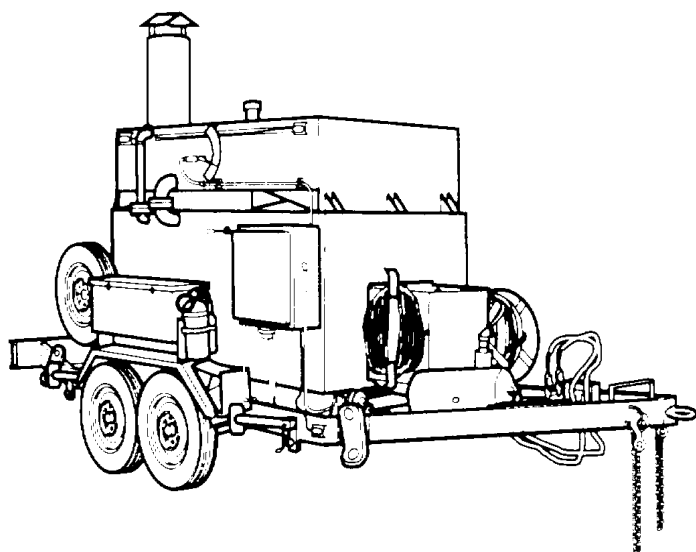


TECHNICAL MANUAL

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



FOR

**FOR HEATER, HOT OIL
MODEL M087
NSN 3895-01-384-5307**

**Approved for public release;
distribution is unlimited**

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TECHNICAL MANUAL

No. 5-3895-377-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 October 1995

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

FOR

HEATER, HOT OIL

MODEL M087

NSN 3895-01-384-5307

Current as of 11 September 1995

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 Tank-automotive and Armaments Command, ATTN: AMSTA-IMI-MMAA, Warren, MI 48397-5000. A reply will be furnished to you. You may also provide DA Form 2028-2 information to TACOM via datafax or e-mail TACOM's datafax number for AMSTA-IM-MMAA is: (8101 574-6323 and the e-mail address is. amsta-im-mmaa@cc.tacom.army.mil

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WARNING
CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU

Carbon monoxide is without color or odor, but can cause death. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no ventilation. Precautions must be followed to ensure crew safety when the personnel heater or engine of any vehicle is operated for any purpose.

1. DO NOT operate Heater in a closed place without proper ventilation.
2. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected crew to fresh air and keep warm. DO NOT PERMIT PHYSICAL EXERCISE. If necessary, give artificial respiration and get immediate medical attention. For artificial respiration, refer to Soldier's Manual of First Aid, FM 21-11, and get medical attention.

FIRST AID. If symptoms of exhaust gas (CO) poisoning are present, remove affected personnel from vehicle, or confined area, and treat as follows:

1. Expose to fresh air.
2. Keep warm.
3. Do not permit physical exercise.
4. If not breathing, administer artificial respiration.

NOTE

The Army-approved Cardiopulmonary Resuscitation (CPR) method is contained in FM 21-11, which is available to all soldiers.

5. Administer oxygen, if available.
6. Seek prompt medical attention for possible delayed onset of lung congestion.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

WARNING

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100-F (38-C) and for type II is 140-F (60-C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
- DO NOT use diesel fuel, gasoline, or benzene (benzol for cleaning)
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read "NO SMOKING WITHIN 50 FEET (15 m)".

WARNING

- Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Personnel exposed to high noise levels shall participate in a hearing conservation program. In accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time.
- Hearing protection is required for operator and also for all personnel working on or around this Heater while it is running.

b

WARNING

HIGH VOLTAGE

the is used in operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

- Never work on electronic equipment unless at least one other person familiar with the operation and hazards of the equipment is nearby. That person should also be competent in giving first aid. When an operator helps a technician, that operator must be warned about dangerous areas.
- Be careful not to contact high-voltage connections when installing or operating this equipment.
- Keep one hand away from the equipment to reduce the hazard of current flowing through life-sustaining organs of the body.
- Remove rings, bracelets, wristwatches, neck chains, and any other jewelry before working around Heater. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

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HOW TO USE THIS MANUAL

This manual is designed to help operate and maintain the M087 Hot Oil Heater, NSN 3895-01-384-5307. Listed below are some of the special features that have been included to help locate and use the needed information:

A front cover Table of Contents is provided for quick reference to chapters and appendixes that will be used often.

Warning, caution, and note headings, subject headings, and certain other essential information are printed in bold type to make them easier to see.

The maintenance tasks describe what must be done to the Heater before starting the task, and what must be done to return the Heater to operating condition after the task is finished.

The appendixes are located at the end of the manual. They contain a reference guide to other manuals, guidelines to reading the Maintenance Allocation Chart (MAC), a list of expendable supplies and materials, Repair Parts and Special Tools List (RPSTL) and other material for maintaining the Heater.

In addition to text, there are exploded-view illustrations showing you how to take the part off and put it on. Cleaning and inspection procedures are also included, when required.

Chapters 1 and 2 of this manual are directed at the crew/operator of the Heater. These chapters include an overall description of the Heater and discuss the controls and indicators, their location and use, and the instructions for operation of the Heater under different circumstances.

Chapter 3 of this manual covers crew/operator lubrication and basic troubleshooting. Crew/operator maintenance is also covered in this chapter.

Chapter 4 of this manual covers unit maintenance including troubleshooting and maintenance procedures.

Chapter 5 of this manual covers direct support maintenance including troubleshooting and maintenance procedures.

FOLLOW THESE GUIDELINES WHEN USING THIS MANUAL:

The operator must read through this manual and become familiar with the contents before attempting to operate the Heater.

Read all WARNINGS and Captions before performing any procedure.

The **equipment conditions** listed at the start of a maintenance procedure and any equipment conditions required for those equipment conditions should be performed before the primary maintenance task. The mechanic may be able to perform only certain steps within a procedure to accomplish the equipment condition.

The **follow-on maintenance** tasks listed at the end of a maintenance procedure, and any follow-on tasks listed at the end of those procedures should be performed to return the Heater to an operational condition.

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PART ONE

CHAPTER 1

INTRODUCTION

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Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual. Operator's, Unit, and Direct Support Maintenance Manual (including Repair Parts and Special Tools List).

b. Model Number and Equipment Name. Hot Oil Heater, Model M087, NSN 3895-01-384-5307, produced by Step Manufacturing Company, Inc., North Branch, Minnesota (see figures 1-1 and 1-21).

c. Purpose of Equipment. The Hot Oil Heater, from here on referred to as the Heater, is used to heat and circulate oil used in conjunction with asphalt melters

1-2. MAINTENANCE FORMS AND PROCEDURES.

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

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

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

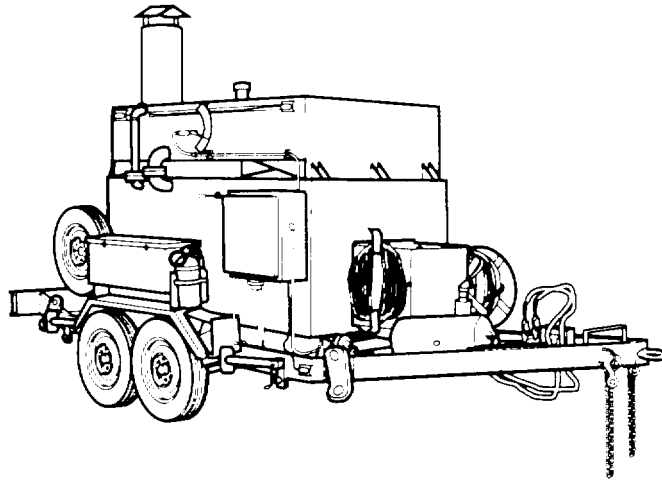


Figure 1-1. Hot Oil Heater M087 - Right Front View

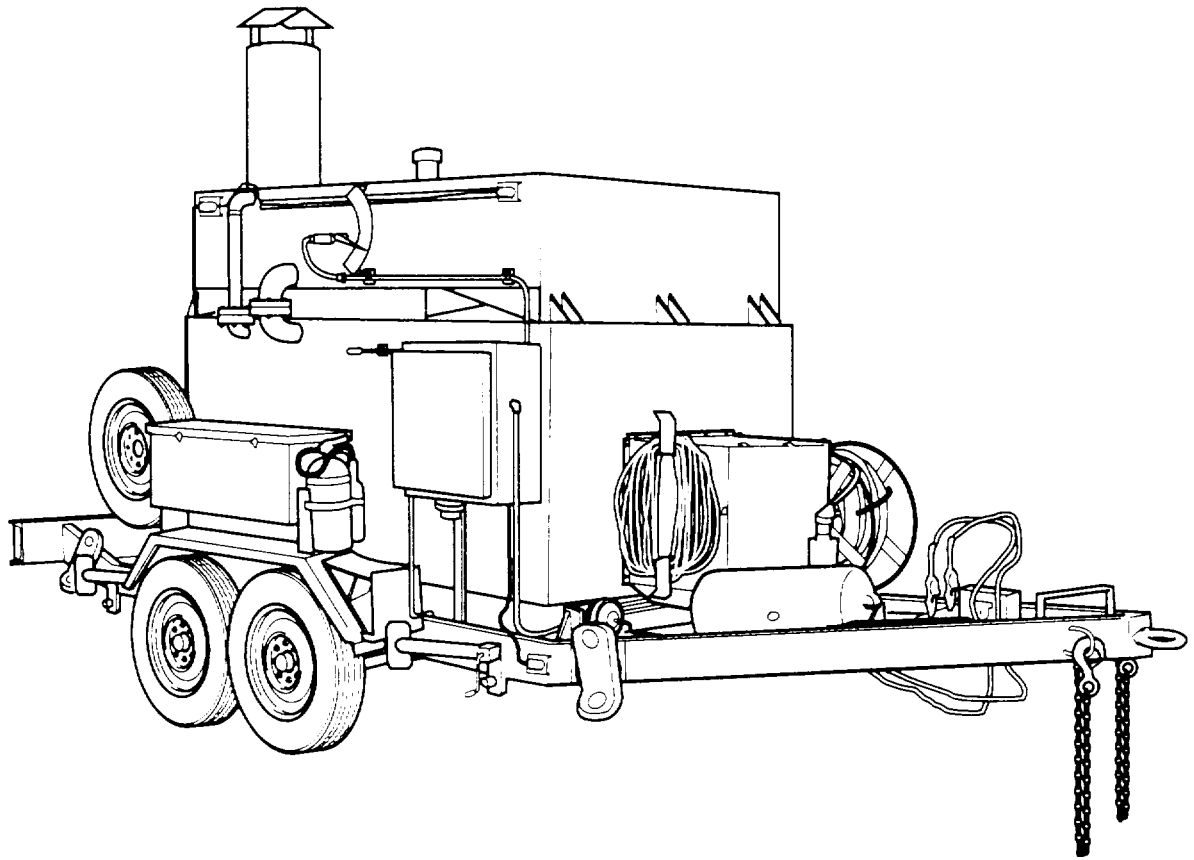


Figure 1-2. Hot Oil Heater M087 - Left Rear View

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

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

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

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

Command decision, according to the tactical situation, will determine when the destruction of the Heater will be accomplished. A destruction plan will be prepared by the using organization unless one has been prepared by a higher authority. For general destruction procedures for this equipment, refer to TM 750-244- 6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use (U.S. Army Tank- Automotive Command)

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

If your Heater needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at Commander, U. S. Army Tank- automotive and Armaments Command, ATTN: AMSTA-IM-M.L.A, Warren, Michigan 48397-5000. A reply will be furnished to you. You may also provide DA Form 2028-2 information to TACOM via datafax or e- mail. TACOM's datafax number for AMSTA-IM-MNAA is: (810) 574-6323 and the e-mail address is amsta- im-mmaa@cc.tacom.army.mil

1-6. WARRANTY INFORMATION.

The Heater is warranted for twelve months. 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 the appropriate action.

1-7. REFERENCE INFORMATION.

This listing includes the nomenclature cross-reference list, and list of abbreviations used in this manual.

a. Nomenclature Cross-Reference list.

Heater
Generator

Heater, Hot Oil
Generator Set, Diesel Engine

1-7. REFERENCE INFORMATION (CONT).

b. List of Abbreviations/Acronyms.

BTUH	British thermal units per hour
dB	decibels
Gph	gallons per hours
kPa	kilo Pascals
NENLEA	National Electrical Manufacturers Association
psi	pounds per square inch
rpm	revolutions per minute
Vac	Volts- alternating current
U V.	Ultra-Violet
mph	miles per hour
hz	hertz

Section II. EQUIPMENT DESCRIPTION

1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. Characteristics.

- (1) Type II, Size 2 Hot Oil Heater.
- (2) Burner can operate using either No. 1 or No. 2 diesel fuel or JP-8 fuel
- (3) Auxiliary power supply and fuel source are required.

b. Capabilities and Features.

- (1) 2,100,000 BTUH output capacity
- (2) A multiple-pass, tubular-type heat exchanger is used.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

Refer to figure 1-3 for location of the following items:

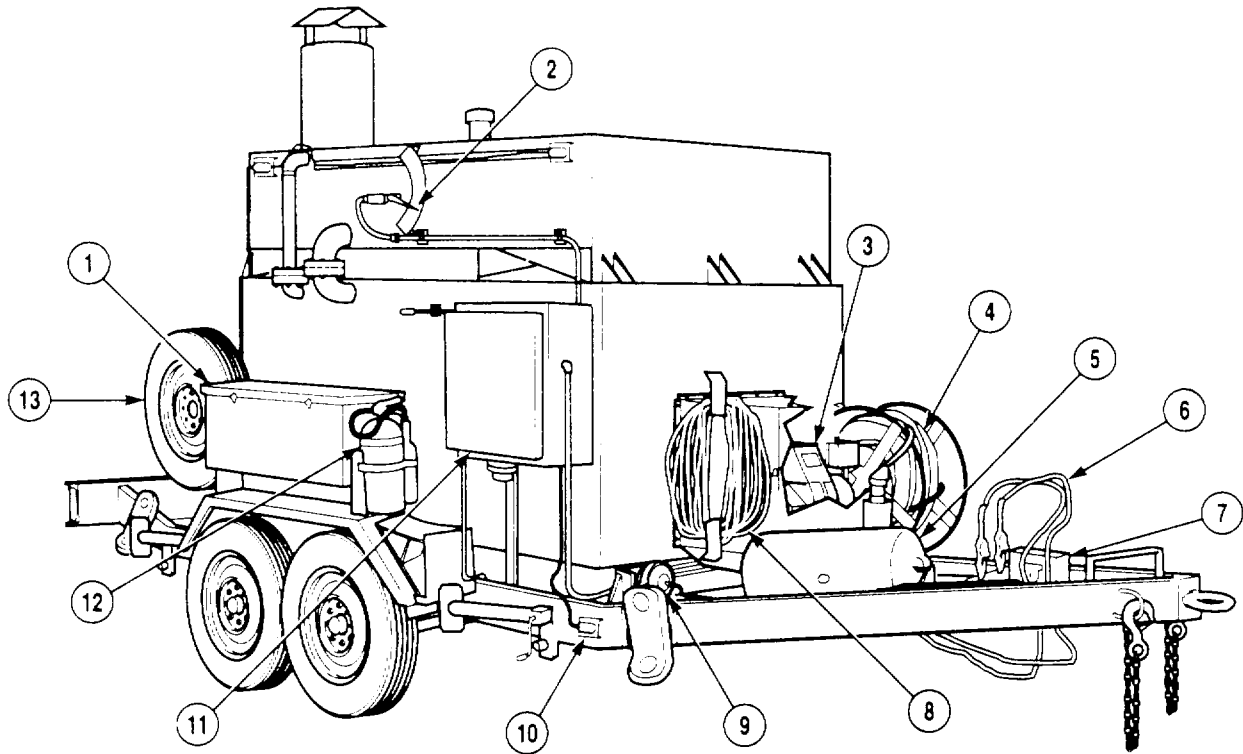


Figure 1-3. Major Components (Sheet 1 of 2)

1. **Stowage Box.** Provides a place to store Heater basic issue items.
2. **Low Oil Indicator.** Provides means to check oil level.
3. **Burner Assembly.** Provides heat for transfer oil.
4. **Power Cable.** Provides power from auxiliary generator to Heater electrical components.
5. **Air Reservoir.** Provides reserve air for brake system.
6. **Air Lines.** Provide a means to link air system of towing vehicle to Heater.
7. **12 Vdc and 24 Vdc Vehicular Lighting Connectors.** 12 Vdc and 24 Vdc connectors allow either a 12 Vdc or 24 Vdc system of the prime mover to be connected to the Heater lighting system
8. **Fuel Lines.** Provide means for transfer of fuel from an auxiliary fuel cell to the Heater
9. **Air/Hydraulic Brake Master Cylinder.** Provides hydraulic fluid to wheel brake cylinders.
10. **Side Marker Lights.** Provide safety marking to sides
11. **Control Panel.** Provides means to control electrical functions.
12. **Fire Extinguisher.** Provides means to put out a fire.
13. **Spare Tire.** Provides tire change capability

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT).

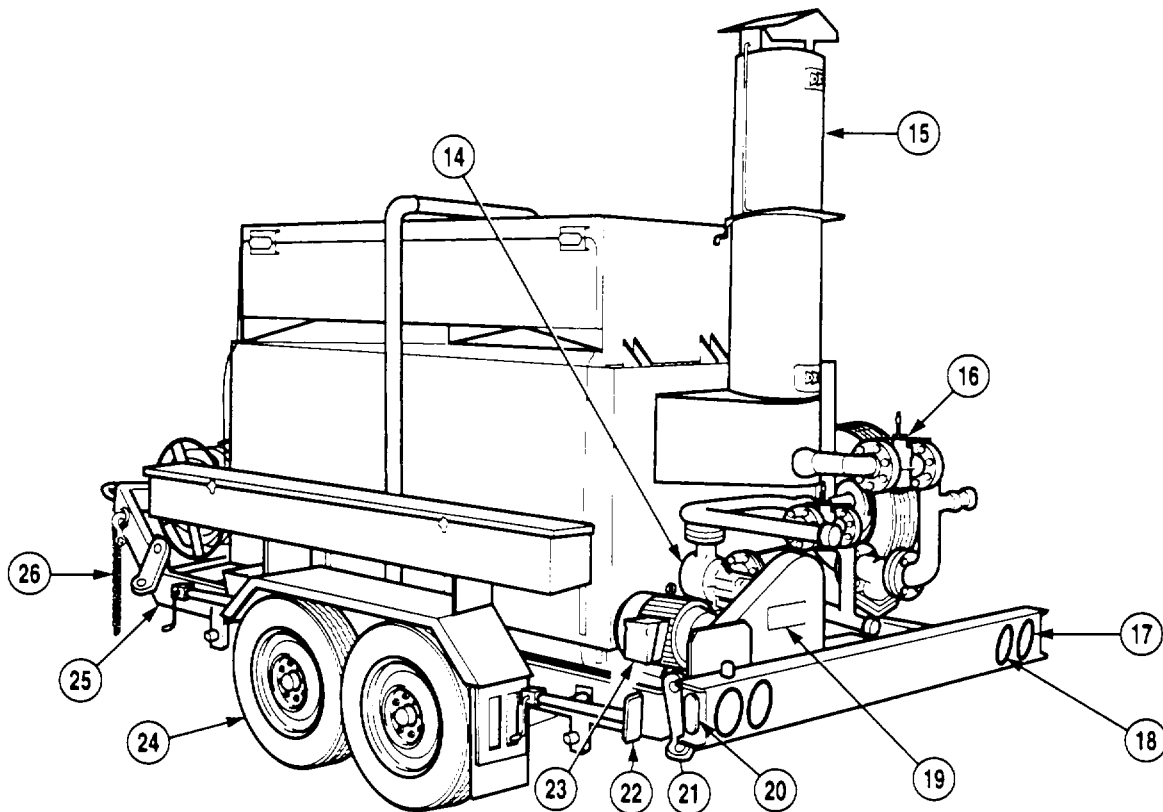


Figure 1-3. Major Components (Sheet 2 of 2)

14. **Circulating Pump.** Provides means of circulating transfer oil.
15. **Exhaust Stack.** Provides means of directing exhaust fumes away from operator.
16. **Valves.** Provide means of directing flow of transfer oil.
17. **Turn Signal/Taillights.** Provide turn signal and tail lighting.
18. **Brake / Taillights.** Provide brake and tail lighting.
19. **Data Plates.** Provide information on operation and technical details of the Heater.
20. **Rear Marker Lights.** Provide safety marking to rear.
21. **Lifting Eyes.** Provide means to lift Heater.
22. **Screw Jacks.** Provide means for lifting and leveling Heater.
23. **Pump Motor.** Provides means of turning circulating pump.
24. **Tires.** Provide excellent cross-country mobility.
25. **Frame.** Provides means of support for Heater.
26. **Safety Chains.** Provide a safety backup for towing

1-10. EQUIPMENT DATA.

Table 1-1 contains the equipment data that applies to the Heater.

Table 1-1. Equipment Data

General Specifications:

Length.....	235-13/16 in. (598.96 cm)
Height	101-9/16 in. (257.9688 cm)
Width	96 in. (243.84 cm)
Weight	10,000 lb (4,536 kg)
Tires:	
Size	7:50R-16 Radial, 12 Ply
Pressure	95 psi (655 kPa)
Maximum Towing Speed	45 mph (72 kph)
Model.....	M087
Maximum Temperature	475°F (246°C)
BTUH Output	2,100,000
Capacity, Oil	321 Gallons
Brakes	Air/Hydraulic
Axles.....	Tandem
Transfer Oil.....	MIL-M-22851, SAE 80
Ground Clearance	12 Inches
Minimum kW Requirement	15 kW

Fuel System:

Fuel Source	Auxiliary
-------------------	-----------

Electrical:

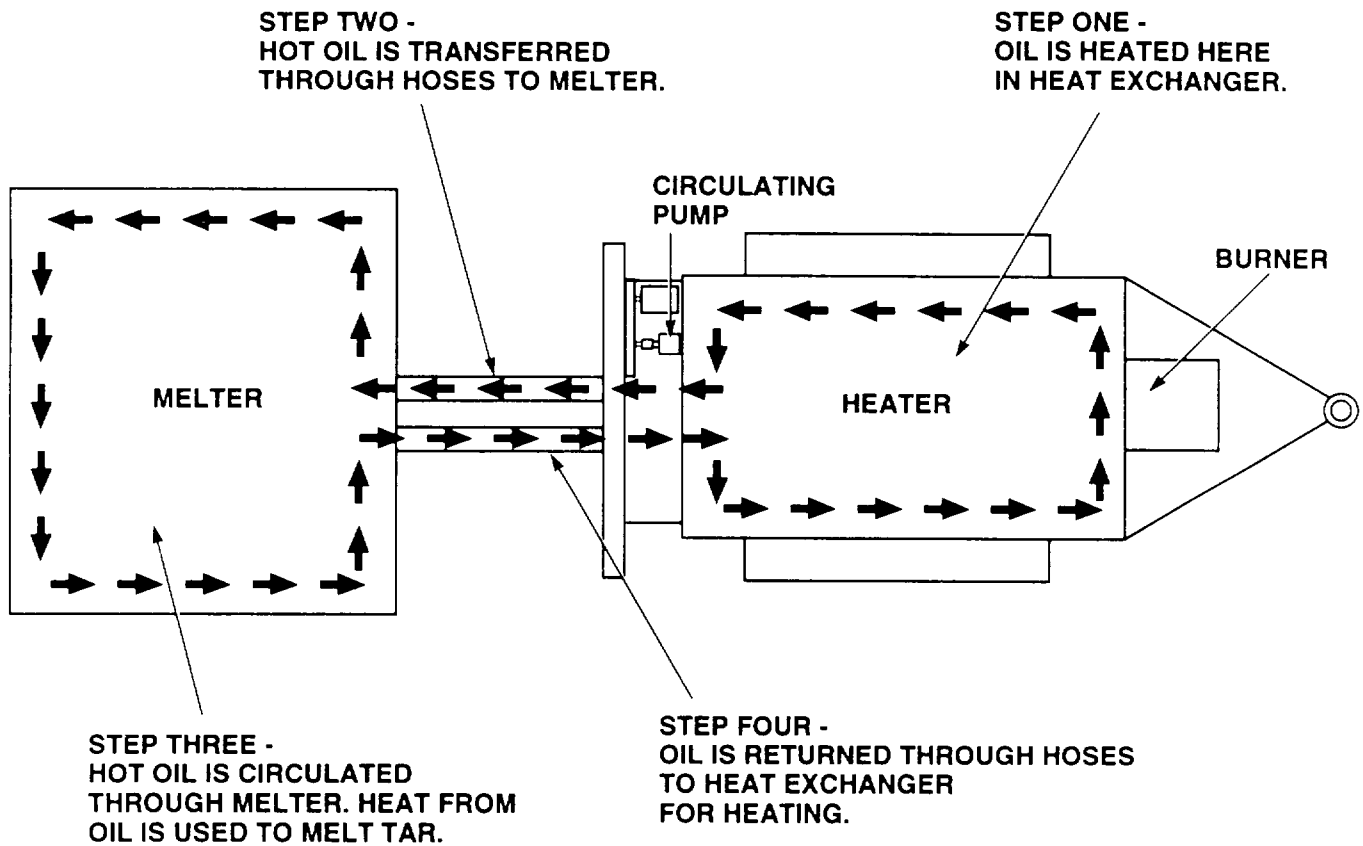
Motor.....	3 Phase, 60 hz, 10 hp, 240V
Motor Contactor.....	NEMA Size 2, 3 Phase, Overload Protection 120V Coil 2 Aux Contacts

Burner:

Fuel Specs.....	No 1 or No 2 Diesel or JP-8 fuel
Firing Range	7.0-19.9 gph
Motor Volts.....	120/60 Hz, single phase
Motor Amps	12.5A at 120Vac
Ignition Transformer	120V/ 12,000V
Housing Material.....	Cast Aluminum
Fuel Pump	100-300 psi (689.5-2068.5 kPa)
Oil Nozzle	45-70° Solid
Timer	30 seconds
Ambient Temperature Range	-40°F (-40°C) to +135°F (+57°C)
Flame Failure Response	3 seconds
Flame Detection	Ultraviolet Sensor

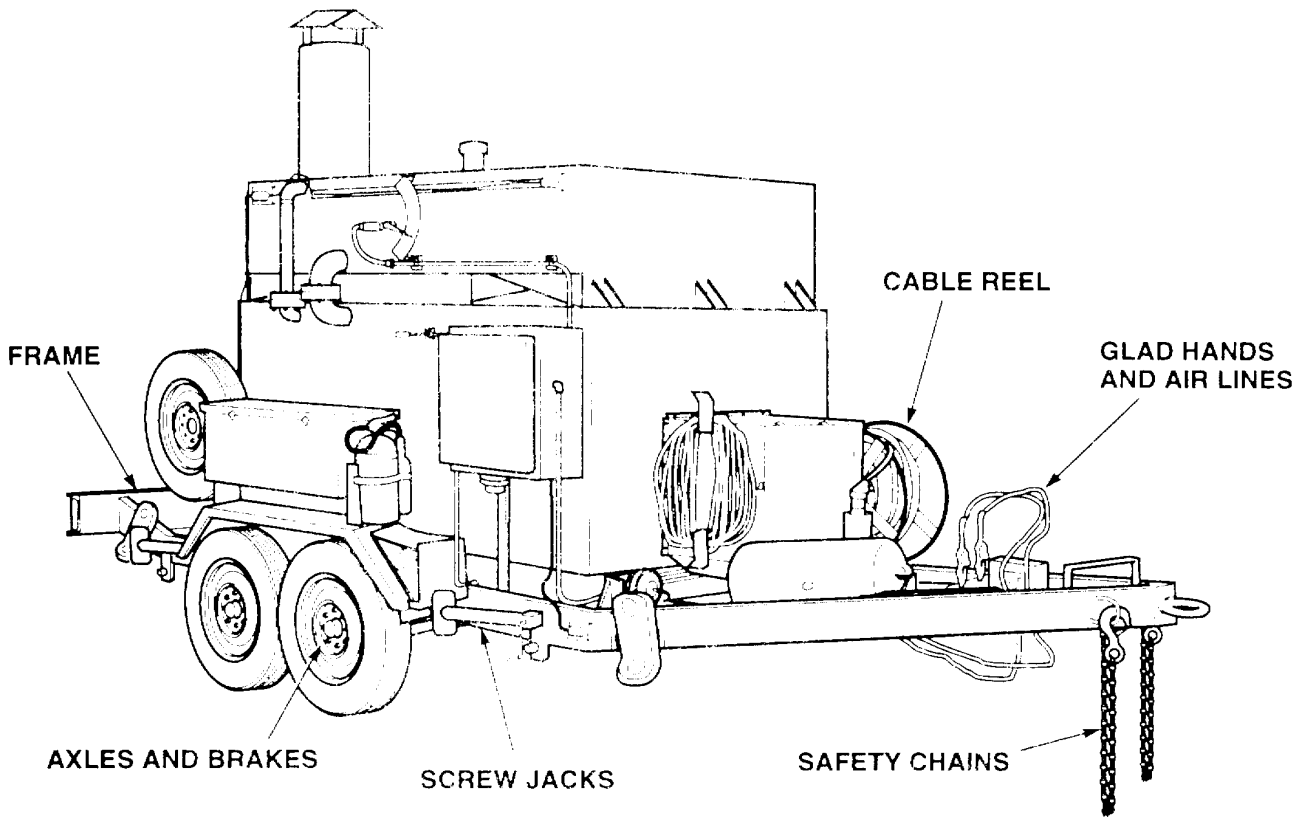
Section III. PRINCIPLES OF OPERATION

1-11. BASIC OPERATION.



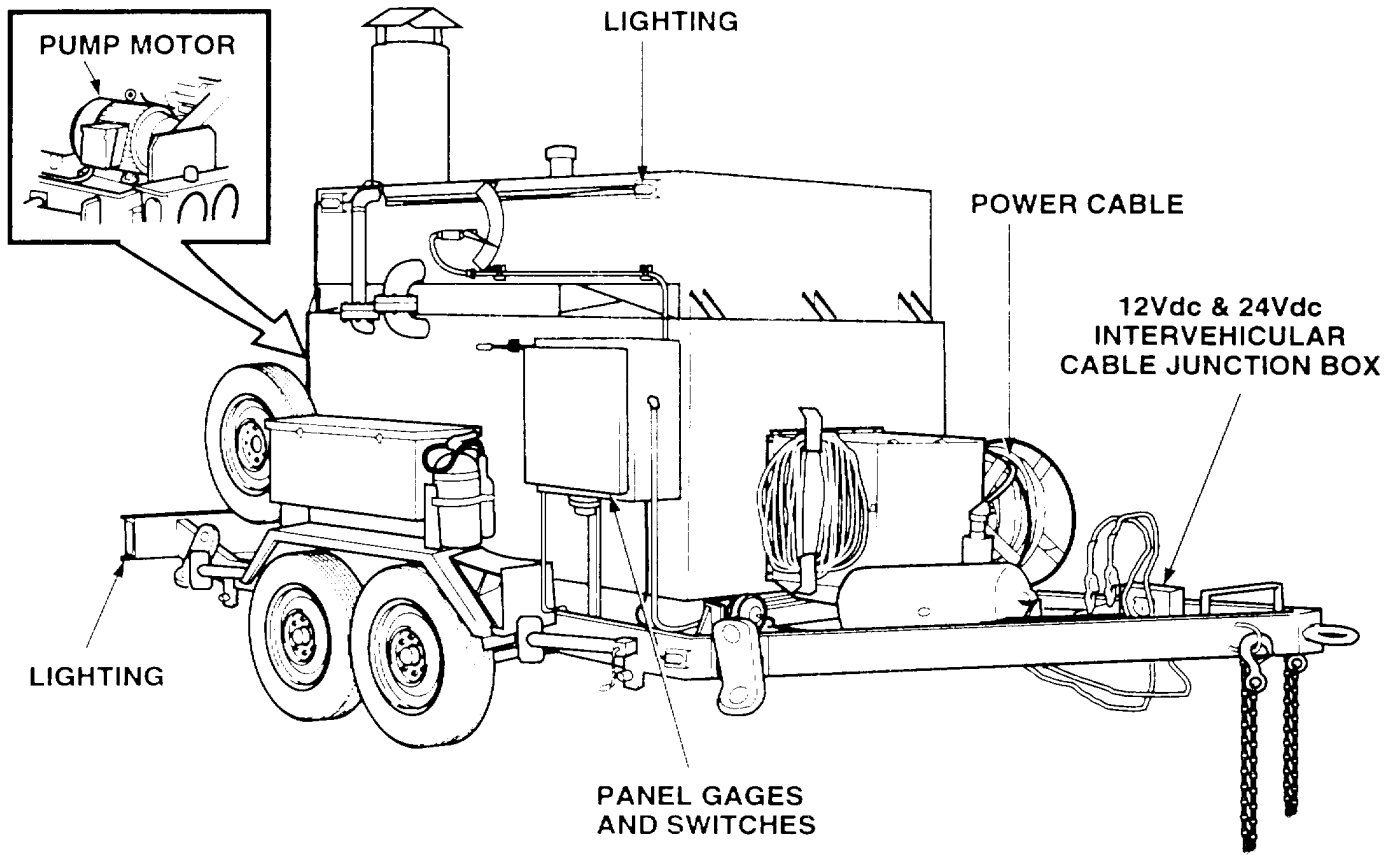
The heater contains a diesel fired burner that heats the transfer oil in the heat exchanger. The hot transfer oil is then pumped through hoses into the melter. The melter uses the heat from the hot oil to melt tar. The oil is then pumped back into the heat exchanger for heating.

1-12. TRAILER SYSTEM.



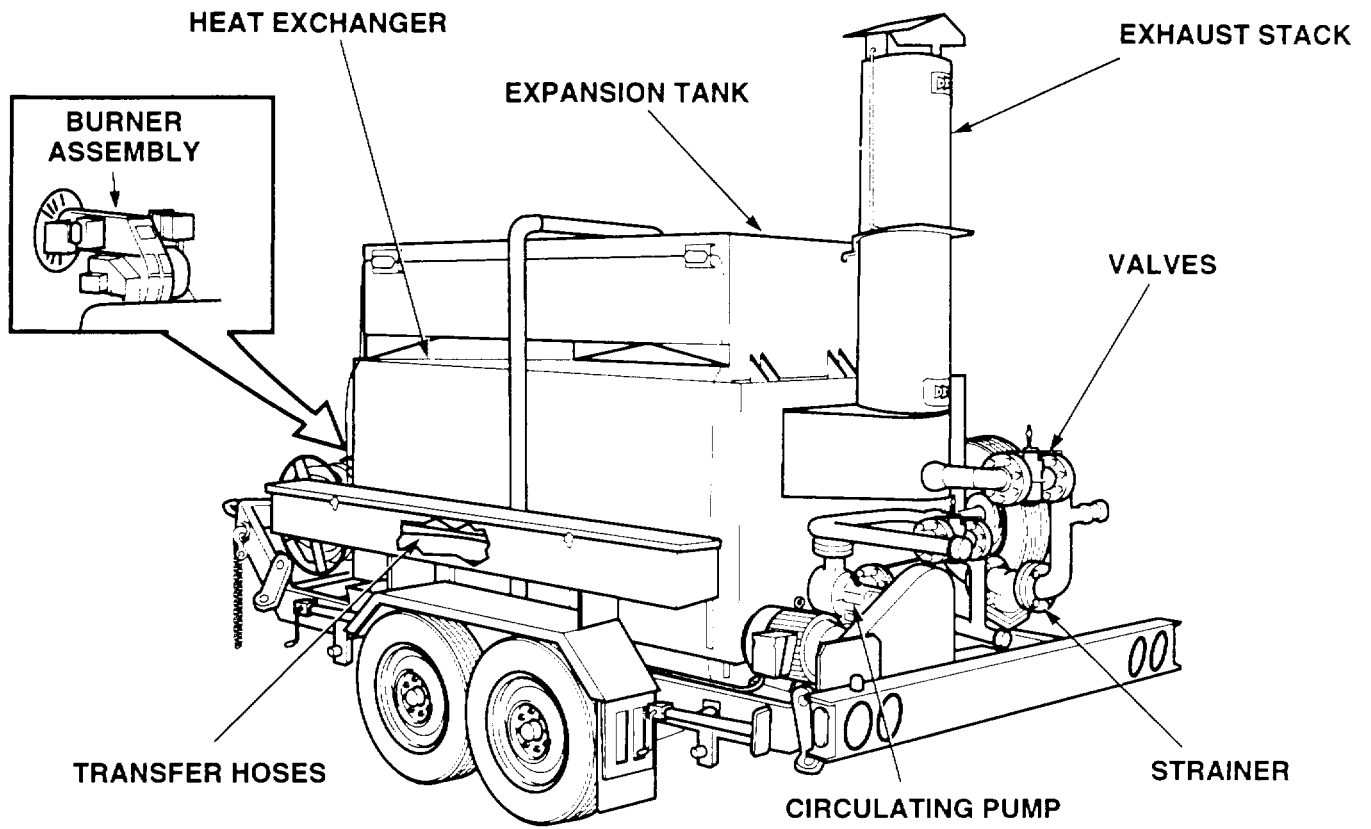
Item	Description
Axles and Brakes	The axles are spring mounted to the frame. The brakes are hydraulic and are operated by means of an air-over-hydraulic master cylinder.
Glad hands and Air lines	Glad hands and air lines provide a way to connect the air-over-hydraulic master cylinder to the air system of the towing vehicle.
Screw Jacks	Screw jacks provide a means of raising the Heater for operation and maintenance.
Cable Reel	Cable reel provides storage for the power cable.
Safety Chains	Safety chains attach to the tow vehicle as a safety backup.
Frame	The frame provides a mounting place for the rest of the systems.

1-13. ELECTRICAL SYSTEM.



Item Description	
Power Cable	Power cable connects burner electrical system to the generator
Panel Gages and Switches	Panel gages and switches are used to start or stop burner and pump and monitor Heater performance
12 Vdc and 24 Vdc Intervehicular Cable Junction Box	The vehicle has 12 Vdc and 24 Vdc hookup capability.
Pump Motor	Pump motor turns the circulating pump.
Lighting	Lighting provides rear, side, safety marking, stopping, and signaling capability.

1-14. OIL TRANSFER SYSTEM.



Item Description	
Heat Exchanger	Transfer oil is heated in the heat exchanger.
Expansion Tank	Expansion tank provides space for transfer oil to expand when it is heated.
Valves	Valves direct the flow of transfer oil.
Strainer	Strainer removes contamination from transfer oil
Circulating Pump	Pump circulates the transfer oil.
Transfer Hoses	Transfer hoses carry the heated oil to the melter.
Burner Assembly	Burner provides heat to the transfer oil.
Exhaust Stack	Exhaust stack directs burner exhaust away from operator.

CHAPTER 2
OPERATING INSTRUCTIONS

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

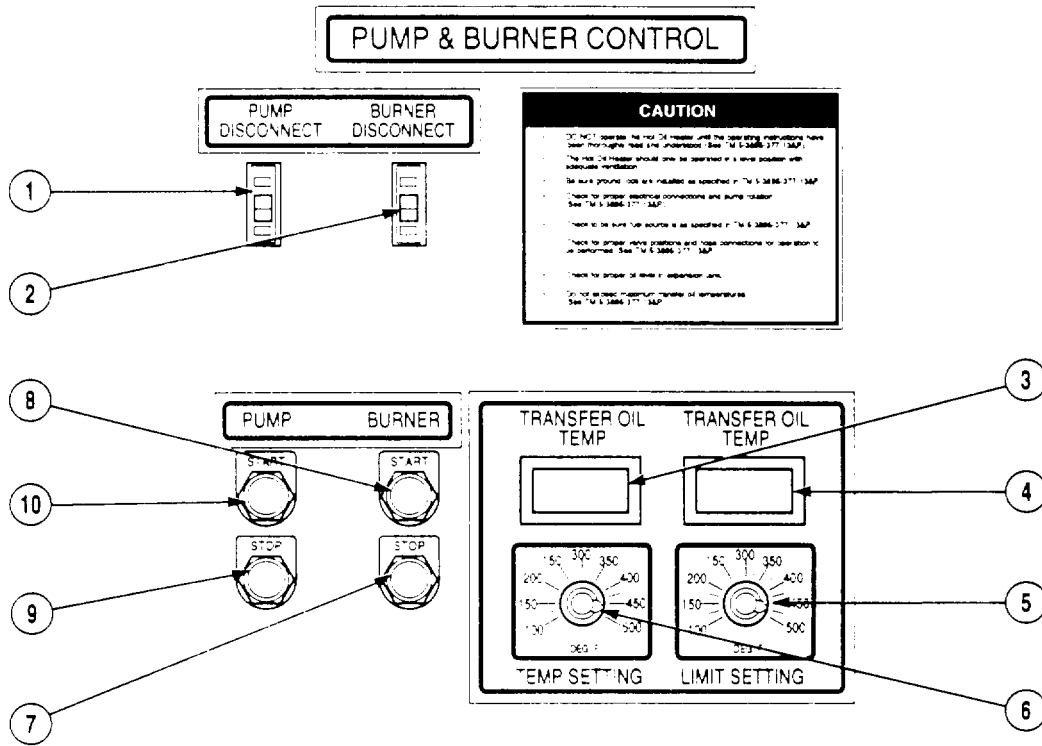
2-1. CONTROLS AND INDICATORS INTRODUCTION.

This section shows the location and describes the use of controls and indicators used to operate the Heater.

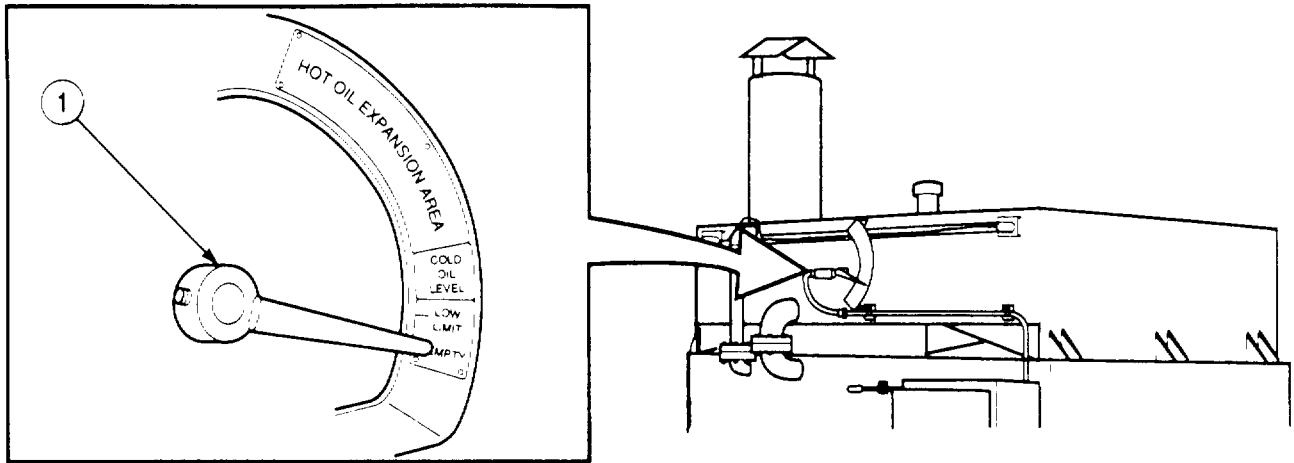
2-2. LOCATION AND USE OF CONTROLS AND INDICATORS.

Know the location and proper use of every control and indicator before operating the Heater. Use this section to learn how each control and indicator is to be used. Separate illustrations, with keys, are provided in this section.

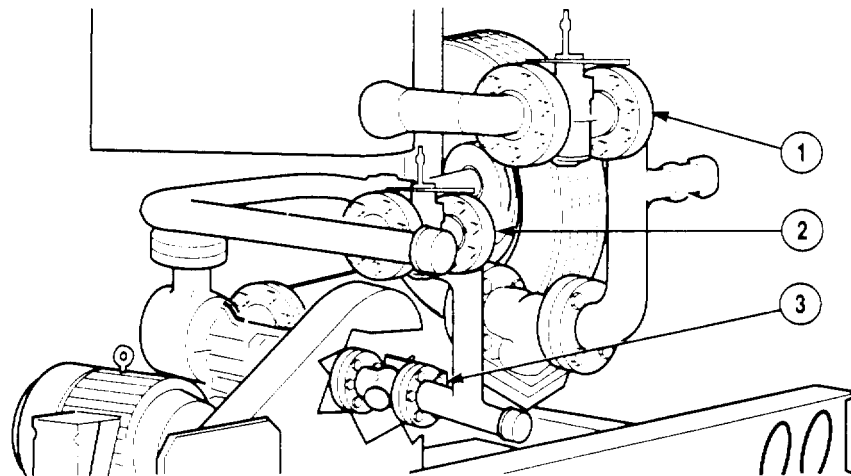
2-2. LOCATION AND USE OF CONTROLS AND INDICATORS (CONT).



Panel Controls and Indicators		
Key	Control/Indicator	Function
1	Pump Disconnect	Disconnects all electrical power to pump.
2	Burner Disconnect	Disconnects all electrical power to burner.
3	Transfer Oil Temperature Gage	Measures temperature of transfer oil in conjunction with TEMP SETTING switch.
4	Transfer Oil Temperature Gage	Measures temperature of transfer oil in conjunction with LIMIT SETTING switch.
5	Limit Setting Switch	Provides control of maximum temperature of transfer oil.
6	Temperature Setting Switch	Provides control of temperature of transfer oil.
7	Burner Stop Button	Turns burner off.
8	Burner Start Button	Turns burner on.
9	Pump Stop Button	Turns pump off.
10	Pump Start Button	Turns pump on.

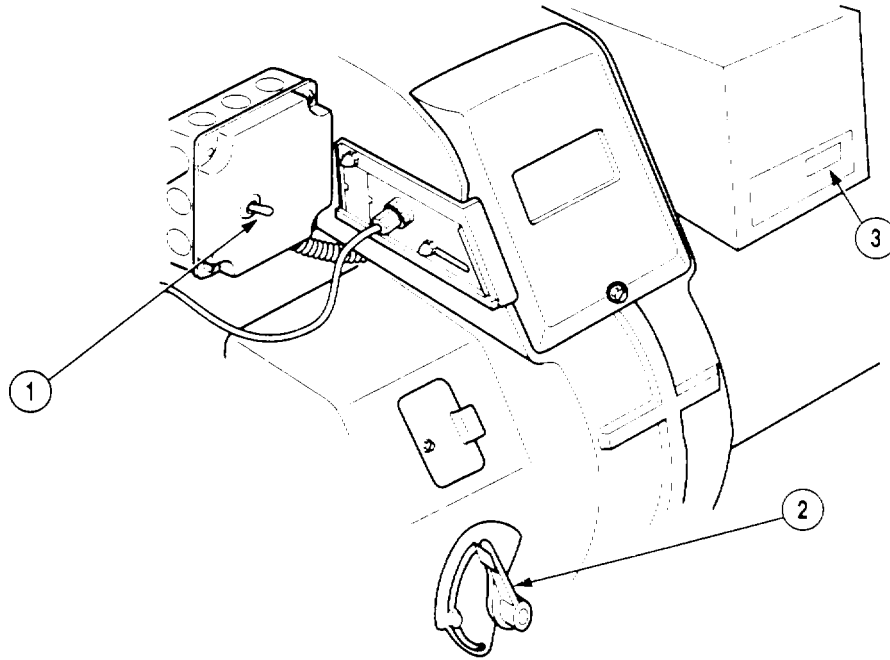


Low Oil Indicator		
Key	Control/Indicator	Function
1	Low Oil Indicator	Indicates level of transfer oil in expansion tank.



Plumbing Controls		
Key	Control Indicator	Function
1	Valve No. 1	Controls flow of transfer oil from pump.
2	Valve No. 2	Controls flow of transfer oil from tank
3	Valve No. 3	Controls flow of transfer oil to tank.

2-2. LOCATION AND USE OF CONTROLS AND INDICATORS (CONT).



Burner Controls		
Key	Control Indicator	Function
1	Low-Fire Hold Switch	Controls low-fire mode of burner
2	Damper Control	Controls air flow to burner.
3	Burner Reset	Manually resets burner in case of misfire

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND LUBRICATION INSTRUCTIONS

2-3. GENERAL PMCS.

Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing equipment to keep it in good condition and to prevent breakdowns. As the Heater's operator, your mission 1, to:

a Be sure to perform your PMCS each time you operate the Heater Always do your PMCS In the same order, so it gets to be a habit. Once you've had some practice, you'll quickly spot anything wrong

b Do your BEFORE PMCS just before you operate the Heater. Pay attention to WARNINGS, CAUTIONs, and NOTES.

c Do your DURING PMCS while you operate the Heater. During operation means to monitor the Heater and its related components while it is actually being operated. Pay attention to WARNINGS, CAUTIONs, and NOTES.

d Do your AFTER PMCS right after operating the Heater Pay attention to WARNINGS, CAUTIONs, and NOTES.

e Do your WEEKLY PMCS once a week.

f Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to record faults that you fix.

g Be prepared to assist organizational maintenance when they lubricate the Heater. Perform any other services when required by organizational maintenance.

2-4. PMCS PROCEDURES.

a Your Preventive Maintenance Checks and Services, Table 2-1, lists inspections and care required to keep your Heater in good operating condition. It is set up so you can make your BEFORE OPERATION checks as you walk around the Heater.

b The "INTERVAL" column of Table 2-1 tells you when to do a certain check or service.

c The "PROCEDURE" column of Table 2-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify' your supervisor.

NOTE

Terms "ready/available" and "mission capable" refer to the same status: Equipment is on hand and ready to perform its combat missions (See DA Pam 738-750

d The "NOT FULLY MISSION CAPABLE IF:" column in Table 2-1 tells you when your Heater is non-mission capable and why the Heater cannot be used.

e If the Heater does not perform as required, refer to Chapter 3, Section II, Troubleshooting (page 3-1).

2-4. PMCS PROCEDURES (CONT).

f If anything looks wrong and you can't fix it, write it on your DA Form 2404 Report it to your supervisor IMMEDIATELY.

g When you do your PMICS, you will always need a rag or two. Following are checks that are common to the entire Heater

(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 drycleaning solvent (P-D-680) on all metal surfaces. Use soap and water when you clean rubber or plastic material. Upholstery can be cleaned with soap and water and a clean, damp cloth.

(2) *Rust and Corrosion.* Check Heater body and frame for rust and corrosion. If any bare metal corrosion exists, clean and apply a thin coat of oil Report It to your supervisor.

(3) *Bolts, Nuts, and Screws.* Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut, or screw you think is loose, tighten it or report it to your supervisor.

(4) *Weld.* Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report It to your supervisor.

(5) *Electric Wires and Connectors.* Look for cracked, frayed, or broken insulation bare wires, and loose or broken connectors. Tighten loose connectors Report any damaged wires to your supervisor.

(6) *Hoses and Fluid Lines.* Look for wear damage and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also 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 your supervisor.

h When you check for "operating condition," you look at the component to see if it's serviceable.

2-5. CLEANING AGENTS.**WARNING**

- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only In well-ventilated places.
- USE CAUTION when using cleaning solvent. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

NOTE

Only use those authorized cleaning solvents or agents listed In Appendix E.

When cleaning grease buildup or rusty places, use a cleaning solvent Then, apply a thin coat of light oil to affected areas.

2-6. SHORTENED MAINTENANCE INSTRUCTIONS.

Local conditions of extreme heat, dust, cold, or wetness dictate that service intervals may need to be shortened.

2-7. ADDITIONAL MAINTENANCE INSPECTIONS.

Additional maintenance inspections may be required for the following reasons

- a** Prolonged storage. Heaters having been stored for a period of three months or more should be inspected.
- b** Initial preparation upon receipt
- c** Preparation for storage.

2-8. LEAKAGE DEFINITIONS FOR OPERATOR PMCS.

It is necessary for you to know how fluid leakage affects the status of the Heater. Following are types/classes of leakage an operator needs to know to be able to determine the status of the Heater. Learn these leakage definitions and remember - when in doubt, notify your supervisor.

CAUTION

- **Equipment operation is allowable minor leakages (Class I or II) Of course. consideration must be given to fluid capacity min 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 immediately to your supervisor**
- a** CLASS I - Seepage of fluid i as indicated by wetness or discoloration) not great enough to form drops.
 - b** CLASS II - Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
 - c** CLASS III - Leakage of fluid great enough to form drops that fall from item being checked/inspected.

2-9. LUBRICATION INSTRUCTIONS.

Lubrication instructions are contained in the PMICS table. All lubrication instructions are mandatory.

2-10. PMCS COLUMN ENTRY EXPLANATION.

a. Item No. Column. The checks and services are numbered in chronological order showing a logical sequence around the heater.

b. Interval column. This column indicates when the lubrication, check, and/ or service should be performed.

c. Location, Item to check/Service Column. The underlined items listed in this column are divided into groups indicating the portion of the equipment of which they are a part, (i.e. brakes, fuel, engine). Under these groupings, a few common words are used to identify the specific item being checked.

d. Procedure Column. This column contains procedures required to perform the checks and services.

e. Not Fully Mission Capable If: Column. This column contains the criteria that causes the equipment to be classified as NOT READY/NOT AVAILABLE because of inability to perform its primary mission. An entry in this column will:

- (1) Identify conditions that make the equipment not ready/not available for readiness reporting purposes.
- (2) Deny use of the equipment until corrective maintenance has been performed.

2-11. PMCS TABLE.

Refer to Table 2-1 for the PMCS for the Heater.

Table 2-1 Preventive Maintenance Checks and Services

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
1		<p><u>GENERAL</u></p> <p>Before During/ After</p>	<p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • If the equipment must be kept in continuous operation done without disturbing operation. Make checks and services when the equipment is shut down. • Ensure that all daily/weekly lubrication requirements are performed on the vehicle as directed in Chapter 3, Section I, Lubrication Instructions. • Perform WEEKLY, as well as BEFORE, PMCS if: <ul style="list-style-type: none"> a. You are the assigned operator but have not operated the equipment since the last WEEKLY. b You are operating the equipment for the first time. • Levers, pins, linkage, etc., not equipped with lubrication fittings, should operate freely and be clear levels, ensure vehicle is on level surface for accurate reading. <p style="text-align: center;">WARNING</p> <ul style="list-style-type: none"> • Read and understand all of the safety precautions and warnings before performing any checks and services or personal injury can result. <p>Perform walk-around inspection of Heater Check for leaks or obvious damage that would require more detailed inspection.</p>	<p>Class III leaks or any fuel leaks.</p>
			2-9	

Item No.	Interval Service	Location Item to Check/	Procedure	Not Fully Mission Capable If:
2	Before	Safety Decals, Data plates, etc.	Check for damage and legibility.	
3	Before	Wheels/ Tires <u>FRONT OF HEATER</u>	Inspect for missing or flat tires Inspect for loose or missing lug nuts	Tires flat or missing Lug nuts loose or missing.
4	Before	Burner	Inspect glass on cover	Glass is broken.
5	Before	Frame (front) and Lunette Hitch	Visually inspect lunette hitch for damage that would impair operation, and ensure safety chains are secure	Lunette hitch is damaged or safety chains are missing or damaged.
6	Before	Decontamination Apparatus Assembly	Visually inspect decontamination apparatus for obvious damage and missing components.	
7	Before	Air Brake Lines and Glad Hands	Inspect for obvious damage to air lines and fittings. Inspect glad hands for cracks and missing or damaged seals.	Air lines and fittings are damaged or Glad hands are damaged or have missing or damaged seals.
8	Before	Air Reservoir	Visually inspect for obvious damage	Air reservoir is damaged.
9	After	Air Reservoir	Open drain cock and observe air stream for pressure of moisture Drain air until only air comes out.	

Table 2-1. Preventive Maintenance Checks and Services - CONT.

Item No.	Interval	<u>Location</u> Item to Check/Service	Procedure	Not Fully Mission capable If:
10	Before/After	Fuel Lines <u>FRONT OF HEATER</u>	<p align="center">WARNING</p> <p>Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.</p> <p>Visually inspect for cuts, cracks, signs of wear, or obvious damage to lines and fittings.</p> <p align="center">NOTE</p> <p>Hydraulic Master Cylinder has a capacity of 16 fl oz (473 ml) of brake fluid (item 1, appendix E).</p>	Lines or fittings are damaged.
11	Weekly	Hydraulic Master Cylinder	Remove cap and check fluid level. Add brake fluid (item 1, appendix E) as required until reservoir is filled. Install cap.	Fluid level is low.

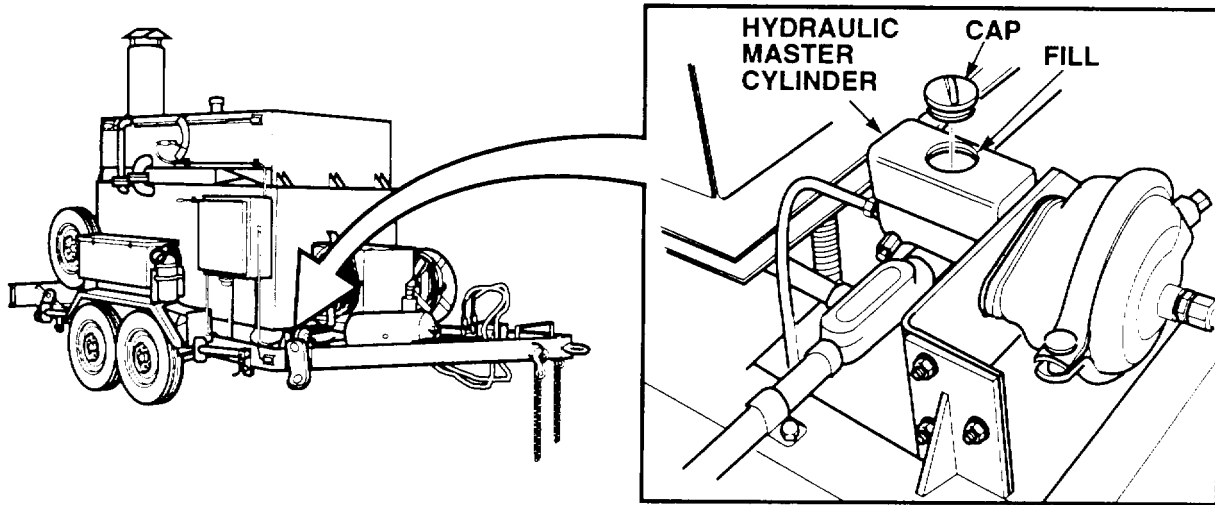


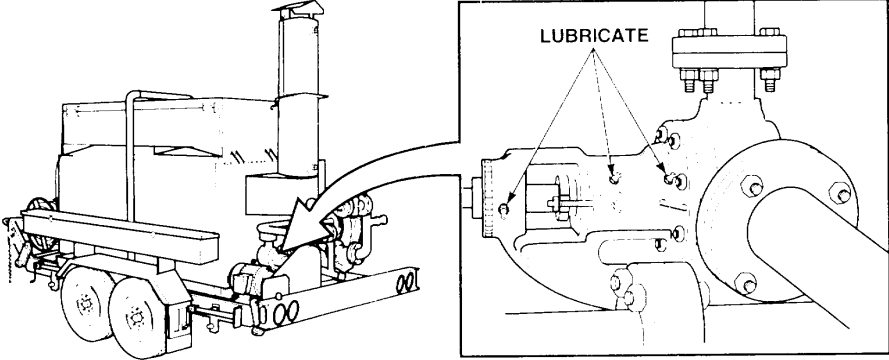
Table 2-1. Preventive Maintenance Checks and Services - CONT.

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
12	Before	<p align="center"><u>RIGHT SIDE OF HEATER</u></p> <p>Screw Jacks</p>	Visually inspect for obvious damage	Screw Jacks are damaged or missing.
13	Before	Fire Extinguisher	Visually Inspect for missing, damaged. or loose fire extinguisher. Check to ensure plastic tie is unbroken.	Fire Extinguisher is missing or damaged Plastic tie is broken or missing
14	During	Control Panel	<p>Inspect panel for damage and unserviceable controls and gages Monitor gages regularly for proper temperature readings.</p> <p>a. Transfer oil temperature 475°F (246°C) max (temp setting)</p> <p>b. Transfer oil temperature 475°F (246°C) max (limit setting)</p>	<p>Controls and gages are damaged or not functioning</p> <p>Temperature is in excess of 475°F (246°C).</p> <p>Temperature is in excess of 475°F (246°C).</p>
15	Before/ During/ After	Low Oil Level Indicator	Visually inspect for low oil level in expansion tank	Oil level is below acceptable range.

Table 2-1. Preventive Maintenance Checks and Services - CONT.

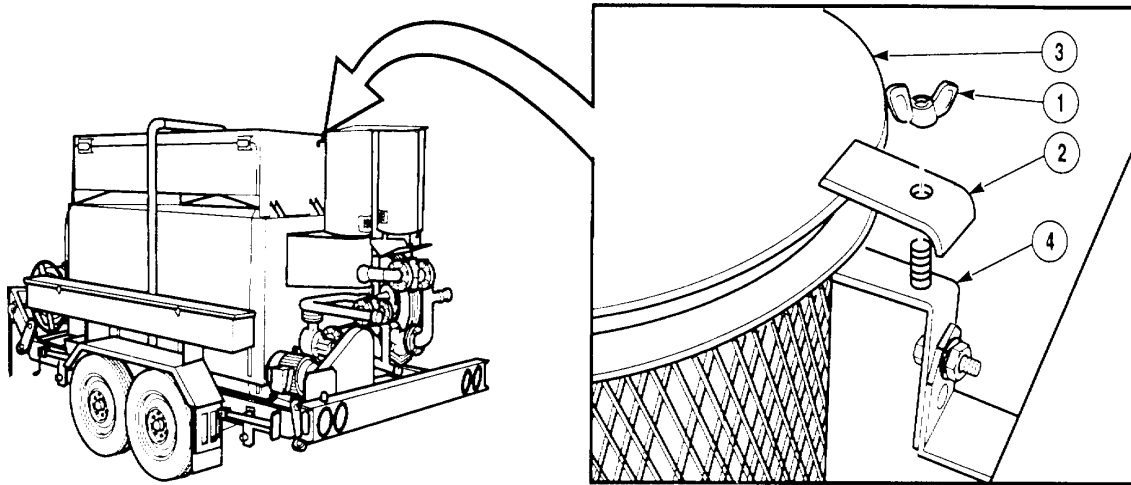
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
		<u>REAR OF HEATER</u>	<p style="text-align: center;">WARNING</p> <ul style="list-style-type: none"> • Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. • Hearing protection is required for operator and also for all personnel working on or around this Heater while it is running. 	
16	Before	Exhaust Stack	Visually inspect for obvious damage.	Exhaust Stack is obviously damaged.
17	Weekly	Valves	Add sealing compound (item 8, appendix E) into fittings. Visually check for leaks or obvious damage.	Valve is damaged or class III leak is present.

Table 2-1. Preventive Maintenance Checks and Services - CONT.

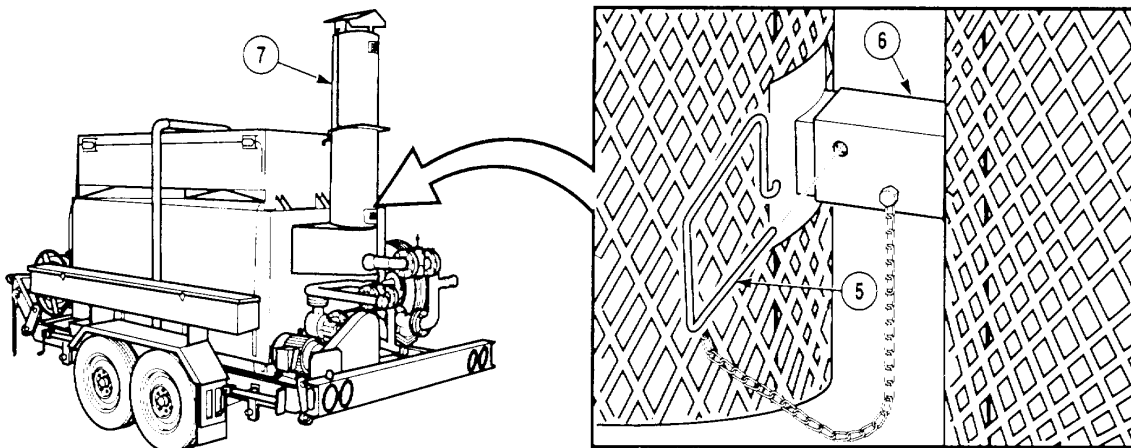
Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
				
18	Weekly	Circulating Pump	Add grease (item 14, appendix E) as required to three fittings. Check for obvious damage.	Pump is damaged.
19	Monthly	Pump Drive Belts	Remove screws and cover and visually check the belts for cracks or fraying. Install cover and screws	Belt(s) is missing, cracked, or frayed.
20	During	Circulating Pump and Motor <u>LEFT SIDE OF HEATER</u>	Visually inspect for rotation of pump and pump motor	Pump and motor are not rotating.
22	Before/After	Power Cable	Visually inspect for cuts, cracks, signs of wear, or obvious damage to lines and fittings.	Power Cable or connector is damaged.

Section III. OPERATION UNDER USUAL CONDITIONS

2-12. ASSEMBLY AND PREPARATION FOR USE.

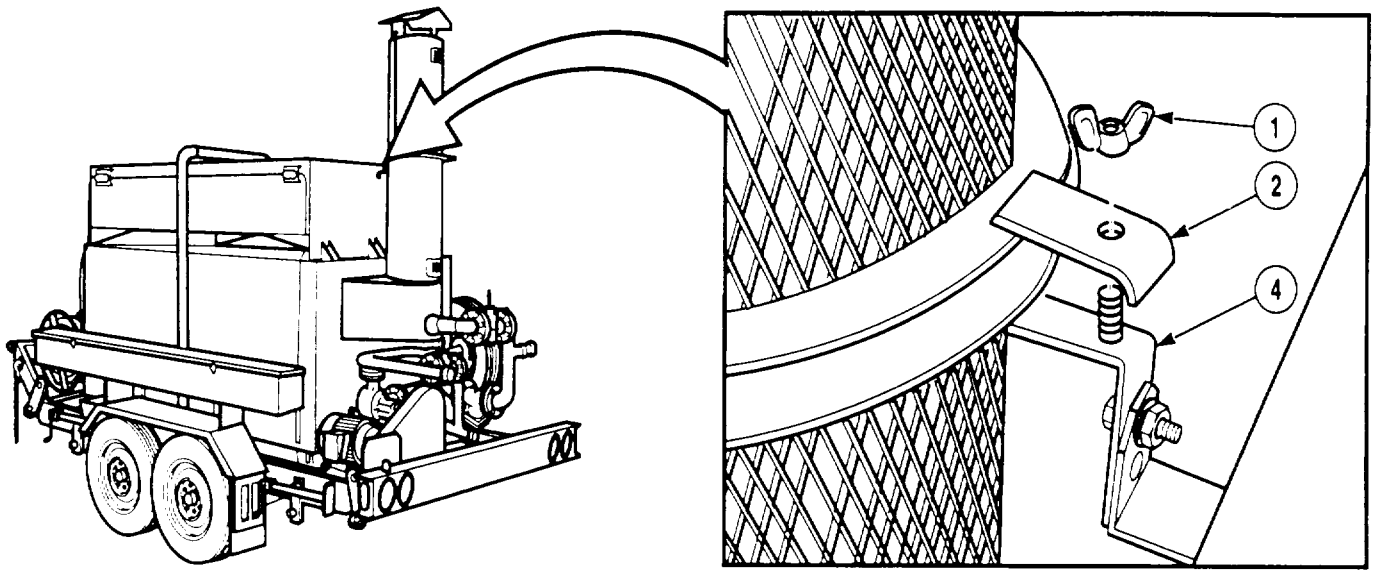


- a. Remove wing nut (1), clamp (2), and rain cover (3) from exhaust stack bracket (4).
- b. Place rain cover (3) in stowage box



- c. Remove pin (5) from bracket (6).
- d. Tilt top half of exhaust stack (7) up and install pin (5) in bracket (6).

2-12. ASSEMBLY AND PREPARATION FOR USE (CONT).

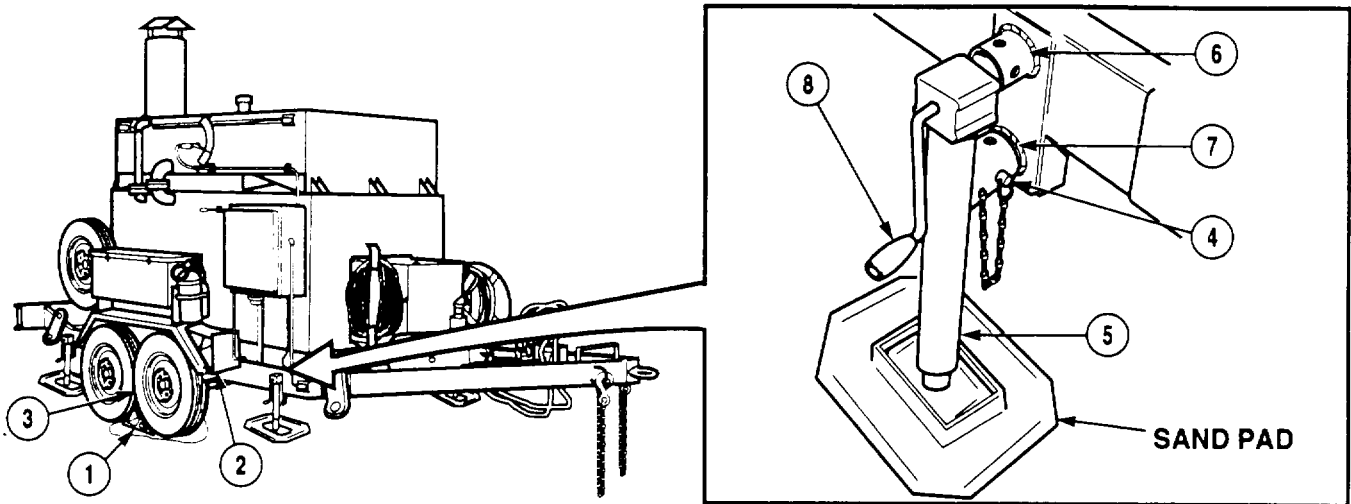


- e. Install clamp (2) and wing nut (1) on exhaust stack bracket (4).

2-13. INITIAL ADJUSTMENTS, CHECKS, AND SELF-TEST.

Ensure that the Heater is located on level ground and in a well-ventilated area.

2-14. OPERATING PROCEDURES.

a. *Leveling the Heater.*

- (1) Remove wheel chocks (1) from stowage bracket (2).
- (2) Place wheel chocks (1) against wheels (3).
- (3) Pull pin (4) and allow screw jack (5) to swing down.
- (4) Position screw jack (5) on upper mount (6) or lower mount (7) as needed.
- (5) Install pin (4) in screw jack (5).
- (6) Remove sand pad from stowage box and place under base of screw jack (5).
- (7) Repeat steps (3) through (6) for three remaining screw jacks.

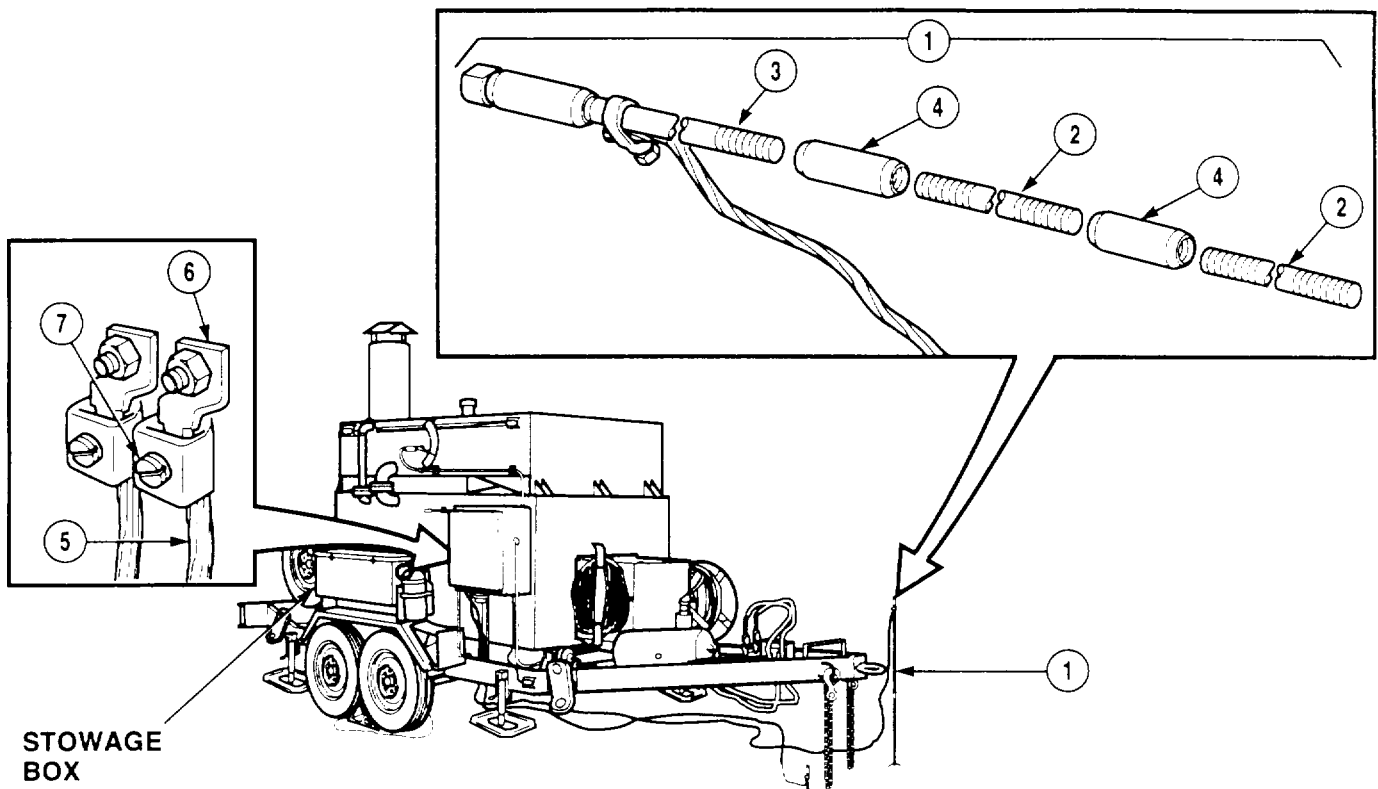
WARNING

Do not lift wheels off ground when leveling Heater. This can create an unstable condition which may result in injury to personnel and/or equipment damage.

- (8) Raise screw jacks (5) by turning handle (8) until Heater is level.

2-14. OPERATING PROCEDURES (CONT).

b. *Connecting Grounding Rods.*



- (1) Remove grounding rod assembly (1) components from stowage box.
- (2) Install rods (2) and rod (3) in couplings (4).
- (3) Install grounding cable (5) in terminal (6) and tighten screw (7).

NOTE

Be careful to not block operator path of travel when driving ground rod assemblies into ground.

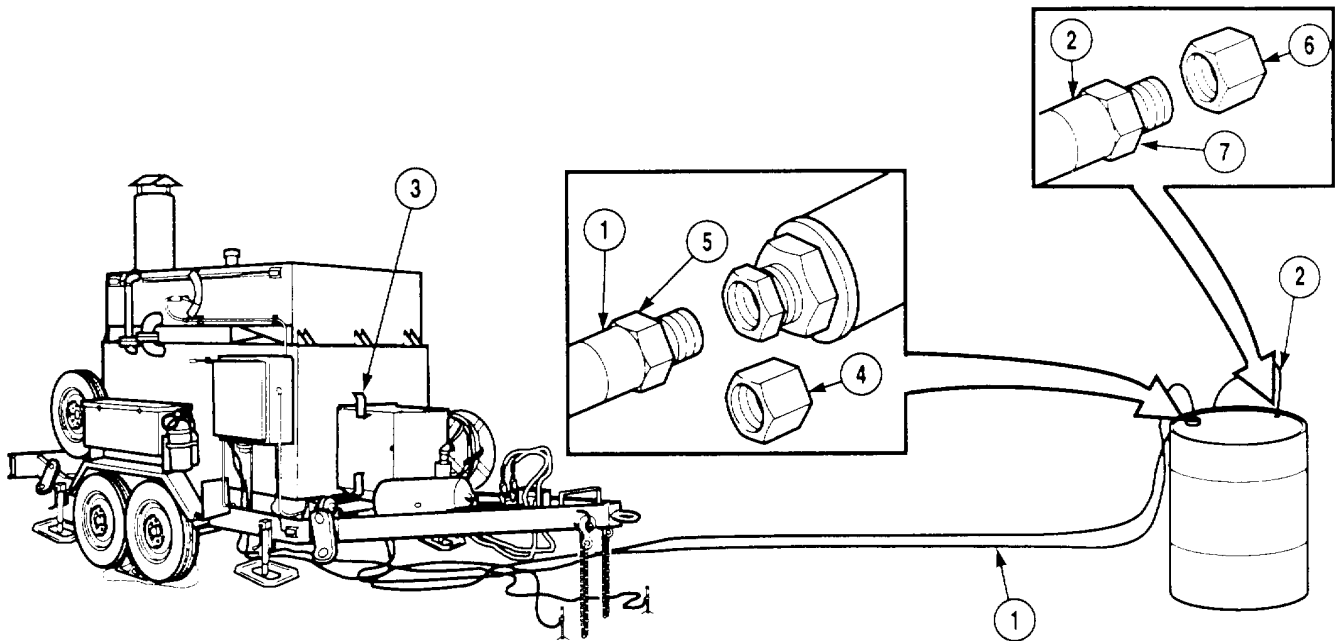
- (4) Drive grounding rod assembly (1) into ground leaving not more that 12 In (30 480 cm) exposed

NOTE

For best results, separate locations of grounding rods.

- (5) Repeat steps (1) through (4) for the second grounding rod assembly

c. **Connecting Fuel Lines.**



WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death.

- Keep fuel away from open flame or any spark (ignition source).
- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on a fuel system.
- Do not work on fuel system when burner is hot; fuel can be ignited by a hot burner
- Post signs that read "NO SMOKING WITHIN 50 FEET (15 m)" when working with open fuel, fuel lines, or fuel tanks.
- Be sure to use correct type and grade of fuel.

(1) Remove fuel lines (1 and 2) from bracket (3).

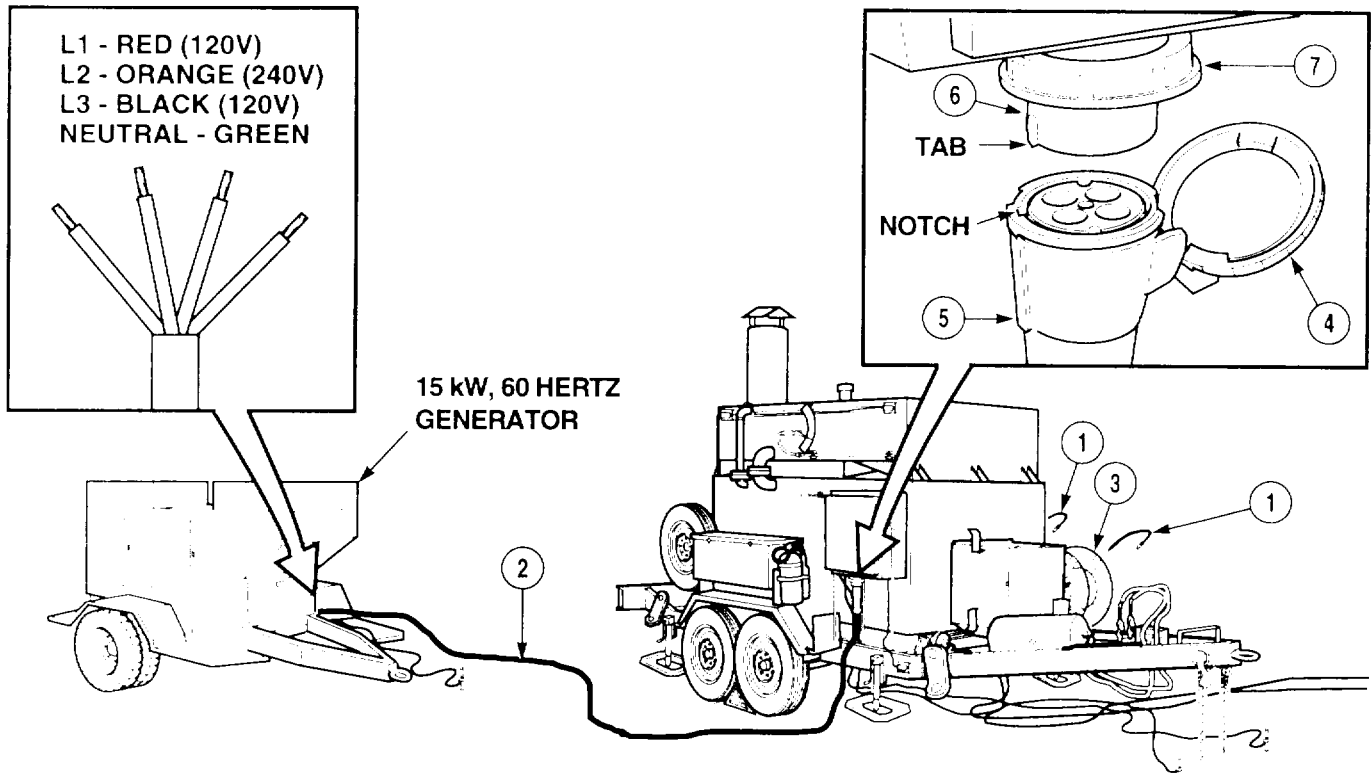
NOTE

Fuel return line must be connected to a port that is separate from where the fuel supply line is connected to prevent air from entering fuel system.

- (2) Remove cap (4) and attach fuel supply line (1) to output port of fuel source. Tighten fitting (5)
- (3) Remove cap (6) and attach fuel return line (2) to return port of fuel source. Tighten fitting (7)
- (4) Turn fuel source on.

2-14. OPERATING PROCEDURES (CONT).

d. Connecting Power Source.



- (1) Remove straps (1) and power cable (2) from cable reel (3)

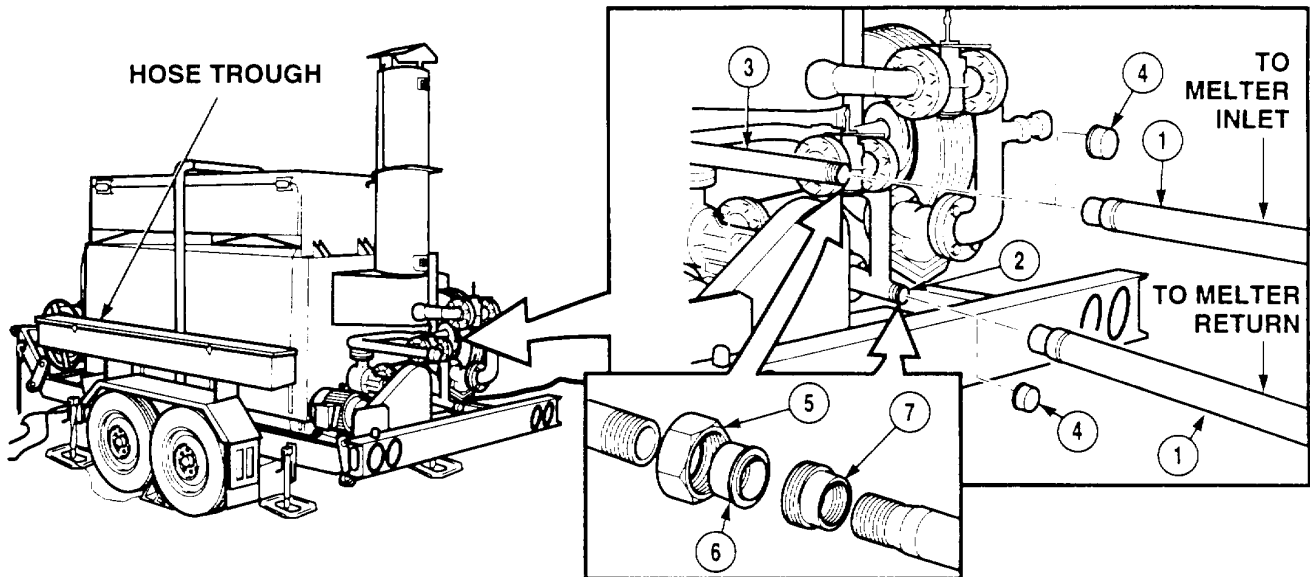
WARNING

DO NOT attempt to connect or disconnect wires while generator is in operation. Serious injury or death may occur as a result. Always ensure generator is shut down before any connection or disconnection of wiring is done. Always ensure generator and Heater are properly grounded before attempting to connect or disconnect any wiring.

- (2) Attach power cable (2) to 15 kW, 60 Hertz generator, NSN 6115-00-118-1241 or NSN 6115-01-274-7388. Refer to TMN5-6115-464-12 or TM5-6115-643-10 as required) Do not start generator
- (3) Unscrew and lift cover (4) from connector (5).
- (4) Aline notch on connector (5) with tab on power inlet (6)
- (5) Install connector (5) In power inlet (6) Tighten nut (7)
- (6) Start generator (Refer to TM5-6115-464-12 or TM5-6115-64:3-10 as required)

e. Installing Transfer Hoses.

- (1) Circulating through external system.



WARNING

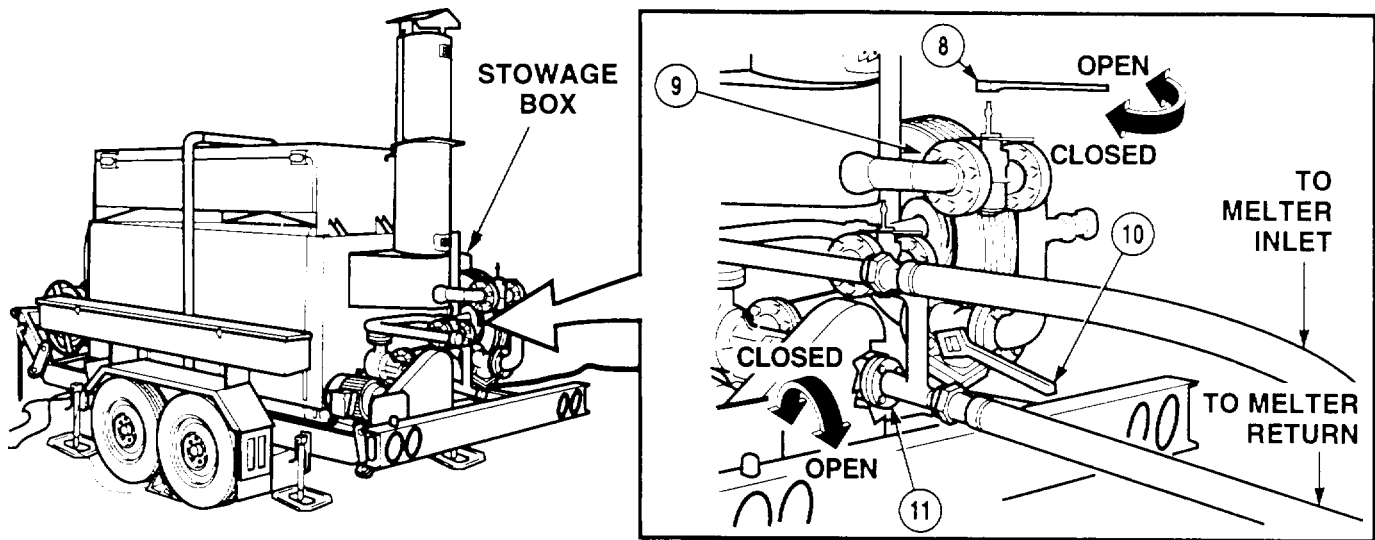
- Oil is slippery and can cause falls Wipe up spilled oil with rags.
- Transfer oil will become extremely hot during operation. Be careful not to touch the hot oil or allow hot oil to come in contact with skin. Transfer oil can become hot enough to cause serious burns or death to personnel.

NOTE

Ensure that all valves are closed before removing caps. Failure to do so may result in drainage of oil from system.

- Remove two transfer hoses (1) from hose trough.
- Place drain pan under RETURN port (2) and OUTLET port (3)
- Remove two caps (4) from RETURN port (2) and OUTLET port (3).
- Install two nuts (5) on two coupling sections (6)
- Install coupling sections (6) on RETURN port (2) and OUTLET port (3) on Heater
- Install coupling sections (7) on transfer hoses (1).
- Install transfer hose (1) to RETURN port (3) on Heater and RETURN port on melter and tighten nuts (5)
- Install transfer hose (1) to OUTLET port (4) on Heater and inlet port on melter and tighten nuts (5).

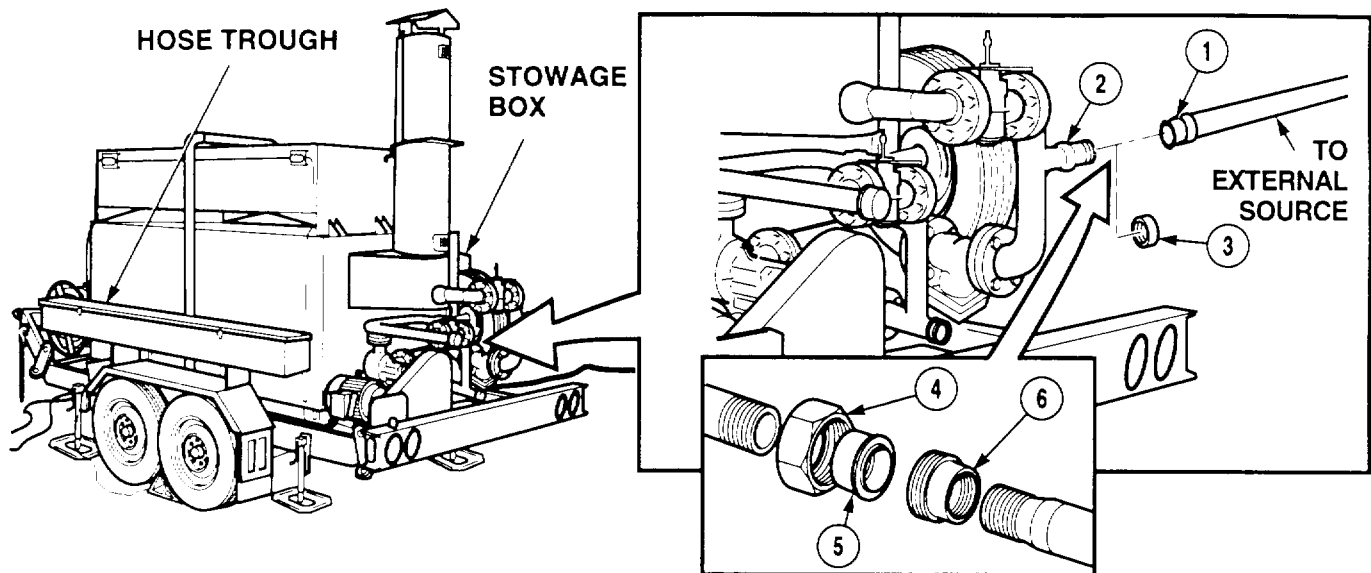
2-14. OPERATING PROCEDURES (CONT).



- (i) Remove handles (8 and 10) from stowage box.
- (j) Install handle (8) on valve No. 1 (9).
- (k) Install handle (10) on valve No. 3 (11).
- (l) Turn handles (8 and 10) until valves (9 and 11) are in the "OPEN" position.
- (m) Check for leaks. If leaks are present, close valves and check connections for proper fit.

e. **Installing Transfer Hoses (cont).**

(2) Pumping from external source to tank.



WARNING

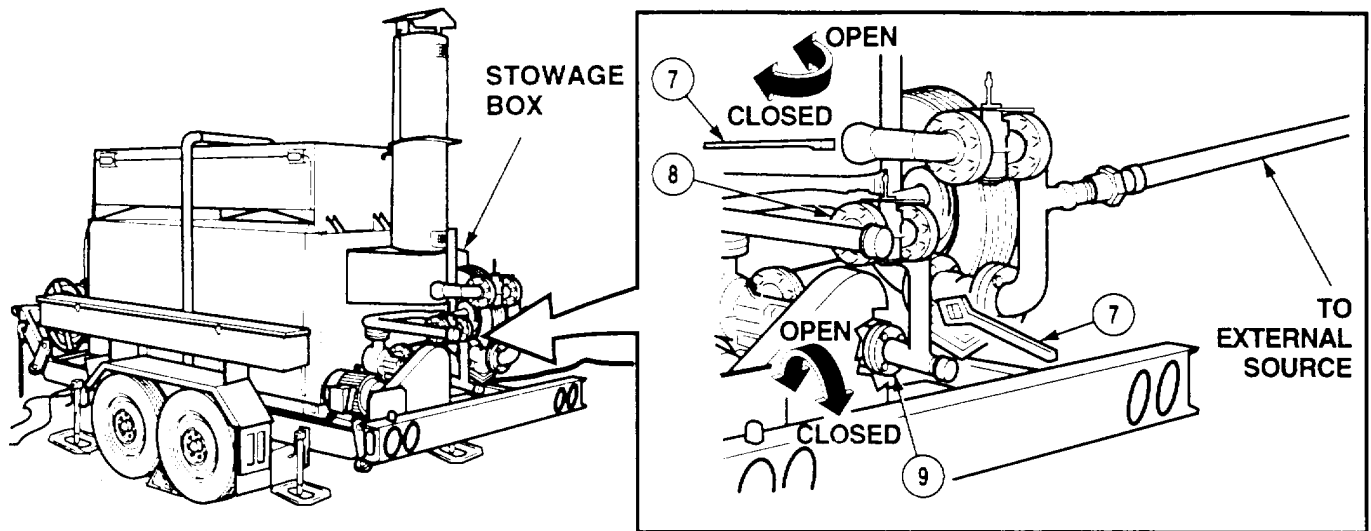
- Oil is slippery and can cause falls. Wipe up spilled oil with rags.
- Transfer oil will become extremely hot during operation. Be careful not to touch the hot oil or allow hot oil to come in contact with skin. Transfer oil can become hot enough to cause serious burns or death to personnel.

NOTE

Ensure that all valves are closed before removing caps. Failure to do so may result in drainage of oil from system.

- Remove one transfer hose (1) from hose trough.
- Place drain pan under EXTERNAL INPUT port (2).
- Remove cap (3) from EXTERNAL INPUT port (2).
- Install nut (4) on coupling section (5).
- Install coupling section (5) on EXTERNAL INPUT port (2) on Heater.
- Install coupling section (6, on transfer hose (1).
- Install transfer hose (1) on EXTERNAL INPUT port (2) and external source. Tighten nuts (4)

2-14. OPERATING PROCEDURES (CONT).



- (h) Remove handle 71 from stowage box
- (i) Install handle (71 on Valve No 2 i(8) and turn handle until valve is In the "OPEN" position.
- (j) Remove handle (7) from Valve No. 2 (8).
- (k) Install handle (7} on Valve No 3 (9) and turn handle until valve is in the "OPEN" position.

NOTE

Ensure that Valve No 1 is in the "CLOSED" position to allow proper pumping operation

- (l) Check for leaks If leaks are present, close valves and check connections for proper fit.

e. Installing Transfer Hoses (cont).

- (3) Pumping from external source to external system.

WARNING

- **Oil is slippery and can cause falls. Wipe up spilled oil with rags.**
- **Transfer oil will become extremely hot during operation. Be careful not to touch the hot oil or allow hot oil to come in contact with skin. Transfer oil can become hot enough to cause serious burns or death to personnel.**

NOTE

Ensure that all valves are closed before removing caps. Failure to do so may result in drainage of oil from system.

- Remove two transfer hoses (1) from hose trough.
- Place drain pan under EXTERNAL INPUT port (2) and
- Remove two caps (4) from EXTERNAL INPUT port (2) and OUTLET port (3)
- Install nuts (5) on coupling sections (6).
- Install coupling sections (6) on EXTERNAL INPUT port (2) and OUTLET port (3) on Heater
- Install coupling sections (7) on transfer hoses (1).
- Install transfer hose (1) on EXTERNAL INPUT port (2) and external source and tighten nuts (5).
- Install transfer hose (1) on OUTLET port (3) and external system and tighten nuts (5).

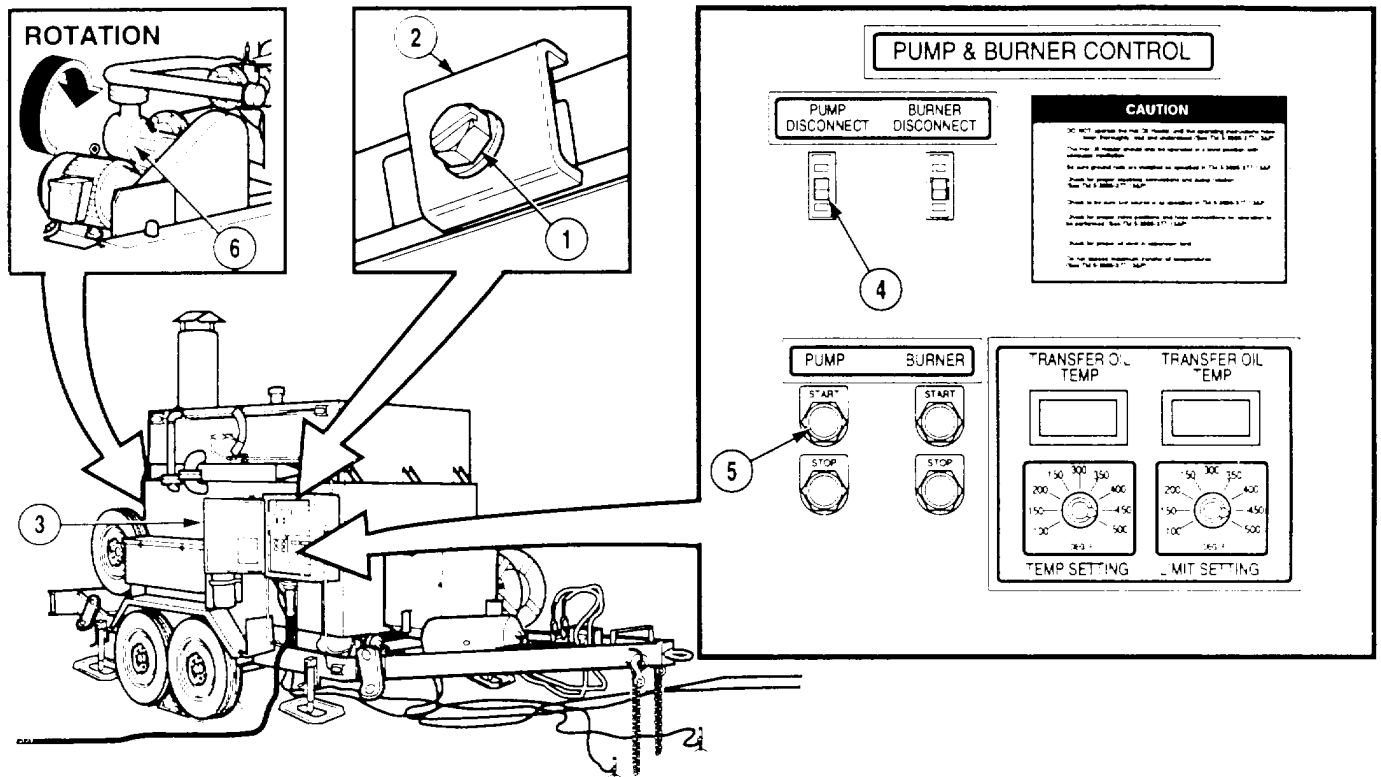
NOTE

Ensure that Valves No. 1, 2, and 3 are in the "CLOSED" position to allow proper pumping operation.

- Check for leaks. If leaks are present, check connections for proper fit.

2-14. OPERATING PROCEDURES (CONT).

f. Starting Circulating Pump.



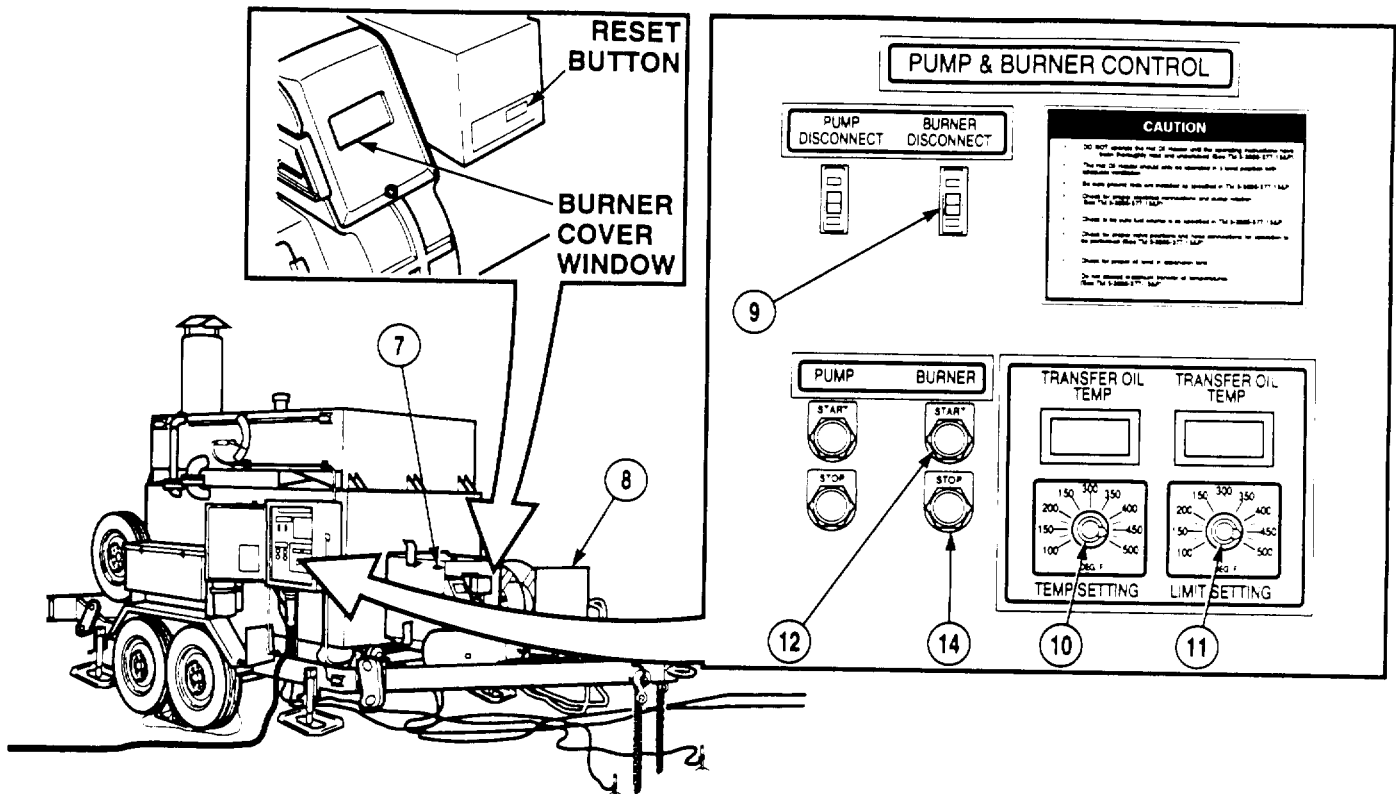
- (1) Loosen nine screws (1) and clamps (2) and open control panel cover (3)
- (2) Switch circuit breaker (4) to "ON" position.
- (3) Push START button (5).

NOTE

If pump is operating in reverse direction, power cable leads may be crossed at generator. To change rotation reverse the black and red leads at the generator

- (4) Check circulating pump (6) for proper direction of rotation.

g. Starting Burner.



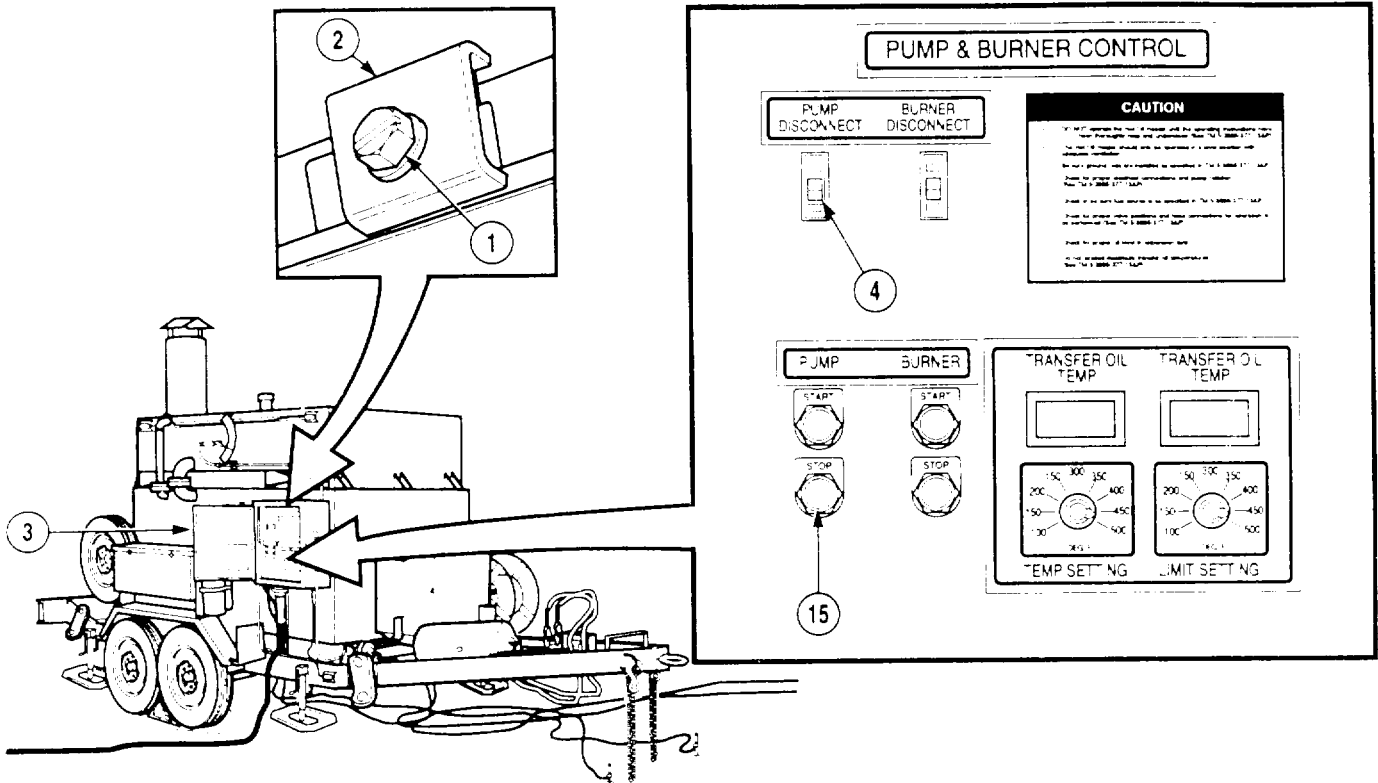
- (1) Loosen six latches (7) and remove front burner access cover (8).
- (2) Switch circuit breaker (9) to "ON" position.
- (3) Set the TEMP SETTING dial (10) to desired temperature.
- (4) Set the LIMIT SETTING dial (11) to setting 25° higher than the temperature setting (do not exceed 475').
- (5) Push START button (12).
- (6) Watch for flame through burner cover window (13).
- (7) If burner does not start, push reset button (14).
- (8) Wait 30 seconds and push start button (12) again.
- (9) Monitor temperature gage during operation.
- (10) Install front burner access cover (8) and close six latches (7).

h. Shutting Down Burner.

- (1) Push STOP button (14).
- (2) Switch circuit breaker (7) to "OFF" position.

2-14. OPERATING PROCEDURES (CONT).

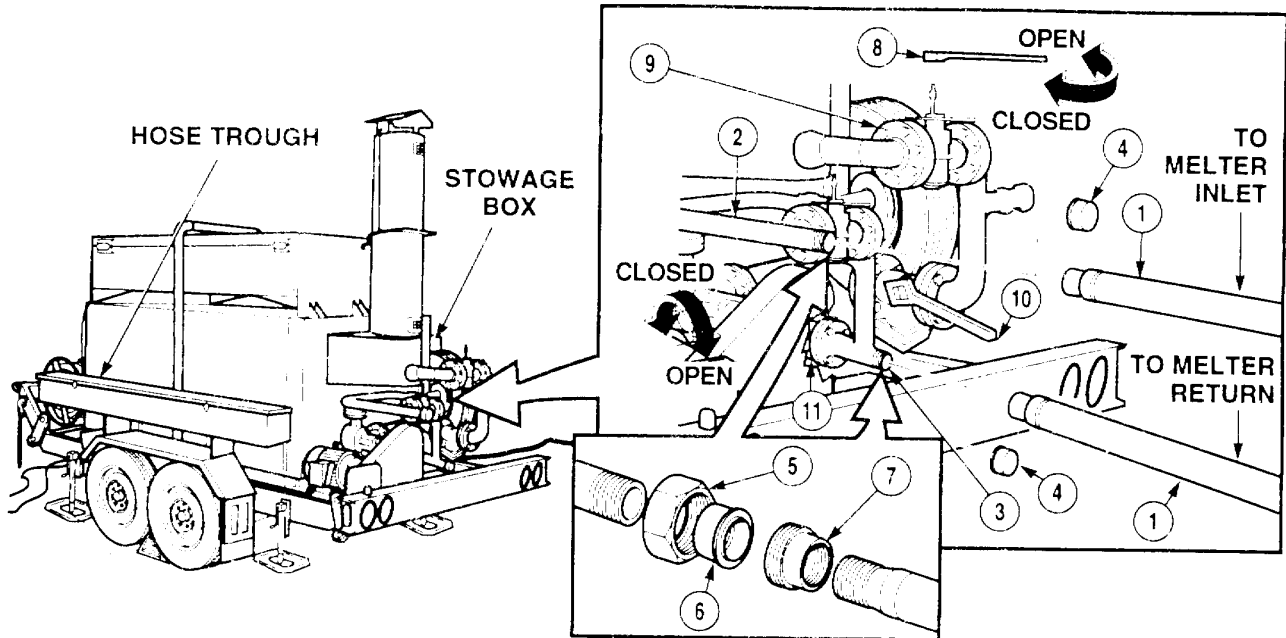
i. Shutting Down Circulating Pump.



- (1) Push STOP button (15)
- (2) Circuit breaker (4) to "OFF" position
- (3) Close control panel cover (13), reposition clamps (2), and tighten screws (1)

j. Removing Transfer Hoses.

- (1) Circulating through external system



WARNING

Transfer oil will become extremely hot during operation. Be careful not to touch the hot oil or allow hot oil to come in contact with skin. Transfer oil can become hot enough to cause serious burns or death to personnel. Allow Heater to completely cool before attempting to remove hoses.

NOTE

Oil is slippery and can cause falls. Wipe up spilled oil with rags.

- (a) Turn handles (8 and 10) until valve No. 1 (9) and valve No. 3 (11) are in the "CLOSED" position.
- (b) Return handles (8 and 10) to storage box.

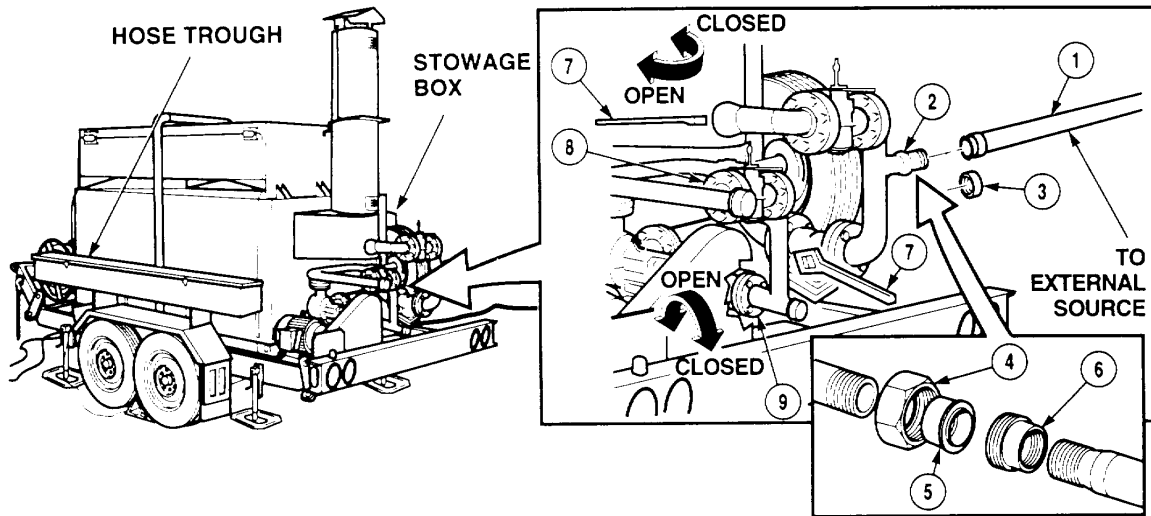
NOTE

Ensure that valve No. 3 is closed before performing step c.

- (c) Loosen nut (5) and remove transfer hose (1) from OUTLET port (2) on Heater and inlet port on melter.
- (d) Loosen nut (5) and remove transfer hose (1) from RETURN port (3) on Heater and return port on melter.
- (e) Remove coupling sections (6 and 7) from Heater and transfer hoses (1).
- (f) Install two caps (4) on RETURN port (3) and OUTLET port (2).
- (g) Drain transfer hoses (1) and return hoses to hose through.

2-14. OPERATING PROCEDURES (CONT).

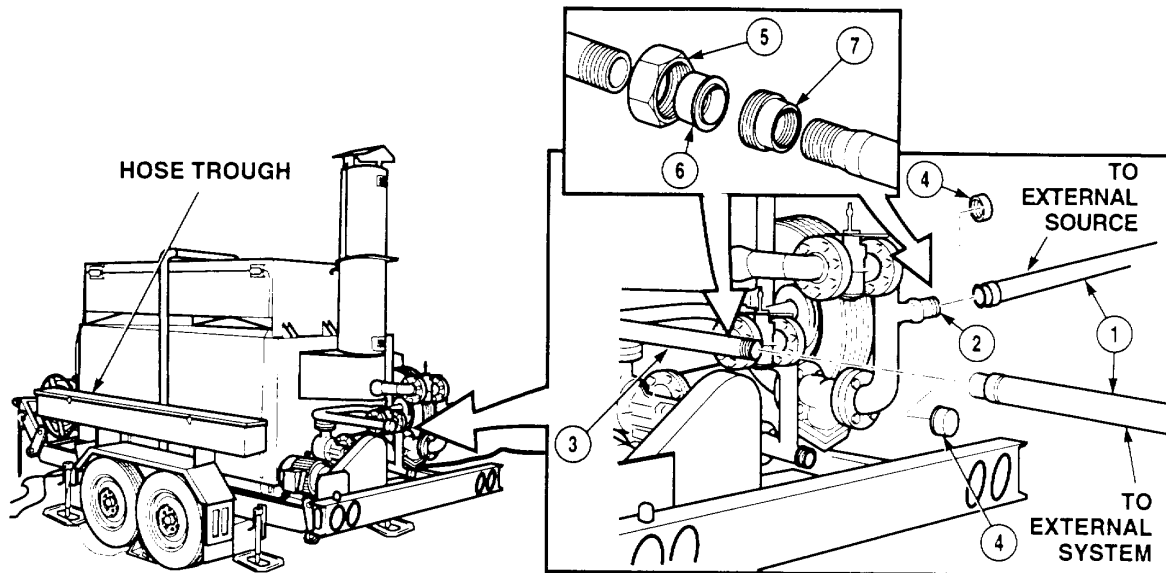
- (2) Pumping from external source to tank

**WARNING**

Transfer oil will become extremely hot during operation. Be careful not to touch the hot oil or allow hot oil to come in contact with skin. Transfer oil can become hot enough to cause serious burns or death to personnel. Allow Heater to completely cool before attempting to remove hoses.

- (a) Turn handle (7) until Valve No 2 (8) is in the "CLOSED" position.
- (b) Position handle (7) on valve No 3 (9) and turn handle until valve is in "CLOSED" position.
- (c) Return handle (7) to storage box.
- (d) Loosen two nuts (4) and remove transfer hose (1) from EXTERNAL INPUT port (2) and external source.
- (e) Remove coupling sections (5 and 6) from Heater and transfer hoses (1).
- (f) Install cap (3) on EXTERNAL INPUT port (2).
- (g) Drain transfer hose (1) and return hose to hose trough.

- (3) Pump from external source to external system.



- (a) Loosen two nuts (5) and remove transfer hose (1) from EXTERNAL INPUT port 12 and external source.
 (b) Loosen two nuts (5) and remove transfer hose (1) from OUTLET port (3) and external system.

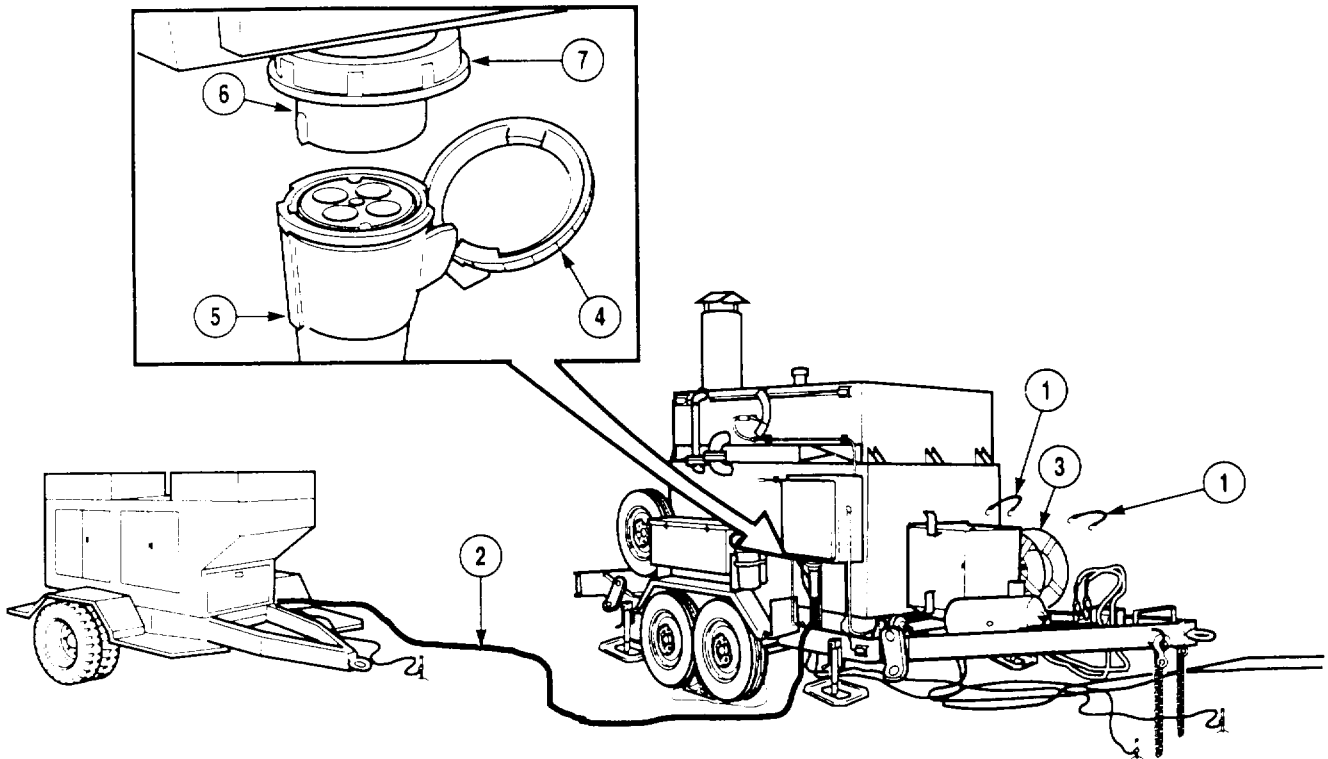
NOTE

Ensure that all valves are closed before performing step c.

- (c) Remove coupling sections (6 and 7) from Heater and transfer hoses (1)
 (d) Install two caps (4) on EXTERNAL INPUT port (2) and OUTLET port (3).
 (e) Drain transfer hoses (1) and return hoses to hose trough.

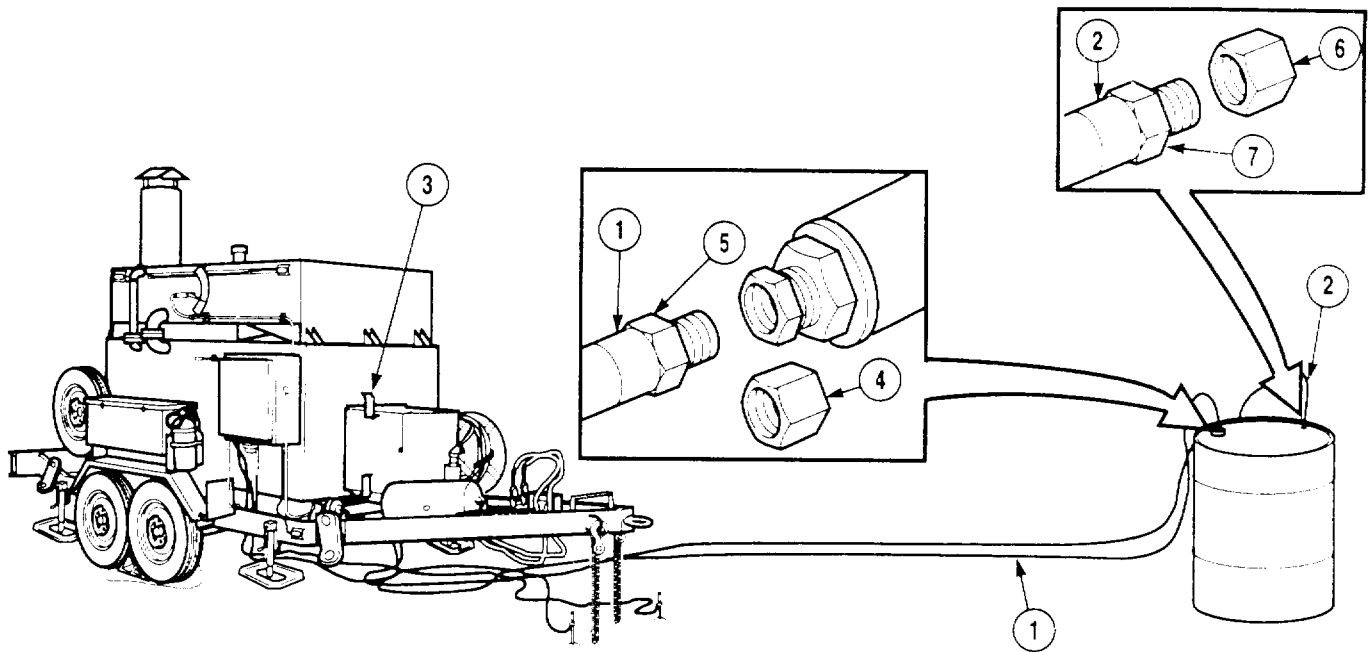
2-14. OPERATING PROCEDURES (CONT).

k. *Disconnecting Power Source.*



- (1) Shut off generator (Refer to TM5-6115-464-12 or TM5-6115-643-10 as required).
- (2) Disconnect power cable (2) from generator (Refer to TM5-6115-464-12 or TM5-6115-643-10 as required)
- (3) Loosen nut (7) and remove connector (5) from power inlet (6).
- (4) Close cover (4) and turn cover in clockwise direction to lock in place.
- (5) Wrap power cable (2) on cable reel (3).
- (6) Secure power cable (2) with straps (1).

I. Disconnecting Fuel Lines.



WARNING

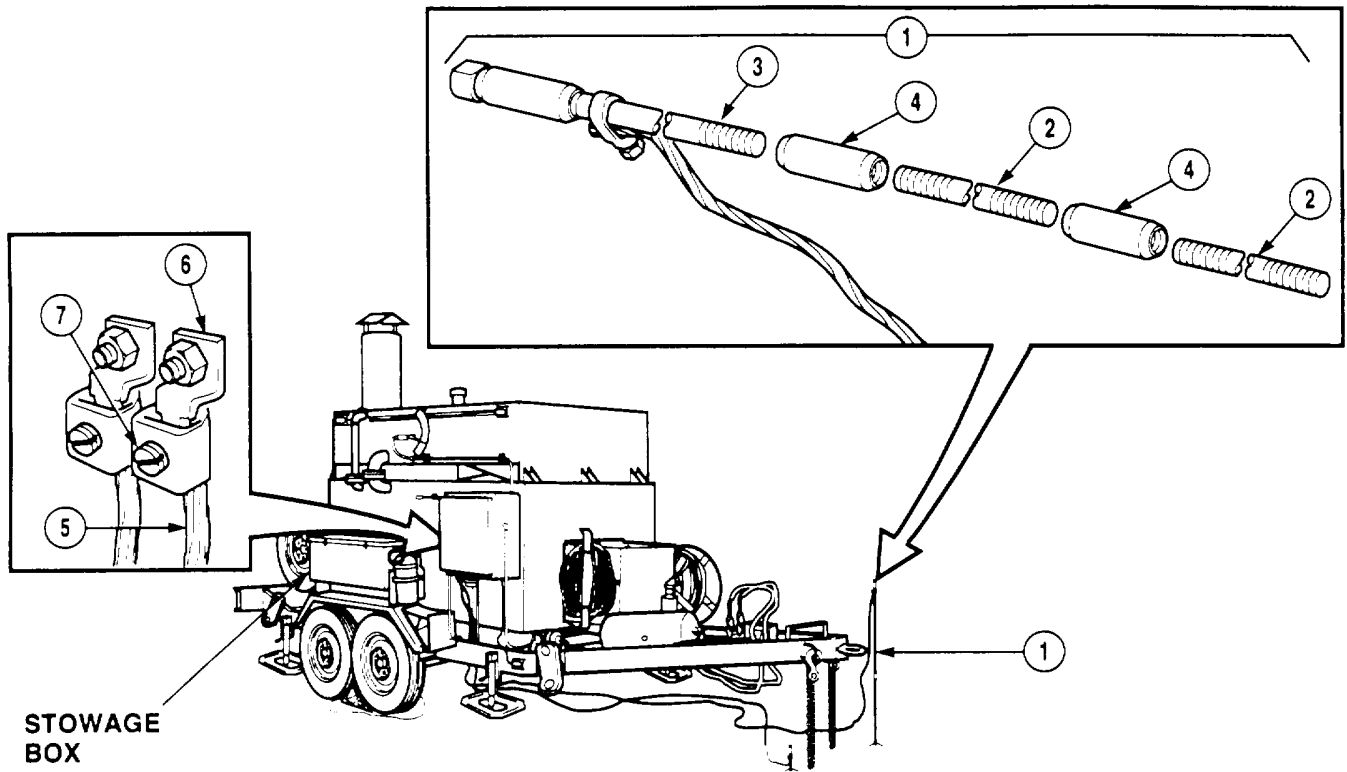
Fuel is very flammable and can explode easily To avoid serious injury or death

- **Keep fuel away from open flame or any spark ignition source).**
- **Keep at least a B-C fire extinguisher within easy reach when working with fuel or on a fuel system.**
- **Do not work on fuel system when burner is hot, fuel can be ignited by a hot burner**
- **Post signs that read "NO SMOKING WITHIN 50 FEET 115 m)" when working with open fuel, fuel lines, or fuel tanks.**
- **Be sure to use correct type and grade of fuel.**

- (1) Turn fuel source off.
- (2) Loosen fitting (5) and remove fuel supply line (1) from fuel source.
- (3) Install cap (4) on fuel supply line (1).
- (4) Loosen fitting (7) and remove fuel return line (2) from fuel source.
- (5) Install cap (6) on fuel return line (2)
- (6) Stow fuel lines (1 and 2) by wrapping around bracket (3).

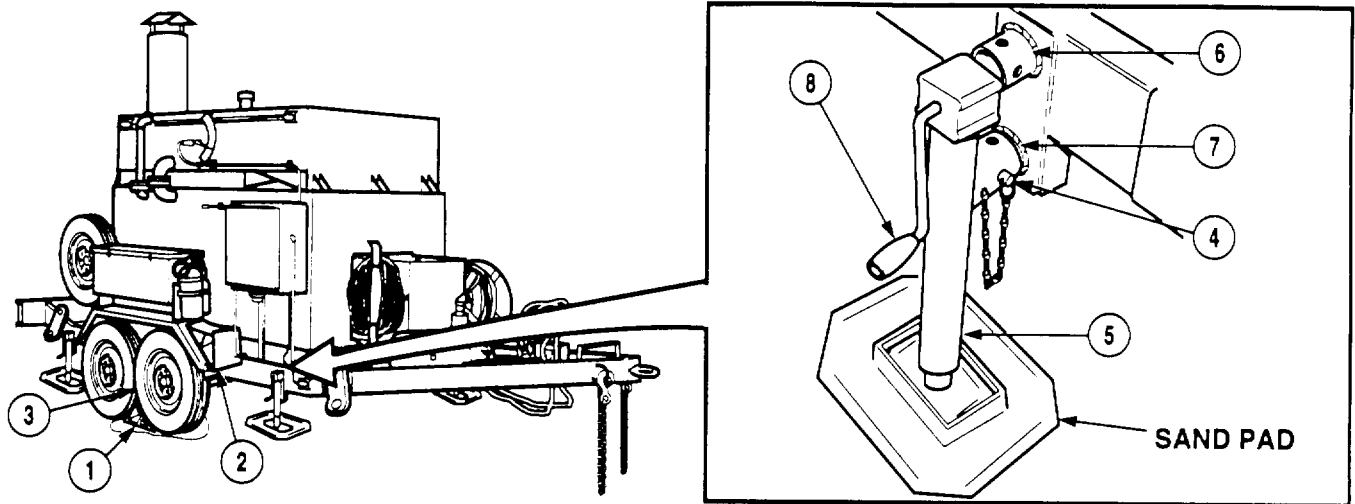
2-14. OPERATING PROCEDURES (CONT).

m. *Disconnecting Grounding Rods.*



- (1) Loosen screw 7) and remove grounding cable (5) from terminal (6).
- (2) Remove grounding rod assembly (1) from ground.
- (3) Remove rods (2) and rod (3) from couplings (4).
- (4) Repeat steps (1) through (3) for second grounding rod assembly.
- (5) Clean and return grounding rod assembly (1) components to storage box.

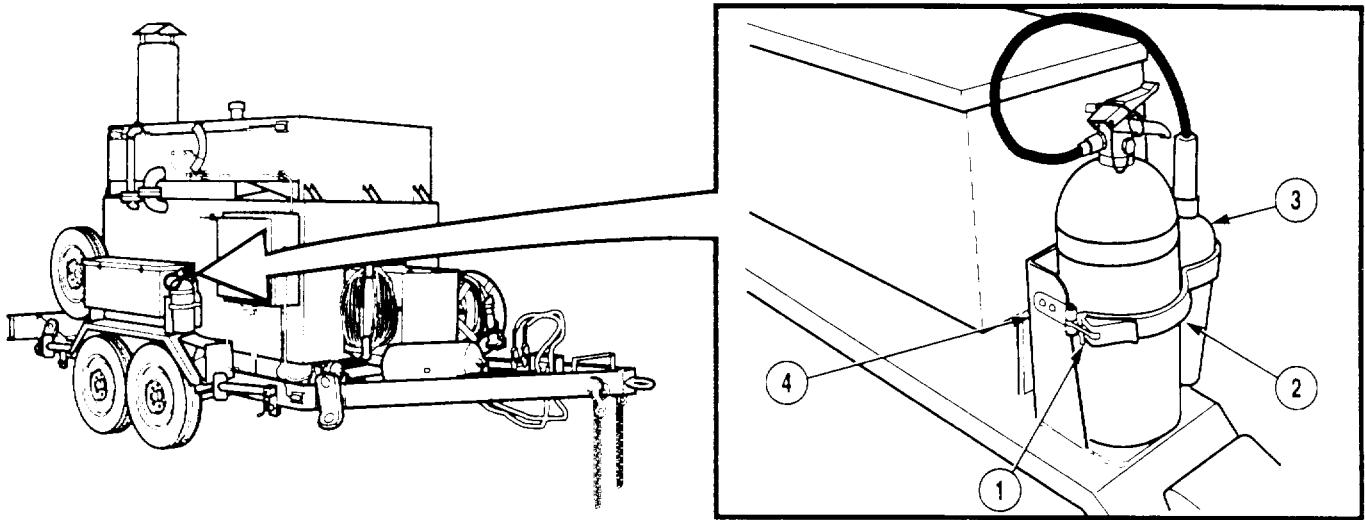
n. **Stowing Wheel Chocks and Screw Jacks.**



- (1) Remove wheel chocks (1) from wheels (3) and place in stowage brackets (2).
- (2) Raise screw jacks (5) by turning handle (8) until screw jack is fully retracted.
- (3) Place sand pad in stowage box.
- (4) Pull pin (4) and position screw jack (5) in stowed position.
- (5) Install pin (4) in screw jack.
- (6) Repeat steps (3) through (6) for three remaining screw jacks.

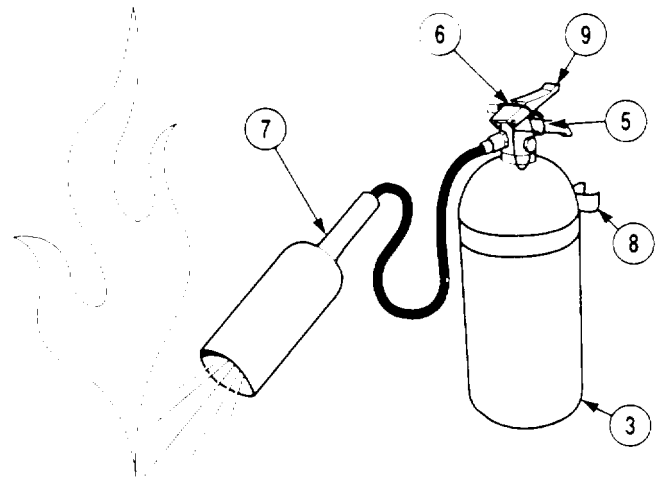
2-14. OPERATING PROCEDURES (CONT).

p. Operate Fire Extinguisher.

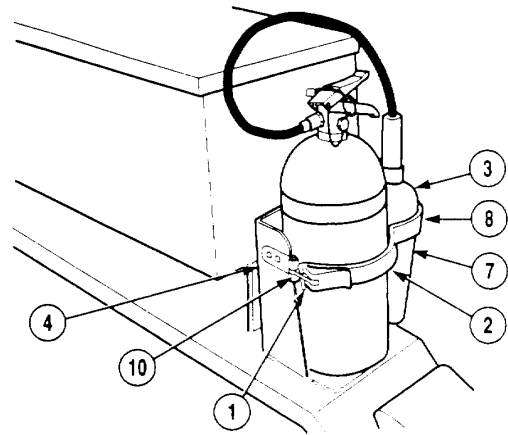


- (1) Remove Fire Extinguisher
 - (a) Pull out clamp (1) and open strap (2)
 - (b) Pull fire extinguisher (3) straight out and off bracket (4)
- (2) Extinguish Fire.

- (a) Hold fire extinguisher (3) upright and pull safety pin (5) to break plastic tie (6)
- (b) Remove nozzle (7) from clamp (8)
- (c) Point nozzle (7) at base of fire
- (d) Press down on stop lever (9) and spray discharge in a side-to-side motion at base of fire
- (e) Let go of stop lever (9) when fire is out.
- (f) Replace fire extinguisher after use.



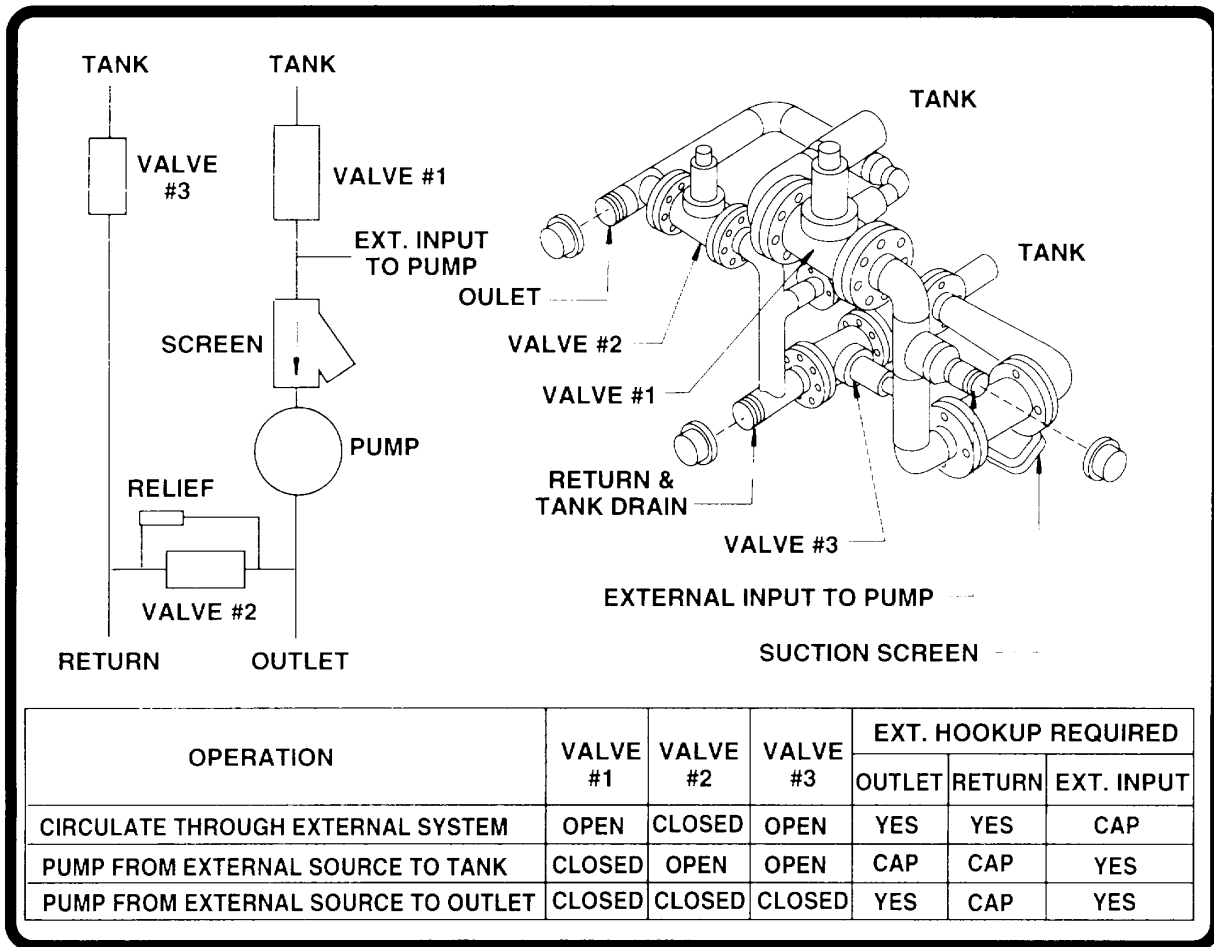
- (3) Install Fire Extinguisher.
 - (a) Place nozzle (7) in clamp (8).
 - (b) Place fire extinguisher (3) in bracket (4).
 - (c) Place clamp (1) on hook (10).
 - (d) Push in on clamp (1) to secure strap (2).



2-15. DECALS AND INSTRUCTION PLATES.

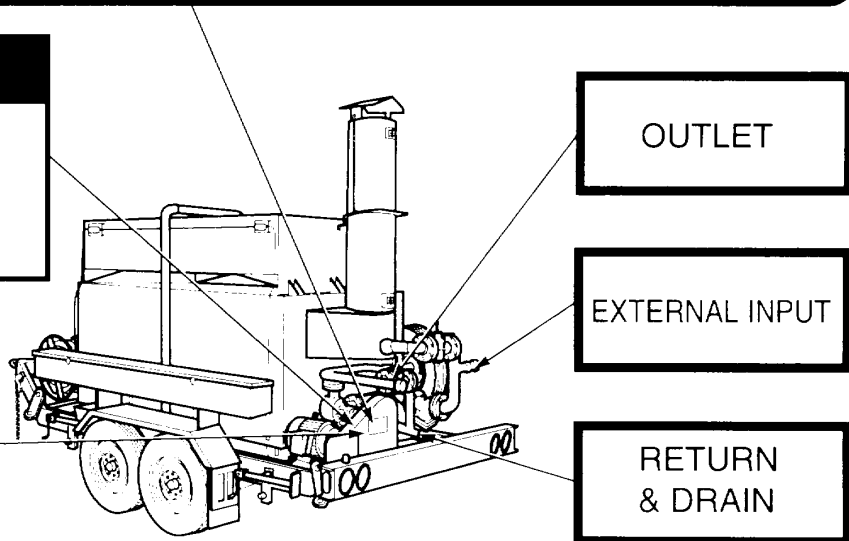
The following illustration identifies the locations of Heater decals and data plates.

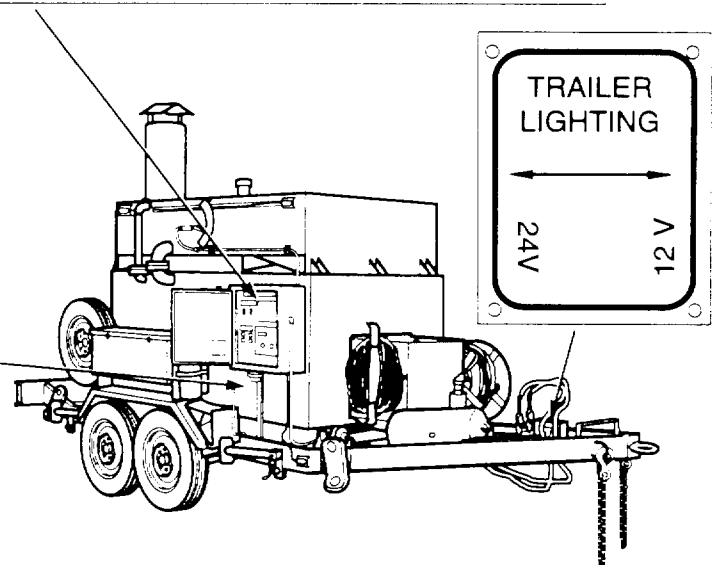
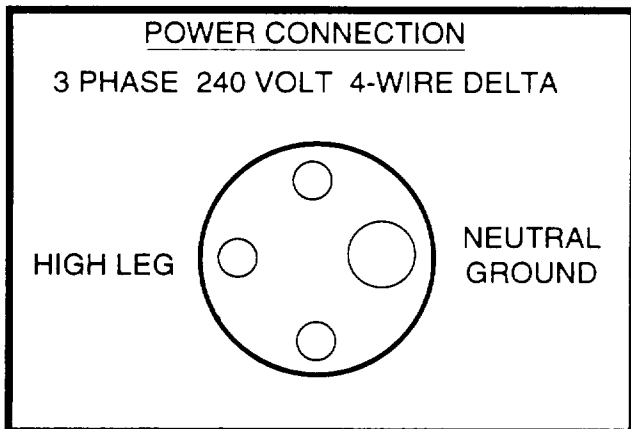
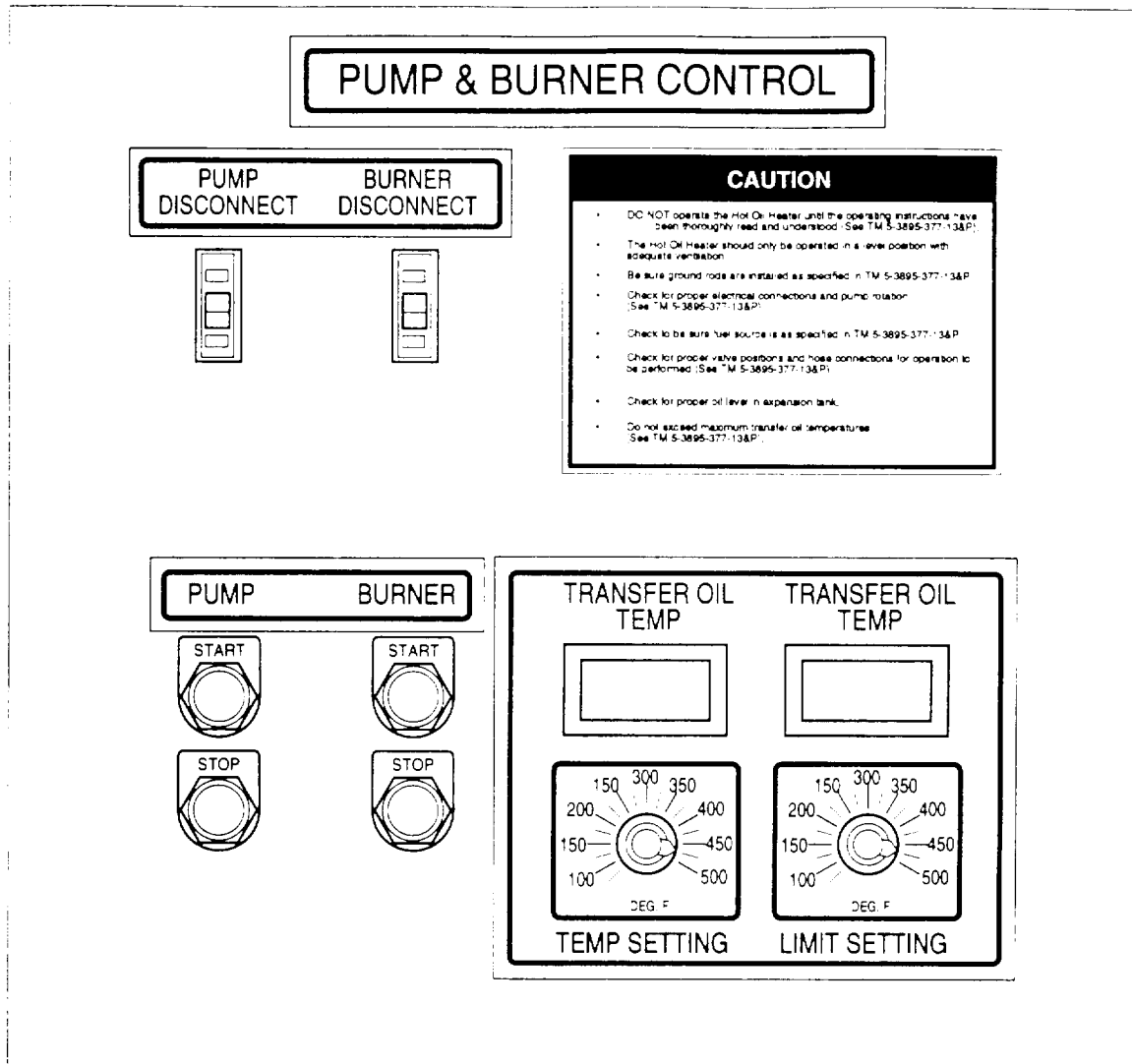
2-15. DECALS AND INSTRUCTION PLATES (CONT).



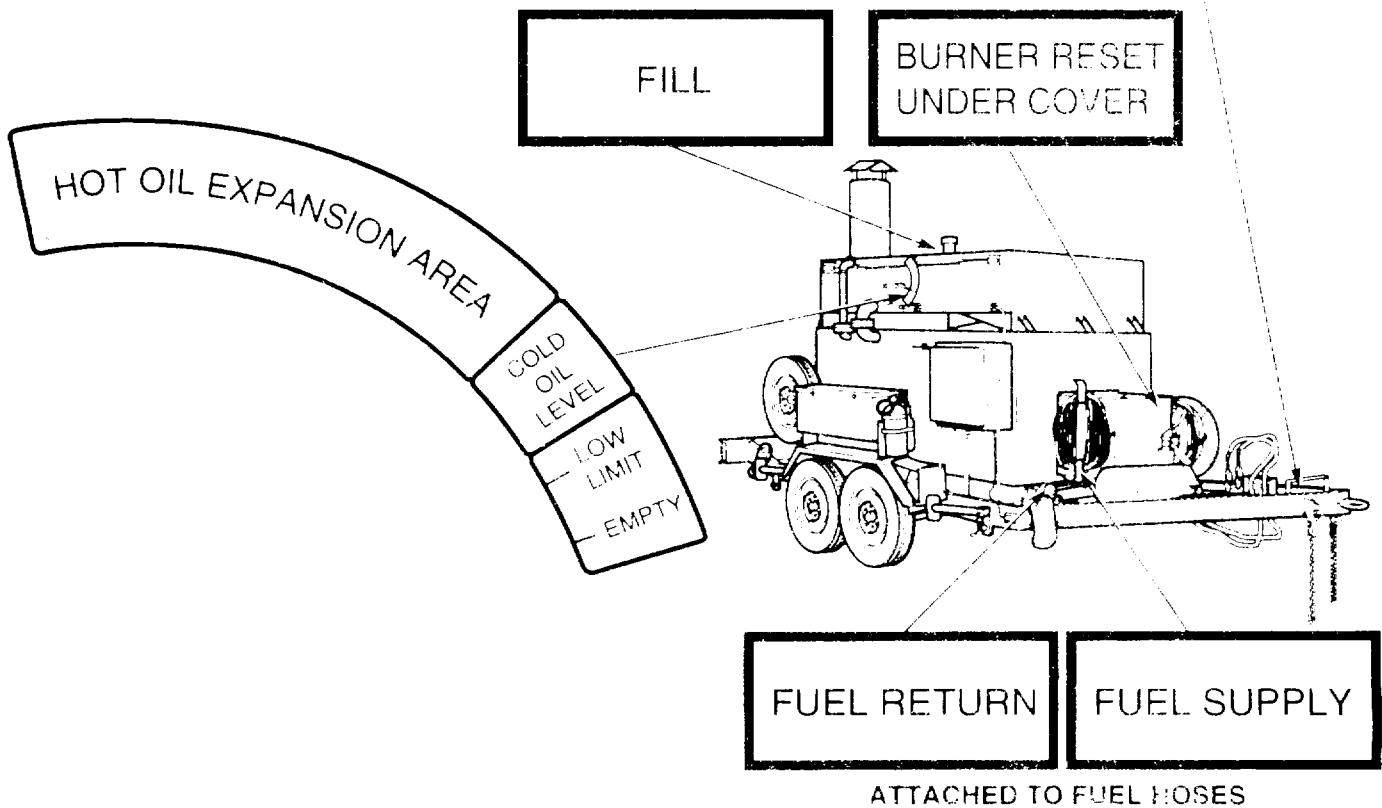
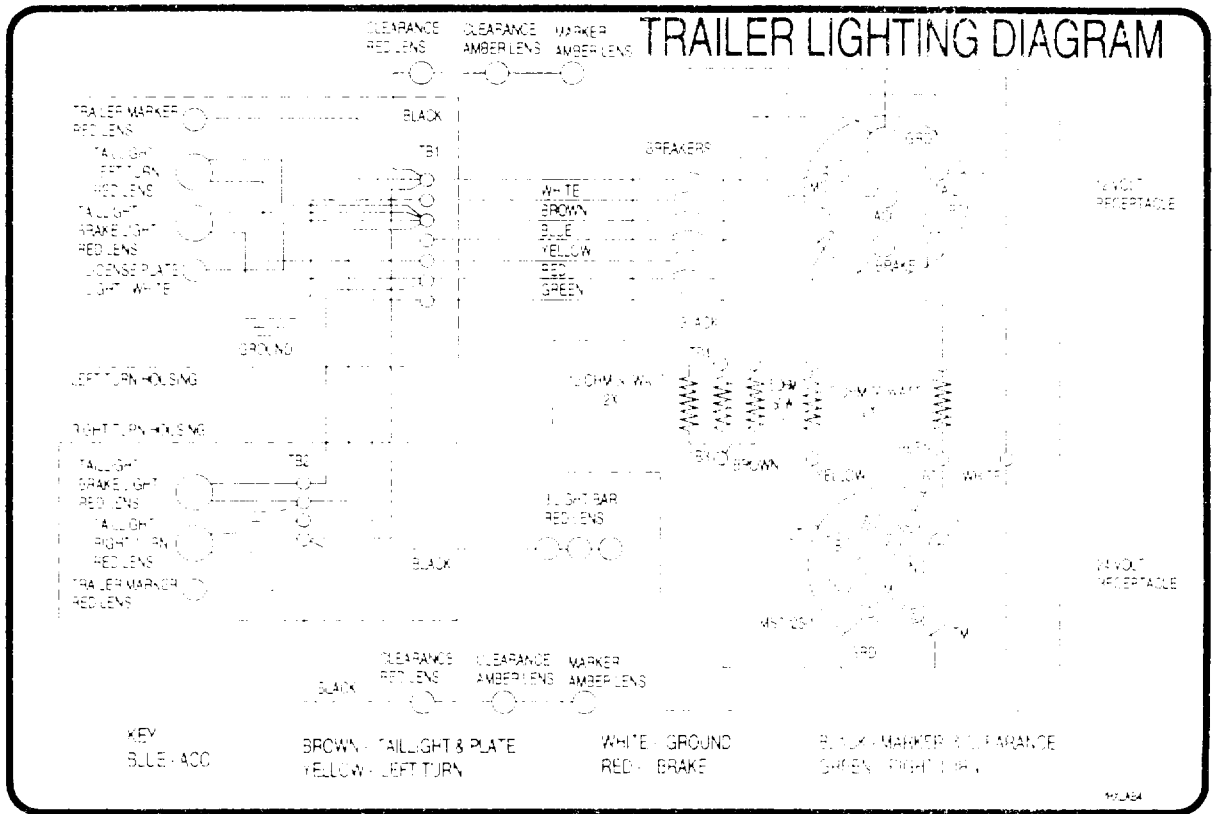
CAUTION
CHECK
ROTATION
➔

CAUTION
HEARING PROTECTION
REQUIRED

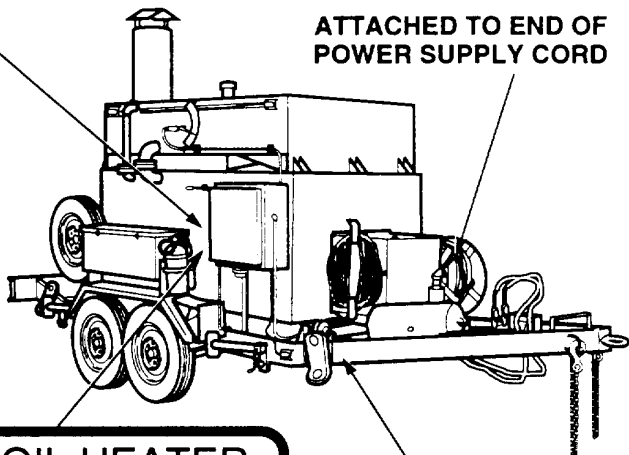
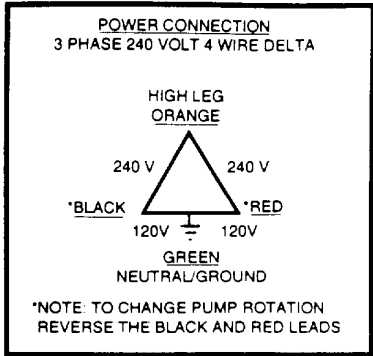




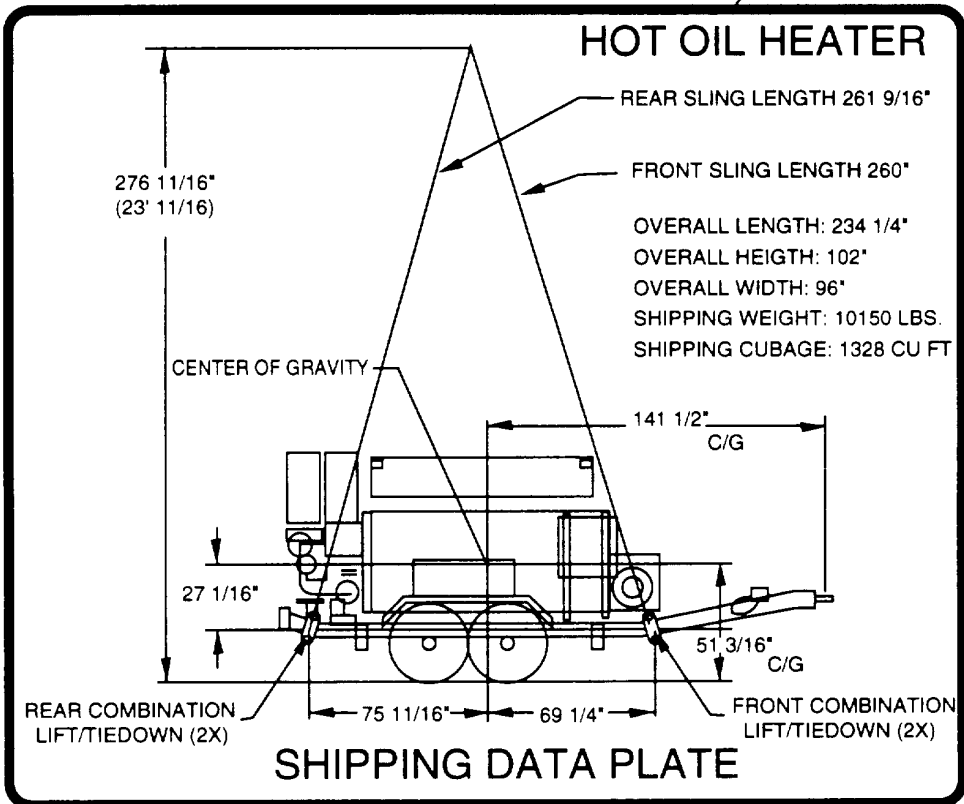
2-15. DECALS AND INSTRUCTION PLATES (CONT).



IDENTIFICATION PLATE
 HOT OIL HEATER STRHE-2100M
 DES. ACT. NO. 06447
 CONTRACT NO. DAAE07-93-C-1019
 SER. NO. STRHE-2100M-
 PART NO. 202101
 US



**ATTACHED TO END OF
 POWER SUPPLY CORD**



**LIFT/TIEDOWN
 HERE**

4X

2-16. OPERATION OF AUXILIARY EQUIPMENT.

Refer to TM5-6115-464-12 for operating instructions for generator set, NSN 6115-00-118-1241. If you are using generator set, NSN 6115-01-274-7388, refer to TM5-6115-643-10 for operating instructions.

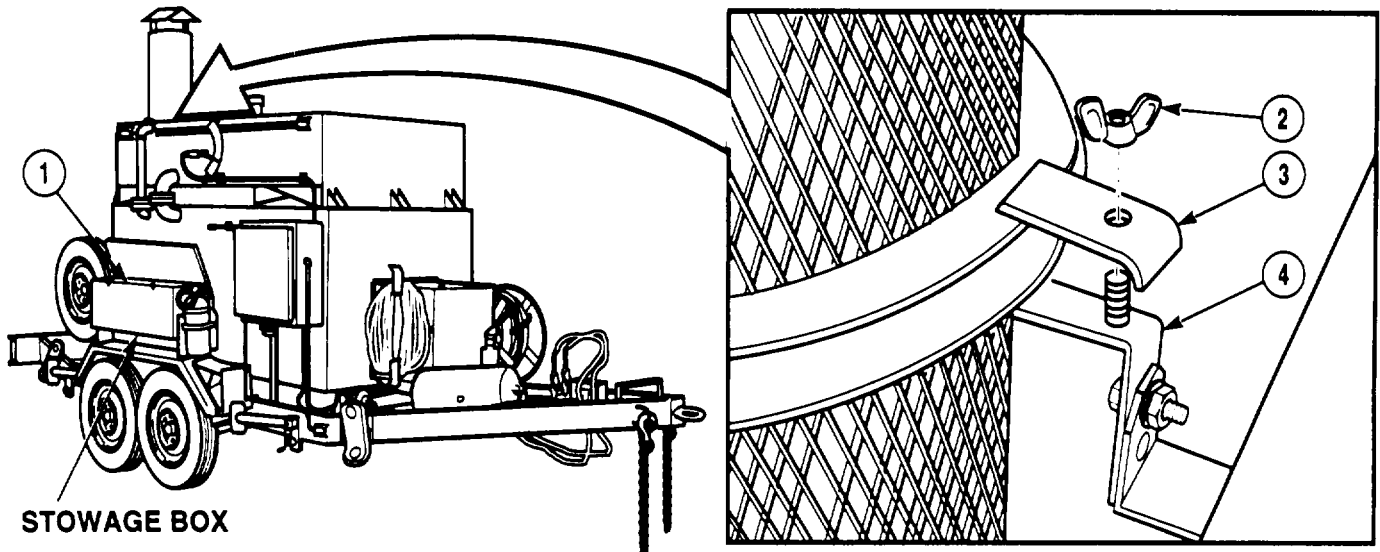
2-17. PREPARATION FOR MOVEMENT.

a. Preparation for towing.

NOTE

The Heater may be towed by the following prime movers. Refer to the corresponding TM for mover's operating instructions.

- M44 Truck, 2 1/2 Ton TM9-2320-209-10.
- M44 Truck, 2 1/2 Ton TM9-2320-361-10.
- M917 Truck, 20 Ton, Dump TM9-3805-274-10.



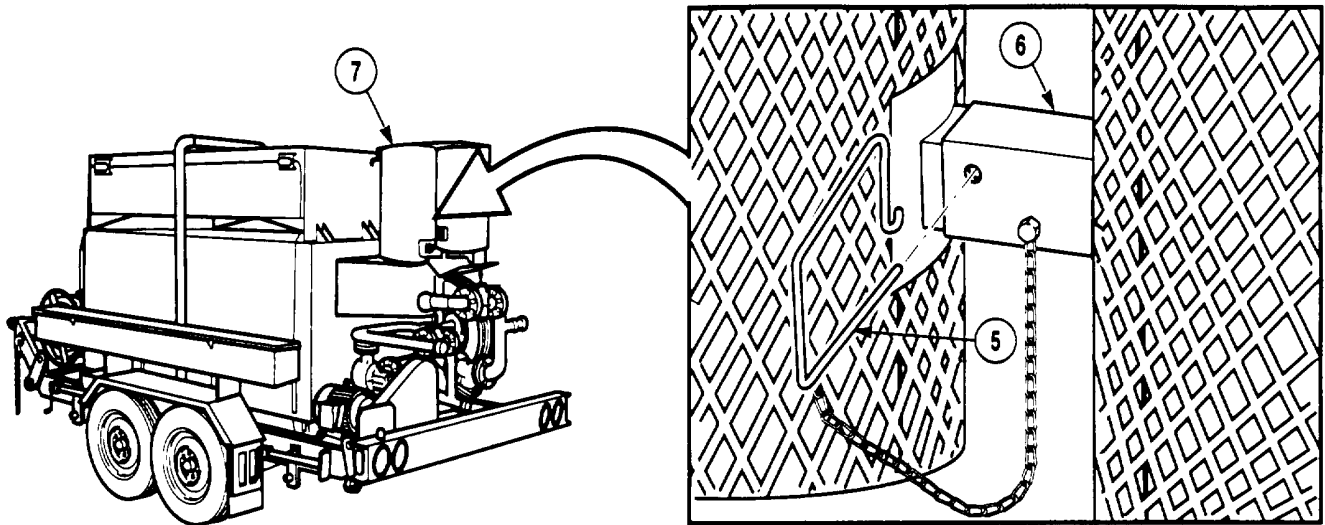
STORAGE BOX

WARNING

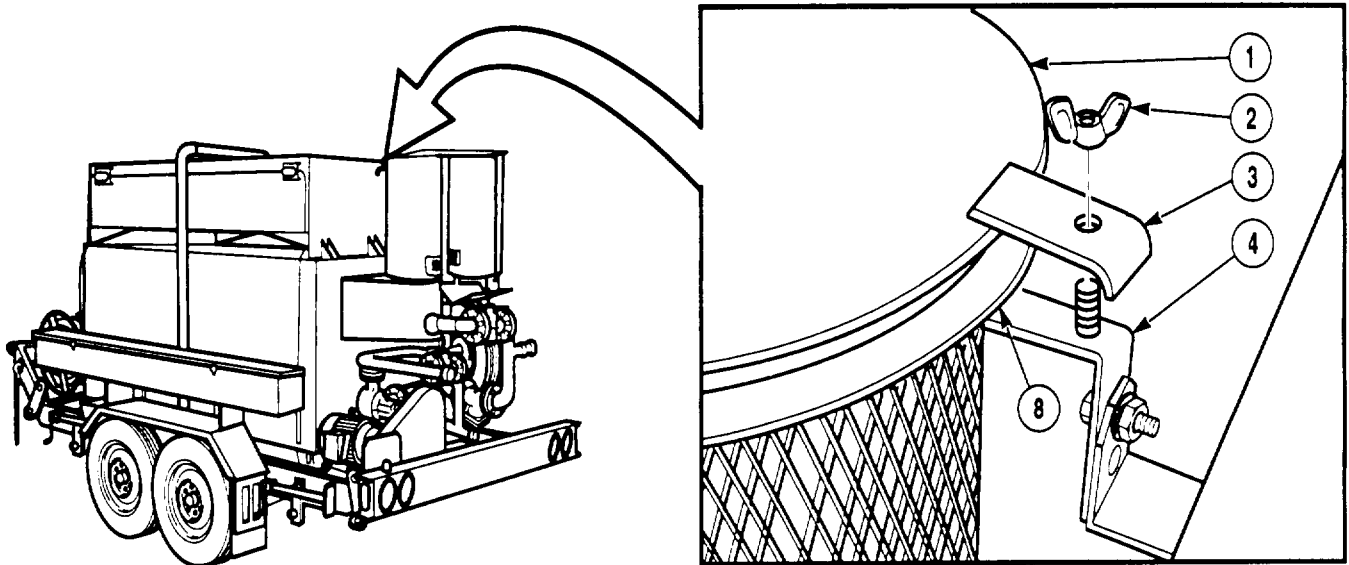
BURN HAZARD

Allow Heater to cool before performing maintenance on the exhaust stack. If necessary, use insulated pads and gloves.

- (1) Remove exhaust rain cover (1) from stowage box.
- (2) Remove wing nut (2) and clamp (3) from exhaust stack bracket (4).

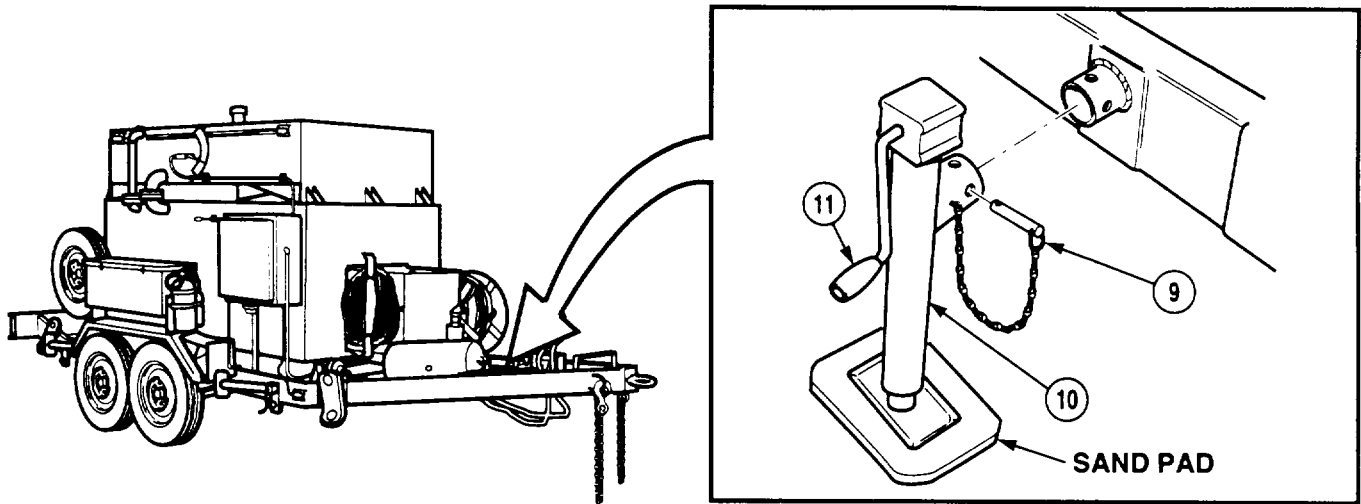


- (3) Remove pin (5) from bracket (6).
- (4) Tilt top half of exhaust stack (7) down and install pin (5) in bracket (6).



- (5) Slide rain cover (1) onto top of bottom half of exhaust stack (8).
- (6) Install clamp (3) and wing nut (2) on bracket (4). Tighten wing nut.

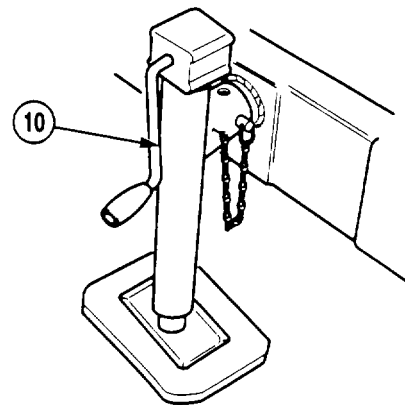
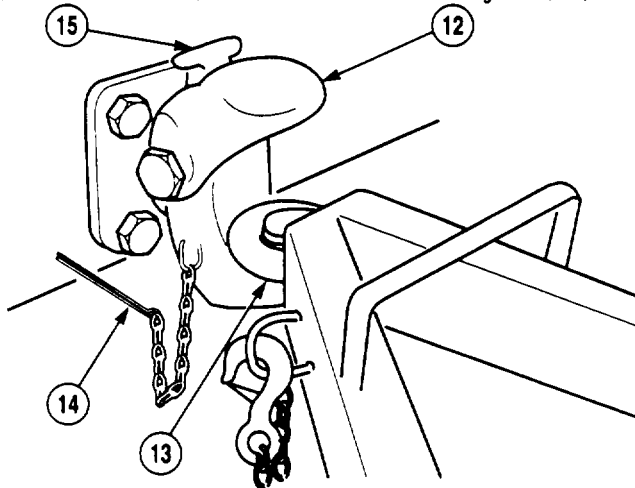
2-17. PREPARATION FOR MOVEMENT (CONT).



NOTE

Ensure that all leveling screw jacks are in stowed position.

- (7) Remove pin (9) from front screw jack (10) and allow screw jack to pivot down.
- (8) Install pin (9) in screw jack (10).
- (9) Remove sand pad from stowage box and position it under screw jack (10).
- (10) Turn handle (11) until base of screw jack (10) rests in sand pad.

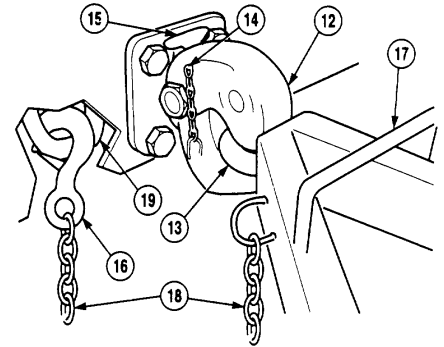


- (11) Back towing vehicle to Heater and align pintle hook (12) and lunette eye (13) using screw jack (10) to raise or lower lunette eye.
- (12) Remove cotter pin (14) from pintle hook (12).
- (13) Pull latch (15) away from vehicle and hold.
- (14) Lift top of pintle hook (12) and let go of latch (15). Pintle hook will be locked open.

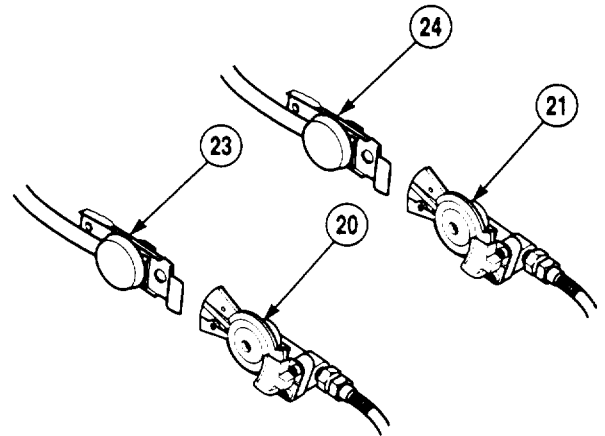
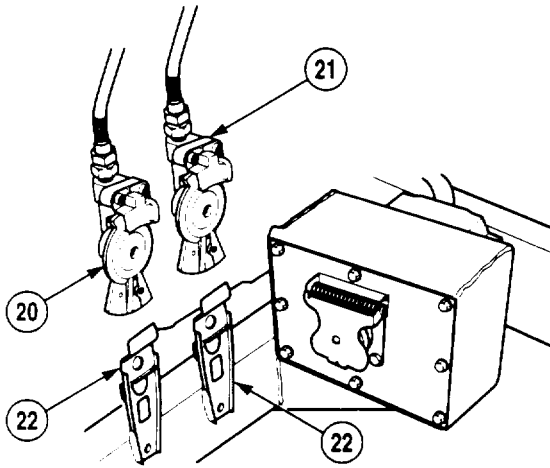
WARNING

Do not put hands near pintle hook while aligning lunette eye with pintle hook. If towing vehicle moves suddenly it may cause serious injury to personnel.

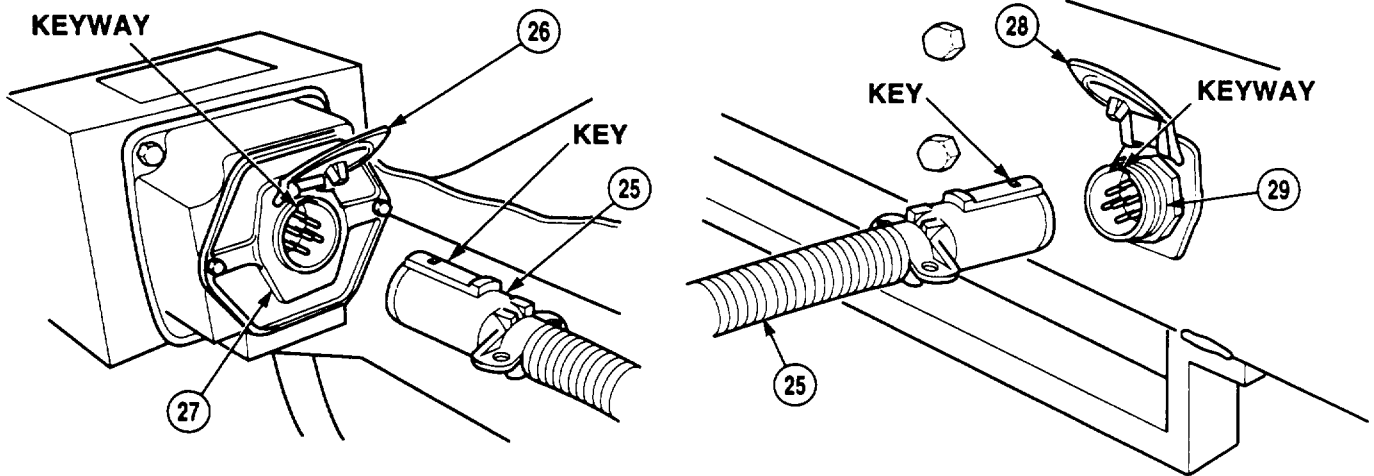
- (15) Align lunette eye (13) as assistant slowly backs towing vehicle.
- (16) Connect lunette eye (13) to pintle hook (12).
- (17) Pull latch (15) and close top half of pintle hook (12).
- (18) Install cotter pin (14) in pintle hook (12).
- (19) Disconnect safety chain hooks (16) from crossbar (17) on Heater.
- (20) Crisscross safety chains (18) under lunette eye (13).
- (21) Connect safety chain hooks (16) to eyebolts (19) on each side of towing vehicle.



2-17. PREPARATION FOR MOVEMENT (CONT).



- (22) Remove two air lines (20 and 21) from mounting brackets (22) on Heater.
- (23) Connect service air line (20) to rear glad hand (23) on driver's side of towing vehicle.
- (24) Connect emergency air line (21) to rear glad hand (24) on right side of towing vehicle.
- (25) Turn towing vehicle air on (if required).

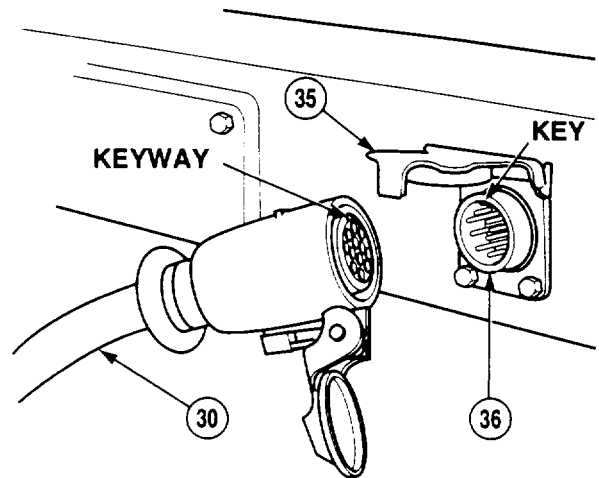
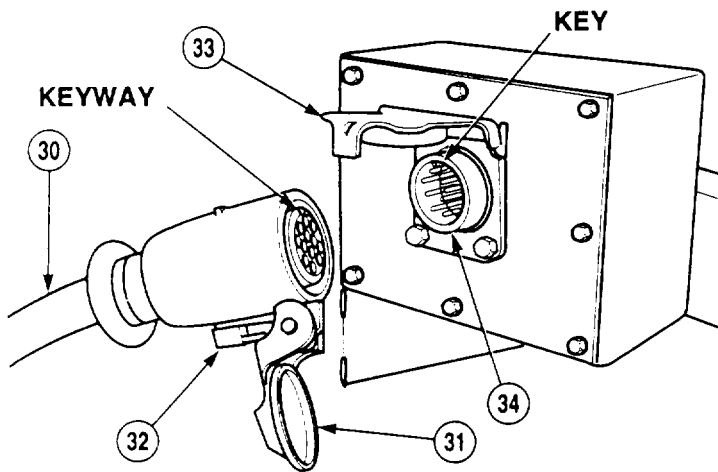


NOTE

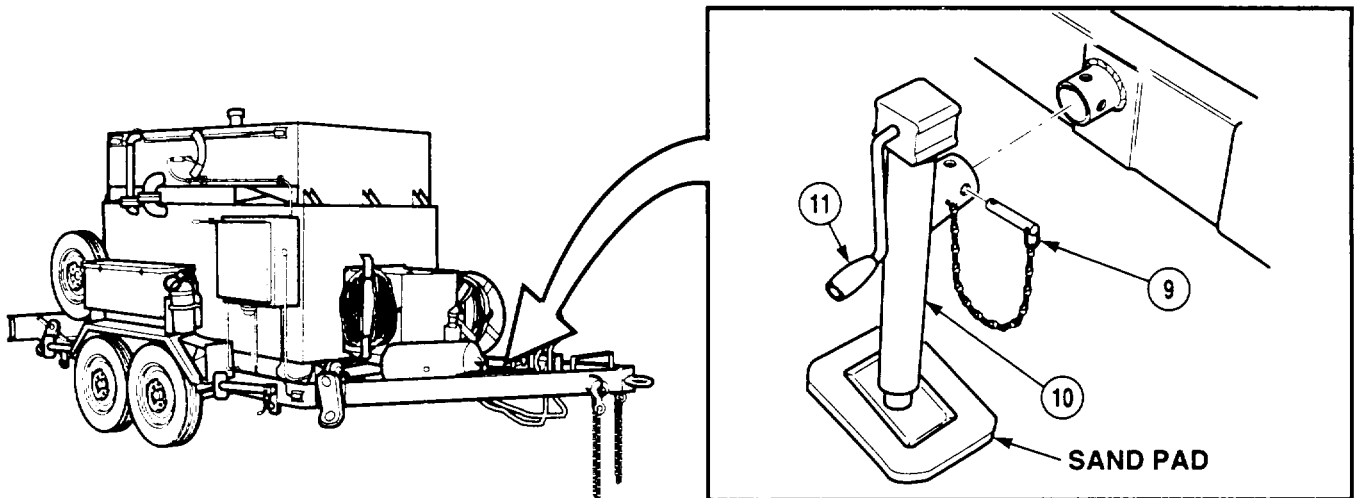
If towing vehicle provides a 12 Vdc connection for towed vehicle, perform steps (26) through (28) only. If towing vehicle provides a 24 Vdc connection for towed vehicle, perform steps (29) through (32) only.

- (26) Remove 12 Vdc intervehicular cable (25) from stowage box.
- (27) Lift cover (26), align key with keyway, and connect 12 Vdc intervehicular cable (25) to connector (27) on Heater.
- (28) Lift cover (28), align key with keyway, and connect 12 Vdc intervehicular cable (25) to connector (29) on towing vehicle.

2-17. PREPARATION FOR MOVEMENT (CONT).

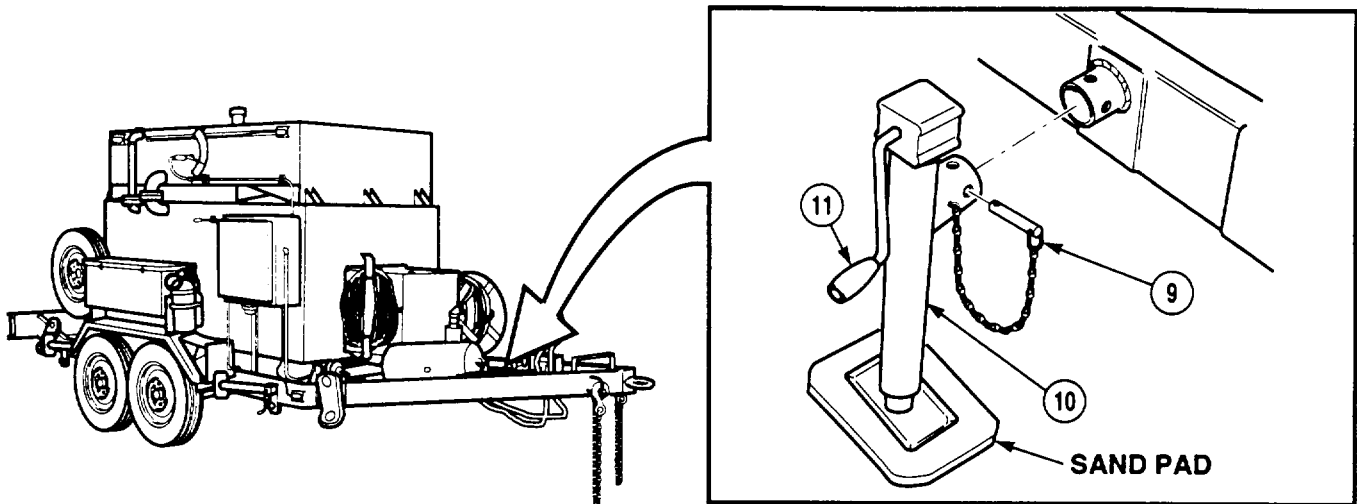


- (29) Remove 24 Vdc intervehicular cable (30) from stowage box.
- (30) Lift cover (31) fully and slide catch (32) forward until cover is locked in open position. Repeat step for the other end of cable.
- (31) Lift cover (33), aline keyway with key, and connect 24 Vdc intervehicular cable (30) to connector (34) on Heater.
- (32) Lift cover (35), aline keyway with tab, and connect 24 Vdc intervehicular cable (30) to connector (36) on towing vehicle.

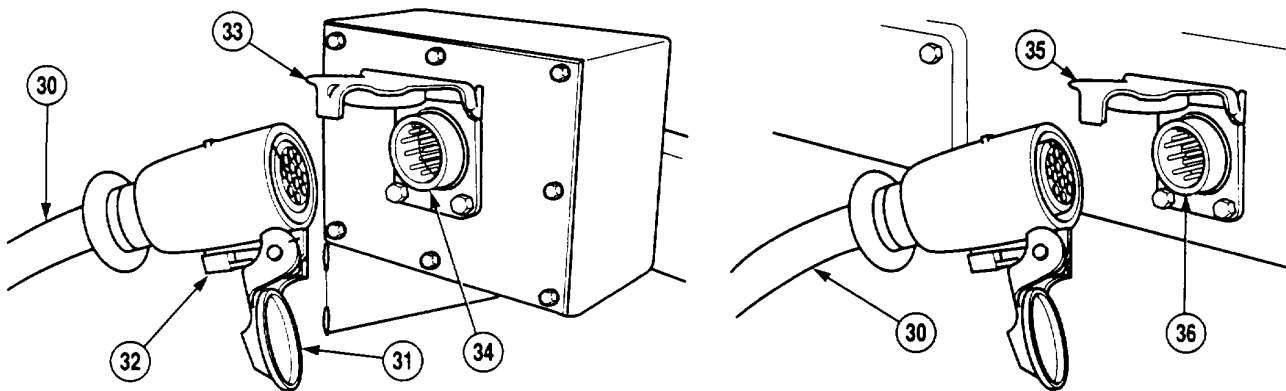


- (33) Turn handle (11) until screw jack (10) is fully retracted.
- (34) Place sand pad in stowage box.
- (35) Remove pin (9) and position screw jack (10) in stowed position.
- (36) Install pin (9) in screw jack (10).

b. Disconnect from towing vehicle.



- (1) Remove pin (9) from front screw jack (10) and allow screw jack to pivot down.
- (2) Install pin (9) in screw jack (10).
- (3) Remove sand pad from stowage box and position it under screw jack (10).
- (4) Turn handle (11) until base of screw jack (10) rests in sand pad.

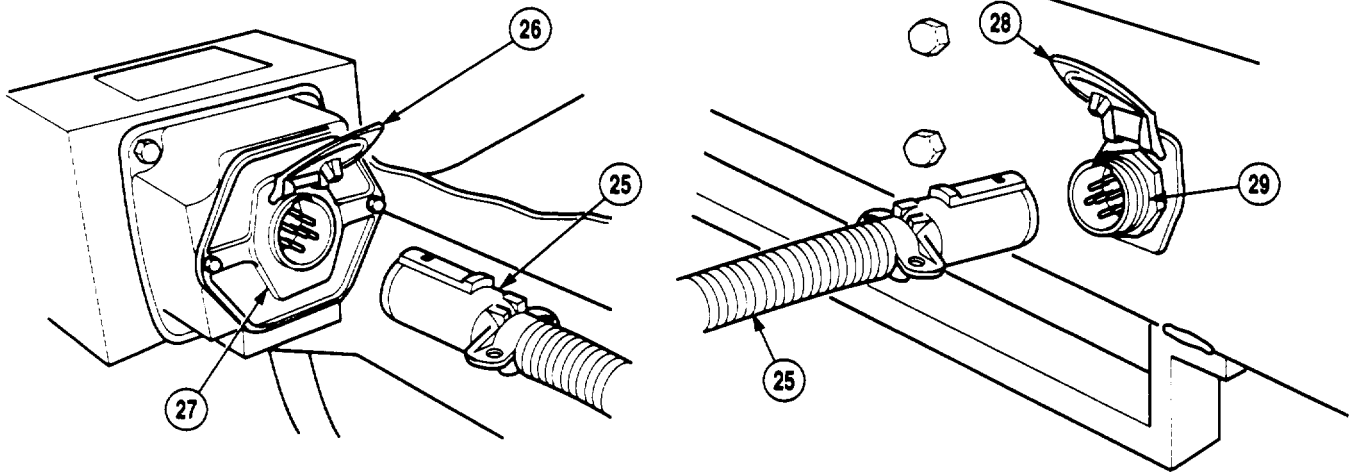


NOTE

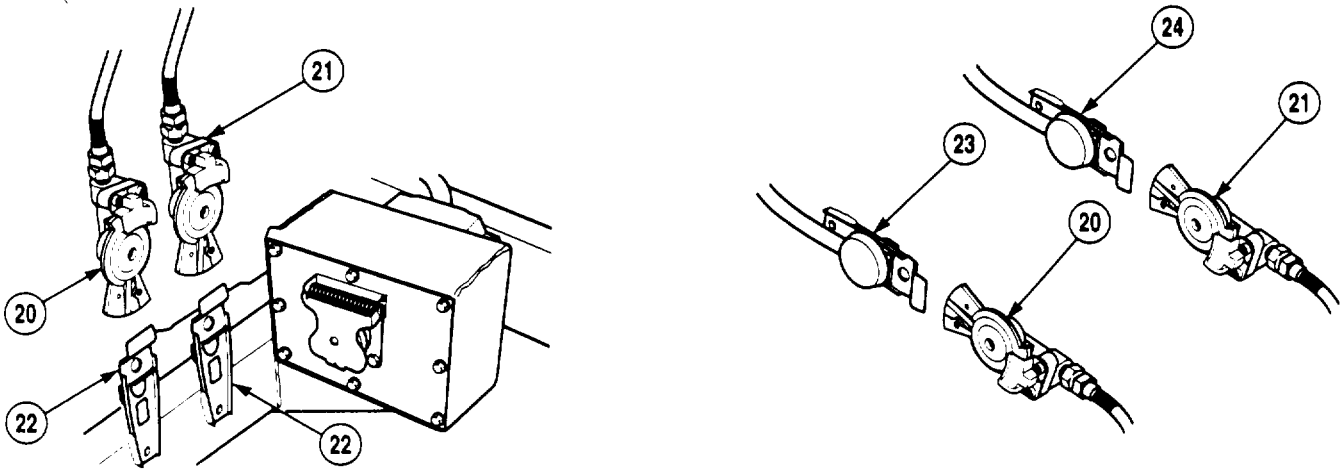
If towing vehicle provides a 12 Vdc connection for towed vehicle, perform steps (9) through (11) only. If towing vehicle provides a 24 Vdc connection for towed vehicle, perform steps (5) through 8 only.

- (5) Lift cover (35) and disconnect 24 Vdc intervehicular cable (30) from towing vehicle connector (36).
- (6) Lift cover (33) and disconnect 24 Vdc intervehicular cable (30) from connector (34) on Heater.
- (7) Slide catch (32) back and allow cover (31) to close. Repeat this step for the other end of the cable.
- (8) Place 24 Vdc intervehicular cable (30) in stowage box.

2-17. PREPARATION FOR MOVEMENT (CONT).

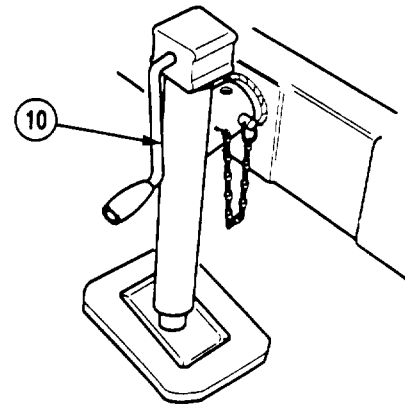
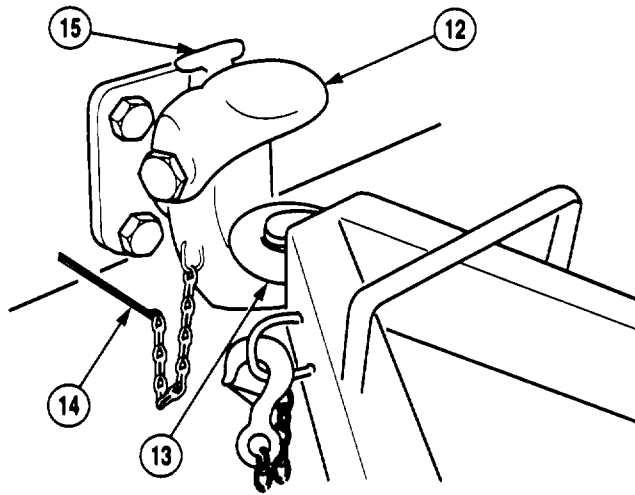
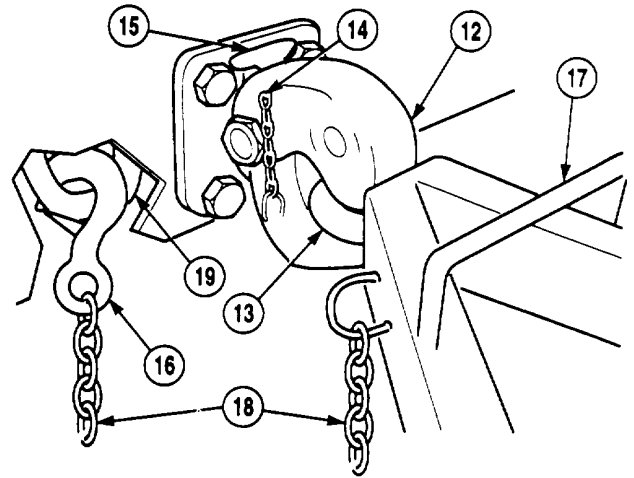


- (9) Lift cover (28) and disconnect 12 Vdc intervehicular cable (25) from connector (29) on towing vehicle.
- (10) Lift cover (26) and disconnect 12 Vdc intervehicular (25) from connector (29) on Heater.
- (11) Place 12 Vdc intervehicular cable (25) in stowage box.



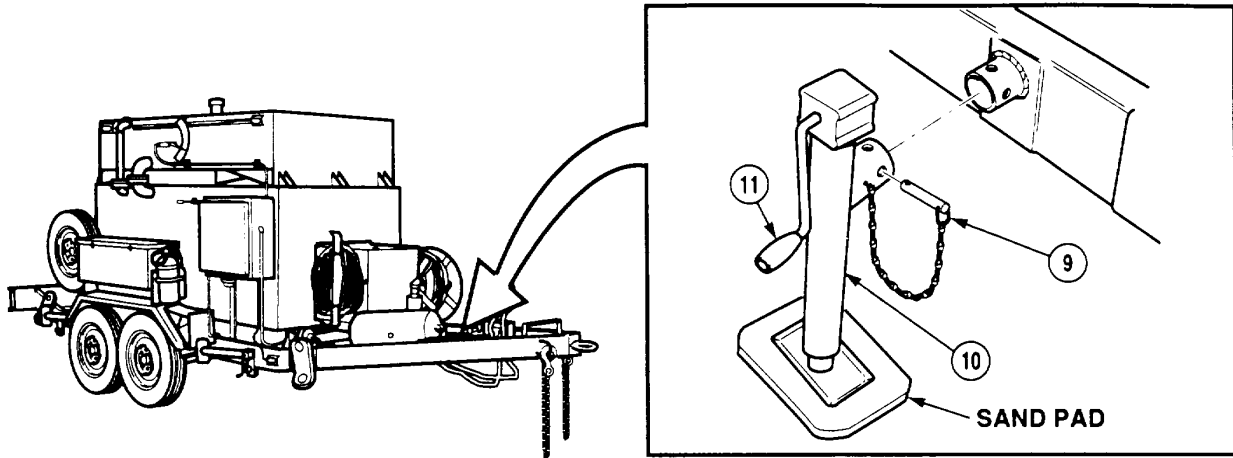
- (12) Turn towing vehicle air off (if required).
- (13) Disconnect air lines (20 and 21) from glad hands (23 and 24) on towing vehicle.
- (14) Position air lines (20 and 21) on mounting brackets (22).

- (15) Disconnect safety chains hooks (16) from eyebolts (19) on towing vehicle.
- (16) Uncross safety chains (18) under lunette eye (13).
- (17) Connect safety chain hooks (10) on crossbar.

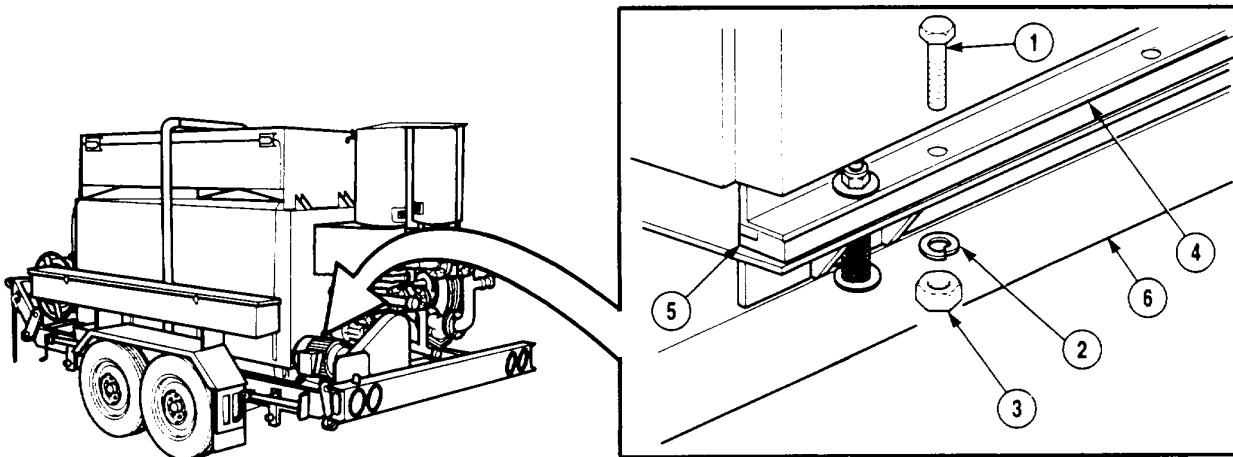


- (18) Remove cotter pin (14) from pintle hook (12).
- (19) Pull latch (15) and open top half of pintle hook (12).
- (20) Raise Heater slightly using screw jack (10) to allow lunette eye (13) to clear pintle hook (12).
- (21) Pull towing vehicle forward.
- (22) Pull latch (15) and close top half of pintle hook (12).
- (23) Install cotter pin (14) in pintle hook (12).

2-17. PREPARATION FOR MOVEMENT (CONT).



- (24) Turn handle (11) until screw jack (10) is fully retracted.
- (25) Place sand pad in stowage box.
- (26) Remove pin (9) and position screw jack (10) in stowed position.
- (27) Install pin (9) in screw jack (10).



c. Preparation for Movement by Rail.

- (1) Remove eight screws (1), lock washers (2), and nuts (3) from stowage box.
- (2) Install eight screws (1), lock washers (2), and nuts (3) in heat exchanger (4), spacer (5), and frame (6). Tighten nuts.

d. Preparation After Movement by Rail

- (1) Remove eight screws (1), lock washers (2), and nuts (3) from heat exchanger (4), spacer (5), and frame (6).
- (2) Place eight screws (1), lock washers (2), and nuts (3) in stowage box.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS**2-18. UNUSUAL ENVIRONMENT/WEATHER.****a. Operation in Extreme Heat.****CAUTION**

Gaskets and seals are more likely to leak when system operating temperatures are high. Transfer oil level should be checked more often during periods of extreme heat to prevent damage to Heater system components. Checks for leaks around gaskets, seals, and fittings should also be made more often.

- (1) Check transfer oil level (page 3-12) often.
- (2) Monitor system for temperature above 475°F (246°C).
- (3) Extreme heat will cause tire pressure to increase. Check tire pressure before towing or moving Heater.
- (4) Perform operator PMCS more often than normal (Table 2-1).

2-18. UNUSUAL ENVIRONMENT/WEATHER (CONT).
--

b. Operation in Extreme Dust.

- (1) Check fuel filter frequently and change it as necessary.
- (2) Watch all gages on instrument panel more closely to ensure vehicle is not affected by dusty conditions.
- (3) Park Heater so control panel does not face into wind.
- (4) Shield burner motor intake, circulating pump, and pump motor from dust.
- (5) Ensure instrument panel and burner are covered when Heater is parked for extended periods of time in extremely dusty conditions.
- (6) Cap or cover all hose connectors when not in use.
- (7) Ensure all caps are installed when connections are not in use.
- (8) Clean lubrication points before applying lubricants.

c. Operation in Extreme Cold.

- (1) Start-up and Operation.
 - (a) Remove all snow and ice from Heater as soon as possible.
 - (b) Prepare Heater for operation in severe cold temperatures according to FM9-207, FM31-70, FM31-71, and FM21-305 as necessary.
 - (c) Decrease tire pressure if pressure was increased for long standby periods when temperatures were below -50°F (-46°C).
 - (d) Watch gages closely. If there are any unusual readings, stop Heater and refer to operator troubleshooting procedures.
- (2) Shutdown.

CAUTION

During periods of extreme cold, damage will occur if tires are allowed to freeze to the ground. If a sheltered area is not available when temperatures are forecast to be below 32°F (0°C), the Heater should be parked in a high, dry area. If a high, dry area is not available, the Heater should be raised off the ground and parked on wooden planks to prevent tires from freezing to the ground.

- (a) Park Heater in sheltered area out of wind. If a sheltered area is not available, park Heater so it does not face into wind.
- (b) If temperatures are forecast to reach -50°F (-46°C), increase tire pressure by approximately 10 psi (69 kPa).

2-19. FORDING.

CAUTION

Do not ford water exceeding 18 in. (45.7 cm) depth. Damage to equipment may result.

While the Heater is not designed for fording, it may be exposed to high water conditions. If these conditions are encountered it may be necessary to repack the wheel bearings and lubricate all lube points. Do not exceed 18 in. (45.7 cm) fording depth.

2-20. EMERGENCY PROCEDURES.

In the event of an emergency, shut down the generator (TM5-6115-464-12 for NSN 6115-00-118-1241 or TM5-6115-643-10 for NSN 6115-01-274-7388) and contact your supervisor.

2-21. NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES.

Refer to TM 3-4320-214-12&P for operation of Decontamination Kit.

2-55/(2-56 blank)

CHAPTER 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

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Section I. LUBRICATION INSTRUCTIONS

3-1. LUBRICATION INSTRUCTIONS.

Operator lubrication instructions are part of Preventive Maintenance Checks and Services (PMCS), Chapter 2, Section II (page 2-5). All lubrication instructions are mandatory.

Section II. TROUBLESHOOTING

3-2. TROUBLESHOOTING INTRODUCTION.

a. This section lists the common malfunctions that you may find with your equipment. Perform the tests, inspections, and corrective actions in the order listed.

b. The troubleshooting table cannot list all the malfunctions that may occur, all the tests and inspections needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify your supervisor.

3-3. TROUBLESHOOTING TABLE

Table 3-1. Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
BURNER		
1. BURNER WILL NOT FIRE OR MISFIRES.	WARNING	
	Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.	
Step 1.	Check low oil indicator for low oil level.	Replenish oil supply (page 3-12).
Step 2.	Check to see that cam on low oil indicator shaft is engaging rollor of low oil limit switch.	Contact Unit Maintenance.
Step 3.	Check fuel supply level and check that fuel shutoff valve is in the free flow position.	Replenish fuel supply and open shutoff valve.
Step 4.	Check fuel lines for loose connections or fittings.	Tighten loose connections and fittings (page 2-19).
Step 5.	Check fuel lines for clogging or kinks.	If fuel lines are clogged or kinked, notify Unit Maintenance.
Step 6.	Check fuel filter for clogging or damage.	Notify Unit Maintenance to replace filter if clogged or damaged.
Step 7.	Press burner disconnect reset button.	Notify Unit Maintenance if unable to reset.
Step 8.	If burner does not start, notify your supervisor.	
3-2		

Table 3.2. Troubleshooting cont.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. SMOKY EXHAUST.	Check opening at the bottom of burner cover for major air restrictions.	If no restrictions exist, notify Unit Maintenance.
3. BURNER WILL NOT SHUT OFF.	Turn power source off (TM 5-6115-464-12 or TM 5-6115-643-10 as required) and notify your supervisor.	
OIL CIRCULATING SYSTEM		
1. OIL DOES NOT CIRCULATE.	WARNING	
	<ul style="list-style-type: none"> • Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. • Hearing protection is required for operator and also for all personnel working on or around this Heater while it is running. 	
Step 1.	Check for correct opening/closing of valves (No. 1, No. 2, and No. 3).	
	Open/close correct valves (pages 2-21 through 2-25).	
Step 2.	Check circulating pump for rotation.	
	If circulating pump is not rotating, or rotation is erratic, shut down circulating pump (page 2-28), turn power source off (TM 5-6115-464-12 or TM 5-6115-643-10 as required), and notify supervisor.	
3-3		

Table 3-3. Troubleshooting cont.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
WHEELS, TIRES, AND HUBS.		
1. WHEEL WOBBLER DURING TOWING.	Step 1. Check for loose, missing, or broken lug nuts.	Notify Unit Maintenance to replace broken or missing lug nuts.
	Step 2. Check to see if wheel is bent.	If wheel is bent, notify Unit Maintenance.
2. TIRE PRESSURE IS LOW.	Step 1. Check for cuts, gouges, or damage to tire.	Replace wheel and tire assembly with spare and notify Unit Maintenance to replace tire.
	Step 2. Check tire valve stem for damage.	Notify Unit Maintenance to change valve stem.
ELECTRICAL SYSTEM.		
1. LIGHTING DOES NOT OPERATE.	Check to see if Heater wire harness is properly connected to the towing vehicle (pages 2-47 and 2-48).	
	If wire harness is properly connected, notify Unit Maintenance.	
2. GAGES DO NOT OPERATE.	Check power cable connections.	
	If power cable connections are good, notify Unit Maintenance.	

Section III. OPERATOR'S MAINTENANCE PROCEDURES

3-4. MAINTENANCE INTRODUCTION.

This section covers maintenance tasks authorized at the operator/crew level of maintenance. The tasks provided in this section include maintenance tasks done on a scheduled basis (PMCS).

3-5. HYDRAULIC MASTER CYLINDER SERVICE.

This task covers:

- a. Fluid Check
- b. Filling

INITIAL SETUP

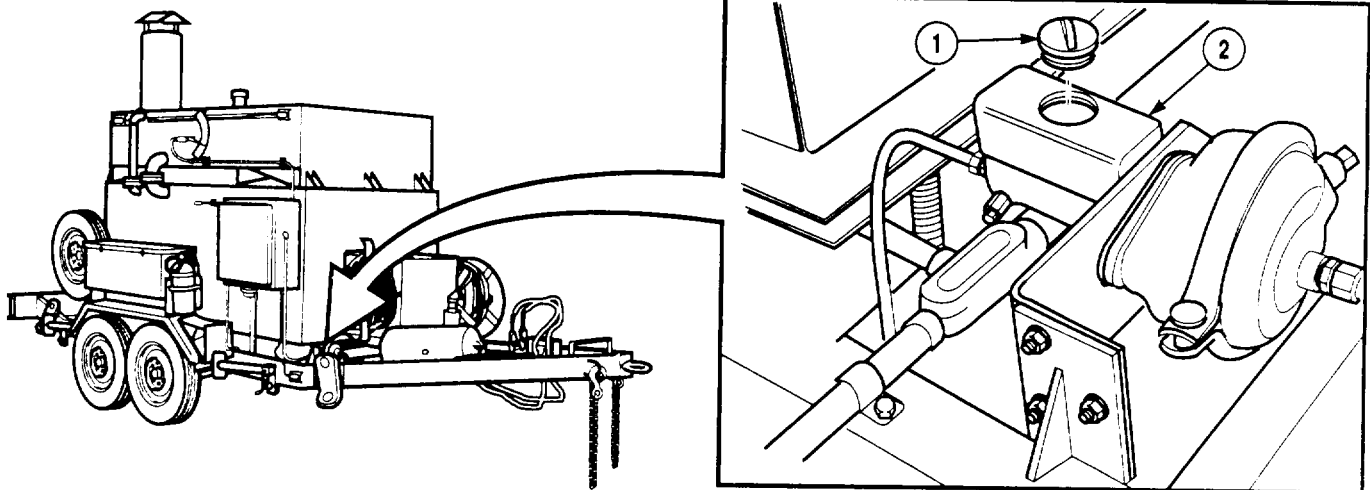
Materials/Parts

Brake Fluid, (item 1, appendix E)

Equipment Condition

Wheels Chocked (page 2-17)

a. Fluid Check.



- (1) Remove cap assembly (1) from master cylinder (2).
- (2) Check brake fluid level. Brake fluid level should be to the bottom threads of fill hole.

b. Filling.

- (1) Fill master cylinder (2) with brake fluid (item 1, appendix E) to the bottom threads of fill hole.
- (2) Install cap assembly (1) on master cylinder (2). Tighten cap assembly.

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

3-6. AIR TANK SERVICE.

This task covers:

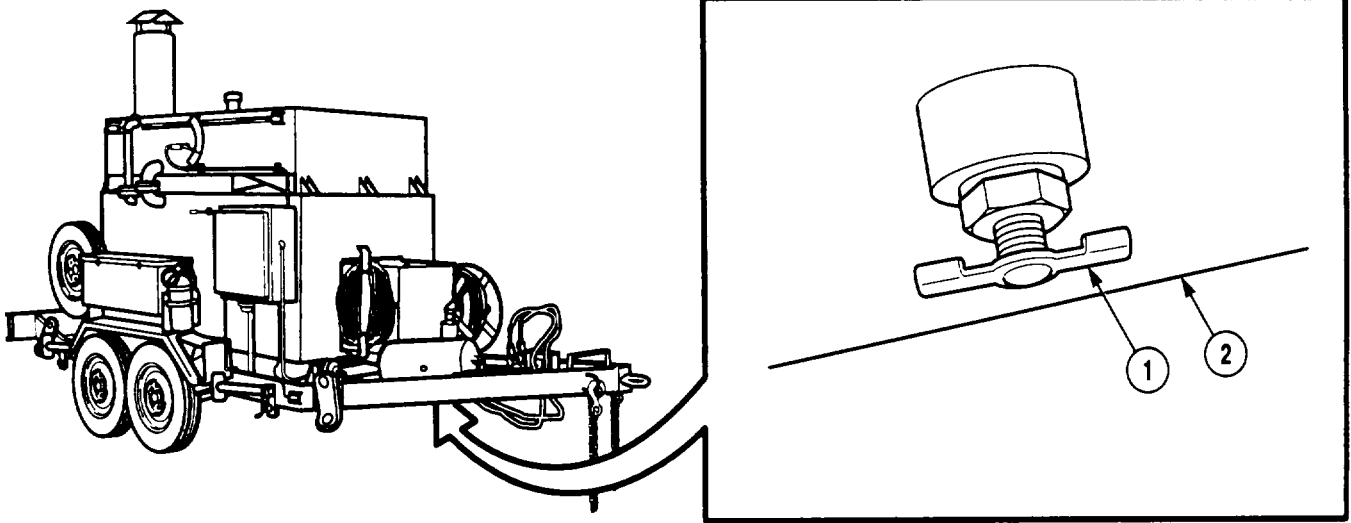
Service

INITIAL SETUP

Equipment Condition

Wheels Chocked (page 2-17)

Service.



- a. Loosen draincock (1) and drain tank (2) until only air is being released.
- b. Tighten draincock (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

3-7. WHEEL AND TIRE ASSEMBLY REPLACEMENT.

