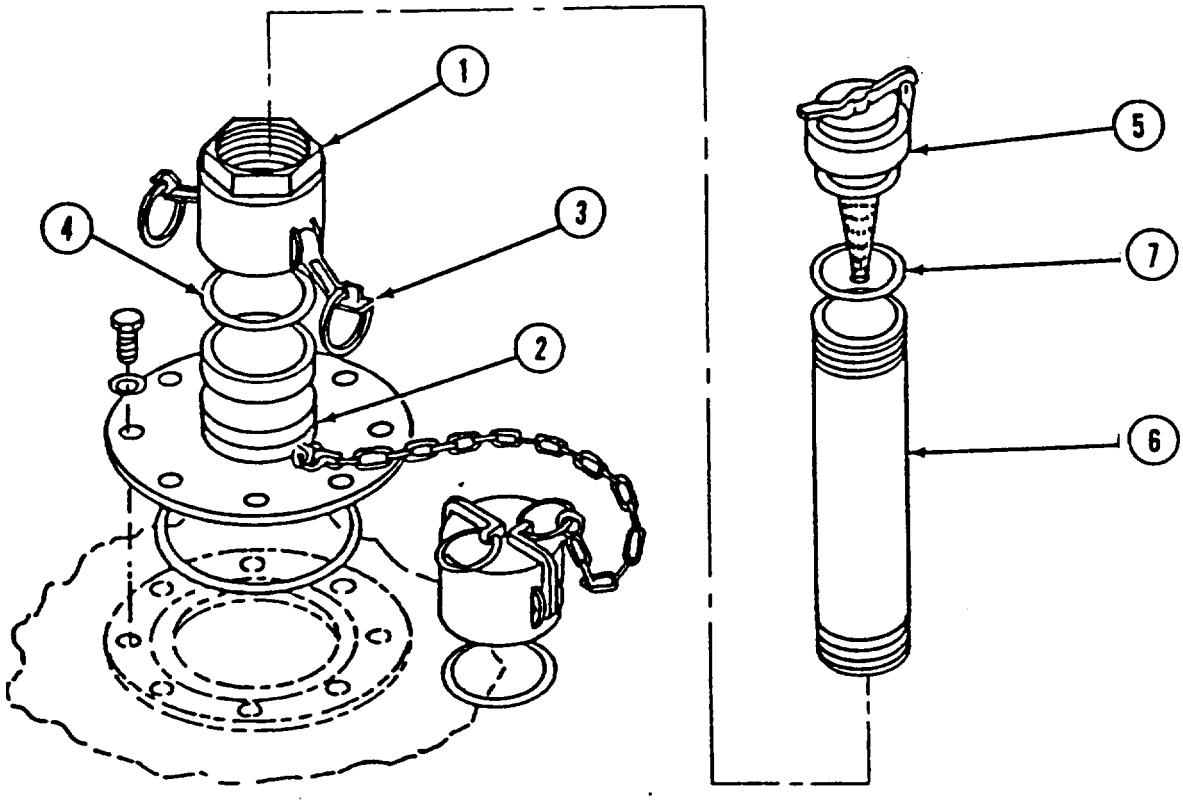


Figure 2-16. Vent and Pipe Assembly

DISASSEMBLY (See figure 2-16.)

1 Disconnect female quick-disconnect coupling (1) from male flanged adapter (2).

   a. Pull outward on cam-lever arms (3).

   b. Lift female quick-disconnect coupling (1) from male flanged adapter (2).

2 Remove gasket (4).

3 Disconnect relief cap (5) from vent pipe (6). Rotate relief cap to the left until threads disengage.

4 Remove relief cap gasket (7) from inside the relief cap (5).

INSPECTION

Carefully inspect gasket for deterioration, distortion, cracks, or breaks. Replace when service is doubtful.

ASSEMBLY (See figure 2-16.)

1 Seat relief cap gasket (7) inside relief cap (5).

2 Install relief cap (5) on vent pipe (6). Rotate relief cap to the right until the two pieces are joined tightly together.

3 Seat gasket (4) in female quick-disconnect coupling (1).

4 With cam-lever arms (3) in outward position, install quick-disconnect coupling (1) on male flanged adapter (2). Pull cam-lever arms inward until they lock in place.

2-17. MAINTMANCE OF FILLER/DISCHARGE ASSEMBLY.

This task covers: a. Disassembly b. Assembly

NOTE

Repair of the filler/discharge assembly includes replacement of the coupling half gaskets in the dust cap assembly and in the quick-disconnect elbow.

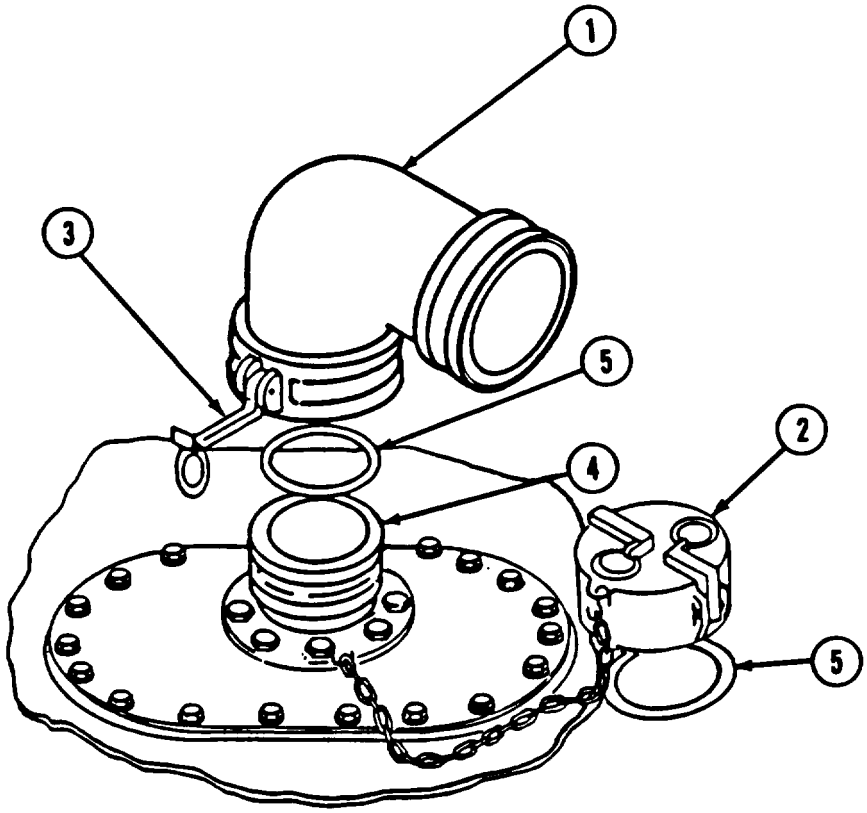


Figure 2-17. Filler/Discharge Assembly

DISASSEMBLY (See figure 2-17.)

1 Remove 4 in. elbow (1) or dust cap (2) by pulling outward on cam-lever arms (3). Lift elbow or dust cap from flanged adapter (4).

2 Remove gasket (5) from inside elbow (1) or dust cap (2).

ASSEMBLY (See figure 2-17.)

1 Place new gasket (5) in dust cap (2) or elbow (1).

2 Place elbow (1) or dust cap (2) on flanged adapter (4). Pull inward on cam-lever arms (3) to lock items together.

2-18. MAINTENANCE OF TANK.

This task covers: a. Emergency repair with wood plugs
b. Emergency repair with sealing clamps

INITIAL SETUP

Tools

General Mechanic's Tool Kit, SC 5180-90-CL-N26

EMERGENCY REPAIR WITH WOOD PLUGS (See figure 2-18.)

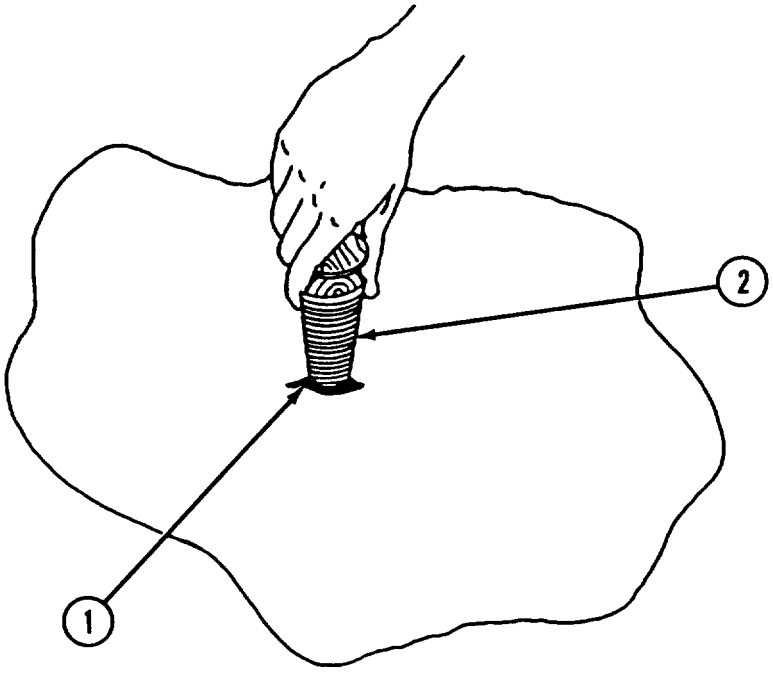


Figure 2-18. Installation of Wood Plug

NOTE

Emergency repair is done only if the tank contains fuel.

1 Select wood plug size needed to seal tank puncture (1).

a. For punctures up to 1/2 inch (1.27 cm), use 3-inch (7.62 cm) long wood plug (2).

b. For punctures up to 1-1/2 inches (3.81 cm), use 5-inch (12.7 cm) long wood plug.

2 Insert wood plug (2) in tear and twist to right until fit becomes snug.

3 Check wood plug (2) regularly for leaks. Tighten wood plug to reduce leaks. If leak continues, also use small sealing clamp.

EMERGENCY REPAIR WITH SEALING CLAMPS (See figure 2-19.)

CAUTION

Do not overtighten the wingnut. Hand-tighten it only until the fuel leak stops. The clamp gasket can be damaged if over–tightened.

NOTE

Emergency repair is done only if the tank contains fuel.

1 Repair small slits, tears, or cuts no more than 6-1/2 in. (16.51 cm) in length with sealing clamps.

2 Use the following criteria to select appropriate size sealing clamp:

a. For tears up to 2 in. (5.08 cm) in length, install 3 in. (7.62 cm) sealing clamp.

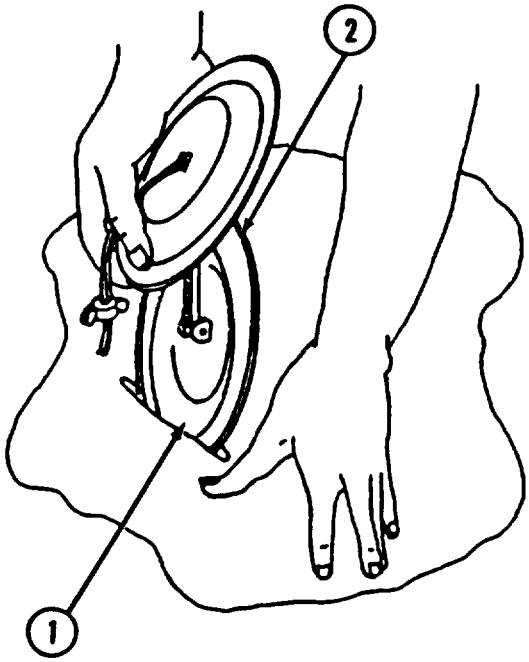
b. For tears 2 to 4 in. (5.08 to 10.16 cm) in length, install 5 in. (12.7 cm) sealing clamp. c. For tears 4 to 6-1/2 in. (10.16 to 16.51 cm) in length, install 7-1/2 in. (19.05 cm) sealing clamp.

c. For tears 4 to 6-1/2 in. (10.16 to 16.51 cm) in length, install 7-1/2 in. (19.05 cm) sealing clamp.

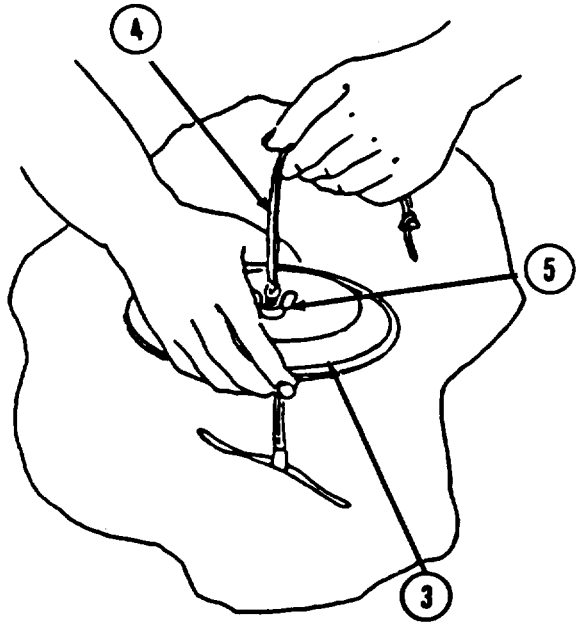
WARNING

Be careful when installing a sealing clamp in the tank. Fuel will pour out when a larger slit is made. Leaking fuel can cause personal injury and loss of Government property.

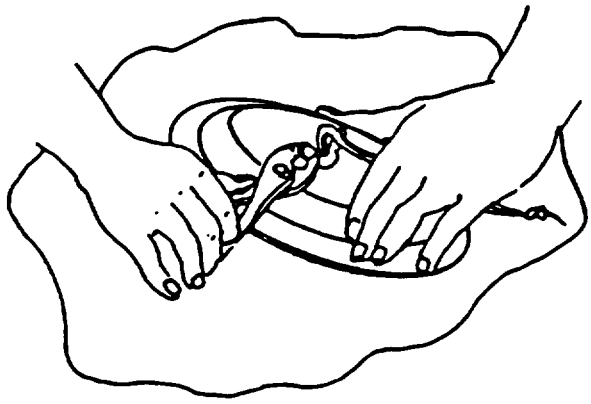
3 If necessary, increase size of tears slightly with pocketknife to insert bottom plate of sealing clamp.



VIEW A



VIEW B



VIEW C

Views A, B, and C

Figure 2-19. Installation of Sealing Clamps

4 Insert bottom plate (1) of sealing clamp through hole or tear; position gasket (2) to side against tank. Rotate plate until it is centered and parallel to tear (View A).

5 Center top plate (3) of sealing clamp on threaded shank and directly over bottom plate (1) (View B).

6 Grasp nylon cord (4) firmly while tightening wingnut (5).

7 Tighten wingnut to secure tank wall between two plates (View C).

a. Tighten wingnut enough to stop leak.

b. If pliers are used, do not over-tighten.

8 Remove nylon cord (4).

CHAPTER 3

UNIT MAINTENANCE

Section I. LUBRICATION INSTRUCTIONS

3-1. LUBRICATION INSTRUCTIONS.

Lubricate all cam-lever arms and lobes semiannually with two drops of lubrication oil. These instructions are mandatory.

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

3-2. COMMON TOOLS AND EQUIPMENT.

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), applicable to your unit.

3-3. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For special tools required for use with the tank, refer to appendix B, maintenance allocation chart. No TMDE or support equipment is required for the tank.

3-4. REPAIR PARTS.

Repair parts are listed and illustrated in TM 5-5430-219-23p.

Section III. SERVICE UPON RECEIPT

3-5.GENERAL.

When a new or used tank is received by an organization, it must be unpacked, inspected, and serviced.

3-6. INSPECTING AND SERVICING TANK.

a. Unpack and assemble tank for use (para 2-5).

b. Inspect tank walls for any punctures or tears.

c. Inspect fittings and components for evidence of damage or missing bolts or gaskets.

e. Inspect emergency repair items (sealing clamps, plugs, gaskets, and preformed packing) that are packaged separately. Place items in secure storage area until needed.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PKS)

3-7. GENERAL.

The tank must be inspected regularly to find and correct defects.

3-7.1 Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) operation PMCS.

3-7.2 While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) operation PMCS.

3-7.3 After You Operate. Be sure to perform your after (A) operation PMCS.

3-7.4 If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report an deficiencies using the proper forms. Refer to DA Pam 738-750.

3-8. PMCS PROCEDURES.

3-8.1 Your Preventive Maintenance Checks and Services table lists the inspections and care of your equipment required to keep it in good operating condition.

3-8.2 Use the “Item No." column of the PMCS table to supply the item number used in the “TM Number” column of DA Form 2404.

3-8.3 The interval column of your PMCS table tells you when to do a certain check or service.

3–8.4 Leakage definitions for unit PMCS shall be classified as follows:

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

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

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

CAUTION

When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS. Report Class III leaks to your supervisor or intermediate direct support maintenance. Failure to heed this caution can damage the equipment.

NOTE

Equipment operation is available with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the itern/system being checked/inspected. When in doubt, notify your supervisor.

3-8.5 The procedure column of your PMCS table tells you how to do the required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, have intermediate direct support maintenance do the work.

3-8.6 If your equipment does not perform as required, refer to Section V, Troubleshooting, for possible problems. Report all malfunctions or failures on DA Form 2404, or refer to DA Pam 738-750.

Table 3-1. Unit Preventive Maintenance Checks and Services

B - Before D - During A - After S - Semiannually

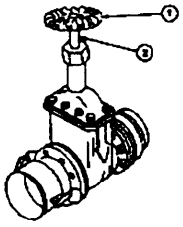
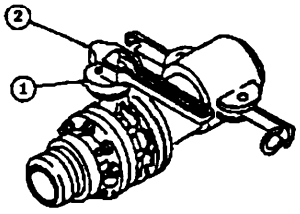
Item No.	Interval				Item To Be I Inspected	Procedures
	B	D	A	S		
1	●	●	●		TANK	Inspect for tears, punctures, or leaks. (Exclude damp spots and weeping/wicking where tank seams are not involved and droplets do not form and run down side of tank.)
2	●	●	●		GATE VALVE 	Check for bent or binding stem (1), broken handwheel (2), and leakage.
2.1	●	●	●		BUTTERFLY VALVE Models #BA91-141 and #BA91-140 	Check for bent or binding stem (1) broken handle (2) and leakage.

Table 3-1. Unit Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually

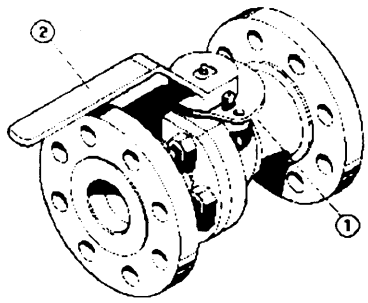
Item No.	Interval				Item To Be I Inspected	Procedures
	B	D	A	S		
2.2	●	●	●		BALL VALVE Models # BA91-141A and BA91-140A 	Check for bent or binding stem (1), broken handle (2), and leakage.

