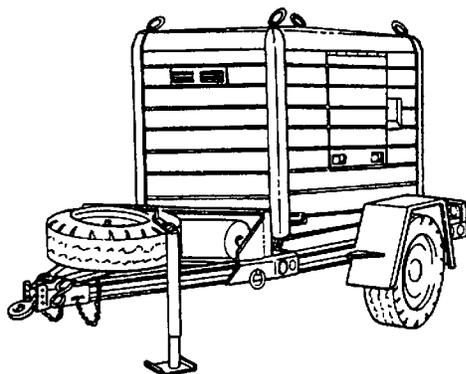


TECHNICAL MANUAL  
OPERATOR, UNIT, DIRECT SUPPORT AND  
GENERAL SUPPORT MAINTENANCE MANUAL

LUBRICATION AND SERVICING UNIT,  
POWER OPERATED,  
TRAILER MOUNTED, 15 CFM COMPRESSOR  
MODEL LST-178A-85

(NSN 4930-01-230-0781)



INTRODUCTION 1-1

OPERATING INSTRUCTIONS 2-1

OPERATOR'S MAINTENANCE 3-1  
INSTRUCTIONS

UNIT MAINTENANCE INSTRUCTIONS 4-1

DIRECT SUPPORT MAINTENANCE 5-1

GENERAL SUPPORT MAINTENANCE 6-1

Distribution Statement A: Approved for public release; distribution is unlimited.

\*This manual supersedes TM 54930-233-14, dated 14 August 1989.

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
AND HEADQUARTERS, U.S. MARINE CORPS  
WASHINGTON, D.C., 1 June 1995

CHANGE  
NO. 1

Operator, Unit, Direct Support  
and General Support Maintenance Manual

**Lubrication and Servicing Unit,  
Power Operated,  
Trailer Mounted, 15 CFM Compressor  
Model LST-178A-85  
(NSN 4930-01-230-0781)**

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Remove pages

i and ii

1-1 through 1-6

2-3 and 2-4

2-11 and 2-12

2-35 and 2-36

3-9 through 3-12

4-1 and 4-2

4-17 through 4-20

---

4-33 through 4-36

4-51 and 4-52

---

4-53 through 4-56

4-59 and 4-60

4-105 and 4-106

4-129 through 4-136

4-155 and 4-156

4-163 and 4-164

5-1 and 5-2

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5-13 and 5-14

5-25 through 5-28

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i and ii

1-1 through 1-6

2-3 and 2-4

2-11 and 2-12

2-35 and 2-36

3-9 through 3-12

4-1 and 4-2

4-17 through 4-20

4-32.1 through 4-32.4

4-33 through 4-36

4-51 and 4-52

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4-53 through 4-56

4-59 and 4-60

4-105 and 4-106

4-129 through 4-136

4-155 and 4-156

4-163 and 4-164

5-1 and 5-2

5-12.1 and 5-12.2

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Remove pages  
5-29 and 5-30  
5-51 and 5-52  
5-81 through 5-84  
5-91 and 5-92  
5-97 and 5-98  
5-105 and 5-106  
5-113 and 5-114  
6-1 through 6-4  
B-3 through B-6  
C-1 through C-5/(C-6 blank)

Insert pages  
5-29 and 5-30  
5-51/(5-52 blank)  
5-81 through 5-84  
5-91 and 5-92  
5-97 and 5-98  
5-105 and 5-106  
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6-1 through 6-4  
B-3 through B-6  
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**DISTRIBUTION:**

To be distributed in accordance with DA Form 12-25E. block no. 2666, requirements for TM 5-4930-233-14.

**WARNING**

Do not operate the engine indoors without taking precautions to vent the exhaust gases. Engine exhaust contains carbon monoxide, a colorless, odorless, deadly poisonous gas.

**WARNING**

Always wear safety glasses while operating lubrication and servicing unit. Failure to do so can lead to severe personal injury.

**WARNING**

Do not use compressed air for blowing dirt from your clothing or skin. Air can enter body openings and cause severe injury or death. Avoid horseplay with compressed air.

**WARNING**

Trailer and towing vehicles should be on level ground to prevent accidental movement resulting in injury to personnel.

**WARNING**

Trailer wheels must be chocked even if parking brake is applied. The parking brake will release within 1-1/2 hours and if not correctly chocked the trailer may roll causing severe personal injury or death.

**WARNING**

Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which can explode causing severe injury or even death.

**WARNING**

Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or DEATH. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

**WARNING**

Serious burns can result from touching an overheated brake drum.

**WARNING**

All nonessential personnel must be clear of vehicle area to avoid injury.

**WARNING**

Do not use open flame or smoke when working on the fuel system. An explosion may occur, causing severe injury or death.

**WARNING**

Release pressure from hoses by activating dispensing handle and disconnect lines slowly; otherwise pressure in lines may result in injury.

**WARNING**

When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.

**WARNING**

Do not remove cylinder completely with a wrench. If cylinder cannot be easily unscrewed by hand after it has been loosened, pressure is probably trapped inside.

**WARNING**

Venting pressure before removal is necessary because a pressurized cylinder can fly off with damaging force that can cause personal injury.

**WARNING**

Protective goggles must be worn when drilling cylinder to prevent personnel injury caused by metal shavings flying out under pressure.

**WARNING**

Worn or damaged parts can cause equipment malfunction which can lead to serious injury or equipment damage. Replace all damaged or worn parts.

**WARNING**

The adjustment procedure which follows can be dangerous for unskilled personnel because improper loosening of the nuts and adjustment screw could cause the control valve connections to blow apart with resultant injury to personnel and property, since lubricant is under high pressure.

**WARNING**

Cleaning solvent trichloroethane (Tri-ethane) is flammable and toxic to the skin, eyes, and respiratory tract. Skin, eye, and respiratory tract protection is required.

**WARNING**

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (207 KPa). Wearing of goggles is required.

**WARNING**

Bottom plug is spring loaded. Remove with extreme care to avoid personal injury.

**WARNING**

Any time the trailer is jacked up, ensure jackstands are used to avoid personal injury.

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TECHNICAL MANUAL  
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HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
AND HEADQUARTERS, U.S. MARINE CORPS  
Washington, D.C., 30 June 1993

Operator, Unit, Direct Support  
and General Support Maintenance Manual

**LUBRICATION AND SERVICING UNIT,  
POWER OPERATED,  
TRAILER MOUNTED, 15 CFM COMPRESSOR  
MODEL LST-178A-85  
(NSN 4930-01-230-0781)**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. Marine Corps personnel submit NAVMC 10722 Form to Commanding General, Marine Corps Logistics Base I (Code 808-1), Albany, GA 31704-5000. A reply will be furnished directly to you.

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**TABLE OF CONTENTS**

			Paragraphs	Pages
<b>CHAPTER</b>	<b>1.</b>	<b>INTRODUCTION</b>		
Section	I.	General information .....	1-1	1-1
	II.	Equipment description .....	1-7	1-2
	III.	Technical principles of operations .....	1-9	1-5
<b>CHAPTER</b>	<b>2.</b>	<b>OPERATING INSTRUCTIONS</b>		
Section	I.	Description and use of operator's control and indicators .....	2-1	2-1
	II.	Operator's preventive maintenance checks and services (PMCS) .....	2-3	2-7
	III.	Operation under usual conditions.....	2-5	2-12
	IV.	Operation under unusual conditions.....	2-9	2-34
<b>Chapter</b>	<b>3.</b>	<b>OPERATOR'S MAINTENANCE INSTRUCTIONS</b>		
Section	I.	Lubrication instructions .....	3-1	3-1
	II.	Operator troubleshooting .....	3-3	3-3
	III.	Operator maintenance procedures.....	3-4	3-10
<b>Chapter</b>	<b>4.</b>	<b>UNIT MAINTENANCE INSTRUCTIONS</b>		
Section	I.	Repair parts, special tools, TMDE and support equipment .....	4-1	4-1

\*This manual supersedes TM 5-4930-233-14, dated 14 August 1989

			Paragraphs	Pages
Section	II.	Service upon receipt .....	4-1	4-1
Section	III.	Unit preventive maintenance checks and services (PMCS) .....	4-6	4-3
		Unit troubleshooting .....	4-8	4-8
Section	IV.	General maintenance .....	4-9	4-13
Section	V.	General wiring repair .....	4-10	4-15
		Enclosure .....	4-11	4-16
		Doors .....	4-12	4-18
		Panels .....	4-13	4-20
		Fuel cap and filler neck assembly .....	4-14	4-22
		Tool box assembly .....	4-15	4-27
		Fuel tank .....	4-16	4-30
		Reel cabinet assembly .....	4-17	4-33
		Battery box assembly .....	4-18	4-37
		Gear lube and engine oil dispensers .....	4-19	4-48
		Air, lube and grease hoses .....	4-20	4-50
		Reel assembly .....	4-21	4-52
		Belts .....	4-22	4-57
		Starter .....	4-23	4-64
		Alternator .....	4-24	4-66
		Air compressor assembly wiring harness .....	4-25	4-68
		Control panel .....	4-26	4-70
		Pilot valve .....	4-27	4-78
		Pressure relief valve .....	4-28	4-80
		Air compressor .....	4-29	4-81
		Engine .....	4-30	4-84
		Air receiver tank .....	4-31	4-92
		Air compressor hose, lines and fittings .....	4-32	4-94
		Engine oil extension assembly .....	4-33	4-97
		Engine exhaust system .....	4-34	4-98
		Alcohol injector .....	4-35	4-100
		Air regulator .....	4-36	4-105
		Low and high pressure pumps .....	4-37	4-107
		Lube tank .....	4-38	4-109
		Heater .....	4-39	4-115
		Control box .....	4-40	4-120
		Fuel pump .....	4-41	4-122

		Paragraphs	Pages
	Winterization wiring harness .....	4-42	4-124
	Ducts, heater hoses and exhaust system .....	4-43	4-126
	Lube piping .....	4-44	4-128
	Pneumatic piping .....	4-45	4-132
	Trailer components .....	4-46	4-136
	Coupler .....	4-47	4-140
	Emergency relay valve .....	4-48	4-142
	Air supply valve .....	4-49	4-144
	Air cleaner assembly .....	4-50	4-146
	Brake lines and hoses .....	4-51	4-150
	Air tank .....	4-52	4-153
	Junction box .....	4-53	4-154
	Clearance light .....	4-54	4-158
	Stop and turn light .....	4-55	4-160
	Trailer wiring harness .....	4-56	4-162
	Wheel and tire assembly .....	4-57	4-165
	Brake assembly .....	4-58	4-169
	Jack leg assembly .....	4-59	4-173
Section	VI. Preparation for storage and shipment .....	4-60	4-175
	Preservation .....	4-60	4-175
	Packing, shipment and storage .....	4-61	4-177
	Inspection in administrative storage .....	4-62	4-179
<b>Chapter</b>	<b>5. DIRECT SUPPORT MAINTENANCE INSTRUCTIONS</b>		
Section	I. Direct support troubleshooting .....	5-1	5-1
Section	II. Maintenance procedures .....	5-2	5-9
	Enclosure and skid assembly .....	5-2	5-9
	Doors .....	5-3	5-11
	Panel .....	5-4	5-13
	Transfer pump .....	5-5	5-14
	Fuel tank assembly .....	5-6	5-25
	Gear lube dispenser .....	5-7	5-29
	Engine oil dispenser .....	5-8	5-37
	Grease control valve .....	5-9	5-45
	Air, lube and grease hoses .....	5-10	5-51
	Air compressor assembly test .....	5-11	5-52
	Starter .....	5-12	5-53
	Alternator .....	5-13	5-58
	Air compressor .....	5-14	5-66

		Paragraphs	Pages
	Air compressor head.....	5-15	5-78
	Centrifugal unloader .....	5-16	5-85
	Air regulator .....	5-17	5-87
	Low pressure pump .....	5-18	5-89
	High pressure pump .....	5-19	5-102
	Lube tank .....	5-20	5-119
	Winterization control box .....	5-21	5-121
	A frame and skid assembly .....	5-22	5-123
	Power cluster .....	5-23	5-125
	Axle assembly .....	5-24	5-130
	Frame assembly .....	5-25	5-132
<b>Chapter</b>	<b>6. GENERAL SUPPORT MAINTENANCE INSTRUCTIONS</b>		
	Fuel tank .....	6-1	6-1
	A frame and skid assembly .....	6-2	6-3
	Frame assembly .....	6-3	6-5
<b>Appendix</b>	<b>A. REFERENCES</b> .....	A-1	A-1
<b>Appendix</b>	<b>B. MAINTENANCE ALLOCATION CHART</b> .....	B-1	B-1
<b>Section</b>	<b>I. Introduction</b>		
	General .....	B-1	B-1
	Maintenance functions .....	B-2	B-1
	Explanation of columns in the MAC .....	B-3	B-2
	Explanation of columns in tool and test equipment requirements .....	B-4	B-3
	Explanation of columns in remarks .....	B-5	B-3
<b>Section</b>	<b>II. Maintenance Allocation Chart</b> .....		B-4
<b>Section</b>	<b>III. Tools and test requirements</b> .....		B-7
<b>Section</b>	<b>IV. Remarks</b> .....		B-8
<b>Appendix</b>	<b>C. COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST</b>		
<b>Section</b>	<b>I. Scope</b> .....	C-1	C-1
	General .....	C-2	C-1
	Explanation of columns .....	C-3	C-1
<b>Section</b>	<b>II. Components of end item</b> .....		C-2
<b>Section</b>	<b>III. Basic Issue Items</b> .....		C-5
<b>Appendix</b>	<b>D. ADDITIONAL AUTHORIZATION LIST</b>		
	NOT APPLICABLE		

		Paragraphs	Pages
<b>Appendix</b>	<b>E. EXPENDABLE AND DURABLE SUPPLIES LIST</b>		
Section	I. Introduction		
	Scope .....	E-1	E-1
	Explanation of columns .....	E-2	E-1
Section	II. Expendable and durable supplies list .....		E-2
<b>Appendix</b>	<b>F. ILLUSTRATED LIST OF MANUFACTURED ITEMS</b> .....		F-1
<b>Appendix</b>	<b>G. TORQUE TABLE</b> .....		G-1
 <b>TABLES</b>			
	2-1 Operator's Controls .....		2-1
	2-2 Preventive Maintenance Checks & Services .....		2-2
	3-1 Operator's Troubleshooting .....		3-4
	4-1 Unit PMCS .....		4-5
	4-2 Unit Troubleshooting .....		4-8
	4-3 Wire List .....		4-60
	4-4 Continuity Chart .....		4-120
	4-5 Wire List .....		4-124
	5-1 Direct Support Troubleshooting .....		5-2

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## Chapter 1

### INTRODUCTION

#### Section I. GENERAL INFORMATION

##### 1-1. SCOPE

Type of Manual: Operator, Unit, Direct Support and General Support Maintenance Manual.

Model Number and Equipment Name: Lubrication and Servicing Unit, Power Operated, Trailer Mounted (LST-178A-85).

Purpose of Equipment: To lubricate all types of equipment at remote locations.

##### 1-2. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS). Marine Corps forms and procedures used for equipment maintenance will be those prescribed by TM 4700-15/1 E.

##### 1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

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

##### 1-4. PREPARATION FOR STORAGE OR SHIPMENT

Instructions for preparation for storage or shipment are contained in Chapter 4, Section VI.

##### 1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)

If your lubrication and servicing unit needs improvement let us know. Send us an EIR. You, the user, are the only one who can tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it directly to Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. Marine Corps users mail it directly to Commanding General, MCLB (Code 808-1), Albany, Georgia 31705. A reply will be furnished directly to you.

##### 1-6. WARRANTY INFORMATION

The Lubrication and Servicing Unit, Power Operated, Trailer Mounted (LST-178A-85) is warranted for two years from the date first placed into use by the Government, not to exceed beyond five years from date of initial delivery. The warranty starts on the date found in block 23, DA Form 2408-9 in the logbook. Report all defects in material and workmanship to your supervisor who will take appropriate action.

## Section II. EQUIPMENT DESCRIPTION

### 1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

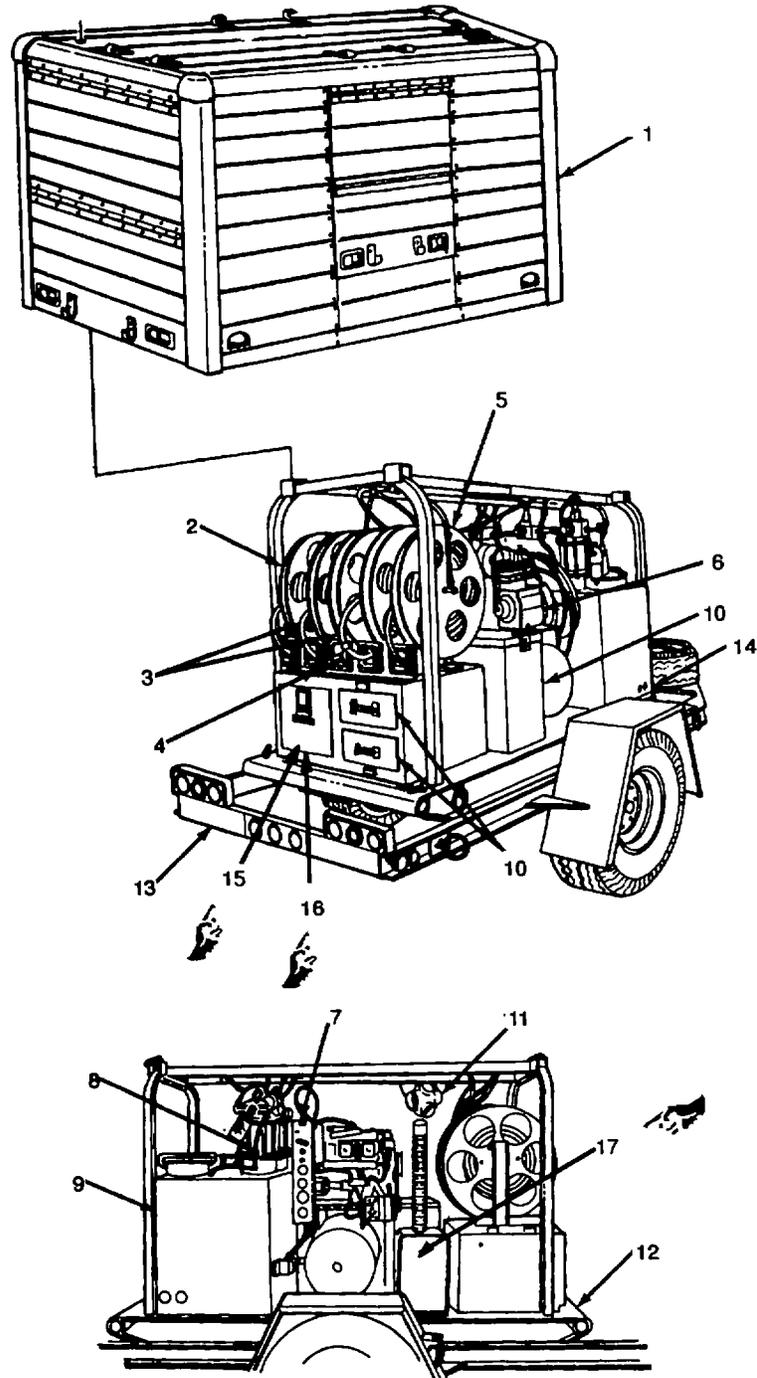
The lubrication and servicing unit provides a highly mobile servicing station for all types of self-propelled and stationary equipment.

- a. Self contained, mobile gasoline powered unit
- b. Can be towed by vehicles operating with 12 or 24 Vdc electrical systems
- c. Contains three lubricant storage tanks (grease, engine oil, and gear oil)
- d. Has four lubricant dispensers mounted on reels (two for grease, one each for engine oil and gear oil)
- e. Has air chuck mounted on a reel for air servicing
- f. Carries a transfer pump for pressurized dispensing from 55 gallon drums
- g. Has a set of hand guns, adapters, couplings, etc. on board for specialized lube jobs

### 1-8 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

- a. Enclosure (1). Gives protection to the skid subassembly parts from extremes in weather.
- b. Gear Lube Dispenser(2). Dispenses pressurized gear lubrication.
- c. Grease Control Valves (3). Dispense pressurized grease.
- d. Air Service (4). Used to service air fills parts (such as tires) or operate auxiliary equipment (such as transfer pump).
- e. Engine Oil Dispenser (5). Dispenses pressurized engine oil.
- f. Air Compressor Assembly (6). Generates and stores compressed air for use in dispensing lubricants.
- g. Control Panel (7). Contains operator control switches and gages.
- h. Lube Tank And Dispenser Pumps (8). Stores and pumps lubricants from lube tank compartments to dispensers.
- i. Transfer Pump (9). Used to pump lubricants from storage drums.
- j. Tool and Accessory Storage (10). Storage provided for tools and specialized lubricating equipment
- k. Winterization Assembly (11). Used to aid operation of equipment in cold weather by providing heated air to various parts.
- l. Skid Assembly (12). A removable base for attachment of lube and service parts.
- m. Trailer Assembly (13). A mobile platform for mounting the skid assembly. Provides brakes and lights for safety.
- n. Data Plates (14). These data plates contain trailer and manufacturer's identification.

- o. Batteries (15). Engine draws power from batteries in order to crank engine.
- p. Battery Box (16). Storage for batteries.
- q. Gas Tank (17).



## 1-9. EQUIPMENT DATA

Manufacturer .....	McGraw Commercial Equipment Co.
NSN .....	4930012300781
Type .....	Compressed air operated
Compressor drive .....	Gasoline engine
Lubricants dispensed .....	Grease, engine oil, and gear oil
Number of hose reels .....	5
Hose reel application .....	2
Grease .....	2
Engine oil .....	1
Gear oil .....	1
Compressed air .....	1
Type of mounting .....	Trailer
Brake Type .....	Air over hydraulic
Engine .....	Military Standard Engine refer to TM 5280520314
Air compressor	
Manufacturer .....	Comp Air Kellogg
Model .....	335 TVX
Type .....	Reciprocating Piston
Drive .....	BELT
Displacement .....	15 cfm (Cubic feet per minute)
Stroke .....	3 inch
Operating pressure .....	175 psi
Transfer pump	
Manufacturer .....	ALEMITE
Model No .....	72164
Operating Pressure .....	100 to 175 psi
Alcohol Injector	
Manufacturer .....	NORGREN
Model .....	LIZ
Lubricant Pumps	
Manufacture .....	ALEMITE
High pressure pump model .....	7785B5
High pressure pump ratio .....	40 to 1
Low pressure pump model .....	7793B
Low pressure pump ratio .....	12 to 1
Types of lubricants required	
High pressure pump .....	GENERAL PURPOSE GREASE
Low pressure pump .....	Engine and gear oil
Electrical System Skid	
Type .....	24 volts, negative ground
Number of batteries .....	2
Capacities	
Fuel tank .....	10 gallon
Hydraulic brakes system .....	5/16 quart
Alcohol Injector .....	1/2 pint
Lubricant storage bins	
Lubricating grease .....	175 lbs.
Lubricating gear oil .....	27 gallon
Lubricating oil .....	27 gallon
Dimension and weight	
Overall height .....	763/4 in.
Overall length .....	184 in.

Overall width .....	83.5 in.
Shipping weight .....	5500 lb.
Shipping cubage .....	758 cu ft
Center of gravity .....	See data plate

### Section III. TECHNICAL PRINCIPLES OF OPERATIONS

#### 1-10. MAJOR ASSEMBLIES

##### SKID SUB ASSEMBLY

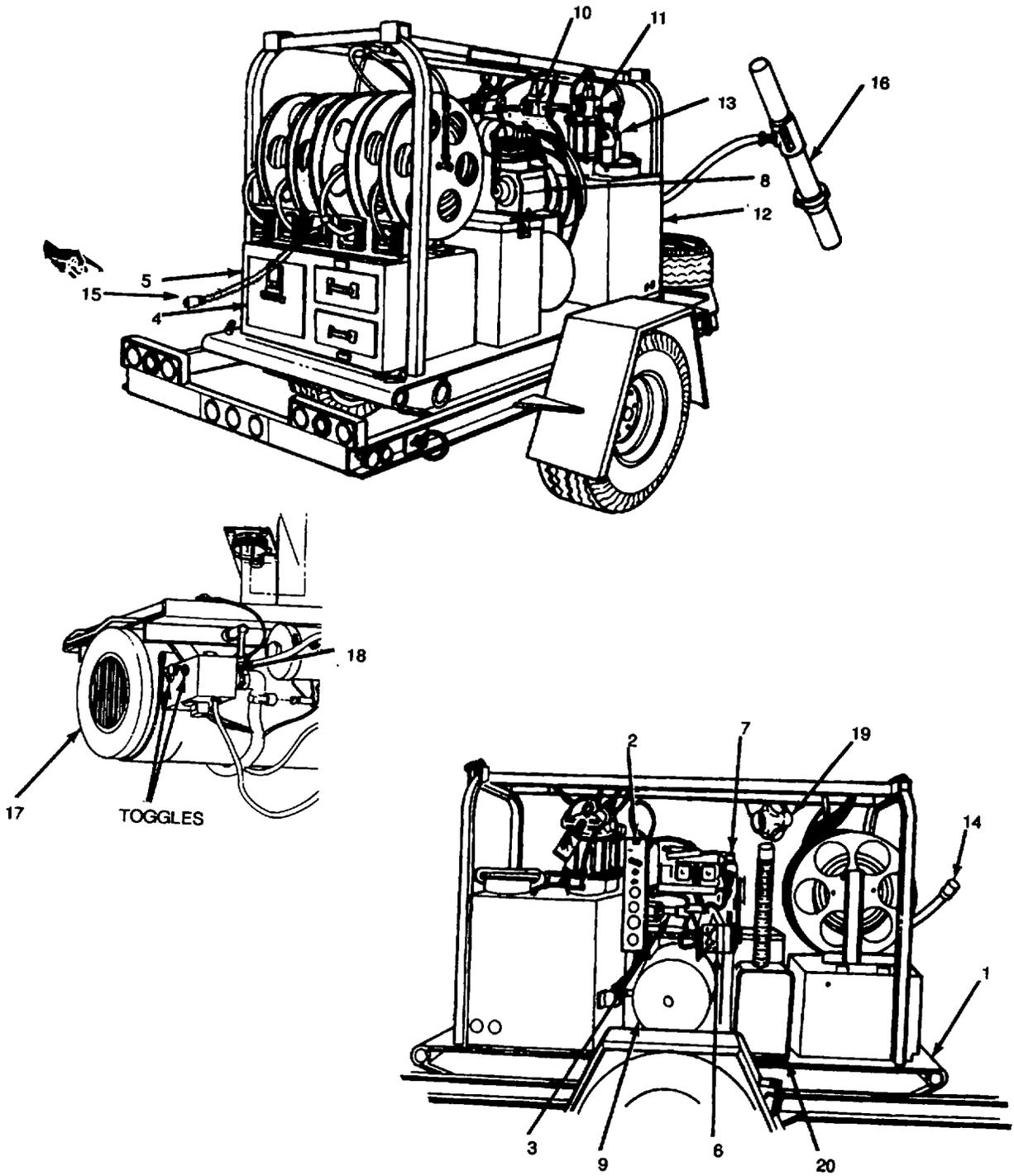
- a. The skid sub assembly (1) is a highly mobile self contained unit that is capable of dispensing various types of lubricants.

##### COMPRESSOR ASSEMBLY

- b. The control panel (2) contains the controls and gages required to operate the compressor assembly. There are two switches located on the control panel. These switches allow starting and continued operations of the air compressor assembly. The gages are provided to allow the user to monitor air compressor operations. Panel lights are provided to aid in night operations.
- c. The starter (3) draws power from the batteries in order to crank the engine. These batteries are stored in the battery box assembly (4) located in the reel cabinet (5). After startup, the belt driven alternator (6) supplies power for charging.
- d. The engine (7) supplies power to turn the air compressor (8) by way of two air compressor drive belts. A system of pressure and temperature switches protect the engine from operating when oil pressure is low or when crankcase temperature goes above a preset maximum. These switches automatically ground out the magneto, stopping the engine.
- e. As the compressor (8) turns, it provides air to the receiver tank (9). The receiver tank then stores the pressurized air until it is needed for servicing operations. There are two unloader systems built in to the air compressor. The first vents starting of the engine. The second receives air flow from the pilot valve and stops air compression when the air pressure reaches 175 psi. The pilot valve also releases a small amount of air to the air cylinder mounted on the engine (7). This air cylinder controls the throttle and will decrease engine rpm when pressure reaches 175 psi. As the engine throttles down, the clutch prevents the compressor drive belts from turning. This also stops air compression. If the pressure does raise above 200 psi, there is a pressure relief valve that pops off to vent excess pressure that could cause serious safety problems.

##### LUBE TANK

- f. The compressed air is sent to a separate regulator (10) for each of the low and high pressure pumps (11). This regulator controls the speed of the pump which affects the force that the lubricant is dispensed with. The low and high pressure pumps are mounted in the lube tank (12) and deliver the lubricant to the various dispensers. The lube tank has three compartments which contain engine oil, gear oil and general purpose grease. During cold weather, the alcohol injector (13) can be used to prevent freezing of the air lines. The dispensers (14) are mounted at the end of hoses stowed on the reel cabinet assembly (5). The oil (gear and engine) dispensers are metered to allow control of the amount of lubricant delivered.



Change 1 1-6

- g. Also provided is an air service chuck (15). This chuck can be used to operate some of the auxiliary equipment such as the transfer pump (16). This pump is for direct dispensing of lubricant from bulk storage containers, such as 55 gallon drums.
- h. The reel cabinet assembly (5) also provides storage for certain tools and equipment.

#### **WINTERIZATION ASSEMBLY**

- i. The vehicle is also equipped with a winterization assembly to aid in starting and operating in extreme cold weather. The winterization heater (17) is operated using the control box (18). The heater provides warm air that travels to various parts such as the engine and air compressor through a system of hoses and ducts (19). The heater receives its fuel from the same tank (20) that provides fuel to the air compressor engine, although the heater has a separate fuel pump.

#### **TRAILER**

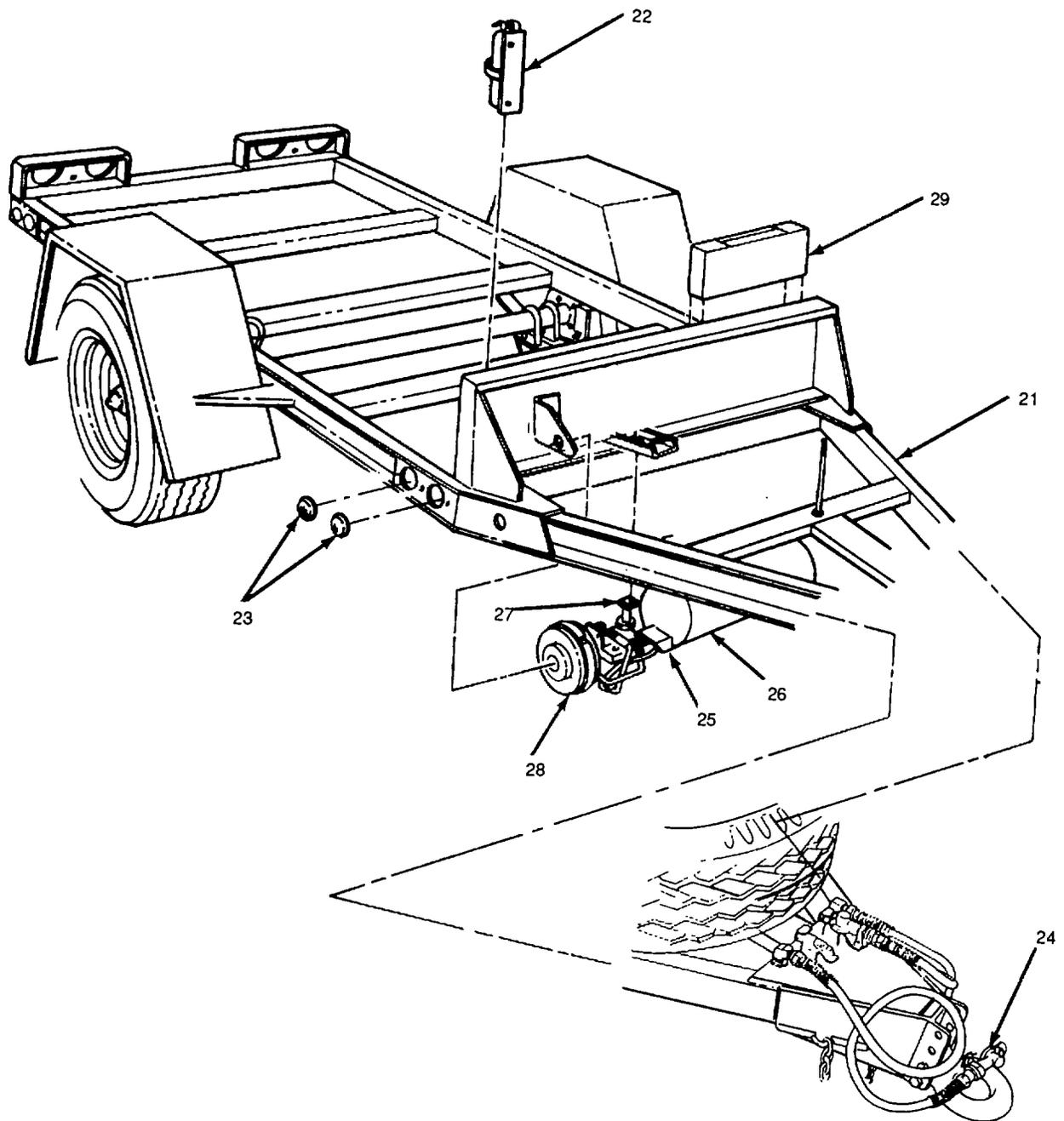
- a. The trailer (21) provides a mobile platform for the skid sub assembly. The trailer includes such safety features as a fire extinguisher (22), reflectors (23), and an air over hydraulic brake system.

#### **AIR BRAKES**

- b. The trailer brake system is connected to the towing vehicle by the emergency and service brake couplers (24). The air is then directed to the emergency relay valve (25). This valve sends the air received from the emergency brake coupler to the air tank (26). This is used to apply the emergency brakes should there be a sudden pressure drop sensed in the emergency brake line (such as during a trailer break away). The air stored in the air tank can also be used to apply the parking brake when the air supply valve (27) is activated. The air received through the service brake line is sent to the power cluster (28). The power X cluster converts the air pressure into hydraulic pressure by use of an air cylinder and a master brake cylinder. The hydraulic fluid is sent to the service brakes through tubing to apply the brakes up on operator demand.

#### **ELECTRICAL**

- c. The trailer is also equipped with 12 Vdc clearance, turn signal and tail lights that are activated along with those of the towing vehicle. The electrical power for these lights can be received in either 12 or 24 volts and is converted to the correct voltage in the junction box (29).



## Chapter 2

### OPERATING INSTRUCTIONS

#### Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROL INDICATORS

##### 2-1. GENERAL

The lubrication and servicing unit operator's controls and indicators provide the means to ensure safe and trouble-free operation in all conditions. Constant monitoring of the instruments is required to stop problems before they start.

##### 2-2. OPERATOR'S CONTROLS

Table 2-1. OPERATOR'S CONTROLS

KEY	CONTROL OR INDICATOR	FUNCTION
1	PANEL LIGHTS	Light controls and indicators for night operators.
2	IGNITION/START SWITCH	Allows engine to run or stops it by grounding the magneto and cranks engine to start.
3	COLD START SWITCH	Allows oil pressure to increase aiding cold weather engine starts.
4	THROTTLE CONTROL	Control maximum engine operating speed. Locks speed setting by turning clockwise.
5	CHOKE CONTROL	Pulls out to aid cold engine starting. Pushes in when engine is warm to maintain smooth operation.
6	AIR PRESSURE GAGE	Indicates air receiver tank pressure.
7	OIL PRESSURE GAGE	Indicates engine oil pressure.
8	AMMETER	Indicates the rate of charge or discharge of the batteries in amps.
9	FUEL LEVEL GAGE	Indicates level of fuel in tank.

Table 2-1. OPERATOR'S CONTROLS - CONTINUED

KEY	CONTROL OR INDICATOR	FUNCTION
10	ALCOHOL INJECTOR ADJUSTING SCREW	Controls flow of alcohol into air system to prevent freezing during cold weather.
11	ALCOHOL INJECTOR SIGHT GAGE	Shows level of alcohol in reservoir.
12	AIR REGULATOR	Adjusts air pressure sent to the lube pumps. One regulator is supplied for each pump.
13	AIR PRESSURE GAGE	Shows air pressure at lube pump to permit air regulator adjustment.
14	FLOW BACK VALVE	Sends lubricants from pumps back to the lube tank and vent line pressure. One valve is supplied for each pump.

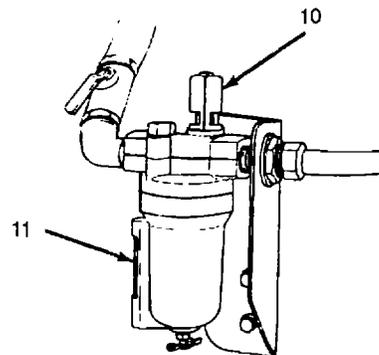
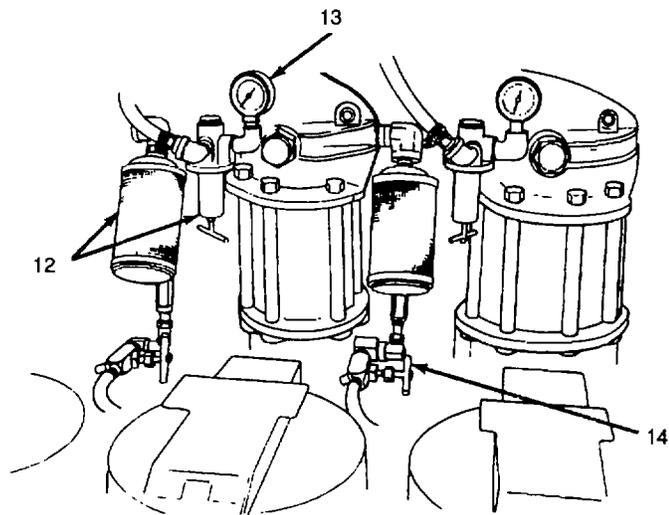
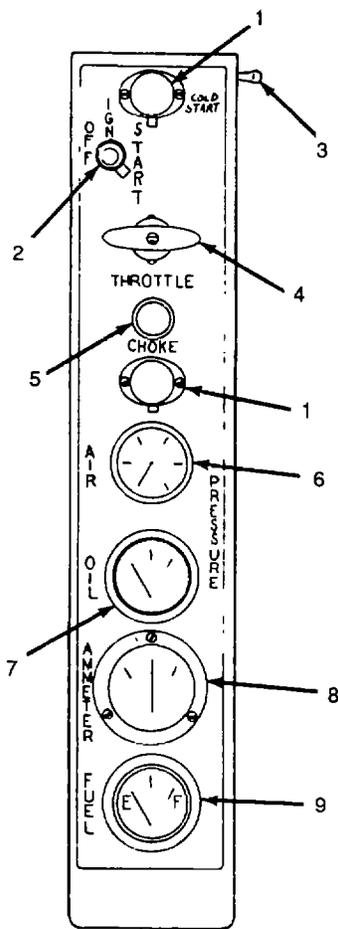


Table 2-1. OPERATOR'S CONTROLS - CONTINUED

KEY	CONTROL OR INDICATOR	FUNCTION
15	DRAW VALVE LEVER	Activates valve to drain moisture and air pressure from air receiver tank
16	AIR SERVICE HOSE	Connection point for air tools, chucks and auxiliary equipment.
17	GEAR OIL DISPENSER	Allows controlled dispensing of gear oil. Measures to the pint.
18	ENGINE OIL DISPENSER	Allows controlled dispensing of engine oil. Measures to the quart.
19	GREASE CONTROL VALVE	Dispenses general purpose grease.
20	HOSE REEL LOCKS	Locks hose reel to prevent excessive hose from unwinding.

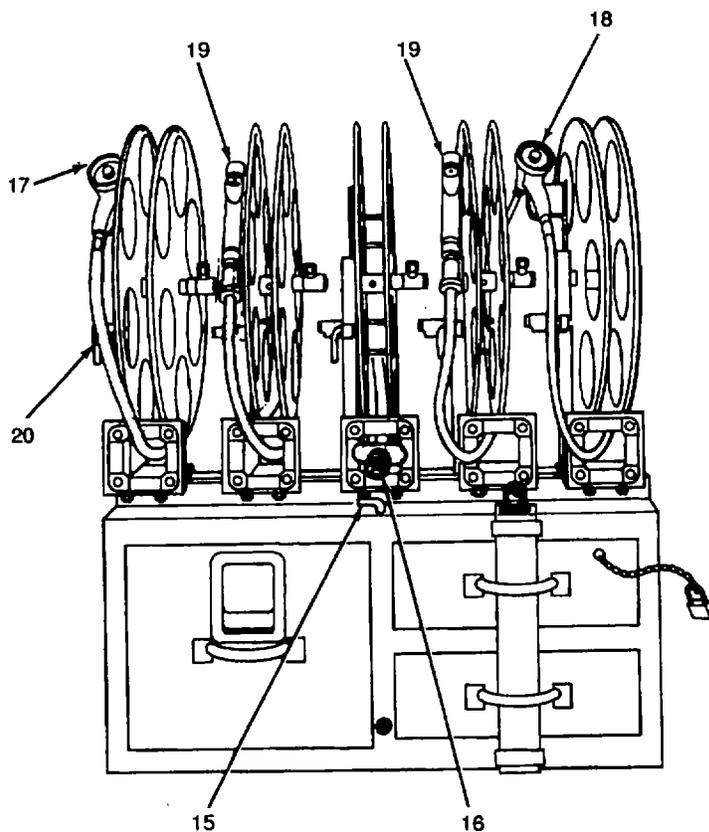


Table 2-1. OPERATOR'S CONTROLS - CONTINUED

KEY	CONTROL OR INDICATOR	FUNCTION
21	EXHAUST DIVERTER	Controls flow of exhaust either to provide warming to lube tank or vent exhaust to the atmosphere.
22	PRESSURE VALVE	Protects air compressor system from excessive pressure build up. Pulling ring provides a check of operation.

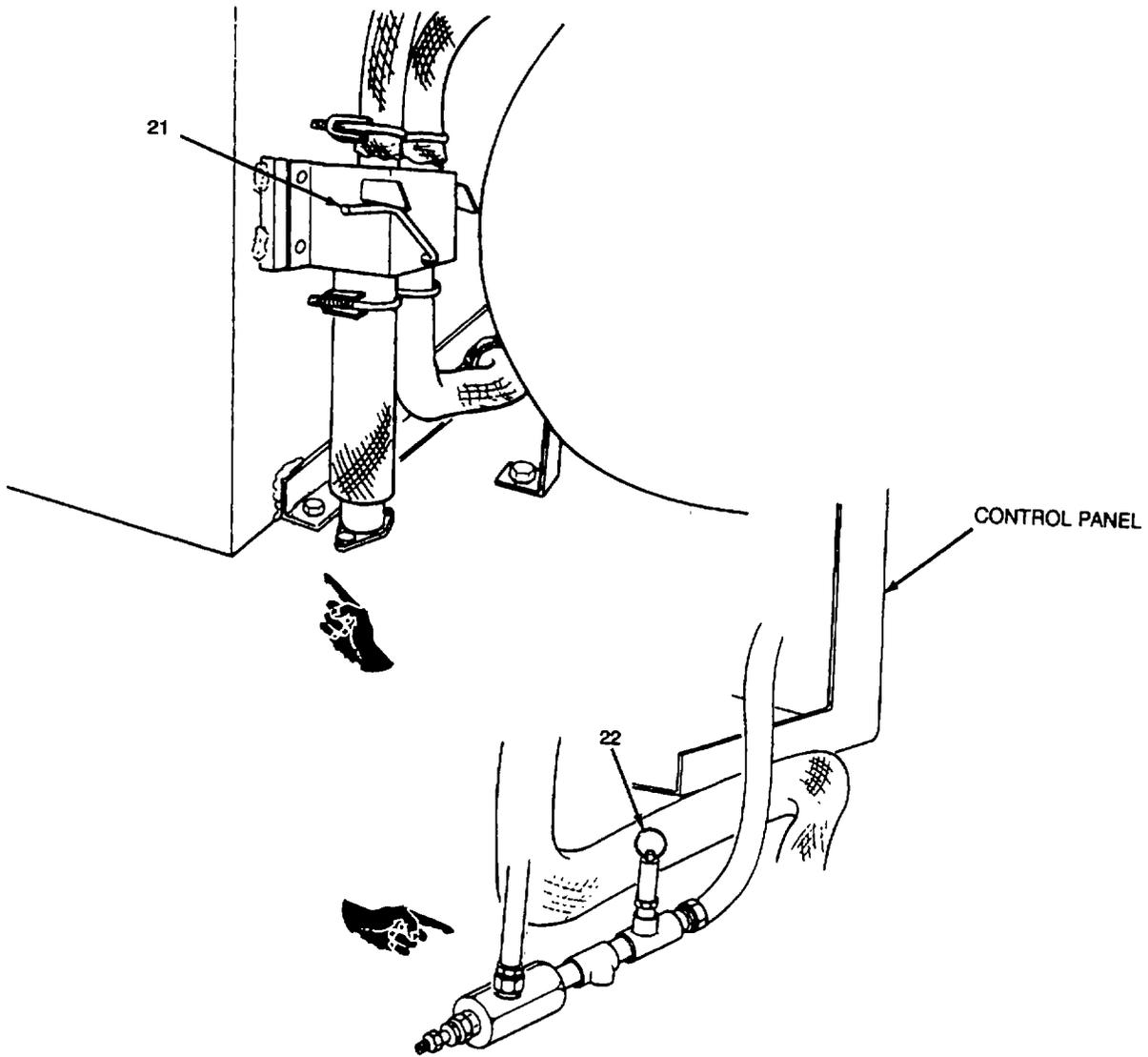
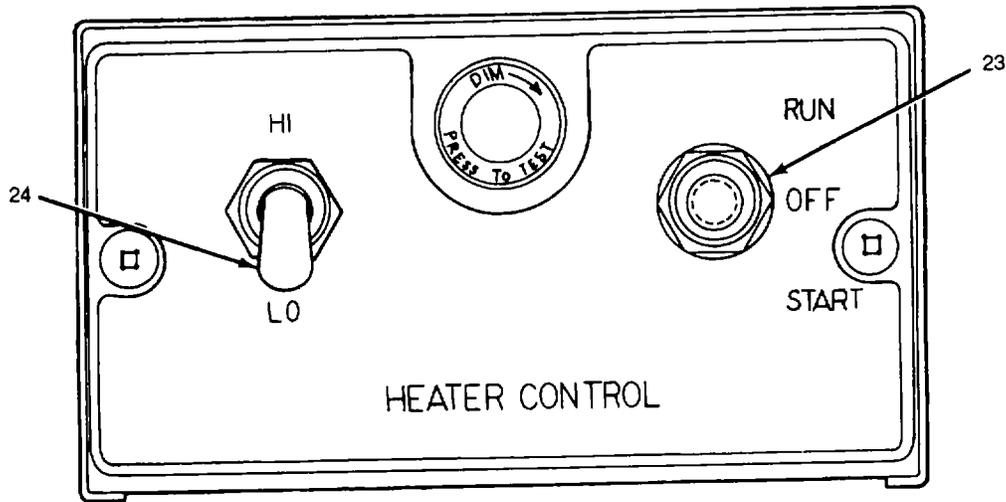


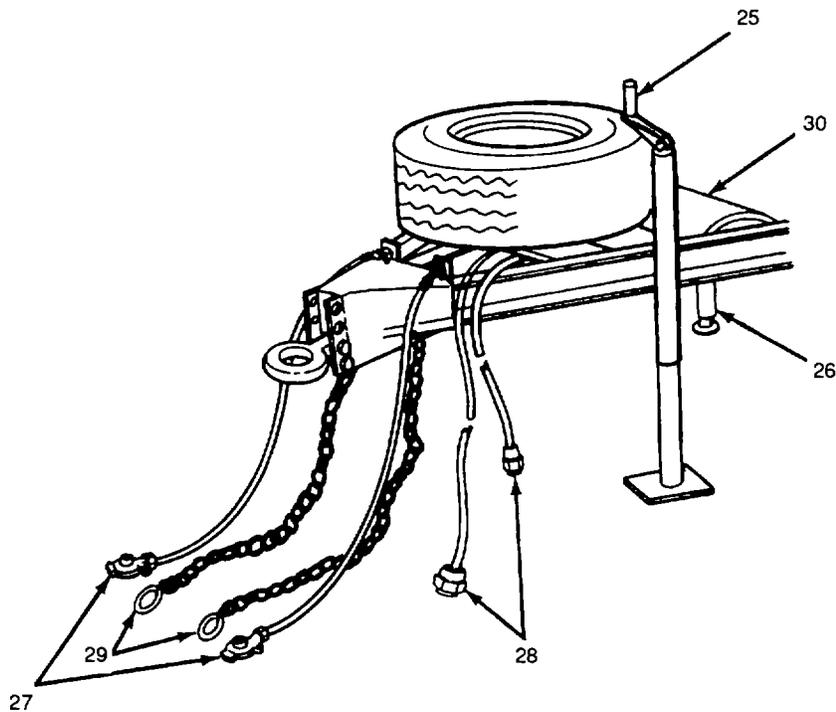
Table 2-1. OPERATOR'S CONTROLS - CONTINUED

KEY	CONTROL OR INDICATOR	FUNCTION
23	WINTERIZATION START SWITCH	Starts winterization heater.
24	HEAT LEVEL SWITCH	Controls winterization heater.



**Table 2-1. OPERATOR'S CONTROLS - CONTINUED**

KEY	CONTROL OR INDICATOR	FUNCTION
25	JACK CRANKING HANDLE	Extends or retracts jack.
26	AIR TANK DRAIN	Drains moisture and air pressure from air brake system.
27	AIR BRAKE COUPLERS	Connects trailer air brake system to that of the towing vehicle.
28	ELECTRICAL CONNECTORS 24 VOLT AND 12 VOLT	Connects trailer electrical system to the towing vehicle.
29	SAFETY CHAINS	Provides a safety factor when the trailer is attached to the towing vehicle.
30	PARKING BRAKE AIR SUPPLY VALVE	Protects parking brake system from excessive pressure build up.



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

### 2-3. GENERAL

- a. Before you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before PMCS.
- b. While you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during PMCS.
- c. On a weekly basis. Be sure to perform your weekly PMCS.
- d. If your equipment fails to operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750. Marine Corps users see TM 4700-15/1 E.

### 2-4. OPERATOR PMCS TABLE (Table 2-2.)

- a. Always do your PREVENTIVE MAINTENANCE in the same order so that it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.
- b. If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to unit maintenance RIGHT NOW.
- c. When you do your PREVENTIVE MAINTENANCE, take along the tools you need to make all the checks. You always need a rag or two.
- d. Bolts, nuts and screws: Check them all for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it, or report it to unit maintenance if you can't tighten it.
- e. Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to unit maintenance.
- f. Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.
- g. Hoses and fluid lines: Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, of course. But a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to unit maintenance.

**CAUTION**

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, NOTIFY YOUR SUPERVISOR

When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.

Class III leaks should be reported to your supervisor or Intermediate Direct Support Maintenance

- h. It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER WHEN IN DOUBT NOTIFY YOUR SUPERVISOR!

**Leakage Definitions for Unit PMCS**

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.

Table 2-2. Preventive Maintenance Checks and Services

Item No	Interval	Item To Check/ Service	Procedures	Not Fully Mission Capable If:
1.	Before	Fuel Tank	Inspect fuel tank and fuel lines for leaks or damage.	The fuel system is leaking or damaged.
2.	Before	Reel Cabinet Assembly	<p style="text-align: center;"><b>WARNING</b></p> <p style="text-align: center;"><b>Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which can explode causing severe injury or DEATH.</b></p> <p>Inspect batteries and battery cables for damage or loose connections.</p>	The batteries or battery cables are missing or damaged.-
3.	Before	Air Compressor Assembly	<p>a. Inspect air compressor and alternator drive belts for looseness, wear or damage.</p> <p>b. Inspect air compressor head assembly for damage or leaks.</p> <p>c. Inspect exhaust diverter and hoses for damage or leaks.</p> <p>d. Perform engine PMCS as required - by TM 9-2805-262-14.</p>	<p>The drive belts are loose, worn, damaged or missing.</p> <p>The head assembly is damaged or leaking.</p>
4.	Before	Lube Tank Assembly	<p>a. Check alcohol injector for alcohol level (para 3-5) if operation is to take place in cold weather.</p> <p>b. Inspect lube tank for proper lubricant levels. Fill as required (para 2-5).</p> <p>c. Inspect lube tank compartments for contamination.</p>	The lubricant is contaminated by water, dirt etc.
5.	Before	Winterization Assembly	Inspect fuel line, fuel pump and heater for leaks or damage.	Fuel is leaking.
6.	Before	Lube and Pneumatic Piping	Inspect lube and pneumatic piping for leaks, kinks, or damage.	The lube and pneumatic piping is missing, damaged or leaking.
7.	Before	Air Brake Assembly	<p>a. Inspect air brake couplers, emergency relay valve, air cleaners, power cluster, air supply valve, air tank, brake lines, tubes and fittings for leaks or damage.</p>	The air brake components are leaking, damaged or missing.

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

Item No	Interval	Item To Check/ Service	Procedures	Not Fully Mission Capable If:
8.	Before	Trailer, Electrical	<p>b. Drain air tank of all moisture by opening valve. Drain two air cleaners by removing bottom plug. Close valve and install plug.</p> <p>Inspect trailer lights for correct operation.</p>	The tail, turn or stop lights do not operate correctly.
9.	Before	Trailer Assembly	Inspect frame assembly for cracked or damaged welds, corrosion or warped and bent frame members.	The frame assembly has cracked or damaged weldments.
10.	Before	Axle Assembly	Check trailer tire pressure. Service if required (para 3-6).	
11.	During	Transfer Pump	Inspect transfer pump for proper operation, leaks or damage.	
12.	During	Reel Cabinet Assembly	Inspect oil and grease dispensers, air, lube and grease hoses and reel assemblies for correct operation, damage or leaking.	The dispensers or components are leaking, damaged or missing.
13.	During	Air Compressor Assembly	<p>a. Observe operation of air compressor assembly.</p> <p>(1) The pilot valve should automatically throttle the engine up and down to keep air receiver tank pressure at 140-175 psi.</p> <p>(2) Oil pressure should not drop to below 15 psi.</p> <p>(3) When engine is at idle, the clutch should disengage the compressor drive belts. They should not turn.</p> <p>b. Observe the operation of the starter.</p> <p>c. Inspect control panel gages for correct operation.</p> <p>d. Test operation of pressure relief valve by pulling up on ring when pressure in air receiver tank is between 140 - 175 psi.</p>	<p>The air compressor assembly does not operate correctly.</p> <p>The starter does not crank the engine.</p> <p>Gages are illegible or not working.</p> <p>The pressure relief valve does not "pop off".</p>

**Table 4-2. Preventive Maintenance Checks and Services - (Continued)**

Item No	Interval	Item To Check/ Service	Procedures	Not Fully Mission Capable If:
14.	During	Winterization Assembly	Inspect control box, wiring harness, heater and fuel pump for correct operation. Inspect heater ducts and hoses for leaks or damage. These inspections are only required during operation in cold weather where the winterization assembly will be used.	The winterization assembly does not operate correctly.
15.	Weekly	Enclosure	Inspect enclosure doors for correct operation or damage.  <b><u>WARNING</u></b> <b>Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which can explode causing severe injury or DEATH.</b>	
16.	Weekly	Reel Cabinet Assembly -	Inspect batteries for proper electrolyte level. Add distilled water to bring level up to completely cover plates.	
17.	Weekly	Air Compressor Assembly	a. Inspect the engine starter, alternator wiring harness and control panel electrical components for damaged or loose connections. b. Inspect compressor air filter for dirt and clogging. Replace if necessary (para 3-5)	If the air compressor assembly electrical components are damaged or missing.
18.	Weekly	Lube Tank Assembly	Inspect alcohol injector, air regulators, and low and high pressure lubricant pumps for leaks, damage and correct operation.	The lube tank components are not working, missing or damaged.
19.	Weekly	Trailer electrical	Inspect trailer lights, wiring harness, and junction box for loose connections - or damage.	
20.	Weekly	Trailer assembly	Inspect frame assembly for cracked or damaged welds, corrosion or warped and bent frame members.	The frame assembly has cracked or damaged weldments.
21.	Weekly	Axle Assembly	Inspect trailer tires for cuts or worn tire tread. Inspect wheel for damage, cracks and out of roundness.	Trailer tires and wheels are damaged, worn or missing.

### Section III. OPERATION UNDER USUAL CONDITIONS

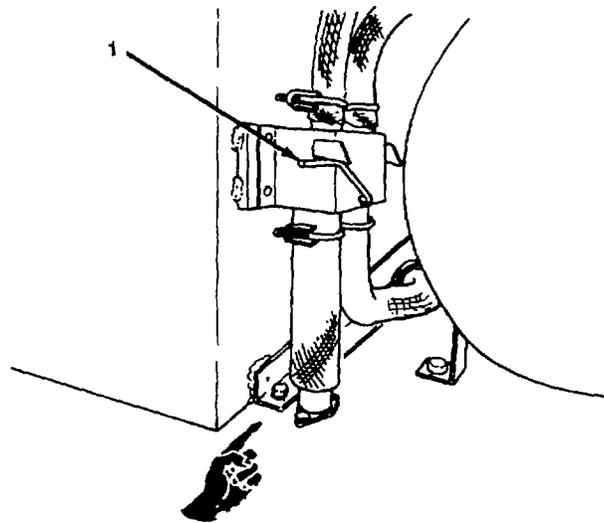
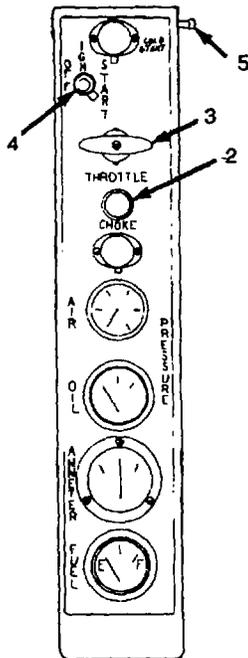
#### 2-5. OPERATION PROCEDURE

##### NOTE

Before operating lubrication and servicing unit, be sure that Before preventive maintenance checks and services are performed.

##### a. Engine Starting

- (1) Push the engine exhaust diverter (1) into position to direct the engine exhaust gases to the atmosphere outside the unit. Do not operate exhaust diverter (1) when engine is running.



##### **WARNING**

**Do not operate the engine indoors without taking precautions to vent the exhaust gases. Engine exhaust contains carbon monoxide, a colorless, odorless, deadly poisonous gas.**

- (2) Pull out the choke control (2).
- (3) Open the throttle control (3) about 1/2 inch. Turn control clockwise to lock in position.
- (4) Place the ignition switch (4) to IGN.

**CAUTION**

**When cranking the engine, you must take care to prevent starting motor overheating. Limit your cranking intervals to 30 seconds and wait 2 minutes between attempts if the engine does not start the first time. If the engine does not start after you have cranked it four or five times, refer problem to unit maintenance.**

5. Turn ignition switch (4) to start.

**NOTE**

**For cold weather conditions hold cold start switch (5) on until oil pressure builds to 30 psi.**

6. When engine starts, release ignition switch (4).
7. Throttle control (3) should be pulled all the way out for normal operation after engine reaches operating temperature.

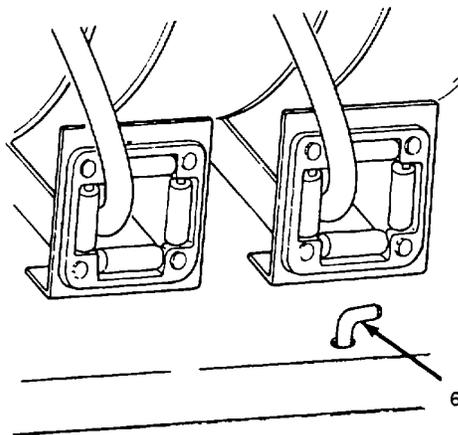
**NOTE**

**Engine rpm under load should be 3200 rpm. See TM 5-2806-208-14 for engine rpm adjusting instructions.**

8. As the engine warms up, push in the choke control (2) in increments to maintain smooth engine operation with minimum choke setting. You should have the choke control (2) pushed in fully before the engine reaches operating temperature.

b. Engine Stopping

1. If the engine has been running under heavy compressor load and is hot, push in the throttle control (3) to run the engine at idle until it cools (2 minutes). When the engine has cooled enough to dissipate the heat caused by the heavy load, push in the throttle control (3) fully.
2. Move the ignition switch (4) to OFF to stop engine.
3. Drain moisture that has condensed in the air receiver tank by turning lever (6) to open drain valve. After moisture is drained, close drain valve.



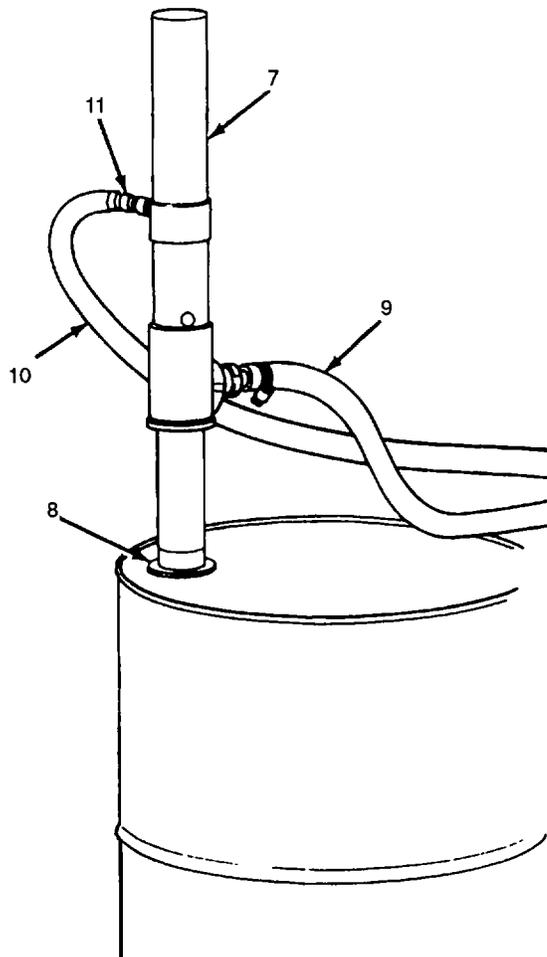
c. Filling Lube Tank

1. Start engine (paragraph 2-5 a)
2. Make sure the air receiver drain valve is closed by turning lever (6).
3. Air pressure in the tank will automatically build up to 175 psi. This pressure is preset to cut out at 175 psi and cut in at 140 psi.
4. Allow pressure to build until the air pressure gage shows a reading of between 140 and 175 psi air pressure.
5. Remove the transfer pump (7) and bung adapter (8) from its mounting and install in drum of lubricant to be dispensed. You cannot use the transfer pump (7) to pump heavy grease. Grease must be hand-packed in the dispenser tank.
6. Remove the transfer pump hose assembly (9) from the tool box assembly and install on the transfer pump assembly.
7. Pull out the air service hose (10) from the center reel assembly and attach it to the transfer pump (7).
8. Open the manhole of the lube tank compartment to be filled and insert the transfer hose.
9. Open the air valve (11) to the required volume.
10. When lube tank is filled, close air valve (11).

**NOTE**

**Always keep lubricant containers three-quarters full.**

11. Disconnect air service hose (10) and return to stowage position.
12. Remove transfer pump (7) and bung adapter (8) from lubricant drum.
13. Clean and store the transfer pump (7) and hose (9) in their respective positions.
14. Shut down engine (paragraph 2-5 b).
15. Open the air receiver drain valve by turning lever (6) to drain moisture and air pressure from the air receiver tank.

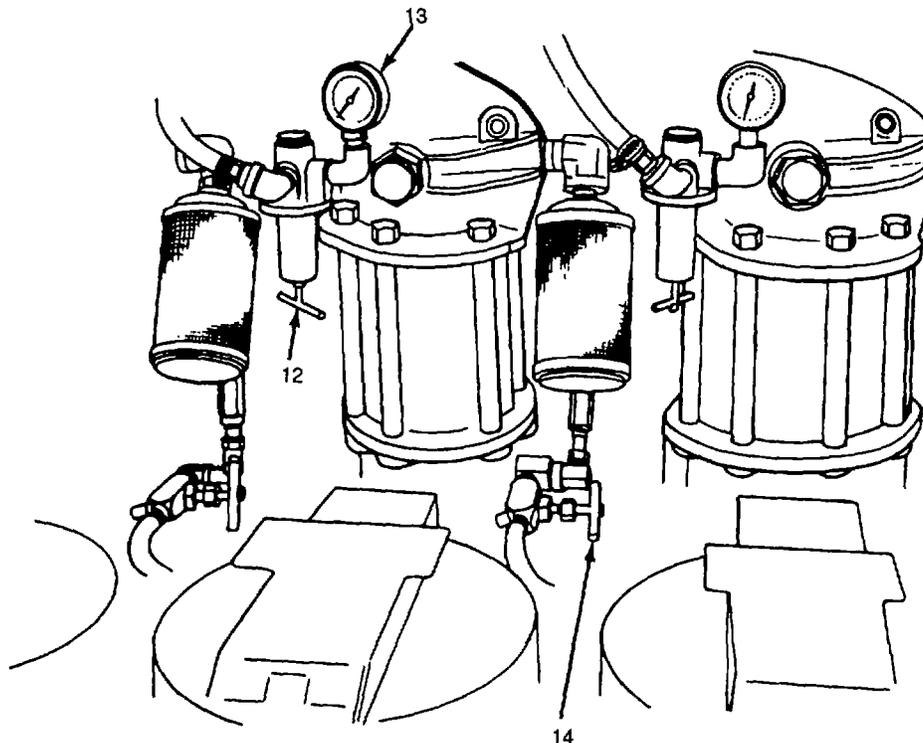


d. Preparing Lubricant Pumps For Operation.

1. Start engine (paragraph 2-5 a) and allow pressure to build to 140-175 psi.
2. Turn the handles of the air pressure regulators (12) clockwise, until set at the desired air pressure (100 psi), as registered on the air pressure gages (13).
3. Air pressure to each pump must be adjusted at the individual pump. Turn the handle of the air pressure regulator (12) clockwise to increase air pressure, and counterclockwise to decrease air pressure. The exact air pressure to operate pumps must be based on delivery rate required and viscosity.
4. Open the circulating valve (14) of each pump by turning the valve handle two full turns counterclockwise.
5. After charging pump with lubricant, close each circulating valve (14) by turning it all the way clockwise.

**WARNING**

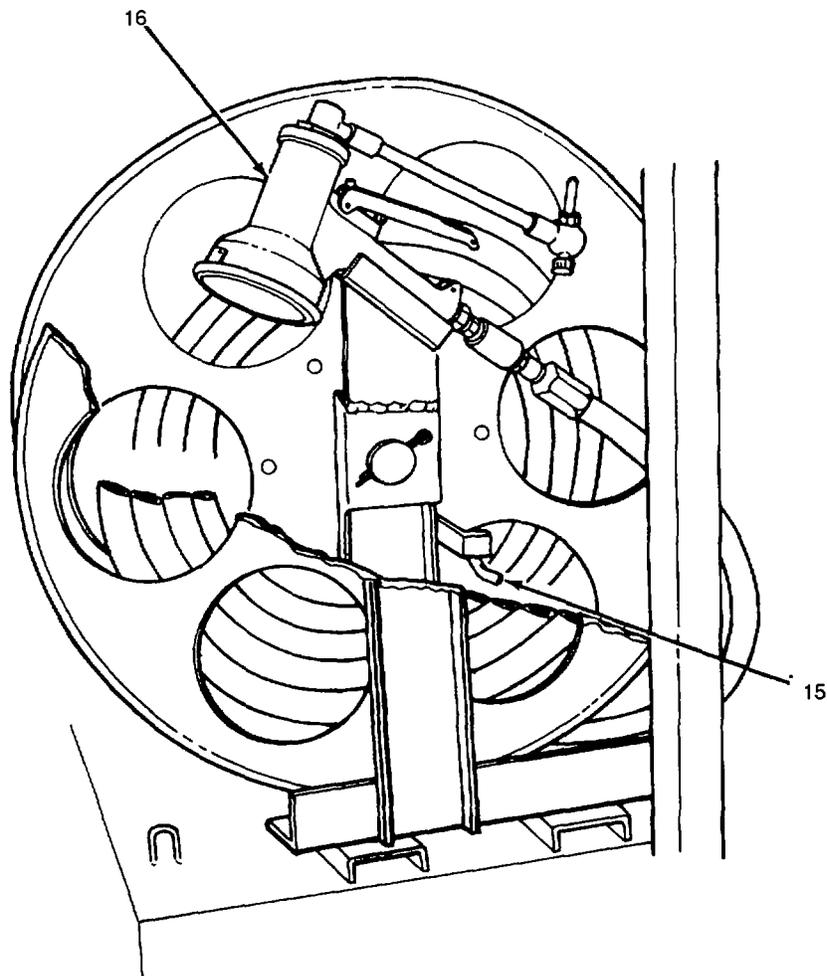
**Always wear safety glasses while operating lubrication and servicing unit. Failure to do so can lead to severe personal injury.**



**NOTE**

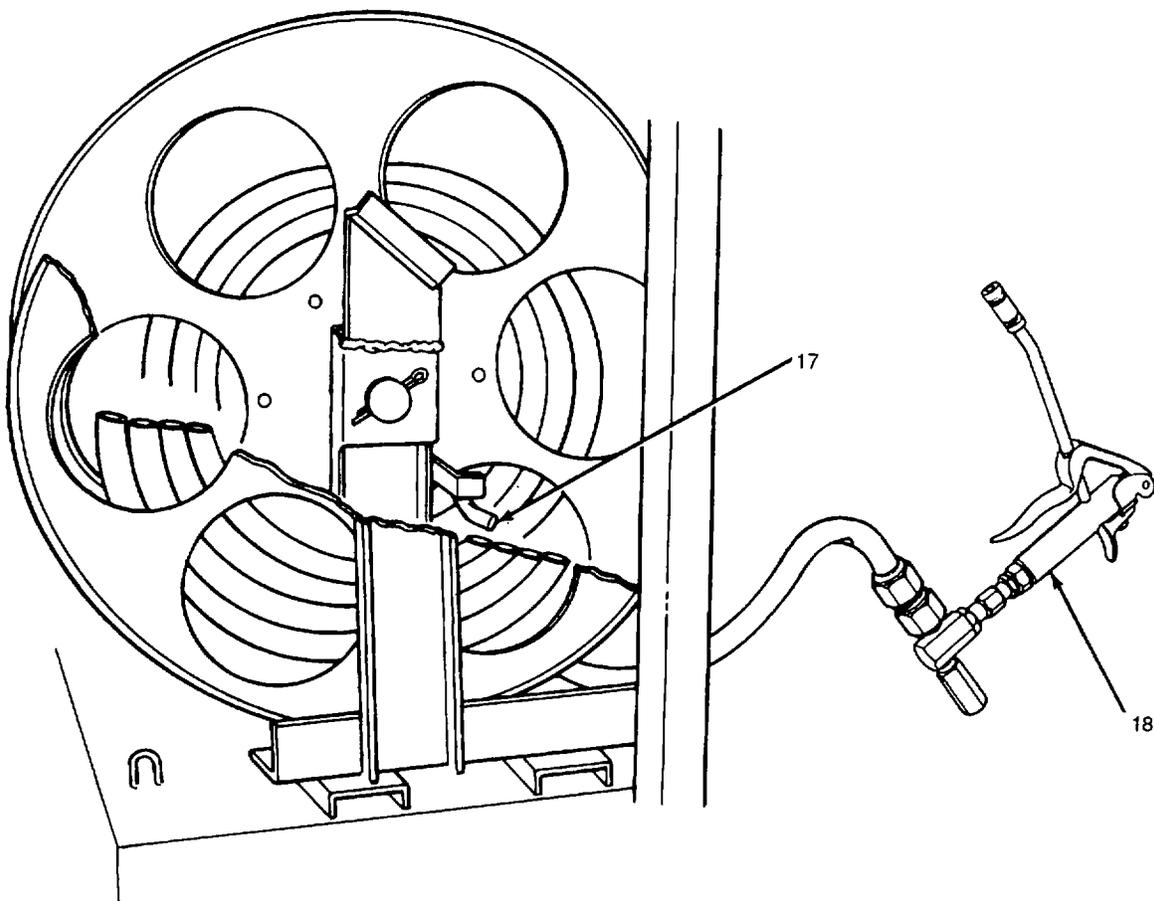
**The following steps 6 thru 9 apply to any of four dispensers.**

6. Open the hose reel access door, release the reel lock (15) of the lubricant reel to be used. Unhook the dispenser (16) from the bracket, and pull the hose from the reel.
7. Open the dispenser (16) by depressing the trigger. The pump will automatically fill the line and force lubricant through the dispenser nozzle or adapter as long as you hold the trigger depressed.
8. Allow lubricant to flow until the line has been purged of air, and no aerated lubricant is dispensed.
9. When you complete this operation on all four lubricant hoses, the lubricating unit is ready to dispense lubricants.



## e. Dispensing General Purpose Grease

1. Prepare the high pressure lubrication pump (center pump) for operation (paragraph 2-5 d).
2. Release the hose reel lock (17) from one of the general purpose grease reels (second or fourth reel) and pull out the required length of hose.
3. Select the proper adapter from the reel cabinet stowage drawers (paragraph 2-6) and connect it to the grease control valve (18).
4. Clean each grease fitting of the part being lubricated or you may force dirt into the bearing point. If necessary, replace a worn or damaged fitting from on board stock (stowed in reel cabinet). Attach the adapter to the fitting and squeeze the grease control valve (18) trigger.
5. When adequate lubricant is provided disconnect the adapter and go on to the next fitting.
6. When lubricating is complete, disconnect the adapter from the dispenser. Wipe it clean and return it to the equipment drawer. Rewind the hose on the reel and replace the dispenser on the bracket. Secure the hose reel lock (17).



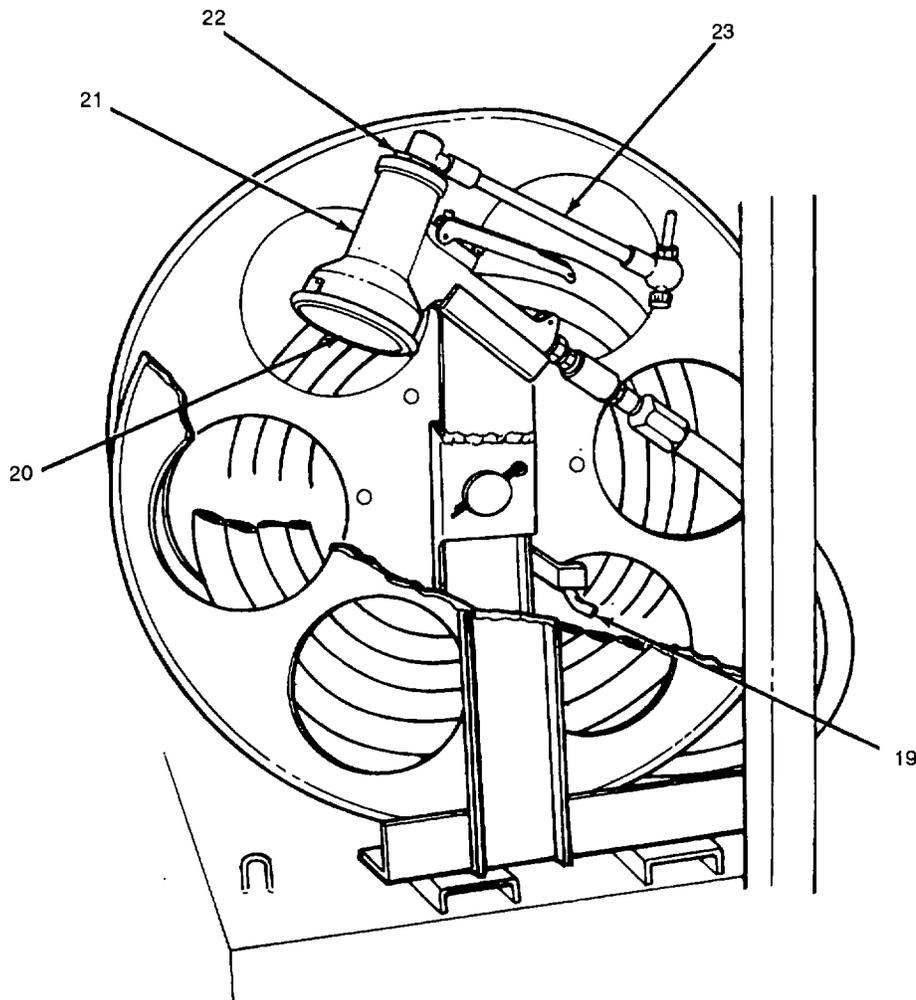
## f. Dispensing Gear Oil

1. Prepare the gear oil lubrication pump for operation (paragraph 2-5 d).

**CAUTION**

**Do not try to set the pointer beyond the "0" position or equipment will be damaged.**

2. Release the hose reel lock (19) and pull out the required length of hose. Set meter pointer (20) on the gear oil dispenser (21) to "0".
3. Loosen jam nut (22) and swivel extension (23) into convenient location for dispensing. Tighten jam nut (22).
4. Clean around the filler plug opening of the unit to be filled. Remove the filler cap or plug. Insert the valve nozzle into the filler opening and add the proper amount of oil.
5. Clean and replace the filler plug or cap.
6. Return swivel extension (23) to stowage position and rewind the hose, set the hose reel lock (19) and hang the gear oil dispenser (21) on the bracket.



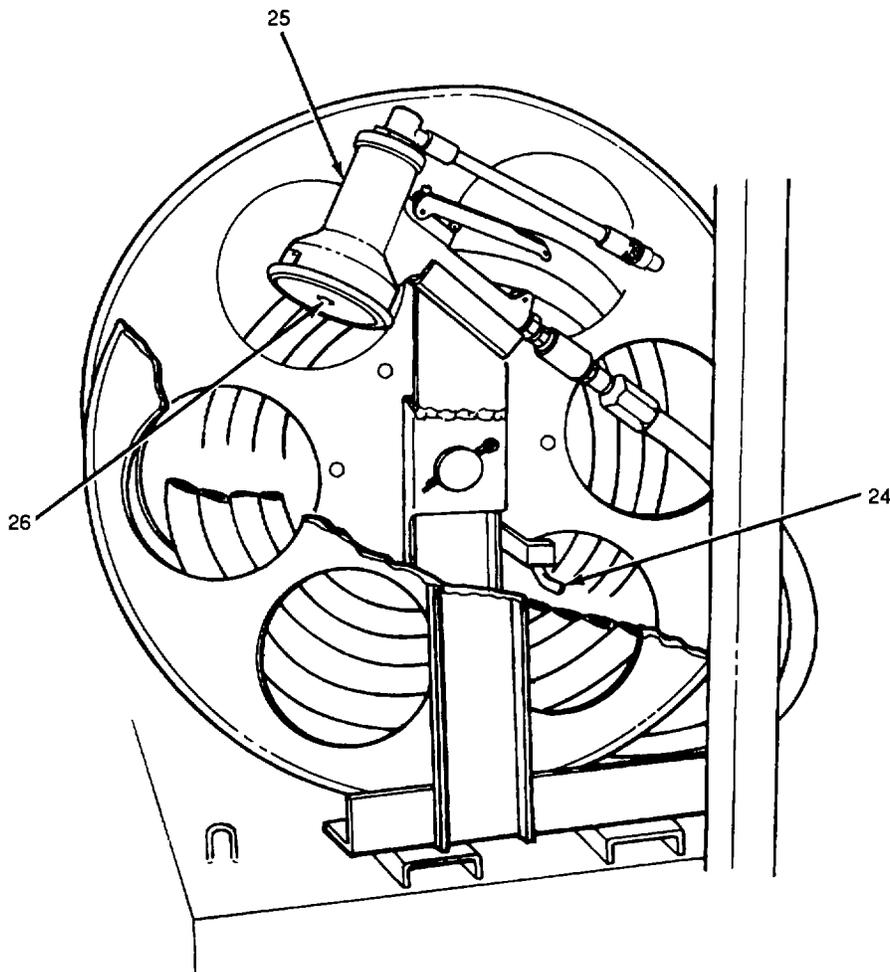
g. Dispensing Engine Oil

1. Prepare the engine oil lubrication pump for operation (paragraph 2-5 d).

**CAUTION**

**Do not try to set the pointer beyond the "0" position or equipment will be damaged.**

2. Release the hose reel lock (24), remove the engine oil dispenser (25) from the bracket, and pull out the desired amount of hose.
3. Set the meter pointer (26) on the dispenser (25) to "0".
4. Clean around the filler plug. Remove filler plug, insert nozzle, and fill reservoir to proper level. Quantity will be indicated on the engine oil dispenser (25).
5. Clean and replace plug. Rewind hose, set hose reel lock (24), and return dispenser (25) to bracket.



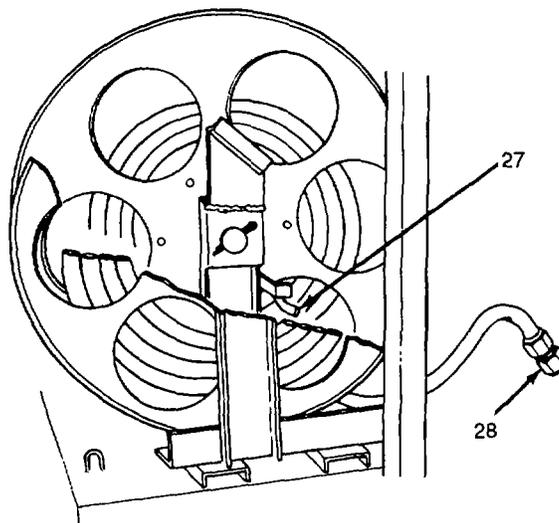
h. Use of Air Chuck

1. Release reel lock (27) and unwind hose as required.
2. Place auxiliary equipment onto quick disconnect (28).

**WARNING**

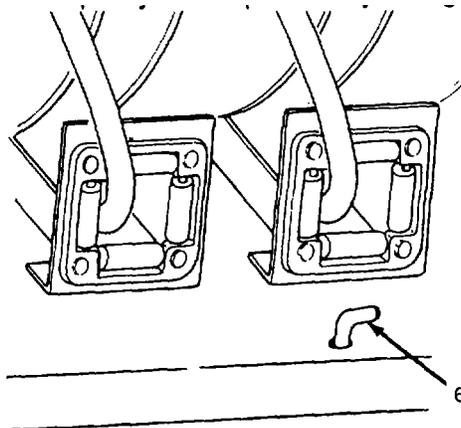
**Do not use compressed air for blowing dirt from your clothing or skin. Air can enter body openings and cause severe injury or death. Avoid horseplay with compressed air.**

3. After air service operations have been performed, rewind the air hose onto reel and lock. Remove auxiliary equipment from quick disconnect (28) and remove to stowage.



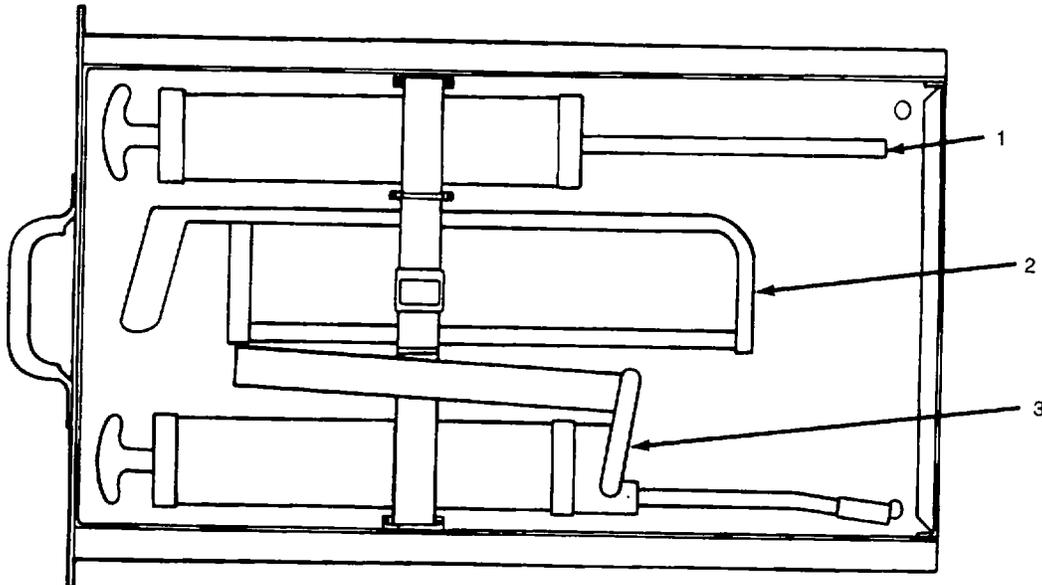
i. Shutdown Procedures

1. Stop the engine (paragraph 2-5 b).
2. Open air drain valve to completely vent air pressure by turning lever (6).

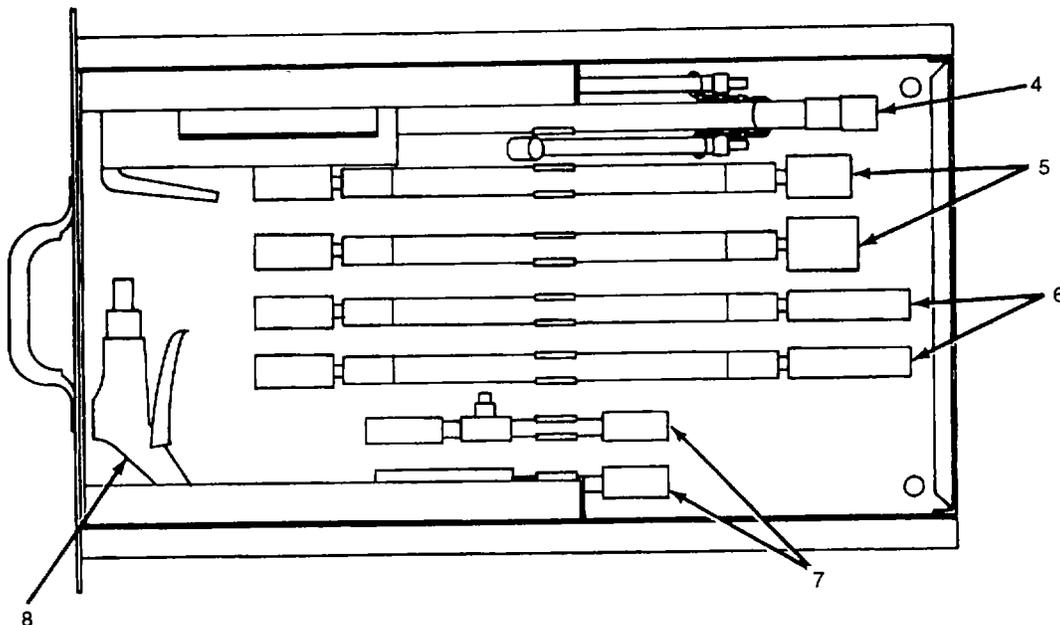


## 2-6. OPERATION OF AUXILIARY EQUIPMENT

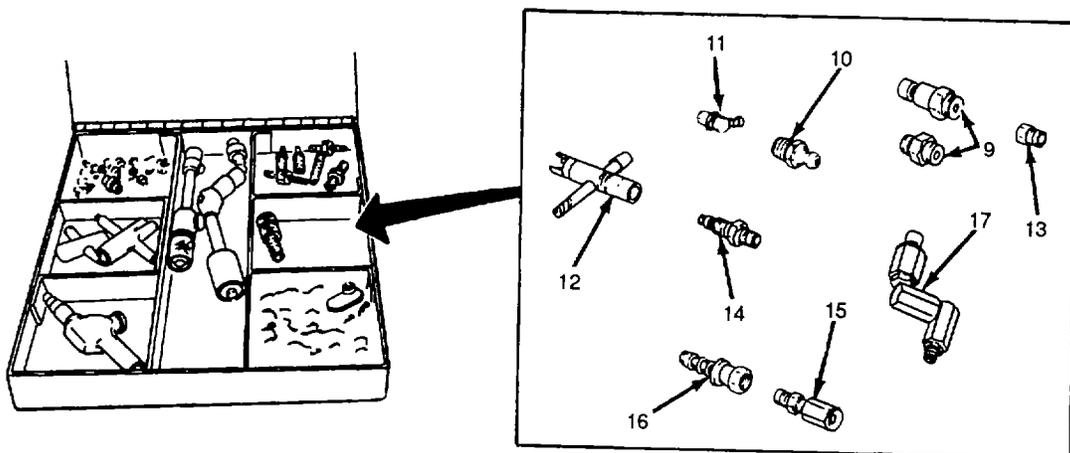
- a. Suction Gun (1). You can use the suction gun to empty or fill transmissions, differentials, or any part of a vehicle that requires emptying, other than by draining through a bottom outlet. Fill the suction gun by inserting the nozzle into the oil or fluid. Pull out the handle as far as it will go. When you use the suction gun for filling purposes, it is operated by inserting the nozzle in the oil hole. Push the handle forward until a sufficient quantity of oil has been delivered. When you use the suction gun for draining purposes, it is operated by inserting the nozzle into the drain hole of the housing. Pull out the suction gun handle as far as it will go, and a gun full of fluid can be removed. To empty, you must remove the nozzle from the drain hole and push in the handle as far as it will go.
- b. Hacksaw Frame and Blade (2). The hacksaw frame and blade, for use in cutting hose when replacing reusable hose and fittings.
- c. Hand Lever Grease Gun (3). Use the high-pressure hand lever gun for dispensing lubricants in small quantities, or for dispensing special lubricants. When you operate the hand lever gun, you will get best results by taking full strokes with the lever handle. If you are using a heavy lubricant, it may be necessary to prime the lever gun occasionally. Special couplers and adapters provide adaptation to all types of fittings. To fill the lever gun, proceed as follows:
  - (1) Unscrew head and lever from cylinder.
  - (2) Engage follower and push into a full stop.
  - (3) Place open end of the cylinder into lubricant approximately 2 inches.
  - (4) If barrel is not completely full, pack tightly by hand to eliminate air pockets.
  - (5) Replace head and lever assembly.



- d. Tire Inflator, Pressure Gage and Chucks (4). An air chuck and gage with quick-operating air line coupling nipple, used for inflating tires, is located in the upper drawer compartment.
- e. Flexible Extension Adapter (5). Two giant buttonhead whip-end hoses, each with a 500 psi pressure relief valve, and equipped with giant buttonhead fittings, are part of the auxiliary equipment on the lubricating unit and are stored in the upper drawer compartment.
- f. Flexible Extension Adapter (6). Two standard buttonhead whip-end hoses, each with a 500 psi pressure relief valve, and equipped with standard buttonhead fittings, are part of the auxiliary equipment on the lubricating unit and are stored in the upper drawer compartment.
- g. Extension Hydraulic Pressure Relief Adapter (7). One extension hydraulic pressure relief adapter with 500 psi pressure relief valve, and one rigid extension without a valve are furnished on the lubricating unit. The adapter with a relief valve is used for greasing seal-type lubrication points, to prevent rupturing seals when using power lubricating equipment. A sliding sleeve locks firmly on the coupler of the hydraulic adapter.
- h. Air blow gun (8). One airblow gun may be attached to the air hose quick-disconnect coupler of the lubricating unit to permit cleaning with air pressure.



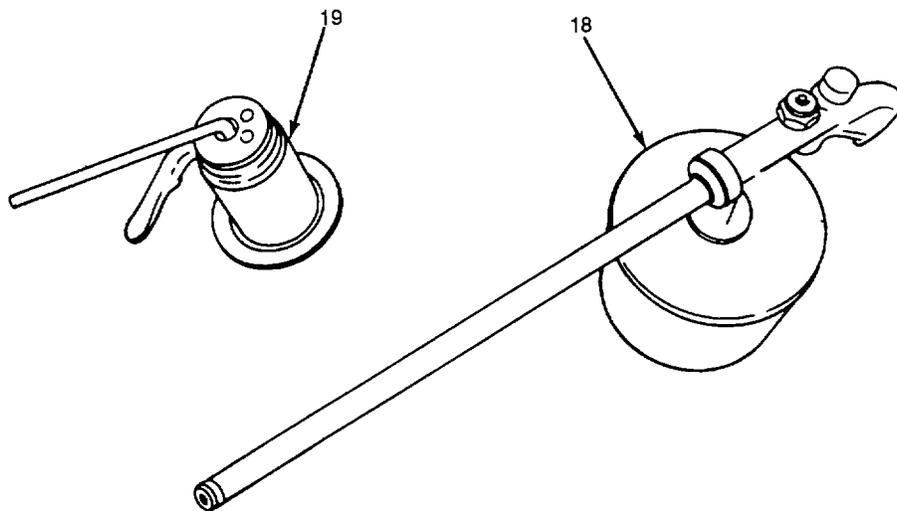
- i. Buttonhead Fittings (9). Nine standard and nine giant buttonhead fittings, to be used as replacement parts, are located in the upper drawer compartment.
- j. Straight Hydraulic Fittings (10). Twelve straight hydraulic fittings, to replace defective fittings of varying sizes, are located in the upper drawer compartment.
- k. Forty-five Degree Hydraulic Lubrication Fittings (11). Twelve 45 hydraulic fittings, to replace defective fittings it necessary, are located in the upper drawer compartment.
- l. Easy-Out Tool (12). Two easy-out tools are used for removing grease fittings. They are located in the upper drawer compartment.
- m. Plug (13). Three plugs are used to plug hydraulic lines after disconnection.
- n. Quick-Disconnect Air Line Couplings (14). One female and three male lube hose repair couplings are located in the upper accessory drawer compartment.
- o. High Pressure Hose End Fittings (15). Six female swivel and six male lube hose repair couplings are located in the upper accessory drawer compartment.
- p. Air Hose End Fittings (16). Three each male and female reusable hose end fittings of 1/4-inch inside diameter air hoses are located in the upper drawer compartment.
- q. Straight and Z-Swivel Adapters (17). A straight and a Z-swivel adapter are used to connect the control valves to the supply hoses, thus permitting the valve to swivel for easy access to hard-to-reach fittings. The swivel adapters are located in the upper drawer compartment.



## r. Oil Spray Gun

1. General. Use the air-operated oil spray gun (18) to obtain oil spray at high pressures. The gun consists of an oil spray container and a head with an air valve. Separate controls, adjust the input quantity of air and the quantity of air ejected. An adjustable nozzle permits either a stream, or spray type oil ejection.
2. Operation. Fill the container with the desired grade of oil. Screw the container into the head. Attach the air line coupler of the spray gun to the air hose quick-disconnect coupler on the lubricating unit. Turn the adjustable nozzle to the closed position. Press the air valve button until desired amount of oil ejection is obtained.

- s. Hand Oiler (19). Operate the hand oiler by squeezing the trigger. You can use it for applying small quantities of oil to friction points.



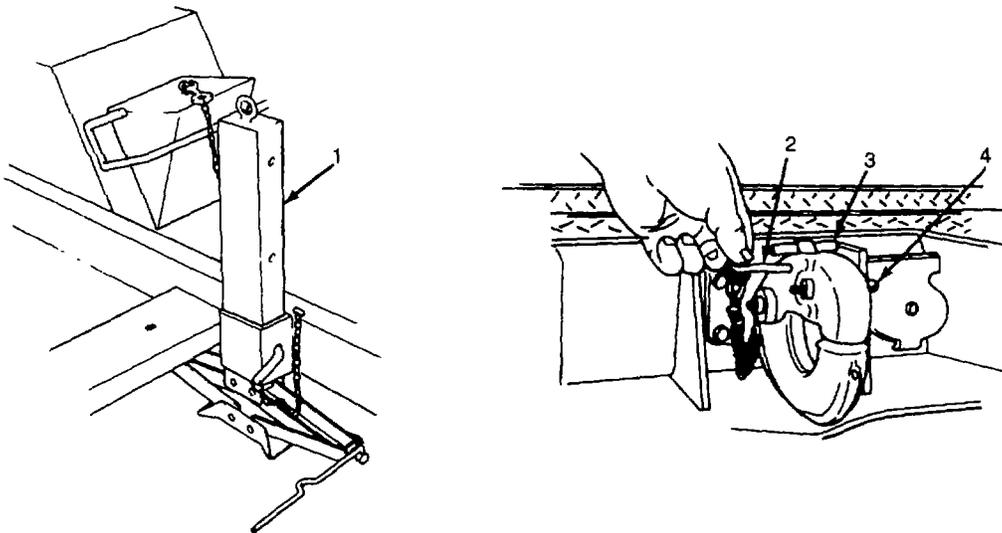
## 2-7. PREPARATION FOR MOVEMENT

### a. Preparation for Towing

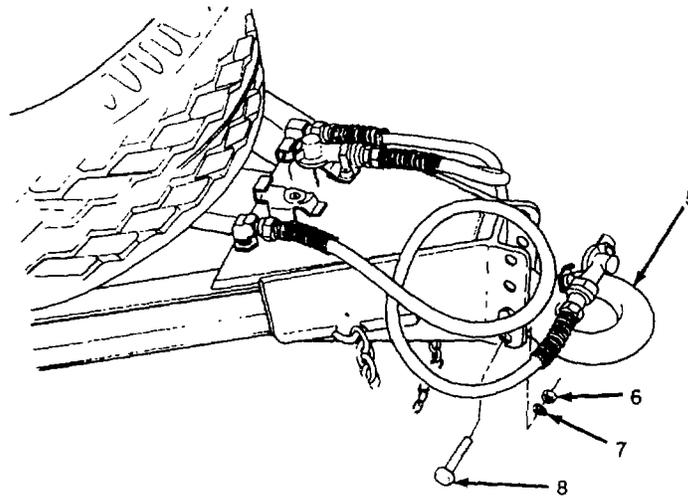
#### **WARNING**

**Trailer and towing vehicles should be on level ground to prevent accidental movement resulting in injury to personnel.**

1. Raise and stow rear jacks (1).
2. Remove safety pin (2) on towing vehicle and pull up on locking latch (3) to light pintle hook (4).



3. Align towing vehicle with trailer lunette (5). If necessary remove two nuts (6) two lockwashers (7) and two screws (8) and move lunette (5) to correct position. Install two screws (8), two lockwashers (7) and two nuts (6).



a. Preparation for Towing (continued)

4. Back towing vehicle in front of lunette (5). Using the front jackleg, raise lunette (5) and back towing vehicle until pintle hook (4) is directly under lunette. Lower onto pintle hook.
5. Push down and close pintle hook (4). Check that locking latch (3) is locked by pulling up on hook upper jaw of pintle hook (4). Insert safety pin (2).

**CAUTION**

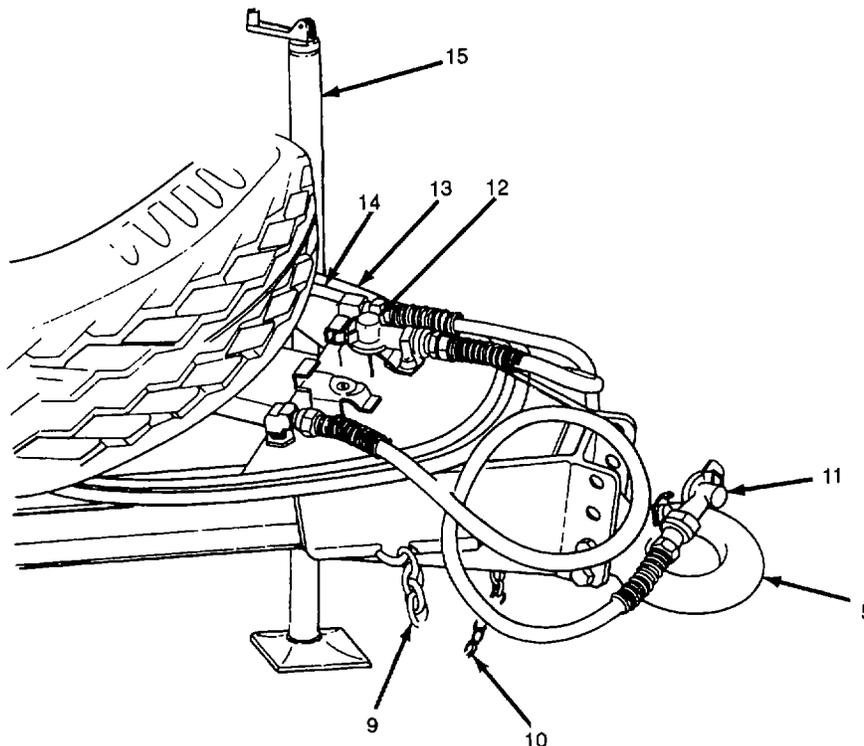
**Safety chains are crossed under lunette to support drawbar in the event that the trailer detaches from the towing vehicle. Be sure to have enough slack to allow trailer to make full turns.**

6. Cross two safety chains (6) and (7) under lunette (5) and hook on towing vehicle. Secure chains to prevent dragging.

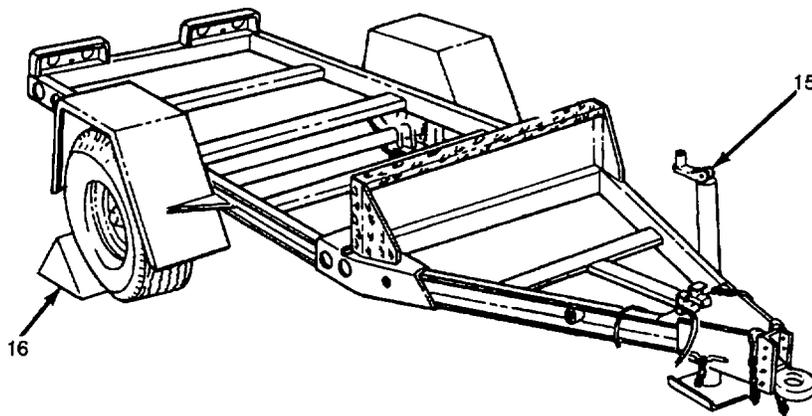
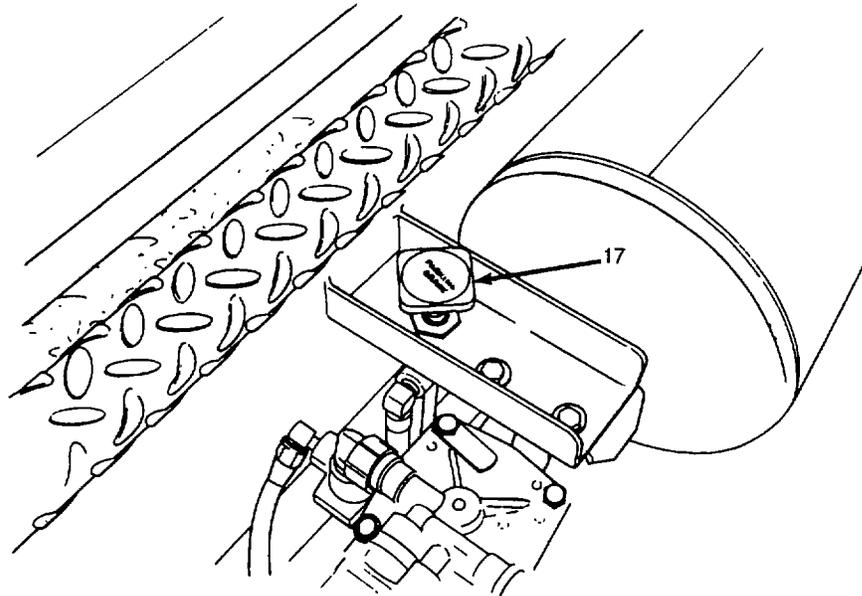
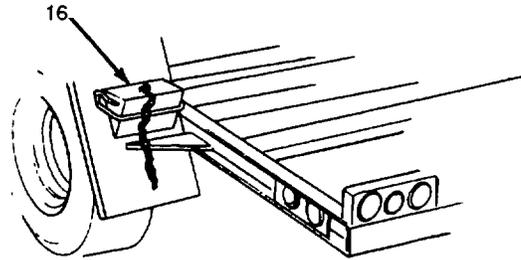
**NOTE**

**Be sure to check tag markings on hose assemblies both on the trailer and towing vehicle before connecting.**

7. Connect both service brake (8) and emergency brake (9) hose assemblies to the towing vehicle. Open towing vehicle shutoff valves (refer to towing vehicle operator's manual). Apply towing vehicle air brakes to pressurize air brake system.
8. Connect either 12 Vdc connector (10) or 24 Vdc connector (11) to towing vehicle electrical receptacle.
9. Raise front jack leg (12) to stowed position.



10. Place two chock blocks (16) into stowage brackets.
11. Release parking brake by actuating air supply valve (17).



b. Driving

**CAUTION**

**Sudden stops may cause the drawbar to bend or buckle.**

1. When trailer is attached always start and stop the towing vehicle slowly and gradually. Do this whether or not the trailer is loaded.
2. Never exceed the maximum speed of 50 mph (80 kph) on highways and 10 mph (16 kph) for cross country use.
3. When driving the towing vehicle and trailer, overall length of the unit must be kept in mind when turning and passing other vehicles. Because the unit is hinged in the middle, turning and backing are also affected. Heavier payloads will increase stopping distance and decrease off road maneuverability.
4. When turning corners, allow for the fact that the trailer wheels turn inside the turning radius of the towing vehicle. To make a right turn at a road intersection, drive the towing vehicle part way into the intersection and then cut sharply to the right. This will allow for the turning radius of the trailer and keep it off the curb.
5. Always back the towing vehicle slowly and gradually. Whenever possible, the assistant driver or another person will act as a ground guide to assist and direct the driver.
6. When backing, the rear of the trailer will move in the opposite direction in which the towing vehicle is turned. When the towing vehicle is turned to the right, the rear of the trailer will go left. When the towing vehicle has turned and backing in a straight line is required, turn the towing vehicle in the direction the trailer is moving. This will slowly bring the towing vehicle and trailer into a straight line.
7. In normal operation the brakes of the towing vehicle and trailer are applied at the same time when the driver steps on the brake pedal. Brake pressure must be applied gradually and smoothly. With some towing vehicles the trailer brakes can be applied separately by using a brake control (refer to towing vehicle operator's manual). On steep grades or slippery surfaces, the trailer brakes should be applied before the towing vehicle brakes, if possible. This will reduce the possibility of jackknifing the trailer.
8. When the towing vehicle and trailer are to be left unattended, set the towing vehicle parking brake, turn off the engine and set the chock blocks.

c. After towing

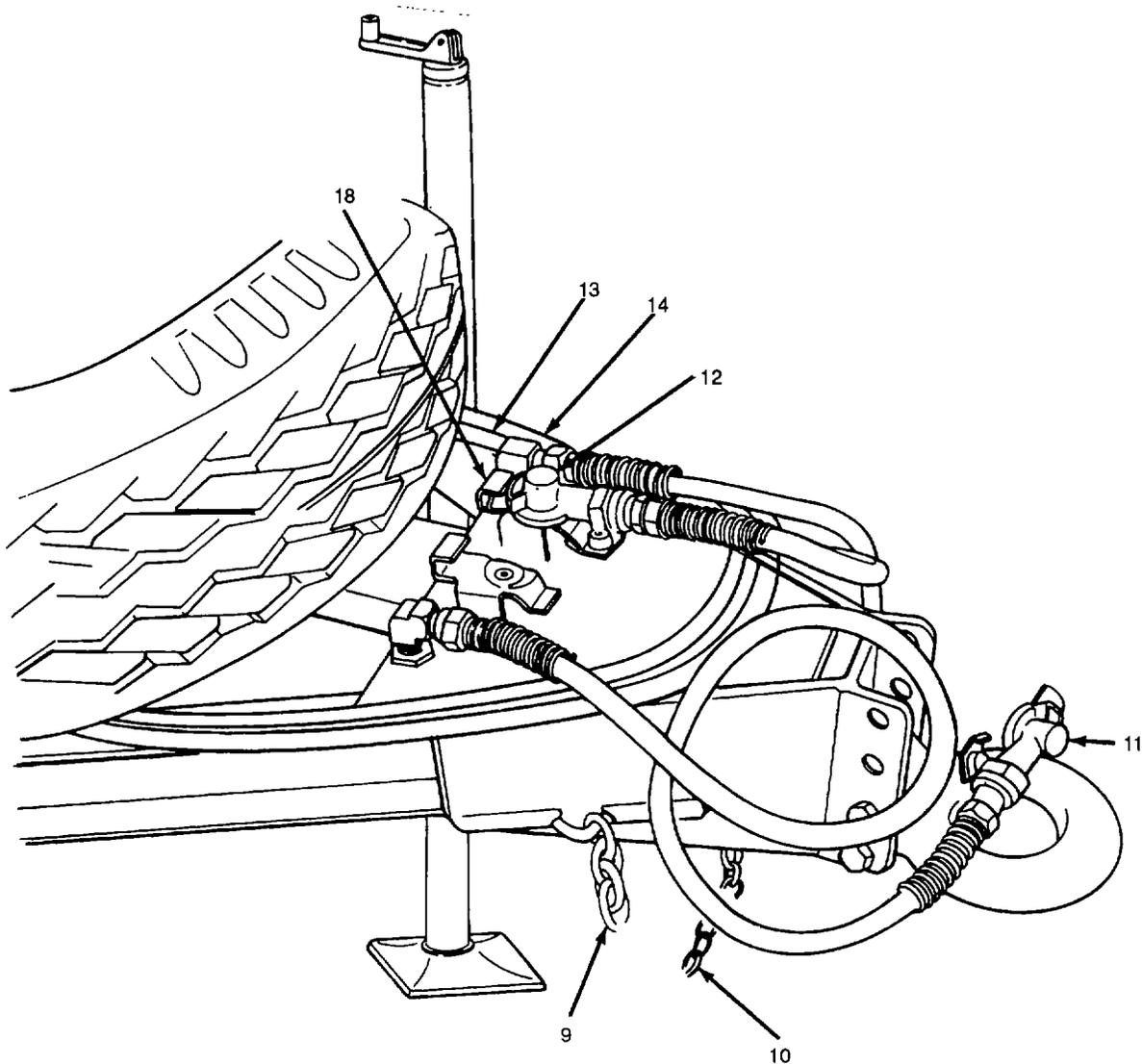
1. Lower front jack leg (15).
2. Position two chock blocks (16) behind wheels.