This task covers:

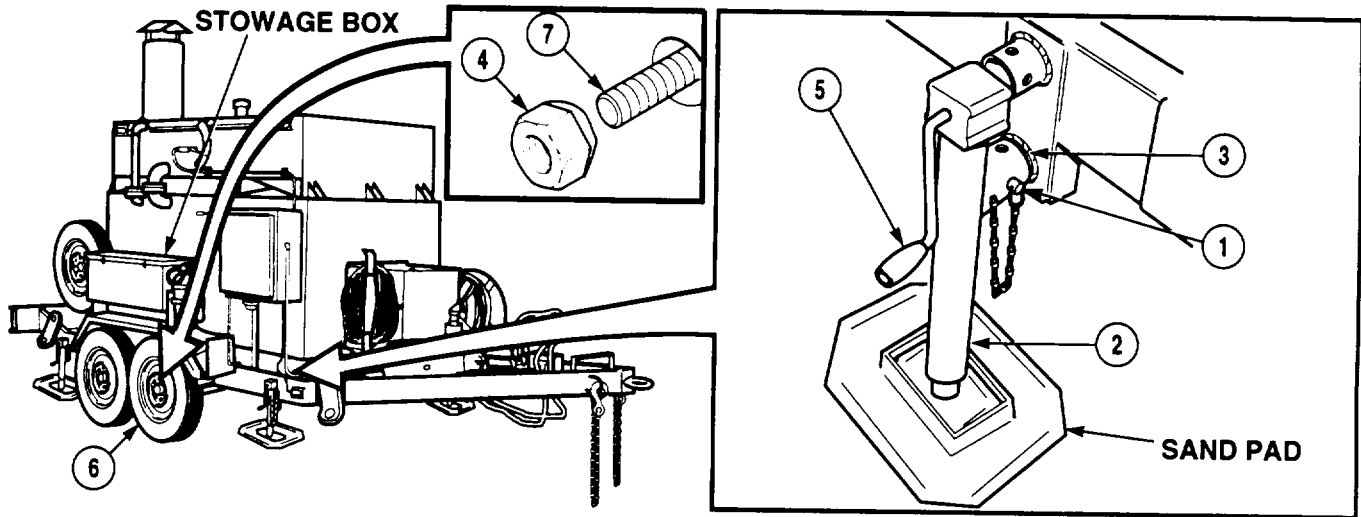
- a. Removal
- b. Installation

INITIAL SETUP

Personal Required
Two

Equipment Condition
Heater Cooled
Wheels Chocked (page 2-17)

a. Removal



WARNING

Wheel weighs 83 lbs (37.68 kg). Two personnel are required to remove wheel. Failure to do so may result in injury to personnel.

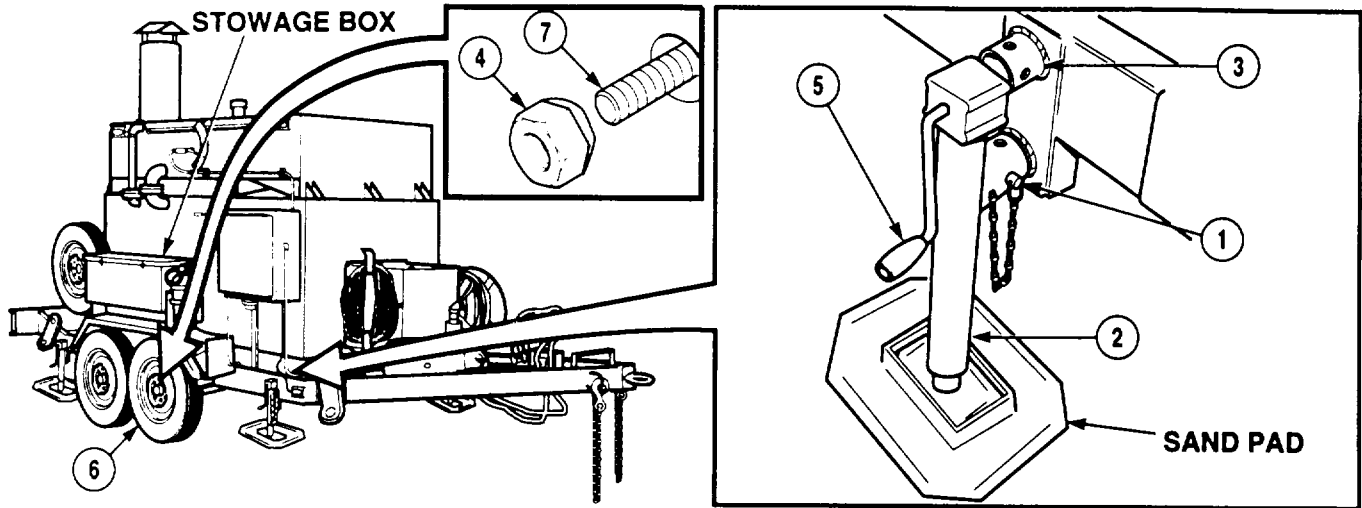
NOTE

Heater must be on level ground.

- (1) Remove pins (1) and allow screw jacks (2) to swing down.
- (2) Position screw jacks (2) on lower mounts (3).
- (3) Remove sand pads from stowage box and position under base of screw jacks (2).
- (4) Install pins (1).
- (5) Loosen lug nuts (4).
- (6) Raise screw jacks (2) by turning handles (5) until tire clears the ground.
- (7) With the aid of an assistant, remove eight nuts (4) and wheel and tire (6) from studs (7).

3-7. WHEEL AND TIRE ASSEMBLY REPLACEMENT (CONT).

b. Installation.



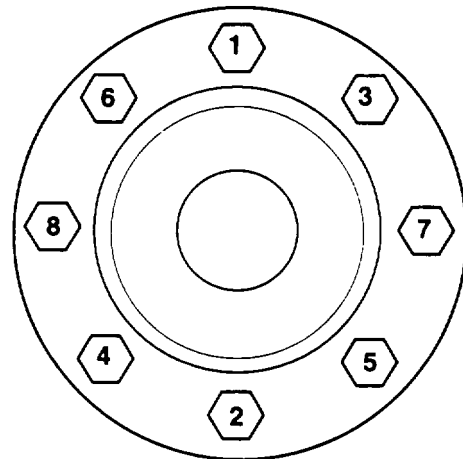
CAUTION

Ensure flanged end of nuts are against wheel. Failure to comply will result in damage to equipment.

NOTE

Nut should be snugged to ensure wheel is flush against hub.

- (1) With the aid of an assistant, install wheel and tire (6) on studs (7) with nuts (4).
- (2) Lower screw jacks (2) by turning handles (5) until tires touch ground.
- (3) Tighten eight nuts (4) in sequence shown.
- (4) Remove pins (1).
- (5) Position screw jacks (2) in stowed position on upper mount (3).
- (6) Install pins (1).
- (7) Place sand pads in stowage box.



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

3-8. SPARE TIRE REPLACEMENT.

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP

Personnel Required
Two

Equipment Condition
Heater Cooled
Wheels Chocked (page 2-17)

a. Removal.

WARNING

Wheel weighs 83 lbs (37.682 kg). Two personnel are required to remove wheel. Failure to do so may result in injury to personnel.

- (1) While assistant holds tire (1), remove nuts (2).
- (2) With the aid of an assistant, remove spare tire (1) from spare tire mount.

b. Inspection.

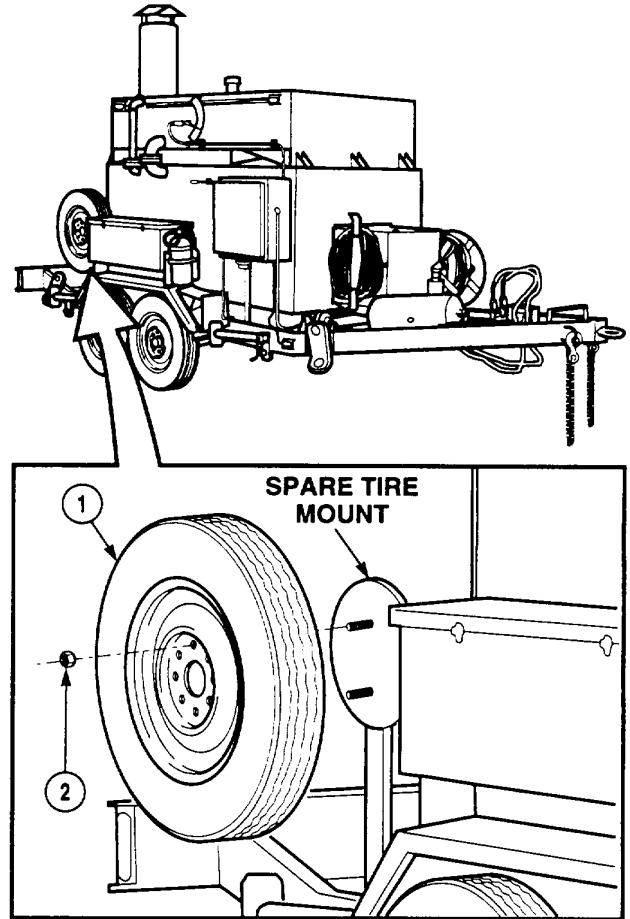
- (1) Check spare tire for gouges, cracks, or under inflation.
- (2) Check rim for corrosion or other signs of damage.

c. Installation.

- (1) With the aid of an assistant, place tire (1) on spare tire mount.
- (2) While assistant holds tire (1) in place, install two nuts (2) and tighten nuts.

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

3-9. WHEEL AND TIRE ASSEMBLY SERVICE.

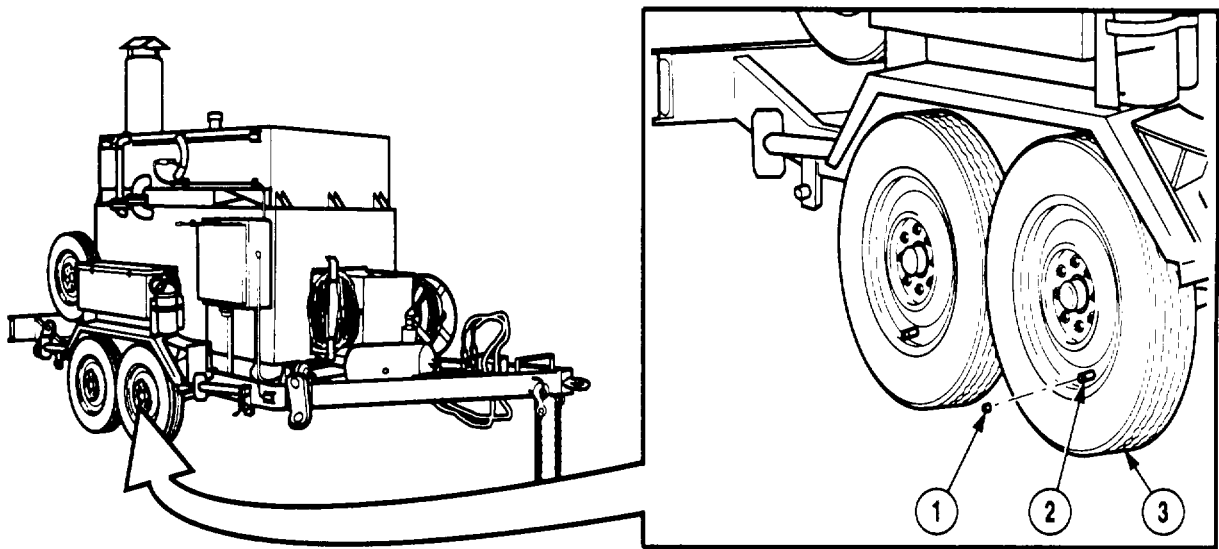
This task covers:

Service

INITIAL SETUP

Tools and Special Tools
Gage, Tire

Equipment Condition
Wheels Chocked (page 2-17)

Service.**NOTE**

This paragraph discusses service of one wheel and tire assembly. All wheel and tire assemblies are serviced in the same way.

- a. Remove cap (1) and position tire gage on valve stem (2).
- b. If required, inflate tire (3) to 95 psi (655 kPa).
- c. Install cap (1) on valve stem (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

3-10. SCREW JACK REPLACEMENT.

This task covers:

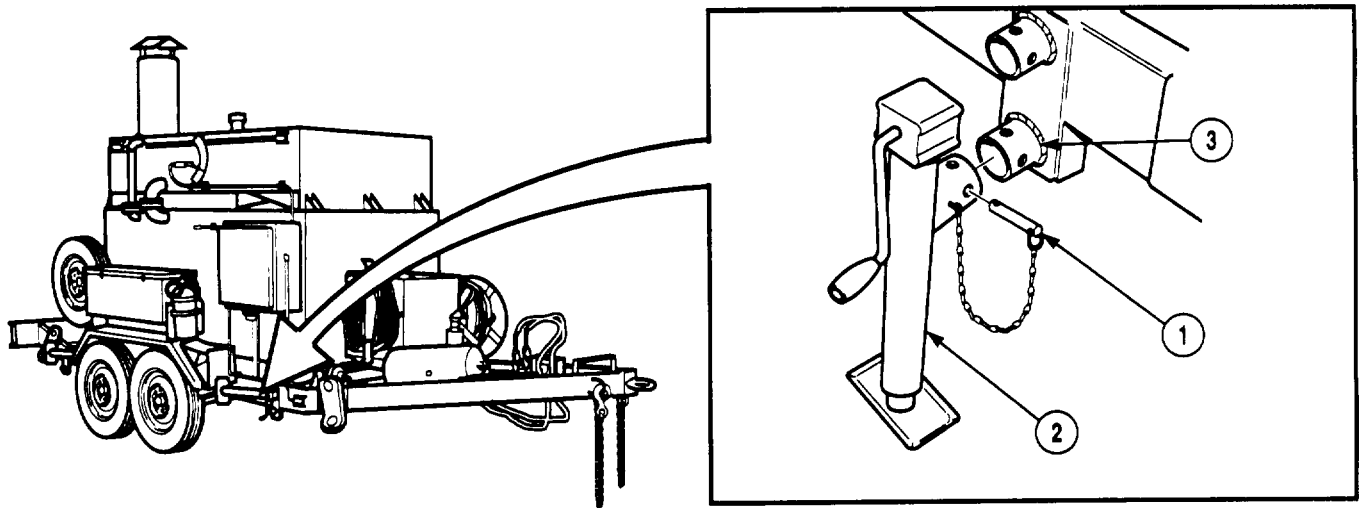
- a. Removal b. Installation

INITIAL SETUP*Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

a. Removal.**NOTE**

This paragraph discusses replacement of one screw jack. All screw jacks are replaced in the same way.

- (1) Remove pin (1) from screw jack (2).
- (2) Remove screw jack (2) from mount (3).

b. Installation.

- (1) Position screw jack (2) on mount (3).
- (2) Install pin (1) in screw jack (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

3-11. EXPANSION TANK ASSEMBLY DRAIN/FILL.

This task covers:

- a. Drain
- b. Fill
- c. Check

INITIAL SETUP

Tools and Special Tools
Wrench, Pipe

Materials/Parts
Oil, Transfer

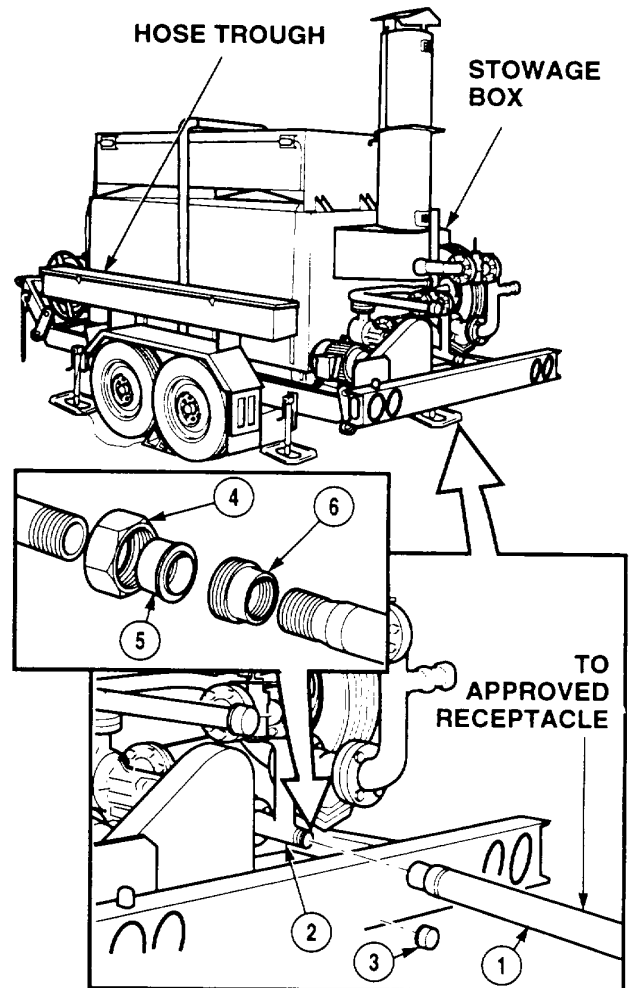
Equipment Condition
Heater Cooled
Wheels Chocked (page 2-17)
Heater Leveled (page 2-17)

a. Drain.

WARNING

Transfer oil will become extremely hot during operation. Be careful not to touch the hot oil or allow hot oil to come in contact with skin. Transfer oil can become hot enough to cause serious burns or death to personnel.

- (1) Remove transfer hose (1) from hose trough.
- (2) Place drain pan under RETURN and DRAIN port (2) and remove cap (3).
- (3) Install nut (4) on coupling section (5).
- (4) Install coupling section (5) on RETURN and DRAIN port (2).
- (5) Install coupling section (6) on transfer hose (1).
- (6) Install transfer hose (1) on RETURN and DRAIN port (2) and tighten nut (4).
- (7) Place open end of transfer hose (1) in approved receptacle.



- (8) Remove handle (7) from stowage box.
- (9) Install handle (7) on Valve No. 3 (8) and turn handle until valve is in the "OPEN" position.
- (10) Allow transfer oil to drain.

WARNING

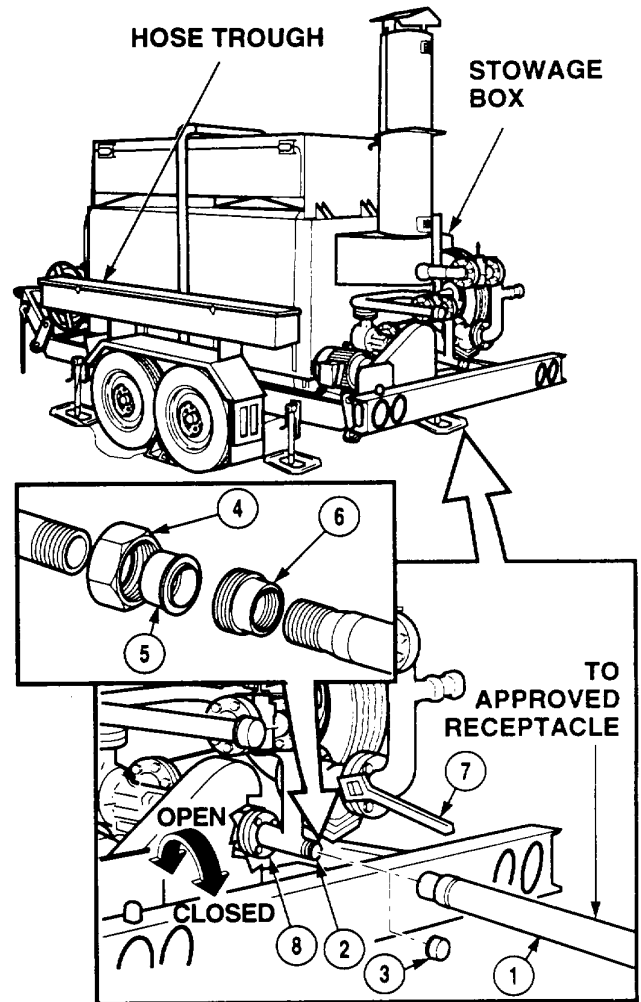
Oil is slippery and can cause falls. Wipe up spilled oil with rags.

- (11) Turn handle (7) until Valve No. 3 (8) is in "CLOSED" position.
- (12) Place handle (7) in stowage box.
- (13) Remove nut (4), coupling sections (5 and 6), and transfer hose (1) from RETURN and DRAIN port (2).
- (14) Install cap (3) on RETURN and DRAIN port (2).
- (15) Drain transfer hose (1) and place hose in hose trough.

NOTE

Disposal of used oil must be performed in accordance with all local and federal regulations. Used oil contains heavy metals and other pollutants that are harmful to the environment.

- (16) Dispose of used oil in accordance with local regulations.

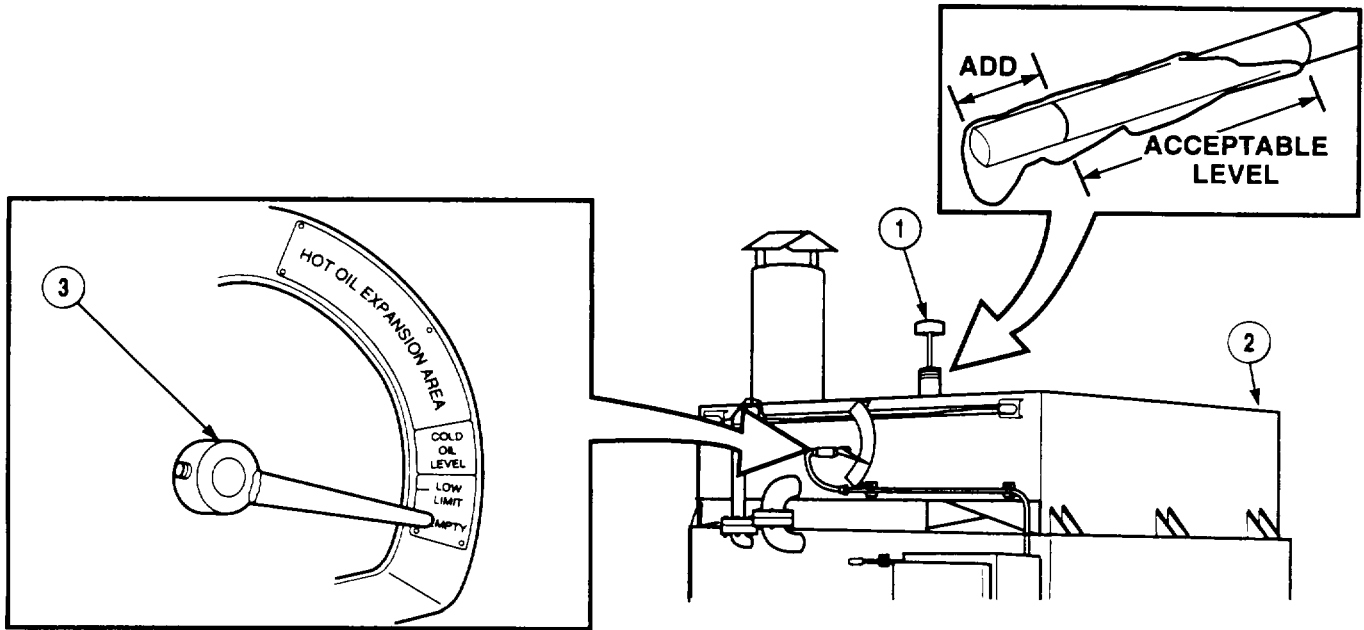


3-11. EXPANSION TANK ASSEMBLY DRAIN/FILL (CONT).

b. Fill.

NOTE

If filling system from empty or near empty condition, refer to paragraph 2-14 (page 2-23) and follow instructions for pumping from external source to tank.



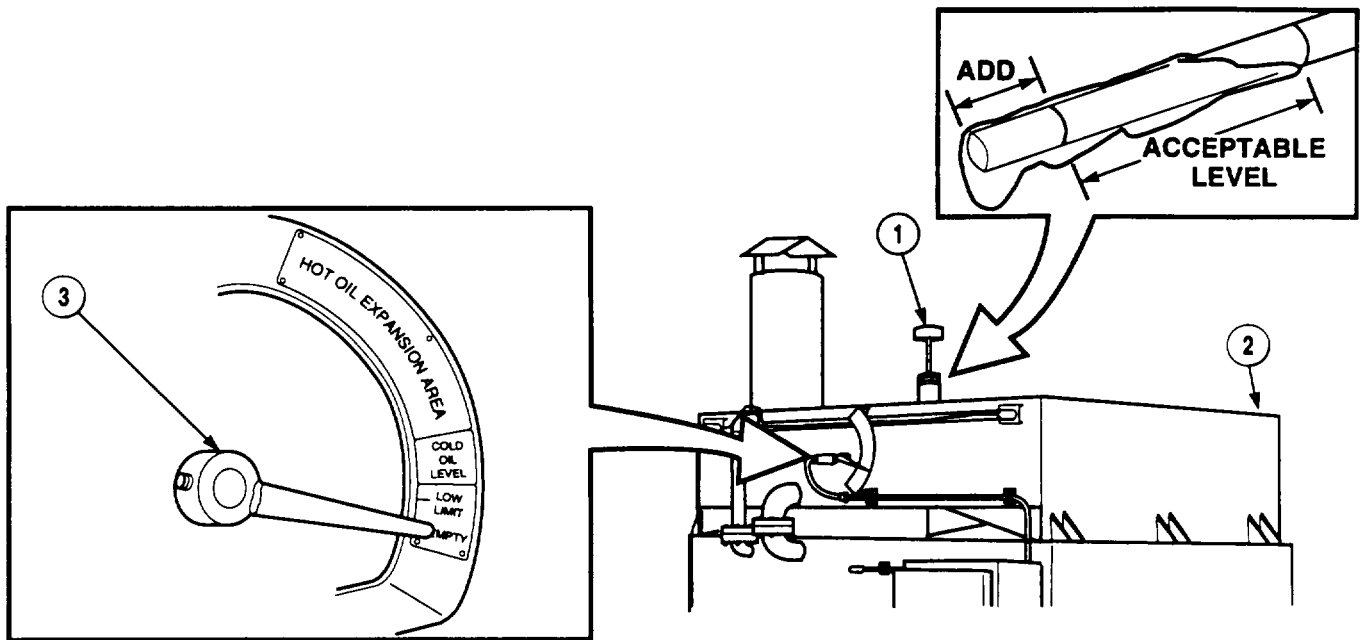
- (1) Remove filler cap (1) from expansion tank (2).

WARNING

Oil is slippery and can cause falls. Wipe up spilled oil with rags.

- (2) Fill expansion tank (2) with transfer oil until oil level indicator (3) is in the "COLD OIL LEVEL" range.
- (3) Install filler cap (1) on expansion tank (2).

c. Check

**WARNING**

Oil is slippery and can cause falls. Wipe up spilled oil with rags.

(1) Dipstick Method:

- (a) Remove filler cap (1) from expansion tank (2).
- (b) Observe oil level on dipstick of filler cap (1). Add transfer oil as needed to obtain oil level between marks.

(2) Oil Level Indicator Method:

- (a) Observe oil level indicator (3) for oil level.
- (b) Add transfer oil as needed.

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

3-15/(3-16 blank)

PART TWO
CHAPTER 4
UNIT MAINTENANCE INSTRUCTIONS

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Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS AND EQUIPMENT.

a. For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970 or CTA 8-100, as applicable to your unit.

b. The basic tool kit is: Tool Kit, General Mechanic's: Automotive SC 5180-90-N26.

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

Refer to Appendix B, Section III, of the Maintenance Allocation Chart (MAC) for a list of tool kits authorized for the Heater. Refer to Appendix G, Repair Parts and Special Tools List (RPSTL), for a list of special tools required for maintenance of the Heater.

4-3. REPAIR PARTS.

Repair parts are listed and illustrated in Appendix G of this manual.

Section II. SERVICE UPON RECEIPT

4-4. PACKING AND UNPACKING.

Upon receipt of a new Heater, the receiving organization must see if it has been properly prepared for service and is in good condition. Inspect all assemblies, subassemblies, and accessories to be sure they are in proper working order. Secure, clean, and correctly adjust and/or lubricate as needed, Chapters 2 and 3. Check all tools and equipment (Appendix C and Appendix D) to be sure every item is there in good condition, clean, and properly stowed.

4-5. LOOSE PARTS INSTALLATION.

The Heater comes fully assembled. Perform regularly scheduled PMCS upon receipt.

4-6. HAND RECEIPT.

NOTE

If Heater has been towed to the using organization, most or all of the following work should have been done.

When Heater is received, inspect all items for damage that may have occurred during shipping and unloading operations. Pay close attention to any loose or missing nuts, bolts, screws, drain plugs, assemblies, subassemblies, or components that may be easily lost or broken in transit. Check Components of End Items (COEI) and Basic Issue Items (BII), Appendix C, and Additional Authorized List (AAL), Appendix D, to make sure all items are accounted for and are in good condition. Carefully list all discrepancies.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS), LUBRICATION INSTRUCTIONS, AND MANDATORY REPLACEMENT PARTS

4-7. LUBRICATION INTRODUCTION.

Lubrication instructions are part of the Preventive Maintenance Checks and Services (PMCS). All lubrication instructions are mandatory.

4-8. GENERAL LUBRICATION INSTRUCTIONS.

a. Clean Fitting Before Lubricating. Clean parts with drycleaning solvent or equivalent. Dry before lubricating.

b. Lubricate After Fording. If fording occurs, lubricate all fittings below fording depth. Fording is not recommended.

c. Lubrication After High-Pressure Washing. After washing, lubricate all grease fittings and oil can points outside and underneath Heater.

d. Warranty Hard-time Statement. For equipment under manufacturer's warranty, hard-time oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (such as longer than usual operating hours, extended idling periods, or extreme dust).

4-9. PMCS INTRODUCTION.

PMCS means systematic caring, inspecting, and servicing equipment to keep it in good condition and to prevent breakdowns. To be sure that the Heater is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. Use a DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any deficiencies and shortcomings. You DO NOT need to record faults that you fix.

4-10. PMCS PROCEDURES.

a. PMCS, Table 4-1, lists inspections and care required to keep your Heater in good operating condition.

b. The "INTERVAL" column of Table 4-1 tells you when to do a certain check or service.

c. The "PROCEDURE" column of Table 4-1 tells you how to do required checks and services. Carefully follow these instructions.

4-10. PMCS PROCEDURES (CONT).**NOTE**

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

d. If the Heater does not perform as required, refer to Chapter 3, Section II (page 3-1), or Chapter 4, Section IV (page 4-12, Troubleshooting).

e. If anything looks wrong and you can't fix it. write it on your DA Form 2404. IMMEDIATELY report it to your supervisor f. When you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire Heater.

(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 drycleaning solvent (P-D-680) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) *Rust and Corrosion.* Check Heater body and frame for rust and corrosion. If any bare metal or corrosion exists, clean and apply a thin coat of oil. Report it to your supervisor.

(3) *Bolts, Nuts, and Screws.* Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut, or screw you think is loose, tighten it or report it to your supervisor.

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

(5) *Electric Wires and Connectors.* Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors. Report any damaged wires to your supervisor.

(6) *Hoses and Fluid Lines.* Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also 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 your supervisor.

g. When you check for "operating condition," you look at the component to see if it's serviceable.

4-11. CLEANING AGENTS.**WARNING**

- **DO NOT** use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- **DO NOT SMOKE** when using cleaning solvent. **NEVER USE IT NEAR AN OPEN FLAME.** Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- **USE CAUTION** when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

NOTE

Only use those authorized cleaning solvents or agents listed in Appendix E. When cleaning grease buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected areas.

4-12. SHORTENED MAINTENANCE INSTRUCTIONS.

Local conditions of extreme heat, dust, cold, or wetness dictate that service intervals may need to be shortened.

4-13. ADDITIONAL MAINTENANCE INSPECTIONS.

Additional maintenance inspections may be required for the following reasons:

- a.** Prolonged storage. Heaters having been stored for a period of three months or more should be inspected.
- b.** Initial preparation upon receipt.
- c.** Preparation for storage.

4-14. LEAKAGE DEFINITIONS FOR UNIT PMCS.

It is necessary for you to know how fluid leakage affects the status of the Heater. The following are types/classes of leakage an operator needs to know to be able to determine the status of the Heater. Learn these leakage definitions and remember when in doubt, notify your supervisor.

4-14. LEAKAGE DEFINITIONS FOR UNIT PMCS (CONT).**CAUTION**

- Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to 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 immediately to your supervisor.

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

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

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

4-15. PMCS COLUMN ENTRY EXPLANATION.

a. Item No. Column. The checks and services are numbered in chronological order showing a logical sequence around the Heater.

b. Interval Column. This column indicates when the lubrication, check, and/or service should be performed.

c. Location, Item to Check/Service Column. The underlined items listed in this column are divided into groups indicating the portion of the equipment of which they are a part, i.e. brakes, fuel, engine. Under these groupings a few common words are used to identify the specific item being checked.

d. Procedures Column. This column contains procedures required to perform the checks and services.

4-16. PMCS TABLE.

Refer to Table 4-1 for the PMCS for the Heater.

4-17. MANDATORY REPLACEMENT PARTS.

Refer to Table 4-1 for a listing of all items that must be replaced during PMCS whether they have failed or not.

Table 4-1. Unit Preventive Maintenance Checks and Services

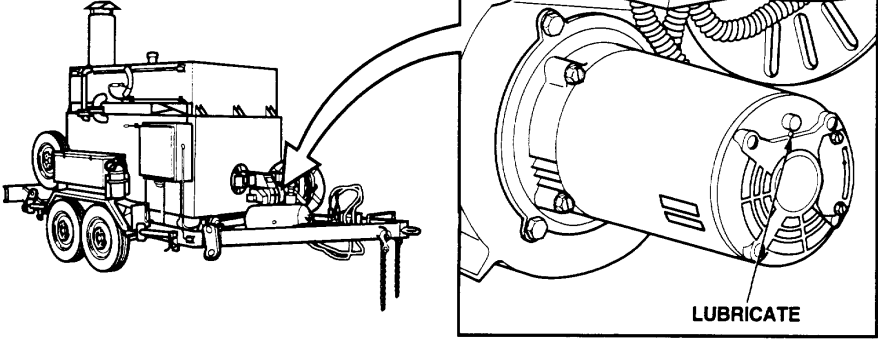
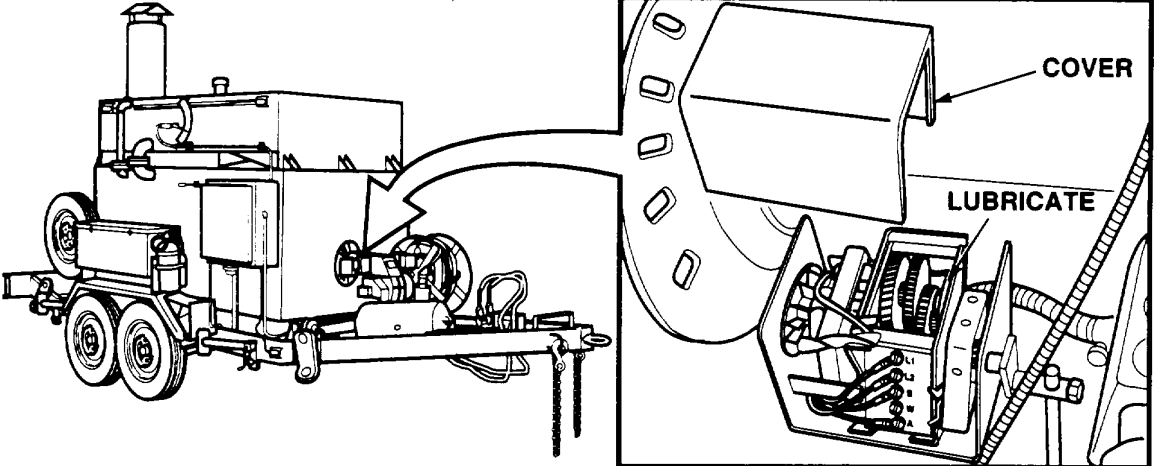
No.	Interval	Location, Item to Check/Service	Procedures
BURNER			
			
1	Annually	Burner Motor	Remove burner cover (page 4-295) and lubricate burner motor with oil (item 16, appendix E).
			
2	Annually	Damper Motor	Remove cover and lubricate the felt pad located on the two shafts in the gear train with oil (item 15, appendix E).

Table 4-1. Unit Preventive Maintenance Checks and Services - CONT.

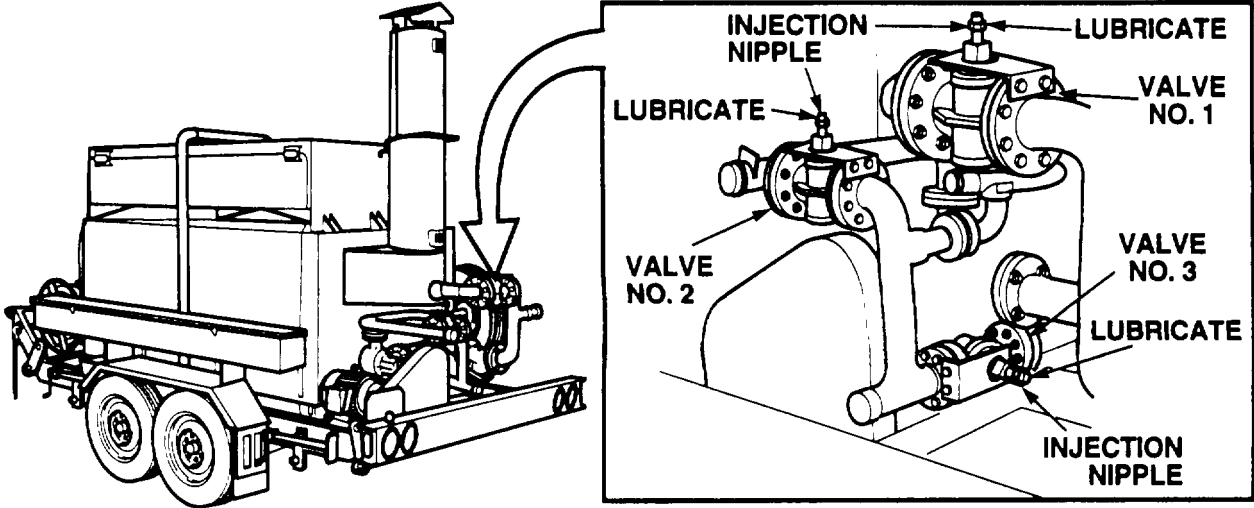
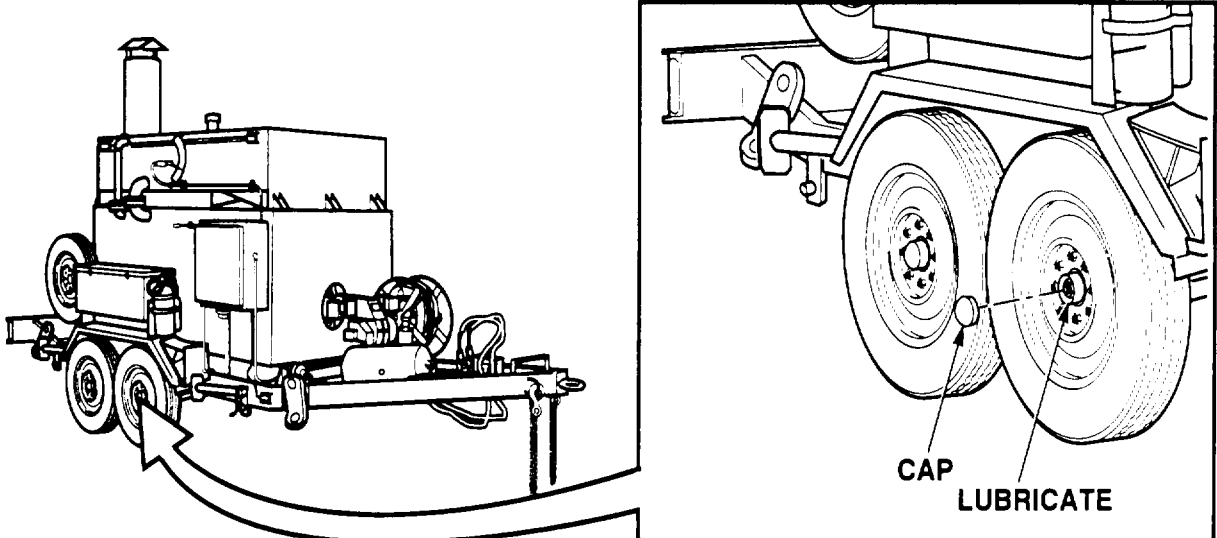
No.	Interval	Location, Item to Check/Service	Procedures
PLUMBING			
			
3	Weekly	No. 1 Valve	Remove injection nipple and add sealing compound (item 8, appendix E) to valve. Install injection nipple.
4	Weekly	No. 2 Valve	Remove injection nipple and add sealing compound (item 8, appendix E) to valve. Install injection nipple.
5	Weekly	No. 3 Valve	Remove injection nipple and add sealing compound (item 8, appendix E) to valve. Install injection nipple.
6	Weekly	Strainer	Clean and remove foreign matter (page 4-204).
BRAKES			
7	Biennially	Pads	Inspect brake pads for wear (page 4-107). Adjust as necessary (page 4-112). Replace if the lining is worn thin (1/16 in. [1.59 mm] or less), contaminated with grease or oil, or abnormally scored or gouged.
8	Biennially	Drums	Inspect the drum surface for excessive wear or heavy scoring. If worn more than 0.020 in. (0.508 mm) oversize or the drum has worn out-of-round by more than 0.015 in. (0.381 mm), the drum must be resurfaced. If scoring or other wear is greater than 0.090 in (2.286 mm), the drum must be replaced (page 4-140).

Table 4-1. Unit Preventive Maintenance Checks and Services - CONT.

Item No.	Interval	Location, Item To Check/Service	Procedures
9	Weekly	<p><u>BELTS</u> Pump Motor Belt</p> <p><u>WHEELS AND TIRES</u></p>	<p>Check and adjust belt tension (page 4-200).</p> 
10	Biennially	Bearings	Remove cap and check bearings for pitting, spalling, or corrosion. If any are present, bearing must be replaced (page 4-140). Lubricate with grease (item 12, appendix E). Install cap.
11	Monthly	<p><u>FUEL</u> Fuel Filter</p>	Drain and change filter (page 4-221).
12	Weekly	<p><u>HYDRAULIC</u> Lines and Fittings</p> <p><u>HEAT EXCHANGER</u></p>	Check for cracks, nicks, bends, tears, dents, stripped threads, and cuts. Replace any damaged parts (page 4-120).
13	Annually	Liner	Replace (page 4-310).

Section IV. TROUBLESHOOTING

4-18. TROUBLESHOOTING INTRODUCTION.

- a. This section lists the common malfunctions that you may find with your equipment. Perform the tests, inspections, and corrective actions in the order listed.
- b. The troubleshooting table cannot list all the malfunctions that may occur, all the tests and inspections needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify your supervisor.
- c. The malfunction index is a quick reference for the troubleshooting tables. It lists the malfunctions in the same order as they appear in the table with the corresponding page number.

Malfunction Index

Troubleshooting Procedure	Page
FUEL	
1. Fuel Pressure is Low or Pulsating.....	4-13
2. Fuel Pump is Noisy.....	4-13
ELECTRICAL	
1. Circulating Pump Motor Does Not Operate	4-14
2. Circulating Pump Motor Runs Hot	4-18
3. Gages Do Not Operate or Operate Erratically	4-20
4. Burner Does Not Operate	4-22
CHASSIS ELECTRICAL	
1. Taillights Do Not Operate	4-26
2. Turn Signals Do Not Operate.....	4-30
3. Brake Lights Do Not Operate	4-34
4. Clearance Lights/Marker Lights Do Not Operate.....	4-37
5. License Lamp Assembly Does Not Operate	4-41
TRANSFER OIL SYSTEM	
1. Pump Does Not Rotate	4-45
2. Pump is Noisy	4-46
3. Pump Output is Weak	4-47
4. Transfer Oil Does Not Circulate Properly	4-47
BURNER	
1. Burner Does Not Fire	4-48
2. Burner Flame Fails	4-52
3. Smoky Exhaust	4-55
4. Burner Motor Does Not Operate	4-56

4-19. TROUBLESHOOTING TABLE.

Table 4-2. Unit Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
FUEL		
1. FUEL PRESSURE IS LOW OR PULSATING.	Step 1. Check fuel filter for clogging.	Service fuel filter (page 4-219).
	Step 2. Check fuel system for air leaks.	Tighten fittings or replace defective fuel lines (page 4-282).
	Step 3. Check couplings for loose connections or damage to parts.	Replace damaged parts, align coupling, and tighten setscrew.
2. FUEL PUMP IS NOISY.	Step 1. Check couplings for loose connections or damage to parts.	Replace damaged parts, align coupling, and tighten setscrew.

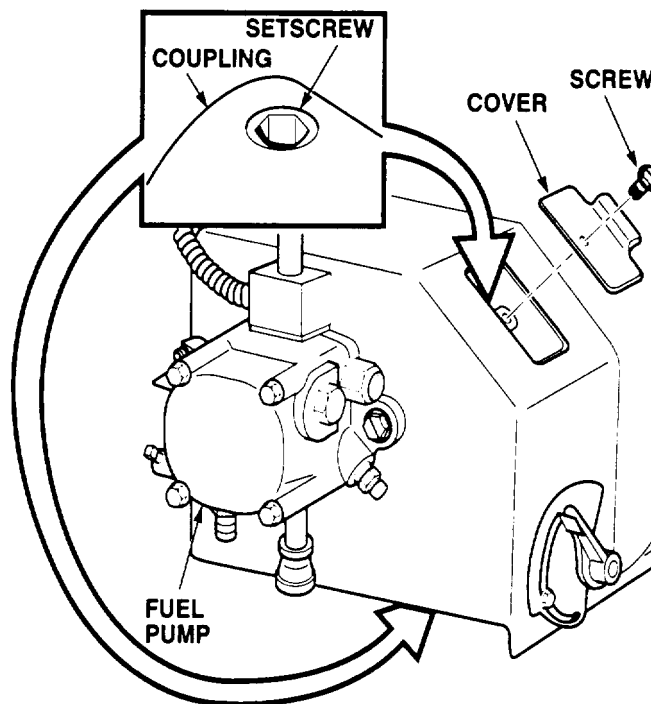
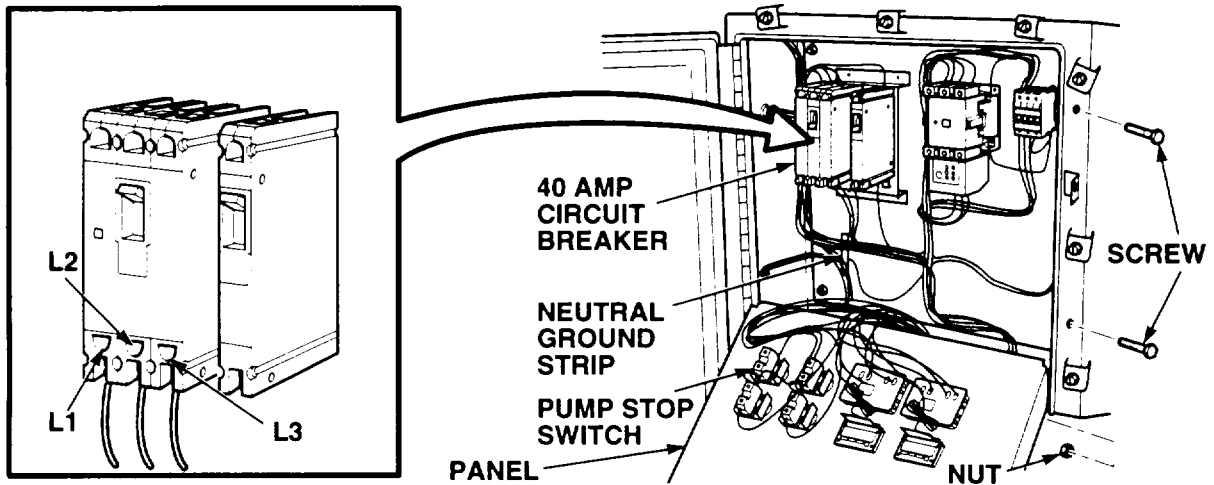


Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

1. CIRCULATING PUMP MOTOR DOES NOT OPERATE.	ELECTRICAL	
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Step 1. Remove nuts and screws and open control box panel. With power disconnected, use an ohmmeter to check for continuity across terminals on PUMP STOP switch.

If the reading is more than one ohm, the switch is damaged. Replace switch (page 4-182).

Step 2. Check that pump motor neutral ground wire and coil neutral ground wire are securely fastened to the neutral ground strip.

Securely fasten wires to neutral ground strip.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

WARNING

HIGH VOLTAGE

is used in the operation of this equipment

SERIOUS INJURY OR DEATH

may result if personnel fail to observe safety precautions.
Repairs are to be done by qualified repairmen

- Never work on electronic equipment unless at least one other person familiar with the operation and hazards of the equipment is nearby. That person should also be competent in giving first aid. When an operator helps a technician, that operator must be warned about dangerous areas.
- Be careful not to contact high-voltage connections installing or operating this equipment.
- Keep one hand away from the equipment to reduce the hazard of current flowing through life sustaining organs of the body.
- Remove rings, bracelets, wristwatches, neck chains, and any other jewelry before working around Heater Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

Step 3. Attach power cable and turn generator on (page 2-20) Switch 40 amp circuit breaker (PUMP DISCONNECT) to the "ON" position and, using a voltmeter, check for 120 Vac at terminals T1 and T and 208 Vac at terminal T2 Check LO for ground.

If correct voltage is not present at all three terminals. circuit break(,r is defective.

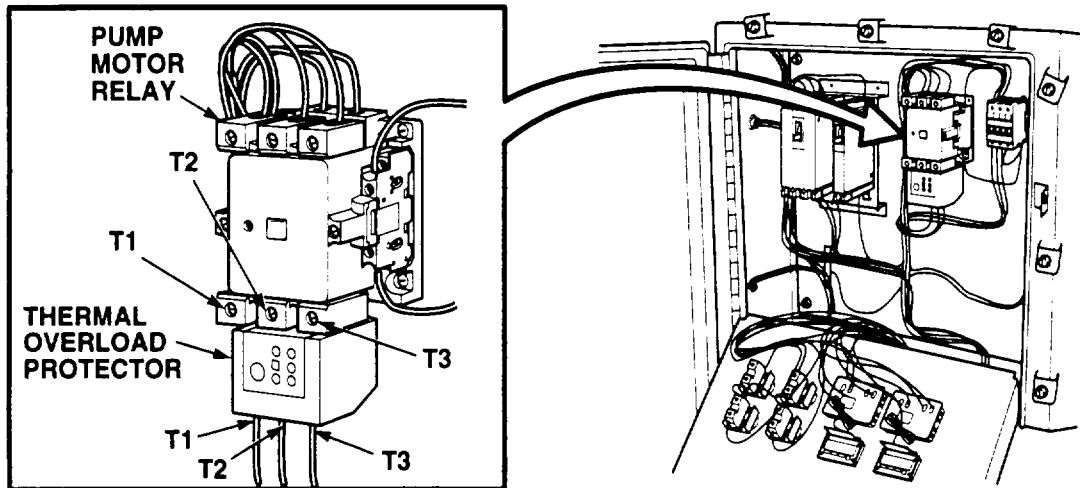
Replace circuit breaker (page 4-174)

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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ELECTRICAL (CONT)

1. CIRCULATING PUMP MOTOR DOES NOT OPERATE (CONT).



Step 4. Push start button and, using a voltmeter, check for 120Vac at terminals T1 and T3 and 208 Vac at terminal T2 of pump motor relay.

If correct voltage is not present at all three terminals, relay is defective. Replace relay (page 4-180).

Step 5. Using a voltmeter, check for 120Vac at terminals T1 and T3 and 208 Vac at terminal T2 of the thermal overload protector.

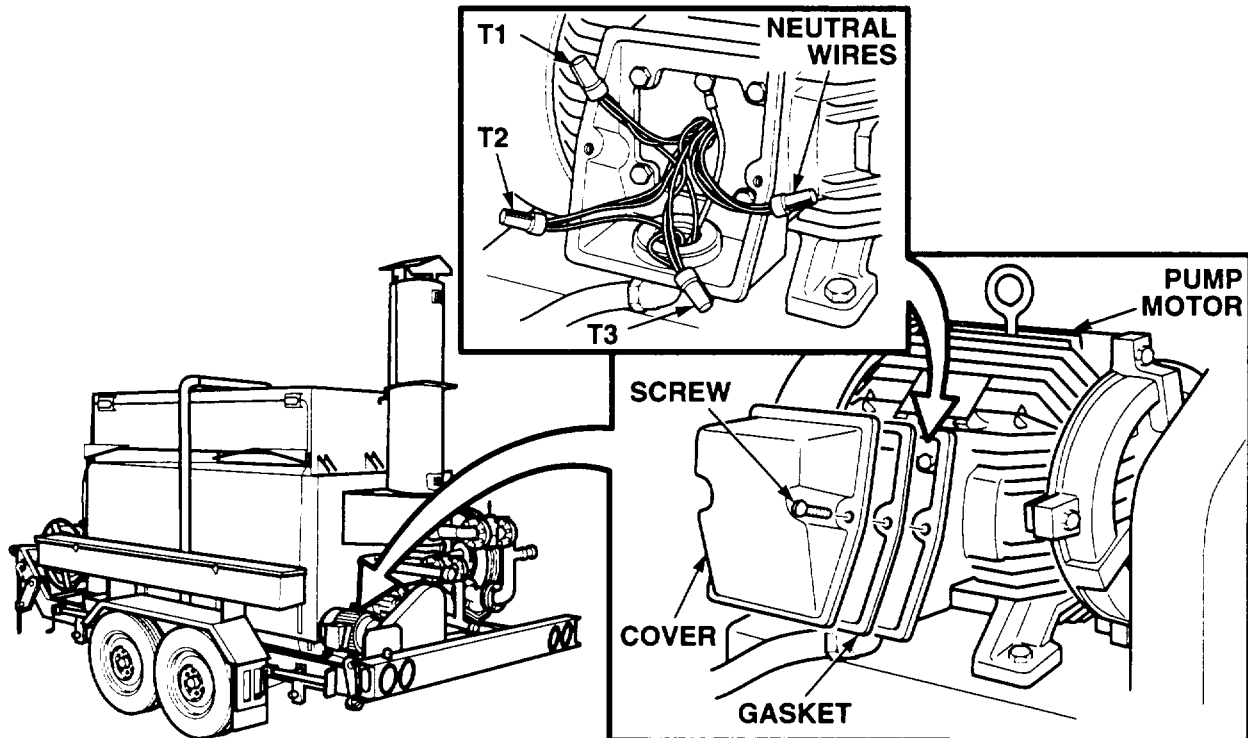
If correct voltage is not present at all three terminals, thermal overload protector is defective. Replace thermal overload protector (page 4-177).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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ELECTRICAL (CONT)

1. CIRCULATING PUMP MOTOR DOES NOT OPERATE (CONT).



Step 6. Remove screws and pump motor cover and check for 120 Vac at two wire connections (T1 and T3) and 208 Vac at one connection (T2).

If correct voltage is not present at all three connections, disconnect power source and replace wire(s) found not having correct voltage.

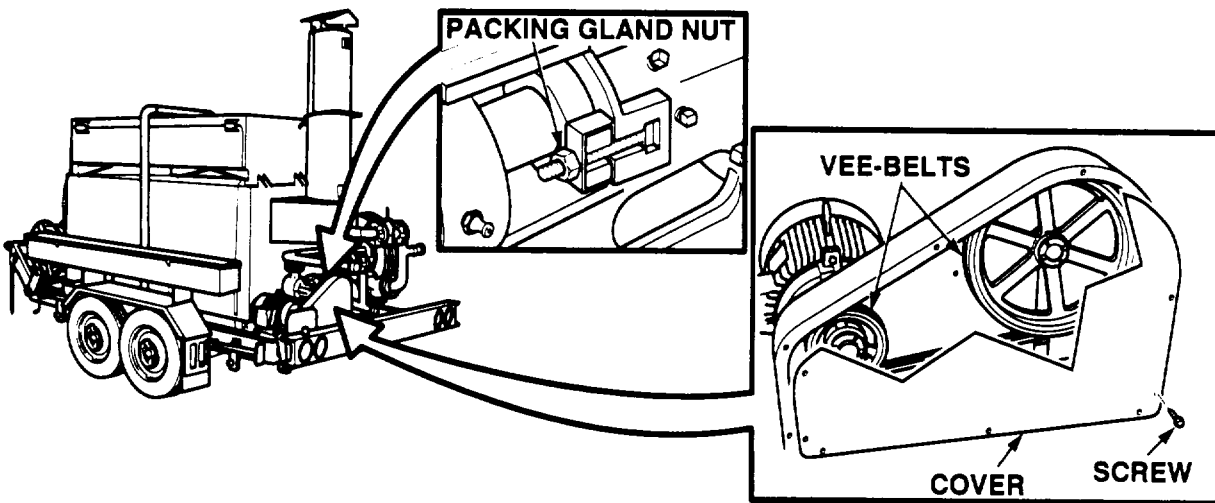
If correct voltage is present at all three connections, replace pump motor (page 4-277).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ELECTRICAL (CONT)

2. CIRCULATING PUMP MOTOR RUNS HOT.



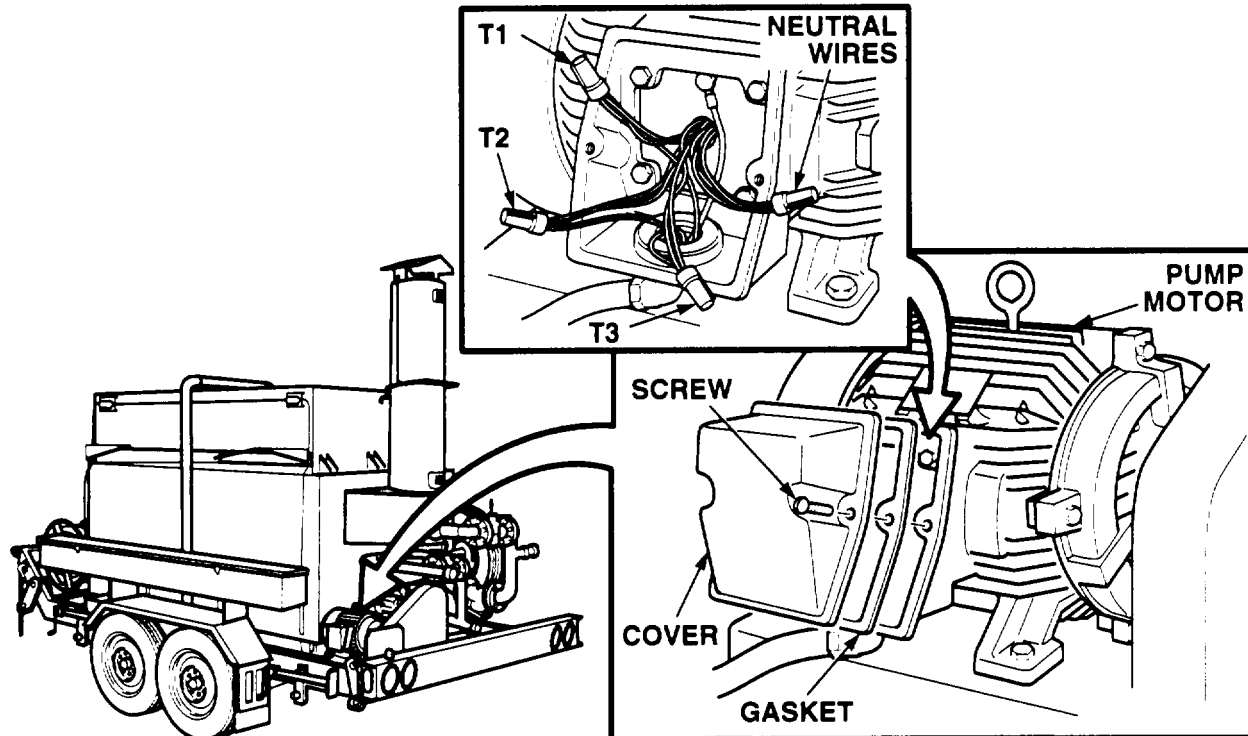
- Step 1. Remove screws and cover and check pump motor belts for excessive tension. Adjust pump motor belt tension (page 4-199).
- Step 2. Check circulating pump packing gland nuts for overtightening. Adjust packing gland nuts by tightening wrench-tight then backing off until packing gland nuts become slightly loose.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

ELECTRICAL (CONT)

2. CIRCULATING PUMP MOTOR RUNS HOT (CONT).



WARNING

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

Step 3. Remove screws and pump motor cover. Connect power cable and turn generator on (page 2-20). Check for 120 Vac at two wire connections (T1 and T3) and 208 Vac at one connection (T2).

If correct voltage is not present at all three connections, disconnect power source and replace wire(s) found not having correct voltage.

If correct voltage is present at all three connections, replace pump motor (page 4-277).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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ELECTRICAL (CONT)

3. GAGES DO NOT OPERATE OR OPERATE ERRATICALLY.

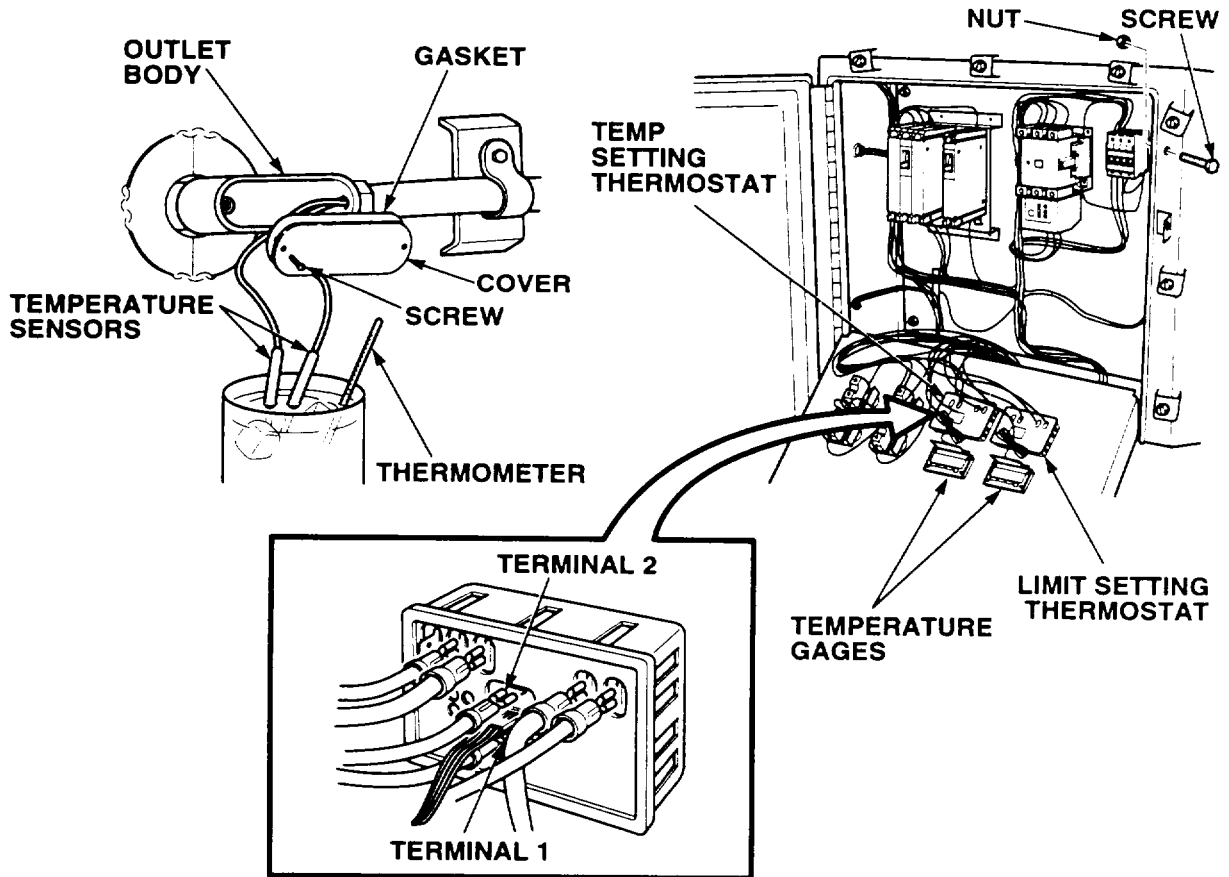


Table 4-2. Unit Troubleshooting - CONT.

**MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION**

ELECTRICAL (CONT)

3. GAGES DO NOT OPERATE OR OPERATE ERRATICALLY (CONT).

WARNING

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

- Step 1. Remove nut and screw and open control box panel and check for loose connections at gage and thermostat. Tighten loose connections.
- Step 2. Remove two screws, cover, gasket, and leads from outlet body. Place sensors and thermometer in cup of iced water. Attach positive lead of multimeter to terminal 2 and negative lead to terminal 1.

MEASURED RESISTANCE			
TEMPERATURE °F	OHMS	TEMPERATURE °C	OHMS
32	1,000.0	0	1,000.0
33	1,002.1	1	1,003.9
34	1,004.2	2	1,007.8
35	1,006.3	3	1,011.7
36	1,008.4	4	1,015.6
37	1,010.5	5	1,019.5
38	1,012.6	6	1,023.4
39	1,014.7	7	1,027.3
40	1,016.8	8	1,031.2
41	1,018.9	9	1,035.1
42	1,021.0	10	1,039.0

Measured resistance should be 1,000 ohms at 32°F (00C), with a change rate of 2.1 ohms per degree Fahrenheit or 3.9 ohms per degree Celsius. If measured resistance does not closely match, replace temperature sensors (page 4-169).

If measured resistance matches, replace temperature gage (page 4-63).

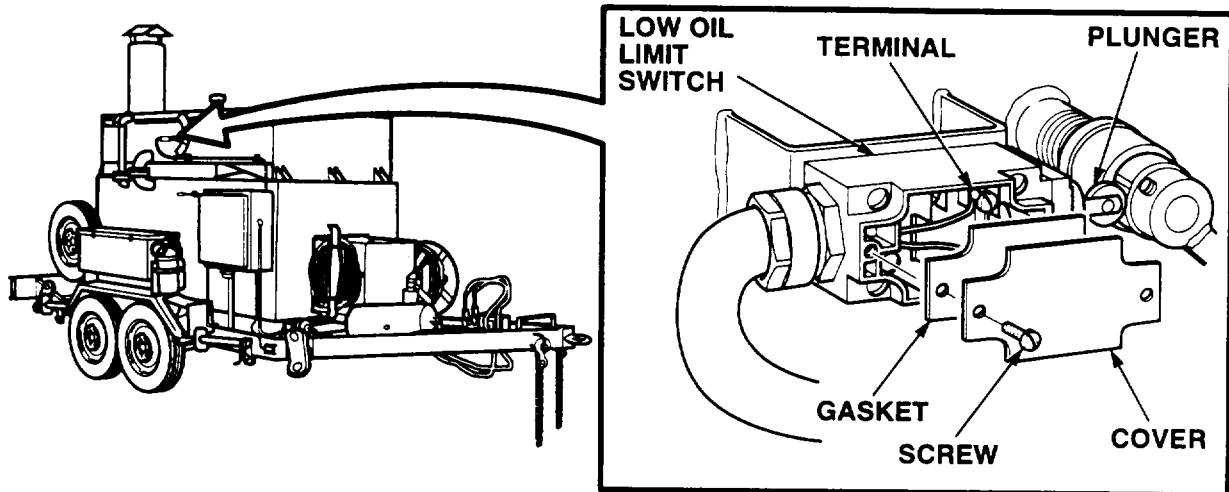
If problem persists, replace thermostat (page 4-188).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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ELECTRICAL (CONT)

4. BURNER DOES NOT OPERATE.



Step 1. Remove screws, cover, and gasket from Low Oil Limit Switch. Use a multimeter to check for continuity across terminals on switch while depressing plunger.

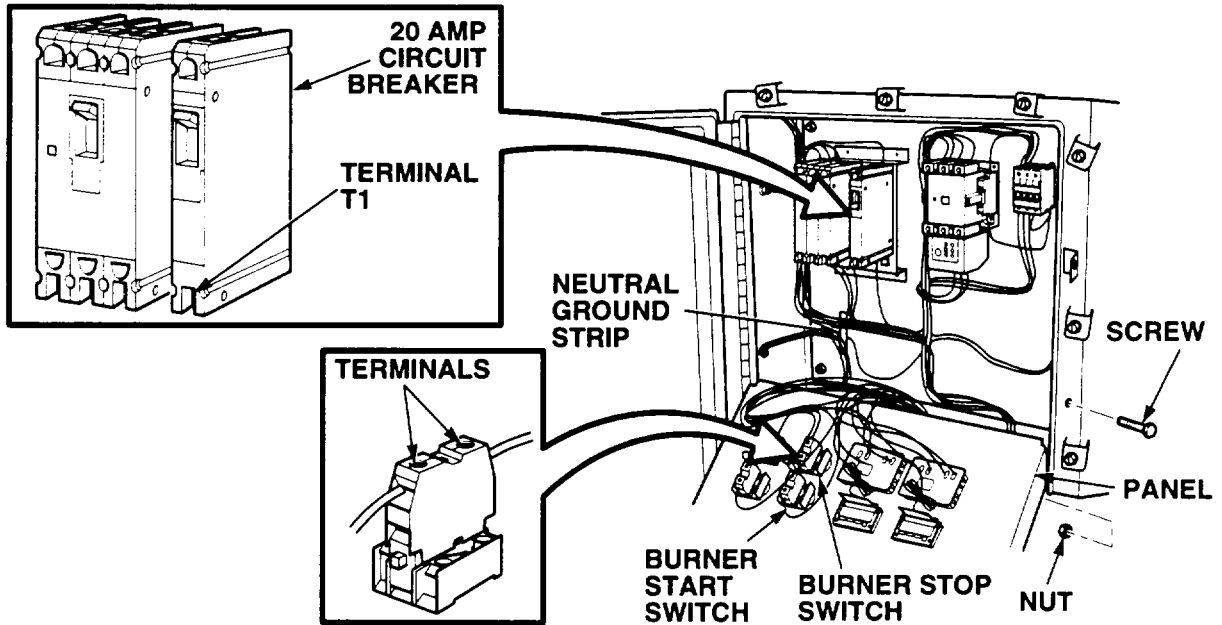
If the reading is more than one ohm, the switch is damaged. Replace switch (page 4-159).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

ELECTRICAL (CONT)

4. BURNER DOES NOT OPERATE (CONT).



Step 2. Remove nuts and screws and open control box panel. Use a multimeter to check for continuity across terminals on BURNER STOP switch. If the reading is more than one ohms, the switch is damaged. Replace switch (page 4-182).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ELECTRICAL (CONT)

4. BURNER DOES NOT OPERATE (CONT).

WARNING

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

Step 3. Push in on BURNER START switch button. Use a multimeter to check for continuity across terminals .

If the reading is less than infinite ohms, the switch is damaged. Replace switch (page 4-182).

Step 4. Check that burner and relay coil neutral ground wires are securely fastened to the neutral ground strip.

Securely fasten wire(s) to neutral ground strip.

Step 5. Attach power cable (page 2-20) and turn generator on (TM5-6115-464-12 or TM5-6115643-10). Switch 20 amp circuit breaker (BURNER DISCONNECT) to the "ON" position and, using a multimeter, check for 120 Vac at terminal T1 on circuit breaker.

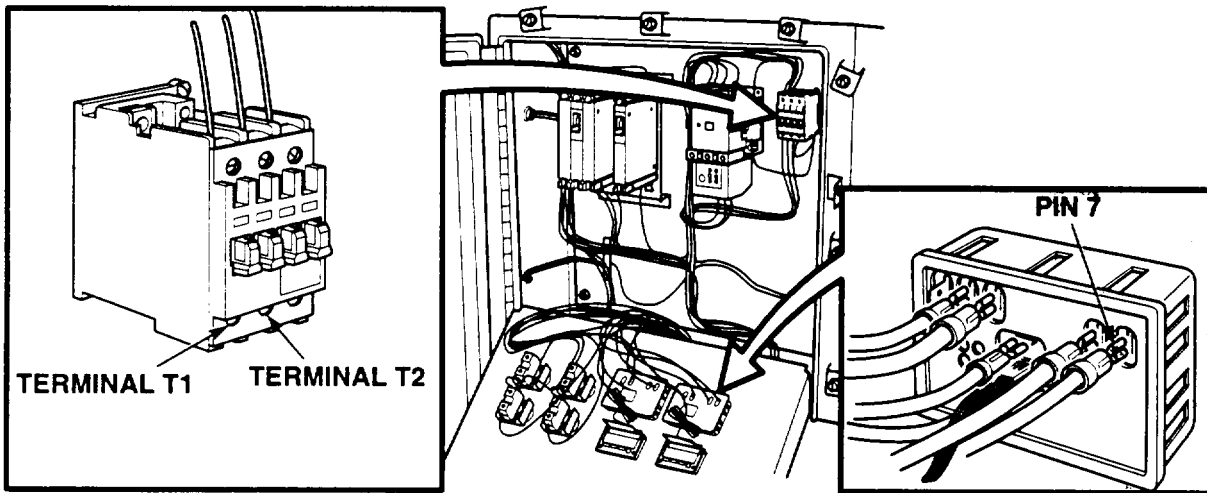
If 120 Vac are not present, replace circuit breaker (page 4-171).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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ELECTRICAL (CONT)

4. BURNER DOES NOT OPERATE (CONT).



Step 6. Using a multimeter, check for 120 Vac at terminals T1 and T2 of burner relay.

If 120 Vac are not present at both terminals, relay is defective. Replace relay page 4-185).

Step 7. Press RESET button on burner, and check for 120 Vac at pin 7 on thermostats.

If voltage is not present, replace thermostats (page 4-188).

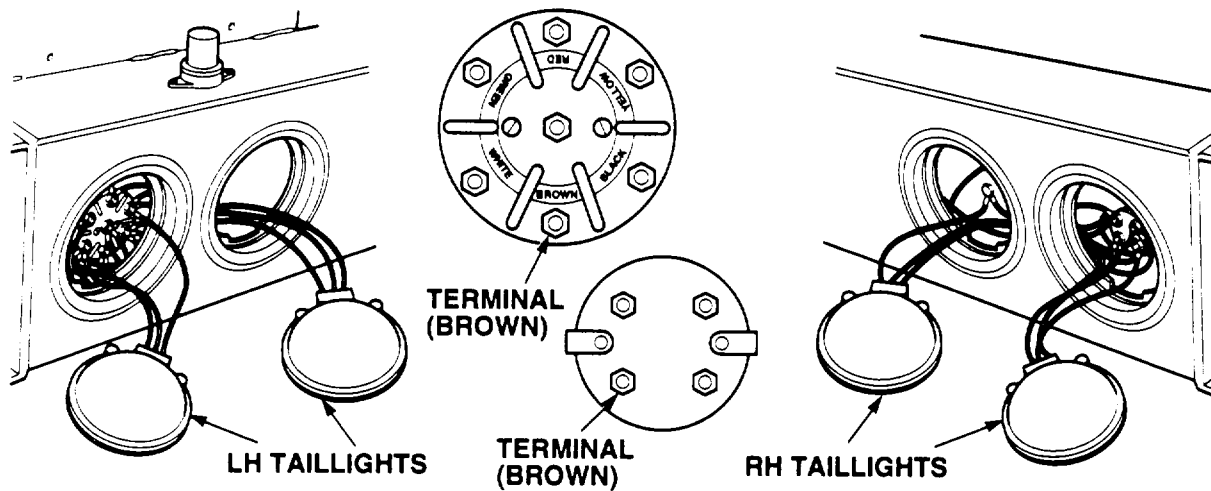
If problem persists, go to Burner Does Not Fire (page 4-48).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL

1. TAILLIGHTS DO NOT OPERATE.



WARNING

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

Step 1. Pry taillights from grommets and check for loose ground connections.

Tighten ground connections.

Step 2. With power connected and using a multimeter, check for 12 Vdc at LH junction block terminal marked BROWN.

If 12 Vdc are present, replace defective lamp assembly (page 4-73, 4-75, 4-80, or 4-82).

Step 3. If only RH lamp assembly is out, use a multimeter and check RH junction block terminal marked brown.

If 12 Vdc are present, replace defective RH lamp assembly (page 4-73, 4-75, 4-80, or 4-82).

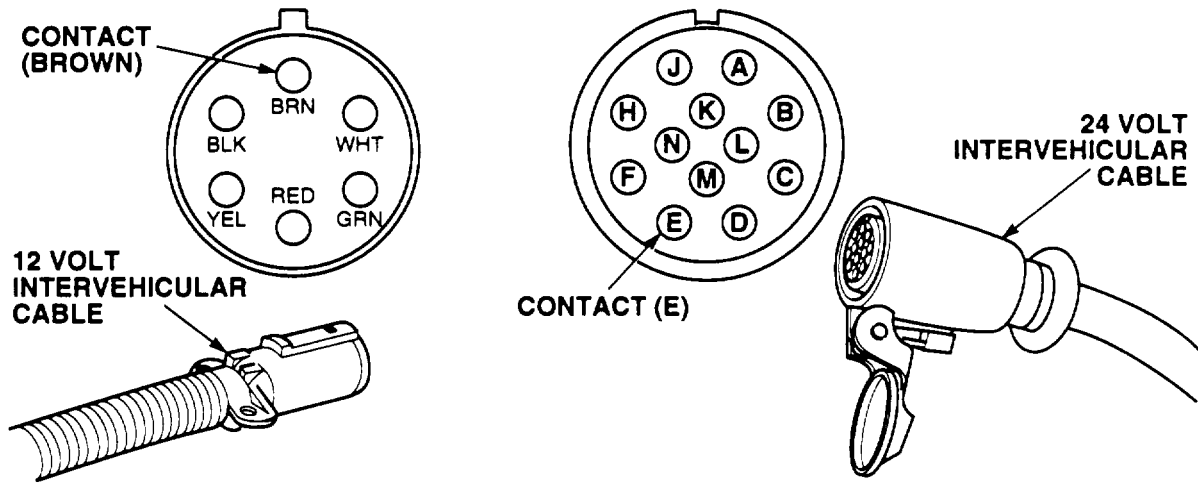
If 12 Vdc are not present, replace or repair wire between junction blocks.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

CHASSIS ELECTRICAL (CONT)

1. TAILLIGHTS DO NOT OPERATE (CONT).



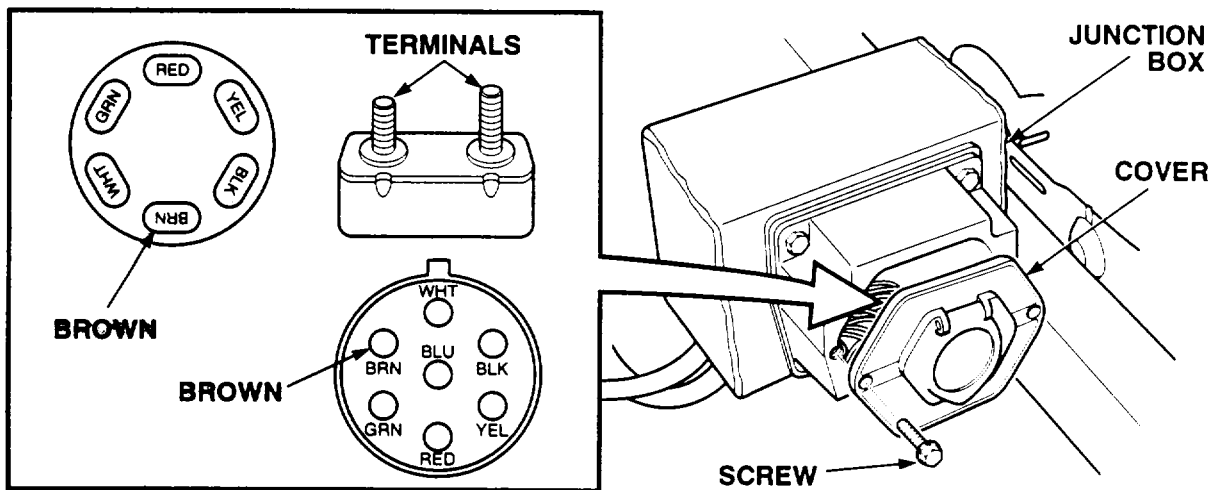
Step 4. If all taillights do not work, use a multimeter and check continuity between contacts marked brown on both ends of intervehicular cable. If continuity is not present, replace cable.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

CHASSIS ELECTRICAL (CONT)

1. TAILLIGHTS DO NOT OPERATE (CONT).



Step 5. Remove screws and cover from junction box. Using a multimeter, check for continuity across terminals on circuit breaker marked BRN.

If continuity is present, replace or repair wiring between junction box and junction block.

If continuity is not present, replace circuit breaker (page 4-97).

Step 6. Using a multimeter, check for continuity across pin marked BRN and jumper to the circuit breaker marked BRN.

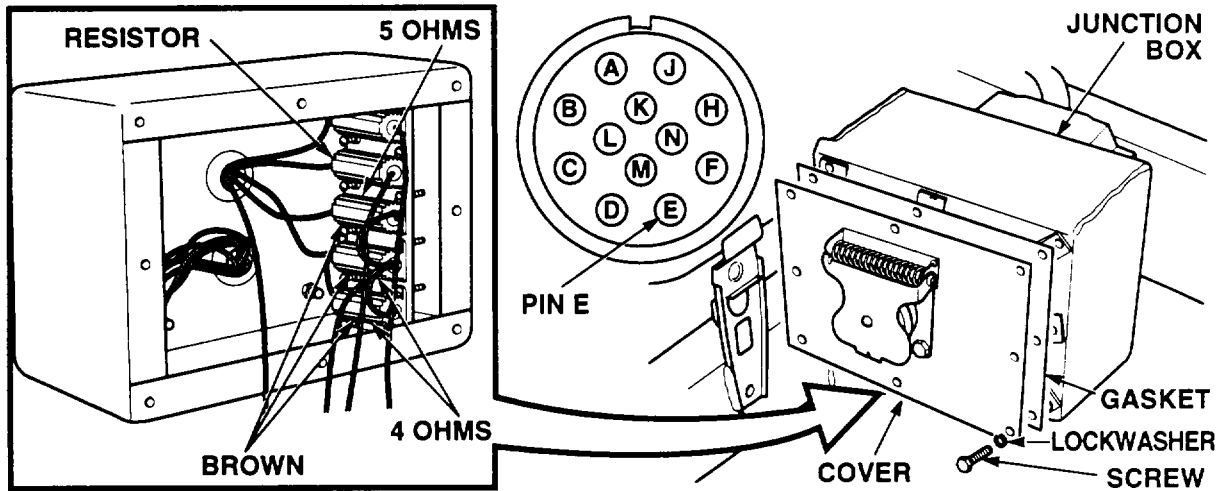
If continuity is not present, replace 12 Vdc intervehicular connector receptacle (page 4-97).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CHASSIS ELECTRICAL (CONT)

1. TAILLIGHTS DO NOT OPERATE (CONT).



Step 7. Remove screws, lock washers, cover, and gasket from junction box. Remove wire from resistors. Using multimeter, check resistance across resistor.

If 4 ohms + 1 or 5 ohms f 1 are not measured, replace resistor (page 4-65).

Step 8. Using a multimeter, check continuity between pin E on 24 Vdc intervehicular connector receptacle and resistor.

If continuity is not present, replace 24 Vdc intervehicular connector (page 4-93).

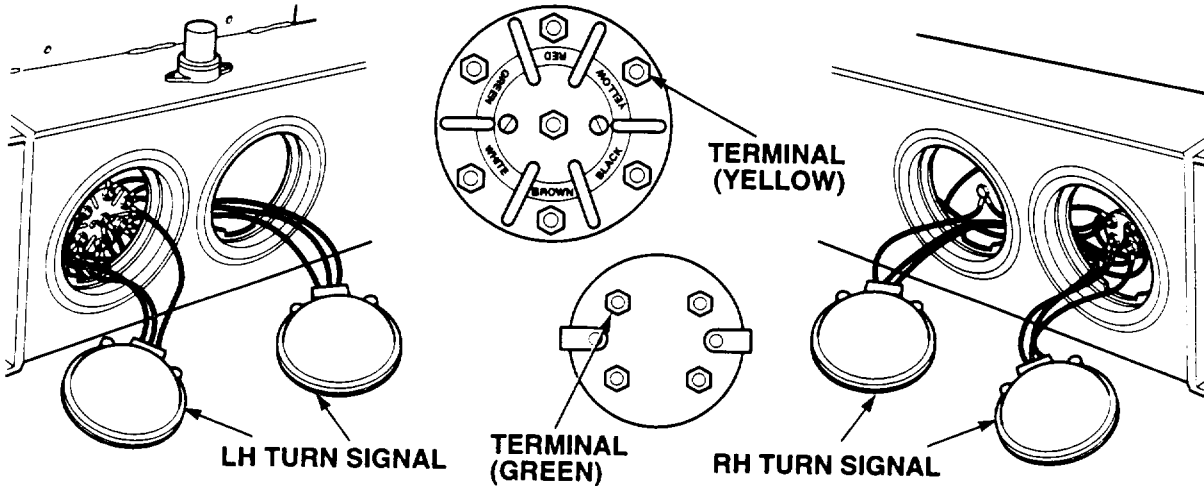
If continuity is present, replace or repair wire between receptacle and resistor.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

2. TURN SIGNALS DO NOT OPERATE.



WARNING

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

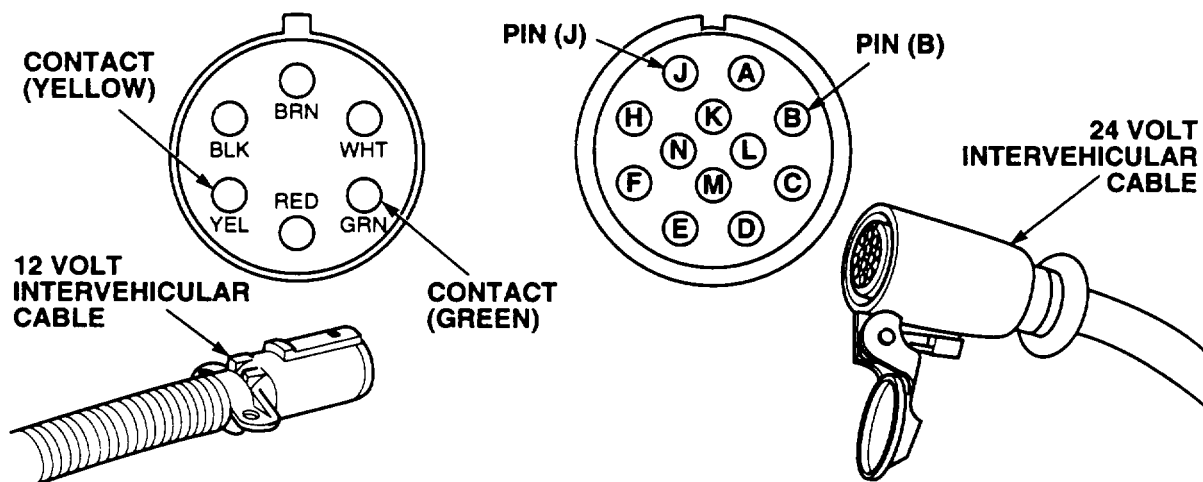
- Step 1. Pry taillights from grommets and check for loose ground connections. Tighten ground connections.
- Step 2. Using a multimeter, check for 12 Vdc at LH junction block terminal marked YELLOW.
If 12 Vdc are present, replace defective LH lamp assembly (page 4-75).
- Step 3. If only RH lamp assembly is out, use a multimeter and check RH junction block terminal marked green.
If 12 Vdc are present, replace defective RH lamp assembly (page 4-82).
If 12 Vdc are not present, replace or repair wire between junction blocks.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

2. TURN SIGNALS DO NOT OPERATE (CONT).



Step 4. If all turn signals do not work, use a multimeter and check continuity between contacts marked yellow (LH) and/or green (RH) on both ends of intervehicular cable.

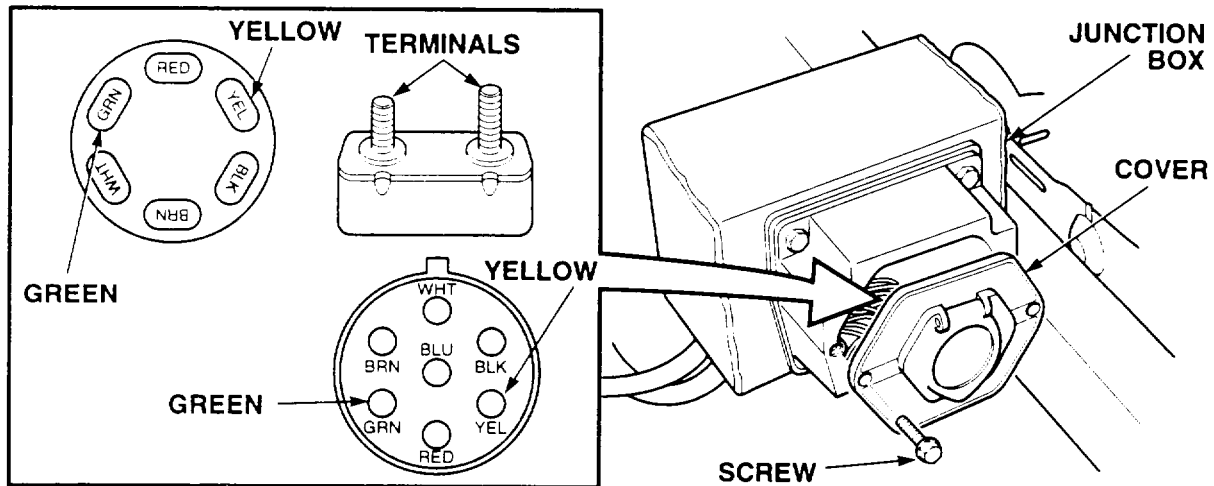
If continuity is not present, replace cable.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CHASSIS ELECTRICAL (CONT)

2. TURN SIGNALS DO NOT OPERATE (CONT).



Step 5. Remove screws and cover from junction box. Using a multimeter, check for continuity across terminal on circuit breaker marked YEL (for left turn signal) and/or GRN (for right turn signal)

If continuity is present, replace or repair wiring between junction box and junction block.

If continuity is not present, replace circuit breaker (page 4-97).

Step 6. Using a multimeter, check for continuity across pins marked YEL (for left turn signal) and/or GRN (for right turn signal) and jumpers to the circuit breakers marked YEL (left) and/or GRN (right).

If continuity is not present, replace 12 Vdc intervehicular connector (page 4-97).

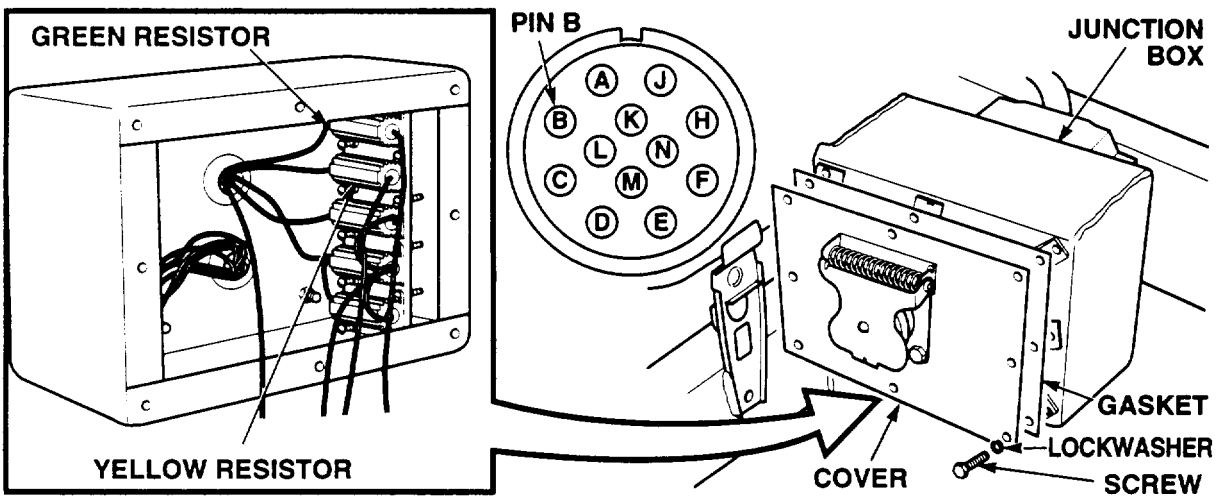
If continuity is present, replace or repair wire between 12 Vdc intervehicular connector and resistor.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

2. TURN SIGNALS DO NOT OPERATE (CONT).



Step 7. Remove screws, lock washers, cover, and gasket from junction box. Using a multimeter, check resistance across resistors with yellow (for left turn signal) and/or green (for right turn signal) wires attached.

If 6 ohms + 1 are not measured, replace resistor(s) (page 4-65).

Step 8. Using a multimeter, check continuity between pin B (for left turn signal) and/or pin J (for right turn signal) on 24 Vdc intervehicular connector and resistors attached to yellow (left) and/or green (right) wire.

If continuity is not present, replace 24 Vdc intervehicular connector (page 4-93).

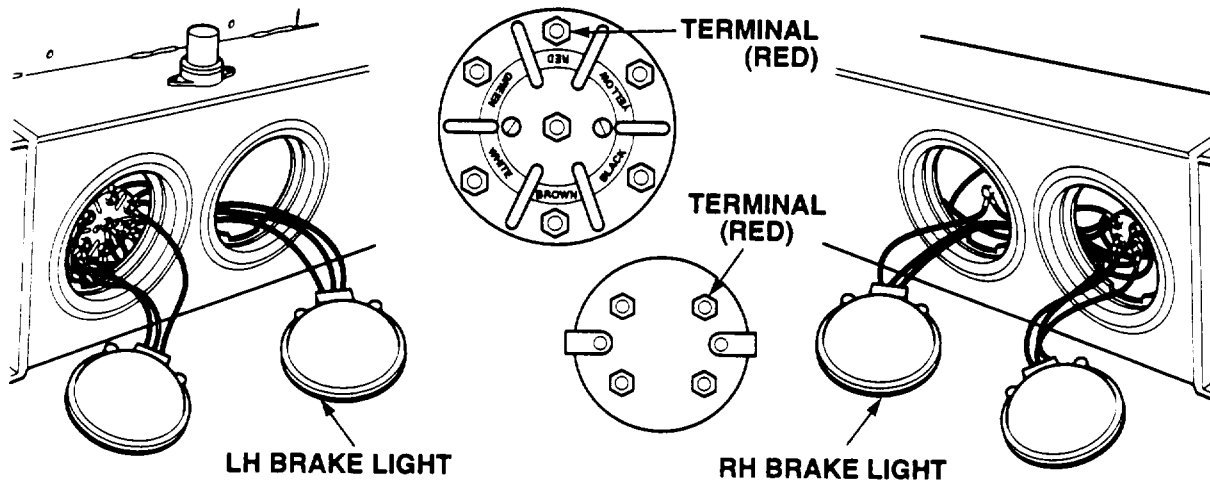
If continuity is present, replace or repair wire between 24 Vdc intervehicular connector and resistor.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

3. BRAKE LIGHTS DO NOT OPERATE.



WARNING

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

Step 1. Pry taillights from grommets and check for loose ground connections. Tighten ground connections.

Step 2. Using a multimeter, check for 12 Vdc at LH junction block terminal marked RED.

If 12 Vdc are present, replace defective LH lamp assembly (page 4-75).

Step 3. If only RH lamp assembly is out, use a multimeter and check RH junction block terminal marked red.

If 12 Vdc are present, replace defective RH lamp assembly (page 4-80).

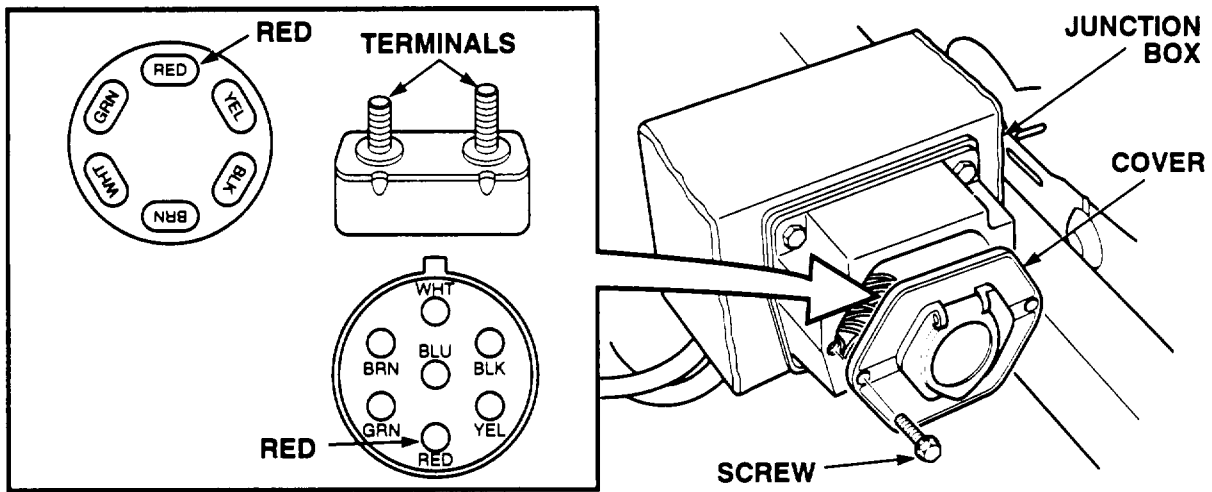
If 12 Vdc are not present, replace or repair wire between junction blocks.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

3. BRAKE LIGHTS DO NOT OPERATE (CONT).



Step 4. Remove screws and cover from junction box. Using a multimeter, check for continuity across terminals on circuit breaker marked RED.

If continuity is present, replace or repair wiring between junction box and junction block.

If continuity is not present, replace circuit breaker (page 4-97).

Step 5. Using a multimeter, check for continuity across pin marked red and jumper to the circuit breaker marked RED.

If continuity is not present, replace 12 Vdc intervehicular connector (page 4-97).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

3. BRAKE LIGHTS DO NOT OPERATE (CONT).

Step 6. Remove screws, lock washers, cover, and gasket from junction box. Using a multimeter, check resistance across resistors with brown wires attached.

If $4 \text{ ohms} \pm 1$ are not measured, replace resistor (page 4-65).

Step 7. Using a multimeter, check continuity between pin E on 24 Vdc intervehicular connector and resistor.

If continuity is not present, replace 24 Vdc intervehicular connector (page 4-93)

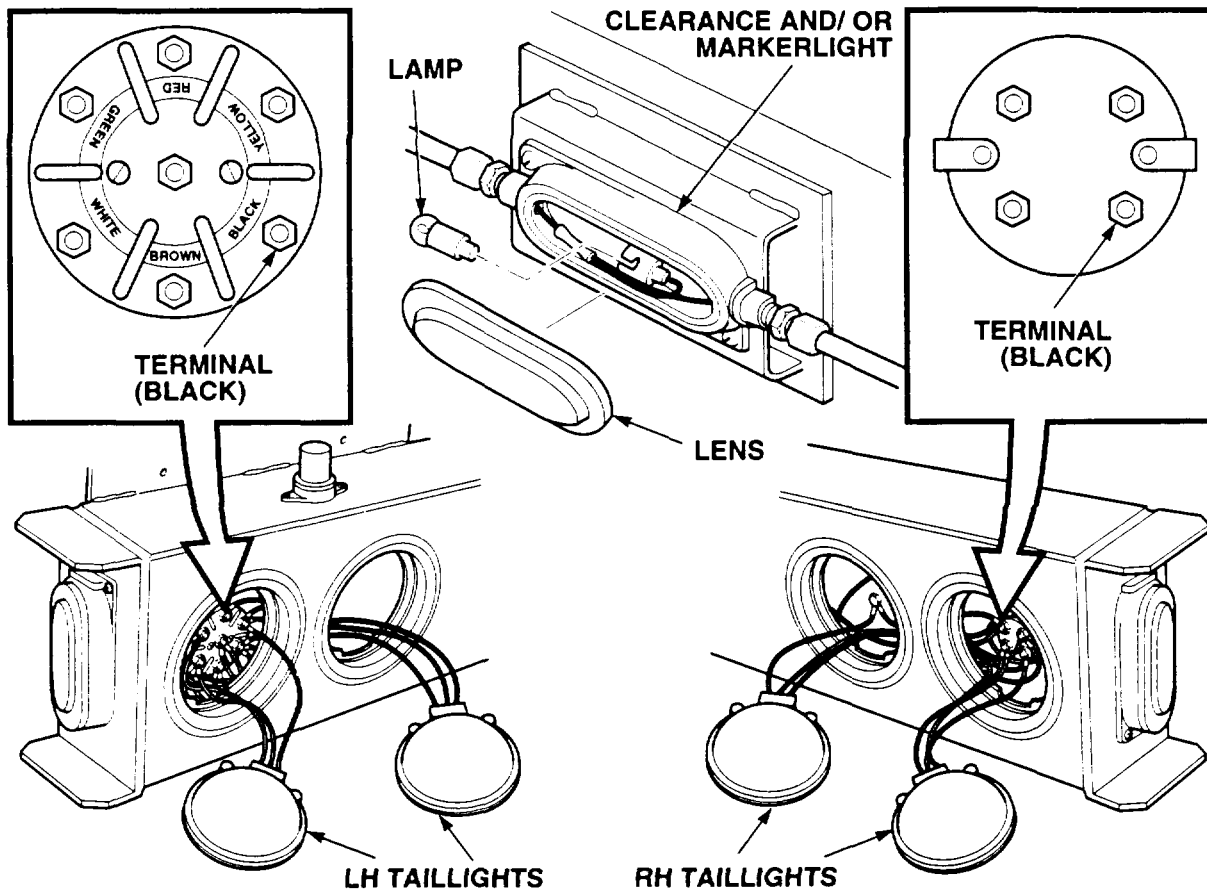
If continuity is present, replace or repair wire between 24 Vdc intervehicular connector and resistor.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CHASSIS ELECTRICAL (CONT)

4. CLEARANCE LIGHTS/MARKER LIGHTS DO NOT OPERATE.



WARNING

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

Step 1. Pry taillights from grommets and check for loose ground connections. Tighten ground connections.

Step 2.. Remove lens and/or lamp and check for continuity across contacts of lamp. If continuity is not present, replace lamp (page 4-71, 4-73, 4-75, 4-80, 4-82, 4-84, 4-86, 4-89, or 4-91).

Table 4-2. Unit Troubleshooting - CONT.

**MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION**

CHASSIS ELECTRICAL (CONT)

4. CLEARANCE LIGHTS/MARKER LIGHTS DO NOT OPERATE (CONT).

Step 3. Check for 12 Vdc at connector.

If 12 Vdc are present, replace defective clearance and/or marker light (page 4-71, 4-73, 4-75, 4-80, 4-82, 4-84, 4-86, 4-89, or 4-91).

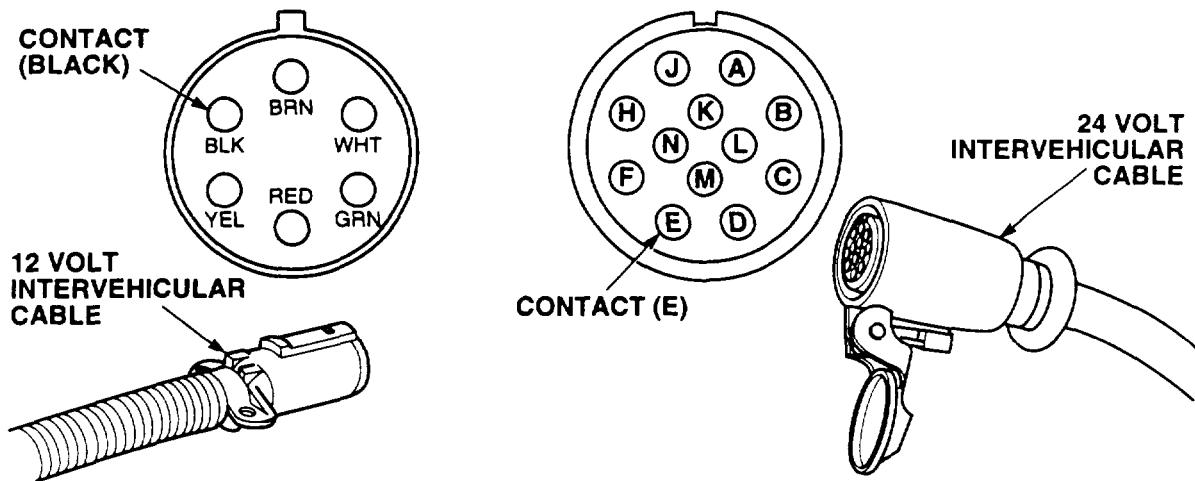
Step 4. Using a multimeter, check for 12 Vdc at LH junction block terminal marked black.

If 12 Vdc are present, replace defective clearance and/or marker light (page 4-71, 4-73, 4-75, 4-80, 4-82, 4-84, 4-86, 4-89, or 4-91).

Step 5. If only RH clearance and/or marker lights are out, use a multimeter and check RH junction block terminal marked black.

If 12 Vdc are present, replace defective clearance and/or marker light (page 4-71, 4-73, 4-75, 4-80, 4-82, 4-84, 4-86, 4-89, or 4-91).

If 12 Vdc are not present, replace or repair wire between junction blocks.



Step 6. If clearance and/or marker lights do not work, use a multimeter and check continuity between contacts marked BLK on both ends of intervehicular cable.

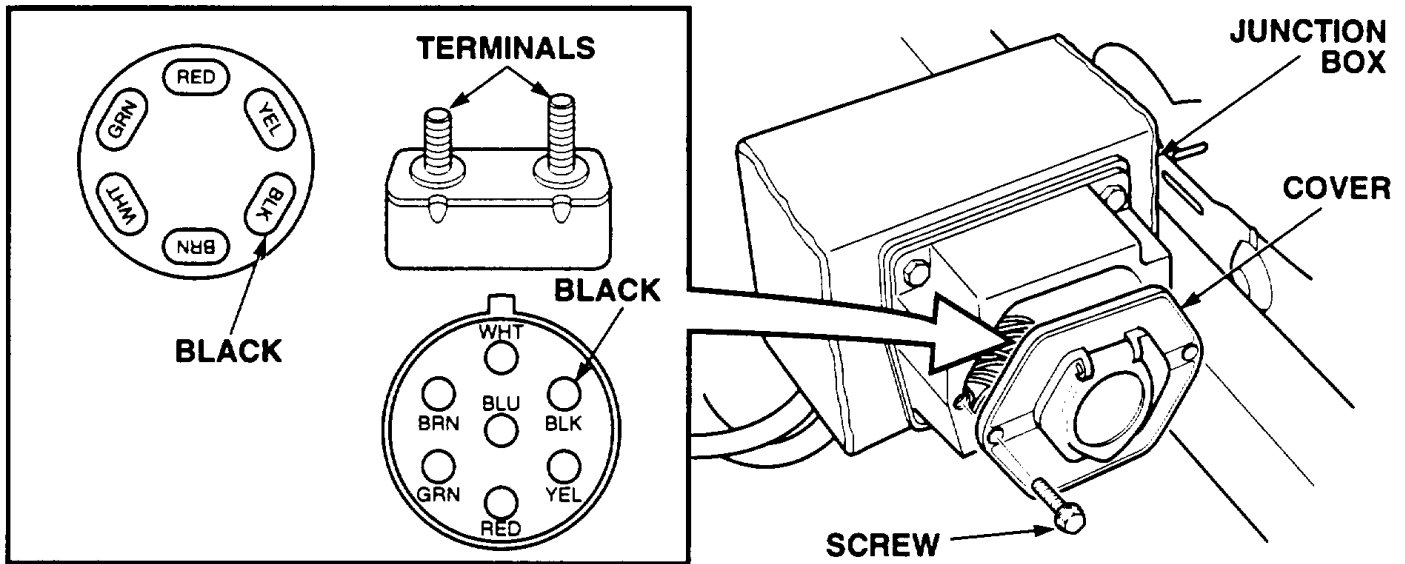
If continuity is not present, replace cable.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

4. CLEARANCE LIGHTS/MARKER LIGHTS DO NOT OPERATE (CONT).



Step 7. Remove screws and cover from junction box. Using a multimeter, check for continuity across terminals on circuit breaker marked BLK.

If continuity is present, replace or repair wiring between junction box and junction block.

If continuity is not present, replace circuit breaker (page 4-97).

Step 8. Using a multimeter, check for continuity across pin marked BLK and jumper to the circuit breaker marked BLK.

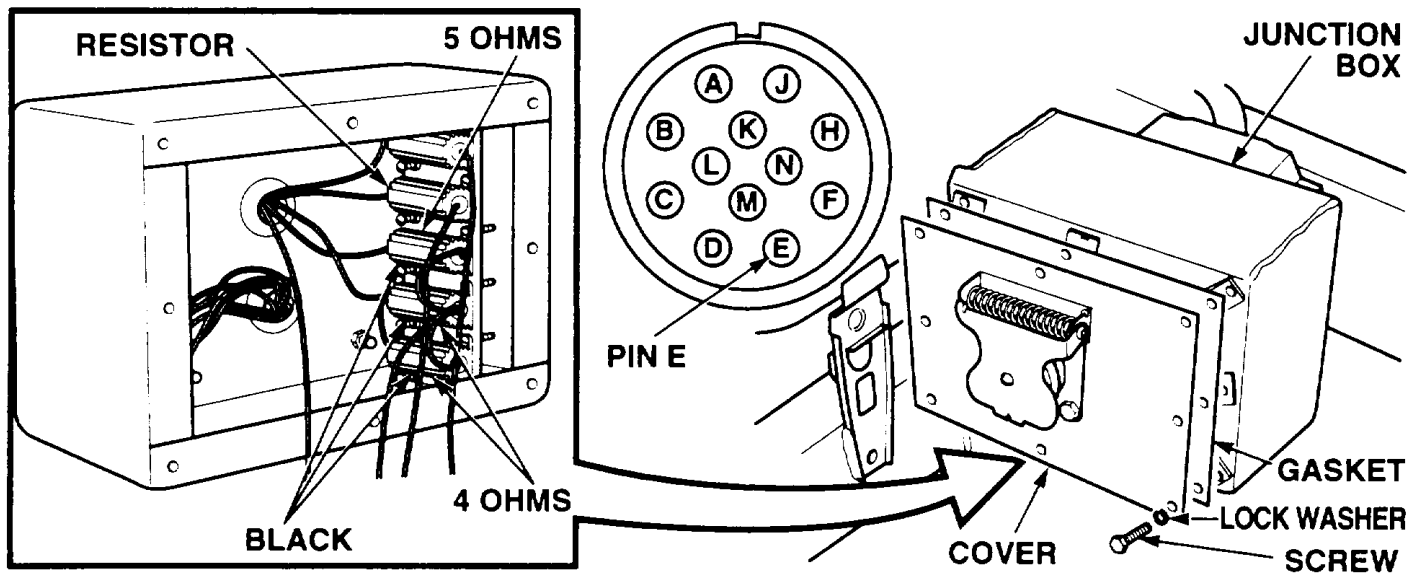
If continuity is not present, replace 12 Vdc intervehicular connector (page 4-97).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

4. CLEARANCE LIGHTS/MARKER LIGHTS DO NOT OPERATE (CONT).



Step 9. Remove screws, lock washers, cover, and gasket from junction box. Tag, mark, and disconnect wires from resistors. Using a multimeter, check resistance across resistor(s).

If 4 ohms + 1 are not measured, replace resistor (page 4-65).

Step 10. Using a multimeter, check continuity between pin E on 24 Vdc intervehicular connector and resistor.

If continuity is not present, replace 24 Vdc intervehicular connector (page 4-93).

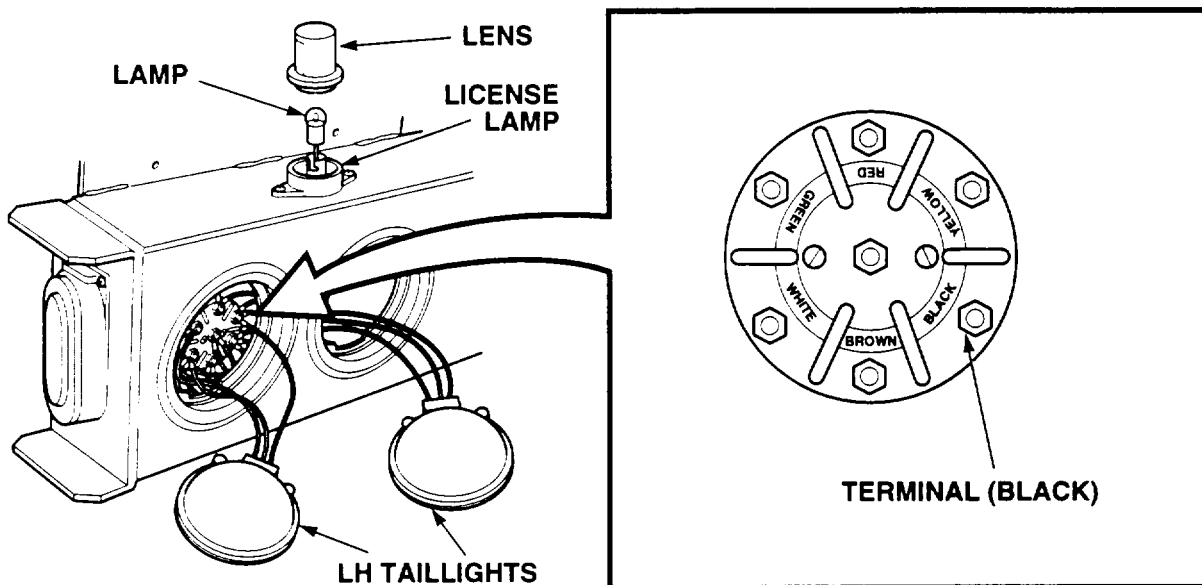
If continuity is present, replace or repair wire between 24 vdc intervehicular connector and resistor.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

5. LICENSE LAMP ASSEMBLY DOES NOT OPERATE.

**WARNING**

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

Step 1. Remove lens and lamp and check for continuity across lamp.

If continuity is not present, replace lamp (page 4-77).

Step 2. Pry LH taillights from grommets and check for loose ground connection.

Tighten ground connection.

Step 3. Using multimeter, check for 12 Vdc at LH junction block terminal marked BLACK.

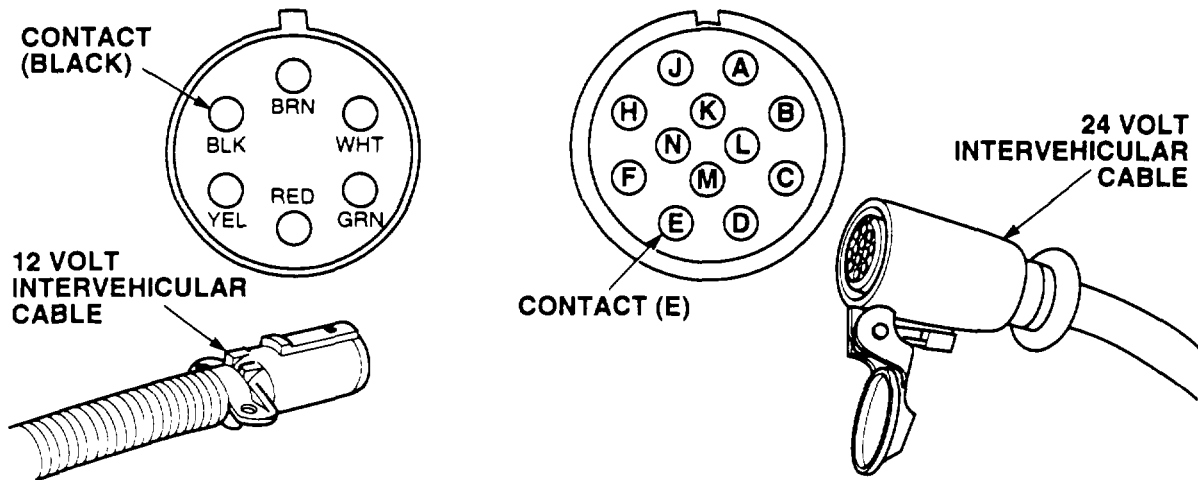
If 12 Vdc are present, replace defective license lamp assembly (page 4-77).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

5. LICENSE LAMP ASSEMBLY DOES NOT OPERATE (CONT).



Step 4. If license lamp assembly does not work, use a multimeter and check continuity between contacts marked BLK on both ends of intervehicular cable.

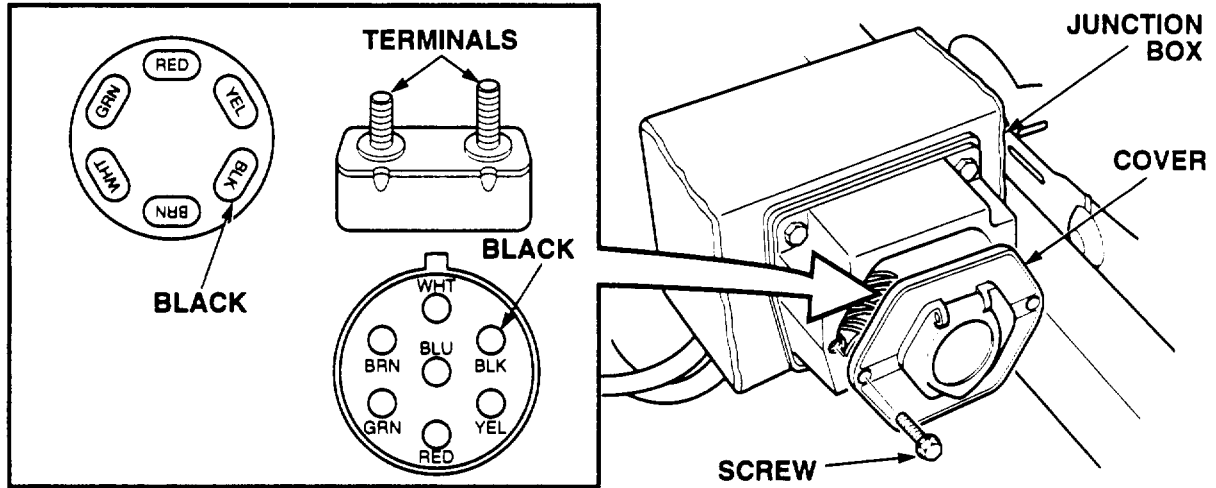
If continuity is not present, replace cable.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

5. LICENSE LAMP ASSEMBLY DOES NOT OPERATE (CONT).



Step 5. Remove screws and cover from junction box. Using a multimeter, check for continuity across terminals on circuit breaker marked black.

If continuity is present, replace or repair wiring between junction box and junction block.

If continuity is not present, replace circuit breaker (page 4-97).

Step 6. Using a multimeter, check for continuity across pin marked BLK and jumper to the circuit breaker marked BLK.

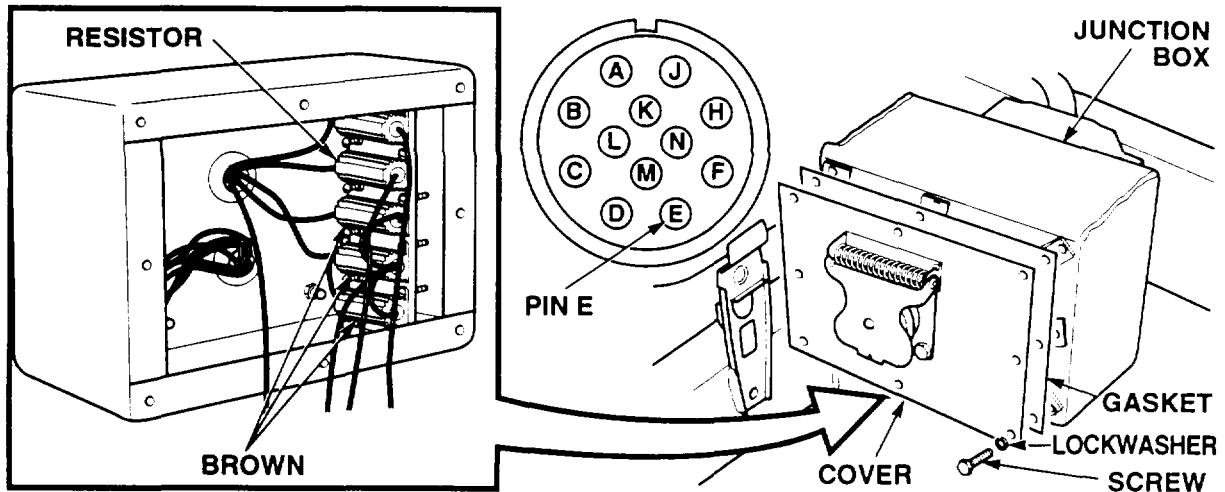
If continuity is not present, replace 12 Vdc intervehicular connector (page 4-97).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHASSIS ELECTRICAL (CONT)

5. LICENSE LAMP ASSEMBLY DOES NOT OPERATE (CONT).



Step 7. Remove screws, lock washers, cover, and gasket from junction box. Tag, mark, and disconnect wires from resistors. Using a multimeter, check resistance across resistor(s).

If 4 ohms + 1 are not measured, replace resistor (page 4-65).

Step 8. Using a multimeter, check continuity between pin E on 24 Vdc intervehicular connector and resistor.

If continuity is not present, replace 24 Vdc intervehicular connector (page 4-93).

If continuity is present, replace or repair wire between 24 vdc intervehicular connector and resistor.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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TRANSFER OIL SYSTEM

1. PUMP DOES NOT ROTATE.

Step 1. With power off, remove nuts, screws, lock washers, and belt guard cover. Check for loose, broken, or missing pump motor belts.

Tighten or replace pump motor belts (page 4-199).

Step 2. Check for loose or broken sheaves.

Tighten or replace sheaves (page 4-202).

WARNING

- Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time.
- Hearing protection is required for operator and also for all personnel working in and around this vehicle while engine is running.

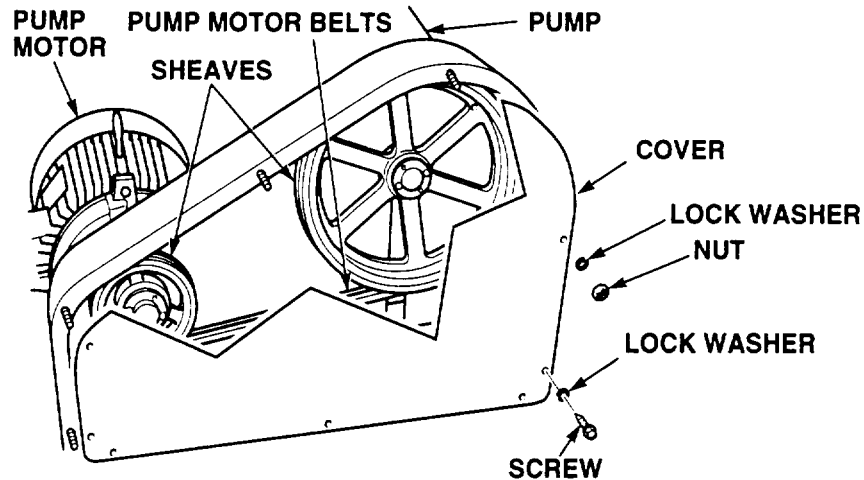


Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

TRANSFER OIL SYSTEM (CONT)**2. PUMP IS NOISY.**

Step 1. Using a straight edge, check that pump motor sheave and pump sheave are aligned.

Align sheaves (page 4-202).

Step 2. Remove belts and turn pump by rotating sheave and check for noise.

Replace pump (page 4-196).

Step 3. With power connected, check for rotation of pump motor.

If pump motor belts are in order and pump motor works, replace pump (page 4-196).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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TRANSFER OIL SYSTEM (CONT)**3. PUMP OUTPUT IS WEAK.**

Step 1. Check for loose or leaking pipe or hose connections.

Tighten connections. If leaks do not stop, gaskets may need replacement.

Step 2. Check strainer for clogging.

Service strainer (page 4-204).

Step 3. Check speed of pump motor. Motor should operate at 1,735 RPM.

If pump operates at less than 1,700 RPM, replace pump motor (page 4-277).

4. TRANSFER OIL DOES NOT CIRCULATE PROPERLY.

Step 1. Check strainer for clogging.

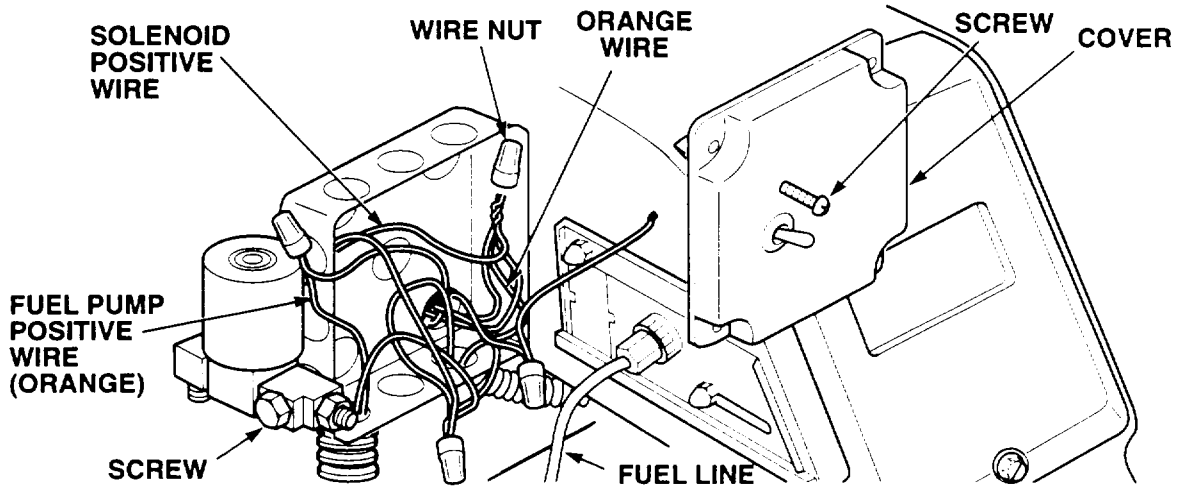
Service strainer (page 4-204).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER

1. BURNER DOES NOT FIRE.



WARNING

- Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark.
Failure to comply may result in serious injury or death.
- Fuel may be forced out of line quickly. Be sure protective equipment is worn, face is not in direction of fuel flow, and your mouth is not open.

Step 1. Loosen screw on solenoid. Place an approved container under fuel line. While assistant momentarily pushes BURNER START button, observe line fuel. Tighten screw.

If fuel does not flow from line, go to Step 2.

If fuel does flow from line, go to Step 5.

Table 4-2. Unit Troubleshooting - CONT.

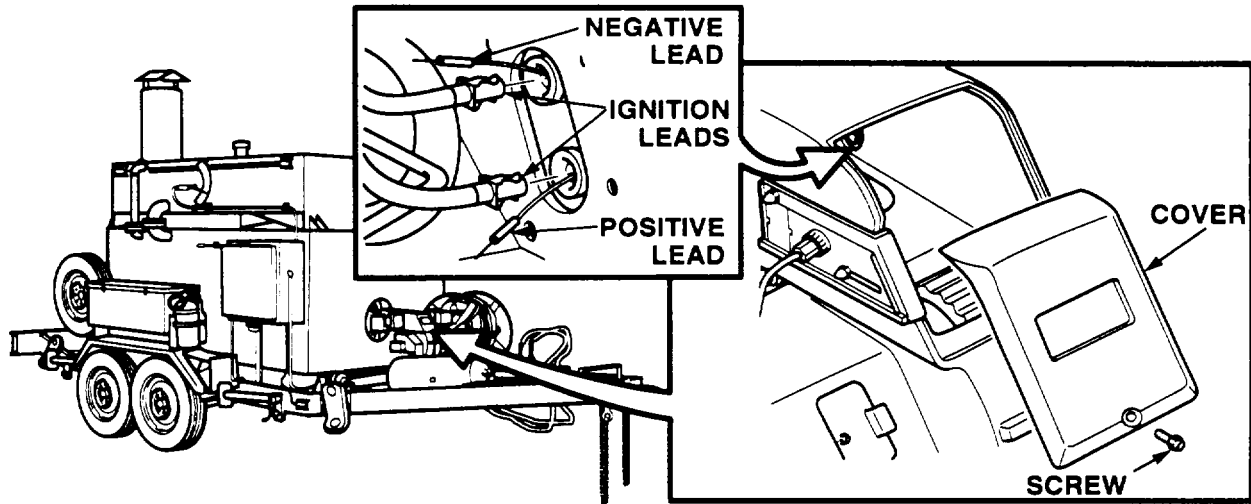
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
BURNER (CONT)		
1. BURNER DOES NOT FIRE (CONT).		
	Step 2. Remove four screws and cover. Remove and discard wire nut and check for 120Vac at orange wire.	
		If 120 Vac is not present, install wire nut, cover, and screws and replace burner controller (page 4-275).
	Step 3. With power off, using multimeter, check for resistance between positive wire of solenoid and known good ground.	
		If resistance is more than zero ohms, install wire nut, cover, and screws and replace burner solenoid (page 4-264).
	Step 4. Using multimeter, check for resistance between positive wire of fuel pump and known good ground.	
		If resistance is more than zero ohms, install wire nut, cover, and screws and replace fuel pump (page 4-240).
	Step 5. Check air adjust.	
		Adjust air setting (page 4-232).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER (CONT)

1. BURNER DOES NOT FIRE (CONT) .



WARNING

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

Step 6. Remove screw and cover. Disconnect ignition leads from burner transformer. Using multimeter, check for 9,000 V to 12,000 V output from burner transformer.

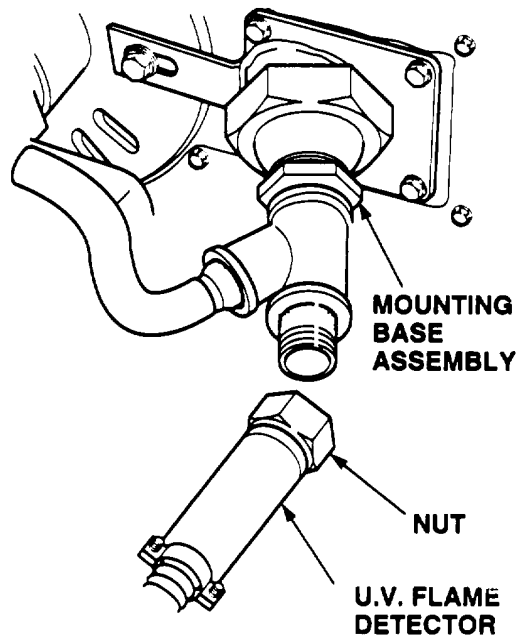
If output is high or low, replace burner transformer (page 4-253).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER (CONT)

1. BURNER DOES NOT FIRE (CONT).



Step 7. Loosen nut and remove U.V. flame detector. Check for damaged or dirty sensor surface.

If surface is damaged, replace U.V. flame detector (page 4-161).

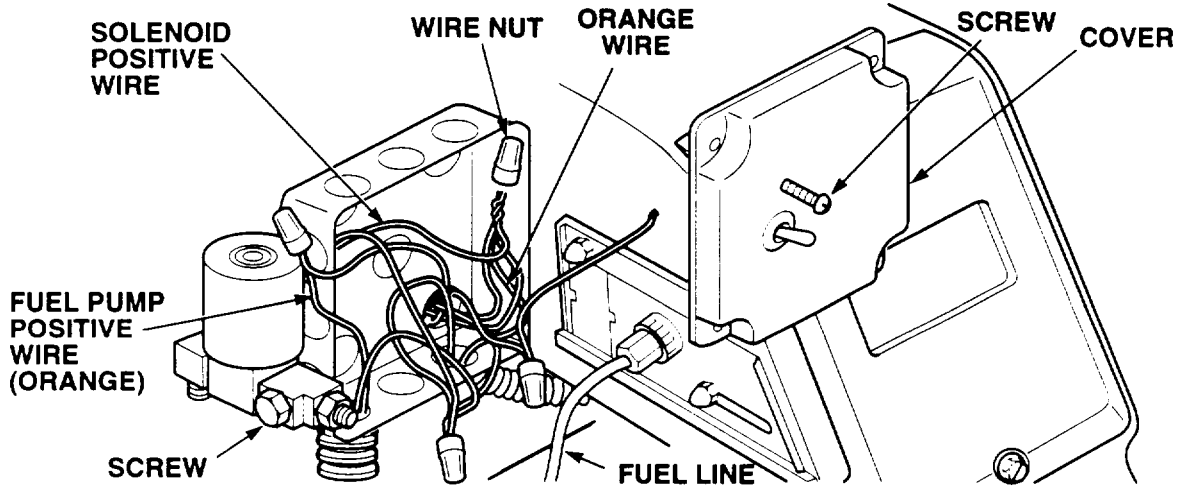
If surface is dirty, clean with rag and install U.V. flame detector. Tighten nut.

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER (CONT)

2. BURNER FLAME FAILS.



WARNING

- Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.
- Fuel may be forced out of line quickly. Be sure protective equipment is worn, face is not in direction of fuel flow, and your mouth is not open.

Step 1. Loosen nut screw on solenoid. Place an approved container under fuel line. While assistant momentarily pushes BURNER START button, observe for fuel. Tighten screw.

If fuel does not flow from line, go to Step 2.

If fuel does flow from line, go to Step 5..

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BURNER (CONT)**2. BURNER FLAME FAILS (CONT).**

Step 2. Remove two screws and cover. Remove and discard wire nut and check for 120 Vac at orange wire.

If 120 Vac is not present, install wire nut, cover, and screws and replace burner controller (page 4-275).

Step 3. With power off, using multimeter, check for resistance between positive wire of solenoid and known good ground.

If resistance is more than zero ohms, install wire nut, cover, and screws and replace burner solenoid (page 4-264).

Step 4. Using multimeter, check for resistance between positive wire of fuel pump and known good ground.

If resistance is more than zero ohms, install wire nut, cover, and screws and replace fuel pump (page 4-240).

Step 5. Check air adjust.

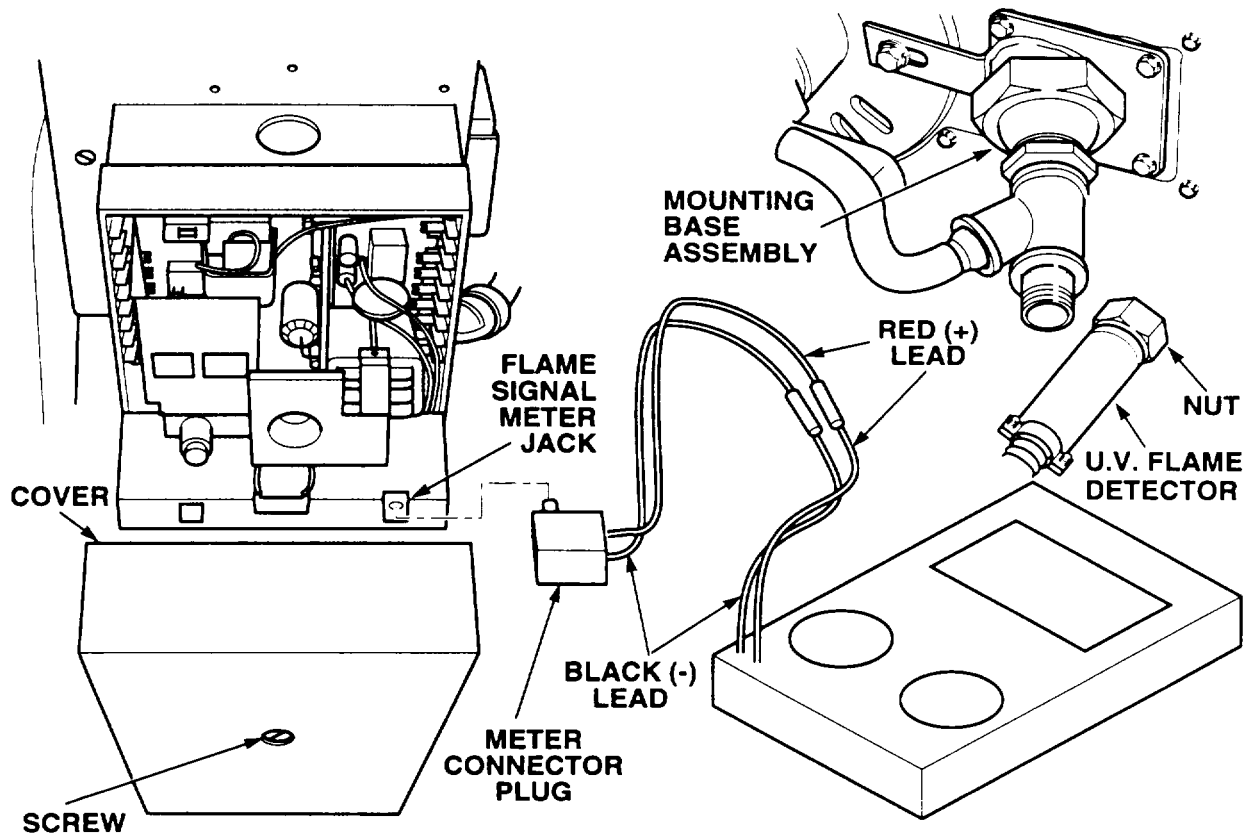
Adjust air setting (page 4-232).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER (CONT)

2. BURNER FLAME FAILS (CONT).



Step 6. Loosen screw and remove cover from burner controller. Connect red (+) lead of multimeter with 0-25 microamp dc range to red spade tip of meter connector plug. Connect black (-) lead of multimeter to black spade tip of meter connector plug. Insert meter connector plug in flame signal meter jack of burner controller. Loosen nut and move flame detector until a steady reading of 3 1/2 (min.) to 7 1/2 (max.) microamps is measured. Tighten nut.

If steady reading of 3 1/2 (min.) to 7 1/2 (max.) microamps cannot be obtained, replace flame detector (page 4-161).

If steady reading of 3 1/2 (min.) to 7 1/2 (max.) microamps is found and flame continues to fail, replace burner controller (page 4-275).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER (CONT)

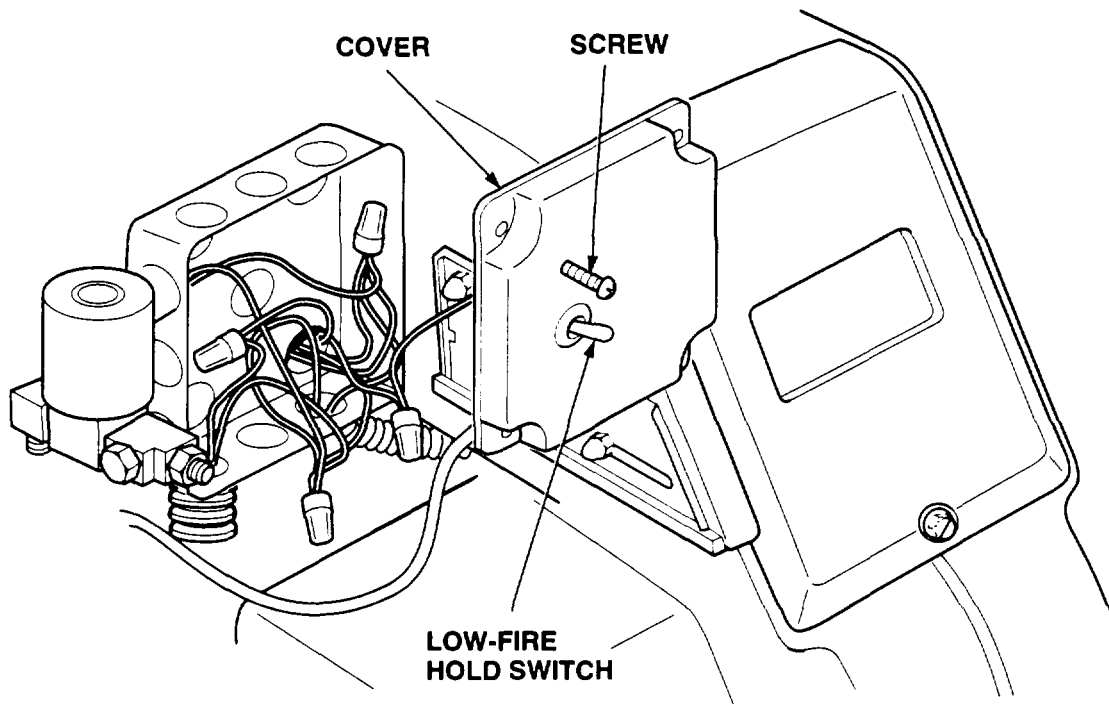
3. SMOKY EXHAUST.

Step 1. Remove burner cover (page 295) and check adjustment of head and air setting.

Adjust head and air setting (page 4-232).



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



Step 2. Remove two screws and cover and check for 120 Vdc at low fire hold switch while in OUT position.

If 120 Vdc are present, replace damper motor (page 4-268).

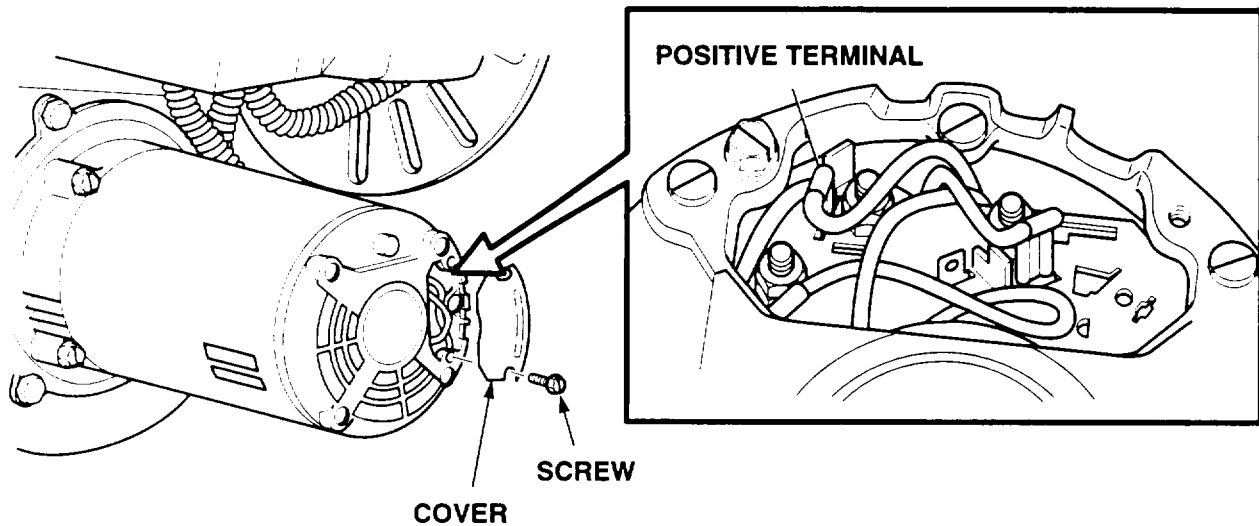
If 120 Vdc are not present, replace burner controller (page 4-275).

Table 4-2. Unit Troubleshooting - CONT.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BURNER (CONT)

4. BURNER MOTOR DOES NOT OPERATE.



WARNING

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

Step 1. Remove two screws and cover and check for 120 Vac at positive terminal using multimeter.

If 120 Vac is present, replace burner motor (page 4-247).

NOTE

Burner assembly must be completely cooled before performing Step 2.

Step 2. Remove screw and cover. Loosen two screws, and remove subbase. Loosen three screws and subbase plate. Using multimeter, check for 12,000 to 18,000 ohms resistance between white wire and each red wire of coil. Measured resistance should be within 1,000 ohms on each wire.

If resistance is not within 1,000 ohms on each wire, or resistance is high or low, replace burner coil (page 4-260).

If resistance is good, replace burner controller (page 4-275).

Section V. UNIT MAINTENANCE PROCEDURES**4-20. UNIT MAINTENANCE INTRODUCTION.**

Instructions in this section provide general procedures to be followed for inspection, removal, cleaning, repair, replacement, or installation of components and testing authorized at the unit level as specified by the Maintenance Allocation Chart (MAC).

4-21. SERVICING EQUIPMENT.

- a.** Perform the PMCS and lubrication instructions contained in Table 4-1.
- b.** Schedule the next preventive maintenance checks and services on DD Form 314, Preventive Maintenance Schedule and Record.

4-22. OPERATIONAL CHECKS.

All operational checks included in the maintenance procedures will include the techniques and methods required to ensure the satisfactory performance of the Heater. Reference the operator's instructions for starting, operating, and shutdown procedures.

4-23. INSPECTION OF COMPONENTS.

a. Examine bearings for rusted or pitted rollers, balls, races, or separator. Examine balls and races for abrasion and/or serious discoloration. The following are conditions for bearing rejection:

- (1) Cuts or grooves parallel to ball or roller rotation.

NOTE

Nicks and gouges outside race load areas are not cause for rejection unless deep enough to cause bearing binding or misalignment.

- (2) Fatigue pits (as opposed to minor machine marks or scratches).

- (3) Clean all parts before inspection. Check for defects such as physical distortion, wear, cracks, and pitting.

b. Check all hose surfaces for broken or frayed fabric, breaks caused by sharp kinks, or chafing against other parts of the unit. Inspect metal tubing lines for kinks. Inspect fitting threads for damage. Replace any defective part. Check for leaks after assembly and during initial operation period.

c Visually inspect all castings and weldments for cracks.

d. Inspect all wiring for chafed or burned insulation. Inspect all terminal connectors for loose connections and broken parts.

e. Inspect gears and splines for cracks, pitting, and discoloration.

4-24. UNIT CLEANING PROCEDURES.**WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - a. When cleaning ball or roller bearings, place in a basket and suspend in a container of drycleaning solvent, P-D-680 (item 21, Appendix E). If necessary, use a brush (item 2, Appendix E) to remove caked grease or chips. Avoid rotating bearings before solid particles are removed to prevent damaging races and balls.
 - b. Do not clean preformed packings or other rubber parts in drycleaning solvent. Wipe with a clean, dry, lint-free cloth.
 - c. For exterior cleaning of frame and structural components, use detergent (item 11, Appendix E) in a solution as recommended on the container. Leave application on items surface for approximately 10 minutes before rinsing. Rinse with hot or cold water under pressure. If available, use hot water under 80 to 120 lb (36 to 54 kg) pressure. An ordinary garden hose may be used if no other equipment is available. If pressurized water supply is not available, wash painted surfaces with a solution of 1/4 cup soap chips (item 3, Appendix E) to one gallon of water.

WARNING

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

d. Electrical parts such as coils, connectors, switches, and insulated wiring, should not be soaked or sprayed with cleaning solutions. Clean these parts with a clean, dry cloth moistened with drycleaning solvent, P-D-680 (item 21, Appendix E).

4-25. REMOVAL AND DISASSEMBLY OF COMPONENTS.

- a.* Before removal of any electrical component, disconnect from power source.
- b.* Ensure that adequate clearance is available for removal of the component. Disassemble the Heater to the extent necessary to provide adequate working clearance.

WARNING

All personnel must stand clear during lifting operations. A swinging or shifting load may cause injury or death to personnel.

c. Use a chain hoist, jack, or other aid when lifting heavier components. Lifting device should be positioned and attached to components to remove all strain from mounting hardware, before last hardware is removed.

d. Discard preformed packings, gaskets, seals, and similar material when removed. Be sure that all traces of oil, gaskets, and sealants are removed. When possible, use wood or plastic probes and scrapers to prevent damage to machined surfaces.

e. Cotter pins, lock washers, lockwire, self-locking nuts, and similar devices should be discarded when removed. Self-locking fasteners that loosen up must be replaced, not tightened.

f. To prevent moisture and foreign matter from entering open housings, lines, and other openings, use protective coverings as soon as possible after disassembly. Wrap all parts in clean paper or dip parts in preservative oil (item 17, Appendix E) or equivalent.

4-25. REMOVAL AND DISASSEMBLY OF COMPONENTS (CONT).

g. Remove parts only if repair or replacement is required. Do not disassemble a component any further than necessary to accomplish needed repairs.

4-26. PAINTING.

Instructions for preparation of material to paint, how to paint, and material to be used are in TM 43-0139. Instructions for camouflage painting are contained in FM 5-20. Instructions for stenciling and marking military vehicles are listed in TB 43-0209. Data plate location and description are listed in Chapter 2.

4-27. LUBRICATION.

Refer to Section III, Preventive Maintenance Checks and Services, Lubrication Instructions, and Mandatory Replacement Parts (page 4-5), for lubrication procedures and requirements for the Heater. The instructions include types and grades of lubricant used, lube points, locations, and frequency of the required lubrication.

4-28. ASSEMBLY.

- a.** Remove protective grease coatings from new parts before installation.
- b.** To replace preformed packings, first clean groove, then stretch ring into position. A light coating of fluid, which the preformed packing will operate in, will make assembly easier.
- c.** Coat oil seals evenly with oil (item 16, Appendix E) or grease (item 14, Appendix E) before installing. Install oil seals with seal lip facing in, applying an even force to the outer edge of seal. If oil seals are to be installed over keyed or splined shafts, use a guide to prevent sharp edges of the keyway or spline from cutting the seal. Guides can be very thin gage sheet metal shaped to the required diameter. Make certain guide edges are not sharp and are bent slightly inward so they do not cut the seal.
- d.** Lubricate bearings before reassembly with the type of lubricant normally used in the related housing or container. This will provide lubrication during the run-in until lubricant from the system can reach the bearings.

4-29. INSTALLATION.

Put hoses, tubes, lines, and electrical wiring in place by matching identification tags and markings on equipment and using illustrations presented. Replace cable ties (item 24, Appendix E) as necessary. Use sealing compounds as required in each maintenance task. When installing screws and nuts, be sure to tighten to torque values given. Refer to tables 4-3 and 4-4 for standard and metric torque values. All torques listed are dry torques.

4-30. ADJUSTMENT.

Make changes to equipment pressures, settings, and positions only as required in each maintenance task. Adjustments will bring the equipment into proper operating conditions.

Table 4-3. U. S. Standard Torque Values

Thread Size	Minimum Breakaway Torque Value S.A.E. Grade 2		Minimum Breakaway Torque Value S.A.E. Grade 5		Minimum Breakaway Torque Value S.A.E. Grade 8	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
1/4-20	5 lb-ft	7 N•m	8 lb-ft	11 N•m	12 lb-ft	16 N•m
1/4-28	6 lb-ft	8 N•m	10 lb-ft	14 N•m	14 lb-ft	19 N•m
5/16-18	11 lb-ft	15 N•m	17 lb-ft	23 N•m	24 lb-ft	33 N•m
5/16-24	13 lb-ft	18 N•m	19 lb-ft	26 N•m	27 lb-ft	37 N•m
3/8-16	20 lb-ft	27 N•m	30 lb-ft	41 N•m	45 lb-ft	61 N•m
3/8-24	22 lb-ft	30 N•m	35 lb-ft	47 N•m	50 lb-ft	68 N•m
7/16-14	30 lb-ft	41 N•m	50 lb-ft	68 N•m	70 lb-ft	95 N•m
7/16-20	35 lb-ft	47 N•m	55 lb-ft	75 N•m	80 lb-ft	108 N•m
1/2-13	50 lb-ft	68 N.m	75 lb-ft	102 N•m	105 lb-ft	142 N•m
1/2-20	55 lb-ft	75 N•m	85 lb-ft	115 N•m	120 lb-ft	163 N•m
9/16-12	70 lb-ft	95 N.m	110 lb-ft	149 N•m	155 lb-ft	210 N•m
9/16-18	80 lb-ft	108 N•m	120 lb-ft	163 N•m	170 lb-ft	230 N•m
5/8-11	100 lb-ft	136 N•m	150 lb-ft	203 N•m	210 lb-ft	285 N•m
5/8-17	110 lb-ft	149 N•m	170 lb-ft	230 N•m	240 lb-ft	325 N•m
3/4-10	170 lb-ft	230 N•m	270 lb-ft	366 N•m	375 lb-ft	508 N•m
3/4-16	190 lb-ft	258 N•m	300 lb-ft	407 N•m	420 lb-ft	569 N•m
7/8-9	165 lb-ft	224 N•m	430 lb-ft	583 N•m	610 lb-ft	827 N•m
7/8-14	180 lb-ft	244 N•m	475 lb-ft	644 N•m	670 lb-ft	908 N•m
1-8	250 lb-ft	339 N•m	645 lb-ft	875 N•m	910 lb-ft	1, 234 N•m
1-12	270 lb-ft	366 N•m	705 lb-ft	956 N•m	1, 000 lb-ft	1, 356 N•m
1-14	280 lb-ft	380 N•m	720 lb-ft	976 N•m	1, 015 lb-ft	1, 376 N •m

Table 4-4. Metric Torque Values

Thread Size	Minimum Breakaway Torque Value S.A.E. Grade 2		Minimum Breakaway Torque Value S.A.E. Grade 5		Minimum Breakaway Torque Value S.A.E. Grade 8	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
4 mm	3 lb-ft	4 N•m	4 lb-ft	5 N•m	5 lb-ft	7 N•m
5 mm	5 lb-ft	7 N•m	7 lb-ft	9 N•m	9 lb-ft	12 N•m
6 mm	9 lb-ft	12 N•m	13 lb-ft	18 N•m	15 lb-ft	20 N•m
7 mm	15 lb-ft	20 N•m	21 lb-ft	28 N•m	25 lb-ft	34 N•m
8 mm	22 lb-ft	30 N•m	31 lb-ft	42 N•m	37 lb-ft	50 N•m
9 mm	28 lb-ft	38 N•m	40 lb-ft	54 N•m	47 lb-ft	64 N•m
10 mm	39 lb-ft	53 N•m	55 lb-ft	75 N•m	66 lb-ft	89 N•m
12 mm	66 lb-ft	89 N•m	93 lb-ft	126 N•m	111 lb-ft	150 N•m
14 mm	100 lb-ft	136 N•m	140 lb-ft	190 N•m	169 lb-ft	229 N•m
16 mm	152 lb-ft	206 N•m	214 lb-ft	290 N•m	256 lb-ft	347 N•m
18 mm	190 lb-ft	258 N•m	268 lb-ft	363 N•m	321 lb-ft	435 N•m
20 mm	265 lb-ft	359 N•m	372 lb-ft	504 N•m	447 lb-ft	606 N•m
22 mm	321 lb-ft	435 N•m	451 lb-ft	611 N•m	542 lb-ft	735 N•m
24 mm	412 lb-ft	559 N•m	578 lb-ft	784 N•m	695 lb-ft	942 N•m

4-31. TEMPERATURE GAGE REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

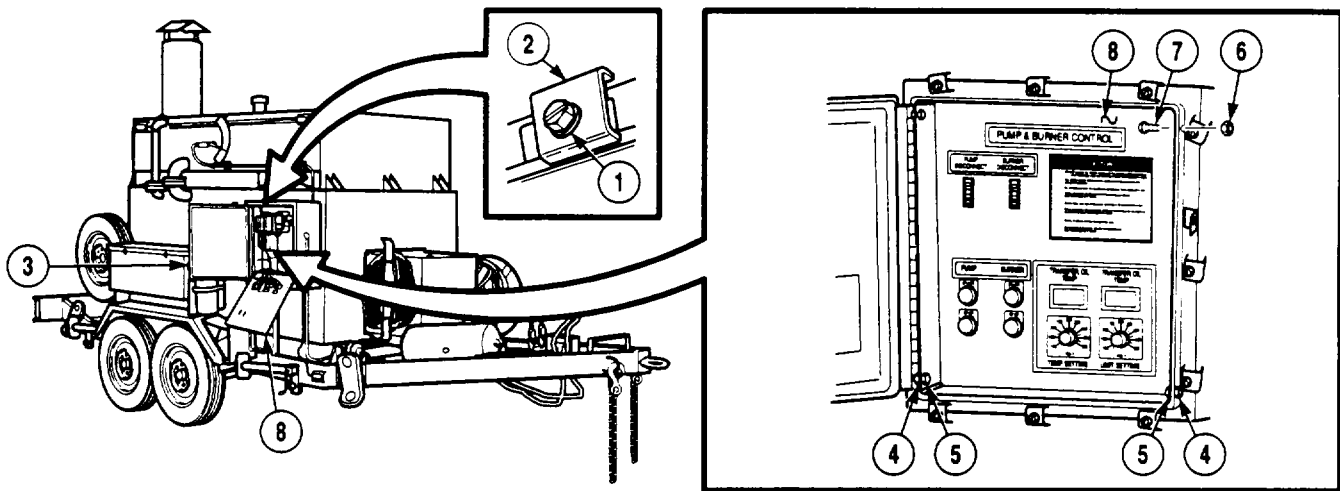
Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Source Disconnected (page 2-32)

a. Removal.



NOTE

This paragraph discusses replacement of one gage. Both gages are replaced in the same way.

- (1) Loosen nine screws (1) and clamps (2) and open cover (3).
- (2) Loosen two nuts (4) and screws (5).
- (3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.

4-31. TEMPERATURE GAGE REPLACEMENT (CONT).

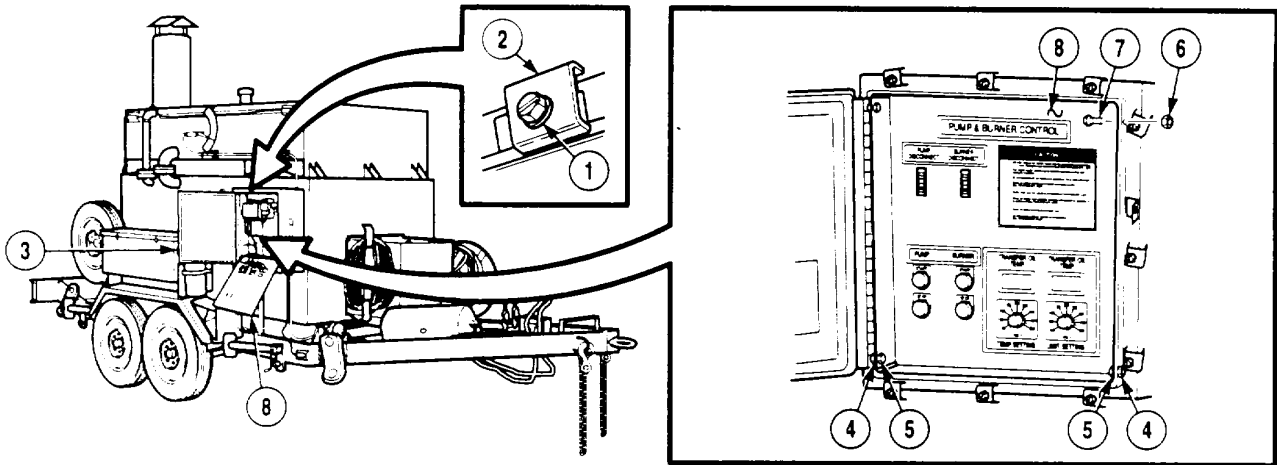
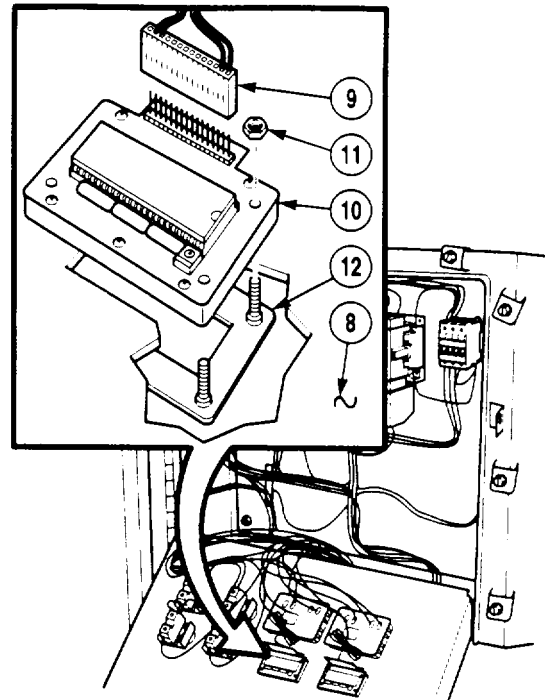
NOTE

Mark position of connector prior to removal.

- (4) Disconnect connector (9) from temperature gage (10).
- (5) Remove four nuts 11, mounting bezel (12), and temperature gage (10) from panel 8).

b. Installation.

- (1) Install mounting bezel (12) and temperature gage (10) on panel (8) with four nuts (11) and tighten nuts.
- (2) Connect connector (9) to temperature gage (10).



- (3) Lift panel (8) to upright position and install ten screws (7) and nuts (6).
- (4) Tighten two screws (7), nuts (6), two screws (5), and nuts (4).
- (5) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance. Remove wheel chocks (page 2-35).

END OF TASK

4-32. RESISTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Gun, Soldering

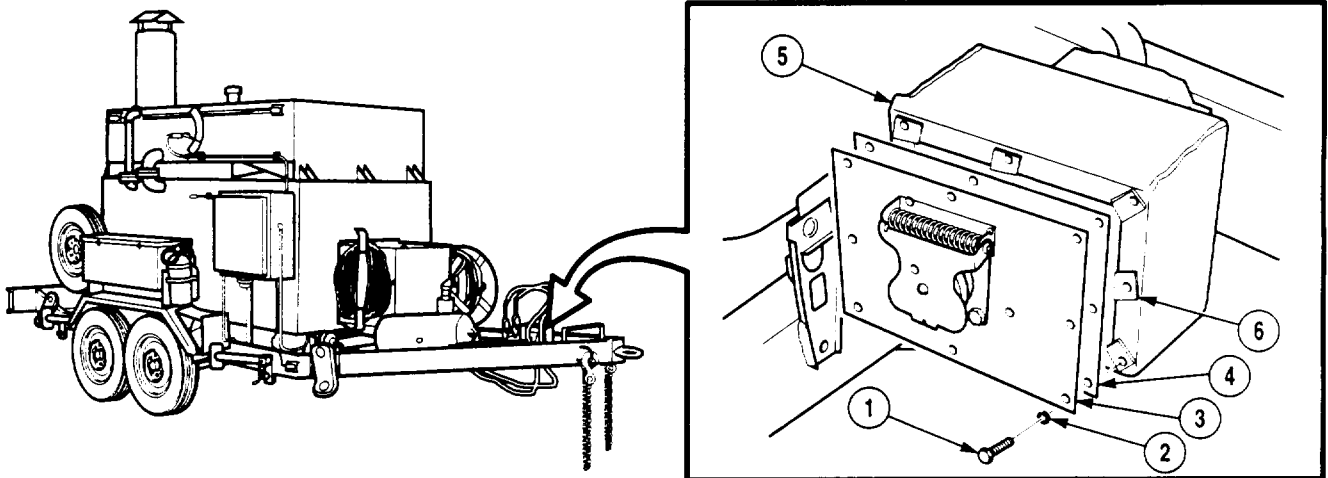
Equipment Condition

Wheels Chocked (page 2-17)
Power Source Disconnected (page 2-32)

Materials / Parts

Gasket
Solder (item 20, Appendix E)
Tags, Identification (item 22, Appendix E)
Lock Washers (8)

a. Removal.



- (1) Remove eight screws (1), lock washers (2), cover (3), and gasket (4) from junction box (5). Discard lock washers and gasket.
- (2) If damaged, remove eight cage nuts (6) from junction box (5).

4-32. RESISTOR REPLACEMENT (CONT).

NOTE

- This paragraph discusses replacement of one resistor. All resistors are replaced in the same way.
- Tag and mark all wires prior to removal.

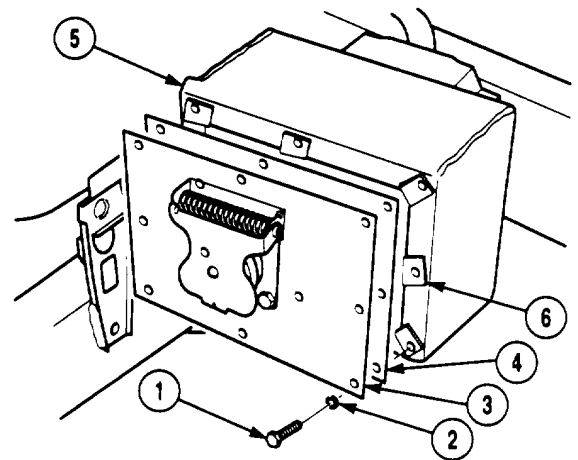
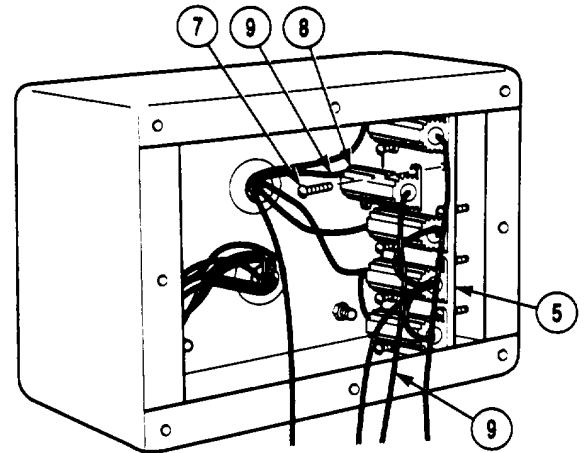
- (2) Remove two screws (7) and resistor (8) from junction box (5).
- (3) Remove wires (9) from resistor (8).

b. Installation.

- (1) Solder wires (9) on resistor (8).
- (2) Install resistor (8) with screws (7) on junction box (5).
- (3) If removed, install eight cage nuts (6) on junction box (5).
- (4) Install cover (3) and gasket (4) with eight lock washers (2) and screws (1) on junction box (5).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-33. TEMPERATURE SENSOR CONDUIT REPLACEMENT/REPAIR.

This task covers:

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

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

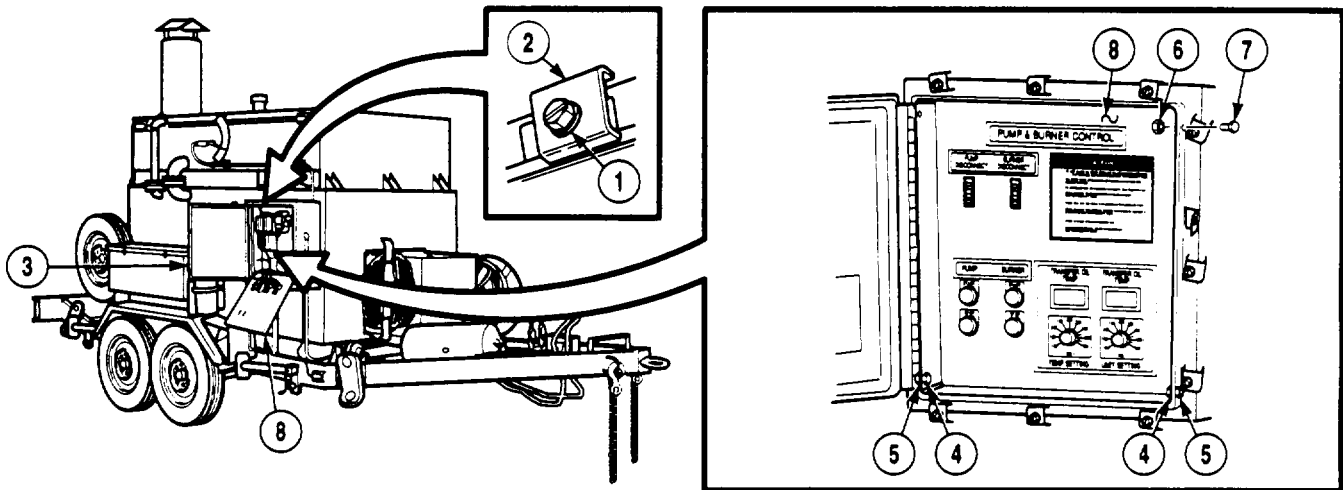
Wheels Chocked (page 2-17)

Temperature Sensors Removed (page 4-169)

Materials/Parts

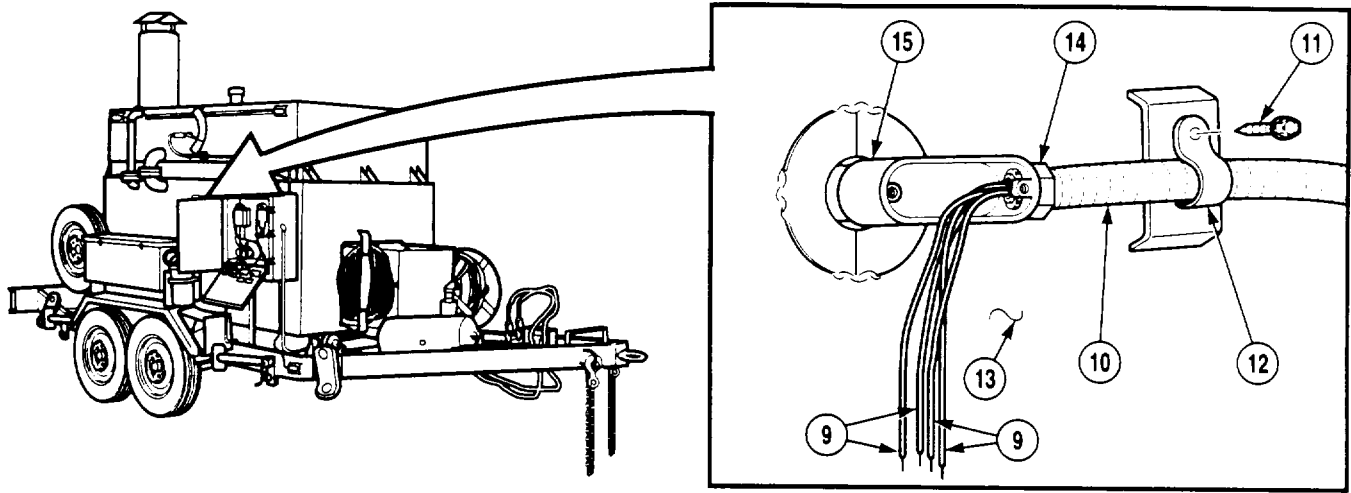
Seals (2)

a. Removal



- (1) Loosen nine screws (1) and clamps (2) and open cover (3).
- (2) Loosen two nuts (4) and screws (5).
- (3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.

4-33. TEMPERATURE SENSOR CONDUIT REPLACEMENT/REPAIR (CONT).

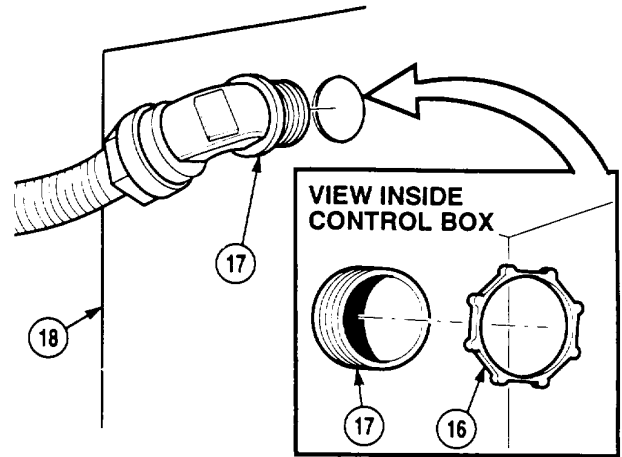


NOTE

Inspect all conduit and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.

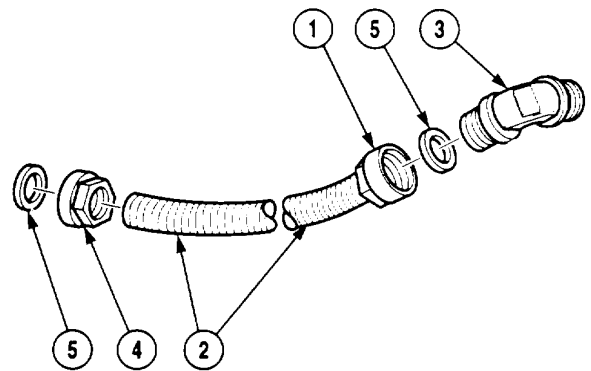
- (4) Pull four wires (9) through conduit (10) into control box .
- (5) Remove two screws (11) and clamps (12) and from Heater (13).
- (6) Loosen nut (14) and remove conduit (10) from hub (15).
- (7) Remove hub (15) from Heater (13).

- (8) Remove nut (16) and elbow (17) from control box (18).



b. Disassembly.

- (1) Loosen nut (1) and remove conduit (2) from elbow (3).
- (2) Remove nuts (1 and 4) and seals (5) from conduit (2).

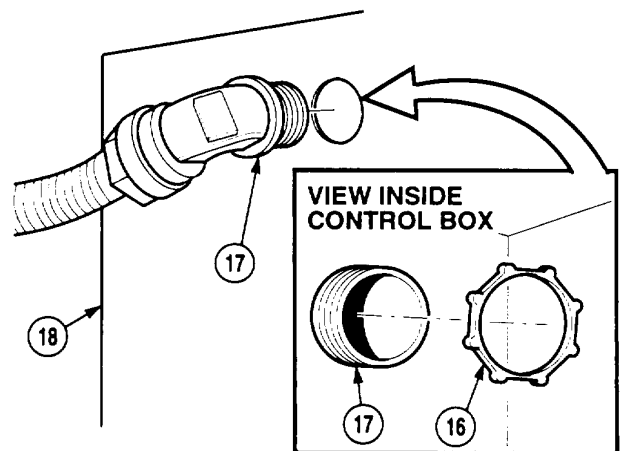


c. Assembly.

- (1) Position seals (5) and nuts (1 and 4) on conduit (2).
- (2) Position conduit (2) on elbow (3) and tighten nut (1).

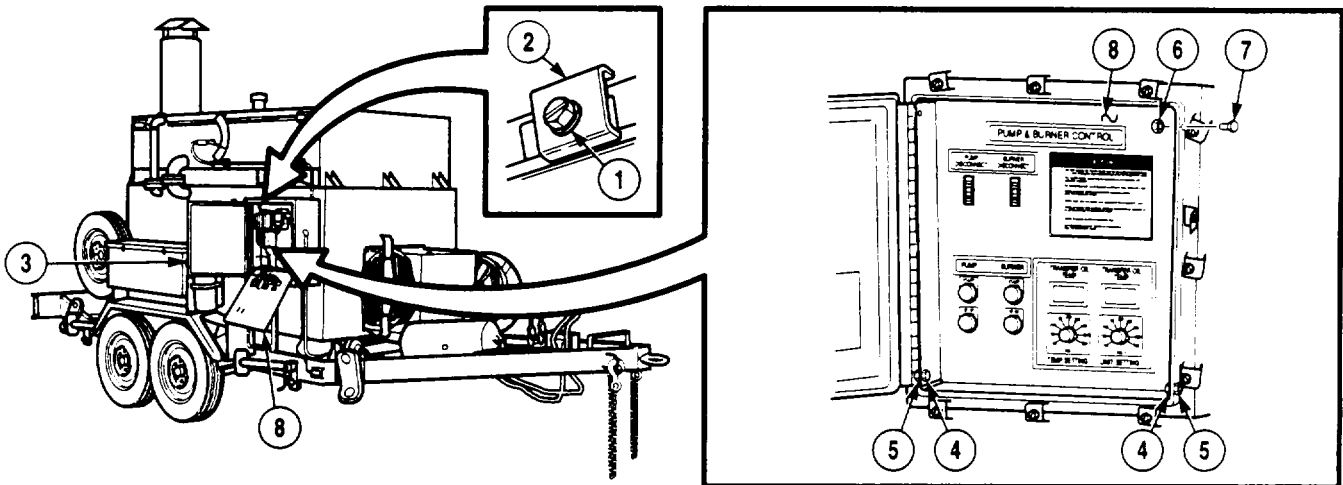
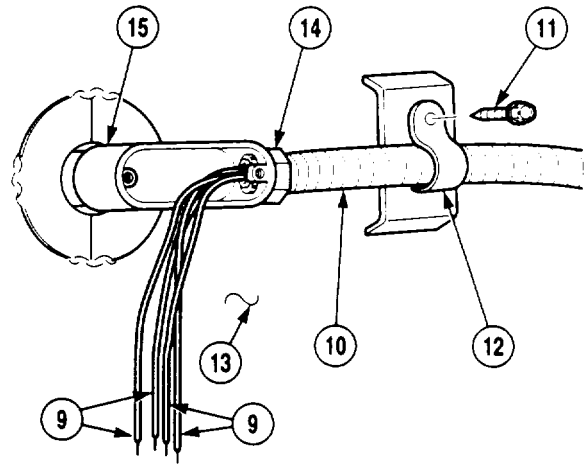
d. Installation.

- (1) Install nut (16) and elbow (17) on control box (18). Tighten nut.



4-33. TEMPERATURE SENSOR CONDUIT REPLACEMENT/REPAIR (CONT).

- (2) Install hub (15) on Heater (13).
- (3) Install conduit (10) in hub (15) and tighten nut (4).
- (4) Secure conduit (10) on Heater (13) with two clamps (12) and screws (11).



- (5) Lift panel (8) to upright position and install two screws (7) and nuts (6).
- (6) Tighten two screws (7) and nuts (6) and two screws (5) and nuts (4).
- (7) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance:

- Install temperature sensors (page 4-169).
- Remove wheel chocks (page 2-35).

END OF TASK

4-34. LEFT REAR MARKER LIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Supply Disconnected (page 2-32)

Materials /Parts

Tags, Identification (item 22, appendix E)

Preformed Packing

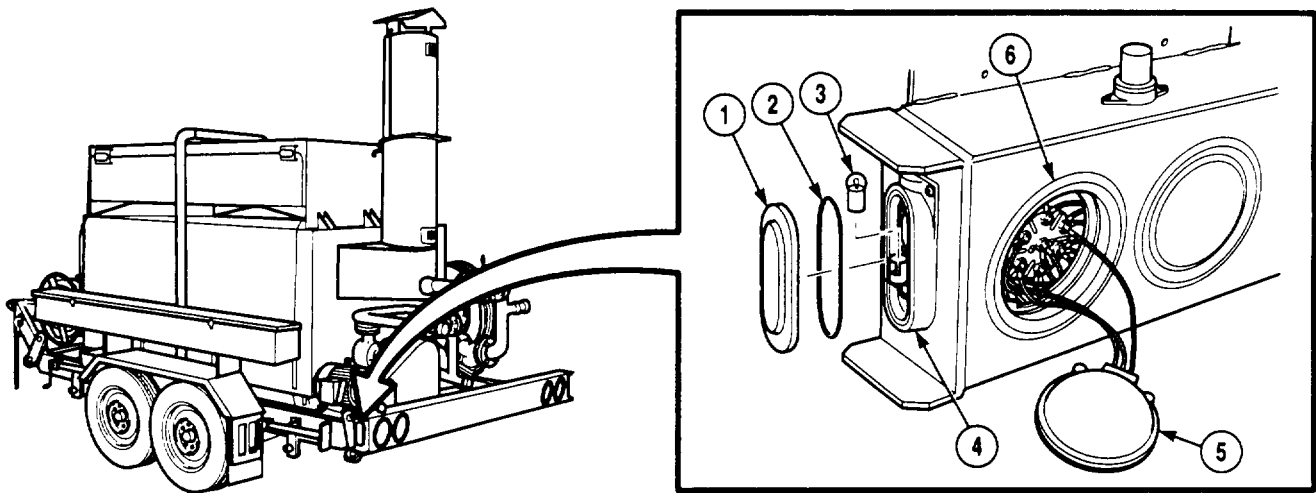
Lock Washer

Gasket

Preformed Packing

Lug, Terminal

a. Removal.



NOTE

Pry lamp assembly from top edge.

- (1) Remove lens (1) and preformed packing (2). Discard preformed packing.
- (2) Remove lamp (3) from marker light (4).
- (3) Pry lamp assembly (5) from grommet (6).

4-34. LEFT REAR MARKER LIGHT REPLACEMENT (CONT).

NOTE

Tag and mark all wires prior to removal.

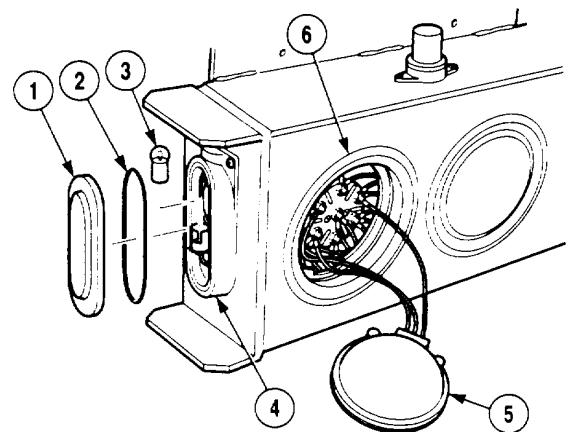
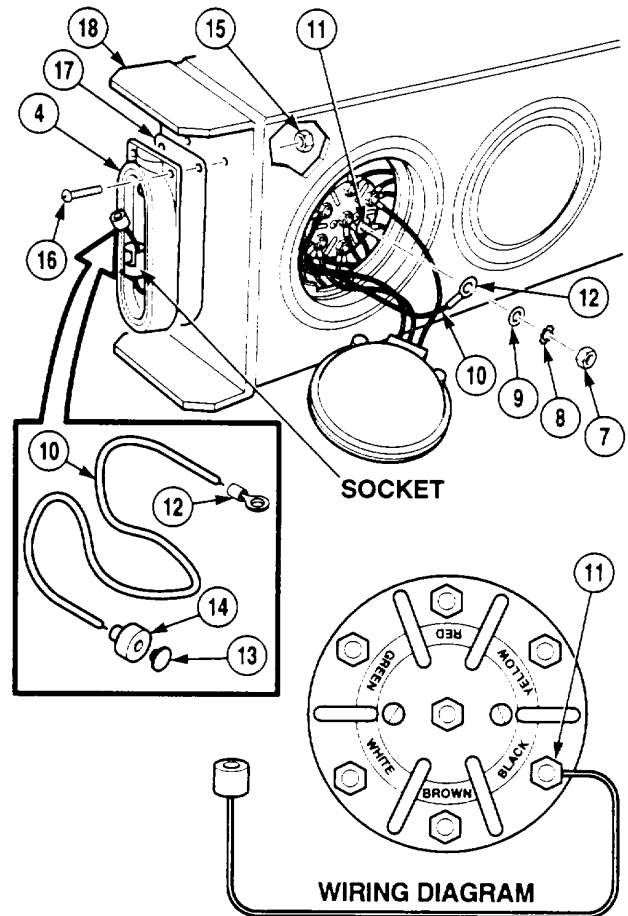
- (4) Remove nut (7), lock washer (8), washer (9), and wire (10) from black terminal (11). Discard lock washer.
- (5) Remove terminal lug (12), contact (13), and preformed packing (14) from wire (10). Discard preformed packing and terminal lug.
- (6) Remove wire (10) from marker light (4).
- (7) Remove two nuts (15), screws (16), marker light (4), and gasket (17) from bumper (18). Discard gasket.

b. Installation.

- (1) Install gasket (17) and marker light (4) with two screws (16) and nuts (15) on bumper (18).
- (2) Install terminal lug (12) on wire (10).
- (3) Place wire (10) through bumper (18), marker light (4), and socket.
- (4) Install preformed packing (14) and contact (13) on wire (10).
- (5) Install wire (10) on black terminal (11) with washer (9), lock washer (8), and nut (7). Tighten nut.
- (6) Install lamp assembly (5) in grommet (6).
- (7) Install lamp (3) in marker light (4).
- (8) Install preformed packing (2) and lens (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-35. LEFT TURN SIGNAL AND TAILLIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

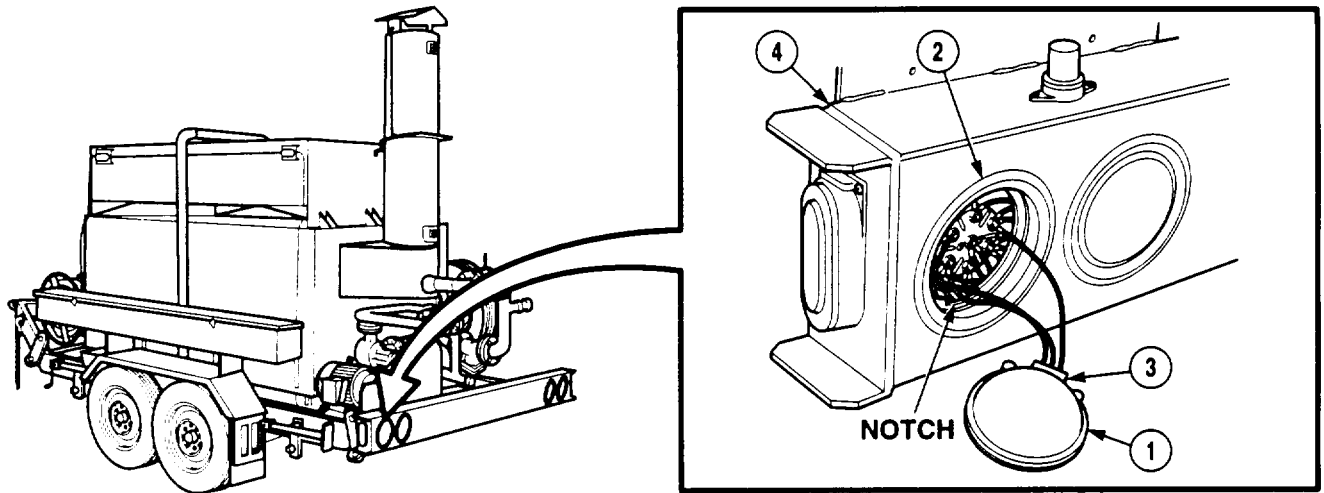
Power Source Disconnected (page 2-32)

Materials/Parts

Tags, Identification (item 22, appendix E)

Lock Washers (3)

a. Removal.



NOTE

Pry lamp assembly from top edge.

- (1) Pry lamp assembly (1) from grommet (2).
- (2) Disconnect connector (3) from lamp assembly (1).
- (3) Remove grommet (2) from bumper (4).

4-35. LEFT TURN SIGNAL AND TAILLIGHT REPLACEMENT (CONT).

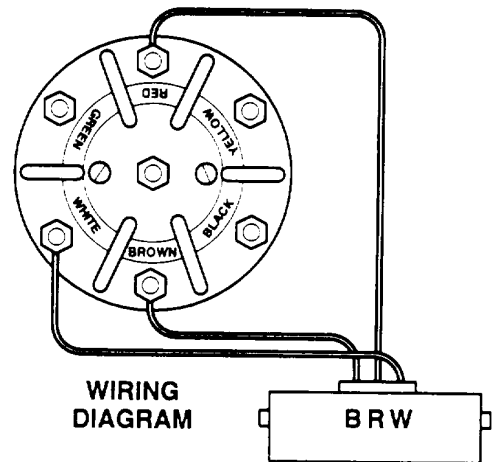
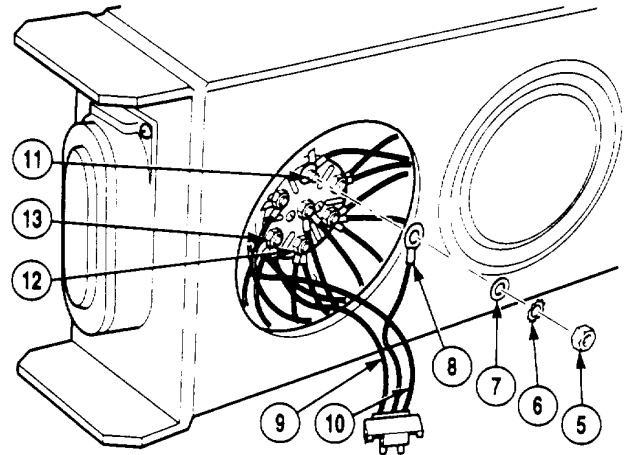
NOTE

Tag and mark all wires prior to removal.

- (4) Remove three nuts (5), lock washers (6), washers (7), and wires (8, 9, and 10) from terminals (11, 12, and 13). Discard lock washers.

b. Installation.

- (1) Install three wires (8, 9, and 10) with washers (7), lock washers (6) and nuts (5) on terminals (11, 12, and 13).



- (2) Connect connector to lamp assembly (1).

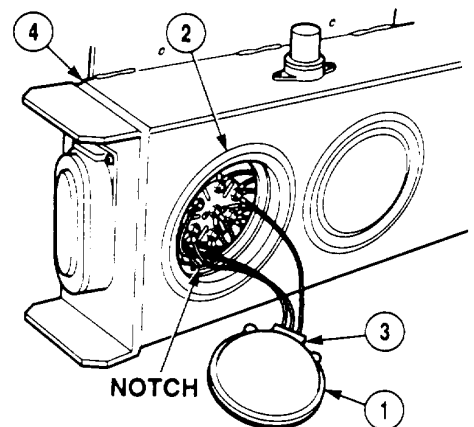
NOTE

Notch should be in the bottom position when grommet is installed.

- (3) Install grommet (2) in bumper (4).
- (4) Install lamp assembly (1) in grommet (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-36. LEFT BRAKE AND TAILLIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

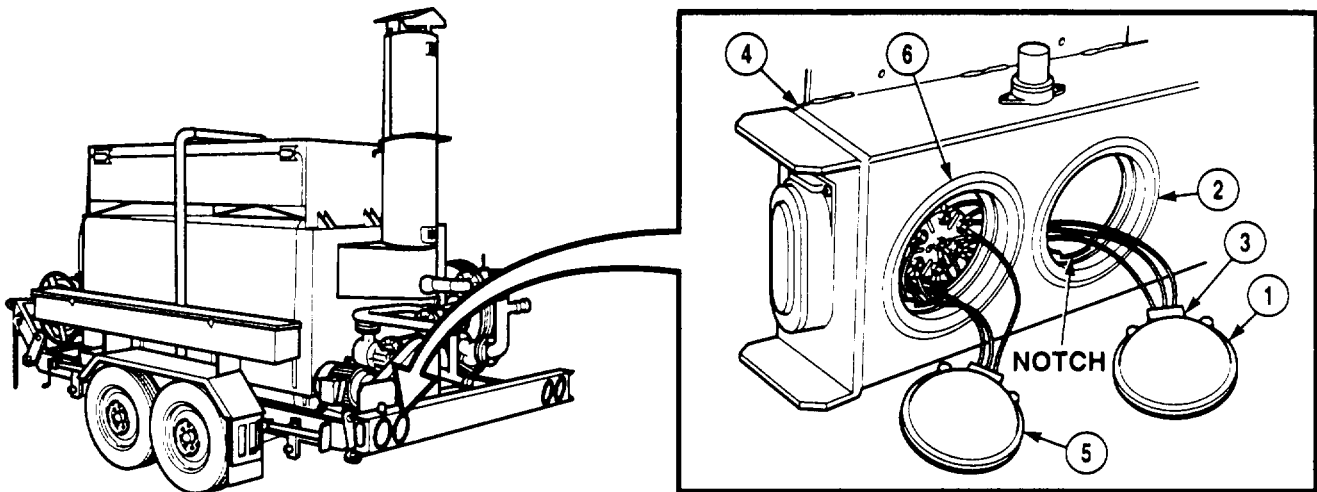
Power Source Disconnected (page 2-32)

Materials/Parts

Tags, Identification (item 22, appendix E)

Lock Washers (3)

a. Removal.



NOTE

Pry lamp assemblies from top edge.

- (1) Pry lamp assembly (1) from grommet (2).
- (2) Disconnect connector (3) from lamp assembly (1).
- (3) Remove grommet (2) from bumper (4).
- (4) Pry lamp assembly (5) from grommet (6).

4-36. LEFT BRAKE AND TAILLIGHT REPLACEMENT (CONT).

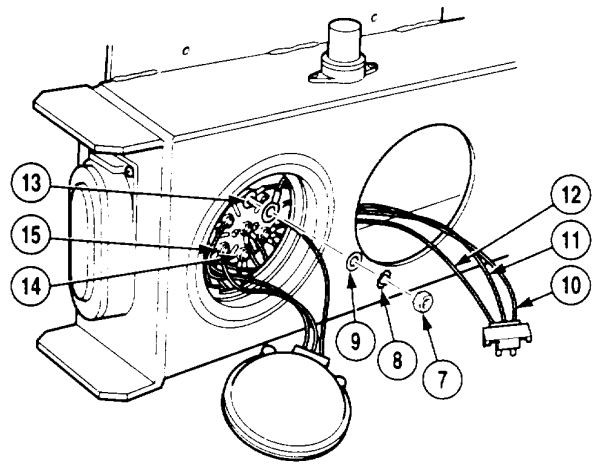
NOTE

Tag and mark all wires prior to removal.

- (5) Remove three nuts (7), lock washers (8), washers (9), and wires (10, 11, and 12) from terminals (13, 14, and 15). Discard lock washers.

b. Installation.

- (1) Install three wires (10, 11, and 12) with washers (9), lock washers (8), and nuts (7) on terminals (13, 14, and 15).



- (2) Install lamp assembly (5) in grommet (6).
- (3) Connect connector (3) to lamp assembly (1).

NOTE

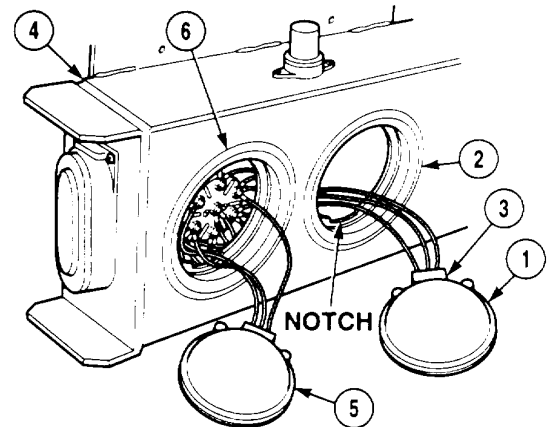
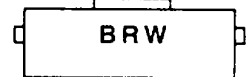
Notch should be in the bottom position when grommet is installed.

- (4) Install grommet (2) in bumper (4).
- (5) Install lamp assembly (1) in grommet (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

WIRING DIAGRAM



END OF TASK

4-37. LICENSE LAMP ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Source Disconnected (page 2-32)

Materials /Parts

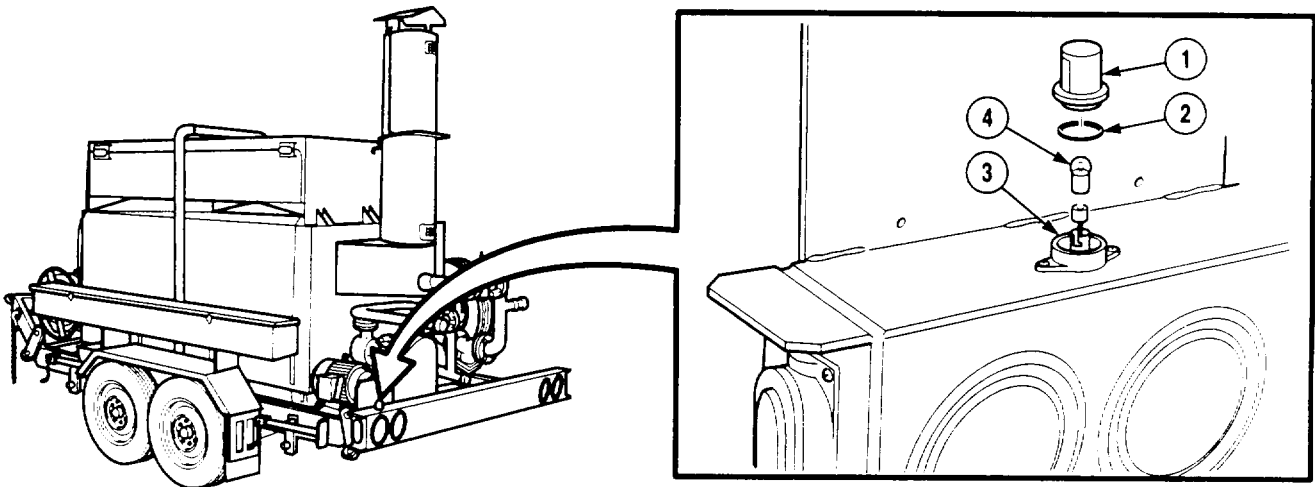
Tags, Identification (item 22, appendix E)

Gasket

Lock Washer

Preformed Packing

a. Removal.



(1) Remove lens (1) and preformed packing (2) from license lamp (3). Discard preformed packing.

(2) Remove lamp (4) from license lamp (3). If damaged, discard lamp.

4-37. LICENSE LAMP ASSEMBLY REPLACEMENT (CONT).

NOTE

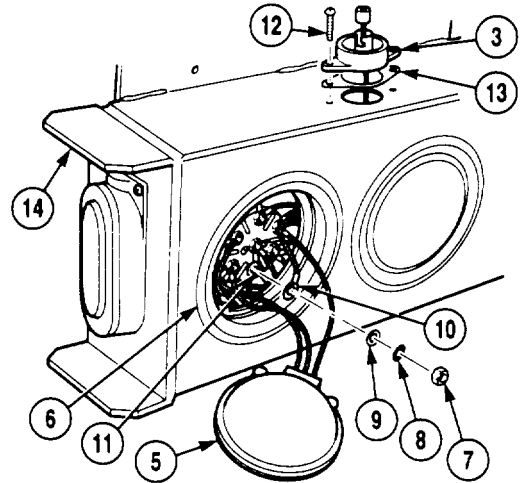
Pry lamp assembly from top edge.

- (3) Pry lamp assembly (5) from grommet (6).

NOTE

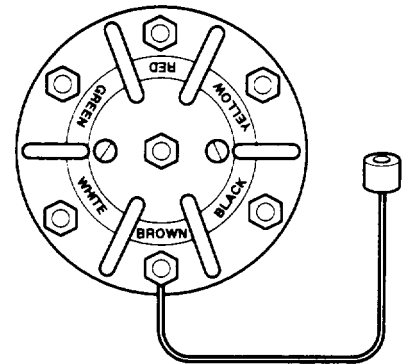
Tag and mark all wires prior to removal.

- (4) Remove nut (7), lock washer (8), washer (9), and wire and button (10) from terminal (11). Discard lock washer.
- (5) Remove wire and button (10) from license lamp (3).
- (6) Remove two screws (12), license lamp (3), and gasket (13) from bumper (14). Discard gasket.



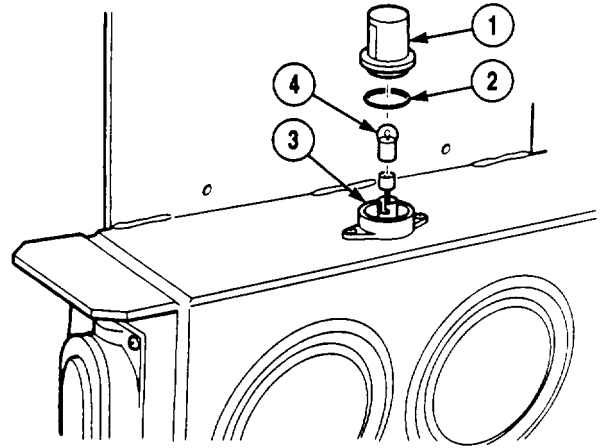
b. Installation.

- (1) Install gasket (13), license lamp (3), and two screws (12) on bumper (14). Tighten screws.
- (2) Install wire and button (10) in license lamp (3).
- (3) Install wire and button (10) with washer (9), lock washer (8), and nut (7) on terminal (11). Tighten nut.
- (4) Install lamp assembly (5) in grommet (6).



WIRING DIAGRAM

- (5) Install lamp (4) in license lamp (3).
- (6) Install preformed packing (2) and lens (1) in license lamp (3).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-38. RIGHT BRAKE AND TAILLIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

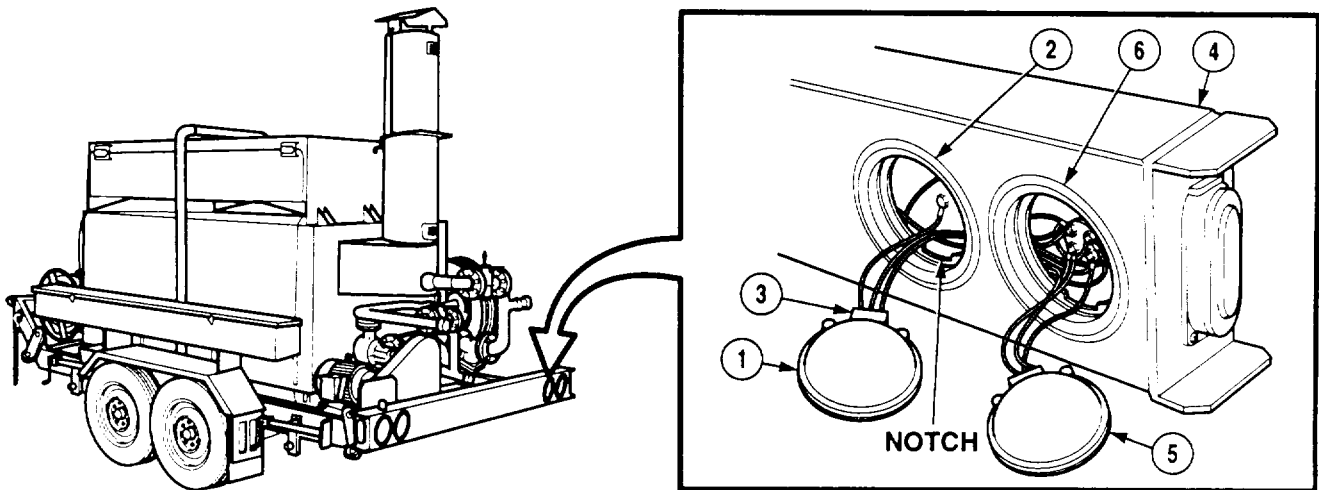
Power Source Disconnected (page 2-32)

Materials/Parts

Tags, Identification (item 22, appendix E)

Lock Washers (2)

a. Removal.



NOTE

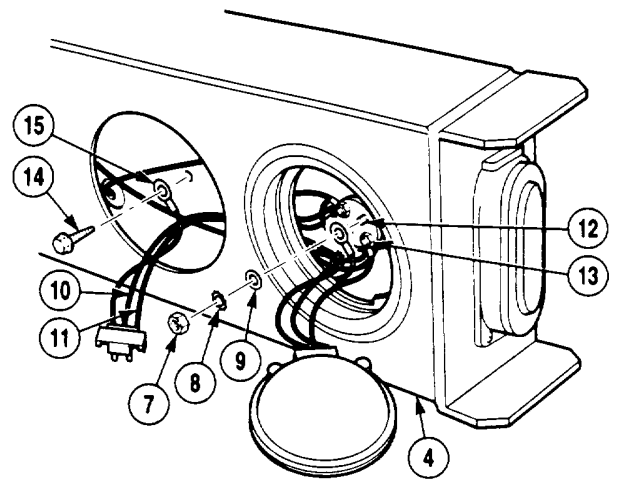
Pry lamp assemblies from top edge.

- (1) Pry lamp assembly (1) from grommet (2).
- (2) Disconnect connector (3) from lamp assembly (1).
- (3) Remove grommet (2) from bumper (4).
- (4) Pry lamp assembly (5) from grommet (6).

NOTE

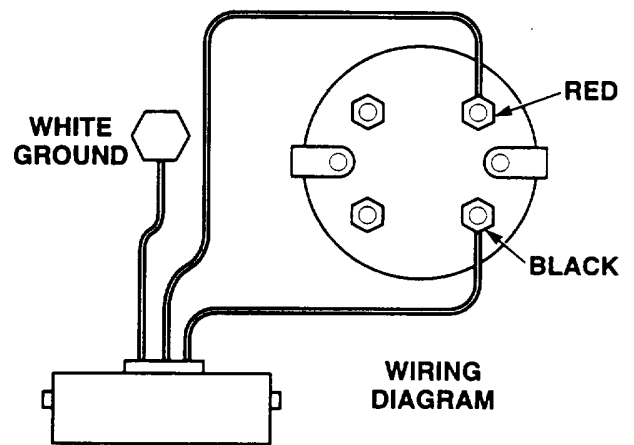
Tag and mark all wires prior to removal.

- (5) Remove two nuts (7), lock washers (8), washers (9), and wires (10 and 11) from terminals (12 and 13). Discard lock washers.
- (6) Remove screw (14) and wire (15) from bumper (4).



b. Installation.

- (1) Install wire (15) and screw (14) in bumper (4). Tighten screw.
- (2) Install two wires (10 and 11) with washers (9), lock washers (8), and nuts (7) on terminals (12 and 13). Tighten nuts.



- (3) Install lamp assembly (5) in grommet (6).

NOTE

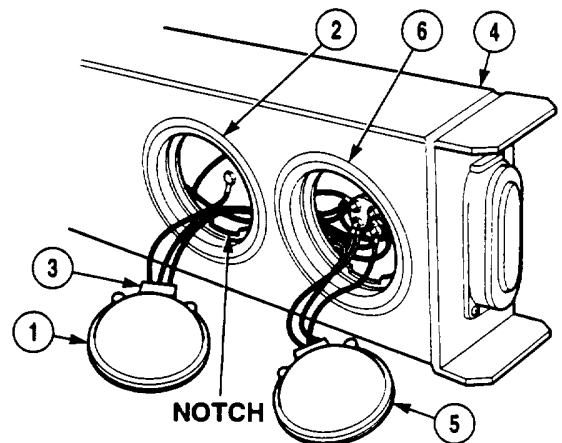
Notch should be in the bottom position when grommet is installed.

- (4) Install grommet (2) in bumper (4).
- (5) Connect connector (3) to lamp assembly (1).
- (6) Install lamp assembly (1) in grommet (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK



4-39. RIGHT TURN SIGNAL AND TAILLIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

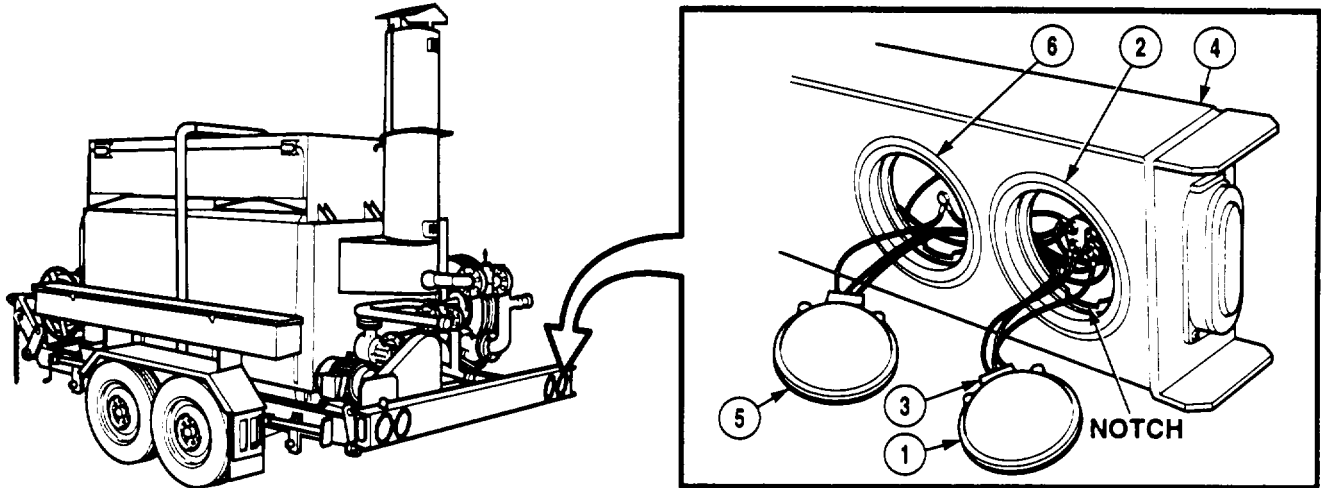
Power Source Disconnected (page 2-32)

Materials /Parts

Tags, Identification (item 22, appendix E)

Lock Washers (2)

a. Removal.



NOTE

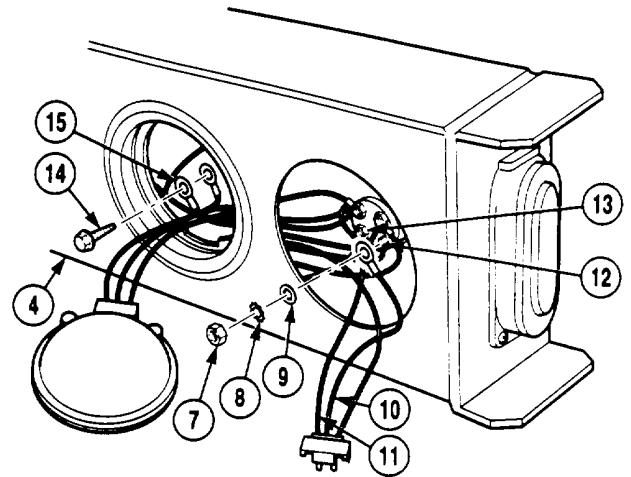
Pry lamp assemblies from top edge.

- (1) Pry lamp assembly (1) from grommet (2).
- (2) Disconnect connector (3) from lamp assembly (1).
- (3) Remove grommet (2) from bumper (4).
- (4) Pry right taillight (5) from grommet (6).

NOTE

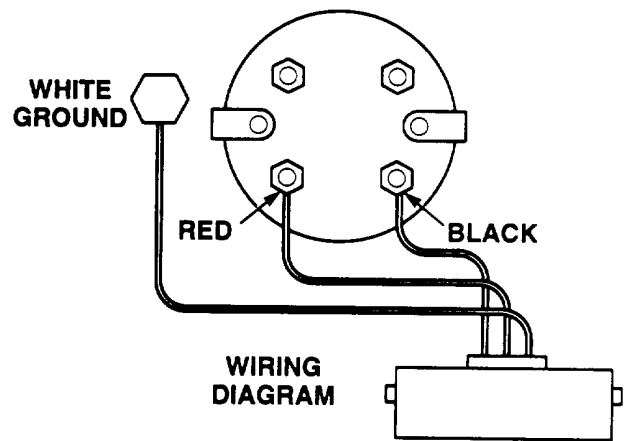
Tag and mark all wires prior to removal.

- (5) Remove two nuts (7), lock washers (8), washers (9), and wires (10 and 11) from terminals (12 and 13). Discard lock washers.
- (6) Remove screw (14) and wire (15) from bumper (4).



b. Installation.

- (1) Install wire (15) and screw (14) in bumper (4). Tighten screw.
- (2) Install two wires (10 and 11) with washers (9), lock washers (8), and nuts (7) on terminals (12 and 13). Tighten nuts.



- (3) Install lamp assembly (5) in grommet (6).

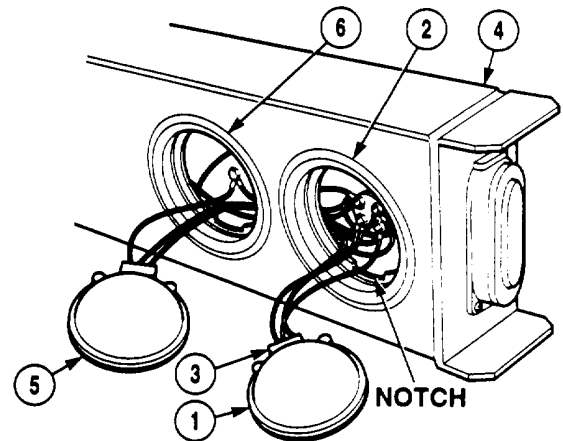
NOTE

Notch should be in the bottom position when grommet is installed.