Table 3-1. Unit Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually

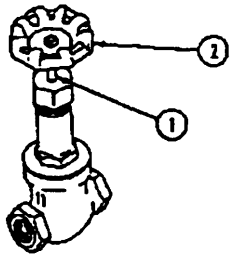
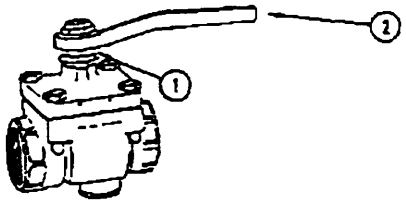
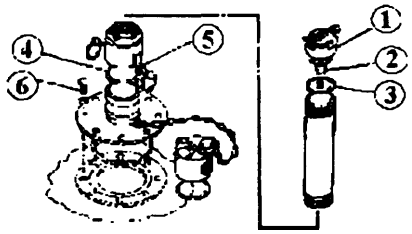
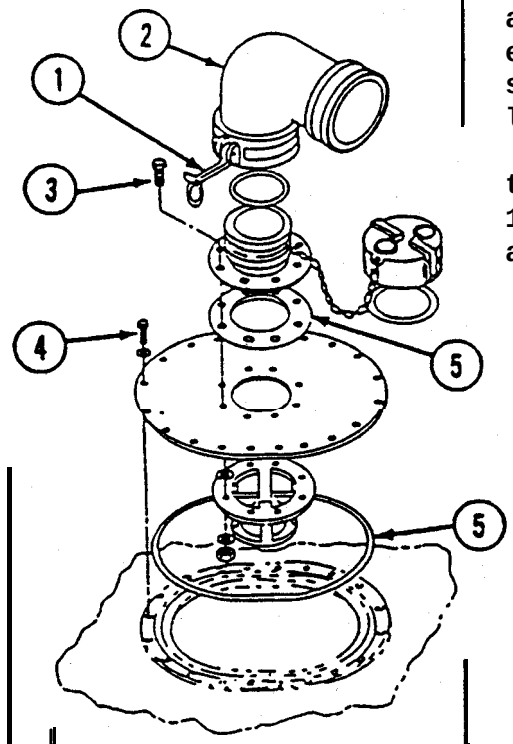
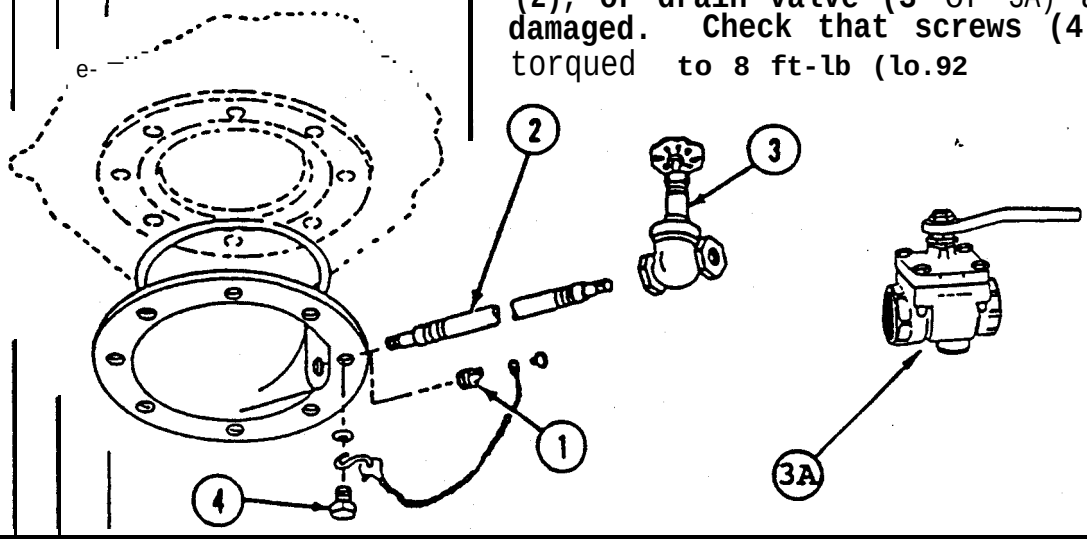
Item No.	Interval				Item To Be I Inspected	Procedures
	B	D	A	S		
3	●	●	●		DRAIN GATE VALVE 	Check for bent or binding stem (1), broken handwheel (2), and leakage.
3.1	●	●	●		DRAIN BALL VALVE Models #BA91-141 and #BA91-140 	Check for bent or binding stem (1), broken handle (2), and leakage.
4	●	●	●		VENT AND PIPE ASSEMBLY 	Check for evidence of leakage, damage, or missing parts. Check relief cap (1) for cleanliness and freedom, of operation. Check if flame arrestor (2), relief cap gasket (3), flat rubber gasket (4), or cam-lever arms (5) are damaged or missing. Check that screws (6) are torqued to 30 in-lb (3.41 N.m).

Table 3-l. Unit 'Preventive Maintenance Checks and Services (Cont)

B - Before D - During A - After S - Semiannually,

Item No.	Interval B	D	A	S	Item To Be Inspecte	Procedures
5	•	•	•		FILLER/DISCHARGE ASSEMBLY	**Check for evidence of damage or leakage. Check if cam-lever arms (1) are damaged or missing. Check if elbow body (2) is cracked, or sealing surface is badly dented. Check for loose, damaged, or missing screws (3 and $) and gaskets (5 and 6). Check that screws (3) are torqued to 10 ft-lb (13 .65 N.m) and screws (4) are torqued to 8 ft-lb (10.92 N.m).**
6	•	•		•	DRAINFITTING ASSEMBLY	**Check nearby area** for evidence of leakage or damaged or missing parts. **Check if drain plug (1) drain hose (2), or drain valve (3** or 3A) are **damaged. Check that screws (4) are** torqued **to 8 ft-lb (lo.92**





Section V. TROUBLESHOOTING

3-9. TROUBLESHOOTING.

Table 3-2 Troubleshooting, lists common malfunctions which may be found during normal operation or during an inspection, check procedure, or scheduled testing. Perform the test/inspections and corrective actions in the order listed. This manual cannot list all malfunctions that may occur or list all tests/inspections and corrective actions. If a malfunction occurs that is not listed or covered in corrective action, notify your supervisor.

Table 3-2. Troubleshooting

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
1. FILLER AND DISCHARGE VALVE ASSEMBLY FEMALE COUPLING LEAKS.	

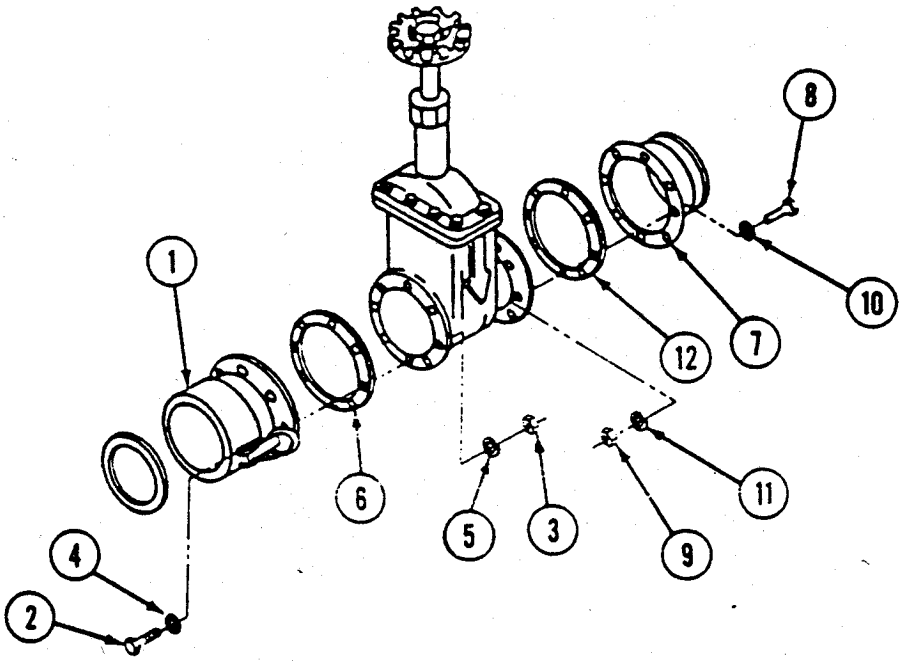


Figure 3-1. Filler and Discharge Valve Assembly

Step 1. Check female coupling (1) for missing or loose hex-head capscrews (2), hex nuts (3), washers (4), and lockwashers (5).

Replace missing screws, washers, and nuts. Torque screws and nuts to 10 ft-lb (13.65 N.m).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
1. FILLER AND DISCHARGE VALVE ASSEMBLY FEMALE COUPLING LEAKS (CONT)	
Step 2. Check flange gasket (6) for damage or breaks.	Remove female coupling (1) and replace flange gasket (6) (para 3-10). Reinstall female coupling.
2. FILLER AND DISCHARGE VALVE ASSEMBLY MALE FLANGED ADAPTER LEAKS.	
Step 1. Check male flanged adapter (7) for missing or loose hex-head capscrews (8), hex nuts (9), washers (10), and lockwashers (11). Torque screws and nuts to 10 ft-lb (13.65 N.m).	Replace missing screws, washers, and nuts. Torque screws And nuts to 8 ft-lb (10.92 N.m).
Step 2. Check flange gasket (12) for damage or breaks.	Remove flanged adapter (7) and replace flange gasket (12) (para 3-10). Reinstall flanged adapter.

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

3. FILLER AND DISCHARGE GATE VALVE LEAKS.

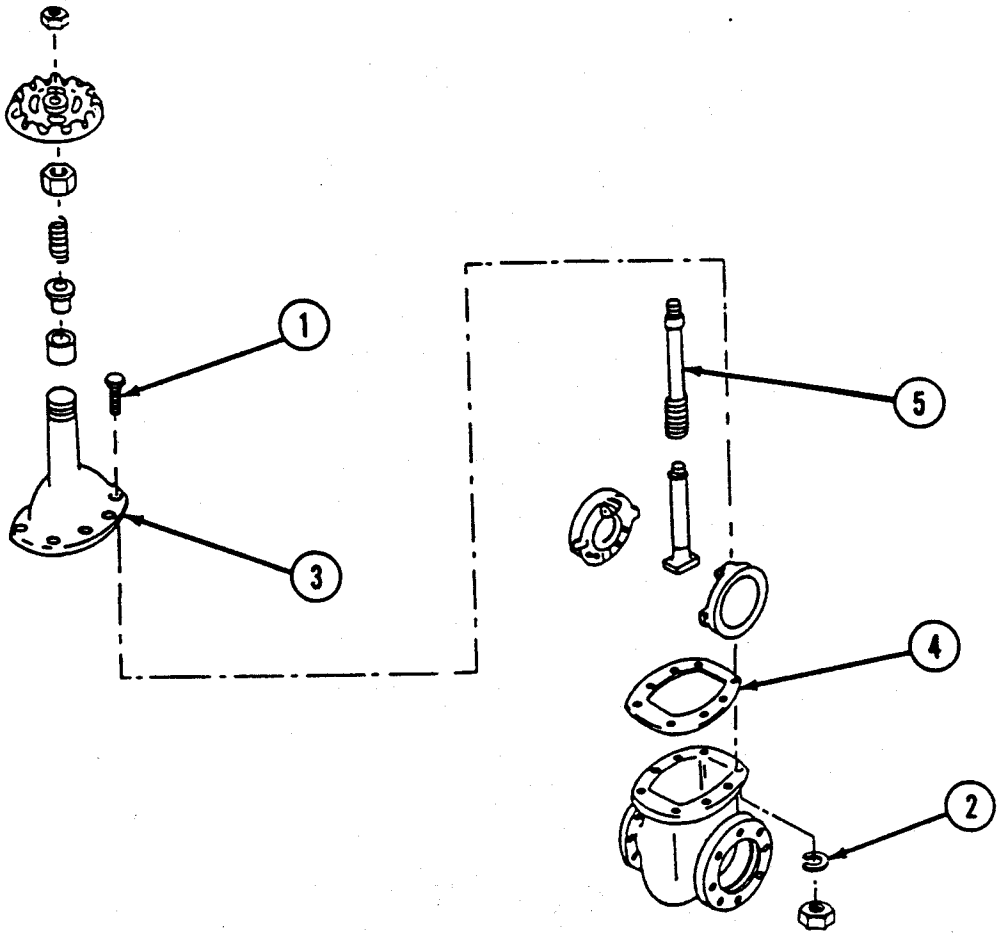


Figure 3-2. Gate Valve .

Step 1. Check for loose or missing capscrews (1) and lockwashers (2) on bonnet (3).

Replace missing washers and screws; torque screws to 8 ft-lb (10.92 N.m) (para 3-11).

Step 2. Check for damaged or distorted bonnet gasket (4).

Replace bonnet gasket (para 3-11).

Step 3. Check for bent or distorted valve stem (5).

Replace valve stem (para 3-11).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
3.1 FILLER AND DISCHARGE BUTTERFLY VALVE LEAKS	

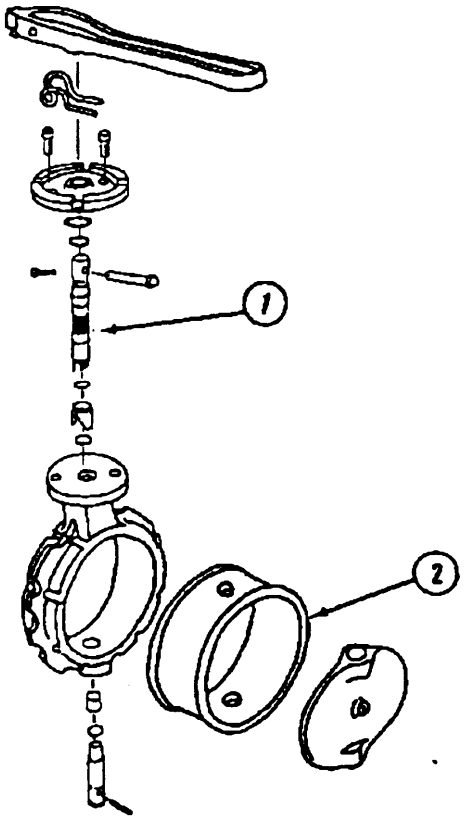


Figure 3-2.1 Butterfly Valve

Step 1. Check for bent or binding stem (1).

Replace stem (para. 3-11.1).

Step 2. Check for damaged sleeve (2).

Replace damaged sleeve (para. 3-11.1).

Table 3-2. Troubleshooting (Cont)

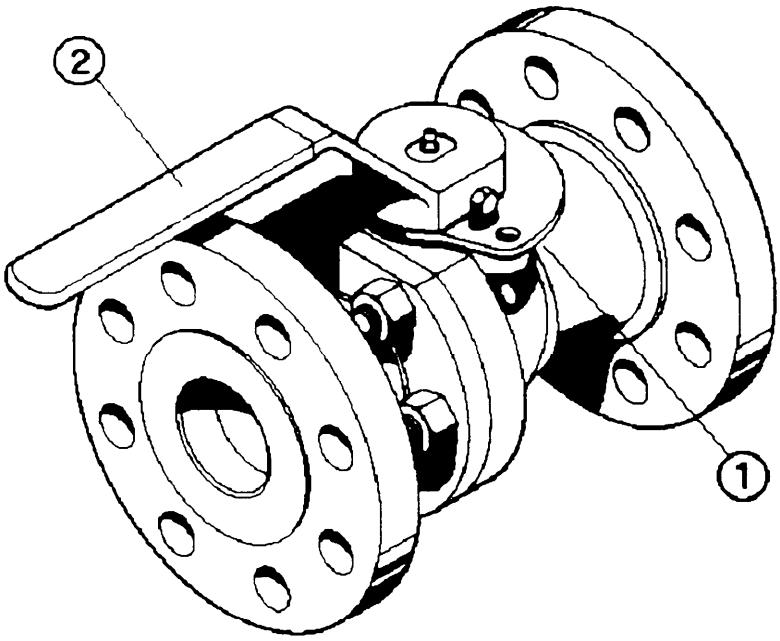
MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
3.2 Filler and Discharge Ball Valve Leaks	
	 Figure 3-2.2 Ball Valve
Step 1. Replace Defective Valve	

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
4. FILLER AND DISCHARGE HOSE ASSEMBLY COUPLING LEAKS.

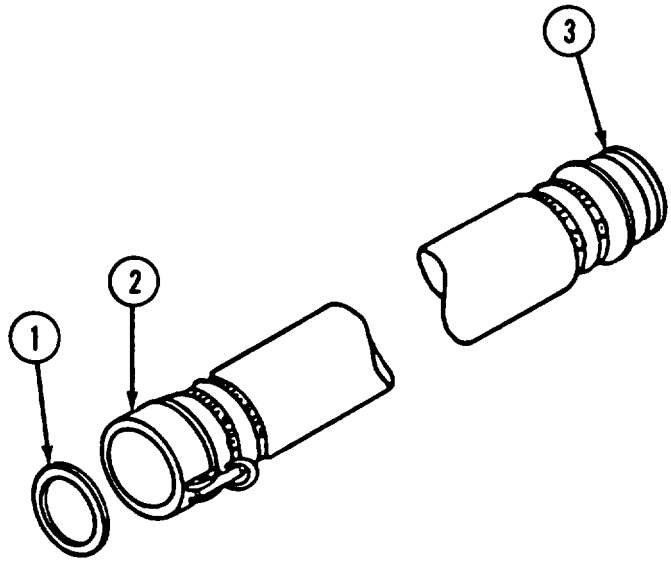


Figure 3-3. Filler and Discharge Hose Assembly

Step 1. Check for tears or breaks in hose.

Replace hose (para 3-14).

Step 2. Check coupling gasket (1) for damage or wear.

Replace gasket.

Step 3. Check quick-disconnect coupling (2) and adapter (3) attached to hose for dirt, damage, or wear.

Remove dirt or debris inside of couplings. If this fails to correct leakage, replace hose assembly (para 3-14).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
5. DRAIN GATE VALVE LEAKS.

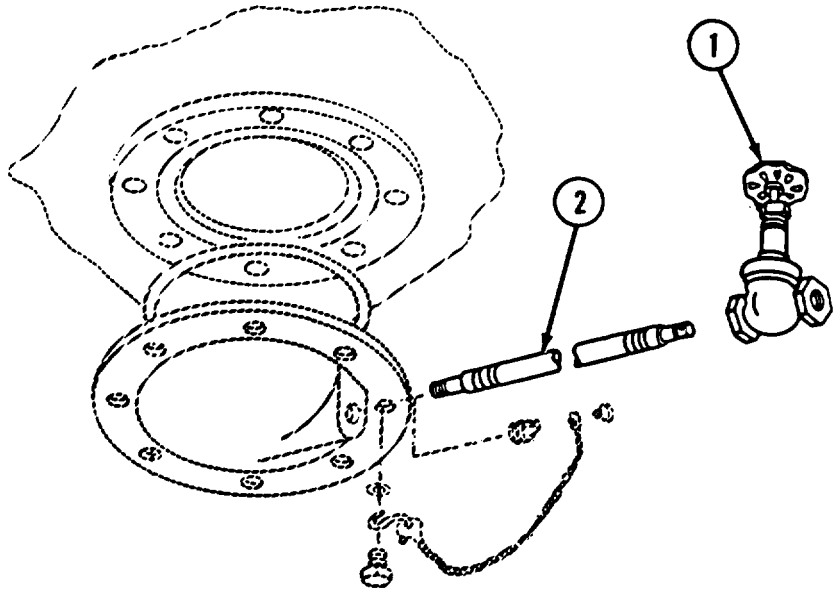


Figure 3-4. Drain Gate Valve

Step 1. Check to ensure that drain gate valve (1) on drain hose (2) is closed completely.

