

TM 10-3930-660-20

**TECHNICAL MANUAL
UNIT MAINTENANCE MANUAL**

FOR

**TRUCK, FORKLIFT; 6,000 LB.
VARIABLE REACH, ROUGH TERRAIN
NSN 3930-01-158-0849**

This manual supersedes the Unit Maintenance portion of
TM 10-3930-660-24 dated 14 Oct 89.

Approved for public release; distribution is unlimited.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
MARCH 1993**

WARNING**CARBON MONOXIDE**

Carbon monoxide is colorless, odorless, DEADLY POISONOUS gas which, when breathed, deprives the body of oxygen and causes SUFFOCATION. Exposure to air contaminated with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, or coma. Permanent BRAIN DAMAGE or DEATH can result from severe exposure.

Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal-combustion engines and becomes DANGEROUSLY CONCENTRATED under conditions of INADEQUATE VENTILATION. The following precautions MUST be observed to insure the safety of personnel whenever the engine is operated for maintenance purposes.

- DO NOT operate the engine in an enclosed area unless it is ADEQUATELY VENTILATED.
- DO NOT operate the engine in an enclosed area such as a test cell without properly fitted and functioning exhaust ducts.
- BE ALERT at all times during engine operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE the work area. If symptoms persist, remove affected personnel from the work area and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration as described in FM 21-11.

WARNING**HANDLING WEIGHTS**

This manual considers short-term, non-repetitive lifts of equipment weighting up to 190 pounds to heights of about 3 feet. Under these conditions, this manual assigns one man for each 47-pound increment of weight up to a total of four men to accomplish the required lifts. If local conditions mandate higher lifts, repetitive lifts, or carries greater than 9 feet, refer to MIL-STD-1472 for a guideline on the number of personnel needed.

WARNING

MECHANICAL HAZARDS

Mechanical systems and components used on this equipment are energized, under pressure, or have sharp edges.

Use all precautions to de-energize a system, bleed pressure and to protect yourself from sharp edges when working on the equipment. Failure to do so may cause serious PERSONAL INJURY or DEATH.

WARNING

HIGH NOISE DANGER

Your hearing can be PERMANENTLY DAMAGED if you are 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.

WARNING

USE OF COMPRESSED AIR TO DRY PARTS

DO NOT exceed 15 psig nozzle pressure when drying parts with compressed air. DO NOT direct compressed air against human skin. Failure to do so may result in SERIOUS INJURY or DEATH.

WARNING

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.

WARNING**FLAMMABLE LIQUIDS**

Dry cleaning fluid, mineral spirits paint thinner, alcohol, acetone, methylethyl ketone and trichloroethylene are flammable solvents. Use these materials only in well-ventilated areas away from open flames and other heat sources that could cause ignition. The minimum safety measures described below must be observed in the handling and use of solvents:

- Fire extinguishers should be nearby when these materials are used.
- Cloths or rags saturated with cleaning solvents must be disposed of in accordance with authorized facilities procedures.
- The use of diesel fuel, oil, gasoline or benzene (benzol) is PROHIBITED for cleaning purposes.
- Fuel vapors can ignite and cause an explosion. Do not allow smoking or an open flame within 50 feet (16 meters).

WARNING**PROPER MACHINE OPERATION**

This equipment must be operated only by authorized personnel who have satisfactorily completed a program of training which must include familiarity with safe operating procedures, characteristics, and a knowledge of applicable codes, regulations, and facilities directives. Untrained personnel subject themselves and others to the possibility of DEATH or SERIOUS INJURY from the improper operation of this machine. Understand the equipment, its function, and the controls before operations are begun.

WARNING

Hot oil or metal parts can cause severe burns. Wear insulated gloves, long sleeves, and eye protection when working with heated parts.

WARNING

HANDLING CLEANING AGENTS (SOLVENTS)

Toxic solvents are used in cleaning the equipment. Methyl-ethyl ketone TT-M-261 is a highly flammable solvent containing toxic characteristics that may irritate the skin and cause burns or internal disorders if fumes are repeatedly inhaled.

Trichloroethylene is a flammable solvent that has a chloroform odor. Inhaling concentrated fumes can cause unconsciousness. Inhaling fumes for a prolonged time can cause headache and drowsiness. Solvent absorbed by the skin can also result in internal disorders.

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Inhaling fumes for a prolonged time can cause headache and drowsiness. Solvent absorbed through the skin can also result in internal disorders.

The safety measures described below should be observed in the handling and use of solvents.

- Avoid prolonged or repeated breathing of vapors.
- Use only in a well-ventilated area.
- Keep away from heat, sparks, or open flames.
- Avoid contact with skin, eyes and clothing. The use of gloves is advised to prevent irritation or inflammation of the skin. If contact with the skin or eyes does occur, quickly wash the affected area with water for at least 15 minutes. For eyes, seek medical attention immediately after flushing eyes with water.

FIRST AID

Refer to FM21-11 for applicable first aid information.

SAFETY SUMMARY

The following warnings and cautions appear in the text in the manual and are repeated here for emphasis.

WARNING

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138°F (58°C) . Use only in a well ventilated area. Inhaling vapors over a long period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention. (page 2-1)

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated area. Avoid contact with skin, eyes and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point is 100 to TF-138 to TF (38 to TC-50 to TF). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately. (page 2-3)

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield/gloves,etc.) (page 2-3)

WARNING

Do not smoke or allow any flame or spark in the vicinity while checking or filling the batteries. The batteries generate hydrogen gas, a highly explosive gas. Severe personal injury could result. (page 2-7)

WARNING

The batteries are filled with an acid electrolyte solution. Always wear protective clothing, rubber gloves, safety glasses and face shield when servicing batteries. (page 2-59)

WARNING

Do not remove cap from radiator when engine is hot. Wait until engine cools. (page 2-62)

WARNING

Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information. (page 3-2)

WARNING

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel. (page 3-3)

WARNING

Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air. (page 3-3)

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and cause injury or death if accidentally ignited. (page 5-2)

WARNING

If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC Officer or NBC NCO for appropriate handling or disposal instructions. (page 5-7)

WARNING

To prevent fire caused by fuel spilling on hot exhaust manifold, do not bleed fuel lines (2) if engine is hot. (page 5-27)

WARNING

Let engine cool before removing radiator cap from radiator. Always turn cap slowly to the first stop and allow pressure to escape before removing cap completely. Removing cap while coolant is hot can result in personal injury. (page 7-2)

WARNING

Move vehicle to an open area to perform inspection. Alert personnel to stay away from front and rear of vehicle during inspection. Vehicle may start and move suddenly, possibly causing injury. Make sure wheels are straight before performing inspection. (page 8-10)

WARNING

Be certain that step 1 of REMOVAL has been performed before performing step 2c, below. Serious injury from hydraulic oil under pressure can result if step 1 is not performed before removing switch (1) in step 2c. (page 8-39)

WARNING

To prevent personal injury from accidental glass breakage, wear a pair of heavy leather gloves or other suitable hand protection when replacing sealed beam bulbs. (page 8-85)

WARNING

Always check the electrolyte level with the engine stopped. Do not smoke when checking the battery. Do not use an exposed flame to check battery levels. Protect the eyes when checking the battery level. (page 8-108)

WARNING

To avoid sparks when installing battery cables, always install negative cable (11) last. (page 8-112)

WARNING

Never disconnect any charging unit circuit or battery circuit cable from battery when the charging unit is Operating. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released through the battery outlets. Injury to personnel can result. (page 8-113)

WARNING

Be sure wheels are chocked before removing parking brake assembly. (page 12-2)

WARNING

Springs (10) are under tension. Always wear eyeglasses when working on springs under tension. Use care when removing springs (10) from brake shoes (11). Failure to follow these precautions could result in personal injury. (page 12-3)

WARNING

Do not bleed brakes without bleeder hoses over brake bleeder valves (2) and (3). The vehicle is equipped with a power braking system. Without bleeder hoses attached, hydraulic oil can shoot considerable distances and cause injury. Always wear proper eye protection when bleeding brakes. (page 12-10)

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move all control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury. (page 12-15)

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines. (page 12-16)

WARNING

Always place blocking material between rear axle housing (3) and frame rear axle housing stops (4) before raising vehicle with floor jack. If blocking material is not used, vehicle will tip to left or right when front axle housing is raised, possibly resulting in personal injury or damage to vehicle. (page 13-2)

WARNING

Two personnel are required to remove wheel assembly (2) from wheel hub (6) of vehicle. Weight of wheel assembly (2) is approximately 465 lbs. Failure to follow this instruction could result in serious injury or death. (page 13-3)

WARNING

When dislodging tire beads, lock rings (8), or aligning rings (7) be absolutely certain no air pressure remains in tire (3). Serious injury or loss of life could result. (page 13-5)

WARNING

Always inflate tires mounted on rims with aligning rings or lock rings in an inflation safety cage, or serious injury or loss of life could result. (page 13-9)

WARNING

Weight of pump (4) is 47 lbs. Have assistant support pump so it does not drop during removal of capscrews (14), lockwashers (15), and nuts (16). (page 14-9)

WARNING

Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause injury. (page 14-14)

WARNING

Use extreme caution when lifting counterweight (1) with a forklift. Never allow forks to tip forward. Counterweight top mount pin holes must be fastened to the lifting forklift when counterweight (1) is not supported by vehicle being worked on. (page 15-2)

WARNING

Use extreme care when lifting counterweight (1) with a forklift. Never allow forks to tip forward. Always tie counterweight top mount pin holes to the lifting forklift. (page 15-3)

WARNING

Pintle hook (3) weighs 36 lbs. Use caution when removing from counterweight (4) to avoid personal injury or damage to equipment. (page 15-4)

WARNING

To avoid personal injury, replace broken window glass carefully. Wear a pair of heavy leather gloves or other suitable hand protection. Support window glass during removal and installation as required so it does not drop. (page 16-16)

WARNING

When working under the boom, always use blocks, or other supports. Combined weight of boom and MLRS attachment is approximately 6300 pounds. Failure to adequately support the boom could result in severe injury or death. (page 18-6)

WARNING

Failure to support rear portion (a) of MLRS attachment cylinder (7) when removing pivot pin (8) may cause severe personal injury and damage to cylinder (7). (page 18-64)

WARNING

Two personnel are required for fork removal. Each fork weighs 125 lbs. Failure to use an assistant and a two point lift when removing forks could result in serious personal injury. (page 18-69)

WARNING

Cleaning solvents are potentially dangerous to personnel and property. Avoid skin contact by wearing rubber gloves. Avoid prolonged inhalation. Make sure work area provides adequate ventilation. Do not use near open flame. (page 18-71)

WARNING

Support rear of cylinder (13) with chain or other suitable lifting device prior to removing pivot pin (22). Failure to do so may cause personal injury and damage to cylinder. (page 18-76)

WARNING

Support rear of cylinder (13) with chain or other suitable lifting device prior to installing MLRS attachment (11). Failure to do so may cause personal injury and damage to cylinder (13). (page 18-76)

WARNING

Continue to support rear of cylinder (13) with chain until pivot pin (22) is installed. Failure to do so may cause personal injury and damage to cylinder (13). (page 18-78)

WARNING

If inner or intermediate sections of boom have been removed, cap three hydraulic lines (a) at underside of outer boom with metal caps. If MLRS attachment has been removed, cap three hydraulic hoses (b) at front of boom with metal caps. Failure to do so may result in personal injury caused by hydraulic oil spraying out of open hoses or lines when engine is started. (page 18-127)

WARNING

Be sure boom is supported with lifting device before upper pivot pins (1) are removed. Failure to support boom during removal of upper pivot pins (1) could result in personal injury or death. Combined weight of boom and MLRS attachment is 6300 lbs. Weight of boom alone is approximately 4100 lbs. (page 18-128)

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When operating with Class I or II leaks, continue to check fluid levels as required on your PMCS. (page 2-4)

CAUTION

The following new vehicle (break-in) maintenance is required on the 6KVRRTFL to prevent damage to the equipment and maintain the warranty. (page 2-5)

CAUTION

The boom electrical cable and hydraulic hoses also require adjustment at 100 hours of operation and at 100 hours after replacement or else damage to the forklift may occur. (page 2-6)

CAUTION

Do not connect or disconnect the VTM while the vehicle is running. Connect DCA cable to the VTM before connecting to the diagnostic connector. (page 2-56)

CAUTION

Do not perform the power test if the engine temperature is above normal operating temperature. However, the engine should be at operating temperature before performing the power test. (page 2-72)

CAUTION

Allow engine to idle for at least 2 minutes after running power test to prevent damage to engine turbocharger. (page 2-72)

CAUTION

Do not perform more than 2 compression unbalance tests in a row to prevent discharge of vehicle batteries. (page 2-99)

CAUTION

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy the material. (page 3-4)

CAUTION

Repaired items must be thoroughly cleaned to remove metal chips and abrasives to prevent them from entering working parts of the 6KVRRTFL. (page 3-7)

CAUTION

Refer to TM9-237, Welding Instructions, to avoid damage to castings if welding method is used. (page 3-8)

CAUTION

Do not overtighten new filter element (4). Overtightening may distort the filter element threads and seal. (page 4-3)

CAUTION

Some of the capscrew holes are drilled through and must be sealed. Apply Loctite 59241 to the capscrews (3). (page 4-13)

CAUTION

If the turbocharger (2) is not to be installed immediately, cover the opening in manifold (4). Failure to do so may cause engine damage. (page 5-15)

CAUTION

A new turbocharger (2) must be prelubricated before being operated. Failure to do so may cause damage to the turbocharger (2). (page 5-15).

CAUTION

Springs on clamps (10) must not be fully compressed or damage to muffler (4) may result. (page 6-3)

CAUTION

Make sure thermostat (9) and gasket (10) are properly positioned as noted during removal to avoid coolant leaks and thermostat malfunction. (page 7-15)

CAUTION

To prevent damage to the engine, install the fan (13) with the concave side of the blades toward the engine. (page 7-21)

CAUTION

Do not use lockwashers to secure the fan (13). Use only flatwashers (12). (page 7-21)

CAUTION

Support cover (4) as required so that weight of cover (4) and circuit board (1) is not supported by electrical leads (5) to board (1). (page 8-46)

CAUTION

Failure to route autoleveler cable (4) as described, may result in damage to vehicle or its load due to malfunctioning of autoleveler system. (page 8-52)

CAUTION

Make sure baking soda and water solution does not enter cells of batteries (4) and (5) during cleaning. Be sure fill plugs (6) are installed. (page 8-109)

CAUTION

Be careful that clevis (13), clevis (14), and attached pedal linkages do not drop when clevis pins (15) and (16) are removed. (page 9-9)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure. (page 9-20)

CAUTION

Always replace both shoes (1) as a set. If only one shoe is replaced, possible disc damage can occur. (page 12-14)

CAUTION

The brake system and hydraulic accumulator must be bled as soon as the brake control valve is installed. If this is not done, air in the system may not allow the brakes to release and may cause severe brake system damage. (page 12-20)

CAUTION

Use care when remounting tires (3) to avoid damaging tire beads or bead seats. (page 13-5)

CAUTION

Use care when assembling rim components to avoid dislodging the O-ring (9). (page 13-9)

CAUTION

Do not strike nut (9) on side to remove steering cylinder (4). Damage to ball joint end cap assembly (10) may occur. (page 14-15)

CAUTION

When placing forks in counterweight (1), tips of forks must not protrude past front of counterweight (1). Possible damage to vehicle engine from forks may result. (page 15-2)

CAUTION

Make sure the counterweight bottom mount pockets fully engage around vehicle frame mounting pins (5) at the rear of the vehicle. (page 15-3)

CAUTION

To avoid breakage of skylight window (1), do not overtighten capscrews (3). (page 16-20)

CAUTION

To prevent internal damage to piston pump (1) be sure pump housing is filled with oil before beginning purging procedures. (page 18-3)

CAUTION

Do not attempt to purge sections (a) and (b) separately. Always purge both sections of pump whenever purging is necessary. Failure to purge pump as directed in this section may result in severe damage to pump. (page 18-4)

CAUTION

Tandem gear pump must be purged of air before engine is started. Refer to para. 18-3 for purging instructions. Failure to purge air as directed may result in severe damage to tandem gear pump. (page 18-9)

CAUTION

Piston pump must be purged of air before engine is started. Refer to para. 18-3 for purging instructions. Failure to purge air as directed may result in severe damage to piston pump. (page 18-15)

CAUTION

Use care not to damage finish on fork shaft (8) during removal. (page 18-70)

CAUTION

Do not load fork for 72 hours after installation of fork bushing. (page 18-72)

CAUTION

Be certain that metal caps are installed on fittings (15) at front of boom as instructed in step 3c. Failure to do so could result in personal injury caused by pressurized hydraulic oil spraying out of open fittings (15) when engine is started. (page 18-76)

CAUTION

Connect electrical leads (1) to autoleveler circuit board as described in steps 5c through 5e. Failure to follow instructions in these steps may result in damage to circuit board (9). (page 18-79)

CAUTION

To ensure adequate lubrication of boom pivot pins (1), be sure that steps 1 and 2 are performed prior to applying lubrication. Inadequate lubrication of boom pivot pins could result in excessive wear and damage to vehicle or load. (page 18-81)

CAUTION

Always check adjustment of chains, boom electrical cable, and boom hoses whenever boom hose pulley is replaced. Refer to para. 18-24 and 18-25. Failure to follow this instruction will result in damage to boom electrical cable or hydraulic hoses. (page 18-89)

CAUTION

If removed, tighten elbow (251) and adapter (252) to 55 ft. lb. during installation. Failure to follow this instruction could result in damage to transmission hose ports. (page 18-112)

TECHNICAL MANUAL
No. 10-3930-660-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 25 March 1993

UNIT MAINTENANCE MANUAL

FOR

**TRUCK, FORKLIFT; 6,000 LB.
VARIABLE REACH, ROUGH TERRAIN
NSN 3930-01-158-0849**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

*This manual supersedes the Unit Maintenance portion of TM 10-3930-660-24 dated 14 Oct 89 with all changes.

Approved for public release; distribution is unlimited.

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HOW TO USE THIS MANUAL

1. ABOUT YOUR MANUAL

Spend some time looking through this manual. You'll find that it has a new look, different than most of the TMs you've been using.

New features added to make this manual easier for you to use are:

- a. **Finding Information** - These include entry features such as the thumb indexing indicators on the cover and edge of the manual. Extensive troubleshooting guides for specific systems lead directly to step-by-step directions for problem solving and maintenance tasks.
- b. **Illustrations** - Many methods are used to make finding and fixing parts much easier. Locator illustrations with keyed text, exploded views, and cutaway diagrams make the information in this manual easier to understand and follow.
- c. **Keying Text With Illustrations** - Instructions/text are located together with figures that illustrate the specific task you are working on. In most cases, the task steps and figures are located side by side.

This TM is organized so that the information and procedures, needed to perform maintenance tasks, is easily located. Take a few minutes to read through this How To Use part of the manual to learn how it is put together and how to find the information you need.

2. BEFORE YOU START

- a. Read and understand all warning and first aid data in the front of this manual. This data contains general shop safety practices not included in maintenance tasks.
- b. Read Chapter 1 to learn more about the truck and its purpose, capabilities and features.

3. CONTENTS OF MANUAL

- a. This TM contains unit maintenance instructions at the organizational level for the 6KVRRTFL. Included are principles of operation, fault isolation troubleshooting, and corrective maintenance tasks as authorized by the Maintenance Allocation Chart (MAC).
- b. This TM is made up of:

(1) Chapters. There are 20 chapters.

- (a) Chapter 1, Introduction. This chapter contains general truck information of interest to organizational level maintenance technicians.

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- (b) Chapter 2, Organizational Maintenance Instructions. This chapter contains instruction of interest to organizational level maintenance technicians on tools, equipment, preventive maintenance and troubleshooting.
- (c) Chapter 3, General Maintenance Practices. This chapter contains general instructions of interest to organizational level maintenance technicians on work safety, cleaning, disassembly and assembly, inspection, repair, lubrication, and painting.
- (d) Chapter 4, Engine Maintenance. This chapter contains engine maintenance instructions for the lubrication system and various engine components.
- (e) Chapter 5, Fuel System Maintenance. This chapter contains maintenance of engine fuel system components.
- (f) Chapter 6, Exhaust System Maintenance. This chapter contains maintenance of engine exhaust system components.
- (g) Chapter 7, Cooling System Maintenance. This chapter contains maintenance of engine cooling system components.
- (h) Chapter 8, Electrical System Maintenance. This chapter contains maintenance of vehicle electrical components and wiring harnesses.
- (i) Chapter 9, Transmission Maintenance. This chapter contains maintenance of transmission components.
- (j) Chapter 10, Propeller and Drive Shaft Maintenance. This chapter contains maintenance of propeller and drive shafts.
- (k) Chapter 11, Front and Rear Axle Assembly Maintenance. This chapter contains maintenance of front and rear axle assembly components.
- (l) Chapter 12, Service and Parking Brake Maintenance. This chapter contains maintenance of service and parking brakes.
- (m) Chapter 13, Wheel and Tire Maintenance. This chapter contains maintenance of wheel assemblies and tires.
- (n) Chapter 14, Steering System Maintenance. This chapter contains maintenance of steering system components.
- (o) Chapter 15, Frame and Towing Attachment Maintenance. This chapter contains maintenance of pintle hook and counterweight.
- (p) Chapter 16, Body and Cab Maintenance. This chapter contains maintenance of body and cab components.

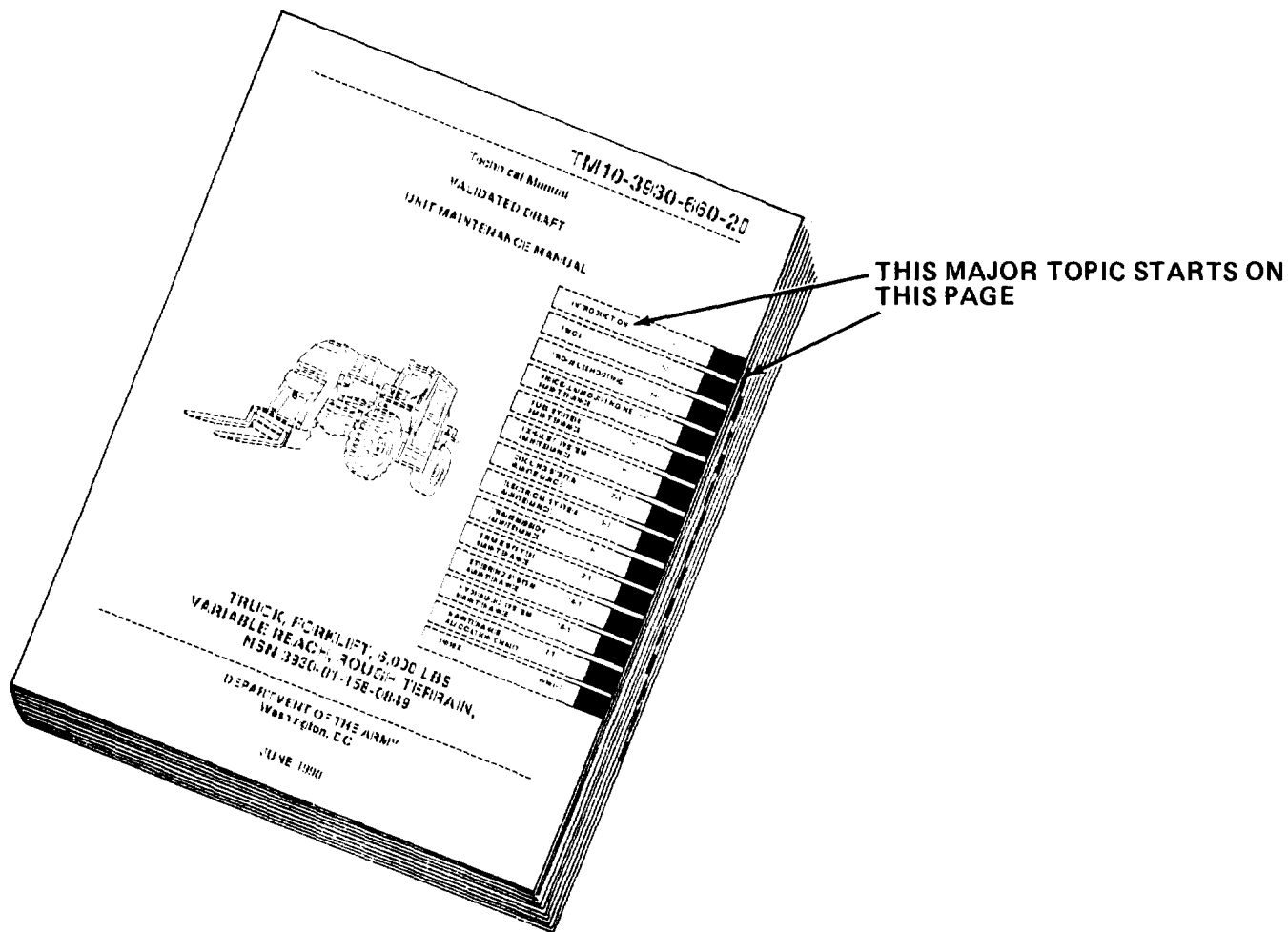
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- (q) Chapter 17, Body and Chassis Accessories Maintenance. This section contains maintenance of body and chassis accessories.
 - (r) Chapter 18, Hydraulic System Maintenance. This chapter contains maintenance of hydraulic system components.
 - (s) Chapter 19, Non-Electrical Gauges Maintenance. This chapter contains maintenance of non-electrical gauges.
 - (t) Chapter 20, Preparation For Storage and Shipment. This chapter contains information on storing the truck for extended periods of time.
- (2) Sections. Some chapters are further subdivided into sections. Sections allow for easier break-up of material. They are:
- (a) Chapter 1 has three sections: General Information, Equipment Description and Data, and Technical Principles of Operation.
 - (b) Chapter 2 has four sections: Repair Parts, Special Tools, TMDE and Support Equipment, Service upon Receipt of Material, Preventive Maintenance Checks and Services, and Troubleshooting Procedures.
- (3) Paragraphs. Paragraphs make up sections. The paragraphs have the information needed to do the job properly. Each paragraph is the start of a major topic within the chapter.
- (4) Pages. Pages are numbered consecutively within each chapter. The first part is the chapter number followed by a dash and the consecutive page number. For example, page 3 of Chapter 2 is numbered 2-3.
- (5) Appendices. Appendices are found in the back of the manual. They provide reference information required for maintenance.
- (a) Appendix A, References. This appendix contains other information you may need to do your job.
 - (b) Appendix B, Maintenance Allocation Chart (MAC). This appendix contains information needed by all maintenance levels. The MAC lists all tasks assigned to each maintenance level and grouped by functional group code. Refer to Section I of Appendix B for more information.
 - (c) Appendix C, Expendable/Durable Supplies and Materials List. This appendix contains information on expendable items you need for maintenance.
 - (d) Appendix D, Illustrated List of Manufactured Items. This appendix contains information you need to make parts that are not procured.

HOW TO USE THIS MANUAL (Cont'd)

- (6) Alphabetical Index. The alphabetical index is located in the back of the manual. It lists topics in alphabetical order and references the paragraph numbers where information on the topic can be found.

4. HOW TO FIND INFORMATION QUICKLY



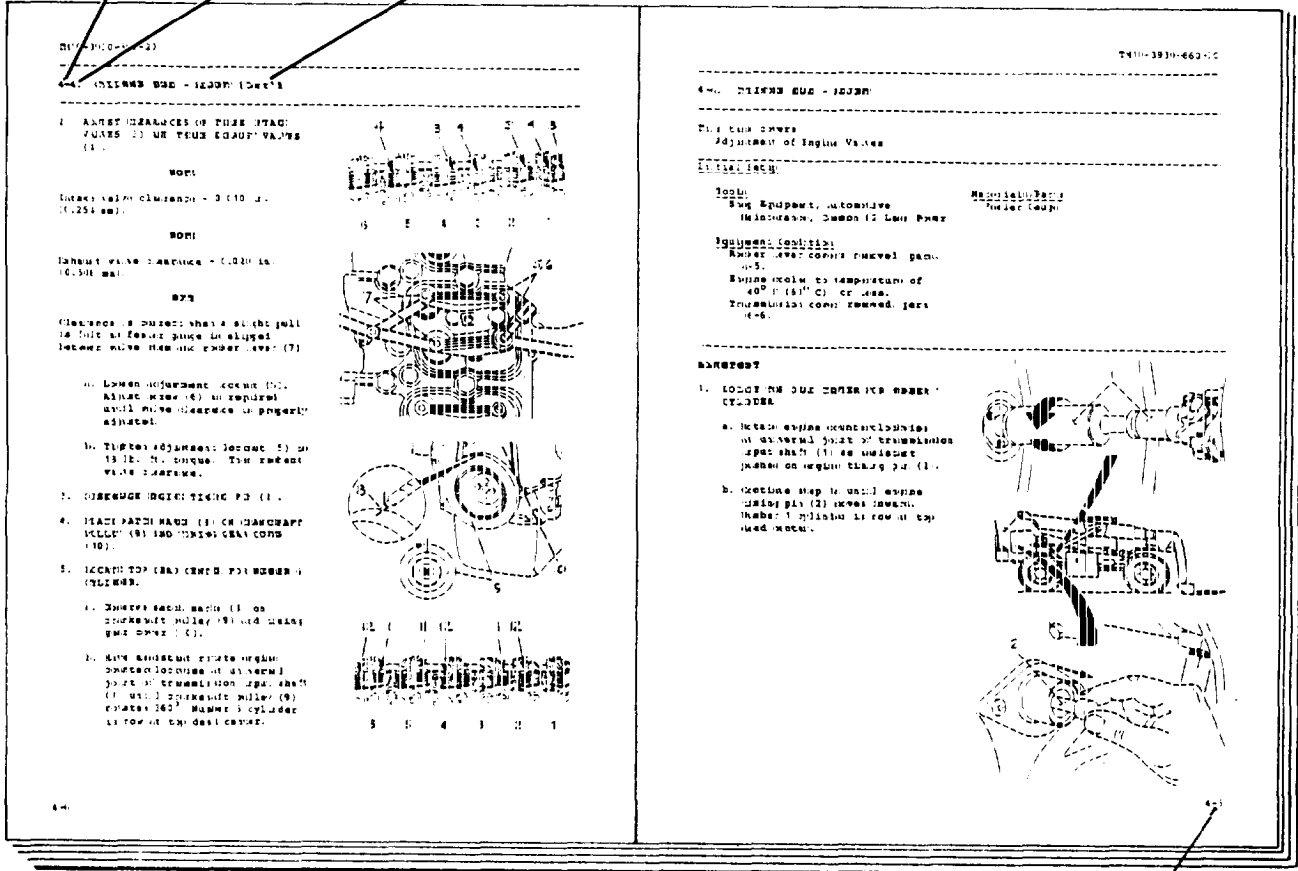
- a. Using the Front Cover. The front cover of the manual has boxed titles for major topics. At the right side of each box is a blackened area. The blackened area matches black markings on the first page of that major topic in the manual. Fan the outer edge of the manual to find the topic material.
- b. Using the Table of Contents. The table of contents lists all chapters, appendices, sections and other important information in this manual and the page number where each starts.

HOW TO USE THIS MANUAL (Cont'd)

CHAPTER NUMBER

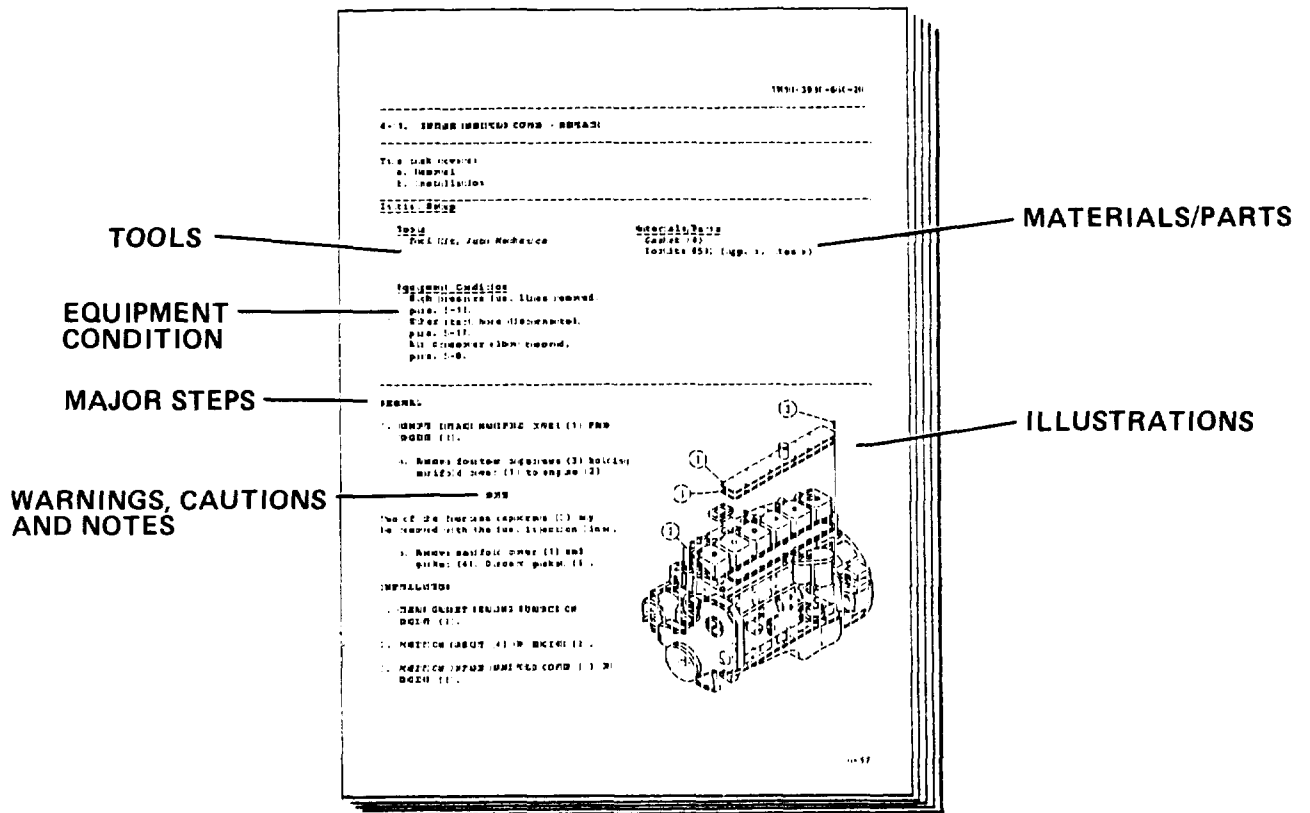
PARAGRAPH NUMBER

PARAGRAPH TITLE CONTINUED



- c. Using Chapter Indexes. On the first page of each chapter is an alphabetical summary listing of all paragraphs in that chapter and the page number where each can be found.
- d. Using Paragraph Numbers and Titles. Paragraph numbers include the chapter number. The paragraph number appears before the title of the paragraph title line. Paragraphs that are longer than one page will have the paragraph number and title continued at the top of each following page.

HOW TO USE THIS MANUAL (Cont'd)



5. HOW TO USE THE TROUBLESHOOTING CHARTS

Troubleshooting is divided into two parts, electrical and mechanical. At the start of the section is an alphabetical summary listing of the paragraphs in that section and the page number where each can be found. No of the paragraphs contain a symptom index, one for electrical and one for mechanical.

The symptom index lists common problems that you may have with the 6KVRRTFL and the page number where each can be found.

Each problem is followed by several tests or inspections that may indicate the cause of the problem. The tests or inspections are arranged from the most likely (1) to the least likely.

Each test or inspection is followed by step-by-step instructions needed to find the problem and the page number needed in the maintenance chapter to correct the problem.

HOW TO USE THIS MANUAL (Cont'd)

6. HOW TO USE A PROCEDURE

Each procedure consists of two parts, an initial setup table and a task section. You must familiarize yourself with the entire maintenance procedures before beginning the maintenance task.

The initial setup table contains all or some of the following headings:

Tools - Describes tools needed to perform the procedure.

Test Equipment - Describes test equipment needed to perform the procedure.

Equipment Condition - Refers to other procedures that must be performed before attempting the procedure.

Materials/Parts - Describes miscellaneous materials and parts needed to perform the procedure.

Personnel Required - Describes quantity of personnel needed to perform the procedure.

7. HOW TO FIND CRITICAL INFORMATION

Critical information in maintenance chapters has been capitalized for experienced technicians so that they may scan a task quickly and pick out the information needed without reading the entire task. This way, the level of detail needed by low-experienced technicians will not interfere with critical information.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION**1-1. SCOPE**

- a. Type of Manual. This manual contains unit maintenance instructions, at the organizational level, for the 6KVRRTFL.
- b. Model Numbers and Equipment Names. 6KVRRTFL, 6000 lb. Variable Reach Rough Terrain Forklift Truck. Equipped with Multiple Launch Rocket System (MLRS) lifting tool.
- c. Purpose of Equipment. The 6KVRRTFL is designed for loading and unloading Multiple Launch Rocket System (MLRS) pods from transport vehicles and containers. The 6KVRRTFL is also designed for use as a standard rough terrain forklift.
- d. Special Limitations on Equipment. The 6KVRRTFL has no special limitations. Normal limitations such as travel speed, lift capacity, etc. are given in paragraph 1-12.

1-2. MAINTENANCE FORMS AND RECORDS

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

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

Demolition of materiel to prevent enemy use shall be in accordance with the requirement of TM 750-244-3 (Procedures for Destruction of Equipment to Prevent Enemy Use for U.S. Army).

1-4. PREPARATION FOR STORAGE OR SHIPMENT

Refer to Chapter 20 for all storage and shipment instructions.

1-5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Not applicable.

1-6. OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS.

Refer to the nomenclature cross-reference list below. This listing gives nomenclature cross-references used in this manual. The common name is in the left column and the official name is in the right.

NOMENCLATURE CROSS-REFERENCE LIST

Common Name	Official Nomenclature
6KVRRTFL	6000 lb. Variable Reach Rough Terrain Forklift Truck
MLRS	Multiple Launch Rocket System

1-7. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your 6KVRRTFL truck 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 (Quality Deficiency Report). Mail it to: Commander US Army Tank-Automotive Command, ATTN: AMSTA-QRD, Warren, MI 48397-5000. We'll send you a reply.

1-8. EQUIPMENT IMPROVEMET REPORT AND MAINTENANCE DIGEST (EIR MD)

The quarterly Equipment Improvement Report and Maintenance Digest, TB 43-001-39 series contains valuable field information on the equipment covered in this manual. The information in the TB 43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB 43-0001 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWO's) , warranties (if applicable), actions taken on some of your DA Forms 2028-2 (Recommended Changes to Publications), and advance information on proposed changes that may affect this manual. The information will help you in doing your job better and will help in keeping you advised of the latest changes to this manual. Also refer to DA PAM 310-1 Consolidated Index of Army Publications and Blank Forms, and Appendix A, References, of this manual.

1-9. WARRANTY INFORMATION

Refer to warranty TB, TB10-3930-660-14.

Section II. EQUIPMENT DESCRIPTION AND DATA

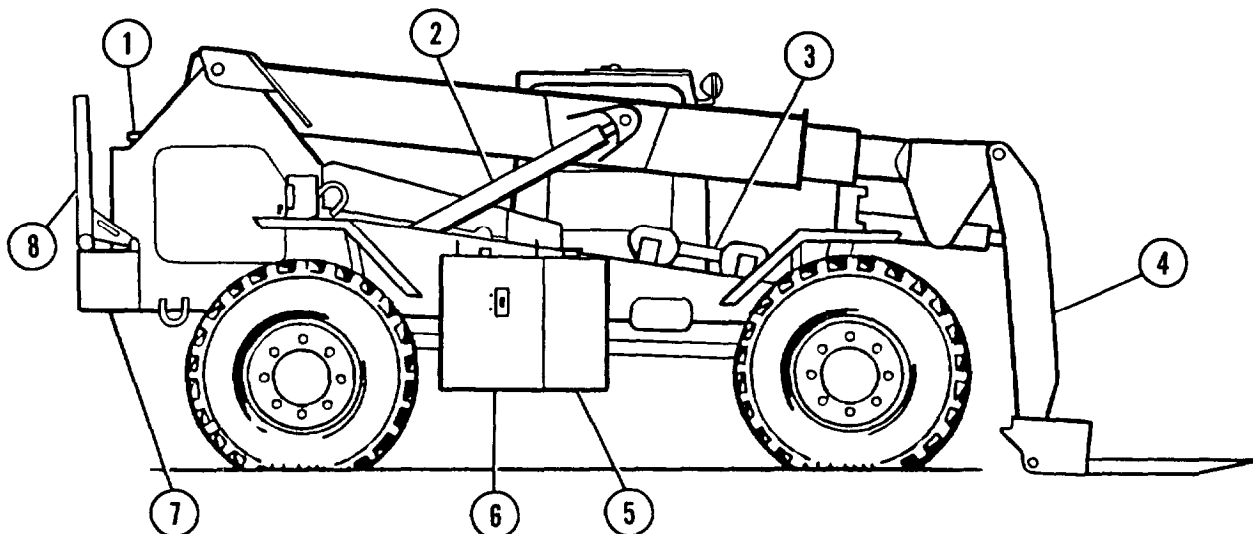
1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

The 6KVRRTFL is designed for loading and unloading munitions from transport vehicles and containers. Also, the 6KVRRTFL can be used as a forklift truck. The features and capabilities are listed as follows:

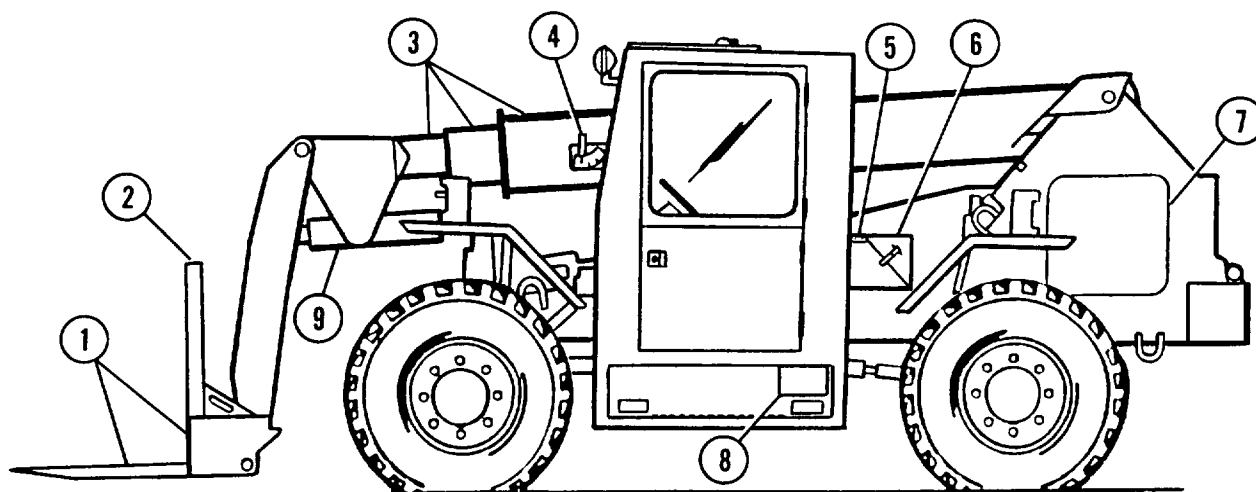
- With the MLRS lifting tool and stop **tube** on the forks, the 6KVRRTFL can handle MLRS pods.
- With the MLRS lifting tool and stop tube removed and the backrest installed on carriage, the 6KVRRTFL can handle boxes and palletized ammunition loads.
- The lifting tool stop tube fits over the forks and prevents the lifting tool from moving too far back on the forks and prevents the MLRS pod from contacting the frame or vehicle wheels when in the carry position.
- The vehicle frame can be tilted 9 degrees to left or right which allows vehicle to be level when traversing a sideslope.
- The MLRS attachment can be raised to a horizontal position for loading and unloading munitions.
- The forks tilt, level, and side shift to maneuver loads.
- Lifts loads of 6,000 lbs (2,722 kg) to a height of 26 ft. (7.9 meters).
- Can tow other vehicles weighing 27,100 pounds or less.
- The operator can select one of three steering modes: two wheel, four wheel, and crab wheel.
- All weather operational.

1-11. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

- (1) RADIATOR. Contains coolant which provides engine cooling.
- (2) BOOM HOIST CYLINDER. Raises and lowers the boom.
- (3) MLRS LIFTING TOOL AND STOP TUBE (Shown in storage position). The stop tube prevents the lifting tool from moving too far back on the forks and prevents the MLRS pod from contacting the frame or vehicle wheels when in the carry position.
- (4) MLRS ATTACHMENT. This attachment is required for MLRS and forklift operations. The MLRS attachment can be raised to a horizontal position, creating a low profile and extended reach configuration. This configuration is useful in loading and unloading munitions from transport vehicles and containers.
- (5) FUEL TANK. Contains diesel fuel for engine operation.
- (6) HYDRAULIC OIL RESERVOIR. Contains hydraulic fluid for the hydraulic system.
- (7) FRAME AND COUNTERWEIGHT. The frame is a heavy-duty design constructed of 1-3/16 in. (30 mm) thick steel plates. The frame is equipped with tie-down lugs meeting air transport specifications, tow lugs, a pintle hook, and a 3,600 lb. (1,636 kg) counterweight. The counterweight is removable so that axle loadings can be adjusted to meet air transport requirements for some aircraft.
- (8) LOAD BACKREST (Shown in storage position). Used to rest a load during non-MLRS operations. The backrest can be attached to the fork carriage and serves as a backstop or support for materials being carried on the forks.



- (1) FORKS AND CARRIAGE. Serves as an anchoring point of the forks. The fork carriage is also equipped with automatic fork leveling. Moving a switch will keep the forks level when raising or lowering the boom.
- (2) LOAD BACKREST (Shown in fork carriage position). Serves as a backstop or support for materials being carried on the forks.
- (3) BOOM . The telescopic, three stage boom is constructed of welded high strength steel. The boom will retract or extend the reach and height of the forks.
- (4) BOOM ANGLE INDICATOR. Shows the angle of the boom relative to the horizon.
- (5) NATO SLAVE RECEPTACLE. Serves as a starting device for another disabled vehicle.
- (6) BATTERY BOX. Holds the batteries which provide current for the electric system.
- (7) ENGINE. Provides the necessary power to drive the transmission. The engine also provides the necessary components for the Simplified Test Equipment for Internal Combustion Engines (STE/ICE) diagnostics.
- (8) TOOL BOX. Storage area for tools.
- (9) ATTACHMENT HOIST CYLINDER. Moves the MLRS attachment forward and backward.



TM10-3930-660-20

1-12. EQUIPMENT DATA

ENGINE :

Model 6BT5.9
Manufacturer Cummins
Horsepower (@2,500 RPM) 152 hp
Number of cylinders 6
Displacement 359 in.³
Weight 1,075 lbs.
Maximum No Load RPM 2650 to 2750 RPM

TRANSMISSION:

Model 1723
Manufacturer Funk
Powershift 3 speed forward and reverse
Speed Range
 First Gear 0-4 mph, level surface
 Second Gear 0-8 mph, level surface
 Third Gear 0-23 mph, level surface
Weight 846 lbs.

AXLE AND BRAKES:

Model (Front) PSOC-205-HOB-205
 (Rear) PSOC-205-HOB-206
Manufacturer Rockwell
Weight - Axle Assembly (Front or Rear) 1,650 lbs.

DIMENSIONS AND WEIGHT:

Vehicle Operational Weight 27,100 lbs.
Boom Assembly Weight 4,100 lbs.
 Inner Boom Weight 955 lbs.
 Intermediate Boom Weight 830 lbs.
 Outer Boom Weight 1,580 lbs.
Length (Carry Position) Maximum 312 in.
Width 102 in.
Height (Maximum) 101 in.
Wheelbase 124 in.
Track Width (Tread) 81.3 in.

CAPACITIES:

Fuel Tank 44 gallons
Cooling System 8 gallons
Hydraulic Oil Reservoir 56.6 gallons
Engine Crankcase 15 quarts
Transmission 5.5 gallons

MISCELLANEOUS :

Lift (Maximum)	6,000 lbs.
Lift Height.....	26 ft.
Boom Lift Angle (Maximum)	45 degrees
Maximum Reach From Load Center to Front Tires	24.16 ft.
Maximum Reach Below Grade.	20 in.
Ground Clearance	14.3 in.
Turning Radius (curb to curb)	15 ft. 4 in.
Frame Oscillation	9 degrees to the left or right
Fording Depth (Freshwater)	30 in.
Travel Speed (Maximum)	23 mph

1-13. EQUIPMENT CONFIGURATION

With a special lifting tool positioned on the forks, the 6KVRRTFL can load and unload Multiple Launch Rocket System (MLRS) pods from transport vehicles and containers. The tool which fits over the forks and allows the MLRS pods to be moved is called the MLRS lifting tool.

The 6KVRRTFL can also be used for many standard rough terrain forklift tasks. When used as a standard forklift, the MLRS lifting tool is removed from the vehicle forks and placed in its storage position. A load backrest is then installed. In this configuration, the 6KVRRTFL can load and unload single and double stacked pallets from 20 ft. (6.1 m) long ISO shipping containers. The containers can be on the ground or on trailers.

1-14. SAFETY, CARE, AND HANDLING

Correct servicing procedures must be followed to ensure the safety of technicians working on the 6KVRRTFL. Refer to the safety summary of this manual (page e) for a list of safety precautions peculiar to this vehicle.

SECTION III. TECHNICAL PRINCIPLES OF OPERATION

	Page		Page
General	1-8	Transmission Cooling and Lubrication System	1-10
Engine Fuel System	1-8	Electrical System	1-11
Engine Lubrication System	1-9	Steering and Braking System	1-12
Engine Cooling System	1-10	Hydraulic System	1-13

1-15. GENERAL

This section explains how components of the 6KVRTFL work together. A functional description is given for the engine, electrical system, steering and brake systems, and hydraulic system.

1-16. ENGINE

FUEL SYSTEM

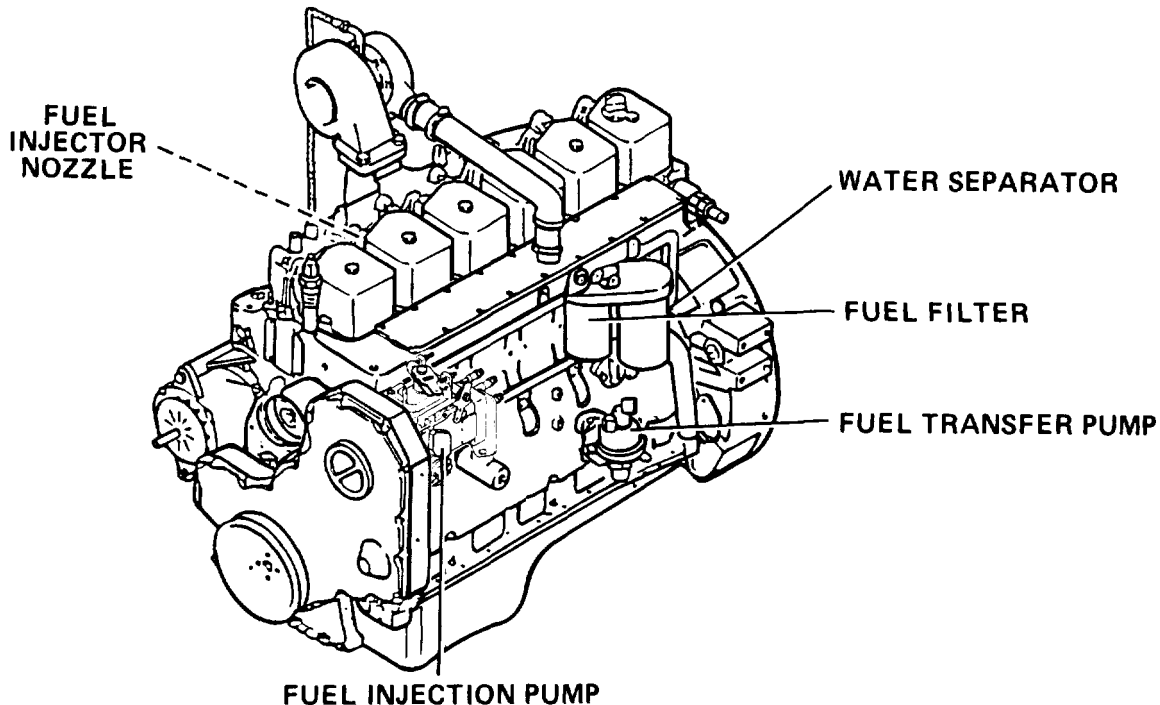
WATER SEPARATOR. Removes water moisture from fuel.

FUEL FILTER. Removes larger particles from the fuel before it reaches the transfer pump. Has primary and secondary filter elements.

FUEL TRANSFER PUMP. Pulls fuel from the fuel tank through the fuel filter, and sends it on to the fuel injection pump.

FUEL INJECTION PUMP. Sends exact amount of fuel to the injector nozzles.

FUEL INJECTOR NOZZLE. Turns the stream of fuel into a fine spray which permits good combustion in the cylinder. There is one nozzle for each cylinder.



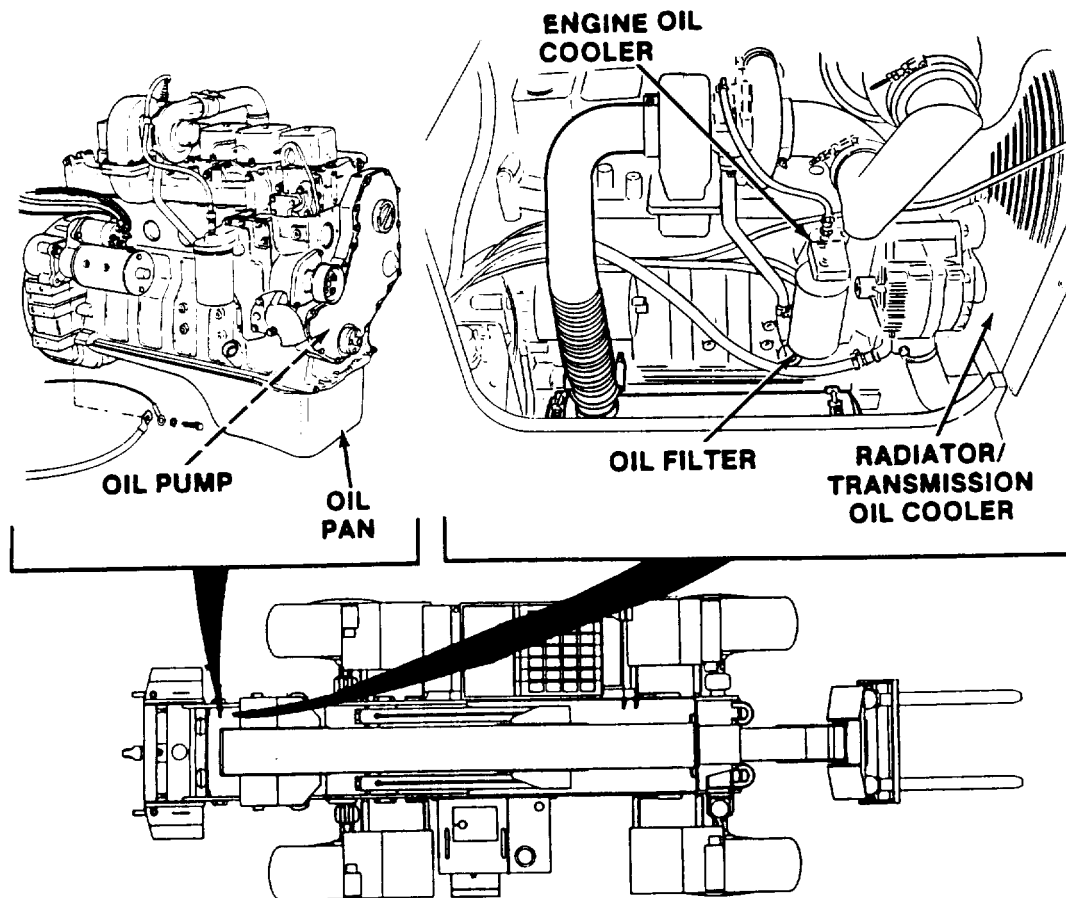
ENGINE LUBRICATION SYSTEM

OIL PUMP. Located on the front housing cover side. The pump draws oil from the oil pan and sends it through the oil cooler, and then through the oil filter. From the filter, the oil enters the cylinder block to lubricate the engine and is then returned to the oil pan. From the filter, oil is also sent through the turbocharger and then returned to the oil pan.

OIL PAN. Contains the oil that lubricates moving parts in the engine. It is attached to the bottom of the engine.

ENGINE OIL COOLER. When the engine is warm, the oil is sent through the oil cooler to lower its temperature.

OIL FILTER. Removes particles from the oil which could cause damage to the internal parts of the engine.



ENGINE COOLING SYSTEM

WATER PUMP. Draws water from the radiator and sends it through the cylinder block to cool the engine and then returns it to the radiator.

ENGINE OIL COOLER. The baffle on this cooler allows engine coolant to cool the engine oil.

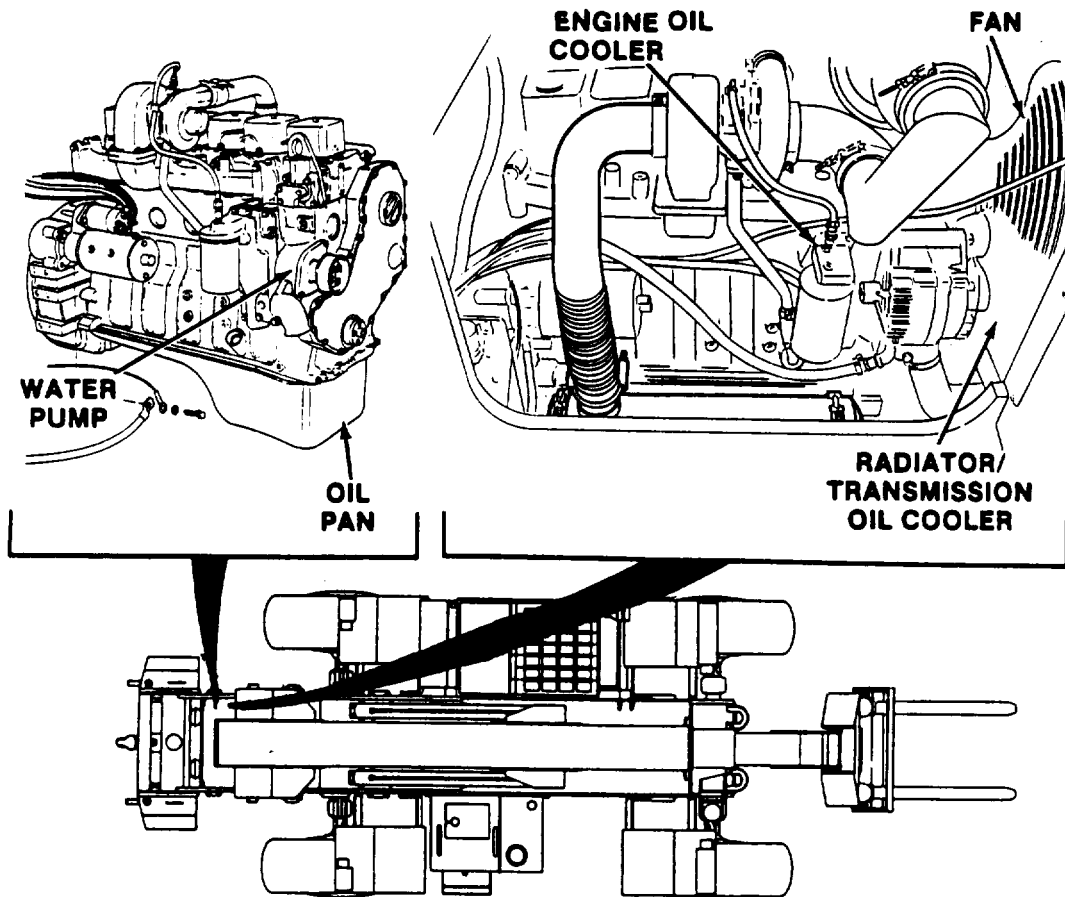
FAN . The fan is powered by the engine. It helps lower the temperature of the water as it passes through the radiator.

RADIATOR . Has a filler cap which permits adding water or coolant to the system. Water or coolant circulates through the radiator to be cooled after leaving the cylinder block.

1-17. TRANSMISSION COOLING AND LUBRICATION SYSTEM

TRANSMISSION OIL COOLER. Cools transmission oil and helps prevent transmission overheating. Oil is drawn through the cooler by the transmission.

TRANSMISSION OIL FILTER. Removes particles from the transmission oil which could cause damage to the internal parts of the transmission.



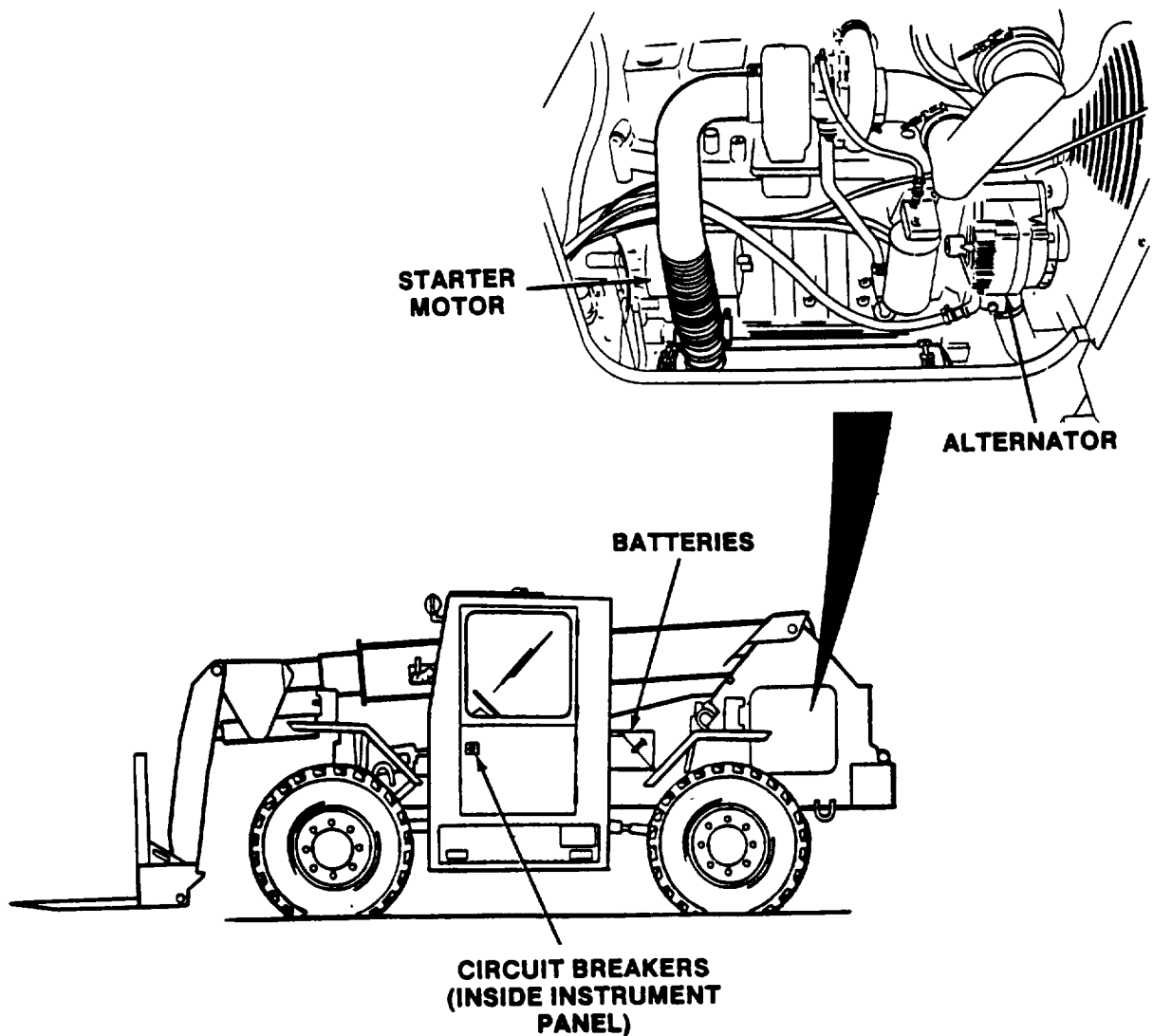
1-18. ELECTRICAL SYSTEM

BATTERIES . Provide power for three circuits; the charging circuit, the starting circuit, and the lighting circuit. Two 12 volt batteries are connected in series to provide starting power.

ALTERNATOR. The 24 volt, 65 amp alternator, an integral part of the charging circuit, provides current when the engine is running.

STARTER MOTOR. Part of the starting circuit, the starter motor is used to turn the engine flywheel fast enough to start the engine running.

CIRCUIT BREAKERS. A switch that opens the battery circuit if there is a shorted, ground wire, or excessive current draw by a defective component in the corresponding circuit. When the circuit is open, no current will flow through the electrical system. The circuit breakers will reset once they cool. If a breaker continually trips, the electrical system requires repair.



1-19. STEERING AND BRAKE SYSTEMS

STEERING CYLINDERS. Two cylinders are mounted at each axle and controlled by the steering wheel.

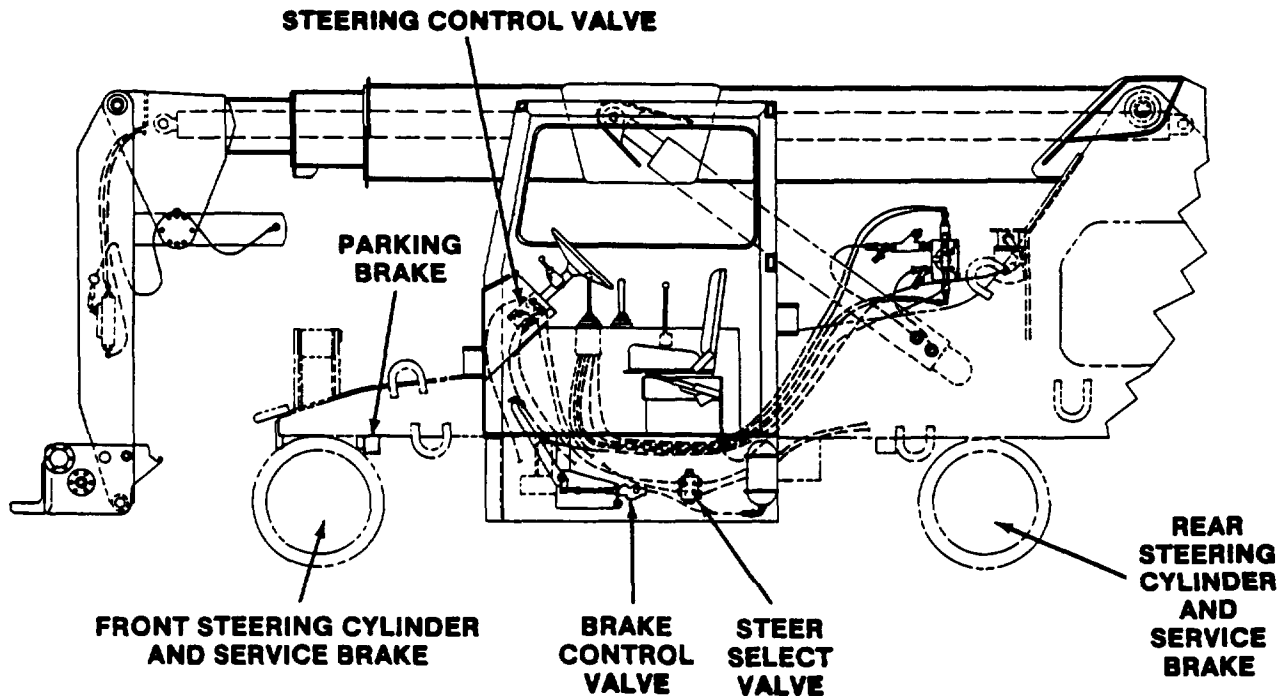
STEERING CONTROL VALVE. Connected directly to the steering wheel and located behind the instrument access panel. Controls the steering function.

STEER SELECT VALVE. Externally mounted under the cab. Allows the selection of two wheel, four wheel, or crab steering.

BRAKE CONTROL VALVE. Located under the cab. Provides a priority flow to the brake system. Excess flow is directed by the priority valve to the frame tilt system.

SERVICE BRAKES. Dry disk type brakes are mounted on all four wheels. The service brakes are hydraulically actuated. An accumulator in the braking system provides a limited number of stops without engine power.

PARKING BRAKES. Mechanically actuated drum brakes are mounted on the front axle input shaft. A lever in the operator's station engages and disengages the parking brake.



1-20. HYDRAULIC SYSTEM

HYDRAULIC OIL RESERVOIR. Contains oil for the entire system.

HYDRAULIC OIL FILTER. Removes smaller harmful particles from the oil before the oil returns to the reservoir.

MAIN CONTROL VALVE. Located on the engine compartment bulkhead of the main frame (near back of transmission). Controls the two boom functions: boom hoist/lowering and extend/retract.

MLRS ATTACHMENT CONTROL VALVE. Mounted in the attachment and is controlled by an electrical joystick and electrical cable down the length of the boom. Controls the three attachment functions: hoist/lowering, fork tilt, and fork side shift.

FRAME TILT VALVE. Mounted inside the console located to the right of the operator's seat. Controls the tilting of the vehicle frame.

HYDRAULIC JOYSTICK CONTROL VALVE. Located on the side console in cab. Controls the following boom functions: raise, lower, extend, and retract.

DUAL GEAR PUMP. Mounted to the transmission. This two section pump supplies the following functions: boom hoist, boom extend, steering, brake and frame tilt.

PISTON PUMP. Mounted to the transmission. This pump supplies the following functions: attachment hoist, fork tilt, left fork control, right fork control, load side shift control.

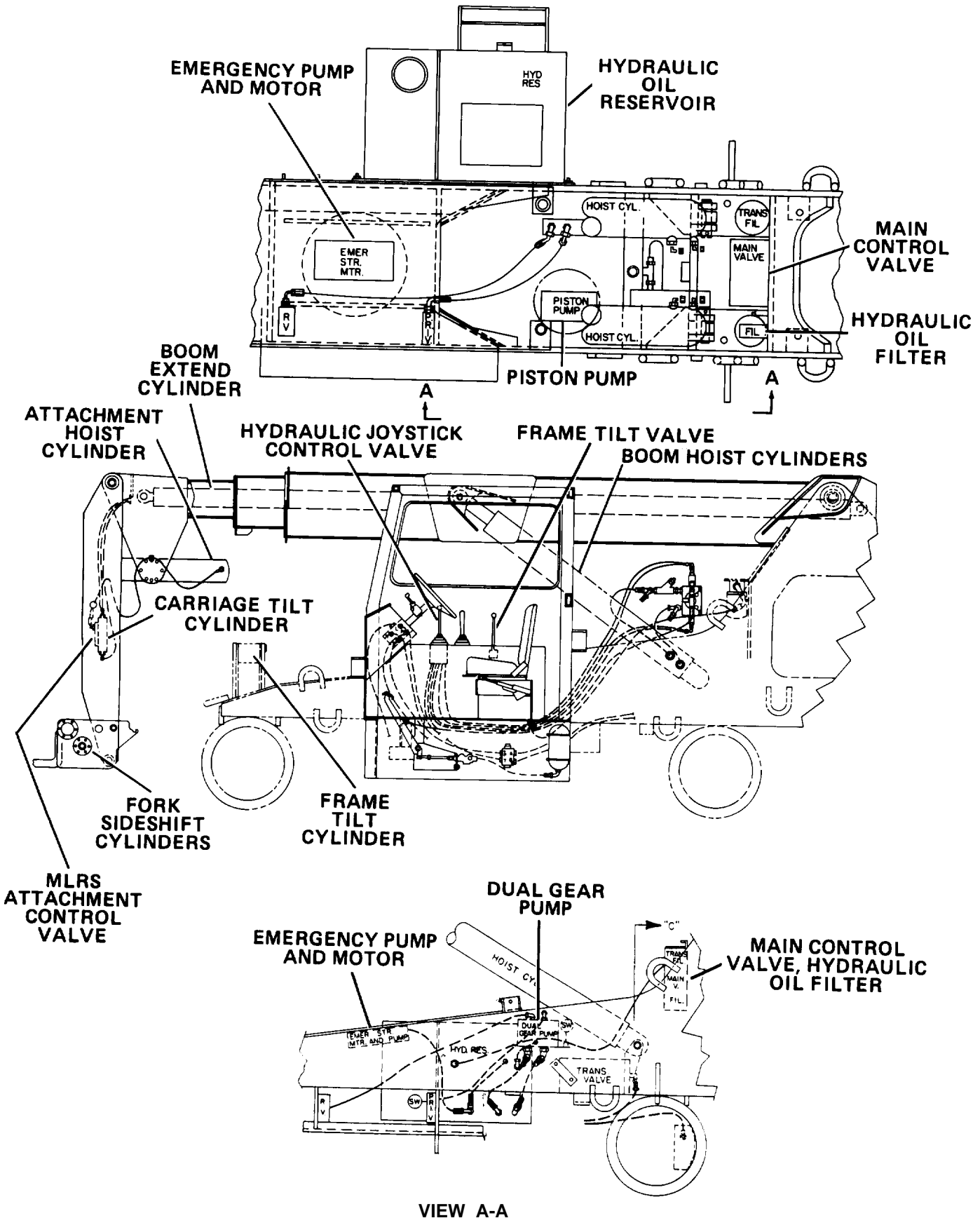
EMERGENCY PUMP AND MOTOR. Located between the vehicle forward of the transmission. This pump supplies 5 gpm (19 l/rein) of emergency flow to the steering system whenever the ignition is on and there is a loss of hydraulic and engine oil pressure. The pump is driven by an electric motor.

FORK SIDESHIFT CYLINDERS. These are two cylinders controlled by one joystick control. The joystick controls sideshift, the left fork and right fork functions. Both cylinders can be operated at the same time to sideshift forks left or right, to move forks together or apart. Also, the cylinders can be operated individually.

CARRIAGE TILT CYLINDERS. These are two cylinders controlled by the fork tilt joystick control. Moving the lever to the right causes the cylinders to extend and the fork tips will raise. Moving the lever to the left causes the cylinder to retract and the cylinders will lower.

ATTACHMENT HOIST CYLINDER. This cylinder is controlled by the attachment hoist control joystick. When the lever is pushed forward, pressure oil from the hydraulic reservoir causes the cylinder to retract. When the lever is pulled back, the cylinder will extend and raise the MLRS attachment.

BOOM EXTEND CYLINDER. This cylinder is controlled by the boom extend and retract joystick control. Moving the lever to the left causes the cylinder to retract and moves the MLRS attachment near to the vehicle. Moving the lever to the right causes the cylinder to extend and increase the reach distance or the height of the forks, depending on the angle of the boom.



HYDRAULIC SYSTEM (cont'd)

FRAME TILT CYLINDER. This cylinder is controlled by the frame tilt control joystick. When the lever is moved forward, pressure oil from the hydraulic oil reservoir causes the cylinder to retract and tilt the vehicle to the left. Pulling the lever back causes the cylinder to extend and tilt the frame to the right.

BOOM HOIST CYLINDERS. These are two cylinders controlled by the boom hoist control joystick. When the lever is moved forward, pressure oil from the hydraulic oil reservoir causes the cylinder to retract. Moving the lever backward causes the cylinder to extend.

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

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

	Page
Common Tools and Equipment	2-1
Repair Parts	2-1
Special Tools, TMDE and Support Equipment.	2-1

2-1. COMMON TOOLS AND EQUIPMENT

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

2-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

For authorized special tools, TMDE and support equipment refer to the RPSTL and maintenance allocation chart (Appendix B) pertaining to organizational maintenance for this equipment.

2-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list (RPSTL) TM10-3930-660-24P covering organizational maintenance for this equipment.

Section II. SERVICE UPON RECEIPT

	Page
Service Upon Receipt of Materiel	2-1
Preliminary Servicing and Adjustment of Equipment	2-2

2-4. SERVICE UPON RECEIPT OF MATERIEL

- a. Remove any plastic tape, wrapping paper or any other shipping and protective items.

WARNING

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138°F (58°C). Use only in a well ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.

- b. Clean any exposed metal parts coated with rust preventive compound. Remove compound with cleaning solvent (P-D-680).
- c. Read and follow all instructions contained in DD Form 1397 attached to the 6KVRRTFL.
- d. Inspect equipment for damage incurred during shipping. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.
- e. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with DA Pam 738-750.
- f. Clean all exterior surfaces.
- g. Touch up any paint scratches.

2-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT

- a. Perform the operator preventive maintenance checks and services (PMCS) contained in TM10-3930-660-10.
- b. Perform the organizational preventive maintenance checks and services (PMCS) contained in Table 2-1.
- c. Lubricate all points as shown in the lubrication order (L010-3930-660-12) regardless of interval.
- d. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 314, Preventive Maintenance Schedule and Record.
- e. Report all deficiencies on DA Form 2407 if the deficiencies appear to involve unsatisfactory design.
- f. Check that all decals and plates are on vehicle.
- g. Make sure vehicle is ready for operation; remove all warning tags.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

	Page
General	2-2
Organizational Preventive Maintenance Checks and Service	2-3
Leakage Definitions for Unit PMCS	2-4
PMCS Column Description	2-5

2-6. GENERAL

To make sure that your vehicle is ready for operation at all times, inspect it systematically so that you can discover any defects and have them corrected before they result in serious damage or failure. The charts on the next few pages contain your unit PMCS. The item numbers indicate the sequence of minimum inspection requirements. If you're operating the vehicle and notice something wrong which could damage the equipment if you continue operation, stop operation immediately.

Record all deficiencies and shortcomings, along with the corrective action taken, on DA Form 2404. The Item Number column is the source for the numbers used on the TM Number column on DA Form 2404.

2-7. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

- a. The item numbers of the table indicate the sequence of PMCS. Perform at intervals shown below:
 - a. Do your (Q) PREVENTIVE MAINTENANCE quarterly (every three months).
 - b. Do your (S) PREVENTIVE MAINTENANCE semiannually (every six months).
 - c. Do your (A) PREVENTIVE MAINTENANCE annually (once every year).
- b. If something doesn't work, troubleshoot it according to the instructions in this manual or notify your supervisor.
- c. Always do your preventive maintenance in the same order, so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.
- d. If anything looks wrong and you can't fix it, write it down on your DA Form 2404. If you find something seriously wrong, report it to Direct Support Maintenance as soon as possible.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated area. Avoid contact with skin, eyes and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point is 100 To TF-138 To TF (38 To TC-50 To TF). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield/gloves, etc.)