- (4) Install grommet (2) in bumper (4).
- (5) Connect connector to lamp assembly (1).
- (6) install lamp assembly (1) in grommet (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-40. RIGHT REAR MARKER LIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Supply Disconnected (page 2-32)

Materials / Parts

Tags, Identification (item 22, appendix E)

Preformed Packing

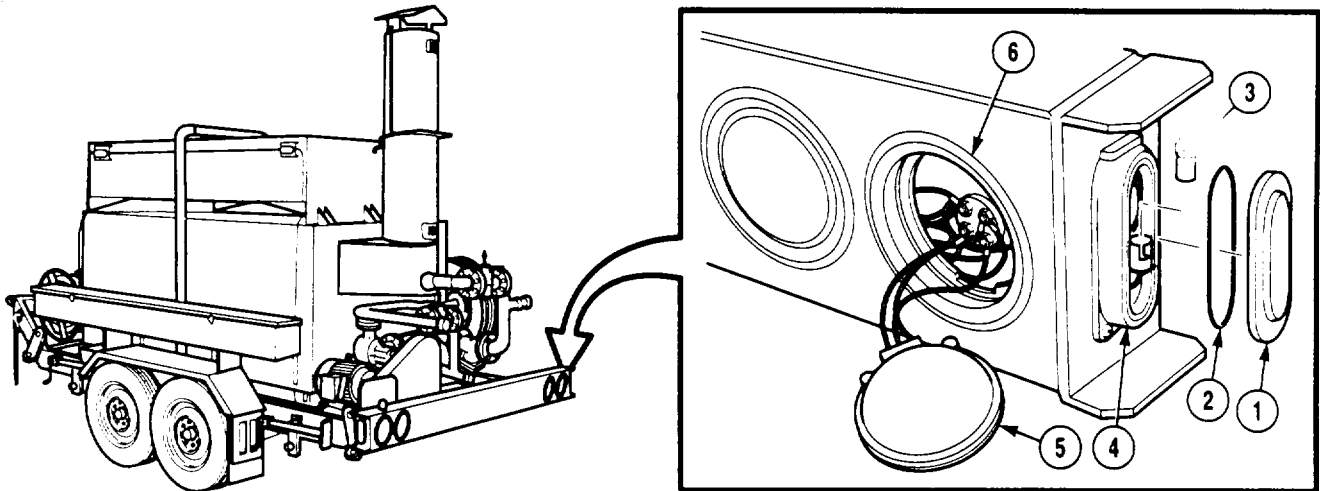
Lock Washer

Gasket

Preformed Packing

Lug, Terminal

a. Removal



NOTE

Tag and mark all wires prior to removal.

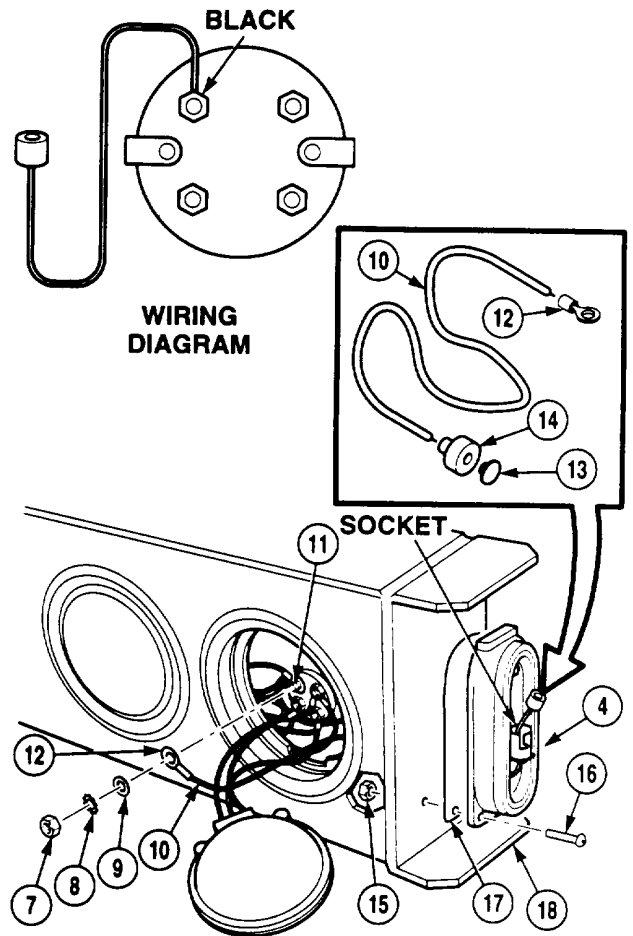
- (1) Remove lens (1) and preformed packing (2). Discard preformed packing.
- (2) Remove lamp (3) from marker light (4).

NOTE

Pry lamp assembly from top edge.

- (3) Pry lamp assembly (5) from grommet (6).

- (4) Remove nut (7), lock washer (8), washer (9), and wire (10) from terminal (11). Discard lock washer.
- (5) Remove terminal lug (12), contact (13), and preformed packing (14) from wire (10). Discard terminal lug and preformed packing.
- (6) Remove wire (10) from marker light (4).
- (7) Remove two nuts (15), screws (16), marker light (4), and gasket (17) from bumper (18). Discard gasket.

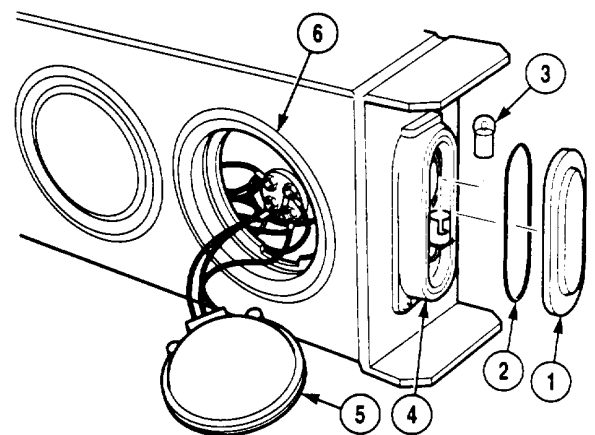


b. Installation.

- (1) Install gasket (17) and marker light (4) with two screws (16) and nuts (15) on bumper (18). Tighten nuts.
- (2) Install terminal lug (12) on wire (10).
- (3) Place wire (10) through bumper (18), marker light (4), and socket.
- (4) Install preformed packing (14) and contact (13) on wire (10).
- (5) Install wire (10) on terminal (11) with washer (9), lock washer (8), and nut (7). Tighten nut.
- (6) Install lamp assembly (5) in grommet (6).
- (7) Install lamp (3) in marker light (4).
- (8) Install preformed packing (2) and lens (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-41. REAR MARKER LIGHT REPLACEMENT.

This task covers:

- a. Removal b. Installation

INITIAL SETUP*Tools and Special Tools*

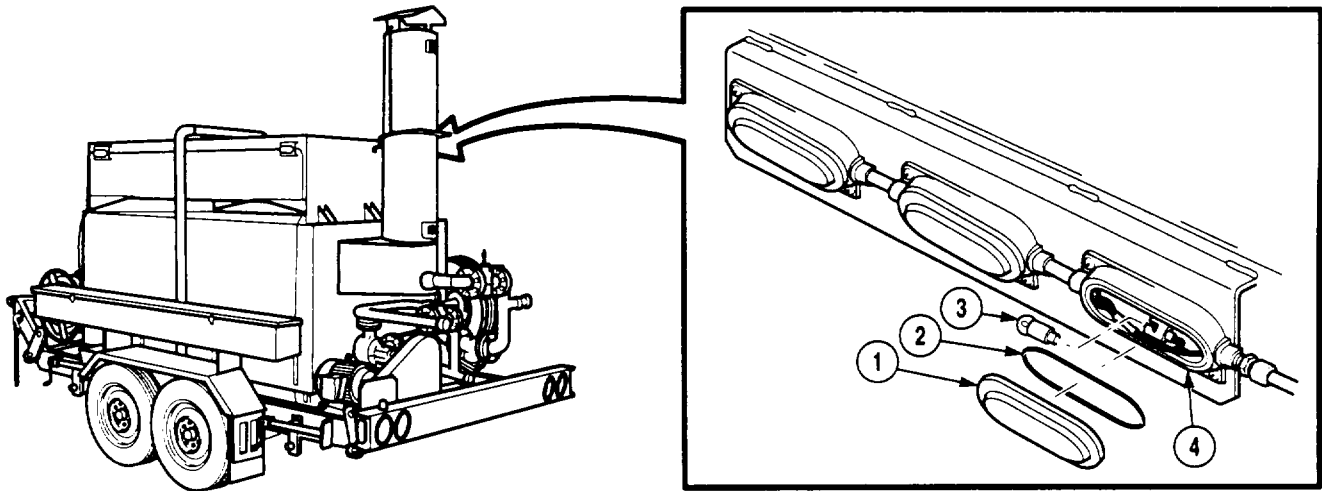
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Tags Identification (item 22, appendix E)
Preformed Packings (3)
Gaskets (3)
Butt Connector

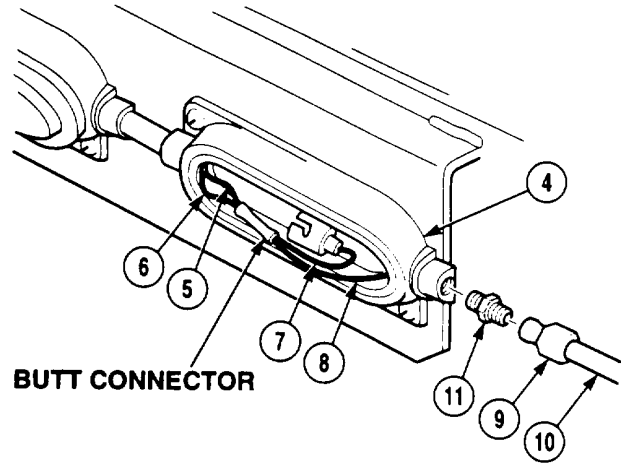
Equipment Condition

Wheels Chocked (page 2-17)
Power Supply Disconnected (page 2-32)
Heater Cooled

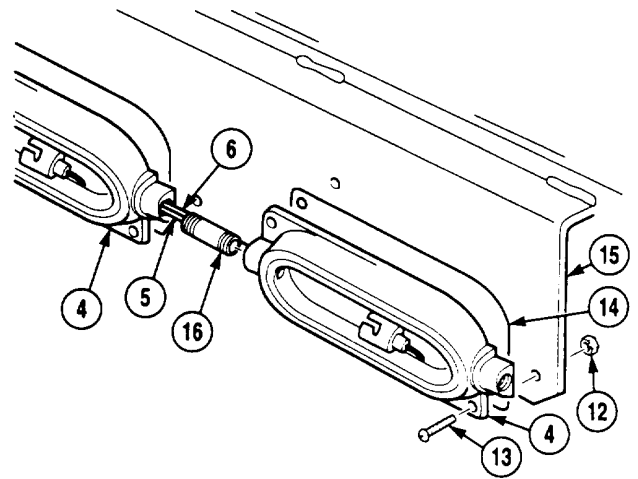
a. Removal.

- (1) Remove lens (1), preformed packing (2), and lamp (3) from marker light (4). Discard preformed packing.
- (2) Repeat step (1) for remaining marker lights as needed.

- (3) Remove butt connector by cutting wires (5, 6, 7, and 8). Discard butt connector.
- (4) Loosen nut (9) and remove conduit (10) from marker light (4).
- (5) Remove wire (8) from marker light (4).
- (6) Remove adapter (11) from marker light (4).

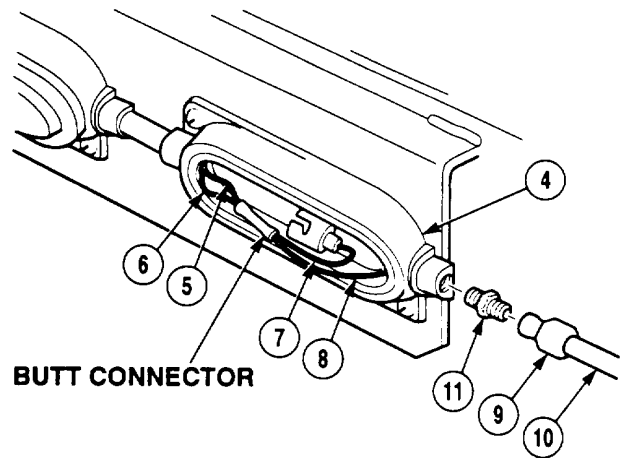


- (7) Remove six nuts (12), screws (13), three marker lights (4), and three gaskets (14) from Heater (15).
- (8) Remove two connector modules (16) from three marker lights (4) and wires (5 and 6).



b. Installation.

- (1) Install two connector modules (16) on three marker lights (4).
- (2) Feed wires (5 and 6) thru connector modules (16).
- (3) Install gaskets (14) and marker lights (4) on Heater (15) with six screw (13) and nuts (12).
- (4) Install adapter (11) and wire (8) in marker light (4).
- (5) Install conduit (10) with nut (9) on marker light (4). Tighten nut.
- (6) Connect wires (5, 6, 7, and 8) with butt connector.

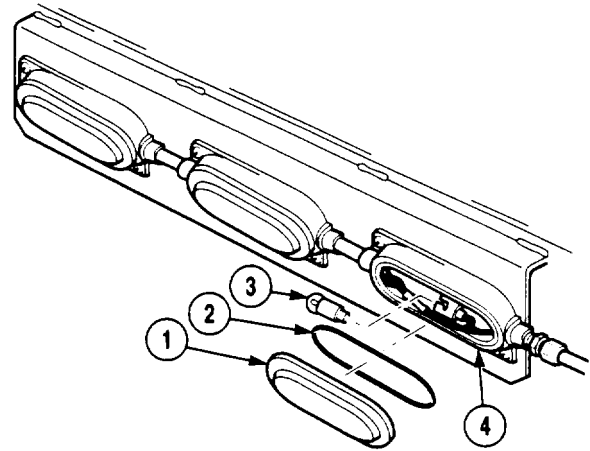


4-41. REAR MARKER LIGHT REPLACEMENT (CONT).

- (7) Install lamp (3) in marker light (4).
- (8) Install preformed packing (2) and lens (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-42. SIDE MARKER LIGHT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Supply Disconnected (page 2-32)

Heater Cooled

Materials/Parts

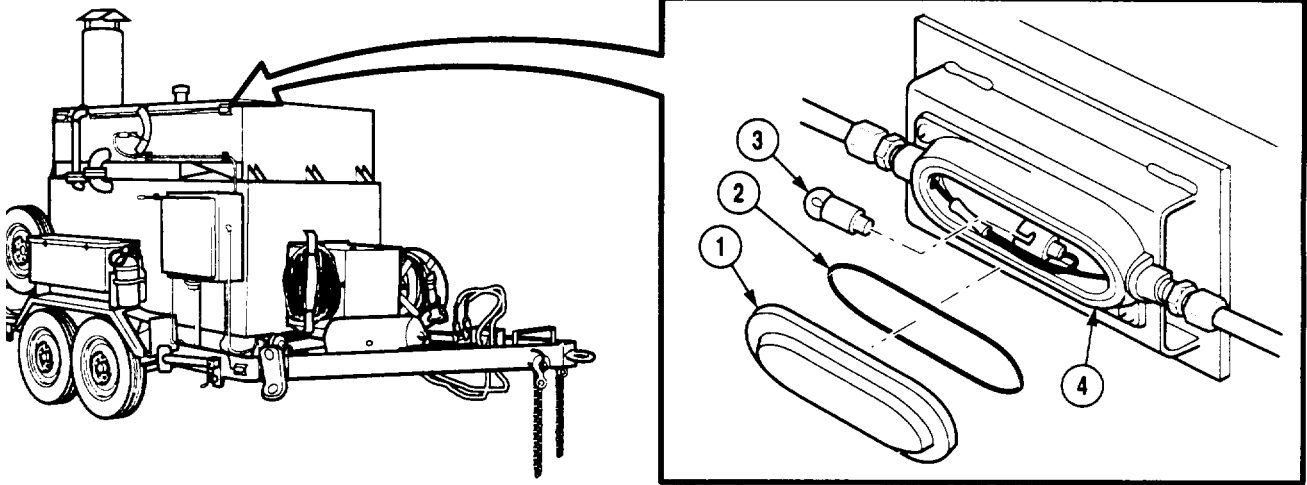
Tags, Identification (item 22, appendix E)

Preformed Packing

Gasket

Butt Connector

a. Removal.



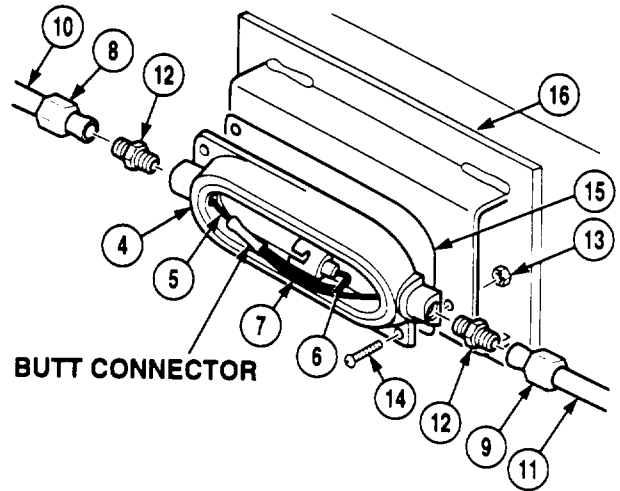
NOTE

Tag and mark all wires prior to removal.

- (1) Remove lens (1) and preformed packing (2). Discard preformed packing.
- (2) Remove lamp (3) from marker light (4).

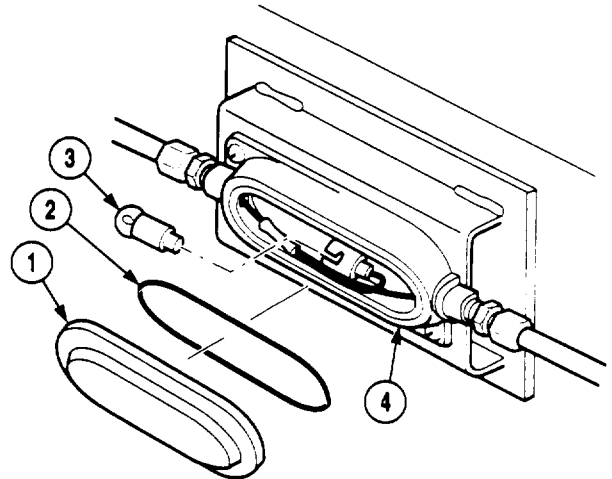
4-42. SIDE MARKER LIGHT REPLACEMENT (CONT).

- (3) Remove butt connector by cutting wires (5, 6, and 7). Discard butt connector.
- (4) Loosen nuts (8 and 9) and remove conduit (10 and 11) from marker light (4).
- (5) Remove wires (5 and 7) from marker light (4).
- (6) Remove two adapters (12) from marker light (4).
- (7) Remove two nuts (13), screws (14), marker light (4), and gasket (15) from Heater (16). Discard gasket.



b. Installation.

- (1) Install gasket (15) and marker light (4) with two screws (14) and nuts (13) on Heater (16).
- (2) Install two adapters (12) in marker light (4).
- (3) Install wires (5 and 7) in marker light (4).
- (4) Install conduit (10 and 11) on marker light (4) and tighten nuts (8 and 9).
- (5) Connect wires (5, 6, and 7) with butt connector.
- (6) Install lamp (3) in marker light (4).
- (7) Install preformed packing (2) and lens (1).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-43. FRONT SIDE MARKER LIGHT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Source Disconnected (page 2-32)

Materials/Parts

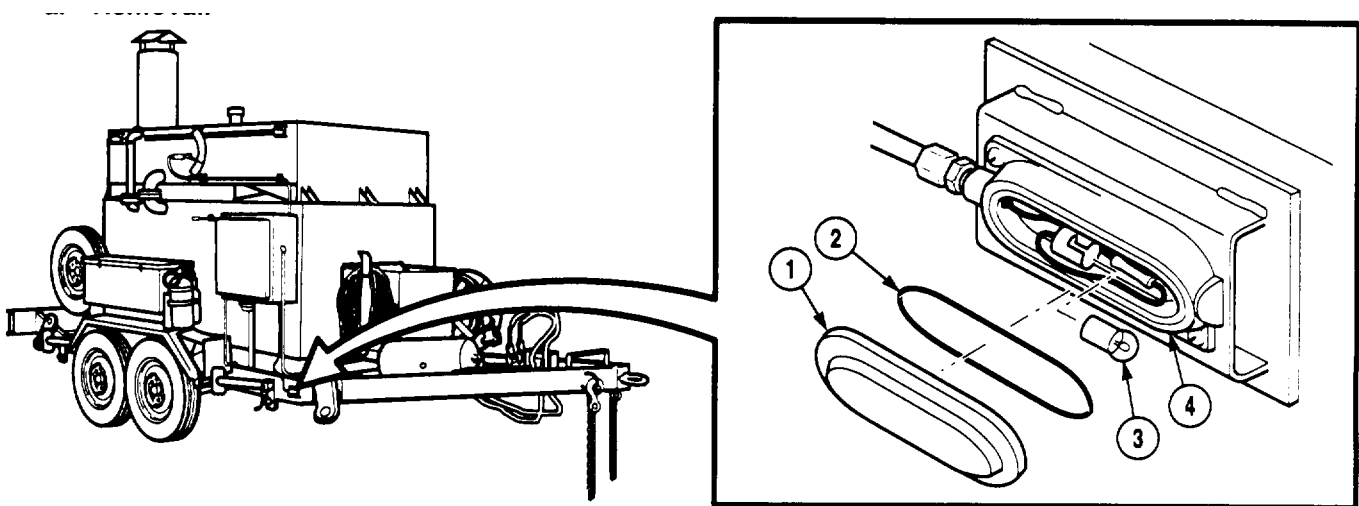
Tags, Identification (item 22, appendix E)

Preformed Packing

Gasket

Butt Connector

a. Removal.



NOTE

Tag and mark all wires prior to removal.

(1) Remove lens (1) and preformed packing (2). Discard preformed packing.

(2) Remove lamp (3) from marker light (4).

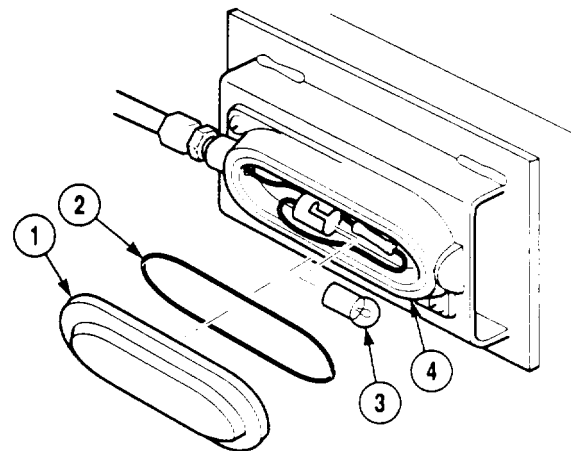
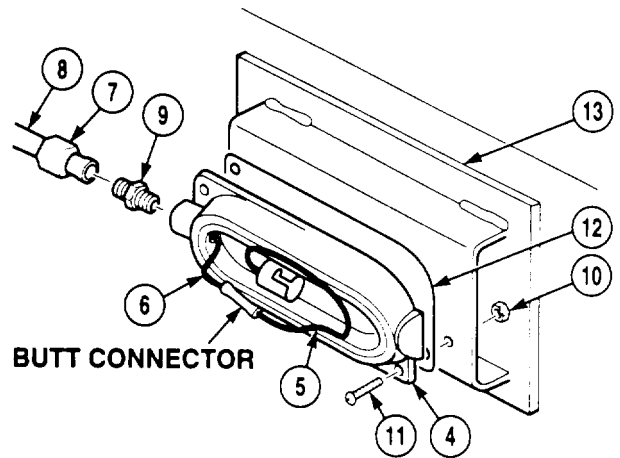
4-43. FRONT SIDE MARKER LIGHT REPLACEMENT (CONT).

- (3) Remove butt connector by cutting wires (5 and 6). Discard butt connector.
- (4) Loosen nut (7) and remove conduit (8) from marker light (4).
- (5) Remove wire (6) from marker light (4).
- (6) Remove adapter (9) from marker light (4).
- (7) Remove two nuts (10), screws (11), marker light (4), and gasket (12) from Heater (13). Discard gasket.

b. Installation.

- (1) Install gasket (12) and marker light (4) with two screws (11) and nuts (10) on Heater (13). Tighten nuts.
- (2) Install adapter (9) in marker light (4).
- (3) Install wire (6) in marker light (4).
- (4) Install conduit (8) in marker light (4) and tighten nut (7).
- (5) Connect wires (5 and 6) with butt connector.
- (6) Install lamp (3) in marker light (4).
- (7) Install preformed packing (2) and lens (1).

NOTE
Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-44. 24 VDC INTERVEHICULAR CONNECTOR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Power Supply Disconnected (page 2-32)

Materials /Parts

Gasket

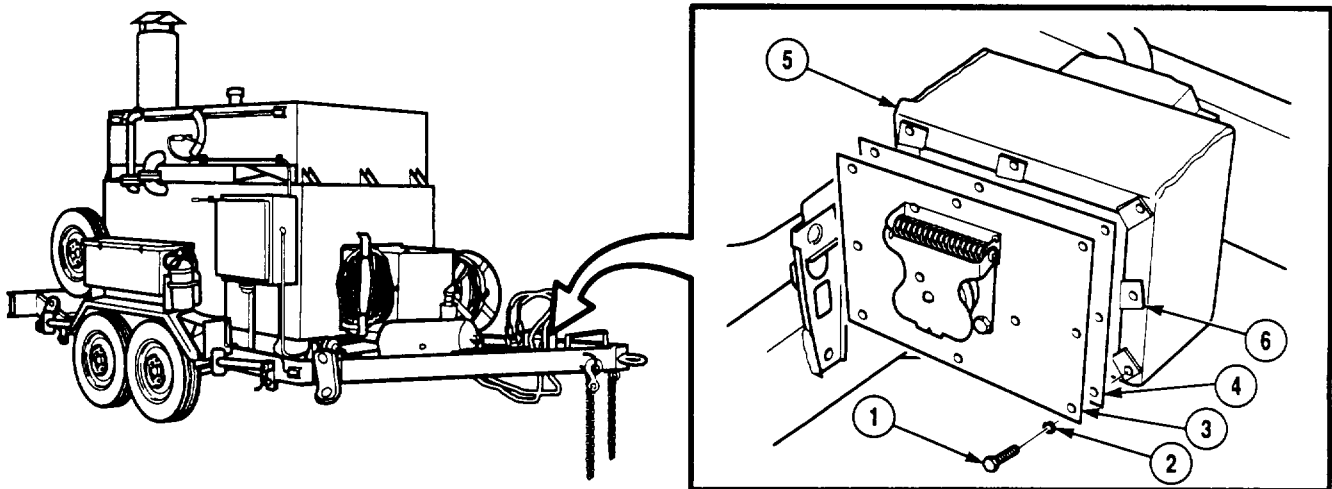
Tags, Identification (item 22, appendix E)

Lock Washers (4)

Lock Washers (8)

Pins

a. Removal.



NOTE

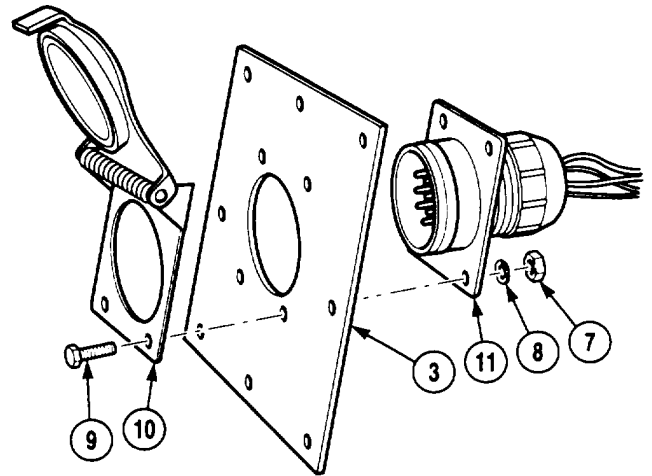
Tag and mark all wires prior to removal.

(1) Remove eight screws (1), lock washers (2), cover (3), and gasket (4) from junction box (5). Discard lock washers and gasket.

(2) If damaged, remove eight cage nuts (6) from junction box (5).

4-44. 24 VDC INTERVEHICULAR CONNECTOR REPLACEMENT (CONT).

- (3) Remove four nuts (7), lock washers (8), screws (9), cover (10), and connector (11) from cover (3). Discard lock washers.

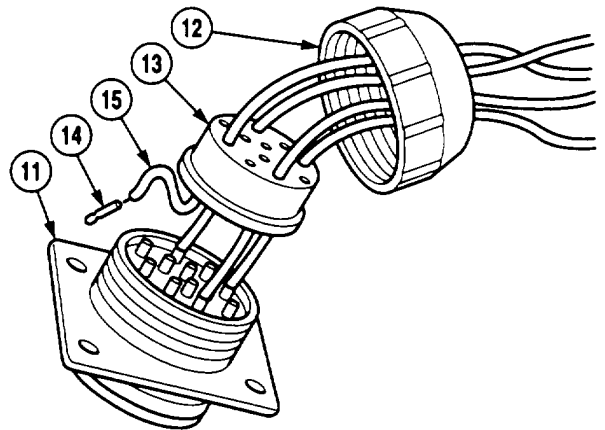


- (4) Loosen nut (12) and slide grommet (13) away from connector (11).

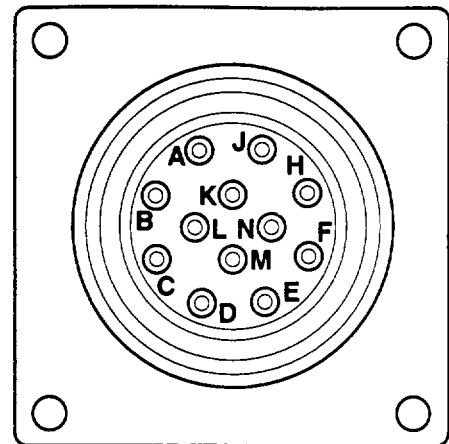
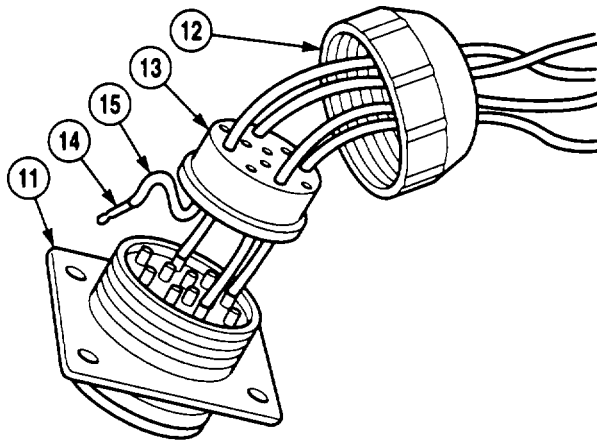
NOTE

Tag and mark the position of pins prior to removal.

- (5) Remove pins (14) from connector (11).
- (6) Remove pins (14) from wires (15).
- (7) Remove grommet (13) and nut (12) from wires (15).



b. Installation.



- (1) Position nut (12) and grommet (13) on wires (15).
- (2) Install pins (14) on wires (15).

NOTE

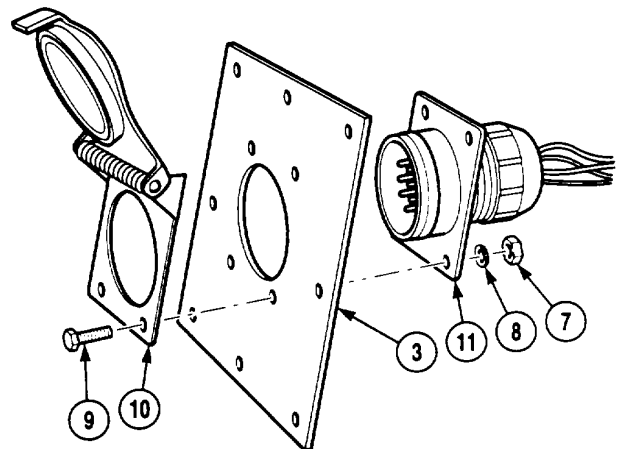
Position pins in connector as marked during removal.

- (3) Install pins (14) in connector (11).



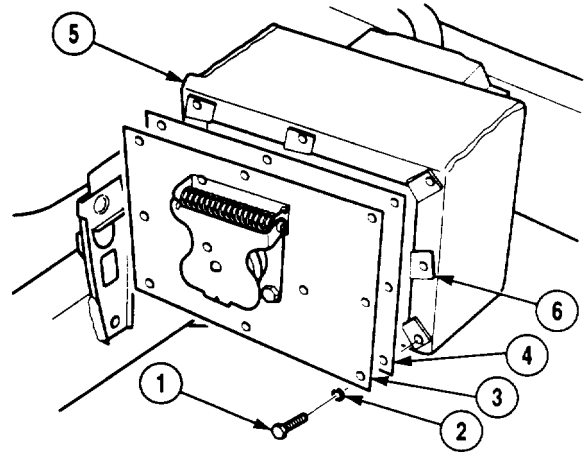
Overtightening of nut will destroy pins. Do not overtighten nut.

- (4) Install grommet (13) and nut (12) on connector (11).
- (5) Install connector (11) and cover (10) with four screws (9), lock washers (8), and nuts (7) on cover (3).



4-44. 24 VDC INTERVEHICULAR CONNECTOR REPLACEMENT (CONT).

- (6) If removed, install eight cage nuts (6) on junction box (5).
- (7) Install gasket (4), cover (3), eight screws (1), and lock washers (2) on junction box (5). Tighten screws.

**NOTE**

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-45. 12 VDC INTERVEHICULAR CONNECTOR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials /Parts

Lock Washers (8)
Gasket
Gasket
Lock Washers (2)

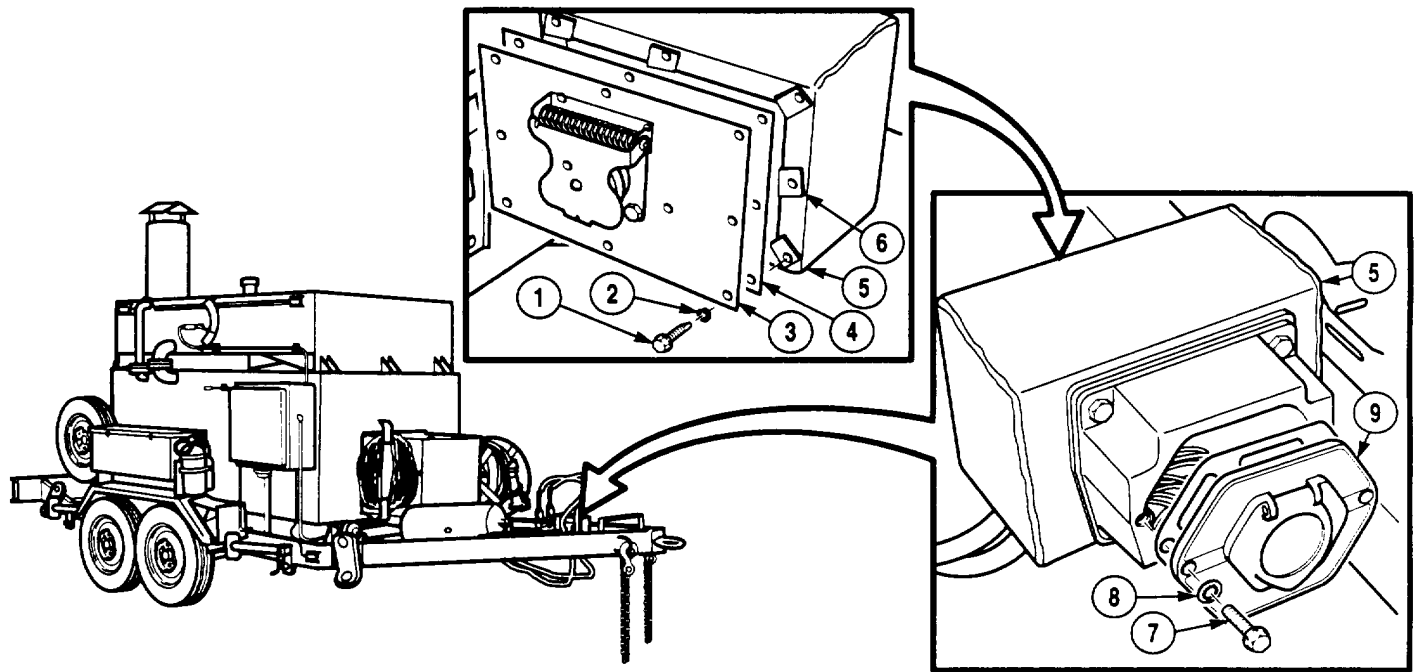
Materials/Parts Continued

Lock Washers (4)
Lock Washers (2)
Gasket
Screw Assembly (2)
Screw Assembly (1)

Equipment Condition

Wheels Chocked (page 2-17)
Power Supply Disconnected (page 2-32)

a. Removal



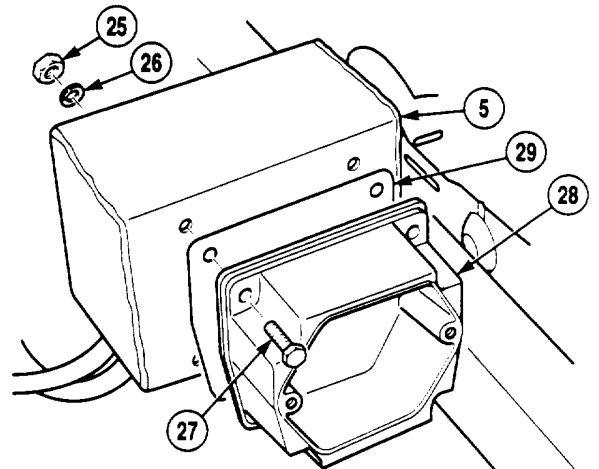
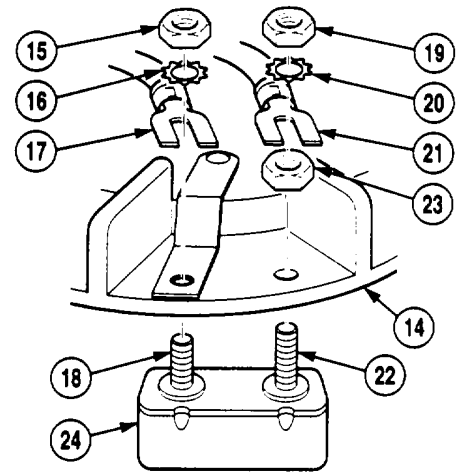
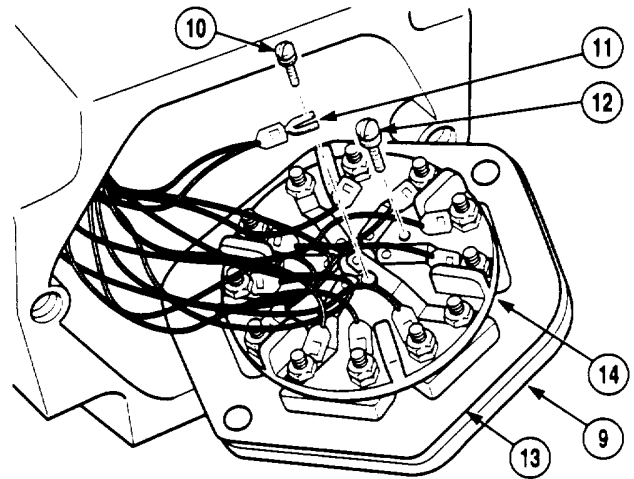
- (1) Remove eight screws (1), lock washers (2), cover (3), and gasket (4) from junction box (5). Discard lock washers and gasket.
- (2) If damaged, remove eight cage nuts (6) from junction box (5).
- (3) Remove two screws (7) and lock washers (8) from junction box (5). Discard lock washers.
- (4) Remove cover (9) from junction box (5).

4-45. 12 VDC INTERVEHICULAR CONNECTOR REPLACEMENT (CONT.)

NOTE

Tag and mark all wires prior to removal.

- (5) Remove screw assembly (10) and ground wire (11) from cover (9). Discard screw assembly.
- (6) Remove two screw assemblies (12) from cover (9). Discard screw assemblies.
- (7) Remove cover (9) and gasket (13) from connector (14). Discard gasket.
- (8) Remove nut (15), lock washer (16), and wire (17) from stud (18). Discard lock washer.
- (9) Remove nut (19), lock washer (20), and wire (21) from stud (22). Discard lock washer.
- (10) Remove nut (23) and circuit breaker (24) from connector (14).
- (11) Repeat Steps (8) thru (10) for five remaining circuit breakers.
- (12) Remove four nuts (25), lock washers (26), and screws (27) from junction box (5). Discard lock washer.
- (13) Remove connector body (28) and gasket (29) from junction box (5). Discard gasket.



b. Installation.

- (1) Install gasket (29) and connector body (28) with four screws (27), lock washers (26), and nuts (25) on junction box (5). Tighten nuts.

NOTE

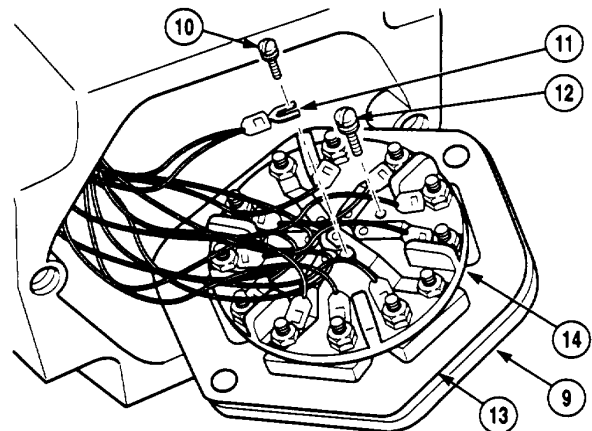
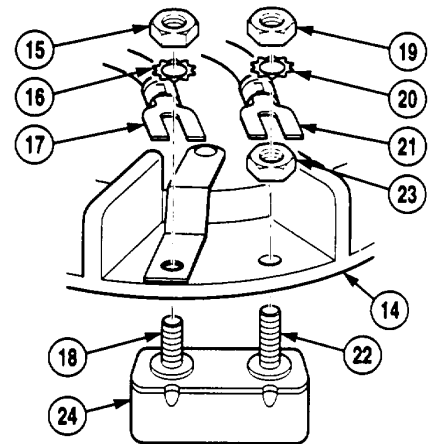
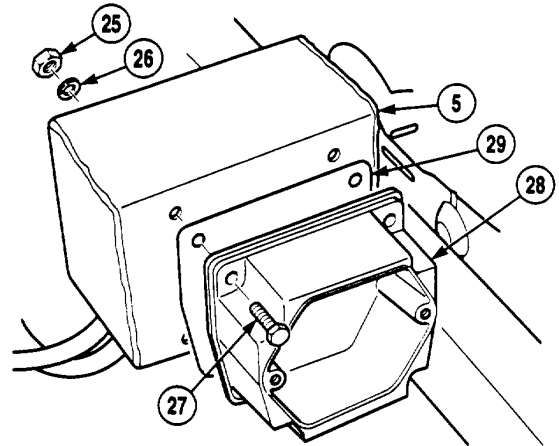
Battery (small) stud of circuit breaker connects to jumper strip.

- (2) Install circuit breaker (24) on connector (14) with nut (23) on stud (22). Tighten nut.
- (3) Install wire (21) on stud (22) with lock washer (20) and nut (19). Tighten nut.
- (4) Install wire (17) on stud (18) with lock washer (16) and nut (15). Tighten nut.
- (5) Repeat steps (2) through (4) for remaining circuit breakers.
- (6) Position gasket (13) on cover (9).

NOTE

Cover and connector are notched at mating surfaces for alignment. Align notches.

- (7) Install connector (14) on cover (9) with two screw assemblies (12). Tighten screw assemblies.
- (8) Install ground wire (11) with screw assembly (10) on cover (9). Tighten screw assembly.

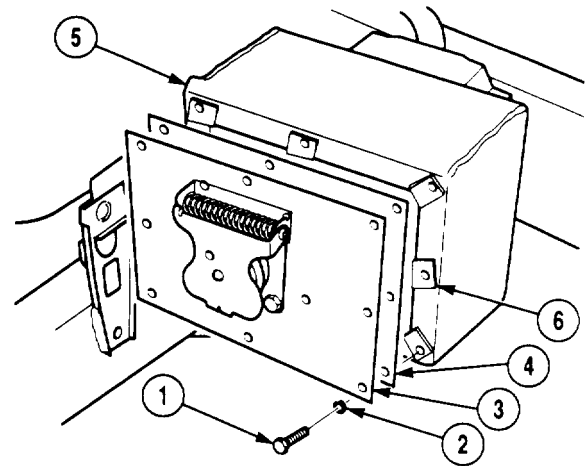
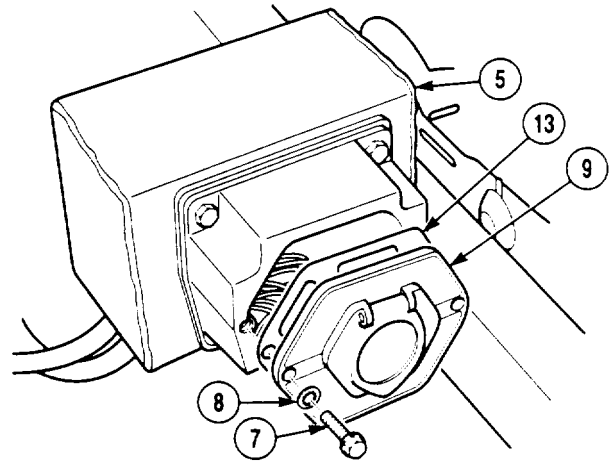


4-45. 12 VDC INTERVEHICULAR CONNECTOR REPLACEMENT (CONT).

(9) Install gasket (13) and cover (9) with two lock washers (8) and screws (7) on junction box (5). Tighten screws.

(10) If removed, install eight cage nuts (6) on junction box (5).

(11) Install gasket (4), cover (3), eight screws (1), and lock washers (2) on junction box (5). Tighten screws

**NOTE**

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-46. AXLE ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit General Mechanic's: Automotive
Wrench, Torque
Jack Stands
Jack

Materials/Parts

Drain Pan
Ties, Cable (item 24, appendix E)
Lock Nut (4)

Personnel Required

Two

Equipment Condition

Wheels Chocked (page 2-17)
Wheel and Tire Assemblies Removed
(page 3-7)
Heater Cooled

a. Removal

WARNING

Heater weighs 10,000 (4,536 kg). Make sure Heater is secured properly on jack stands. Failure to comply may result in serious injury or death.

NOTE

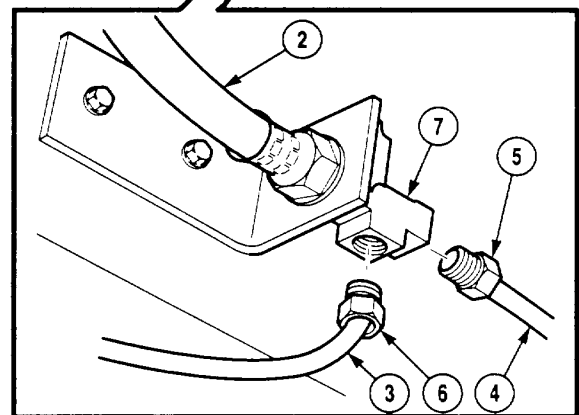
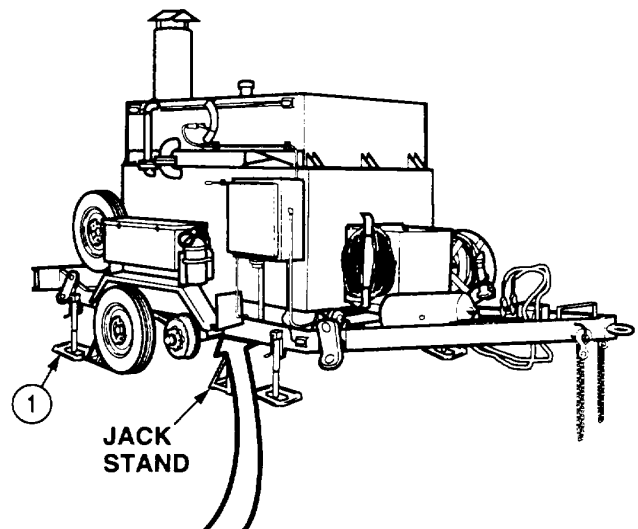
This paragraph discusses replacement of one axle. Both axles are replaced in the same way.

- (1) Position jack stands under Heater and lower screw jacks (1) until Heater rests securely on jack stands.
- (2) Position drain pan under brake hose (2) and brake lines (3 and 4).

NOTE

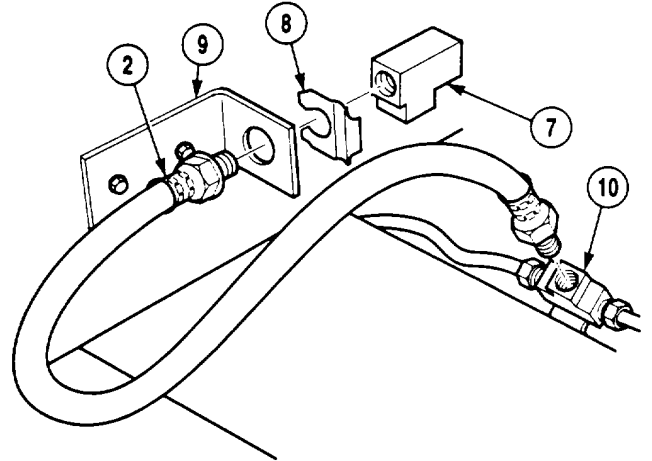
Inspect all hoses, lines, and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.

- (3) Loosen nuts (5 and 6) and allow fluid to drain.
- (4) Remove brake lines (3 and 4) from tee fitting (7).

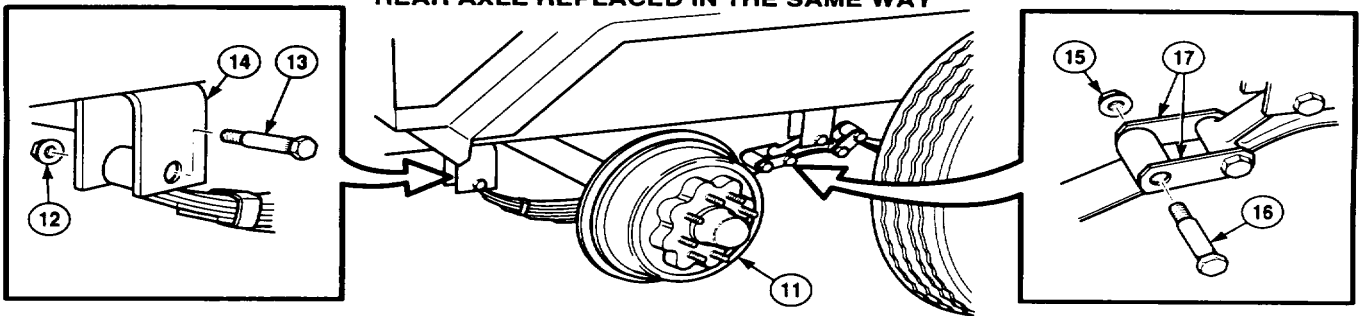


4-46. AXLE ASSEMBLY REPLACEMENT (CONT.)

- (5) Remove tee fitting (7) from brake hose (2).
- (6) Remove spring clip (8) and brake hose (2) from bracket (9).
- (7) Remove brake hose (2) from tee fitting (10).



**FRONT AXLE SHOWN
REAR AXLE REPLACED IN THE SAME WAY**



WARNING

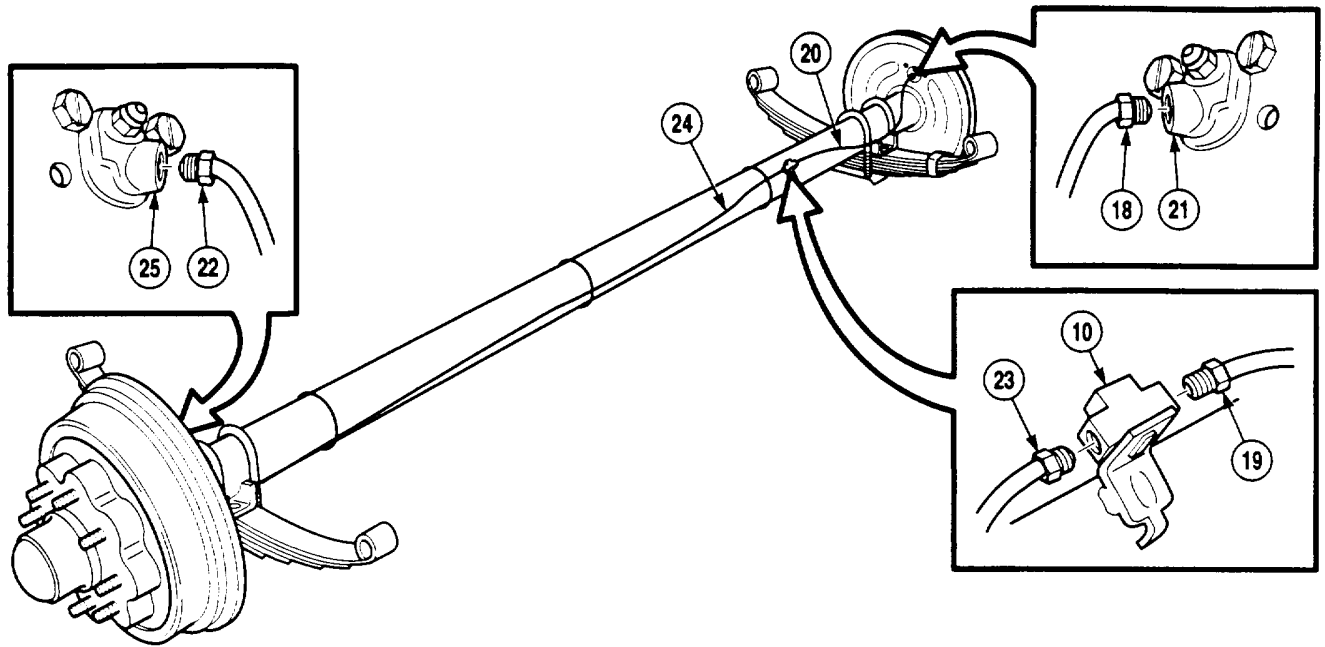
Axle assembly weighs 222 lbs (100.7 kg). Position jack securely under axle for removal or installation to prevent possible serious injury to personnel.

- (8) Position jack under axle (11).

NOTE

LH and RH sides are removed the same.

- (9) Remove locknut (12) and screw (13) from spring hanger (14). Discard locknut.
- (10) Remove locknut (15) and screw (16) from shackle links (17). Discard locknut.
- (11) Repeat steps (9) and (10) for other side of axle.
- (12) With the aid of an assistant, lower jack and remove axle (11) from under Heater.



NOTE

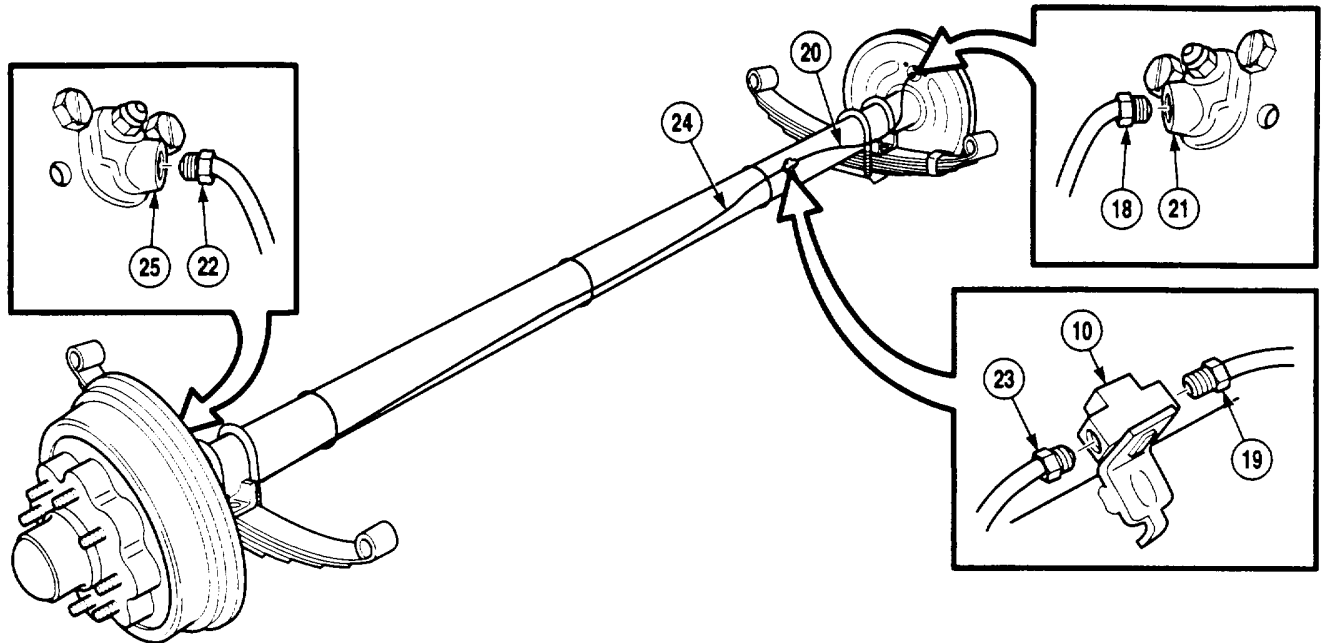
Remove cable ties as necessary.

(13) Loosen nuts (18 and 19) and remove brake line (20) from brake cylinder (21) and tee fitting (10).

(14) Loosen nuts (22 and 23) and remove brake line (24) from brake cylinder (25) and tee fitting (10).

4-46. AXLE ASSEMBLY REPLACEMENT (CONT).

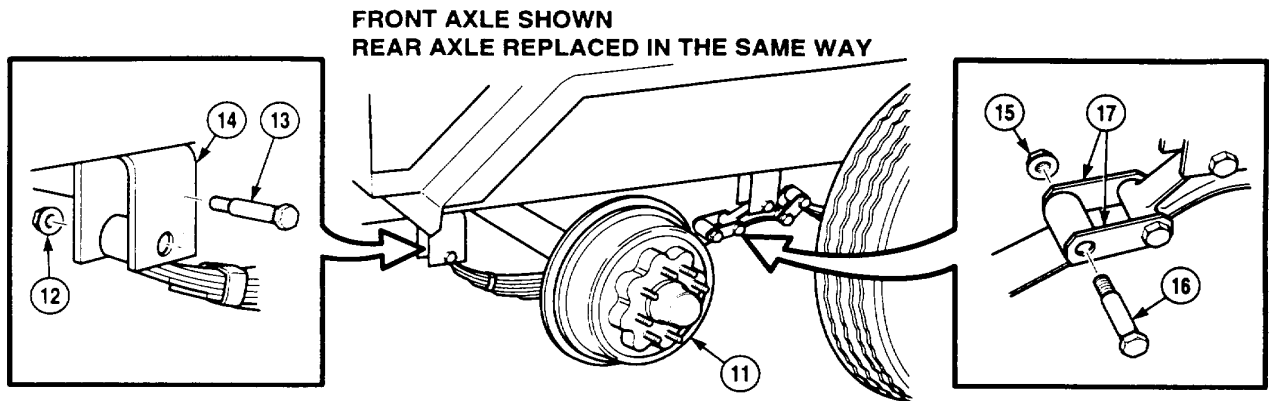
b. Installation.



NOTE

Install cable ties as necessary.

- (1) Install brake line (24) in brake cylinder (25) and tee fitting (10). Tighten nuts (22 and 23).
- (2) Install brake line (20) in brake cylinder (21) and tee fitting (10). Tighten nuts (18 and 19).



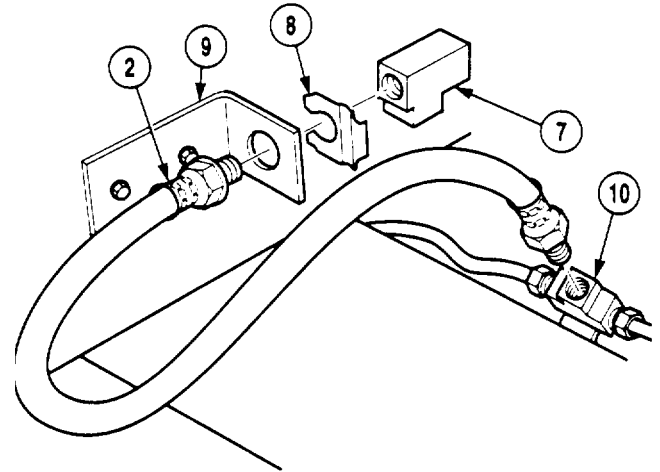
WARNING

Axle assembly weighs 222 lbs (100.7 kg). Position jack securely under axle for removal or installation to prevent possible serious injury to personnel.

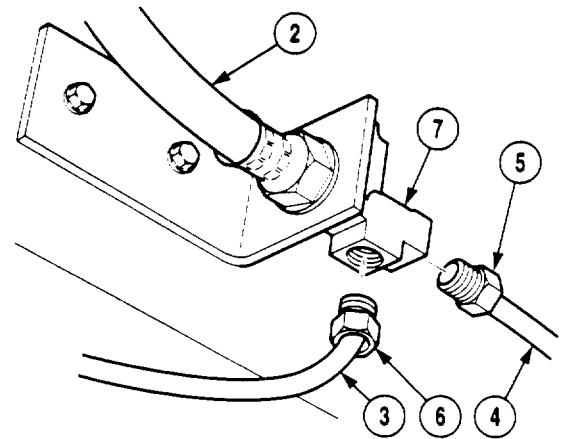
- (3) Position axle (11) on jack.
- (4) With the aid of an assistant, position axle (11) under Heater, raise jack, and align spring eyelets with spring hanger (14) and shackle links (17).
- (5) Install screws (13) and locknuts (12) in spring hangers (14) on both sides of Heater. Do not tighten screws.
- (6) Install screws (16) and locknuts (15) in shackle links (17) on both sides of Heater. Do not tighten locknuts.
- (7) Tighten locknuts (12 and 15) to 30-50 lb-ft. (41-68 N.m).
- (8) Remove jack from axle (11).

4-46. AXLE ASSEMBLY REPLACEMENT (CONT).

- (9) Install brake hose (2) in tee fitting (10).
- (10) Install brake hose (2) in bracket (9) with spring clip (8).
- (11) Install tee fitting (7) on brake hose (2).



- (12) Install brake lines (3 and 4) in tee fitting (7).
- (13) Tighten nuts (5 and 6).
- (14) Raise screw jacks (1) and remove jack stands.

**NOTE**

Follow-on Maintenance:

- Install wheel and tire assemblies (page 3-8).
- Fill and bleed hydraulic system (page 4-118).
- Remove wheel chocks (page 2-35).

END OF TASK

4-47. BRAKE ASSEMBLY REPLACEMENT

This task covers:

- a. Removal b. Cleaning/Inspection c. Installation**

INITIAL SETUP:

Tolls and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

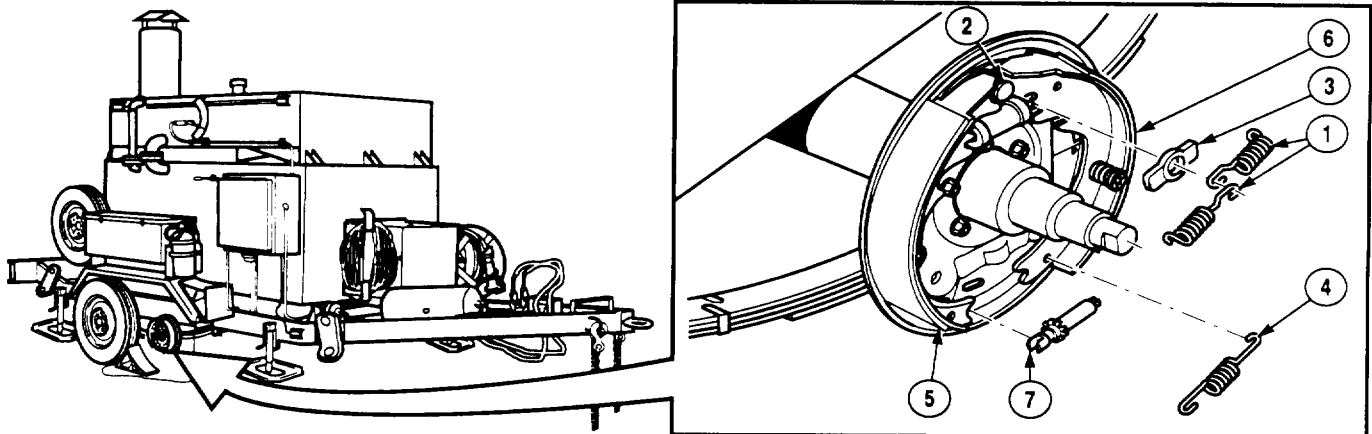
Equipment Condition

Hub and Drum Assembly Removed
(page 4-140)
Heater Cooled

Materials Parts

Drain Pan
Rags, Wiping (item 19, appendix E)
Solvent, Drycleaning (item 21, appendix E)
Screw and Washer Assemblies (2)
Lock Washers (5)

a. Removal.



WARNING

Brake shoe springs are under tension. Wear eye protection and use caution when removing springs or serious injury to personnel could result.

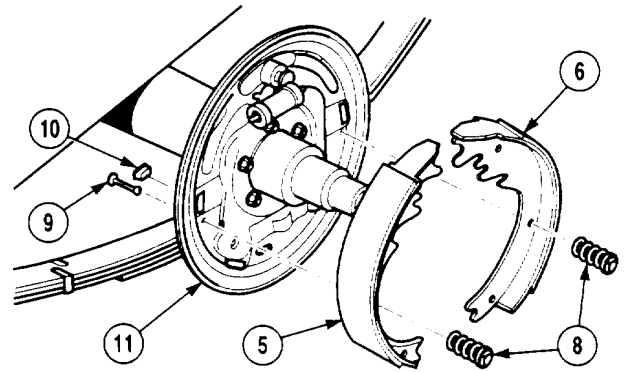
NOTE

This paragraph discusses replacement of one brake assembly. All brake assemblies are replaced in the same way.

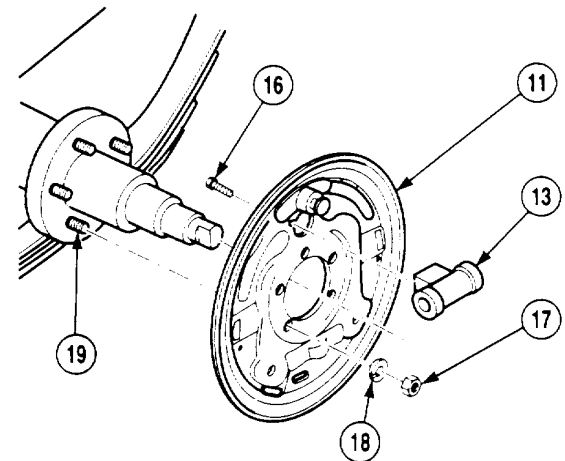
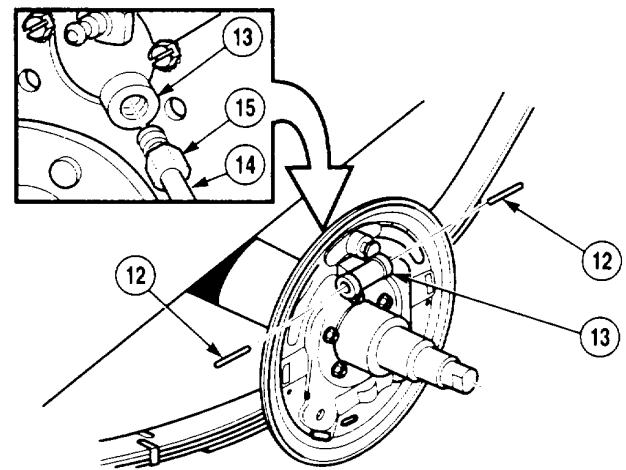
- (1) Remove two springs (1) from anchor post (2).
- (2) Remove washer (3) from anchor post (2).
- (3) Remove adjusting screw spring (4) from brake shoes (5 and 6).
- (4) Remove adjuster assembly (7) from brake shoes (5 and 6).

4-47. BRAKE ASSEMBLY REPLACEMENT (CONT.)

- (5) Remove hold-down springs (8) from hold-down pins (9) and brake shoes (5 and 6) from backing plate (11).
- (6) Remove adjuster plug (10) from backing plate (11).
- (7) Position drain pan under brake line (14) and brake cylinder (13).
- (8) Remove two push rods (12) from brake cylinder (13).
- (9) Loosen nut (15) and remove brake line (14) from brake cylinder (13). Allow to drain.

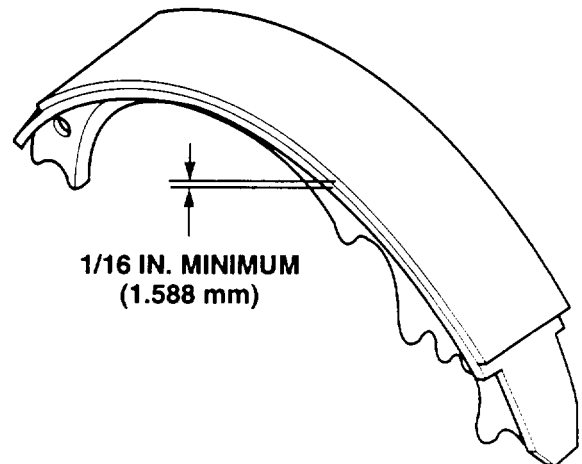


- (10) Remove two screw and washer assemblies (16) from brake cylinder (13). Discard screw and washer assemblies.
- (11) Remove five nuts (17), lock washers (18), and backing plate (11) from studs (19). Discard lock washers.



b. Cleaning/Inspection.**WARNING**

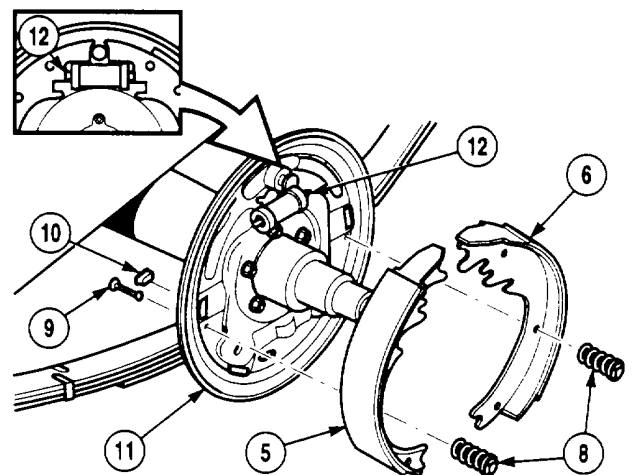
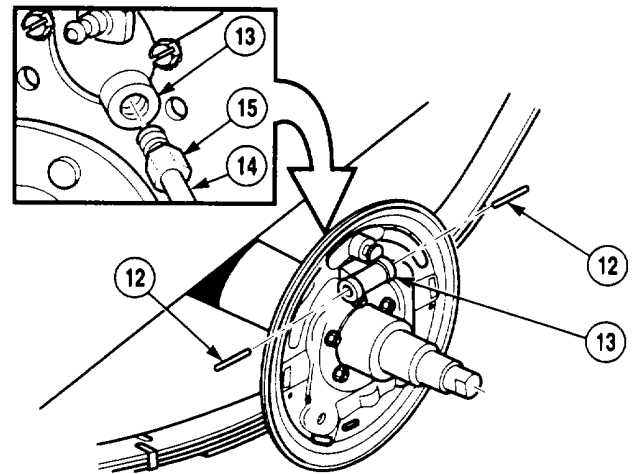
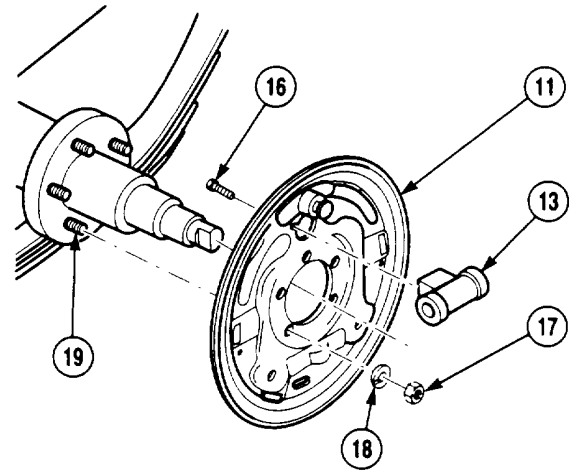
- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
- (1) Clean all parts with drycleaning solvent and brush and dry with rags.
 - (2) Check all parts for cracks, excessive wear, and metal fatigue.
 - (3) Measure thickness of brake blocks. If blocks are less than 1/16 in. (1.588 mm) thick at thinnest point, replace brake shoe.
 - (4) Replace all parts failing inspection.



4-47. BRAKE ASSEMBLY REPLACEMENT (CONT.)

c. Installation.

- (1) Install backing plate (11) with five lock washers (18) and nuts (17) on studs (19). Tighten nuts.
- (2) Install brake cylinder (13) with two screw and washer assemblies (16). Tighten screw and washer assemblies.
- (3) Install brake line (14) in brake cylinder (13) and tighten nut (15).
- (4) Install push rods (12) in brake cylinder (13).
- (5) Install adjuster plug (10) in backing plate (11).
- (6) Install brake shoes (5 and 6) with hold-down pins (9) and hold-down springs (8) on backing plate (11) and in notches of push rods (12).

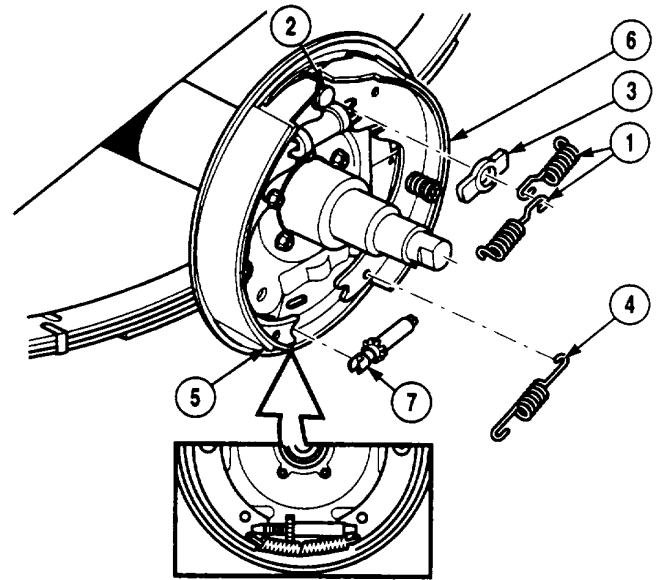


- (7) Install adjuster assembly (7) on brake shoes (5 and 6).

WARNING

Brake shoe springs are under tension. Wear eye protection and use caution when installing springs or serious injury to personnel could result.

- (8) Install adjusting screw spring (4) on brake shoes (5 and 6).
- (9) Install washer (3) and two springs (1) on brake shoes (5 and 6) and anchor post (2).



NOTE

Follow-on Maintenance:

- Replace hub and drum assembly (page 4-143).
- Adjust brakes (page 4-112).
Bleed brake system (page 4-118).

END OF TASK

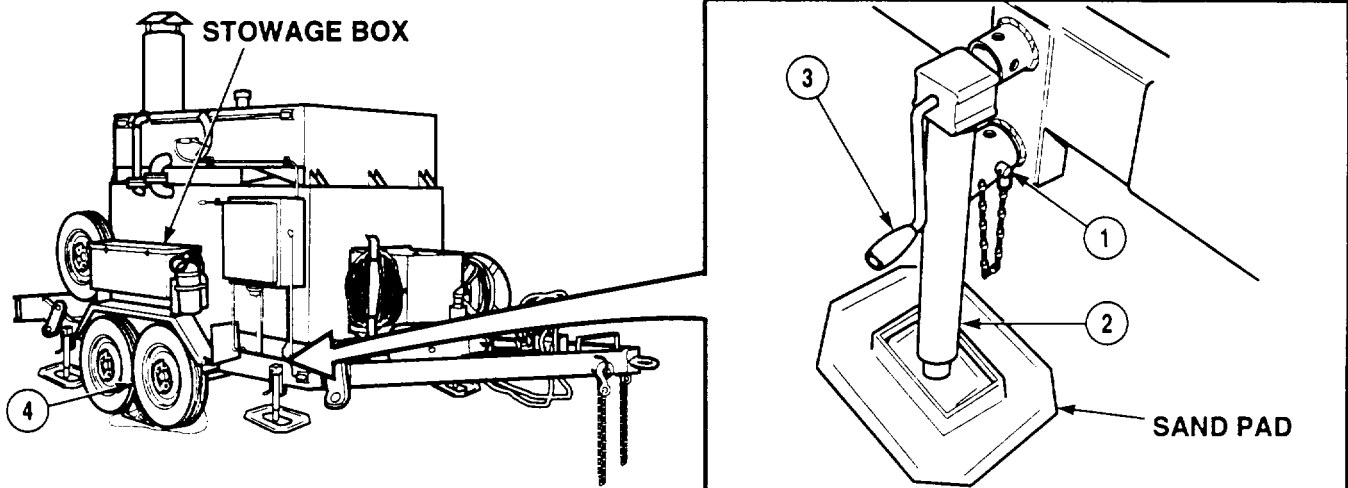
4-48. BRAKE ASSEMBLY ADJUSTMENT.**This task covers:****Adjustment****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive

Equipment Condition

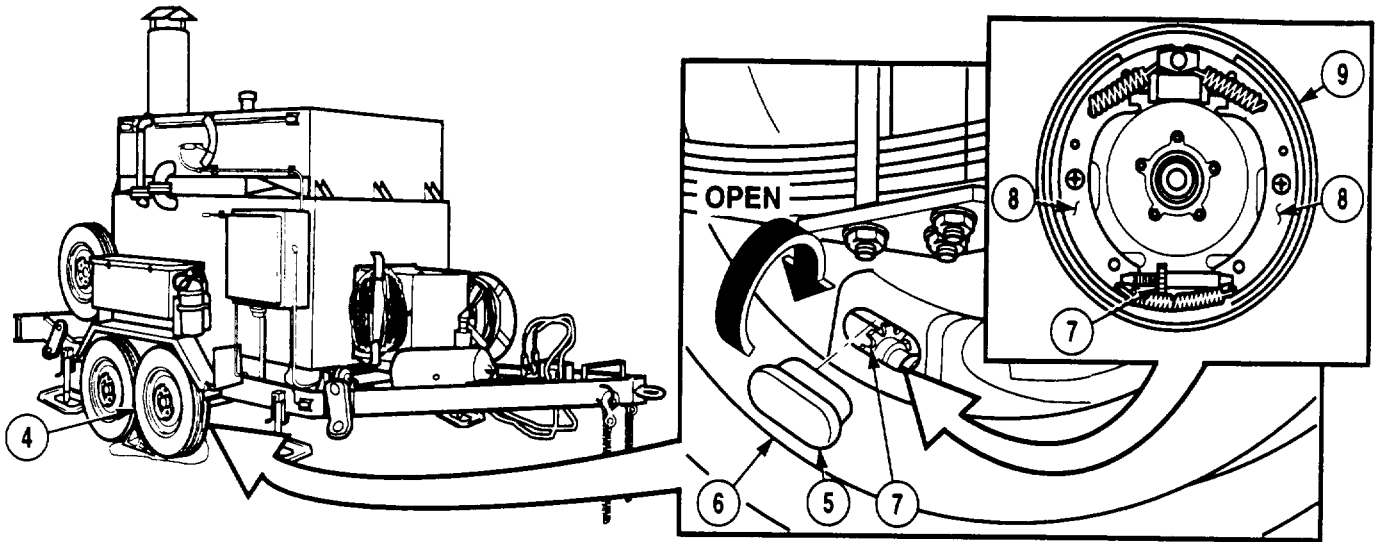
Wheels Chocked (page 2-17)

Heater Cooled

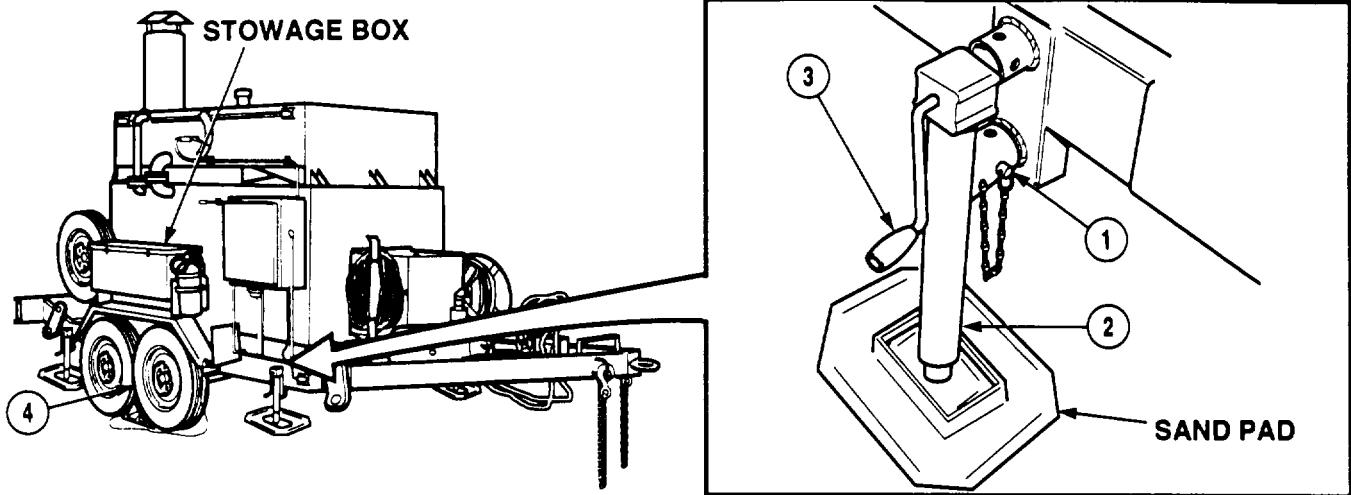
Adjustment.**NOTES**

- **This paragraph discusses adjustment of one brake. All brakes are adjusted in the same way.**
- **Use screw jack nearest to brake being adjusted.**

- (1) Pull pin (1) and allow screw jack (2) to swing down.
- (2) Install pin (1) in screw jack (2).
- (3) Remove sand pad from stowage box and position under base of screw jack (2).
- (4) Raise Heater by turning handle (3) until tire (4) rotates freely.



- (5) Remove adjustor plug (5) from backing plate (6).
- (6) Using flat tip of screwdriver, rotate starwheel (7) until brake shoes (8) open and rest against drum (9) making tire (4) difficult to turn.
- (7) Rotate the starwheel (7) in the opposite direction until the tire (4) turns freely with a slight lining drag.
- (8) Install adjustor plug (5) in backing plate (6).

4-48. BRAKE ASSEMBLY ADJUSTMENT (CONT).

- (10) Lower screw jack (2) by turning handle (3) until tire (4) is on ground.
- (11) Remove sand pad from under base of screw jack (2) and stow in stowage box.
- (12) Pull pin (1) and position screw jack (2) in the upright position.
- (13) Install pin (1) in screw jack (2).
- (14) Repeat steps (1) through (13) for remaining brakes.

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-49. HYDRAULIC MASTER CYLINDER REPLACEMENT AND BRAKE SYSTEM BLEEDING.**This task covers:****a. Removal****b. Installation****c. Bleed Brake System****INITIAL SETUP:***Tools and Special Tools*

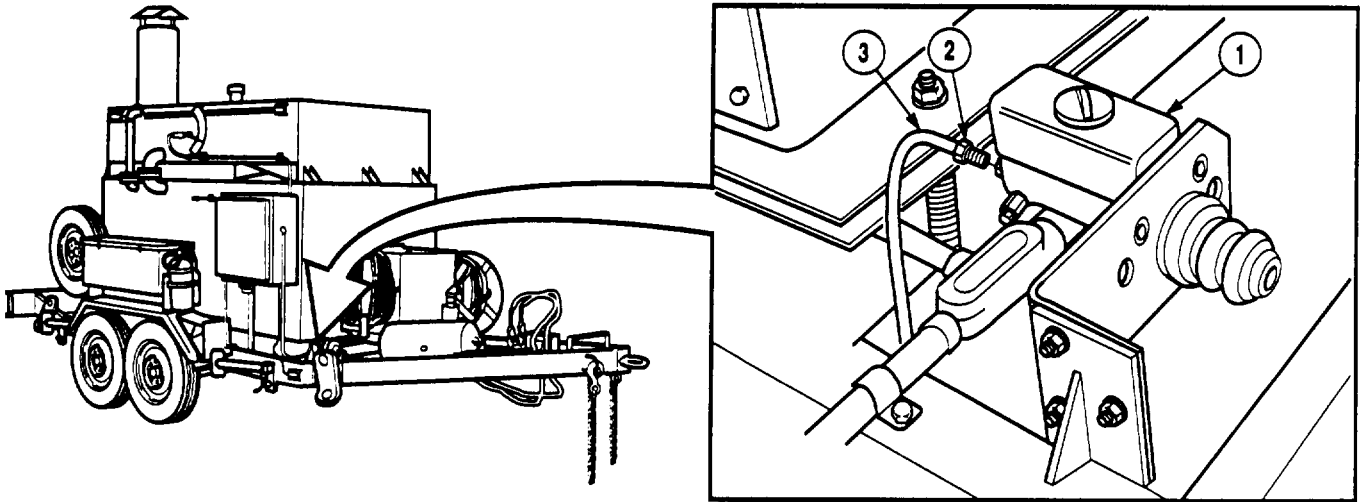
Tool Kit, General Mechanic's: Automotive
Hydraulic Brake Bleeder Filler

Equipment Condition

Wheels Chocked (page 2-17)
Air Chamber Assembly Removed
(page 4-138)

Materials / Parts

Drain Pan
Locknuts (3)
Lock Washers (3)

a. Removal.

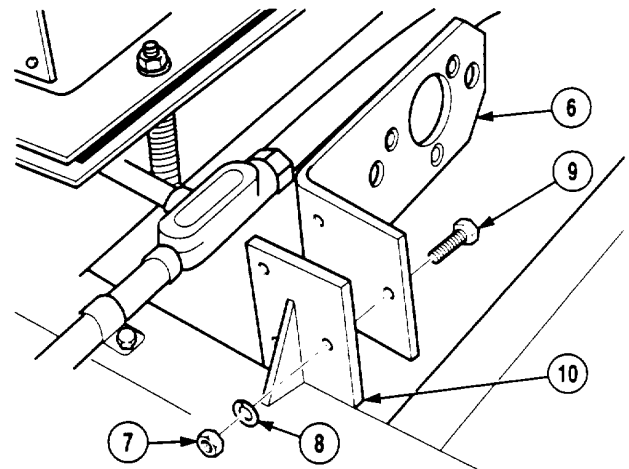
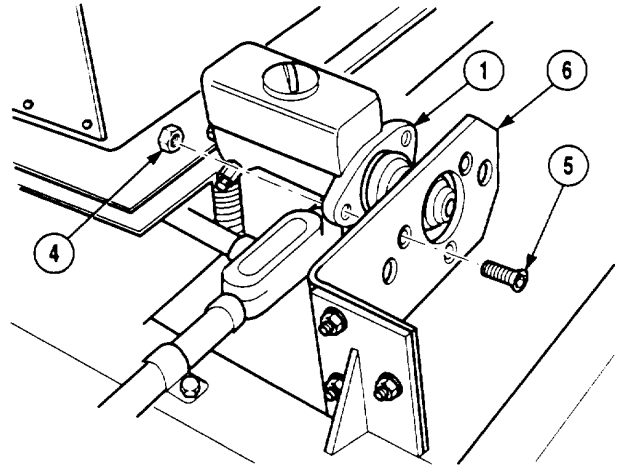
- (1) Position drain pan under master cylinder (1).
- (2) Loosen nut (2) and remove brake line (3) from master cylinder (1).

4-49. HYDRAULIC MASTER CYLINDER REPLACEMENT AND BRAKE SYSTEM BLEEDING (CONT).**NOTE**

Allow fluid to drain from master cylinder before performing step (3).

- (3) Remove three locknuts (4), screws (5), and master cylinder (1) from bracket (6). Discard locknuts.

- (4) If damaged, remove three nuts (7), lock washers (8), screws (9), and bracket (6) from frame (10). Discard lock washers.

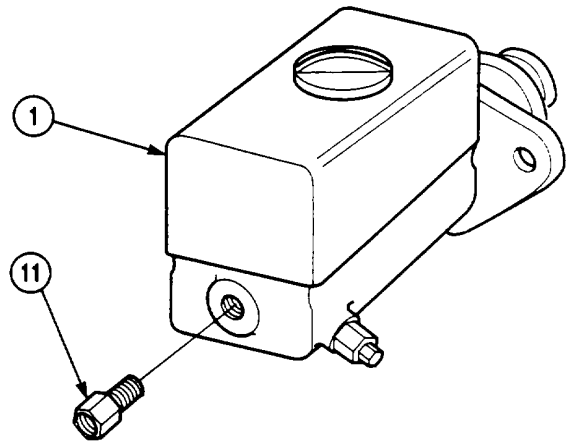


- (5) Remove reducer bushing (11) from master cylinder (1).

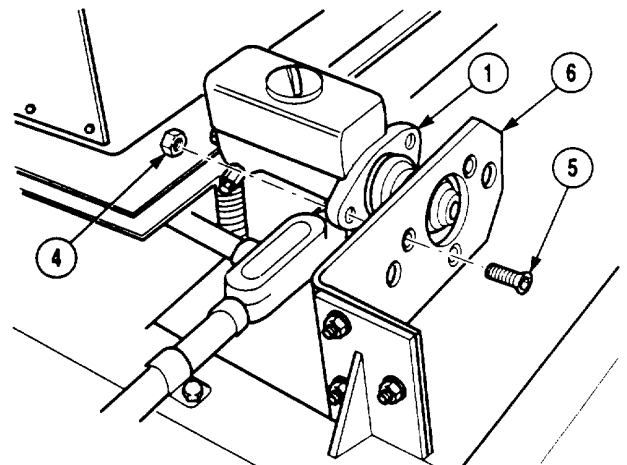
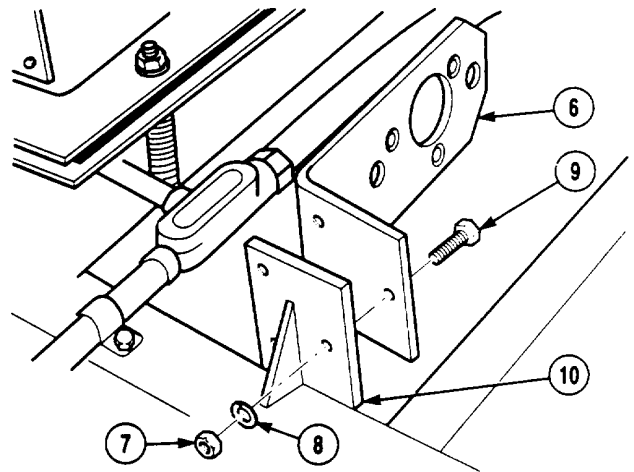
b. Installation.

- (1) Install reducer bushing (11) on master cylinder (1).

- (2) If removed, install bracket (6) with three screws (9), lock washers (8), and nuts (7) on frame (10). Tighten nuts.

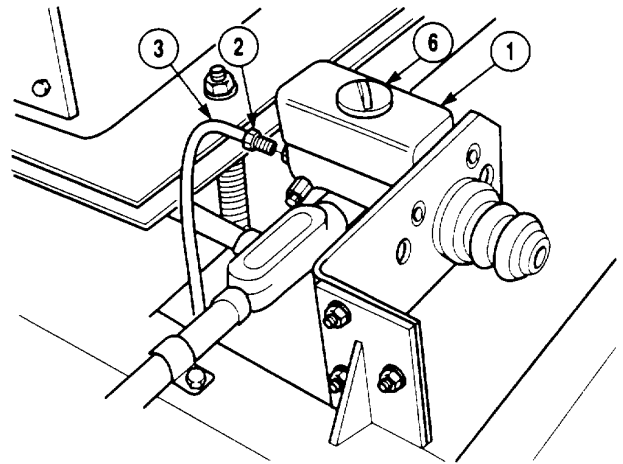


- (3) Install master cylinder (1) with three screws (5) and locknuts (4) on bracket (6). Tighten nuts.



4-49. HYDRAULIC MASTER CYLINDER REPLACEMENT AND BRAKE SYSTEM BLEEDING (CONT).

- (4) Install brake line (3) in master cylinder (1) and tighten nut (2).
- (5) Remove cap (6) and fill master cylinder (1) with brake fluid (item 1, appendix E) to bottom of threads.
- (6) Install air chamber assembly (page 4-139).

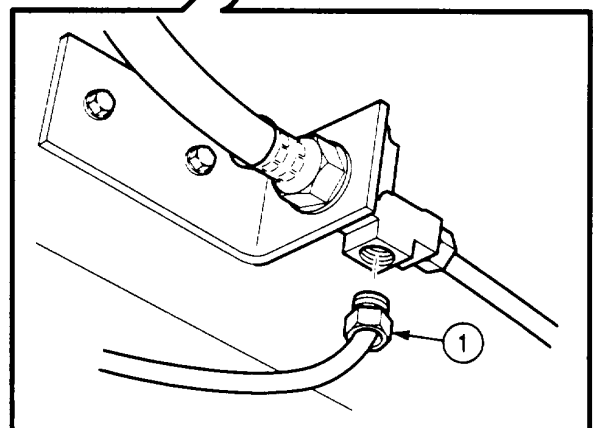
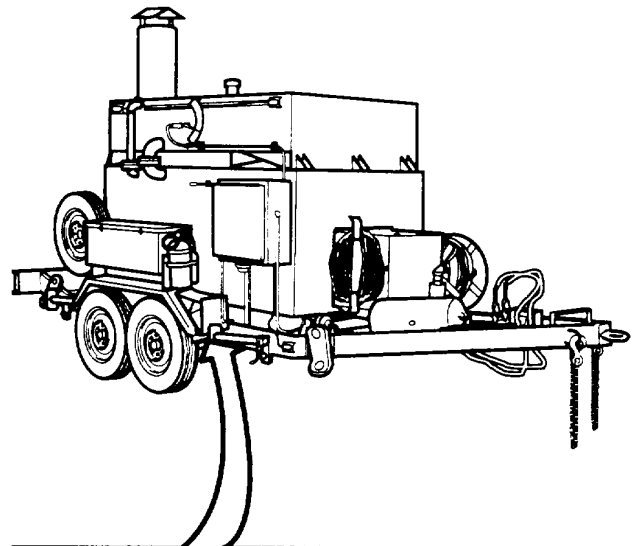


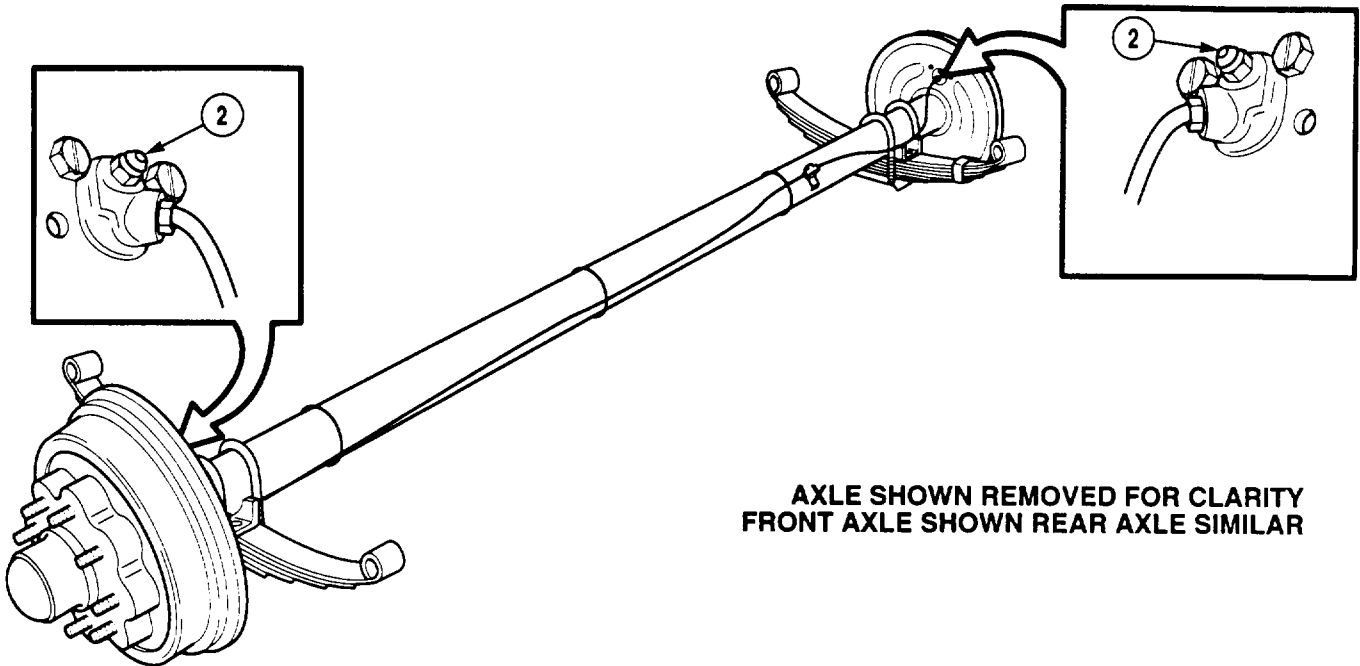
c. Bleed Brake System.

NOTE

Hydraulic brake system filler bleeder (NSN 4910-00-2733658) may be used in place of towing vehicle for bleeding brake system.

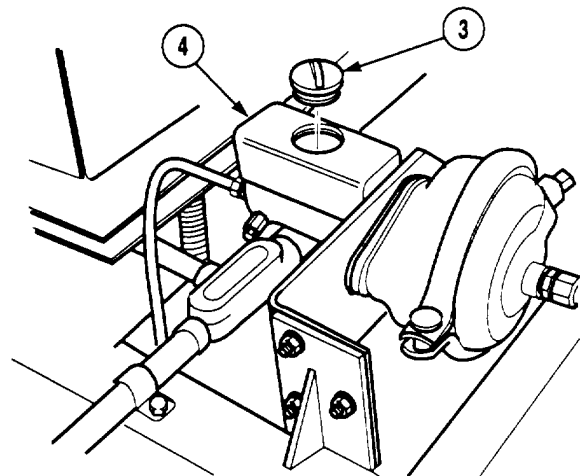
- (1) Connect glad hands to towing vehicle (page 2-46).
- (2) Place drain pan under nut (1).
- (3) While an assistant applies brake pedal on towing vehicle (TM 9-2320-209-10, TM 9-2320-361-10, or TM 9-3805-274-10), loosen nuts (1) until only brake fluid escapes. Tighten nuts.
- (4) Repeat step (2) if required.





- (5) Place drain pan under bleeder screw (2).
- (6) While assistant applies brake pedal on towing vehicle (TM 9-2320-209-10, TM 9-2320-361-10, or TM 9-3805-274-10), loosen bleeder screws (2) until only brake fluid escapes. Tighten nuts.
- (7) Repeat step (4) if required.
- (8) Disconnect glad hands (para 2-50).
- (9) Remove cap (3) and fill master cylinder (4) with brake fluid (item 1, appendix E).
- (10) Install cap.

NOTE
Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-50. HYDRAULIC BRAKE LINE REPLACEMENT.**This task covers:****a. Removal****b. Installation****INITIAL SETUP:***Tools and Special Tools*

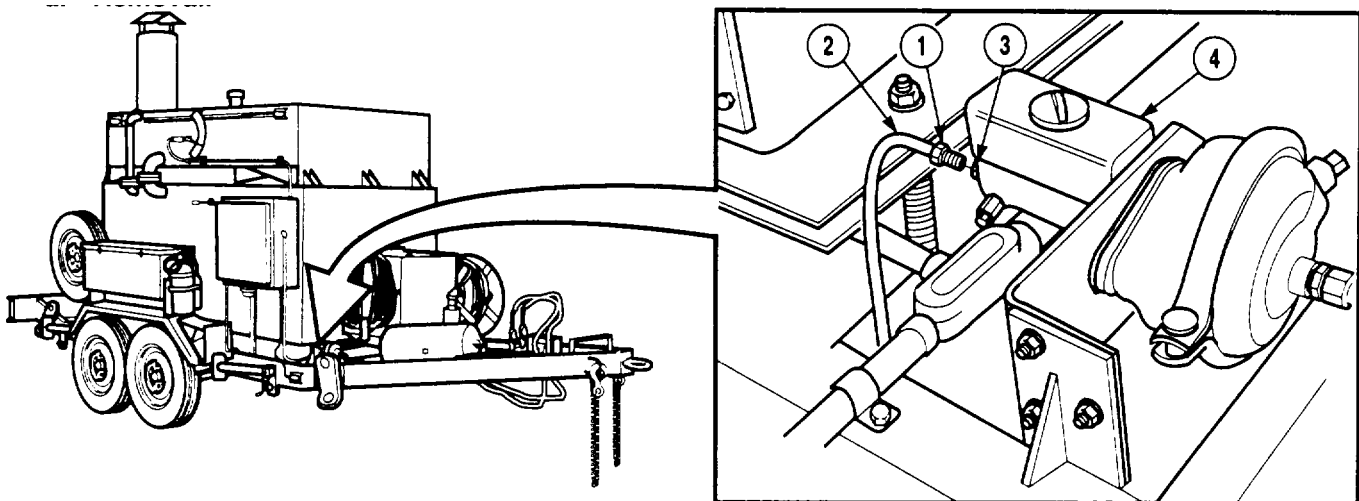
Tool Kit, General Mechanic's: Automotive
 Heater Cooled

Materials /Parts

Drain Pan
 Lock Washers (4)

Equipment Condition

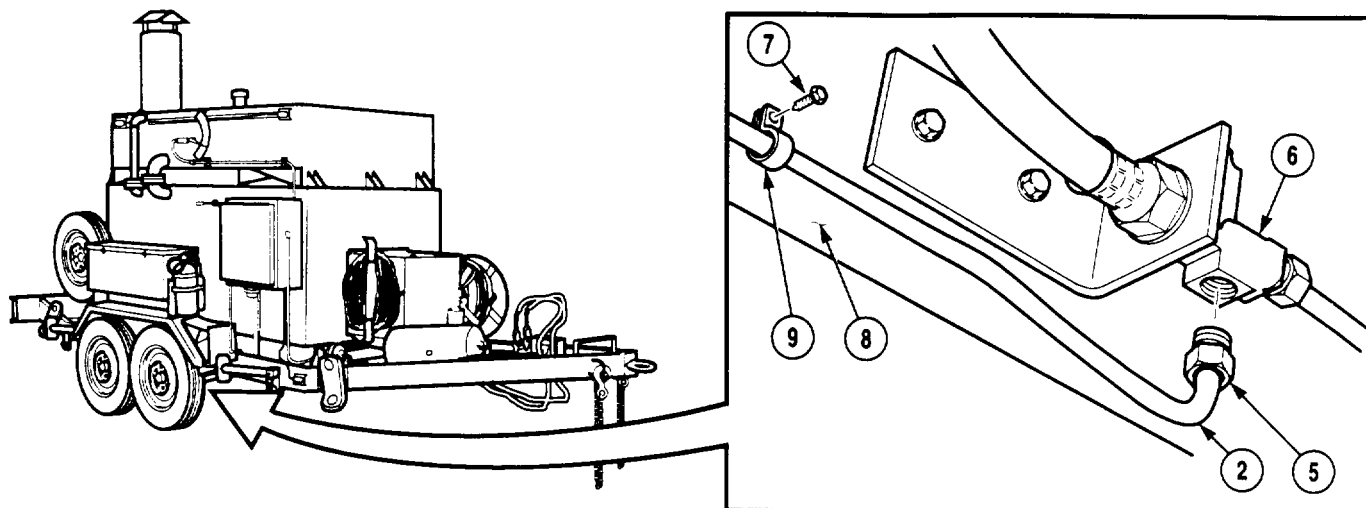
Wheels Chocked (page 2-17)

a. Removal.**NOTES**

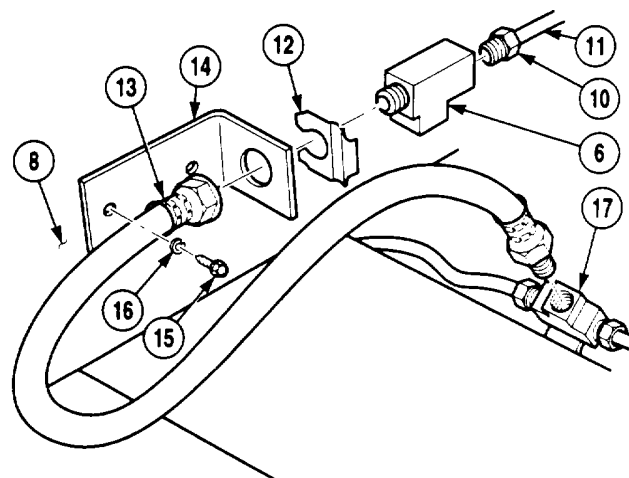
- Inspect all hoses, lines, and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.
- Position drain pan under each connection being disconnected while performing steps (1) through (11).

(1) Loosen nut (1) and remove brake line (2) from reducer bushing (3) on master cylinder (4).

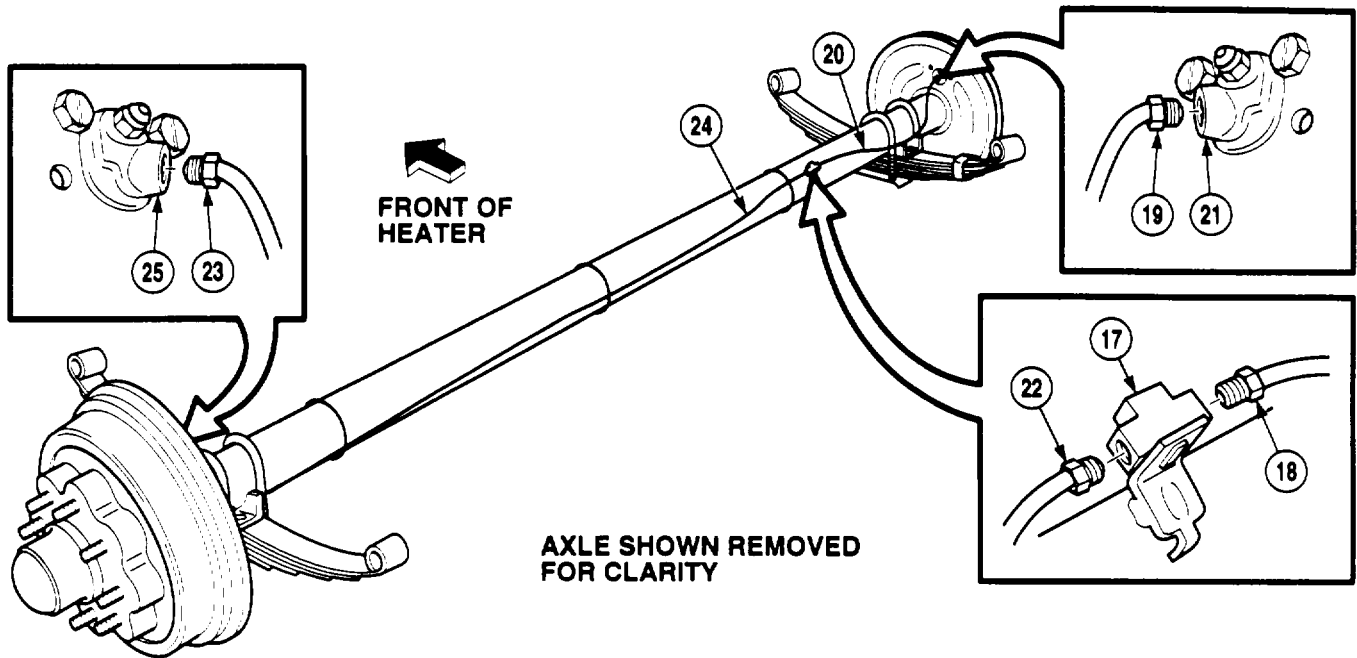
(2) Remove reducer bushing (3) from master cylinder (4).



- (3) Loosen nut (5) and remove brake line (2) from tee fitting (6).
- (4) Remove two screws (7) and brake line (2) from frame (8).
- (5) Remove two clamps (9) from brake line (2).
- (6) Loosen nut (10) and remove brake line (11) from tee fitting (6).
- (7) Remove spring clip (12) and brake hose (13) from bracket (14).
- (8) If damaged, remove two screws (15), lock washers (16), and bracket (14) from frame (8). Discard lock washers.
- (9) Remove brake hose (13) from tee fitting (17).



4-50. HYDRAULIC BRAKE LINE REPLACEMENT (CONT).



(10) Loosen nuts (18 and 19) and remove brake line (20) from brake cylinder (21) and tee fitting (17).

NOTE

Remove cable ties as necessary.

(11) Loosen nuts (22 and 23) and remove brake line (24) from brake cylinder (25) and tee fitting (17).

(12) Loosen nut (26) and remove brake line (11) from brake hose (27).

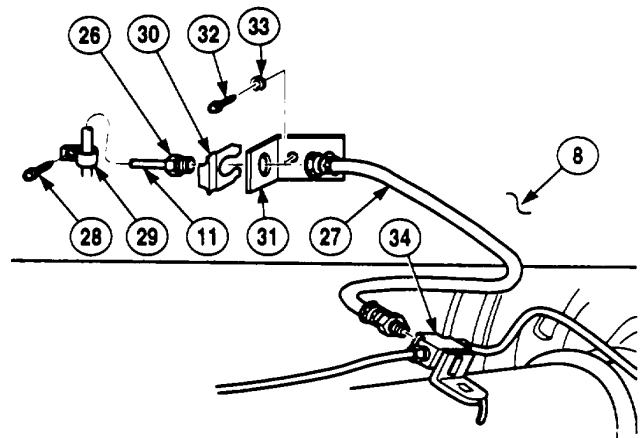
(13) Remove screw (28), clamp (29), and brake line (11) from frame (8).

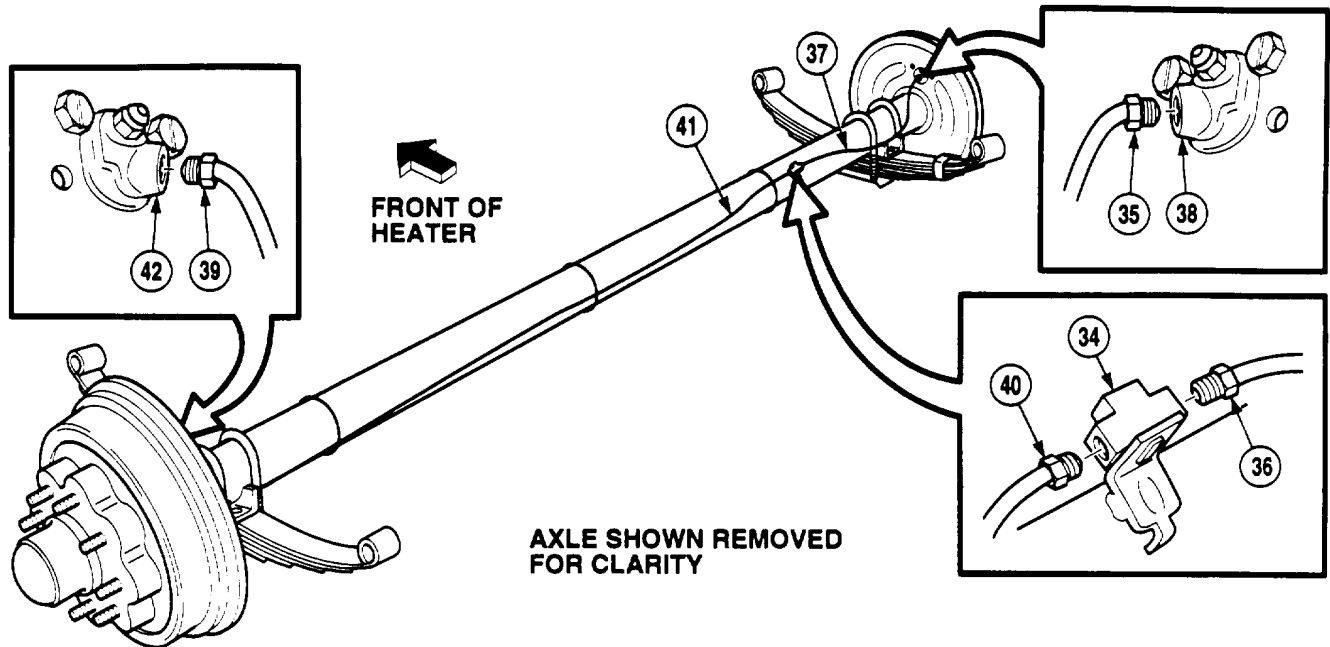
(14) Remove clamp (29) from brake line (11).

(15) Remove spring clip (30) and brake hose (27) from bracket (31).

(16) If damaged, remove two screws (32), lock washers (33), and bracket (31) from frame (8). Discard lock washers.

(17) Remove brake hose (27) from tee fitting (34).





(18) Loosen nuts (35 and 36) and remove brake line (37) from brake cylinder (38) and tee fitting (34).

NOTE

Remove cable ties as necessary.

(19) Loosen nuts (39 and 40) and remove brake line (41) from brake cylinder (42) and tee fitting (34).

b. Installation.

NOTE

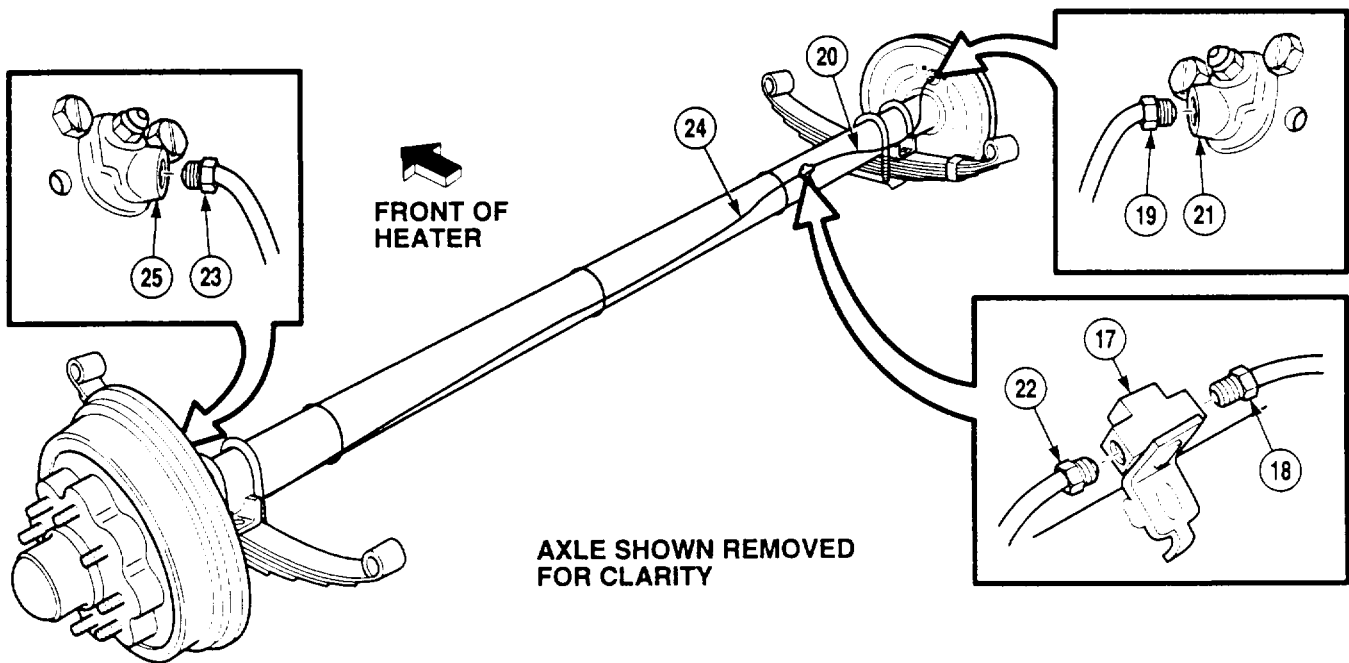
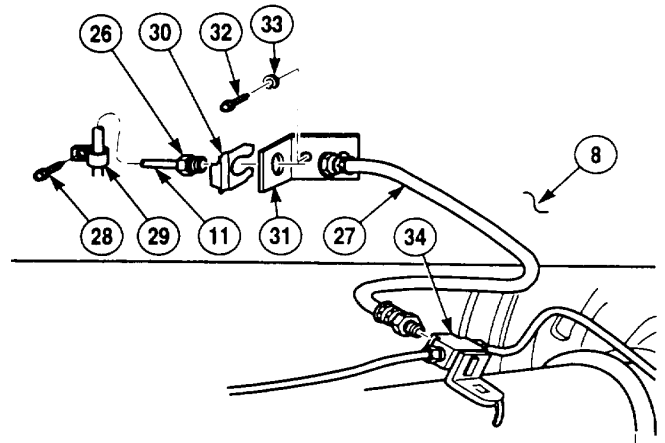
Install cable ties as necessary.

(1) Install brake line (41) in tee fitting (34) and brake cylinder (42) and tighten nuts (39 and 40).

(2) Install brake line (37) in tee fitting (34) and brake cylinder (38) and tighten nuts (35 and 36).

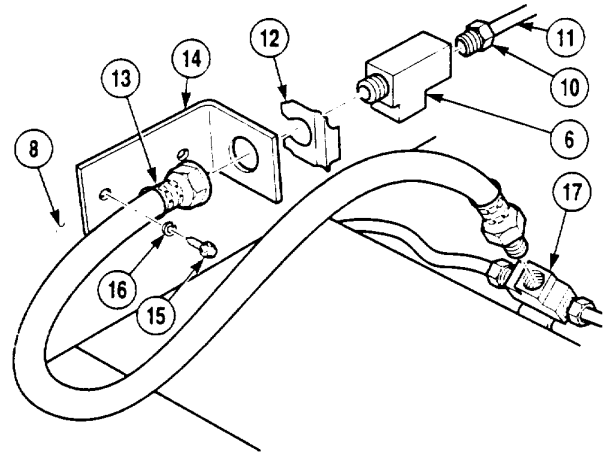
4-50. HYDRAULIC BRAKE LINE REPLACEMENT (CONT). I

- (3) Install brake hose (27) on tee fitting (34).
- (4) If removed, install bracket (31) with two lock washers (33) and screws (32) on frame (8).
- (5) Install brake hose (27) and spring clip (30) on bracket (31).
- (6) Install clamp (29) on brake line (11).
- (7) Install brake line (11) and clamp (29) with screw (28) on frame (8).
- (8) Install brake line (11) in brake hose (27) and tighten nut (26).

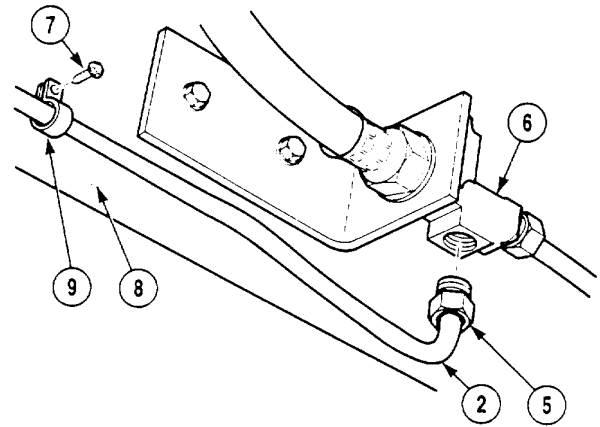


- (9) Install brake line (24) in brake cylinder (25) and tee fitting (17) and tighten nuts (22 and 23).
- (10) Install brake line (20) in brake cylinder (21) and tee fitting (17) and tighten nuts (18 and 19).

- (11) Install brake hose (13) on tee fitting (17).
- (12) If removed, install bracket (14) with two lock washers (16) and screws (15) on frame (8).
- (13) Install brake hose (13) and spring clip (12) on bracket (14).
- (14) Install brake line (11) on tee fitting (6) and tighten nut (10).



- (15) Position clamps (9) on brake line (2).
- (16) Install brake line (2) with two screws (7) on frame (8).
- (17) Install brake line (2) on tee fitting (6) and tighten nut (5).

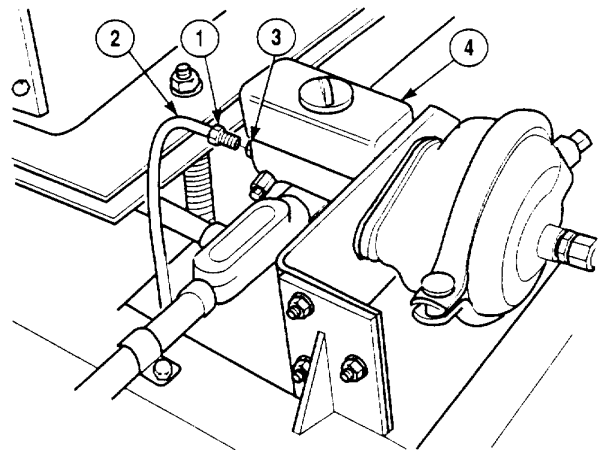


- (18) Install reducer bushing (3) on master cylinder (4).
- (19) Install brake line (2) in reducer bushing (3) on master cylinder (4).

NOTE

Follow-on Maintenance:

- Fill master cylinder (page 4-118).
- Bleed brake system (page 4-118).
- Remove wheel chocks (page 2-35).



END OF TASK

4-51. GLAD HAND REPLACEMENT/REPAIR.

This task covers:

- a. Removal b. Cleaning/Inspection c. Installation

INITIAL SETUP:*Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive

Materials /Parts

Solvent, Drycleaning (item 21, appendix E)

Tags, Identification (item 22, appendix E)

Tape, Teflon (item 23, appendix E)

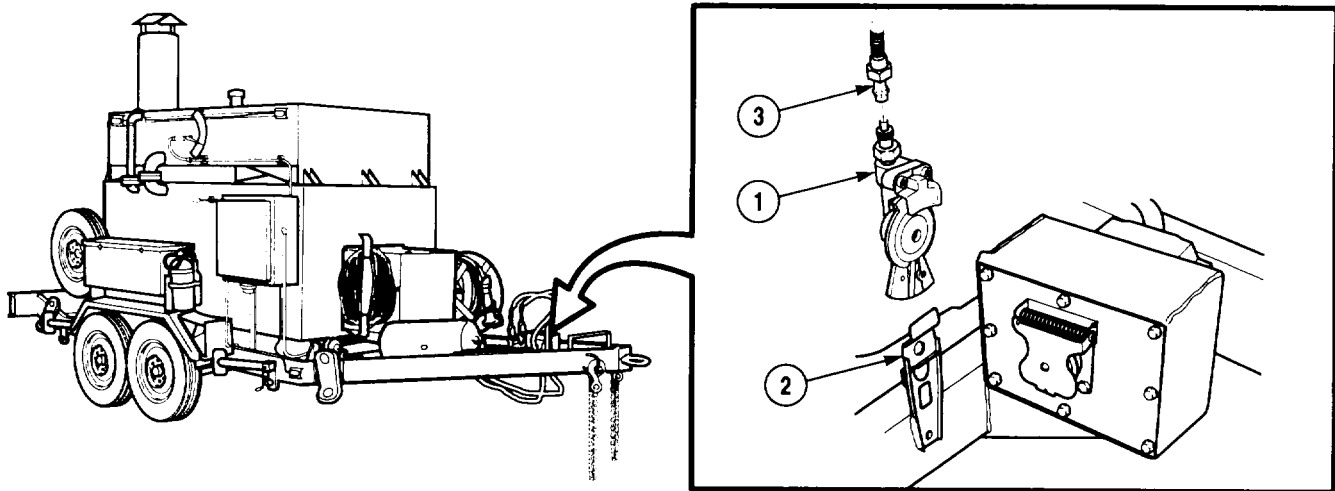
Seal

Equipment Condition

Wheels Chocked (page 2-17)

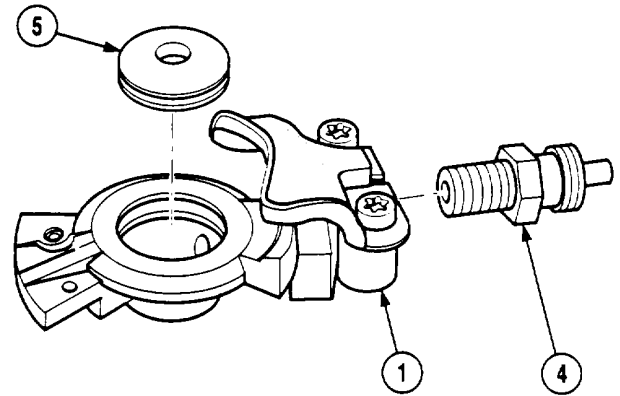
a. Removal.**NOTES**

- This paragraph discusses replacement/repair of one glad hand. Both glad hands are replaced/repared in the same way.
- Tag and mark all hoses prior to removal.



- (1) Remove glad hands (1) from bracket (2).
- (2) Remove air lines (3) from glad hand (1).

- (3) Remove fitting (4) from glad hand (1).
- (4) Remove seal (5) from glad hand (1).
Discard seal.



b. Cleaning/Inspection.

WARNING

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean with drycleaning solvent and dry with compressed air.
 - (2) Check for nicks, gouges, chips, and burrs.

c. Installation.

- (1) Install seal (5) into glad hand (1).

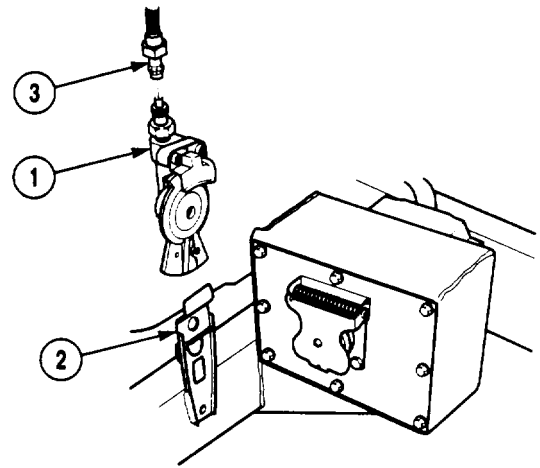
NOTE

Apply Teflon tape to threads of fitting.

- (2) Install fitting (4) into glad hand (1).

4-51. GLAD HAND REPLACEMENT/REPAIR (CONT).

- (3) Install air lines (3) on glad hand (1).
- (4) Install glad hand (1) on bracket (2).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-52. AIR LINE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit General Mechanics: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

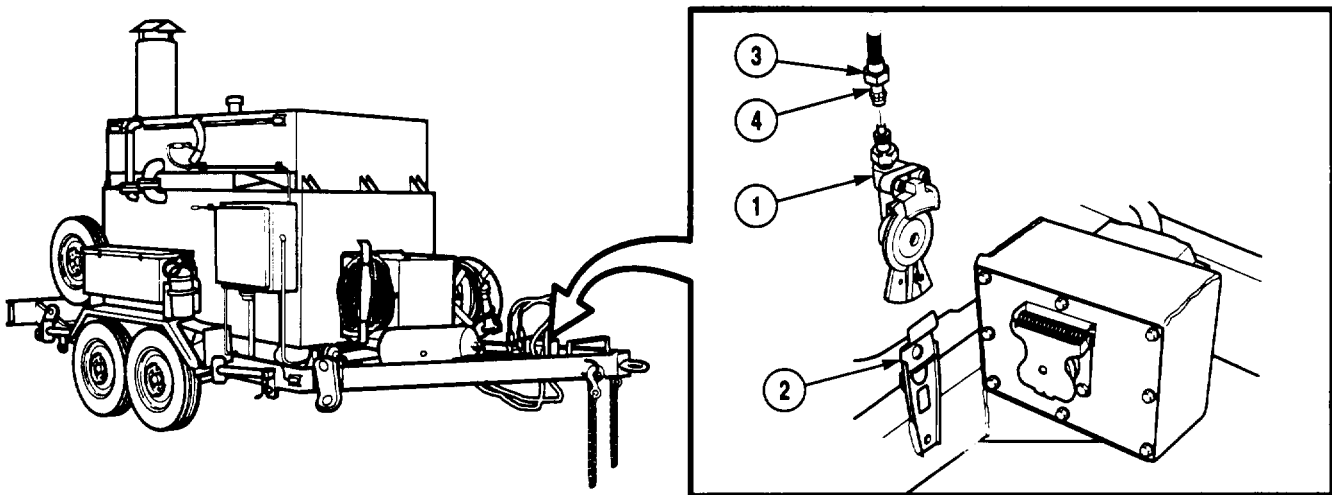
Air System Drained (page 3-6)

Materials/ Parts

Tags, Identification (item 22, appendix E)

Tape, Teflon (item 23, appendix E)

a. Removal.



NOTE

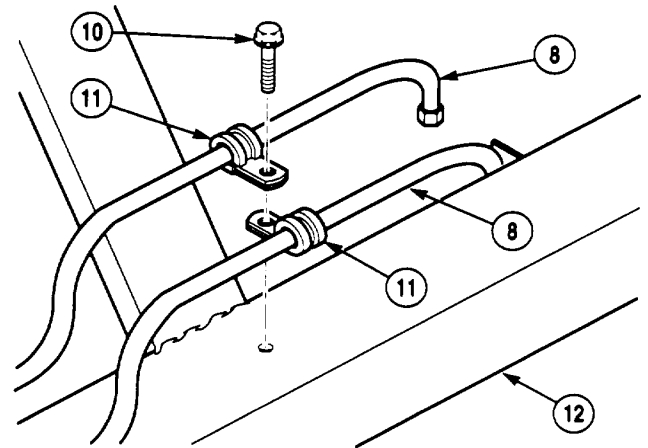
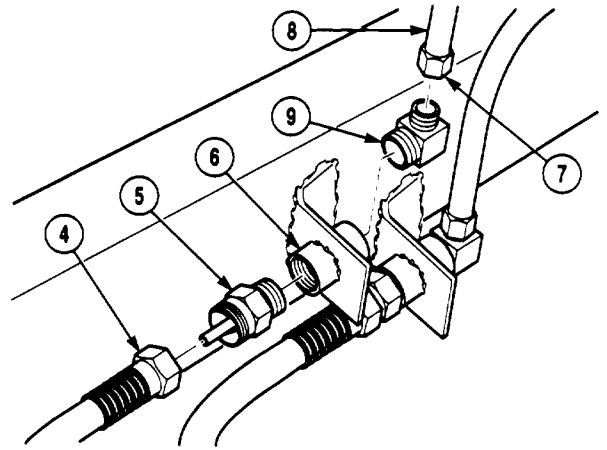
Tag and mark all hoses prior to removal.

- (1) Remove two glad hands (1) from brackets (2).
- (2) Loosen nut (3) and remove glad hands (1) from air lines (4).

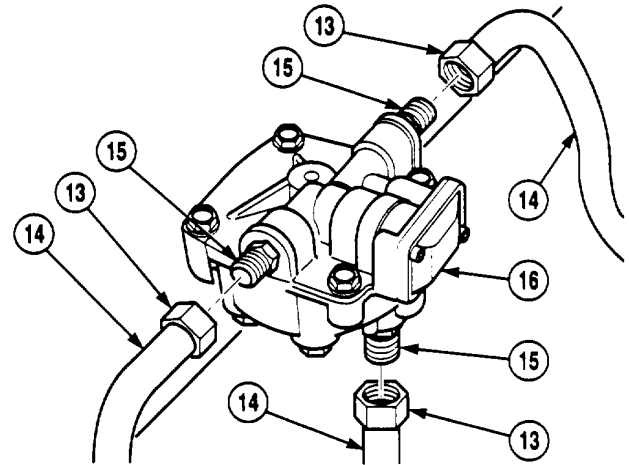
4-52. AIR LINE REPLACEMENT (CONT).

- (3) Remove air line (4) and fitting (5) from bracket (6).
- (4) Loosen nut (7) and remove air line (8) from fitting (9).
- (5) Remove fitting (9) from bracket (6).
- (6) Repeat steps (3) through (5) for second air line.

- (7) Remove two screws (10), air lines (8), and hose clips (11) from frame (12).



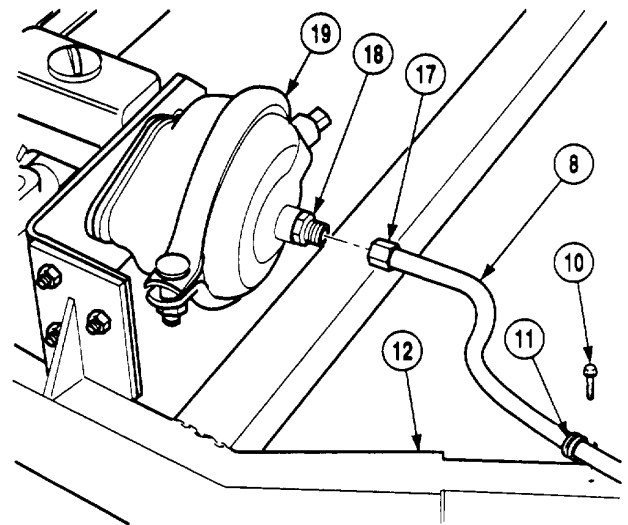
- (8) Loosen three nuts (13) and remove air lines (14) from fittings (15) on air relay valve (16).



- (9) Loosen nut (17) and remove air line (8) from fitting (18) on air chamber (19).
- (10) Remove screw (10) and hose clip (11) from frame (12) and air line (8).
- (11) Remove air lines (8) from frame (12).

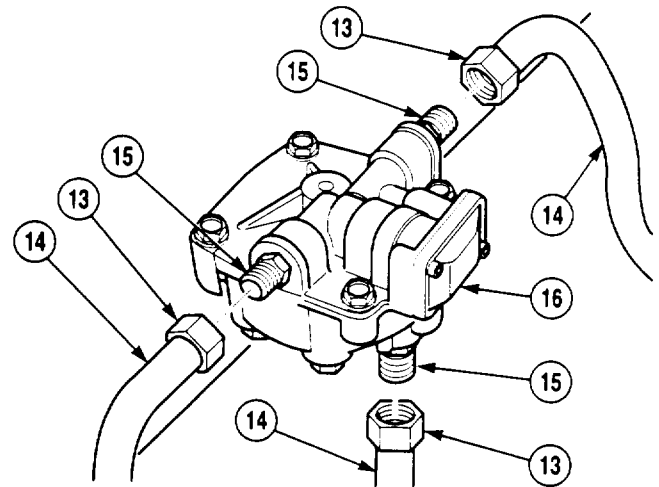
b. Installation.

- (1) Connect air line (8) to fitting (18) on air chamber (19) and tighten nut (17).
- (2) Install air lines (8) on frame (12).
- (3) Secure air line (8) with hose clips (11) and screws (10).

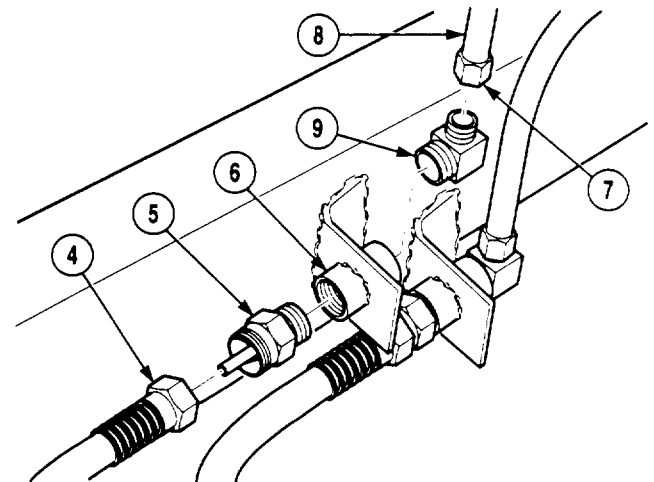


4-52. AIR LINE REPLACEMENT (CONT).

- (4) Install three air lines (14) and nuts (13) to fittings (15) on air relay valve (16). Tighten nuts.



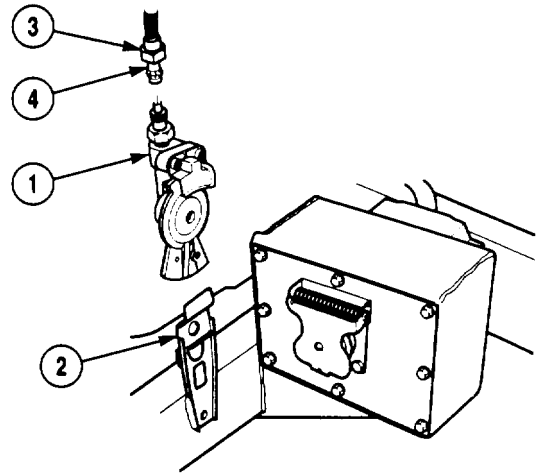
- (5) Apply Teflon tape to threads of fittings.
- (6) Install fitting (9) in bracket (6).
- (7) Install air line (8) on fitting (9) and tighten nuts (7).
- (8) Install fitting (5) in bracket (6).
- (9) Install air line (4) to fitting (5) and tighten nut.



- (10) Install air line (4) on glad hand (1) and tighten nut (3).
- (11) Install glad hands (1) on brackets (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-53. AIR RELAY VALVE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

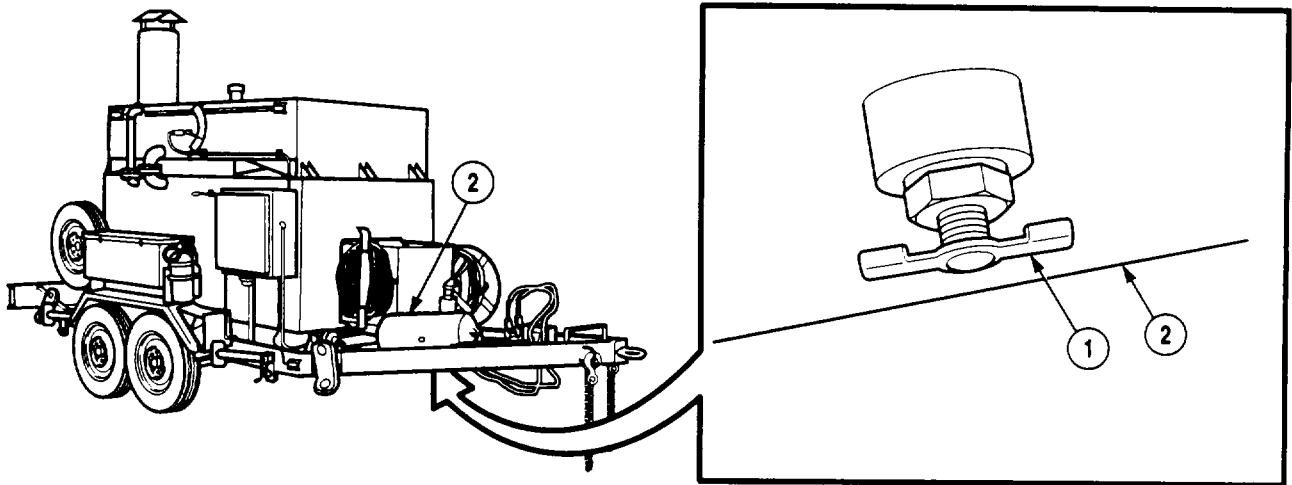
Wheels Chocked (page 2-17)

Materials/Parts

Tags, Identification (item 22, appendix E)

Tape, Teflon (item 23, appendix E)

a. Removal.



- (1) Loosen draincock (1) and drain air from air tank (2).
- (2) Tighten draincock (1) after air has been drained.

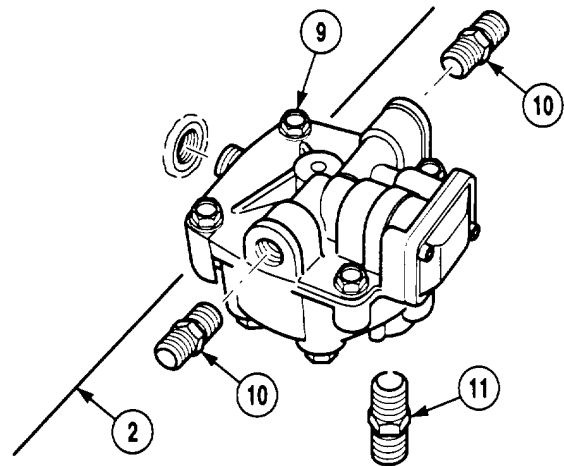
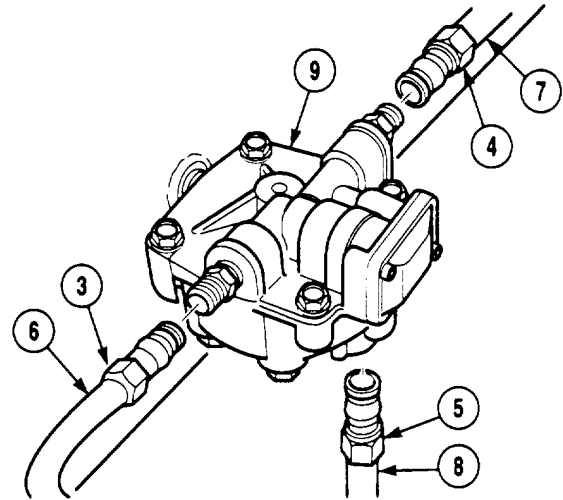
NOTE

Tag and mark all hoses prior to removal.

- (3) Loosen three nuts (3, 4, and 5) and remove three hoses (6, 7, and 8) from air relay valve (9).
- (4) Remove air relay valve (9) from air tank (2).
- (5) Remove two fittings (10) and fitting (11) from air relay valve (9).

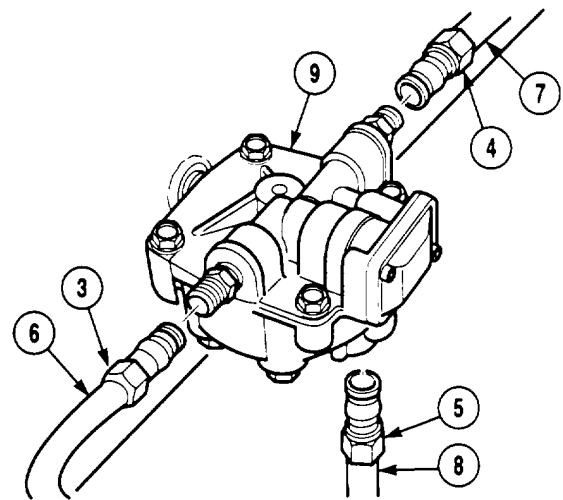
b. Installation.

- (1) Apply Teflon tape to threads of fittings.
- (2) Install two fittings (10) and fitting (11) in air relay valve (9).
- (3) Install air relay valve (9) in air tank (2).
- (4) Install three hoses (6, 7, and 8) to air relay valve (9) and tighten nuts (3, 4, and 5).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-54. AIR TANK REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

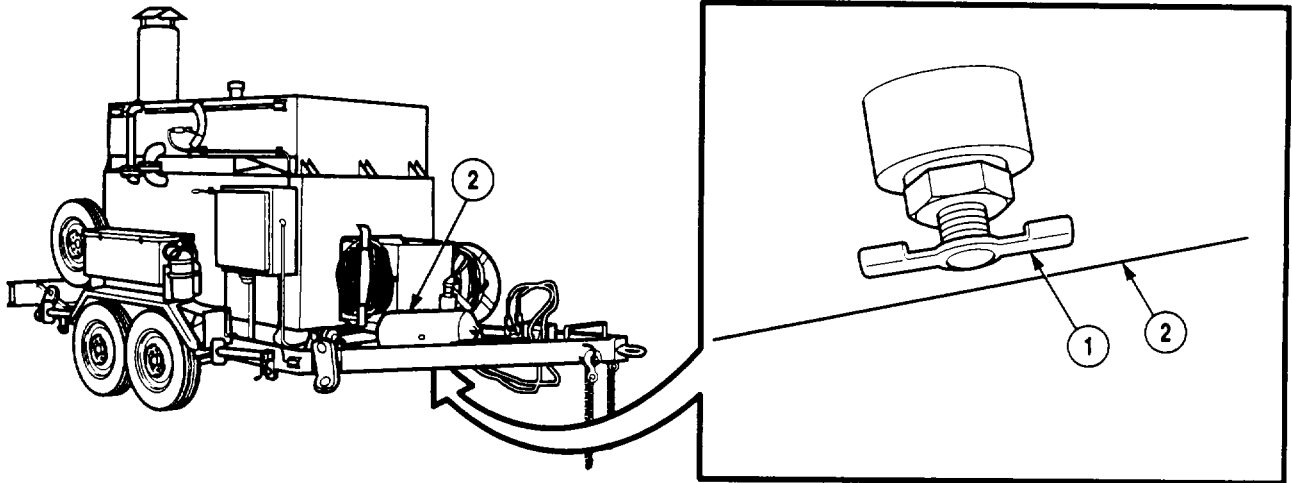
Equipment Condition

Wheels Chocked (page 2-17)
Air Relay Valve Removed (page 4-134)

Materials /Parts

Solvent, Drycleaning (item 21, appendix E)
Tape, Teflon (item 23, appendix E)
Lock Washers (4)

a. Removal.



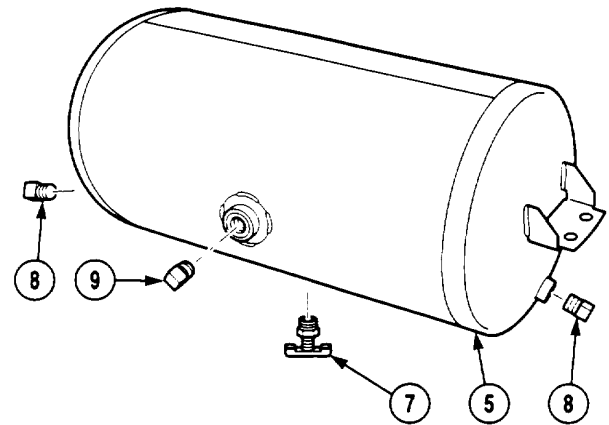
- (1) Remove four nuts (1), lock washers (2), eight washers (3), and four screws (4) from air tank (5). Discard lock washers.

NOTE

Air tank weighs 39 lb (17.7 kg).

- (2) Remove air tank (5) from frame assembly (6).

- (3) Remove draincock (7) from air tank (5).
- (4) Remove two plugs (8) and plug (9) from air tank (5).



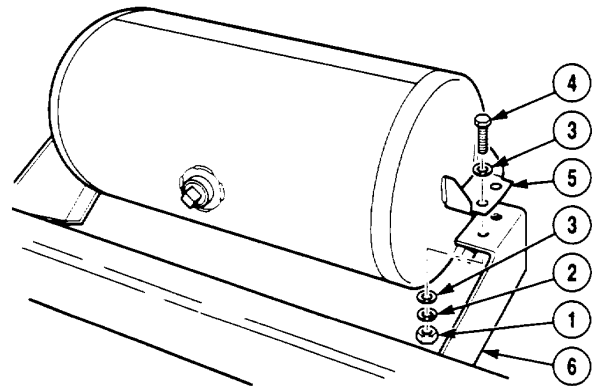
b. Installation.

- (1) Apply Teflon tape to threads of plugs (8 and 9).
- (2) Install two plugs (8) and plug (9) in air tank (5).
- (3) Install draincock (7) in air tank (5).
- (4) Position air tank (5) on frame assembly (6).
- (5) Install four screws (4), eight washers (3), four lock washers (2), and four nuts (1) in air tank (5) and frame assembly (6). Tighten nuts to 23 lb-ft (31 N•m).

NOTE

Follow-on Maintenance:

- Install air relay valve (page 4-135).
- Remove wheel chocks (page 2-35).



END OF TASK

4-55. AIR CHAMBER ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal b. Installation
-

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

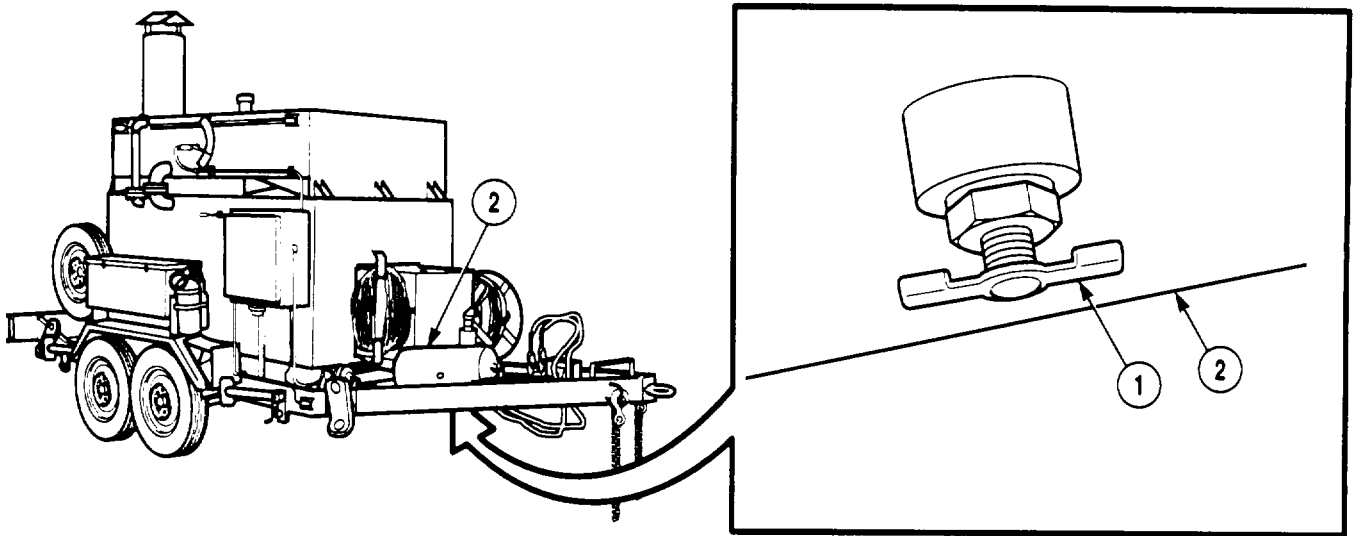
Wheels Chocked (page 2-17)

Materials /Parts

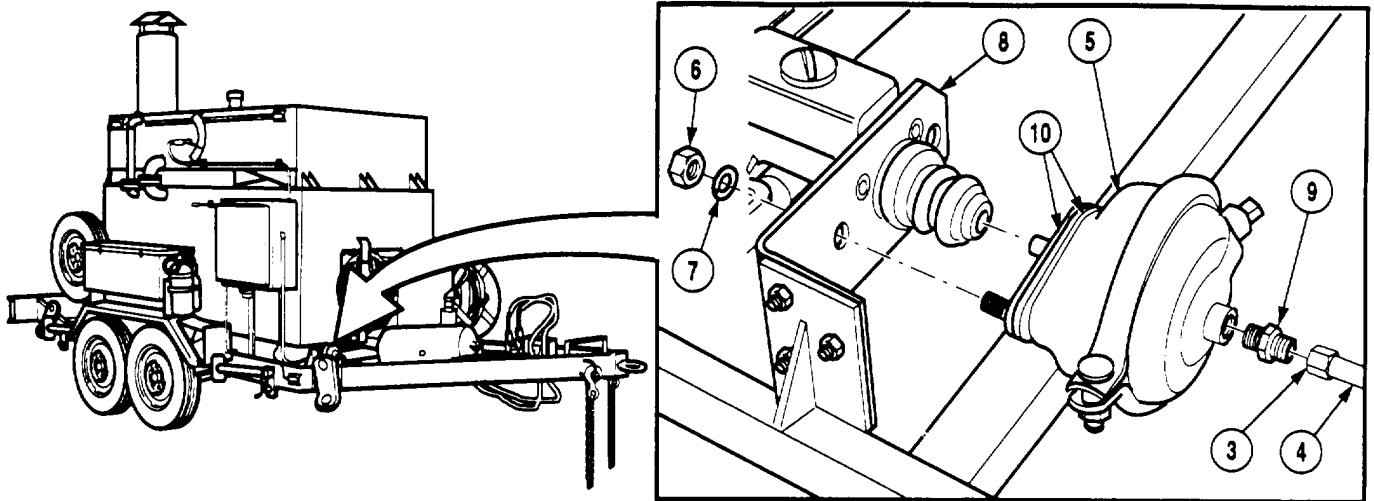
Tape, Teflon (item 22, appendix E)

Lock Washers (2)

a. Removal.



- (1) Loosen draincock (1) and drain air from air tank (2).
- (2) Tighten draincock (1) after air has been drained.



- (3) Loosen nut (3) and remove air line (4) from air chamber assembly (5).
- (4) Remove two nuts (6), lock washers (7), and air chamber assembly (5) from bracket (8). Discard lock washers.
- (5) Remove fitting (9) and shims (10) from air chamber assembly (5).

b. Installation.

NOTE

Apply Teflon tape to threads of fitting.

- (1) Install fitting (9) in air chamber assembly (5).
- (2) Install air chamber assembly (5), three shims (10), two lock washers (7), and nuts (6) on bracket (8).
- (3) Install air line (4) on air chamber assembly (5) and tighten nut (3).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-56. HUB AND DRUM ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Cleaning/Inspection
- c. Installation

INITIAL SETUP

Tools and Special Tools

- Tool Kit, General Mechanic's: Automotive
- Wooden Block
- Press

Materials/Parts

- Brush (item 2, appendix E)
- Compound, Sealing (item 9, appendix E)
- Grease (item 14, appendix E)
- Rags, Wiping (item 19, appendix E)

Materials/Parts - Continued

- Solvent, Drycleaning (item 21, appendix E)
- Oil Seal
- Cotter Pin

Equipment Condition

- Wheels Chocked (page 2-17)
- Wheel and Tire Assembly Removed (page 3-7)

a. Removal

NOTE

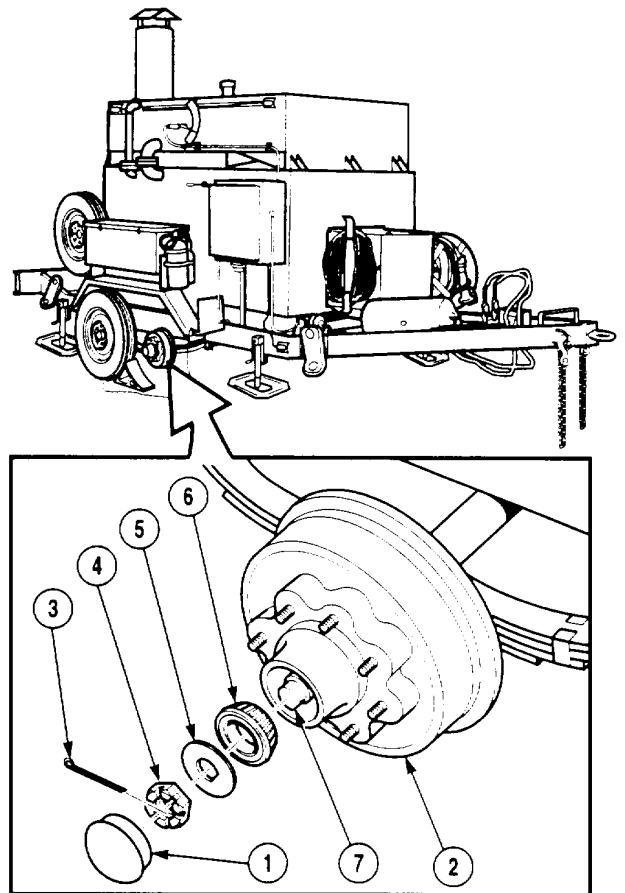
This paragraph discusses replacement of one hub and drum assembly. All hub and drum assemblies are replaced in the same way.

- (1) Remove grease cap (1) from hub and drum assembly (2).

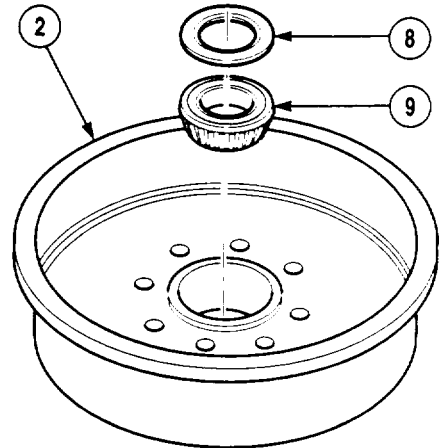


Bearings and cups are not interchangeable. Do not switch inner or outer bearings and cups. Damage will result to hub and drum assembly and axle.

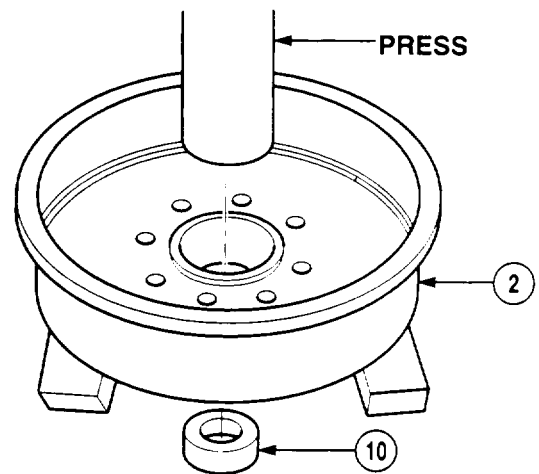
- (2) Remove cotter pin (3), nut (4), washer (5), and bearing (6) from hub and drum assembly (2). Discard cotter pin.
- (3) Remove hub and drum assembly (2) from axle (7).



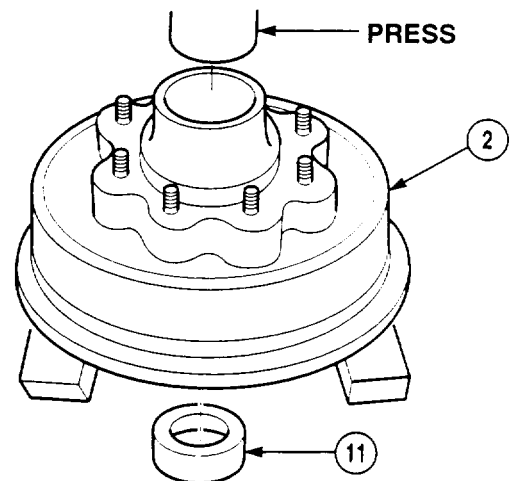
- (4) Remove oil seal (8) and bearing (9) from hub and drum assembly (2). Discard oil seal.



- (5) Using press, remove bearing race (10) from hub and drum assembly (2).

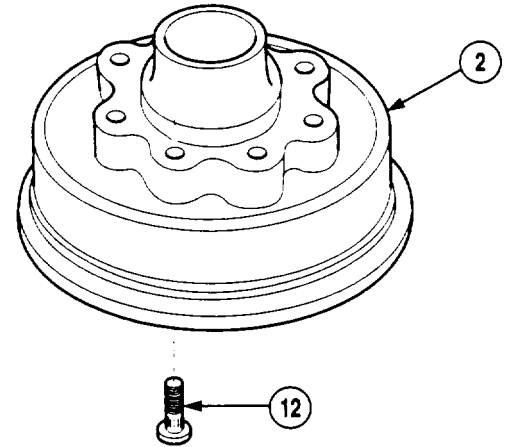


- (6) Using press, remove bearing race (11) from hub and drum assembly (2).



4-56. HUB AND DRUM ASSEMBLY REPLACEMENT (CONT).

- (7) If damaged, remove studs (12) from hub and drum assembly (2).

**b. Cleaning/Inspection.**

WARNING

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
- (1) Clean all parts, except bearings with drycleaning solvent and brush. Dry with rags.
 - (2) Turn bearings slowly and inspect bearings for discoloration, pitting, rust, and rough operation.
 - (3) Inspect outer race for flat spots, pitting, discoloration, and rust.
 - (4) Inspect oil seal for nicks and tears.
 - (5) Inspect hub and studs for thread bareness, warpage, and metal fatigue.

(6) Inspect brake drum for excessive wear. Replace brake drum if not within the following specifications:

Nominal Internal Diameter	12.000 in. (30.480 cm)
Maximum Usable Diameter	12.090 in. (30.709 cm)
Remachining Diameter	12.020 in. (30.531 cm)
Allowable Radial Variance	0.015 in. (0.038 cm)

(7) Replace all parts failing inspection.

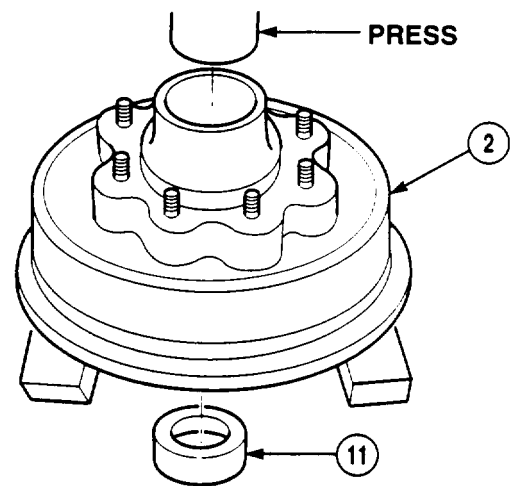
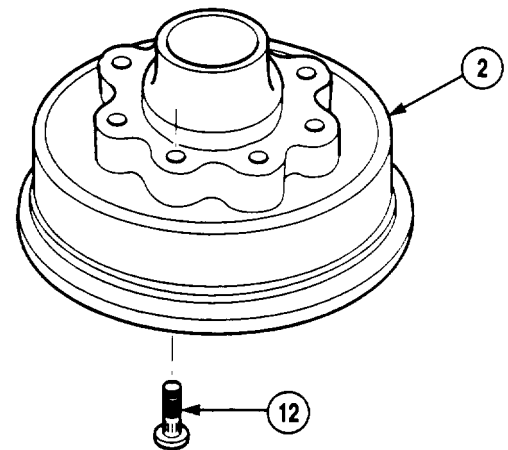
c. Installation.

(1) If removed, install eight studs (12) in hub and drum assembly (2).

NOTE

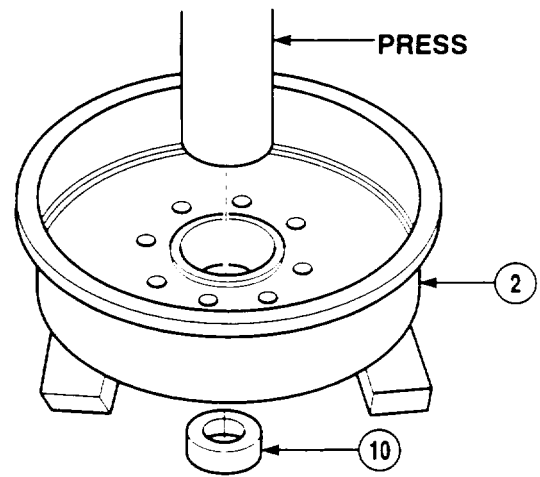
Pack bearings and apply a light coat of grease on outer surface of cups before installing.

(2) Using press, install bearing race (11) in hub and drum assembly (2).

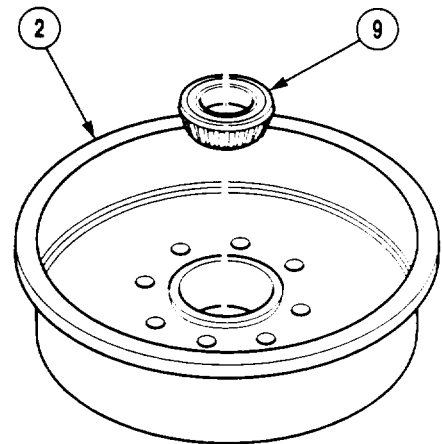


4-56. HUB AND DRUM ASSEMBLY REPLACEMENT (CONT).

- (3) Using press, install bearing race (10) in hub and drum assembly (2).



- (4) Apply grease to bearing (9).
- (5) Install bearing (9) in hub and drum assembly (2).



WARNING

Adhesive sealant, MIL-S- 46163, can damage your eyes. Wear safety goggles/glasses when using; avoid contact with eyes. If sealant contacts eyes, flush eyes with water and get immediate medical attention.

NOTE

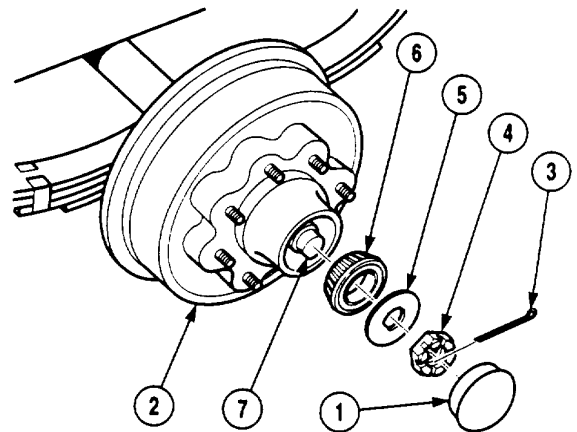
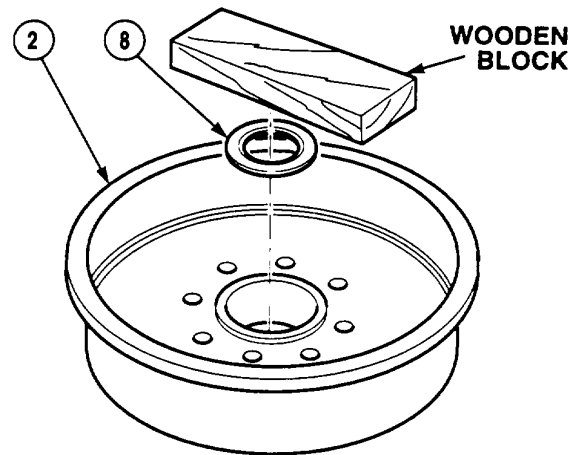
Apply sealing compound to outer surface of oil seal.

- (6) Using a wooden block, install oil seal (8) in hub and drum assembly (2).
- (7) Position hub and drum assembly (2) on axle (7).
- (8) Apply grease to bearing.
- (9) Install bearing (6), washer (5), and nut (4) on axle (7).
- (10) Rotate the hub and drum assembly (2) slowly while preloading nut (4) to approximately 50 lb-ft (68 N•m).
- (11) Loosen nut (4) to remove torque; do not rotate hub and drum assembly (2).
- (12) Tighten nut (4) until snug and back nut out slightly until first notch lines up with cotter pin hole.
- (13) Install cotter pin (3) in axle (7).
- (14) Install grease cap (1) on hub and drum assembly (2).

NOTE**Follow-on Maintenance:**

- Install wheel and tire assembly (page 3-8).
- Remove wheel chocks (page 2-35).

END OF TASK



4-57. TIRE REPAIR.

Refer to TM 9-2610-200-20 for care, maintenance, repair, and inspection of pneumatic tires and inner tubes.

4-58. SAFETY CHAIN REPLACEMENT.

This task covers:

a. Removal

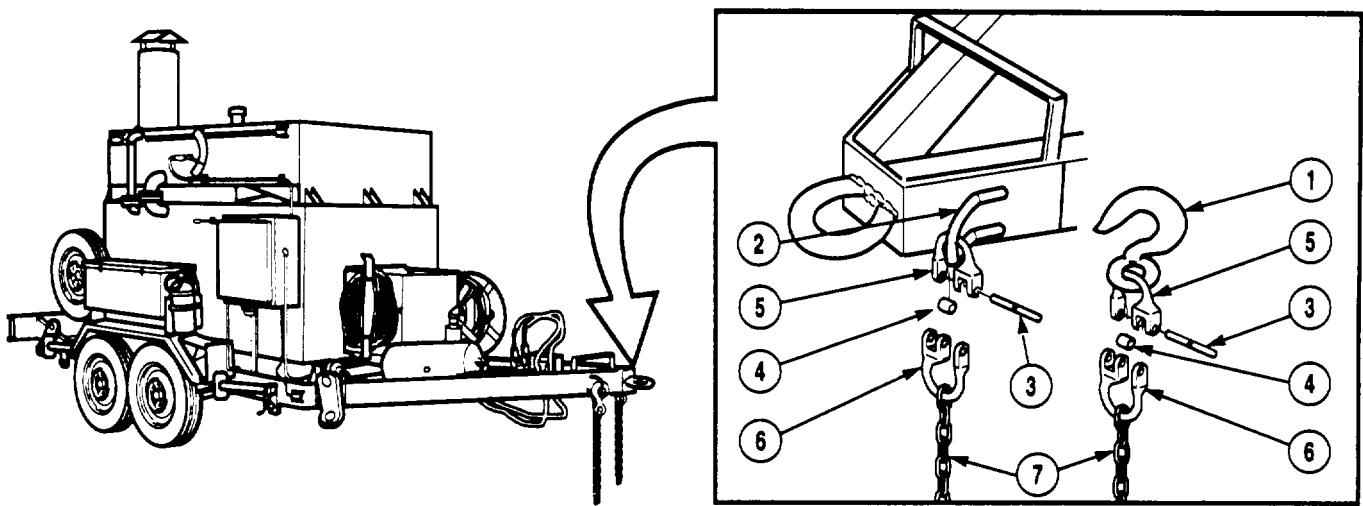
b. Installation

INITIAL SETUP*Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

**NOTE**

This task discusses replacement of one safety chain. Both safety chains are replaced in the same way.

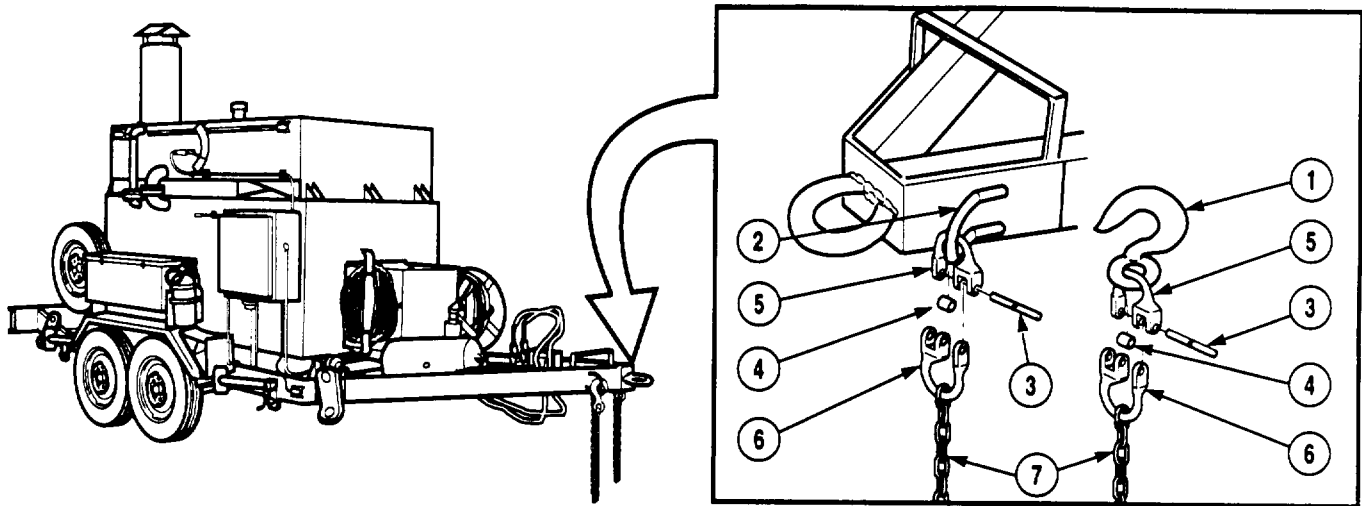
- (1) Remove hook (1) from mounting eye (2).

NOTE

First tap to remove pin must be forceful.

- (2) Remove two pins (3) and spacers (4) from connecting links (5 and 6).
- (3) Pull halves of connecting links (5 and 6) apart.
- (4) Remove upper halves of connecting links (5) from mounting eye (2) and hook (1).
- (5) Remove lower halves of connecting links (6) from chain (7).

b. Installation.



- (1) Install lower halves of connecting links (6) to chain (7).
- (2) Install upper halves of connecting links (5) to mounting eye (2) and hook (1).
- (3) Position halves of connecting links (5 and 6) together.
- (4) Install two spacers (4) and pins (3) to halves of connecting links (5 and 6).
- (5) Install hook (1) to mounting eye (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-59. SPRING ASSEMBLY AND EQUALIZER REPLACEMENT.

This task covers:

- a. Removal b. Installation

INITIAL SETUP*Tools and Special Tools*

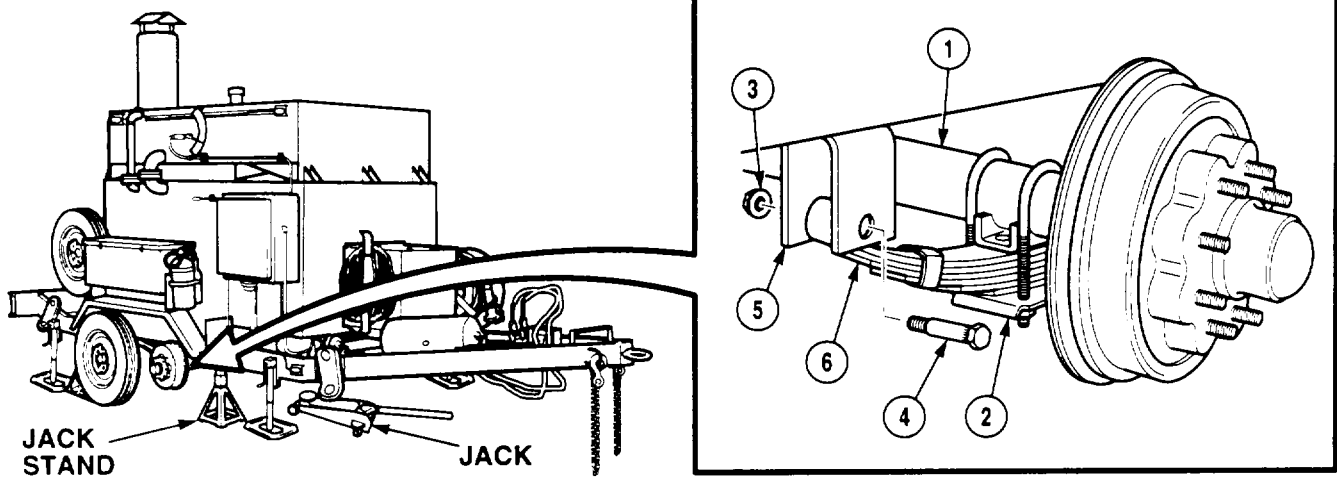
Tool Kit, General Mechanic's: Automotive
 Jack (2)
 Jack Stands (2)

Personnel Required

Two

Equipment Condition

Wheel and Tire Assembly Removed
 (page 3-7)
 Wheels Chocked (page 2-17)

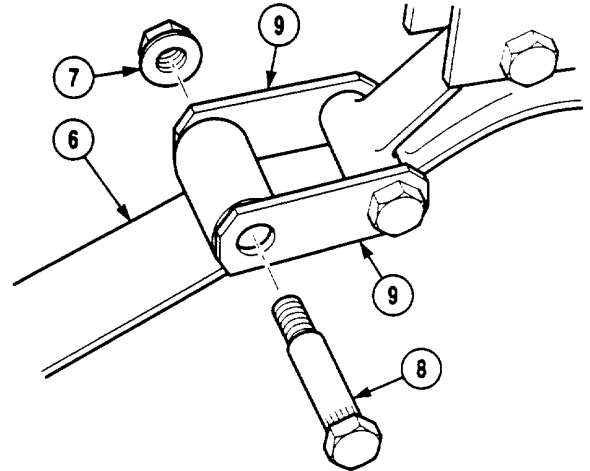
a. Removal.**NOTE**

- This paragraph discusses removal/installation of one spring assembly. All spring assemblies are removed/installed the same way.
- Position jack stands securely under frame and close to spring assembly being removed.

(1) Position jack under axle assembly (1); do not cover bottom plate (2).

(2) Remove nut (3) and screw (4) from spring hanger (5) and spring assembly (6).

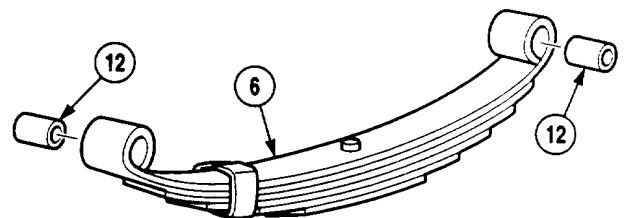
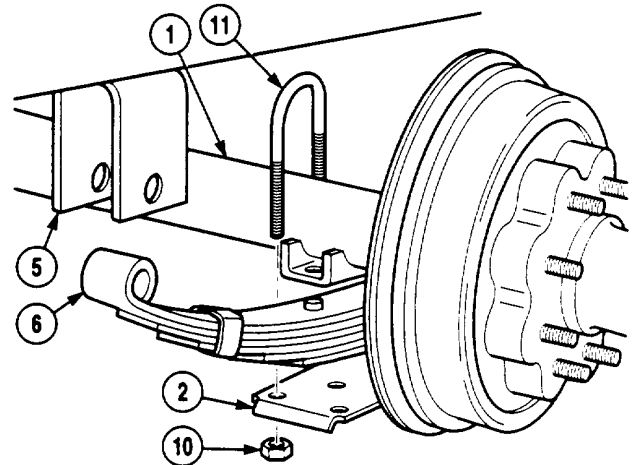
- (3) Remove nut (7) and screw (8) from shackle links (9) and spring assembly (6).



- (4) Lower axle assembly (1) with jack until spring assembly (6) clears spring hanger (5).

- (5) With the aid of an assistant, remove four nuts (10), two u-bolts (11), bottom plate (2), and spring assembly (6) from axle assembly (1).

- (6) If damaged, remove two eye bushings (12) from spring assembly (6).



4-59. SPRING ASSEMBLY AND EQUALIZER REPLACEMENT (CONT).

NOTE

Follow steps (7) through (9) if replacement of equalizer is required. Both LH and RH sides are removed/installed the same. Position jack under axle not supported.

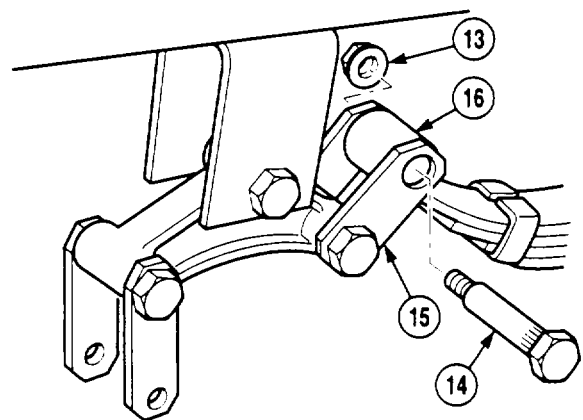
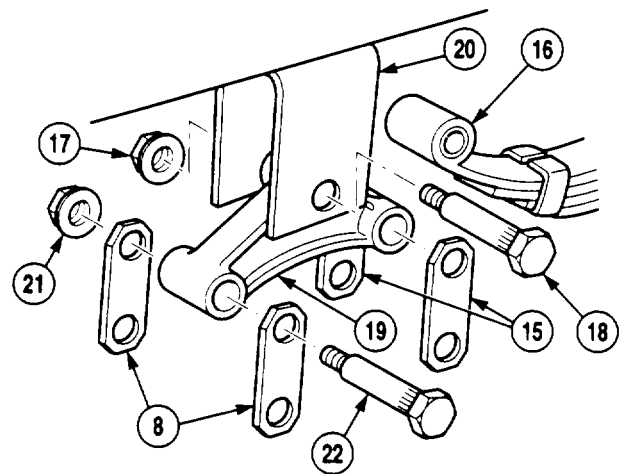
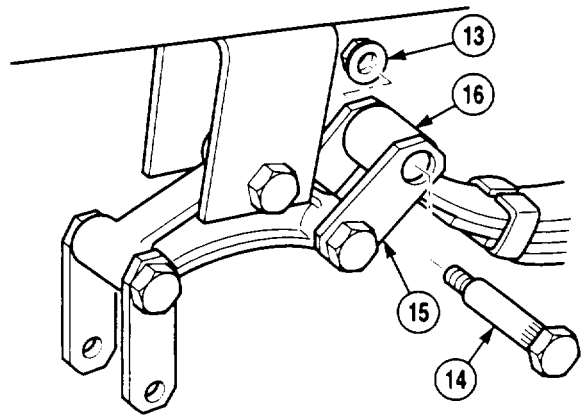
- (7) Remove nut (13) and screw (14) from shackle links (15) and spring assembly (16).
- (8) Remove nut (17), screw (18), and equalizer (19) from hanger (20).
- (9) Remove two nuts (21), two screws (22), and four shackle links (8 and 15) from equalizer (19).

b. Installation.

NOTE

If equalizer was not removed, go to step (5).

- (1) Position four shackle links (8 and 15) on equalizer (19) with two screws (22) and nuts (21). Do not tighten nuts.
- (2) Install equalizer (19) in spring hanger (20) with screw (18) and nut (17). Tighten nut.
- (3) Install shackle links (15) to spring assembly (16) with screw (14) and nut (13).
- (4) Tighten nuts (13 and 21).

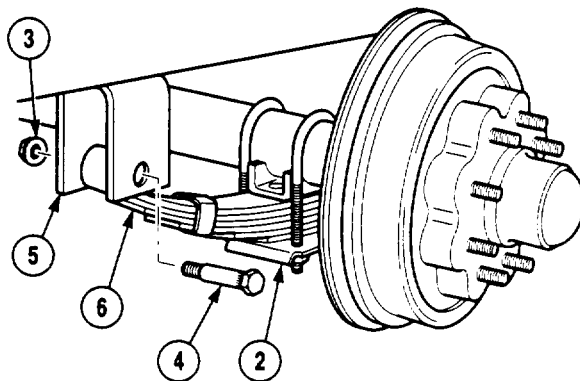
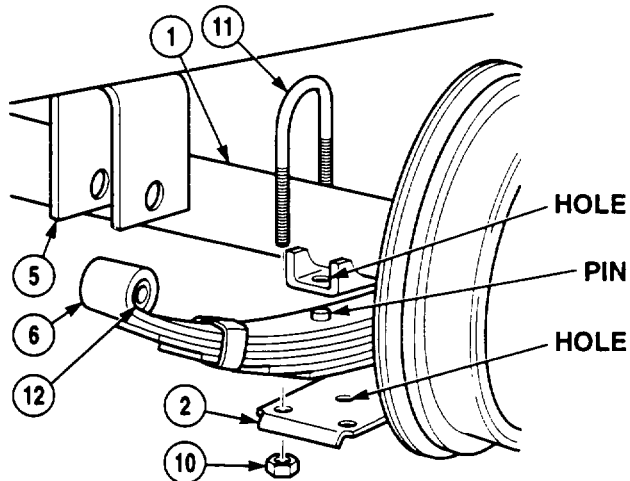
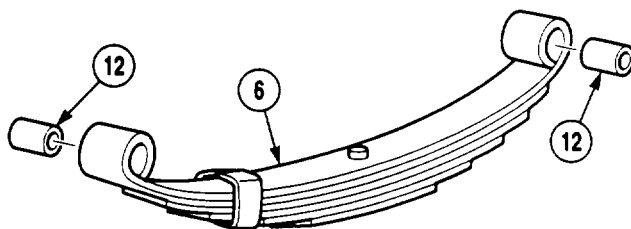


(5) If removed, install eye bushings (12) in spring assembly (6).

(6) With the aid of an assistant, install spring assembly (6), bottom plate (2), two u-bolts (11), and four nuts (10) on axle assembly (1). Tighten nuts.

(7) Raise axle assembly (1) with jack until hole in bushing (12) and hole in spring hanger (5) are aligned.

(8) Install screw (4) and nut (3) in spring hanger (5) and spring assembly (6). Do not tighten nut.



4-59. SPRING ASSEMBLY AND EQUALIZER REPLACEMENT (CONT).

(9) Install shackle links (9) with screw (8) and nut (7) in spring assembly (6).

(10) Tighten nuts (3 and 7).

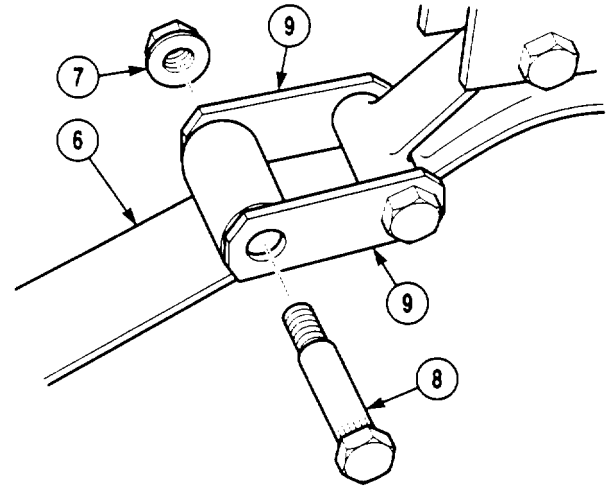
(11) Remove jacks from under axles.

NOTE

Follow-on Maintenance:

- Install wheel and tire assembly (page 3-8).
- Remove wheel chocks (page 2-35).

END OF TASK



4-60. MUDFLAP AND ANTI-SAIL REPLACEMENT.**This task covers:**

- a. Removal
- b. Installation

INITIAL SETUP:*Tools and Special Tools*

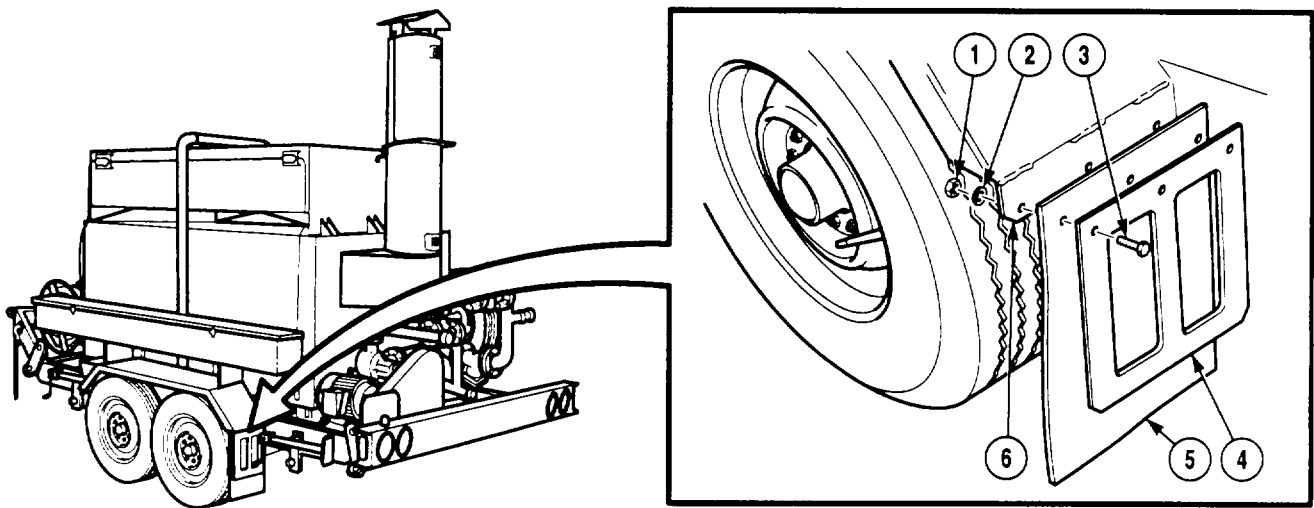
Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Materials / Parts

Lock Washers (3)



- a. Removal. Remove three nuts (1), lock washers (2), screws (3), anti-sail (4), and mudflap (5) from fender (6).
- b. Installation. Install anti-sail (4) and mudflap (5) on fender (6) with three screws (3), lock washers (2), and nuts (1). Tighten nuts.

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-61. CABLE REEL REPLACEMENT.

This task covers:

- a. Removal
- c. Inspection
- e. Pre-Load Check of Bearing

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Materials/Parts

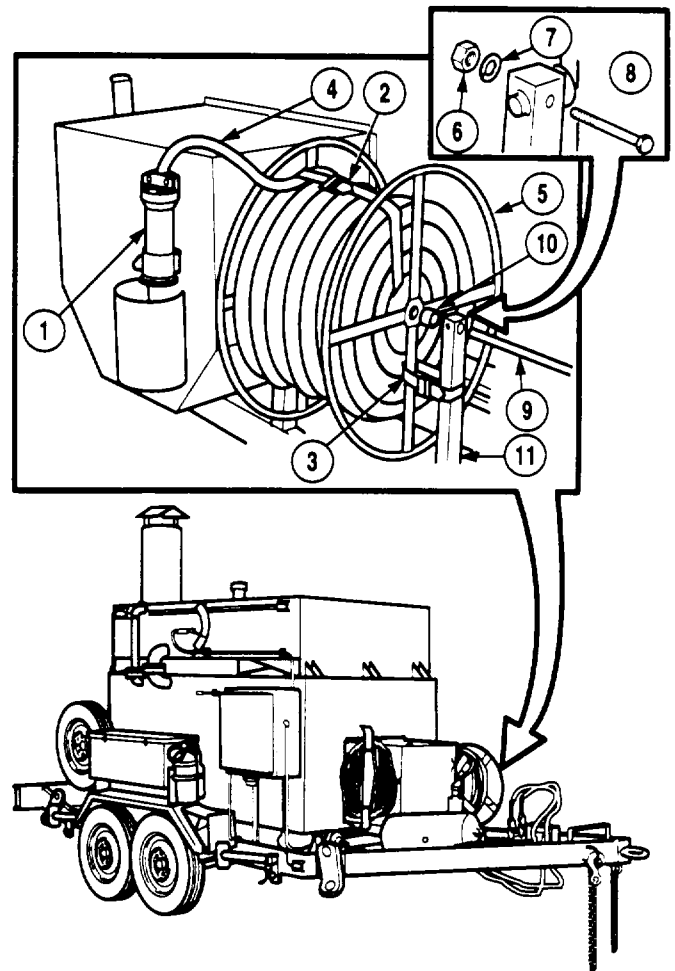
Lock Washers

a. Removal.

- (1) Remove cable connector (1) from connector holder.
- (2) Remove two straps (2 and 3) and power cable (4) from reel (5).
- (3) Remove two nuts (6), lock washers (7), and screws (8) from axle (9). Discard lock washers.
- (4) Remove axle (9), cable reel (5), and two spacers (10) from reel mounts (11).

b. Installation.

- (1) With the aid of an assistant, position cable reel (5) and two spacers (10) between reel mounts (11) and install axle (9).
- (2) Install two screws (8), lock washers (7), and nuts (6) in axle (9) and reel mounts (11).
- (3) Wind power cable (4) around cable reel (5) and secure with two straps (2 and 3).
- (4) Place cable connector (1) in connector holder.



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-62. DECONTAMINATION BRACKET REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

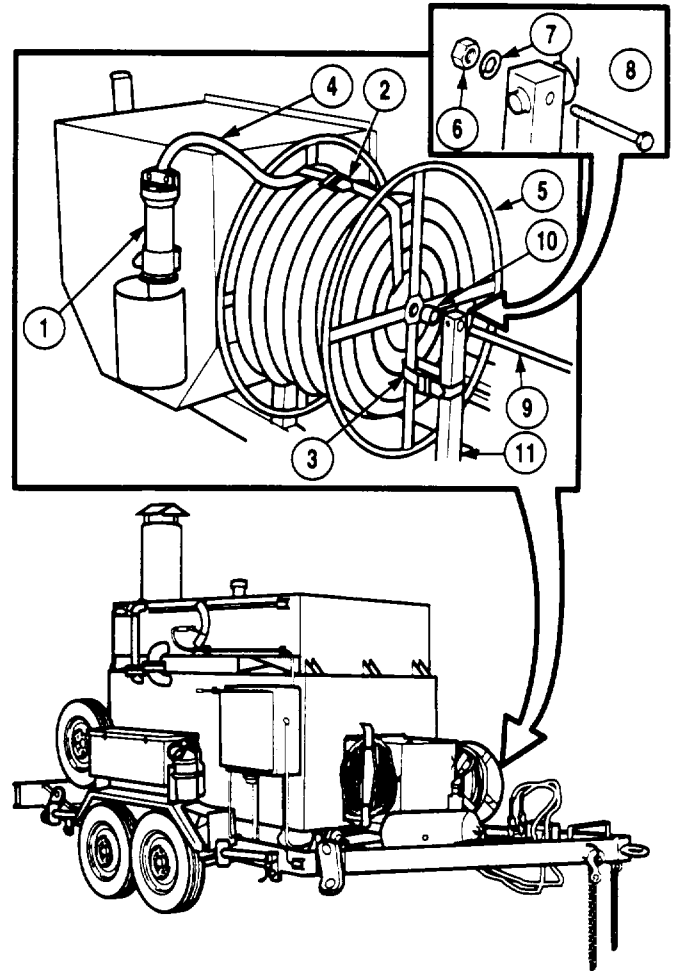
INITIAL SETUP:

a. Removal.

- (1) Remove strap (1) from bracket (2).
- (2) Remove four nuts (3), lock washers (4), and bracket (2) from frame (5). Discard lock washers.

b. Installation.

- (1) Install bracket (2), lock washers (4), and nuts (3) on frame (5). Tighten nuts.
- (2) Install strap (1) in bracket (2).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-63. WHEEL CHOCKS REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit General Mechanic's: Automotive

Equipment Condition

Heater on Level Ground

Materials/Parts

Cotter Pins (2)

a. Removal.

NOTE

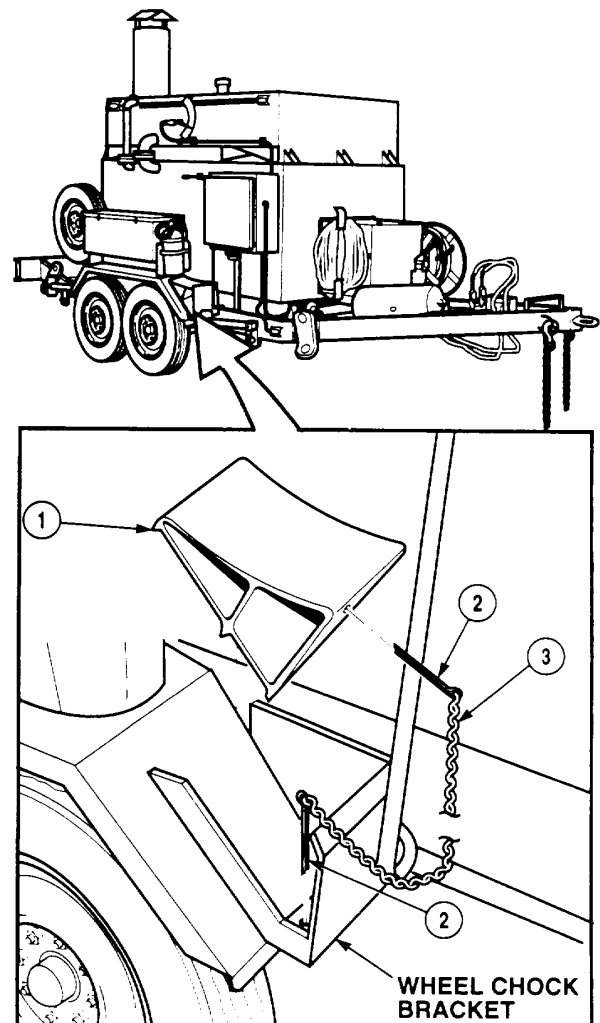
This paragraph discusses replacement of one wheel chock. Both wheel chocks are replaced in the same way.

- (1) Remove wheel chock (1) from wheel chock bracket.
- (2) Remove two cotter pins (2) and chain (3) from wheel chock (1) and wheel chock bracket.
- (3) Remove two cotter pins (2) from chain (3). Discard cotter pins.

b. Installation.

- (1) Install cotter pins (2) and chain (3).
- (2) Install chain (3) on wheel chock (1) with cotter pin (2).
- (3) Install chain (3) on wheel chock bracket with cotter pin (2).
- (4) Install wheel chock (1) in wheel chock bracket.

END OF TASK



4-64. DATA PLATES REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Power Source Disconnected (page 2-32)

Wheels Chocked (page 2-17)

Materials/Parts

Rivets

a. Removal.

WARNING

- Drilling rivets while the power source is connected can cause electrical shock. Disconnect power source before using any electric tool.
- Use protective clothing while drilling. Goggles or safety glasses are recommended. Failure to comply can result in eye injury.

CAUTION

Ensure proper drill bit size and stance while drilling rivets. Failure to do so can result in damage to data plate and component.

NOTE

This task is for reference only. It will never be necessary to remove all data plates at one time.

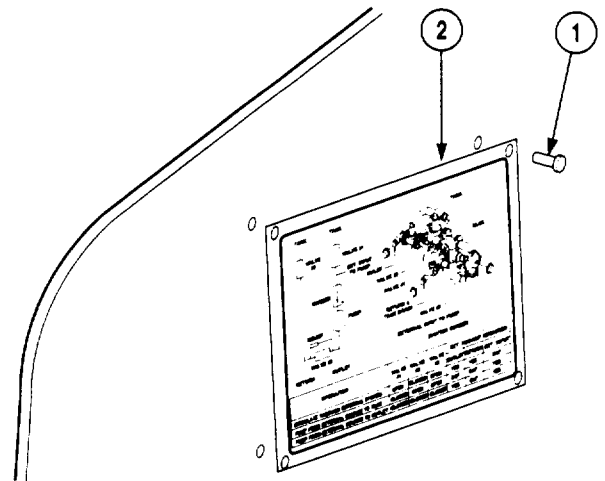
(1) Using drill bit size comparable to rivet (1) size, drill out rivets (1) from front of data plate (2). Discard rivets.

(2) Remove data plate (2) from component.

b. Installation. Position data plate (2) on component and install with rivets (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).



END OF TASK

4-65. GROUND ROD ASSEMBLY REPAIR.

This task covers:

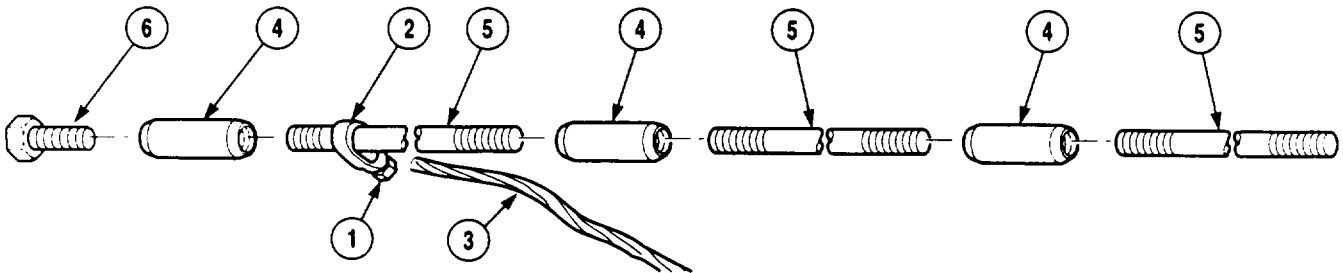
- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

a. Disassembly.



- (1) Loosen screw (1) on clamp (2) and remove grounding cable (3).
- (2) Remove three couplings (4) and clamp (2) from three rods (5).
- (3) Remove driving stud (6) from coupling (4).

b. Assembly.

- (1) Install two couplings (4) on two rods (5).
- (2) Install clamp (2), coupling (4), and driving stud (6) on the other rod (5).
- (3) Install grounding cable (3) on clamp (2) and tighten screw (1).

END OF TASK

4-66. LOW OIL LIMIT SWITCH REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit General Mechanic's: Automotive

Equipment Condition

Power Source Disconnected (page 2-32)

Wheels Chocked (page 2-17)

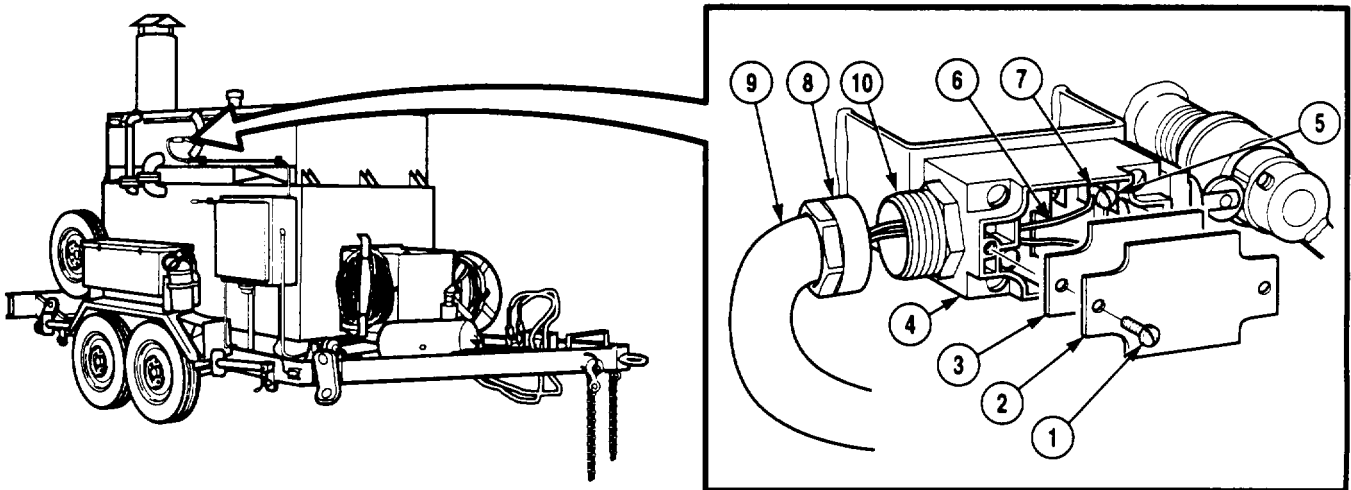
Heater Cooled

Materials /Parts

Tags, Identification (item 22, appendix E)

Gasket

a. Removal



NOTE

Tag and mark all wires prior to removal.

- (1) Remove two screws (1), cover (2), and gasket (3) from low oil limit switch (4). Discard gasket.
- (2) Loosen two screws (5) and remove two wires (6) from terminals (7).
- (3) Loosen nut (8) and remove conduit (9) and two wires (6) from adapter (10).

4-66. LOW OIL LIMIT SWITCH REPLACEMENT (CONT).

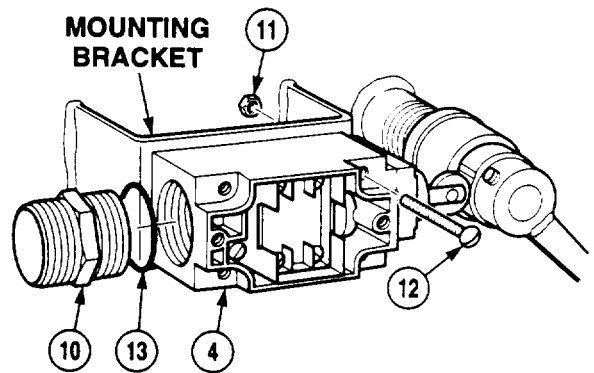
(4) Remove four nuts (11), screws (12), and low oil limit switch (4) from mounting bracket.

(5) Remove adapter (10) and preformed packing (13) from low oil limit switch (4).

b. Installation.

(1) Install adapter (10) and preformed packing (13) in low oil limit switch (4).

(2) Install low oil limit switch (4) with four screws (12) and nuts (11) on mounting bracket. Tighten nuts.



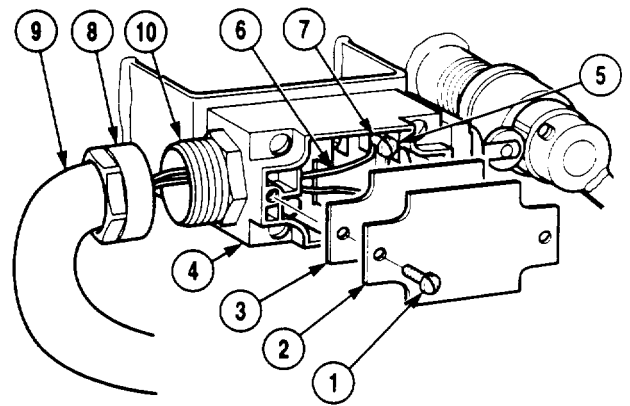
NOTE

Ensure that inner switch is seated in notch at rear of switch body. Unseating will cause switch to not operate properly.

(3) Insert two wires (6) and conduit (9) in adapter (10). Tighten nut (8).

(4) Install two wires (6) on terminals (7) and tighten two screws (5).

(5) Install gasket (3) and cover (2) with two screws (1) on low oil limit switch (4). Tighten screws.



NOTE

Follow-on Maintenance:

- **Adjust low oil indicator (page 4-194).**
- **Remove wheel chocks (page 2-35).**

END OF TASK

4-67. FLAME DETECTOR REPLACEMENT/ADJUSTMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

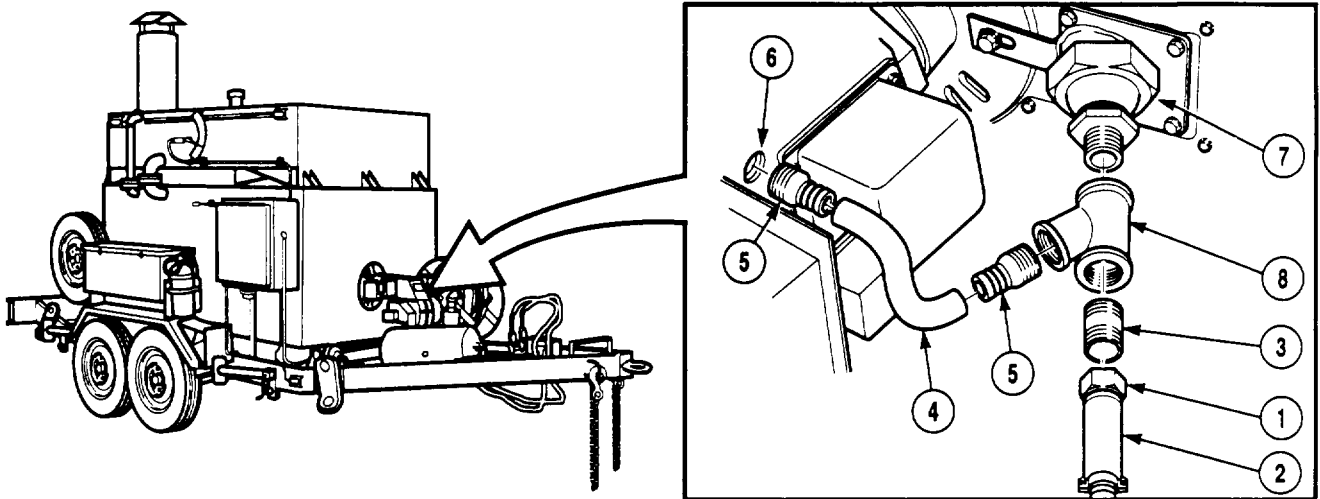
Materials/Parts

Tags, Identification (item 22, appendix E)
Screw and Lock Washer Assembly (3)

Equipment Condition

Wheels Chocked (page 2-17)
Heater Cooled
Power Source Disconnected (page 2-32)
Fuel Lines Disconnected (page 2-33)
Burner Cover Removed (page 4-295)

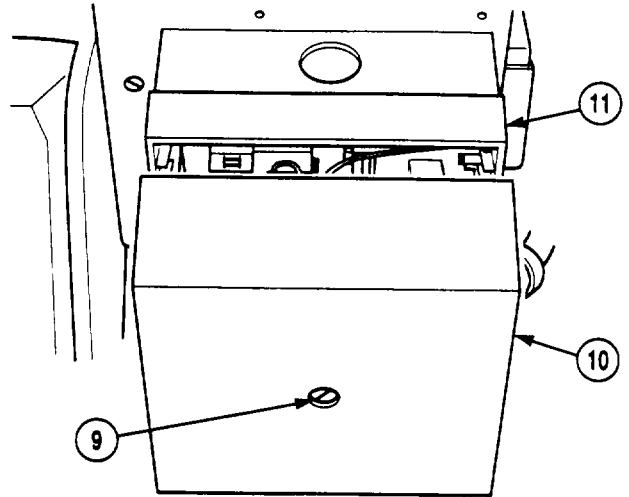
a. Removal.



- (1) Loosen nut (1) and remove flame detector (2) from nipple (3).
- (2) Remove hose (4) and two nipples (5) from burner assembly (6) and mounting base assembly (7).
- (3) Remove nipple (3) and 45° lateral fitting (8) from mounting base assembly (7).

4-67. FLAME DETECTOR REPLACEMENT/ADJUSTMENT (CONT).

(4) Loosen captive screw (9) and remove cover (10) from burner controller (11).

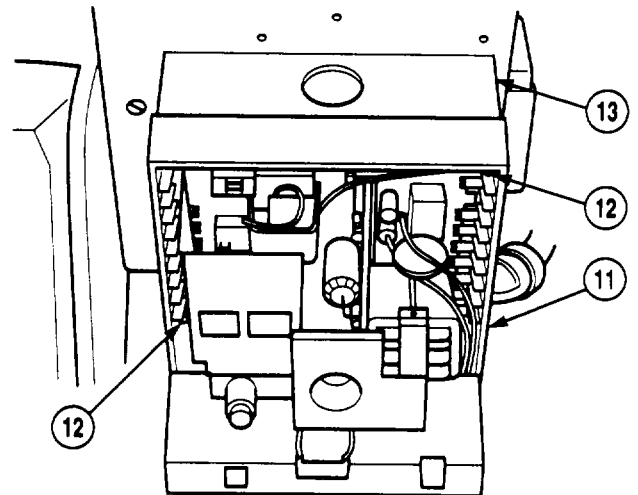


(5) Loosen two captive screws (12) and remove controller (11) from controller subbase (13).

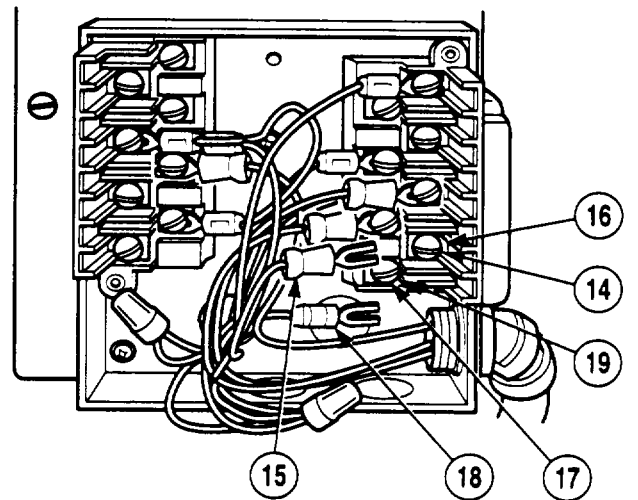
NOTE

Tag and mark all wires prior to removal.