3. Disconnect either 12 Vdc connector (13) or 24 Vdc connector (14) from towing vehicle.

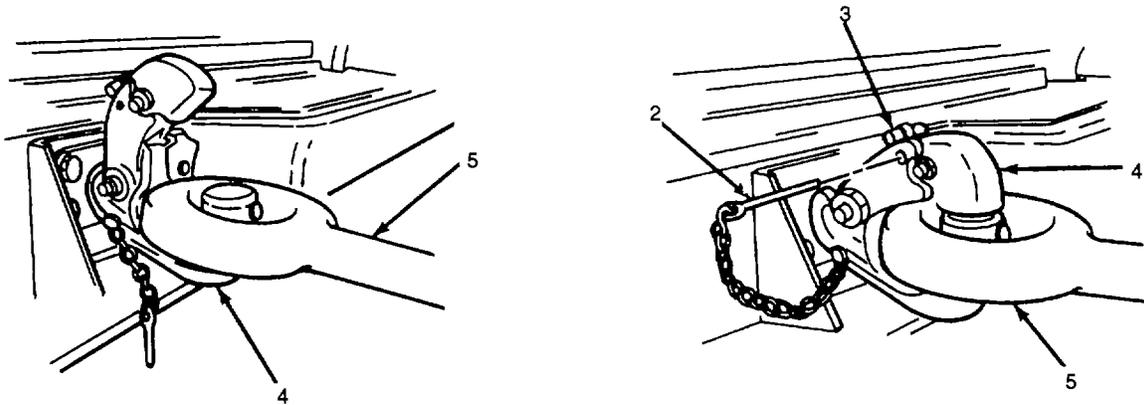
**WARNING**

**Trailer wheels must be chocked even if parking brake is applied. The parking brake will release within 1-1/2 hours and if not correctly chocked the trailer may roll causing severe personal injury or death.**

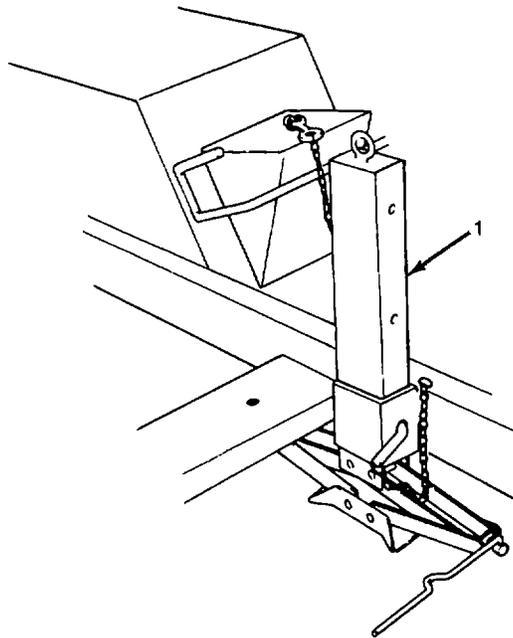
4. Apply parking brake by activating air supply valve (17).
5. Disconnect both service brake (11) and emergency brake (12) hose assemblies from the towing vehicle. Stow in two brackets (18).
6. Unhook two safety chains (9 and 10) from towing vehicle.



7. Remove safety pin (2) on towing vehicle and pull up on locking latch (3) to lift pintle hook (4).
8. Using the front backleg, lift lunette (5) off of pintle hook (4). Slowly move towing vehicle forward to clear lunette (5).
9. Push down and close pintle hook (4). Check that locking latch (3) is locked by pulling up on pintle hook (4). Insert safety pin (2).



10. Lower rear jacks (1) and adjust with front jackleg to provide a level, stable base for lubrication and servicing operations.



## 2-8. OPERATION AND SAFETY INSTRUCTION PLATES

Follow operation procedures and safety precautions on the Operation and Safety Instruction Plates located on various components such as air compressor and winterization heater.

**AIR COMPRESSOR OPERATION**

<p>(1) FOR DETAILED OPERATING AND SERVICE INSTRUCTIONS SEE TECHNICAL MANUAL TM 5-4930-233-14</p> <p>(2) CHECK OIL LEVEL, IF LOW, SERVICE</p> <p>(3) DRAIN WATER FROM AIR RECEIVER BY OPENING DRAIN IN REEL CABINET (LEVER STRAIGHT BACK)</p> <p>(4) CLOSE AIR RECEIVER IN REEL CABINET (LEVER IN LEFT OR RIGHT POSITION).</p> <p>(5) SELECT EXHAUST DIVERTER POSITION - WARM TEMPERATURES: THROUGH FLOOR - COOL TEMPERATURES: THROUGH TANK NOTE: IF ARCTIC KIT IS INSTALLED DIVERTER MUST BE IN THE FLOOR POSITION</p> <p>(6) TOGGLE IGNITION SWITCH TO THE ON POSITION</p> <p>(7) CHECK FUEL LEVEL, IF LOW, SERVICE</p> <p>(8) PULL CHOKE KNOB TO ENGAGE CHOKE IF ENGINE IS COLD</p> <p>(9) RELEASE THROTTLE HANDLE BY ROTATING 1/4 TURN PULL HANDLE COMPLETELY OUT. PUSH HANDLE 3/4</p>	<p>OF THE WAY BACK IN AND LOCK HANDLE BY ROTATING HANDLE 1/4 TURN COUNTER CLOCKWISE.</p> <p>(10) TOGGLE START SWITCH UP TO ENGAGE STARTER. DO NOT ENGAGE STARTER FOR MORE THAN (15) SEC. ALLOW (2) MINUTES BETWEEN STARTING ATTEMPTS</p> <p>(11) ALLOW (5) MINUTES BEFORE DISENGAGING CHOKE</p> <p>(12) TO COMPRESS AIR, RELEASE THROTTLE HANDLE AND PULL COMPLETELY OUT. ENGINE WILL THROTTLE DOWN AUTOMATICALLY WHEN TANK IS CHARGED</p> <p>(13) ALLOW ENGINE TO IDLE (2) MINUTES BEFORE TURNING ENGINE OFF</p> <p>(14) TO TURN ENGINE OFF PUT IGNITION SWITCH IN OFF POSITION</p> <p>(15) WHEN COMPRESSOR IS NOT IN USE RELEASE AIR PRESSURE IN TANK.</p> <p>(16) CONSULT TECHNICAL MANUAL FOR PULL STARTING INSTRUCTIONS</p>
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#### HEATER OPERATION

- (1) FOR DETAILED OPERATING AND SERVICING INSTRUCTIONS SEE TECHNICAL MANUAL TM 5-4930-233-14
- (2) CHECK FUEL AND ELECTRICAL CONNECTIONS
- (3) CHECK PLENUM CLAMP TO HEATER IS SECURE
- (4) CHECK DUCTWORK IS IN PLACE AND HOSES ARE TIGHT
- (5) CHECK FUEL LEVEL, IF LOW SERVICE
- (6) SET HI-LO SWITCH IN LO POSITION
- (7) HOLD START-RUN SWITCH IN START POSITION UNTIL IGNITION LIGHT COMES ON. THEN MOVE THE SWITCH TO THE RUN POSITION
- (8) HI-LO SWITCH MAY NOW BE PLACED IN HI POSITION
- (9) TO SHUT HEATER DOWN PLACE START-RUN SWITCH IN THE OFF POSITION.

#### SAFETY INSTRUCTIONS

- (1) STAY CLEAR OF ALL MOVING PARTS
- (2) DO NOT TOUCH HEATER WHILE IN OPERATION
- (3) WEAR SAFETY GLASSES
- (4) RELIEVE AIR PRESSURE IN TANK WHEN UNIT IS NOT IN USE
- (5) NO SMOKING
- (6) FIRE EXTINGUISHER LOCATED ON TRAILER BULKHEAD
- (7) NEVER OPERATE UNIT WITH ANY BELT GUARD OR PROTECTIVE COVER REMOVED
- (8) DO NOT ADJUST EXHAUST DIVERTER WHILE COMPRESSOR IS IN OPERATION

## Section IV. OPERATION UNDER UNUSUAL CONDITIONS

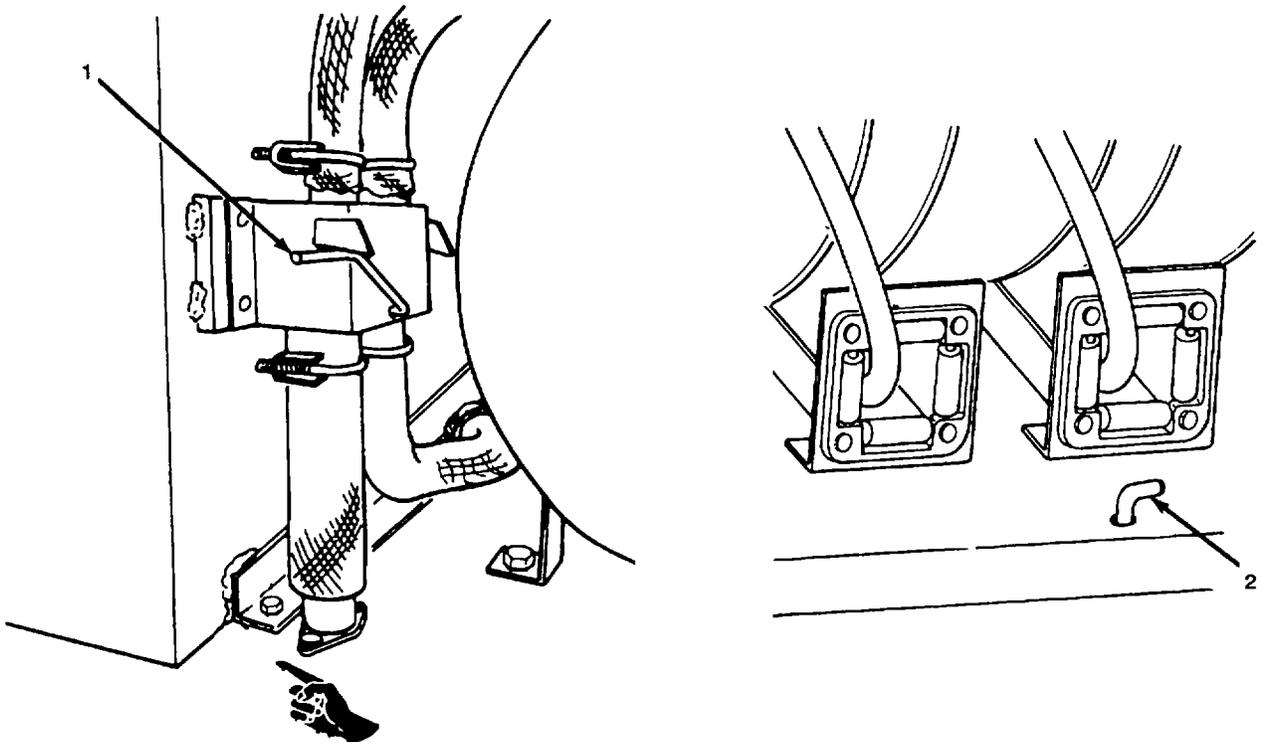
### 2-9. OPERATION IN EXTREME COLD

- a. General. You will have to take special precautions when operating the lubricating and servicing unit in extremely cold temperatures. Lubrication, fuel, oil, electrical and compressed air systems, and care of lubricants are all affected by cold weather operations.
- b. Care of Lubricants. Keep lubricants in tightly closed containers and, if possible, in a protected place to insure ease of handling. You must remove all snow and ice from the containers before opening them to transfer lubricants to lubricant tanks or to guns.
- c. Lubrication. During the cold weather, lubricants that are too heavy will make your vehicle hard to start and difficult to operate. This will also cause rapid wear of the moving parts.
- d. Electrical System. The large surges of electrical current required to start a cold engine demand good electrical contacts. Inspect, clean, and tighten all connections, especially battery terminals.
- e. Fuel Systems. In cold weather, condensation of moisture in the air will cause water to accumulate on tools, in drums and containers. This water will freeze and form ice crystals, which clog fuel lines and carburetor jets unless the following precautions are taken.
  1. Use filter paper or other approved strainer when you fill the fuel tank or when you transfer fuel from one container to another.
  2. Remove snow or ice from the fuel tank filler cap and dispensing equipment before you fill the fuel tank.
  3. Keep the filler cap tightened properly to keep moisture and dirt from the tank.
  4. After filling or moving a fuel container, allow the fuel to settle before you fill the tank.
  5. If possible, keep the fuel tank full when you operate the unit in extremely cold weather. This will prevent condensation of moisture inside the tank.
- f. Compressed Air System. Drain accumulated moisture from the compressed air reservoir as often as necessary. The air reservoir is equipped with an air receiver drain valve that is operated by the lever mounted on the reel cabinet assembly. When you open the air receiver drain valve, the water which has collected at the bottom of the tank will be ejected.
- g. Batteries. The batteries installed in the lubricating unit will give satisfactory service in extreme low temperatures if you take care of them and keep them fully charged. If the lubricating unit is to remain idle for any long length of time during the cold weather, disconnect the batteries and store them in a warm place.

- h. Cold Engine Starting. Before attempting to start in subzero weather, make certain the consistency of the crankcase oil is such that the engine can be started. Check the controls to make sure they are free and in operating condition. When the engine starts, leave the choke partly open until the engine is warmed to operating temperature, but be careful not to flood the carburetor.
- i. Valves. Be extremely careful in operating all valves as they can be easily damaged in low temperatures.
- j. Exhaust Heat Diverter. The engine exhaust diverter (1) ducts gas either to a heat reservoir beneath the lubricant container or directly to atmosphere. Use as follows:
- (1) In cold weather, operate the engine exhaust diverter (1) to duct exhaust gas to the heat reservoir.
  - (2) Start the engine (para 2-5) and dose all doors and panel vents on the lubricating unit.
  - (3) Allow the engine to run for about 10 minutes with the air receiver drain valve lever (2) in open position.
  - (4) Close the air receiver drain valve (2); wait until the compressor unloads before using the lubricant pump.
  - (5) Maintain control of lubricant temperature by opening and dosing the engine exhaust diverter (1) as required.

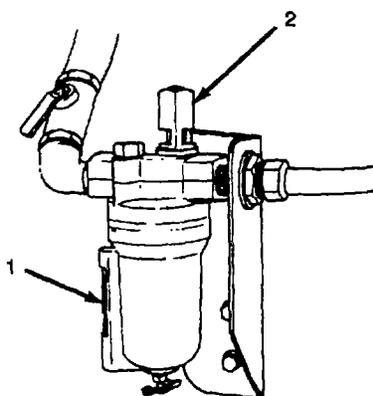
**NOTE**

**If the winterization assembly is to be used, the exhaust diverter should be in the floor position.**



k. Alcohol Injector. Use the alcohol injector when temperature is below 32°F (0°C). The injector is used to inject alcohol into the air line leading to the pump to prevent condensate freezeup. The alcohol injector is equipped with an 8-ounce capacity metal bowl and a needle valve which controls the flow of alcohol. Operate as follows:

- (1) Shut down the unit (para 2-5).
- (2) Service alcohol injector (para 3-5).
- (3) Start engine (para 2-5).
- (4) Turn adjusting screw (1) approximately one-quarter turn.
- (5) During operation, inspect sight gage (2), frequently and refill when necessary.

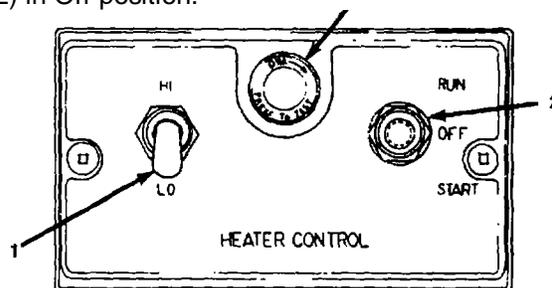


l. Operation of Winterization Assembly.

**NOTE**

**Exhaust diverter should be placed in the floor position if winterization assembly is to be used.**

- (1) Set HI-LO switch (1) in LO position.
- (2) Hold Start-Run switch (2) in Start position until ignition light (3) comes on. Then move switch (2) to Run position.
- (3) HI-LO switch (1) may now be placed in HI position.
- (4) To shut down heater place Start-Run switch (2) in Off position.



- m. Towing in Extreme Cold.
  - 1. Be careful when placing the trailer in motion after a shutdown. Congealed lubricants can cause part failure.
  - 2. Tires may be frozen to the ground or have a flat spot if they were underinflated.
  - 3. Brake shoes may be frozen to the drums and will require preheating to avoid damage.
  - 4. Refer to FM 9-207 and FM 21-305 for special instructions on driving hazards in snow and ice that may be encountered during extremely cold weather conditions.
- n. At-Halt Parking.
  - 1. For short shutdown periods, park in a sheltered spot out of the wind.
  - 2. For long shutdown periods, if high, dry ground is not available, prepare a footing of planks or brush.
  - 3. Remove all built up ice and snow as soon as possible after shutdown.

#### **2-10. OPERATION IN EXTREME HEAT.**

When operating in extremely high temperature, efficient cooling and adequate lubrication of the engine and air compressor is vitally important. The cooling system must be checked frequently to make sure the air circulation is not impaired. Give special attention to the engine shrouds and fins for cleanliness. Inspect the carburetor air cleaner frequently. Lubricate more frequently than specified in the lubrication instructions (para 3-2).

#### **2-11. OPERATION IN DUSTY OR SANDY AREAS.**

Operation of the lubricating and servicing unit in sandy or dusty areas will require more frequent inspections and lubrication of the unit. Fine sand can penetrate into bushings and bearings. Remove accumulations of sand and dirt at frequent intervals. Inspect the engine and compressor shroud and fins for clogging or impairment of air circulation. Check the fuel system and take all necessary precautions to prevent sand from entering the fuel tank. During shutdown periods, fasten all housing doors securely.

#### **2-12. OPERATION UNDER RAINY OR HUMID CONDITIONS.**

Operation of the lubricating and servicing unit under rainy or humid conditions requires that special attention be given to exposed machined parts. A thin coat of oil should be applied to all exposed machined parts to keep them as free of moisture as possible. High moisture content in the air may cause difficulty in the electrical system. The spark plug, magneto, and wiring can become unserviceable due to high humidity. Clean and dry affected parts at frequent intervals.

**2-13. OPERATION IN SALT WATER AREAS.**

In salt water areas, give special attention to general maintenance of the lubricating and servicing units to prevent corrosion of these metal parts. Keep a thin coat of oil on all exposed machined parts, and keep as clean and free of moisture as possible. Make sure all unpainted spots are painted or coated with approved preventive compounds. When equipment has been exposed to salt water, steam clean or wash exposed areas with clean, fresh water as soon as possible; dry thoroughly.

**2-14. OPERATION IN HIGH ALTITUDES.**

The air pressure above sea level decreases as altitude is increased. The result is a decrease in air pressure to the carburetor causing a too rich gasoline air mixture. If this condition interferes with the operation of the unit, adjust the carburetor in accordance with instructions provided in TM 9-2805-262-14.

**2-15. FORDING.**

- a. Do not drive the trailer through more than 30 inches of water. Clean, inspect and lubricate immediately after fording or when the tactical situation permits.
- b. If fording operations are required, move fuel cap valve to fording position as instructed on cap.

## Chapter 3

### OPERATOR'S MAINTENANCE INSTRUCTIONS

#### Section I. LUBRICATION INSTRUCTIONS

##### 3-1. GENERAL

- a. Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dust, dirt or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.
- b. Keep all external parts not requiring lubrication free of lubricants. Before lubricating the equipment wipe all lubrication points free of dirt and grease. Clean all lubrication points after you lubricate them to prevent accumulation of dirt.
- c. Intervals are based on normal hours of operation. Change the interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours. You may extend the interval during times of low activity, but you must take adequate preservation precautions.
- d. Lube all points after fording operations.
- e. Lube points shown by dotted arrow on both sides of the equipment.
- f. The lowest level of maintenance authorized to lube a point is indicated by one of the following: (C) Operator/Crew.
- g. Service engine in accordance with TM 9-2805-262-14.

##### 3-2. LUBRICATION INSTRUCTIONS

- a. Skid Sub Assembly
  1. Remove air compressor oil fill plug. Fill compressor crankcase up to high level mark on the oil hole.
  2. Run the compressor long enough to warm the crankcase oil. Place suitable container under oil drain hole and remove drain plug. Re-install drain plug and fill crankcase up to high level mark on the oil hole, approximately one quart (0.95 liter).
  3. Coat reel cabinet drawer rails so operation is smooth, when drawers are pulled out.
  4. Coat reel assembly at bracket so the rotation is smooth.
  5. OIL CAN POINTS. Every 50 hours lubricate devises, control linkages, and all exposed adjusting threads with OE.

#### **NOTE**

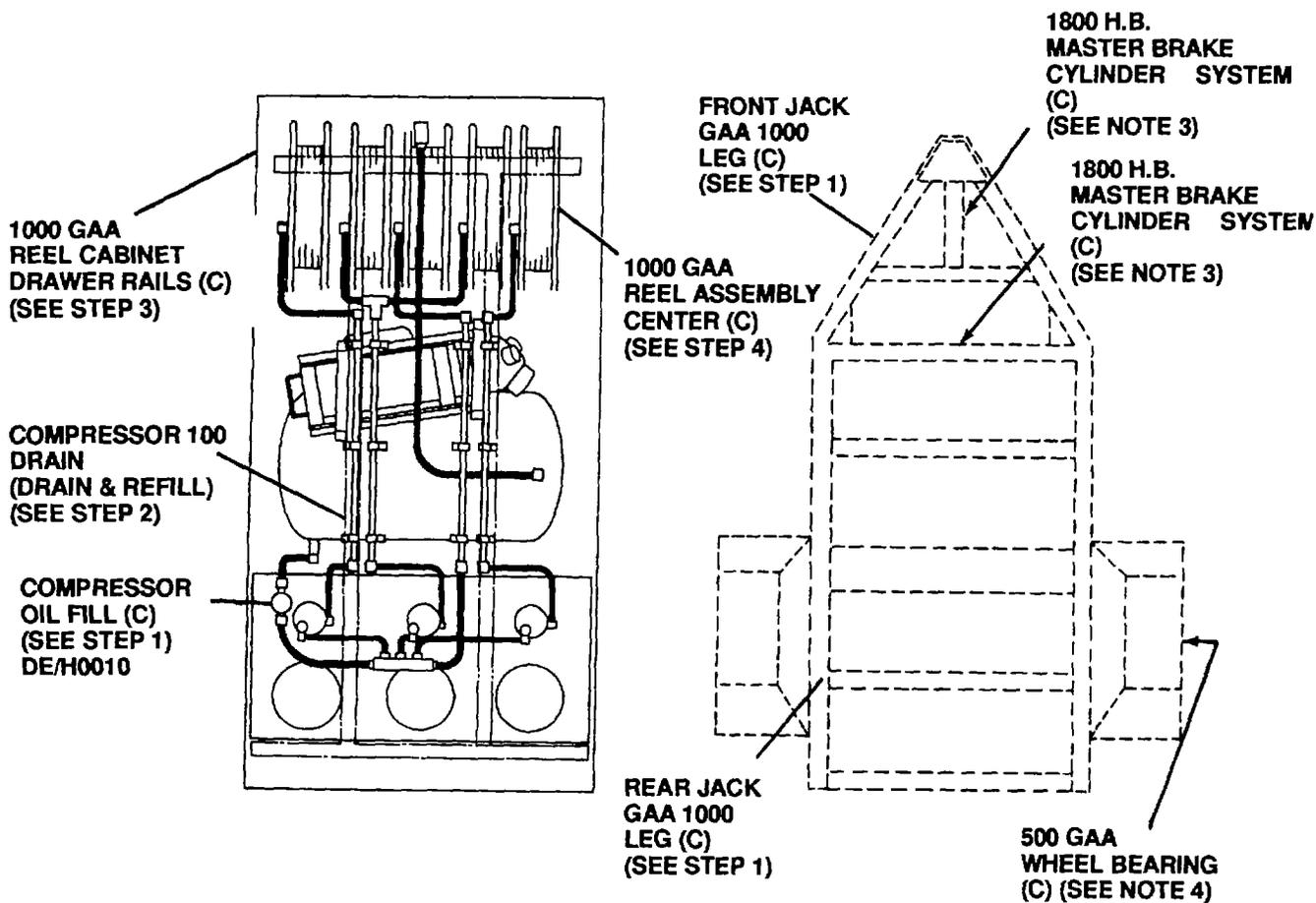
**THESE LUBRICATION INSTRUCTIONS ARE MANDATORY.**

b. Trailer Assembly

- 1 Lubricate front jack leg through lubrication hole near cranking handle.
- 2 Coat rear jack slide and screw to provide smooth operation.
- 3 Be sure that master brake cylinder is full. Capacity is 5/16 qt. (0.3 liter).
- 4 WHEEL BEARINGS. Every 500 hours, remove wheels, inspect all parts, replace damaged or worn parts, repack bearings and reassemble (para 4-58).

KEY

LUBRICANTS	REFILL CAPACITY (APP)	EXPECTED TEMPERATURES			INTERVALS
		ABOVE +32°F ABOVE 0°C	+40°F TO -10°F +5°C TO -23°C	0°F TO -66°F -18°C TO -60°C	
OE/HDO (MIL-L-2104) OIL, Engine Compressor Crankcase	2 qt (1.9L)	OE/HDO 30	OEA	OEA	Intervals given are in hours of normal operation
OEA/APG-PD-1 OIL, Engine, Subzero					
BFS (MIL-B-46176) Brake Fluid, Silicone Brake Master Cylinder	5/16 qt (0.3L)	HB	HB	HB	
GAA (MIL-G-10924) GREASE, Automotive and Artillery			All Temperatures		



## Section II. OPERATOR TROUBLESHOOTING

### 3-3. INTRODUCTORY INFORMATION

- a. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the lubrication and service unit. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective action in the order listed.
- b. This manual cannot list all malfunctions that may occur; nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 3-1. Operator's Troubleshooting

---

ITEM		
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION

---

1. ENGINE FAILS TO TURN OVER WHEN STARTER SWITCH IS PUSHED

**WARNING**

**Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which can explode causing severe injury or even death.**

Step 1. Check to see if batteries electrolyte level is over plates.

Add distilled water until level is correct.

Step 2. Inspect for loose, corroded or broken battery cables.

Clean corroded cables. Tighten loose connections. If cables are broken or damaged, notify unit maintenance.

Step 3. Inspect air compressor wiring harness for damage or loose connections.

Tighten loose connections. If wiring harness is damaged or broken, notify unit maintenance.

Step 4. Inspect control panel switches for damage.

Notify unit maintenance if switches are damaged.

Step 5. Inspect starter for damage.

Notify unit maintenance if starter is damaged.

2. ENGINE TURNS OVER BUT FAILS TO START

Step 1. Ensure that control panel switches are in correct position for starting.

Place switches in correct positions (paragraph 2-5).

Step 2. Check for improperly choked engine, especially when engine is cold pull out choke completely.

Step 3. Check for empty fuel tank.

Fill empty fuel tank.

Step 4. Check for damaged or leaking fuel lines.

Notify unit maintenance if fuel lines are damaged or leaking.

Table 3-1. Operator's Troubleshooting - Continued

ITEM	MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
		Step 5. Check for flooded carburetor, especially if engine is hot.	Turn over engine with choke open and throttle open completely.
3.	ENGINE STARTS BUT THEN STOPS		
		Step 1. Check for insufficient fuel supply.	Fill fuel tank.
		Step 2. Check for pulled out choke control.	Push in choke control as engine warms.
		Step 3. Check for correct engine oil level (TM 9-2805-262-14).	Service engine as required. If oil level is correct, notify unit maintenance.
4.	ENGINE OVERHEATS		
		Check engine oil level (TM 9-2805-262-14).	Service engine as required. Notify unit maintenance if engine continues to operate in an overheated condition.
5.	ENGINE RUNS BUT LACKS POWER		
		Step 1. Check that throttle control is in full speed condition.	Pull throttle control into full speed condition.
		Step 2. Check that choke control is fully open (pushed in) when engine is warm.	Push in choke control.
6.	COMPRESSOR OVERHEATS		
		Step 1. Check for dirty cooling fins on intercooler and cylinder.	Clean cooling fins.
		Step 2. Check for slipping drive belts.	Notify unit maintenance if drive belts are slipping or worn.

Table 3-1. Operator's Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 3.	Check for dirty air compressor air filter. Replace air filter (paragraph 3-4).
	Step 4.	Check compressor oil level (paragraph 3-2). Service air compressor as needed.
7.	COMPRESSOR PUMPS TOO SLOWLY	
	Step 1.	Check for loose or slipping drive belts Notify unit maintenance if drive belts are slipping or worn.
	Step 2.	Check for dirty air filter. Replace air filter (paragraph 3-4).
	Step 3.	Check compressor oil level (paragraph 3-2). Service air compressor as needed.
8.	DRIVE BELTS WEAR RAPIDLY	
		Check that drive belts are loose or slipping. Notify unit maintenance if drive belts are slipping or worn.
	REEL ASSEMBLY	
1.	ALL DISPENSERS FAIL TO DELIVER LUBRICANT AT NORMAL RATE	
	Step 1.	Check that air pressure gauge reads 140 to 175 psi. If pressure will not build correctly, notify unit maintenance.
	Step 2.	Check that pressure relief valve and air drain valve are closed. If valves will not properly dose, notify unit maintenance.
	Step 3.	Check for stiff lubricants due to cold weather. Operate winterization assembly (paragraph 2-9).

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Table 3-1. Operator's Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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	Step 4.	Check for frozen air regulator due to cold weather. Operate alcohol injector (paragraph 2-9).
2.	ONE DISPENSER FAILS TO DELIVER LUBRICANT AT NORMAL RATE.	
	Step 1.	Check that lubricant level in lube tank is correct. Fill as required (paragraph 2-5).
	Step 2.	Check that flow back valve is closed. Close valve.
	Step 3.	Check dispensing pump air pressure regulator for proper adjustment. Adjust air pressure regulator (paragraph 2-5 c).
	Step 4.	Check air line to pump for kinks or restrictions. If kinks or restrictions cannot be cleared, notify unit maintenance.
	Step 5.	Check lubricant line for kinks or restrictions. If kinks or restrictions cannot be cleared, notify unit maintenance.
TRANSFER PUMP		
1.	PUMP DOES NOT OPERATE	
	Step 1.	Check that air pressure gauge reads 140 to 175 psi. If pressure will not build correctly, notify unit maintenance.
	Step 2.	Check air lines for leaks or damage. Correct air leaks due to bad connections. Notify unit maintenance if needed.
2.	PUMP DELIVERS LITTLE OR NO LUBRICANT	
	Step 1.	Check for lubricant in drum. Move pump to other drum if needed.

**Table 3-1. Operator's Troubleshooting - Continued**

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 2. Check lower portion of transfer pump for obstructions.  
Clean lower portion of transfer pump.

#### TRAILER ELECTRICAL

1. ALL LAMPS DO NOT LIGHT.

Step 1. Check light switch position on towing vehicle.  
Place switch in correct position (Towing Vehicle Technical Manual).

Step 2. Check electrical connections on the trailer and towing vehicle.  
Reconnect all incorrectly connected harnesses.

Step 3. Inspect trailer wiring harness for damage.  
Notify unit maintenance of damaged wiring harness.

2. ONE OR MORE (BUT NOT ALL) LIGHTS WILL NOT LIGHT

Step 1. Check for damaged or broken electrical leads.  
Notify unit maintenance.

Step 2. Check for loose or damaged electrical connections.  
Tighten loose connections. If damaged, notify unit maintenance.

#### AIR BRAKES

1. AIR BRAKES WILL NOT RELEASE

Step 1. Check position of air supply valve.  
Release parking brake if set.

Step 2. Check for proper connection of air brake couplers.  
Connect air brakes correctly (paragraph 2-7).

Step 3. Check towing vehicle controls for correct positions.  
Place controls in correct positions (Towing Vehicle Technical Manual).

Table 3-1. Operator's Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 4.	Check for dirty or worn air brakes couplers. Clean dirty couplers. Notify unit maintenance if worn or damaged.
	Step 5.	Inspect air brake hoses for damage or leaks. Notify unit maintenance of any damage or leaks discovered.
2.	BRAKES GRAB	Check for moisture in air tank. Drain moisture in air tank (paragraph 2-4).
3.	NO BRAKES OR WEAK BRAKES	Step 1. Check for proper connection of air brake couplers. Connect air brakes correctly (paragraph 2-7).
	Step 2.	Check that brake lines are connected to towing vehicle properly. Connect brake lines correctly (paragraph 2-7).
AXLE ASSEMBLY		
TIRES ARE EXCESSIVELY SCUFFED OR WORN		
	Step 3.	Check tire pressure. Service tires as required (paragraph 3-6).
	Step 4.	Check for loose, cracked or broken wheels. Notify unit maintenance if wheels are loose, cracked or broken.
	Step 5.	Inspect suspension for damage. Notify unit maintenance if suspension is damaged.

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### Section III. OPERATOR MAINTENANCE PROCEDURES

#### AIR COMPRESSOR ASSEMBLY

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#### 3-4. AIR FILTER-REPLACE/SERVICE

---

This task covers:

- a. Removal                      b. Cleaning                      c. Installation
- 

INITIAL SET-UP:

Materials/Parts  
Detergent (Item 5, App E)

---

- a. Removal

**Warning Deleted**

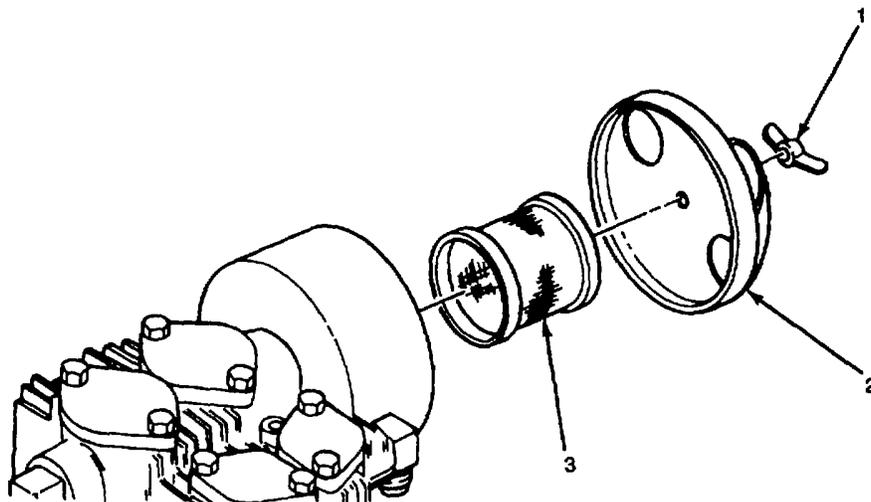
Remove wing nut (1), end cover (2) and filter element (3).

- b. Cleaning

Wash filter element in soapy water and allow to dry. Replace if dogged, punctured or in any way damaged.

- c. Installation

Install filter element (3), end cover (2) and wing nut (1).



Change 1

3-10

## LUBE TANK ASSEMBLY

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### 3-5. ALCOHOL INJECTOR - SERVICE

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This task covers:

Service

---

INITIAL SET-UP:

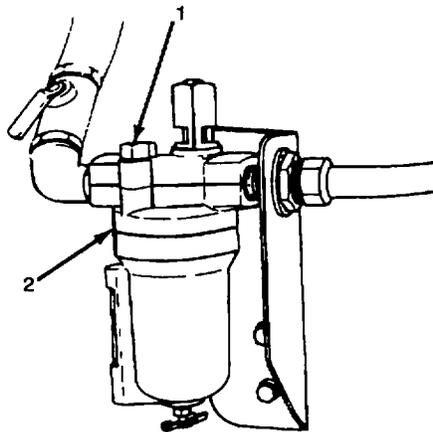
Materials/Parts

Alcohol (Item 1, App E)

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Service (for Cold Weather only--Below 32°F)

- 1 Shut down air compressor (para 2-5).
- 2 Remove fill plug (1) and fill injector (2) with alcohol.
- 3 Install fill plug (1).



Change 1

3-11

## AXLE ASSEMBLY

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### 3-6. WHEEL AND TIRE - SERVICE

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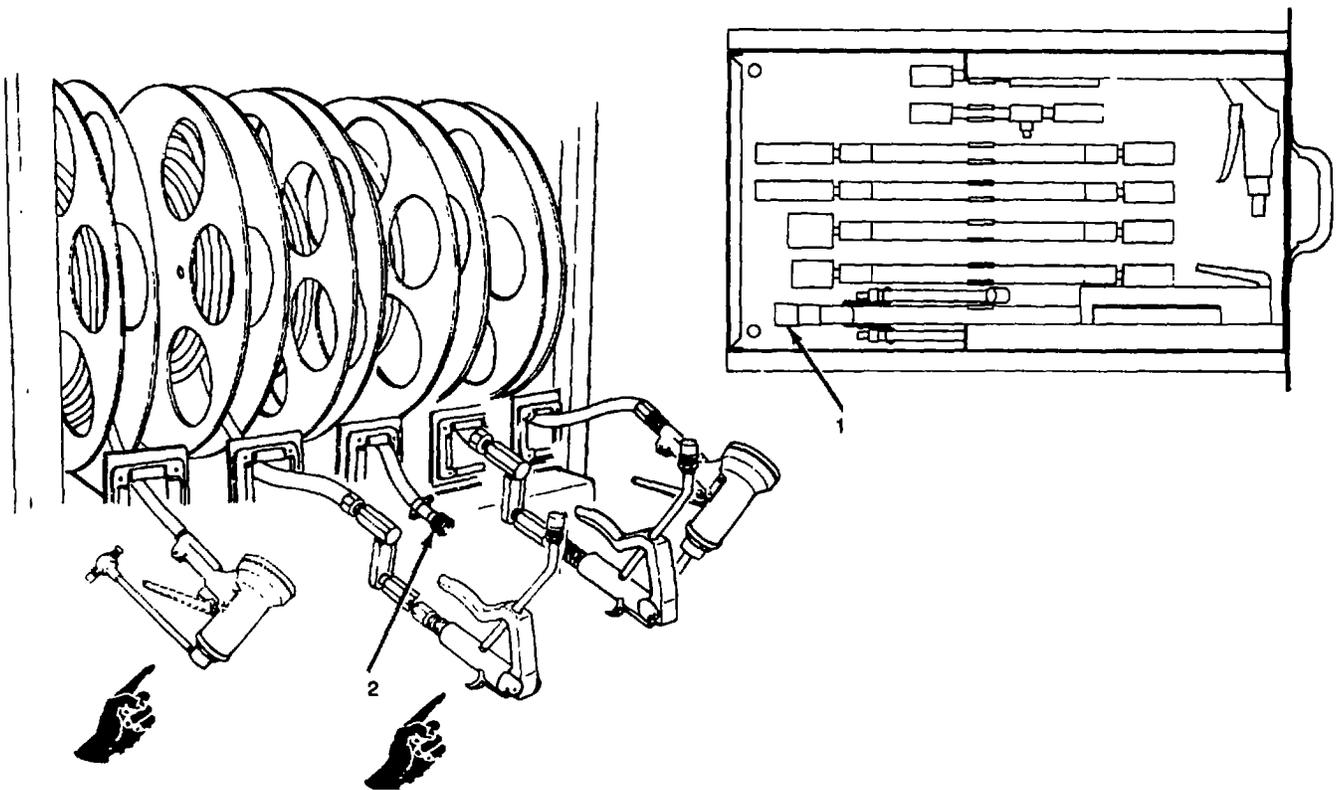
This task covers:

Service

---

Service

- 1 Start air compressor (para 2-5).
- 2 Remove tire inflator and pressure gauge (1) from stowage drawer.
- 3 Install inflator (1) on air service hose (2).
- 4 Use tire inflator and pressure gauge (1) to fill tires to 60 psi.
- 5 Return air service hose (2) and tire inflator (1) to stowage.



## Chapter 4

### UNIT MAINTENANCE INSTRUCTIONS

#### Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

##### 4-1. COMMON TOOLS AND EQUIPMENT

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

##### 4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

No special tools or equipment is required to maintain the lube and servicing unit.

##### 4-3. REPAIR PARTS

**Repair** parts are listed and illustrated in the repair parts and special tools list (TM 5-4930-233-24P) covering Unit, Direct Support and General Support maintenance for this equipment.

#### Section II. SERVICE UPON RECEIPT

##### 4-4. CHECK UNPACKED EQUIPMENT

- a. Remove any metal strapping, plywood, tapes, seals, wrapping paper or any other shipping material.

#### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or DEATH. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- b. If any exterior parts are coated with rust preventative compound, remove it with cleaning solvent (Item 6 App. E).
- c. Inspect the equipment for damage incurred during shipping. If the equipment has been damaged, report the damage on DD Form 6 Packaging Improvement Report.
- d. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750. Marine Corps users refer to MC04430.3.
- e. Check to see whether the equipment has been modified.

#### 4-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT

- a. Perform the preventive maintenance checks and services contained in Table 2-2 and Table 4-1.

#### **WARNING**

**Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which is highly explosive. Failure to do so can lead to severe injury or death.**

**Caustic chemicals in batteries may cause severe burns or blindness if electrolyte comes in contact with skin or eyes. To avoid injury, wear safety protective equipment such as face mask or goggles and gloves. If electrolyte does come in contact with skin or eyes, rinse affected area thoroughly with cold water.**

- b. If you are preparing the unit for initial use, open the container of electrolyte and fill the dry charge batteries so that the electrolyte is up to the required level. If possible, charge the batteries for 10 or 15 minutes before connecting and applying the starting load. Make sure you have securely connected the batteries. Note that the positive lead is marked +. The electrical system has a negative ground.
- c. Fill the fuel tank with gasoline. Fuel tank capacity is 10 gallons.
- d. Lubricate all points as shown in the lubrication instructions (para 3-2) regardless of interval.
- e. Schedule the next preventive maintenance checks and services on DD Form 314, Preventive Maintenance Schedule and Record.
- f. Report all deficiencies on DA Form 2404 if the deficiencies appear to involve unsatisfactory design. Marine Corps users report all deficiencies on TM 4700-15/1E.
- g. Perform a break-in road test of 25 miles at a maximum speed of 55 miles per hour.

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

#### 4-6. GENERAL

- a. The best way to maintain vehicles covered by this manual is to inspect the equipment on a regular basis so minor faults can be discovered and corrected before they result in serious damage, failure, or injury. This section contains systematic instructions for inspection, adjustment and correction of vehicle components to avoid costly repairs or major breakdowns. This is Preventive Maintenance Checks and Services (PMCS).
- b. All vehicle shortcomings will be reported on DA Form 2404, (DA PAM 738-750). Marine Corps users report all vehicle shortcomings on TM 4700-15/1 E. Equipment Inspection and Maintenance Worksheet, immediately after the PMCS and before taking corrective action. They will also be reported in the equipment log.
- c. If something doesn't work, troubleshoot it with the instructions in your manual or notify your supervisor.
- d. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

- e. If anything looks wrong, write it on your DA Form 2404. Marine Corps users write it on your TM 4700-15/1 E. If you find something seriously wrong, report it to Direct Support Maintenance RIGHT NOW.
- f. When you do your PREVENTIVE MAINTENANCE, take along the tools you will need to make all the checks. Take along a rag, you'll always need at least one.

### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Keep it clean: Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use cleaning solvent (Item 6 App. E) on all metal surfaces. Use soap and water when you clean rubber or plastic material.
- (2) Bolts, nuts and screws: Check them all for looseness, missing, bent or broken condition. You can't try them all with a tool of course, but look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it, or report it to Direct Support Maintenance if you can not tighten it.
- (3) Welds: Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to Direct Support Maintenance.
- (4) Electric wires and connectors: Look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.
- (5) Hoses and fluid lines: Look for wear, damage and leaks and make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to maintenance supervisor.

### **CAUTION**

**Equipment operation is allowable with minor leakage (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, NOTIFY YOUR SUPERVISOR!**

**When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.**

**Class III leaks should be reported to your supervisor or Direct Support Maintenance.**

- (6) It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER WHEN IN DOUBT NOTIFY YOUR SUPERVISOR!

#### Leakage Definitions for Unit PMCS

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.

#### 4-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICE (PMCS) TABLE

##### EXPLANATION OF COLUMNS

Item No. This column shows the sequence of doing the checks and services and is used to identify the equipment area on the equipment inspection and maintenance worksheet, DA Form 2404.

Interval. This column shows when each check is to be done.

Item To Check/Service. This column shows what items to check and service.

Procedure. This column shows the checks and services to do and how to do them.

Not Fully Mission Capable If. This column lists conditions that would render the equipment unable to perform the mission.

Table 4-1. Unit PMCS

ITEM NO.	INTERVAL	ITEM TO BE CHECKED/SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	Quarterly	Lubrication Points	Lubricate in accordance with the lubrication instructions (para 3-2).	Not properly lubricated.
2	Quarterly	Air Brake Assembly	Drain air tank of all moisture by opening valve.	Moisture in air tank.
3	Quarterly	Brake Assembly	Inspect brakes for correct operation and adjustment (para 4-58).	Brakes aren't operating correctly.
4	Quarterly	Air Compressor Assembly	<ul style="list-style-type: none"> <li>a. Inspect alternator and air compressor drive belts for deterioration or wear. Replace if necessary (para 4-22).</li> <li>b. Inspect belts for proper adjustment (para 4-22).</li> <li>c. Check that engine oil filter has been replaced at the required interval (TM 9-2805-262-14).</li> </ul>	<ul style="list-style-type: none"> <li>Drive belts are deteriorated or worn.</li> <li>Belts are incorrectly adjusted.</li> <li>Engine oil filter needs replacement.</li> </ul>
5	Semi-annually	Air Brake Assembly	Replace air cleaner assembly filter (para 4-50).	Air cleaner assembly filter needs replacement.
6	Semi-annually	Skid Sub Assembly	<ul style="list-style-type: none"> <li>a. Clean fuel filter element (para 4-15). Inspect fuel tank, if contaminated, drain and flush (para 4-15).</li> <li>b. Inspect fuel system for leaks. Repair as necessary.</li> </ul>	<ul style="list-style-type: none"> <li>Dirt or contamination is present.</li> <li>Fuel system has leaks.</li> </ul>

Table 4-1. Unit PMCS - Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED/SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7	Semi-Annually	Reel Cabinet Assembly	Test battery condition (para 4-17).	Battery is missing or damaged.
8	Semi-Annually	Road Test	<div data-bbox="808 646 1065 730" style="text-align: center;">  </div> <p data-bbox="743 741 1170 800">Serious burns can result from touching an overheated brake drum.</p> <p data-bbox="870 827 948 852" style="text-align: center;">NOTE</p> <p data-bbox="732 884 1159 1026">An overheated wheel hub and brake drum indicates an improperly adjusted or defective brake or a dry bearing. An abnormally cool condition indicates an inoperative brake.</p> <p data-bbox="732 1056 1159 1226">Perform road test. Give special attention to items that were repaired or adjusted. Check brake drums and hubs immediately after road test; cautiously. Feel brake drums and hubs for excessive heat build-up.</p>	Road test fails.
9	Annually	Air Compressor Assembly	Test air compressor in accordance with TB 43-0151.	Air compressor doesn't test properly.

## Section IV. UNIT TROUBLESHOOTING

### 4-8. INTRODUCTORY INFORMATION

- a. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of lubrication and servicing unit components. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective actions in the order listed.
- b. After performing a corrective action always check to see if the malfunction has been corrected. If so, your troubleshooting is complete for that malfunction. If it has not been corrected, continue on with the next corrective action or step.
- c. This manual cannot list all malfunctions that may occur; or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 4-2. Unit Troubleshooting

---

ITEM	TEST OR INSPECTION	CORRECTIVE ACTION
1.	ENGINE FAILS TO TURN OVER	
	Step 1. Check for weak or dead batteries (para 4-18).	Charge or replace batteries (para 4-18).
	Step 2. Check for loose, broken or damage on battery cables.	Replace or repair cables (para 4-18).
	Step 3. Check for defective starter (para 4-23).	Replace starter (para 4-23).
	Step 4. Test wiring harness (para 4-25).	Replace or repair wiring harness (para 4-25).
	Step 5. Test starter/ignition switch (para 4-26).	Replace switch (para 4-26).
	Step 6. Test cold start switch (para 4-26).	Replace switch (para 4-26).
2.	ENGINE RUNS ROUGH	
	Step 1. Check fuel for contamination.	Clean and drain fuel tank (para 4-16).
	Step 2. Troubleshoot engine (TM 9-2805-262-14).	
3.	BATTERIES NOT CHARGING OR HOLDING CHARGE	
	Step 1. Check for weak batteries (para 4-18).	Replace batteries (para 4-18).
	Step 2. Check for missing or loose alternator belt (para 4-22).	Replace or adjust belt (para 4-22).

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Table 4-2. Unit Troubleshooting - Continued

ITEM	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 3. Test wiring harness (para 4-25).	Replace or repair harness.
	Step 4. Test for defective alternator (para 4-24).	Replace alternator (para 4-24).
4.	ENGINE CRANKS BUT WILL NOT RUN OR RUNS FOR A SHORT TIME ONLY	
	Step 1. Check wiring harness for proper connections and test (para 4-25).	Correct connections or repair harness as needed (para 4-25).
	Step 2. Check fuel strainer and filter for clogging.	Replace or clean elements as needed (para 4-16).
	Step 3. Test ignition/starter switch (para 4-26).	Replace switch (para 4-26).
	Step 4. Test relays A and B (para 4-26).	Replace defective relay (para 4-26).
	Step 5. Disconnect oil pressure switch (para 4-25) and operate engine.	Replace oil pressure switch if engine operates correctly.

**NOTE**

**If engine will not run with new oil pressure switch but will operate with switch disconnected, troubleshoot engine (TM 9-2805-262-14).**

- Step 6. Disconnect oil temperature switch (para 4-26). Operate engine.  
Replace oil temperature switch if engine operates correctly

**NOTE**

**If engine will not run with new oil temperature switch but will operate with switch disconnected, troubleshoot engine (TM 9-2805-262-14).**

Table 4-2. Unit Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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5. ENGINE OPERATES WITH OIL PRESSURE BELOW 15 PSI

**CAUTION**

**Troubleshoot engine for low oil pressure along with the steps below. Failure to correct this problem can lead to serious engine damage.**

Step 1. Test wiring harness (para 4-25).  
Replace or repair harness (para 4-25).

Step 2. Replace oil pressure switch.

Step 3. Test oil pressure gauge (para 4-26).  
Replace oil pressure gauge (para 4-26).

6. WINTERIZATION HEATER DOES NOT OPERATE

Step 1. Inspect wiring harness for damage and test (para 4-42).  
**Repair** or replace harness (para 4-42).

Step 2. Test fuel pump (para 4-41).  
Replace fuel pump (para 4-41).

Step 3. Test control box (para 4-40).  
Replace control box (para 4-40).

Step 4. Replace heater (para 4-39).

7. COMPRESSOR FAILS TO BUILD UP OR MAINTAIN REQUIRED PRESSURE.

Step 1. Check drive belts for damage or slipping.  
Adjust or replace drive belts (para 4-22).

Step 2. Check compressor pilot valve for proper adjustment.  
Adjust pilot valve (para 4-27).

Table 4-2. Unit Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 3.	Check for leaks in air compressor tubes, hoses and fittings. Repair leaks as needed.
	Step 4.	Check for leaking pressure relief valve. Replace pressure relief valve (para 4-28).
8.		ONE LUBRICANT DISPENSER SYSTEM FAILS TO DISPENSE AT REQUIRED RATE.
	Step 1.	Check for faulty air pressure regulator. Replace air regulator assembly (para 4-36).
	Step 2.	Check for lubricant discharge directly from pump. Replace faulty pump (para 4-37).
	Step 3.	Check for damaged or leaking lubrication piping. Replace damaged piping and repair any leaks.
	Step 4.	Check operation of lubricant dispenser. Replace defective dispenser (para 4-19).
9.		COMPRESSOR OPERATES AT OVER 175 PSI.
	Step 1.	Check pilot valve for proper adjustment. Adjust pilot valve (para 4-27).
	Step 2.	Check air cylinder for damage or binded operation. Replace air cylinder (para 4-30).
10.		WHEEL BRAKES FAIL TO APPLY.
	Step 1.	Check that towing vehicle brake system is operating correctly. (Towing Vehicle Technical Manual) Repair towing vehicle brake system.

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Table 4-2. Unit Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 2. Check brake system for leaks or damage.  
Fix leaks or damage, replacing parts if required.

Step 3. Check for clogged air filter.  
Replace air filter (para 4-50).

Step 4. Check for improperly adjusted brakes (para 4-58).  
Adjust brakes (para 4-58).

Step 5. Check for air in the hydraulic system by bleeding the brakes (para 4-58).

11. BRAKES GRAB OR FAIL TO RELEASE

Step 1. Check for moisture in air reservoir.  
Drain the reservoir.

Step 2. Check brakes for correct adjustment.  
Adjust as needed (para 4-58).

Step 3. Check for out-of-round, cracked, or damaged brake drum.  
Notify direct support maintenance.

12. ALL LIGHTS ARE OUT

Step 1. Check towing vehicle light operation  
Troubleshoot towing vehicle electrical (Towing Vehicle Technical Manual).

Step 2. Test wiring harness (para 4-56).  
Replace or repair as required (para 4-56).

Step 3. Test junction box (para 4-53).

Table 4-2. Unit Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
13.	ONE OR MORE (NOT ALL) LAMPS FAIL TO LIGHT	
	Step 1. Check towing vehicle light operation	Troubleshoot towing vehicle electrical (Towing Vehicle Technical Manual).
	Step 2. Inspect wiring for loose connections or damage.	Replace or repair as necessary (para 4-56).
	Step 3. Test lights that are out (para 4-54 or 4-55).	Replace lights as required (para 4-54 or 4-55).
	Step 4. Test junction box (para 4-53).	Replace junction box (para 4-53).
14.	ONE OR MORE CONTROL PANEL GAUGES FAIL TO OPERATE OR GIVE REQUIRED READINGS NOTE	
		<b>NOTE</b>
		Step 1 applies only to Fuel Gauge.
	Step 1. Check for fuel in fuel tank.	Fill fuel tank
	Step 2. Troubleshoot air compressor (Table 4-2, malfunction 7. and 9.).	Replace air pressure gauge (para 4-25).
	Step 3. Test wiring harness connection to gauge(s).	Replace or repair wiring harness (para 4-25).
	Step 4. Replace gauge(s) (para 4-25).	

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## Section V. UNIT MAINTENANCE INSTRUCTIONS

### 4-9. GENERAL MAINTENANCE

- a. This paragraph contains general maintenance instructions which you must observe during removal, disassembly, repair and reassembly of lubrication and servicing unit components.

#### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C)**

- b. Prior to removing component assemblies, you should thoroughly clean the surrounding area and the exterior surfaces of the unit being removed. Use dry cleaning solvent (Item 6 App. E) for most general cleaning requirements. If assemblies are caked with grease, use a steam cleaner with solvent. Take care to wear protective clothing when degreasing. Clean new components or parts if they are received with a preservative coating.
- c. When removing components, always securely block both trailer wheels using trailer chocks. If special blocking procedures are required for a task, you will find these in the maintenance procedure.
- d. When disassembling components, tag and identify any matched or mated parts in the unit so that they can be returned to their original locations or positions when reassembled.
- e. Prior to component assembly, make certain that your hands, work bench, assembly tools and parts to be assembled are thoroughly clean. Use clean, lintfree shop cloths or paper towels when necessary to wipe parts.
- f. When reassembling components, be sure that you coat moving and sliding parts with a light oil. Also coat packings and oil seal lips with light oil. This reduces the possibility of cutting the packages and seal lips when installing over sharp edges or threads. Also replace all locking hardware, preformed packing paper or fiber gaskets and any parts that are subject to deterioration or fatigue.
- g. If assembly work cannot be completed the same day, cover the assembly and remaining parts with clean cloths or sheet plastic to keep out dust and contaminants which accumulate overnight. Apply a light coat of oil to the remaining parts and clean parts prior to beginning reassembly the following day.
- h. After reassembly is completed, reclean the exterior surfaces and check condition of paint. If paint was damaged during reassembly, sand the areas affected and touch up with the correct paint and color. If sanded areas are through the paint and down to bare metal, apply a primer coat and sand lightly before applying final coat. Mask off areas or parts that are not to be painted.

- i. Make certain components are initially greased or filled with oil, so that there is no chance for damage prior to scheduled service of the component. If lubrication is not practical, you should tie a warning tag on the equipment indicating unit has been drained and must be serviced before operation.

#### 4-10. GENERAL WIRING REPAIR

Preferred repair methods consists of replacing wires, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals and other make-shift procedures, although the latter may be appropriate for emergency field repairs. Determine the proper size and length of wire, or the terminal, or connector to be used for replacement by referring to the "Wire List" and the wiring diagram included with each electrical wiring harness maintenance procedure.

- a. Soldering Connections. Wire connections must be made mechanically sound before they are soldered; solder alone does not provide sufficient strength to prevent breakage. Joining surfaces of connections to be soldered must be clean and bright. If a separate flux is used, it should conform to Specification M IL-F-14256, rosin base flux (Item 7, Appendix E) and should be brushed onto the joint before soldering. If a flux-core solder is used, it should always be rosin-core electrical solder. If an uncored solder is used, it should be a lead-tin solder, (Item 16, Appendix E) conforming to Specification QQ-S-571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive build-up of solder on the joint should be avoided or removed.
- b. Insulating Joints. The preferred method of insulating electrical joints is by the use of heat-shrink tubing. To apply, cut a piece of heat-shrink tubing of suitable diameter to a length of 1 inch (2.5 cm) for covering joints at terminals or connectors, or to a length about ½ inch (1.3 cm) longer than the joint to be insulated. Slide the tubing over the wire before making the joint. After the joint is made, slide the tubing so that it covers the joint and shrink in place with moderate heat.

## ENCLOSURE AND SKID ASSEMBLY

---

### 4-11. ENCLOSURE - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

INITIAL SET-UP:

Personnel Required

4

Tools

General Mechanic's Tool Box  
(Section III, Item 1, App B)

---

### **CAUTION**

**Be certain all controls are pushed in and take care during removal so not to damage lights on control panel.**

- a. Removal

### **NOTE**

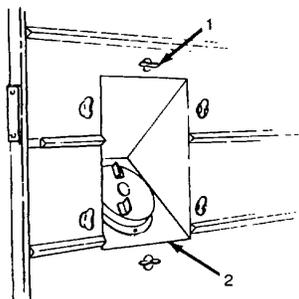
**Be sure that all doors are closed.**

- (1) Turn six thumbscrews (1) to release fuel cap and filler neck assembly (2) from enclosure assembly (3).
- (2) Loosen clamp at fuel tank and remove fuel cap and filler neck assembly (2) (para 4-14).
- (3) Remove four lifting rings (4), four washers (5) and four rubber washers (6).
- (4) Lower rear jacks (para 2-7).

### **WARNING**

**All nonessential personnel must be clear of vehicle area to avoid injury.**

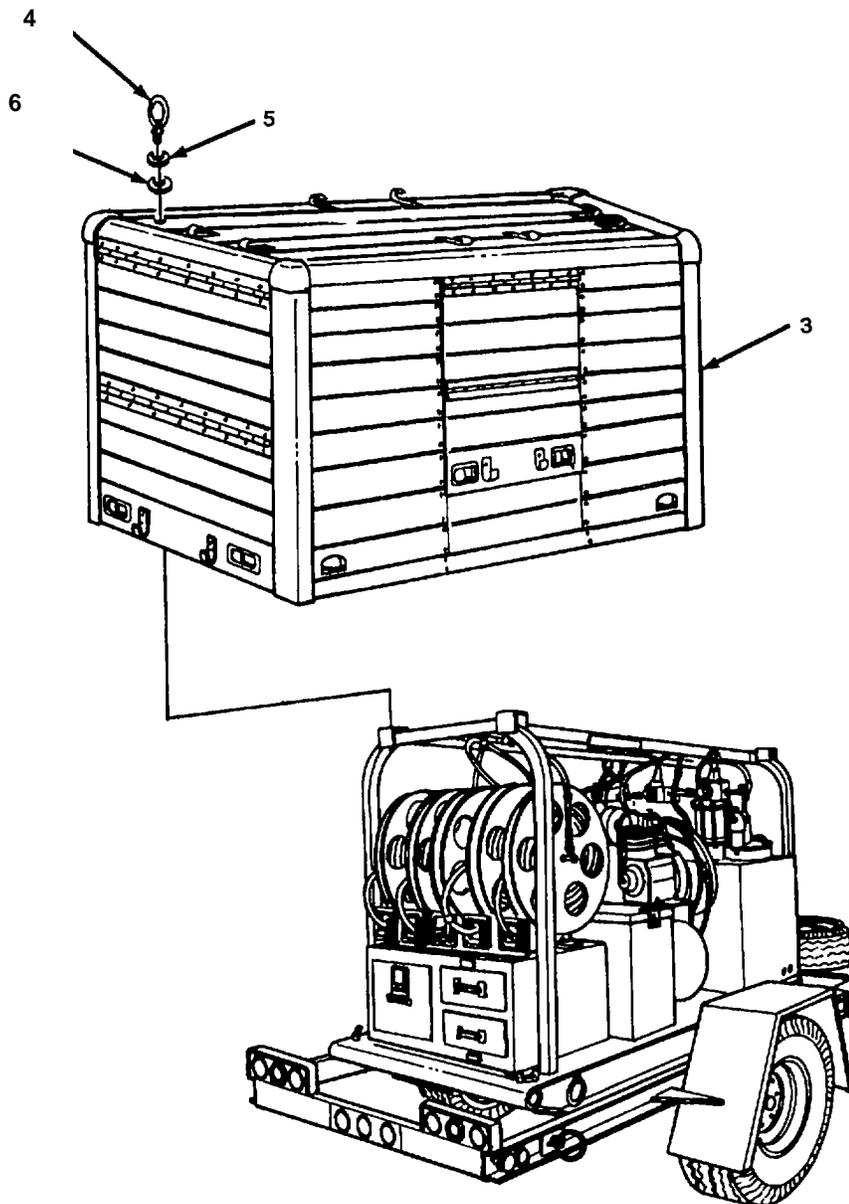
- (5) With a person on each corner, lift enclosure assembly (3) up and off of skid. Place on level surface.



4-16

b. Installation

- (1) Place enclosure assembly (3) on slid.
- (2) Install four rubber washers (6), four washers (5) and four lifting rings (4).
- (3) Slide hose onto fuel tank neck and tighten damp (para 4-14).
- (4) Position fuel cap and filler neck assembly (2) and turn six thumbscrews (1) to lock in place (para 4-14).



## ENCLOSURE AND SKID ASSEMBLY

---

### 4-12. DOORS - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

Personnel Required

4

Materials/Parts

Self-Locking Nuts

Tools

General Mechanic's Tool Box  
(Section III, Item 1, App B)

#1 Common Tool Box

Drill with 3/16 Drill Bit

(Section III, Item 2, App B)

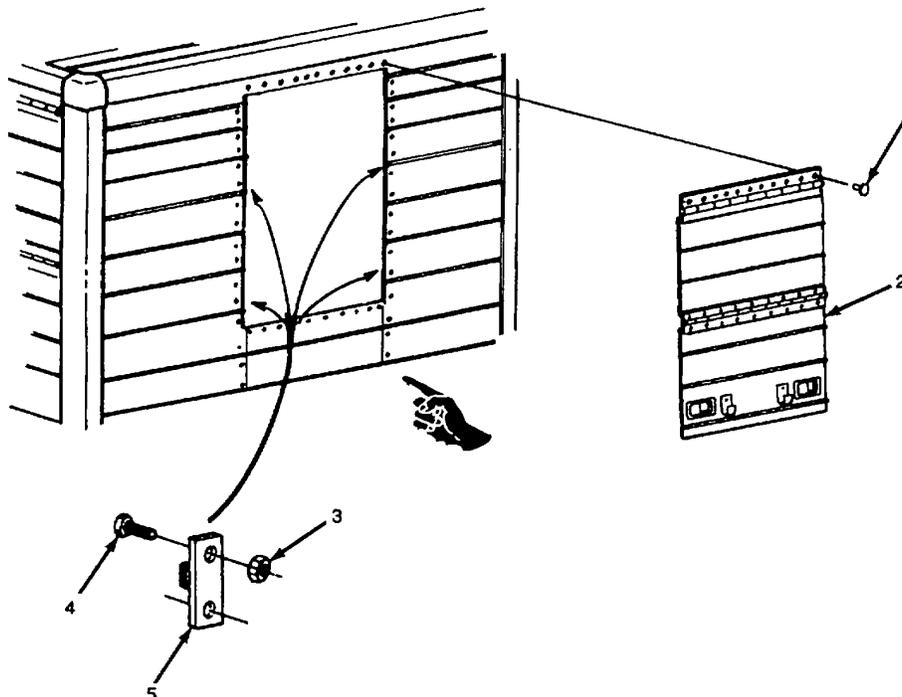
---

- a. Removal

#### NOTE

The following procedure applies to any of the four enclosure doors.

- (1) Drill out 13 rivets (1) and remove door (2).
- (2) Remove eight self locking nuts (3), eight screws (4) and four latch strikers (5). Discard nuts (3).



## ENCLOSURE AND SKID ASSEMBLY

---

### 4-12. DOORS- REPLACE - (Cont.)

---

b. Installation

- (1) Install four latch strikers (5), eight screws (4) and eight new self-locking nuts (3). Do not tighten nuts (3).
- (2) Position door (2) to align 13 rivet holes and support.
- (3) Install 13 rivets (1).
- (4) Adjust four latch strikers (5) by sliding in or out to ensure that the enclosure door (2) will close tightly. Tighten nuts (3).

## ENCLOSURE AND SKID ASSEMBLY

### 4-13. PANEL - REPAIRS

This task covers:

Repair

#### INITIAL SET-UP:

##### Materials/Parts

Synthetic rubber caulking compound (Item 4, App. E)  
Aluminum sheet, sized to fit (Item 2, App. E)  
Rivets (MS 24662-203) as required

##### Equipment Condition

Panel Removed

##### NOTE

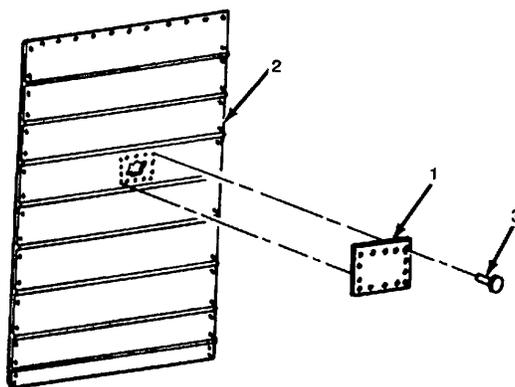
The following procedure may be used to patch any panel

##### Tools

General Mechanic's Tool Box (Section III, Item 1, App B)

#### Repair

- (1) Straighten any dents and flatten area to be patched.
- (2) Cut sheet aluminum patch (1), and shape if necessary to fit.
- (3) Drill patch perimeter at a spacing of approx. 2.5 inches (63.5 mm).
- (4) Lay patch over damaged area and transfer holes to panel (2).
- (5) Coat perimeter of patch with synthetic rubber caulking compound.
- (6) Position patch and install with rivets (3) as required.



## ENCLOSURE AND SKID ASSEMBLY

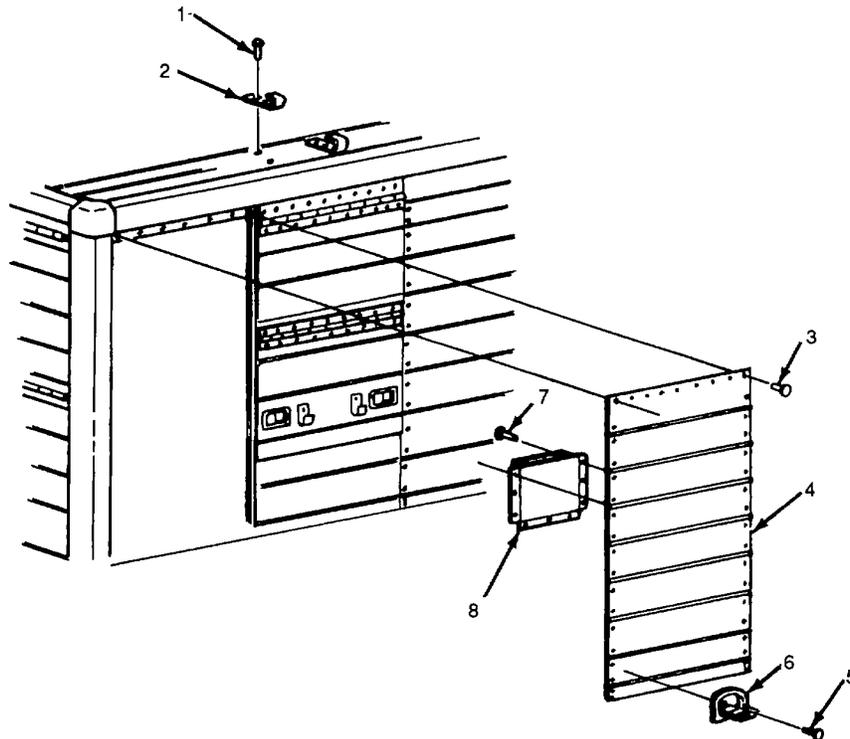
### 4-13. PANELS - REPLACE - (Cont.)

#### b. Installation

#### NOTE

**Step 3 applies to all panels. For other steps, proceed as needed.**

- (1) For right rear panel, position storage pocket (8) and install using nine rivets (7).
- (2) For front and rear side panels, coat back side of handle (6) with epoxy-polymide primer and install using four rivets (5).
- (3) Position panel (4) and install using rivets (3) as necessary. Seal panel along all outside edges with synthetic rubber caulking compound.
- (4) For top panel, install eight hooks (2) using rivets (1) as necessary.



## ENCLOSURE AND SKID ASSEMBLY

---

### 3-4. AIR FILTER-REPLACE/SERVICE

---

This task covers:

- |    |          |    |              |    |        |
|----|----------|----|--------------|----|--------|
| a. | Removal  | b. | Disassembly  | c. | Repair |
| d. | Assembly | e. | Installation |    |        |
- 

INITIAL SET-UP:

General Safety Instructions

#### **WARNING**

**Do not use open flame or smoke when working on the fuel system. An explosion may occur, causing severe injury or death.**

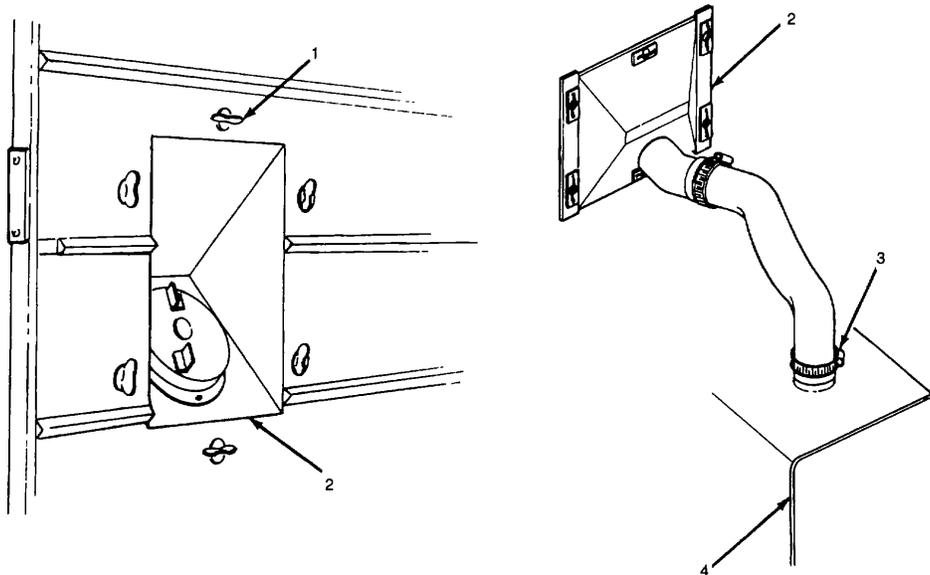
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Tools

General Mechanic's Tool Box  
(Section III, Item 2, App B)

#### a. Removal

- (1) Turn six thumbscrews (1) to release fuel cap and filler neck assembly (2).
- (2) Loosen clamp (3) at fuel tank (4) and remove fuel cap and filler neck assembly (2).

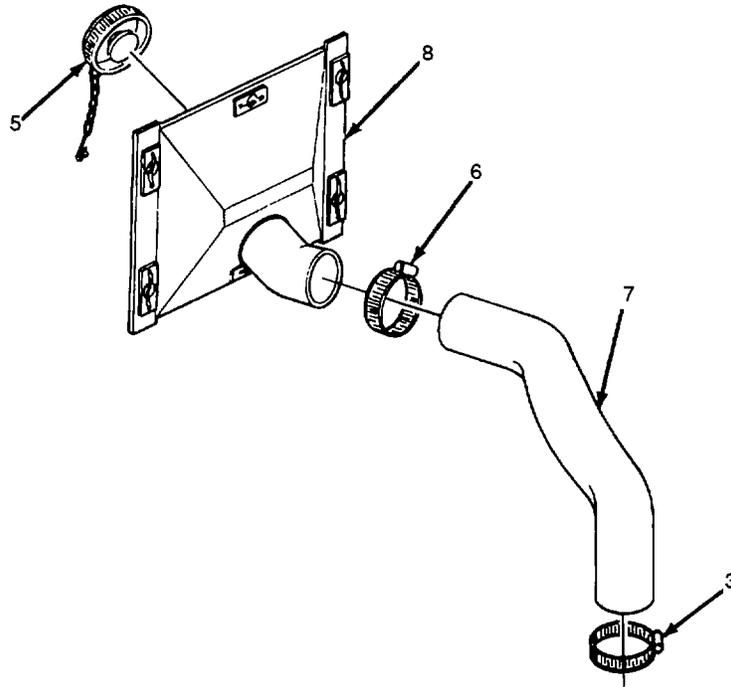


## ENCLOSURE AND SKID ASSEMBLY

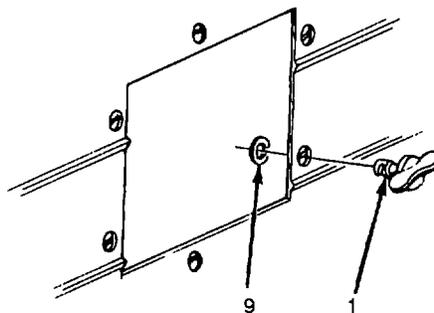
### 4-14. FUEL CAP AND FILLER NECK ASSEMBLY - REPLACE/REPAIR - (Cont.)

#### b. Disassembly

- (1) Remove fuel cap (5).
- (2) Loosen clamp (6) and remove hose (7) from cap housing (8). Slide two clamps (3) and (6) off of hose.



- (3) Remove six spring washers (9) and six thumbscrews (1) on housing.



#### c. Repair

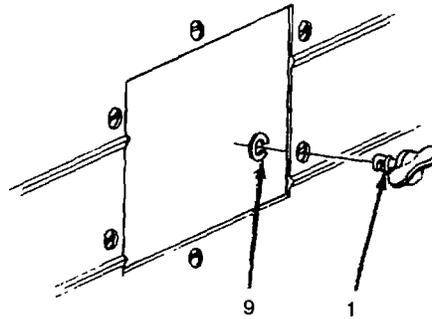
- (1) Inspect fuel hose for cracks or deterioration. Replace if necessary.
- (2) Replace any part that shows obvious wear or damage.

## ENCLOSURE AND SKID ASSEMBLY

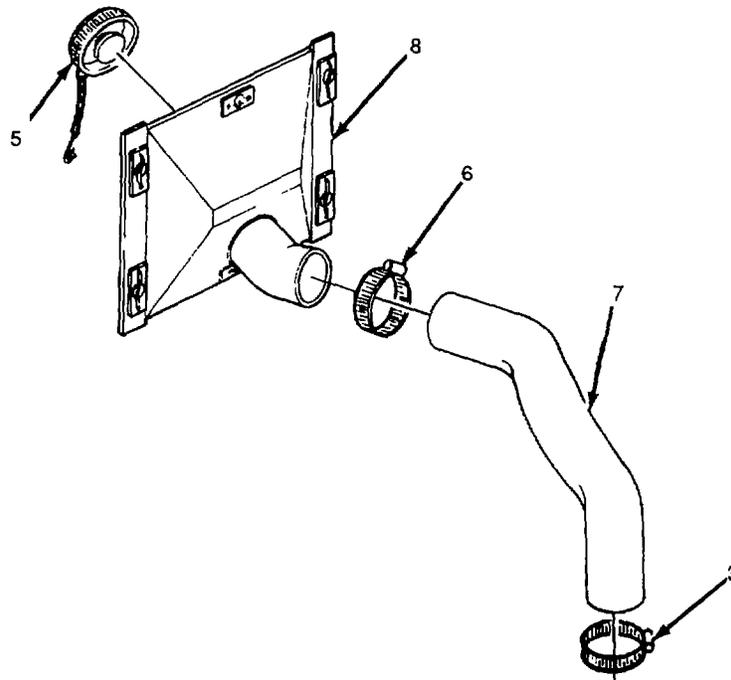
### 4-14. FUEL CAP AND FILLER NECK ASSEMBLY - REPLACE/REPAIR - (Cont.)

#### d. Assembly

- (1) Install six spring washers (9) and six thumbscrews (1) onto housing.



- (2) Slide two clamps (3) and (6) onto hose (7).
- (3) Install hose (7) on cap housing (8) and tighten clamp (6).
- (4) Install fuel cap (5).



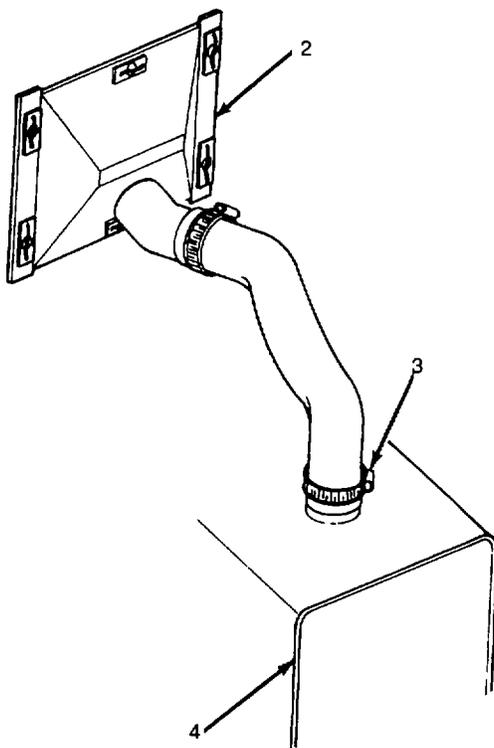
## ENCLOSURE AND SKID ASSEMBLY

### 4-14. FUEL CAP AND FILLER NECK ASSEMBLY - REPLACE/REPAIR - (Cont.)

---

e. Installation

- (1) Slide hose (7) onto fuel tank neck (4).
- (2) Tighten clamp (3).



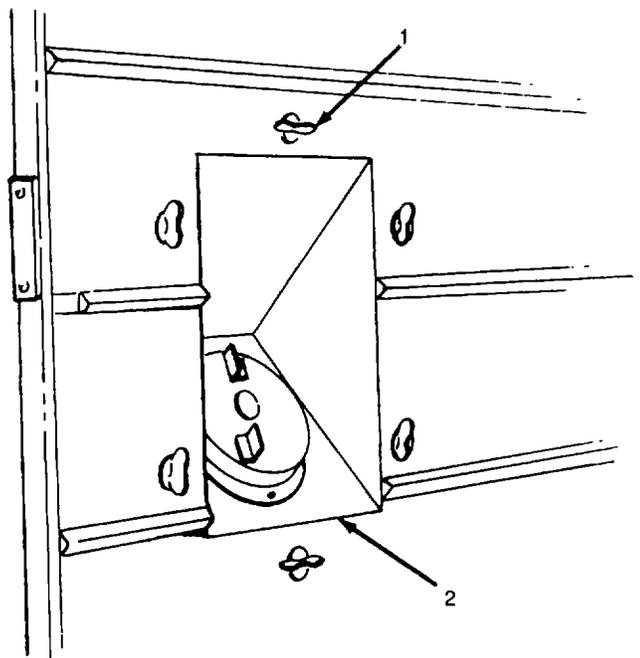
ENCLOSURE AND SKID ASSEMBLY

---

4-14. FUEL CAP AND FILLER NECK ASSEMBLY - REPLACE/REPAIR - (Cont.)

---

- (3) Position fuel cap and filler neck assembly (2) and turn six thumbscrews (1) to lock in place.



## SKID SUB ASSEMBLY

---

### 4-15. TOOL BOX ASSEMBLY - REPLACE/REPAIR

---

This task covers:

- a. Removal
- b. Disassembly
- c. Repair
- d. Assembly
- e. Installation

---

INITIAL SET-UP:

Personnel Required

2

Equipment Condition

Enclosure Assembly Removed (para. 4-11)

Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)  
Drill with 3/16 Drill Bit  
(Section III, Item 2, AppB)

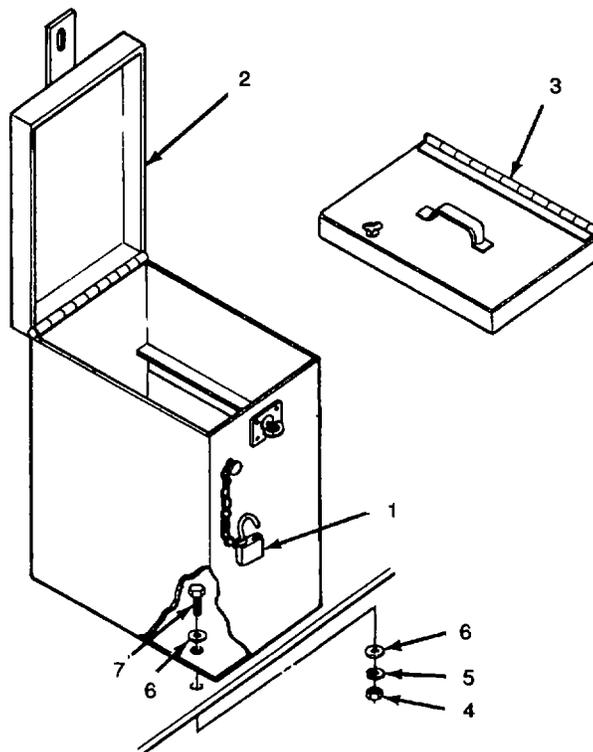
Materials/Parts

Lockwashers

---

a. Removal

- (1) Open padlock (1) and lift lid on tool box assembly (2).
- (2) Lift compartment tray (3) out of tool box assembly (2).
- (3) Remove four nuts (4) four lockwashers (5), eight flatwashers (6), four screws (7) and tool box assembly (2). Discard lockwashers (5).



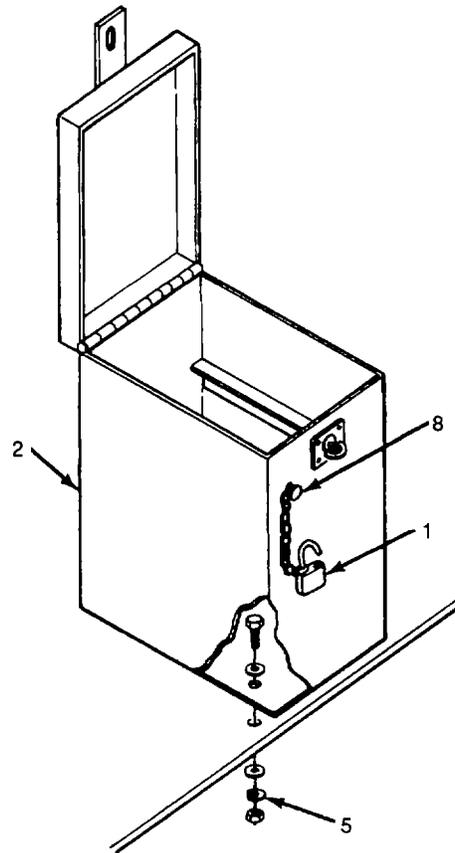
## SKID SUB ASSEMBLY

### 4-15. TOOL BOX ASSEMBLY - REPLACE/REPAIR - (Cont.)

---

b. Disassembly

Drill out rivet (8) from tool box assembly (2) and remove padlock (1).



c. Repair

- (1) Inspect tool box assembly (2) for dents. Straighten if possible.
- (2) Replace four lockwashers (5).
- (3) Replace any damaged parts.

## SKID SUB ASSEMBLY

### 4-15. TOOL BOX ASSEMBLY - REPLACE/REPAIR - (Cont.)

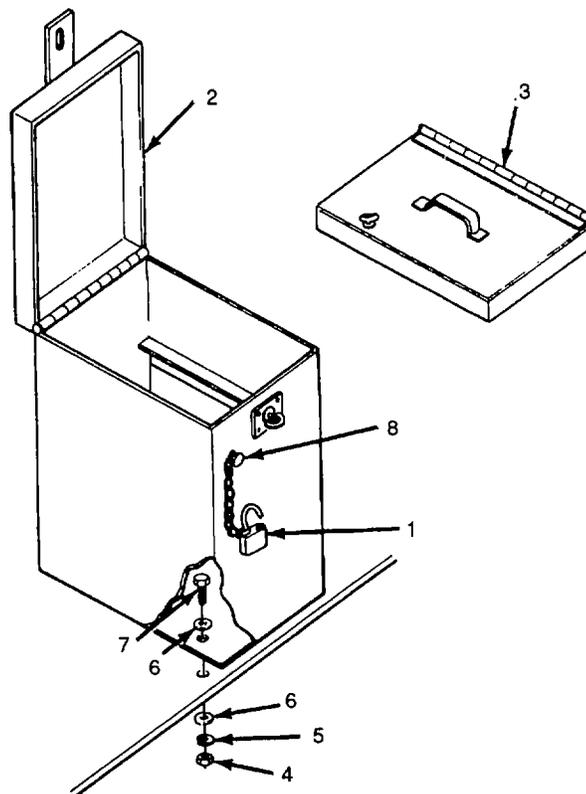
d. Assembly

Install padlock (1) to tool box assembly (2) with rivet (8).

e. Installation

(1) Install tool box assembly (2), with four screws (7), four new lockwashers (5), eight flatwashers (6) and four nuts (4).

(2) Install compartment tray (3) into tool box assembly (2).



## SKID SUB ASSEMBLY

---

### 416. FUEL TANK - SERVICE/REPLACE

---

This task covers:

- a. Draining                      b. Cleaning                      c. Removal                      d. Installation
- 

#### INITIAL SET-UP:

##### Materials/Parts

Container, 10 gallon capacity  
Dry cleaning solvent (Item 6, AppE)  
Plastic Ties (Item 23, AppE)

##### Equipment Condition

Enclosure removed (para 4-11)

##### General Safety Instructions

#### **WARNING**

Do not use open flame or smoke when working on the fuel system. An explosion may occur, causing severe injury or death.

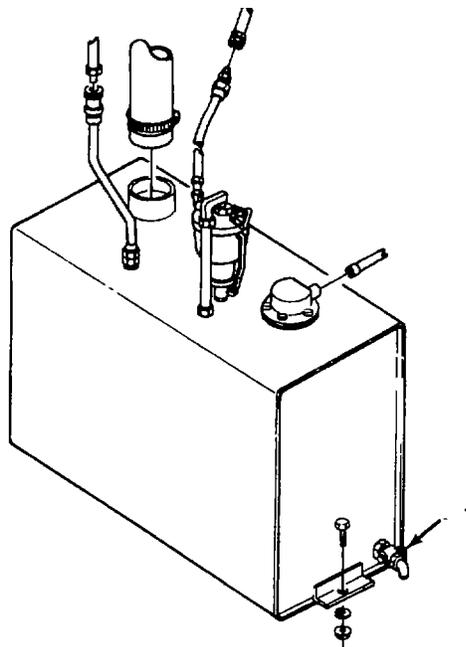
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##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

#### a. Draining

- (1) Drain fuel into suitable container by opening shutoff cock (1).
- (2) If fuel appears to be contaminated, or if rough or erratic engine operation has been noticed, clean system thoroughly. (ref para 4-16b Cleaning).
- (3) Close shutoff cock (1).



## SKID SUB ASSEMBLY

### 4-16. FUEL TANK - SERVICE/REPLACE - (Cont.)

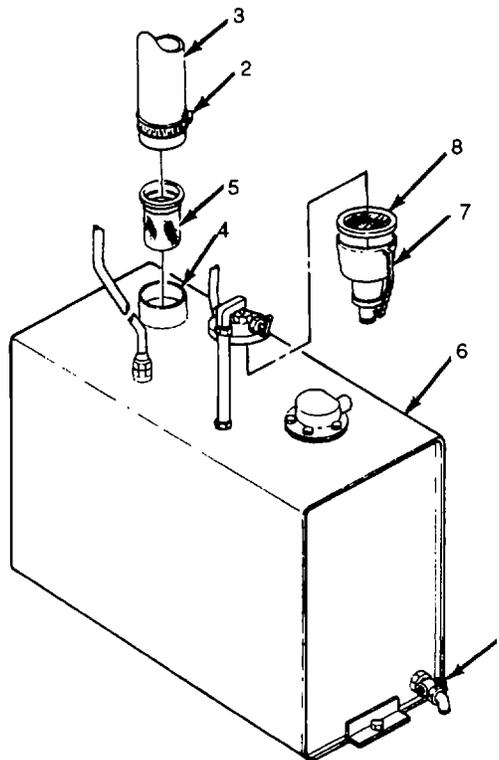
#### b. Cleaning

- (1) Loosen clamp (2) and slide hose (3) off of fuel tank filler neck (4).

#### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F (88°C to 59°C).**

- (2) Remove fuel strainer (5) and clean with dry-cleaning solvent.
- (3) Flush out fuel tank (6) with dry-cleaning solvent.
- (4) Remove bowl (7) and gasket (8). Clean inside of bowl (7) with dry-cleaning solvent.
- (5) Install gasket (8) and bowl (7).
- (6) Install fuel strainer (5) and hose (3) onto fuel tank filler neck (4).
- (7) Tighten clamp (2).



## SKID SUB ASSEMBLY

### 4-16. FUEL TANK - SERVICE/REPLACE - (Cont.)

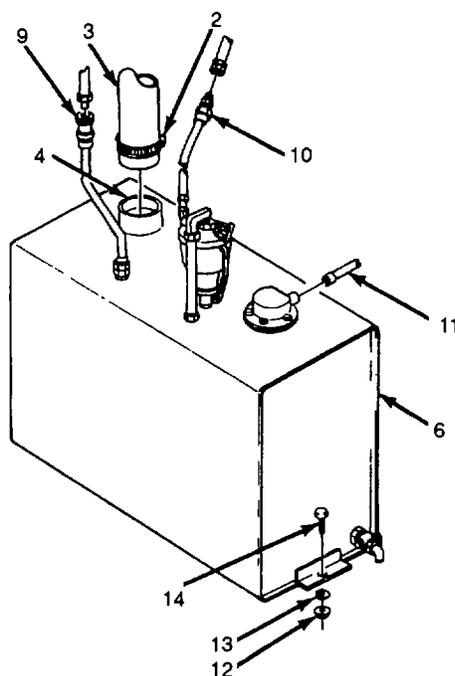
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#### c. Removal

- (1) Drain fuel tank (ref para 4-16a Draining).
- (2) Disconnect heater fuel hose assembly (9) at quick disconnect and remove plastic ties.
- (3) Disconnect engine fuel hose assembly (10) at engine.
- (4) Loosen clamp (2) and slide hose (3) off of fuel tank filler neck (4).
- (5) Disconnect electrical connector (11) at sending unit.
- (6) Remove two nuts (12), two lockwashers (13), two screws (14) and fuel tank assembly (6).

#### d. Installation

- (1) Position fuel tank assembly (6) and install two screws (14), two lockwashers (13) and two nuts (12).
- (2) Connect electrical connector (11) at sending unit.
- (3) Slide hose (3) onto fuel tank filler neck (4).
- (4) Tighten clamp (2).
- (5) Connect engine fuel hose assembly (10) at engine.
- (6) Connect heater fuel hose assembly (9) at quick disconnect and secure hose to rigid tubing at top of trailer with plastic ties.



## SKID SUB ASSEMBLY

---

### 4-16.1. FUEL TANK ASSEMBLY - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly
- 

INITIAL SET-UP:

#### GENERAL SAFETY INTRODUCTIONS

#### **WARNING**

**Do not use open flame or smoke when working on the fuel system. An explosion may occur, causing severe injury or death.**

#### Equipment Condition

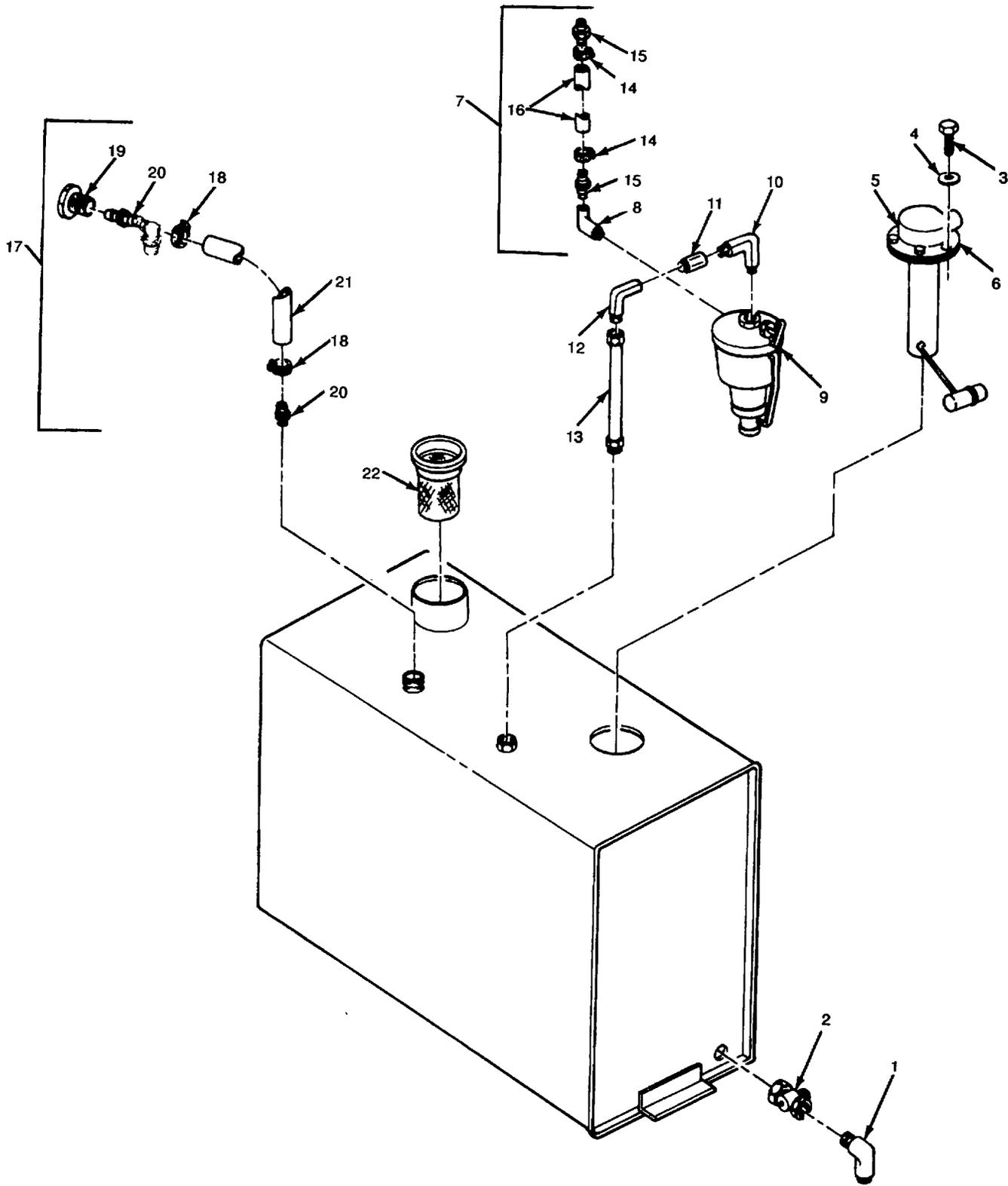
Fuel Tank Removed (para 4-16)

#### Tools

General Mechanics Tool Box  
(Section III, Item App B)

---

- a. Disassembly
- (1) Remove elbow (1) and shutoff cock (2).
  - (2) Remove five screws (3), five starwashers (4), sending unit (5) and gasket (6).
  - (3) Remove engine fuel hose assembly (7), elbow (8), fuel filter (9), elbow (10), nipple (11), elbow (12) and nipple (13).
  - (4) To disassemble fuel hose assembly (7) loosen two dampers (14) and remove two hose barbs (15). Slide dampers (14) off of hose (16).
  - (5) Remove heater fuel hose assembly (17). Disassemble by loosening two clamps (18) and removing coupling (19) and two hose barbs (20).
  - (6) Remove two clamps (18) from hose (21).
  - (7) Remove fuel strainer (22).



## SKID SUB ASSEMBLY

---

### 4-16.1. FUEL TANK ASSEMBLY - REPAIR - (Cont.)

---

b. Repair

- (1) Inspect fuel tank sending unit for cracks, rough or catching movement of the float and for damaged terminals. Replace damaged sending unit.
- (2) Inspect hoses and fittings for deterioration or damage. Replace all damaged parts.

c. Assembly

- (1) Install fuel strainer (22).
- (2) Slide two dampers (18) onto hose (21) and install two hose barbs (20) and coupling (19).
- (3) Install heater fuel hose assembly (17).
- (4) Slide two dampers (14) onto hose (16) and install two hose barbs (15). Tighten dampers (14).
- (5) Install nipple (13), elbow (12), nipple (11), elbow (10), fuel filter (9), elbow (8) and engine fuel hose assembly (7).
- (6) Install gasket (6), sending unit (5), five starwashers (4) and five screws (3).
- (7) Install shutoff cock (2) and elbow (1).



## REEL CABINET ASSEMBLY

---

### 4-17. REEL CABINET ASSEMBLY - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly
- 

#### INITIAL SET-UP:

##### Personnel Required

2

##### Tools

General Mechanics Tool Box  
(Section III, Item 2, AppB)

Drill with 3/16 Drill Bit  
(Section III, Item 2, AppB)

##### Equipment Condition

Battery box assembly removed (para. 4-18)

Reel assemblies removed (para. 4-21)

---

#### a. Disassembly

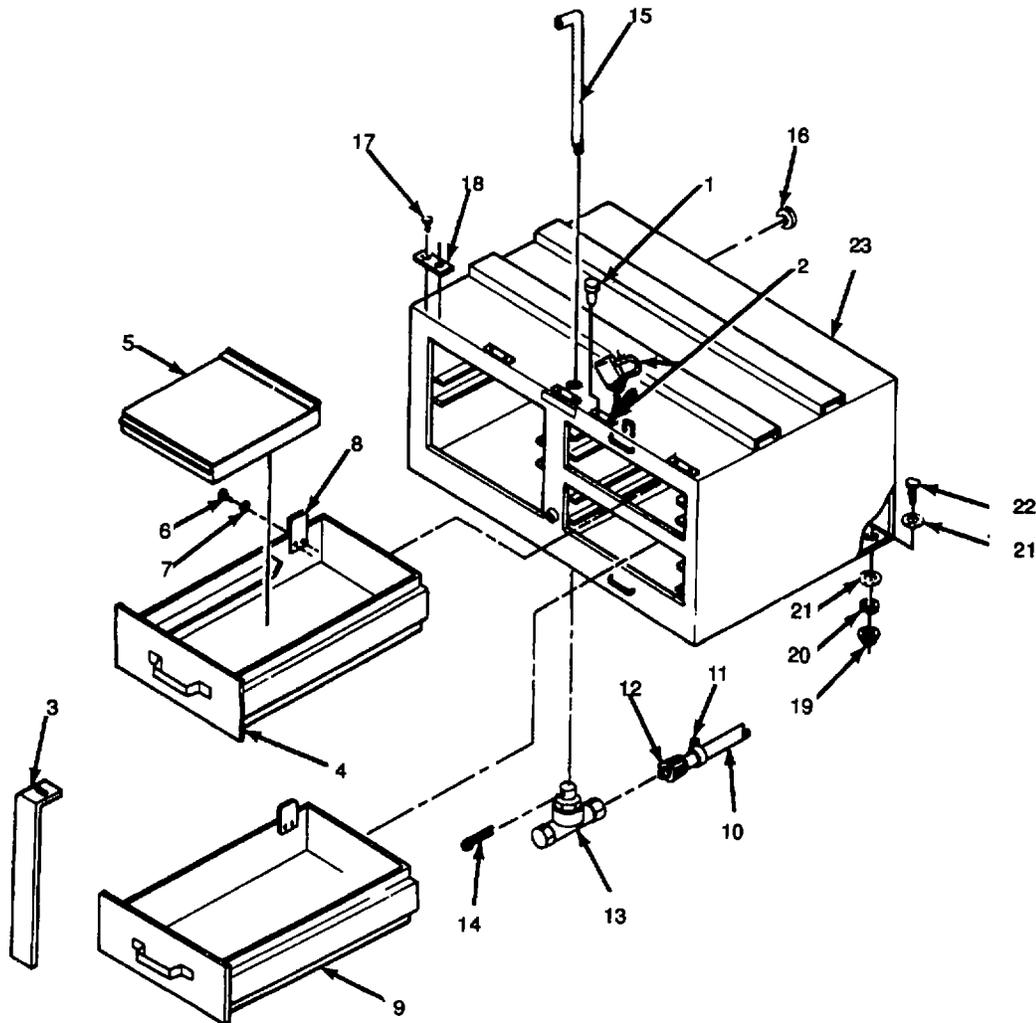
- (1) Remove winterization hose and duct (para 4-43)
- (2) Drill out rivet (1) and remove padlock and chain (2).
- (3) Remove lock bar (3).
- (4) Pull out top drawer (4) and remove compartment tray (5).
- (5) Remove two screws (6), two lockwashers (7), drawer stop (8) and top drawer (4). Repeat for lower drawer (9).
- (6) Disconnect hose (10) at ball valve and air tank and remove hose.
- (7) Remove hose (10) by loosening two dampers (11). Slide two clamps (11) off of hose (10). Remove two fittings (12).
- (8) Remove cotter pin (14) and lever (15) from ball valve (13).
- (9) Remove ball valve (13).
- (10) Remove grommet (16).
- (11) Drill out ten rivets (17) and remove five identification plates (18).
- (12) Remove four nuts (19), four lockwashers (20), eight flatwashers (21), four screws (22) and reel cabinet (23).

## REEL CABINET ASSEMBLY

### 4-17. REEL CABINET ASSEMBLY - REPAIR - (Cont.)

b. Repair

- (1) Inspect hose (10) for cracks, deterioration, abrasion, cuts, or fraying. Replace if damaged.
- (2) Inspect all other parts for damaged threads, cracks, distortion or wear. Replace damaged or worn parts.



## REEL CABINET ASSEMBLY

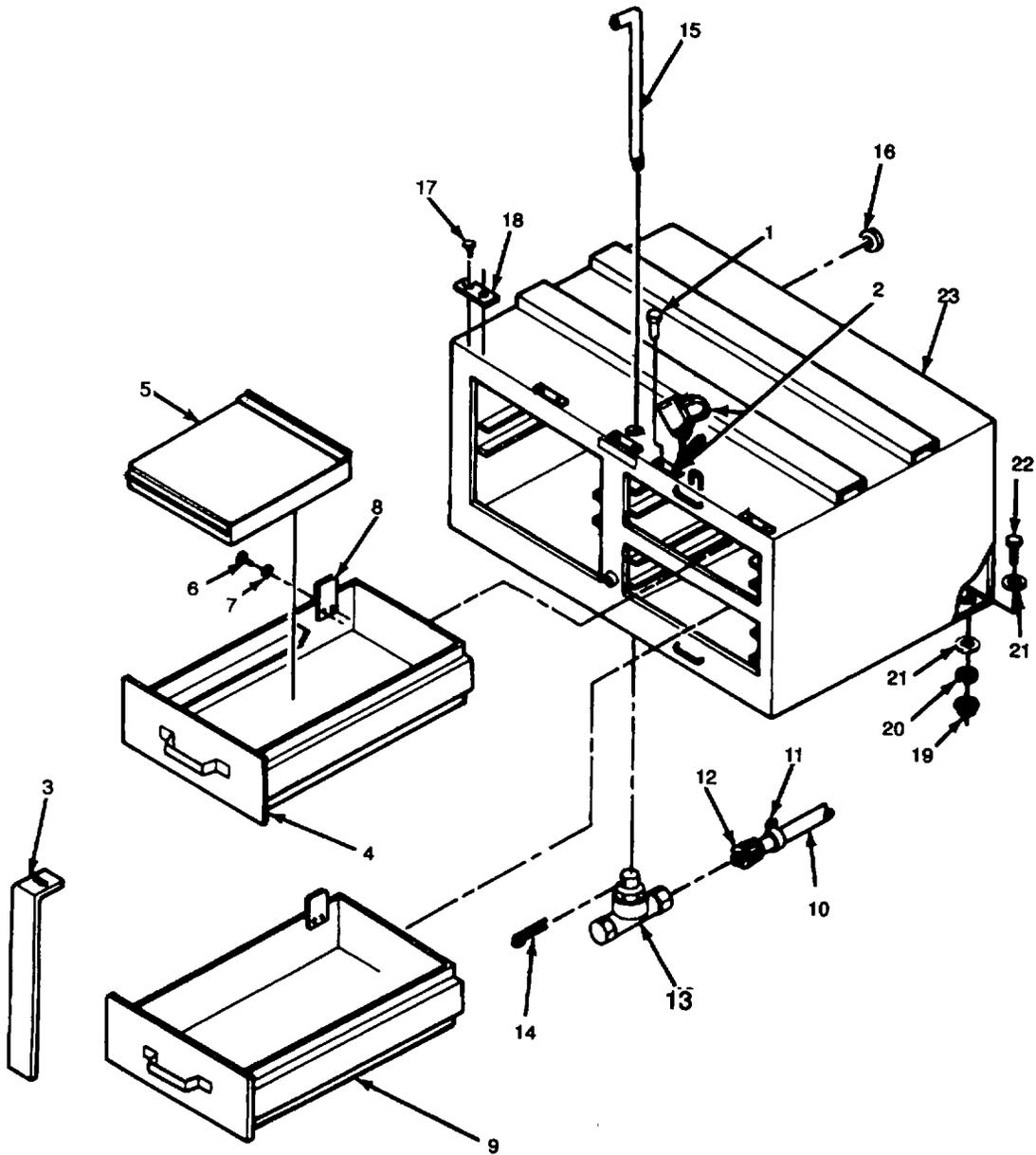
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### 4-17. REEL CABINET ASSEMBLY - REPAIR - (Cont.)

---

c. Installation

- (1) Install reel cabinet (23) with four screws (22), four lockwashers (20), eight flatwashers (21) and four nuts (19).
- (2) Position five identification plates (18) and install using ten rivets (17).
- (3) Install grommet (16).
- (4) Install ball valve (13), lever (15) and cotter pin (14).
- (5) Assemble hose (10) by sliding two clamps (11) onto hose (10).
- (6) Install two fittings (12) and tighten clamps (11).
- (7) Connect hose (10) at ball valve (16) and air tank.
- (8) Install lower drawer (9), drawer stop (8), two lockwashers (7) and two screws (6). Repeat for top drawer (4).
- (9) Store compartment tray (5) in top drawer (4).
- (10) Install lock bar (3).
- (11) Install padlock and chain (2) using rivet (1).
- (12) Lubricate drawer rails (para. 3-2).
- (13) Install winterization duct and hose (para. 4-43).



## REEL CABINET ASSEMBLY

---

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR

---

This task covers:

- |             |                 |                |           |
|-------------|-----------------|----------------|-----------|
| a. Service  | b. Removal      | c. Disassembly | d. Repair |
| e. Assembly | f. Installation |                |           |

---

INITIAL SET-UP:

Materials/Parts

Dry-cleaning solvent (Item 6, AppE)  
Heat Shrink tubing (Item 20 and 21 AppE)  
Grease, GAA (Item 8, AppE)

General Safety Instructions

**WARNING**

When working on batteries, wear eye protection and remove all jewelry, dogtags and metal items to avoid electrical shock and burns.

Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

- 
- a. Service

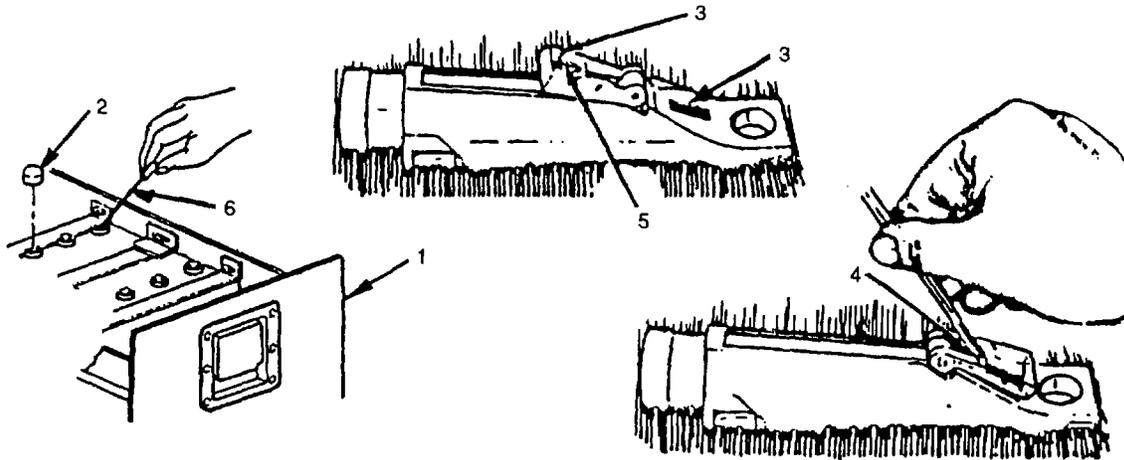
**WARNING**

**Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which is highly explosive and can cause severe injury or death.**

- (1) Open battery box assembly drawer (1).
- (2) Remove battery caps (2) and check electrolyte level in each cell.
- (3) Fill to proper level with distilled water.
- (4) Install caps (2) and run engine for 10 to 15 minutes.
- (5) Remove caps (2) and check specific gravity for each cell (steps (6) through (9)).
- (6) To measure specific gravity, swing plastic cover (3) back on duo-check coolant and battery tester. Clean the measuring surface (4) and the bottom cover (5) with a clean soft cloth. Close cover.
- (7) Use black dipstick (6) to obtain a small sample of battery acid.
- (8) Place a few drops of acid onto measuring surface (4) through opening in cover plate.

REEL CABINET ASSEMBLY

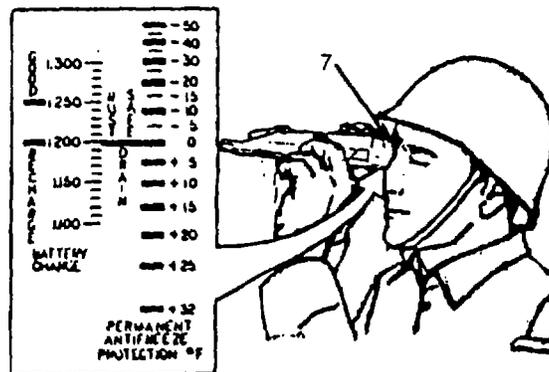
4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)



- (9) Point the instrument toward any light source (headlight) and look into eyepiece (7). The battery charge is at a point on the left-hand part of the scale where the dividing line between light and dark (shadow) crosses the scale.

NOTE

A little experience will enable you to quickly obtain the best contrast between light and dark portions of the field of view. Tilt the instrument toward the light source until the best results are obtained. If the edge of the shadow is not sharp, the measuring surface was not sufficiently cleaned or dried.



REEL CABINET ASSEMBLY

---

4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

---

- (10) If battery specific gravity is not adequate, remove battery from vehicle (para 4-18b) and charge. While charging check battery specific gravity every 30 minutes. The batteries are fully charged when you get a constant reading for three 30-minute intervals.
- (11) During charging, check the electrolyte level frequently. Add distilled water when necessary.

**NOTE**

**Batteries should be charged at least once a month while in storage. (12) If a battery fails to take or hold a charge, replace.**

## REEL CABINET ASSEMBLY

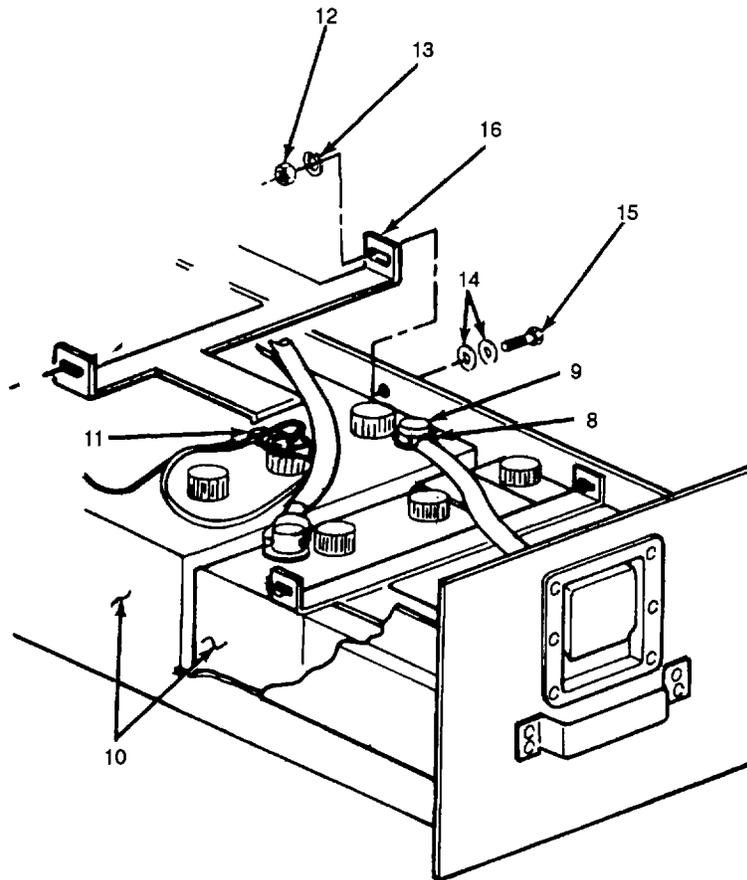
### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

#### b. Removal

#### **CAUTION**

**When removing batteries always disconnect ground cables first to prevent damage to batteries.**

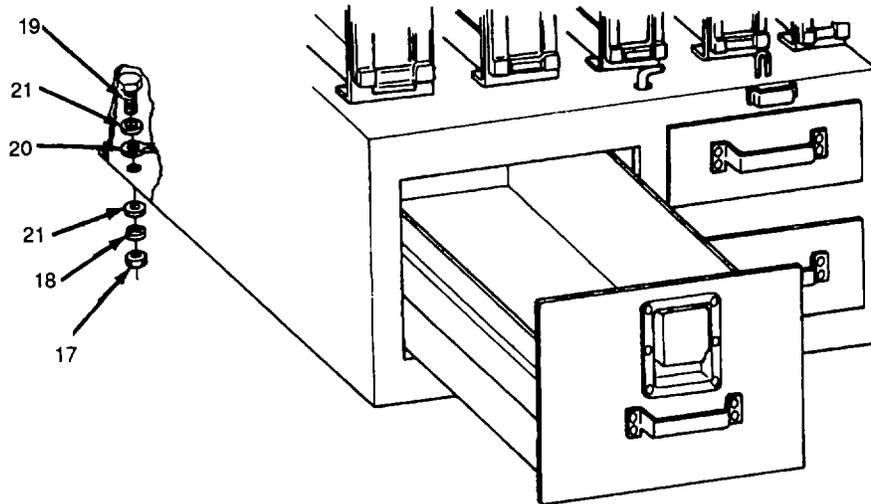
- (1) Loosen four nuts (8) and remove four terminal lugs (9) from two batteries (10).
- (2) Remove temperature switch (11) from battery cell. Install battery cap in its place.
- (3) Remove four nuts (12), four lockwashers (13), eight washers (14), four screws (15), two battery hold down brackets (16).
- (4) Remove two batteries (10).



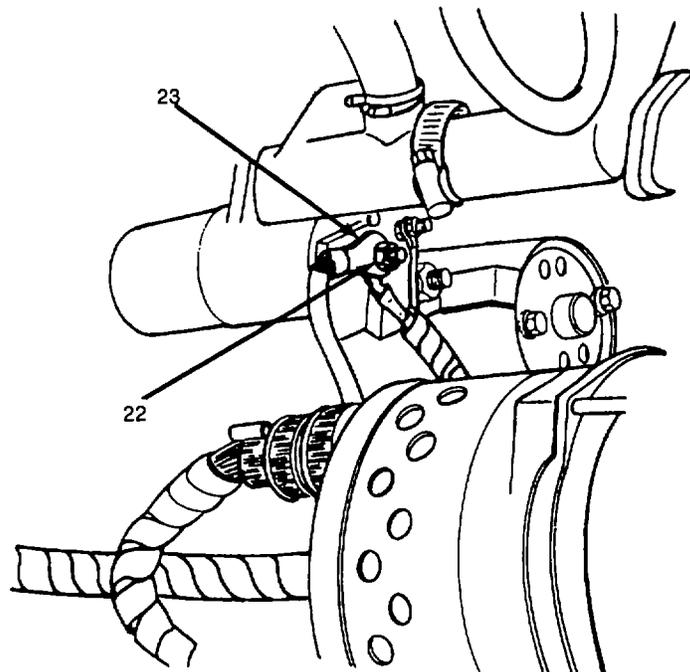
## REEL CABINET ASSEMBLY

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

- (5) Remove nut (17), lockwasher (18), two flatwashers (21), screw (19) to disconnect ground lead (20). Reinstall screw, lockwasher and nut.



- (6) Remove battery temperature sending unit by removing grommet from reel cabinet (para 4-17).
- (7) Remove nut (22) and starter lead (23).

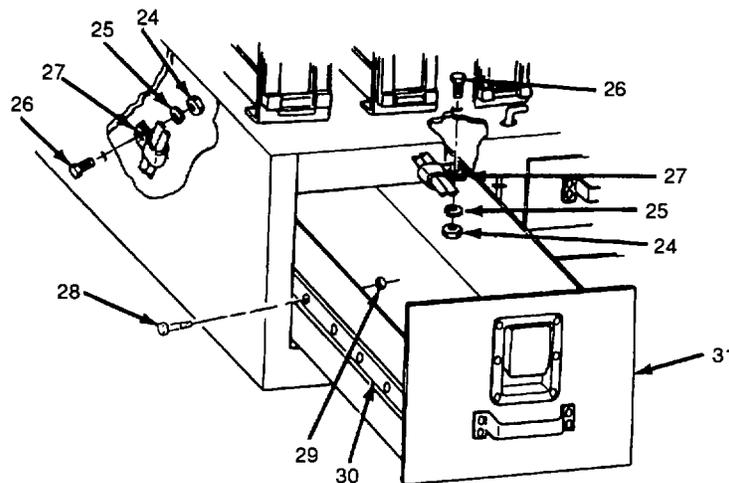


## REEL CABINET ASSEMBLY

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

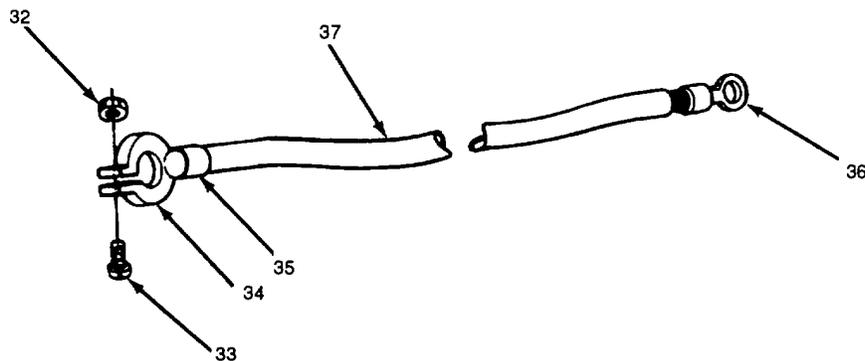
#### b. Removal - (cont.)

- (8) Remove two nuts (24), two lockwashers (25), two screws (26) and two clamps (27).
- (9) Remove ten screws (28), ten locking nuts (29) from track (30).
- (10) Remove battery box assembly (31).



#### c. Disassembly

- (1) To disassemble battery cables remove nuts (32) and screws (33) from terminal lugs (34).
- (2) Remove heat shrink tubing (35).
- (3) Cut terminal (36) and/or terminal lugs (34) from cable (37) as required.



REEL CABINET ASSEMBLY

---

4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

---

d. Repair

**CAUTION**

**Do not allow baking soda solution to enter batteries. Failure to do so could damage equipment.**

- (1) Flush metallic parts and battery cable ends with a solution of baking soda and water, to neutralize any acid on these parts.
- (2) Clean battery tops with a baking soda and water solution. Do not allow mixture to enter batteries.

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of the skin to the cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

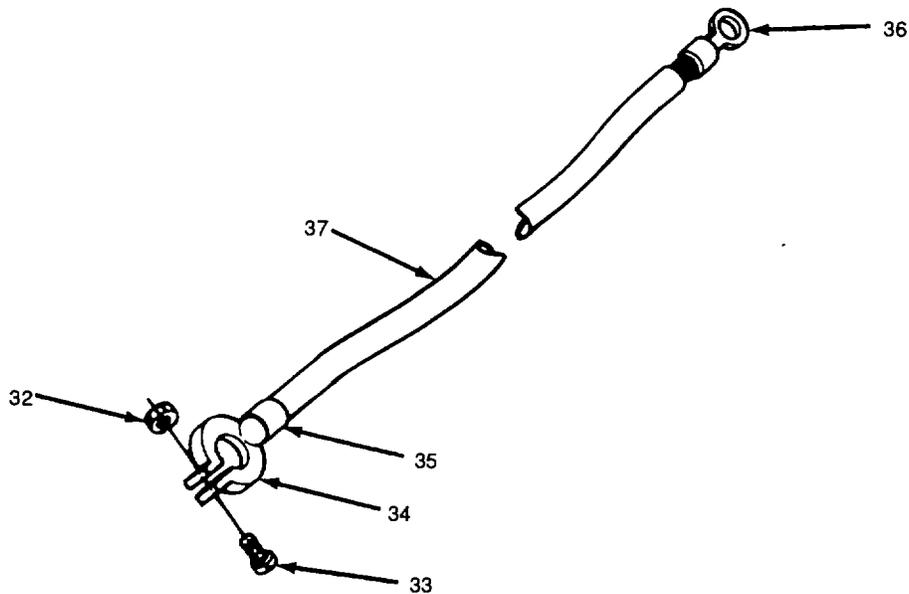
- (3) Remove any grease or gummy deposits with dry cleaning solvent.
- (4) Inspect batteries for cracks, loose posts or other damage. Replace if needed.
- (5) Inspect battery cables for corrosion, breaks or deteriorated insulation. Replace if damaged.
- (6) Inspect all sheet metal parts for cracked or broken weldments, dents or distortion. Re-weld and straighten parts as necessary.
- (7) Inspect all parts for obvious wear or damage. Replace as required.

## REEL CABINET ASSEMBLY

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

e. Assembly

- (1) Strip battery cable insulation to terminal well depth as required.
- (2) Slide length of heat shrink tubing (35) onto battery cable (37) as follows.
  - a Black tubing for negative battery cable and jumper cable
  - b Red tubing for positive battery cable.
- (3) Install terminal lugs (34) and/or terminal (36) onto cable (37). Crimp ends securely.
- (4) Move heat shrink tubing (35) over exposed wire and shrink by applying heat.
- (5) Install screws (33) and nuts (32) onto terminal lugs (34).

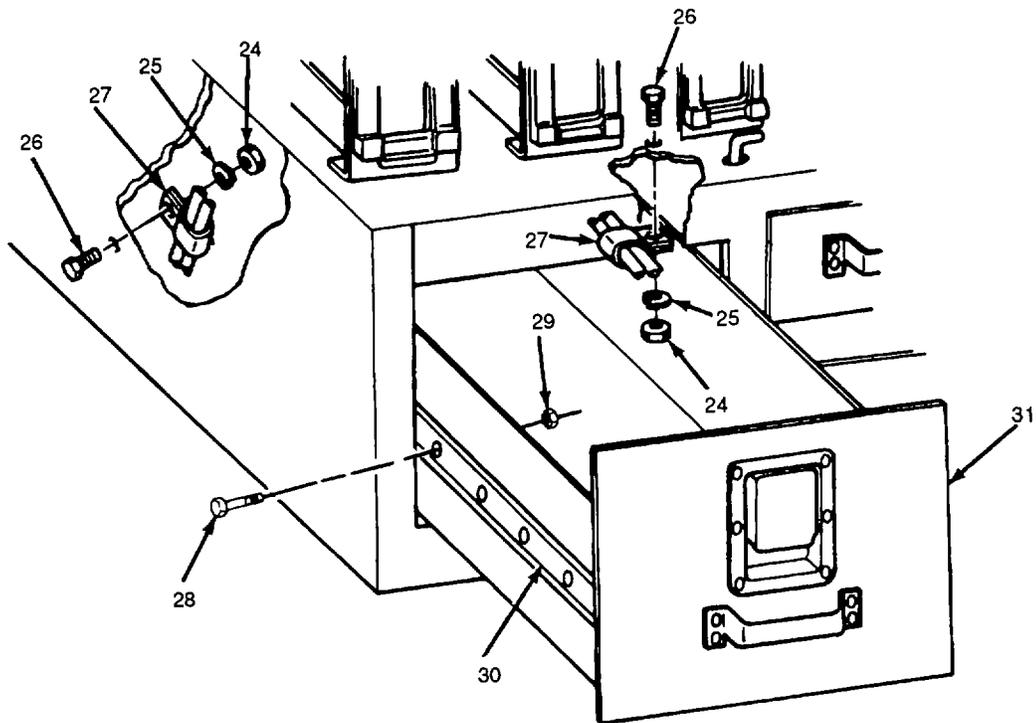


## REEL CABINET ASSEMBLY

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

#### f. Installation

- (1) Install battery box assembly (31).
- (2) Install track (30), ten screws (28) and ten self locking nuts (29).
- (3) Install two clamps (27), two screws (26), two lockwashers (25) and two nuts (24).
- (4) Lubricate drawer rail (para 3-2) to insure smooth operation.

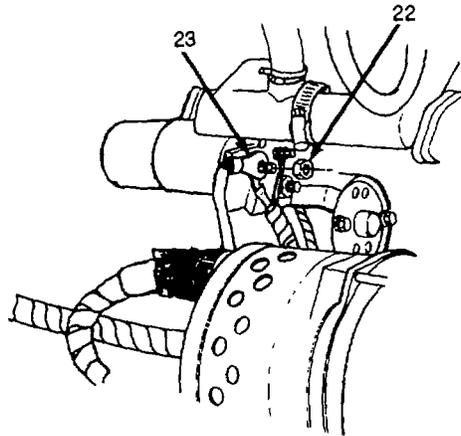


## REEL CABINET ASSEMBLY

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

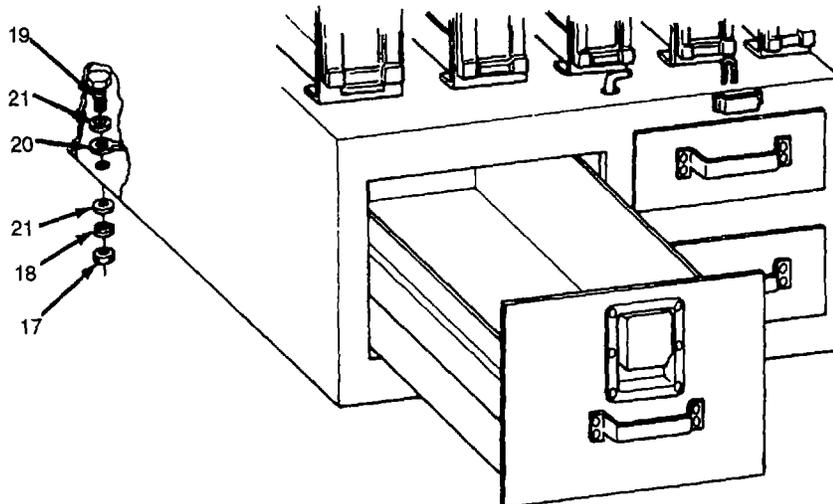
f. Installation - (cont.)

- (5) Connect starter lead (23) using nut (22).



- (6) Remove nut (17), lockwasher (18), two flatwashers (21), screw (19). Connect ground lead (20) using screw, lockwasher and nut.

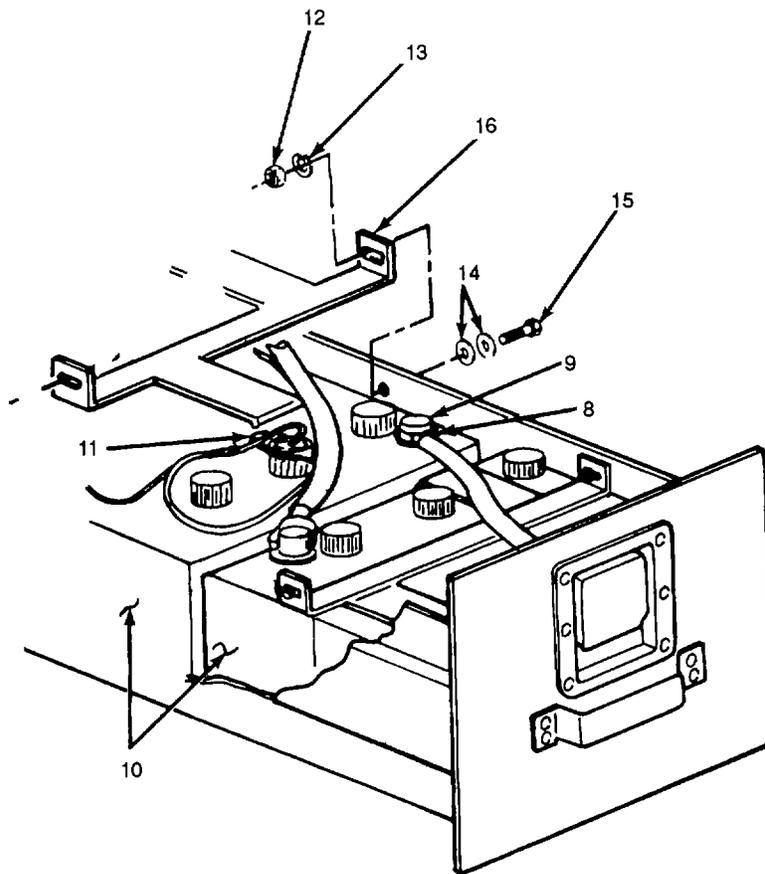
- (7) Install battery temperature sending unit by using grommet from reel cabinet (para 4-17).



## REEL CABINET ASSEMBLY

### 4-18. BATTERY BOX ASSEMBLY - SERVICE/REPLACE/REPAIR - (Cont.)

- (8) Install two batteries (10).
- (9) Install two battery hold down brackets (16) using six screws (15), 12 washers (14), six lockwashers (13) and six nuts (12).
- (10) Remove temporary cap from battery cell and install temperature switch (11).
- (11) Loosen four nuts (8) and install four terminal lugs (9) on two batteries (10). Tighten nuts (8).
- (12) Coat battery terminal with grease.



## REEL CABINET ASSEMBLY

---

### 4-19. GEAR LUBE AND ENGINE OIL DISPENSERS - REPLACE

---

This task covers:

- a. Removal                      b. Installation
- 

#### INITIAL SET-UP:

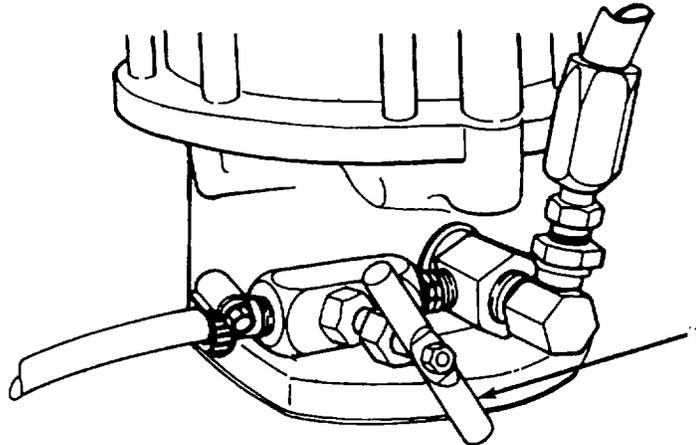
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

---

#### a. Removal

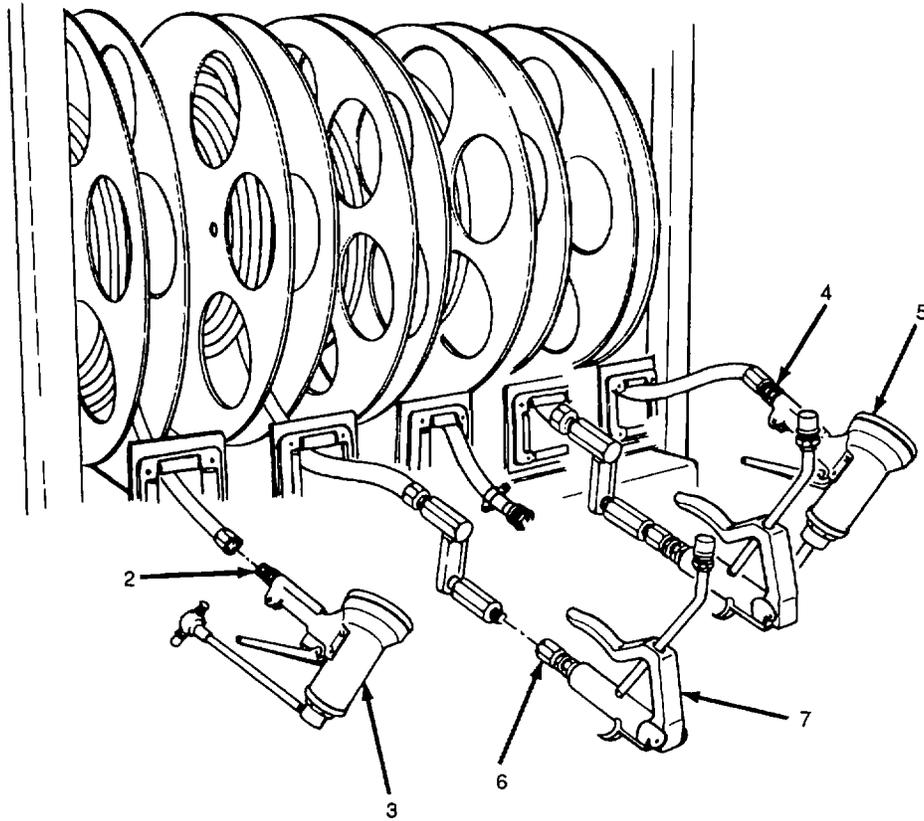
- (1) Vent lube pressure completely by opening valve (1). Close valve (1).



- (2) Loosen swivel (2) and remove gear lube dispenser (3).  
(3) Loosen swivel (4) and remove engine oil dispenser (5).  
(4) Loosen two nuts (6) and remove two grease control valves (7).

#### b. Installation

- (1) Install two grease control valves (7) and tighten two nuts (6).  
(2) Install engine oil dispenser (5) and tighten swivel (4).  
(3) Install gear lube dispenser (3) and tighten swivel (2).



## REEL CABINET ASSEMBLY

---

### 4-20. AIR, LUBE AND GREASE HOSES - REPLACE

---

This task covers:

- a. Removal    b. Installation
- 

INITIAL SET-UP:

Tools

General Mechanics Tool Box  
(Section II, Item 1, App B)

---

- a. Removal
- (1) Remove gear lube and engine oil dispensers as required (para 4-19).
  - (2) Remove two bushings (12) from gear lube and oil dispenser hoses (1 and 2).
  - (3) Remove two reducers (5) from air hose (4).
  - (4) Remove two screws (9) and hose stop (10) from air hose (4).
  - (5) Remove two couplings (7), two bushings (8) and two swivels (6) from two grease control valve hoses (3).
  - (6) Unreel hose and remove after disconnecting at reel center (11).
- b. Installation
- (1) Install hose at reel center (11) and wind up.
  - (2) Install hose stop (10) and two screws (9) to air hose (4).
  - (3) Install two reducers (5) onto air hose (4).
  - (4) Install two swivels (8), two bushings (6) and two couplings (7) to two grease control valve hoses (3).
  - (5) Install two bushings (12) to gear lube and oil dispenser hoses (1 and 2).
  - (6) Install gear lube and engine oil dispensers as required (para 4-19).



## REEL CABINET ASSEMBLY

---

### 4-20.1. AIR, LUBE AND GREASE HOSES - REPAIR

---

This task covers:

- a. Disassembly
  - b. Repair
  - c. Assembly
- 

INITIAL SET-UP:

Equipment Condition

Air, lube or grease hoses removed (para. 4-20)

**NOTE**

**The following procedure applies to any of five air, lube, and grease hoses.**

Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

a. Disassembly

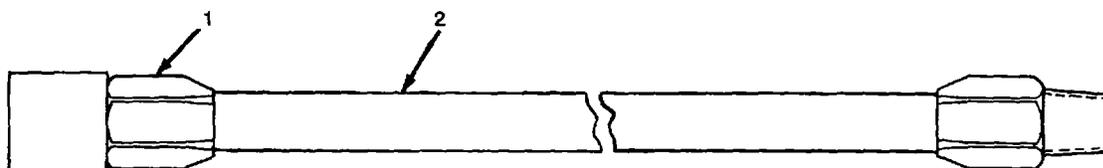
Remove two reusable fittings (1) from hose (2).

b. Repair

- (1) Inspect hose for deterioration or wear. Replace hose if required.
- (2) If hose has a break or cut near either end, cut damage off of hose and reuse.
- (3) Inspect fittings for damage. Replace if defective.

c. Assembly

Install two fittings (1) onto hose (2).



## REEL CABINET ASSEMBLY

---

### 4-21. REEL ASSEMBLY - REPLACE/REPAIR

---

This task covers:

- a. Removal    b. Disassembly    c. Repair    d. Assembly    e. Installation
- 

#### INITIAL SET-UP:

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

##### Materials/Parts

Teflon Tape (Item 18, App E)

##### Equipment Condition

Gear lube and engine oil dispensers  
removed (para 4-19)  
Air, lube and grease hoses  
removed (para 4-20)

---

#### **WARNING**

**Release pressure from hoses by activating dispensing handle and disconnect line slowly; otherwise pressure in line may result in injury.**

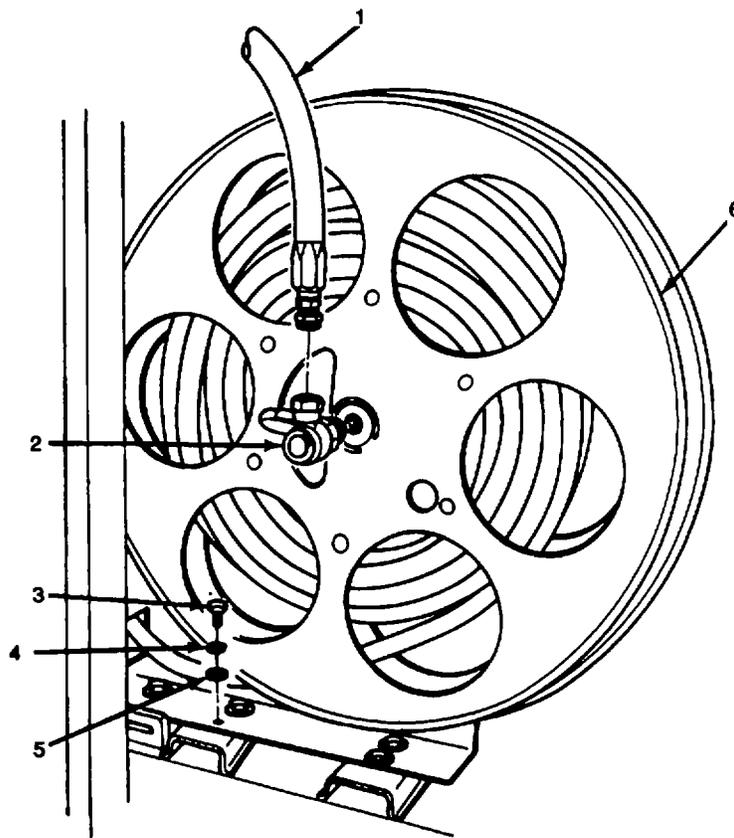
- a. Removal
- (1) Remove elbows (2) from reel.
  - (2) Disconnect lube and air hose (1) from elbows (2).
  - (3) Remove 4 screws (3), 4 lockwashers (4), 4 flatwashers (5) and reel assembly (6).

## REEL CABINET ASSEMBLY

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### 4-21. REEL ASSEMBLY - REPLACE/REPAIR - (Cont.)

---



b. Disassembly

**NOTE**

**The following applies to any of the five reel assemblies.**

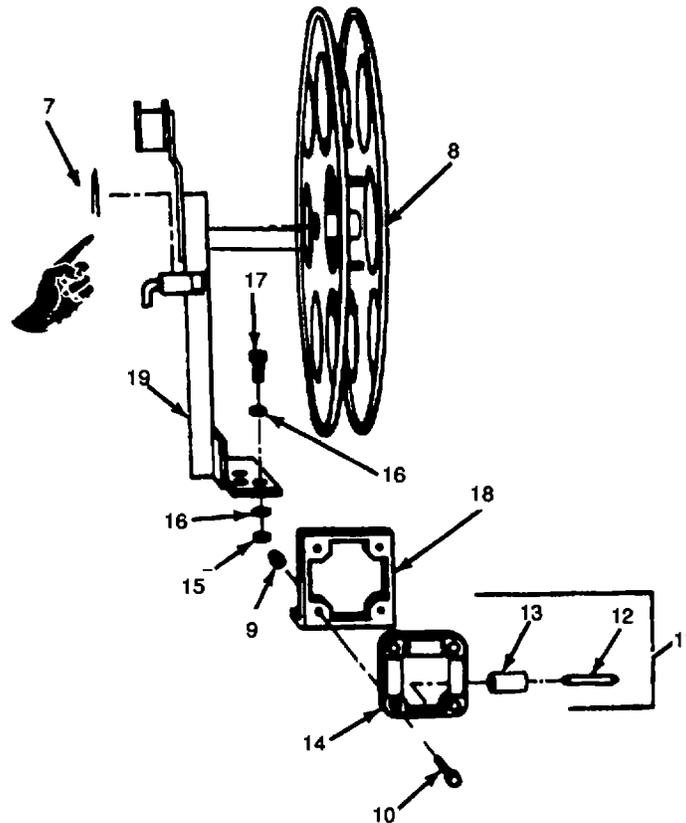
- (1) Remove cotter pin (7) and hose reel (8).
- (2) Remove four self-locking nuts (9), four screws (10) and roller assembly (11).
- (3) To disassemble roller assembly (11) remove four shafts (12), four rollers (13) from roller mount (14).
- (4) Remove two self-locking nuts (15), four washers (16), two screws (17) and roller bracket (18) from reel bracket (19).

## REEL CABINET ASSEMBLY

---

### 4-21. REEL ASSEMBLY - REPLACE/REPAIR

---



c. Repair

- (1) Replace six self-locking nuts (9 and 15) and cotter pin (7).
- (2) Inspect all other parts for damaged threads, cracks, distortion and other damage. Replace parts as needed.

## REEL CABINET ASSEMBLY

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### 4-21. REEL ASSEMBLY - REPLACE/REPAIR

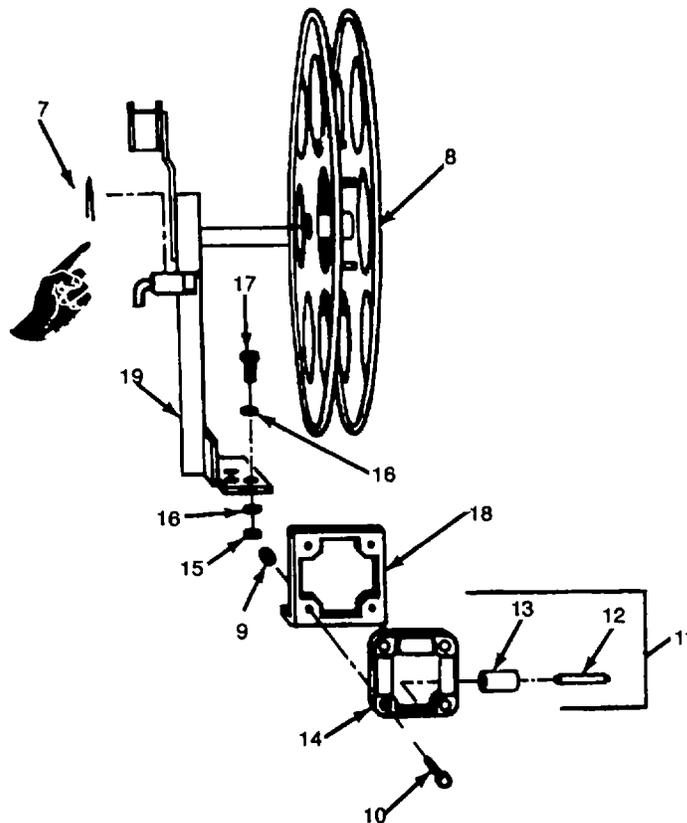
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d. Assembly

**NOTE**

- The following procedures applies to any of the five reel assemblies.
- Apply Teflon tape to hose/pipe connections.

- (1) Install roller bracket (18), two screws (17), four washers (16) and two self-locking nuts (15) to roller bracket (18).
- (2) To assemble roller assembly (11), install four shafts (12) into four rollers (13) and place into rear of roller mount (14).
- (3) Install roller assembly (11), four screws (10) and four self-locking nuts (9).
- (4) Install hose reel (8) and cotter pin (7).
- (5) Lubricate hose reel shaft (para 3-2).



## REEL CABINET ASSEMBLY

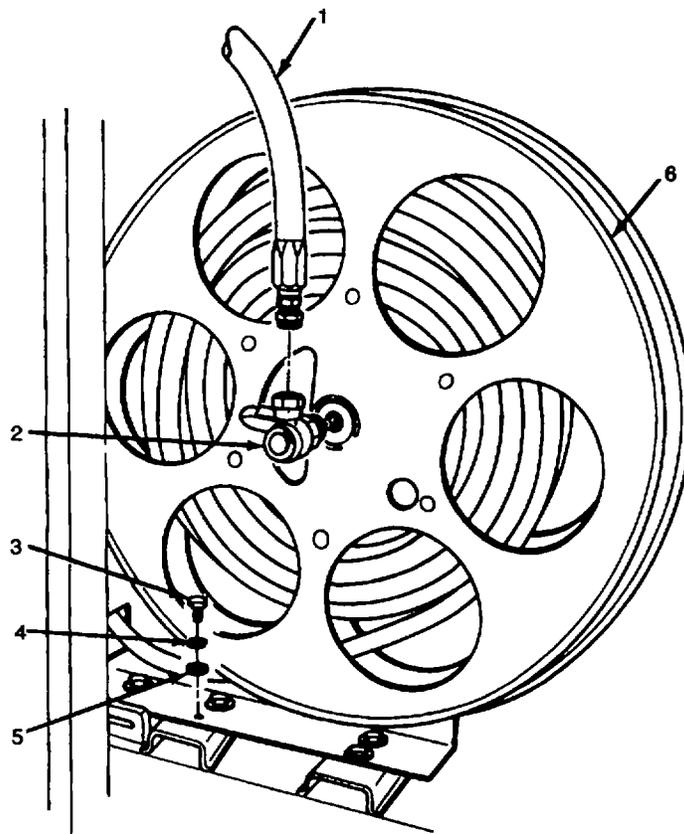
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### 4-21. REEL ASSEMBLY - REPLACE/REPAIR

---

e. Installation

- (1) Install reel assembly (6), four flatwashers (5), four lockwashers (4) and four screws (3).
- (2) Install elbow (2).
- (3) Connect lube or air hose (1) at elbow (2).



## AIR COMPRESSOR ASSEMBLY

---

### 4-22. BELTS - REPLACE/ADJUST

---

This task covers:

- a. Removal   b. Installation   c. Adjustment
- 

#### INITIAL SET-UP:

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

##### Equipment Condition Page

Enclosure Removed (para 4-11)

---

- a. Removal

#### **NOTE**

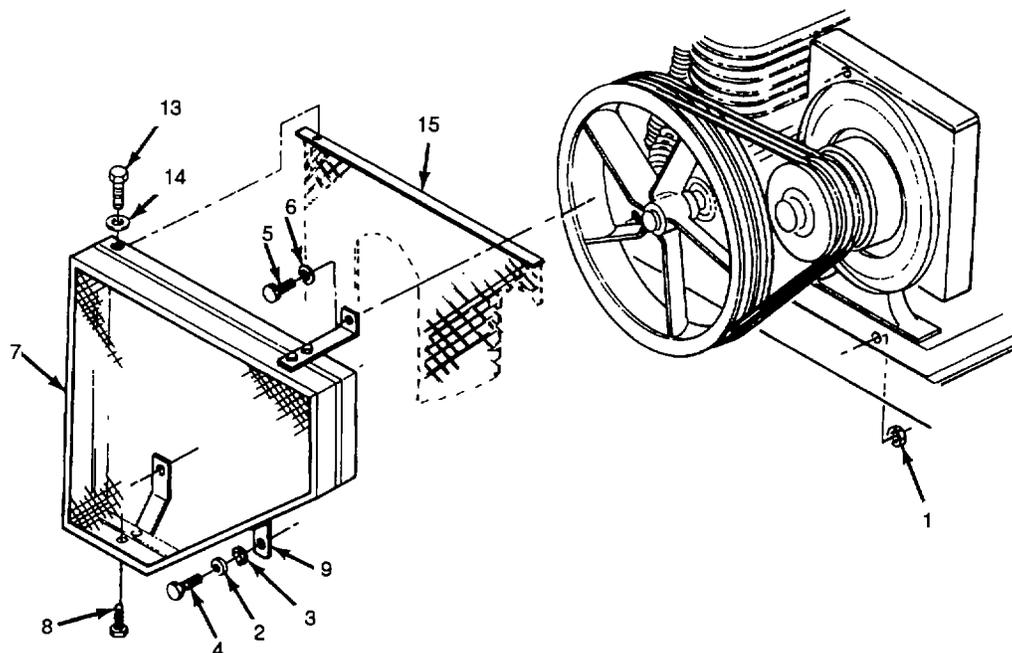
**Follow step (1) through (5) for removal of compressor drive belts and guard. Proceed to step (6) for removal of alternator belt and guard.**

- (1) Disconnect engine exhaust tube from exhaust diverter.
- (2) Remove four mounting bolts, four lockwashers and four nuts (para 4-31).
- (3) Slide compressor back against tool box and fuel tank (para 4-31).
- (4) Remove six screws (8) and three brackets (9) from belt guard (7).
- (5) Remove two nuts (1), two lockwashers (2), two washers (3) and two screws (4).
- (6) Remove screw (5), lockwasher (6) from belt guard (7).
- (7) Remove two screws (13) and two flatwashers (14) from inner belt guard (15)
- (8) Slide inner belt guard (15) up and remove.
- (9) Move front belt guard (7) forward as much as possible.

## AIR COMPRESSOR ASSEMBLY

### 4-22. BELTS - REPLACE/ADJUST

a. Removal - (cont.)



(10) Loosen four compressor mounting bolts (10) and slide compressor (11) toward engine to relieve belt tension.

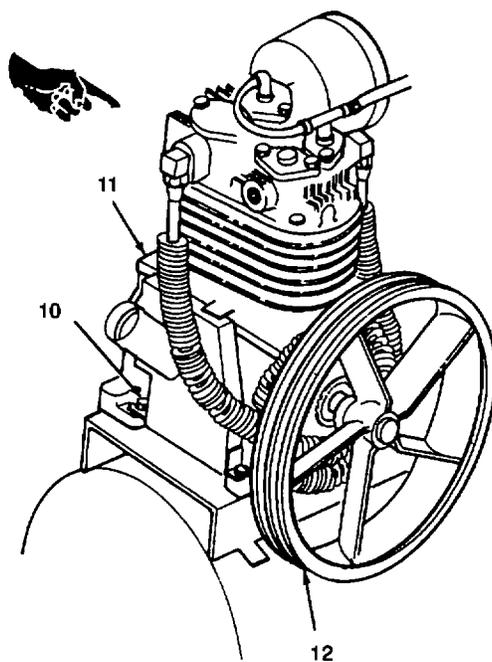
**NOTE**

**Drive belts must be replaced as a pair.**

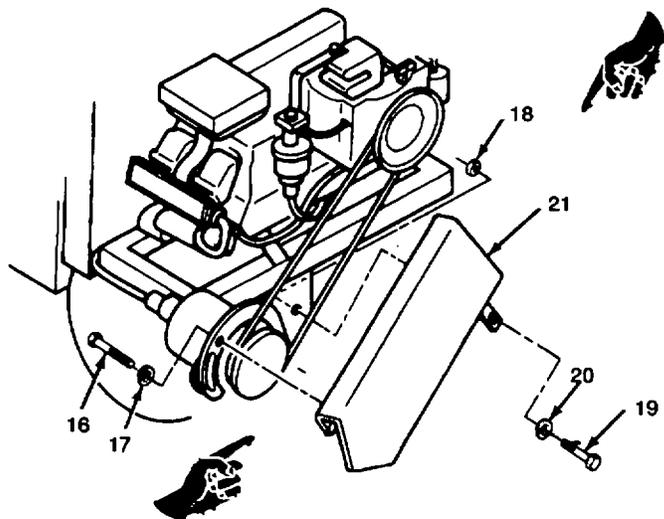
(11) Remove two belts (12).

## AIR COMPRESSOR ASSEMBLY

### 4-22. BELTS - REPLACE/ADJUST



(12) Remove screw (16), lockwasher (17), one nut (18), bolt (19), lockwasher (20), and guard (21).



## AIR COMPRESSOR ASSEMBLY

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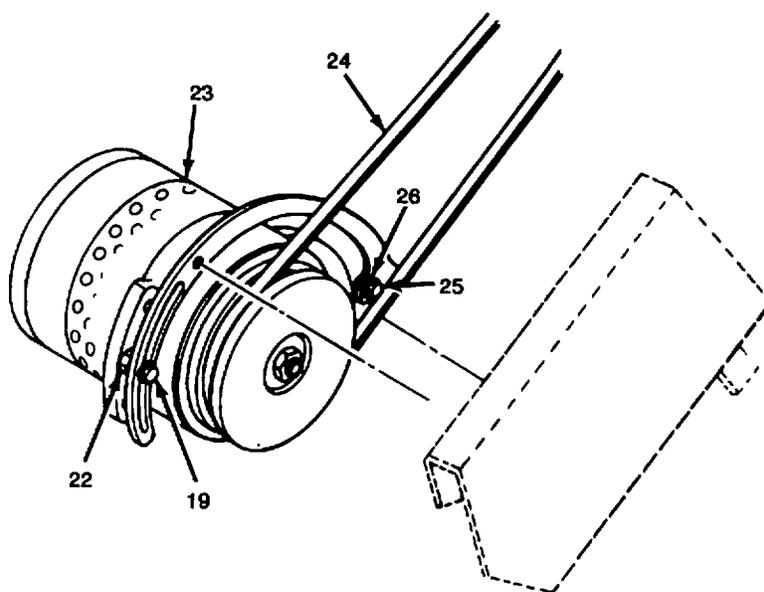
### 4-22. BELTS - REPLACE/ADJUST

---

a. Removal - (cont.)

(13) Loosen screw (19) and nut (22) and rotate alternator (23) to relieve tension on belt (24).

(14) Remove belt (24).



b. Installation

**NOTE**

- Follow steps (1) through (5) for installation of alternator belt and guard.
- Proceed to step (6) for installation of compressor drive belts and guard.

(1) Install belt (24).

(2) Adjust belt tension (para 4-22c)

(3) Install belt guard (21), screw (16), lockwasher (17), one nut (18), bolt (19), lockwasher (20).

(4) Install two belts (12).

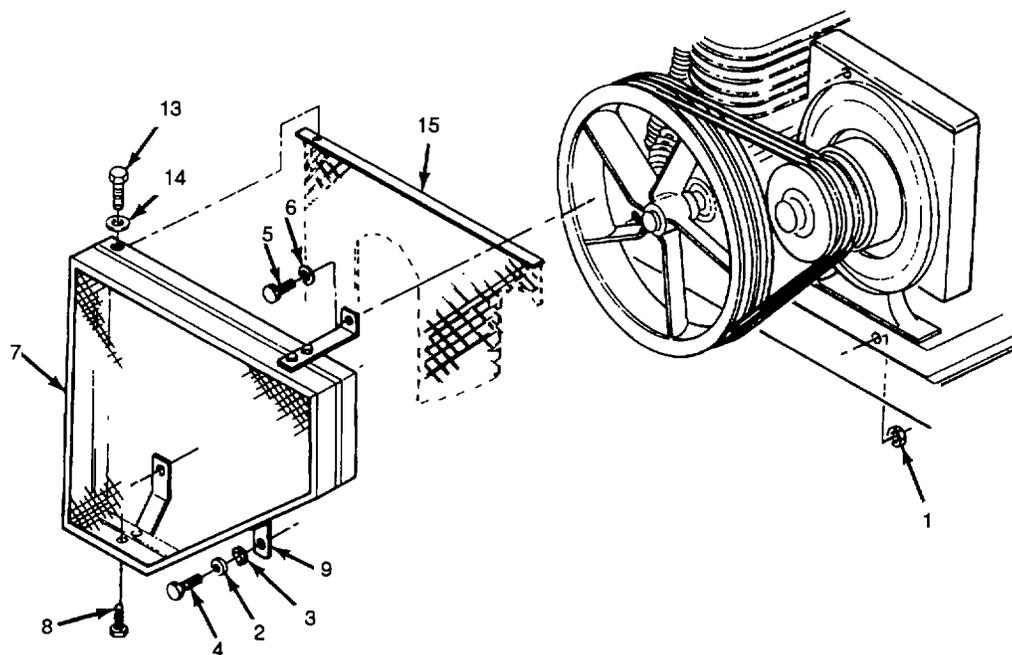
(5) Adjust belt tension (para 4-22c).

(6) Move front guard (7) back into place.

## AIR COMPRESSOR ASSEMBLY

### 4-22. BELTS - REPLACE/ADJUST

- (7) Slide inner belt guard (15) in place and tighten with two screws (13) and two flatwashers (14).
- (8) Install three brackets (9) and six screws (8) onto belt guard (7).
- (9) Install belt guard (7), lockwasher (6) and screw (5).
- (10) Install two washers (3), two screws (4), two lockwashers (2), and two nuts (1).
- (11) Slide compressor back into place and install four mounting bolts, four lockwashers and four nuts (para 4-31).
- (12) Connect engine exhaust tube to exhaust diverter.



## AIR COMPRESSOR ASSEMBLY

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### 4-22. BELTS - REPLACE/ADJUST - (Cont.)

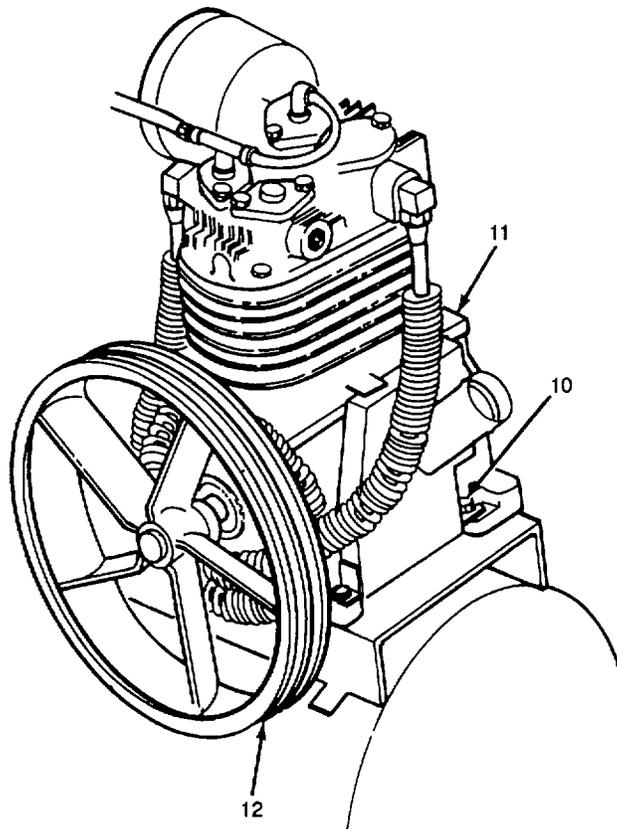
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c. Adjustment

**NOTE**

- To adjust compressor drive belts, do steps (1) through (5).
- To adjust alternator belt, go to step (6).

- (1) Remove compressor belt guard (para 4-22a).
- (2) Loosen four compressor mounting bolts (10).
- (3) Slide compressor (11) toward the engine to loosen the drive belts (12) and away from the engine to tighten. When drive belts are properly adjusted, they should deflect 1/2 to 3/4 inch (12.7 to 19.05 mm) using thumb pressure at midpoint of the belt.
- (4) Tighten four compressor mounting bolts (10).
- (5) Install belt guard (para 4-22b).



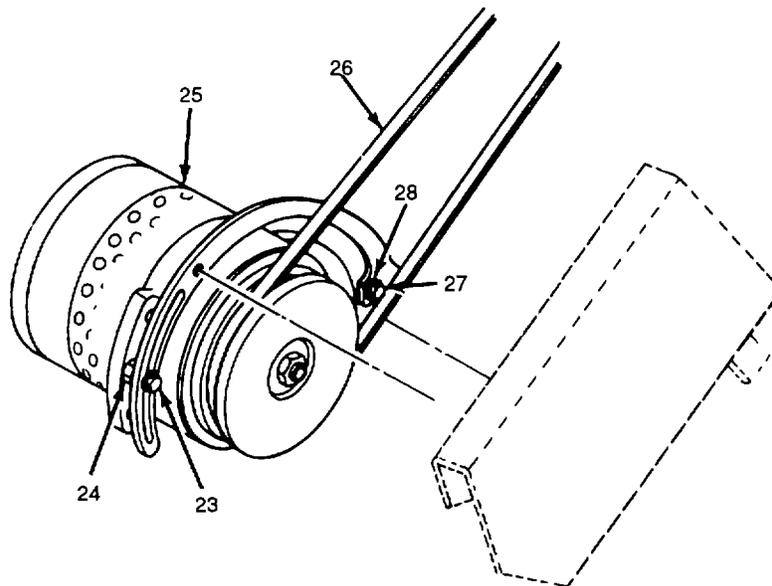
## AIR COMPRESSOR ASSEMBLY

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### 4-22. BELTS - REPLACE/ADJUST - (Cont.)

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- (6) Remove alternator drive belt guard (para 4-22a).
- (7) Loosen screw (23) and (27), and nut (24) and (28).
- (8) To adjust belt (26) tension move the position of the alternator (25) until the belt deflects 1/2 in. (12.7 mm) when thumb pressure is applied at midpoint between the pulleys.
- (9) Tighten nut (24) and (28), and screw (23) and (27).
- (10) Install alternator drive belt guard (para 4-21b).



## AIR COMPRESSOR ASSEMBLY

---

### 4-23. STARTER - TEST/REPLACE

---

This task covers:

- a. Test
- b. Removal
- c. Installation

---

#### INITIAL SET-UP:

General Safety Instructions

#### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

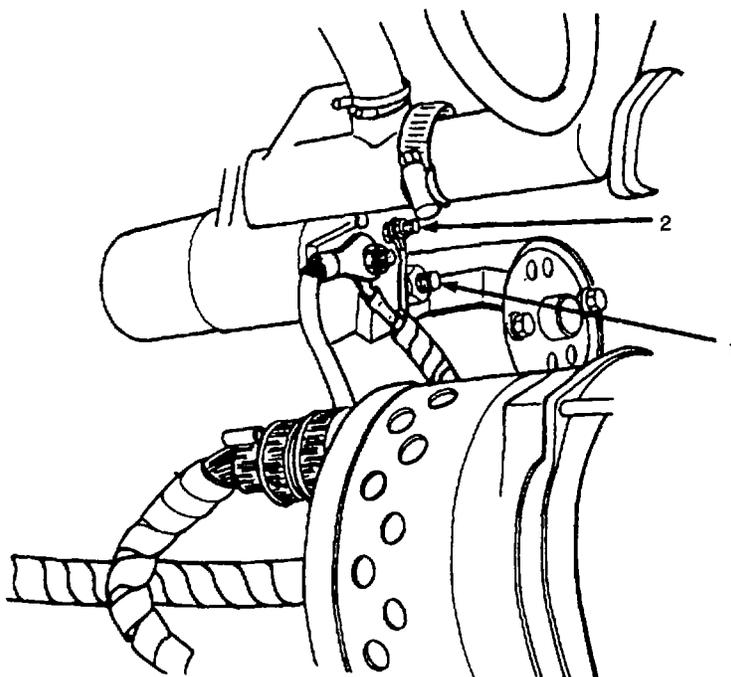
#### **WARNING**

**When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.**

---

a. Test

- (1) With multimeter set to DC volts place red multimeter lead on positive terminal (1) and black to ground. There should be 24 volts present.
- (2) Place red multimeter lead on starter switch terminal (2). With ignition switch ON, check that 24 volts is present when starter switch is ON.
- (3) If voltage is present at both points and starter fails to rotate the engine, replace the starter.



## AIR COMPRESSOR ASSEMBLY

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### 4-23. STARTER - TEST/REPLACE - (Cont.)

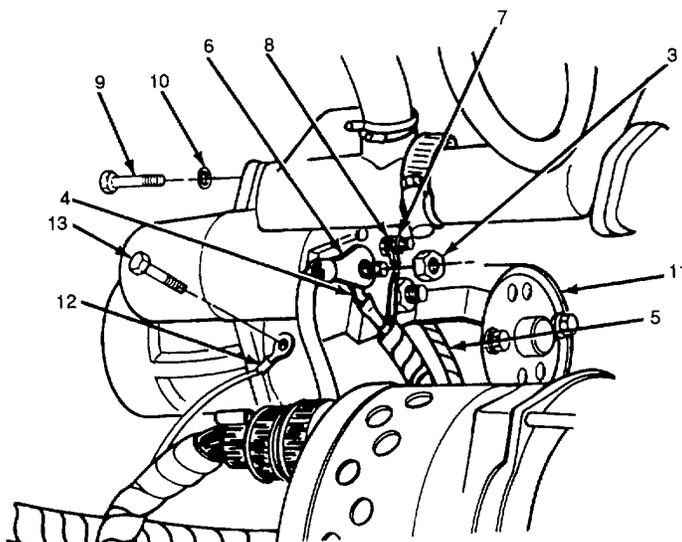
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#### b. Removal

- (1) Disconnect negative battery lead.
- (2) Remove alternator belt and guard and move alternator to lowest position (para 4-22a).
- (3) Remove nut (3), ignition lead (4), winterization lead (5) and positive battery lead (6) from positive starter battery terminal (1).
- (4) Remove nut (7) and starter switch lead (8) from starter switch terminal (2).
- (5) Remove two screws (9), two lockwashers (10) and pull starter motor (11) straight out from engine.
- (6) Remove ground wire (12) and bolt (13) from starter.

#### c. Installation

- (1) Install ground wire (12) and bolt (13) to starter.
- (2) Install starter motor (11), two lockwashers (10) and two screws (9).
- (3) Install starter switch lead (8) and nut (7) onto starter switch terminal (2).
- (4) Install positive battery lead (6), winterization lead (5), ignition lead (4) and nut (3) onto positive starter battery terminal (1).
- (5) Install alternator belt and guard (para 4-22a).
- (6) Connect negative battery lead.



## AIR COMPRESSOR ASSEMBLY

---

### 4-24. ALTERNATOR - TEST/REPLACE

---

This task covers:

- a. Test
- b. Removal
- c. Installation

---

#### INITIAL SET-UP:

##### Test Equipment

Multimeter  
(Section III, Item 4, App B)

##### General Safety Instructions

#### **WARNING**

**When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical**

##### Tools

General Mechanics Tool Box  
  
(Section III, Item 1, App B)  
shock and burns.

##### Equipment Condition

Belts Removed (para 4-22)

---

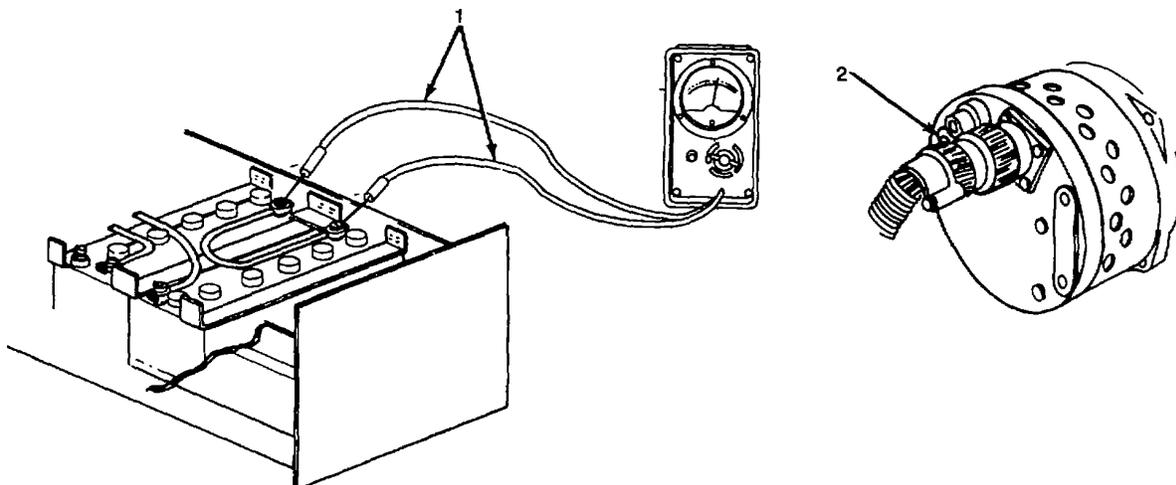
#### a. Test

- (1) Attach multimeter leads (1), positive to positive battery terminal, and negative to negative battery terminal.
- (2) Check voltage. Voltage reading should be 24 volts without engine running.
- (3) Start engine. Voltage reading should be 25 to 26 volts. If not 25 to 26 volts, set adjusting screw accordingly.

#### **NOTE**

**Turn adjusting screw (2) clockwise to increase, counterclockwise to decrease.**

- (4) If voltage cannot be adjusted to proper level, remove alternator and replace.



## AIR COMPRESSOR ASSEMBLY

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### 4-24. ALTERNATOR - TEST/REPLACE - (Cont.)

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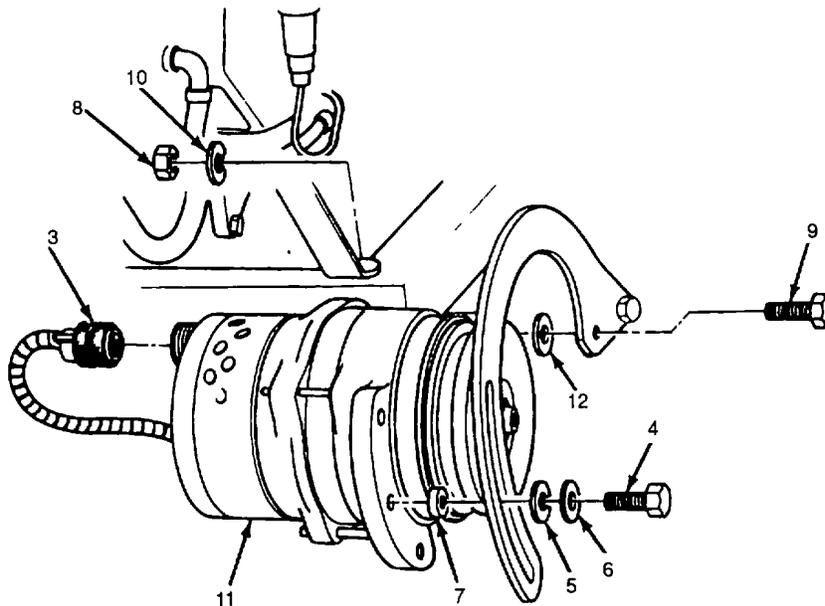
#### b. Removal

- (1) Disconnect electrical connector (3).

#### CAUTION

**Alternator (11) must be supported while removing alternator bracket to prevent equipment damage.**

- (2) Remove screw (4), lockwasher (5), washer (6) and spacer (7).
- (3) Remove nut (8), screw (9) and flatwasher (12) and lockwasher (10).
- (4) Remove alternator (11).



#### c. Installation

- (1) Install alternator (11) in place.
- (2) Install lockwasher (10), flatwasher (12), screw (9) and nut (8).
- (3) Install spacer (7), washer (6), lockwasher (5), and screw (4).
- (4) Connect electrical connector (3).

**AIR COMPRESSOR ASSEMBLY**

**4-25. WIRING HARNESS - TEST/REPLACE/REPAIR**

This task covers:

- a. Test
- b. Removal
- c. Repair
- d. Installation

**INITIAL SET-UP:**

General Safety Instructions

Tools

General Mechanics Tool Box

Test Equipment

Multimeter (Section III, Item 4, App B)

**WARNING**

**When working on electrical multi-meter components, remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.**

- a. Test

See wiring diagram and wire list (Table 4-3). Perform continuity tests on individual wires. Replace or repair wires with no continuity.

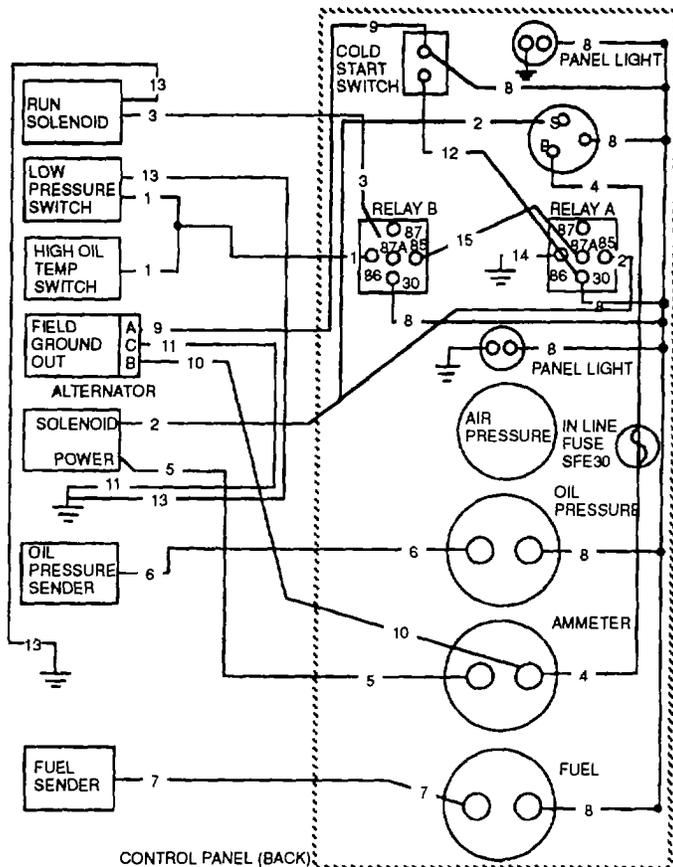


Table 4-3. Wire List

TERMINATION		TERMINATION		AVG. SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
Run Solenoid	MIL-T-7928/1-41	Ground	MIL-T-7928/1-43	16	12.0	30.5
Run Solenoid	MIL-T-7928/1-41	Relay B 87A	13227E0634	16	9.0	22.9
Low Pressure Switch	MIL-T-7928/1-41	Ground	MIL-T-7928/1-43	16	12.0	30.5
Low Pressure Switch	MIL-T-7928/1-41	High Temp Switch	MIL-T-7928/1-41	16	21.0	53.3
High Temp Switch	MIL-T-7928/1-41	Relay B 89	13227E0634	16	18.0	45.7
Alternator A	MS3106318-5P	Cold Start	MIL-T-7928/1-40	16	14.0	35.6
Alternator C		Ground	MIL-T-7928/1-60	12	14.0	35.6
Alternator B		Ammeter	MIL-T-7928/1-59	12	14.0	35.6
Starter Solenoid	MIL-T-7928/1-41	Relay A 85	13227E9634	16	9.0	22.9
Starter	MIL-T-7928/1-60	Ammeter	MIL-T-7928/1-59	12	14.0	35.6
Oil Pressure Sender	MS27144-1	Oil Pressure Gage	MS27144-3	16	12.0	30.5
Fuel Sender	MS27144-1	Fuel Gage	MS27144-3	16	16.0	40.6
Fuel Gage	MS27144-3	Circuit #8		16	6.0	15.2
Ammeter	MIL-T-7928/1-59	In Line	Fuse Holder SFE 30	12	12.0	30.5
Oil Pressure Gage	MS27144-3	Circuit #8		16	6.0	15.2
Ignition B	MIL-T-7928/1-56	In Line	Fuse Holder SFE 30	12	12.0	30.5
Panel Light (Bottom)	strip and trim	Circuit #8		16	8.0	20.3
Panel Light (Top)	strip and trim	Circuit #8		16	8.0	20.3
Relay A 30	13227E9634	Circuit #8		16	3.0	7.6
Relay A 86	13227E9634	Ground	MIL-T-7928/1-40	16	6.0	15.2
Relay A 87A	13227E9634	Relay B 85	13227E9634	16	6.0	15.2
Relay B 30	13227E9634	Circuit #8		16	3.0	7.6
Cold Start	MIL-T-7928/1-40	Relay A 30	13227E9634	16	9.0	22.9
Cold Start	MIL-T-7928/1-40	Circuit #8		16	6.0	15.2
Ignition S	MIL-T-7928/1-40	Starter Solenoid	MIL-T-7928/1-40	16	12.0	30.5
Ignition I	MIL-T-7928/1-40	Circuit #8		16	6.0	15.2

b. Removal

Tag and disconnect individual wires and connectors in accordance with the wiring diagram.

c. Repair

- (1) Replace any wires or connectors that are defective or show signs of wear or damage.
- (2) See paragraph 4-10 for general wire repair instructions.
- (3) See Table 4-3 Wire List for wire lengths and terminal information when individual wires are replaced.

d. Installation

See wiring diagram and tags and connect the wire leads and connectors. Remove tags.

## AIR COMPRESSOR ASSEMBLY

---

### 4-26. CONTROL PANEL- TEST/REPLACE/REPAIR

---

This task covers:

- a. Test
- b. Removal
- c. Disassembly
- d. Repair
- e. Assembly
- f. Installation

INITIAL SET-UP:

Materials/Parts

Teflon tape (Item 18, App E)

General Safety Instructions

Tools

General Mechanics Tool Box  
(Section III, em 1, App B)

**WARNING**

**When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.**

Test Equipment

Multimeter (Section III, Item 4, App B)

---

**NOTE**

**For the starter/ignition switch (2) continuity should not be present between terminals:**

- **B and S when switch is OFF**
- **B and I when switch is IGN**
- **S and I when switch is START**

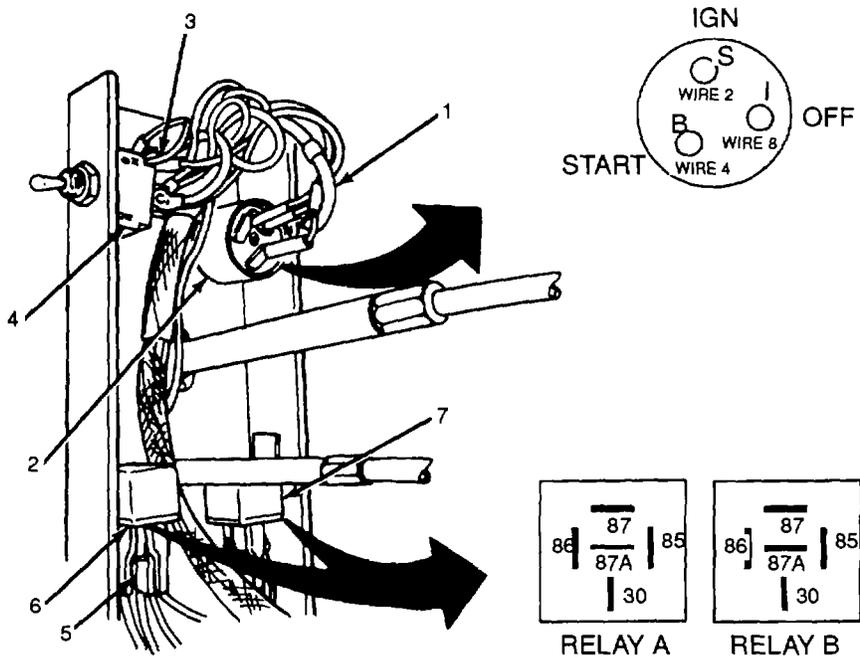
a. Test

- (1) Tag and disconnect three electrical leads (1) from starter/ignition switch (2).
- (2) With multimeter, test starter/ignition switch (2) by checking for continuity between terminals.
- (3) If switch is defective, replace (para 4-26c).
- (4) Tag and disconnect two electrical leads (3) from cold start switch (4).
- (5) With multimeter, test cold start switch (4) for continuity between terminals.
- (6) If continuity is not present, replace cold start switch (4) (para 4-26c).
- (7) Tag and disconnect four electrical leads (5) from relay A (6).
- (8) With multimeter, test relay A (6) for continuity between terminals 30 and 87A. If no continuity is present, replace relay A (6).
- (9) Repeat test between terminals 30 and 87. If continuity is present, replace relay A (6).

**AIR COMPRESSOR ASSEMBLY**

**4-26. CONTROL PANEL - TEST/REPLACE/REPAIR - (Cont.)**

- (10) Connect 24 volt power source with jumper wires to terminals 85 and 86 of relay A (6). If no clicking sound is present, replace relay A (6).
- (11) With jumper wires in place, test for continuity between terminals 30 and 87 of relay A (6). If no continuity is present, replace relay A (6)
- (12) Repeat test between terminals 30 and 87A. If continuity is present, replace relay A (6) (para 4-26c).
- (13) Repeat steps (7) through (12) for relay B (7)



AIR COMPRESSOR ASSEMBLY

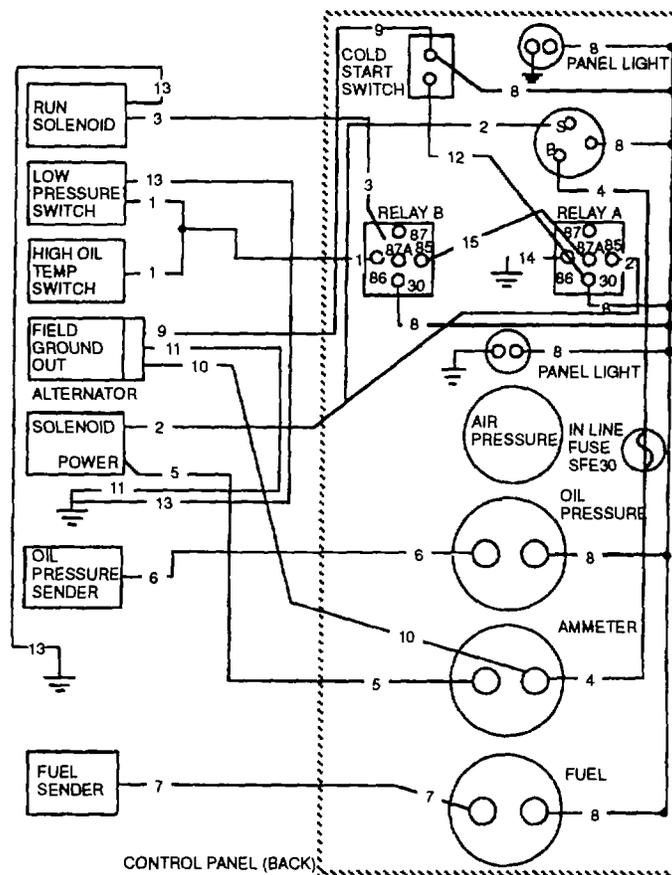
4-26. CONTROL PANEL- TEST/REPLACE/REPAIR - (Cont.)

b. Removal

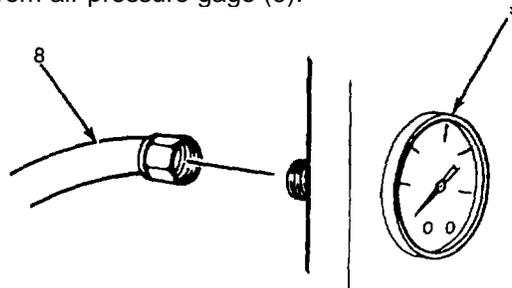
NOTE

The control panel does not need to be removed for removal of individual gages.

- (1) Tag and remove all electrical connectors in accordance with the wiring diagram.



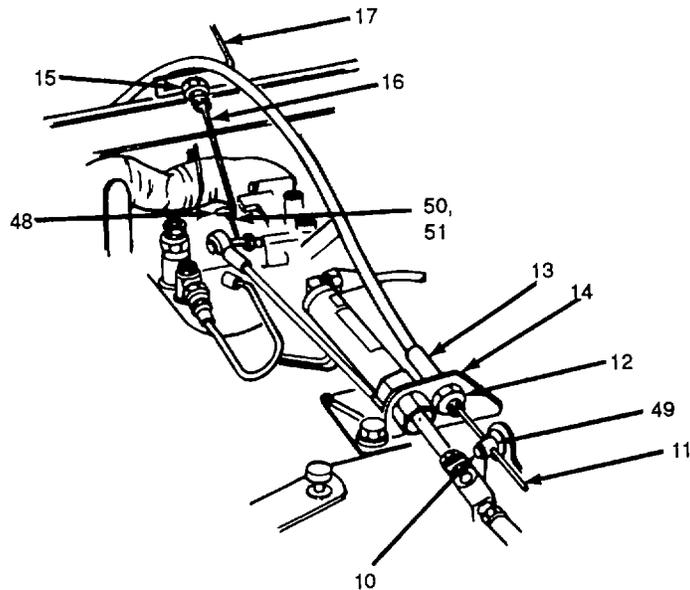
- (2) Disconnect air tube (8) from air pressure gage (9).



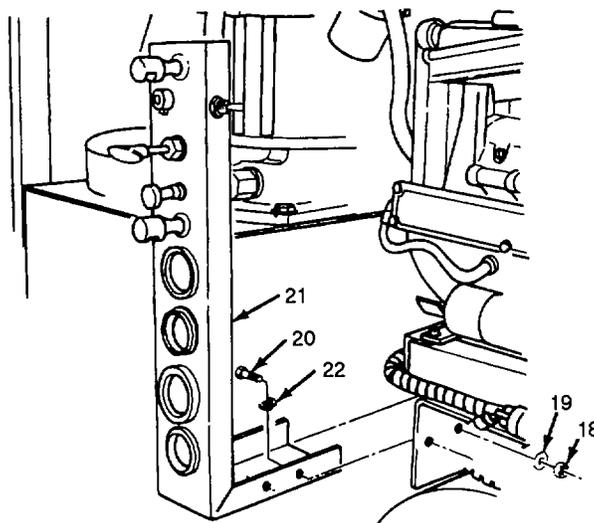
## AIR COMPRESSOR ASSEMBLY

### 4-26. CONTROL PANEL - TEST/REPLACE/REPAIR - (Cont.)

- (3) Loosen screw (10) to disconnect throttle cable (11).
- (4) Remove jam nut (12) and withdraw cable assembly (13) from bracket (14).
- (5) Loosen screw (50) and nut (51) from choke cable at choke lever (48).
- (6) Remove jam nut (15). Disengage choke control cable (16) and remove from bracket (17).



- (7) Remove two nuts (18), two flatwashers (19), two lockwashers (22), two screws (20) and control panel assembly (21).



## AIR COMPRESSOR ASSEMBLY

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### 4-26. CONTROL PANEL - TEST/REPLACE/REPAIR - (Cont.)

---

c. Disassembly

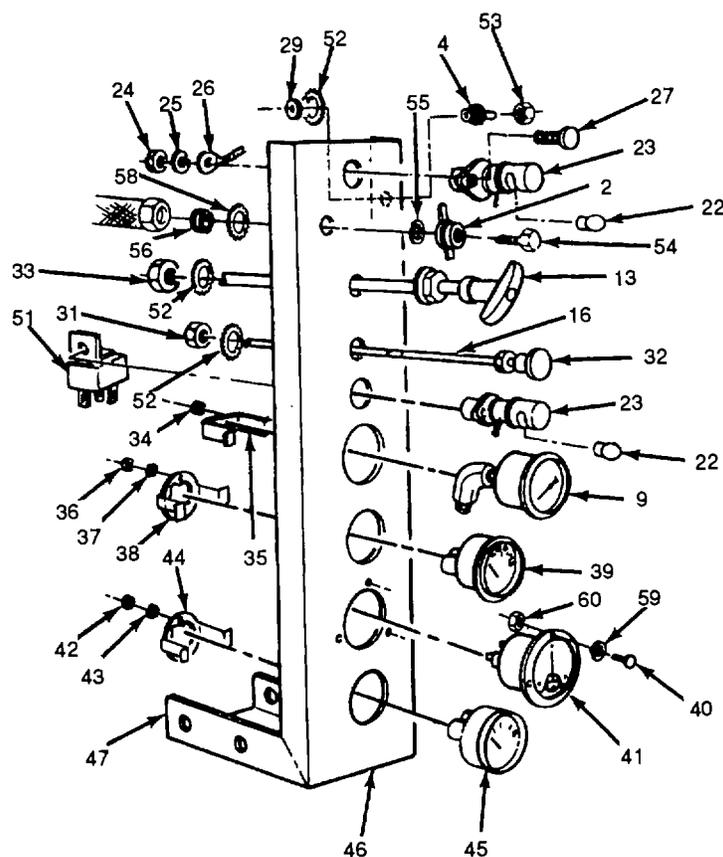
- (1) Remove two bulbs (22) from two dash lamps (23).
- (2) Remove four nuts (24), four lockwashers (25), two ground leads (26), four screws (27), and two dash lamps (23).
- (3) Remove nut (53), flatwasher (29), starwasher (52), and cold start switch (4).
- (4) Remove screw (54), lockwasher (55), starwasher (58), nut (56), and starter/ignition switch (2).
- (5) Remove jam nut (33), starwasher (52), and remove throttle cable assembly (13).
- (6) Remove knob (32), jam nut (31), starwasher (52), and choke cable (16).
- (7) Remove two nuts (34), bracket (35), and air pressure gage (9).
- (8) Remove two nuts (36), two lockwashers (37), mounting clamp (38), and oil pressure gage (39).
- (9) Remove three screws (40), three lockwashers (59), three nuts (60), and ammeter (41).
- (10) Remove two nuts (42), two lockwashers (43), mounting clamp (44), and fuel gage (45).
- (11) Drill out rivets and remove two relays (51).
- (12) Remove control panel plate (46) from control panel (47).

d. Repair

- (1) Inspect gages for discolored or illegible markings, bent or sticking dial pointers and loose, damaged or corroded connectors. Replace defective gages.
- (2) Check operation of switches. The toggle switch must operate positively to each of its positions. If the switch is suspect, test (para 4-26a).
- (3) Inspect all electrical connections. Replace components that have loose, corroded or damaged connectors.
- (4) Check operation of choke control and throttle cables. If necessary, lubricate with light oil. If sheathes are kinked or broken or if the cables stick or bind, replace the controls.
- (5) Inspect control panel find plate for cracks, illegible markings and damage. Replace if necessary.

## AIR COMPRESSOR ASSEMBLY

### 4-26. CONTROL PANEL - TEST/REPLACE/REPAIR - (Cont.)



#### e. Assembly

- (1) Place control panel plate (46) onto control panel (47).
- (2) Install two relays (51) using rivets as necessary.
- (3) Install fuel gage (45), mounting clamp (44), two lockwashers (43) and two nuts (42).
- (4) Install ammeter (41), three lockwashers (59), three nuts (60) and three screws (40).
- (5) Install oil pressure gage (39), mounting clamp (38), two lockwashers (37) and two nuts (36).
- (6) Install air pressure gage (9), bracket (35) and two nuts (34).
- (7) Install choke cable (16), jam nut (31), starwasher (52), and knob (32).
- (8) Install throttle cable assembly (13), starwasher (52) and jam nut (33).

## AIR COMPRESSOR ASSEMBLY

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### 4-26. CONTROL PANEL - TEST/REPLACE/REPAIR - (Cont.)

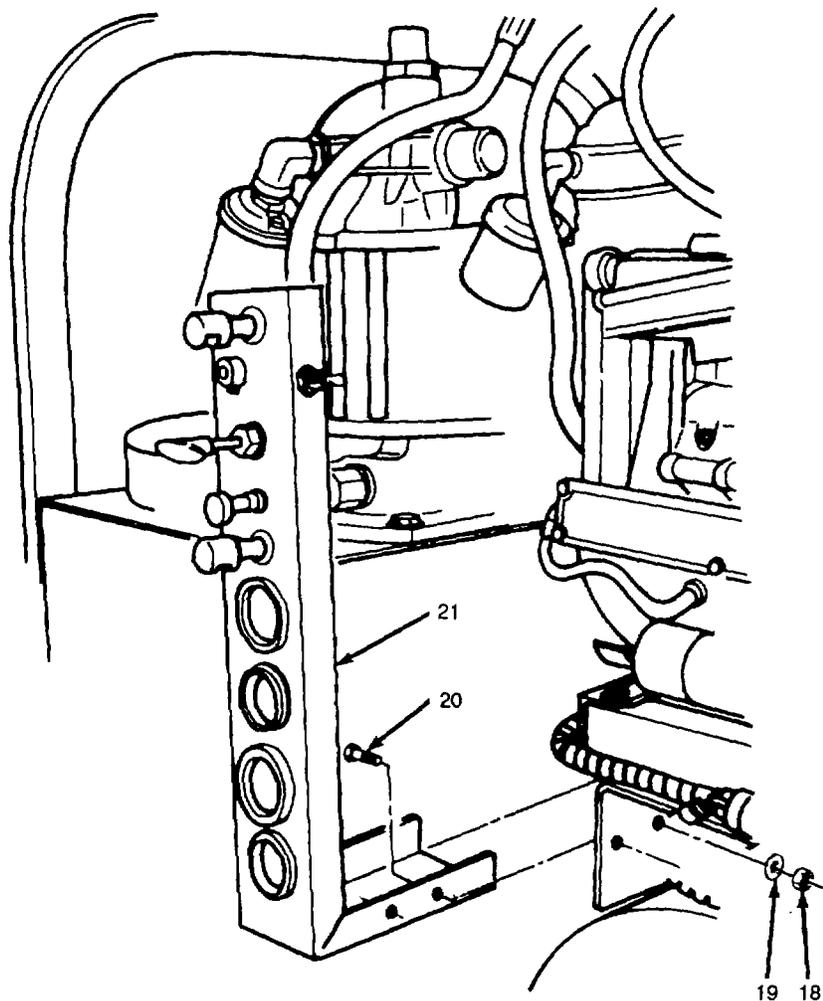
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e. Assembly - (cont.)

- (9) Install starter/ignition switch (2), screw (54), lockwasher (55), starwasher (58) and nut (56).
- (10) Install cold start switch (4), nut (53), flatwasher (29) and starwasher (52).
- (11) Install dash lamps (23), four screws (27), two ground leads (26), four lockwashers (25) and four nuts (24).
- (12) Install two bulbs (22) into two dash lamps (23).

f. Installation

- (1) Install control panel assembly (21) using two screws (20) four washers (19) and two nuts (18).



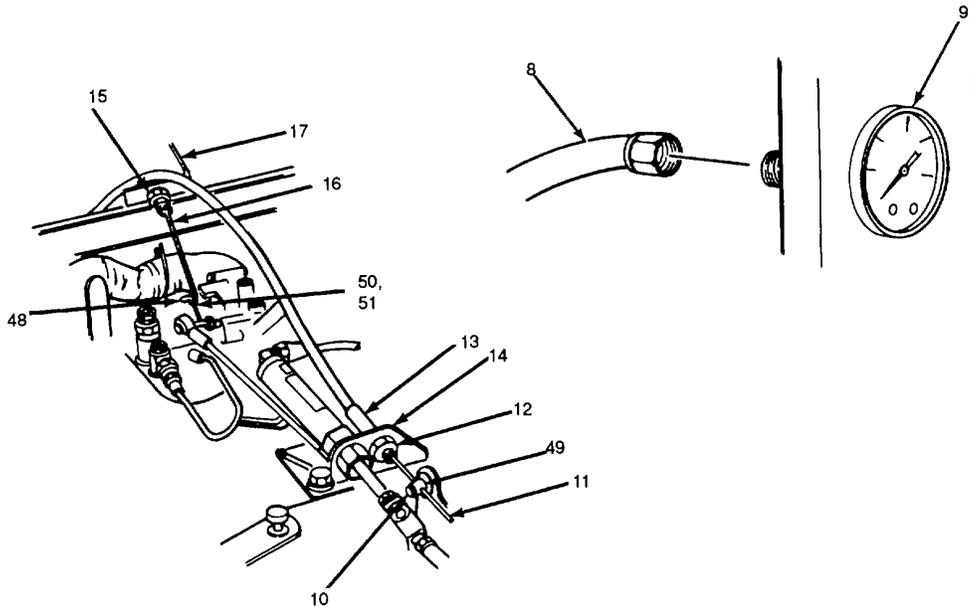
## AIR COMPRESSOR ASSEMBLY

### 4-26. CONTROL PANEL - TEST/REPLACE/REPAIR - (Cont.)

#### NOTE

When using choke control and throttle cables, be sure to adjust positions to allow full range of movement of the choke lever or throttle lever.

- (2) Slide choke control cable assembly (16) through bracket (17).
- (3) Install jam nut (15).
- (4) Engage choke control (16) at choke lever (48). Install screw (51) and nut (50) to choke cable.
- (5) Slide throttle control assembly (13) through bracket (14) and install jam nut (12).
- (6) Slide throttle cable (11) through throttle lever (49) and tighten screw (10).
- (7) Tape threads and install air tube (8) to pressure gage (9).



- (8) Install all electrical connectors in accordance with the wiring diagram and tags. Remove tags.

## AIR COMPRESSOR ASSEMBLY

---

### 4-27. PILOT VALVE - ADJUST/REPLACE

---

This task covers:

- a. Adjustment                      b. Removal                      c. Installation
- 

INITIAL SET-UP:

Materials/Parts

Teflon tape  
(Item 18, App E)

Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

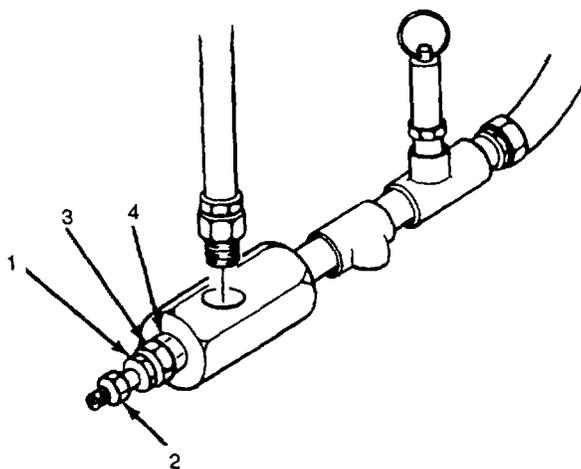
a. Adjustment

- (1) To raise or lower the pressure range without increasing or decreasing the spread of the range, loosen the outside lock nut (1), and turn the adjusting screw (2). If you turn the adjusting screw clockwise, you will increase the pressure. Turning it counterclockwise will decrease the pressure.
- (2) To adjust the spread of the range (that is, to increase or decrease the difference between the cut-in and cut-out pressure), you should loosen the inner lock nut (3) and rotate the adjusting barrel (4). Turning the barrel clockwise will increase the spread between cut-in and cut-out pressures. Turning it counterclockwise will decrease the spread.

**CAUTION**

**Do not leave the adjusting barrel (4) screwed down to the bottom position. It will prevent the pilot valve from controlling**

- (3) If the overall range is too high or too low after adjusting the spread of the range, you must readjust the adjusting screw (2) as required. Tighten all lock nuts after making the adjustments.
- (4) Replace the pilot valve if you cannot adjust it to control the pressure properly.



## AIR COMPRESSOR ASSEMBLY

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### 4-27. PILOT VALVE - ADJUST/REPLACE - (Cont.)

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b. Removal

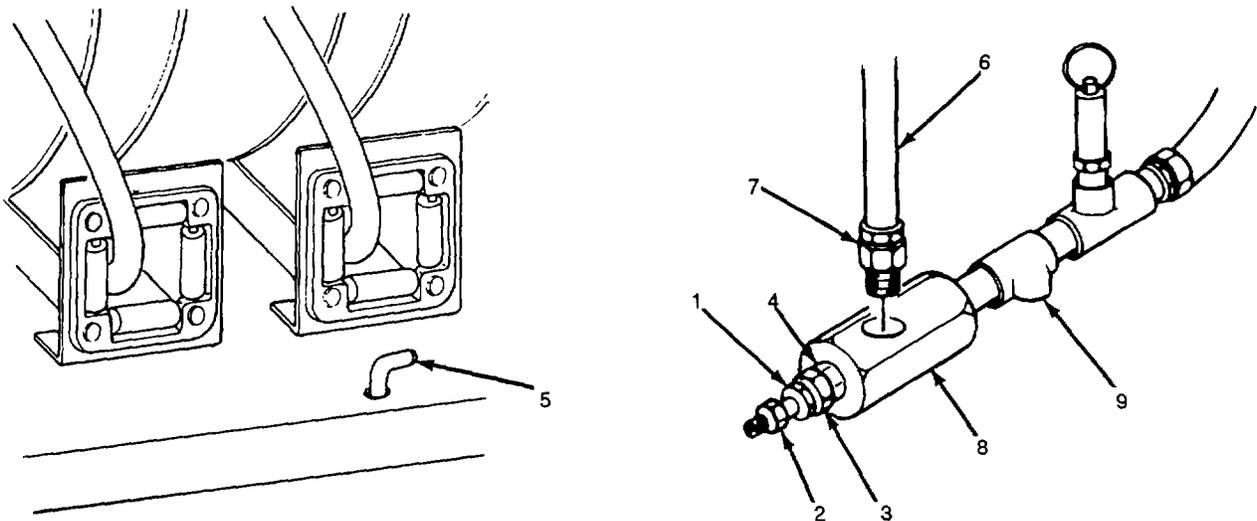
- (1) Vent air pressure completely by turning lever (5).
- (2) Remove tube end (6) and adapter (7) from pilot valve (8).
- (3) Remove pilot valve (8) from tee (9).

c. Installation

**NOTE**

**Seal all threads using tape**

- (1) Install pilot valve (8) at tee (9).
- (2) Install adapter (7) and tube end (6).
- (3) Check operation of compressor. If the compressor fails to maintain reservoir pressure in the required range (140 or 175 psi), you should adjust the pilot valve.



## AIR COMPRESSOR ASSEMBLY

---

### 4-28. PRESSURE RELIEF VALVE - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Materials/Parts

Teflon tape (Item 18, AppE)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

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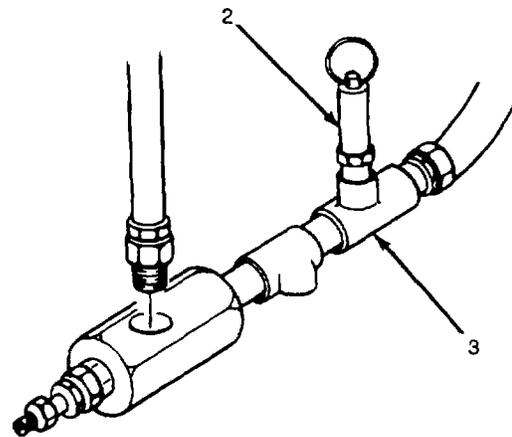
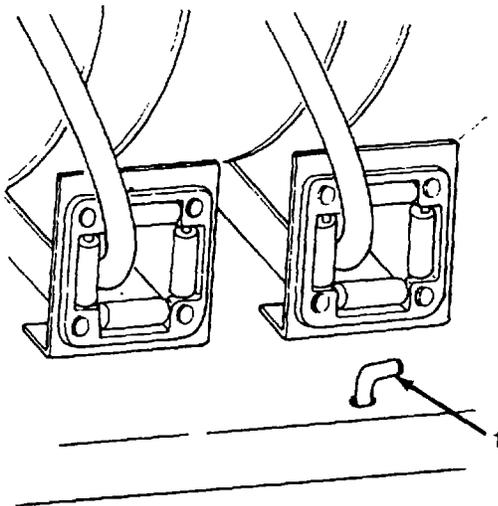
#### a. Removal

- (1) Vent air pressure completely by turning lever (1).
- (2) Remove pressure relief valve (2) from tee (3).

**NOTE**  
Seal all thread using tape.

#### b. Installation

Install pressure relief valve (2) at tee (3).



## AIR COMPRESSOR ASSEMBLY

---

### 4-29. AIR COMPRESSOR - REPLACE

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Personnel

2

##### Materials/Parts

Teflon Tape (Item 18, App E)

##### Equipment Condition

Enclosure Removed (para 4-11)  
Compressor Drive Belts and Guard  
Removed (para 4-22)  
Heater Removed (para 4-39)  
Air Compressor Hose, Lines and Fittings  
- Replace (para 4-32)

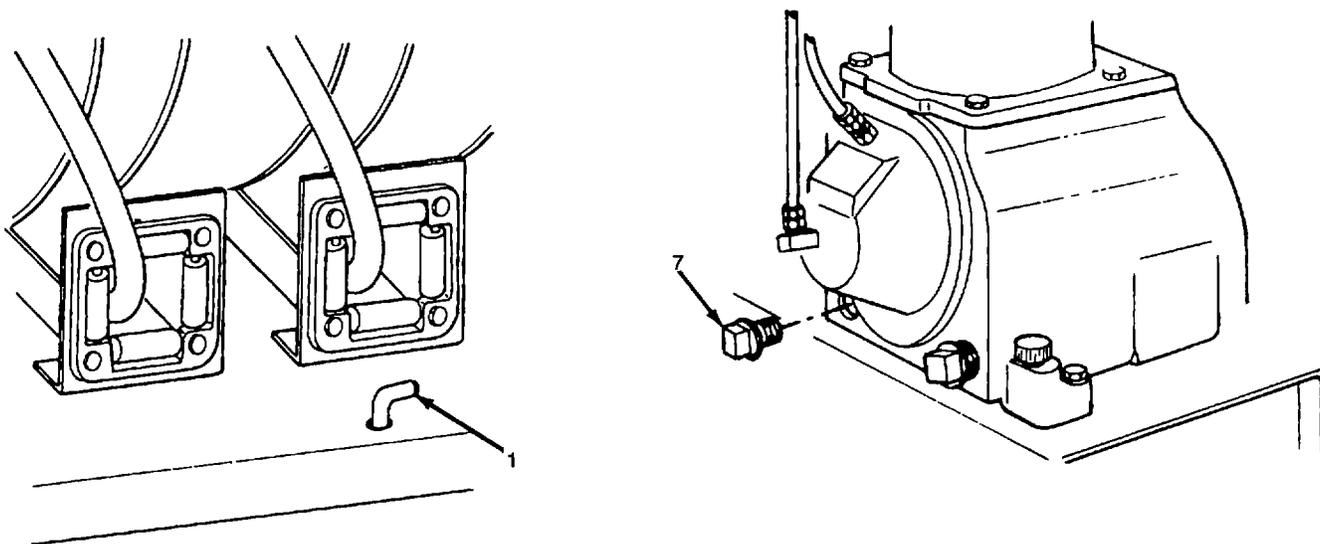
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

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#### a. Removal

- (1) Vent air pressure completely by turning lever (1).
- (2) Drain compressor crankcase oil into suitable container by removing plug (7). Reinstall plug.



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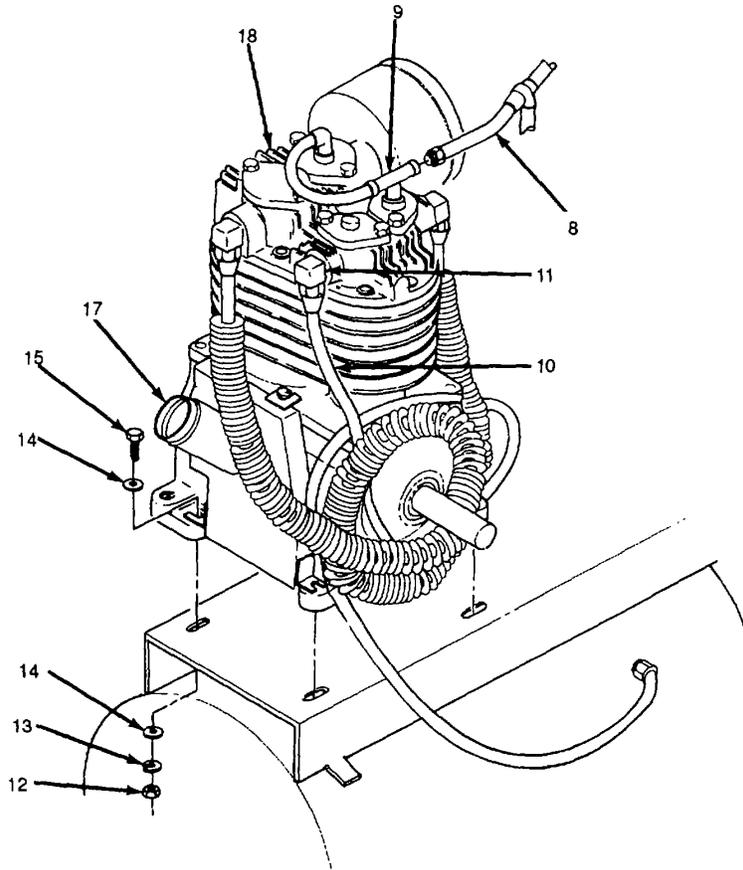
**AIR COMPRESSOR ASSEMBLY**

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**4-29. AIR COMPRESSOR - REPLACE - (Cont.)**

---

a. Removal - (cont.)



- (3) Disconnect tube (8) at tee (9).
- (4) Disconnect tube (10) at elbow (11). Remove elbow (11).
- (5) Remove four nuts (12), four lockwashers (13), eight washers (14) and four screws (15).
- (6) Disconnect winterization duct hose (17).
- (7) Lift compressor (18) and remove.
- (8) Remove nut (2), lockwasher (3), screw (4), flywheel (5), and key (6).

---

## AIR COMPRESSOR ASSEMBLY

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### 4-29. AIR COMPRESSOR - REPLACE - (Cont.)

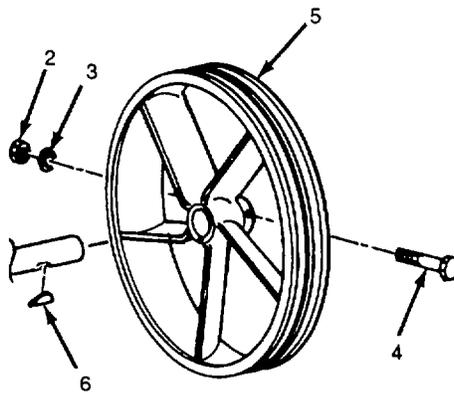
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b. Installation

**NOTE**

**Wrap all air line threads using tape**

- (1) Install key (6), flywheel (5), screw (4), lockwasher (3), and nut (2). Torque to 43 FT LB (58.31 V.M).
- (2) Position compressor (18) and winterization duct hose (17).
- (3) Install four screws (15), eight washers (14), four lockwashers (13) and four nuts (12).
- (4) Install elbow (11) and tube (10).
- (5) Install tube (8) at tee (9).



- (6) Lubricate crankcase (para 3-2).
- (7) After installation is complete, operate compressor and check for leaks. Repair if necessary.

---

## AIR COMPRESSOR ASSEMBLY

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### 4-30. ENGINE - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Tools

General Mechanics  
Tool Box  
(Section III, item 1, App B)  
Hoist

##### Materials/Parts

Teflon Tape  
(Item 18, App E)  
Wire Connector  
(Item 26, App E)

##### General Safety Instructions

**WARNING**

When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.

##### Equipment Condition

Enclosure Removed (para 4-11)  
Starter Removed (para 4-23)  
Alternator Removed (para 4-24)  
Compressor Drive Belts and Guard Removed (para 4-22)  
Engine Oil Extension Assembly Removed (para 4-33)

##### Personnel Required

2

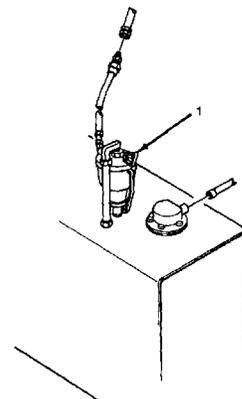
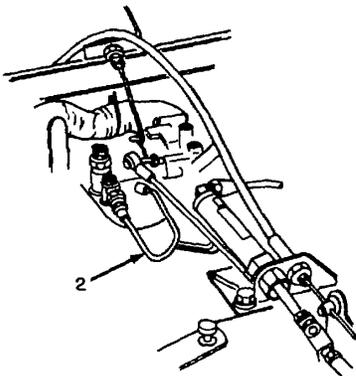
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- a. Removal

#### NOTE

**Negative battery cable has black heat shrink tubing.**

- (1) Disconnect negative battery cable to engine.
- (2) Shut off fuel by turning valve (1).
- (3) Disconnect fuel line (2) at engine.



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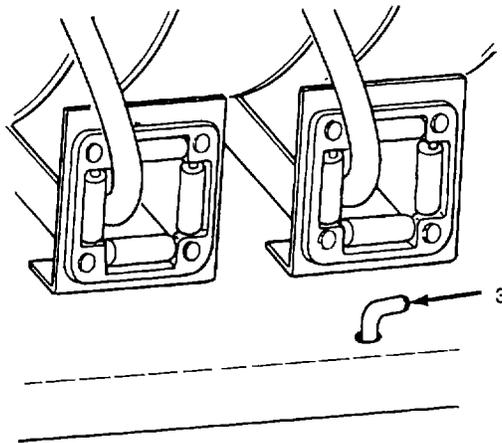
**AIR COMPRESSOR ASSEMBLY**

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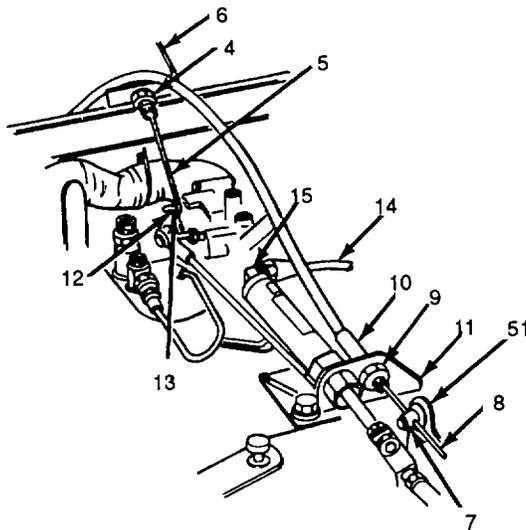
**4-30. ENGINE - REPLACE - (Cont.)**

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- (4) Vent air pressure completely by turning lever (3).



- (5) Loosen screw (12) and nut (13) from choke cable at choke lever.
- (6) Remove jam nut (4). Disengage choke control cable (5) and remove from bracket (6).
- (7) Loosen screw (7) to disconnect throttle cable (8).
- (8) Remove jam nut (9) and withdraw cable assembly (10) from bracket (11).
- (9) Disconnect air line tube (14) from air cylinder (15).



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**AIR COMPRESSOR ASSEMBLY**

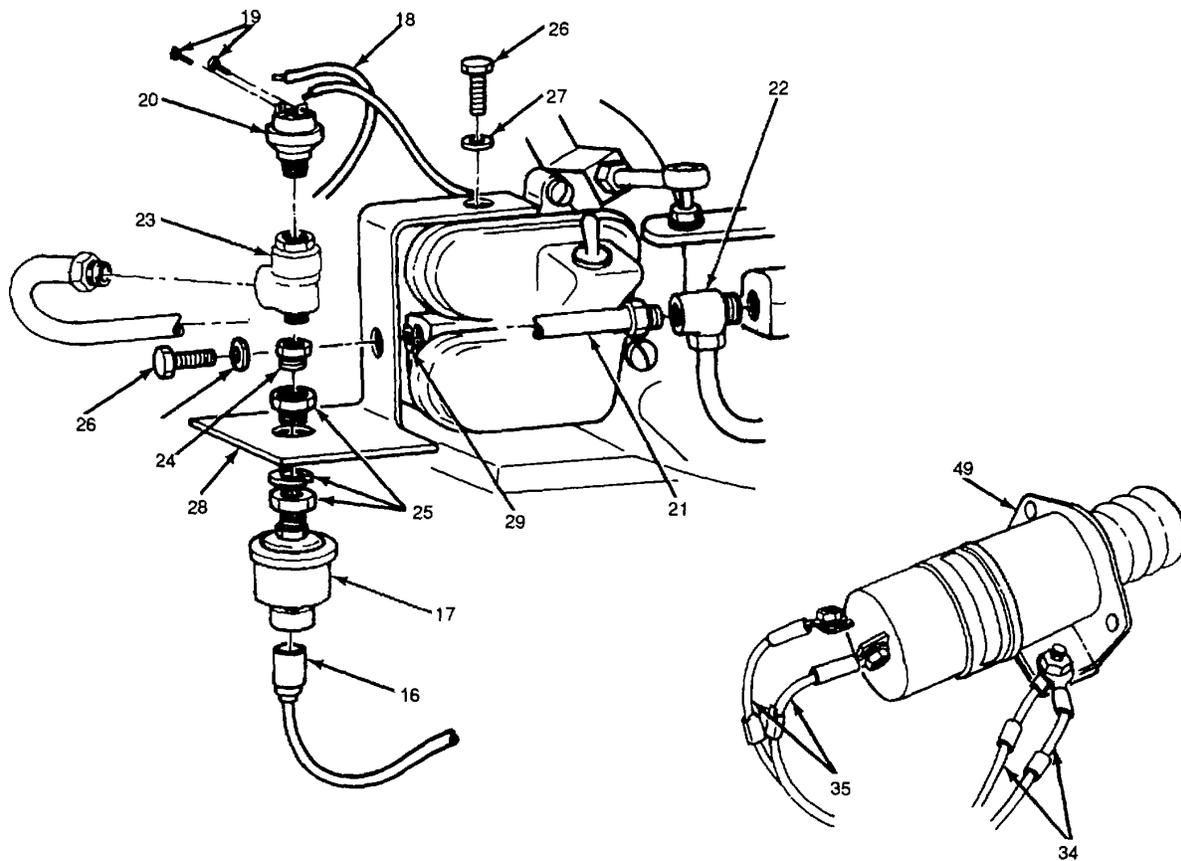
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**4-30. ENGINE - REPLACE - (Cont.)**

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a. Removal - (cont.)