- (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 dry cleaning solvent (P-D-680) to clean metal surfaces. Use soap and water when you clean rubber or plastic material.

- (2) Bolts, nuts and screws: Check that they are not loose, missing, bent or broken. You can't try them all with a tool, of course, but look for chipped paint, bare metal or rust around bolt heads. Tighten any bolt, nut, or screw that you find loose.
- (3) Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to Direct support.
- (4) Electric wires and connectors: Look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connections and make sure wires are in good condition.
- (5) Hoses and fluid lines: Look for wear, damage and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten the fitting or connector. If something is broken or worn out, either correct it or report it to Direct Support Maintenance (see Maintenance Allocation Chart, Appendix B).

2-8. LEAKAGE DEFINITIONS FOR UNIT PMCS

It is necessary for you to know how fluid leaks affect the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them and REMEMBER - When in doubt, notify your supervisor.

LEAKAGE DEFINITIONS FOR UNIT PMCS

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

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When operating with Class I or II leaks, continue to check fluid levels as required on your PMCS.

NOTE

Change the interval if your lubricants/elements are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours.

2-9. PMCS COLUMN DBSCRIPTION

- a. Item Number - The order that PMCS should be performed, and also used as a source of item numbers for the TM number column on DA Form 2404 Equipment Inspection and Maintenance worksheet when recording results of PMCS.
- b. Interval - Tells when each check is to be performed.
- c. Item To Be Inspected - Lists the checks to be performed.
- d. Procedures Description of the procedure by which the check is to be performed.

NOTE

Perform Operator PMCS prior to or in conjunction with Organizational PMCS if:

- a. There is a delay between the daily operation and the Organizational PMCS.
- b. Regular operator is not assisting/participating.

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS)

W - Weekly Q - Quarterly S - semiannually A - Annually

Item No.	Interval				Item To Be Inspected Procedure: Check for and repair, fill or adjust as necessary
	W	Q	S	A	
					<p style="text-align: center;"><u>CAUTION</u></p> <p>The following new vehicle (break-in) maintenance is required on the 6KVRRTFL to prevent damage to the equipment and maintain the warranty.</p> <p>THE FOLLOWING ITEMS MUST BE CHANGED AFTER THE FIRST 20 HOURS OPERATION:</p> <p>-Transmission oil and transmission oil filter element. Refer to para. 9-7.</p>

W - Weekly

Q - Quarterly

S - Semiannually

A - Annually

Item No.	Interval				Item To Be Inspected Procedure: Check for and repair, fill or adjust as necessary
	W	Q	S	A	
					<p>THE FOLLOWING ITEMS MUST BE CHANGED AFTER THE FIRST 50 HOURS OF OPERATION:</p> <ul style="list-style-type: none"> - Planetary gear oil. Refer to para. 11-4. - Differential oil. Refer to para. 11-3. - Hydraulic oil filter element. Refer to para. 18-30. - Engine oil and engine oil filter element. Refer to para. 4-3. <p>THE FOLLOWING ITEMS MUST BE CHECKED AND ADJUSTED IF NECESSARY AFTER THE FIRST 100 HOURS OF OPERATION:</p> <ul style="list-style-type: none"> - Boom electrical cable tension. Refer to para. 18-25. - Boom hydraulic base tension. Refer to para. 18-25.
1		•			<p>BOOM CHAIN</p> <p>Check boom chain tension. With the boom fully extended in a horizontal position, measure the retract chain sag at the middle of the intermediate boom section. The chain sag should be approximately 3-1/4 to 3-1/2 inches from the top of the chain to the bottom of the boom. Refer to para. 18-24 if the chain requires adjustment.</p>
2					<p>BOOM ELECTRICAL CABLE AND HYDRAULIC HOSES</p> <p style="text-align: center;">CAUTION</p> <p>The boom electrical cable and hydraulic hoses also require adjustment at 100 hours of operation and at 100 hours after replacement or else damage to the forklift may occur.</p>
3		•			<p>Check cable and hose adjustment. Refer to para. 18-25 for adjustment procedures.</p> <p>FORK BUSHINGS AND WEAR PADS</p> <p>Check fork bushings and wear pads for excessive wear and obvious damage. Replace wear pads when worn to less than 3/8 of an inch. Refer to para. 18-17 and para. 18-18 for replacement instructions.</p>

W - Weekly

Q - Quarterly

S - semiannually

A - Annually

Item No.	Interval				Item To Be Inspected Procedure: Check for and repair, fill or adjust as necessary
	W	Q	S	A	
4			●		ENGINE ASSEMBLY Check the engine drive belt for wear. Firmly press the belt midway between its longest span. Maximum deflection should be 3/8 to 1/2 inch. If drive belt is worn or stretched, refer to para. 7-9 for drive belt replacement. Drive belt tension is not adjustable.
5			●		ENGINE MOUNTS Check engine mounts for cracks, deterioration and damage.
6					BATTERIES <p style="text-align: center;">WARNING</p> Do not smoke or allow any flame or spark in the vicinity while checking or filling the batteries. The batteries generate hydrogen gas, a highly explosive gas. Severe personal injury could result.
7			●		Test batteries to determine cell condition. Replace or recharge. Refer to TM9-6140-200-14.
			●		SERVICE BRAKES Check brake pads for wear. Pads should not be allowed to wear below 1/8 inch in thickness. Refer to para. 12-6 for wear pad replacement procedures.
			●		Check brake rotors for grooves, discoloration, cracks, and warpage.
8			●		PROPELLER SHAFTS Check all propeller shaft universal joints for excessive vibration or noise. Refer to para. 10-3 for replacement procedures.

W - Weekly

Q - Quarterly

S - Semiannually

A - Annually

Item No.	Interval				Item To Be Inspected Procedure: Check for and repair, fill or adjust as necessary
	W	Q	S	A	
9			●		BOOM ASSEMBLY Remove rear boom cover and check all visible boom wear pads (front and rear). Refer to para. 18-21 for inspection procedures.
10				●	TRUCK, FORKLIFT Perform annual safety inspection in accordance with TB 43-0142, Safety Inspection and Testing of Lifting Devices.
11		●			COOLANT MIXTURE CHECK Check for 50-50 mix of ethylene glycol and clean water. Refer to MIL-A-46153. If necessary, drain and refill engine cooling system. Refer to para. 7-3.
12		●			FUEL FILTERS Replace primary and secondary engine fuel filters, para. 5-16.

Section IV. TROUBLESHOOTING PROCEDURES**2-10. GENERAL**

- a. This section is divided into two paragraphs:
 - (1) Electrical Troubleshooting, Paragraph 2-11
 - (2) Mechanical Troubleshooting, Paragraph 2-12
- b. Table 2-2 of paragraph 2-11 lists common electrical malfunctions which may be found during the operation or maintenance of the 6KVRRTFL. It includes troubleshooting procedures for the battery charging system, cab electrical components, MLRS attachment group, and other electrical subsystems. A list of the symptoms covered in table 2-2 begins on page 2-10.
- c. Table 2-3 of paragraph 2-12 lists common mechanical malfunctions which may be found during the operation or maintenance of the 6KVRRTFL. It includes troubleshooting procedures for the steering, transmission, and drivetrain. A list of the symptoms covered in table 2-3 begins on page 2-23.
- d. This manual cannot list all malfunctions that may occur, nor all tests or inspection and corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions, notify your Supervisor.
- e. Each malfunction symptom, given for an individual component or system, is followed by a step(s) that should be taken to determine the cause and the corrective action that must be taken to remedy the problem.
- f. Always perform the test/inspections and corrective actions in the order listed.
- g. Before taking any action to correct a possible malfunction, the following rules should be followed:
 - (1) Question the truck operator to obtain any information that might help determine the cause of the problem.
 - (2) Never overlook the chance that the problem could be of simple origin. The problem could be corrected with minor adjustments.
 - (3) Use all senses to observe and locate troubles.
 - (4) Use test instruments or gauges to help you isolate the problems.
 - (5) Always isolate the system where the malfunction occurs, then locate the defective component.

2-11. ELECTRICAL SYSTEMS TROUBLESHOOTING

Refer to table 2-2 for electrical troubleshooting procedures, and use the symptom index below to quickly locate a particular fault or malfunction.

TM10-3930-660-20

Because of its complexity, the electrical troubleshooting is divided into the following functional systems:

- Charging System (page 2-12)
- Starting System (page 2-12)
- Gauges and Meters (page 2-14)
- Lighting System (page 2-16)
- Warning Systems (page 2-17)
- Battery System (page 2-19)
- Cab Group (page 2-19)
- MLRS Attachment Group (page 2-21)

ELBCTRICAL TROUBLESHOOTING
SYMPTOM INDEX

MALFUNCTION No.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
	CHARGING SYSTEM	
1.	Alternator not charging or insufficient charging	2-12
	STARTING SYSTEM	
2.	Starting motor will not turn	2-12
3*	Starter turns engine Slowly	2-13
4.	Starter motor keeps running	2-14
	GAUGES AND METERS	
5.	All gauges and hourmeter do not work	2-14
6.	A temperature or pressure gauge does not work	2-15
7.	Fuel gauge or level sender does not work or gives Inaccurate fuel level readings.	2-15
	LIGHTING SYSTEM	
8.	Blackout lights do not work	2-16
9.	Flood lights, horn, and backup alarm operate in blackout mode.	2-16
10.	Floodlight(s) do not work	2-16
	WARNING SYSTEMS	
11.	Horn does not sound	2-17
12.	Backup alarm does not sound.	2-18
	BATTERY SYSTEM	
13.	Low battery output	2-19
	CAB GROUP	
14.	Both front and rear wipers and washer do not work.	2-19
15.	Front wiper, rear wiper, or washer do not work	2-20
16,	Heater fans and cab fans do not work	2-20
17.	Only one heater fan works on high speed	2-20
	MLRS ATTACHMENT GROUP	
18.	One or more fork, carriage, or attachment functions not working.	2-21
19.	Forks will not autolevel.	2-21
20.	Fork autoleveling and electric joystick do not work.	2-22
21*	MLRS attachment hoist/lower function does not work	2-22

Table 2-2. Electrical Troubleshooting

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

CHARGING SYSTEM

1. ALTERNATOR NOT CHARGING OR INSUFFICIENT CHARGING

Step 1. Check for loose or corroded battery connections.

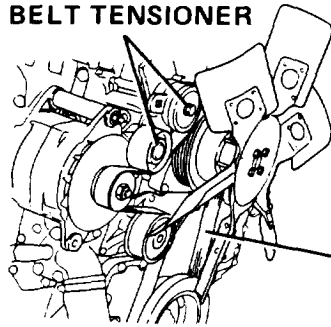
Clean and tighten battery connections as needed, para. 8-44.

Step 2. Check for alternator belt slippage.

Check belt tension and replace belt if required, para. 7-9.

Check belt tensioner operation, and replace belt tensioner if necessary, para. 7-9.

BELT TENSIONER



**DRIVE BELT
TENSION: 1/2 INCH
BETWEEN LONGEST
SPAN OF BELT**

Step 3. Check for alternator pulley loose on shaft.

Check pulley nut torque and tighten to 70-80 lb. ft. if necessary, para. 8-3.

STARTING SYSTEM

2. STARTING MOTOR WILL NOT TURN

Step 1. Check for corroded or loose battery terminal or cable.

Clean and tighten cables as required, para. 8-44.

Step 2. Check for low battery output with STE/ICE.

Test battery voltage using STE/ICE test #67. Battery voltage should be 24 volts or higher. Service or replace batteries as required if voltage is below minimum requirement. Refer to TM9-6140-200-14.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 3. Check if circuit breaker (CB6) is tripped.

. The circuit breakers will trip if there is a shorted or grounded wire.

- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Step 4. Check for continuity of starter switch between CB6 and neutral safety switch, para. 8-46. Replace starter switch if necessary, para. 8-9.

Step 5. Check for broken or disconnected wiring.

Check wiring and replace if necessary, para. 8-46.

Step 6. Check operation of neutral safety switch.

Test safety switch, para. 8-5.

Step 7. Check operation of starting relay.

Listen to relay for "click". If click is not heard, check coil continuity, para. 8-22. Replace relay if necessary, para. 8-22.

3. STARTER TURNS ENGINE SLOWLY

Step 1. Check for low battery output with STE/ICE.

Test battery voltage using STE/ICE #67. Battery voltage should be 24 volts or higher. **Service** or replace batteries as required if voltage is below minimum requirement. Refer to TM9-6140-200-14.

Step 2. Check for proper starting system operation with STE/ICE.

Test starting system using STE/ICE tests #68, 69, 70, 71, and 72.

- Results of #68 starater motor voltage test should be between 18 and 27.5 volts.
- Result of #69 starter negative cable voltage drop test should be between 0 and 3 volts.
- Result of #70 starter solenoid voltage test should be between 18 and 27.5 volts.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

- Result of #89 starter solenoid voltage drop test should be less than 0.3 volts.
- Result of #71 starter current average test should be between 0 and 250 amps.
- Result of #72 starter current first peak test should be between 300 and 1000 amps.

If test parameters are not met, check for loose or corroded connections at battery and starting motor. Inspect, clean, and tighten all connections as required.

Step 3. Check for proper engine oil.

Verify oil weight with oil sample (TM10-3930-660-10). If incorrect, drain and add correct oil. (see L010-3930-660-12).

4. STARTER MOTOR KEEPS RUNNING

Step 1. Check for defective starter switch or short in wiring harness.

Test starter switch and wiring harness for continuity, para. 8-46 and 8-47. Repair or replace as necessary, para. 8-9, 8-46, and 8-47.

Step 2. Check for defective starter relay.

Test starter relay for continuity. Replace if defective, para. 8-22.

GAUGES AND METERS

5. ALL GAUGES AND HOURMETER DO NOT WORK

Step 1. Check if circuit breaker (CB1) is tripped

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

Check circuit for shorts, bad ground, or defective electrical components. Refer to the electrical schematic, page F/O-1.

Step 2. Check for defective starter relay.

Check if starter relay closes. If not, replace starter relay, para. 8-22.

6. A TEMPERATURE OR PRESSURE GAUGE DOES NOT WORK

Step 1. Check continuity of gauge wiring harness, para. 8-46.

Replace broken wires or tighten loose connections, para. 8-46.

Step 2. Check for poor ground connection.

Check for poor ground connection at sender.

Step 3. Check for grounding of wire between gauge and sender.

Inspect wire between gauge and sender for grounding. Refer to electrical schematic, page F/O-1.

Step 4. Check gauge and sender for defects.

Replace gauge and/or sender if defective, para. 8-3, and 8-36 through 8-39.

7. FUEL GAUGE AND LEVEL GAUGE DO NOT WORK OR GIVE INACCURATE FUEL LEVEL READINGS

Step 1. Check continuity of gauge wiring harness, para. 8-46.

Replace broken wires or tighten loose connectional para. 8-46.

Step 2. Check for poor ground connection.

Make sure circuit has good ground connection at the sender. Refer to electrical schematic, page F/O-1.

Step 3. Check for grounding of wire between gauge and fuel level sender.

Inspect wire between fuel level sender and gauge for grounding. Refer to electrical schematic, page F/O-1.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION	
CORRECTIVE ACTION	

Step 4. Check for defective gauge, defective fuel level sender, or fuel saturated float.

Replace gauge and/or fuel level sender if necessary, para. 8-7 and 8-39.

LIGHTING SYSTEM

8. BLACKOUT LIGHTS DO NOT WORK

Check for tripped circuit breaker (CB4), faulty switch, faulty wiring, or faulty circuit breaker (CB4).

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check circuit for shorts and bad grounds. Refer to the electrical schematic, page F/0-1.

Replace defective electrical components as required, para. 8-12, 8-14, 8-33, and 8-34.

9. FLOODLIGHTS, HORN, AND BACKUP ALARM OPERATE IN BLACKOUT MODE.

Check for defective blackout light relay (RY2).

Test and, if necessary, replace blackout light relay (RY2), para. 8-24.

10. FLOODLIGHT(S) DO NOT WORK

Step 1. Check that floodlight bulbs have not failed.

Replace bulbs if necessary, para. 8-32.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check if circuit breaker (CB7) is tripped.

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check circuit for shorts, broken wire, or bad ground. Refer to electrical schematic, page F/0-1.

Step 3. Check for bad ground connection, broken wire, loose connections, or faulty floodlight assembly.

Test floodlight assembly and wires for continuity, para. 8-46 and 8-47. Replace if defective.

Step 4. Check for defective light switches.

Test for continuity in boom, front, and rear, floodlight switches. Replace switches if defective, para. 8-8.

WARNING SYSTEMS

11. HORN DOES NOT SOUND

Step 1. Check if circuit breaker (CB10) is tripped.

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Test circuit for shorts, broken wire or bad ground. Refer to electrical schematic, page F/0-1.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check for defective horn button or wires.

Test horn button and wires for continuity, para. 8-46.

Step 3. Check for defective horn.

Test horn, replace if necessary, para. 8-42.

Step 4. Check blackout light switch.

Replace switch if defective, para. 8-14.

12. BACKUP ALARM DOES NOT SOUND

Step 1. Check if circuit breaker (CB2) is tripped.

- The circuit breakers will trip if there is a shorted or grounded wire.

- The circuit breakers will automatically reset after cooling. They cannot be reset manually.

- . Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check backup alarm circuit for shorts, broken wire, or bad ground. Refer to electrical schematic, page F/O-1.

Step 2. Check for defective backup alarm switch, broken switch wires, or loose connections.

Check switch and switch wires for continuity, para. 8-46. Replace defective switch, para. 8-41, or broken wire, para. 8-46, if necessary.

Step 3. Check for defective backup alarm.

Test backup alarm. Replace if defective, para. 8-40.

Step 4. Check for defective blackout light switch.

Replace switch if defective, para. 8-14.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

BATTERY SYSTEM

13. Low BATTERY OUTPUT

Step 1. Check for low electrolyte level in battery.

Add distilled water to battery. Charge battery, para. 8-43 and TM9-6140-200-14.

Step 2. Check for loose or corroded battery cables.

Clean and tighten cables, para. 8-44.

Step 3. Check for bad or weak cell in battery.

Test battery using a hydrometer. Refer to TM9-6140-200-14.

CAB GROUP

14. BOTH FRONT AND REAR WIPERS AND WASHER DO NOT WORK

Step 1. Check if circuit breaker (CB3) is tripped.

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check circuit for shorts, bad ground, or defective electrical components. Refer to the electrical schematic, page F/0-1. Replace defective component, para. 7-3, 7-4, and 7-5.

Step 2. Check for faulty wiring in circuit.

Check for poor ground connections. Refer to electrical schematic, page F/0-1.

Check for broken wires and loose connections, para. 8-46.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 3. Check for defective engine run relay.

Test engine run relay and, if necessary, replace the relay, para. 8-24.

15. FRONT WIPER, REAR WIPER, OR WASHER DO NOT WORK

Step 1. Check for defective wiper or washer switch.

Check switch(es) for continuity. Replace switch(es) if defective, para. 8-8.

Step 2. Check for faulty wiring in the circuit.

Check for poor ground connections. Refer to electrical schematic, page F/0-1.

Check for broken wires and loose connections, para. 8-46.

Step 3. Check for defective wiper or washer motor(s).

Replace wiper motor or washer reservoir assembly if motor(s) are defective, para. 17-3, 17-4, and 17-5.

16. HEATER FANS AND CAB FANS DO NOT WORK

Check if circuit breaker (CB8) is tripped.

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check circuit for shorts, broken wire or bad ground. Refer to electrical schematic, page F/0-1.

17. ONLY ONE HEATER FAN WORKS ON HIGH SPEED

Check for bad ground connection, loose connections, or defective switch.

Check switch and wires for continuity. Refer to page F/0-1 and paragraph 8-46. Replace switch if required, para. 8-8. If necessary, replace broken wire, para. 8-46.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

MLRS ATTACHMENT GROUP

18. ONE OR MORE FORK, CARRIAGE, OR ATTACHMENT FUNCTIONS NOT WORKING

Step 1. Check for defective electrical joystick controller.

Test and, if necessary, replace electric joystick assembly, para. 8-19.

Step 2. Check for shorted or damaged connector plug(s) on joystick harness and boom electrical cable bulkhead connector at rear of boom, and for broken or damaged wire(s) and/or loose connections.

Check connections and wires for continuity. Check continuity between the electric joystick and MLRS valve. Refer to electrical schematic, page F/O-2 and paragraphs 8-46 and 8-48.

Replace wires as necessary, para. 8-46 and 8-48.

19. FORKS WILL NOT AUTOLEVEL

Step 1. Check that fork autoleveler switch is on.

Move control to ON position, see TM10-3930-660-10.

Step 2. Check fork autoleveler switch for defects.

Replace fork autoleveler switch if defective, para. 8-21.

Step 3. Check for damaged or broken wire(s) from toggle switch to fork autoleveler switch.

Repair or replace wire(s) as necessary, para. 8-46 and 8-47.

Step 4. Check for defective fork autoleveler switch or circuit board.

Test fork autoleveler switch or circuit board and replace if defective, para. 8-20 and 8-21.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

20. FORK AUTOLEVELING AND ELECTRIC JOYSTICK DO NOT WORK

Check if circuit breaker (CB5) is tripped.

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.
- . Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check circuit for shorts, broken wires, or bad ground. Refer to electrical schematic, page F/O-1.

21. MLRS ATTACHMENT HOIST/LOWER FUNCTION DOES NOT WORK

Step 1. Check for defective electrical joystick assembly.

Check electrical joystick assembly and replace if defective, para. 8-19.

Step 2. Check for bad ground or loose connections.

Inspect wires and connections, para. 8-46 and 8-47.

2-12. MECHANICAL TROUBLESHOOTING

Refer to table 2-3 for mechanical troubleshooting procedures~ and use the symptom index below to quickly locate a particular fault or malfunction.

Because of its complexity, the mechanical troubleshooting is divided into the following functional systems:

- Engine (page 2-25)
- Cooling System (page 2-37)
- Transmission (page 2-39)
- Axles and Differentials (page 2-43)
- Brakes (page 2-43)
- Steering (page 2-46)
- Hydraulic System (page 2-48)

MECHANICAL TROUBLESHOOTING SYMPTOM INDEX

MALFUNCTION No.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
ENGINE		
1	Engine cranks but fails to start	2-25
2	Engine cranks but will not start - no smoke from exhaust	2-25
3	Engine hard to start or will not start - smoke from exhaust	2-26
4	Engine surges (speed change)	2-28
5	Engine starts but will not keep running	2-28
6	Rough idle (irregularly firing or engine shaking)	2-30
7	Engine runs rough or misfiring	2-30
8	Engine RPM will not reach rated speed	2-30
9	Low power	231
10	Excessive exhaust smoke.	2-32
11	Engine lubricating oil pressure low	2-33
12	Engine lubricating oil pressure too high	2-33
13	Engine lubricating oil loss	2-34
14	Contaminated engine lube oil	2-34
15	Fuel or oil leaking from exhaust manifold	2-35
16	Compression knocks	2-35
17	Excessive fuel consumption.	2-35
18	Engine will not shut off	2-36
19	Excessive vibration	2-36
20	Excessive engine noises	2-36
COOLING SYSTEM		
21	Coolant temperature above normal	2-37
22	Coolant temperature below normal	2-38

23	Coolant loss	2-38
24	Contaminated coolant	2-39

TRANSMISSION

25	Low torque converter out pressure	2-39
26	High transmission oil temperature	2-40
27	High engine speed at torque converter stall	2-40
28	Low engine speed at torque converter stall	2-41
29	Loss of power	2-41
30	No power transmitted in any range	2-42
31	Low main pressure	2-42
32	No power transmitted in one range	2-42
33	Slow clutch engagement	2-42

AXLES AND DIFFERENTIALS

34	Continuous "clicking" sound from front axle when moving in a straight line	2-43
35	Slow engagement of front no spin differential clutch assemblies	2-43

BRAKES

36	Park brake will not hold unit	2-43
37	Park brake will not release	2-44
38	Poor or no brakes	2-44
39	Brakes will not release	2-45
40	Engine cannot move vehicle or has difficulty moving vehicle	2-45
41	Brakes chatter or are noisy	2-45

STEERING

42	Unit pulls to the right or left when moving straight ahead	2-46
43	Vehicle will not steer or is hard to steer	2-46
44	Steering wheel kickback	2-46
45	Emergency steering pump motor will not start or does not rotate freely	2-47
46	Emergency steering pump will not pump oil but motor spins freely	2-47
47	Emergency steering pump does not develop full pressure or flow	2-47
48	Steering select valve does not work	2-47
49	No power to one wheel	2-48

HYDRAULIC SYSTEM

50	Hydraulic functions operate slowly	2-48
51	Hydraulic functions move erratically	2-49
52	Slow boom or extend functions	2-49
53	Foamy hydraulic oil	2-50

Table 2-3. Mechanical Troubleshooting

MALFUNCTION
TEST OR INSPECTION
<u>CORRECTIVE ACTION</u>

ENGINE

1. ENGINE CRANKS BUT FAILS TO START

Step 1. Refer to Starting System section of Electrical Troubleshooting, table 2-2.

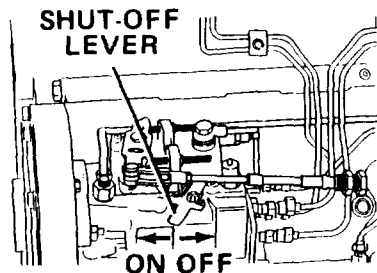
2. ENGINE CRANKS BUT WILL NOT START-NO SMOKE FROM EXHAUST

Step 1. Check for fuel in fuel tank.

Add fuel if required (see TM10-3930-660-10).

Step 2. Check for fuel shutoff solenoid or manual fuel shutoff valve not open.

a. Tighten loose wires and verify that the fuel shutoff solenoid is functioning para. 5-3.



b. Check that the mechanical shutdown lever is placed in ON position.

Step 3. Check for plugged air intake or exhaust system.

a. Remove and clean air intake cap. Clean air inlet tube.

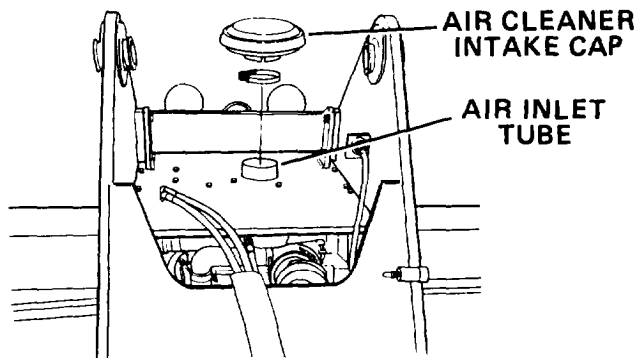
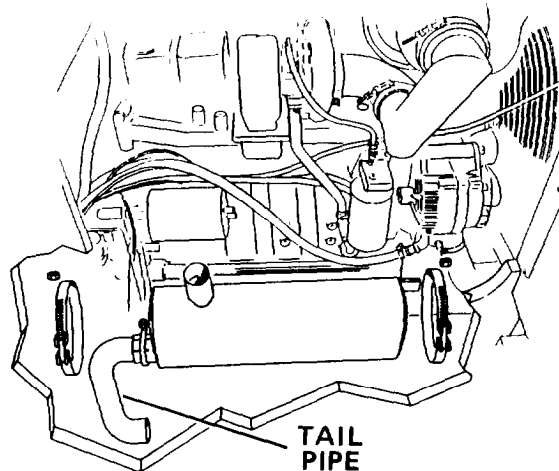


Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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b. Remove and clean tail pipe.



Step 4. **Check for** plugged fuel filter.

Drain water separator or replace fuel filter head, TM10-3930-660-10 and para. 5-16.

Step 5. Check for lack of fuel at injection pump or aerated fuel.

Check for fuel flow and bleed fuel system, para. 5-12.

3. ENGINE HARD TO START OR WILL NOT START - SMOKE FROM EXHAUST

Step 1. Check for cranking speed too slow.

a. Check for low battery output with STE/ICE. Battery voltage should be 24 volts or higher. Service or replace batteries as required if voltage is below 24 volts. Refer to TM9-6140-200-14.

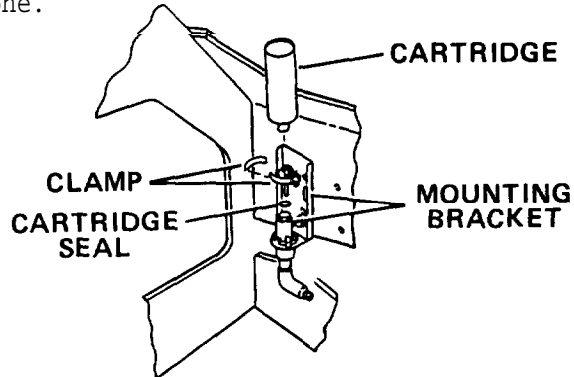
b. Check starting system. Refer to Starting System section of Electrical Troubleshooting Table **2-2**. Repair and/or replace starting system components and wiring as necessary.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 2. Check ether start aid operation.

- a. Remove ether start cartridge, para. 5-18. Shake and listen for liquid splashing inside cartridge. If cartridge is empty, replace with a full one, para. 5-18. Be sure you discard the old cartridge seal and install a new one.



- b. Crank the engine and press the engine primer button for no longer than 5 seconds. Release the engine primer button and listen for ether start cartridge operation. When primer button is released, a measured amount of starting fluid from the cartridge is injected into the engine.
- c. If ether start aid operates, inspect ether start hose and atomizer for damage, and replace if necessary, para. 5-17.
- d. If ether start aid is not operating, place starter-run control switch in the OFF position, and disconnect cable from negative (-) battery terminal. Inspect and continuity check ether start aid electrical wiring and thermostat. Refer to the electrical schematic, page FO-1. If necessary replace broken wire(s), para. 8-46, or defective thermostat, para. 5-19.

Step 3. Check for obstructions to intake air.

- a. Remove and clean air cleaner intake cap. Clean air inlet tube.

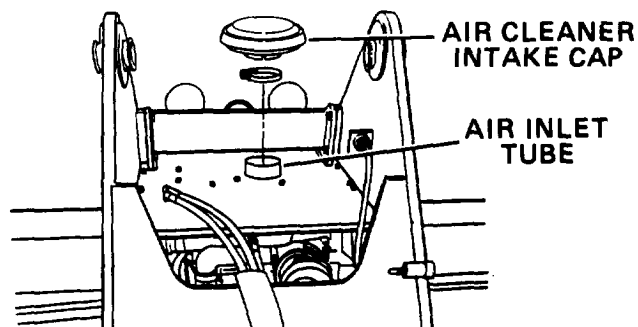


Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

b. Service air cleaner elements, TM10-3930-660-10.

Step 4. Check **for** air in the fuel system or inadequate fuel supply.

Bleed the **fuel** system, para. 5-12, or fill fuel tank as necessary, TM10-3930-660-10.

Step 5. Check for contaminated fuel.

Obtain sample (see TM10-3930-660-10). Verify by operating the engine with clean fuel from a temporary supply tank. Drain and flush the fuel supply tank.

4. ENGINE SURGES (speed change)

Step 1. If surging occurs at idle, check if idle speed is set too low for accessories.

Adjust idle speed by adjusting accelerator cable as necessary, para. 5-21.

Step 2. Check for high pressure fuel leak.

Replace high pressure lines, or tighten fittings, injector sealing washers *or* delivery valves, para. 5-12.

5. ENGINE STARTS BUT WILL NOT KEEP RUNNING

Step 1. Check for idle speed too low for accessories.

Adjust idle speed by adjusting accelerator cable as necessary, para. 5-21.

Table 2-3. Mechanical Troubleshooting (Cont'd)

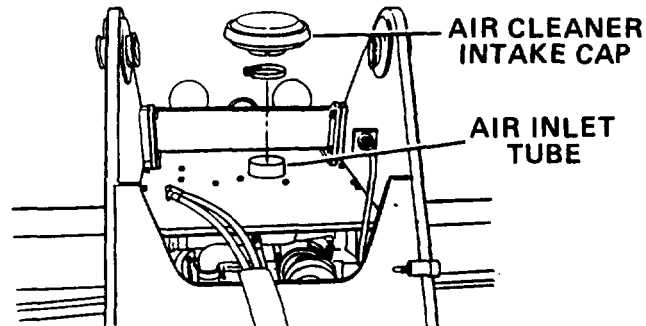
MALFUNCTION

TEST OR INSPECTION

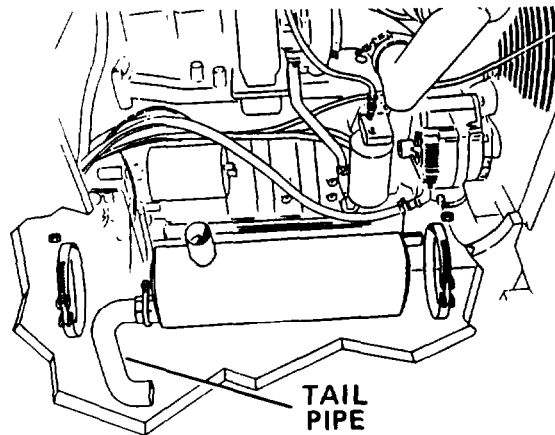
CORRECTIVE ACTION

Step 2. Check for restrictions in intake air and exhaust systems.

a. Remove and clean air cleaner intake cap. Clean air inlet tube.



b. Remove and clean tail pipe.



Step 3. Check for air in the fuel system or inadequate fuel supply.

Check the flow through the fuel filter and bleed the system, para. 5-12. Locate and correct the air leak.

Step 4. Check for fuel waxing due to extremely cold weather.

Inspect the fuel filter, para. 5-16. Clean the system and use climatized fuel.

Step 5. Check for contaminated fuel.

Verify by operating the engine with clean fuel from a temporary supply tank. Drain and flush the fuel/hydraulic tank, para. 5-10.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

6. ROUGH IDLE (irregularly firing or engine shaking)

Step 1. Check for idle speed too low for the accessories.

Adjust idle speed by adjusting accelerator cable as required, para. 5-21.

Step 2. Check for high pressure fuel leak.

Check for leaks in the high pressure lines, fittings, injection sealing washers, or delivery valve seals. Replace defective parts as required, para. 5-12.

Step 3. Check for air in the fuel system.

Bleed the fuel system, para. 5-12. Locate and repair the leak.

7. ENGINE RUNS ROUGH OR MISFIRING

Step 1. Fuel injection lines leaking.

Inspect high pressure lines, fittings, injector sealing washers, or delivery valves for leaks. Replace components as necessary, para.5-12.

Step 2. Check for air in the fuel or inadequate fuel supply.

Check the flow through the filter and bleed the system, para. 5-12. Locate and correct the air leak.

Step 3. Check for contaminated fuel.

Verify by operating the engine with clean fuel from a temporary tank. Drain and fill fuel/hydraulic tank if necessary, para. 5-10.

8. ENGINE RPM WILL NOT REACH RATED SPEED

Step 1. Check for overloaded engine.

Verify high idle speed without load. Investigate operation to be sure correct **gear** range is being used, TM10-3930-660-10.

Step 2. Check for accelerator linkage wear or incorrect adjustment.

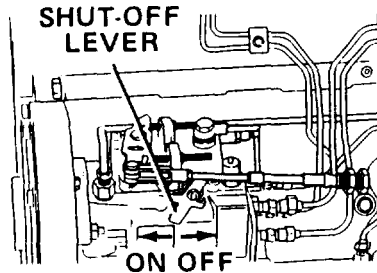
Adjust accelerator cable linkage, para. 5-21.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

Step 3. Check for partially engaged manual fuel shutoff valve lever.

Check position of manual fuel shutoff valve lever. Be sure lever is placed in "ON" position.



Step 4. Check for inadequate fuel supply.

Check for and remove the source of fuel restriction, para. 5-11 and 5-16.

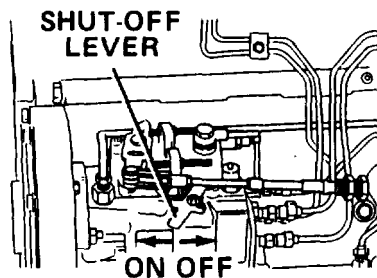
9. LOW POWER

Step 1. Check for fuel control lever not moving to full speed.

Adjust accelerator cable if necessary, para. 5-21.

Step 2. Check for partially engaged manual fuel shutoff valve lever.

Verify that manual fuel shutoff valve lever is positioned fully in "ON" position.



Step 3. Check for high oil level.

Check for high oil level and drain oil if necessary, para. 4-3.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 4. Check for overloaded engine.

Check for added loading from malfunctioning accessories or driven units. Check for dragging brakes and other changes in vehicle loading.

Step 5. Check for inadequate intake air and high or low temperature intake air.

Inspect air cleaner element and replace if necessary. Check air intake system for other restrictions, para. 5-5.

Step 6. Check for high pressure fuel leak.

Check for leaks in the high pressure lines and fittings. Replace components as necessary, para. 5-12.

Step 7. Check for inadequate fuel supply.

Check for clogged filter. Replace if necessary, para. 5-16.

Step 8. Check for poor quality fuel.

Check for poor quality fuel by operating vehicle from a temporary tank with good quality fuel. Drain and fill fuel/hydraulic tank if necessary, para. 5-10.

Step 9. Check for air leak between the turbocharger and the intake manifold.

Step 10. Check for leaks in the air crossover tube, hoses, and through holes in the manifold cover. Replace parts as necessary, para. 5-7 and 5-8.

Step 11. Check for leaks in the manifold or turbocharger gaskets. Check for a cracked manifold. Replace parts as necessary, para. 5-7.

Step 12. Check for excessive exhaust system restriction.

Remove restrictions as needed, para. 6-3 and 6-4.

10. EXCESSIVE EXHAUST SMOKE

Step 1. Check for engine running too cold (white smoke).

See troubleshooting for Coolant Temperature Below Normal, Step 22.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check for inadequate intake air and restrictions.

Inspect air cleaner and change elements if necessary, para. 5-5. Clean or replace air intake system as necessary, para. 5-5.

Step 3. Check for air leak between the turbocharger and the exhaust manifold. Replace the turbocharger gasket if necessary, para. 5-7.

Step 4. Check for air leaks in the air crossover tube, hoses, and through holes in the manifold cover. Replace parts as necessary, para. 4-10 and 5-8.

Step 5. Check for leaks in the exhaust manifold. Inspect manifold for cracks. Replace manifold if necessary, para. 4-9.

Step 6. Check for a malfunctioning turbocharger. Replace turbocharger if necessary, para. 5-7.

11. ENGINE LUBRICATING OIL PRESSURE LOW

Step 1. Check for low engine oil level.

a. Replenish engine oil as necessary, L05-3930-660-12.

b. Replace any lines found with oil leaks that could reduce oil pressure, para. 5-9.

Step 2. Check engine oil for thin viscosity, diluted, or wrong specification.

Verify that correct oil is being used, see L010-3930-660-12. Check for oil dilution. Refer to troubleshooting for Engine Contaminated Lube Oil, Step 14.

Step 3. Check for malfunctioning pressure switch or gauge.

Replace the engine oil pressure switch, para. 8-15, or gauge, para. 8-7.

Step 4. Check for plugged oil filter.

Replace oil filter if plugged, para. 4-3.

12. ENGINE LUBRICATING OIL PRESSURE TOO HIGH

Step 1. Check for malfunctioning engine oil pressure switch or gauge.

Replace the engine oil pressure switch, para. 8-15 and gauge, para. 8-7.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check for engine running too cold.

Refer to Coolant Temperature Below Normal section, Step 22 of Cooling System Troubleshooting.

Step 3. Check engine oil for viscosity too thick.

- a. Check that the correct engine oil is being used, see LO 10-3930-660-12.
- b. Replace engine oil if necessary, para. 4-3.

13. ENGINE LUBRICATING OIL LOSS

Step 1. Check for external leaks.

Inspect engine for external oil leaks.

Step 2. Check crankcase for oil overfill.

Verify that the crankcase is not overfilled. Drain oil to correct level, if necessary, para. 4-3. Verify that the oil is at correct mark on dipstick.

Step 3. Check for turbocharger oil leaking to the air intake.

Replace oil and lines or gaskets as necessary, para. 5-7 thru 5-9.

14. CONTAMINATED ENGINE LUBE OIL

Step 1. Check for coolant in the engine oil, internal engine component leaks.

Refer to Test 23, Coolant Loss in this table (Table 2-3).

Step 2. Check for excessive engine oil sludge.

- a. Replace engine oil and filter, para. 4-3.
- b. Check that the correct engine oil is being used; see LO10-3930-660-12.

Step 3. Check for fuel in the engine oil, engine operating too cold.

If either condition is found, review vehicle operation for excessive idling resulting in the engine running below normal temperature.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION****15. FUEL OR OIL LEAKING FROM EXHAUST MANIFOLD**

Step 1. Check for intake air restriction.

a. Clean or replace air cleaner filter element if necessary
TM10-3930-660-10.

b. Review vehicle operation for excessive idling.

Step 2. Check for obstructed turbocharger drain line(s).

Remove and clean turbocharger drain line, para. 5-9.

Step 3. Check turbocharger and gasket for leaking oil.

Replace turbocharger or gasket if necessary, para. 5-7.

16. COMPRESSION KNOCKS

Step 1. Check for air in the fuel system.

Bleed the fuel system, para. 5-12.

Step 2. Check for poor quality fuel.

Verify by operating from a temporary tank with good fuel. Clean and flush the fuel/hydraulic tank, para. 5-10.

Step 3. Check for overloaded engine.

Check that the engine load rating is not being exceeded, para. 1-12.

17. EXCESSIVE FUEL CONSUMPTION

Step 1. Check for additional loading from malfunctioning accessories.

Check for malfunctioning accessories and vehicle components and repair or replace as necessary.

Step 2. Check for incorrect operator technique.

Review vehicle operation for correct gear shifts, deceleration, and idling, see TM10-3930-660-10.

Table 2-3. Mechanical Troubleshooting (Cont'd)

TEST OR INSPECTION	CORRECTIVE ACTION
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Step 3. Check for poor quality fuel.

Check that **quality no. 2 fuel is** being used.

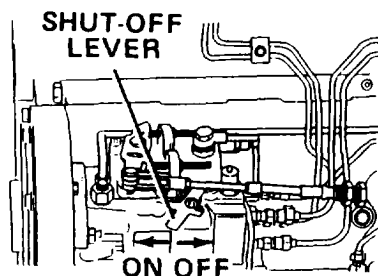
Step 4. Check for exhaust restriction or inadequate intake air.

Refer to Test 10, Excessive Exhaust Smoke in this table (Table 2-3).

18. ENGINE WILL NOT SHUT OFF

Step 1. Check for inoperative fuel shutoff solenoid.

Stop the engine mechanically with manual fuel shutoff valve lever.
Test fuel shutoff valve, para. 5-3.



Step 2. Check for engine running on fumes drawn into the air intake.

Check the air intake ducts for the source of the fumes.

19. EXCESSIVE VIBRATION

Step 1. Check for engine not running smoothly.

Refer to Test 7. Engine Runs Rough or Misfiring, in this table (Table 2-3).

Step 2. Check for loose or damaged fan.

Check for loose fan mounting screws and, if necessary, tighten to 216 in. lb.

20. EXCESSIVE ENGINE NOISES

Step 1. Check for drive belt squeal caused by insufficient belt tension or abnormally high loading.

Replace belt if necessary, para. 7-9.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check for intake air or exhaust leaks.

Refer to Test 10, Excessive Exhaust Smoke, in this table (Table 2-3).

COOLING SYSTEM

21. COOLANT TEMPERATURE ABOVE NORMAL

Step 1. Check for low coolant level.

a. Check and replenish coolant as necessary, para. 7-3.

b. Locate and correct the source of the coolant leak. Refer to Test 23, Coolant Loss, in this table.

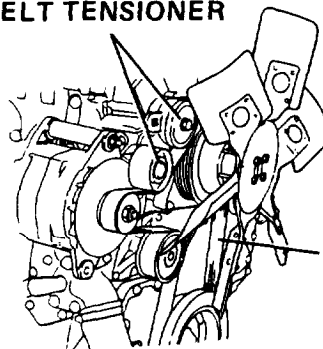
Step 2. Check for incorrect or malfunctioning radiator cap.

A 6-8 psi radiator cap should be installed. Replace radiator pressure cap with correct rating if necessary.

Step 3. Check for loose drive belt.

Check belt tension and replace belt if necessary, para. 7-9.

BELT TENSIONER



**DRIVE BELT
TENSION: 1/2 INCH
BETWEEN LONGEST
SPAN OF BELT**

Step 4. Check for inadequate air flow caused by restrictions to the radiator.

Remove restrictions.

Step 5. Check for plugged radiator fins.

Inspect radiator and blow debris from radiator fins.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 6. Check for collapsed radiator hose.

Inspect radiator hoses and replace if required, para. 7-5.

Step 7. Check for malfunctioning thermostat, temperature sender, or gauge.

Replace thermostat, gauge and/or temperature sender as necessary, para. 7-4, 8-7 and 8-37.

Step 8. Check for malfunctioning water pump.

Replace if necessary para. 7-6.

Step 9. Check for plugged cooling passages in the cooling system.

Flush the engine cooling system and fill with cleaning solution, and fill cooling system with coolant, para. 7-4.

Step 10. Check for overloaded engine.

Verify that the engine load rating is not being exceeded, para. 1-12.

22. COOLANT TEMPERATURE BELOW NORMAL

Step 1. Check for incorrect thermostat or faulty thermostat.

Test thermostat. Replace thermostat if required, para. 7-4.

Step 2. Check temperature sender or gauge for malfunctions.

Replace gauge and/or temperature sender if necessary, para. 8-7 and 8-37.

Step 3. Check if coolant is flowing by temperature sensor.

Flush the engine cooling system with cleaning solution and fill cooling system with coolant, para. 7-4.

23. COOLANT LOSS

Step 1. Check for radiator or cab heater leaking.

a. Inspect the radiator and cab heater hoses and connections for leaks, para. 7-5 and 17-10.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

b. If oil is present in the coolant, check for a transmission or lube oil cooler leak.

Step 2. Check for overheating or leaking compression gasses causing loss of coolant through the radiator overflow.

Review the operation for overheating and low power. Refer to Test 21, Coolant Temperature Above Normal, in this table (Table 2-3).

Step 3. Check for transmission cooler and transmission cooler lines leaks.

Test combination radiator/transmission oil cooler, and if necessary, replace, para. 7-3.

24. CONTAMINATED COOLANT

Check for rusty coolant, operation without correct mixture of antifreeze and coolant. Review the coolant change interval.

Replace coolant if necessary, para 7-3.

TRANSMISSION**25. LOW TORQUE CONVERTER OIL PRESSURE**

Step 1. Check for low transmission oil level.

Add oil as necessary, LO10-3930-660-12.

Step 2. Check for leakage in transmission oil cooler and cooler lines.

a. Replace cooler lines as necessary, para. 7-3.

b. Replace combination radiator/transmission cooler if necessary, para. 7-3.

Step 3. Check for high transmission oil temperature.

Refer to Test 26, High Transmission Oil Temperature, in this table (Table 2-3) .

Step 4. Check for foaming transmission oil.

Refer to Test 29, Loss of Power, in this table.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

26. HIGH TRANSMISSION OIL TEMPERATURE

Step 1. Check for low transmission oil level.

Add oil as necessary, L010-3930-660-12.

Step 2. Check for high transmission oil level.

If transmission oil level is too high, drain transmission oil down to the full mark, para. 9-7.

Step 3. Check for low water level in engine cooling system.

Add water to engine cooling system, para. 7-3. Check for leaks in engine cooling system. Refer to Tests 22 and 23 in this table.

Step 4. Check for low main pressure.

Refer to Test 31, LOW Main Pressure, in this table.

Step 5. Check for low torque converter out pressure.

Refer to Test 25, Low Torque Converter Out Pressure, in this table.

Step 6. Check for clogged or dirty transmission oil cooler/radiator. Replace transmission oil cooler/radiator if necessary, para. 7-3.

Step 7. Check for operation of vehicle too slow for gear selected.

Downshift transmission at a higher speed, TM10-3930-660-10.

Step 8. Check for vehicle brakes dragging.

Check parking and service brakes for dragging condition. Repair brakes as required. Refer to Tests 36-40 in this table.

Step 9. Check for restricted oil lines to transmission oil filter and cooler.

Clean or replace lines as necessary, para. 9-9.

27. HIGH ENGINE SPEED AT TORQUE CONVERTER STALL

Step 1. Check for low transmission oil level.

Add oil as needed, L010-3930-660-12.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

Step 2. Check for high transmission oil temperature, above 250°F.

Refer to Test 26, High Transmission Oil Temperature, in this table.

Step 3. Check for foaming transmission oil.

Refer to Test 29, Loss of Power, in this table.

28. LOW ENGINE SPEED AT TORQUE CONVERTER STALL

Step 1. Check for low engine output torque.

Check engine for proper output torque and tune engine if necessary.
Refer to Direct Support Maintenance.

Step 2. Check for transmission not up to operating temperature.

Check that transmission temperature is between 180 to 210°F.

29. LOSS OF POWER

Step 1. Check for low engine speed at torque converter stall.

Refer to Test 28, Low Engine Speed at Torque Converter Stall, in this table.

Step 2. Check for high engine speed at torque converter stall.

Refer to Test 27, High Engine Speed at Torque Converter Stall, in this table.

Step 3. Check for transmission control valve not positioned properly.

Replace control valve linkage, para. 9-4.

Step 4. Check for vehicle brakes dragging.

Inspect parking and service brakes for dragging. Repair brakes if necessary. Refer to Tests 36-40 in this table.

Step 5. Check for foaming oil.

a. Check for low transmission oil level; add oil as necessary, L010-3930-660-12.

b. Check for water in transmission oil (see L010-3930-660-12). If found, find and repair leak. Drain and fill system, para. 9-7.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

c. Check for high transmission oil level. If too high, drain transmission oil to proper level, para. 9-7.

d. Check for proper transmission oil. Check oil specifications (see L010-3930-660-12). If incorrect, replace with proper oil, para. 9-7.

30. NO POWER TRANSMITTED IN ANY RANGE

Step 1. Check for drive line failure.

Repair input and output transmission or replace propeller shafts if necessary, para. 10-3 and 10-4.

Step 2. Check for range selector valve not positioned properly.

Replace control valve linkage as necessary, para. 9-4.

Step 3. Check for low transmission oil level.

Add oil to transmission as necessary, L010-3930-660-12.

Step 4. Check for low main pressure.

Refer to Test 31, Low Main Pressure, in this table.

31. LOW MAIN PRESSURE

Step 1. Check for low transmission oil level.

Add oil to transmission as necessary, L010-3930-660-12.

Step 2. Check for leaks in hydraulic system.

Check each range for localizing internal leaks. Replace or repair hoses and lines as necessary, para. 18-26.

32. NO POWER TRANSMITTED IN ONE RANGE

Check for manual selector linkage out of adjustment.

Adjust selector linkage as necessary, para. 9-3.

33. SLOW CLUTCH ENGAGEMENT

Step 1. Check for low transmission oil level.

Fill transmission to proper oil level, L010-3930-660-12.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check for foaming transmission oil.

Refer to Test 29, Loss of Power, in this table.

AXLES AND DIFFERENTIALS

34. CONTINUOUS "CLICKING" SOUND FROM FRONT AXLE WHEN MOVING IN A STRAIGHT LINE

Check for incorrect front tires and/or unequal diameters of front tires.

Replace tire(s) or adjust tire pressures until both tire diameters are the same, para. 13-4.

35. SLOW ENGAGEMENT OF FRONT NO SPIN DIFFERENTIAL CLUTCH ASSEMBLIES

Step 1. Inspect axle housing for contamination in oil.

Clean if necessary, para. 11-3.

Step 2. Heavy gear lubricant.

Change to appropriate lubricant, para. 11-3.

BRAKES

36. PARK BRAKE WILL NOT HOLD UNIT

Step 1. Check park brake cable for proper adjustment.

Readjust as necessary, para. 12-4.

Step 2. Inspect park brake drum lining.

Replace if worn or glazed, para. 12-3.

Step 3. Check for missing or damaged park brake linkage.

Replace if necessary para. 12-4.

Table 2-3. Mechanical Troubleshooting (Cont'd)

A C T I O N

TEST OR INSPECTION

CORRECTIVE ACTION

37. PARK BRAKE WILL NOT RELEASE

Step 1. Check for out of adjustment park brake linkage.

Adjust or replace park brake cable, para. 12-4.

Step 2. Check for binding of internal park brake mechanism.

Remove park brake drum and inspect for wear or damage, para. 12-3.

38. POOR OR NO BRAKES

Step 1. Check for air in brake system.

Bleed brake system, para. 12-5.

Step 2. Check for leaking, damaged, or obstructed brake lines.

Repair or replace brake lines as necessary, para. 12-9.

Step 3. Check for low accumulator pressure caused by weak tandem gear pump output.

Replace tandem gear pump if small section flow and pressure is found, para. 18-4.

Step 4. Check for low accumulator charging pressure.

Adjust accumulator charging pressure as needed in brake control valve, para. 12-8.

Step 5. Check for low nitrogen precharge or faulty accumulator.

Replace or repair accumulator if necessary, para. 12-8.

Step 6. Check for leakage at service brake shoe calipers.

Inspect service brake shoe calipers for oil. Replace service brake shoe calipers. Refer to Direct Support Maintenance.

Step 7. Check for worn service brake shoes.

Replace service brake shoes if necessary, para. 12-6.

Step 8. Check for low hydraulic oil.

Add hydraulic oil to proper level, L010-3930-660-12.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

39. BRAKES WILL NOT RELEASE

Step 1. Check that brake pedal is returning to full up position.

Inspect brake linkage and spring. Replace linkage and spring if necessary, para. 12-7.

Step 2. Inspect pistons in service brake caliper for binding.

Replace service brake calipers if necessary. Refer to Direct Support Maintenance.

Step 3. Check for restrictions and excessive back pressure in return line.

Remove restriction in return line. Replace or repair lines as necessary, para. 12-9.

40. ENGINE CANNOT MOVE VEHICLE OR HAS DIFFICULTY MOVING VEHICLE

Step 1. Check parking brake for dragging condition.

Inspect and adjust parking brake, para. 12-4.

Step 2. Check service brakes for dragging condition.

Inspect and, if necessary, replace service brake caliper(s). Refer to Direct Support Maintenance.

Step 3. Check for a broken propeller shaft.

Replace propeller shaft and/or U-joints, para. 10-3.

41. BRAKES CHATTER OR ARE NOISY

Step 1. Check for air in brake system.

Bleed brake system to purge air from system, para. 12-5.

Step 2. Check for loose or worn service brake shoes.

Replace service brake shoes if required, para. 12-6.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

STEERING

42. UNIT PULLS TO THE RIGHT OR LEFT WHEN MOVING STRAIGHT AHEAD

Step 1. Check wheel alignment.

Adjust tie rod as necessary, para. 14-5.

Step 2. Inspect steering cylinder for hydraulic oil leaking past cylinder piston.

Replace steering cylinder, para. 14-8.

Step 3. Check for worn steering control valve.

Replace steering control valve, para. 14-10.

Step 4. Check for worn steering select valve.

Test steering select valve. Repair or replace steering select valve if defective, para. 14-11.

Step 5. Inspect service brake caliper and rotor for damage.

Repair or replace service brake caliper or rotor. Refer to Direct Support Maintenance.

43. VEHICLE WILL NOT STEER OR IS HARD TO STEER

Step 1. Check for defective priority valve,

Replace priority valve if required, para. 18-8.

Step 2. Inspect steering control valve for leakage.

Replace steering control valve as required, para. 14-10.

Step 3. Check for low tandem gear pump flow.

Test large section of tandem gear pump for output. Replace if necessary, para. 18-4.

44. STEERING WHEEL KICKBACK

Step 1. Check for air in hydraulic system

Check for leaks and loose connections on pump inlet lines. Purge air by operating hydraulic system, para. 18-3.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

Step 2. Check for **leakage in steering control valve.**

Replace steering control Valve, para. 14-10.

45. EMERGENCY STEERING PUMP MOTOR WILL NOT START OR DOES ROTATE FREELY

Step 1. Check for loose electrical connections.

Repair loose connections in wiring as necessary para. 8-47 and 14-6.

Step 2. Check for seized steering pump assembly.

Inspect steering pump; replace if necessary para. 14-6.

Step 3. Check for failure of steering pump-mounted relay.

Inspect steering relay, replace if necessary para. 8-23.

46. EMERGENCY STEERING PUMP WILL NOT PUMP OIL BUT MOTOR SPINS FREELY

Step 1. Check that the fuel/hydraulic tank is filled with hydraulic oil.

Add oil to fuel/hydraulic tank as necessary, L010-3930-660-12.

Step 2. Check that steering pump assembly is working properly.

Replace steering pump assembly if necessary, para. 14-6.

47. EMERGENCY STEERING PUMP DOES NOT DEVELOP FULL PRESSURE OR FLOW

Step 1. Check for low battery output with STE/ICE.

Test battery voltage using STE/ICE test #67. Battery voltage should be 24 volts or higher. Service or replace batteries as required if voltage is below minimum requirement. Refer to TM9-6140-200-14.

48. STEERING SELECT VALVE DOES NOT WORK

Step 1. Check for tripped circuit breaker (CB4).

- The circuit breakers will trip if there is a shorted or grounded wire.
- The circuit breakers will automatically reset after cooling. They cannot be reset manually.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

- Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced, para. 8-12.

Check circuit for shorts, bad ground, or defective steering select valve. Replace steering Select valve if necessary, para. 14-11. Refer to the electrical schematic page FO-1.

Step 2. Check for broken wires, loose connections, and poor grounds.

Replace wires **if** necessary, para. 8-46 and 8-47. Tighten connections.

Step 3. Check for defective run relay.

Check that run relay closes, if not, replace run relay, para. **8-24**.

Step 4. Check for defective steering select switch.

Check switch for continuity. Replace switch if defective, para. 8-8.

Step 5. Check steering select valve.

Test steering select valve. Replace valve if defective, para. 14-11.

Step 6. Check blackout light switch.

Replace switch if defective, para. 8-14.

49. NO POWER TO ONE WHEEL

Step 1. Check for steering universal (Cardan) joint failure.

Inspect and replace steering universal joints if necessary, para. 14-9.

HYDRAULIC SYSTEM

50. HYDRAULIC FUNCTIONS OPERATE SLOWLY

Step 1. Cold hydraulic oil.

Operate hydraulic system until hydraulic oil warms up.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

Step 2. Engine speed too low.

Increase engine speed with accelerator pedal.

Step 3. Check oil level.

Add hydraulic oil to proper level, L010-3930-660-12.

Step 4. Inspect hydraulic line(s) and tube(s) for damage.

Replace hose(s) and tube(s) as necessary, para. 18-26.

Step 5. Check strainers and filter for obstructions.

Repair or replace filter, para. 18-30, and/or inspect and clean tank strainers, para. 18-29.

Step 6. Check relief valve for defects.

Inspect relief valve in system with little or no pressure. Replace relief valve if necessary, para. 18-9.

Step 7. Check for worn or defective pumps.

Test pumps for proper operation and replace if necessary, para. 18-4 and 18-5.

Step 8. Check **for** proper hydraulic oil viscosity.

Verify oil weight with oil sample. If incorrect, drain hydraulic tank, para. 5-10. Add correct oil, L010-3930-660-12.

51. HYDRAULIC FUNCTIONS MOVE ERRATICALLY

Check for air leak in hydraulic system.

Operate hydraulic system, purge air from hydraulic circuits. Check for leaks and loose connections on pump inlet lines, para. 18-3.

52. SLOW BOOM OR EXTEND FUNCTIONS

Step 1. Check for pinched or kinked sections of pilot hoses.

Replace pilot hoses as necessary from cab to control valve, para. 18-26.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check for defective hydraulic joystick control valve.

Replace hydraulic joystick control valve if necessary, para. 18-12.

53. FOAMY HYDRAULIC OIL

Step 1. Check for water in hydraulic oil.

Determine where water entered system. Change oil, para. 5-10. Repair leaks as necessary.

Step 2. Check for low oil level.

Add oil as necessary, L010-3930-660-12.

2-13. STE/ICE VEHICLE SYSTEM DIAGNOSTIC CHECK

- a. General. This section contains information and tests which may be used with STE/ICE (Simplified Test Equipment for Internal Combustion Engines) to locate malfunctions that may occur in the vehicle. The tests can be used during troubleshooting, corrective maintenance, and after routine adjustments.

The STE/ICE system is primarily used in conjunction with the vehicle electrical system. The test cannot **cover** all possible malfunctions that may occur. If a particular malfunction is not discussed, refer to the troubleshooting tables.

NOTE

Refer to page **2-101** for a copy of the vehicle STE/ICE test card.

- b. Description and Operation. STE/ICE is portable and operates off of the vehicles 24 volt system. The STE/ICE kit consists of the following items: Refer to the figures below and on page 2-52.

- o Vehicle Test Meter (VTM)
- o Transducer Kit (TK)
- o Four Electrical Cables (W1, W2, W3, and W4)
- o Transit Case
- o Technical Publications

TABLE 2-4 STE/ICE KIT

1. Tray, Transducer Kit
2. Cable Assembly, power W1
3. Cable Assembly, Special W2
4. Shell, Electrical Connector
5. Shell, Electrical Connector
6. Clip, Electrical
7. Cable Assembly, Special W3
8. Shell, Electrical Connector
9. Clip, Electrical
10. Shell, Electrical Connector
11. Cable Assembly, Power W4
12. Cable Assembly, Power W5
13. Shell, Electrical Connector
14. Clip, Electrical
15. Shell, Electrical Connector
16. Case, Test Set
17. STE/ICE Test Meter

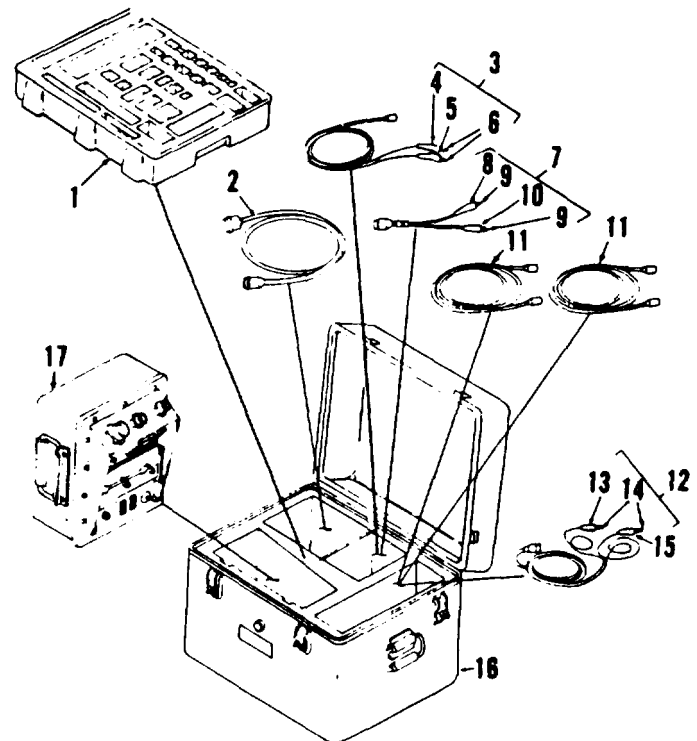
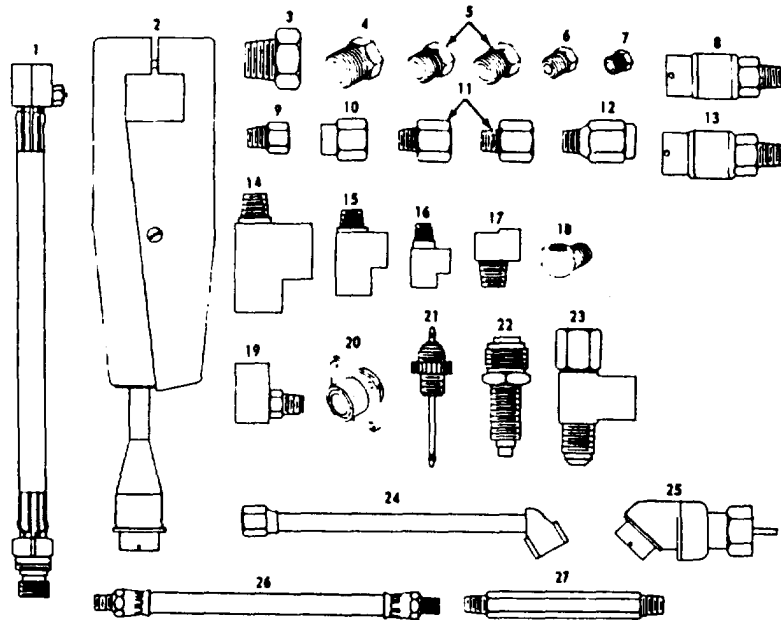


TABLE 2-5 TRANSDUCER KIT CONTENTS

1. Hose Assembly TK10
2. Prod, Test TK11
3. Reducer, Pipe TK12
4. Reducer, Pipe TK13
5. Reducer, Pipe TK14
6. Plug, Pipe TK15
7. Plug, Pipe TK16
8. Transducer (Blue)
0 to 1,000 psi TK17
9. Adapter, Straight TK18
10. Reducer, Pipe TK19
11. Reducer, Pipe TK20
12. Dampener, Fluid TK21
13. Transducer (Red)
-30 in. hg to 25 psi TK22
14. Tee, Pipe TK23
15. Tee, Pipe TK24
16. Tee TK25
17. Elbow, Pipe TK26
18. Elbow, Pipe TK27
19. Tee, Pipe to Tube TK28
20. Adapter, Connector TK29
21. Adapter, Connector TK30
22. Adapter, Speedometer TK31
23. Tee, Pipe to Fuel Line TK32
24. Chuck, Inflating TK33
25. Tachometer, Pulse TK34
26. Hose Assembly TK35
27. Nipple, Pipe TK36



Refer to the manual provided with the STE/ICE kit for description and operation of the VTM and the TK.

- c. STE/ICE Testing Procedures. The vehicle test procedures consist of two test sequences; GO-Chain Sequences and NO-GO-Chain Sequences. A GO-Chain sequence is a logical sequence of tests performed to determine the general condition of the vehicle. If the vehicle fails any of the GO-Chain tests, the test will direct the user to a specific NO-GO test for further testing. The NO-GO tests are used to isolate what is wrong with the vehicle.

The Go and NO-GO-Chain Sequences are presented as an illustrated flowchart with test branching controlled by YES and NO decisions. Generally, a YES determination leads to the next test; a NO determination leads to NO-GO testing and corrective action.

When the VTM interfaces with the vehicle through the Diagnostic Connector Assembly (DCA) the test is titled DCA Mode Testing. If the VTM interfaces with the vehicle through the use of the transducer kit (TK), the test is titled TK Mode Testing. The DCA and TK testing modes can be used at the same time.

Always Follow The Following Rules When Using the GO-Chain Test Sequence:

1. Always start at G01. Never enter the middle of a GO or NO-GO testing sequence unless directed by the flow chart.
2. Follow each instruction in a GO-Chain Test Sequence. Do not skip any instructions or procedures.
3. If a particular test is failed in a GO-Chain test sequence, proceed to the indicated NO-GO-Chain test sequence or to a higher level of maintenance.
4. After correcting a vehicle problem, repeat the testing beginning at G01.
5. Each GO Chain testing sequence depends upon the completion of the previous test. Do not skip any tests.

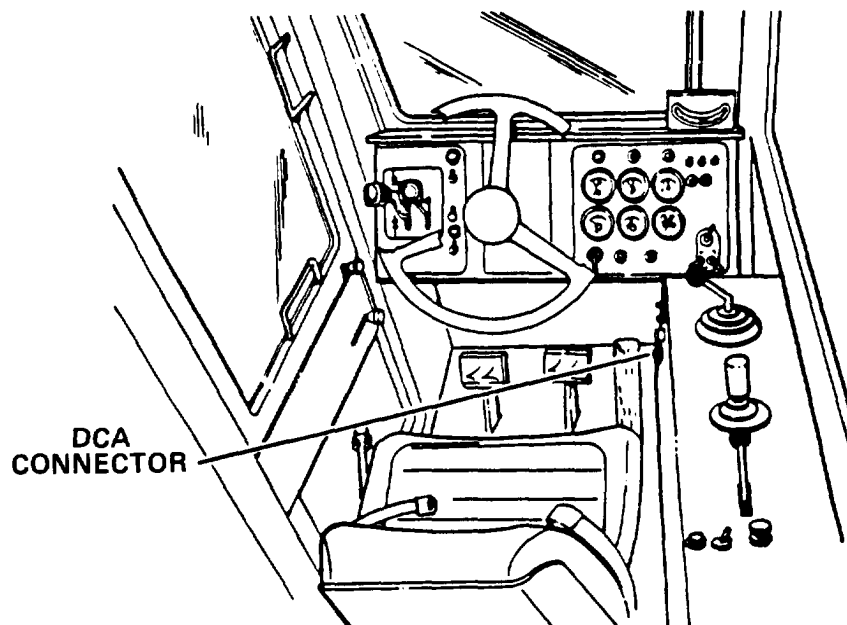
Use the GO, NO-GO flowcharts for testing. As you become more familiar with the test procedures, you can use the Vehicle Test Cards as your sole reference. The flip cards on the VTM can also be used as you become familiar with the vehicle and STE/ICE equipment.

Prior to testing, make the following pre-test inspections:

- Check fan belts for proper tension. Replace cracked or frayed belts.
- Check **for** proper engine oil level. Add oil as necessary.
- Check that the fuel tank has enough fuel for testing.
- Check for proper engine coolant level. Add coolant as necessary.
- Check that the battery is in good condition. Check for low electrolyte level and add distilled water as required.
- Check that emergency steering pump is turned off when required by test.

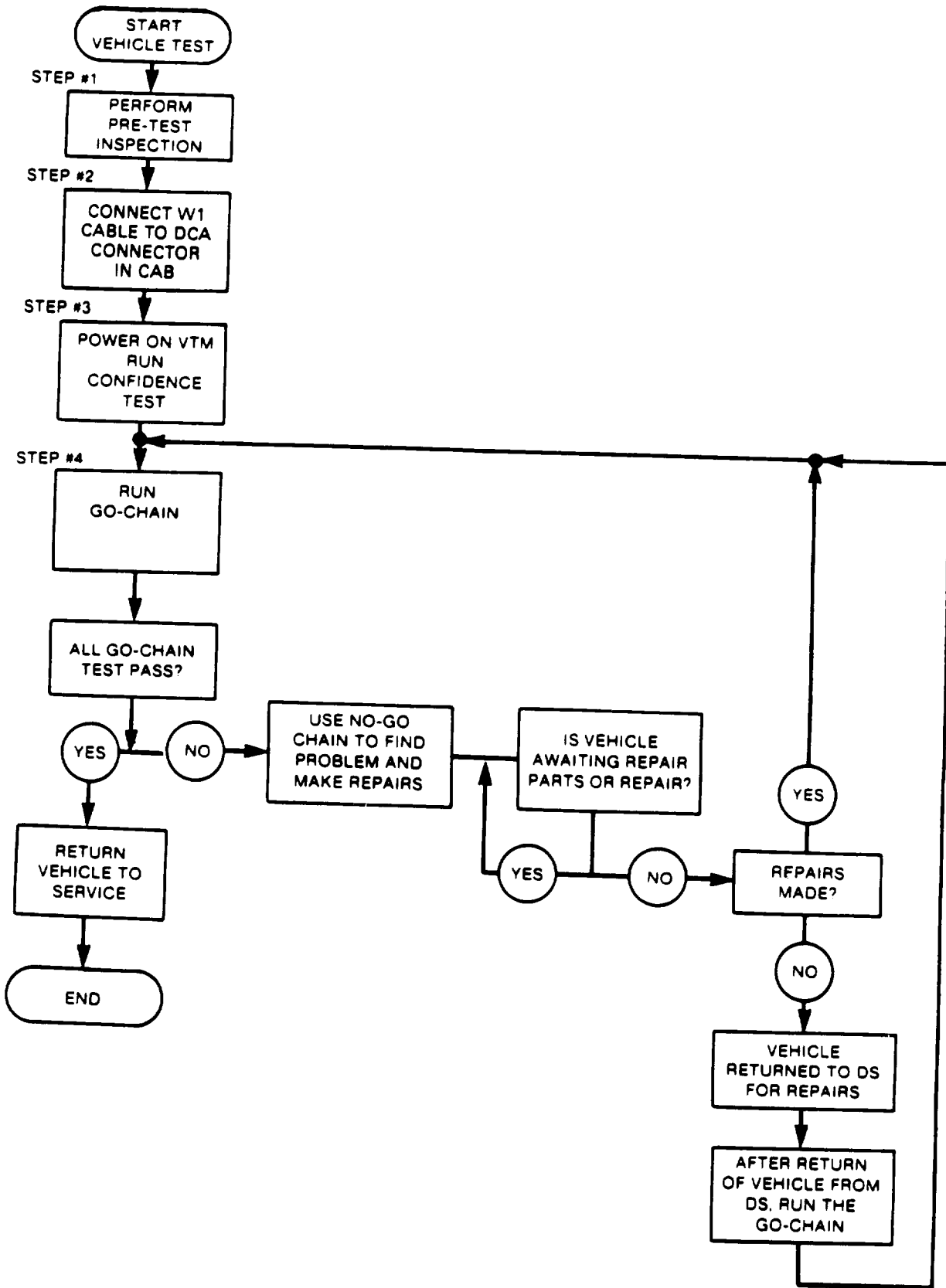
VEHICLE DIAGNOSTIC CONNECTOR ASSEMBLY (DCA)

The DCA connector of the vehicle is located on the panel to the right of the vehicle operator. Refer to the figure below for vehicle DCA location.



Vehicle DCA Connector.

STE/ICE TESTING PROCEDURE FLOW CHART



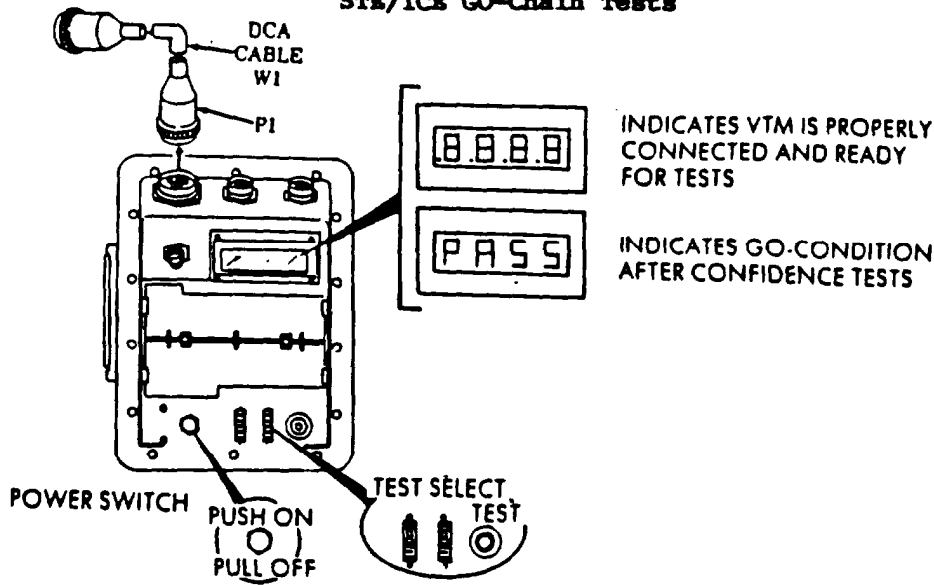
STE/ICE GO-Chain Testing Sequence

The following GO-Chain tests are made using the vehicle DCA connector. All tests must be performed sequentially. The following is a summary of each test.

For normal readings, see vehicle test card, page 2-100.