(6) Loosen screw (14) and remove wire (15) from terminal F (16).



(7) Loosen screw (17) and remove wire (18) from terminal G (19).

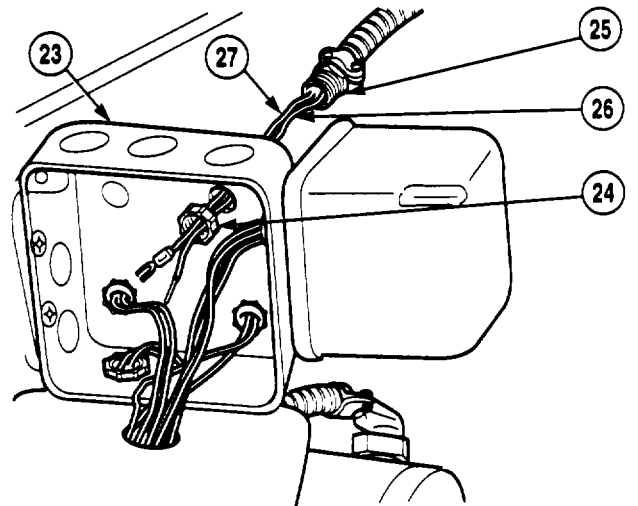
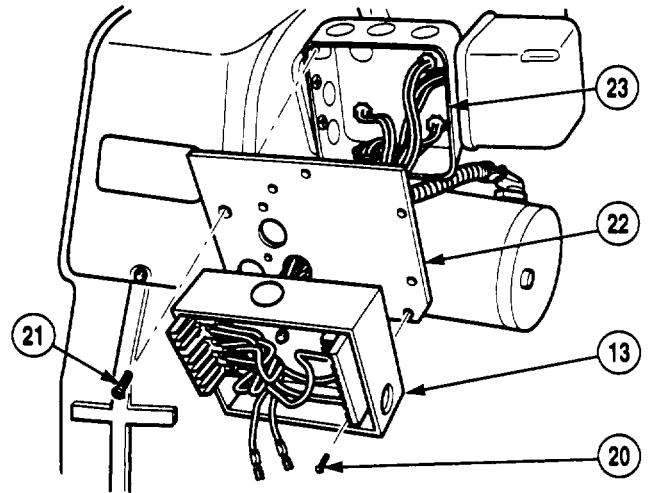


(8) Remove three screw and lock washer assemblies (20) from controller subbase (13). Discard screw and lock washer assemblies.

(9) Remove two screws (21) and subbase plate (22) from electrical box (23).

(10) Remove nut (24) from connector (25).

(11) Remove connector (25) and two wires (26 and 27) from electrical box (23).



4-67. FLAME DETECTOR REPLACEMENT/ADJUSTMENT (CONT).

(12) Remove two terminals (28) from wires (26 and 27).

(13) Loosen two screws (26) and remove connector (25) from conduit (30) and wires (26 and 27).

(14) Loosen two screws (31) and remove conduit (30) from wires (26 and 27) on flame detector (2).

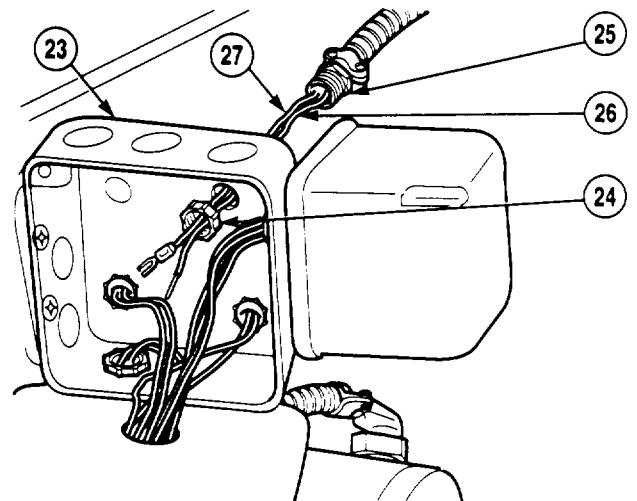
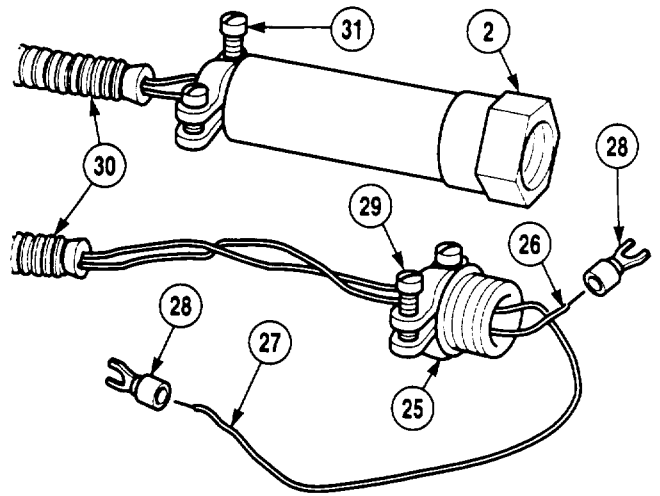
b. Installation.

(1) Install conduit (30) on two wires (26 and 27) and flame detector (2) and tighten two screws (31).

(2) Install connector (25) on wires (26 and 27) and conduit (30) and tighten two screws (29).

(3) Position wires (26 and 27) and connector (25) in electrical box (23).

(4) Install nut (24) on connector (25). Tighten nut.



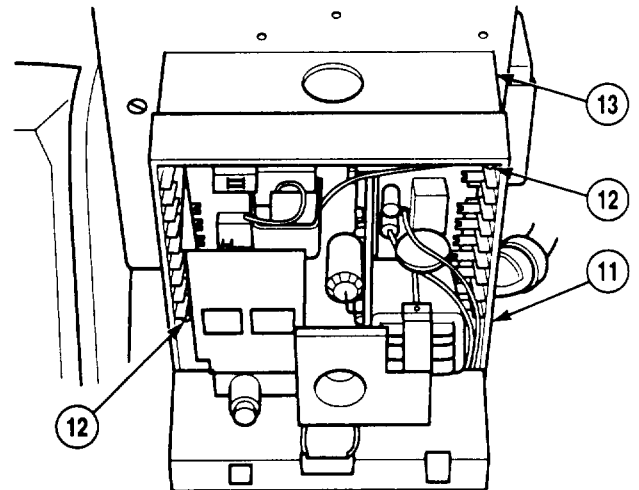
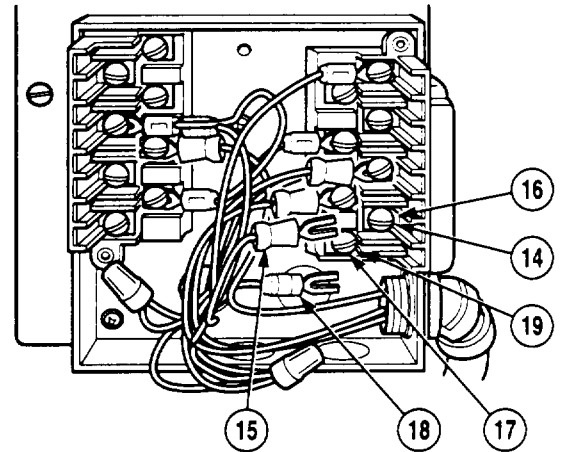
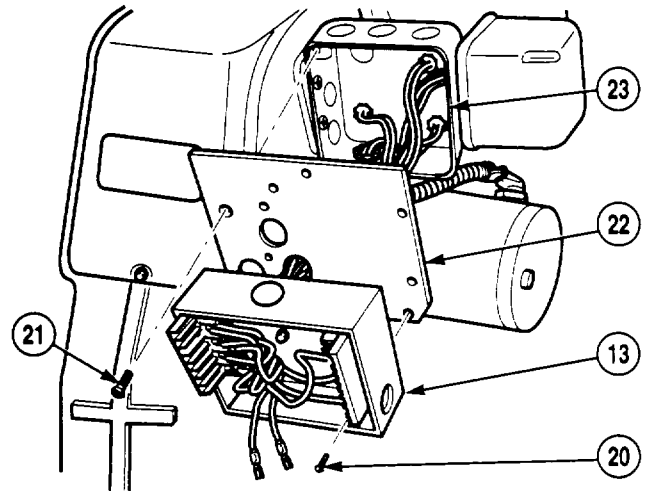
(5) Install subbase plate (22) with two screws (21) on electrical box (23).

(6) Install controller subbase (13) with three screw and lock washer assemblies (20) on subbase plate (22).

(7) Install wire (18) on terminal G (19). Tighten screw (17).

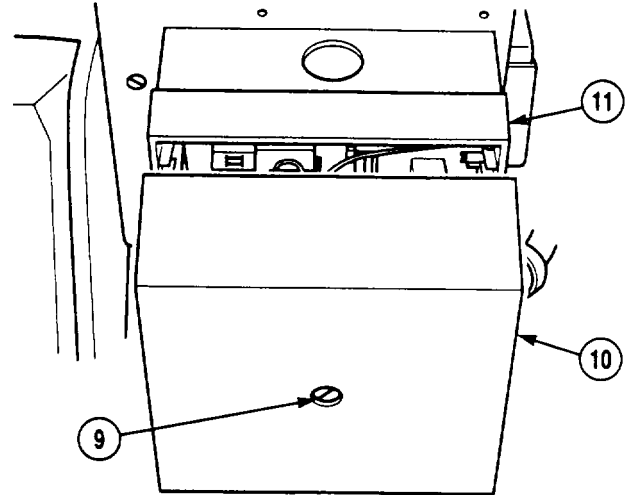
(8) Install wire (15) on terminal F (16). Tighten screw (14).

(9) Install controller (11) with two captive screws (12) on controller subbase (13).



4-67.FLAME DETECTOR REPLACEMENT/ADJUSTMENT (CONT).

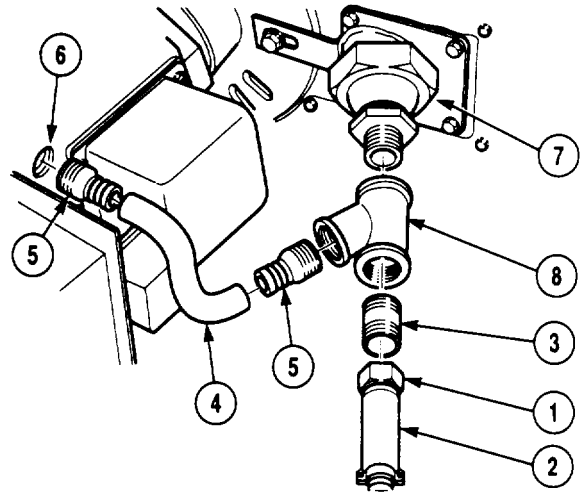
(10) Install cover (10) with captive screw (9) on controller (11).

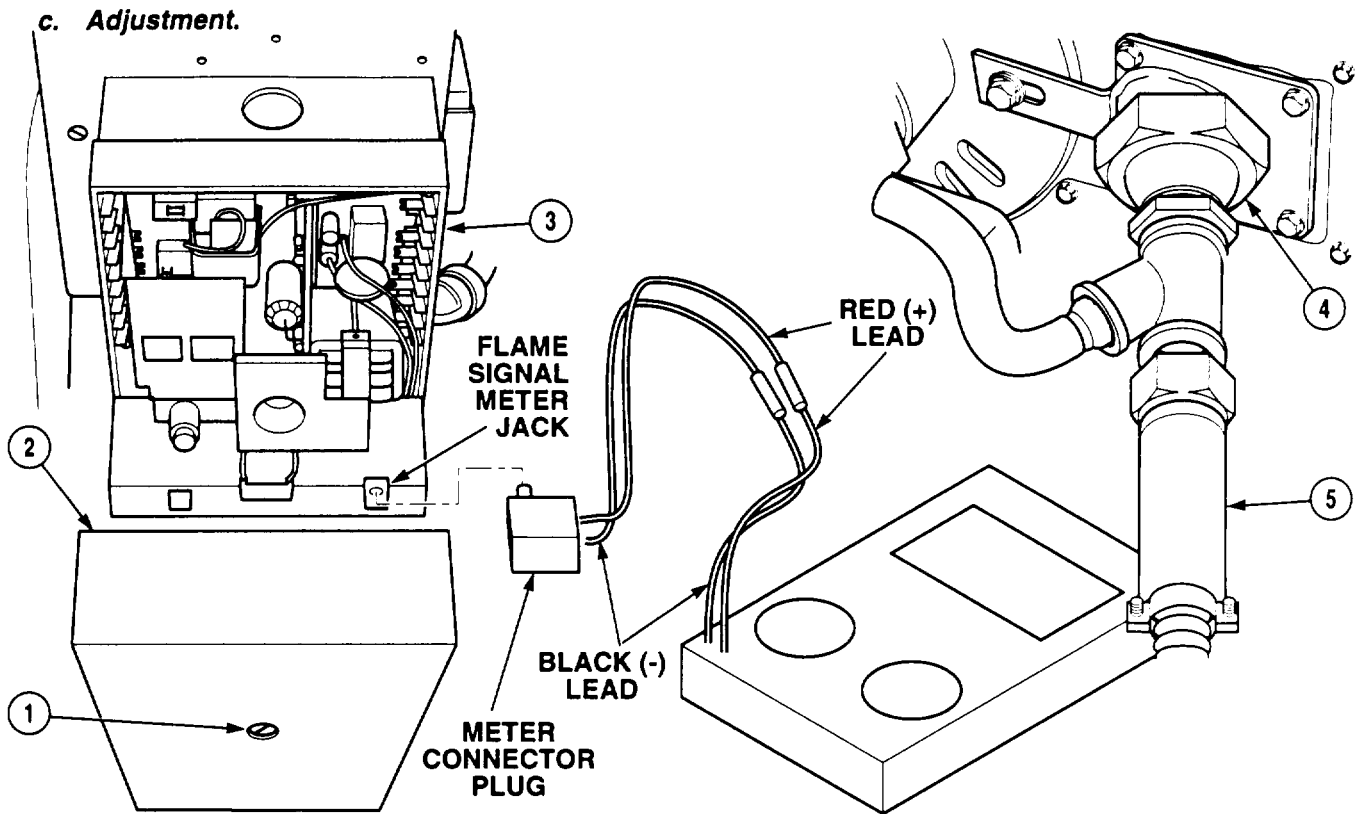


(11) Install nipple (3) and 45° lateral fitting (8) on mounting base assembly (7).

(12) Install two nipples (5) and hose (4) on burner assembly (6) and mounting base assembly (7).

(13) Install flame detector (2) on nipple (3) and tighten nut (1).





WARNING

Care must be taken when troubleshooting the controller; line voltage is present in most contacts when power is on. Serious injury to personnel can occur

CAUTION

Output terminals must not be shorted to L2. Permanent damage to the controller will result.

- (1) With the burner running, loosen captive screw (1) and remove cover (2) from burner controller (3).
- (2) Connect red (+) lead of multimeter with 0-25 microamp dc range to red spade tip of meter connector plug.
- (3) Connect black (-) lead of multimeter to black spade tip of meter connector plug.
- (4) Insert meter connector plug in flame signal meter jack of burner controller (3).
- (5) Loosen nut (4) and move flame detector (5) until a steady reading of 3 1/2 (min.) - 7 1/2 (max.) microamp, is found.
- (6) Tighten nut (4).
- (7) Remove meter connector plug from burner controller (3) and multimeter.
- (8) Install cover (2) on burner controller (3) and tighten captive screw (1).

4-67. FLAME DETECTOR REPLACEMENT/ADJUSTMENT (CONT).

NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-68. TEMPERATURE SENSOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

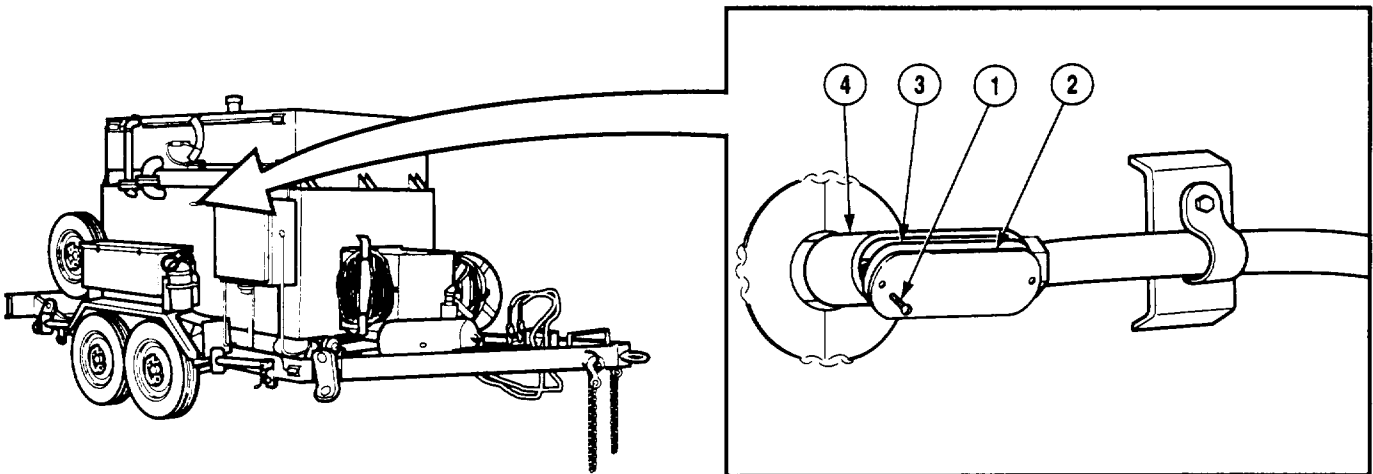
Materials /Parts

Tags, Identification (item 22, appendix E)
 Gasket
 Butt Connectors (4)

Equipment Condition

Wheels Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Line Disconnected from Source
 (page 2-33)

a. Removal.



(1) Remove two screws (1), cover (2), and gasket (3) from outlet body (4). Discard gasket.

4-68. TEMPERATURE SENSOR REPLACEMENT (CONT).

(2) Remove two temperature sensors (5) from outlet body (4).

NOTE

Tag and mark all wires prior to removal.

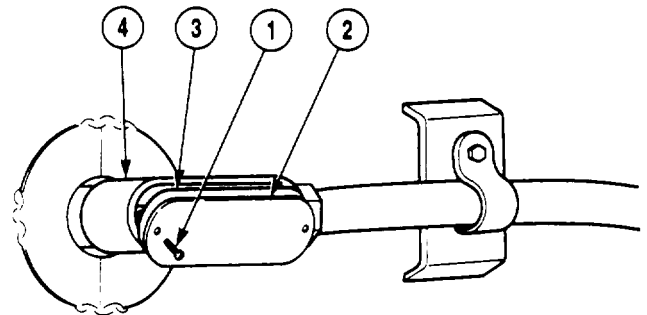
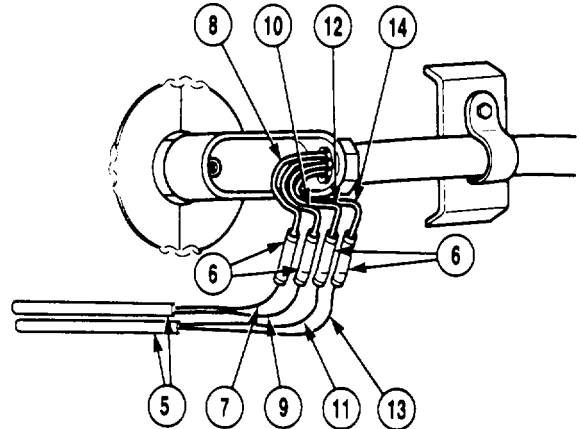
(3) Remove four butt connectors (6) by cutting wires (7, 8, 9, 10, 11, 12, 13, and 14). Discard butt connectors.

b. Installation.

(1) Install four butt connectors (6) on wires (7, 8, 9, 10, 11, 12, 13, and 14).

(2) Install temperature sensors (5) through hole in outlet body (4).

(3) Install gasket (3) and cover (2) with two screws (1) on outlet body (4). Tighten screws.



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-69. 20 AMP CIRCUIT BREAKER REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

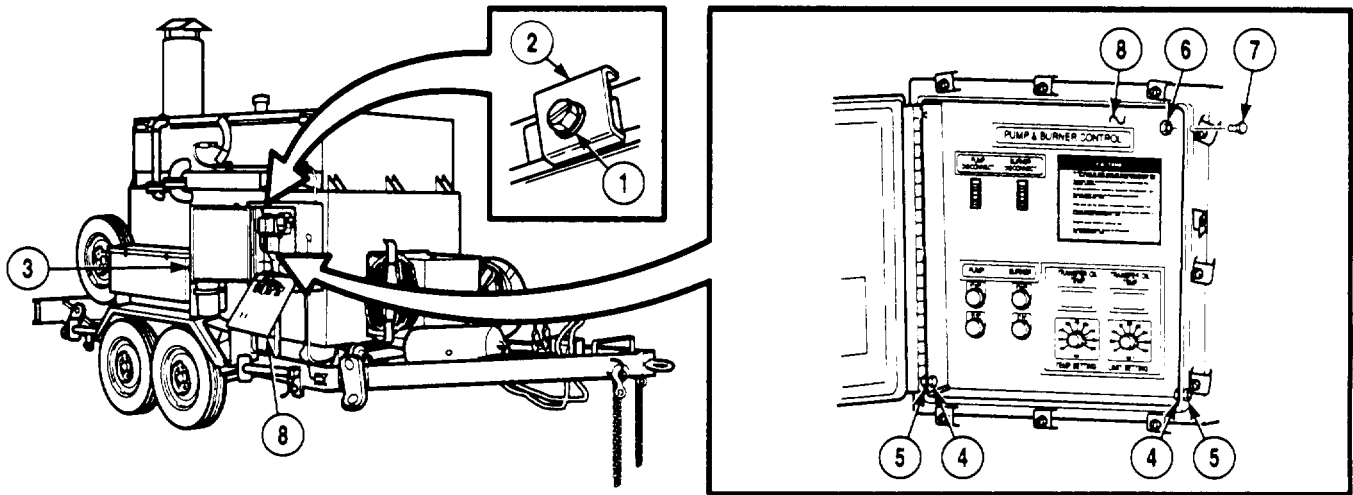
Wheels Chocked (page 2-17)

Power Source Disconnected (page 2-32)

Material /Parts

Tags, Identification (item 22, appendix E)

a. Removal.

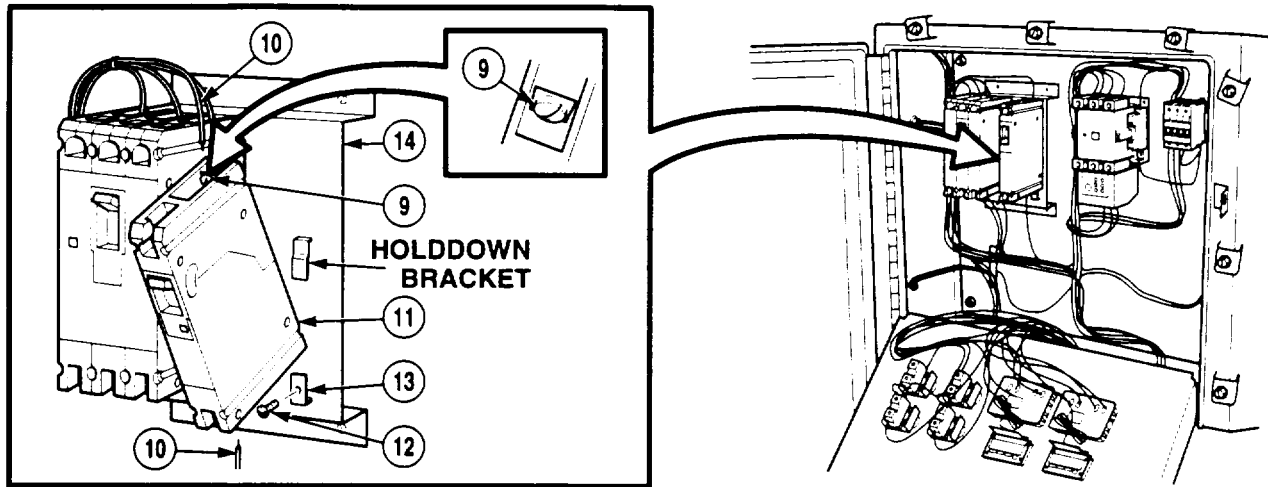


(1) Loosen nine screws (1) and clamps (2) and open cover (3).

(2) Loosen two nuts (4) and screws (5).

(3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.

4-69. 20 AMP CIRCUIT BREAKER REPLACEMENT (CONT).

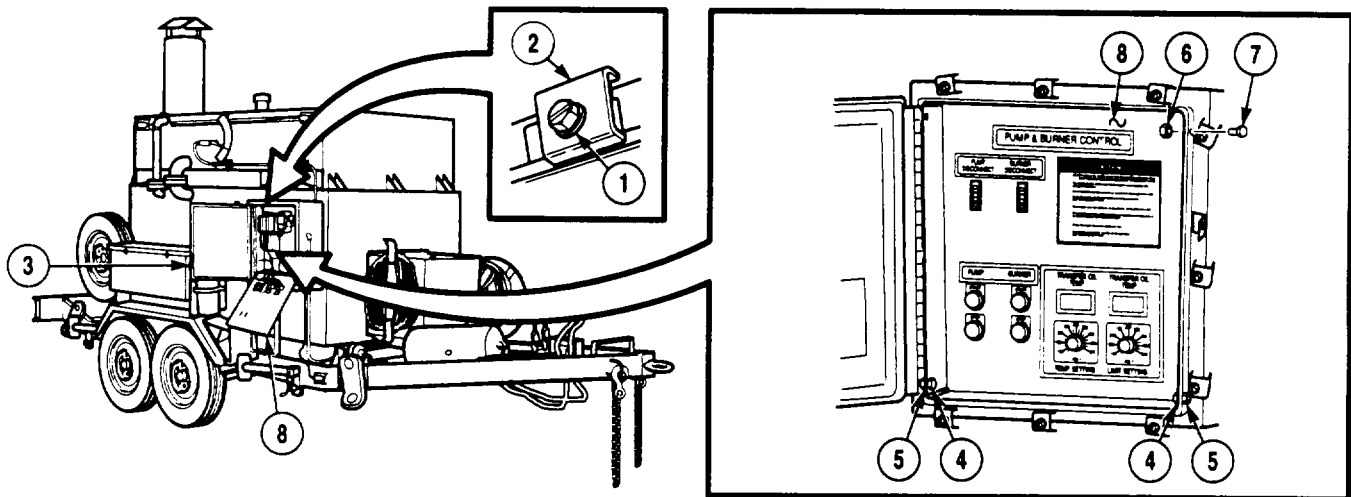
**NOTE**

Tag and mark all wires prior to removal.

- (4) Loosen two screws (9) and remove two wires (10) from circuit breaker (11).
- (5) Remove screw (12) and clamp (13) from backplate (14).
- (6) Remove circuit breaker (11) from backplate (14).

b. Installation.

- (1) Position circuit breaker (11) in holddown bracket on backplate (14).
- (2) Install clamp (13) and screw (12) on circuit breaker (11) and in backplate (14). Tighten screws.
- (3) Install two wires (10) in circuit breaker (11) and tighten two screws (9).



- (4) Lift panel (8) to upright position and install two screws (7) and nuts (6).
- (5) Tighten two screws (7) and nuts (6) and two screws (5) and nuts (4).
- (6) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-70. 40 AMP CIRCUIT BREAKER REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit General Mechanic's: Automotive
 Power Source Disconnected (page 2-32)

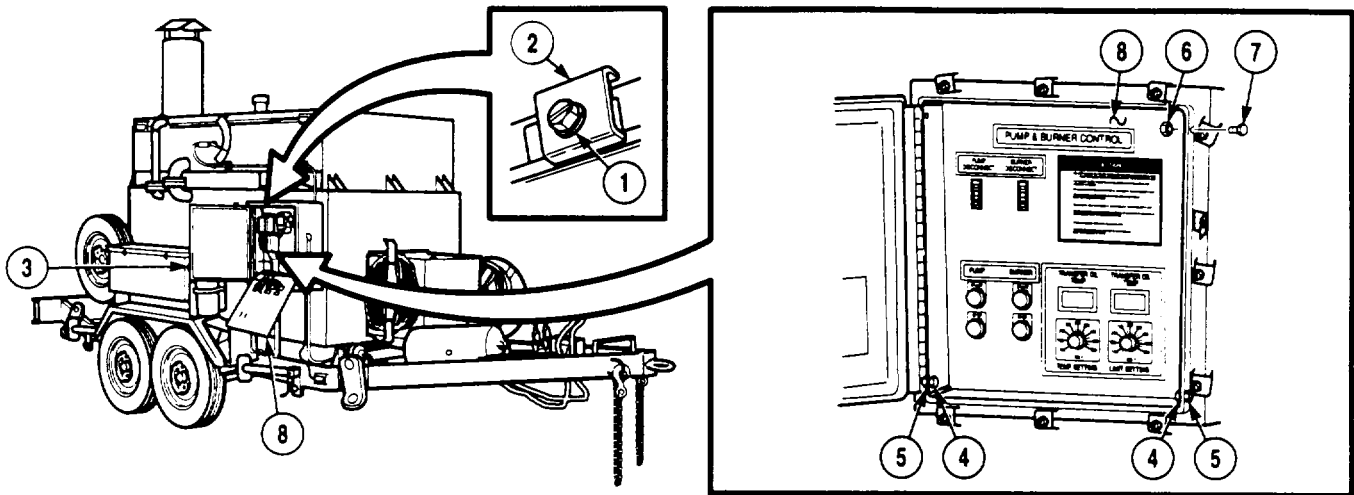
Equipment Condition

Wheel Chocked (page 2-17)

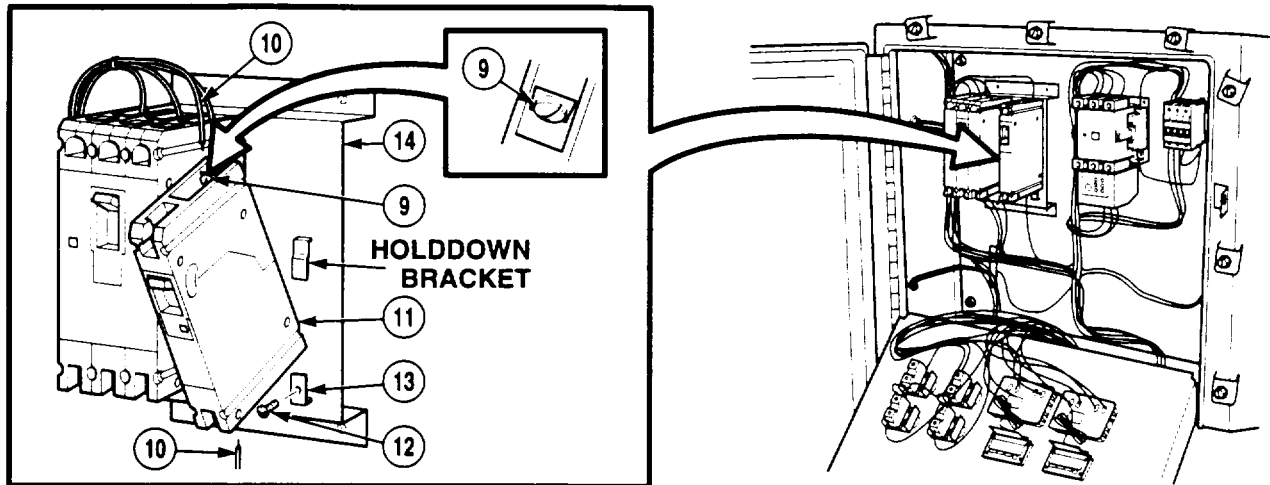
Materials/Parts

Tags, Identification (item 22, appendix E)

a. Removal.



- (1) Loosen nine screws (1) and clamps (2) and open cover (3).
- (2) Loosen two nuts (4) and screws (5).
- (3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.



NOTE

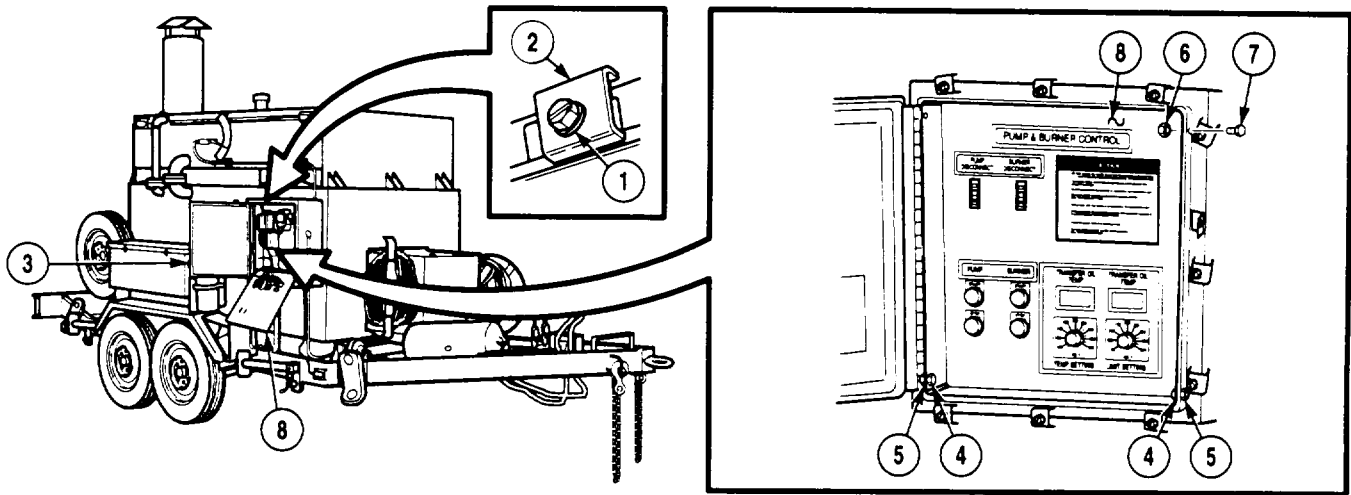
Tag and mark all wires prior to removal.

- (4) Loosen six screws (9) and remove six wires (10) from circuit breaker (11).
- (5) Remove screw (12) and clamp (13) from backplate (14).
- (6) Remove circuit breaker (11) from backplate (14).

b. Installation.

- (1) Position circuit breaker (11) in holddown bracket on backplate (14).
- (2) Install clamp (13) and screw (12) on circuit breaker (11) and in backplate (14). Tighten screws.
- (3) Install eleven wires (10) in circuit breaker (11) and tighten six screws (9).

4-70. 40 AMP CIRCUIT BREAKER REPLACEMENT (CONT).



- (4) Lift panel (8) to upright position and install two screws (7) and nuts (6).
- (5) Tighten two screws (7) and nuts (6) and two screws (5) and nuts (4).
- (6) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-71. THERMAL OVERLOAD PROTECTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
 Power Source Disconnected (page 2-32)

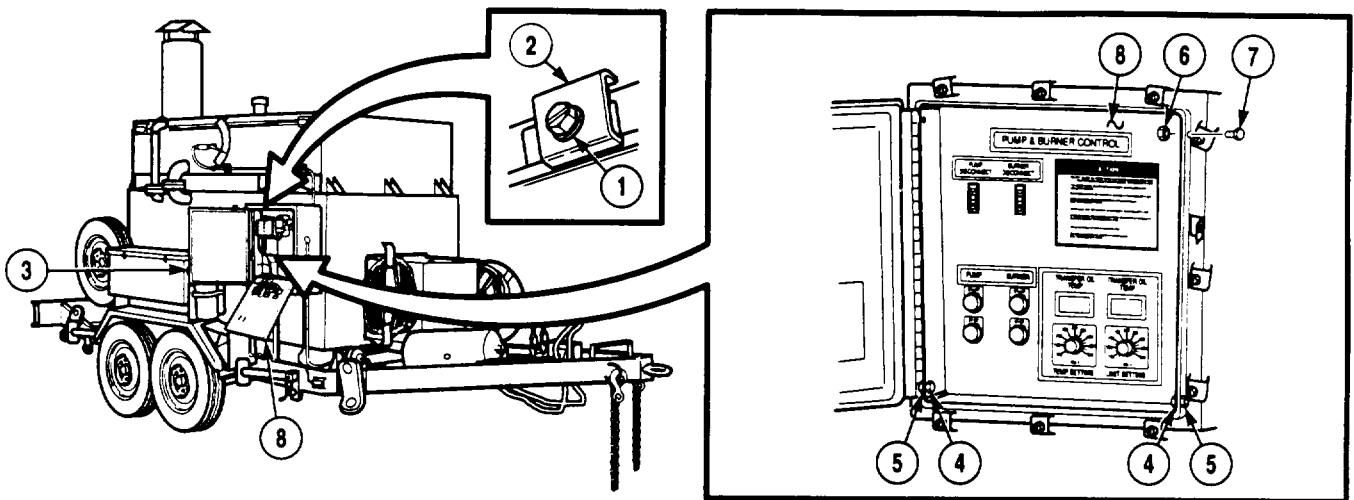
Equipment Condition

Wheels Chocked (page 2-17)

Materials /Parts

Tags, Identification (item 22, appendix E)

a. Removal.



- (1) Loosen nine screws (1) and clamps (2) and open cover (3).
- (2) Loosen two nuts (4) and screws (5).
- (3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.

**4-71. THERMAL OVERLOAD PROTECTOR REPLACEMENT
(CONT).**

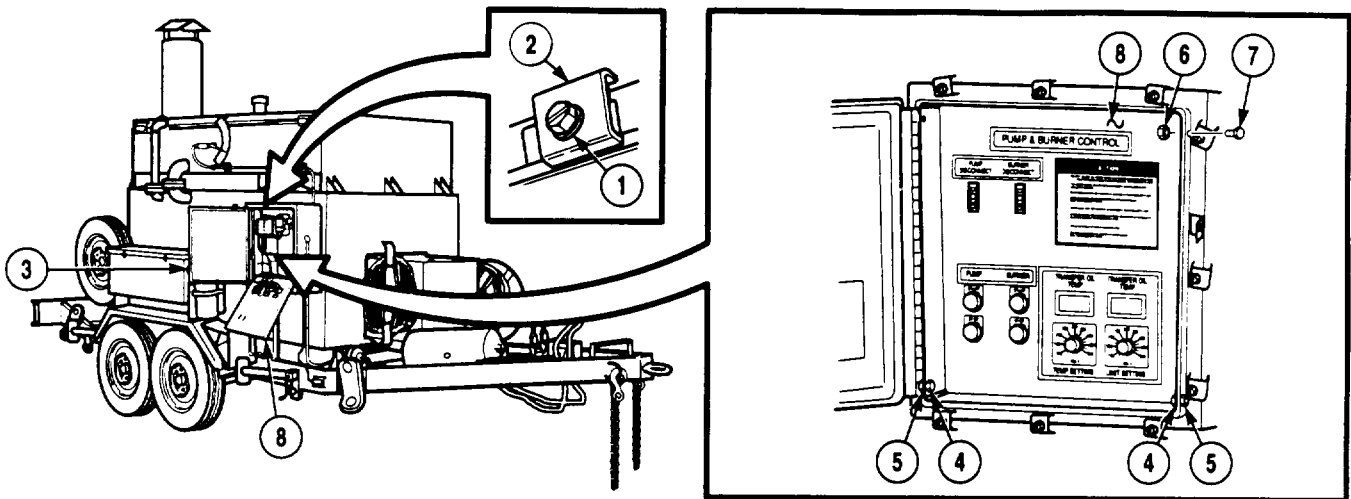
NOTE

Tag and mark all wires prior to removal.

- (4) Loosen three screws (9) and remove three wires (10) from thermal overload protector (11).
- (5) Loosen three screws (12) and remove thermal overload protector (11) from pump motor relay (13).

b. Installation.

- (1) Install thermal overload protector (11) in pump motor relay (13) and ensure tab is seated in notch.
- (2) Tighten three screws (12) in pump motor relay (13).
- (3) Install three wires (10) in thermal overload protector (11) and tighten three screws (9).



(4) Lift panel (8) to upright position and install two screws (7) and nuts (6).

(5) Tighten two screws (7), nuts (6), screws (5), and nuts (4).

(6) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-72. PUMP MOTOR RELAY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

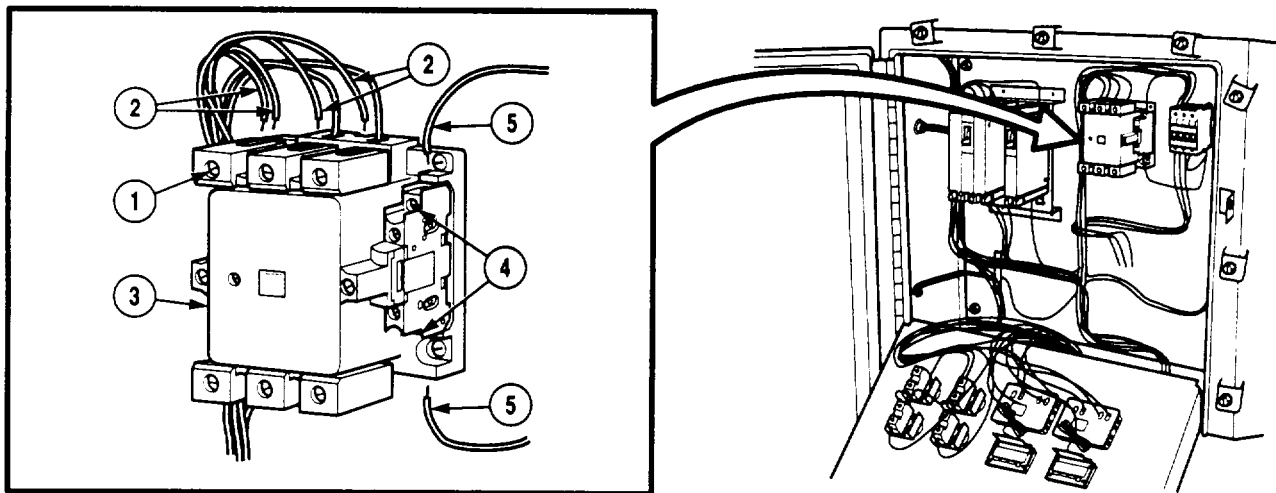
Equipment Condition

Thermal Overload Protector Removed
(page 4-177)

Materials/ Parts

Tags, Identification (item 22, appendix E)

a. Removal.



NOTE

Tag and mark all wires prior to removal.

(1) Loosen three screws (1) and remove four wires (2) from pump motor relay (3).

(2) Loosen two screws (4) and remove two wires (5) from pump motor relay (3).

(
 3) Loosen two screws (6) and remove three wires (7) from pump motor relay (3).

(4) Loosen two screws (8) and disconnect two wires (9) from pump motor relay (3).

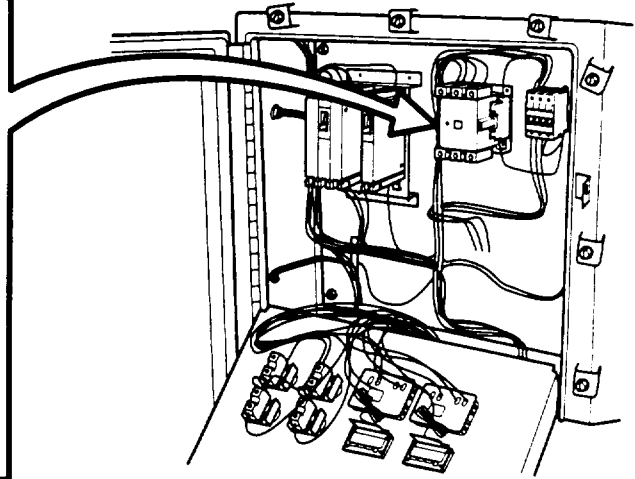
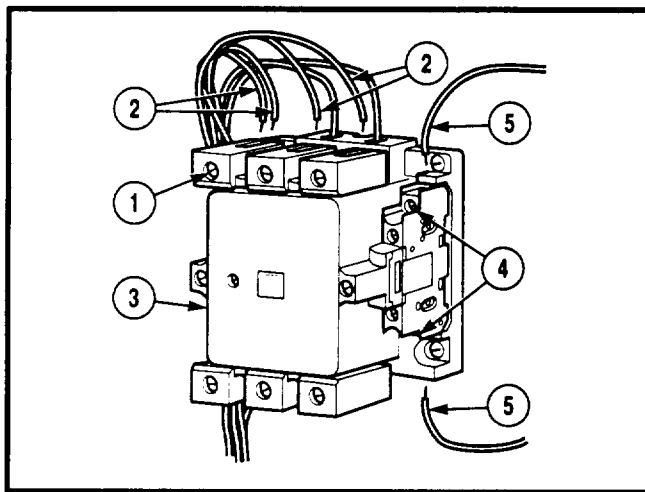
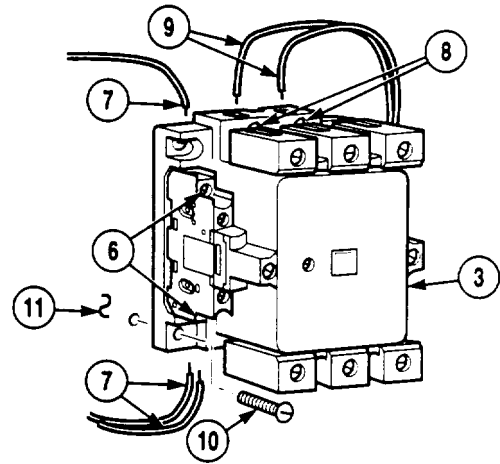
(5) Remove four screws (10) and pump motor relay (3) from backplate (11).

b. Installation.

(1) Install pump motor relay (3) and four screws (10) on backplate (11). Tighten screws.

(2) Install two wires (9) and tighten screws (8).

(3) Install three wires (7) and tighten screws (6).



(4) Install two wires (5) in pump motor relay (3) and tighten two screws (4).

(5) Install four wires (2) in pump motor relay (3) and tighten screws (1).

NOTE

Follow-on Maintenance: Install thermal overload protector (page 4-178).

END OF TASK

4-73. START/STOP SWITCH REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

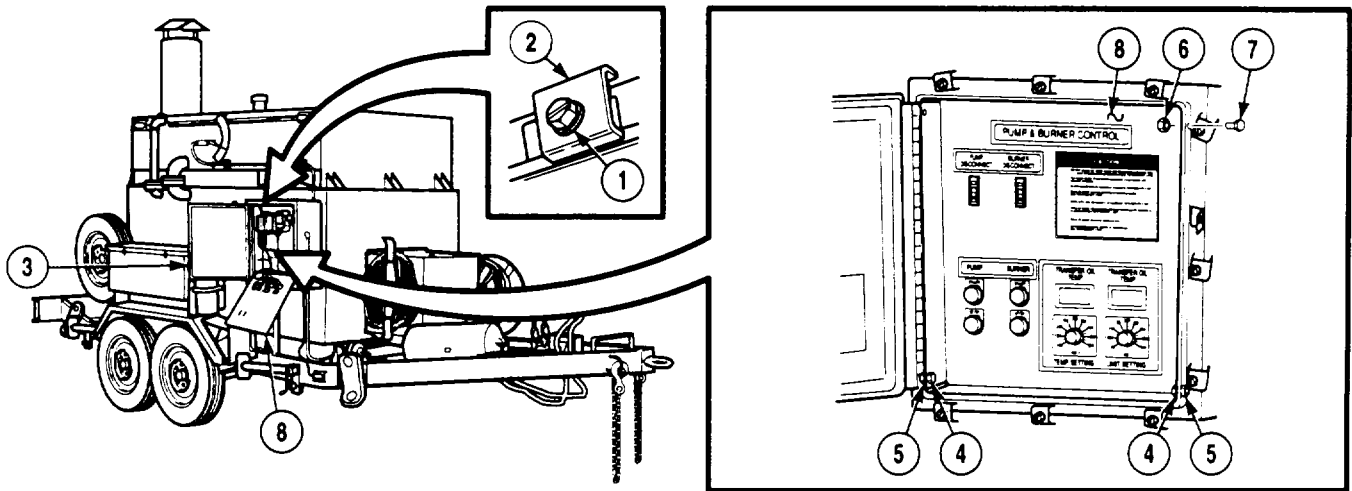
Wheels Choked (page 2-17)

Power Source Disconnected (page 2-32)

Materials /Parts

Tags, Identification (items 22, appendix E)

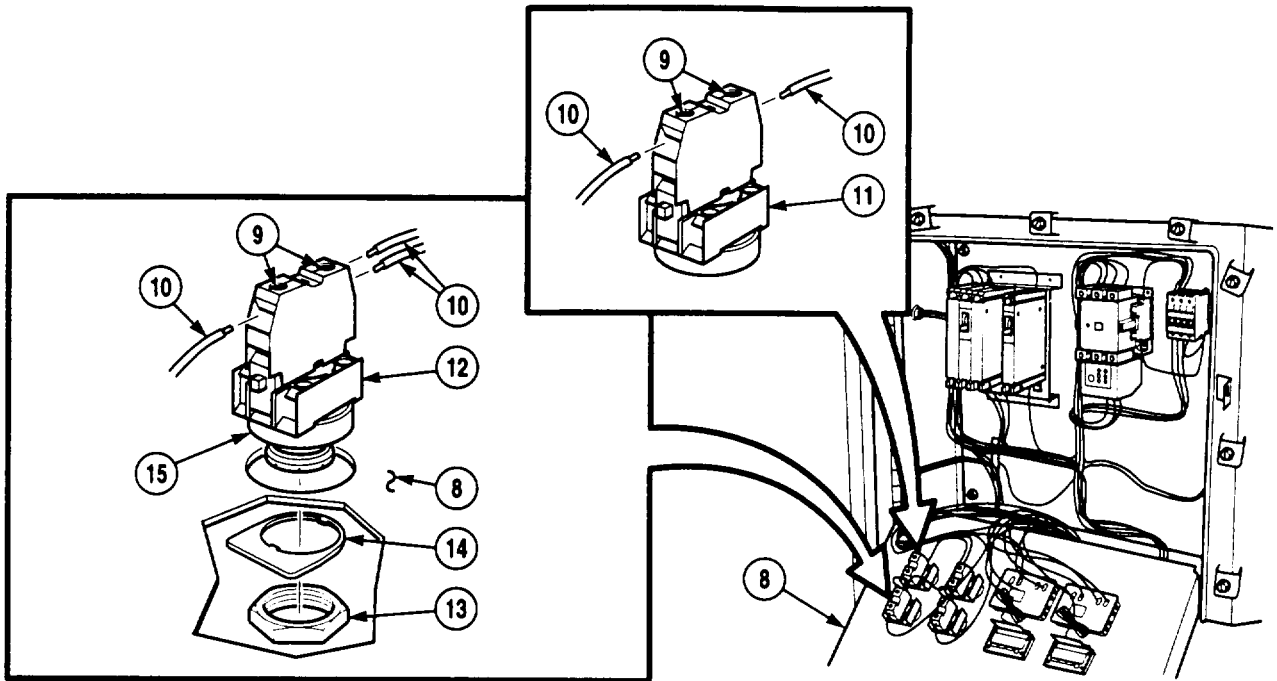
a. Removal.



(1) Loosen nine screws (1) and clamps (2) and open cover (3).

(2) Loosen two nuts (4) and screws (5).

(3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.



NOTE

- Tag and mark all wires prior to removal.
- This paragraph discusses replacement of one switch. All switches are replaced in the same way.

(4) Loosen two screws (9) and remove two wires (10) from STOP switch (11) or three wires (10) from START switch (12).

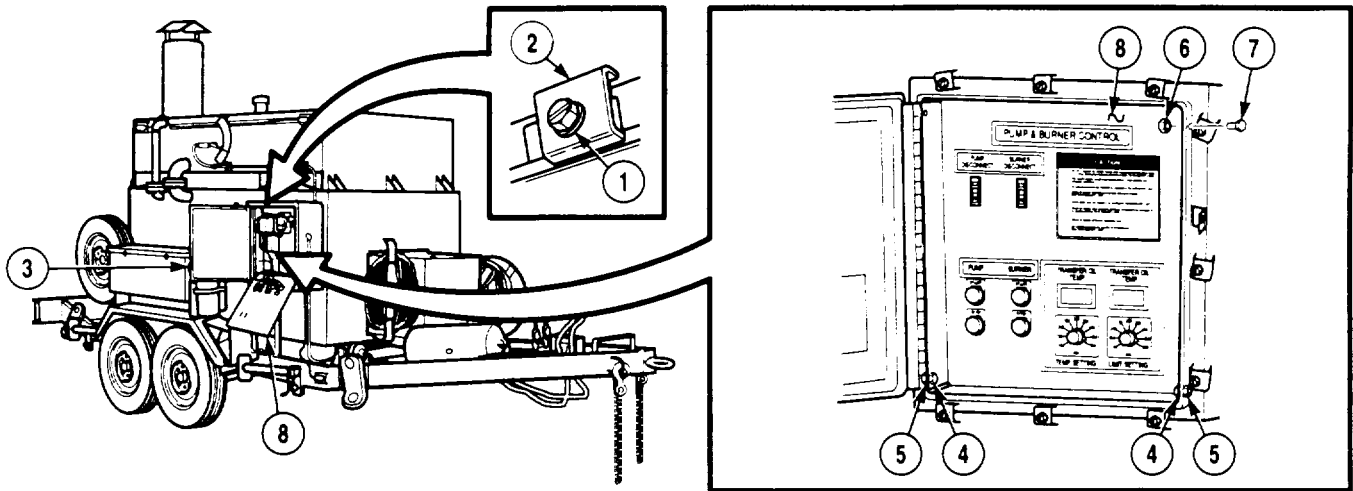
(5) Remove nut (13), plate (14), switch (11 or 12), and gasket (15) from panel (8).

b. Installation.

(1) Install gasket (15), switch (11 or 12), plate (14), and nut (13) on panel (8).

(2) Install two wires (10), or three wires (10), and tighten two screws (9).

4-73. START/STOP SWITCH REPLACEMENT (CONT).



- (3) Lift panel (8) to upright position and install two screws (7) and nuts (6).
- (4) Tighten two screws (7) and nuts (6) and two screws (5) and nuts (4).
- (5) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-74. BURNER RELAY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

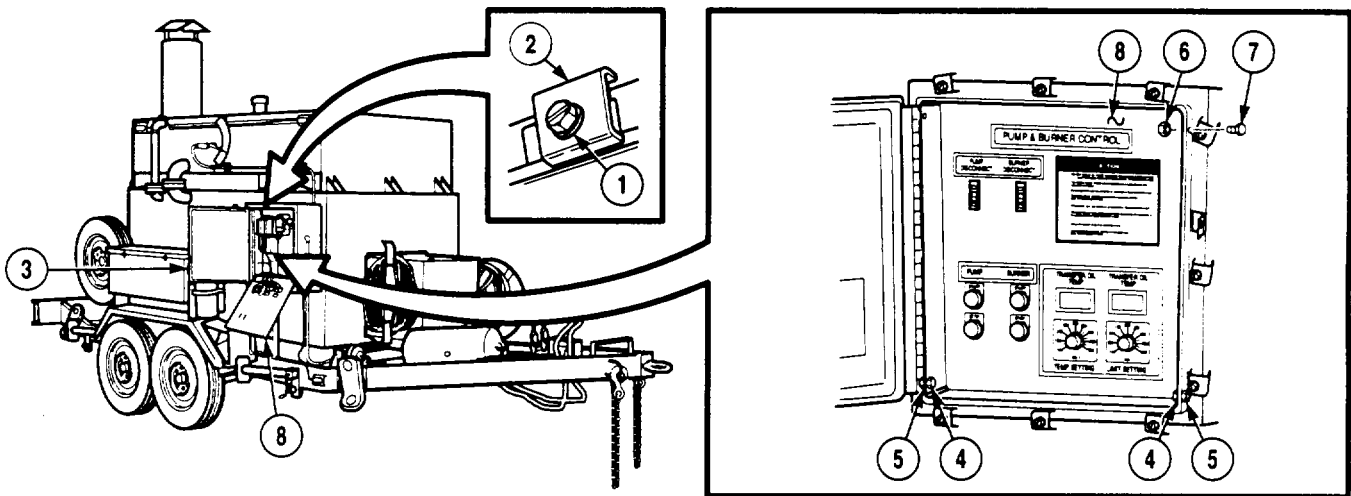
Wheels Choked (page 2-17)

Power Source Disconnected (page 2-32)

Materials /Parts

Tags, Identification (item 22, appendix E)

a. Removal.

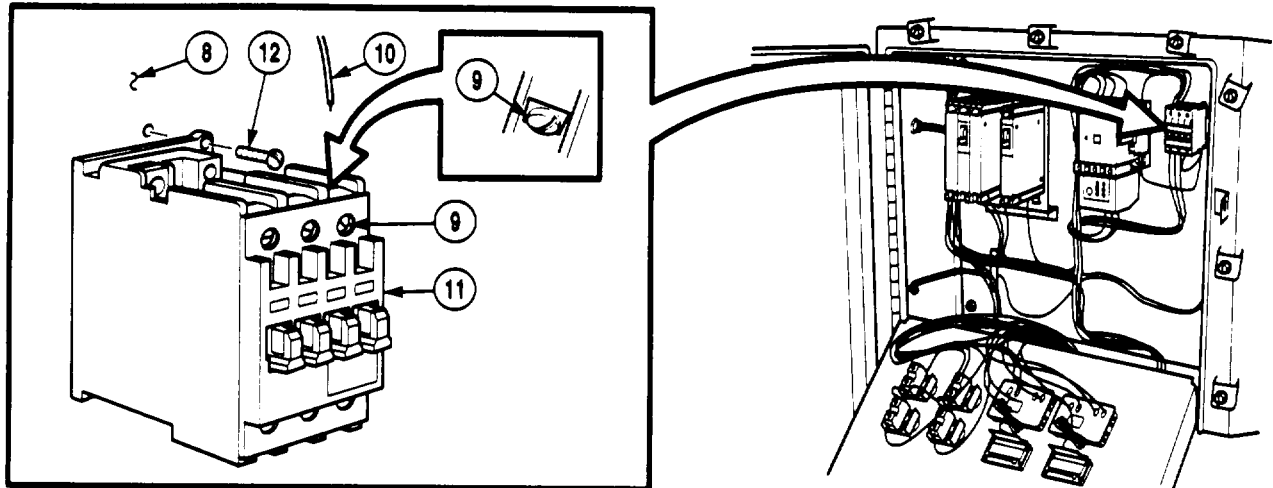


(1) Loosen nine screws (1) and clamps (2) and open cover (3).

(2) Loosen two nuts (4) and screws (5).

(3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.

4-74. BURNER RELAY REPLACEMENT (CONT).



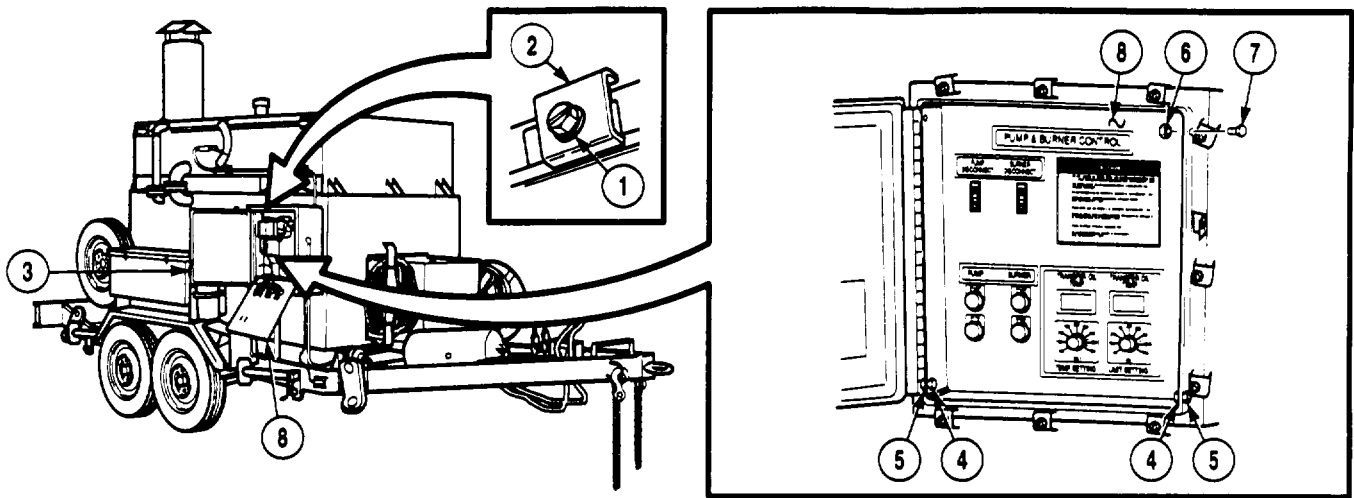
NOTE

Tag and mark all wires prior to removal.

- (4) Loosen six screws (9) and remove 11 wires (10) from burner relay (11).
- (5) Remove two screws (12) and burner relay (11) from panel (8).

b. Installation.

- (1) Install burner relay (11) on panel (8) with two screws (12). Tighten screws.
- (2) Install 11 wires (10) and tighten screws (9).



- (3) Lift panel (8) to upright position and install two screws (7) and nuts (6).
- (4) Tighten two screws (7), nuts (6), screws (5), and nuts (4).
- (5) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-75. THERMOSTAT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Choked (page 2-17)

Power Source Disconnected (page 2-32)

Materials /Parts

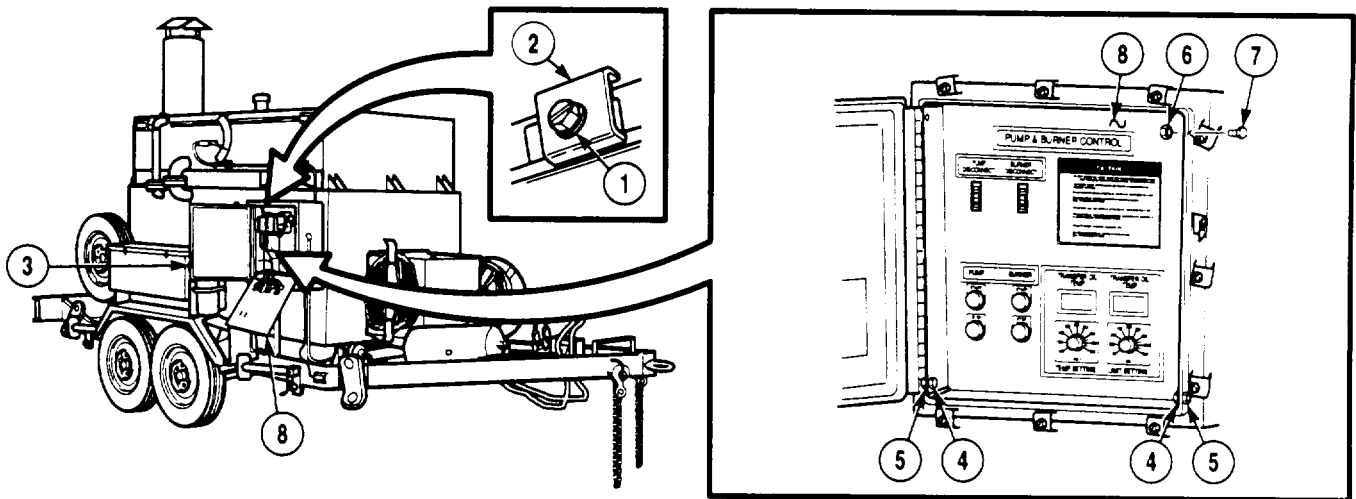
Tags, Identification (item 22, appendix E)

Lock Washer

NOTE

This task describes the replacement of one thermostat. Both thermostats are replaced in the same way.

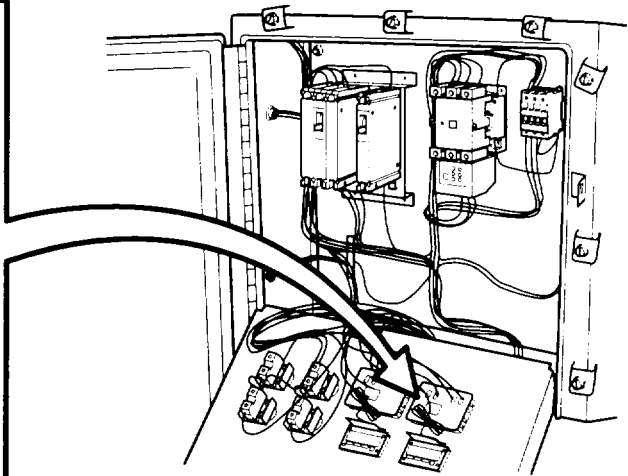
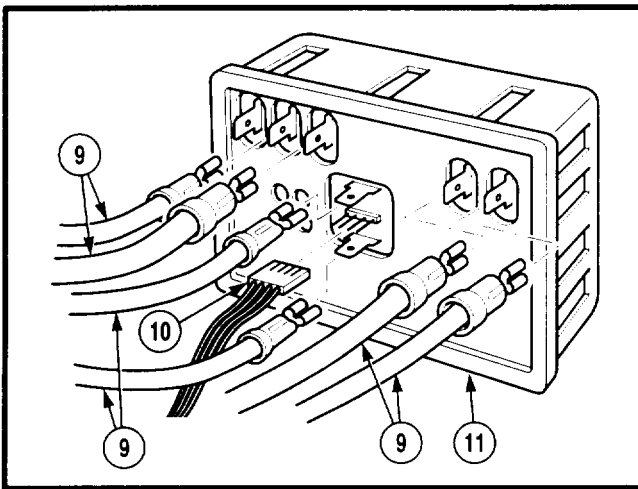
a. Removal.



(1) Loosen nine screws (1) and clamps (2) and open cover (3).

(2) Loosen two nuts (4) and screws (5).

(3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.



NOTE

- Tag and mark all wires prior to removal.
- Mark position of connector prior to removal.

(4) Disconnect six wires (9) and connector (10) from thermostat (11).

(5) Loosen setscrew (12) and remove knob (13) from thermostat (11).

(6) Remove nut (14), lock washer (15), and thermostat (11) from panel (8). Discard lock washer.

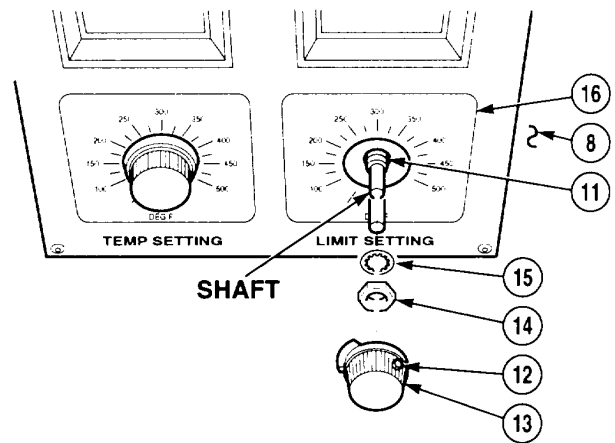
b. Installation.

(1) Install thermostat (11) on panel (8) with lock washer (15) and nut (14). Tighten nut.

(2) Turn shaft of thermostat (11) counterclockwise until it stops.

NOTE

The right-side thermostat will be at the zero degrees mark when the knob meets the post.

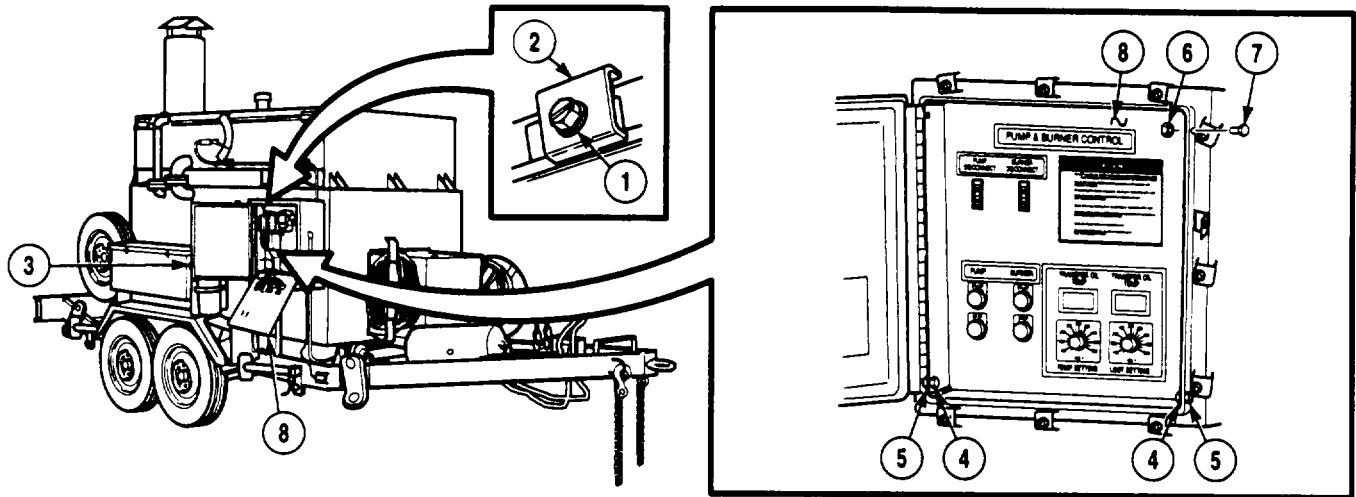


(3) Position knob (13) on shaft so the indicator line is at the zero degrees mark on the data plate (16).

(4) Tighten setscrew (12).

(5) Connect six wires (9) and connector (10) to thermostat (11).

4-75. THERMOSTAT REPLACEMENT (CONT)



(6) Lift panel (8) to upright position and install two screws (7) and nuts (6).

(7) Tighten two screws (7), nuts (6), screws (5), and nuts (4).

(8) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-76. POWER INLET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Choked (page 2-17)

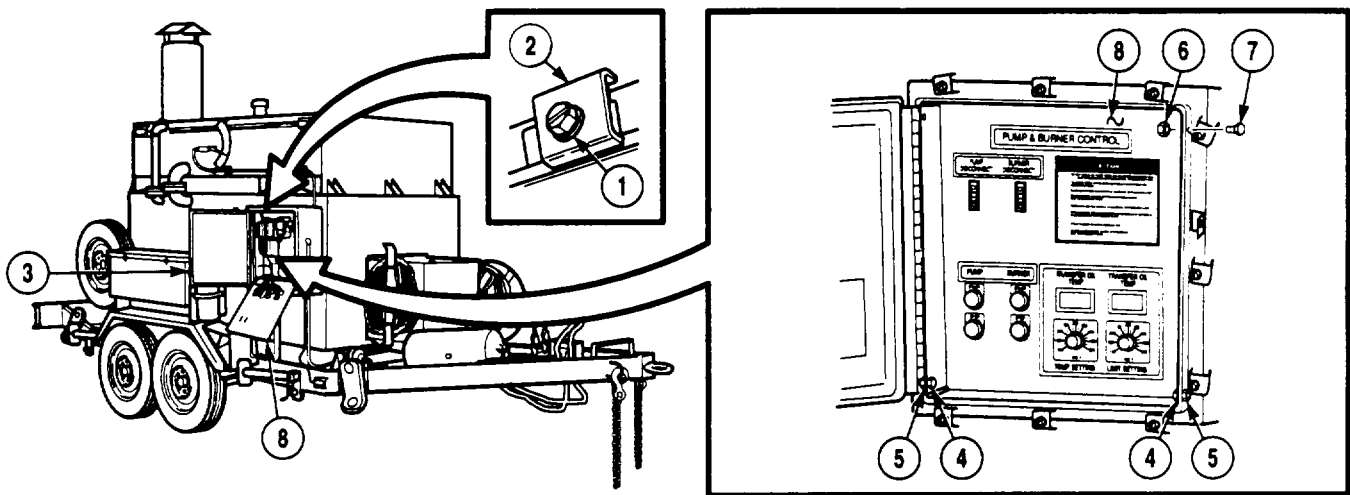
Power Source Disconnected (page 2-32)

Materials /Parts

Tags, Identification (item 22, appendix E)

Gasket

a. Removal

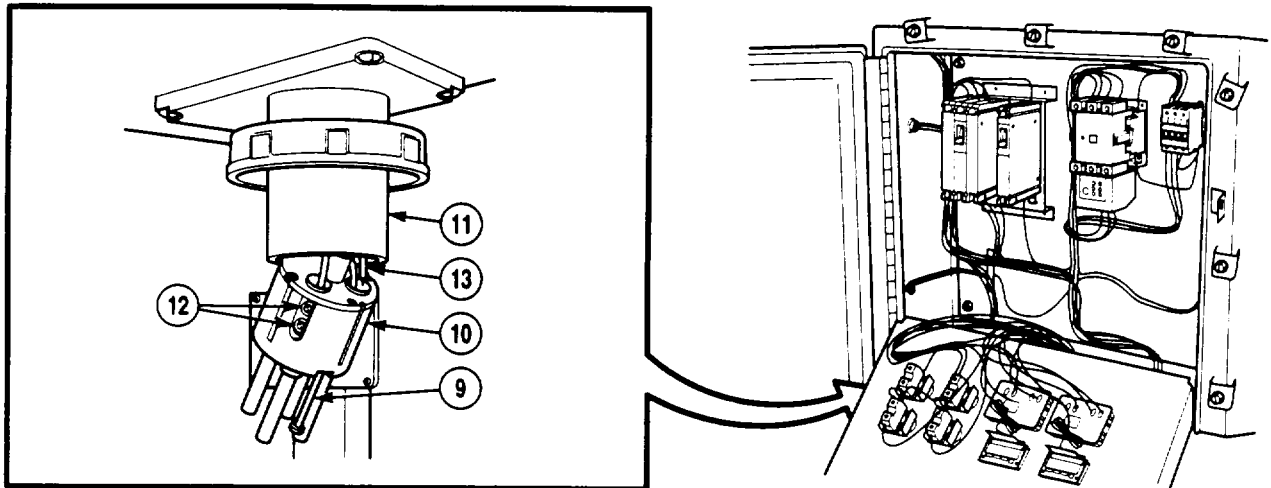


(1) Loosen nine screws (1) and clamps (2) and open cover (3).

(2) Loosen two nuts (4) and screws (5).

(3) Remove two nuts (6) and screws (7) and allow panel (8) to lean forward.

4-76. POWER INLET REPLACEMENT (CONT)

**WARNING**

Power inlet can be replaced with panel down. If you close panel during power inlet replacement, ensure door is closed and one or more clamps are in place. Failure to comply will create an unsafe condition and may result in injury to personnel.

NOTE

- Tag and mark all wires prior to removal.
- Note position of outlet prior to removal.

(4) Loosen two screws (9) and remove interior (10) from body (11).

(5) Loosen eight screws (12) and remove four wires (13) from interior (10).

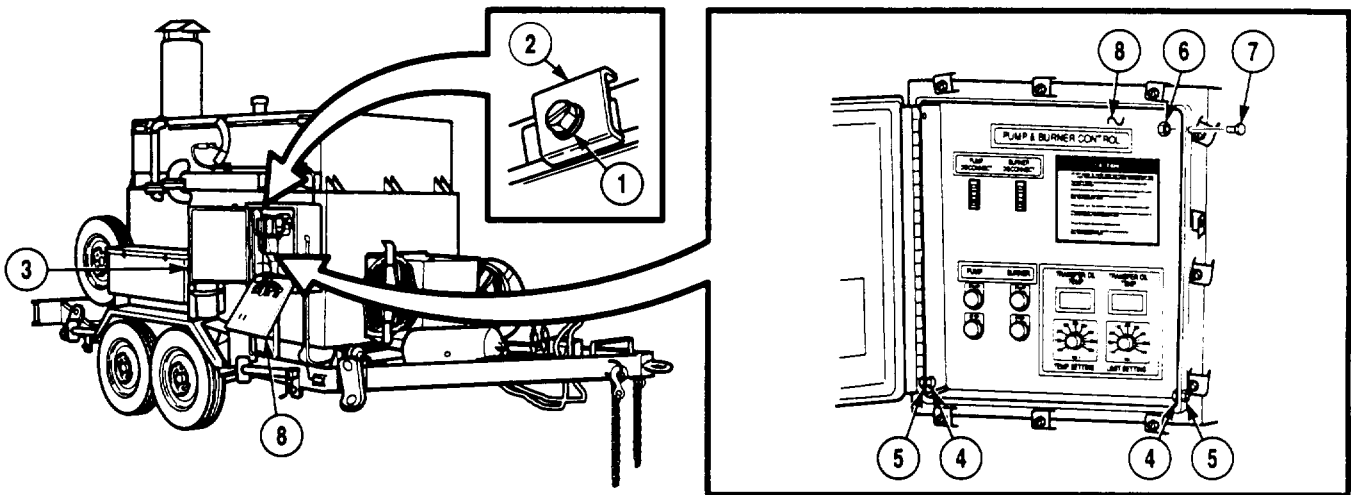
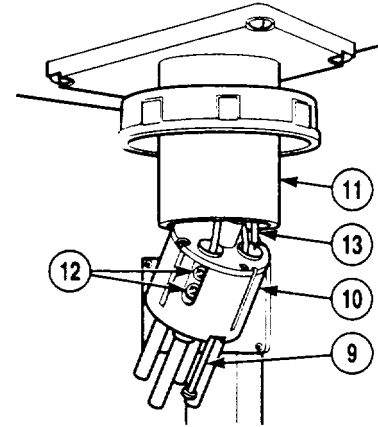
(6) Remove four nuts (14), screws (15), body (11), and gasket (16) from control box (17). Discard gasket.

b. Installation.

(1) Install gasket (16) and body (11) with four screws (15) and nuts (14) in control box (17) and tighten nuts.

(2) Install four wires (13) in interior (10) and tighten eight screws (12).

(3) Install interior (10) in body (11) and tighten two screws (9).



(4) Lift panel (8) to upright position and install two screws (7) and nuts (6).

(5) Tighten ten screws (7), nuts (6), screws (5), and nuts (4).

(6) Close cover (3), reposition clamps (2), and tighten screws (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-77. LOW OIL INDICATOR REPLACEMENT/ADJUSTMENT

This task covers:

a. Removal

b. Installation

c. Adjustment

INITIAL SETUP

Tools and Special Tools

Tool Kit General Mechanic's: Automotive

Materials/Parts

Packing

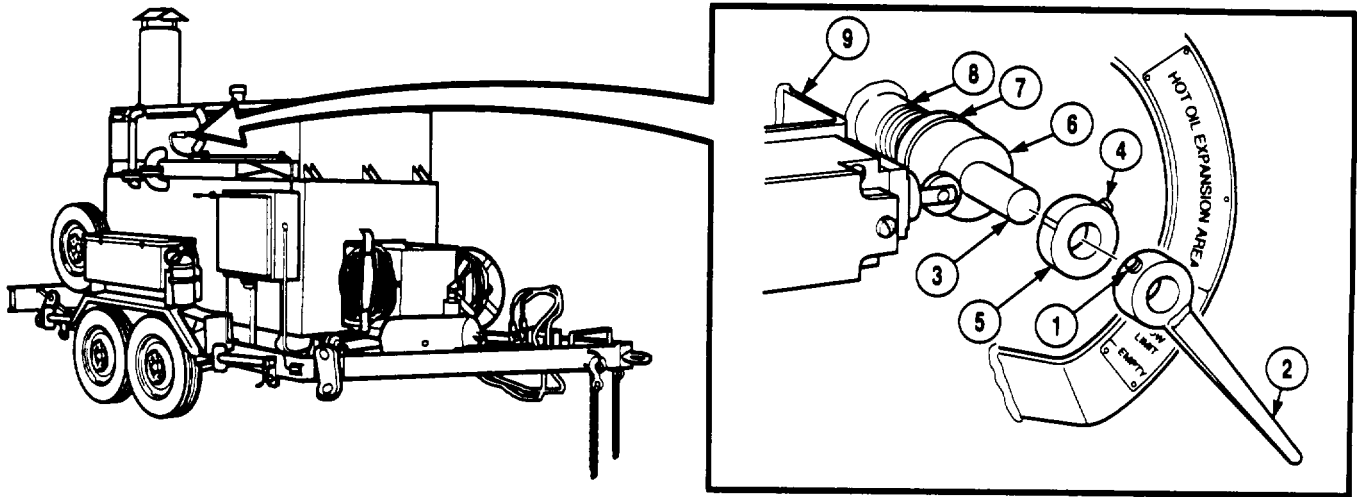
Personal Required

Two

Equipment Condition

Heater Cooled

Wheels Choked (page 2-17)



a. Removal

- (1) Loosen setscrew (1) and remove indicator (2) from shaft (3).
- (2) Loosen setscrew (4) and remove cam (5) from shaft (3).
- (3) Remove dust boot (6), packing spacer (7), and packing (8) from Heater (9). Discard packing.

b. Installation.

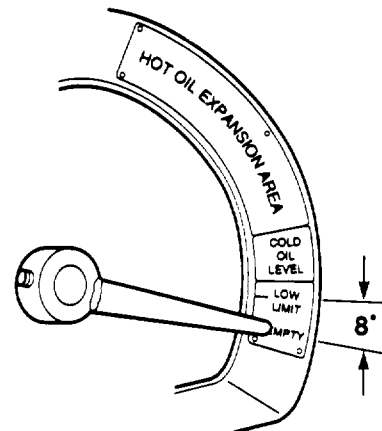
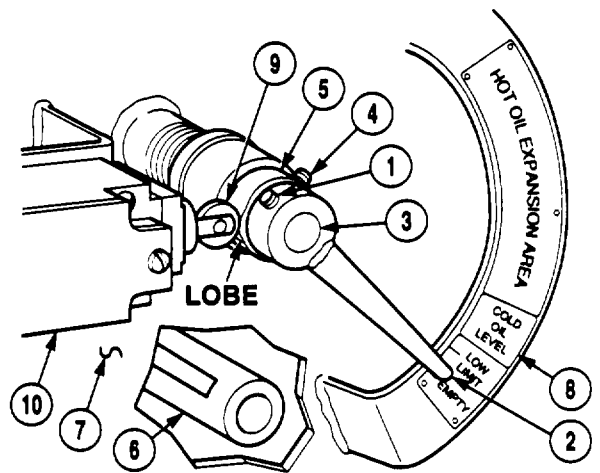
- (1) Install packing (8), packing spacer (7), and dust boot (6) on Heater (9).
- (2) Install cam (5) on shaft (3).
- (3) Install indicator (2) on shaft (3).

c. Adjustment.

NOTE

You will hear a thump and shaft will stop turning when float touches bottom.

- (1) Using lock jawed pliers, turn shaft (3) clockwise until float (6) touches bottom of expansion tank (7). Hold shaft in this position while performing step (2).
- (2) With the aid of an assistant, and while holding shaft position point of indicator (2) at the "EMPTY" mark on the decal (8) tighten setscrew (1) and release shaft (3).
- (3) Move indicator (2) until point is at the "LOW LIMIT" mark on the decal (8). Hold indicator in this position while performing step (4).
- (4) Turn cam (5) counterclockwise until lobe depresses roller (9) and engages low oil sensor switch (10).
- (5) Tighten setscrew (4) and release indicator (2).
- (6) Check adjustment by turning indicator (2) until float (6) touches bottom of expansion tank (7).
- (7) Move indicator (2) up 8° and check that cam (5) has engaged low oil sensor switch (10) and point of indicator (2) is on "LOW LIMIT" mark on the decal (8).
- (8) Repeat steps (1) through (7) if conditions do not exist.



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-78. PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Lifting Device
Wrench, Torque

Personnel Required

Two

Materials/Parts

Compound (item 10, appendix E)
Rags, Wiping (item 19, appendix E)
Gasket
Gasket
Lock Washers (12)
Drain Pan

Equipment Condition

Wheels Choked (page 2-17)
Heater Cooled
Transfer Oil Drained (page 3-12)
Sheave and Belt Guard Removed
page 4-202)
Pressure Relief Valve Removed (page 4-216)
Valve No. 2 Removed (page 4-210)

a. Removal

WARNING

- Pump weighs 106 lbs (48.1 kg). Attach a suitable lifting device for removal or installation to prevent possible injury to personnel.

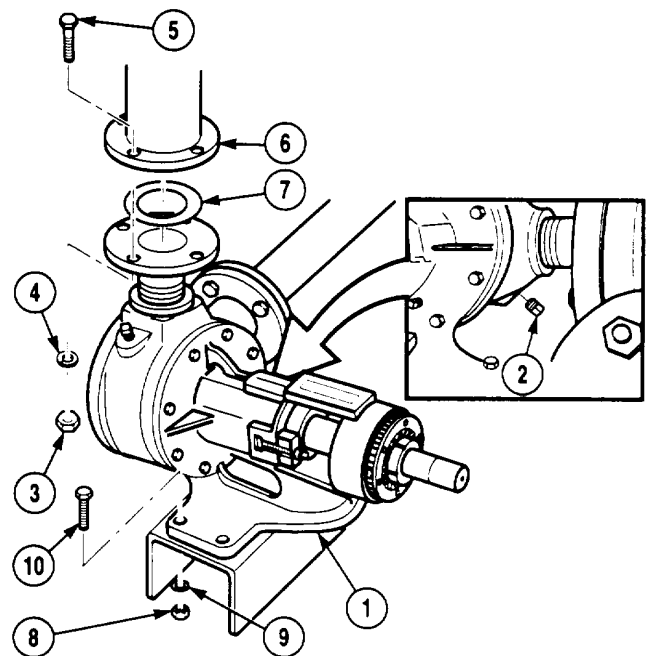
- Oil is slippery and can cause falls. Wipe up spilled oil with rags.

(1) Position drain pan under pump (1), and remove plug (2) from pump (1), and allow oil to drain.

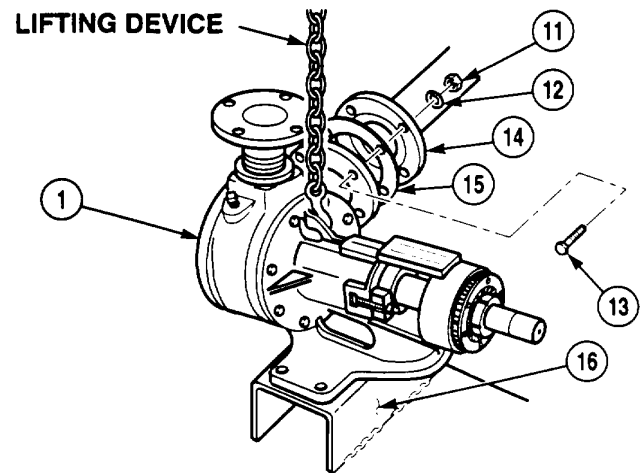
(2) Install plug (2) in pump (1).

(3) With the aid of an assistant, remove four nuts (3), lock washers (4), screws (5), plumbing section (6), and gasket (7) from pump (1). Discard lock washers and gasket.

(4) Remove four nuts (8), lock washers (9), and screws (10) from pump (1). Discard lock washers.

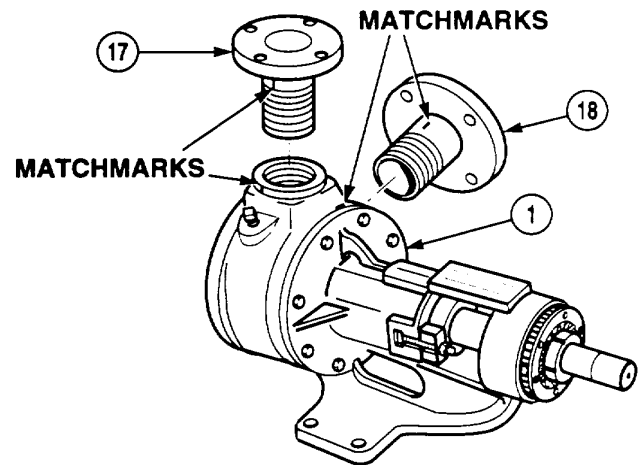


- (5) With the aid of an assistant, remove four nuts (11), lock washers (12), and screws (13) from pump (1) and plumbing section (14). Discard lock washers.
- (6) Attach lifting device and remove pump (1) and gasket (15) from plumbing section (14) and mounting bracket (16). Discard gasket.
- (7) Remove lifting device from pump (1).
- (8) Matchmark plumbing sections (17 and 18) and pump (1).
- (9) Remove two plumbing sections (17 and 18) from pump (1).



b. Installation.

- (1) Apply compound to threads of plumbing sections (17 and 18).
- (2) Install two plumbing sections (17 and 18) in pump (1) and align matchmarks.



4-78. PUMP REPLACEMENT (CONT)

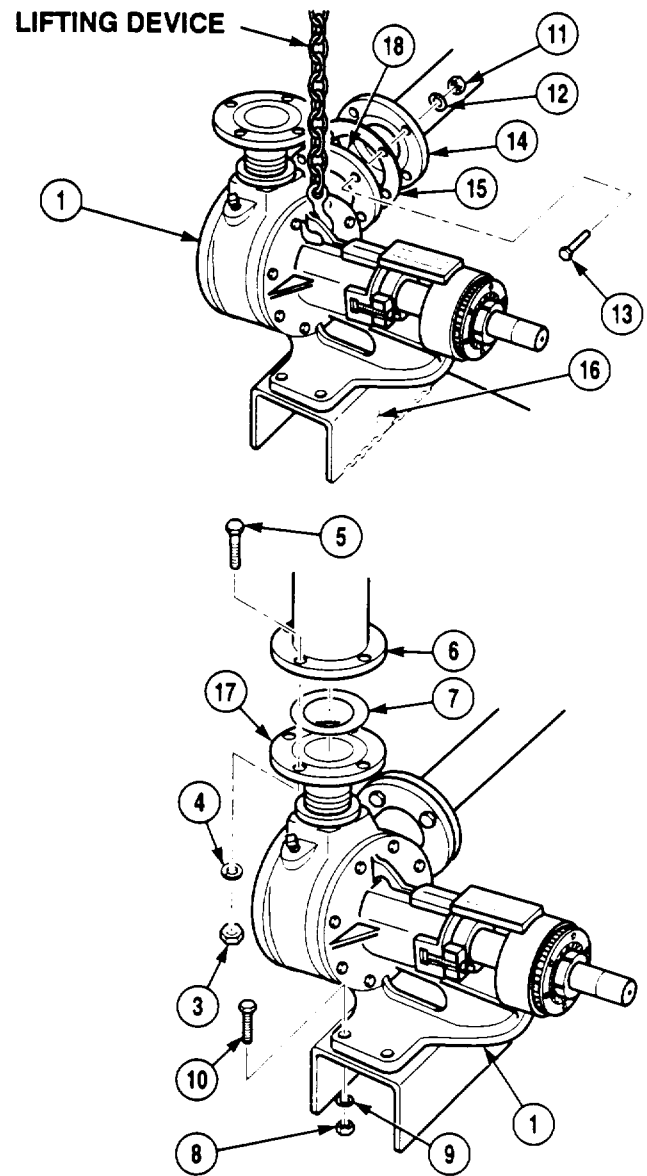
- (3) Using a lifting device, position pump (1) on pump mounting bracket (16) and install four screws (10), lock washers (9), and nuts (8). Do not tighten nuts.
- (4) Aline holes of plumbing section (14) and plumbing section (18).
- (5) Position gasket (15) between plumbing sections (14 and 18) and, with the aid of an assistant, install four screws (13), lock washers (12), and nuts (11). Tighten nuts to 110 lb.-ft (149 kg).
- (6) Tighten nuts (8 and 11) to 110 lb.-ft (149 kg).
- (7) With the aid of an assistant, install gasket (7) and plumbing section (6) on plumbing section (17) with four screws (5), lock washers (4), and nuts (3).
- (8) Tighten nuts (3) to 110 lb.-ft (149 kg).

NOTE

Follow-on Maintenance:

- Install pressure relief valve (para 4-217).
- Install valve no. 2 (page 4-211).
- Install sheave and belt guard (page 4-203).
- Fill expansion tank (page 3-14).
- Remove wheel chocks (page 2-35).

END OF TASK



4-79. PUMP MOTOR BELT REPLACEMENT/ADJUSTMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

- Tool Kit, General Mechanic's: Automotive
- Tensioning gage, belt
- Wrench, torque (0 to 175 lb.-ft [0-237 N-m])

Equipment Condition

- Wheels Choked (page 2-17)
- Power Source Disconnected (page 2-32)

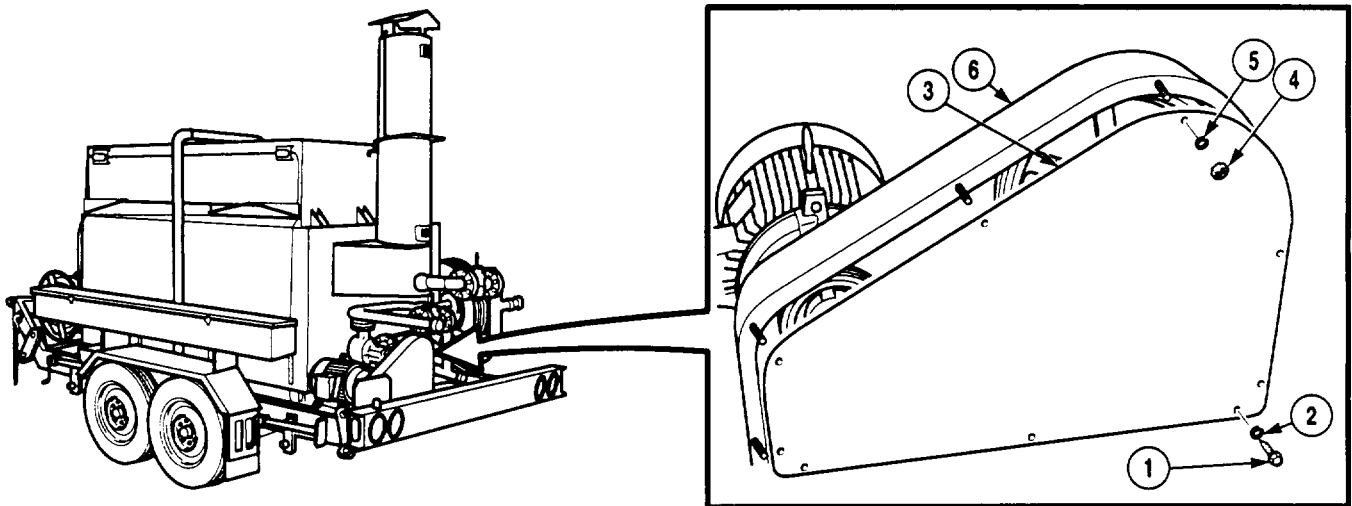
Materials/Parts

- Vee-Belts (2)
- Lock Washers (6)
- Lock Washers (4)

Personnel Required

Two

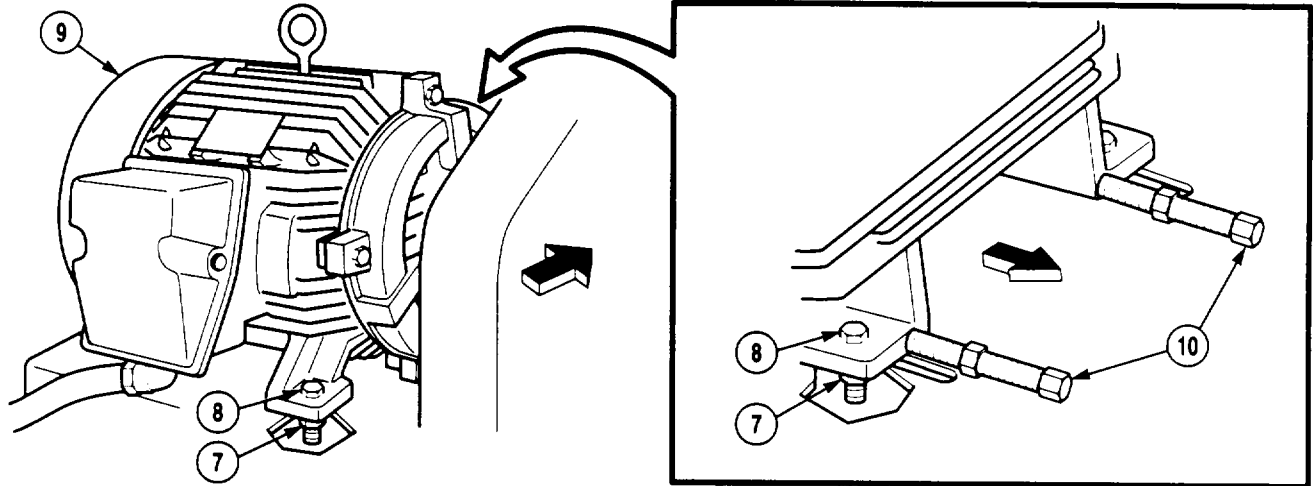
a. Removal



(1) move three screws (1) and lock washers (2) from belt guard cover (3).

(2) Remove six nuts (4), lock washers (5) and belt guard cover (3) from belt guard (6).

4-79. PUMP MOTOR BELT REPLACEMENT/ADJUSTMENT (CONT)



(3) With the aid of an assistant, loosen four nuts (7) and screws (8) on pump motor (9).

(4) Loosen two adjusting screws (10) and slide pump motor (9) forward.

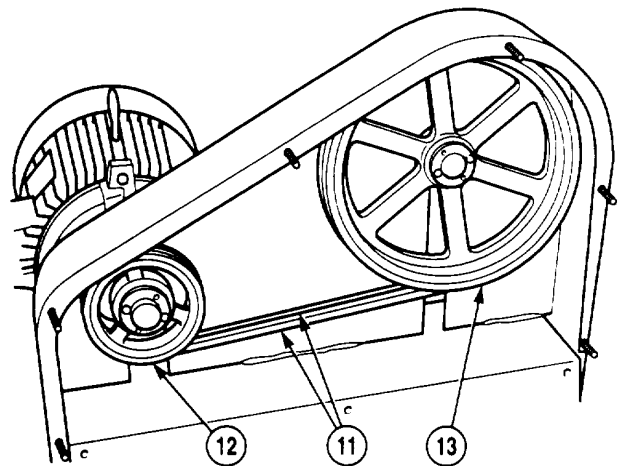
NOTE

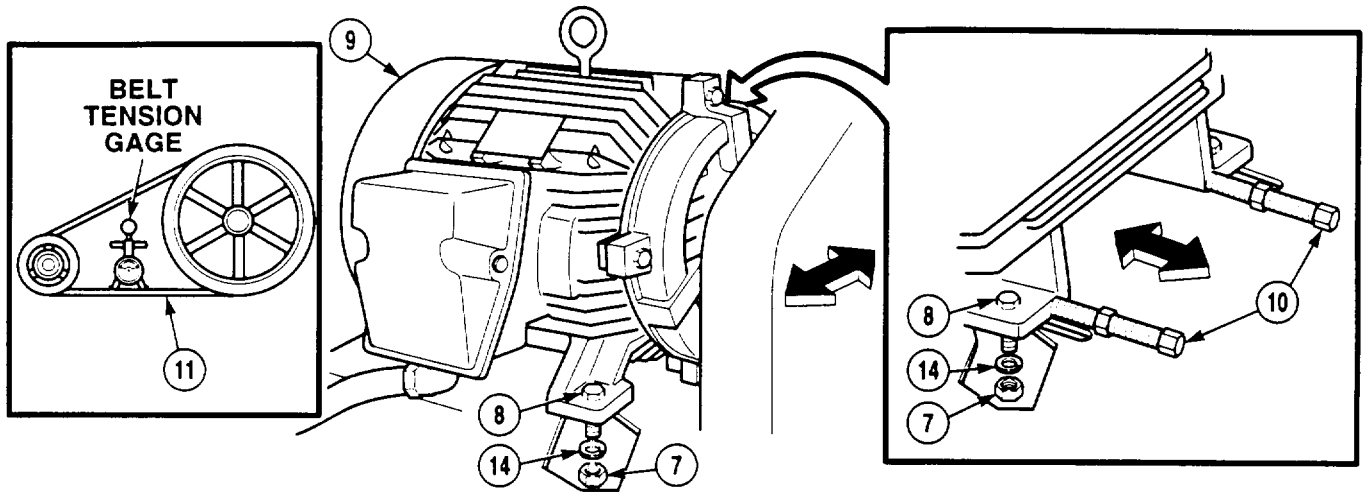
Follow removal step (5) and installation step (1) only when replacing belts.

(5) Remove two vee-belts (11) from sheaves (12 and 13). Discard vee-belts.

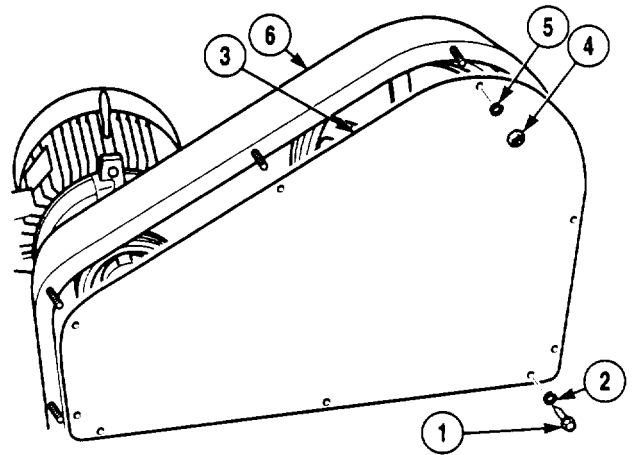
b. Installation/Adjustment.

(1) Install two vee-belts (11) on sheaves (12 and 13).





- (2) Install belt tensioning gage on belt (11).
- (3) Tighten adjusting screws (10) until belt tension reaches 55-65 lbs.
- (4) Remove four nuts (7) and lock washers (14) from four screws (8). Discard lock washers.
- (5) Install four lock washers (14) and nuts (7) on screw (8). Tighten nuts.
- (6) Remove belt tensioning gage from belt (11).
- (7) Install belt guard cover (3) on belt guard (6) with six lock washers (5) and nuts (4). Tighten nuts.
- (8) Install three screws (1) and lock washers (2) on belt guard cover (3). Tighten screws.



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-80. SHEAVE AND BELT GUARD REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

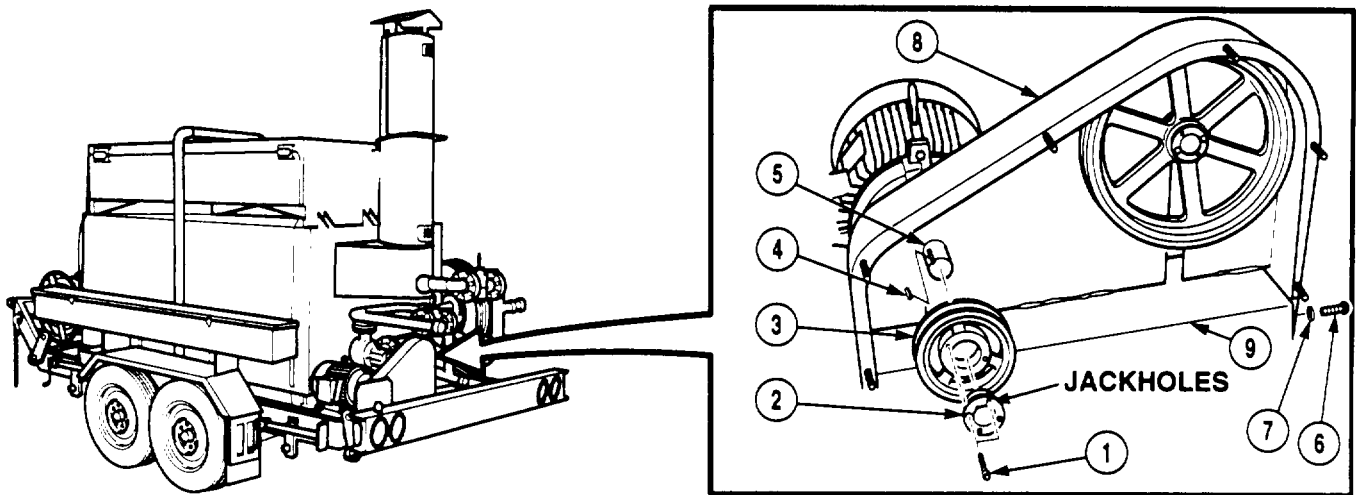
Materials/ Parts

Key
Lock Washers (8)

Equipment Condition

Wheels Choked (page 2-17)
Power Disconnected (page 2-32)
Pump Motor Belts Removed (page 4-199)

a. Removal



NOTE

This paragraph discusses the replacement of one sheave. Both sheaves are replaced in the same way.

- (1) Remove two hex socket screws (1) from bushing (2) and install in jack holes.
- (2) Tighten screws (1) until bushing (2) is loosened from sheave (3). Remove screws.

NOTE

Gear Puller may be required to remove bushing.

- (3) Remove bushing (2), sheave (3), and key (4) from shaft (5). Discard key.
- (4) If damaged, remove eight screws (6), lock washers (7), and belt guard (8) from frame (9). Discard lock washers.

b. Installation.

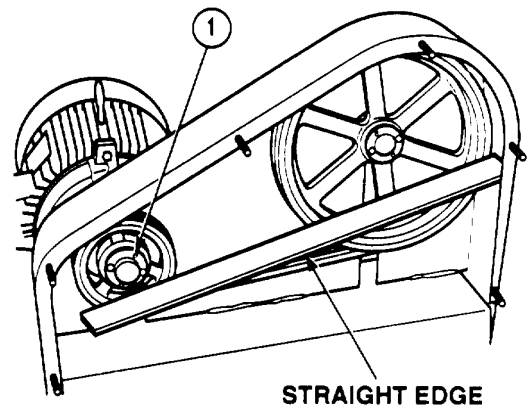
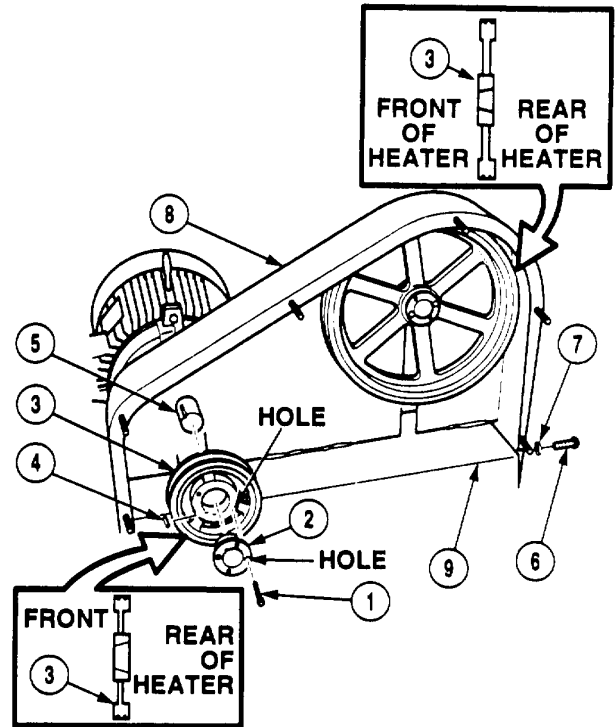
- (1) If removed, install belt guard (8) with eight screws (6) and lock washers (7). Tighten screws.
- (2) Install sheave (3), key (4), and bushing (2) on shaft (5).
- (3) Aline facing surface of bushing (2) flush with facing surface of shaft (5).
- (4) Align holes and install screws (1). Do not tighten screws.
- (5) Using straight edge, align sheaves.
- (6) Tighten screws (1).

NOTE

Follow-on Maintenance:

- Install pump motor belts (page 4-200).
- Remove wheel chocks (page 2-35).

END OF TASK



4-81. STRAINER SERVICE

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Gasket

Pan

Equipment Condition

Wheels Choked (page 2-17).

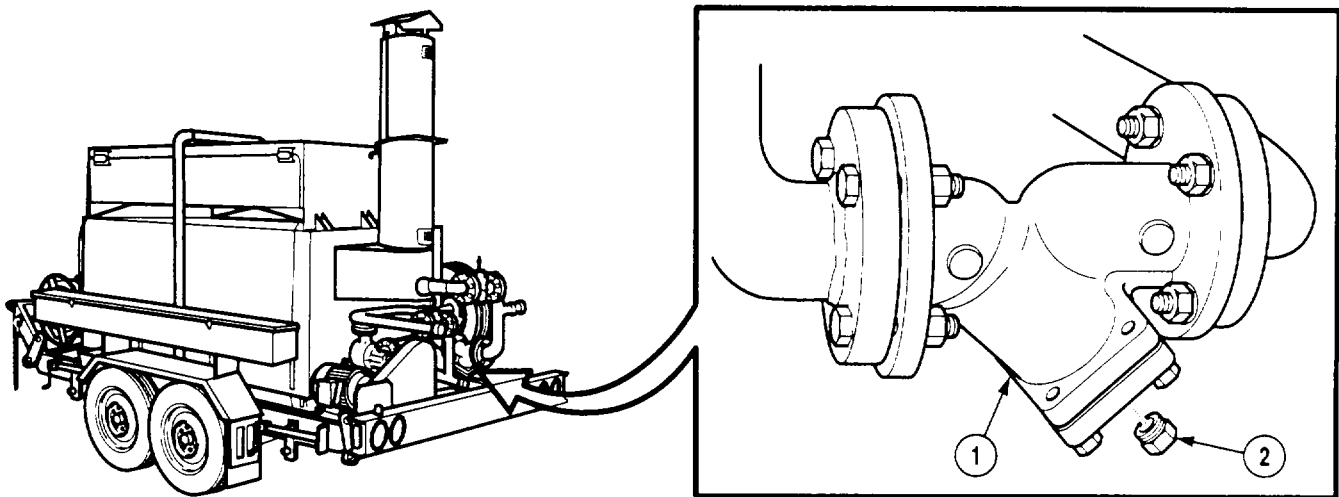
Transfer Oil Cooled

Circulating Pump Shut Down (page 2-28).

Valve No. 1 and 2 Closed (pages 2-29 and Drain

2-30)

a. Removal



WARNING

The transfer oil becomes very hot during operation. Be careful not to touch the hot oil or allow body to come into contact with hot oil. Transfer oil can become hot enough to cause burns.

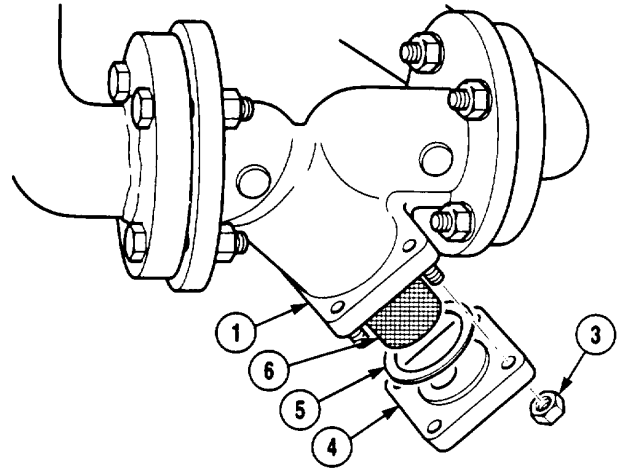
- (1) Position drain pan under strainer assembly (1).
- (2) Remove plug (2) and allow oil to drain.
- (3) Install plug (2) in strainer assembly (1).

(4) Remove four nuts (3), cover (4), gasket (5), and screen (6) from strainer assembly (1). Discard gasket.

NOTE

Ensure that screen is fully seated before installing cover to prevent crushing of screen.

- b. Installation.** Install screen (6), gasket (5), and cover (4) on strainer assembly (1) with four nuts (3).
Tighten nuts.



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35)

END OF TASK

4-82. STRAINER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

Personnel Required

Two

Materials / Parts

Rags, Wiping (item 19, appendix E)
Gasket
Drain Pan
Gaskets (2)
Lock Washers (8)
Lock Washers (8)

Equipment Condition

Wheels Choked (page 2-17)
Heater Cooled
Valves No. 1 and No. 2 Closed (pages 2-29
and 2-30)

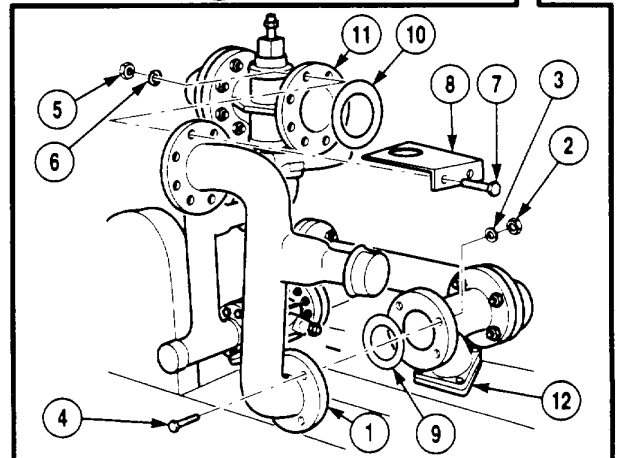
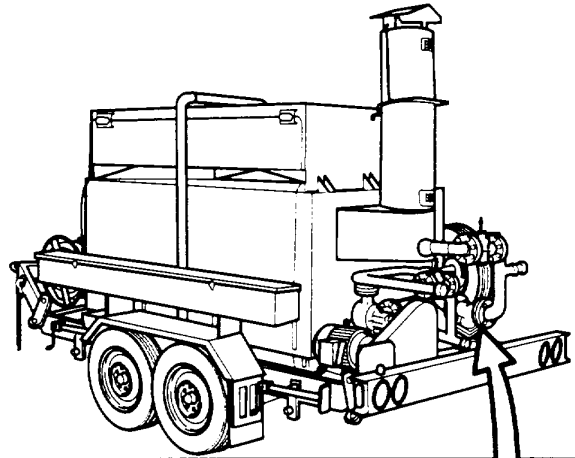
a. Removal

WARNING

Oil is slippery and can cause falls. Wipe up spilled oil with rags

NOTE

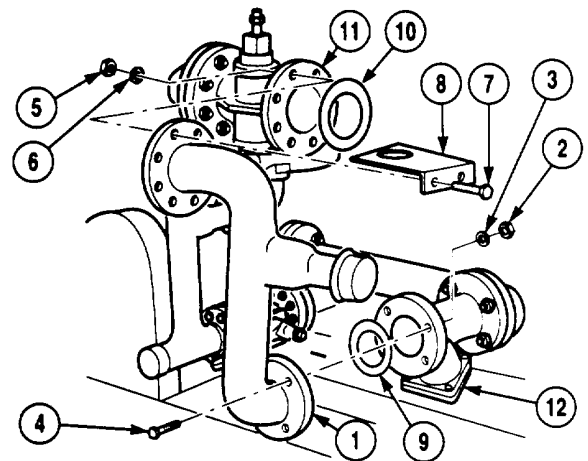
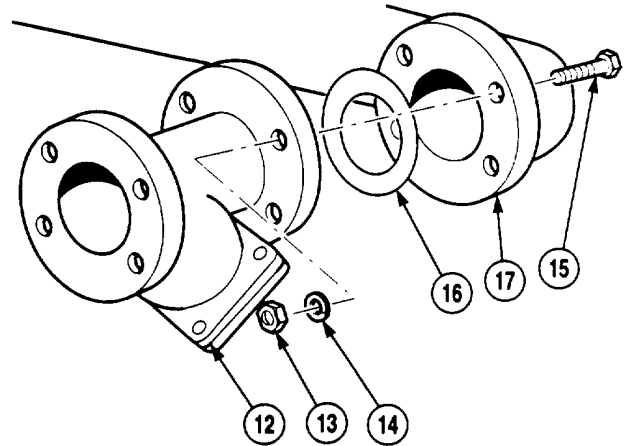
- Plumbing section weighs 32 lbs (14.5 kg)
 - Strainer weighs 30 lbs (13.6 kg).
- (1) Place drain pan under plumbing section (1).
 - (2) Remove four nuts (2), lock washers (3), and screws (4) from plumbing section (1). Discard lock washers.
 - (3) With the aid of an assistant, remove eight nuts (5), lock washers (6), screws (7), plate (8), gaskets (9 and 10), and plumbing section (1) from valve No. 1 (11) and strainer (12). Discard lock washers and gaskets.



- (
 4) With the aid of an assistant, remove four nuts (13), lock washers (14), screws (15), strainer (12), and gasket (16) from plumbing section (17). Discard gasket and lock washers.

b. Installation.

- (1) With the aid of an assistant, position gasket (16), strainer (12), four screws (15), lock washers (14), and nuts (13) to plumbing section (17). Snug, but do not tighten, nuts.
- (2) With the aid of an assistant, position gasket (10), plumbing section (1), and plate (8) on valve No. 1 (11) with eight screws (7), lock washers (6), and nuts (5). Snug, but do not tighten, nuts.
- (3) Position gasket (9), four screws (4), lock washers (3) and nuts (2) in plumbing section (1). Snug, but do not tighten, nuts.
- (4) Aline plumbing section (1) with valve No. 1 (11) and strainer (12).
- (5) Tighten eight nuts (2 and 13) to 110 lb.-ft (149 N.m).
- (6) Tighten eight nuts (5) to 200 lb.-ft (271 N.m).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-83. VALVE NO. 1 REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

Personnel Required

Two

Materials /Parts

Rags, Wiping (item 19, appendix E)
Drain Pan
Gasket
Gaskets (2)
Lock Washers (4)
Lock Washers (16)

Equipment Condition

Wheels Choked (page 2-17)
Heater Cooled
Transfer Oil Drained (page 3-12)

a. Removal

WARNING

Oil is slippery and can cause falls. Wipe up spilled oil with rags.

NOTE

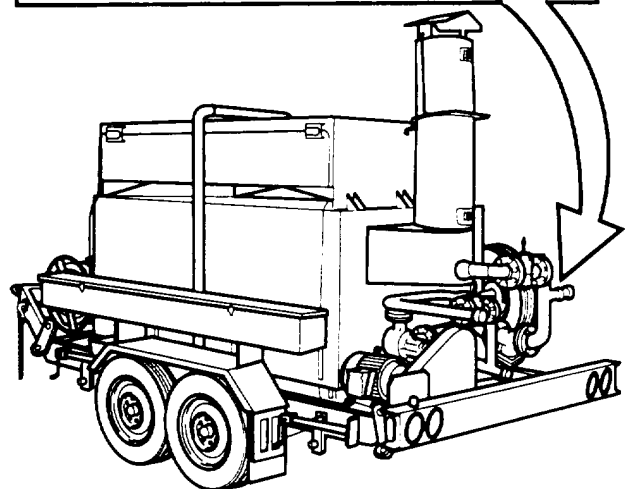
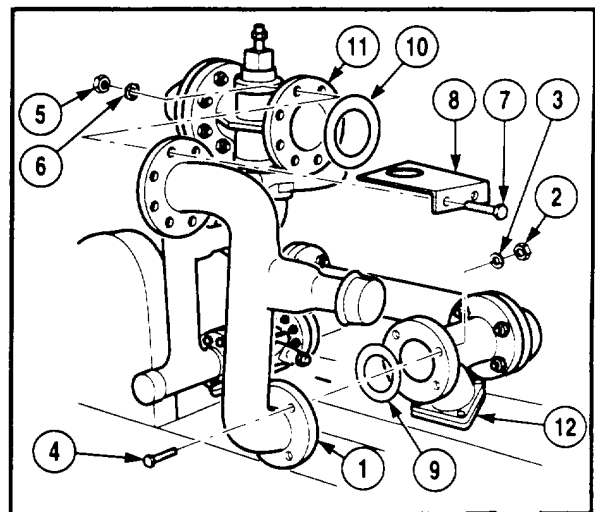
Plumbing section weighs 32 lbs (14.5 kg).

- (1) Position drain pan under plumbing section (1)

NOTE

Valve no. 1 weighs 63 lbs (28.6 kg).

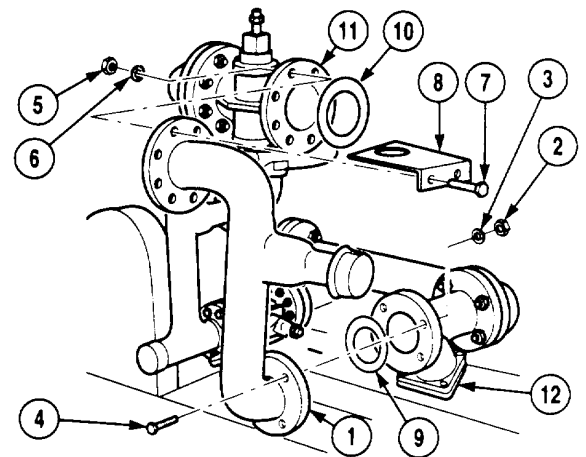
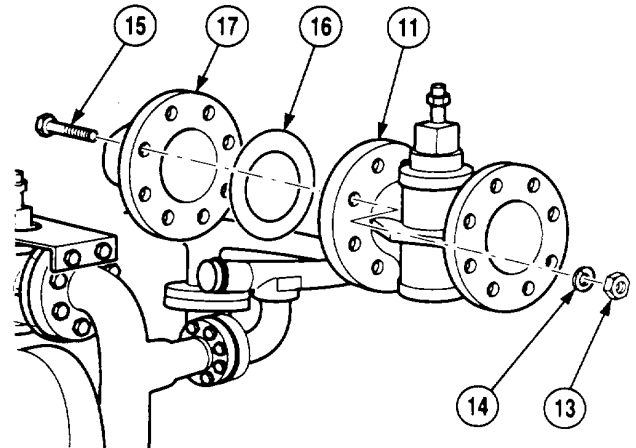
- (2) Remove four nuts (2), lock washers (3), and screws (4) from plumbing section (1). Discard lock washers.
- (3) With the aid of an assistant, remove eight nuts (5), lock washers (6), screws (7), plate (8), gaskets (9 and 10), and plumbing section (1) from valve no. 1 (11) and strainer (12). Discard lock washers and gaskets



- (4) With the aid of an assistant, remove eight nuts (13), lock washers (14), screws (15), valve (11), and gasket (16), from plumbing section (17). Discard gasket and lock washers.

b. Installation.

- (1) With the aid of an assistant, position gasket (16), valve (11), eight screws (15), lock washers (14), and nuts (13) on plumbing section (17). Snug, but do not tighten, nuts.
- (2) With the aid of an assistant, position gasket (10), plumbing section (1), plate (8), eight screws (7), lock washers (6), and nuts (5) on valve no. 1 (11). Snug, but do not tighten, nuts
- (3) Position gasket (9), four screws (4), lock washers (3), and nuts (2) in plumbing section (1). Snug, but do not tighten, nuts.
- (4) Aline plumbing section (1) with valve no. 1(11) and strainer (12).
- (5) Tighten four nuts (2) to 110 lb.-ft (149 N.m).
- (6) Tighten sixteen nuts (5 and 13) to 200 lb.-ft (271 N.m).



NOTE

Follow-on Maintenance:

- * Fill expansion tank with oil (page 3-14).
- * Remove wheel chocks (page 2-35).

END OF TASK

4-84. VALVE NO. 2 REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

Personnel Required

Two

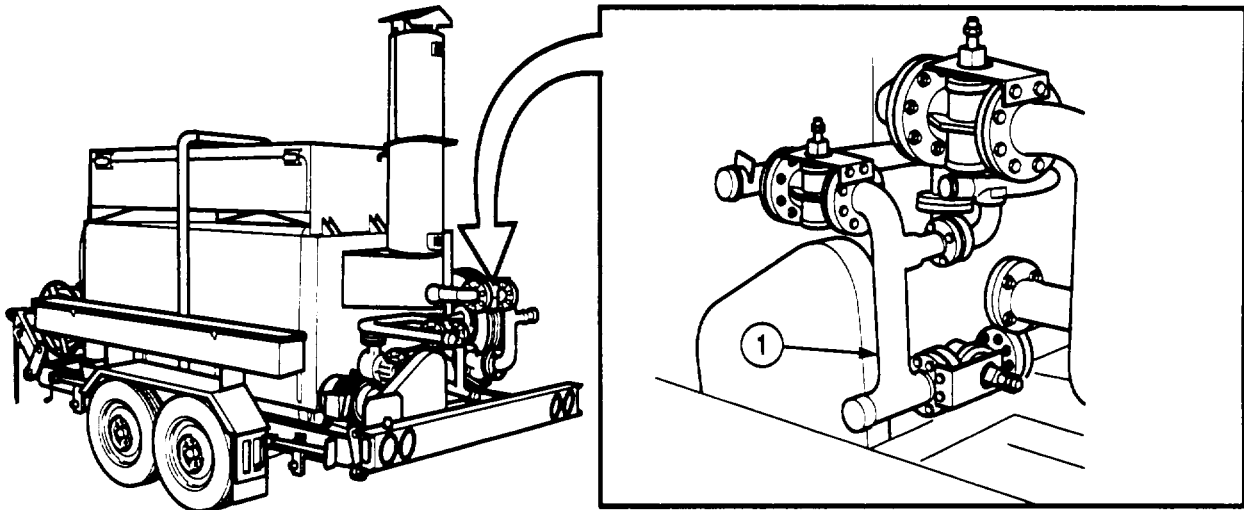
Materials/Parts

Rags, Wiping (item 19, appendix E)
Drain Pan
Gasket (2)
Gasket (2)
Lock Washers (4)
Lock Washers (24)

Equipment Condition

Wheels Choked (page 2-17)
Heater Cooled
Transfer Oil Drained (para 3-12)

a. Removal



WARNING

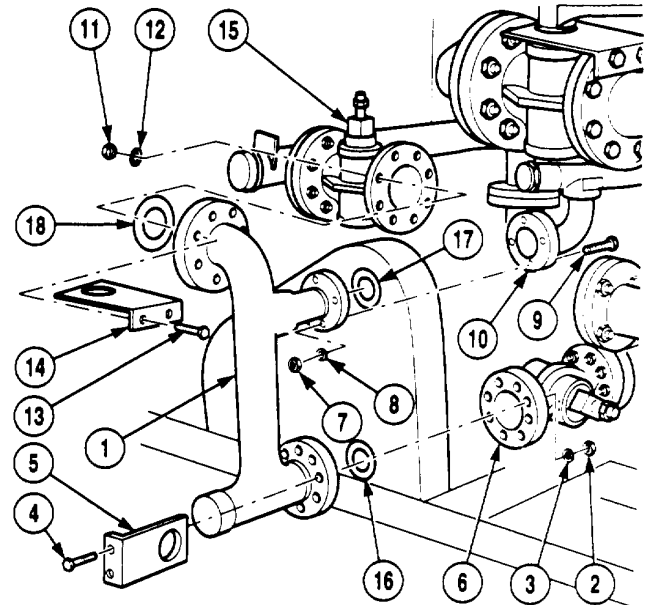
Oil is slippery and can cause falls. Wipe up spilled oil with rags.

NOTE

- Plumbing section weighs 32 lbs (14.5 kg).
- Valve No. 2 weighs 30 lbs (13.6 kg).

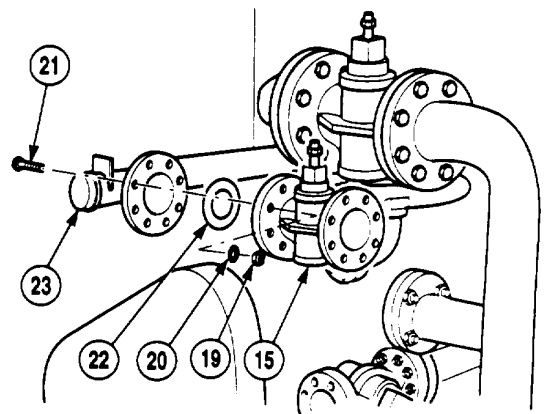
(1) Position drain pan under plumbing section (1).

- (2) Remove eight nuts (2), lock washers (3), screws (4), and plate (5) from valve no. 3 (6). Discard lock washers.
- (3) Remove four nuts (7), lock washers (8), and screws (9) from plumbing sections (1 and 10). Discard lock washers.
- (4) With the aid of an assistant, remove eight nuts (11), lock washers (12), screws (13), plate (14), and plumbing section (1) from valve no. 2 (15). Discard lock washers.
- (5) Remove gaskets (16, 17, and 18) from plumbing section (1). Discard gaskets.
- (6) With the aid of an assistant, remove eight nuts (19), lock washers (20), screws (21), gasket (22), and valve no. 2 (15) from plumbing section (23). Discard lock washers and gasket.



b. Installation.

- (1) With the aid of an assistant, position gasket (22), eight screws (21), lock washers (20), nuts (19), and valve no. 2 (15) on plumbing section (23). Do not tighten nuts.



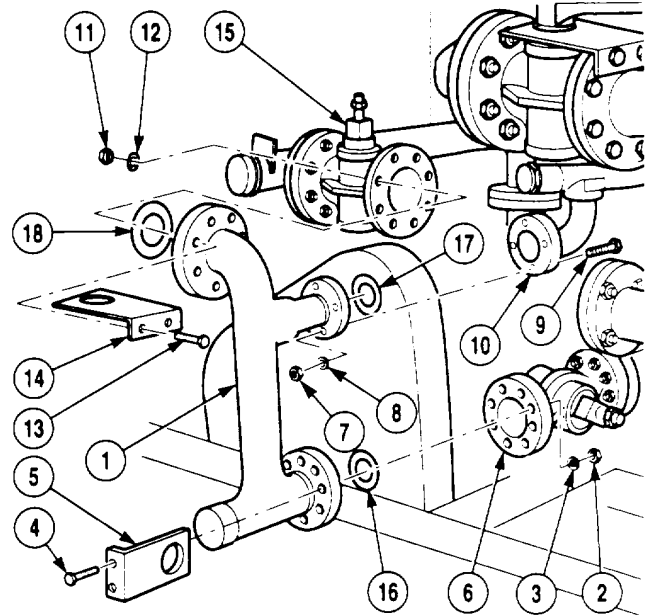
4-84. VALVE NO. 2 REPLACEMENT (CONT).

- (2) With the aid of an assistant, position gasket (18), plate (14), eight screws (13), eight lock washers (12), nuts (11), and plumbing section (1) on valve no. 2 (15). and plumbing section (1). Do not tighten nuts.
- (3) Position gasket (17), four screws (9), lock washers (8), and nuts (7) in plumbing sections (10 and 1). Do not tighten nuts.
- (4) Position gasket (16), eight screws (4), plate (5)), lock washers (3), and nuts (2) In valve no. 3 (6) and plumbing section (1).
- (5) Tighten nuts (2, 11, and 19) to 110 lb-ft (149 N.m) t6) Tighten nuts (7) to 55 lb-ft (75 N.m).

NOTE

Follow-on Maintenance:

- Fill expansion tank with oil (page 3-14).
- Remove wheel chocks (page 2-35).

**END OF TASK**

4-85. VALVE NO. 3 REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

Personnel Required

Two

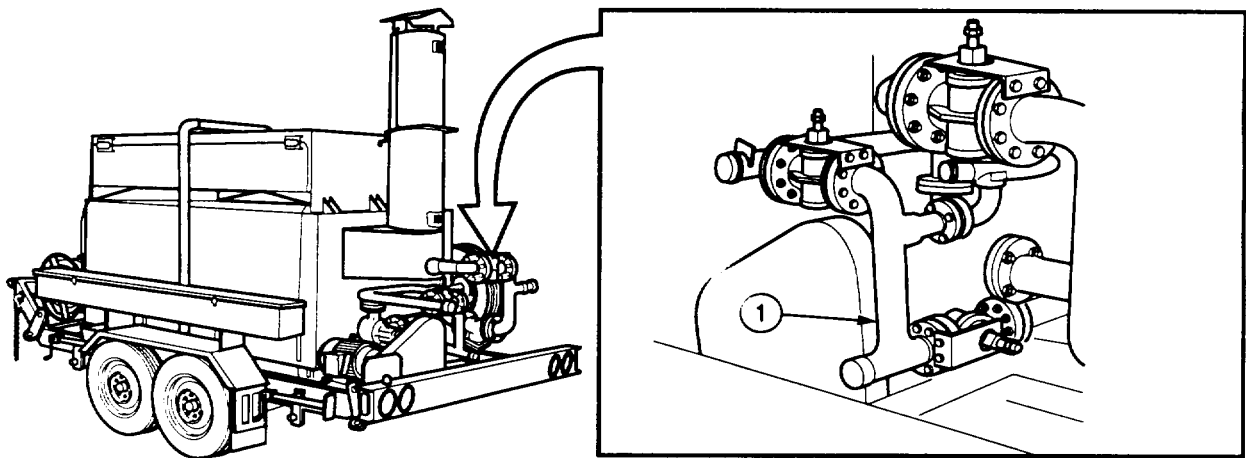
Materials/Parts

Rag, Wiping (item 19, appendix E)
Drain Pan
Gasket
Gasket (6)
Lock Washers (4)
Lock Washers (24)

Equipment Condition

Wheels Chocked (page 2-17)
Heater Cooled
Transfer Oil Drained (page 3-12)

a. Removal.



WARNING

Oil is slippery and can cause falls. Wipe up spilled oil with rags.

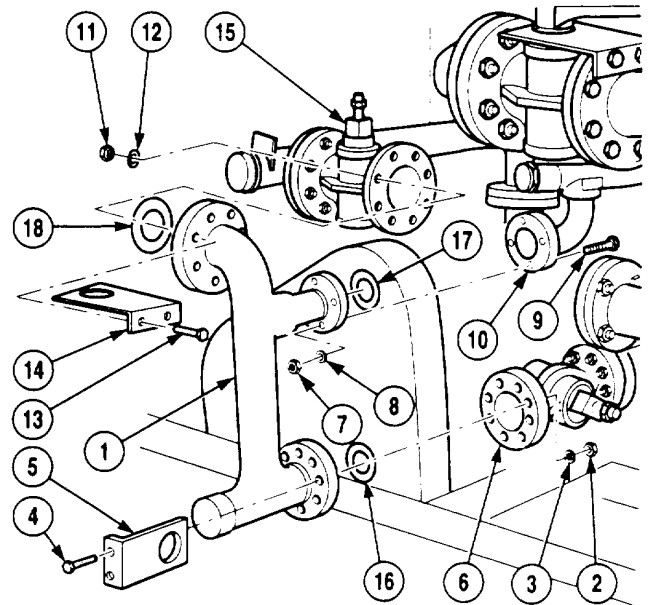
NOTE

- Plumbing section weighs 32 lbs (14.5 kg).
- Valve No. 3 weighs 30 lbs (13.6 kg).

(1) Position drain pan under plumbing section (1).

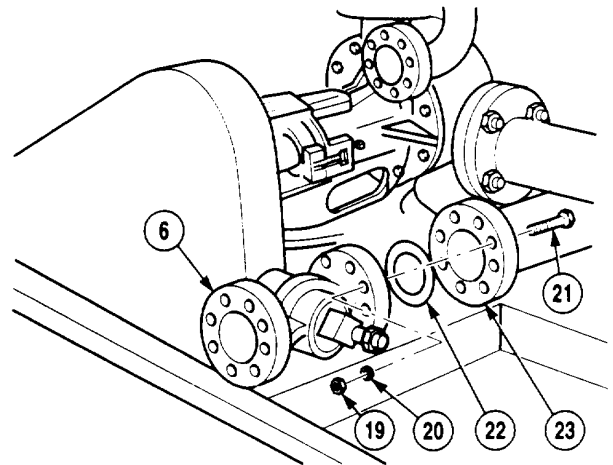
4-85. VALVE NO. 3 REPLACEMENT (CONT).

- (2) Remove eight nuts (2), lock washers (3), screws (4), and plate (5) from valve no. 3 (6). Discard lock washers.
- (3) Remove four nuts (7), lock washers (8), and screws (9) from plumbing sections (1 and 10). Discard lock washers.
- (4) With the aid of an assistant, remove eight nuts (11), lock washers (12), screws (13), plate (14), and plumbing section (1) from valve no. 2 (15). Discard lock washers.
- (5) Remove gaskets, (16, 17, and 18) from plumbing section (1). Discard gaskets.
- (6) Remove eight nuts (19), lock washers (20), screws (21), gasket (22), and valve no. 3 (6) from plumbing section (23). Discard lock washers and gasket.

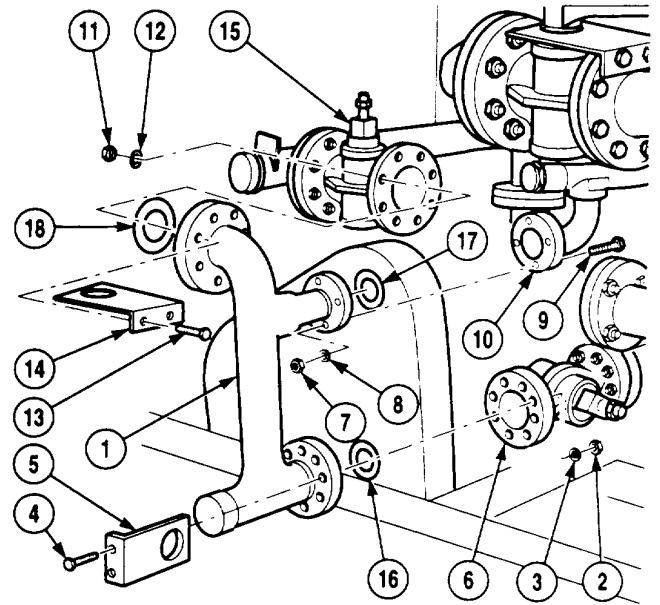


b. Installation.

- (1) With the aid of an assistant, position gasket (22), eight screws (21), lock washers (20), nuts (19), and valve no. 3 (6) on plumbing section (23). Do not tighten nuts.



- (2) With the aid of an assistant, position gasket (18), plate (14), eight screws (13), lock washers (12), nuts (11), and plumbing section (1) on valve no. 2 (15). and plumbing section (10). Do not tighten nuts.
- (3) Position gasket (17), four screws (9), lock washers (8), and nuts (7) in plumbing sections (10 and 1). Do not tighten nuts.
- (4) Position eight screws (4), plate (5), lock washers (3), and nuts (2) in valve no. 3 (6) and plumbing section (1).
- (5) Tighten nuts (2, 11, and 19) to 110 lb-ft (149 N.m).
- (6) Tighten nuts (7) to 55 lb-ft (75 N.m).



NOTE

Follow-on Maintenance:

- Fill expansion tank with oil (page 3-14).
- Remove wheel chocks (page 2-35).

END OF TASK

4-86. PRESSURE RELIEF VALVE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque

Personnel Required

Two

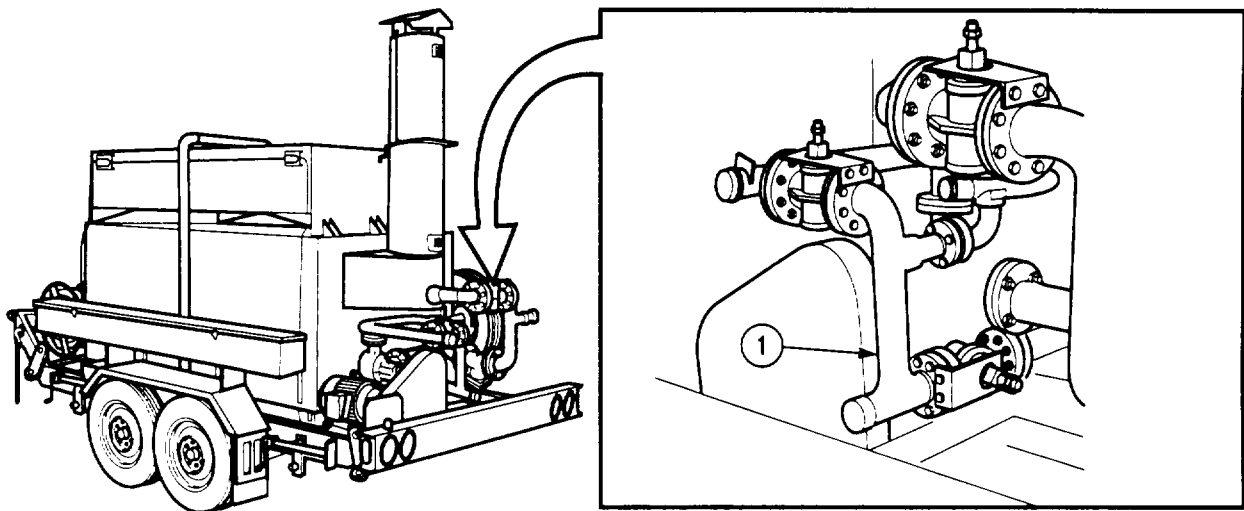
Materials/Parts

Compound, Pipe Thread Sealing
(item 9, appendix E)
Gasket
Drain Pan
Gaskets (2)
Lock Washers (4)
Lock Washers (16)

Equipment Condition

Wheels Chocked (page 2-17)
Heater Cooled
Transfer Oil Drained (page 3-12)

a. Removal

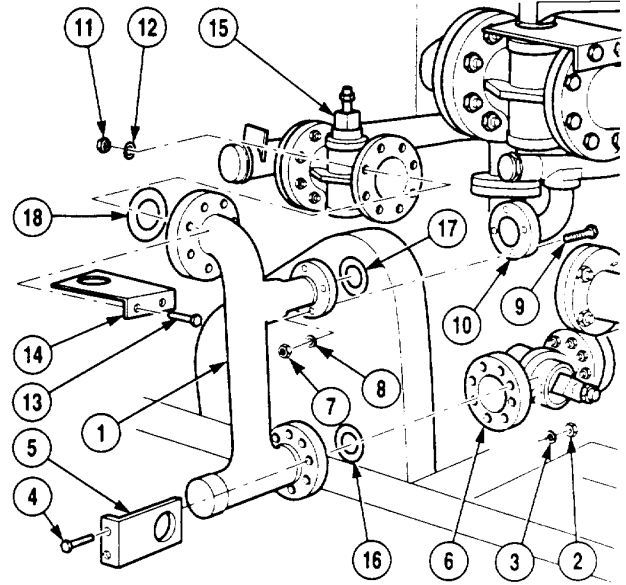


WARNING

Oil is slippery and can cause falls. Wipe up spilled oil with rags.

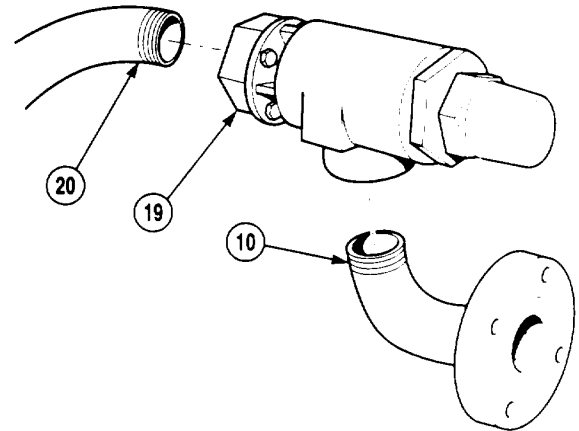
(1) Position drain pan under plumbing section (1).

- (2) Remove eight nuts (2), lock washers (3), screws (4), and plate (5) from valve no. 3 (6). Discard lock washers.
- (3) Remove four nuts (7), lock washers (8), and screws (9) from plumbing section (10). Discard lock washers.
- (4) With the aid of an assistant, remove eight nuts (11), lock washers (12), screws (13), plate (14), and plumbing section (1) from valve no. 2 (15). Discard lock washers.
- (5) Remove gaskets (16, 17, and 18) from plumbing section (1). Discard gaskets.
- (6) Remove plumbing section (10) from pressure relief valve (19).
- (7) Remove pressure relief valve (19) from plumbing section (20).



b. Installation.

- (1) Apply sealing compound to threads of plumbing sections (20 and 10).
- (2) Install pressure relief valve (19) on plumbing section (20).
- (3) Install plumbing section (10) on pressure relief valve (19).

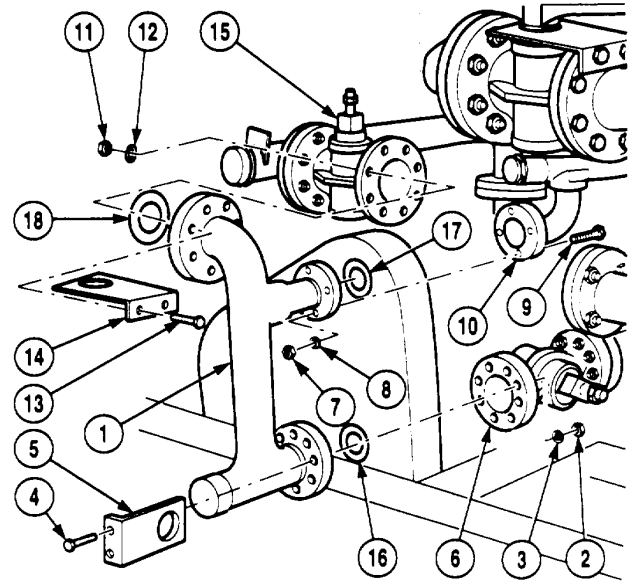


4-86. PRESSURE RELIEF VALVE REPLACEMENT (CONT).

- (4) With the aid of an assistant, position plumbing section (1), gasket (18), plate (14), eight screws (13), lock washers (12), and nuts (11) on valve no. 2 (15). Do not tighten nuts.
- (5) Position gasket (17), four screws (9), lock washers (8), and nuts (7) on plumbing section (1 and 10). Do not tighten nuts.
- (6) Position gasket (16), eight screws (4), plate (5), eight lock washers (3), and nuts (2) on valve no. 3 (6) and plumbing section (1).
- (7) Tighten nuts (2 and 11) to 110 lb-ft (149 N.m).
- (8) Tighten nuts (7) to 55 lb-ft (75 N.m).

NOTE**Follow-on Maintenance:**

- Fill expansion tank with oil (page 3-14).
- Remove wheel chocks (page 2-35).

**END OF TASK**

4-87. FUEL FILTER SERVICE.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Fuel Supply Turned Off or Disconnected

Materials/Parts

Drain Pan
Gasket
Filter Element
Gasket

Equipment Condition

Wheels Chocked (page 2-17)

(page 2-33)

Burner Off and Cool (page 2-27)

Power Supply Turned Off or Disconnected

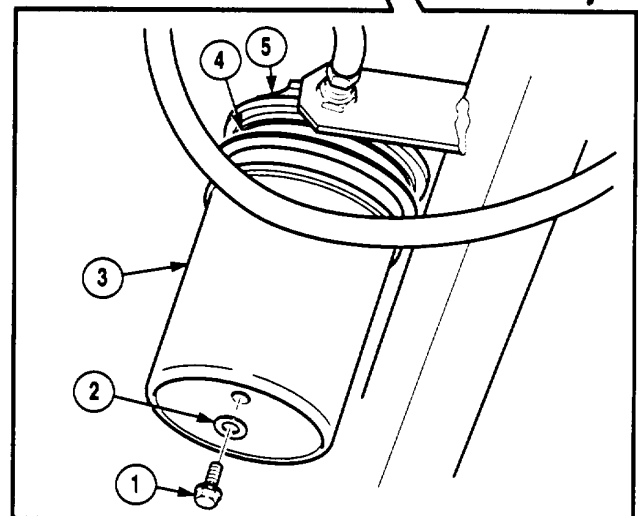
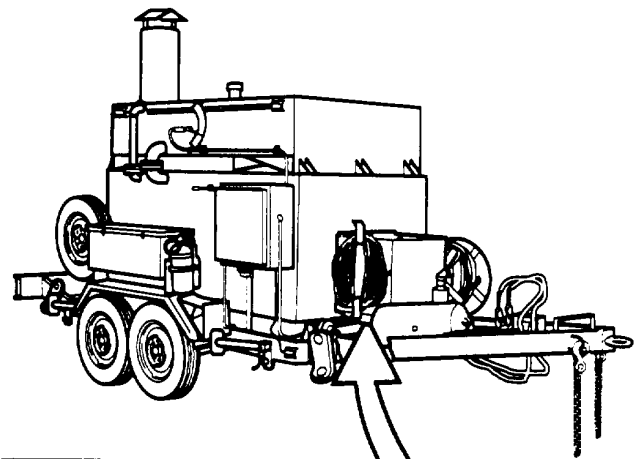
(page 2-32)

a. Removal.

WARNING

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

- (1) Place drain pan under screw (1).
- (2) Remove screw (1) and gasket (2) from reservoir (3). Allow fuel to drain. Discard gasket.
- (3) Remove reservoir (3) and gasket (4) from filter housing (5). Discard gasket.

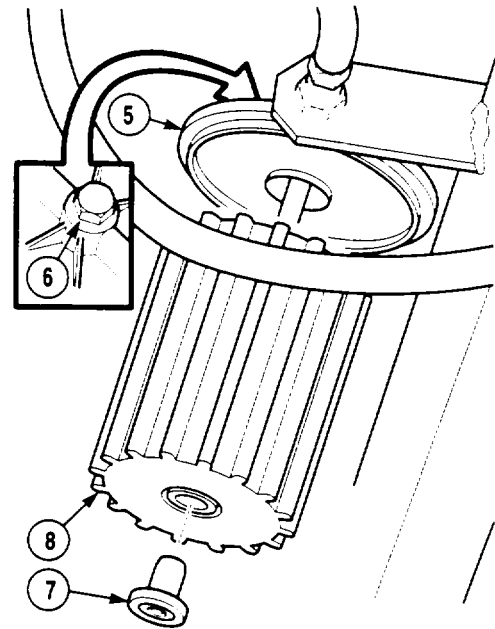


4-87. FUEL FILTER SERVICE (CONT).

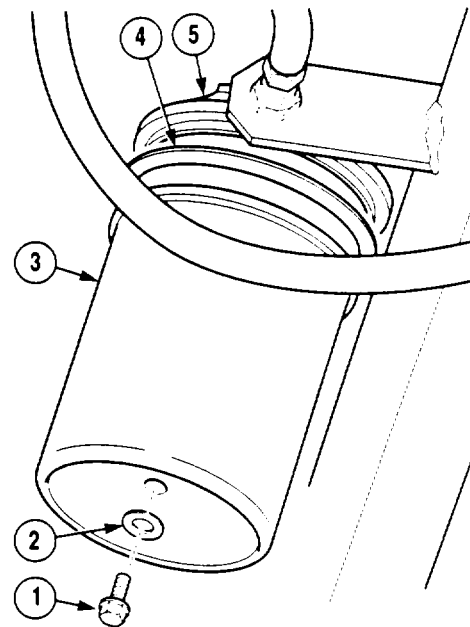
- (4) Loosen screw (6) and remove retainer (7) and filter element (8) from filter housing (5). Discard filter element.

b. Installation.

- (1) While holding screw (6) in place, install filter element (8) and retainer (7) on filter housing (5). Tighten screw finger tight.



- (2) Install gasket (4) and reservoir (3) on filter housing (5) with gasket (2) and screw (1). Tighten screw.

**NOTE**

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-88. FUEL FILTER REPLACEMENT.**This task covers:**

- a. Removal** **b. Installation**

INITIAL SETUP:*Tools and Special Tools*

- Tool Kit, General Mechanic's: Automotive
- Fuel Supply Disconnected (page _-33)

Materials/Parts

- Tags, Identification (item 22, appendix E)
- Tape, Teflon (item 23, appendix E)
- Drain Pan

Equipment Condition

- Wheels Chocked (page 2-17)
- Burner Off and Cooled (page 2-27)
- Power Supply Disconnected (page 2-32)

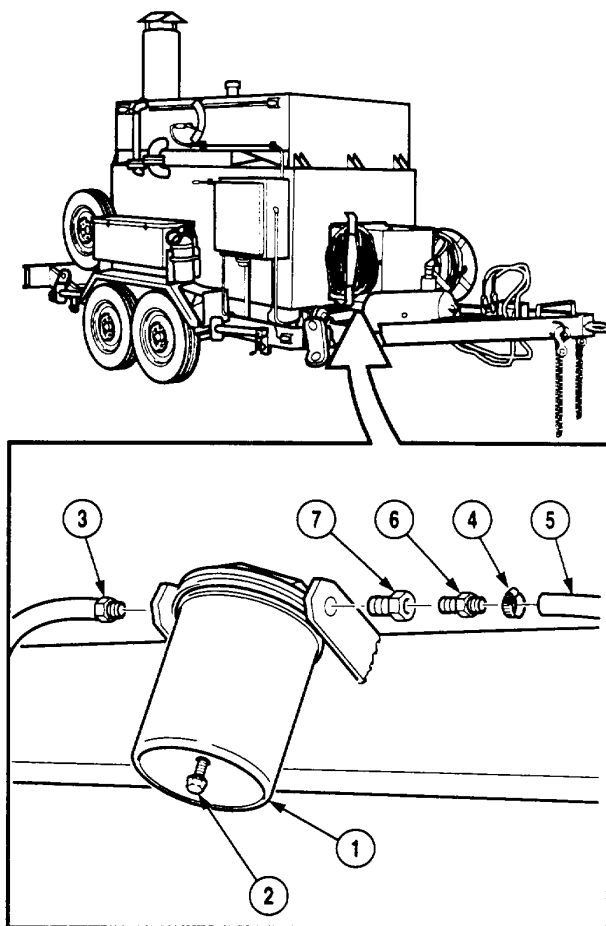
a. Removal.**WARNING**

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

- (1) Position drain pan under fuel filter assembly (1).
- (2) Loosen screw (2) and allow fuel to drain.
- (3) Tighten screw (2).

NOTE

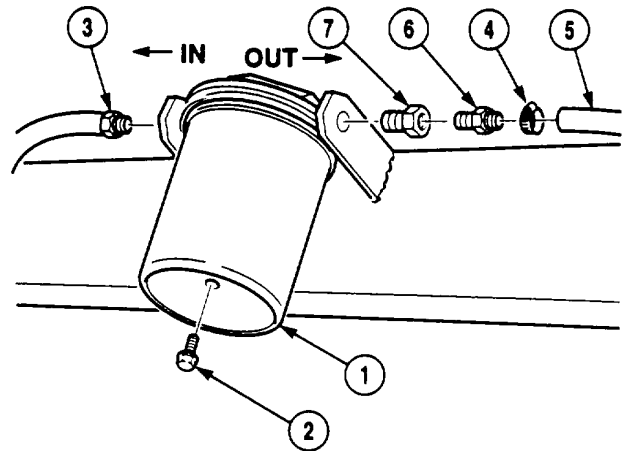
- **Tag and mark all hoses prior to removal.**
 - **Hold fuel supply hose while loosening fitting to prevent kinking.**
- (4) Disconnect fuel supply hose (3) from fuel filter assembly (1).
 - (5) Loosen clamp (4) and disconnect fuel input hose (5) from fitting (6).
 - (6) Remove fitting (6) and reducer bushing (7) from fuel filter assembly (1).



4-88. FUEL FILTER REPLACEMENT (CONT).**b. Installation.****NOTE**

- Wrap threads on all fittings with Teflon tape prior to installation.
- Position fuel filter assembly with "OUT" port to right side of Heater on fuel line connected to fuel pump.

- (1) Install reducer bushing (7) and fitting (6) in fuel filter assembly (1).
- (2) Connect fuel input hose (5) to fitting (6). Tighten clamp (4).

**NOTE**

Hold fuel supply hose while tightening fitting to prevent kinking.

- (3) Connect fuel supply hose (3) on fuel filter assembly (1).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-89. BURNER ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Lifting Device, Minimum 79 lb (36 kg)
capacity

Materials/Parts

Tags, Identification (item 22, appendix E)
Tape, Teflon (item 23, Appendix E)
Lock Washers (4)
Gasket, Burner Mounting
Gasket, Flame Detector Mounting Bracket
Lock Washers (4)
Lock Washers (4)

Personnel Required

Two

Equipment Condition

Wheels Chocked (page 2-17)
Heater Cool
Power Source Disconnected (page 2-32)
Fuel Lines Disconnected From Source
(page 2-33)
Burner Cover Removed (page 4-295)

a. Removal.

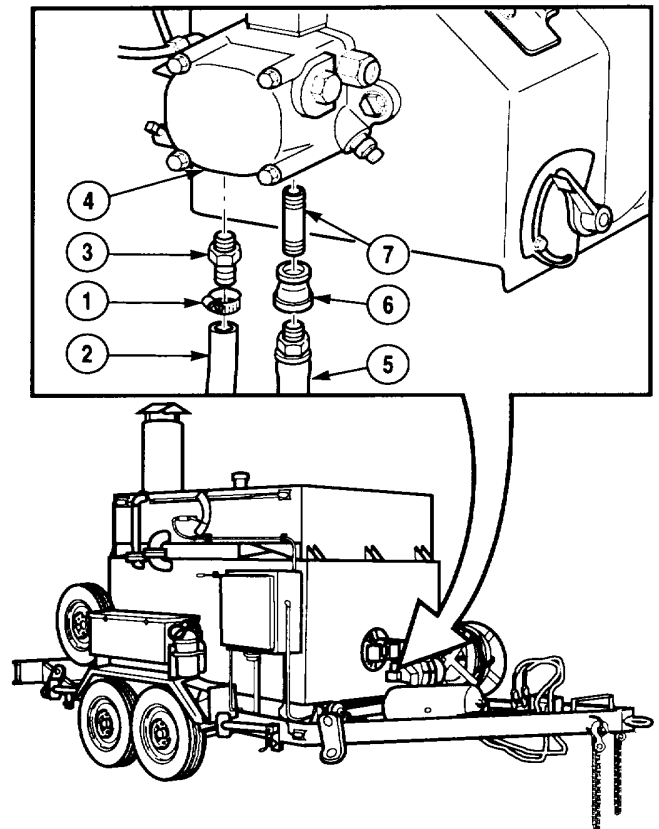
WARNING

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

NOTE

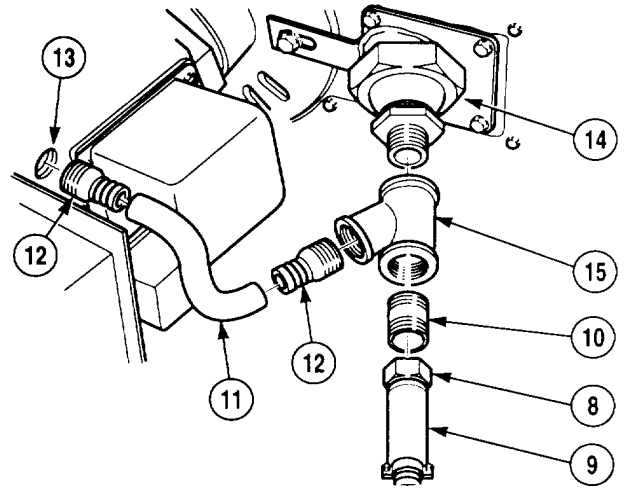
Inspect all hoses, lines, and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.

- (1) Loosen hose clamp (1) and disconnect fuel line (2) from fitting (3).
- (2) If damaged, remove hose clamp (1) from fuel line (2).
- (3) Remove fitting (3) from fuel pump (4).
- (4) Disconnect fuel return line (5) from reducer bushing (6).
- (5) Remove reducer bushing (6) and nipple (7) from fuel pump (4).

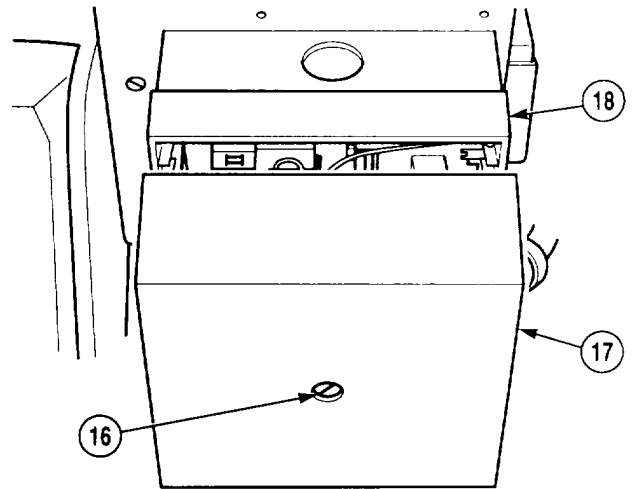


4-89. BURNER ASSEMBLY REPLACEMENT (CONT.)

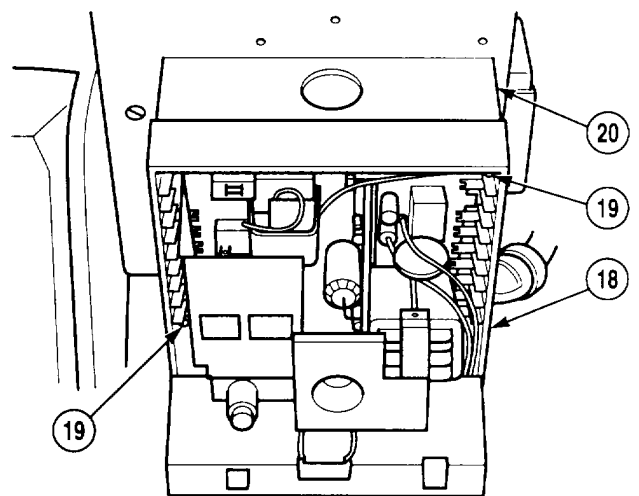
- (6) Loosen nut (8) and remove flame detector (9) from nipple.
- (7) Remove hose (11) and two nipples (12) from burner assembly (13) and mounting base assembly (14).
- (8) Remove nipple (10) and 45° lateral fitting (15) from mounting base assembly (14).



- (9) Loosen captive screw (16) and remove cover (17) from burner controller (18).



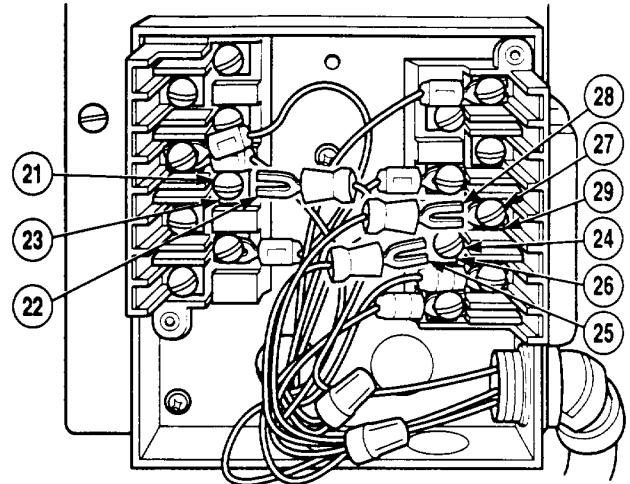
- (10) Loosen two captive screws (19) and remove burner controller (18) from controller subbase (20).



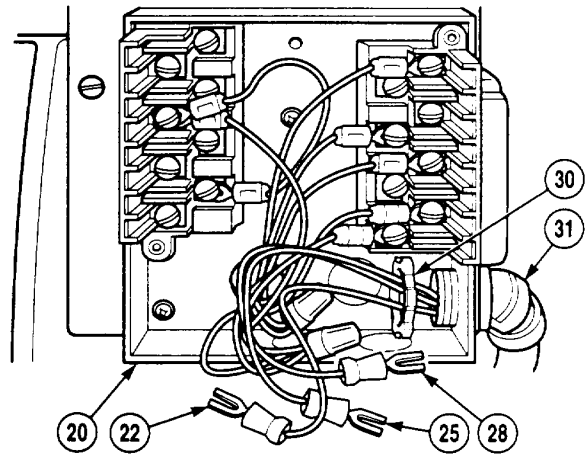
NOTE

Tag and mark all wires prior to removal.

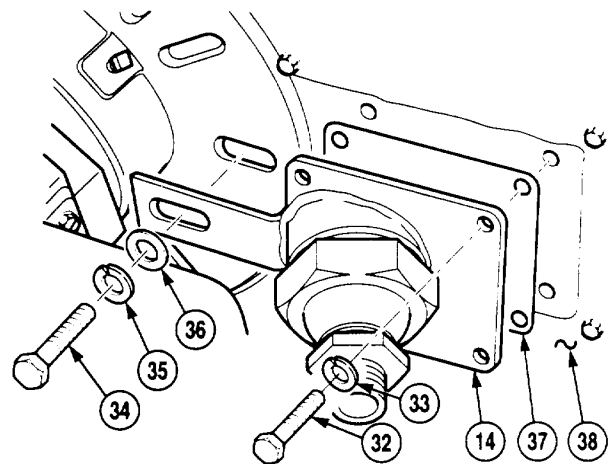
- (11) Loosen screw (21) and remove wire (22) from terminal 16 (23).
- (12) Loosen screw (24) and remove wire (25) from terminal L2 (26).
- (13) Loosen screw (27) and remove wire (28) from terminal L1 (29).



- (14) Remove nut (30) from elbow (31).
- (15) Remove elbow (31) and wires (22, 25, and 28) from controller subbase (20).



- (16) Remove four screws (32) and lock washers (33) from mounting base assembly (14). Discard lock washers.
- (17) Remove screw (34), lock washer (35), washer (36), mounting base assembly (14), and gasket (37) from Heater (38). Discard lock washer and gasket.

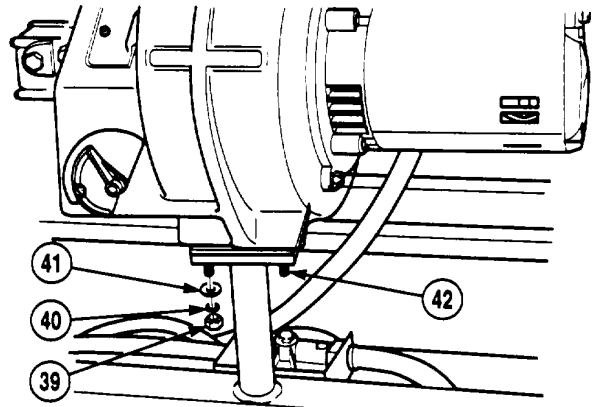


4-89. BURNER ASSEMBLY REPLACEMENT (CONT.)

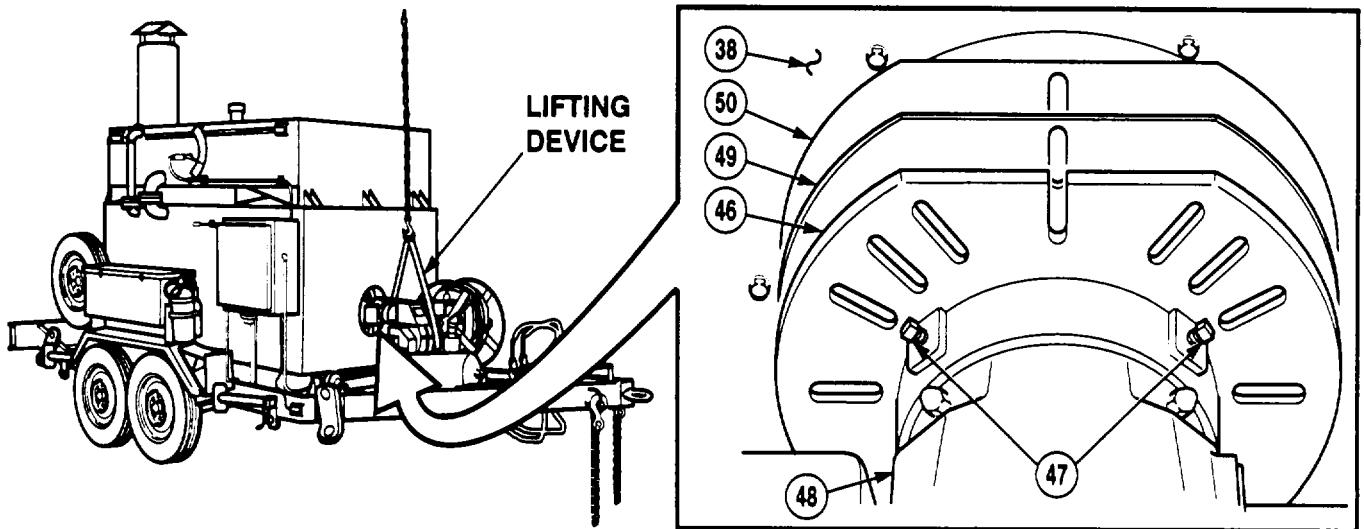
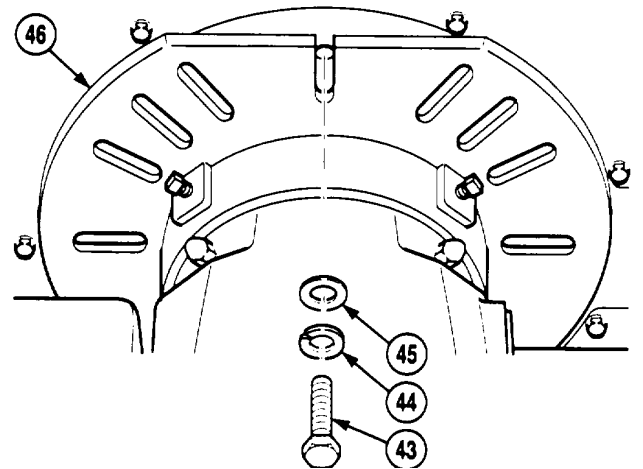
- (18) Remove four nuts (39), lock washers (40) and washers (41) from studs (42). Discard lock washers.

NOTE

Remove screws starting with bottom and ending with top to improve balance.



- (19) Remove three screws (43), lock washer (44), and washer (45) from flange (46). Discard lock washers (45).



- (20) Loosen two setscrews (47) and slide flange (46) back on burner (48).

WARNING

To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

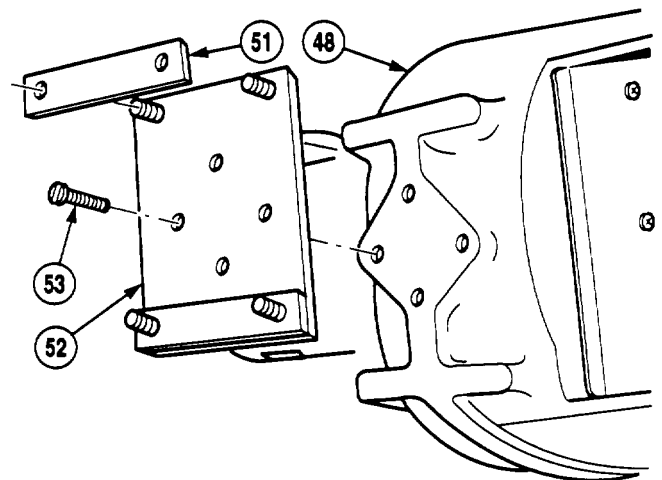
NOTE

Burner assembly weighs 79 lb (36 kg).

(21) Using a lifting device, remove burner assembly (48), flange (46), backing plate (49), and gasket (50) from Heater (38). Discard gasket.

(22) Remove two spacers (51) from mounting plate (52).

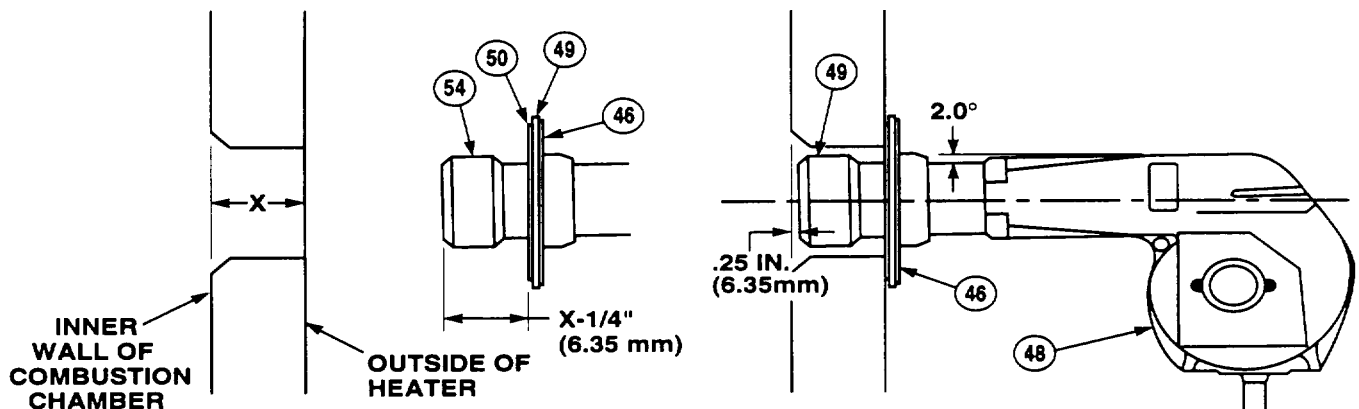
(23) Remove four screws (53) and mounting plate (52) from burner assembly (48).



b. Installation

(1) Install mounting plate (52) with four screws (53) on burner assembly (48).

(2) Install two spacers (51) on mounting plate (52).



(3) Measure distance outside of Heater to inner wall of combustion chamber.

(4) Position flange (46), backing plate (49), and gasket (50) on air tube (54) 1/4 in. (6.35 mm) less than distance measured between outside of heater and inner wall of combustion chamber. This will position burner (48) so air tube is 1/4 in. (6.35 mm) away from inner wall of combustion chamber when installed.

(5) Tighten setscrews (47) on flange (46).

14-89. BURNER ASSEMBLY REPLACEMENT (CONT).

WARNING

To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

CAUTION

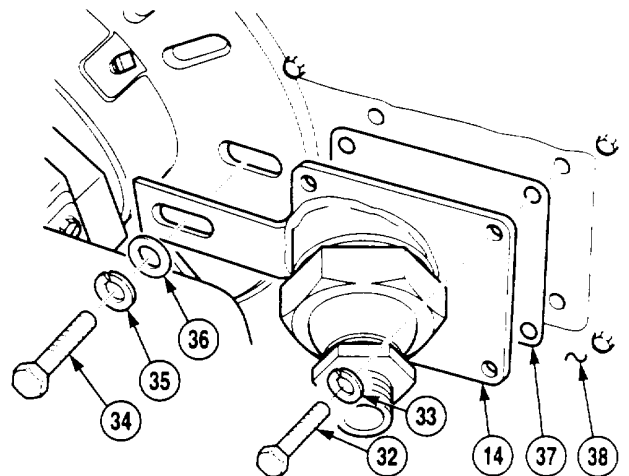
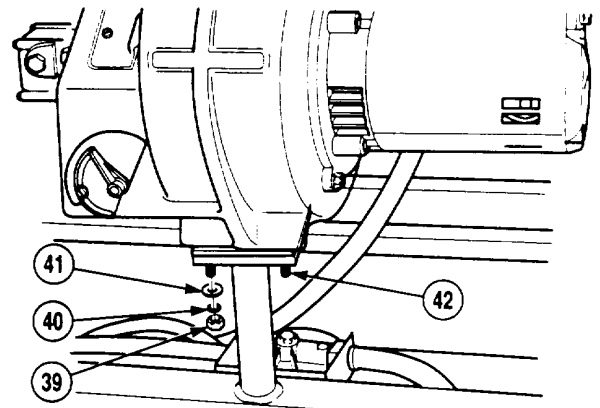
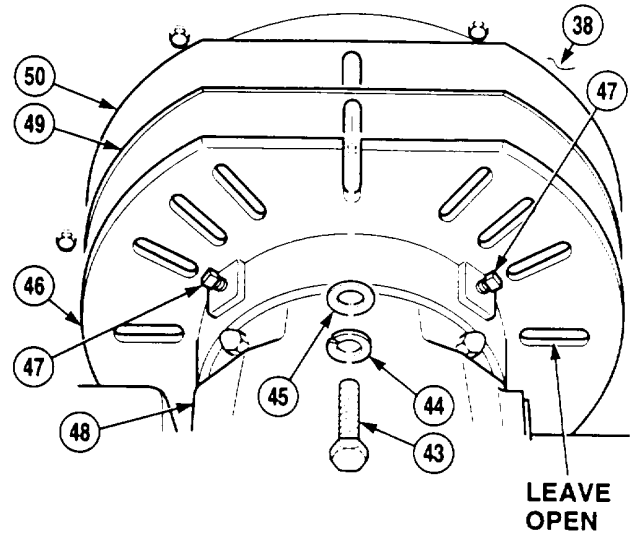
Do not extend air tube into combustion chamber.

- (6) Using a lifting device, position gasket (50), backing plate (49), flange (46), and burner assembly (48) on Heater (38).

NOTE

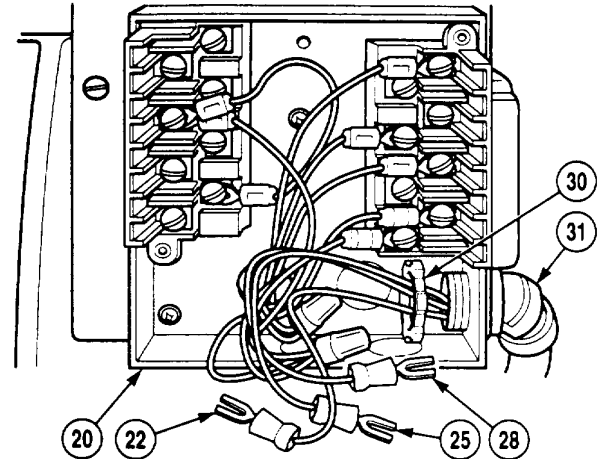
Install screws in 12: 00, 6: 00, and 9: 00 positions. Leave 3: 00 position open.

- (7) Install three washers (45), lock washers (44), and screws (43). Tighten screws.
- (8) Install four washers (41), lock washers (40), and nuts (39) on studs (42). Tighten nuts.
- (9) Install mounting base assembly (14) and gasket (37) with four lock washers (33) and screws (32) on Heater (38). Tighten screws.
- (10) Install screw (34), lock washer (35), and washer (36) in Heater (38). Tighten screw.



(11) Insert three wires (22, 25, and 28) and elbow (31) in controller subbase (20).

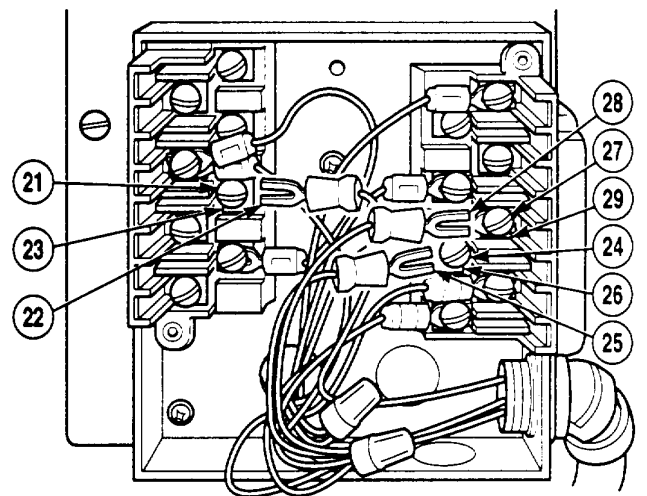
(12) Install nut (30) on elbow (31). Tighten nut.



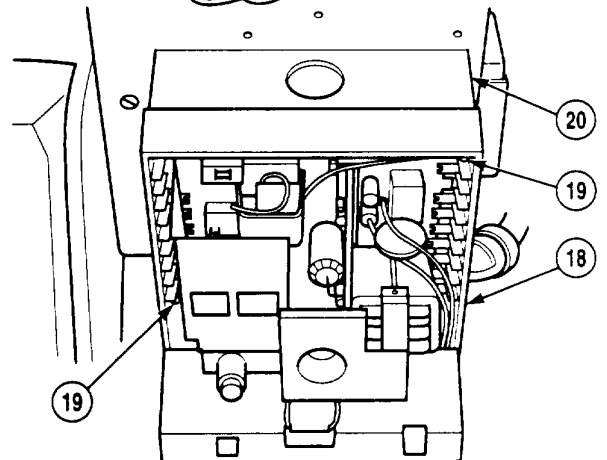
(13) Install wire (28) on terminal L1 (29). Tighten screw (27).

(14) Install wire (25) on terminal L2 (26). Tighten screw (24).

(15) Install wire (22) on terminal 16 (23). Tighten screw (21).

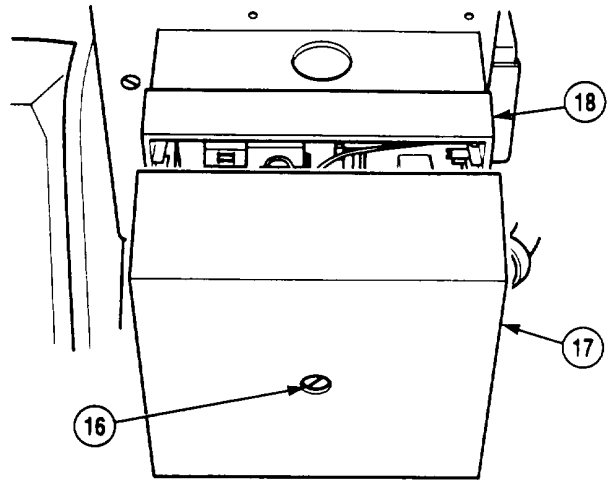


(16) Install burner controller (18) on controller subbase (20). Tighten two captive screws (19).



14-89. BURNER ASSEMBLY REPLACEMENT (CONT).

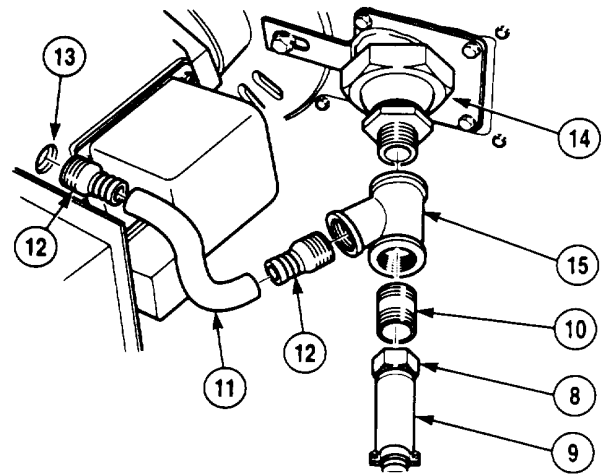
(17) Install cover (17) on burner controller (18).
Tighten captive screw (16).



(18) Install nipple (10) and 45° lateral fitting (15) on mounting base assembly (14).

(19) Install two nipples (12) and hose (11) on burner assembly (13) and mounting base assembly (14).

(20) Install flame detector (9) on nipple (10). Tighten nut (8).

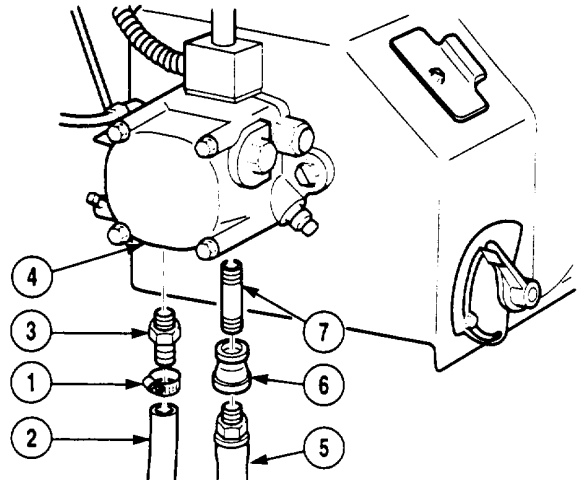


- (21) Apply teflon tape and install nipple (7) and reducer bushing (6) on fuel pump (4).
- (22) Connect fuel return line (5) on reducer bushing (6).
- (23) Apply teflon tape and install fitting (3) on fuel pump (4).
- (24) If removed, position hose clamp (1) on fuel line (2).
- (25) Connect fuel line (2) on fitting (3). Tighten hose clamp (1).

NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).



END OF TASK

4-90. BURNER HEAD AND AIR ADJUSTMENT.

This task covers:
Adjustment

INITIAL SETUP:*Tools and Special Tools*

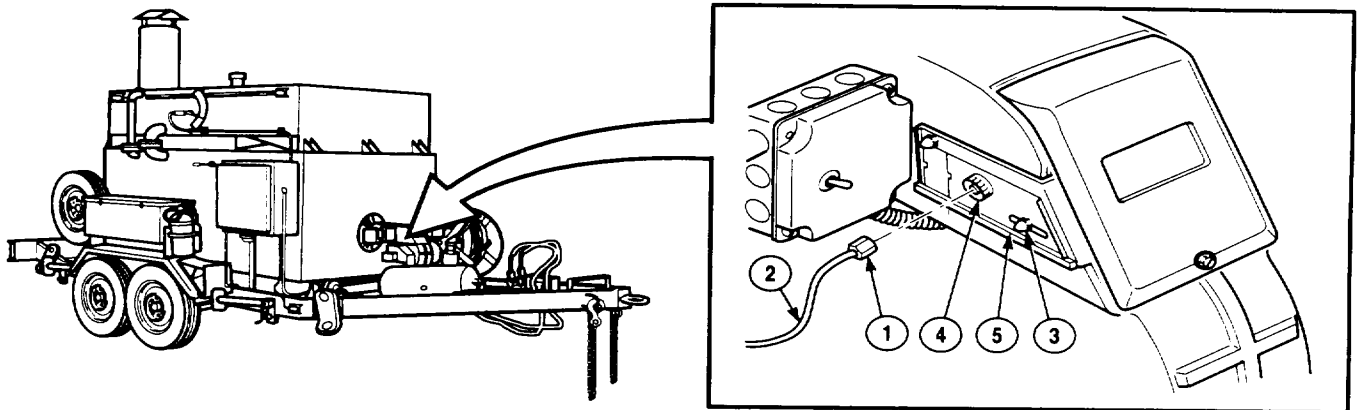
Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17).
Heater Cooled

Equipment Condition - Continued

Power Source Disconnected (page 2-32).
Fuel Lines Disconnected from Source
(page 2-33).
Burner Cover Removed (page 4-295).

Adjustment.**WARNING**

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

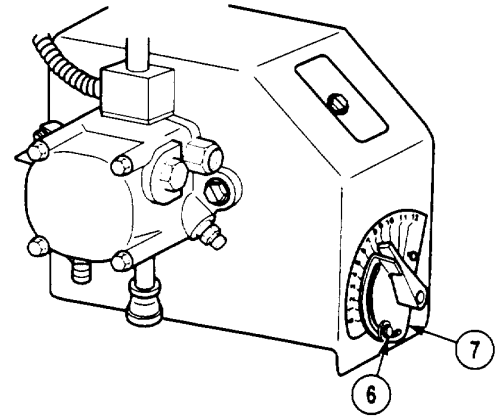
- (1) Loosen nut (1) and remove fuel line (2).

NOTE

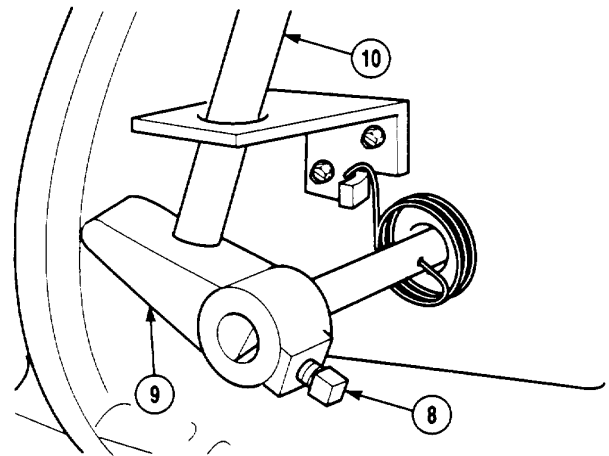
The top nut on the adjusting plate assembly should not be loosened once the burner is installed.

- (2) Loosen acorn nut (3) and knurled nut (4).
(3) Slide top adjusting plate (5) to setting of 8.
(4) Tighten knurled nut (4) and acorn nut (3).
(5) Install fuel line (2) on adjusting plate assembly (5) with nut (1). Tighten nut.

- (6) Loosen screw (6) and position air adjusting plate (7) to setting of 2 1/2.
- (7) Tighten screw (6).
- (8) Loosen setscrew (8) and turn damper linkage arm (9) until it touches damper rod (10). Tighten screw.
- (9) Start burner (page 227)
- (10) Repeat Steps (6), (7), and (8) for final adjustment.
- (11) Stop burner (page 227).



- NOTE**
- Follow-on Maintenance:**
- Install burner cover (page 4-296).
 - Remove wheel chocks (page 2-35).



END OF TASK

4-91. ELECTRODE AND HEAD REPLACEMENT/REPAIR/ADJUSTMENT.

This task covers:

- | | | |
|----------------|------------------------|-----------------|
| a. Removal | c. Cleaning/Inspection | e. Installation |
| b. Disassembly | d. Assembly | f. Adjustment |

INITIAL SETUP*Tools and Special Tools*

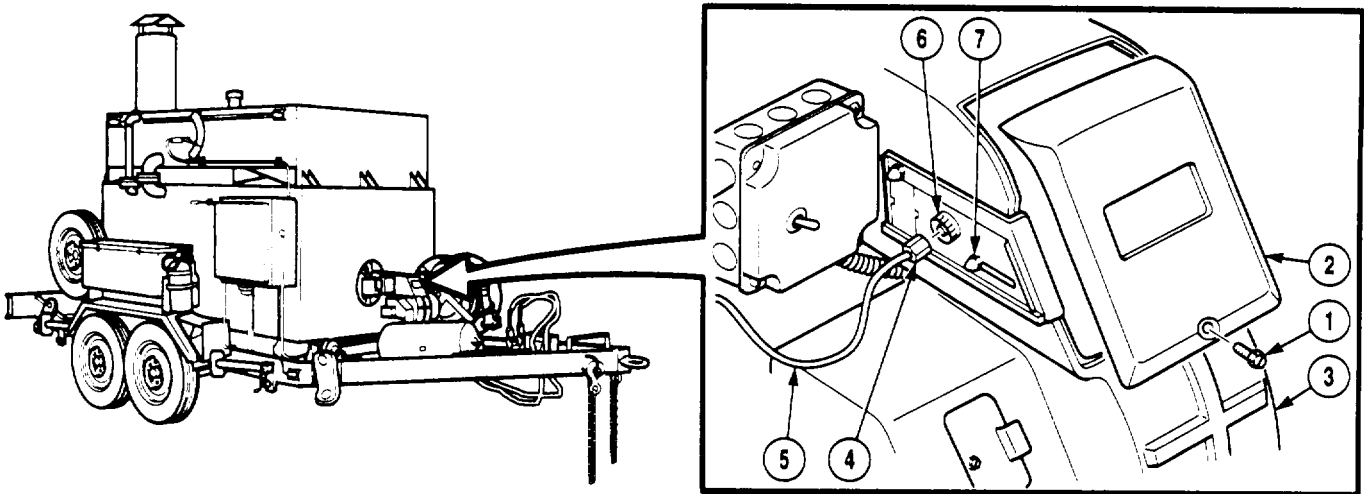
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Drycleaning Solvent (item 21, appendix E)
Electrodes

Equipment Condition

Wheels Chocked (page 2-17)
Power Source Disconnected (page 2-32)
Fuel Lines Disconnected (page 2-33)
Heater Cooled
Burner Cover Removed (page 4-295)

a. Removal.

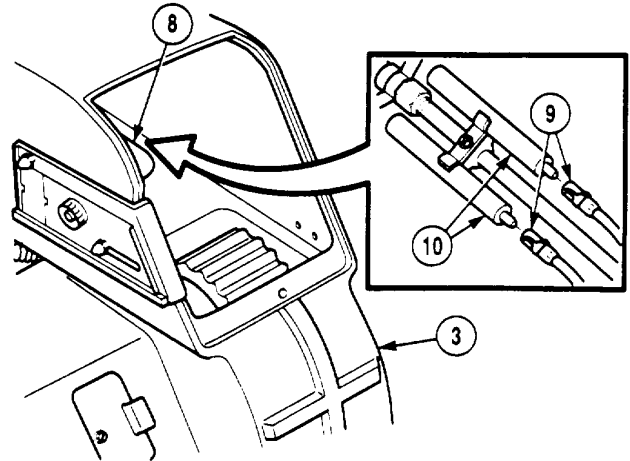
- (1) Remove screw (1) and cover (2) from burner assembly (3).

WARNING

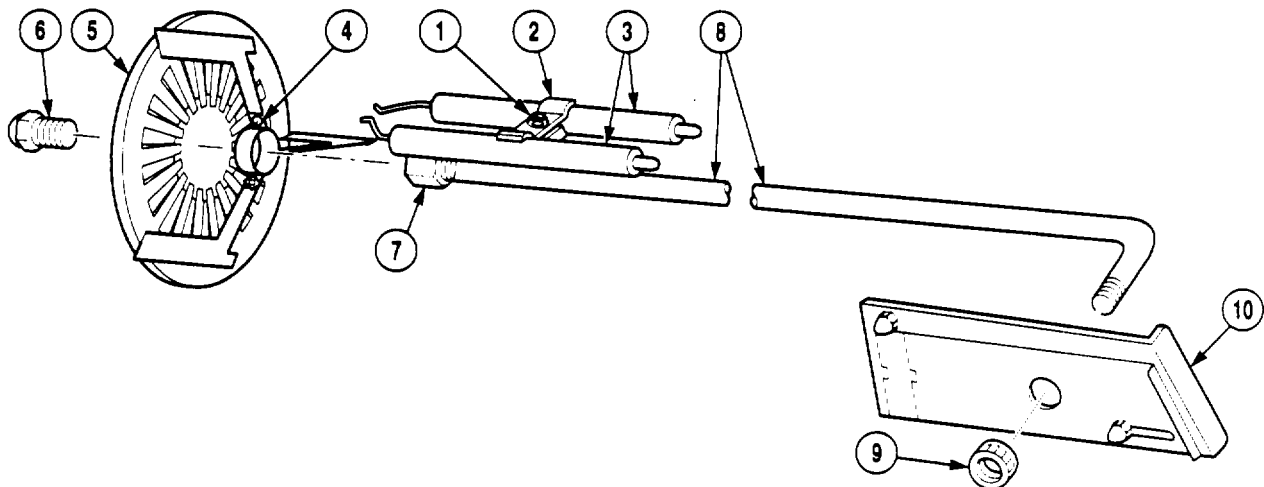
Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

- (2) Loosen nut (4) and remove fuel line (5).
(3) Loosen knurled nut (6) and nut (7).

- (4) Slide adjusting plate assembly (8) back from burner assembly (3).
- (5) Disconnect ignition leads (9) from electrodes (10).
- (6) Remove adjusting plate assembly (8) from burner assembly (3).



b. Disassembly.

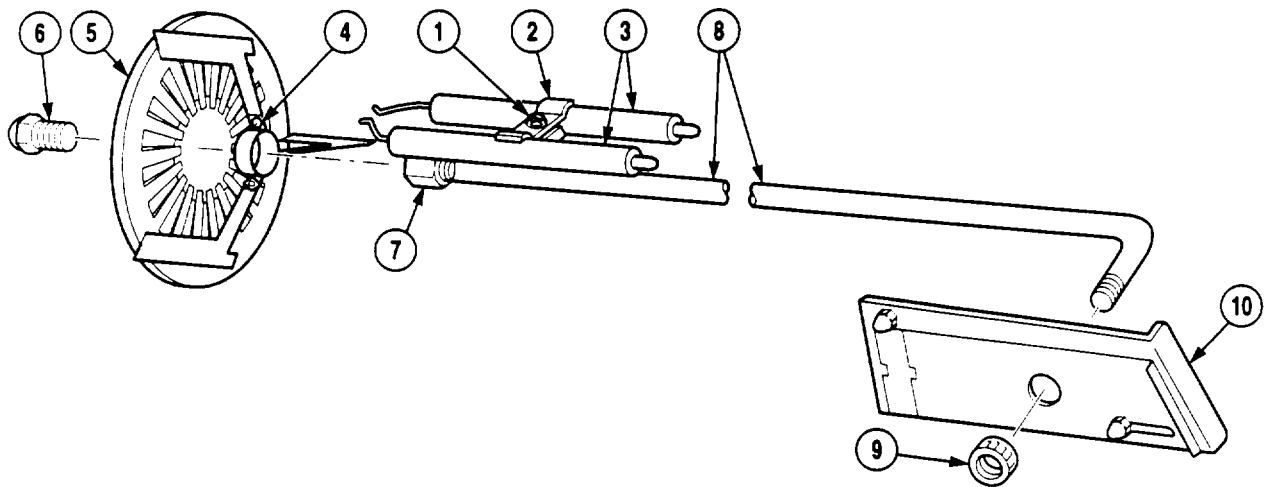


- (1) Loosen screw (1) on clip (2) and remove electrodes (3). Discard electrodes.
- (2) Loosen screw (4) and slide head assembly (5) off nozzle (6).
- (3) Loosen nut (7) and remove nozzle (6) from nozzle line (8).
- (4) Remove knurled nut (9) from nozzle line (8).
- (5) Remove nozzle line (8) from adjusting plate assembly (10).

4-91. ELECTRODE AND HEAD REPLACEMENT/REPAIR/ADJUSTMENT (CONT).***c. Cleaning/Inspection.*****WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean all parts with drycleaning solvent and dry with compressed air.
 - (2) Inspect parts for cracks and excessive wear.
 - (3) Replace all damaged parts.

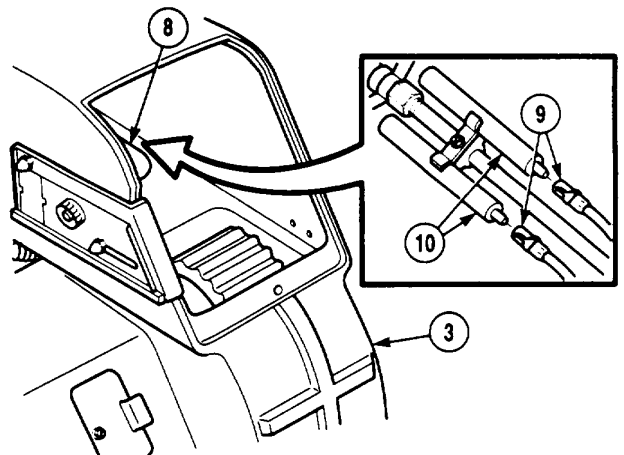
d. Assembly.



- (1) Install adjusting plate assembly (10) on nozzle line (8).
- (2) Install knurled nut (9) on nozzle line (8).
- (3) Install nozzle (6) with nut (7) on nozzle line (8). Tighten nut.
- (4) Install head assembly (5) on nozzle (6) and tighten screw (4).
- (5) Install electrodes (3) on clip (2) and tighten screw (1).

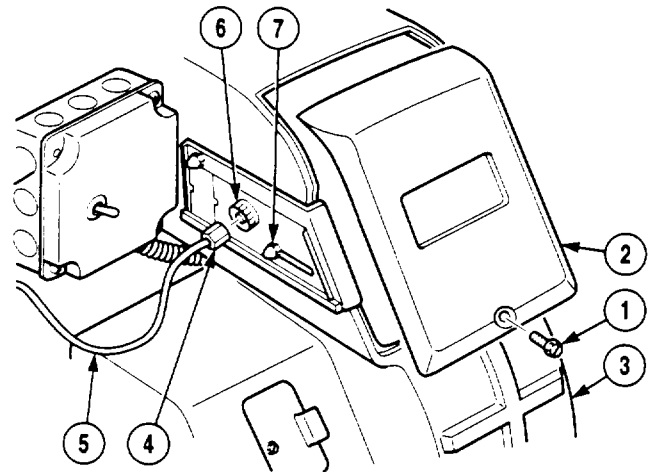
e. Installation.

- (1) Refer to adjustment if head, nozzle, and electrodes were replaced.
- (2) Position adjusting plate assembly (8) in burner assembly (3).
- (3) Connect ignition leads (9) on electrodes (10).
- (4) Slide adjusting plate assembly (8) in burner assembly (3).

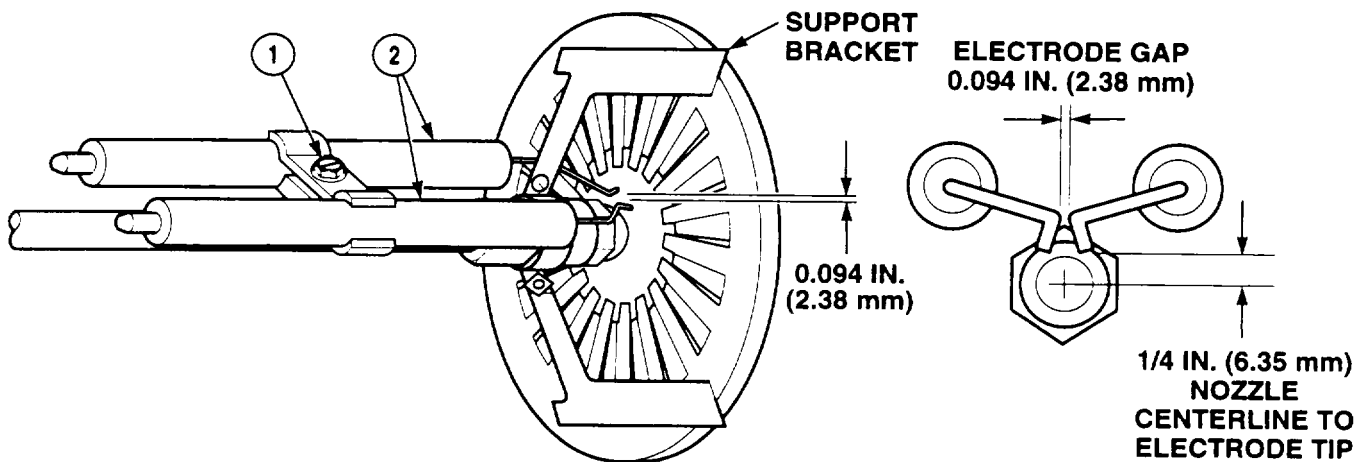


4-91. ELECTRODE AND HEAD REPLACEMENT/REPAIR/ADJUSTMENT (CONT).

- (5) Tighten nut (7) and knurled nut (6).
- (6) Install fuel line (5) with nut (4). Tighten nut.
- (7) Install cover (2) with screw (1) on burner assembly (3).



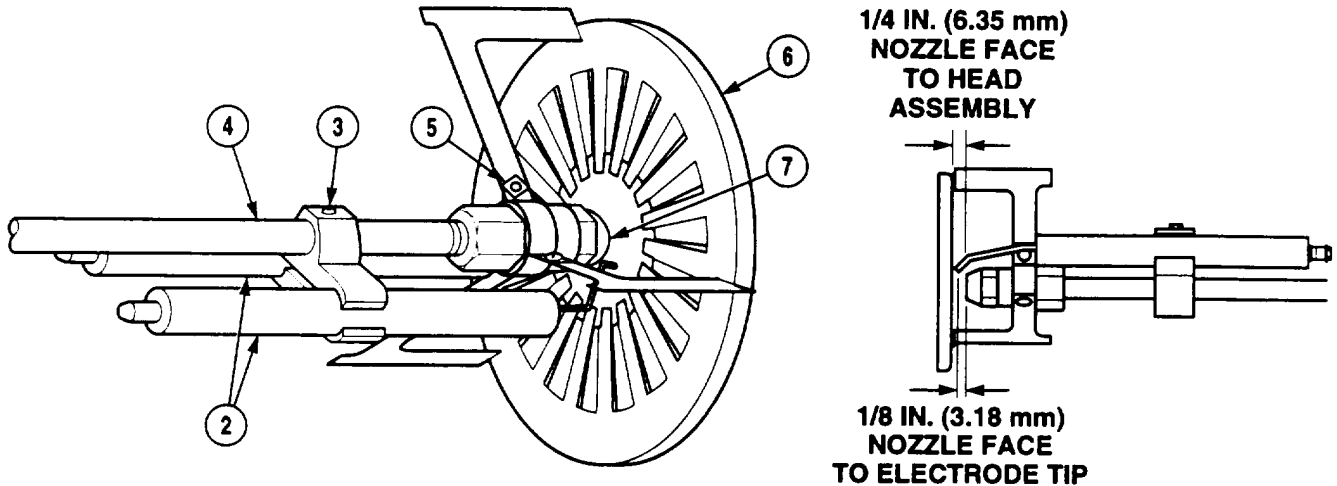
f. Adjustment.



NOTE

Electrodes must be divided by support bracket of head assembly.

- (1) Loosen screw (1) and turn electrodes (2) until a gap of 3/32 in. (2.38 mm) is reached between the narrow points of electrodes, 1/4 in. between the narrowest points of electrodes, and 1/4 in. between nozzle centerline and electrode tips. Tighten screw.



- (2) Loosen setscrew (3) and slide electrodes (2) on nozzle line (4) until a gap of 1/8 in. (3.18 mm) is reached between the face of nozzle and electrode tips. Tighten setscrew (3).
- (3) Loosen screw (5) and slide head assembly (6) on nozzle (7) until a gap of 1/4 in. (6.35 mm) is reached between the face of nozzle and head assembly. Tighten screw (5).

NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-92. FUEL PUMP REPLACEMENT.**This task covers:****a. Removal****b. Installation****INITIAL SETUP:***Tools and Special Tools*

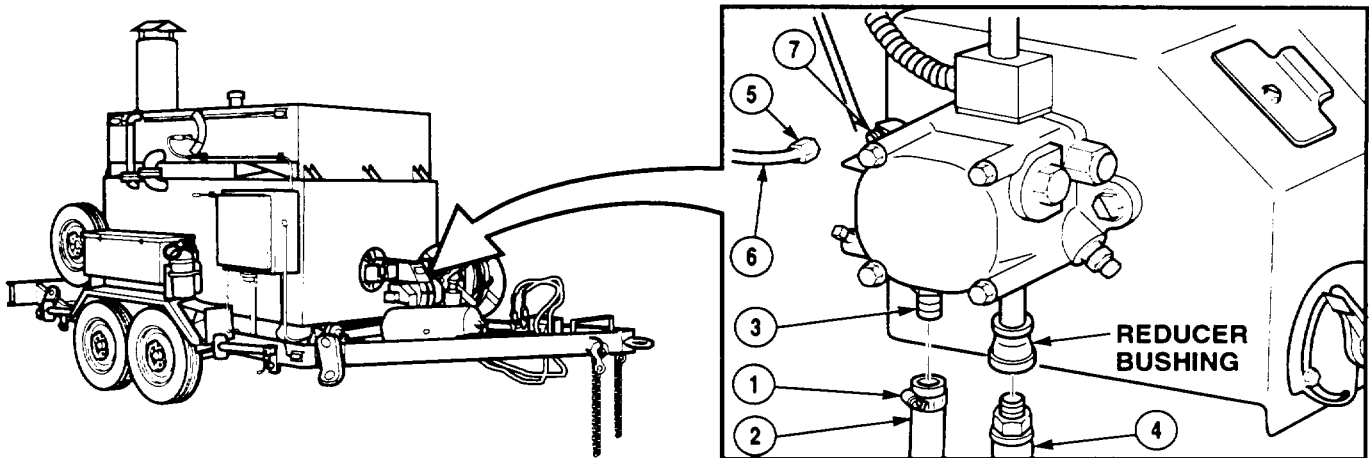
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Tags, Identification (item 22, appendix E)
 Compound, Sealing (item 9, appendix E)
 Wire Nuts (2)

Equipment Condition

Wheels Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Lines Disconnected From Source
 (page 2-33)
 Burner Cover Removed (page 4-295)

a. Removal.**WARNING**

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

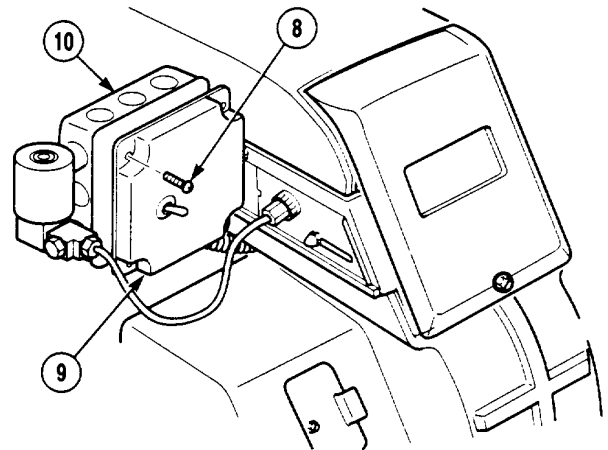
- (1) Loosen hose clamp (1) and disconnect fuel line (2) from fitting (3).
- (2) If damaged, remove hose clamp (1) from fuel line (2).

NOTE

Reducer bushing may need to be held in place to remove fuel return line.

- (3) Disconnect fuel return line (4).
- (4) Loosen nut (5) and remove fuel line (6) from elbow (7).

(5) Remove two screws (8) and cover (9) from electrical box (10).

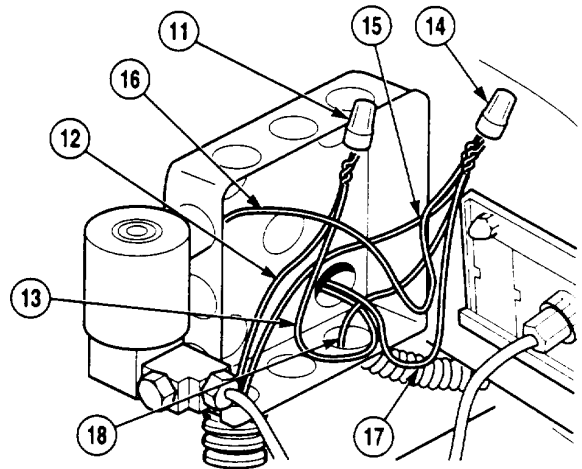


NOTE

Tag all wires prior to removal.

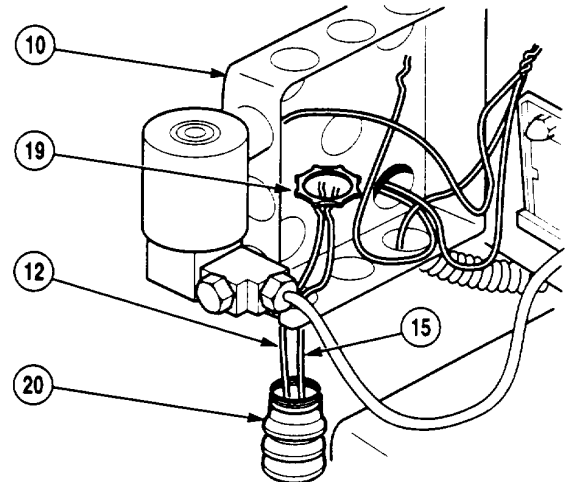
(6) Remove wire nut (11) and disconnect wires (12 and 13). Discard wire nut.

(7) Remove wire nut (14) and disconnect wires (15, 16, 17, and 18). Discard wire nut.



(8) Remove nut (19) from connector (20).

(9) Remove connector (20) and wires (12 and 15) from electrical box (10).



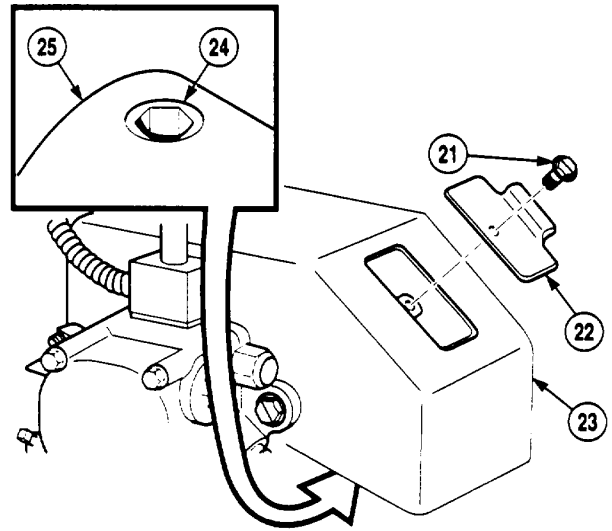
4-92. FUEL PUMP REPLACEMENT (CONT).