- (10) Tag and disconnect electrical lead (16) and remove oil pressure sending unit (17).
- (11) Tag and disconnect two ground leads (34) and two electrical leads (35) from cold start solenoid (49).
- (12) Tag two electrical leads (18).
- (13) Remove two screws (19) to disconnect two electrical leads (18).
- (14) Cut wire 10 (battery temperature sending unit) and remove harness from engine.
- (15) Remove pressure switch (20) if damaged or replacing on another engine.



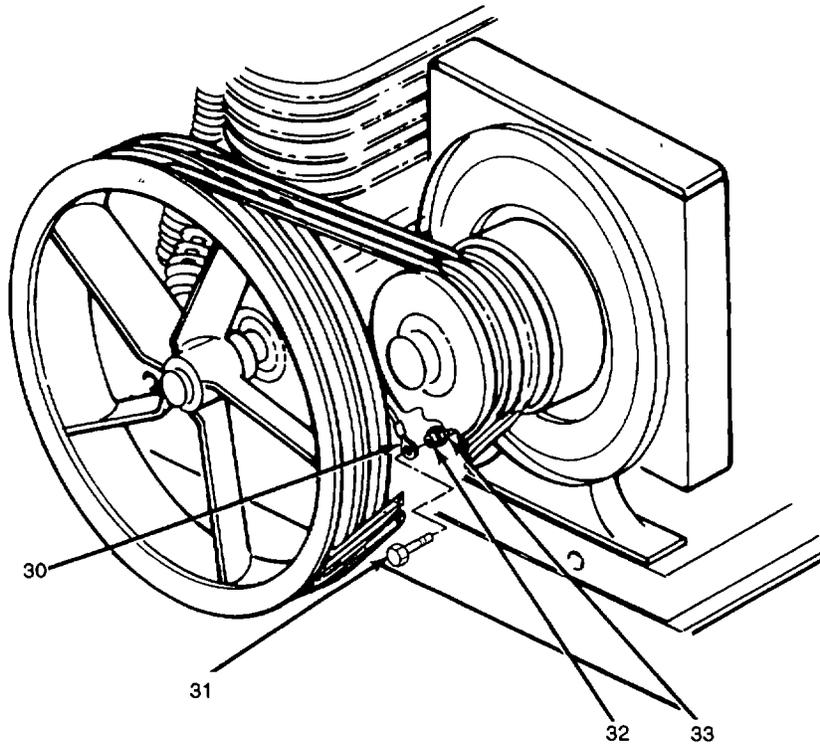
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**AIR COMPRESSOR ASSEMBLY**

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**4-30. ENGINE - REPLACE - (Cont.)**

- (16) Remove tube assembly (21), tee (22), tee (23), bushing (24), and anchor connector (25) if damaged or replacing on another engine.
- (17) Remove two screws (26), two clockwashers (27), bracket (28), spacer (29), and ground lead (18).
- (18) Tag and disconnect electrical lead (30) by removing screw (31).
- (19) Remove temperature switch (32) and bushing (33) if damaged or replacing on another engine.



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## AIR COMPRESSOR ASSEMBLY

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### 4-30. ENGINE - REPLACE - (Cont.)

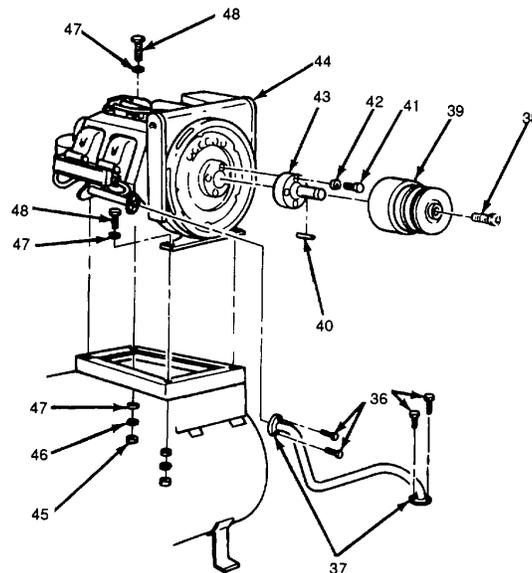
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a. Removal - (cont.)

- (20) Remove four screws (36) to disconnect two exhaust adaptors (37).
- (21) Remove four nuts (45), four lockwashers (46), eight flatwashers (47) and four screws (48).
- (22) Lift off engine (44) and set on blocks.
- (23) Loosen setscrew (38) and remove clutch assembly (39) and key (40).
- (24) Remove four screws (41), four lockwashers (42) and adapter shaft (43).

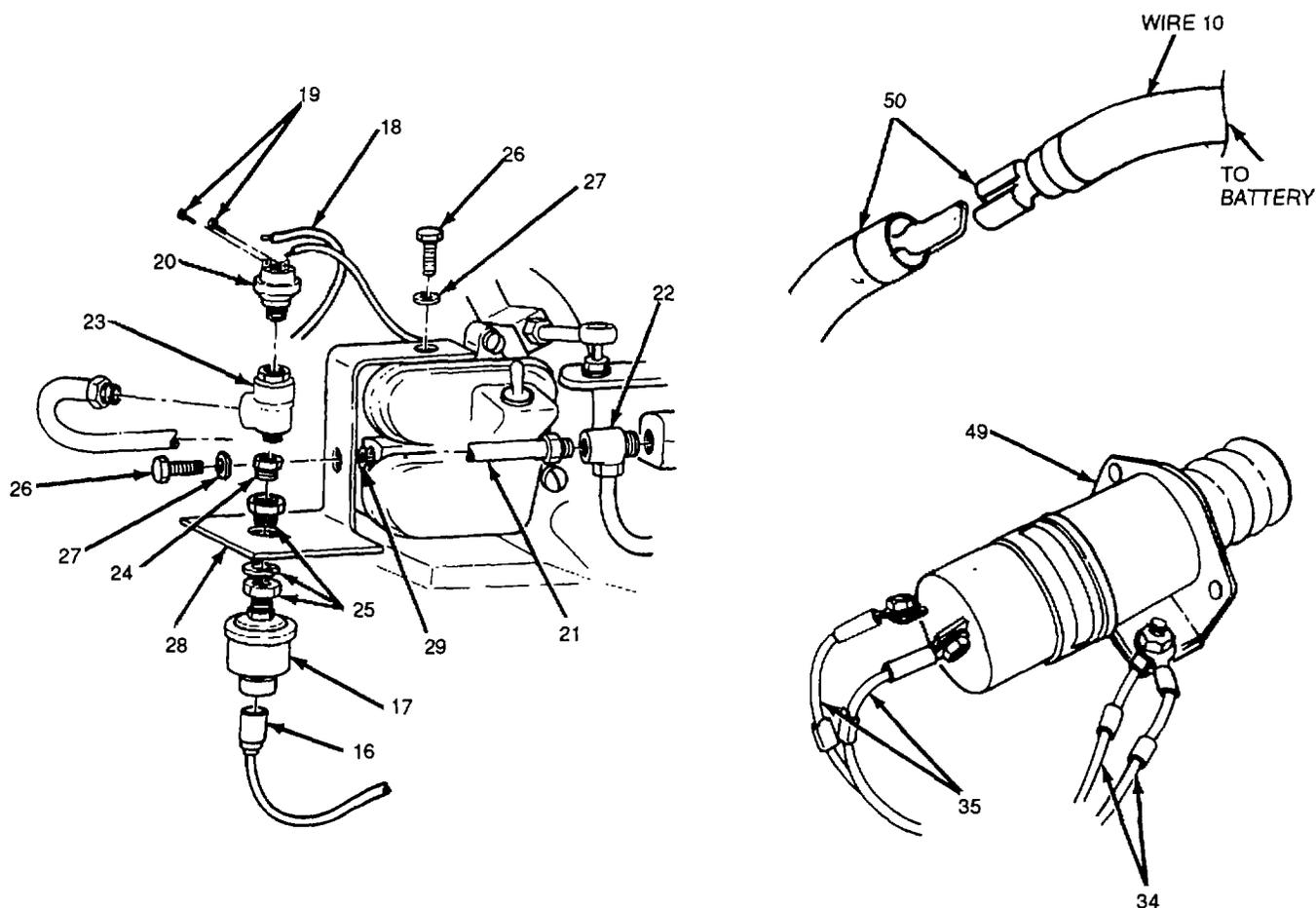
b. Installation

- (1) Install adapter shaft (43), four lockwashers (42) and four screws (41).
- (2) Install key (40) and clutch assembly (39). Tighten setscrew (38).
- (3) Position engine (44) and install using four screws (48), eight flatwashers (47), four lockwashers (46) and four nuts (45).
- (4) Connect two exhaust adapters (37) using four screws (36).



## AIR COMPRESSOR ASSEMBLY

### 4-30. ENGINE - REPLACE - (Cont.)

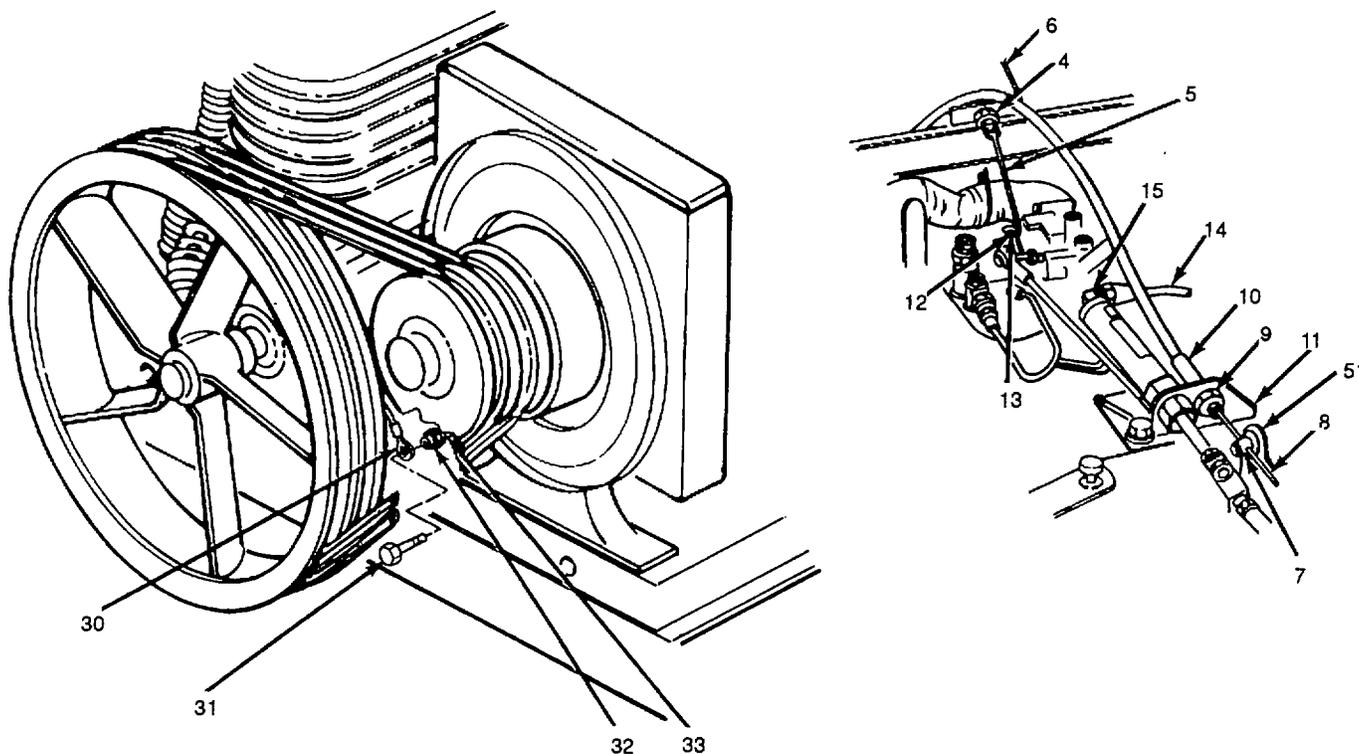


- (5) Install bushing (33) and temperature switch (32) if removed.
- (6) Connect electrical lead (30) using screw (31). Remove tag.
- (7) Reroute wiring harness into engine and install ground lead (18). Install two ground leads (34) and two electrical leads (35) to cold start solenoid (49).
- (8) Install spacer (29), bracket (28), two lockwashers (27) and two screws (26).
- (9) Install anchor connector (25), bushing (24), tee (23), tee (22), and tube assembly (21), if removed.
- (10) Install pressure switch (20) and connect two electrical leads (18) using two screws (19). Remove tags.
- (11) Reconnect wire 10 to wire going to battery temperature sending unit with connector (50).

## AIR COMPRESSOR ASSEMBLY

### 4-30. ENGINE - REPLACE - (Cont.)

#### b. Installation - (cont.)



(12) Install pressure sending unit (17), if removed, and connect electrical lead (16). Remove tag.

(13) Install air line tube to air cylinder (14).

(14) Install cable assembly (10) in bracket (11) using jam nut (9).

#### NOTE

**When installing choke control and throttle cables, be sure to adjust positions to allow full range of movement of the choke lever or throttle lever.**

(15) Slide throttle cable (8) through throttle lever (51) and tighten screw (7).

(16) Slide choke control cable (5) through bracket (6) and install jam nut (4).

## AIR COMPRESSOR ASSEMBLY

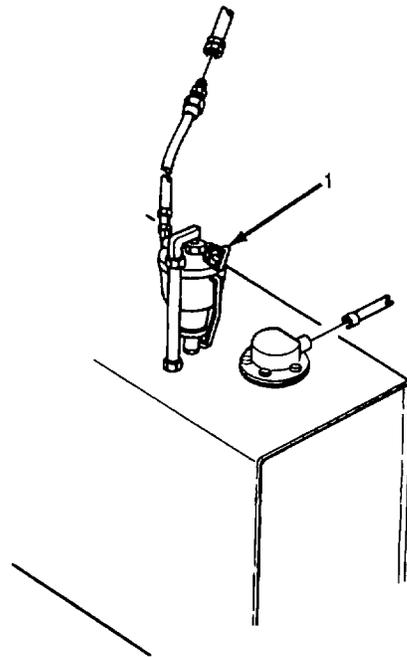
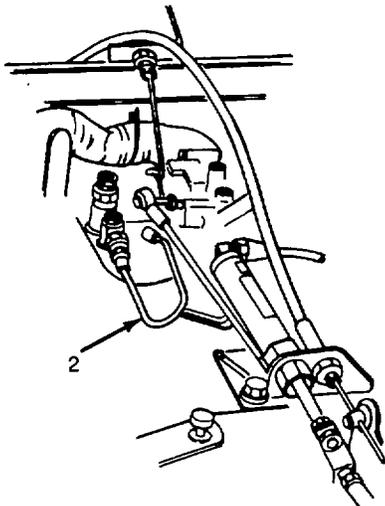
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### 4-30. ENGINE - REPLACE - (Cont.)

---

b. Installation - (cont.)

- (17) Tighten screw (12) and nut (13) to choke cable at choke lever.
- (18) Engage choke control cable (5) at choke lever.
- (19) Connect fuel line (2).
- (20) Open shutoff valve (1).
- (21) Connect negative battery cable.



## AIR COMPRESSOR ASSEMBLY

---

### 4-31. AIR RECEIVER TANK - REPLACE

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Personnel Required

2

##### Materials/Parts

Teflon Tape (Item 18, App E)

##### Equipment Condition

Enclosure removed (para 4-11)  
Wiring Harness removed (para 4-25)  
Control Panel removed (para 4-26)  
Air Compressor removed (para 4-29)  
Engine removed (para 4-30)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

#### a. Removal

- (1) Disconnect hose assembly (3) at elbow (4).
- (2) Remove four nuts (18), four lockwashers (19), and four screws (20).
- (3) Lift air receiver tank (21) away from skid.
- (4) Remove elbow (4), hose barb (6) and bushing (5).
- (5) Remove elbow (1) and check valve (2).
- (6) Remove elbow (7) and hose barb (6).
- (7) Remove tubes (8 and 9) and tee (10) as a unit.
- (8) Remove tube (11).
- (9) Remove adapter (12), pressure relief valve (13), two tees (14), pilot valve (15) and adapter (16) as a unit.
- (10) Remove two plugs (17).

## AIR COMPRESSOR ASSEMBLY

---

### 4-31. AIR RECEIVER TANK - REPLACE - (Cont.)

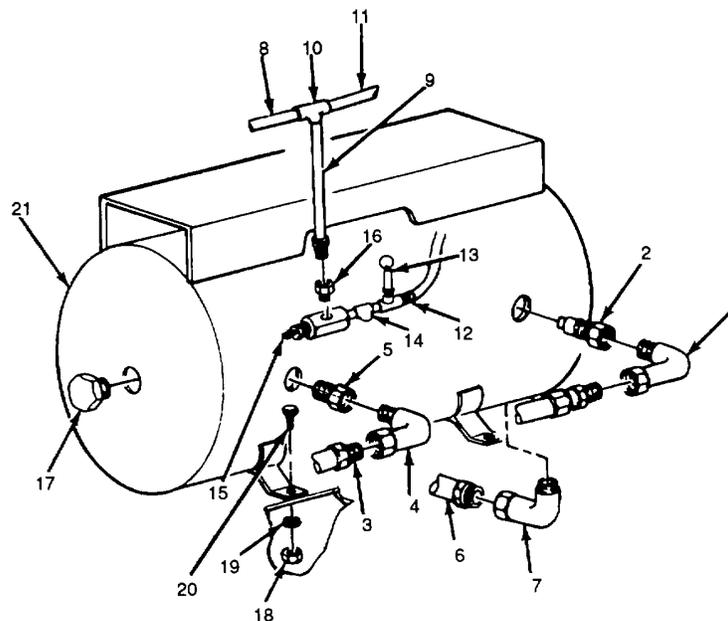
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#### b. Installation

#### NOTE

**Seal all tapped threads with tape.**

- (1) Install two plugs (17).
- (2) Install adapter (16), pilot valve (15), two tees (14), pressure relief valve (13) and adapter (12).
- (3) Connect tube (11).
- (4) Install tee (10) and tubes (8 and 9).
- (5) Install elbow (7) and hose barb (6).
- (6) Install check valve (2) and elbow (1).
- (7) Install bushing (5), elbow (4) and hose barb (6).
- (8) Lift air receiver tank (21) into position and install using four screws (20), four lockwashers (19), and four nuts (18).
- (9) Connect hose assembly (3) at elbow (4).



## AIR COMPRESSOR ASSEMBLY

---

### 4-32. AIR COMPRESSOR HOSE, LINES AND FITTINGS - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Materials/Parts

Teflon Tape (Item 18, AppE)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

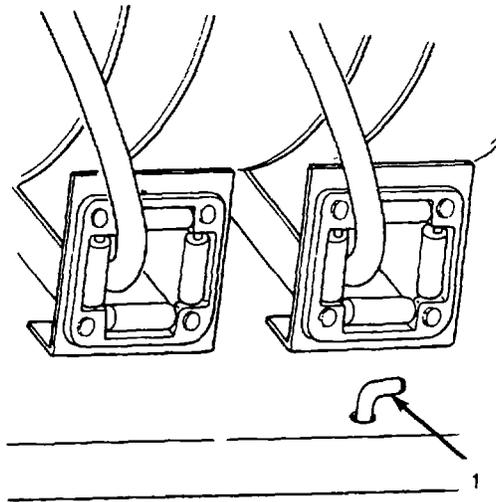
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- a. Removal

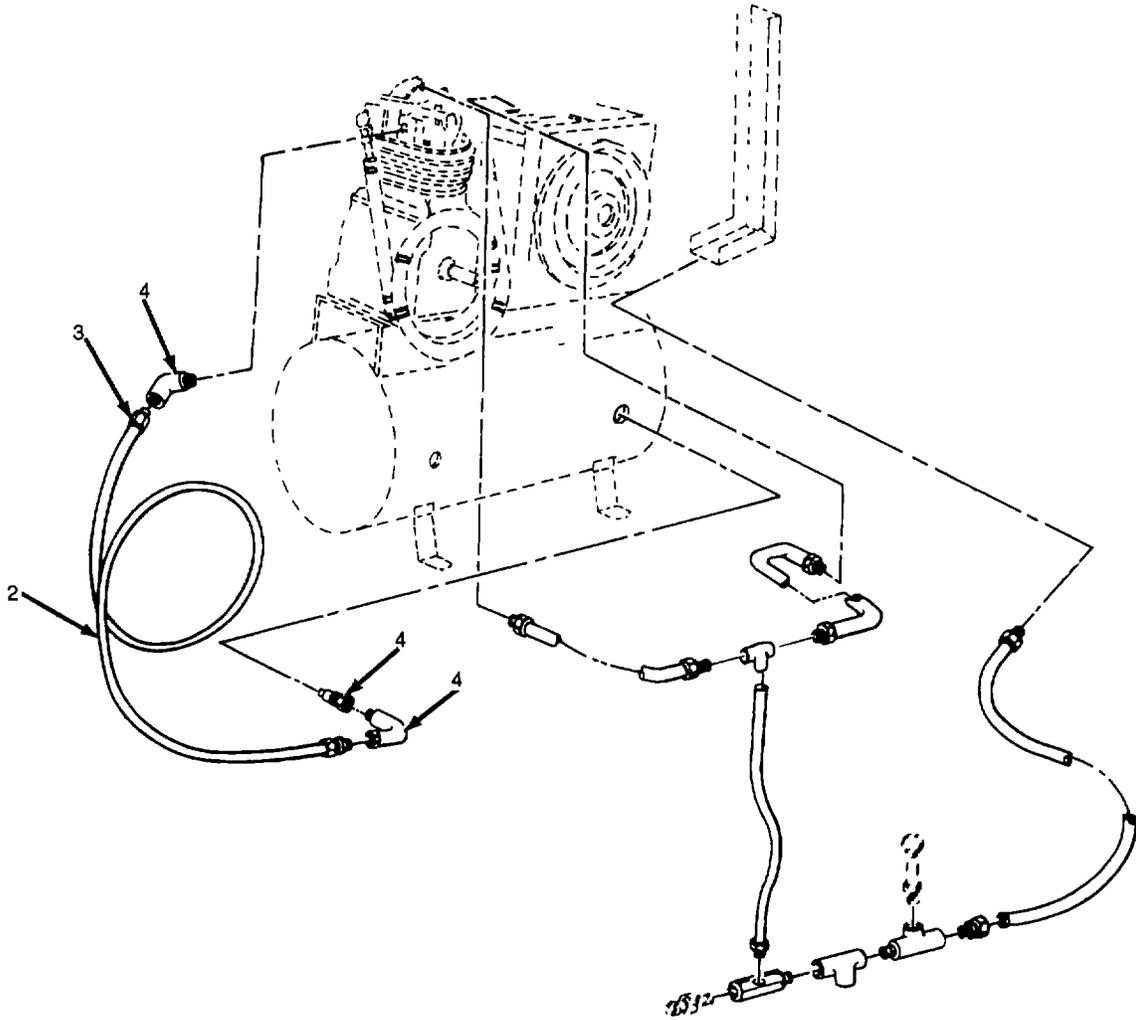
#### NOTE

The following procedure applies to all air compressor hoses lines and fittings.

- (1) Vent air pressure completely by turning lever (1).



- (2) Disconnect and remove tube (2) by loosening nuts (3).
- (3) Remove elbows, adapters and tees (4) as applicable.



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**AIR COMPRESSOR ASSEMBLY**

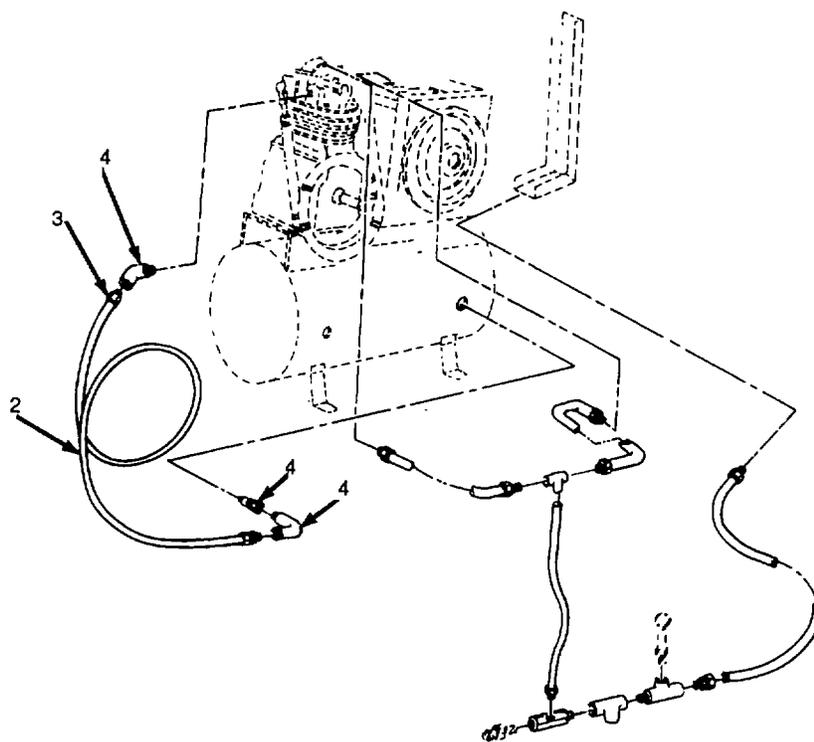
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**4-32. AIR COMPRESSOR HOSE, LINES AND FITTINGS - REPLACE. (Cont.)**

---

b. Installation

- (1) Wrap all threads using tape
- (2) Install tees, adapters and elbows (4).
- (3) Install tube (2) and tighten nuts (3).



## AIR COMPRESSOR ASSEMBLY

---

### 4-33. ENGINE OIL EXTENSION ASSEMBLY - REPLACE

---

This task covers

a. Removal

b. Installation

---

#### INITIAL SET-UP:

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

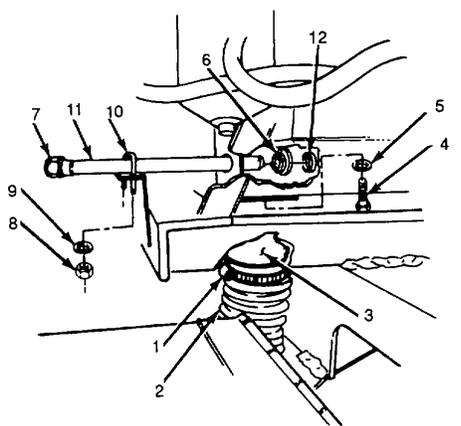
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#### a. Removal

- (1) Loosen clamp (1) and disconnect hose (2) at duct (3).
- (2) Remove two screws (4), two lockwashers (5) and duct (3).
- (3) Remove cap (7) and drain engine oil into suitable container.
- (4) Remove two nuts (8), two lockwashers (9) and clamp (10).
- (5) Unscrew and remove engine oil extension (11) and preformed packing (12). Discard packing.

#### b. Installation

- (1) Install preformed packing (12) and engine oil extension (11).
- (2) Install clamp (10), two lockwashers (9) and two nuts (8).
- (3) Install cap (7) and fill engine crankcase with oil (para 3-2).
- (4) Install grommet (6), duct (3), two lockwashers (5) and two screws (4).
- (5) Install hose (2) and tighten clamp (1).



## AIR COMPRESSOR ASSEMBLY

---

### 4-34. ENGINE EXHAUST SYSTEM - REPLACE

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Equipment Condition

Enclosure Removed (para 4-11)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

- a. Removal

#### NOTE

**Steps (1) through (3) apply to any of four exhaust hoses.**

- (1) Remove four nuts (1), four lockwashers (2) and two dampers (3).
- (2) Remove exhaust hoses (4).
- (3) Side insulation jacket (5) off of exhaust hose.
- (4) Remove four nuts (6) four screws (7) four lockwashers (8) and two exhaust adapters (9).
- (5) Drill out four rivets (10) and remove exhaust diverter (11).

**AIR COMPRESSOR ASSEMBLY**

---

**4-34. ENGINE EXHAUST SYSTEM - REPLACE - (Cont.)**

---

b. Installation

- (1) Install exhaust diverter (11) using four rivets (10).
- (2) Install two exhaust adapters (9), four lockwashers (8), four screws (7) and four nuts (6)

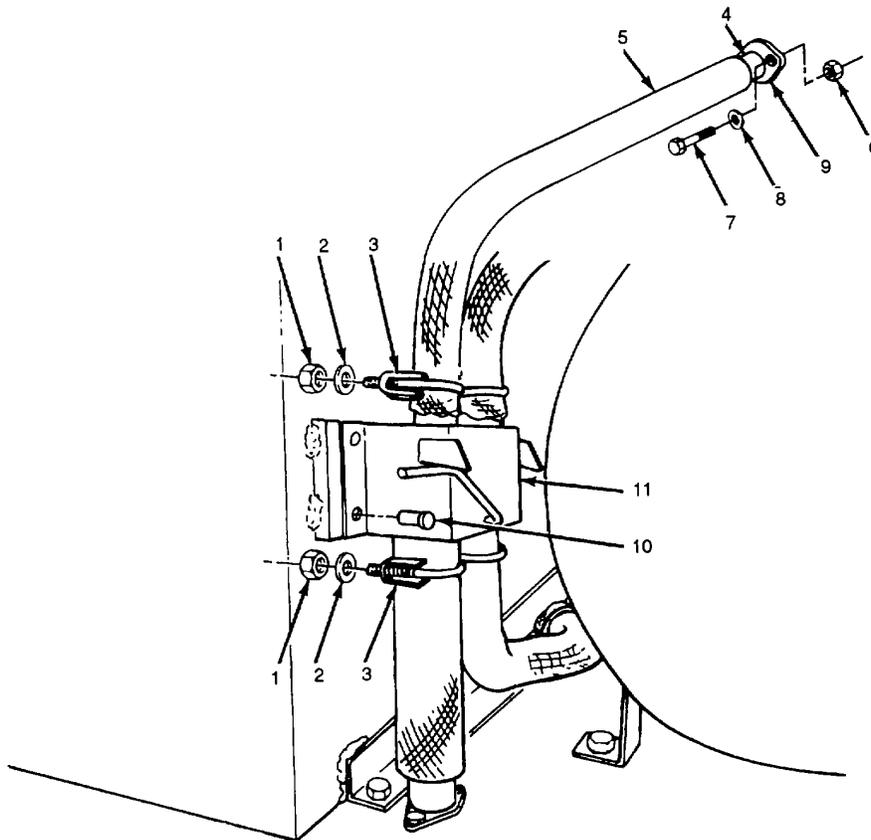
**NOTE**

**Steps (3) and (4) apply to any of four exhaust hoses.**

- (3) Slide insulation jacket (5) over exhaust hose (4).
- (4) Install exhaust hose (4) using two clamps (3), four lockwashers (2) and four nuts (1).

**NOTE**

**Ensure exhaust hoses do not interfere with operation of the lever.**



## LUBE TANK ASSEMBLY

---

### 4-35. ALCOHOL INJECTOR - ADJUST/REPLACE/REPAIR

---

This task covers:

- |               |                 |                |           |
|---------------|-----------------|----------------|-----------|
| a. Adjustment | b. Removal      | c. Disassembly | d. Repair |
| e. Assembly   | f. Installation |                |           |
- 

#### INITIAL SET-UP:

##### Materials/Parts

Dry cleaning Solvent (Item 6, AppE)  
Alcohol (Item 1, AppE)  
Teflon Tape (Item 18, AppE)

##### **NOTE**

The alcohol injector should only be used in temperatures below 32°F (0°C).

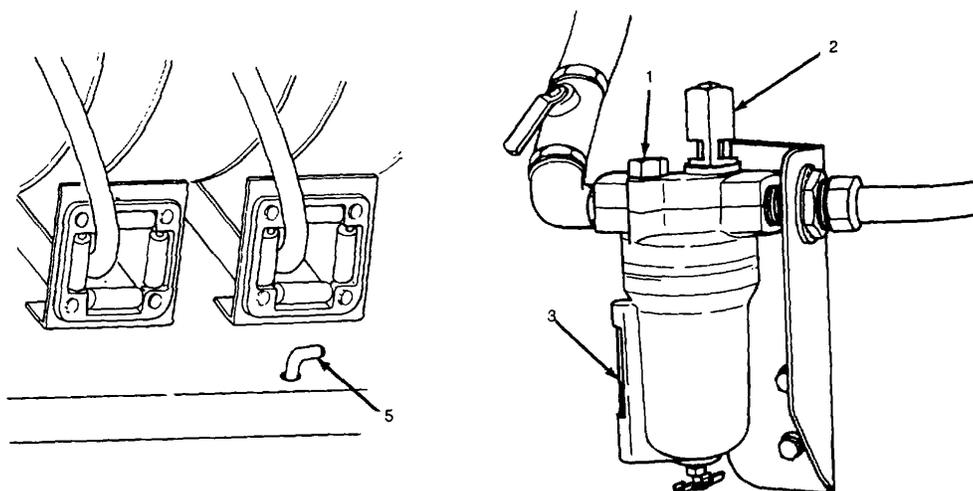
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

---

#### a. Adjustment

- (1) Remove fill plug (1) and fill injector with alcohol. Reinstall plug.
- (2) Start engine.
- (3) Turn adjusting screw (2) fully clockwise.
- (4) Rotate adjusting screw (2) approximately one quarter turn counterclockwise to establish drip rate.
- (5) During operation, inspect sight gage (3) frequently and fill injector as needed. Also, monitor drip rate and adjust if alcohol in system is excessive or low.



## LUBE TANK ASSEMBLY

### 4-35. ALCOHOL INJECTOR - ADJUST/REPLACE/REPAIR - (Cont.)

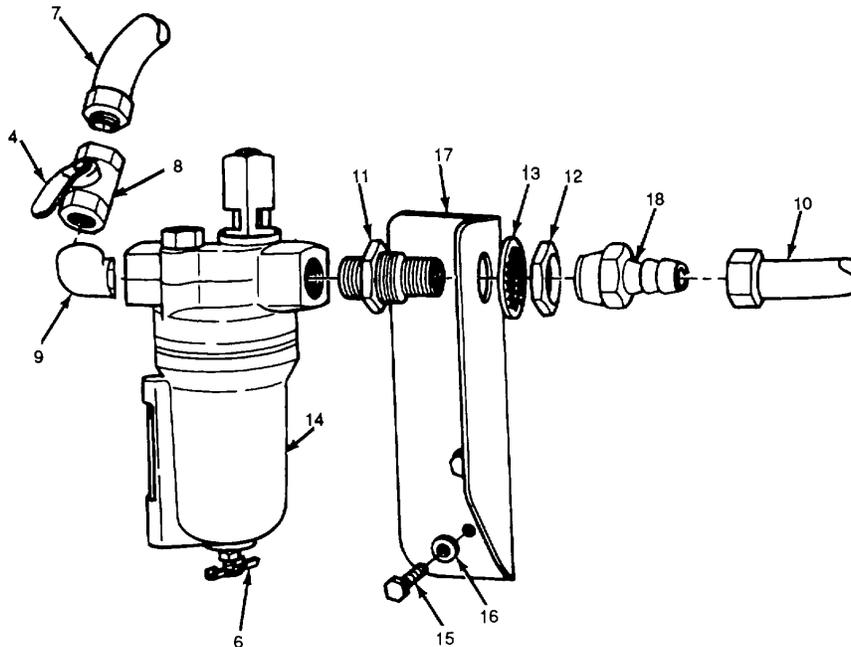
#### b. Removal

- (1) Shut off air flow by turning ball valve handle (4).
- (2) Vent air pressure completely by turning lever (5).

#### NOTE

**Injector does not need to be removed for repair.**

- (3) Open drain petcock (6) and drain alcohol into suitable container.
- (4) Disconnect hose (7) at ball valve (8).
- (5) Remove ball valve (8).
- (6) Remove elbow (9).
- (7) Disconnect hose (10) at bulkhead fitting (11). Remove hose barb (18), jam nut (12) and starwasher (13).
- (8) Remove bulkhead fitting (11) and alcohol injector (14).
- (9) Remove two screws (15), two lockwashers (16) and mounting bracket (17).



## LUBE TANK ASSEMBLY

---

### 4-35. ALCOHOL INJECTOR - ADJUST/REPLACE/REPAIR - (Cont.)

---

c. Disassembly

- (1) Remove drain petcock (6).
- (2) Remove retainer (18), preformed packing (19), two seals (20) and gauge glass (21).
- (3) Unscrew bowl (22) and remove with preformed packing (23).

**NOTE**

**Do not remove siphon tube (24) unless replacement is necessary.**

- (4) Remove siphon tube (24), fill plug (25), sight feed dome (26) and preformed packing (27) from body (28).

d. Repair

- (1) Replace all preformed packings and seals.

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling so vent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 1 00°F to 1 38°F (38°C to 590C)**

- (2) Clean all parts with dry cleaning solvent and dry thoroughly. Be sure that all mating surfaces are clean and free of foreign particles.
- (3) Inspect the sight glass and the bowl for cracks, chips, and discoloration. Replace if necessary.
- (4) Inspect the valve for cracks, damaged threads, and faulty seating surfaces. Inspect the mating seating surfaces on the valve plate for scoring or damage. Replace damaged parts.
- (5) Inspect all other parts for cracks, distortion, damaged threads, and other damage; replace damaged parts.

## LUBE TANK ASSEMBLY

### 4-35. ALCOHOL INJECTOR - ADJUST/REPLACE/REPAIR - (Cont.)

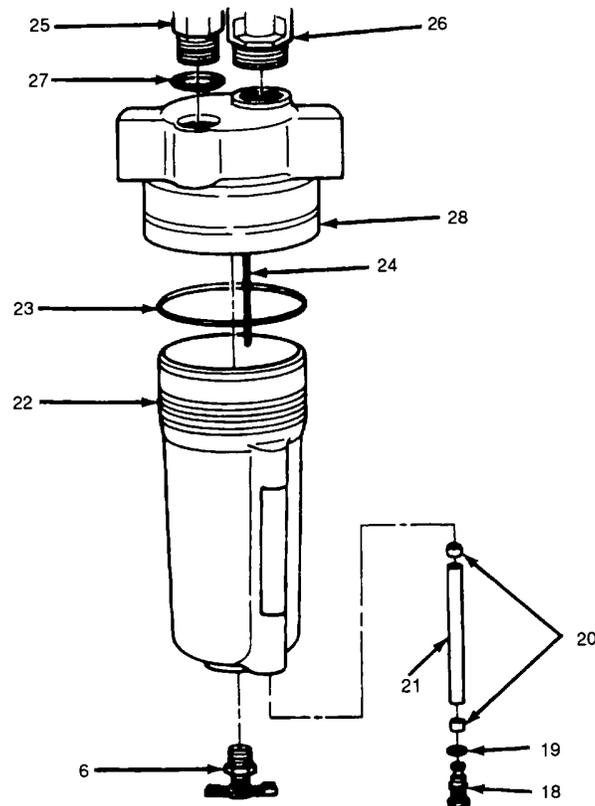
#### e. Assembly

- (1) Install preformed packing (27), sight feed dome (26), fill plug (25) and siphon tube (24) into body (28). Torque sight feed dome to 30-35 IN LB (3.39 to 3.95 NM).
- (2) Lubricate preformed packing (23) and install with bowl (22).

#### **CAUTION**

**Do not over torque retainer (18) as damage to gauge glass can occur.**

- (3) Lubricate preformed packing (19) and two seals (20) and install with gauge glass (21) and retainer (18). Torque retainer (18) to 7-10 IN LB (.79 - 1.13 NM).
- (4) Install drain petcock (6).



## LUBE TANK ASSEMBLY

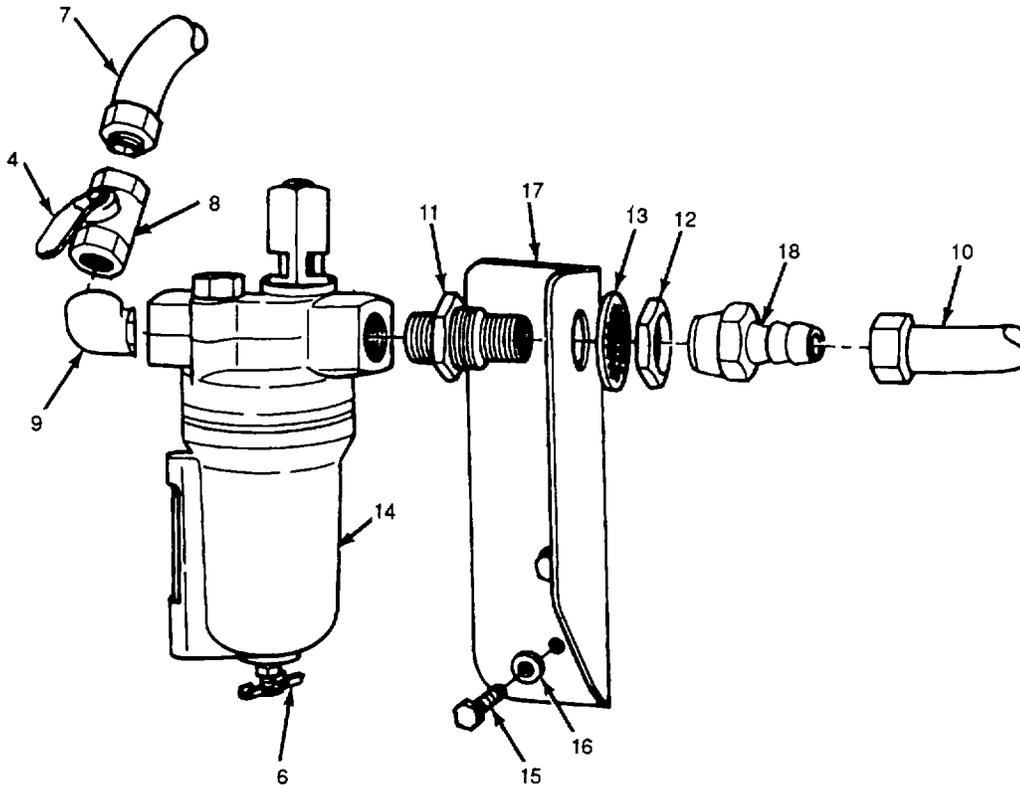
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### 4-35. ALCOHOL INJECTOR - ADJUST/REPLACE/REPAIR - (Cont.)

---

f. Installation

- (1) Install mounting bracket (17), two lockwashers (16) and two screws (15).
- (2) Seal threads of bulkhead fitting with tape. Install alcohol injector (14) and bulkhead fitting (11) using lockwasher (13) and jam nut (12).
- (3) Connect hose (10) at bulkhead fitting (11).
- (4) Seal male threads with tape. Install elbow (9), ball valve (8) and connect hose (7).
- (5) Close drain petcock (6).
- (6) Fill and adjust (para 4-35a) if operations will be conducted in temperatures below 32°F (0°C).



## LUBE TANK ASSEMBLY

---

### 4-36. AIR REGULATOR - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Material/Parts

Teflon Tape  
(Item 18, AppE)

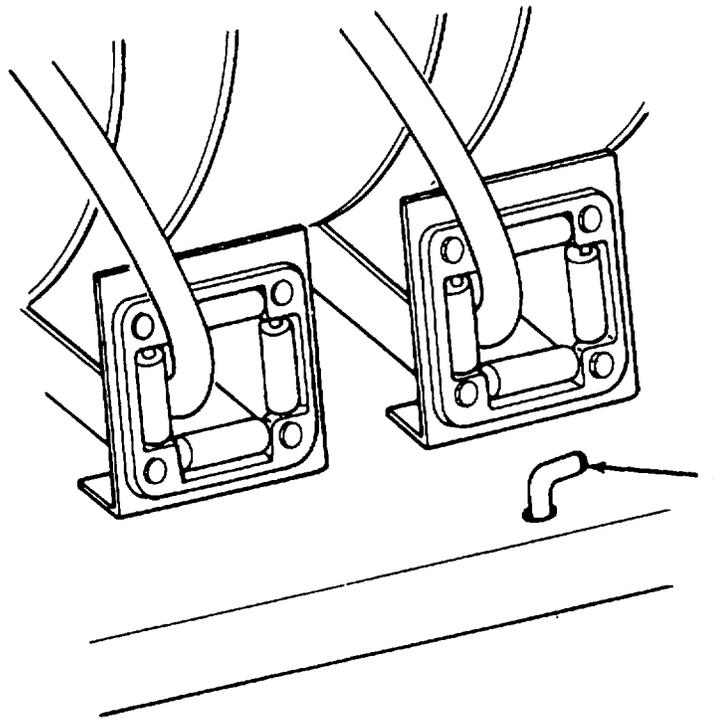
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

---

#### a. Removal

- (1) Vent air pressure completely by turning lever (1).



## LUBE TANK ASSEMBLY

---

### 4-36. AIR REGULATOR - REPLACE- (Cont)

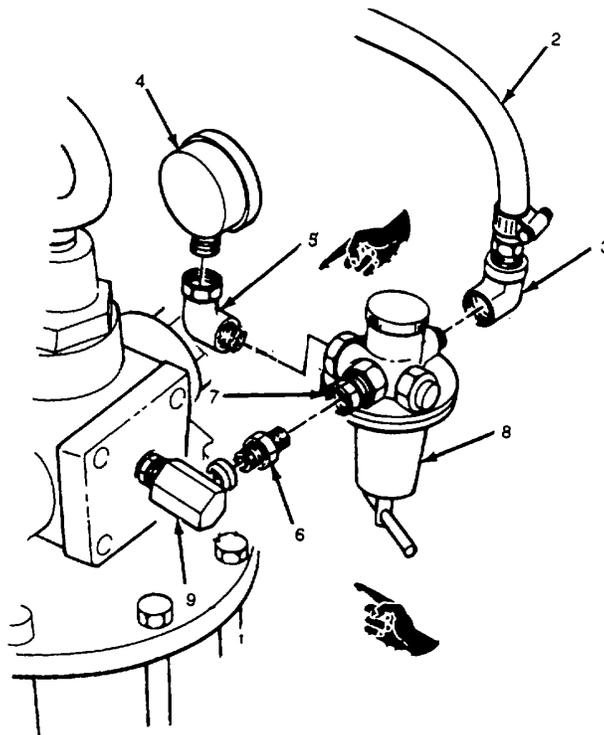
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- a. Removal - (cont.)
- (2) Disconnect hose assembly (2) at elbow (3). Remove elbow.
  - (3) Remove air pressure gage (4) and elbow (5).
  - (4) Loosen nut (6) and remove nipple (7) and regulator (8).
  - (5) Deleted.
- b. Installation

#### NOTE

Seal all male threads with tape.

- (1) Deleted.
- (2) Install nipple (7) and regulator (8). Tighten nut (6).
- (3) Install elbow (5) and air pressure gage (4).
- (4) Install elbow (3) and connect hose assembly (2).



## LUBE TANK ASSEMBLY

---

### 4-37. LOW AND HIGH PRESSURE PUMPS - REPLACE

---

This task covers:

- a. Removal
- b. Installation

---

#### INITIAL SET-UP:

##### Materials/Parts

Teflon Tape  
(Item 18, App E)

##### Equipment Condition

Air Regulator Removed  
(para 4-36)

**NOTE**  
The following procedure applies to the high pressure pump or either of the two low pressure pumps.

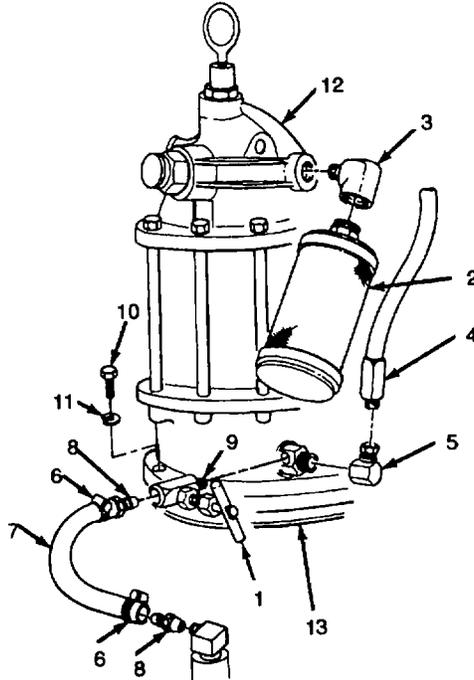
##### Tools

General Mechanics  
Tool Box (Section III, Item 1, AppB)

---

#### a. Removal

- (1) Remove alcohol injector if needed (para 4-35).
- (2) Vent lube pressure by opening valve (1). Close valve.
- (3) Remove pneumatic muffler (2) and elbow (3).
- (4) Disconnect lube hose assembly (4) and remove adapter (5).
- (5) Loosen two clamps (6) and remove hose (7). Remove dampers (6) from hose (7).



## LUBE TANK ASSEMBLY

---

### 4-37. LOW AND HIGH PRESSURE PUMPS - REPLACE - (Cont.)

---

#### a. Removal- (cont.)

- (6) Remove two hose barbs (8).
- (7) Remove return valve (1) and nipple (9).
- (8) Remove four screws (10) and four lockwashers (11).
- (9) For high pressure pump only, loosen setscrew on pickup tube collar (located inside tank).
- (10) Lift out lube pump (12) and allow excess lubricant to drip into tank.
- (11) For high pressure pump only, remove collar.
- (12) Remove gasket (13).

#### b. Installation

- (1) Seal all tapered threads with tape.
- (2) Install gasket (13), lube pump (12), four lockwashers (11) and four screws (10). Install collar and setscrew for high pressure pump.
- (3) Install nipple (9) and return valve (1).
- (4) Install two hose barbs (8).
- (5) Slide two clamps (6) onto hose (7) and install.
- (6) Install adapter (5) and connect lube hose assembly (4).
- (7) Install elbow (3) and pneumatic muffler (2).
- (8) Install alcohol injector if removed (para 4-35).

## LUBE TANK ASSEMBLY

---

### 4-38. LUBE TANK - REPLACE/REPAIR

---

This task covers:

- |                 |                |           |             |
|-----------------|----------------|-----------|-------------|
| a. Removal      | b. Disassembly | c. Repair | d. Assembly |
| e. Installation |                |           |             |
- 

#### INITIAL SET-UP:

##### Personnel Required

2

##### Materials/Parts

Dry cleaning Solvent

(Item 6, AppE)

Silicon Sealant (Item 14, App E)

##### Equipment Condition

Enclosure removed (para 4-11)

Alcohol Injector Removed (para 4-35)

Three air regulators removed (para 4-36)

Low and high pressure pumps removed  
(para 4-37)

##### Tools

General Mechanics Tool Box

(Section III, Item 1, App B)

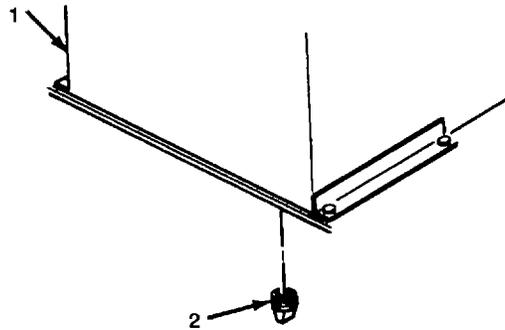
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a. Removal

#### NOTE

**GAA Grease will have to be scooped out.**

- (1) Completely drain all lubricants from lube tank (1) by removing three plugs (2).



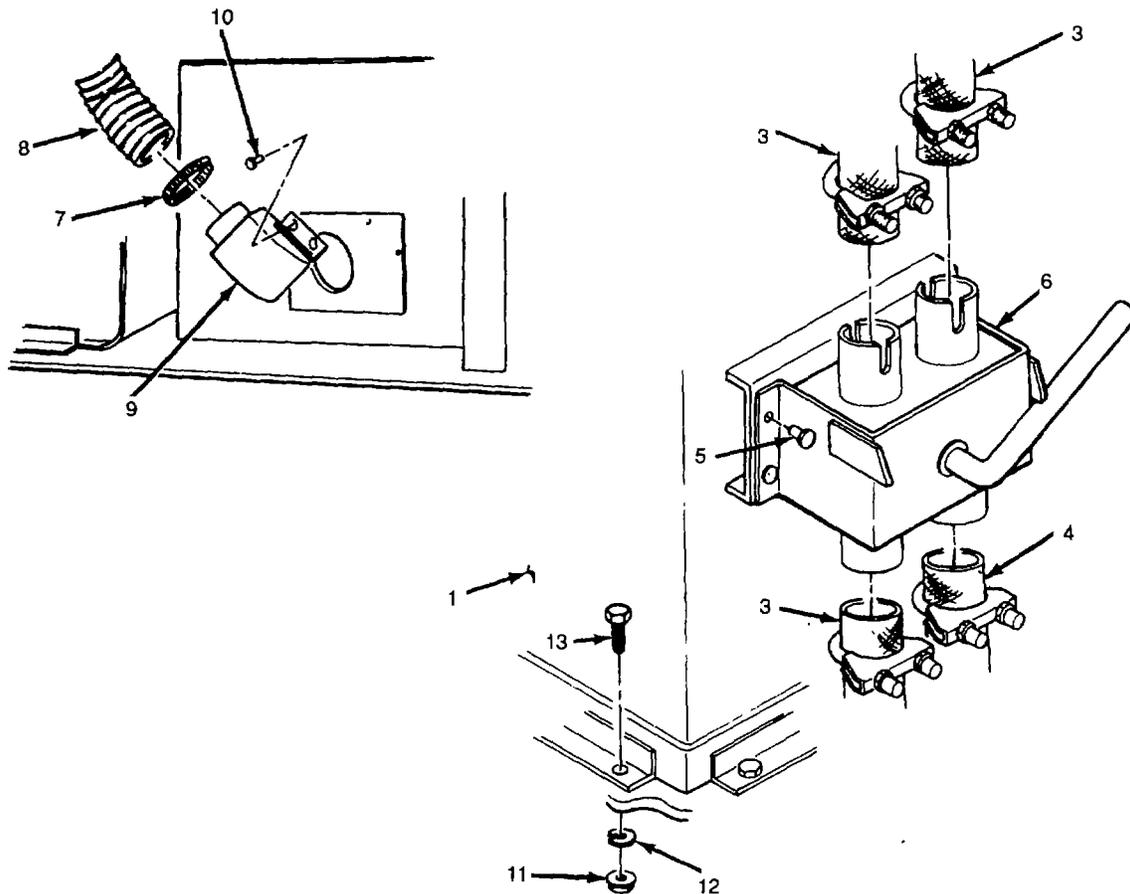
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## LUBE TANK ASSEMBLY

### 4-38. LUBE TANK - REPLACE/REPAIR - (Cont.)

#### a. Removal - (cont.)

- (2) Disconnect three exhaust hoses (3) and remove exhaust hose (4).
- (3) Drill out four rivets (5) and remove exhaust diverter (6).
- (4) Loosen clamp (7) and disconnect hose (8) at duct (9).
- (5) Drill out six rivets (10) and remove duct (9).
- (6) Remove eight nuts (11), eight lockwashers (12) and eight screws (13).
- (7) Lift lube tank (1) off of skid.



## LUBE TANK ASSEMBLY

### 4-38. LUBE TANK- REPLACE/REPAIR - (Cont.)

#### b. Disassembly

#### NOTE

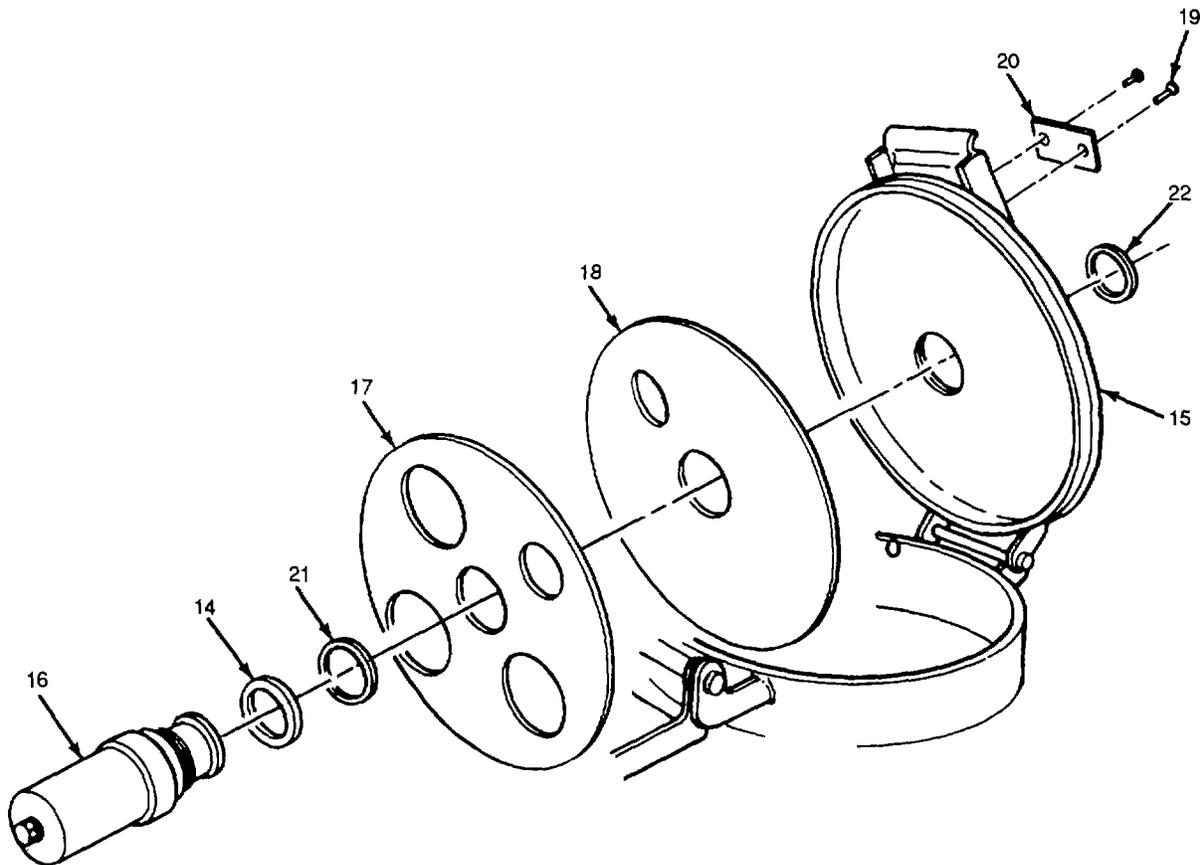
Steps (1) and (2) apply to any of three manholes

- (1) Unscrew spring well (16) and remove manhole (15). Remove retainer (17), packing (14), gasket (21), gasket (18) and gasket (22).

#### NOTE

- Remove ID plate only if illegible or if manhole latch is to be replaced.
- Step 3 applies to any of three ID plates.

- (2) Drill out two rivets (19) and remove ID plate (20).



## LUBE TANK ASSEMBLY

---

### 4-38. LUBE TANK - REPLACE/REPAIR - (Cont.)

---

c. Repair

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100 °F to 138°F (38°C to 59°C).**

- (1) Flush out each of three lubricant compartments in the tank using dry cleaning solvent.
- (2) Inspect tank for cracks defective manhole hinges, broken weldments and other damage. Replace defective tanks.
- (3) Inspect manhole for damage, corrosion, gasket damage or wear or other conditions that could impair its sealing ability. Replace parts as required.

## LUBE TANK ASSEMBLY

### 4-38. LUBE TANK - REPLACE/REPAIR - (Cont.)

#### d. Assembly

##### NOTE

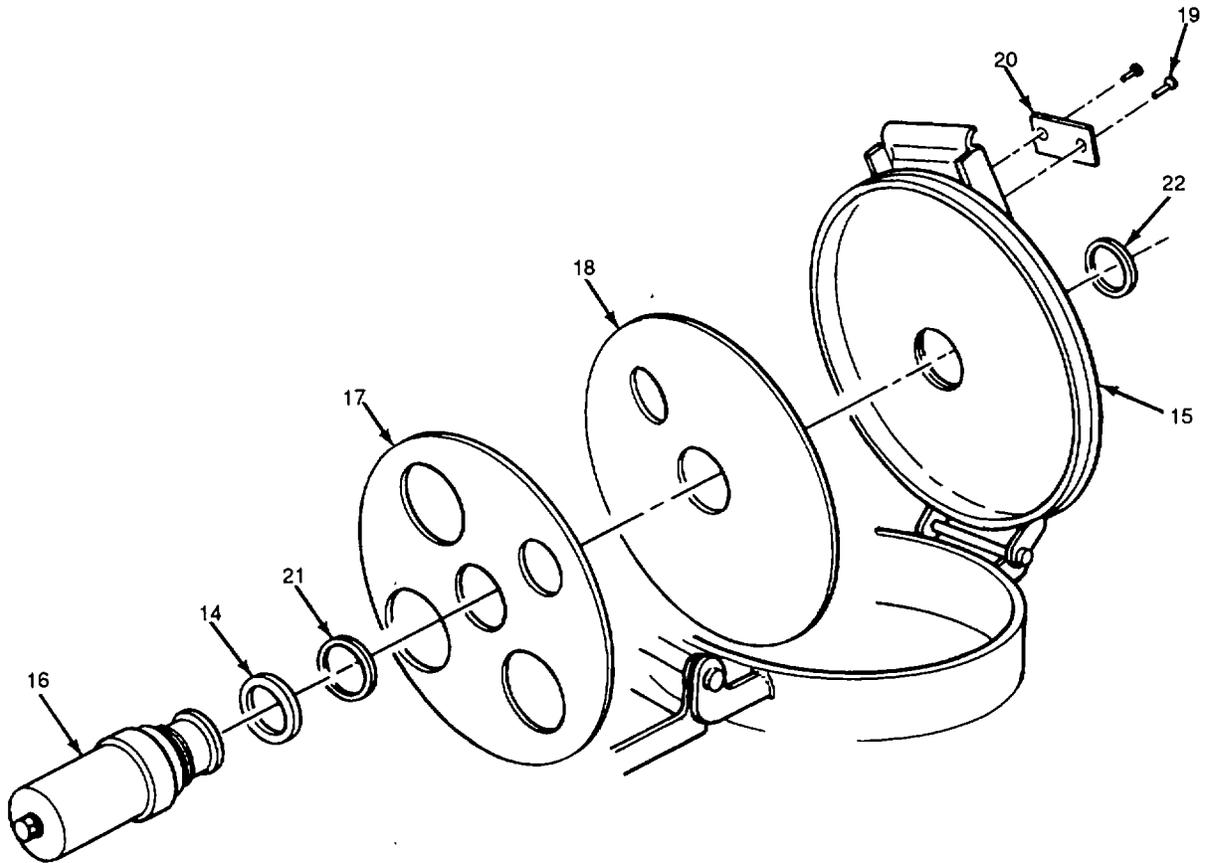
Step (1) applies to any of three ID plates.

- (1) Install ID plate (20) using two rivets (19).

##### NOTE

Step (2) applies to any of three manholes.

- (2) Install retainer (1), packing (14), gasket (21), gasket (22), gasket (18) and spring well (16) and manhole (15).

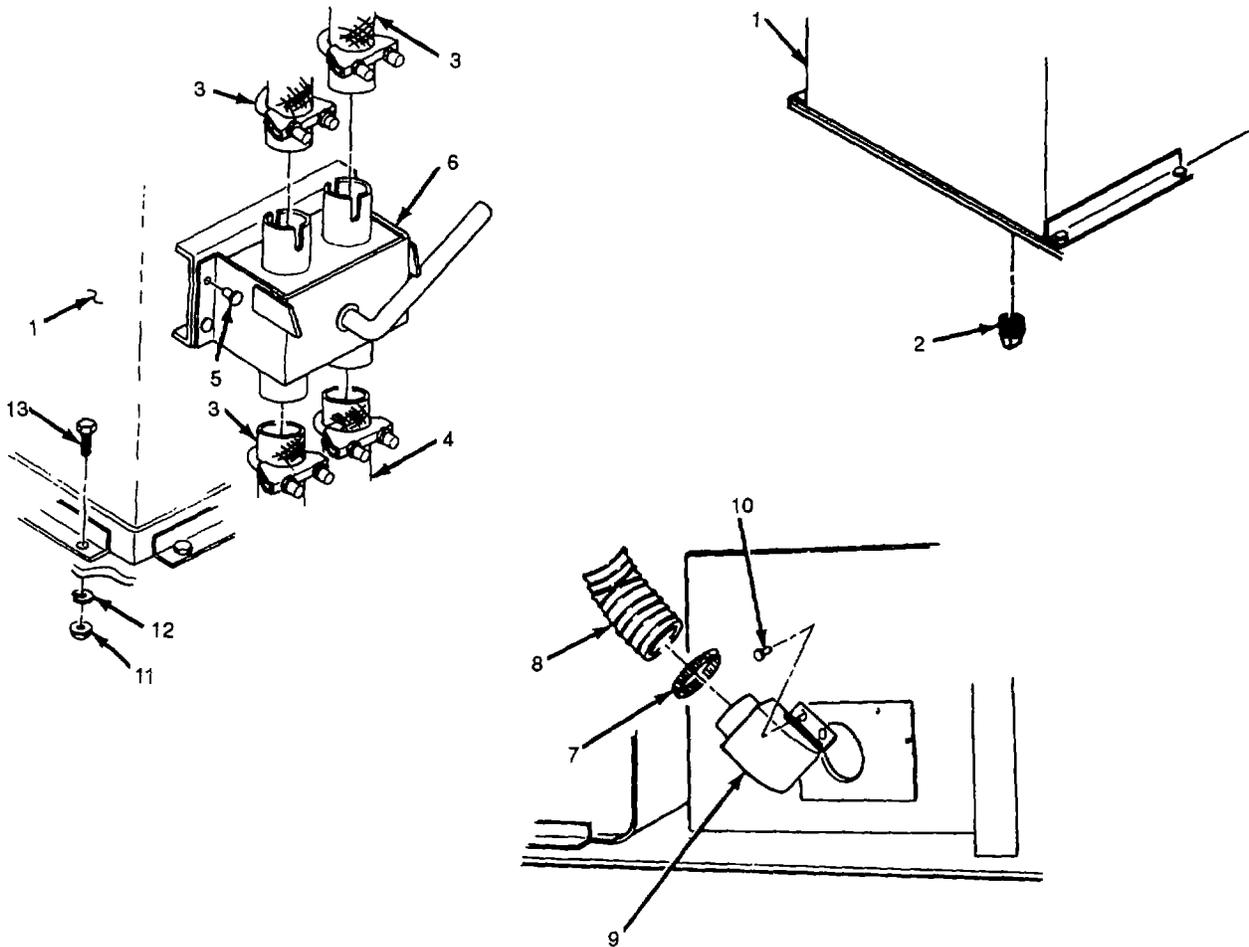


## LUBE TANK ASSEMBLY

### 4-38. LUBE TANK - REPLACE/REPAIR - (Cont.)

#### e. Installation

- (1) Position lube tank (1) on skid and secure with eight screws (13), eight lockwashers (12) and eight nuts (11).
- (2) Coat winterization duct (9) mating surface with silicon sealant and install with six rivets (10).
- (3) Connect hose (8) to duct (9) and tighten clamp (7).
- (4) Install exhaust diverter (6) with four rivets (5).
- (5) Install exhaust hose (4) and connect three exhaust hoses (3).
- (6) Install three drain plugs (2) and fill lube tank (para 2-5).



## WINTERIZATION ASSEMBLY

---

### 4-39. HEATER - REPLACE

---

This task covers:

a. Removal

b. Installation

---

INITIAL SET-UP:

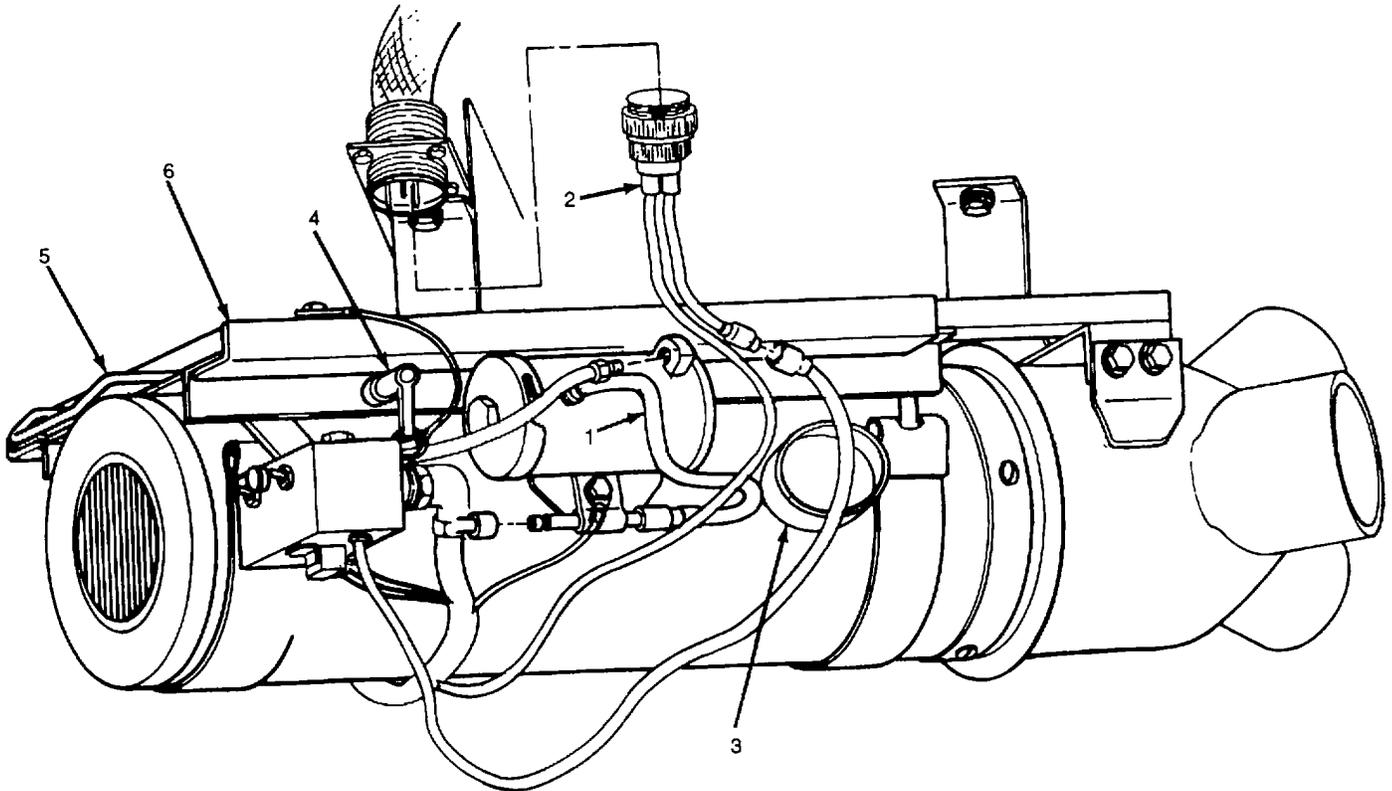
Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

---

a. Removal

- (1) Disconnect fuel line quick disconnect (1).
- (2) Disconnect electrical connector (2).
- (3) Disconnect exhaust hose (3).
- (4) Remove pin (4) and pull heater and slide (5) out of track (6).

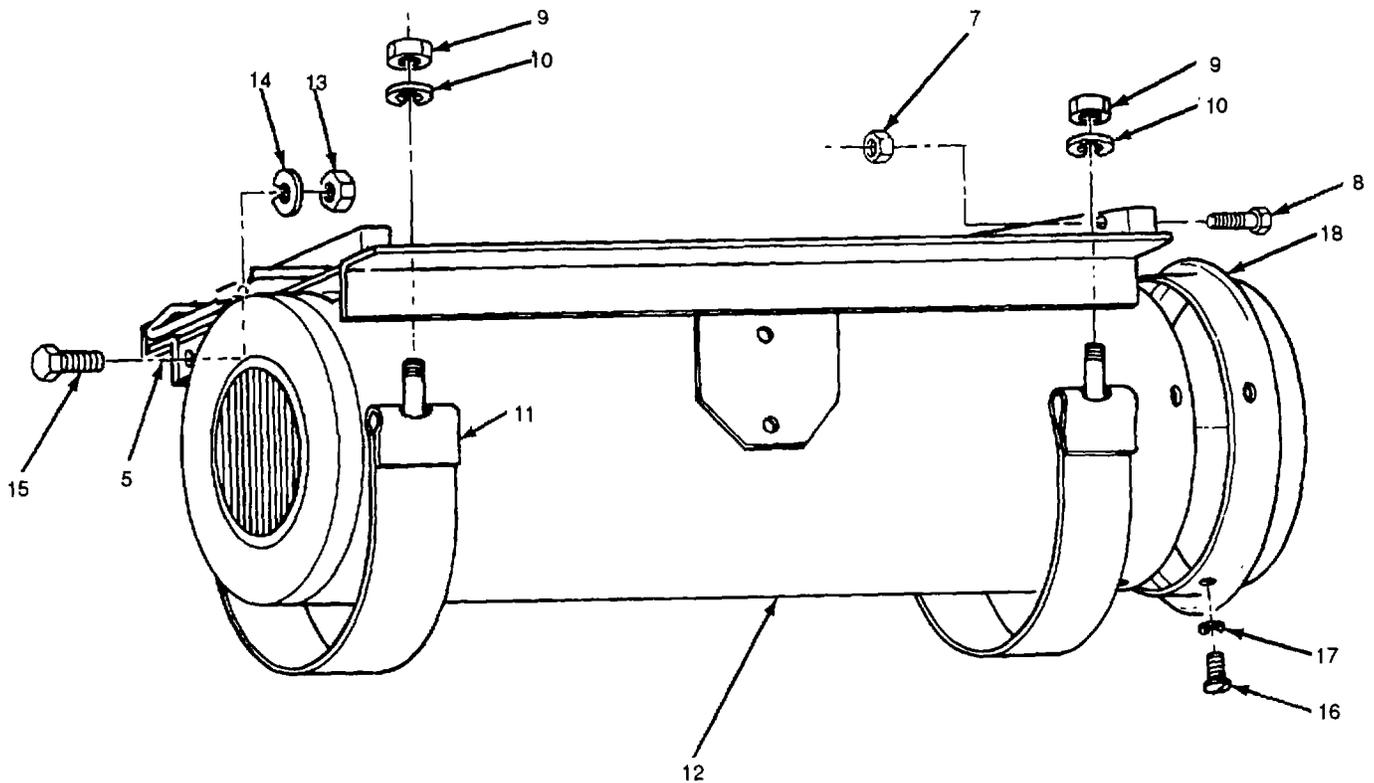


## WINTERIZATION ASSEMBLY

### 4-39. HEATER - REPLACE - (Cont.)

#### a. Removal - (cont.)

- (5) Remove control box (para 4-40) and wiring harness (para 4-42).
- (6) Remove fuel pump (para 4-41).
- (7) Remove nut (7) and screw (8).
- (8) Remove two nuts (9) and two lockwashers (10) to release two straps (11) and remove heater (12) from slide (5).
- (9) Remove two nuts (13), two lockwashers (14), two screws (15) and two straps (11).
- (10) Remove four screws (16), four starwashers (17) and plenum adapter (18).

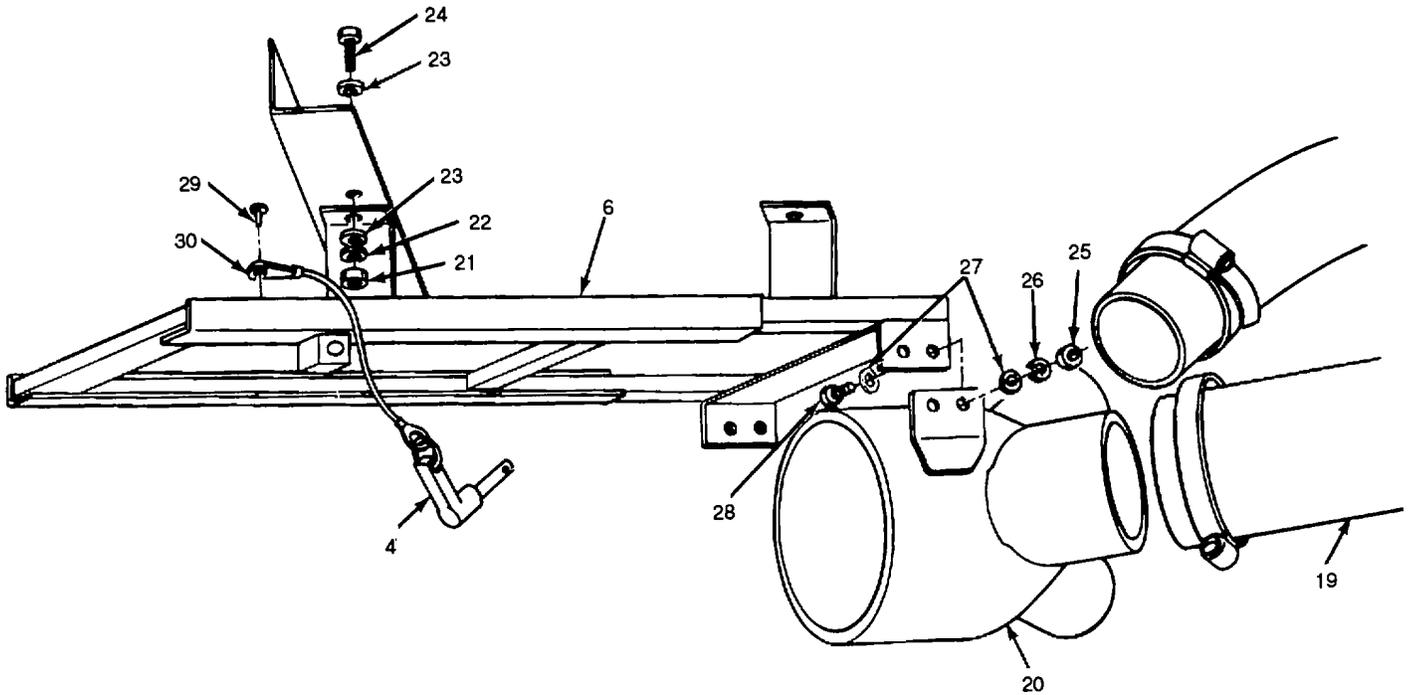


4-116

## WINTERIZATION ASSEMBLY

### 4-39. HEATER - REPLACE - (Cont.)

- (11) Disconnect four hoses (19) at plenum (20).
- (12) Remove four nuts (21), four lockwashers (22), eight washers (23), four screws (24) and slide (6).
- (13) Remove four nuts (25), four lockwashers (26), eight washers (27), four screws (28) and plenum (20).
- (14) Drill out rivet (29) to remove cable (30) and retainer pin (4).

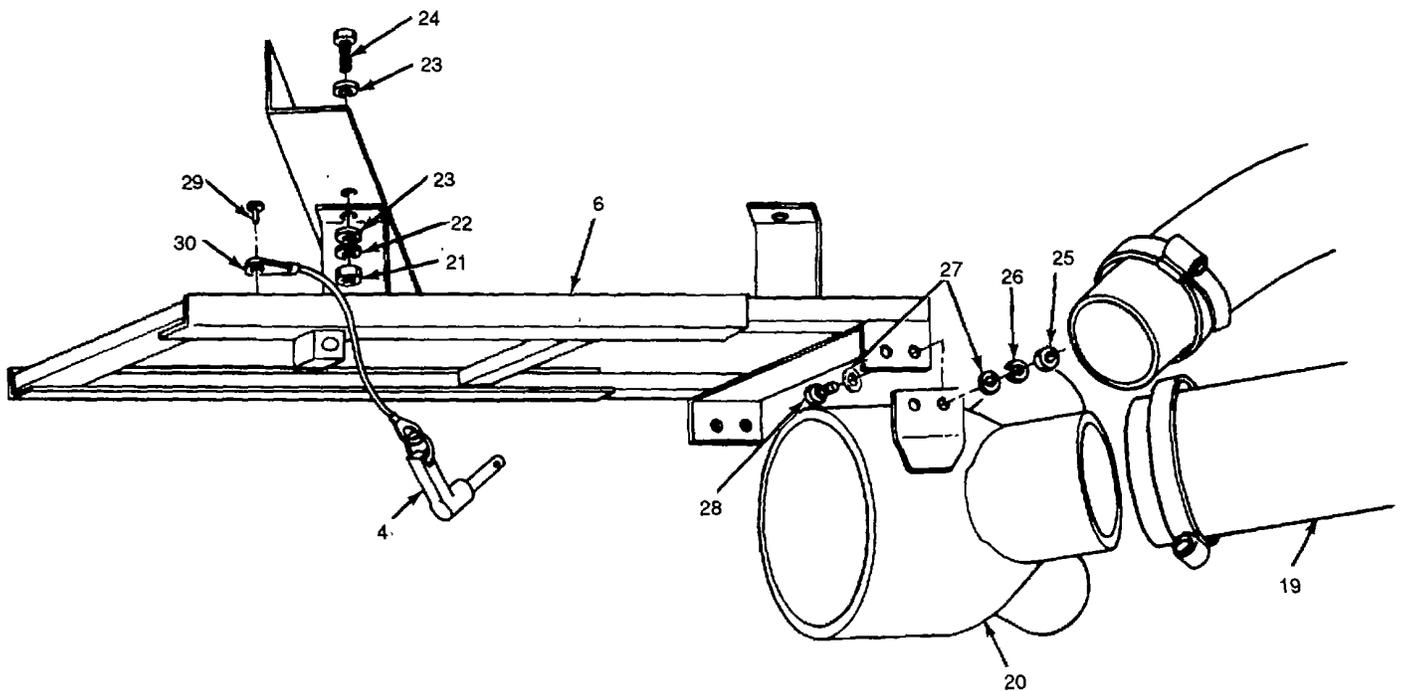


## WINTERIZATION ASSEMBLY

### 4-39. HEATER - REPLACE - (Cont.)

#### b. Installation

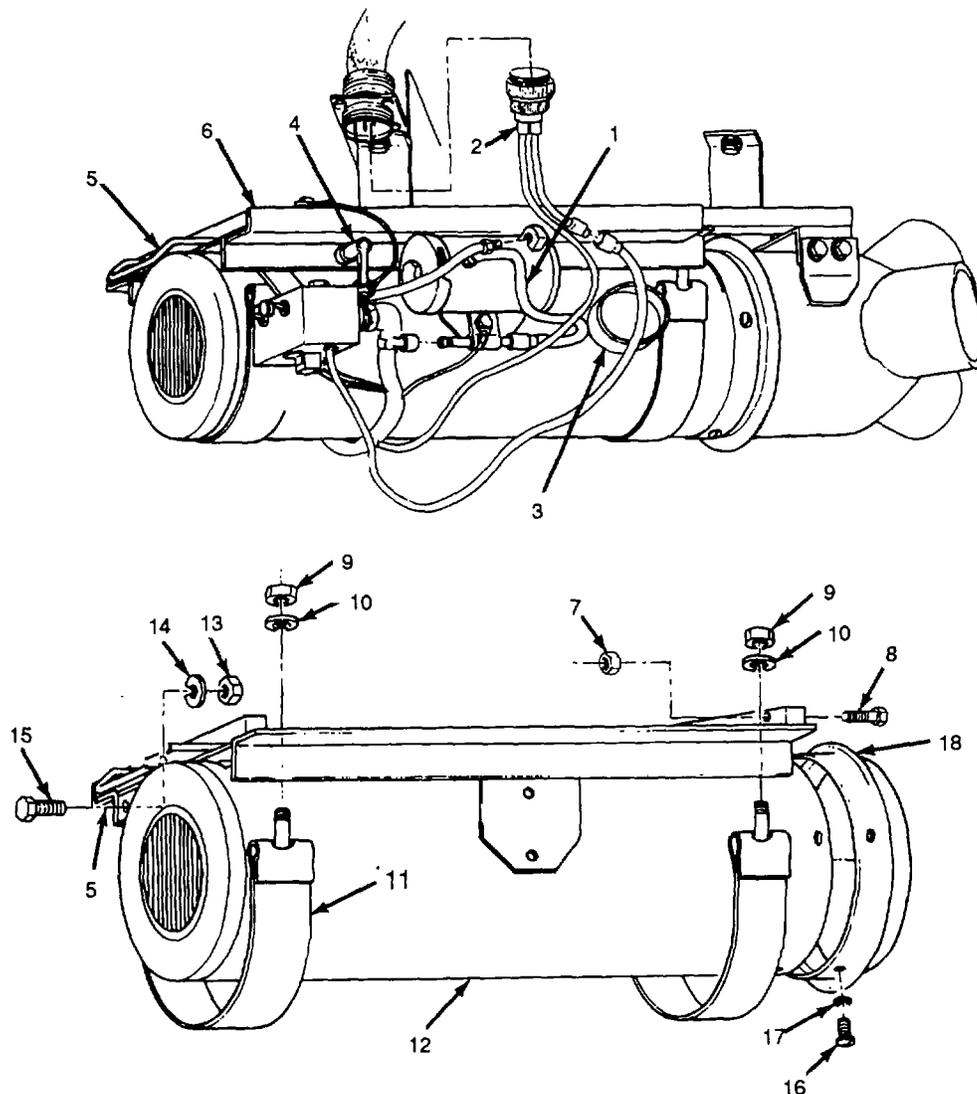
- (1) Install retainer pin (4), cable (30) and rivet (29).
- (2) Install plenum (20), four screws (28), eight washers (27), four lockwashers (26) and four nuts (25).
- (3) Install slide (6) using four screws (24), eight washers (23), four lockwashers (22) and four nuts (21).
- (4) Connect four hoses (19) at plenum (20).
- (5) Install plenum adapter (18), four starwashers (17) and four screws (16).
- (6) Install two straps (11) with two nuts (15), two lockwashers (14) and two screws (13).



## WINTERIZATION ASSEMBLY

### 4-39. HEATER - REPLACE - (Cont.)

- (7) Install heater (12) onto slide (5) and retain with straps (11), two lockwashers (10) and two nuts (9).
- (8) Install screw (8) and nut (7).
- (9) Install fuel pump (para 4-41).
- (10) Install control box (para 4-40) and wiring harness (para 4-42).
- (11) Install heater and slide (5), into track (6) and retain using pin (4).
- (12) Connect exhaust hose (3).
- (13) Connect electrical connector (2).
- (14) Connect fuel line (1).





## WINTERIZATION ASSEMBLY

### 4-40. CONTROL BOX - TEST/REPLACE - (Cont.)

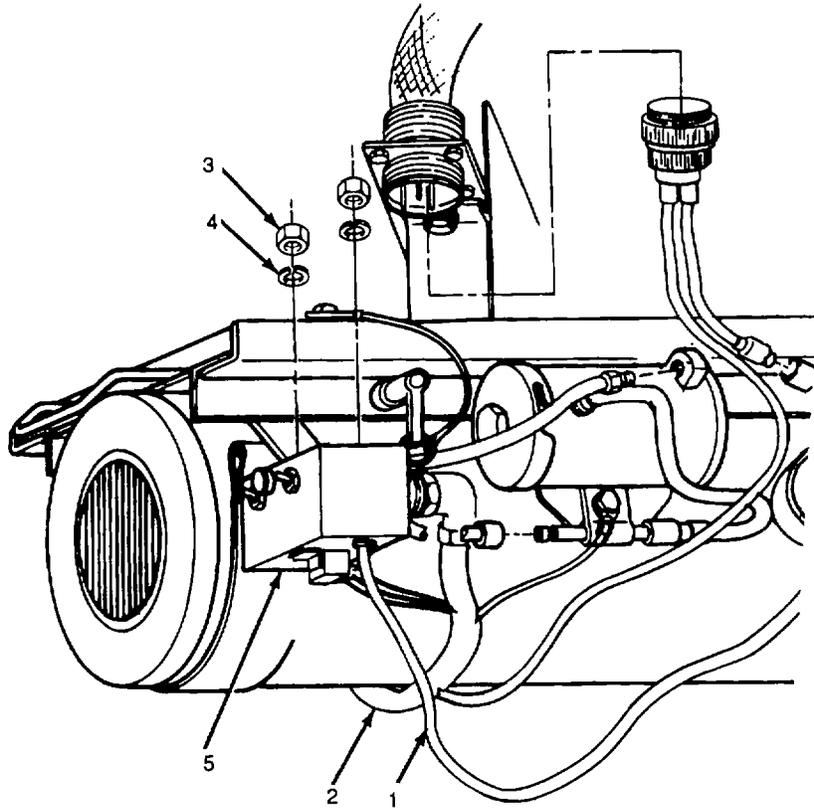
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#### b. Removal

- (1) Disconnect two electrical connectors (1 and 2).
- (2) Remove two nuts (3), two lockwashers (4) and control box assembly (5).

#### c. Installation

- (1) Install control box assembly (5), two lockwashers (4) and two nuts (3).
- (2) Connect two electrical connectors (1 and 2).



## WINTERIZATION ASSEMBLY

---

### 4-41. FUEL PUMP - TEST/REPLACE

---

This task covers:

a. Test

b. Removal

c. Installation

---

INITIAL SET-UP:

General Safety Instructions

#### **WARNING**

**Do not use open flame or smoke when working on fuel system. An explosion may occur, causing severe injury or death.**

---

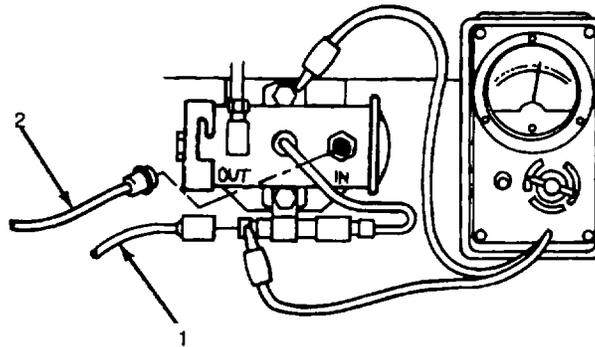
Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

Multimeter  
(Section III, Item 4, AppB)

a. Test

- (1) Disconnect electrical connector (1) at relay and fuel line (2).
- (2) Place one multimeter lead in electrical connector and one on the fuel pump mount, check for continuity.
- (3) Replace fuel pump if multimeter reading is infinity (00) or if fuel pump does not operate.



4-122

## WINTERIZATION ASSEMBLY

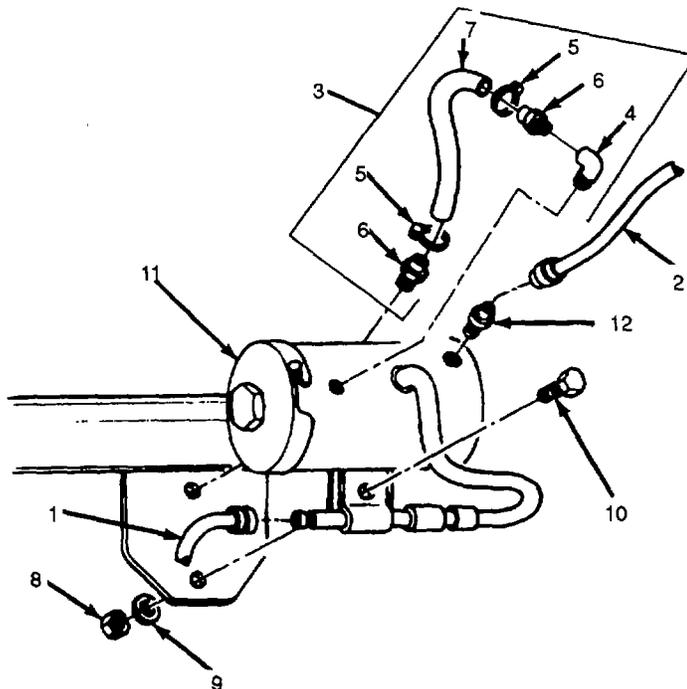
### 4-41. FUEL PUMP - TEST/REPLACE - (Cont.)

#### b. Removal

- (1) Disconnect electrical lead at relay (1).
- (2) Disconnect fuel line (2).
- (3) Remove hose assembly (3) and elbow (4), if necessary.
- (4) Loosen two clamps (5) and remove two hose barbs (6) from hose (7). Remove clamps.
- (5) Remove two nuts (8), two lockwashers (9), two screws (10) and fuel pump (11).
- (6) Remove coupling (12) from fuel pump.

#### c. Installation

- (1) Install coupling (12) at fuel pump (11).
- (2) Install fuel pump (11), two screws (10), two lockwashers (9) and two nuts (8).
- (3) Slide two clamps (5) onto hose (7) and install two hose barbs (6).
- (4) Install elbow (4) and hose assembly (3), if necessary.
- (5) Connect fuel line (2) and electrical connector (1).
- (6) Reconnect electrical lead at relay (1).



**WINTERIZATION ASSEMBLY**

**4-42. WIRING HARNESS - TEST/REPLACE/REPAIR**

This task covers:

- a. Test                      b. Removal                      c. Repair                      d. Installation

INITIAL SET-UP:

General Safety Instructions

**WARNING**

**When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.**

Tools

- General Mechanics Tool Box  
(Section III, Item 1, AppB)
- Multimeter  
(Section III, Item 4, AppB)
- (Section III,

a. Test

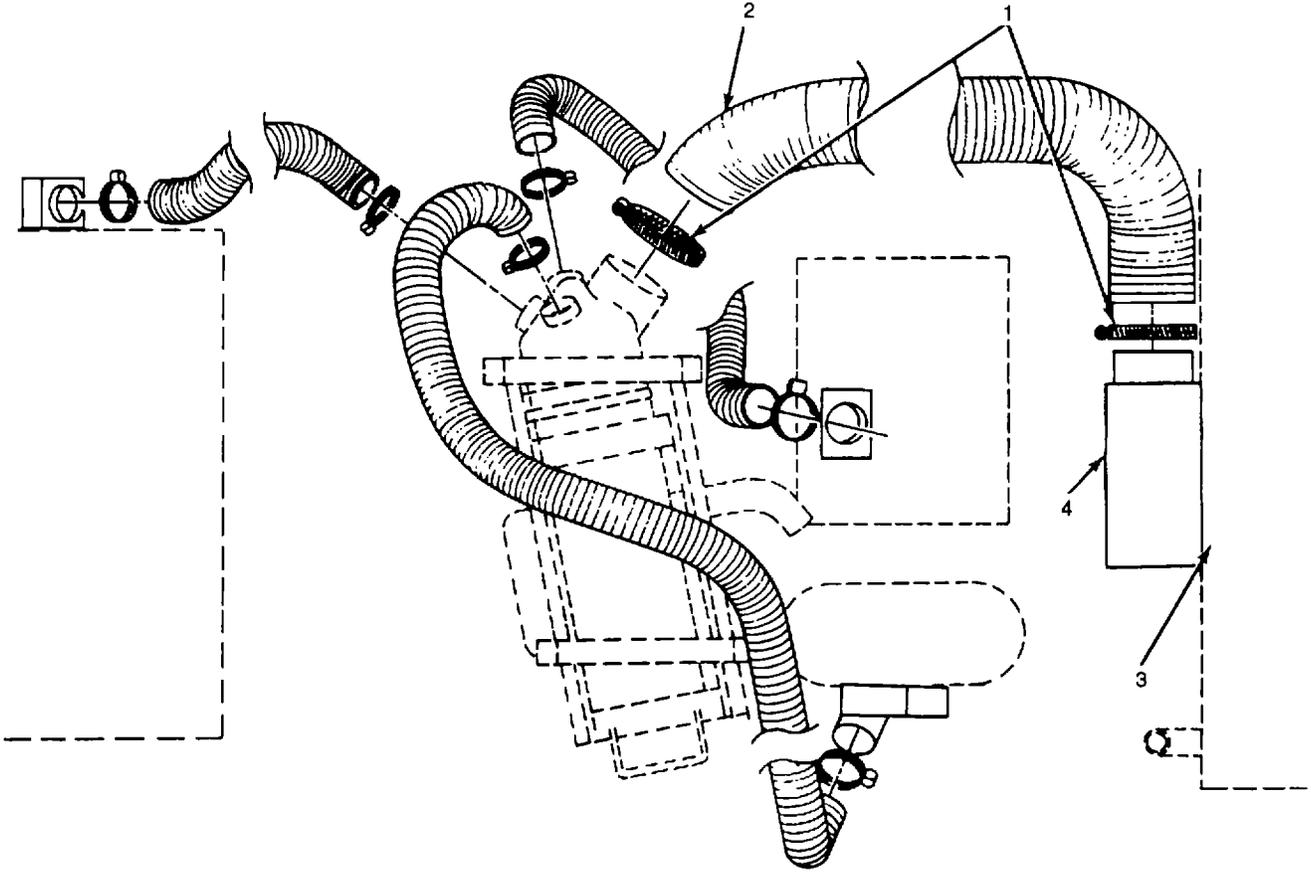
See wiring diagram and wire list (Table 4-5). Perform continuity tests on individual wires. Replace or repair wires with no continuity.

**Table 4-5. Wire List**

TERMINATION		TERMINATION		AWG SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
Heater	MS3106E18-115	Fuel Pump	MS79281	14	18	45.7
Heater	---	Control Box	MS3108E18-115	14	23	58.4
Fuel Pump	MS27144-1	Control Box	---	14	4	10.6
Connector	MS3106E16-115	Ground Circuit	---	14	7	17.8
Connector	---	Control Box	MS27144-1	14	5	12.7
Control Box	MS79281	Ground Circuit	---	14	11	27.9
Connector	MS3100E16-11P	Starter	MS79281	14	72	183
Connector	---	Ground	MS79281	14	72	183







## LUBE AND PNEUMATIC PIPING

---

### 4-44. LUBE PIPING - REPLACE/REPAIR

---

This task covers:

- a. Removal                      b. Repair                      c. Installation
- 

#### INITIAL SET-UP:

##### Materials/Parts

- Teflon Tape (Item 18, App E)
- Dry Cleaning Solvent (Item 6, App E)
- Cloth (Item 22, App E)

##### **NOTE**

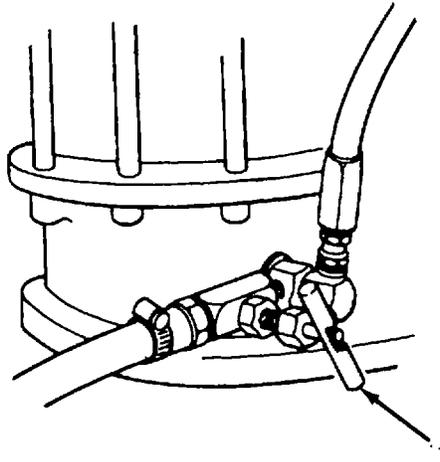
**The following procedure applies to any hose line or fitting shown .**

##### Tools

- General Mechanics Tool Box (Section III, Item 1, App B)
- 

#### a. Removal

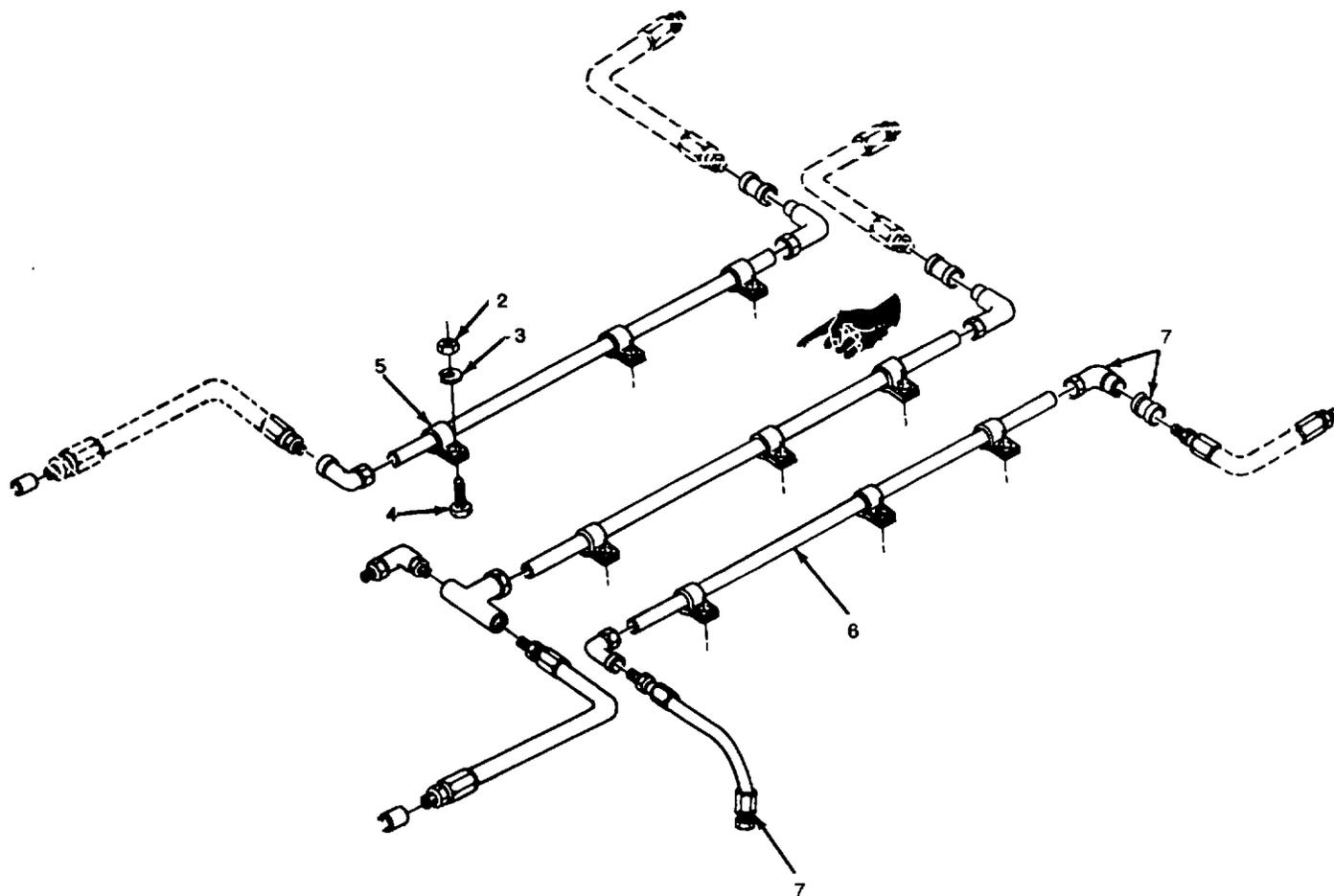
- (1) Vent lube pressure by opening three valves (1). Close valves after pressure is gone.



## LUBE AND PNEUMATIC PIPING

### 4-44. LUBE PIPING - REPLACE/REPAIR - (Cont)

- (2) Remove nuts (2), lockwashers (3), screws (4) and dampers (5) as needed.
- (3) Disconnect hose or tube (6) at both ends and remove.
- (4) Remove elbows, bushings and tees (7) as required.



Change 1 4-129

## LUBE AND PNEUMATIC PIPING

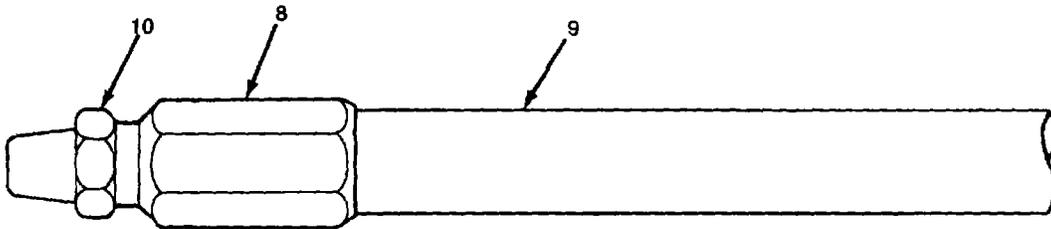
### 4-44. LUBE PIPING - REPLACE/REPAIR - (Cont.)

#### b. Repair

#### **WARNING**

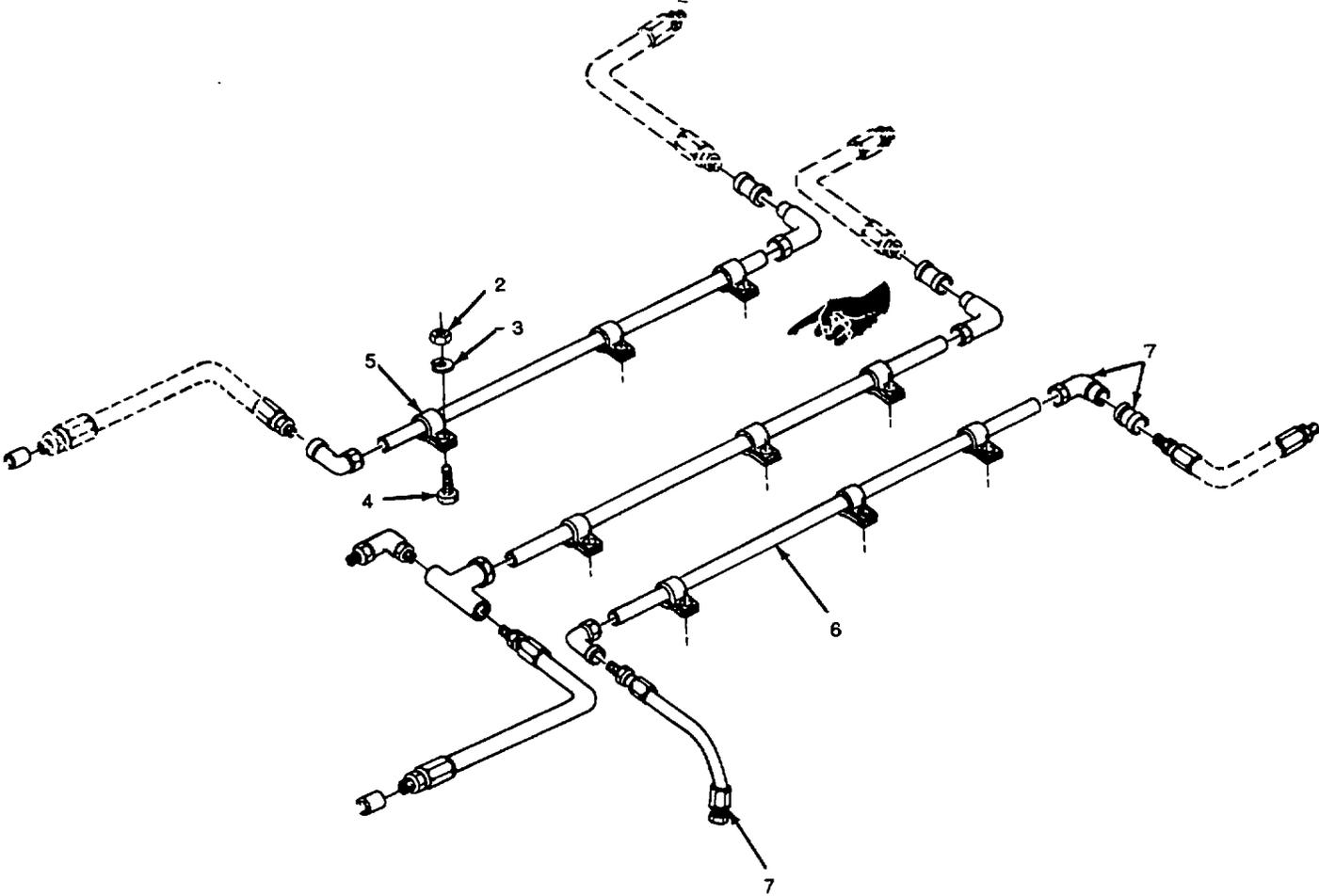
**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Clean lube hoses with a cloth dampened lightly in dry cleaning solvent.
- (2) Inspect hoses for cracks, frayed or abraded coverings or deteriorated rubber. Inspect hose fittings for damaged threads.
- (3) If necessary to replace any hose or hose fitting, loosen and slide nut (8) up hose (9). Remove fitting (10) and nut.
- (4) Replace damaged item and install nut (8) and fitting (10) onto hose (9).



#### c. Installation

- (1) Wrap all threads with tape.
- (2) Install tees, bushings and elbows (7) as required.
- (3) Install hose or tube (6).
- (4) Install clamps (5) with screws (4), lockwashers (3) and nuts (2).