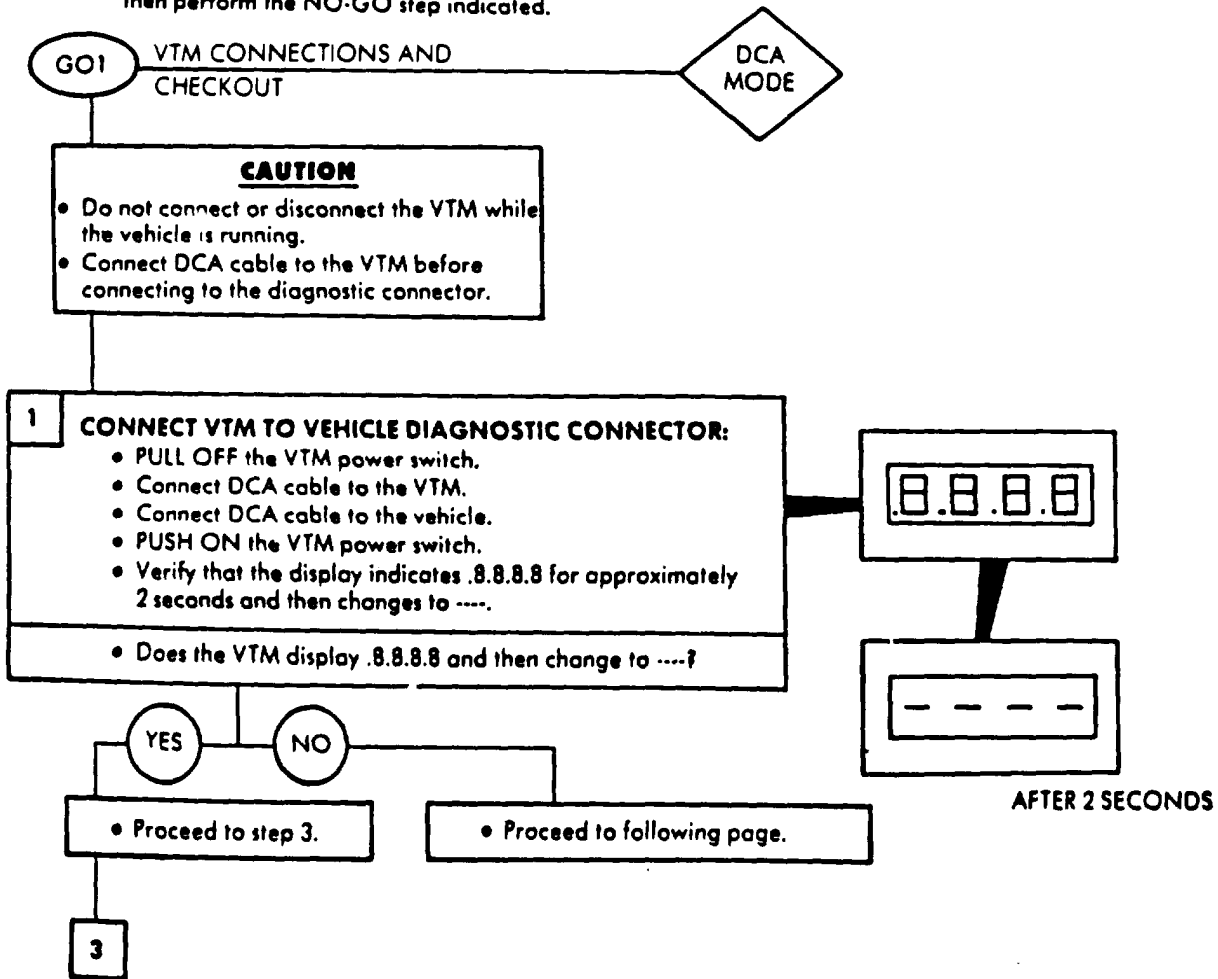
Go TEST NUMBER	MODE	TEST TITLE	PAGE NUMBER
G01	DCA	VTM Connections and Checkout	2-56
G02	DCA	First Peak Test-Starter Current	2-60
G03	DCA	Vehicle Gauges Check	2-62
G04	DCA	Vehicle Voltmeter	2-65
G05	DCA	Engine Temperature and Pressure Checks	2-66
G06	DCA	Engine Idle Speed Check	2-68
G07	DCA	Battery Voltage Check	2-69
G08	DCA-TK	Engine Oil Pressure Test	2-70
G09	DCA	Engine Power Test	2-72
GO10	DCA-TK	Transmission Oil Pressure Test	2-73
GO11	DCA-TK	Transmission Clutch Pressure Test	2-75
G012	DCA-TK	Transmission Converter Charge Pressure Test	2-77
G013	DCA-TK	Transmission Brake Cutoff Valve Pressure Test	2-79

STE/ICE GO-Chain Tests

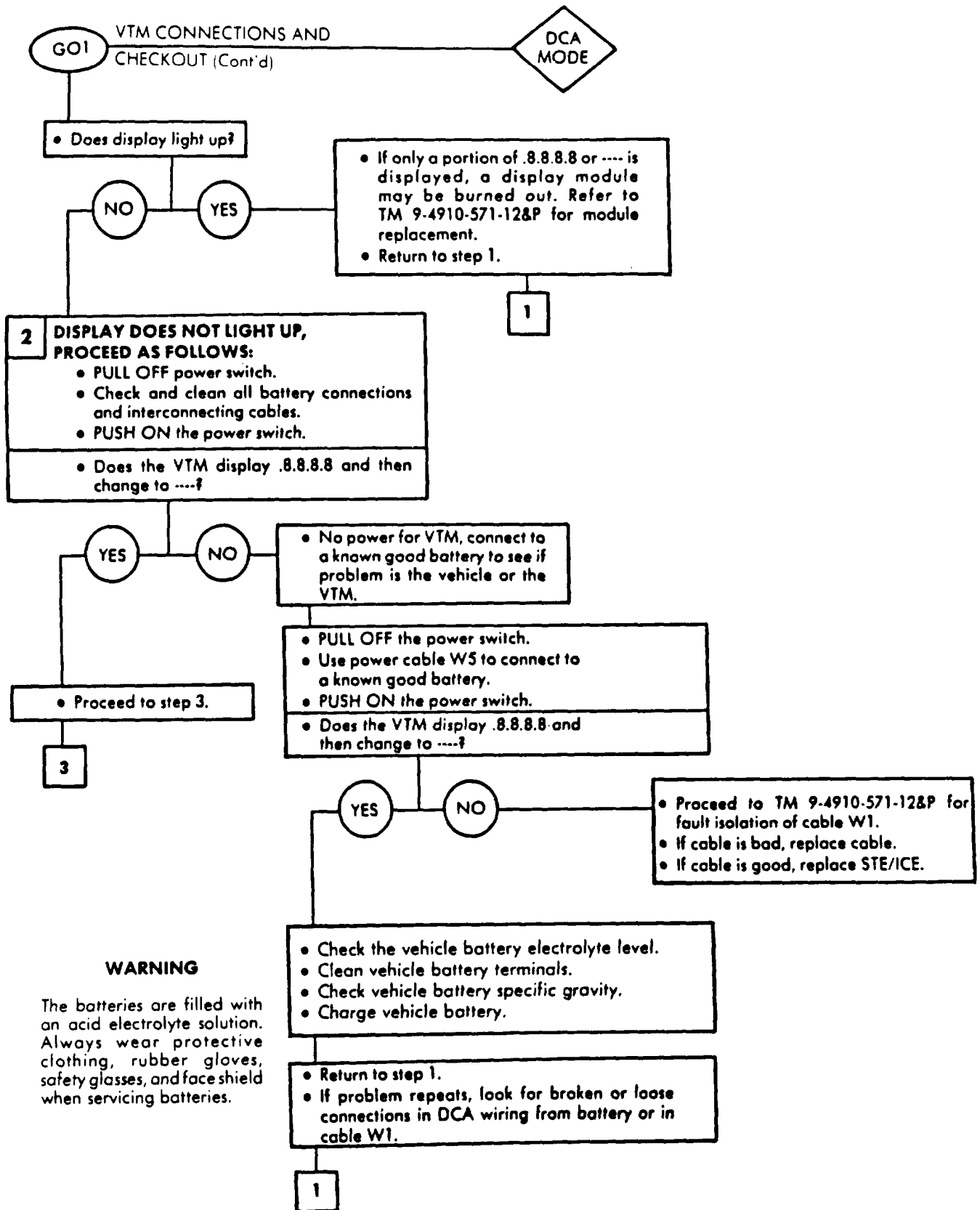


NOTE

Perform all GO steps until a NO-GO condition exists, then perform the NO-GO step indicated.



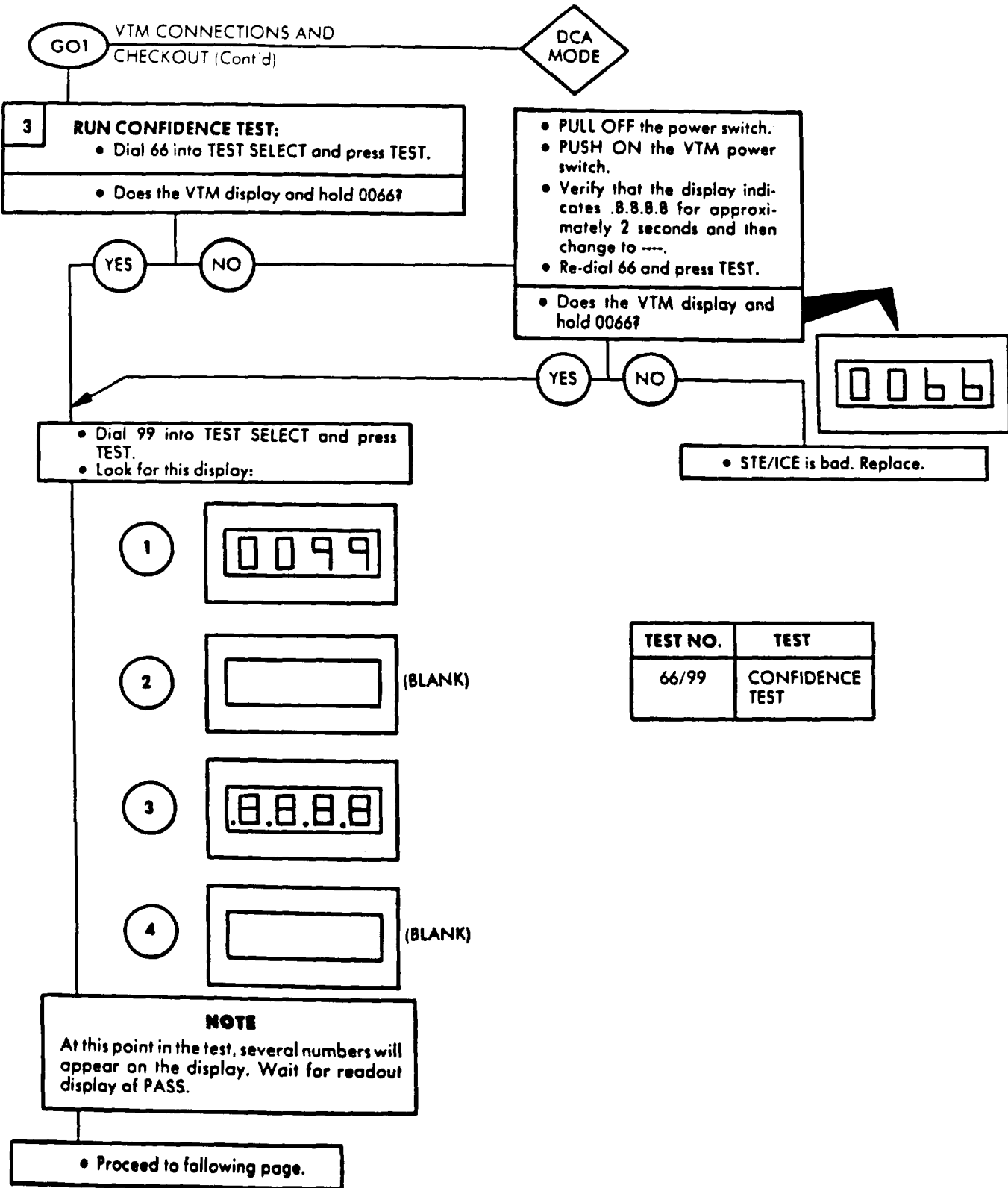
STE/ICE GO-Chain Tests (Cont'd)



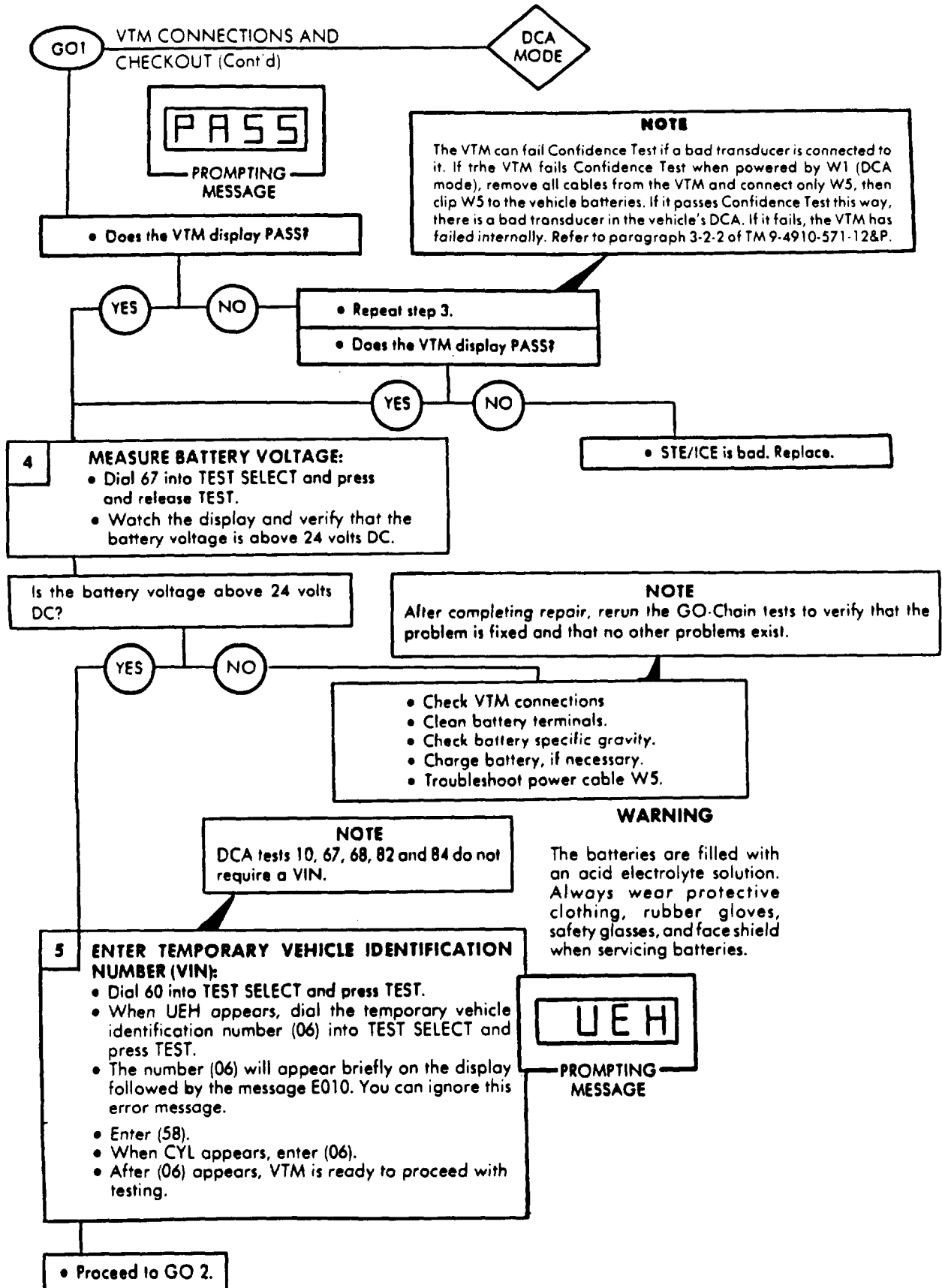
WARNING

The batteries are filled with an acid electrolyte solution. Always wear protective clothing, rubber gloves, safety glasses, and face shield when servicing batteries.

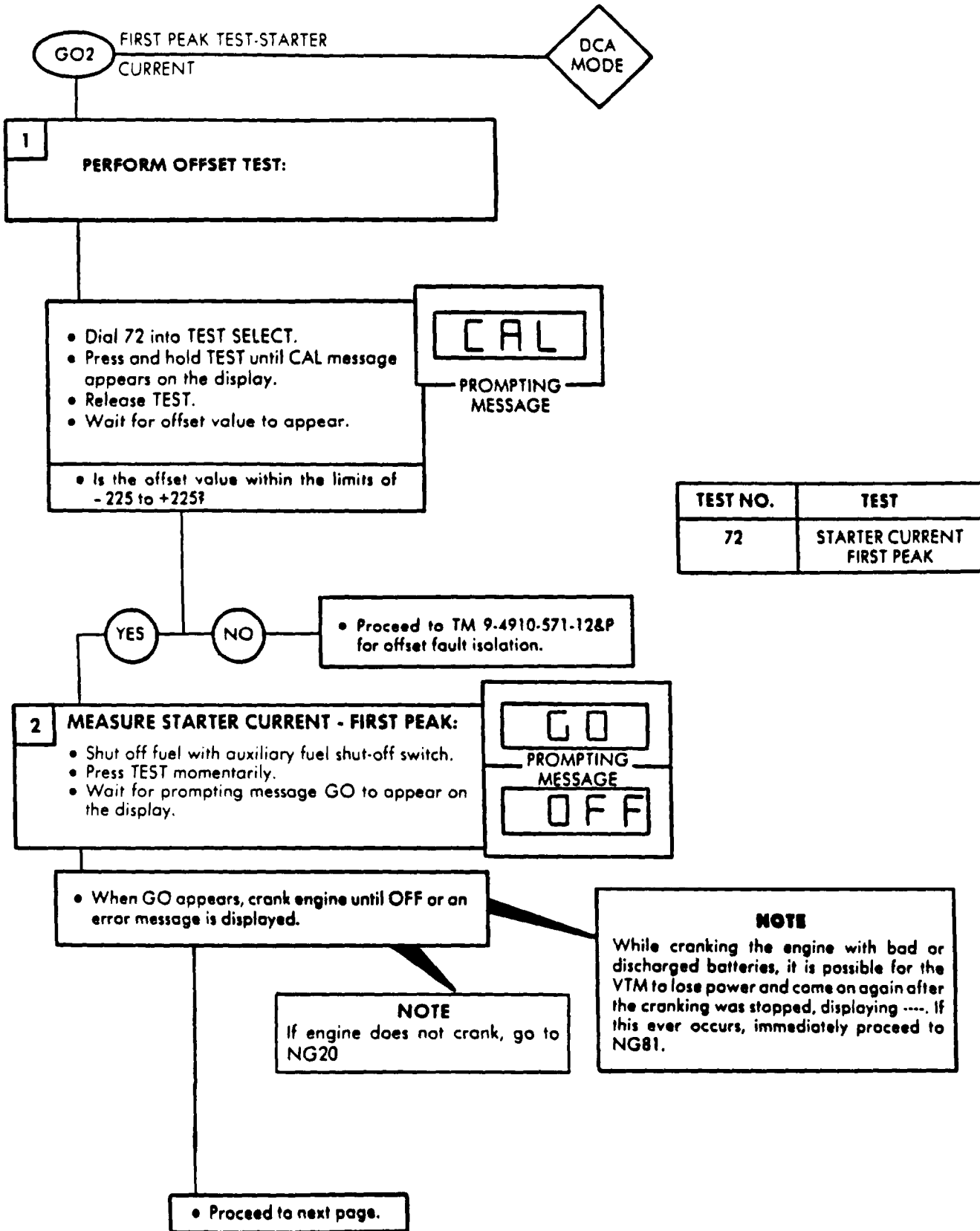
STE/ICE GO-Chain Tests (Cont'd)



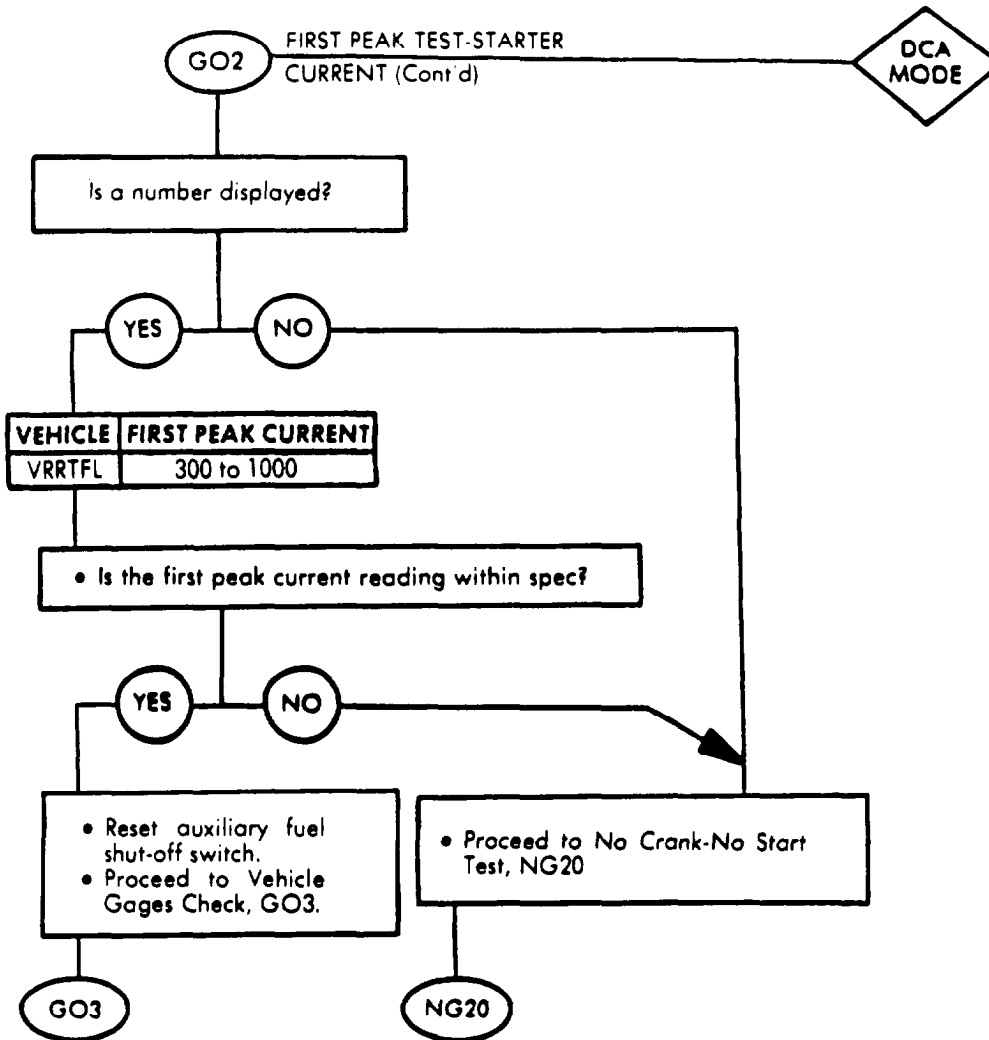
STE/ICE GO-Chain Tests (Cont'd)



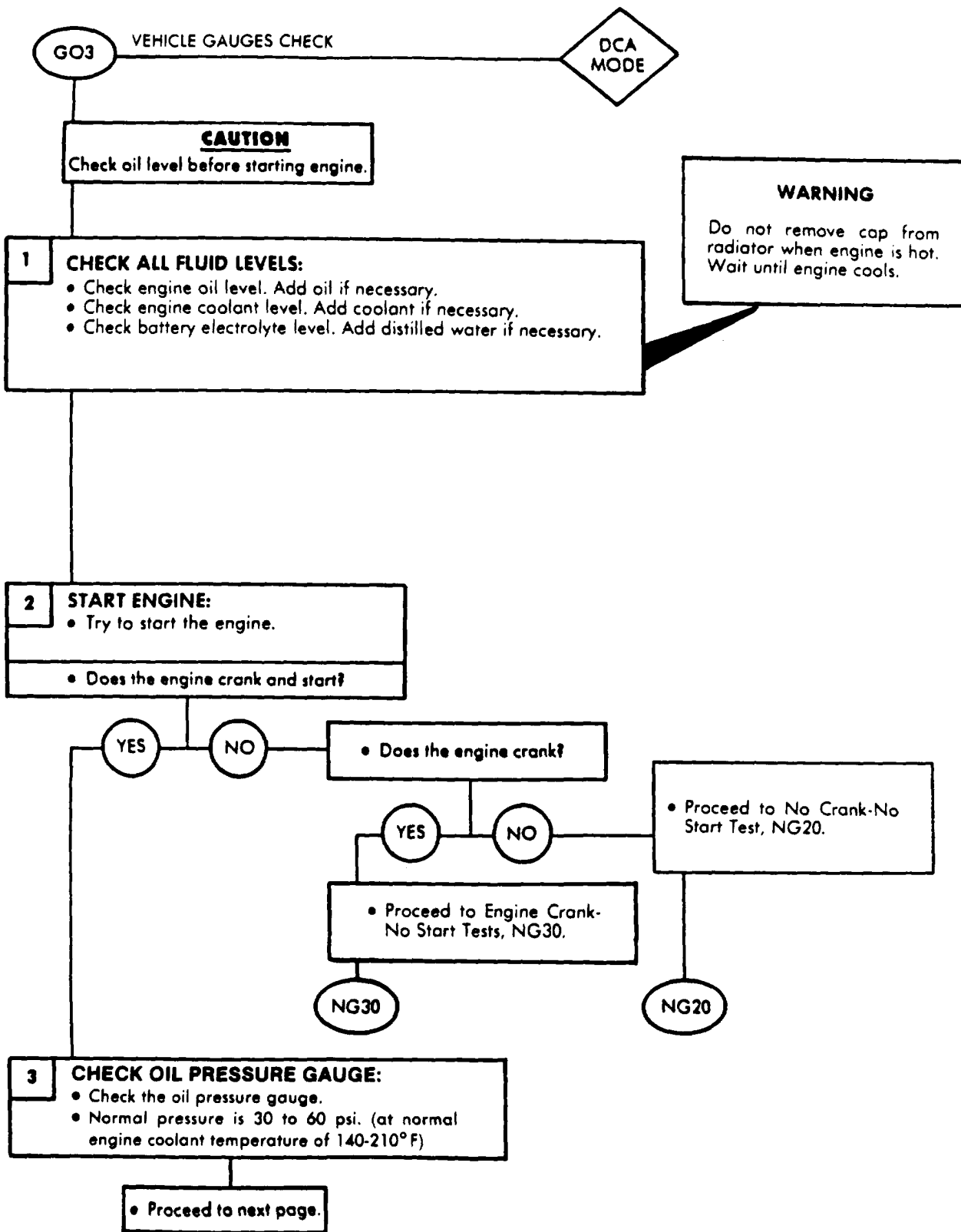
STE/ICE GO-Chain Tests (Cont'd)



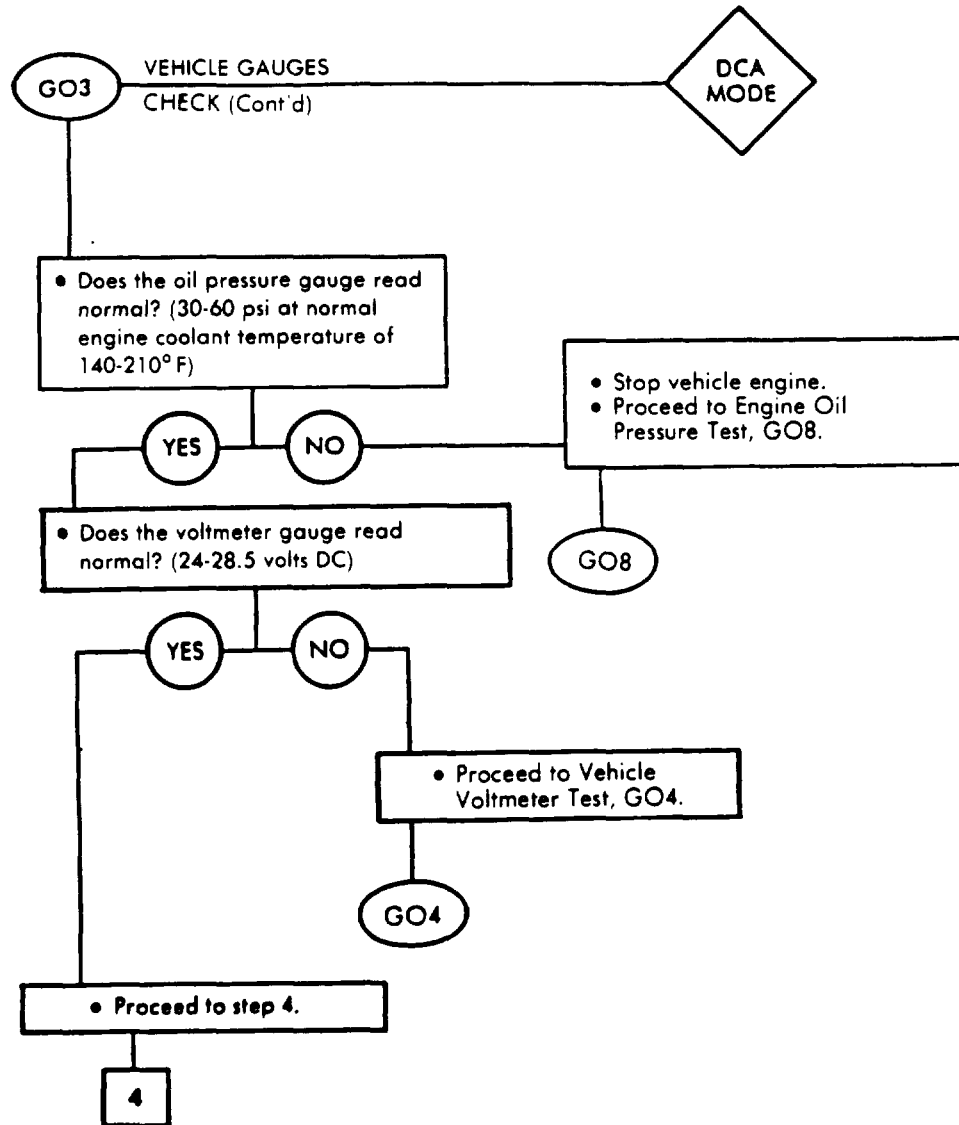
STE/ICE GO-Chain Tests (Cont'd)



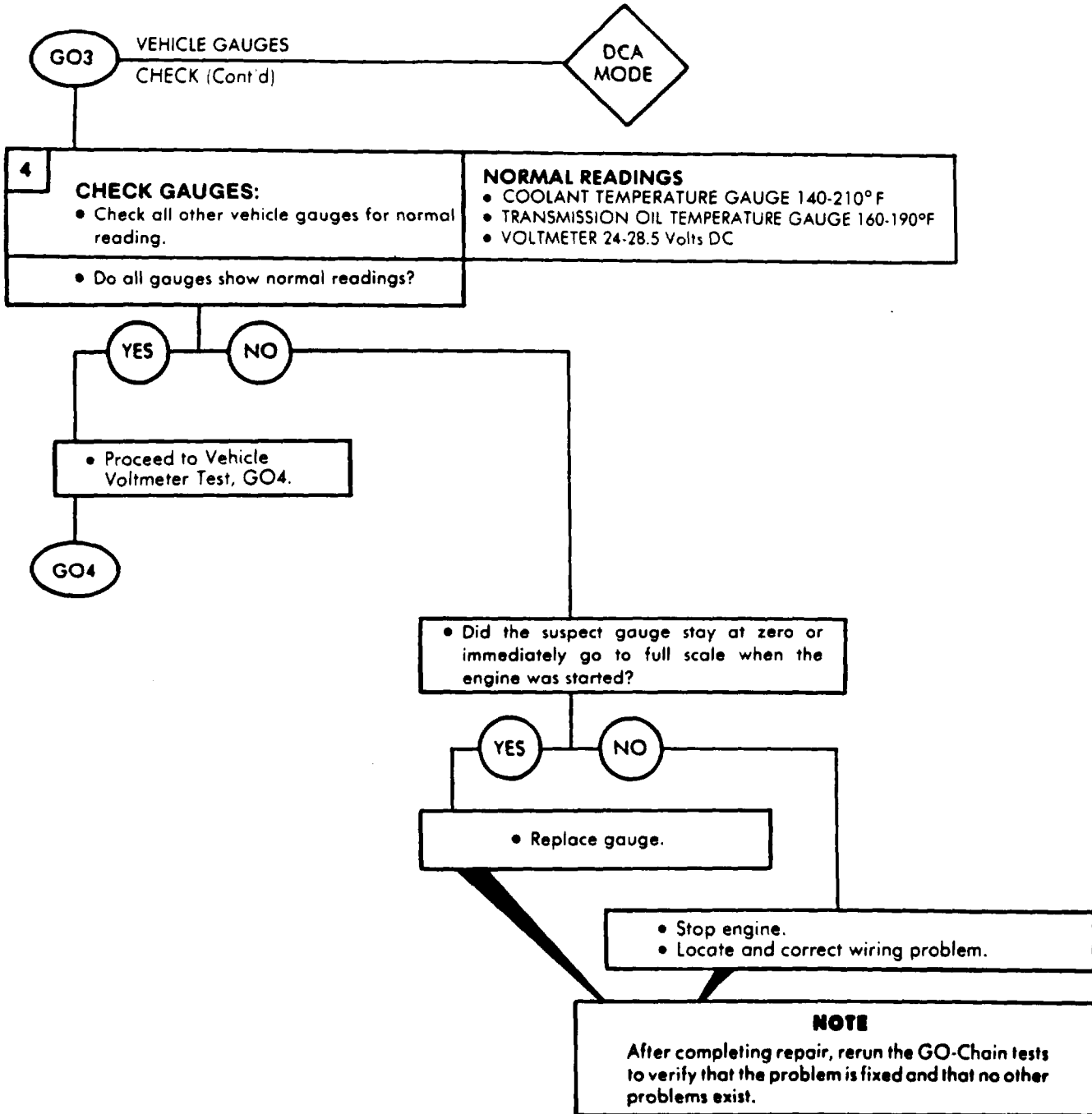
STE/ICE GO-Chain Tests (Cont'd)



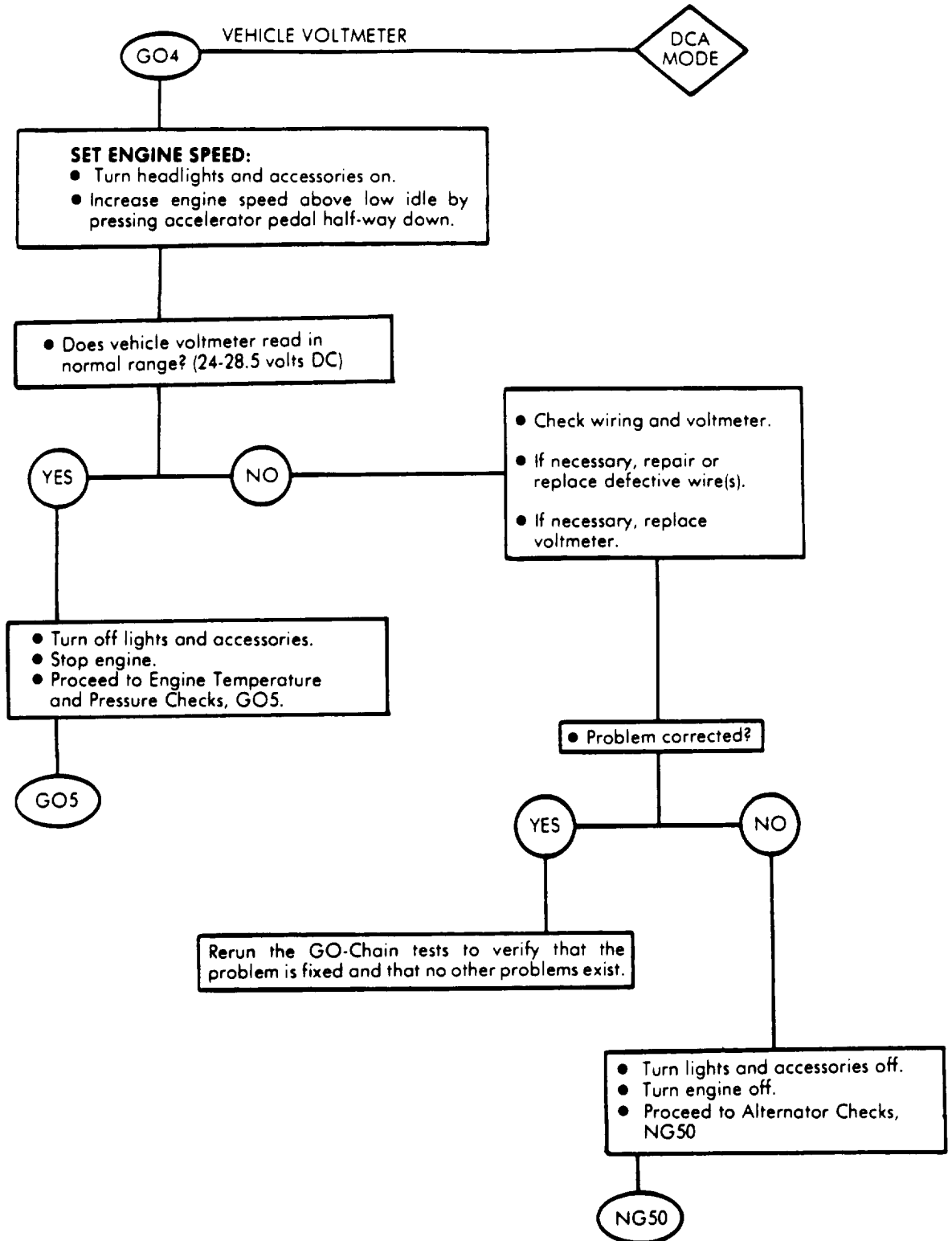
STE/ICE GO-Chain Tests (Cont'd)

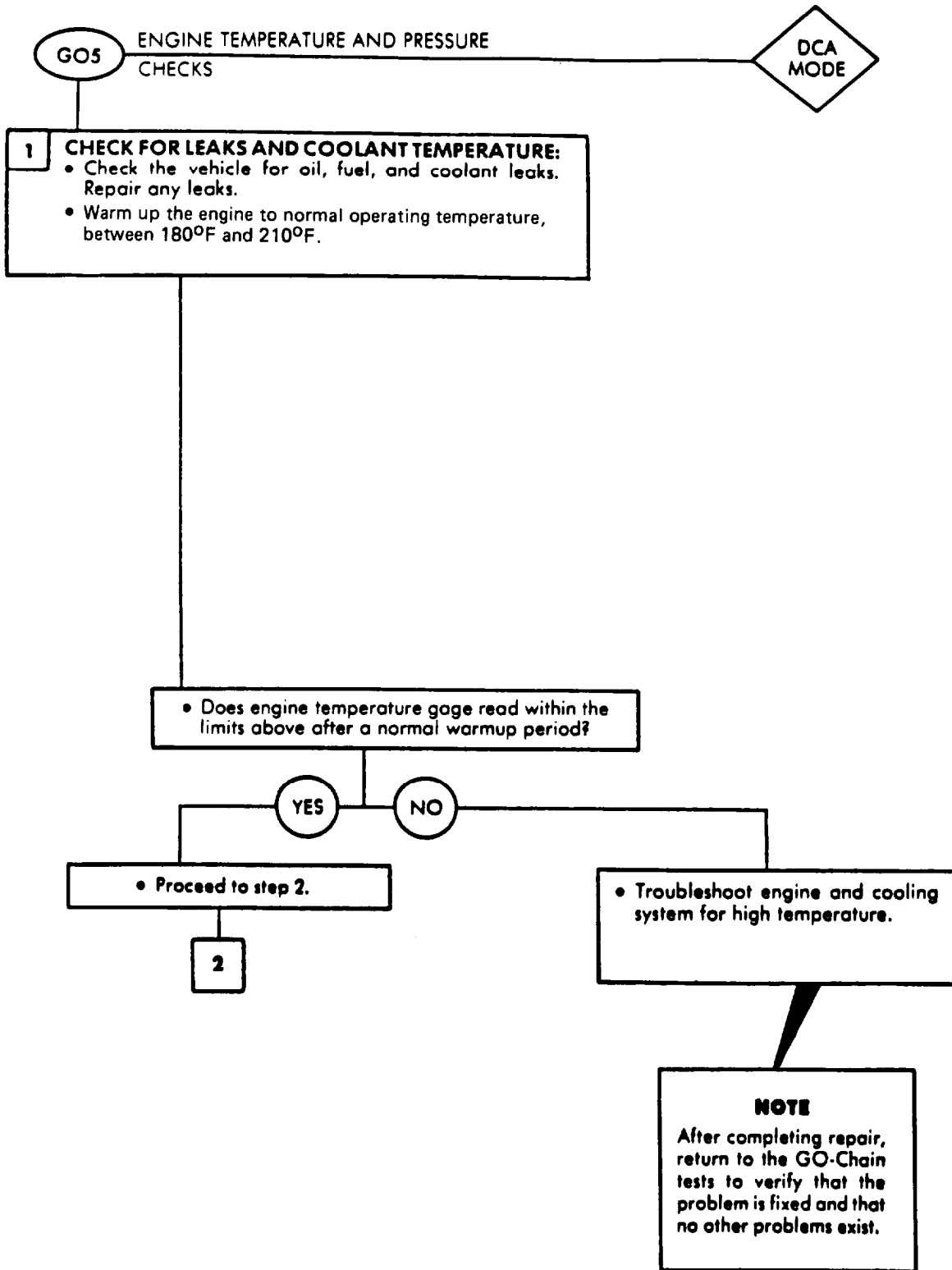


STE/ICE GO-Chain Tests (Cont'd)

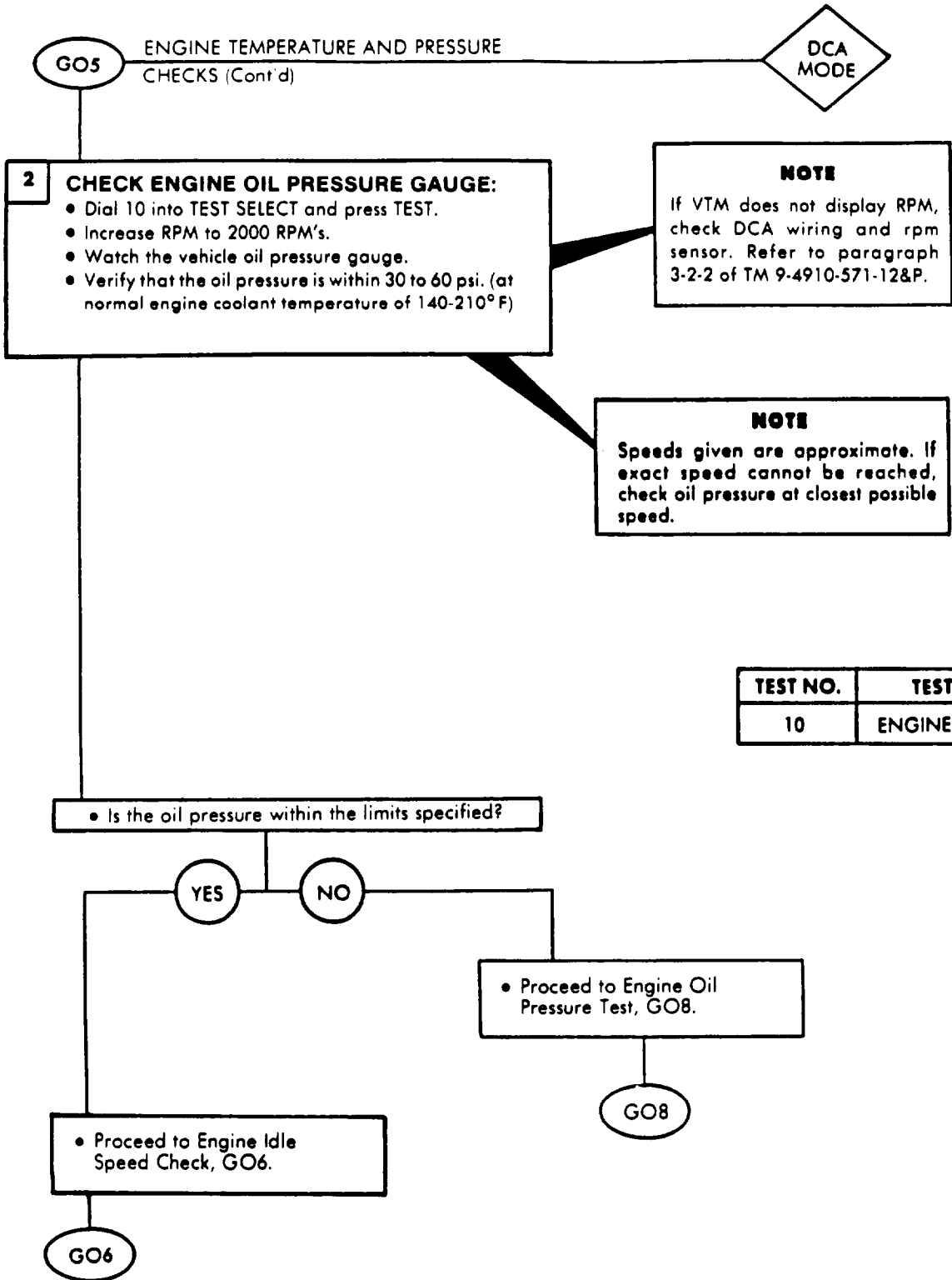


STB/ICE GO-Chain Tests (cont'd)



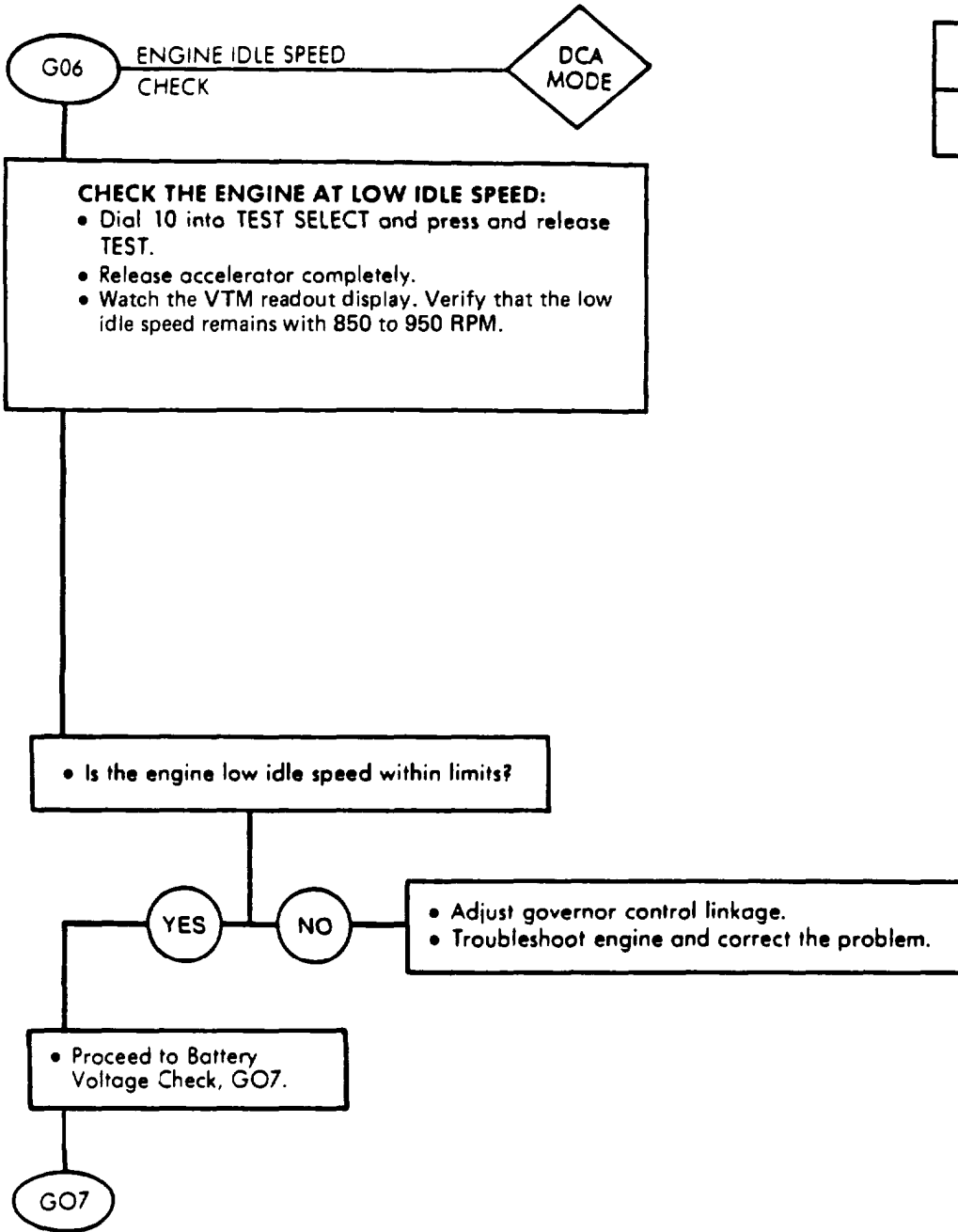


STB/ICE GO-Chain Test (Cont'd)

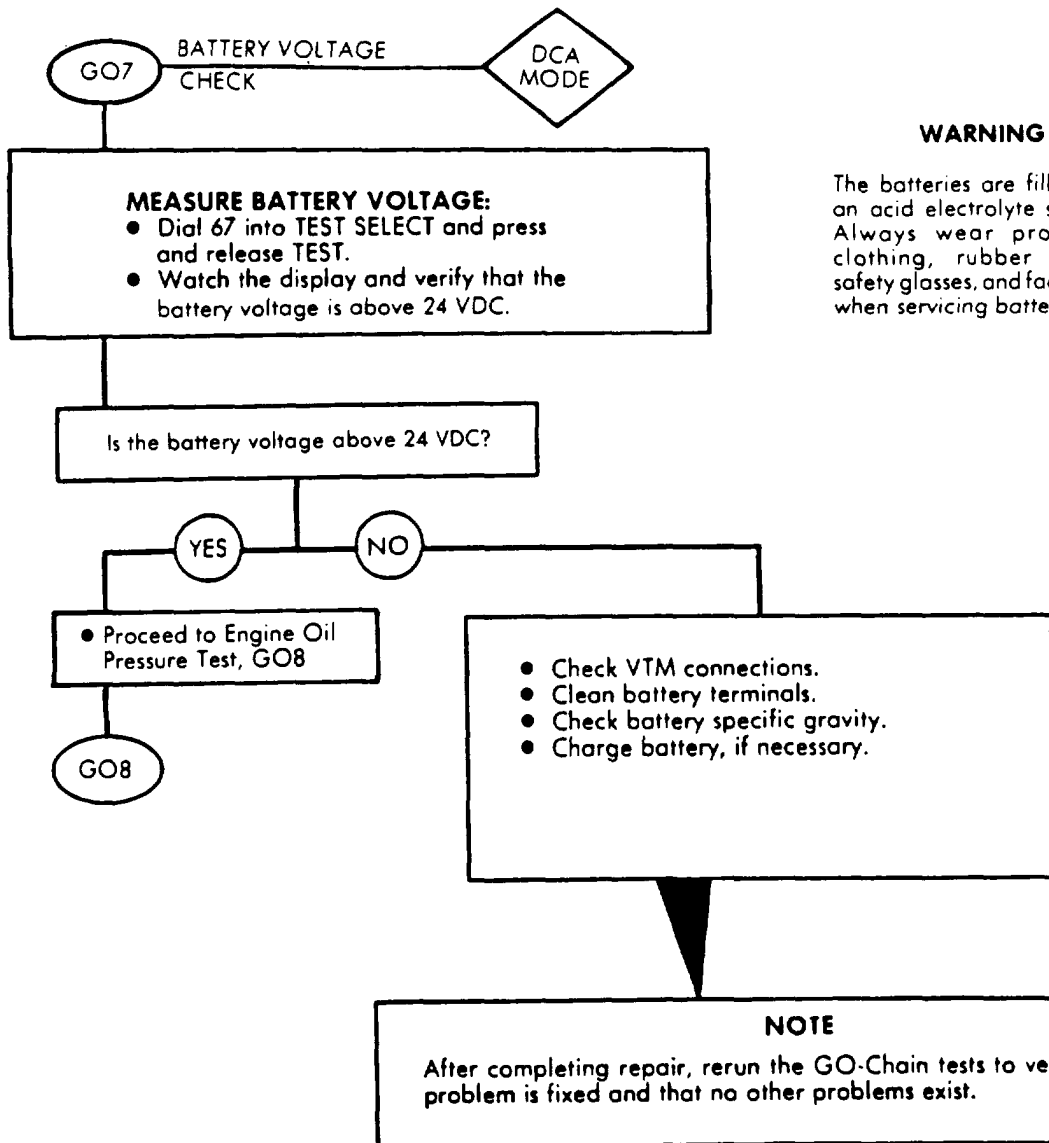


STE/ICE GO-Chain Test (cont'd)

TEST NO.	TEST
10	ENGINE RPM



STE/ICE GO-Chain Tests (Cont'd)

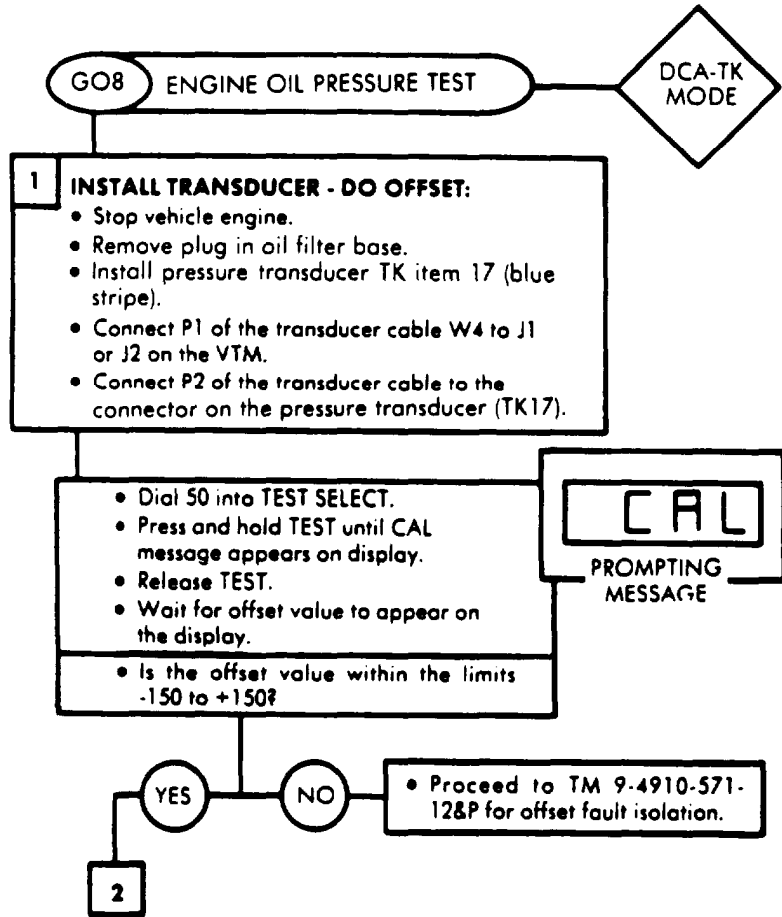
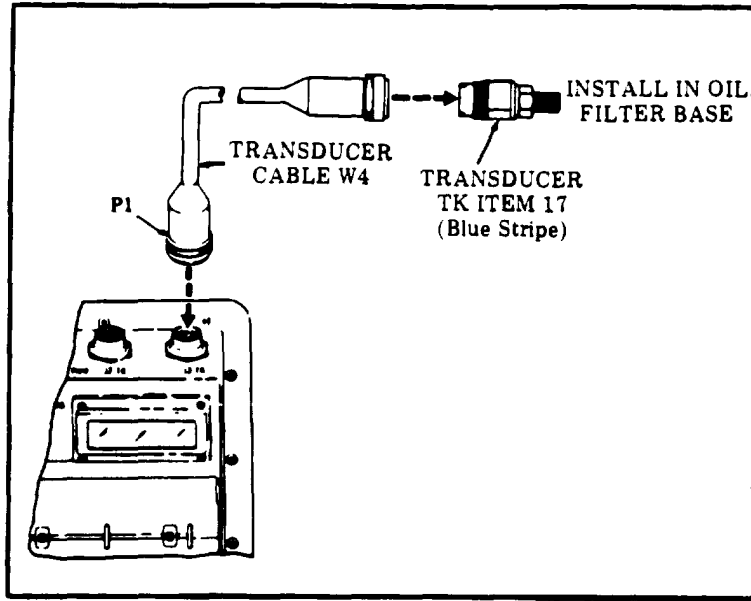


WARNING

The batteries are filled with an acid electrolyte solution. Always wear protective clothing, rubber gloves, safety glasses, and face shield when servicing batteries.

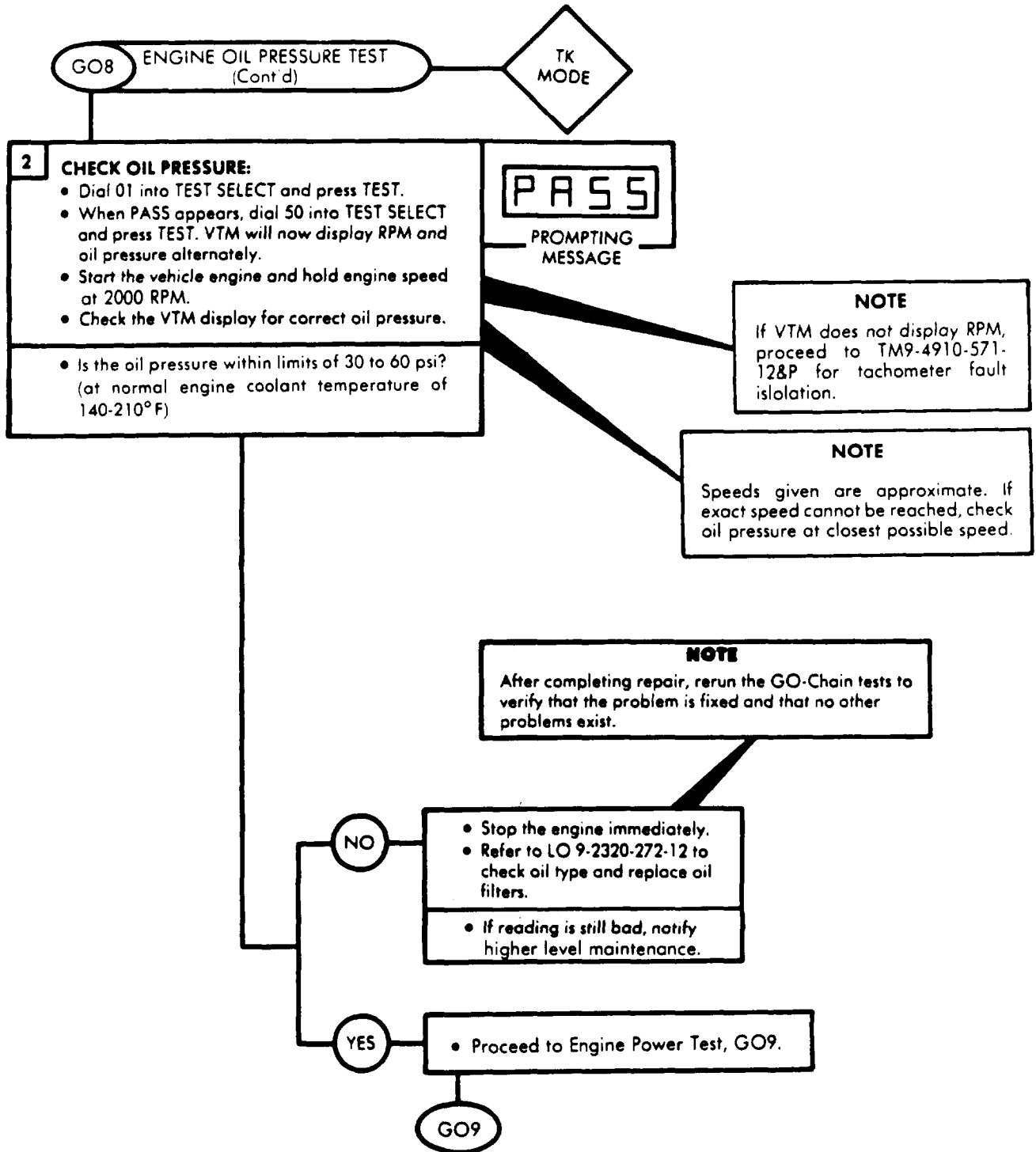
NOTE

After completing repair, rerun the GO-Chain tests to verify that the problem is fixed and that no other problems exist.

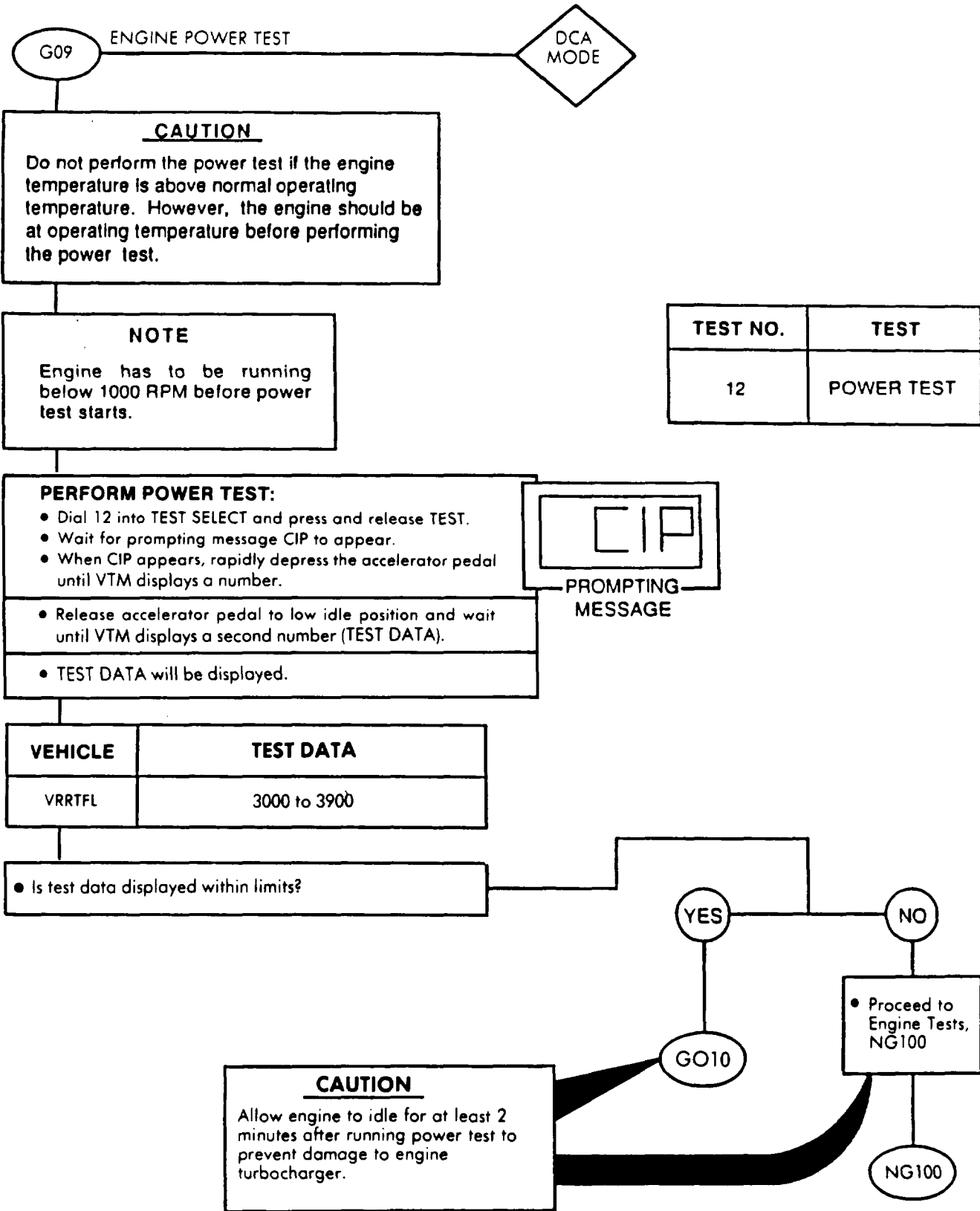


TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

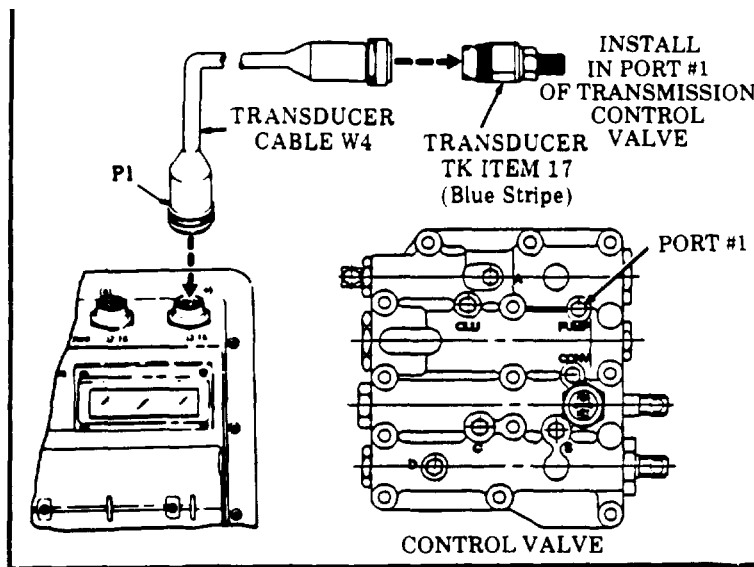
STE/ICE GO-Chain Tests (Cont'd)



STE/ICE GC-Chain Tests (Cont'd)



STE/ICE Go-Chain Tests (Cont'd)



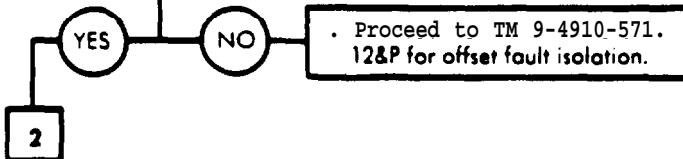
GO10 TRANSMISSION OIL PRESSURE TEST

DCA-TK MODE

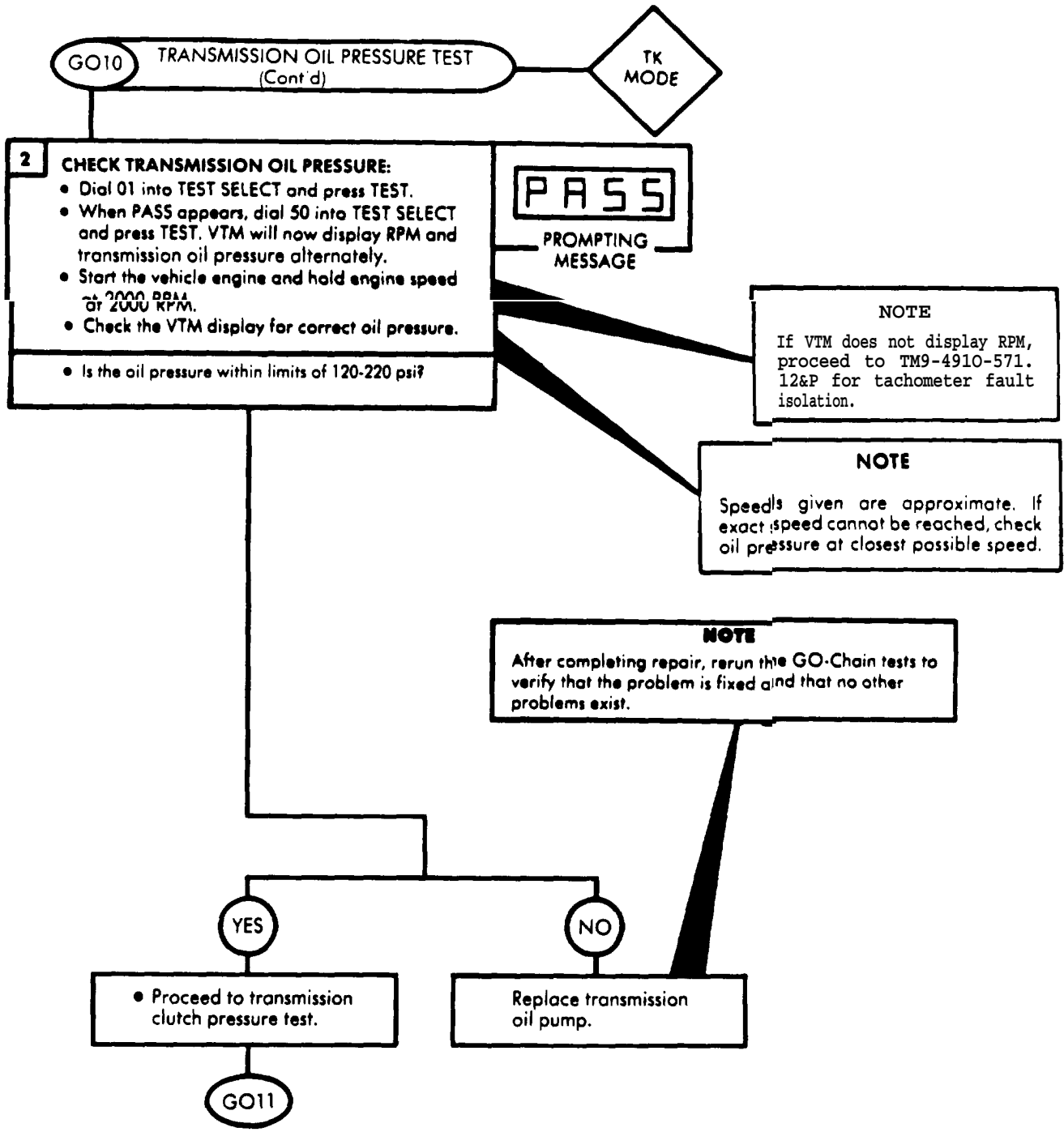
- 1 INSTALL TRANSDUCER - DO OFFSET:**
- Stop vehicle engine.
 - Remove plug at port #1 of transmission control valve.
 - Install pressure transducer TK item 17 (blue stripe).
 - Connect P1 of the transducer cable W4 to J1 or J2 on the VTM.
 - Connect P2 of the transducer cable to the connector on the pressure transducer (TK17).

TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

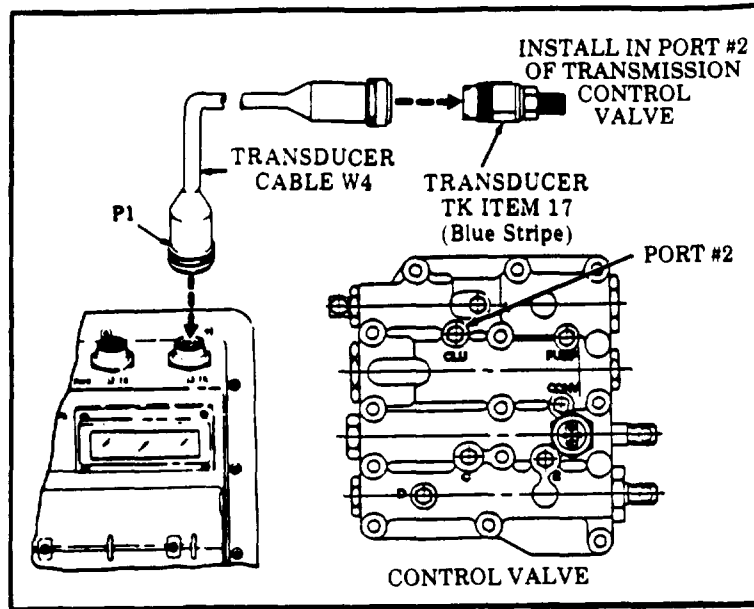
- Dial 50 into TEST SELECT.
 - Press and hold TEST until CAL message appears on display.
 - Release TEST.
 - Wait for offset value to appear on the display.
- Is the offset value within the limits -150 to +150?



STE/ICE GO-Chain Tests (Cont'd)



STE/ICE GO-Chain Tests (Cont'd)



GO11 TRANSMISSION CLUTCH PRESSURE TEST

DCA-TK MODE

- 1 INSTALL TRANSDUCER - DO OFFSET:**
- Stop vehicle engine.
 - Remove plug at port #2 of transmission control valve.
 - Install pressure transducer TK item 17 (blue stripe).
 - Connect P1 of the transducer cable W4 to J1 or J2 on the VTM.
 - Connect P2 of the transducer cable to the connector on the pressure transducer (TK17).

TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

- Dial 50 into TEST SELECT.
 - Press and hold TEST until CAL message appears on display.
 - Release TEST.
 - Wait for offset value to appear on the display.
- Is the offset value within the limits -150 to +150?

CAL

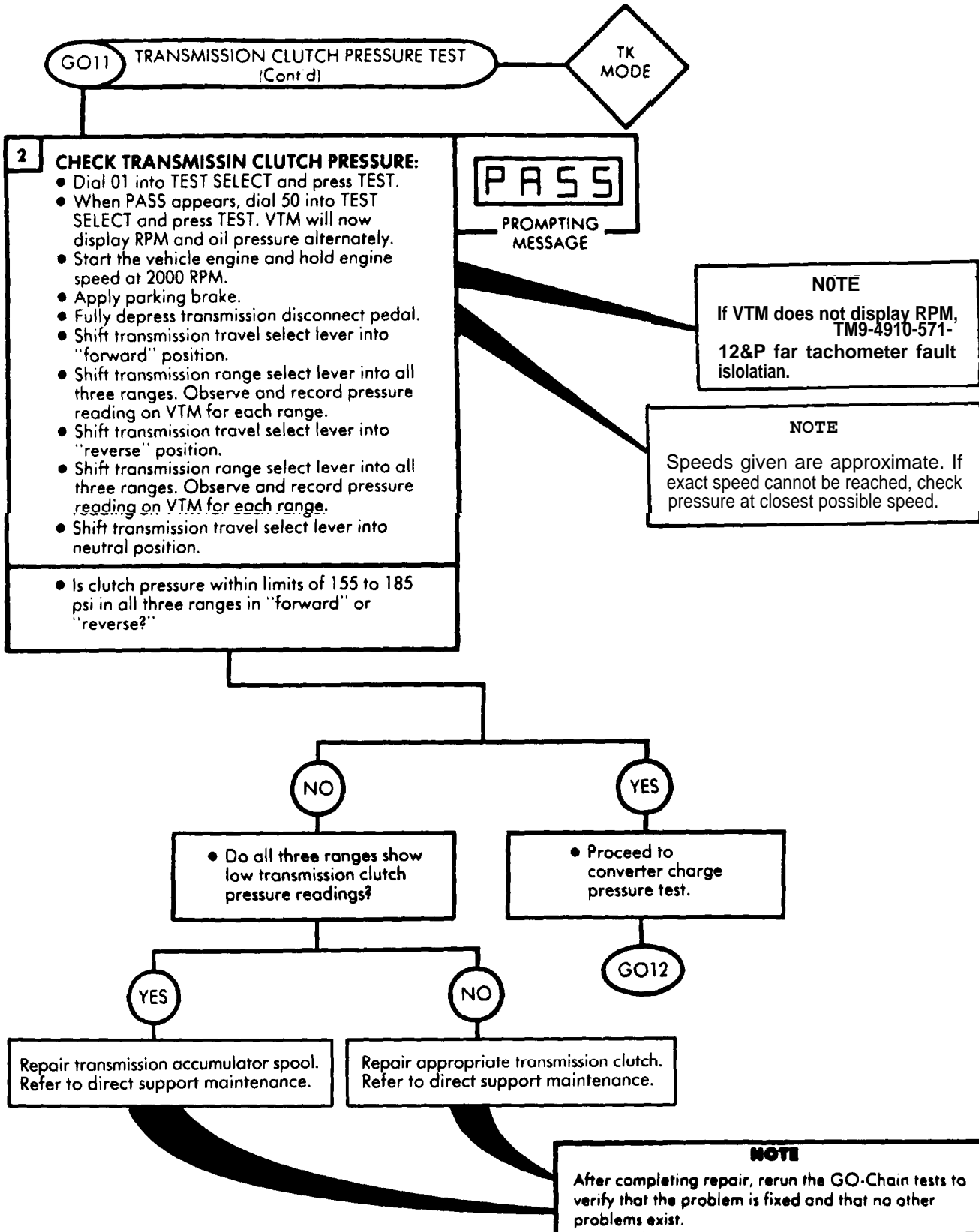
PROMPTING MESSAGE

YES

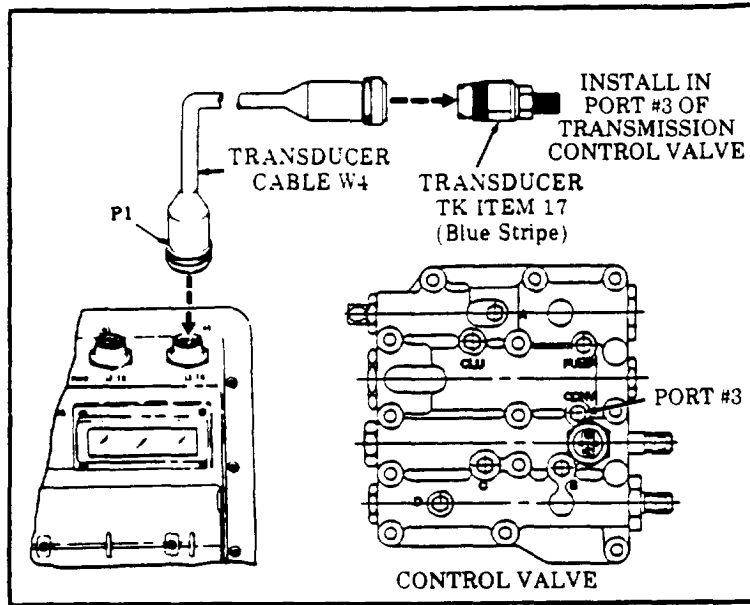
NO

• Proceed to TM 9-4910-571-12&P for offset fault isolation.

2



STE/ICE GO-Chain Tests (cont'd)



GO12 TRANSMISSION CONVERTER CHARGE PRESSURE TEST

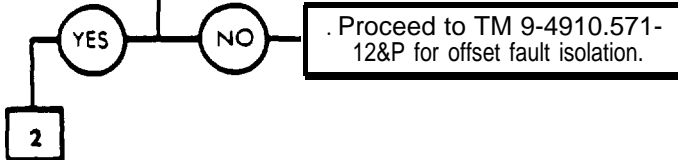
DCA-TK MODE

- 1** **INSTALL TRANSDUCER - DO OFFSET:**
- Stop vehicle engine.
 - Remove plug at port #3 of transmission control valve.
 - Install pressure transducer TK item 17 (blue stripe).
 - Connect P1 of the transducer cable W4 to J1 or J2 on the VTM.
 - Connect P2 of the transducer cable to the connector on the pressure transducer (TK17).