Close drain gate valve.

Step 2. If closing drain gate valve (1) does not stop leakage, check for damage or wear.

Replace drain gate valve (para 3-13).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
5.1	**DRAIN BALL VALVE LEAKS**

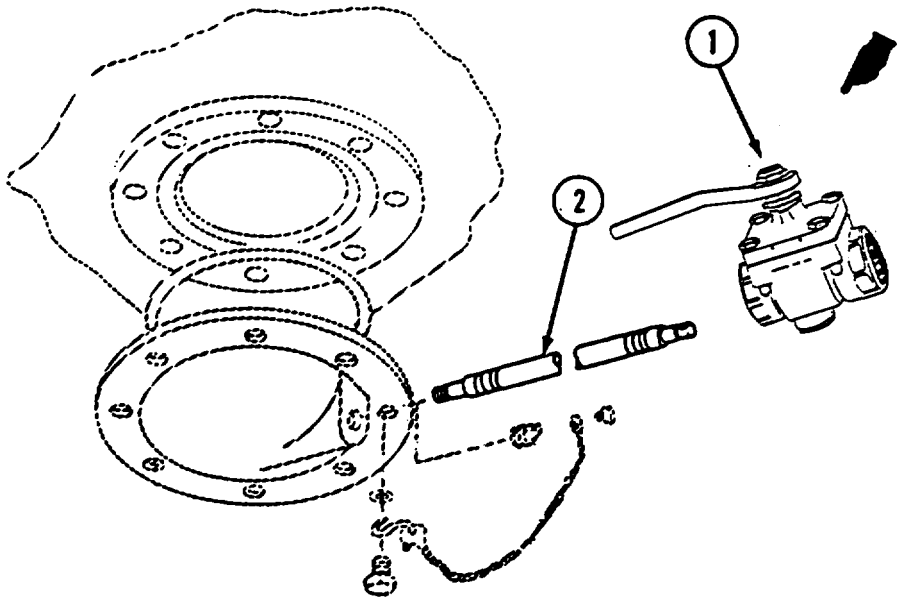


Figure 34.1 Drain Ball Valve

Step 1. Check to ensure that drain ball valve (1) on drain hose (2) is closed completely.

Close drain ball valve.

Step 2. If closing drain ball valve (1) does not stop leakage, check for damage or wear

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
6. DRAIN HOSE ASSEMBLY LEAKS. (See figure 3-4.)
Check for leaks or breaks in drain hose (2).
Replace drain hose (para 3-14).
7.RELIEF CAP REMAIN OPEN

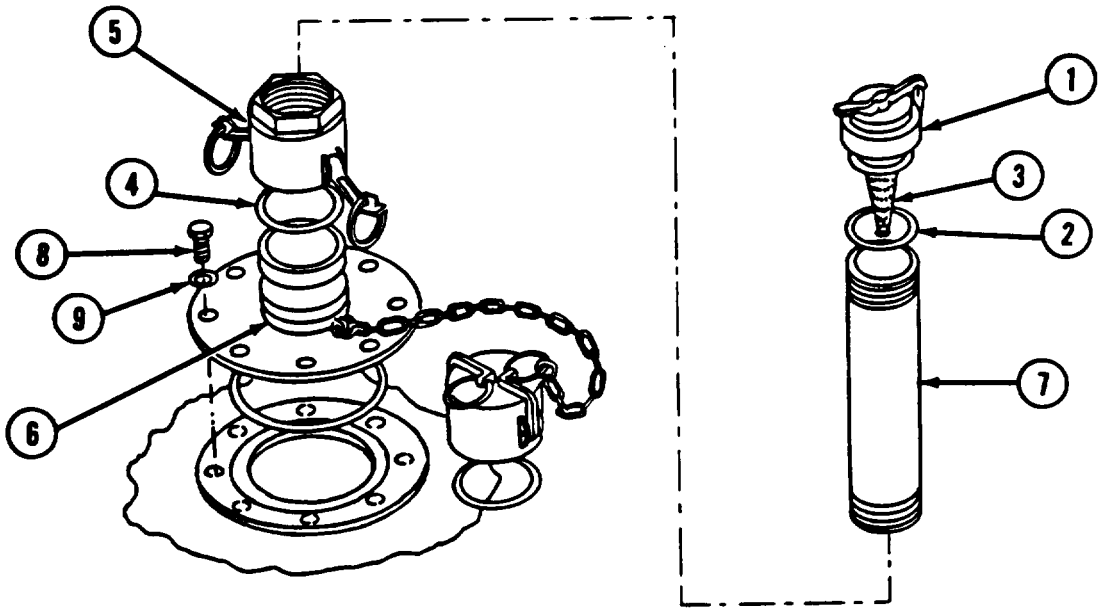


Figure 3-5. Vent and Pipe Assembly

Check relief cap (1) for broken or bent pivot pin.

Replace relief cap (para 3-15).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTION ACTION	
8. VENT PIPE ASSEMBLY LEAKS.	
Step1. Check relief cap gasket (2) for distortion or wear.	
Remove flame arrestor (3) and replace gasket (2) (para 3-16).	
Step 2. Check gasket (4) between quick-disconnect coupling (5) and flanged adapter (6).	
Replace gasket (para 3-16).	
Step 3. Check vent pipe (7) for cracks or damage.	
Replace cracked or broken vent pipe (para 3-17).	
Step 4. Check for cracked or broken flanged adapter (6).	
Replace cracked or broken flanged adapter (para 3–17).	
Step 5. Check for loose or missing capscrews (8) and washers (9).	
Replace missing screws and washers. Torque to 30 in-lb (3.41 NŽm).	

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
9. FILLER.DISCHARGE ASSEMBLY LEAKS BETWEEN CLOSURE PLATE AND TANK FITTING.

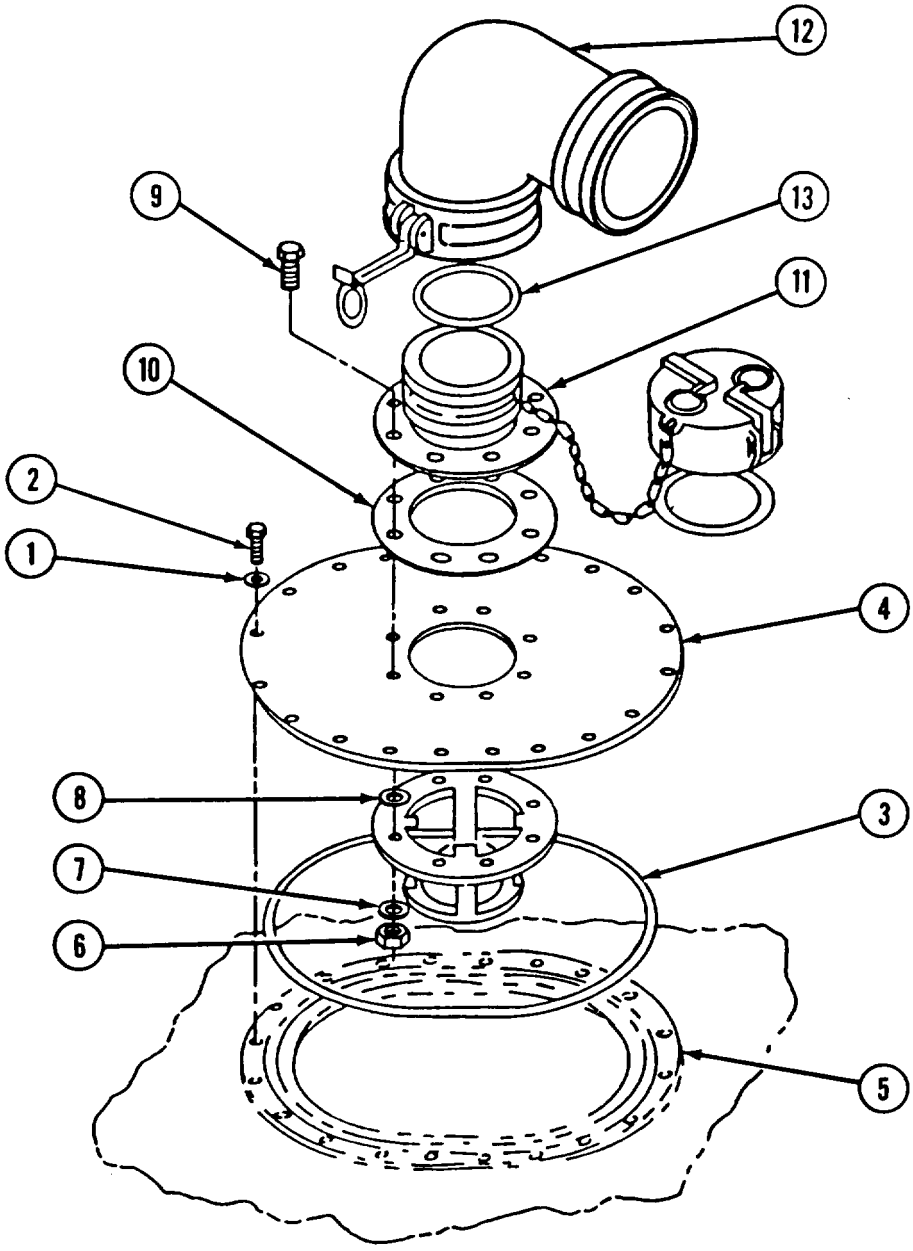


Figure 3-6. Filler/Discharge Assembly

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
9. FILLER/DISCHARGE ASSEMBLY LEAKS BETWEEN CLOSURE PLATE AND TANK FITTING (CONT)	
Step 1. Check for missing or loose washers (1) and hex-head capscrews (2).	Replace missing screws and washers, Torque screws to 30 in-lb (3.41 N•m).
Step 2. Check preformed packing (3) between closure plate (4) and tank fitting (5) for nicks, breaks, and compression.	Replace preformed packing (para 3-17).
10. FILLER/DISCHARGB ASSEMBLY LEAKS BETWEEN CLOSURE PLATE AND FLANGED ADAPTER.	
Step 1. Check for missing or loose nuts (6), lockwashers (7), thread seal washers (8), and hex-head capscrews (9).	Replace missing screws (9), washers (7 and 8), and nuts (6). Torque screws to 30 ft-lb (40.95 N•m).
Step 2. Check flange gasket (10) for damage or breaks.	Remove flanged adapter (11) from closure plate (4) and replace damaged flange gasket (para 3–17).
11. FILLER/DISCHARGB ASSEMBLY LEAKS BETWEEN FLANGED ADAPTER AND QUICK-DISCONNECT COUPLING.	
Remove quick-disconnect coupling (12) from flanged adapter (11) and check elbow gasket (13) for damage or breaks.	Replace gasket as required (para 3-17).
12. FILLER/DISCHARGB ASSEMBLY LEAKS THROUGH HARDWARE OR WILL NOT ASSEMBLE.	
Check all filler/discharge hardware for cracks, damage, and wear.	Replace required hardware.

Table 3-2. Troubleshooting (Cont)

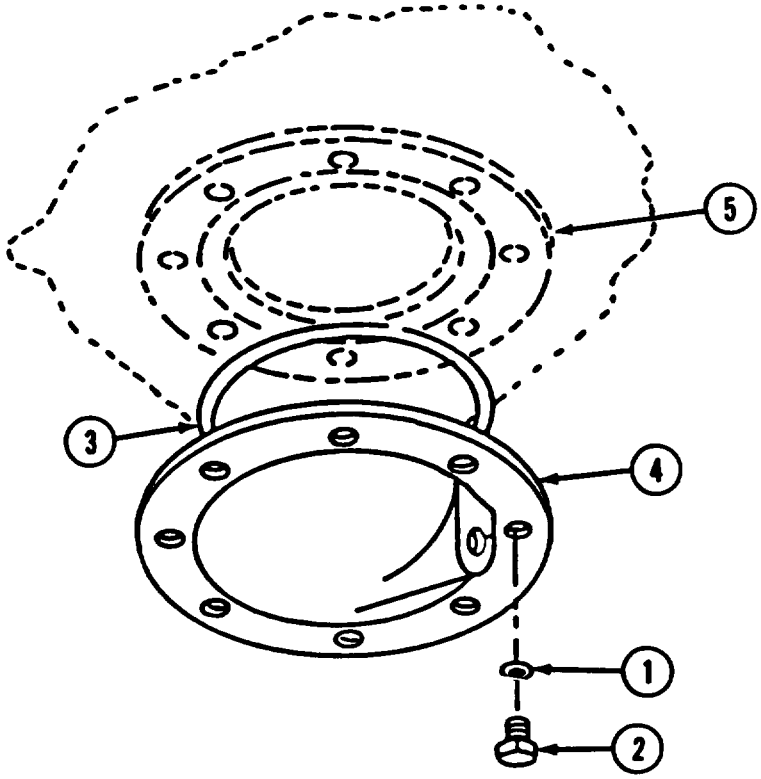
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
13. DRAIN FITTING ASSEMBLY LEAKS BETWEEN DRAIN FITTING AND TANK FITTING.
 Figure 3-7. Drain Fitting Assembly
Step 1. Check for missing or loose washers (1) and hex-head capscrews (2). Replace missing screws and washers. Torque screws to 30 in-lb (3.41 N•m).
Step 2. Check preformed packing (3) between drain cover plate (4) and tank fitting (5) for nicks, breaks, and compression. Replace preformed packing (para 3-18).
14. DRAIN FITTING LEAKS THROUGH METAL.
Check drain cover plate (4) for damage or cracks. Replace drain cover plate (para 3-18).

Table 3-2. Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
15. TANK LEAKS.
Inspect tank for punctures or tears.
Repair punctures or tears (para 2-16).

Section VI. MAINTENANCE PROCEDURES

3-10. MAINTENANCE OF FILLER AND DISCHARGE VALVE ASSEMBLY.

This task covers: a. Removal d. Assembly
b. Disassembly e. Installation
c. Service

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26
Torque wrench (ft-lb), item 3, appendix B

Materials/Parts

Cleaning solvent, item 1, appendix E
Sealing compound, item 2, appendix E
Detergent, item 4, appendix E
Rags, item 6, appendix E

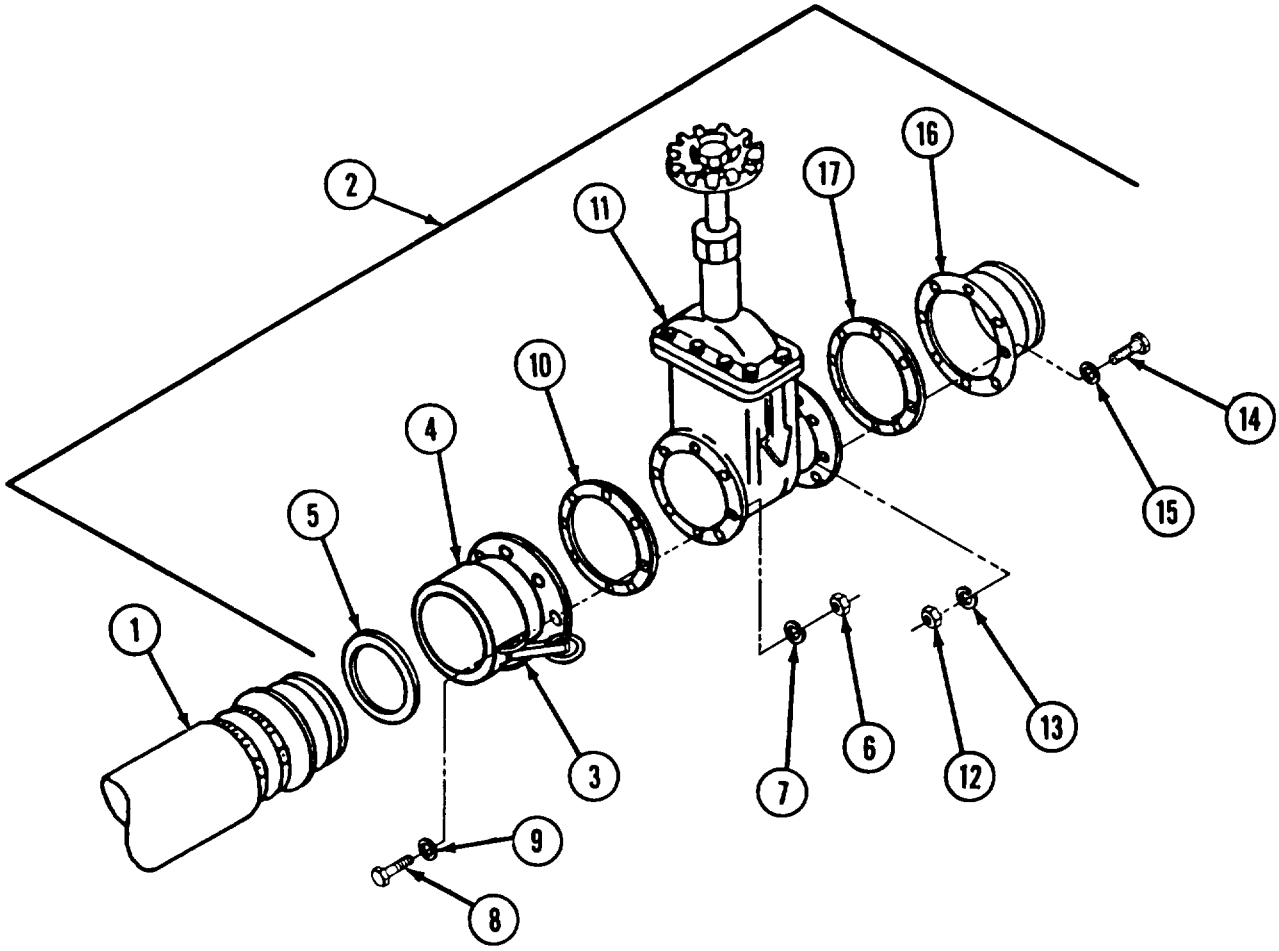


Figure 3-8 Filler and Discharge Valve Assembly

REMOVAL (See figure 3-8.)

Disconnect hose assembly (1) from gate valve assembly (2).

a. Pull cam-lever arms (3) outward on female quick-disconnect coupling (4).

b. Withdraw hose assembly (1).

DISASSEMBLY (See figure 3-8.)