(10) Remove screw (21) and damper door (22) from burner assembly (23).

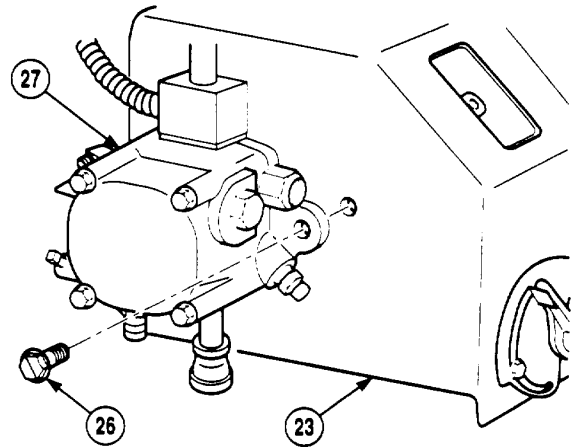
NOTE

Setscrew can be reached through damper door or damper.

(11) Loosen setscrew (24) in coupling (25).



(12) Remove two screws (26) and fuel pump (27) from burner assembly (23).



(13) Remove reducer bushing (28) and nipple (29) from fuel pump (27).

(14) Remove hose fitting (3) from fuel pump (27).

(15) Remove elbow (7) from fuel pump (27).

b Installation.

(1) Install elbow (7) in fuel pump (27).

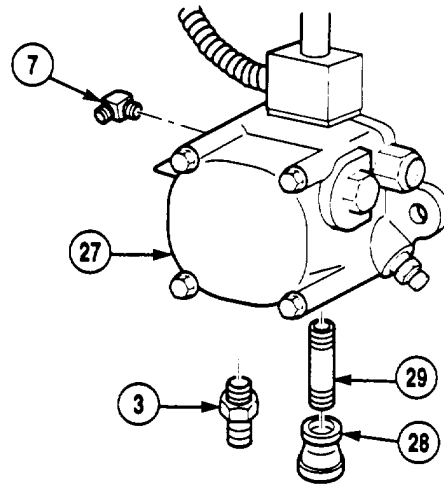
(2) Apply sealant compound to threads of hose fitting (3).

(3) Install hose fitting (3) in fuel pump (27).

(4) Apply sealing compound to threads of nipple 29).

(5) Install nipple (29) in fuel pump (27).

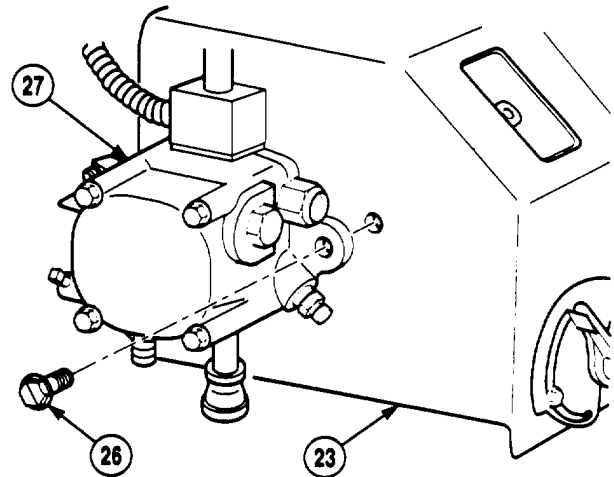
(6) Install reducer bushing (28) on nipple (29).



NOTE

Aline flat of fuel pump shaft with setscrew in coupling.

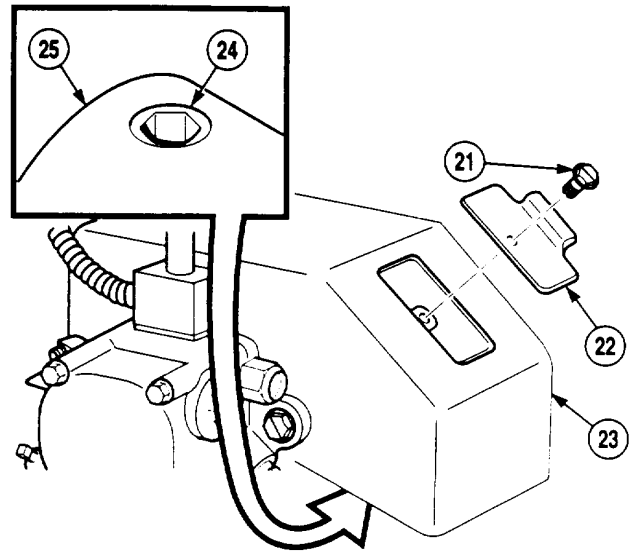
(7) Install fuel pump (27) with two screws (26) on burner assembly (23).



4-92. FUEL PUMP REPLACEMENT (CONT).

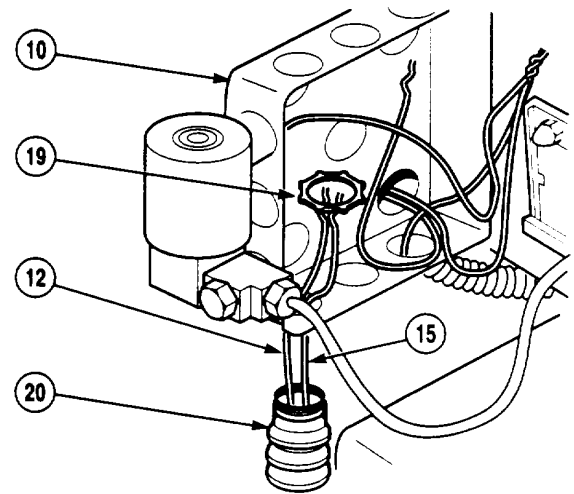
(8) Tighten setscrew (24) in coupling (25).

(9) Install damper door (22) with screw (21) on burner assembly (23).



(10) Insert two wires (12 and 15) and connector (20) in electrical box (10).

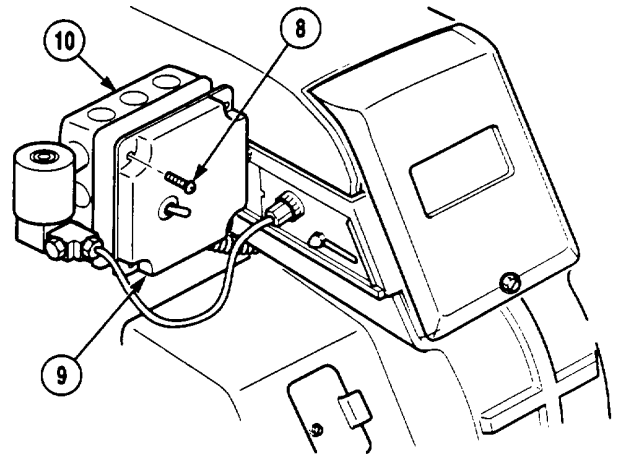
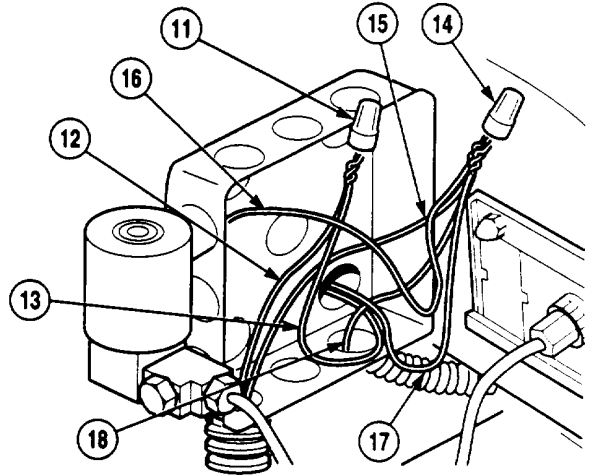
(11) Install nut (19) on connector (20). Tighten nut.



(12) Connect wires (15, 16, 17, and 18) with wire nut (14).

(13) Connect wires (12 and 13) with wire nut (11).

(14) Install cover (9) with two screws (8) on electrical box (10).



4-92. FUEL PUMP REPLACEMENT (CONT).

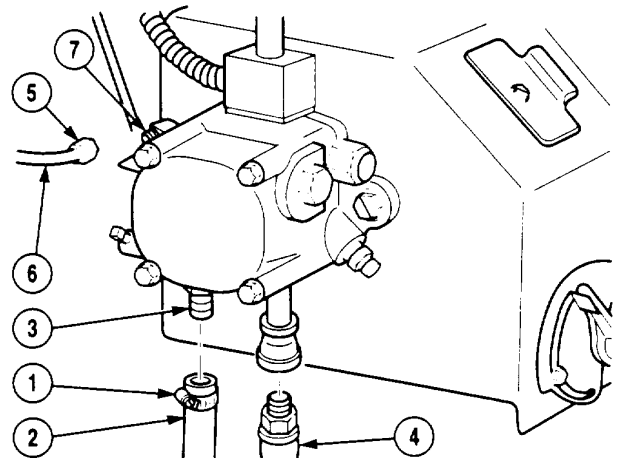
- (15) Install fuel line (6) with nut (5). Tighten nut.
- (16) If removed, install hose clamp (1) on fuel line 2).
- (17) Connect fuel line (2) on fitting (3) and tighten hose clamp (1).

CAUTION

Fuel pump adjustment preset by manufacturer. Do not attempt any adjustments.

NOTE**Follow-on Maintenance:**

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-93. BURNER MOTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lock Washers (4)

Equipment Condition

Wheels Chocked (page 2-17)

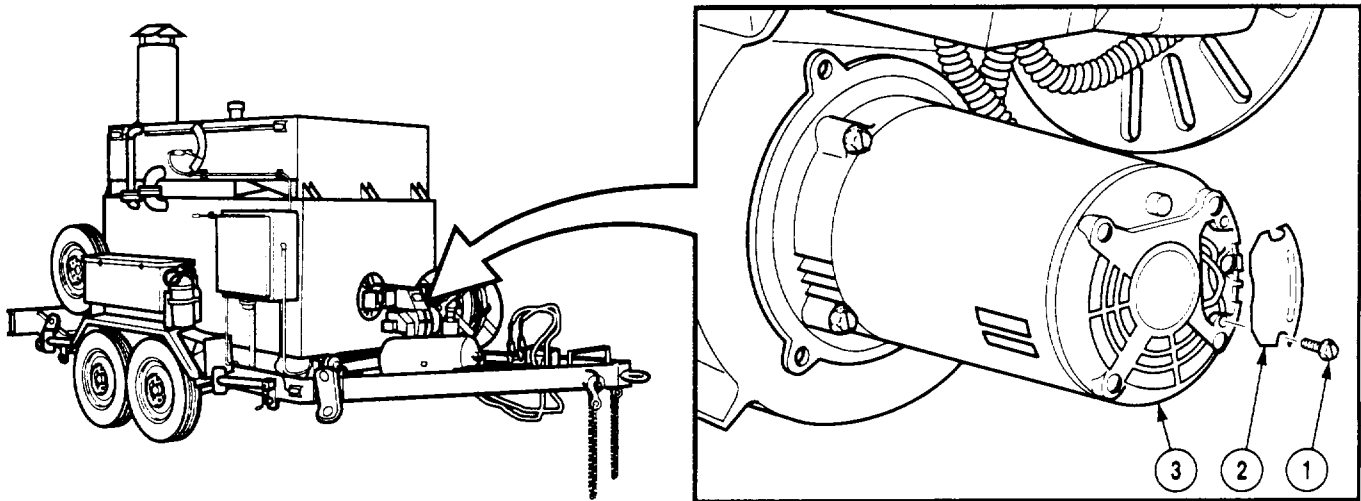
Heater Cooled

Power Source Disconnected (page 2-32)

Fuel Lines Disconnected From Source (page 2-33)

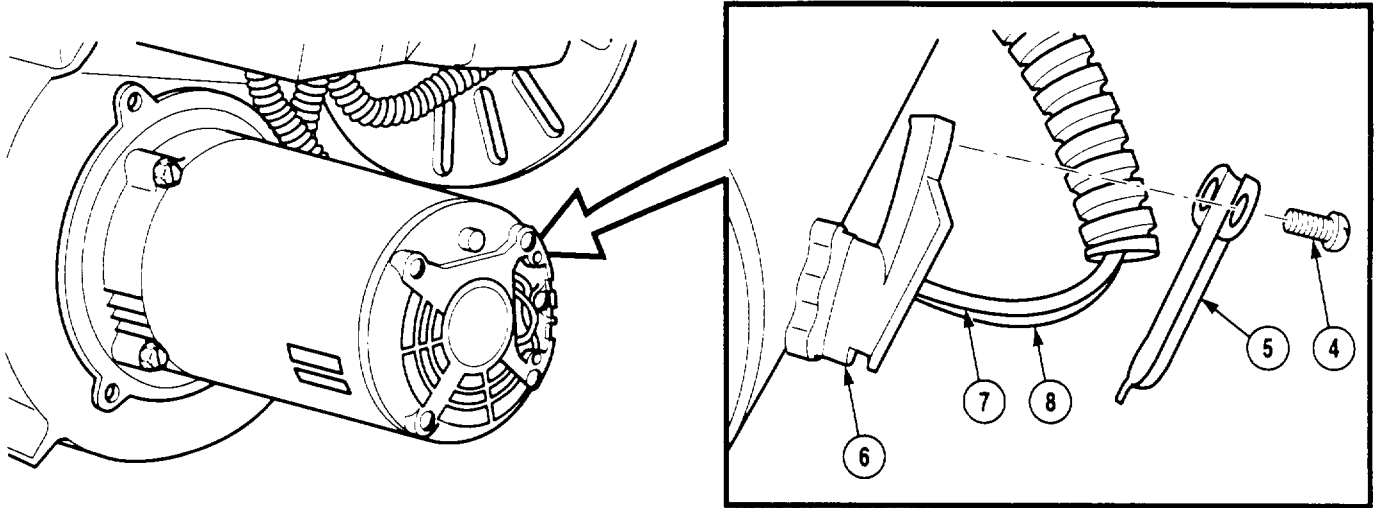
Burner Cover Removed (page 4-295)

a. Removal.



(1) Remove two screws (1) and cover (2) from burner motor (3).

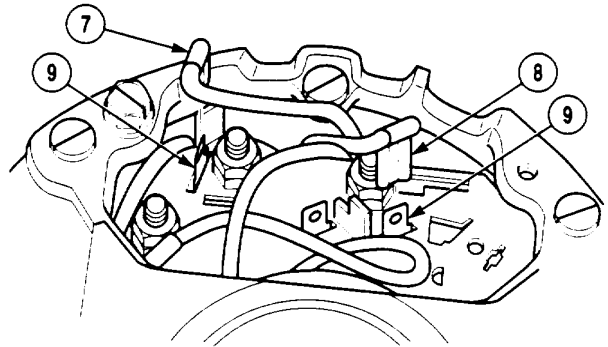
4-93. BURNER MOTOR REPLACEMENT (CONT).



NOTE

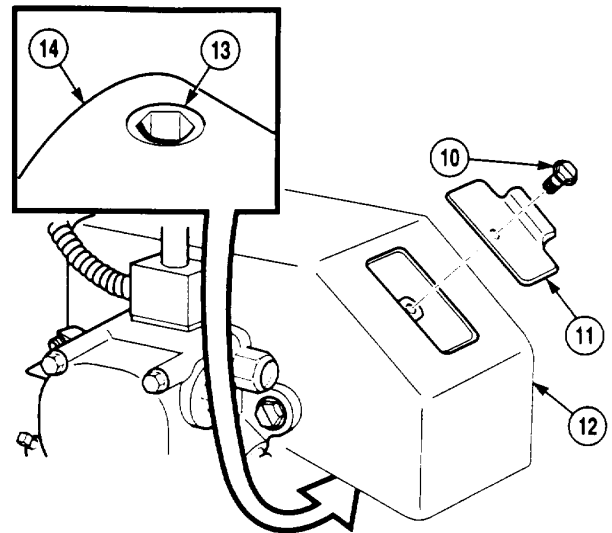
Tag and mark all wires prior to removal.

- (2) Remove two screws (4) and cover (5) from elbow (6).
- (3) Disconnect wires (7 and 8) from terminals (9).
- (4) Remove wires (7 and 8) from elbow (6).



(5) Remove screw (10) and damper door (11) from burner assembly (12).

(6) Loosen setscrew (13) in coupling (14).



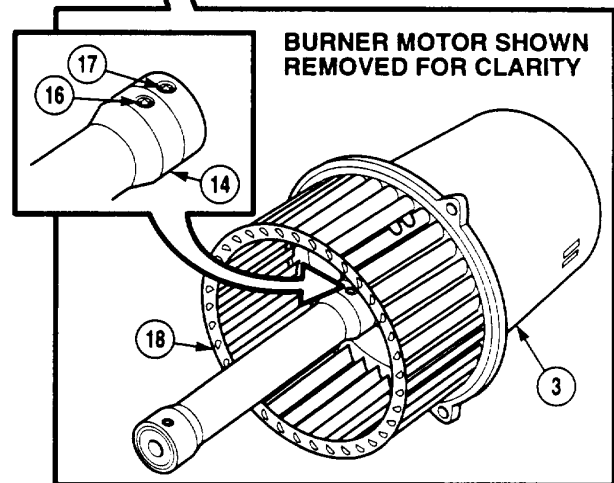
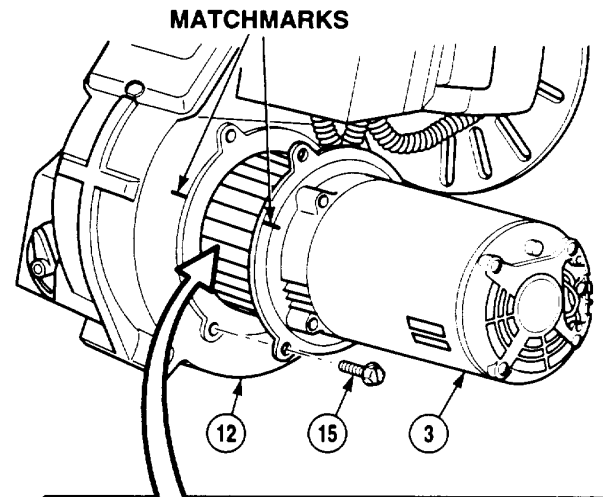
(7) Matchmark burner motor (3) and burner assembly (12).

(8) Remove three screws (15) and burner motor (3) from burner assembly (12).

(9) Loosen setscrew (16) and remove coupling (14) from burner motor (3).

(10) Loosen setscrew (17) and remove motor wheel (18) from burner motor (3).

(11) Remove burner motor (3), motor wheel (18), and coupling (14) from burner assembly (12).



4-93. BURNER MOTOR REPLACEMENT (CONT).

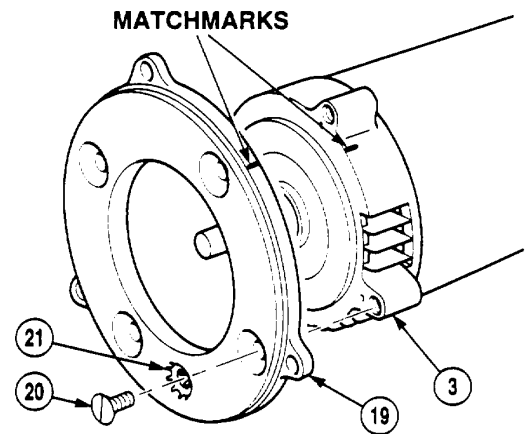
(12) Matchmark burner motor (3) and motor flange (19).

(13) Remove four screws (20), lock washers (21), and motor flange (19) from burner motor (3). Discard lock washers.

b. Installation.

(1) Aline matchmarks on motor flange (19) and burner motor (3).

(2) Install motor flange (19) with screws (20) and lock washers (21) on burner motor (3). Tighten screw.

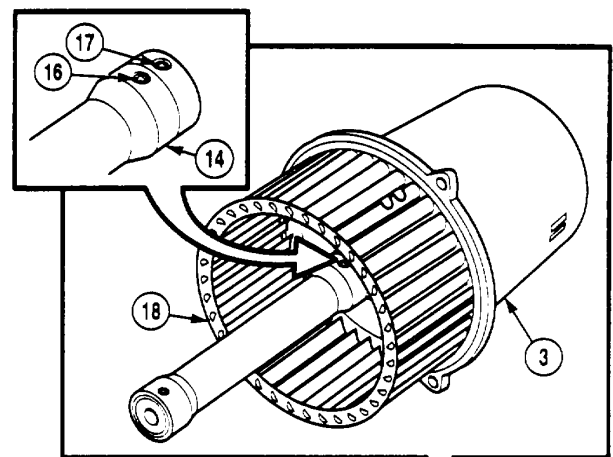


NOTE

- When installing motor wheel and coupling, aline setscrews with flat on the burner motor shaft.
- Motor wheel and coupling may need to be positioned in burner housing before assembling with burner motor.

(3) Install motor wheel (18) on burner motor (3) and tighten setscrew (17).

(4) Install coupling (14) on burner motor (3) and tighten setscrew (16).

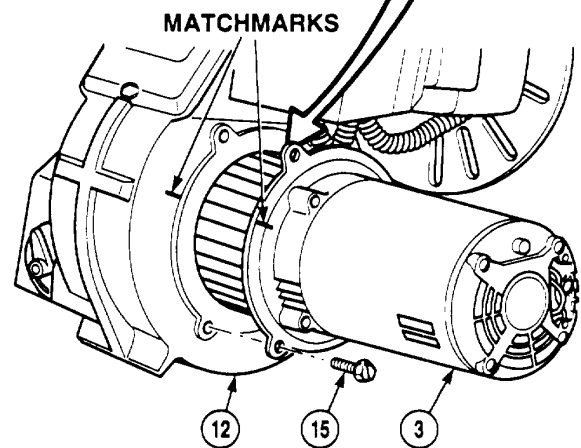


NOTE

When installing burner motor align setscrew with flat on the burner fuel pump.

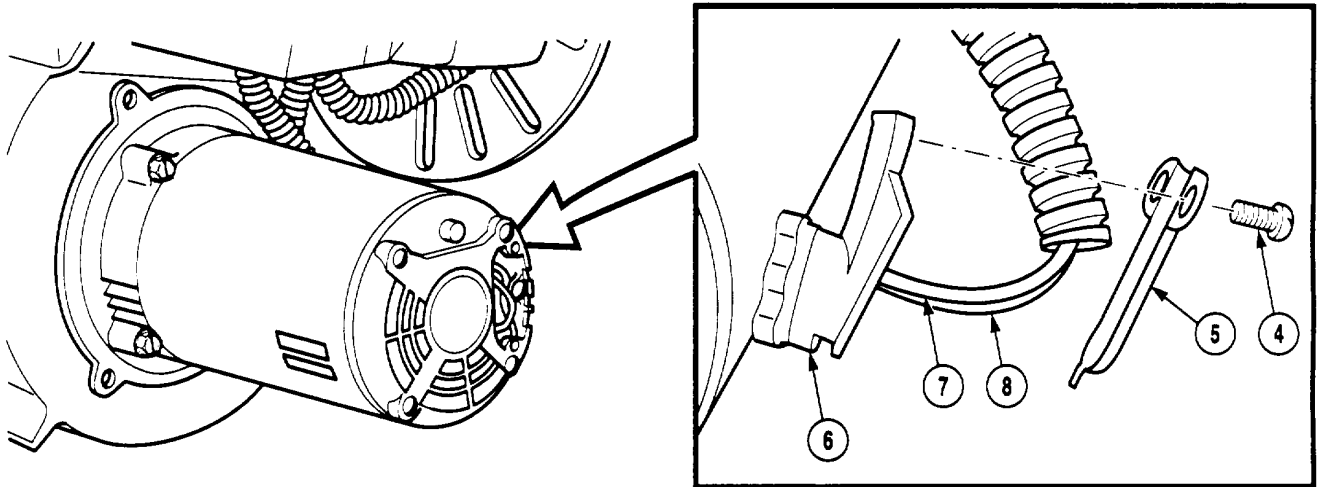
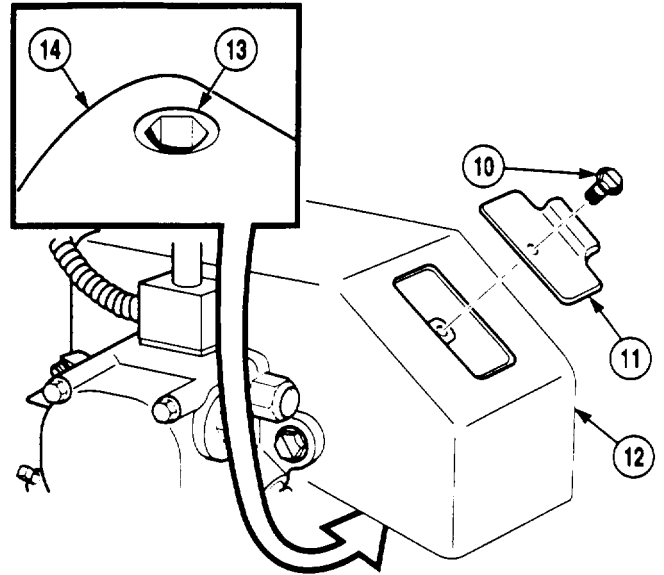
(5) Aline matchmarks on burner motor (3) and burner assembly (12).

(6) Install burner motor (3) with three screws (15) on burner assembly (12). Tighten screws.



(7) Tighten setscrew (13) in coupling (14).

(8) Install damper door (11) with screw (10) on burner assembly (12). Tighten screw.

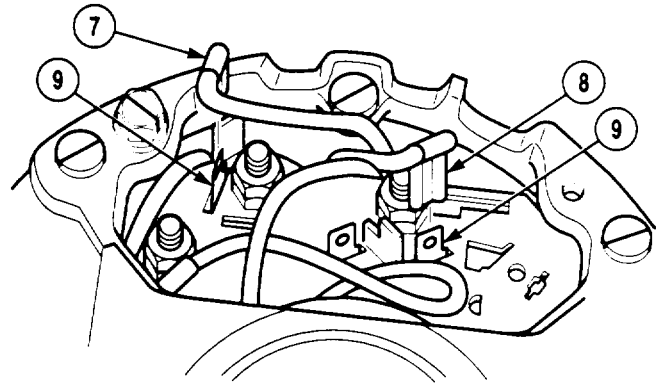


(9) Insert wires (7 and 8) through elbow (6).

(10) Install cover (5) with two screws (4) on elbow (6). Tighten screws.

4-93. BURNER MOTOR REPLACEMENT (CONT).

(11) Connect wires (7 and 8) to terminals (9).



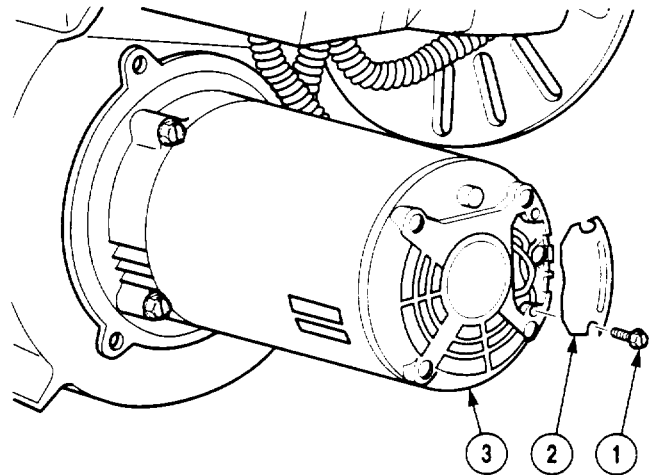
(12) Install cover (2) with two screws (1) on burner motor (3). Tighten screws.

NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK



4-94. BURNER TRANSFORMER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

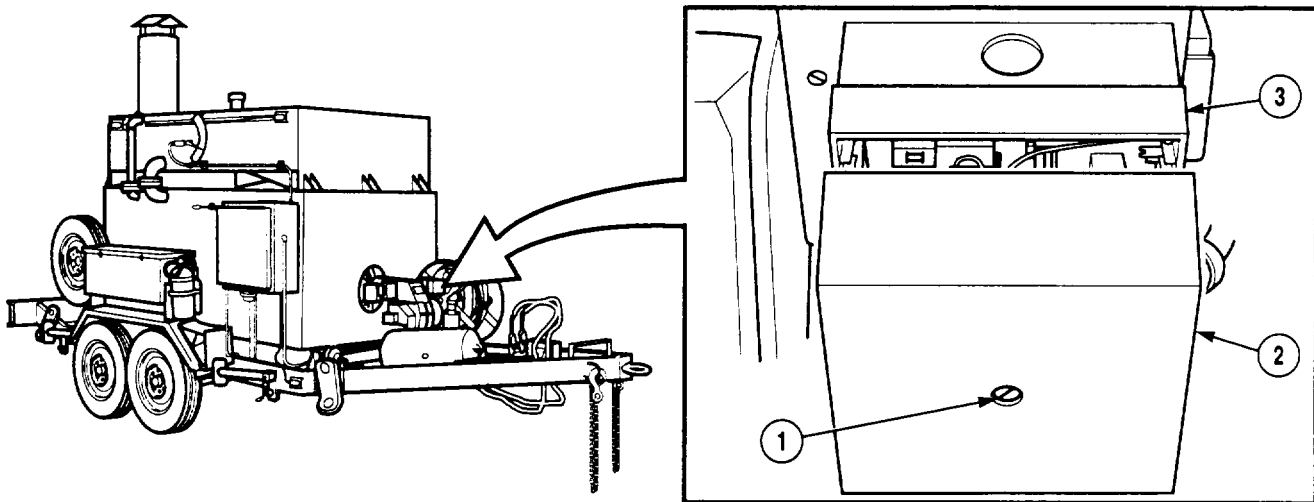
Materials/Parts

Tags, Identification (item 22, appendix E)
 Lock Washers (3)
 Wire Nuts (2)

Equipment Condition

Wheels Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Line Disconnected From Source (page 2-33)
 Burner Cover Removed (para 4-103)

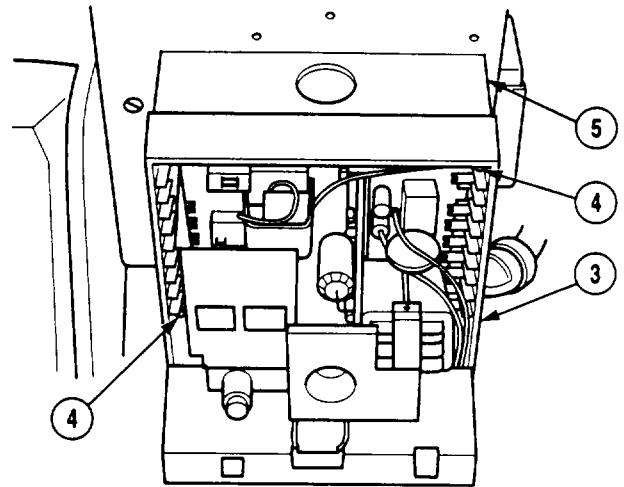
a. Removal.



(1) Loosen captive screw (1) and remove cover (2) from burner controller (3).

4-94. BURNER TRANSFORMER REPLACEMENT (CONT).

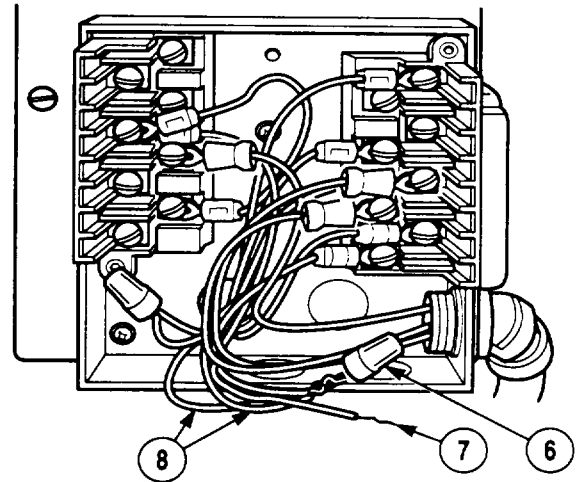
(2) Loosen two captive screws (4) and remove burner controller (3) from controller subbase (5).



NOTE

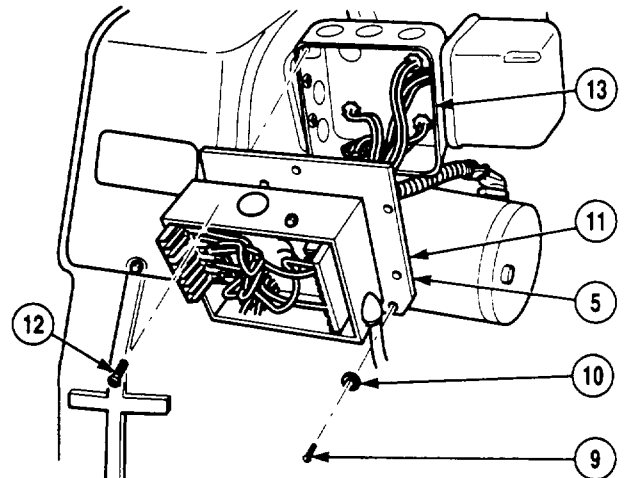
Tag and mark all wires prior to removal.

(3) Remove wire nut (6) and disconnect wire (7) from wires (8). Discard wire nut.



(4) Remove three screws (9), lock washers (10), and controller subbase (5) from subbase plate (11). Discard lock washers.

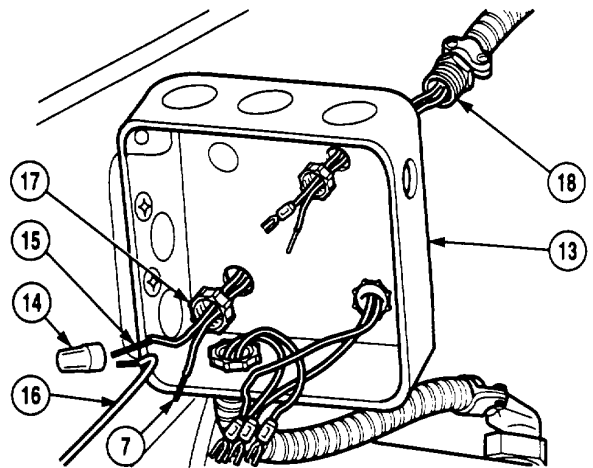
(5) Remove two screws (12) and subbase plate (11) from electrical box (13).



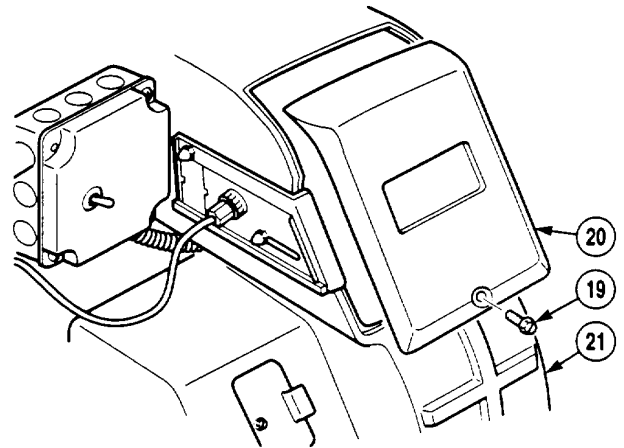
(6) Remove wire nut (14) and disconnect two wires (15 and 16). Discard wire nut.

(7) Remove nut (17) from connector (18).

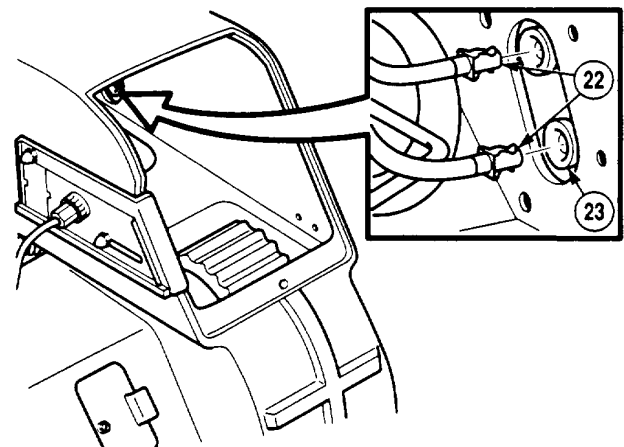
(8) Remove connector (18) and wires (15 and 7) from electrical box (13).



(9) Remove screw (19) and cover (20) from burner assembly (21).

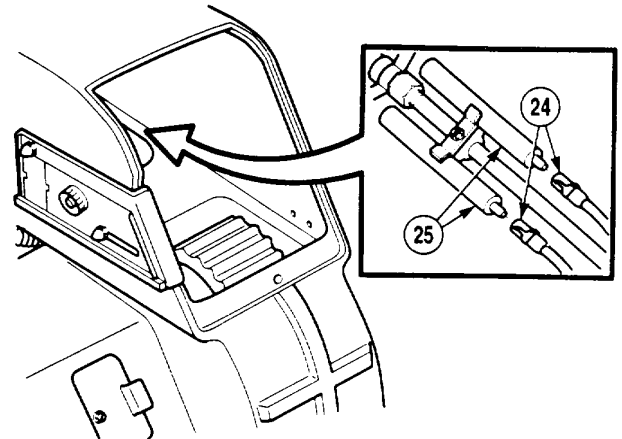


(10) Disconnect two ignition leads (22) from burner transformer (23).



4-94. BURNER TRANSFORMER REPLACEMENT (CONT).

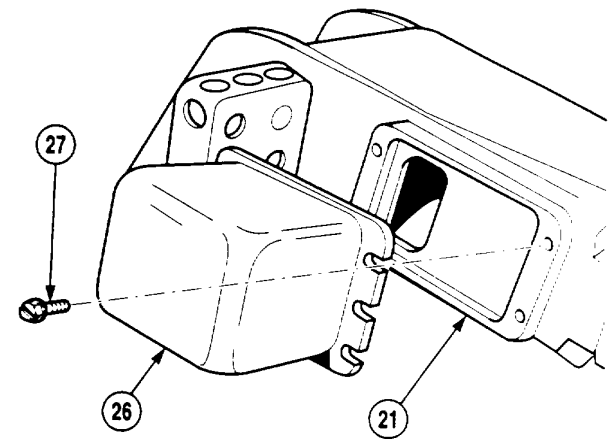
(11) If damaged, disconnect two ignition leads (24) from two electrodes (25).



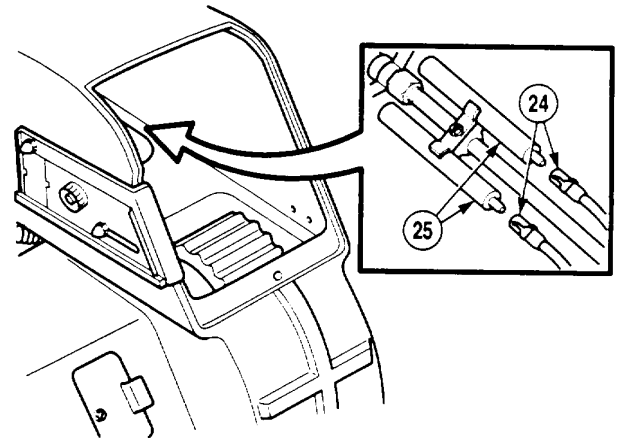
(12) While holding burner transformer (26), remove four screws (27) and burner transformer (26) from burner assembly (21).

b. Installation.

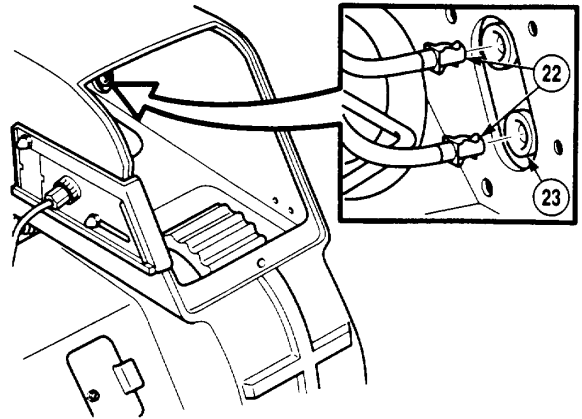
(1) Install burner transformer (26) with four screws (27) on burner assembly (21).



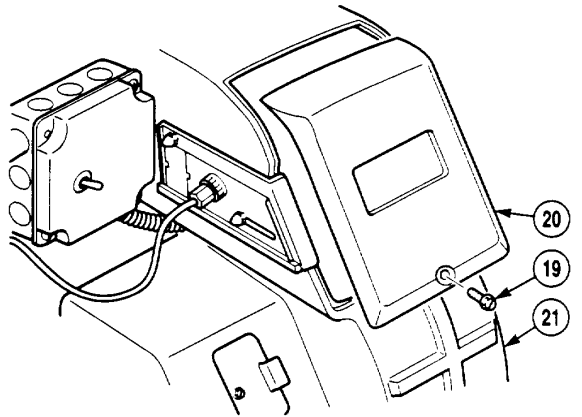
(2) If removed, connect two ignition leads (24) on two electrodes (25).



(3) Connect two ignition leads (22) on burner transformer (23).



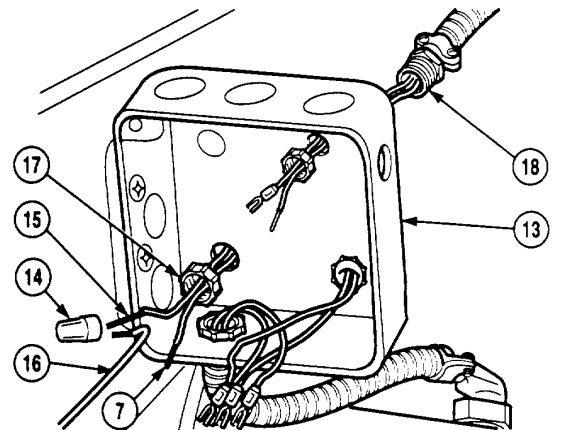
(4) Install cover (20) with screw (19) on burner assembly (21).



(5) Insert wires (15 and 7) and connector (18) in electrical box (13).

(6) Install nut (17) on connector (18).

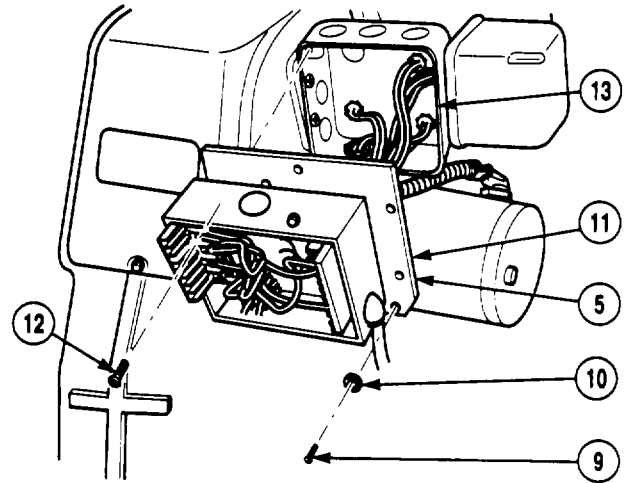
(7) Connect wires (16 and 15) with wire nut (14).



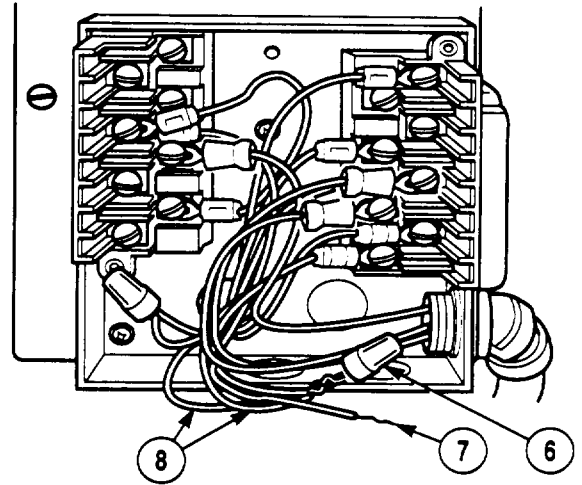
4-94. BURNER TRANSFORMER REPLACEMENT (CONT).

(8) Install subbase plate (11) with two screws (12) on electrical box (13).

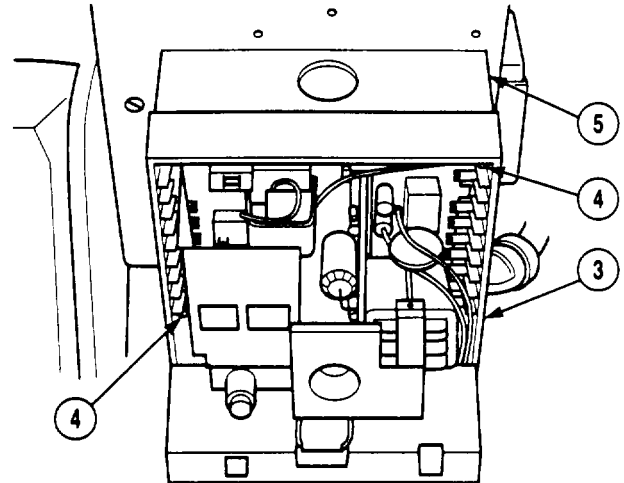
(9) Install controller subbase (5) with three screws (5) and lock washers (10) on subbase plate (11).



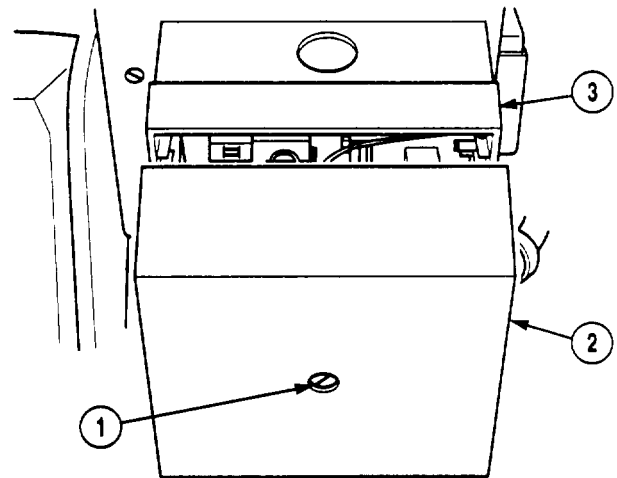
(10) Connect wire (7) to wires (8) and install wire nut (6).



(11) Install burner controller (3) with two captive screws (4) on burner controller subbase (5).



(12) Install cover (2) with captive screw (1) on burner controller (3).



NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-95. BURNER COIL REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

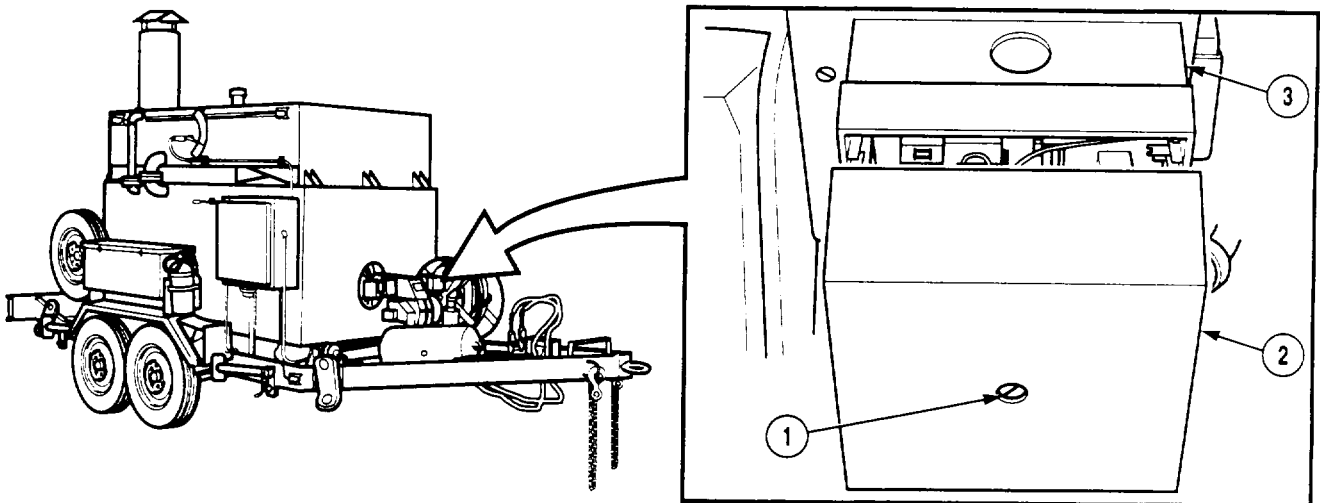
Materials/Parts

Tags, Identification (item 22, appendix E)
 Wire Nuts (2)
 Lock Washers (3)

Equipment Condition

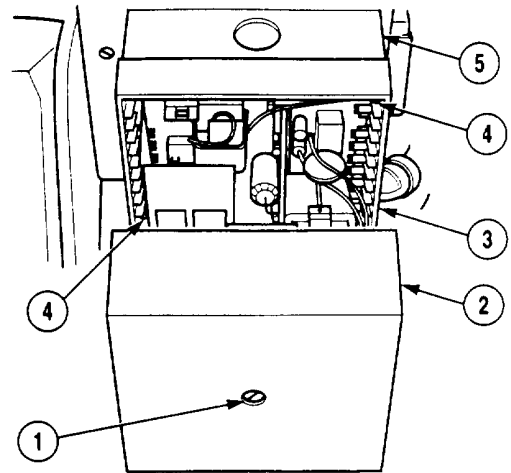
Wheel Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Lines Disconnected From Supply
 (page 2-33)
 Burner Cover Removed (page 4-295)

a. Removal.



(1) Loosen captive screw (1) and remove cover (2) from burner controller (3).

(2) Loosen two captive screws (4) and remove burner controller (3) from controller subbase (5).

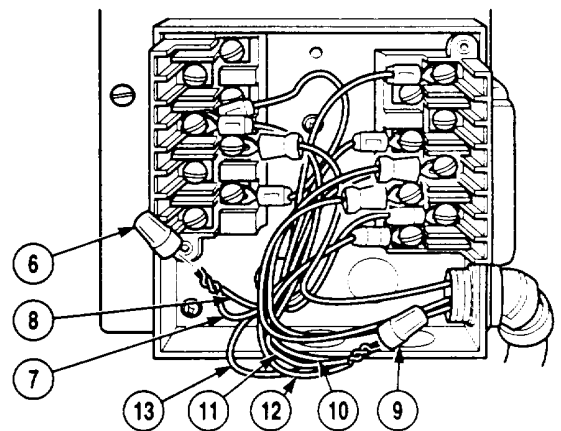


NOTE

Tag and mark all wires prior to removal.

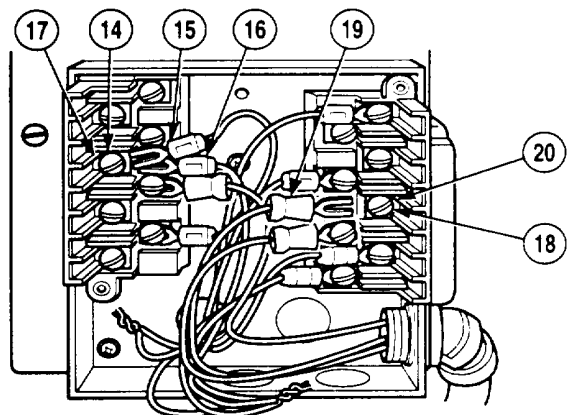
(3) Remove wire nut (6) from wires (7 and 8). Discard wire nut.

(4) Remove wire nut (9) from wires (10, 11, 12, and 13). Discard wire nut.



(5) Loosen screw (14) and remove wires (15 and 16) from terminal 8 (17).

(6) Loosen screw (18) and remove wire (19) from terminal L1 (20).



4-95. BURNER COIL REPLACEMENT (CONT).

(7) Remove three screws (21), lock washers (22), and controller subbase (5) from subbase plate (23). Discard lock washers.

(8) Remove controller subbase (5) from twelve wires.

(9) Remove two screws (24) and subbase plate (23) from electrical box (25).

(10) Remove nut (26) from coil (27).

(11) Remove coil (27) and four wires from electrical box (25).

b. Installation.

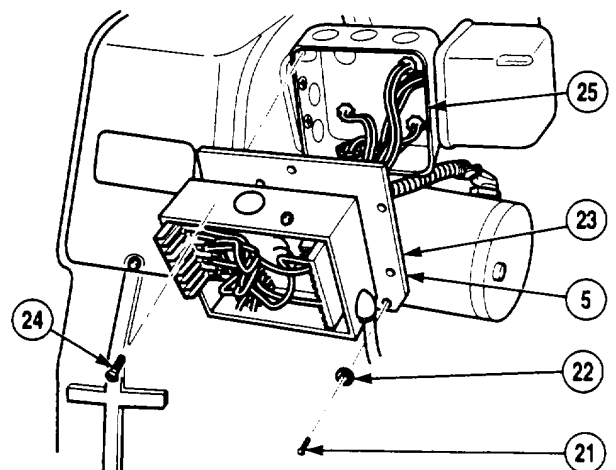
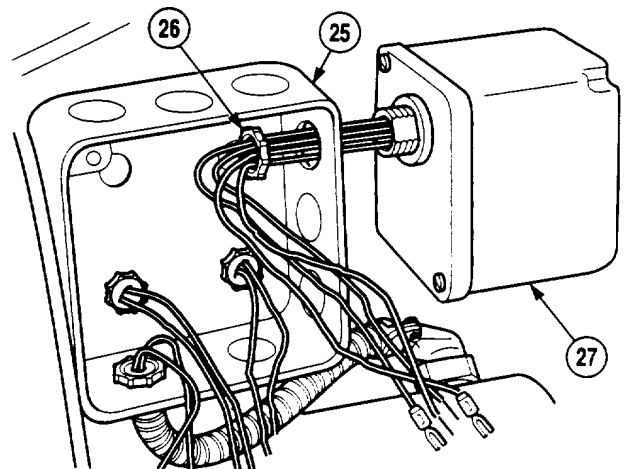
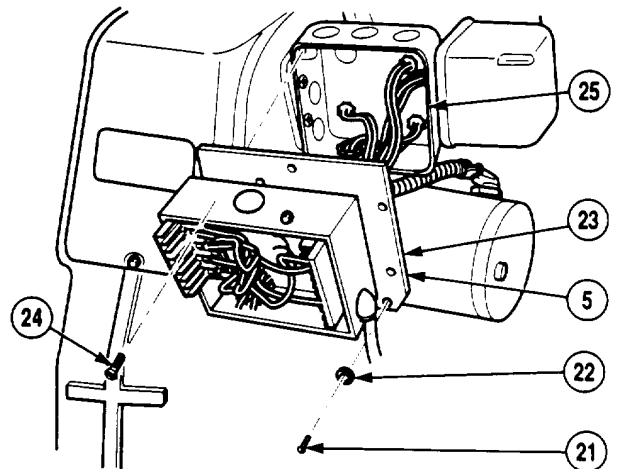
(1) Insert four wires and coil (27) in electrical box (25).

(2) Install nut (26) on coil (27).

(3) Install subbase plate (23) with two screws (24) on electrical box (25).

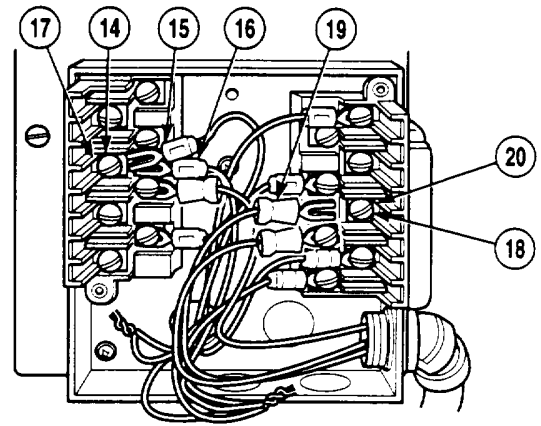
(4) Install controller subbase (5) on twelve wires.

(5) Install controller subbase (5) with three screws (21) and lock washers (22) on subbase plate (23).



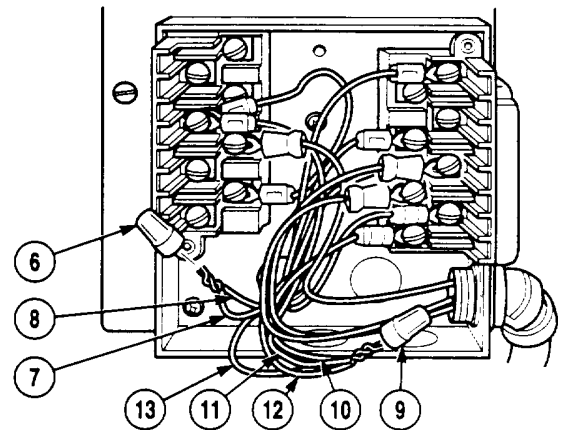
(6) Install wire (19) on terminal L1 (20) and tighten screw (18).

(7) Install wire (15 and 16) on terminal 8 (17) and tighten screw (14).



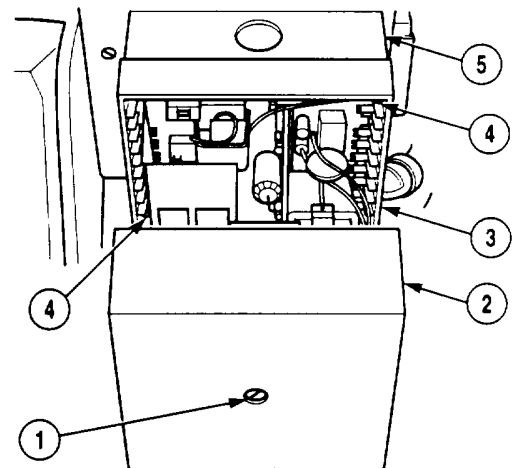
(8) Connect wires (10, 11, 12, and 13) and install wire nut (9).

(9) Connect wires (7 and 8) and install wire nut (6).



(10) Install burner controller (3) with two captive screws (4) on controller subbase (5).

(11) Install cover (2) with captive screw (1) on controller (3).



NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-96. BURNER SOLENOID REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

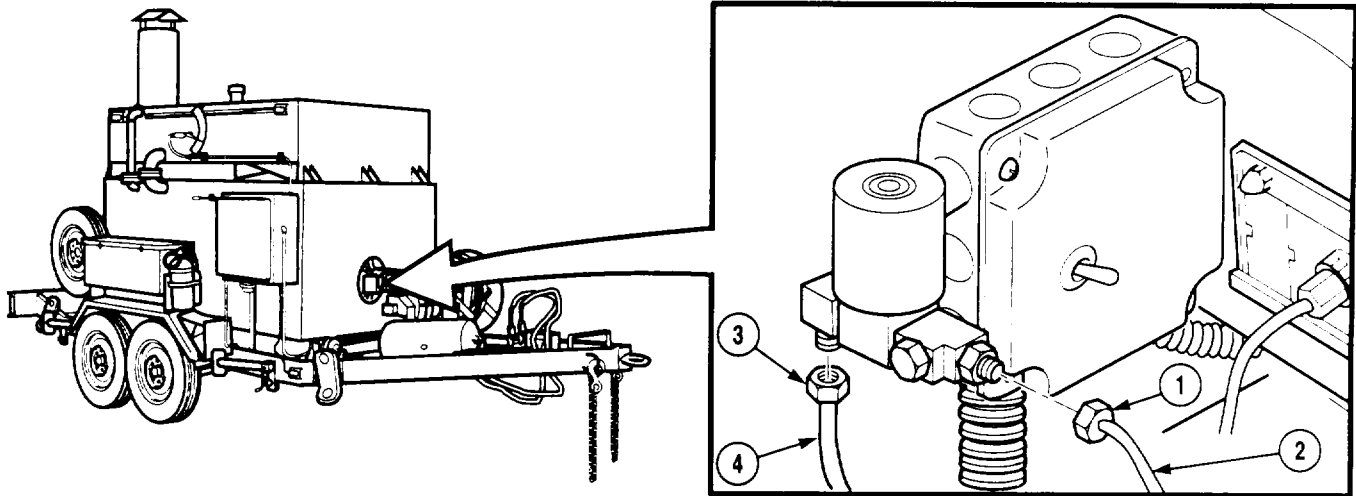
Materials/Parts

Tags, Identification (item 22, appendix E)
Wire Nuts (2)

Equipment Condition

Wheels Chocked (page 2-17)
Heater Cooled
Power Source Disconnected (page 2-32)
Fuel Lines Disconnected From Source (page 2-33)
Burner Cover Removed (page 4-295)

a. Removal.



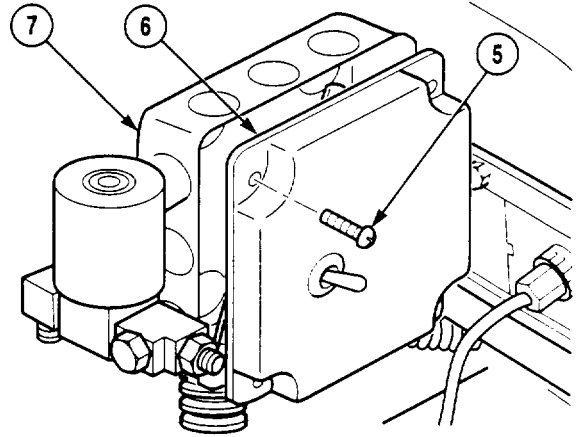
WARNING

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

(1) Loosen nut (1) and disconnect fuel line (2).

(2) Loosen nut (3) and disconnect fuel line (4).

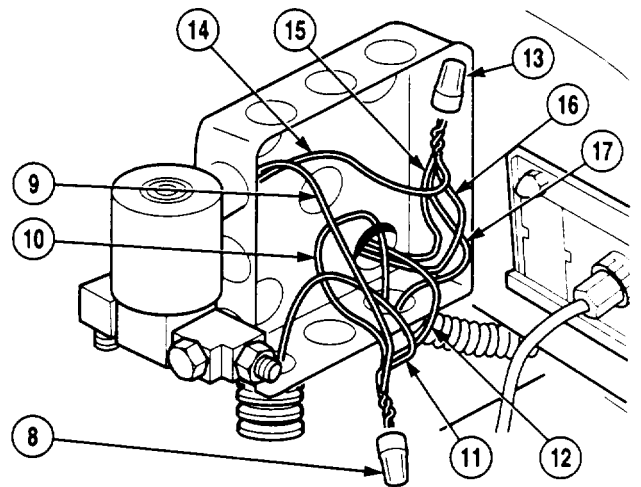
(3) Remove two screws (5) and cover (6) from electrical box (7).



NOTE

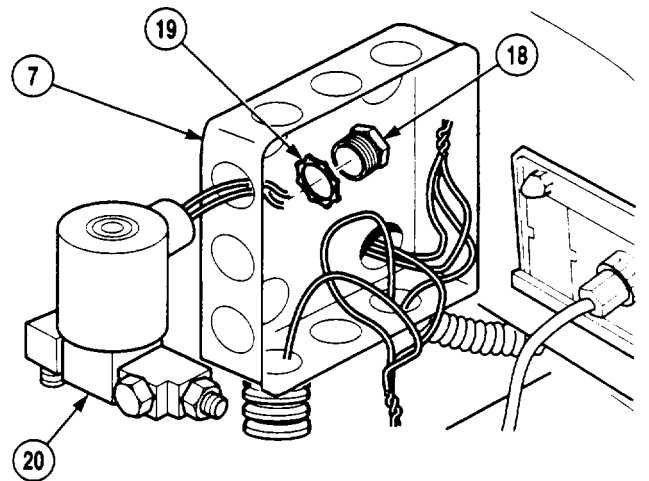
Tag and mark all wires prior to removal.

(4) Remove wire nut (8) from wires (9, 10, 11, and 12). Discard wire nut.



(5) Remove wire nut (13) from wires (14, 15, 16, and 17). Discard wire nut.

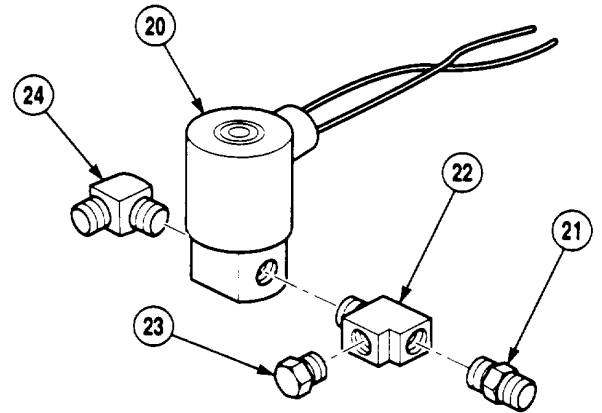
(6) Remove nipple (18), nut (19), and solenoid valve (20) from electrical box (7).



4-96.BURNER SOLENOID REPLACEMENT (CONT).

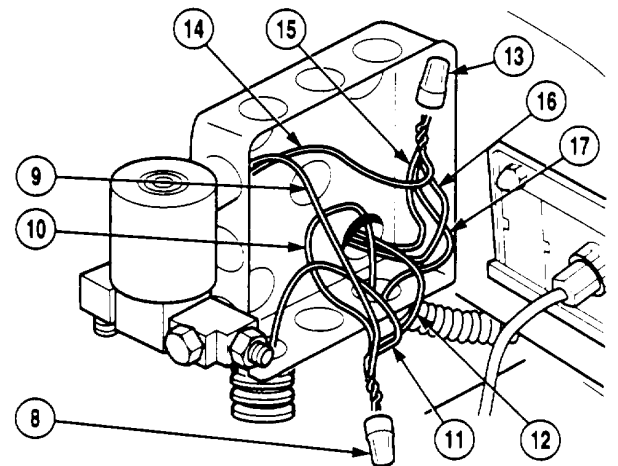
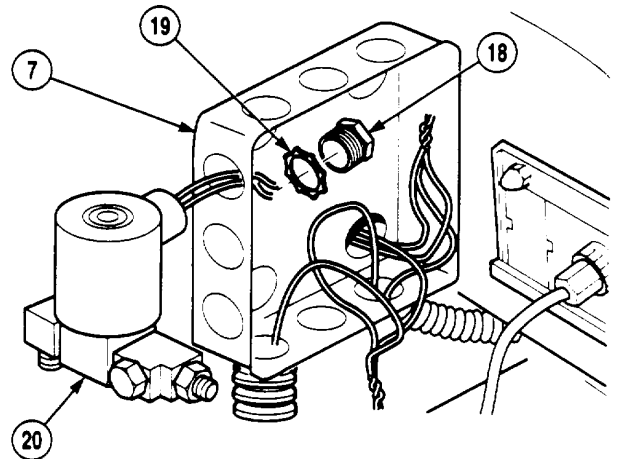
NOTE
Mark position of fitting before removal.

- (7) Place solenoid valve (20) in vise.
- (8) Remove adapter (21) from tee (22).
- (9) Remove plug (23) from tee (22).
- (10) Remove tee (22) from solenoid valve (20).
- (11) Remove elbow (24) from solenoid valve (20).
- (12) Remove solenoid valve (20) from vise.

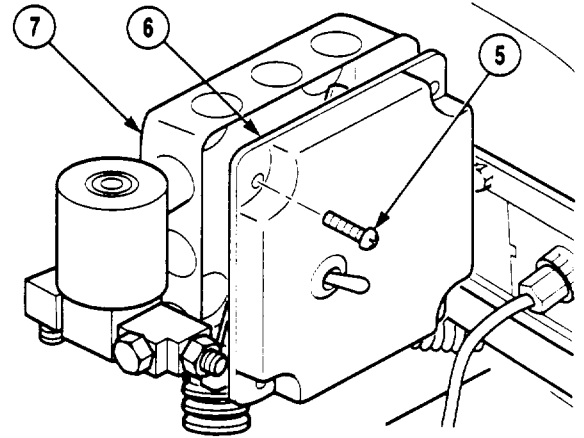


b. Installation.

- (1) Place solenoid valve (20) in vise.
- (2) Install elbow (24) on solenoid valve (20).
- (3) Install tee (22) on solenoid valve (20).
- (4) Install plug (23) on tee (22).
- (5) Install adapter (21) on tee (22).
- (6) Remove solenoid valve (20) from vise.
- (7) Install solenoid valve (20), nut (19), and nipple (18) in electrical box (7). Tighten nipple.
- (8) Connect wires (14, 15, 16, and 17) and install wire nut (13).
- (9) Connect wires (9, 10, 11, and 12) and install wire nut (8).

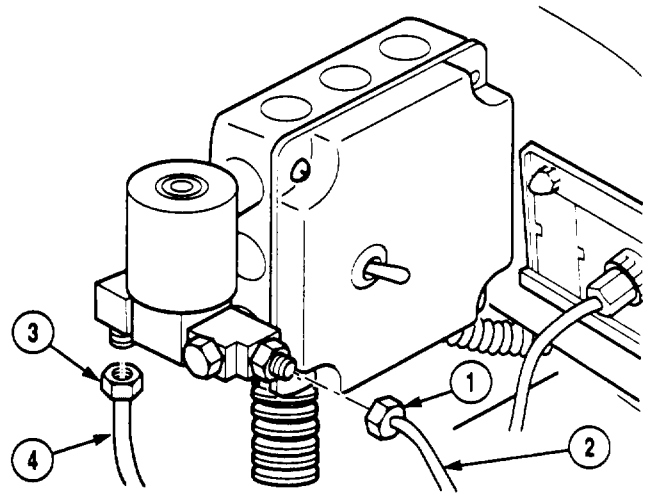


(10) Install cover (6) with two screws (5) on electrical box (7).



(11) Connect fuel line (4) and tighten nut (3).

(12) Connect fuel line (2) and tighten nut (1).



NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-97. DAMPER MOTOR AND DAMPER REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

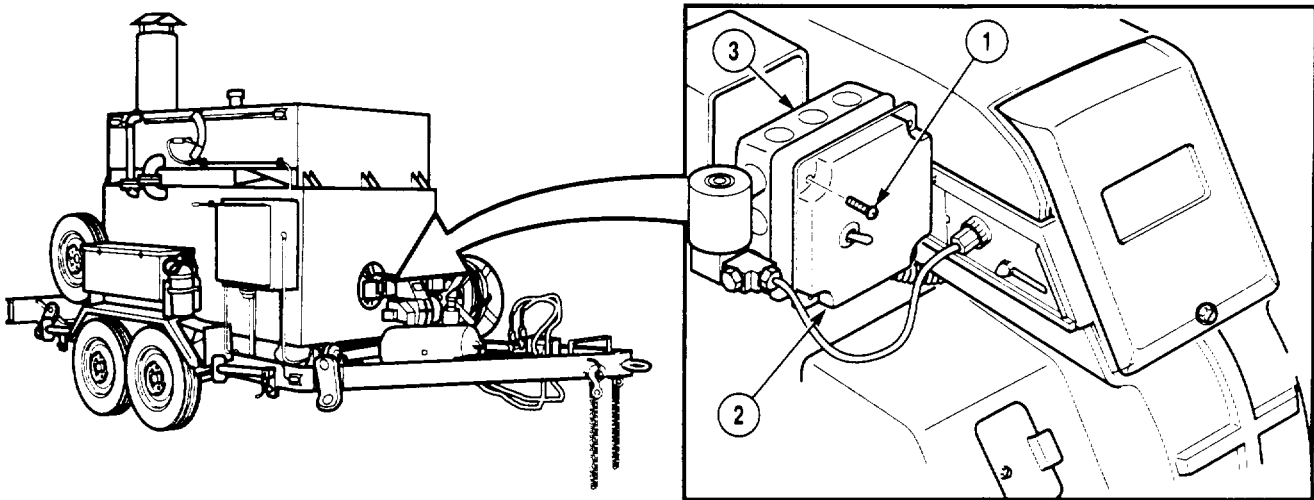
Materials/Parts

Tags, Identification (item 22, appendix E)
 Screws with captive Lock washers (3)
 Wire Nuts (4)
 Lock Washer

Equipment Condition

Wheels Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Lines Disconnected From Source (page 2-33)
 Burner Cover Removed (page 4-295)

a. Removal.



(1) Remove two screws (1) and cover (2) from electrical box (3).

NOTE

Tag and mark all wires prior to removal.

(2) Remove wire nut (4) from wires (5 and 6). Discard wire nuts.

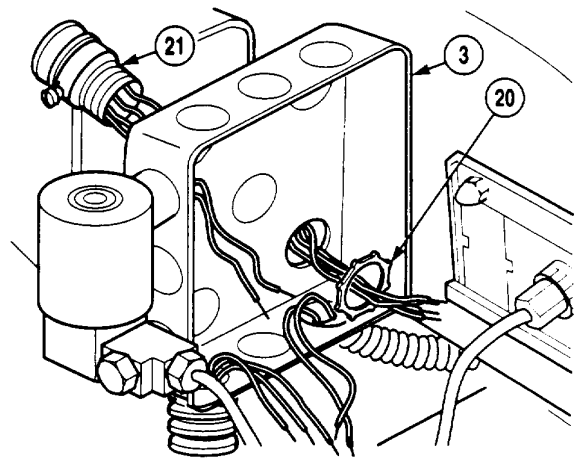
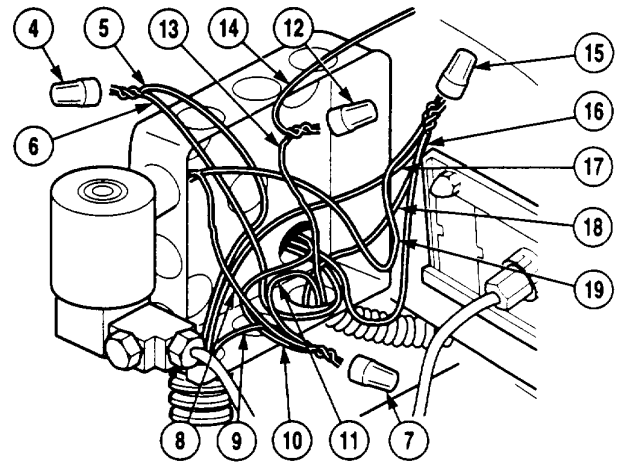
(3) Remove wire nut (7) from wires (8, 9, 10, and 11). Discard wire nuts.

(4) Remove wire nut (12) from wires (13 and 14). Discard wire nuts.

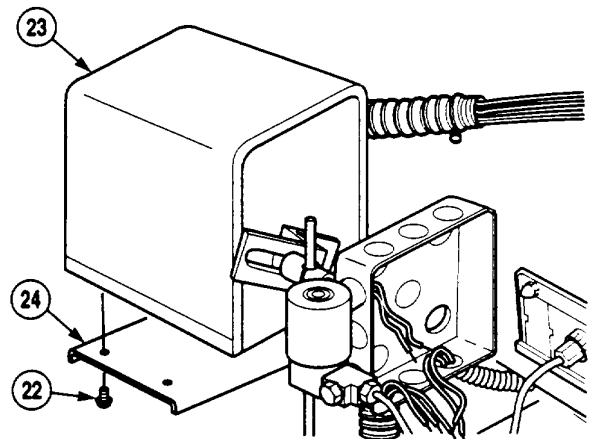
(5) Remove wire nut (15) from wires (16, 17, 18, and 19). Discard wire nuts.

(6) Remove nut (20) from connector (21).

(7) Remove connector (21) and four wires from electrical box (3).



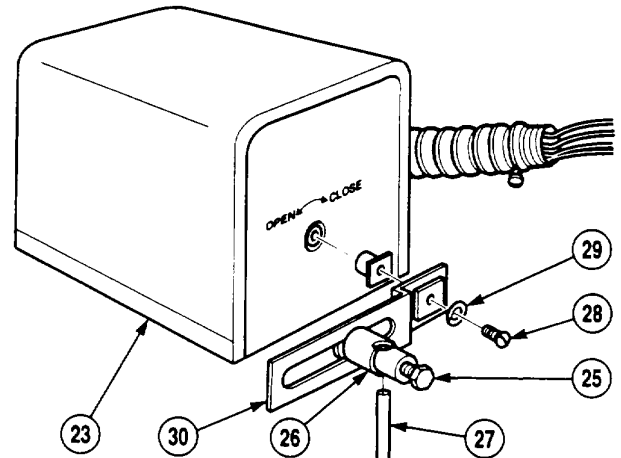
(8) Remove four screws (22) and damper motor (23) from bracket (24).



4-97. DAMPER MOTOR AND DAMPER REPLACEMENT (CONT).

(9) Loosen screw (25) on coupling (26) and remove damper adjustment rod (27).

(10) Remove screw (28), lock washer (29), and arm assembly (30) from damper motor (23). Discard lock washer.



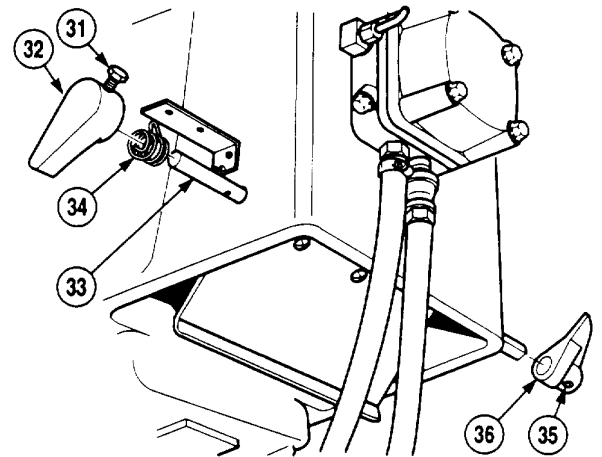
(11) Loosen setscrew (31) on damper linkage arm (32).

(12) Remove damper linkage arm (32) from damper shaft (33).

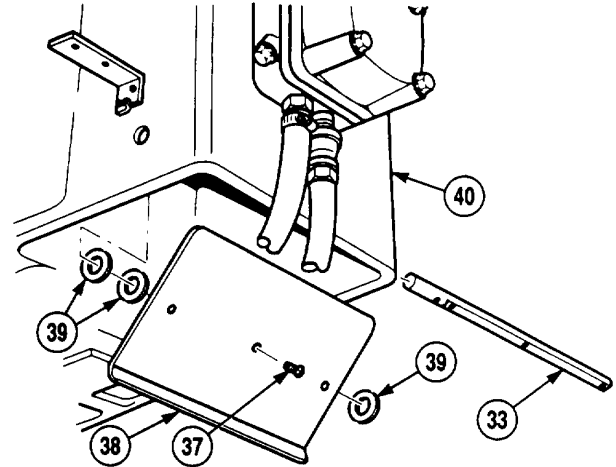
(13) Remove spring (34) from damper shaft (33).

(14) Loosen setscrew (35) in damper indicator (36).

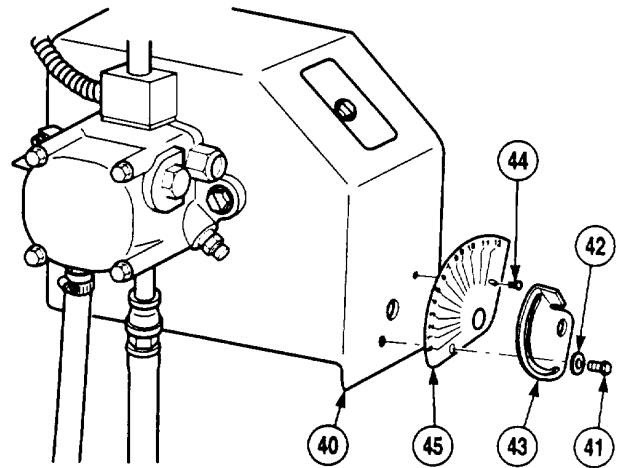
(15) Remove damper indicator (36) from damper shaft (33).



- (16) Remove three screws with captive lock washers (37) and damper (38) from damper shaft (33). Discard screws with captive lock washers.
- (17) Remove damper shaft (33) and three washers (39) from burner assembly (40).



- (18) Remove screw (41), washer (42), and damper adjusting plate (43) from burner assembly (40).
- (19) Remove drive screw (44) and damper label (45) from burner assembly (40).



b. Installation.

- (1) Install damper label (45) with drive screw (44) on burner assembly (40).
- (2) Install damper adjusting plate (43) with screw (41) and washer (42) on burner assembly (40).

4-97. DAMPER MOTOR AND DAMPER REPLACEMENT (CONT).

- (3) Install three washers (39) and damper shaft (33) in burner assembly (40).

NOTE

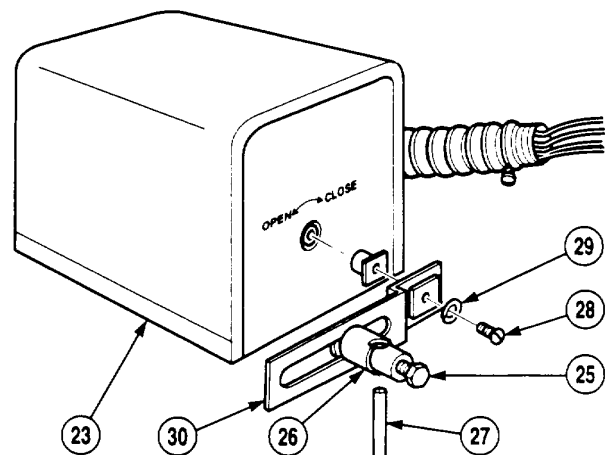
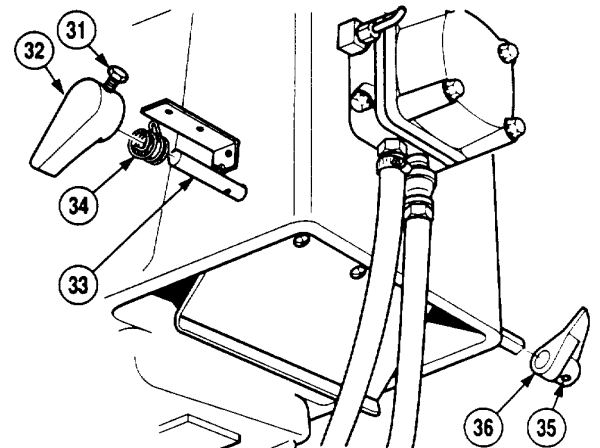
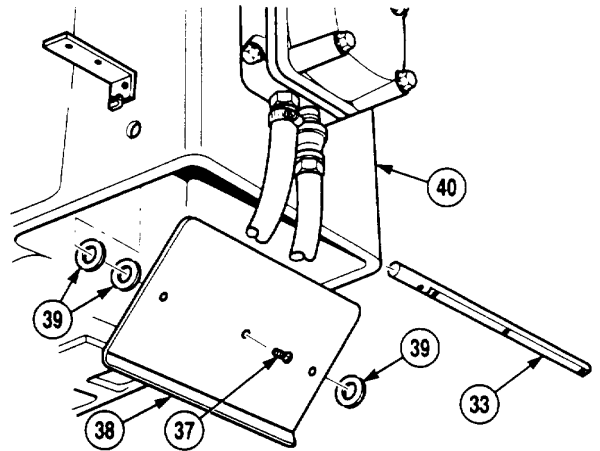
Position one washer between damper and burner assembly towards the damper indicator and two washers between the damper and burner assembly towards the damper linkage.

- (4) Install damper (38) with three screws with captive lock washers (37) on damper shaft (33).

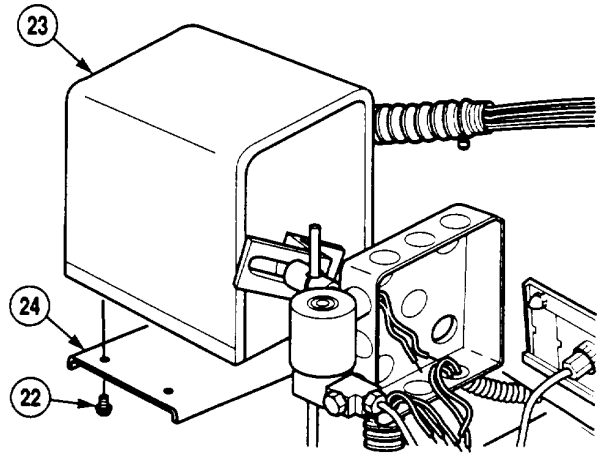
NOTE

Align damper indicator setscrew and flat of damper shaft before tightening setscrew.

- (5) Install damper indicator (36) on damper shaft (33).
- (6) Tighten setscrew (35) in damper indicator (36).
- (7) Install spring (34) on damper shaft (33).
- (8) Install damper linkage arm (32) on damper shaft (33).
- (9) Tighten setscrew (31) in damper linkage arm (32).
- (10) Install arm assembly (30) with screw (28) and lock washer (29) on damper motor (23).
- (11) Install damper adjustment rod (27) in coupling (26) and tighten screw (25).

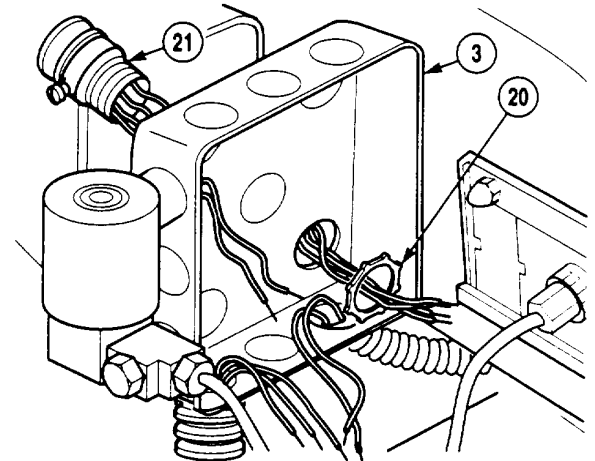


- (12) Install damper motor (23) with four screws (22) on bracket (24).



- (13) Position four wires and connector (21) in electrical box (3).

- (14) Install nut (20) on connector (21). Tighten nut.

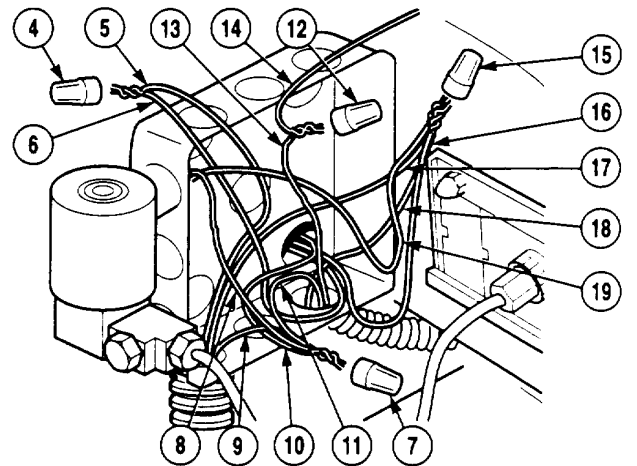


- (15) Connect wires (16, 17, 18, and 19) with wire nut (15).

- (16) Connect wires (13 and 14) with wire nut (12).

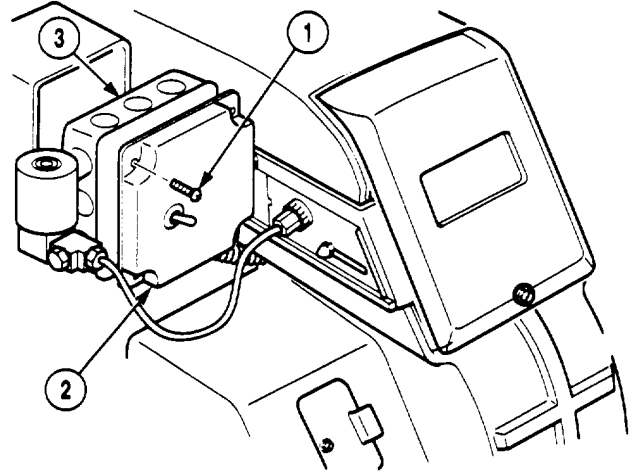
- (17) Connect wires (8, 9, 10, and 11) with wire nut (7).

- (18) Connect wires (5 and 6) with wire nut (4).



4-97. DAMPER MOTOR AND DAMPER REPLACEMENT (CONT).

(19) Install cover (2) with two screws (1) on electrical box (3).

**NOTE**

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-98. BURNER CONTROLLER REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

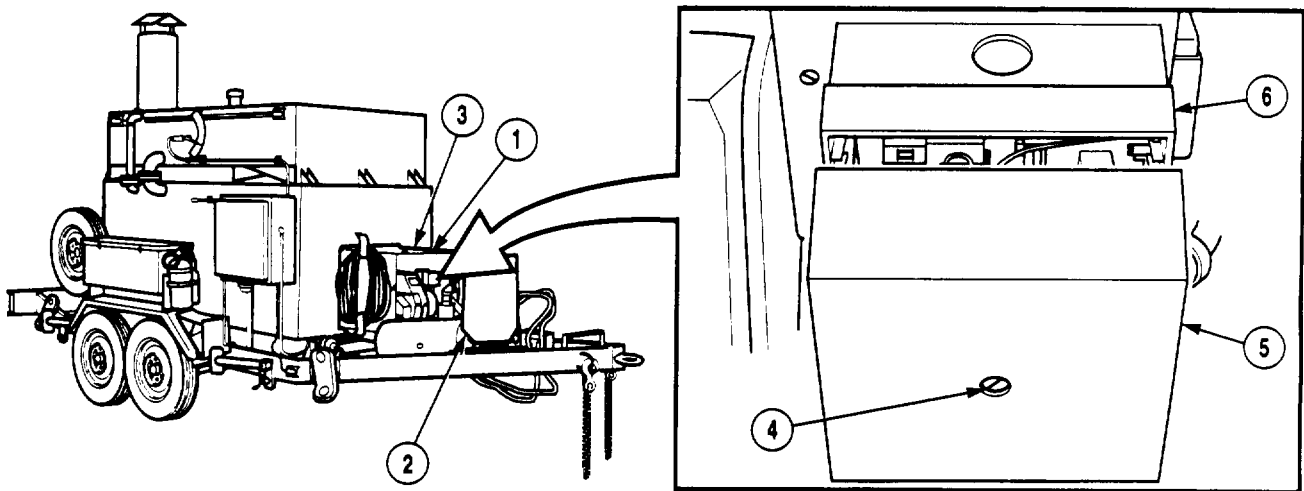
Wheels Chocked (page 2-17)

Heater Cooled

Power Source Disconnected (page 2-32)

Fuel Lines Disconnected From Source (page 2-33)

a. Removal.



(1) Loosen six latches (1) and remove front burner access cover (2) from burner cover (3).

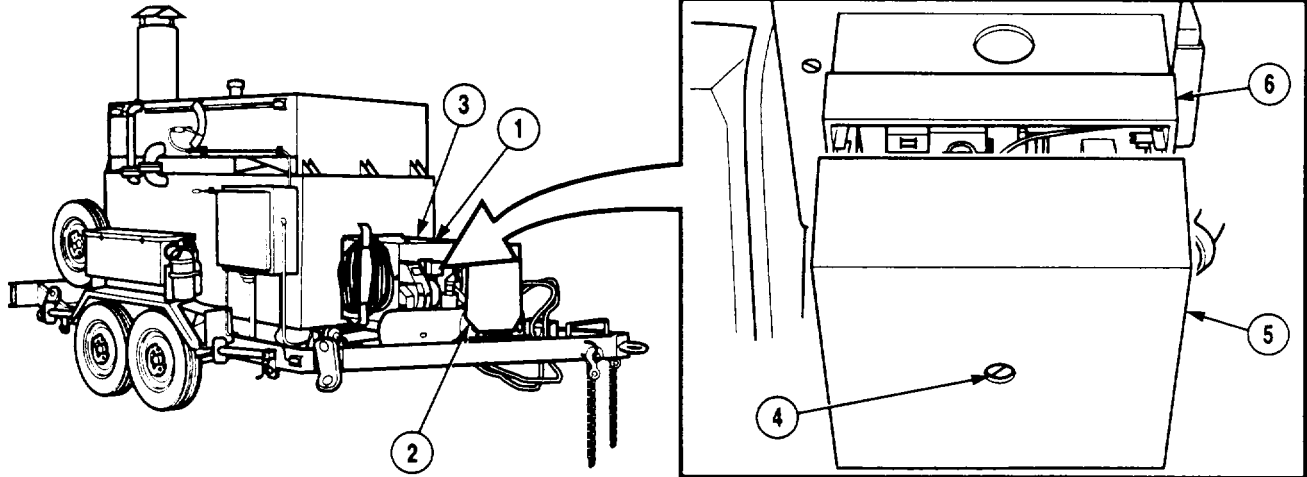
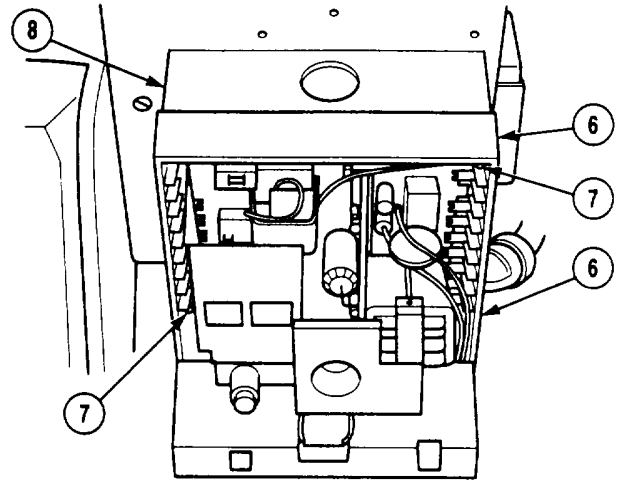
(2) Loosen captive screw (4) and remove cover (5) from burner controller (6).

4-98. BURNER CONTROLLER REPLACEMENT (CONT).

- (3) Loosen two captive screws (7) and remove burner controller (6) from controller subbase (8).

b. Installation.

- (1) Install burner controller (6) with two captive screws (7) on controller subbase (8).



- (2) Install cover (5) with captive screw (4) on burner controller (6).
- (3) Install front burner access cover (2) on burner cover (3) and close six latches (1).

NOTE

Follow-on Maintenance:

- Remove wheel chocks (page 2-35).

END OF TASK

4-99. PUMP MOTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Lifting Device

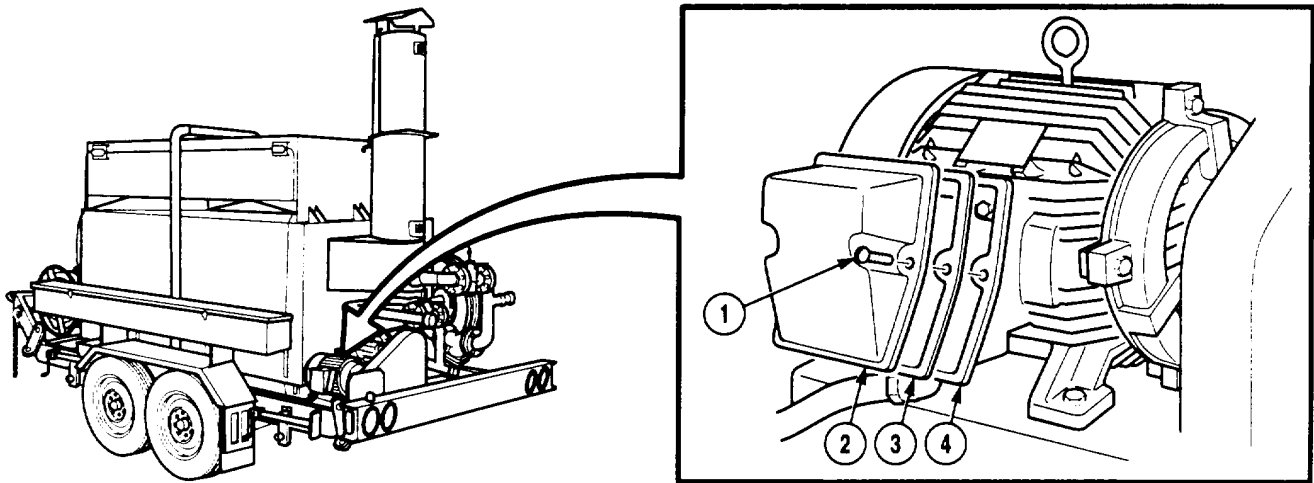
Materials/Parts

Tags, Identification (item 22, appendix E)
Gasket
Preformed Packing
Lug, Terminal
Wire Nut (4)
Lock Washer (4)

Equipment Condition

Wheels Chocked (page 2-17)
Power Source Disconnected (page 2-32)
Pump Motor Belts Removed (page 4-199)
Sheaves Removed (page 4-202)

a. Removal.



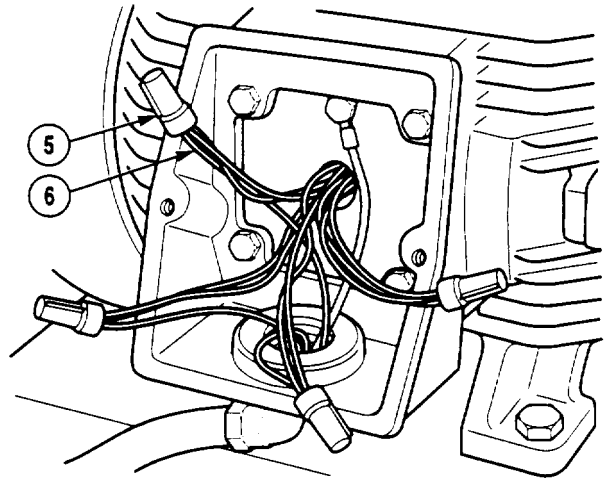
NOTE

Tag and mark all wires prior to removal.

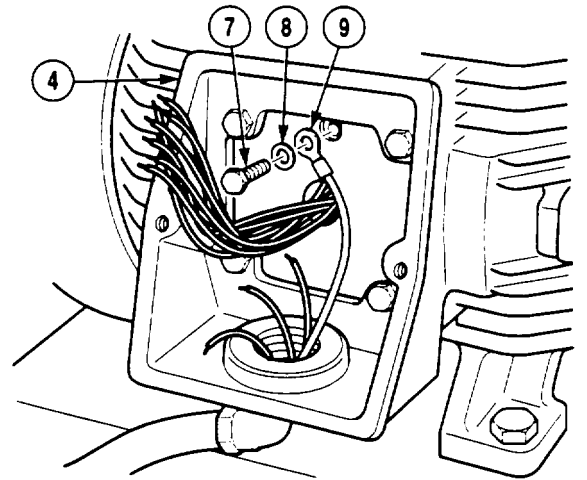
- (1) Remove two screws (1), cover (2), and gasket (3) from motor (4). Discard gasket.

4-99. PUMP MOTOR REPLACEMENT (CONT).

- (2) Remove four wire nuts (5) from wires (6). Discard nuts.



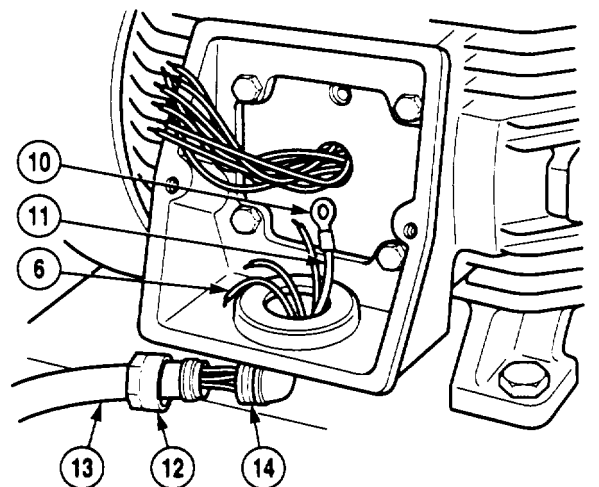
- (3) Remove screw (7), washer (8), and ground wire (9) from motor (4).



- (4) Remove terminal lug (10) from wire (11). Discard terminal lug.

- (5) Loosen nut (12) and pull conduit (13) from elbow (14).

- (6) Remove wires (6) from elbow (14).



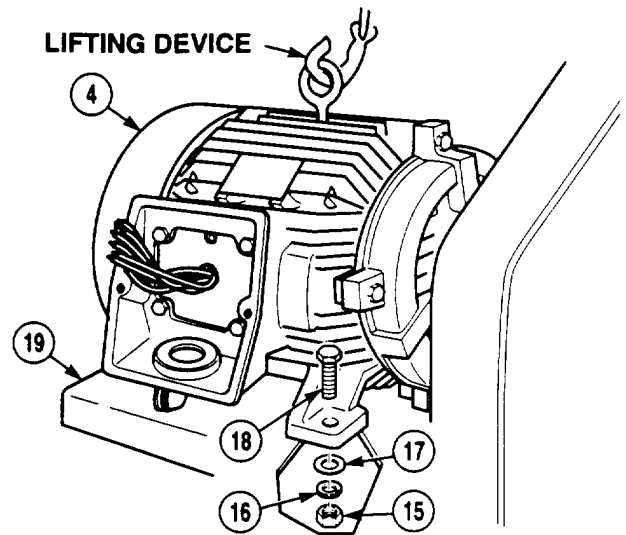
WARNING

To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

NOTE

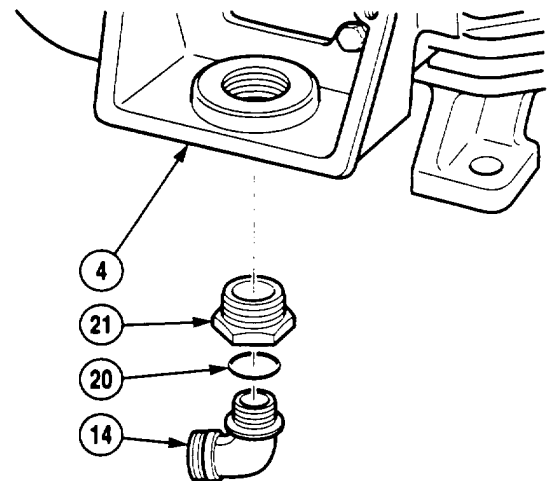
Pump motor weighs 135 lb (62 kg).

- (7) Using a lifting device, remove four nuts (15), lock washers (16), washers (17), screws (18), and motor (4) from frame (19). Discard lock washers.
- (8) Remove elbow (14), preformed packing (20), and reducer bushing (21) from motor (4). Discard preformed packing.



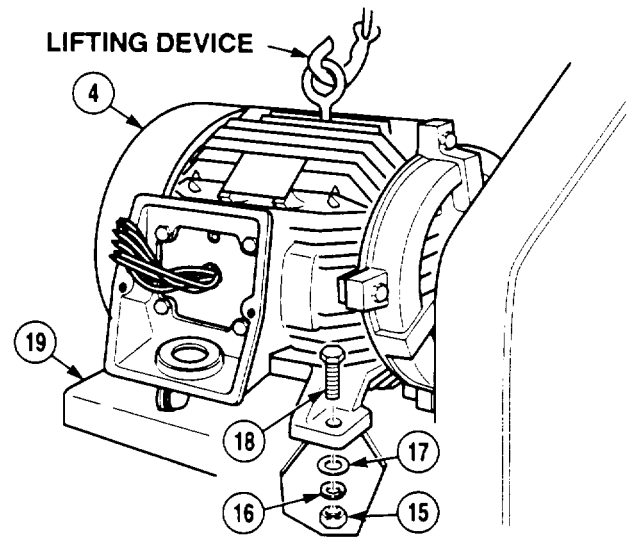
b. Installation.

- (1) Install reducer bushing (21), preformed packing (20), and elbow (14) on motor (4).

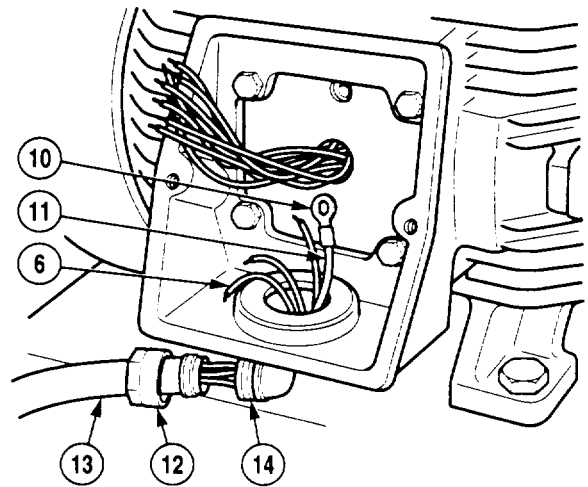


4-99. PUMP MOTOR REPLACEMENT (CONT).

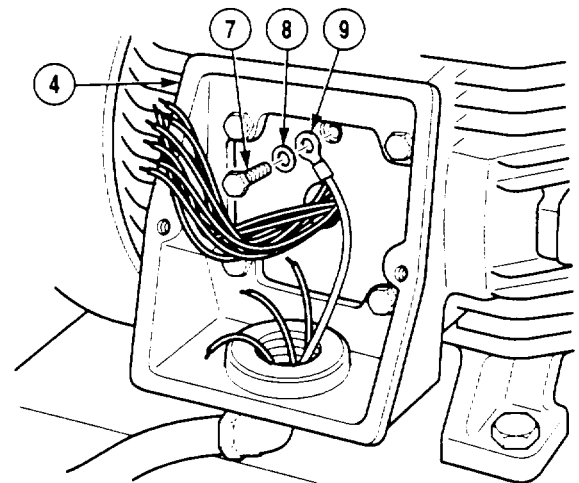
- (2) Using a lifting device, install motor (4) with four screws (18), washers (17), lock washers (16), and nuts (15) on frame (19).



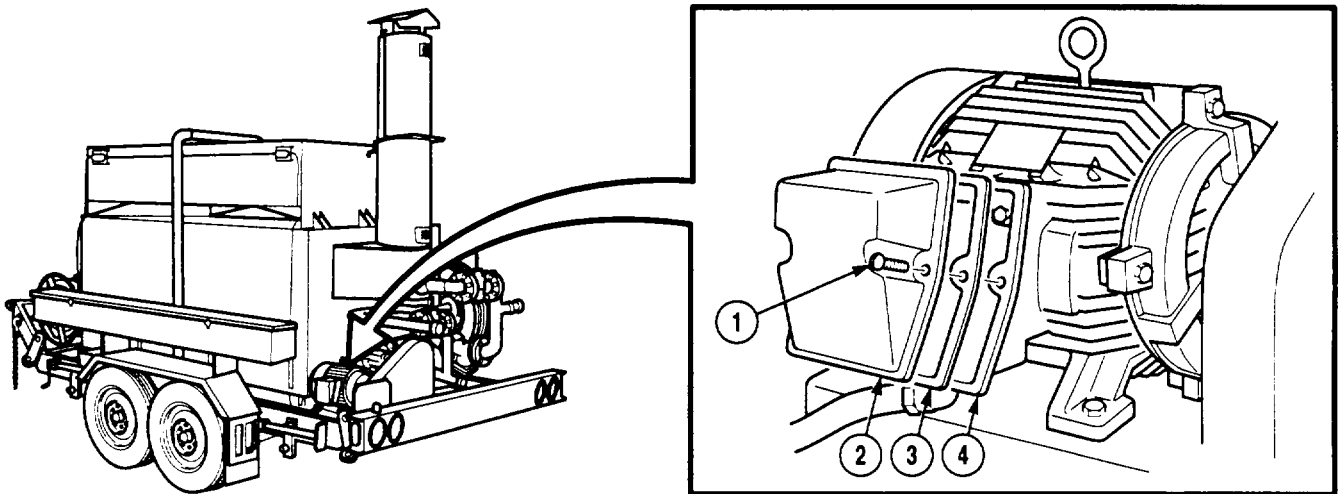
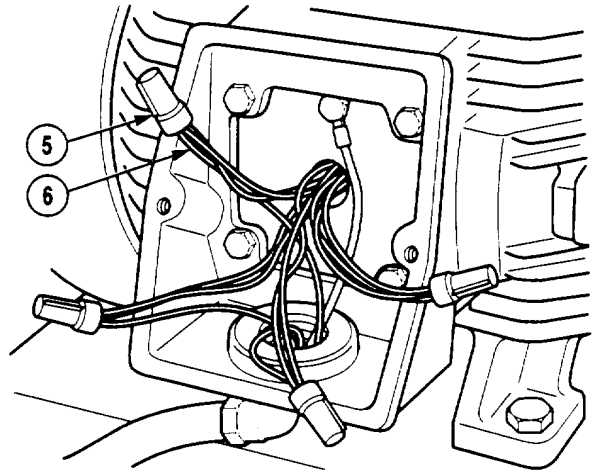
- (3) Install wires (6) through elbow (14).
- (4) Install conduit (13) with nut (12) on elbow (14). Tighten nut.
- (5) Install terminal lug (10) on wire (11).



- (6) Install ground wire (9) with screw (7) and washer (8) on motor (4).



(7) Install four wire nuts (5) on wires (6).



(8) Install gasket (3) and cover (2) with two screws (1) on motor (4).

NOTE

Follow-on Maintenance:

- Install sheaves (page 4-203).
- Install pump motor belts (page 4-200).
- Remove wheel chocks (page 2-35).

END OF TASK

4-100. FUEL LINES REPLACEMENT/REPAIR.

This task covers:

- | | | |
|----------------|------------------------|-----------------|
| a. Removal | c. Cleaning/Inspection | e. Installation |
| b. Disassembly | d. Assembly | |

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Solvent, Drycleaning (item 21, appendix E)
 Ties, Cable (item 24, appendix E)
 Drain Pan

Equipment Condition

Wheel Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Line Disconnected from Source (page 2-33)
 Burner Cover Removed (page 4-295)

a. Removal.

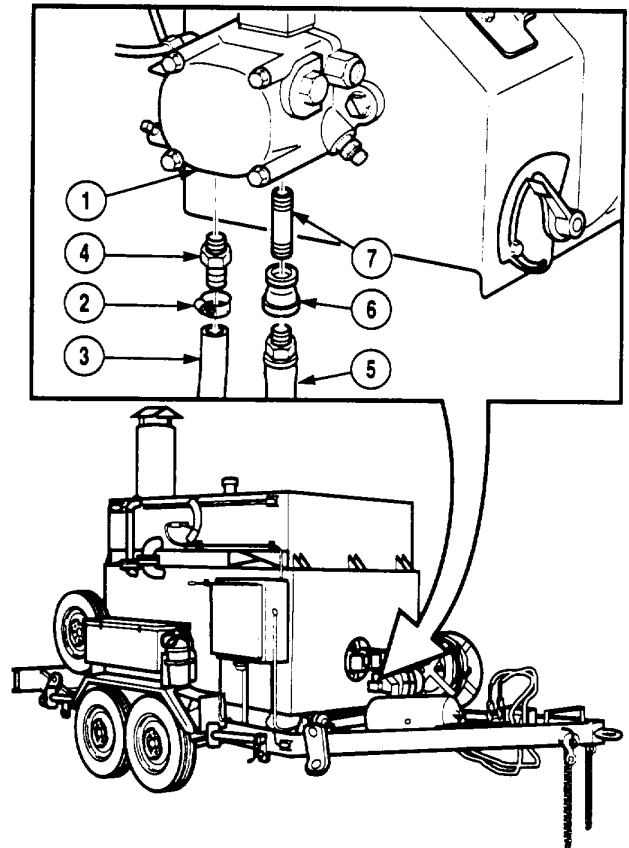
WARNING

Fuel is very flammable and can explode easily. Keep fuel away from open flame or any spark. Failure to comply may result in serious injury or death.

NOTE

- Inspect all hoses, lines, and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.
- Tag and mark all hoses prior to removal.

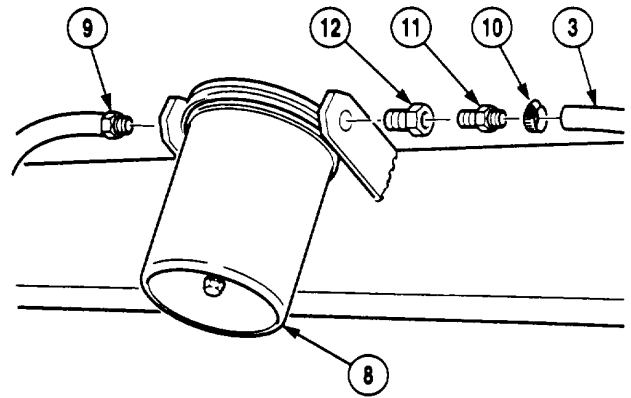
- (1) Position drain pan under fuel pump (1).
- (2) Loosen hose clamp (2) remove fuel line (3) and fitting (4) from fuel pump (1).



NOTE

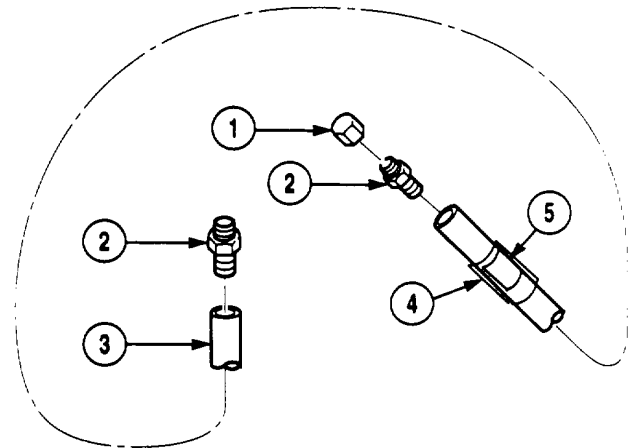
- Reducer bushing may need to be held in place to remove fuel return line.
- Hold fuel line while turning fitting to prevent kinking.

- (3) If damaged, remove hose clamp (2) from fuel line (3).
- (4) Remove fuel return line (5) from reducer bushing (6).
- (5) Remove reducer bushing (6) and nipple (7) from fuel pump (1).
- (6) Position drain pan under fuel filter (8).
- (7) Remove fuel supply line (9) from fuel filter (8).
- (8) Loosen hose clamp (10) and remove fuel line (3) from fitting (11).
- (9) Remove fitting (11) and reducer bushing (12) from fuel filter (8).



b. Disassembly.

- (1) Remove cap (1) and two fittings (2) from fuel return line (3).
- (2) Remove clear shrink tubing (4) and identification tag (5) from fuel return line (3). Discard clear shrink tubing.
- (3) Repeat steps (1) and (2) for fuel supply hose.

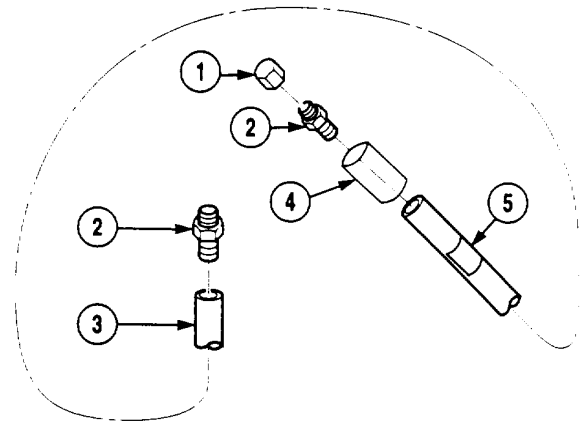


4-100. FUEL LINES REPLACEMENT/REPAIR (CONT).**c. Cleaning/Inspection.****WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean all parts with drycleaning solvent and dry with compressed air.
 - (2) Inspect parts for cracks and excessive wear.
 - (3) Replace all damaged parts.

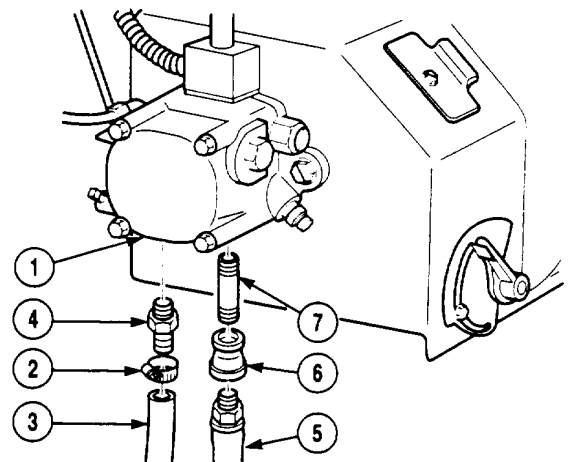
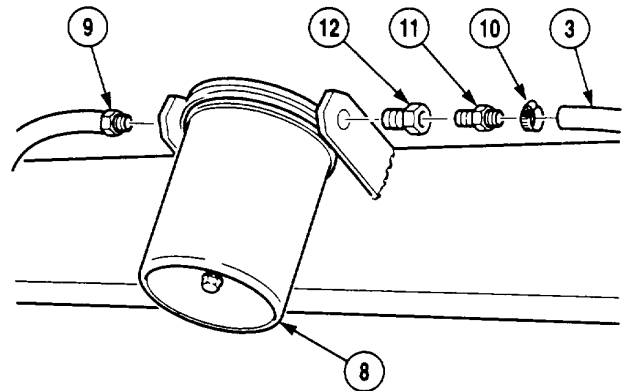
d. Assembly.

- (1) Apply adhesive to identification tag (5).
- (2) Install identification tag(5) with clear shrink tubing (4) on fuel return hose (3).
- (3) Install two fittings (2) and cap (1) on fuel return line (3).
- (4) Repeat steps (1), (2), and (3) for fuel supply hose.



e. Installation.

- (1) Install reducer bushing (12) and fitting (11) in fuel filter (8).
- (2) Install fuel line (3) with hose clamp (10) on fitting (11). Tighten clamp.
- (3) Install fuel supply hose (9) on fuel filter (8).
- (4) Install nipple (7) and reducer bushing (6) on fuel pump (1).
- (5) Install fuel return line (5) on reducer bushing (6).
- (6) If removed, install hose clamp (2) on fuel line (3).
- (7) Install fitting (4) and fuel line (3) on fuel pump (1) and tighten hose clamp (2).



NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

4-101. COMBUSTION CHAMBER LINER REPLACEMENT.

This task covers:

- a. Removal b. Cleaning/Inspection c. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Lifting Device

Personnel Required

Two

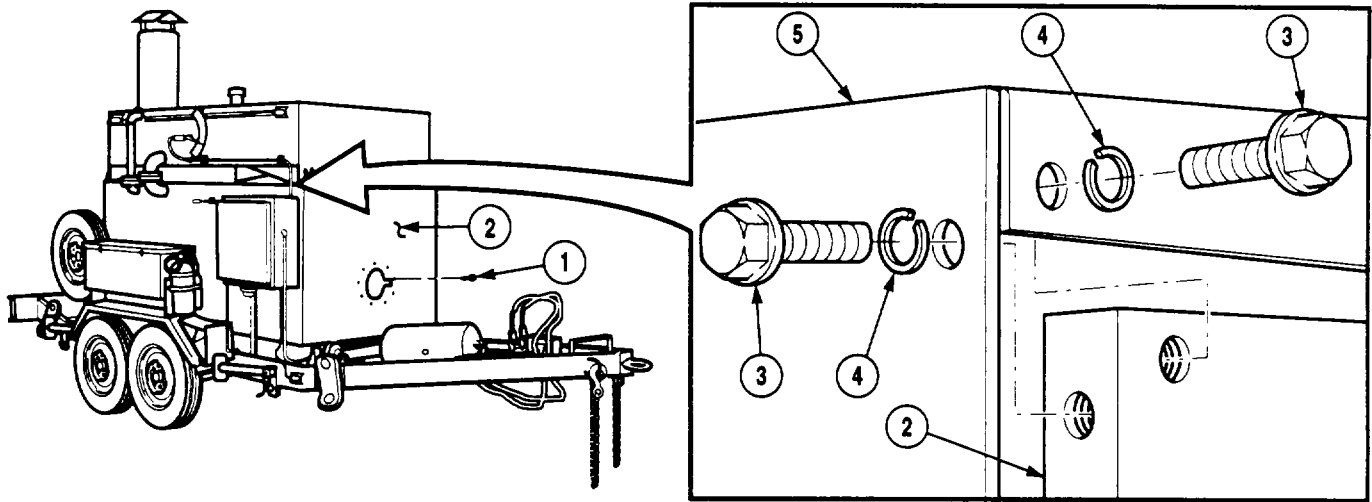
Materials/Parts

Compound (item 7, appendix E)
Washers (65)
Lock Washers (65)
Lock Washers (29)
Insulation

Equipment Condition

Wheels Chocked (page 2-17)
Heater Cooled
Power Source Disconnected (page 2-32)
Fuel Lines Disconnected (page 2-33)
Cable Reel Removed (page 4-154)
Burner Cover Removed (page 4-295)
Burner Assembly Removed (page 4-223)

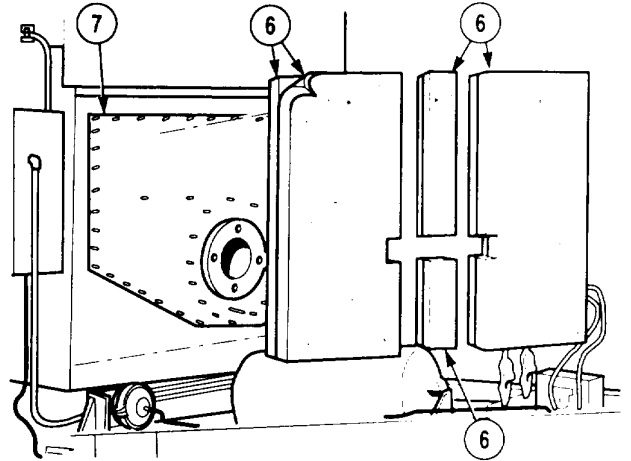
a. Removal.



- (1) Remove nine screws (1) from front tin (2).
- (2) With the aid of an assistant, remove twenty-nine screws (3), lock washers (4), and front tin (2) from Heater (5).

WARNING

- Wires holding insulation could cause serious injury to personnel if they are not bent back toward front service plate after insulation is removed.
 - Protective equipment (gloves, goggles, ventilation mask) must be worn when removing/installing insulation; breathing the insulation can be harmful to personnel.
- (3) Remove eight pieces of insulation (6) from heat exchanger (7).



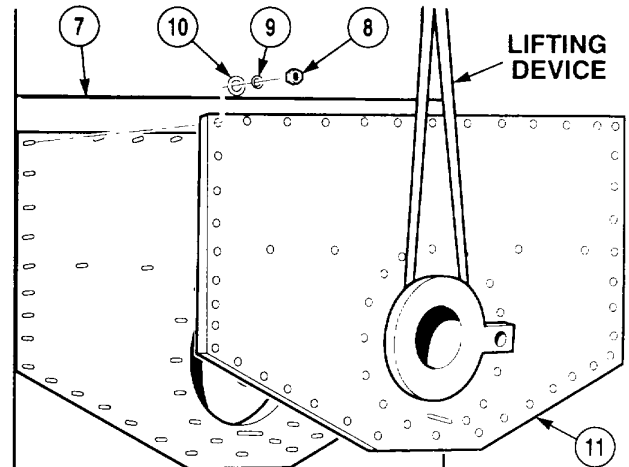
4-101. COMBUSTION CHAMBER LINER REPLACEMENT (CONT).**WARNING**

To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

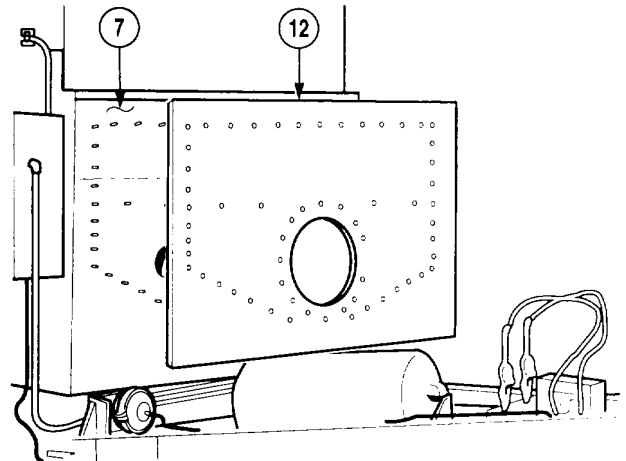
NOTE

Front service plate weighs 120 lb (54.31 kg).

- (4) Using a lifting device, and with the aid of an assistant, remove sixty-five nuts (8), lock washers (9), washers (10), and front service plate (11) from heat exchanger (7). Discard lock washers.



- (5) Remove insulation (12) from heat exchanger (7). Discard insulation.



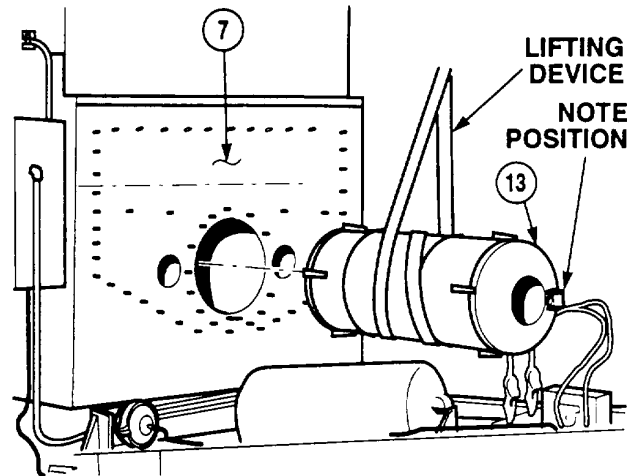
WARNING

To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

NOTE

- Combustion chamber liner weighs 70 lb (32 kg).
- Note the position of the chamber liner before removal.

- (6) Using a lifting device, remove combustion chamber liner (13) from heat exchanger (7).

**b. Cleaning/Inspection.****WARNING**

Protective equipment (gloves, goggles, ventilation mask) must be worn when cleaning combustion chamber. Breathing exhaust waste can be harmful to personnel.

- (1) Remove exhaust buildup from combustion chamber and liner.
- (2) Inspect parts for cracks, broken welds, excessive wear, or damage.
- (3) Replace all damaged parts.

4-101. COMBUSTION CHAMBER LINER REPLACEMENT (CONT).

c. Installation.

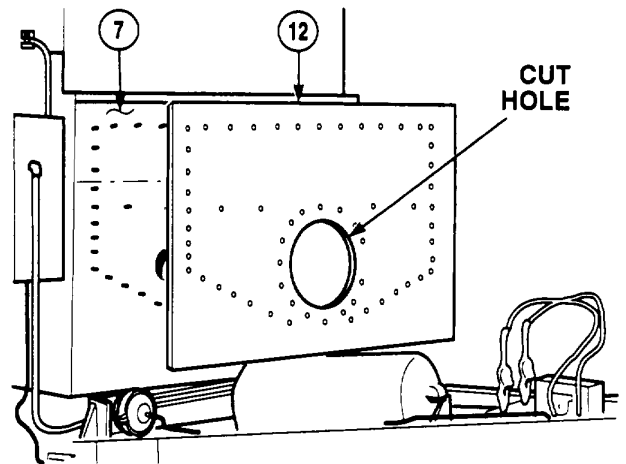
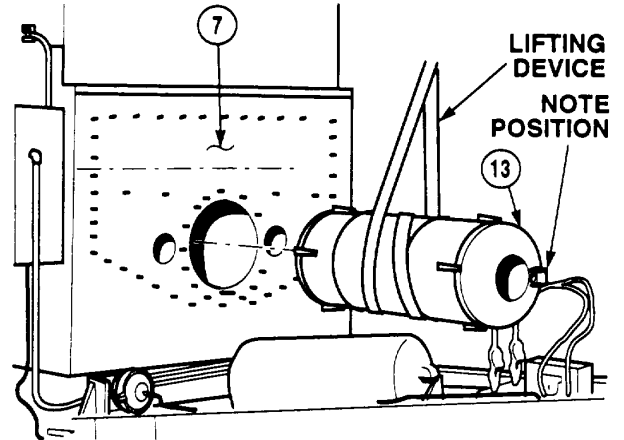
WARNING

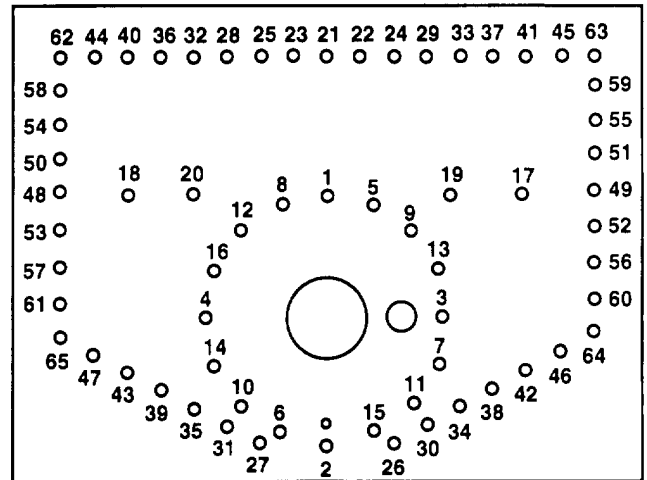
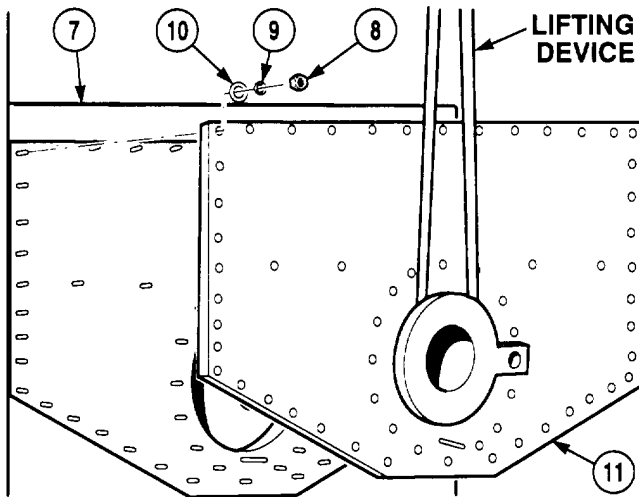
To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

NOTE

- Combustion chamber liner weighs 70 lb (32 kg).
- Position chamber liner as noted during removal.

- (1) Using a lifting device, install combustion chamber liner (13) in heat exchanger (7).
- (2) Install insulation (12) on heat exchanger (7), pressing insulation over studs. Trim edges.
- (3) Cut hole in insulation (12) to match center hole in combustion chamber liner.





NOTE

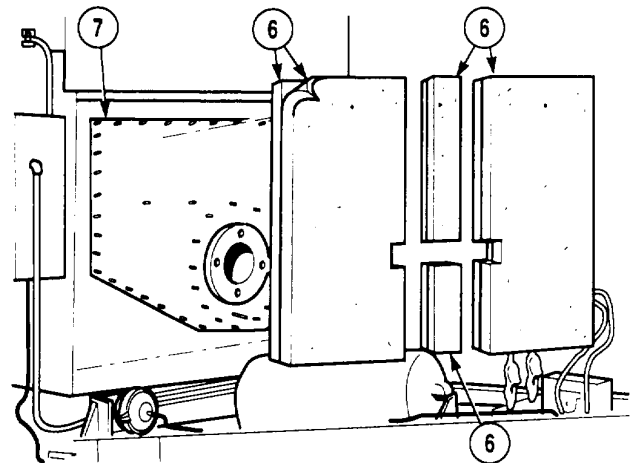
Apply compound (item 7, appendix E) to studs.

- (4) Using a lifting device, and with the aid of an assistant, install front service plate (11) with sixty-five washers (10), lock washers (9), and nuts (8). Tighten nuts in sequence shown to 10 -12 lb-ft (14-16 N•m).

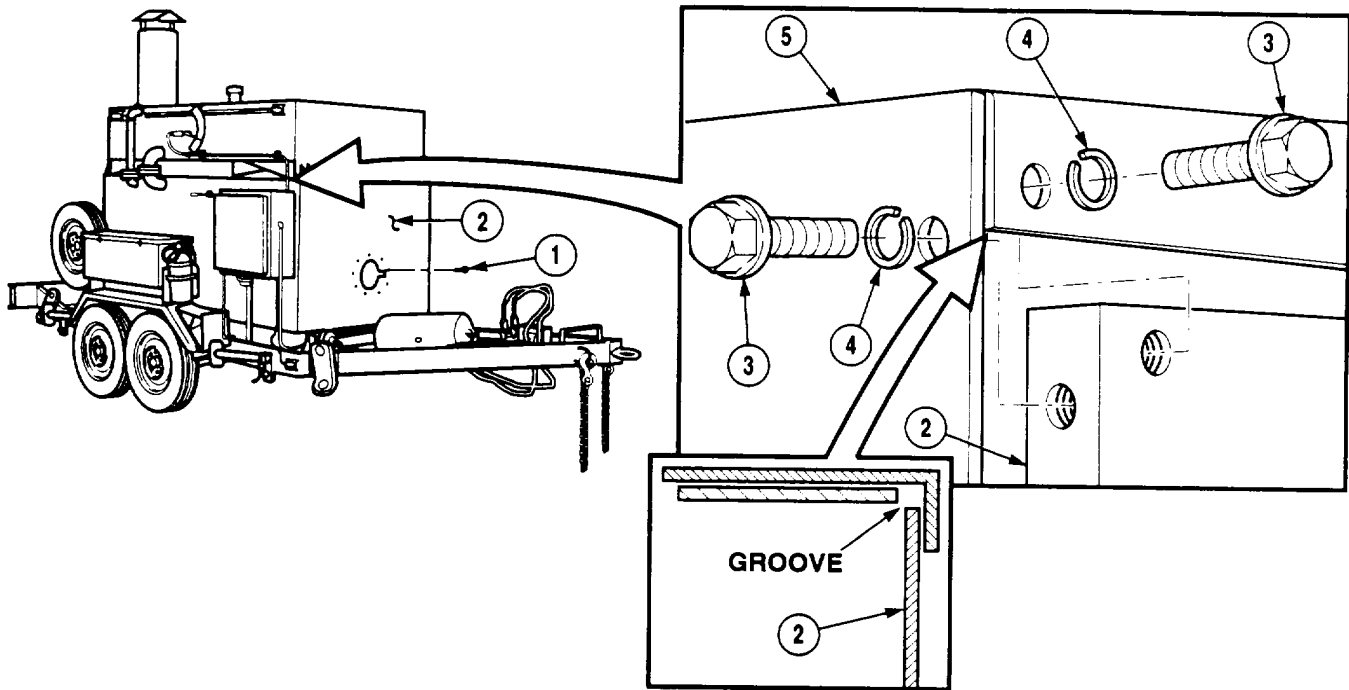
WARNING

Protective equipment (gloves, goggles, ventilation mask) must be worn when removing/installing insulation; breathing the insulation can be harmful to personnel.

- (5) Install eight pieces of insulation (6) on heat exchanger (7).
- (6) Bend three wires (5) up to hold insulation (6) in place.



4-101. COMBUSTION CHAMBER LINER REPLACEMENT (CONT).



NOTE

- Trim excess insulation to aid in installation of front tin.
- Front tin must be positioned in groove before attempting to install screws.

(7) With the aid of an assistant, install front tin (2) with nine screws (1) on Heater (5).

(8) Install twenty-nine lock washers (4) and screws (3) in front tin (2).

NOTE

Follow-on Maintenance:

- Install burner assembly (page 4-227).
- Install burner cover (page 4-296).
- Install cable reel (page 4-154).

END OF TASK

4-102. HEAT SHIELD AND COVER REPLACEMENT AND EXHAUST STACK CLEANOUT.

This task covers:

- a. Removal
- b. Cleaning/Inspection
- c. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Equipment Condition

Wheels Chocked (page 2-17)

Heater Cooled

Exhaust Stack Raised (page 2-15)

Materials/Parts

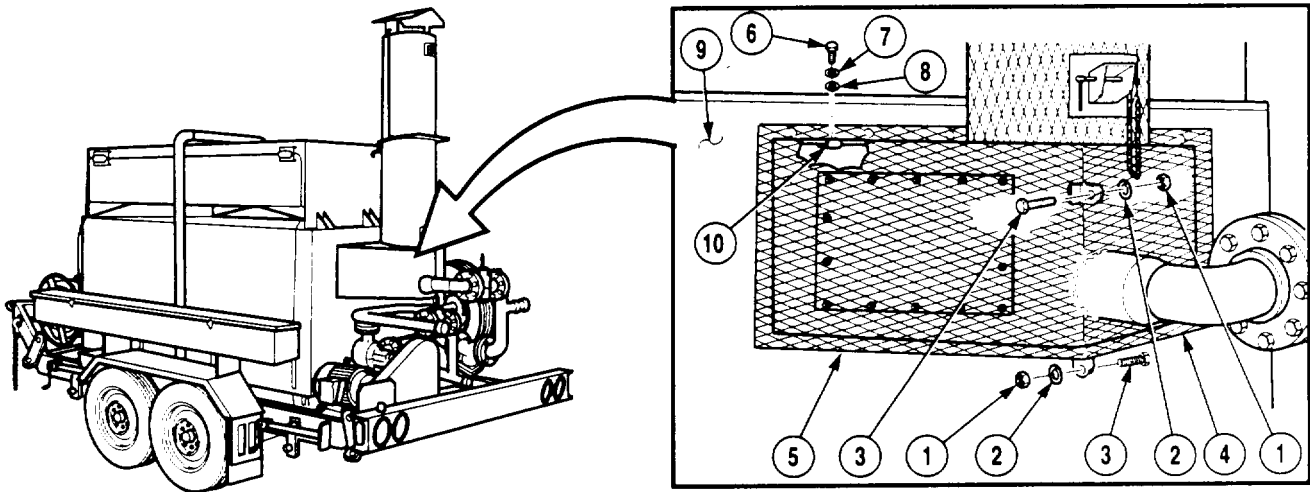
Gasket

Lock Washers (2)

Lock Washers (14)

Lock Washers (14)

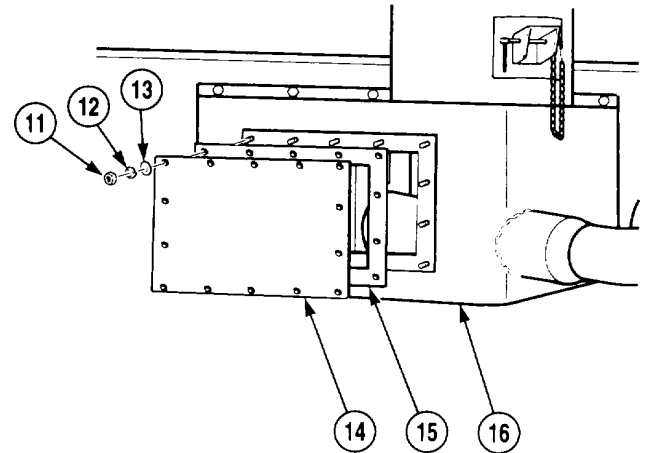
a. Removal.



- (1) Remove two nuts (1), lock washers (2), and screws (3) from bracket of left and right heat shield (4 and 5). Discard lock washers.
- (2) Remove seven screws (6), lock washers (7), washers (8), and left heat shield (4) from Heater (9)
- (3) Remove seven screws (6), lock washers (7), washers (8), and right heat shield (5) from Heater (9).
- (4) If damaged, remove fourteen cage nuts (10) from Heater (9).

4-102. HEAT SHIELD AND COVER REPLACEMENT AND EXHAUST STACK CLEANOUT (CONT).

- (5) Remove fourteen nuts (11), lock washers (12), washers (13), panel (14), and gasket (15) from exhaust stack (16). Discard gasket and lock washers.



b. Cleaning/Inspection.

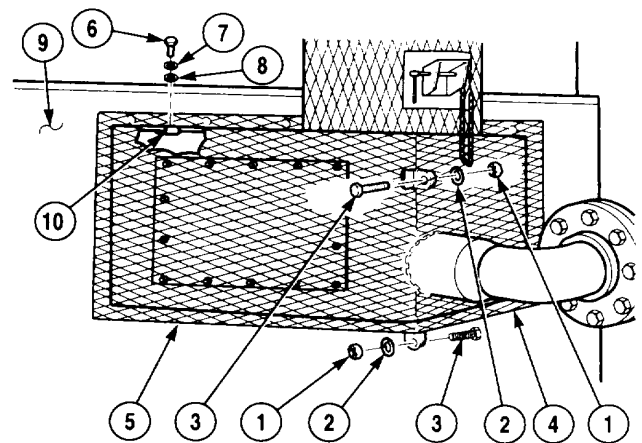
WARNING

Protective equipment (gloves, goggles, ventilation mask) must be worn when cleaning exhaust stack. Breathing exhaust waste can be harmful to personnel.

- (1) Using a whisk broom, clean exhaust stack (16).
- (2) Inspect parts for cracks, broken welds, excessive wear, or damage.

c. Installation.

- (1) Install gasket (15), panel (14), fourteen washers (13), lock washers (12), and nuts (11) on exhaust stack (16).
- (2) If removed, installed fourteen cage nuts (10) on Heater (9).
- (3) Position two screws (3), lock washers (2), and nuts (1) in left heat shield (4) and right heat shield (5). Do not tighten nuts.
- (4) Install left heat shield (4) and right heat shield (5) on heater (9) with fourteen screws (6), lock washers (7), and washers (8).
- (5) Tighten nuts (1).



NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-103. BURNER COVER REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Gasket
 Lock Washers (12)
 Lock Washers (16)

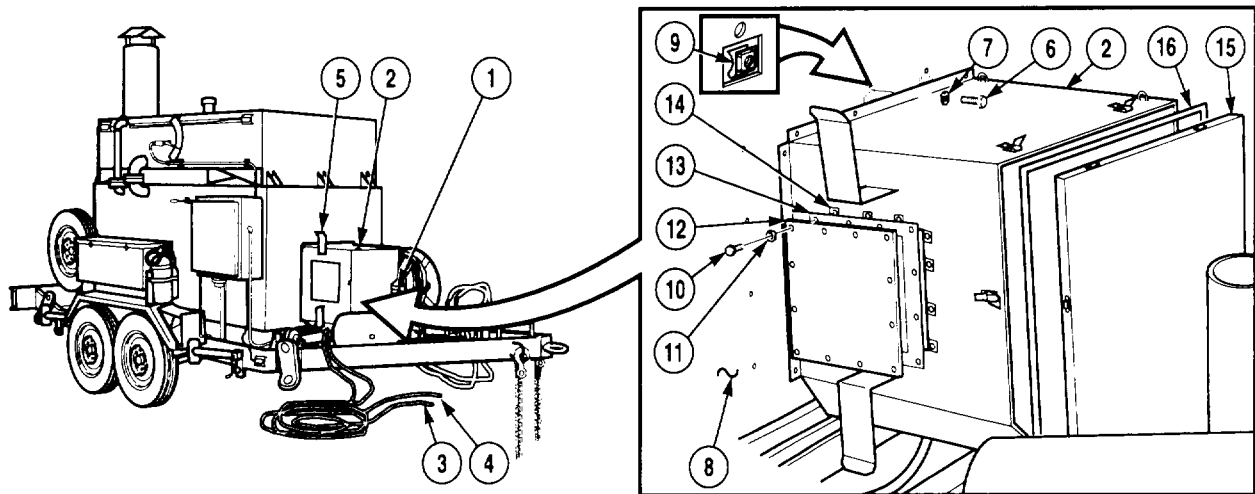
Equipment Condition

Wheels Chocked (page 2-17)
 Heater Cooled
 Power Source Disconnected (page 2-32)
 Fuel Line Disconnected From Source
 (page 2-33)

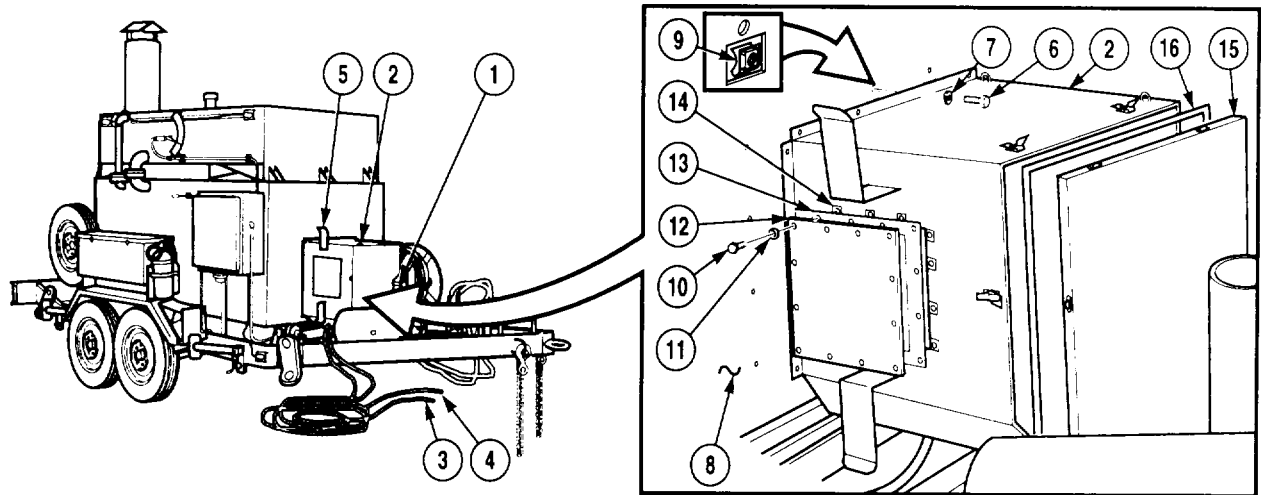
Personnel Required

Two

a. Removal.



- (1) Remove cable (1) from burner cover (2).
- (2) Remove fuel lines (3 and 4) from brackets (5).
- (3) With the aid of an assistant, remove sixteen screws (6), lock washers (7), and burner cover (2) from Heater (8).
- (4) If damaged, remove sixteen cage nuts (9) from Heater (8).
- (5) If damaged, remove twelve screws (10), lock washers (11), cover plate (12), and gasket (13) from burner cover (2). Discard gasket and lock washers.
- (6) If damaged, remove twelve cage nuts (14) from burner cover (2).
- (7) If damaged, remove front burner access cover (15) and gasket (16) from burner cover (2)

4-93. BURNER COVER REPLACEMENT (CONT).
b. Installation.


- (1) If removed, install gasket (16) and cover (15) on burner cover (2)
- (2) If removed, install twelve cage nuts (14) on burner cover (2).
- (3) If removed, install gasket (13) and cover plate (12) with twelve lock washers (11) and screws (10) on burner cover (2).
- (4) If removed, install sixteen cage nuts (9) on burner cover (2).
- (5) With the aid of an assistant, install burner cover (2) with sixteen lock washers (7) and screws (6) on Heater (8).
- (6) Replace fuel lines (3 and 4) on brackets (5).
- (7) Replace cable (1) in burner cover (2).

NOTE

Follow-on Maintenance: Remove wheel chocks (page 2-35).

END OF TASK

4-104. EXPANSION TANK ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Lifting Device 700 lb (318 kg)

Personnel Required

Two

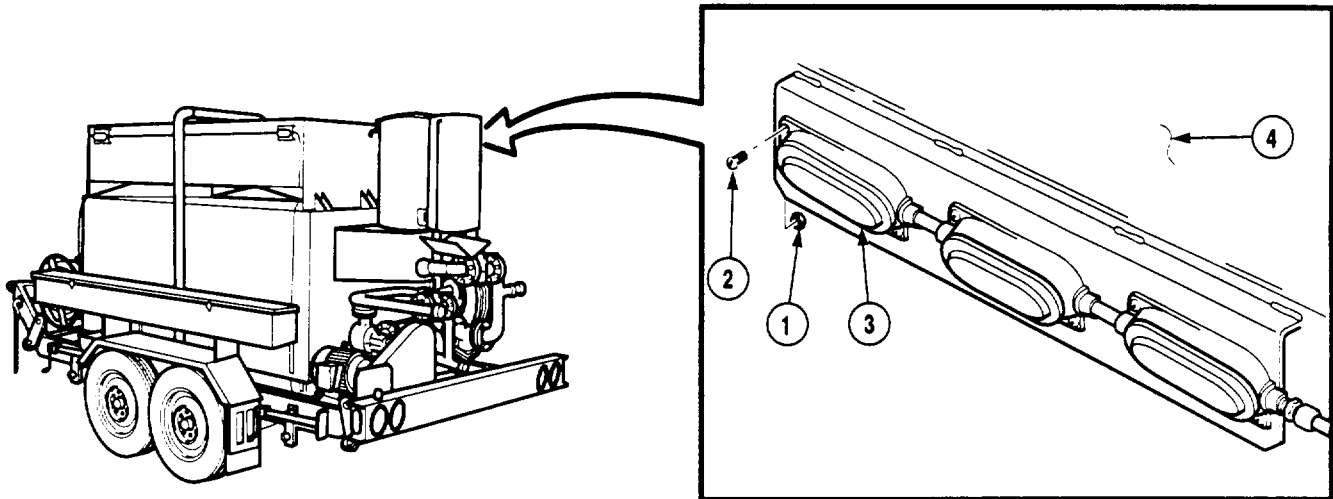
Materials/Parts

Preformed Packing
Lock Washers (4)
Lock Washers (4)
Lock Washers (6)
Gaskets (3)
Gasket
Gasket
Butt Connector
Lock Washers (2)

Equipment Condition

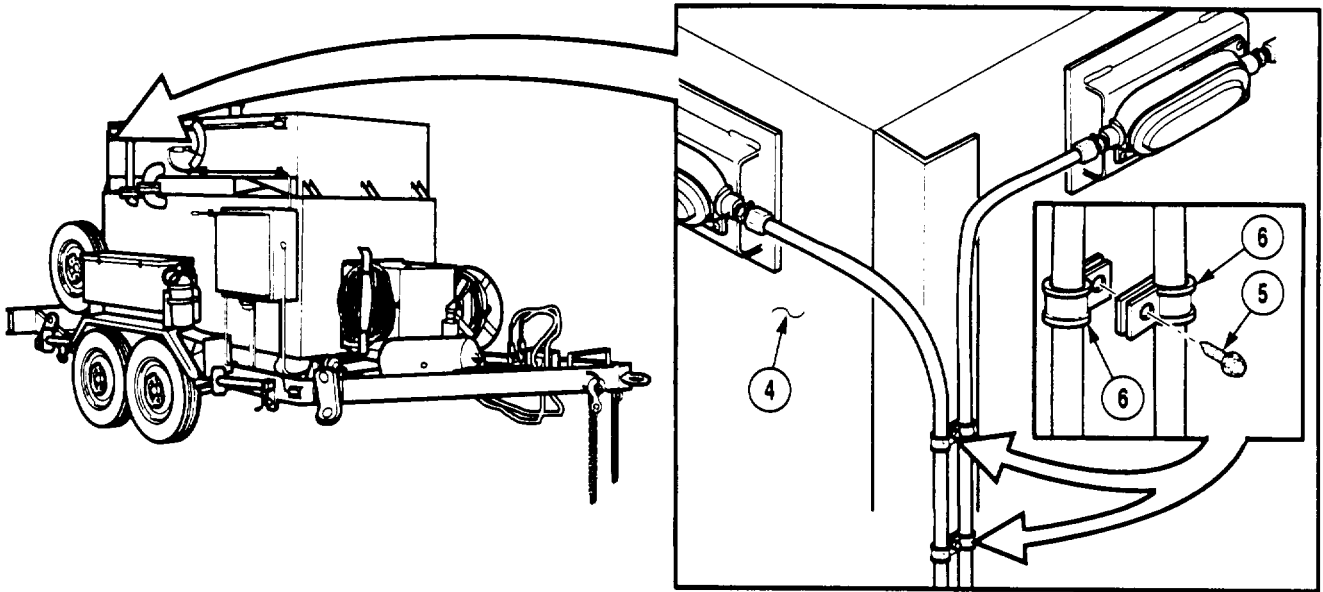
Wheels Chocked (page 2-17)
Heater Cooled
Power Source Disconnected (page 2-32)
Fuel Line Disconnected From Source (para 2-33)
Heater Leveled (page 2-17)
Exhaust Stack Lowered (page 2-43)
Drain Expansion Tank (page 3-12)

a. Removal.

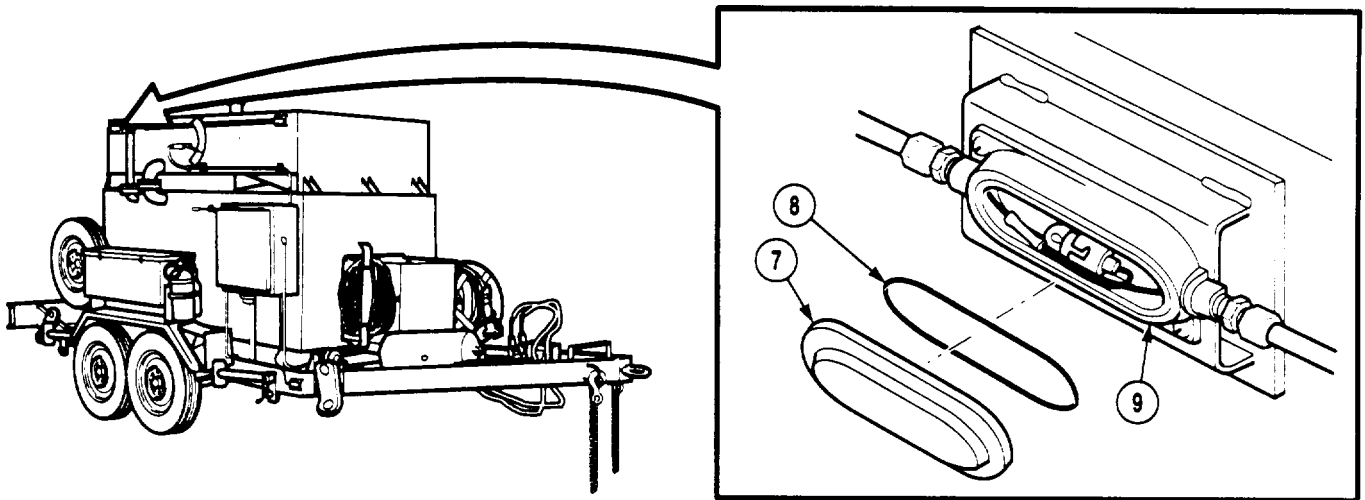


(1) Remove six nuts, (1) screws (2), and rear marker lights (3) from expansion tank (4).

4-104. EXPANSION TANK ASSEMBLY REPLACEMENT (CONT).

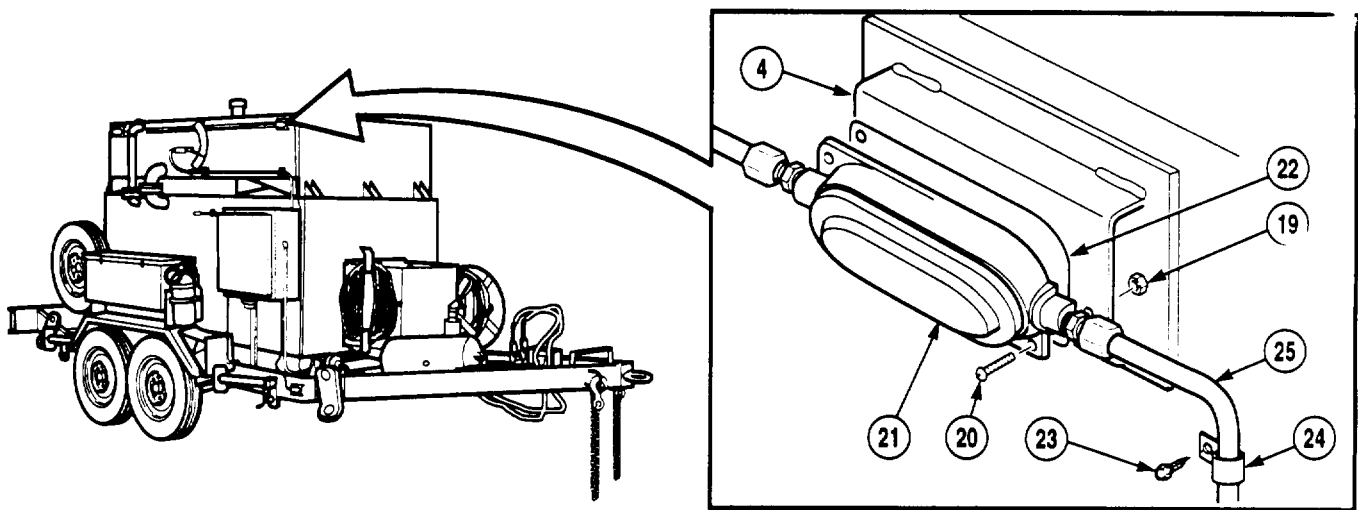
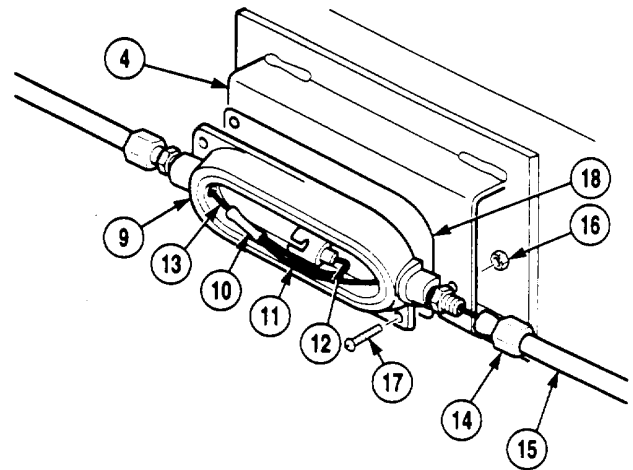


(2) Remove two screws (5) and four clamps (6).



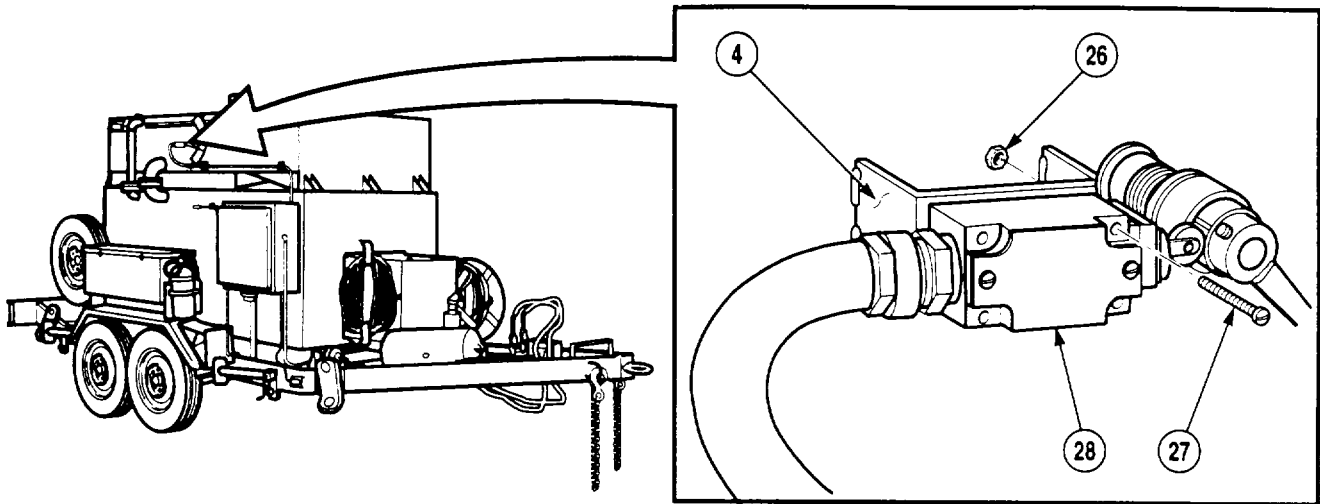
(3) Remove lens (7) and preformed packing (8) from side marker light (9). Discard preformed packing.

- (4) Remove butt connector (10) by cutting wires (11, 12, and 13). Discard butt connector.
- (5) Loosen nut (14) and then remove conduit (15) and wire (11) from side marker light (9).
- (6) Remove two nuts (16), screws (17), side marker light (9), and gasket (18) from expansion tank (4). Discard gasket.

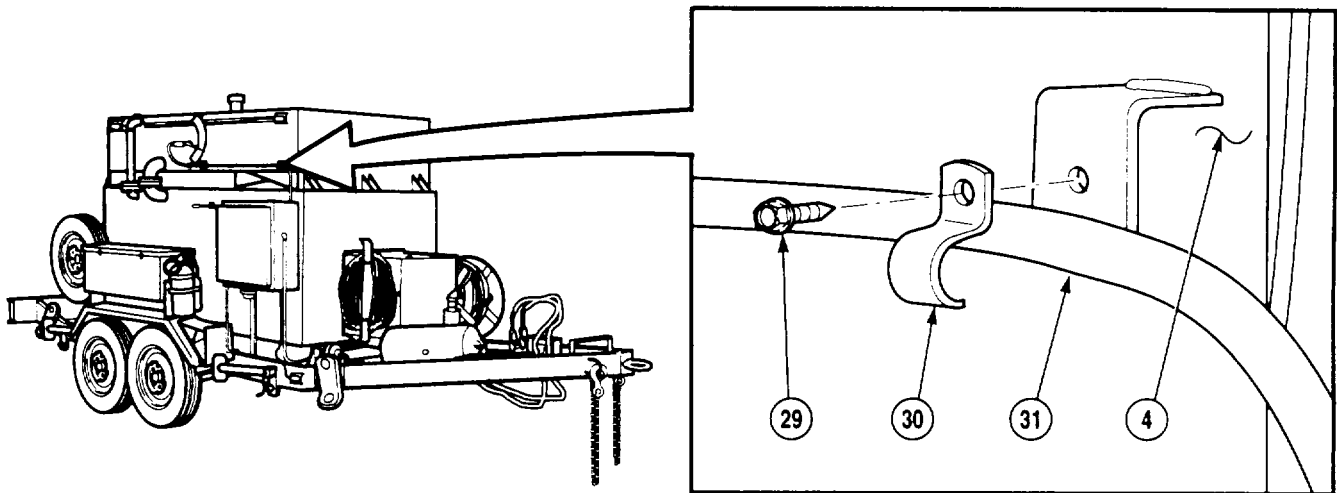


- (7) Remove two nuts (19), screws (20), side marker light (21), and gasket (22) from expansion tank (4). Discard gasket.
- (8) Remove seven screws (23) and clamps (24) from expansion tank (4).
- (9) Position conduit (25), marker light (21), and clamps (24) safely away from expansion tank (4).

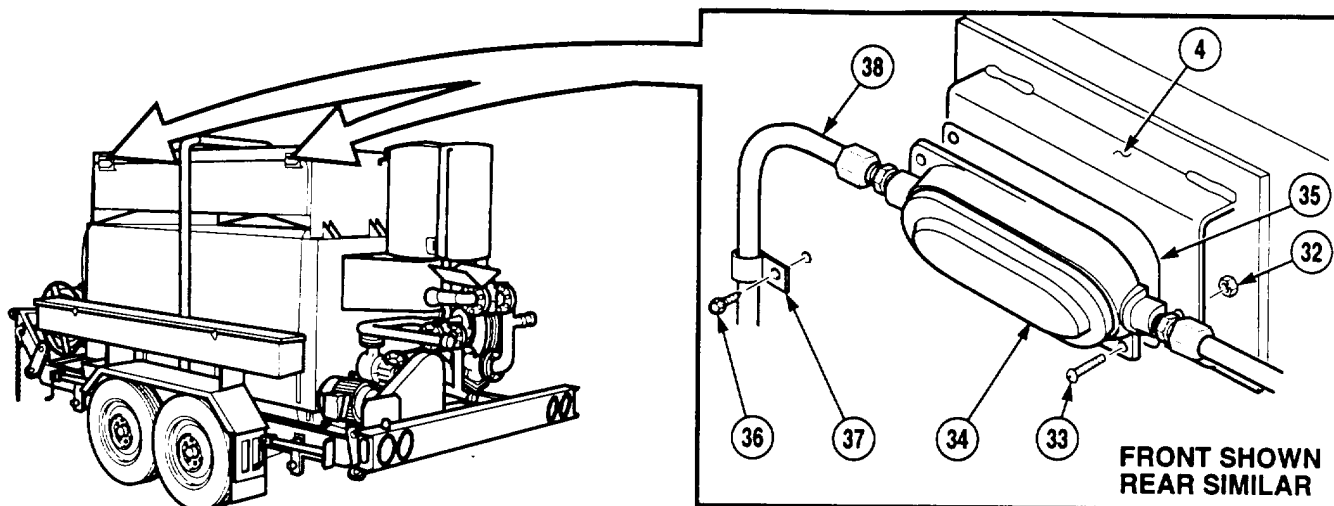
4-104. EXPANSION TANK ASSEMBLY REPLACEMENT (CONT).



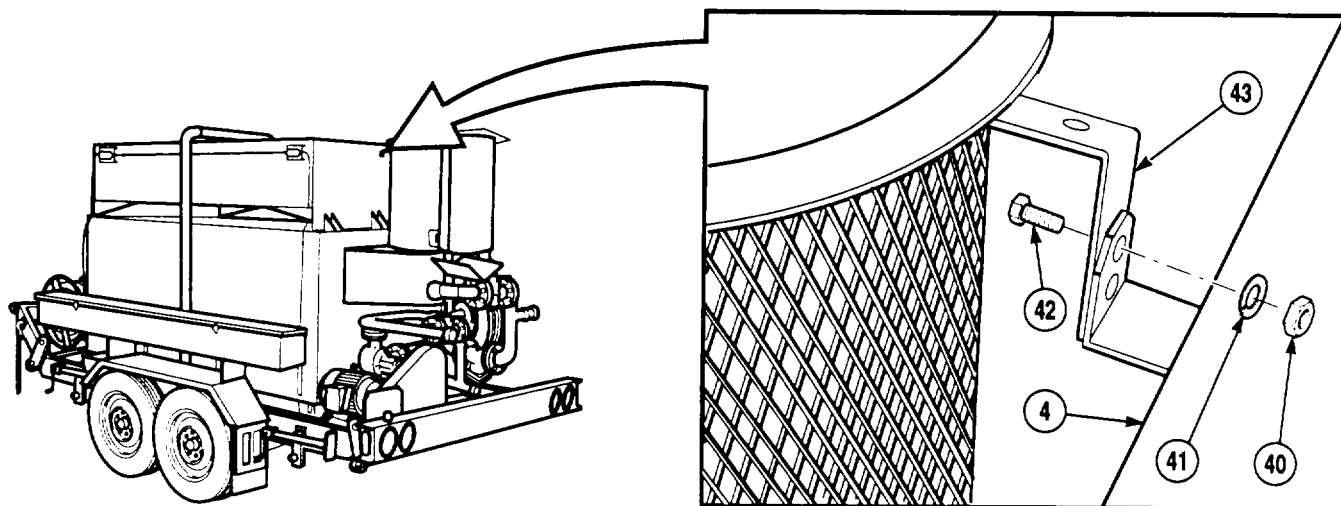
(10) Remove four nuts (26), screws (27), and limit switch (28) from expansion tank (4).



(11) Remove two screws (29) and clamps (30), and swing conduit (31) away from expansion tank (4).

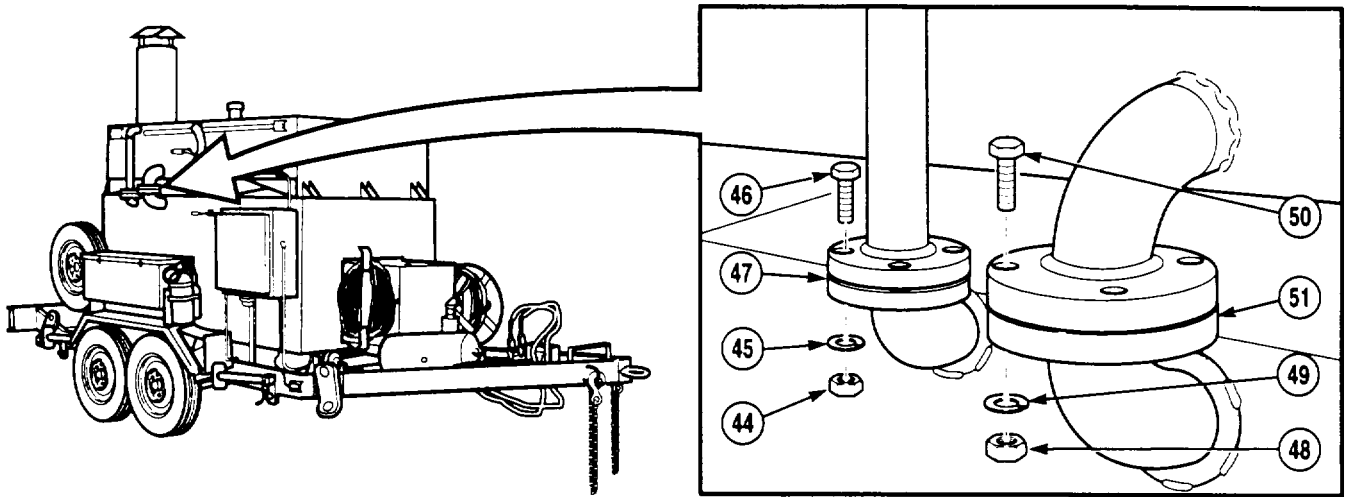


- (12) Remove four nuts (32), screws (33), two side marker lights (34), and gasket (35) from expansion tank (4). Discard gasket.
- (13) Remove nine screws (36), clamps (37), and conduit (38) from expansion tank (4).
- (14) Position conduit (38) with side marker light (34) and clamps (37) on heat exchanger (39) in safe area.



- (15) Remove two nuts (40), lock washers (41), and screws (42) from exhaust stack bracket (43) and expansion tank (4). Discard lock washers.

4-104. EXPANSION TANK ASSEMBLY REPLACEMENT (CONT).



(16) Remove four nuts (44), lock washers (45), and screws (46) from flange (47). Discard lock washers.

(17) Remove four nuts (48), lock washers (49), and screws (50) from flange (51). Discard lock washers.

WARNING

To avoid personnel injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs. (23 kg). Ensure all chairs, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

NOTE

Expansion tank weighs 700 lb (318 kg)

- (18) Using a lifting device, remove six nuts (52), lock washers (53), washers (54), and expansion tank (4) from Heater (55). Discard lock washers.
- (19) Remove gasket (56) from flange (47). Discard gasket.
- (20) Remove gasket (57) from flange (51). Discard gasket.

NOTE

Follow steps (21) through (23) only if expansion tank is being replaced.

- (21) Remove fill cap (58) from expansion tank (4).
- (22) Refer to page 4-157 for data plate replacement.
- (23) Refer to page 4-194 for low oil indicator replacement/adjustment.

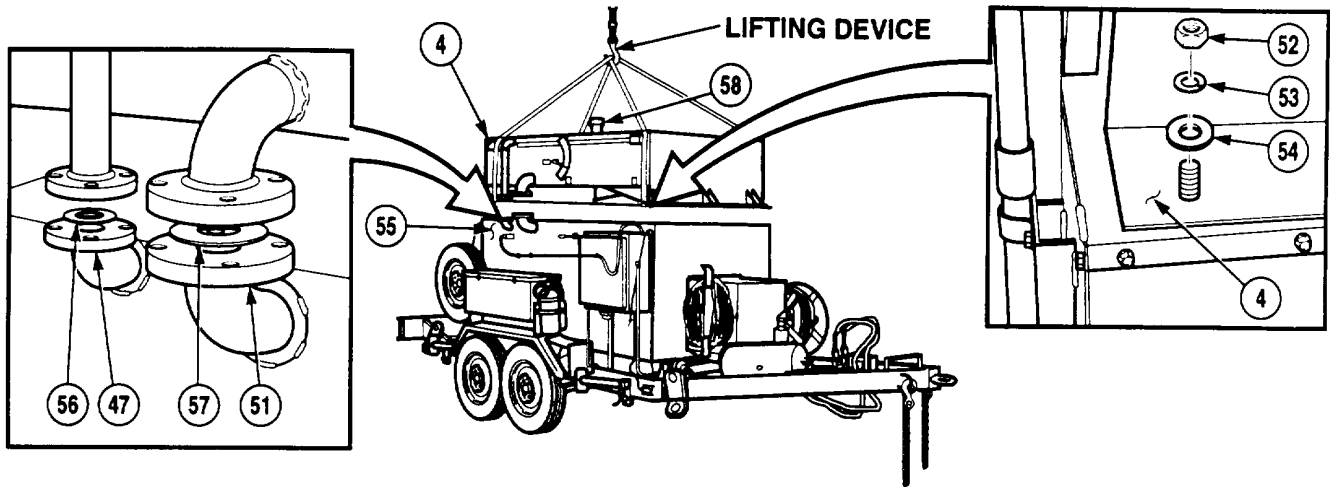
4-104. EXPANSION TANK ASSEMBLY REPLACEMENT (CONT).

b. Installation.

NOTE

Follow steps (1) through (3) if expansion tank is being replaced.

- (1) If removed, install data plates (page 4-157).
- (2) If removed, install low oil indicator (page 4-194).

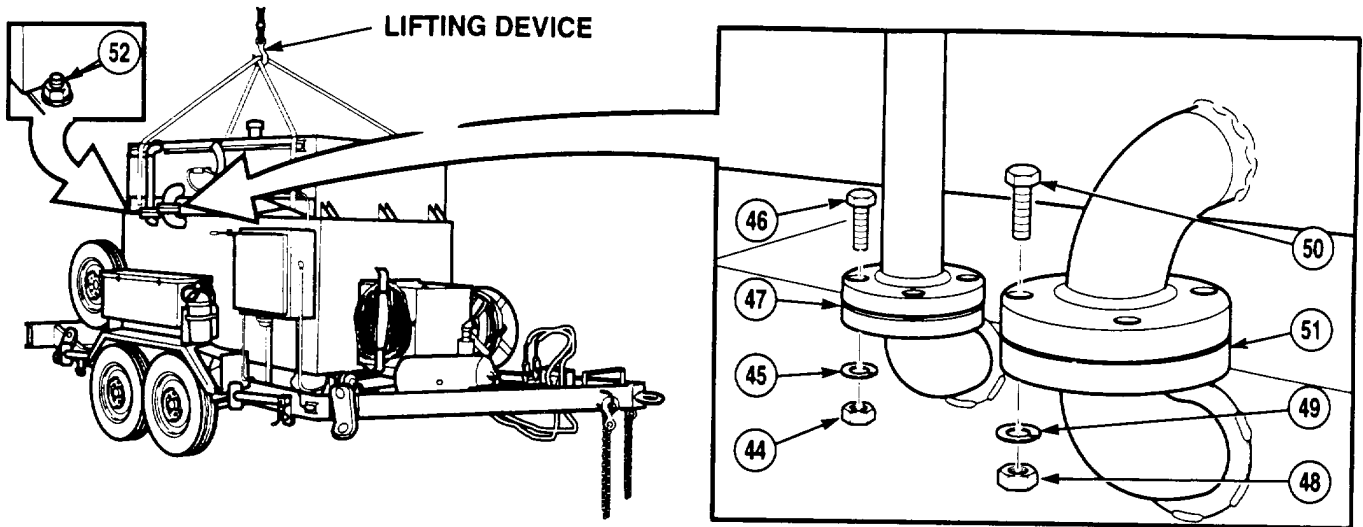


- (3) Install fill cap (58) on expansion tank (4).
- (4) Position gasket (57) on flange (51).
- (5) Position gasket (56) on flange (47).

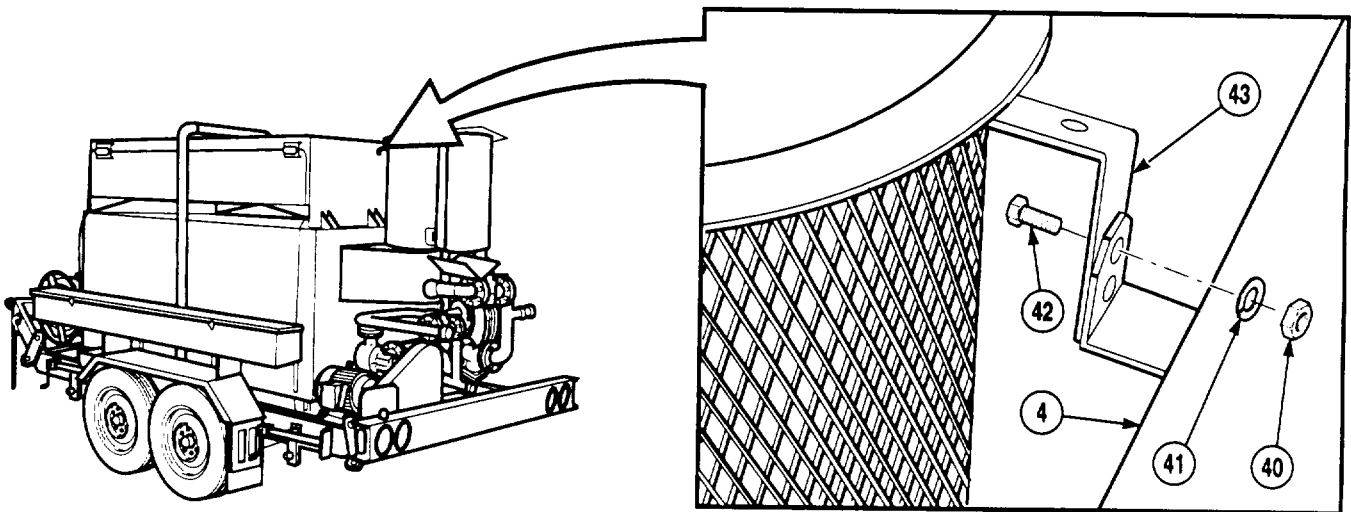
WARNING

To avoid personnel injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs. (23 kg). Ensure all chairs, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

- (6) Using a lifting device, and with the aid of an assistant, position expansion tank (4) over Heater (55).
- (7) Lower expansion tank (4) ensuring that conduit (38) is behind overflow tube (59) as tube passes through ring (60).
- (8) Install six washers (54), lock washers (53) and nuts (52) on Heater (55). Do not tighten nuts.

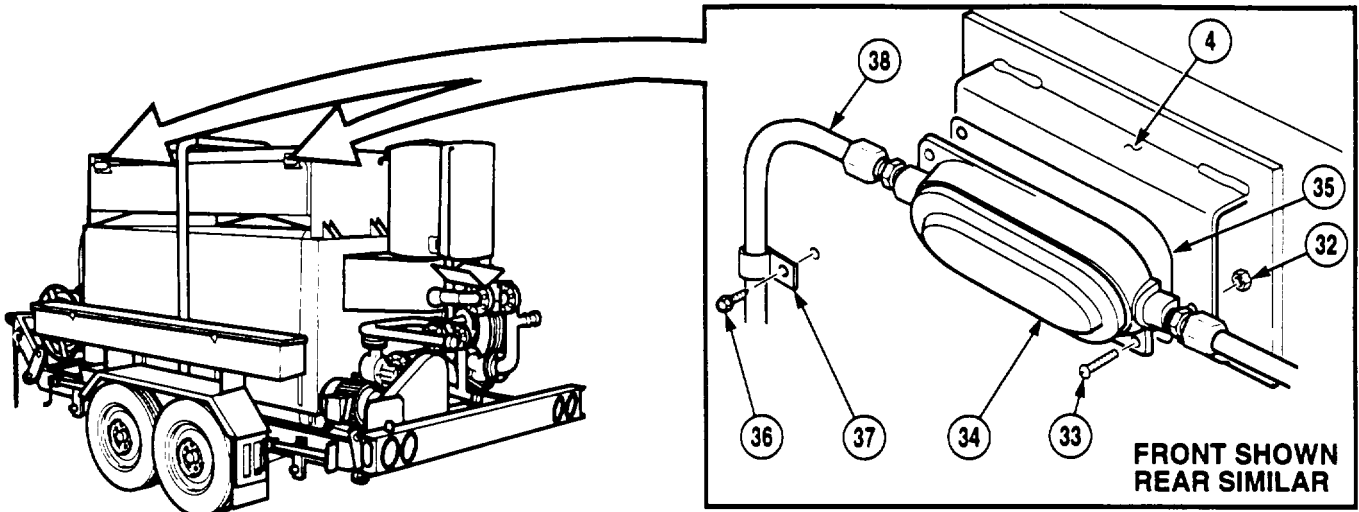


- (9) Aline holes and install four screws (50), lock washers (49), and nuts (48) on flange (51). Tighten nuts.
- (10) Aline holes and install screws (46), lock washers (45), and nuts (44) on flange (47). Tighten nuts.
- (11) Tighten nuts (52).
- (12) Remove lifting device from expansion tank (4).

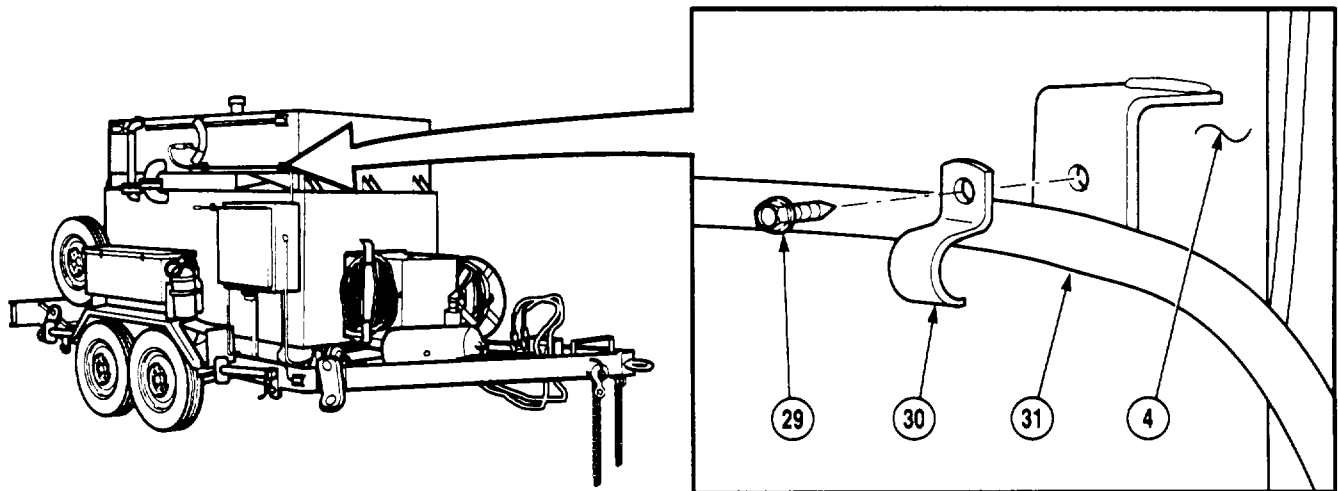


- (13) Install two screws (42), lock washers (41), and nuts (40) on exhaust stack bracket (43) and expansion tank (4).

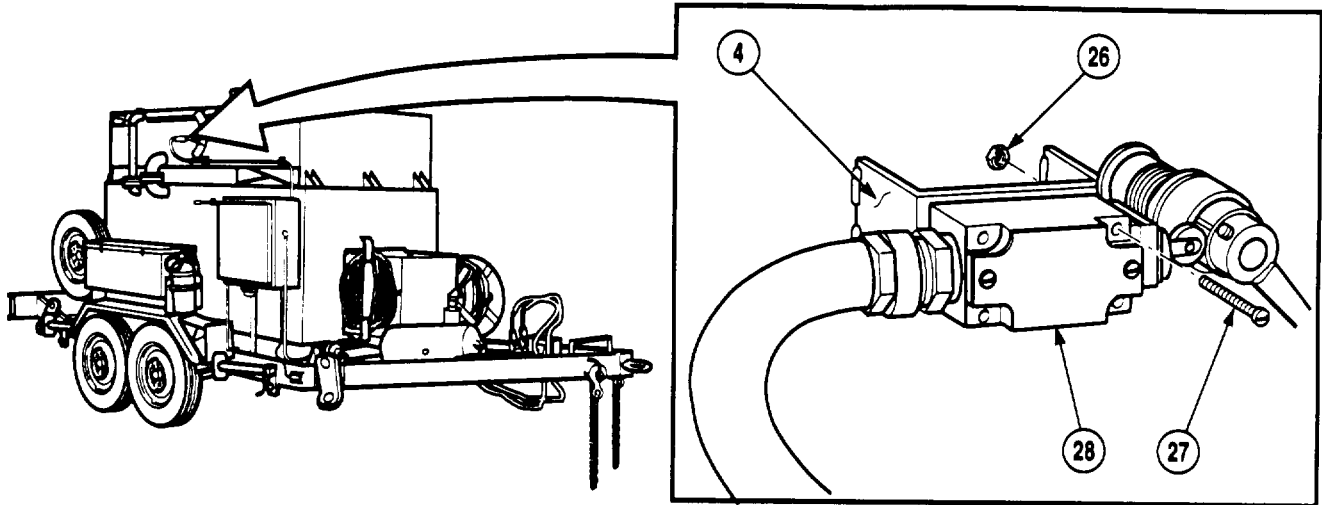
4-104. EXPANSION TANK ASSEMBLY REPLACEMENT (CONT).



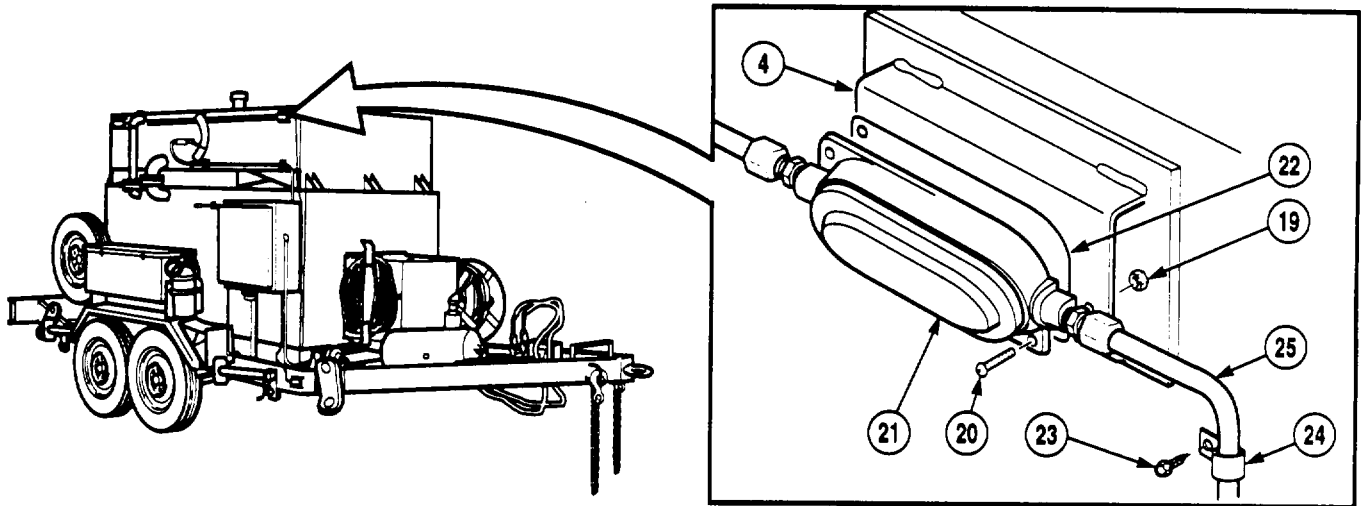
- (14) Install two gaskets (35) and side marker lights (34) with four screws (33) and nuts (32) on expansion tank (4).
- (15) Install nine clamps (37) with screws (36) on expansion tank (4).



- (16) Install conduit (31) with two clamps (30) and screws (29) on expansion tank (4).



(17) Install limit switch (28) with four screws (27) and nuts (26) on expansion tank (4).



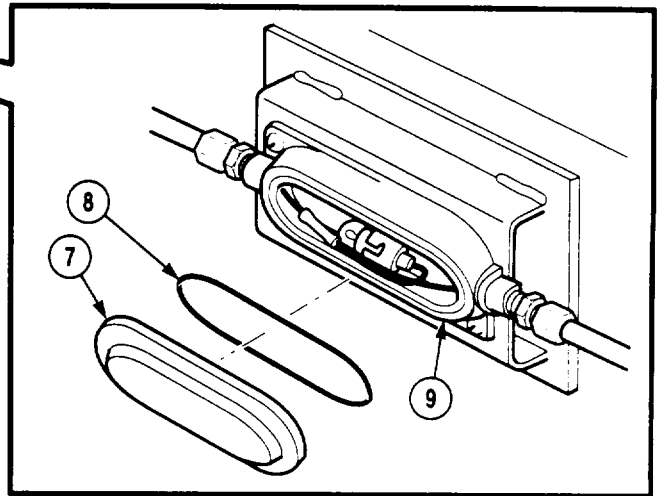
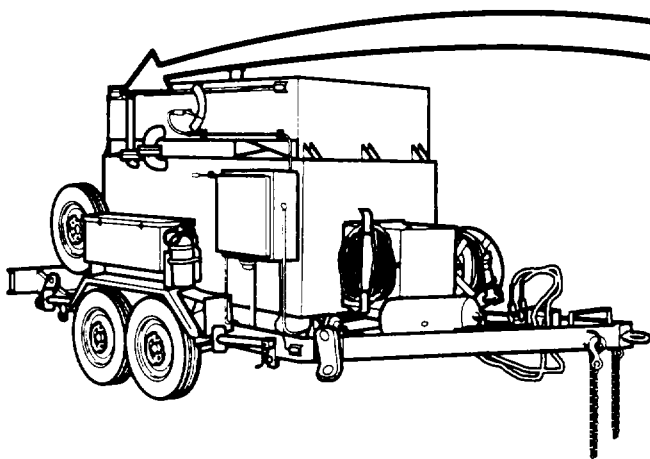
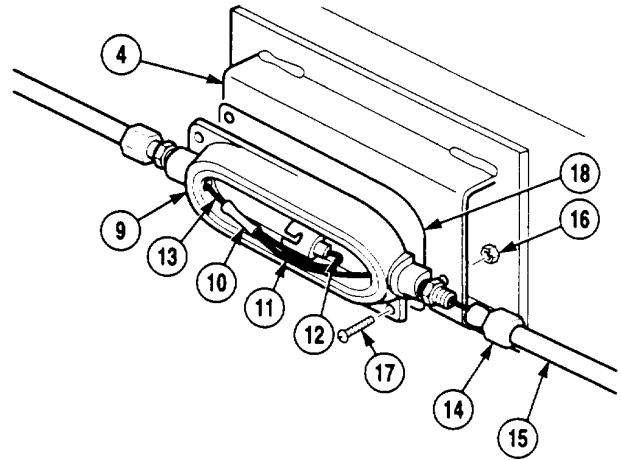
(18) Position conduit (25), marker light (21), and clamps (24) on expansion tank (4).

(19) Install seven clamps (24) with screws (23) on expansion tank (4).

(20) Install gasket (22) and side marker light (21) with two screws (20) and nuts (19) on expansion tank (4).

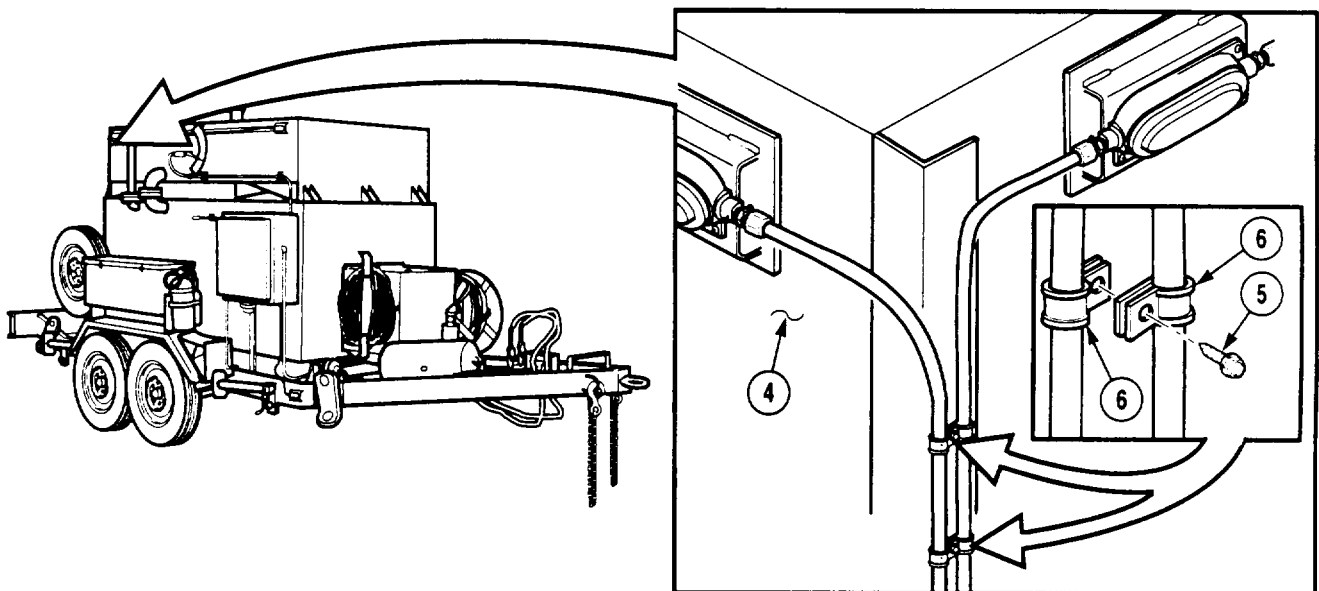
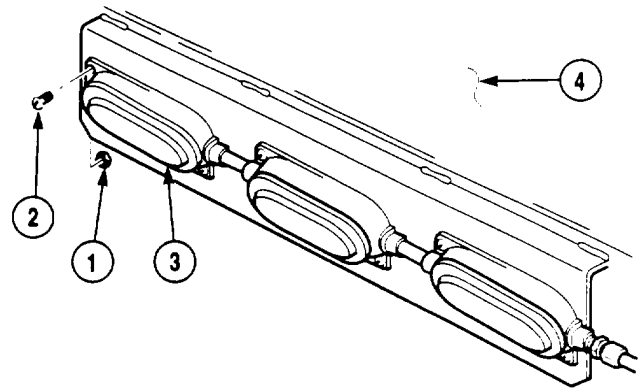
4-104. EXPANSION TANK ASSEMBLY REPLACEMENT (CONT).

- (21) Install gasket (18) and side marker light (9) with two screws (17) and nuts (16) on expansion tank (4).
- (22) Insert wire (11) and conduit (15) in side marker light (9). Tighten nut (14).
- (23) Connect wires (11, 12, and 13) with butt connector (10).



- (24) Install preformed packing (8) and lens (7) on side marker light (9).

(24) Install rear marker lights (3) on expansion tank (4) with six screws (2) and nuts (1).



(25) Install four clamps (6) with two screws (5) on expansion tank (4).

NOTE

Follow-on Maintenance:

- Fill expansion tank (page 3-13).
- Remove wheel chocks (page 2-35).

END OF TASK

4-105. HEAT EXCHANGER ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Lifting Device, Minimum 3,500 lb (1,588 kg)

Materials/Parts

Gasket
Locknuts (6)

Personnel Required

Two

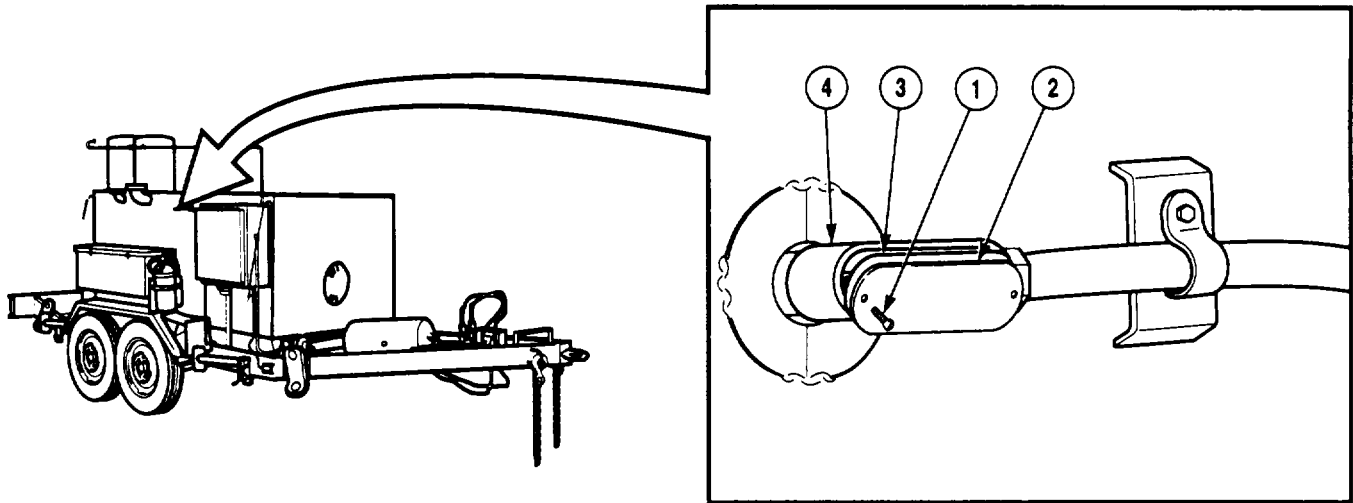
Equipment Condition

Wheels Chocked (page 2-17)
Heater Cooled
Power Source Disconnected (page 2-32)
Fuel Supply Disconnected From Source
(page 2-33)
Exhaust Stack Lowered (page 2-43)

Equipment Condition - Continued

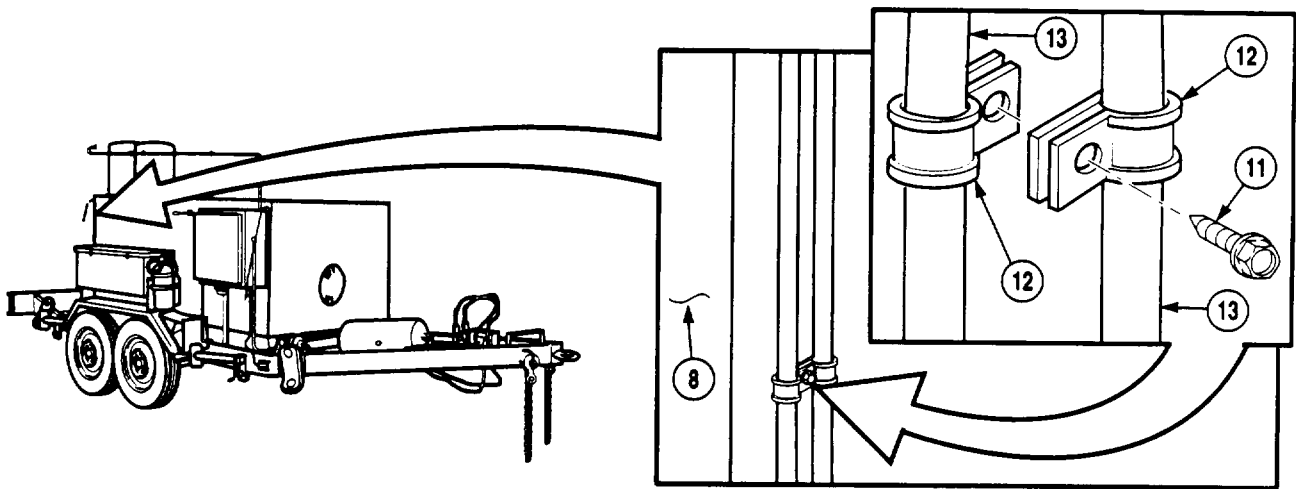
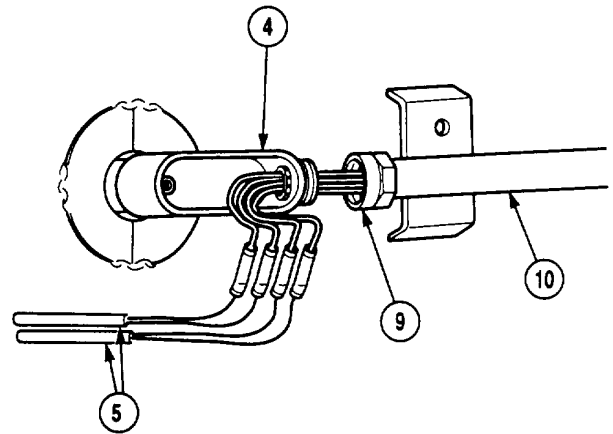
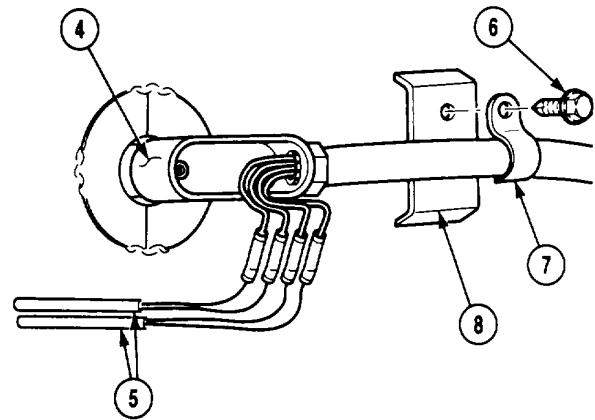
Spare Tire Removed (page 3-9)
Cable Reel Removed (page 4-154)
Burner Cover Removed (page 4-295)
Burner Assembly Removed (page 4-223)
Valve No. 1 Removed (page 4-208)
Valve No. 2 Removed (page 4-210)
Valve No. 3 Removed (page 4-213)
Strainer Removed (page 4-206)
Pressure Relief Valve Removed (page 4-216)
Expansion Tank Removed (page 4-297)

a. Removal.



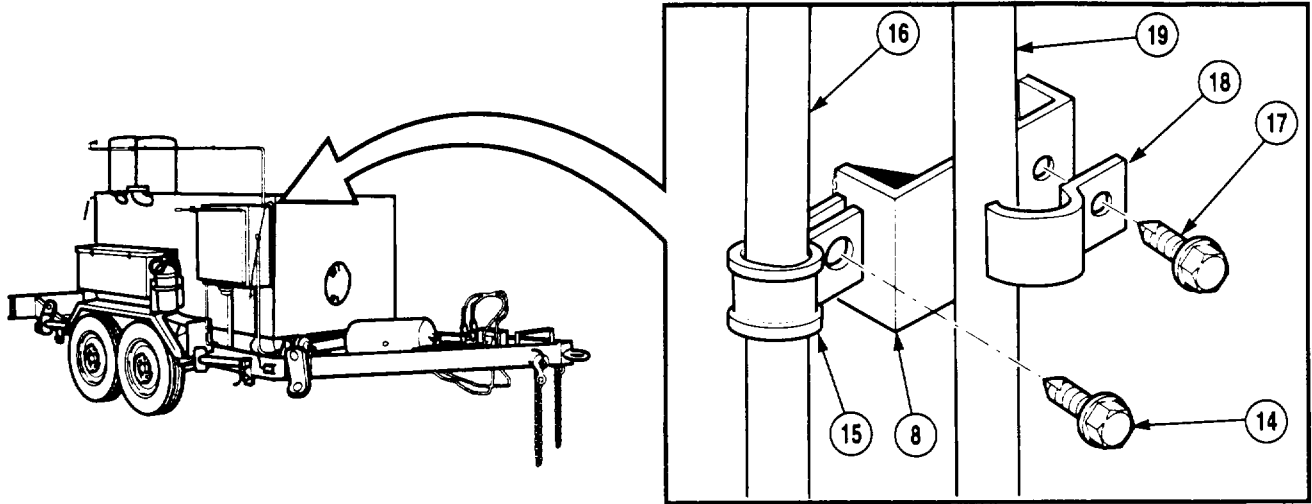
(1) Remove two screws (1), cover (2), and gasket (3) from outlet body (4). Discard gasket.

- (2) Remove temperature sensors (5) from outlet body (4).
- (3) Remove two screws (6) and clamps (7) from heat exchanger (8).
- (4) Loosen nut (9), then remove conduit (10), and slide temperature sensors (5) through end of outlet body (4).



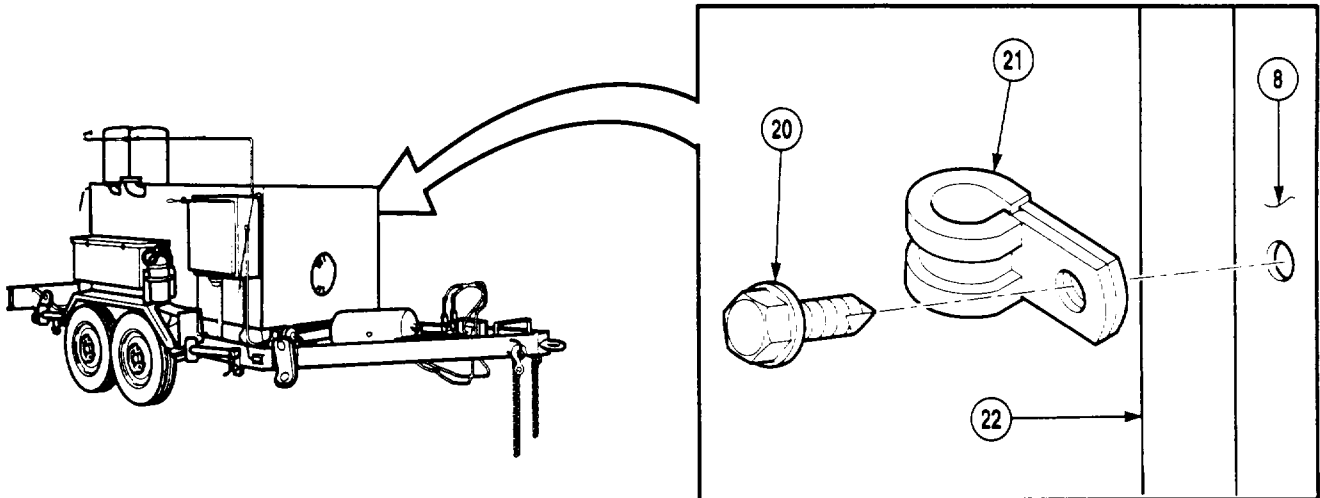
- (5) Remove three screws (11), six clamps (12), and conduit (13) from heat exchanger (8).

4-105. HEAT EXCHANGER ASSEMBLY REPLACEMENT (CONT).

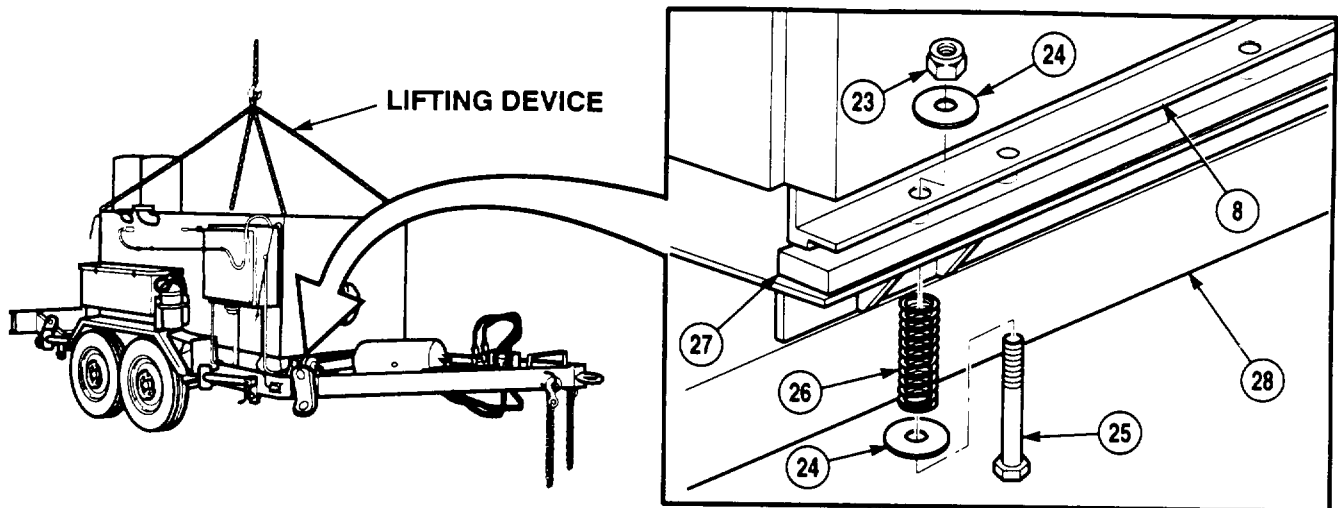


(6) Remove three screws (14), clamps (15), and conduit (16) from heat exchanger (8).

(7) Remove two screws (17), clamps (18), and conduit (19) from heat exchanger (8).



(8) Remove six screws (20), clamps (21), and conduit (22) from heat exchanger (8).

**WARNING**

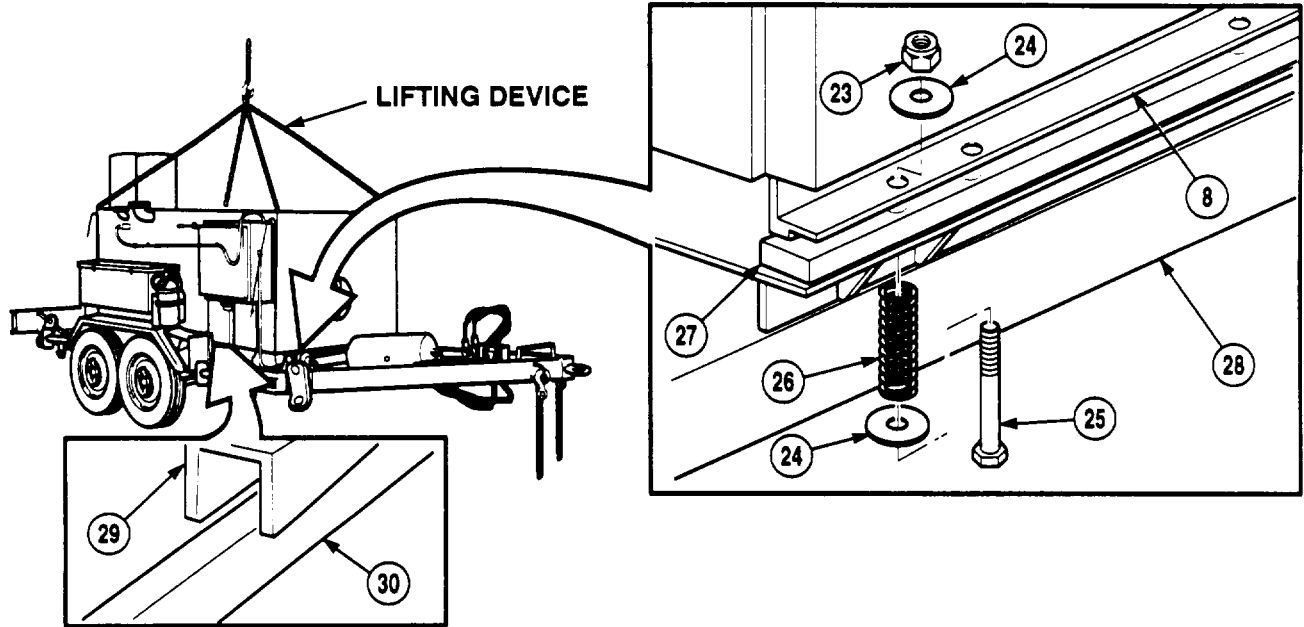
To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs. (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

NOTE

Heat exchanger weighs 3,500 lb (1,588 kg).

- (9) Attach a lifting device to heat exchanger (8).
- (10) Remove six locknuts (23), twelve washers (24), six screws (25), six springs (26), two steel spacers (27), and heat exchanger (8) from frame (28). Discard locknuts.

4-105. HEAT EXCHANGER ASSEMBLY REPLACEMENT (CONT).