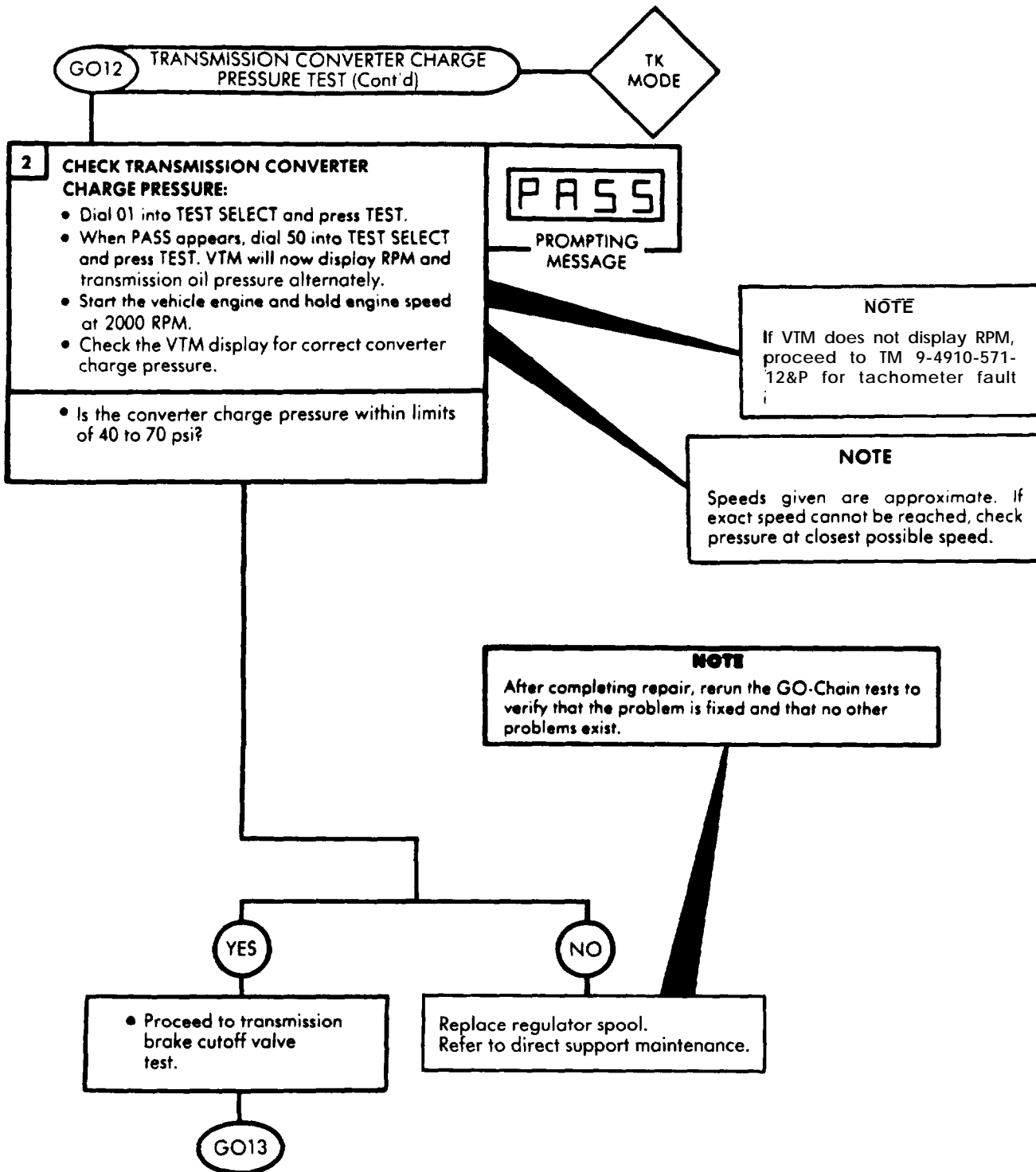
TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

- Dial 50 into TEST SELECT.
 - Press and hold TEST until CAL message appears on display.
 - Release TEST.
 - Wait for offset value to appear on the display.
- Is the offset value within the limits -150 to +150?

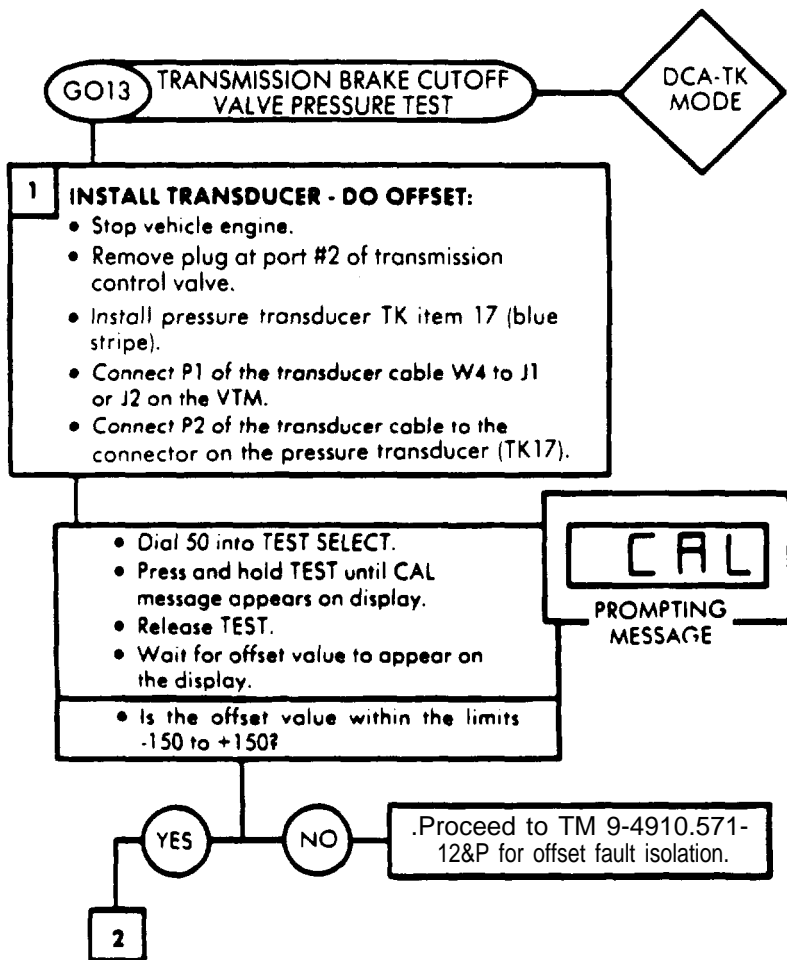
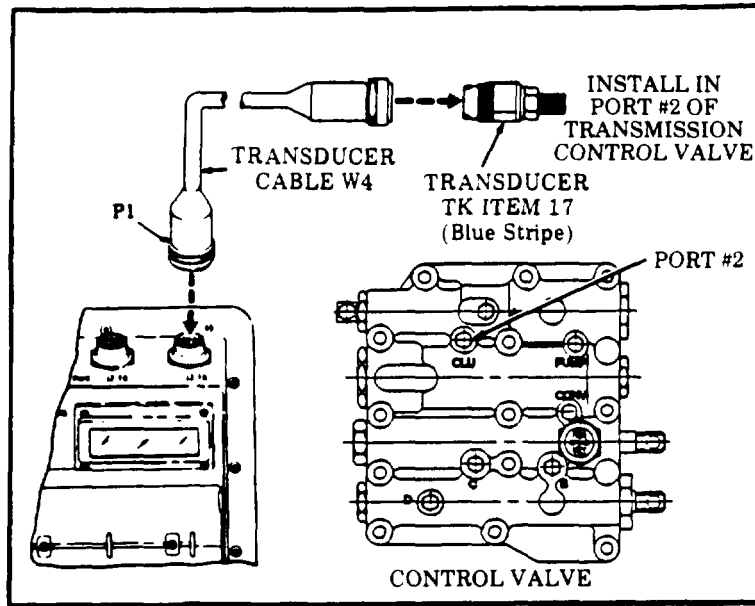
CAL
PROMPTING MESSAGE



STE/ICE GO-Chain Tests (Cont'd)

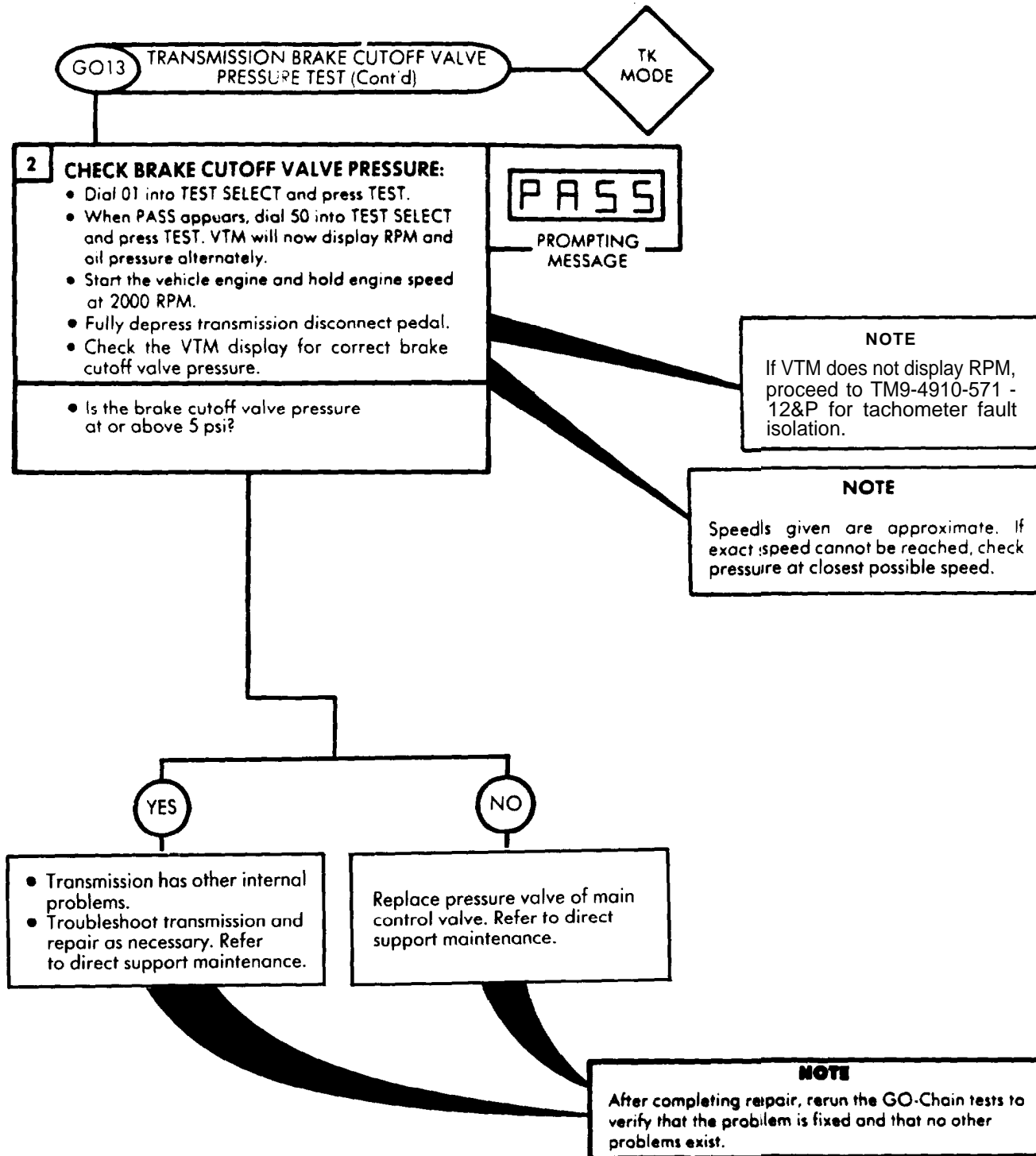


STE/ICE Chain Tests (Cont'd)



TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

STE/ICE GO-Chain Test (Cost'd)



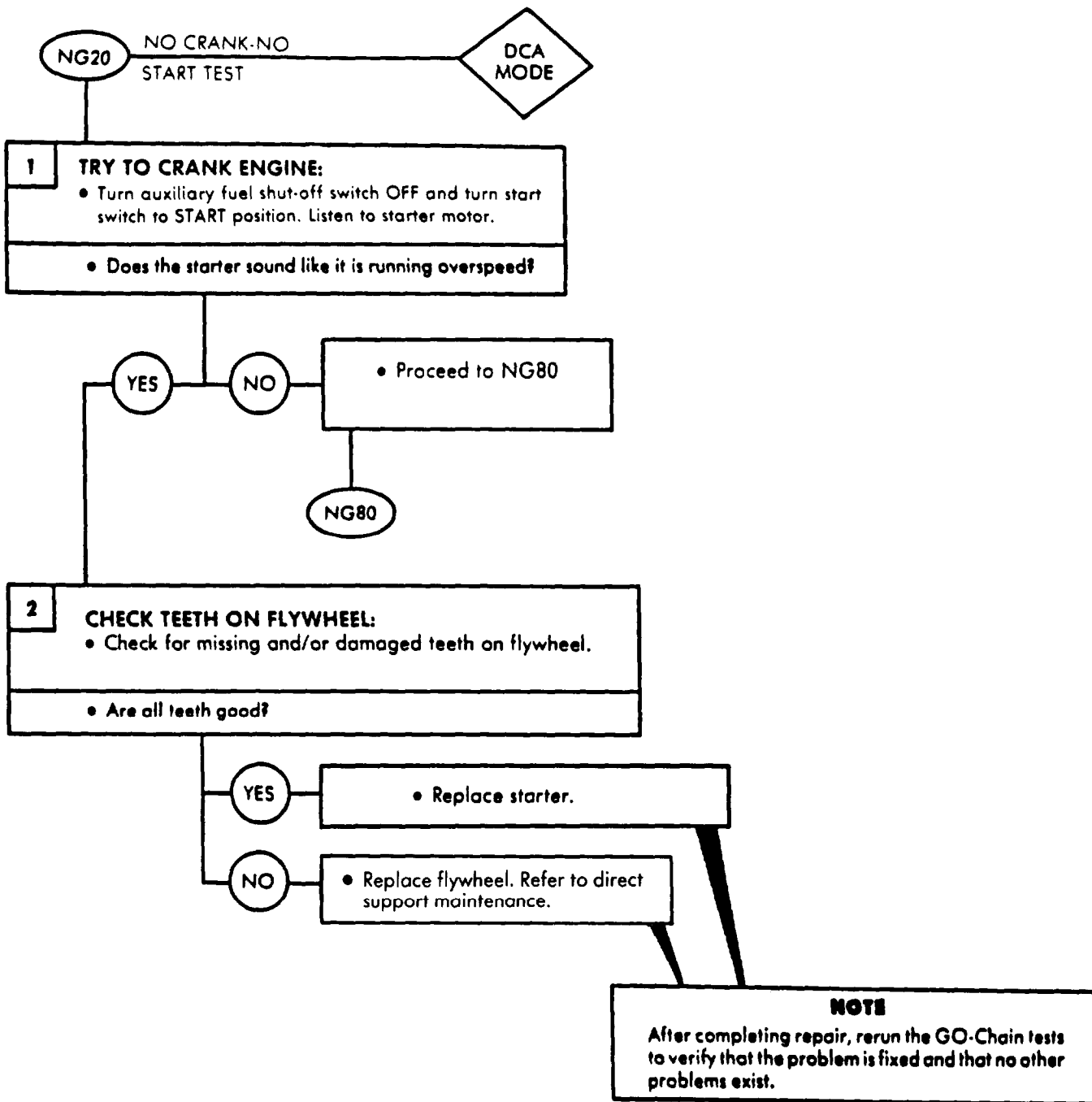
STE/ICE NO-GO-Chain Testing Sequence

The following NO-GO-Chain tests are made using the vehicle DCA connector. Each test is referenced from the GO-Chain testing sequence. Do not perform any of these tests unless you are instructed to by the GO-Chain testing. All testing is referenced by the NG (No-Go) number. Refer to the following table for the NO-GO test index.

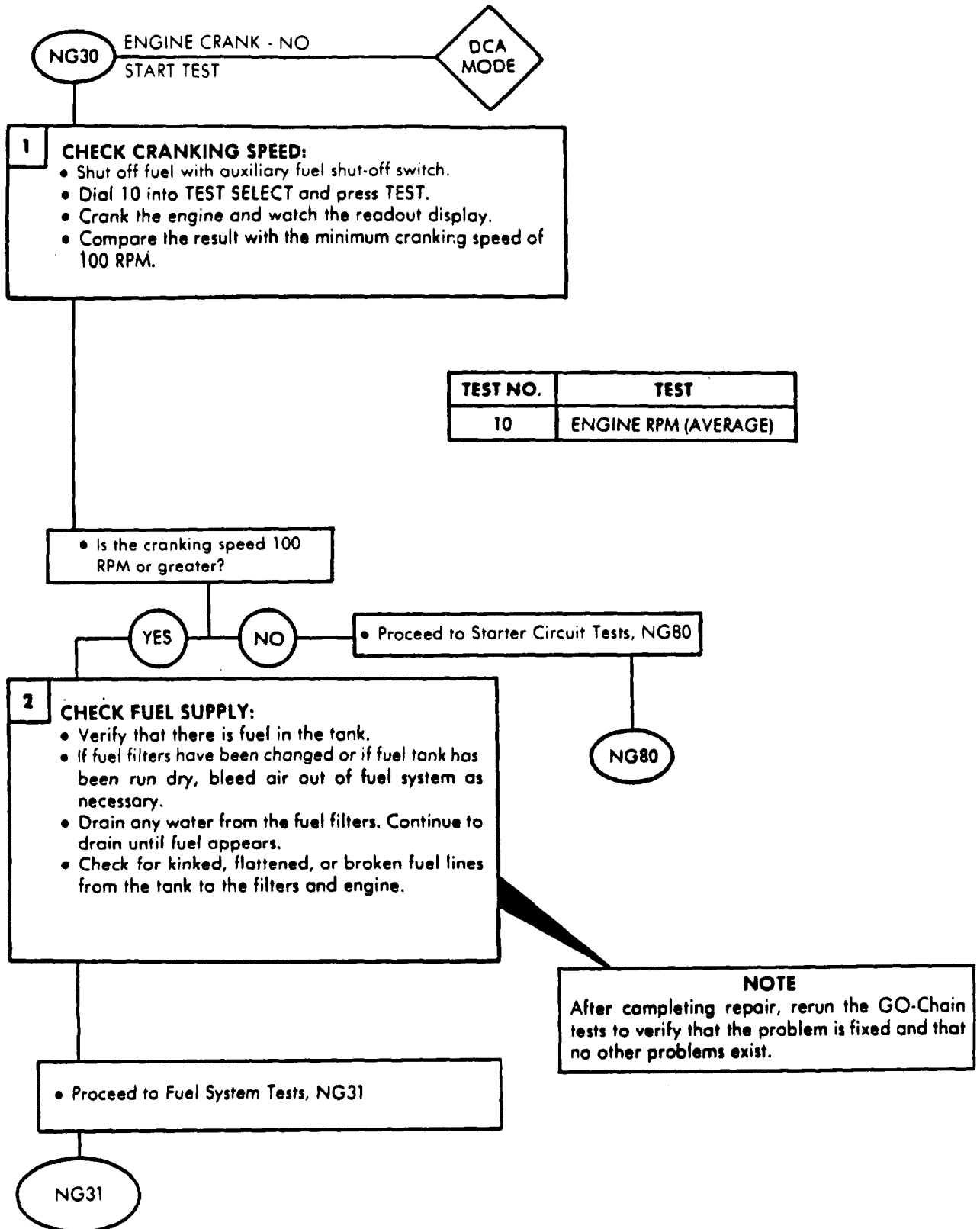
For normal readings, see vehicle test card, page 2-100.

Go TEST NUMBER	MODE	TEST TITLE	PAGE NUMBER
NG20	DCA	No Crank-No Start Test	2-82
NC30	DCA	Engine Crank-No Start Test	2-83
NG31	DCA	Fuel System Tests	2-84
NG50	DCA	Alternator Tests	2-87
NG80	DCA	Starter Circuit Tests	2-89
NG81	DCA	Battery Tests	2-93
NG90	DCA	Starter Tests	2-96
NG100	DCA	Engine Tests	2-98
NG110	DCA	Starter Current Test	2-100

STE/ICE NO-GO-Chain Tests

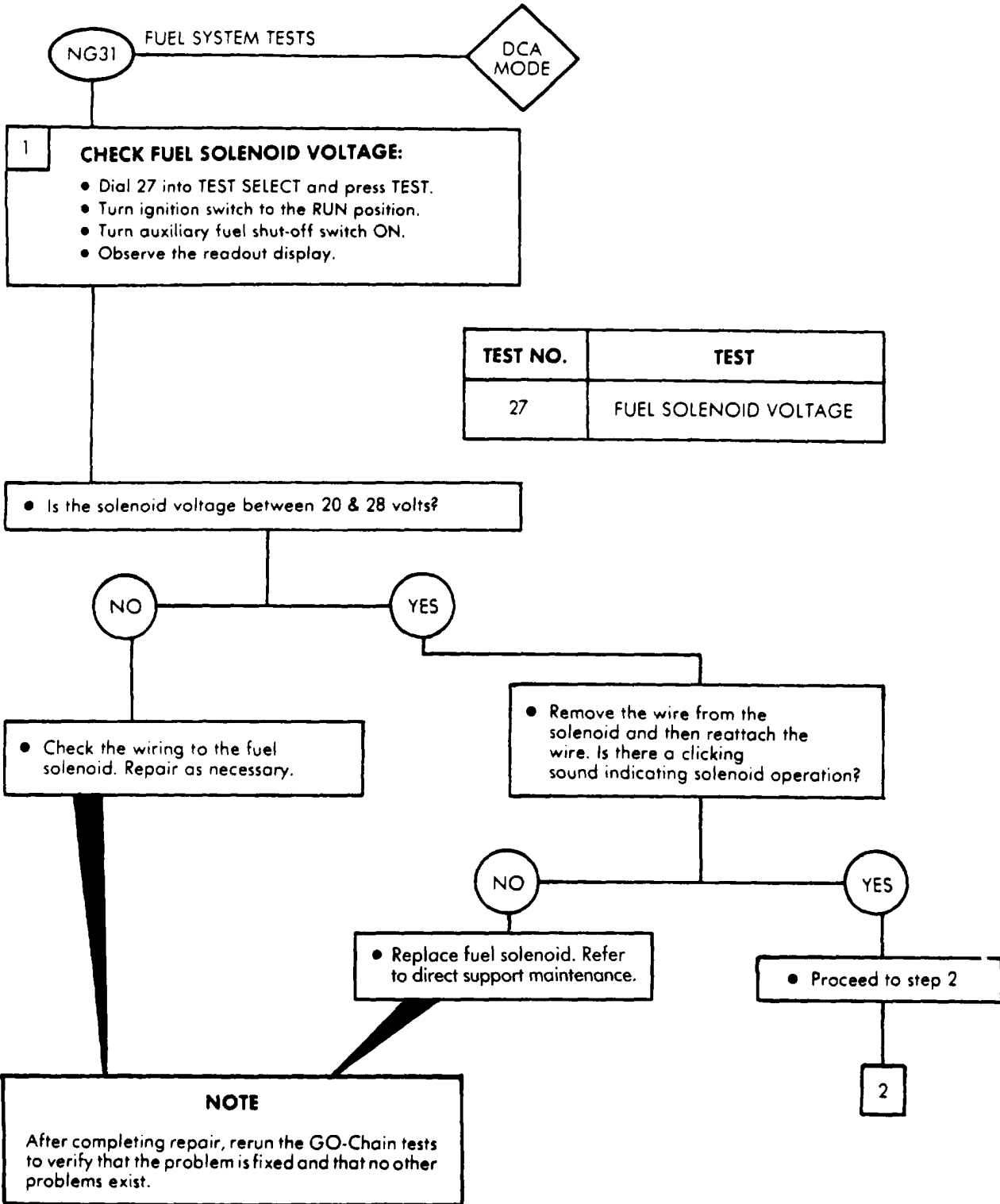


STE/ICE NO-GO-Chain Tests (Cont'd)

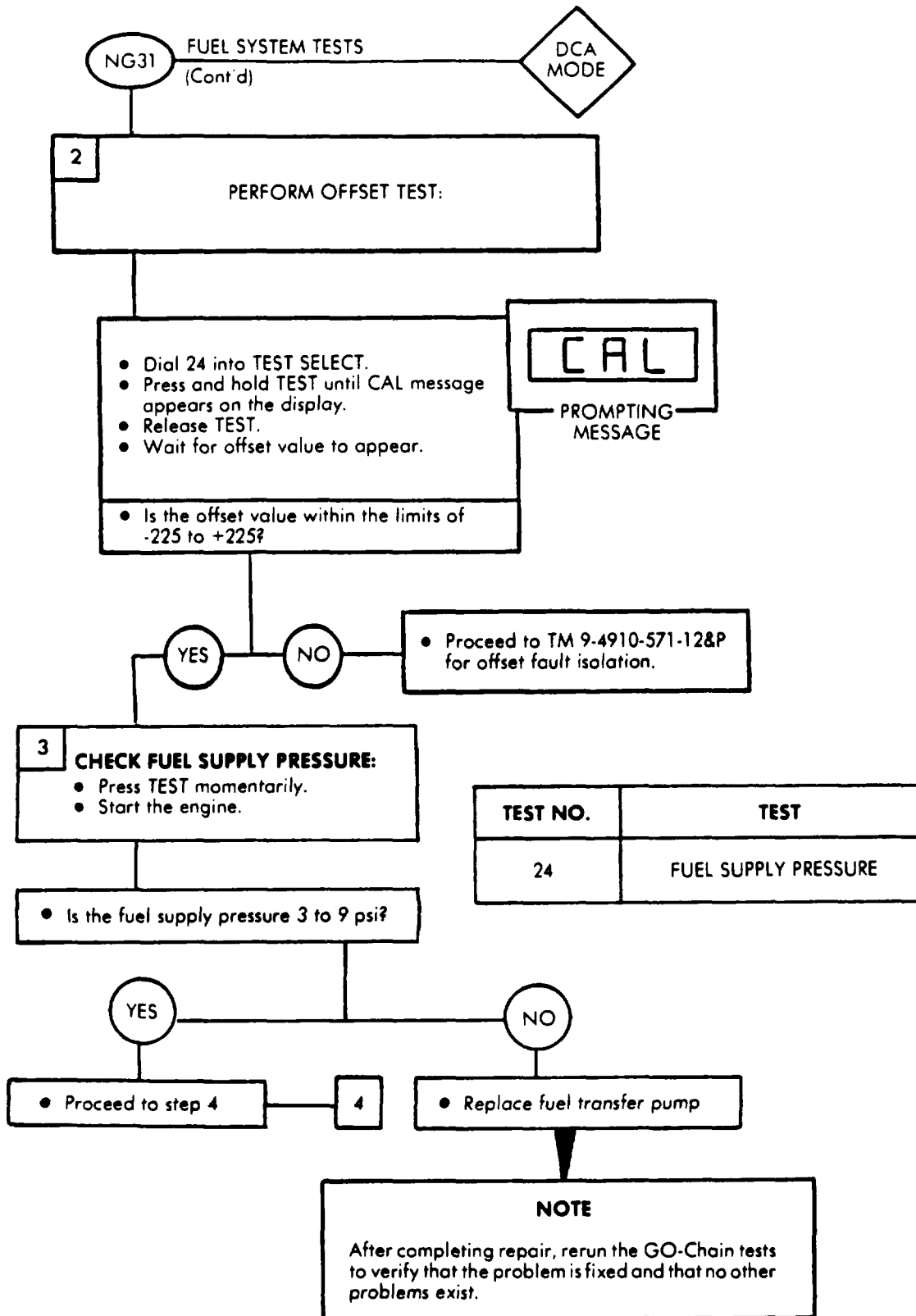


TEST NO.	TEST
10	ENGINE RPM (AVERAGE)

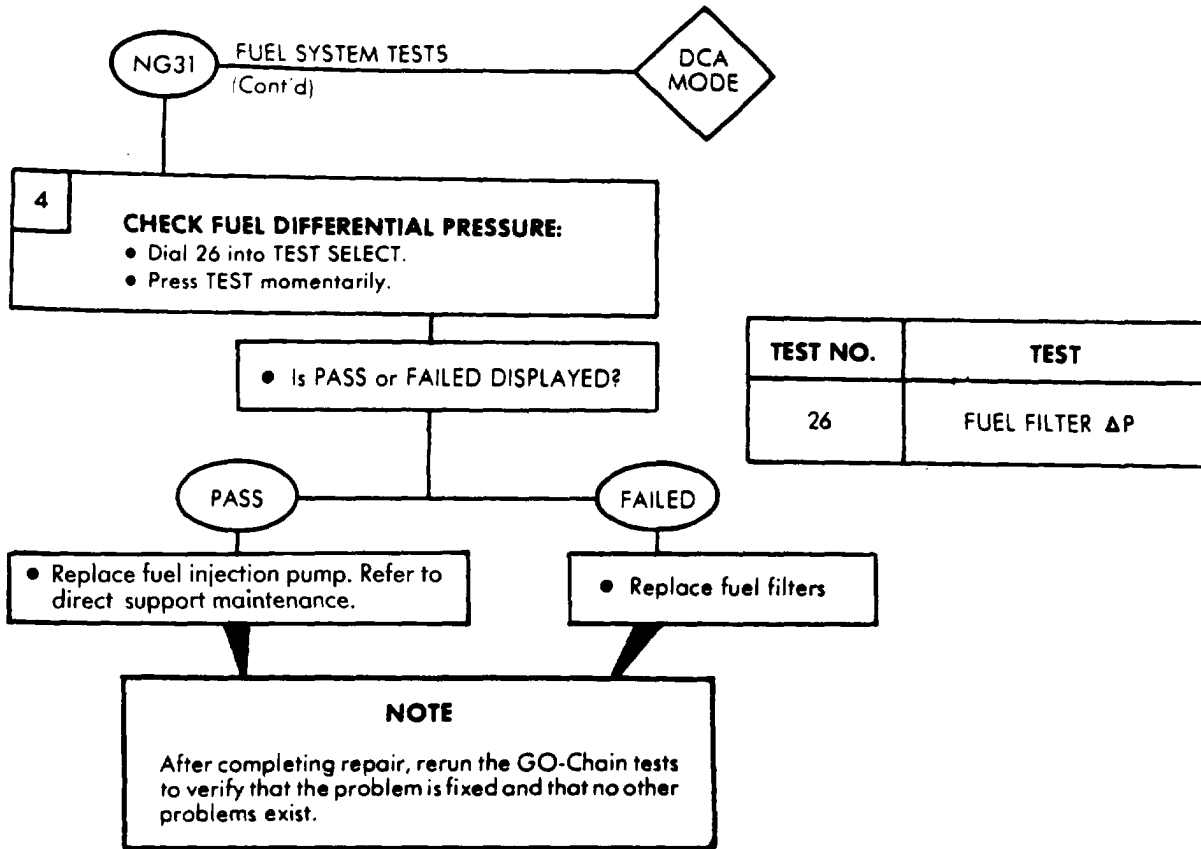
STE/ICE NO-GO-Chain Tests (Cont'd)



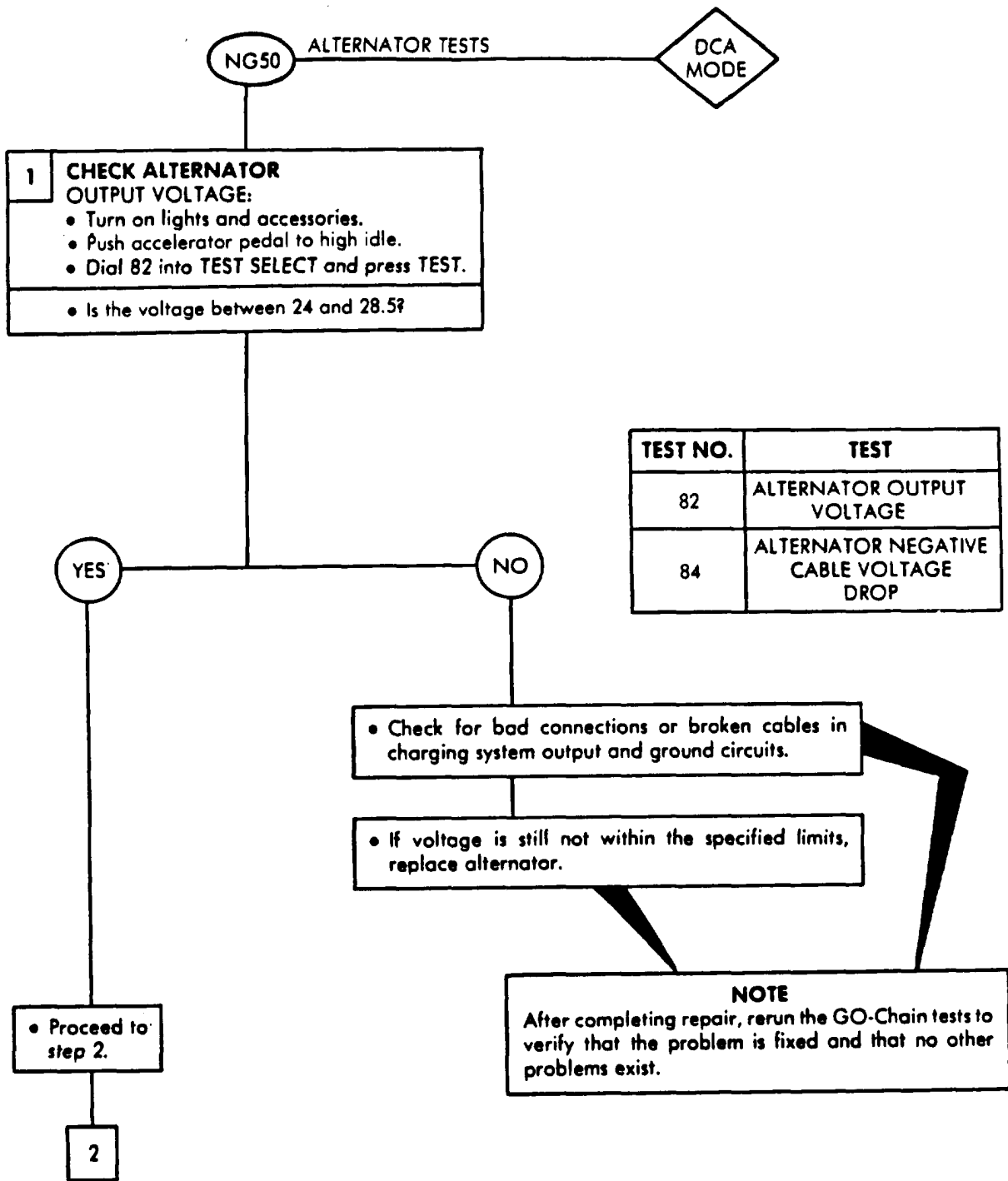
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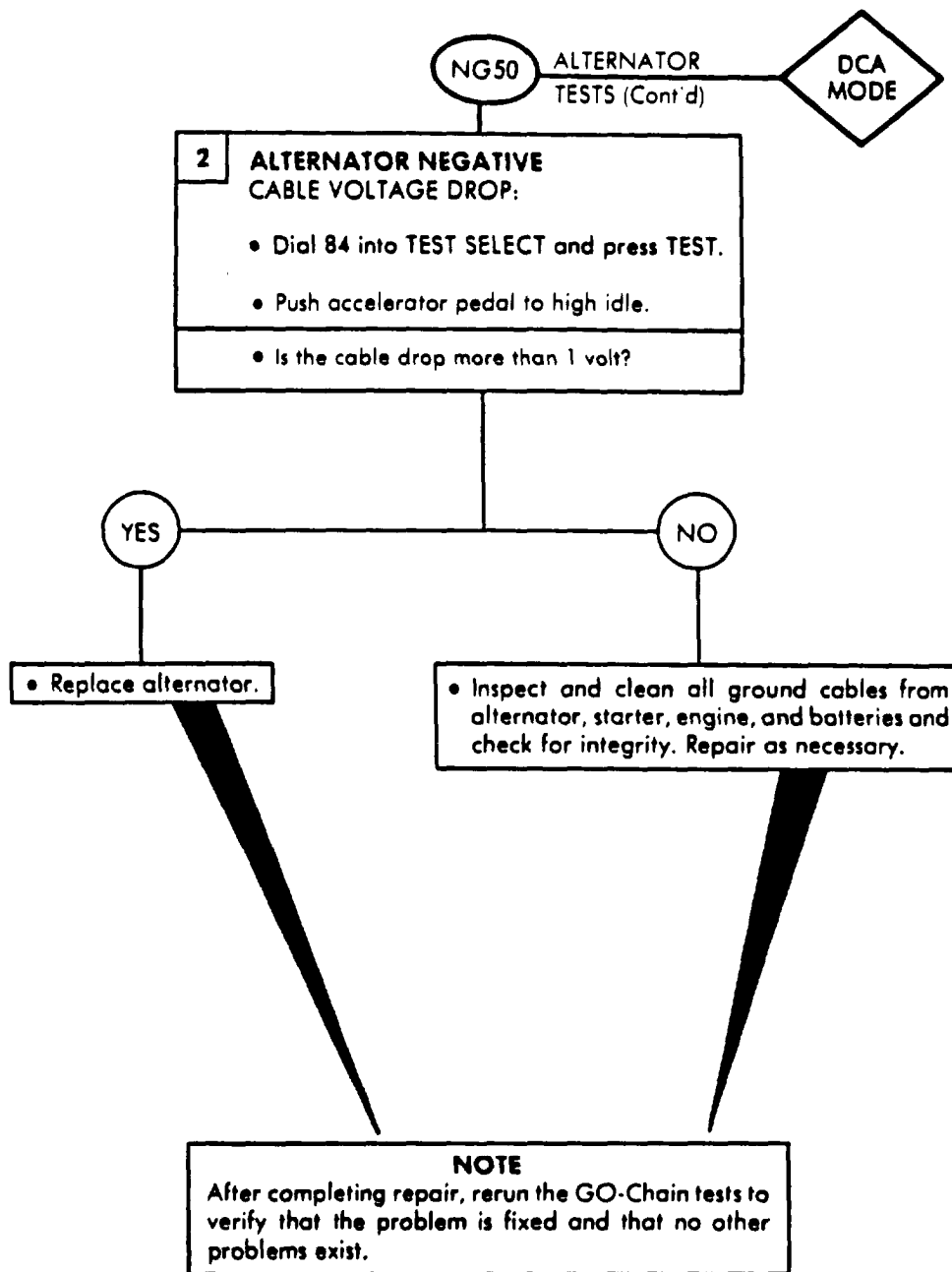
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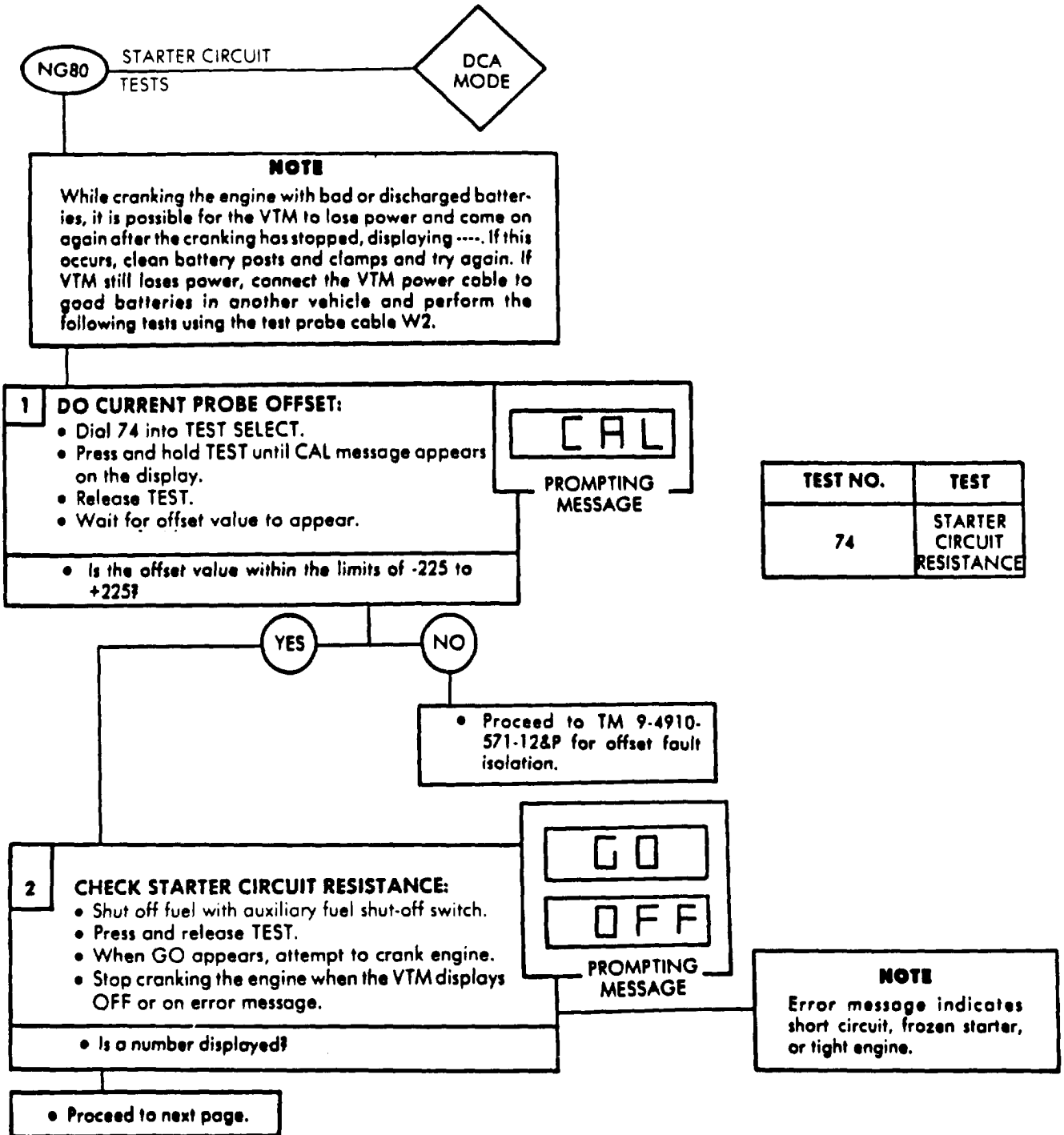
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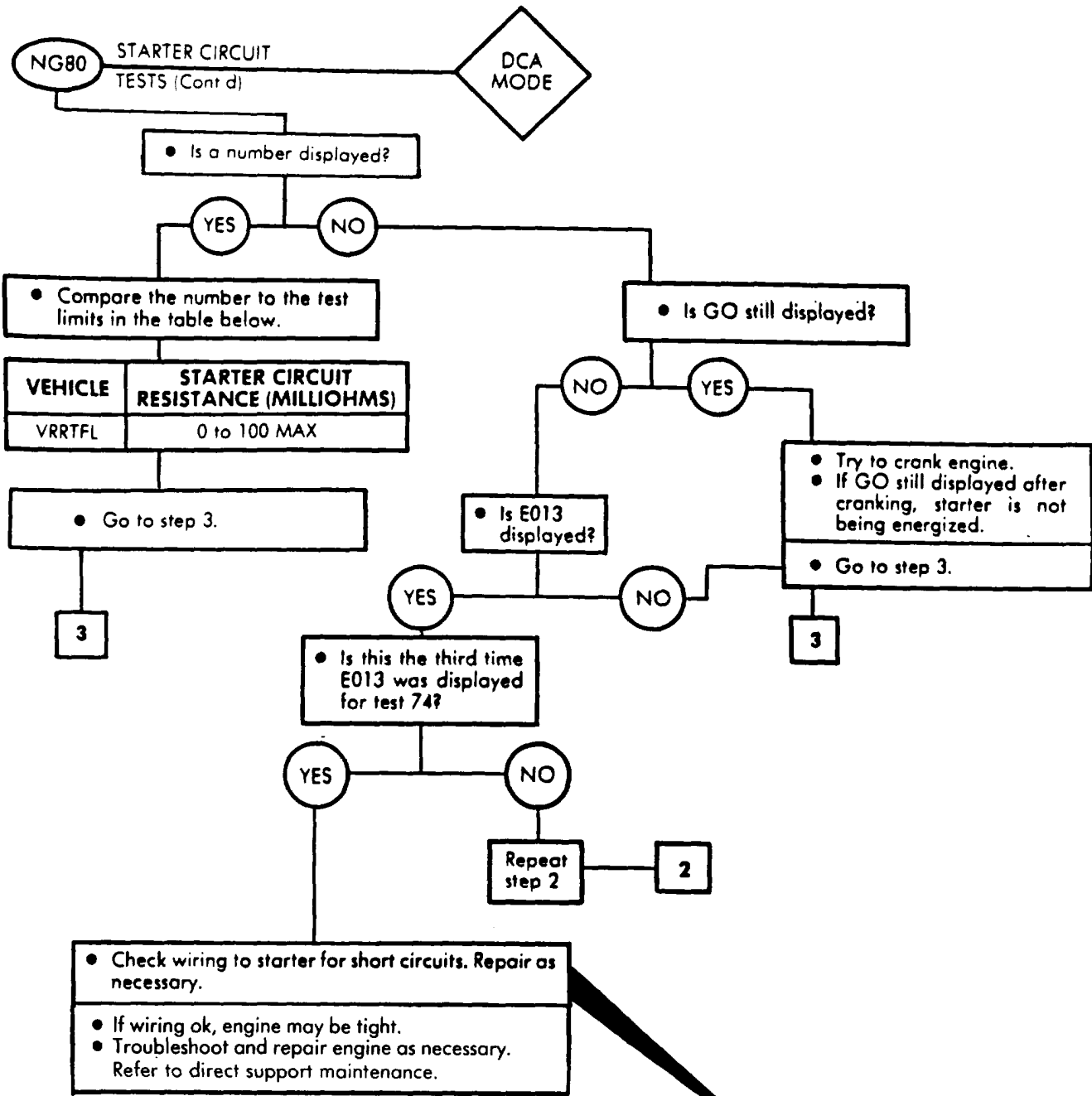
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STE/ICE NO-GO Chain Tests (Cont'd)



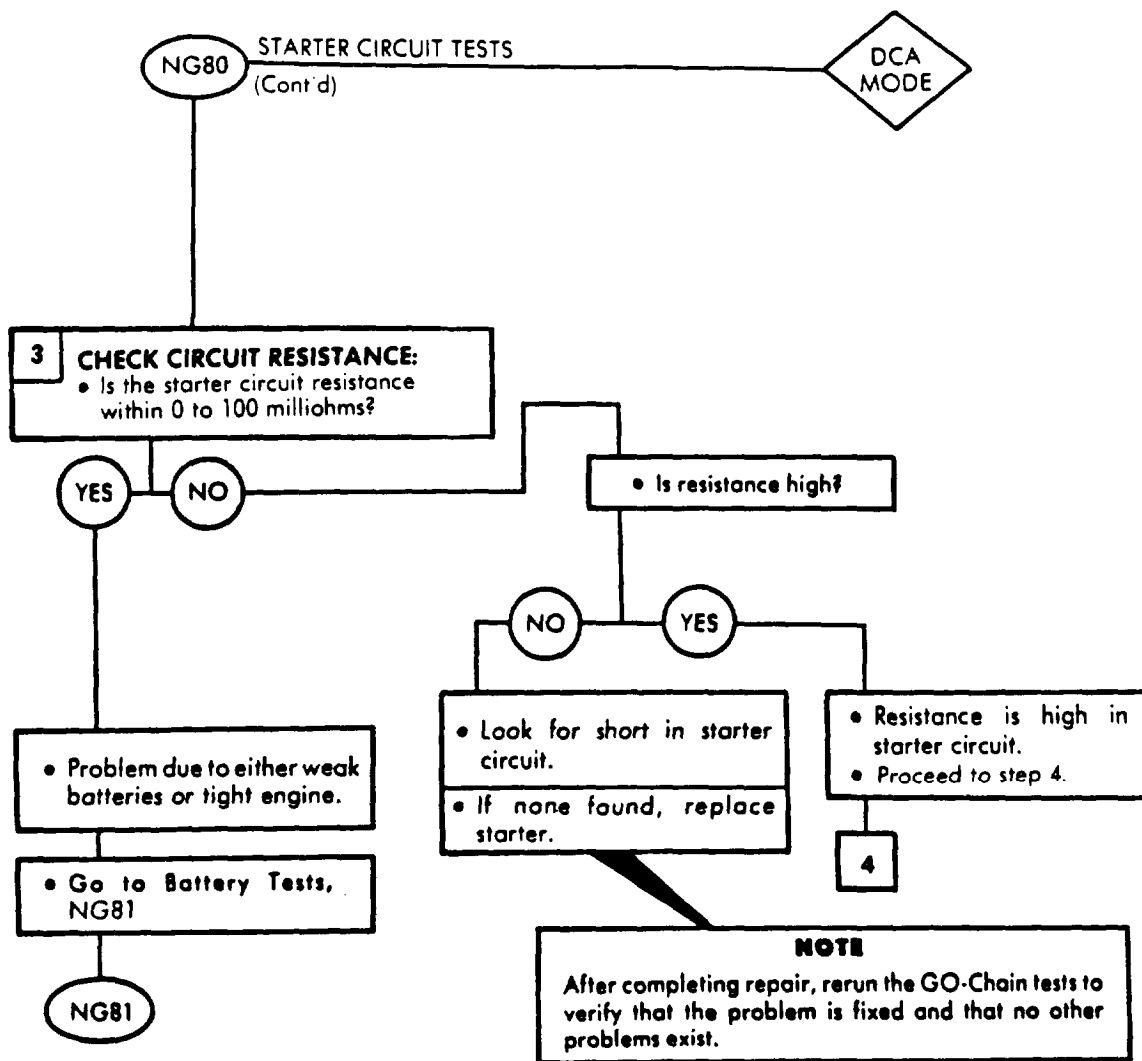
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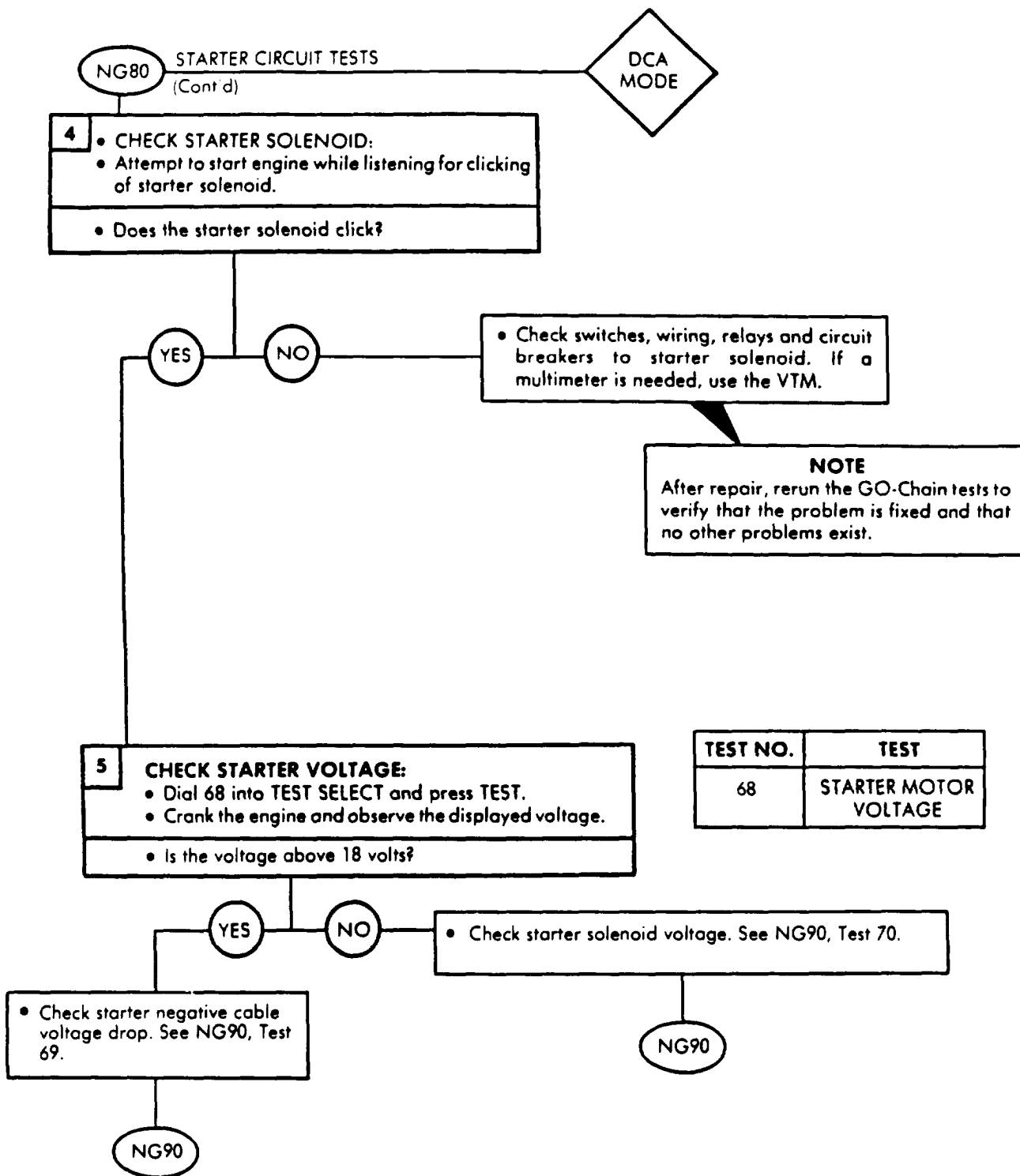
NOTE

After completing repair, rerun the GO-Chain tests to verify that the problem is fixed and that no other problems exist.

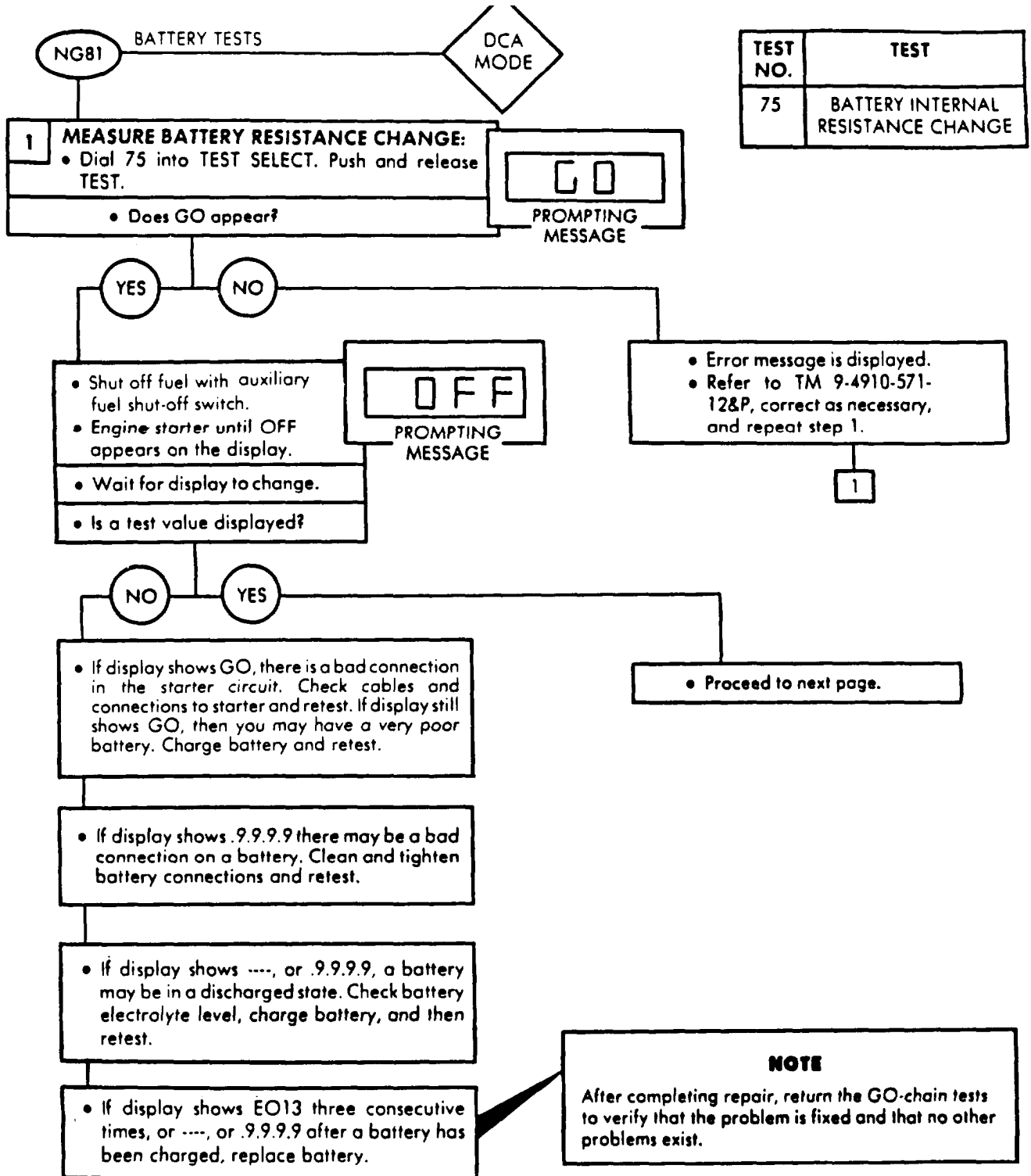
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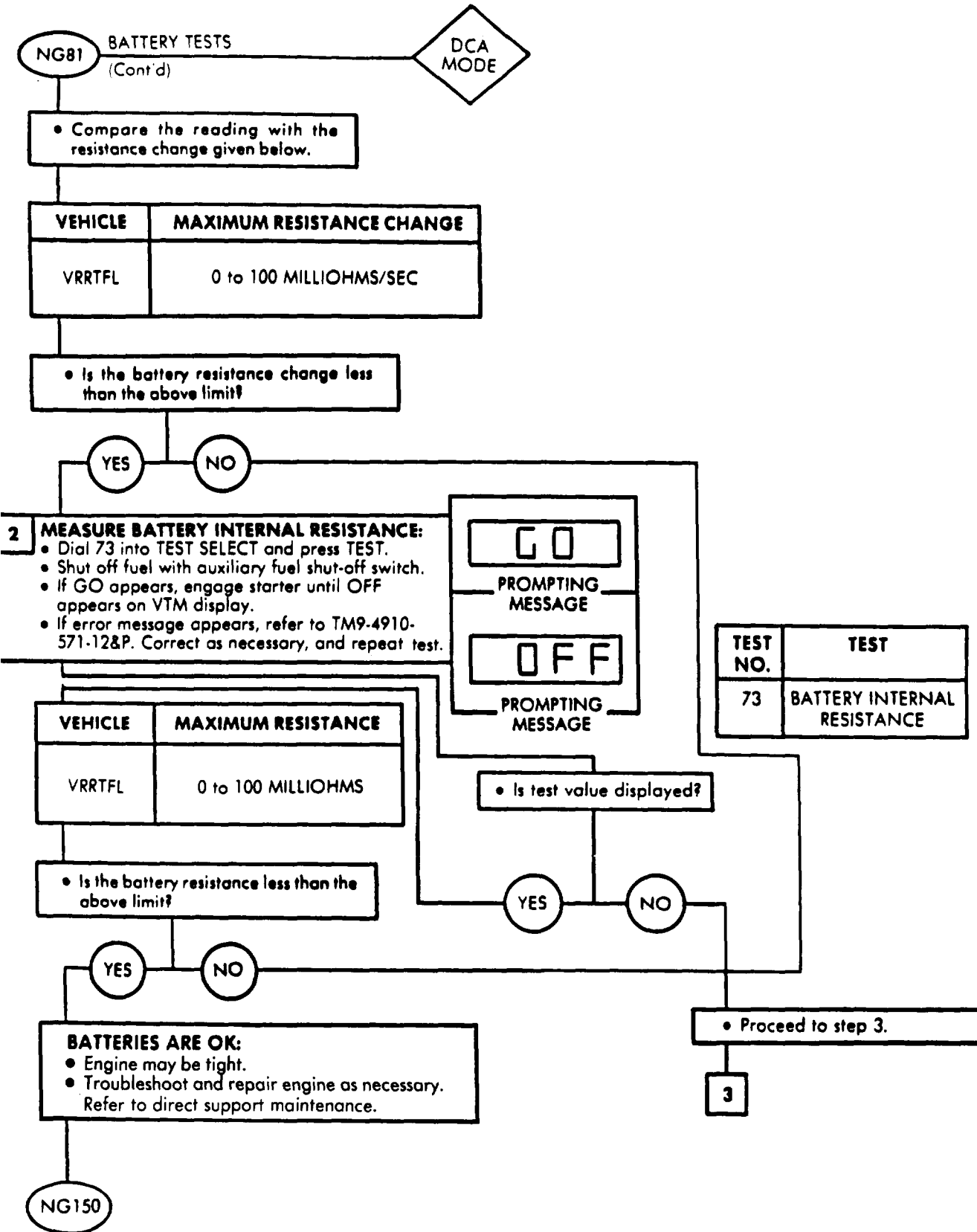
STE/ICE NO-GO-Chain Tests (Cont'd)



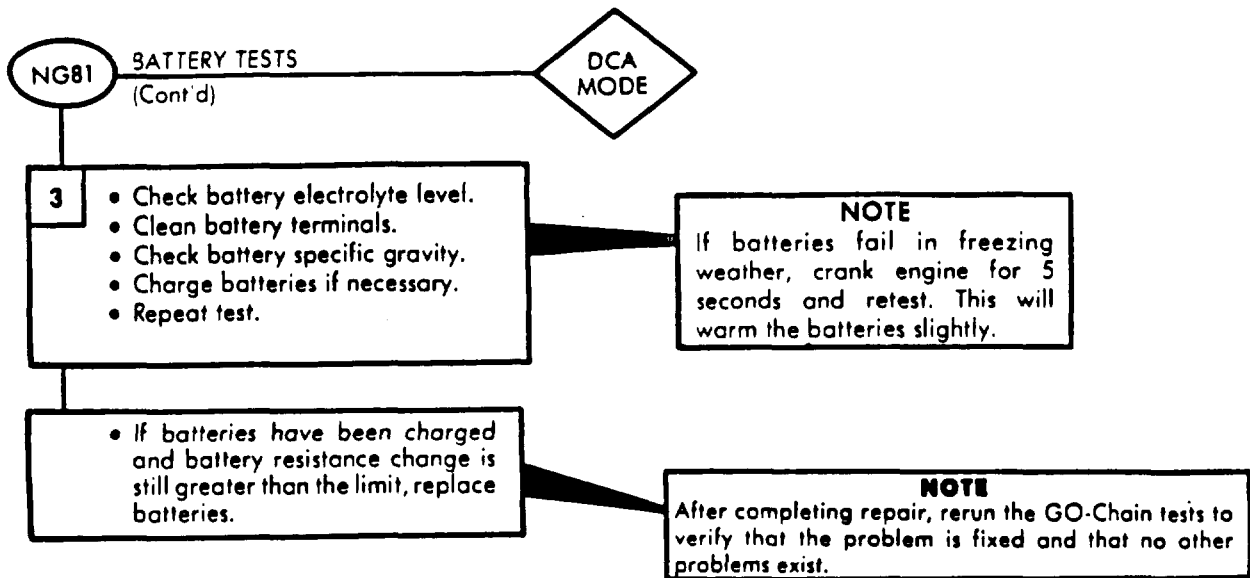
STE/ICE NO-GO-Chain Tests (Cont'd)



TEST NO.	TEST
75	BATTERY INTERNAL RESISTANCE CHANGE



STE/ICE NO-GO-Chain Tests (Cont'd)



WARNING

The batteries are filled with an acid electrolyte solution. Always wear protective clothing, rubber gloves, safety glasses, and face shield when servicing batteries.

STE/ICE NO-GO-Chain Tests (Cont'd)



TEST NO.	TEST
69	STARTER NEGATIVE CABLE DROP
70	STARTER SOLENOID VOLTAGE

1

- **STARTER NEGATIVE CABLE VOLTAGE DROP:**
- Dial 69 into TEST SELECT.
- Place auxiliary fuel shut off switch in the off position.
- Press and release TEST.
- Crank the engine and observe the displayed voltage.

- Is voltage drop more than 3 volts?

YES

NO

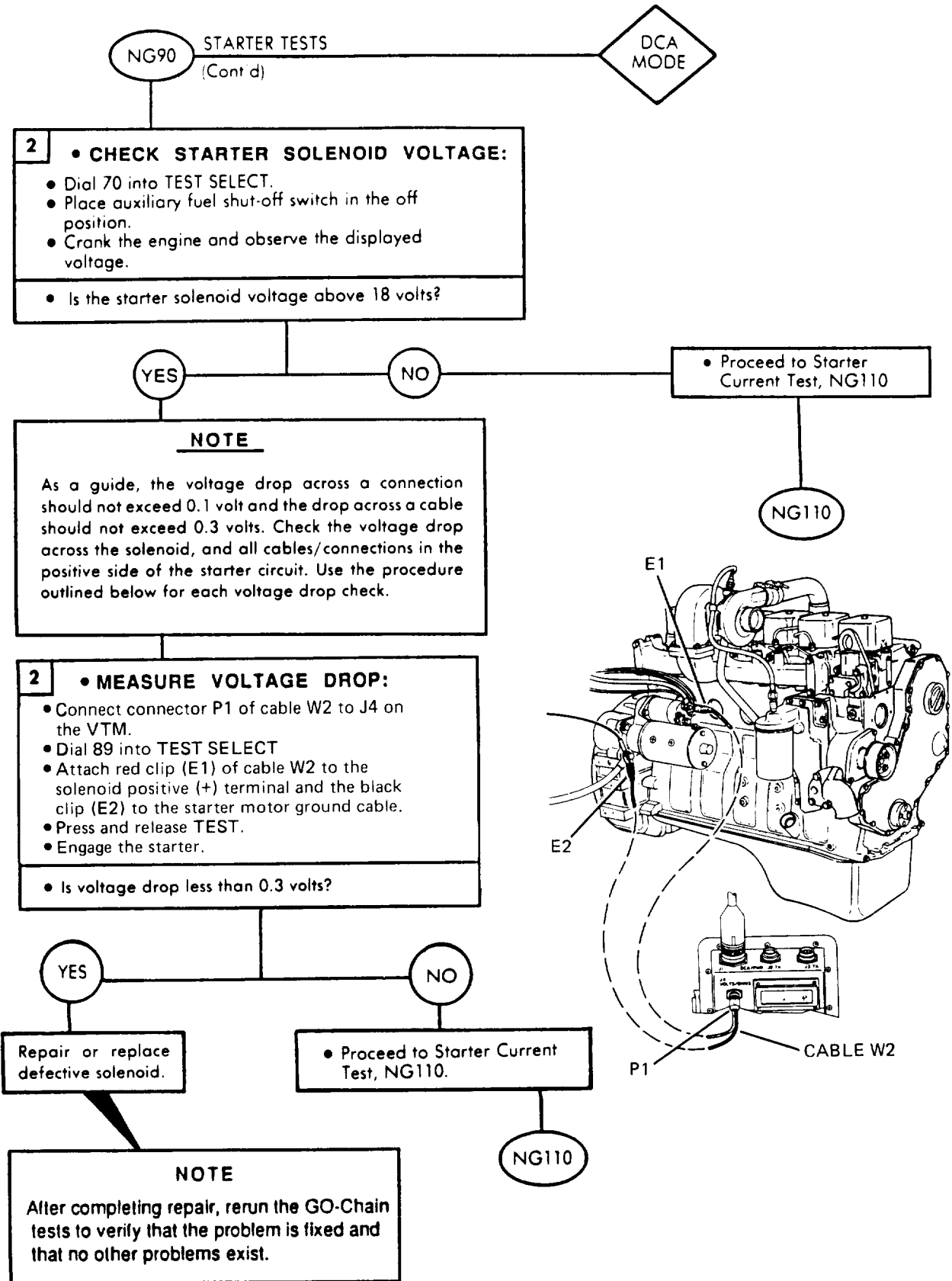
- Inspect and clean all ground cables from starter, engine, and batteries and check for integrity. Repair if necessary.

NOTE
 After completing repair, rerun the GO-Chain tests to verify that the problem is fixed and that no other problems exist.

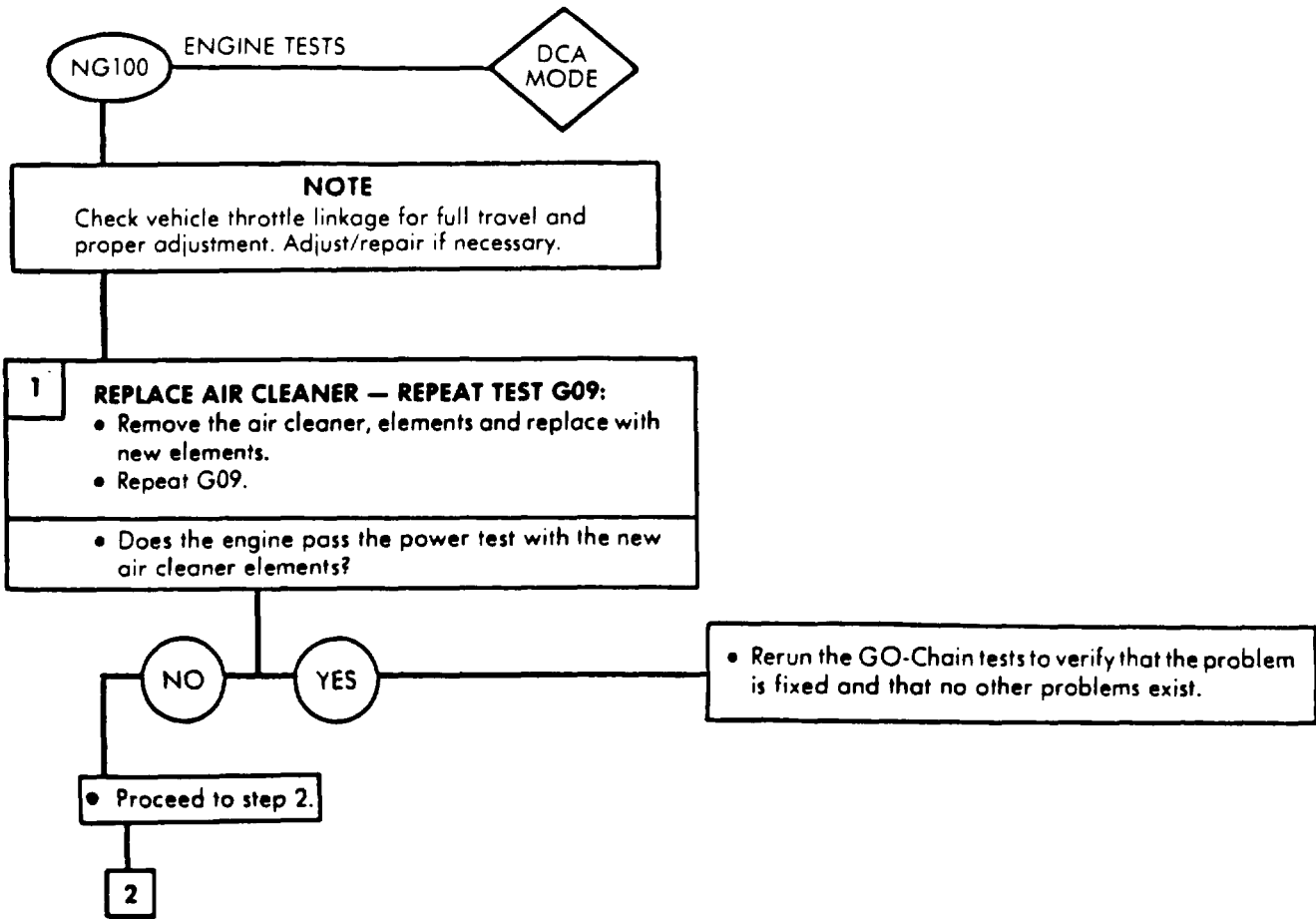
- Proceed to Step 2.

2

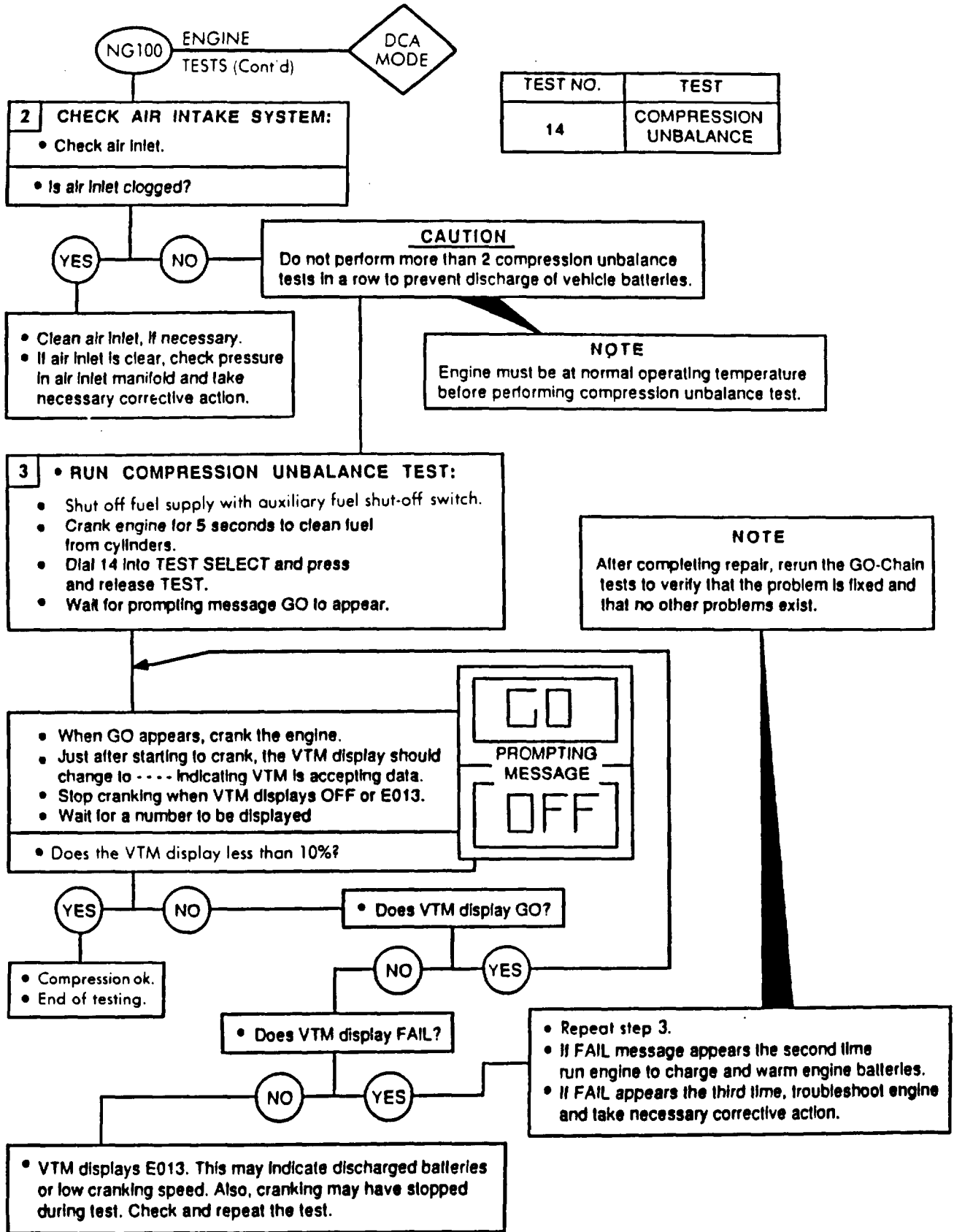
STE/ICE NO-GO-Chain Tests (Cont'd)



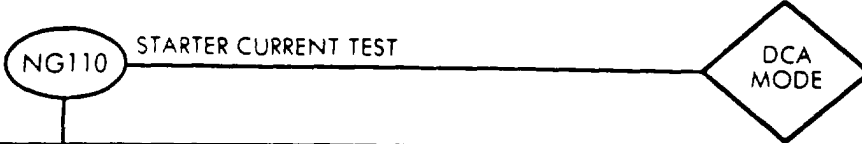
STE/ICE NO-GO-Chain Tests (Cont'd)



STE/ICE NO-GO-Chain Tests (cont'd)



STE/ICE NO-GO-Chain Tests (Cont'd)



NOTE
 While cranking the engine with bad or discharged batteries, it is possible for the VTM to lose power and come on again after the cranking has stopped, displaying - - - -. If this occurs, clean battery posts and clamps and try again. If VTM still losses power, replace batteries.

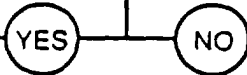
TEST NO.	TEST
71	STARTER CURRENT AVERAGE

1 MEASURE STARTER CURRENT:

- Dial 71 into TEST SELECT.
- Place auxiliary fuel shut-off switch in the off position.
- Press and release TEST.
- Crank engine and observe displayed amperage.

• Is starter current above 250 amps?

NOTE
 In freezing weather if batteries fail, crank engine for 5 seconds and retest. This will warm the batteries slightly.



• Batteries are OK.
 • Check cables and connections to starter.
 • If necessary, replace starter.
 • If wiring and starter are OK, engine may be tight. Troubleshoot engine and repair as necessary.
 Refer to direct support maintenance.

• Check electrolyte level of batteries.
 • Clean all battery terminals.
 • Check specific gravity of batteries.
 • Charge batteries if necessary.
 • Replace batteries if necessary.

WARNING

The batteries are filled with an acid electrolyte solution. Always wear protective clothing, rubber gloves, safety glasses, and face shield when servicing batteries.

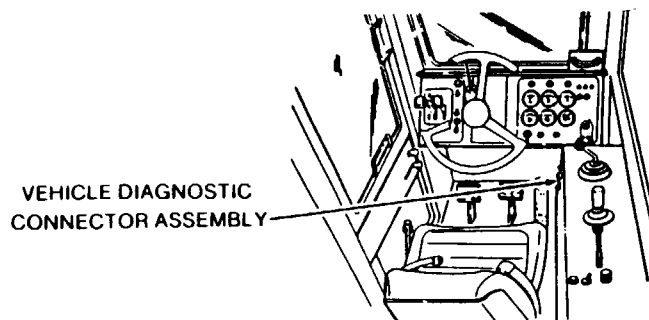
NOTE
 After completing repair, rerun the GO-Chain tests to verify that the problem is fixed and that no other problems exist.