1 Remove coupling gasket (5) from inside of quick-disconnect coupling (4) on gate valve assembly (2).

2 Remove hex nuts (6), lockwashers (7), hex-head capscrews (8), and washers (9).

3 Remove female quick-disconnect coupling (4) and flange gasket (10) from face of gate valve (11).

4 Remove plain hex nuts (12), lockwashers (13), hex-head capscrews (14), and washers (15) from opposite end of gate valve (11).

5 Remove male flanged adapter (16) and flange gasket (17).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes, Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°c).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Clean all gasket sealing surfaces thoroughly with detergent and hot water.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Carefully inspect gaskets for deterioration, distortion, cracks, or breaks. Replace when serviceability is doubtful.

ASSEMBLY (See figure 3-8.)

1 Place flange gasket (17) on face of gate valve (11) and align holes.

2 Place male flanged adapter (16) against flange gasket (17) and align holes.

3 Install flatwashers (15) and hex-head capscrews (14) on male flanged adapter (16), flange gasket (17), and gate valve (11).

4 Install lockwashers (13) and plain hex nuts (12); torque to 30 ft-lb (40.95 N•m).

5 On opposite end of gate valve (11), place flange gasket (10) against gate valve.

6 Place female quick-disconnect coupling (4) against flange gasket (10); align holes.

7 Install washers (9) and hex-head capscrews (8) on female quick-disconnect coupling (4), flange gasket (10), and face of gate valve (11).

8 Install lockwashers (7) and hex nuts (6) on hex-head capscrews (8); torque to 30 ft-lb (40.95 N•m).

INSTALLATION (See figure 3-8.)

1 Lubricate coupling gasket (5) and ensure that it is installed on inside of female quick-disconnect coupling (4).

2 Connect hose assembly (1) to gate valve assembly (2) and secure in place by pushing in cam-lever arms (3).

3-11. MAINTENANCE OF GATE VALVE.

This task covers: a. Removal
b. Disassembly
c. Service
d. Assembly
e. Installation

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26
Torque wrench (ft-lb), item 3, appendix B

Materials/Parts

Cleaning solvent, item 1, appendix E
Crocus cloth, item 3, appendix E
Detergent, item 4, appendix E
Grease, item 5, appendix E

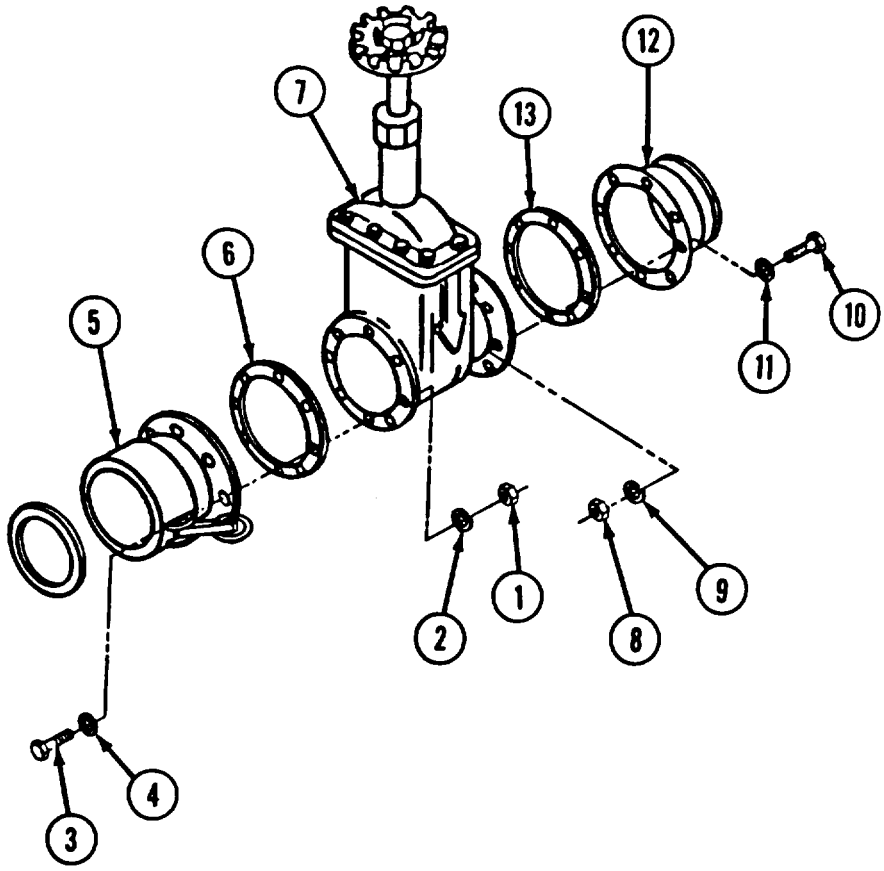


Figure 3-9. Gate Valve

REMOVAL (See figure 3-9.)

1 Remove hex nuts (1), lockwashers (2), washers (4), and hex-head capscrews (3).

2 Remove female quick-disconnect coupling (5) and flange gasket (6) from face of gate valve (7).

3 Remove plain hex nuts (8), lockwashers (9), hex-head capscrews (10), and washers (11), from opposite end of gate valve (7).

4 Remove male flanged adapter (12) and flange gasket (13) from gate valve (7).

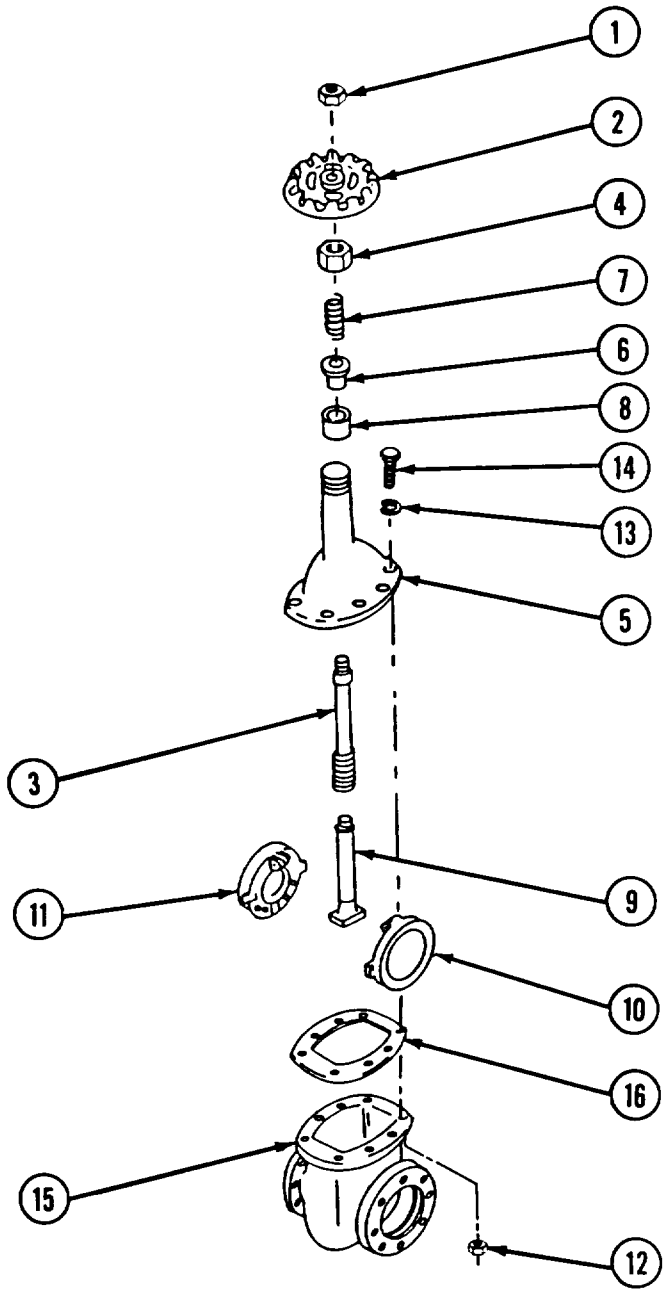


Figure 3-10. Gate Valve

DISASSEMBLY (See figure 3-10.)

1 Remove jam nut (1) from top of handwheel (2).

2 Remove handwheel (2) from top of valve stem (3).

3 Remove packing nut (4) from bonnet (5).

4 Remove packing gland (6) and gland spring (7) from valve stem (3).

NOTE

The packing ring will remain in the bonnet until after the valve stem, the disk riser, and the disk halves have been removed from the bonnet.

5 Remove eight hex nuts (12), lockwashers (13), and hex-head capscrews (14) holding bonnet (5) to valve body (15).

6 Lift bonnet (5), complete with valve stem (3), disk riser (9), and disk halves (10 and 11) from valve body (15).

CAUTION

Take care to keep disk halves together when lifting them. Disk halves must be grasped firmly when removing them from slots in the valve body. Dropping disk halves off disk riser can damage sealing surfaces.

7 Remove bonnet gasket (16).

8 Remove disk riser (9) from valve stem (3). Rotate disk riser to left.

9 Remove valve stem (3) from bottom side of bonnet (5). Rotate valve stem to right.

NOTE

The packing should be removed only when it is to be replaced.

10 Using piece of hardwood, drive packing ring (8) through bottom of bonnet (5).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°c).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Clean all gasket surfaces thoroughly with hot water and detergent.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Carefully inspect gasket for deterioration, distortion, cracks, or breaks. Replace when service is doubtful.

5 Polish bonnet stem with a crocus cloth; then coat with grease.

ASSEMBLY (See figure 3-10.)

1 Thread disk riser (9) into valve stem (3) approximately four complete turns.

2 Secure disk riser (9) completely in bonnet (5).

3 Lay valve body (15) on its side on clean surface.

4 Place bonnet gasket (16) over disk riser (9).

5 Install two disk halves (10 and 11) onto disk riser (9).

6 Insert disk halves (10 and 11) into slot in valve body (15).

7 Bring valve body (15) and bonnet (5) to erect Position.

8 Align screw holes and bonnet gasket (16) holes; install eight hex-head capscrews (14), lockwashers (13), and hex nuts (12) until finger-tight.

9 Insert packing ring (8) on valve stem (3).

10 Install packing nut (4) on valve stem (3); manually push packing nut down on neck of bonnet (5) until packing ring (8) is well seated in bonnet.

11 Remove packing nut (4) from valve stem (3); install gland spring (7) and packing gland (6) on valve stem.

12 Install packing nut (4), handwheel (2), and jam nut (1) on valve stem (3).

13 Install eight hex-head capscrews (14), lockwashers (13), and hex nuts (12) on valve body (15); torque to 16 ft-lb (21.84 N•m).

INSTALLATION (See figure 3-9.)

1 Place flange gasket (13) on face of gate valve (7) and align holes.

2 Place male flanged adapter (12) against flange gasket (13) and align holes.

3 Install washers (11) and hex-head capscrews (10) on male flanged adapter (12), flange gasket (13), and gate valve (7).

4 Install lockwashers (9) and plain hex nut (8); torque to 30 ft-lb (40.95 N•m).

5 On opposite end of gate valve (7), place flange gasket (6) against gate valve.

6 Place female quick-disconnect coupling (5) against flange gasket (6); align holes.

7 Install washers (3) and hex-head capscrews (4) on female quick-disconnect coupling (5), flange gasket (6), and face of gate valve (7).

8 Install lockwashers (2) and hex nuts (1) on hex-head capscrews (4); torque to 30 ft-lb (40.95 N-m).

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLY.

This task covers:
a. Removal
b. Cleaning
c. Inspection
d. Repair
e. Assembly

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26
Torque wrench (ft-lb), item 3, appendix B

Materials/Parts

Cleaning solvent, item 1, appendix E
Crocus cloth, item 3, appendix E
Detergent, item 4, appendix E
Grease, item 5, appendix E

NOTE

Ensure that all parts identified as mandatory replacement parts are discarded and replaced with new components.

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLY cont.

a. Disassemble.

Butterfly valve removal. Refer refer to figure 3-10.1

1 Disconnect ring (1) and remove cap (3) from male coupling (7).

2 Remove gasket (2) from cap (3).

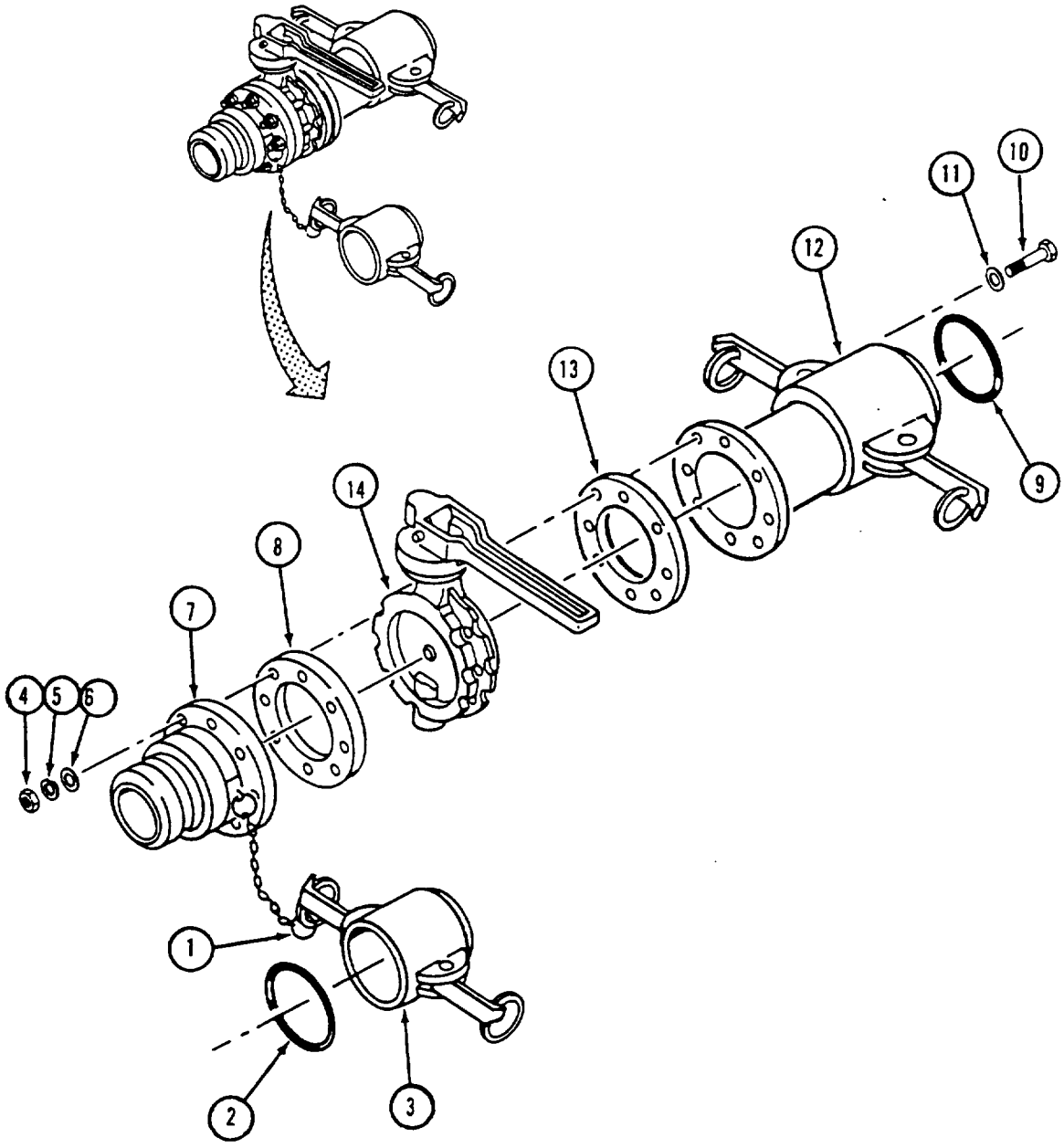


Figure 3-10.1 Butterfly Valve Disassembly

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLY cont.

3 Remove eight nuts (4), lockwashers (5), flat washers (6 and 11) and screws (10).

4 Remove male coupling (7) and gasket (8) from butterfly valve (14).

5 Remove female coupling (12) and gasket (13) from butterfly valve (14).

6 Remove gasket (9) from female coupling (12).

Butterfly valve disassembly. Refer to figure 3-10.2

7 Remove cotter pin (1) and pin (2) from handle (3). Lift handle and attached spring (4) from stem (8).

8 Remove two socket head screws (5) and stop plate (6) from body (8)

9 Remove top seal (7) from bottom of stop plate (6).

10 Pull to extract top stem (8) and attached parts from body (19) .

11 Remove seal (9), o-ring (10), top bearing (12) and o-ring (11) from top stem (8).

12 Using punch, drive out spring (13) from body (19) and bottom stem (14).

13 Pull bottom stem (14) and attached parts from body (19)

14 Remove bottom bearing (15) and o-ring (16) from bottom stem (14).

15 Push disc (17) from body (19).

16 Remove sleeve (18) from body (19).

b. Cleaning.

1 Wash all components with clean water and detergent.

2 Rinse components in clean water and dry with wiping rag.

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLY- cont.

c. Inspection.

1 Inspect male coupling (7, figure 3-10.1) female coupling (12) and cap (3) for cracks and corrosion.

2 Inspect body (19, figure 3-10.2), handle (3), disc (17) and stop plate (6) for cracks and corrosion.

3 Inspect top stem (8) and bottom stem (14) for cracks, deep scratches and corrosion.

d. Repair.

Replace damaged parts and all sealing components.

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLY- cont.