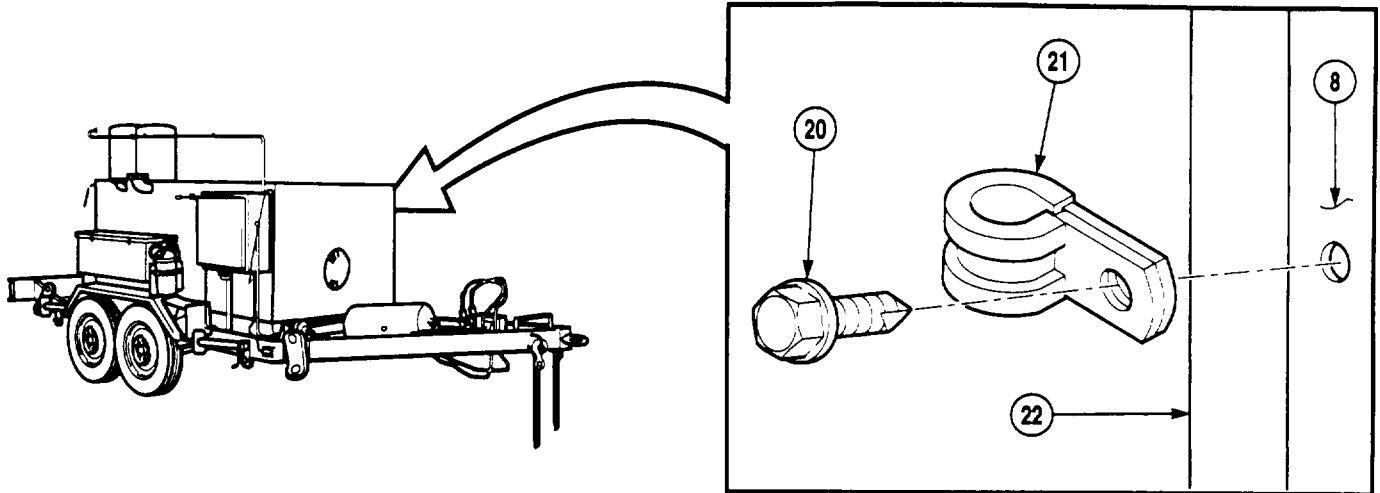
b. Installation.**WARNING**

To avoid personal injury, use a hoist or get assistance when lifting components that weigh more than 50 lbs. (23 kg). Ensure all chains, hooks, slings, etc., are in good condition and are of correct capacity. Ensure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

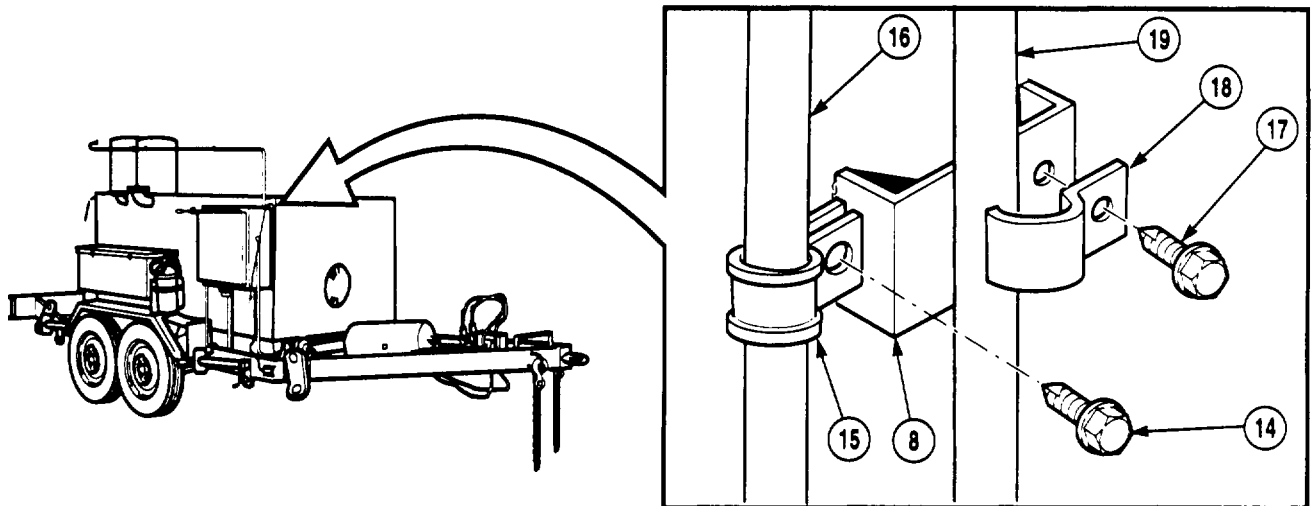
NOTE

Heat exchanger weighs 3,500 lb (1,588 kg).

- (1) Using a lifting device, and with the aid of an assistant, align bracing (29) with cross member (30), and install heat exchanger (8) and two steel spacers (27) on frame (28) with six springs (26), screws (25), twelve washers (24) and six locknuts (23).
- (2) Tighten locknuts (23) until springs (26) start to compress.



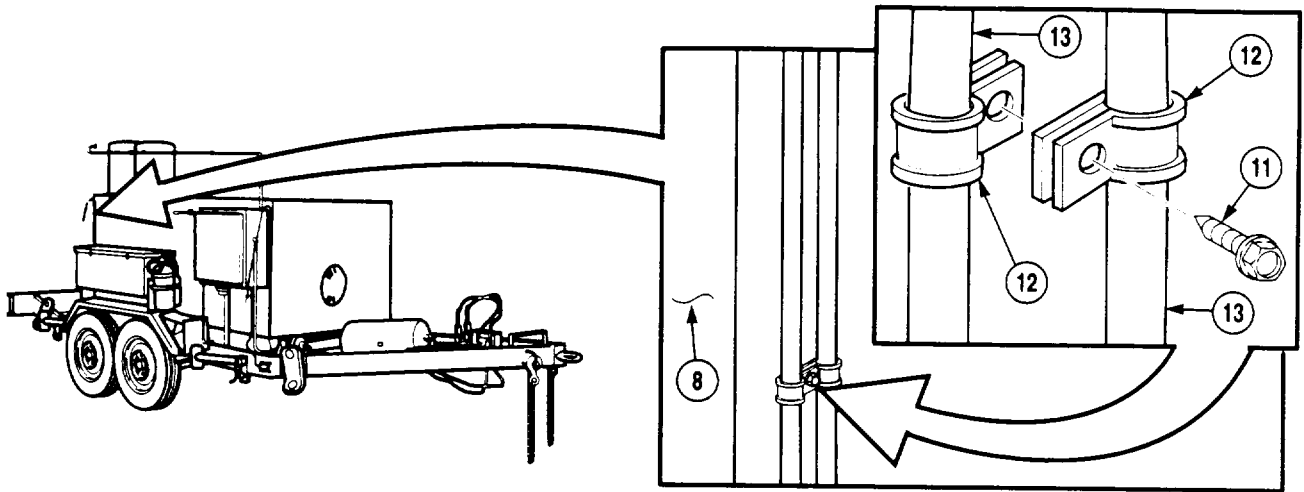
(3) Install conduit (22) and six clamps (21) with screws (20) on heat exchanger (8).



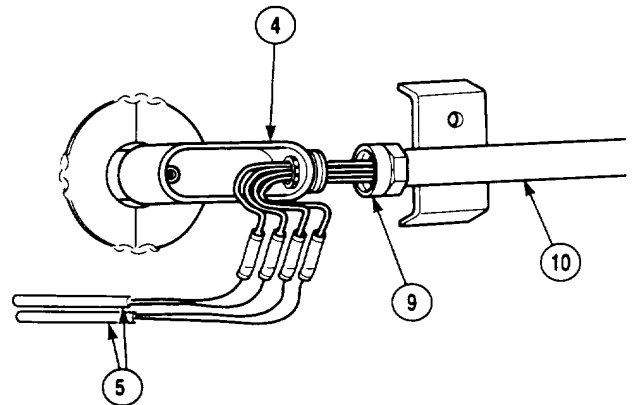
(4) Install conduit (19) and two clamps (18) with two screws (17) on heat exchanger (8).

(5) Install conduit (16) and three clamps (15) with screws (14) on heat exchanger (8).

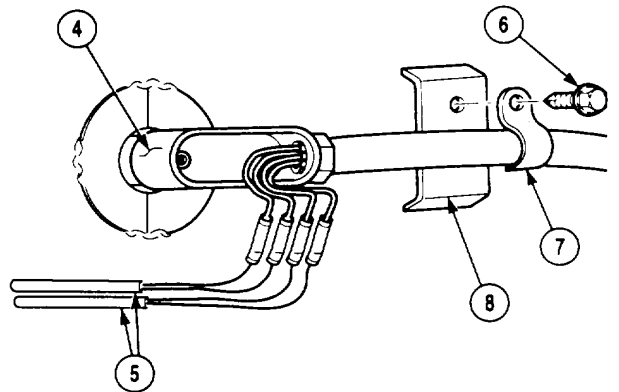
4-105. HEAT EXCHANGER ASSEMBLY REPLACEMENT (CONT).



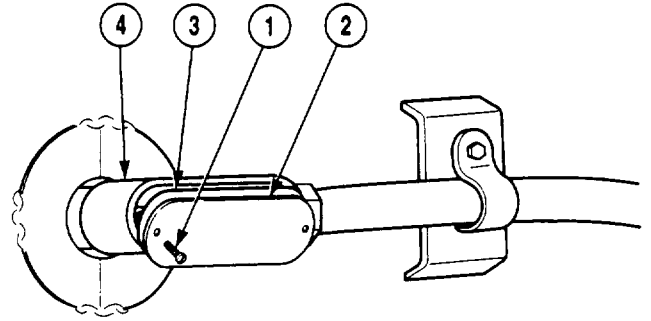
- (6) Install conduit (13) and six clamps (12) with three screws (11) on heat exchanger (8).
- (7) Insert temperature sensors (5) and conduit (10) in outlet body (4). Tighten nut (9).



- (8) Install two clamps (7) with screws (6) on heat exchanger (8).
- (9) Insert temperature sensors (5) through hole in outlet body (4).



- (10) Install gasket (3) and cover (2) with two screws (1) on outlet body (4).



NOTE

Follow-on Maintenance:

- Install expansion tank (page 4-304).
- Install strainer (page 4-207).
- Install valve No. 3 (page 4-214).
- Install valve No. 2 (page 4-211).
- Install valve No. 1 (page 4-209).
- Install pressure relief valve (page 4-217).
- Install burner assembly (page 4-227).
- Install burner cover (page 4-296).
- Install cable reel (page 4-154).
- Install spare tire (page 3-9).
- Remove wheel chocks (page 2-35).

END OF TASK

4-317/(4-318 blank)

PART THREE

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

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Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT**5-1. COMMON TOOLS AND EQUIPMENT.**

a. For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970 or CTA 8-100, as applicable to your unit.

b. The basic tool kit is: Tool Kit, General Mechanic's SC 5180-90-CL-N05.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Refer to Appendix B, Section III, of the Maintenance Allocation Chart (MAC) for a list of tool kits authorized for the Heater. Refer to Appendix G, Repair Parts and Special Tools List (RPSTL), for a list of special tools required for maintenance of the Heater.

5-3. REPAIR PARTS.

Repair parts are listed and illustrated in Appendix G of this manual.

Section II. SERVICE UPON RECEIPT**5-4. PACKING AND UNPACKING.**

Upon receipt of a new Heater, the receiving organization must see if it has been properly prepared for service and is in good condition. Inspect all assemblies, subassemblies, and accessories to be sure that they are in proper working order. Secure, clean, and correctly adjust and/or lubricate as needed (Chapters 2 and 3). Check all tools and equipment (Appendix C and Appendix D) to be sure every item is there in good condition, clean, and properly stowed.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS), LUBRICATION INSTRUCTIONS, AND MANDATORY REPLACEMENT PARTS**5-5. LUBRICATION INTRODUCTION.**

Lubrication instructions are part of the PMCS. All lubrication instructions are mandatory.

5-6. GENERAL LUBRICATION INSTRUCTIONS.

- a. *Clean Fitting Before Lubricating.*** Clean parts with drycleaning solvent, (item 21, Appendix E), or equivalent. Dry before lubricating.
- b. *Lubricate After Fording.*** If fording occurs, lubricate all fittings below fording depth. Fording is not recommended.
- c. *Lubrication After High-Pressure Washing.*** After washing, lubricate all grease fittings and oil can points outside and underneath Heater.
- d. *Warranty Hard-time Statement.*** For equipment under manufacturer's warranty, hard-time oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (such as longer than usual operating hours, extended idling periods, or extreme dust).

5-7. PMCS INTRODUCTION.

PMCS means systematic caring, inspecting, and servicing equipment to keep it in good condition and to prevent breakdowns. To be sure that the Heater is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. Use a DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any deficiencies and shortcomings. You DO NOT need to record faults that you fix.

5-8. PMCS PROCEDURES.

- a.** Your PMCS, Table 5-1, lists inspections and care required to keep your Heater in good operating condition.
- b.** The "INTERVAL" column of Table 5-1 tells you when to do a certain check or service.
- c.** The "PROCEDURE" column of Table 5-1 tells you how to do required checks and services. Carefully follow these instructions.

NOTE

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

- d.** If the Heater does not perform as required, refer to Chapter 3, Section II (page 3-1), or Chapter 4, Section IV (page 4-12), Troubleshooting.
- e.** If anything looks wrong and you can't fix it, write it on your DA Form 2404. IMMEDIATELY report it to your supervisor.
- f.** When you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire Heater.

5-8. PMCS PROCEDURES (CONT).

(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 drycleaning solvent (P-D-680) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) *Rust and Corrosion.* Check Heater body and frame for rust and corrosion. If any bare metal or corrosion exists, clean and apply a thin coat of oil. Report it to your supervisor.

(3) *Bolts, Nuts, and Screws.* Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut, or screw you think is loose, tighten it or report it to your supervisor.

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

(5) *Electric Wires and Connectors.* Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors. Report any damaged wires to your supervisor.

(6) *Hoses and Fluid Lines.* Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also 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 your supervisor.

g. When you check for "operating condition," you look at the component to see if it's serviceable.

5-9. CLEANING AGENTS.**WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

NOTE

Only use those authorized cleaning solvents or agents listed in Appendix E.

When cleaning grease buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected areas.

5-10. SHORTENED MAINTENANCE INSTRUCTIONS.

Local conditions of extreme heat, dust, cold, or wetness dictate that service intervals may need to be shortened.

5-11. ADDITIONAL MAINTENANCE INSPECTIONS.

Additional maintenance inspections may be required for the following reasons:

- a.** Prolonged storage. Heaters having been stored for a period of three months or more should be inspected.
- b.** Initial preparation upon receipt.
- c.** Preparation for storage.

5-12. LEAKAGE DEFINITIONS FOR PMCS.

It is necessary for you to know how fluid leakage affects the status of the Heater. Following are types/classes of leakage an operator needs to know to be able to determine the status of the Heater. Learn these leakage definitions and remember - when in doubt, notify your supervisor.

CAUTION

- Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to 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 immediately to your supervisor.
- a.** CLASS I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
- b.** CLASS II Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
- c.** CLASS III - Leakage of fluid great enough to form drops that fall from item being checked/inspected.

5-13. PMCS COLUMN ENTRY EXPLANATION.

a. *Item No. Column.* The checks and services are numbered in chronological order showing a logical sequence around the Heater.

b. *Interval Column.* This column indicates when the lubrication, check, and/or service should be performed.

c. *Location, Item to Check/Service Column.* The underlined items listed in this column are divided into groups indicating the portion of the equipment of which they are a part, i.e. brakes, fuel, engine. Under these groupings a few common words are used to identify the specific item being checked.

d. *Procedures Column.* This column contains procedures required to perform the checks and services.

5-14. PMCS TABLE.

Table 5-1. Direct Support Preventive Maintenance Checks and Services

Item No.	Interval	Location, to Check/Service	Procedures
1	Annually	PLUMBING Pump	Replace idler bushing and repack packings (page 5-72) and bearing with grease (item 15, appendix E).

Section IV. DIRECT SUPPORT MAINTENANCE INTRODUCTION**5-15. MAINTENANCE INTRODUCTION.**

Instructions in this section provide general procedures to be followed for inspection, removal, cleaning, repair, replacement, or installation of components and testing authorized at the direct support level as specified by the MAC.

5-16. OPERATIONAL CHECKS.

All operational checks included in the maintenance procedures will include the techniques and methods required to ensure the satisfactory performance of the Heater. Reference the operator's instructions for starting, operating, and shutdown procedures.

5-17. INSPECTION OF COMPONENTS.

a. Examine bearings for rusted or pitted rollers, balls, races, or separator. Examine balls and races for abrasion and/or serious discoloration. The following are conditions for bearing rejection.

- (1) Cuts or grooves parallel to ball or roller rotation.

NOTE

Nicks and gouges outside race load areas are not cause for rejection unless deep enough to cause bearing binding or misalignment.

- (2) Fatigue pits (as opposed to minor machine marks or scratches).
- (3) Clean all parts before inspection. Check for defects such as physical distortion, wear, cracks, and pitting.

b. Check all hose surfaces for broken or frayed fabric, breaks caused by sharp kinks, or chafing against other parts of the Heater. Inspect metal tubing lines for kinks. Inspect fitting threads for damage. Replace any defective part. Check for leaks after assembly and during initial operation period.

c. Visually inspect all castings and weldments for cracks.

d. Inspect all wiring for chafed or burned insulation. Inspect all terminal connectors for loose connections and broken parts.

e. Inspect gears and splines for cracks, pitting, and discoloration.

5-18. CLEANING PROCEDURES.**WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - a.** When cleaning ball or roller bearings, place in a basket and suspend in a container of drycleaning solvent, P-D-680 (item 21, appendix E). If necessary, use a brush (item 2, appendix E) to remove caked grease or chips. Avoid rotating bearings before solid particles are removed to prevent damaging races and balls.
 - b.** Do not clean O-rings or other rubber parts in drycleaning solvent. Wipe with a clean, dry, lint-free cloth.
 - c.** For exterior cleaning of frame and structural components, use detergent (item 11, appendix E) in a solution as recommended on the container. Leave application on item surface for approximately 10 minutes before rinsing. Rinse with hot or cold water under pressure. If available, use hot water under 80 to 120 lb (36 to 54 kg) pressure. An ordinary garden hose may be used if no other equipment is available. If pressurized water supply is not available, wash painted surfaces with a solution of 1/4 cup soap chips (item 3, appendix E) to one gallon of water.
 - d.** Electrical parts such as coils, connectors, switches, and insulated wiring, should not be soaked or sprayed with cleaning solutions. Clean these parts with a clean, dry cloth moistened with drycleaning solvent, P-D-680 (item 21, appendix E).

5-19. REMOVAL AND DISASSEMBLY OF COMPONENTS.

- a.** Before removal of any electrical component, disconnect from power source.
- b.** Ensure that adequate clearance is available for removal of the component. Disassemble the Heater to the extent necessary to provide adequate working clearance.

WARNING

All personnel must stand clear during lifting operations. A swinging or shifting load may cause injury or death to personnel.

- c.** Use a chain hoist, jack, or other aid when lifting heavier components. Lifting device should be positioned and attached to components to remove all strain from mounting hardware before last hardware is removed.
- d.** Discard O-rings, gaskets, seals, and similar material when removed. Be sure that all traces of oil, gaskets, and sealants are removed. When possible, use wood or plastic probes and scrapers to prevent damage to machined surfaces.
- e.** Cotter pins, lock washers, lockwire, self-locking nuts, and similar devices should be discarded when removed. Self-locking fasteners that loosen up must be replaced, not tightened.
- f.** To prevent moisture and foreign matter from entering open housings, lines, and other openings, use protective coverings as soon as possible after disassembly. Wrap all parts in clean paper or dip parts in preservative oil (item 17, appendix E) or equivalent.
- g.** Remove parts only if repair or replacement is required. Do not disassemble a component any further than necessary to accomplish needed repairs.

5-20. PAINTING.

Instructions for preparation of material to paint, how to paint, and material to be used are in TM 43-0139. Instruction for camouflage painting are contained in FM 5-20. Instructions for stenciling and marking military vehicles are listed in TB 43-0209. Data plate location and description are listed in Chapter 2.

5-21. LUBRICATION.

Refer to Section III, Preventive Maintenance Checks and Services (PMCS), Lubrication Instructions, and Mandatory Replacement Parts, for lubrication procedures and requirements for the Heater. The instructions include types and grades of lubricant used, lube points, locations, and frequency of the required lubrication.

5-22. ASSEMBLY.

- a.** Remove protective grease coatings from new parts before installation.
- b.** To replace O-rings, first clean groove, then stretch ring into position. A light coating of fluid, which the ring will operate in, will make assembly easier.

5-22. ASSEMBLY (CONT).

c. Coat oil seals evenly with oil (item 16, appendix E) or grease (item 14, appendix E) before installing. Install oil seals with seal lip facing in, applying an even force to the outer edge of seal. If oil seals are to be installed over keyed or splined shafts, use a guide to prevent sharp edges of the keyway or spline from cutting the seal. Guides can be very thin gage sheet metal shaped to the required diameter. Make certain guide edges are not sharp and are bent slightly inward so they do not cut the seal.

d. Lubricate bearings before reassembly with the type of lubricant normally used in the related housing or container. This will provide lubrication during the run-in until lubricant from the system can reach the bearings.

5-23. INSTALLATION.

Put hoses, tubes, lines, and electrical wiring in place by matching identification tags, markings on equipment, and using illustrations presented. Replace cable ties (item 24, appendix E) as necessary. Use sealing compounds as required in each maintenance task. When installing screws and nuts, be sure to tighten to torque values given. Refer to tables 5-2 and 5-3 for standard and metric torque values. All torques listed are dry torques.

5-24. ADJUSTMENT.

Make changes to equipment pressures, settings, and positions only as required in each maintenance task. Adjustments will bring the equipment into proper operating conditions.

Table 5-2. U.S. Standard Torque Values

Thread Size	Minimum Breakaway Torque Value S.A.E. Grade 2		Minimum Breakaway Torque Value S.A.E. Grade 5		Minimum Breakaway Torque Value S.A.E. Grade 8	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
1/4-20	5 lb-ft	7 N•m	8 lb-ft	11 N•m	12 lb-ft	16 N•m
1/4-28	6 lb-ft	8 N•m	10 lb-ft	14 N•m	14 lb-ft	19 N•m
5/16-18	11 lb-ft	15 N•m	17 lb-ft	23 N•m	24 lb-ft	33 N•m
5/16-24	13 lb-ft	18 N•m	19 lb-ft	26 N•m	27 lb-ft	37 N•m
3/8-16	20 lb-ft	27 N•m	30 lb-ft	41 N•m	45 lb-ft	61 N•m
3/8-24	22 lb-ft	30 N•m	35 lb-ft	48 N•m	50 lb-ft	68 N•m
7/16-14	30 lb-ft	41 N•m	50 lb-ft	68 N•m	70 lb-ft	95 N•m
7/16-20	35 lb-ft	48 N•m	55 lb-ft	75 N•m	80 lb-ft	109 N•m
1/2-13	50 lb-ft	68 N•m	75 lb-ft	102 N•m	105 lb-ft	142 N•m
1/2-20	55 lb-ft	75 N•m	85 lb-ft	115 N•m	120 lb-ft	163 N•m
9/16-12	70 lb-ft	95 N•m	110 lb-ft	149 N•m	155 lb-ft	210 N•m
9/16-18	80 lb-ft	109 N•m	120 lb-ft	163 N•m	170 lb-ft	230 N•m
5/8-11	100 lb-ft	136 N•m	150 lb-ft	203 N•m	210 lb-ft	285 N•m
5/8-17	110 lb-ft	149 N•m	170 lb-ft	230 N•m	240 lb-ft	325 N•m
3/4-10	170 lb-ft	231 N•m	270 lb-ft	366 N•m	375 lb-ft	508 N•m
3/4-16	190 lb-ft	258 N•m	300 lb-ft	407 N•m	420 lb-ft	569 N•m
7/8-9	165 lb-ft	224 N•m	430 lb-ft	583 N•m	610 lb-ft	827 N•m
7/8-14	180 lb-ft	244 N•m	475 lb-ft	642 N•m	670 lb-ft	908 N•m
1-8	250 lb-ft	339 N•m	645 lb-ft	875 N•m	910	1,234 N•m
1-12	270 lb-ft	366 N•m	705 lb-ft	956 N•m	1,000	1,356 N•m
1-14	280 lb-ft	380 N•m	720 lb-ft	1376 N•m	1,015	1,376 N•m

Table 5-3. Metric Torque Values

Thread Size	Minimum Breakaway Torque Value Grade 8.8		Minimum Breakaway Torque Value Grade R10		Minimum Breakaway Torque Value Grade 12	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
4 mm	3 lb-ft	4 N•m	4 lb-ft	5 N•m	5 lb-ft	7 N•m
5 mm	5 lb-ft	7 N•m	7 lb-ft	9 N•m	9 lb-ft	14 N•m
6 mm	9 lb-ft	14 N•m	13 lb-ft	18 N•m	15 lb-ft	20 N•m
7 mm	15 lb-ft	20 N•m	21 lb-ft	28 N•m	25 lb-ft	34 N•m
8 mm	22 lb-ft	30 N•m	31 lb-ft	42 N•m	37 lb-ft	50 N•m
9 mm	28 lb-ft	38 N•m	40 lb-ft	54 N•m	47 lb-ft	64 N•m
10 mm	39 lb-ft	53 N•m	55 lb-ft	75 N•m	66 lb-ft	89 N•m
12 mm	66 lb-ft	89 N•m	93 lb-ft	126 N•m	111 lb-ft	150 N•m
14 mm	100 lb-ft	136 N•m	140 lb-ft	190 N•m	169 lb-ft	229 N•m
16 mm	152 lb-ft	206 N•m	214 lb-ft	290 N•m	256 lb-ft	347 N•m
18 mm	190 lb-ft	258 N•m	268 lb-ft	363 N•m	321 lb-ft	435 N•m
20 mm	265 lb-ft	359 N•m	372 lb-ft	504 N•m	447 lb-ft	606 N•m
22 mm	321 lb-ft	435 N•m	451 lb-ft	611 N•m	542 lb-ft	735 N•m
24 mm	412 lb-ft	559 N•m	578 lb-ft	784 N•m	695 lb-ft	942 N•m

Section V. DIRECT SUPPORT MAINTENANCE

5-25. BURNER LIMIT SWITCH CONDUIT REPLACEMENT/REPAIR.

This task covers:

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

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's

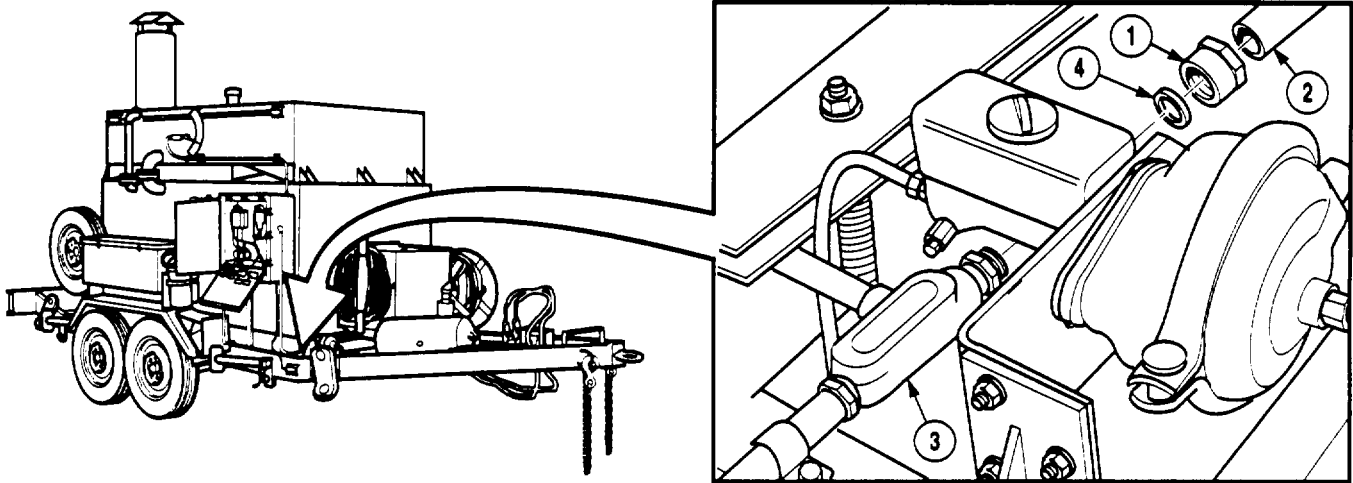
Materials/Parts

Gasket
Seals (3)

Equipment Condition

Heat Exchanger Wiring Harness Removed
(page 5-39)
Wheels Chocked (page 2-17)

a. Removal.

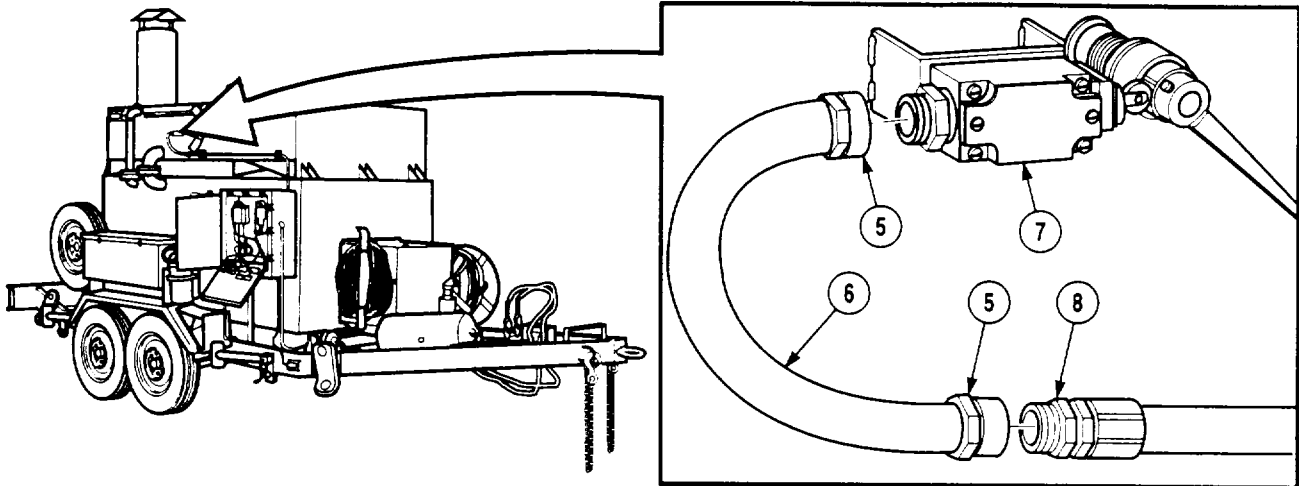
**NOTE**

Inspect all conduit and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.

(1) Loosen nut (1) and remove conduit (2) from hub (3).

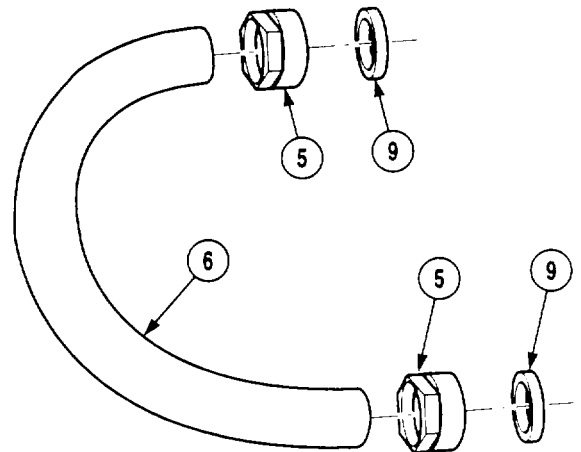
(2) If damaged, remove nut (1) and seal (4) from conduit (2). Discard seal.

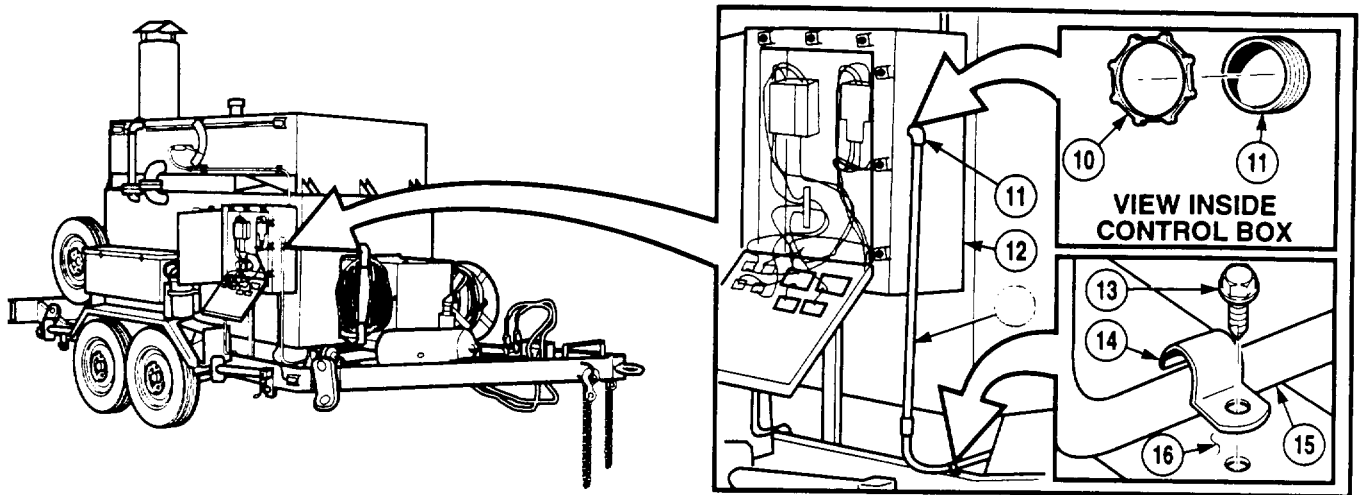
5-25. BURNER LIMIT SWITCH CONDUIT REPLACEMENT/REPAIR (CONT).



(3) Loosen two nuts (5) and remove conduit (6) from limit switch (7) and adapter (8).

(4) If damaged, remove two seals (9) and nuts (5) from conduit (6). Discard seals.





(5) Remove nut (10) and elbow (11) from control box (12).

(6) Remove five screws (13), clamps (14), and conduit section (15) from Heater (16).

b. Disassembly.

(1) Remove adapter (1), reducer bushing (2), sleeve (3), and nut (4) from conduit (5).

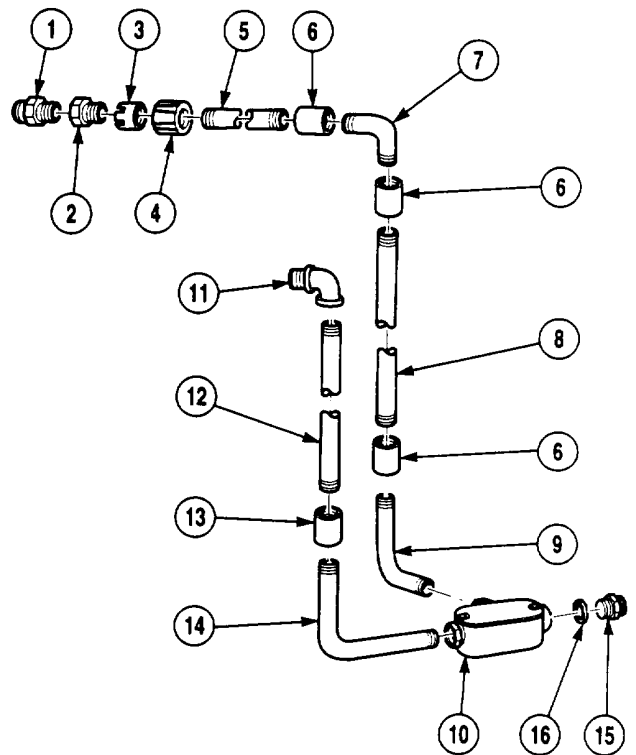
(2) Remove conduit (5), three couplings (6), elbow (7), and conduit (8) from elbow (9).

(3) Remove elbow (9) from tee hub (10).

(4) Remove elbow (11), conduit (12), and coupling (13) from elbow (14).

(5) Remove elbow (14) from tee hub (10).

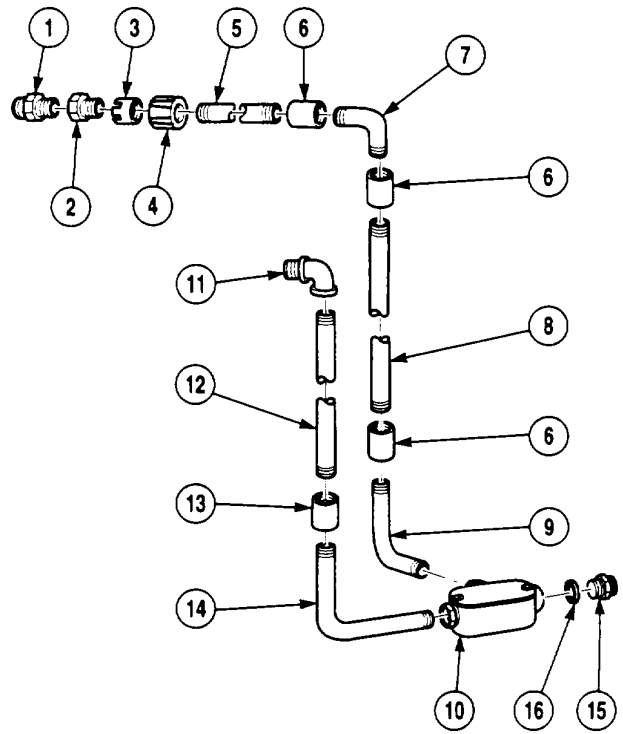
(6) Remove adapter (15) and gasket (16) from tee hub (10). Discard gasket.



5-25. BURNER LIMIT SWITCH CONDUIT REPLACEMENT/REPAIR (CONT).

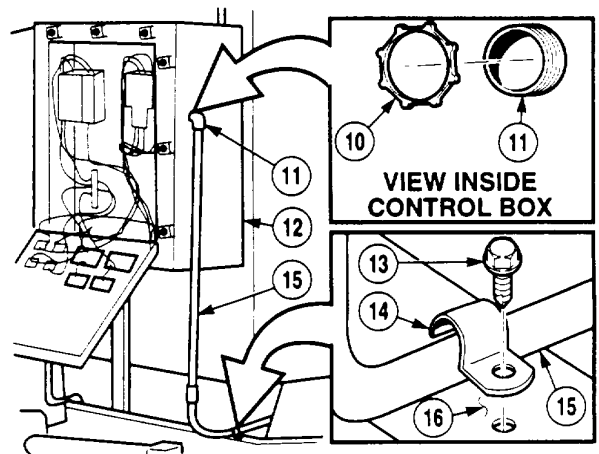
c. Assembly.

- (1) Install gasket (16) and adapter (15) on tee hub (10).
- (2) Install elbow (14) on tee hub (10).
- (3) Install coupling (13), conduit (12), and elbow (11) on elbow (14).
- (4) Install elbow (9) on tee hub (10).
- (5) Install three couplings (6), conduit (8), elbow (7), and conduit (5) on elbow (9).
- (6) Install nut (4), sleeve (3), reducer bushing (2), and adapter (1) on conduit (5).

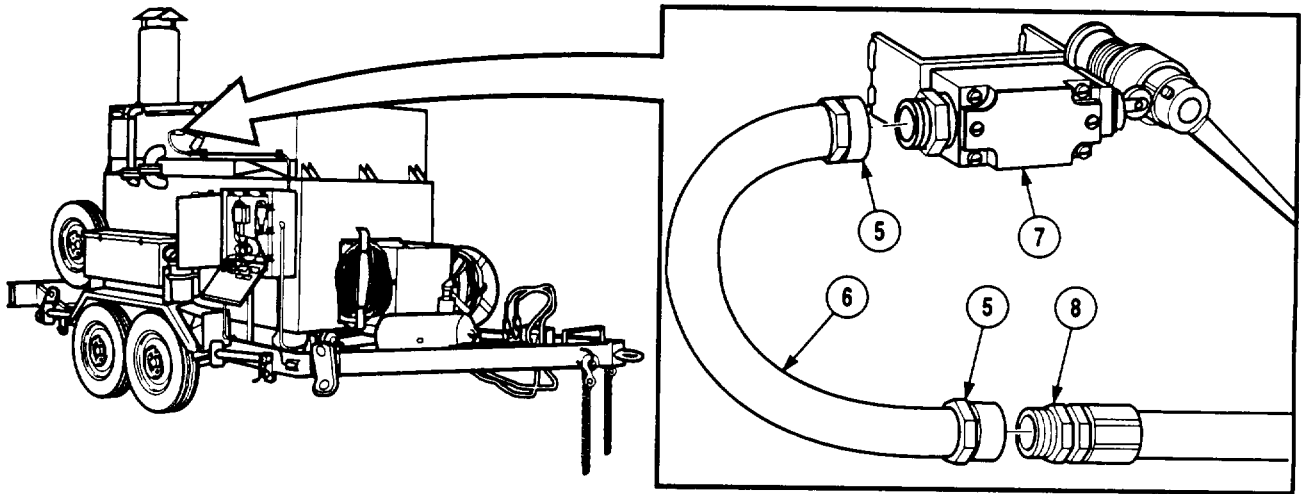
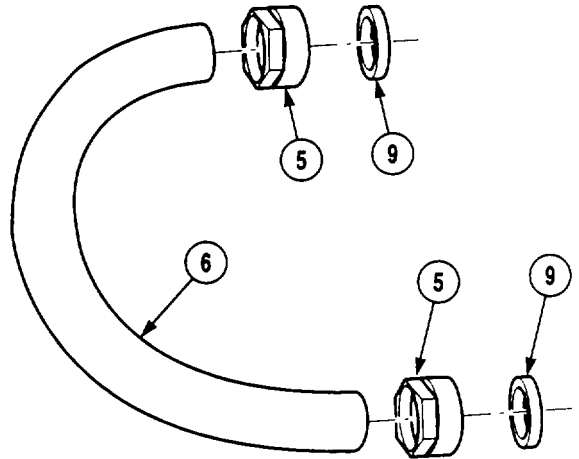


d. Installation.

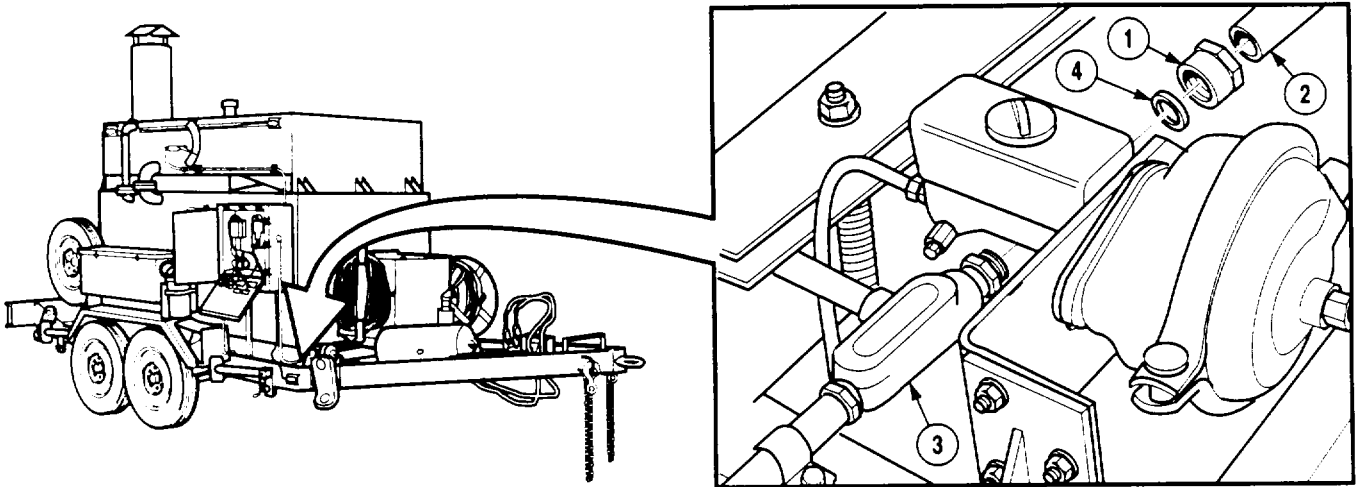
- (1) Install conduit section (15) with five clamps (14) and screws (13) on Heater (16).
- (2) Install elbow (11) and nut (10) in control box (12). Tighten nut.



- (3) If removed, position nuts (5) and seals (9) on conduit (6).



- (4) Install conduit (6) on adapter (8) and limit switch (7) with nuts (5). Tighten nuts.

5-25. BURNER LIMIT SWITCH CONDUIT REPLACEMENT/REPAIR (CONT).

- (5) If removed, Install seal (4) and nut (1) on conduit (2). 161 Install conduit (2) on hub (3) with nut (1).

NOTE

Follow-on Maintenance:

- Install heat exchanger wiring harness (page 5-50).
- Remove wheel chocks (page 2-35).

END OF TASK

5-26. PUMP MOTOR CONDUIT REPLACEMENT/REPAIR.

This task covers:

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

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's

Materials Parts

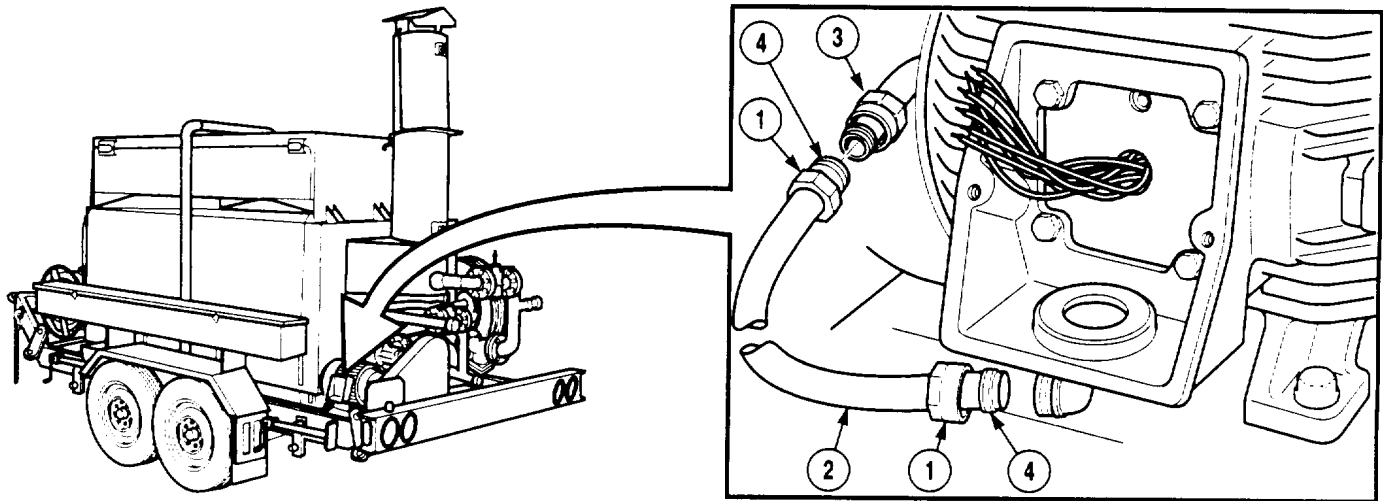
Seals (2)

Equipment Condition

Wheels Chocked (page 2-17)

Heat Exchanger Wiring Harness Removed
(page 5-39)

a. Removal

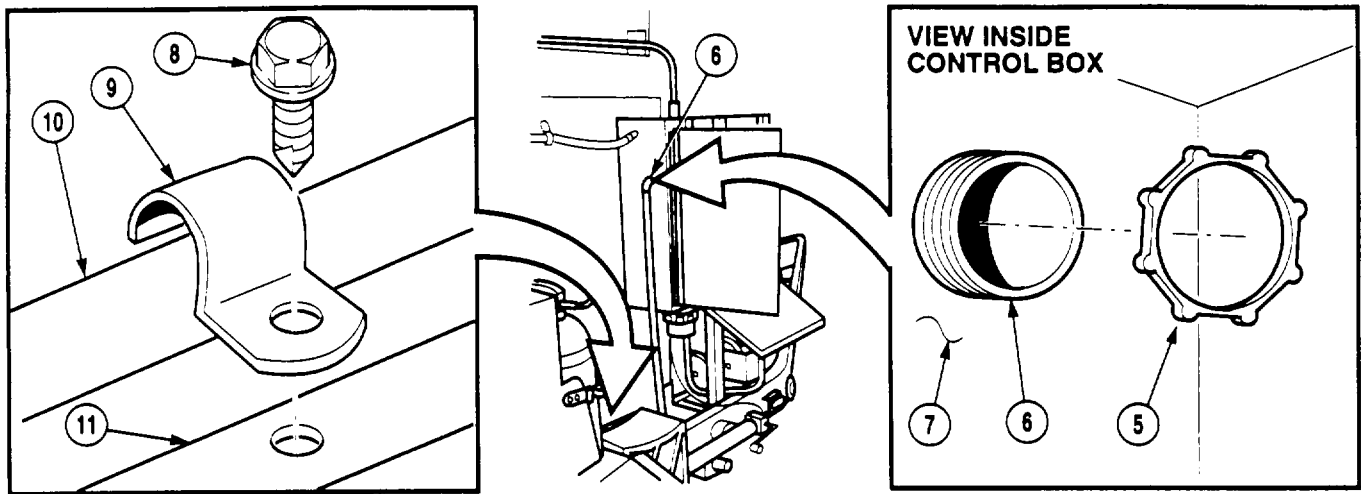


NOTE

Inspect all conduit and fittings for cracks, bends, nicks, dents, stripped threads, and cuts. Replace all damaged parts.

- (1) Loosen nut (1) and remove conduit (2) from adapter (3).
- (2) If damaged, remove two nuts and seals (4) from conduit (2).

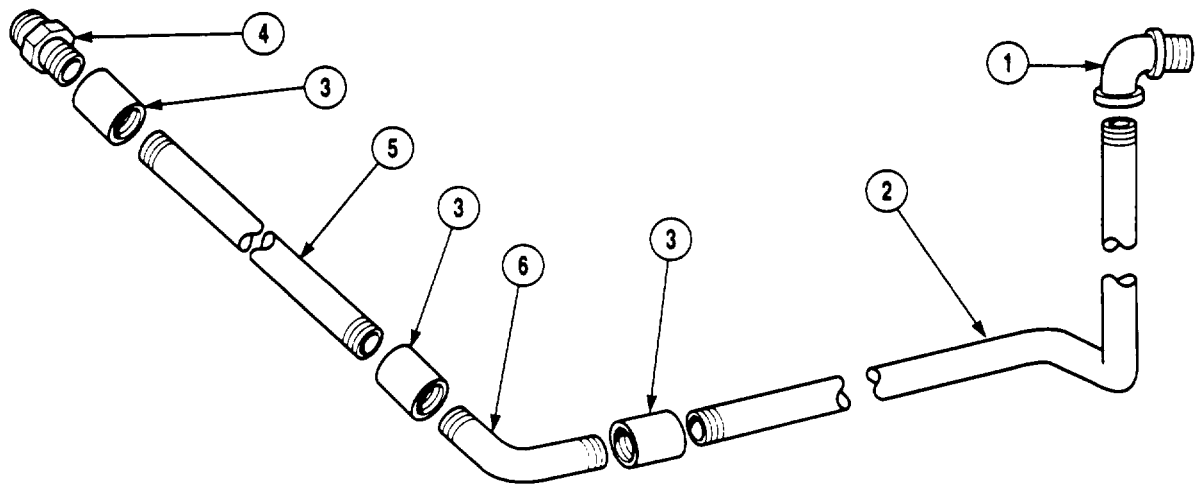
5-26. PUMP MOTOR CONDUIT REPLACEMENT/REPAIR (CONT).



(3) Remove nut (5) and elbow (6) from control box (7).

(4) Remove four screws (8), clamps (9), and conduit section (10) from Heater (11).

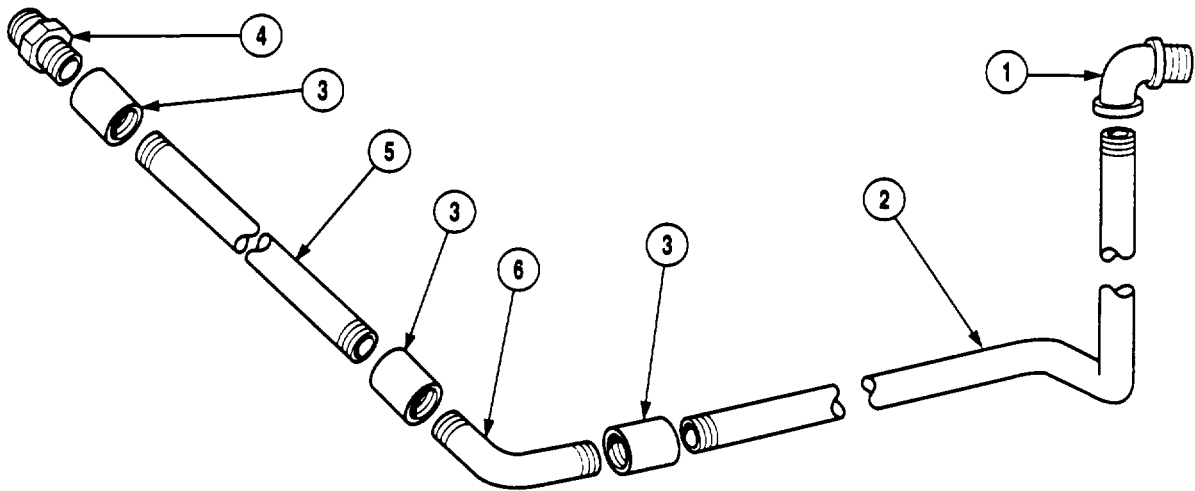
b. Disassembly.



(1) Remove elbow (1) and conduit (2) from coupling (3).

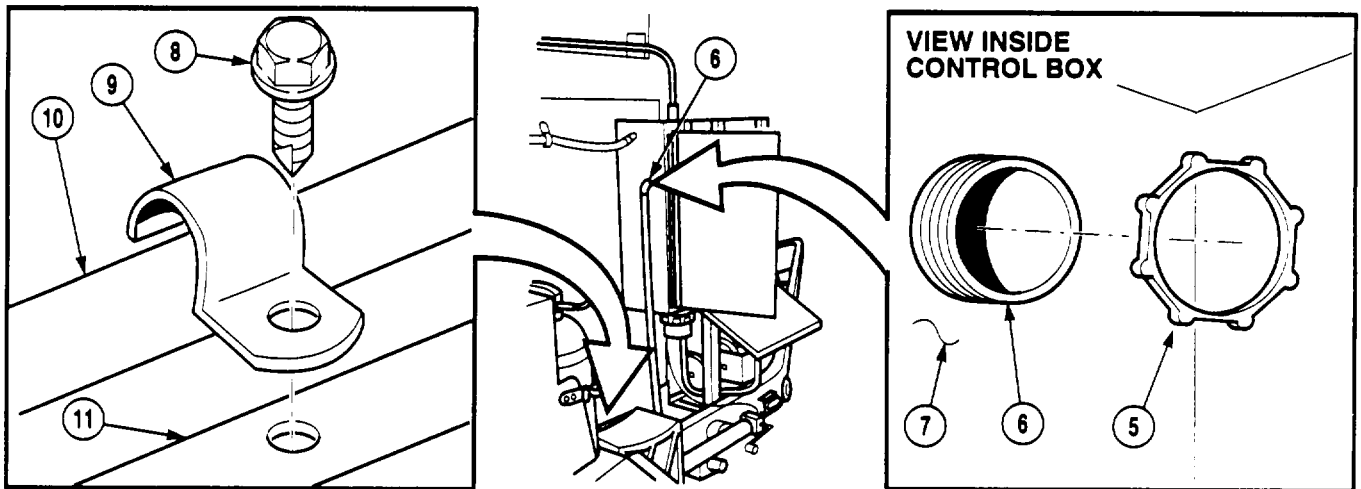
(2) Remove adapter (4), three couplings (3), and conduit (5) from elbow (6).

c. Assembly.



- (1) Install conduit (5), three couplings (3), and adapter (4) on elbow (6).
- (2) Install conduit (2) and elbow (1) on coupling (3).

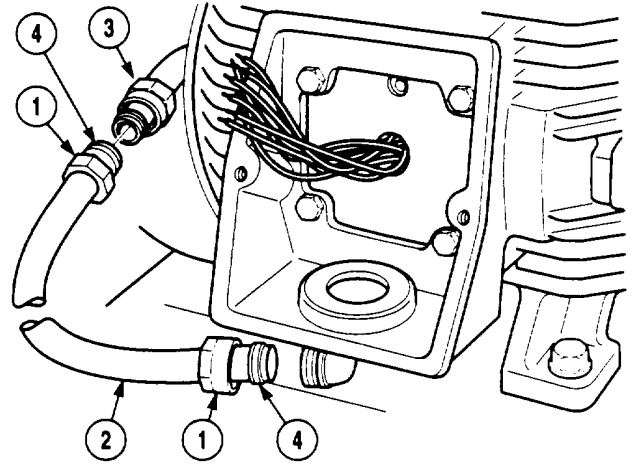
d. Installation.



- (1) Install conduit section (10) on Heater (11) with four clamps (9) and screws (8). Tighten screws.
- (2) Install elbow (6) and nut (5) in control box (7). Tighten nut.

5-26. PUMP MOTOR CONDUIT REPLACEMENT/REPAIR (CONT).

- (3) If removed, install two seals (4) and nuts (1) on conduit (2).
- (4) Install conduit (2) on adapter (3) and tighten nut (1).

**NOTE**

Follow-on Maintenance:

- Install heat exchanger wiring harness (page 5-50).
- Remove wheel chocks (page 2-35).

END OF TASK

5-27. GENERAL WIRING REPAIR.

This task covers:

- a. Solderless Terminal Replacement
- b. Wire Splicing Using Butt Connectors
- c. Wire Splicing Using Solder Method

Tools and Special Tools

Tool Kit, General Mechanic's
 Tool Kit, Electrical Connector Repair
 Stripper, Wire, Hand

Materials/Parts

Kit, Terminal
 Solder
 Tubing, Heat Shrink

Equipment Condition

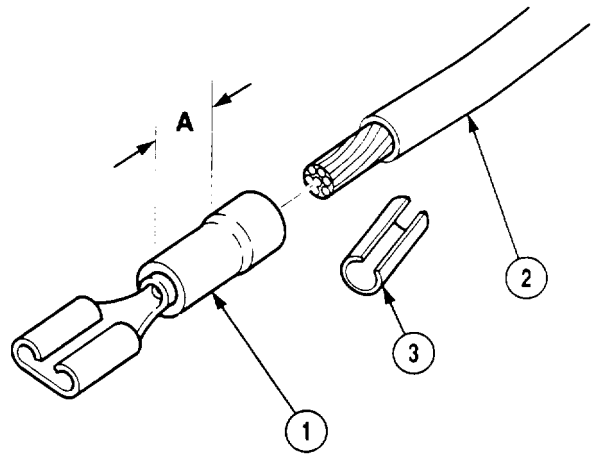
Power Source Disconnected (page 2-32)

a. Solderless Terminal Replacement.



Terminals come in different styles and sizes. To prevent equipment damage, be sure to use only the exact replacements. Do not attempt to modify terminal to fit.

- (1) Remove old terminal (1) and trim end of wire as required.



NOTE

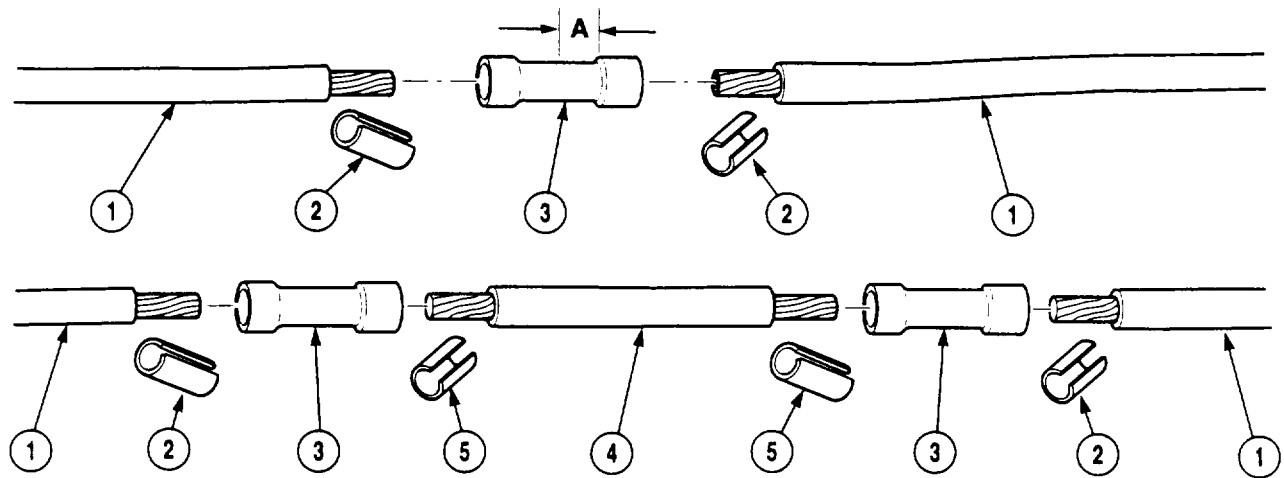
If trimming causes wire to become too short, refer to splicing sections (b. and c.) of this paragraph.

- (2) Remove insulation (3) from wire (2) end equal to dimension A.

NOTE

Be sure all strands of wire are inside terminal when installing terminal to wire.

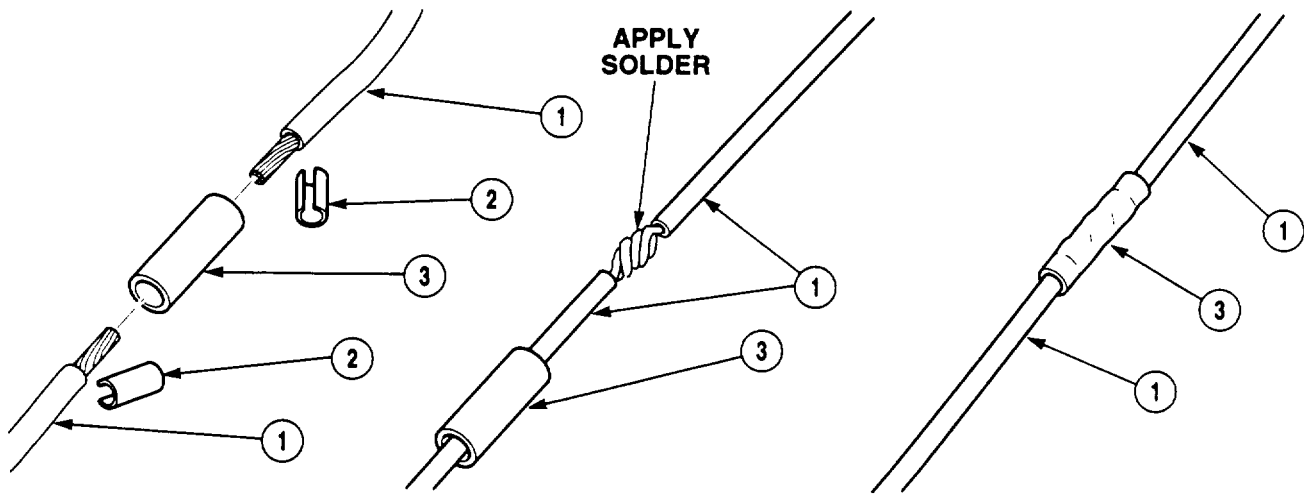
- (3) Install terminal (1) over bare end of wire (2).
- (4) Crimp terminal (1) firmly in place.

5-27. GENERAL WIRING REPAIR (CONT).**b. Wire Splicing Using Butt Connectors.****NOTE**

- Whenever possible, use solder method of wire splicing. Refer to section c. of this paragraph.
- If repairing a broken wire, or a section of wire is being replaced, perform steps (1) through (4) only.

- (1) Remove damaged wire (1) section.
- (2) Remove insulation (2) from both ends of wire (1) equal to dimension A.
- (3) Install butt connector (3) over bare ends of wire (1) and crimp securely over both ends.
- (4) Inspect wire splice and be sure no bare wire is visible.
- (5) If a section of wire is to be replaced, install two butt connectors (3), one to each bare end of wire (1).
- (6) Crimp one end of both butt connectors (3) securely in place over wire (1).
- (7) Measure distance between the two open ends of butt connector (3).
- (8) Cut a section of new wire (4) 1 in. (2.54 cm) longer than the distance measured in step (7).
- (9) Remove insulation (5) from both ends of new wire (4) equal to dimension A.
- (10) Install bare ends of new wire (4) into butt connectors (3) and crimp securely into place.
- (11) Inspect splice and be sure that no bare wire (1 or 4) is visible.

c. Wire Splicing Using Solder Method.



NOTE

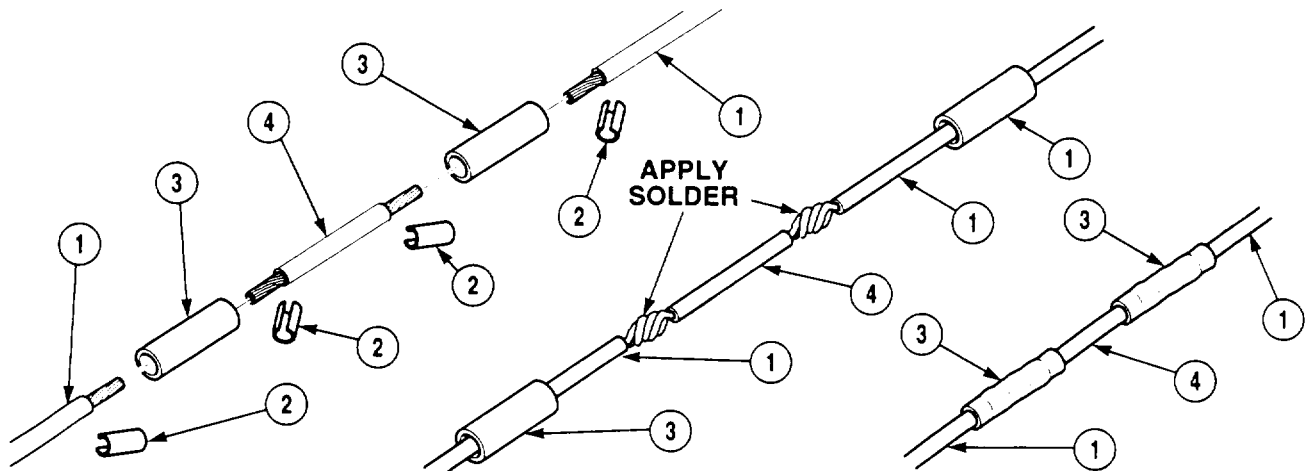
- This method produces a stronger and more permanent repair. Use this method whenever possible.
- If repairing a broken wire, perform steps (1) through (7) only. If a section of wire is being replaced, perform steps (8) through (12).

- (1) If needed, remove broken wire (1).
- (2) Remove 0.75 in. (1.9 cm) of insulation (2) from both ends of wire (1).
- (3) Slide a 3 in. (7.62 cm) piece of proper size heat shrink tubing (3) over one end of wire (1).

WARNING

To prevent personal injury, allow solder to cool before handling.

- (4) Twist the two ends of wire (1) together and solder. Be sure solder flows evenly onto both ends of wire (1).
- (5) Slide heat shrink tubing (3) over solder joint.

5-27. GENERAL WIRING REPAIR (CONT).**WARNING**

- To prevent injury to personnel, never use an open flame to apply heat to heat shrink tubing.
- To prevent personnel injury, allow heat shrink tubing to cool before handling.

- (6) Apply heat to heat shrink tubing (3). Allow heat shrink tubing to shrink until tight on solder joint and insulation of wire (1).
- (7) If replacing a section of wire (1), measure distance between ends of wire.
- (8) Cut a section of new wire (4) 2 inches (5.08 cm) longer than distance measured in step (7).
- (9) Remove 0.75 in. (1.9 cm) of insulation (2) from both ends of new wire (4).
- (10) Slide two 3-in. (7.62 cm) pieces of heat shrink tubing (3) over ends of wire (1).

WARNING

To prevent personal injury, allow solder to cool before handling.

- (11) Twist bare ends of wires (1) and new wire (4) together and solder. Ensure solder flows evenly onto wires of each joint.
- (12) Repeat steps (5) through (7) for both solder joints.

END OF TASK

5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR.

This task covers:

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

INITIAL SETUP

Tools and Special Tools

Tool Kit. General Mechanic's
(page 4-75)

Materials /Parts

Tags, Identification (item 22, appendix E)
Gaskets (4)
Lock Washer

Equipment Condition

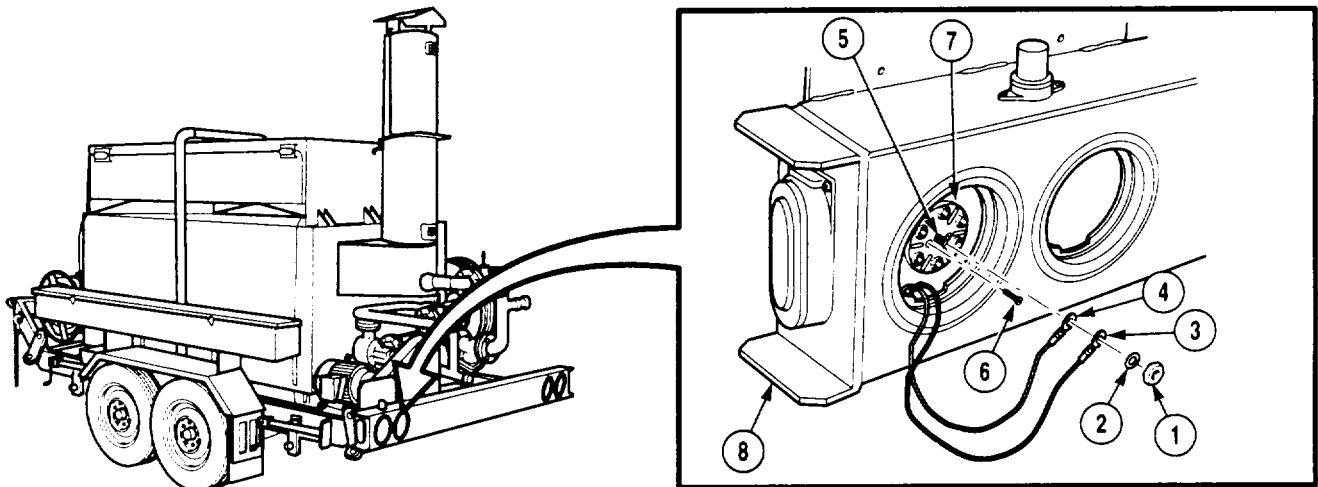
Wheels Chocked (page 2-17)
Heater Cooled
Spare Tire Removed (page 3-9)
Power Source Disconnected (page 2-32)
Resistors Removed (page 4-65)
24 Vdc Intervehicular Connector Removed
(page 4-93)
12 Vdc Intervehicular Connector Removed
(page 4-97)

Equipment Condition - Continued

Left Brake and Taillight Removed

Right Brake and Taillight Removed
(page 4-80)
Right Rear Marker Light Removed
(page 4-84)
Front Side Marker Light Removed
(page 4-91)
Side Marker Light Removed (page 4-89)
Rear Marker Light Removed (page 4-86)
Left Rear Marker Light Removed (page 4-71)
License Lamp Assembly Removed (page 4-77)
Right Turn Signal and Taillight Removed
(page 4-82)
Left Turn Signal and Taillight Removed
(page 4-73)

a. Removal.



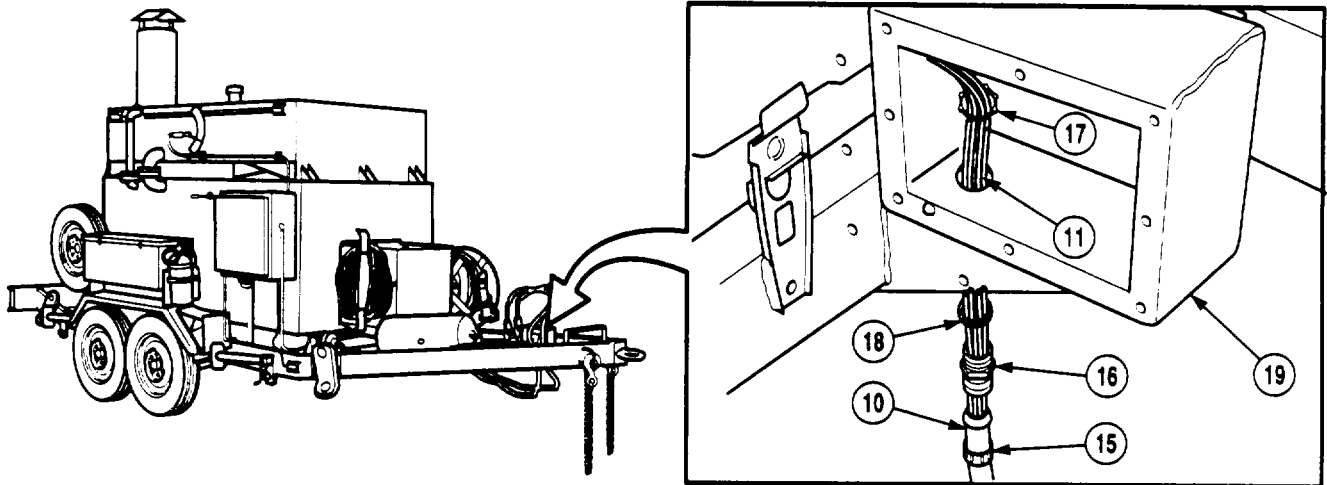
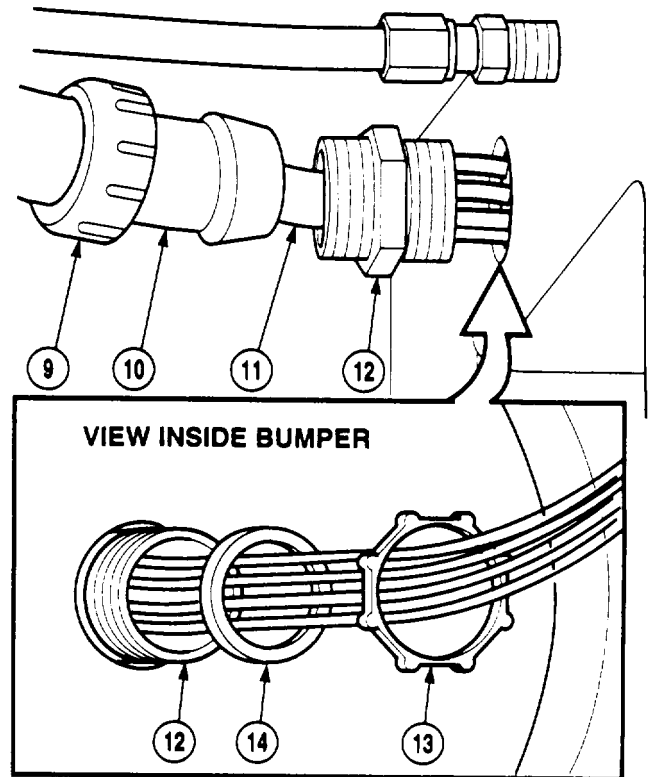
NOTE

Tag and mark all wires prior to removal.

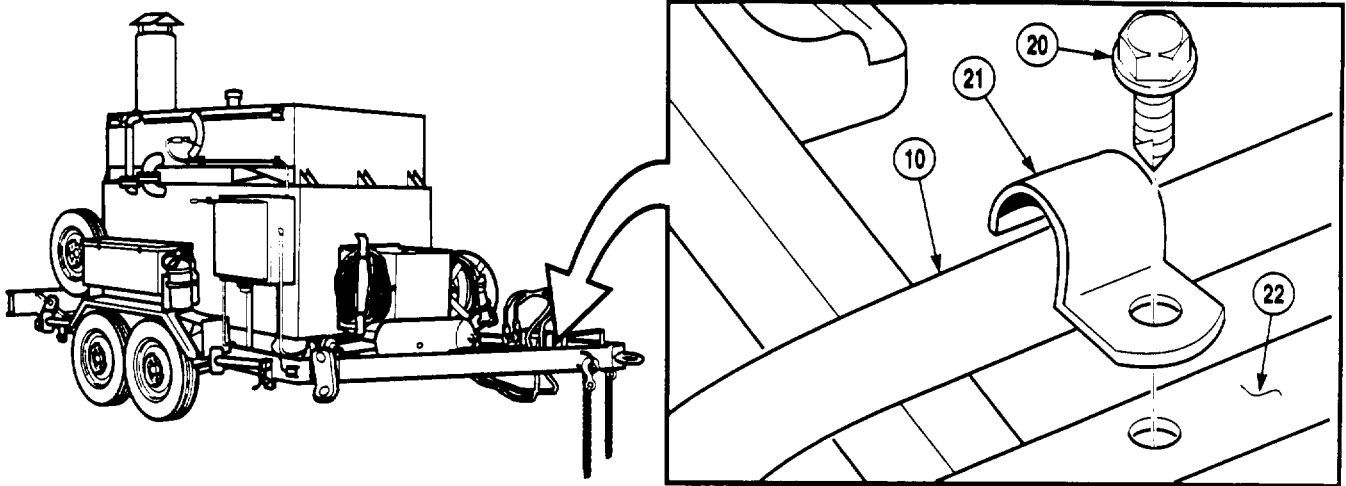
- (1) Remove nut (1), lock washer (2), and two wires (3 and 4) from terminal (5). Discard lock washer
- (2) If damaged, remove two screws (6) and junction block (7) from bumper (8).

5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR (CONT).

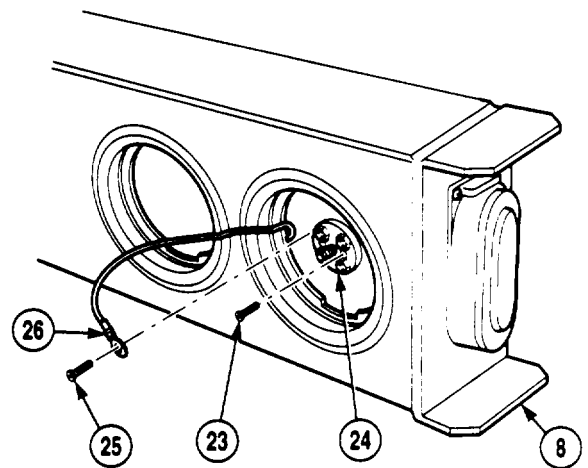
- (3) Loosen nut (9) and remove conduit (10) and wiring harness (11) from adapter (12).
- (4) Remove nut (13), gasket (14), and adapter (12) from bumper (8). Discard gasket.



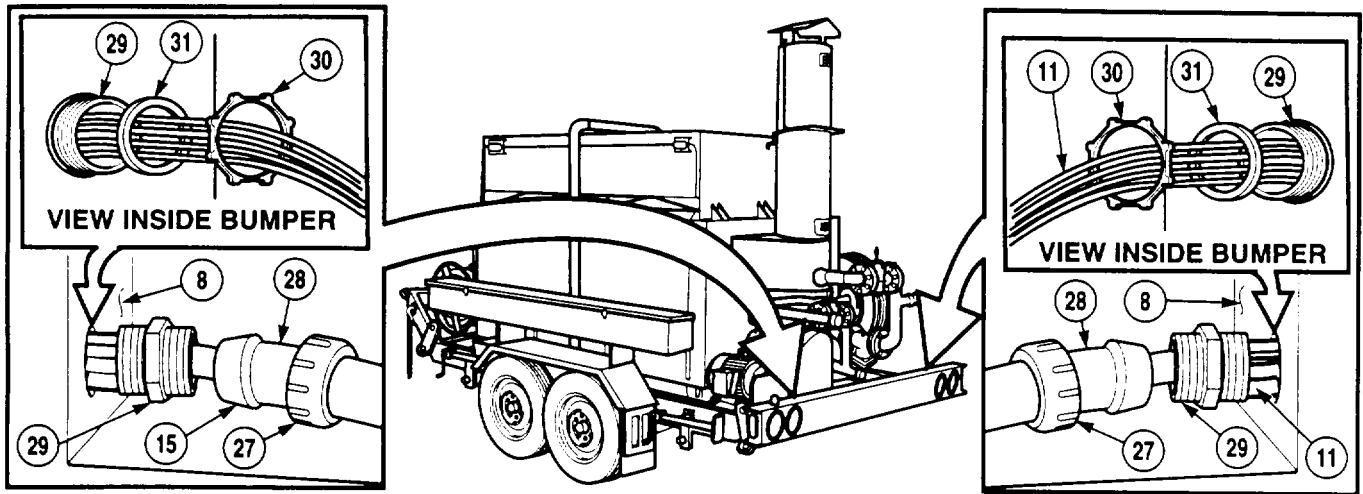
- (5) Loosen nut (15) and remove conduit (10) and wiring harness (11) from adapter (16).
- (6) Remove nut (17), gasket (18), and adapter (16) from junction box (19). Discard gasket.



- (7) Remove eleven screws (20), clamps (21), and conduit (10) from frame (22).
- (8) If damaged, remove two screws (23) and junction block (24) from bumper (8).
- (9) Remove screw (25) and ground wire (26) from bumper (8).

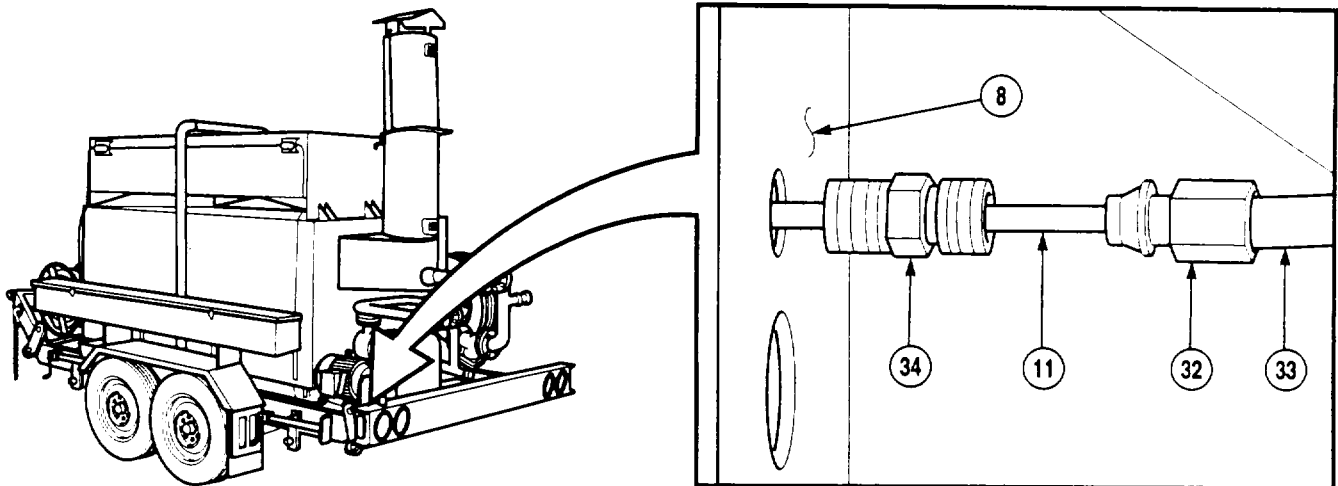


5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR (CONT).



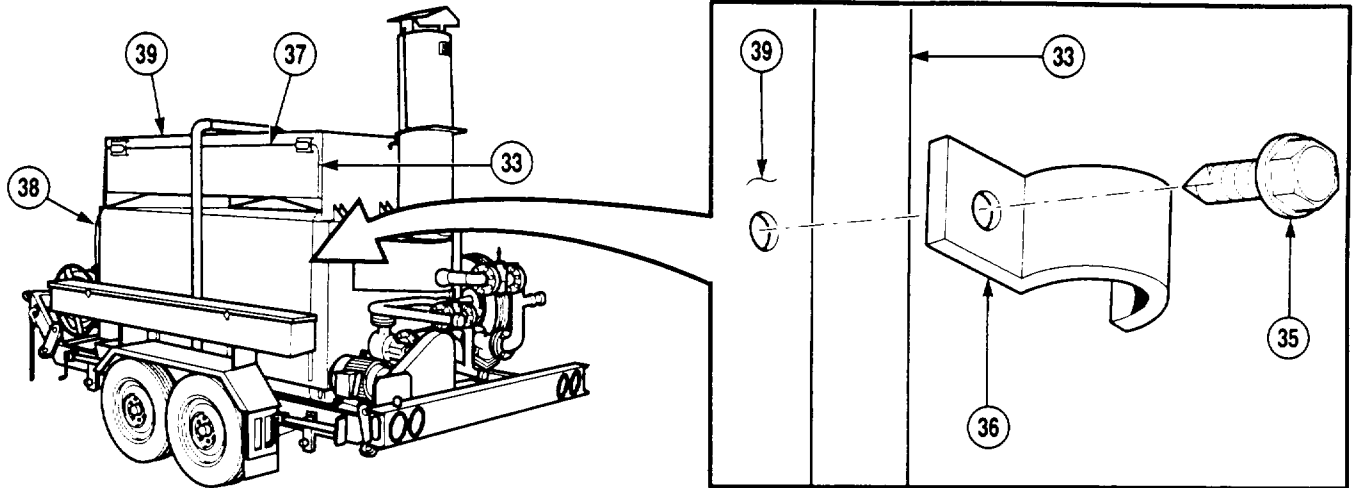
(10) Loosen two nuts (27) and remove conduit (28) and wiring harness (11) from two adapters (29).

(11) Remove two nuts (30), gaskets (31), and adapters (29) from bumper (8). Discard gaskets.

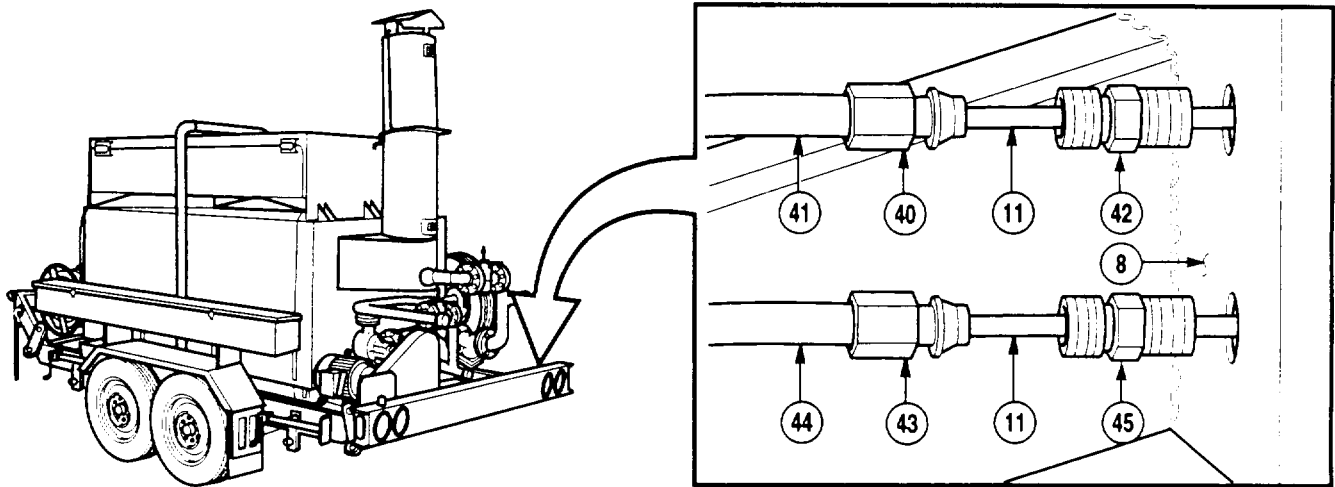


(12) Loosen nut (32) and remove conduit (33) and wiring harness (11) from adapter (34).

(13) Remove adapter (34) from bumper (8).



(14) Remove nineteen screws (35), clamps (36), and three conduits (33, 37, and 38) from Heater (39).



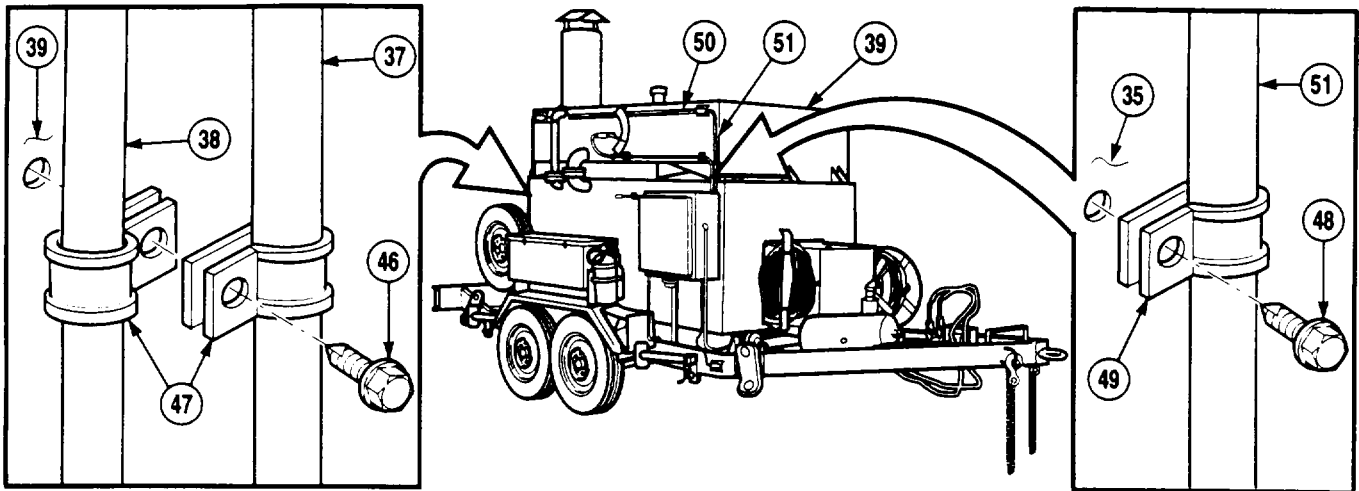
(15) Loosen nut (40) and remove conduit (41) and wiring harness (11) from adapter (42).

(16) Remove adapter (42) from bumper (8).

(17) Loosen nut (43) and remove conduit (44) and wiring harness (11) from adapter (45).

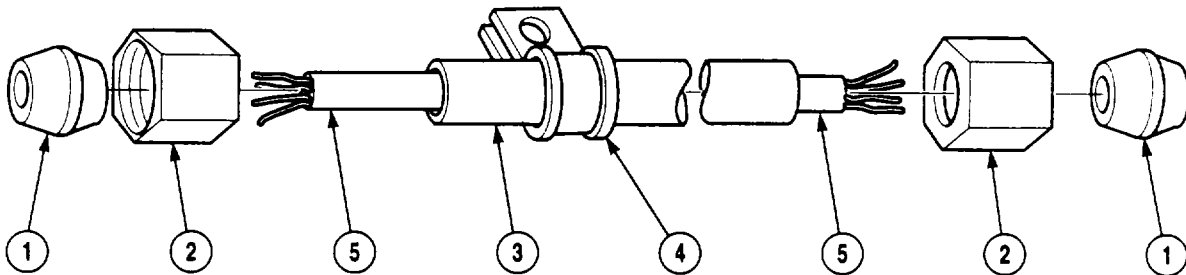
(18) Remove adapter (45) from bumper (8).

5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR (CONT).



(19) Remove eight screws (46), sixteen clamps (47), and two conduits (37 and 38) from Heater (39).

(20) Remove ten screws (48), clamps (49), and two conduits (50 and 51) from Heater (39).



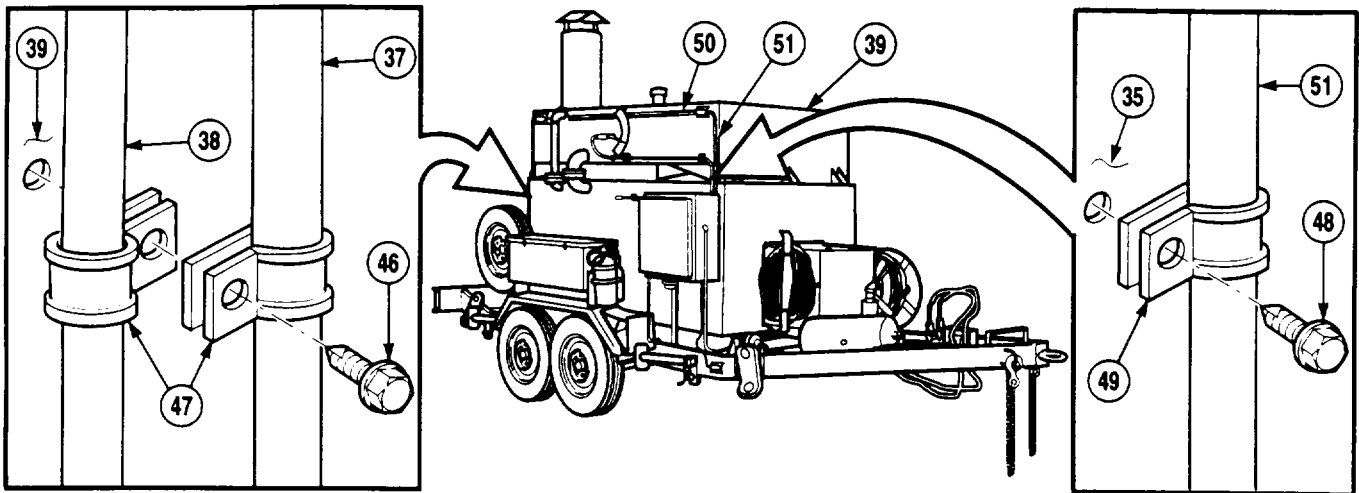
b. Disassembly.

- (1) Remove two sleeves (1) and nuts (2) from conduit (3).
- (2) Remove clamps (4) from conduit (3).
- (3) Remove wiring harness (5) from conduit (3).
- (4) Refer to General Wiring Repair (para 5-27) if repair of wiring harness is required.

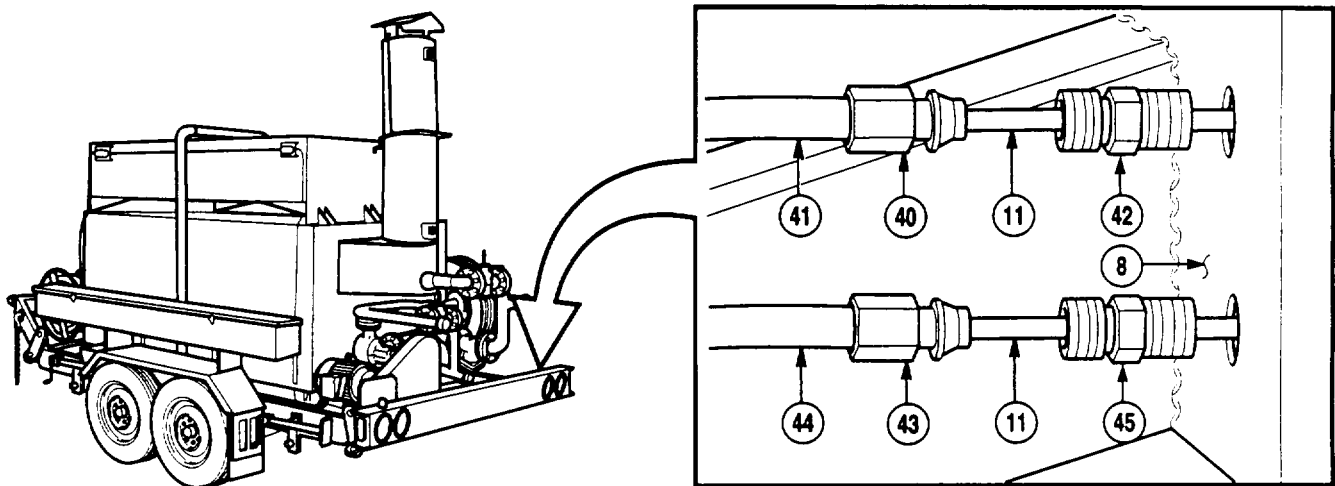
c. Assembly.

- (1) Install wiring harness (5) in conduit (3).
- (2) Install clamps (4) on conduit (3).
- (3) Position two nuts (2) and sleeves (1) on conduit (3).

d. Installation.

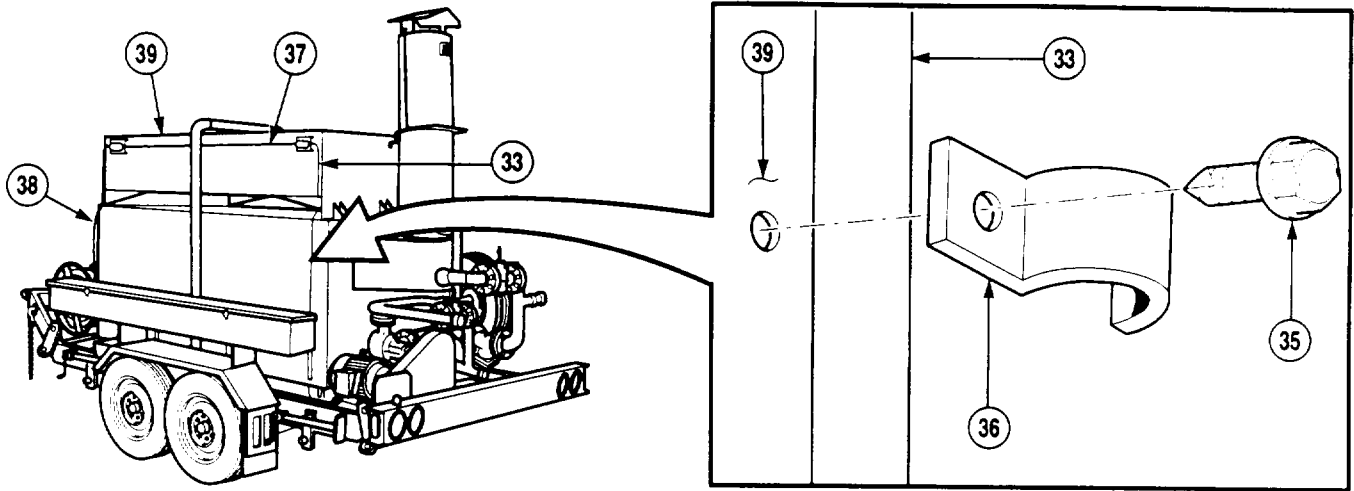


- (1) Install conduit (50 and 51) and ten clamps (49) with screws (48) on Heater (39).
- (2) Install conduit (37 and 38) and sixteen clamps (47) with eight screws (46) on Heater (39).

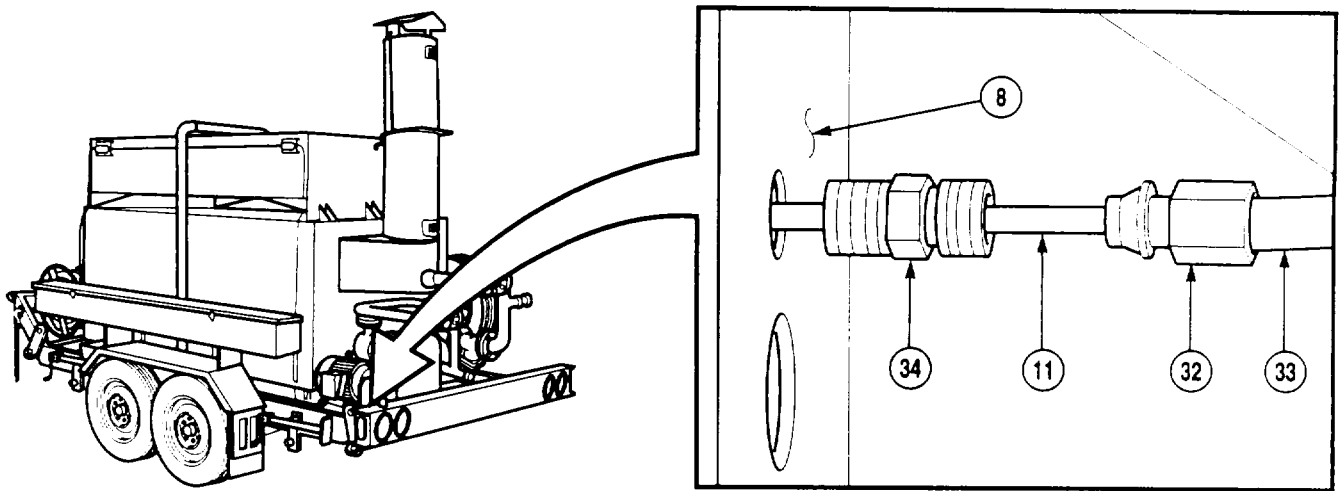


- (3) Install adapter (45) on bumper (8).
- (4) Install wiring harness (11) and conduit (44) in adapter (45) and tighten nut (43).
- (5) Install adapter (42) on bumper (8).
- (6) Install wiring harness (11) and conduit (41) in adapter (42) and tighten nut (40).

5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR (CONT).

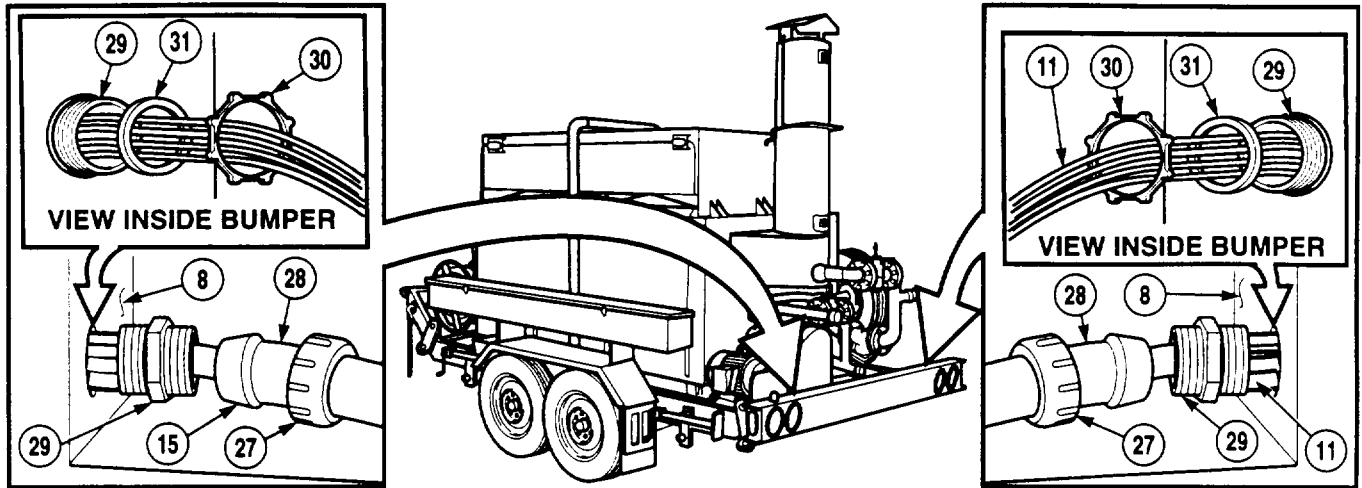


(7) Install conduits (33, 37, and 38) and nineteen clamps (36) with screws (35) on Heater (39).



(8) Install adapter (34) in bumper (8).

(9) Install wiring harness (11) and conduit (33) on adapter (34) and tighten nut (32).

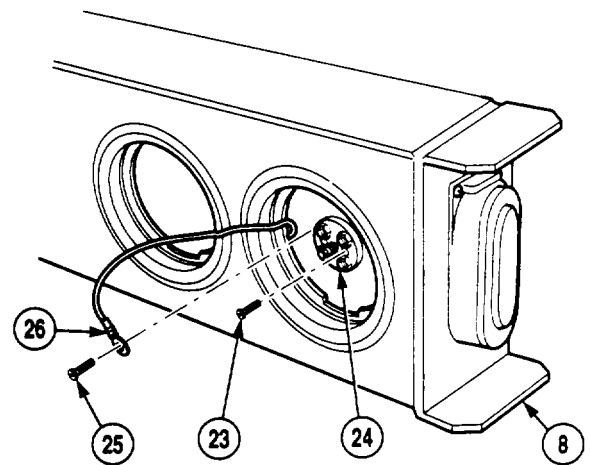


(10) Install two adapters (29), gaskets (31), and nuts (30) on bumper (8). Tighten nuts.

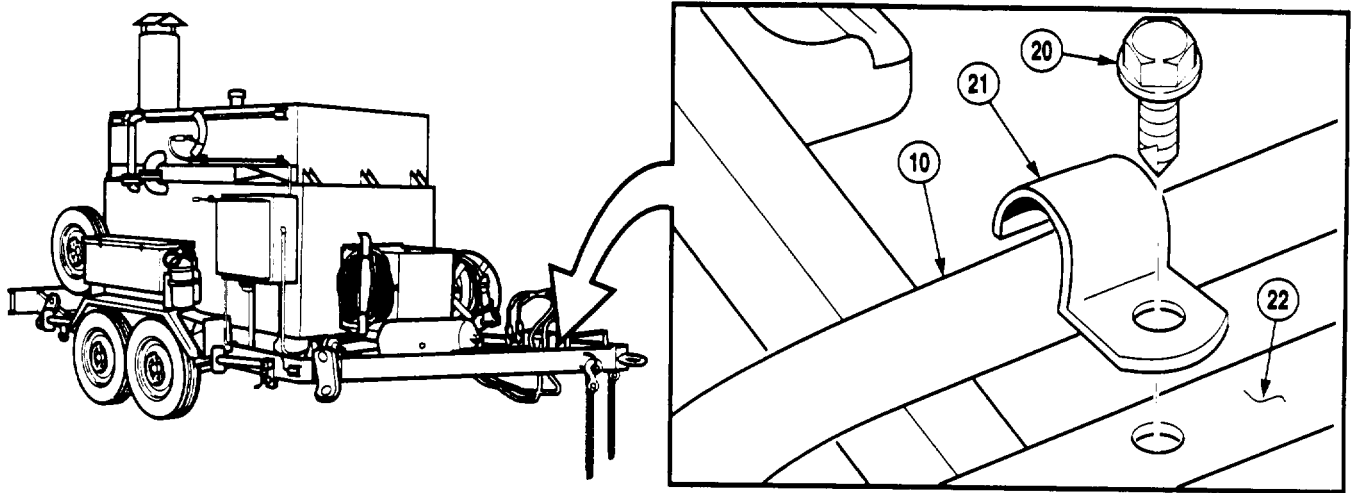
(11) Install wiring harness (11) and conduit (28) in bumper (8) and tighten nuts (27).

(12) Install ground wire (26) with screw (25) on bumper (8).

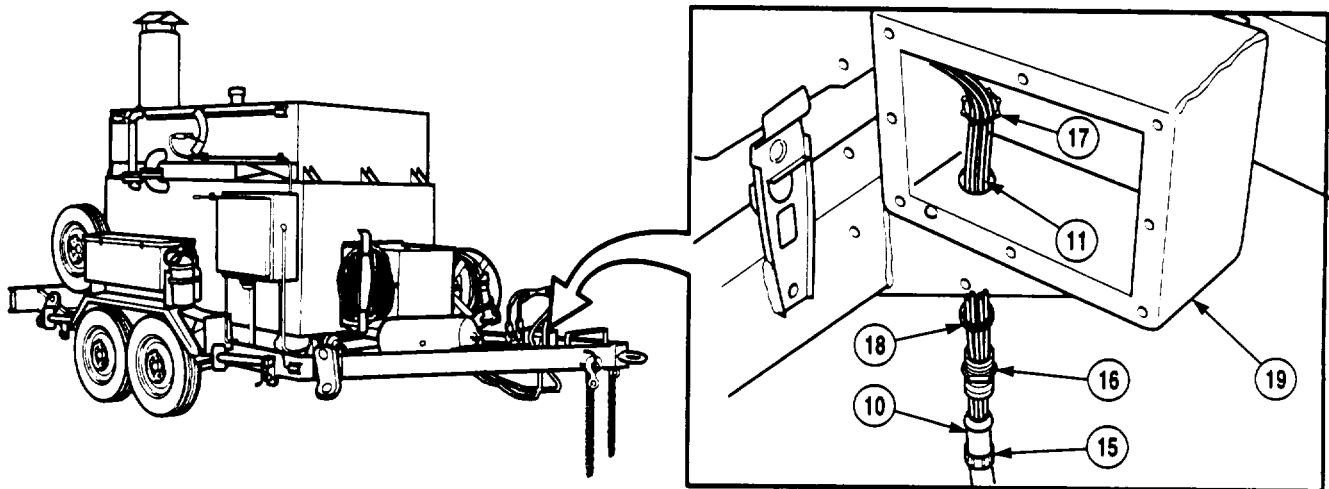
(13) If removed, install junction block (24) with two screws (23) on bumper (8).



5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR (CONT).



(14) Install conduit (10) and eleven clamps (21) with 11 screws (20) on frame (22).

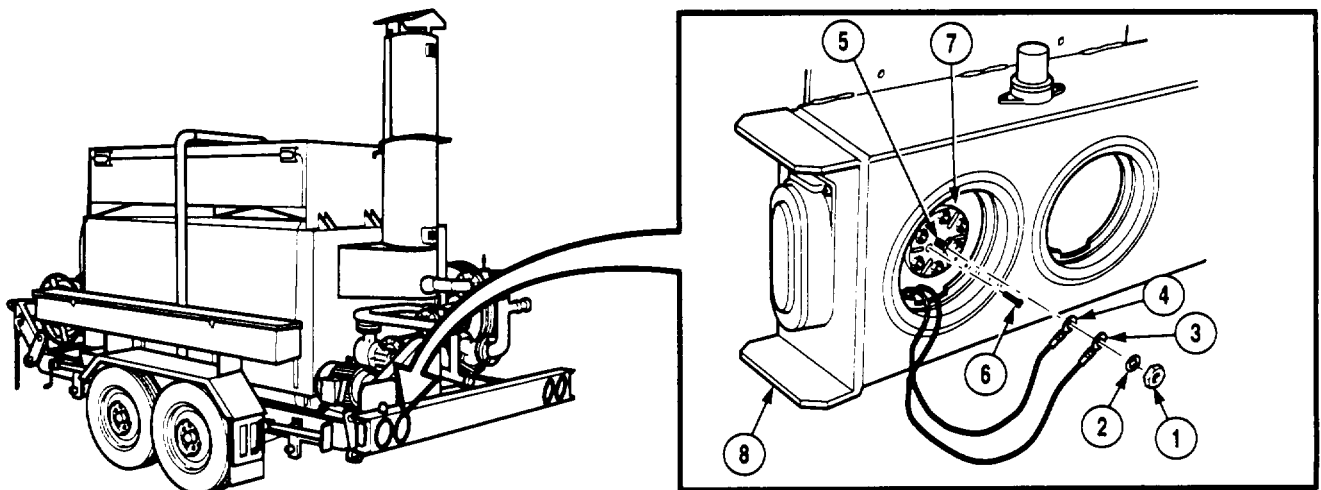
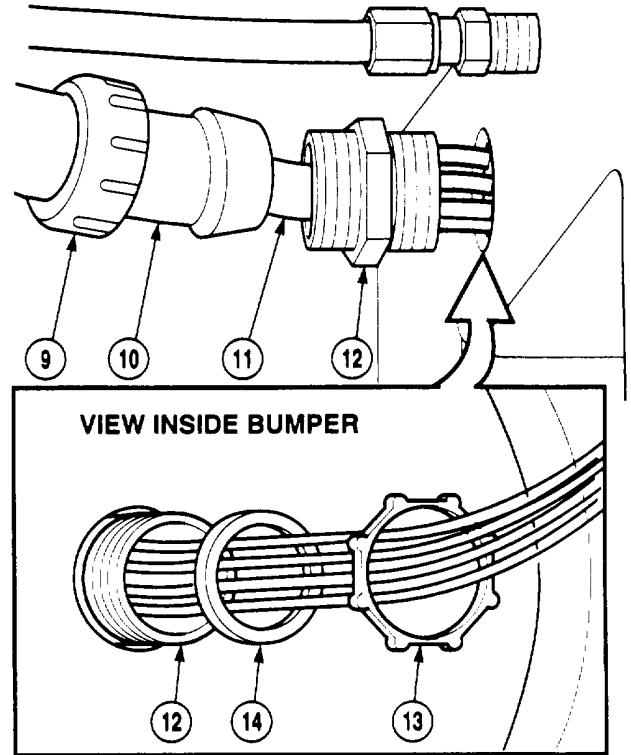


(15) Install adapter (16), gasket (18), and nut (17) in junction box (19). Tighten nut.

(16) Install wiring harness (11) and conduit (10) on adapter (16) and tighten nut (15).

(17) Install adapter (12), gasket (14), and nut (13) on bumper (8) and tighten nut (13).

(18) Install wiring harness (11) and conduit (10) on adapter (12) and tighten nut (9).



(19) If removed, install junction block (7) with two screws (6) on bumper (8).

(20) Install wires (3 and 4) on terminal (5) with lock washer (2) and nut (1). Tighten nut.

5-28. CHASSIS WIRING HARNESS REPLACEMENT/REPAIR (CONT).**NOTE**

Follow-on Maintenance:

- Install resistors (page 4-66).
- Install 12 Vdc Intervehicular connector (page 4-99).
- Install 24 Vdc Intervehicular connector (page 4-95).
- Install left turn signal and taillight (page 4-74).
- Install license lamp assembly (page 4-78).
- Install right turn signal and taillight (page 4-83).
- Install left brake and taillight (page 4-76).
- Install right brake and taillight (page 4-81).
- Install right rear marker light (page 4-85).
- Install front side marker light (page 4-92).
- Install side marker light (page 4-90).
- Install rear marker light (page 4-87).
- Install left rear marker light (page 4-72).
- Install spare tire (page 3-9).
- Remove wheel chocks (page 2-35).

END OF TASK

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT.

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's
Tape, Fish

Materials/Parts

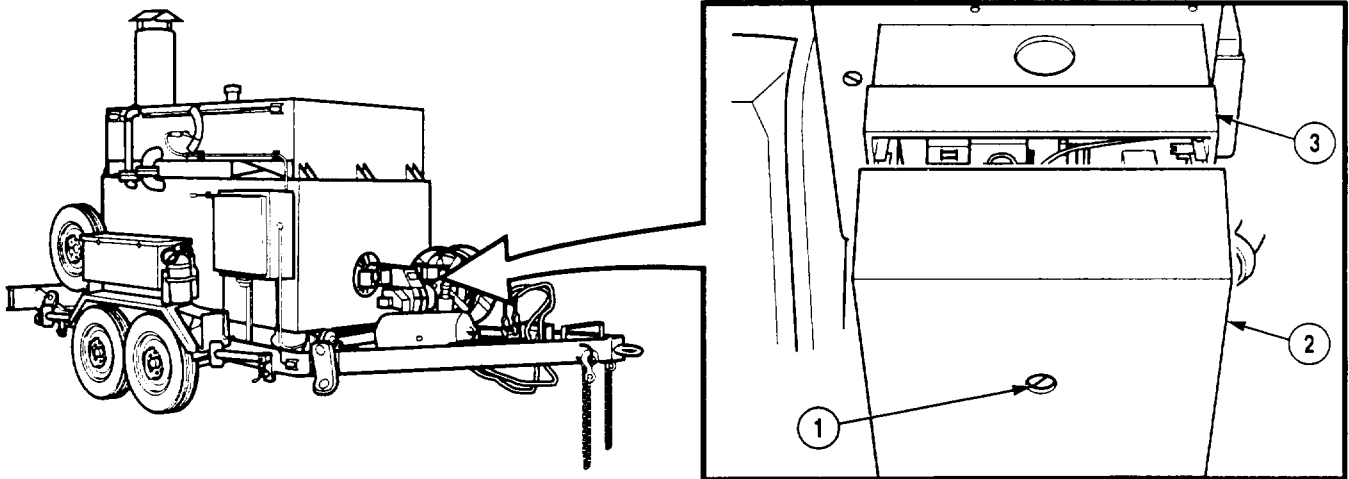
Tag, Identification (item 22, appendix E)
Butt Connectors (4)
Gasket
Gasket
Gasket
Preformed Packing
Terminal (3)
Terminal Lug
Wire Nut (4)

Equipment Condition

Wheel Chocked (page 2-17)
Power Supply Disconnected (page 2-32)
Heater Cooled
Fuel Lines Disconnected From Source (page 2-33)
Burner Cover Removed (page 4-295)

a. Removal

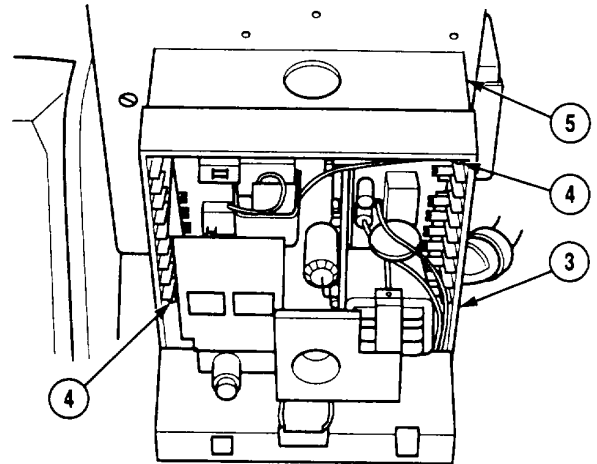
a. Removal.



(1) Loosen captive screw (1) and remove cover (2) from burner controller (3).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).

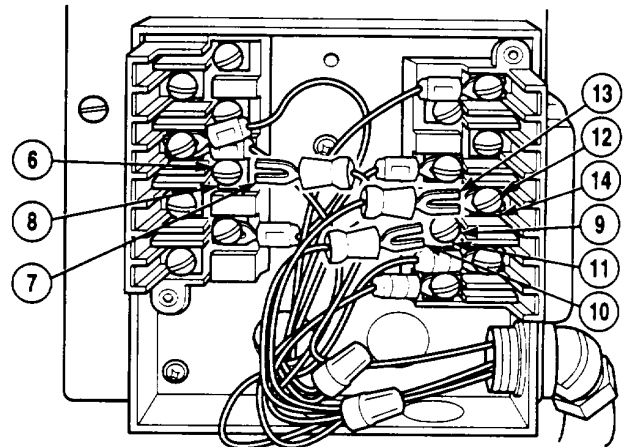
- (2) Loosen two captive screws (4) and remove burner controller (3) from controller subbase (5).



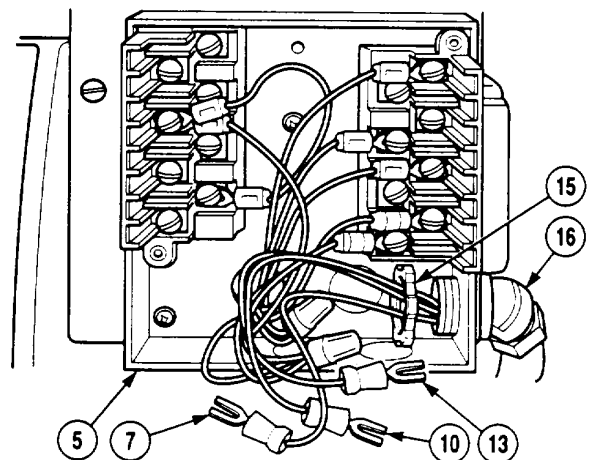
NOTE

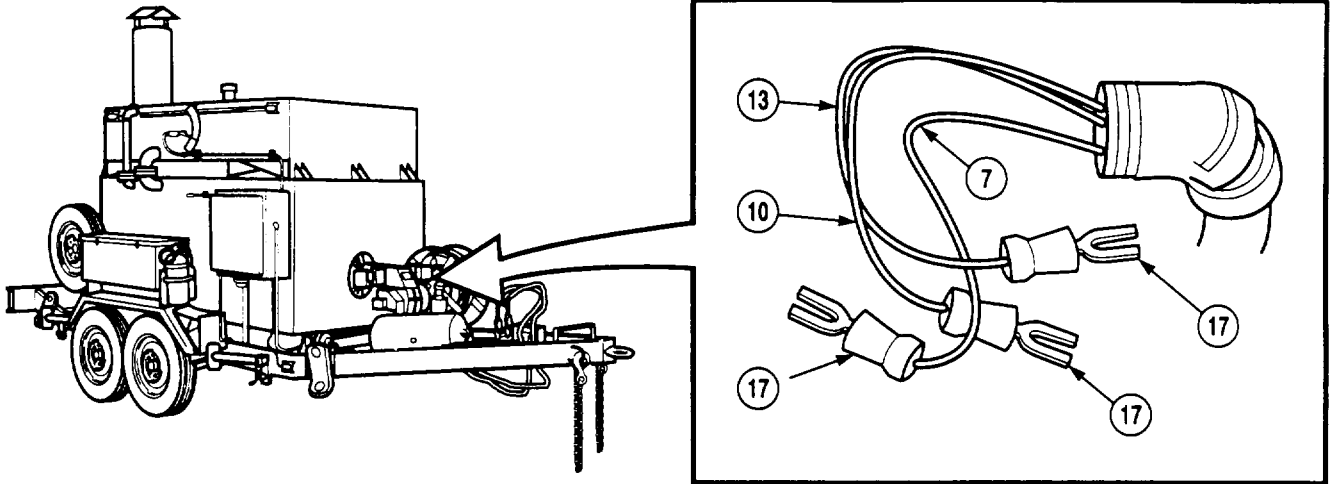
Tag and mark all wires prior to removal.

- (3) Loosen screw (6) and remove wire (7) from terminal 16 (8).
- (4) Loosen screw (9) and remove wire (10) from terminal L2 (11).
- (5) Loosen screw (12) and remove wire (13) from terminal L1 (14).

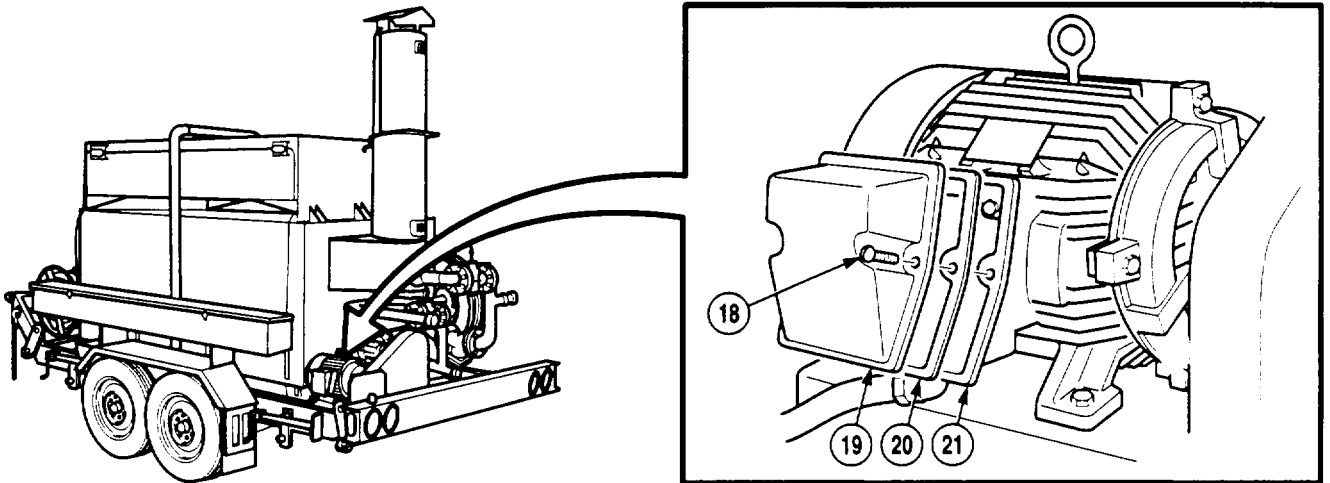


- (6) Remove nut (15) from elbow (16).
- (7) Remove elbow (16) and wires (7, 10, and 13) from controller subbase (5).





(8) Remove three terminals (17) from wires (7, 10, and 13). Discard terminals.



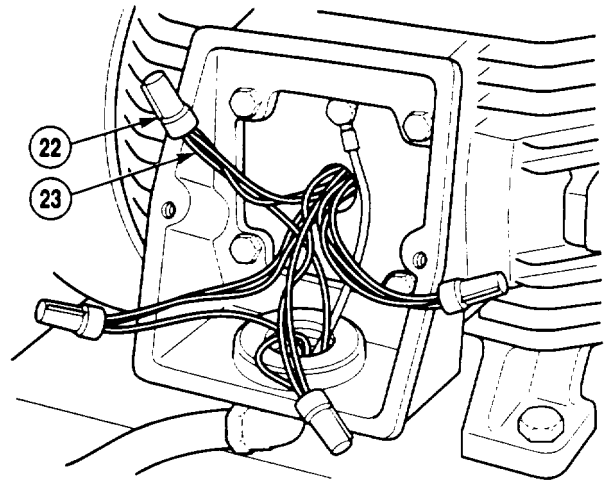
NOTE

Tag and mark all wires prior to removal.

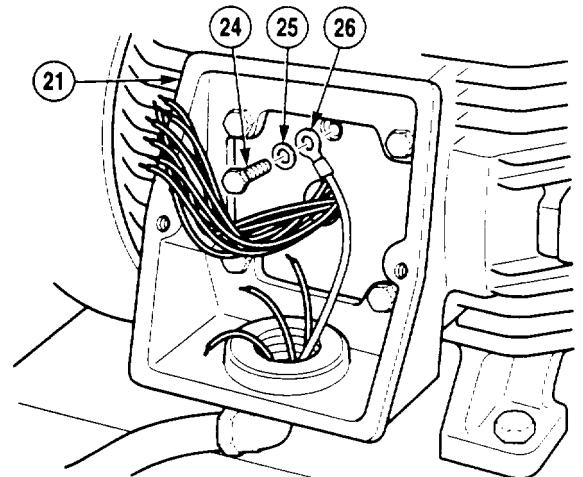
(9) Remove two screws (18), cover (19), and gasket (20) from pump motor (21). Discard gasket.

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT.)

(10) Remove four wire nuts (22) and disconnect wires (23). Discard wire nuts.

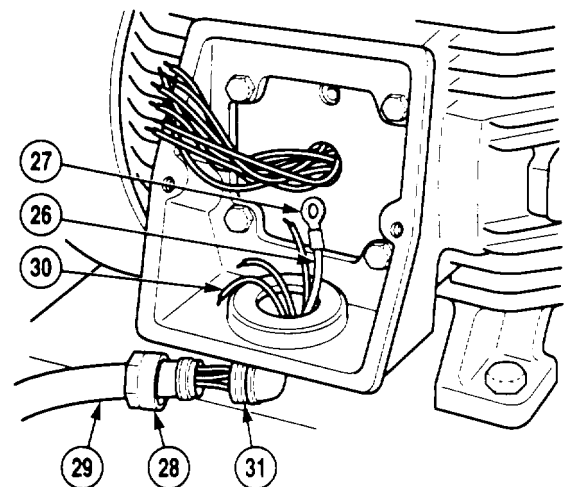


(11) Remove screw (24), washer (25), and ground wire (26) from pump motor (21).

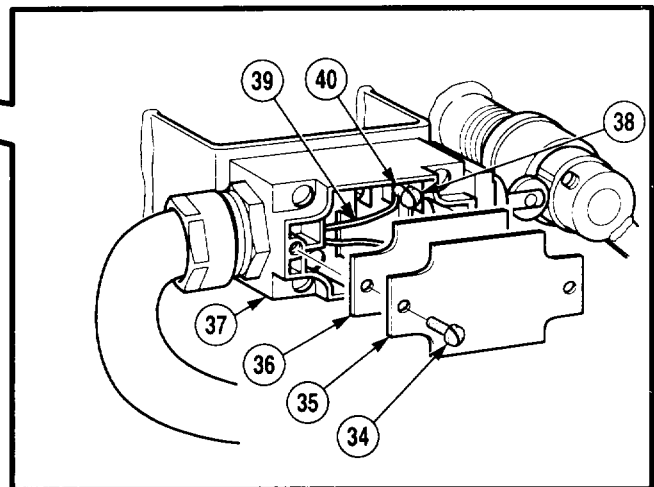
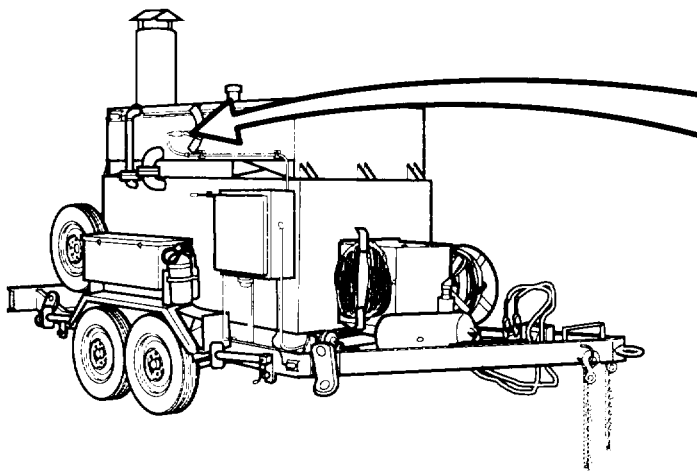
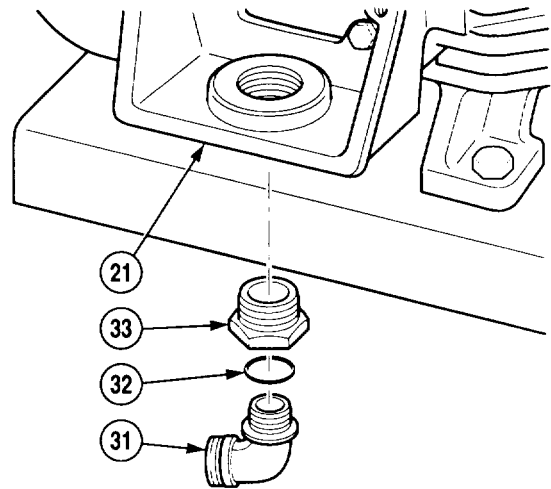


(12) Remove terminal lug (27) from ground wire (26). Discard terminal lug.

(13) Loosen nut (28) and remove conduit (29) and wiring harness (30) from elbow (31).



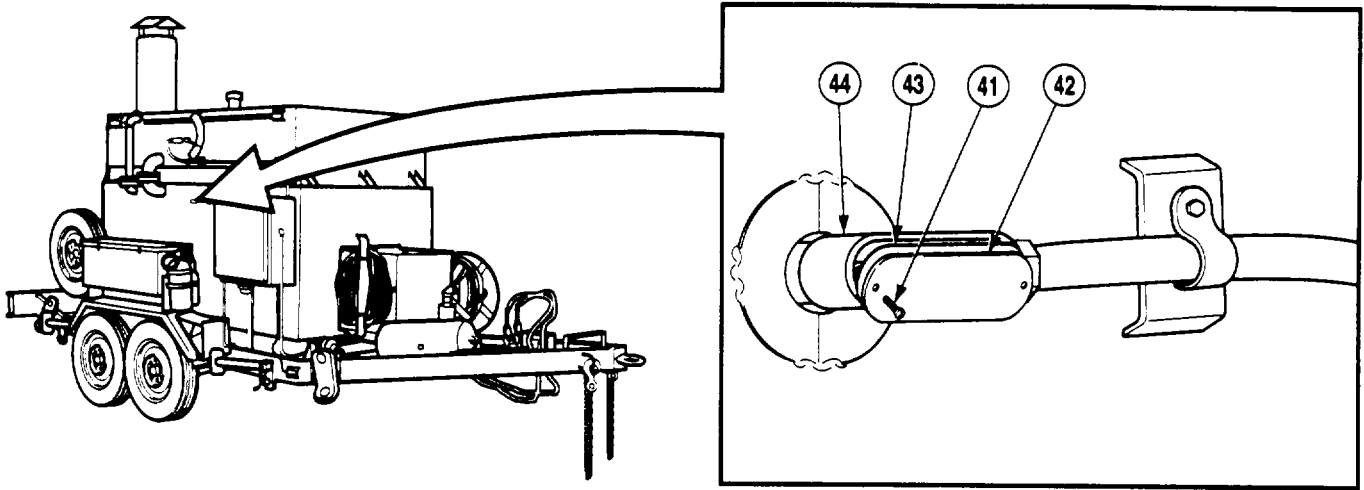
(14) If damaged, remove elbow (31), preformed packing (32), and reducer bushing (33) from pump motor (21). Discard preformed packing.



(15) Remove two screws (34), cover (35), and gasket (36) from limit switch (37). Discard gasket.

(16) Loosen two screws (38) and remove wires (39) from terminals (40).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).



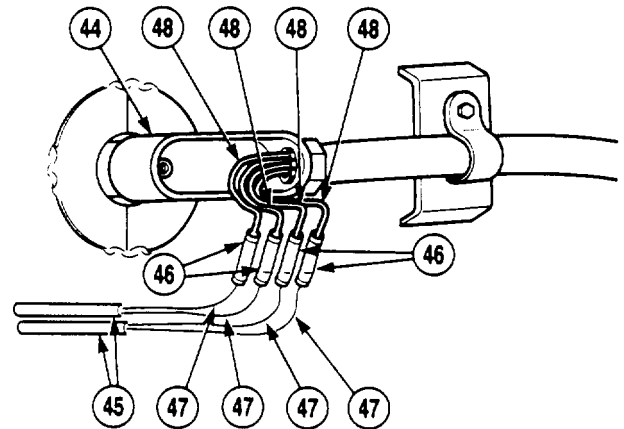
(17) Remove two screws (41), cover (42), and gasket (43) from outlet hub (44). Discard gasket.

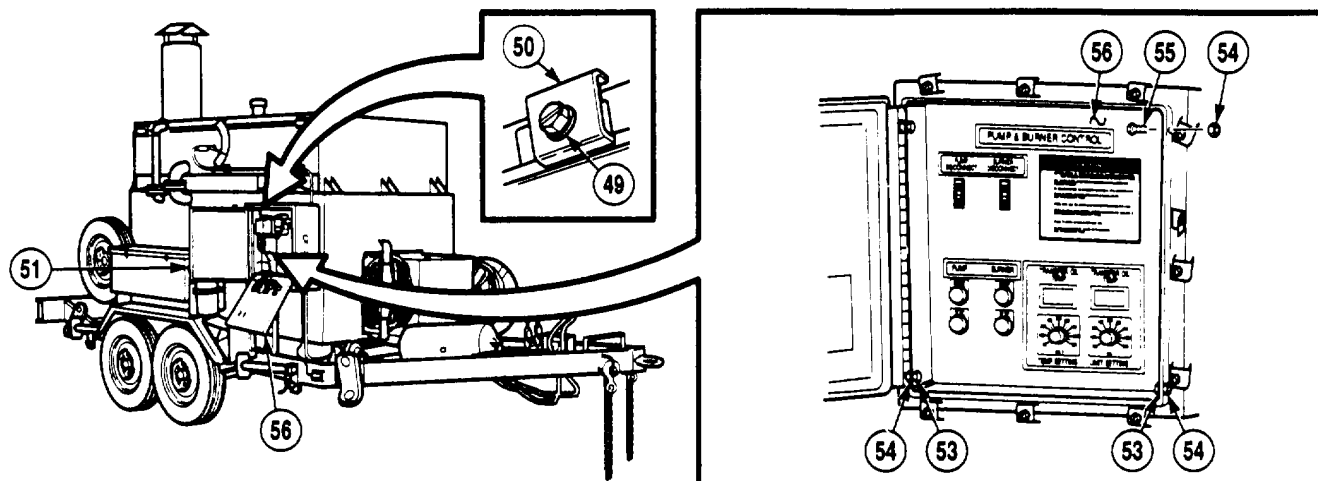
NOTE

Tag and mark all wires prior to removal.

(18) Remove two temperature sensors (45) from outlet hub (44).

(19) Remove four butt connectors (46) from wires (47 and 48). Discard butt connectors.

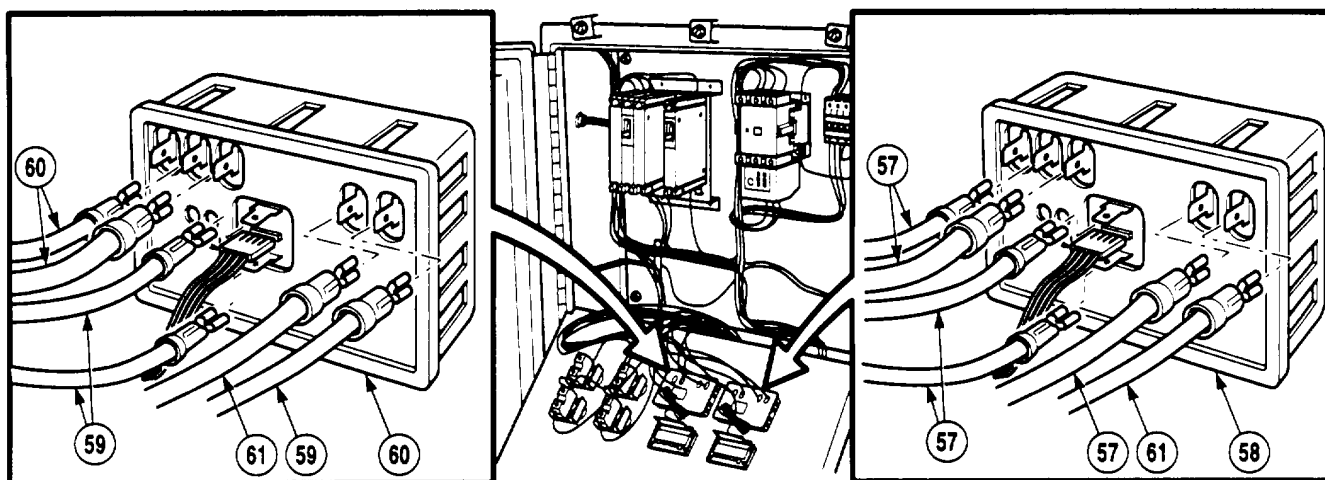




(20) Loosen nine screws (49) and clamps (50) and open cover (51).

(21) Loosen two nuts (52) and screws (53).

(22) Remove two nuts (54) and screws (55) and allow panel (56) to lean forward.



NOTE

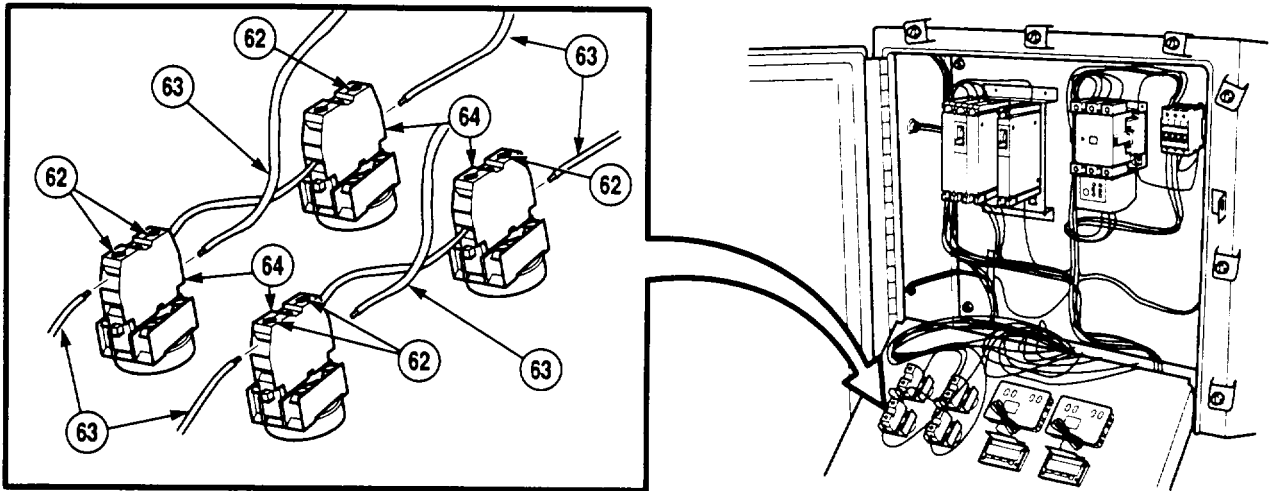
Tag and mark all wires prior to removal.

(23) Disconnect five wires (57) from thermostat (58).

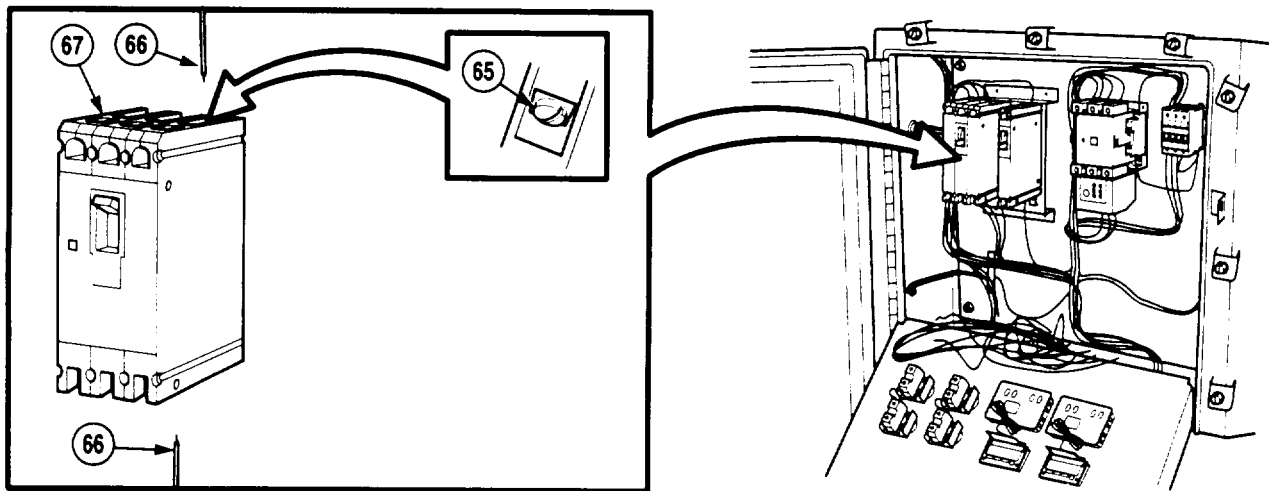
(24) Disconnect five wires (59) from thermostat (60).

(25) If damaged, remove jumper wire (61) from thermostats (58 and 60).

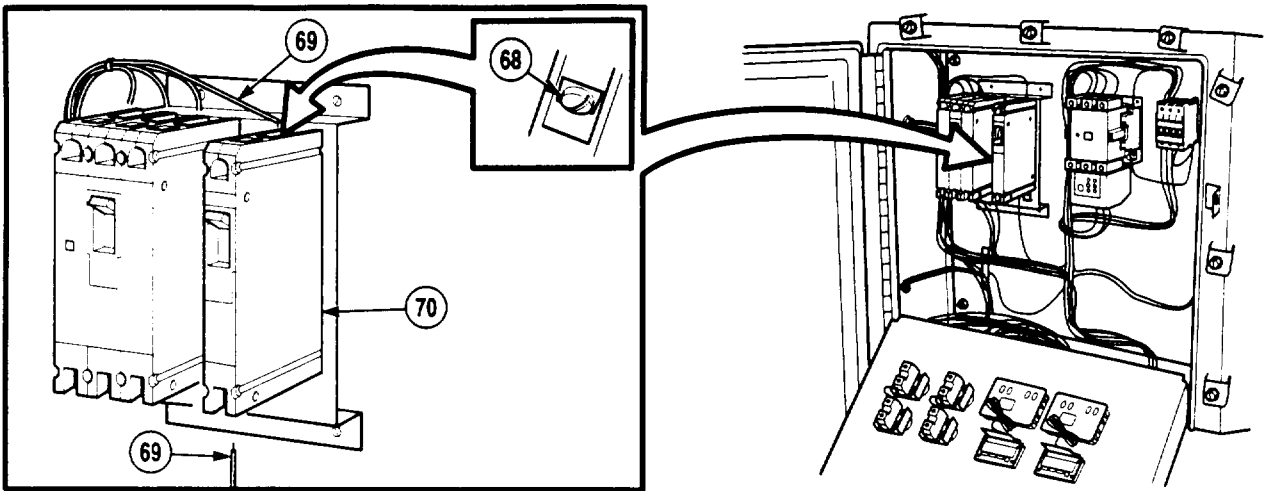
5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).



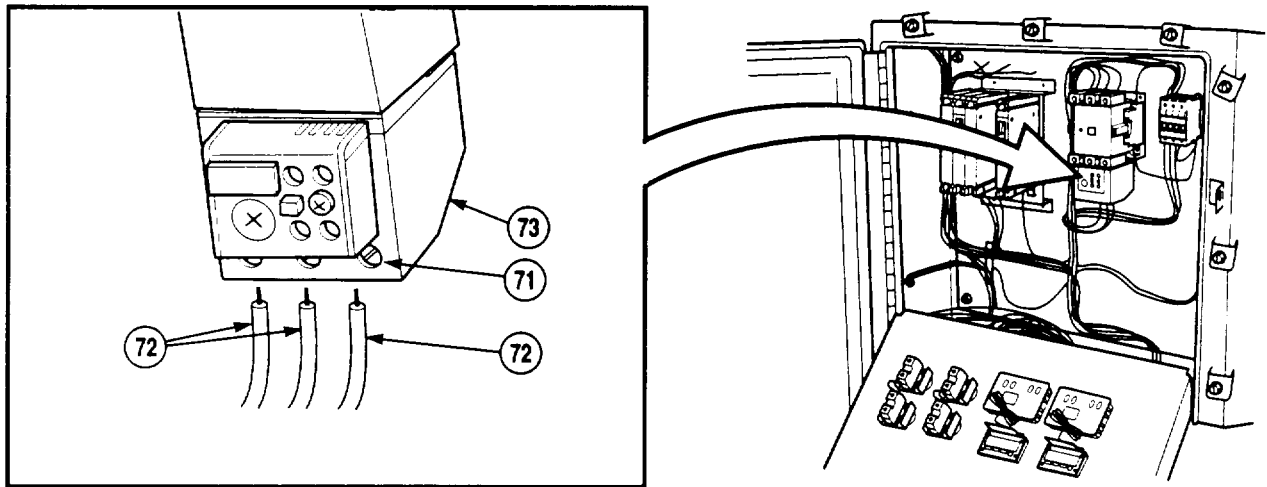
(26) Loosen six screws (62) and disconnect six wires (63) from four switches (64).



(27) Loosen six screws (65) and six wires (66) from 40 amp circuit breaker (67).

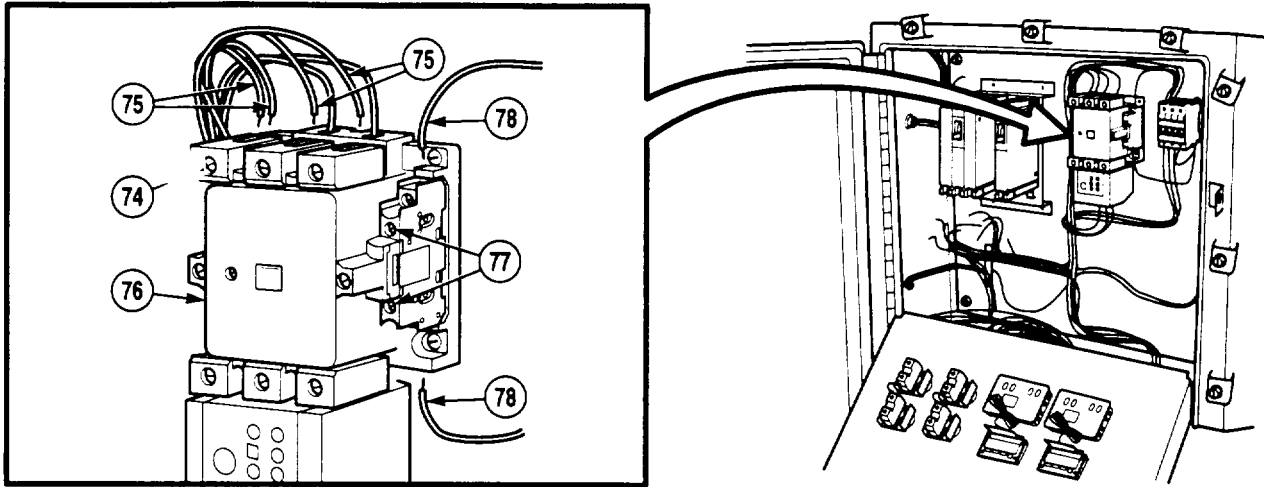


(28) Loosen two screws (68) and remove two wires (69) from 20 amp circuit breaker (70).



(29) Loosen three screws (71) and remove three wires (72) from terminal overload protector (73).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).

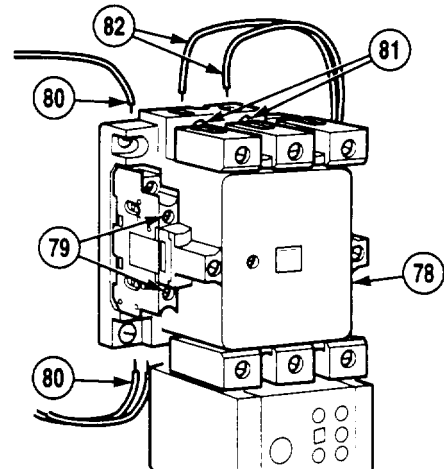


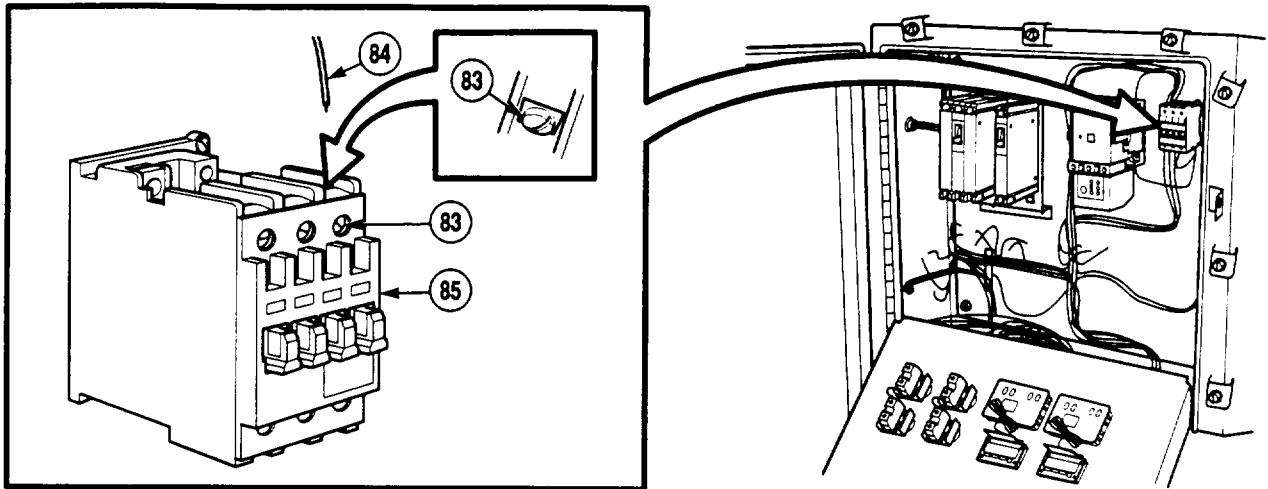
(30) Loosen three screws (74) and remove four wires (75) from pump motor relay (76).

(31) Loosen two screws (77) and remove two wires (78) from pump motor relay (76).

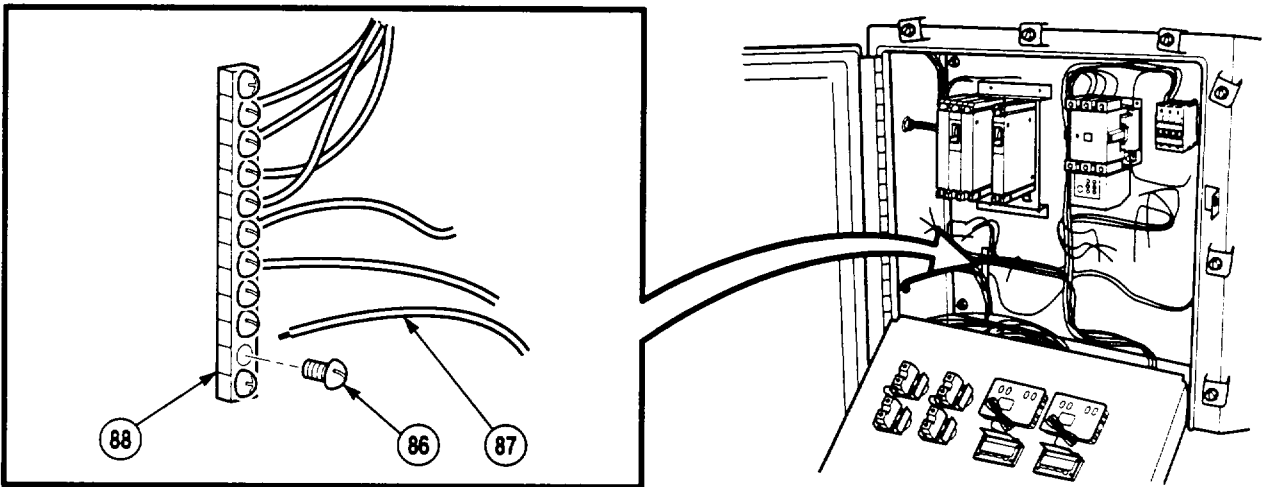
(32) Loosen two screws (79) and remove three wires (80) from pump motor relay (76).

(33) Loosen two screws (81) and remove two wires (82) from pump motor relay (76).

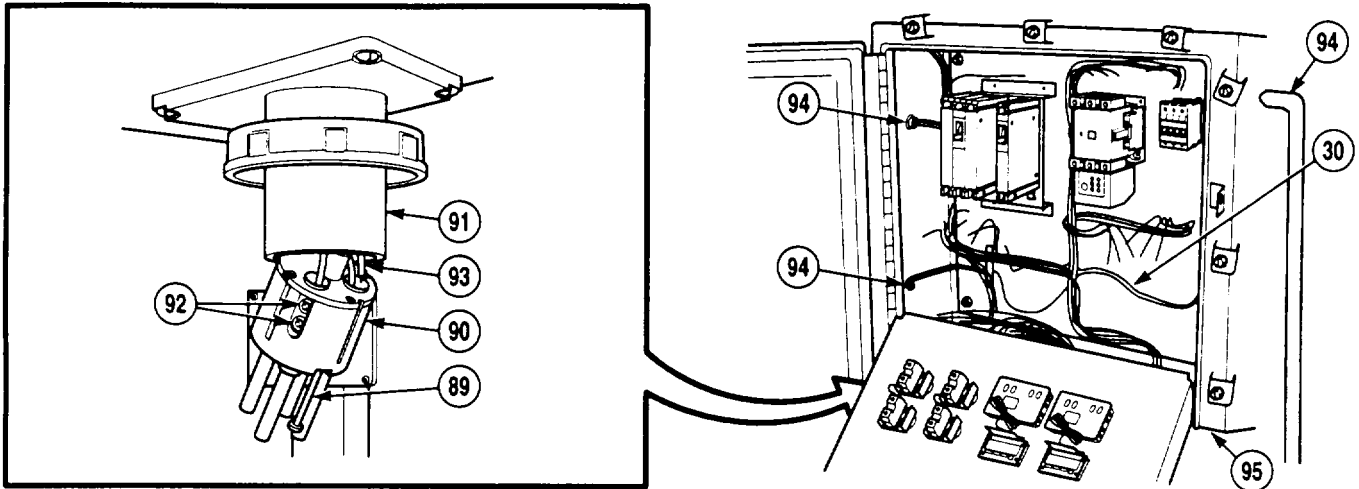




(34) Loosen seven screws (83) and remove eleven wires (84) from burner relay (85).



(35) Loosen seven screws (86) and remove seven ground wires (87) from grounding terminal (88).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).


(36) Loosen two screws (89) and remove interior (90) from body (91).

(37) Loosen eight screws (92) and remove five wires (93) from interior (90).

(38) Remove wiring harness (30) from conduit (94) and control panel box (95).

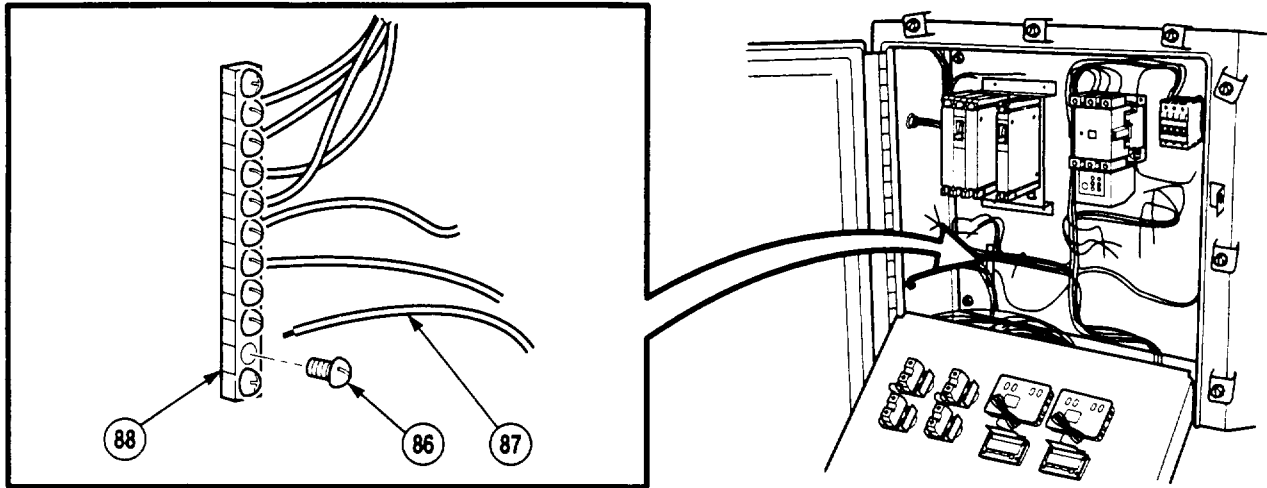
(39) Refer to General Wiring Repair (para 5-27) if repair of wiring harness is required.

b. Installation.

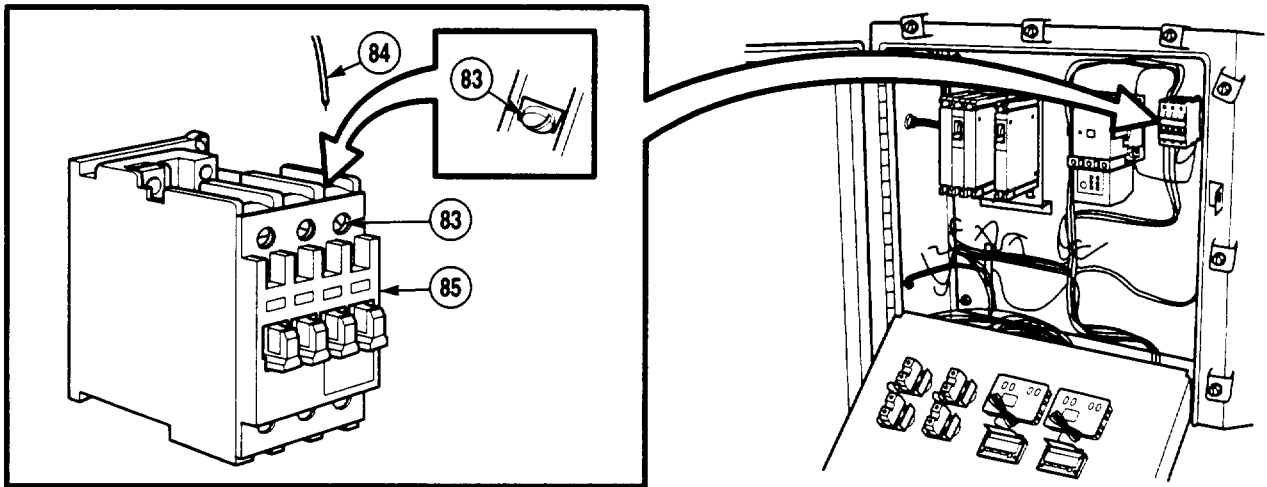
(1) Using fish tape, install wiring harness (30) in control panel box (95) and conduit (94).

(2) Install five wires (93) in interior (90) and tighten eight screws (92).

(3) Install interior (90) on body (91) and tighten two screws (89).



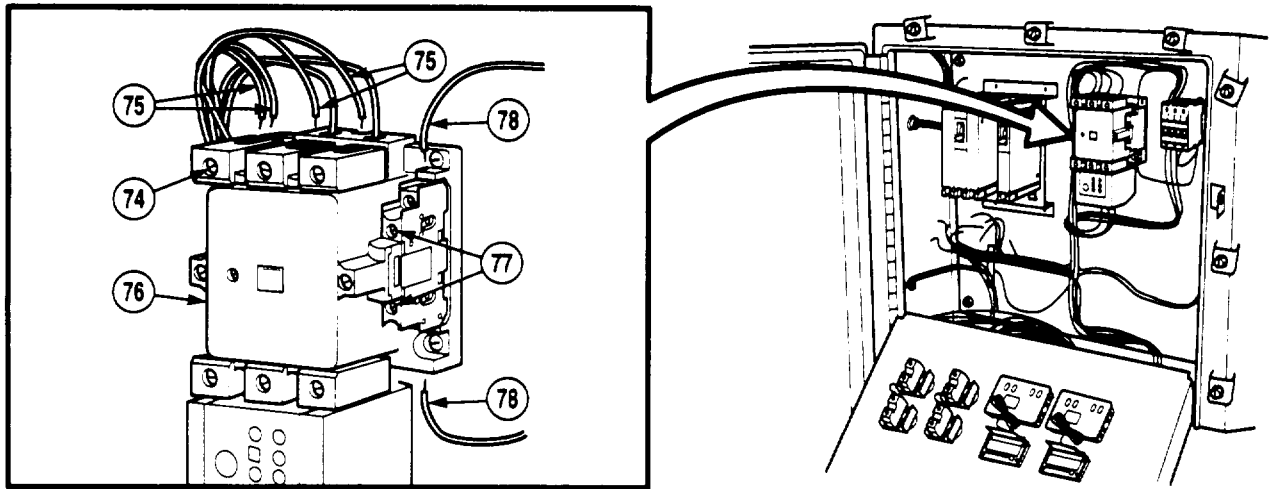
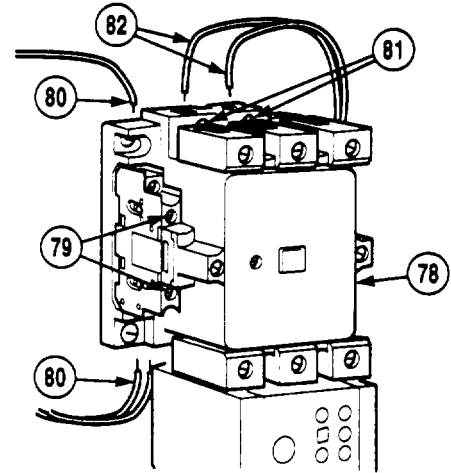
(4) Install seven ground wires (87) on grounding terminal (88) and tighten seven screws (86).



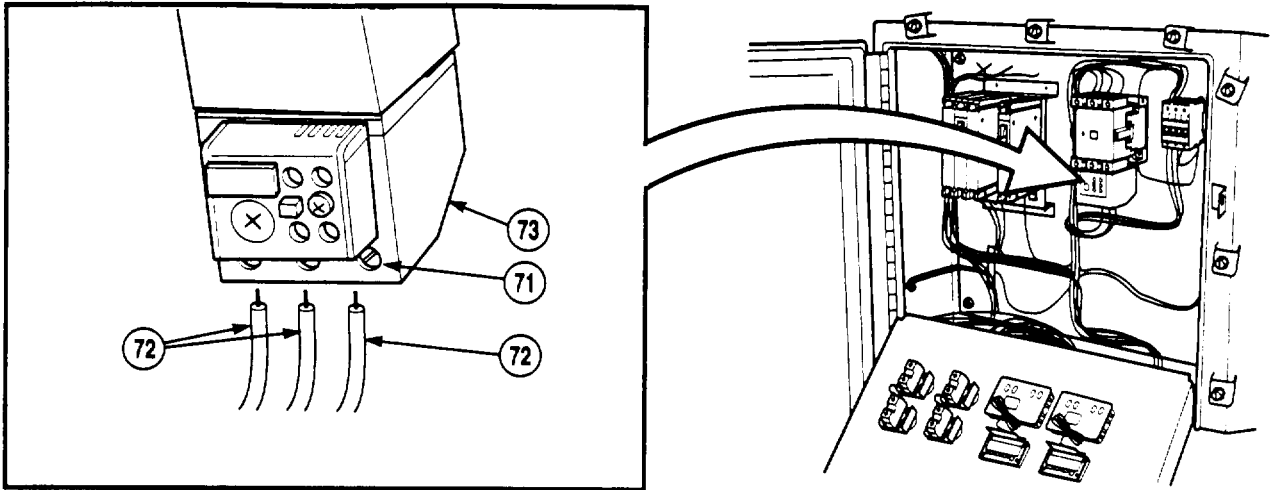
(5) Install eleven wires (84) on burner relay (85) and tighten seven screws (83).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).

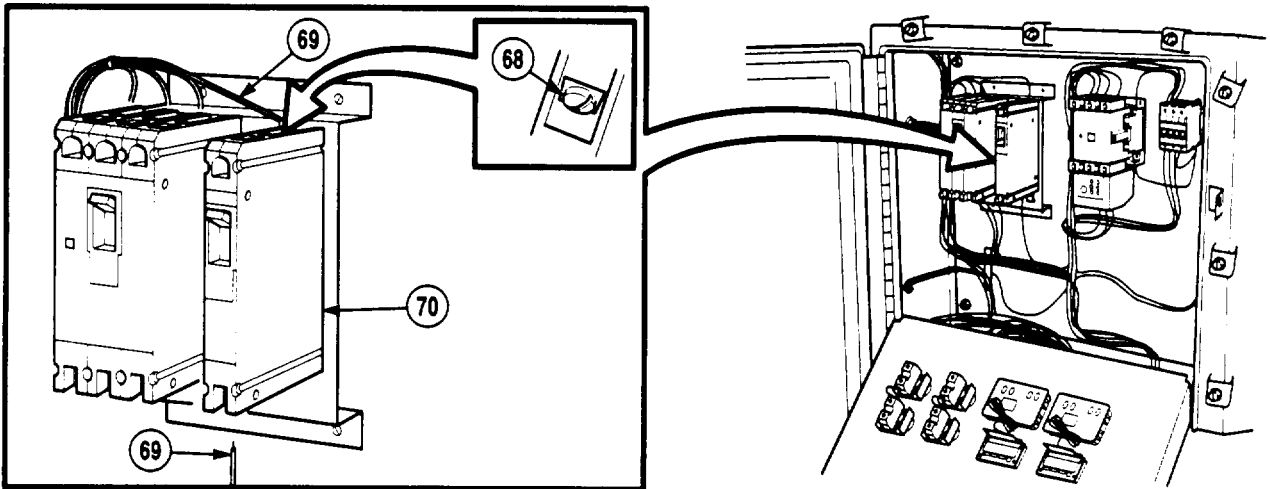
- (6) Install two wires (82) on pump motor relay (76) and tighten screws (81).
- (7) Install three wires (80) on pump motor relay (76) and tighten two screws (79).



- (8) Install two wires (78) on pump motor relay (76) and tighten two screws (77).
- (9) Install four wires (75) on pump motor relay (76) and tighten three screws (74).

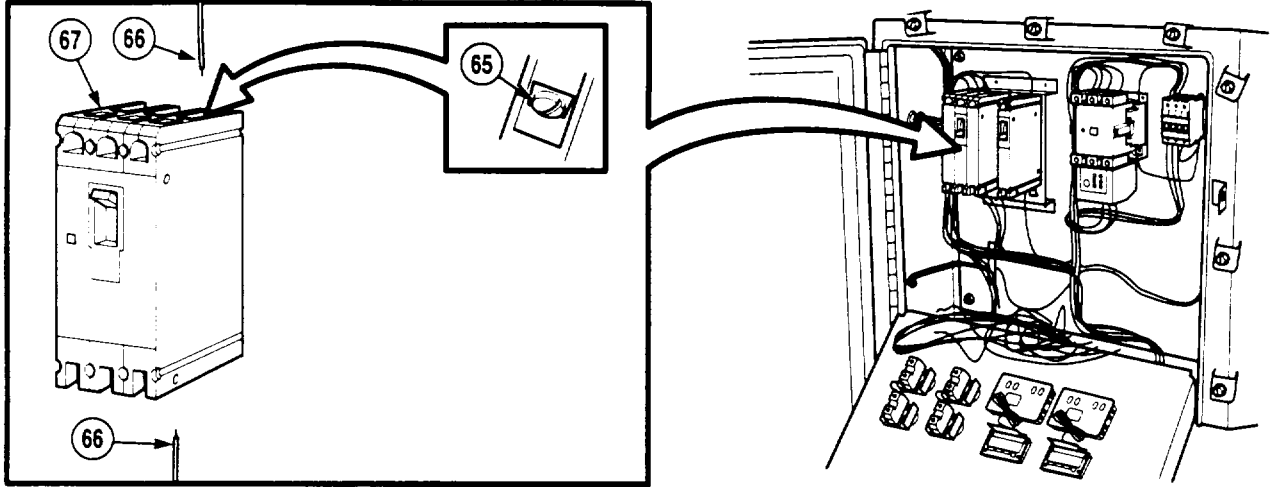


(10) Install three wires (72) on thermal overload protector (73) and tighten three screws (71).

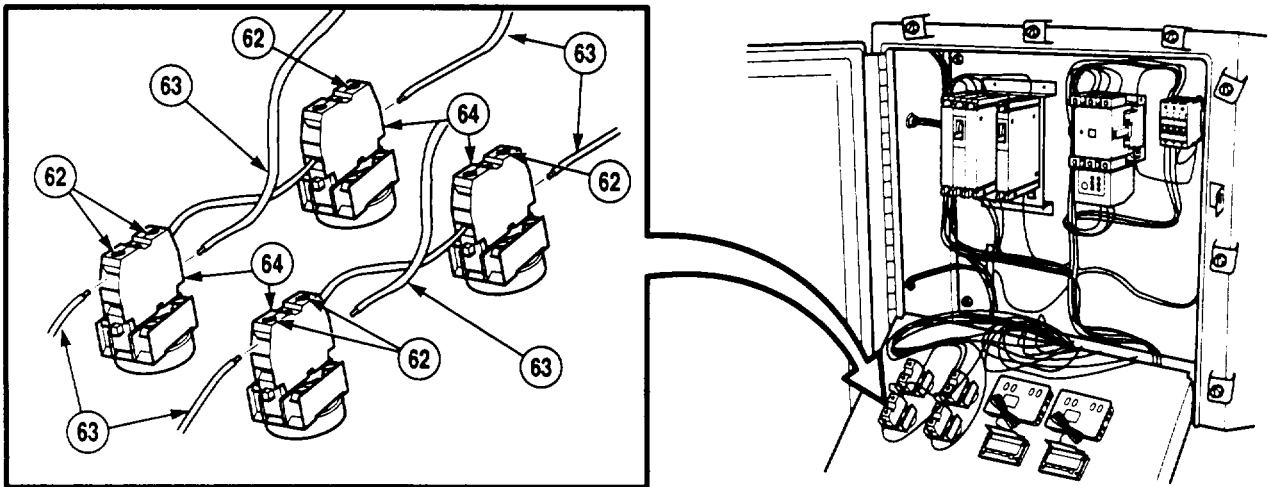


(11) Install two wires (69) on 20 amp circuit breaker (70) and tighten two screws (68).

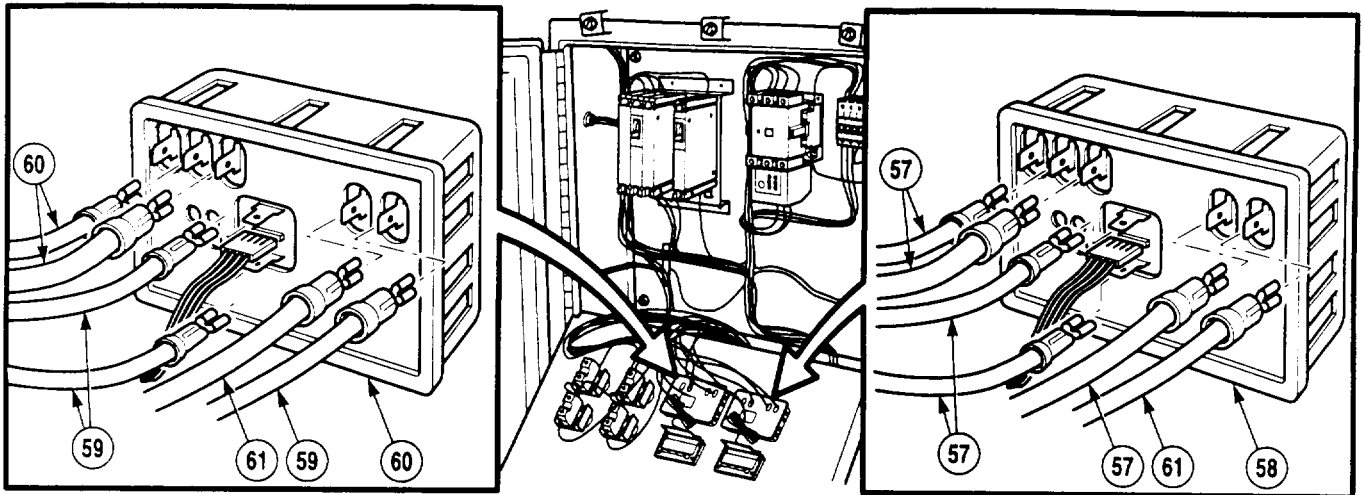
5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).



(12) Install six wires (66) on 40 amp circuit breaker (67) and tighten six screws (65).



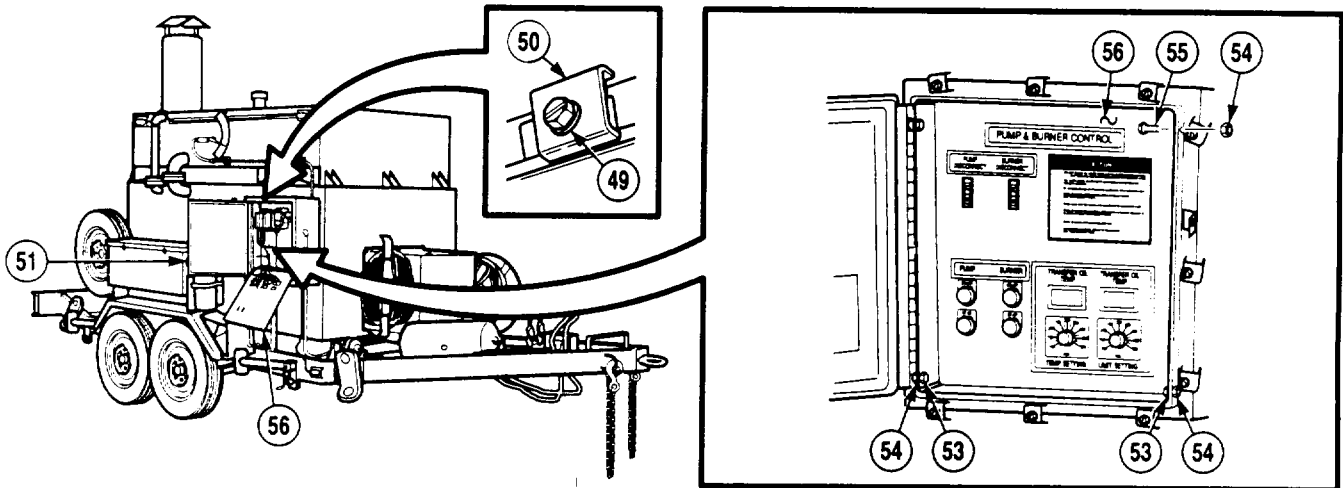
(13) Install six wires (63) on four switches (64) and tighten six screws (62).



(14) If removed, install jumper wire (61) on thermostats (58 and 60).

(15) Install five wires (59) on thermostat (60).

(16) Install five wires (57) on thermostat (58).



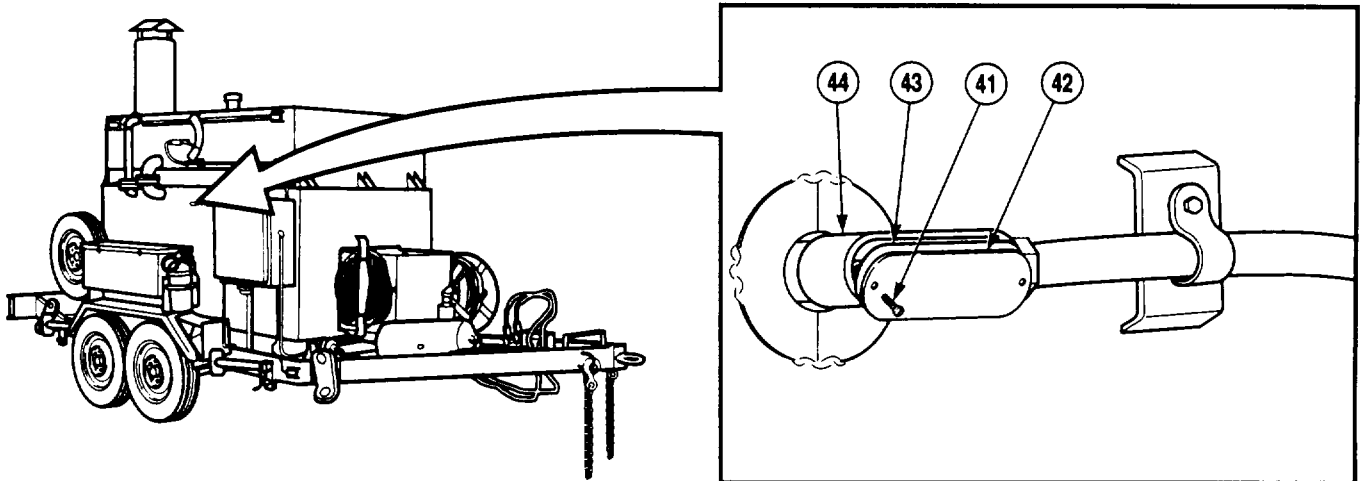
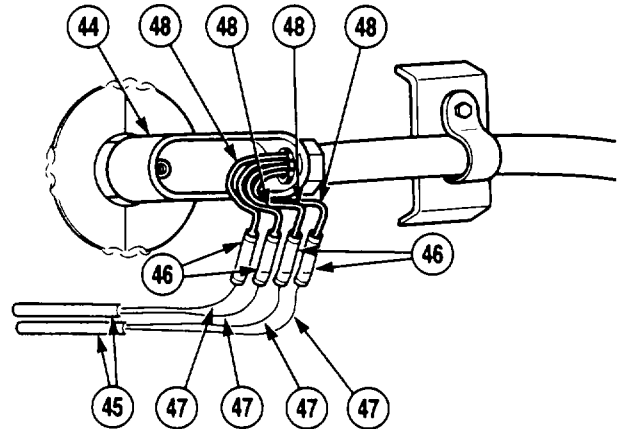
(17) Lift panel (56) to the upright position and install two screws (55) and nuts (54).

(18) Tighten two nuts (54), screws (56), two nuts (52), and screws (53).

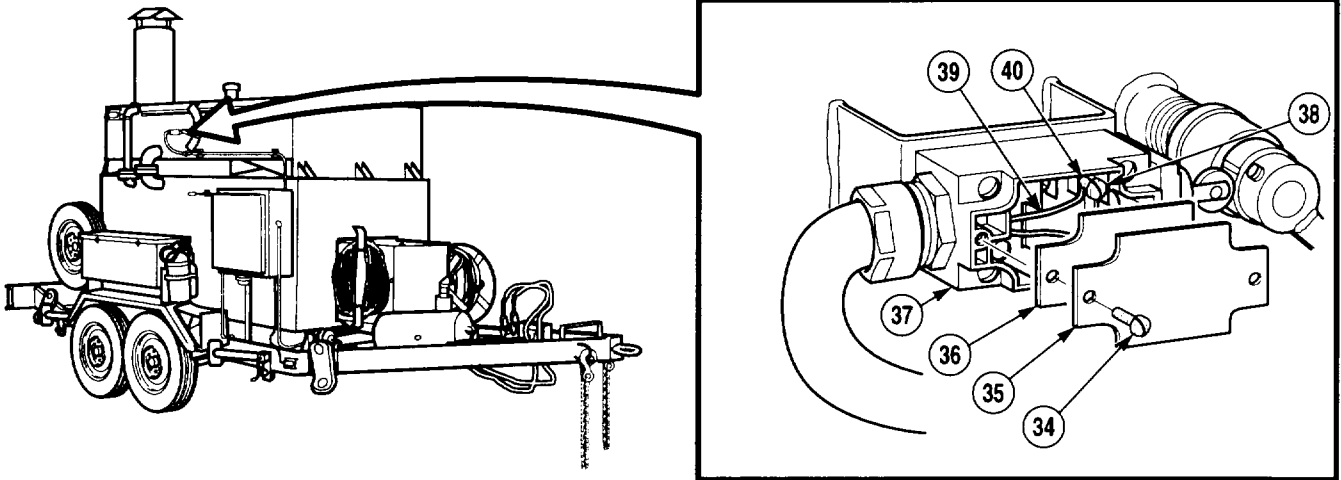
(19) Close cover (51), reposition nine clamps (50), and tighten screws (49).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).

- (20) Install four butt connectors (46) on wires (47 and 48).
- (21) Install two temperature sensors (45) in outlet hub (44).



- (22) Install gasket (43), cover (42), and two screws (41) on outlet hub (44). Tighten screws.



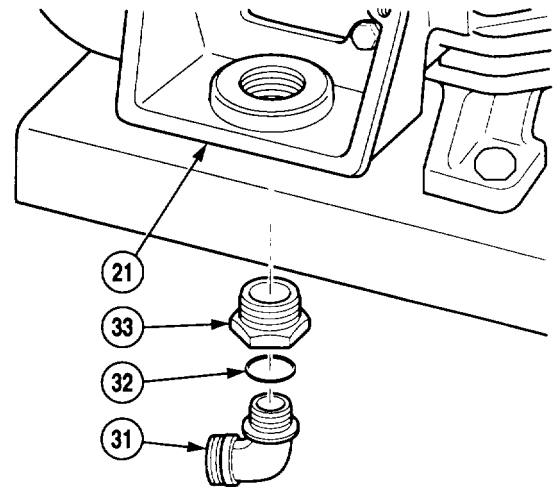
NOTE

Ensure that inner switch is seated in notch at rear of switch body. Unseating will cause switch to not operate properly.

(23) Install wires (39) on terminals (40) and tighten two screws (38).

(24) Install gasket (36), cover (35), and two screws (34) on limit switch (37).

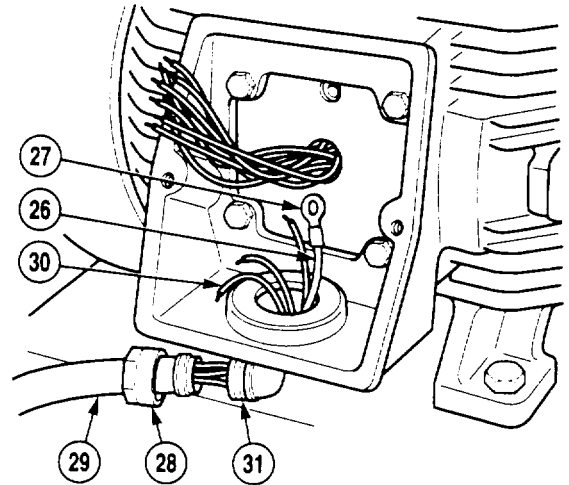
(25) If removed, install reducer bushing (33), preformed packing (32), and elbow (31) on pump motor (21).



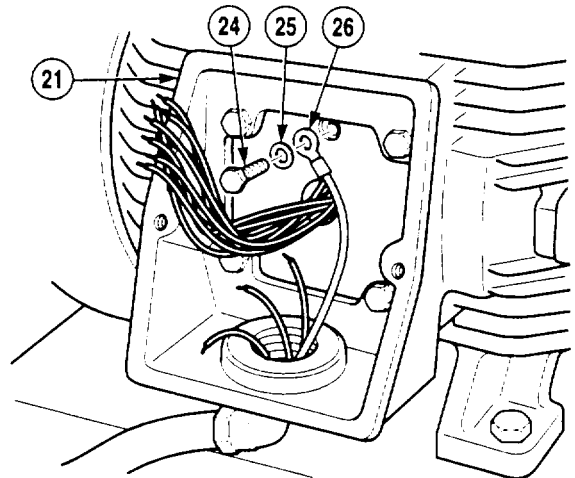
5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).

(26) Place wiring harness (30) through elbow (31) and install conduit (29) in elbow (31) and tighten nut (28).

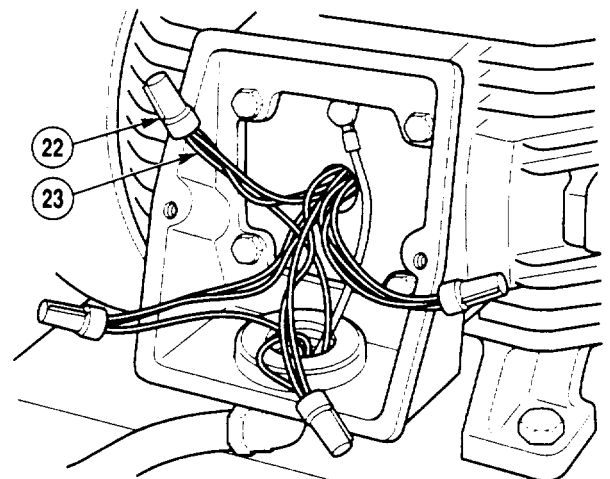
(27) Install terminal lug (27) on ground wire (26).

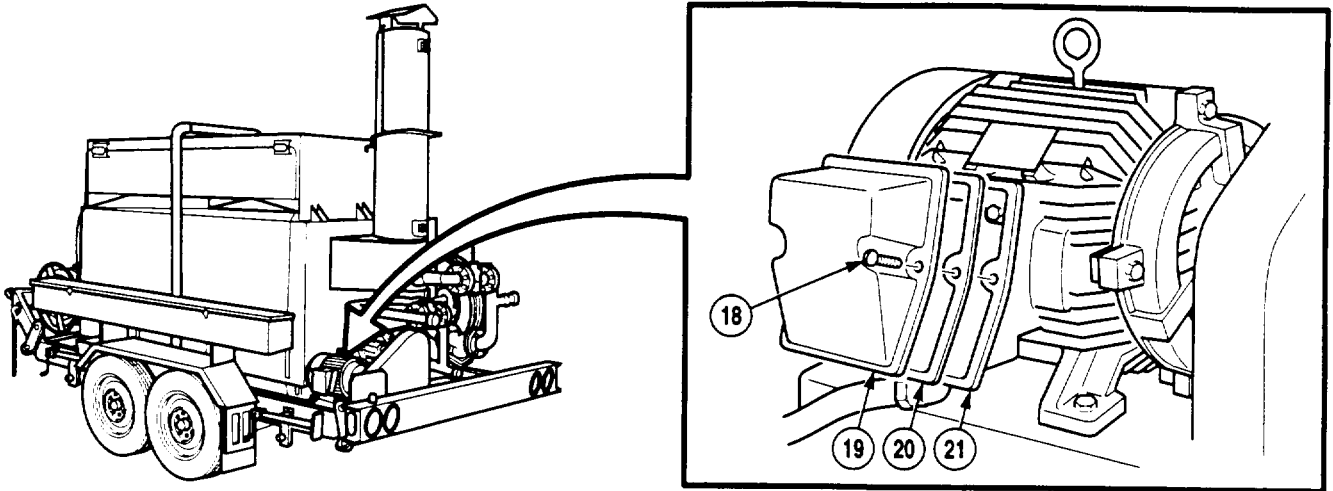


(28) Install ground wire (26), washer (25), and screw (24) on pump motor (21) and tighten screw.

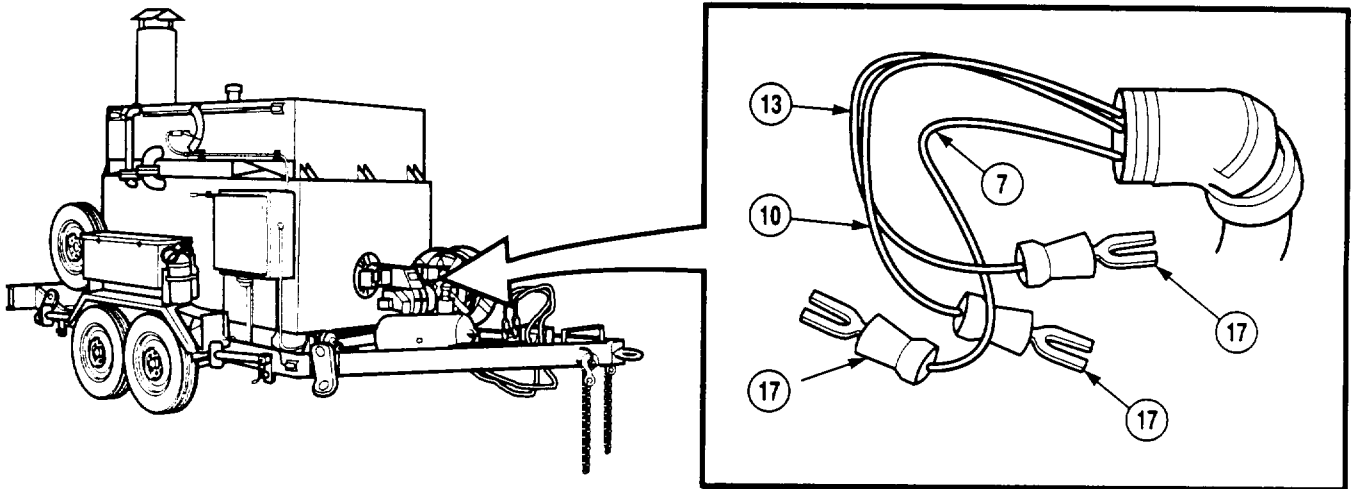


(29) Connect wires (23) and install wire nuts (22).





(30) Install gasket (20), cover (19), and two screws (18) on pump motor (21). Tighten screws.

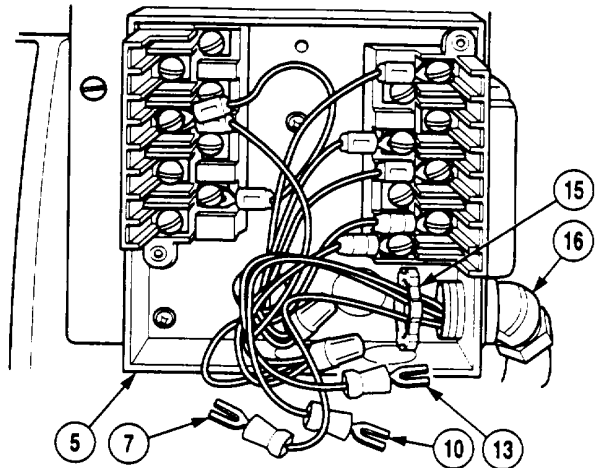


(31) Install three terminals (17) on wires (7, 10, and 13).

5-29. HEAT EXCHANGER WIRING HARNESS REPLACEMENT (CONT).

(32) Position wires (7, 10, and 13) and elbow (16) in controller subbase (5).

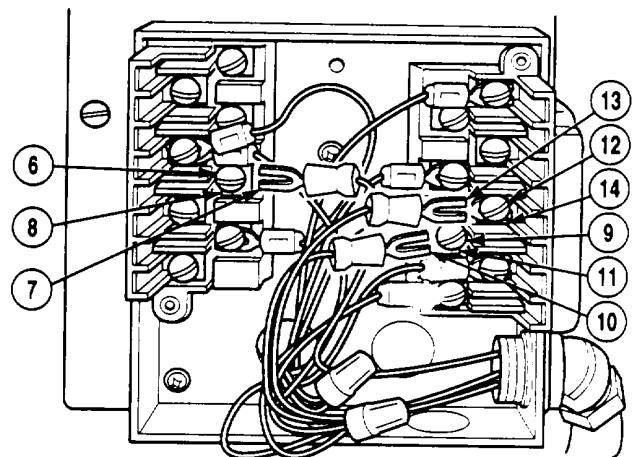
(33) Install nut (15) on elbow (16). Tighten nut.



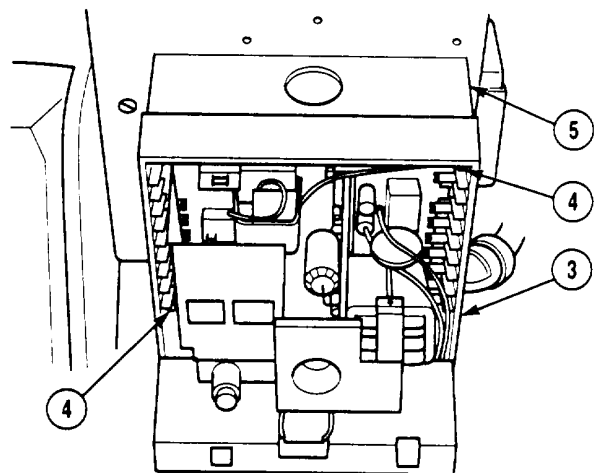
(34) Install wire (13) on terminal L1 (14) and tighten screw (12).

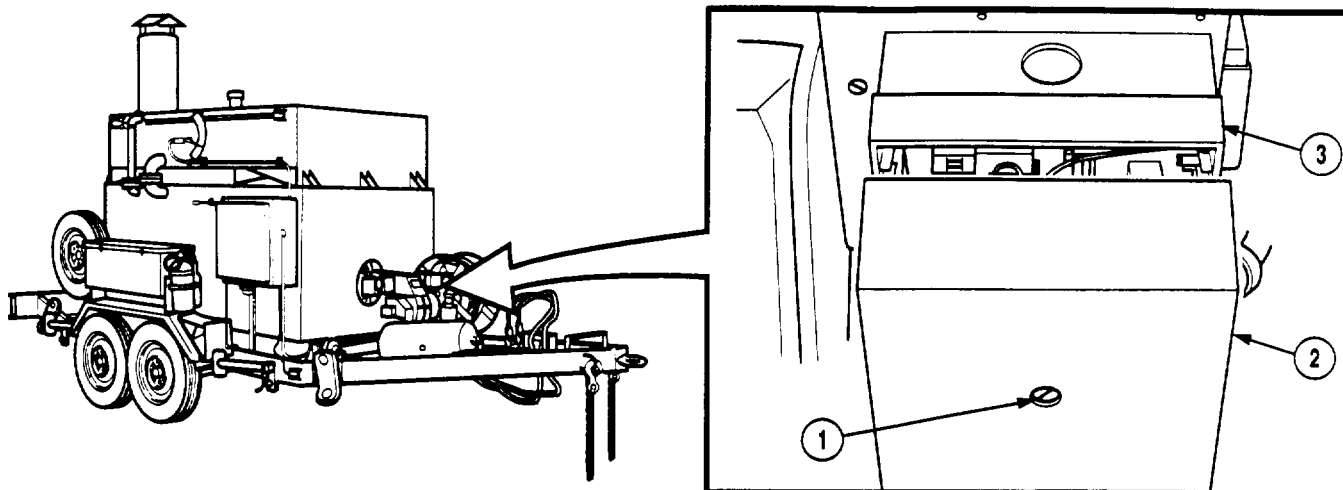
(35) Install wire (10) on terminal L2 (11) and tighten screw (9).

(36) Install wire (7) on terminal 16 (8) and tighten screw (6).



(37) Install burner controller (3) on controller subbase (5) and tighten two captive screws (4).





(38) Install cover (2) on burner controller (3) and tighten captive screw (1).

NOTE

Follow-on Maintenance:

- Install burner cover (page 4-296).
- Remove wheel chocks (page 2-35).

END OF TASK

5-30. CONTROL PANEL AND BOX REPLACEMENT.

This task covers:

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

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lock Washers (4)
Lock Washers (2)

Personnel Required

Two

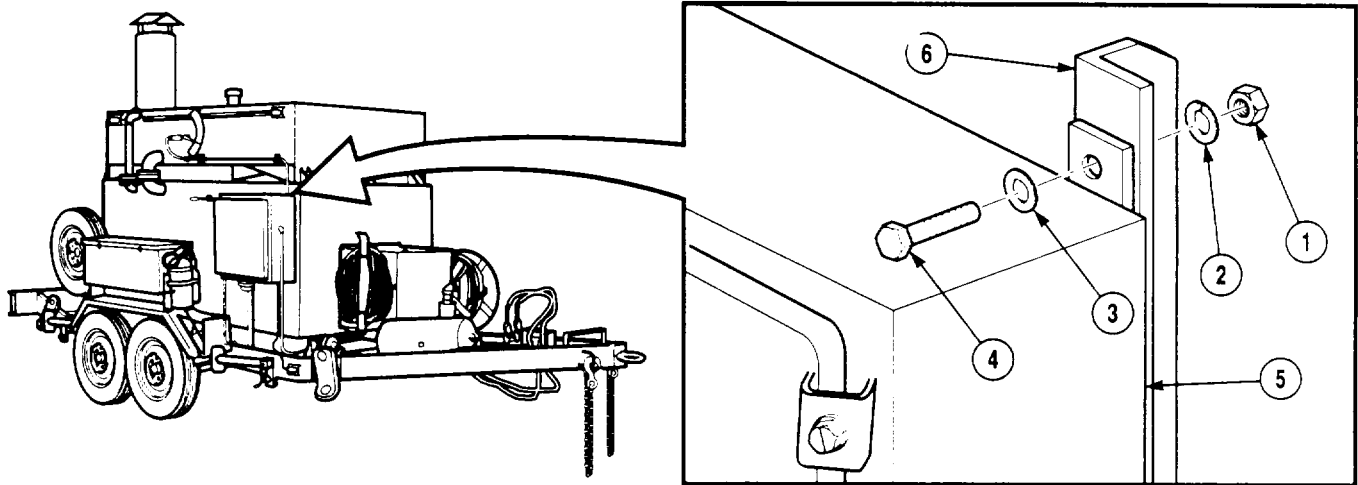
Equipment Condition

Wheels Chocked (page 2-17)
Heat Exchanger Wiring Harness Removed (page 5-39)
Pump Motor Conduit Removed (page 5-19)
Temperature Sensor Conduit Removed (page 4-67)

Equipment Condition (continued)

Burner Limit Switch Conduit Removed (para 5-13)
20 Amp Circuit Breaker Removed (page 4-171)
40 Amp Circuit Breaker Removed (page 4-174)
Burner Relay Removed (page 4-185)
Thermal Overload Protector Removed (page 4-177)
Pump Motor Relay Removed (page 4-180)
Start/Stop Switches Removed (page 4-182)
Thermostats Removed (page 4-188)
Temperature Gages Removed (page 4-63)
Power Inlet Removed (page 4-191)
Data Plates Removed (page 4-157)

a. Removal.

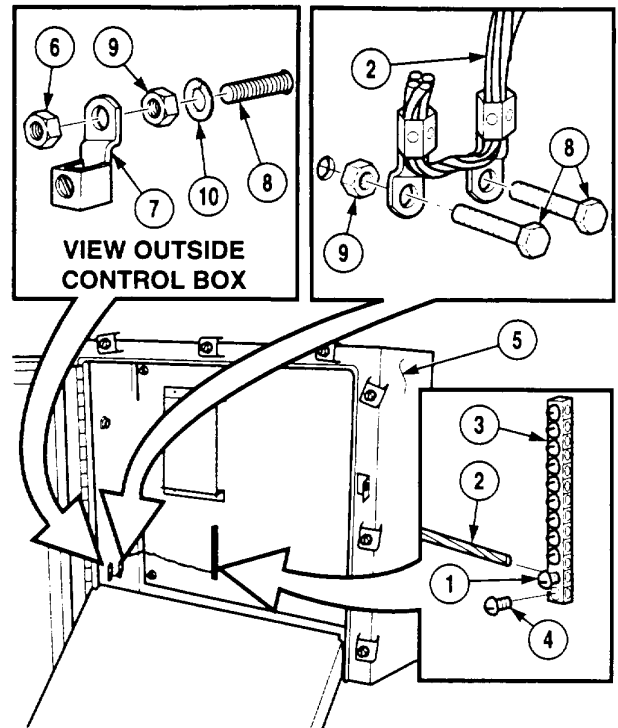


ST9472

- (1) With the aid of an assistant, remove four nuts (1), lock washers (2), washers (3), screws (4), and control panel box (5) from Heater (6). Discard lock washers.

b. Disassembly.

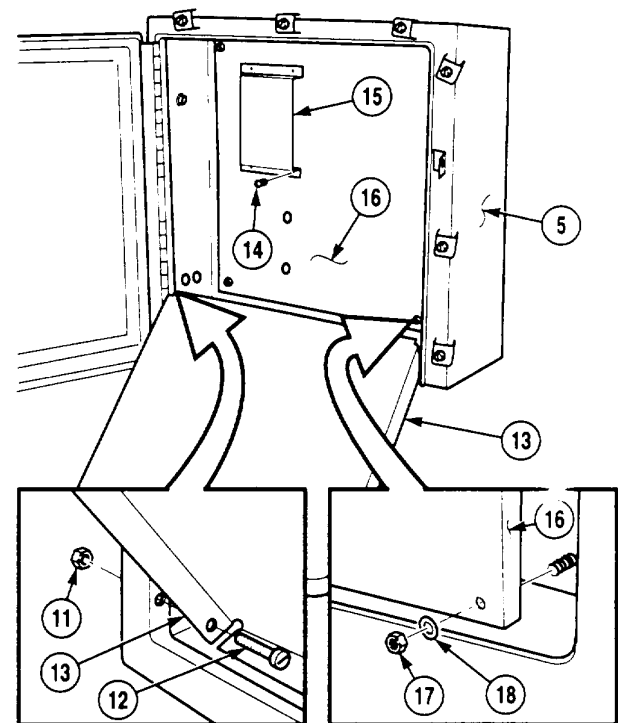
- (1) Loosen screw (1) and remove grounding cable (2) from grounding terminal strip (3).
- (2) Remove two screws (4) and grounding terminal strip (3) from control panel box (5).
- (3) Remove two nuts (6) and grounding lugs (7) from screws (8).
- (4) Remove four nuts (9), two lock washers (10), two screws (8), and grounding cable (2) from control panel box (5). Discard lock washers.



- (5) Remove two nuts (11), screws (12), and panel (13) from control panel box (5).
- (6) Remove four screws (14) and back plate (15) from control panel (16).
- (7) Remove four nuts (17), washers (18), and control panel (16) from control panel box (5).

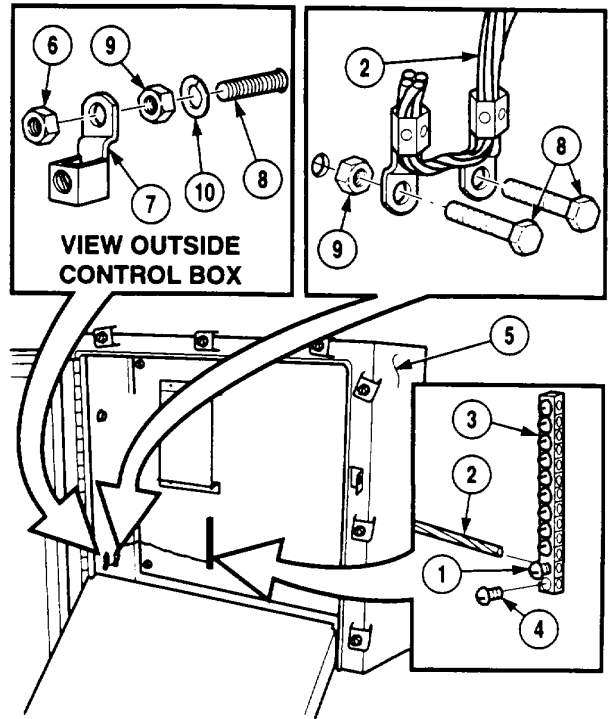
c. Assembly.

- (1) Install control panel (16) with four washers (18) and nuts (17) in control panel box (5).
- (2) Install back plate (15) with four screws (14) on control panel (16).
- (3) Position panel (13) with two screws (12) and nuts (11) on control panel box (5).



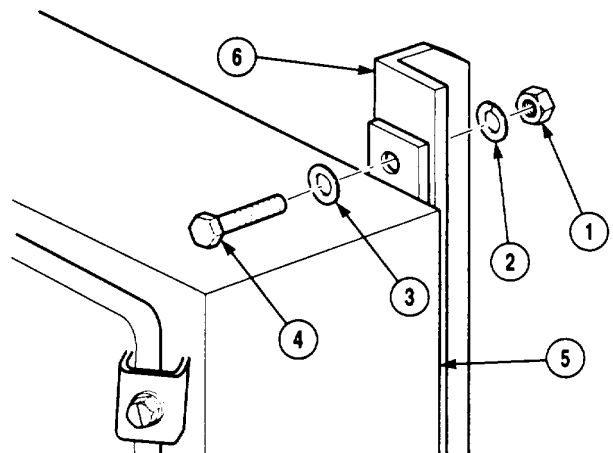
5-30. CONTROL PANEL AND BOX REPLACEMENT (CONT).

- (4) Install grounding cable (2) with two screws (8), two lock washers (10), and four nuts (9) on control panel box (5).
- (5) Install two grounding lugs (7) with nuts (6) on screws (8).
- (6) Install grounding terminal strip (3) with two screws (4) in control panel box (5).
- (7) Install grounding strap (2) with screw (1) on grounding terminal strip (3).



d. Installation.

- (1) With the aid of an assistant, install control panel box (5) with four screws (4), washers (3), lock washers (2), and nuts (1) on Heater (6).



NOTE

Follow-on Maintenance:

- Install burner limit switch conduit (page 5-16).
- Install temperature sensor conduit (page 4-69).
- Install pump motor conduit (page 5-21).
- Install heat exchanger wiring harness (page 5-50).
- Install data plates (page 4-157).
- Install temperature gages (page 4-64).
- Install thermostats (page 4-189).
- Install start/stop switches (page 4-183).
- Install power inlet (page 4-192).
- Install thermal overload protector (page 4-178).
- Install pump motor relay (page 4-181).
- Install burner relay (page 4-186).
- Install 40 amp circuit breaker (page 4-175).
- Install 20 amp circuit breaker (page 4-172).
- Remove wheel chocks (page 2-35).

END OF TASK

5-31. AIR RELAY VALVE REPAIR.

This task covers:

- a. Disassembly
- b. Cleaning/Inspection
- c. Assembly

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's
Wrench, Torque

Equipment Condition

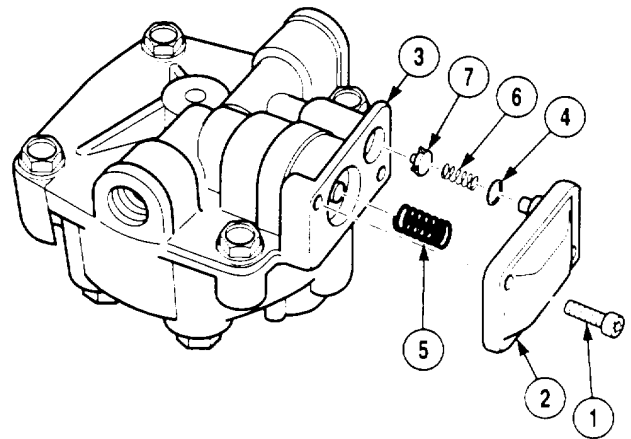
Air Relay Valve Removed (page 4-134)

Materials/Parts

Jelly, Petroleum (item 18, appendix E)
Solvent, Drycleaning (item 21, appendix E)
Tape, Teflon (item 23, appendix E)
Preformed Packing (2)
Preformed Packing
Preformed Packing
Preformed Packing
Preformed Packing
Preformed Packing
Preformed Packing
Preformed Packing

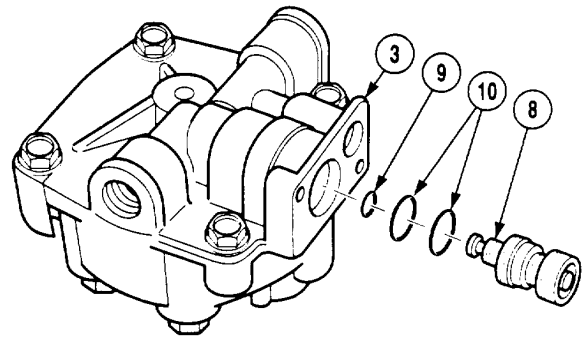
a. Disassembly.

- (1) Remove two screws (1) and cover (2) from air relay valve (3).
- (2) Remove preformed packing (4), spring (5), valve spring (6), and check valve (7) from air relay valve (3). Discard preformed packing.



(3) Remove emergency piston assembly (8) from air relay valve (3).

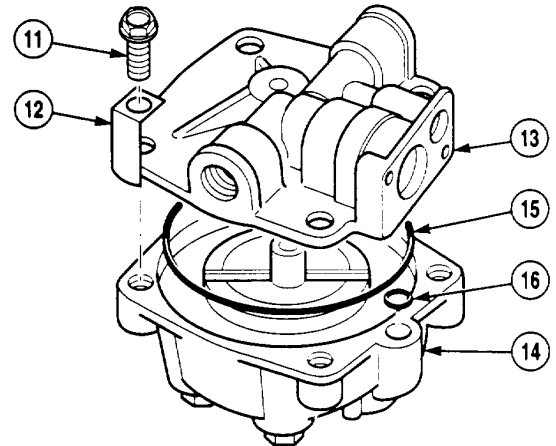
(4) Remove preformed packing (9) and two preformed packings (10) from emergency piston assembly (8). Discard preformed packings.



(5) Remove four screws (11), service tag (12), and cover assembly (13) from body (14).

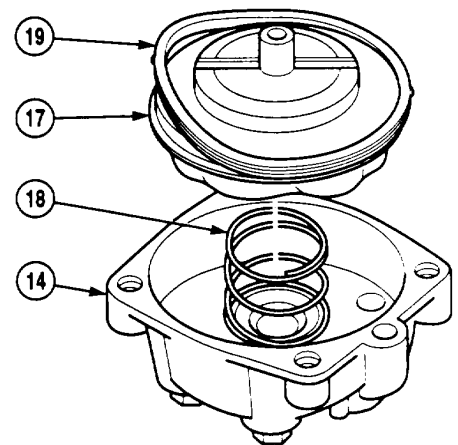
(6) Remove preformed packing (15) from cover assembly (13). Discard preformed packing.