6KVRTFL VEHICLE TEST CARD

PRE-TEST INSPECTION	
1. Fan Belts	4. Fuel Level
2. Oil Level	5. Batteries
3. Coolant Level	

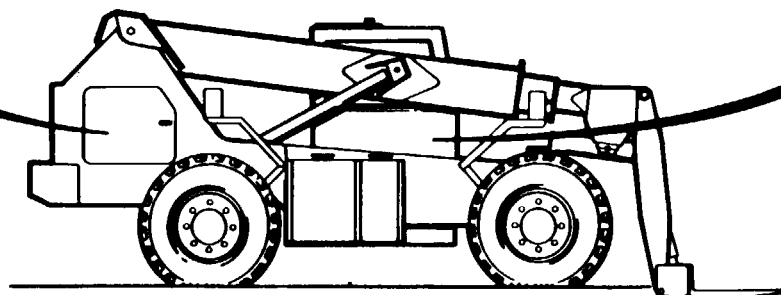
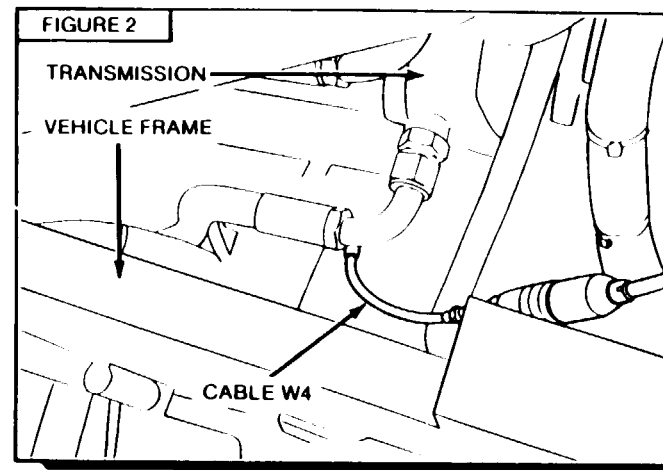
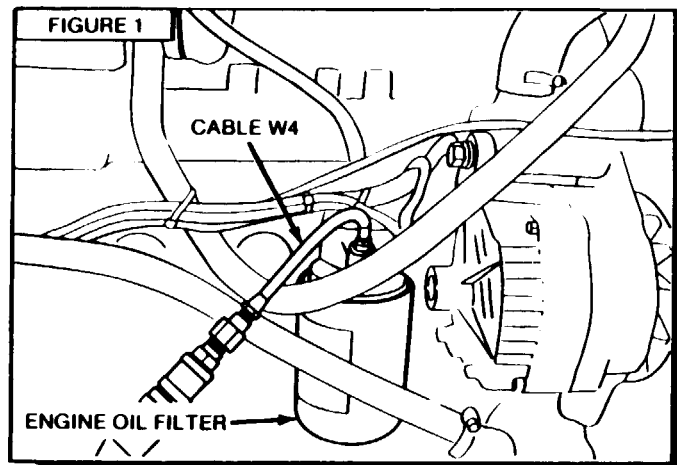
POWERING UP VTM
1. Connect VTM to W1 cable. W1 cable attaches to batteries
2. Enter VID into VTM using test 60.
3. Perform confidence test, test 66. (second entry 99)

MEASUREMENT NAME	VTM TEST NO.	VTM OFFSET LIMITS	OPERATING CONDITION	SPECIAL CONNECTIONS REQUIRED	MIN	LIMITS NORM	MAX	UNITS
Engine RPM (average)	10	—	Idle	DCA-CABLE W1	750	900±50	950	RPM-Average
Power Test	12	—	Engine Warm	DCA-CABLE W1	3000	3000-3900	3900	— — —
Compression Unbalance	14	—	Warm Engine, Crank on Go	DCA-CABLE W1	0	0-10	10	%
Fuel Supply Pressure	24	—	Idle	DCA-CABLE W1	3	3-10	10	PSI
Fuel Filter Pressure Drop (PASS/FAIL)	26	—	Idle	DCA-CABLE W1				PASS/FAIL
Fuel Solenoid Voltage	27	—	Idle	DCA-CABLE W1	20	20-28	28	VOLTS DC
Engine Oil Pressure	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	30	30-60	80	PSI
Transmission Oil Pressure	50	±150	Engine Warm, Neutral	CABLES W1, W4 (FIG 2)	120	120-220	220	PSI
Transmission Clutch Pressure	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	155	155-185	185	PSI
Transmission Converter Charge	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	40	40-70	70	PSI
Transmission Brake Cutoff Valve	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	5	—	—	PSI
Battery Voltage	67	—	Engine Off	DCA-CABLE W1	24	24-27	27	VOLTS DC
Starter Motor Voltage	68	—	Cranking	DCA-CABLE W1	18	18-27.5	27.5	VOLTS DC
Starter Negative Cable Voltage Drop	69	—	Cranking	DCA-CABLE W1	0	0-3	3	VOLTS DC
Starter Solenoid Volts	70	—	Cranking	DCA-CABLE W1	18	18-27.5	27.5	VOLTS DC
Starter Current Average	71	—	Crank on GO	DCA-CABLE W1	0	0-250	250	AMPS
Starter Current First Peak	72	±225	Crank on GO	DCA-CABLE W1	300	300-1000	1000	AMPS (PEAK)
Battery Internal Resistance	73	±225	Crank on GO	DCA-CABLE W1	0	0-100	100	MILLIOHMS
Starter Circuit Resistance	74	±225	Crank on GO	DCA-CABLE W1	0	0-100	100	MILLIOHMS
Battery Resistance Change	75	±225	Crank on GO	DCA-CABLE W1	0	0-100	100	MILLIOHMS/SECOND
Alternator Output Voltage	82	—	2,000 RPM	DCA-CABLE W1	24	24-28.5	28.5	VOLTS DC
Alternator Negative Cable Voltage Drop	84	—	Idle	DCA-CABLE W1	0	0-1	1	VOLTS DC

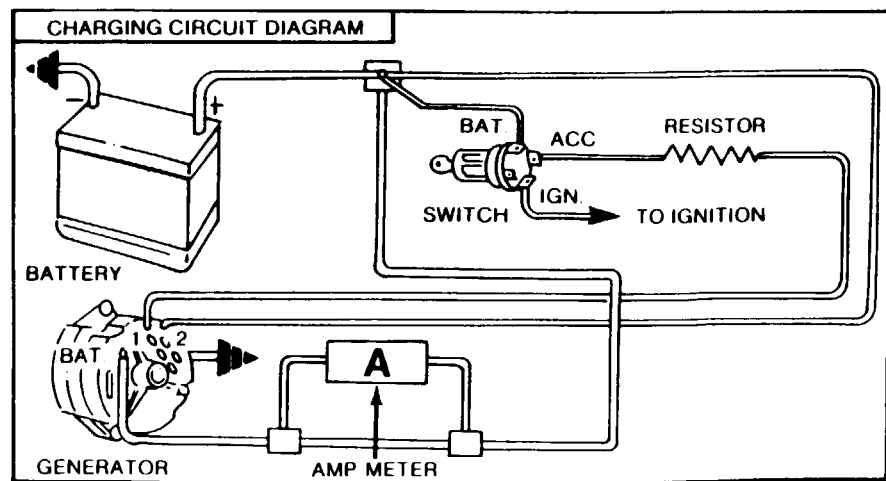
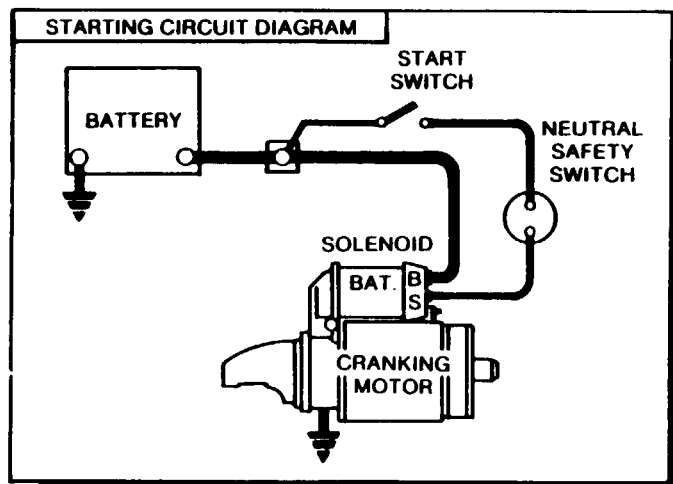


6KVRRTFL VEHICLE TEST CARD
TK MODE TEST CONNECTIONS

2-102



TM1 0-3930-660-20



CHAPTER 3

GENERAL MAINTENANCE PRACTICES

	Page
Cleaning Instructions	3-2
General Disassembly and Assembly Instructions	3-5
General Information	3-1
Inspection Instructions	3-5
Painting Instructions	3-8
Repair Instructions	3-7
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3-1. SCOPE

These general maintenance instructions contain general shop practices and specific methods you must be familiar with to properly maintain the 6KVRRTFL. You should read and understand these practices and methods before starting maintenance tasks on the 6KVRRTFL.

3-2. WORK SAFETY

a. Before starting a task, think about the risks and hazards to your safety as well as others. Wear protective gear such as safety goggles or lenses, safety shoes, rubber apron, or gloves. Protect yourself against injury.

b. When lifting heavy parts, have someone help you. Make sure that lifting equipment is working properly, that it is suitable for the task assigned, and is secured against slipping.

c. Always use power tools carefully.

d. Disconnect negative battery terminal before performing any maintenance.

3-3. GENERAL INFORMATION

a. Before beginning a task, find out how much repair, modification, or replacement is needed to fix the equipment as described in this manual. Sometimes the reason for equipment failure can be seen right away and complete teardown is not necessary. Disassemble the equipment only as far as necessary to repair or replace damaged or broken parts.

b. All tags and forms attached to the equipment must be checked to learn the reason for removal from service. Check all Modification Work Orders (MWO) and Technical Bulletins (TB) for equipment changes and updates.

c. In some cases a part may be damaged by removal. If the part appears to be good, and other parts behind it are not defective, leave it on and continue the procedure. Here are a few simple rules:

- (1) Do not take out dowel pins or studs unless loose, bent, broken or otherwise damaged.

- (2) Do not pull bearings or bushings unless damaged. If you must get at parts behind them, pull out bearings or bushings carefully.
- (3) Replace all gaskets, seals, and preformed packings.

3-4. CLEANING INSTRUCTIONS

a. General.

- (1) The cleaning instructions will be the same for the majority of parts and components that make up the 6KVRRTFL.
- (2) The importance of cleaning must be thoroughly understood by maintenance personnel. Great care and effort are required in cleaning. Dirt and foreign material are a constant threat to satisfactory maintenance. The following should apply to all cleaning, inspection, repair and assembly operations.
 - (a) Clean all parts before inspection, after repair and before assembly.
 - (b) Hands should be kept free of any accumulation of grease, which can collect dust, dirt or grit.
 - (c) After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled.
- (3) Observe the following precautions during all cleaning operations:

WARNING

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138°F (59°C). Use only in a well ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.

WARNING

Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.

WARNING

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.

WARNING

Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

b. External Engine Cleaning.

- (1) Protect all electrical equipment that could be damaged by the steam or moisture before steam cleaning.
- (2) Cover all openings before steam cleaning.
- (3) After cleaning, dry and apply a light coat of oil to all parts subject to rust.
- (4) Blow out all tapped (threaded) holes with compressed air to remove dirt and cleaning fluids.

c. Disassembled Parts Cleaning.

- (1) Place all disassembled parts in wire baskets for cleaning.
- (2) Dry and cover all cleaned parts.
- (3) Place parts on or in "racks" and hold for inspection or repair.
- (4) All parts subject to rusting must be lightly oiled and wrapped.
- (5) Keep all related parts and components together. Do not mix parts.

d. Castings.

- (1) Clean inner and outer surfaces of castings and all areas subject to grease and oil with cleaning solvents. Refer to TM9-247.
- (2) Use a stiff brush to remove sludge and gum deposits.
- (3) Blow out all tapped (threaded) holes with compressed air to remove dirt and cleaning fluids.

e. Oil Passages. particular attention must be given to all oil passages in castings and machined parts. Oil passages must be clean and free of any obstructions.

- (1) Clean passages with wire probes to break up any sludge or gum deposits.
- (2) Wash passages by flushing with solvents. Refer to TM9-247.
- (3) Dry passages with compressed air.

f. Oil Seals, Electrical Cables, and Flexible Hoses.

CAUTION

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy the material.

- (1) Wash electrical cables and flexible hose with water and mild soap solution and wipe dry.
- (2) Oil seals are generally damaged during removal, so cleaning will not be necessary since new seals will be used in assembly.

g. Bearings.

- (1) Bearings require special cleaning. After removing surface oil and gum deposits, place bearings in hot oil (140°F (60°C)) to loosen congealed oil and grease. Wipe bearings dry. Do not use compressed air. After cleaning, coat bearings with oil, wrap in paper, and hold for inspection.
- (2) Refer to TM9-214 for information and care of bearings.

h. Machine Tooled Parts.

- (1) Clean machine tooled parts with dry cleaning solvent (P-D-680).
- (2) Dry parts with compressed air.

i. Machined Surfaces.

- (1) Clean machined surfaces with dry cleaning solvent (P-D-680).
- (2) Dry surfaces with compressed air.

j. Mated Surfaces.

- (1) Remove old gasket and/or sealing compound using wire bush and dry cleaning solvent (P-D-680).
- (2) Lightly oil and wrap all parts subject to rust before storing.

k. Rusted Surfaces. Clean all rusted surfaces using wire brush and crocus cloth .

l. Oil Bathed Internal Parts. Wipe oil bathed internal parts clean with lint free cloth.

- m. Air Actuated Internal Parts. Wipe air actuated internal parts clean with lint free cloth.
- n. Externally Exposed Parts. Wash externally exposed parts with soap and water. Rinse thoroughly and air dry.

3-5. GENERAL DISASSEMBLY AND ASSEMBLY INSTRUCTIONS

a. Always put together or take apart one part at a time. DO NOT work on two parts at the same time. Be sure to make all adjustments. Always check your work when you are finished. Make sure everything is done.

b. Check the adjustments for the last time by operating the vehicle. If all adjustments are correct, the vehicle is ready to go back to work.

3-6. INSPECTION INSTRUCTIONS

- a. General. All components and parts must be carefully checked to determine if they are serviceable for reuse, if they can be repaired, or if they must be scrapped.
- b. Drilled and Tapped (Threaded) Holes.
 - (1) Inspect for wear, distortion (stretching), cracks or any other damage in or around holes.
 - (2) Inspect threaded areas for wear, distortion or evidence of cross-threading.
 - (3) Mark all damaged areas for repair or replacement.
- c. Metal Lines, Flexible Lines (Hoses) and Fittings.
 - (1) Inspect lines for sharp kinks, cracks, bends or dents.
 - (2) Inspect flexible lines for fraying, evidence of leakage or loose fittings or connectors.
 - (3) Check all fittings and connectors for thread damage. Check for hex heads that are worn or rounded by poorly fitting wrenches.
 - (4) Mark all damaged material for repair or replacement.
- . Castings.
 - (1) Inspect all ferrous and nonferrous castings for cracks using a magnifying glass and strong light.
 - (2) Refer to MIL-I-6866, Inspection, Liquid Penetrant Methods, and MIL-I-6868, Inspection Process, Magnetic Particles.
 - (3) Particularly check areas around studs, pipe plugs, threaded inserts, and sharp corners. Replace all cracked castings.
 - (4) Inspect machined surfaces for nicks, burrs, or raised metal. Mark damaged areas for repair or replacement.

- (5) Inspect all pipe plugs, pipe plug openings, screws, and screw openings for damaged or stripped threads.
 - (6) Check all gasket mating surfaces, flanges on housings, and supports for warpage with a straightedge or surface plate. Inspect mating flanges for discolorations that may indicate persistent oil leakage.
 - (7) Check all castings for conformance to applicable repair standards.
- e. Bearings. Refer to TM9-2L4 for inspection of bearings. Check all bearings for conformance to applicable repair standards.
 - f. Studs, Bolts, and Screws. Replace if threads are damaged, bent, loose or stretched.
 - g. Gears.

NOTE

When gear teeth wear limits are not established, good judgement is required to determine if gear replacement is necessary.

- (1) Inspect all gears for cracks using a magnifying glass and strong light. No cracks are permissible.
 - (2) Inspect gear teeth for wear, sharp fins, burrs, and galled or pitted surfaces.
 - (3) Check keyway slots for wear or damage.
- h. Bushings and Bushing Type Bearings.
 - (1) Check all bushings and bushing type bearings for secure fit, evidence of overheating, wear, burrs, nicks and out-of-round condition. Replace as necessary.
 - (2) Check for dirt in lubrication holes or grooves. Holes and grooves must be clean and free from damage.
 - i. Oil Seals. Oil seals are mandatory replacement items.
 - j. Core Hole Expansion Plugs. Inspect for leakage. Replace plugs when leakage is present.
 - k. Machine Tooled Parts. Inspect for cracks, breaks, elongated holes, wear and chips. Replace any damaged parts.
 - l. Machined Surfaces. Inspect for cracks, evidence of wear, galled or pitted surface, burrs, nicks, and scratches.
 - m. Mated Surfaces. Inspect for remains of old gasket, seal, secure fit, pitting and evidence of leakage.
 - n. Rusted Surfaces. Inspect for pitting, holes and severe damage.

- o. Oil Bathed Internal Parts. Inspect for cracks, nicks, burrs, evidence of overheating and wear.
 - p. Air Actuated Internal Parts. Inspect for cracks, nicks, burrs? evidence of overheating and wear.
 - q. Externally Exposed Parts. Inspect for breaks, cracks, rust damage and wear.
 - r. Springs. Inspect for broken, collapsed and twisted coils.
- 3-7. REPAIR INSTRUCTIONS

- a. General. Any repair procedure peculiar to a specific part or component is covered in the section or paragraph relating to that item. After repair, clean all parts thoroughly to prevent dirt, metal chips or other foreign material from entering any working parts.

CAUTION

Repaired items must be thoroughly cleaned to remove metal chips and abrasives to prevent them from entering working parts of the 6KVRRTFL.

- b. Castings.
 - (1) All cracked castings will be replaced.
 - (2) Only minor repairs to machined surfaces, flanges and gasket mating surfaces are permitted. Remove minor nicks, burrs and scratches with:
 - (a) Fine mill file.
 - (b) Crocus cloth dipped in cleaning solvent.
 - (c) Lapping across a surface plate.
 - (3) Remachining of machined surfaces to repair damage, warpage or uneven surfaces is not permitted. Replace castings.
 - (4) Repair damaged threaded pipe plug or screw threads with a tap. Repair oversize holes with threaded inserts.
- c. Bearings. Refer to TM9-214 for repair of bearings.
- d. Studs . Replace all bent and stretched studs. Repair minor thread damage with a thread die. Replace studs having stripped or damaged threads as outlined below:
 - (1) Remove using a stud remover. Back studs out slowly to avoid heat buildup and seizure-that can cause stud to break off.
 - (2) If studs break off too short to use a stud remover, use a stud extractor to remove or use "welding method".

CAUTION

Refer to TM9-237, Welding Instructions, to avoid damage to castings if welding method is used.

- (3) Broken studs can be removed by welding bar stock or a nut to stud and removing with wrench.
- (4) Install replacement stud slowly to prevent heat buildup and snapping off.

e. Gears.

- (1) Remove gears using pullers.
- (2) Only minor repairs to gears are permitted. Remove minor nicks, burrs or scratches on gear teeth with:
 - (a) Fine mill file.
 - (b) Crocus cloth dipped in cleaning solvent.
- (3) If keyways are worn or enlarged, replace gear.

f. Bushings and Bushinng Type Bearings. When bushings and bushing type bearings seize to a shaft and spin in the bore, the associated part must also be replaced.

g. Oil Seals.

- (1) Remove oil seals by pressing or prying out, being careful not to damage casting or adapter bore.
- (2) Always install new seal in bore using proper seal replacing tool.

3-8. PAINTING INSRUCTIONS

Upon installation, restored parts must be painted per TB 43-0209.

CHAPTER 4

ENGINE MAINTENANCE

4-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the engine oil system. Also included in this chapter are maintenance procedures for various engine components that are not part of the oil system. To find a specific maintenance procedure, see the maintenance task summary below.

4-2 . GENERAL ENGINE MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
4-3	Engine Assembly - Service	4-2
4-4	Cylinder Head - Adjust	4-4
4-5	Rocker Lever Covers - Replace	4-7
4-6	Engine Oil Level Gage - Replace	4-9
4-7	Engine Oil Filler Neck - Replace	4-10
4-8	Engine Oil Sampling Valve - Replace	4-11
4-9	Exhaust Manifold - Replace	4-12
4-10	Intake Manifold Cover - Replace	4-13

4-3. ENGINE ASSEMBLY - SERVICE

This task covers:

Service by changing engine oil and filter

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

Engine Oil, 15 quarts (App. C, Item 30)
Filter Element (3)
Flatwasher (2)

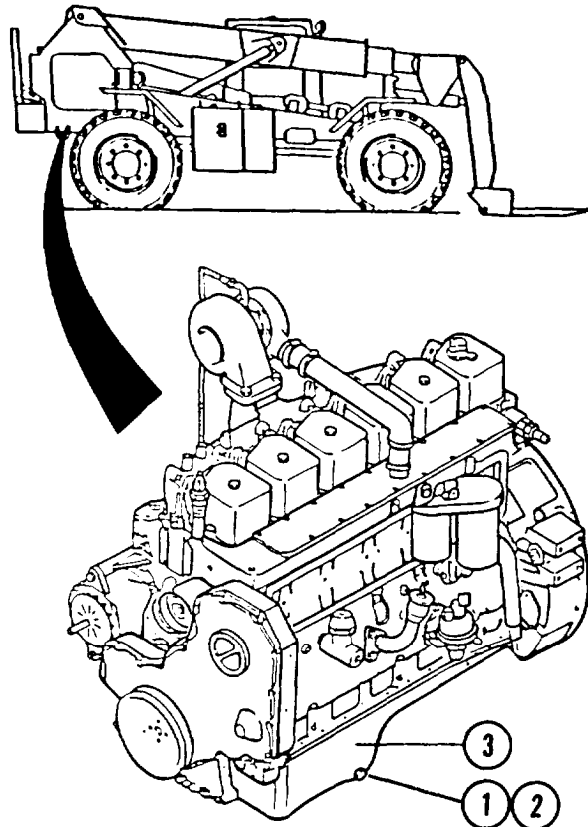
Equipment Condition

Vehicle parked on level ground.

SERVICE BY CHANGING ENGINE OIL

1. DRAIN ENGINE OIL.

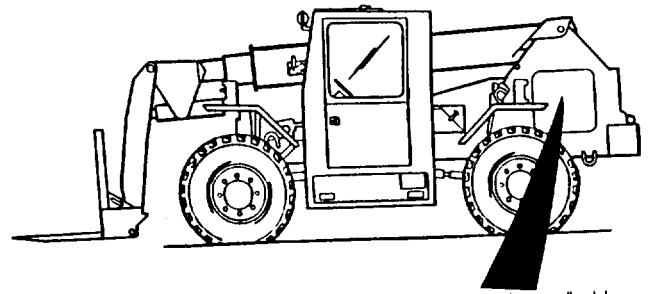
- a. Start and run engine until water temperature gauge reading is between 140 and 210°F. Stop engine.
- b. Place suitable container under oil drain plug (1).
- c. Remove oil drain plug (1) and flatwasher (2) from engine oil pan (3) and allow oil to drain completely. Discard flatwasher (2).



4-3. ENGINE ASSEMBLY - SERVICE (Cont'd)

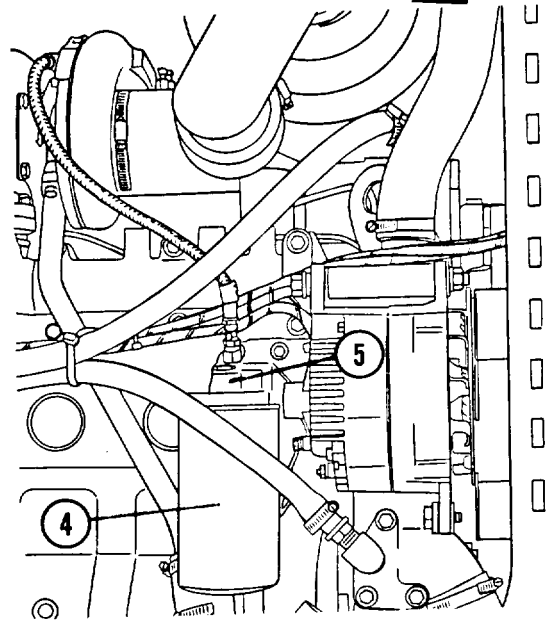
2. REMOVE AND DISCARD ENGINE OIL FILTER ELEMENT (4) .

- a. Place suitable container under filter element (4) .
- b. Slowly unscrew and remove filter element (4) from filter head (5). Discard filter element (4).



3. INSTALL NEW ENGINE OIL FILTER ELEMENT (4) .

- a. Clean surface of filter head (5) to remove any possible contaminants.
- b. Lubricate seal on new filter element (4) with clean oil.



CAUTION

Do not overtighten new filter element (4) . Overtightening may distort the filter element threads and seal.

- c. Screw new filter element (4) onto filter head (5) until top of element (4) makes contact with head (5). Tighten element (4) an additional 3/4 turn.

4. INSTALL OIL DRAIN PLUG (1) AND ADD OIL THROUGH ENGINE OIL FILLER (6) .

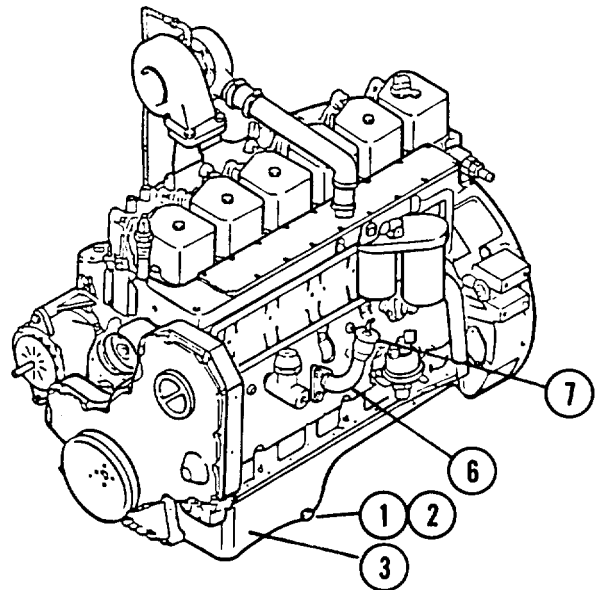
- a. Install oil drain plug (1) and new flatwasher (2) to engine oil pan (3).

NOTE

Engine oil capacity is 15 quarts including filter element.

- b. Remove cap (7) from engine oil filler (6) and add oil. Install cap (7).

5. START ENGINE AND CHECK FOR OIL LEAKS.



4-4. CYLINDER HEAD - ADJUST

This task covers:
Adjustment of Engine Valves

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Equipment Condition

Rocker lever covers removed, para.
4-50
Engine cooled to temperature of
140° F (60° C), or less.
Transmission cover removed, para.
16-6.

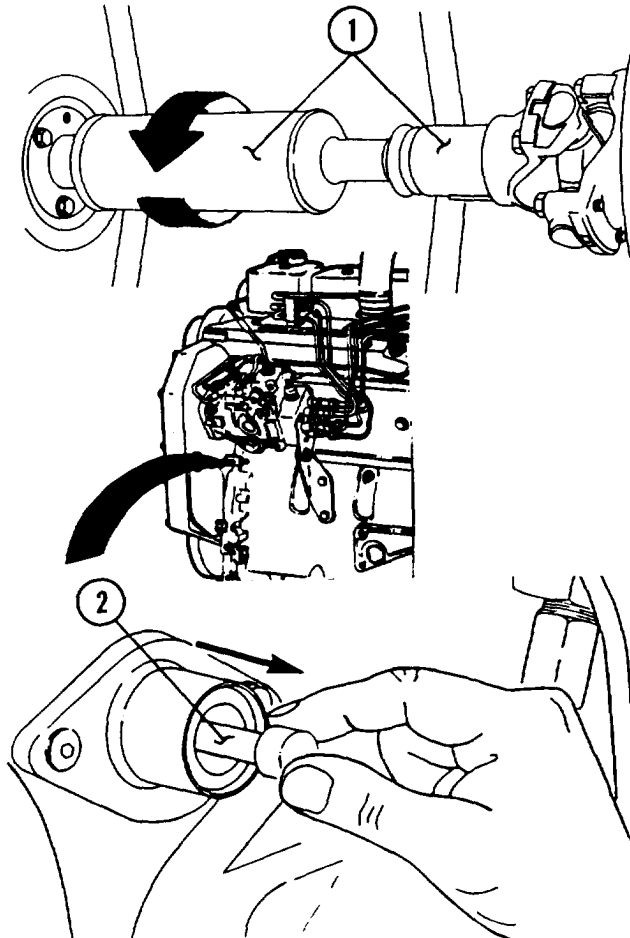
ADJUSTMENT

1. LOCATE TOP DEAD CENTER FOR NUMBER 1 CYLINDER.

Rotate engine counterclockwise at universal joint of transmission input shaft (1) as assistant pushes on engine timing pin (2).

NOTE

Continue step 1a until engine timing pin (2) moves inward. Number 1 cylinder is now at top dead center.



4-4. CYLINDER HEAD - ADJUST (Cont'd)

2. ADJUST CLEARANCES OF THREE INTAKE VALVES (3) AND THREE EXHAUST VALVES (4).

NOTE

Intake valve clearance - 0.010 in.
(0.254 mm).

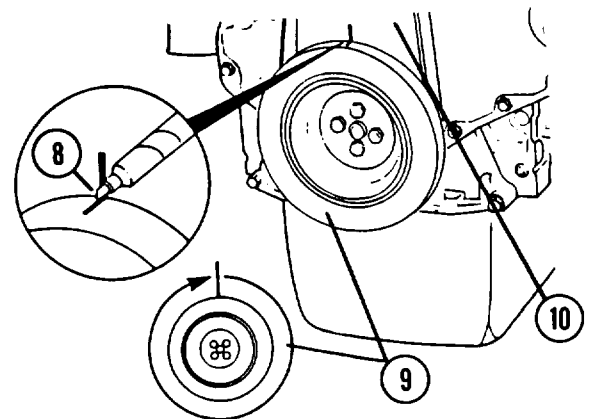
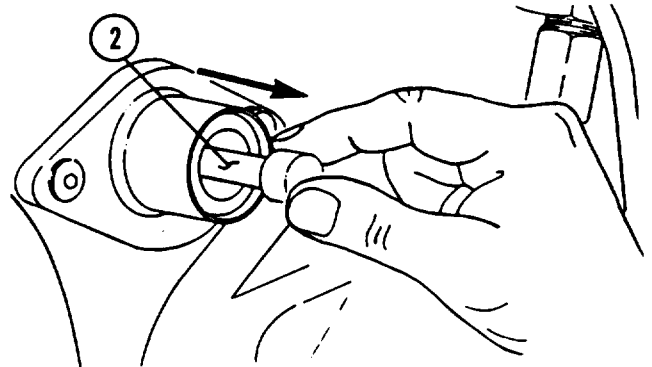
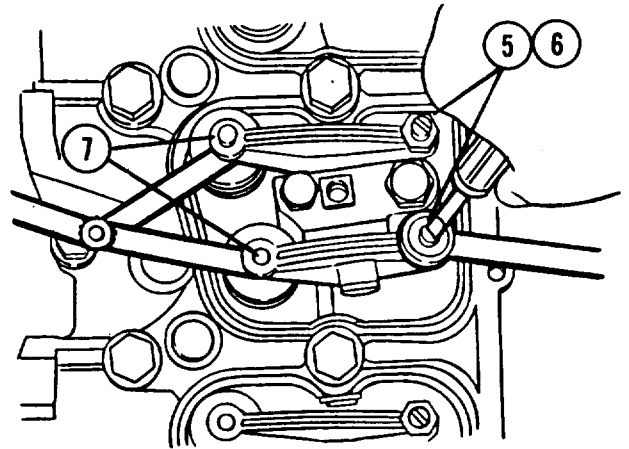
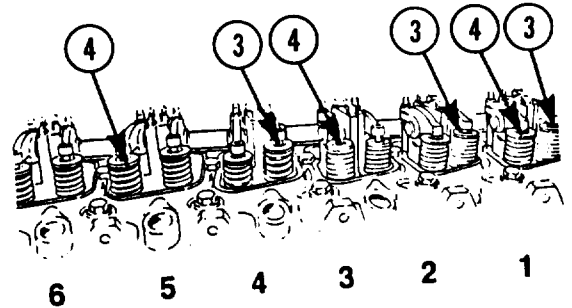
NOTE

Exhaust valve clearance - 0.020 in.
(0.508 mm).

NOTE

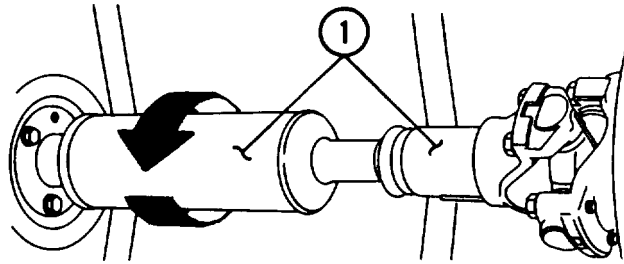
Clearance is correct when a slight pull is felt as feeler gauge is slipped between valve stem and rocker lever (7).

- a. Loosen adjustment locknut (5).
Adjust screw (6) as required until valve clearance is properly adjusted.
- b. Tighten adjustment locknut (5) to 216 in. lb. of torque. Then recheck valve clearance.
3. DISENGAGE ENGINE TIMING PIN (2).
4. PLACE MATCH MARKS (8) ON CRANKSHAFT PULLEY (9) AND TIMING GEAR COVER (10).
5. LOCATE TOP DEAD CENTER FOR NUMBER 6 CYLINDER.
 - a. Observe match marks (8) on crankshaft pulley (9) and timing gear cover (10).



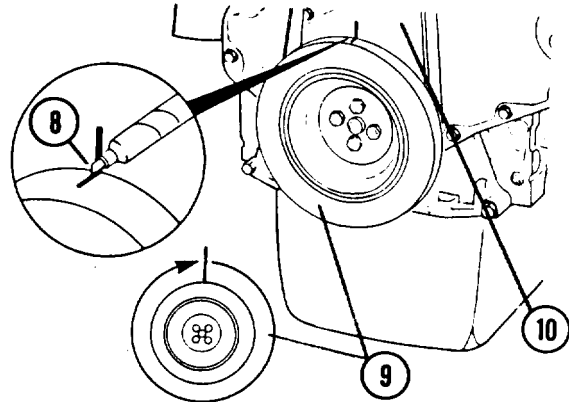
4-4. CYLINDER HEAD - ADJUST (Cont'd)

b. Have assistant rotate engine counterclockwise at universal joint of transmission input shaft (1) until crankshaft pulley (9) rotates 360°. Number 6 cylinder is now at top dead center.

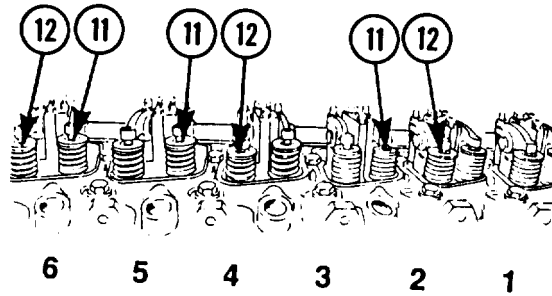


6. ADJUST CLEARANCES OF THREE INTAKE VALVES (11) AND THREE EXHAUST VALVES (12) BY FOLLOWING STEPS 2a - 2d.

7. INSTALL ROCKER LEVER COVERS, PAM. 4-5.



8. INSTALL TRANSMISSION COVER, PARA. 16-6.



4-5. ROCKER LEVER COVERS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive Maintenance, Common #2 Less Power

Materials/Parts

Gaskets (2)
O-Rings (5)

Equipment Condition

Vehicle parked on level ground.
Engine off and cool.

NOTE

The rocker lever covers are accessed through the left and right-hand engine access doors.

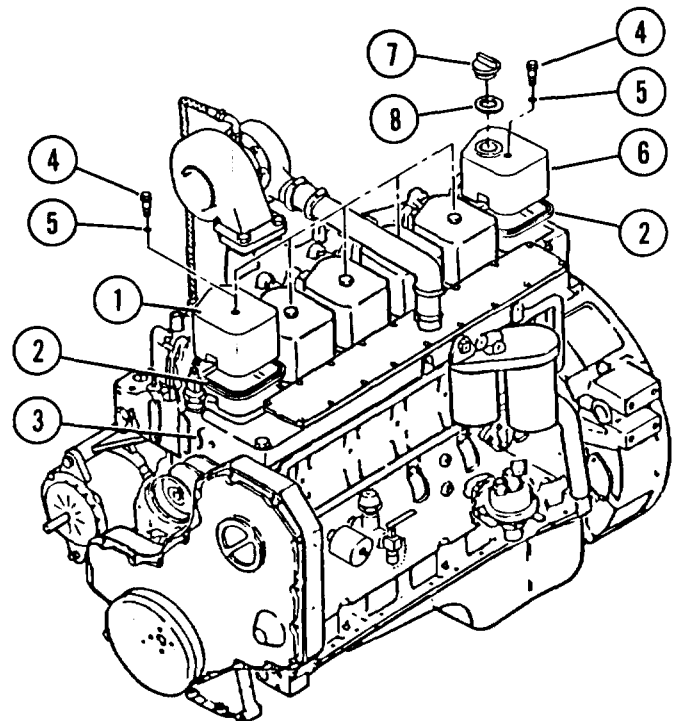
REMOVAL

1. REMOVE FIVE COVERS (1) AND GASKETS (2) FROM ENGINE (3).
 - a. Remove five capscrews (4) and five O-rings (5) holding five covers (1). Discard O-rings (5).
 - b. Remove five covers (1) and five gaskets (2). Discard gaskets (2).
2. REMOVE COVER (6) AND GASKET(2) FROM ENGINE (3).

NOTE

Cover (6) is located furthest away from the fan side of the engine.

- a. Remove capscrew (4) and O-ring (5) holding cover (6).
- b. Remove cover (6) and gasket (2) from engine (3). Discard gasket (2).



4-5. ROCKER LEVER COVERS - REPLACE (Cont'd)

3. IF NECESSARY, REMOVE CAP (7) AND SEAL (8) FROM COVER (6).

INSTALLATION

1. IF REMOVED, INSTALL SEAL (8) AND CAP (7) TO COVER (6).

NOTE

Cover (6) is located furthest away from the fan side of the engine.

2. INSTALL COVER (6) AND NEW GASKET (2) TO ENGINE (3).

- a. Place new gasket (2) and cover (6) on engine (3).
- b. Secure cover (6) with new O-ring (5) and capscrew (4). Torque capscrew (4) to 216 in. lb. of torque.

3. INSTALL FIVE COVERS (1) AND FIVE NEW GASKETS (2) TO ENGINE (3).

- a. Place five new gaskets (2) and covers (1) on engine (3).
- b. Secure covers (1) with five new O-rings (5) and capscrews (4). Torque capscrews (4) to 216 in. lb. of torque.

4-6. ENGINE OIL LEVEL GAGE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Loctite 277 (App. C, Item 41)

Equipment Condition

Vehicle parked on level ground.
Engine off and cool.
Engine oil drained, para. 4-3.

NOTE

The engine oil level gage (dipstick and dipstick tube) is accessed through the right-hand engine access door.

REMOVAL

1. REMOVE DIPSTICK (1) FROM DIPSTICK TUBE (2).
2. PULL AND REMOVE DIPSTICK TUBE (2) FROM ENGINE (3).

NOTE

If dipstick tube (2) cannot be removed using this procedure, oil pan must be removed and dipstick tube (2) must be pressed out of engine block. Notify Direct Support Maintenance.

INSTALLATION

1. APPLY LOCTITE 277 TO MOUNTING SURFACE OF DIPSTICK TUBE (2).
2. INSTALL DIPSTICK TUBE (2) IN ENGINE (3) .
3. INSERT DIPSTICK (1) IN DIPSTICK TUBE (2) .

4-7. ENGINE OIL FILLER NECK - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

O-Ring (4)

Equipment Condition

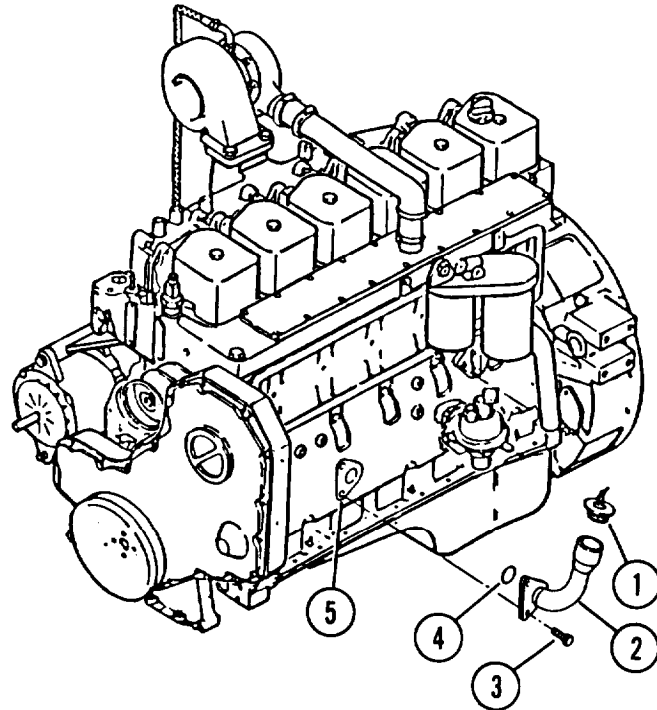
Vehicle parked on level ground.
 Engine oil drained, para. 4-3.
 Engine cool and off.

NOTE

The engine oil filler neck is accessed through the right-hand engine access door.

REMOVAL

1. REMOVE CAP (1) FROM OIL FILLER NECK (2).
- 20 SUPPORT OIL FILLER NECK (2) AND REMOVE TWO CAPSCREWS (3).
3. REMOVE OIL FILLER NECK (2) AND O-RING (4) FROM ENGINE (5). DISCARD O-RING (4).



INSTALLATION

1. ALIGN AND SUPPORT NEW O-RING (4) AND OIL FILLER NECK (2) ON ENGINE-(5).
2. SECURE OIL FILLER NECK (2) WITH TWO CAPSCREWS (3). TIGHTEN CAPSCREWS (3) TO 32 lb. ft.
3. INSTALL CAP (1) ON OIL FILLER NECK (2).
4. FILL ENGINE WITH OIL, PARA. 4-3.

4-8. ENGINE OIL SAMPLING VALVE - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Loctite 59241 (App. C, Item 42).

Equipment Condition

Engine off and cool.

The engine oil sampling valve is accessed through the right-hand engine access door.

REMOVAL

UNSCREW AND REMOVE SAMPLING VALVE (1)
FROM FITTING (2).

INSTALLATION

1. APPLY LOCTITE 59241 TO VALVE
THREADS (a).
2. SCREW SAMPLING VALVE (1) INTO
FITTING. MAKE SURE THE DRAIN END (b)
OF VALVE (1) IS FACING DOWN .

4-9. EXHAUST MANIFOLD - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Gaskets (4)

Equipment Condition

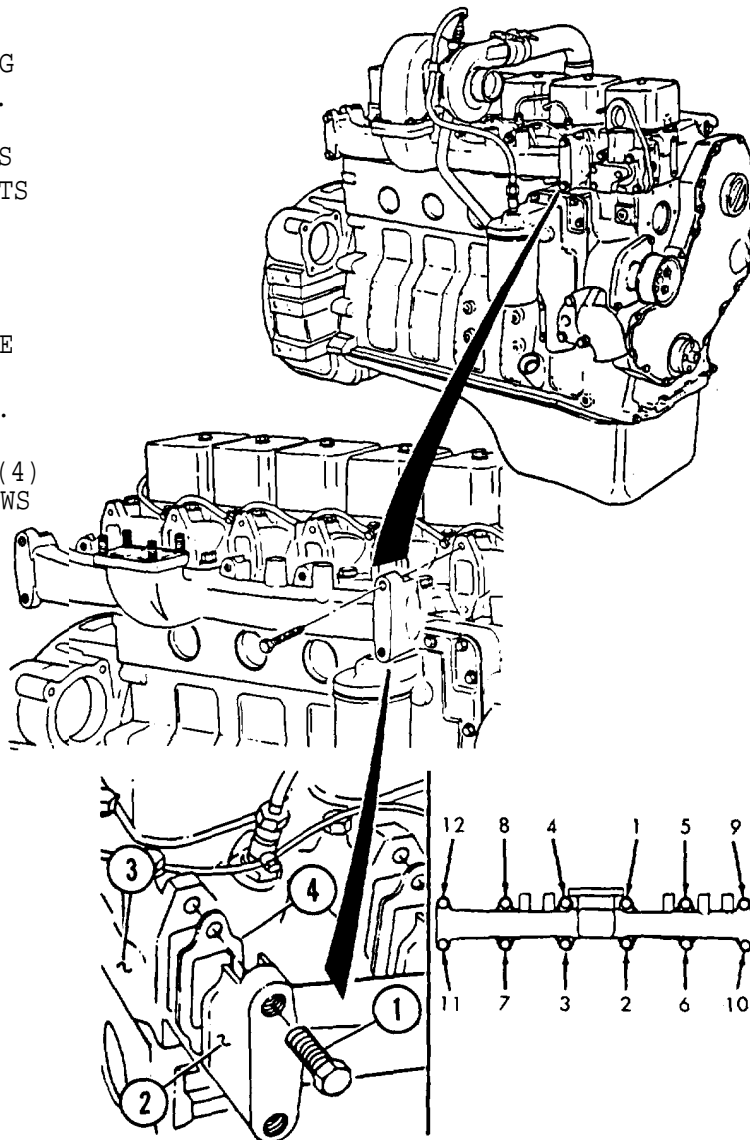
Turbocharger assembly removed,
para. 5-7.

REMOVAL

1. REMOVE TWELVE CAPSCREWS (1) HOLDING EXHAUST MANIFOLD (2) TO ENGINE (3).
2. REMOVE MANIFOLD (2) AND SIX GASKETS (4) FROM ENGINE (3). DISCARD GASKETS (4).

INSTALLATION

1. CLEAN THE GASKET SURFACES ON ENGINE (3). POSITION MANIFOLD (2) AND SIX GASKETS (4) IN PLACE ON ENGINE (3).
2. USE CAPSCREWS (1) TO HOLD GASKETS (4) IN POSITION. TORQUE TWELVE CAPSCREWS (1) IN ORDER SHOWN TO 32 FT. LBS. EACH .
3. INSTALL TURBOCHARGER ASSEMBLY AND NEW GASKET, PARA. 5-7.



4-10. INTAKE MANIFOLD COVER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Gasket (4)
 Loctite #59241 (APP. C, Item 42)

Equipment Condition

High pressure fuel lines removed,
 para. 5-12.
 Ether start hose disconnected,
 para. 5-17.
 Air crossover elbow removed,
 para. 5-8.

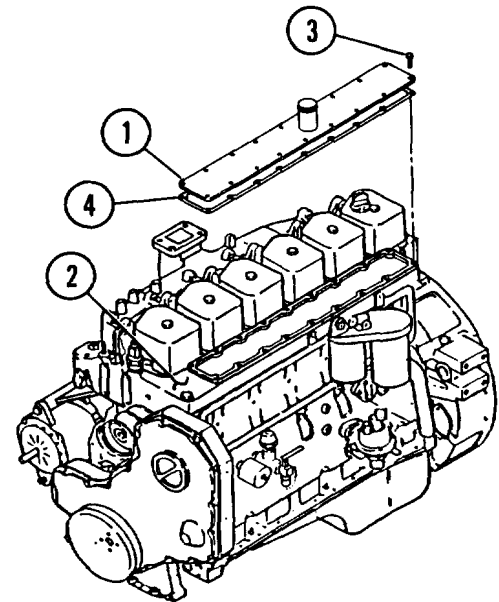
REMOVAL

1. REMOVE INTAKE MANIFOLD COVER (1) FROM ENGINE (2).
 - a. Remove fourteen capscrews (3) holding manifold cover (1) to engine (2).

NOTE

Two of the fourteen capscrews (3) may be removed with the fuel injection lines.

- b. Remove manifold cover (1) and gasket (4). Discard gasket (4).



INSTALLATION

1. CLEAN GASKET SEALING SURFACE ON ENGINE (2).
2. POSITION NEW GASKET (4) ON ENGINE (2).
3. POSITION INTAKE MANIFOLD COVER (1) ON ENGINE (2).
4. INSTALL TWELVE CAPSCREWS (3) AND TIGHTEN TO 216 IN. LB. OF TORQUE.
5. INSTALL AIR CROSSOVER ELBOW, PAR. 5-8.
6. CONNECT ETHER START HOSE, PARA. 5-17.
7. INSTALL HIGH PRESSURE FUEL LINES, PARA. 5-12.

CAUTION

Some of the capscrew holes are drilled through and must be sealed. APPLY Loctite 59241 to the capscrews (3).

CHAPTER 5

FUEL SYSTEM MAINTENANCE

5-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the engine fuel system. To find a specific maintenance procedure, see the maintenance task summary below.

5-2. FUEL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
5-3	Fuel Shut-off Solenoid - Test	5-2
5-4	Fuel Transfer Pump - Replace/Test	5-4
5-5	Air Cleaner Assembly - Replace/Repair	5-7
5-6	Air Cleaner Intake Cap - Replace	5-14
5-7	Turbocharger Assembly - Replace	5-15
5-8	Turbocharger Air Lines - Replace	5-16
5-9	Turbocharger Oil lines - Replace	5-20
5-10	Fuel/Hydraulic Tank - Service	5-22
5-11	Fuel Strainer Assembly - Service/Replace	5-24
5-12	High Pressure Fuel Lines - Replace	5-25
5-13	Fuel Drain Lines and Manifold - Replace	5-28
5-14	Fuel Supply Lines - Replace	5-30
5-15	Water Separator - Replace	5-33
5-16	Fuel Filter Head - Service/Replace	5-35
5-17	Ether Start Hose and Atomizer - Replace	5-38
5-18	Ether Start Cartridge - Replace	5-40
5-19	Ether Start Thermostat - Replace	5-41
5-20	Ether Start Cartridge Mounting Bracket - Replace	5-43
5-21	Accelerator Cable - Replace/Adjust	5-44
5-22	Accelerator Pedal Assembly - Replace/Repair	5-48

5-3. FUEL SHUT-OFF SOLENOID - TEST

This task covers:
Electrical testing of shut-off solenoid

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Test Equipment

Ammeter

Ohmmeter

Personnel Required

Two Personnel

Equipment Condition

Vehicle parked on level ground.

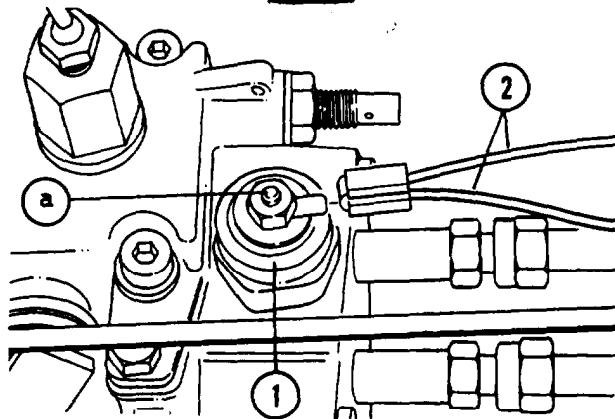
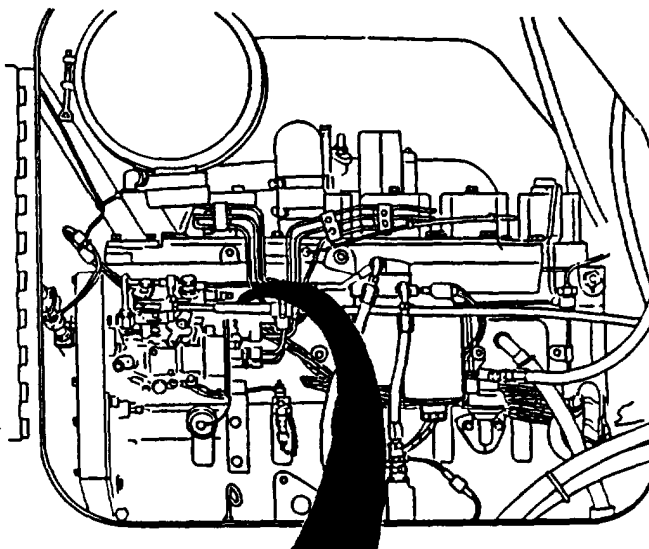
Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.

ELECTRICAL TESTING OF FUEL SHUT-OFF SOLENOID

NOTE

The fuel shut-off solenoid is located on the fuel injection pump and reached through the right-hand engine access door.

Do not attempt to remove fuel shut-off solenoid. If replacement is required, refer to direct support maintenance.



5-3. FUEL SHUT-OFF SOLENOID - TEST (Cont'd)

NOTE

Be sure starter switch is in OFF position during step 1.

1. TEST RESISTANCE OF FUEL SHUT-OFF SOLENOID (1).

NOTE

Electrical leads (2) are connected together with a jumper strap. Do not remove jumper strap when disconnecting electrical leads (2) for this test.

- a. Disconnect female spade connectors of two electrical leads R and 07 (2) from male spade connector of solenoid (1).
- b. Place one probe of ohmmeter at terminal (a) of solenoid (1). Place other probe of ohmmeter at engine ground.

NOTE

Ohmmeter should read 29.5 ohms +/- 2.5 ohms during test in step 1b. If ohms reading is not within acceptable limits, solenoid (1) requires replacement. Notify direct support maintenance.

- c. Connect female spade connectors of two electrical leads R and 07 (2) to male spade connector of solenoid (1).

NOTE

Be sure auxiliary fuel shut-off switch is in the ON position during step 2.

2. TEST CURRENT DRAW OF FUEL SHUT-OFF SOLENOID (1).

- a. Position clamps of ammeter around electrical leads (2)
- b. Have an assistant turn the starter switch to the ON position without starting the engine.

NOTE

Ammeter should read approximately one ampere when starter switch is turned to the ON position. If reading is not correct, solenoid (1) requires replacement. Notify direct support maintenance.

5-4. FUEL TRANSFER PUMP - REPLACE/TEST

This task covers:

- a. Removal
- b. Installation
- c. Testing of pump pressure and flow

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Test Equipment

Simplified Test Equipment for
Internal Combustion Engines
(STE/ICE)

Equipment Condition

Vehicle parked on level ground.
Engine OFF and cool.

Materials/Parts

Container, 5 Gal.
Gasket (6)

Reference

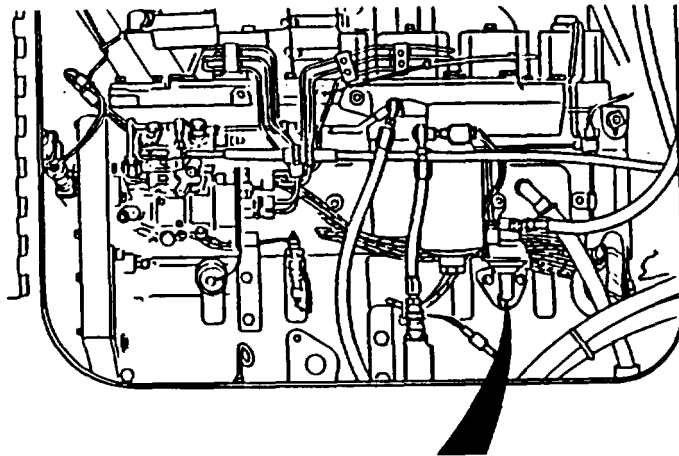
TM10-3930-660-10

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.

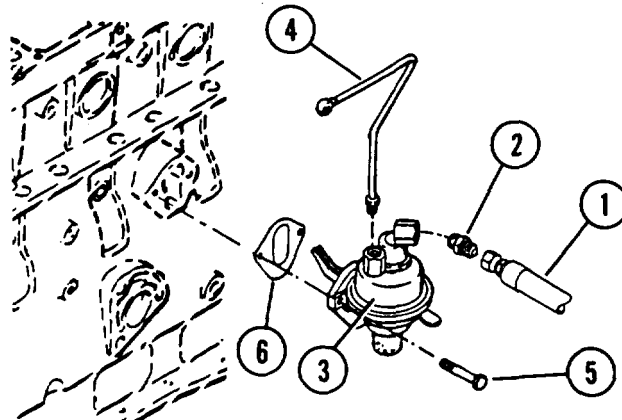
NOTE

The fuel transfer pump is reached through the right-hand engine access door.



REMOVAL

1. REMOVE FUEL HOSE (1) FROM FITTING (2) AT TRANSFER PUMP (3).
2. DISCONNECT FUEL LINE (4) FROM TRANSFER PUMP (3).
3. REMOVE TWO SCREWS (5) AND TRANSFER PUMP (3) FROM ENGINE.
4. REMOVE GASKET (6) FROM ENGINE AND DISCARD .

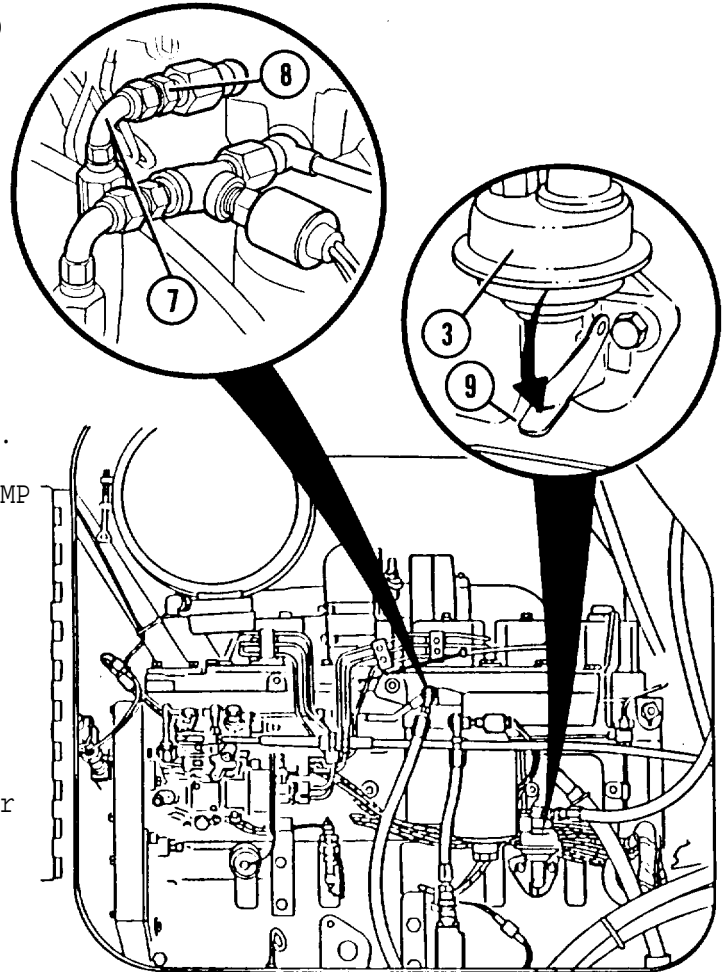


5-4. FUEL TRANSFER PUMP - REPLACE/TEST (Cont'd)

5. IF NECESSARY, REMOVE FITTING (2) FROM TRANSFER PUMP (3).

INSTALLATION

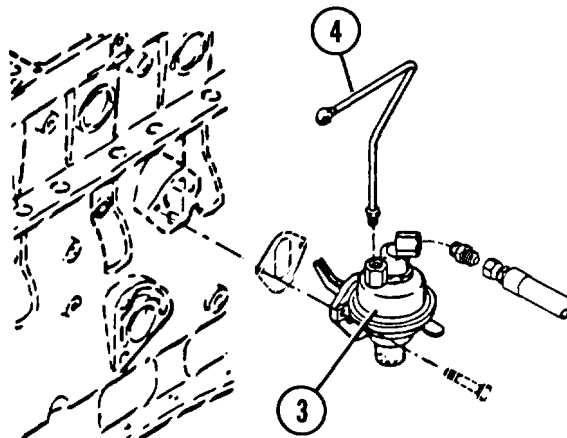
1. IF REMOVED, INSTALL FITTING (2) TO TRANSFER PUMP (3).
2. CLEAN MOUNTING SURFACE OF ENGINE.
3. POSITION NEW GASKET (6) ON ENGINE.
4. POSITION TRANSFER PUMP (3) ON ENGINE AND TORQUE SCREWS (5) TO 216 IN. LBS.
5. CONNECT FUEL LINE (4) TO TRANSFER PUMP (3).
6. INSTALL FUEL HOSE (1) TO FITTING (2) AT TRANSFER PUMP (3).
7. BLEED FUEL LINE (4).
 - a. Loosen hose (7) at fitting (8).
 - b. Operate hand lever (9) on transfer pump (3) until fuel flowing from fitting (8) is free of air.
 - c. Tighten hose (7) at fitting (8).



5-4. FUEL TRANSFER PUMP- REPLACE/TEST (Cont'd)

TESTING OF TRANSFER PUMP PRESSURE AND FLOW

1. PLACE AUXILIARY FUEL SHUT-OFF SWITCH IN "OFF" POSITION, TM10-3930-660-10.
2. REMOVE FUEL LINE (4) FROM TRANSFER PUMP (3).
3. TEST TRANSFER PUMP (3) FOR ADEQUATE VOLUME .
 - a. Connect test hose to pump (3) at port where fuel line (4) was removed.
 - b. Position end of test hose in suitable container.
 - c. Crank engine for thirty seconds.



NOTE

Transfer pump (3) should produce at least 0.7 U.S. quart of fuel in container during step 3c. If fuel volume is too low, pump (3) should be replaced. Refer to removal and installation sections of this paragraph.

- d. Remove test hose from transfer pump (3).
4. TEST TRANSFER PUMP (3) FOR ADEQUATE PRESSURE .
 - a. Connect pressure gauge to transfer pump (3) at port where fuel line (4) was removed.
 - b. Crank engine and observe reading on gauge.

NOTE

Transfer pump (3) should provide between 3 to 5 psi when engine is cranked. If fuel pressure is too low, transfer pump (3) should be replaced. Refer to removal and installation sections of this paragraph.

- c. Remove pressure gauge from transfer pump (3).
5. INSTALL FUEL LINE (4) TO TRANSFER PUMP (3).
6. BLEED FUEL LINE (4). REFER TO STEP 7 OF "INSTALLATION" SECTION IN THIS PARAGRAPH .
7. PLACE AUXILIARY FUEL SHUT-OFF SWITCH IN "ON" POSITION, TM10-3930-660-10.

5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Cleaning and Inspection
- d. Assembly
- e. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Equipment Condition

Vehicle parked on level ground.
Engine OFF and cool.

Materials/Parts

Lockwashers (15, 21, 27, 30)
Loctite 242 (App. C, Item 39)

Personnel Required

Two

Reference

TM10-3930-660-10

WARNING

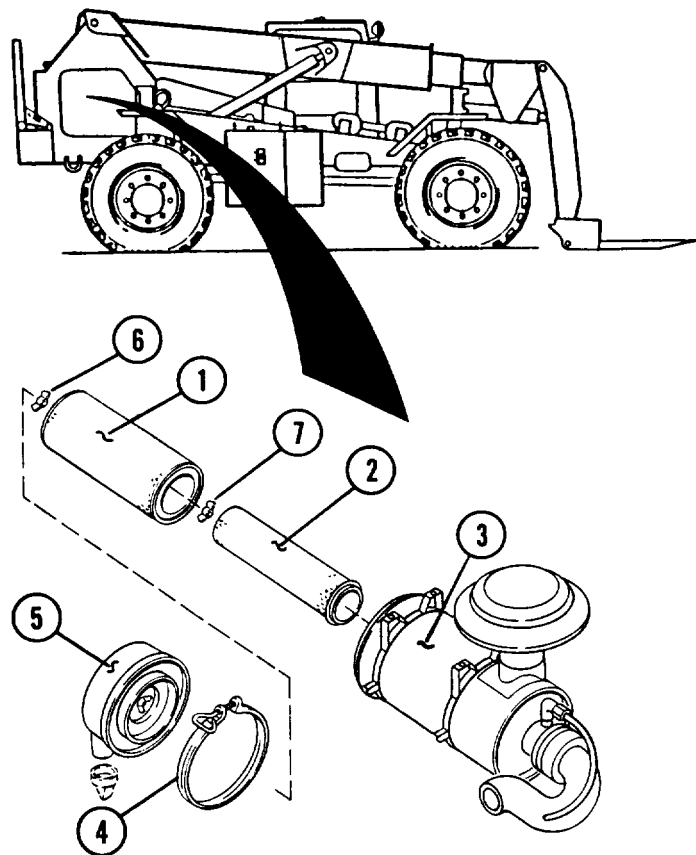
If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC Officer or NBC NCO for appropriate handling or disposal instructions.

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.

NOTE

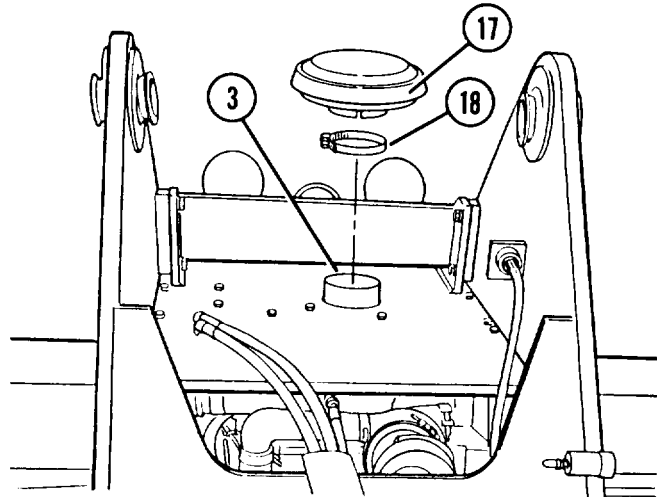
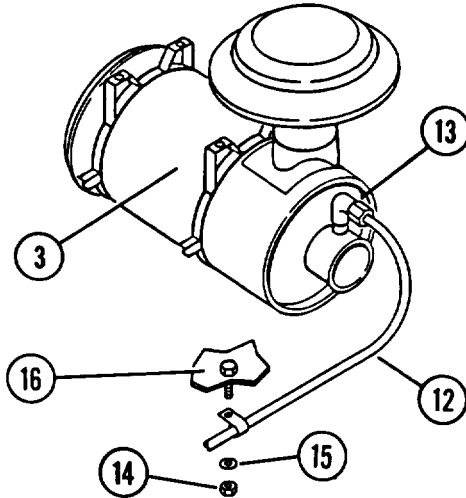
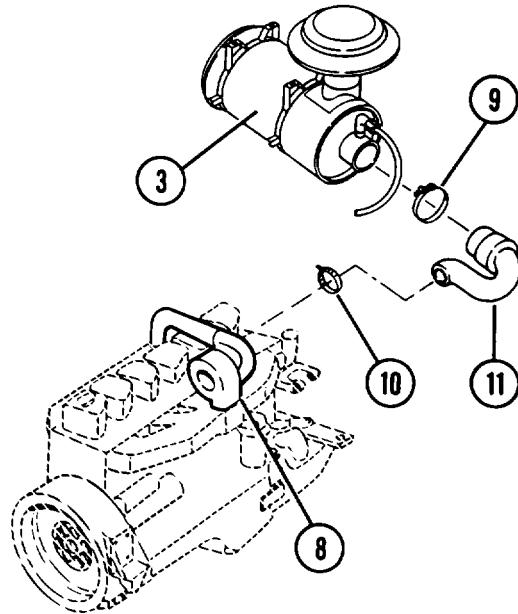
The air cleaner assembly is reached through the left and right-hand engine access doors.



5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR (Cont'd)

REMOVAL

1. REMOVE ELEMENTS (1) AND (2) FROM HOUSING (3).
 - a. Loosen clamp (4) securing access cover (5) to housing (3).
 - b. Remove wing nut (6), and primary filter element (1) from housing (3).
 - c. Remove wing nut (7) and secondary filter element (2) from housing (3).
2. REMOVE HOSE (11) FROM HOUSING (3) AND TURBOCHARGER (8).
 - a. Loosen clamps (9) and (10) securing hose (11), to turbocharger (8) and housing (3).
 - b. Remove hose (11) from turbocharger (8) and housing (3).
3. REMOVE AIR RESTRICTION INDICATOR TUBE (12) AT HOUSING (3)
 - a. Unscrew tube (12) from elbow assembly (13) at housing (3).
 - b. Remove two nuts (14) and two lockwashers (15) securing tube (12) to underside of front engine cover (16). Discard lockwashers (15).
4. REMOVE AIR CLEANER INTAKE CAP (17) FROM HOUSING (3).
 - a. Loosen clamp (18) securing cap (17) to housing (3).
 - b. Remove cap (17) and clamp (18) from housing (3).



5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR (Cont' d)

5. USING AN ASSISTANT REMOVE FOUR CAPSCREWS (19) , FOUR FLATWASHERS (20) , FOUR LOCKWASHERS (21) , AND FOUR NUTS (22) SECURING TWO CLAMPS (23) AND HOUSING (3) TO REAR ENGINE COVER (24) . DISCARD LOCKWASHERS (21) .

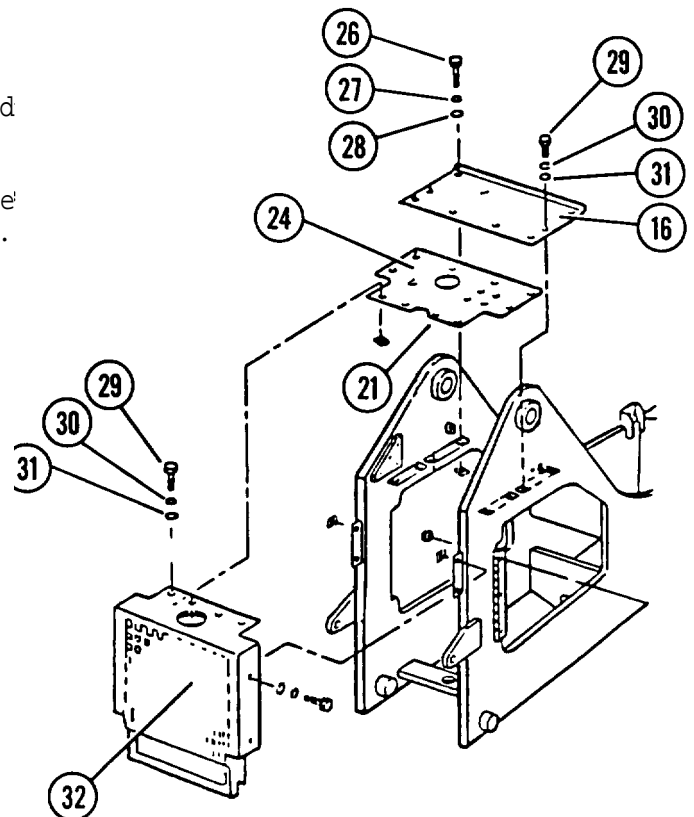
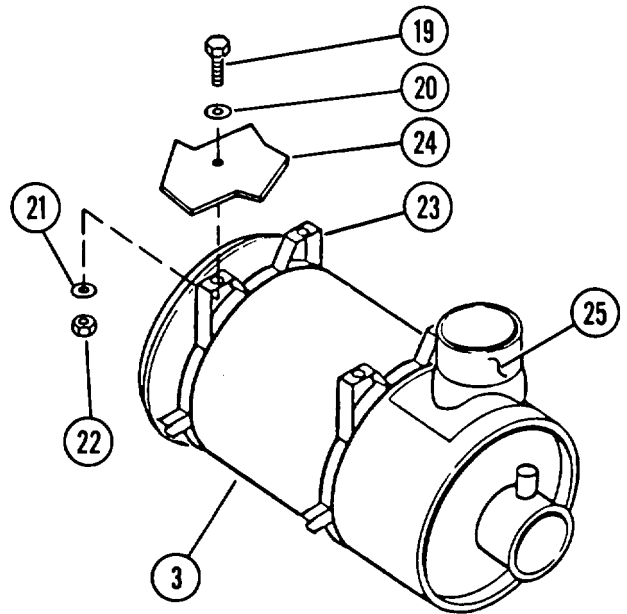
6. REMOVE MOUNTING HARDWARE (PARTS 26-31) SECURING ENGINE COVERS (16) AND (24) TO ALLOW FOR REMOVAL OF HOUSING (3) AND AIR INLET TUBE (25) .

NOTE

Bolts (26) are longer than other bolts used to secure engine covers (16) and (24) . Note location of bolts (26) for use during installation.

a. Remove two bolts (26), two lockwashers (27) and two flatwashers (28) securing left-hand side of front engine cover (16) . Discard lockwashers (27).

b. Remove remaining twelve bolts (29), twelve lockwashers (30), and twelve flatwashers (31), securing front and rear engine covers (16) and (24) to each other, to vehicle frame, and to radiator cover (32). Discard lockwashers (30).



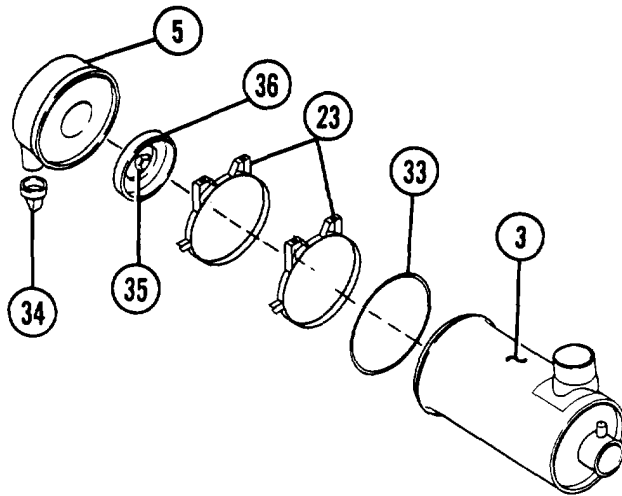
5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR (Cont'd)

7. REMOVE HOUSING (3) FROM VEHICLE.

- a. Lift front and rear engine covers (16) and (24), as required, to clear air inlet tube (25) welded to housing (3).
- b. Rotate housing (3), as required, and remove housing (3) through right-hand engine access door.

DISASSEMBLY

1. REMOVE O-RING (33) FROM HOUSING (3).
2. LOOSEN AND REMOVE TWO CLAMPS (23) FROM HOUSING (3).
3. REMOVE VACUUM DIAPHRAGM (34) FROM ACCESS COVER (5).
4. LOOSEN CAPTIVE WING NUT (35) AND REMOVE BAFFLE (36) FROM ACCESS COVER (5).



CLEANING AND INSPECTION

Refer to Para. 3-4 for cleaning instructions and Para. 3-6 for inspection instructions.

ASSEMBLY

1. INSTALL BAFFLE (36) TO ACCESS COVER (5) AND TIGHTEN CAPTIVE WING NUT (35).
2. INSTALL VACUUM DIAPHRAGM (34) TO CUP ASSEMBLY (5),
3. INSTALL AND TIGHTEN TWO CLAMPS (23) TO HOUSING (3)
4. INSTALL O-RING (33) TO HOUSING (3).

INSTALLATION

NOTE

Apply Loctite 242 to all capscrews and bolts as they are installed.

1. INSTALL HOUSING (3) TO VEHICLE.

5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR (Cont'd)

- a. Carefully position housing (3) through right-hand engine access door.
- b. Lift front and rear engine covers (16) and (24) as required to clear air inlet tube (25) welded to housing (3).
- c. Rotate housing into position and align air inlet tube (25) through hole in rear engine cover (24). Lower front and rear engine covers (16) and (24).

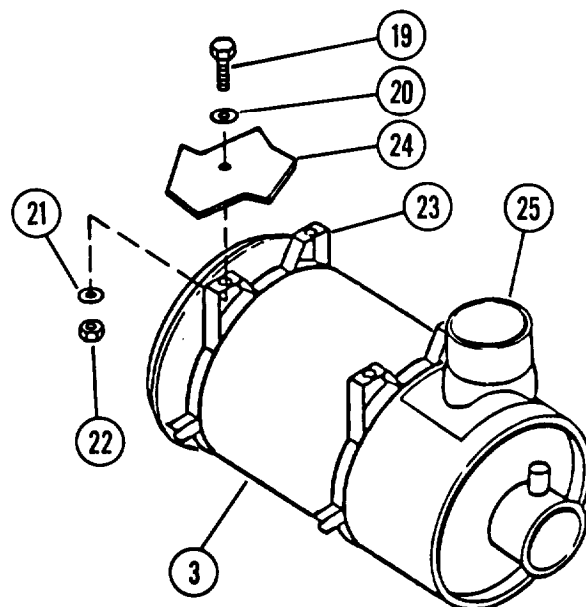
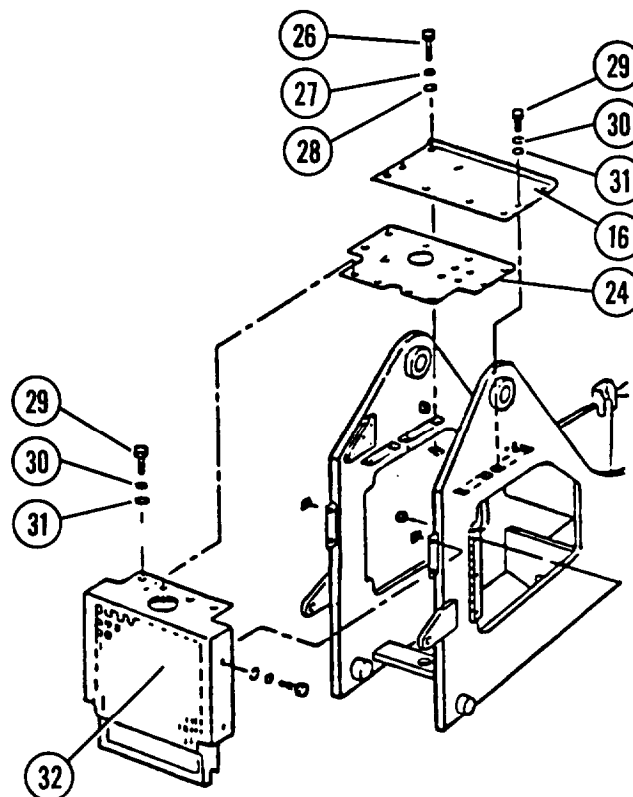
2. INSTALL MOUNTING HARDWARE (PARTS 26-31) SECURING ENGINE COVERS (16) AND (24) .

NOTE

Bolts (26) are longer than other bolts used to secure engine covers (16) and (24) . Install bolts (26) in location noted during removal.

- a. Install two bolts (26), two new lockwashers (27) and two flatwashers (28) to secure left-hand side of front engine cover (16) .
- b. Install remaining twelve bolts (29), twelve new-lockwashers (30), and twelve flatwashers (31) , to secure front and rear engine covers (16) and (24) to each other, to vehicle frame, and to radiator cover (32).

3. USING AN ASSISTANT, SECURE TWO CLAMPS (23) AND HOUSING (3) TO REAR ENGINE COVER (24) WITH FOUR CAPSCREWS (19), FOUR FLATWASHERS (20), FOUR NEW LOCKWASHERS (21) AND FOUR NUTS (22).