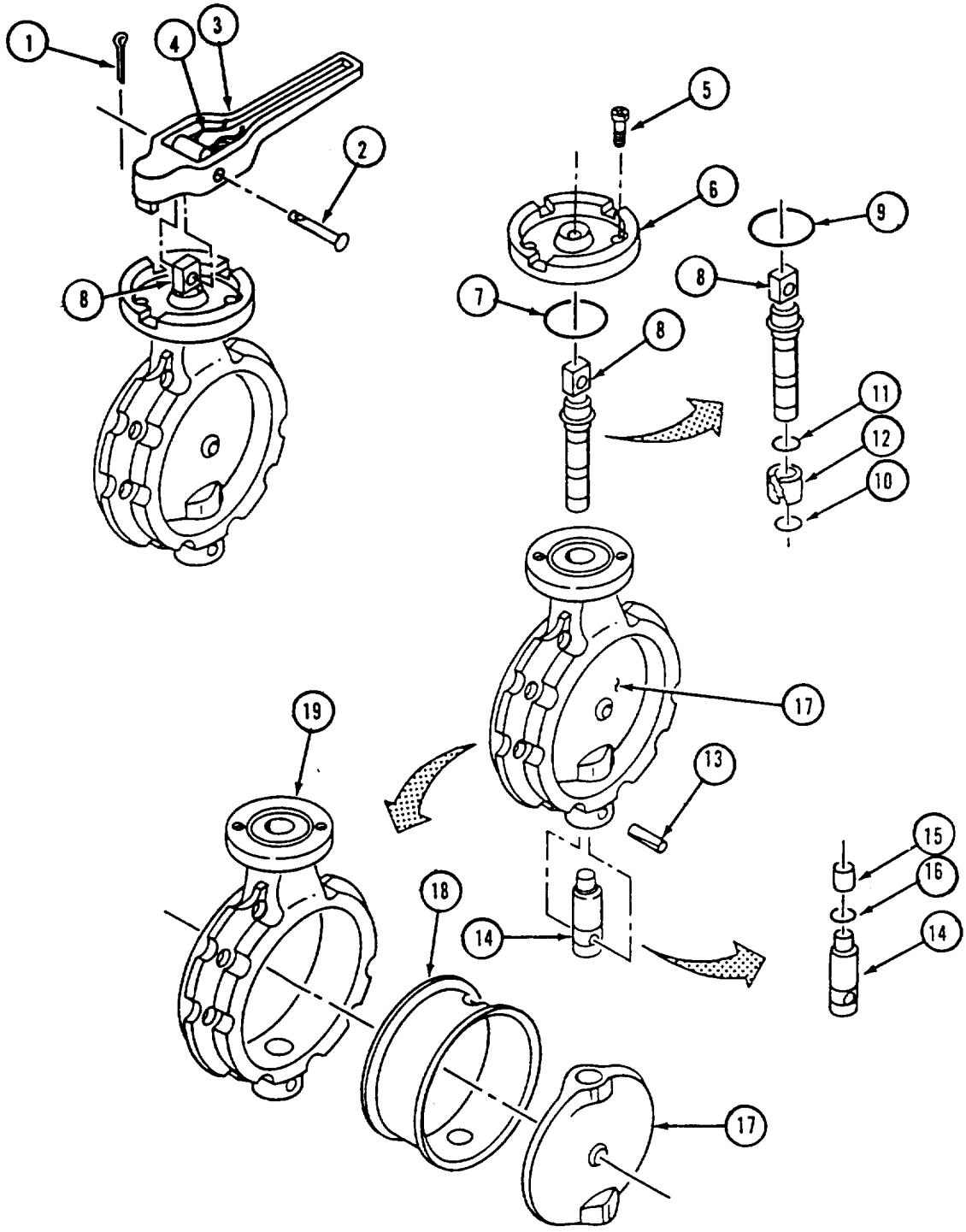


Figure 3-10.2 Butterfly Valve Repair

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLYcont.

e. Assembly.

Butterfly valve assembly. Refer to figure 3-10.2

1 Install sleeve (18) into body (19). Align holes in sleeve with holes in body (19).

NOTE
Bottom hole in disc is round and smooth. Top hole is slotted to fit on end of top stem.

2 Push disc (17) into body (19). Align holes in top of bottom disc with holes in sleeve (18) and body (19).

3 Install o-ring (16) and bottom bearing (15) on bottom stem (14) .

4 Push bottom stem (14) in through bottom of body (19) and into bottom hole in disc (17). Align spring pin hole in stem with spring pin hole in body.

5 Using punch, drive spring pin (13) into body (19) and through bottom stem (14).

6 Install o-ring (11), top bearing (12) and o-ring (10) on bottom of top stem (8).

7 Install seal (9) on top of top stem (8).

8 Align end of top stem (8) with hole in disc (17). Push stem and attached parts through body (19) and into slot in disc (17). Make sure stem is fully seated in disc.

9 Install top seal (7) in bottom of stop plate (6).

10 Position stop plate (6) on body (19) and install two socket head screws (5).

11 Rotate disc (17) to open position.

12 Position handle (3) and attached spring (4) on top stem (8) so that handle is in line with disc (17).

NOTE
Press handle down against spring to align holes with top stem.

13 Install pin (2) through handle (3) and top stem (8). Secure pin with cotter pin (1).

3-11.1 MAINTENANCE OF BUTTERFLY VALVE ASSEMBLY- cont.

Butterfly valve installation. Refer to figure 3-10.1

NOTE

Make sure gasket is fully seated in coupling groove.

14 Install gasket (9) in female coupling (12).

15 Position gasket (13) and female coupling (12) on butterfly valve (14).

16 Position gasket (8) and male coupling (7) on butterfly valve (14).

17 Install eight flat washers (11), screws (10), flat washers (6), lockwashers (5) and nuts (4). Tighten to 30 ft-lb. (40.95 N.m)

18 Install gasket (2) in cap (3).

19 Install cap (3) onto coupling (7) .

3-11.2. MAINTENANCE OF BALL VALVE ASSEMBLY

Item is not repairable, replace if defective. See para 3-10 and Figure 3-8.

3-12. MAINTENANCE OF FILLER AND DISCHARGE HOSE ASSEMBLY.

This task covers: a. Removal b. Service c. Installation

INITIAL SETUP

Materials/Parts

Detergent, item 4, appendix E
Rags, item 6, appendix E

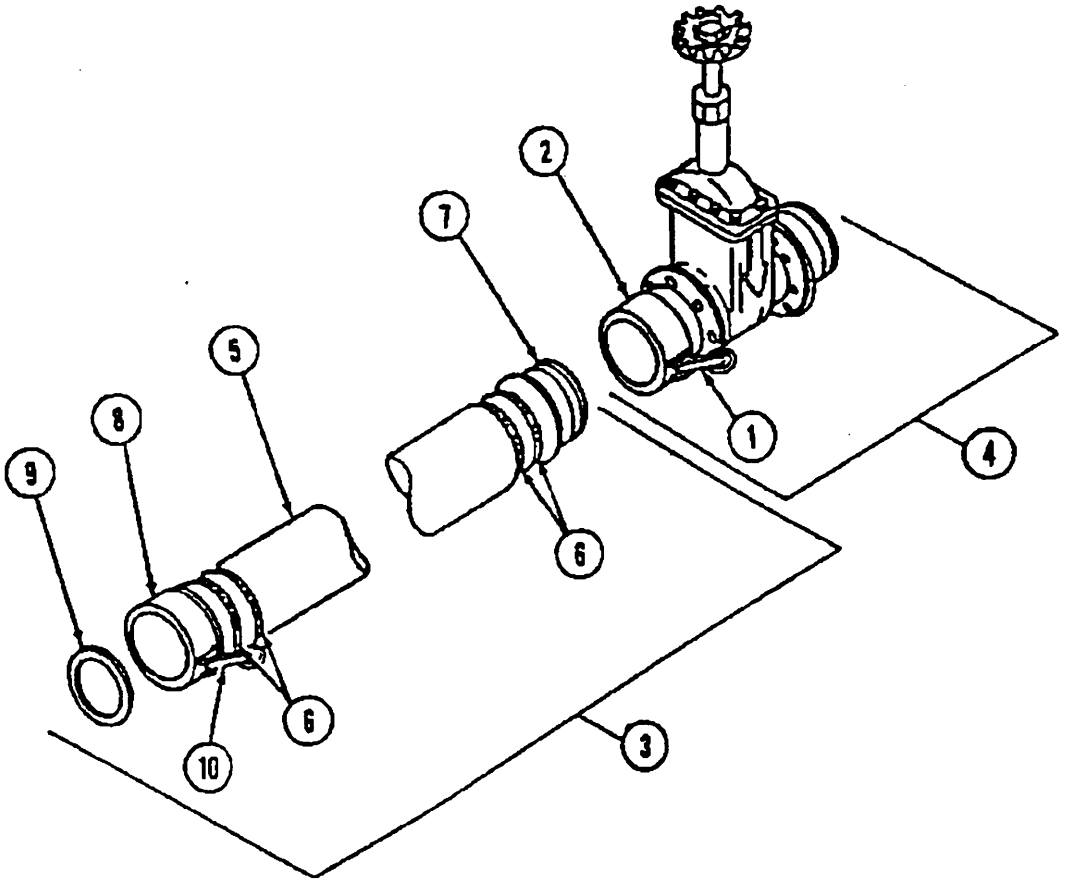


Figure 3-11. Filler and Discharge Hose Assembly

REMOVAL (See figure 3-11.)

1 Pull outward on cam-lever arms (1) of female quick–disconnect coupling (2) .

2 Withdraw filler and discharge hose assembly (3) from filler and discharge valve assembly (4).

SERVICE (See figure 3-11.)

1 Flush hose assembly with hot, soapy water.

2 Rinse thoroughly and air dry.

3 Inspect hose (5) for cracks, tears, or wear and ensure that hose bands (6) are secure to couplings (7 and 8). Replace if necessary.

4 Inspect cam-lever arms (10) for distortion or breaks.

5 Inspect coupling gaskets (9) for deterioration or wear. Replace if necessary.

INSTALLATION (See figure 3-11.)

1 Ensure that coupling gasket (9) is installed inside female quick-disconnect coupling (2).

2 Connect filler and discharge hose assembly (1) to filler and discharge valve assembly (4); push cam-lever arms (1) inward on female quick-disconnect coupling (2).

3-13. MAINTENANCE OF DRAIN GATE VALVE.

This task covers: a. Removal d. Assembly
b. Disassembly e. Installation
c. Service

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26

Materials/Parts

Cleaning solvent, item 1, appendix E
Thread sealing compound, item 2, appendix E
Grease, item 5, appendix E
Rags, item 6, appendix E
Antiseize tape, item 9, appendix E

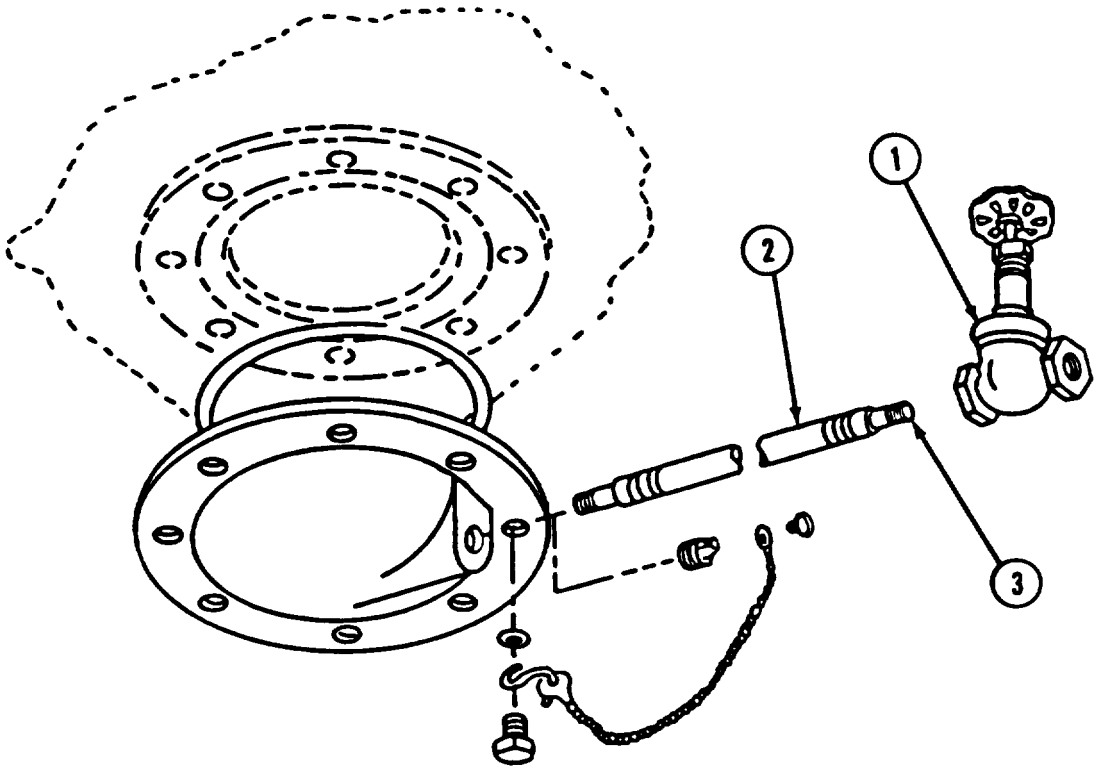


Figure 3-12. Drain Gate Valve

REMOVAL (See figure 3-12.)

1 Remove drain gate valve (1) from drain hose assembly (2).

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

2 Using cleaning solvent, clean threads (3) of drain hose assembly (2).

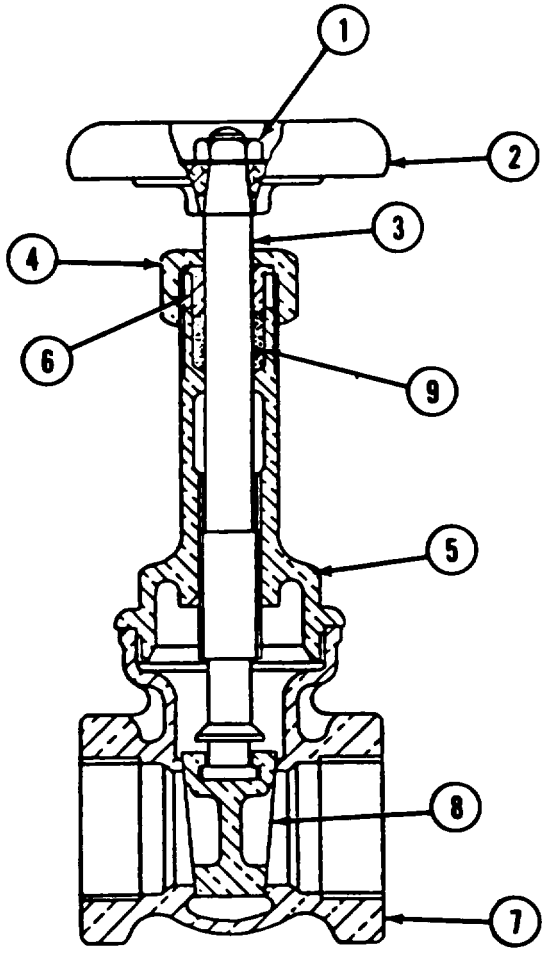


Figure 3-13. Drain Gate Valve

DISASSEMBLY (See figure 3-13.)

1 Remove handwheel nut (1) from top of handwheel (2).

2 Remove handwheel (2) from top of stem (3).

3 Remove packing nut (4) from bonnet (5).

4 Remove packing gland (6) from bonnet (5).

5 Remove bonnet (5) from valve body (7).

6 Remove wedge disks (8) from stem (3).

7 Remove stem (3) from bonnet (5).

8 Remove packing (9) from bonnet (5).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well–ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

3 Polish stem with a crocus cloth; then coat with grease.

ASSEMBLY (See figure 3-13.)

1 Lay valve body (7) on its side on a clean surface.

2 Insert wedge disks (8) into slot in valve body (7).

3 Insert stem (3) in bonnet (5).

4 Install bonnet (5) in valve body (7).

5 Install packing (9) in bonnet (5).

6 Install packing gland (6) in bonnet (5).

7 Install packing nut (4) on bonnet (5).

8 Install handwheel (2) on stem (3).

9 Install handwheel nut (1) on stem (3) above handwheel (2).

INSTALLATION (See figure 3-12.)

1 Using thread sealing compound or antiseize tape, coat threads (3) of drain hose assembly (2).

2 Install drain gate valve (1) on drain hose assembly (2).

3-13.1 MAINTENANCE OF DRAIN BALL VALVE.

This task covers: a. Removal d. Repair
b. Cleaning e. Assembly
c. Inspection

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26

Materials/Parts

Cleaning solvent, item 1, appendix E
Thread sealing compound, item 2, appendix E
Grease, item 5, appendix E
Rags, item 6, appendix E
Antiseize tape, item 9, appendix E

DISASSEMBLY (See figure 3-13.1)

1 Remove handle nut (1) from stem (2).

2 Remove handle (3) from stem (2) .

3 Remove stem nut (4) from stem (2) .

4 Remove travel stop (5), gland ring (6), and stem seal (7) from stem (2).

5 Remove capscrews (8) from bonnet (9) and lift assembly off valve.

6 Remove stem (2), stem seal (10), spring (11), o-ring (12), ball (13), and seats (14) from valve body (15) .

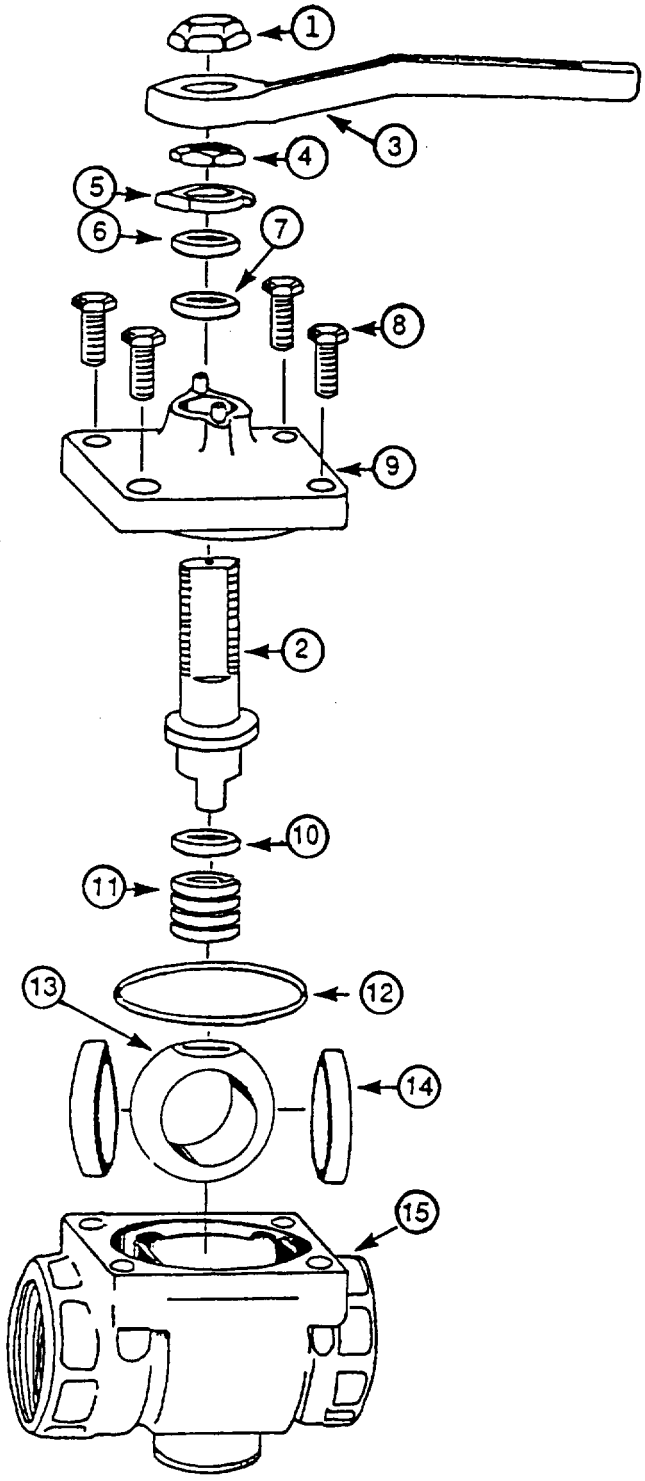


Figure 3-13.1 Drain Ball Valve

SERVICE

WARNING

Cleaning solvent, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excess heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

3 Polish stem with a crocus cloth; then coat with grease.

ASSEMBLY (See Figure 3-13.1)

1 Replace ball seats (14) into valve body (15).

2 Re-insert o-ring (12) into valve body (15) .

3 Insert ball body (13) into valve body (15) .

4 Slip seal (10) followed by spring (11) onto bottom of stem (2), and insert stem (2) into valve body (15).

5 Place bonnet (9) over stem (2) and install capscrews (8). Tighten capscrews (8) to 16 ft-lb (21.04 N•m). Install seal (7), gland ring (6), travel stop (5), and stem nut (4) on stem (2).