Change 1 4-131

## LUBE AND PNEUMATIC PIPING

---

### 4-45. PNEUMATIC PIPING - REPLACE/REPAIR

---

This task covers:

- a. Removal                      b. Repair                      c. Installation
- 

INITIAL SET-UP:

#### Material Parts

- Teflon Tape (Item 18, App E)
- Dry Cleaning Solvent (Item 6, App E)
- Cloth (Item 22, App E)

#### **NOTE**

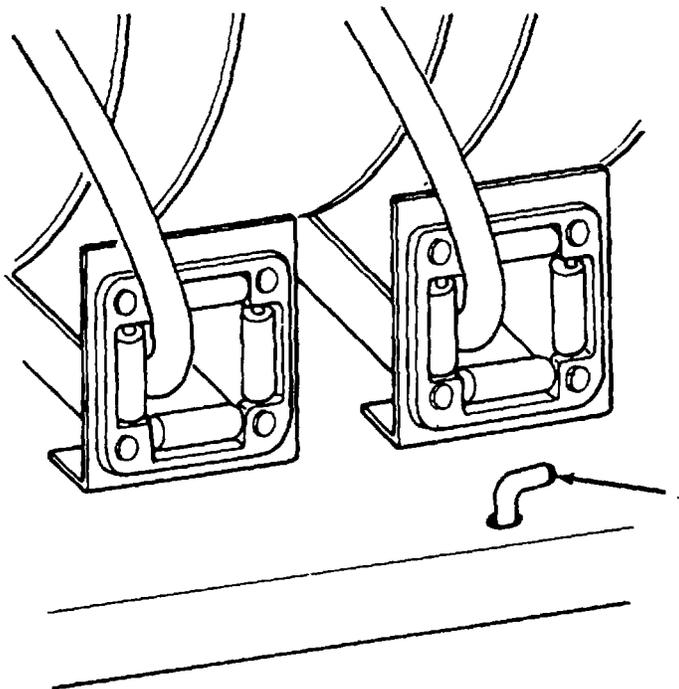
**The following procedure applies to any hose line or fitting shown .**

#### Tools

- General Mechanics Tool Box (Section III, Item 1, App B)
- 

a. Removal

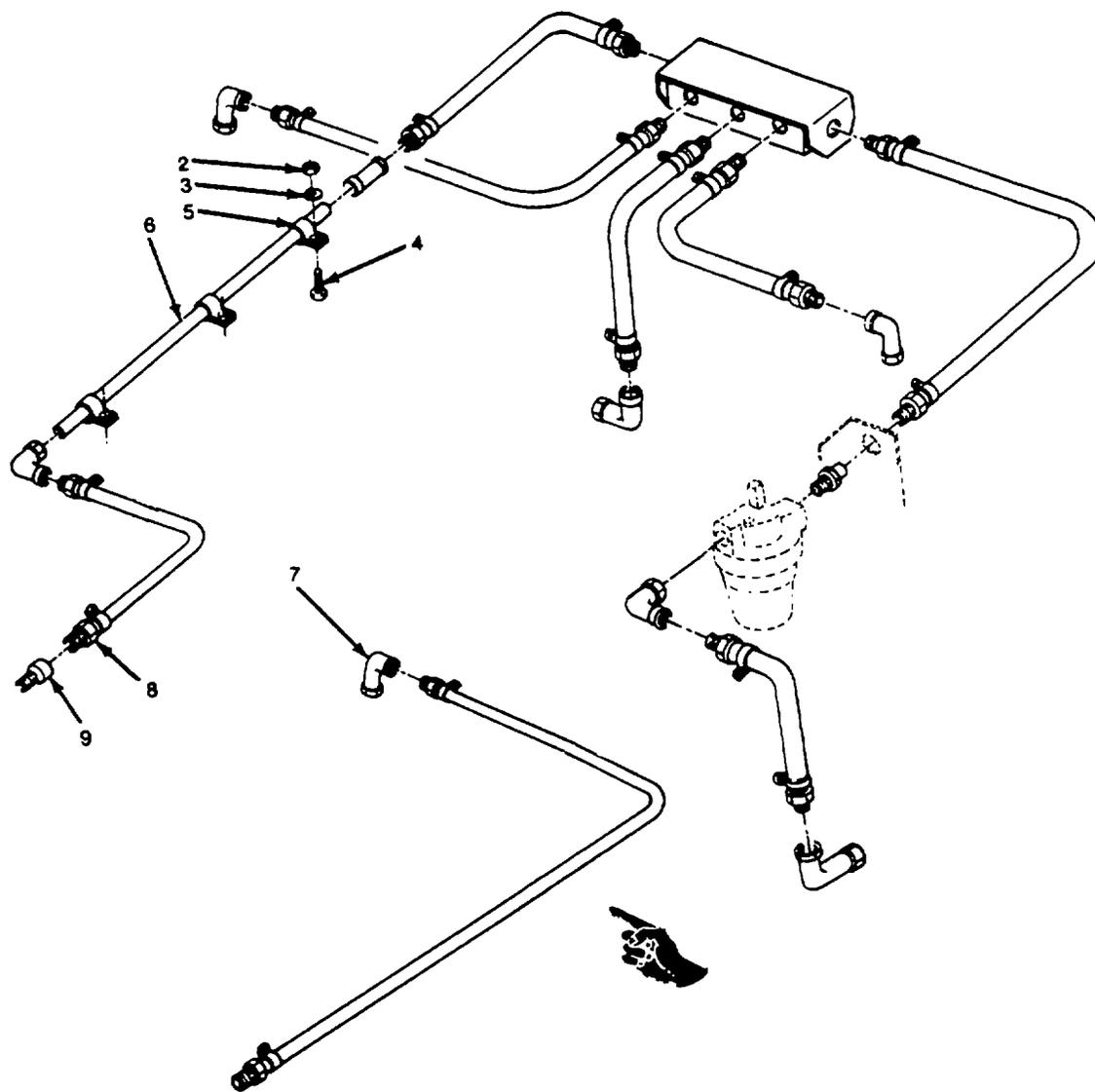
- (1) Drain air pressure completely by turning lever (1).



## LUBE AND PNEUMATIC PIPING

### 4 45. PNEUMATIC PIPING - REPLACE/REPAIR - (Cont.)

- (2) Remove nuts (2), lockwashers (3), screws (4) and damp (5) as needed.
- (3) Disconnect hose or tube (6) at both ends and remove.
- (4) Remove elbows (7), adapters (8), and bushings (9) as required.



Change 1 4-133

## LUBE AND PNEUMATIC PIPING

---

### 4-45. PNEUMATIC PIPING - REPLACE/REPAIR - (Cont)

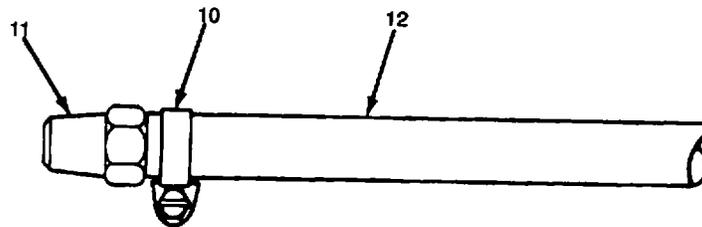
---

b. Repair

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Clean all hoses with a cloth dampened lightly in dry cleaning solvent.
- (2) Inspect hoses for cracks, frayed or abraded coverings or deteriorated rubber. Inspect hose fittings for damaged threads.
- (3) If necessary to replace any hoses or hose fittings, loosen clamp (10) and remove along with fitting (11) from hose (12).
- (4) Replace damaged item and install clamp (10) and fitting (11) onto hose (12).



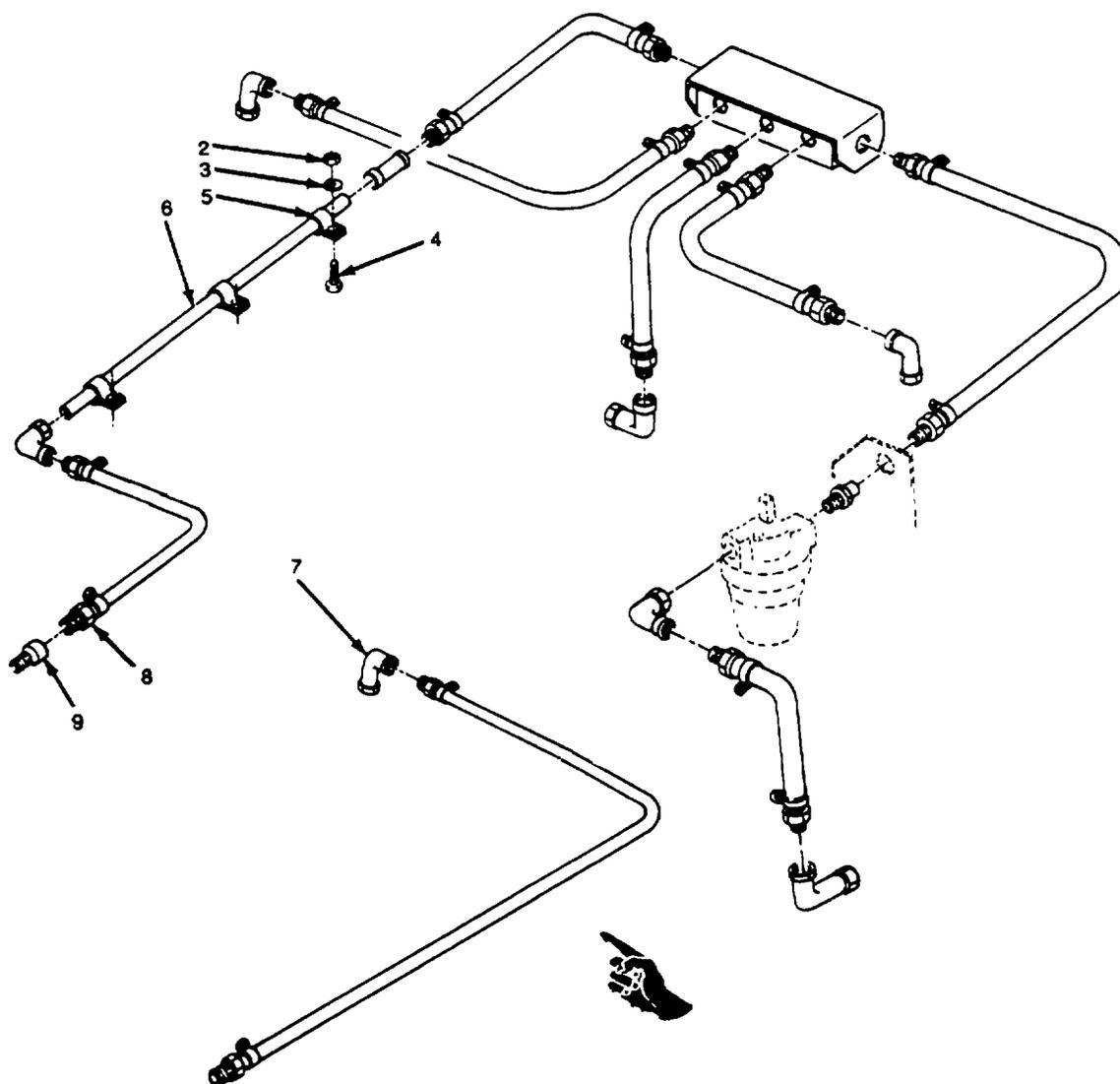
4-134

## LUBE AND PNEUMATIC PIPING

### 4-45. PNEUMATIC PIPING - REPLACE/REPAIR - (Cont.)

#### c. Installation

- (1) Wrap all threads with tape.
- (2) Install bushings (9), adapters (8) and elbows (7) as required.
- (3) Install hose or tube (6).
- (4) Install clamps (5) with screws (4), lockwashers (3) and nuts (2).



## TRAILER ASSEMBLY

---

### 4-46. TRAILER COMPONENTS

---

This task covers:

- a. Removal                                      b. Installation
- 

INITIAL SET-UP:

Materials/Prints

Tape, masking (Item 17, AppE)

Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

---

- a. Removal

**NOTE**

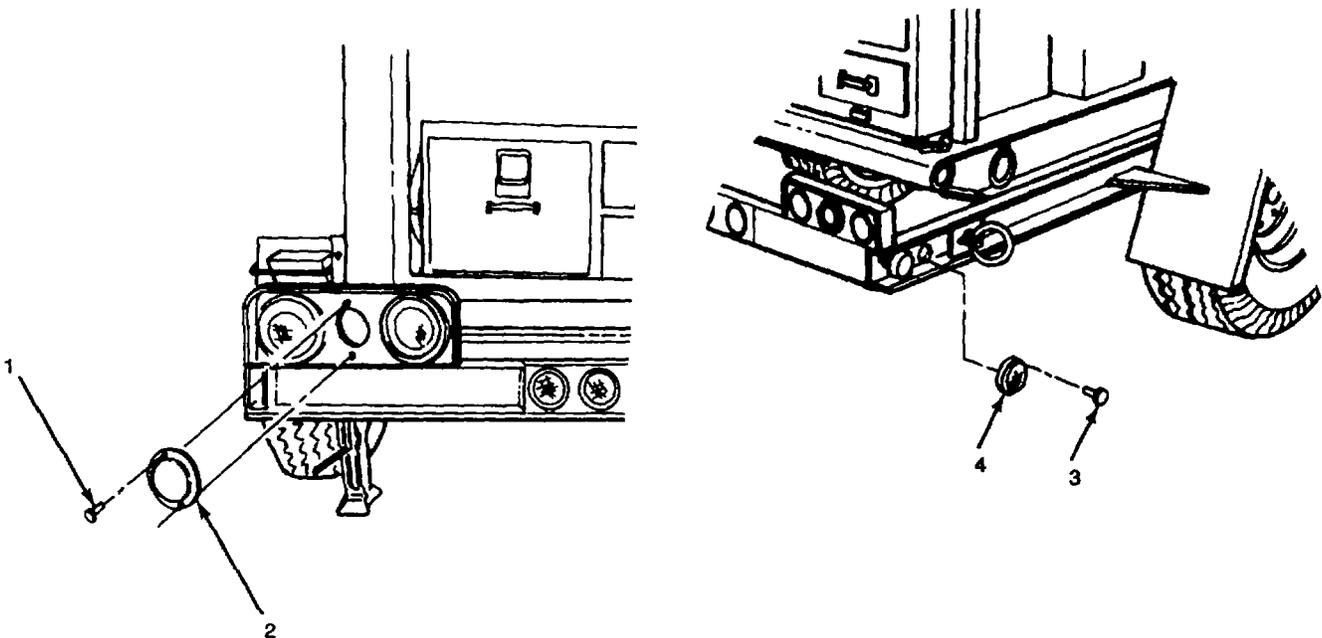
**Step 1 applies to the two rear reflectors.**

- (1) Remove two rivets (1) and remove rear reflector (2).

**NOTE**

**Step 2 applies to any of the four side reflectors.**

- (2) Drill out two rivets (3) and remove side reflector (4).



## TRAILER ASSEMBLY

---

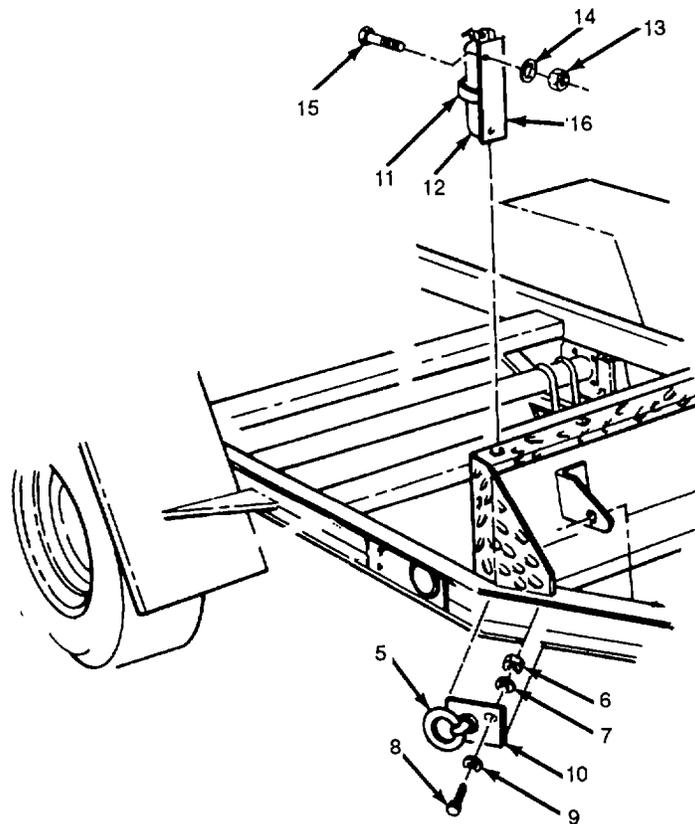
### 4-46. TRAILER COMPONENTS - (Cont.)

---

#### NOTE

Steps 3 and 4 apply to any of four lifting rings.

- (3) Unscrew lifting eye (5) and remove.
- (4) Remove two nuts (6), two lockwashers (7), two flatwashers (9), two screws (8) and plate nut (10).
- (5) Open clamp (11) and remove fire extinguisher (12).
- (6) Remove two nuts (13), two lockwashers (14), two screws (15) and extinguisher bracket (16).



## TRAILER ASSEMBLY

---

### 4-46. TRAILER COMPONENTS - (Cont.)

---

b. Installation

- (1) Install extinguisher bracket (16), two screws (15), two lockwashers (14) and two nuts (13).
- (2) Install fire extinguisher (12) and close clamp (11).

**NOTE**

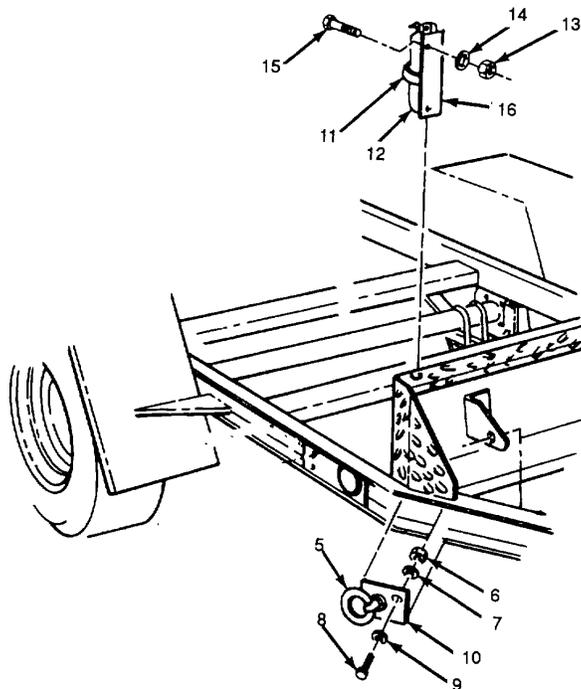
Steps 3 and 4 apply to any of four lifting rings.

- (3) Install plate nut (10), two flatwashers (9), two screws (8), two lockwashers (7) and two nuts (6).

**NOTE**

Taping lockwasher and nut to rear of plate will aid in installation of lifting eye.

- (4) Install lifting eye (5).



## TRAILER ASSEMBLY

---

### 4-46. TRAILER COMPONENTS - (Cont.)

---

#### NOTE

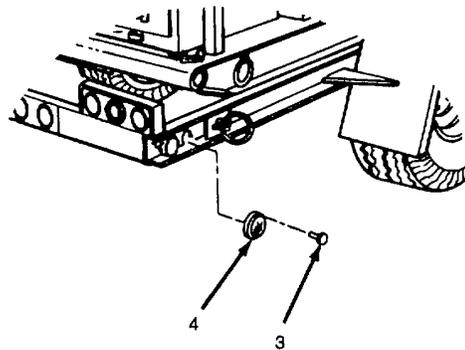
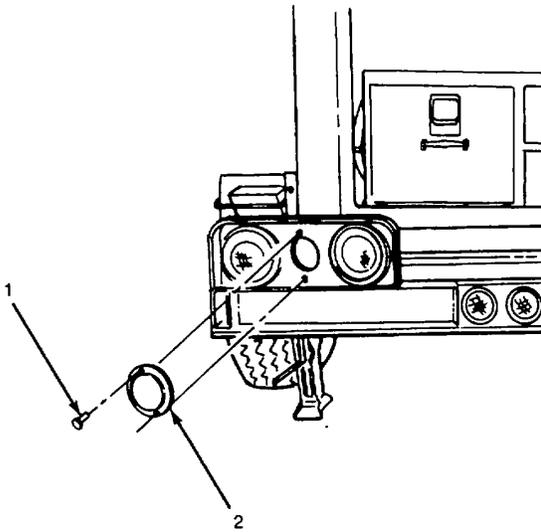
Step 5 applies to the two rear reflectors.

- (5) Install rear reflector (2) with two rivets (1).

#### NOTE

Step 6 applies to any of the four side reflectors.

- (6) Install side reflector (4) with two rivets (3).



## AIR BRAKE ASSEMBLY

---

### 4-47. COUPLER (GLAD HAND) - REPLACE/REPAIR

---

This task covers:

- |                 |                |           |             |
|-----------------|----------------|-----------|-------------|
| a. Removal      | b. Disassembly | c. Repair | d. Assembly |
| e. Installation |                |           |             |
- 

#### INITIAL SET-UP:

##### Materials/Parts

Teflon tape  
(Item 18, App E)  
Cloth (Item 22, App E)

##### **NOTE**

The following procedure applies to either the emergency or service brake coupler.

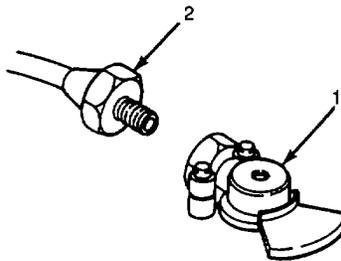
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

#### a. Removal

Unscrew coupler (glad hand) (1) from fitting (2) and cap line.



#### b. Disassembly

Pry out glad hand seal (1).

## AIR BRAKE ASSEMBLY

---

### 4-47. COUPLER (GLAD HAND) - REPLACE/REPAIR

---

c. Repair

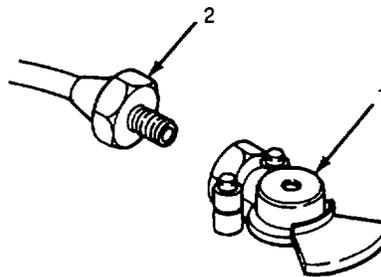
- (1) Remove all buildup of dirt, grease, etc., by wiping with a soft cloth.
- (2) Inspect for cracks, dents, holes, warps, rust and corrosion. Replace coupler.

d. Assembly

Install glad hand seal (1).

e. Installation

Wrap fitting (2) threads with tape and install coupler (glad hand) (1).



## AIR BRAKE ASSEMBLY

---

### 4-48. EMERGENCY RELAY VALVE - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

INITIAL SET-UP:

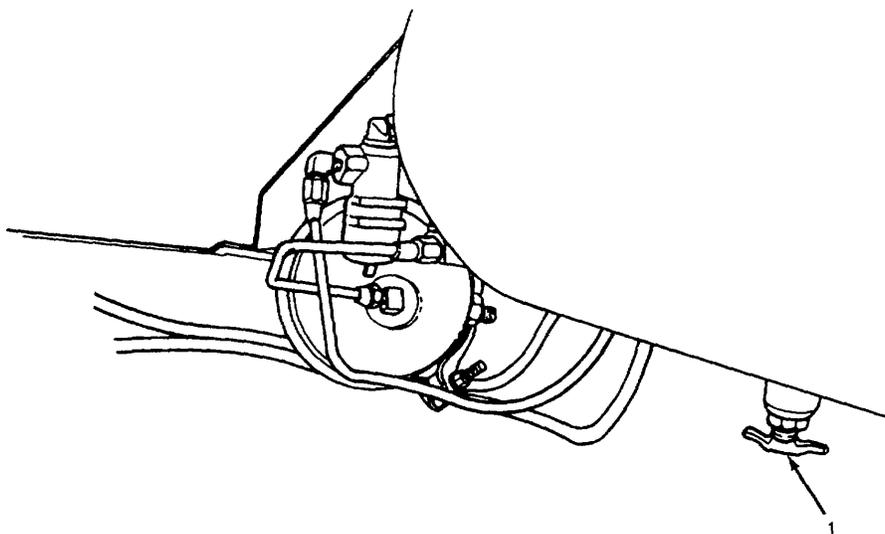
#### Tools

General Mechanics Tool Box (Section III, Item 1, App B)

---

#### a. Removal

- (1) Vent air brake pressure completely by opening valve (1). Close valve.



- (2) Tag three air lines (2) at emergency relay valve (4).
- (3) Disconnect and remove three air lines (2) and two elbows (3).
- (4) Remove emergency relay valve (4) along with two air cleaner assemblies (5) and nipple (6).
- (5) Remove two air cleaner assemblies (5) from relay valve.

## AIR BRAKE ASSEMBLY

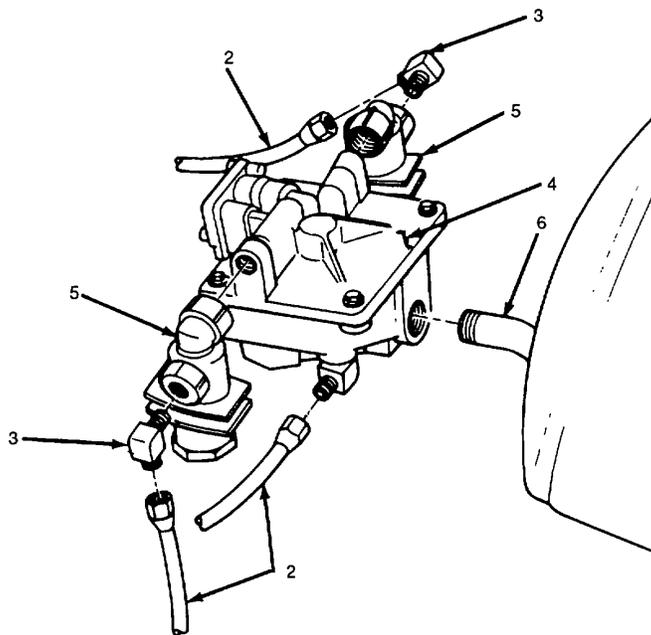
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### 4-48. EMERGENCY RELAY VALVE - REPLACE

---

b. Installation

- (1) Install two air cleaner assemblies (5) onto emergency relay valve (4).
- (2) Install nipple (6) and emergency relay valve (4).
- (3) Install three air lines (2) according to tags. Remove tags.
- (4) Pressurize air brake system and check for leaks.



## AIR BRAKE ASSEMBLY

---

### 4-49. AIR SUPPLY VALVE - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

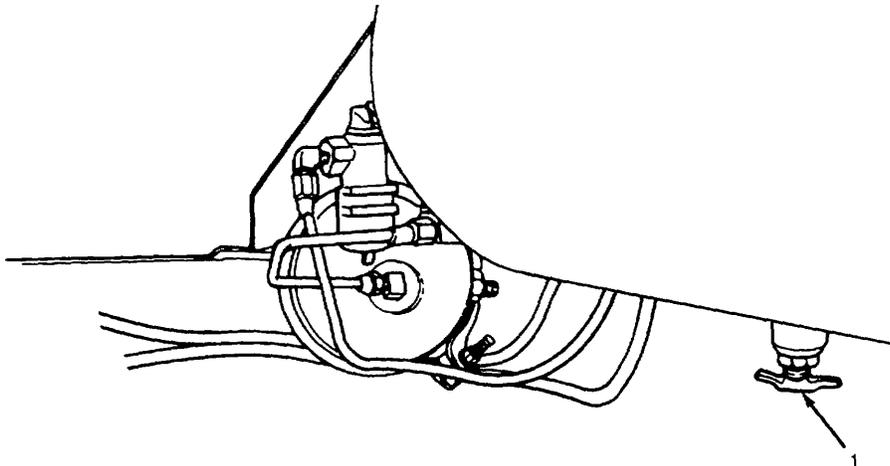
INITIAL SET-UP:

#### Tools

General Mechanics Tool Box (Section III, Item 1, App B)

#### a. Removal

- (1) Vent air brake pressure completely by opening valve (1). Close valve.



- (2) Tag, disconnect and remove two air lines (2), nipple (3) and elbow (4).
- (3) Remove knob (5), jamnut (6), washer (7) and air supply valve assembly (8).

## AIR BRAKE ASSEMBLY

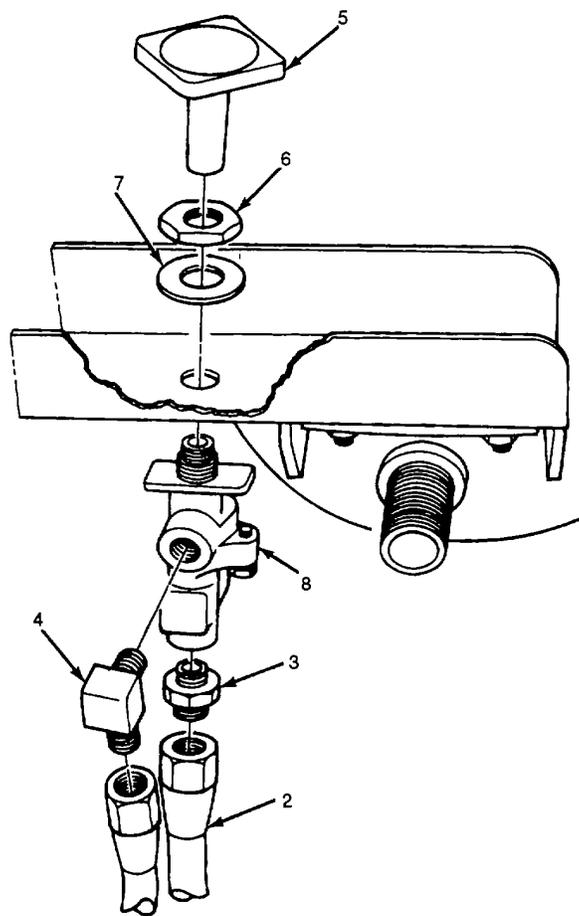
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### 4-49. AIR SUPPLY VALVE - REPLACE - (Cont.)

---

b. Installation

- (1) Install valve assembly (8), washer (7), jamnut (6) and knob (5).
- (2) Install elbow (4), nipple (3) and two air lines (2). Remove tags.
- (3) Pressure air brake system and check for leaks.



## AIR BRAKE ASSEMBLY

---

### 4-50. AIR CLEANER ASSEMBLY - REPLACE/REPAIR

---

This task covers:

- |                 |                |           |             |
|-----------------|----------------|-----------|-------------|
| a. Removal      | b. Disassembly | c. Repair | d. Assembly |
| e. Installation |                |           |             |
- 

INITIAL SET-UP:

#### NOTE

The following procedure applies to either of two air cleaner assemblies. The air cleaner does not need to be removed to replace the filter element.

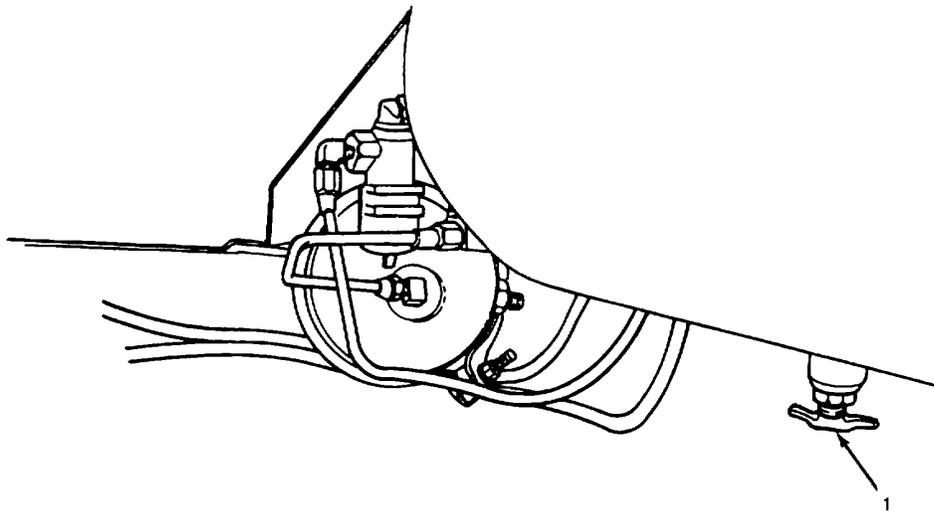
#### Tools

General Mechanics Tool Box (Section III, Item 1, App B)

---

#### a. Removal

- (1) Vent air brake system pressure completely by opening valve (1). Close valve.



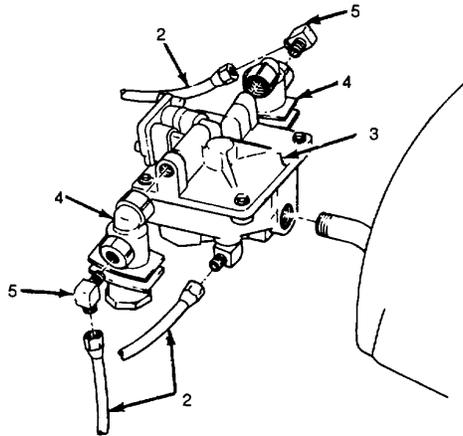
## AIR BRAKE ASSEMBLY

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### 4-50. AIR CLEANER ASSEMBLY - REPLACE/REPAIR - (Cont.)

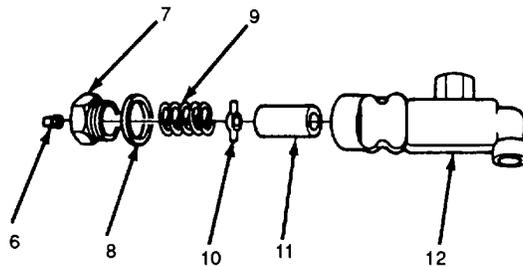
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- (2) Tag, disconnect and remove three air lines (2).
- (3) Remove emergency relief valve (3) along with two air cleaner assemblies (4).
- (4) Remove elbow (5) and air cleaner assembly (4).



#### b. Disassembly

- (1) Remove plug (6), nut (7) and preformed packing (8).
- (2) Remove spring (9), washer (10) and filter element (11) from housing (12).



## AIR BRAKE ASSEMBLY

---

### 4-50. AIR CLEANER ASSEMBLY - REPLACE/REPAIR - (Cont.)

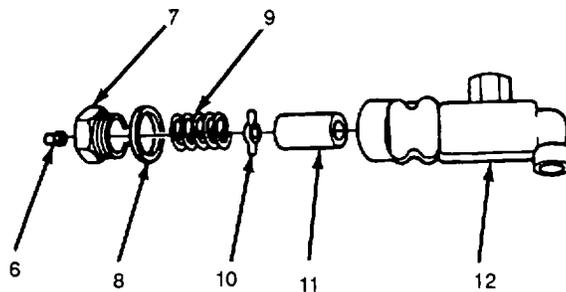
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c. Repair

- (1) Discard filter element (11).
- (2) Inspect spring (9) for damage or loss of tension. Discard if defective.
- (3) Inspect all components for damage. Replace any damaged item.

d. Assembly

- (1) Install filter (11) and washer (10) to housing (12).
- (2) Install spring (9), preformed packing (8), nut (7) and plug (6).



## AIR BRAKE ASSEMBLY

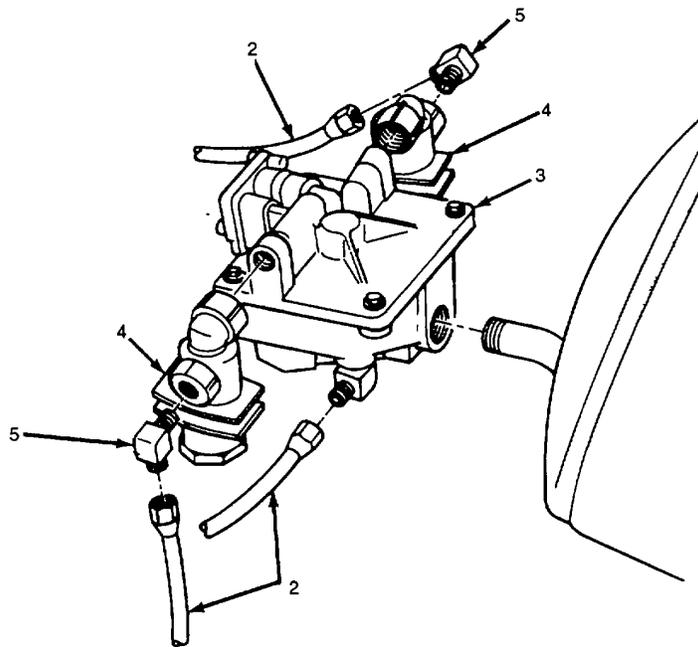
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### 4-50. AIR CLEANER ASSEMBLY - REPLACE/REPAIR - (Cont.)

---

e. Installation

- (1) Install air cleaner assembly (4) and elbow (5) onto emergency relief valve (3).
- (2) Install emergency relief valve (3).
- (3) Install three air lines (2). Remove tags.
- (4) Pressure air brake system and check for leaks.



## AIR BRAKE ASSEMBLY

---

### 4-51. BRAKE LINES AND HOSES - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

INITIAL SET-UP:

#### NOTE

The following procedure applies to any hose, line or fitting.

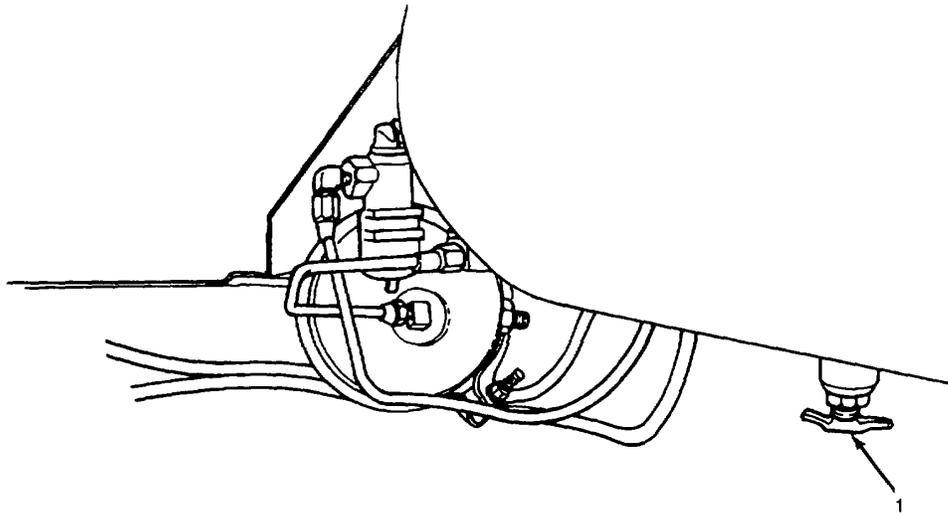
#### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

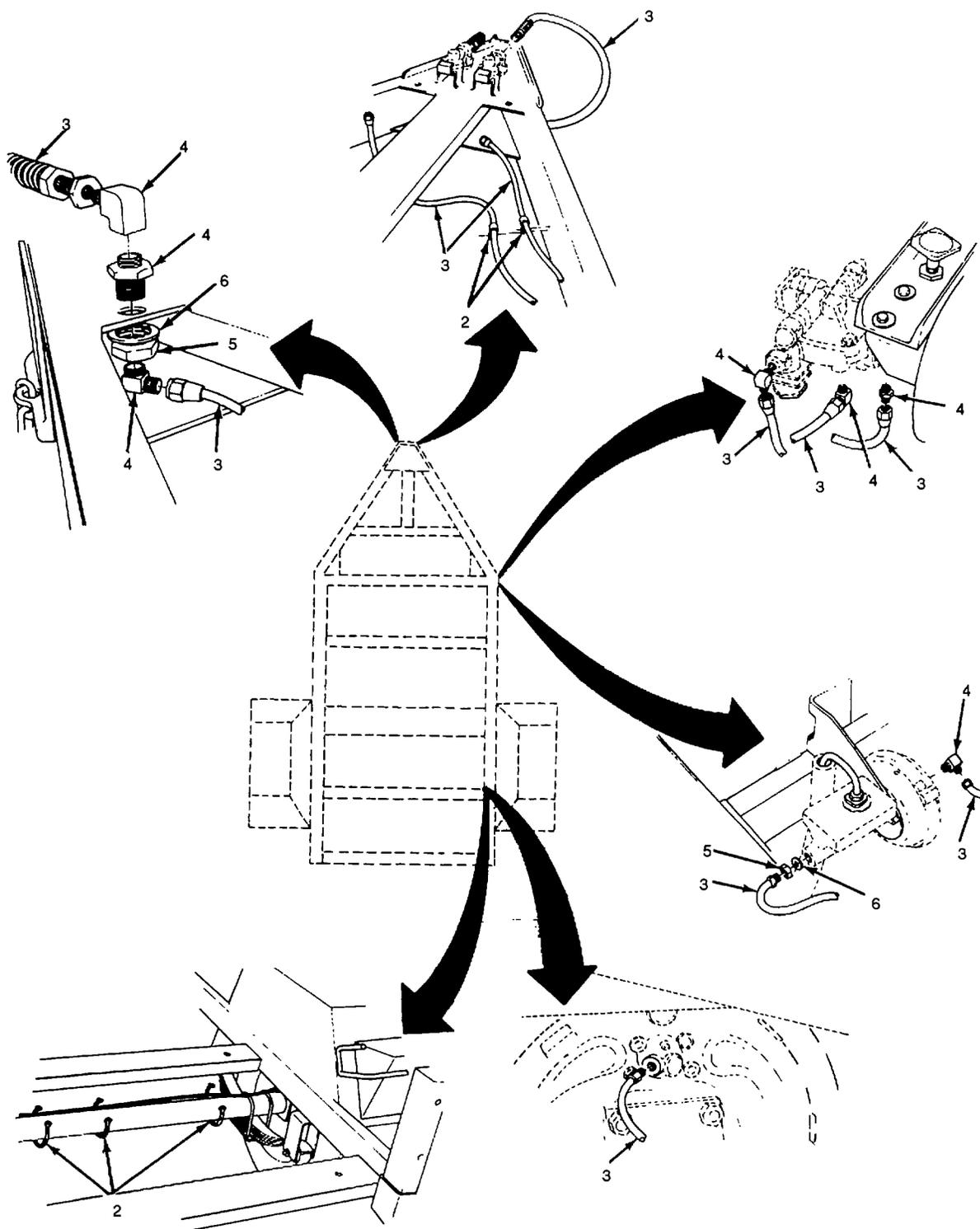
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#### a. Removal

- (1) Vent air brake pressure completely by opening valve (1). Close valve.



- (2) Remove rivets, clamps or straps (2) as needed.
- (3) Disconnect hose or tube (3) at either end.
- (4) Remove elbows, tees or adapters (4) as required.
- (5) Remove two nuts (5) and two flatwashers (6).



## AIR BRAKE ASSEMBLY

---

### 4-51. BRAKE LINES AND HOSES - REPLACE - (Cont.)

---

b. Installation

- (1) Install two nuts (5) and two flatwashers (6).
- (2) Install adapters, tees, or elbows (4).
- (3) Connect hose or tube (3) at either end.
- (4) Install straps, clamps and rivets (2) as required.
- (5) Bleed and adjust brakes (para. 4-58) if hydraulic lines tubes or fittings were removed.
- (6) If air lines were removed, pressurize air brake system and check for leaks.

## AIR BRAKE ASSEMBLY

---

### 4-52. AIR TANK - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Equipment Condition

Emergency Relay Valve  
Removed (para. 4-48)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

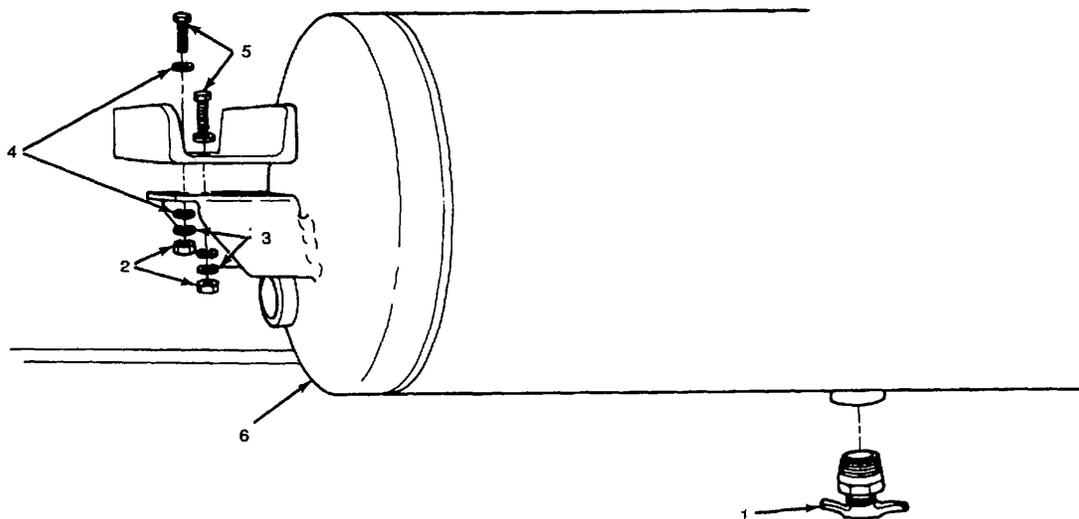
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#### a. Removal

- (1) Remove air drain valve (1).
- (2) Remove four nuts (2), four lockwashers (3), eight flatwashers (4), four screws (5) and air tank (6).

#### b. Installation

- (1) Install air tank (6), four screws (5), eight flatwashers (4), four lockwashers (3) and four nuts (2).
- (2) Install air drain valve (1).



## WIRING HARNESS OR TRAILER ELECTRICAL

---

### 4-53. JUNCTION BOX - TEST/REPLACE

---

This task covers:

- a. Test                                      b. Removal                                      c. Installation
- 

#### INITIAL SET-UP:

##### General Safety Instructions

##### Equipment Condition

Air Tank Removed (para 4-52)

##### **WARNING**

When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

a. Test

- (1) Open junction box (1) by removing screws (2) and sliding latches (3) out of the way.

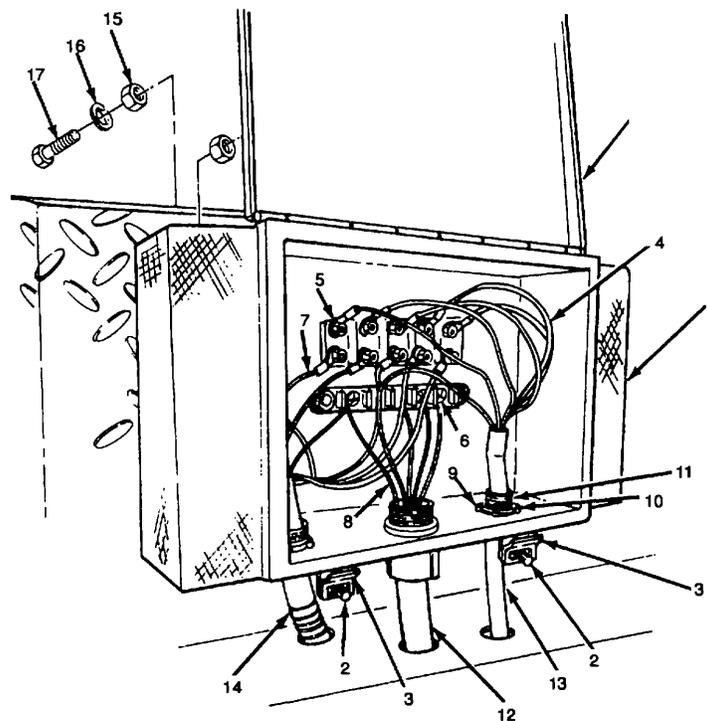
#### **NOTE**

The lube and service unit trailer can operate on 12 Vdc (commercial mode) or 24 Vdc (military mode). Do steps 2 through 6 if malfunction occurred while operating in military mode. Go to step 7 for testing commercial mode.

- (2) Hook up intervehicular cable at military style (24 Vdc) vehicle.
- (3) Turn on towing vehicle headlights, and clearance lights. Step on brake.
- (4) See the power output chart (Table 4-6) and junction box wiring diagram and check power outputs for military mode only.

**WIRING HARNESS OR TRAILER ELECTRICAL****4-53. JUNCTION BOX - TEST/REPLACE - (Cont.)**

- (5) If voltage is not present at any location, replace junction box.
- (6) If voltage at terminals 1 and 2 is above 12 Vdc replace junction box.
- (7) Hook up intervehicular cable at commercial style (12 Vdc) connection.
- (8) Turn on towing vehicle headlights and clearance lights. Step on brake.
- (9) See the power output chart (Table 4-6) and junction box wiring diagram and check power outputs for commercial and military modes. It will be necessary to activate the appropriate turn signals to test terminals 3 and 4.
- (10) If voltage is not present at any location, replace junction box.



## WIRING HARNESS OR TRAILER ELECTRICAL

---

### 4-53. JUNCTION BOX - TEST/REPLACE - (Cont.)

---

#### b. Removal

- (1) Insure that intervehicular connector is disconnected.
- (2) Open junction box (1) loosen screws (2) and slide latches (3) out of the way.
- (3) Tag and disconnect six 12 volt intervehicular electrical leads (4) by loosening nuts (5) and screw (6).
- (4) Tag and disconnect six 24 volt intervehicular electrical leads (7) by loosening nuts (5) and screw (6).
- (5) Tag and disconnect five trailer harness electrical leads (8) by loosening screws (6).
- (6) Remove three nuts (9), three washers (10), three grommets (11), trailer electrical harness (12), 12 volt intervehicular cable (13) and 24 volt intervehicular cable (14).
- (7) Remove eight nuts (15), four lockwashers (16), four screws (17) and junction box (1).

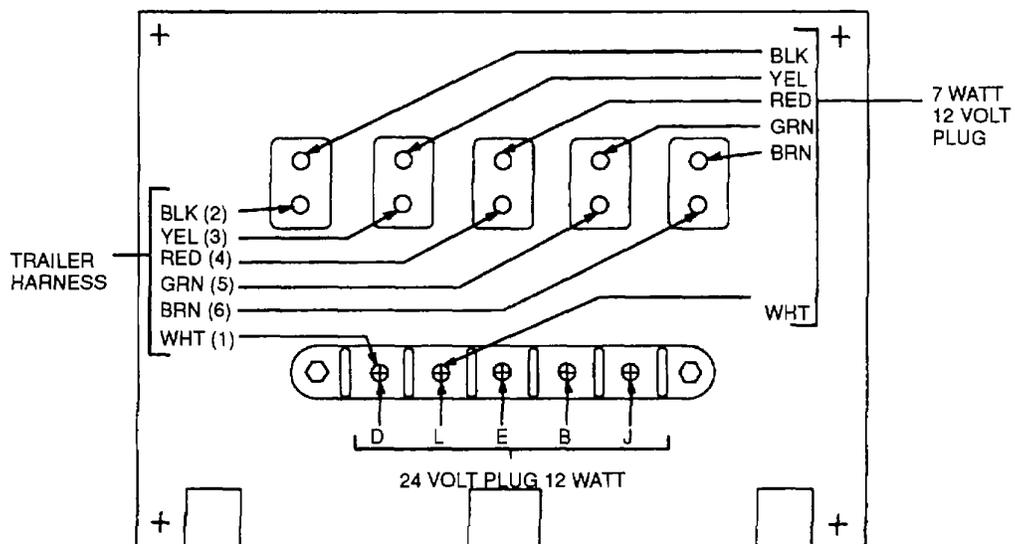
#### c. Installation

- (1) Install junction box (1), four screws (17), four lockwashers (16) and eight nuts (15).
- (2) Slide three nuts (9), three washers (10) and three grommets (11) onto trailer electrical harness (12), 12 volt intervehicular cable (13) and 24 volt intervehicular cable (14).
- (3) Install trailer electrical harness (12), 12 volt intervehicular cable (13) and 24 volt intervehicular cable (14) into junction box (1) and tighten nuts (9).
- (4) Connect five trailer electrical leads (8) and remove tags.
- (5) Connect six 24 volt intervehicular electrical leads (7) and remove tags.
- (6) Connect six 12 volt intervehicular electrical leads (4) and remove tags.
- (7) Close junction box (1) and tighten latches (3) by tightening screws (2).

Table 4-6. Power Output Chart

CIRCUIT	DESCRIPTION	TURNS ON
A	NC	
B	Left turn/stop	Left outer tail, bright filament
C	NC	
D	Ground	
E	Service tail & marker	Individual clearance, all tail dim filament
F	NC	
H	NC	
J	Right turn/stop	Right outer tail, bright filament
K	NC	
L	Ground	
M	NC	
N	NC	

CIRCUIT	DESCRIPTION	TURNS ON
WHITE	Ground	
BLACK	Clearance & marker	7 individual clearance lamps
YELLOW	Left turn	Left outer tail, bright filament
RED	Stop	Left & right inner tail, bright filament
GREEN	Right turn	Right outer tail, bright filament
BROWN	Tail	All tail, dim filament
BLUE	NC	



## WIRING HARNESS OR TRAILER ELECTRICAL

---

### 4-54. CLEARANCE LIGHT - TEST/REPLACE

---

This task covers:

- a. Test                      b. Removal                      c. Installation
- 

#### INITIAL SET-UP:

##### General Safety Instructions

##### **WARNING**

When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.

##### **NOTE**

The following procedure applies to any of seven clearance lights.

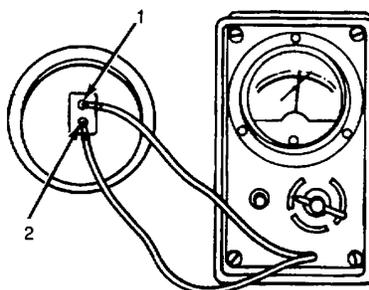
##### Tools

General Mechanics Tool Box (Section III, Item 1, App B)  
Multimeter (Section III, Item 4, App B)

---

#### a. Test

- (1) Remove clearance light (para. 4-54b.)
- (2) Place multimeter leads in electrical pin contacts (1 and 2).
- (3) Check for continuity. If continuity is not present, replace clearance light.



**WIRING HARNESS OR TRAILER ELECTRICAL**

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**4-54. CLEARANCE LIGHT - TEST/REPLACE - (Cont.)**

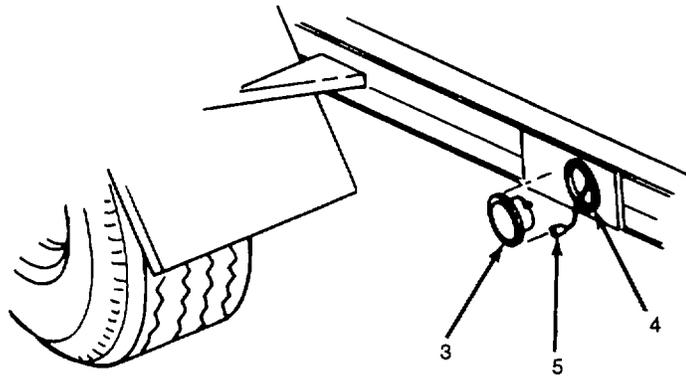
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b. Removal.

- (1) Pull light (3) out of grommet (4).
- (2) Disconnect electrical connector (5) and remove light (3).
- (3) Remove grommet (4).

c. Installation

- (1) Position grommet (4).
- (2) Connect electrical connector (5) to light (3).
- (3) Push light (3) into grommet (4) to install.



**WIRING HARNESS OR TRAILER ELECTRICAL**

---

**4-55. STOP AND TURN LIGHT - TEST/REPLACE**

---

This task covers:

- a. Test                      b. Removal                      c. Installation
- 

**INITIAL SET-UP:**General Safety Instructions**WARNING**

When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.

**NOTE**

The following procedure applies to any of seven clearance lights.

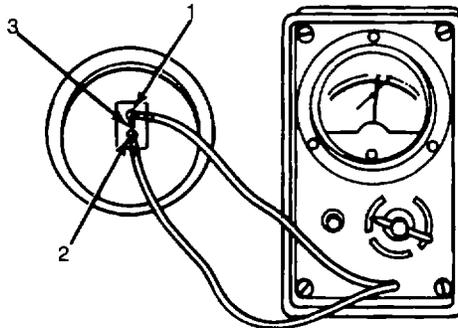
Tools

General Mechanics Tool Box (Section III, Item 1, App B)  
Multimeter (Section III, Item 4, App B)

---

**a. Test**

- (1) Remove stop and turn light (para 4-55b).
- (2) Place one multimeter lead in ground terminal (1) and one multimeter lead in terminal (2).
- (3) Check for continuity. If continuity is not present, replace stop and turn light.
- (4) Repeat for ground terminal (1) and terminal (3).



**WIRING HARNESS OR TRAILER ELECTRICAL**

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**4-55. STOP AND TURN LIGHT - TEST/REPLACE (Cont.)**

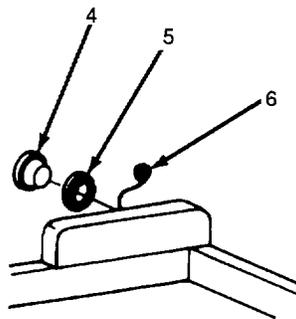
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b. Removal

- (1) Pull light (4) out of grommet (5).
- (2) Disconnect electrical connector (6) and remove light.
- (3) Remove grommet (5).

c. Installation

- (1) Position grommet (5).
- (2) Connect electrical connector (6) to light (4).
- (3) Push light (4) into grommet (5) to install.



**WIRING HARNESS OR TRAILER ELECTRICAL**

**4-55. WIRING HARNESS - TEST/REPLACE/REPAIR**

This task covers:

- a. Test
- b. Removal
- c. Repair
- d. Installation

**INITIAL SET-UP:**

General Safety Instructions

**WARNING**

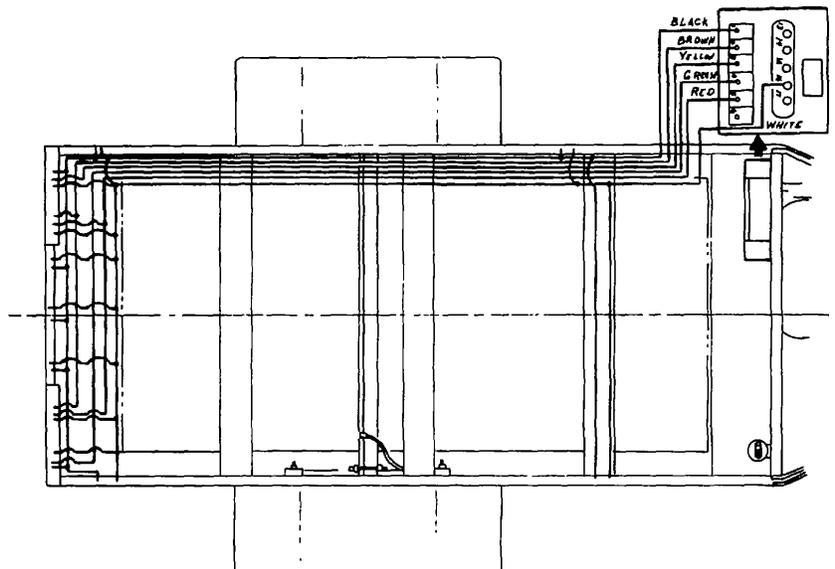
When working on electrical components remove all jewelry, dogtags, and metal items to avoid electrical shock and burns.

Tools

- General Mechanics Tool Box  
(Section III, Item 1, App B)
- Multimeter  
(Section III, Item 4, App B)

- a. Test

See wiring diagram and wire list (Table 4-7). Perform continuity tests on individual wires. Replace or repair wires with no continuity.



WIRING HARNESS OR TRAILER ELECTRICAL

4-55. WIRING HARNESS - TEST/REPLACE/REPAIR - (Cont.)

Table 4-7. WIRE LIST

TERMINATION		TERMINATION		LENGTH	
FROM	TYPE	TO	TYPE	IN.	CM
Junction Box - Term. 1	3	Right Rear Clearance	2	187	478.0
Right Turn	1	Clearance Circuit	--	7	17.8
Rear Clearance (3 total)	2	Clearance Circuit	--	6	15.2
Left Turn	1	Clearance Circuit	--	7	17.8
Left Clearance (2 total)	2	Clearance Circuit	--	3	7.6
Right Forward Clearance	2	Clearance Circuit	--	50	12.7
Junction Box - Term. 2	3	Right Tail	1	186	453.6
Left Tail	3	Tail Circuit	--	7	17.8
Junction Box - Term. 3	3	Left Turn	1	146	371.0
Junction Box - Term. 4	3	Right Turn	1	186	453.6
Junction Box - Term. 5	3	Right Tail/Stop	1	186	453.6
Left Tail/Stop	3	Stop Circuit	--	7	17.8
Junction Box - Term. 16	4	Right Rear Clearance	2	187	478.0
Right Turn	1	Ground Circuit	--	7	17.8
Right Tail	1	Ground Circuit	--	7	17.8
Rear Clearance (3 total)	2	Ground Circuit	--	6	15.2
Left Tail	1	Ground Circuit	--	7	17.8
Left Turn	1	Ground Circuit	--	7	17.8
Left Clearance (2 total)	2	Ground Circuit	--	3	7.6
Right Forward Clearance	2	Ground Circuit	--	50	12.7

Terminal Types

- 1 13227E 9589 3 pin connector
- 2 13227E 9590 2 pin connector
- 3 SAE H204
- 4 SAE H304

NOTE

All wires are AWG 14 gauge.

b. Removal

Tag and disconnect individual wires and connectors in accordance with the wiring diagram.

**WIRING HARNESS OR TRAILER ELECTRICAL**

---

**4-56. WIRING HARNESS - TEST/REPLACE/REPAIR - (Cont.)**

---

c. Repair

- (1) Replace any wires or connectors that are defective or show signs of wear or damage.
- (2) See paragraph 4-10 for general wire repair instructions.
- (3) See Table 4-7 Wire List for wire lengths and terminal information when individual wires are replaced.

d. Installation

See wiring diagram and tags and connect the wire leads and connectors. Remove tags.

## AXLE ASSEMBLY

---

### 4-57. WHEEL AND TIRE ASSEMBLY - TEST/REPLACE/REPAIR

---

This task covers:

- a. Removal
  - b. Repair
  - c. Installation
- 

#### INITIAL SET-UP:

##### References

TM 9-2610-200-24 Care  
Maintenance and Repair  
of Pneumatic Tires and  
Inner Tubes.

##### Special Environmental Conditions

Trailer on dry, level ground

##### **NOTE**

The following procedure applies  
to either wheel or tire

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Jack and Lug Wrench  
(Section III, Items 2 & 3, App C)

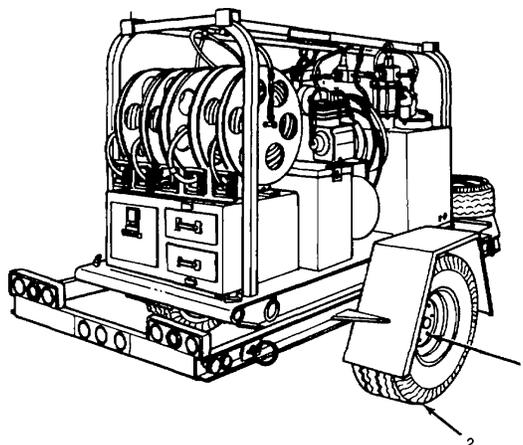
##### Materials

Cloth (Item 2, App E)

---

#### a. Removal

- (1) Securely block trailer at opposite side wheel.
- (2) Loosen eight lug nuts (1).
- (3) Place jack under the trailer axle and raise tire (2) off of ground.
- (4) Remove eight nuts (1), tire and wheel (2).



AXLE ASSEMBLY

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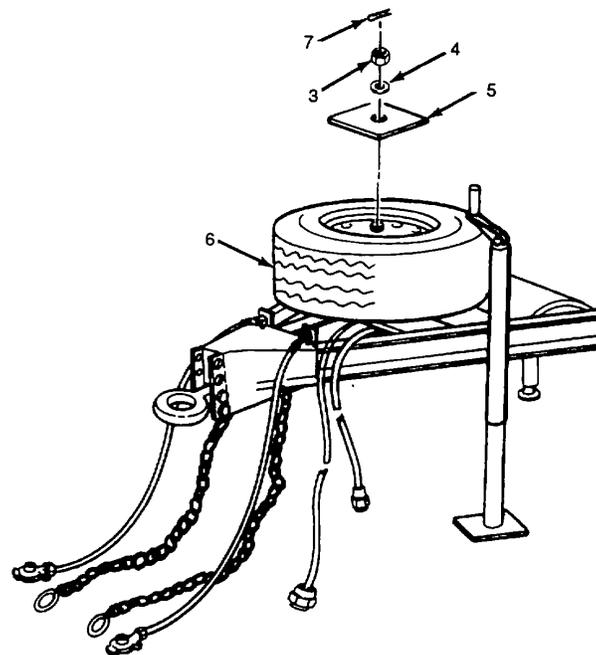
4-57. WHEEL AND TIRE ASSEMBLY - TEST/REPLACE/REPAIR

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NOTE

Remove the spare tire from its stowage location as follows and install if it is necessary to place the trailer back into immediate operation.

- (5) Remove cotter pin (7), nut (3), washer (4), retaining plate (5), spare tire and wheel (6).



**AXLE ASSEMBLY**

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**4-57. WHEEL AND TIRE ASSEMBLY - REPLACE/REPAIR - (Cont.)**

---

b. Repair

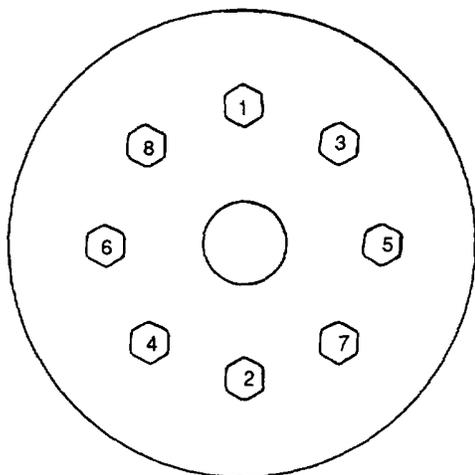
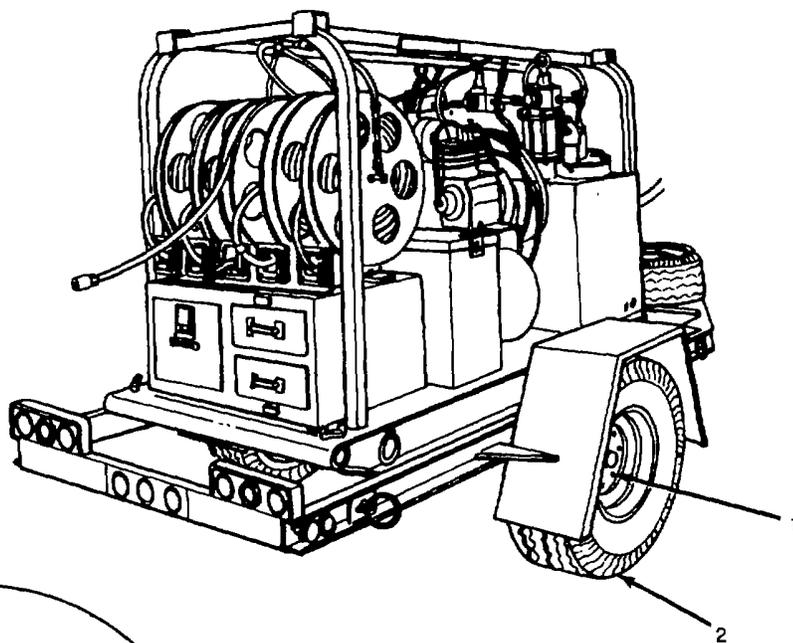
- (1) To demount tire, refer to TM 9-2610-200-24.
- (2) Remove all buildup of dirt, grease, etc. by wiping with a soft cloth.
- (3) Inspect wheel for cracks, dents, holes, and warps or deformed lug bolt holes. Replace if damaged.
- (4) Inspect tire for cracks, holes, signs of chunking, uneven wear or deterioration. Tires are to be repaired in accordance with TM 9-2610-200-24.
- (5) Mount tire in accordance with TM 9-2610-200-24.

## AXLE ASSEMBLY

### 4-57. WHEEL AND TIRE ASSEMBLY - REPLACE/REPAIR - (Cont.)

#### c. Installation

- (1) Position wheel and tire (2) on hub.
- (2) Loosely install eight nuts (1). Do not tighten.
- (3) Lower trailer and remove jack.
- (4) Alternately tighten eight nuts (1) until snug. Refer to bolt tightening sequence illustration.
- (5) Remove blocks.
- (6) Inflate tire to 60 PSI.



## AXLE ASSEMBLY

---

### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR

---

This task covers:

- |                |               |             |            |
|----------------|---------------|-------------|------------|
| a. Inspection  | b. Adjustment | c. Bleeding | d. Removal |
| e. Disassembly | f. Repair     | g. Assembly |            |
- 

#### INITIAL SET-UP:

##### Special Environmental Conditions

Parked on level dry ground

##### Equipment Condition

Air brake lines connected  
to towing vehicle (para. 2-5)  
Tire and Wheel Removal (para 4-57)

##### References

TM 9-214 Care and  
Maintenance of Anti-  
friction Bearings

#### **NOTE**

The service brake can be removed from the vehicle or disassembled while in place. This procedure applies to either the right or left brake assembly.

##### Materials

Cloth (Item 22, App E)  
Drycleaning Solvent (Item 6, App E)  
GAA Grease (Item 8 App E)  
Wire Brush (Item 25 App E)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Adjusting Tool, Brake Shoes  
(Section III, Item 8, App B)

---

- a. Inspection
- (1) Block opposite side trailer wheel.
  - (2) Place jack under axle and raise wheel to be inspected.
  - (3) Spin wheel and apply brakes using air supply valve.
  - (4) If brakes grind or squeak severely, notify Direct Support Maintenance.
  - (5) If brakes do not apply properly, adjust (para. 4-58b). If the problem cannot be solved through adjustment, notify Direct Support Maintenance.
  - (6) Repeat for opposite side brake.

## AXLE ASSEMBLY

### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

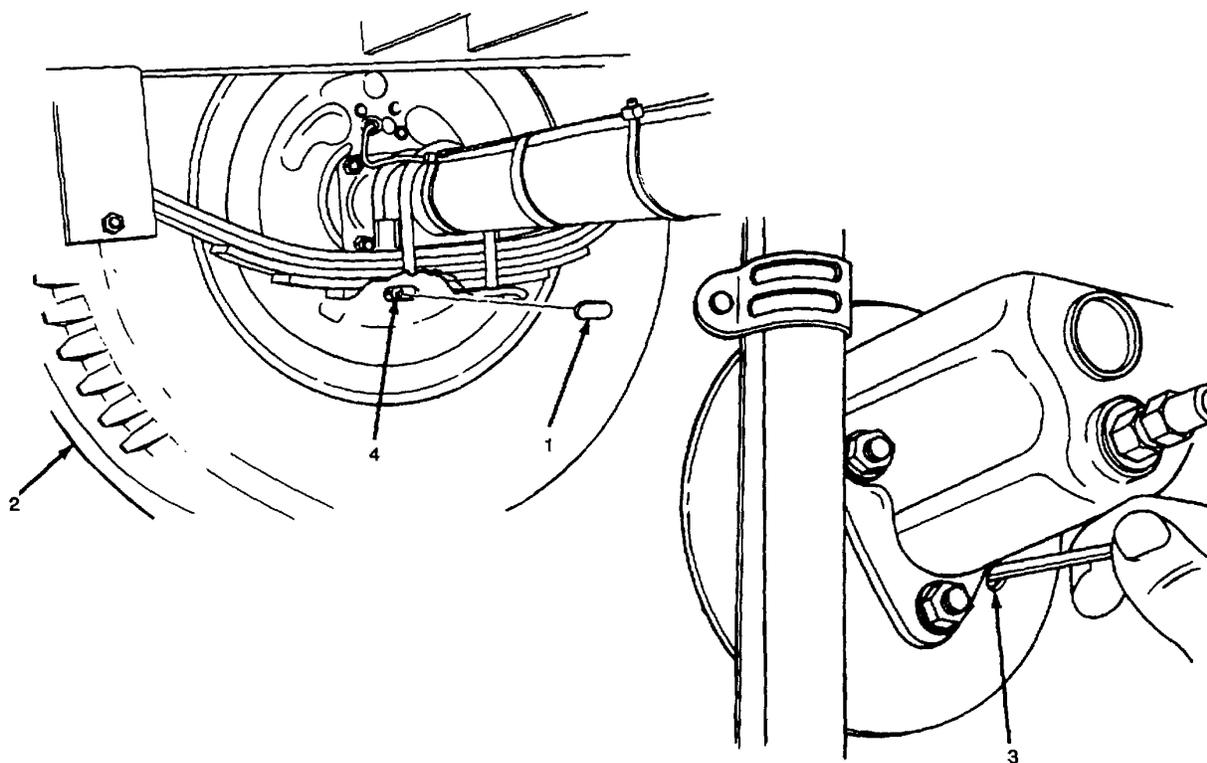
#### b. Adjustment

- (1) Raise and block trailer so that both wheels are off the ground.
- (2) Remove adjustment hole cover plate (1) and turn adjusting screw (4) until brake begins to drag when wheels (2) are spun. Back off screw just enough to allow wheel to turn freely.
- (3) With brakes released, insert a small rod through one of two inspection holes in air brake chamber
- (3) Mark rod at surface of support when rod contacts the push rod spring retainer in air brake chamber (3).
- (4) Apply brakes and again mark rod at surface of support. Withdraw rod and measure distance between two marks.
- (5) Adjust brakes to achieve 1/2 to 3/4 inch (12.7 to 19.05 mm) travel.

#### NOTE

Both brakes must be adjusted equally.

- (6) Install cover plate (1).



## AXLE ASSEMBLY

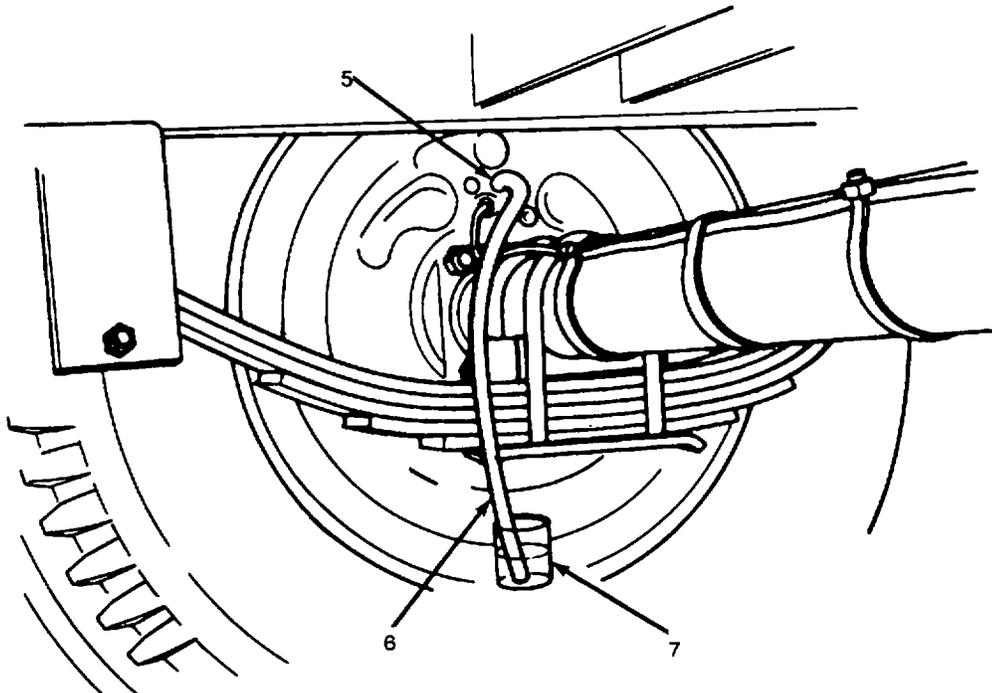
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### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

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#### c. Bleeding

- (1) Check trailer wheels.
- (2) Fill master cylinder with brake fluid (para. 3-2).
- (3) Clean bleeder valve (5) with a clean cloth.
- (4) Attach a tube (6) to the bleeder valve and place the other end in a clear container (7) half full of brake fluid.
- (5) Pump brake pedal on towing vehicle until pressure is applied. Loosen bleeder valve (5) one turn, be sure to fill master cylinder as necessary.
- (6) Observe bleeder hose. When bubbles no longer rise to the surface of the fluid, bleeding is complete. Tighten bleeder valve (5) securely.
- (7) Remove bleeder hose and repeat for opposite brake.



**AXLE ASSEMBLY**

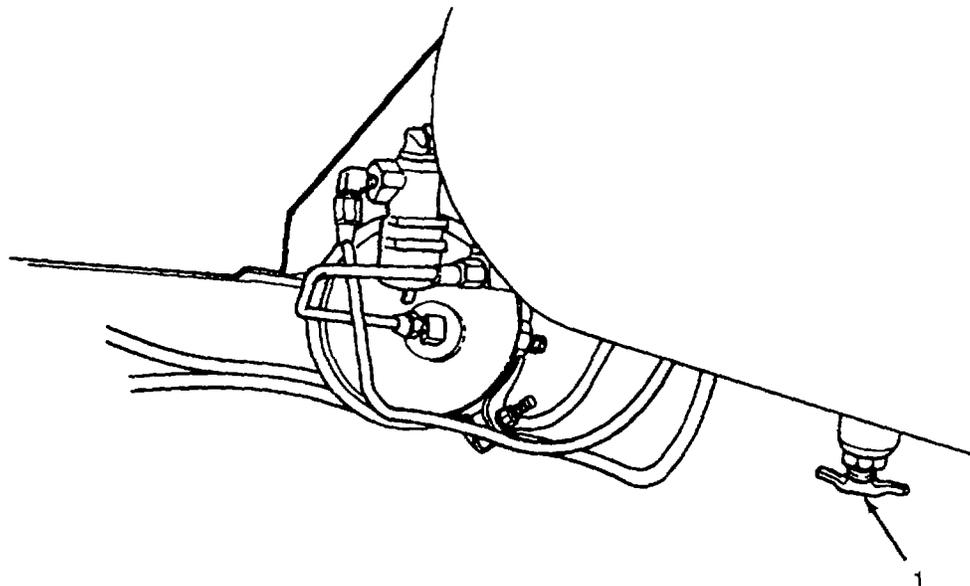
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**4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)**

---

## d. Removal

- (1) Vent air brake pressure completely by opening drain valve (1). Close valve when completed.



4-172

## AXLE ASSEMBLY

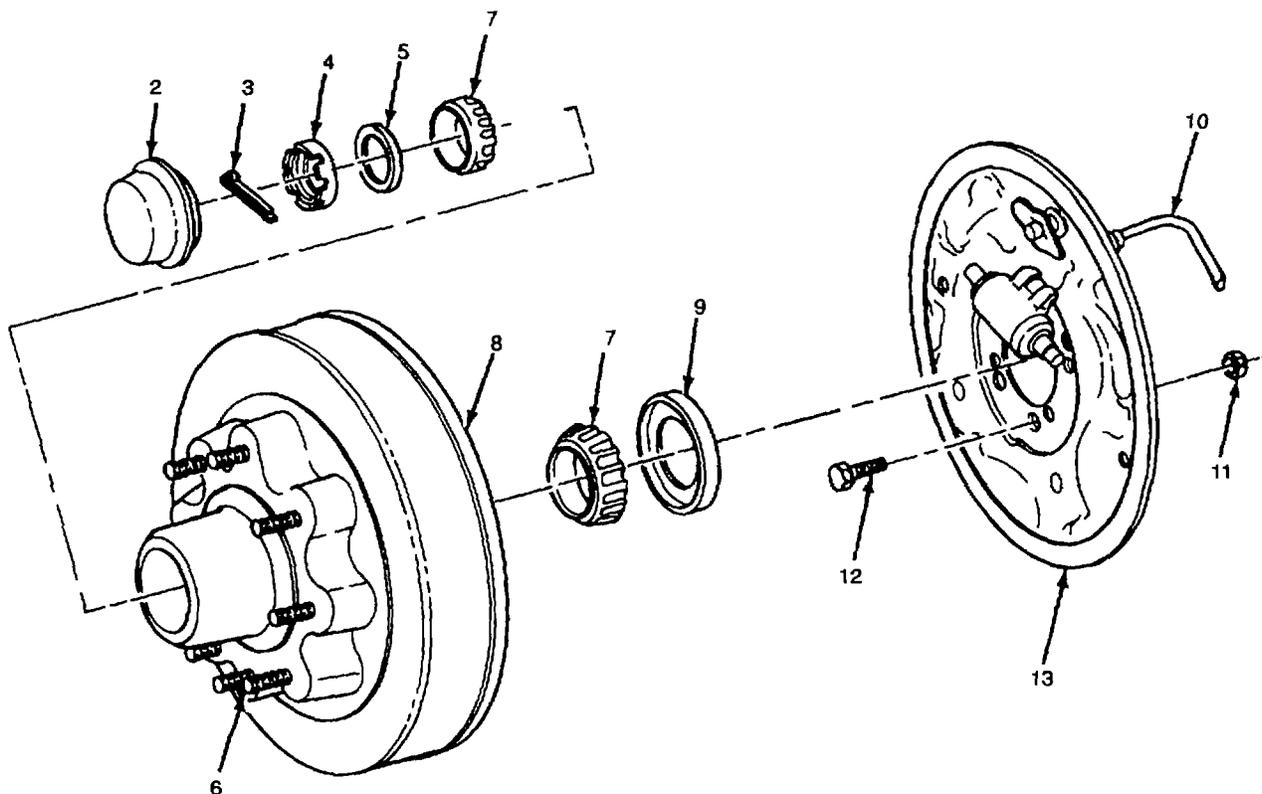
### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

- (2) Remove cap (2), cotter pin (3), spindle nut (4), and spindle washer (5).

#### NOTE

Do not remove bearing races unless damaged or bearing replacement is necessary.

- (3) Gently work hub and drum (6) off of axle spindle and remove inner and outer bearings (7), inner and outer races (8) and grease seal (9).
- (4) Disconnect brake line (10) at back of brake cylinder.
- (5) Remove four nuts (11), four screws (12) and brake assembly (13).

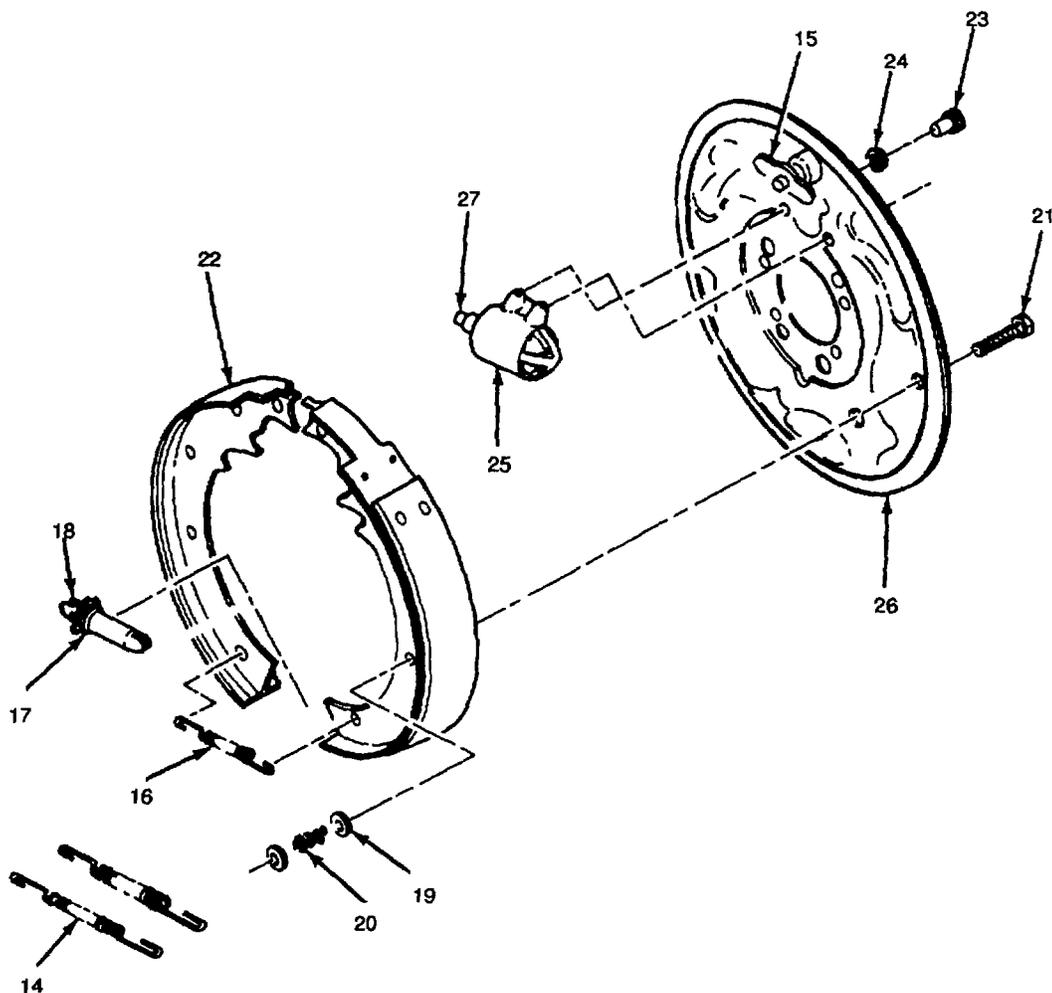


## AXLE ASSEMBLY

### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

#### e. Disassembly

- (1) Remove two shoe springs (14) and plate (15).
- (2) Remove spring (16) and adjusting screw (17). Remove socket (18) from screw.
- (3) Push in two cups (19) and turn to release. Remove four cups (19), two springs (20), two pins (21) and two shoes (22).
- (4) Remove two screws (23), two starwashers (24) and cylinder (25) from back plate (26).
- (5) Remove push rod (27) from cylinder.



AXLE ASSEMBLY

---

4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

---

f. Repair

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

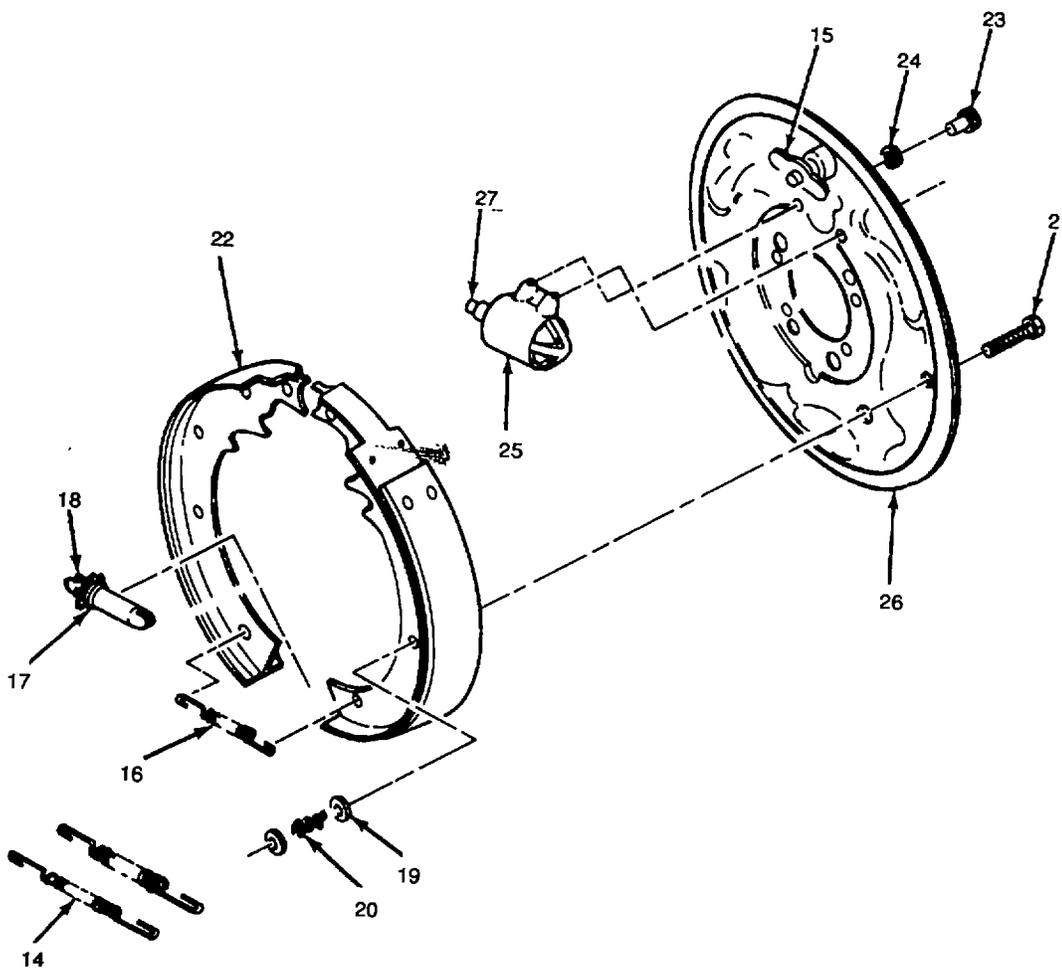
- (1) Clean all parts of grease and dirt using dry cleaning solvent.
- (2) Use a wire brush to remove all corrosion.
- (3) Inspect back plate for cracks, galling or wear. Replace if defective.
- (4) Inspect hydraulic cylinder for leakage or corrosion. Replace if defective.
- (5) Measure brake linings. If thickness is not 1/8 inch (3.175 mm), replace. If linings are cracked, replace.
- (6) Replace adjustment screw if corroded or worn.
- (7) Inspect bearings in accordance with TM 9-214.
- (8) Discard springs (20) and cups (19).

## AXLE ASSEMBLY

### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

#### g. Assembly

- (1) Install push rod (27) into cylinder (25).
- (2) Install cylinder (25), two starwashers (24) and two screws (23) onto back plate (26).
- (3) Install two shoes (22), two pins (21), two springs (20) and four cups (19).
- (4) Install socket (18) onto screw (17) and screw adjuster in fully.
- (5) Install brake adjusting screw (17) and spring (16).
- (6) Install plate (15) and two shoe springs (14).

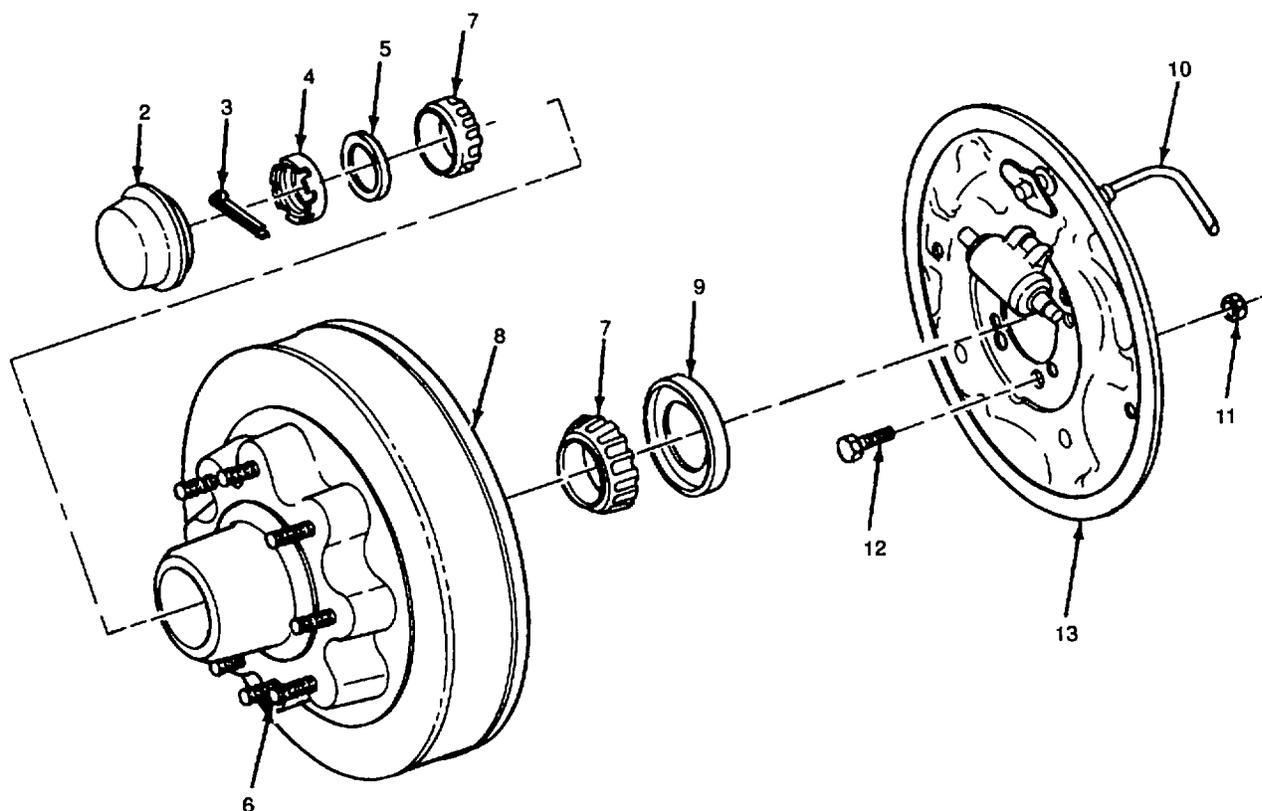


## AXLE ASSEMBLY

### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

#### h. Installation

- (1) Install brake assembly (13) with four screws (12), and five nuts (11).
- (2) Connect brake line (10) at back of brake cylinder.
- (3) Install inner and outer races (8).
- (4) Pack inner and outer bearings (7) and races (8) with GAA grease.
- (5) Install inner bearing and grease seal (9)
- (6) Using GAA grease, lightly coat axle spindle.
- (7) Install hub and drum (6), outer bearing (7), spindle washer (5) and spindle nut (4). Don't install cotter pin (3) or cap (2) at this time.



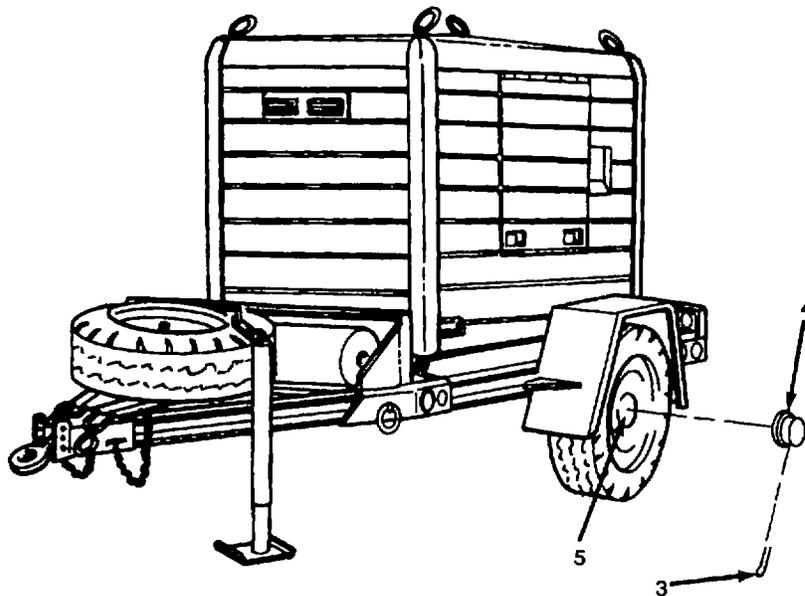
## AXLE ASSEMBLY

---

### 4-58. BRAKE ASSEMBLY - INSPECT/ADJUST/BLEED/REPLACE/REPAIR (Cont.)

---

- i. Installation - (cont.)
  - (1) Install tire and wheel (para 4-57). Do not lower trailer off of jack
  - (2) Turn wheel and tire and tighten nut (5) until wheel and tire binds.
  - (3) Loosen nut approximately one-sixth turn or until wheel and tire do not bind.
  - (4) Try rocking wheel and tire, it should not be loose enough to turn.
  - (5) Install cotter pin (3) and cap (4).
  - (6) Bleed and adjust brakes (para 4-58)



## TRAILER ASSEMBLY

---

### 4-59. JACK LEG ASSEMBLY - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

INITIAL SET-UP:

Tools

General Mechanics Tool Box (Section III, Item 1, App B)

---

- a. Removal

**NOTE**

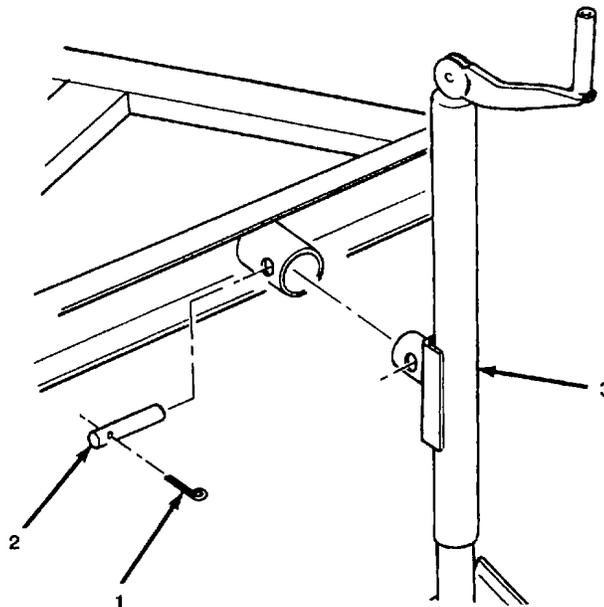
Step 1 applies to removal of front jack leg. Go to step 2 for removal of rear jacks.

- (1) Remove retaining pin (1), pin (2) and Jack leg (3).

**NOTE.**

The following instructions apply to either of the two rear jacks.

- (2) Fully retract rear jack (4).
- (3) Raise rear of trailer using external jack to allow removal of rear jack.
- (4) Remove retaining pin (5), pin (6) and slide rear jack (4) out of trailer frame.



## TRAILER ASSEMBLY

---

### 4-59. JACK LEG ASSEMBLY - REPLACE (Cont.)

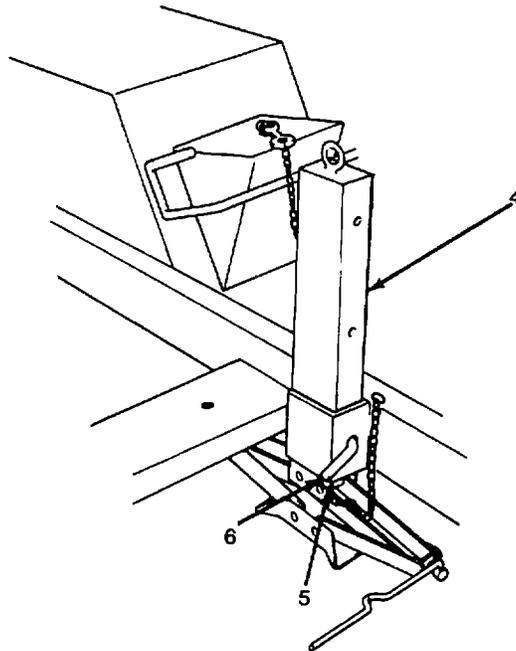
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b. Installation

**NOTE**

- Go to step 3 for installation of front jack leg.
- Steps 1 through 2 apply to either of the two rear jacks.

- (1) Slide rear jack (4) into position and install pin (6) and retaining pin (5).
- (2) Lower trailer and remove external jack.
- (3) Install front jack leg (3), pin (2) and retaining pin (1)



## Section VI. PREPARATION FOR STORAGE OR SHIPMENT

---

### 4-60. PRESERVATION

---

This task covers:

- a. Preparation
  - b. Preservation
- 

#### INITIAL SET-UP:

##### Materials/Parts

- Detergent (Item 5, AppE)
- Sheets, plastics, block (Item 15, AppE)
- Tape, masking (Item 17, AppE)

##### References

- TM 43-0139 Painting instructions for field use.

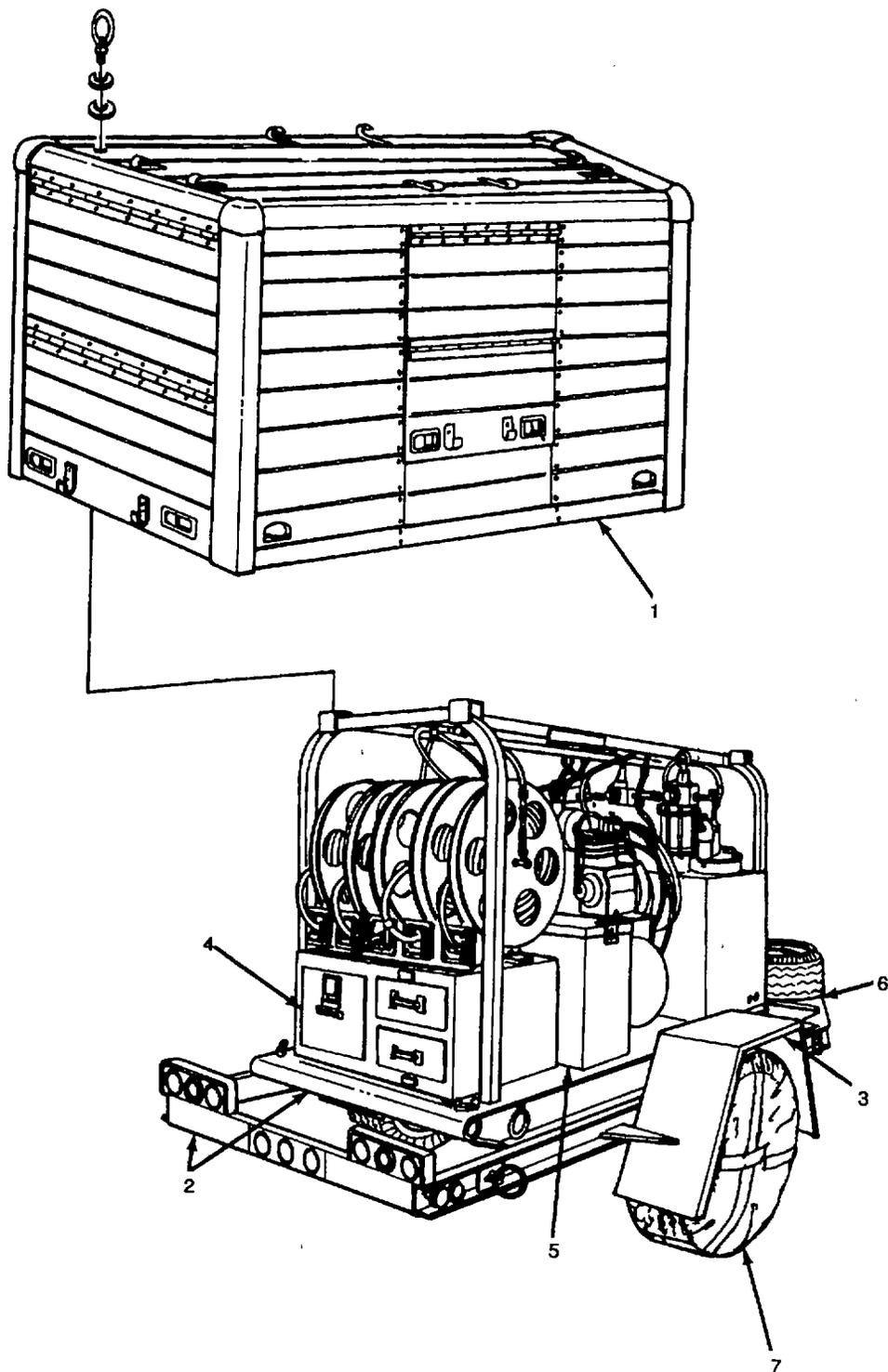
##### Equipment Condition

- Enclosure Removed (para 4-11)

##### Tools

- General Mechanics Tool Box (Section III, Item 1, AppB)
- 

- a. Preparation
  - (1) Clean trailer and skid using soap and water solution. Dry completely.
  - (2) Using wire brush, remove any corrosion and touch up paint (TM 43-0139).
- b. Preservation
  - (1) Apply preservation to the following areas:
    - a. Interior of enclosure assembly (1).
    - b. Entire skid and trailer bottom (2).
    - c. Fender wells (3).
    - d. Interiors of reel cabinet (4), tool box (5) and lube tank (6) (not in lube reservoirs).
    - e. All open areas and areas where moisture is likely to collect.
  - (2) Using black plastic sheets and masking tape cover two wheels (7).



## PREPARATION FOR STORAGE OR SHIPMENT

---

### 4-61. PACKING, SHIPMENT AND STORAGE

---

This task covers:

- a. Overview
  - b. Storage
  - c. Shipment
- 

#### INITIAL SET-UP:

##### Tools

General Mechanics Tool Box (Section III, item 1, AppB)

---

- a. Overview  
The unit commander is to make sure that the lube and service units and auxiliary equipment in his or her command are properly cared for.

A unit may not be able to care for the trailer properly because it lacks:

- (1) Time
- (2) Trained personnel
- (3) Proper tools

If any or all of the above conditions exist, the unit commander, with the approval of the major commander, may:

- (4) Place the trailer in administrative storage.
- (5) Return the trailer to supply.

When preparing the trailer for administrative storage, the unit commander must make sure that the trailer and the auxiliary equipment are properly stored. To do this the trailer and the auxiliary equipment must be protected from:

- (6) Corrosion
- (7) Deterioration
- (8) Physical damage

Item should be in mission readiness within 24 hours or within the time factors as determined by the directing authority.

## PREPARATION FOR STORAGE OR SHIPMENT

---

### 4-61. PACKING, SHIPMENT AND STORAGE - (Cont.)

---

Time limitations. You may place the trailer and its auxiliary equipment in administrative storage for 90 days. After that, the trailer and its auxiliary equipment must be cleaned and preserved as described in the following storage procedure.

b. Storage

- (1) Do semiannual PMCS (para. 4-6).
- (2) Lubricate entire system (para. 3-2).
- (3) Preserve (para. 4-60).
- (4) Locate trailer on level ground in an area which affords protection from the elements and pilferage. This location should give easy access to the unit to allow inspection and service as required.
- (5) Block trailer so that the wheels are off the ground.
- (6) Tie a tag to the trailer with the words ADMINISTRATIVE STORAGE written on it. The trailer may not be operated when the tag is tied to it.

c. Shipment

Trailers shipped on flatcars require wheel blocking in accordance with the Association of American Railroads Rules Governing the Loading of Commodities on Open-Top Cars". Chocks for blocking the trailer wheels and anchors for tie-downs may be manufactured in accordance with the drawings in the appendix.

## PREPARATION FOR STORAGE OR SHIPMENT

---

### 4-62. INSPECTION IN ADMINISTRATIVE STORAGE

---

This task covers:

- a. Overview
  - b. Inspection
- 

#### INITIAL SET-UP:

##### References

TM 43-0139 Painting  
Instructions for field use

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, AppB)

---

#### a. Overview

Inspect the trailer:

- (1) Once each month.
- (2) Just after hard rain, heavy snow storm, or other bad weather conditions.

#### b. Inspection

- (1) Inspect lube and service unit for corrosion and damage.
- (2) Remove corrosion and touch up paint.
- (3) Repair any damage.
- (4) Inspect for evidence of standing water. If necessary preserve these areas (para. 4-60).

**4-185/(4-186 blank)**

## Chapter 5

### DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

#### Section I. DIRECT SUPPORT TROUBLESHOOTING

##### 5-1. GENERAL

- a. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the Lube and Service Unit. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective actions in the order listed.
- b. This manual cannot list all malfunctions that may occur; nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

I

**Table 5-1. Direct Support Troubleshooting**

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ITEM	MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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---

**TRANSFER PUMP**

- 1. LEAKING FROM BUSHING ASSEMBLY ADJUSTMENT HOLE**  
Check teflon packing for improper adjustment or wear.  
Adjust or replace teflon packing set as required (paragraph 5-5).
- 2. PUMP DOES NOT OPERATE**  
Step 1. Check for clogged air inlet.  
Clean or replace air coupler, adapters and shut off valve (paragraph 5-5).  
Step 2. Check teflon packing set for improper adjustment.  
Adjust teflon packing set as required (paragraph 5-5).
- 3. PUMP OPERATES BUT DELIVERS LITTLE OR NO LUBRICANT**  
Check for worn packings in power head and/or pump tube assembly.  
Replace worn packings or seals (paragraph 5-5).

**GEAR LUBE DISPENSERS**

- 1. LUBRICANT LEAKS FROM AROUND INLET**  
Check washers and block "V" packing at inlet for wear.  
Replace washers and block "V" packing (paragraph 5-7).
- 2. LUBRICANT FLOWS OUT OF NOZZLE CONTINUOUSLY**  
Check valve assembly and seat at lever assembly for wear.  
Replace valve assembly and seat (paragraph 5-7).
- 3. LEAKAGE OCCURS FROM LEVER ASSEMBLY**  
Check preformed packings at lever assembly for wear.  
Replace preformed packings (paragraph 5-7)

Table 5-1. Direct Support Troubleshooting - Continued

---

ITEM	MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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4. LEAKAGE OCCURS FROM OUTLET FITTING BODY  
Check preformed packings at outlet fitting body for wear.  
Replace preformed packings (paragraph 5-7).

5. LEAKAGE OCCURS AROUND FACE DIAL  
Check packing and leather washer for wear at gear and shaft.  
Replace packing and leather washer (paragraph 5-7).

ENGINE OIL DISPENSER

1. LUBRICANT LEAKS FROM AROUND INLET  
Check preformed packings and block "V" packing at inlet for wear.  
Replace preformed packings and block "V" packing (paragraph 5-8).

2. LUBRICANT FLOWS OUT OF NOZZLE CONTINUOUSLY  
Check valve assembly and seat at lever assembly for wear.  
Replace valve assembly and seat (paragraph 5-8).

3. LEAKAGE OCCURS FROM LEVER ASSEMBLY  
Check preformed packings at lever assembly for wear.  
Replace preformed packings (paragraph 5-8).

4. LEAKAGE OCCURS FROM OUTLET FITTING BODY  
Check preformed packings at outlet fitting body for wear.  
Replace preformed packings (paragraph 5-8).

5. LEAKAGE OCCURS AROUND FACE DIAL  
Inspect packing and leather washer for wear at gear and shaft.  
Replace packing and leather washer (paragraph 5-8).