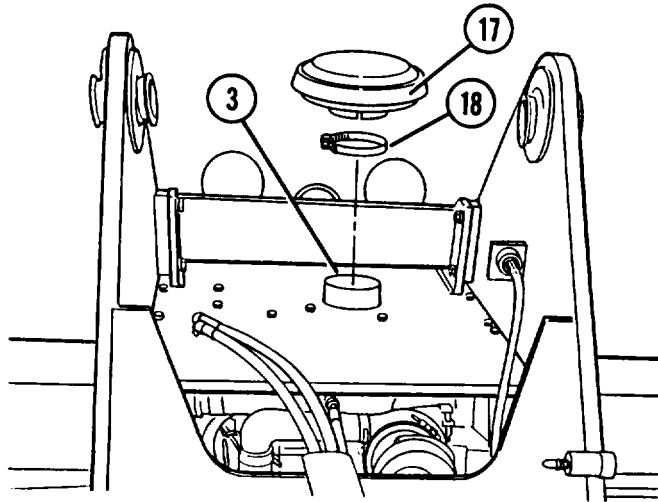
5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR (Cont'd)

4. INSTALL AIR CLEANER INTAKE CAP (17) TO HOUSING (3).

- a. Position clamp (18) and air inlet cap (17) on housing (3).
- b. Tighten clamp (18) to secure cap (17) to housing (3).

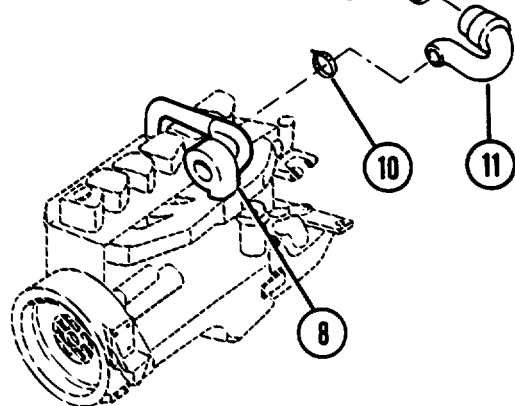
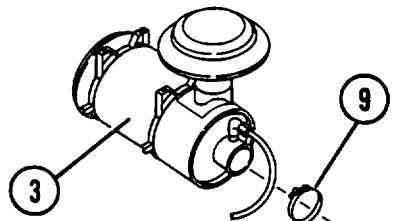
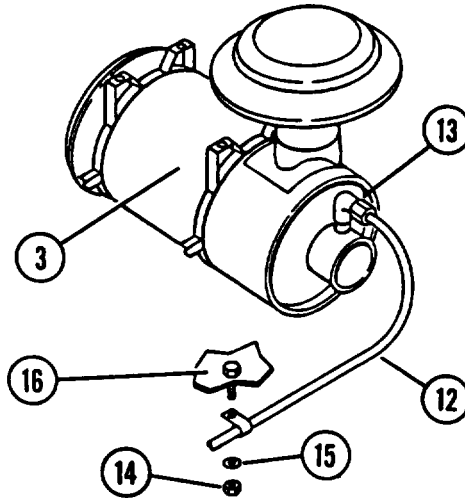
5. INSTALL AIR RESTRICTION INDICATOR TUBE (12) AT HOUSING (3).

- a. Position tube (12) on underside of front engine cover (16) and secure with two flatwashers (15) and two nuts (14).
- b. Screw tube (12) into elbow assembly (13) at housing (3).



6. INSTALL HOSE (11) TO HOUSING (3) AND TURBOCHARGER (8).

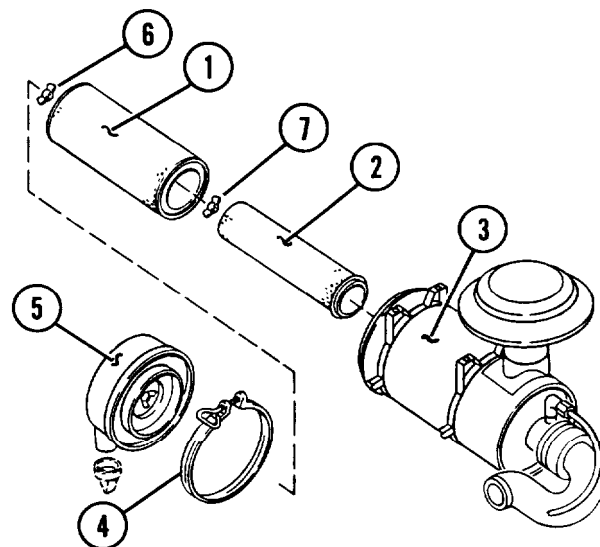
- a. Position hose (11) as on turbocharger (8) and housing (3).
- b. Tighten clamps (9) and (10) to 216 in. lbs.



5-5. AIR CLEANER ASSEMBLY - REPLACE/REPAIR (Cont' d)

7. INSTALL ELEMENTS (1) AND (2) TO HOUSING (3) .

- a. Position secondary filter element (2) in housing (3) and secure with wingnut (7) .
- b. Position primary filter element (1) in housing (3) and secure with wingnut (6) .
- c. Position access cover (5) on housing (3) and secure with clamp (4) .
- d. Reset air intake restriction indicator, TM10-3930-660-10.



5-6. AIR CLEANER INTAKE CAP - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

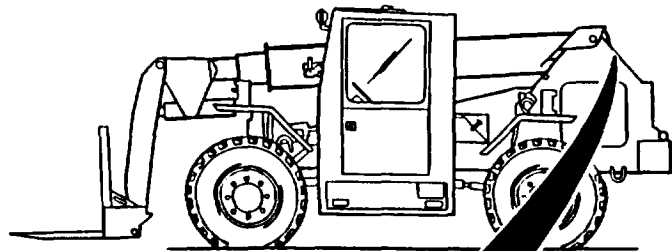
Tool Kit, Automotive Mechanics

Equipment Condition

Engine OFF and cool.
Vehicle parked on level ground.

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.

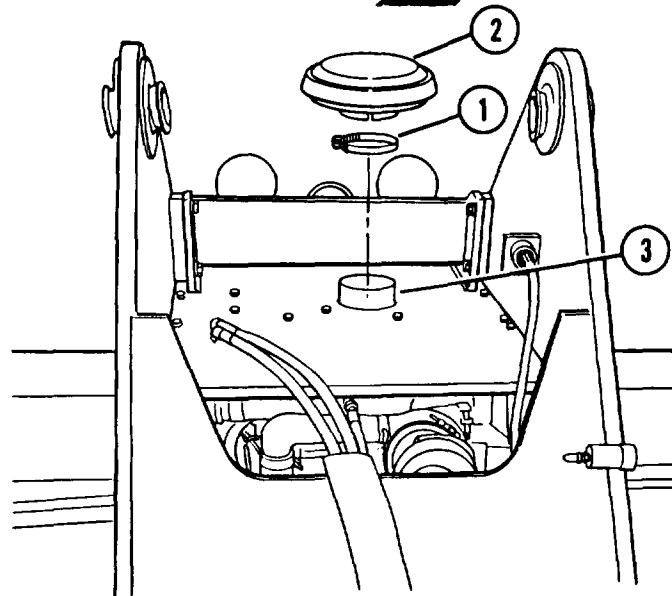


REMOVAL

1. LOOSEN CLAMP (1) SECURING AIR CLEANER INTAKE CAP (2).
2. LIFT AIR CLEANER INTAKE CAP (2) FROM AIR CLEANER ASSEMBLY (3).

INSTALLATION

1. POSITION AIR CLEANER INTAKE CAP (2) ON AIR CLEANER ASSEMBLY (3).
2. TIGHTEN CLAMP (1) TO SECURE AIR CLEANER INTAKE CAP (2).



5-7. TURBOCHARGER ASSMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials

Engine Oil, 3 oz. (App. C, Item 26)
Gasket (3)

Equipment Condition

Vehicle parked on level ground.
Engine cool.
Turbocharger air lines removed,
para. 5-8.
Turbocharger oil lines removed,
para. 5-9.

REMOVAL

1. REMOVE FOUR HEX NUTS (1).
2. REMOVE TURBOCHARGER (2).
3. REMOVE AND DISCARD TURBOCHARGER GASKET (3).

CAUTION

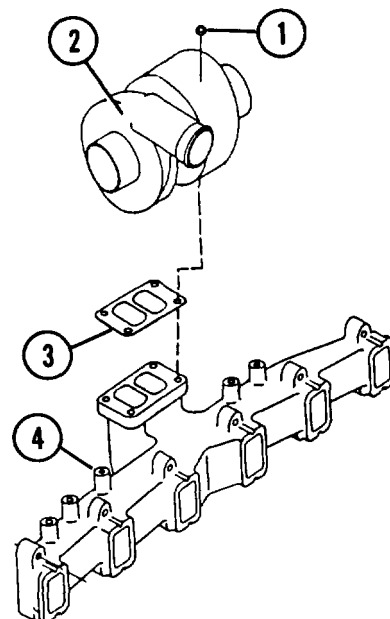
If the turbocharger (2) is not to be installed immediately, cover the opening in manifold (4). Failure to do so may cause engine damage.

INSTALLATION

1. INSTALL NEW TURBOCHARGER GASKET (3).
2. POSITION TURBOCHARGER (2) ON MANIFOLD (4) AND SECURE WITH FOUR HEX NUTS (1). TORQUE NUTS (1) TO 24 LB. FT.
3. INSTALL TURBOCHARGER OIL DRAIN LINE, PARA. 5-9.

CAUTION

A new turbocharger (2) must be prelubricated before being operated. Failure to do so may cause damage to the turbocharger (2).



4. POUR TWO TO THREE OUNCES OF ENGINE OIL INTO FEMALE FITTING LOCATED ON TOP OF TURBOCHARGER (2). ROTATE TURBOCHARGER (2) BY HAND TO ALLOW OIL TO ENTER TURBOCHARGER (2).
5. INSTALL TURBOCHARGER OIL SUPPLY LINE, PARA 5-9.
6. INSTALL TURBOCHARGER AIR LINES, PARA. 5-8.

5-8. TURBOCHARGER AIR LINES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

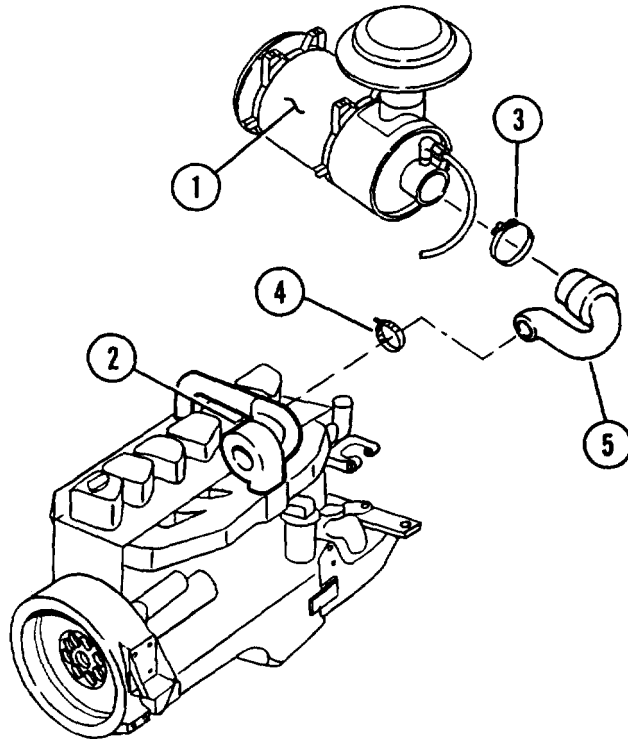
Vehicle parked on level ground.
Engine cool.

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.

REMOVAL

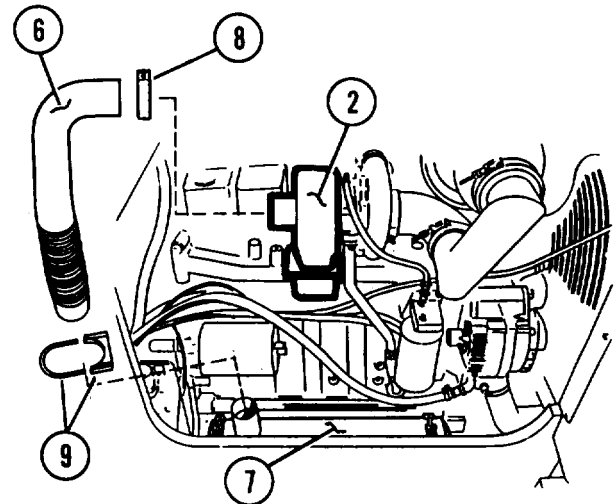
1. REMOVE AIR DUCTING ASSEMBLY FROM AIR CLEANER HOUSING (1) AND TURBOCHARGER (2).
 - a. Loosen clamps (3), and (4) securing hose (5) to air cleaner housing (1) and turbocharger (2).
 - b. Remove hose (5) from air cleaner housing (1) and turbocharger (2).



5-8. TURBOCHARGER AIR LINES - REPLACE (Cont'd)

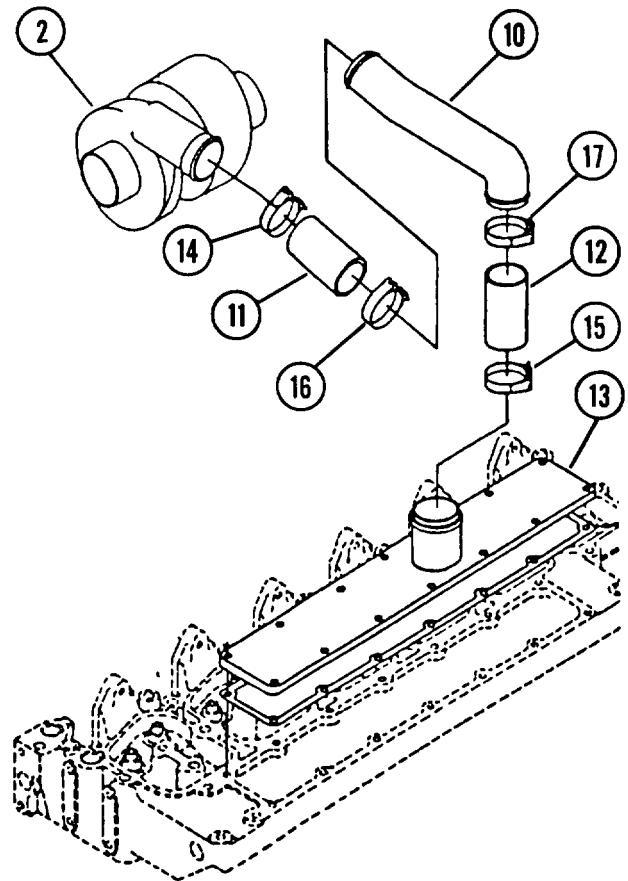
2. REMOVE EXHAUST PIPE (6) FROM TURBOCHARGER (2) AT MUFFLER (7).

- a. Loosen clamp (8) securing exhaust pipe (6) to turbocharger (2).
- b. Loosen clamp (9) securing exhaust pipe (6) to muffler (7).
- c. Remove exhaust pipe (6) from turbocharger (2) and muffler (7).



3. REMOVE AIR INLET PIPE (10) AND HOSES (11 AND 12) FROM TURBOCHARGER (2) AND INTAKE MANIFOLD COVER (13) AS AN ASSEMBLY .

- a. Remove clamp (14) at turbocharger (2).
- b. Remove clamp (15) at intake manifold cover (13).
- c. Remove air inlet pipe (10) and hoses (11 and 12).



4. IF NECESSARY, REMOVE HOSES (11) AND (12) FROM AIR INLET PIPE (10).

- a. Remove clamp (16) at air inlet pipe (10).
- b. Remove hose (11) from air inlet pipe (10).
- c. Remove clamp (17) at air inlet pipe (10).
- d. Remove hose (12) from air inlet pipe (10).

5-8. TURBOCHARGER AIR LINES - REPLACE (Cont'd)

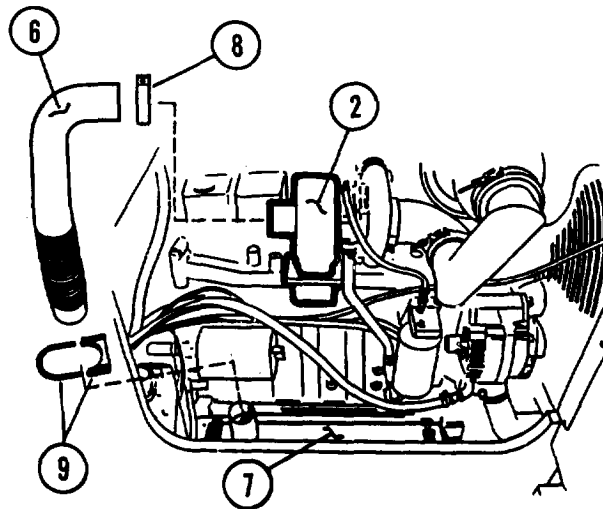
INSTALLATION

1. IF NECESSARY, INSTALL HOSES (11) AND (12) TO AIR INLET PIPE (14). "
 - a. Install hose (12) on air inlet pipe (10).
 - b. Secure hose (12) with clamp (17) . Torque clamp (17) to 6 lb. ft.
 - c. Install hose (11) on air inlet pipe (10).
 - d. Secure hose (10) with clamp (16) . Torque clamp (16) to 6 lb. ft.
2. INSTALL AIR INLET PIPE (10) AND HOSES (11) AND (12) TO TURBOCHARGER (2) AND INTAKE MANIFOLD COVER (13) AS AN ASSEMBLY .
 - a. Place air inlet pipe (10) in position.
 - b. Secure hose (12) at intake manifold cover (13) with clamp (15). Torque clamp (15) to 6 lb. ft.
 - c* Secure hose (11) at turbocharger (2) with clamp (14). Torque clamp (14) to 6 lb. ft.
3. INSTALL EXHAUST PIPE (6) TO TURBOCHARGER (2) AT MUFFLER (7).

NOTE

Match groove on pipe (6) with groove on turbocharger (2).

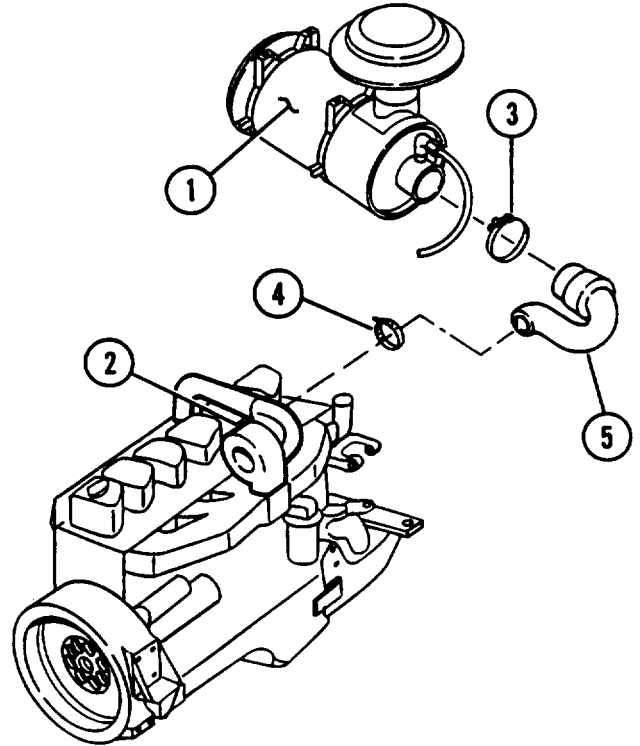
- a. Position exhaust pipe (6) on turbocharger (2) and muffler (7).
- b. Tighten clamp (9) securing exhaust pipe (6) to muffler (7).
- c. Tighten clamp (8) securing exhaust pipe (6) to turbocharger (2).



5-8. TURBOCHARGER AIR LINES - REPLACE (Cont'd)

4. INSTALL HOSE (5) TO AIR CLEANER HOUSING (1) AND TURBOCHARGER (2).

Position hose (5) on turbocharger (2) and air cleaner housing (1). Torque clamps (4) and (3) to 6 lb. ft. to secure.



5-9. TURBOCHARGER OIL LINES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

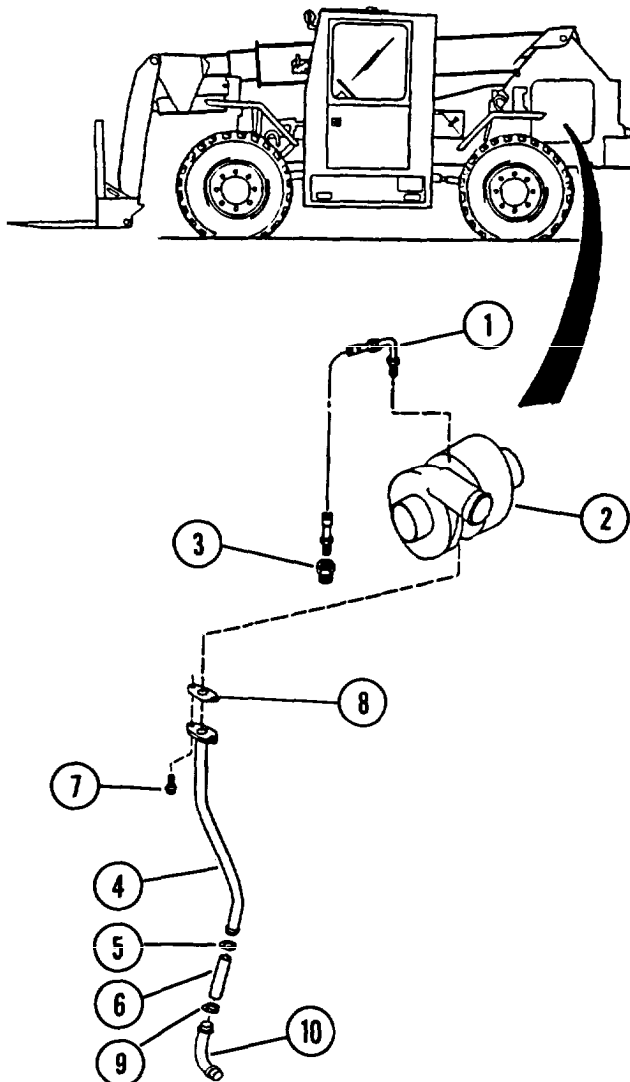
Clamp (9)
Clamp (5)
Loctite 271 (App. C, Item 40)
Oil drain gasket (8)

Equipment Condition

Vehicle parked on level ground.
Engine cool.

REMOVAL

1. REMOVE TURBOCHARGER OIL SUPPLY HOSE (1) .
 - a. Disconnect turbocharger oil supply hose (1) from turbocharger (2).
 - b. Disconnect turbocharger oil supply hose (1) from adapter (3).
 - c. Remove turbocharger oil supply hose (1).
2. REMOVE TURBOCHARGER OIL DRAIN TUBE ASSEMBLY (PARTS 4-6) .
 - a. Remove two capscrews (7).
 - b. Remove and discard oil drain gasket (8) .
 - c. Loosen clamp (9) and remove drain tube assembly (parts 4-6). Remove and discard clamp (9).
 - d. If necessary, loosen clamp (5) and separate tubes (4 and 6). Remove and discard clamp (5).



5-9. TURBOCHARGER OIL LINES - REPLACE (Cont'd)

3. IF NECESSARY, REMOVE ELBOW (10) FROM ENGINE BLOCK.

INSTALLATION

1. IF REMOVED, INSTALL ELBOW (10) TO ENGINE BLOCK.
 - a. Apply Loctite 271 to engine block end of elbow (10).
 - b. Drive elbow (10) into engine using a soft head hammer.
2. INSTALL TURBOCHARGER OIL DRAIN TUBE ASSEMBLY (PARTS 4-6).
 - a. If separated, secure tubes (4 and 6) with new clamp (5). Torque clamp (5) to 6 lb. ft.
 - b. Position drain tube assembly (parts 4-6) on elbow (10) and secure with clamp (9). Torque clamp (5) to 72 lb. in.
 - c. Install new oil drain gasket (8).
 - d. Secure turbocharger oil drain tube assembly (parts 4-6) with two capscrews (7). Torque capscrews (7) to 18 lb. ft.
3. INSTALL TURBOCHARGER OIL SUPPLY HOSE (1).
 - a. Connect turbocharger oil supply hose (1) to adapter (3).
 - b. Connect turbocharger oil supply hose (1) to turbocharger (2).

5-10. FUEL/HYDRAULIC TANK - SERVICE

This task covers:

- a. Service by draining and filling tank with fuel.
- b. Service by draining and filling tank with hydraulic oil.

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Diesel Fuel (App. C, Item 17)

Drain Pan

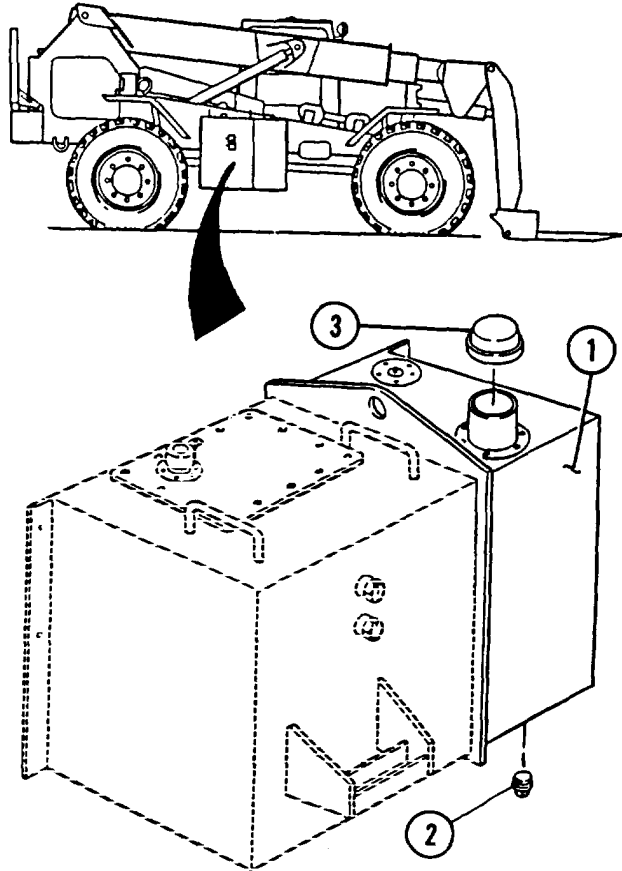
Hydraulic Oil (App. C, Item 35)

SERVICE BY DRAINING AND FILLING TANK WITH FUEL

NOTE

Fuel side of fuel/hydraulic tank (1) contains 44 gallons of fuel when full.

1. REMOVE DRAIN PLUG (2) FROM FUEL SIDE OF FUEL/HYDRAULIC OIL TANK (1) AND ALLOW FUEL TO DRAIN.
 - a. Open cap (3) at top of fuel/hydraulic tank (1).
 - b. Place suitable drain pan under fuel side of fuel/hydraulic tank.
 - c. Remove drain plug (2) from fuel side of fuel/hydraulic tank (1).
 - d. Allow fuel to drain completely.
2. INSTALL DRAIN PLUG (2) TO FUEL SIDE OF FUEL/HYDRAULIC TANK (1) AND FILL TANK (1) WITH FUEL.
 - a. Install drain plug (2) to fuel side of fuel/hydraulic tank (1).
 - b. Fill fuel side of fuel/hydraulic tank (1) with fuel.
 - c. Install cap (3) at top of fuel/hydraulic tank (1).



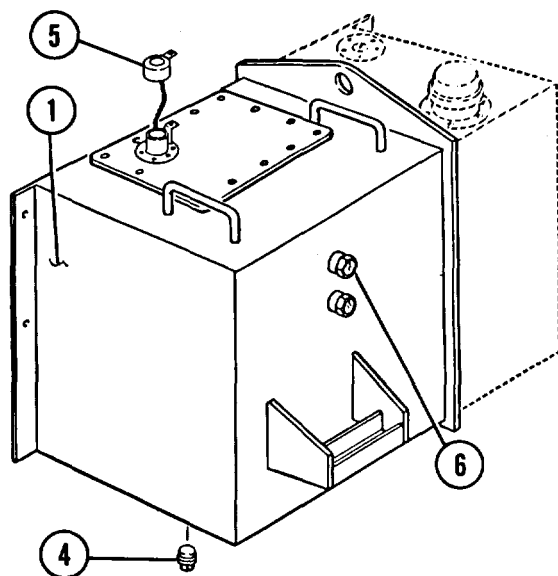
5-10. FUEL/HYDRAULIC TANK - SERVICE (Cont'd)

SERVICE BY DRAINING AND FILLING TANK
WITH HYDRAULIC OIL

NOTE

Hydraulic side of fuel/hydraulic tank (1) contains 55.6 gallons of hydraulic oil when full.

1. PLACE ALL HYDRAULIC CYLINDERS IN RETRACTED POSITION .
2. REMOVE DRAIN PLUG (4) FROM HYDRAULIC OIL SIDE OF FUEL/HYDRAULIC TANK (1) AND ALLOW HYDRAULIC OIL TO DRAIN.
 - a. Open cap (5) at top of fuel/hydraulic tank (1) .
 - b. Place suitable drain pan under hydraulic oil side of fuel/hydraulic tank (1).
 - c. Remove drain plug (4) from hydraulic side of fuel/hydraulic tank (1).
 - d. Allow hydraulic oil to drain completely.
3. INSTALL DRAIN PLUG (4) TO HYDRAULIC OIL SIDE OF FUEL/HYDRAULIC TANK (1) AND FILL TANK (1) WITH HYDRAULIC OIL.
 - a. Install drain plug (4) to hydraulic oil side of fuel/hydraulic tank (1).
 - b. Fill hydraulic oil side of fuel/hydraulic tank (1) with hydraulic oil until oil level is visible in the upper sight gauge (6).
 - c. Install cap (5) at top of fuel/hydraulic tank (1).



5-11. FUEL STRAINER ASSEMBLY - SERVICE/REPLACE

This task covers:

- a. Service
- b. Removal
- c. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Gasket (7)
Lockwashers (6)

Equipment Condition

Fuel drained from fuel/hydraulic tank, para. 5-10.

SERVICE

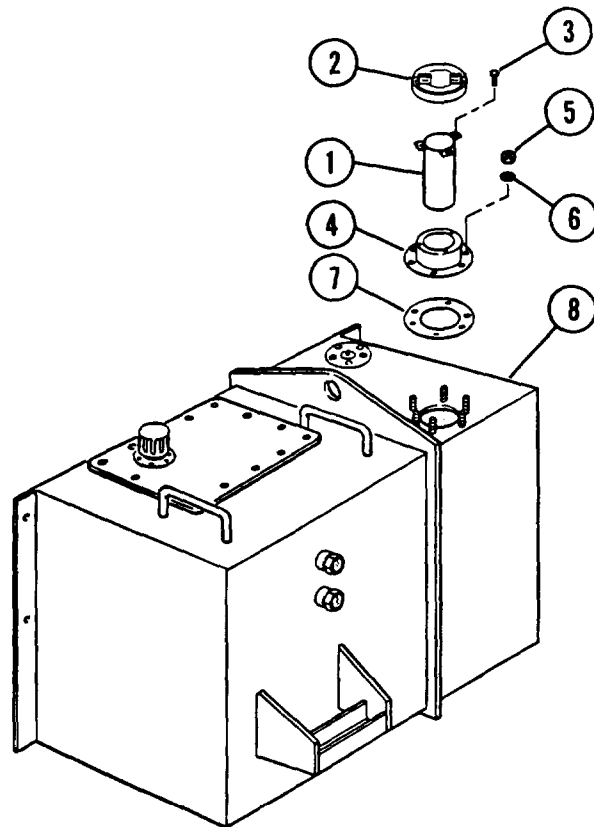
1. REMOVE FUEL STRAINER ASSEMBLY (1) AS DESCRIBED IN "REMOVAL", BELOW.
2. REMOVE FUEL SEDIMENT AND FOREIGN MATTER FROM FUEL STRAINER ASSEMBLY.
3. INSTALL FUEL STRAINER ASSEMBLY (1) AS DESCRIBED IN "INSTALLATION", BELOW.

REMOVAL

1. REMOVE FUEL CAP (2).
2. REMOVE THREE SCREWS (3) HOLDING STRAINER ASSEMBLY (1) IN NECK (4).
3. LIFT STRAINER ASSEMBLY (1) FROM NECK (4).
4. IF NECESSARY, REMOVE THREE NUTS (5), THREE LOCKWASHERS (6), NECK (4), AND GASKET (7). DISCARD LOCKWASHERS (6) AND GASKET (7).

INSTALLATION

1. IF NECESSARY, INSTALL NEW GASKET (7), NECK (4), THREE NEW LOCKWASHERS (6), AND THREE NUTS (5).
2. LOWER STRAINER ASSEMBLY (1) INTO TANK (8) THROUGH NECK (4).
3. SECURE STRAINER ASSEMBLY (1) WITH THREE SCREWS (3).
4. SCREW FUEL CAP (2) ONTO NECK (4).
5. FILL FUEL/HYDRAULIC TANK WITH FUEL, PARA. 5-10.



5-12. HIGH PRESSURE FUEL LINES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive Maintenance, Common #2 Less Power

Equipment Condition

Vehicle parked on level ground.
Engine cool.

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited. To prevent fire, remove fuel lines only when engine is cool.

REMOVAL

NOTE

Inspect fuel lines for cracks and other signs of deterioration as they are removed. Replace if necessary.

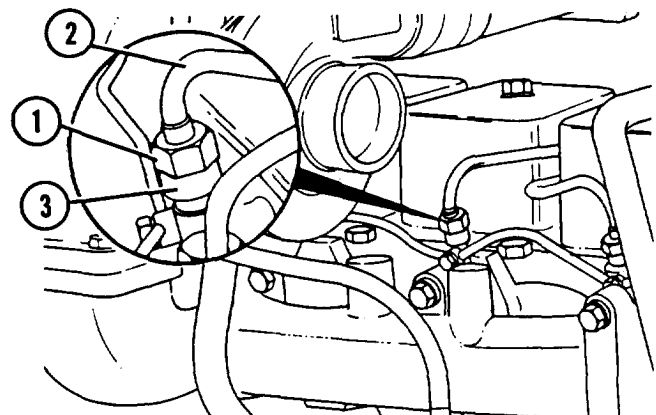
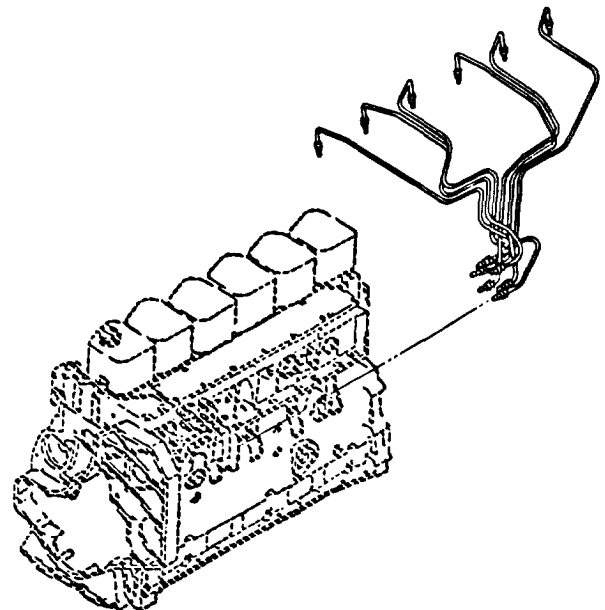
NOTE

Fuel lines are not interchangeable. Identify and tag lines prior to removal from fuel injectors and fuel injection pump.

1. LOOSEN NUTS (1) ON FUEL LINES (2) AND REMOVE LINES (2) FROM FUEL INJECTORS (3).

NOTE

Inspect seats of fuel lines for nicks, gouges, or burrs. Replace if necessary.

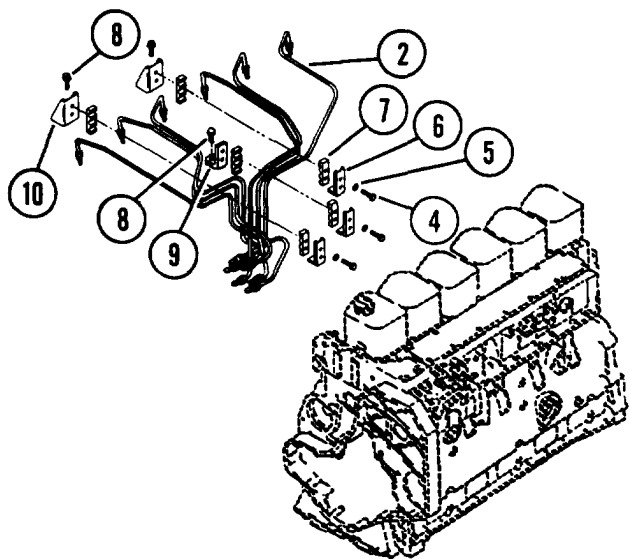


5-12. HIGH PRESSURE FUEL LINES - REPLACE (Cont'd)

NOTE

If removal of lines (2) as a unit is desired, skip step 2 and go on to step 3.

2. REMOVE SIX CAPSCREWS (4), SIX FLATWASHERS (5), THREE BRACKETS (6), AND SIX MOUNTS (7) SECURING FUEL LINES (2).
3. REMOVE THREE CAPSCREWS (8) SECURING BRACKET (9) AND TWO BRACKETS (10) TO ENGINE .



NOTE

Hold delivery valve (11) stationary when loosening nuts (12) on fuel lines (2) at injection pump (13).

4. LOOSEN NUTS (12) ON FUEL LINES (2) AND REMOVE FUEL LINES (2) FROM INJECTION PUMP (13).

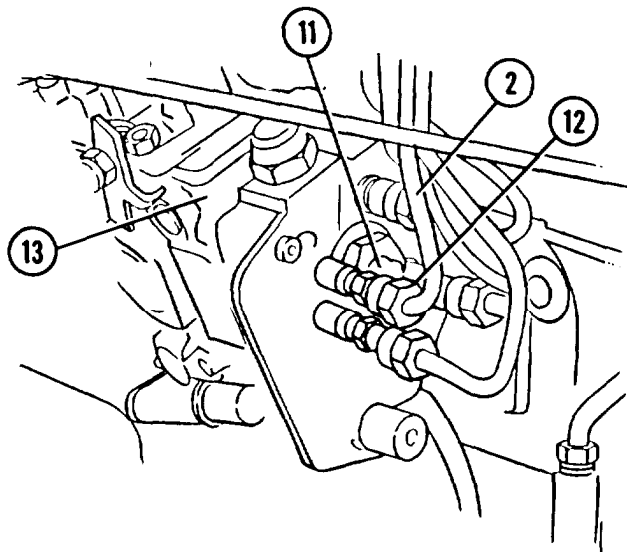
INSTALLATION

CAUTION

To ensure proper engine operation, do not weld or substitute lines (2).

NOTE

Fuel lines (2) are not interchangeable. Connect fuel lines to fuel injectors and fuel injection pump ports as noted during removal. Use tags for identification.



5-12. HIGH PRESSURE FUEL LINES - REPLACE (Cont'd)

NOTE

Hold delivery valve (11) stationary when tightening nuts (12) on fuel lines (2) at injection pump (13) .

1. POSITION FUEL LINES (2) ON INJECTION PUMP (13), AS TAGGED, AND TIGHTEN NUTS (12) TO SECURE.

CAUTION

Fuel lines (2) must be clamped securely and routed so they do not contact each other or any other component during engine operation.

2. SECURE BRACKET (9) AND TWO BRACKETS (10) TO ENGINE WITH THREE CAPSCREWS (8) . TORQUE CAPSCREWS (8) TO 216 LB. IN.
3. SECURE FUEL LINES (2) WITH SIX MOUNTS (7), THREE BRACKETS (6), SIX FLATWASHERS (5), AND SIX CAPSCREWS (4) .

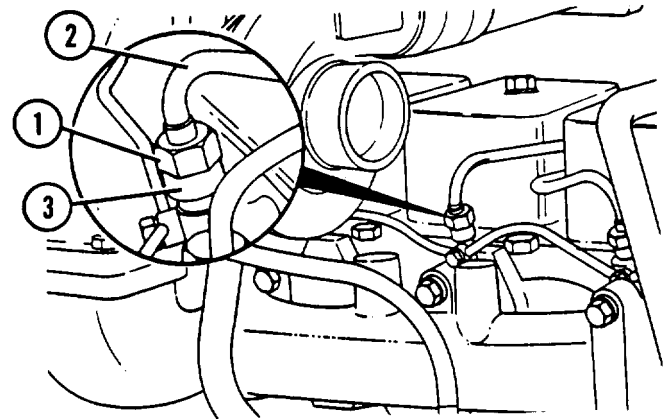
NOTE

Install, but do not fully tighten, nuts (1) in Step 4. Nuts will be fully tightened during bleeding in Step 5.

4. POSITION FUEL LINES (2) ON FUEL INJECTORS (3), AS TAGGED, AND LOOSELY INSTALL NUTS (1) TO SECURE.

WARNING

To prevent danger of fire caused by fuel spilling on hot exhaust manifold, do not bleed fuel lines (2) if engine is hot.



5. BLEED FUEL LINES (2) AT FUEL INJECTORS (3).

NOTE

Be sure auxiliary fuel shut-off switch is in the ON position, TM10-3939-660-10.

- a. Crank engine until fuel is flowing from all six lines (2) at injectors (3). Tighten all nuts (1) until snug.
- b. Bleed fuel lines (2) at injectors (3), one at a time, until engine starts and runs smoothly. Repeat steps 5c through 5e for each fuel line (2) as required.
- c. Loosen nut (1).
- d. Crank engine until fuel flows from line (2).
- e. Tighten nut (1) until snug.

5-13. FUEL DRAIN LINES AND MANIFOLD - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

Grommets (5)
Sealing Washers (8)
Seals (11)

Equipment Condition

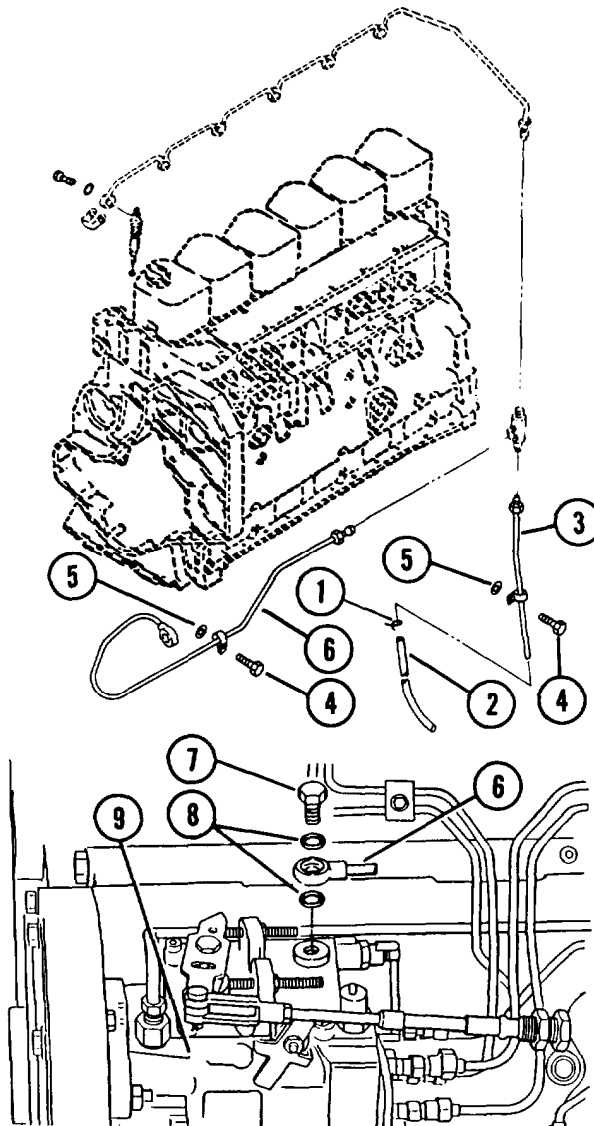
Vehicle parked on level ground.

WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited. To prevent fire, remove fuel lines only when engine is cool.

REMOVAL

1. REMOVE HOSE CLAMP (1) AND HOSE (2) FROM FUEL DRAIN LINE (3).
2. REMOVE TWO CAPSCREWS (4) AND TWO GROMMETS (5) SECURING FUEL DRAIN LINE (3) AND FUEL DRAIN LINE (6) TO ENGINE. DISCARD GROMMETS (5).
3. REMOVE FLUID PASSAGE BOLT (7), TWO SEALING WASHERS (8) AND FUEL DRAIN LINE (6) FROM INJECTION PUMP (9). DISCARD SEALING WASHERS (8).



5-13. FUEL DRAIN LINES AND MANIFOLD - REPLACE (Cont'd)

NOTE

If necessary, remove engine lifting bracket, water outlet, and thermostat, as an assembly, to provide access to fuel injector closest to fan side of engine, para. 7-4.

4. REMOVE FLUID PASSAGE BOLT (10) AND SEAL (11) FROM FUEL DRAIN MANIFOLD (12) AT EACH OF THE SIX INJECTORS (13). DISCARD SEALS (11).
5. REMOVE FUEL DRAIN MANIFOLD (12) AND FUEL DRAIN LINES (3) AND (6) FROM TEE (14).

NOTE

Seals (15) are an integral part of lines (3), (6), and (12). Inspect seal (15) at end of each line and replace entire line if seal is damaged.

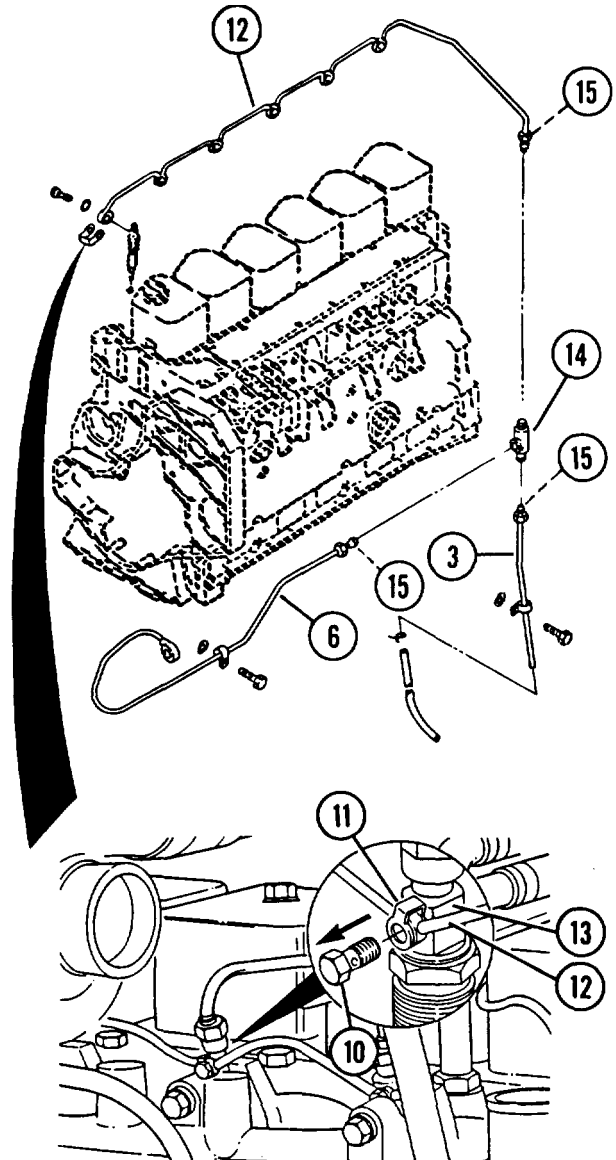
INSTALLATION

1. INSTALL FUEL DRAIN MANIFOLD (12) AND FUEL DRAIN LINES (3) AND (6) TO TEE (14).
2. INSTALL FLUID PASSAGE BOLT (10) AND NEW SEAL (11) TO FUEL DRAIN MANIFOLD (12) AT EACH OF THE SIX INJECTORS (13). TORQUE BOLTS (10) TO 6.5 LB. FT.

NOTE

If removed to provide access during removal, install engine lifting bracket, water outlet, and thermostat, as an assembly, to engine, para. 7-4.

3. SECURE FUEL DRAIN LINE (6) TO INJECTION PUMP (9) WITH FLUID PASSAGE BOLT (7) AND TWO NEW SEALING WASHERS (8). TORQUE BOLT (7) TO 32 LB. FT.



4. SECURE FUEL DRAIN LINE (3) AND FUEL DRAIN LINE MANIFOLD (6) TO ENGINE WITH TWO NEW GROMMETS (5) AND TWO CAPSCREWS (4). TORQUE CAPSCREWS TO 216 LB. IN.
5. SECURE HOSE (2) TO FUEL DRAIN LINE (3) WITH HOSE CLAMP (1).

5-14. FUEL SUPPLY LINES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Loctite 59241 (App. C, Item 42)

Sealing Washers (10)

Sealing Washers (15)

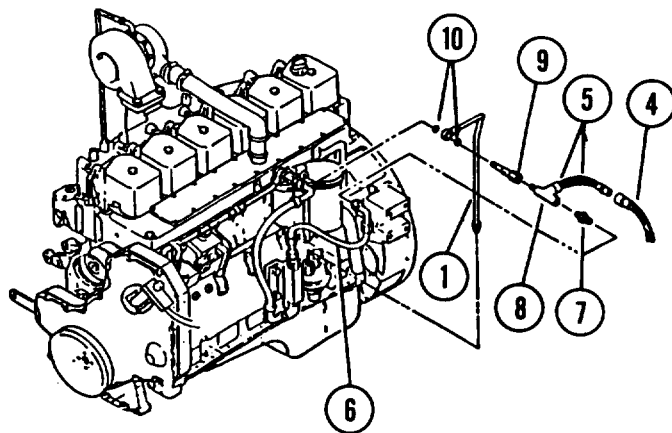
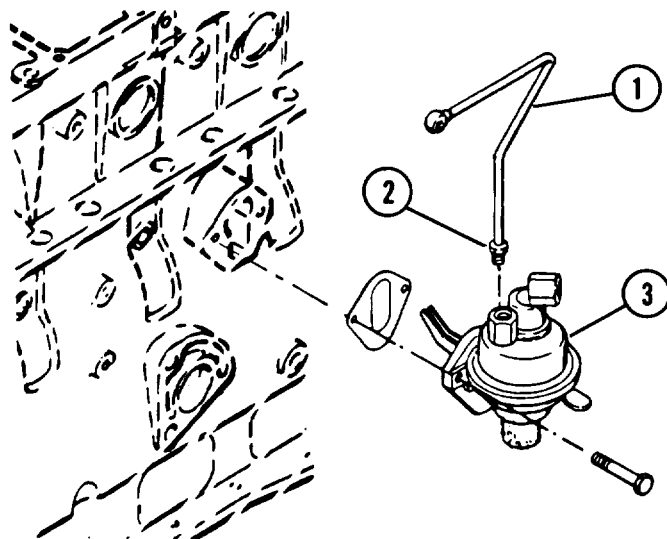
Seals (20)

WARNING

do not smoke or allow open flame or sparks in the vicinity while working on any part of fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.

REMOVAL

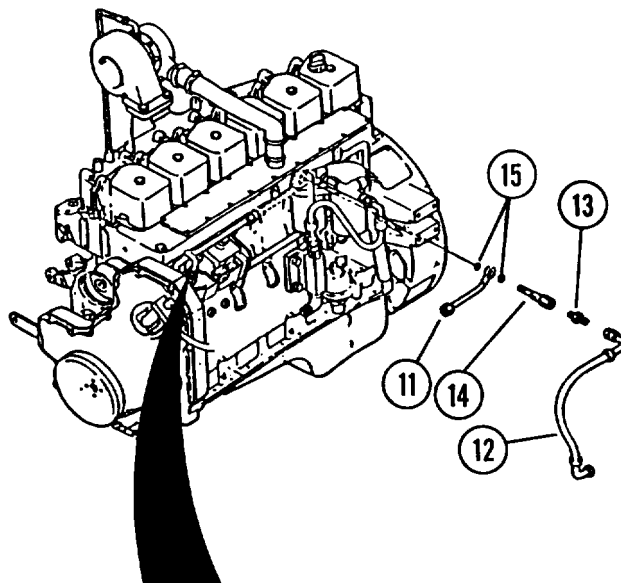
1. REMOVE SUPPLY LINE (1).
 - a. Loosen nut (2) on line (1) at pump (3).
 - b. Tag and disconnect female plug of vehicle wiring harness (4) from male plug of fuel pressure sender (5).
 - c. Disconnect hose (6) from adapter (7). Remove sender (5) from tee (8). Remove adapter (7), tee (8), and fluid passage bolt (9) as an assembly.
 - d. Remove supply line (1) from engine and pump (3). Remove and discard two sealing washers (10) at end of line (1).



5-14. FUEL SUPPLY LINES - REPLACE (Cont'd)

2. REMOVE SUPPLY LINE (11).

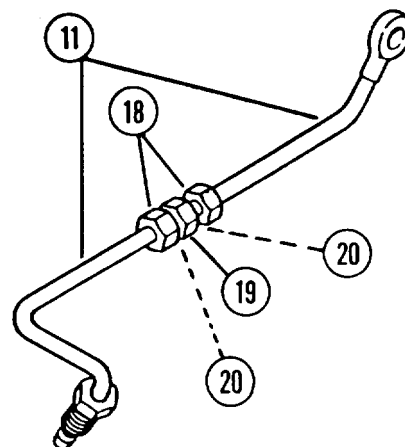
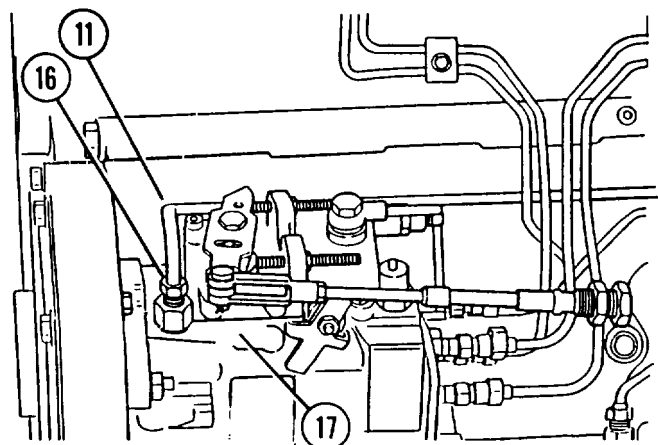
- a. Remove hose (12) from adapter (13).
- b. Remove fluid passage bolt (14) and adapter (13) as an assembly.
- c. Remove and discard two sealing washers (15) at end of line (11).
- d. Loosen nut (16) on line (11) and remove line (11) from injection pump (17).
- e. If necessary, loosen nuts (18) and remove halves of line (11) from union (19).
- f. If necessary, remove and discard seals (20) from halves of line (11).



INSTALLATION

1. INSTALL SUPPLY LINE (11).

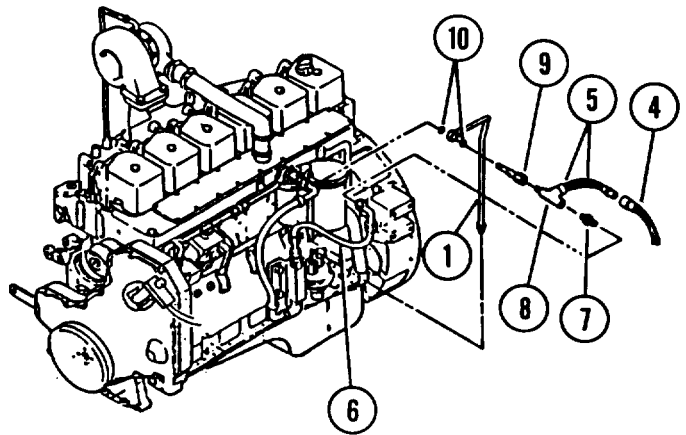
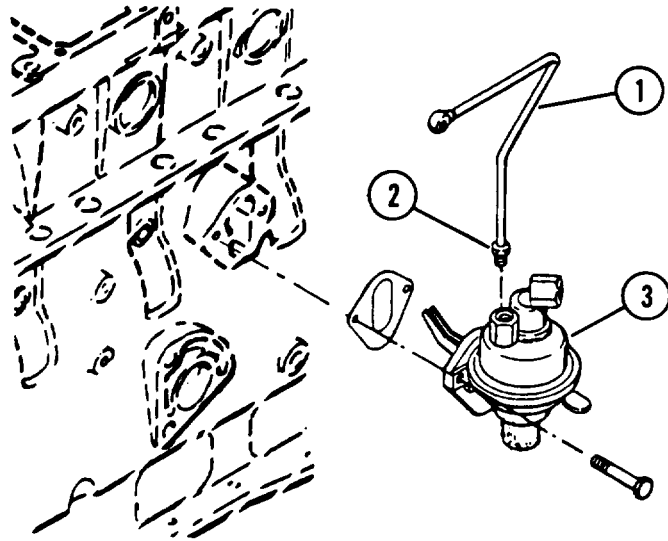
- a. If removed, install two new seals (20) to halves of line (11).
- b. If removed, position halves of line (11) on union (19) and tighten two nuts (18).
- c. Position line (11) on injection pump (17) and tighten nut (16) to secure.
- d. Place two new sealing washers (15) at end of line (11).
- e. Install fluid passage bolt (14) and adapter (13) as an assembly.
- f. Install hose (12) to adapter (13).



5-14. FUEL SUPPLY LINES - REPLACE (Cent 'd)

2. INSTALL SUPPLY LINE (1).

- a. Place two new sealing washers (10) at end of line (1). Position line (1) on engine and pump (3).
- b. Install adapter (7), tee (8), and fluid passage bolt (9) as an assembly. Apply Loctite 59241 teflon sealant to sender (5) and install sender (5) to tee (8).
- c. Connect hose (6) to adapter (7).
- d. Connect female plug of vehicle wiring harness (4) to male plug of fuel pressure sender (5) as tagged.
- e. Tighten nut (2) on line (1) at pump (3).



5-15. WATER SEPARATOR - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

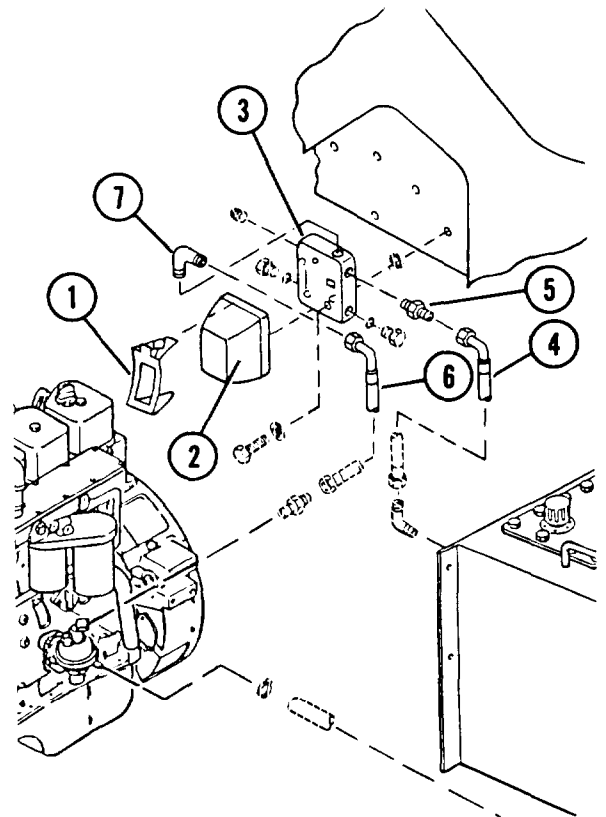
Lockwashers (9)
Starwashers (10)

Equipment Condition

Vehicle parked on level ground.

REMOVAL

1. REMOVE CLAMP (1) AND ELEMENT (2) FROM BASE (3).
2. REMOVE HOSE (4) FROM ADAPTER (5) AT BASE (3).
3. REMOVE HOSE (6) FROM ELBOW (7) FROM BASE (3).



5-15. WATER SEPARATOR - REPLACE (Cont'd)

4. REMOVE TWO SCREWS (8) , Two LOCKWASHERS (9) , BASE (3) , AND TWO STARWASHERS (10) , FROM VEHICLE FRAME. DISCARD LOCKWASHERS (9) AND STARWASHERS (10) .
5. IF NECESSARY, REMOVE PARTS FROM BASE (3) .
 - a. Remove plug kit components (11) from base (3) .
 - b. Remove elbow (7) and adapter (5) from base (3) .

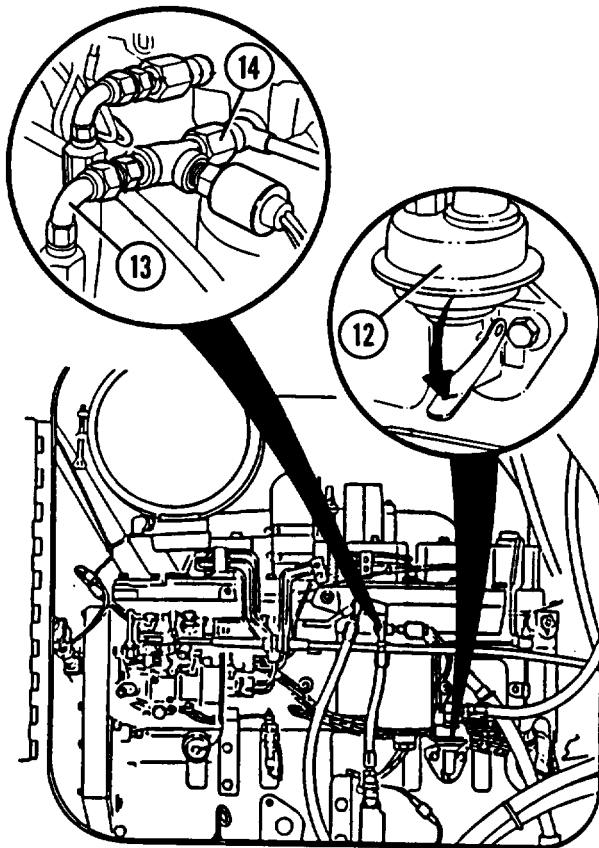
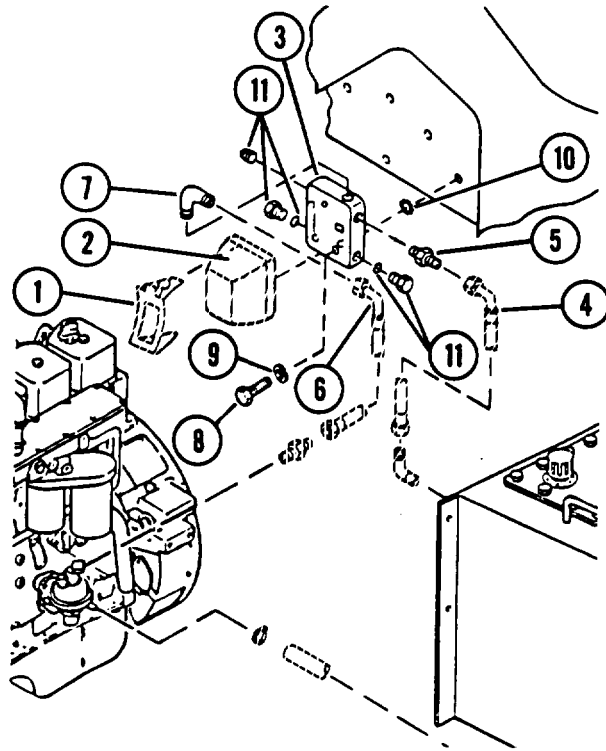
INSTALLATION

1. **IF REMOVED**, INSTALL PARTS TO BASE (3) .
 - a. Install plug kit components (11) to base (3).
 - b. Install elbow (7) and adapter (5) to base (3).
2. INSTALL TWO NEW STARWASHERS (10), BASE (3) , TWO NEW LOCKWASHERS (9) , AND TWO SCREWS (8) TO VEHICLE FRAME.
3. INSTALL HOSE (6) TO ELBOW (7) AT BASE (3).
4. INSTALL HOSE (4) TO ADAPTER (5) AT BASE (3) .
5. POSITION ELEMENT (2) ON BASE (3) AND SECURE WITH CLAMP (1) .

NOTE

sure clamp (1) is securely engaged in both slots of base (3) .

6. BLEED WATER SEPARATOR ASSEMBLY AT TRANSFER PUMP (12) .
 - a. Loosen hose (13) at fitting (14).
 - b. Operate hand lever on transfer pump (12) until fuel flowing from fitting (14) is free of air.
 - c. Tighten hose (13) at fitting (14).



5-16. FUEL FILTER HEAD - SERVICE/REPLACE

This task covers:

- a. Service of filter elements
- b. Removal
- c. Installation

Initial Setup

Tools

- Tool Kit, Automotive Mechanics
- Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power

Materials/Parts

- Filters (1) (4)
- Seals (6) (7) (11) (12)

Equipment Condition

Vehicle parked on level ground.

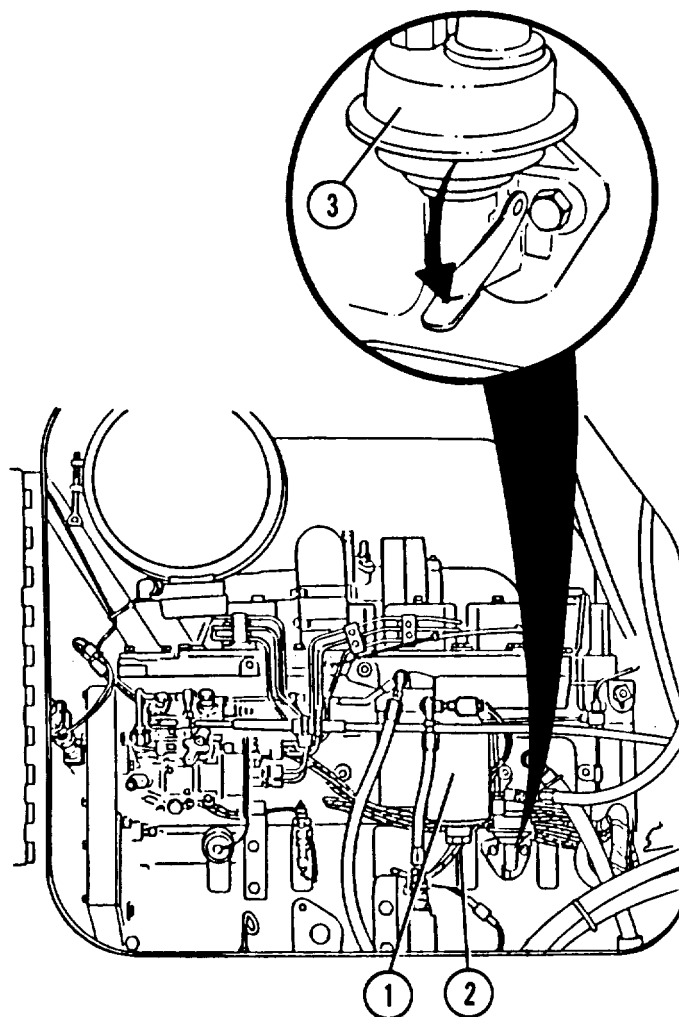
SERVICE OF FUEL FILTER ELEMENTS

- 1. DRAIN PRIMARY FILTER ELEMENT (1).

NOTE

Drain primary fuel filter when water is present in fuel/water separator **or** after 50 hours of operation. Be sure fuel tank is at least 1/4 full.

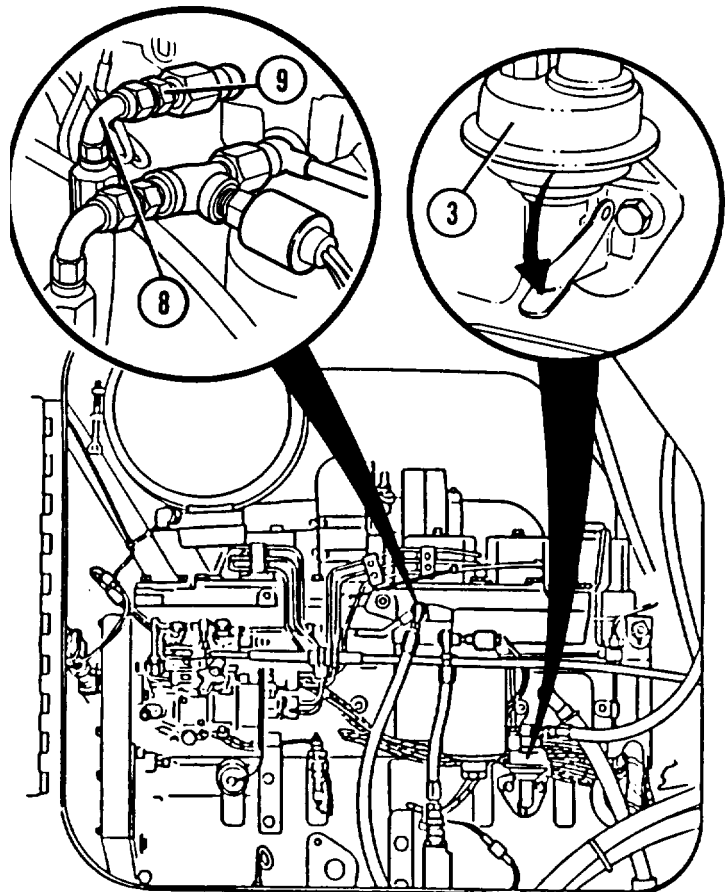
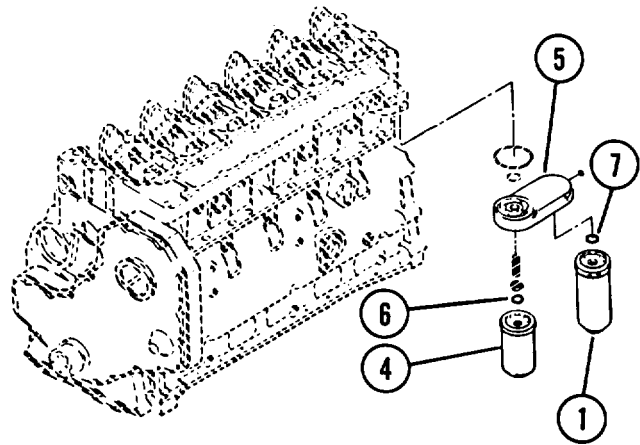
- a. Open drain (2) at base of primary filter element (1).
- b. Operate hand lever on fuel transfer pump (3) until all water is drained from primary filter element (1) and only diesel fuel is present.
- c. Close drain (2) at base of primary filter element (1).



5-16. FUEL FILTER HEAD - SERVICE/REPLACE (Cont'd)

20 CHANGE PRIMARY (1) AND SECONDARY (4) FILTER ELEMENTS.

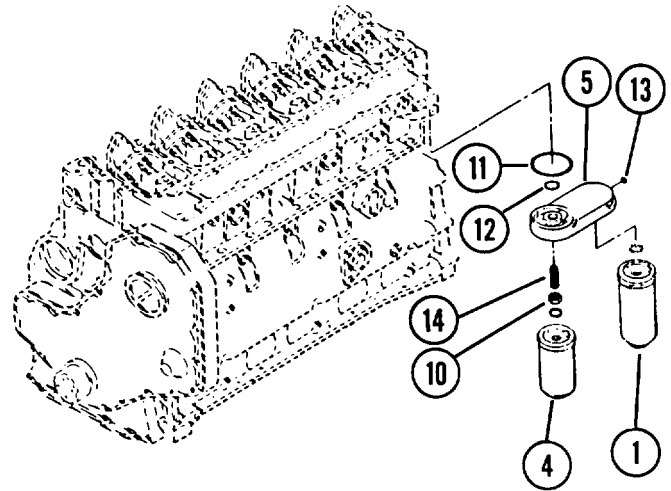
- a. Turn primary filter element (1) counterclockwise and remove from fuel filter head (5).
- b. Turn secondary filter element (4) counterclockwise and remove from fuel filter head (5).
- c. Discard old filter elements (1) and (4).
- d. Remove and discard seals (6) and (7) from filter head (5).
- e. Clean fuel filter head (5) where 01 filter elements (1) and (4) were attached.
- f. Install new seals (6) and (7) to filter head (5).
- g. Fill new filter elements (1) and (4) with clean fuel. Lubricate outer seals on filter elements (1) and (4) with clean oil.
- h. Turn secondary filter element (4) clockwise on fuel filter head (5) until tight.
- i. Turn primary filter element (1) clockwise on fuel filter head (5) until tight.
- j. Loosen hose (8) at fitting (9).
- k. Operate hand lever on fuel transfer pump (3) until fuel flowing from fitting (9) is free of air.
- l. Tighten hose (8) at fitting (9).



5-16. FUEL FILTER HEAD - SERVICE/REPLACE (Cont' d)

REMOVAL

1. REMOVE FILTER ELEMENTS (1) AND (4) FROM FILTER HEAD (5) AS DESCRIBED IN "SERVICE OF FILTER ELEMENTS" SECTION OF THIS PARAGRAPH .
2. REMOVE NUT (10) AND FILTER HEAD (5) FROM ENGINE.
3. REMOVE AND DISCARD TWO SEALS (11) AND (12) FROM FILTER HEAD (5).
4. IF NECESSARY, REMOVE EXPANSION PLUG (13) FROM FILTER HEAD (5).
5. IF NECESSARY, REMOVE STUD (14) FROM ENGINE .

**INSTALLATION**

1. IF NECESSARY, INSTALL STUD (14) TO ENGINE .
2. IF NECESSARY, INSTALL EXPANSION PLUG (13) TO FILTER HEAD (5).
3. INSTALL TWO NEW SEALS (12) AND (11) TO FILTER HEAD (5).
4. POSITION FILTER HEAD (5) ON ENGINE AND SECURE WITH NUT (10).
5. INSTALL FILTER ELEMENTS (1) AND (4) TO FILTER HEAD (5) AS DESCRIBED IN "SERVICE OF FILTER ELEMENTS" SECTION OF THIS PARAGRAPH.

5-17. ETHER START HOSE AND ATOMIZER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

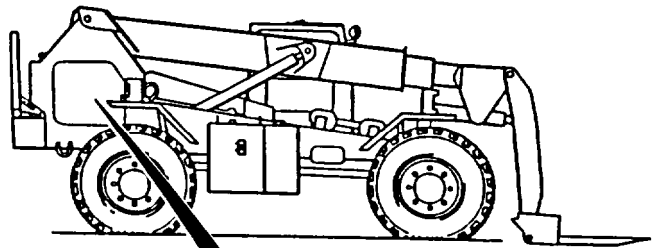
Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
 Ether cartridge removed, para. 5-18.

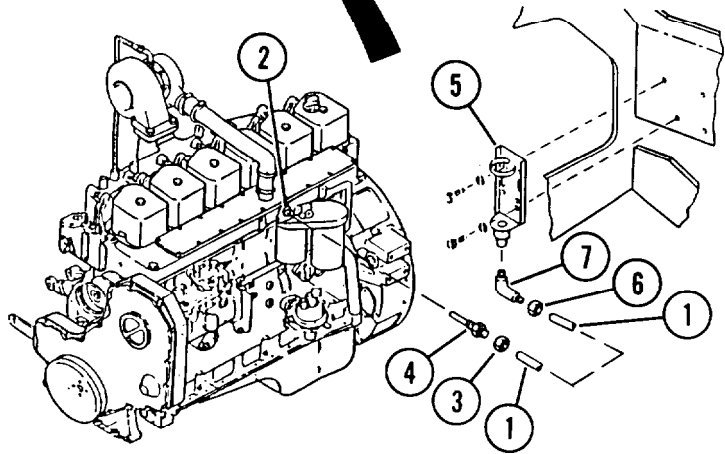
NOTE

Hose (1) is disconnected at engine (2) through the right-hand engine access door. Other end of hose (1) is disconnected at elbow (7) through the left-hand engine access door.



REMOVAL

1. DISCONNECT HOSE (1) AT ENGINE (2).
 - a. Loosen nut (3) to disconnect hose (1) from atomizer (4).
 - b. Unscrew atomizer (4) from engine (2).
2. DISCONNECT HOSE (1) FROM MOUNTING BRACKET (5).
 - a. Loosen nut (6) to disconnect hose (1) from elbow (7).
 - b. Unscrew elbow (7) from bracket (5).



INSTALLATION

1. CONNECT HOSE (1) TO MOUNTING BRACKET (5).
 - a. Screw elbow (7) into bottom of bracket (5).

5-17. ETHER START HOSE AND ATOMIZER - REPLACE (Cont'd)

- b. Connect hose (1) to elbow (7) with nut (6).
2. CONNECT HOSE (1) AT ENGINE (2) .
 - a. Screw atomizer (4) into engine (2) .
 - b. Connect hose (1) to atomizer (4) with nut (3).
3. INSTALL ETHER START CARTRIDGE,
PARA. 5-18.

5-18. ETHER START CARTRIDGE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Engine cool and off.

Materials/Parts

Cartridge (2)
Seal (4)

NOTE

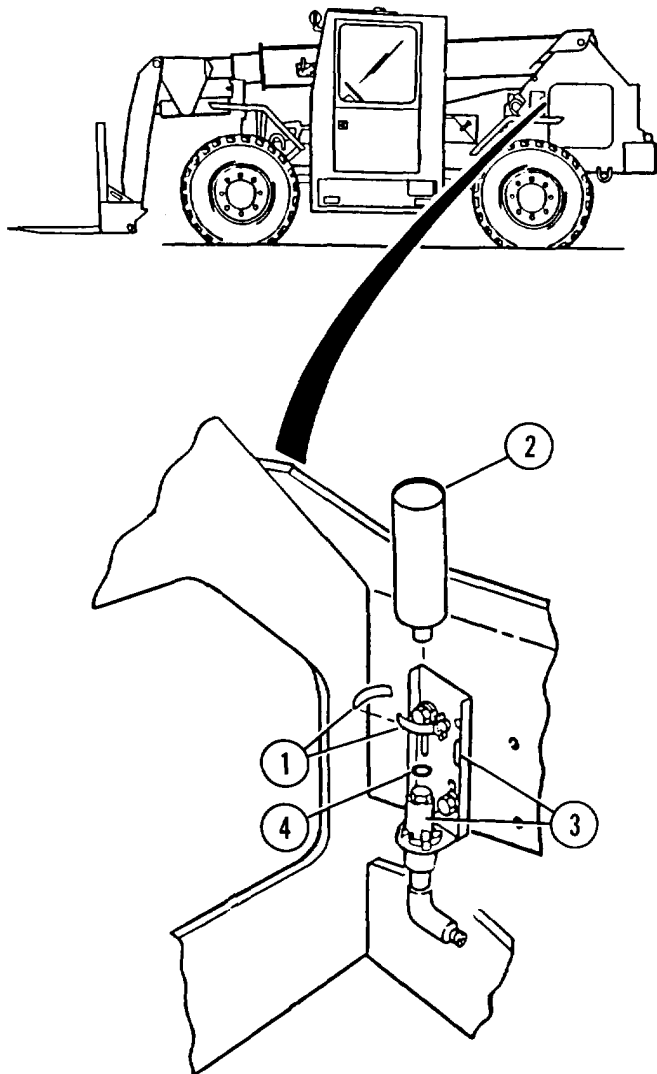
The ether start cartridge is accessed through the left-hand engine access door.