6 Place handle (3) onto stem (2) and tighten nut (1) onto stem (2).

INSTALLATION (See figure 3-12.)

1 Using thread sealing compound or antiseize tape, coat threads (3) of drain hose assembly (2).

2 Install drain ball valve (1) on drain hose assembly (2).

3-14. MAINTENANCE OF DRAIN HOSE ASSEMBLY.

This task covers: Service

INITIAL SETUP

Materials/Parts

Cleaning solvent, item 1, appendix E
Detergent, item 4, appendix E
Rags, item 6, appendix E

Equipment/Condition

Reference
Para 3-13, drain hose assembly removed

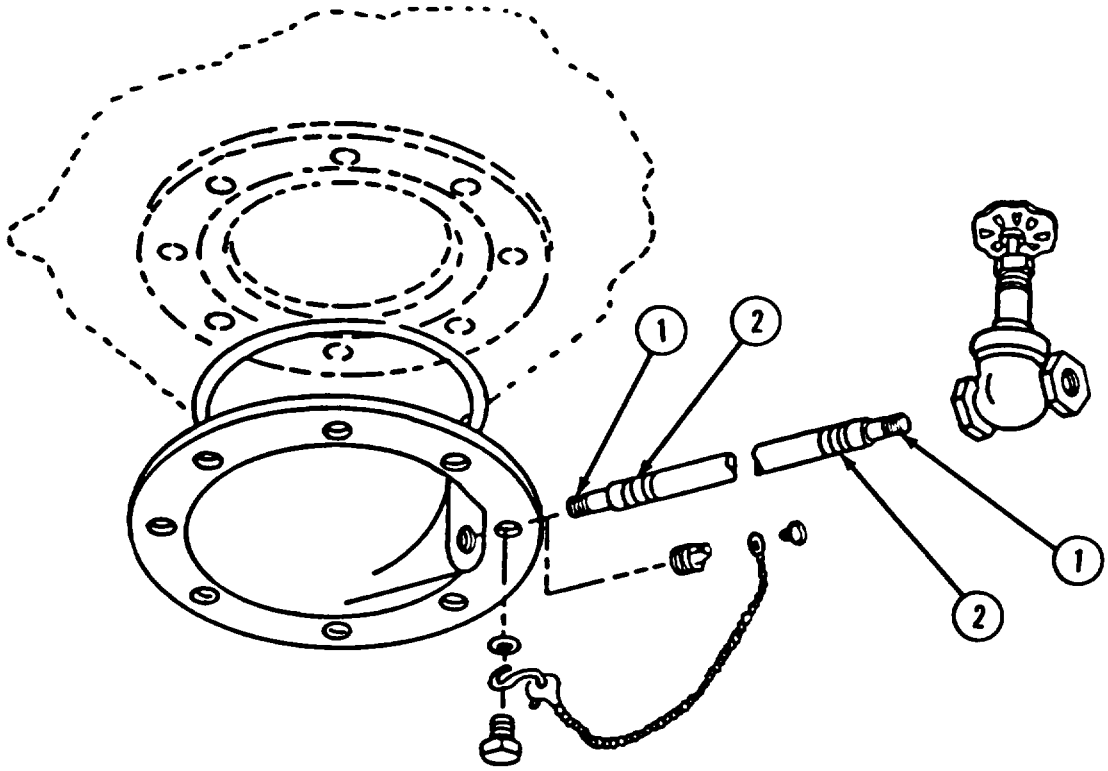


Figure 3-14. Drain Hose

SERVICE (See figure 3-14.)

1 Flush drain hose assembly with hot, soapy water.

2 Rinse thoroughly and air dry.

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well–ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

3 Using cleaning solvent, clean threads of threaded coupling (1).

4 Inspect drain hose for cracks, tears, or wear.

5 Ensure hose bands (2) are secure to threaded couplings.

3-15. MAINTENANCE OF VENT AND PIPE ASSEMBLY.

This task covers: a. Removal
b. Disassembly
c. Service
d. Assembly
e. Installation

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26
Torque wrench (in-lb), item 2, appendix B

Materials/Parts

Cleaning solvent, item 1, appendix E
Rags, item 6, appendix E
Silicone compound, item 7, appendix E

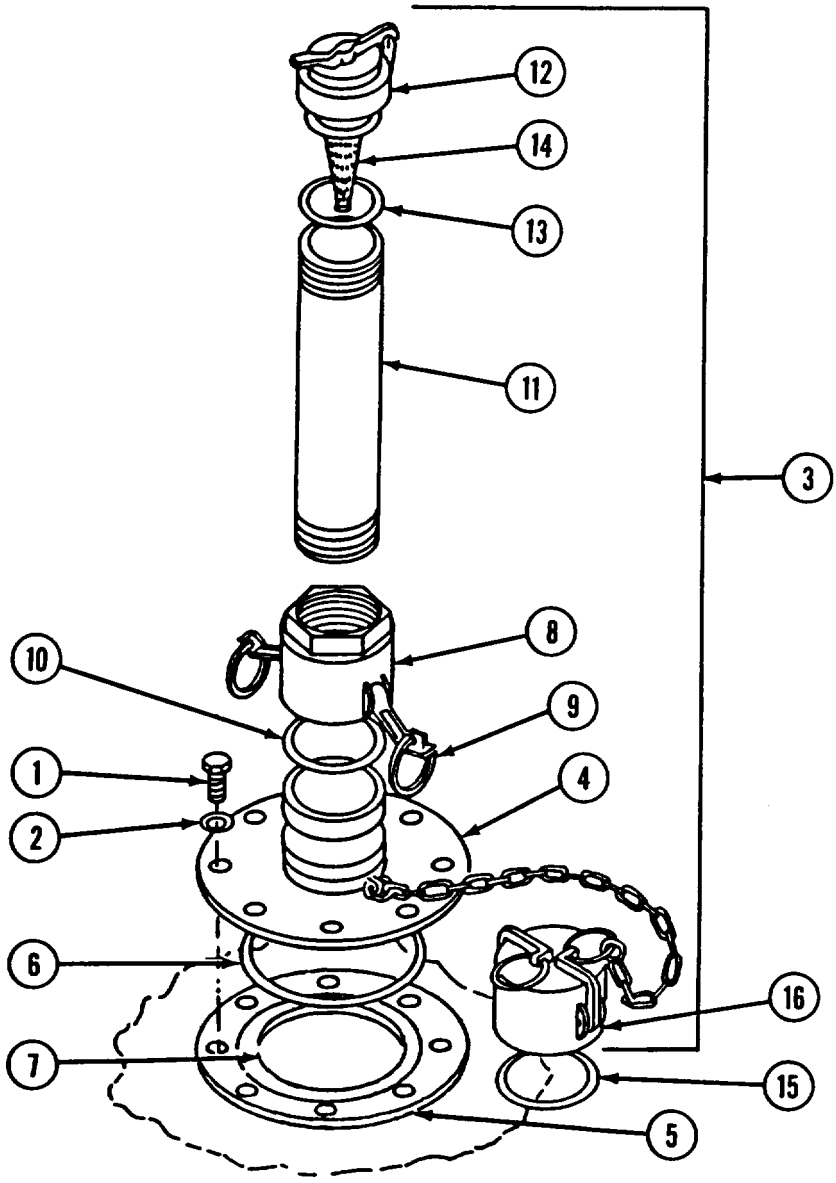


Figure 3-15. Vent and Pipe Assembly

REMOVAL (See figure 3-15.)

1 Remove eight screws (1) and washers (2) from vent and pipe assembly (3).

2 Lift male flanged adapter (4) from tank fitting (5).

3 Remove preformed packing (6) from packing groove (7) in tank fitting (5).

DISASSEMBLY (See figure 3-15.)

1 Disconnect female quick-disconnect coupling (8) from flanged male adapter (4).

a. Pull outward on cam-lever arms (9).

b. Lift female quick-disconnect coupling (8) from flanged male adapater (4).

c. Remove gasket (10)

2 Disconnect female quick-disconnect coupling (8) from vent pipe (11). Turn vent pipe to left until threads disengage.

3 Disconnect relief cap (12) from vent pipe (11). Turn relief cap to left until threads disengage.

4 Remove relief cap gasket (13) from inside relief cap (12).

5 Remove flame arrestor (14) from relief cap (12). Turn flame arrestor to left until threads disengage from relief cap (12).

6 Remove gasket (15) from inside dust cap (16).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Clean out preformed packing grooves with cleaning solvent and dry thoroughly.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Carefully inspect gaskets and preformed packings for deterioration, distortion, cracks, or breaks. Replace when service is doubtful.

5 Ensure that vent hole in flame arrestor is clear.

ASSEMBLY (See figure 3-15.)

1 Place relief cap gasket (13) over flame arrestor (14) and seat it inside relief cap (12).

2 Install flame arrestor (14) on relief cap (12); turn flame arrestor to right until two pieces are joined tightly together.

3 Install flame arrestor (14) in vent pipe (11) until vent pipe contacts relief cap (12). Rotate relief cap to right until vent pipe and relief cap are joined tightly together.

4 Insert vent pipe (11) in quick-disconnect coupling (8); rotate pipe to right until two pieces are joined tightly together.

5 Insert gasket (10) into female quick-disconnect coupling (8).

6 With cam-lever arms (9) in outward position, install quick-disconnect coupling (8) on male flanged adapter (4). Pull cam-lever arms in until they lock in place.

7 Install gasket (15) into dust cap (16).

INSTALLATION (See figure 3-15.)

1 Lubricate preformed packing (6) with silicone compound; install into packing groove (7) in tank fitting (5).

2 Place male flanged adapter (4) over tank fitting (5).

3 Install eight washers (2) and screws (1) through vent and pipe assembly (3) and tank fitting (5). Torque screws to 30 in-lb (3.41 NŽm).

3-16. MAINTENANCE OF RELIEF CAP AND FLAME ARRESTOR ASSEMBLY.

This task covers: a. Disassembly b. Service c. Assembly

INITAL SETUP

Materials/Parts

Cleaning solvent, item 1, appendix E
Detergent, item 4, appendix-E
Rags, item 6, appendix E
Silicone compound, item 7, appendix E

DISASSEMBLY (See figure 3-15.)

1 Disconnect relief cap (12) from vent pipe (11). Rotate relief cap to left until threads disengage.

2 Remove flame arrestor (14) from relief cap (12).

3 Remove relief cap gasket (13) from inside relief cap (12).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Clean all gasket sealing surfaces thoroughly with detergent and hot water.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Carefully inspect gaskets for deterioration, distortion, cracks, or breaks. Replace when service is doubtful.

ASSEMBLY (See figure 3-15.)

1 Place relief cap gasket (13) *over* flame arrestor (14) and seat it inside relief cap (12).

2 Install flame arrestor (14) on relief cap (12). Rotate flame arrestor right until two pieces are joined tightly together.

3 Place flame arrestor (14) into vent pipe (11) until vent pipe contacts relief cap (12). Rotate relief cap to right until vent pipe and relief cap are joined tightly together.

3-17. MAINTENANCE OF FILLER/DISCHARGE ASSEMBLY.

This task covers: a. Disassembly b. Service c. Assembly

INITAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26
Torque wrench (ft-lb), item 3, appendix B
Torque wrench (in-lb), item 2, appendix B

Materials/Parts

Cleaning solvent, item 1, appendix E
Detergent, item 4, appendix E
Rags, item 6, appendix E
Silicone compound, item 7, appendix E

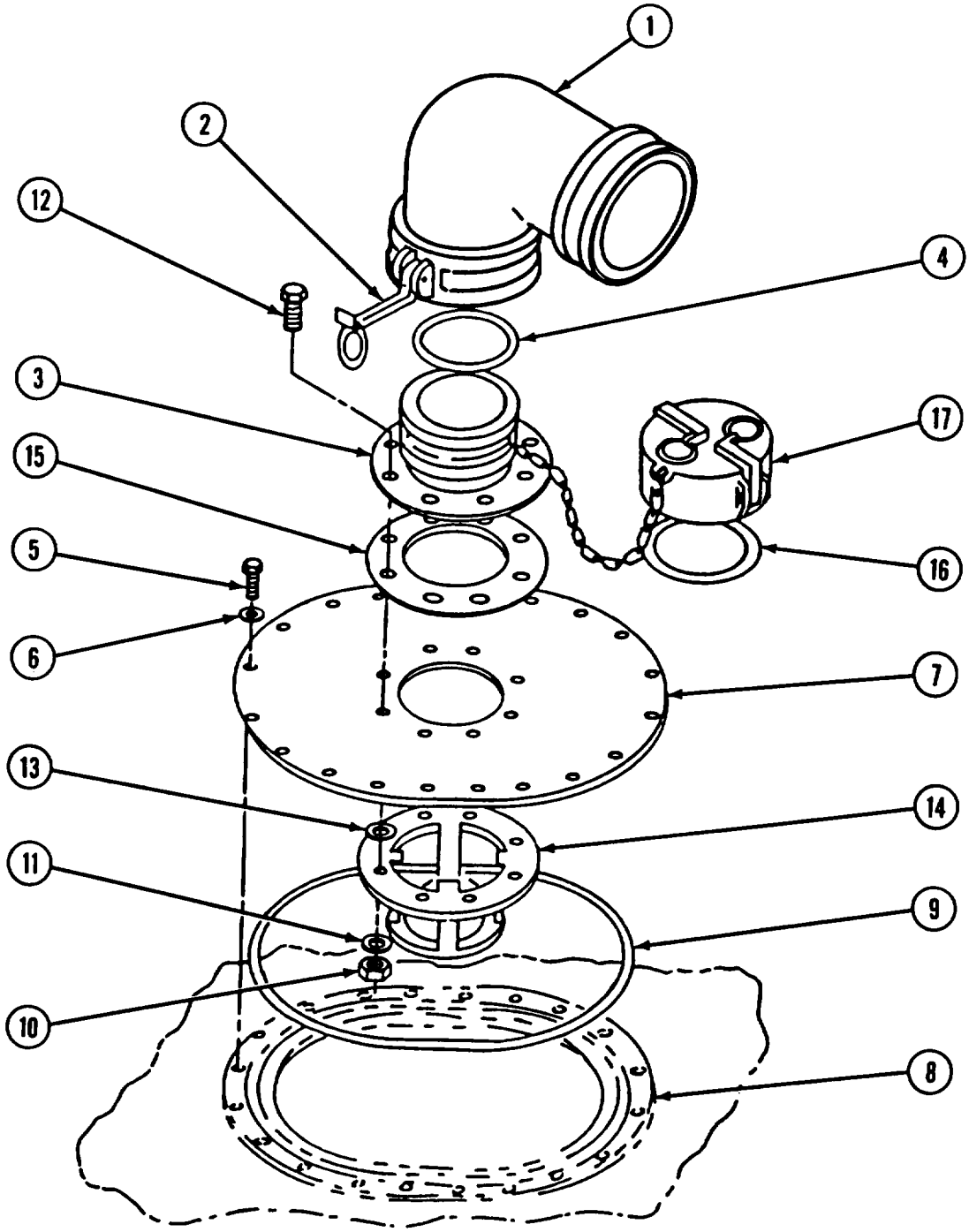


Figure 3-16. Filler/Discharge Assembly

CAUTION

Be sure to take off the closure plate before removing the flanged adapter. The flanged adapter is bolted to the closure plate and suction stub. If it is removed first, hex-head nuts bolted to the suction stub will fall into the tank.

NOTE

The filler/discharge fitting on the discharge end requires a female/male elbow. The filler/discharge fitting on the fill end requires a female/female elbow.

DISASSEMBLY (See figure 3-16.)

1 Remove 4-inch elbow (1) by pulling outward on cam-lever arms (2). Lift elbow from flanged adapter (3).

2 Remove elbow gasket (4) from inside of elbow (l).

3 Remove screws (5) and washers (6) and lift closure plate (7) from collapsible tank fitting (8).

4 Lift preformed packing (9) from inside packing groove in tank fitting (8).

5 Remove nuts (10), lockwashers (11), screws (12), and thread seal washers (13) from remaining assembly. This releases suction stub (14) from bottom of closure plate (7) and flanged adapter (3) and gasket (15) from top of closure plate (7).

6 Remove gasket (16) from inside of dust cap (17).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

1 Clean all parts with cleaning solvent and dry thoroughly.

2 Clean out packing grooves thoroughly with detergent and hot water.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Carefully inspect gaskets and packings for deterioration, distortion, cracks, or breaks. Replace when serviceability is doubtful.

ASSEMBLY (See figure 3-16.)

1 Place gasket (16) into dust cap (17).

2 Place elbow gasket (4) into elbow (1).

3 Place suction stub (14) on flat hard surface with bolt holes on top.

4 Place thread seal washers (13) over each bolt hole in suction stub (14).

5 Place closure plate (7) on top of thread seal washers (13) being careful to keep all holes aligned.

6 Place flanged adapter gasket (15) on closure plate (7) and align holes.

7 Place flanged adapter (3) on flanged adapter gasket (15) and align holes.

8 Insert screws (12) through holes in flanged adapter (3) and thread until screw ends protrude through suction stub (14).

9 Assemble lockwashers (11) and nuts (10) to screws (12) and torque to 30 ft-lb (40.95 N•m).

10 Lubricate preformed packing (9) with silicone compound and place in packing groove in collapsible tank fitting.

11 Place closure plate (7) and attached components on tank and insert suction stub (14) through opening in tank until closure plate (7) contacts tank fitting (8).

12 If tank is lying completely flat, lift tank to closure plate (7) to start screws (5) in tank fitting (8).

13 Assemble washers (6) on screws (5) and insert screws through closure plate (7) and in tank fitting (8).

14 Torque to 30 in-lb (3.41 N•m).

15 Place elbow (1) on flanged adapter (3). Pull inward on cam-lever arms (2) to lock items together.

3-18. MAINTENANCE OF DRAIN FITTING ASSEMBLY.