Table 5-1. Direct Support Troubleshooting - Continued

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ITEM	MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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GREASE CONTROL VALVE

1. LUBRICANT LEAKS OUT OF GREASE COUPLING WHEN VALVE IS NOT IN USE
  - Step 1. Check control valve for proper adjustment.  
Adjust control valve (paragraph 5-9).
  - Step 2. Check spring, plunger, and seat assembly for wear.  
Replace spring, plunger, and seat assembly if worn (paragraph 5-9).
2. LUBRICANT LEAKS OUT OF TOP OF GREASE CONTROL VALVE
  - Check preformed packings in packing plug for wear.  
Replace preformed packings (paragraph 5-9).
3. LUBRICANT LEAKS OUT OF BOTTOM OF GREASE CONTROL VALVES
  - Step 1. Check bushing and locknut at inlet for looseness.  
Tighten bushing and locknut.
  - Step 2. Check packing ring in stem of control valve for wear.  
Replace packing ring (paragraph 5-9).
4. GREASE CONTROL VALVE HAS NO "ONE SHOT" CAPABILITIES
  - Step 1. Check control valve for correct adjustment.  
Adjust control valve (paragraph 5-9).
  - Step 2. Inspect spring, plunger, and seat assembly for wear.  
Replace spring, plunger, and seat assembly if worn (paragraph 5-9).
5. GREASE CONTROL VALVE FAILS TO DELIVER GREASE WHEN TRIGGER IS OPERATED
  - Check control valve for proper adjustment  
Adjust control valve (paragraph 5-9).

Table 5-1. Direct Support Troubleshooting - Continued

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ITEM MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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LOW PRESSURE PUMP

1. LOW PRESSURE PUMP DOES NOT PUMP CORRECTLY

Step 1. Inspect for foreign objects lodged in check valve or seat of pump tube.  
Remove foreign objects and replace defective parts as needed (paragraph 5-18).

Step 2. Check for worn piston packings in pump tube body and/or cylinder.  
Replace packings as required (paragraph 5-18).

Step 3. Inspect for damaged or bent shafts or cylinders.  
Replace damaged parts (paragraph 5-18).

2. LOW PRESSURE PUMP LEAKS LUBRICANT FROM CYLINDER HEAD BODY

Check pump tube gaskets and/or packings for wear  
Replace worn gaskets and packings in pump tube assembly (paragraph 5-18).

HIGH PRESSURE PUMP

1. HIGH PRESSURE PUMP DOES NOT PUMP CORRECTLY

Step 1. Check for foreign objects lodged in check valve or seat of pump tube.  
Remove foreign objects and replace defective parts as needed (paragraph 5-19).

Step 2. Check for worn piston packings in pump tube body and/or cylinder.  
Replace packings as required (paragraph 5-19).

Step 3. Inspect for damaged or bent shafts and cylinder.  
Replace damaged parts (paragraph 5-19).

Table 5-1. Direct Support Troubleshooting - Continued

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ITEM	MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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2. HIGH PRESSURE PUMP LEAKS LUBRICANT FROM CYLINDER HEAD BODY  
Check pump tube gaskets and/or packings for wear.  
Replace worn gaskets and packings in pump tube assembly (paragraph 5-19)

AIR REGULATOR

AIR REGULATOR OPERATES ERRATICALLY OR WILL NOT REGULATE  
Inspect valve for dirt.  
Disassemble and clean regulator (paragraph 5-17).

AIR COMPRESSOR

1. COMPRESSOR PUMPS SLOWLY OR HAS INSUFFICIENT PRESSURE  
Step 1. Check compressor head valves for leaks.  
Clean or replace valves and valve components as needed (paragraph 5-15).  
  
Step 2. Check for clogged or damaged head unloader valves.  
Clean or replace unloader valves (paragraph 5-15).
2. COMPRESSOR USES EXCESSIVE AMOUNTS OF OIL  
Inspect for worn or damaged piston oil rings.  
Replace oil rings (paragraph 5-14).
3. COMPRESSOR MAKES EXCESSIVE NOISE WHEN OPERATING  
  
Step 1. Inspect loose external parts.  
Tighten any loose part found during inspection.  
  
Step 2. Check for foreign matter such as carbon, metal chips, etc. on piston.  
Remove head (paragraph 5-14) and clean.

**Table 5-1. Direct Support Troubleshooting - Continued**

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ITEM	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 3. Check crankshaft for excessive end play.  
Remove one end cover gasket (paragraph 5-14).

Step 4. Check torque on head valve hold down cover screws.  
Tighten hold down cover screws to correct torque (paragraph 5-15).

Step 5. Inspect for loose or worn internal parts.  
Replace and tighten internal parts as necessary (paragraph 5-14).

4. COMPRESSOR OVERHEATS

Step 1. Inspect for properly seated head valves.  
Disassemble head and seat valves correctly (paragraph 5-15).

Step 2. Check for blown cylinder head gasket.  
Replace cylinder head gasket (paragraph 5-14).

AXLE ASSEMBLY

1. TRAILER TIRES WEAR UNEVENLY

Step 1. Check wheel bearing adjustment.  
Adjust wheel bearings (paragraph 5-25).

Step 2. Inspect axle tube for bends.  
Remove (paragraph 5-24) and straighten axle.

2. WHEEL HUB RUNS EXCESSIVELY HOT  
Check wheel bearings for adequate lubrication.  
Remove and pack wheel bearings.

Table 5-1. Direct Support Troubleshooting - Continued

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ITEM	MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
------	-------------	--------------------	-------------------

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BRAKE ASSEMBLY

1. SERVICE BRAKES WILL NOT APPLY

Step 1. Check for damaged or worn wheel brake cylinder.  
Replace wheel brake cylinder (paragraph 5-25).

Step 2. Inspect for grease on brake linings.  
Repair leaks and brake shoes (paragraph 5-25).

Step 3. Inspect brake linings for wear.  
Replace brake shoes (paragraph 5-25).

Step 4. Check for scored brake drum.  
Replace brake drum (paragraph 5-25).

2. BRAKES APPLY AND RELEASE SLOWLY

Inspect for weak or broken brake return springs.  
Replace brake return springs (paragraph 5-25).

3. BRAKES GRAB

Step 1. Inspect wheel bearings for proper adjustment and/or wear.  
Adjust or replace as needed (paragraph 5-25).

Step 2. Check for out of round, cracked, or deformed brake drum.  
Replace brake drum (paragraph 5-25).

Step 3. Inspect for loose or worn brake linings.  
Replace brake linings (paragraph 5-25).

Section II. MAINTENANCE PROCEDURES

---

ENCLOSURE AND SKID ASSEMBLY

---

5-2. ENCLOSURE AND SKID ASSEMBLY - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

INITIAL SET-UP:

Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Hoist

Special Environmental Conditions

Trailer parked on level ground  
and blocked.

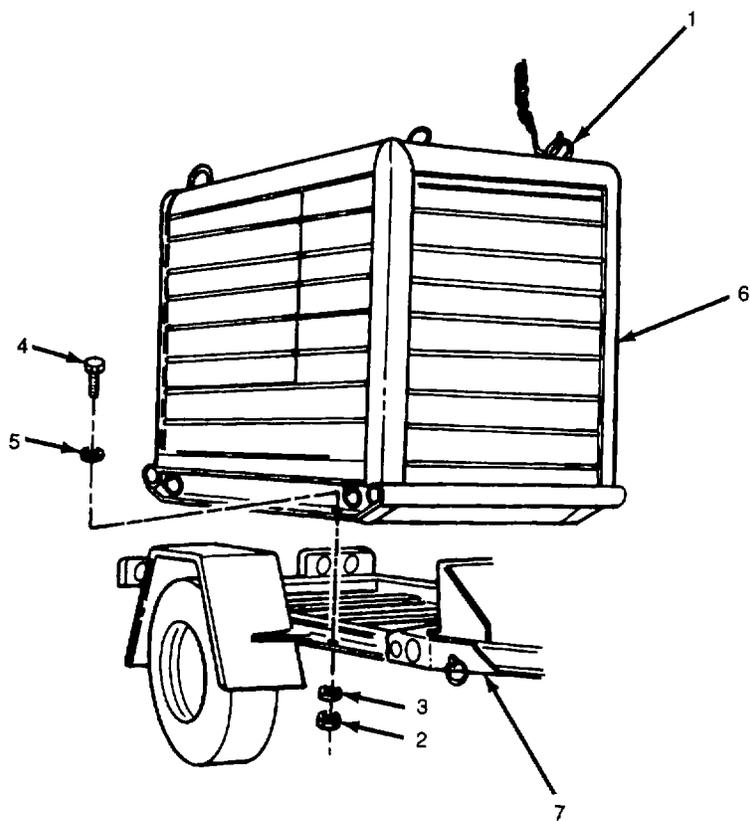
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a. Removal

- (1) Attach hoist at four lifting eyes (1).
- (2) Remove six nuts (2), six washers (3), six screws (4) and six beveled washers (5).
- (3) Lift skid sub assembly (6) off of trailer assembly (7) and place on firm, level ground.

b. Installation

- (1) Attach hoist at four lifting eyes (1).
- (2) Lift skid sub assembly (6) onto trailer assembly (7) and install six beveled washers (5), six screws (4), six lockwashers (3) and six nuts (2).



## ENCLOSURE

---

### 5-3. DOORS - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                      c. Assembly
- 

INITIAL SET-UP:

Equipment Condition

Door Removed (para. 4-12)

**NOTE**

The following procedures apply to any four door assemblies

Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

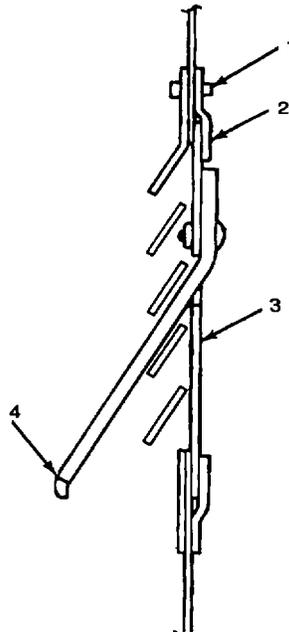
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- a. Disassembly

**NOTE**

Step 1 applies only to front and rear doors.

- (1) Drill out ten rivets (1), two tracks (2) and two shutters (3).
- (2) Remove two handles (4) and shutters (3).



## ENCLOSURE

### 5-3. DOORS - REPAIR - (Cont.)

a. Disassembly - (cont.)

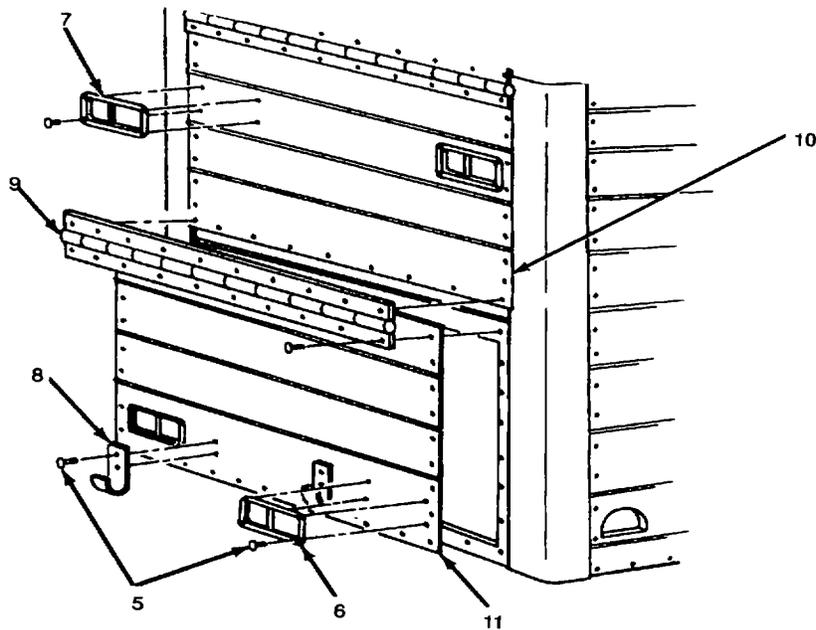
- (3) Drill out rivets (5) as required and remove two lower latches (6), two upper latches (7), two hooks (8), two hinges (9), upper panel (10) and lower panel (11) from frames (12).

b. Repair

- (1) Inspect all sheet metal parts for damage. Straighten if possible, replace if damage is too extensive.
- (2) Inspect latches for correct operation. Replace if faulty.

c. Installation

- (1) Install lower panel (11), upper panel (10), two hinges (9), two hooks (8), two upper latches (7) and two lower latches (6) using rivets (5) as necessary.



**NOTE**

**Step (2) and (3) applies only to front and rear doors.**

- (2) Install two handles (4) and two shutters (3).
- (3) Position two shutters (3), two tracks (2) and install using ten rivets (1).

## ENCLOSURE AND SKID ASSEMBLY

### 5-4. PANELS- REPLACE

This task covers:

- a. Removal                      b. Installation

#### INITIAL SET-UP:

##### Materials/Parts

Epoxy-polymide primer coatings (Item 13 App.E)  
Synthetic rubber caulking compound (Item 4, App.E)

##### Equipment Condition

Enclosure Assembly Removed (para 4-11)

##### Tools

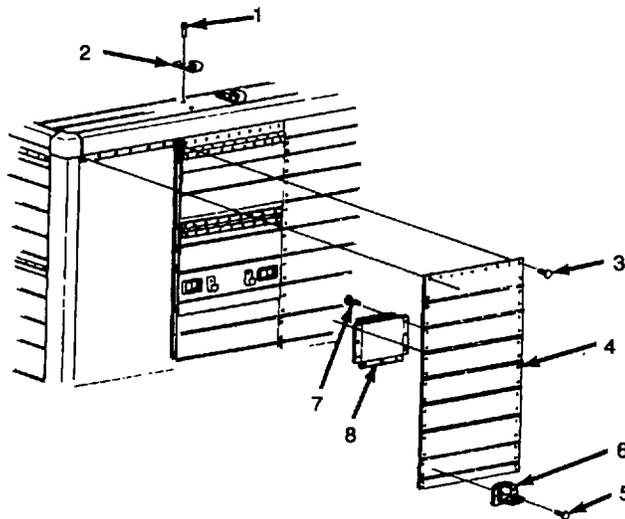
Drill with 3/16 Drill Bits (Section III, Item 2, App B)

- a. Removal.

#### NOTE

**Step 2 applies to all panels. For other steps, proceed only as needed.**

- (1) For top panel removal, drill out all rivets (1) and remove eight hooks (2).
- (2) For all panels, drill out rivets (3) around outside edge and remove panel (4).
- (3) For front and rear side panels, drill out four rivets (5) and remove handle (6).
- (4) For near right side panel, drill out nine rivets (7) and remove storage pocket (8).



## ENCLOSURE AND SKID ASSEMBLY

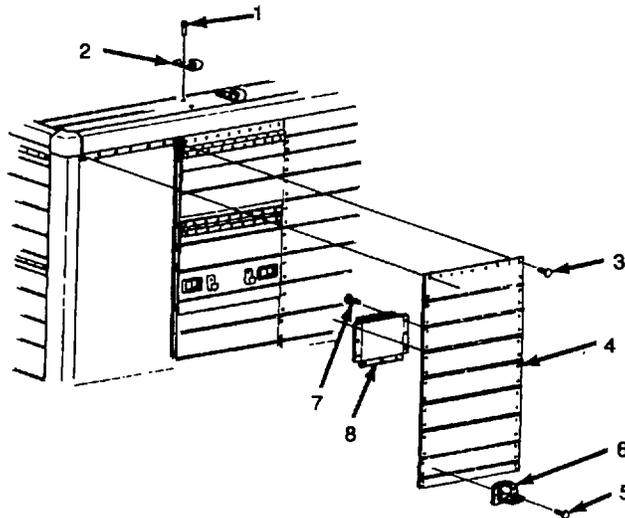
### 5-4. PANELS - REPLACE - (Cont.)

#### b. Installation

#### NOTE

**Step 3 applies to all panels. For other steps, proceed as needed.**

- (1) For right rear panel, position storage pocket (8) and install using nine rivets (7).
- (2) For front and rear side panels, coat back side of handle (6) with epoxy- polyimide primer and install using four rivets (5).
- (3) Position panel (4) and install using rivets (3) as necessary. Seal panel along all outside edges with synthetic rubber caulking compound.
- (4) For top panel, install eight hooks (2) using rivets (1) as necessary.



- (5) For front and rear side panels, drill out four rivets (5) and remove handle (6).
- (6) For rear right side panel, drill out nine rivets (7) and remove storage pocket (8).

**SKID SUB ASSEMBLY**

---

**5-5. TRANSFER PUMP - REPAIR/ADJUST**

---

This task covers:

- |             |                |                 |
|-------------|----------------|-----------------|
| a. Removal  | b. Disassembly | c. Repair       |
| d. Assembly | e. Adjustment  | f. Installation |
- 

INITIAL SET-UP:

Tools

General Mechanics Tool Box (Section III, Item 1, App B)

---

- a. Removal

**NOTE**

**Remove strap assembly only if damaged.**

- (1) Remove transfer pump (1) from strap assembly (2).
- (2) Remove strap assembly (2) from enclosure (3) if damaged.

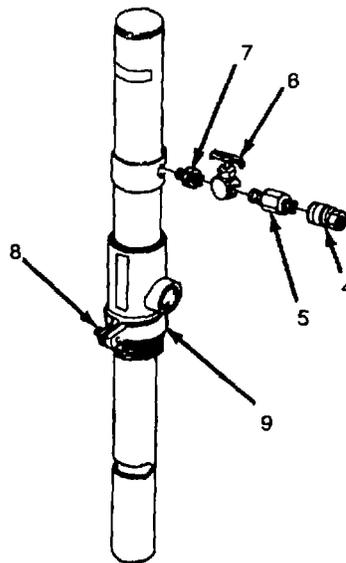
**Change 1 (5-13 blank)/5-14**

SKID SUB ASSEMBLY

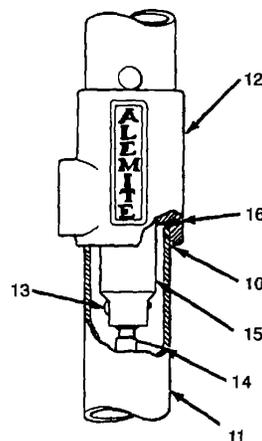
5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

b. Disassembly

- (1) Remove quick disconnect (4), coupler (5), shutoff valve (6), and adapter (7).
- (2) Loosen bung adapter nut (8) and slide bung adapter (9) off of pump.



- (3) Loosen jam nut (10) and unscrew cylinder (11) from pump casting (12) to expose cotter pin (13).
- (4) Remove cotter pin (13) and unscrew pump tube rod (14) from power head piston (15).
- (5) Remove gasket (16).



## SKID SUB ASSEMBLY

### 5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

#### b. Disassembly - (cont.)

#### **WARNING**

Do not remove cylinder completely with a wrench. If cylinder cannot be easily unscrewed by hand after it has been loosened, pressure is probably trapped inside. Venting pressure before removal is necessary because a pressurized cylinder can fly off with damaging force that can cause personal injury.

(6) Loosen cylinder (17).

(7) After cylinder is loosened, remove it by hand. Do not force.

#### **WARNING**

Protective goggles must be worn when drilling cylinder to prevent personnel injury caused by metal shavings flying out under pressure.

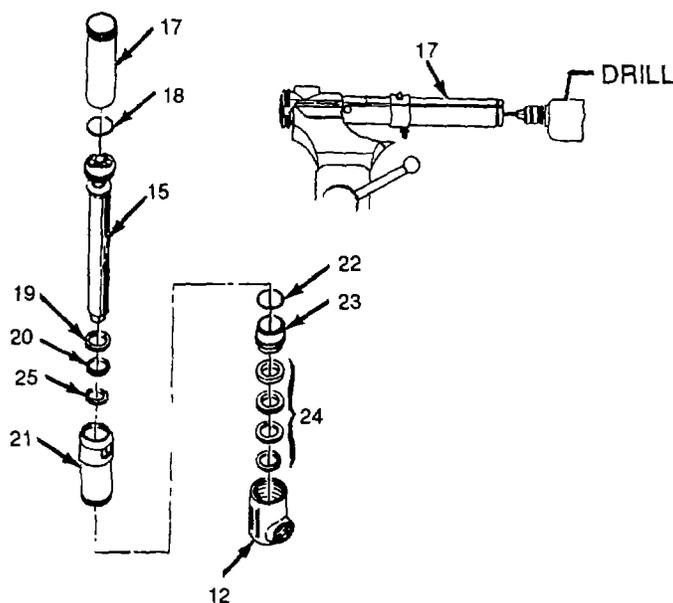
(8) If cylinder (17) does not easily unscrew, relieve pressure by drilling a small hole in the center to vent pressure.

(9) Remove cylinder (17) and preformed packing (18). Discard cylinder if it was drilled.

(10) Withdraw piston assembly (15).

(11) Remove rubber seal (19), backup washer (20), metal gasket (25), adapter (21) and preformed packing (22).

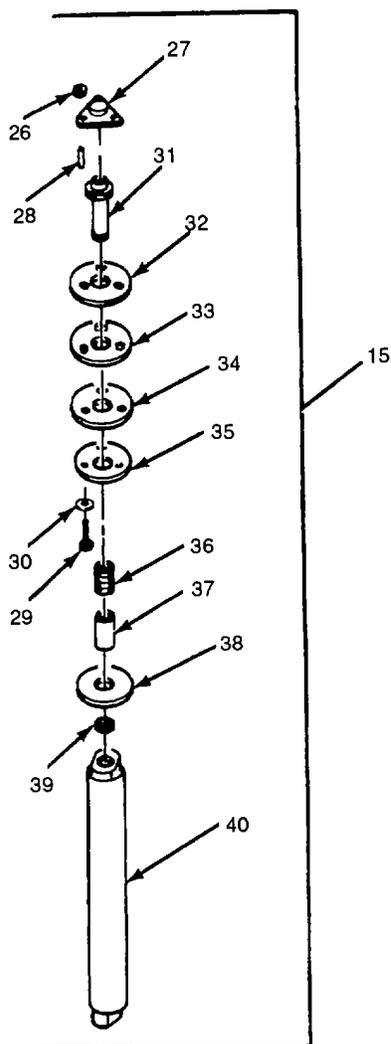
(12) Remove bushing (23) and teflon packing set (24) from pump casting (12).



## SKID SUB ASSEMBLY

## 5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

- (13) To disassemble piston assembly (15) remove three elastic nuts (26), seal plate (27) and three spacers (28).
- (14) Remove three screws (29) and three gaskets (30).
- (15) Remove adapter (31), thick washer (32), packing (33), thin washer (34), washer (35), spring (36), spacer (37), solid washer (38), and washer (39), from piston (40).

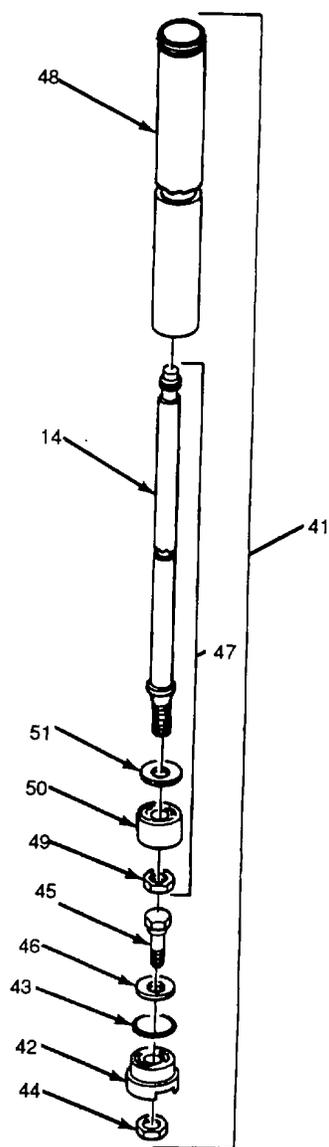


SKID SUB ASSEMBLY

5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

b. Disassembly - (cont)

- (16) To disassemble pump tube (41) remove valve base (42) and preformed packing (43).
- (17) Remove selflocking nut (44), screw (45) and washer (46).
- (18) Take rod and stop assembly (47) out of cylinder (48).
- (19) Remove nut (49), plunger (50) and washer (51) from pump tube rod (14).



## SKID SUB ASSEMBLY

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### 5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

---

#### c. Repair

- (1) Clean all parts thoroughly.
- (2) Discard any parts that are included in repair kit (TM 5-4930-233-24P).
- (3) Inspect all piston parts and cylinders for wear or scoring. Replace as needed.
- (4) Inspect threaded surfaces for damage. Replace if defective.
- (5) Inspect castings and cylinders for cracks or deformities. Replace any component that would prevent correct operation.

#### d. Assembly

#### NOTE

**Lubricant referred to in the procedures below is included in Repair kits (TM 5-4930-233-24P).**

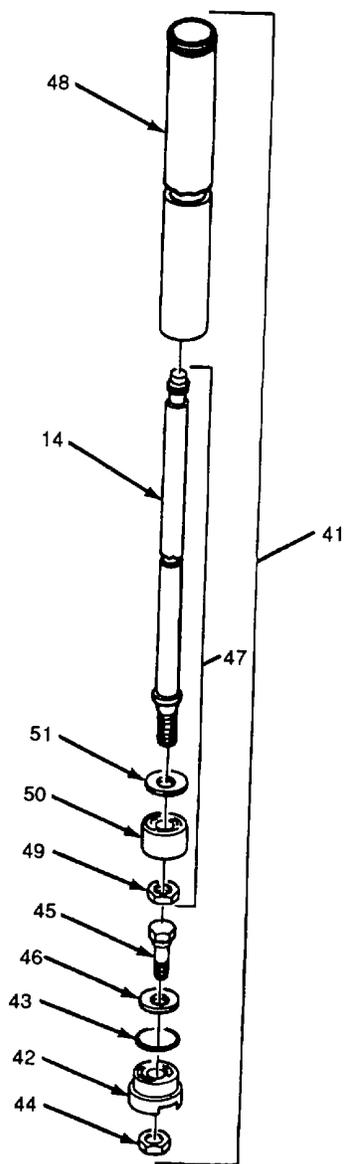
- (1) Lubricate all seals, preformed packings and sealing rings.
- (2) Install washer (51), plunger (50) and nut (49) onto pump tube rod (14). Be sure that ground surface of washer faces plunger.
- (3) Slide rod and stop assembly (47) into cylinder (48).
- (4) Install perform packing (43), washer (46), screw (45) and selflocking nut (44) onto valve base (42).
- (5) Install valve base (42) onto cylinder (48).
- (6) Install washer (39), solid washer (38), spacer (37), spring (36), washer (35), thin washer (34), packing (33), thick washer (32) and adapter (31) onto piston (40). Be sure that packing (33) is installed with marking "Top Side" facing up.
- (7) Install three gaskets (30) and three screws (29).
- (8) Install three spacers (28), seal plate (27) and three elastic nuts (26). Torque nuts to 23-27 in. lbs. (2.599-3.05 N.m).

SKID SUB ASSEMBLY

5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

d. Assembly- (cont.)

- (9) Install teflon packing set (24) and bushing (23) into pump casting (12). Do not tighten bushing.
- (10) Install preformed packing (22), adapter (21), metal gasket (25), backup washer (20) and rubber seal (19).
- (11) Install piston assembly (15) and hand tighten bushing (23).
- (12) Install preformed packing (18) and cylinder (17).

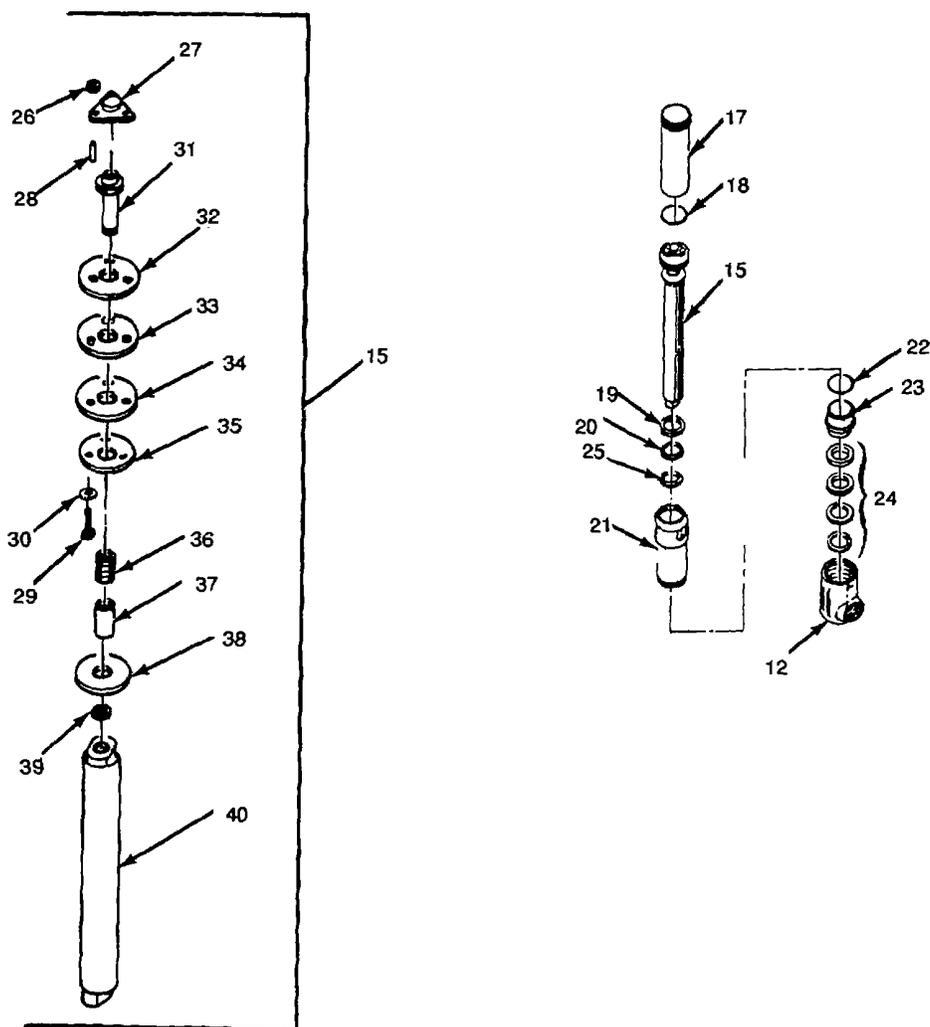


SKID SUB ASSEMBLY

5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

d. Assembly - (cont.)

- (13) Connect power head piston (15) and pump tube rod (14).
- (14) Install cotter pin (13).
- (15) Thread cylinder (11) into pump casting (12) and tighten jam nut (10).
- (16) Slide bung adapter (9) onto pump and tighten bung adapter nut (6).
- (17) Install adapter (7), shutoff valve (6), coupler (5) and quick disconnect (4).
- (18) Perform initial run-in and adjustment (para. 5-5e).



## SKID SUB ASSEMBLY

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### 5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

---

#### e. Adjustment

#### **NOTE**

**This adjustment can also be made to correct leaking that occurs around packing adjustment slot**

- (1) Run pump for approximately 5 minutes to allow teflon packings to form evenly.
- (2) Allow cylinder and plunger to cool.
- (3) Apply a maximum of 30 psi air pressure. If pump does not start or if leakage occurs, adjustment is required.
- (4) Loosen adapter (21) to a point where its holes line up with a hole on bushing (23).

#### **CAUTION**

**Do not overtighten bushing as this will cause piston assembly to bind. If pump did not operate during run-in, skip steps (5) and (6).**

- (5) Place a rod through holes and hand tighten to drive bushing assembly into pump casting, thereby tightening packings.
- (6) Remove rod and repeat run-in. If pump doesn't operate proceed. If pump operates without leakage, go to step (9).

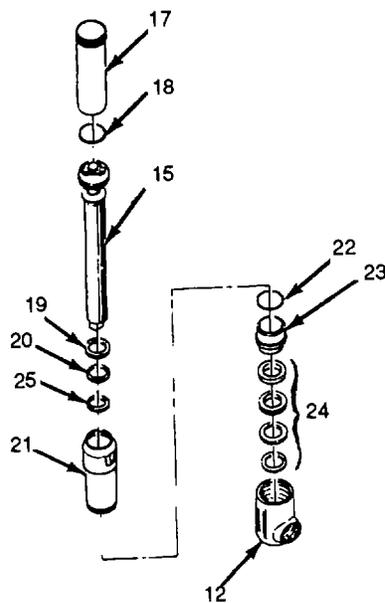
SKID SUB ASSEMBLY

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5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

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- (7) Place a rod through holes in adapter and bushing and slightly loosen adapter. Repeat run-in until pump cycles correctly.
- (8) If bushing cannot be tightened further and packings still leak, replacement of teflon packings is necessary.
- (9) Tighten adapter (21).
- (10) Repeat procedure after 6 hours of initial running time to adjust for breaking in of packings.

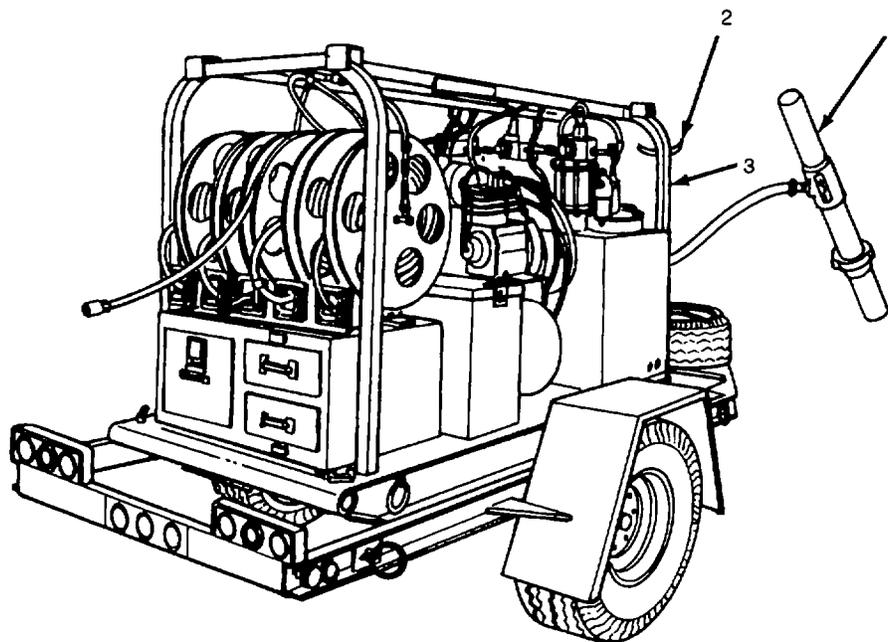


## SKID SUB ASSEMBLY

## 5-5. TRANSFER PUMP - REPAIR/ADJUST (Cont.)

## f. Installation

- (1) Install strap assembly (2) to enclosure (3).
- (2) Install transfer pump (1) with strap assembly (2) to enclosure (3).



**SKID SUB ASSEMBLY**

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**5-6. FUEL TANK ASSEMBLY - REPAIR**

---

This task covers:

- a. Disassembly                      b. Repair                              c. Assembly
- 

INITIAL SET-UP:

GENERAL SAFETY INTRODUCTIONS**WARNING**

Do not use open flame or smoke when working on the fuel system. An explosion may occur, causing severe injury or death.

Equipment Condition

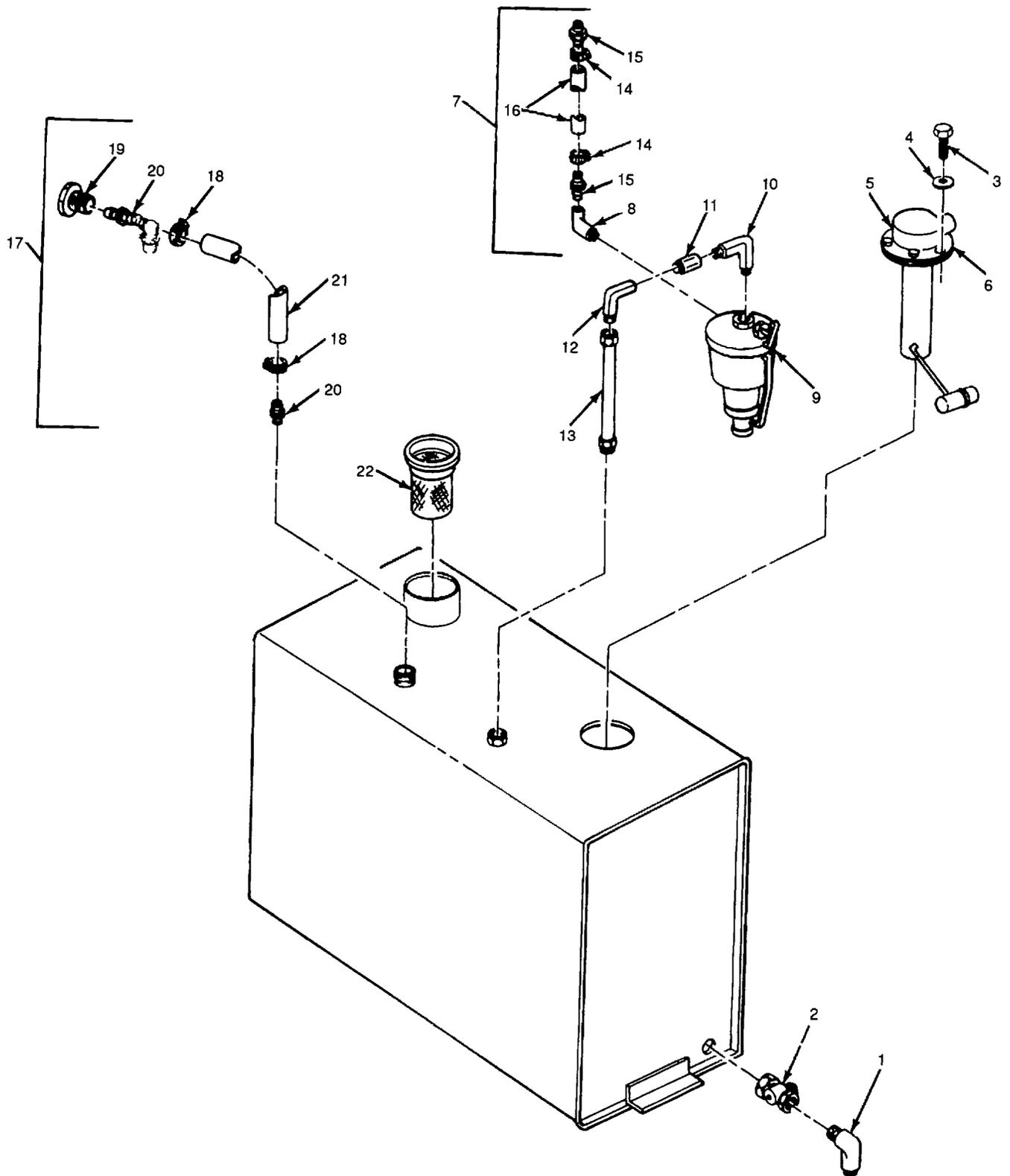
Fuel Tank Removed (para 4-16)

Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

a. Disassembly

- (1) Remove elbow (1) and shutoff cock (2).
- (2) Remove five screws (3), five starwashers (4), sending unit (5) and gasket (6).
- (3) Remove engine fuel hose assembly (7), elbow (8), fuel filter (9), elbow (10), nipple (11), elbow (12) and nipple (13).
- (4) To disassemble fuel hose assembly (7) loosen two clamps (14) and remove two hose barbs (15). Slide clamps (14) off of hose (16).
- (5) Remove heater fuel hose assembly (17). Disassemble by loosening two clamps (18) and removing coupling (19) and two hose barbs (20).
- (6) Remove two clamps (18) from hose (21).
- (7) Remove fuel strainer (22).



**SKID SUB ASSEMBLY**

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**5-5. FUEL TANK ASSEMBLY - REPAIR - (Cont.)**

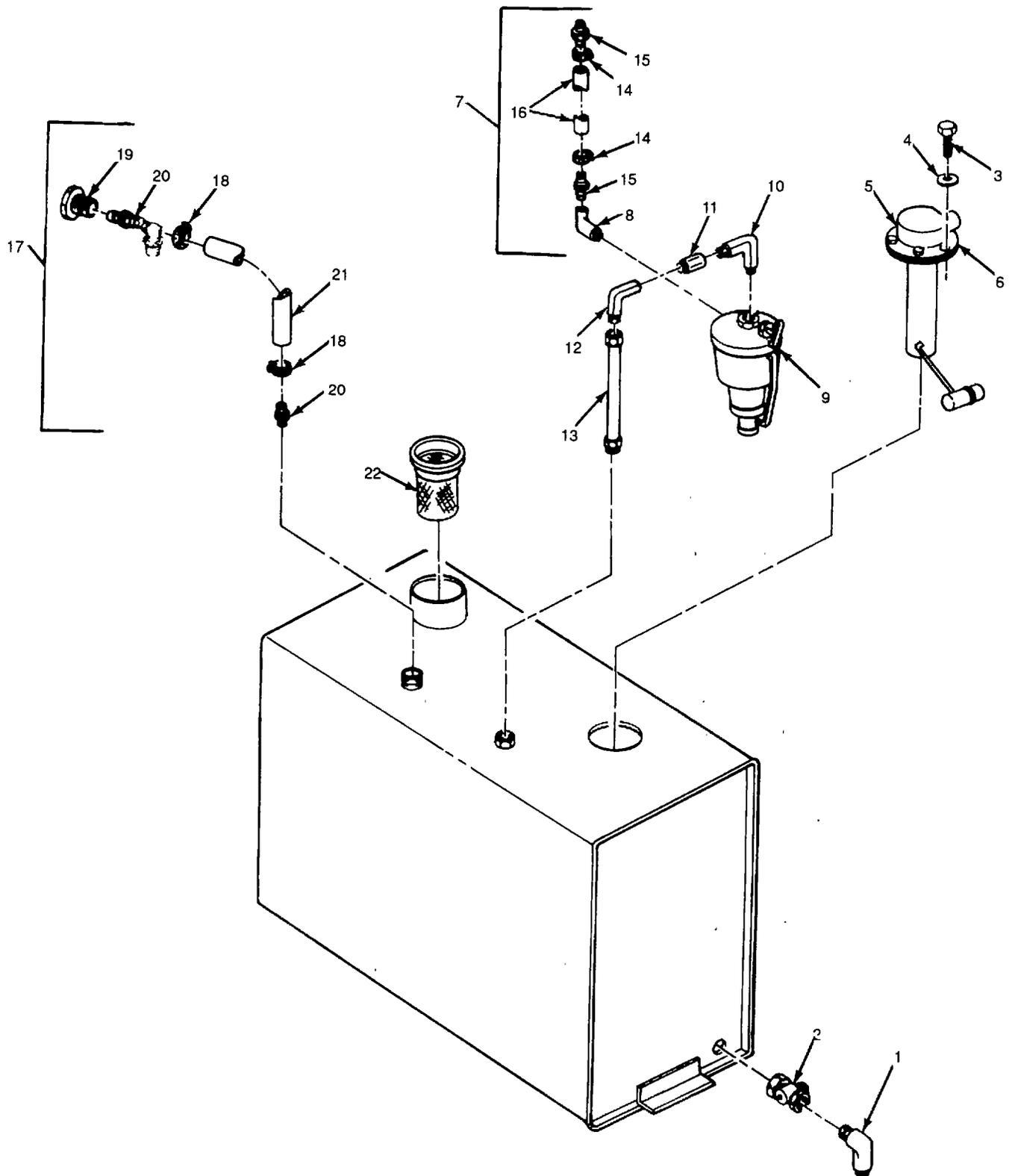
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## b. Repair

- (1) Inspect fuel tank sending unit for cracks, rough or catching movement of the float and for damaged terminals. Replace damaged sending unit.
- (2) Inspect hoses and fittings for deterioration or damage. Replace all damaged parts.

## c. Assembly

- (1) Install fuel strainer (22).
- (2) Slide two clamps (18) onto hose (21) and install two hose barbs (20) and coupling (19).
- (3) Install heater fuel hose assembly (17).
- (4) Slide two clamps (14) onto hose (16) and install two hose barbs (15). Tighten clamps (14).
- (5) Install nipple (13), elbow (12), nipple (11), elbow (10), fuel filter (9), elbow (8) and engine fuel hose assembly (7).
- (6) Install gasket (6), sending unit (5), five starwashers (4) and five screws (3).
- (7) Install shutoff cock (2) and elbow (1).



Information from pages 5-25 through 5-28 has been deleted

## REEL CABINET ASSEMBLY

---

### 5-7. GEAR LUBE DISPENSER - REPAIR

---

This task covers:

- a. Disassembly      b. Repair      c. Assembly
- 

#### INITIAL SET-UP:

##### Materials/Parts

Dry cleaning solvent  
(Item 6, App. E)

##### Equipment Condition

Gear lube dispenser removed  
(para 4-19)

##### Tools

General Mechanics  
Tool Box (Section III, Item 1, App B)

---

#### a. Disassembly

- (1) Remove four screws (1) and remove dial assembly (2), gasket (3), and totalizer (4).
- (2) Remove nozzle assembly (5) and extension (6).
- (3) Remove nut (7), plug (8), preformed packing (9), lockwasher (10), stem (11) and preformed packing (12).
- (4) Remove metering mechanism (13) and spur gear (14).
- (5) Remove setscrew (15), worn gear (16), flat washer (17), gear and shaft (18), washer (19), preformed packing (20), and leather washer (21).
- (6) Remove two retaining rings (22), pin (23), lever assembly (24), spring (25), and cap and pin (26).
- (7) Remove plug (27), preformed packing (28), preformed packing (29), valve seat (30) and preformed packing (31).
- (8) Remove screw (32), seat (33), plunger (34) and spring (35).

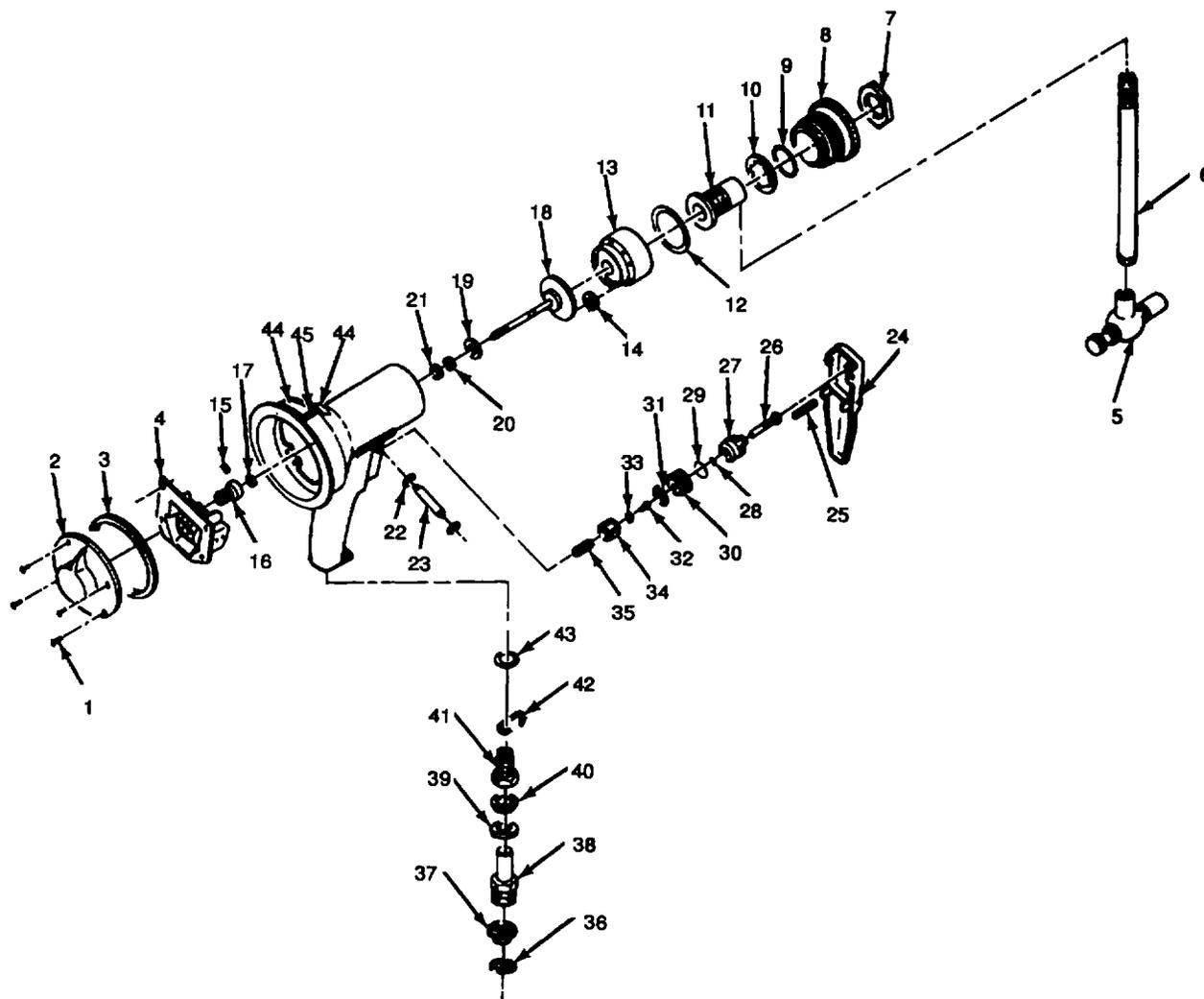
(9) Remove ring (36), strainer (37), inlet (38), washer (39) and block (40).

(10) Remove swivel adapter (41), split ring (42), and preformed packing (43).

**NOTE**

**Remove two plates (44) only if illegible.**

(11) Remove four screws (45) and two plates (44), from meter housing (46).



## REEL CABINET ASSEMBLY

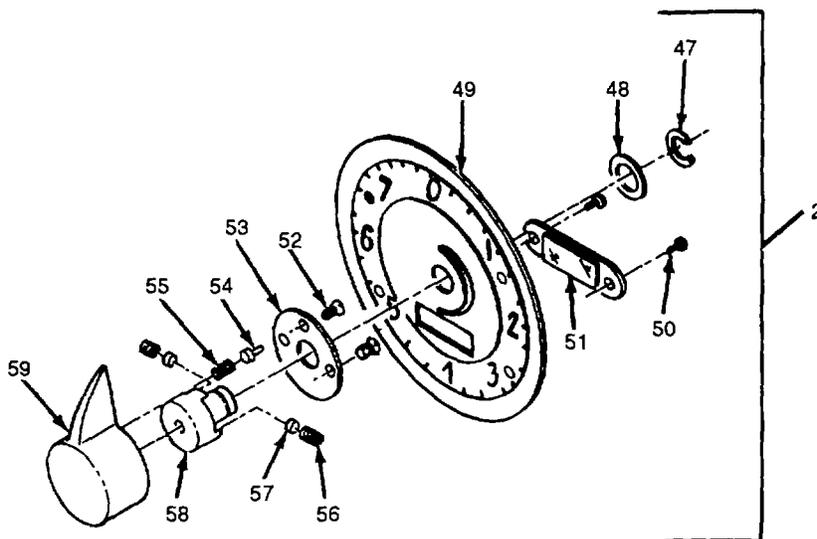
### 5-7. GEAR LUBE DISPENSER - REPAIR - (Cont.)

#### a. Disassembly - (cont.)

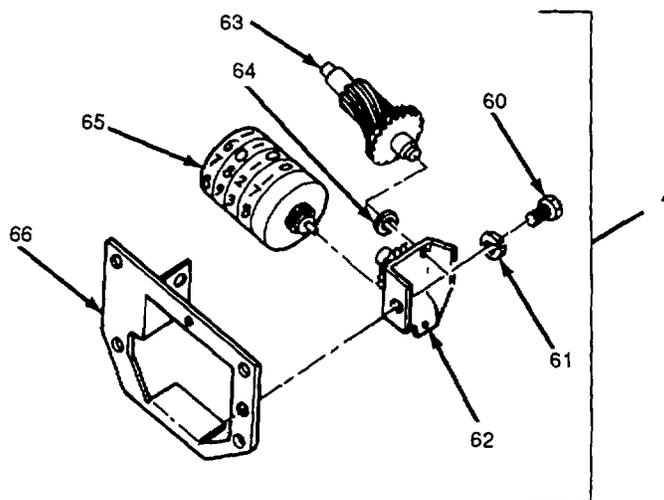
(12) To disassemble dial assembly (2) remove ring (47), washer (48) and dial (49).

(13) Remove two screws (50) and window (51) from dial (49).

(14) Remove two screws (52), plate (53), pin (54), spring (55), two springs (56), two rollers (57) and clutch (58) from knob (59).



(15) To disassemble totalizer (4) remove screw (60), lockwasher (61), bracket and gear assembly (62), gear assembly (63), washer (64) and odometer assembly (65) from base plate (66).



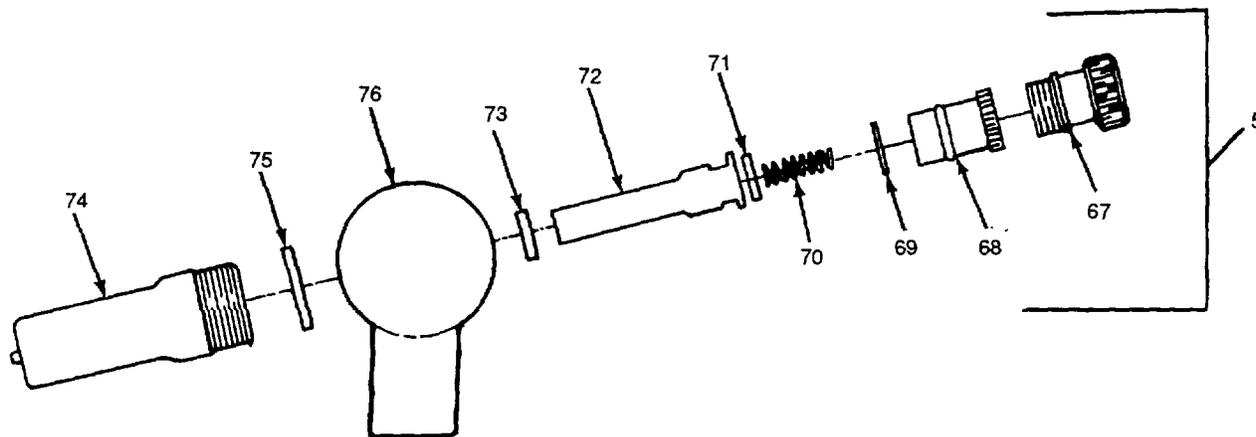
## REEL CABINET ASSEMBLY

## 5-7. GEAR LUBE DISPENSER - REPAIR - (Cont.)

## a. Disassembly - (cont.)

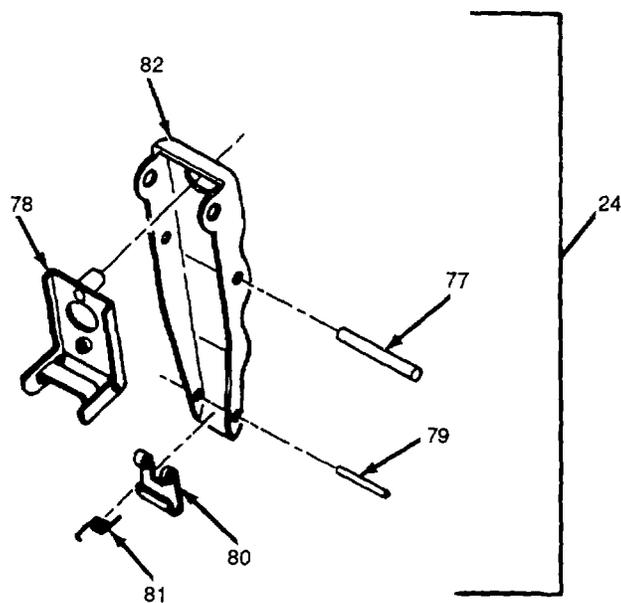
(16) To disassemble nozzle assembly (5) remove adapter screw assembly (67), block (68), washer (69), spring (70), packing (71), nozzle stem (72), and gasket (73).

(17) Remove nozzle (74) and preformed packing (75) from angle body (76).



(18) To disassemble lever assembly (24) remove rivet (77) and stop assembly (78).

(19) Remove rivet (79), hook (80) and spring (81) from lever (82).



## REEL CABINET ASSEMBLY

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### 5-7. GEAR LUBE DISPENSER - REPAIR

---

b. Repair

**WARNING**

**Worn or damaged parts can cause equipment malfunction which can lead to serious injury or equipment damage. Replace all damaged or worn parts.**

- (1) Replace all parts that are included in repair parts kit (TM 5-4930-233-24P).

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

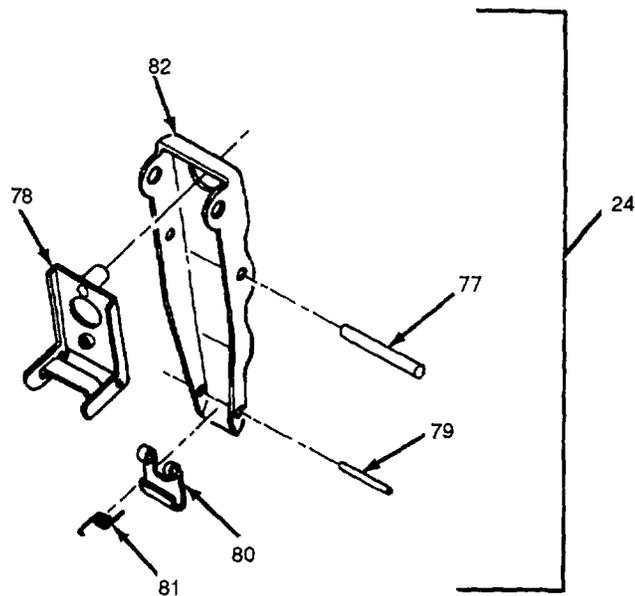
- (2) Clean all parts with drycleaning solvent thoroughly. Small particles of dirt or foreign matter can cause malfunction.
- (3) Inspect gears for chipped or broken teeth. Replace as needed.
- (4) Inspect all parts for damaged threads, wear, deterioration or damage. Replace any damaged or worn parts.

## REEL CABINET ASSEMBLY

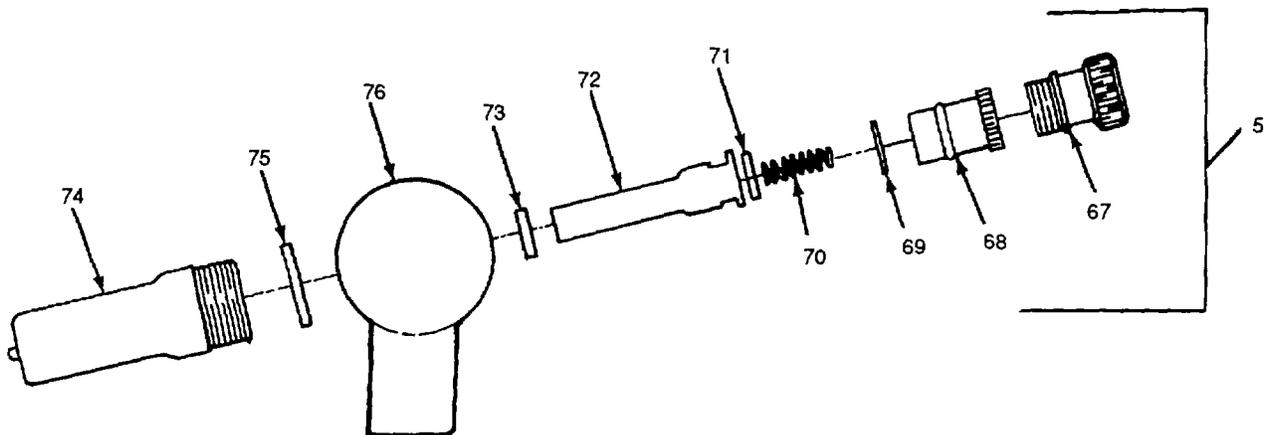
### 5-7. GEAR LUBE DISPENSER - REPAIR - (Cont.)

#### c. Assembly

- (1) To assemble lever assembly ( 24) install spring (81), hook (80) and rivet (79) to lever (82).
- (2) Install stop assembly (78) and rivet (77).



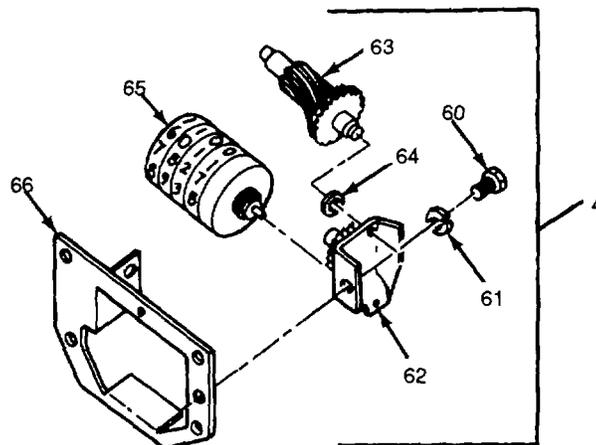
- (3) To assemble nozzle assembly (5) install preformed packing (75) and nozzle (74) to angle body (76).
- (4) Install packing (71), spring (70), washer (69), block (68), gasket (73), nozzle stem (72) and gasket (73).



## REEL CABINET ASSEMBLY

### 5-7. GEAR LUBE DISPENSER - REPAIR - (Cont.)

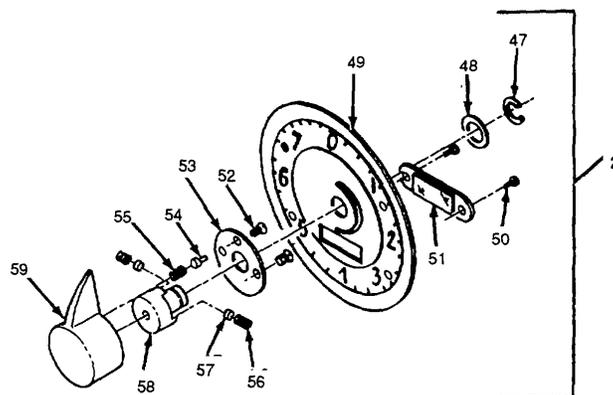
- (5) To assemble totalizer (4) coat gears with light coating of grease and install odometer assembly (65), washer (64), gear assembly (63), bracket and gear assembly (62), lockwasher (61) and screw (60) to base plate (66).



- (6) To assemble dial assembly (2) install clutch (58) two rollers (57) two springs (56), spring (55), pin (54), plate (53) and two screws (52) to knob (59).
- (7) Install window (51) with two screws (50) to dial (49).
- (8) Install dial (49), washer (48) and ring (47).

**CAUTION**  
Strainer (37) is easily damaged.

- (9) Install two plates (44) and four screws (45) to meter housing.

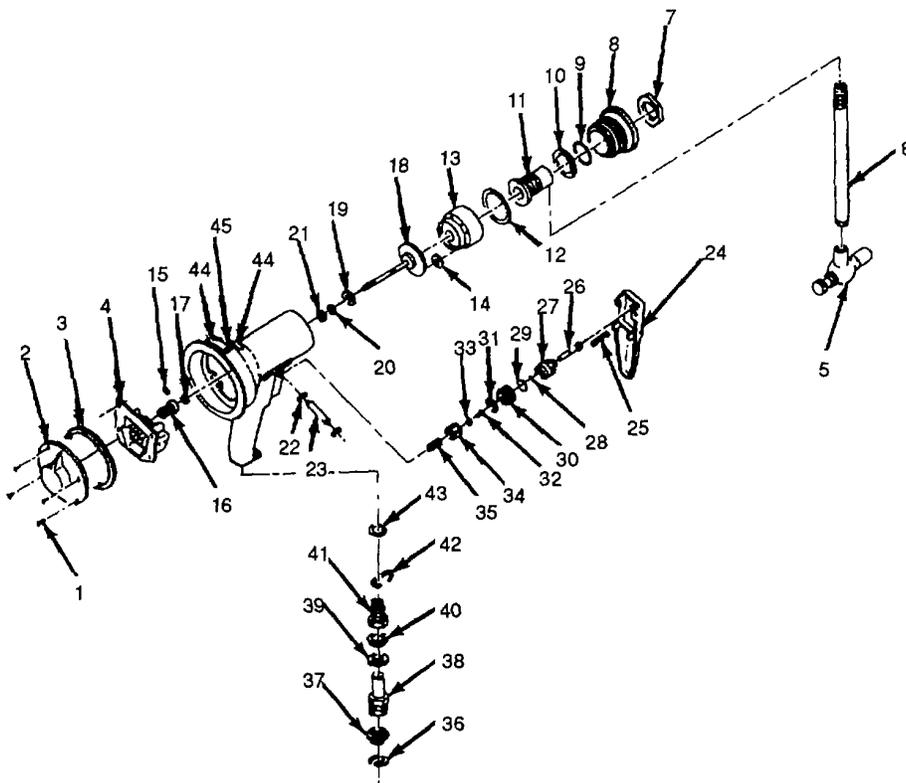


## REEL CABINET ASSEMBLY

### 5-7. GEAR LUBE DISPENSER - REPAIR - (Cont.)

#### c. Assembly - (cont.)

- (10) Install preformed packing (43), split ring (42) and swivel adapter (41).
- (11) Install block (40), washer (39), inlet (38), strainer (37) and ring (36). Position block (40) as shown.
- (12) Install spring (35), plunger (34), seat (33) and screw (32).
- (13) Install preformed packing (31), valve seat (30), preformed packing (29), preformed packing (28) and plug (27).
- (14) Install cap and pin (26), spring (25), lever assembly (24), pin (23), and two retaining rings (22).
- (15) Install leather washer (21), preformed packing (20), washer (19), gear and shaft (18), flatwasher (17), worm gear (16) and setscrew (15).
- (16) Install spur gear (14) and metering mechanism (13).
- (17) Install preformed packing (12), stem (11), lockwasher (10), preformed packing (9), plug (8) and nut (7).
- (18) Install extension (6) and nozzle assembly (5).
- (19) Install totalizer (4), gasket (3), and dial assembly (2) with four screws (1).



## REEL CABINET ASSEMBLY

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### 5-8. ENGINE OIL DISPENSER - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly
- 

INITIAL SET-UP:

Materials/Parts

Dry cleaning Solvent  
(Item 6, App. E)

Equipment Condition

Engine oil dispenser removed  
(para 4-19)

Tools

General Mechanics  
Tool Box (Section III, Item 1, App B)

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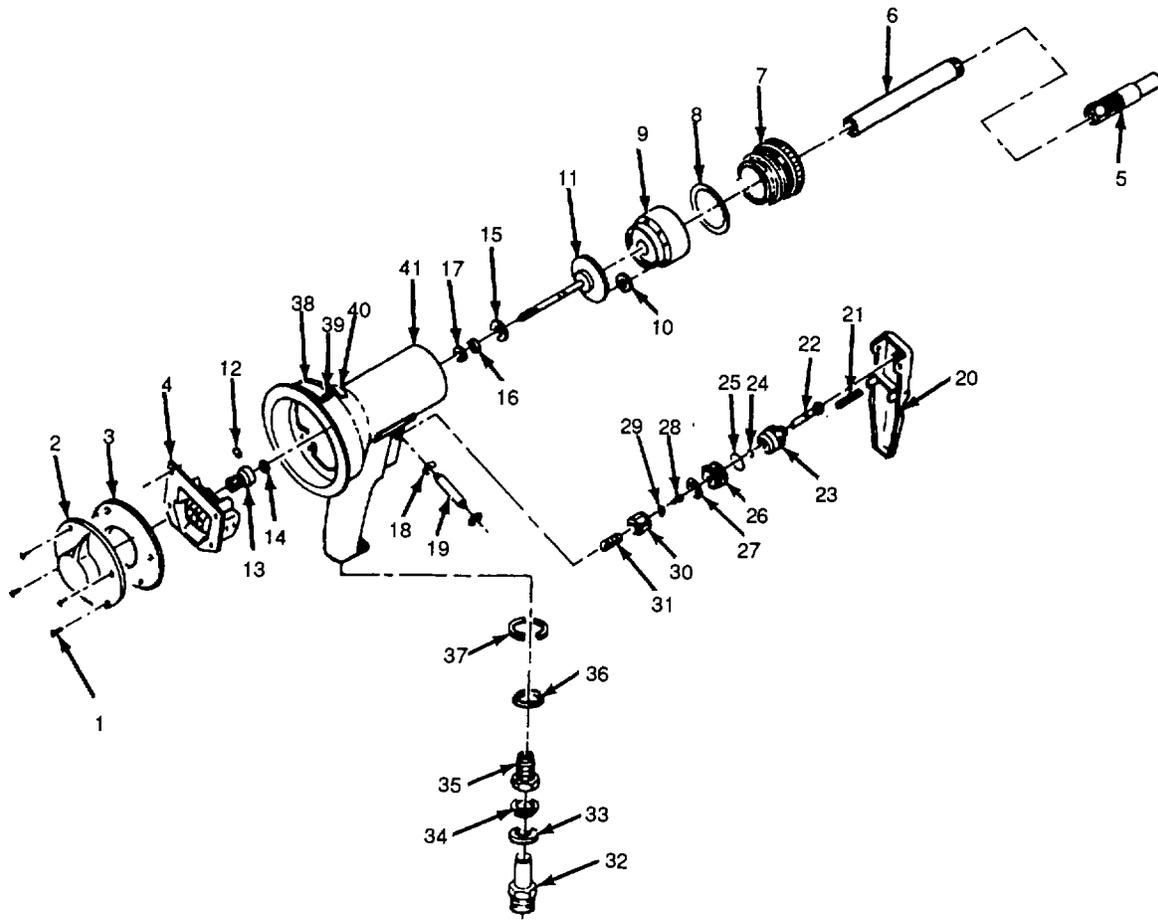
a. Disassembly

- (1) Remove four screws (1) and remove dial assembly (2), gasket (3) and totalizer (4).
- (2) Remove nozzle assembly (5) and extension (6).
- (3) Remove outlet fitting body (7), preformed packing (8), metering mechanism (9) and spur gear (10).
- (4) Remove setscrew (12), worn gear (13), flatwasher (14), gear and shaft (11), lockwasher (15), preformed packing (16) and leather washer (17).
- (5) Remove two retaining rings (18), pin (19), lever assembly (20), spring (21) and cap and pin (22).
- (6) Remove plug (23), preformed packing (24), preformed packing (25), valve seat (26) and preformed packing (27).
- (7) Remove screw (28), seat (29), plunger (30) and spring (31).
- (8) Remove stem (32), lockwasher (33) and block (34).
- (9) Remove swivel adapter (35), preformed packing (36), and split ring (37).

**NOTE**

**Remove two plates (39) only if illegible.**

- (10) Remove four screws (38) and two plates (39) from meter housing (40).

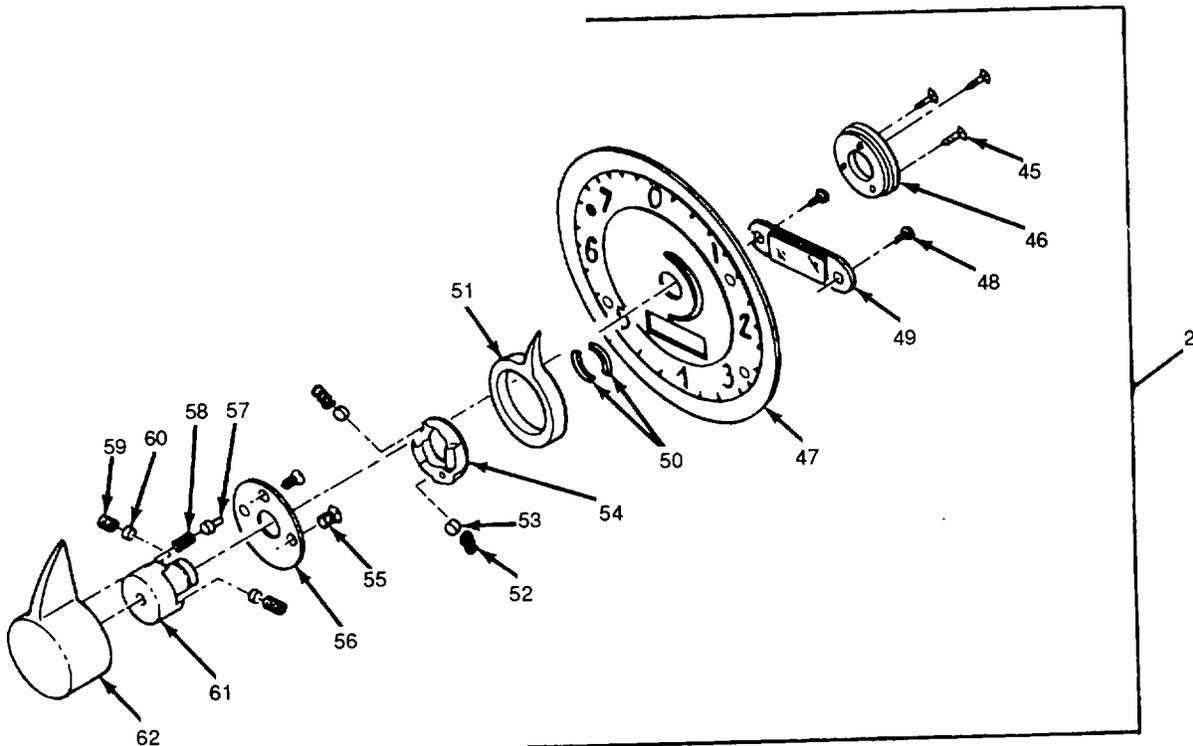


## REEL CABINET ASSEMBLY

### 5-8. ENGINE OIL DISPENSER - REPAIR - (Cont.)

a. Disassembly - (cont.)

- (11) To disassemble dial assembly (2) remove three screws (45), gear (46) and dial (47).
- (12) Remove two screws (48) and window (49) from dial (47).
- (13) Remove retainer (50), inner pointer (51), two springs (52), two rollers (53) and cam (54).
- (14) Remove two screws (55), plate (56), pin (57), spring (58), two springs (59), two rollers (60) and clutch (61) from knob (62).

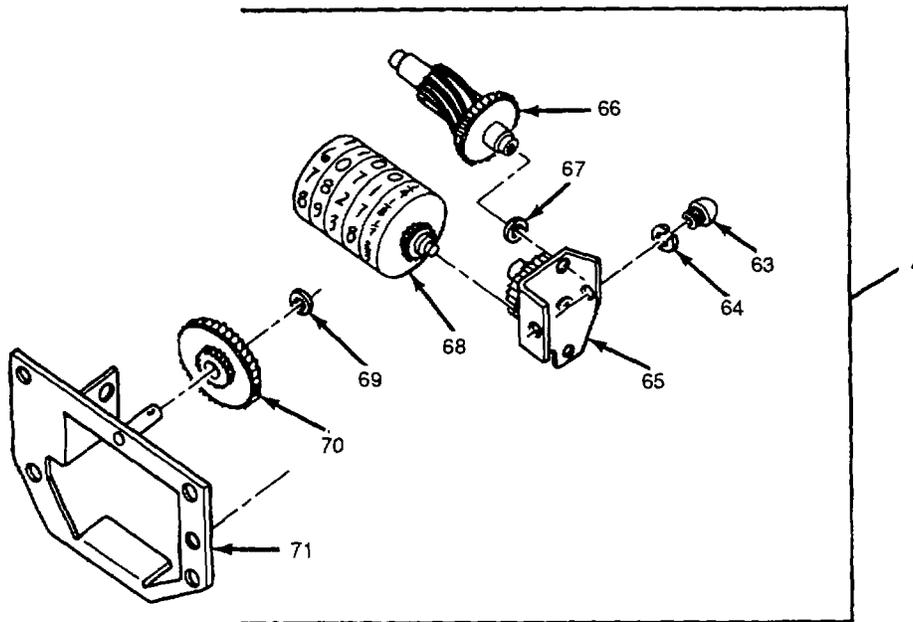


## REEL CABINET ASSEMBLY

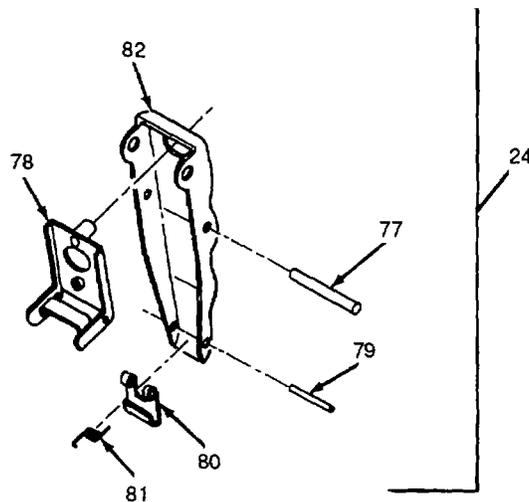
### 5-8. ENGINE OIL DISPENSER - REPAIR - (Cont.)

a. Disassembly - (cont.)

- (15) To disassemble totalizer (4), remove screw (63), lockwasher (64), bracket and idler assembly (65), gear assembly (66), washer (67) and odometer assembly (68).
- (16) Remove retaining ring (69) and gear (70) from plate and shaft assembly (71).



- (17) To disassemble lever assembly (24) remove rivet (77) and stop assembly (78), rivet (79), hook (80) and spring (81) from lever (82).



## REEL CABINET ASSEMBLY

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### 5-8. ENGINE OIL DISPENSER - REPAIR - (Cont.)

---

b. Repair

**WARNING**

**Worn or damaged parts can cause equipment malfunction which can lead to serious injury or equipment damage. Replace all damaged or worn parts.**

- (1) Replace all parts that are included in repair parts kit (TM 5-4930-233-24P).

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F - 138°(380C - 590C).**

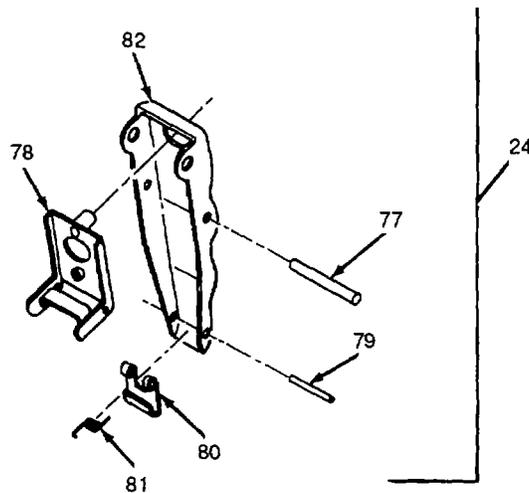
- (2) Clean all parts with dry cleaning solvent thoroughly. Small particles of dirt or foreign matter can cause malfunction.
- (3) Inspect gears for chipped or broken teeth. Replace as needed.
- (4) Inspect all parts for damaged threads, wear, deterioration or damage. Replace any damaged or worn parts.

## REEL CABINET ASSEMBLY

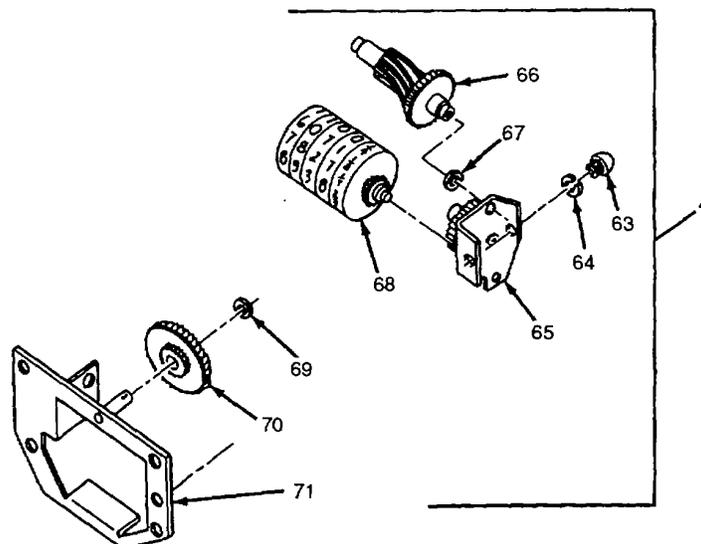
### 5-8. ENGINE OIL DISPENSER - REPAIR - (Cont.)

#### c. Assembly

- (1) To assemble lever assembly (24) install spring (81), hook (80) and rivet (79) to lever (82).
- (2) Install stop assembly (78) and rivet (77).



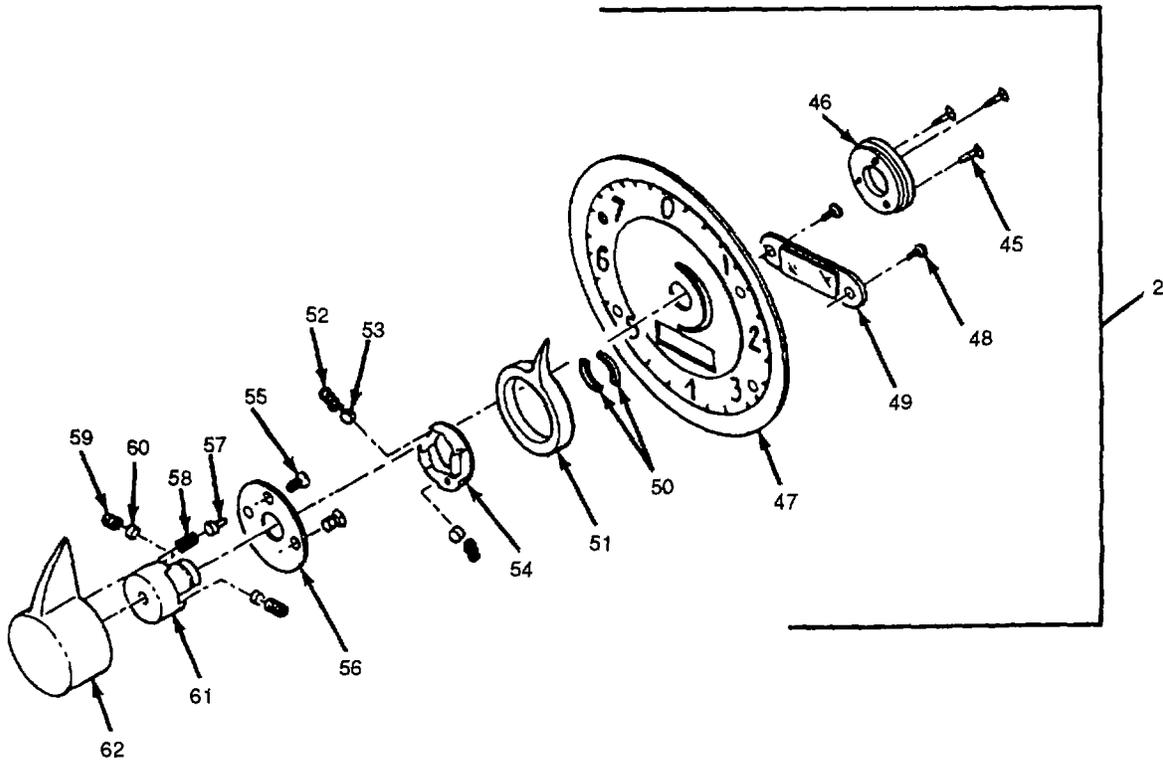
- (3) To assemble totalizer (4) lightly coat gears with grease and install gear (70) and retaining ring (69) to plate and shaft assembly (71).
- (4) Install odometer assembly (68), washer (67), gear assembly (66), bracket and idler assembly (65), lockwasher (64) and screw (63).



## REEL CABINET ASSEMBLY

### 5-8. ENGINE OIL DISPENSER - REPAIR- (Cont.)

- (5) To assemble dial assembly (2) install clutch (61), two rollers (60), two springs (59), spring (58), pin (57), plate (56) and two screws (55) to knob (62).
- (6) Install cam (54), two rollers (53), two springs (52), inner pointer (51) and retainer (50).
- (7) Install window (49) with two screws (48) to dial (47).
- (8) Install dial (47), gear (46) and three screws (45).

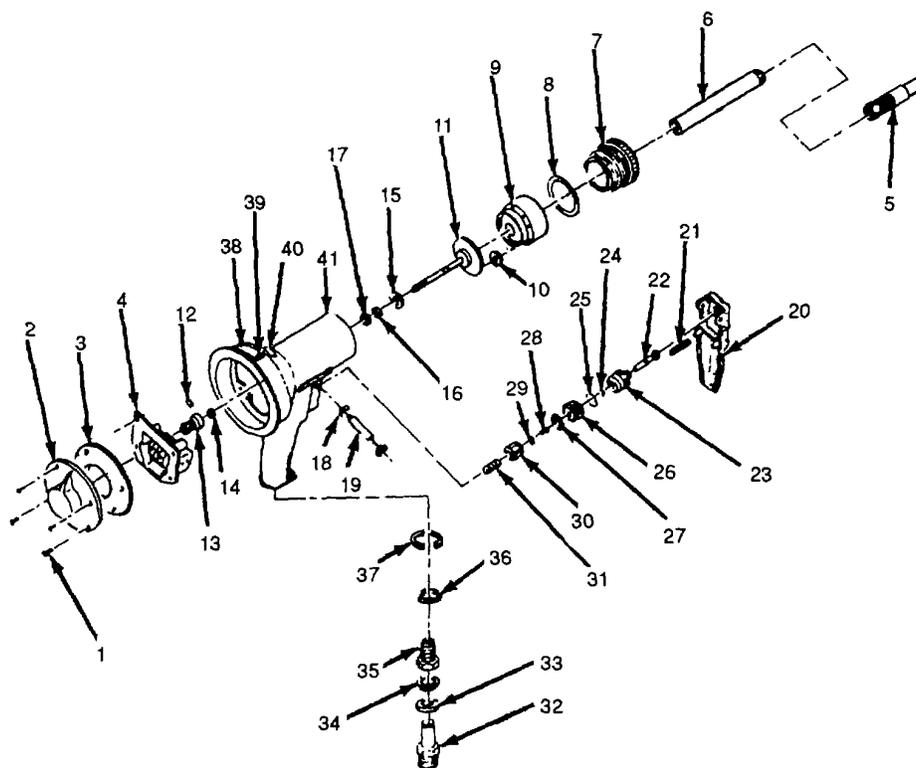


## REEL CABINET ASSEMBLY

### 5-8. ENGINE OIL DISPENSER - REPAIR - (Cont.)

c. Assembly - (cont.)

- (9) Install two plates (39) with four screws (38) to meter housing (40).
- (10) Install split ring (37), preformed packing (36) and swivel adapter (35).
- (11) Install block (34), washer (33), and stem (32). Position block as shown.
- (12) Install spring (31), plunger (30), seat (29) and screw (28).
- (13) Install preformed packing (27), valve seat (26), preformed packing (25), preformed packing (24) and plug (23).
- (14) Install cap and pin (22), spring (21), lever assembly (20), pin (19) and two retaining rings (18).
- (15) Install leather washer (17), packing (16), lockwasher (15), gear and shaft (11), flatwasher (14), worn gear (13) and setscrew (12). Be sure that setscrew (12) is tightened on to the flat side of the shaft.
- (16) Install spur gear (10), metering mechanism (9), preformed packing (8) and outlet body (7).
- (17) Install extension (6) and nozzle assembly (5).
- (18) Install totalizer (4), gasket (3), dial assembly and four screws (1).



## REEL CABINET ASSEMBLY

---

### 5-9. GREASE CONTROL VALVE - REPAIR/ADJUST

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly                                      d. Adjustment
- 

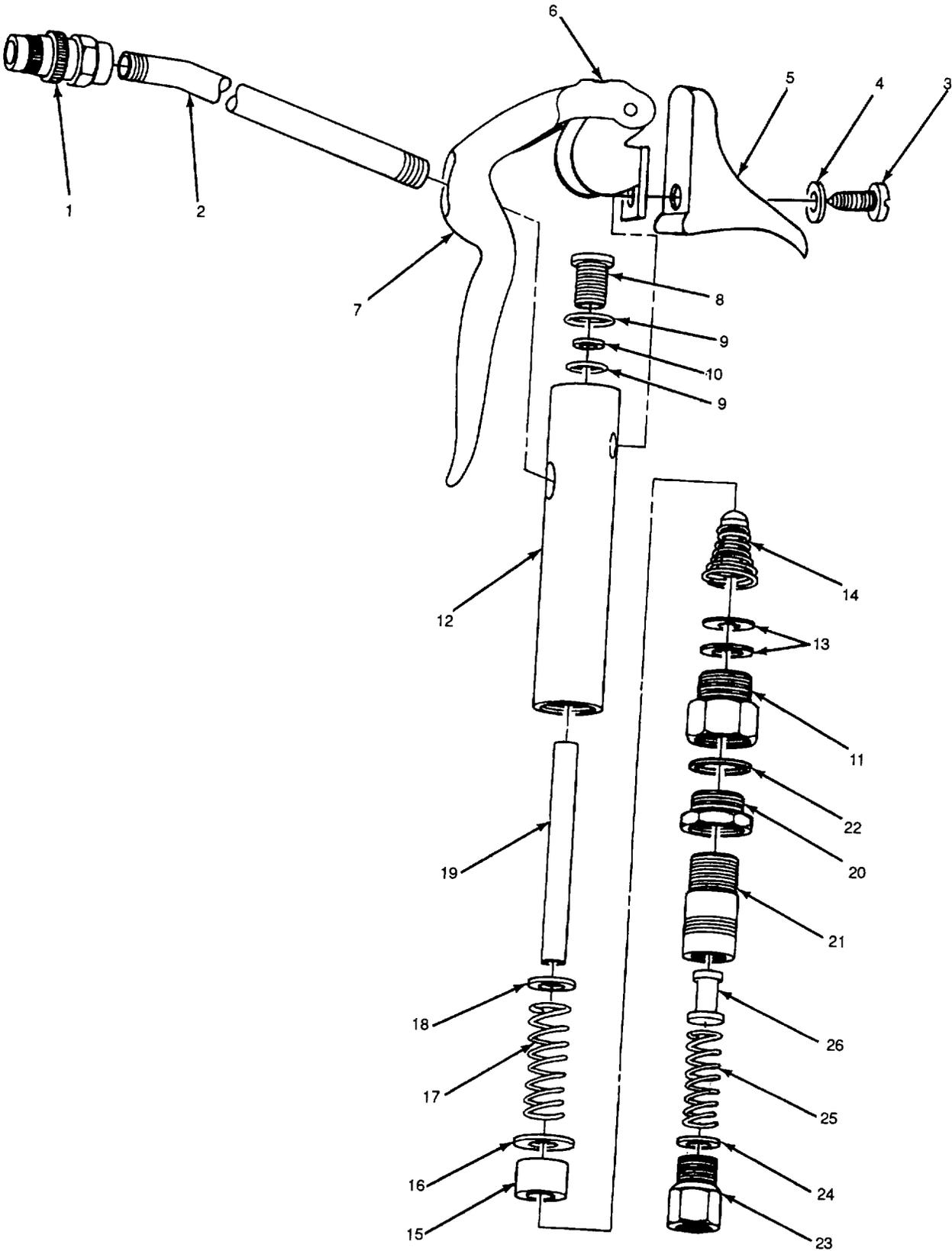
INITIAL SET-UP:

<u>Materials/Parts</u>	<u>Equipment Condition</u>	<u>Tools</u>
Dry cleaning solvent (Item 6, App. E)	Grease Control Valve Removed (para. 4-19)	General Mechanics Tool Box (Section III, Item 1, App B)

---

a. Disassembly

- (1) Remove hydraulic coupler (1) and extension (2).
- (2) Remove screw (3), lockwasher (4), support casting (5), setscrew (6) and lever assembly (7).
- (3) Remove packing plug (8), two preformed packings (9) and leather washer (10) between items (9) inside (8).
- (4) Remove retaining bushing (11) and fittings from body (12).
- (5) Remove two gaskets (13), valve assembly (14), spacer (15), gasket (16), spring (17), washer (18), and plunger stem (19).
- (6) Loosen locknut (20) and remove adjustment screw (21) and packing ring (22) from retaining bushing (11).
- (7) Remove connector (23), preformed packing (24), spring (25), valve seat (26) and locknut (20) from adjustment screws (21).



## REEL CABINET ASSEMBLY

---

### 5-9. GREASE CONTROL VALVE - REPAIR/ADJUST - (Cont.)

---

#### b. Repair

##### WARNING

**Worn or damaged parts can cause equipment malfunction which can lead to serious injury or equipment damage. Replace all damaged or worn parts.**

- (1) Replace all parts that are included in repair parts kit (TM 5-4930-233-24P).

##### WARNING

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°).**

- (2) Clean all parts with dry cleaning solvent thoroughly. Small particles of dirt or foreign matter can cause malfunction.
- (3) Inspect all parts for damaged threads, wear, deterioration or damage. Replace any damaged or worn parts.

#### c. Assembly

- (1) Install locknut (20), valve seat (26), spring (25), preformed packing (24) and connector (23) to adjustment screw (21).
- (2) Install packing ring (22), adjustment screw (21) and locknut (20) to retaining bushing (11).
- (3) Install plunger stem (19), washer (18), spring (17), gasket (16), spacer (15), valve assembly (14) and two gaskets (13).
- (4) Install retaining bushing (11) to body (12).
- (5) Install lever assembly (7), setscrew (6), support casting (5), lockwasher (4) and screw (3).
- (6) Install extension (2) and hydraulic coupler (1).
- (7) Adjust grease control valve (para. 5-9d).



## REEL CABINET ASSEMBLY

---

### 5-9. GREASE CONTROL VALVE - REPAIR/ADJUST- (Cont.)

---

d. Adjustment

- (1) Tighten setscrew (6) so that there is 1/8 inch (3.175 mm) clearance between bottom of lever (7), hole and extension (2).
- (2) To adjust for single shot delivery, disconnect grease control valve from lube hose.

**CAUTION**

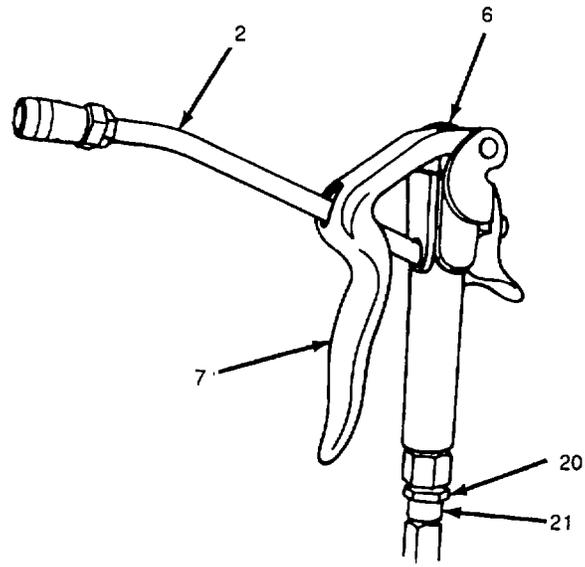
**Do not force adjustment screw (21) as damage to equipment can result.**

- (3) Loosen locknut (20) and turn adjustment screw (21) clockwise until a definite stop is felt.
- (4) Turn adjustment screw (21) back (counterclockwise) approximately one and a quarter turns. Tighten locknut (20).
- (5) Reconnect control valve to hose and test single shot delivery.
- (6) If delivery volume in single shot mode is unsatisfactory, the following readjustment procedure should be performed.

**WARNING**

**The adjustment procedure which follows can be dangerous for unskilled personnel because improper loosening of the nuts and adjustment screw could cause the control valve connections to blow apart with resultant injury to personnel and property, since lubricant is under high pressure.**

- (7) Disconnect control valve from lube hose.
- (8) Loosen locknut (20) approximately 1/8 turn but do not allow locknut to come off.
- (9) Turn adjustment screw (21) about an eighth of a turn clockwise to decrease delivery, or turn screw counterclockwise to increase amount of lubricant delivered.
- (10) Tighten locknut (20) and test delivery.
- (11) If delivery is unsatisfactory, repeat steps (7) through (10).



## REEL CABINET ASSEMBLY

---

### 5-11. AIR COMPRESSOR ASSEMBLY - TEST

---

This task covers:

Test

---

#### INITIAL SET-UP:

##### References

TB 43-0151  
Inspection and test  
of air and other gas  
compressors.

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

Test

Perform tests as required by TB 43-0151 for direct support maintenance. These tests should be performed periodically as indicated.

## AIR COMPRESSOR ASSEMBLY

---

### 5-12. STARTER - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly                                      d. Test
- 

#### INITIAL SET-UP:

##### Materials/Parts

Dry cleaning solvent  
(Item 6, App. E)  
Cloth (Item 22, App E)

##### Equipment Condition Page

Starter removed (para. 4-23)

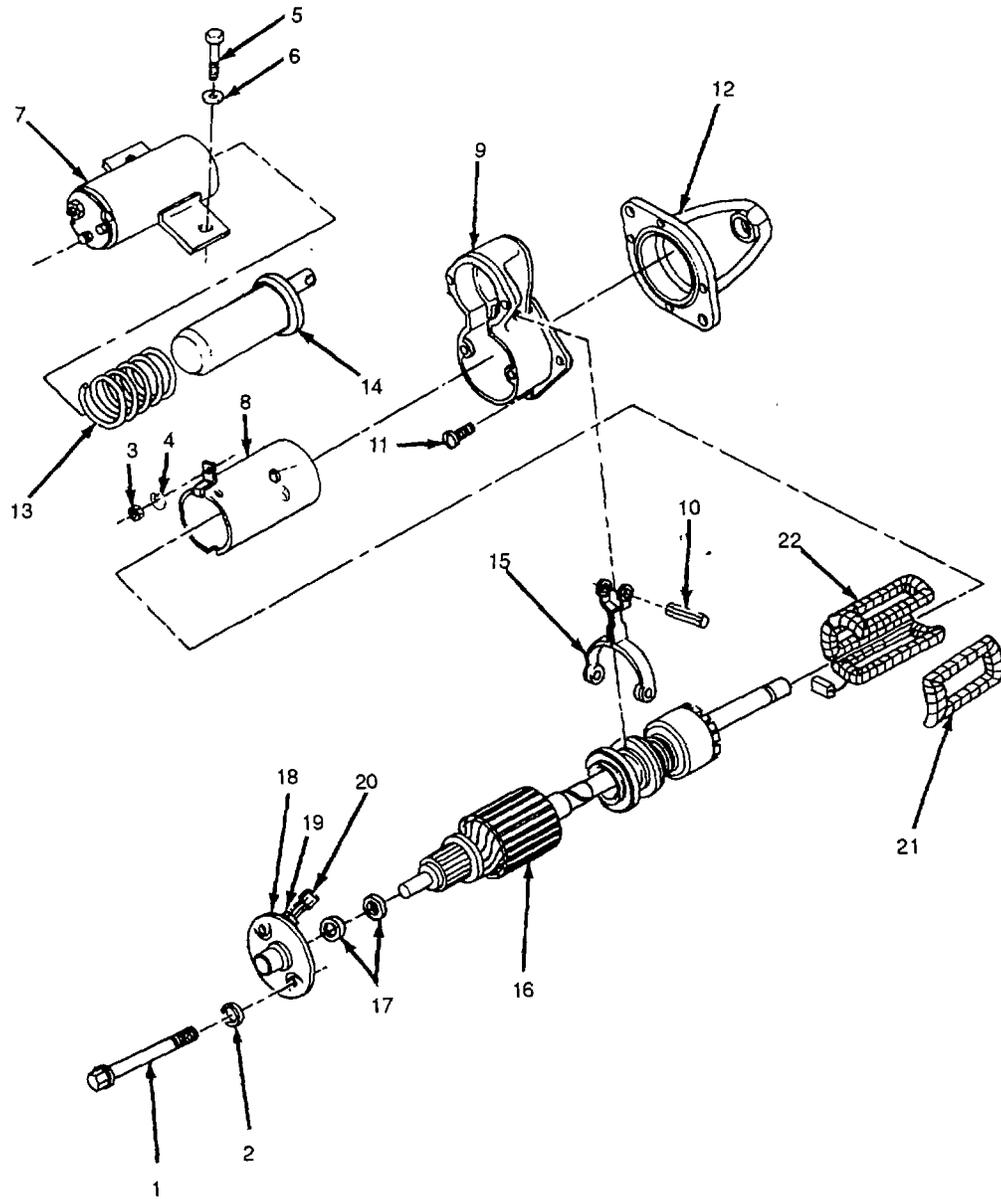
##### Tools

General Mechanics Tool Box (Section III, Item 1,  
App B) Lathe (Section III, Item 9, App B)  
Multimeter (Section III, Item 4, App B)

---

#### a. Disassembly

- (1) Remove two screws (1) and two lockwashers (2).
- (2) Remove one nut (3) and one lockwasher (4).
- (3) Remove two screws (5), two lockwashers (6) and solenoid switch (7).
- (4) Separate housing (8) from shift lever housing (9).
- (5) Remove pin (10) from shift lever housing (9).
- (6) Remove four screws (11), separate shift lever housing (9) from drive housing (12)
- (7) Remove spring (13), core assembly (14), forkshifter (15), motor armature assembly (16) and two washers (17).
- (8) Remove brushes (18) and brush holders (19).
- (9) Remove grommet (20) from housing (8).
- (10) Remove field coils (21) and field assembly (22) from housing (8).



## AIR COMPRESSOR ASSEMBLY

---

### 5-12. STARTER - REPAIR - (Cont.)

---

b. Repair

#### WARNING

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Use a cloth dampened with dry cleaning solvent to wipe all dust, oil, and other foreign material from the brush plates, end frames, and armature and field assemblies.
- (2) Use filtered compressed air to blow dust and dirt from the crevices of the armature and field windings.
- (3) Secure armature in a lathe with armature spinning, hold a sheet of No. 000 sandpaper against the commutator until the copper is bright and smooth.
- (4) Examine field frame assembly for cracks or warping. Inspect armature shaft end for damage or wear. Replace defective parts.
- (5) Examine clutch for broken or cracked teeth. Replace if damaged.
- (6) Examine field coils for worn, burned, and frayed insulation. Be certain connections between field coils are secure. Repair connections if necessary.
- (7) Inspect springs for distortion or fatigue. Examine brushes for damage or excessive wear. Replace if needed.
- (8) Check brushholder for shorts. Replace if shorted.
- (9) Test armature assembly for open coils and shorts to ground, or between coils.
- (10) Check field coils for open circuits and shorts to ground, or between coils.
- (11) If commutator is out-of-round in excess of 0.001 inch (0.0254 mm) turn down on lathe.
- (12) Replace all parts indicating wear, cracks, or damage.
- (13) Undercut mica insulation between the commutator bars to a depth of 1/32 of an inch (.7937 mm). When undercutting mica, the cut should be square and free of burrs.

## AIR COMPRESSOR ASSEMBLY

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### 5-12. STARTER - REPAIR - (Cont.)

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c. Assembly

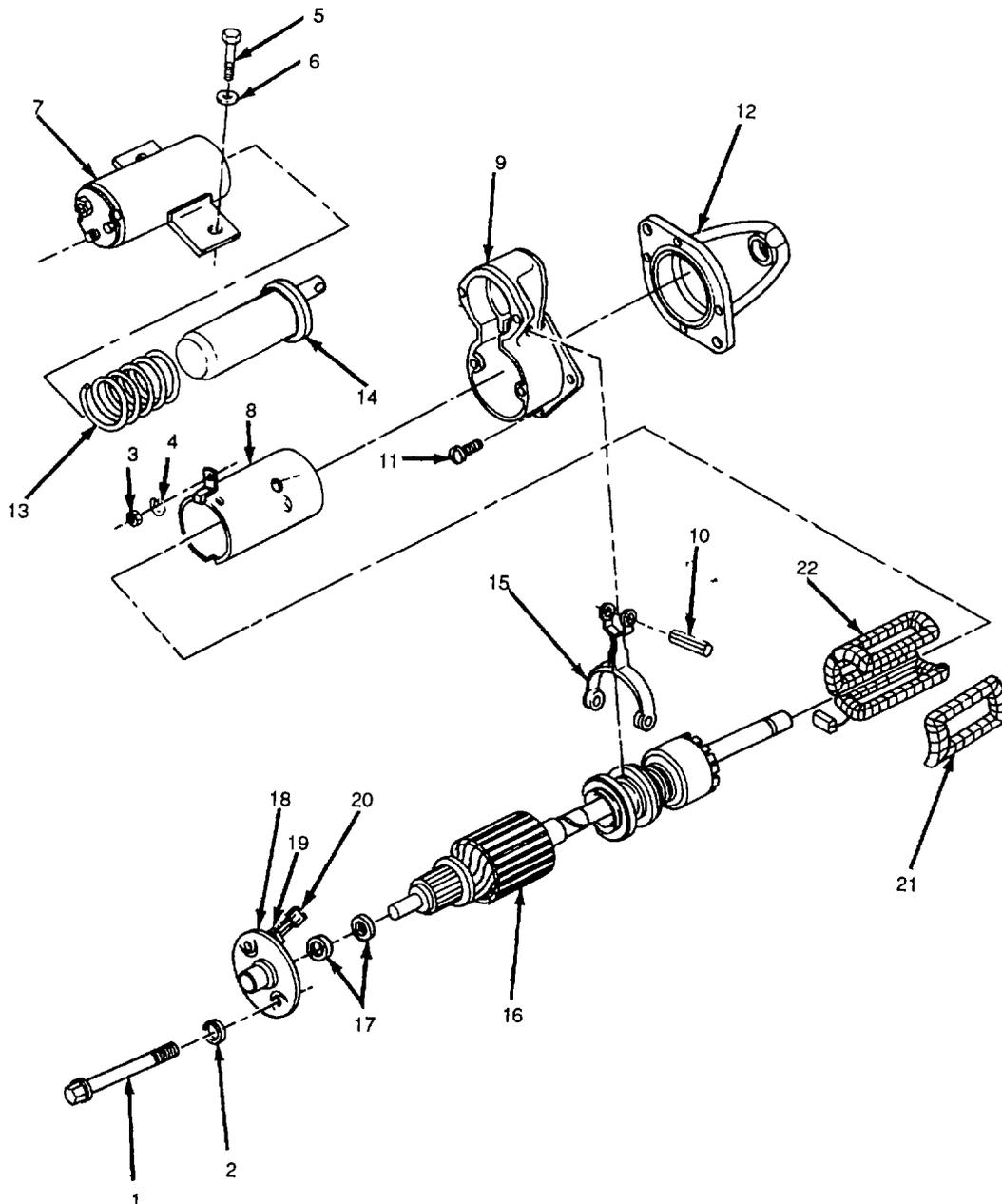
- (1) Install field assembly (22) and field coils (21) in housing (8).
- (2) Install grommet (20) in housing (8).
- (3) Install brush holders (19) and brushes (18).
- (4) Install two washers (17), motor armature assembly (16), forkshifter (15), core assembly (14) and spring (13) into shift lever housing (9).
- (5) Install drive housing (12) into shift lever housing (9) with four screws (11).
- (6) Install pin (10) into shift lever housing (9).
- (7) Position shift lever housing (9) and housing (8).
- (8) Install solenoid switch (7), two lockwashers (6) and two screws (5) into housing (8).
- (9) Install lockwasher (4) and nut (3).
- (10) Install two lockwashers (2) and two screws (1).

AIR COMPRESSOR ASSEMBLY

5-12. STARTER - REPAIR - (Cont.)

d. Test

- (1) Connect the starting motor to a 24 volt dc supply. With an ammeter and voltmeter connected in the circuit, apply voltage to the starting motor.
- (2) With the starting motor armature turning approximately 6,000 rpm, the ammeter should be indicating 23 volts.



## AIR COMPRESSOR ASSEMBLY

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### 5-13. ALTERNATOR - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly
- 

#### INITIAL SET-UP:

<u>Materials/Parts</u>	<u>Equipment Condition</u>	<u>Tools</u>
Solvent, PD-680a, Type III (Item 19, App E)	Alternator Removed (para 4-24)	General Mechanics Tool Box (Section III, Item 1, App B)
Soft Bristle Brush (Item 24, App E)		Multimeter (Section III, Item 4, App B)
Solder Lead, Tin (Item 16, App E)		Solder Gun (Section III, Item 3, App B)
Cloth (Item 22, App E)		

---

#### a. Disassembly

- (1) Remove three screws (1) which secure cover and connector assembly (2) to housing (3).
- (2) Remove two nuts (4), two lockwashers (5), tag and disconnect leads from cover and connector assembly (2).
- (3) Remove cover and connector assembly (2).
- (4) Remove eight screws (6) which secure housing (3) to front housing (7) and remove housing (3).
- (5) Remove two nuts (4), two washers (5), two spacers (8).
- (6) Remove three screws (10), two nuts (35), two lockwashers (36), tag and disconnect leads from regulator (12), and remove regulator.
- (7) Remove two screws (11) and remove cover (13) and brush assembly (14).

#### CAUTION

**Because it may damage stator windings, do not use sharp tools between front and rear housings:**

- (8) Mark front and rear housings for use in assembly. Remove nut (9), lockwasher (8), three nuts with starwashers attached (34), three flatwashers (33) and three insulators (32).
- 9) Remove four bolts (15) and nuts (16) to free rear housing (17). While gently rapping with rawhide hammer, worm rear housing (17) free.

## AIR COMPRESSOR ASSEMBLY

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### 5-13. ALTERNATOR - REPAIR - (Cont.)