REMOVAL

1. REMOVE CLAMP (1) FROM MOUNTING BRACKET (3).
2. REMOVE AND DISCARD CARTRIDGE (2) ACCORDING TO REGULATIONS FOR PRESSURIZED CONTAINERS.
3. REMOVE AND DISCARD CARTRIDGE SEAL (4).

INSTALLATION

1. INSTALL NEW CARTRIDGE SEAL (4).
2. SCREW NEW CARTRIDGE (2) INTO MOUNTING BRACKET (3).
3. SECURE CARTRIDGE (2) WITH CLAMP (1).



 5-19. ETHER START THERMOSTAT - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwasher (11)

Starwashers (7)

Equipment Condition

Vehicle parked on level ground.

Negative battery cable disconnected,
para. 8-44.

NOTE

The ether start thermostat is accessed through the right-hand engine access door.

REMOVAL

1. DISCONNECT ELECTRICAL LEADS (1), (2), AND (3).
 - a. Disconnect lead (1) from lead (2) by pulling male connector (4) from female connector (5).
 - b. Remove capscrew (6), two starwashers (7) and ground lead (3). Discard starwashers (7).

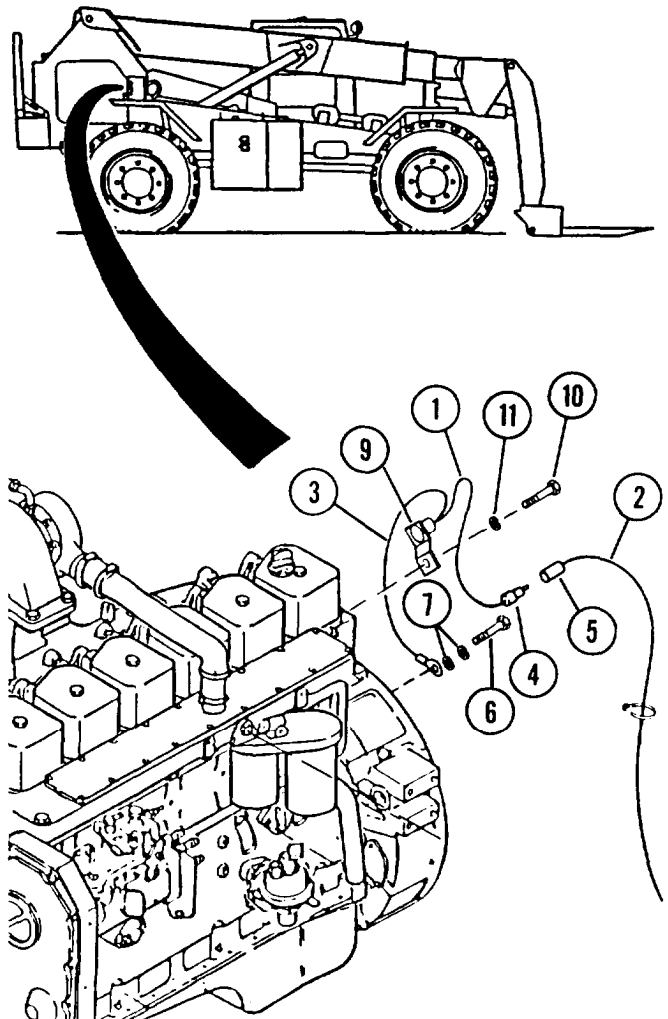
2. REMOVE THERMOSTAT (9).

Remove capscrew (10), lockwasher (11), and thermostat (9). Discard lockwasher (11).

INSTALLATION

1. INSTALL THERMOSTAT (9).

Position thermostat (9) on engine and secure with new lockwasher (11) and capscrew (10).



5-19. ETHER START THERMOSTAT - REPLACE (Cont'd)

2. CONNECT ELECTRICAL LEADS (1), (2)
AND (3).
 - a. Position ground wire (3), on engine
and secure with two new starwashers
(7) and capscrew (6).
 - b. Connect lead (1) to lead (2) by
pushing male connector (4) into
female connector (5).
3. CONNECT NEGATIVE BATTERY CABLE, PARA,
8-44.

5-20. ETHER START CARTRIDGE MOUNTING BRACKET - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

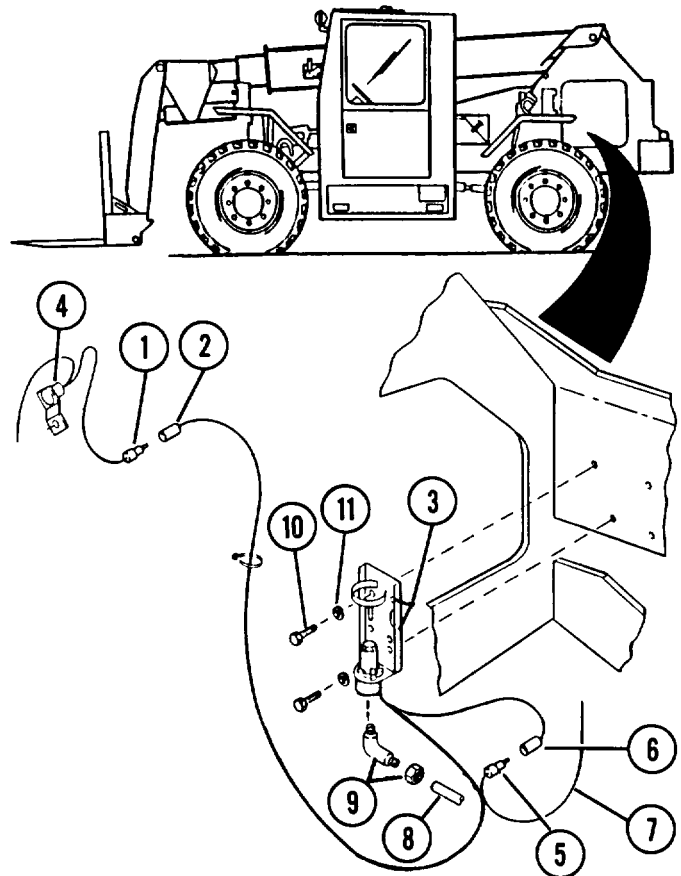
Lockwashers (11)

Equipment Condition

Ether cartridge removed) para. 5-18.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

1. DISCONNECT ELECTRICAL WIRING.
 - a. Disconnect the male (1) and female (2) connectors on the wiring attaching bracket (3) to thermostat (4).
 - b. Disconnect the male (5) and female (6) connectors on the wiring from bracket (3) to engine harness (7).
2. REMOVE HOSE (8) AND ELBOW (9) AT BASE OF BRACKET (3).
3. REMOVE BRACKET (3) BY REMOVING TWO CAPSCREWS (10) AND TWO LOCKWASHERS (11). DISCARD LOCKWASHERS (11).



INSTALLATION

1. INSTALL BRACKET (3).

Position bracket (3) on vehicle and secure with two new lockwashers (11) and two cap screws (10).
2. SCREW ELBOW (9) ONTO BRACKET (3). ATTACH HOSE (8) TO ELBOW (9).
3. CONNECT ELECTRICAL WIRING.
 - a. Connect male (1) and female (2) ends on the wiring from bracket (3) to thermostat (4).
 - b. Connect male (5) and female (6) ends on the wiring from bracket (3) to engine wiring harness (7).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
5. INSTALL ETHER CARTRIDGE, PARA. 5-18.

5-21. ACCELERATOR CABLE - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

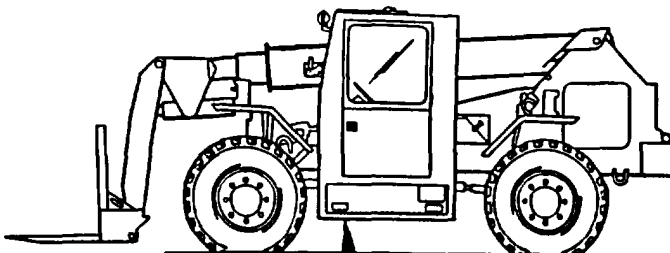
Cotter Pin (12)
Locknuts (8)

Equipment Condition

Vehicle parked on level ground.

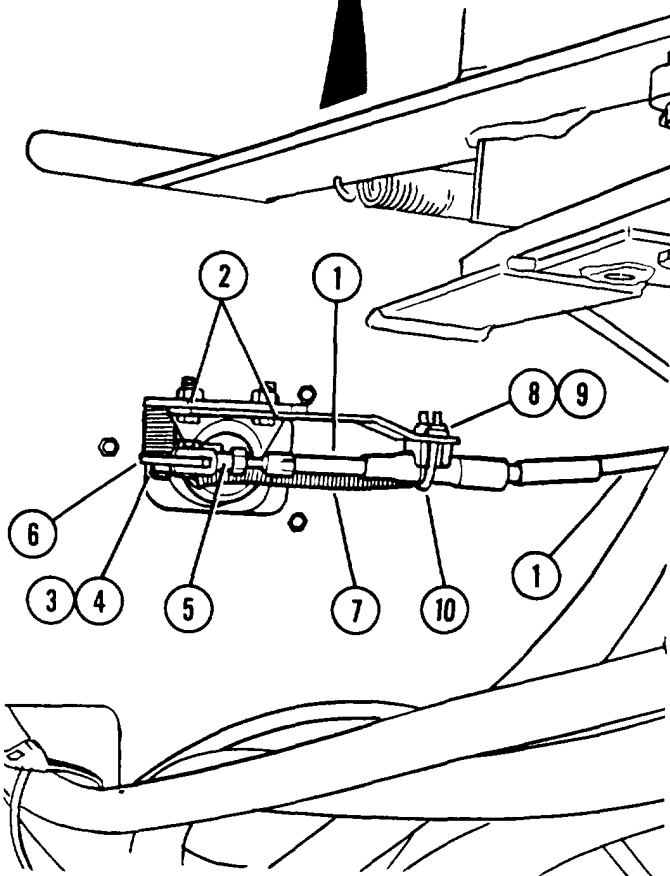
WARNING

Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.



REMOVAL

1. REMOVE ACCELERATOR CABLE (1) AT ACCELERATOR PEDAL (2).
 - a. Remove spring clip (3) and clevis pin (4) securing clevis (5) to linkage (6).
 - b. Remove spring (7) from linkage (6)
 - c. Remove two locknuts (8), two flatwashers (9), and cable clamp (10). Discard locknuts (8).
 - d. Remove cable (1).



5-21. ACCELERATOR CABLE - REPLACE/ADJUST (Cont'd)

2. REMOVE ACCELERATOR CABLE (1) AT FUEL INJECTION PUMP (1.1).

- a. Remove cotter pin (12) and clevis pin (13) securing clevis (14). Discard cotter pin (12).
- b. Loosen nut (16) and starwasher (17). Remove cable (1).

NOTE

Note routing of accelerator cable (1) on vehicle frame for use during installation.

3. REMOVE ACCELERATOR CABLE (1) FROM VEHICLE FRAME.

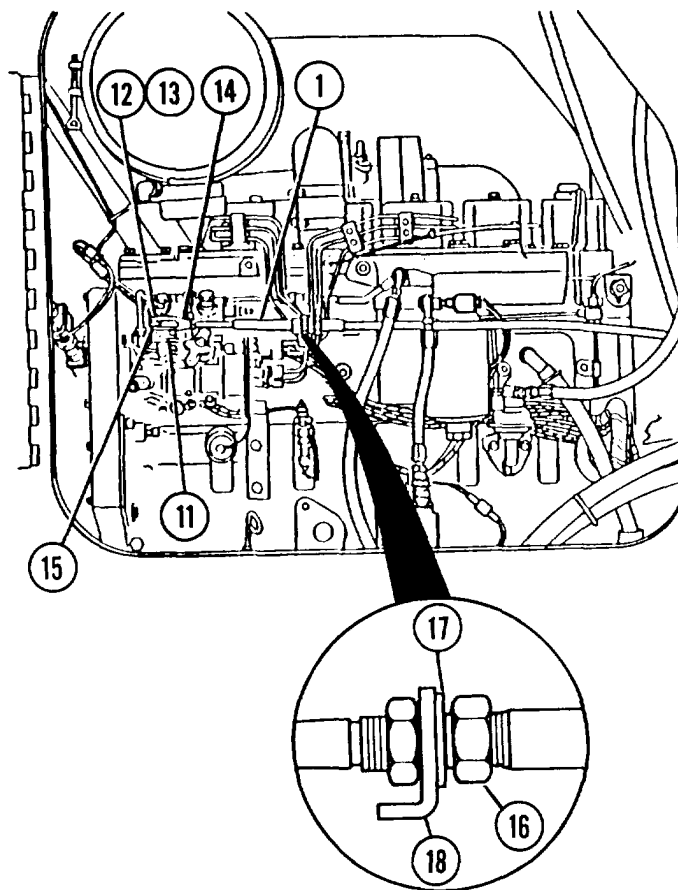
INSTALLATION

- 1. POSITION ACCELERATOR CABLE (1) ON VEHICLE FRAME AS NOTED DURING REMOVAL.
- 2* INSTALL ACCELERATOR CABLE (1) AT FUEL INJECTION PUMP (11).
 - a. Secure clevis (14) of cable (1) to linkage (15) with clevis pin (13) and new cotter pin (12).

NOTE

Position starwasher (17) in front of bracket (18).

- b. Position cable (1) on bracket (18) and secure with nut (16) and starwasher (17).

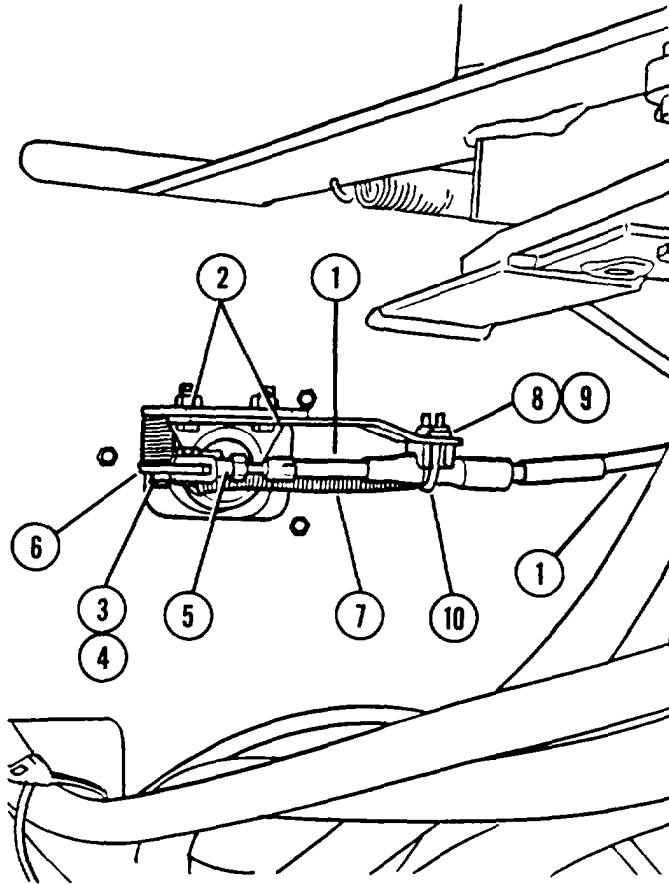


5-21. ACCELERATOR CABLE - RBPLACE/ADJUST (Cont'd)

3. INSTALL ACCELERATOR CABLE (1) AT ACCELERATOR PEDAL (2) FROM UNDER CAB.

- a. Secure clevis (5) of cable (1) to linkage (6) of pedal (2) with clevis pin (4) and spring clip (3).
- b. Install spring (7) to linkage (6).
- c. Position cable (1) on pedal (2).
- d. Secure cable (1) to pedal (2) with two new locknuts (8), two flatwashers (9), and cable clamp (10).

4. CHECK ADJUSTMENT OF ACCELERATOR CABLE (1) AND ADJUST, IF NECESSARY. REFER TO "ADJUST" SECTION OF THIS PARAGRAPH .



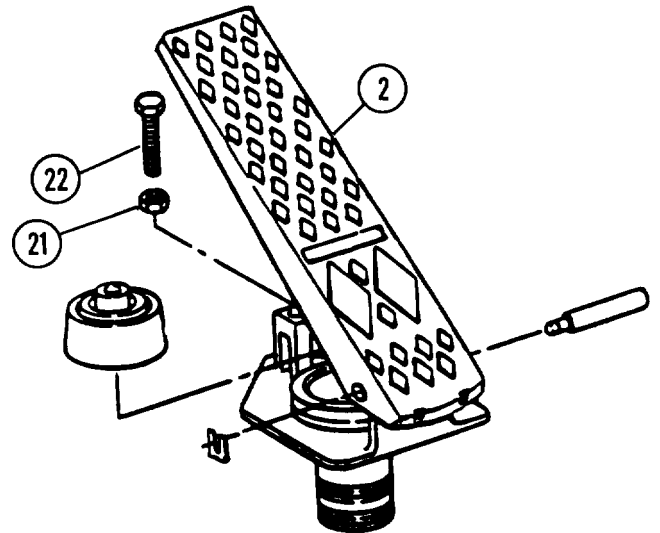
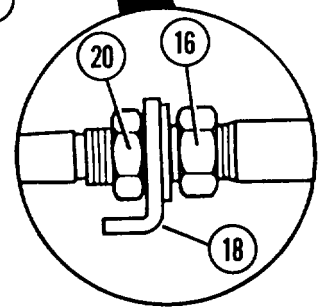
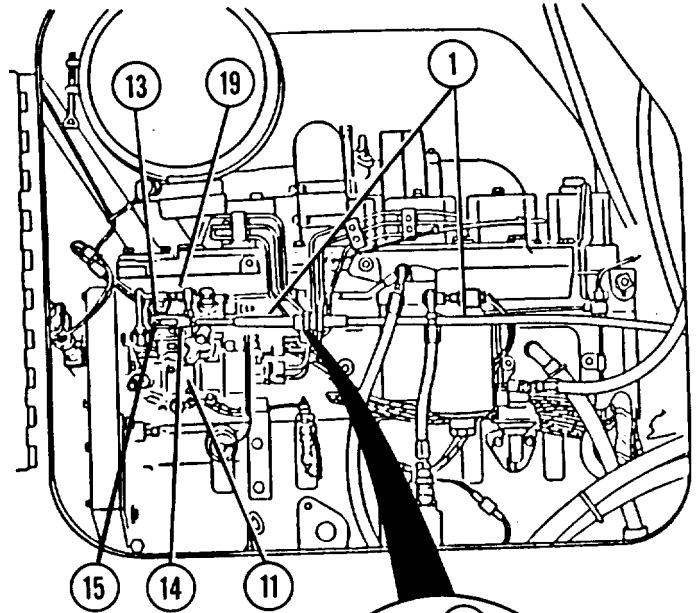
5-21. ACCELERATOR CABLE - REPLACE/ADJUST (Cont'd)

ADJUSTMENT

1. CHECK ADJUSTMENT OF ACCELERATOR CABLE (1).

With linkage (15) tight against the idle stop screw (19), clevis pin (13) should fit freely through clevis (14) of cable (1). If not, adjustment is required.

2. IF NECESSARY, ADJUST ACCELERATOR CABLE (1).
 - a. Loosen nuts (16) and (20) at bracket (18).
 - b. Reposition cable (1) until clevis pin (13) fits freely through holes in clevis (14) and linkage (15).
 - c. Tighten nuts (16) and (20) at bracket (18).
 - d. Loosen jam nut (21) and turn stop screw (22) on accelerator pedal (2) fully clockwise.
 - e. Depress accelerator pedal (2) fully and hold. Turn stop screw (22) counterclockwise until head of stop screw (22) touches pedal (2).
 - f. Release accelerator pedal (2) and tighten jam nut (21).
 - g. Use STE/ICE to check engine RPM at idle and at full throttle, para. 2-13. If necessary, readjust cable (1) and stop screw (22), as required, until engine RPM readings are within limits.



5-22. ACCELERATOR PEDAL & ASSEMBLY - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Cleaning and Inspection
- d. Assembly
- e. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Accelerator cable disconnected
at pedal [para. 5-21.

Materials/Parts

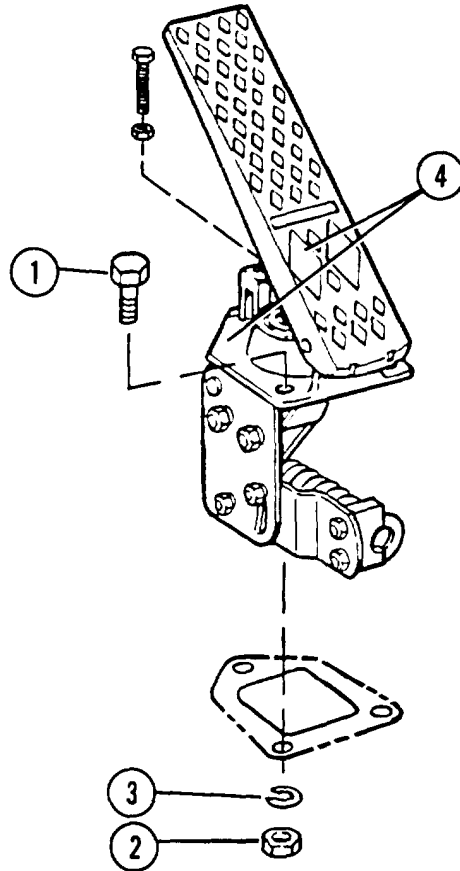
Lockwashers (3)
Lockwasher (25)
Loctite 242 (App. C, Item 39)

REMOVAL

NOTE

If necessary, have an assistant retain capscrews (1) inside cab while nuts (2) are removed.

1. REMOVE THREE NUTS (2), THREE LOCKWASHERS (3) AND THREE CAPSCREWS (1) SECURING ACCELERATOR PEDAL ASSEMBLY (4) TO CAB. DISCARD LOCKWASHERS (3).
2. REMOVE ACCELERATOR PEDAL ASSEMBLY (4) FROM CAB.

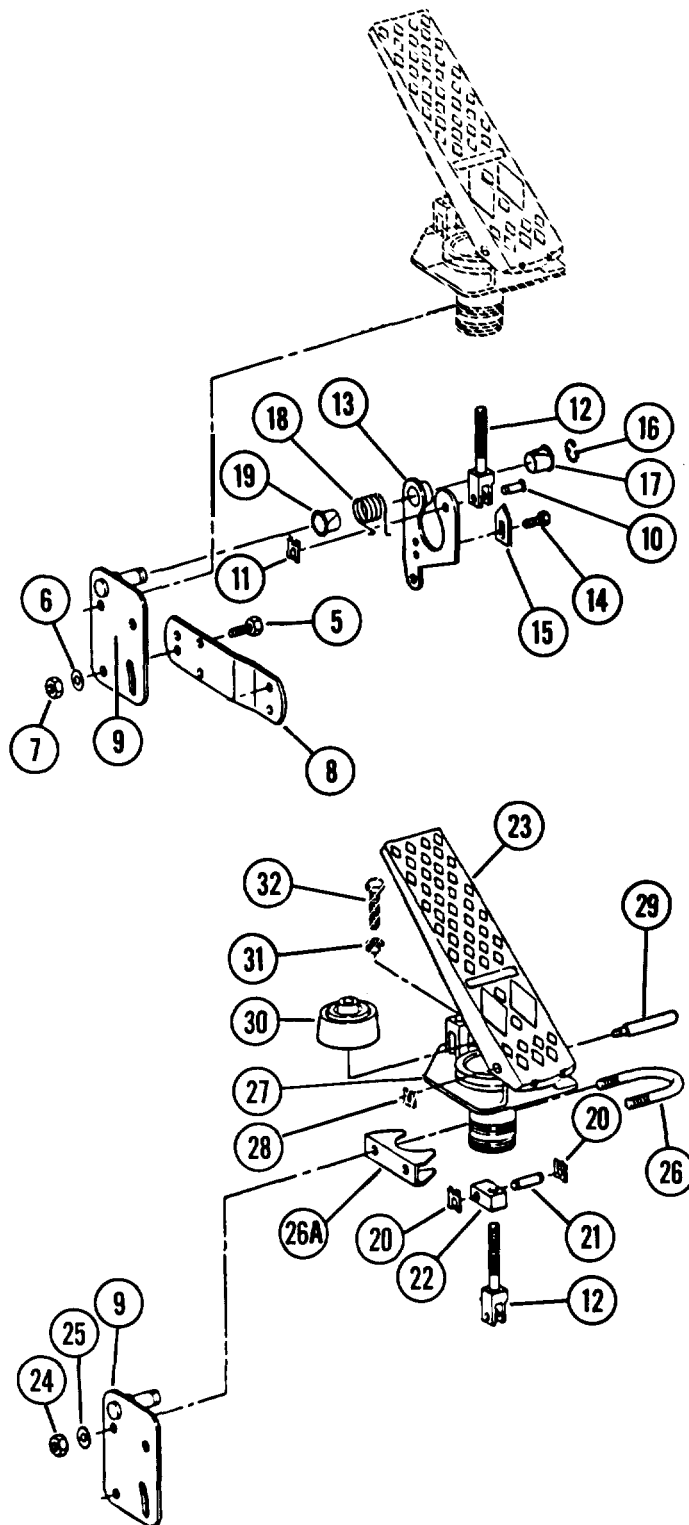


5-22. ACCELERATOR PEDAL ASSEMBLY - RBPLACE/REPAIR (Cont' d)

DISASSEMBLY

DISASSEMBLE ACCELERATOR PEDAL ASSEMBLY (4).

- a. Remove screw (5) , flatwasher (6) , and nut (7) , securing cable support bracket (8) to hanger plate assembly (9) .
- b. Remove pin (10) and spring clip (11) securing pushrod (12), to lever assembly (13) .
- c. Remove hex bolt (14) and travel stop (15) from lever assembly (13) .
- d. Remove circlip (16), nyliner bearing (17), lever assembly (13), spring (18), and nyliner bearing (19), from shaft of hanger plate assembly (9).
- e. Remove two spring clips (20) and and long pin (21) securing block assembly (22) and pushrod (12) to pedal (23).
- f. Remove pushrod (12) from block assembly (22).
- g. Remove nut (24), lockwasher (25), U-bolt (26) and bracket (26A) securing hanger plate assembly (9) to pedal base (27).
- h. Remove spring clip (28) and pivot pin (29) securing pedal (23) to pedal base (27).
- i. Remove bellows (30) from pedal base (27).
- j. Loosen jamnut (31) and remove capscrew (32) and jamnut (31) from pedal base (27).



5-22. ACCELERATOR PEDAL ASSEMBLY - REPLACE/REPAIR (Cont'd)

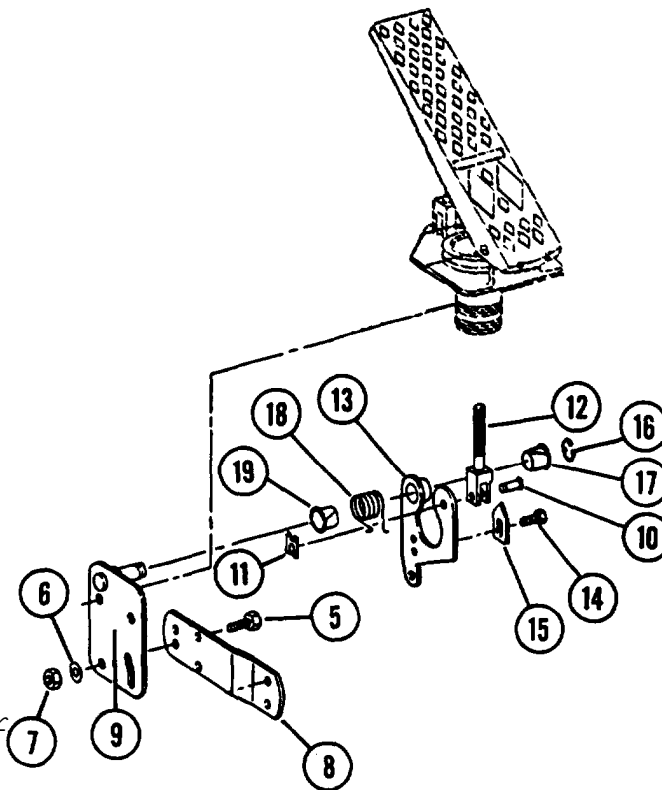
CLEANING AND INSPECTION

Refer to Para. 3-4 for cleaning instructions and Para. 3-6 for inspection instructions.

ASSEMBLY

ASSEMBLY ACCELERATOR PEDAL ASSEMBLY (4).

- a. Install jamnut (31) and capscrew (32) to pedal base (27).
- b. Install bellows (30) to pedal base (27).
- c. Secure pedal (23) to pedal base (27) with pivot pin (29) and spring clip (28).
- d. Install pushrod (12) to block assembly (22).
- e. Secure block assembly (22) and pushrod (12) to pedal (23) with long pin (21) and two spring clips (20).
- f. Secure hanger plate assembly (9) to pedal base (27) with U-bolt (26), bracket (26A), new flatwasher (25) and nut (24).
- g* Install nyliner bearing (19), spring (18), lever assembly (13), nyliner bearing (17) and circlip (16) on shaft of hanger plate assembly (9).
- h. Secure travel stop (15) to lever assembly (13) with capscrew (14).
- i. Secure pushrod (12) to lever assembly (13) with short pin (10) and spring clip (11).
- j. Secure cable support bracket (8) to hanger plate assembly (9) with screw (5), flatwasher (6), and nut (7).



5-22. ACCELERATOR PEDAL ASSEMBLY - REPLACE/REPAIR (Cont'd)

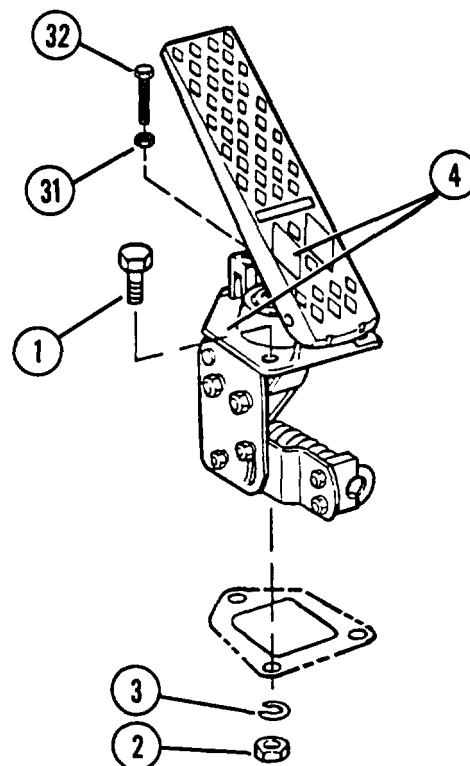
INSTALLATION

1. POSITION ACCELERATOR PEDAL ASSEMBLY (4) ON CAB.

NOTE

Apply Loctite 242 to threads of capscrews (1) . Have an assistant retain capscrews (1) inside cab while nuts (2) are installed.

2. SECURE ACCELERATOR PEDAL ASSEMBLY (4) TO CAB WITH THREE CAPSCREWS (1) , THREE NEW LOCKWASHERS (3) , AND THREE NUTS (2) .
3. CONNECT ACCELERATOR CABLE TO ACCELERATOR PEDAL (4), PARA. 5-21.
4. CHECK ADJUSTMENT OF PEDAL CAPSCREW (32).
 - a. Loosen jamnut (31) and turn capscrew (32) on accelerator pedal assembly (4) fully clockwise.
 - b. Depress accelerator pedal to the end of its travel and hold. Turn capscrew (32) counterclockwise until head of capscrew (32) touches pedal.
 - c. Release accelerator pedal and tighten jamnut (31).
 - d. Use STE/ICE to check engine RPM at full throttle, para. 2-13. If necessary, readjust capscrew (32). as required, until engine full throttle RPM is within limits.
5. CONNECT ACCELERATOR CABLE AT PEDAL ASSEMBLY (4), PARA. 5-21.



CHAPTER 6

EXHAUST SYSTEM MAINTENANCE

6-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the engine exhaust system. To find a specific maintenance procedure, see the maintenance task summary below.

6-2. EXHAUST SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
6-3	Muffler and Tail Pipe - Replace	6-2
6-4	Exhaust Pipe - Replace	6-5

6-3. MUFFLER AND TAIL PIPE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

- Vehicle parked on level ground.
- Engine off and cool.

NOTE

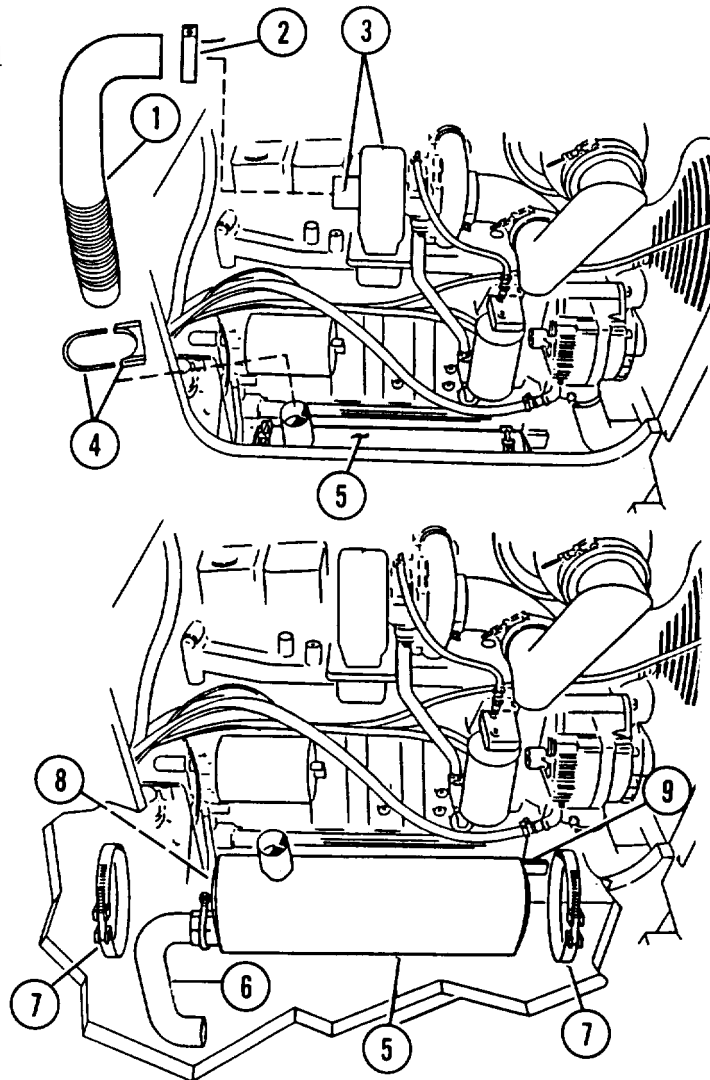
If desired, the tail pipe can be removed and installed without removing the muffler. Refer to Step 3 of removal and Step 1 of installation, below.

NOTE

The muffler and tail pipe are accessed through the left-hand engine door.

REMOVAL

1. REMOVE EXHAUST PIPE (1).
 - a. Remove clamp (2) at turbocharger (3).
 - b. Remove clamp (4) at muffler (5).
 - c. Remove exhaust pipe (1) from turbocharger (3) and muffler (5).
2. REMOVE MUFFLER (5) AND TAIL PIPE (6) AS AN ASSEMBLY.
 - a. Remove two clamps (7) that secure muffler (5) to engine mounts (8) and (9).

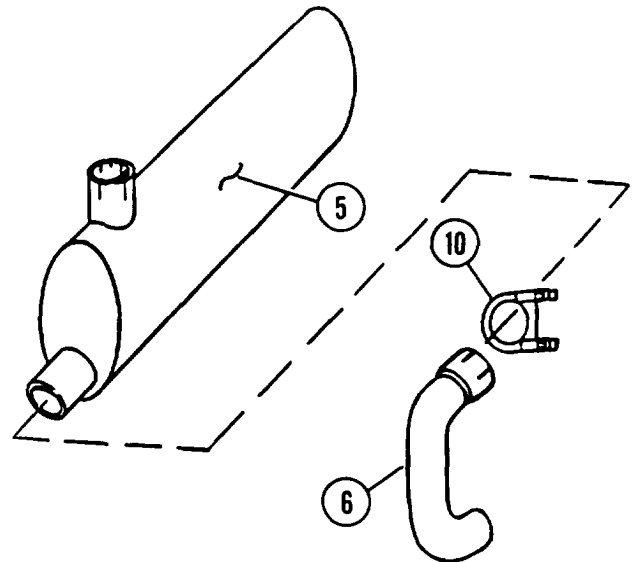


6-3. MUFFLER AND TAIL PIPE REPLACE (Cont'd)

- b. Remove muffler (5) and tail pipe (6) as an assembly.
3. IF NECESSARY, REMOVE TAIL PIPE (6).
 - a. Loosen clamp (10).
 - b. Remove tail pipe (6) from muffler (5).

INSTALLATION

1. IF NECESSARY, INSTALL TAIL PIPE (6).
 - a. Position clamp (10) and tail pipe (6) on muffler (5).
 - b. Tighten two clamps (10).
- 20 INSTALL MUFFLER (5) AND TAIL PIPE (6) AS AN ASSEMBLY.
 - a. Loosen two clamps (7) and place clamps (7) around muffler (5).
 - b. Position and support muffler (5) and tail pipe (6) as an assembly next to engine mounts (8) and (9).
 - c. Slide clamps (7) over engine mounts (8) and (9).

CAUTION

Springs on clamps (7) must not be fully compressed or damage to muffler (5) may result.

- d. Tighten two clamps (7).

6-3. MUFFLER AND TAIL PIPE - REPLACE (Cont'd)

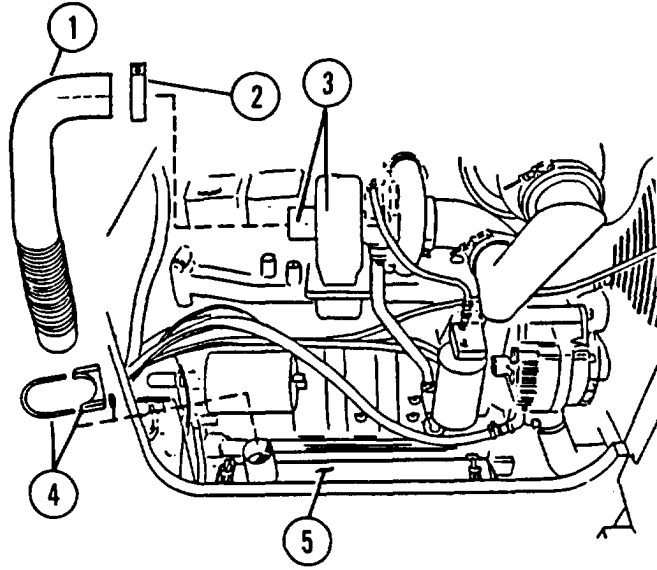
3. INSTALL EXHAUST PIPE (1).

- a. Place exhaust pipe (1) on openings of turbocharger (3) and muffler (5).

NOTE

To prevent exhaust leaks, be sure exhaust pipe (1) is pushed far enough onto muffler opening.

- b. Install and tighten clamp (4) at muffler (5).
- c. Install and tighten clamp (2) at turbocharger (3).



6-4. EXHAUST PIPE - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial Setup**Tools**

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Engine cool and off.

NOTE

The exhaust pipe is accessed through the left-hand engine access door.

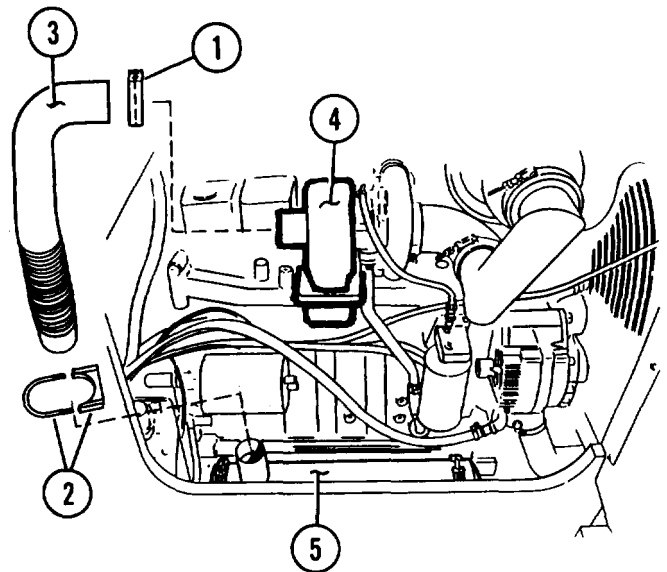
REMOVAL

1. LOOSEN CLAMPS (1) AND (2) SECURING EXHAUST PIPE (3) TO TURBOCHARGER (4) AND MUFFLER (5).
2. REMOVE EXHAUST PIPE (3) FROM OPENINGS ON TURBOCHARGER (4) AND MUFFLER (5).

INSTALLATION**NOTE**

To prevent exhaust leaks, be sure exhaust pipe (3) is pushed far enough onto the turbocharger (4) and muffler (5) openings.

1. POSITION EXHAUST PIPE (3) ON OPENINGS OF TURBOCHARGER (4) AND MUFFLER (5).
2. TIGHTEN CLAMPS (1) AND (2) TO SECURE EXHAUST PIPE (3) TO TURBOCHARGER (4) AND MUFFLER (5).



CHAPTER 7

COOLING SYSTEM MAINTENANCE

7-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the engine cooling system. To find a specific maintenance procedure, see the maintenance task summary below.

7-2. COOLING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
7-3	Radiator - Service/Replace/Test	7-2
7-4	Thermostat and Water Outlet - Replace	7-14
7-5	Radiator Hoses - Replace/Inspect	7-17
7-6	Water Pump - Replace	7-19
7-7	Engine Cooling Fan - Replace	7-20
7-8	Engine Cooling Fan Guards - Replace	7-22
7-9	Drive Belt and Tensioner - Replace	7-24
7-10	Coolant Overflow Tank - Replace	7-26
7-11	Water Inlet - Replace	7-28

7-3. RADIATOR - SERVICE/REPLACE/TEST

This task covers:

- a. Checking and adding engine coolant
 - b. Changing coolant
 - c. Radiator removal
 - d. Radiator installation
 - e. Pressure testing cooling system
-

Initial Setup

Tools

Tool Kit, General Mechanics

Equipment Condition

Vehicle parked on level ground.
Engine OFF and cool.
Load backrest removed from storage position (if stored).
Negative battery cable removed, para. 8-44.

Materials/Parts

Clamps (9), (21), (22)
Cleaning Solution (App. C, Item 8A)
Container, 10 Gal.
Coolant (App. C, Item 5)
Locknuts (40), (44)
Lockwashers (13), (30), (33), (36)
Loctite 242 (App. C, Item 39)

Personnel Required

Two Personnel

WARNING

Let engine cool before removing radiator cap from radiator. Always turn cap slowly to the first stop and allow pressure to escape before removing cap completely. Removing cap while coolant is hot can result in personal injury.

NOTE

Two people are required to remove and install the radiator.

7-3. RADIATOR SERVICE/TEST (Cont'd)

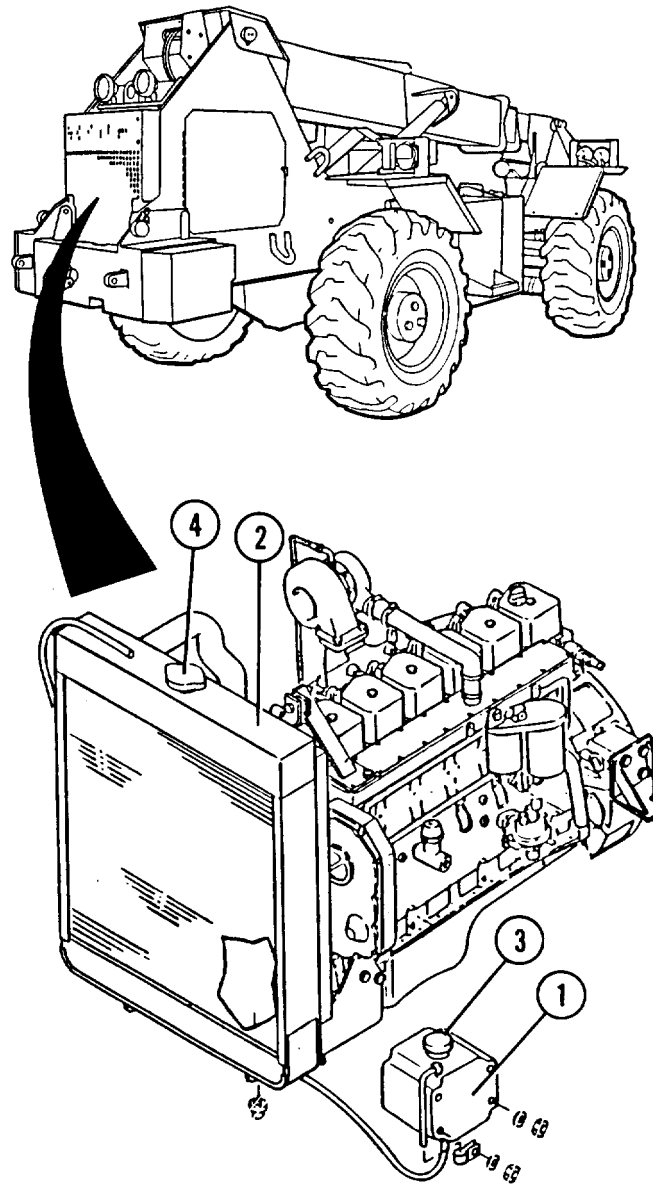
CHECKING AND ADDING ENGINE COOLANT

1. CHECK COOLANT LEVEL IN THE OVERFLOW TANK (1). TANK (1) SHOULD BE 1/3 TO 2/3 FULL.

NOTE

A 50-50 mixture of ethylene glycol and clean water is used in the 6000M. Use of plain water coolant is not recommended. Never add coolant without first diluting to a 50-50 mixture.

2. IF OVERFLOW TANK (1) IS BETWEEN 1/3 FULL AND EMPTY, OPEN OVERFLOW TANK CAP (3) AND ADD ONE QUART OF COOLANT. CLOSE CAP (3).
3. IF OVERFLOW TANK (1) IS COMPLETELY EMPTY. OPEN OVERFLOW TANK CAP (3) AND ADD TWO QUARTS OF COOLANT. CLOSE CAP (3). SLOWLY REMOVE RADIATOR CAP (4) AND ALLOW PRESSURE TO ESCAPE. ADD COOLANT TO RADIATOR (2), AS NECESSARY, UNTIL COOLANT LEVEL REACHES BOTTOM OF FILLER NECK. INSTALL RADIATOR CAP (4).



7-3 . RADIATOR SERVICE/REPLACE/TEST (Cont'd)

CHANGING COOLANT

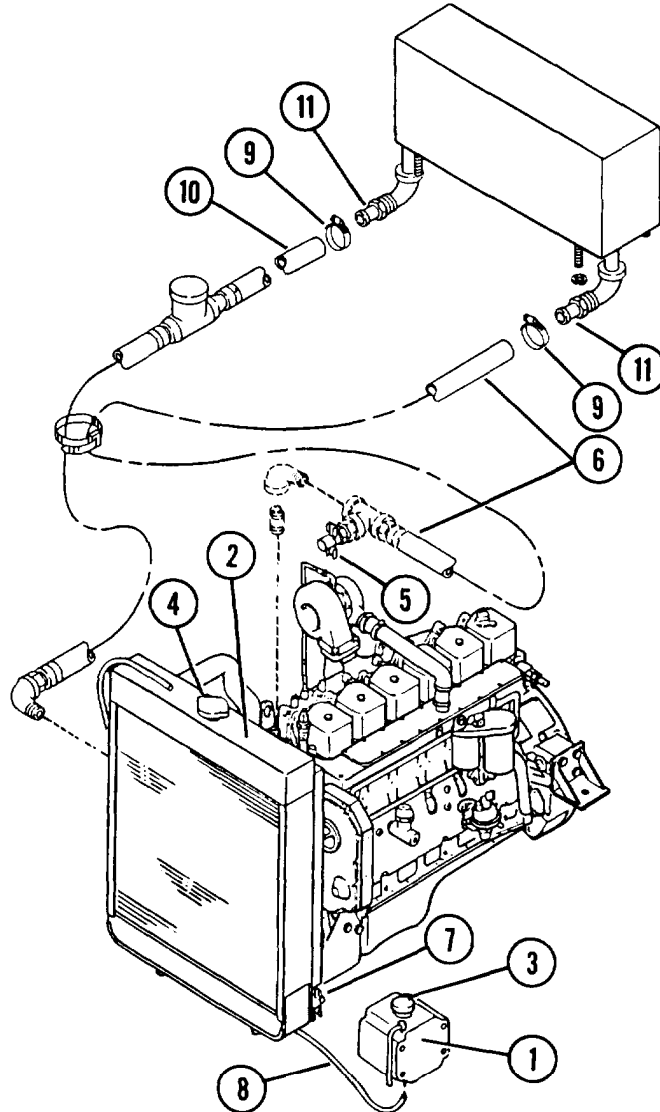
1. DRAIN ENGINE COOLING SYSTEM.

- a. Slowly remove radiator cap (4) from radiator (2) and allow pressure to escape.

NOTE

Use suitable containers to catch coolant when draining cooling system in steps 1b through 1e.

- b. Open drain cock (7) at bottom of radiator (2).
- c. Open drain cock (5) at top of engine where heater hose (6) attaches. Open drain cock (5) only enough to allow air into system.
- d. Disconnect hose (8) at bottom of overflow tank (1).
- e. Remove two clamps (9) securing cab heater hoses (6) and (10) to two connectors (11). Tag and remove hoses (6) and (10) from connectors (11). Discard clamps (9).
- f. Allow all coolant to drain from the cooling system.



2. FLUSH ENGINE COOLING SYSTEM.

- a. Position cab heater hoses (6) and (10) on two connectors (11) as tagged and secure with two new clamps (9).
- b. Connect hose (8) at bottom of overflow tank (1).
- c. Close drain cock (7) at bottom of radiator (2).

7-3. RADIATOR SERVICE/REPLACE/TEST (Cont'd)

- d. Open cap (3) of overflow tank (1) and add two quarts of cleaning solution. Close cap (3).
- e. Slowly fill the radiator (2) through the filler neck with cleaning solution until solution begins to run out of drain cock (5) at top front of engine.
- f. Close drain cock (5). Continue filling radiator (2) until solution level reaches filler neck.
- g. Clean seal on radiator cap (4) and install radiator cap to radiator (2).

NOTE

Check for cooling system leaks during step h.

- h. Start engine and allow to idle for 1/2 hour. Stop engine and allow to cool.
- i. Slowly remove radiator cap (4) from radiator (2) and allow pressure to escape.

NOTE

Use suitable containers to catch cleaning solution when draining cooling system in steps j through n.

- j. Open drain cock (5) at top of engine where heater hose (6) attaches to engine.
- k. Open drain cock (7) at bottom of radiator (2).
- l. Disconnect hose (8) at bottom of overflow tank (1).

7-3. RADIATOR SERVICE/REPLACE/TEST (Cont'd)

m. Remove two clamps (9) securing cab heater hoses (6) and (10) to two connectors (11). Tag and remove hoses (6) and (10) from connectors (11). Discard clamps (9).

n. Allow all cleaning solution to drain from the cooling system.

3. FILL ENGINE COOLING SYSTEM WITH COOLANT.

a. Position cab heater hoses (6) and (10) on two connectors (11), as tagged, and secure with two new clamps (9).

b. Connect hose (8) at bottom of overflow bottle (1).

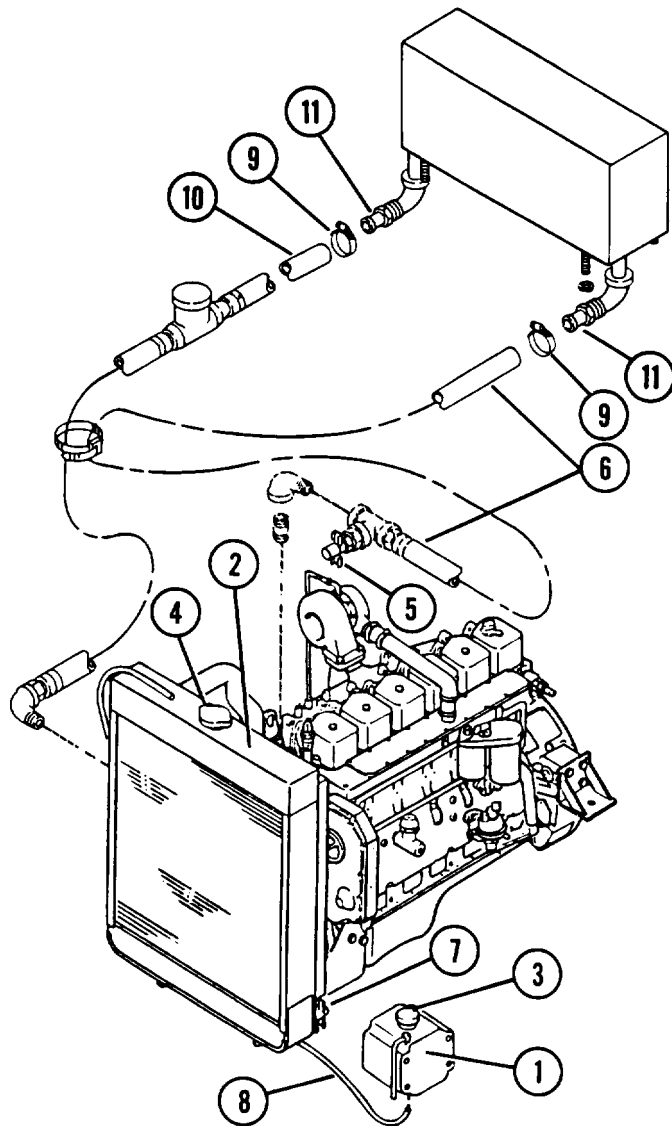
c. Close drain cock (7) at bottom of radiator (2).

d. Open cap (3) of overflow tank (1) and add two quarts of coolant. Close cap (3).

e. Slowly fill the radiator (2) through the filler neck with coolant until coolant begins to run out of drain cock (5) at top front of engine. Close drain cock (5). Continue filling radiator until coolant level reaches filler neck.

f. Clean seal on radiator cap (4) and install radiator cap to radiator (2).

9. Run the engine until normal engine operating temperature is reached. Check for coolant leaks. Turn heater on and make sure heated air is being emitted.



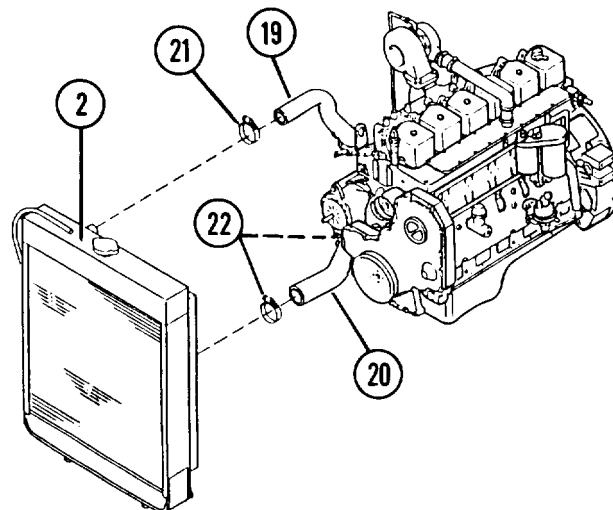
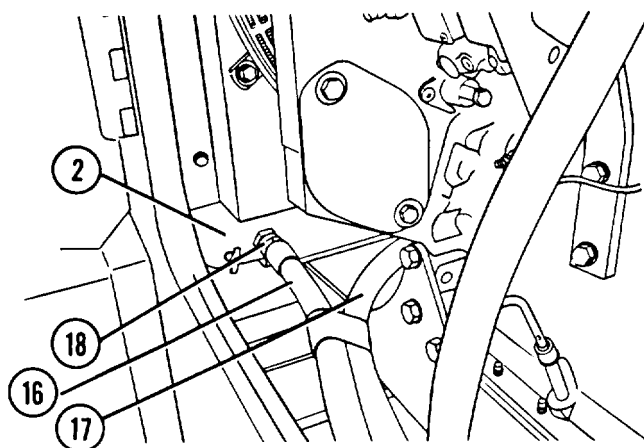
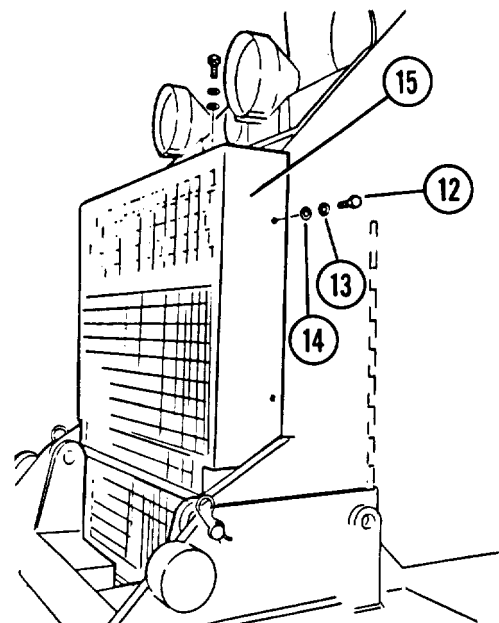
7-3. RADIATOR - SERVICE/REPLACE/TEST (Cont'd)

h. Stop the engine and let it cool. Check coolant level at overflow tank (1) and add coolant, if necessary. Refer to CHECKING AND ADDING COOLANT section of this paragraph.

4. IF REMOVED FROM STORAGE POSITION, INSTALL THE LOAD BACKREST AT REAR OF VEHICLE .

RADIATOR REMOVAL

1. REMOVE COUNTERWEIGHT, PARA. 15-3.
2. REMOVE RADIATOR COVER.
 - a. Remove eight bolts (12), eight lockwashers (13), and eight flatwashers (14) securing radiator cover (15) to vehicle frame. Discard lockwashers (13).
 - b. Remove radiator cover (15) from vehicle frame.
3. DRAIN COOLING SYSTEM AS DESCRIBED IN SERVICE SECTION, SUBPARAGRAPH 1a thru 1d.
4. TAG AND REMOVE TRANSMISSION OIL COOLER HOSES (16) AND (17), AND TWO CONNECTORS (18) FROM BOTTOM OF RADIATOR (2).
5. REMOVE ENGINE COOLING HOSES (19) AND (20) FROM RADIATOR (2).
 - a. Remove clamp (21) securing upper engine cooling hose (19) and remove hose (19) from radiator (2). Discard clamp (21).
 - b. Remove two clamps (22) securing lower engine cooling hose (20) to radiator (2) and engine. Remove hose (20) from engine first and then from radiator (2). Discard clamps (22).



7-3. RADIATOR - SERVICE/REPLACE/TEST (cont'd)

6. PULL AND REMOVE MALE CONNECTOR (23) OF PULSE TACHOMETER (24) FROM FEMALE CONNECTOR (25) OF VEHICLE WIRING HARNESS .

70 REMOVE FAN GUARDS (26) AND (27) FROM RADIATOR SHROUD (28) .

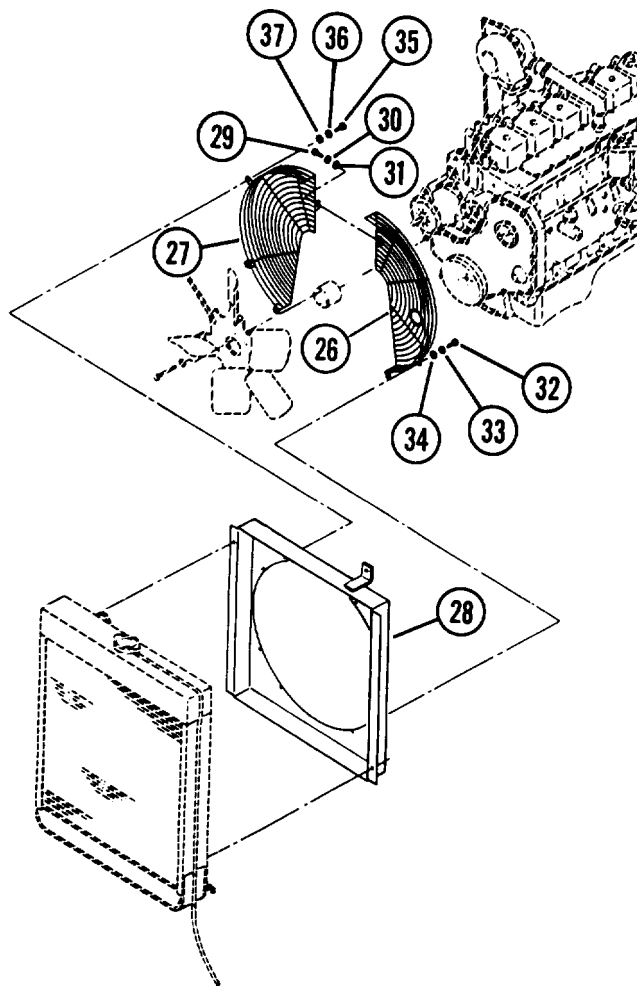
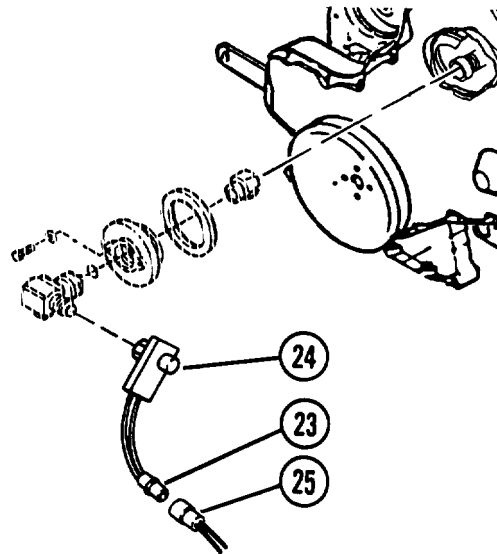
a. Remove screw (29) , lockwasher (30) , and flatwasher (31) securing right-hand fan guard (26) to left-hand fan guard (27). Discard lockwasher (30).

b. Remove four screws (32), lockwashers (33), and flatwashers (34) retaining the right-hand fan guard (26) to radiator shroud (28). Discard lockwashers (33).

c. Remove right-hand fan guard (26) from engine compartment.

d. Remove four screws (35), lockwashers (36), and flatwashers (37) retaining left-hand fan guard (27) to radiator shroud (28). Discard lockwashers (36).

e. Remove left-hand fan guard (27) from engine compartment.



7-3. RADIATOR - SERVICE/REPLACE/TEST (Cont'd)

8. REMOVE CAPSCREW (38) , WASHER (39) , AND LOCKNUT (40) SECURING BRACKET (41) TO RADIATOR SHROUD (28). LEAVE RUBBER BUSHING (42) INSTALLED TO BRACKET (41). DISCARD LOCKNUT (40).

9. REMOVE RADIATOR (2) FROM ENGINE COMPARTMENT.

a. Have an assistant support the radiator (2).

NOTE

Studs (43) may unscrew from radiator (2) as nuts (44) are removed.

b. Remove two locknuts (44) and two rebound washers (45) securing radiator (2) to radiator support (46). Discard locknuts (41).

c. Remove radiator (2) from engine compartment.

d. If necessary, remove two rubber mounts (47) from radiator (2).

10. IF NECESSARY, REMOVE RADIATOR SHROUD (28) FROM RADIATOR (2)

a. Remove eight capscrews (48), securing radiator shroud (28) to radiator (2).

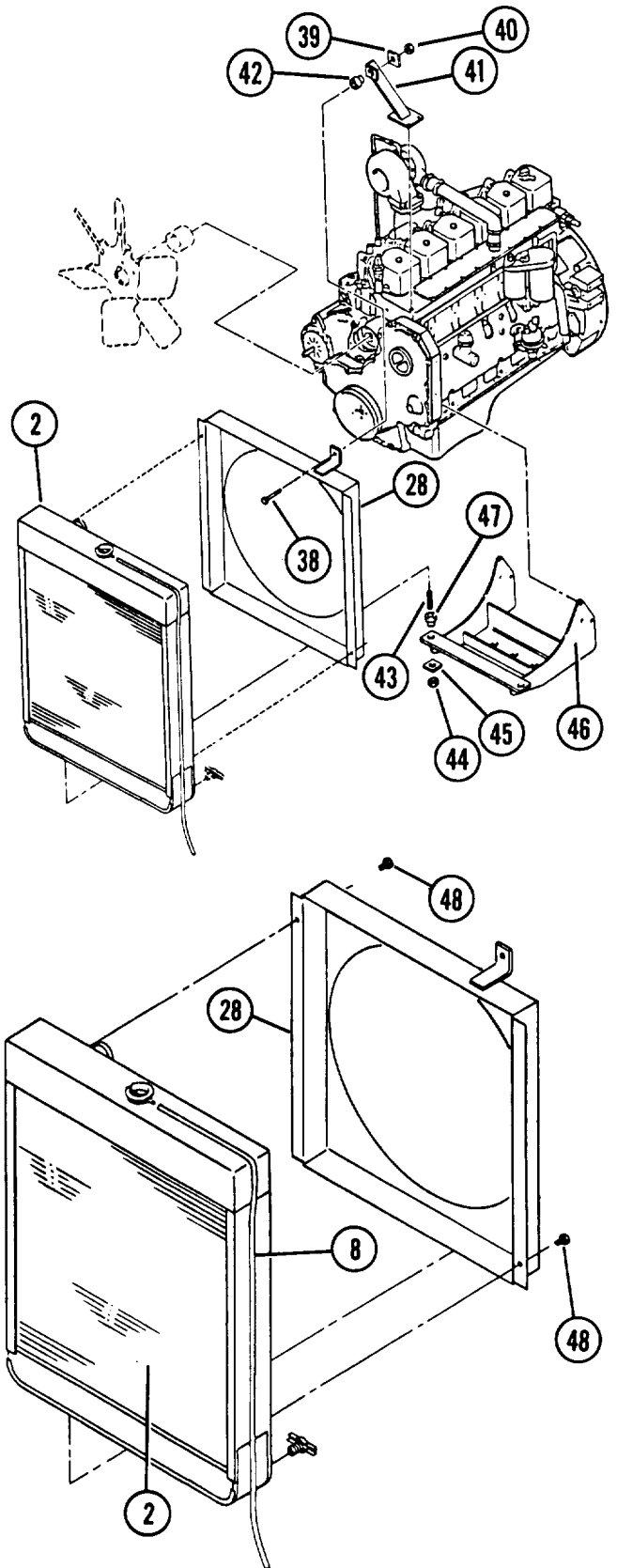
b. Remove shroud (28) from radiator (2).

11. IF NECESSARY, REMOVE OVERFLOW HOSE (8) FROM RADIATOR (2).

RADIATOR INSTALLATION

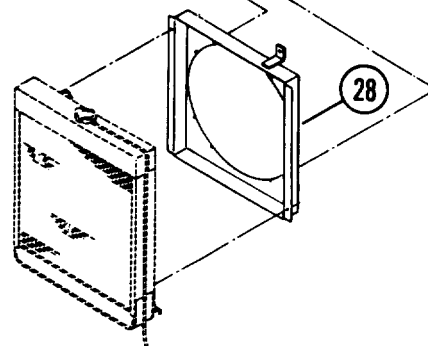
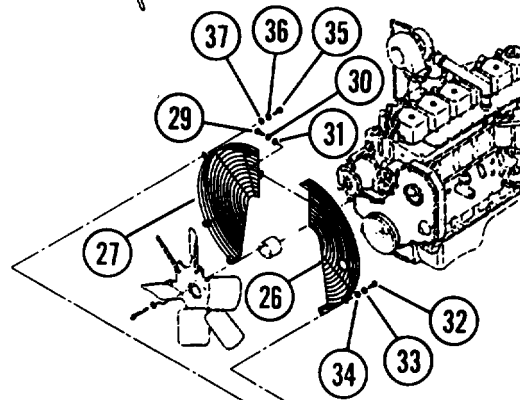
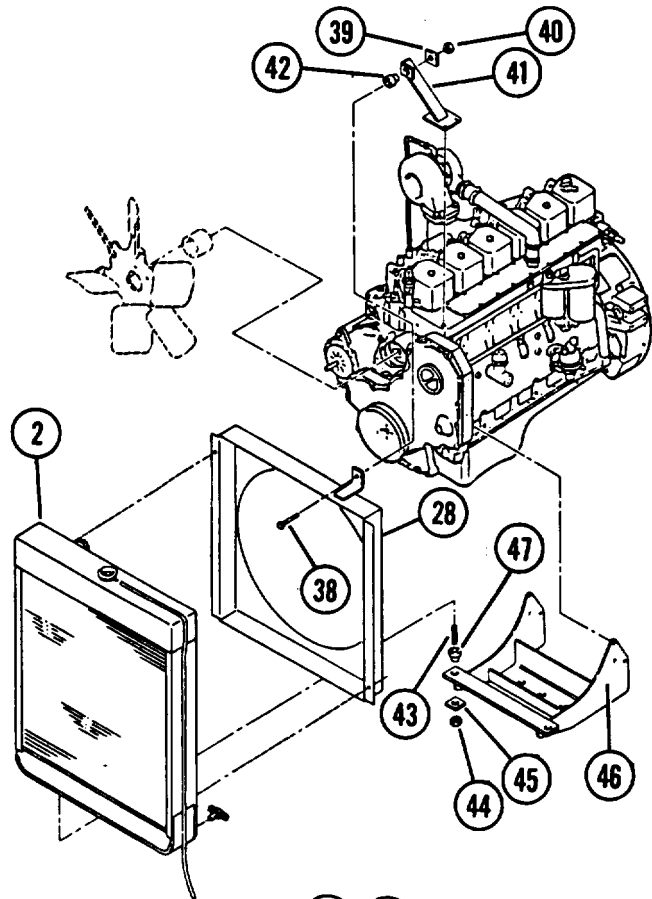
1. IF REMOVED, INSTALL OVERFLOW HOSE (8) TO RADIATOR (2).

2. IF REMOVED, INSTALL RADIATOR SHROUD (28) TO RADIATOR (2).



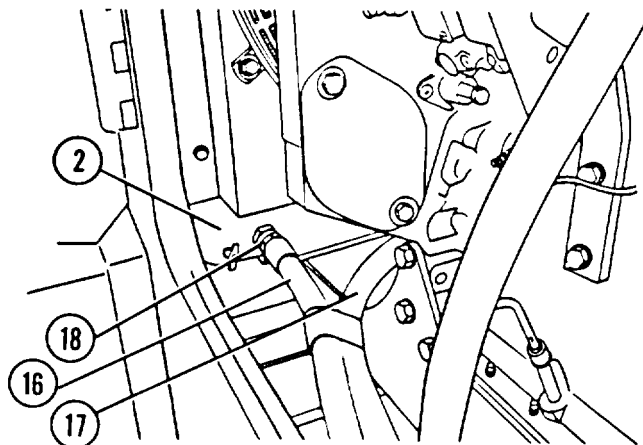
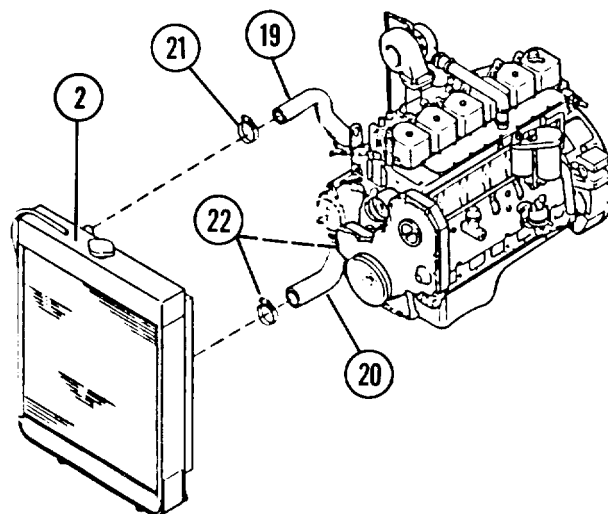
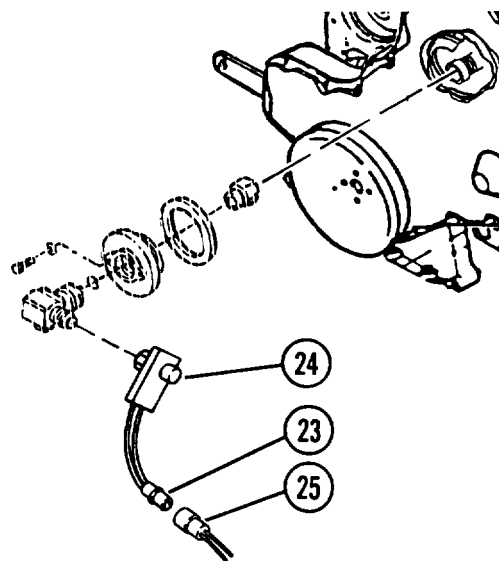
7-3. RADIATOR - SERVICE/REPLACE/TEST (Cont'd)

- a. Position shroud (28) on radiator (2).
 - b. Secure shroud (28) to radiator (2) with eight capscrews (48).
3. INSTALL RADIATOR (2) TO ENGINE COMPARTMENT .
 - a. If removed, install studs (43) to radiator (2).
 - b. If removed, install two rubber mounts (47) to radiator (2).
 - c. Position radiator (2) on radiator support (46).
 - d. Secure radiator (2) to radiator support (46) with two rebound washers (45) and two new locknuts (44).
 4. SECURE BRACKET (41) TO RADIATOR SHROUD (28) WITH CAPSCREW (38), WASHER (39), AND NEW LOCKNUT (40).
 5. INSTALL FAN GUARDS (26) AND (27) TO RADIATOR SHROUD (28).
 - a. Position left-hand fan guard (27) on radiator shroud (28).
 - b. Secure left-hand fan guard (27) to radiator shroud (28) with four flatwashers (37), four new lockwashers (36), and four screws (35).
 - c. Position right-hand fan guard (26) on radiator shroud (28).
 - d. Secure right-hand fan guard (26) to radiator shroud (28) with four flatwashers (34), four new lockwashers (33), and four screws (32).



7-3. RADIATOR - SERVICE/REPLACE/TBST (Cont'd)

- e. Secure right-hand fan guard (26) to left-hand fan guard (27) with flatwasher (31), new lockwasher (30), and screw (29).
6. PUSH AND INSTALL MALE CONNECTOR (23) OF PULSE TACHOMETER (24) INTO FEMALE CONNECTOR (25) OF VEHICLE WIRING HARNESS .
7. INSTALL ENGINE COOLING HOSES (19) AND (20) TO RADIATOR (2).
 - a. Position upper engine cooling hose (19) on radiator (2) and secure with new clamp (21).
 - b. Position lower engine cooling hose (20) on engine first, then on radiator (2). Secure with two new clamps (22).
8. INSTALL TRANSMISSION OIL COOLER HOSES (16) AND (17), AND TWO CONNECTORS (18) TO BOTTOM OF RADIATOR (2).
9. INSTALL COUNTERWEIGHT, PARA. 15-3.
10. FILL RADIATOR (2) AS DESCRIBED IN SERVICE SECTION OF THIS PARAGRAPH.



7-3. RADIATOR - SERVICE/REPLACE/TEST (Cont'd)

11. INSTALL RADIATOR COVER.

- a. Position radiator cover (15) on vehicle frame.

NOTE

Apply Loctite 242 to bolts (12).

- b. Secure radiator cover (15) to vehicle frame with eight flatwashers (14), eight new lockwashers (13), and eight bolts (12).

12. IF REMOVED FROM STORAGE POSITION, INSTALL THE LOAD BACKREST AT REAR OF VEHICLE .

13. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

PRESSURE TESTING COOLING SYSTEM

NOTE

If cooling system pressure loss is suspected, check radiator cap (4) first. Any foreign material or deposits on cap, cap seal, or radiator opening can cause pressure loss.

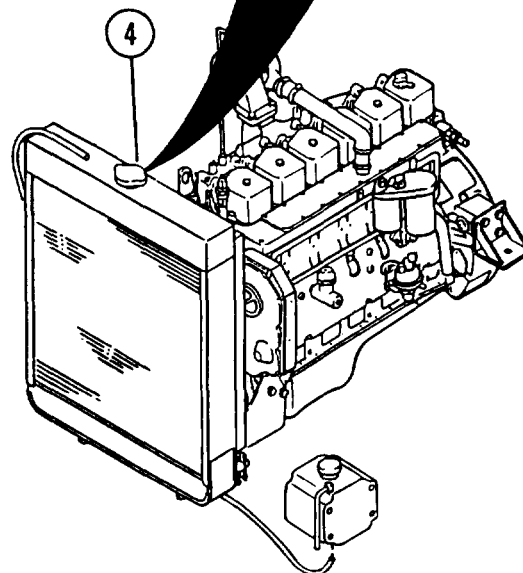
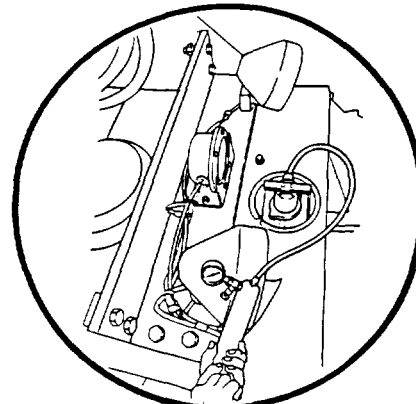
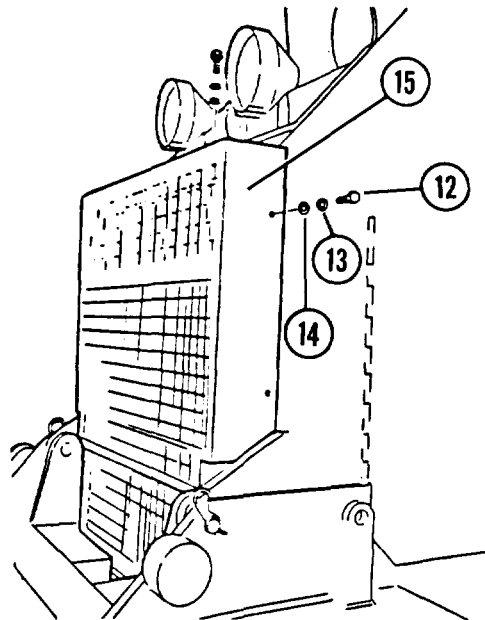
1. REMOVE RADIATOR CAP(4).