This task covers: a. Disassembly b. Service c. Assembly

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26
Torque wrench (in-lb), item 2, appendix B

Material/Parts

Cleaning solvent, item 1, appendix E
Detergent, item 4, appendix E
Rags, item 6, appendix E
Silicone compound, item 7, appendix E

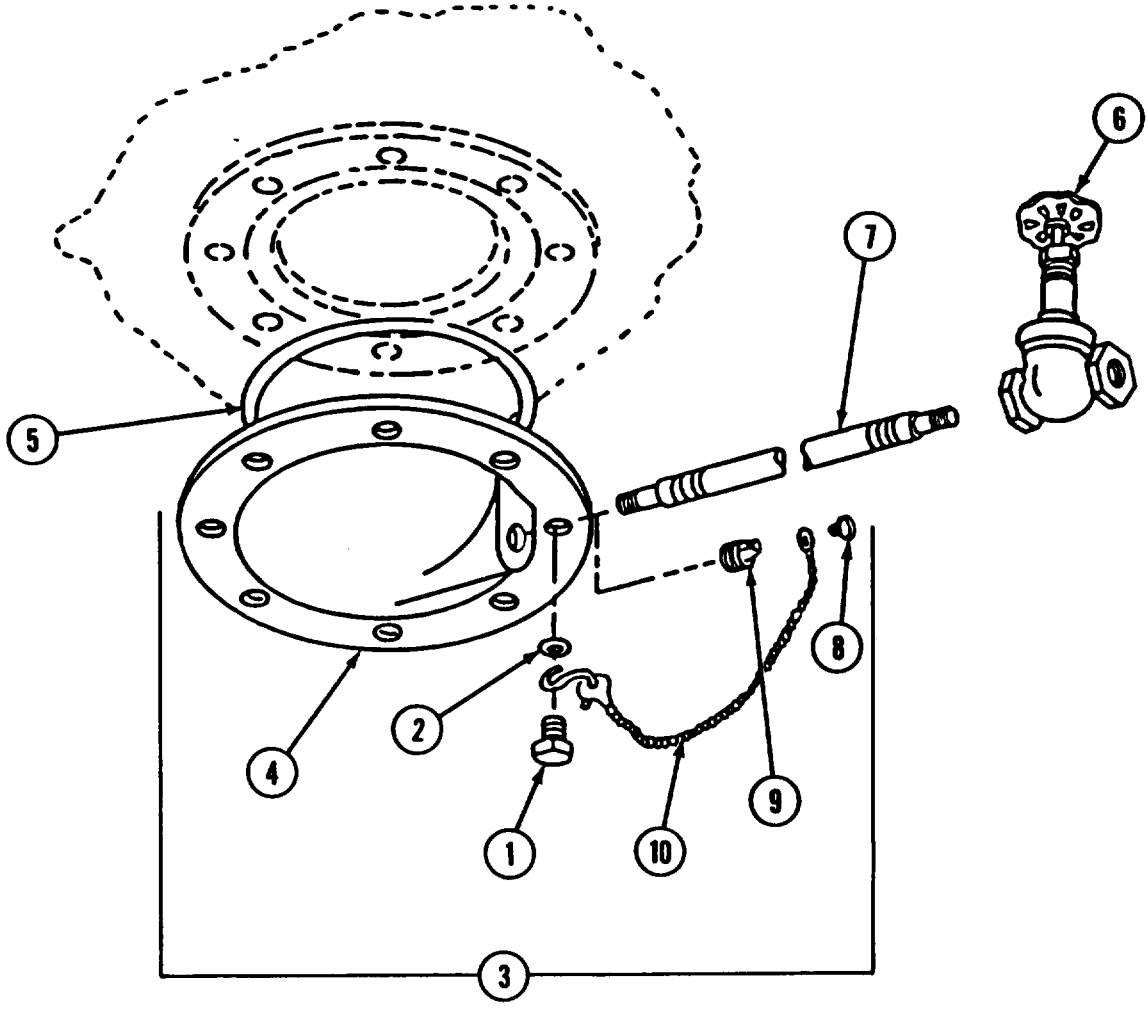


Figure 3-17. Drain Fitting Assembly

DISASSEMBLY (See figure 3-17.)

1 Remove screws (1) and washers (2) that hold drain fitting assembly (3) to tank fitting.

2 Remove drain cover plate (4) with remaining hardware attached.

3 Remove preformed packing (5) from packing groove in tank fitting,

4 Disconnect gate valve (6) from drain hose (7) by rotating gate valve to left until threads disengage.

5 Disconnect drain hose (7) from drain cover plate (4) by rotating drain hose to left until threads disengage.

6 Remove roundhead screw (8) from drain plug (9) and remove chain assembly (10).

SERVICE

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

1 Clean parts with cleaning solvent and dry thoroughly.

2 Clean packing groove thoroughly with detergent and hot water.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Carefully inspect preformed packing for deterioration, distortion, cracks, or breaks. Replace when serviceability is doubtful.

ASSEMBLY (See figure 3-17.)

1 Attach chain assembly (10) to drain plug (9) with roundhead screw (8).

2 Apply sealing compound or antiseize tape to threads.

3 Assemble drain hose (7) to drain cover plate (4). Engage threads and rotate hose to right until components are tightly joined.

4 Attach gate valve (6) to drain hose (7). Engage threads and rotate gate valve to right until components are tightly joined.

5 Lubricate preformed packing (5) with silicone compound and place in packing groove on tank fitting.

6 Place drain cover plate (4) on tank fitting. Align holes.

7 Install screws (1) with washers (2) and hand-tighten.

8 Insert S-hook of chain assembly (10) under head of screw (1) and torque all screws to 30 in-lb (3.41 N•m).

3-19. MAINTENANCE OF TANK.

This task covers: a. Removal and Disassembly
b. Service
c. Installation and Assembly

INITIAL SETUP

Tools

General Mechanic's Automotive Tool Kit, SC 5180-90-CL-N26

Materials/Parts

Cleaning solvent, item 1, appendix E
Detergent, item 4, appendix E

Equipment Condition

Reference
Para 3-12, filler and discharge hose assembly disconnected

REMOVAL AND DISASSEMBLY

1 Remove vent and pipe assembly from vent fitting (Para 3-15).

2 Remove filler/discharge assemblies (para 3-17).

3 Remove drain fitting assembly (para 3-18).

WARNING

Cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. It produces toxic and flammable fumes. Use only in well-ventilated areas. Avoid repeated and prolonged skin contact. Do not use near an open flame or excessive heat. The flash point of solvent is 100°F to 138°F (38°C to 59°C).

SERVICE

1 Clean tank exterior with detergent and hot water.

2 Clean mechanical parts with cleaning solvent and dry thoroughly.

3 Inspect all mechanical parts for cracks, dents, breaks, or wear. Replace or repair if unserviceable.

4 Inspect gaskets and preformed packing for deterioration, distortion, cracks, or breaks. Replace when serviceability is doubtful.

ASSEMBLY AND INSTALLATION

NOTE

The drain end of the tank will unroll first.

1 Unroll tank and unfold sides, using tank handles to position tank.

2 Install drain fitting assembly (para 3-18).

3 Install vent and pipe assembly (para 3-15).

4 Install filler/discharge assemblies (para 3-17).

Section VII. PREPARATION FOR STORAGE OR SHIPMENT

3-20. GENERAL.

Prior to storage, the tank should be disassembled, purged of all residual fuel and fumes, cleaned, and preserved along with its components for future use.

3-21. STORAGE.

WARNING

Sludge that accumulates in the bottom of the fuel tank gives off toxic and explosive vapors. Inhaling these vapors can cause lead poisoning. When cleaning tanks, provide ample ventilation to carry off harmful fumes.

Always wear protective goggles, breathing apparatus, and other protective gear when cleaning the tank interior. Fuel vapors are toxic and can damage eyes, skin, and lungs.

Fuel vapors are extremely flammable. Exercise care to prevent sparks when working near or in the tank. Death or severe personal injury can result if safety precautions are not strictly observed.

CAUTION

Always handle the tank carefully. Pad components stored with the tank to avoid chafing it during storage or transportation. Rough handling or careless storage can damage the tank.

a. Drain fuel from tank (para 2-7.2).

b. Remove drain hose assembly from drain fitting and install drain plug.

c. Remove filler/discharge elbows from filler and discharge adapters.

d. Remove vent and pipe assembly from flanged adapter and install dust cap.

e. Inflate tank with air and air dry for 24 hours.

f. Remove filler/discharge assembly from tank (para 3-17).

g. Flush tank with detergent solution.

h. Remove detergent solution with shop vacuum.

i. Flush tank with clear water.

j. Air dry with blower until dry.

k. Apply technical talc (item 8, appendix E) to tank interior.

l. Install filler/discharge assembly on tank (para 3-17).

m. Install dust caps on flanged adapters of filler and discharge fitting assemblies.

n. Brush off stones or debris clinging to tank.

o. Apply technical talc (item 8, appendix E) to tank exterior.

p. Fold tank from sides toward the middle.

q. Roll tank from end opposite drain fitting.

r. Plug exposed hose assembly openings with suitable, clean materials to keep them dirt-free.

s. Place tank in suitable storage container.

t. Pad or wrap components before placing in separate storage container or storing with tank.

CHAPTER 4

INTERMEDIATE DIRECT SUPPORT MAINTENANCE

Section I. MAINTENANCE PROCEDURES

4-1. GENERAL.

This section contains inspection instructions authorized by the maintenance allocation chart (appendix B) to the intermediate direct support (IDS) maintenance level.

4-2. INSPECT TANK.

IDS maintenance will be notified of unit maintenance's determination that the tank is damaged beyond emergency repair. IDS maintenance will then visually inspect the damaged tank to determine its disposition.

APPENDIX A

REFERENCES

A-1 SCOPE.

This appendix list all forms, technical manuals, field manuals and miscellaneous publications required for operation and maintenance of the 10,000-Gallon, 20,000-Gallon or 50,000-Gallon collapsible fabric tank.

A-2. FORMS.

Hand Receipt/Annex Number ..... DA Form 2062

Equipment Daily Log ..... DA Form 2408-1

Equipment Inspection and Maintenance Worksheet . . . DA Form 2404

Maintenance Request ..... DA Form 2407

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

Recommended Changes to Publications and Blank Forms ..... Form 2028

A-3. TECHNICAL MANUALS.

Arctic Construction ..... TM 5-349

Chemical, Biological, and Radiological (CBR) Decontamination ..... TM 3-220

Firefighting and Rescue Procedures in Theaters of Operation ..... TM 5-315

Military Petroleum Pipeline Systems ..... TM 5-343

Petroleum Handling Equipment and Operations ..... TM 10-1101

Preservation: Packaging and Packing of Military Supplies and Equipment ..... TM 38-460

Storage, Inspection, and Preservation of POL Pipeline Equipment ..... TM 38-230

Unit and Intermediate Direct Support Maintenance Repair Parts and Special Tools List for Tank, Fabric, Collapsible, POL 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, 50,000-Gallon, and 5,000 BBL ..... TM 5-5430-219-23P

A-4. FIELD MANUALS.

Basic Cold Weather Manual	FM 31-70
Camouflage	FM 5-20
First Aid Procedures	FM 21-11
Northern Operations	FM 31-71
Nuclear, Biological, and Chemical (NBC) Defense (Reprinted with Basic Incl. Cl)	FM 21-40
Organizational Maintenance: Military Petroleum Pipelines, Tanks, and Related Equipment	FM 10-20
Petroleum Terminal and Pipeline Operations	FM 10-18

A-5. MISCELLANEOUS PUBLICATION.

Army Medical Department Expendable/Durable Items	CTA 8-100
Consolidated Index of Army Publications and Blank Forms	DA Pam 310-1
Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)	CTA 50-970
Hand Portable Fire Extinguishers	TB 5-4200-200-10
The Army Maintenance Management System (TAMMS)	DA Pam 738-750

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

B-1.1 This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

B-1.2 The maintenance allocation chart (MAC) is Section II designates overall authority and responsibility for the performance of maintenance functions on the 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, and 50,000-Gallon collapsible fabric tank. The application of the maintenance function to the end item or component will be consistent with the capabilities of the designed maintenance categories.

B-1.3 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.

B-1.4 Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and defined as follows:

B-2.1 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-2.2 Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

B-2.3 Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

B-2.4 Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

B-2.5 Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

B-2.6 Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

B-2.7 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 into position a spare, repair part, or module (compoment or assembly) in a manner to allow the proper functioning of an equipment or system.

B-2.8 Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position code of the SMR code.

B-2.9 Repair The application of maintenance services[1], including fault location/troubleshooting[2], removal/installation, and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part; subassembly, module (component or assembly). end item, or system.

B-2.10 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.

B-2.11 Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

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[1]Services - Inspect, test, service, adjust, align, calibrate, and/or replace.

[2]Fault locate/troubleshoot - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3]Disassemble/assemble - Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e,, assigned an SMR code) for the category of maintenance under consideration.

[4]Actions - Welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

B-3.1 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 with the next higher assembly. End item group number shall be "00."

B-3.2 Column 2. Component/ Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

B-3.3 Colunm 3 Maintenance Funtion. 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.)

B-3.4 Column 4. Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance categories, appropriate work time figures will be shown for each category. 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/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C	Operator
O	Unit maintenance
F	Intermediate direct support maintenance
H	Intermediate general support maintenance
D	Depot maintenance

B-3.5 Column 5. Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

B-3.6 Column 6. Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS. SECTION III.

B-4.1 Column 1. reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

B-4.2 Column 2. Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

B-4.3 Column 3. Nomenclature. Name or identification of the tool or test equipment.

B-4.4 Column 4. National Stock Number. The National stock number of the tool or test equipment.

B-4.5 Column 5. Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMN IN REMARKS, SECTION IV

B-5.1 ~. Column 1. Reference Code. The code recorded in column 6, section II.

B-5.2 _ Column 2. Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART FOR 3,000-GALLON, 10,000-GALLON, 20,000-GALLON, 50,000-GALLON COLLAPSIBLE FABRIC TANK

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
00	Tank, Fabric, Collapsible, 3,000-Gallon, 10,000-Gallon, 20,000-Gallon or 50,000-Gallon	Inspect	0.1	0.1					A
01	Valve Assy, 4 in. Filler and Discharge	Service		0.8					
		Replace		0.2				1, 2, 3	
		Repair	0.4	0.8				1, 2, 3	B
0101	Valve, Gate, 4 in.	Inspect	0.1	0.1					
		Service		0.5					
		Replace		0.3				1, 2, 3	
		Repair		0.5				1, 2, 3	
0101	Valve, Butterfly	Inspect	0.1	0.1					
		Service		0.5					
		Replace		0.3					
		Repair		0.5					
0101	Valve, Ball	Inspect	0.1	0.1				1, 2, 3	
		Replace							
02	Hose Assy, Filler and Discharge	Inspect	0.1	0.1					
		Service		0.2					
		Replace	0.2	0.2					
		Repair	0.1						B
03	Valve, Gate, ½ in. Drain	Inspect	0.1	0.1					A
		Service		0.4					
		Replace		0.2					
		Repair		0.4					
03	Valve, Ball, 2 in. Drain	Inspect	0.1	0.1					
		Service		0.4					
		Replace		0.2					
		Repair		0.4					
04	Hose Assy, Drain	Inspect	0.1						
		Service		0.2				1	
		Replace	0.2						

Section II. MAINTENANCE ALLOCATION CHART FOR 3,000-GALLON, 10,000-GALLON, 20,000-GALLON, 50,000-GALLON COLLAPSIBLE FABRIC TANK

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	Maintenance Level					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
05	Vent and Pipe Assy	Inspect	0.1	0.1					A
		Service		0.8					
		Replace		0.2					
		Repair	0.4	0.8				1	B
0501	Cap and Flame Arrestor Assy, Relief	Inspect	0.1	0.1					A
		Service		0.2					
		Replace		0.2					
		Repair		0.2				2	
0502	Pipe Assy, Vent	Inspect	0.1	0.1					A
		Service		0.2					
		Replace		0.2					
		Repair	0.2	0.2				1	B
06	Assy, Filler/Discharge	Inspect	0.1	0.1					A
		Service		0.8					
		Repair	0.4	0.8				1, 2, 3	B
07	Fitting Assy, Drain	Inspect	0.1	0.1					A
		Service		0.5					
		Repair		0.5				1, 2, 3	
08	Tank	Inspect			0.5				
		Service		1.0					
		Replace		1.0				1	
		Repair	0.5						C
09	Repair Items Emergency	Inspect	0.1						
		Replace	0.1						

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

FOR

3,000-GALLON, 10,000-GALLON, 20,000-GALLON, OR 50,000-GALLON

COLLAPSIBLE FABRIC TANK

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
1	C	TOOL KIT, GENERAL MECHANIC'S: AUTOMOTIVE	5180-00177-7033	
2	C	TORQUE WRENCH (INCH-POUNDS)	5120-00-177-7315	
3	C	TORQUE WRENCH (FOOT-POUNDS)	5120-00-242-3564	

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Operator inspection occurs with assembly intact. Unit level inspection occurs after the assembly has been disassembled and cleaned.
B	Operator repair is limited to replacement of gaskets on quick-disconnect couplings.
C	Operator repair is limited to use of the clamps and plugs included with the emergency repair items.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists components of end items and basic issue items for the 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon collapsible fabric tank to help you inventory items required for safe and efficient operation.

C-2 GENERAL.

The components of End Item and Basic Issue Items Lists are divided into the following sections:

C-2.1 Section II, Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

C-2.2 Section III, Basic Issue Items.
These are the minimum essential items required to place a 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon collapsible fabric tank in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon collapsible fabric tank during operation and whenever it is transferred between property accounts. This manual is your authority to request/requisition replacement basic issued items (BII), based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS.

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

C-3.1 Column (1) - Illustration Number (Illus. Number). This column indicates the number of the illustration in which the item is shown.