(7) Remove preformed packing (16) from body (14). Discard preformed packing.



(8) Remove relay piston (17) and spring (18) from body (14).

(9) Remove preformed packing (19) from relay piston (17). Discard preformed packing.

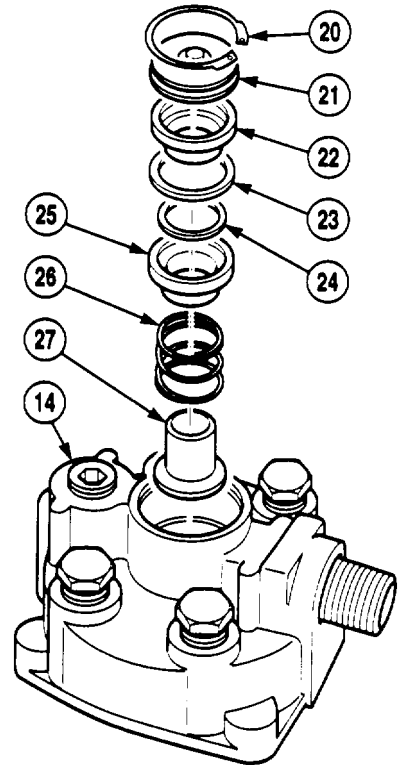


5-31. AIR RELAY VALVE REPAIR (CONT).

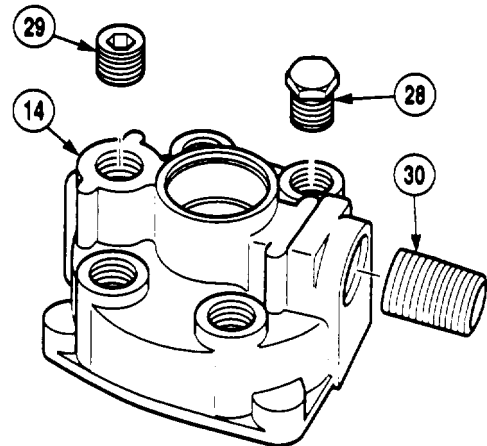
WARNING

Use care when removing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

- (10) Remove retaining ring (20) from body (14).
- (11) Remove exhaust protector assembly (21), seal retainer (22), preformed packing (23), preformed packing (24), valve guide (25), spring (26), and inlet valve assembly (27) from body (14). Discard preformed packings.



- (12) Remove three plugs (28) and plug (29) from body (14).
- (13) Remove nipple (30) from body (14).

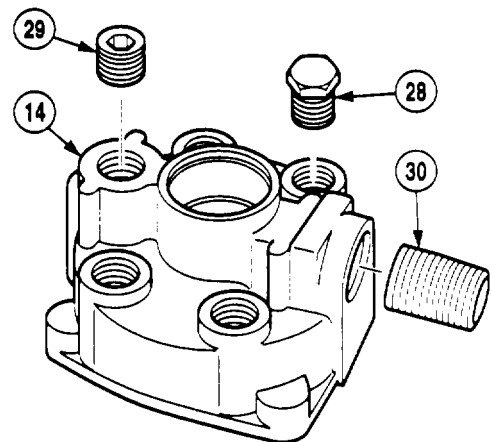


b. Cleaning/Inspection.**WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean with drycleaning solvent and dry with compressed air.
 - (2) Check closures, ball bearings and bushings and replace if necessary.
 - (3) Check all other parts for nicks, gouges, chips, burrs, excessive wear and replace if necessary.

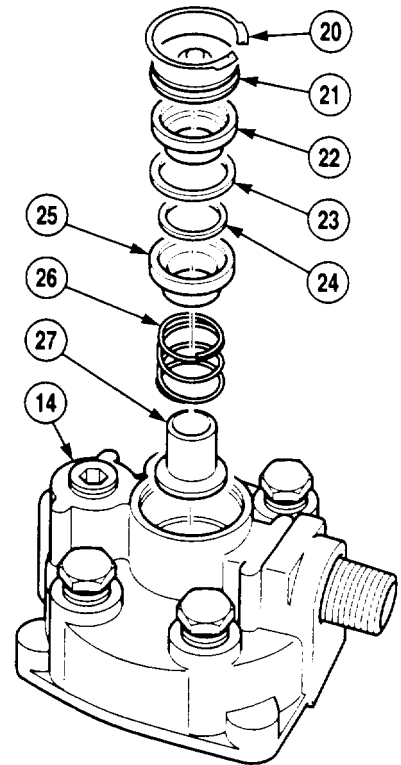
c. Assembly.

- (1) Apply Teflon tape to threads of nipple (30) and plugs (28 and 29).
- (2) Install nipple (30) in body (14). Tighten finger tight.
- (3) Install plug (29) and three plugs (28) in body (14). Tighten to 180-300 lb-in (20-34 N•m).

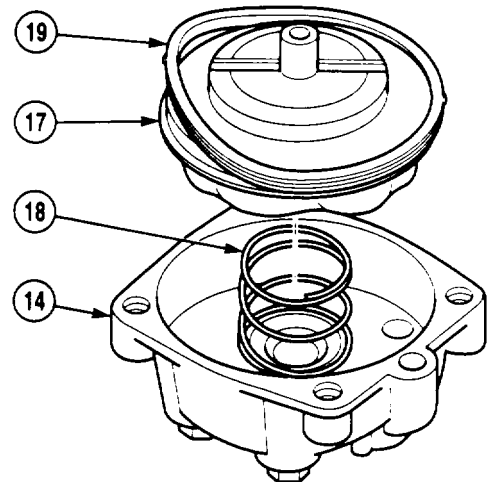


5-31. AIR RELAY VALVE REPAIR (CONT).

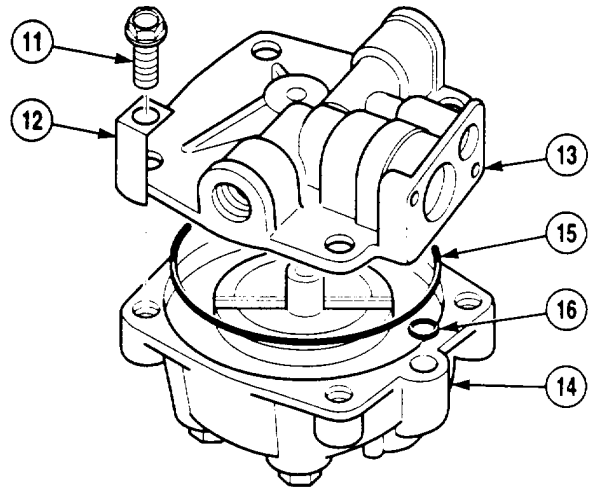
- (4) Install inlet valve assembly (27), spring (26), valve guide (25), preformed packing (24), preformed packing (23), seal retainer (22), and exhaust protector assembly (21) in body (14).
- (5) Install retaining ring (20) in body (14).



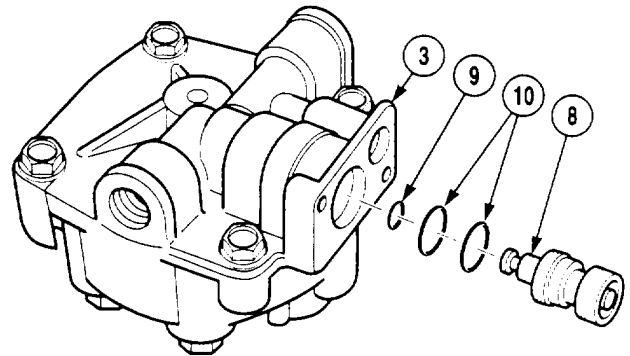
- (6) Install spring (18) in body (14).
- (7) Install preformed packing (19) on relay piston (17).
- (8) Apply petroleum jelly to outer surface of relay piston (17).
- (9) Install relay piston (17) in body (14).



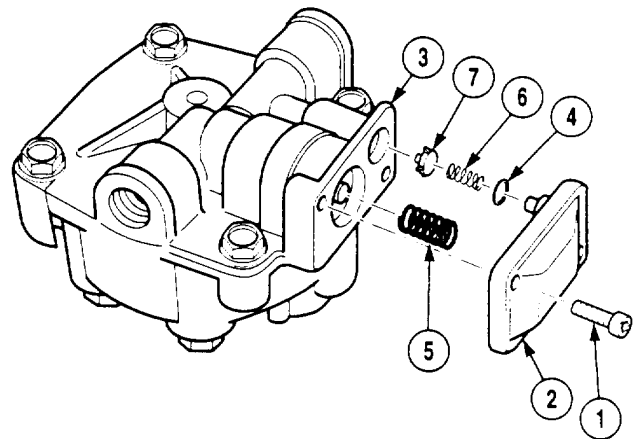
- (10) Install preformed packing (16) in body (14).
- (11) Install preformed packing (15) on cover assembly (13).
- (12) Install cover assembly (13) and service tag (12) with four screws (11) on body (14). Tighten 10-15 lb-ft. (14-20 N•m).



- (13) Install preformed packing (9) and two preformed packings (10) on emergency piston assembly (8).
- (14) Install emergency piston assembly (8) in air relay valve (3).



- (15) Install check valve (7) in air relay valve (3).
- (16) Install preformed packing (4) on cover (2).
- (17) Install spring (5), valve spring (6), and cover (2) with two screws (1) in air relay valve (3). Tighten screws to 60-80 lb-in (414-552 N•m).



NOTE

Follow-on Maintenance: Install air relay valve (page 4-135).

END OF TASK

5-32. CIRCULATING PUMP REPAIR.

This task covers:

- a. Disassembly
- b. Cleaning/Inspection
- c. Assembly

INITIAL SETUP

Tools and Special Tools

- Tool Kit, General Mechanic's
- Spanner Wrench
- Press, Arbor
- Wrench, Torque

Equipment Condition

Pump Removed (page 4-196)

Materials /Parts

- Solvent, Drycleaning (Item 21, appendix E)
- Grease (Item 13, appendix E)
- Gasket
- Gasket
- Locknut
- Lock Washer
- Packings (10)
- Amyl Acetate

a. Disassembly.

WARNING

Blades of rotor are sharp. Wearing gloves is recommended or injury to personnel could occur.

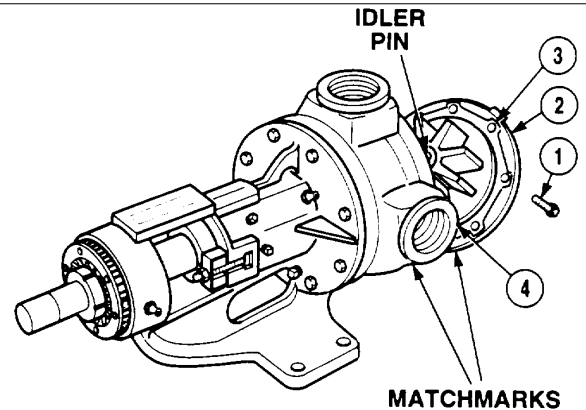
CAUTION

Do not allow the idler to fall from the idler pin. Tilting the head back as it is removed will prevent this.

NOTE

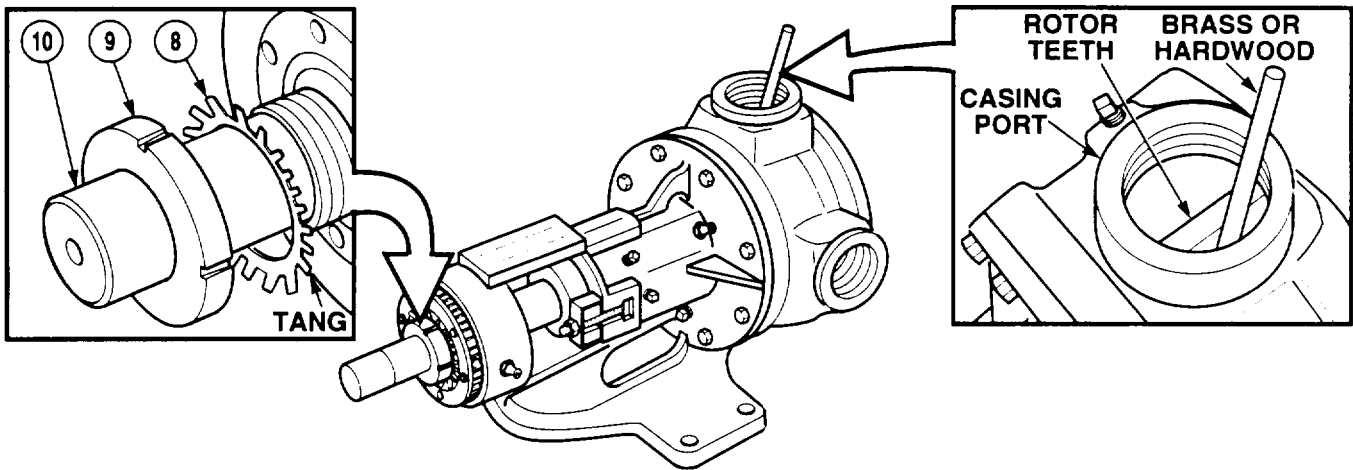
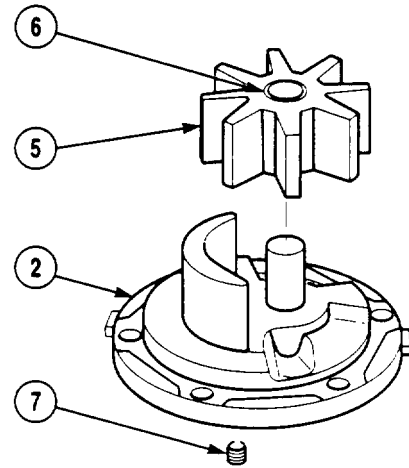
Matchmark head and casing before removal.

- (1) Remove six screws (1), head (2), and gasket (3) from body (4). Discard gasket.



5-32. CIRCULATING PUMP REPAIR (CONT).

- (2) Remove idler (5) and bushing (6) from head (2).
- (3) Remove plug (7) from head (2).

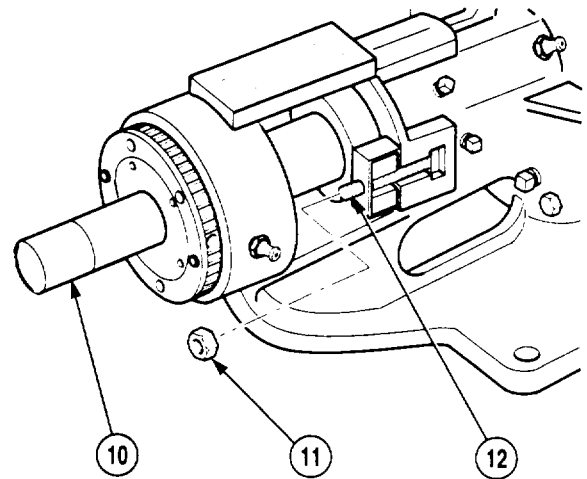


- (4) Position a piece of hardwood or brass between the rotor teeth and into the casing port to prevent the shaft from turning.
- (5) Bend up tang of lock washer (8) and remove locknut (9) and lock washer from shaft (10). Discard lock washer.
- (6) Remove hardwood or brass from casing port.

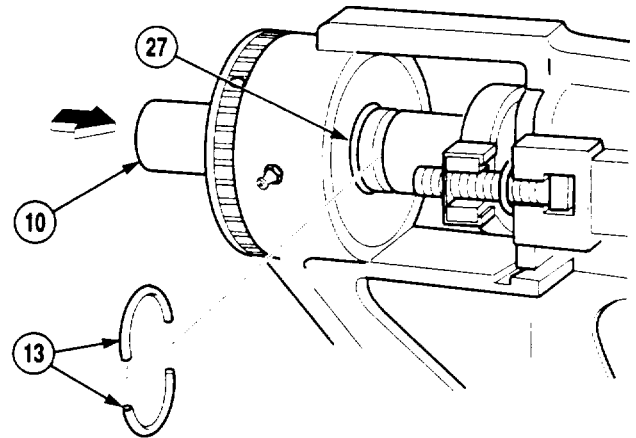
NOTE

Packing gland nuts must be removed before rotor and shaft can be removed from pump.

- (7) Remove packing gland nuts (11) from packing gland screw (12).



- (8) Tap shaft (10) forward approximately 1/2 inch (12.70 mm) and remove a pair of half circle, round wire rings (13) from shaft.



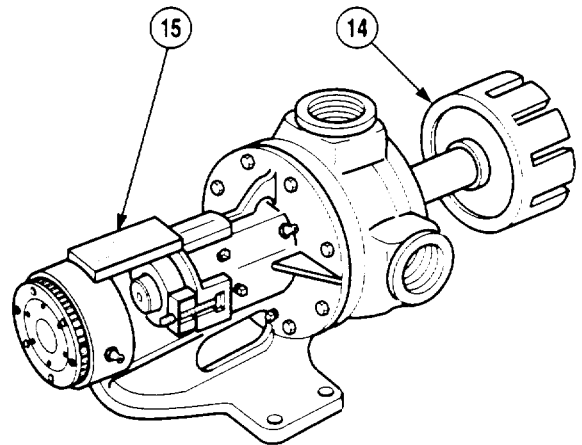
CAUTION

Remove rotor and shaft carefully to avoid damage to the bracket bushing.

NOTE

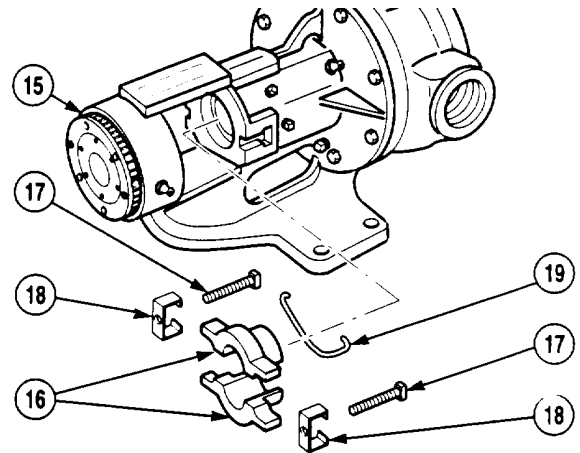
Inner bearing spacer collar may fall out while rotor and shaft are being removed. If this occurs, set it aside so it does not become lost.

- (9) Remove rotor and shaft (14) from pump (15).



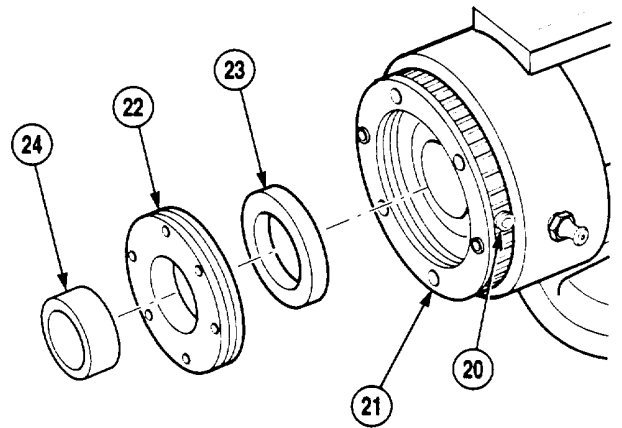
5-32. CIRCULATING PUMP REPAIR (CONT).

(10) Remove split packing gland (16), two packing gland screws (17), clips (18), and spring wire retainer (19) from pump (15).



(11) Loosen two setscrews (20) in flange of bearing housing (21).

(12) Using spanner wrench, remove outer end cap (22), closure (23), and outer bearing spacer collar (24) from bearing housing (21).



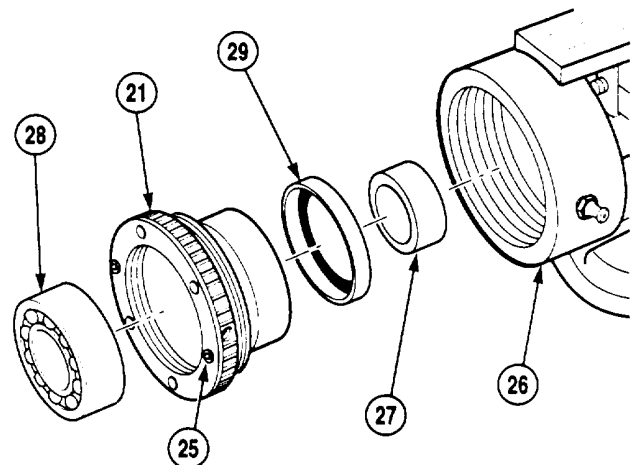
(13) Loosen two setscrews (25) in face of bearing housing (21).

(14) While turning bearing housing (21) counterclockwise, remove it from bracket (26).

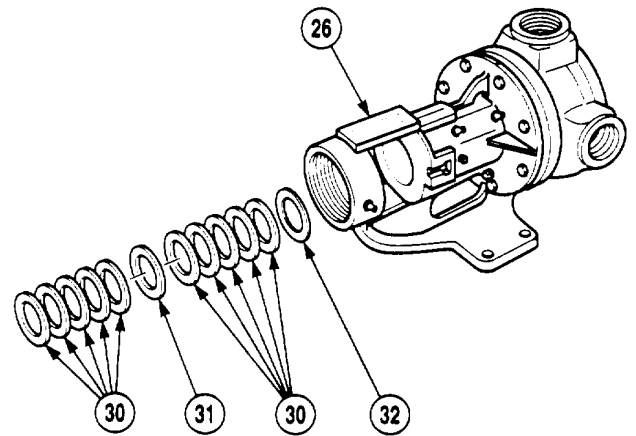
NOTE

Inner bearing spacer collar may have fallen out while rotor and shaft were being removed in step (9).

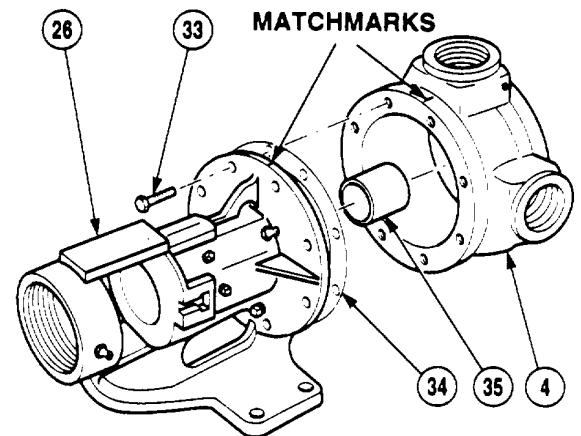
(15) Remove inner bearing spacer collar (27), double row ball bearing (28) and closure (29) from bearing housing (21).



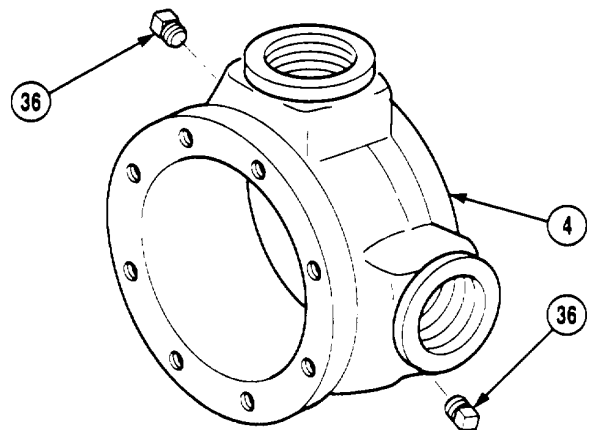
- (16) Remove five packings (30), lantern ring (31), five packings (30), and packing retainer washer (32) from bracket (26). Discard packings.



- (17) Matchmark body (4) and bracket (26).
- (18) Remove eight screws (33), body (4) and gasket (34) from bracket (26). Discard gasket.
- (19) Remove bracket bushing (35) from bracket (26).

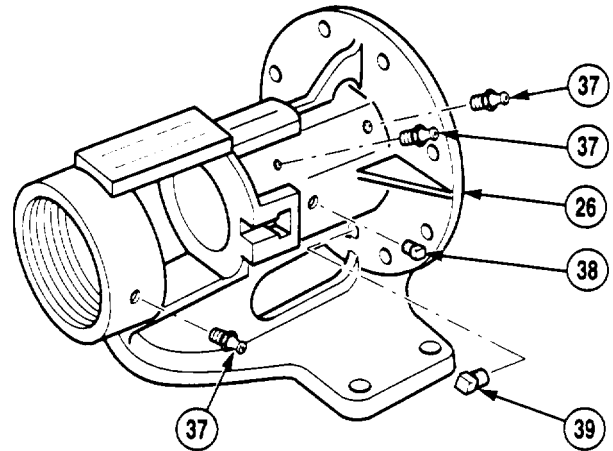


- (20) Remove two plugs (36) from body (4).



5-32. CIRCULATING PUMP REPAIR (CONT).

- (21) Remove three grease fittings (37), plug (38), and plug (41) from bracket (26).

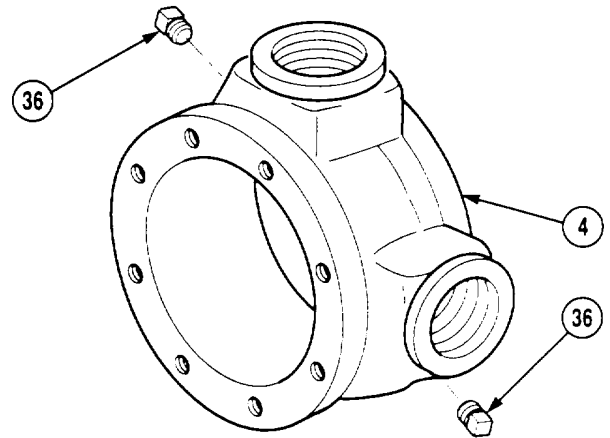
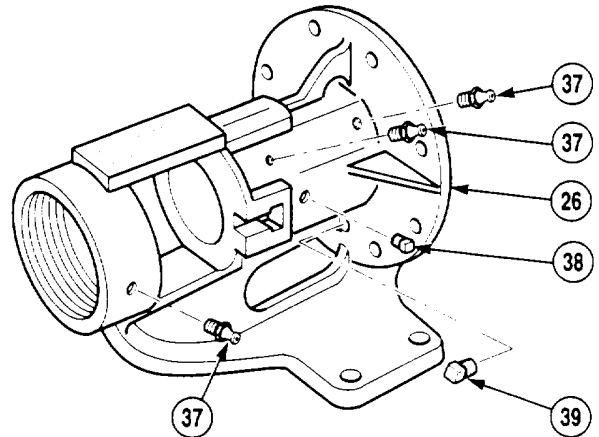
**b. Cleaning/Inspection.****WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean with drycleaning solvent and dry with compressed air.
 - (2) Check closures, ball bearings and bushings and replace if necessary.
 - (3) Check all other parts for nicks, gouges, chips, burrs, excessive wear and replace if necessary.

c. Assembly.

(1) Install three grease fittings (37), plug (38), and plug (39) in bracket (26).

(2) Install two plugs (36) in body (4).



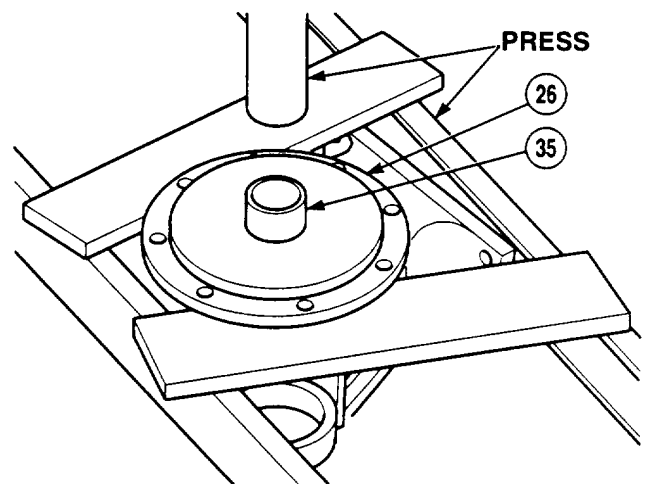
5-32. CIRCULATING PUMP REPAIR (CONT).**WARNING**

Amyl acetate is a flammable solvent and should be used with care or injury could occur to personnel.

NOTE

- Check bushing for cracks after installation. Coat surface of the bushing with Amyl acetate (banana oil). Let it evaporate, and any cracks will be visible as wet streaks. If cracks appear, the bushing should be replaced.
- Scratches on the shaft in the seal area will provide leakage paths under the seal.
- When installing a new carbon graphite idler on bracket bushing, extreme care should be taken to prevent breaking, as it is brittle material and easily cracked. If cracked, the bushing will quickly disintegrate. Using a lubricant and adding a chamfer on the bushing and the mating part will help in the installation of carbon graphite bushings.
- An arbor press should always be used for installing carbon graphite bushings. Be sure bushing is started straight and **DO NOT STOP** pressing operation until bushing is in proper position. Starting and stopping will invariably result in a cracked bushing.
- Carbon graphite bushings with extra interference fits are frequently furnished for high-temperature operation. These bushings must be installed by shrink fitting. Heat the bracket or idler to 750°F and install cool bushings with an arbor press. If facilities are not available for this temperature, it is possible to install with 450°F temperature. However, the lower the temperature the greater the possibility of cracking the bushing.

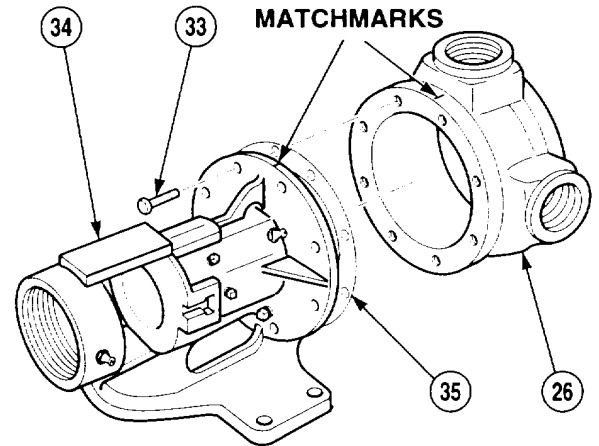
- (3) Using press, install bracket bushing (35) in bracket (26).



NOTE

Aline matchmarks on body and bracket before installing.

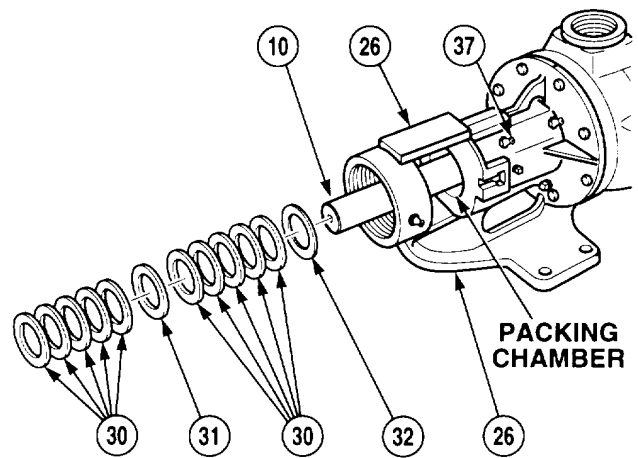
- (4) Install gasket (35), body (36), and eight screws (33) on bracket (26). Torque to 24 lb-ft (33 N.m).



WARNING

Blades of rotor are sharp. Wearing gloves is recommended or injury to personnel could occur.

- (5) Start the end of shaft (10) in bracket (26) and turn from right to left slowly, pushing rotor into casing.
- (6) Install rotor and shaft (10) in bracket (26).



NOTE

Install and seat each ring of packing one at a time, staggering the ring joints from one side of the shaft to the other. Lubricate the packing rings with oil, grease, or graphite to aid assembly. A length of pipe or tubing will help to install and seat each packing ring.

- (7) Install packing retainer washer (32) and five packings (30) in packing chamber.
- (8) Apply grease to lantern ring (31).
- (9) Install lantern ring (31) and five packings (30) ensuring lantern ring (31) is positioned under the grease fitting (37).

5-32. CIRCULATING PUMP REPAIR (CONT).

NOTE

Make sure the inner bearing spacer collar is positioned with beveled edge toward packings.

- (10) Install closure (29), double row ball bearing (28), and inner bearing spacer collar (27) in bearing housing (21).
- (11) Apply grease to bearing housing (21).

NOTE

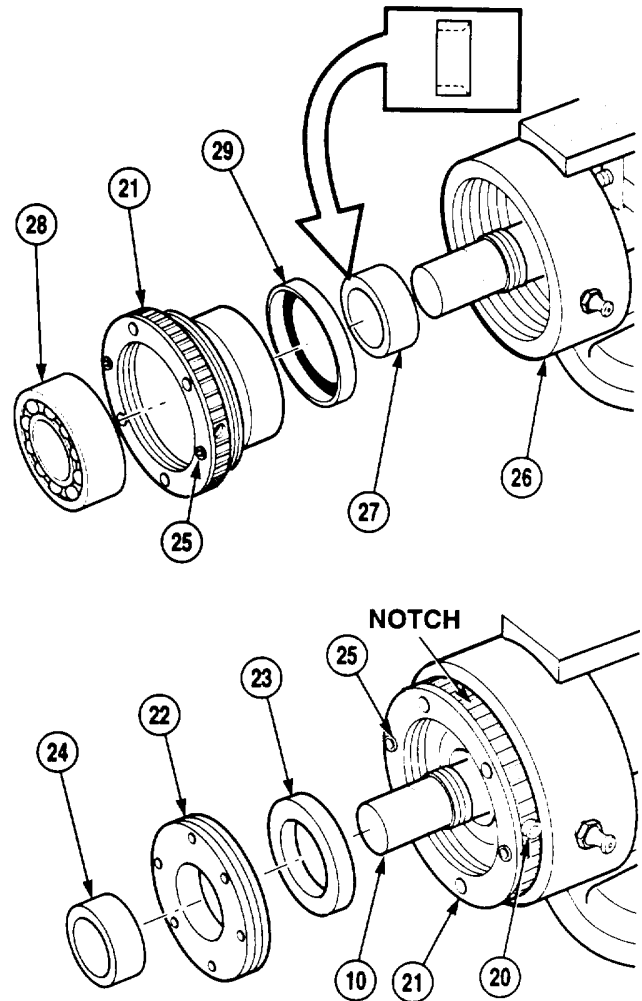
Push shaft back to install inner bearing housing.

- (12) Install bearing housing (21) in bracket (26).
- (13) Install closure (23) and outer bearing spacer collar (24) in outer end cap (22).
- (14) Install outer end cap (22) in bearing housing (21).
- (15) Tighten two setscrews (20) in bearing housing (21).

NOTE

Shaft can be turned by moving rotor with your hand.

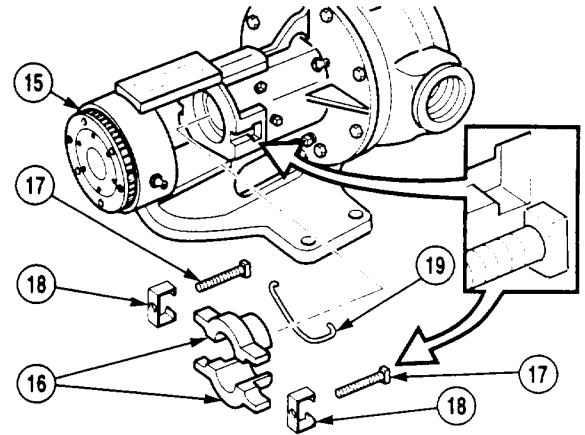
- (16) Tighten bearing housing (21) until rotor shaft (10) can no longer be turned by hand.
- (17) Turn bearing housing (21) counterclockwise until rotor shaft can be turned by hand with a slight noticeable drag.
- (18) Turn bearing housing (21) counterclockwise 4 notches, for standard bearing clearance, and tighten two setscrews (25).



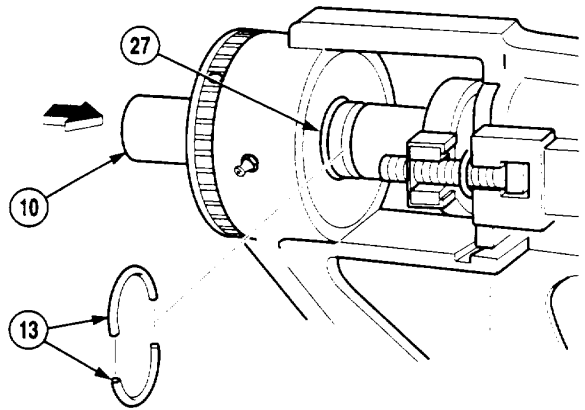
NOTE

Be sure the shaft can rotate freely. If not, back off additional notches and check again.

- (19) Install split packing gland (16), two clips (18), packing gland screws (17), and spring wire retainer (19) on pump (15).



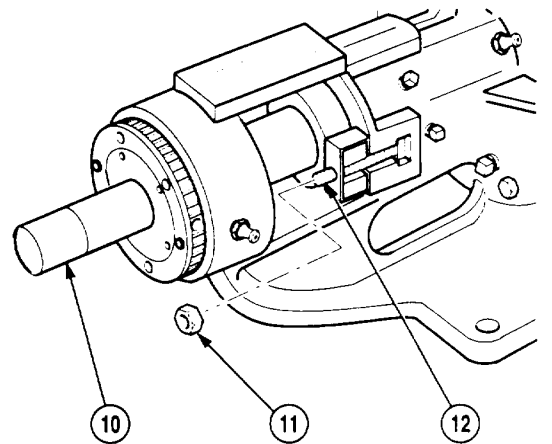
- (20) Install pair of half circle, round wire rings (13) in the groove of shaft (10) and slide the shaft forward: the rings seat into inner bearing spacer collar (27).



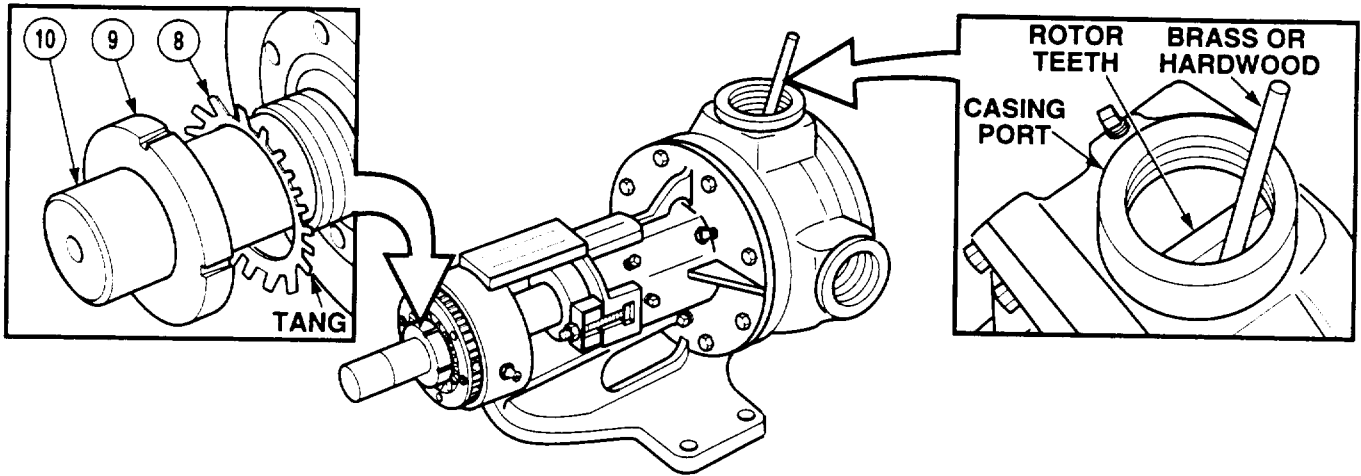
NOTE

Ensure the packing gland is installed square and nuts are tightened evenly.

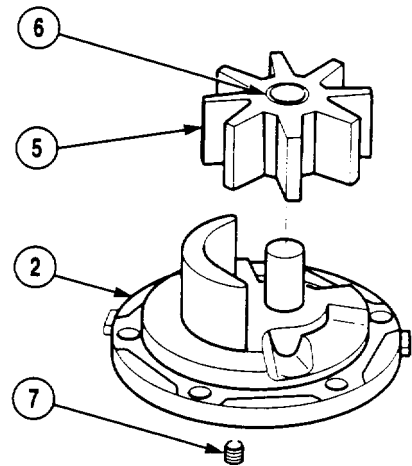
- (21) Install packing gland nuts (11) on packing gland screws (12).
- (22) Tighten nuts until rotor shaft becomes difficult to turn and then back off until gland is slightly loose.



5-32. CIRCULATING PUMP REPAIR (CONT).



- (23) Insert a piece of hardwood or brass between the rotor teeth and into the casing port to keep the shaft from turning.
- (24) Install locknut (9) and lock washer (8) on shaft (10). Tighten locknut.
- (25) Bend tangs of lock washer (8) down.
- (26) Install plug (7) in head (2).
- (27) Install bushing (6) in idler (5).
- (28) Install idler (5) on head (2).



(29) Install gasket (3) on head (2).

WARNING

Blades of rotor are sharp. Wearing gloves is recommended or injury to personnel could occur.

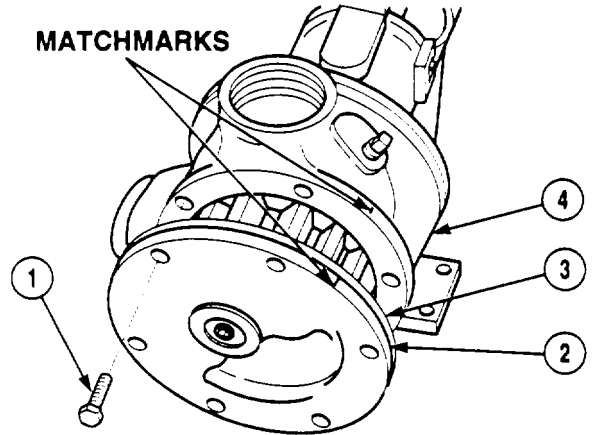
NOTE

- Aline teeth of rotor and idler before installing
- Aline matchmarks on head and casing before installing.

(30) Install head (2) and six screws (1) in body (4).
Tighten screws to 24 lb-ft (33 N.m).

NOTE

Follow-on Maintenance: Install pump (page 4-197).



END OF TASK

5-33. PRESSURE RELIEF VALVE REPAIR.

This task covers:

- a. Disassembly
- b. Cleaning/Inspection
- c. Assembly
- d. Adjustment

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's

Materials Parts

Solvent, Drycleaning (item 20, appendix E)

Locknut

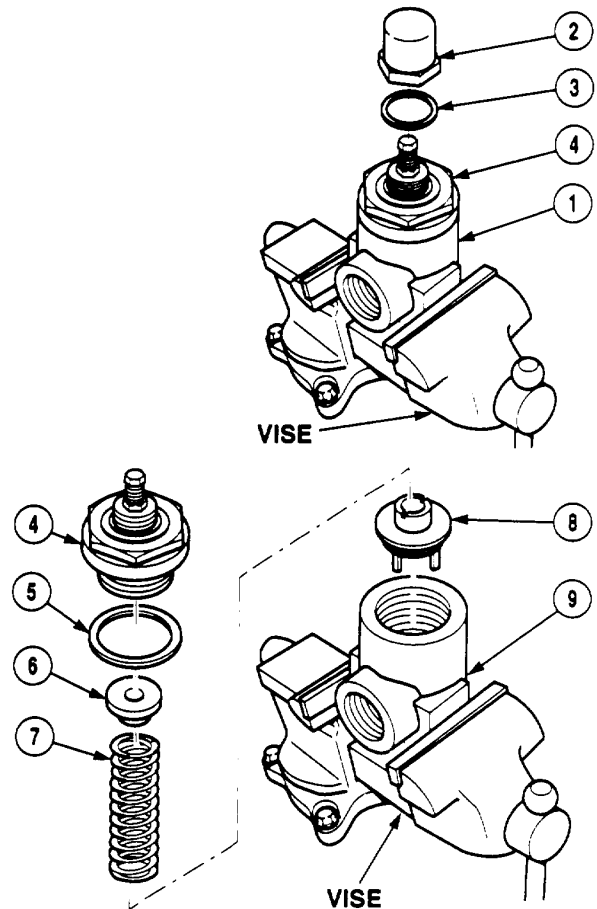
Preformed Packings (3)

Equipment Condition

Pressure Relief Valve Removed (page 4-216)

a. Disassembly.

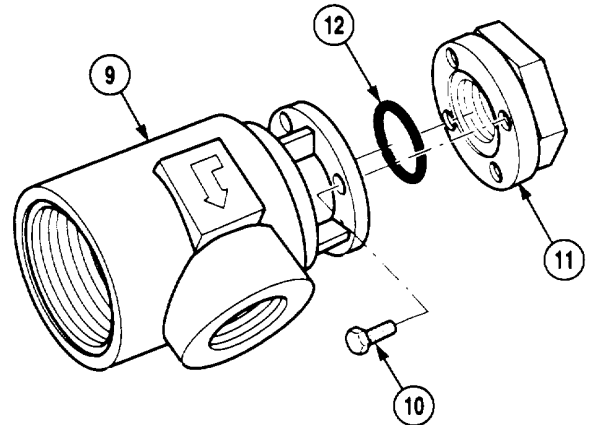
- (1) Place valve (1) in vise.
- (2) Remove cap (2) and preformed packing (3) from bonnet (4). Discard preformed packing.
- (3) Remove bonnet (4) and preformed packing (5) from valve. Discard preformed packing.
- (4) Remove spring guide (6), spring (7), and poppet (8) from valve body (9).



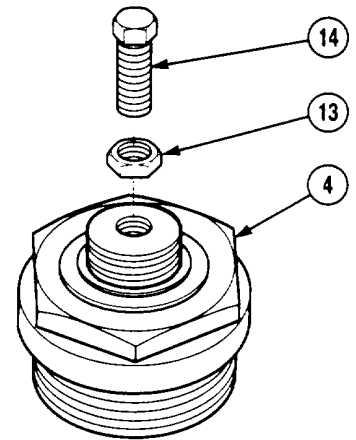
5-33. PRESSURE RELIEF VALVE REPAIR (CONT).

(5) Remove four screws (10), adapter (11), and preformed packing (12) from valve body (9). Discard preformed packing.

(6) Remove valve from vise.



(7) Loosen locknut (13) and remove adjusting screw (14) from bonnet (4). Discard locknut.



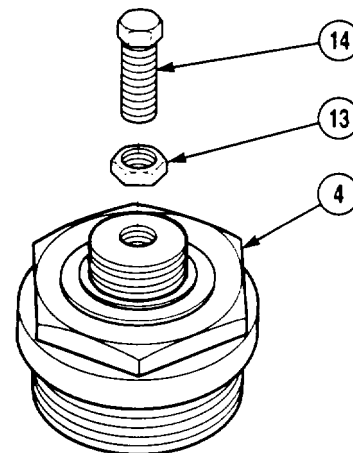
b. Cleaning/Inspection.**WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

- (1) Clean with drycleaning solvent and dry with compressed air.
- (2) Check closures, ball bearings and bushings and replace if necessary.
- (3) Check all other parts for nicks, gouges, chips, burrs, excessive wear and replace if necessary.

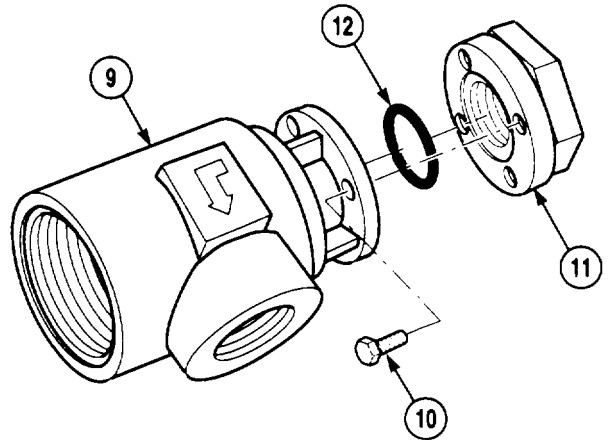
c. Assembly.

- (1) Install locknut (13) and adjusting screw (14) in bonnet (4).

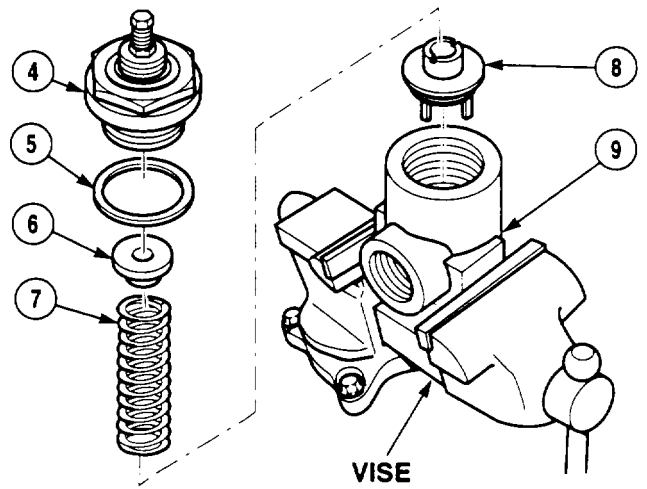


5-33. PRESSURE RELIEF VALVE REPAIR (CONT).

- (2) Install preformed packing (12), adapter (11), and four screws (10) in valve body (9).



- (3) Place valve body (9) in vise.
- (4) Install poppet (8), spring (7), and spring guide (6) in valve body (9).
- (5) Install preformed packing (5) and bonnet (4) in valve body (9).
- (6) Perform steps (1) and (2) of adjustment.



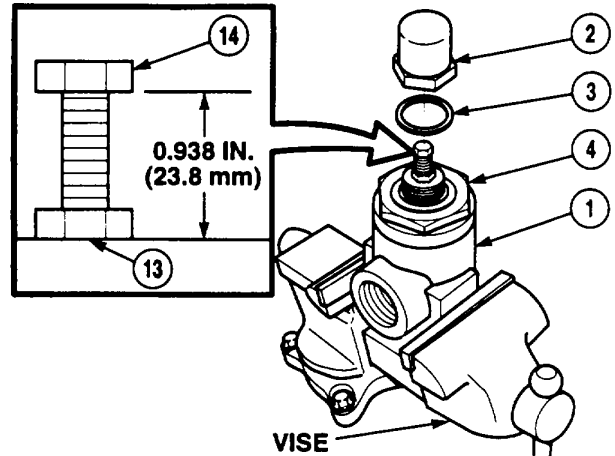
(7) Install preformed packing (3) and cap (2) on bonnet (4).

(8) Remove valve (1) from vise.

d. Adjustment

(1) Turn adjusting screw (14) until measurement 0.938 in (23.8 mm) is notched.

(2) Tighten locknut (13).



NOTE

Follow-on Maintenance: Install pressure relief valve (page 4-217).

END OF TASK

5-34. VALVE NO. 1 REPAIR.

This task covers:

- a. Disassembly c. Cleaning/Inspection c. Assembly**

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's

Materials/Parts

Compound, Sealing (item 8, appendix E)
Solvent, Drycleaning (item 21, appendix E)

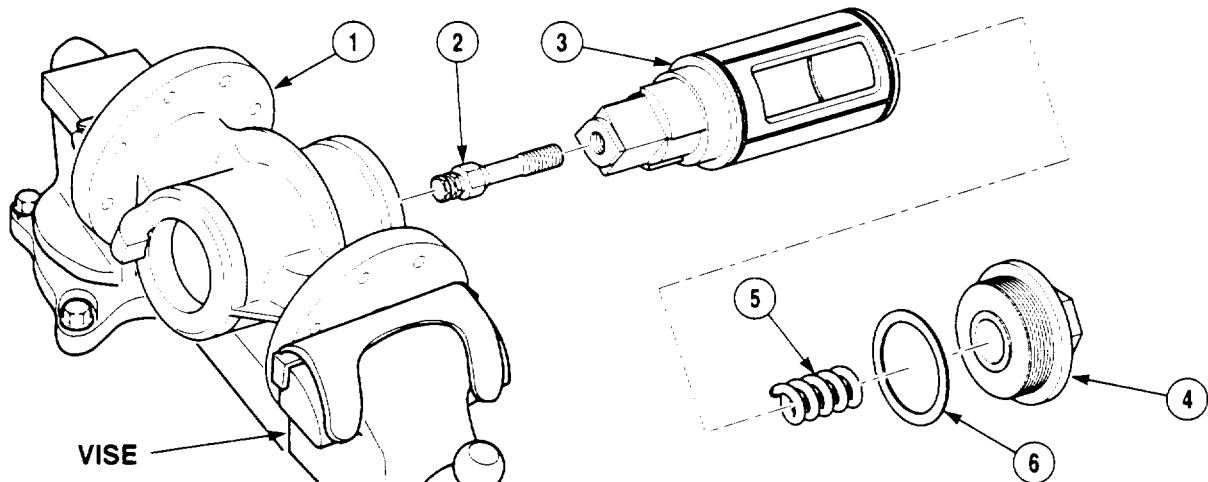
Personnel Required

Two

Equipment Condition

Valve No. 1 Removed (page 4-208)

a. Disassembly.



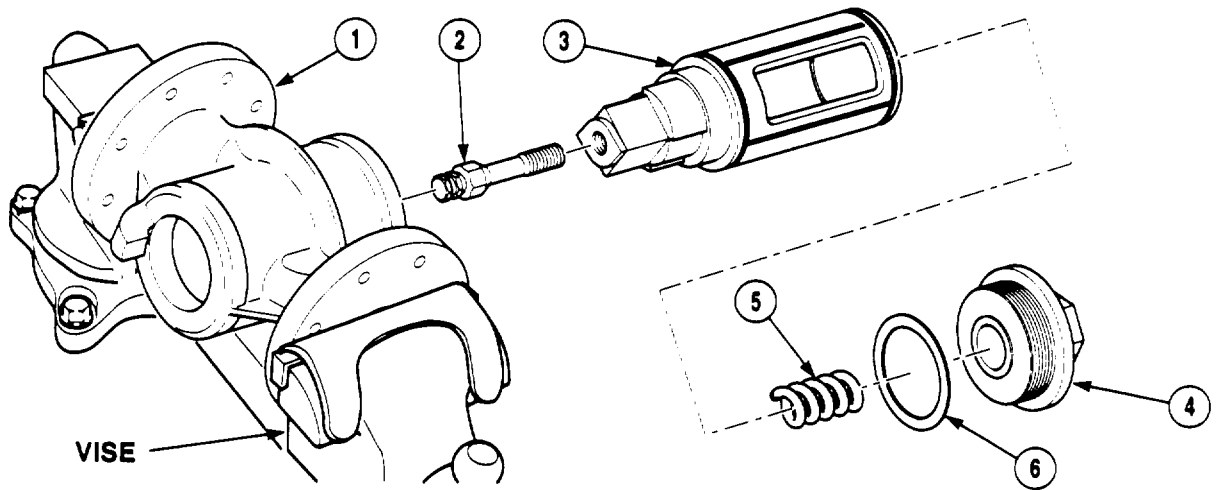
NOTE

Valve No. 1 weighs 63 lbs (28.6 kg).

- (1) With the aid of an assistant, place valve (1) in soft-jawed vise.
- (2) Remove ejection nipple (2) from plug (3).
- (3) Remove bottom cover (4), spring (5), and plug (3) from valve (1).
- (4) Remove thrust ring (6) from plug (3).

b. Cleaning/Inspection.

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean with drycleaning solvent and dry with compressed air.
 - (2) Check for nicks, gouges, chips, and burns.

5-34. VALVE NO. 1 REPAIR (CONT).**c. Assembly.****NOTE**

Valve No. 1 weighs 63 lbs (28.6 kg).

- (1) With the aid of an assistant, place valve (1) in vise.
- (2) Install thrust ring (6) on plug (3).
- (3) Install plug (3), spring (5), and bottom cover (4) in valve (1). Tighten bottom cover.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in a well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (4) Insert sealing compound (item 7, appendix E) in plug (3).
- (5) Install injection nipple (2) in plug (3).

NOTE

Follow-on Maintenance: Install Valve No. 1 (page 4-209).

END OF TASK

5-35. VALVE NO. 2 OR NO. 3 REPAIR.

This task covers:

- a. Disassembly c. Cleaning/Inspection c. Assembly**

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's
Valve No.

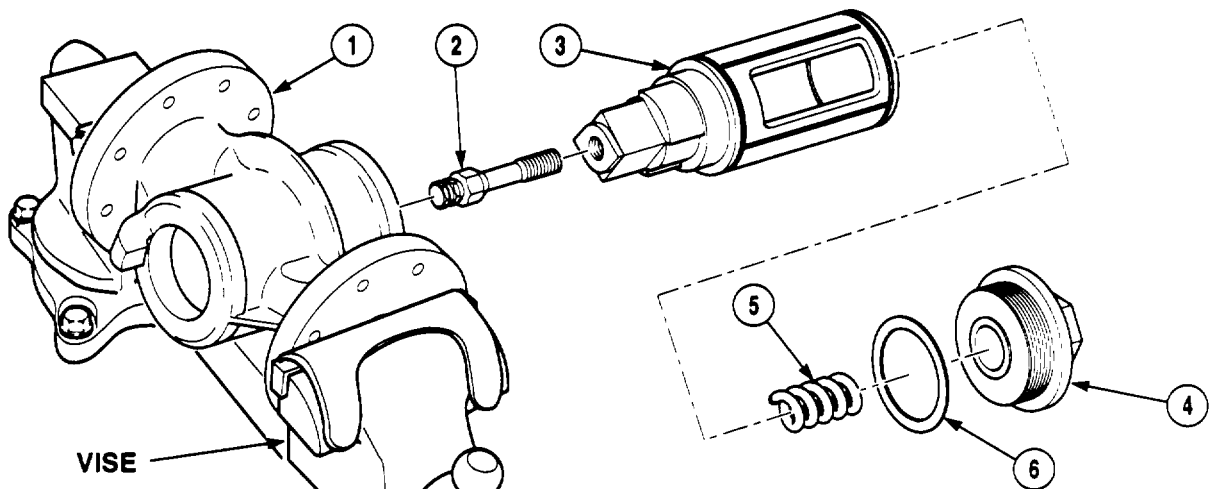
Materials / Parts

Compound, Sealing (item 8, appendix E)
Solvent, Drycleaning (item 20, appendix E)

Equipment Condition

Valve No. 2 Removed (page 4-210)
3 Removed (page 4-213)

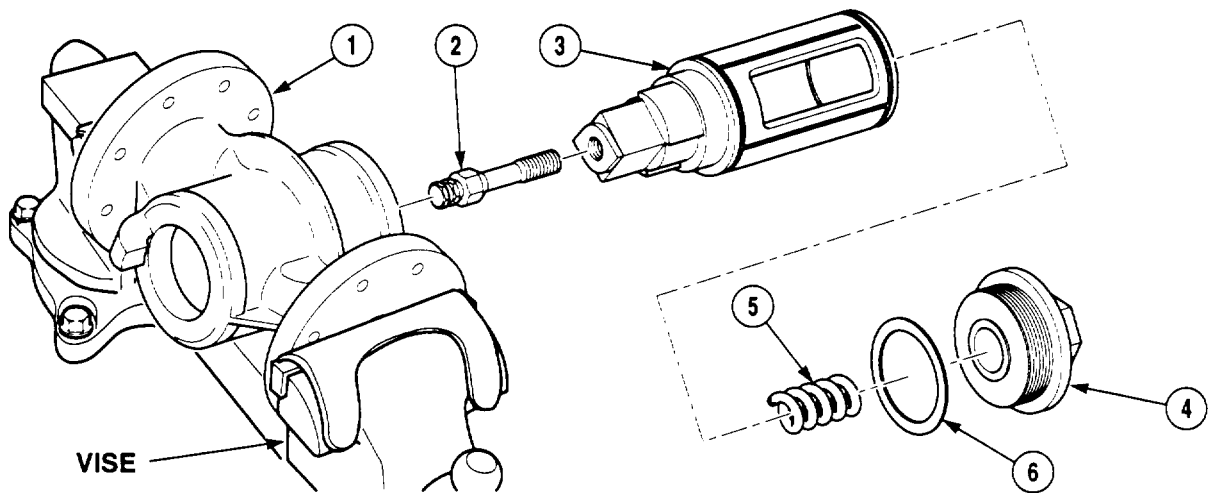
a. Disassembly.



- (1) Place valve (1) in soft-jawed vise.
- (2) Remove ejection nipple (2) from plug (3).
- (3) Remove bottom cover (4), spring (5), and plug (3) from valve (1).
- (4) Remove thrust ring (6) from plug (3).

5-35. VALVE (NO. 2 OR NO. 3) REPAIR (CONT).***b. Cleaning/Inspection.*****WARNING**

- Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles, face mask, and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapor. Do not use near open flame or excessive heat. The flash point for type I drycleaning solvent is 100°F (38°C) and for type II is 140°F (60°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, flush eyes with water and get medical aid immediately.
 - DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
 - DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places.
 - USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.
 - Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- (1) Clean with drycleaning solvent and dry with compressed air.
 - (2) Check for nicks, gouges, chips, and burrs.

c. Assembly.

- (1) Place valve (1) in soft-jawed vise.
- (2) Install thrust ring (6) on plug (3).
- (3) Install plug (3), spring (5), and bottom cover (4) in valve (1). Tighten bottom cover.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in a well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (4) Insert sealing compound (item 8, appendix E) in plug (3).
- (5) Install injection nipple (2) in plug (3).

NOTE

Follow-on Maintenance: Install valve No. 2 (page 4-211) or valve No. 3 (page 4-214).

END OF TASK

5-95/(5-96 blank)

APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix lists forms, field manuals, technical manuals, and other publications either referenced in this manual or which apply to the operation and maintenance of the Heater.

A-2. DEPARTMENT OF THE ARMY PAMPHLETS.

Consolidated Index of Army Publications and Blank Forms.....	DA Pam 25-30
Using Unit Supply System (Manual Procedures)	DA Pam 710-2-1
The Army Maintenance Management System (TAMMS).....	DA Pam 738-750

A-3 FORMS.

Recommended Changes to Publications and Blank Forms.....	DA Form 2028
Recommended Changes to Equipment Technical Publications	DA Form 2028-2
Organizational Control Record for Equipment.....	DA Form 2401
Equipment Inspection and Maintenance Worksheet.....	DA Form 2404
Maintenance Request.....	DA Form 2407
Preventive Maintenance Schedule and Record	DD Form 314
Product Quality Deficiency Report (NSN 7540-00-105-0078).....	SF 368

A-4. FIELD MANUALS.

NBC Contamination Avoidance.....	FM 3-3
NBC Protection.....	FM 3-4
NBC Decontamination.....	FM 3-5
NBC Handbook	FM 3-7
Camouflage FM 5-20	
Operation and Maintenance of Ordnance Materiel in Extreme Cold	
Weather (0° to -65°F).....	FM 9-207
Vehicle Recovery Operations.....	FM 20-22
Soldier's Manual for First Aid.....	FM 21-11
Basic Cold Weather Manual.....	FM 31-70
Northern Operations.....	FM 31-71
Army Motor Transport Units and Operators	FM 55-30
Desert Operations (How to Fight).....	FM 90-3
Operational Symbols.....	FM 101-5-1
Manual for Wheel Vehicle Driver.....	FM 21-305

A-5. SUPPLY BULLETIN.

Storage Serviceability Standard - Tracked Vehicles, Wheeled Vehicles, and Component Parts	SB 740-98-1
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A-6. TECHNICAL BULLETINS.

Equipment Improvement Report and Maintenance Digest (US Army Tank-Automotive Command) Tank-Automotive Equipment	TB 43-001-39-Series
Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment.....	TB 43-0209
Maintenance in the Desert.....	TB 43-0239
Description, Use, Bonding Techniques, and Properties of Adhesives	TB ORD 1032

A-7 TECHNICAL MANUALS.

Inspection, Care, and Maintenance of Antifriction Bearings.....	TM 9-214
Operator's Manual for Welding Theory and Application.....	TM 9-237
Deepwater Fording of Ordnance Materiel	TM 9-238
Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Items Including Chemicals.....	TM 9-247
Organizational, Direct Support, and General Support Care, Maintenance, and Repair of Pneumatic Tires and Inner Tubes	TM 9-2610-200-24
Tool Outfit Hydraulic System Test and Repair Unit (HYSTRU).....	TM 9-4940-468-14
Painting Instructions for Field Use.....	TM 43-0139
Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use	TM 750-244-6

A-8. OTHER PUBLICATIONS.

Army Logistics Readiness and Sustainability.....	AR 700-138
Packaging of Army Materiel for Storage and Shipment	AR 746-1
Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)	CTA 50-970
Abbreviations for Use on Drawings Specifications, Standards, and Technical Documents.....	MIL-STD- 12

APPENDIX B

MAINTENANCE ALLOCATION CHART (MAC)

Section I. INTRODUCTION

B-1. THE ARMY MAINTENANCE SYSTEM MAC.

a. This introduction (section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The MAC in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as: * Unit Includes two subcolumns, C (operator/crew) and O (unit) maintenance.

- Direct Support includes an F subcolumn.
- General Support includes an H subcolumn.
- Depot Includes a D subcolumn.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions are limited to and defined as follows:

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

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

c. **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

e. **Aline.** To adjust specified variable elements of an item to bring about optimum or desired performance.

B-2. MAINTENANCE FUNCTIONS (CONT).

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of 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 assigned maintenance level is shown as the third position code of the SMR code.

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

J. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e. DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

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

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

a. Column (1), Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

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

c. Column (3), Maintenance Function. Column 3 lists functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

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

²Fault location/troubleshooting 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).

³Disassembly/assembly The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e. identified as maintenance significant).

⁴Actions Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

d. Column (4), Maintenance Level. Column 4 specifies each level of maintenance authorized to perform each function listed in Column 3, by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work-time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work-time figures are shown for each level. The work-time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

- C Operator or crew maintenance
- O Unit maintenance
- F Direct support maintenance
- L Specialized Repair Activity (SRA)⁵

e. Column (5), Tools and Equipment Ref Code. Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE, and special tools, special TMDE, and special support equipment required to perform the designated function. Codes are keyed to tools and test equipment in section III.

f. Column (6), Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in section IV.

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

- a. Column (1), Tool or Test Equipment Code.** The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.
- b. Column (2), Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.
- c. Column (3), Nomenclature.** Name or identification of the tool or test equipment.
- d. Column (4), National Stock Number.** The National Stock Number of the tool or test equipment.
- e. Column (5), Tool Number.** The manufacturer's part number, model number, or type number.

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

- a. Column (1), Remarks Code.** The code recorded in column 6, section II.
- b. Column (2), Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MIAC, section II.

⁵This maintenance level is not included in Section II, column (4) of the Maintenance Allocation Chart. Functions to this level of maintenance are identified by a work-time figure in the "H" column of Section II, column (4), and an associated reference code is used in the remarks column (6). This code is keyed to Section IV, Remarks, and the SRA complete repair application is explained there.

**Section II. MAINTENANCE ALLOCATION CHART
FOR
M087 HOT OIL HEATER**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
06	ELECTRICAL SYSTEM								
0607	Instrument or Engine Control Panel:								
	Temperature Gage	Replace		0.3				1	
0608	Miscellaneous Items:								
	Burner Limit Switch	Replace			1.0			6	
	Conduit								
	Pump Motor Conduit	Replace			1.5			6	
	Temperature Sensor	Replace		0.3				1	
	Conduit								
	Resistor	Replace		0.2				1,2	
0609	Lights:								
	Taillights (each)	Replace		0.1				1	
	Marker Lights (each)	Replace		0.2				1	
	License Lamp	Replace		0.2				1	
0613	Hull or Chassis Wiring Harness								
	24 V Intervehicular Connector	Replace		0.3				1	
	12 V Intervehicular Connector	Replace		0.7				1	
	General Wiring	Repair			*				
	Chassis Wiring Harness	Replace			3.0			7,8	
	Burner Wiring Harness	Replace			4.0			7,8	
11	REAR AXLE								
1100	Rear Axle Assembly:								
	Axle Assembly	Replace		1.0				1,2	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
12	BRAKES								
1202	Service Brakes: Brake Assembly	Adjust Replace		0.2 0.3				1 1,2	
1204	Hydraulic Brake System: Hydraulic Brake Lines Hydraulic Master Cylinder	Replace Service	0.1	1.3				1	
1208	Air Brake System: Glad Hands Air Lines Air Relay Valve	Replace Replace Replace Repair		0.4 0.4 0.2	0.4			1 1 6	
	Air Tank	Service	0.1						
	Replace			0.3				1	
	Air Chamber	Replace		0.2				1	
13	WHEELS AND TRACKS								
1311	Wheel Assembly: Wheel and Tire Assembly Hub and Drum Assembly	Service Replace Inspect	0.1 0.2	0.1				1 1,2 1	
1313	Spare Tire Assembly Tire, Tubes, Tire Chains: Tires	Replace Replace Repair	0.1	0.4 *				1 1,2 1,2	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
15	FRAME, TOWING ATTACHMENTS, AND DRAWBARS								
1503	Pintles and Towing Attachments:								
1507	Safety Chain	Replace		0.3				1	
	Landing Gear, Leveling Jacks:								
16	Screw Jacks	Replace	0.1						
1601	SPRINGS AND SHOCK ABSORBERS								
	Springs:								
18	Spring Assembly and Equalizer	Replace		1.0				1,2	
1802	BODY, CAB, HOOD, AND HULL								
	Fenders, Running Boards with mounting and attaching Parts, Windshield, Glass, etc.:								
1808	Mudflap and Antisail	Replace		0.1				1	
	Stowage Racks, Boxes, Straps, Carrying Cases, Cable Reels, Hose Reels, etc.:								
	Cable Reel	Replace		0.1				1	
	Decontamination Kit	Replace		0.1				1	
22	Bracket								
2202	BODY, CHASSIS OR HULL, AND ACCESSORY ITEMS								
	Accessory Items:								
2210	Wheel Chocks	Replace		0.1				1	
	Data Plates and Instruction Holders:								

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
42	Data Plates ELECTRICAL EQUIPMENT	Replace		0.1				1,2	
4202	Electrical Controls: Ground Rod Assembly	Repair		0.1				1	
4203	Control Box Assembly Circuit Breakers, Cut Out Devices, Fuse, and Fuse Holders:	Replace			0.8			1	
	Low Oil Sensor Switch	Replace		0.3				1	
	Start/Stop Switch	Replace		0.3				1	
	20A Circuit Breaker	Replace		0.3				1	
	40A Circuit Breaker	Replace		0.4				1	
	Flame Detector	Replace		0.3				1	
	Burner Relay	Replace		0.3				1	
	Pump Motor Relay	Replace		0.3				1	
	Thermal Overload Relay	Replace		0.2				1	
4206	Thermostatic, Automatic, and Manual Control Devices:								
	Temperature Sensor	Replace		0.3				1,2	
	Thermostat	Replace		0.3				1	
4211	Power Receptacles: Power Inlet	Replace		0.6				1	A
47	GAGES (NON ELECTRICAL), WEIGHING AND MEASURING DEVICES								
4702	Gages, Mountings, Lines, and Fittings: Low Oil Indicator	Replace		0.3				1	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
55	PUMPS								
5500	Pump Assembly: Pump Assembly	Replace Repair		0.8		1.2		1 6,8,9	
5507	Pump Drive: Pump Motor Belts	Inspect Replace Replace	0.2	0.7 0.3				1 1,2,10	
5510	Sheaves Inlet and Outlet Components: Strainer Assembly	Service Replace		0.5 0.6				1 1	
5513	Fluid Lines: Valve No 1	Replace Repair		0.7		0.2		1,2 6,8	
	Valve No 2	Replace Repair		1.0		0.2		1,2 6,8	
	Valve No 3	Replace Repair		1.0		0.2		1,2 6,8	
	Pressure Relief Valve	Replace Repair		1.0		0.3		1,2 6,8	
60	STEAM BOILERS, WATER HEATERS, HEATING UNITS, BURNERS								
6004	Fuel System Fuel Filter	Service Replace		0.2 0.1				1	
6005	Burner Assembly: Burner Assembly	Replace		1.0				1	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	Burner Head and Air Electrode and Head	Adjust		0.1				1	
		Adjust		0.2				1	
		Replace		0.2				1	
	Burner Motor	Replace		0.5				1	
	Fuel Pump	Replace		0.6				1	
	Burner Transformer	Replace		0.4				1	
	Burner Coil	Replace		0.3				1	
	Burner Solenoid	Replace		0.4				1	
	Damper Motor and Damper	Replace		0.8				1	
	Burner Controller	Replace		0.1				1	
		Test		0.1				3	
6006	Motor Assembly:								
	Pump Motor	Replace		0.3				1	B
6007	Fuel Tank:								
	Fuel Lines	Replace/ Repair		0.3				1	
6011	Combustion Chamber:								
	Combustion Chamber Liner	Replace		1.2				1,2	
6013	Heat Exchanger:								
	Heat Exchanger Assembly	Replace		3.0				6,8	
	Heat Shield	Replace		1.0				1	
	Burner Cover	Replace		1.0	1				
	Expansion Tank Assembly	Service	1.0						
		Replace		3.0				6,8	
* Time may vary									

**SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
M087 HOT OIL HEATER**

Tool or Test Equipment REF Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
1	O, F	Tool Kit, General Mechanics: Automotive	5180-00-177-7033	50980/SC 5180-90-N26
2	0, F	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance Supplemental No.1, Less Power	4910-00-754-0654	19204/ SC 4910-95-CL-A74
3	0	Connector, Plug, Electrical	5935-01-160-6132	(17479) 117053
4	0	Ammeter	6625-01-160-6150	(14579) W1364
5	F	Multimeter, Digital AN/PSM-45	6625-01-265-6000	89536/27-FM-W-ACCE
6	F	Tool Kit, General Mechanics: Equipment Maintenance and Repair	5180-00-699-5273 SC 5180-90-CL-NO5	50980/
7	F	Shop Equipment, General Purpose Repair: Semi-trailer Mounted	4940-01-235-5080	98255/ SEGP-RSM
8	0, F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power	4910-00-754-0706	
9	F	Wrench, Spanner	5120-01-337-0511	(05506) 482
10	0	Puller (1), Mechanical	5120-00-293-2925	(95225) 1000 1-26

**SECTION IV. REMARKS
FOR
M087 HOT OIL HEATER**

REFERENCE CODE	REMARKS
A	Inlet must be disassembled for replacement. A repair kit is available.
B	Repair parts are unavailable Replace entire motor.

APPENDIX C

COMPONENTS OF END ITEM (COEI) AND
BASIC ISSUE ITEMS (BII) LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists components of the end item and basic issue items for the Heater to help you inventory the items for safe and efficient operation of the equipment.

C-2. GENERAL.

The Components of End Item (COEI) and Basic Issue Items (BII) Lists are divided into the following sections:

a. Section II, Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the Heater. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are transferred between property accounts. Items of COEI are removed and separately packaged for transportation or removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

b. Section III, Basic Issue Items. These essential items are required to place the Heater in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the Heater during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

C-3. EXPLANATION OF COLUMNS.

a. Column (1), Illus Number. This column gives you the number of the item illustrated.

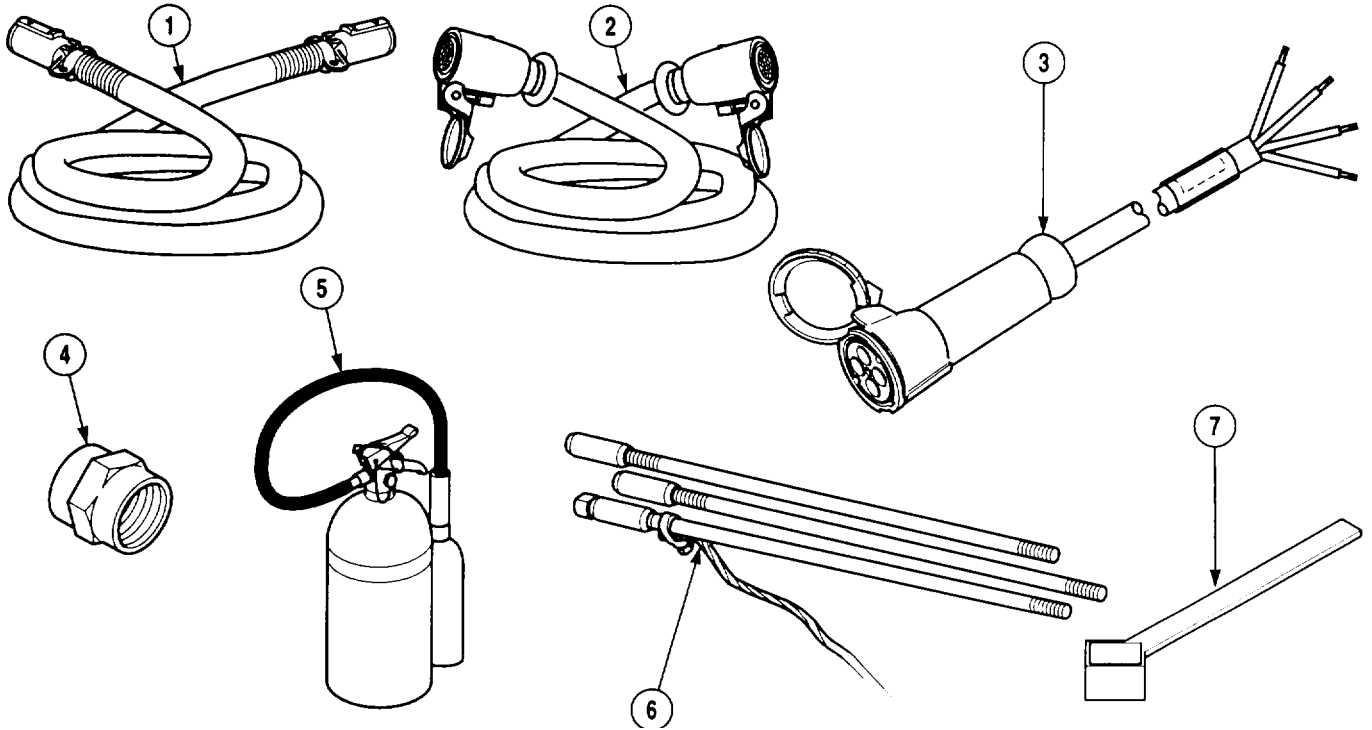
b. Column (2), National Stock Number. This column identifies the stock number of the item to be used for requisitioning purposes.

c. Column (3), Description and Usable On Code. This column identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGE) (in parentheses) and the part number.

d. Column (4), U/I (Unit of Issue). This column indicates how the item is issued for the National Stock Number shown in column two.

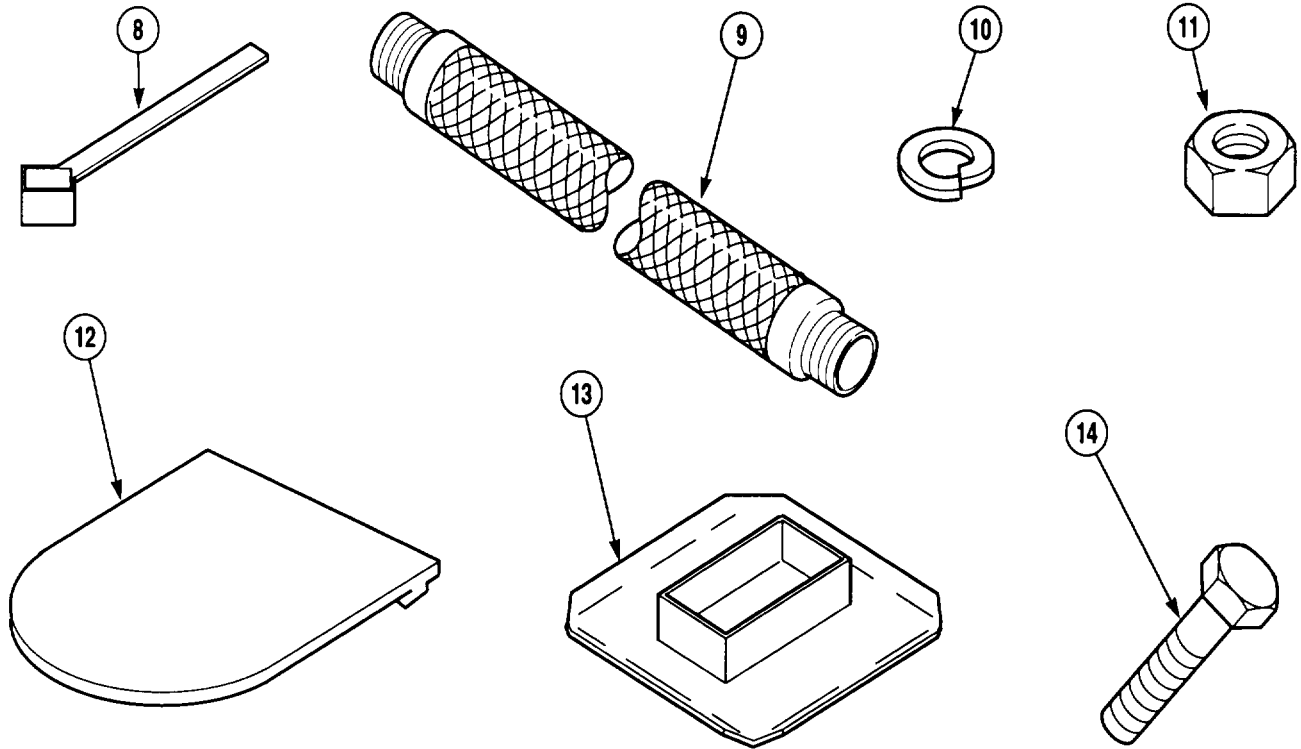
e. Column (5), Qty Rqd. This column indicates the quantity required.

Section II. COMPONENTS OF END ITEM



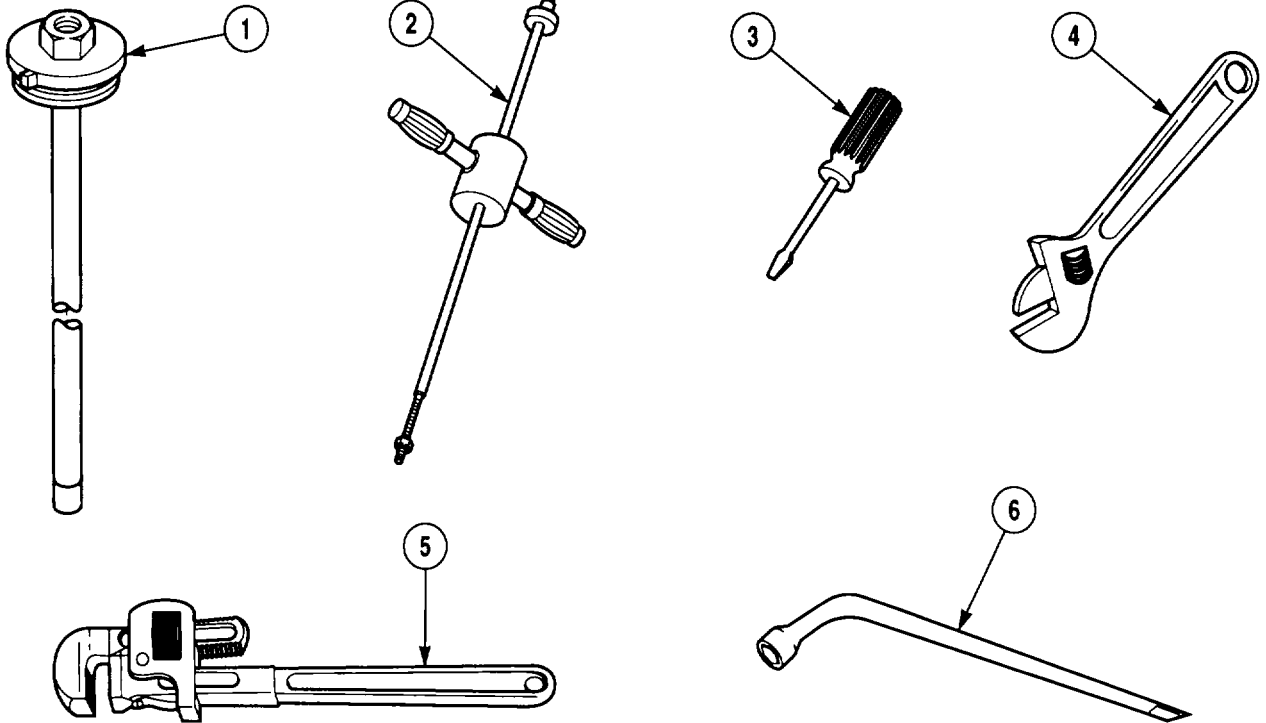
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC and Part Number	Usable On Code	(4) U/M	(5) QTY Reqd
1	6150-01-396-5366	Cable, Intervehicular, 12V (06442) 2HXLPB3	All	Ea	1
2	5995-00-038-3914	Cable, Intervehicular, 24V (19207)7728811	All	Ea	1
3	6145-01-413-8466	Cord, Electrical (06442) P136-29-MSHA	All	Ea	1
4	4730-01-411-4870	Union, Pipe (39428) 4627K288	All	Ea	4
5	4210-00-288-7219	Fire Extinguisher (81349) 0E910	All	Ea	1
6	5975-00-878-3791	Ground Rod Assembly (82370) A104	All	Ea	2
7	5340-01-396-3897	Handle, Valve (06447) 2HX-401M3-106	All	Ea	1

Section II. COMPONENTS OF END ITEM (CONT)



(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC and Part Number	Usable On Code	(4) U/M	(5) QTY Reqd
8	5340-01-396-3807	Handle, Valve (06447) 2HX-401M3-106L	All	Ea	1
9	4720-01-396-7777	Hose, Transfer Oil (06535) 32-DA11-0960-110-110	All	Ea	4
10	5310-00-045-5001	Lock Washer (96906) MS35340-50	All	Ea	8
11	5310-00-763-8920	Nut (96906) MS51967-20	All	Ea	8
12		Rain Cap (06447) 2HXXPB14	All	Ea	1
13		Sand Pad (06447) 2HXFLVPBW1	All	Ea	4
14	5305-00-724-7224	Screw, Cap, Hex Head (80204) B1821BH063C250N	All	Ea	8

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 Reqd
1	5340-00-066-1235	Adapter, Container (06076) 13211E7541	All	Ea	1
2	5120-01-013-1676	Slide Hammer, Ground: Steel, 36 in. long (97403) 13226E7741	All	Ea	1
3	5120-00-227-7356	Screwdriver: Flat Top, Flared Sides, Plastic Handle, Round Blade Shaft, 3/16 in. wide Tip, 6 in. long. (55719) SSDE-66	All	Ea	1
4	5120-00-240-5328	Wrench: Adjustable, Open End 8 in. long (80063) TL4476U	All	Ea	2
5	5120-00-063-6502	Wrench, Pipe: 24 in. long, Nonmagnetic Nonsparking. (37078) S24	All	Ea	2
6	5120-01-156-7296	Wrench: Wheel Lug, 1-15/32; 1-19/64 in. Socket dia., 1-3/16 in.; socket depth, 17-1/2 in. long. (11862) 14009303	All	Ea	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST (AAL)

D-1. SCOPE.

This appendix lists additional items that you are authorized for the support of the Heater.

D-2. GENERAL.

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

D-3. EXPLANATION OF LISTING.

National Stock Numbers, description, and quantities are provided to help you identify and request the additional items you require to support this equipment. If the item required differs for different models of this equipment, see the "Usable on Code" column for the applicable model. Codes used are:

Usable on Code
All

Model
All

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM & PART NUMBER	USABLE ON CODE	(3) U/M	(4) QTY AUTHD
4230-01-133-4124 4910-00-204-3170	Decontamination Apparatus: M-13 (81361) E5-51-527 Gage: Tire Pressure (19207) 7081758 D-1/(2 blank)	All All	Ea Ea	1 1

APPENDIX E

EXPENDABLE AND DURABLE ITEMS LIST

Section I. INTRODUCTION

E-1. SCOPE.

This appendix lists expendable and durable items that you will need to operate and maintain the Heater. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except medical, class V, repair parts, and heraldic items) or CTA 8-100, Army Medical Department Expendable/Durable Items.

E-2. EXPLANATION OF COLUMNS.

a. Column (1), Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instruction to identify the item (e.g. Compound, cleaning (item 5, appendix E)).

b. Column (2), Level. This column identifies the lowest level of maintenance that requires the item.

c. Column (3), National Stock Number. This is the National Stock Number assigned to the item which you can use to requisition it.

d. Column (4), Item Name, Description, CAGEC, Part Number. This provides the other information you need to identify the item.

e. Column (5), U/M. This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Section II. EXPENDABLE/DURABLE SUPPLIES AND REQUIREMENTS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NUMBER AND CAGEG	(5) UNIT OF MEAS
1	C,O	9150-01-102-9455	Brake Fluid, Automotive (gal) MIL-B-46176A	gal
2	O,F	7920-00-056-5525	Brush, Stiff Bristle (MIL-B-43871)	
3	F	7930-00-634-3935	Chips, Soap (P-S-579) 200-lb drum	lb
4	O,F		Cleaner, Contact (Honey-well 132569)	
5	O,F		Cleaning Compound, Solvent' Degreasing, Depreserving and Self-Emulsifying (MIL-C-11090)	
		6850-00-584-4077	1-gal can	gal
		6850-00-224-6665	5-gal can	gal
		6850-00-224-6666	55-gal drum	gal
6	F	7902-00-044-9281	Cloth, Lint-Free <MIL-C-85043) 10-lb box	lb
7	0		Compound, Anti-Seize, High Temperature (MIL-A-907)	lb
		8030-00-597-5367	2-1/2-lb can	
8	F		Compound, Sealing (No.750) (ZHX-401MO)	
9	0		Compound, Sealing, Lubricating, Anaerobic Single Component (059721 Loctite 271 iMIL-S-46163) Type 1 Grade	
		8030-00-148-9833	10cc bottle	cc
10	O,F	8030-01-054-0740	Compound, Sealing, Pipe Thread 161603), Type A	ca
11	F	7930-00-292-9699	Detergent Non-Sudsing, General Purpose Liquid (MIL-D-16751) Type 1 (1-gal can)	gal
12	C,F		Grease, Automotive and Artillery (MIL-G-10924)	
		9150-00-065-0029	2-1/4-oz tube	oz
		9150-01-197-7690	1-3/4-lb can	lb
		9150-00-190-0907	35-lb can	lb
			E-2	

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NUMBER AND CAGE	(5) UNIT OF MEAS
13	O,F	9150-00-823-8048 9150-00-435-4019 9150-00-141-6770 9150-00-141-6771	Grease, Ball and Roller Bearing (MIL-G-25013) 8-oz tube 14-oz can 1-3/4-lb can 35-lb can	oz oz lb lb
14	O	9150-01-091-9336	Grease, Molybdenum Disulfide (58372) Lithium-Base Grease 1-1/2-lb can	lb
15	O,F		Oil, Lubricating (Anderol 465)	oz
16	O,F		Oil, Lubricating (SAE 20), Non-detergent	
17	O,F		Oil, Preservative	
18		9150-00-250-0931 9150-00-250-0926 9150-00-250-0933	Petrolatum, Technical (81348 V-P-236) 8-oz tube 1.75-lb can 7.5-lb can	oz lb lb
19	C,O	7920-00-205-1711	Rag, Wiping (AA-531) (58536) 50-lb Bale	lb
20	O		Solder, Resin Flux	
21	O,F	6850-00-669-5685 6850-00-281-1985	Solvent, drycleaning: (P-D-680) Type II 1-qt can 1-gal can	qt gal
22	O	8135-00-178-9200	Tag, Identification (MIL-S-29190) 1,000 Per Carton	Carton
23	O	9320-01-053-8266	Tape, Teflon	rl
24	O	5975-00-984-6582	Ties, Cable: Plastic (MIL-S-29190)	hd
E-3/(E-4 blank)				

APPENDIX F

STOWAGE AND SIGN GUIDE

F-1. SCOPE.

This appendix shows the location for stowage of equipment and material required to be carried on the Heater.

F-2. GENERAL.

The equipment stowage locator is designed to help inventory items required for safe and efficient operation. This equipment locator is representative of BII and applicable AAL stowage on the Heater.

F-3. STOWAGE LOCATIONS.

Refer to figure F-1 for stowage locations of BII and AAL.

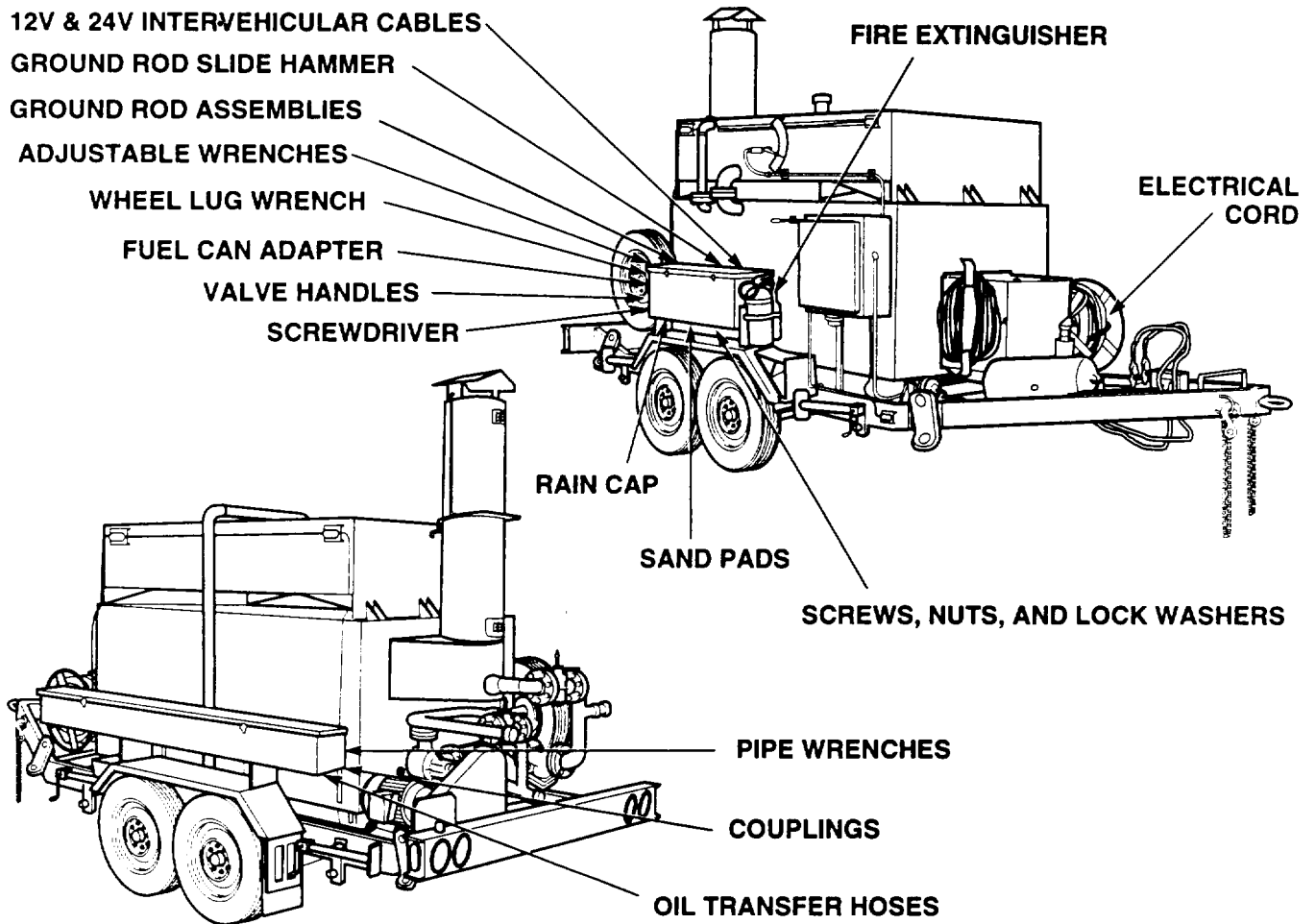


Figure F-1. Stowage Location of BII and AAL

F-4. SIGN GUIDE.

Refer to Figure F-2 for location of crew area and exterior decals and data plates.

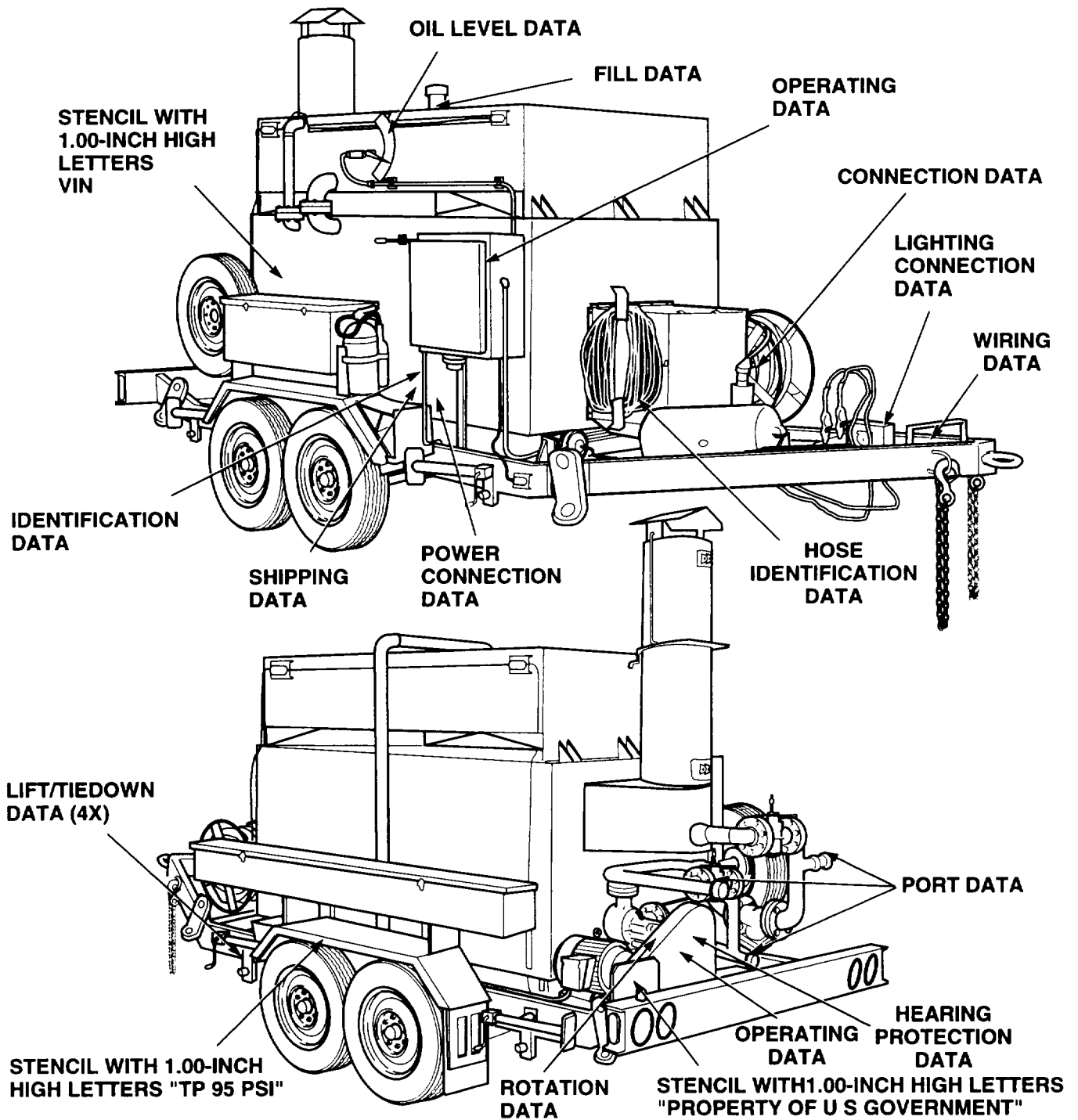


Figure F-2. Location of Crew Area and Exterior Decals and Data Plates

APPENDIX G

REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)

Section I. INTRODUCTION

G-1. SCOPE.

This RPSTL lists and authorizes spares and repair parts; special tools; special Test, Measurement, and Diagnostic Equipment (TMDE); and other special support equipment required for performance of Operator's, Unit, and Direct Support maintenance of the Heater. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

G-2. GENERAL.

In addition to Section I, Introduction, this RPSTL is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed by item name in FIG BULK at the end of the section. Repair parts kits or sets are listed separately in their own functional group within Section II. Repair parts for repairable special tools are also listed in the section.

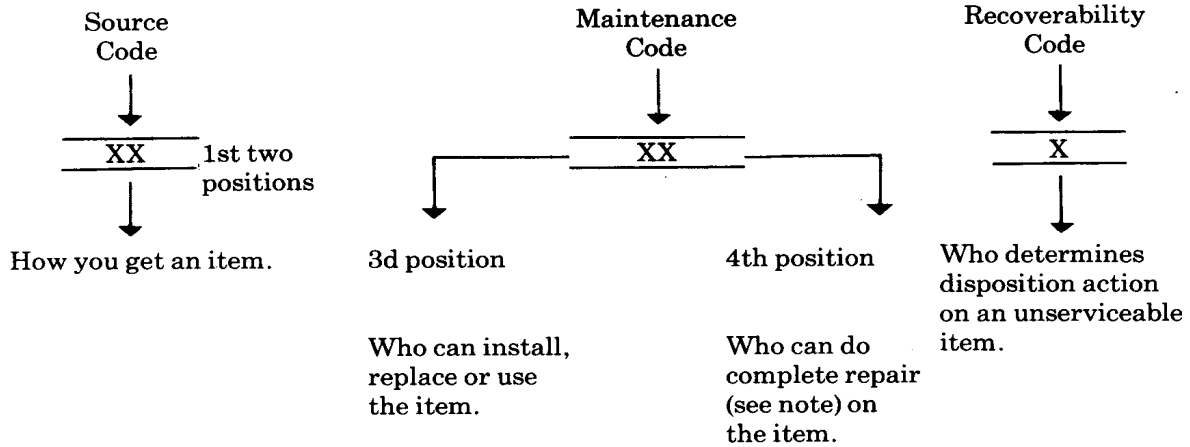
b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE (UOC) column) for the performance of maintenance.

c. Section IV. Cross-Reference Indexes. A list, in National Item Identification Number (NIIN) sequence, of all National stock numbered items appearing in the listings, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance. The figure and item number index lists figure and item numbers in alphanumeric sequence and cross-references NSN, CAGEC, and part numbers.

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

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

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



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

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

Code	Explanation
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> PA PB PC PD PE PF PG </div>	Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code. *NOTE: Items coded PC are subject to deterioration
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> KD KF KB </div>	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
MO — Made at unit level MF — Made at DS level MH — Made at GS level ML — Made at Specialized Repair Activity (SRA) MD — Made at Depot	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
AO — Assembled by Unit AF — Assembled by DS AH — Assembled by GS AL — Assembled by SRA AD — Assembled by Depot	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.

Code	Explanation
XA -	Do not requisition an "XA" item. Order its next higher assembly. (Also, refer to the NOTE below.)
XB -	If an "XB" item is not available from salvage, order it using the CAGEC and part number given.
XC -	Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD -	Item is not stocked. Order an "XD" item through normal supply channels using the CAGEC and part number given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA."

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

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

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

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e. all authorized maintenance functions). (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the MAC and SMR codes.) This position will contain one of the following maintenance codes:

Code	Application/Explanation
O -	Unit is the lowest level that can do complete repair of the item.
F -	Direct support is the lowest level that can do complete repair of the item.

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

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

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

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

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

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

NOTE

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

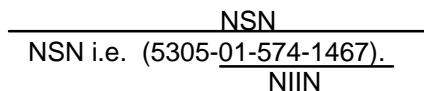
- e. DESCRIPTION AND USABLE ON CODE (UOC) (Column (5)).** This column includes the following information:
- (1) The Federal item name and, when required, a minimum description to identify the item.
 - (2) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.
 - (3) In the Special Tools List section, the basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the BOI, the total authorization is increased proportionately.
 - (4) The statement "END OF FIGURE" appears just below the last item description in Column 5 for a given figure in both Section II and Section III.

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

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

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) STOCK NUMBER column. This column lists the NSN by National Item Identification Number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN, i.e.



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

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

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

G-4. EXPLANATION OF COLUMNS (SECTION IV) (CONT).

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

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

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

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

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

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

c. FIGURE AND ITEM NUMBER INDEX.

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

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

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

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

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

G-5. SPECIAL INFORMATION.

a. USABLE ON CODE. The UOC appears in the lower left corner of the Description column heading.

Usable on codes are shown as "UOC...." in the Description Column (justified left) on the last line applicable item description/nomenclature. Uncoded items are applicable to all models. Identification of the UOC used in this publication is:

Code	Used On
JWG	Model M087

G-6. HOW TO LOCATE REPAIR PARTS.**a. When National Stock Number or Part Number is NOT Known.**

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

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

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

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

(5) Fifth. Refer to the Figure and Item Number Index to find the NSN, if assigned.

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

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

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

G-7. ABBREVIATIONS.

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

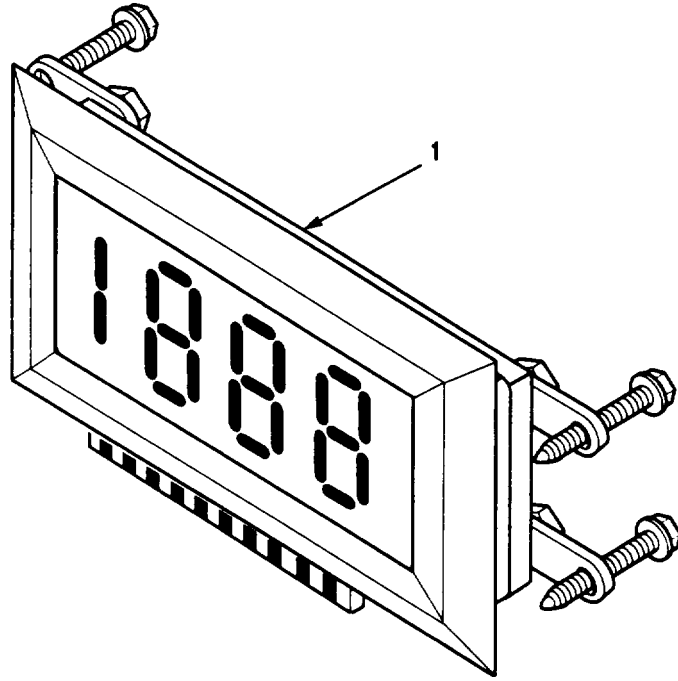


Figure 1. Temperature Gage Display

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

GROUP 06 ELECTRICAL SYSTEM

GROUP 0607 INSTRUMENT OR ENGINE CONTROL PANEL

FIG. 1 TEMPERATURE GAGE DISPLAY

1	PAOZZ	6M717	LCD3000-001	DISPLAY,OPTOELECTRO	2
---	-------	-------	-------------	---------------------------	---

END OF FIGURE

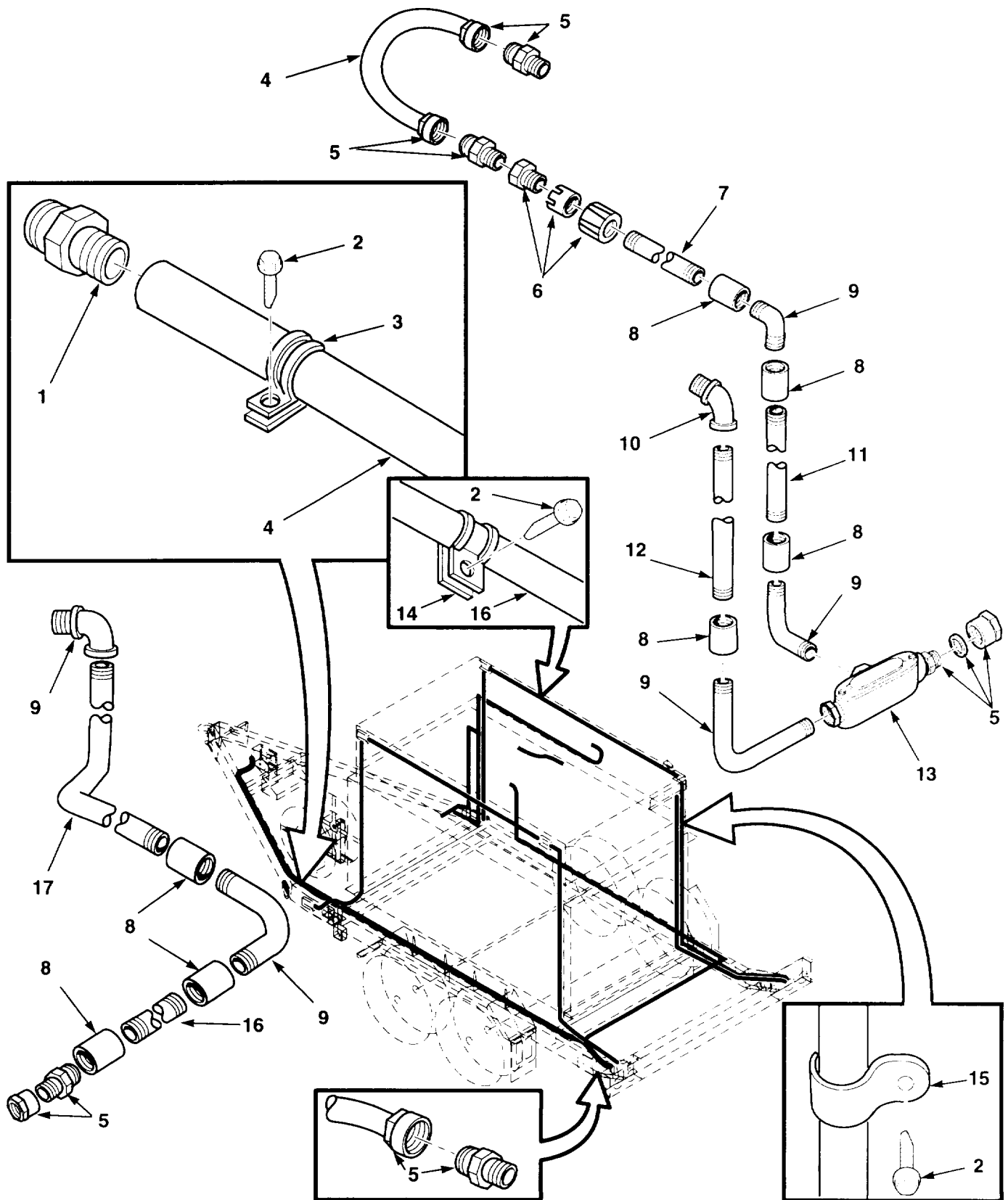


Figure 2. Conduits

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
GROUP 0608 TEMPERATURE SENSOR CONDUIT FIG. 2 CONDUITS					
1	PAOZZ	06447	2HXLPBS	ADAPTER,STRAIGHT.TU	1
2	PAOZA	96906	MS24628-64	SCREWVTAPPING.....V	
3	PAOZZ	96906	MS21333-77	CLAMPVLOOP.....V	
4	PAOZZ	06447	2HXLBP4	CONOUITNONMETALLIC,	V
5	PAOZZ	03743	EC50	UNION,ELECIRICAL CO	5
6	PAOZZ	39428	7513K41	UNION,ELECTRICAL CO	1
7	PAOZZ	06447	2HXBPB24	CONDUIT ASSEMBLY,NO	8
8	PAOZZ	39428	4638K164	COUPLING ELECTRICAL	5
9	PAOZZ	06447	2HXBPB21	ADAPTER2ELECTRICAL,	2
10	PAQZZ	72971	22N-50B	BOX CONNECTOR,ELECT	1
11	PAOZZ	06447	2HXBPB23	CONDUIT, RIGID	1
12	PAOZZ	06447	2HXBP822	CONDUIT OUTLET	1
13	PAOZZ	03743	T351AND35010	CONDUIT OUTLET	1
14	PAOZZ	96906	MS21333-69	CLAMP, LOOP	V
15	PAOZZ	39428	9434T41	CLAMP ELECTRICAL.....V	
16	PAOZZ	06447	2HXBPB25	CONDUIT OUTLET	2
17	PAOZZ	06447	2HXBPB26	CONDUIT OUTLET,,.....	

END OF FIGURE

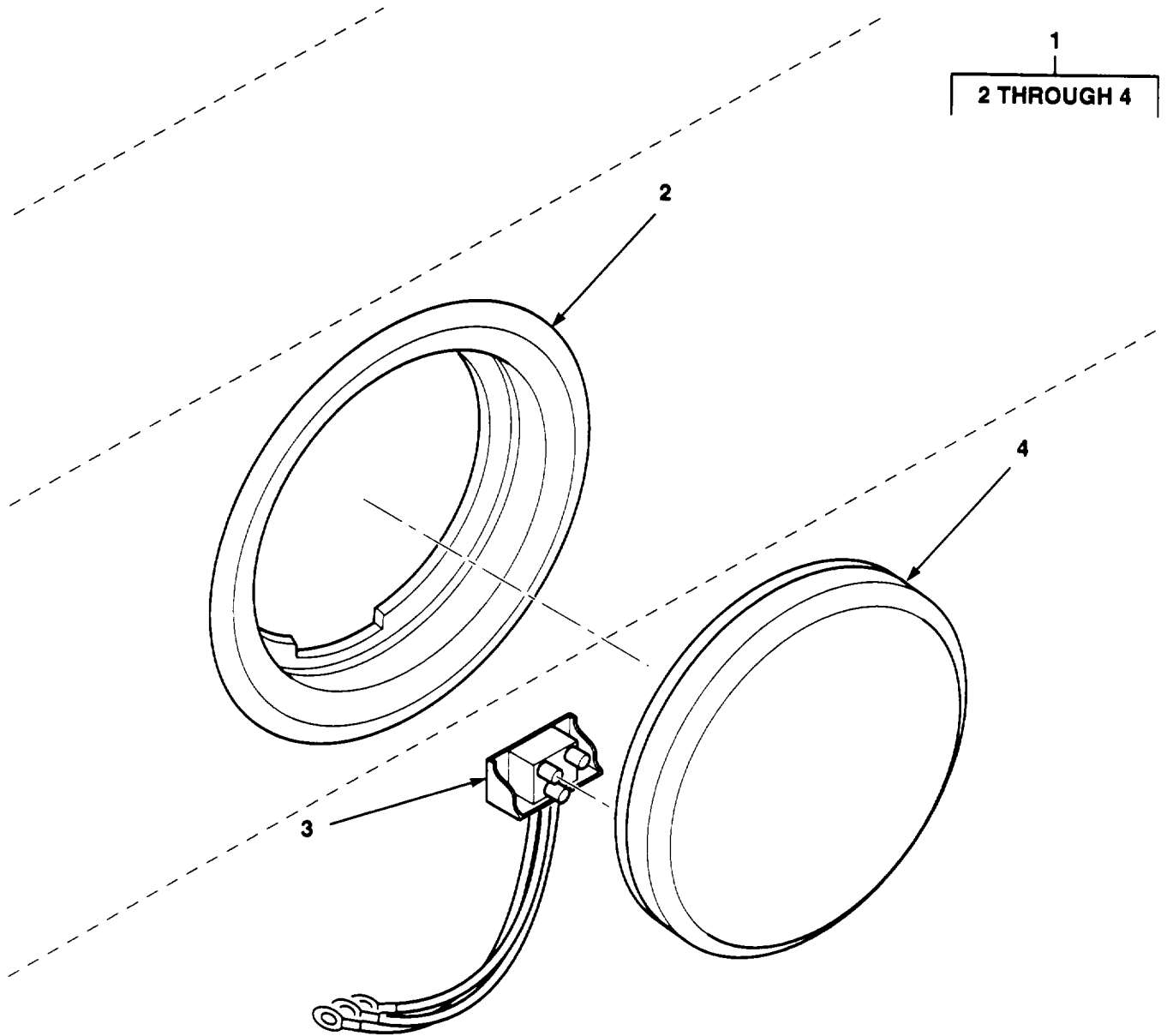


Figure 3. Turn Signal/Stop Lights

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 0609 LIGHTS	
				FIG. 3 TURN, STOP AND TAIL LIGHTS	
1	PA000 13548		40002R	LAMP VEHICULAR.....	4
2	PAOZZ 30076		450498	.GROMMET	1
3	PAOZZ 13548		94993	.LEAD ASSEMBLY, ELECT.....	1
4	PAOZZ 13548		40202R	.STOP LIGHT-TAILLIGH.....	1

END OF FIGURE

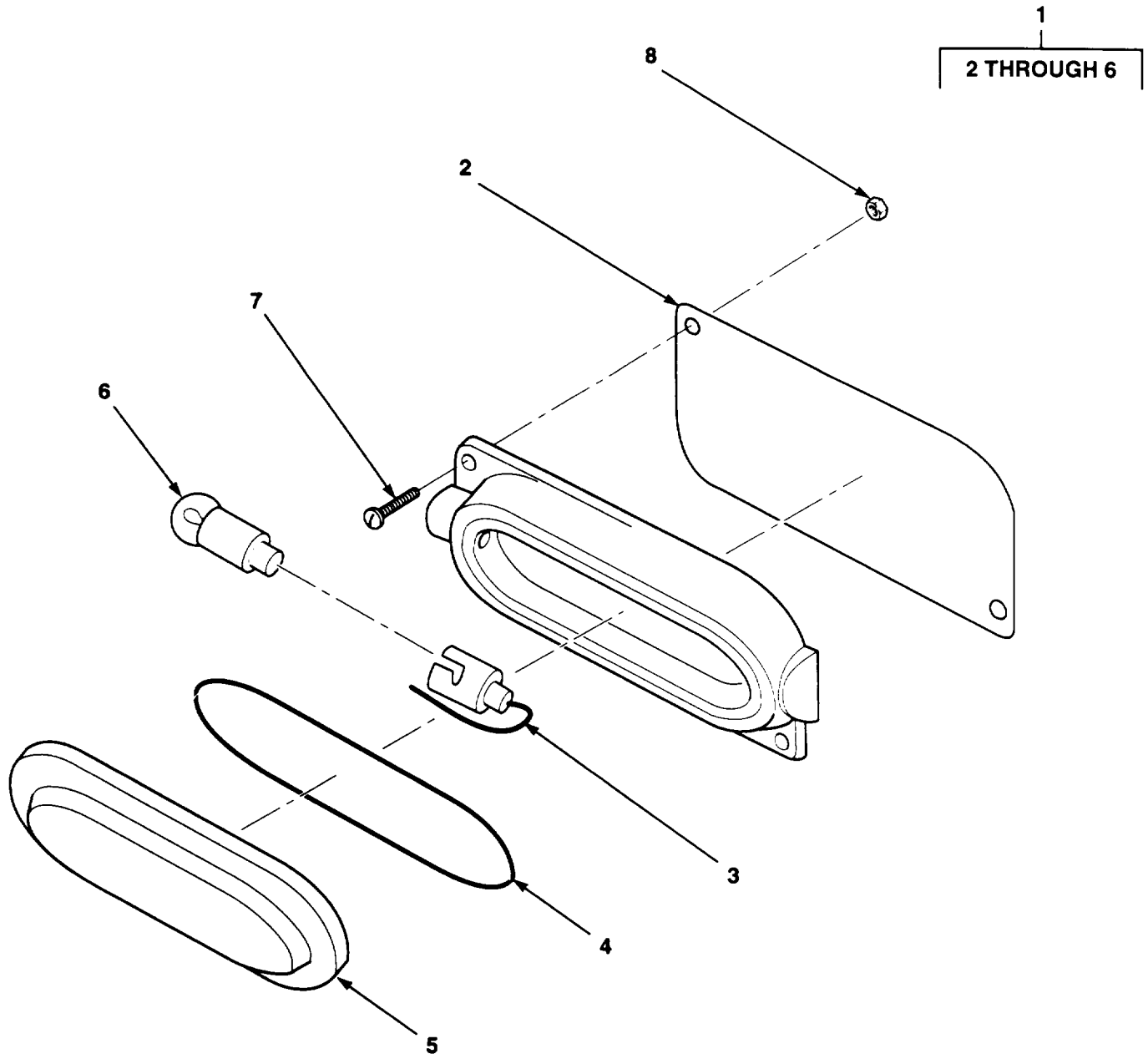


Figure 4. Red and Amber Marker Lights

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 0609 LIGHTS	
				FIG. 4 RED AND AMBER MARKER LIGHTS	
1	PAOZZ	13226	S-200CR-RD-24	LIGHT,MARKER, CLEARA.....	2
2	PAOZZ	13226	920052	.GASKET	1
3	PAOZZ	13226	55	.LEAD, ELECTRICAL.....	1
4	PAOZZ	13226	920051	.PACKING, PREFORNED.....	1
5	PAOZZ	13226	201R	.LENS, LIGHT RED.....	1
5	PAOZZ	13226	920050	.LENS, LIGHT AMBER.....	1
6	PAOZZ	08806	168	.LAMP, INCANDESCENT	1
7	PAOZZ	96906	MS35206-281	SCREW, MACHINE	2
8	PAOZZ	96906	MS35649-2252	NUT, PLAIN, HEXAGON	2

END OF FIGURE

1
2 THROUGH 7

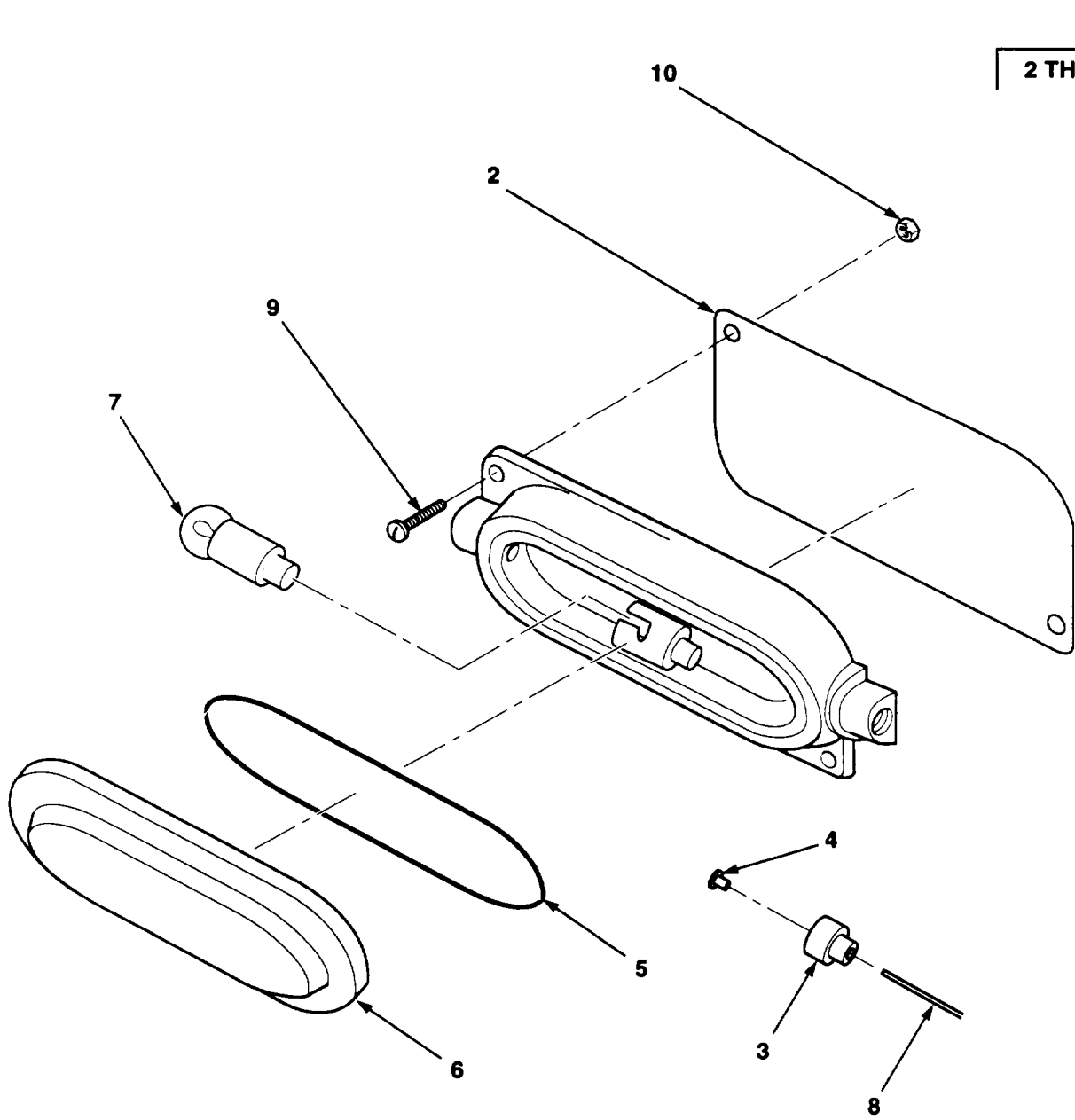


Figure 5. Rear Clearance Lights

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 0609 LIGHTS					
FIG. 5 REAR CLEARANCE LIGHTS					
1	PAOZZ	13226	200011	LIGHT, MARKER, CLEARA.....	2
2	PAOZZ	13226	920052	.GASKET	1
3	PAOZZ	13226	920123	.GROMMET AND WIRE AY.....	1
4	PAOZZ	13226	55	.LEAD, ELECTRICAL.....	1
5	PAOZZ	13226	920051	.PACKING, PREFORMED	1
6	PAOZZ	13226	201R	.LENS, LIGHT	1
7	PAOZZ	46717	LA-200-15	.LAMP, INCANDESCENT	1
8	PAOZZ	64488	811225	.WIRE, ELECTRICAL.....	1
9	PAOZZ	96906	MS35206-281	SCREW, MACHINE	2
10	PAOZZ	96906	MS35649-2252	NUT, PLAIN, HEXAGON	2

END OF FIGURE

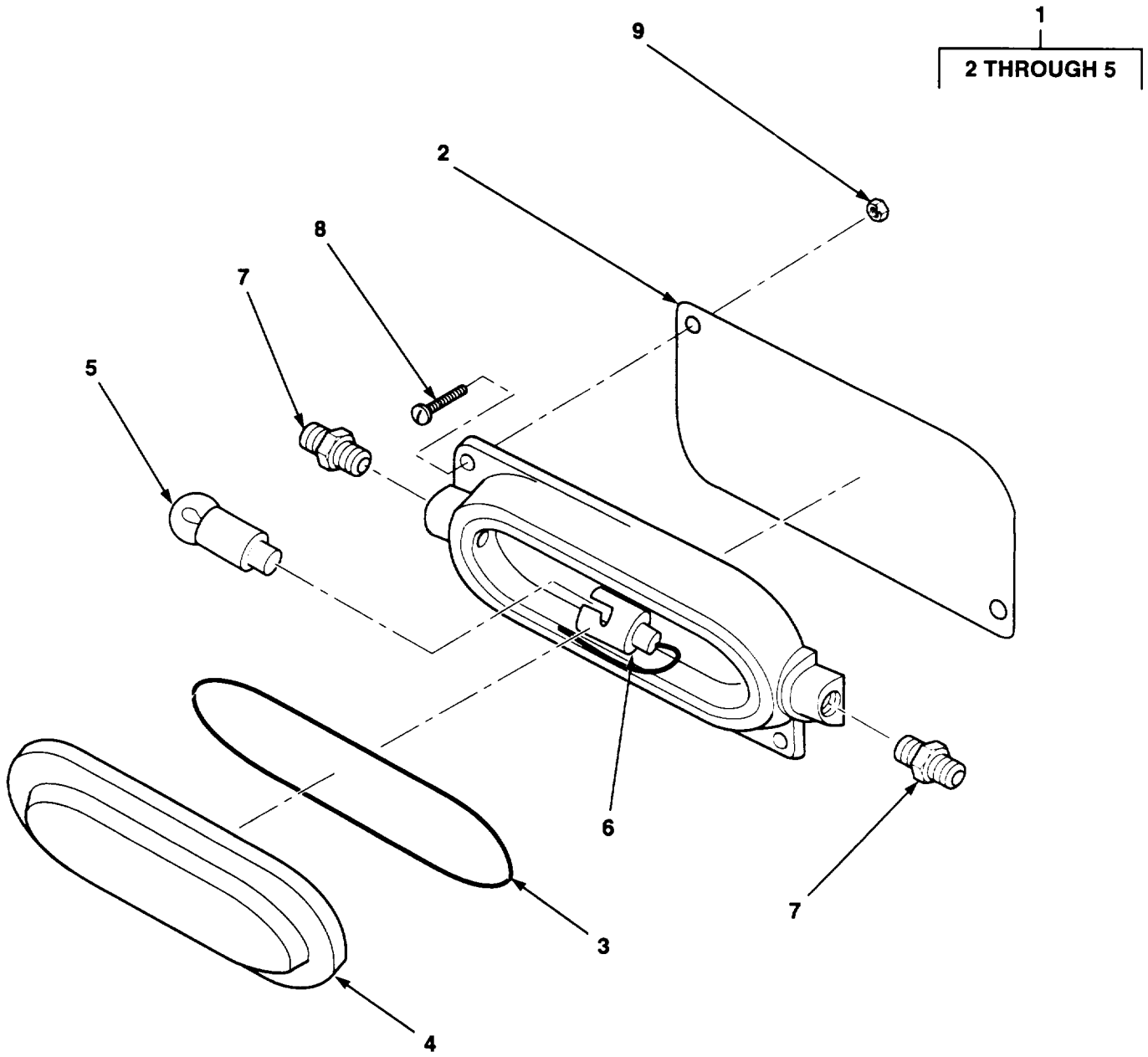


Figure 6. Front Clearance Lights

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 0609 LIGHTS					
FIG. 6 FRONT CLEARANCE LIGHTS					
1	PAOZZ	13226	210006	LIGHT, MARKER, CLEARA.....	1
2	PAOZZ	13226	920052	.GASKET	1
3	PAOZZ	13226	920060	.PACKING PREFORMED	1
4	PAOZZ	13226	920059	.LENS, LIGHT	1
5	PAOZZ	08806	168	.LAMP, INCANDESCENT	1
6	PAOZZ	13226	55	LEAD ELECTRICAL.....	1
7	PAOZZ	93061	68NTA-6-2	ADAPTER, STRAIGHT, PI.....	6
8	PAOZZ	96906	M535206-281	SCREW, MACHINE	2
9	PAOZZ	96906	MS535649-2252	NUT, PLAIN, HEXAGON	2

END OF FIGURE

1
2 THROUGH 6

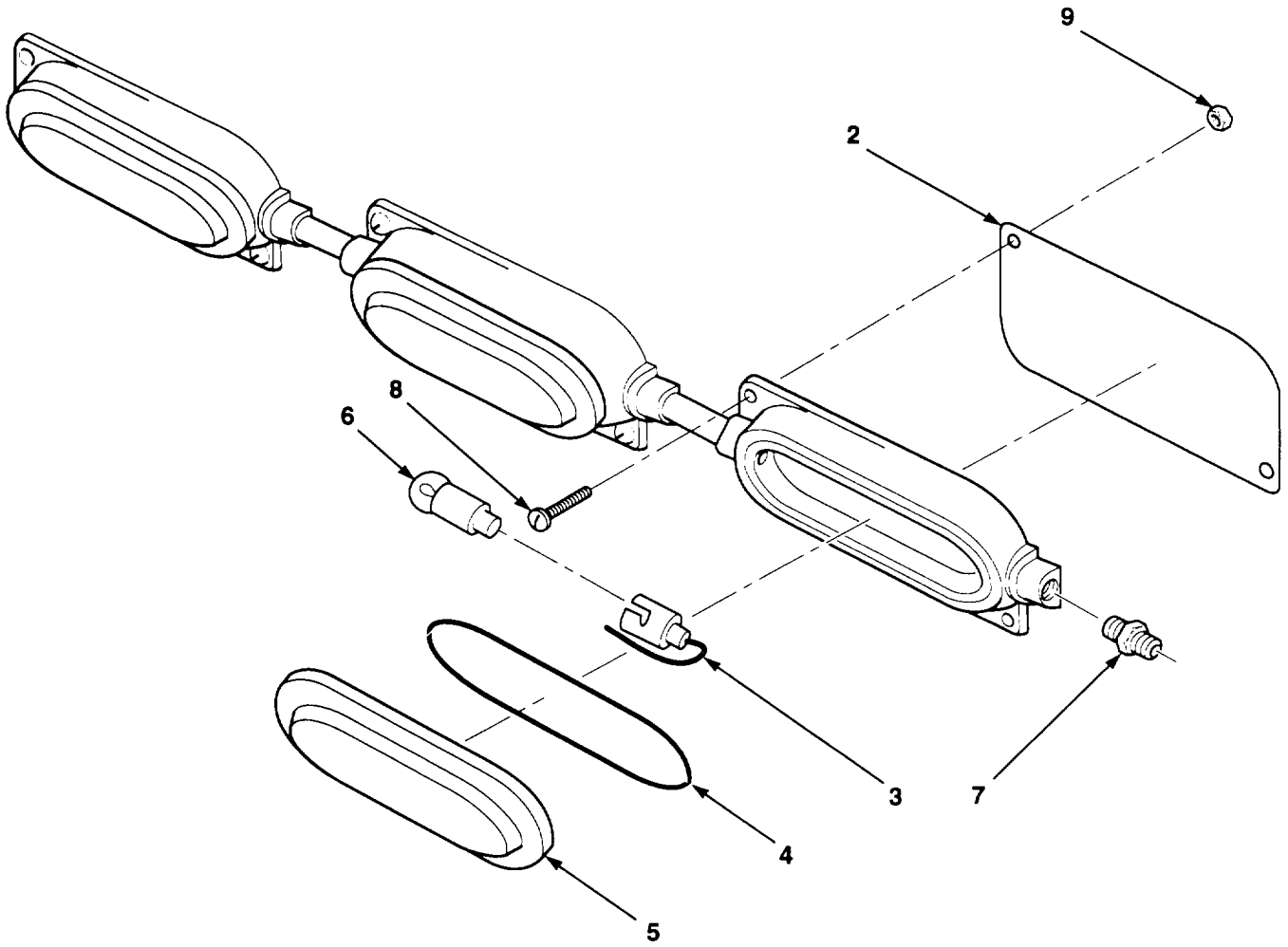


Figure 7. Red Bar Lights

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 0609 LIGHTS					
FIG. 7 RED BAR LIGHTS					
1	PAOZZ	13226	200-09122	LIGHT ASSEMBLY, CLEA.....	1
2	PAOZZ	13226	920052	.GASKET	3
3	PAOZZ	13226	55	.LEAD, ELECTRICAL.....	3
4	PAOZZ	13226	920051	.PACKING, PREFORMED	3
5	PAOZZ	13226	201R	.LENS, LIGHT	3
6	PAOZZ	46711	LA-200-15	.LAMP, INCANDESCENT	3
7	PAOZZ	79470	1468X6	ADAPTER, STRAIGHT, PI.....	3
8	PAOZZ	96906	MS35206-281	SCREW, MACHINE	2
9	PAOZZ	96906	MS35649-2252	NUT, PLAIN, HEXAGON.	2

END OF FIGURE

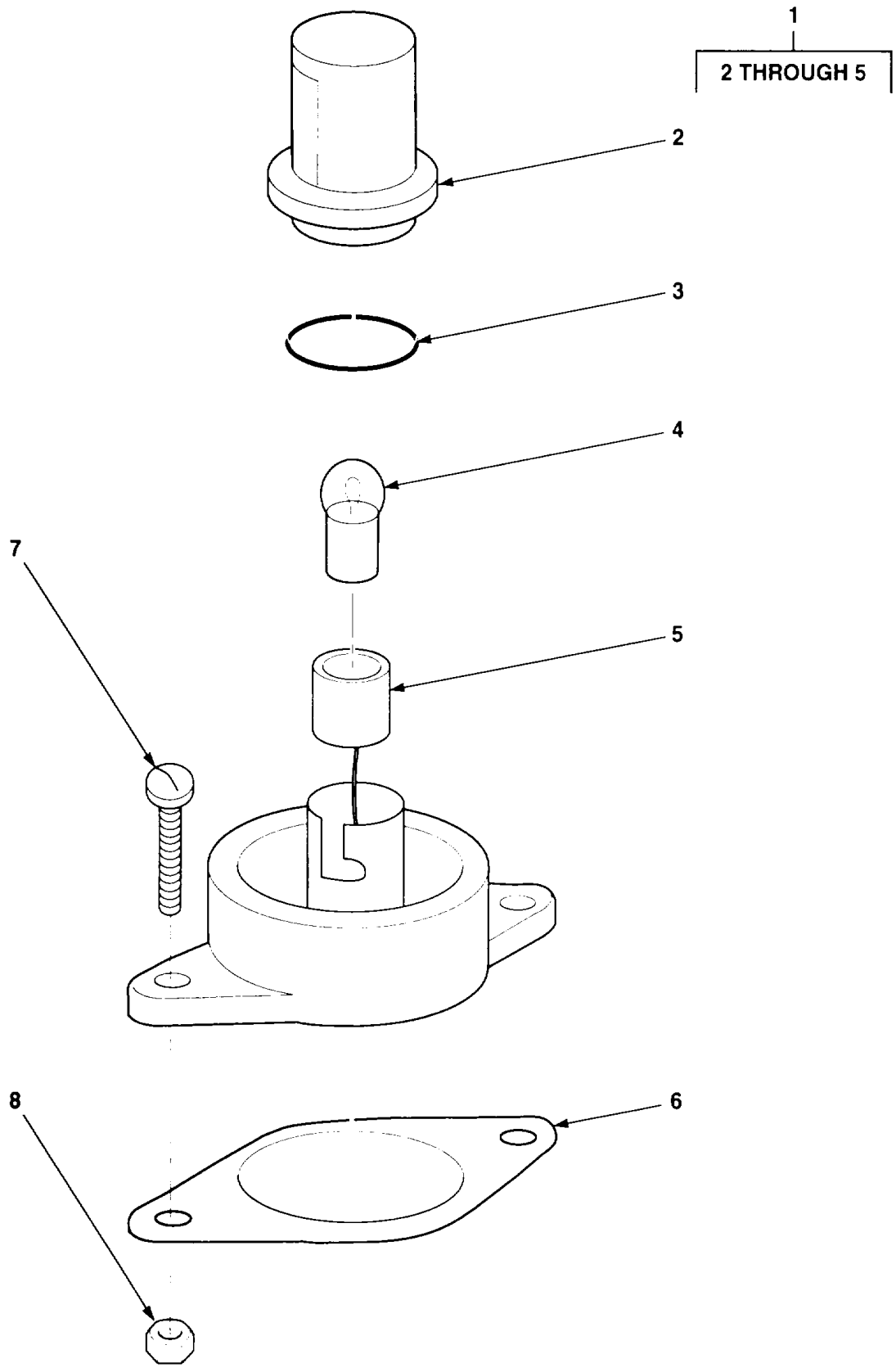


Figure 8. License Light

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 0609 LIGHTS					
FIG. 8 LICENSE LIGHT					
1	PAOZZ	13226	240003	LAMP, UNIT, VEHICULAR.....	1
2	PAOZZ	13226	920055	.LENS, LIGHT.....	1
3	PAOZZ	13226	920056	.PACKING, PREFORMED.....	1
4	PAOZZ	46717	LA-200-15	.LAMP, INCANDESCENT.....	1
5	PAOZZ	13226	55	.LEAD, ELECTRICAL.....	1
6	PAOZZ	13226	920073	.GASKET.....	1
7	PAOZZ	96906	MS35206-281	SCREW, MACHINE	2
8	PAOZZ	96906	MS35649-2252	NUT, PLAIN, HEXAGON.....	2

END OF FIGURE

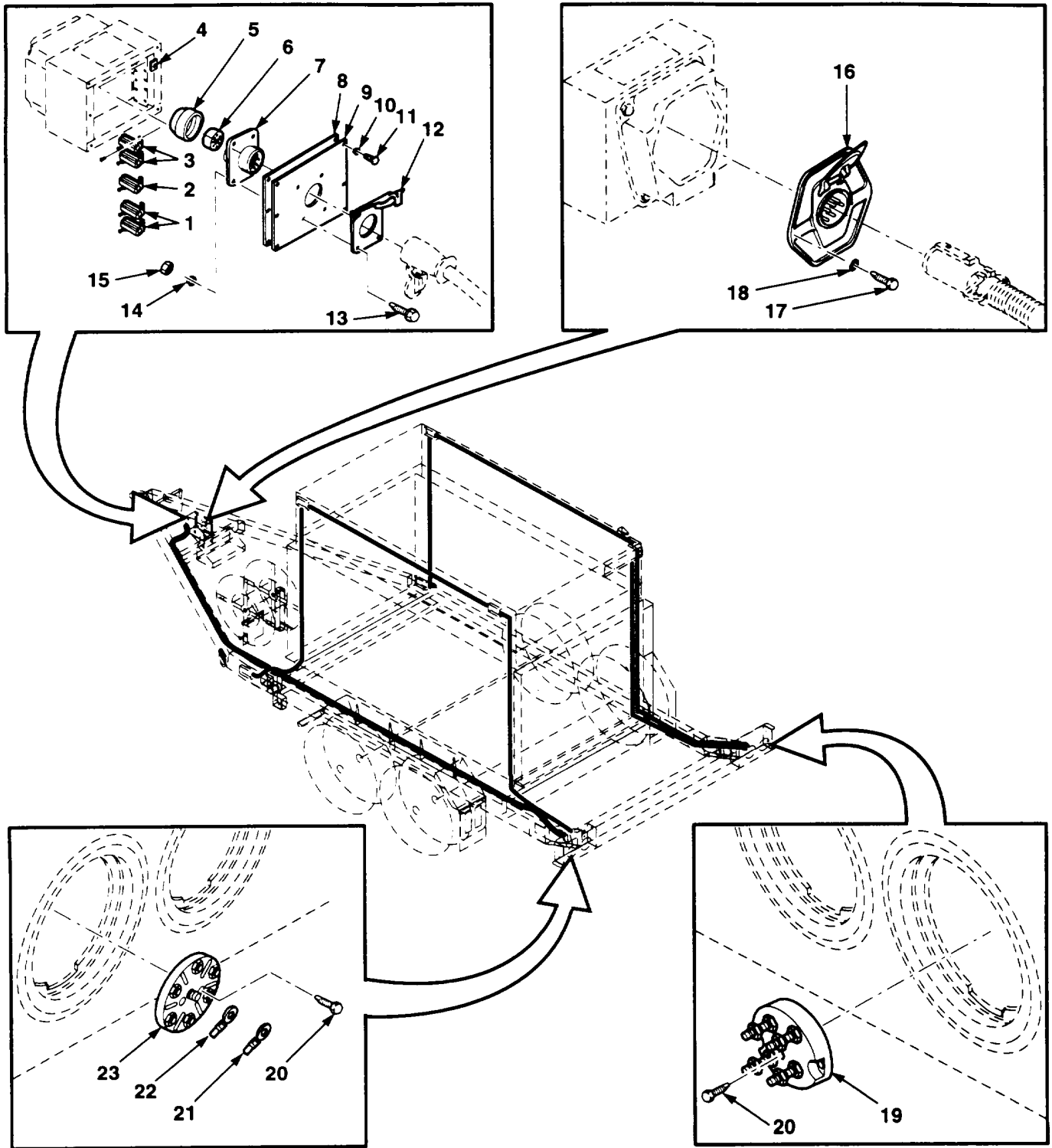


Figure 9. Lighting System

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 0613 HULL OR CHASSIS WIRING HARNESS					
FIG. 9 LIGHTING SYSTEM					
1	PAOZZ	81349	RER75F4RO2R	RESISTOR, FIXED, WIRE.....	2
2	PAOZZ	81349	RER75F4R99R	RESISTOR, FIXED, WIRE.....	1
3	PAOZZ	81349	RER75F6RO4R	RESISTOR, FIXED, WIRE.....	2
4	PAOZZ	39428	90679A029	NUT, CLIP-ON.....	8
5	PAOZZ	19207	7723309	NUT, PLAIN, KNURLED.....	1
6	PAOZZ	19207	7722333	BUSHING, NONMETALLIC.....	1
7	PAOZA	96906	MS75021-1	CONNECTOR, RECEPTACL.....	1
8	XOOZZ	06447	2HXLBP7	GASKET.....	1
9	XDOZZ	06447	2HXLBP1	COVER, RESISTOR BOX.....	1
10	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	8
11	PAOZZ	96906	MS90725-6	SCREW, CAP, HEXAGON.....	8
12	PAOZZ	19207	7731428	COVER, ELECTRICAL, CO.....	1
13	PAOZZ	96906	MS90725-6	SCREW, CAP, HEXAGON H.....	4
14	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	4
15	PAOZZ	96906	MS35649-2252	NUT, PLAIN, HEXAGON.....	4
16	PAOZZ	06721	24115	CONNECTOR, RECEPTACL.....	1
17	PAOZZ	24617	9418191	SCREW CAP HEX HD.....	2
18	PAOZZ	96906	MS35333-40	WASHER, LUG.....	2
19	PAOZZ	13226	920268	TERMINAL, BOX.....	3
20	PAOZZ	96906	MS16995-26	SCREW.MACHINE.....	4
21	PAOZZ	96906	MS25036-112	TERMINNAL, LUG.....	6
22	PAOZZ	96906	MS25036-108	TERMINAL, LUG.....	1
23	PAOZZ	13226	920264	TERMINAL, BOX.....	1

END OF FIGURE

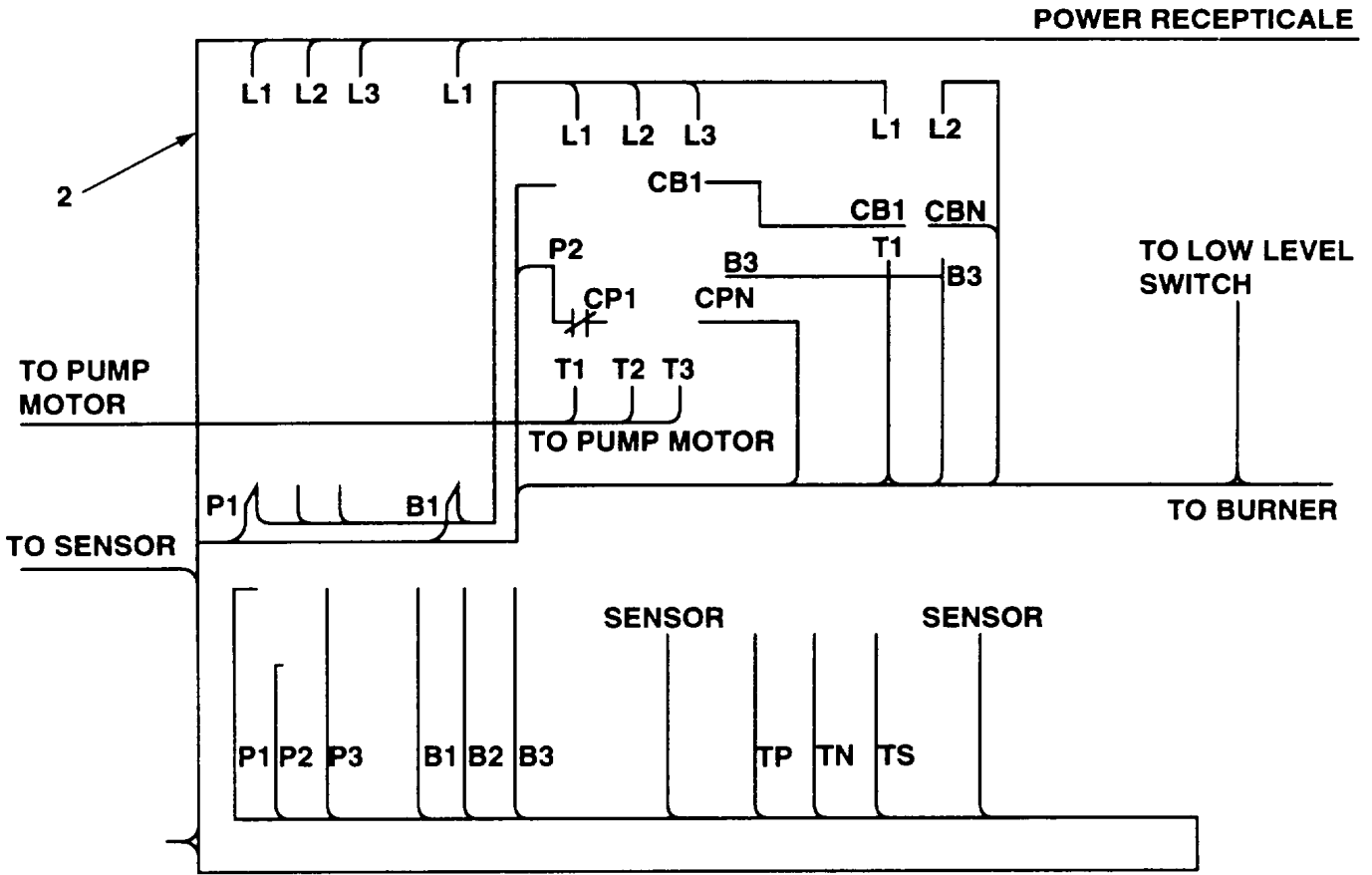
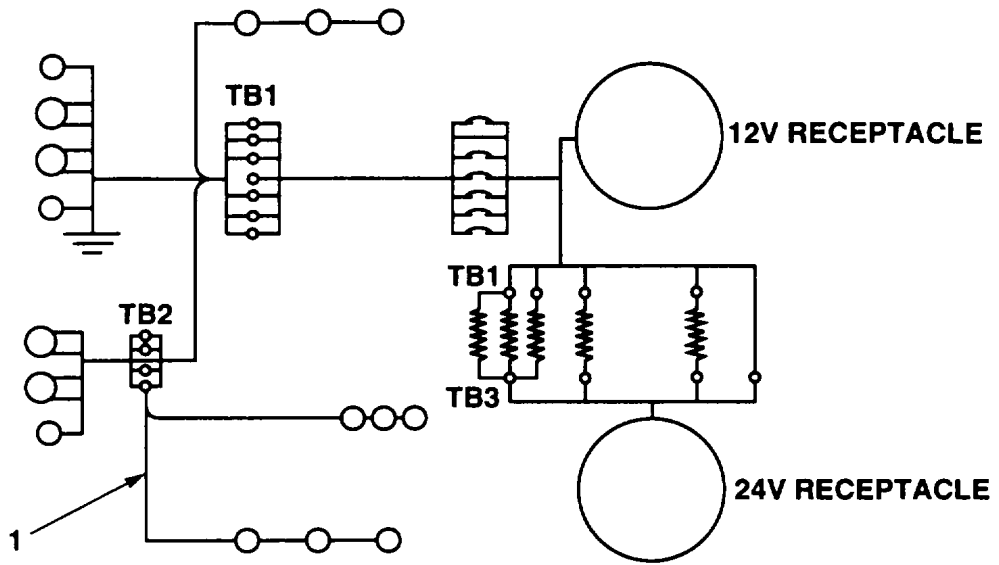


Figure 10. Wiring Harnesses

SECTION II

TM 5-3895-377-13&P

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

GROUP 0613 HULL OR CHASIS WIRING
HARNESS

FIG. 10 WIRING, HARNESSES

1	PFOZZ	06447	2HXLBP2	WIRING, HARNESS, SET	1
2	PFOZZ	06447	2HXBPB3	WIRING, HARNESS	1

END OF FIGURE

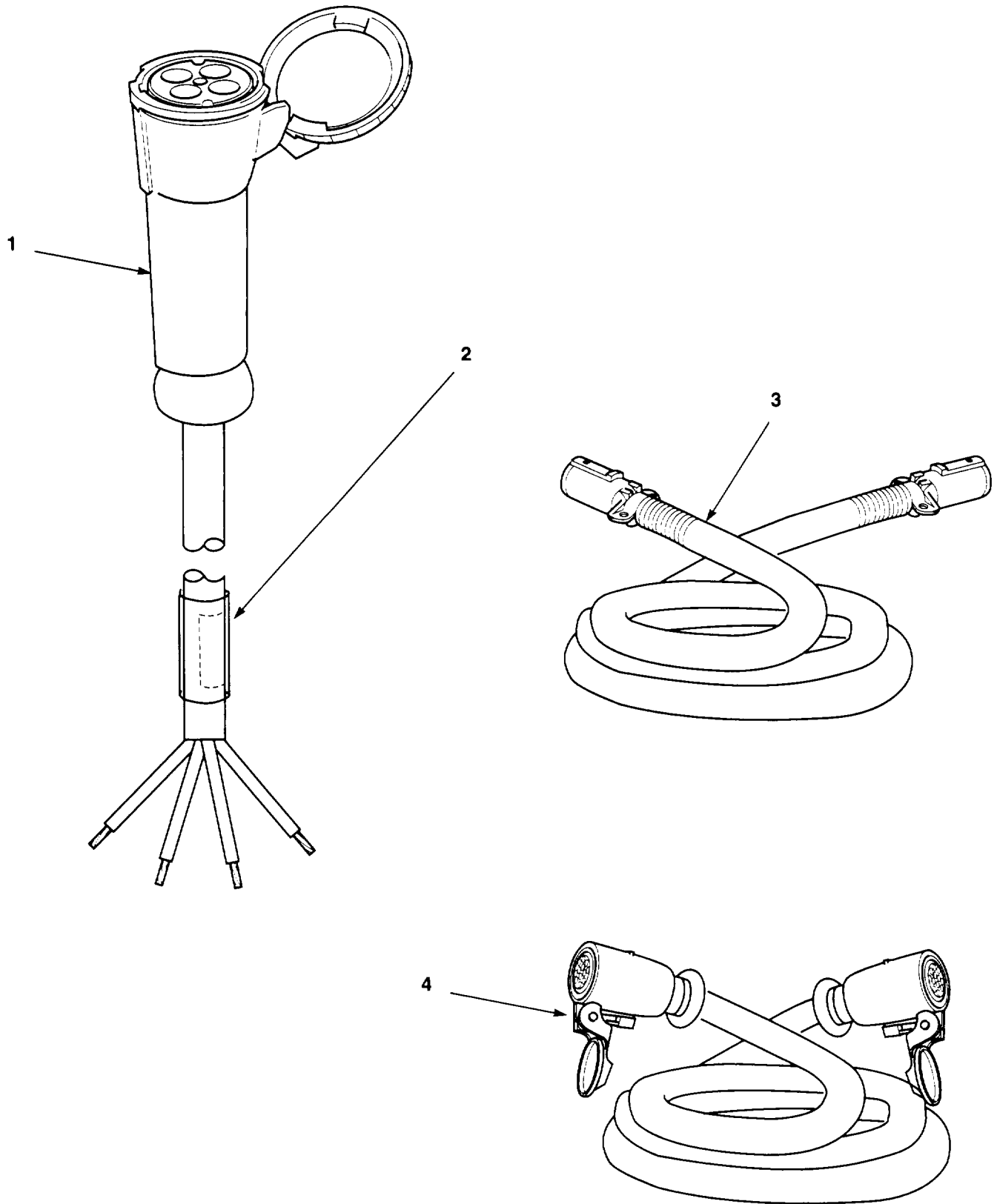


Figure 11. Power Cord and Intervehicular Cables

SECTION II

TM 5-3895-377-13&P

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

GROUP 0613 HULL AND CHASIS WIRING
HARNESS

FIG. 11 POWER CORD

1	PFOZZ	06447	P136-29MSHA	CORD, ELECTRICAL	1
2	XDOZZ	06447	2HXBP818	RETAINER, OER, CABLE.....	1
3	PAOZZ	06447	2HXLPB3	CABLE ASSEMBLY, POWE, 12V.....	1
				INTERVEHICULAR CABLE	
4	PAOZZ	19207	7728811	CABLE ASSEMBLY, SPEC 24V.....	1
				INTERVEHICULAR CABLE	

END OF FIGURE

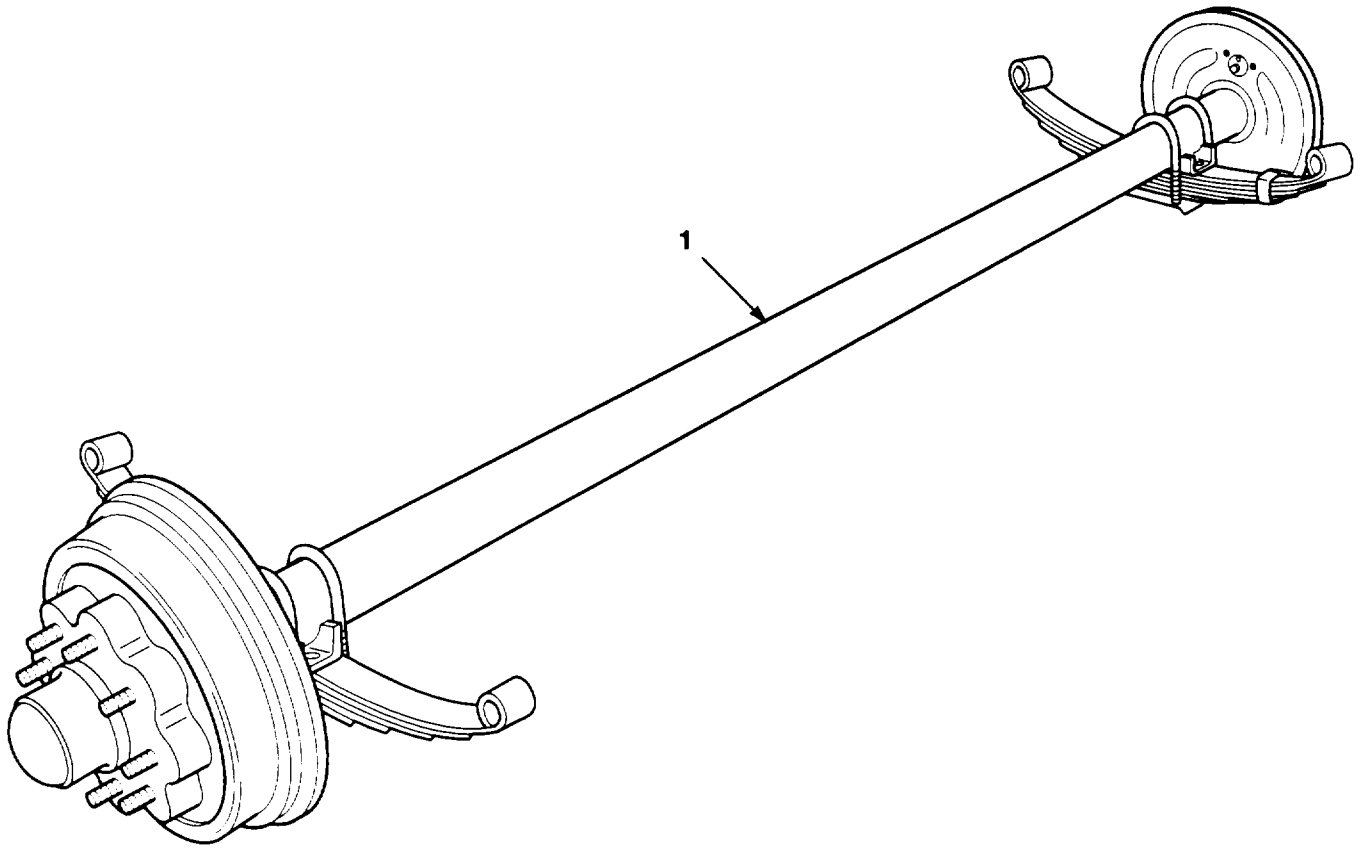


Figure 12. Axle Assembly

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 11 REAR AXLE	
				GROUP 1100 REAR AXLE ASSEMBLY	
				FIG 12 AXLE ASSEMBLY	
1	PB000	1V815	770SKH	AXLE, VEHICULAR, NOND.....	2
				END OF FIGURE	

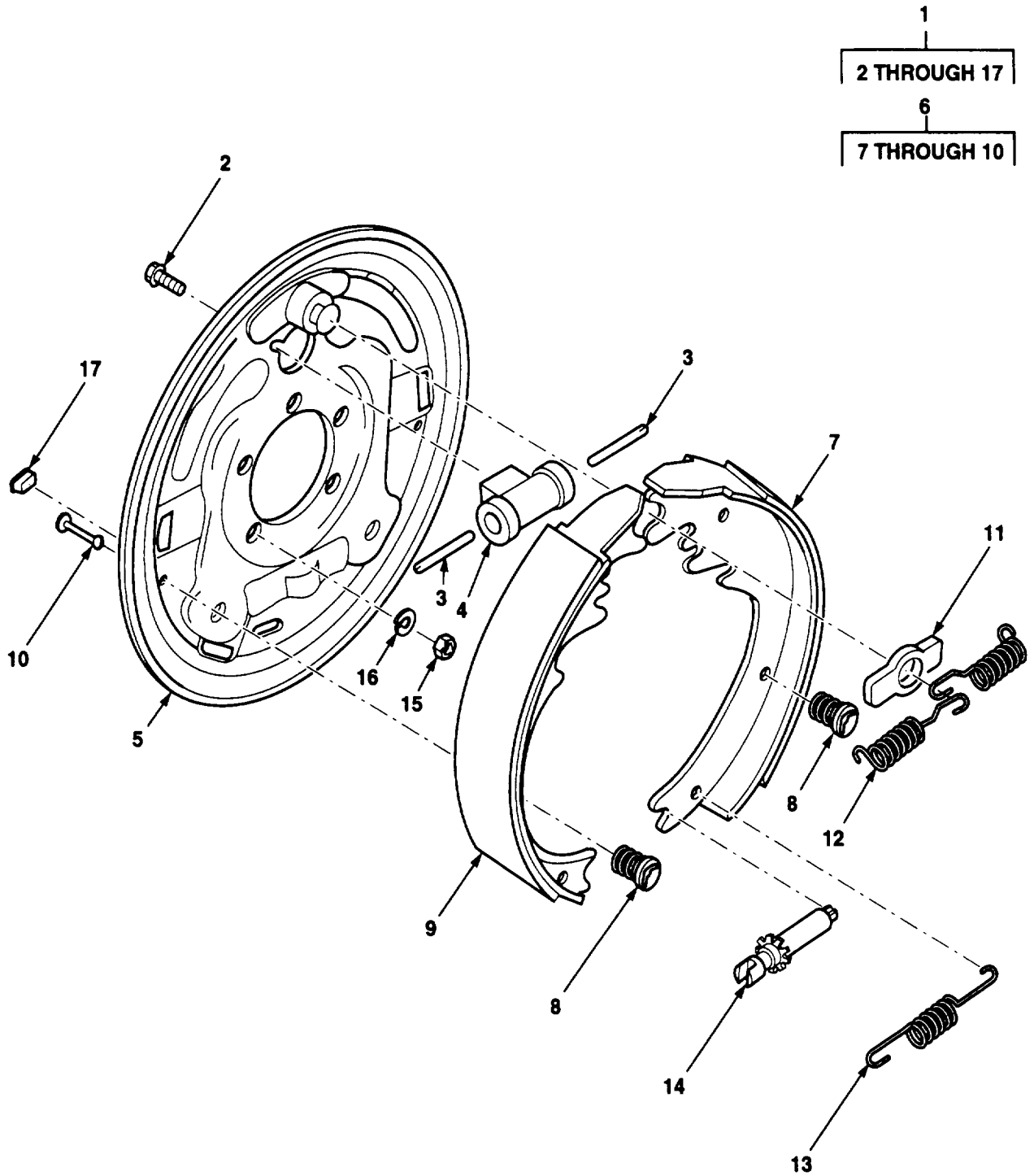


Figure 13. Brake Assembly

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 12 BRAKES					
GROUP 1202 SERVICE BRAKES					
FIG. 13 BRAKE ASSEMBLY					
1	PFOOO	15460	23-336	BRAKE, SHOE LH	1
1	PFOOO	15460	23-337	BRAKE, SHOE, TYPE RH	1
2	PAOZZ	15460	87-1	.SCREW, ASSEMBLYWASH	1
3	PAOZZ	15460	54-60	.ROD, PISTON, VEHICULA	2
4	PAOZZ	15460	54-62	.CYLINDER, ASSY, HYDRA LH.....	1
5	PFOZZ	15460	36-93-8	.PLATE, BACKING.....	1
6	PAOZZ	15460	71-270	.BRAKE, LINING, KIT LH.....	1
6	PAOZZ	15460	71-269	.BRAKE, SHOE SET RH.....	1
7	PAOZZ	15460	40-218-1	..BRAKE SHOE	1
7	PAOZZ	15460	40-218-2	..BRAKE SHOE	1
8	PFOZZ	15460	46-77	..SPRING, HELICAL, COMP	2
9	PAOZZ	15460	40-219	..BRAKE SHOE	11
10	PFOZZ	15460	49-12	..PIN, BRAKE SHOE	2
11	PFOZZ	15460	5-113	.SPACER, PLATE	1
12	PAOZZ	15460	46-101	.SPRING, HELICAL.....	2
13	PFOZZ	15460	46-102	.SPRING, HELICAL, TORS	1
14	PFOZZ	15460	43-4	.ADJUSTER, SLACK, BRAK.....	1
15	PFOZZ	15460	6-10	.NUT.....	5
16	PAOZZ	15460	5-4	.WASHER, , LOCK.....	5
17	PFOZZ	15460	46-7	.PLUG.....	1

END OF FIGURE

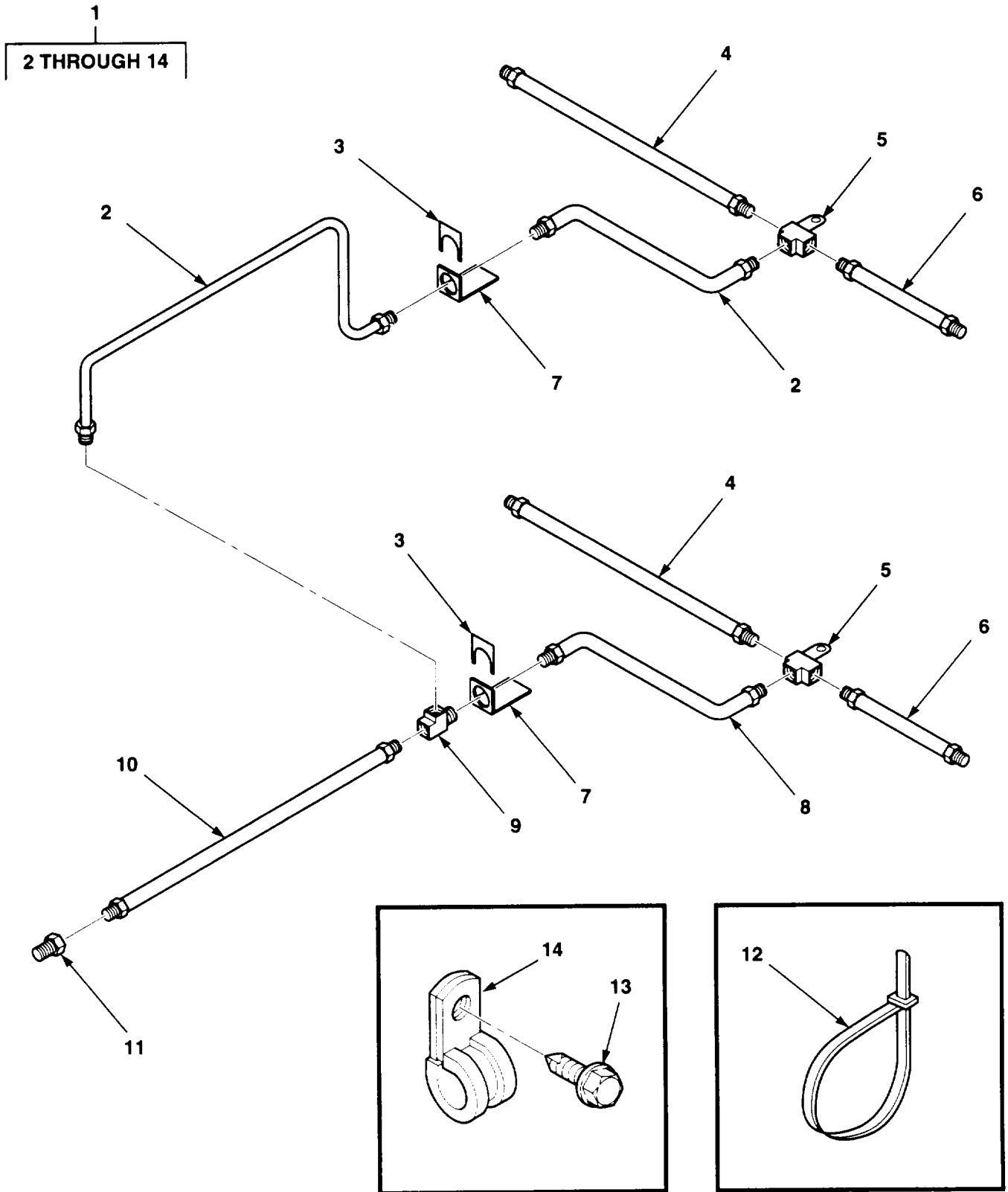


Figure 14. Hydraulic Brake Lines and Fittings

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 1204 BRAKES HYDRAULIC BRAKE SYSTEM					
FIG. 14 HYDRAULIC BRAKE LINES AND FITTINGS					
1	XDOOO	06447	T-200TA	KIT, BRAKE, LINE T AX	1
2	PFOZZ	06447	T-16030-C	.TUBE ASSEMBLY, METAL	1
3	PFOZZ	06447	1457	.PLATE, RETAINING	2
4	PFOZZ	06447	T-16072-C	.TUBE ASSEMBLY, METAL	2
5	PAOZZ	79470	7812	.TEE, TUBE	2
6	PFOZZ	06447	25X15	.BRACKET, ANGLE	2
8	PFOZLZ	06447	18018-MF	.HOSE ASSEMBLY, NONME	1
10	PFOZZ	06447	T-16180-C	.TUBE ASSEMBLY, METAL	1
11	PFOZZ	35301	182-12	.ADAPTER, STRAIGHT, PI.....	1
12	PAOZZ	96906	MS3367-3	.STRAP, TIEDOWN, ELECT	6
13	PAOZA	96906	MS24628-64	.SCREW, TAPPING	6
14	PAOZZ	96906	MS21333-20	.CLAMP, LOOP	6

END OF FIGURE

SECTION II

TM 5-3895-377-13&P

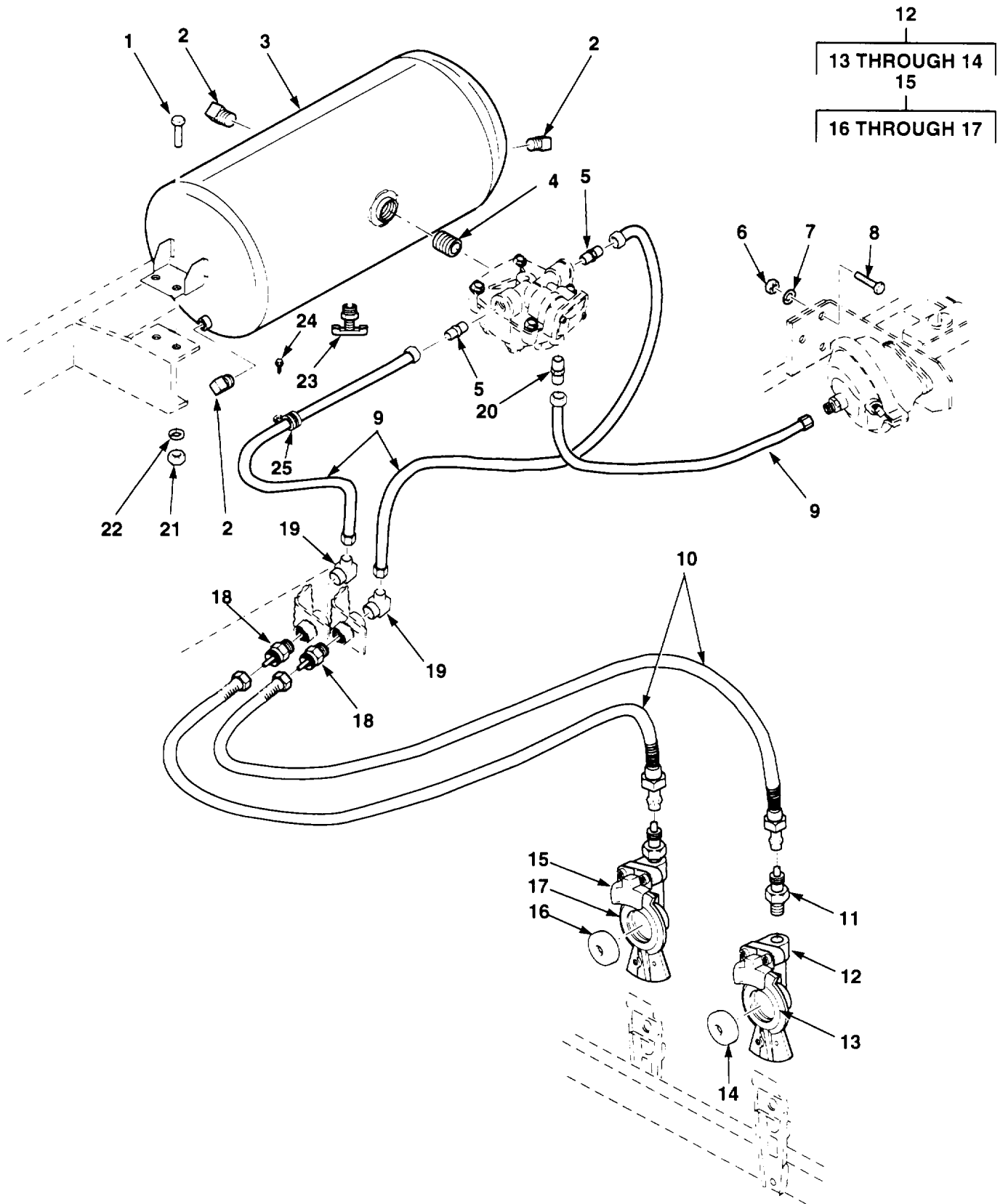


Figure 15. Air Brake System

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC) GROUP 1208 AIR BRAKE SYSTEM	(6) QTY
FIG. 15 AIR BRAKE SYSTEM					
1	PAOZZ	97403	13222E0109	SCREW, ROLLER ASSEMB	4
2	PAOZZ	96906	MS20913-3	PLUG, PIPE	3
3	PAOZZ	98343	19820	TANK, PRESSURE	1
4	PAOZZ	05415	003248	NIPPLE, PIPE	1
5	PAOZZ	79470	1468X6	ADAPTER, STRAIGHT, PI.....	2
6	PAOZZ	96906	MS35691-17	NUT, PLAIN, HEXAGON	3
7	PAOZZ	81718	H2525M	WASHER, LOCK.....	3
8	PAOZZ	97403	13222E0109	SCREW, ROLLER ASSEMB	3
9	POOZZ	61424	PFT-6B-10	HOSE, NONMETALLIC	1
10	PAOZZ	81300	6ABB	HOSE, ASSEMBLY NONME	2
11	PFOZZ	06721	11901	COUPLING, HOSE	2
12	PAOZZ	98343	10451EA	COUPLING HALF, QUICK.....	1
13	PAOZZ	98343	10035	STRAINER ELEMENT, SE	1
14	PAOZZ	98343	10440	PACKING, PREFORMED	1
15	PAOZZ	98343	10452-SA	COUPLING HALF, QUICK.....	1
16	PAOZZ	98343	10440	PACKING, PREFORMED	1
17	PAOZZ	98343	10035	STRAINER ELEMENT, SE	1
18	PAOZA	58429	N-10492	ADAPTER, STRAIGHT, PI.....	2
19	PAOZZ	93061	269NTA-6-4	ELBOW, PIPE TO TUBE	2
20	PAOZZ	79146	012033	ADAPTER, STRAIGHT, PI.....	1
21	PAOZZ	96906	MS35691-17	NUT, PLAIN, HEXAGON	4
22	PAOZZ	81718	H2525M	WASHER, LOCK.....	4
23	PFOZZ	93061	DC602-4	COCK, LUG.....	1
24	PAOZA	96906	MS24628-64	SCREW, TAPPING	5
25	PAOZZ	96906	MS21333-69	CLAMP, LOOP	5

END OF FIGURE

SECTION II

TM 5-3895-377-13&P

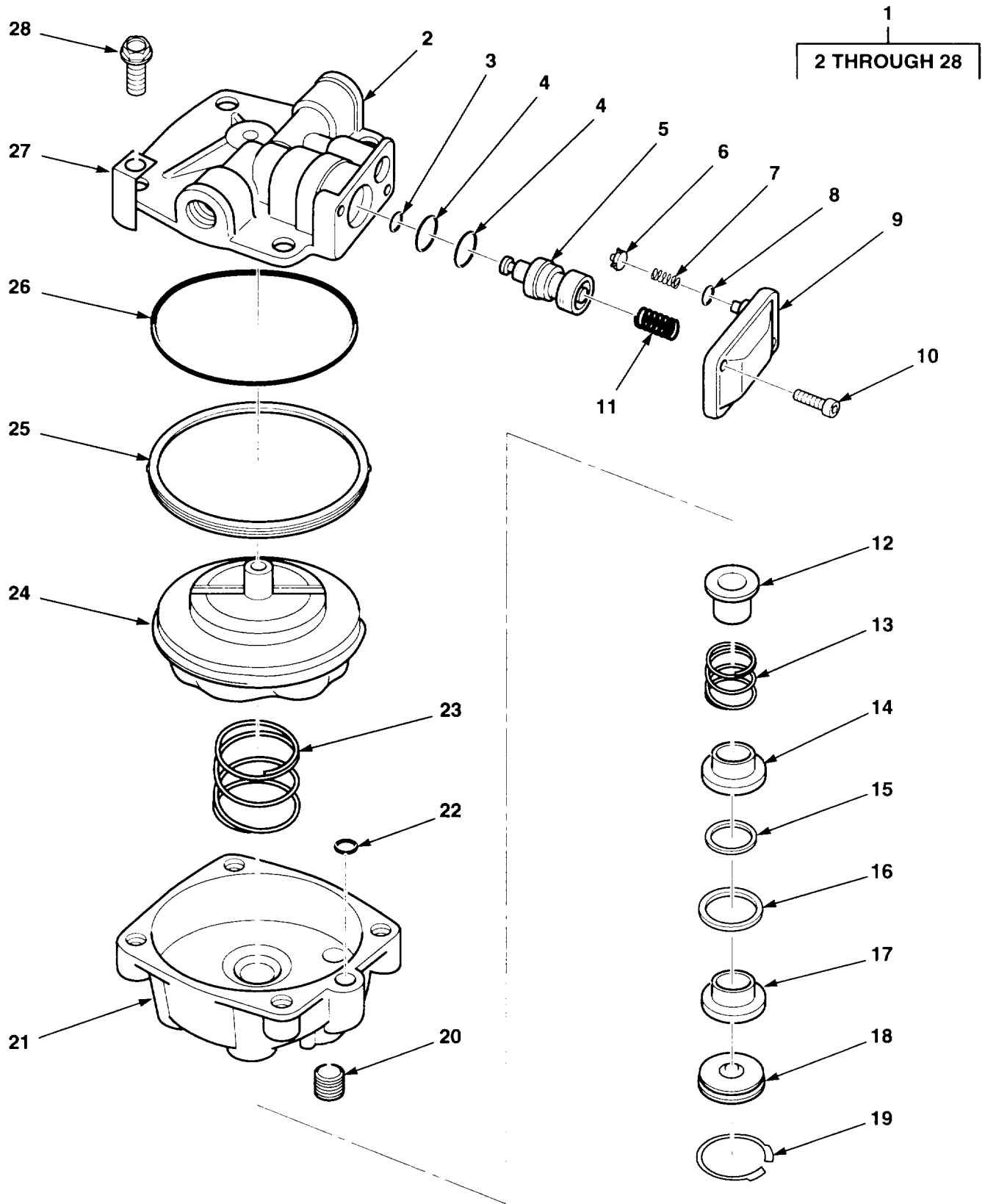


Figure 16. Air Pressure Relay Valve

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 1208 AIR BRAKE SYSTEM					
FIG. 16 AIR PRESSURE RELAY VALVE					
1	PFOZZ	06721	N-4301-CB	VALVE, RELAY, AIR PRE.....	1
2	PFFZZ	06721	300479-AB	.CAP, VALVE	1
3	PFFZZ	06721	N-11728-VR	.PACKING, PREFORMED	1
4	PFOZZ	06721	N-11728-TV	.PACKING, PREFORMED	2
5	PFFZZ	06721	AO-37459	.PISTON, AIR BRAKE SY PART OF KIT P/N.....	1
				RN-10-HLL	
6	PFFZZ	06721	AD-d7349	.VALVE, CHECK PART OF KIT P/N RN-10	1
7	XAOZZ	06721	AC-37495	.SPRING, HELICAL, COMP.....	1
8	PFFZZ	06721	N-11728-TT	.PACKING, PREFORMED PART OF KIT P/N.....	1
				RN-10-HL	
9	PFFZZ	06721	AD-75530	.COVER.....	1
10	PAFZZ	06721	30-X-909	.SCREW, MACHINE.	2
11	XDFZZ	16662	AC37442	.SPRING, HELICAL, COMP.....	1
12	PFFZZ	06721	AD-97596	.VALVE, RELAY, AIR PRE PART OF KIT P/N	1
				RN-10-HL	
13	KFOZZ	16662	AC37448	.SPRING, HELICAL, COMP PART OF KIT P/N	1
				RN-00-HLI	
14	KFOZZ	06721	101318-F	.RELAY, AIR PRESSURE.....	1
15	XAOZZ	06721	AD-37455	.PACKING, PERFORMED.	1
16	XAOZZ	06721	AD-73439	.PACKING, PERFORMED	1
17	PAFZZ	06721	N-13773-B	.RETAINER, PACKING PART OF KIT P/N RN	1
				10-HL.....	1
18	PFFZZ	06721	102631	.PROTECTOR, EXHAUST PART OF KIT P/N	1
				RN-10-HL	1
19	PAFZZ	06721	44W16138	.RING, RETAINING.....	1
20	PFOZZ	96906	MS49005-5	.PLUG, QUICK DISCONNE	1
21	XAOZZ	06721	102621	.VALVE, VACUUM REGULA	1
22	PFFZZ	06721	N-11728-CQ	.PACKING, PREFORMED PART OF KIT P/N.....	1
				RN- 10-HL-	
23	PAFZZ	16662	AC-37432	.SPRING, HELICAL, COMP FART OF KIT P/N.....	1
				RN-10-HL	1
24	PFFZZ	06721	AE-97524	.PISTON, RELAY	1
25	PAFZZ	06721	AD-37444	.RING, QUAD PART OF KIT P/N RN-10-HL	1
26	XAOZZ	06721	N-11728-WL	.PACKING, PERFORMED	1
27	XAFZZ	06721	102692-DA	.MARKER, IDENTIFICATION	1
28	PAFZZ	06721	26W32012	.SCREW, CAP, HEXAGON H.....	4

END OF FIGURE

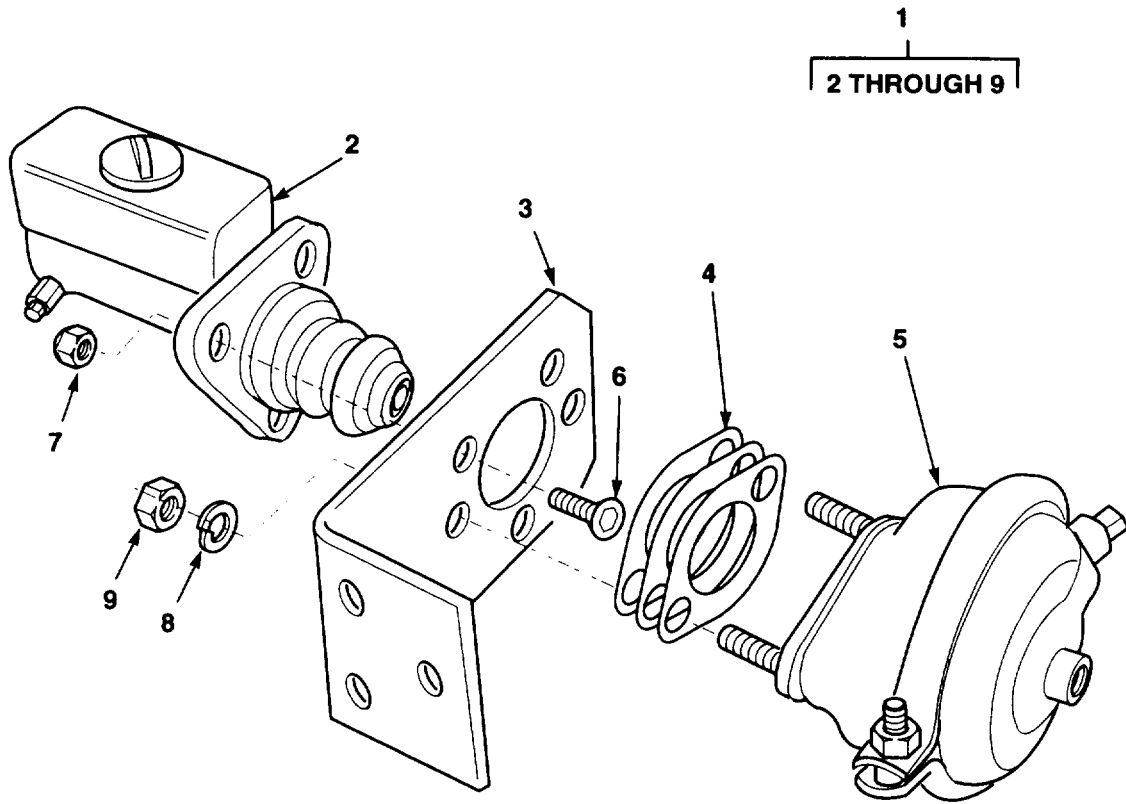


Figure 17. Air Slave converter

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 1208 AIR BRAKE SYSTEM					
FIG. 17. AIR SLAVE CONVERTER					
1	A0000	06447	2HXFPBI2	BRAKE MASTER CYL AS	1
2	PAOZZ	06721	C-3494-CZ	.CYLINDER ASSEMBLY, H	1
3	XDOZZ	06447	2HXFPB9	.BRACKET	1
4	PFOZZ	06447	2HXFPBIO	.SPACER.....	3
5	PFOZZ	06447	2HXFPBI	.CHAMBER, .AIR BRAKE	1
6	PAOZZ	96906	MS24667-53	.SCREW.CAP, SOCKET HE.....	1
7	PAOZZ	96906	MS51922-17	.NUT, SELF LOCKING, HE.....	2
8	PAOZZ	96906	MS35340-50	.WASHER, LOCK.....	2
9	PAOZZ	96906	M551967-20	NUT, PLAIN, HEXAGON	2

END OF FIGURE

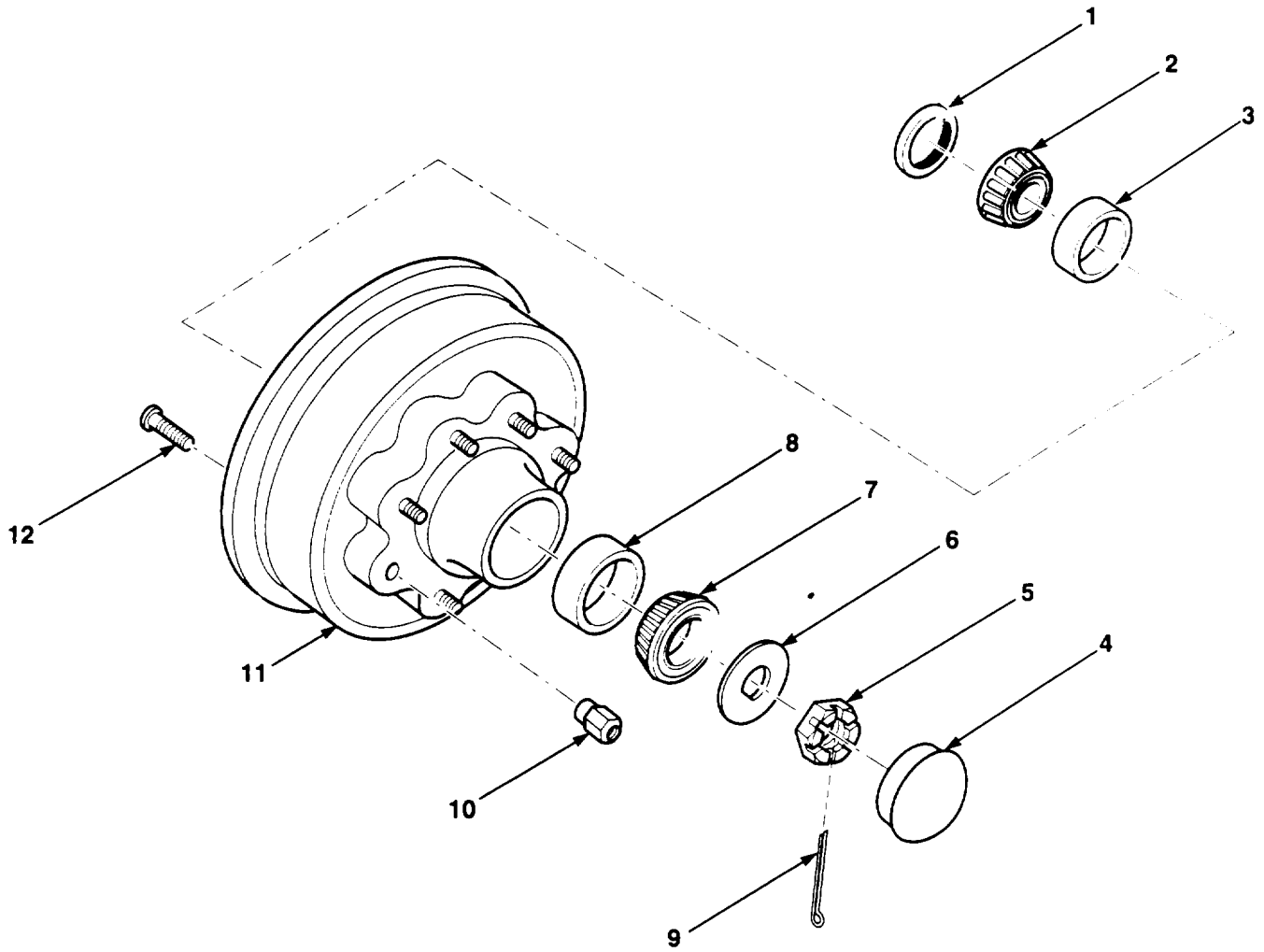


Figure 18. Hub and Drum

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 13 WHEELS AND TRACKS					
GROUP 1311 WHEEL ASSEMBLY					
FIG 18 HUB AND DRUM					
1	PAOZZ	15460	10-1	SEAL, PLAIN ENCASED	2
2	PAOZZ	60038	25580	CONE AND ROLLERS, TA.....	2
3	PAOZZ	60038	25520	CUP, TAPERED ROLLER	2
4	PAOZZ	15460	21-39	CAP, GREASE	2
5	PFOZZ	15460	6-1	NUT	2
6	PFOZZ	15460	5-57	WASHER, SPINDLE	2
7	PAOZZ	60038	14125A	CONE AND ROLLERS, TA.....	2
8	PAOZZ	60038	14276	CUP, TAPERED ROLLER	2
9	PAOZZ	15460	19-2	PIN, COTTER	2
10	PAOZZ	31654	250021-769	NUT, PLAIN, HEXAGON	16
11	PFOZZ	15460	8-219-4	HUB, WHEEL, VEHICULAR	2
12	PAOZZ	31654	250021-770	STUD, STEPPED.....	16

END OF FIGURE

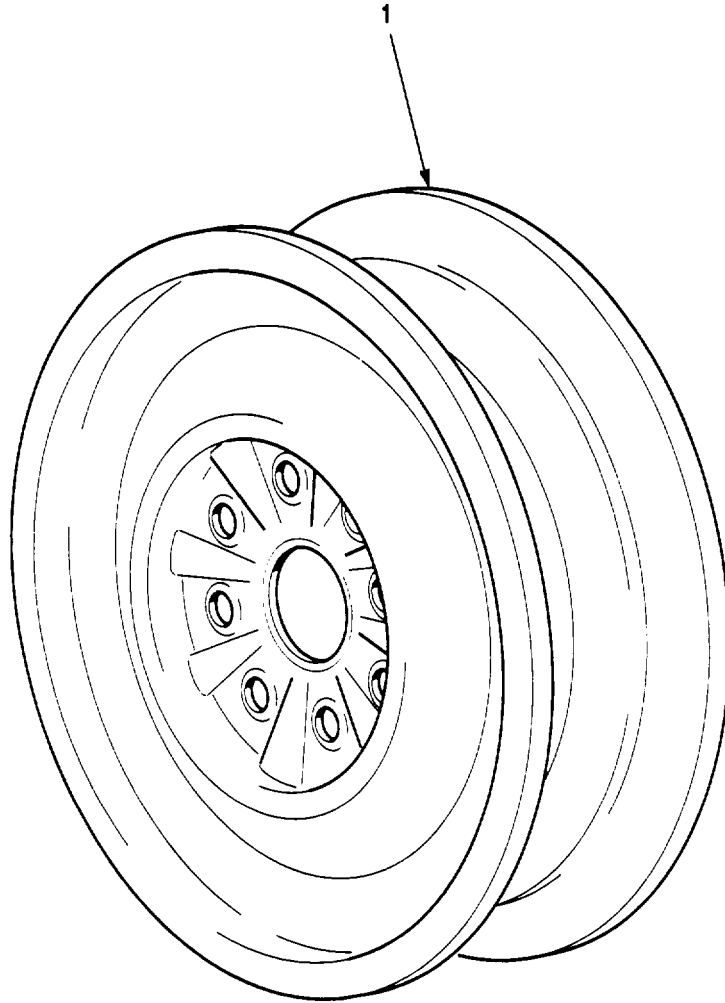


Figure 19. Wheel

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 1312 WHEEL ASSEMBLY

FIG. 19 WHEEL

1	PFOZZ	15460	017-153	WHEEL, PNEUMATIC TIR	5
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END OF FIGURE

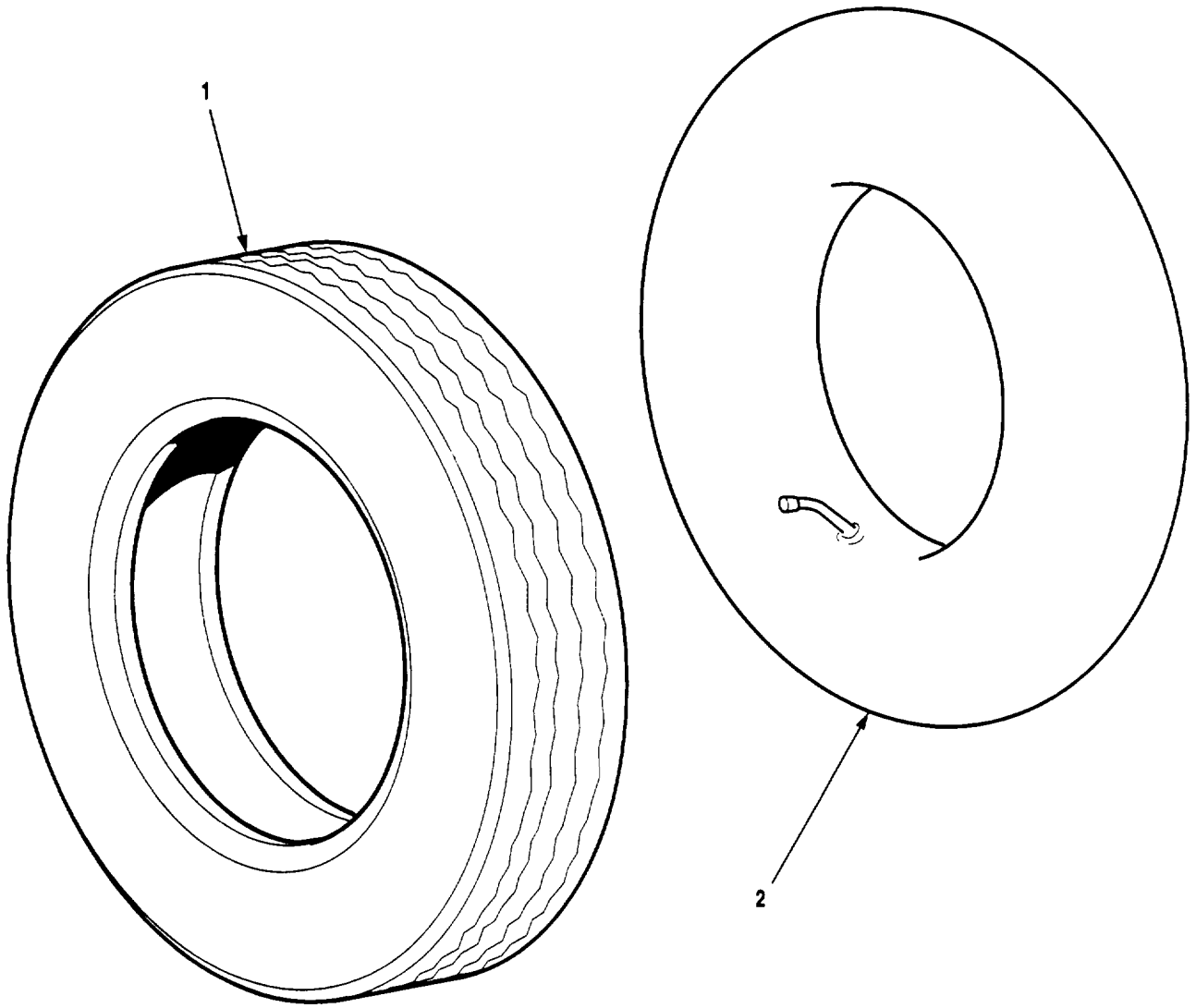


Figure 20. Tire and Tube

SECTION II

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
GROUP 1313 TIRE, TUBE, TIRE CHAINS					
FIG. 20 TIRE AND TUBE					
1	PCOZZ	81348	GP2STYLXTYRA CLA/S/7.50R16/D/ LTAW	TIRE, PNEUMATIC	5
2	PCOOF	01059	MR-16HD-700/750/ L78-16	INNER TUBE, PNEUMATIC	5

END OF FIGURE

20-1

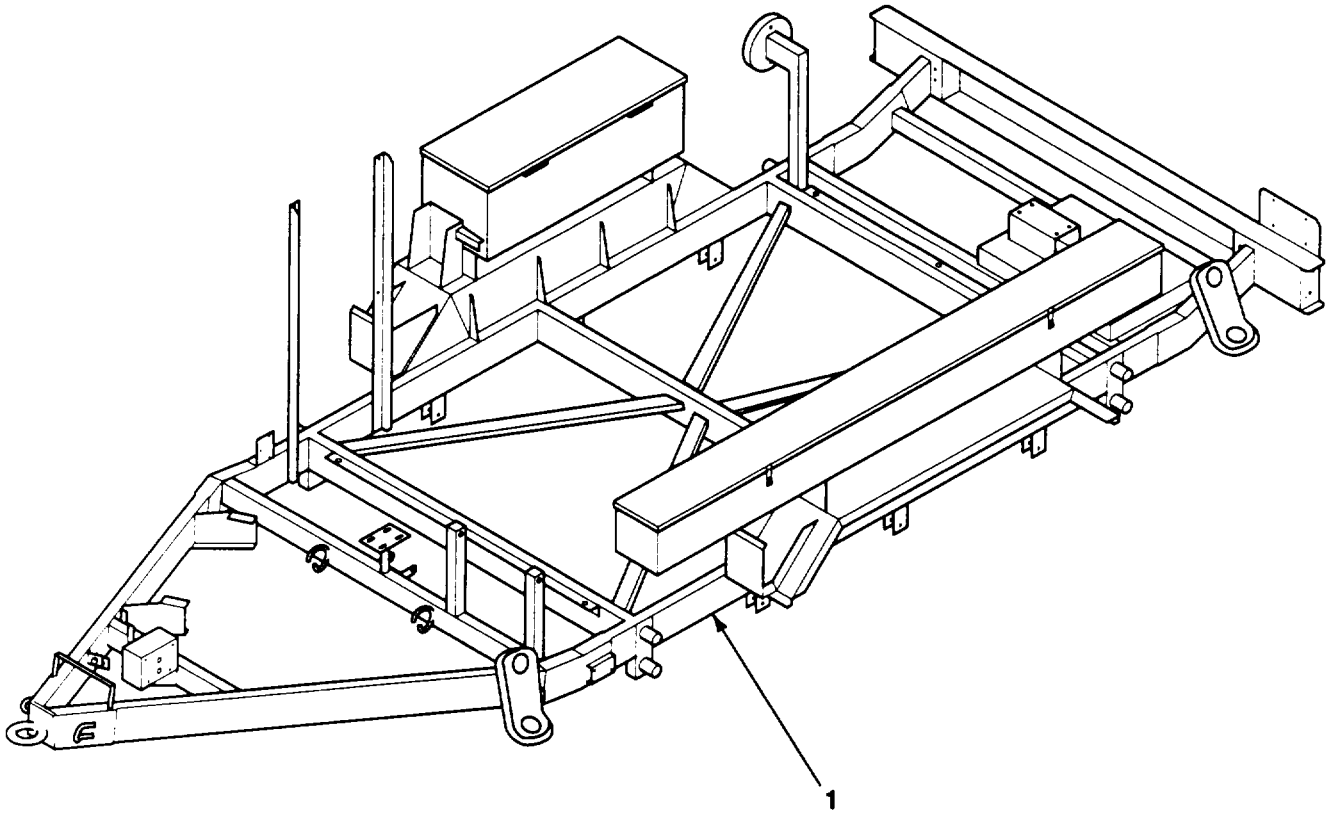


Figure 21. Frame

SECTION II

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 15 FRAME, TOWING ATTACHMENTS
AND DRAWBARS

GROUP 1501 PINTLES AND TOWING
ATTACHMENTS

FIG. 21 FRAME

1	XAHHH 06447		2HXFPBW1	FRAME WELDMENT	1
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END OF FIGURE

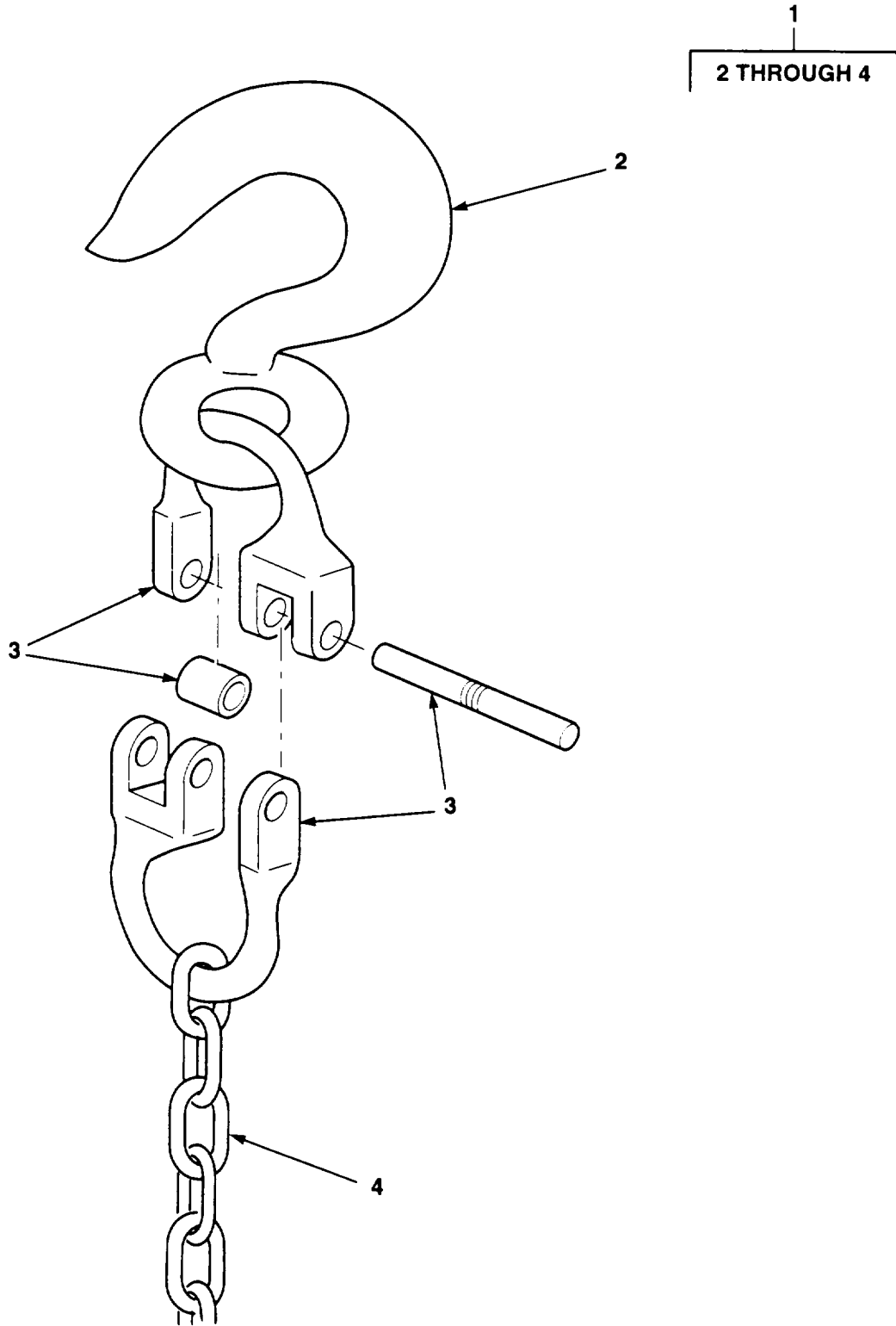


Figure 22. Safety Chain

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
				GROUP 1503 PINTLES AND TOWING ATTACHMENTS	
				FIG. 22 SAFETY CHAIN	
1	AOOOO	06447	2HXFPB7	SAFETY, CHAIN, ASSY.....	2
2	PAOZZ	39428	8934T15	.HOOK, PELICAN	2
3	PAOZZ	39428	3578T15	.LINK, CHAIN, DETACHAB.....	2
4	PAOZZ	19207	22R775	.CHAIN, WELDED.....	2

END OF FIGURE

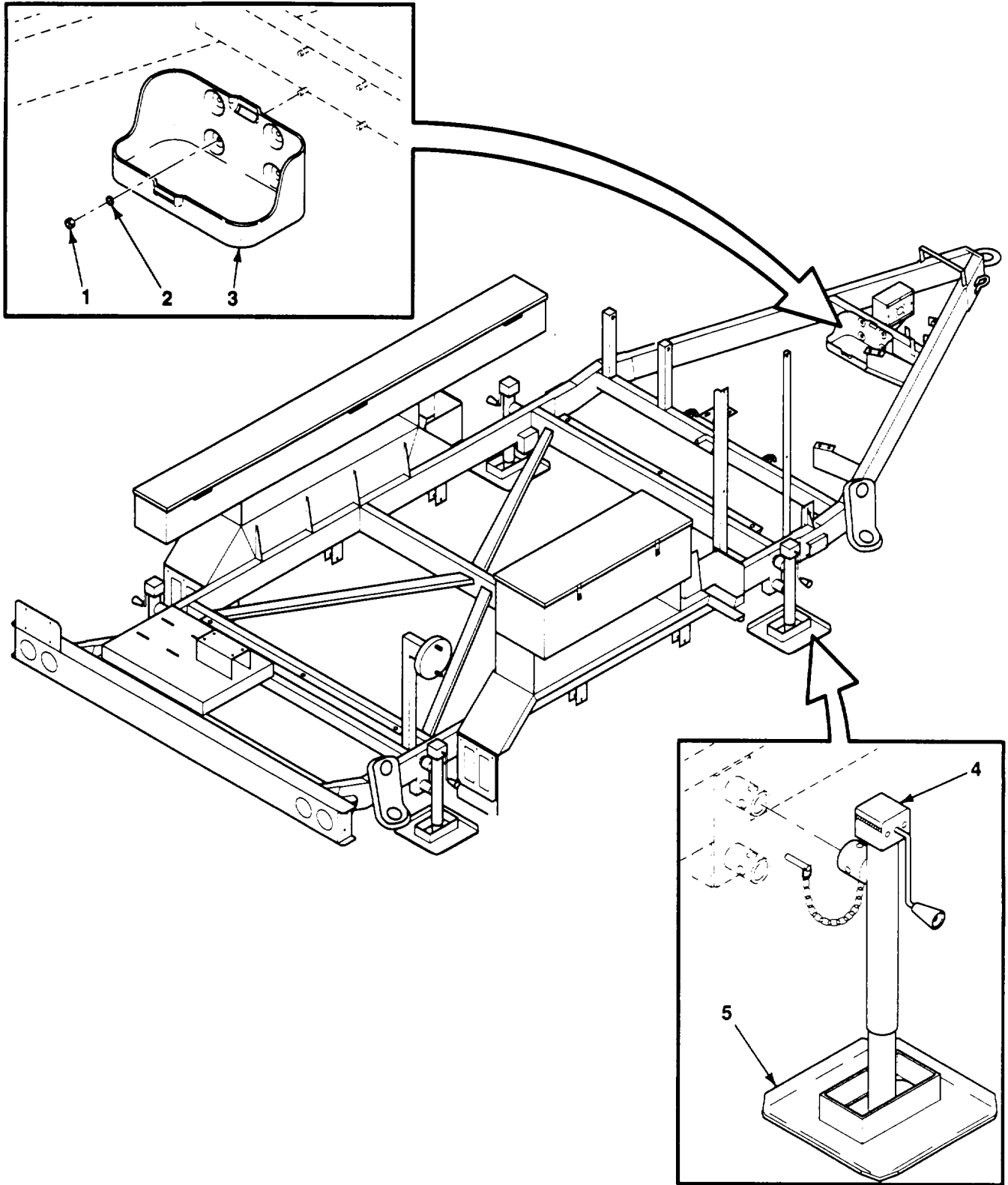


Figure 23. Screw Jacks and Sand Pads

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
GROUP 1507 LANDING GEAR AND LEVELING JACKS					
FIG. 23 SCREW JACKS, AND SAND PADS					
1	PAOZZ	96906	MS35691-17	NUT, PLAIN, HEXAGON	4
2	PAOZZ	81718	H2525M	WASHER, LOCK.....	4
3	XBOZZ	07860	C21452	BRACKET, VEHICULAR C	1
4	XBOZZ	89257	SWL 178DTSFW/ P&C	SCREW JACK.....	4
5	XBOZZ	06447	2HXFLVPBW1	SANDPAD	4
END OF FIGURE					