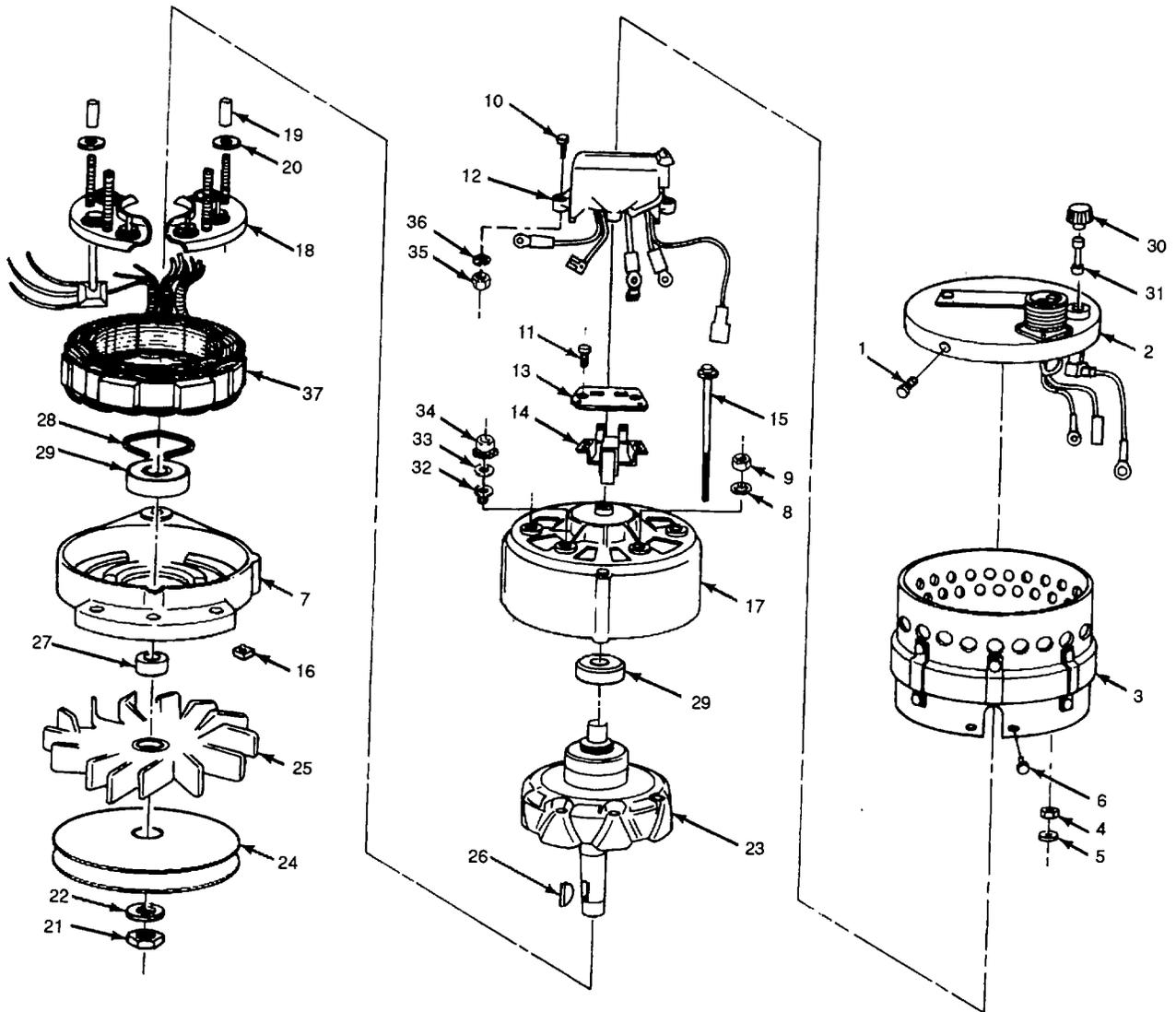
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- (10) Remove two rectifier diode assemblies (18) and place spacers (19) and washers (20) over threaded studs of diode assemblies.

#### CAUTION

**To prevent possible damage to rectifier diodes when unsoldering, grasp diode connections with long nose pliers or other heat sink device.**

- (11) As required unsolder leads from stator (37) going to diode assemblies (18) and remove diode assemblies.
- (12) Remove nut (21) and lockwasher (22) from end of rotor assembly (23) by locking nut (21) in bench vise and turning rotor assembly (23) by hand.
- (13) Remove pulley (24) and fan (25) from end of rotor assembly (23).
- (14) Slip woodruff key (26) and spacer (27) off end of rotor assembly (23).
- (15) Remove retaining ring (28) and two bearings (29).
- (16) Remove cap (30) and fuse (31) from cover (2).



## AIR COMPRESSOR ASSEMBLY

---

### 5-13. ALTERNATOR - REPAIR - (Cont.)

---

b. Repair

#### CAUTION

**Do not immerse alternator assembly in cleaning solvent of any kind. Do not clean isolation diodes with cleaning solvent. The diodes are coated with a special corrosion resistant paint. Failure to follow this caution can lead to severe equipment damage.**

#### WARNING

**Cleaning solvent is flammable and toxic to the skin, eyes, and respiratory tract. Skin, eye, and respiratory tract protection is required.**

- (1) Clean parts with a soft bristle brush moistened with tri-ethane.

#### WARNING

**Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (207 KPa). Wearing of goggles is required.**

- (2) Dry parts with filtered, low-pressure compressed air or a clean lint-free cloth.
- (3) Inspect brush assembly for excessive wear, replace brush assembly if 3/16 of inch (4.76 mm) or less extends beyond bottom of holder.
- (4) Check brush assembly spring tension with suitable spring scale. Spring tension should be 4 to 6 ounces (112 to 168 grams).
- (5) Test rectifier diode in heat sinks connecting one of multimeter leads to the heat sink and the other multimeter lead to the diode stem, and note the reading. Then reverse the multimeter lead connections, and note the reading. If both readings are very low, or if both readings are very high, the diode is defective. A good diode will give one low reading and one high reading (at least 100 times the low reading).
- (6) Test isolation diode assembly by connecting one of the multimeter test leads to the output terminal stud of the diode, the other to the exposed metal area on heat sink, and note reading. Then reverse the lead connections and note reading. If both readings are very low, or if both readings are very high, the diode is defective.

## AIR COMPRESSOR ASSEMBLY

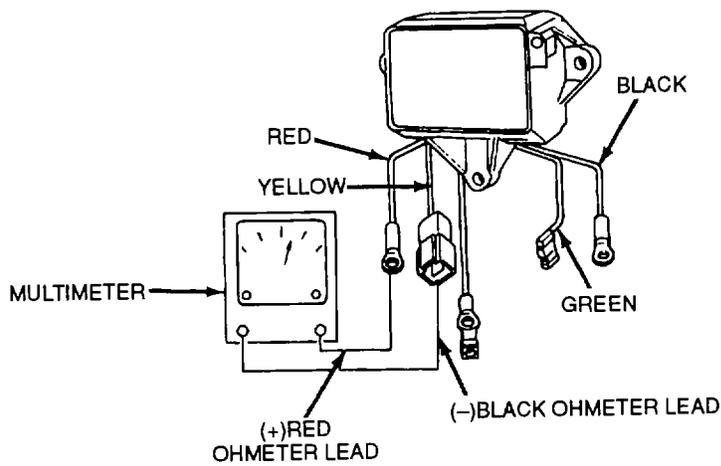
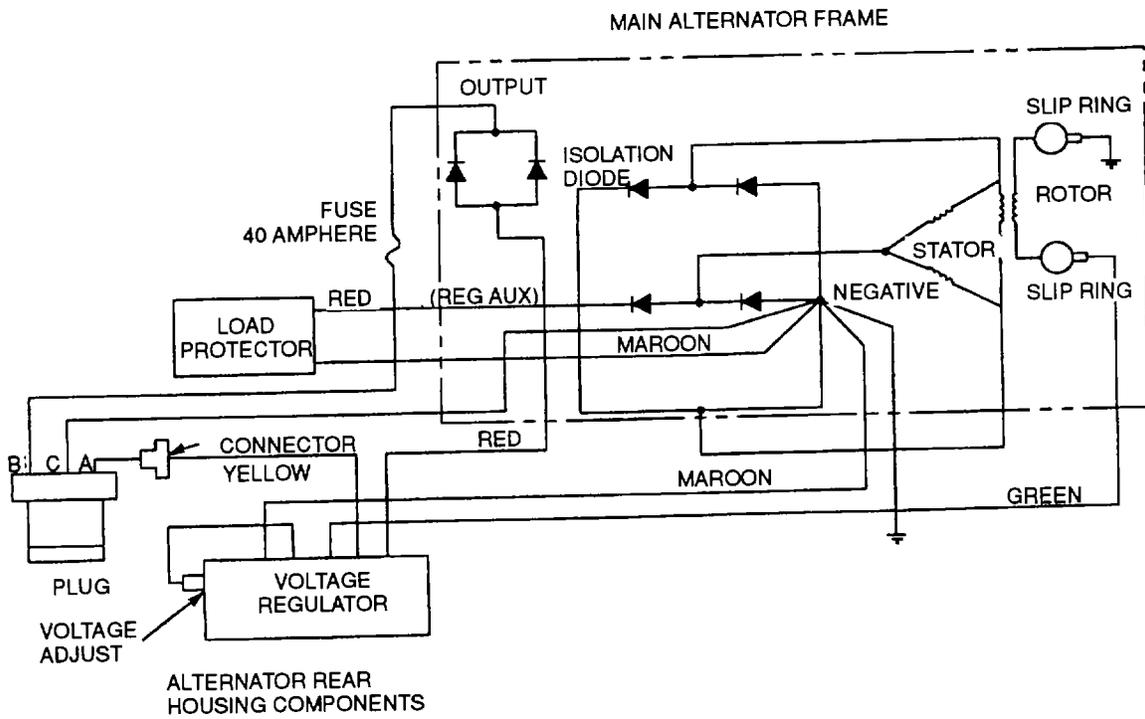
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### 5-13. ALTERNATOR - REPAIR - (Cont.)

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b. Repair (cont.)

- (7) Test stator assembly for grounds and opens as follows:
  - (a) Connect the multimeter (set to lowest resistance range) to two pairs of stator leads; if reading is very high (over 10 ohms) the stator winding is open.
  - (b) To test the stator for grounds, connect the multimeter from any stator lead to the ground screw or the shell, and note the reading. If reading is very low, the stator is shorted to ground (defective).
- (8) Test rotor assembly for grounds between slip ring and shaft, using a multimeter. An open circuit from either slip ring to shaft is a correct condition.
- (9) Perform resistance check on rotor assembly windings using a multimeter; resistance should be between 11 to 14 ohms.
- (10) Test voltage regulator by connecting multimeter leads to regulator leads as follows:
  - (a) Connect multimeter lead (+) to regulator yellow lead and multimeter lead (-) to regulator red lead; multimeter should indicate between 300 to 350 ohms.
  - (b) Connect multimeter lead (+) to regulator red lead and multimeter lead (-) to regulator yellow lead; multimeter should indicate an open circuit.
  - (c) If above readings are not obtained, replace regulator.
- (11) Inspect fan for cracked or broken fins. Check fan bore for wear.
- (12) Inspect pulley for worn drive surfaces and condition of key groove. Check pulley bore for wear.
- (13) Inspect front bearing cavity for evidence of wear. Check condition of retainer recess.
- (14) Check slip rings for pitting, roughness, or burned spots. If surface is worn beyond repair, replace entire rotor assembly.
- (15) Inspect rotor shaft for key slot wear, worn bearing surfaces, scuff marks on pole fingers, and condition of threads on pulley nut.
- (16) Inspect bearings for scored, pitted, scratched, cracked, or chipped races.
- (17) Replace any part or component that is damaged, worn or defective.



## AIR COMPRESSOR ASSEMBLY

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### 5-13. ALTERNATOR - REPAIR - (Cont.)

---

c. Assembly

**NOTE**

**Refer to alternator wiring diagram when connecting electrical leads.**

- (1) Press two bearings (29) in front and rear housings (17 and 7), respectively.
- (2) Install two retaining rings (28) to secure bearings in place.
- (3) Place longer end of rotor assembly (23) shaft through front housing (7).
- (4) Place spacer (27) over longer end of shaft.
- (5) Place woodruff key (26) into mechanical keyway in longer end of shaft.
- (6) Align slots in fan (25) and pulley (24) with woodruff key and press over end of shaft.
- (7) After placing washer (22) over end of shaft, screw (finger tight) nut (21) onto threaded end of shaft.
- (8) To prevent rotor assembly (23) from turning when tightening nut (21), wrap an oversize belt around pulley and clamp pulley in vise. Tighten nut (21).
- (9) After placing washers (20) and spacers (19) over threaded studs of diode assemblies, install stator (37) and two diode assemblies (18) in rear housing (17).

**NOTE**

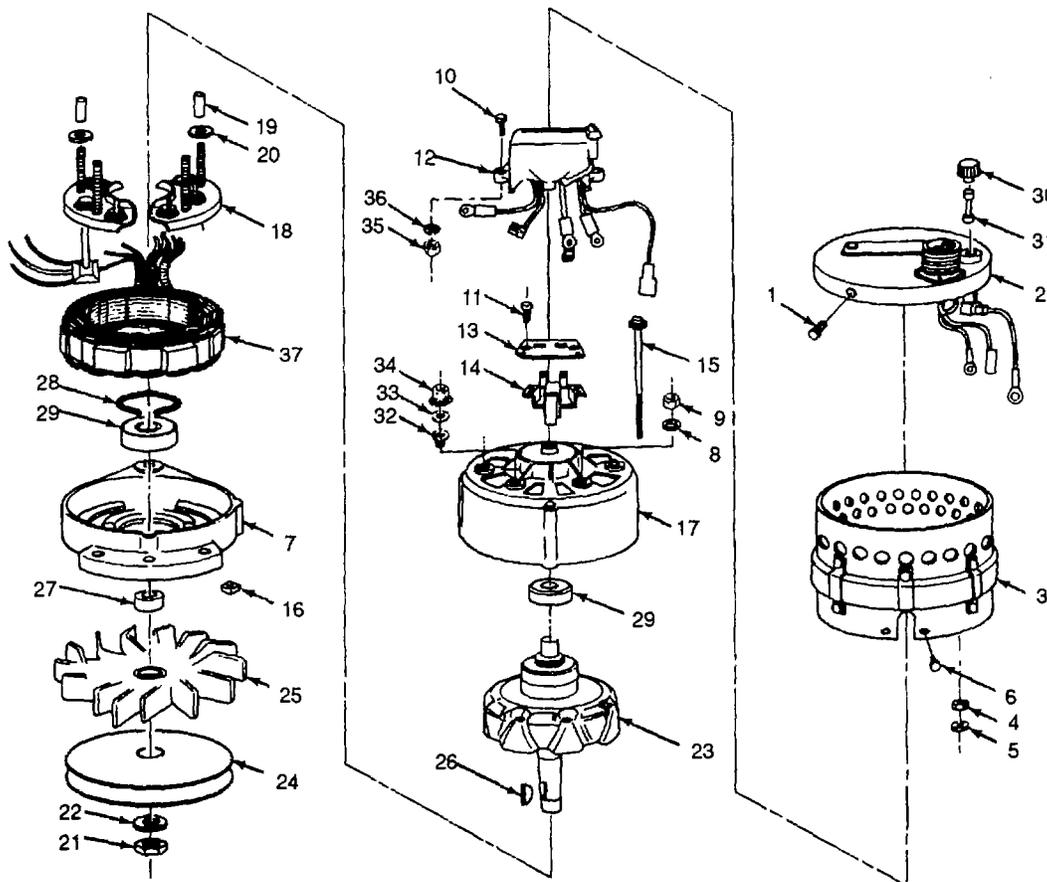
**To prevent heat damage to rectifier diodes when soldering, use heat sink between soldering iron and diode.**

- (10) Reconnect stator leads as directed by tagging done during disassembly.
- (11) Install nut (9), lockwasher (8), three nuts with starwashers attached (34), three flatwashers (33) and three insulators (32).
- (12) After ensuring that rotor assembly (23) turns freely, secure front and rear housings in place with bolts (15) and nuts (16).
- (13) Mount brush assembly (14) over rear housing (17) and secure in place with cover (13) and two screws (11).

## AIR COMPRESSOR ASSEMBLY

### 5-13. ALTERNATOR - REPAIR - (Cont.)

- (14) Using two screws (10), two nuts (35), and two lockwashers (36) secure regulator (12) in place on rear housing (17). Connect leads from regulator as indicated by tagging diode during disassembly.
- (15) Secure over threaded studs projection from rear housing (17) with spacers (8), washers (5), and nuts (4).
- (16) Position housing (3) over alternator and secure in place with screws (6).
- (17) Connect leads and connector with two nuts (4) and two lockwashers (5) as indicated by tagging done during disassembly.
- (18) Using three screws (1), secure cover and connector assembly (2) in place over end of housing (3).
- (19) Install fuse (31) and cap (30) in cover.
- (20) Test alternator in accordance with para 4-24.



## AIR COMPRESSOR ASSEMBLY

---

### 5-14. AIR COMPRESSOR - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                      c. Assembly
- 

#### INITIAL SET-UP:

##### Materials/Parts

Dry Cleaning Solvent  
(Item 6, App E)  
Tape (Item 17, App. E)

##### Equipment Condition

Air Compressor Removed  
(para 4-29)  
Air Compressor hose, lines and fittings  
Removed (para 4-32)

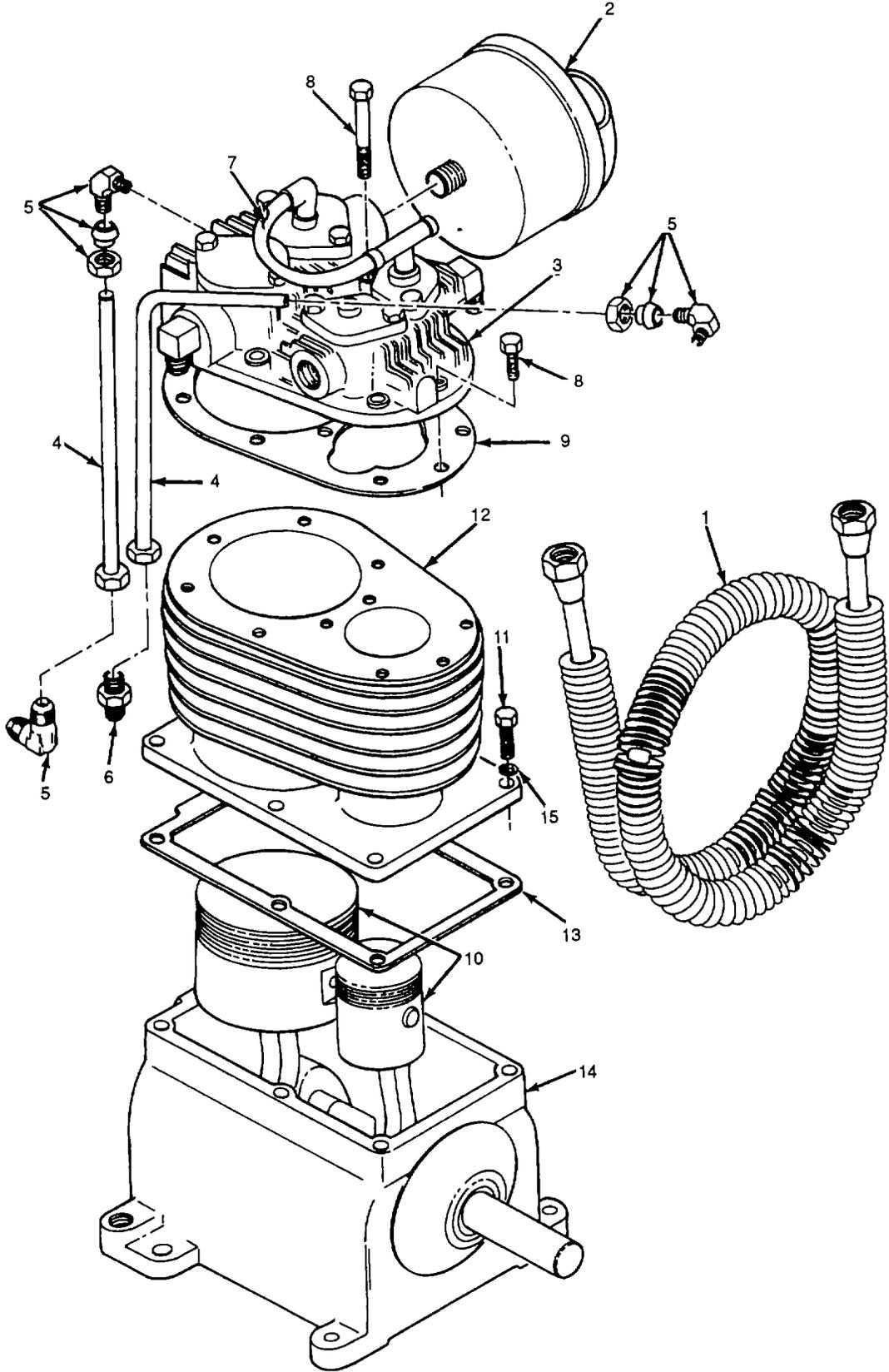
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Torque Wrench  
(Section III, Item 6, App B)

---

#### a. Disassembly

- (1) Remove intercooler (1) and air filter (2) from head (3).
- (2) Disconnect and remove two breather tubes (4), three elbow breather connectors (5) and straight breather connector (6).
- (3) Disconnect and remove unloading tube (7).
- (4) Remove ten screws (8), cylinder head assembly (3) and gasket (9).
- (5) Mark pistons (10) on flywheel side so they can be reinstalled in the same position.
- (6) Remove six screws (11) and six lockwashers (15).
- (7) Gently twist cylinder (12) back and forth while pulling upward to remove. Take care not to allow connecting rods and pistons to strike metal when cylinder is removed.
- (8) Remove all traces of gasket (13) from cylinder (12) and base and cup assembly (14).



## AIR COMPRESSOR ASSEMBLY

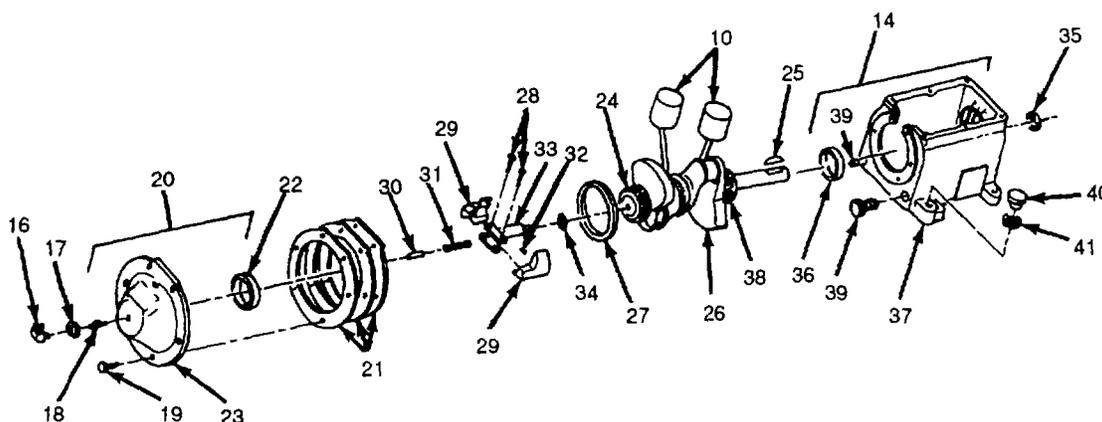
### 5-14. AIR COMPRESSOR - REPAIR - (Cont.)

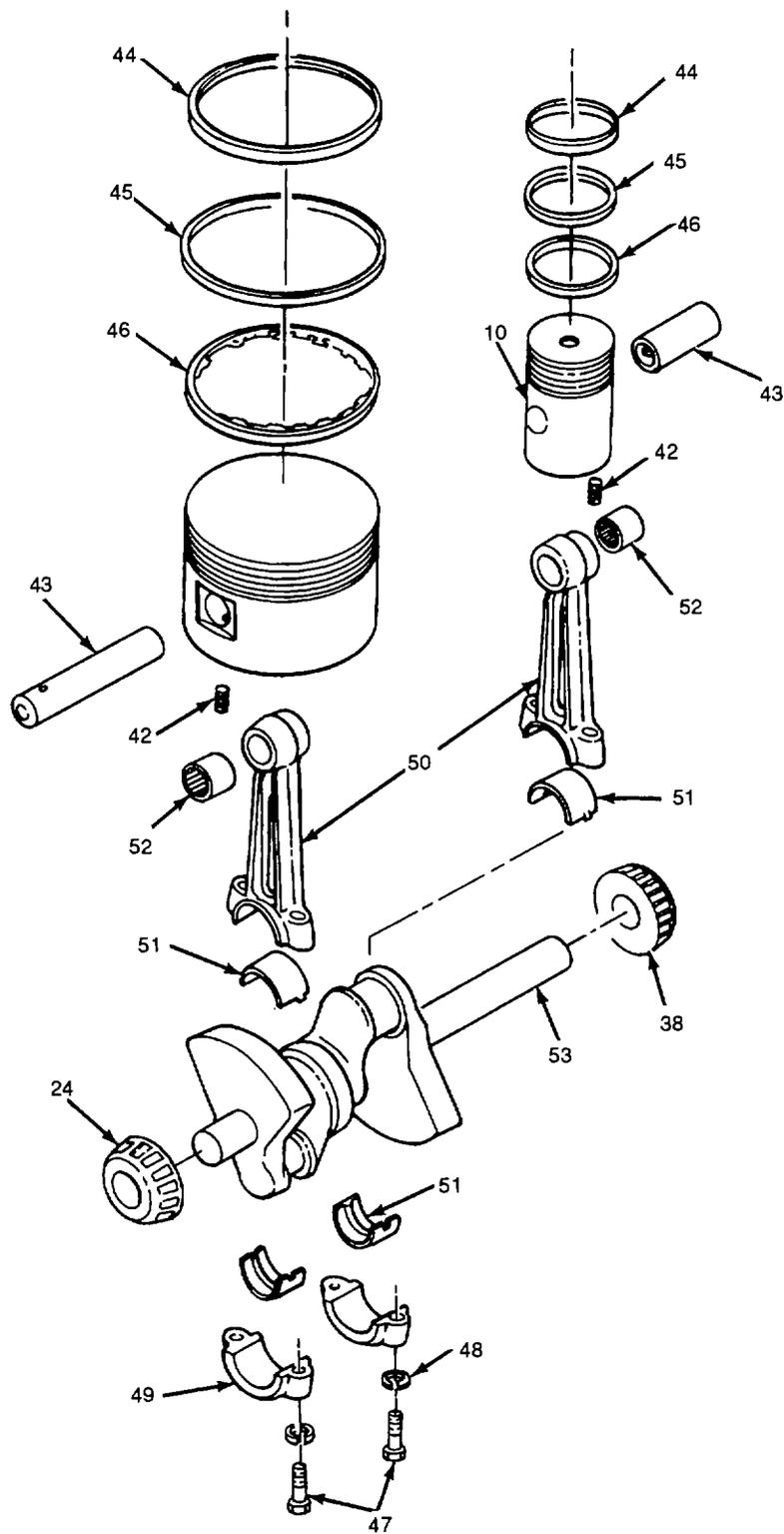
#### a. Disassembly - (cont.)

#### WARNING

**Take care that pistons are not scratched or damaged during removal.**

- (9) Remove elbow (16) and locknut (17).
- (10) Remove six screws (19), end cover and cup assembly (20) and three gaskets (21).
- (11) Remove two rivets (28), two weights (29), plunger (18), air valve (30), spring (31) and two bumper springs (32).
- (12) Remove bearing cup (22) from end cover (23) only if damaged or if bearing (24) is to be replaced.
- (13) Remove tape and key (25) from crankshaft and cone assembly (26). Slide crankshaft and cone assembly (26) along with pistons (10) and oil feeder ring (27) out of base and cup assembly (14) being careful not to damage feeder ring.
- (14) Remove weight retainer and shaft (33) and washer (34) from crankshaft.
- (15) Drive oil seal (35) out of base and cup assembly (14) only if replacement is required.
- (16) Remove bearing cup (36) from base (37) only if damaged or if bearing (38) is to be replaced.
- (17) Remove two plugs (39), oil filler plug (40) and gasket (41).





## AIR COMPRESSOR ASSEMBLY

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### 5-14. AIR COMPRESSOR - REPAIR - (Cont.)

---

a. Disassembly - (cont.)

(18) Drive two roll pins (42) into two wrist pins (43) and remove two wrist pins (43) and two pistons (10).

(19) Remove two roll pins (42) from wrist pins (43).

**NOTE**

**Remove rings only if replacement is required.**

(20) Remove top compression ring (44), bottom compression ring (45) and oil control ring (46) from high pressure piston. Repeat for low pressure piston.

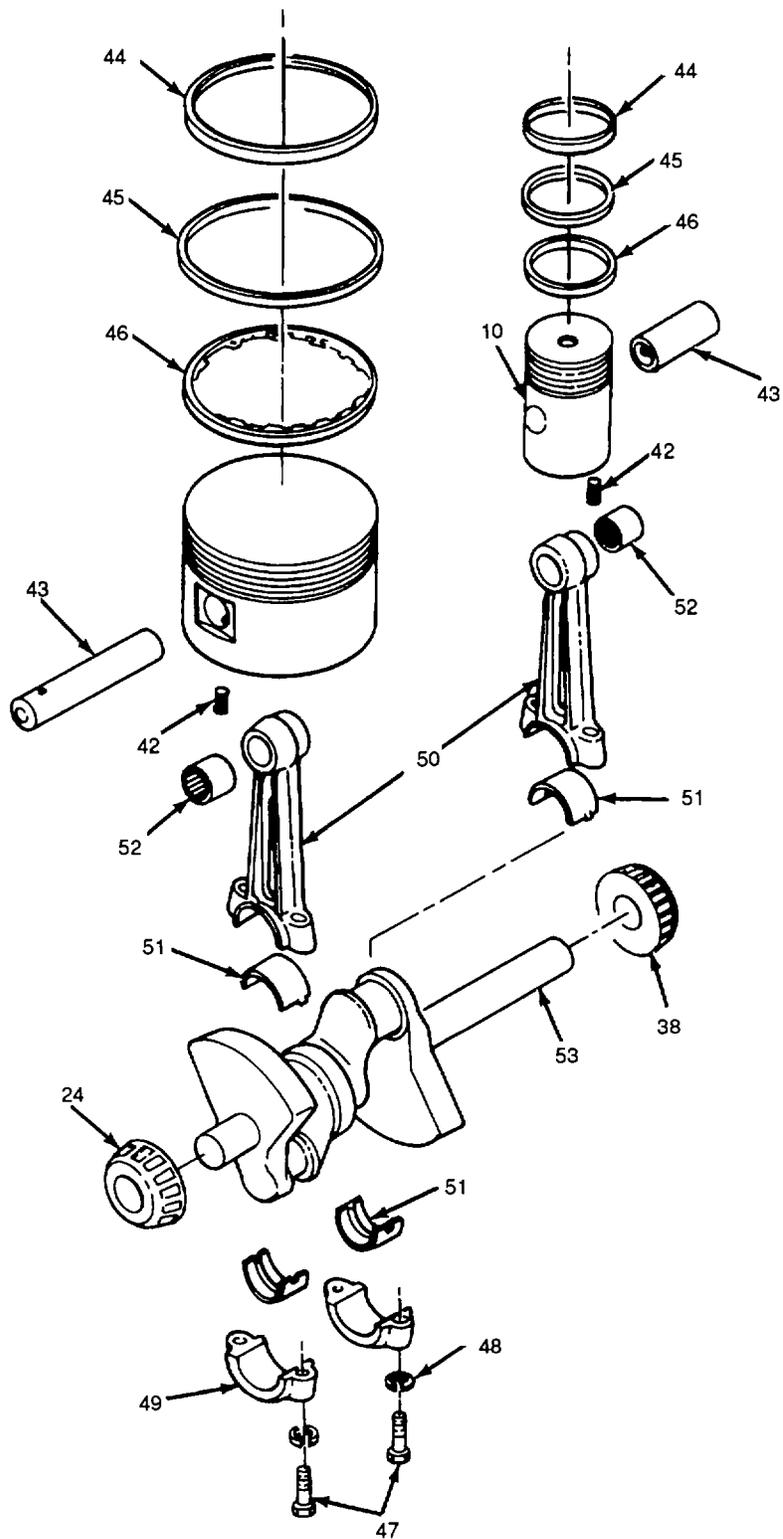
**NOTE**

**When removing connection rods, be sure that rods and caps are kept in matched sets.**

(21) Mark connecting rods so that they can be installed in the same position originally occupied. Remove two screws (47), two lockwashers (48), rod cap (49), rod (50) and two bearing inserts (51). Repeat for other rod assembly.

(22) Remove two pin bearings (52) only if replacement is required.

(23) Remove two bearings (24 and 38) from crankshaft (53).



## AIR COMPRESSOR ASSEMBLY

---

### 5-14. AIR COMPRESSOR - REPAIR - (Cont.)

---

#### b. Repair

#### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Clear all metal parts thoroughly with dry cleaning solvent.
- (2) Check piston fit. Pistons without rings should slide through the cylinder of their own weight and holding the skirt of the piston with the two thumbs there should be no appreciable side motion at any point of piston travel. Scored or out of round cylinders or pistons should be replaced.
- (3) Inspect all springs for loss of tension and set. Replace if defective.
- (4) Inspect bearings and bearing cups for wear, scoring or damage. Replace if defective.
- (5) Inspect cylinder for broken cooling fins and cracks. Replace if damaged.
- (6) Inspect crankshaft for cracks, scores and distortion. Replace if defective.
- (7) Inspect all parts for cracks, nicks, burns, wear or other damage. Replace, wrist pin must also be replaced.

#### **NOTE**

**During assembly, check component fit as required by the procedure. Replace an item that is found to be defective.**

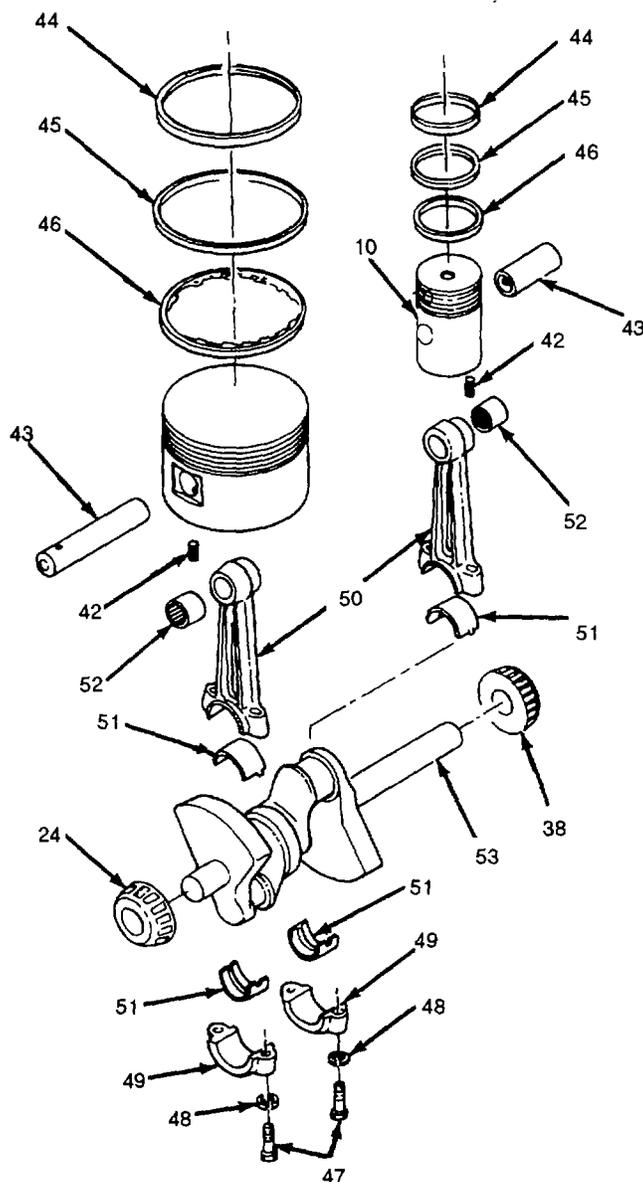
#### c. Assembly

- (1) Install two bearings (38 and 24) on crankshaft (53).
- (2) Press in two pin bearings (52) making sure that the small hole through casting lines up with oil hole in rod.
- (3) Install two bearing inserts (51), rod (50), rod cap (49), two lockwashers (48) and two screws (47). Torque screws (47) to 25 ft lbs (33.9 N-m). Repeat for other rod.

AIR COMPRESSOR ASSEMBLY

5-14. AIR COMPRESSOR - REPAIR - (Cont.)

- (4) Install oil controlling (46), bottom compression ring (45) and top compression ring (44) on high pressure piston. Repeat for low pressure piston.
- (5) Install two pistons (10) onto two rods (50) using two wrist pins (43). Piston should fit so that it can be rocked with three fingers. The piston should not rock of its own weight. Replace wrist pin (43) and pin bearing (52) if required.



## AIR COMPRESSOR ASSEMBLY

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### 5-14. AIR COMPRESSOR - REPAIR - (Cont.)

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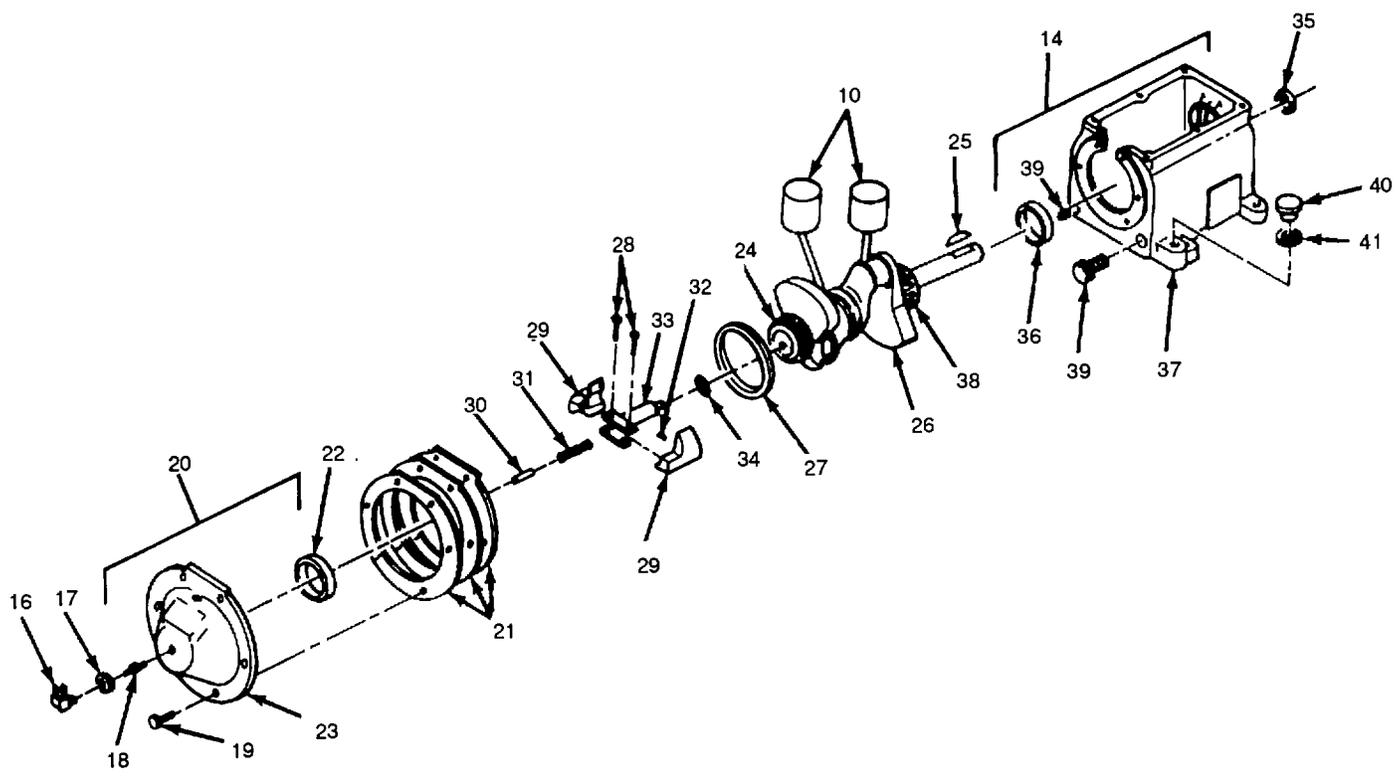
c. Assembly - (cont.)

- (6) If fit is good, drive roll pin (42) into wrist pin (43) when holes are in line.
- (7) At this time the combined piston and rod should turn slowly on the crankshaft of their own weight. If this is not true, re-torque screws (47).
- (8) Install gasket (41), oil filler plug (40) and two plugs (39).
- (9) Install bearing cup (36) into base (37).
- (10) Install washer (34) and weight retainer and shaft (33).
- (11) Install key (25) and tape key in place.
- (12) Install crankshaft and cone assembly (26) and oil feed ring (27) into base and cup assembly (14).
- (13) Install bearing cup (22) into end cover (23).
- (14) Install spring (31), air valve (30), two bumper springs (32), two weights (29), plunger (18) and two rivets (28) to weight retainer and shaft (33).
- (15) Install end cover and cup assembly (20) and six screws (19) along with gaskets (21). Gaskets should be selected so that crankshaft can be spun in the bearings without end play. Also ensure that oil feed ring (27) turns freely within the guide lugs in the gasket. Torque screws (19) to 10 ft lbs (13.56 N-m).
- (16) Slide oil seal (35) over crankshaft and press into place in the base. Be sure that the seal side is toward the crankcase. Do not hammer directly on the seal.
- (17) Install elbow (16) and locknut (17).

#### **CAUTION**

**Do not screw elbow into end cover to far or malfunction of equipment can occur leading to permanent equipment damage.**

- (18) Screw elbow (16) into end cover and cup assembly (20) until part of valve (30) can be seen when looking into tube opening of elbow. Tighten jam nut.



## AIR COMPRESSOR ASSEMBLY

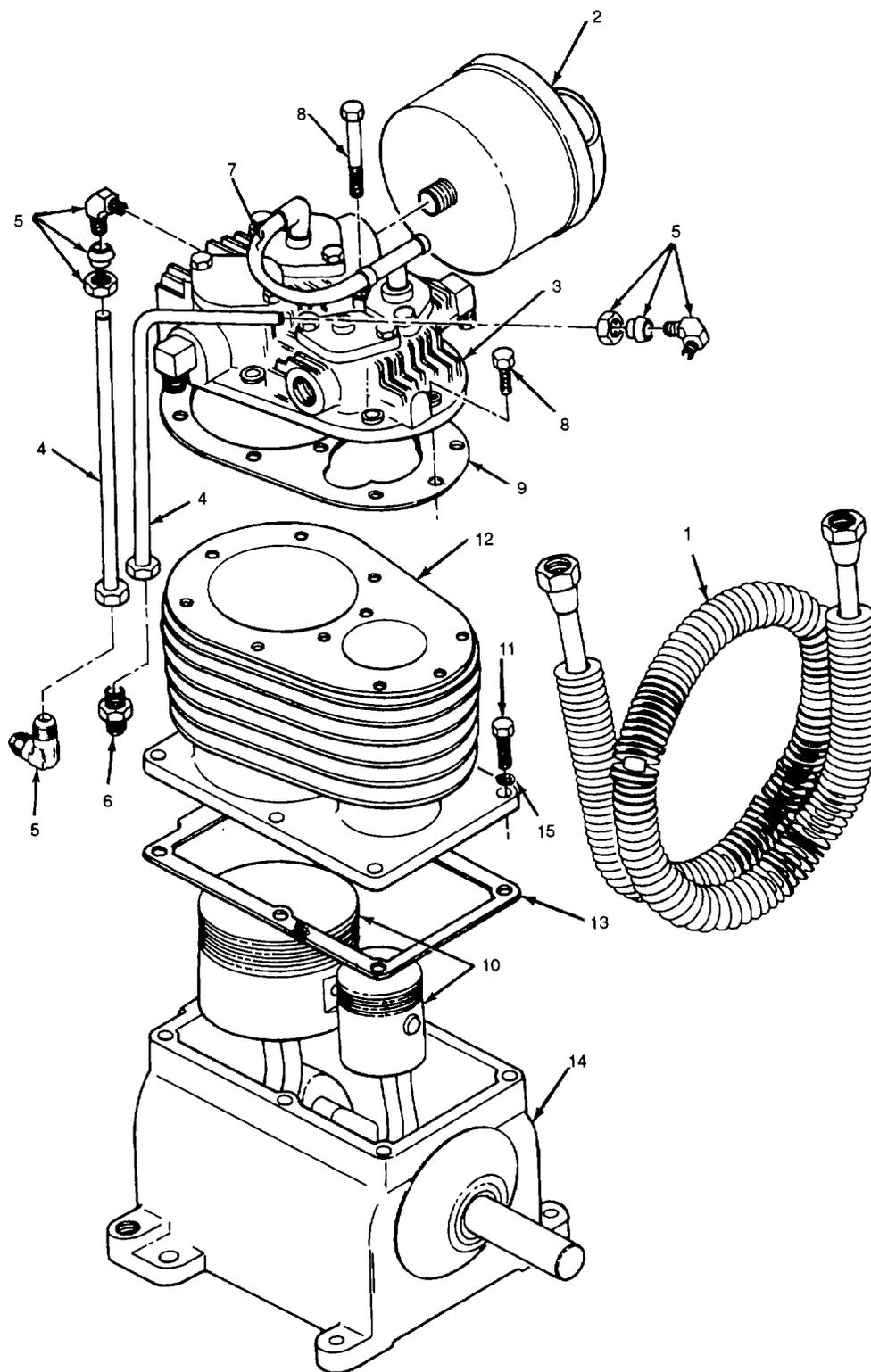
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### 5-14. AIR COMPRESSOR - REPAIR - (Cont.)

---

c. Assembly - (cont.)

- (19) Install gasket (13) and cylinder (12) with six screws (11) and six lockwashers (15). Torque screws to 28 ft lbs (30 N-m).
- (20) Install gasket (9), cylinder head assembly (3) and ten screws (8). Torque screws to 10 ft lbs (13.56 N-m).
- (21) Install unloading tube (7).
- (22) Install straight breather connector (6), three elbow breather connectors (5) and two breather tubes (4).
- (23) Install air filter (2) and intercooler (1).



## AIR COMPRESSOR ASSEMBLY

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### 5-15. HEAD- REPLACE/REPAIR

---

This task covers:

- a. Removal
  - b. Disassembly
  - c. Repair
  - d. Assembly
  - e. Installation
- 

INITIAL SET-UP:

Materials/Parts

Dry Cleaning Solvent  
(Item 6, App E)

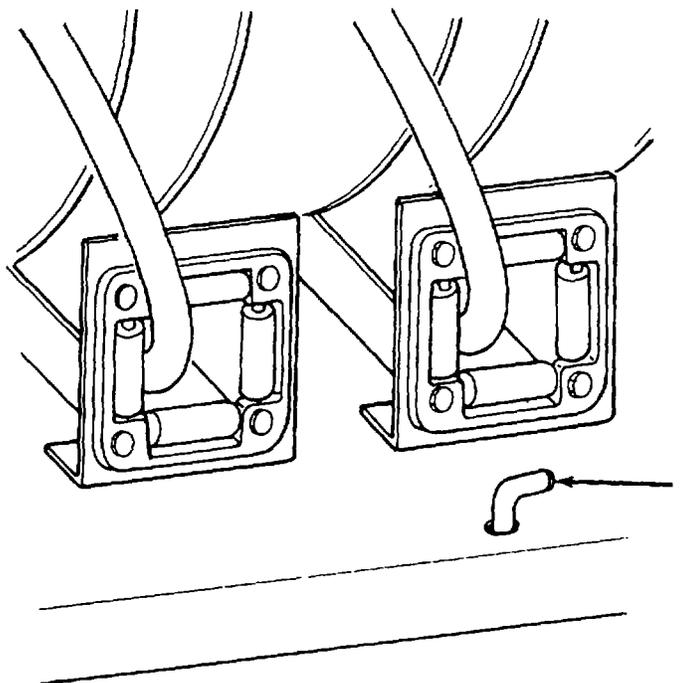
Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Torque Wrench 0-150 ft lbs  
(Section III, Item 6, App B)

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a. Removal

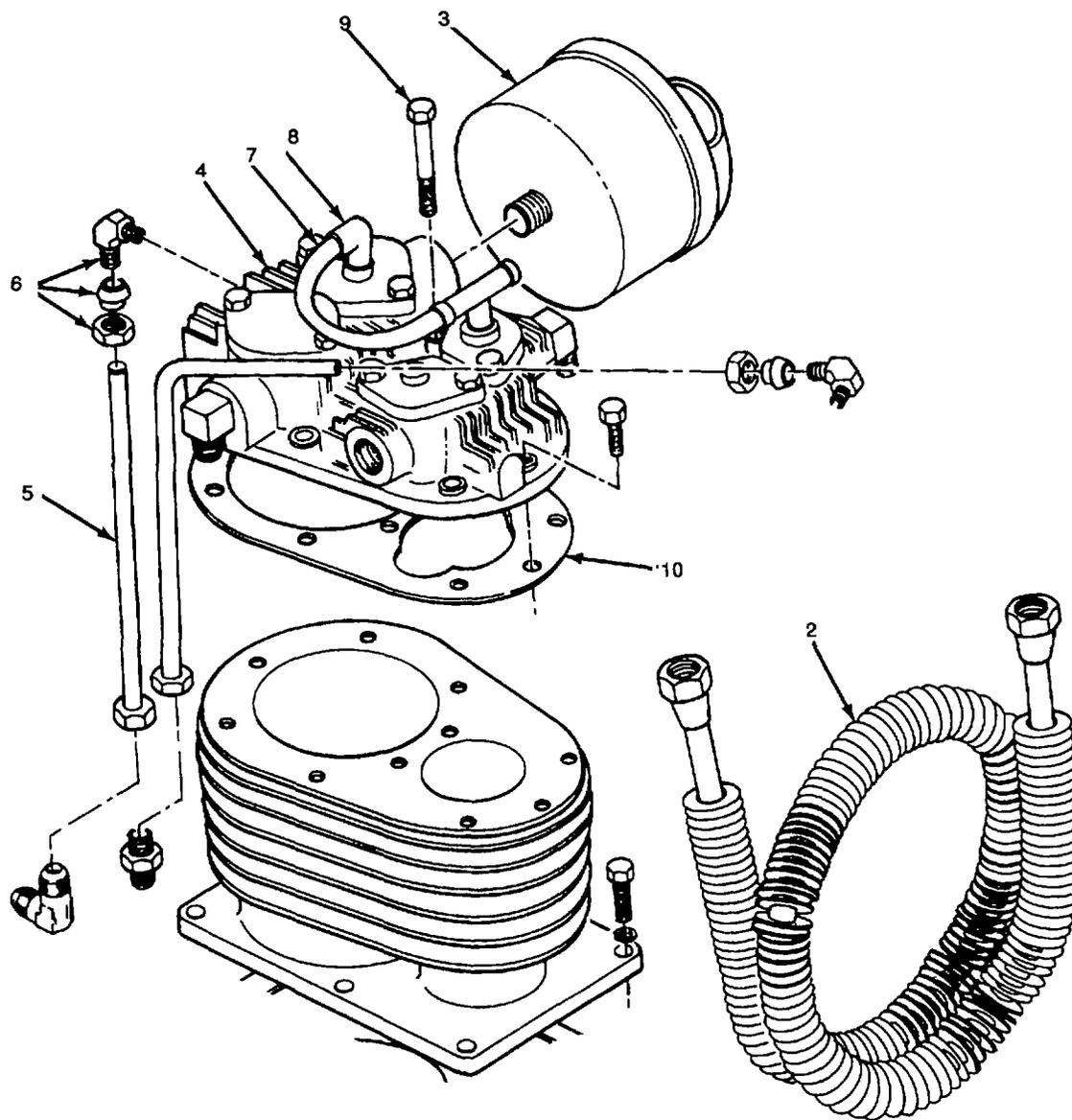
- (1) Vent all air pressure completely by turning lever (1).
- (2) Remove intercooler (2) and air filter (3) from head (4).
- (3) Disconnect and remove breather tube (5) and elbow breather connector (6).



## AIR COMPRESSOR ASSEMBLY

## 5-15. HEAD- REPLACE/REPAIR - (Cont.)

- (4) Disconnect and remove unloading tube (7).
- (5) Disconnect and remove pilot valve tube (8).
- (6) Remove ten screws (9), cylinder head assembly (4) and gasket (10).



## AIR COMPRESSOR ASSEMBLY

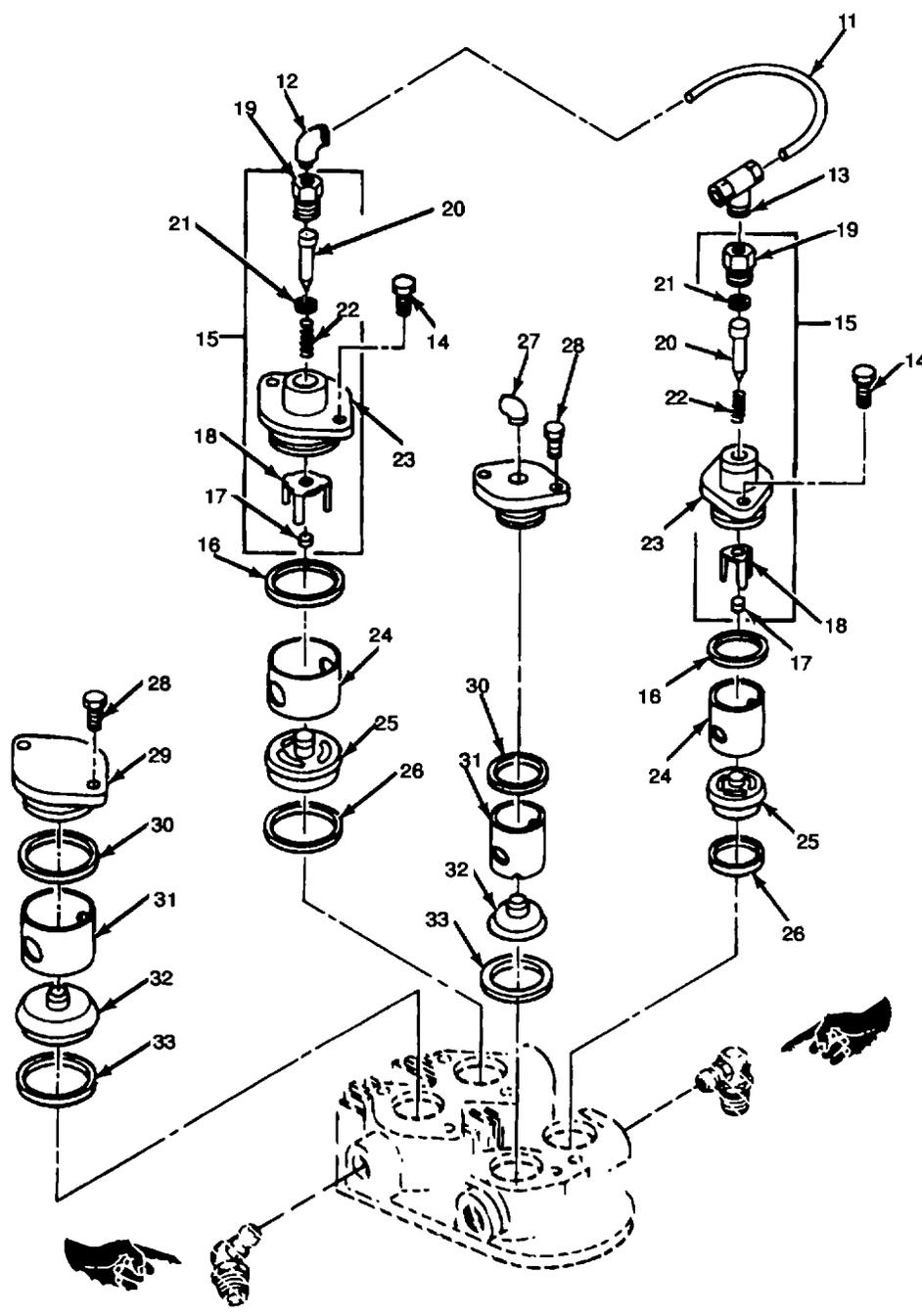
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### 5-15. HEAD- REPLACE/REPAIR - (Cont.)

---

b. Disassembly

- (1) Disconnect and remove unloader tube (11).
- (2) Remove elbow (12) and tee (13).
- (3) Remove four screws (14), two inlet hold down cover assemblies (15), and two preformed packings (16).
- (4) Remove locknut (17), fingers (18), bushing (19), plunger (20), preformed packing (21) and spring (22) from cover (23). Repeat for other inlet hold down cover assembly.
- (5) Remove two cages (24), two inlet valves (25) and two gaskets (26).
- (6) Remove elbow (27).
- (7) Remove four screws (28), two discharge hold down covers (29), and two preformed packings (30).
- (8) Remove two cages (31), two discharge valves (32) and two gaskets (33).



Change 1 5-81

**AIR COMPRESSOR ASSEMBLY**

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**5-15. HEAD- REPLACE/REPAIR - (Cont.)**

---

## c. Repair

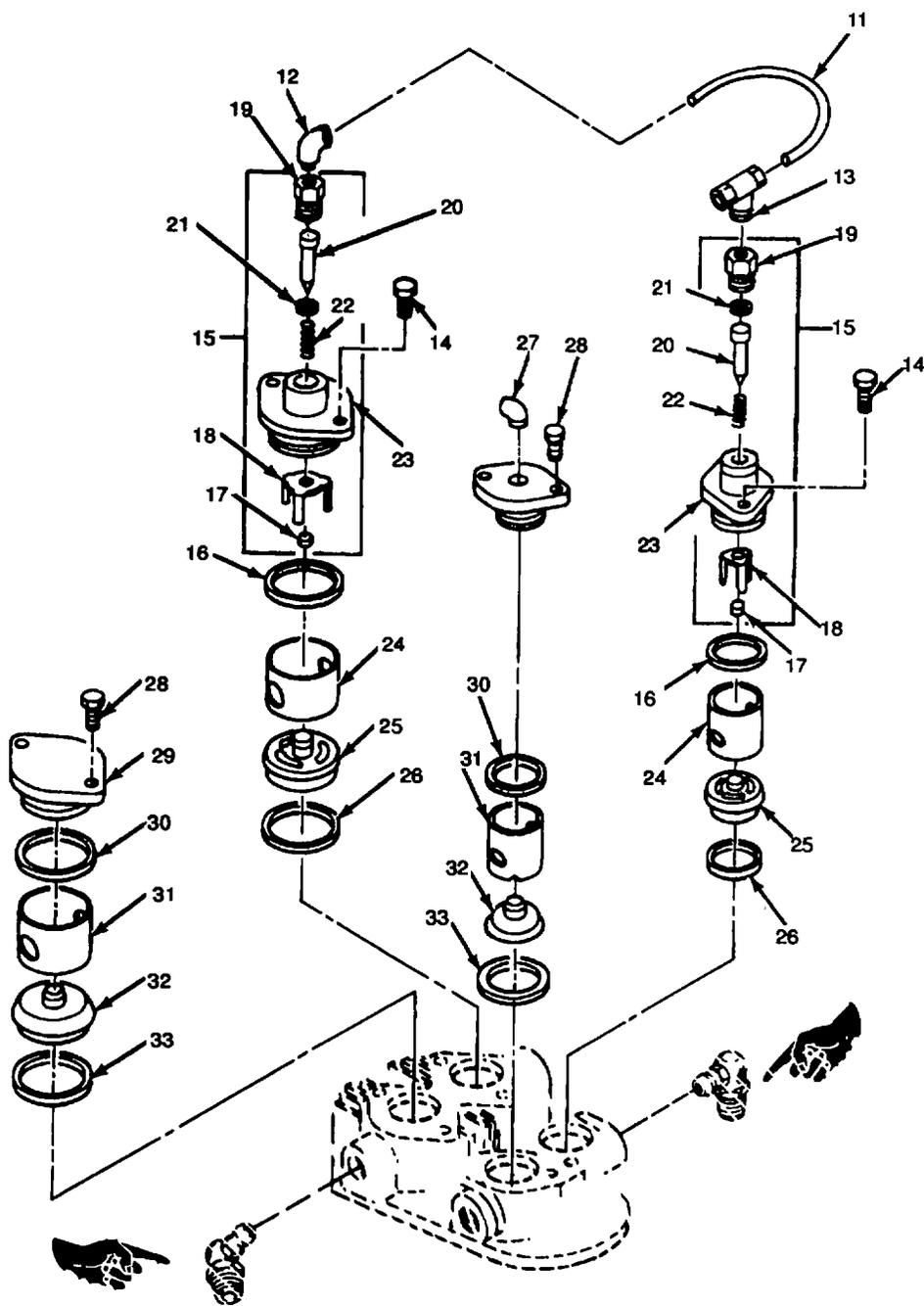
**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Clean all parts in dry cleaning solvent.
- (2) Inspect all valve seat and cages for cracks, breaks, rough or scored seats and mating surfaces. Replace if defective.
- (3) Inspect springs for distortion, weakness or broken coils. Replace if damaged.
- (4) Inspect all other parts for wear, damage or corrosion. Replace as needed.

## d. Assembly

- (1) Install two gaskets (33), two discharge valves (32) and two cages (31).
- (2) Install two preformed packings (30), two discharge hold down covers (29) and four screws (28). Torque screws evenly to 10 ft lbs (13.56 N-m).
- (3) Install elbow (27).
- (4) Install two gaskets (26), two inlet valves (25) and two cages (24).
- (5) Assemble inlet hold down cover assemblies (15) by installing spring (22), preformed packing (21), plunger (20), bushing (19), fingers (18) and locknut (17) into cover (23). Repeat for other inlet hold down cover assembly.
- (6) Install two preformed packings (16), two inlet hold down cover assemblies (15) and four screws (14). Torque screws evenly to 10 ft lbs (13.56 N-m).
- (7) Install elbow (12) and tee (13).
- (8) Install inloader tube (11).



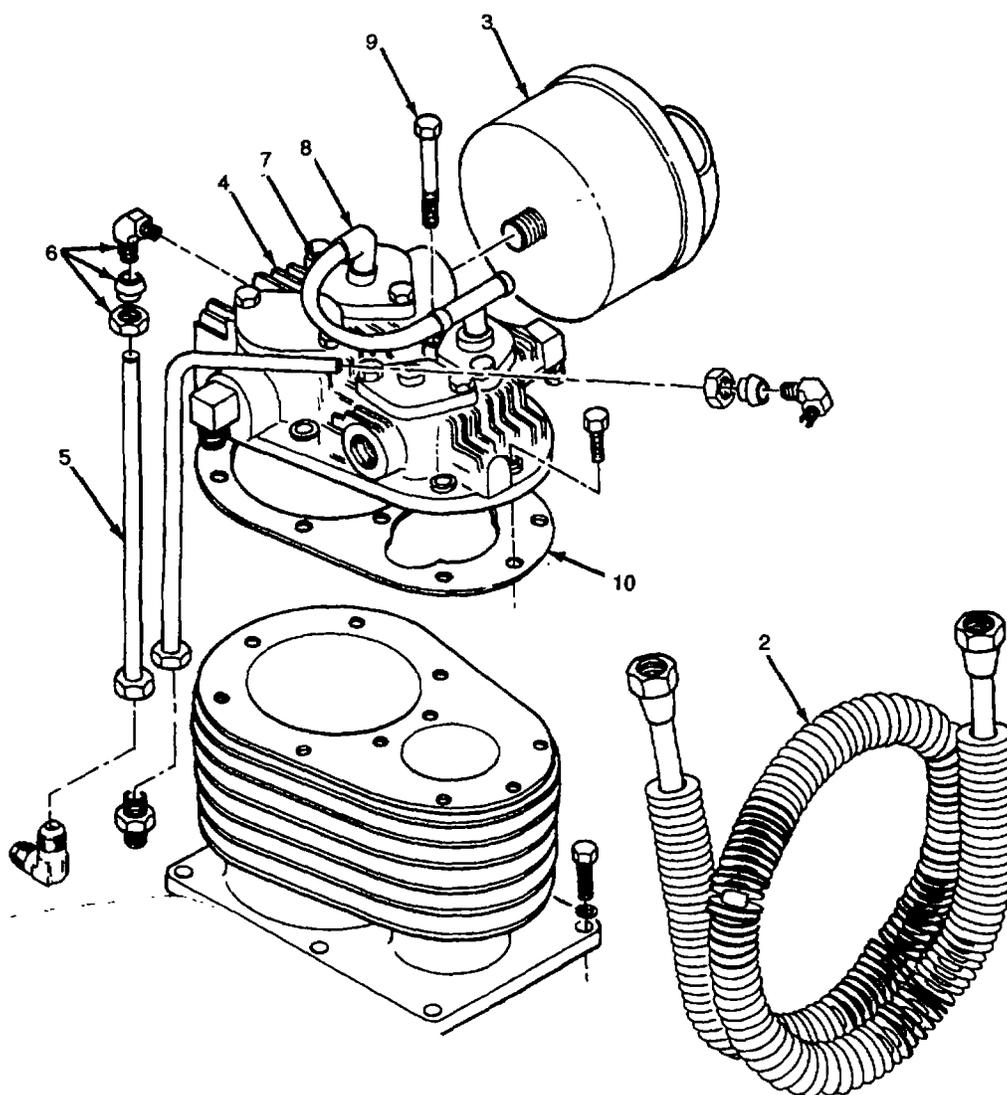
Change 1 5-83

## AIR COMPRESSOR ASSEMBLY

### 5-15. HEAD- REPLACE/REPAIR - (Cont.)

#### e. Installation

- (1) Install gasket (10), cylinder head assembly (4) and ten screws (9). Torque screws to 10 ft lbs (13.56 N-m).
- (2) Install pilot valve tube (8).
- (3) Install unloading tube (7).
- (4) Install elbow breather connector (6) and breather tube (5).
- (5) Install air filter (3) and intercooler (2).



## AIR COMPRESSOR ASSEMBLY

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### 5-16. CENTRIFUGAL UNLOADER - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

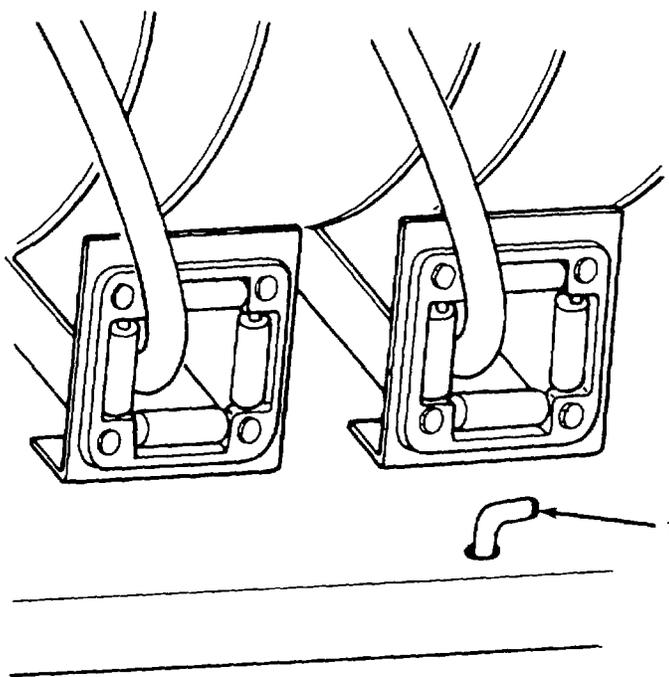
##### Tools

General Mechanics Tool Box (Section III, Item 1, App B)  
Torque Wrench (Section III, Item 6, App B)

---

#### a. Removal

- (1) Vent air pressure completely by turning lever (1).



- (2) Disconnect and remove unloading tube (2) and breather tube assembly (3).
- (3) Remove tube connector (4), elbow (5), locknut (6), plunger (7) and air valve (8).
- (4) Remove six screws (9), end cover and cup assembly (10), and gaskets (11). Note thickness of gaskets for installation.

## AIR COMPRESSOR ASSEMBLY

### 5-16. CENTRIFUGAL UNLOADER - REPLACE - (Cont.)

a. Removal- (cont.)

- (5) Remove weight retainer and shaft assembly (12) from crankshaft (13).
- (6) Remove two rivets (14), two bumper springs (15), two weights (16) and spring (17).

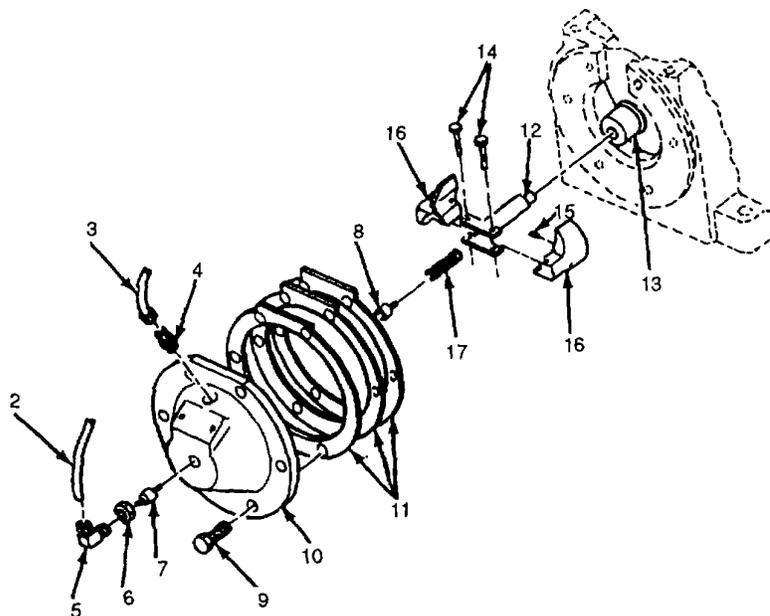
b. Installation

- (1) Install spring (17), two weights (16), two bumper springs (15) and two rivets (14).
- (2) Install weight retainer and shaft assembly (12) onto crankshaft (13).
- (3) Install gaskets (11) at same thickness as removed, end cover and cup assembly (10) and six screws (9). Torque screws to 10 ft lbs (13.56 N-m).
- (4) Insert air valve (8) and plunger (7) into elbow (5) and locknut (6).

#### **CAUTION**

**Do not screw elbow into end cover too far or malfunction of equipment can occur leading to permanent equipment damage.**

- (5) Screw elbow (5) into end cover until part of valve (8) is visible, when looking into tube opening of elbow. Tighten locknut (6).
- (6) Install tube connector (4), breather tube assembly (3) and unloading tube (2).



## LUBE TANK ASSEMBLY

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### 5-17. AIR REGULATOR - REPAIR

---

This task covers:

- a. Disassembly      b. Repair      c. Assembly
- 

#### INITIAL SET-UP:

##### Materials/Parts

Dry cleaning Solvent  
(Item 6, App E)  
Primer, Sealing Compound  
(Item 9, App E)  
Sealing Compound  
(Item 10, App E)

##### Equipment Condition

Air Regulator Removed  
(para 4-36)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

#### a. Disassembly

- (1) Remove adjusting screw (1) and check nut (2) at top of regulator

#### **WARNING**

**Bottom plug is spring loaded. Remove with extreme care to avoid personal injury.**

- (2) Loosen and slowly remove bottom plug (3) and gasket (4).
- (3) Remove spring (5) and disc assembly (6) and valve seat (7) from cavity.
- (4) Remove six screws (8) at base of bonnet assembly (9) and lift it from body assembly (10).
- (5) Remove spring pad (11), spring (12) and diaphragm assembly (13) from body assembly.

#### b. Repair

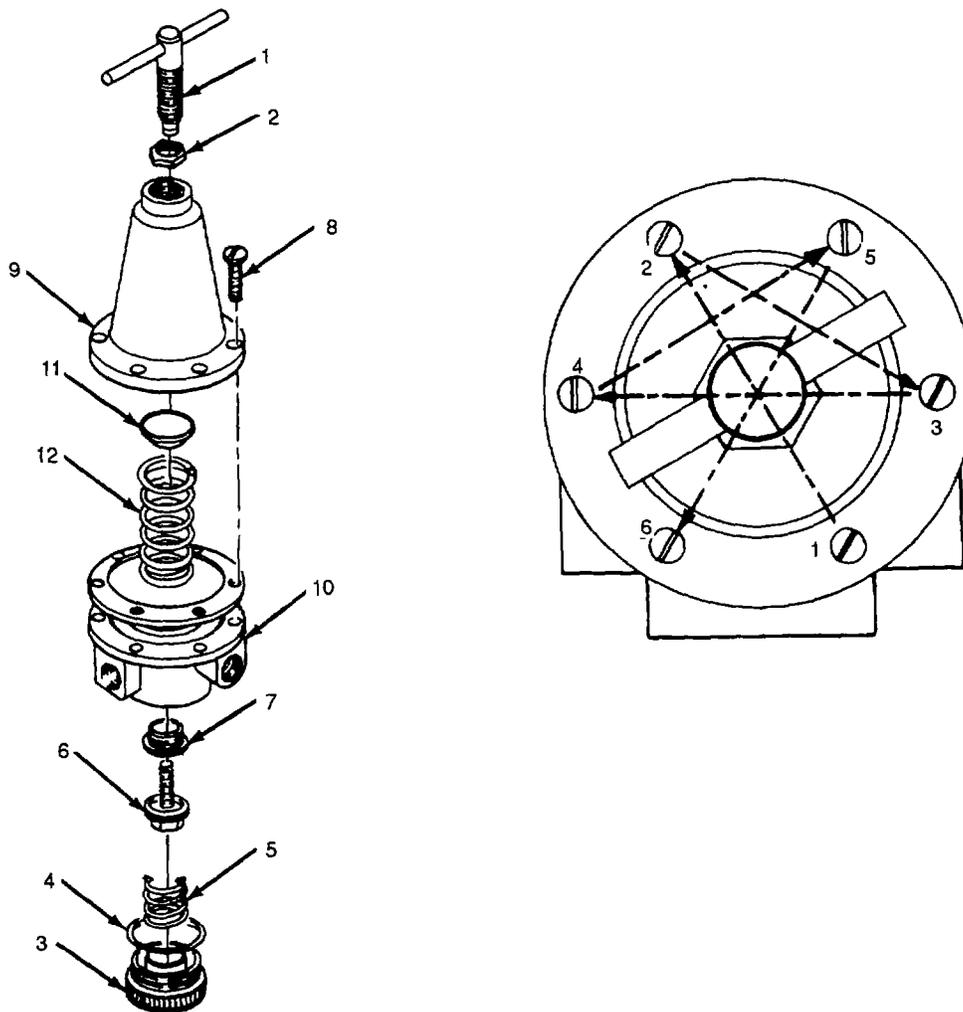
- (1) Clean all metallic parts in dry cleaning solvent.
- (2) Inspect valve seat for damage. Replace if required.
- (3) Inspect diaphragm for deterioration, cracks or damage. Replace if needed.
- (4) Inspect all parts for damage or wear. Discard defective items.

## LUBE TANK ASSEMBLY

### 5-17. AIR REGULATOR - REPAIR - (Cont.)

#### c. Assembly

- (1) Install diaphragm assembly (13), spring (12) and spring pad (11) into body assembly (10).
- (2) Install bonnet assembly (9) and six screws (8). Tighten screws in pattern shown.
- (3) Apply sealing compound primer to valve seat (7) threads and allow to dry.
- (4) Sparingly apply sealing compound to male threads and install valve seat (7).
- (5) Install disc assembly (6), spring (5), lightly greased gasket (4) and plug (3).
- (6) Install checknut (2) and adjusting screw (1).



## LUBE TANK ASSEMBLY

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### 5-18. LOW PRESSURE PUMP

---

This task covers:

- a. Disassembly      b. Repair      c. Assembly
- 

#### INITIAL SET-UP:

##### Material/Parts

Dry cleaning Solvent  
(Item 6, App E)

##### Equipment Condition

Low Pressure Pump  
Removal (para 4-37)

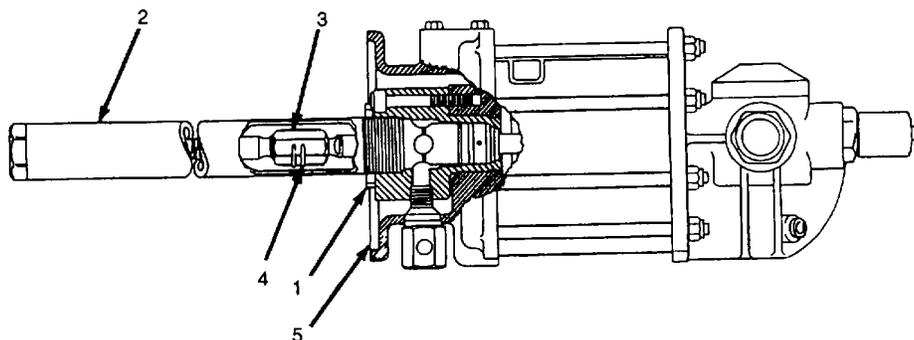
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

#### a. Disassembly

- (1) Loosen jam nut (1) and unthread pump tube (2) enough to expose upper coupler (3).
- (2) Remove upper spring clip (4) from upper coupler (3).
- (3) Loosen coupler (3) and separate pump tube (2) from air motor (5).



#### NOTE

Steps 4 through 23 apply to disassembly of air motor (5). Proceed to step 24 for disassembly of pump tube (2).

- (4) Remove four screws (6), adapter (7) and preformed packing (8).
- (5) Remove two set screws (9), two caps (10), two gaskets (11) and two springs (12).
- (6) Remove cylinder (13), washer (14) and spring (15) from cap (10). Repeat for other cap.
- (7) Remove eyebolt (16), adapter (17) and preformed packing (18).

## LUBE TANK ASSEMBLY

### 5-18. LOW PRESSURE PUMP (Cont.)

#### a. Disassembly - (cont.)

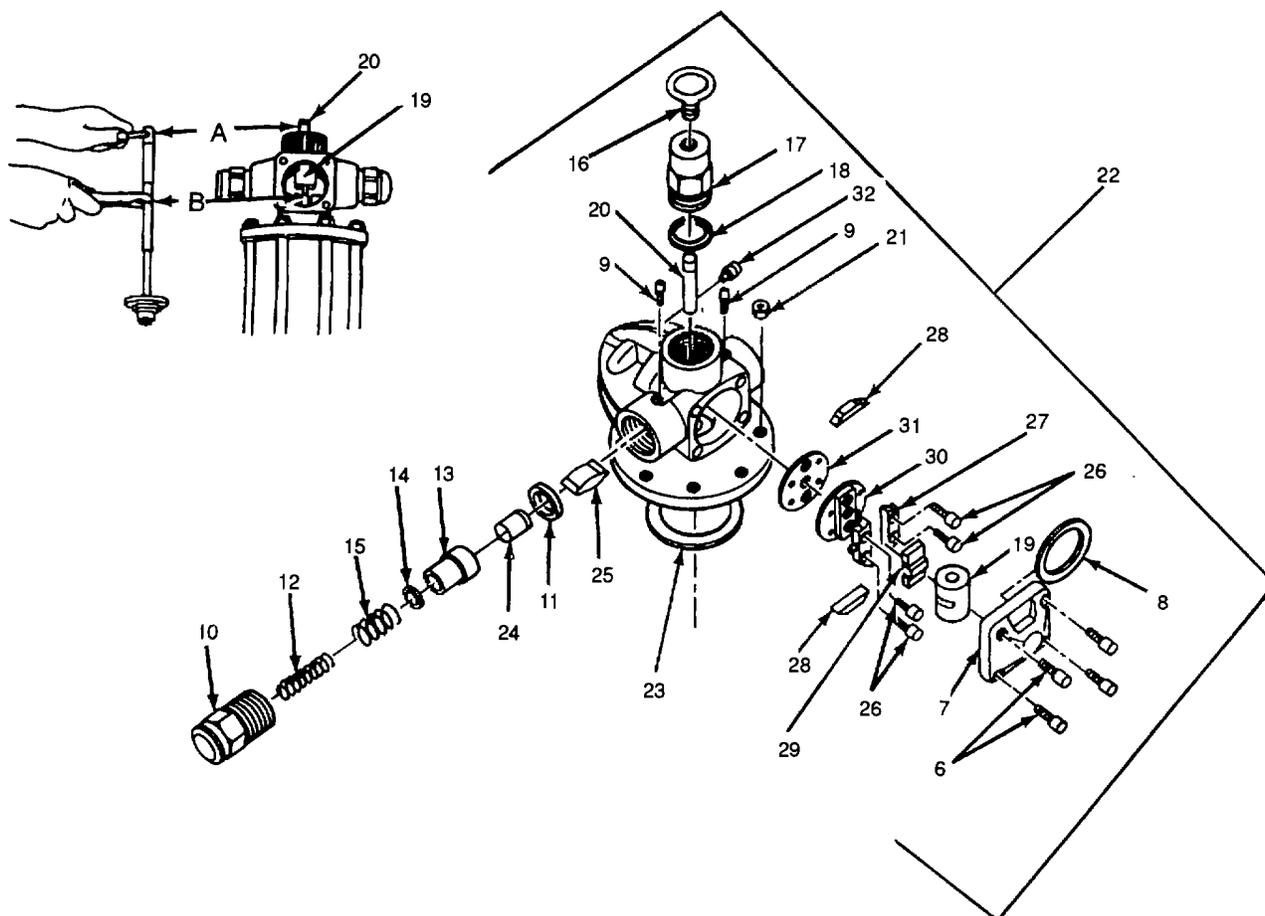
#### **CAUTION**

**Do not scratch trip rod. This can lead to equipment damage and unnecessary failure.**

#### **NOTE**

**Nut (20) is secured with sealant.**

- (8) Lift shuttle (19) and secure inside the motor assembly as shown. Remove nut (20).
- (9) Remove eight nuts (21) and lift valve body and stop assembly (22) off of tie rods. Remove preformed packing (23).
- (10) Remove shuttle (19), two plungers (24) and two toggles (25).
- (11) Remove four screws (26), two valve guide and plug assemblies (27) two stops (28) and slide valve (29).



**LUBE TANK ASSEMBLY**

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**5-18. LOW PRESSURE PUMP (Cont.)**

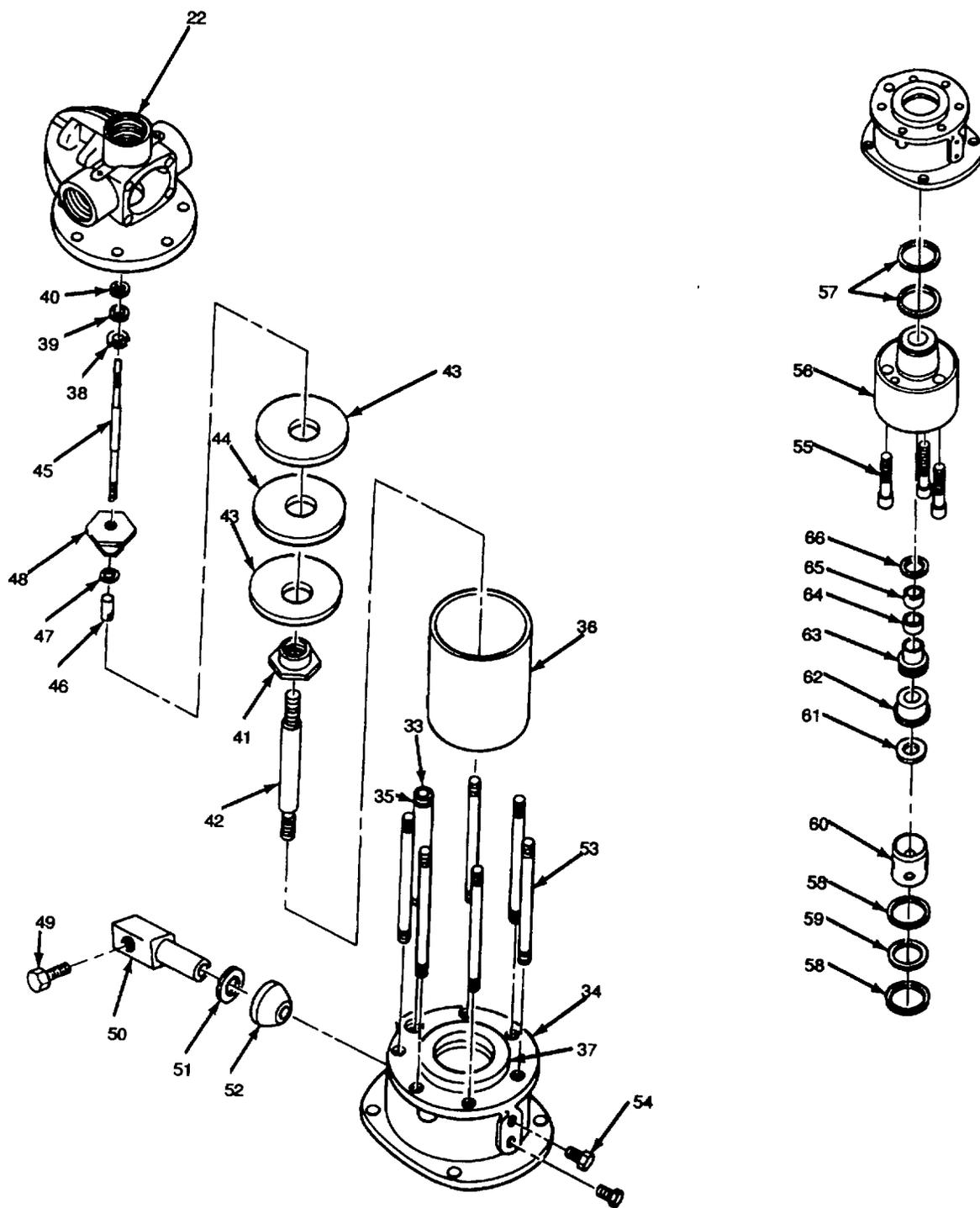
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**CAUTION**

**Take care not to scratch valve side of seat during removal.**

- (12) Remove valve seat (30) and gasket (31).
- (13) Remove plug (32).
- (14) Pull air tube (33) from cylinder head and plug assembly (34) and remove two preformed packings (35).
- (15) Lift out cylinder (36) and remove preformed packing (37).
- (16) Remove retaining ring (38), washer (39) and block "v" packing (40) from underside of valve body and stop assembly (22).
- (17) Loosen nut (41) and remove piston rod (42), two washers (43), packing (44) and nut (41).
- (18) Secure trip rod (45) and remove nut (46), preformed packing (47) and nut (48).
- (19) Remove plug (49), adapter (50), washer (51) and bushing (52).
- (20) Remove six tie rods (53) and two screws (54).

**Change 1 5-91**



## LUBE TANK ASSEMBLY

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### 5-18. LOW PRESSURE PUMP (Cont.)

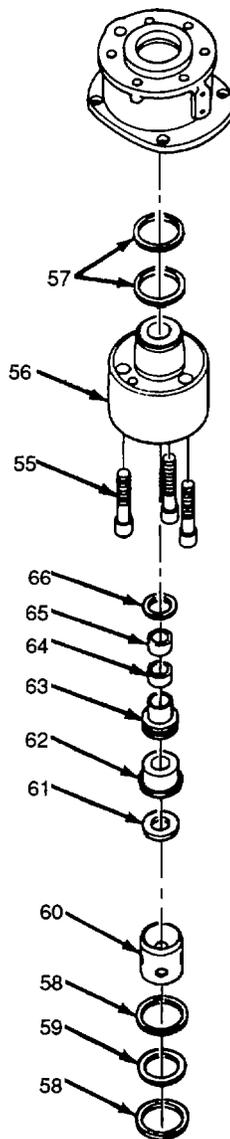
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a. Disassembly - (cont.)

(21) Remove three screws (55), body (56) and two preformed packings (57).

(22) Remove two gaskets (58), washer (59) and spacer (60).

(23) Push out through bottom of body (56), washer (61), seal (62), lantern ring (63), seal (64), spacer (65) and preformed packing (66).

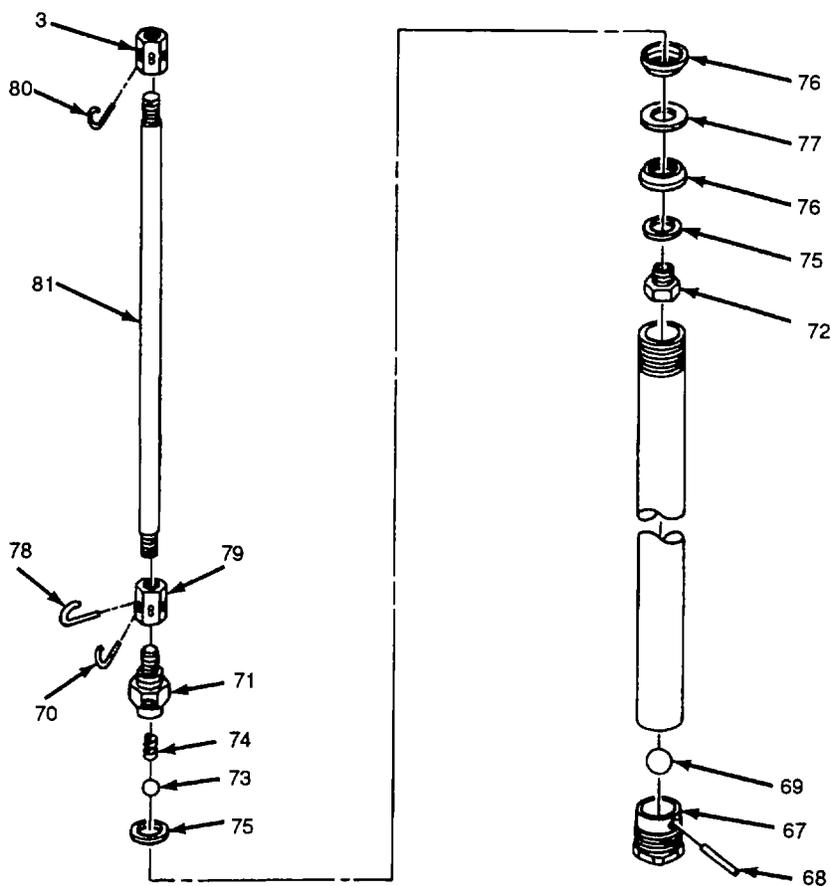


LUBE TANK ASSEMBLY

5-18. LOW PRESSURE PUMP (Cont.)

a. Disassembly - (cont.)

- (24) Remove foot valve body (67), pin (68) and ball (69).
- (25) Remove lower spring clip (70) and remove adapter (71) with attached parts.
- (26) Remove valve seat (72) and catch ball (73) and spring (74).
- (27) Remove two piston washers (75), two leather cups (76), plate (77).
- (28) Remove upper spring clip (78) and lower coupling (79).
- (29) Remove lower spring clip (80) and rod (81) from upper coupling (3).



**LUBE TANK ASSEMBLY**

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**5-18. LOW PRESSURE PUMP (Cont.)**

---

## b. Repair

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).**

- (1) Clean all parts with dry cleaning solvent.
- (2) Discard and replace all gaskets and packings.
- (3) Inspect and replace any worn or damaged parts.
- (4) Inspect threaded surfaces for damage. Replace if defective.
- (5) Inspect pump rods and tubes for cracks, breaks or other defects which would prevent proper operation.
- (6) Inspect valve and valve seats for damage or wear. Replace as required.

## LUBE TANK ASSEMBLY

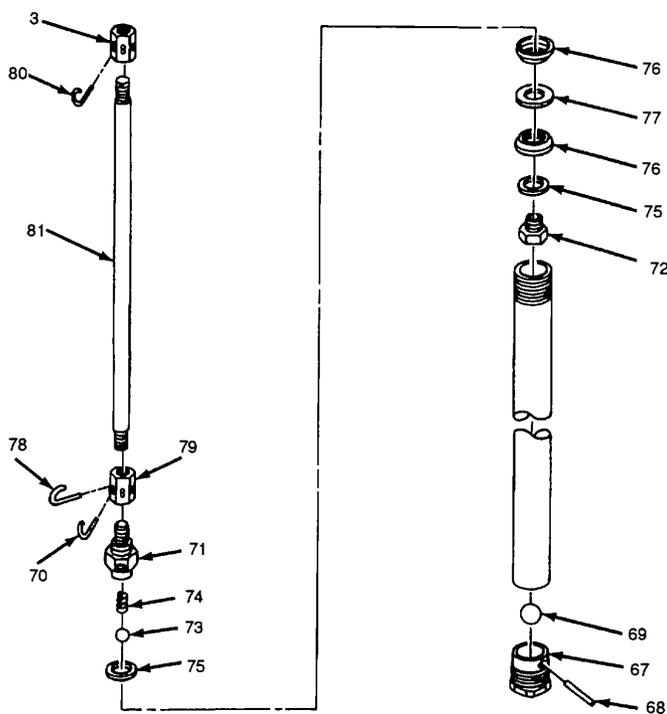
### 5-18. LOW PRESSURE PUMP (Cont.)

#### c. Assembly

#### NOTE

**Steps (1) through (6) apply to assembly of pump tube (2). Proceed to step (7) for assembly of air motor (5). Go to step (30) for pump tube and air motor assembly together.**

- (1) Install upper coupling (3) and lower spring clip (80) onto rod (81).
- (2) Install lower coupling (79) and upper spring clip (78).
- (3) Install plate (77), two leather cups (76) and two piston washers (75). Open side of upper leather cup should face upwards and open side of lower leather cup faces downwards.
- (4) Install spring (74), ball (73) and valve seat (72).
- (5) Install adapter (71) with attached parts and spring clip (70) to lower coupling (79).
- (6) Install ball (69), pin (68) and pin (67).



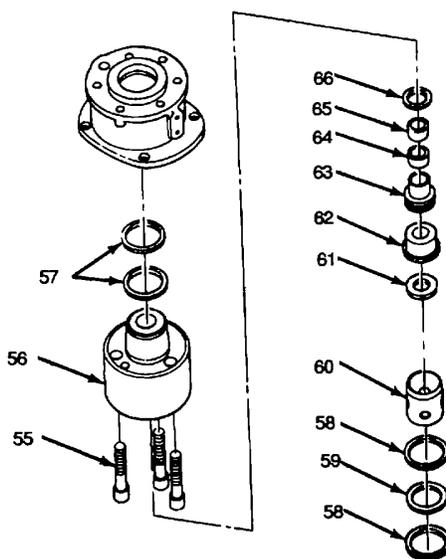
## LUBE TANK ASSEMBLY

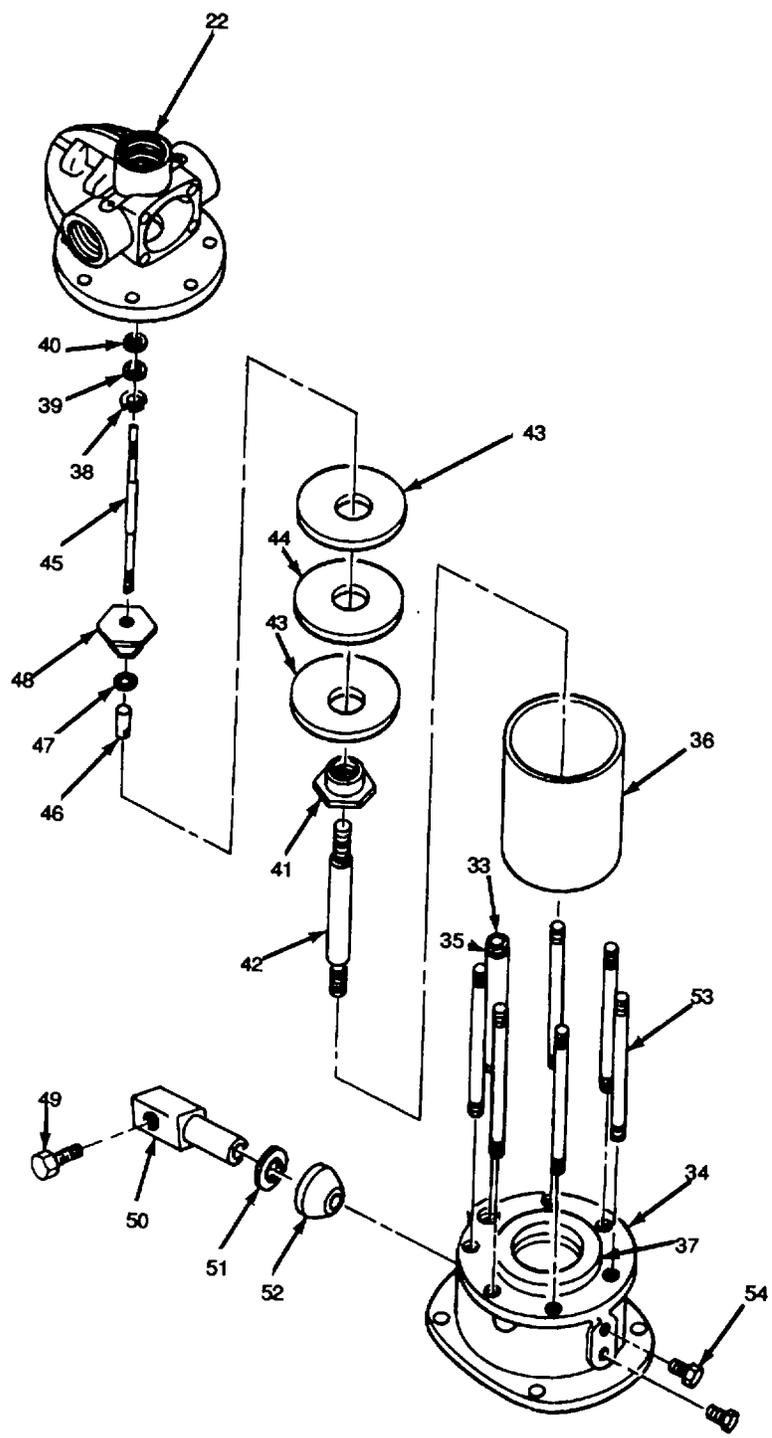
### 5-18. LOW PRESSURE PUMP (Cont.)

#### NOTE

The lubricant and sealant referred to below are included in the air motor major repair kit (TM5-4930-233-24P).

- (7) Install preformed packing (66), spacer (65), seal (64), lantern ring (63), seal (62), and washer (61) into body (56). Be sure that lips of seals face downward.
- (8) Install spacer (60), washer (59), and two gaskets (58).
- (9) Install two preformed packings (57), body (56) and three screws (55).
- (10) Install two screws (54) and six tie rods (53).
- (11) Install bushing (52), washers (51) and adapter (50) and plug (49).
- (12) Coat threads of trip rod (45) with sealant and install nut (48), a preformed packing (47) and nut (46).
- (13) Install nut (41), packing (44), and two washers (43) onto piston rod (42).
- (14) Tighten piston rod (42) to nut (48) and then tighten nut (41). Coat piston rod (42) with lubricant.
- (15) Install block V packing (40), washer (39) and retaining ring (38) to underside of valve body and stop assembly (22).
- (16) Install preformed packing (37) and cylinder (36).
- (17) Install two preformed packings (35) and air tube (33) onto cylinder head and plug assembly (34).





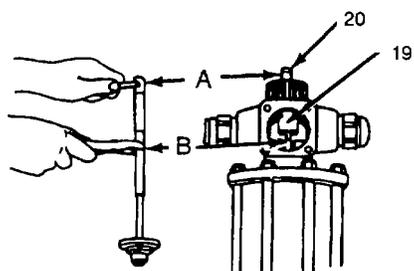
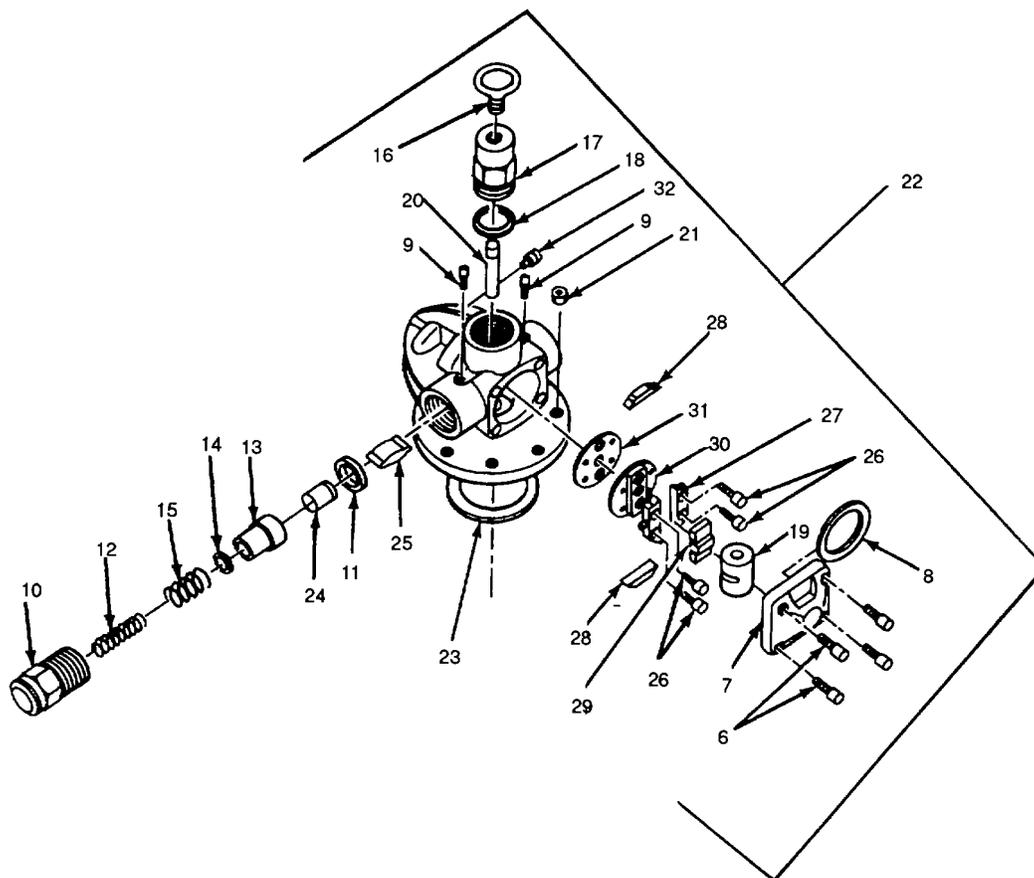
## LUBE TANK ASSEMBLY

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### 5-18. LOW PRESSURE PUMP - (Cont.)

---

- c. Assembly - (cont.)
- (18) Install plug (32).
  - (19) Install gasket (31) and valve seat (30).
  - (20) Lubricate sides of slide valve (29) that contact valve fluid and plug assemblies (27).
  - (21) Install slide valve (29), two stops (28), two valve guide and plug assemblies (27) and four screws (26).
  - (22) Coat shuttle (19) (including inside bore), plungers (24) and toggles (25) with lubricant.
  - (23) Install two toggles (25), two plungers (24) and shuttle (19). Be sure that larger bore of shuttle is facing upwards.
  - (24) Install preformed packing (23) and position valve body and stop assembly (22) on eight tie rods. Install eight nuts (21).
  - (25) Lift trip rod as shown, apply sealant and install nut (20).
  - (26) Install preformed packing (18), adapter (17) and eyebolt (16).
  - (27) Install spring (15), washer (14) and cylinder (13) into cap (10). Be sure that top of cylinder is flush with or below edge of cap. Repeat for other cap.
  - (28) Coat two springs (12) with lubricant.
  - (29) Install two springs (12), two gaskets (11), two caps (10) and two set screws (9).
  - (30) Place ¼ ounce (7.4 ml) of oil into air cavity before installing preformed packing (8), adapter (7) and four screws (6).



## LUBE TANK ASSEMBLY

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### 5-18. LOW PRESSURE PUMP - (Cont.)

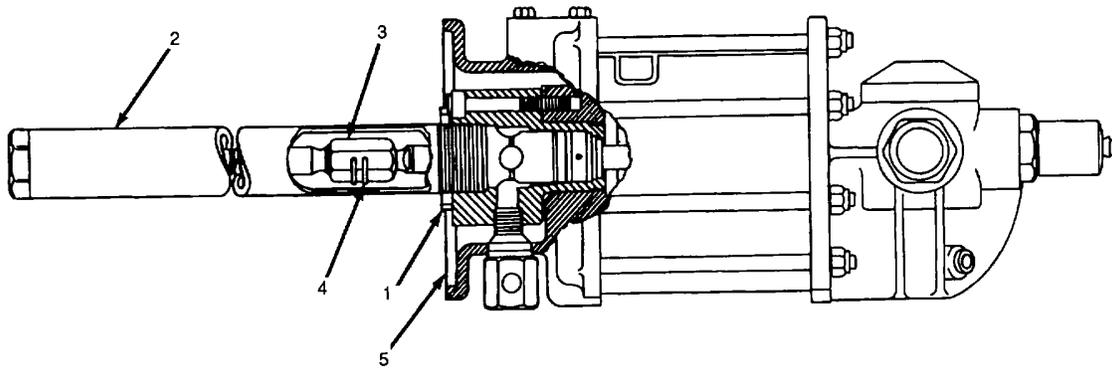
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c. Assembly - (cont.)

(31) Connect air motor (5) and pump tube (2) with coupler (3).

(32) Install upper spring clip (4).

(33) Screw pump tube (2) into air motor (5) and tightened jam nut (1).



## LUBE TANK ASSEMBLY

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### 5-19. HIGH PRESSURE PUMP - REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                                  c. Assembly
- 

#### INITIAL SET-UP:

##### Materials/Parts

Dry Cleaning Solvent  
(Item 6, App E)

##### Equipment Condition

High Pressure Pump Removed  
(para.. 4-37)

##### Tools

General Mechanics Tool Box (Section III, Item 1, App B)  
Snap Wrench (Section III, Item 7, App B)

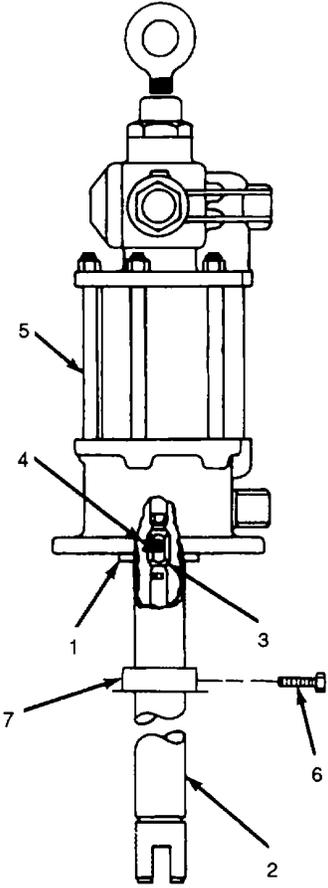
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- a. Disassembly
- (1) Loosen jam nut (1) and unthread pump tube (2) enough to expose upper coupler (3).
  - (2) Remove upper spring dip (4), from upper coupler (3).
  - (3) Loosen coupler (3) and separate pump tube (2) from air motor (5) and remove screw (6) and baffle (7).

#### **NOTE**

Steps 4 through 24 apply to disassembly of air motor (5). Proceed to step 25 for disassembly of pump tube (2).

- (4) Remove four screws (8), adapter (9) and preformed packing (10).
- (5) Remove two set screws (11), two caps (12), two gaskets (13) and two springs (14).
- (6) Remove cylinder (15), washer (16) and spring (17) from cap (12). Repeat for other cap.
- (7) Remove eyebolt (18), adapter (19) and preformed packing (20).



5-103

LUBE TANK ASSEMBLY

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5-19. HIGH PRESSURE PUMP - REPAIR

---

- a. Disassembly - (cont.)

**CAUTION**

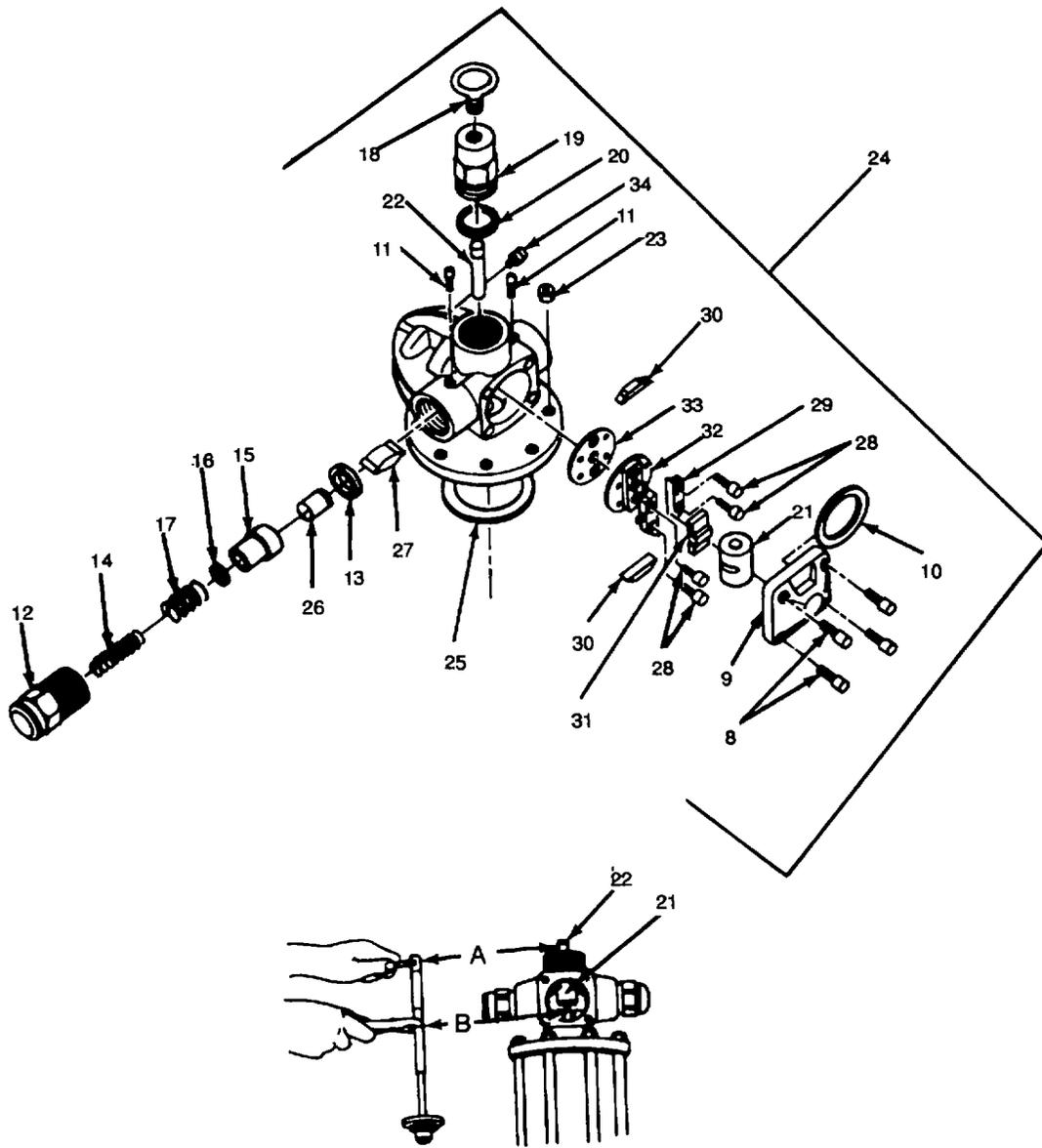
**Do not scratch trip rod. This can lead to equipment damage and unnecessary failure.**

- (8) Lift shuttle (21) and secure inside the motor assembly as shown. Remove nut (22).
- (9) Remove five nuts (23) and lift valve body and stop assembly (24) off of tie rods. Remove preformed packing (25).
- (10) Remove shuttle (21), two plungers (26) and two toggles (27).
- (11) Remove four screws (28), two valve guide and plug assemblies (29), two stops (30) and slide valve (31).