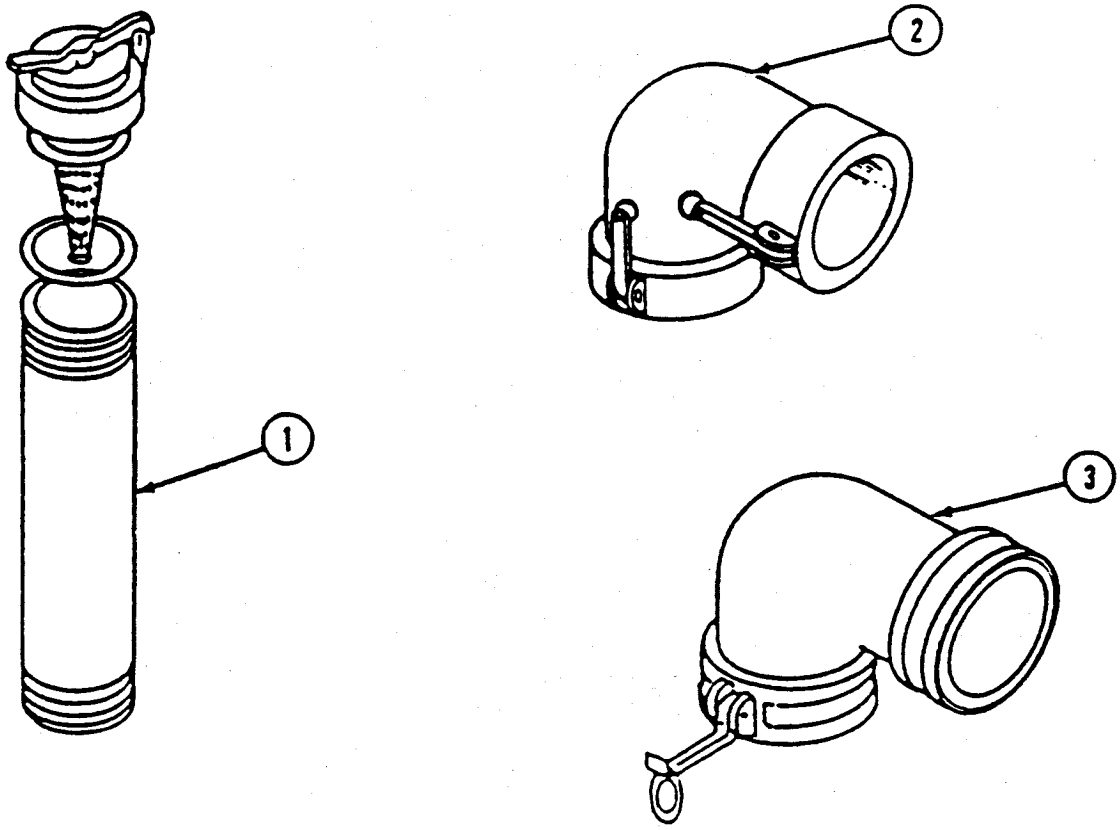
C-3.2 Column (2) - National Stock Number. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

C-3.3 Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

C-3.4 Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

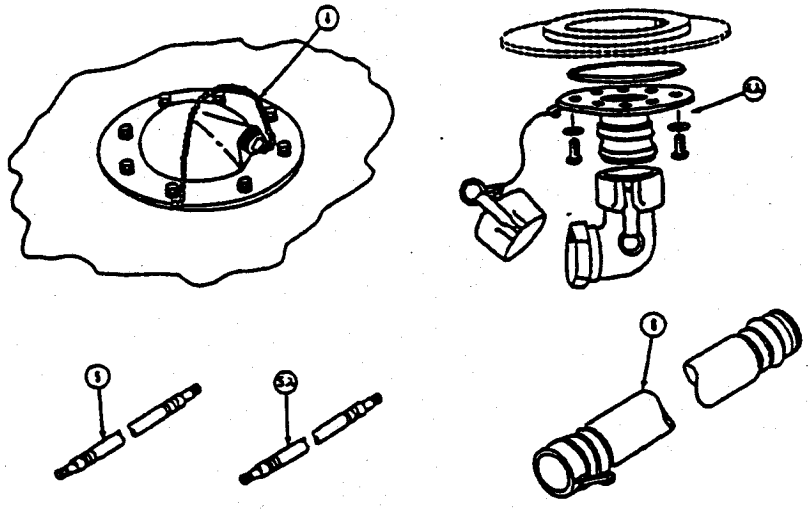
C-3.5 Column (5) - Quantity Required (Qty Rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM



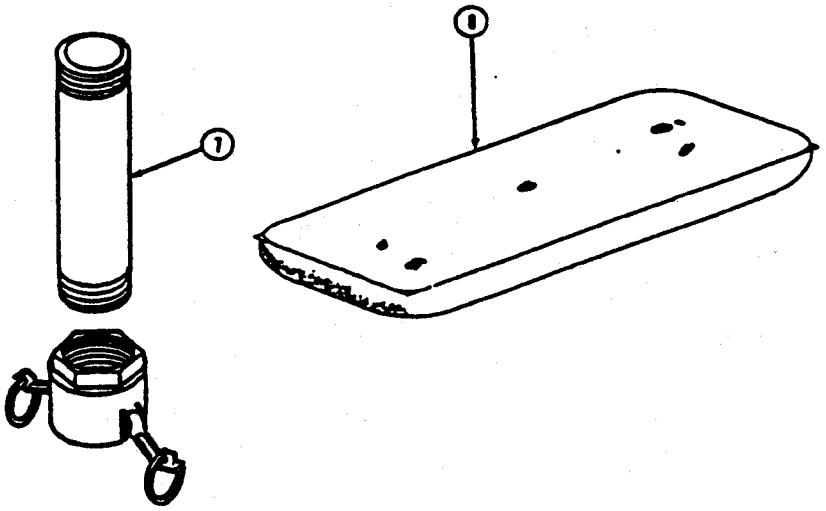
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable on Code	(4) U/M	(5) Qty Rqr
1		CAP AND FLAME ARRESTOR ASSEMBLY, VENT (49234) EX1333B	EDC, FCN FCM, ELS EDD	EA	1
2		ELBOW, QUICK-DISCONNECT, FEMALE/FEMALE (00333) 50609789 OR (80691) 40BB90AL	EDC, FCN FCM, ELS EDD	EA	1
3		ELBOW, QUICK-DISCONNECT, FEMALE/MALE (00333) 50609362 OR (80691) 40BA90AL	EDC, FCN FCM, ELS EDD	EA	1

Section II. COMPONENTS OF END ITEM (CONT)



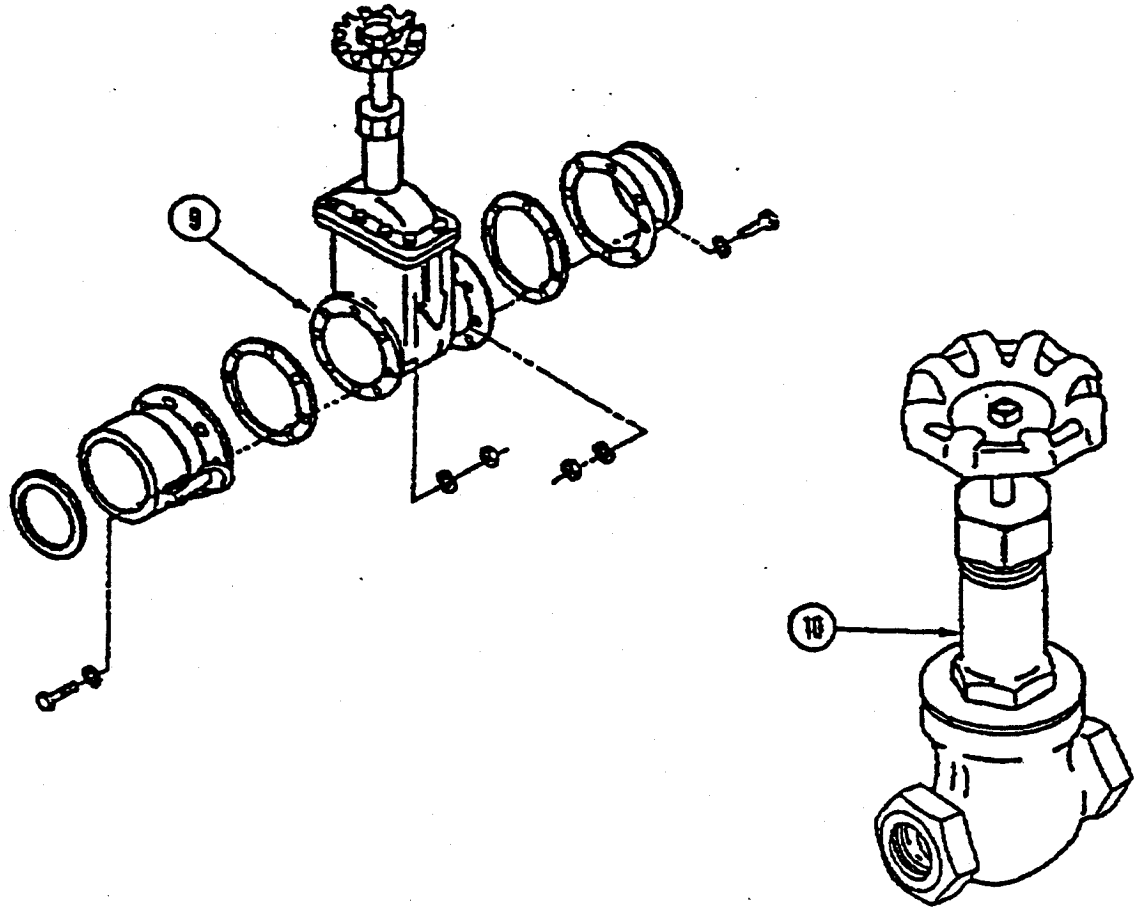
(1) Illus. Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Req
4		FITTING ASSEMBLY, DRAIN ½" (00333) 50609838 OR (85109) X3328F	EDC, ELS	EA	1
4A		FITTING ASSEMBLY, DRAIN 2-INCH (66618) X3328F	FCN, FCM FNR	EA	1
			EDD		2
5		HOSE ASSEMBLY, DRAIN ½" (00333) 5068694 OR (94519) 0758370	EDC, ELS	EA	1
5A		HOSE ASSEMBLY, DRAIN, 2-INCH (OA6KI) 28148	FCN, FCM FNR	EA	1
			EDD		2
6		HOSE ASSEMBLY, 4-INCH FILLER/DISCHARGE (96906) MS27021-17 OR (94519) 410370 OR (OA6K1) D102408	EDC, ELS FNR	EA	2
			EDD		1

Section II. COMPONENTS OF END ITEM (CONT)



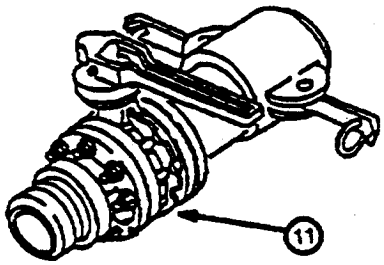
(1) Illus. Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) Usable on Code	(5) U/M	(6) Qty Rqr
7		PIPE AND COUPLER ASSEMBLY, VENT (00333) 50609780 OR (80691) 20VPALTM	EDC, FCN FCM, ELS FNR, EDD	EA	1
8	5430-00-182-8181 5430-01-455-5676 OR	TANK, FABRIC, COLLAPSIBLE, 50,000-GALLON (00333) MHW-64 50,000-GALLON (0CBB4) PD52983	EDC , EDD	EA	1
	5430-01-215-7525 OR	TANK FABRIC COLLAPSIBLE 20,000-GALLON (66618) SM1855-01	ELS	EA	1
	5430-01-359-4943 OR	TANK FABRIC COLLAPSIBLE 20,000-GALLON (66618) MM91140-001	FCM	EA	1
	5430-01-358-6157	TANK FABRIC COLLAPSIBLE 10,000-GALLON (66618) MM91141-001	FCN	EA	1
		TANK FABRIC COLLAPSIBLE 3,000-GALLON (0X0J8) WTM3KF-1	FNR	EA	1

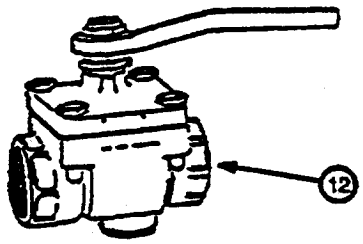
Section II. COMPONENTS OF END ITEM (CONT)

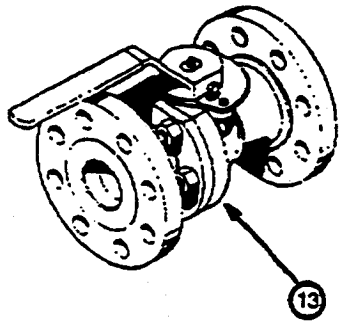


(1) Illus. Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) Usable on Code	(5) U/M	(6) Qty Rqr
9		VALVE ASSEMBLY, 4-INCH FILLER/DISCHARGE (00333) 50609764 OR (41592) 235-RF	EDC, ELS FNR , EDD	EA	1
10		VALVE, ½-INCH DRAIN GATE (76364) 1148 OR (00000) SP-80	EDC, ELS	EA	1

Section II. COMPONENTS OF END ITEM (CONT)

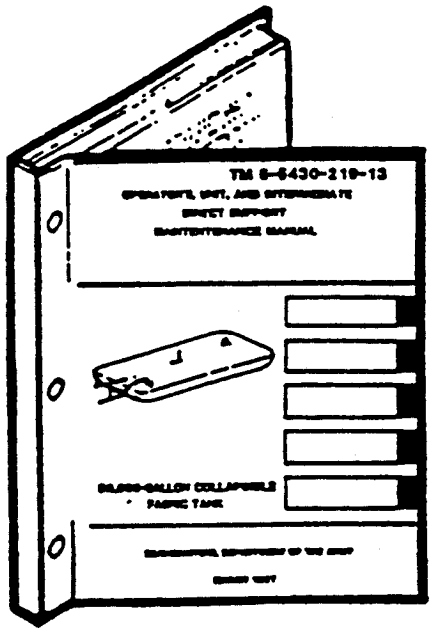






(1) Illus. Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Req
11		BUTTERFLY VALVE ASSEMBLY (76364) P-2680H	FCN,FCM	EA	1
12		DRAIN BALL VALVE (OA6K1) 2222191	FCN, FCM, FMD, FMC FNR, EDD	EA	1
13		BALL VALVE 41N-C515-F (OA6K1)	FCN, FCM FMD, FMC	EA	1

Section III. BASIC ISSUE ITEMS



(1) Illus	(2) National Stock	(3) Description FSCM and Part Number	Usable on Code	(4) U/M	(5) Qty. Rqr.
1		TM 5-5430-219-13 Operator's Unit and Intermediate Direct Support Maintenance Manual for 10,000-Gallon, 20,000-Gallon or 50,000-Gallon Collapsible Fabric Tank.	EDC, FCM FCN, ELS EDD	EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. SCOPE.

This appendix lists additional items you are authorized for the support of the Tank, Fabric, Collapsible, POL.

D-2. GENERAL.

This list identifies items tht do not have to accompany the tank, fabric, collapsible, POL and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING.

National Stock Numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name. If the item you require differs between the serial numbers of the same model, effective serial numbers are shown in the last line of the description. If the item required differs for different models of this equipment, the model number is shown under the "Usable On" heading in the description column. These codes are identified as:

NSN	UOC
5430-01-455-5676	**EDD**
5430-00-182-8181	**EDC**
5430-01-215-7525	**ELS**
5430-01-359-4943	**FCM**
5430-01-358-6157	**FCN**
5430-01-433-8528	**FNR**

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION		(3) U/M	(4) QTY. AUTH
	CAGEC &PART NUMBER	USABLE ON CODE		
5430-01-237-3659	Liner, Berm, Tank, Fabric (81349) M53081-2	FCN	EA	1
5430-01-237-3660	Liner, Berm, Tank, Fabric (81349) M53081-3	ELS, FCM	EA	1
5430-01-237-3661	Liner, Berm, Tank, Fabric (81349) M53081-4	EDC	EA	1
5430-01-237-3658	Liner, Berm, Tank, Fabric (81349) M53081-1	FNR	EA	1
5430-01-352-6073	Repair Kit, Collapsible Fabric Tank (ROCTAD) (63775) 201225		EA	1
5430-01-359-1078	Repair Kit, Collapsible Fabric Tank (ROCTAD) (0F6E1) BOV-USA-1		EA	1

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE.

This appendix lists expendable durable supplies and materials you will need to operate and maintain the 3,000-Gallon, 10,000-Gallon, 20,000-Gallon, or 50,000-Gallon collapsible fabric tank. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

E-2. EXPLANATION OF COLUMNS.

E-2.1 Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, appendix E").

E-2.2 Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C	Operator/Crew
O	Unit Maintenance
F	Intermediate Direct Support Maintenance

E-2.3 Column (3) - National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

E-2.4 Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for manufacturer (FSCM) in parentheses followed by the part number.

E-2.5 Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	6950-00-281-1985	SOLVENT, DRY CLEANING A-A-711 TY 1	GL
2	O	8030-00-543-4384	COMPOUND, SEALING, THREAD AND GASKET, FUEL, OIL AND WATER RESISTANT, MIL-S-7916	LB
3	O	5350-00-221-0872	CROCUS CLOTH	EA
4	O	7930-00-282-9700	DETERGENT, MIL-D-16791	GL
5	O	9150-00-261-8291	GREASE, MIL-G-6032	OZ
6	O	7920-02-205-1711	RAGS, WIPING, COTTON, AND COTTON SYNTHETIC, A-A-531	EA
7	O	6850-01-137-8525	SILICONE COMPOUND, DC 340 (71984)	OZ
8	O	6810-00-270-9988	TALC, TECHNICAL, T1 AND T3, MIL-T-50036	LB
9	O	8030-00-889-3534	TAPE, ANTISEIZE, POLYTETRA-FLUORSETHYLENE, MIL-T-27730	EA
10	C	9150-00-231-6689	OIL, LUBRICATION	QT

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APPENDIX F

REPAIR PARTS AND SPECIAL TOOLS LIST

(Not applicable)

APPENDIX G

TORQUE LIMITS

Table G-1. Torque Values for Hex-head Capscrews and Hex Nuts

Thread Size	Recommended Torque
Hex Nut, 3/8-16	10 ft-lb (13.65 N.m)
Capscrew, 3/8-16 x 1 1/2 in.	10 ft-lb (13.65 N.m)
Capscrew, 1/4-20 x 1 1/8 in.	8 ft-lb (10.92 N.m)

NOTE

Tighten all screws or nuts hand-tight and check alinement of gasket before applying torque. The handle of torque wrench must be perpendicular with the screw or nut and torque applied in a continuous motion. Do not jerk on wrench handle. To ensure proper seating of gasket, screws or nuts should be torqued in a top-to-bottom, left-to-right cross-pattern when possible.

GLOSSARY

Section I. ABBREVIATIONS

IDS	Intermediate Direct Support
MAC	Maintenance Allocation Chart

Section II. DEFINITION OF UNUSUAL TERMS

Berm	A mound or wall of earth that surrounds and protects the tank.
Drop cloth	Any kind of protective material placed between the ground and the tank.
Preformed packing	An O-ring type gasket.

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By Order of the Secretary of the Army:

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The Adjutant General

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To be distributed in accordance with DA 12-25A, Operator, Unit and Intermediate General Support Maintenance requirements for Tank, Fabric, Collapsible, POL, 50,00 10,000, 3,000 GAL.

*U.S. Government Printing Office: 1987-554-030/06568

These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@avma27.army.mil>
To: mpmt%avma28@st-louis-emh7.army.mil

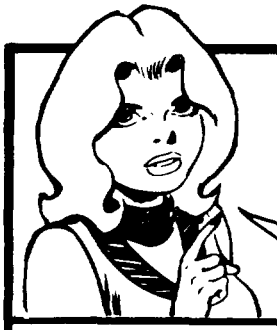
Subject: DA Form 2028

1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** *77777*
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter FName:*** Joe
14. *Submitter MName:* T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** **1**
18. *Page:* 2
19. *Paragraph:* 3
20. *Line:* **4**
21. *NSN:* **5**
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text:***

This is the text for the problem below line 27.

☆U.S. GOVERNMENT PRINTING OFFICE: 1996 - 755-025/40159

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-5430-219-13	31 Aug 1987	50,000-Gallon Collapsible Fabric Tank

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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

SIGN HERE John Doe
JOHN DOE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 1, 1 Nov 80

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

TEAR ALONG PERFORATED LINE

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

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNITS ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY TANK-AUTOMOTIVE AND ARMAMENTS COMMAND
ATTN: AMSTA-AC-NML
ROCK ISLAND, IL 61299-7630

TEAR ALONG PERFORATED LINE

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FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-5430-219-13	31 Aug 1987	50,000-GALLON COLLAPSIBLE FABRIC TANK

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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ROCK ISLAND, IL 61299-7630

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

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

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

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

PIN: 063099-004