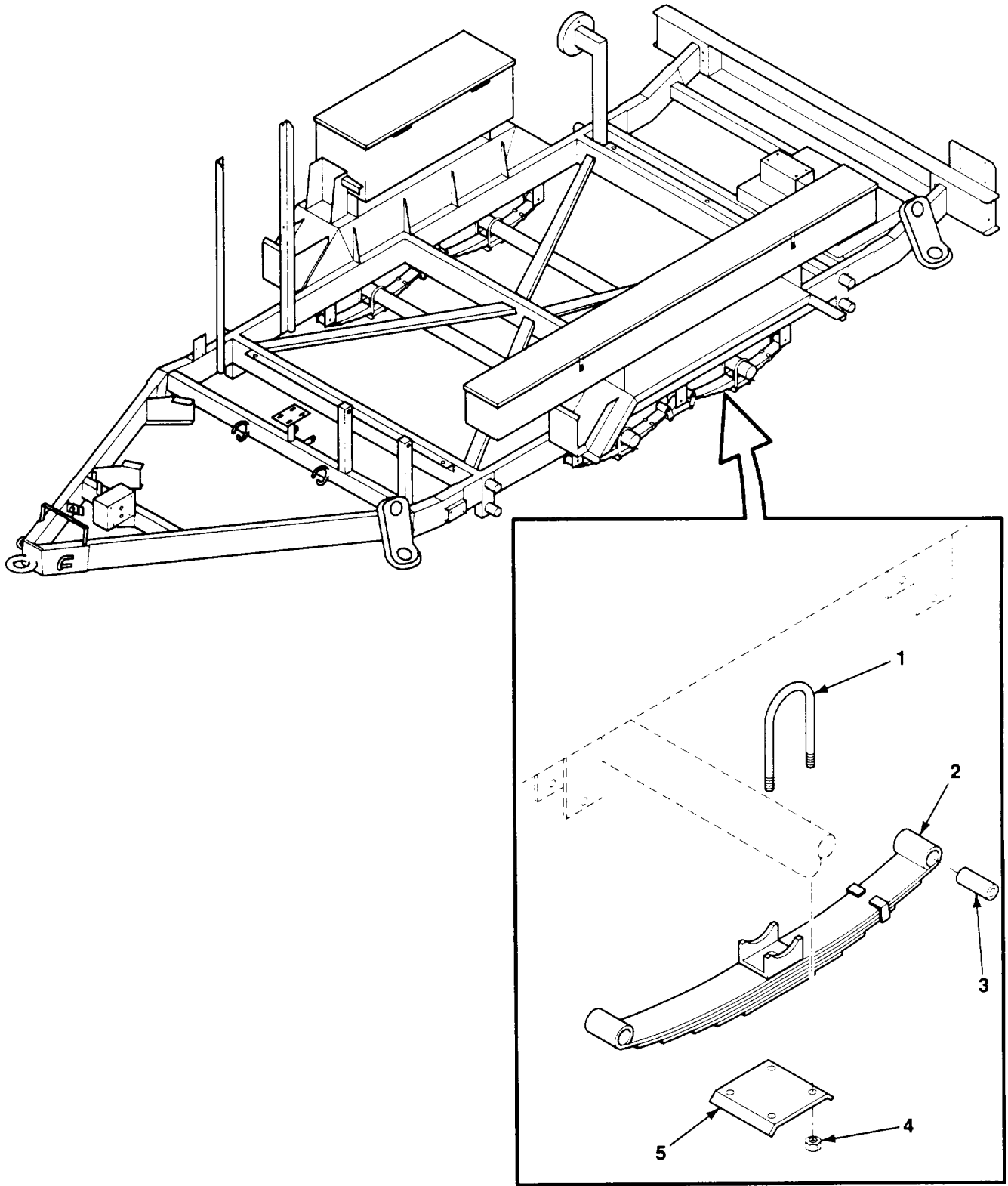


Figure 24. Spring Assembly

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

GROUP 16 SPRING AND SHOCK ABSORBERS

GROUP 1601 SPRINGS

FIG. 24 SPRING ASSEMBLY

1	PAOZZ	35197	11-17	BOLT, U	4
2	PFOZZ	15460	72-26 26-2500	SPRING, LEAF.....	2
3	XAOZZ	15460	030068	.BUSHING, EYE.....	2
4	PAOZZ	96906	MS51968-14	NUT, PLAIN, HEXAGON	8
5	XBOZZ	15460	12-1	PLATE, MOUNTING	2

END OF FIGURE

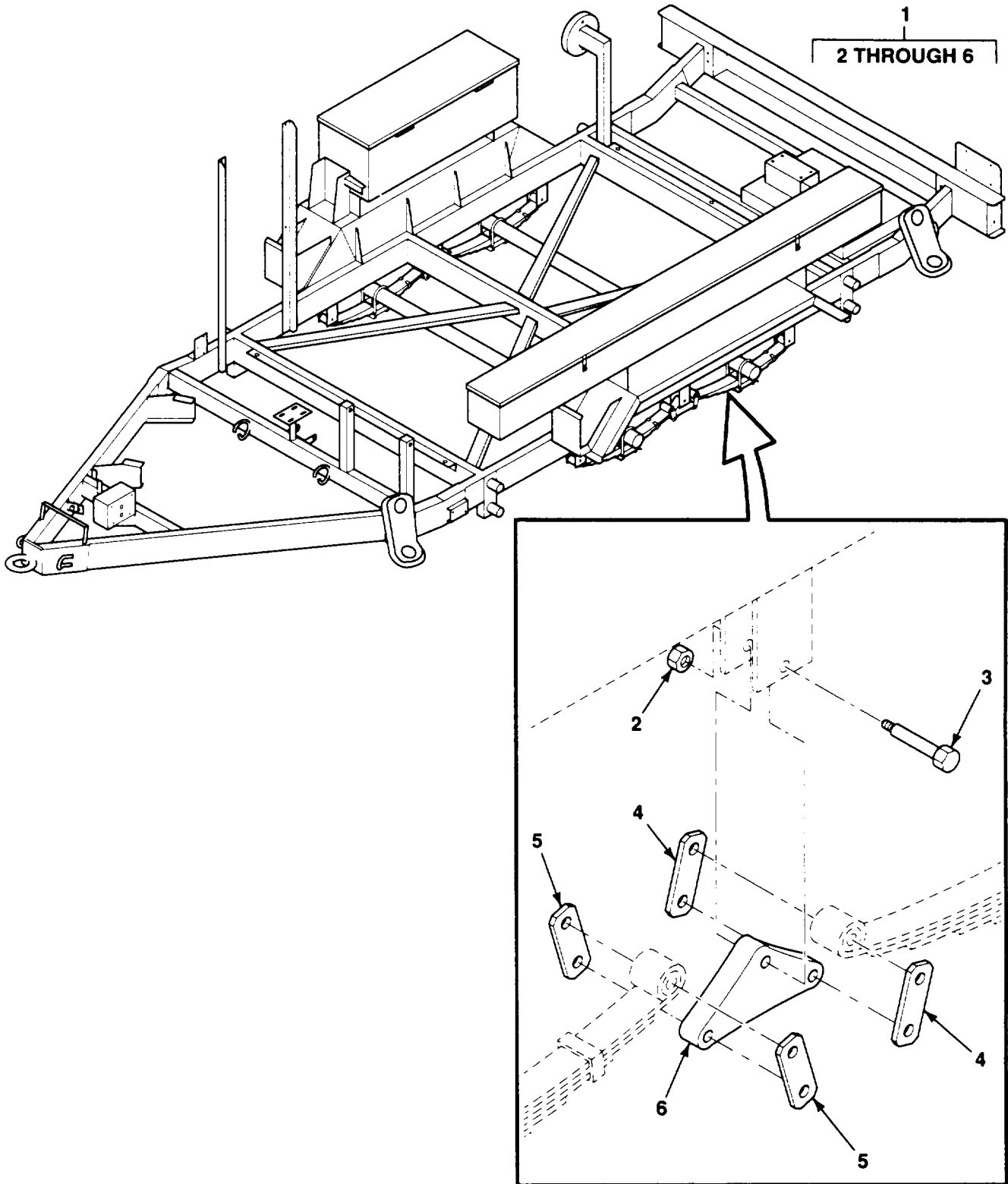


Figure 25. Equalizers and Shackles

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 1601 SPRINGS

FIG. 25 EQUALIZERS AND SHACKLES

1	XDOZZ	15460	AP-233	ATTACHING PARTS GRP.....	1
2	PAOZZ	15460	6-92	.SHACKLE NUT	14
3	PAOZZ	15460	7-126	.BOLT, MACHINE	14
4	PAOZZ	15460	16-11	.SHACKLE, LEAF SPRING.....	4
5	PFOZZ	15460	18-20	.SHACKLE, LEAF SPRING.....	4
6	PFOZZ	15460	13-104-2	.SPACER, PLATE	2

END OF FIGURE

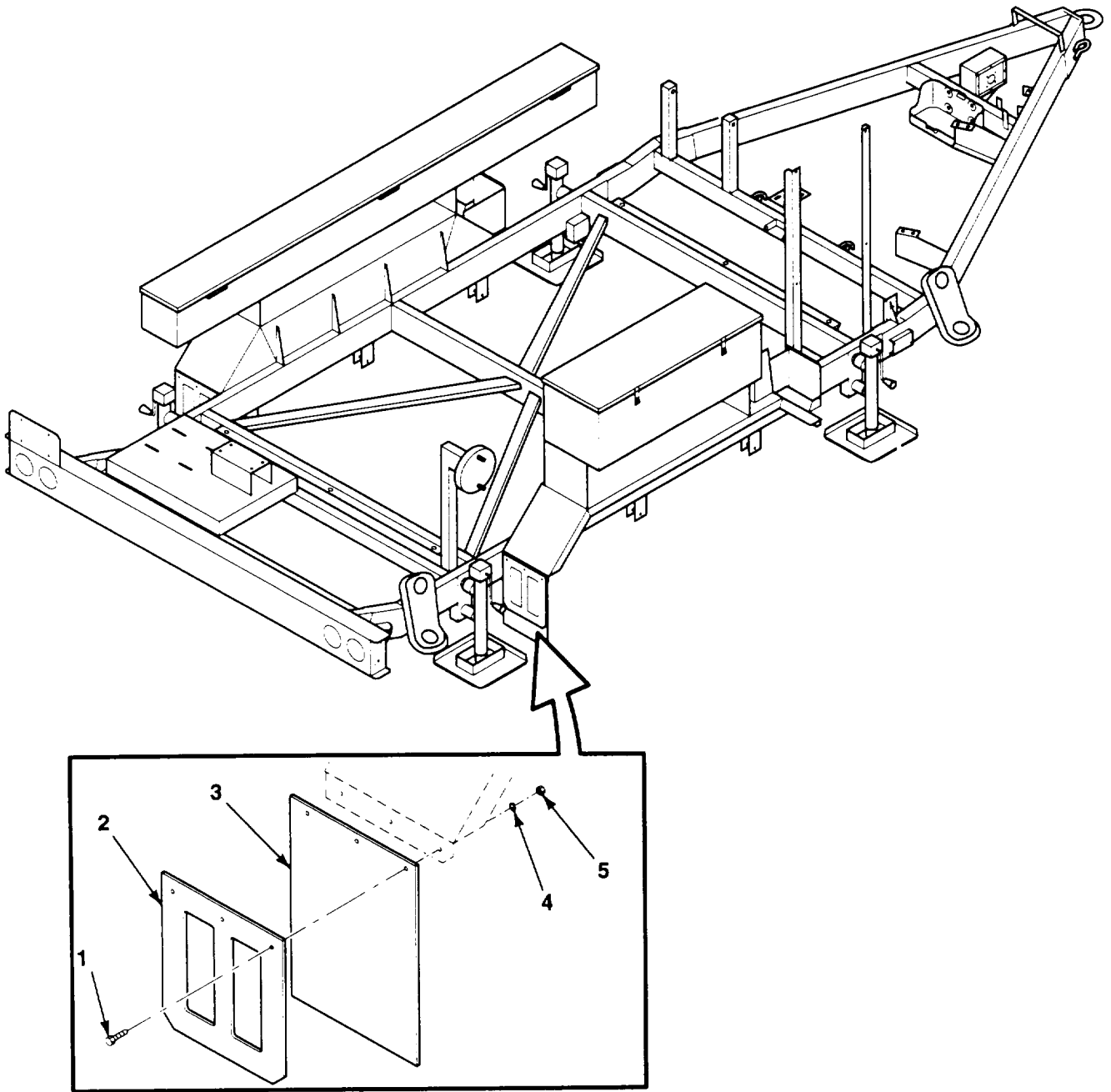


Figure 26. Mudflaps

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM NO	SMR CODE	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
				GROUP 18 BODY, CAB, HOOD, AND HULL	
				GROUP 1802 FENDERS, RUNNING BOARDS WITH MOUNTING AND ATTACHING PARTS, WINDSHIELD, GLASS, ETC.	
				FIG. 26 MUDFLAPS	
1	PAOZZ	80204	B1821BHO25 C100N	SCREW, CAP, HEXAGON H.....	6
2	XDOZZ	06447	2HXFPB1	BRACKET, MOUNTING.....	2
3	PFOZZ	06447	2HXFPB2	GUARD, SPLASH, VEHICU.....	2
4	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	6
5	PAOZZ	96906	MS35691-1	NUT, PLAIN, HEXAGON	6

END OF FIGURE

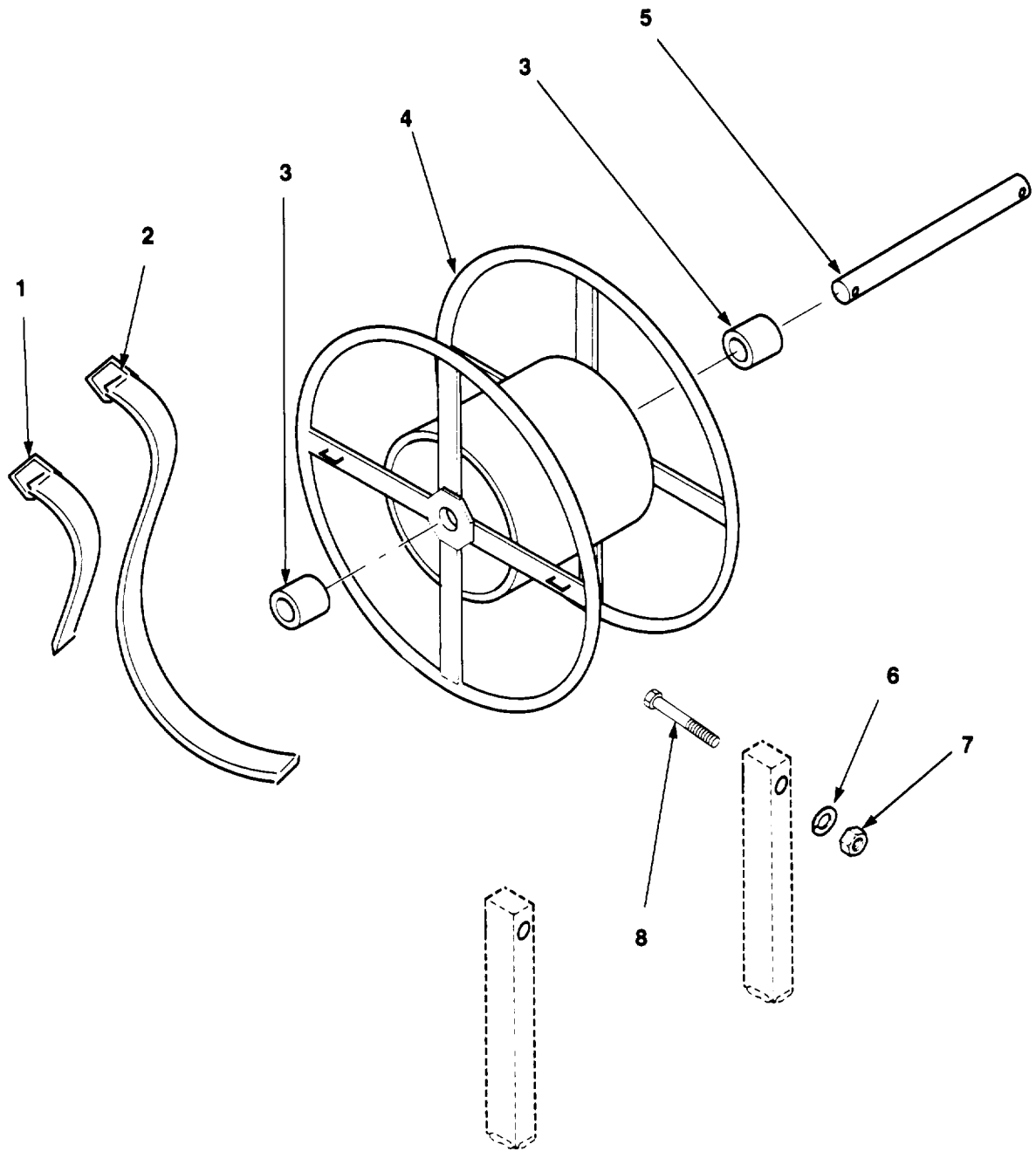


Figure 27. Cable Reel

SECTION II

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 1808 STOWAGE RACKS, BOXES, STRAPS, CARRYING CASES, CABLE REELS, HOSE REELS ETC.	
				FIG. 27 CABLE REEL	
1	MOOZZ	39428	3706T88-1	STRAP WEBBING	1
2	MOOZZ	39428	3706T88	STRAP WEBBING	1
3	PAOZZ	06447	2HXPB506	SPACER, PLATE	2
4	PFOZZ	06447	2HXPB5W2	REEL ASSY, HOSE	1
5	PFOZZ	06447	2HXPB516	AXLE, CABLE REEL	
6	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	
7	PAOZZ	96906	MS35649-282	NUT, PLAIN, HEXAGON-	2
8	PAOZZ	80204	B1821BH031C 250N	BOLT, MACHINE	2

END OF FIGURE

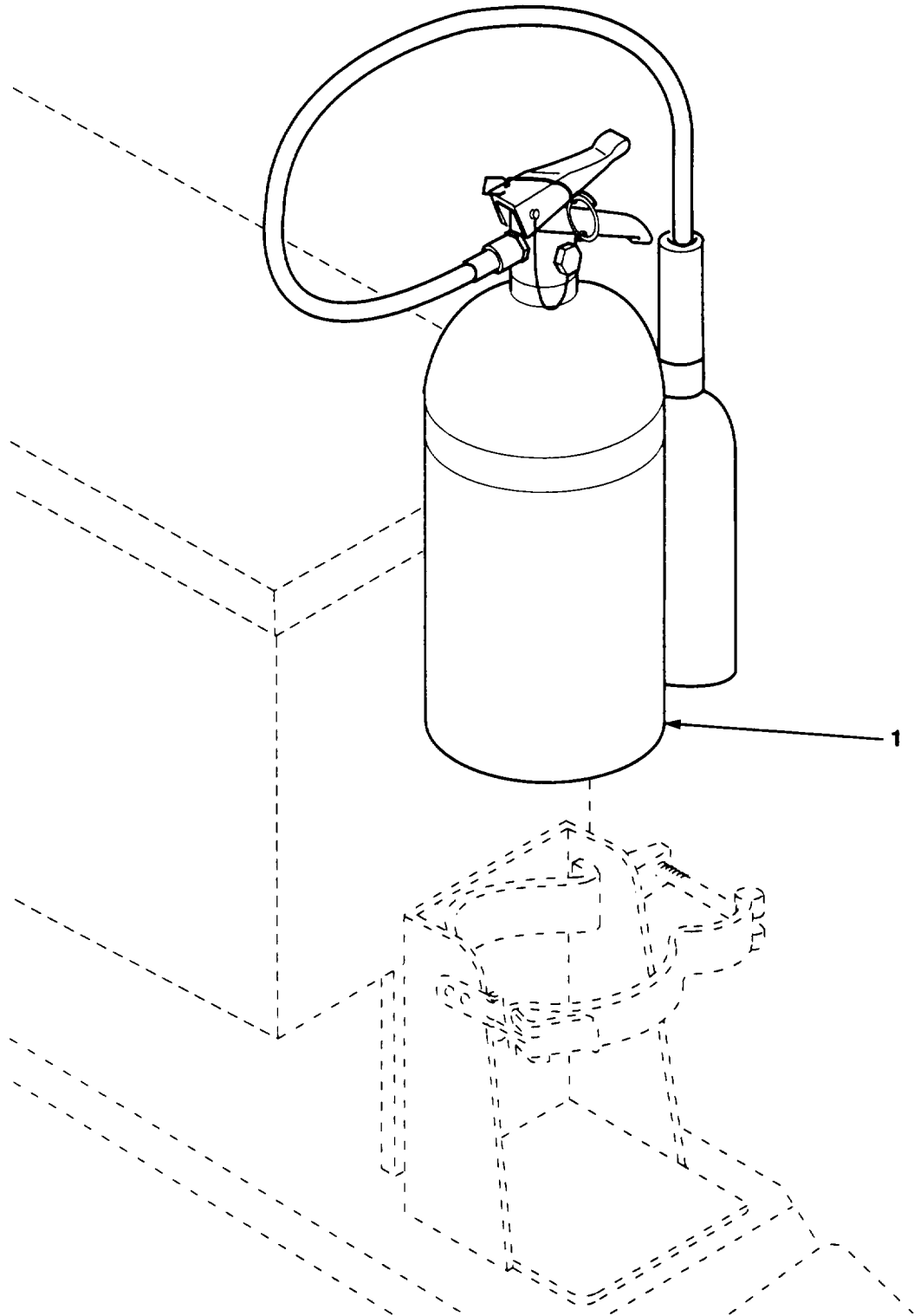


Figure 28. Fire Extinguisher and Bracket

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 22 BODY, CHASIS OR HULL, AND ACCESSORY ITEMS	
				GROUP 2202 ACCESSORY ITEMS	
				FIG 28 FIRE EXTINGUISHER AND BRACKET	
1	PAOZZ	81349	0E910	EXTINGUISHER, FIRE	1
				END OF FIGURE	

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
SECTION II					
GROUP 2210 DATA PLATES AND INSTRUC- TION HOLDERS					
FIG. 29 DATA PLATES					
1	XBOZZ	51384	6540	PLATE, INDIFICATION.....	1
2	PAOZZ	06447	2HXFPB6	PLATE SET, INSTRUCTI.....	1
3	PAOZZ	51384	6732	PLATE, IDENTIFICATIO.....	4
4	PAOZZ	06447	2HXLPB6	PLATE SET, INSTRUCTI.....	1
5	PAOZZ	06447	2HXPPB16	PLATE SET, INSTRUCTI.....	1
6	PFOZZ	66842	P30NPS03	PLATE, IDENTIFICATIO.....	1
7	PFOZZ	66842	P30NPS04	PLATE, IDENTIFICATIO.....	1
8	PAOZZ	06447	2HXBPB5	MARKER, IDENTIFICATI.....	1
9	PAOZZ	12361	7376001472	MARKER, IDENTIFICATI.....	1

END OF FIGURE

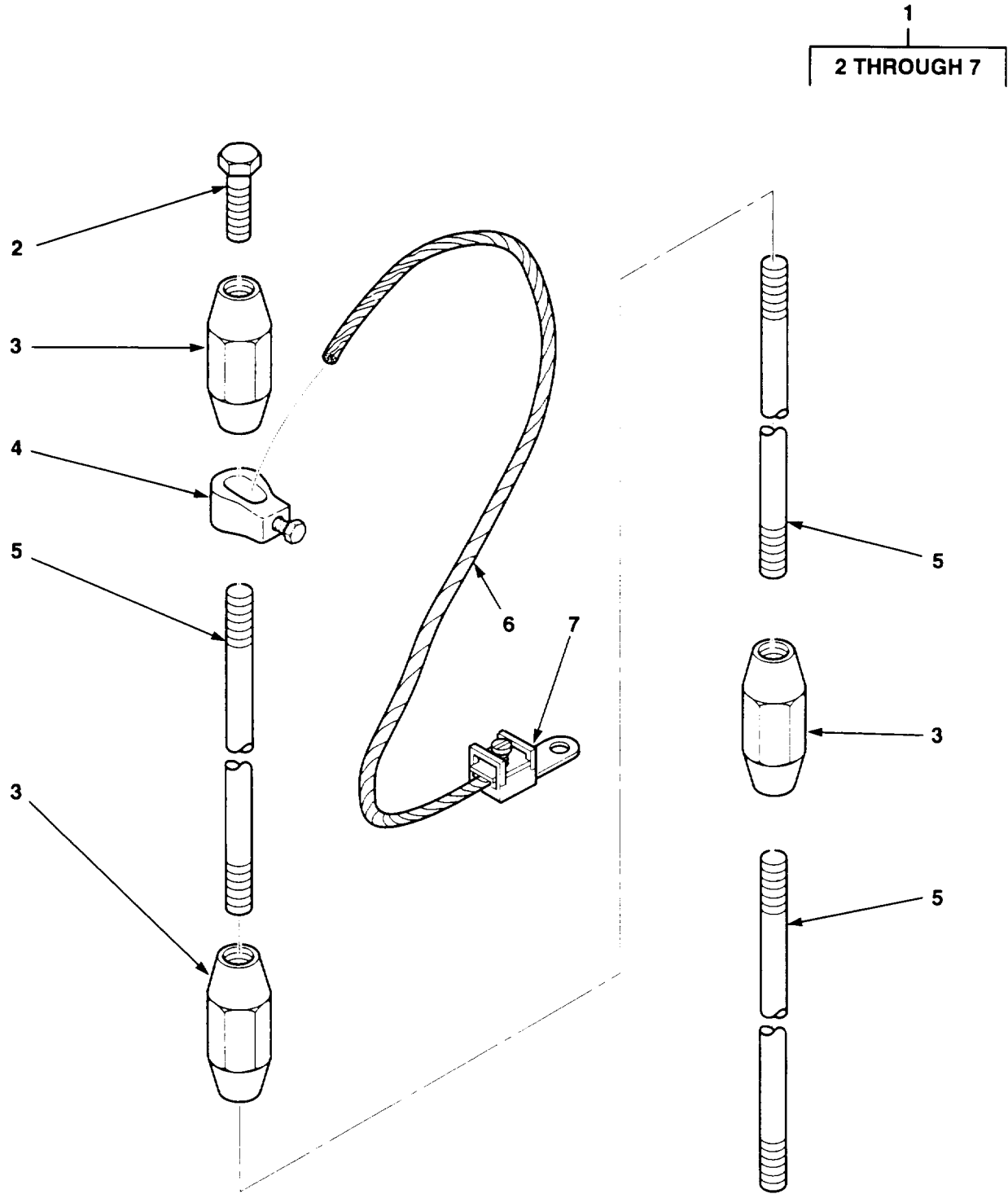


Figure 30. Ground Rod Assembly

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 42 ELECTRICAL EQUIPMENT	
				GROUP 4202 ELECTRICAL CONTROLS	
				FIG. 30 GROUND ROD ASSEMBLY	
1	PAOZZ	82370	A104	ROD, GROUND.	1
2	PAOZA	73616	GRB58	.STUD.....	1
3	PAOZZ	OBKK8	GR058	.COUPLING, GROUND ROD	3
4	PAOZZ	04655	70-801074	.CLAMP, ELECTRICAL.....	1
5	PAOZZ	14559	667ER	.ROD, THREADED END.....	3
6	PAOZZ	81348	QQW343CO6B1T	.WIRE, GROUND.....	1
7	PAOZZ	74829	SLU35	.TERMINAL, LUG.....	1

END OF FIGURE

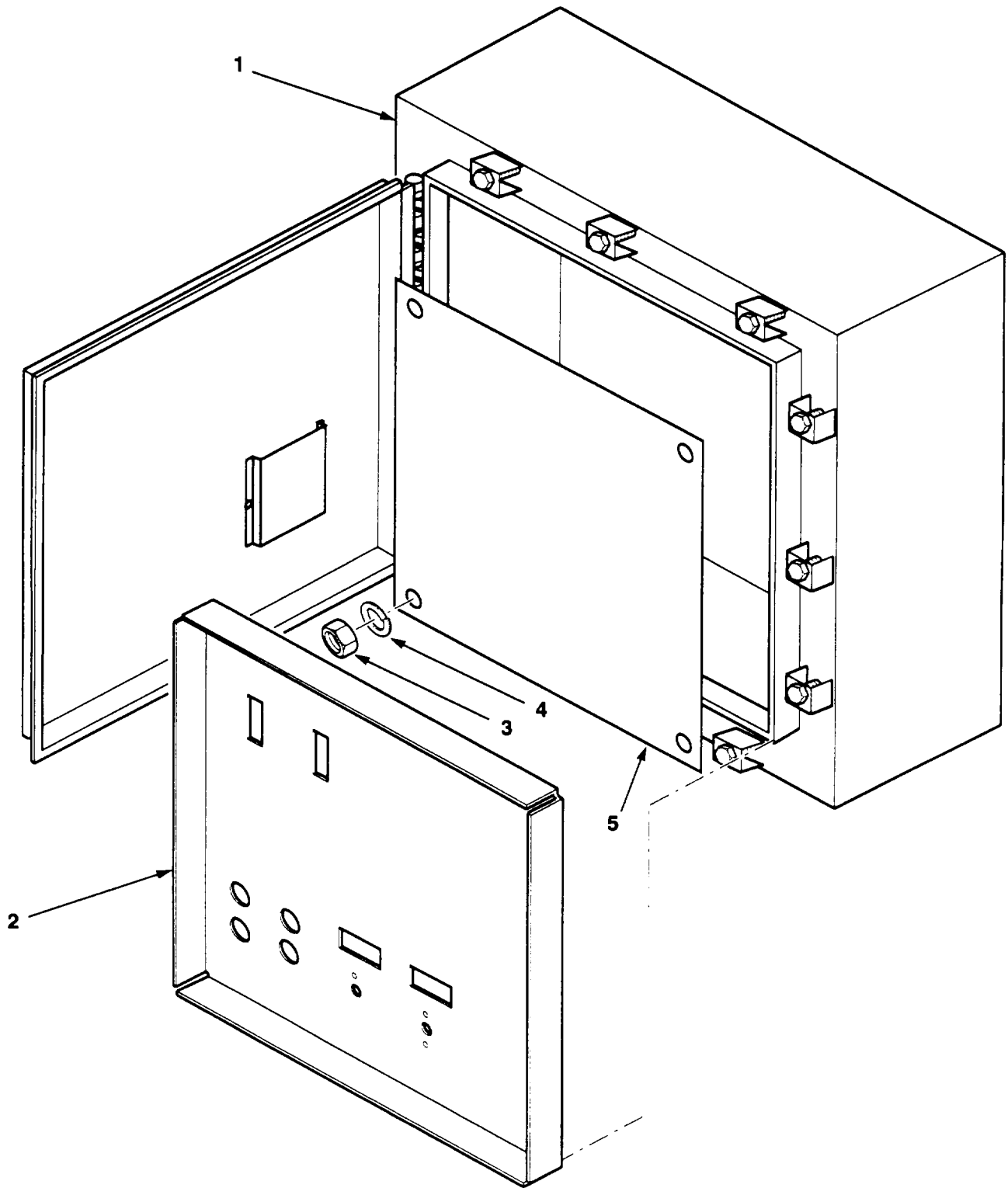


Figure 31. Control Box - Back Plate

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 4202 ELECTRICAL CONTROLS					
FIG. 31 CONTROL BOX - BACK PLATE					
1	XBOZZ	06447	2HXBPB15	CONTROL BOX BURNER.....	1
2	XBOZZ	06447	2HXBPB4	PANEL, CONTROL.....	1
3	PAOZZ	96906	MS51967-8	NUT, PLAIN, HEXAGON	4
4	PAOZZ	81718	H2525M	WASHER, LOCK.....	4
5	XBOZZ	06447	2HXBPB14	PANEL INNER MOUNTIN	1

END OF FIGURE

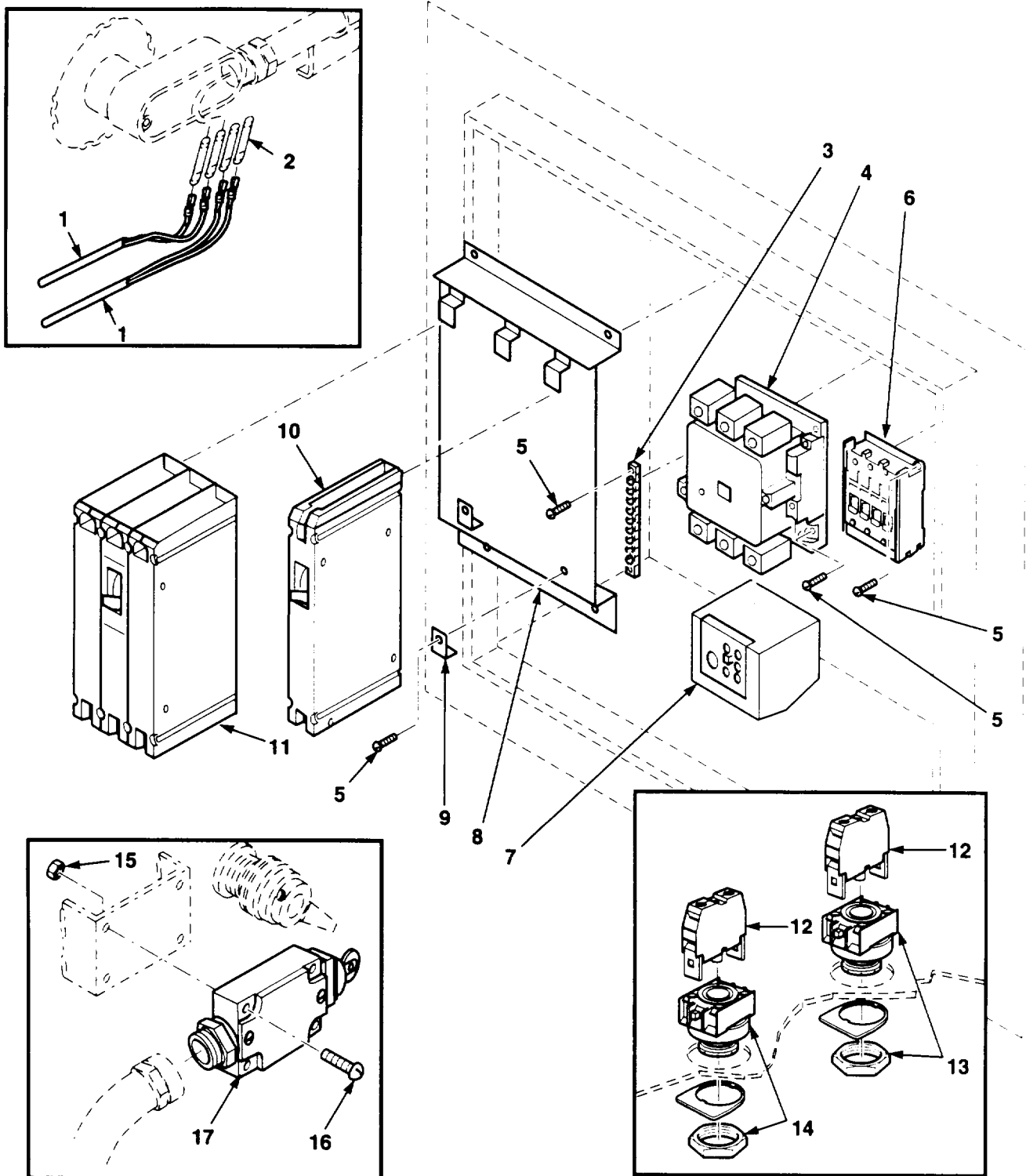


Figure 32. Circuit Breakers, Blocks

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM NO	SMR CODE	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 4203 CIRCUIT BREAKERS, CUT OUT DEVICES, FUSE AND FUSE HOLDERS					
FIG. 32 CIRCUIT BREAKERS, BLOCKS					
1	PAOZZ	6M717	01726819-001	PROBE-LEAD ASSEMBLY	2
2	PAOZZ	75037	MV1OBCX	SPLICE, CONDUCTOR	4
3	PAOZZ	14280	PK9GTA	PLATE, ELECTRICAL GR	1
4	PAOZZ	OACF4	3TF4622-OA-K6	CONTACTOR, MAGNETIC	1
5	PAOZA	96906	MS24627-38	SCREW, TAPPING	8
6	PAOZZ	OACF4	3TF3200-OA-K6	CONTACT ASSEMBLY, EL	1
7	PAOZZ	OACF4	3UA5800-2D	RELAY, THERMAL	1
8	PFOZZ	06447	2HXBPB9	MOUNTING BASE, ELECT	1
9	PFOZZ	06447	2HXBPB10	CLIP ELECTRICAL	2
10	PAOZZ	66842	ED21B020	CIRCUIT BREAKER.....	1
11	PAOZZ	66842	ED23B040	CIRCUIT BREAKER.....	1
12	PFOZZ	OACF4	3SB1400-OA	CONTACT ASSEMBLY, EL	2
13	PAOZZ	668642	3SB03-PFR11	SWITCH, PUSH	1
14	PAOZZ	66842	3SB03-PFG11	SWITCH, PUSH	1
15	PAOZZ	96906	MS35649-282	NUT, PLAIN, HEXAGON	1
16	PAOZZ	96906	MS35206-255	SCREW, MACHINE	4
17	PAOZZ	02295	CR115L-1E	SWITCH, SENSITIVE	1

END OF FIGURE

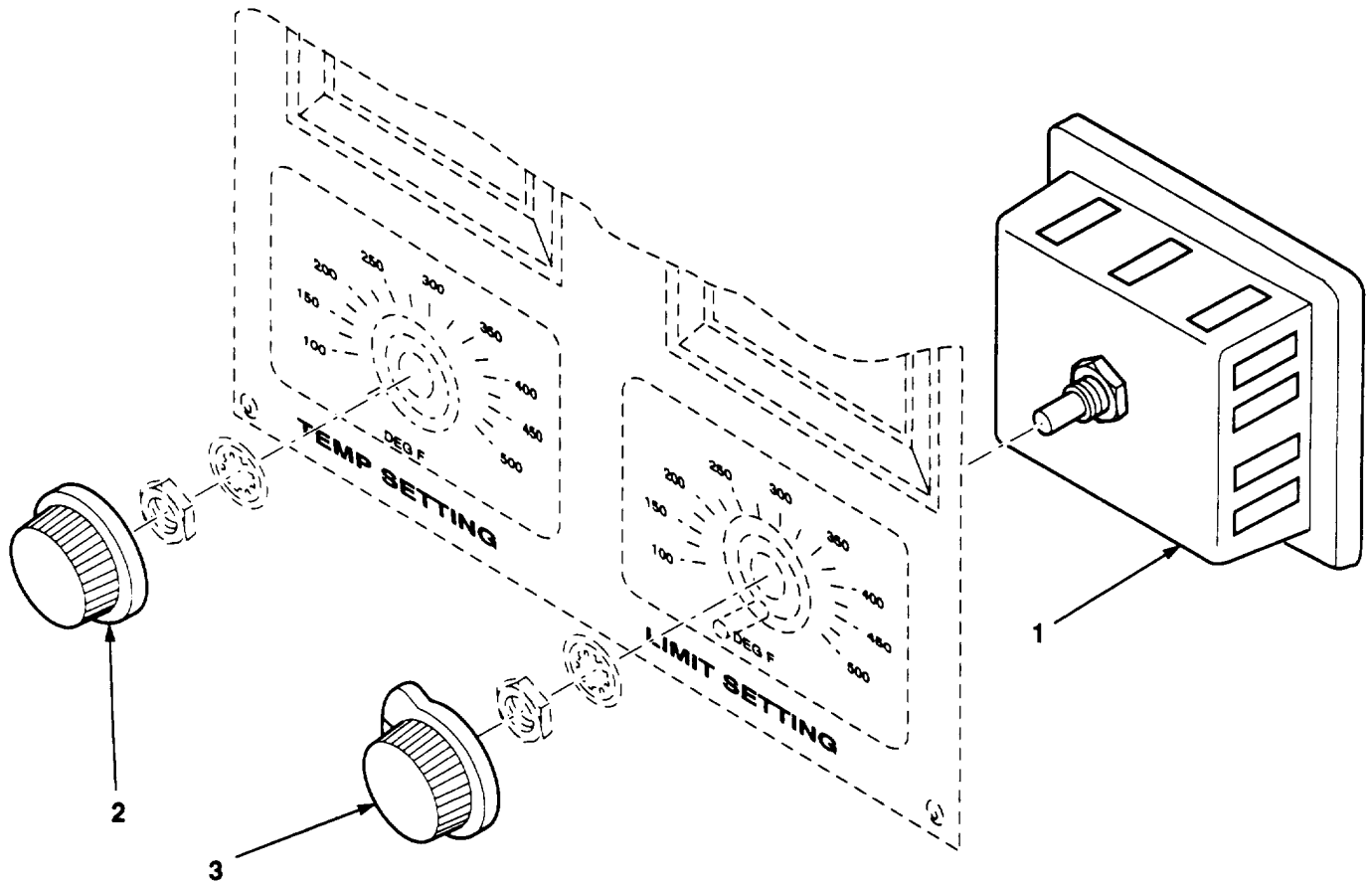


Figure 33. Controls

SECTION II

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 4206 THERMOSTATIC, AUTOMATIC
AND MANUAL CONTROL
DEVICES

FIG. 33 CONTROLS

1	PAOZZ	06447	2HXBPB7	CONTROL, TEMPERATURE	2
2	PFOZZ	6M717	03926683-000	KNOB	1
3	PFOZZ	06447	2HXBPB1	KNOB	1

END OF FIGURE

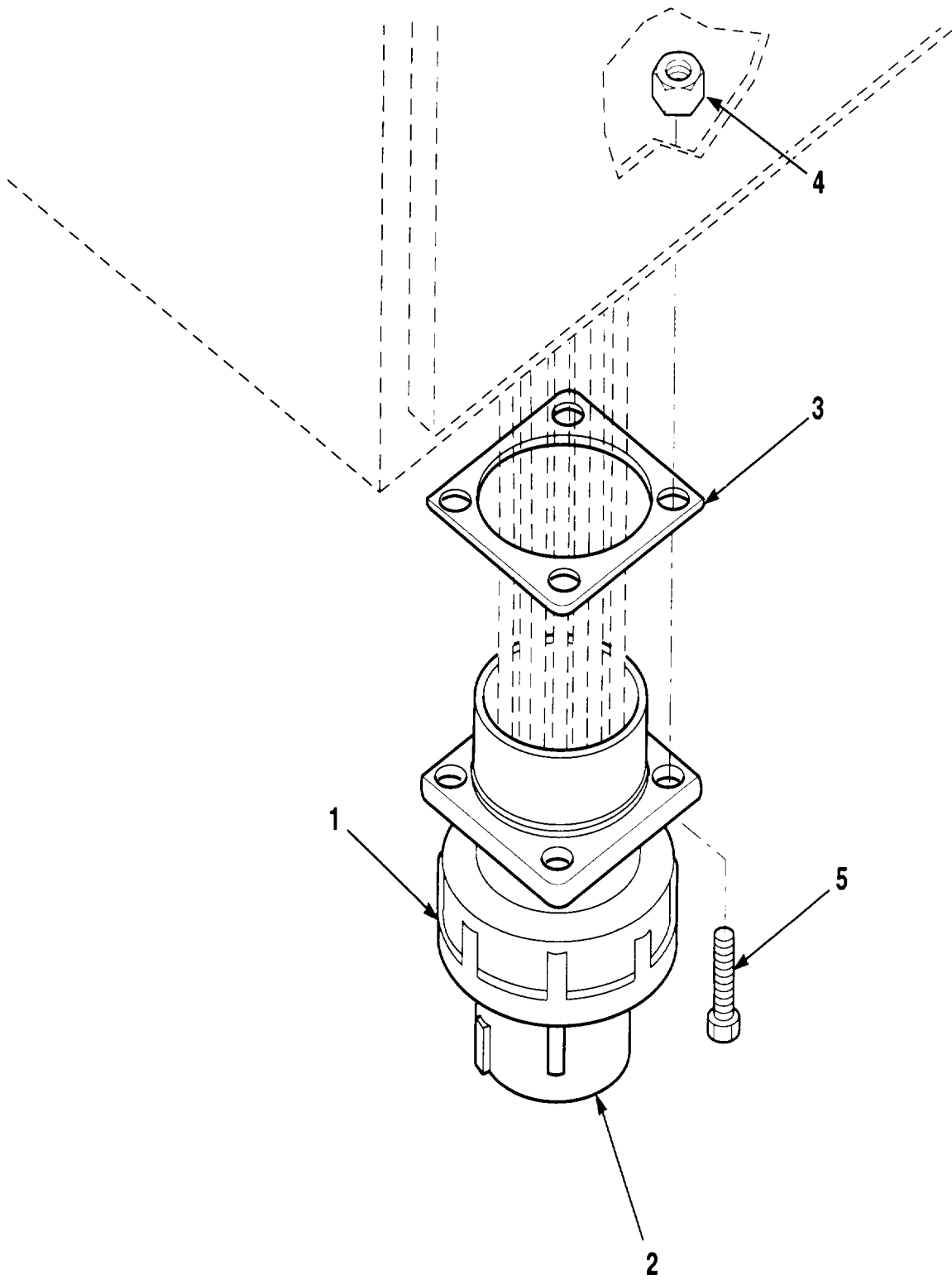


Figure 34. Connector - Cord Adapter

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
				GROUP 4211 POWER RECEPTACLES	
				FIG. 34 CONNECTOR - CORD ADAPTER	
1	PFOZZ	74545	4100B9W	CONNECTOR BODY, PLUG	1
2	XBOZZ	74545	IN4100DM	RECEPTACLE	1
3	PFOZZ	06447	2HXBPB16	GASKETING MATERIAL	1
4	PAOZZ	96906	MS35649-282	NUT, PLAIN, HEXAGON	4
5	PAOZZ	96906	MS35206-247	SCREW, MACHINE--	4

END OF FIGURE

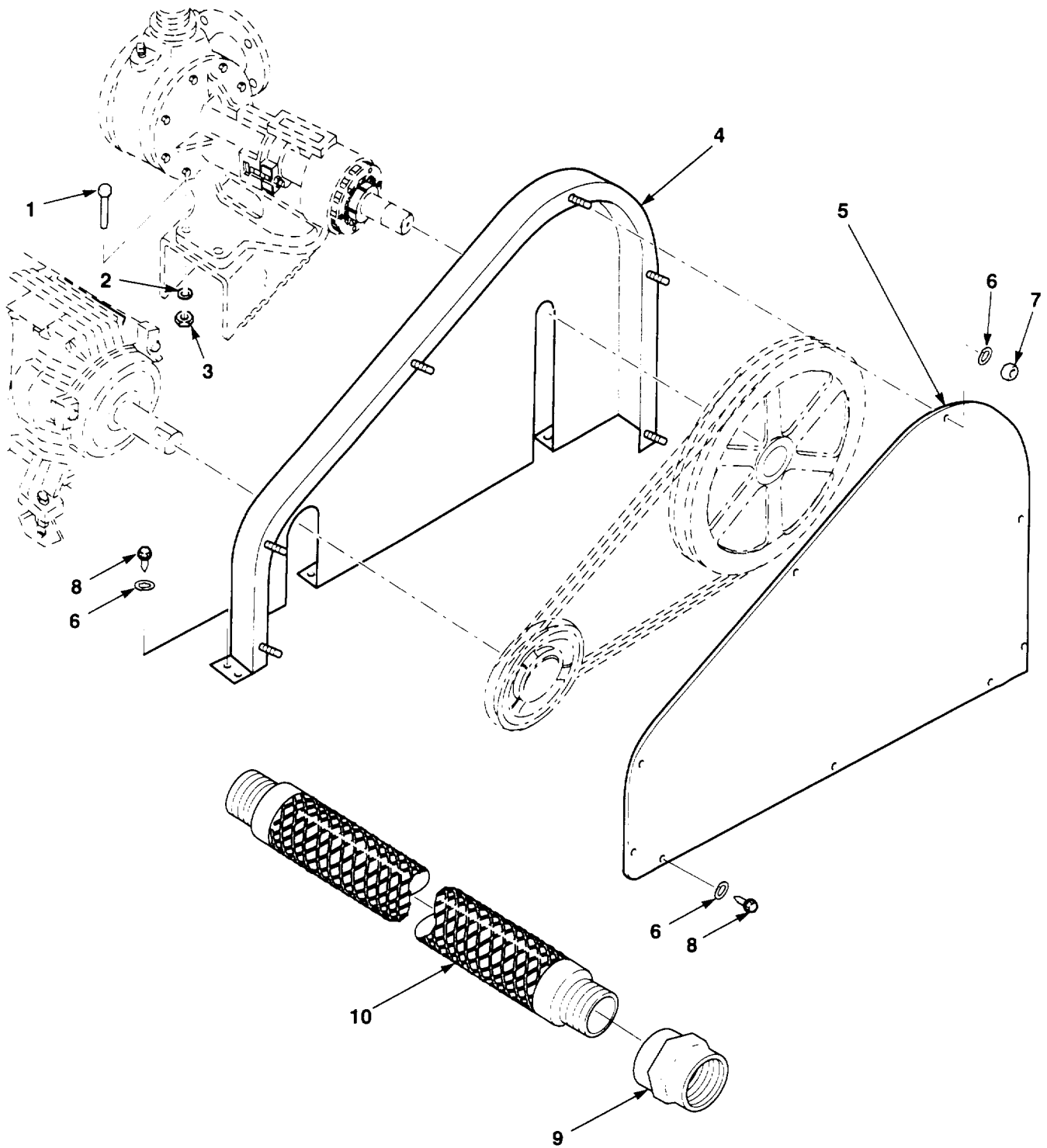


Figure 35. Hot Oil Pump Mounting

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM NO	SMR CODE	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
				GROUP 55 PUMPS	
				GROUP 5500 PUMP ASSEMBLY	
				FIG. 35 HOT OIL PUMP MOUNTING	
1	PAOZZ	80204	B1821BH050C 150N	SCREW, CAP, HEXAGON H.....	4
2	PAOZZ	96906	MS35338-48	WASHER, LOCK.....	4
3	PAOZZ	96906	MS35691-33	NUT, PLAIN, HEXAGON	4
4	XBOZZ	06447	2HXPPB9	BELT GUARD	1
5	XBOZZ	06447	2HXPPB15	COVER BELT GUARD	1
6	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	19
7	PAOZZ	96906	MS51967-2	NUT, PLAIN, HEXAGON	6
8	PAOZA	96906	MS24628-64	SCREW, TAPPING	11
9	PAOZZ	39428	4627K288	ELBOW, PIPE	4
10	PAOZZ	60535	32-DA11-0960-110 -110	HOSE ASSEMBLY, METAL.....	4

END OF FIGURE

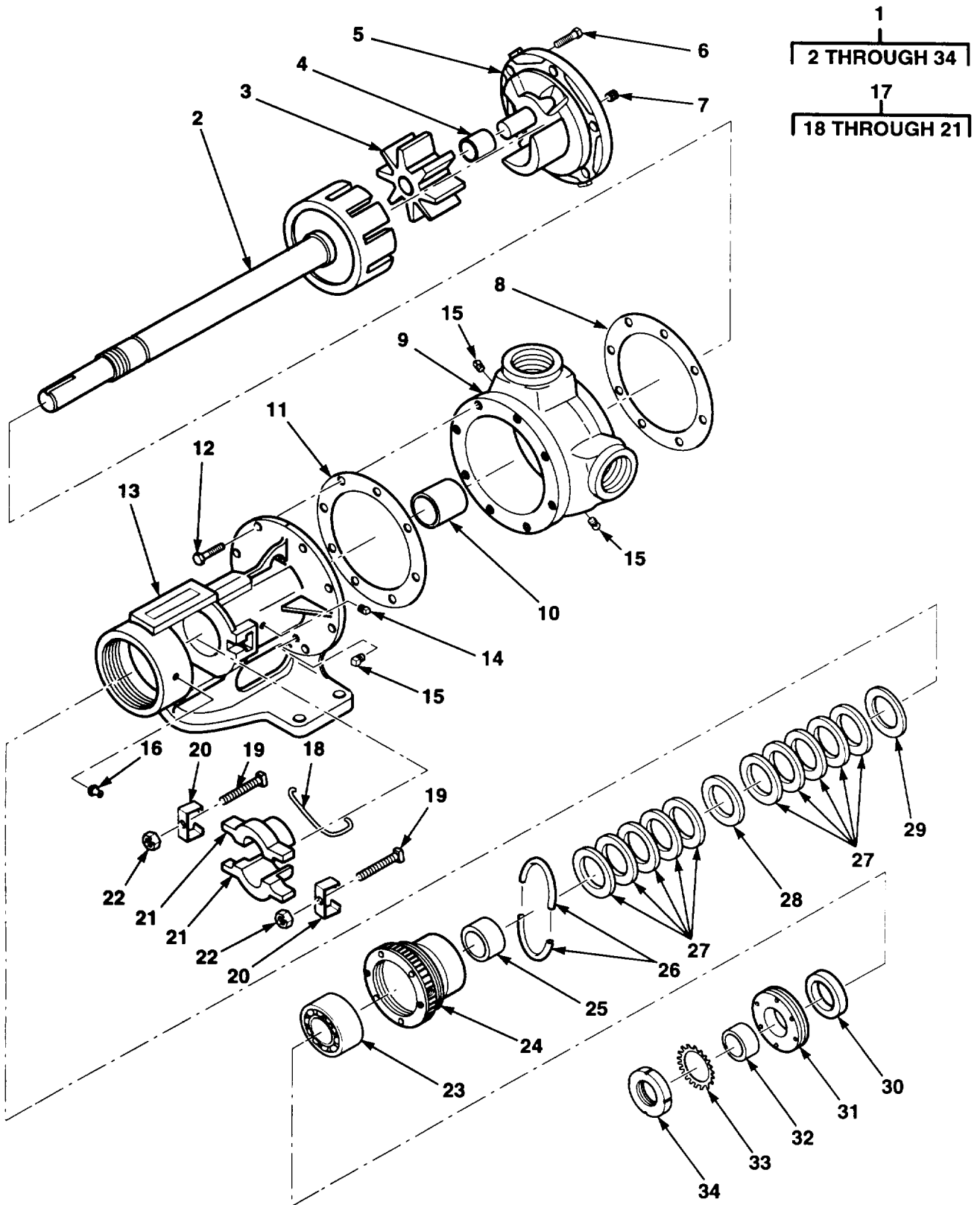


Figure 36. Hot Oil Pump

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM NO	SMR CODE	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 5500 PUMP ASSEMBLY					
FIG. 36 CIRCULATING PUMP					
1	PFOZZ	63097	KK125	PUMP, ROTARY	1
2	PFOZZ	63097	3-570-552-312-37	•ROTOR, PUMP.....	1
3	PAOZZ	63097	3-420-401-47d-54	•GEAR, SPUR.....	1
4	XAOZZ	63097	2-115-006-880	BEARING, SLEEVE	1
5	PAOZZ	63097	3-381-400-088	•HEAD, HYDRAULIC MOTO	1
6	PAOZZ	96906	MS90725-84	•SCREW, CAP, HEXAGON H	6
7	PAOZZ	63097	2-542-002-376	PLUG, PIPE	2
9	PAOZZ	63097	2-311-003-806-15	•GASKET	1
C					
9	PFOZZ	63097	2-214-809-100.	•HOUSING, LIQUID PUMP.....	1
10	PAOZZ	63097	2-108-015-880-04	•BUSHING, SLEEVE.....	3
11	PAOZA	63097	2-313-003-804-15	•GASKET	1
12	PAOZZ	96906	MS90725-84	•SCREW, CAP, HEXAGON H	8
13	XBOZZ	63097	3-077-067-080	•BRACKET AND BUSHING	1
14	PAOZZ	63097	2-542-004-376	•PLUG, MACHINE THREAD	1
15	PAOZZ	63097	2-544-004-376	•PLUG, MACHINE THREAD	3
16	PAOZZ	63097	2-469-002-376	•FITTING, LUBRICATION.....	1
17	PFOZZ	63097	3-524-00B-48N	•RETAINER, PACKING.....	1
18	PFOZZ	63097	2-470-143-376	••CLIP, SPRING TENSION	1
19	PAOZZ	63097	2-154-008-375	••SCREW, MACHINE	2
20	PFOZZ	63097	2-490-140-375	••BRACKET, DOUBLE ANGL	2
21	PFOZZ	63097	2-254-040-367	••SLEEVE, HALF, PACKING,	2
22	PAOZZ	63097	2-505-008-375	•PACKING NUT	2
23	PFOZZ	63097	2-055-021-375	•BEARING, BALL, ANNULA.....	1
24	PFOZZ	63097	3-060-035-922	•BEARING; WASHER, THRU	1
25	PFOZZ	63097	2-288-040-213	•SPACER, RING	1
26	PFOZZ	63097	2-557-004-370	•RING, RETAINING	2
27	PAOZZ	63097	2-520-015-830	•PACKING ASSEMBLYV	10
28	PAOZZ	63097	2-465-007-375	•RINGLANTERN	1
29	PAOZZ	63097	2-805-026-375	•WASHER, FLAT	1
30	PFOZA	63097	2-283-014-378	•SEAL, SET ,.....	1
31	PFOZZ	63097	2-140-002-781	•CAP, VALVE	1
32	PFOZZ	63097	2-288-006-210	•SPACERIRING	1
33	PAOZZ	63097	2-807-005-375	•WASHER, LOCK	1
34	PFOZZ	63097	2-507-005-375	•NUT, SELF-LOCKING, EX	1

END OF FIGURE

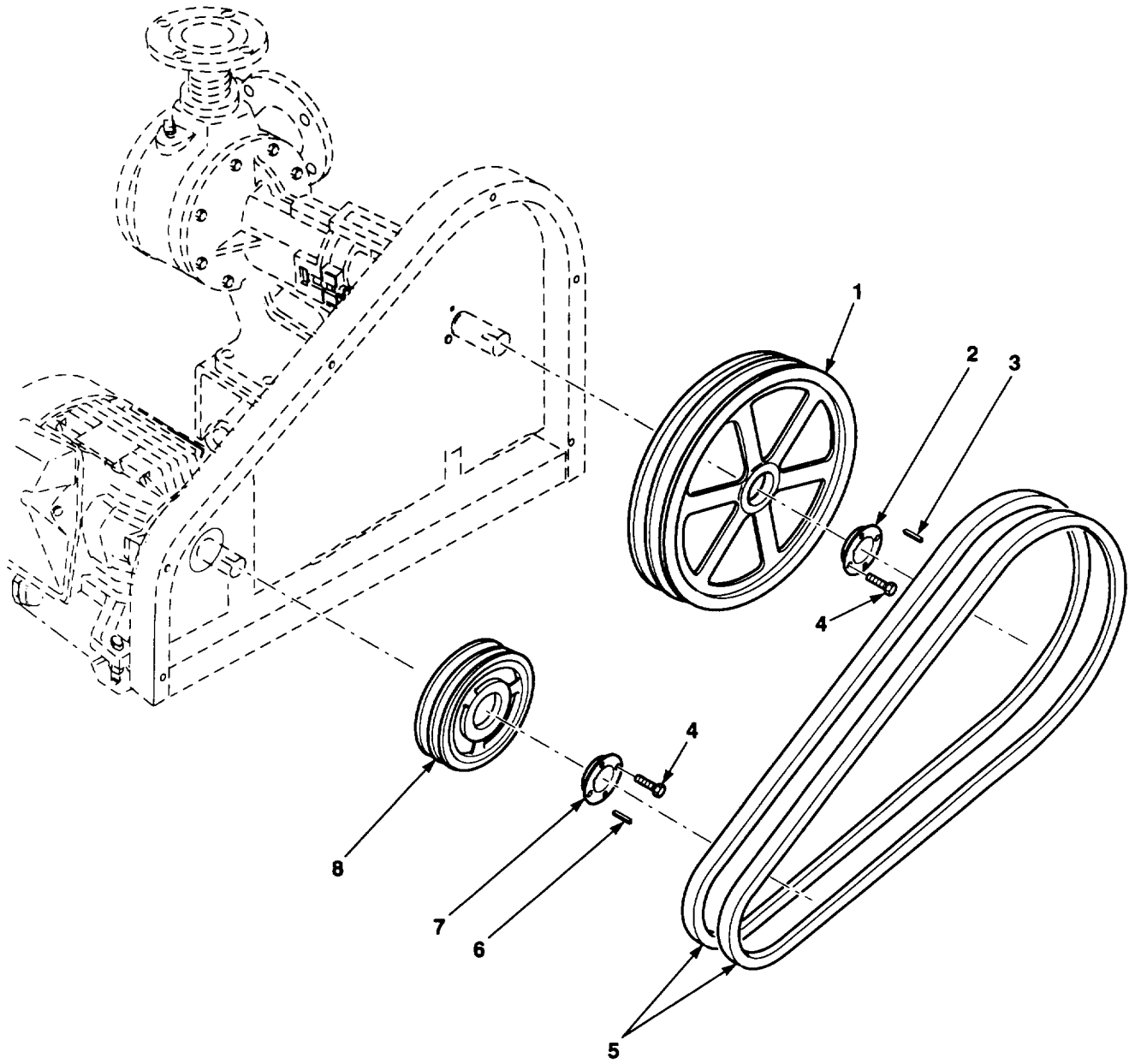


Figure 37. Pump Drive

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
GROUP 5507 PUMP DRIVE					
FIG. 37 PUMP DRIVE					
1	PFOZZ	71176	2AK124H-1.125BOR E	PULLEY, GROOVE	1
2	PFOZZ	71176	H-11/8	BUSHINGVTAPERED,.....	1
3	PAOZZ	39428	98535A150	KEY MACHINE.....	1
4	PAOZZ	96906	MS24667-22	SCREW, CAP, SOCKET HE.....	4
5	PAOZZ	71176	A58	BELT, V.	2
6	PAOZZ	39428	98535A160	KEY MACHINE.....	1
7	PFOZZ	71176	H-13/8	BUSHINGVSLEEVE.....	1
8	PFOZZ	71176	2AK59H-1.375 E	BOR PULLEY, GROOVE	1

END OF FIGURE

1
2 THROUGH 7

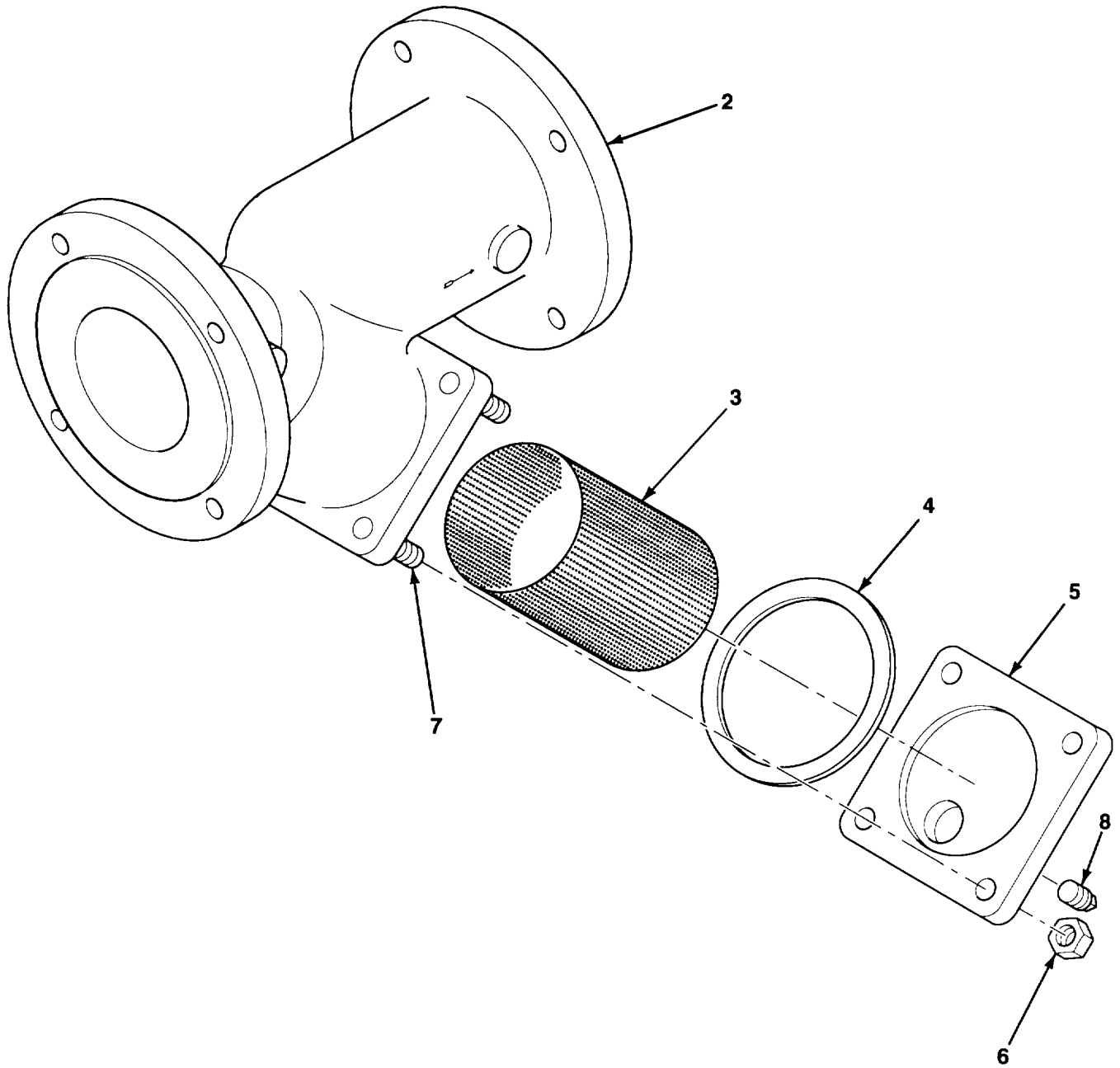


Figure 38. Strainer

SECTION II				(5)	(6)
(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 5510 INLET AND OUTLET COMPONENTS					
FIG. 38 STRAINER					
1	PFOZZ	76588	781	FILTER ELEMENT, FLUI	1
2	PFOZZ	76588	A216-WCB	•FILTER BODY, FLUID	1
3	PFOZZ	76588	S-3.0-781-4-F-0- 0	•STRAINER ELEMENT, SE	1
4	PFOZZ	76588	G-3.0-781K1-0	•GASKET	1
5	PFOZZ	76588	HRS	•COVER, ACCESS.....	1
6	PFOZZ	76588	A-194-4	•NUT, PLAIN, HEXAGON	4
7	PFOZZ	76588	A-193-B16	•STUD, PLAIN	1
8	PAOZZ	96906	MS20913-8	PLUG, PIPE	1

END OF FIGURE

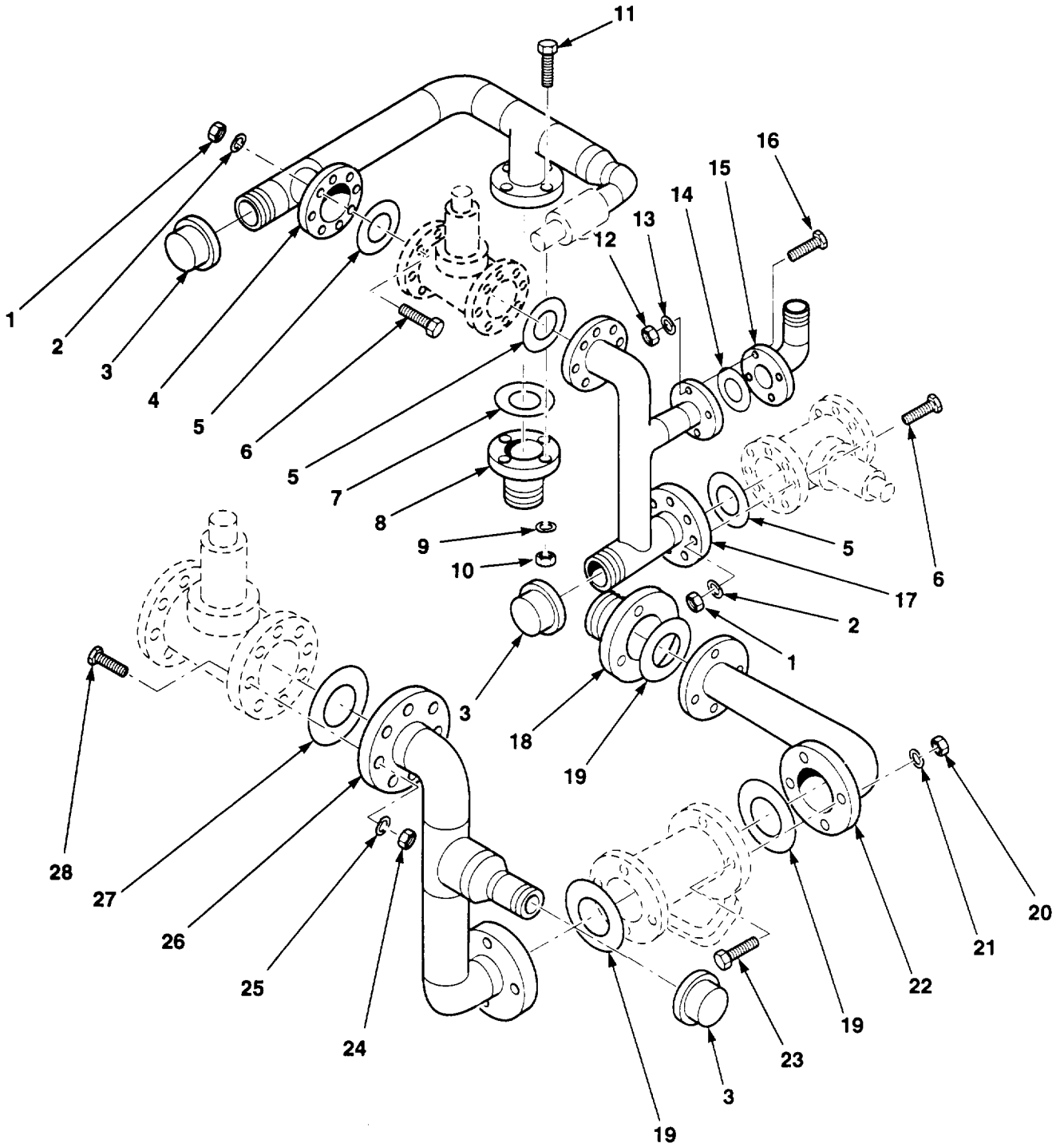


Figure 39. Transfer Oil Lines and Fittings

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
SECTION II					
GROUP 5513 FLUID LINES					
FIG. 39 TRANSFER OIL LINES AND FITTINGS					
1	PAOZZ	96906	MS35691-49	NUT, PLAIN, HEXAGON.....	32
2	PAOZZ	31007	Q1925	WASHER, LOCK.....	32
3	PAOZZ	39428	4627K278	REDUCER, PIPE.....	3
4	XBOZZ	06447	2HXPPB6	PLUMBING SECTION.....	1
5	PAOZZ	06447	2HXPPB10	GASKET	4
6	PAOZZ	96906	MS90725-167	SCREW, CAP, HEXAGON H.....	32
7	PAOZZ	06447	2HXKEPPB7	GASKET	1
8	XBOZZ	06447	2HXPPB5	PLUMBING SECTION.....	1
9	PAOZZ	31007	Q1925	WASHER, LOCK.....	4
10	PAOZZ	96906	MS35691-49	NUT, PLAIN1HEXAGON.....	4
11	PAOZZ	80204	B1821BH063C250N	SCREW, CAP, HEXAGON H.....	4
12	PAOZZ	96906	MS35691-33	NUT, PLAIN, HEXAGON.....	4
13	PAOZZ	14351	X296	WASHER, LOCK.....	4
14	PAOZZ	06447	2HXPPB12	GASKET	1
15	PFOZZ	06447	2HXPPB8	PLUMBING, SECTION.....	1
16	PAOZZ	80204	B1821BH050C200N	SCREWCAP, HEXAGON H	4
17	X8OZZ	06447	ZHXPPB7	PLUMBING SECTION.....	1
18	PFOZZ	06447	ZHXPPB4	FLANGE PIPE WELDMEN	1
19	PFOZZ	06447	2HXXEPPBB	GASKET	3
20	PAOZZ	96906	MS35691-49	NUT, PLAIN, HEXAGON.....	12
21	PAOZZ	37296	C1541	WASHER, LOCK.....	12
22	XBOZZ	06447	2HXPPB3	PLUMBING SECTION.....	1
23	PAOZZ	80204	B1821BH063C250N	SCREW, CAP, HEXAGON H	12
24	PAOZZ	96906	MS35691-57	NUT, PLAIN, HEXAGON.....	64
25	PAOZZ	96906	MS35338-51	WASHER:LOCK.....	64
26	XBOZZ	06447	2HXPPB1	PLUMBING SECTION.....	1
27	PFOZZ	06441	2HXPPBII	GASKET	8
28	PAOZZ	96906	MS907Z25-193	SCREW, CAP, HEXAGON H.....	64

END OF FIGURE

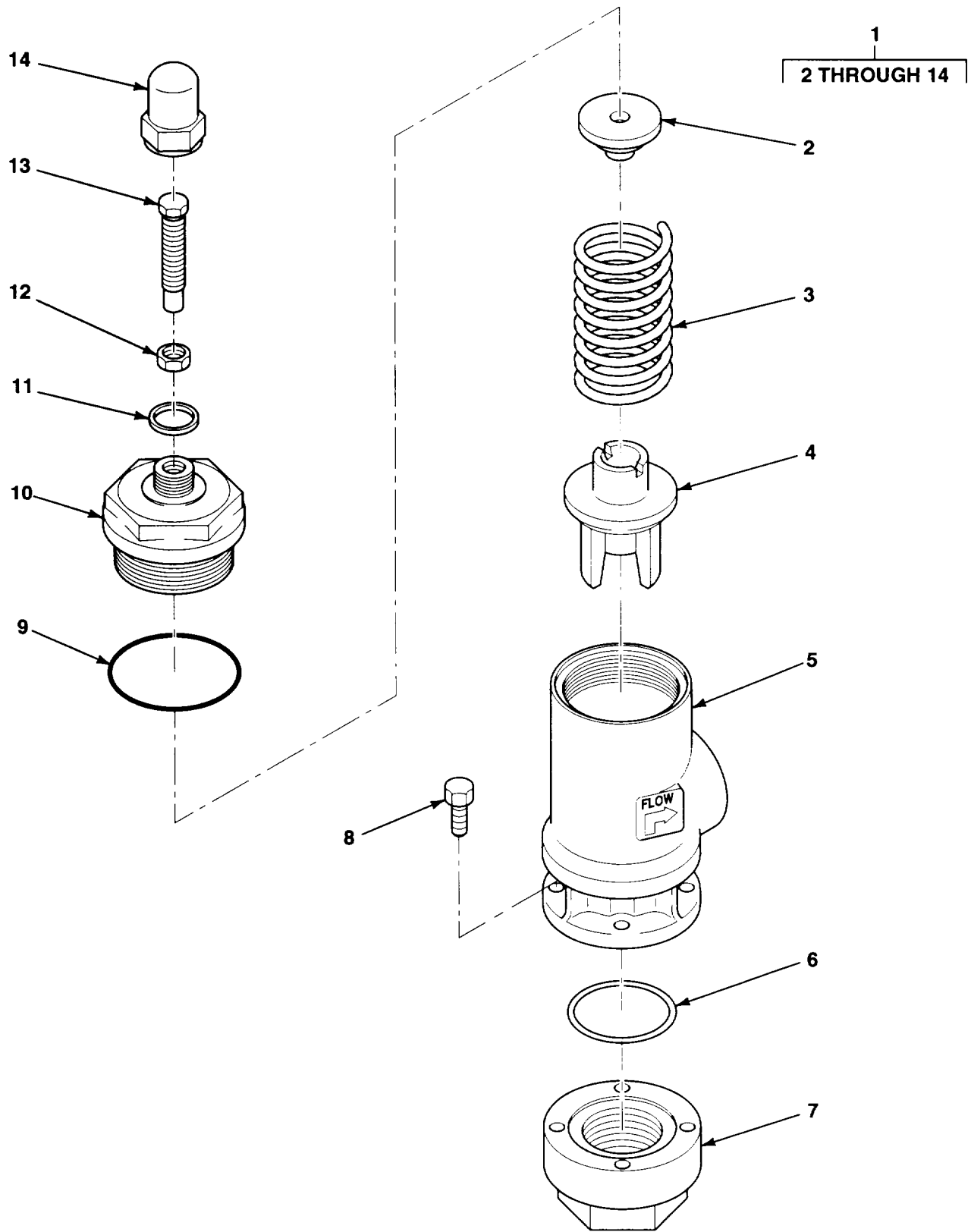


Figure 40. Pressure Relief Valve

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM NO	SMR CODE	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 5513 FLUID LINES					
FIG. 40 PRESSURE RELIEF VALVE					
1	PFOZZ	63097	3-795-503-000-19	VALVE, SAFETY RELIEF	1
2	PFOZZ	63097	2-799-043-375	•SPRING GUIDE	1
3	PFOZZ	63097	2-763-019-610	•SPRING, HELICAL, COMP	1
4	PFOZZ	63097	2-796-007-100	•DISK, VALVE	1
5	PFOZZ	63097	2-795-007-100	•BODY, VALVE	1
6	PFOZZ	63097	2-512-007-860	•PACKING, PREFORMED	1
7	PFOZZ	63097	2-540-078-100	•ADAPTAR, STRAIGHT, PI	1
8	PFOZZ	63097	2-150-019-255	•SCREW, CAP, HEXAGON H	4
9	PFOZZ	63097	2-512-018-860	•GASKET	1
10	PFOZZ	63097	2-797-024-100	•CAP, VALVE	1
11	PFOZZ	63097	2-512-012-860	•GASKET	1
12	PFOZZ	63097	2-503-006-376	•NUT, SELF-LOCKING, HE	1
13	PFOZZ	63097	2-595-006-376	•SCREW	1
14	PFOZZ	63097	2-798-022-100	•CAP, VALVE	1

END OF FIGURE

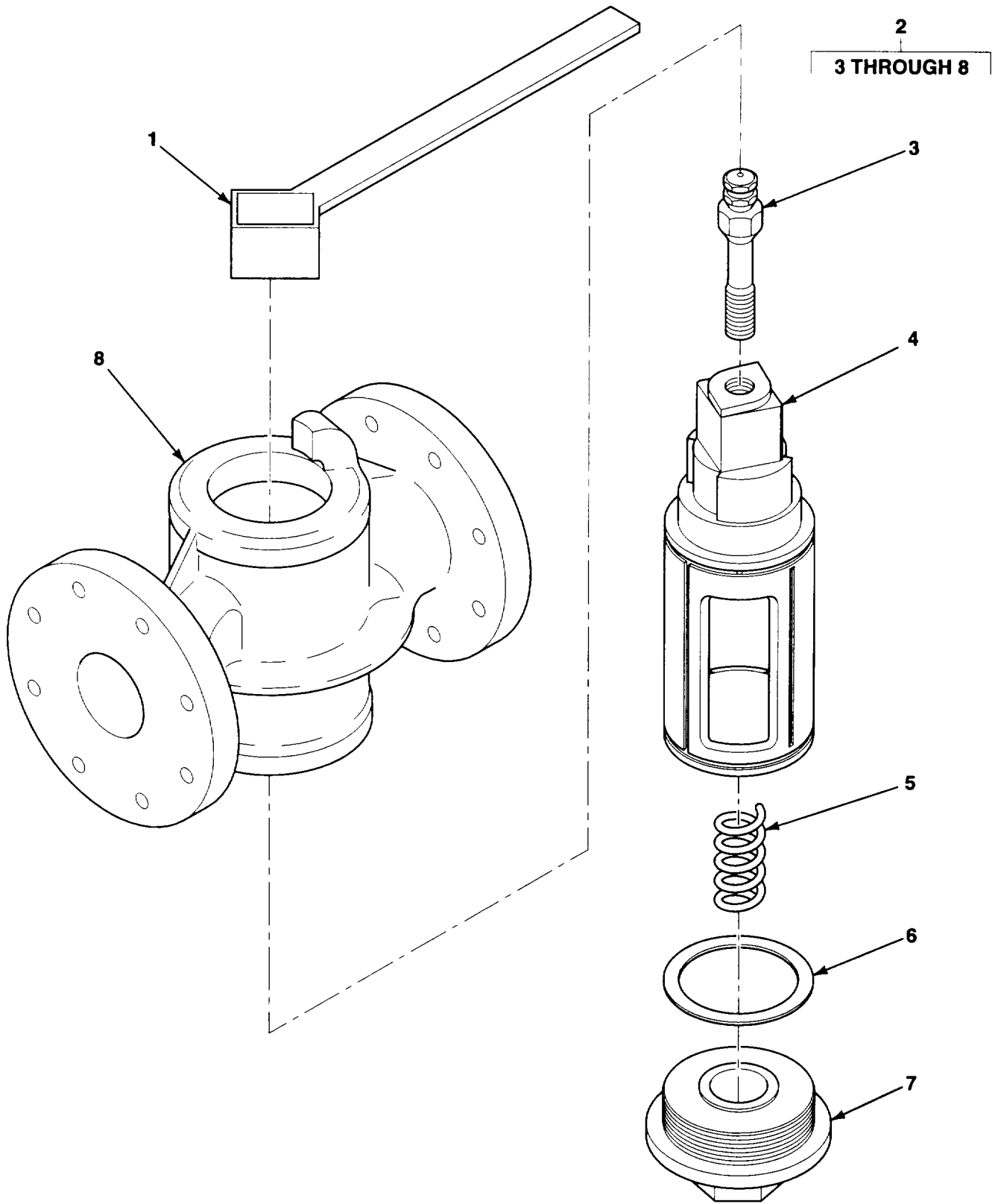


Figure 41. 3 3/4 In. Plug Valve

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 5513 FLUID LINES

FIG. 41 3" PLUG VALVE

1	PFOZZ	06447	2HX-401M3-106	HANDLE, MANUAL CONTR.....	1
2	PFOZZ	06447	2HX-401M3-750LB.	VALVE, PLUG.....	1
3	PFGZZ	06447	2HX-401M3INJNIP	•NIPPLE, INJECTION.....	10
4	PFOZZ	06441	2HX-401H3PLUG	•VALVE, PLUG.....	1
5	PFOZZ	06447	2HX-401M3SPRING	•SPRING, HELICAL, COMP.....	1
6	PFOZZ	06447	2HX-401M3TRING	•SPACER, RING.....	1
7	PFOZZ	06447	2HX-401M3BTMC0V	•FLANGE, PIPE.....	1
8	PFOZZ	06447	2HX-401M3BODY	•BODY, VALVE.....	1

END OF FIGURE

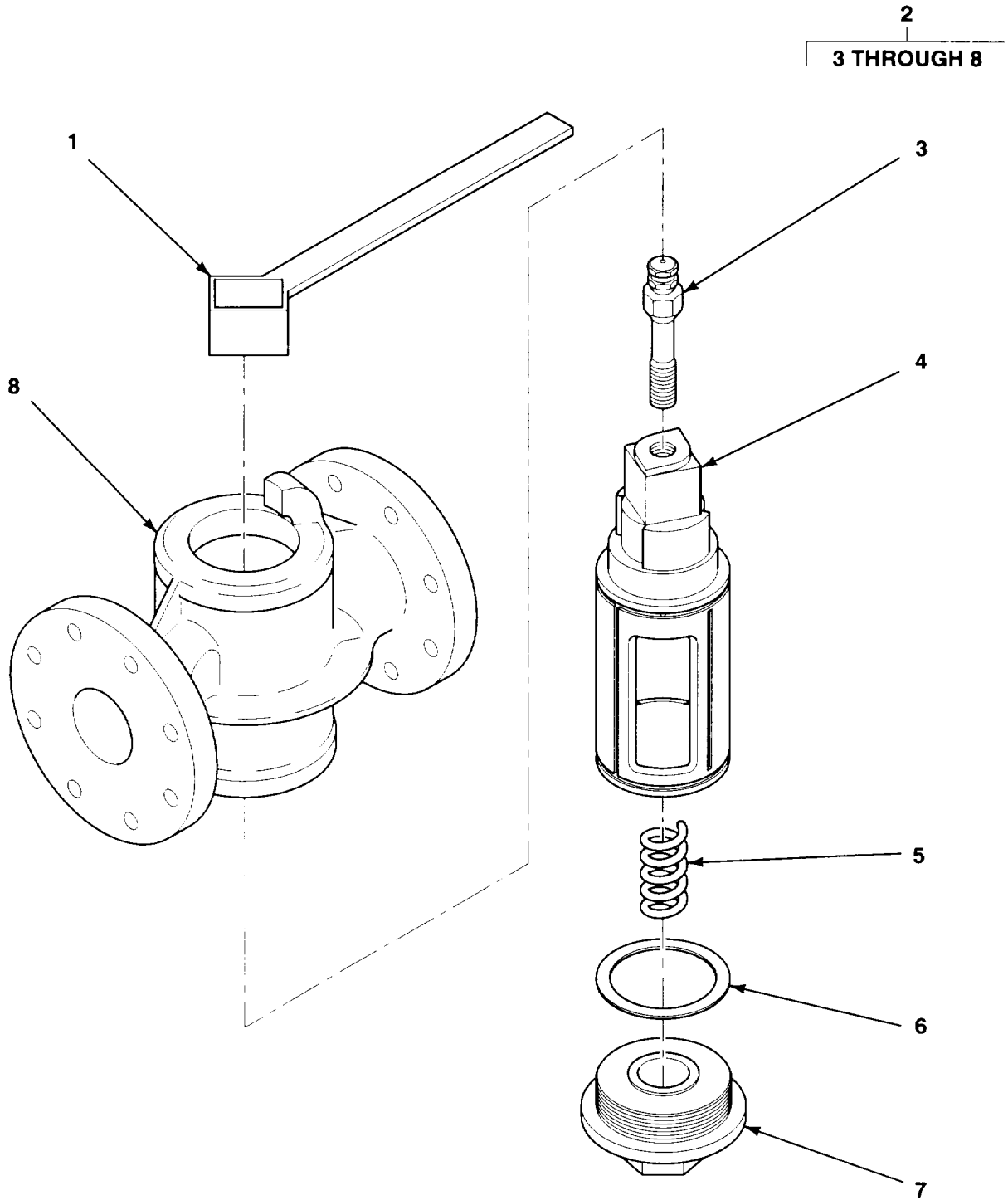


Figure 42. 2 In. Plug Valve

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
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GROUP 5513 FLUID LINES

FIG. 42 2" PLUG VALVE

1	PFOZZ	06447	2HX-401M2-106-L	HANDLE, MANUAL CONTR.....	2
2	PFOZZ	06447	2HX-401M2-#750	BODY, VALVE.....	2
3	PFOZZ	06447	2HX-401INJNIP	•FITTING, LUBRICATION.....	1
4	PFOZZ	06447	ZHX-401M2PLUG	•VALVE, PLUG.....	1
5	PFOZZ	06447	ZHX-401M2SPRING	•SPRING, HELICAL, COMP.....	1
6	PFOZZ	06447	2HX-401M2TRING	•PACKING, PERFORMED.....	1
7	PFOZZ	06447	2HX-401M2BTMC0V	•COVER, BOTTOM.....	1
8	PFOZZ	06447	2HX-401M2BODY	•BODY, VALVE.....	1

END OF FIGURE

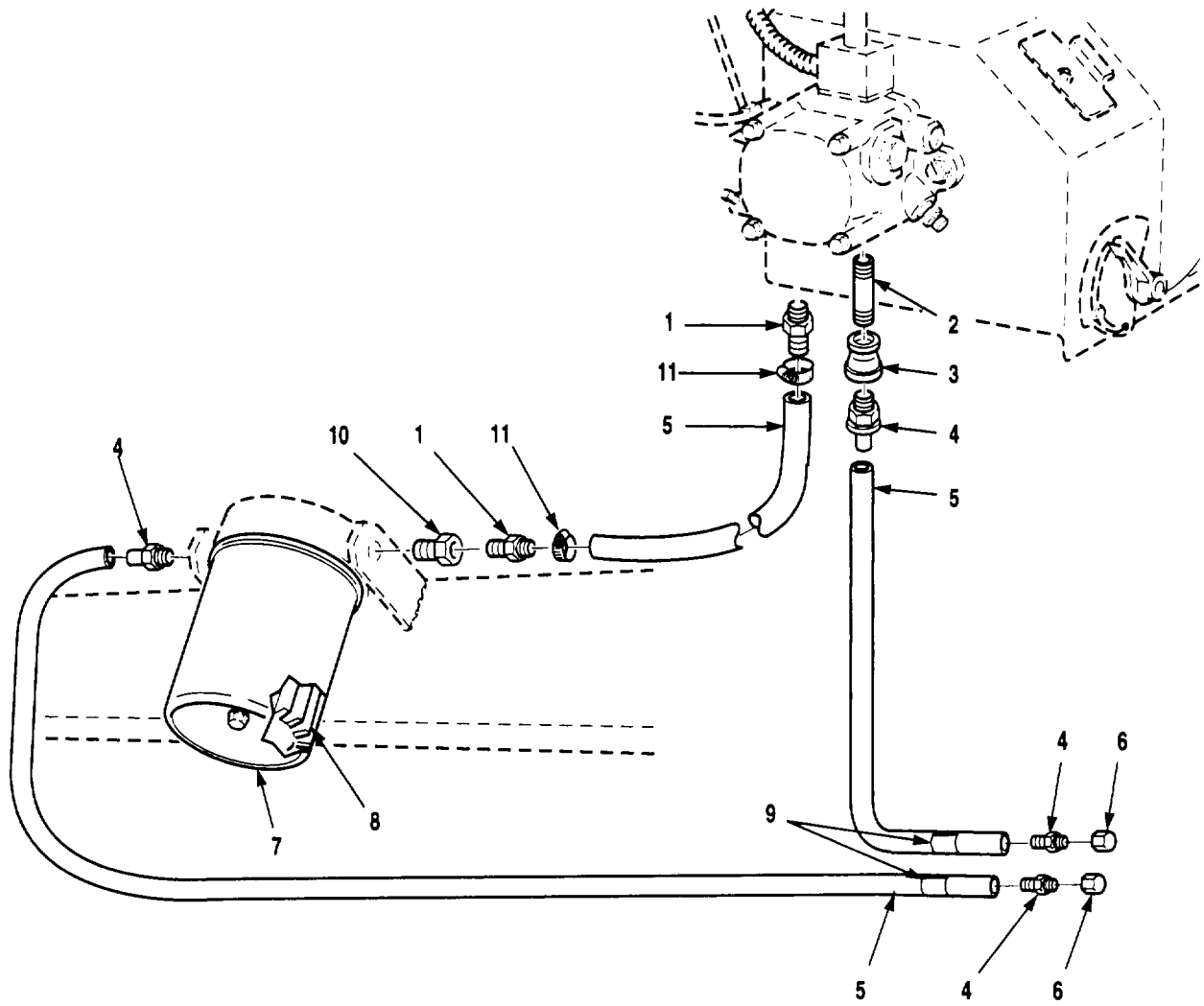


Figure 43. Fuel Lines and Fuel Filter Assembly

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
				GROUP 60 STEAM BOILERS, WATER HEATERS, HEATING UNITS, BURNERS	
				GROUP 6004 FUEL SYSTEM	
				FIG. 43 FUEL FILTER ASSEMBLY	
1	PAOZZ	39428	5350K12	ADAPTER, STRAIGHT, HO.....	2
2	PAOZZ	39428	44615K412	NIPPLE, PIPE	1
3	PAOZZ	39428	44605K271	REDUCER, PIPE 3/8" X 1/4.....	1
4	PAOZZ	81300	6NP-6PL	COUPLING, HOSE	4
5	PFOZZ	81300	6L3	HOSE ASSEMBLY, NONME 3/8"	3
6	PAOZZ	39428	44605K173	CAP-PLUG PROTECTIVE 3/8".....	2
7	PAOZZ	72692	2A700A3-8	FILTER, FLUID	1
8	PAOZZ	72692	2A-710	FILTER ELEMENT, FLUI	1
9	PAOZZ	06447	2HXBPB19	MAKER, IDENTIFICATIO	2
10	PAOZZ	39428	44605K242	REDUCER, PIPE 3/8" X 1/4"	1
11	PAOZZ	76599	MMF4-SS	CLAMP, HOSE.....	2

END OF FIGURE

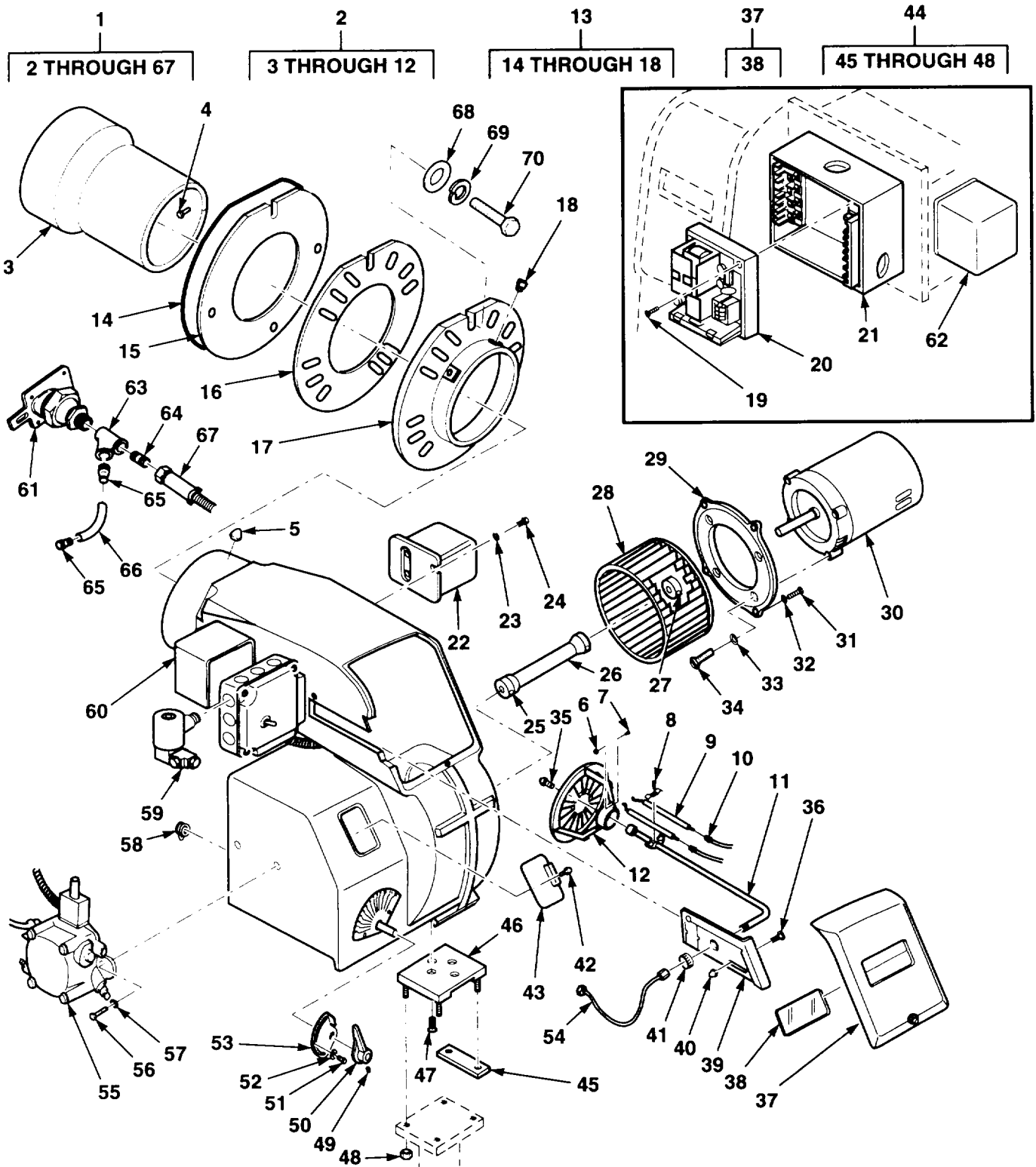


Figure 44. Burner Assembly

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
SECTION II					
GROUP 6005 BURNER ASSEMBLY					
FIG. 44 BURNER ASSEMBLY					
1	PFOOO	06447	ZHXBPB20	BURNER, OIL, PRESSURE.....	1
2	PAOZZ	51384	CF66KG	•NOZZLE, OIL BURNER, P	1
3	PFOZZ	51384	512780768BK	••TUBE, AIR	1
4	PAOZZ	96906	MS90125-3	••SCREW, CAP, HEXAGON H	4
5	PAOZZ	96906	M524679-5	••NUT, PLAIN, CAP.....	4
6	PAOZZ	96906	MS35649-282	••NUT, PLAIN, HEXAGON	1
7	PAOZZ	96906	MS35206-243	••SCREW, MACHINE.. ..	1
8	PAOZZ	96906	MS90725-5	••SCREW, CAP, HEXAGON H	1
9	PAOZZ	513A4	51212	••ELECTRODE	1
10	PAOZZ	51384	5990082	••LEAD ASSEMBLY, ELECT.....	1
11	PAOZZ	51384	NLH66KGU	••NOZZLE AND TUBE ASS,	1
12	PFOZZ	51384	51203	••END BELL, ELECTRICAL	1
13	X0000	51384	51313	••INSTALLATION KIT, OI.....	1
14	PAOZZ	51384	3156703	••GASKET	1
15	PAOZZ	51384	31436	••GASKET	1
16	PAOZZ	51384	31550	••PLATE, MOUNTING.....	1
17	PAOZZ	51384	31389	••FLANGE, ADJUSTABLE	1
18	PAOZZ	96906	MS51955-19	••SETSCREW	4
19	PAOZZ	96906	MS35206-245	•SCREW, MACHINE	3
20	PAOZZ	27319	R7795AI01	•CONTROL, PRIMARY	1
21	PAOZZ	27319	Q795A1004	•PLATEVMOUNTING.....	1
22	PAOZZ	51384	51214	•TRANSFORMER, POWER	1
23	PAOZZ	96906	MS35338-44	•WASHER, LOCK	4
24	PAOZZ	96906	MS90725-1	•SCREW CAP, HEXAGON H	4
25	PAOZZ	96906	MS51963-81	•SETSCREW	1
26	PAOZZ	51384	21549	•REDUCER, BOSS	1
27	PAOZZ	96906	MS51963-81	•SETSCREW	1
28	PAOZZ	51384	21267	•WHEEL, BLOWER	1
29	PFOZZ	51384	31347	•FLANGE, SEALING ELEC.....	1
30	PFOZZ	51384	21402	•MOTOR.....	1
31	PAOZZ	96906	MS90725-34	•BOLT, MACHINE	5
32	PAOZZ	96906	MS35338-45	•WASHER, LOCK	5
33	PAOZZ	81718	H2525M	•WASHER, LOCK	4
34	PAOZZ	80204	B1821BH038C075D	•SCREW, CAP, HEXAGON H	4
35	PAOZZ	73007	29270	•NOZZLE, FUEL INJECTI	1
36	PAOZZ	96906	MS16995-26	•SCREW, MACHINE	1
37	PFOOO	51384	51204	•SHIELD, EYE, GRINDING	1
38	PFOZZ	51384	31346	•LENS, LIGHT	1
39	XBOZZ	51384	51213	•PLATE ASSY, ADJUST	1
40	PAOZZ	96906	MS24679-2	•NUT, PLAIN, CAP	1
41	PAOZZ	51364	3666	•NUT, PLAIN, KURLE D.....	1
42	PAOZZ	96906	MS51849-64	•SCREW, MACHINE	1
43	XBOZZ	51384	16703GY	•DOOR, DAMPER.....	1
44	PFOZZ	51384	51193	•PEDESTAL, SEAT	1
45	PAOZZ	51384	31561	••GASKET	2
46	X8OZZ	51384	51420	••BASE, ASSY, MOUNTING	1
47	PAOZZ	51384	4232	•SCREW, MACHINE 10-32 X 3/4"	4
43	PAOZZ	96906	MS35649-2382	••NUT, PLAIN, HEXAGON	4

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
49	PAOZZ	96906	MS51964-49	•SETSCREW	1
50	XBOZZ	51384	5955	•KNOB.....	1
51	PAOZZ	96906	MS51849-64	•SCREW, MACHINE	1
52	PAOZZ	96906	MS35333-39	•WASHER, LOCK	1
53	PAOZZ	51384	5985BK	•DIAL, CONTROL	1
54	PAOZZ	51384	5394	•TUBE ASSEMBLY SET, M.....	1
55	PAOZZ	1Y370	B2GA8852N642R	•PUMP, FUEL, ELECTRICA	1
56	PAOZZ	96906	MS90725-34	•BOLT, MACHINE	2
57	PAOZZ	96906	MS35338-45	•WASHER, LOCK	2
58	PFOZZ	51384	4339	•SPRING, DAMPER.....	1
59	PAOZZ	51384	7201	•VALVE, LINEAR, DIRECT	2
60	XBOZZ	27319	M436A1110	MOTOR, DAMPER	1
61	PFOZZ	51384	51419	KIT, MOUNTING, DETECT	1
62	PAOZZ	51384	7273	RELAY, MOTOR DRIVEN.....	1
63	PAOZZ	39428	4638K322	ELBOW, THREE WAY, DRA 45 DEG	1
64	PAOZZ	39428	44615K414	NIPPLE, PIPE	1
65	PAOZZ	39428	5363K51	REDUCER, PIPE	2
66	PAOZZ	39428	5237K15	HOSE ASSEMBLY, NONME	1
67	PAOZZ	27319	C7027A1023	DETECTOR, FLAME, ULTR	1
68	PAOZZ	96906	MS27183-14	WASHER, FLAT.....	3
69	PAOZZ	81718	H2525M	WASHER, LOCK.....	3
70	PAOZZ	96906	MS90725-64	SCREW, CAP, HEXAGON H.....	3

END OF FIGURE

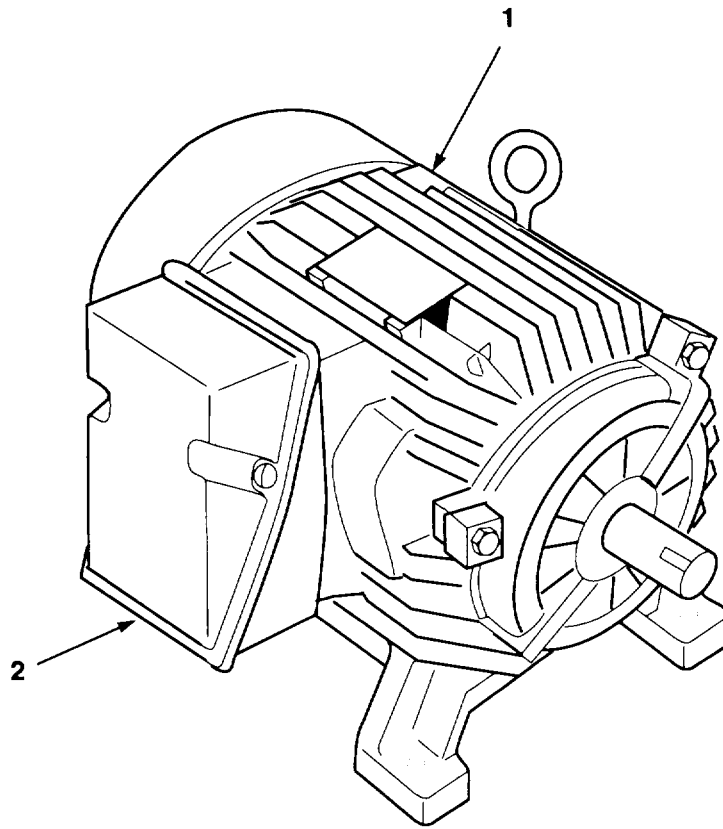


Figure 45. Motor

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART		
NO	CODE	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
				GROUP 6006 MOTOR ASSEMBLY	
				FIG. 45 MOTOR	
1	PAOZZ	OACF4	HTH2660	MOTOR, DIRECT CURREN	1
2	XBOZZ	OACF4	3MSG223002602	CONDUIT BOX	1

END OF FIGURE

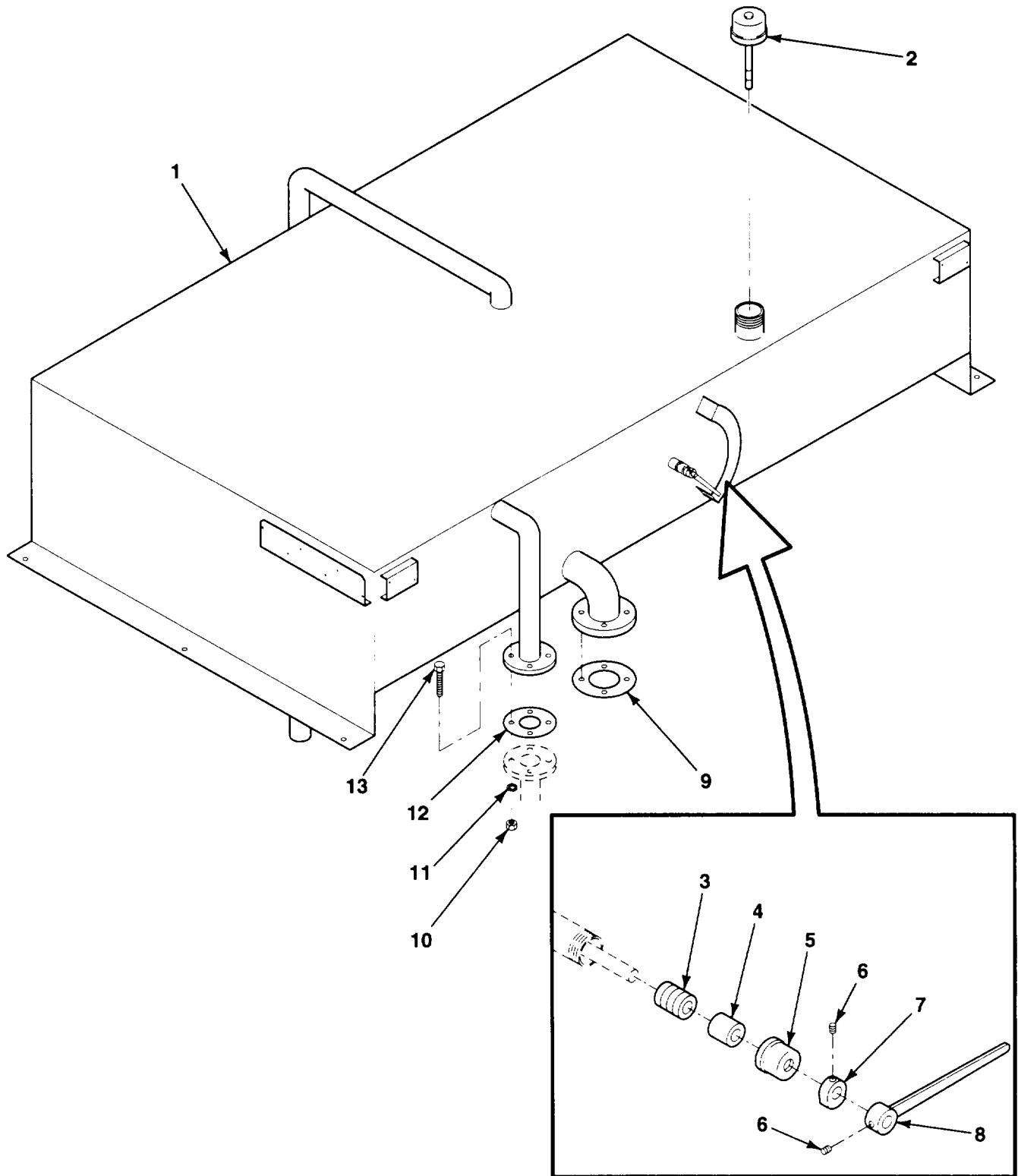


Figure 46. Expansion Tank

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 60 STEAM BOILERS, WATER HEATERS, HEATING UNITS, BURNERS	
				GROUP 6007 EXPANSION TANK ASSEMBLY	
				FIG. 46 EXPANSION TANK	
1	PFFZZ	06447	2HXXEPPB6	TANK, EXPANSION, OIL.....	1
2	PFFZZ	06447	ZHXXEPPB1	CAP, FILLER OPENING.....	1
3	PFFZZ	06447	2HXXEPPBZ	SPACER, SLEEVE.....	1
4	PAFZZ	06447	2HXXEPPB9	PACKING ASSEMBLY.....	1
5	PFFZZ	06447	2HXXEPPB3	BOOT, DUST AND MOIST.....	1
6	PAFZZ	96906	MS51963-65	SETSCREW.....	1
7	PFFZZ	06447	2HXXEPPB4	CAM, HEAT EXCHANGER.....	1
8	PFFZZ	06447	2HXXEPPB5	POINTER, DIAL.....	1
9	PAFZZ	06447	2HXXEPPB8	GASKET.....	1
10	PAOZZ	96906	MS51967-20	NUT, PLAIN, HEXAGON.....	8
11	PAFZZ	96906	MS35338-50	WASHER, LOCK.....	8
12	PAOZZ	06447	2HXXEPPB7	GASKET.....	1
13	PAFZZ	96906	MS90725-168	SCREW, CAP, HEXAGON H.....	8

END OF FIGURE

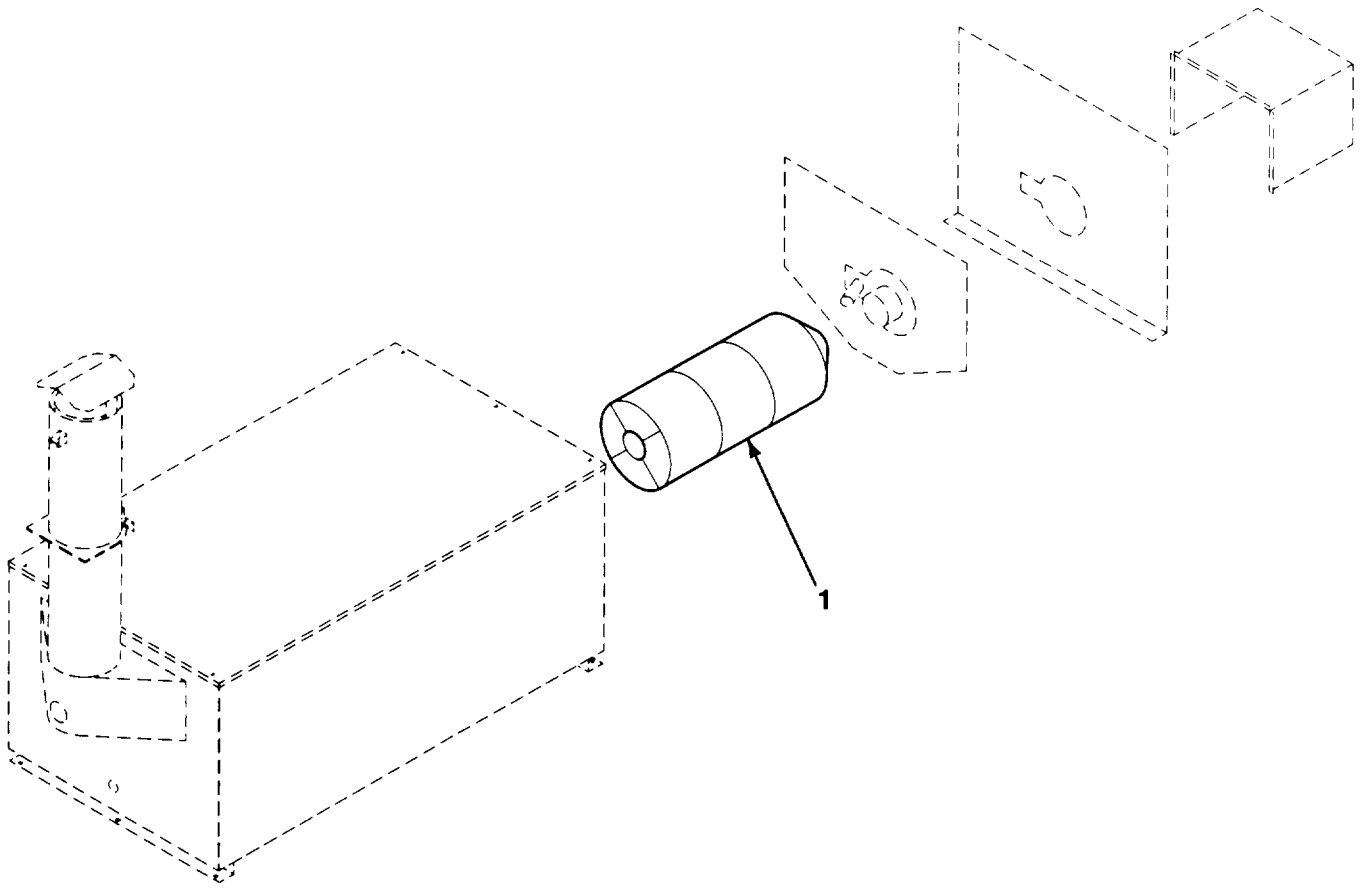


Figure 47. Combustion Chamber Liner

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 6011 COMBUSTION CHAMBER	
				FIG. 47 COMBUSTION CHAMBER LINER	
1	PFFZZ	06447	2HXXPBW2	LINER, HEAT EXCHANGE	1

END OF FIGURE

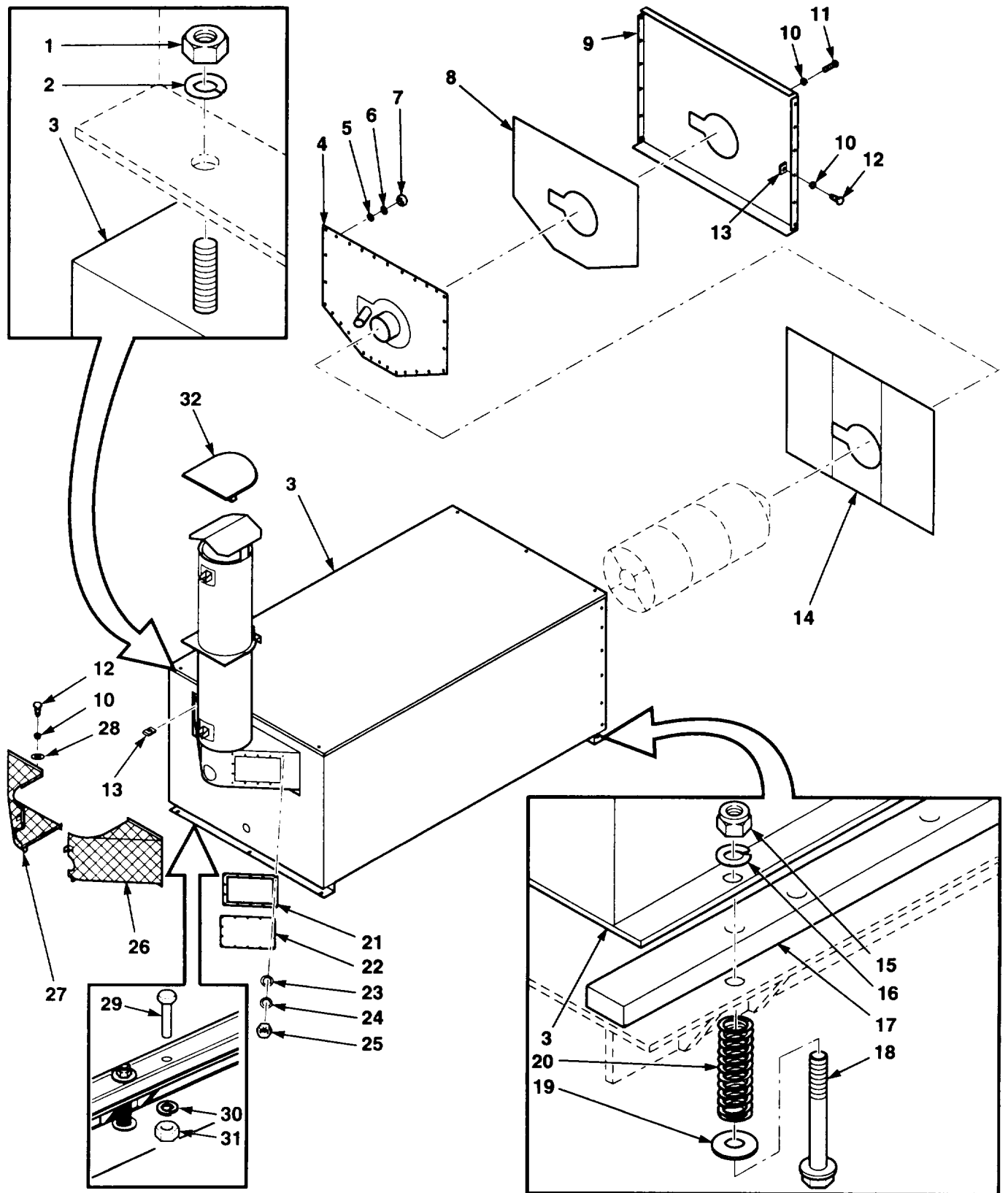


Figure 48. Exchanger Assembly

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
SECTION II					
GROUP 6013 HEAT EXCHANGER					
FIG. 48 EXCHANGER ASSEMBLY					
1	PAFZZ	96906	MS51967-14	NUT, PLAIN, HEXAGON	1
2	PAFZZ	96906	MS35338-48	WASHER, LOCK.....	3
3	XBFFF	06447	2HXXPBW1	POTIMELTINGIELECTRI.....	1
4	PFFZZ	06447	2HXXPBW3	COVER, ACCESS.....	1
5	PAFZZ	96906	MS27183-14	WASHER, FLAT.....	65
6	PAFZZ	81718	H2525M	WASHER, LOCK.....	65
7	PAFZZ	96906	MS51967-8	NUT, PLAIN, HEXAGON	65
8	PFOZZ	06447	2HXXPB10	INSULATION BLANKET,	1
9	XBFZZ	06447	2HXXPB2	PLATE, METAL.....	1
10	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	1
11	PAFZZ	96906	MS24628-63	SCREW, TAPPING	9
12	PAOZZ	96906	MS90725-6	SCREW, CAP, HEXAGON H.....	46
13	PAOZZ	39428	90679A029	NUT, CLIP-ON	46
14	PAFZZ	06447	2HXXPB1	GASKET.....	1
15	PAFZZ	96906	MS51967-20	NUT, PLAIN, HEXAGON	6
16	PFFZZ	96906	MS35338-50	WASHER, LOCK.....	1
17	PFFZZ	06447	2HXXPB11	SPACER, SPECIAL SHAP.....	2
18	PFFZZ	80204	B1821BH063C250N	SCREW;CAP, HEXAGON H.....	6
19	PAFZZ	96906	MS51412-13A	WASHER, FLAT.....	12
20	PFFZZ	43199	9-2420-3	SPRING, HELICAL COMP.....	6
21	PAFZZ	06447	2HXXPB5	GASKET.....	2
22	PFFZZ	06447	2HXXPB3	COVER, ACCESS.....	2
23	PAFZZ	96906	MS27183-9	WASHER, FLAT.....	24
24	PAFZZ	96906	MS35338-44	WASHER, LOCK.....	34
25	PAFZZ	96906	MS51967-2	NUT, PLAIN, HEXAGON	24
26	PFFZZ	06447	2HXXPB6	GUARD, STACK, HEATER.....	1
27	PFFZZ	06447	2HXXPB7	STACK GUARD, L SIDE.....	1
28	PAOZZ	96906	MS27183-9	WASHER, FLAT.....	14
29	PAOZZ	80204	B1821BH063C250N	SCREW, CAP, HEXAGON H.....	8
30	PAOZZ	96906	MS35340-50	WASHER, LOCK.....	8
31	PAOZZ	96906	MS51967-20	NUT, PLAIN, HEXAGON	8
32	XBOZZ	06447	2HXXPB14	RAIN CAP	1

END OF FIGURE

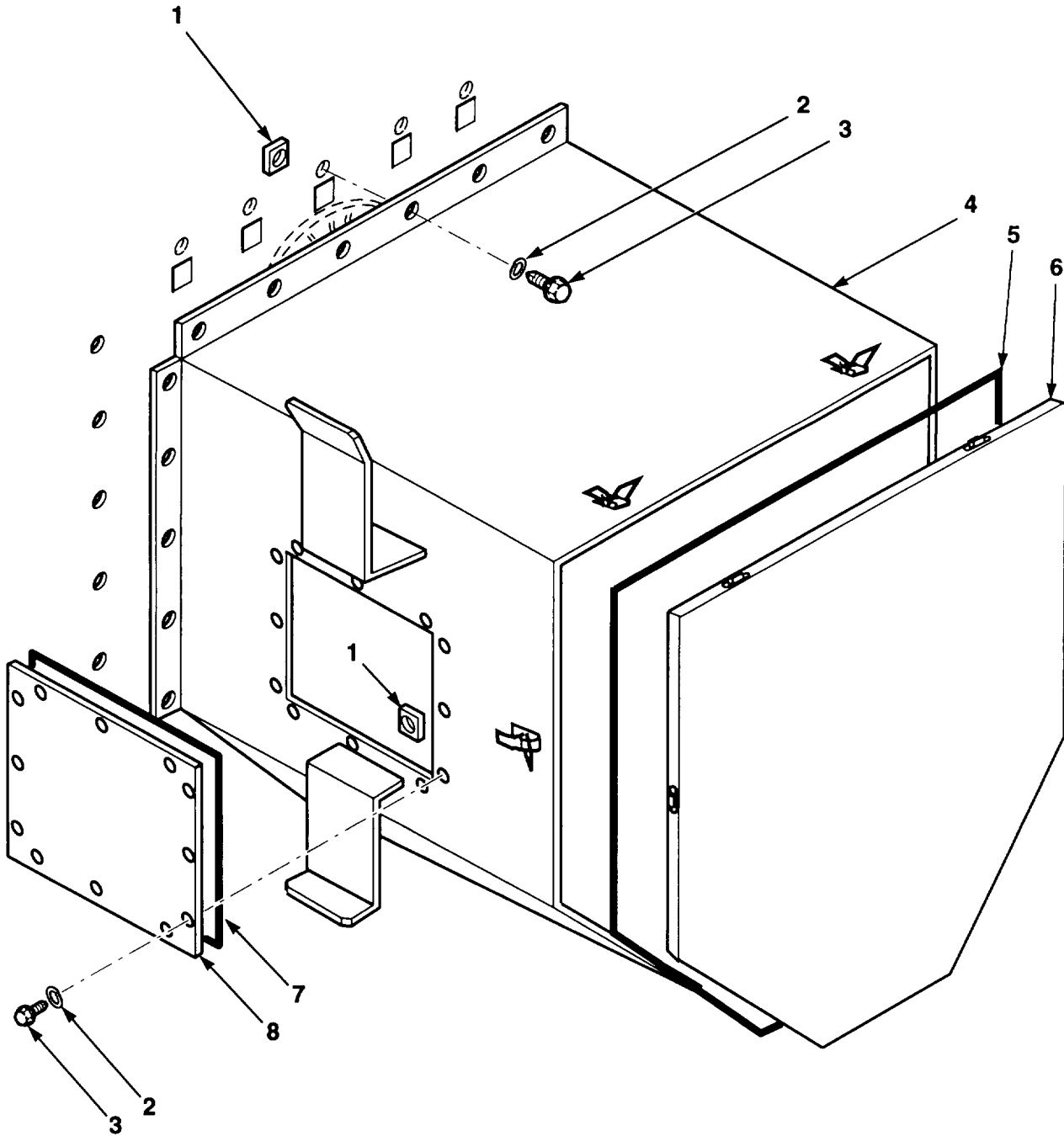


Figure 49. Burner Cover

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 6013 HEAT EXCHANGER	
				FIG. 49 BURNER COVER	
1	PAFZZ	39428	90679A029	NUTCLIP-ON	28
2	PAOZZ	96906	MS35338-44	WASHER, LOCK.....	28
3	PAOZZ	96906	MS90725-6	SCREW, CAP, HEXAGON H.....	28
4	XBFZZ	06447	2HXXPBW4	COVER, ACCESS.....	1
5	XBOZZ	06447	2HXXPB13	GASKET.....	1
6	XBOZZ	06447	2HXXPB12	DOOR.....	1
7	PFOZZ	97942	525R972H01	INSULATION FELT, THE.....	1
8	PFOZZ	06447	2HXXPB8	COVER, ACCESS.....	1

END OF FIGURE

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

GROUP 94 KITS

GROUP 9401 KITS AND RELATED PARTS

FIG. KITS

1	PFOZZ	06721	RN-10-HL	PARTS KIT, RELAY VAL	1
				PACKING, PREFORMED (1) 16-8	
				PACKING , PREFORMED (1) 16-22	
				PISTON, AIR BRAKE SY (1) 16-5	
				PROTECTOR, EXHAUST (1) 16-18	
				RETAINER, PACKING (1) 16-17	
				RING, QUAD (1) 16-25	
				SPRING, HELICAL, COMP (1) 16-23	
				SPRING, HELICAL, COMP (1) 16-13	
				VALVE, CHECK (1) 16-6	
				VALVE, RELAY , AIR PRE (1) 16-12	

END OF FIGURE

KIT-1

SECTION II					
(1)	(2)	(3)	(4)	(5)	(6)
ITEM	SMR		PART	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
NO	CODE	CAGEC	NUMBER		
				GROUP 95 BULK ITEMS	
				GROUP 9501 BULK MATERIALS LIST	
				FIG. BULK 1 (NOT ILLUSTRATED)	
1	PAOZZ	61424	PFT-6B	HOSE, NONMETALLIC 61424 PFT-6B-1	1
				RANDOM LENGTH.....	
2	PAOZZ	39428	3706T88	STRAP WEBBING	1

END OF FIGURE

BULK -1

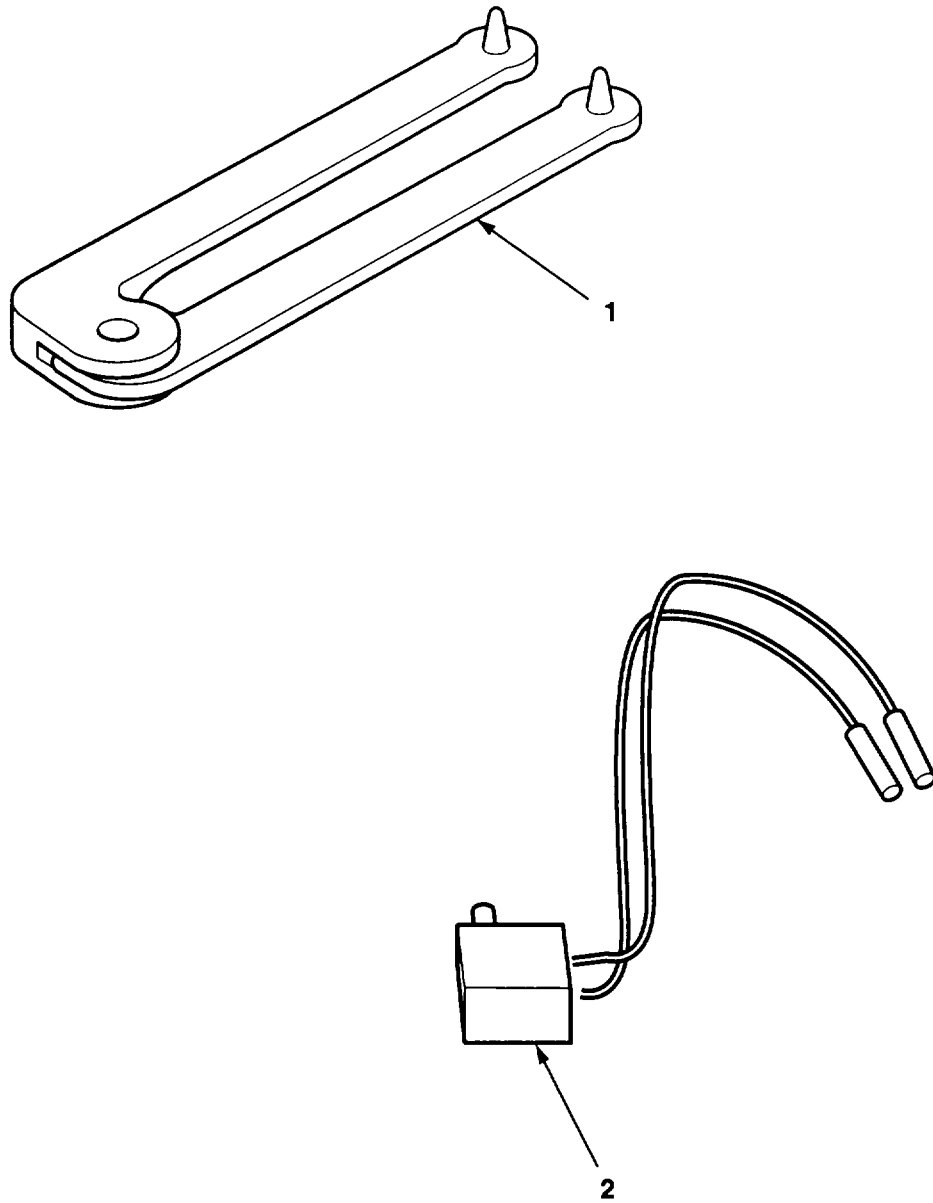


Figure 50. Special Tools

SECTION III

TM 5-3895-377-13&P

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 26 TOOLS AND TEST EQUIPMENT GROUP 2604 SPECIAL TOOLS FIG. 50 SPECIAL TOOLS	
1	PEOZZ	05506	482	WRENCH, SPANNER.....	
2	PEOZZ	17479	117053	CONNECTOR, PLUG, ELEC.....	
				END OF FIGURE	

CROSS- REFERENCE-INDEXES

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5305-00-016-6327	32	5	4730-00-289-1930	14	11
5995-00-038-3914	11	4	5905-00-329-5320	9	2
5310-00-045-5001	17	8	5330-30-375-2933	36	11
	48	30	5310-00-393-6685	9	5
5305-00-052-8911	48	11	6145-00-395-8799	30	6
5305-00-054-9265	44	18	5310-00-407-9566	44	32
5310-00-056-3395	44	48		44	57
5305-00-068-0498	44	24	5330-00-464-7329	4	4
5305-00-068-0500	44	4		5	5
5305-00-068-0501	44	8		7	4
5305-00-068-0502	9	11	5975-00-469-9238	2	5
	9	13	5905-00-520-6516	9	3
	48	12	4320-00-523-2304	36	1
	49	3	5940-00-549-1984	30	7
5305-00-068-5400	37	4	5310-00-550-1130	9	18
4730-00-069-1187	15	19	4330-00-552-7910	43	7
5305-00-069-5572	36	6	5305-00-562-2750	2	2
	36	12		14	13
5305-00-071-2069	35	1		15	24
5305-00-071-2071	39	16		35	8
5310-00-080-6004	44	68	5310-00-576-5752	44	52
	48	5	5310-00-582-5965	9	10
5305-00-C81-6729	17	6		9	14
5310-00-087-4652	17	7		26	4
5365-00-090-5426	9	6		27	6
3110-00-100-0516	18	8		35	6
3110-00-100-0544	18	3		44	23
3110-00-100-3541	18	2		48	10
5305-00-115-9526	44	34		48	24
5905-00-139-1989	9	1		49	2
3110-00-142-4355	18	7	5310-00-584-5272	35	2
5940-00-143-4780	9	22		39	13
5940-00-143-4794	9	21		48	2
6240-00-144-4693	4	6	5310-00-584-7888	39	25
	6	5	3030-00-605-1377	37	5
6240-00-155-8717	5	7	5310-00-637-9541	15	7
	7	6		15	22
	8	4		23	2
5305-00-180-4966	44	42		31	4
	44	51		44	33
4010-00-184-3476	22	4		44	69
5999-00-186-3912	30	4		48	6
4730-00-188-3514	15	2	5365-00-687-8575	37	2
4730-00-196-1468	15	4	5305-00-723-9385	46	6
5340-00-222-1604	14	14	5305-30-724-5893	44	25
5305-00-225-3843	26	1		44	27
5306-00-225-8499	44	31	5305-00-724-5914	46	13
	44	56	5305-00-724-61761	39	6
5306-00-226-4835	27	8	5305-00-724-6798	44	49
4730-00-287-2182	38	8	5305-00-724-7224	39	11

CROSS- REFERENCE-INDEXES

STOCK NUMBER	NATIONAL STOCK NUMBER INDEX				FIG.	ITEM
	FIG.	ITEM	STOCK NUMBER	FIG.		
5305-00-724-7224	39	23	5975-00-924-9927	30	2	
	49	18	6220-00-926-1331	5	1	
	4e	29	5310-00-928-9321	44	40	
5310-00-732-0558	31	3	5310-00-934-9757	27	7	
	48	7		32	15	
5310-00-732-0560	24	4		34	4	
4730-00-733-5707	15	18		44	6	
5360-00-738-6943	16	23	5305-00-939-9206	39	28	
5310-00-761-6882	35	7	2530-00-977-5741	KIT	1	
	48	25	5310-00-984-3805	44	5	
5310-00-763-8920	17	9	53C5-00-984-6191	44	7	
	46	10	5305-00-984-6193	44	19	
	48	15	5305-00-984-6195	34	5	
	48	31	5305-00-984-6203	32	16	
			5305-00-988-1725	4	7	
5340-00-764-7051	2	14		5	9	
	15	25		6	8	
5310-00-768-0318	48	1		7	8	
5330-00-769-2360	40	6		8	7	
5935-00-773-1428	9	12		9	20	
5975-00-794-2523	30	3	5305-00-988-7602	44	36	
5310-00-820-6653	39	2		4	8	
	39	9	5310-00-997-1888	5	10	
	39	21		6	9	
	46	11		7	9	
	48	16		9	8	
				9	15	
5310-00-823-8804	48	23		18	1	
	48	28	5330-01-035-9418	3	4	
3110-00-829-9669	36	23	6220-01-047-4059	7	7	
5330-00-829-9670	36	27	4730-01-062-2570	15	5	
5310-00-834-8732	35	3		3	2	
	39	12	5325-01-073-2812	32	2	
5310-00-838-1702	39	24	5940-01-079-1936	16	1	
5975-00-839-5320	2	13	2530-01-095-8752	15	20	
4330-00-844-0413	43	8	4730-01-096-9128	36	8	
6220-00-844-6471	4	5	5330-01-098-5997	49	7	
		6	5640-01-103-8587	2	10	
	5	5	5975-01-113-5885	4	3	
5935-00-846-3883	9	7	6150-01-115-0845	5	4	
5310-00-851-2674	26	5		6	6	
5310-00-851-2677	39	1		7	3	
	39	10		8	5	
	39	20		43	11	
			4730-01-118-8278	8	3	
5310-00-851-2682	15	6	5330-01-121-5360	5	3	
	15	21	5325-01-127-1390	3	1	
	23	1	6220-01-133-5941	6	7	
5975-00-878-3791	30	1	4730-01-134-0854	14	9	
5330-00-882-0665	36	33	4730-01-146-1062	14	5	
5330-00-916-4677	15	14	4730-01-146-1063			
	15	16				
5340-00-922-6300	2	3				

CROSS- REFERENCE-INDEXES

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
2510-01-148-1636	20	1	4733-01-360-2246	15	15
5935-01-160-6132	50	2	5330-01-378-0057	38	4
4720-01-169-9991	BULK	1	5310-01-385-6796	48	19
7690-01-171-9522	29	9	3040-01-386-6637	11	4
5330-01-182-4137	40	11	4730-01-387-4534	36	16
5310-01-193-4454	13	16	5975-01-388-5641	32	3
5310-01-193-9080	13	15	2530-01-395-2297	13	6
5310-01-193-9081	18	6	2533-01-395-5262	13	6
5360-01-195-7753	40	2	5930-01-395-8671	32	14
5310-01-195-8930	40	12	5365-01-396-3888	46	3
5315-01-196-5296	13	10	5340-01-396-3890	48	4
5305-01-196-6696	40	8	5340-01-396-3891	48	22
5310-01-197-1476	18	5	5365-01-396-3892	16	19
5305-01-205-5430	40	13	5365-01-396-3893	16	25
5305-01-210-4595	15	1	5340-01-396-3894	46	5
	15	8	5340-01-396-3895	16	9
5305-31-213-5289	16	28	5360-01-396-3896	41	5
4320-01-216-4021	36	28	5340-01-396-3897	41	1
5360-01-216-6991	40	3	5340-01-396-3899	14	7
4010-01-217-0911	22	3	5340-01-396-3903	14	3
6145-01-229-4129	5	8	5360-01-396-3901	24	2
3120-01-233-0556	36	10	5360-01-396-3902	13	13
4030-01-235-7939	22	2	5340-01-396-3903	42	7
5365-01-272-2499	36	26	5340-01-396-3904	46	2
5365-01-272-2536	36	25	5360-01-396-3905	13	8
4320-01-273-1365	36	2	5365-01-396-3906	13	11
4320-01-273-1376	36	5	5340-01-396-3907	42	1
3020-01-273-4764	36	3	5340-01-396-3908	44	16
5975-01-273-8133	14	12	5365-31-396-3910	41	6
5310-01-274-3153	36	29	5340-01-396-3911	44	21
5365-01-274-3198	36	32	5340-01-396-3912	49	8
5307-01-277-2306	18	12	5340-01-396-3913	38	5
5310-01-277-4855	18	10	5340-01-396-3914	36	20
5330-01-280-6522	40	9	5360-01-396-3915	42	5
6220-01-283-8703	7	1	5365-01-396-3916	36	15
6220-01-283-8706	4	1	5340-31-396-3917	36	18
5306-01-285-9971	24	1	5365-01-396-3919	36	14
2510-01-286-3406	25	4	6150-01-396-4216	44	10
2530-01-292-8302	13	1	5360-01-396-4316	48	20
5315-01-304-5121	18	9	5950-31-396-4607	44	22
5999-01-315-4428	32	12	4730-01-396-5055	15	11
6150-01-321-5778	3	3	4820-01-396-5056	41	8
5330-01-321-6596	8	6	4820-01-396-5057	42	4
5305-01-325-8387	44	70	4820-01-396-5058	41	4
5930-01-330-3513	32	13	4730-31-396-5060	15	13
5120-01-337-0511	50	1	15	17	
3120-01-339-0778	37	7	4730-01-396-5061	39	3
5945-01-341-9162	32	7	4730-01-396-5062	44	11
6110-01-341-9209	32	4	4730-01-396-5063	44	26
4730-01-359-9541	15	12	4820-01-396-5065	41	2

CROSS- REFERENCE-INDEXES

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4730-01-396-5066	44	17	6105-01-396-9515	44	12
4730-01-396-5067	40	7	6105-01-396-9517	45	1
4730-01-396-5069	36	7	5940-01-396-9933	9	23
4730-01-396-5070	38	3	7690-01-396-9963	29	8
5306-01-396-5277	30	5	5980-01-397-0482	1	1
5305-01-396-5281	36	19	2530-01-397-1000	16	24
6223-01-396-5363	6	1	2530-01-397-1167	15	3
6150-01-396-5366	11	3	2530-01-397-1168	16	5
6625-01-396-5453	32	1	2530-01-397-1171	16	12
4530-01-396-5523	44	59	4730-01-397-1172	38	1
5330-01-396-5843	48	14	5935-01-397-1474	34	1
5360-01-396-5844	44	58	3895-01-397-1605	48	27
5330-01-396-5845	48	21	3895-01-397-1606	48	26
5330-01-396-7235	4	2	3895-01-397-1607	46	7
	5	2	3895-01-397-1608	46	1
	6	2	6220-01-397-1861	4	5
	7	2	4820-01-397-1987	40	5
5305-01-396-7239	16	10	5355-01-397-2253	46	8
5306-01-396-7241	25	3	5355-01-397-2256	33	3
5307-01-396-7242	38	7	4730-31-397-2320	43	4
5330-01-396-7243	44	14	5355-01-397-2826	44	53
5330-01-396-7244	44	15	2990-01-397-3550	16	18
5305-01-396-7245	44	47	4820-01-397-3769	42	2
5330-01-396-7246	44	45	4820-01-397-3998	42	8
5330-01-396-7247	36	21	5977-01-397-4813	44	9
2530-01-396-7767	13	17	5925-01-397-4949	32	11
2530-01-396-7768	19	1	5925-01-397-4951	32	10
2530-01-396-7770	18	11	9905-01-397-5155	29	2
2530-01-396-7771	13	14	4320-01-397-5288	36	9
3020-01-396-7772	37	8	2530-01-397-5290	17	2
4710-01-396-7773	44	3	4730-01-397-5309	36	22
3020-01-396-7774	37	1	6685-01-397-5632	33	1
2910-01-396-7775	44	55	4710-01-397-5692	14	10
4720-01-396-7777	35	10	4710-01-397-5693	14	4
5330-01-396-8304	46	9	4720-01-397-5696	14	8
5330-01-396-8006	46	12	4710-01-397-5697	14	2
5330-01-396-8007	39	7	4713-31-397-5698	14	6
5330-01-396-80C8	46	4	4540-01-397-6014	39	15
5330-01-396-8009	39	19	4420-01-397-6031	39	18
5330-01-396-8010	39	27	5935-01-397-6394	9	16
5330-01-396-8011	39	5	5330-01-397-6852	36	17
5330-01-396-8012	39	14	3995-01-397-7383	47	1
4710-01-396-8266	44	54	9905-01-397-7509	29	6
5310-01-396-8380	25	2	9905-01-397-7510	29	7
5310-01-396-8383	36	34	4820-01-397-7969	16	2
5310-01-396-8385	38	6	9905-01-397-8069	29	4
5310-01-396-8386	44	41	4820-01-397-8080	40	4
6220-01-396-9512	8	2	4820-01-397-8583	16	6
6223-01-396-9513	8	1	4820-01-397-8590	40	1
6220-01-396-9514	6	4	5940-01-397-8648	9	19

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
2610-01-397-8794	20	2	4730-01-412-7563	44	65
4920-01-398-0450	40	10	2540-01-412-7565	26	3
5330-01-398-0706	16	17	5975-01-412-7770	32	8
5330-01-398-0715	16	22	2530-U1-412-8159	13	9
5330-01-398-0717	16	8	2530-01-412-8160	13	4
5330-01-398-0721	16	3	2510-01-412-8163	25	5
5975-01-398-1452	2	4	2530-01-412-8164	13	5
5975-01-396-1900	2	1	2530-01-412-8165	13	3
4820-01-398-1977	15	23	2530-01-412-8166	13	4
9905-01-398-2417	29	5	4730-01-412-9563	43	1
5945-01-398-3201	44	62	9340-01-413-2225	44	38
4820-01-398-4686	41	3	6150-01-413-3472	10	1
4730-01-398-5657	42	3	6150-01-413-3473	10	2
5945-01-398-8265	44	20	5340-01-413-3714	44	37
4140-01-398-8938	44	28	6145-01-413-8466	11	1
2940-01-399-0797	38	2	9905-01-413-9297	29	3
6110-01-399-3632	32	6	4320-01-414-0466	36	31
3895-01-406-2582	44	61	2530-01-414-9313	13	1
5340-01-410-1055	BULK	2	2910-01-416-4031	44	35
5310-01-410-7946	9	4	5365-01-416-5333	27	3
	48	13	5365-01-416-6596	25	6
	49	1	5305-01-417-3961	13	2
5360-01-410-7948	13	12	5930-01-417-5569	32	17
5315-01-410-8149	37	3	2530-01-417-5815	12	1
5315-01-410-8402	37	6	5330-01-417-6444	42	6
3895-01-410-8806	27	4	6105-01-417-9118	44	30
5365-01-411-1610	48	17	5340-01-417-9876	43	6
5330-01-411-2494	16	4	3120-01-418-1026	36	24
5330-01-411-2495	6	3			
4730-01-411-4870	35	9			
5975-01-411-6588	44	29			
4730-01-411-8483	44	63			
4720-01-411-8484	43	5			
4730-01-411-8485	44	64			
4720-01-411-8486	44	66			
4730-01-411-8487	43	3			
5305-01-411-8662	9	17			
5975-01-411-8781	2	8			
4530-01-412-0271	44	1			
5310-01-412-0865	36	33			
4730-01-412-1131	43	2			
4720-01-412-1664	15	10			
5340-01-412-1740	2	15			
5999-01-412-2869	32	9			
5355-01-412-3196	33	2			
5975-01-412-3911	2	6			
5330-01-412-4452	34	3			
5340-01-412-6381	41	7			
2540-01-412-6757	44	44			
4530-01-412-6762	44	2			

CROSS-REFERENCE INDEXES

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
76588	A-193-816	5307-01-396-7242	38	7
76588	A-194-4	5310-01-396-8385	38	6
16662	AC-37432	5360-00-738-6943	16	23
06721	AC-37495		16	7
16662	AC37442		16	11
16662	AC37448		16	13
06721	A0-37444	5365-01-396-3893	16	25
06721	AD-37455		16	15
06721	AD-37459	2530-01-397-1168	16	5
C6721	AD-73439		16	16
06721	AD-75530	5340-01-396-3895	16	9
06721	AD-87349	4820-01-397-8583	16	6
06721	A0-97596	2530-01-397-1171	16	12
06721	AE-97524	2530-01-397-1000	16	24
15460	AP-233		25	1
82370	A104	5975-00-878-3791	30	1
76588	A216-WCB	2940-01-399-0797	38	2
71176	A58	3030-00-605-1377	37	5
80204	81821BH0250100N	5305-00-225-3843	26	1
80234	81821BH0310250N	5306-00-226-4935	27	8
80204	81821BH0380075D	5305-00-115-9526	44	34
80204	B1821BH0500150N	5305-00-071-2069	35	1
80204	818218H0500200N	5305-00-071-2071	39	16
80204	81821BH0630250N	5305-00-724-7224	39	11
			39	23
			498	18
			48	29
1Y370	82GA8852N642R	2910-01-396-7775	44	55
06721	0-3494-CZ	2530-01-397-5290	17	2
51384	0F66KG	4530-01-412-6762	44	2
02295	0R115L-1E	5930-01-417-5569	32	17
37296	01541	5310-00-820-6653	39	21
07860	021452		23	3
27319	07027A1023		44	67
93061	DC602-4	4820-01-398-1977	15	23
03743	EC50	5975-00-469-9238	2	5
66842	E0218020	5925-01-397-4951	32	10
66842	E0238040	5925-01-397-4949	32	11
76588	G-3.0-781*K1-0	5330-C1-378-0057	38	4
81348	GP2STYLXYRACLA/ S/7.50R16/D/LTAW	2610-01-148-1636	20	1
73616	GRB58	5975-00-924-9927	30	2
0BKKB	GRC58	5975-00-794-2523	30	3
71176	H-11/8	5365-00-687-8575	37	2
71176	H-13/8	3120-01-339-0778	37	7
76588	HRS	5340-01-396-3913	38	5
0ACF4	HTH2660	6105-01-396-9517	45	1
81718	H2525M	5310-00-637-9541	15	7
			15	22
			23	2
			31	4

CROSS-REFERENCE INDEXES

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
81718	H2525M	5310-00-637-9541	44	33
			44	69
			49	6
74545	IN4100DM		34	2
63097	KK125	4320-00-523-23C4	36	1
46717	LA-200-15	6240-00-155-8717	5	7
			7	6
			8	4
6M717	LCD3000-001	5980-01-397-0482	1	1
76599	MMF4-SS	4730-31-118-8278	43	11
01059	MR-16HD-700/750/ L78-16	2610-01-397-8794	20	2
96906	MS16995-26	5305-00-988-7602	9	20
			44	36
96906	MS20913-3	4730-00-188-3514	15	2
96906	MS20913-8	4730-00-287-2182	38	8
96906	MS21333-20	5340-00-222-1604	14	14
96906	MS21333-69	5340-00-764-7051	2	14
			15	25
96906	MS21333-77	5340-00-922-6300	2	3
96906	MS24627-38	5305-00-016-6327	32	5
96936	MS24628-63	5305-00-052-8911	48	11
96936	MS24628-64	5305-00-562-2750	2	2
			14	13
			15	24
			35	8
96906	MS24667-22	5305-00-068-5400	37	4
96906	MS24667-53	5305-00-081-6729	17	6
96906	M524679-2	5310-00-928-9821	44	40
96906	M524679-5	5310-00-994-3805	44	5
96906	MS25036-108	5940-00-143-4780	9	22
96906	MS25036-112	5940-00-143-4794	9	21
96906	MS27183-14	5310-00-080-6004	44	68
			48	5
96906	M527183-9	5310-00-823-8304	48	23
			48	28
96906	MS3367-3	5975-01-273-8133	14	12
96906	MS35206-243	5305-00-984-6191	44	7
96906	MS35206-245	5305-00-984-6193	44	19
96906	M535206-247	5305-00-984-6195	34	5
96906	MS35206-255	5305-00-984-6203	32	16
96906	MS35206-281	5305-30-988-1725	4	7
			5	9
			6	8
			1	8
			8	7
96906	MS35333-39	5310-00-576-5752	44	52
96906	MS35333-40	5310-00-550-1130	9	18
96906	MS35338-44	5310-00-582-5965	9	10
			9	14
			26	4

CROSS-REFERENCE INDEXES

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS35338-44	5310-00-582-5965	27	6
			35	6
			44	23
			48	10
			48	24
96906	MS35338-45	5310-00-407-9566	49	2
			44	32
96906	MS35338-48	5310-00-584-5272	44	57
			35	2
96906	MS35338-50	5310-00-820-6653	48	2
			46	11
96906	MS35338-51	5310-00-584-7888	48	16
			39	25
96906	MS35340-50	5310-00-045-5001	17	8
			48	30
96906	MS35649-2252	5310-00-997-1888	4	8
			5	10
			6	9
			7	9
			8	8
96906	MS35649-2382	5310-00-056-3395	9	15
			44	48
96906	MS35649-282	5310-00-934-9757	27	7
			32	15
96906	MS35691-1	5310-00-851-2674	34	4
			44	6
96906	MS35691-17	5310-00-851-2682	26	5
			15	6
96906	MS35691-33	5310-00-834-8732	15	21
			23	1
96906	MS35691-49	5310-00-851-2677	35	3
			39	12
96906	MS35691-57	5310-00-838-1702	39	1
			39	10
96906	MS49005-5	5310-00-838-1702	39	20
			39	24
96906	MS51412-13A	5310-01-385-6796	16	20
			48	19
96906	MS51849-64	5305-00-180-4966	44	42
			44	51
96906	MS51922-17	5310-00-087-4652	44	27
			17	7
96906	MS51955-19	5305-00-054-9265	44	18
			44	18
96906	M551963-65	5305-00-723-9385	46	6
			44	25
96906	MS51963-81	5305-00-724-5893	44	27
			44	27
96906	MS51964-49	5305-00-724-6798	44	49
			44	49
96906	MS51967-14	5310-00-768-0318	48	1
			48	1
96906	MS51967-2	5310-00-761-6882	35	7
			48	25
96906	MS51967-20	5310-00-763-8920	17	9
			46	10

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS51967-20	5310-00-763-8920	48	15
			48	31
96906	MS51967-8	5310-00-732-0558	31	3
			48	7
96906	MS51968-14	5310-00-732-0560	24	4
96906	MS75021-1	5935-00-846-3883	9	7
96936	MS90725-1	5305-00-068-0498	44	24
96936	MS90725-167	5305-00-724-6761	39	6
96936	MS90725-168	5305-00-724-5914	46	13
96906	MS90725-193	5305-00-939-9206	39	2a
96906	MS90725-3	5305-00-068-0500	44	4
96906	MS90725-34	5306-00-225-8499	44	31
			44	56
96906	MS90725-5	5305-00-068-0501	44	8
96906	MS90725-6	5305-00-068-0502	9	11
			9	13
			48	12
			49	3
96906	M590725-64	5305-01-325-8387	44	70
96906	MS90725-84	5305-00-069-5572	36	6
			36	12
75037	MV10BCX	5940-01-079-1936	32	2
27319	M436A1110		44	60
58429	N-10492	4730-00-733-5707	15	18
06721	N-11728-CQ	5330-01-398-0715	16	22
06721	N-11728-TT	5330-01-398-0717	16	8
06721	N-11728-TV	5330-01-411-2494	16	4
06721	N-11728-VR	5330-01-398-0721	16	3
06721	N-11728-WL		16	26
06721	N-13773-B	5330-01-398-0706	16	17
06721	N-4331-CB	2530-01-095-8752	16	1
51384	NLH66KGU	4730-01-396-5062	44	11
61424	PFT-63	4720-01-169-9891	BULK	1
61424	PFT-68-10		15	9
14280	PK9GTA	5975-01-388-5641	32	3
66842	P30NPS03	9905-01-397-7509	29	6
66842	P30NPS04	9905-01-397-7510	29	7
81348	QQW343C0681T	6145-00-395-8799	30	6
31007	Q1925	5310-00-820-6653	39	2
			39	9
27319	Q795A1004	5340-01-396-3911	44	21
81349	RER75F4R02R	5905-00-139-1989	9	1
81349	RER75F4R99R	5905-00-329-5320	9	2
81349	RER75F6R34R	5905-00-520-6516	9	3
06721	RN-10-HL	2530-00-977-5741	KIT	1
27319	R7795A1001	5945-01-398-8265	44	20
13226	S-200CR-RD-24	6220-01-283-8706	4	1
76588	5-3.0-781-4-F-0-0	4730-01-396-5070	38	3
74829	SLU35	5940-00-549-1984	30	7
89257	SWL 1780TSFW/P&C		23	4

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
06447	T-16017.50-F	4710-01-397-5693	14	6
06447	T-16C30-C	4710-01-397-5697	14	2
06447	T-16072-C	4710-01-397-5693	14	4
p6447	T-16180-C	4710-01-397-5692	14	10
06447	T-200TA		14	1
C3743	T351AN035010	5975-00-839-5320	2	13
82879	W4418	6145-01-413-8466	11	1
14351	X296	5310-00-584-5272	39	13
81349	OE910		28	1
05415	003248	4730-00-196-1469	15	4
79146	012033	4730-01-096-9128	15	20
15460	017-153	2530-01-396-7768	19	1
6M717	01726819-001	6625-01-396-5453	32	1
15460	030068		24	3
6M717	03926683-000	5355-01-412-3196	33	2
15460	10-1	5330-01-035-9418	18	1
98343	10035	4730-01-396-5060	15	13
			15	17
06721	101318-F		16	14
06721	102621		16	21
06721	102631	2990-01-397-3550	16	18
06721	102692-DA		16	27
98343	10440	5330-00-916-4677	15	14
			15	16
98343	10451EA	4730-01-359-9541	15	12
98343	10452-SA	4730-01-360-2246	15	15
35197	11-17	5306-01-285-9971	24	1
17479	117053	5935-01-160-6132	50	2
06721	11901	4730-01-396-5055	15	11
15460	12-1		24	5
15463	13-104-2	5365-01-416-6596	25	6
97403	13222E0109	5305-01-210-4595	15	1
			15	8
60038	14125A	3110-00-142-4355	18	7
60038	14276	3110-00-100-0516	19	8
06447	1457	5340-01-396-3900	14	3
79470	1468X6	4730-01-062-2570	7	7
			15	5
51384	16703GY		44	43
08836	168	6240-00-144-4693	4	6
			6	5
15460	18-11	2510-01-286-3406	25	4
15460	18-20	2510-01-412-8163	25	5
06447	18018-MF	4720-01-397-5696	14	8
35301	182-12	4730-00-299-1930	14	11
15460	19-2	5315-01-304-5121	18	9
98343	19820	2530-01-397-1167	15	3
63097	2-055-021-375	3110-00-829-9669	36	23
63097	2-108-015-880-04	3120-01-233-0556	36	10
63097	2-115-006-880		36	4
63097	2-140-002-781	4320-01-414-0466	36	31

CROSS-REFERENCE INDEXES

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
63097	2-150-019-255	5305-01-196-6696	40	8
63097	2-154-008-375	5305-01-396-5281	36	19
63097	2-214-809-100	4320-01-397-5288	36	9
63097	2-254-040-367	5330-01-396-7247	36	21
63097	2-283-014-378	5330-00-882-0665	36	30
63097	2-288-006-210	5365-01-274-3198	36	32
63097	2-288-040-213	5365-01-272-2536	36	25
63097	2-311-003-906-15 C	5330-01-098-5997	36	8
63097	2-313-063-804-15	5330-00-375-2933	36	11
63097	2-465-007-375	4320-01-216-4021	36	28
63097	2-469-002-376	4730-01-387-4534	36	16
63097	2-470-143-376	5340-01-396-3917	36	18
63097	2-490-140-375	5340-01-396-3914	36	20
63097	2-503-006-376	5310-01-195-8930	40	12
63097	2-505-008-375	4730-01-397-5309	36	22
63097	2-507-005-375	5310-01-396-8383	36	34
63097	2-512-007-960	5330-00-769-2360	40	6
63097	2-512-012-860	5330-01-182-4137	40	11
63097	2-512-018-860	5330-01-290-6522	40	9
63097	2-520-015-830	5330-00-829-9670	36	27
63097	2-540-078-100	4730-01-396-5067	40	7
63097	2-542-002-376	4730-01-396-5069	36	7
63097	2-542-004-376	5365-01-396-3919	36	14
63097	2-544-004-376	5365-01-396-3916	36	15
63097	2-557-004-370	5365-01-272-2499	36	26
63097	2-595-006-376	5305-01-205-5430	40	13
63097	2-763-019-610	5360-01-216-6991	40	3
63097	2-795-007-100	4820-01-397-1987	40	5
63097	2-796-007-100	4820-01-397-8083	40	4
63097	2-797-024-100	4820-01-398-0450	43	10
63097	2-798-022-100		40	14
63097	2-799-043-375	5360-01-195-7753	40	2
63097	2-805-026-375	5310-01-274-3153	36	29
63097	2-807-005-375	5310-01-412-0865	36	33
72692	2A-710	4330-00-844-0413	43	8
71176	2AK124H-1.125BOR	3020-01-396-7774	37	1
71176	2AK59H-1.375 BOR E	3020-01-396-7772	37	8
72692	2A700A3-8	4330-00-552-7910	43	7
06447	2HX-401INJNIP	4730-01-398-5657	42	3
06447	2HX-401M2-#750	482C-01-397-3769	42	2
06447	2HX-401M2-106-L	5340-01-396-3907	42	1
06447	2HX-401M2BODY	4820-01-397-3998	42	8
06447	2HX-401M2BTMCOV	5340-01-396-3903	42	7
06447	2HX-401M2PLUG	4820-01-396-5057	42	4
06447	2HX-401M2SPRING	5360-01-396-3915	42	5
06447	2HX-401M2TRING	5330-01-417-6444	42	6
06447	2HX-401M3-106	5340-01-396-3897	41	1
06447	2HX-401M3-750LB.	4820-01-396-5065	41	2

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
06447	2HX-4C1M3BODY	4820-01-396-5056	41	8
06447	2HX-401M3BTMCOV	5340-01-412-6381	41	7
06447	2HX-401M3INJNIP	4820-01-398-4686	41	3
06447	2HX-401M3PLUG	4820-01-396-5058	41	4
06447	2HX-401M3SPRING	5360-01-396-3896	41	5
06447	2HX-401M3TRING	5365-01-396-3910	41	6
06447	2HXBPB1	5355-31-397-2256	33	3
06447	2HXBPB10	5999-01-412-2869	32	9
06447	2HXBPB14		31	5
06447	2HXBPB15		31	1
06447	2HXBPB16	5330-01-412-4452	34	3
06447	2HXBPB19		43	9
06447	2HXBPB20	4530-01-412-0271	44	1
06447	2HXBPB21		2	9
06447	2HXBPB22		2	12
06447	2HXBPB23		2	11
06447	2HXBPB24		2	7
06447	2HXBPB25		2	16
06447	2HXBPB26		2	17
06447	2HXBPB3	6150-01-413-3473	10	2
06447	2HXBPB4		31	2
06447	2HXBPB5	7690-01-396-9963	29	8
06447	2HXBPB7	6685-01-397-5632	33	1
06447	2HXBPB9	5975-01-412-7770	32	8
06447	2HXBPB818		11	2
06447	2HXFLVPBW1		23	5
06447	2HXFPBW1		21	1
06447	2HXFPB1		26	2
06447	2HXFPB10		17	4
06447	2HXFPB11		17	5
06447	2HXFPB12		17	1
06447	2HXFPB2	2540-01-412-7565	26	3
06447	2HXFPB6	9905-01-397-5155	29	2
06447	2HXFPB7		22	1
06447	2HXFPB9		17	3
06447	2HXKEPPB7	5330-01-396-8007	39	7
06447	2HXLP81		9	9
06447	2HXLPB2	6150-01-413-3472	10	1
06447	2HXLPB3	6150-01-396-5366	11	3
06447	2HXLPB4	5975-01-398-1452	2	4
06447	2HXLPB5	5975-01-398-1900	2	1
06447	2HXLPB6	9905-01-397-8069	29	4
06447	2HXLPB7		9	8
06447	2HXPB5W2	3895-01-410-8806	27	4
06447	2HXP8506	5365-01-416-5333	27	3
06447	2HXPB516		27	5
06447	2HXPPB1		39	26
06447	2HXPPB100	5330-01-396-8011	39	5
06447	2HXPP811	5330-01-396-8010	39	27
06447	2HXPPB12	5330-01-396-8012	39	14
06447	2HXPPB15		35	5

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
06447	2HXPP916	9905-01-393-2417	29	5
06447	2HXPP83		39	22
06447	2HXPP84	4420-01-397-6031	39	18
06447	2HXPP85		39	8
06447	2HXPP86		39	4
06447	2HXPP87		39	17
06447	2HXPP83	4540-01-397-6014	39	15
06447	2HXPP89		35	4
06447	2HXXEPPBB	5330-01-396-8009	39	19
06447	2HXXEPPB81	5340-01-396-3904	46	2
06447	2HXXEPPB2	5365-01-396-3888	46	3
06447	2HXXEPPB3	5340-01-396-3894	46	5
06447	2HXXEPPB4	3895-01-397-1607	46	7
05447	2HXXEPPB5	5355-01-397-2253	46	8
06447	2HXXEPPB6	3895-01-397-1608	46	1
06447	2HXXEPPB7	5330-01-396-8006	46	12
06447	2HXXEPPB8	5330-01-396-8004	46	9
06447	2HXXEPPB9	5330-01-396-8008	46	4
06447	2HXXPBW1		48	3
06447	2HXXPBW2	3895-01-397-7383	47	1
06447	2HXXPBW3	5340-01-396-3990	48	4
06447	2HXXPBW4		49	4
06447	2HXXPB1	5330-01-396-5343	48	14
06447	2HXXPB10		48	8
06447	2HXXPB11	5365-01-411-1610	48	17
06447	2HXXPB12		49	6
06447	2HXXPB13		49	5
06447	2HXXPB14		48	32
06447	2HXXPB2		48	9
06447	2HXXPB3	5340-01-396-3391	49	22
06447	2HXXPB5	5330-01-396-5845	48	21
06447	2HXXPB6	3995-01-397-1606	48	26
06447	2HXXPB7	3895-01-397-1605	48	27
06447	2HXXPB8	5340-01-396-3912	49	8
13226	200-09122	6220-01-283-8703	7	1
13226	200011	6220-00-926-1331	5	1
13226	201R	6220-00-844-6471	4	5
			5	6
			7	5
15460	21-39	3040-01-396-6637	18	4
13226	210006	6220-01-396-5363	6	1
51384	21267	4140-01-398-8938	44	28
51384	21402	6105-01-417-9118	44	30
51384	21549	4730-01-396-5063	44	26
72971	22N-508	5975-01-113-5885	2	10
19207	22R775	4010-00-184-3476	22	4
15460	23-336	2530-01-414-9313	13	1
15460	23-337	2530-01-292-8302	13	1
13226	240003	6220-01-396-9513	8	1
06721	24115	5935-01-397-6394	9	16
06447	25X15	5340-01-396-3899	14	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
31654	250021-769	5310-01-277-4855	18	10
31654	250021-770	5307-01-277-2306	18	12
60038	25520	3110-00-100-0544	18	3
60038	25580	3110-00-100-3541	18	2
06721	26W32012	5305-01-213-5289	16	28
93061	269NTA-6-4	4730-00-069-1187	15	19
73007	29270	2910-01-416-4031	44	35
63097	3-060-035-922	3120-01-418-1026	36	24
63097	3-077-067-080		36	13
63097	3-381-400-088	4320-01-273-1376	36	5
63097	3-420-401-47J-54	3020-01-273-4764	36	3
63097	3-524-008-48N	5330-01-397-6852	36	17
63097	3-570-552-312-37	4320-01-273-1365	36	2
63097	3-795-503-000-19	4820-01-397-8590	40	1
DACF4	3MSG223002602		45	2
66842	3SB03-PFG11	5930-01-395-8671	32	14
66842	3SB03-PFR11	5930-01-330-3513	32	13
OACF4	3S81400-OA	5999-01-315-4428	32	12
DACF4	3TF3200-OA-K6	6110-01-399-3632	32	6
DACF4	3TF4622-OA-K6	6110-01-341-9209	32	4
DACF4	3UA5800-2D	5945-01-341-9162	32	7
06721	30-X-909	5305-01-396-7239	16	10
06721	300479-AB	4820-01-397-7969	16	2
51384	31346	9340-01-413-2225	44	38
51384	31347	5975-01-411-6588	44	29
51384	31389	4730-01-396-5066	44	17
51384	31436	5330-01-396-7244	44	15
51384	31550	5340-01-396-3908	44	16
51384	31561	5330-01-396-7246	44	45
51384	3156703	5330-01-396-7243	44	14
60535	32-DA11-0960-110	4720-01-396-7777	35	10
	-110			
39428	3578T15	4010-01-217-0911	22	3
15460	36-93-8	2530-01-412-8164	13	5
51384	3666	5310-01-396-8386	44	41
39428	3706T88		27	2
		5340-01-410-7055	BULK	2
39428	3706T88-1		27	1
15460	40-218-1		13	7
15460	40-218-2		13	7
15460	40-219	2530-01-412-8159	13	9
13548	40002R	6220-01-133-5941	3	1
13548	40202R	6220-01-047-4G59	3	4
74545	410089W	5935-01-397-1474	34	1
51384	4232	5305-01-396-7245	44	47
15460	43-4	2530-01-396-7771	13	14
513B4	4339	5360-01-396-5844	44	58
06721	44W16138	5365-01-396-3892	16	19
39428	44605K173	5340-01-417-9876	43	6
39428	44605K242		43	10
39428	44605K271	4730-01-411-8487	43	3

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
39428	44615K412	4730-01-412-1131	43	2
39428	44615K414	4730-01-411-8485	44	64
30076	450498	5325-31-073-2812	3	2
15460	46-101	5360-01-410-7948	13	12
15460	46-102	5360-01-396-3902	13	13
15460	46-7	2530-01-396-7767	13	17
15460	46-77	5360-01-396-3905	13	8
39428	4627K278	4730-01-396-5061	39	3
39428	4627K288	4730-01-411-4870	35	9
39428	4638K164	5975-01-411-8781	2	8
39428	4638K322	4730-01-411-8483	44	63
05506	482	5120-01-337-0511	50	1
15460	49-12	5315-01-196-5296	13	10
15460	5-113	5365-01-396-3906	13	11
15460	5-4	5310-01-193-4454	13	16
15460	5-57	5310-01-193-9081	18	6
51384	51193	2540-01-412-6757	44	44
51384	51203	6105-01-396-9515	44	12
51384	51204	5340-01-413-3714	44	37
51334	51212	5977-01-397-4813	44	9
51384	51213		44	39
51384	51214	5950-01-396-4607	44	22
51384	512780768K	4710-01-396-7773	44	3
51384	51313		44	13
51384	51419	3895-01-406-2582	44	61
51384	51420		44	46
39428	5237K15	4720-01-411-8486	44	66
97942	525R972H01	5640-01-103-8587	49	7
39428	5350K12	4730-01-412-9563	43	1
39428	5363K51	4730-01-412-7563	44	65
51384	5394	4710-01-396-8266	44	54
15460	54-60	2530-01-412-8165	13	3
15460	54-62	2530-01-412-8166	13	4
15460	54-63	2530-01-412-8160	13	4
13226	55	6150-01-115-0845	4	3
			5	4
			6	6
			7	3
			3	5
51384	5955		44	50
51384	59858K	5355-01-397-2826	44	53
51334	5990082	6150-01-396-4216	44	10
15460	6-1	5310-01-197-1476	18	5
15460	6-10	5310-01-193-9080	13	15
15460	6-92	5310-01-396-8380	25	2
81300	6ABB	4720-01-412-1664	15	10
81300	6L3	4720-01-411-8484	43	5
81300	6NP-6PL	4730-01-397-2320	43	4
51384	6543		29	1
14559	667ER	5306-01-396-5277	30	5
51384	6732	9905-01-413-9297	29	3

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
93051	68NTA-6-2	4730-01-134-0854	6	7
15400	7-126	5306-31-396-7241	25	3
04655	70-901074	5999-00-186-3912	30	4
15460	71-269	2530-01-395-2297	13	6
15460	71-270	2530-01-395-5262	13	6
15460	72-26 26-2500	5360-01-396-3901	24	2
51334	7201	4530-31-396-5523	44	59
51384	7273	5945-01-398-3201	44	62
12361	7376C01472	7690-01-171-9522	29	9
39428	7513K41	5975-01-412-3911	2	6
1V815	770SKH	2530-01-417-5815	12	1
19207	7722333	5365-00-090-5426	9	6
19207	7723309	5310-00-393-6685	9	5
19207	7728811	5995-00-038-3914	11	4
19207	7731428	5935-00-773-1428	9	12
76588	781	4730-01-397-1172	38	1
79470	7812	4730-01-146-1063	14	5
79470	7900	4730-01-146-1062	14	9
15460	8-219-4	2530-01-396-7770	18	11
64488	811225	6145-01-229-4129	5	8
15460	87-1	5305-01-417-3961	13	2
39428	8934T15	4030-01-235-7939	22	2
43199	9-2420-3	5360-01-396-4316	48	20
39428	90679A029	5310-01-410-7946	9	4
			48	13
			49	1
13226	920350	6220-01-397-1861	4	5
13226	920051	5330-00-464-7329	4	4
			5	5
			7	4
13226	920052	5330-01-396-7235	4	2
			5	2
			6	2
			7	2
13226	920055	6220-01-396-9512	8	2
13226	920056	5330-01-121-5360	8	3
13226	920059	6220-01-396-9514	6	4
13226	920060	5330-01-411-2495	6	3
13226	920073	5330-01-321-6596	8	6
13226	920123	5325-01-127-1390	5	3
13226	920264	5940-01-396-9933	9	23
13226	920268	5940-01-397-8648	9	19
24617	9418191	5305-01-411-8662	9	17
39428	9434T41	5340-01-412-1740	2	15
13548	94993	6150-01-321-5778	3	3
39428	98535A150	5315-01-410-8149	37	3
39428	95535A160	5315-01-410-8402	37	6

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FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
BULK	1	4720-01-169-9891	61424	PFT-6B
BULK	2	5340-01-410-7055	39428	3706T8B
KIT	1	2533-00-977-5741	06721	RN-10-HL
1	1	5980-01-397-0482	6M717	LC03000-301
2	1	5975-01-398-1900	06447	2HXLPB5
2	2	5305-00-562-2750	96906	MS24628-64
2	3	5340-00-922-6300	96906	MS21333-77
2	4	5975-01-398-1452	06447	2HXLPB4
2	5	5975-00-469-9238	03743	EC50
2	6	5975-01-412-3911	39428	7513K41
2	7		06447	2HXBPB24
2	8	5975-01-411-8781	39428	4638K164
2	9		06447	2HXBPB21
2	10	5975-31-113-5885	72971	22N-508
2	11		06447	2HXBPB23
2	12		06447	2HX8PB22
2	13	5975-00-839-5320	03743	T351AND35010
2	14	5340-00-764-7051	96906	MS21333-69
2	15	5340-01-412-1740	39428	9434T41
2	16		06447	2HXBPB25
2	17		06447	2HXBPB26
3	1	6220-01-133-5941	13548	40002R
3	2	5325-01-073-2812	30076	450498
3	3	6150-01-321-5778	13548	94993
3	4	6220-01-047-4059	13548	40202R
4	1	6220-01-283-8706	13226	S-200CR-RD-24
4	2	5330-01-396-7235	13226	920052
4	3	6150-01-115-0845	13226	55
4	4	5330-00-464-7329	13226	920051
4	5	6220-00-844-6471	13226	201R
4	5	6220-01-397-1861	13226	920050
4	6	6240-00-144-4693	08806	168
4	7	5305-00-988-1725	96906	MS35206-281
4	8	5310-00-997-1888	96906	MS35649-2252
5	1	6220-00-926-1331	13226	200011
5	2	5330-01-396-7235	13226	920052
5	3	5325-01-127-1390	13226	920123
5	4	6150-01-115-0845	13226	55
5	5	5330-00-464-7329	13226	920051
5	6	6220-00-844-6471	13226	201R
5	7	6240-00-155-8717	46717	LA-200-15
5	8	6145-01-229-4129	64488	81122S
5	9	5305-00-988-1725	96906	MS35206-281
5	10	5310-00-997-1888	96906	MS35649-2252
6	1	6220-01-396-5363	13226	210006
6	2	5330-01-396-7235	13226	920052
6	3	5330-01-411-2495	13226	920060
6	4	6220-01-396-9514	13226	920059
6	5	6240-00-144-4693	08806	168
6	6	6150-01-115-0845	13226	55
6	7	4730-01-134-0854	93061	68NTA-6-2

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FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
6	8	5305-00-998-1725	96906	MS35236-281
6	9	5310-30-997-1988	96906	MS35649-2252
7	1	6220-01-283-8703	13226	200-39122
7	2	5330-01-396-7235	13226	920052
7	3	6150-01-115-0845	13226	55
7	4	5330-00-464-7329	13226	920051
7	5	6220-00-844-6471	13226	201R
7	6	6240-00-155-8717	46717	LA-200-15
7	7	4730-01-062-2570	79470	1468X6
7	8	5305-00-988-1725	96906	MS35206-281
7	9	5310-00-997-1888	96906	MS35649-2252
8	1	6220-01-396-9513	13226	240003
8	2	6220-01-396-9512	13226	920055
8	3	5330-01-121-5360	13226	920056
8	4	6240-00-155-8717	46717	LA-200-15
8	5	6150-01-115-0845	13226	55
8	6	5330-01-321-6596	13226	920073
8	7	5305-00-988-1725	96906	MS35206-281
8	8	5310-00-997-1888	96906	MS35649-2252
9	1	5905-00-139-1989	81349	RER75F4R02R
9	2	5905-00-329-5320	81349	RER75F4R99R
9	3	5905-00-520-6516	81349	RER75F6R04R
9	4	5310-01-410-7946	39428	90679A029
9	5	5310-00-393-6685	19207	7723309
9	6	5365-00-090-5426	19207	7722333
9	7	5935-00-846-3883	96906	MS75021-1
9	8		06447	2HXL8P87
9	9		06447	2HXLPSI
9	10	5310-00-582-5965	96906	MS35338-44
9	11	5305-00-068-0502	96906	MS90725-6
9	12	5935-00-773-1428	19207	7731428
9	13	5305-00-068-0502	96906	MS90725-6
9	14	5310-00-582-5965	96936	MS35338-44
9	15	5310-00-997-1888	96906	MS35649-2252
9	16	5935-01-397-6394	06721	24115
9	17	5305-01-411-8662	24617	9418191
9	18	5310-00-550-1130	96906	MS35333-40
9	19	5940-01-397-8648	13226	920268
9	20	5305-00-988-7602	96906	MS16995-26
9	21	5940-00-143-4794	96906	MS25036-112
9	22	5940-00-143-4780	96906	MS25036-108
9	23	5940-01-396-9933	13226	920264
10	1	6150-01-413-3472	06447	2HXL8PB2
10	2	6150-01-413-3473	06447	2HXL8PB3
11	1	6145-01-413-8466	82879	W4418
11	2		06447	2HXL8PB818
11	3	6150-01-396-5366	06447	2HXL8PB3
11	4	5995-00-038-3914	19207	7728811
12	1	2530-01-417-5815	1V815	770SKH
13	1	2530-01-292-8302	15460	23-337
13	1	2530-01-414-9313	15460	23-336

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FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX		
		STOCK NUMBER	CAGEC	PART NUMBER
13	2	5305-01-417-3961	15460	87-1
13	3	2530-31-412-8165	15460	54-60
13	4	2530-01-412-8160	15460	54-63
13	4	2530-01-412-8166	15460	54-62
13	5	2530-01-412-8164	15460	36-93-9
13	6	2530-01-395-2297	15460	71-269
13	6	2530-01-395-5262	15460	71-270
13	7		15460	40-218-1
13	7		15460	40-218-2
13	8	5360-01-396-3905	15460	46-77
13	9	2530-01-412-8159	15460	40-219
13	10	5315-01-196-5296	15460	49-12
13	11	5365-01-396-3906	15460	5-113
13	12	5360-01-410-7948	15460	46-101
13	13	5360-01-396-3902	15460	46-102
13	14	2530-01-396-7771	15460	43-4
13	15	5310-01-193-9080	15460	6-10
13	16	5310-01-193-4454	15460	5-4
13	17	2530-01-396-7767	15460	46-7
14	1		06447	T-200TA
14	2	4710-01-397-5697	06447	T-16030-C
14	3	5340-01-396-3900	06447	1457
14	4	4710-01-397-5693	06447	T-16072-C
14	5	4730-01-146-1063	79470	7812
14	6	4710-01-397-5698	06447	T-16017.50-F
14	7	5340-01-396-3899	06447	25X15
14	8	4720-01-397-5696	06447	18018-MF
14	9	4730-01-146-1062	79470	7900
14	10	4710-01-397-5692	06447	T-16180-C
14	11	4730-00-289-1930	35301	182-12
14	12	5975-01-273-8133	96906	MS3367-3
14	13	5305-00-562-2750	96906	MS524628-64
14	14	5343-00-222-1604	96906	MS21333-20
15	1	5305-01-210-4595	97403	13222E0109
15	2	4730-00-188-3514	96906	M520913-3
15	3	2530-01-397-1167	98343	19820
15	4	4730-00-196-1468	05415	003248
15	5	4730-01-062-2570	79470	1468X6
15	6	5310-00-851-2682	96906	MS35691-17
15	7	5310-00-637-9541	81718	H2525M
15	8	5305-01-210-4595	97403	13222E0109
15	9		61424	PFT-6B-10
15	10	4720-01-412-1664	81300	6ABB
15	11	4730-01-396-5055	06721	11901
15	12	4730-01-359-9541	98343	10451EA
15	13	4730-01-396-5060	98343	10035
15	14	5330-00-916-4677	98343	10440
15	15	4730-01-360-2246	98343	10452-SA
15	16	5330-00-916-4677	98343	10440
15	17	4730-01-396-5060	98343	10035
15	18	4730-00-733-5707	58429	N-10492

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FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX		
		STOCK NUMBER	CAGEC	PART NUMBER
15	19	4730-00-069-1187	93061	269NTA-6-4
15	20	4730-01-096-9128	79146	012033
15	21	5310-00-851-2682	96906	MS35691-17
15	22	5310-00-637-9541	81718	H2525M
15	23	4820-01-398-1977	93061	DC602-4
15	24	5305-00-562-2750	96906	MS24628-64
15	25	5340-00-764-7051	96906	MS21333-69
16	1	2530-01-095-8752	06721	N-4301-C8
16	2	4820-01-397-7969	06721	300479-AB
16	3	5330-01-398-0721	06721	N-11728-VR
16	4	5330-01-411-2494	06721	N-11728-TV
16	5	2530-01-397-1168	06721	AD-37459
16	6	4820-01-397-8583	06721	AD-87349
16	7		06721	AC-37495
16	8	5330-01-398-0717	06721	N-11728-TT
16	9	5340-01-396-3895	06721	AD-75530
16	10	5305-01-396-7239	06721	30-X-909
16	11		16662	AC37442
16	12	2530-01-397-1171	06721	AD-97596
16	13		16662	AC37448
16	14		06721	101318-F
16	15		06721	AD-37455
16	16		06721	Ad-73439
16	17	5330-01-398-0706	06721	N-13773-B
16	18	2990-01-397-3550	06721	102631
16	19	5365-01-396-3892	06721	44W16138
16	20		96906	MS49005-5
16	21		06721	102621
16	22	5330-01-398-0715	06721	N-11728-CQ
16	23	5360-00-738-6943	16662	AC-37432
16	24	2530-01-397-1000	06721	AE-97524
16	25	5365-01-396-3893	06721	AD-37444
16	26		06721	N-11728-WL
16	27		06721	102692-DA
16	28	5305-01-213-5289	06721	26W32012
17	1		06447	2HXFPB12
17	2	2530-01-397-5290	06721	C-3494-CZ
17	3		06447	2HXFP89
17	4		06447	2HXFPB10
17	5		06447	2HXFPB11
17	6	5305-00-081-6729	96906	MS24667-53
17	7	5310-00-087-4652	96906	MS51922-17
17	8	5310-00-045-5001	96906	MS35340-5C
17	9	5310-00-763-8920	96906	MS51967-20
18	1	5330-01-035-9418	15460	10-1
18	2	3110-00-100-3541	60038	25580
18	3	3110-00-100-0544	60038	25520
18	4	3040-01-386-6637	15460	21-39
18	5	5310-01-197-1476	15460	6-1
18	6	5310-01-193-9081	15460	5-57
18	7	3110-00-142-4355	60038	14125A

CROSS REFERENCE INDEXES

FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
18	8	3110-00-100-0516	60038	14276
18	9	5315-01-304-5121	15460	19-2
18	10	5310-01-277-4855	31654	250021-769
19	11	2530-01-396-7770	15460	8-219-4
18	12	5307-01-277-2306	31654	250021-770
19	1	2533-01-396-7768	15460	017-153
20	1	2610-01-148-1636	81348	GP2STYLXTYRACLA/ S/7.50R16/0/LTAW
20	2	2613-01-397-8794	01059	MR-16HO-700/750/ L78-16
21	1		06447	2HXFPBWI
22	1		06447	2HXFPB7
22	2	4030-01-235-7939	39428	89341T15
22	3	4010-01-217-0911	39428	3578T15
22	4	4010-00-184-3476	19207	22R775
23	1	5310-00-851-2682	96906	M5S35691-17
23	2	5310-00-637-9541	81718	H2525M
23	3		07860	C21452
23	4		89257	SWL 17BDTSFW/P&C
23	5		06447	2HXFLVPBWI
24	1	5306-01-285-9971	35197	11-17
24	2	5360-01-396-3901	15460	72-26 26-2500
24	3		15460	030068
24	4	5310-00-732-0560	96906	MS51968-14
24	5		15460	12-1
25	1		15460	AP-233
25	2	5310-01-396-8380	15460	6-92
25	3	5306-01-396-7241	15460	7-126
25	4	2510-01-286-3406	15460	18-11
25	5	2510-01-412-8163	15450	18-20
25	6	5365-01-416-6596	15460	13-104-2
26	1	5305-00-225-3843	80204	81821BH025C100N
26	2		06447	2HXFPB1
26	3	2540-01-412-7565	06447	2HXFPB2
26	4	5310-00-582-5965	96906	MS35338-44
26	5	5310-00-851-2674	96906	MS35691-1
27	1		3942d	3736T88-1
27	2		39428	3706T88
27	3	5365-01-416-5333	05447	2HXPB506
27	4	3895-01-410-8806	06447	2HXP85W2
27	5		06447	2HXPB516
27	6	5310-00-582-5965	96906	M35338-44
27	7	5310-00-934-9757	96906	MS35649-282
27	8	5306-00-226-4835	80204	81821BH031C250N
28	1		81349	0E910
29	1		51384	6540
29	2	9905-01-397-5155	06447	2HXFPB6
29	3	9905-01-413-9297	51384	6732
29	4	9905-01-397-8069	06447	2HXLBP6
29	5	9905-01-398-2417	06447	2HXPPB16
29	6	9905-01-397-7509	66842	P30NPS03

CROSS REFERENCE INDEXES

FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
29	7	9905-01-397-7510	66842	P30NPS04
29	8	7690-01-396-9963	06447	2HXBPBS
29	9	7690-01-171-9522	12361	7376001472
30	1	5975-00-878-3791	82370	A104
30	2	5975-00-924-9927	73616	GRB85
30	3	5975-00-794-2523	9OKK8	GRC58
30	4	5999-00-186-3912	04655	70-801074
30	5	5306-01-396-5277	14559	667ER
30	6	6145-00-395-8799	81348	QQW343C06B1T
30	7	5940-00-549-1984	74829	SLU35
31	1		06447	2HXBPB15
31	2		06447	2HXBPB4
31	3	5310-00-732-0558	96906	MS51967-8
31	4	5310-00-637-9541	81718	H2525M
31	5		06447	2HXBPB14
32	1	6625-01-396-5453	6M717	01726819-001
32	2	5940-01-079-1936	75037	MV10BCX
32	3	5975-01-388-5641	14280	PK9GTA
32	4	6110-01-341-9209	0ACF4	3TF4622-0A-K6
32	5	5305-00-016-6327	96906	MS24627-38
32	6	6110-01-399-3632	0ACF4	3TF3200-0A-K6
32	7	5945-01-341-9162	0ACF4	3UA5800-2D
32	8	5975-01-412-7770	06447	2HX8PB9
32	9	5999-01-412-2369	06447	2HXBPB10
32	10	5925-01-397-4951	66842	ED218020
32	11	5925-01-397-4949	66842	ED238040
32	12	5999-01-315-4428	0ACF4	3S81400-0A
32	13	5930-01-330-3513	66842	3SB03-PFR11
32	14	5930-01-395-8671	66842	3SB03-PFG11
32	15	5310-00-934-9757	96906	MS35649-282
32	16	5305-00-984-6203	96906	MS35206-255
32	17	5930-01-417-5569	02295	CR115L-1E
33	1	6685-01-397-5632	06447	2HXBPB7
33	2	5355-01-412-3196	6M717	03926683-000
33	3	5355-01-397-2256	06447	2HXBPB1
34	1	5935-01-397-1474	74545	410089W
34	2		74545	IN4100DM
34	3	5330-01-412-4452	06447	2HXBPB16
34	4	5310-00-934-9757	96906	MS35649-282
34	5	5305-00-984-6195	96906	MS35206-247
35	1	5305-00-071-2069	80204	B18218H050C150N
35	2	5310-00-584-5272	96906	MS35338-48
35	3	5310-00-834-8732	96906	MS35691-33
35	4		06447	2HXPPB9
35	5		06447	2HXPPB15
35	6	5310-00-582-5965	96906	MS35338-44
35	7	5310-00-761-6882	96906	MS51967-2
35	8	5305-00-562-2750	96906	MS24628-64
35	9	4730-01-411-4870	39428	4627K288
35	10	4720-01-396-7777	60535	32-DA11-0960-110-110

CROSS REFERENCE INDEXES

FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
36	1	4320-30-523-2304	63097	KK125
36	2	4320-01-273-1365	63097	3-570-552-312-37
36	3	3020-01-273-4764	63097	3-420-401-47J-54
36	4		63097	2-115-006-880
36	5	4320-31-273-1376	63097	3-381-403-08a
36	6	5305-00-069-5572	96936	MS90725-34
36	7	4730-01-396-5069	63097	2-542-002-376
36	1	5330-01-098-5997	63097	2-311-003-806-15 C
36	9	4320-01-397-5288	63097	2-214-809-103
36	10	3120-01-233-0556	63097	2-108-015-B80-04
36	11	5330-00-375-2933	63097	2-313-003-804-15
36	12	5305-00-069-5572	96906	MS90725-84
36	13		63097	3-077-067-080
36	14	5365-01-396-3919	63097	2-542-004-376
36	15	5365-01-396-3916	63097	2-544-004-376
36	16	4730-01-387-4534	63097	2-469-002-376
36	17	5330-01-397-6852	63097	3-524-008-48N
36	18	5340-01-396-3917	63097	2-470-143-376
36	19	5305-01-396-5281	63097	2-154-008-375
36	20	5340-01-396-3914	63097	2-490-140-375
36	21	5330-01-396-7247	63097	2-254-040-367
36	22	4730-01-397-5309	63097	2-505-008-375
36	23	3110-00-829-9669	63097	2-055-021-375
36	24	3120-01-418-1026	63097	3-060-035-922
36	25	5365-01-272-2536	63097	2-288-040-213
36	26	5365-01-272-2499	63097	2-557-004-370
36	27	5330-00-829-9670	63097	2-520-015-830
36	28	4320-01-216-4021	63097	2-465-007-375
36	29	5310-01-274-3153	63097	2-805-026-375
36	30	5330-00-882-0665	63097	2-283-014-378
36	31	4320-01-414-0466	63097	2-140-002-781
36	32	5365-01-274-3198	63097	2-288-006-210
36	33	5310-01-412-0865	63097	2-807-005-375
36	34	5310-01-396-8383	63097	2-507-005-375
37	1	3020-01-396-7774	71176	2AK124H-1.12580R E
37	2	5365-00-687-8575	71176	H-11/8
37	3	5315-01-410-8149	39428	98535A150
37	4	5305-00-068-5400	96906	MS24667-22
37	5	3030-00-605-1377	71176	A58
37	6	5315-01-410-8402	39428	98535A160
37	7	3120-01-339-0778	71176	H-13/8
37	8	3020-01-396-7772	71176	2AK59H-1.375 BOR E
38	1	4730-01-397-1172	76588	781
38	2	2940-01-399-0797	76588	A216-WCB
38	3	4730-01-396-5070	76588	5-3.0-781-4-F-0- 0
38	4	5330-01-378-0057	76588	G-3.0-781*K1-0
38	5	5340-01-396-3913	76588	HRS

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FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
38	6	5310-01-396-8385	76588	A-194-4
38	7	5307-01-396-7242	76589	A-193-B16
39	9	4730-00-287-2192	96906	MS20913-8
39	1	5310-00-851-2677	96906	MS35691-49
39	2	5310-00-820-6653	31007	Q1925
39	3	4730-01-396-5061	39428	4627K278
39	4		06447	2HXPPB6
39	5	5330-01-396-8011	06447	2HXPPB10
39	6	5305-00-724-6761	96906	MS90725-167
39	7	5330-01-396-8007	06447	2HXKEPP87
39	8		06447	2HXPPB5S
39	9	5310-00-820-6653	31007	Q1925
39	10	5310-00-851-2677	96906	MS35691-49
39	11	5305-00-724-7224	80204	81821BH0630250N
39	12	5310-00-834-8732	96906	MS535691-33
39	13	5310-00-584-5272	14351	X296
39	14	5330-01-396-8012	06447	2HXPPB12
39	15	4540-01-397-6014	06447	2HXPPBB
39	16	5305-00-071-2071	80204	B18218H0500200N
39	17		06447	2HXPPB7
39	18	4420-01-397-6031	06447	2HXPPB4
39	19	5330-01-396-8009	06447	2HXEPPBB
39	20	5310-00-851-2677	96906	MS35691-49
39	21	5310-00-820-6653	37296	01541
39	22		06447	2HXPPB3
39	23	5305-00-724-7224	80204	81821BH0630250N
39	24	5310-00-838-1702	96906	MS35691-57
39	25	5310-00-584-7888	96906	M535338-51
39	26		06447	2HXPPBI
39	27	5330-01-396-8010	06447	2HXPPB11
39	28	5305-00-939-9206	96906	MS90725-193
43	1	4920-01-397-8590	63097	3-795-503-000-19
40	2	5360-01-195-7753	63097	2-799-043-375
40	3	5360-01-216-6991	63097	2-763-019-610
40	4	4820-01-397-8080	63097	2-796-007-100
40	5	4820-01-397-1987	63097	2-795-007-100
40	6	5330-00-769-2360	63097	2-512-307-860
40	7	4730-01-396-5067	63097	2-540-078-100
40	8	5305-01-196-6696	63097	2-150-019-255
40	9	5330-01-280-6522	63097	2-512-018-860
40	10	4820-01-398-0450	63097	2-797-024-100
40	11	5330-01-182-4137	63097	2-512-012-860
40	12	5310-01-195-8930	63097	2-503-006-376
40	13	5305-01-205-5430	63097	2-595-006-376
40	14		63097	2-798-022-100
41	1	5340-01-396-3897	06447	2HX-401M3-106
41	2	4820-01-396-5065	06447	2HX-401M3-750LB.
41	3	4820-01-398-4686	06447	2HX-401M3INJNIP
41	4	4820-01-396-5058	06447	2HX-401M3PLUG
41	5	5360-01-396-3896	06447	2HX-401M3SPRING
41	6	5365-01-396-3910	06447	2HX-401M3TRING

CROSS REFERENCE INDEXES

FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
41	7	5340-01-412-6381	06447	2HX-401H38TMCOV
41	8	4820-01-396-5056	06447	2HX-401M38ODY
42	1	5340-01-396-3907	06447	2HX-401M2-106-L
42	2	4820-01-397-3769	06447	2HX-401M2-#750
42	3	4730-01-398-5657	06447	2HX-401INJNIP
42	4	4820-01-396-5057	06447	2HX-401M2PLUG
42	5	5360-01-396-3915	06447	2HX-401M2SPRING
42	6	5330-01-417-6444	06447	2HX-401M2TRING
42	7	5340-01-396-3903	06447	2HX-401M2BTMCOV
42	8	4820-01-397-3998	06447	2HX-401M2800BODY
43	1	4730-01-412-9563	39428	5350K12
43	2	4730-01-412-1131	39428	44615K412
43	3	4730-01-411-8487	39428	44605K271
43	4	4730-01-397-2320	81300	6NP-6PL
43	5	4720-01-411-8484	81300	6L3
43	6	5340-01-417-9876	39428	44605K173
43	7	4330-00-552-7910	72692	2A700A3-8
43	8	4330-00-844-0413	72692	2A-710
43	9		06447	2HXBPB19
43	10		39428	44605K242
43	11	4730-01-118-8278	76599	MMF4-SS
44	1	4530-01-412-0271	06447	2HX8PB20
44	2	4530-01-412-6762	51384	CF66KG
44	3	4710-01-396-7773	51384	512780768K
44	4	5305-00-068-0500	96906	MS90725-3
44	5	5310-00-984-3805	96906	MS24679-5
44	6	5310-00-934-9757	96906	MS35649-282
44	7	5305-00-984-6191	96906	MS35206-243
44	8	5305-00-068-0501	96906	MS90725-5
44	9	5977-01-397-4813	51384	51212
44	10	6150-01-396-4216	51384	5990082
44	11	4730-01-396-5062	51384	NLH66KGU
44	12	6105-01-396-9515	51384	51203
44	13		51384	51313
44	14	5330-01-396-7243	51384	3156703
44	15	5330-01-396-7244	51384	31436
44	16	5340-01-396-3908	51384	31550
44	17	4730-01-396-5066	51384	31389
44	18	5305-00-054-9265	96906	MS51955-19
44	19	5305-00-984-6193	96906	MS35206-245
44	20	5945-01-398-8265	27319	R7795A1001
44	21	5340-01-396-3911	27319	0795A1004
44	22	5950-01-396-4607	51384	51214
44	23	5310-00-582-5965	96906	MS35338-44
44	24	5305-00-068-0498	96906	MS90725-1
44	25	5305-00-724-5893	96906	MS51963-81
44	26	4730-01-396-5063	51384	21549
44	27	5305-00-724-5893	96906	MS51963-81
44	28	4140-01-398-8938	51384	21267
44	29	5975-01-411-6588	51384	31347
44	30	6105-01-417-9118	51384	21402

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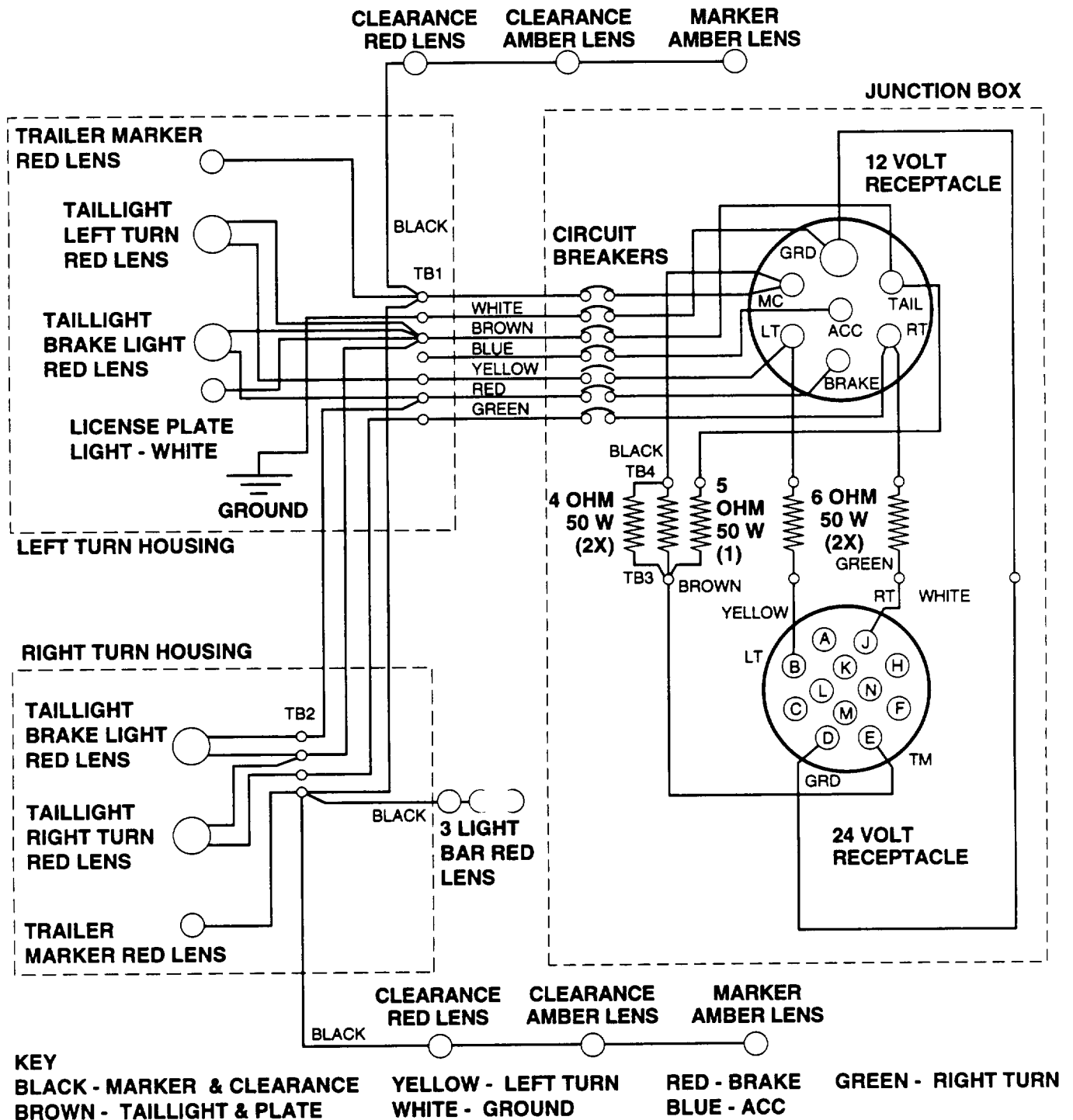
FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
44	31	5306-00-225-8499	96906	MS90725-34
44	32	5310-00-407-9566	96906	MS35338-45
44	33	5310-30-637-9541	81718	H2525M
44	34	5305-00-115-9526	80204	818218H03800750
44	35	2910-01-416-4031	73007	29270
44	36	5305-00-988-7602	96906	MS16995-26
44	37	5340-01-413-3714	51384	51204
44	38	9340-01-413-2225	51384	31346
44	39		51384	51213
44	40	5310-30-928-9821	96906	MS24679-2
44	41	5310-01-396-8386	51384	3666
44	42	5305-00-180-4966	96906	MS51849-64
44	43		51384	16703GY
44	44	2540-01-412-6757	51384	51193
44	45	5330-01-396-7246	51384	31561
44	46		51384	51420
44	47	5305-01-396-7245	51384	4232
44	48	5310-00-056-3395	96906	MS35649-2382
44	49	5305-00-724-6798	96906	MS51964-49
44	50		51384	5955
44	51	5305-00-180-4966	96906	MS51849-64
44	52	5310-00-576-5752	96906	MS535333-39
44	53	5355-01-397-2826	51384	59858K
44	54	4710-01-396-8266	51384	5394
44	55	2910-01-396-7775	1Y370	82GA8852N642R
44	56	5306-00-225-8499	96906	MS90725-34
44	57	5310-00-407-9566	96906	M535338-45
44	58	5360-01-396-5844	51384	4339
44	59	4530-01-396-5523	51384	7201
44	60		27319	M436A1110
44	61	3895-01-406-2582	51384	51419
44	62	5945-01-398-3201	51384	7273
44	63	4730-01-411-8483	39428	4638K322
44	64	4730-01-411-8485	39428	44615K414
44	65	4730-01-412-7563	39428	5363K51
44	66	4720-01-411-8486	39428	5237K15
44	67		27319	C7027A1023
44	68	5310-00-080-6004	96906	MS27183-14
44	69	5310-00-637-9541	81718	H2525M
44	70	5305-01-325-8387	96906	MS590725-64
45	1	6105-31-396-9517	OACF4	HTH2660
45	2		OACF4	3MSG223002602
46	1	3895-01-397-1608	06447	2HXXEPPB6
46	2	5340-01-396-3904	06447	2HXXEPPB1
46	3	5365-01-396-3888	06447	2HXXEPPB2
46	4	5330-01-396-8008	06447	2HXXEPPB9
46	5	5340-01-396-3894	06447	2HXXEPPB3
46	6	5305-00-723-9385	96906	MS51963-65
46	7	3895-01-397-1607	06447	2HXXEPPB4
46	8	5355-01-397-2253	06447	2HXXEPPB5
46	9	5330-01-396-8004	06447	2HXXEPPB8

CROSS REFERENCE INDEXES

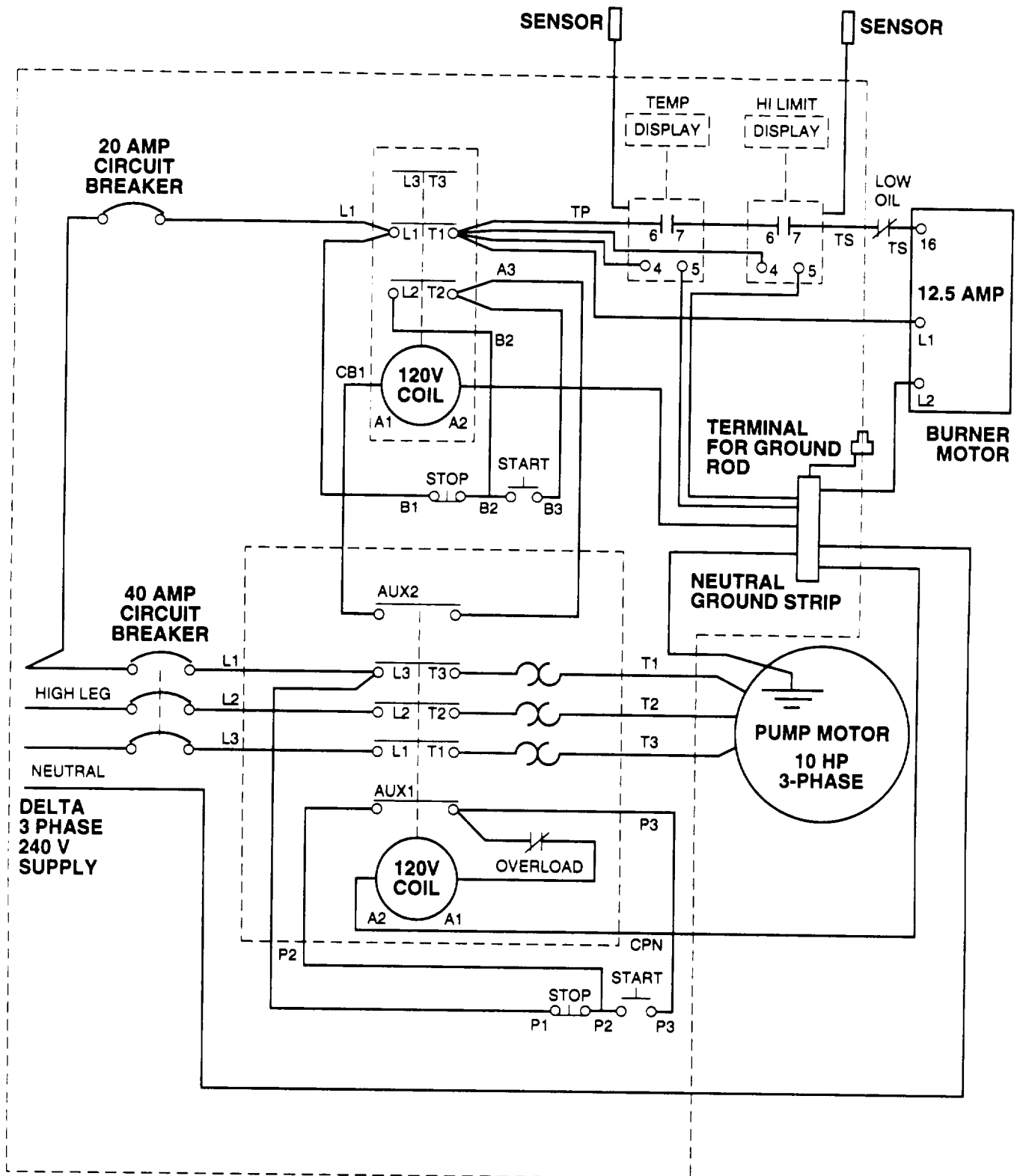
FIG.	ITEM	FIGURE AND ITEM NUMBER INDEX STOCK NUMBER	CAGEC	PART NUMBER
46	10	5310-00-763-8920	96906	MS51967-20
46	11	5310-00-820-6653	96906	MS35339-50
46	12	5330-01-396-8006	06447	2HXXEPP87
46	13	5305-00-724-5914	96906	MS90725-168
47	1	3895-01-397-7383	06447	2HXXPBW2
48	1	5310-00-768-0318	96906	MS51967-14
48	2	5310-00-584-5272	96906	M35338-48
48	3		06447	2HXXPBWi
48	4	5340-01-396-3890	06447	2HXXPBW3
49	5	5310-00-080-6004	96906	MS27183-14
48	6	5310-00-637-9541	81718	H2525M
48	7	5310-00-732-0558	96906	MS51967-8
48	8		06447	2HXXP810
48	9		06447	2HXXP82
48	10	5310-00-582-5965	96906	MS35338-44
48	11	5305-00-052-8911	96906	MS24628-63
48	12	5305-00-068-0502	96906	MS90725-6
48	13	5310-01-410-7946	39428	90679A029
48	14	5330-01-396-5843	06447	2HXXPB1
48	15	5310-00-763-8920	96906	MS51967-20
48	16	5310-00-820-6653	96906	MS35338-50
48	17	5365-01-411-1610	06447	2HXXP811
48	18	5305-00-724-7224	80204	B18218H063C250N
48	19	5310-01-385-6796	96906	MS51412-13A
498	20	5360-01-396-4316	43199	9-2420-3
48	21	5330-01-396-5845	06447	2HXXPB5
48	22	5340-01-396-3891	06447	2HXXP83
48	23	5310-00-823-8804	96906	MS27183-9
48	24	5310-00-582-5965	96906	M535338-44
48	25	5310-00-761-6882	96906	MS51967-2
48	26	3895-01-397-1606	06447	2HXXPB6
48	27	3895-01-397-1605	06447	2HXXPB7
48	28	5310-00-823-8804	96906	MS27183-9
49	29	5305-00-724-7224	80204	B18218H063C250N
48	30	5310-00-045-5001	96906	MS35340-50
48	31	5310-00-763-8920	96906	MS51967-20
48	32		06447	2HXXPB14
49	1	5310-01-410-7946	39428	90679A029
49	2	5310-00-532-5965	96906	M535338-44
49	3	5305-00-068-0502	96906	MS90725-6
49	4		06447	2HXXPBW4
49	5		06447	2HXXPB13
49	6		06447	2HXXPB12
49	7	5640-01-103-8587	97942	525R972H01
49	8	5340-01-396-3912	06447	2HXXP88
50	1	5120-01-337-0511	05506	482
50	2	5935-01-160-6132	17479	117053

APPENDIX H

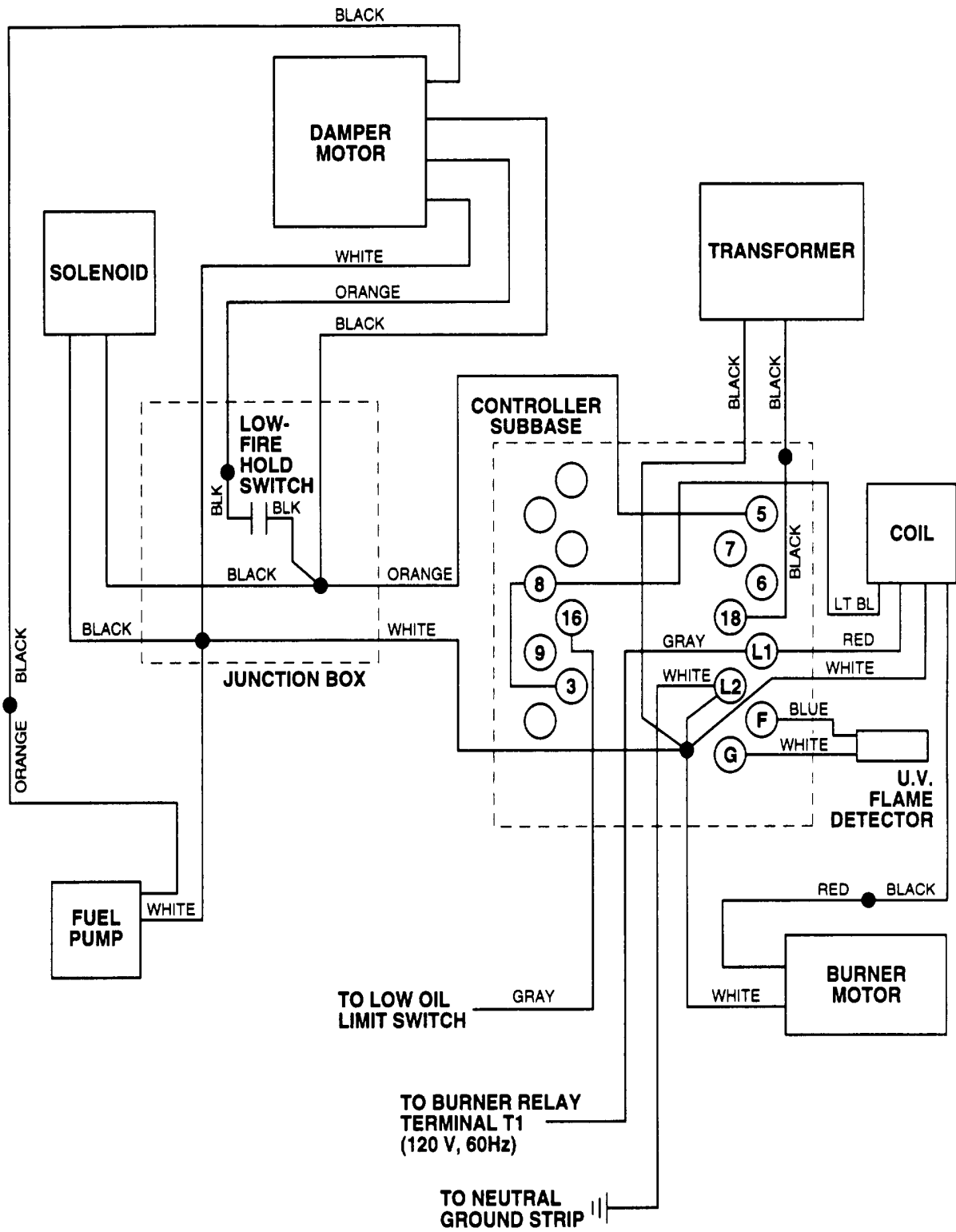
SCHEMATICS



Trailer Wiring Schematic



Heat Exchanger Wiring Schematic



Burner Wiring Schematic

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 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 lb.
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

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$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
ometers per Hour	Miles per Hour	0.621



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