**CAUTION**

**Take care not to scratch valve side of seat during removal.**

- (12) Remove valve seat (32) and gasket (33).
- (13) Remove plug (34).



**LUBE TANK ASSEMBLY**

---

**5-19. HIGH PRESSURE PUMP - REPAIR**

---

## a. Disassembly - (cont.)

(14) Pull air tube (35) from cylinder head and plug assembly (36) and remove two preformed packings (37).

(15) Lift out cylinder (38) and remove preformed packing (39).

(16) Remove retaining ring (40), washer (41) and block v packing (42) from underside of valve body and stop assembly (24).

(17) Loosen nut (43) and remove piston rod (44).

(18) Secure trip rod (47) and remove nut (48), preformed packing (49) and nut (50).

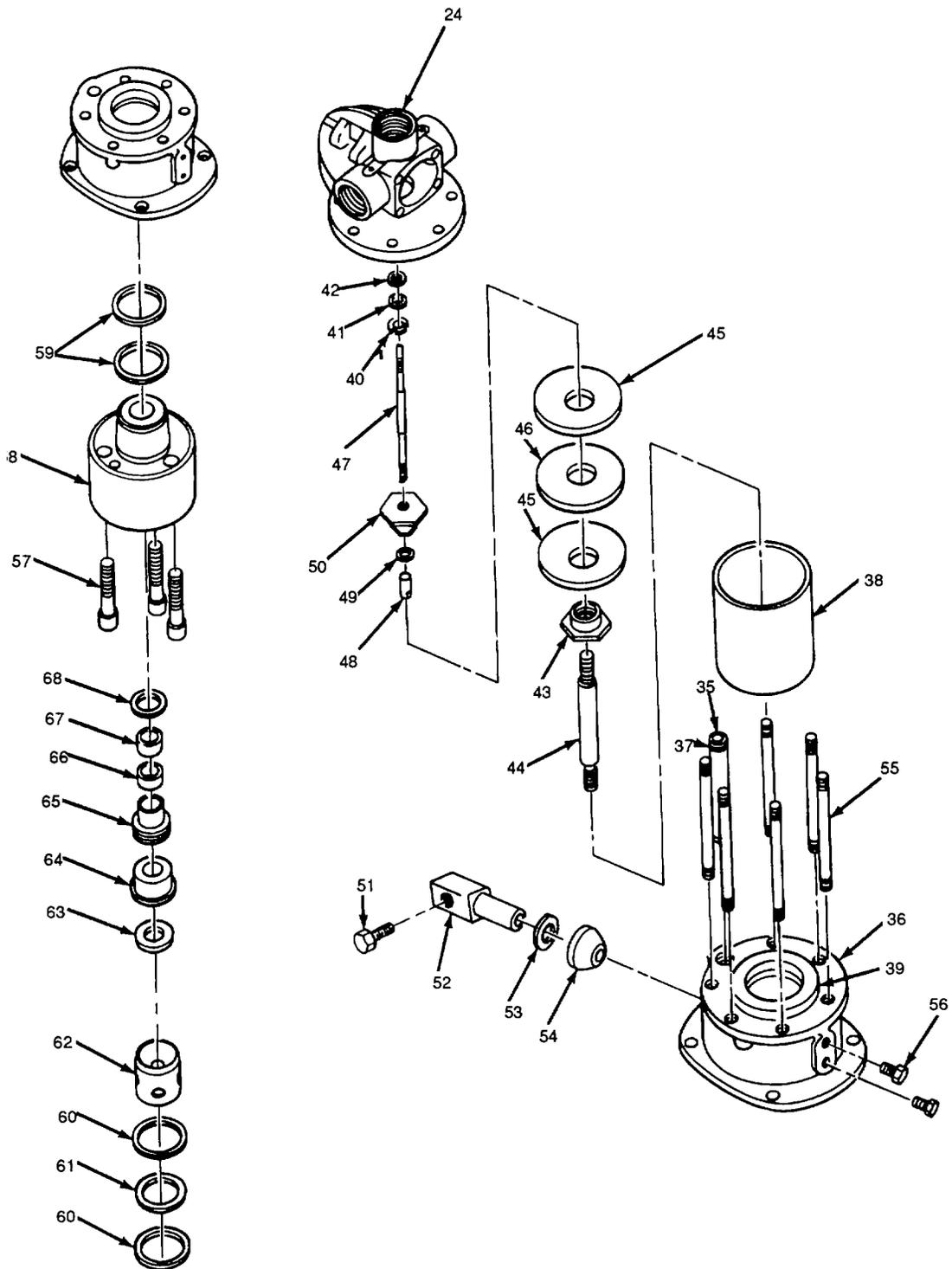
(19) Remove plug (51), adapter (52), washer (53), and bushing (54).

(20) Remove six tie rods (55) and two screws (56).

(21) Remove three screws (57), body (58) and two preformed packings (59).

(22) Remove two gaskets (60), washers (61) and spacer (62).

(23) Push out through bottom of body (58), washer (63), seal (64), lantern ring (65), seal (66), spacer (67) and preformed packing (68).



## LUBE TANK ASSEMBLY

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### 5-19. HIGH PRESSURE PUMP - REPAIR - (Cont.)

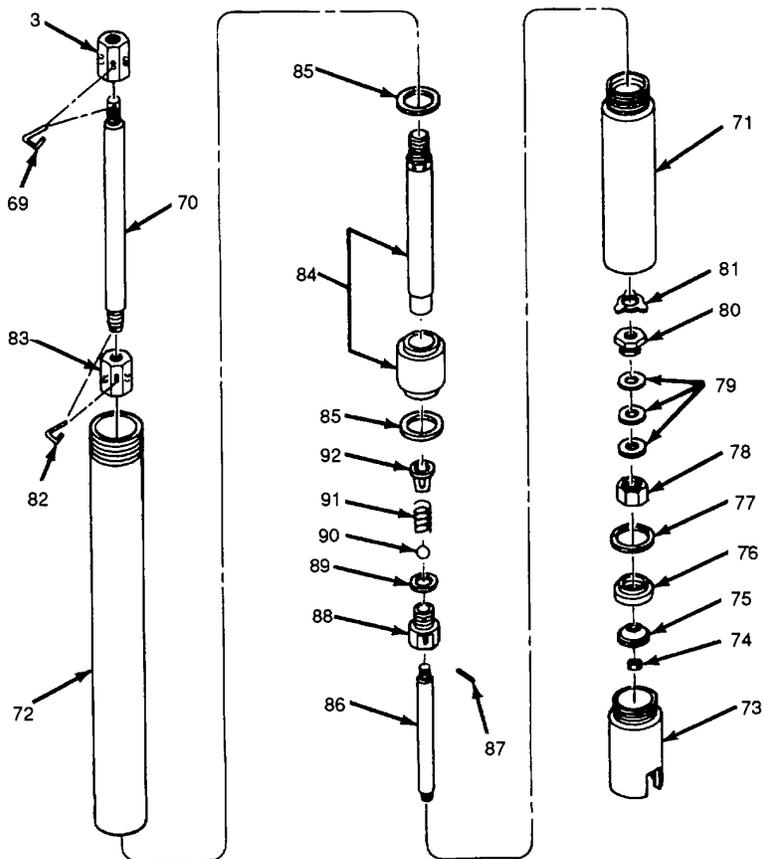
---

a. Disassembly - (cont.)

**CAUTION**

**For initial disassembly take care not to damage adapter (71) when unthreading. Adapter threads are coated with sealant.**

- (24) Remove lower spring clip (69), and upper coupler (3) from rod (70).
- (25) Unthread adapter (71) and pull free from assembly tube (72).
- (26) Unthread primer body (73), and remove stop nut (74), plate (75), valve seat (76), gasket (77), valve body (78), three packings (79), screw (80) and guide washer (81).
- (27) Remove lower spring clip (82) from lower coupler (83) and unthread piston and cylinder assembly (84).
- (28) Pull tube (72) loose from piston and cylinder assembly and remove two gaskets (85).
- (29) Pull adapter (71) up over primer rod (86) to expose roll pin (87).
- (30) Drive out roll pin (87) and remove adapter (88), gasket (89), ball (90), spring (91) and spring retainer (92).



## LUBE TANK ASSEMBLY

---

### 5-19. HIGH PRESSURE PUMP - REPAIR - (Cont.)

---

b. Repair

**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100° F to 138°F (38°C to 59°C).**

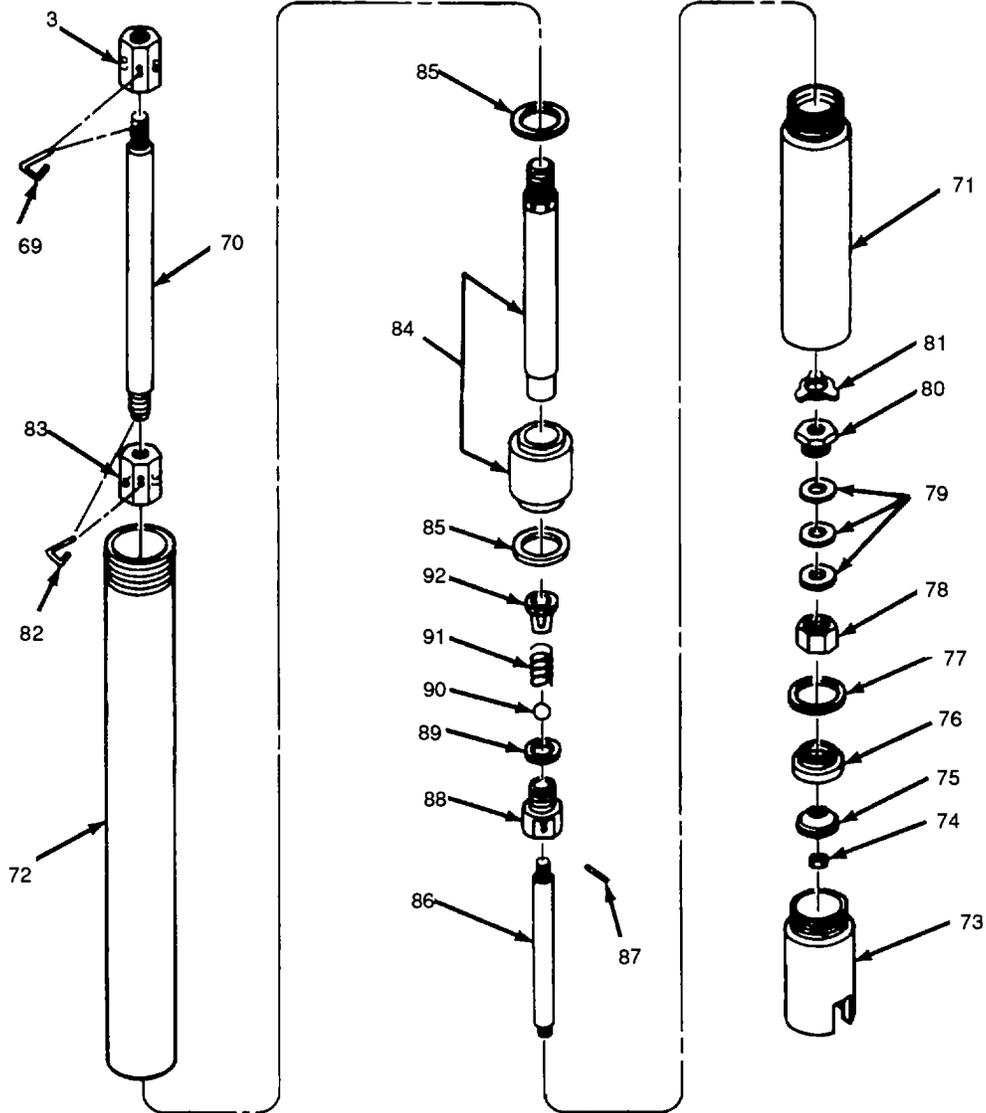
- (1) Clean all parts with dry cleaning solvent.
- (2) Discard and replace all gaskets and packings.
- (3) Inspect and replace any worn or damaged parts.
- (4) Inspect threaded surfaces for damage. Replace if defective.
- (5) Inspect pump rods and tubes for cracks, breaks or other defects which should prevent proper operation.
- (6) Inspect valve and valve seats for damage or wear. Replace as required.

c. Assembly

**NOTE**

**Steps 1 through 8 apply to assembly of pump tube (2). Proceed to step 9 for assembly of air motor (5). Go to step 34 for pump tube and air motor assembly, together.**

- (1) Install spring retainer (92), spring (91), ball (90), gasket (89) and adapter (88). Drive in new roll pin (87).
- (2) Slide adapter (71) over primer rod (86).
- (3) Install two gaskets (85) and slide tube (72) onto piston and cylinder assembly (84).
- (4) Connect piston and cylinder assembly (84) to rod (70) with lower coupler (83) and spring clip (82).
- (5) Install guide washer (81), screw (80), three packings (79), valve body (78), gasket (77), valve seat (76), plate (75) and stop nut (74).



**LUBE TANK ASSEMBLY**

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**5-19. HIGH PRESSURE PUMP - REPAIR - (Cont.)**

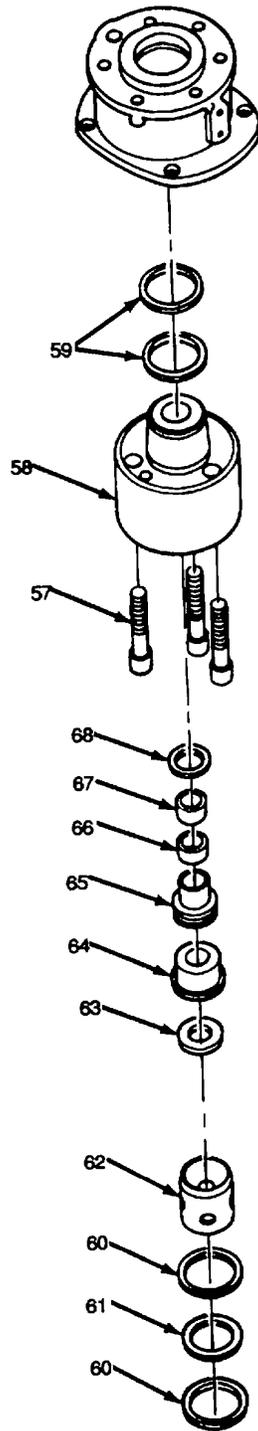
---

- c. Assembly - (cont.)
- (6) Install primer body (73).
  - (7) Connect assembly tube (72) to adapter (71).
  - (8) Install upper couplet (3) and spring clip (69).

**NOTE**

**The lubricant and sealant referred to below are included in the air motor major repair kit (TM 5-4930-233-24P).**

- (9) Coat all packings and preformed packings with lubricant.
- (10) Install preformed packing (68), spacer (67), seal (66), lantern ring (65), seal (64), washer (63) into body (58). Be sure lips of seals face downward.
- (11) Install spacer (62), washer (61), and two gaskets (60).
- (12) Install two preformed packings (59), body (58) and three screws (57).



**LUBE TANK ASSEMBLY**

---

**5-19. HIGH PRESSURE PUMP - REPAIR - (Cont.)**

---

## c. Assembly - (cont.)

(13) Install two screws (56) and six tie rods (55).

(14) Install bushing (54), washer (53) and adapter (52) and plug (51).

(15) Coat threads of trip rod (47) with sealant and install nut (50), and preformed packing (49) and nut (48).

(16) Install nut (43), packing (46) and two washers (45) onto piston rod (44).

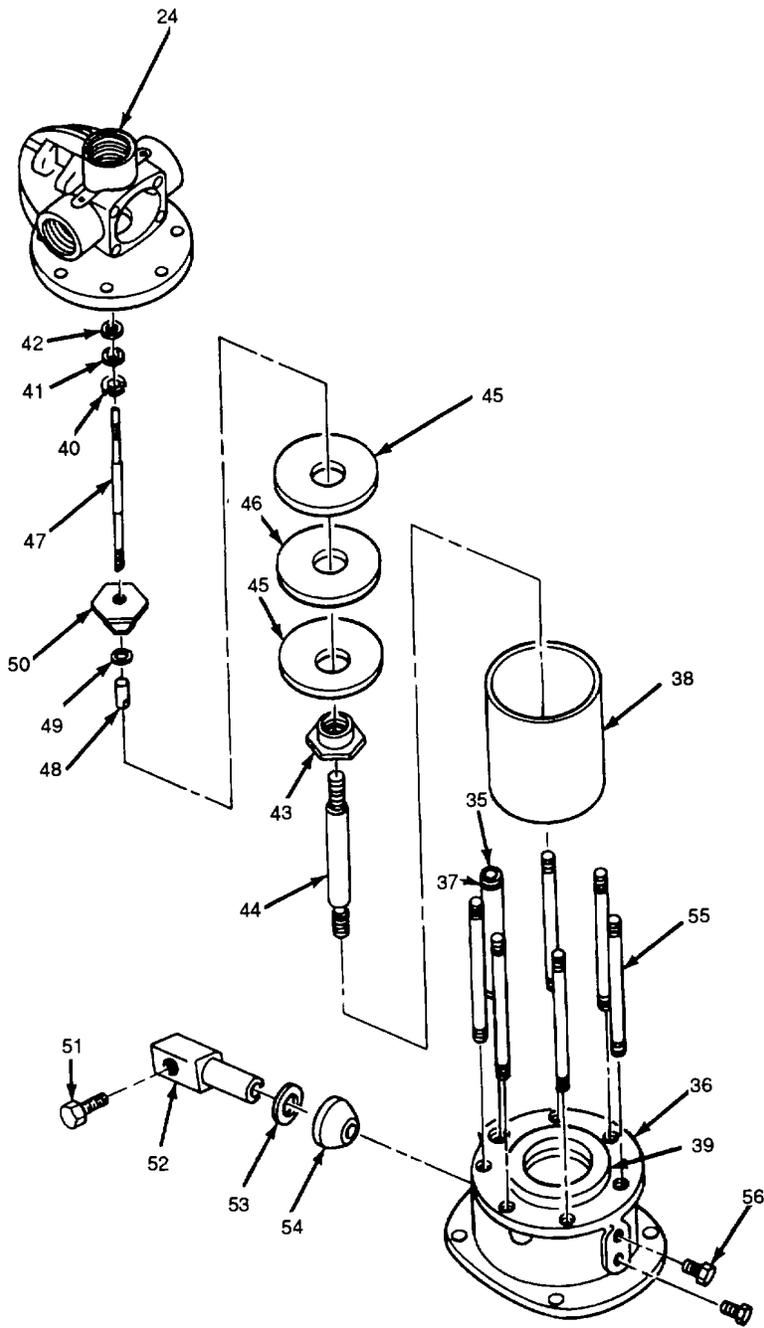
(17) Tighten piston rod (44) to nut (50) and then tighten nut (43). Coat piston rod (44) with lubricant.

(18) Install block "v" packing (42), washer (41) and retaining ring (40) to underside of valve body and stop assembly (24).

(19) Install preformed packing (39) and cylinder (38).

(20) Install two preformed packings (37) and air tube (3) onto cylinder head and plug assembly (36).

**Change 1 5-114**



## LUBE TANK ASSEMBLY

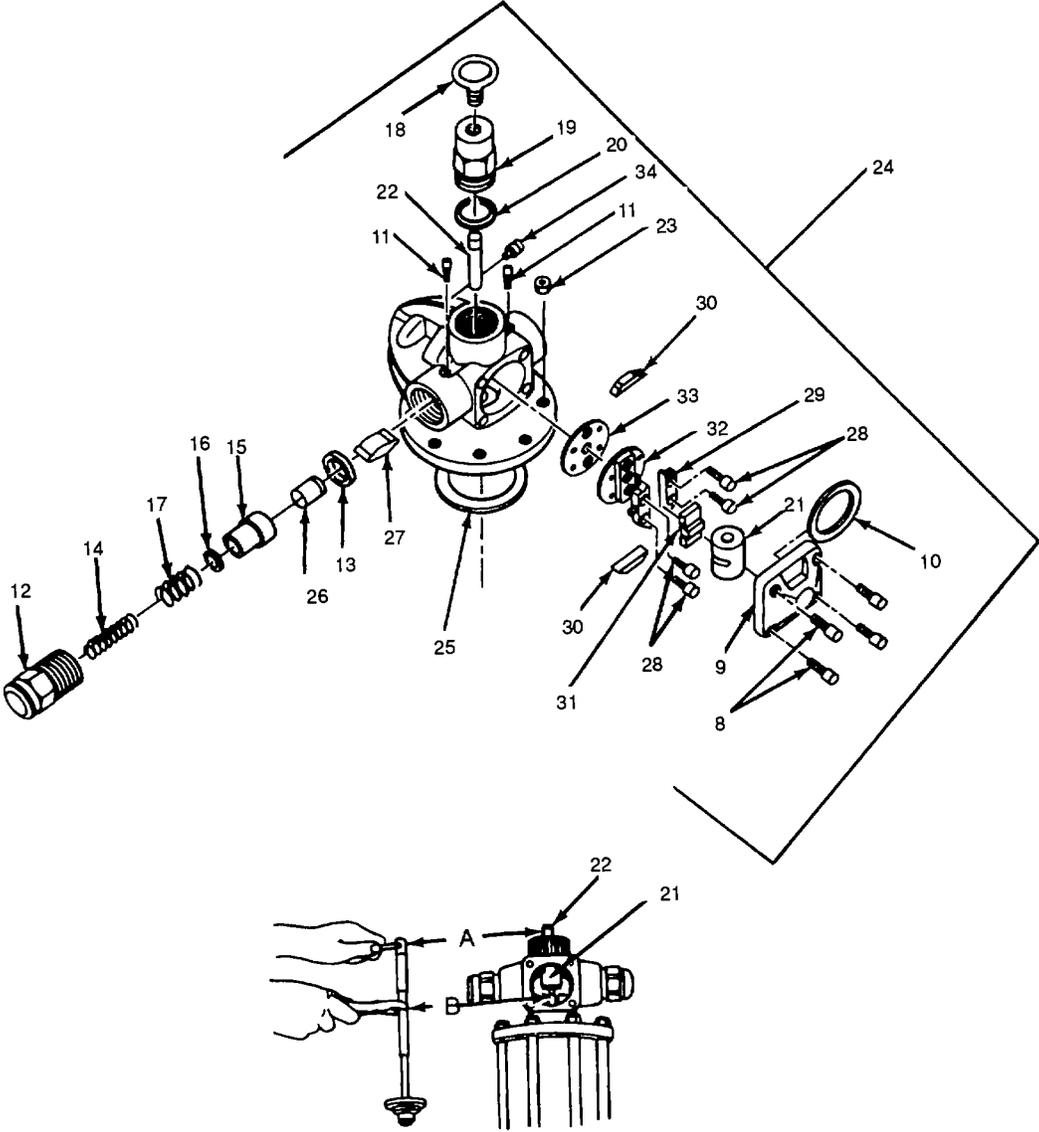
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### 5-19. HIGH PRESSURE PUMP - REPAIR - (Cont.)

---

c. Assembly- (cont.)

- (21) Install plug (34).
- (22) Install gasket (33) and valve seat (32).
- (23) Lubricate sides of slide valve (31) that contact valve guide and plug assemblies (29).
- (24) Install slide valve (31), two stops (30), two valve guide and plug assemblies (29) and four screws (28).
- (25) Coat shuttle (21) (including inside bore), plungers (26) and toggles (27) with lubricant.
- (26) Install two toggles (27), two plungers (26) and shuttle (21). Be sure that larger bore of shuttle is facing upwards.
- (27) Install preformed packing (25) and position valve body and stop assembly (24) on five tie rods. Install five nuts (23).
- (28) Lift trip rod as shown and install nut (22).
- (29) Install preformed packing (20), adapter (19) and eyebolt (18).
- (30) Install spring (17), washer (16) and cylinder (15) into cap (12). Be sure that top of cylinder is flush with or below edge of cap. Repeat for other cap.
- (31) Coat four springs (14) with lubricant.
- (32) Install four springs (14), two gaskets (133), two caps (12) and two set screws (11).
- (33) Place ¼ ounce (7.4 ml) of oil into air cavity before installing preformed packing (10), adapter (9) and four screws (8).



## LUBE TANK ASSEMBLY

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### 5-19. HIGH PRESSURE PUMP - REPAIR - (Cont.)

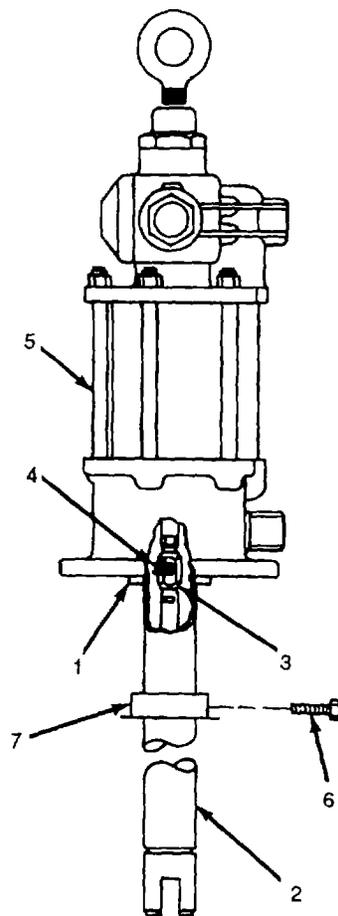
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c. Assembly - (cont.)

(34) Install baffle (7), screw (6) on pump tube (2), connect air motor (5) and pump tube (2) with couplet (3).

(35) Install upper spring clip (4).

(36) Screw pump tube (2) into air motor (5) and tighten jam nut (1).



## LUBE TANK ASSEMBLY

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### 5-20. LUBE TANK- REPAIR

---

This task covers:

Repair

---

#### INITIAL SET-UP:

##### Materials/Parts

Dry Cleaning Solvent  
(Item 6, App E)

##### Equipment Condition

Lube Tank Removed  
(para.. 4-38)

##### Tools

General Mechanics Tool Box (Section III, Item 1, App B)  
Electric Welder (Section III, Item 5, App B)

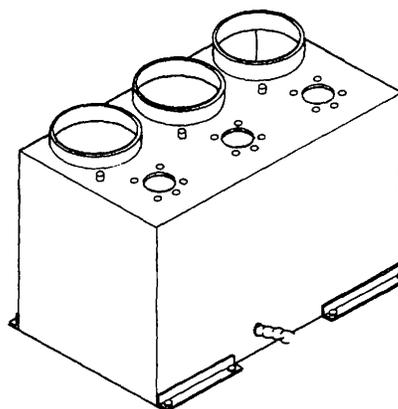
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Repair

#### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100° F to 138°F (38°C to 59°C).**

- (1) Flush out each of the three lubricant compartments in the tank using dry cleaning solvent.
- (2) Inspect tank for cracks, broken welds and damage.
- (3) Repair cracks by welding if practical.
- (4) Repair broken welds.
- (5) Straighten dents and tap damaged threads.



## WINTERIZATION ASSEMBLY

---

### 5-21. CONTROL BOX- REPAIR

---

This task covers:

- a. Disassembly                      b. Repair                      c. Assembly
- 

#### INITIAL SET-UP:

##### Equipment Condition

Control Box Removed  
(para. 4-40)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Multimeter  
(Section III, Item 4, App B)

---

#### a. Disassembly

- (1) Remove two screws (1) and case assembly (2).
- (2) Remove two nuts (3), two screws (4) and two nuts (5) from case.
- (3) Tag and disconnect all electrical leads and jumpers.
- (4) Remove two nuts (6), two lockwashers (7) and two switches (8).
- (5) Remove lens assembly (9), bulb (10), nut (11), washer (12), lamp assembly (13) and switch panel (14).
- (6) Remove four screws (15) and receptacle assembly (16).
- (7) Remove two screws (17) and bracket (18).
- (8) Remove two screws (19), two washers (20) and circuit breaker (21).
- (9) Remove grommet (22) from panel (23).

#### b. Repair

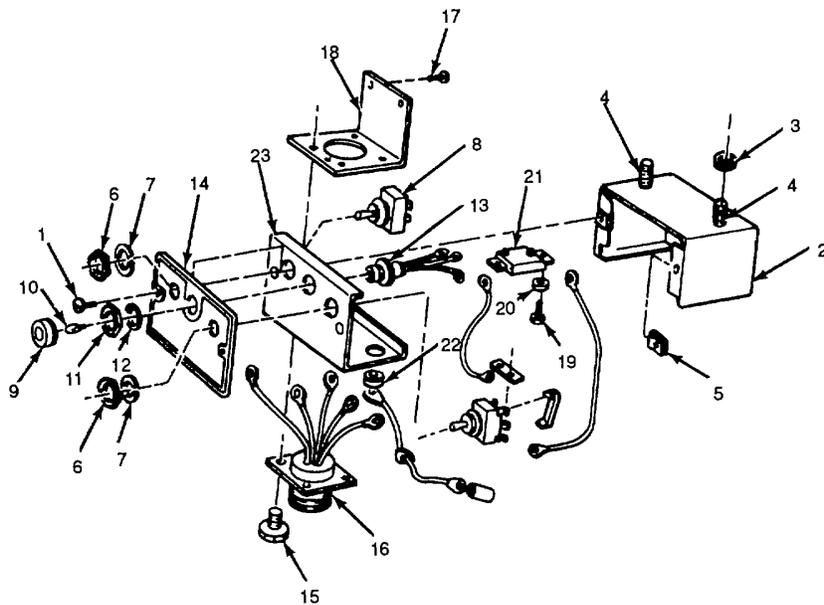
- (1) Test circuit breaker for continuity. If no continuity is present, replace.
- (2) Inspect all wiring for cuts, deterioration or damage. Replace if defective.
- (3) Check switches for correct operation. Replace if damaged or if contact is not positive during switch actions.
- (4) Replace case if damaged.
- (5) Replace switch panel if illegible.

## WINTERIZATION ASSEMBLY

### 5-21. CONTROL BOX- REPAIR

#### c. Assembly

- (1) Install grommet (22) into panel (23).
- (2) Install circuit breaker (21), two washers (20) and two screws (19).
- (3) Install bracket (18) with two screws (17).
- (4) Install receptacle assembly (16) with four screws (15).
- (5) Install switch panel (14), lamp assembly (13), washer (12), nut (11), bulb (10) and lens assembly (9).
- (6) Install two switches (8), two lockwashers (7) and two nuts (6).
- (7) Connect all electrical leads and jumpers. Remove tags.
- (8) Install two nuts (5), two screws (4) and two nuts (3).
- (9) Install case assembly (2) with two screws (1).



## FRAME AND SKID ASSEMBLY

---

### 5-22. FRAME AND SKID ASSEMBLY - INSPECT/REPAIR

---

This task covers:

- a. Repair
- 

#### INITIAL SET-UP:

##### References

TM 43-0139 Painting  
Instructions for field use

##### **NOTE**

**This procedure does not require the removal of any components except those that will provide access to the area to be repaired.**

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Electric Welder  
(Section III, Item 5, App B)

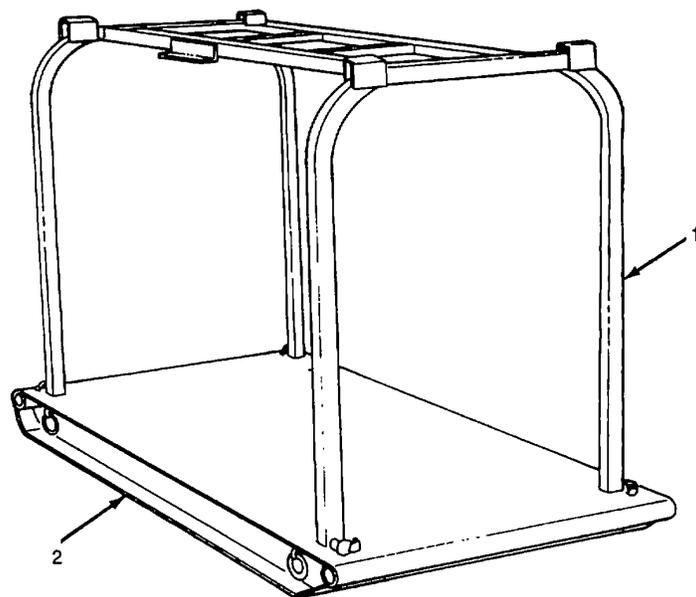
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#### Repair

##### **NOTE**

**If access cannot be gained to any area requiring repair without removal of the enclosure, notify general support maintenance.**

- (1) Inspect a frame (1) and skid (2) assembly for corrosion.
- (2) If corrosion is present, remove using with brush and touch up paint (TM 43-0139).
- (3) Inspect all welded joints for cracks. Repair welds as required.



5-123

## AIR BRAKE ASSEMBLY

---

### 5-23. POWER CLUSTER - REPLACE/REPAIR

---

This task covers:

- |                 |                |           |             |
|-----------------|----------------|-----------|-------------|
| a. Removal      | b. Disassembly | c. Repair | d. Assembly |
| e. Installation |                |           |             |
- 

INITIAL SET-UP:

Materials/Parts

Dry Cleaning Solvent  
(Item 6, App E)

**NOTE**

**No repair is authorized for the master brake cylinder. Replace if damaged.**

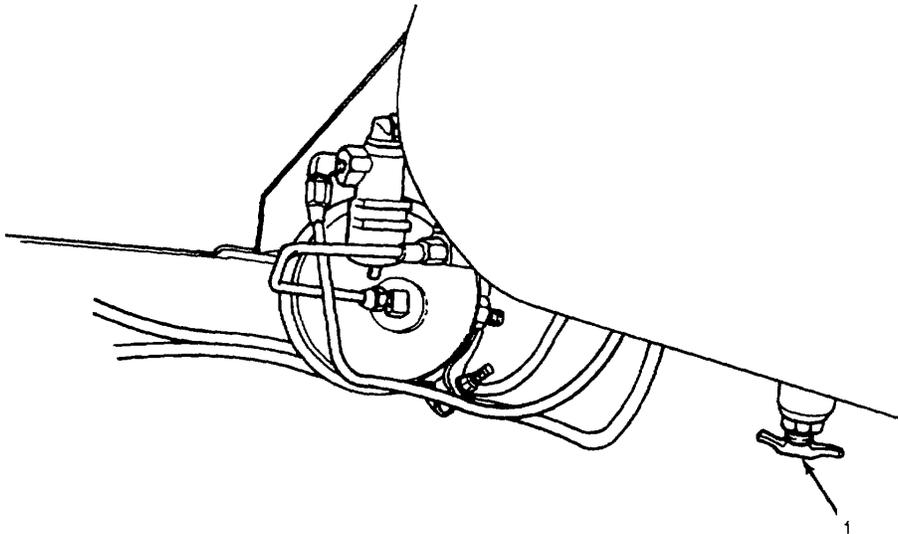
Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

- a. Removal

(1) Vent air brake pressure completely by opening valve (1). Close valve.



## AIR BRAKE ASSEMBLY

---

### 5-23. POWER CLUSTER - REPLACE/REPAIR - (Cont.)

---

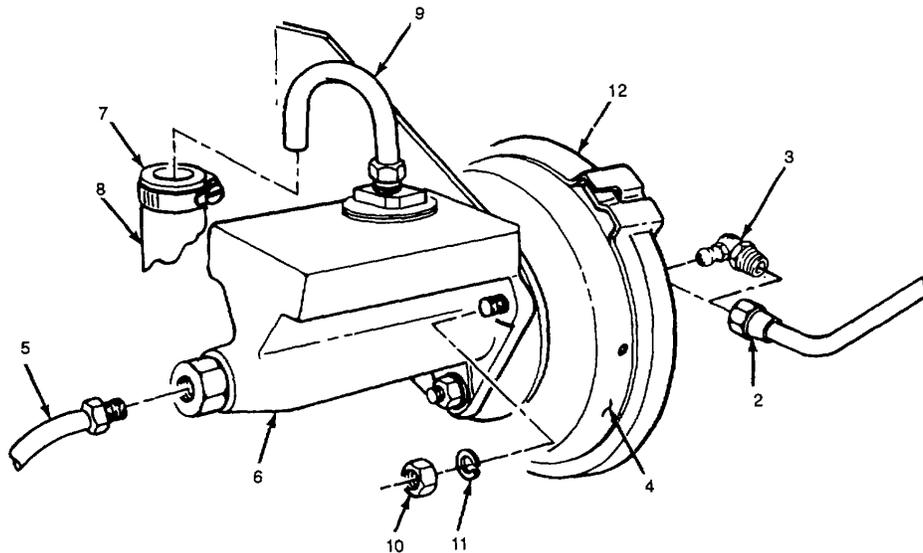
a. Removal - (cont.)

- (2) Disconnect air line (2) and remove elbow (3) at air chamber assembly (4).
- (3) Disconnect hydraulic tube (5) at master brake cylinder (6).

#### NOTE

**Do not remove hose and tube assembly from master cylinder unless replacement is necessary.**

- (4) Loosen clamp (7) and remove hose (8) and tube assembly (9).
- (5) Remove three nuts (10) and three lockwashers (11).
- (6) Slowly pull master cylinder (6) away from air chamber assembly (4) and remove with collar (12).
- (7) Remove air chamber assembly (4).



## AIR BRAKE ASSEMBLY

---

### 5-23. POWER CLUSTER - REPLACE/REPAIR - (Cont.)

---

b. Disassembly

- (1) Remove nut (13), screw (14) and clamp band (15).
- (2) Separate cover assembly (16) and body assembly (17) and remove diaphragm (18), push rod assembly (19), preformed packing (20) and spring (21).

c. Repair

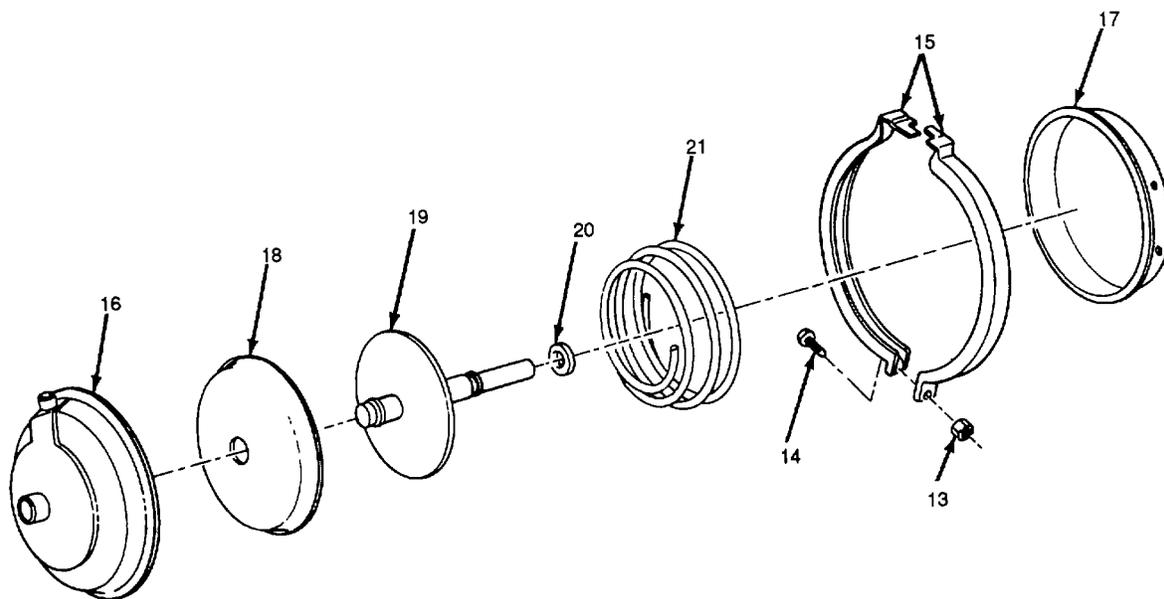
**WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 100° F to 138°F (38°C to 59°C).**

- (1) Clean all metallic parts with dry cleaning solvent.
- (2) Inspect air chamber diaphragm for cracks, deterioration or wear. Replace a damaged diaphragm.
- (3) Inspect cover and body assemblies for cracks, dents, distortion and damaged threads. Replace if defective.
- (4) Inspect spring for rust, distortion and for loss of tension. Replace a damaged or worn spring.

d. Assembly

- (1) Assemble spring (21), preformed packing (20), push rod assembly (19), diaphragm (18), body assembly (17) and cover assembly (16).
- (2) Install clamp band (15), screw (14) and nut (13). Torque nut to 210-225 in. lbs (23.73 - 25.42 N-m).



5-127

## AIR BRAKE ASSEMBLY

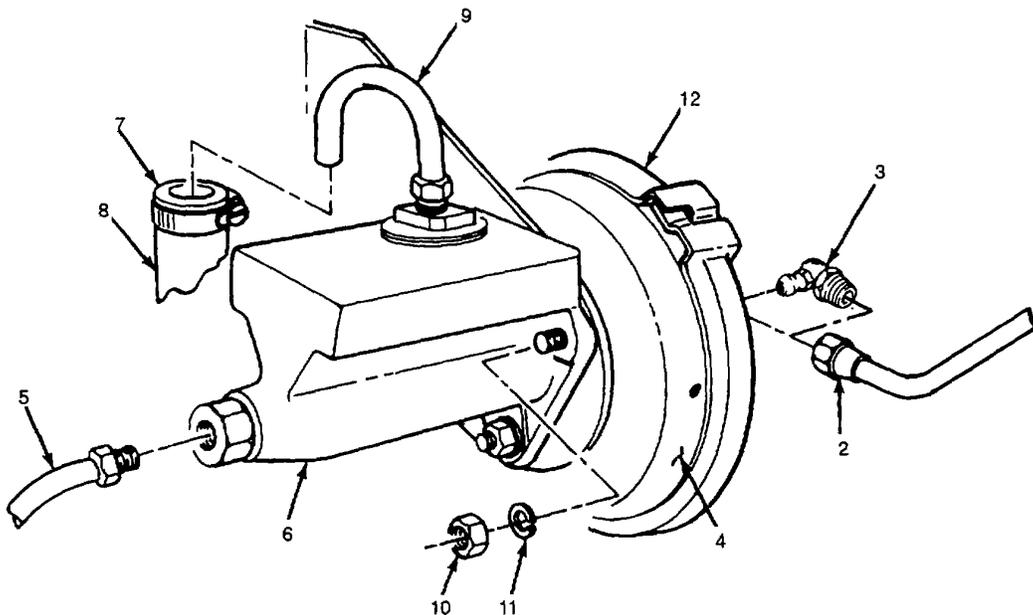
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### 5-23. POWER CLUSTER - REPLACE/REPAIR - (Cont.)

---

e. Installation

- (1) Install air chamber assembly (4), collar (12) and master cylinder (6).
- (2) Install three lockwashers (11), and three nuts (10). Torque nut to 25-31 ft. lbs (33.9 - 42.03 N-m).
- (3) Install tube assembly (9). Tube assembly nut should be hand tightened.
- (4) Install hose (8) and clamp (7). Torque clamp to 30-50 ft. lbs (40.68-67.8 N-m).
- (5) Connect hydraulic tube (5) at master brake cylinder.
- (6) Install elbow (3) and connect air line (2).
- (7) Bleed and adjust brakes (para. 4-58).



## AXLE ASSEMBLY

---

### 5-24. AXLE ASSEMBLY - REPLACE

---

This task covers:

- a. Removal
  - b. Installation
- 

#### INITIAL SET-UP:

##### Equipment Condition

Enclosure and Skid Assembly  
Removed (para 5-2)

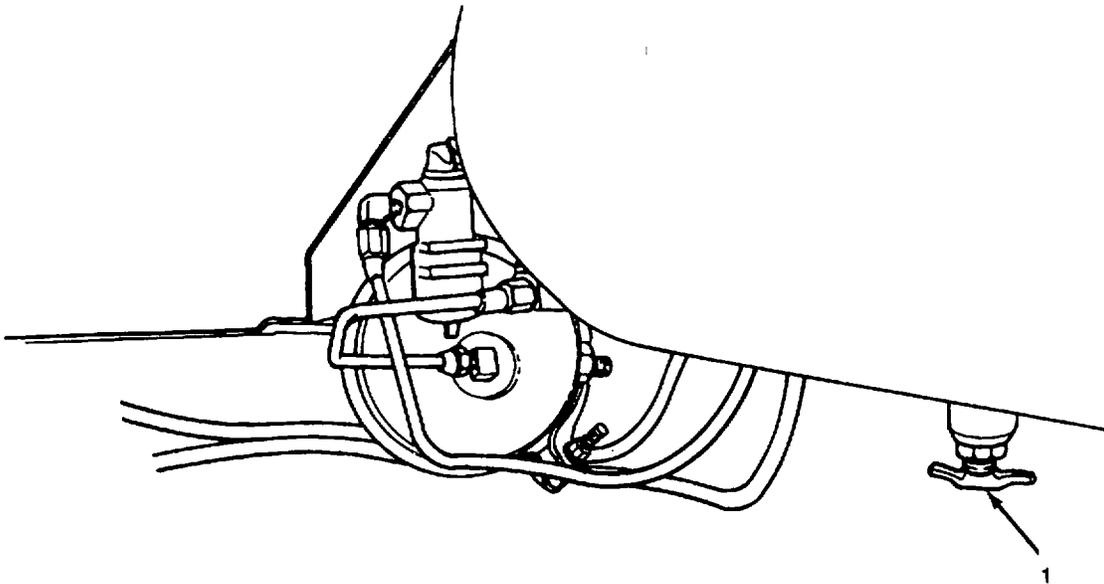
##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)

---

#### a. Removal

- (1) Disconnect trailer air brake lines from towing vehicle.
- (2) Vent all air brake pressure by opening valve (1). Close valve when complete.



## AXLE ASSEMBLY

---

### 5-24. AXLE ASSEMBLY - REPLACE - (Cont.)

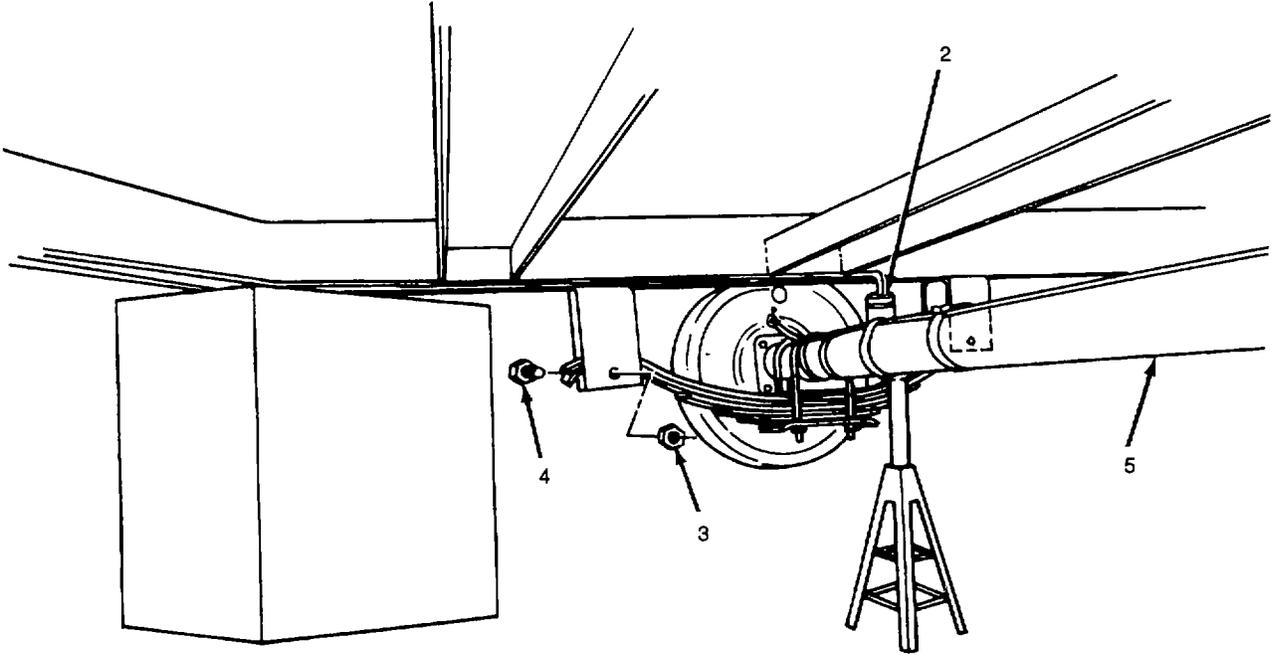
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a. Removal - (cont.)

**WARNING**

**Any time the trailer is jacked up, ensure jackstands are used to avoid personal injury.**

- (3) Jack trailer up until both wheels are off the ground and securely blocked in all four corners.
  - (4) Block axle securely at both ends.
  - (5) Remove both tire and wheels (para 4-57).
  - (6) Disconnect hydraulic brake line (2).
  - (7) Remove four locknuts (3) and four screws (4). Note location of bolts for installation purpose.
  - (8) Slide lower axle assembly (5) out from under trailer.
- b. Installation
- (1) Position axle assembly (5) under trailer and install four screws (4) and four locknuts (3).
  - (2) Connect hydraulic brake line (2).
  - (3) Install both tires and wheels (para 4-57).
  - (4) Remove blocking from underneath axle.
  - (5) Bleed brake system (para 4-58).
  - (6) Remove blocking and lower trailer to the ground.



## FRAME ASSEMBLY

---

### 5-25. FRAME ASSEMBLY - REPLACE

---

This task covers:

Replacement

---

INITIAL SET-UP:

Tools

General Mechanics Tool Box (Section III, Item 1, App B)

---

Replacement

#### NOTE

**The following items must be removed from the trailer frame being replaced and installed on the new one.**

- (1) Enclosure and skid assembly (para 5-2).
- (2) Trailer components (para 4-46).
- (3) Air Brake components (para 4-47 thru 4-52).
- (4) Power Cluster (para 5-23).
- (5) Trailer Electrical Components (para 4-53 thru 4-56).
- (6) Axle Assembly (para 5-24).

## Chapter 6

### Section I. PMCS AND TROUBLESHOOTING PROCEDURES

There are no General Support PMCS or troubleshooting procedures.

### Section II. GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

---

#### SKID SUB ASSEMBLY

---

#### 6-1. FUEL TANK - REPAIR

---

This task covers:

Repair

---

#### INITIAL SET-UP:

##### Materials/Parts

Dry Cleaning Solvent  
(Item 6, App E)

##### Equipment Condition

Fuel Tank Removed (para 4-16)  
Fuel Tank Disassembled (para NO TAG)

##### Tools

General Mechanics Tool Box (Section III, Item 1, App B)  
Electric Welder (Section III, Item 5, App B)

#### **WARNING**

**Before performing any work on fuel tank, insure that all gasoline and gasoline vapors have been purged. If not, an explosion can result, causing death or severe injury.**

---

Repair

#### **WARNING**

**Clean all parts in a well ventilated area. Avoid inhaling solvent fumes and prolonged exposure of the skin to cleaning solvent. Failure to do so can cause severe injury or death. Do not use near flame or excessive heat. Flash point of solvent is 1000F to 1380F (380C to 59°C).**

- (1) Flush out tank completely with dry cleaning solvent.
- (2) Dry out tank thoroughly.
- (3) Inspect fuel tank for large cracks, severe dents or damage.

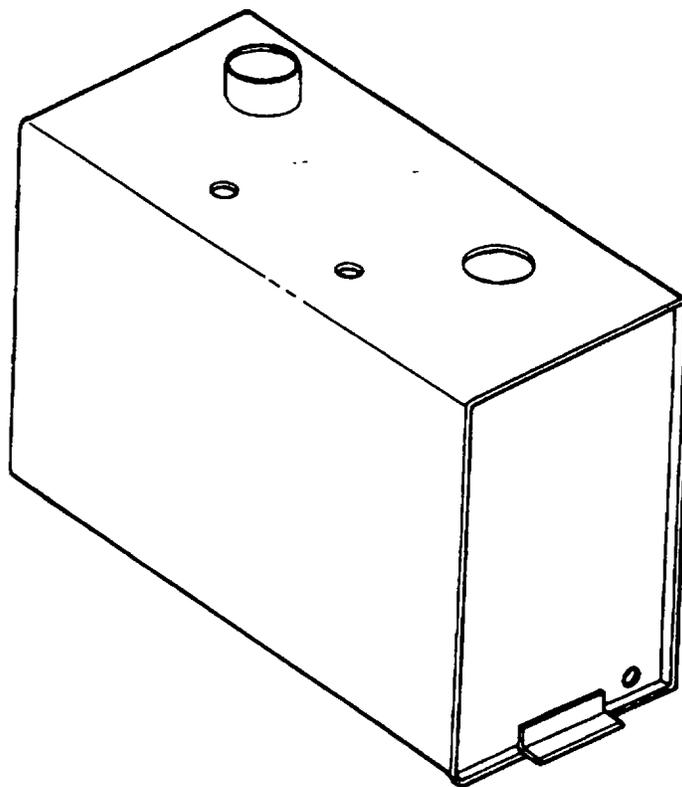
**SKID SUB ASSEMBLY**

**6-1. FUEL TANK - REPAIR - (Cont.)**

---

Repair - (cont.)

- (4) If damage is such that repair is not feasible, replace tank.
- (5) If dents are minor, straighten out as required.
- (6) If welds are damaged or cracks are present, weld as needed.
- (7) If threads are damaged, retap as necessary.



## FRAME AND SKID ASSEMBLY

### 6-2. FRAME AND SKID ASSEMBLY - REPLACE/REPAIR

---

This task covers:

- a. Replace
  - b. Repair
- 

#### INITIAL SET-UP:

##### References

TM 43-0139  
Painting instructions  
for field use

##### Equipment Conditions Page

Enclosure and skid assembly  
removed (para 5-2)  
Enclosure removed (para 4-11)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Welder (Section III, Item 1, App B)

##### Materials/Parts

Wire Brush (Item 15, App E)

---

- a. Replace

#### NOTE

**A frame and skid assembly does not have to be removed to be repaired. The following items must be removed from the A frame and skid assembly being replaced, and installed on the new one.**

- (1) Skid sub assembly components removed (para 4-15 and 4-16).
- (2) Reel cabinet and components removed (para 4-17 thru 4-21).
- (3) Air compressor assembly components removed (para 4-29 thru 4-31).
- (4) Lube tank assembly components (para 4-35 thru 4-38).
- (5) Winterization assembly components removed (para 4-39 and 4-43).
- (6) Lube and pneumatic piping removed (para 4-44 and 4-45).

## FRAME AND SKID ASSEMBLY

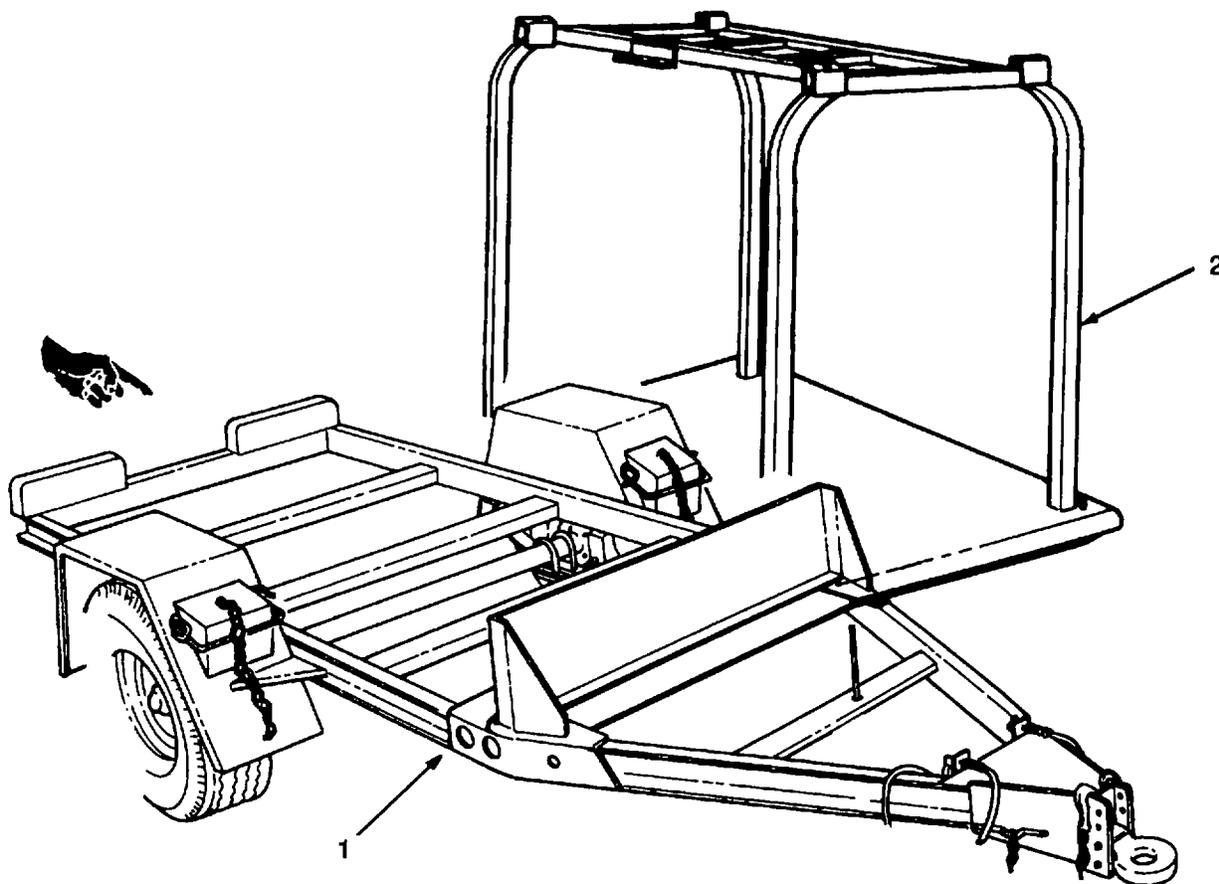
### 6-2. FRAME AND SKID ASSEMBLY - REPLACE/REPAIR - (Cont.)

#### b. Repair

#### NOTE

Remove slid sub assembly components as required to give full access to area needing repair.

- (1) Inspect A frame (1) and skid (2) assembly for corrosion.
- (2) If corrosion is present, remove using wire brush and touch up paint (TM 43-0139).
- (3) Inspect all welded joints for cracks. Repair welds as required.
- (4) Straighten any dents and repair damage as necessary.



## FRAME AND SKID ASSEMBLY

---

### 6-3. FRAME ASSEMBLY - REPAIR

---

This task covers:  
Repair

---

#### INITIAL SET-UP:

##### References

TM 43-0139 Painting  
instructions for field use

##### Equipment Condition Page

Enclosure and skid assembly  
removed (para 5-2)

##### Tools

General Mechanics Tool Box  
(Section III, Item 1, App B)  
Electric Welder  
(Section III, Item 5, App B)

##### Materials/Parts

Wire Brush (Item 25, App E)

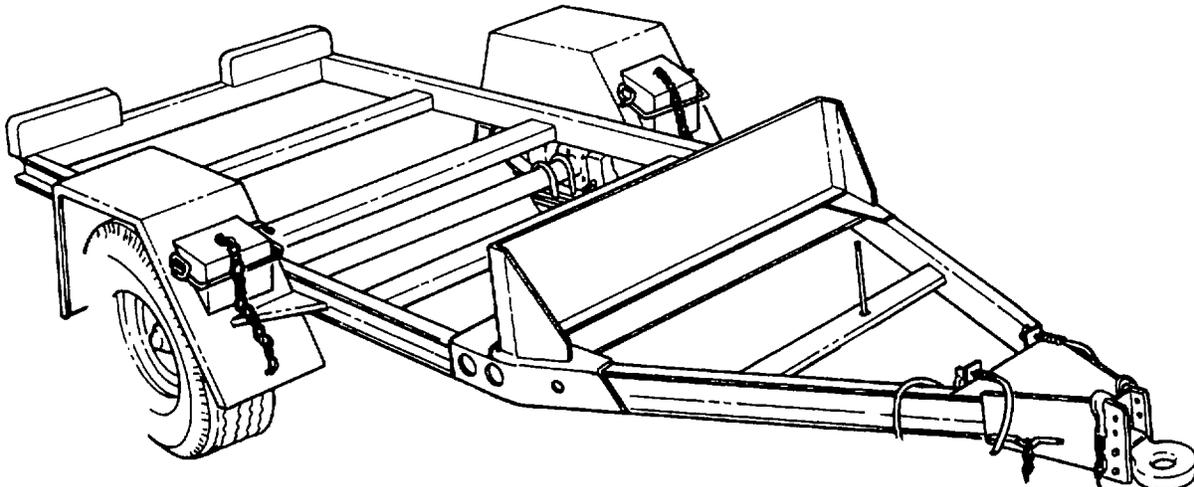
#### **NOTE**

**Removal of trailer components should be restricted to only those that are necessary to gain access to and being repaired.**

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#### Repair

- (1) Inspect frame assembly for corrosion.
- (2) If frame is corroded, clean using wire brush and touch up paint (TM 43-0139).
- (3) Inspect all weld joints for cracks or damage. Re-weld as necessary.
- (4) Inspect frame member for straightness. Straighten as necessary.



## Appendix A

### REFERENCES

#### A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals and miscellaneous publications referenced in this manual.

#### A-2. FORMS

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

Equipment Inspection and Maintenance Work Sheet ..... DA Form 2404

Quality Deficiency Report ..... DA Form 368

#### A-3. FIELD MANUALS

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

Manual for the Wheeled Vehicle Driver ..... FM 21-305

#### A-4. MANUALS

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

Inspection and Test of Air and Other Gas Compressors ..... TB 43-0151

The Army Maintenance Management System

(TAMMS) ..... DA PAM 738-750

Equipment Record Procedures (Marine Corps) ..... TM 4700-15/1E

Operator, Organizational, (Field)

(Direct Support and General Support)

and Depot Level Maintenance Manual:

Engine, Gasoline, 6 HP (Military Standard

Models DOD 4A032-1) (NSN 2805-

01-776-0483) and (Model 4A032-2) (2805-

00-066-7512) and (Model 4A032-3) (2805-

01 -139-0596) ..... TM 9-2805-262-14

Organizational, Intermediate (Field) (Direct and General Support) and Depot Maintenance Repair Parts and Special Tools List for Engine, Gasoline, 6 HP, Military Standard Models: DOD Model 4A032-1 (NSN 2805-00-776-8403), DOD Model 4A032-2 (2805-00-066-7512) and Model 4A032-3 (2805-01-139-0596) .....	TM 5-2805-203-24P
Care and Maintenance of Antifriction Bearings .....	TM 9-214
Welding Theory and Application .....	TM 9-237
Organizational, Direct Support and General Support Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes .....	TM 9-2610-200-24
Operator's Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries: 4HN, 24 V (NSN 6140-00-059-3526) MS75047-1; 2HN, 12 V (6140-00-057-2563) MS35000-1; 6TN, 12 V (6140-00-057-2554) MS35000-3 .....	TM 9-6140-200-14
Painting Instructions for Field Use .....	TM 43-0139
Procedures for Destruction of Equipment to Prevent Enemy Use .....	TM 750-244-3
Unit, Direct and General Support Repair Parts and Special Tools List for Lubrication and Servicing Unit, Power Operated LST-178A-85 .....	TM 5-4930-233-24P(Army)
.....	TM 4930-24/2 (MC)

## Appendix B

### MAINTENANCE ALLOCATION CHART

#### Section I. INTRODUCTION

##### B-1. GENERAL

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

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance function to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II

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

##### B-2. MAINTENANCE FUNCTIONS . Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

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

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. Repair. The application of maintenance services<sup>1</sup>, including fault location/troubleshooting<sup>2</sup>, removal/installation, and disassembly/assembly<sup>3</sup> procedures, and maintenance actions<sup>4</sup> 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.

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

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

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

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

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

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of work time figures 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 vary 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

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<sup>1</sup> Services - inspect, test, service, adjust, align, calibrate, and/or replace.

<sup>2</sup> 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).

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

<sup>4</sup> Actions - welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

designations for the various maintenance categories are as follows:

- C Operator or crew
- O Unit Maintenance
- F Direct Support Maintenance
- H General Support Maintenance
- L Specialized Repair Activity (SRA)
- D Depot Maintenance

e. 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.

f. 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**

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

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

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

d. Column 4, National Stock Number. The National Stock Number (NSN) of the tool or test equipment.

e. Column 5, Tool Number. The Manufacturer's part number.

#### **B-5. EXPLANATION OF COLUMNS IN REMARKS, Section IV.**

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

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

Section II. MAINTENANCE ALLOCATION CHART

NONMENCLATURE OF END ITEMS:

Lube and Service Unit NSN 4730-01-230-0781

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIAT		DEPOT		
			C	O	F	H	D		
00	Lubrication and Service Unit								
01	Enclosure and Replace Skid Assembly			0.4		1.5			
0101	Enclosure	Replace		0.4					
010101	Doors	Inspect	0.2						
		Replace		0.8		1.5			
010102	Panels	Repair				1.5			
		Replace		1.5					
0102	Skid Sub Assembly	Repair				1.5			
		Replace							
010201	Transfer Pump	Inspect	0.2						
		Adjust		0.2					
		Replace	0.3						
		Repair				0.6			
010202	Fuel and Neck Assembly	Replace		0.3					
		Repair		0.3					
010203	Tool Box Assembly	Replace		0.3					
		Repair		0.3					
010204	Fuel Tank Assembly	Inspect	0.2						
		Service		0.2					
		Replace		0.4					
		Repair		0.4		2.0			A
		Repair		0.5					
010205	Reel Cabinet Assembly								
01020501	Battery Box Assembly	Inspect	0.2						
		Service	0.2	0.2					
		Replace		0.5					
		Repair		1.0					
01020502	Gear Lube and Engine Oil Dispensers	Inspect	0.2			0.2			B
		Adjust				0.2			
		Replace		0.5					
		Repair				0.7			
01020503	Grease Control Valve	Inspect	0.2						B
		Replace		0.3					
		Adjust				0.3			
		Repair				1.0			
01020504	Air, Lube, and Grease Hoses	Inspect	0.2						
		Replace		0.5					
		Repair		0.5					
01020505	Reel Assembly	Inspect	0.2						
		Replace		0.5					
		Repair		0.7					
010206	Air Compressor Assembly	Inspect	0.3						
		Test		0.2		0.3			
01020601	Belts	Inspect	0.2						
		Adjust		0.3					
		Replace		0.4					
01020602	Starter	Inspect	0.2						
		Test		0.2					
		Replace		0.5					
		Repair				1.0			
01020603	Alternator	Inspect	0.2						
		Test		0.2					
		Replace		0.4					
		Repair				0.7			

Section II. MAINTENANCE ALLOCATION CHART

NONMENCLATURE OF END ITEMS:

Lube and Service Unit NSN 4730-01-230-0781

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIAT		DEPOT		
			C	O	F	H	D		
01020604	Wiring Harness	Inspect	0.2						
		Test		0.3					
		Replace		0.3					
01020605	Control Panel	Repair		0.7					
		Inspect	0.2						
		Test		0.3					
		Replace		0.5					
01020606	Pilot Valve	Repair		0.4					
		Adjust		0.2					
		Replace		0.3					
01020607	Pressure Relief Valve	Inspect	0.2						
		Replace		0.4					
01020608	Air Compressor	Inspect	0.3						
		Service		0.5					
		Replace		1.5					
0102060801	Air Filter	Repair			2.0				
		Inspect	0.2						
		Service		0.3					
0102060802	Head	Replace		0.4					
		Inspect	0.2						
		Replace			2.0				
		Repair			3.0				
0102060803	Centrifugal Unloader	Replace			0.3				
01020609	Engine	Replace			4.0			C	
010207	Lube Tank Assembly	Inspect	0.2						
01020701	Alcohol Injector	Repair		0.5					
		Inspect	0.2						
		Service		0.2					
		Adjust		0.2					
		Replace		0.4					
01020702	Air Regulator	Repair		0.4					
		Inspect	0.2						
		Replace		0.3					
01020703	Low and High Pressure Pumps	Repair			0.3				
		Inspect	0.2						
		Replace		0.4					
01020704	Lube Tank	Repair			0.6				
		Inspect	0.2						
		Replace		0.6					
010208	Winterization	Repair		0.3	2.0			D	
01020801	Heater	Assembly							
01020802	Control Box	Replace		0.2				E	
		Inspect	0.2						
		Test		0.4					
		Replace		0.4					
01020803	Fuel Pump	Repair			0.5				
		Inspect	0.2						
		Test		0.2					
		Replace		0.4					
01020804	Exhaust System	Inspect	0.2						
		Replace		0.6					

Section II. MAINTENANCE ALLOCATION CHART

NONMENCLATURE OF END ITEMS:

Lube and Service Unit NSN 4730-01-230-0781

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIAT		DEPOT		
			C	O	F	H	D		
01020805	Wring Harness	Inspect Test Replace	0.2	0.3 0.3 0.6					
01020806	Ducts and Healer Hoses	Inspect Replace	0.2	1.0					
010209	Lube and Pneumatic Piping	Inspect Replace Repair	0.2	0.6 0.6					
010210	A Frame and Skid Assembly	Inspect Replace Repair			0.3 2.0	16.0		F	
02 0201	Trailer Assembly Air Brake	Assembly							
020101	Coupler (Gladhand)	Inspect Replace Repair	0.2	0.3 0.4					
020102	Emergency Relay Valve	Inspect Replace	0.2	0.4					
020103	Air Supply Valve	Inspect Replace	0.2	0.4					
020104	Air Cleaner Assembly	Inspect Service Replace Repair	0.1	0.2 0.6 0.5					
020105	Power Cluster	Inspect Replace Repair	0.2		0.4 0.2				
020106	Brake Lines and Hoses	Inspect Replace	0.2	0.5					
020107	Air Tank	Inspect Service Replace	0.2 0.1	0.3 0.1					
0202	Wiring Harness or Trailer Electrical	Inspect Test Replace Repair	0.3	0.3 0.7 0.5				G	
0203 020301	Axle Assembly Wheel Assembly (Tire and Wheel)	Inspect Adjust Replace Repair		0.3 0.3 2.0	0.8				
020302	Brake Assembly	Inspect Adjust Replace Repair		0.3 0.3 2.0 2.0	2.0				
0204	Frame Assembly	Inspect Replace Repair	0.2		3.0	3.0			

**Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS**

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	General Mechanics Automotive Tool Kit	5180-00-177-7033	
2	O	#1 Common Tool Kit	4910-01-238-8115	
3	O	#2 Common Tool Kit	4910-01-238-8116	
4	O	Multimeter		
5	F	Electric Welder		
6	F	Torque Wrench	5120-01-247-2540	
7	F	Strap Wrench	5120-01-179-1898	
8	O	Adjusting Tool, Brake Shoes	5120-00-596-1034	
9	F	Lathe	4910-01-028-9849	

<b>Section IV. REMARKS</b>	
<b>REFERENCE CODE</b>	<b>REMARKS</b>
A	General Support repair limited to fuel tank only
B	Adjustment limited to grease control valve
C	Engine: See TM 5-2805-203-24-P
D	Unit repair limited to manhole gaskets only
E	Heater: See TM 9-2540-205-24P
F	Direct Support limited to repair not requiring enclosure removal
G	Unit replacement limited to power cable only

## Appendix C

### COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

#### Section I. INTRODUCTION

##### C-1. SCOPE

This appendix lists components of end item and basic issue items for the Lubrication and Servicing Unit to help you inventory items required for safe and efficient operation.

##### C-2. GENERAL

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

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

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

##### C-3. EXPLANATION OF COLUMNS

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

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

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

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

d. Column (6) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (7) - Quantity required (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

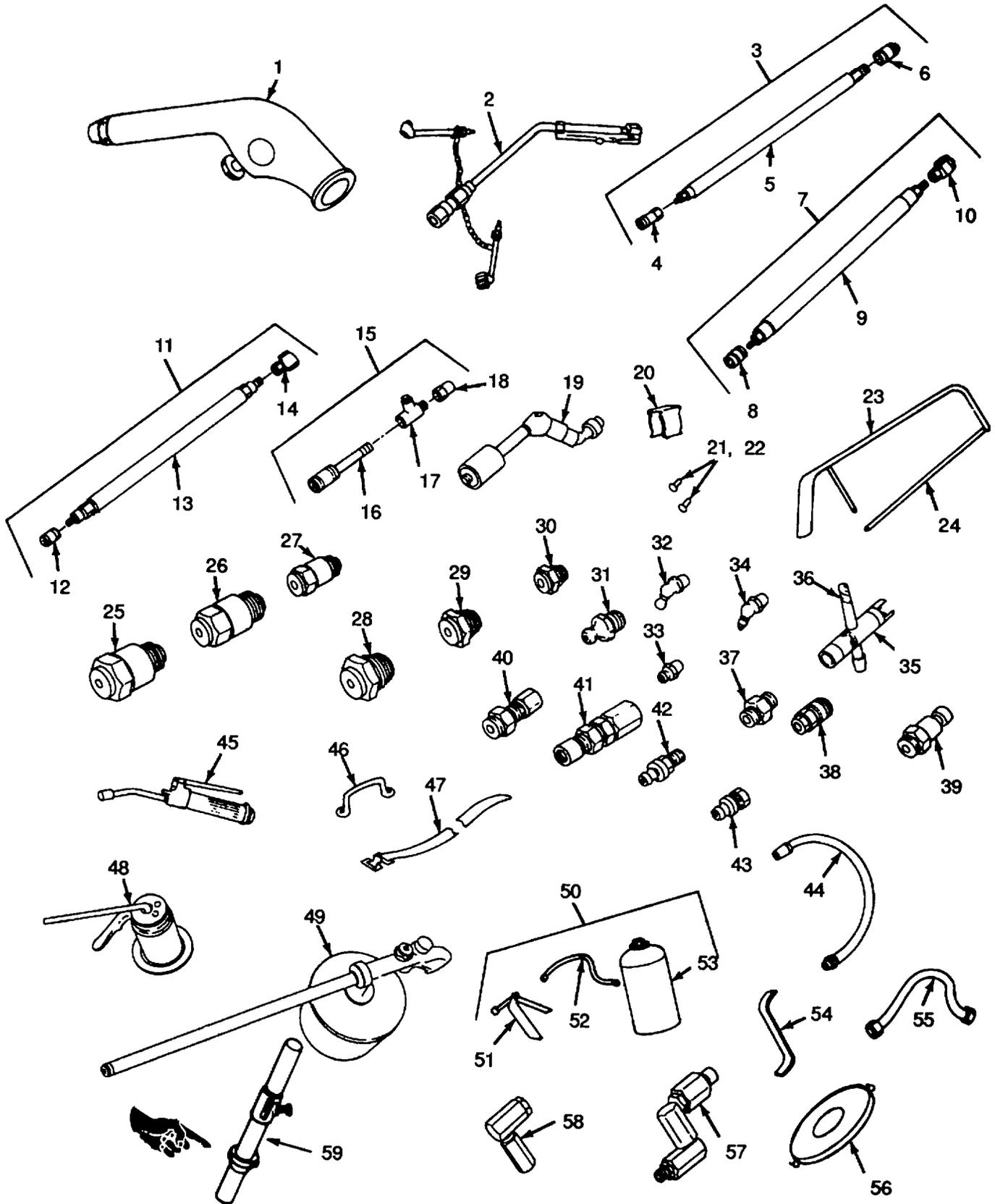
Section II. COMPONENTS OF END ITEM

1 Illus Num- ber	2 National Stock Number	3 Description	4 FSCM	5 Part Number	6 U/M	7 Qty rqr
1	4940-01-040-7193	Air Blow Gun	57733	8338-ISP	EA	1
2	4910-01-138-9105	Tire Inflator Assembly	81348	GG-G-91, Type- III, Style 3	EA	1
3	4930-00-288-1511	Adapter, Flexible	97403	13227E9554-3	EA	2
4	4930-00-868-6709	Sleeve, Slip	57733	310048	EA	2
5	4720-00-917-8332	Hose, Lubricating	81348	MIL-L4387	EA	2
6	4930-00-377-6820	Fitting, Lubrication	57733	6304B	EA	2
7	4930-01-388-6192	Adapter, Flexible	97403	13227E9554-4	EA	1
8	4930-00-868-6769	Sleeve, Slip	57733	B10048	EA	1
9	4720-00-148-5084	Hose, Lubricating	81348	MIL-L-4387	EA	1
10	4930-00-422-9435	Fitting, Lubrication	57733	304300-A	EA	1
11	4930-00-212-5825	Adapter, Flexible	97403	13227E9554-5	EA	1
12	4930-00-868-6769	Sleeve, Slip	57733	310048	EA	1
13	4720-00-148-5084	Hose, Lubricating	81348	MIL-L-4387	EA	1
14	4730-01-391-7242	Fitting, Lubrication	57733	42030-A	EA	1
15	4930-01-B79-9560	Adapter, Rigid, Swivel	97403	13227E9554-8	EA	1
16	4930-00-141-8258	Adapter, Rigid	57733	6278	EA	1
17	4730-01-164-8930	Tee, Street	57733	50500	EA	1
18	4930-00-377-6820	Valve	57733	6304B	EA	1
19	4930-00-141-8258	Adapter, Rigid	57733	6278	EA	1
20	5340-01-015-9017	Clip, Retaining	81348	MIL-C-24066/ 2-325	EA	9
21	5320-01-049-9232	Rivet, Pop	81348	SAE J1200	EA	18
22	4930-00-224-8487	Rivet, Pop	81348	SAE J1200	EA	8
23	5110-00-223-4972	Frame, Hacksaw	81348	GGG-F-671	EA	1
24	5110-00-277-4587	Blade, Hacksaw, Type I, GR A	81348	GGG-B-451	EA	2
25	4720-00-222-0966	Fitting, Giant Buttonhead	97403	13227E9646-1	EA	3
26	4730-00-223-6411	Fitting, Lubrication	97403	13227E9646-2	EA	3
27	4730-01-382-3099	Fitting, Lubrication	97403	13227E9646-3	EA	3
28	4730-00-223-6416	Fitting, Lubrication	97403	13227E9647-1	EA	3
29	4730-00-222-1008	Fitting, Lubrication	97403	13227E9647-2	EA	3
30	4730-00-223-6414	Fitting, Lubrication	97403	13227E9647-3	EA	3
31	4730-00-050-4208	Fitting, Lubrication	96906	MS15003-1	EA	6
32	4730-00-172-0028	Fitting, Lubrication	95879	MS15003-4	EA	6
33	4730-00-050-4203	Fitting, Lubrication	96906	MS15001-1	EA	6
34	4730-00-050-4205	Fitting, Lubrication	95879	MS15001-3	EA	1
35	5120-00-910-8370	Tool, Lubrication	97403	13227E9648-1	EA	1
36	5120-01-396-9446	Tool, Lubrication	97403	13227E9648-2	EA	1
37	4730-00-278-3462	Plug	96906	MS27769-2	EA	3
38	4730-01-B79-6793	Coupling	57733	328030	EA	1
39	4730-01-B80-2095	Coupling, Half	57733	328034	EA	3
40	4730-00-986-0175	Coupling, Reusable	97403	13227E9649	EA	6
41		Coupling, Reusable	97403	13227E9650	EA	6

Section II. COMPONENTS OF END ITEM

1 Illus Num- ber	2 National Stock Number	3 Description	4 FSCM	5 Part Number	6 U/M	7 Qty rqr
42	4730-01-382-2862	Coupling, Reusable	97403	13227E9651	EA	3
43	4730-01-386-3399	Coupling, Reusable	97403	13227E9652	EA	3
44	4930-00-266-9182	Gun, Fluid Suction	81348	GGG-0-591	EA	1
45	4930-00-253-2478	Gun, Grease Hand	57733	500	EA	1
46	5340-00-299-0340	Loop, Footman	96906	MS51939(WC)-3	EA	4
47	5340-01-396-7999	Strap Assembly	97403	13227E9443-2	EA	1
48	4930-00-222-2975	Gun, Oil Spray	57733	5328C	EA	1
49	4930-00-554-6778	Oiler, Hand Pump	57733	5336	EA	1
50	4930-00-893-3890	Lubricator, Portable	97403	13227E9653	EA	1
51	4930-00-910-8374	Handle, Control	03990	71880	EA	1
52	4720-00-758-0494	Hose	03990	621509-04	EA	1
53	4310-01-242-8044	Tank		640105	EA	1
54	5120-00-342-4662	Wrench, Bung	97403	13227E9654	EA	1
55	4720-01-394-6472	Hose, Assembly, Air	97403	13227E9574	EA	1
56	8110-01-395-4866	Cover, Drum	97403	13227E9477	EA	1
57	4730-01-B79-798	Swivel, Straight	81348	MIL-C-4387	EA	1
58	4730-01-386-4308	Swivel, Z	57733	331107	EA	1
59		Transfer Pump	57733	7216-4	EA	1

Section II. COMPONENTS OF END ITEM



Section III. BASIC ISSUE ITEMS

(1) Illus Number	(2) National Stock Number	(3) Description, CAGEC, and Part Number	Usable on Code	(4) U/M	(5) Qty rqr
1		Technical Manual		1	1
2	5120-00-224-7330	Jack		1	1
3	5120-00-034-2120	Lug Wrench		1	1

Appendix D

ADDITIONAL AUTHORIZATION LIST  
NOT APPLICABLE

## Appendix E

### EXPENDABLE AND DURABLE SUPPLIES LIST

#### Section I. INTRODUCTION

##### E-1. SCOPE

This appendix lists expendable and durable supplies you will need to operate and maintain the Lubricating and Servicing Unit. These items are authorized to you by CTA 50-970, Expendable Items.

##### E-2. EXPLANATION OF COLUMNS

a. Column (1) - Item number. This number is assigned to the entry in the listing and is referenced in the initial set-up to identify the material (e.g., "Cleaning Compound, item 5, App. D").

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

C - Operator/Crew

O - Unit Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

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

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

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

1 Item Number	2 Level	3 National Stock Number	4 Description	5 U/M
1	C		Alcohol	sh
2	F		Aluminum Alloy, Sheet QQ-A-250/11 T4	
3	O	9150-01-102-3650	Brake Fluid, Silicone (BFS) MIL-B-46167 1-Qt Can	ea
4	O		Caulking Compound MIL-C-15705A	
5	O	7930-00-282-9699	Detergent, GP, LIQ, WS, A MIL-D-16791 (81349) 1-Gallon Can	gl
6	O	6850-00-669-5685	Dry Cleaning Solvent, A-A-711, Type I and Type II	dr
7	O	3439-01-045-7940	Flux, Solder, Liquid, Rosin Base MIL-F-14256	qt
8	O	9150-00-935-1017	Grease, Automotive Art, GAA 14-Oz Can MIL-G-19204 (81349)	ty
9	F	8030-00-181-8372	Primer, Sealing Compound 6-Oz Can MIL-S-22473 Grade T (05972)	oz
10	F	8140-00-339-0310	Sealing Compound 50-cc Bottle MIL-S-22473 (05972)	ea
11	O	9150-00-265-9425	Oil Lubricating, OE/HDO MIL-L-2104 (81349) 1-Quart Can	ea
12	O	9150-00-402-4478	Oil, Lubricating ICE, Arctic, OEA MIL-L-46167, 1-Quart Can	ea
13	O	8010-00-935-7080	Primer Coatings, Epoxy-Polyamide MIL-P-23377	
14		Sealant, Silicon		

1 Item Number	2 Level	3 National Stock Number	4 Description	5 U/M
15	O		Sheet, Plastic Black	ft
16	O		Solder, Lead-Tin, QQ-S-571 Type SN60WRP2	
17	O		Tape, Masking Roll	ea
18	O		Tape, Teflon	
19	O	6850-01-369-2474	Solvent, PD-680a, Type III MIL-T-8153A	gl
20	O		Tubing, Heat Shrinkable, Black MIL-T-47051	
21	O		Tubing, Heat Shrinkable, Red MIL-T-47051	
22	F	7920-00-044-9281	Cloth	
23	O		Plastic Ties	
24	O		Soft Bristle Brush	
25	O		Wire Brush	
26	F		Wire Connector	

## Appendix F

### ILLUSTRATED LIST OF MANUFACTURED ITEMS

#### OVERVIEW

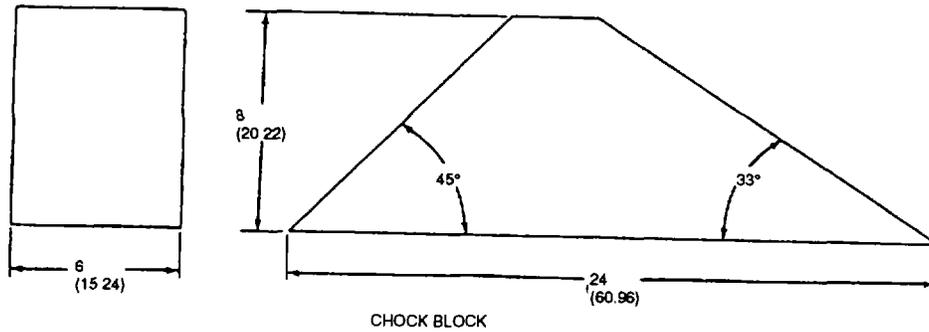
This appendix includes complete instructions for making items to be manufactured or fabricated at organizational maintenance.

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

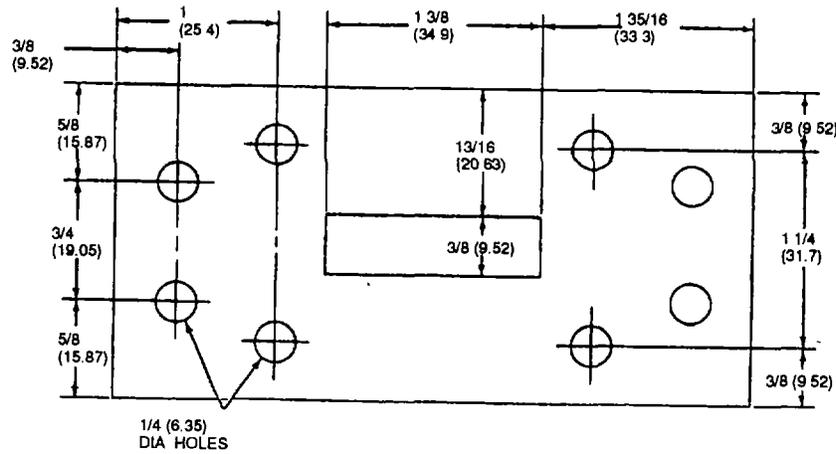
#### INDEX

PART NAME	FIGURE
Chocks, Wheel	Figure F-1
Plate Anchor, Shipping	Figure F-2



- NOTES
1. RAILROAD TIES MAY BE SUBSTITUTED FOR TIMBERS WHEN AVAILABLE.
  2. ( ) DIMENSIONS ARE IN CENTIMETERS ALL OTHER LINEAR DIMENSIONS ARE IN INCHES

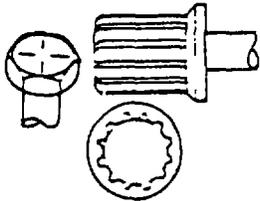
Figure F-1. Chocks, wheel



- NOTES
1. FABRICATE FROM STEEL PLATE 1/8 INCH (3.175 MILLIMETERS) THICK.
  2. ( ) DIMENSIONS ARE IN MILLIMETERS ALL OTHER LINEAR DIMENSIONS ARE IN INCHES

Figure F-2 Plate Anchor, Shipping

Appendix G  
TORQUE TABLE

STANDARD CAPSCREW MARKINGS AND TORQUE				
Current Usage	Much Used	Much Used	Used at Times	Used at Times
Minimum Tensile Strength PSI MPa	To 1/2-69,000(476) To 3/4-64,000(421) To 1-55,000(379)	To 3/4-120,000(827) To 1-115,000(793)	To 5/8-140,000(965) To 3/4-133,000(917)	150,000 (1034)
Quality of Material	Indeterminate	Minimum Commercial	Medium Commercial	Best Commercial
SAE Grade Number	1 or 2	5	6 or 7	8
Capscrew Head Markings				
Manufacturer's marks may vary  These are all SAE Grade 5 (3 line)				
Capscrew Body Size (Inches)-(Thread)	Torque Ft.-Lb (N-m)	Torque Ft.-Lb(N-m)	Torque Ft.-Lb (N-m)	Torque Ft.-Lb (N-m)
1/4—20	5(7)	8(11)	10(14)	12(16)
—28	6(8)	10(14)		14(19)
5/16—18	11(15)	17(23)	19(26)	24(33)
—24	13(18)	19(26)		27(37)
3/8—16	18(24)	31(42)	34(46)	44(60)
—24	20(27)	35(47)		49(66)
7/17—14	28(38)	49(66)	55(75)	70(95)
—20	30(41)	55(75)		78(106)
1/2—13	39(53)	75(102)	85(115)	105(142)
—20	41(56)	85(115)		120(163)
9/16—12	51(69)	110(149)	120(163)	155(210)
—18	55(75)	120(163)		170(231)
5/6—11	83(113)	150(203)	167(226)	210(285)
—18	95(129)	170(231)		240(325)
3/4—10	105(142)	270(366)	280(380)	375(508)
—16	115(156)	295(400)		420(569)
7/8—9	160(217)	395(536)	440(597)	605(820)
—14	175(237)	435(590)		675(915)
1 — 8	235(319)	590(800)	660(895)	910(1234)
—14	250(339)	660(895)		990(1342)

- Always use the torque values listed above when definite specifications are not available.

Note: Do not use standard values in place of those specified in other sections of this manual; special attention should be observed when using SAE Grade 6, 7 and 8 capscrews.

- The above is based on use of clean and dry threads.
- Reduce torque by 10% when engine oil is used as a lubricant.
- Reduce torque by 20% if new plated capscrews are used.

Caution: Capscrews threaded into aluminum may require reductions in torque of 30% or more, unless inserts are used.

## A

### Adapters

- Extension Hydraulic Pressure Relief, 2-23
- Flexible Extension, 2-23
- Straight and Z-Swivel, 2-24

### Air Brake Assembly, 4-140

### Air Chuck, Use of, 2-21

### Air Cleaner Assembly

- Assembly, 4-148
- Disassembly, 4-147
- Installation, 4-149
- Removal, 4-146
- Repair, 4-148

### Air Compressor Assembly

- Assembly, 5-72
- Disassembly, 5-66
- Installation, 4-83
- Removal, 4-81
- Repair, 5-72
- Test, 5-52

### Air Compressor Hose, Lines and Fittings

- Installation, 4-96
- Removal, 4-94

### Air Filter

- Cleaning, 3-10
- Installation, 3-10
- Removal, 3-10

### Air Receiver Tank

- Installation, 4-93
- Removal, 4-92

### Air Regulator

- Assembly, 5-88
- Disassembly, 5-87
- Installation, 4-106
- Removal, 4-105
- Repair, 5-87

### Air Supply Valve

- Installation, 4-145
- Removal, 4-144

### Air, Lube and Grease Hoses

- Assembly, 5-51
- Disassembly, 5-51
- Installation, 4-50
- Removal, 4-50
- Repair, 5-51

### Alcohol Injector

- Adjustment, 4-100
- Assembly, 4-103

### Disassembly, 4-102

### Installation, 4-104

### Removal, 4-101

### Repair, 4-102

### Alcohol Injector, Service, 3-11

### Alternator

### Assembly, 5-64

### Disassembly, 5-58

### Disassembly, 5-58

### Installation, 4-67

### Removal, 4-67

### Repair, 5-61

### Test, 4-66

### Auxiliary Equipment, Operation of, 2-22

### Axle Assembly, Wheel and Tire Service, 3-12

## B

### Battery Box Assembly

### Assembly, 4-44

### Disassembly, 4-42

### Installation, 4-45

### Removal, 4-40

### Repair, 4-43

### Service, 4-37

### Belts

### Adjustment, 4-62

### Installation, 4-60

### Removal, 4-57

### Brake Assembly

### Adjustment, 4-170

### Assembly, 4-176

### Bleeding, 4-171

### Disassembly, 4-174

### Inspection, 4-169

### Removal, 4-172

### Repair, 4-175

### Brake Lines and Hoses

### Installation, 4-152

### Removal, 4-150

## C

### Characteristics, Features and Capabilities, 1-2

### Clearance Light

### Installation, 4-159

### Removal, 4-159

### Test, 4-158

### Components of End Item and Basic Issue Items, C-1

Control Box  
  Assembly, 5-121  
  Disassembly, 5-120  
  Installation, 4-121  
  Removal, 4-121  
  Repair, 5-120  
  Test, 4-120

Control Panel  
  Assembly, 4-75  
  Disassembly, 4-74  
  Installation, 4-76  
  Removal, 4-72  
  Repair, 4-74  
  Test, 4-70

Control Valve - Grease  
  Adjustment, 5-49  
  Assembly, 5-47  
  Disassembly, 5-45  
  Repair, 5-47

Controls, Operator's, 2-1

Coupler (Glad Hand)  
  Assembly, 4-141  
  Disassembly, 4-140  
  Installation, 4-141  
  Removal, 4-140  
  Repair, 4-141

## D

Direct Support Troubleshooting

  Air Compressor, 5-6  
  Axle Assembly, 5-7  
  Brake Assembly, 5-8  
  Engine Oil Dispenser, 5-3  
  Gear Lube Dispensers, 5 -2  
  Grease Control Valve, 5-4  
  High Pressure Pump, 5-5  
  Low Pressure Pump, 5-5  
  Transfer Pump, 5-2

Dispensers - Engine Oil  
  Assembly, 5-42  
  Disassembly, 5-37  
  Installation, 4-48  
  Removal, 4-48  
  Repair, 5-41

Dispensers - Gear Lube  
  Assembly, 5-34  
  Disassembly, 5-29  
  Installation, 4-48  
  Removal, 4-48

  Repair, 5-33  
Doors (Direct Support)  
  Disassembly, 5-11  
  Installation, 5-12  
  Repair, 5-12  
Doors (Unit)  
  Installation, 4-19  
  Removal, 4-18  
Ducts, Heater Hoses and Exhaust System  
  Installation, 4-126  
  Removal, 4-126

## E

Emergency Relay Valve  
  Installation, 4-143  
  Removal, 4-142

Enclosure (Unit)  
  Installation, 4-17  
  Removal, 4-16

Enclosure and Skid Assembly  
  Installation, 5-9  
  Removal, 5-9

Engine  
  Installation, 4-88  
  Removal, 4-84

Engine Exhaust System  
  Installation, 4-99  
  Removal, 4-98

Engine Oil Dispensers  
  Assembly, 5-42  
  Disassembly, 5-37  
  Installation, 4-48  
  Removal, 4-48  
  Repair, 5-41

Engine Oil Extension Assembly  
  Installation, 4-97  
  Removal, 4-97

Engine Oil, Dispensing, 2-20  
Equipment Data, 1-4

Equipment Descriptions, 1-2  
Exhaust System, Engine  
  Installation, 4-99  
  Removal, 4-98

Expendable/Durable Supplies and Materials List,  
  E-1

## F

Fittings  
  45x Hydraulic Lubrication, 2-24

Air Hose End, 2-24  
Buttonhead, 2-24  
High Pressure Hose End, 2-24  
Straight Hydraulic, 2-24  
Fording, 2-38

Frame and Skid Assembly  
Repair, 5-122, 6-4  
Replace, 6-3

Frame Assembly  
Repair, 6-5  
Replacement, 5-132

Fuel Cap and Neck Assembly  
Assembly, 4-24  
Disassembly, 4-23  
Installation, 4-25  
Removal, 4-22  
Repair, 4-23

Fuel Pump  
Installation, 4-123  
Removal, 4-123  
Test, 4-122

Fuel Tank  
Assembly, 5-27  
Cleaning, 4-31  
Disassembly, 5-25  
Draining, 4-30  
Installation, 4-32  
Removal, 4-32  
Repair, 5-27, 6-1

## G

Gear Lube Dispensers  
Assembly, 5-34  
Disassembly, 5-29  
Installation, 4-48  
Removal, 4-48  
Repair, 5-33  
Gear Oil, Dispensing, 2-20

General Maintenance, 4-14  
General Purpose Grease, Dispensing, 2-18  
General Wiring Repair, 4-15  
Glad Hand - Coupler  
Assembly, 4-141  
Disassembly, 4-140  
Installation, 4-141  
Removal, 4-140  
Repair, 4-141

Grease Control Valve  
Adjustment, 5-49  
Assembly, 5-47  
Disassembly, 5-45  
Repair, 5-47  
Grease Hoses - Air, Lube

Assembly, 5-51  
Disassembly, 5-51  
Installation, 4-50  
Removal, 4-50  
Repair, 5-51

## Gun

Air Blow, 2-23  
Hand Lever Grease, 2-22  
Oil Spray, 2-25  
Suction, 2-22

## H

Head (Air Compressor)  
Assembly, 5-82  
Disassembly, 5-80  
Installation, 5-84  
Removal, 5-78  
Repair, 5-82  
Heater - Winterization Assembly  
Installation, 4-118  
Removal, 4-115

Heater Hoses and Exhaust System - Ducts  
Installation, 4-126  
Removal, 4-126

High Pressure Pumps  
Assembly, 5-110  
Disassembly, 5-102  
Installation, 4-108  
Removal, 4-107  
Repair, 5-110

Hose, Lines and Fittings - Air Compressor  
Installation, 4-96  
Removal, 4-94

Hoses - Air, Lube and Grease  
Assembly, 5-51  
Disassembly, 5-51  
Repair, 5-51

## J

Jack Leg Assembly  
Installation, 4-180  
Removal, 4-179

Junction Box - Trailer  
Installation, 4-156  
Removal, 4-156  
Test, 4-154

## L

Light - Clearance  
Installation, 4-159  
Removal, 4-159  
Test, 4-158

Light - Stop and Turn  
Installation, 4-161  
Removal, 4-161  
Test, 4-160

Lines and Hoses - Brakes  
Installation, 4-152  
Removal, 4-150

Low Pressure Pumps  
Assembly, 5-96  
Disassembly, 5-89  
Installation, 4-108  
Removal, 4-107  
Repair, 45-95  
Repair, 5-95

Lube Piping  
Installation, 4-130  
Removal, 4-128  
Repair, 4-130

Lube Pumps, Preparing for Operation, 2-16

Lube Tank  
Assembly, 4- 113  
Disassembly, 4 - 111  
Installation, 4-114  
Removal, 4-109  
Repair, 4-112, 5-119

Lube Tank Assembly, Service, 3-11

Lube Tank, Filling, 2-14

Lubrication Instructions, 3-1  
Skid Sub Assembly, 3-1  
Trailer Assembly, 3-2

## M

Maintenance Allocation Chart, B- 1  
Maintenance Instructions  
Direct Support, 5-1  
Operator's, 3-1  
Unit, 4-1

Maintenance, Unit, 4-1  
Manufactured Items, Illustrated List of, F-

## O

Oil Extension Assembly, Engine  
Installation, 4-97  
Removal, 4-97

Operating Instructions, 2-1  
Operator's Controls, 2-1

Operating Procedure, 2-12  
Dispensing Engine Oil, 2-20  
Dispensing Gear Oil, 2-19  
Dispensing General Purpose Grease, 2-18  
Engine Starting, 2-12  
Engine Stopping, 2-13  
Filling Lube Tank, 2-14  
Preparing Lube Pumps for Operation, 2-16  
Shutdown Procedures, 2-21  
Use of Air Chuck, 2-21

Operating Under Unusual Conditions, 2-34  
Operation and Safety Instructions, 2-32

Operation in Dusty or Sandy Areas, 2-37

Operation in Extreme Cold, 2-34  
Alcohol Injector, 2-36  
At-Halt Parking, 2-37  
Batteries, 2-34  
Care of Lubricants, 2-34  
Cold Engine Starting, 2-35  
Compressed Air System, 2-34  
Electrical System, 2-34  
Exhaust Heat Diverter, 2-35  
Fuel System, 2-34  
Lubrication, 2-34  
Towing in Extreme Cold, 2-37  
Valves, 2-35  
Winterization Assembly, 2-36

Operation in Extreme Heat, 2-37

Operation in High Altitudes, 2-38  
Operation in Salt Water Areas, 2-38

Operation of Auxiliary Equipment, 2-22  
45x Hydraulic Lubrication Fittings, 2-24  
Air Blow Gun, 2-23  
Air Hose End Fittings, 2-24  
Buttonhead Fittings, 2-24  
Easy Out Tools, 2-24  
Extension Hydraulic Pressure Relief Adapter,  
2-23  
Flexible Extension Adapter, 2-23  
Hacksaw Frame and Blade, 2-22

- Hand Lever Grease Gun, 2-22
  - Hand Oiler, 2-25
  - High Pressure Hose End Fittings, 2-24
  - Oil Spray Gun, 2-25
  - Plug, 2-24
  - Quick-Disconnect Air Line Couplings, 2-24
  - Straight and Z-Swivel Adapters, 2-24
  - Straight Hydraulic Fittings, 2-24
  - Suction Gun, 2-22
  - Tire Inflator, Pressure Gage and Chucks, 2-23
- Operation Under Rainy or Humid Conditions, 2-37
- Operator Troubleshooting, 3-3
- Air Brakes, 3-8
  - Axle Assembly, 3-9
  - Compressor, 3-5
  - Engine, 3-4
  - Reel Assembly, 3-6
  - Trailer Electrical, 3-8
  - Transfer Pump, 3-7
- Operator's Maintenance Instructions, 3-1
- Operator's Preventative Maintenance Checks and Services, 2-7
- Operator PMCS Table, 2-9
- P**
- Packing
- Overview, 4-183
  - Shipment, 4-184
  - Storage, 4-184
- Panels
- Installation, 4-21
  - Removal, 4-20
  - Repair, 5-13
- Pilot Valve
- Adjustment, 4-78
  - Installation, 4-79
  - Removal, 4-79
- Piping - Lube
- Installation, 4-130
  - Removal, 4-128
  - Repair, 4-130
- Piping - Pneumatic
- Installation, 4-135
  - Removal, 4-132
  - Repair, 4-134
- Pneumatic Piping
- Installation, 4-135
  - Removal, 4-132
  - Repair, 4-134
- Power Cluster
- Assembly, 5-126
  - Disassembly, 5-126
  - Installation, 5-128
  - Removal, 5-124
  - Repair, 5-126
- Preliminary Servicing and Adjustment of Equipment, 4-2
- Preparation for Movement, 2-26
- After Towing, 2-29
  - Driving, 2-29
  - Preparation for Towing, 2-26
- Preparation for Storage or Shipment, 4-181
- Preservation, 4-181
- Pressure Relief Valve
- Installation, 4-80
  - Removal, 4-80
- Procedures
- Operation, 2-12
  - Shutdown, 2-21
- Pumps - Low Pressure
- Installation, 4-108
  - Removal, 4-107
- Pumps - High Pressure
- Assembly, 5-110
  - Disassembly, 5-102
  - Installation, 4-108
  - Repair, 5-110
- Pumps - Low Pressure
- Assembly, 5-96
  - Disassembly, 5-89
  - Repair, 5-95
- R**
- Reel Assembly
- Assembly, 4-55
  - Disassembly, 4-53
  - Installation, 4-56
  - Removal, 4-52
  - Repair, 4-54
- Reel Cabinet. Assembly
- Disassembly, 4-33
  - Installation, 4-35
  - Repair, 4-34
- References, A- 1

Regulator - Air  
  Assembly, 5-88  
  Disassembly, 5-87  
  Installation, 4-106  
  Removal, 4-105  
  Repair, 5-87

## S

Service Upon Receipt, 4-1  
Shipment and Storage, 4-183

Skid Assembly, Enclosure  
  Installation, 5-9  
  Removal, 5-9

Skid Sub Assembly, 4-27

Starter

  Assembly, 5-56  
  Disassembly, 5-53  
  Installation, 4-65  
  Removal, 4-65  
  Repair, 5-55  
  Test, 4-64, 5-57

Starting Engine, 2-12

Stop and Turn Light  
  Installation, 4-161  
  Removal, 4-161  
  Test, 4-160

Stopping Engine, 2-13

Storage - Inspection in Administrative  
  Inspection, 4-185  
  Overview, 4-185

## T

Tank - Fuel

  Assembly, 5-27  
  Cleaning, 4-31  
  Disassembly, 5-25  
  Draining, 4-30  
  Installation, 4-32  
  Removal, 4-32  
  Repair, 5-27

Tank - Lube

  Assembly, 4-113  
  Disassembly, 4-111  
  Inspection, 4-114  
  Removal, 4-109  
  Repair, 4-112

Tank, Air Receiver  
  Installation, 4-93  
  Removal, 4-92

Testing

  Alternator, 4-66  
  Starter, 4-64  
  Wiring Harness (Air Compressor), 4-68  
    Control Box, 4-120  
    Control Panel, 4-70  
    Fuel Pump, 4-122

Wiring Harness (Trailer), 4-162

  Air Compressor, 5-5 2  
  Starter, 5-57

Wiring Harness (Winterization Assy.), 4-124

  Clearance Light, 4-158  
  Junction Box, 4-154  
  Stop and Turn Light, 4-160

Tire Assembly, Wheel and

  Installation, 4-168  
  Removal, 4-16  
  Repair, 4-167

Tool Box Assembly

  Assembly, 4-29  
  Disassembly, 4-28  
  Installation, 4-29  
  Removal, 4-27  
  Removal, 4-27  
  Repair, 4-28

Tools, Easy Out, 2-24

Torque Table, G-1

Trailer Assembly, 4-179

Trailer Assembly - Components

  Installation, 4-138  
  Removal, 4-136

Transfer Pump

  Adjustment, 5-22  
  Assembly, 5-19  
  Disassembly, 5-15  
  Installation, 5-24  
  Removal, 5-14  
  Repair, 5-19

Troubleshooting - Operator, 3-3

  Air Brakes, 3-8  
  Axle Assembly, 3-9  
  Compressor, 3-5  
  Engine, 3-4  
  Reel Assembly, 3-6  
  Trailer Electrical, 3-8  
  Transfer Pump, 3-7

Troubleshooting - Unit

  Batteries, 4-8  
  Compressor, 4-10

Control Panel Gages, 4-13  
Engine, 4-8  
Lights, 4-12  
Lubricant Dispenser, 4-11  
Wheel Brakes, 4-11  
Winterization Assembly, 4-10

## U

Unit Maintenance Instructions, 4-1  
Common Tools and Equipment, 4-1  
Repair Parts, 4-1  
Special Tools, TMDE, and Support Equipment,  
4-1  
Unit Preventative Maintenance Checks and Ser-  
vices, 2-7  
Unit PMCS Table, 2-9  
Unit Troubleshooting  
Batteries, 4-8  
Compressor, 4-10  
Control Panel Gages, 4-13  
Engine, 4-8  
Lights, 4-12  
Lubricant Dispenser, 4 - 11  
Wheel Brakes, 4-11  
Winterization Assembly, 4-10  
Unloader - Centrifugal  
Installation, 5-86  
Removal, 5-85

## V

Valve - Emergency Relay  
Installation, 4-143  
Removal, 4-142  
Valve - Grease Control  
Adjustment, 5-49  
Assembly, 5-47

Disassembly, 5-45  
Repair, 5-47

Valve-Pilot  
Adjustment, 4-78  
Installation, 4-7  
Removal, 4-79  
Valve - Pressure Relief, 4-80  
Installation, 4-80  
Removal, 4-80  
Valve, Air Supply  
Installation, 4-145  
Removal, 4-144

## W

Wheel and Tire Assembly  
Installation, 4-168  
Removal, 4-165  
Repair, 4-167  
Wheel and Tire, Service, 3-12  
Wheel Assembly, Wheel and Tire Service, 3-12  
Winterization Assembly, 4-115  
Wiring Harness - Air Brake  
Installation, 4-164  
Removal, 4-163  
Repair, 4-164  
Test, 4-162  
Wiring Harness - Air Compressor  
Installation, 4-69  
Removal, 4-69  
Repair, 4-69  
Test, 4-68  
Wiring Harness - Winterization Assembly  
Installation, 4-125  
Removal, 4-125  
Repair, 4-125  
Test, 4-124

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## The Metric System and Equivalents

### Linear Measure

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

### Weights

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

### Liquid Measure

1 centiliter = 10 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

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

### Temperature (Exact)

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