NOTE

Make sure the radiator is adequately filled.

2. ATTACH COOLING SYSTEM PRESSURIZER TO RADIATOR FILLER NECK.

3. PRESSURIZE COOLING SYSTEM TO BETWEEN EIGHT AND TEN PSI.



7-3. RADIATOR - SERVICE/REPLACE/TEST (Cont'd)

4. CHECK COOLING SYSTEM FOR LEAKAGE.
 - a. Check radiator for visible leakage. Replace radiator if leaks are present. Refer to REMOVAL and INSTALLATION sections of this paragraph.
 - b. Check all connections and hoses of cooling system for visible leakage. Replace leaking heater and radiator hoses as required, para. 7-5.

NOTE

If leakage is not observed in steps a and b above, continue to pressurize system for five minutes and observe pressure gauge on cooling system pressurizer.

NOTE

If pressure remains constant after five minutes of pressurization, radiator and cooling system do not have leakage.

If pressure lowers during five minutes of pressurization, internal cooling system leak in engine or transmission is present. Refer to Direct Support Maintenance.

5. AFTER TEST IS COMPLETED, REMOVE PRESSURIZER FROM RADIATOR FILLER NECK AND INSTALL RADIATOR CAP (4).
6. IF REMOVED FROM STORAGE POSITION, INSTALL THE LOAD BACKREST AT REAR OF VEHICLE .

7-4. THERMOSTAT AND WATER OUTLET - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

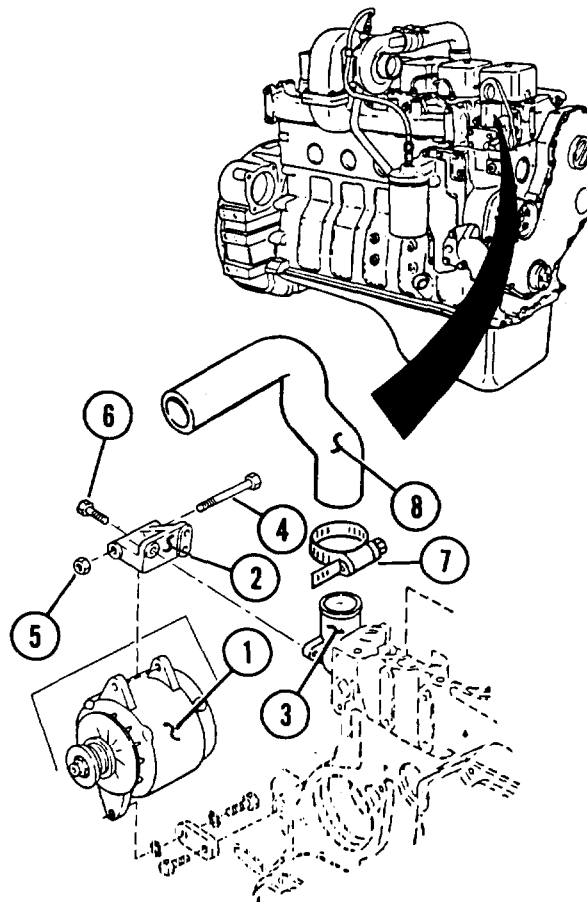
Clamp (7)
Gasket (10)

Equipment Condition

Vehicle parked on level ground.
Engine cool.
Coolant drained from engine cooling
system, Para. 7-3.
Drive belt removed from alternator
pulley, Para. 7-9.
Negative battery cable disconnected, Para. 8-44.

REMOVAL

1. REMOVE ALTERNATOR (1) FROM ALTERNATOR SUPPORT (2) AND REMOVE SUPPORT (2) FROM WATER OUTLET (3).
 - a. Remove capscrew (4) and nut (5) securing alternator (1) to support (2).
 - b. Position alternator (1) away from support (2).
 - c. Remove three capscrews (6) and support (2) from water outlet (3).



7-4. THERMOSTAT AND WATER OUTLET - REPLACE (Cont'd)

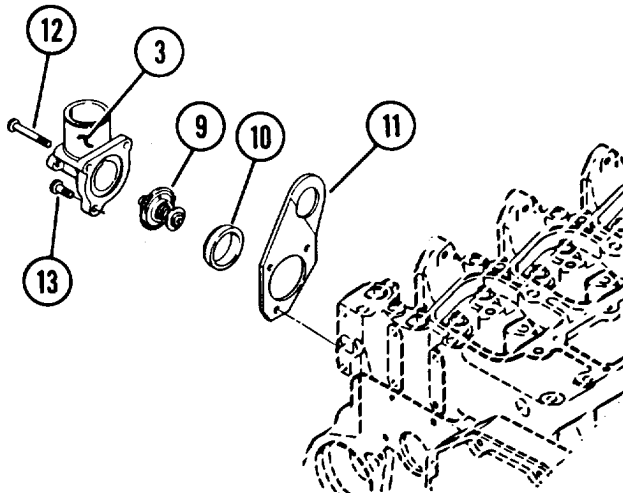
2. REMOVE CLAMP (7) AND HOSE (8) FROM WATER OUTLET (3) . DISCARD CLAMP (7) .

NOTE

Note position of thermostat (9) and gasket (10) in water outlet (3) for use during installation.

3. REMOVE WATER OUTLET (3), THERMOSTAT (9), GASKET (10), AND LIFTING BRACKET (11) FROM ENGINE .

- a. Remove two bolts (12) and one capscrew (13) from thermostat housing (3).
- b. Remove water outlet (3), thermostat (9), gasket (10), and lifting bracket (11) from engine. Discard gasket (10).



INSTALLATION

CAUTION

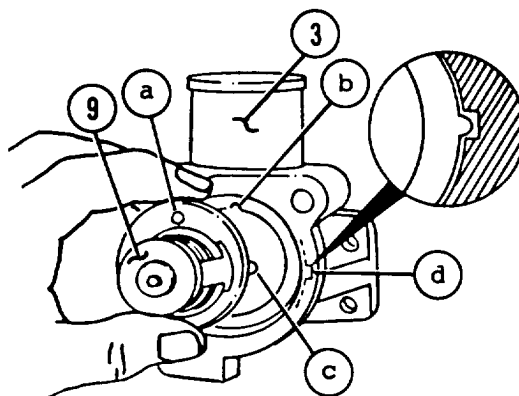
Make sure thermostat (9) and gasket (10) are properly positioned as noted during removal to avoid coolant leaks and thermostat malfunction.

NOTE

Clean all sealing surfaces thoroughly before installing thermostat (9), new gasket (10) and water outlet (3).

1. INSTALL WATER OUTLET (3), THERMOSTAT (9), NEW GASKET (10), AND LIFTING BRACKET (11) TO ENGINE.

- a. Position thermostat (9), in water outlet (3), with pin (a) in notch (b) and tang (c) in slot (d).



7-4. THERMOSTAT AND WATER OUTLET - REPLACE (Cont'd)

- b. Position water outlet (3), thermostat (9), new gasket (10), and lifting bracket (11), on engine.
 - c. Install two bolts (12) and one capscrew (13) to water outlet (3). Tighten bolts (12) and capscrew (13) to 216 lb. in.
2. POSITION HOSE (8) ON WATER OUTLET (3). SECURE WITH NEW CLAMP (7).
 3. INSTALL ALTERNATOR SUPPORT (2) To WATER OUTLET (3) AND INSTALL ALTERNATOR (1) TO SUPPORT (2).
 - a. Position support (2) on water outlet (3) and secure with three capscrews (6). Torque capscrews (6) to 216 lb.in.
 - b. Align alternator (1) with support (2) .
 - co Secure alternator (1) to support (2) with capscrew (4) and nut (5).
 4. INSTALL DRIVE BELT TO ALTERNATOR PULLEY, PARA. 7-9.
 5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
 6. FILL ENGINE COOLING SYSTEM WITH COOLANT, PARA. 7-3.

 7-5. RADIATOR HOSES - REPLACE/INSPECT

This task covers:

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

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
 Engine cool.
 Coolant drained from engine,
 para. 7-3.

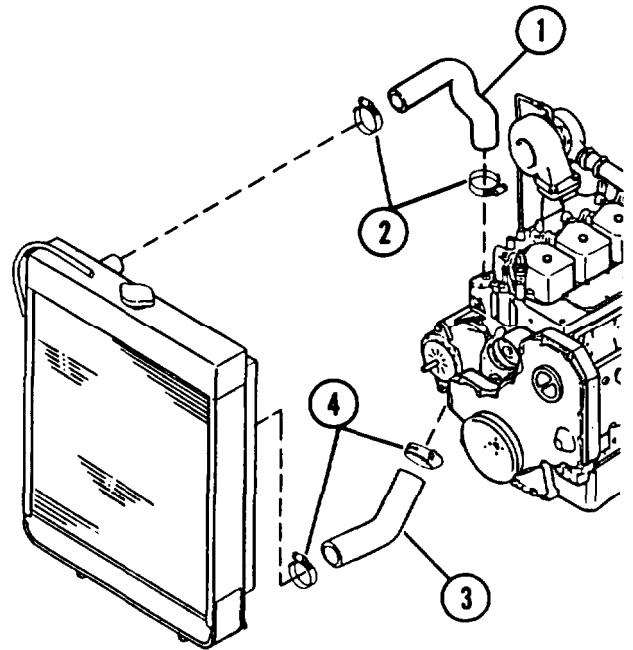
Materials/Parts

Flashlight
 Mirror
 Rags (App. C, Item 38A)
 Scraper or Knife
 Clamps (2), (4)

REMOVAL

REMOVE UPPER AND LOWER RADIATOR HOSES.

- a. At upper radiator hose (1),
 loosen two hose clamps (2).
- b. Remove upper radiator hose (1).
- c. At lower radiator hose (3),
 loosen two hose clamps (4).
- d. Remove lower radiator hose (3).
- e. Remove and discard clamps (2) and
 (4).



INSTALLATION

NOTE

Clean hose fittings on engine and radiator. Scrape all rubber residue from hose fittings to avoid coolant leaks.

1. INSTALL UPPER AND LOWER RADIATOR HOSES .
 - a. Slide one end of upper hose (1)
 on engine water outlet.
 - b. Open two new hose clamps (2) and
 slide them on hose (1).

7-5. RADIATOR HOSES - REPLACE/INSPBCT (Cont'd)

- c. Slide other end of hose (1) on upper radiator fitting.
 - d. Position one clamp (2) at each end of hose (1) and tighten clamps (2).
 - e. Slide one end of lower radiator hose (3) on lower radiator fitting.
 - f. Open two new hose clamps (4) and slide them on hose (3).
 - g. Slide other end of hose (3) on engine water inlet.
 - h. Position one clamp (4) at each end of hose (3) and tighten clamps (4).
2. FILL ENGINE WITH COOLANT, PARA. 7-3.

INSPECTION

- 1. INSPECT UPPER (1) AND LOWER (3) RADIATOR HOSES FOR CRACKS AND CUTS. USE MIRROR AND FLASHLIGHT TO SEE BACKSIDE OF HOSES.
- 2. SQUEEZE HOSES (1) AND (3) TO CHECK FOR SOFT SPOTS.
- 3. IF NECESSARY, REPLACE HOSES (1) AND (3). SEE REMOVAL AND INSTALLATION SECTIONS OF THIS PARAGRAPH.

7-6. WATER PUMP - REPLACE

This task covers:
 a. Removal
 b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
 Maintenance, Common #2 Less Power

Materials Needed

Gasket (4)

Equipment Condition

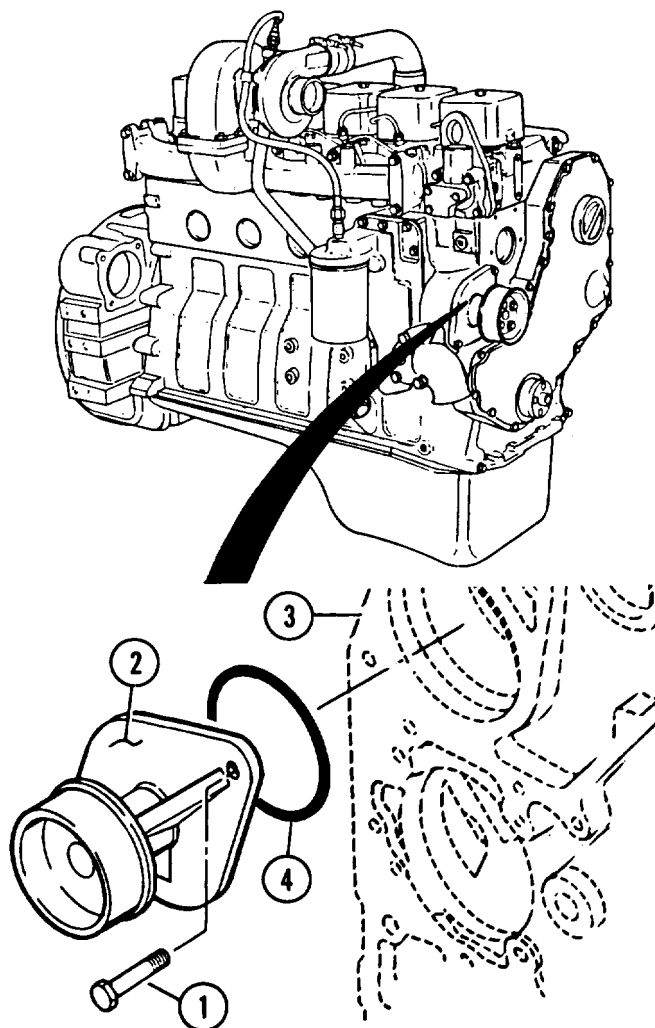
Vehicle parked on level ground.
 Engine off and cool.
 Coolant drained, para. 7-3.
 Left-hand fan guard removed, para. 7-8.
 Fan drive belt removed, para. 7-9.

REMOVAL

1. REMOVE TWO CAPSCREWS (1) HOLDING WATER PUMP (2) TO ENGINE (3)
2. REMOVE WATER PUMP (2) AND GASKET (4). DISCARD GASKET (4).

INSTALLATION

1. CLEAN SEALING SURFACE ON ENGINE (3) WHERE WATER PUMP (2) ATTACHES TO ENGINE (3).
2. INSTALL NEW GASKET (4) INTO GROOVE ON PUMP (2).
3. INSTALL PUMP (2) USING TWO CAPSCREWS (1). TIGHTEN CAPSCREWS TO 216 IN. LBS.
4. INSTALL FAN DRIVE BELT, PARA. 7-9.
5. INSTALL LEFT-HAND FAN GUARD, PARA. 7-8.
6. FILL RADIATOR WITH COOLANT, PARA. 7-3.



7-7. ENGINE COOLING FAN - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

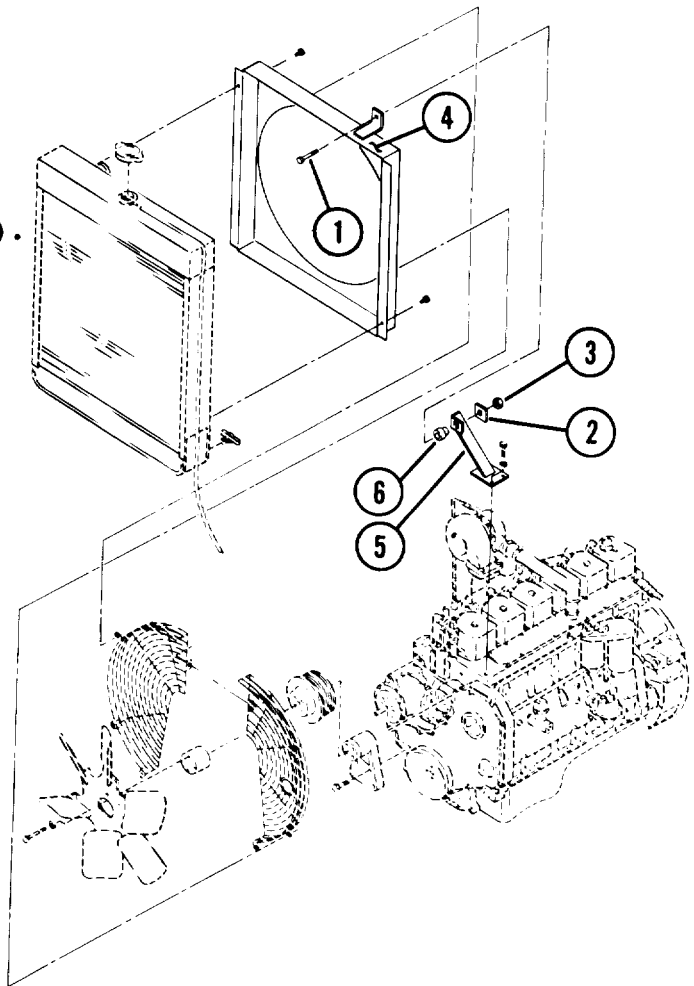
Loctite 242 (App. C, Item 39)
 Lockwashers (9)
 Locknut (3)

Equipment Condition

Vehicle parked on level ground.
 Engine off and cool.

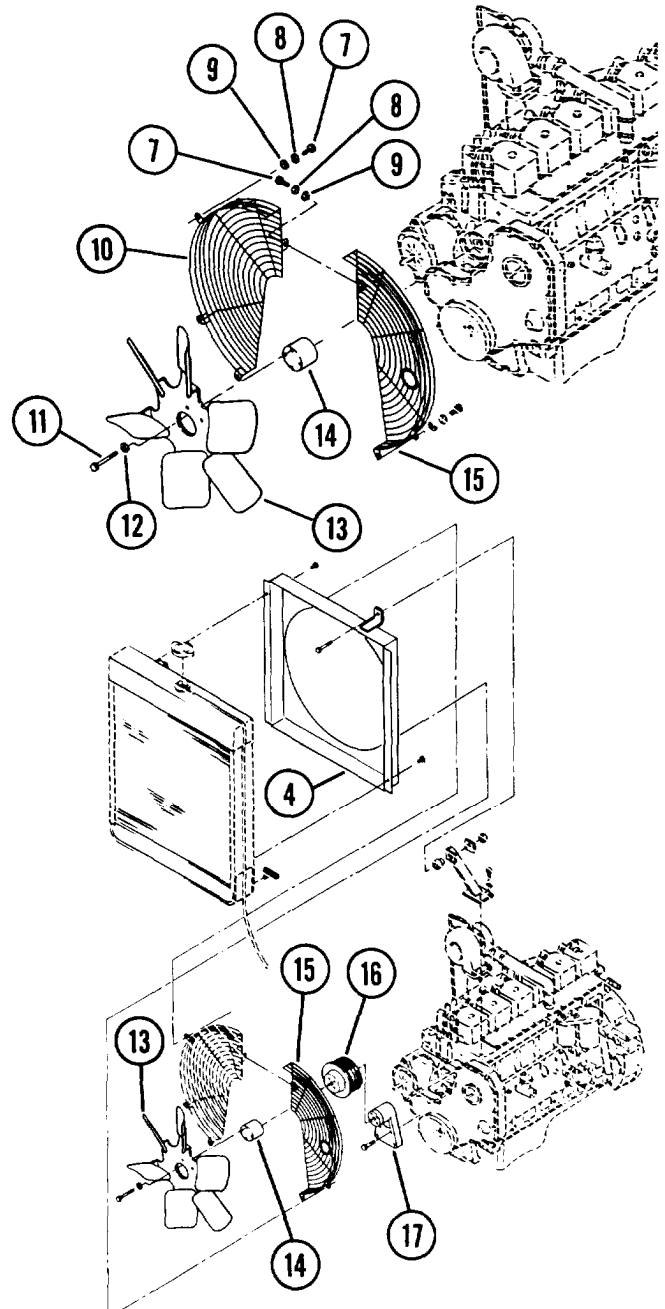
REMOVAL

1. REMOVE DRIVE BELT FROM AROUND ALTERNATOR PULLEY TO RELIEVE BELT TENSION, PARA. 7-9.
2. REMOVE TOP RADIATOR SHROUD CAPSCREW (1), REBOUND WASHER (2), AND LOCKNUT (3). DISCARD LOCKNUT (3).
3. INSERT A PRYBAR BETWEEN RADIATOR SHROUD (4) AND BRACKET (5) AND WEDGE THE RADIATOR SHROUD (4) REARWARD. LEAVE THE RUBBER MOUNT (6) IN BRACKET (5).



7-7. ENGINE COOLING FAN - REPLACE (Cont'd)

4. REMOVE FIVE SCREWS (7) , FIVE FLATWASHERS (8), AND FIVE LOCKWASHERS (9) RETAINING THE LEFT HALF OF THE FAN GUARD (10). REMOVE FAN GUARD HALF (10). DISCARD LOCKWASHERS (9).
5. REMOVE FOUR SCREWS (11) AND FOUR FLATWASHERS (12) FROM THE FAN (13).
6. SEPARATE THE FAN (13) FROM THE SpACER (14). REST THE FAN (13) AGAINST THE RIGHT HALF OF THE FAN GUARD (15). REMOVE THE SPACER (14) , THEN REMOVE THE FAN (13) AND PULLEY (16).



INSTALLATION

CAUTION

To prevent damage to the engine, install the fan (13) with the concave side of the blades toward the engine.

NOTE

The pry bar installed during removal may have to be loosened to install the fan (13) .

1. POSITION THE FAN (13) LOOSELY INTO THE RADIATOR SHROUD (4) OPENING. REST FAN ON RIGHT GUARD (15).
2. POSITION PULLEY (16) AND SPACER (14) ALIGN BOLT HOLES OF FAN (13), SPACER (14), AND PULLEY (16).

CAUTION

Do not use lockwashers to secure the fan (13). Use only flatwashers (12).

- 3* APPLY LOCTITE 242 TO THREADED AREA OF SCREWS (11). INSTALL FOUR SCREWS (11) AND FLATWASHERS (12) TO SECURE FAN (13). TIGHTEN TO 216 IN. LB.
4. INSTALL LEFT GUARD HALF (10) USING FIVE SCREWS (7), FIVE FLATWASHERS (8). AND FIVE NEW LOCKWASHERS (9).
5. REMOVE PRYBAR. INSTALL CAPSCREW (1), REBOUND WASHER (2), AND NEW LOCKNUT (3). TIGHTEN TO 23 LB. FT.
6. INSTALL DRIVE BELT AROUND ALTERNATOR PULLEY. BE SURE DRIVE BELT IS ROUTED PROPERLY AROUND ALL ENGINE PULLEYS, PARA. 7-9.

7-8. ENGINE (COOLING FAN GUARDS - REPLACE)

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwashers (3)

Equipment Condition

Vehicle parked on level ground.

Engine OFF and cool.

NOTE

Right and left-hand fan guards may be removed and installed separately. If right-hand fan guard is to be removed, STE/ICE pulse tachometer must be removed first to provide clearance, para. 8-30.

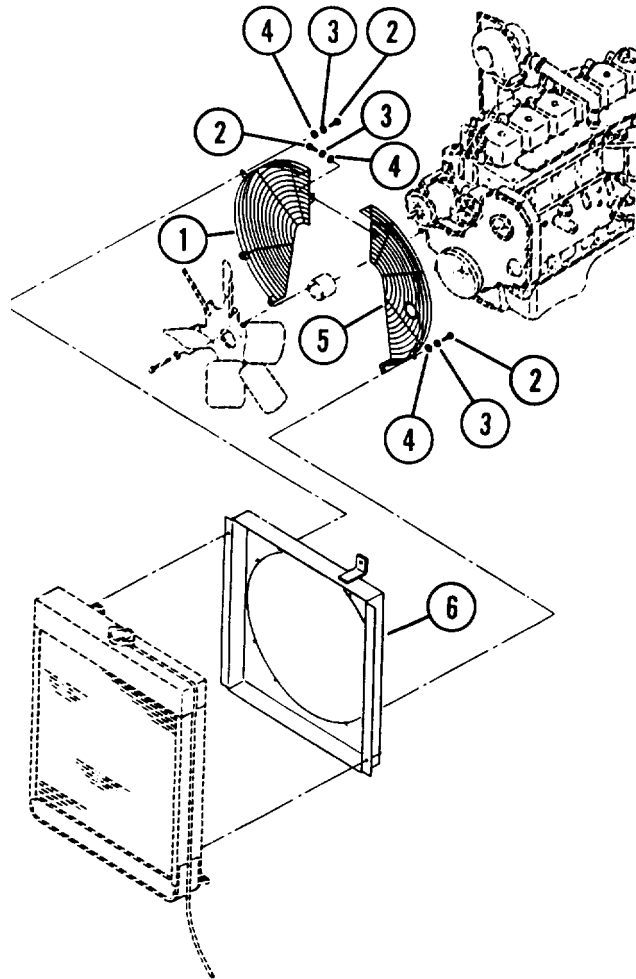
REMOVAL

1. REMOVE LEFT-HAND FAN GUARD (1).

- a. Through left-hand engine access door, remove screw (2), lockwasher (3) and flatwasher (4) securing left-hand fan guard (1) to right-hand fan guard (5). Discard lockwasher (3).
- b. Remove four screws (2), lockwashers (3) and flatwashers (4) securing left-hand fan guard (1) to radiator shroud (6). Discard lockwashers (3).
- c. Remove left-hand fan guard (1) from engine compartment.

2. REMOVE RIGHT-HAND FAN GUARD (5).

- a. Through right-hand engine access door, remove four screws (2), lockwashers (3) and flatwashers (4) securing right-hand fan guard (5) to radiator shroud (6). Discard lockwashers (3).
- b. Remove right-hand fan guard (5) from engine compartment.



7-8. ENGINE COOLING FAN GUARDS - REPLACE (Cont'd)

INSTALLATION

1. INSTALL RIGHT-HAND FAN GUARD (5).
 - a. Through left-hand engine access door, position right-hand fan guard (5) on radiator shroud (6).
 - b. Secure right-hand fan guard (5) to radiator shroud (6) with four flatwashers (4), four new lockwashers (3) and four screws (2).
2. INSTALL LEFT-HAND FAN GUARD (1).
 - a. Through left-hand engine access door, position left-hand fan guard (1) on radiator shroud (6).
 - b. Secure left-hand fan guard (1) to radiator shroud (6) with four flatwashers (4), four new lockwashers (3) and four screws (2).
 - c. Secure left-hand fan guard (1) to right-hand fan guard (5) with flatwasher (4), new lockwasher (3) and screw (2).
3. IF REMOVED, INSTALL STE/ICE PULSE TACHOMETER, PARA. 8-30.

7-9. DRIVE BELT AND TENSIONER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Equipment Condition

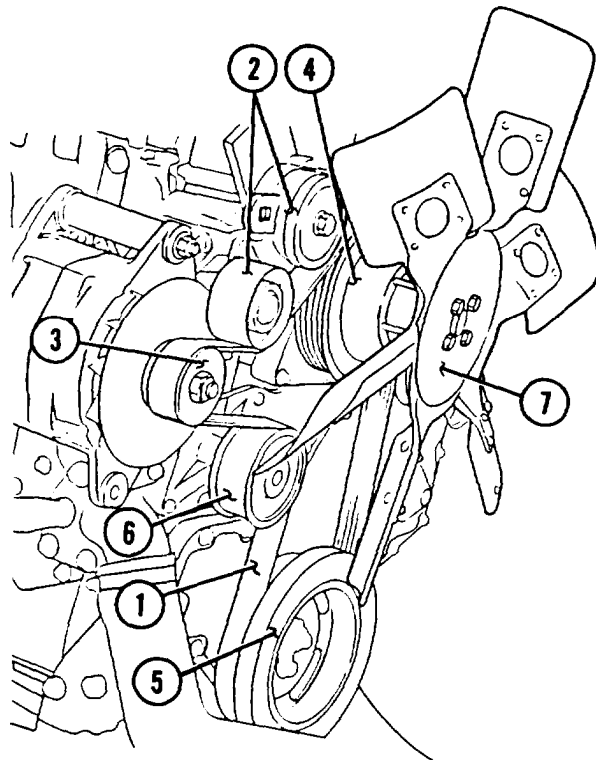
Vehicle parked on level ground.
Engine cool.
Fan guards removed, Para. 7-8.

NOTE

Drive belt deflection when measured midway between longest span of belt should be no greater than 1/2 inch. If deflection is greater than 1/2 inch, replace belt. Drive belt tension is not adjustable.

REMOVAL

1. REMOVE DRIVE BELT (1).
 - a. Lift tensioner (2).
 - b. Remove belt (1) from alternator pulley (3), fan pulley (4), crankshaft pulley (5), and water pump pulley (6).
 - c. Position belt (1) around blades of fan (7) and remove from vehicle.



7-9, DRIVE BELT AND TENSIONER - REPLACE (Cont'd)

2. IF NECESSARY, REMOVE TENSIONER (2).

- a. Remove capscrew (8) and tensioner (2) from bracket (9).
- b. If necessary, remove two capscrews (10) and bracket (9) from engine.

INSTALLATION

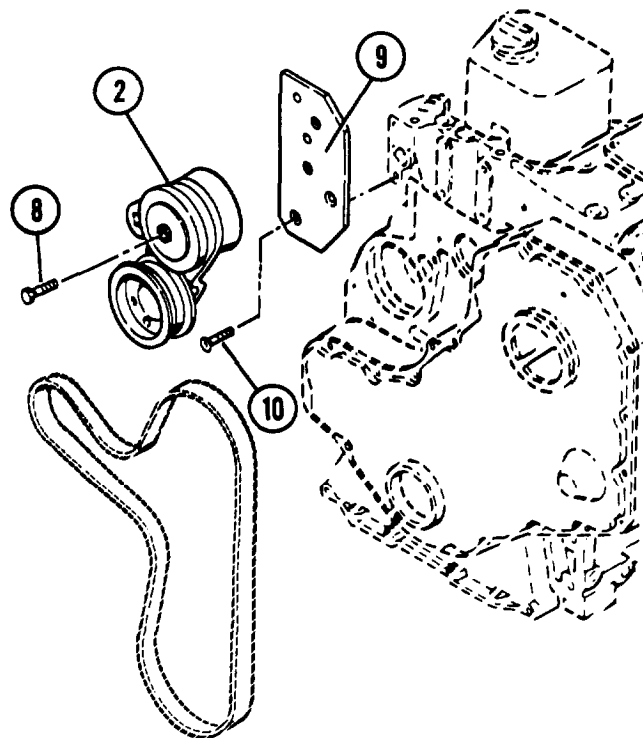
1. IF REMOVED, INSTALL TENSIONER (2).

- a. If removed, secure bracket (9) to engine with two capscrews (10). Torque capscrews to 216 lb. in.
- b. Align mounting hole on tensioner (2) with lower mounting hole on bracket (9).
- c. Secure tensioner (2) to bracket (9) with capscrew (8). Torque capscrew (8) to 32 lb. ft.

2. INSTALL DRIVE BELT (1).

- a. Position belt (1) around blades of fan (7).
- b. Place belt (1) on crankshaft pulley (5), fan pulley (4), and water pump pulley (6).
- c. Lift tensioner (2) and place belt (1) on alternator pulley (3) and under tensioner (2). Lower tensioner assembly (2).

3. INSTALL FAN GUARDS, PARA. 7-8.



7-10. COOLANT OVERFLOW TANK - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

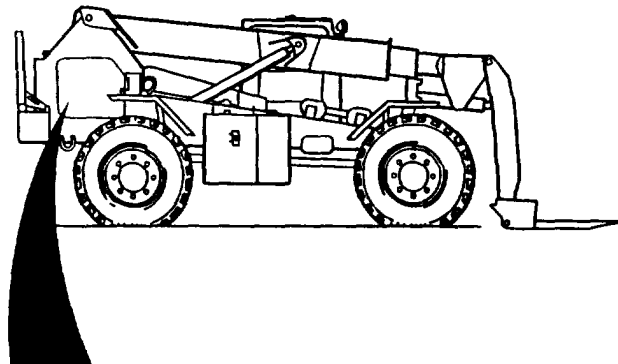
Vehicle parked on level ground.
Engine cool.

Materials/Parts

Container, 2 qt.
Coolant (App. C, Item 5)
Locknuts (3)

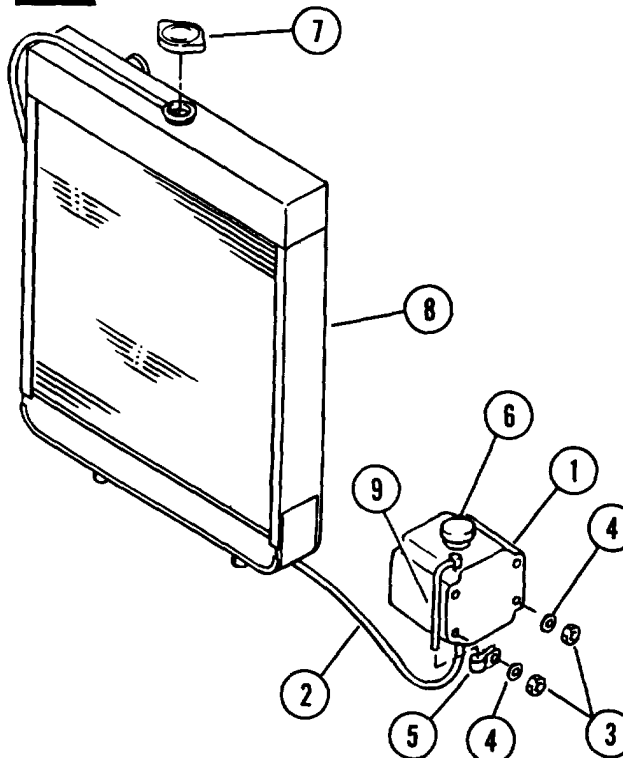
REMOVAL

1. DRAIN COOLANT OVERFLOW TANK (1)
 - a. Place container under tank (1).
 - b. Disconnect hose (2) from bottom of tank (1) and allow coolant to drain from tank (1).
2. REMOVE FOUR LOCKNUTS (3), FOUR FLATWASHERS (4), ONE CLAMP (5), AND COOLANT OVERFLOW TANK (1). DISCARD LOCKNUTS (3).



INSTALLATION

1. [NSTALL COOLANT OVERFLOW TANK (1) TO VEHICLE.
 - a. Position clamp (5) around discharge hose (9) of tank (1).
 - b. Position tank (1) on vehicle and secure with four flatwashers (4) and four new locknuts (3).
 - c. Connect hose (2) to bottom of tank (1).

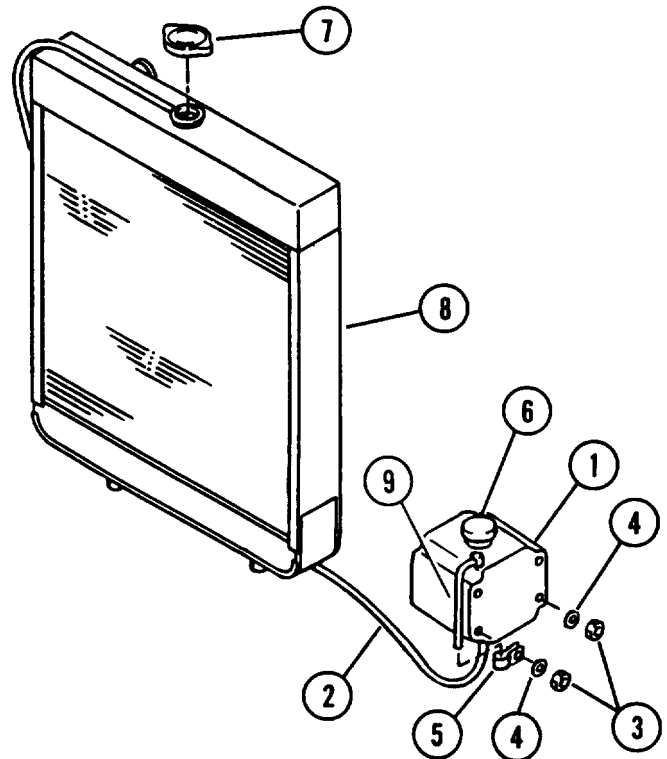


7-10. COOLANT OVERFLOW TANK - REPLACE (Cont'd)

2. FILL COOLANT OVERFLOW TANK (1).**NOTE**

A 50-50 mixture of ethylene glycol and clean water is used in the 6KVRRTFL. Use of plain water coolant is not recommended. Never add coolant without first diluting to a 50-50 mixture.

- a. Open overflow tank cap (6).
- b. Add two quarts of coolant to overflow tank (1).
- c. Close overflow tank cap (6).
- d. Slowly remove radiator cap (7) and allow pressure to escape.
- e. Add coolant to radiator (8) as necessary, until coolant level reaches bottom of filler neck.
- f. Install radiator cap (7).



7-11. WATER INLET - REPLACE

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Clamps (2)
Seal (6)

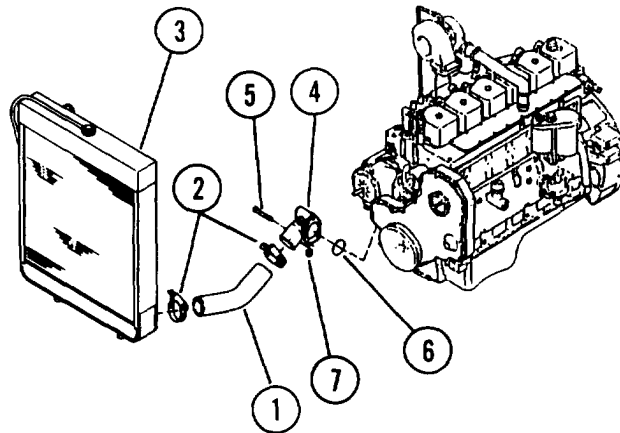
Equipment Condition

Vehicle parked on level ground.
Engine cool.
Coolant drained from engine,
para. 7-3.

REMOVAL

1. REMOVE LOWER RADIATOR HOSE (1).
 - a. Loosen two clamps (2) at lower radiator hose (1).
 - b. Remove lower radiator hose (1) from radiator (3) and water inlet (4).
2. REMOVE WATER INLET (4).

Remove three bolts (5), water inlet (4), and seal (6) from engine.
Discard seal (6).
3. IF NECESSARY, REMOVE TWO PLUGS (7).



7-11. WATER INLET - (C o n t ' d)

INSTALLATION

NOTE

Clean hose fittings on engine and radiator. Scrape all rubber residue from hose fittings to avoid coolant loss.

1. IF REMOVED, INSTALL TWO PLUGS (7).
2. INSTALL WATER INLET (4).
 - a. Position new seal (6) and water inlet (4) on engine.
 - b. Secure water inlet (4) with three bolts (5).
3. INSTALL LOWER RADIATOR HOSE (1).
 - a. Slide ends of lower radiator hose (1) on water inlet (4) and radiator (3).
 - b. Secure lower radiator hose (1) with two new clamps (2).
4. FILL COOLING SYSTEM WITH COOLANT ,
PARA. 7-3.

CHAPTER 8

ELECTRICAL SYSTEM MAINTENANCE

8-1.

This chapter provides maintenance procedures assigned to the organizational level for the electrical system. To find a specific maintenance procedure, see the maintenance task summary below.

8-2. ELECTRICAL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
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8-4	Starting Motor - Replace	8-7
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8-13	Turn Signal Switch - Replace	8-30
8-14	Blackout/Service Light Switch - Replace	8-32
8-15	Engine Oil Pressure Switch - Replace/Test	8-34
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8-29	STE/ICE Fuel Filter Differential Pressure Switch - Replace	8-74
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CHAPTER 8

ELECTRICAL SYSTEM MAINTENANCE (Cont'd)

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0-35	Rear Turn Signal Lights - Repair/Replace	8-92
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8-38	Transmission Temperature Sender - Replace	8-98
8-39	Fuel Level Sender - Test/Replace	8-99
8-40	Back-up Alarm - Replace	8-101
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8-42	Horn - Replace	8-106
8-43	Batteries - Service/Test/Replace	8-107
8-44	Battery Cables and Terminals - Service/Replace	8-114
8-45	Battery Box and Cover - Replace	8-125
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8-48	Boom Electrical Cable - Test/Replace/Repair	8-144
8-49	STE/ICE Wiring Harness - Test/Replace/Repair	8-153
8-50	Slave Receptacle - Replace	8-157
8-51	Hydraulic Bypass Switch - Replace/Test	8-160

8-3. ALTERNATOR AND ALTERNATOR PULLEY

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

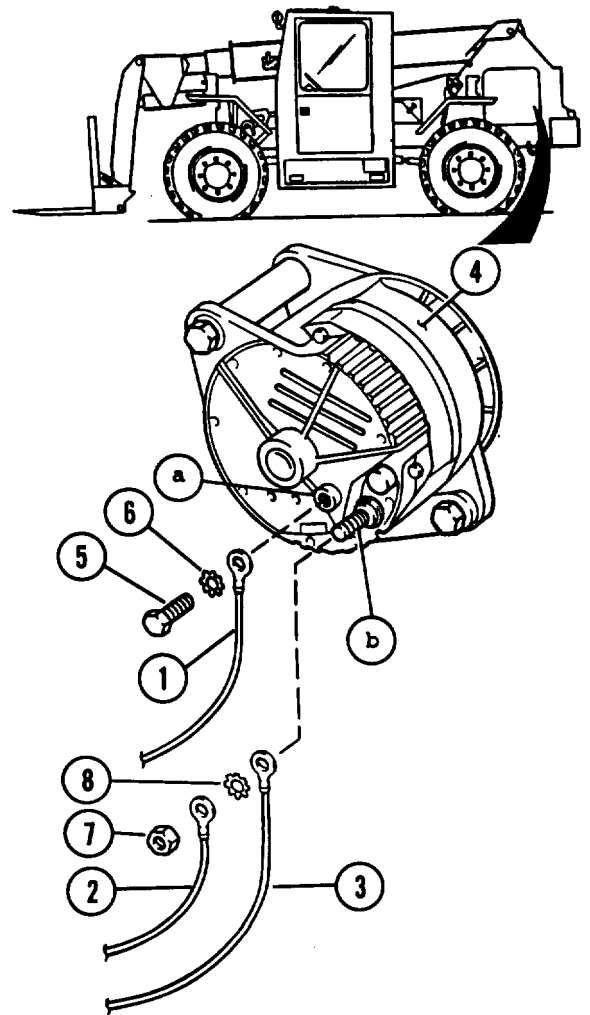
Starwasher (6)
starwashers (8)
Starwashers (13)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected
para. 8-44.

REMOVAL

1. TAG AND REMOVE ELECTRICAL LEADS (1), (2), AND (3) FROM ALTERNATOR (4).
 - a. Tag and remove capscrew (5), starwasher (6) and electrical lead "p" (1) from terminal (a) of alternator (4). Discard starwasher (6).
 - b. Tag and remove nut (7), electrical lead "N" (2), starwasher (8), and electrical lead "60" (3) from terminal (b) of alternator (4). Discard starwasher (8).



8-3. ALTERNATOR AND ALTERNATOR PULLEY - REPLACE (Cont'd)

NOTE

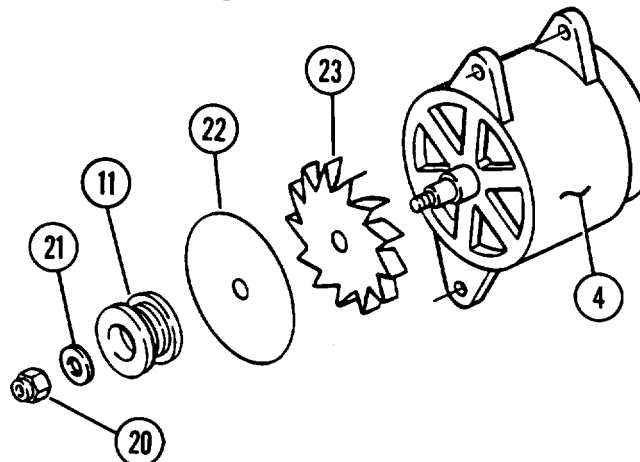
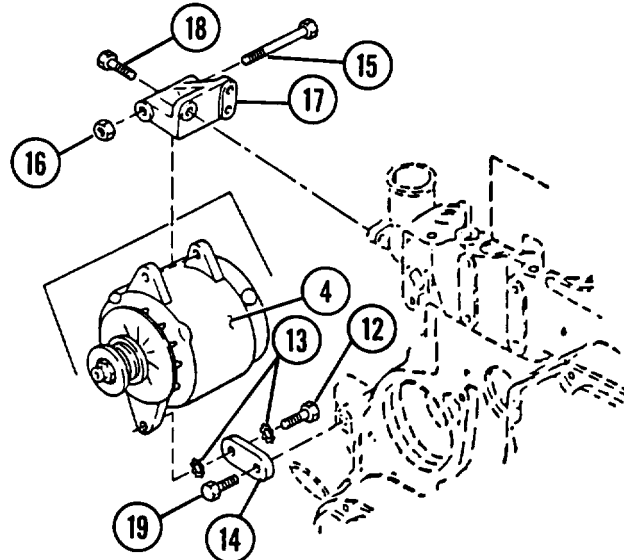
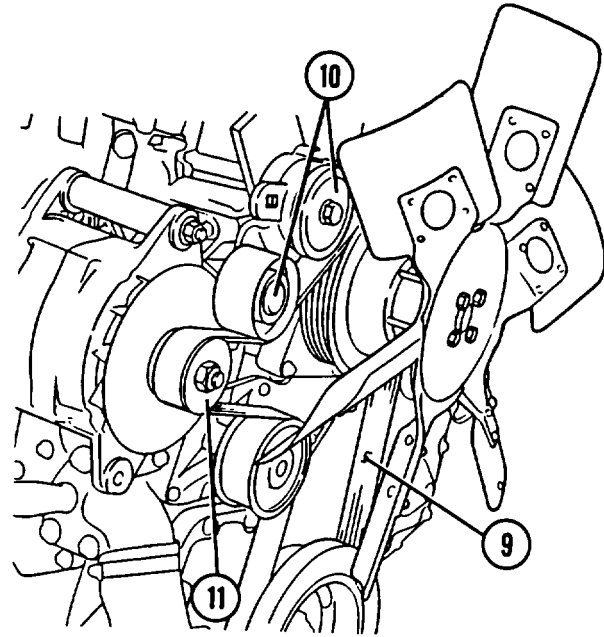
Note positioning of drive belt (9) around engine pulleys for use during installation.

2. LIFT DRIVE BELT TENSIONER ASSEMBLY (10) AND REMOVE DRIVE BELT (9) FROM ALTERNATOR PULLEY (11).
3. REMOVE MOUNTING HARDWARE AND ALTERNATOR (4) FROM ENGINE.
 - a. Remove capscrew (12) and two starwashers (13) securing alternator (4) to alternator brace (14). Discard starwashers (13).

NOTE

Support alternator (4) so it does not drop during removal of capscrew (15) and nut (16).

- b. Remove capscrew (15) and nut (16) securing alternator (4) to alternator support (17) on engine.
4. IF NECESSARY, REMOVE THREE CAPSCREWS (18) AND ALTERNATOR SUPPORT (17) FROM ENGINE.
5. IF NECESSARY, REMOVE CAPSCREW (19) AND ALTERNATOR BRACE (14) FROM ENGINE .
6. IF NECESSARY, REMOVE NUT (20), FLATWASHER (21), ALTERNATOR PULLEY (11), BAFFLE (22), AND FAN (23) FROM ALTERNATOR (4).



8-3. ALTERNATOR AND ALTERNATOR PULLEY - REPLACE (Cont'd)

INSTALLATION

1. IF REMOVED, POSITION FAN (23), BAFFLE (22), AND ALTERNATOR PULLEY (11) ON SHAFT OF ALTERNATOR (4) AND SECURE WITH FLATWASHER (21) AND NUT (20). TORQUE NUT (20) TO BETWEEN 70 AND 80 LB. FT.
2. IF REMOVED), POSITION ALTERNATOR BRACE (14) ON ENGINE AND SECURE WITH CAPSCREW (19). TORQUE CAPSCREW (19) TO 32 LB. FT.
3. IF REMOVED, POSITION ALTERNATOR SUPPORT (17) ON ENGINE AND SECURE WITH THREE CAPSCREWS (18). TORQUE CAPSCREWS (18) TO 216 LB. IN.
4. SECURE ALTERNATOR (4) TO ENGINE WITH MOUNTING HARDWARE.
 - a. Align upper mounting holes of alternator (4) with alternator support (17) and secure with nut (16) and capscrew (15). Torque nut (16) and capscrew (15) to 57 lb. ft.

NOTE

If necessary, loosen capscrew (19) to permit alignment of lower mounting hole of alternator (4) and alternator brace (14).

- b. Align lower mounting hole of alternator (4) with alternator brace (14) and secure with two new starwashers (13) and capscrew (12) 1 Torque capscrew (12) to between 60 and 70 lb. ft.
- c. If necessary, torque capscrew (19) to 32 lb. ft.

8-3. ALTERNATOR AND ALTERNATOR PULLEY - REPLACE (Cont'd)

NOTE

Be sure drive belt (9) is properly positioned around engine pulleys as noted during removal. If necessary, refer to Para. 7-9 for drive belt (9) installation instructions.

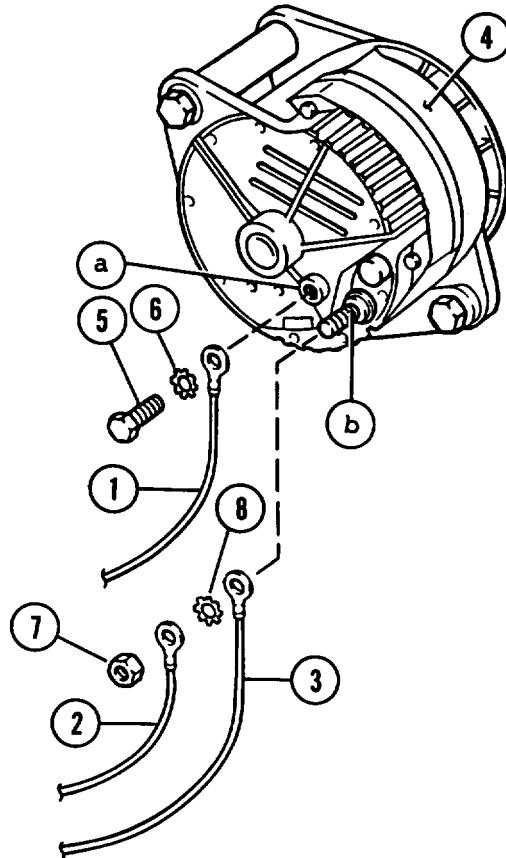
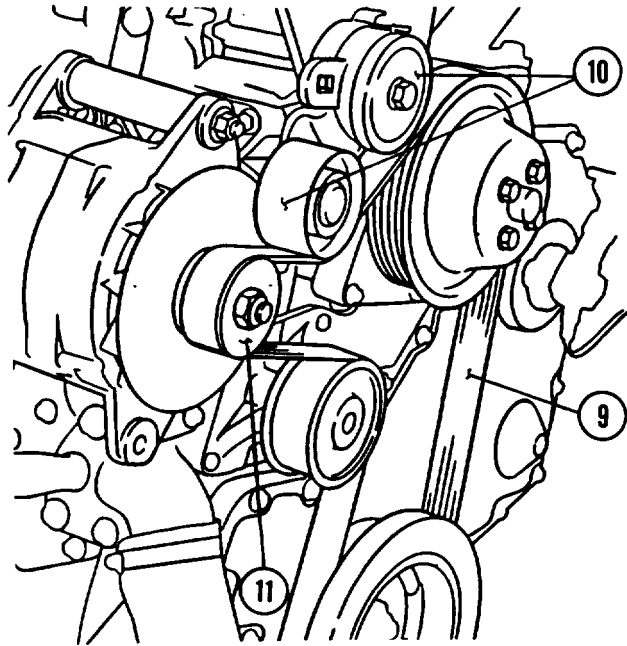
5. LIFT FAN BELT TENSIONER ASSEMBLY (10) AND INSTALL FAN BELT (9) ON ALTERNATOR PULLEY (11).

6. CONNECT ELECTRICAL LEADS (1), (2), AND (3) TO ALTERNATOR (4).

a. Position electrical lead "60" (3), new starwasher (8), and electrical lead "N" (2) on terminal (b) of alternator (4) and secure with nut (7). Torque nut (7) to between 24 lb. in. and 38 lb. in.

b. Position electrical lead "p" (1), new starwasher (6), and capscrew (5) at terminal (a) of alternator (4) and secure with capscrew (5). Torque capscrew to between 78 and 120 lb. in.

7. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-4. STARTING MOTOR - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive Maintenance, Common #2 Less Power

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected, para. 8-44.
 Exhaust pipe removed, para. 6-4.

Materials/Parts

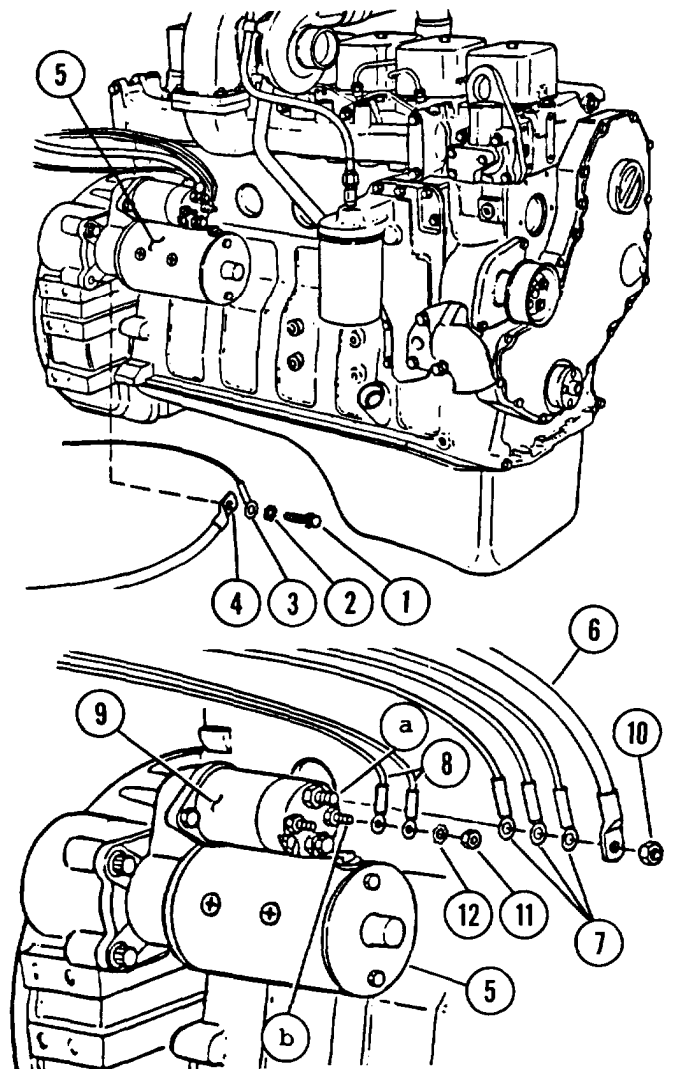
Starwasher (2)
 Starwasher (12)

NOTE

The starting motor is accessed through the left-hand engine access door.

REMOVAL

1. REMOVE CAPSCREW (1), AND STARWASHER (2), SECURING ELECTRICAL LEAD (3), AND GROUND CABLE (4), TO STARTING MOTOR (5). TAG AND REMOVE ELECTRICAL LEAD (3), AND GROUND CABLE (4). DISCARD STARWASHER (2).
2. TAG AND DISCONNECT POSITIVE ELECTRICAL CABLE (6), LEADS (7), AND LEADS (8), AT STARTING MOTOR SOLENOID (9).
 - a. Remove nut (10), securing one cable (6), and three electrical leads (7), to terminal (a) on starting motor solenoid (9).
 - b. Tag and remove cable (6), and electrical leads (7).
 - c. Remove nut (11), and starwasher (12), securing two electrical leads (8), to terminal (b) of solenoid (9).
 - d. Tag and remove electrical leads (8). Discard starwasher (12).



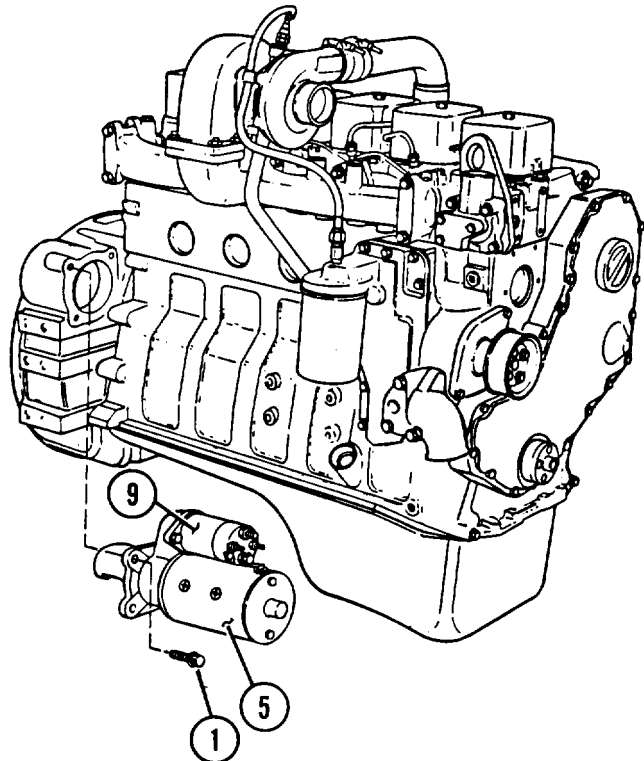
8-4. STARTING MOTOR - REPLACE (Cont'd)

3. REMOVE STARTING MOTOR (5), AND STARTING MOTOR SOLENOID (9), FROM VEHICLE AS AN ASSEMBLY.

NOTE

Support starting motor (5) to prevent starting motor from dropping when capscrews (1) are removed.

- a. Remove two capscrews (1).
- b. Remove starting motor (5), and solenoid (9).

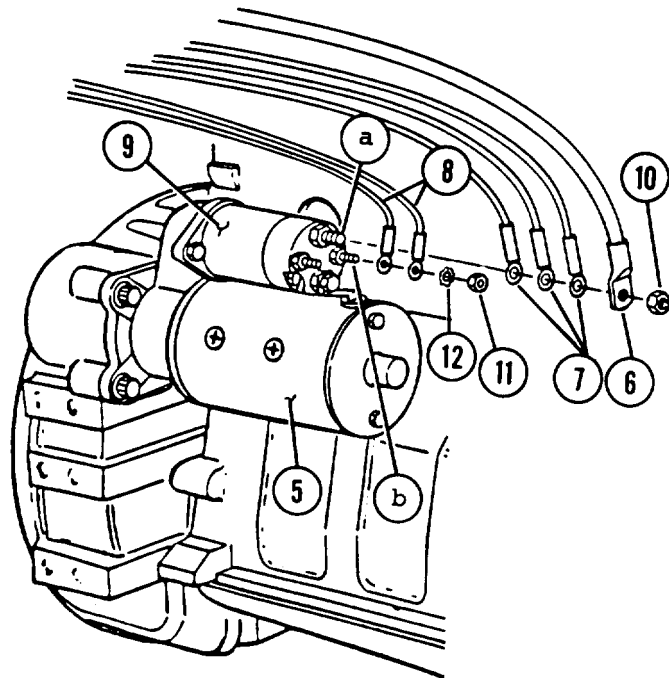


INSTALLATION

NOTE

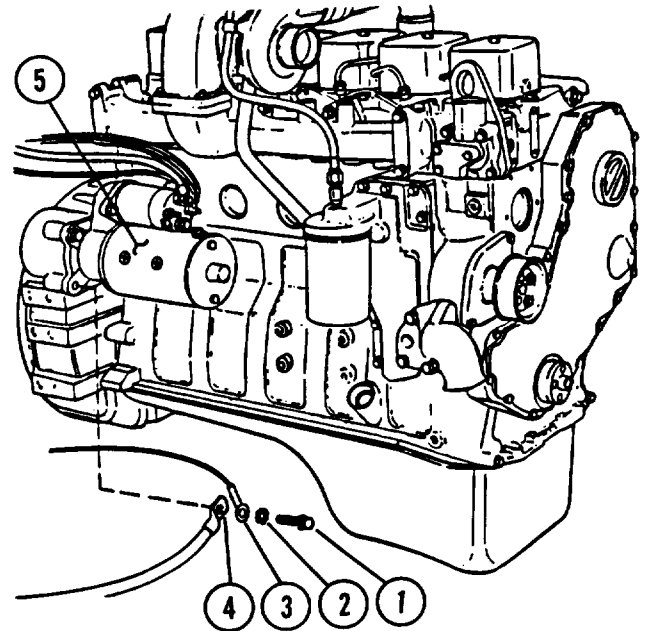
Support starting motor (5) during installation.

1. INSTALL STARTING MOTOR (5), AND STARTING MOTOR SOLENOID (9).
 - a. Position starting motor (5) on engine.
 - b. Install two capscrews (1).
2. CONNECT LEADS (8), LEADS (7), AND POSITIVE ELECTRICAL CABLE (6), AT STARTING MOTOR SOLENOID (9) AS TAGGED.
 - a. Position two electrical leads (8) on terminal (b) of solenoid (9). Secure with nut (11) and new starwasher (12).



8-4. STARTING MOTOR - REPLACE (Cont'd)

- b. Position three electrical leads (7), and positive electrical cable (6), on terminal (a) of starting motor solenoid (9) as tagged. Secure with nut (10).
3. POSITION GROUND CABLE (4), AND ELECTRICAL LEAD (3) ON LOWER MOUNTING HOLE OF STARTING MOTOR (5) AS TAGGED. SECURE WITH CAPSCREW (1), AND NEW STARWASHER (2).
4. TIGHTEN THREE CAPSCREWS (1) TO 32 LB. FT.
5. INSTALL EXHAUST PIPE, PARA. 6-4.
6. CONNECT BATTERIES, PARA. 8-44.



8-5. NEUTRAL SAFETY SWITCH - INSPECT/RBPIACE

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwashers (2)

Equipment Condition

Vehicle parked on level ground.

Reference

TM10-3930-660-10

INSPECTION

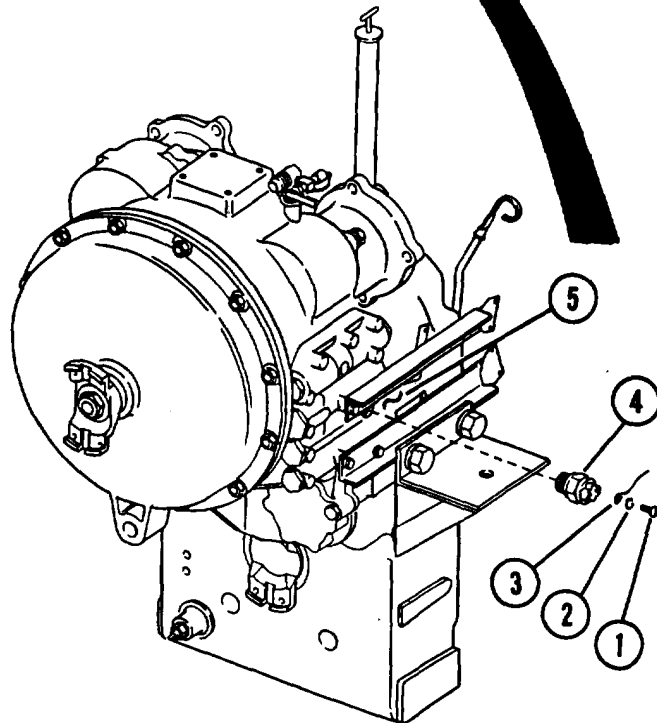
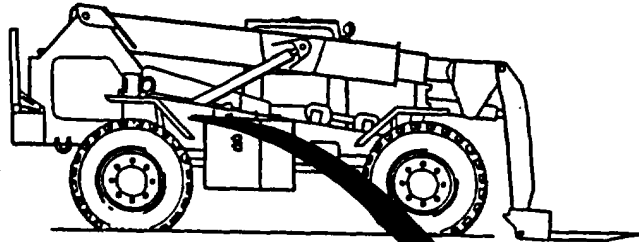
WARNING

Move vehicle to an open area to perform inspection. Alert personnel to stay away from front and rear of vehicle during inspection. Vehicle may start and move suddenly, possibly causing injury. Make sure wheels are straight before performing inspection.

NOTE

See TM10-3930-660-10 for vehicle operating instructions.

1. STRAIGHTEN VEHICLE WHEELS AND TURN ENGINE OFF.
2. PUT THE TRAVEL SELECT LEVER IN THE FORWARD (F) POSITION.
3. WITH PARKING BRAKE ON AND BRAKE PEDAL DEPRESSED, TRY TO START THE ENGINE. TURN ENGINE OFF IMMEDIATELY IF IT STARTS .
4. IF ENGINE STARTED IN STEP 3., REPLACE NEUTRAL SAFETY SWITCH. SEE REMOVAL IN THIS PARAGRAPH, IF ENGINE DID NOT START, GO TO NEXT STEP.



8-5. NEUTRAL SAFETY SWITCH - INSPECT/REPLACE (Cont'd)

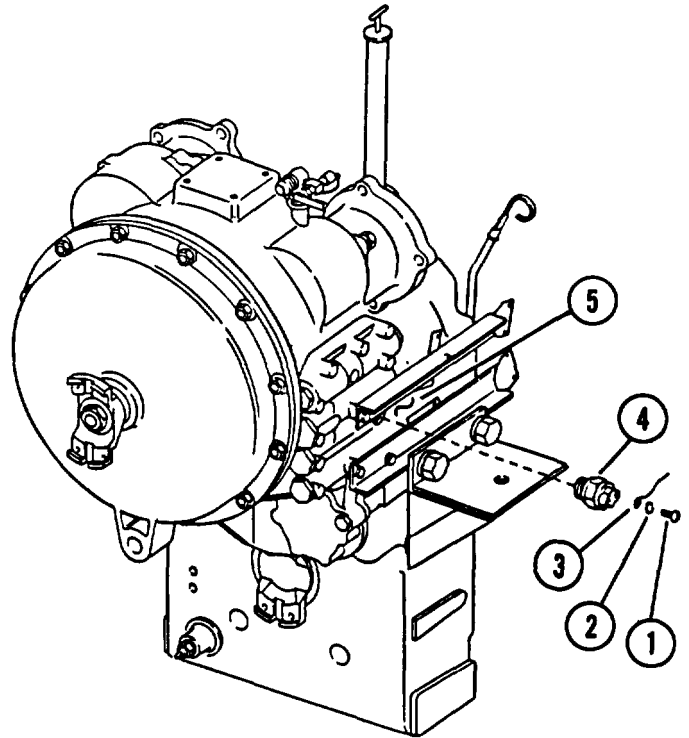
5. PERFORM STEP 3. WITH TRAVEL SELECT LEVER IN THE REVERSE (R) POSITION.
6. IF ENGINE STARTED IN STEP 5, REPLACE NEUTRAL SAFETY SWITCH.

REMOVAL

NOTE

The neutral safety switch is located on the right side of the transmission.

1. DISCONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
2. REMOVE TRANSMISSION COVER, PARA. 16-6.
3. REMOVE two SCREWS (1), Two LOCKWASHERS (2) AND DISCONNECT WIRING (3) FROM NEUTRAL SAFETY SWITCH (4). DISCARD LOCKWASHERS (2).
4. REMOVE NEUTRAL SAFETY SWITCH (4) FROM THE TRANSMISSION CONTROL VALVE (5).



INSTALLATION

1. INSTALL NEUTRAL SAFETY SWITCH (4) INTO THE TRANSMISSION CONTROL VALVE (5).
2. INSTALL TWO SCREWS (1) AND TWO NEW LOCKWASHERS (2) TO CONNECT WIRING (3) TO NEUTRAL SAFETY SWITCH (4).
3. INSTALL TRANSMISSION COVER, PARA. 16-6.
4. CONNECT NEGATIVE BATTERY CAELE, PARA. 8-44.

8-6. INSTRUMENT PANELS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

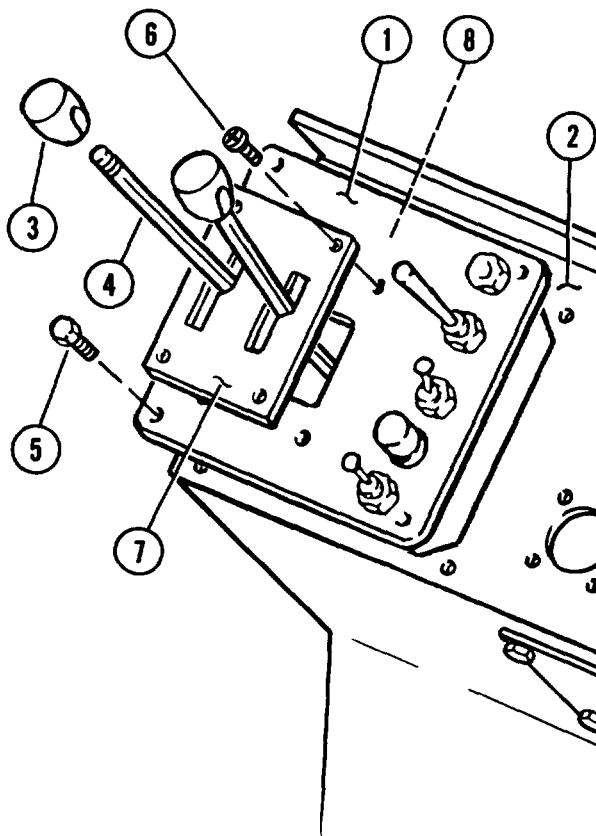
NOTE

The left-hand instrument panel and the right-hand instrument panel can be removed and installed separately as required.

REMOVAL

1. SEPARATE LEFT-HAND INSTRUMENT PANEL (1) FROM FRONT CONSOLE (2).

- a. Use a suitable puller to remove two knobs (3) from shift levers (4).
- b. Remove four capscrews (5) which secure panel (1) to console (2).
- c. Remove four phillips head screws (6) which secure panel (7), and lever housing (8), to panel (1).
- d. Remove panel (7) from panel (1).
- e. Separate panel (1) from console (2) by lifting left edge of panel (1) at console (2).



8-6. INSTRUMENT PANELS - REPLACE (Cont'd)

2. SEPARATE RIGHT-HAND INSTRUMENT PANEL (9) FROM FRONT CONSOLE (2).

- a. Remove four capscrews (10) from right-hand instrument panel (9).
- b. Separate panel (9) from console (2) by lifting right edge of panel (9) at console (2).

NOTE

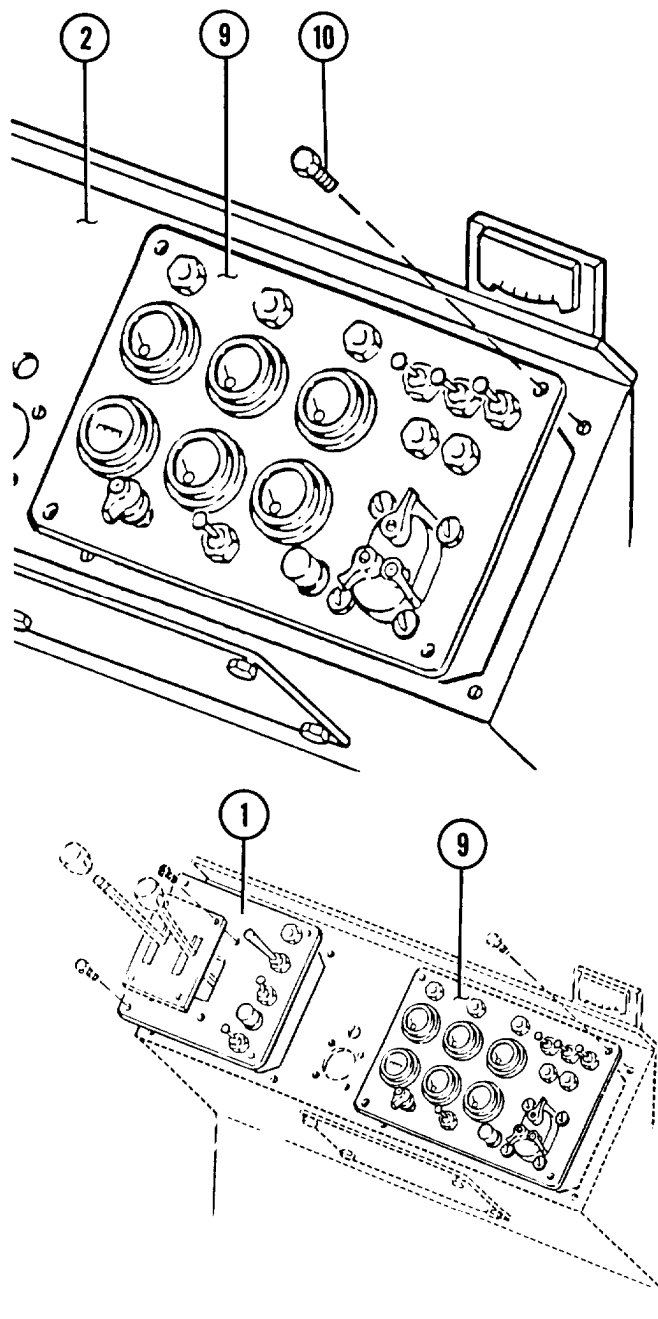
If complete removal of one or both instrument panels from vehicle is required, follow steps 3 and 4 below.

3. DISCONNECT ELECTRICAL LEADS FROM COMPONENTS ON INSTRUMENT PANELS (1) AND/OR (9). REMOVE INSTRUMENT PANELS (1) AND/OR (9) FROM VEHICLE.

- a. Tag and disconnect all electrical leads of vehicle wiring harness from components on instrument panels (1) and/or (9). Refer to paragraphs 8-7 thru 8-11 for component wiring removal instructions.
- b. Remove instrument panels (1) and/or (9) from vehicle.

4. IF NECESSARY, REMOVE COMPONENTS FROM INSTRUMENT PANELS (1) AND/OR (9) AS REQUIRED.

If necessary, remove components from instrument panels (1) and/or (9) as required. Note location of components for use during installation. Refer to paragraph 8-7, 8-8, 8-9, 8-10 and 8-11 for component removal instructions.



8-6. INSTRUMENT PANELS - REPLACE (Cont'd)

INSTALLATION

1. IF REMOVED, INSTALL COMPONENTS TO INSTRUMENT PANELS (1) AND/OR (9) AS REQUIRED.

If necessary, install components to instrument panels (1) and/or (9), as required. Locate components as noted during removal. Refer to paragraphs 8-7 thru 8-11 for component wiring installation instructions.

2. IF REMOVED, CONNECT ELECTRICAL LEADS AS TAGGED TO COMPONENTS ON INSTRUMENT PANELS (1) AND/OR (9).

Connect electrical leads of vehicle wiring harness to components on instrument panels (1) and/or (9) as tagged. Refer to paragraphs 8-7 thru 8-11 for component wiring installation instructions.

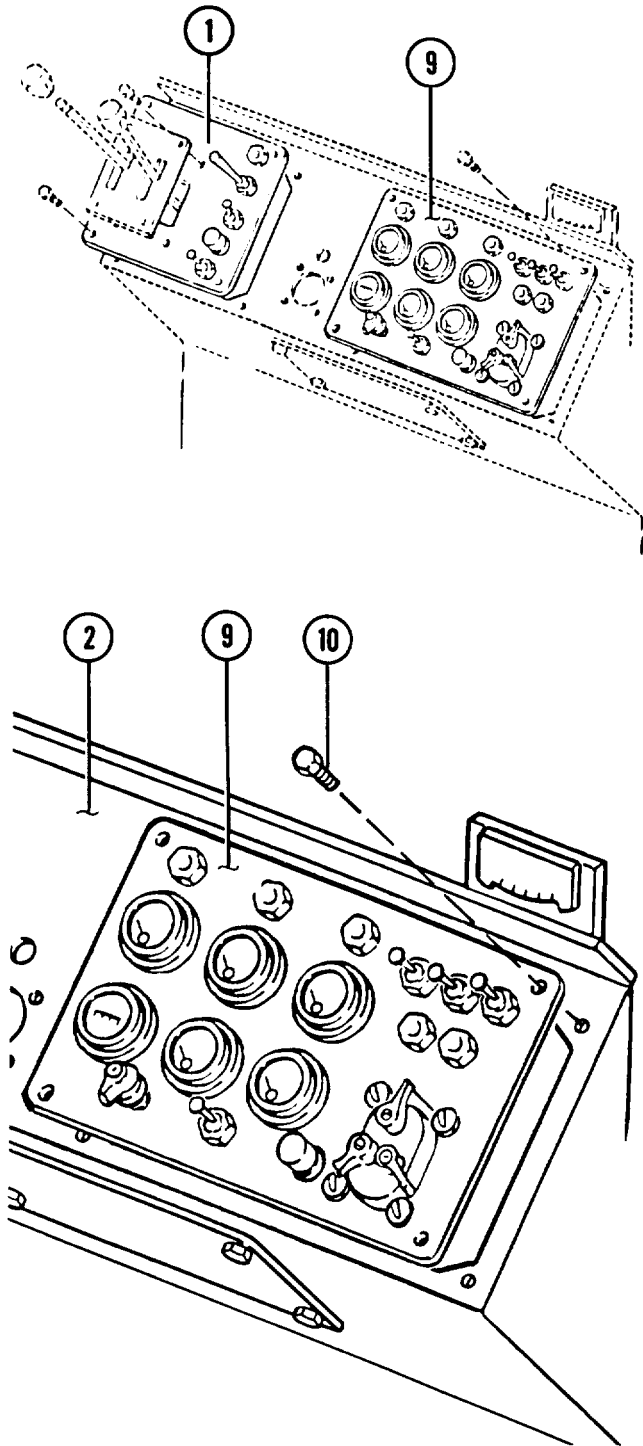
3. INSTALL RIGHT-HAND INSTRUMENT PANEL (9) TO FRONT CONSOLE (2).

- a. Lower and align panel (9) on console (2).

NOTE

Apply Loctite 242 to threads of capscrews (10).

- b. Secure panel (9) to console (2) with four capscrews (10).



8-6. INSTRUMENT PANELS - REPLACE (Cont'd)

4. INSTALL LEFT-HAND INSTRUMENT PANEL (1)
TO FRONT CONSOLE (2).

NOTE

Apply Loctite 242 to threads of phillips head screw (6).

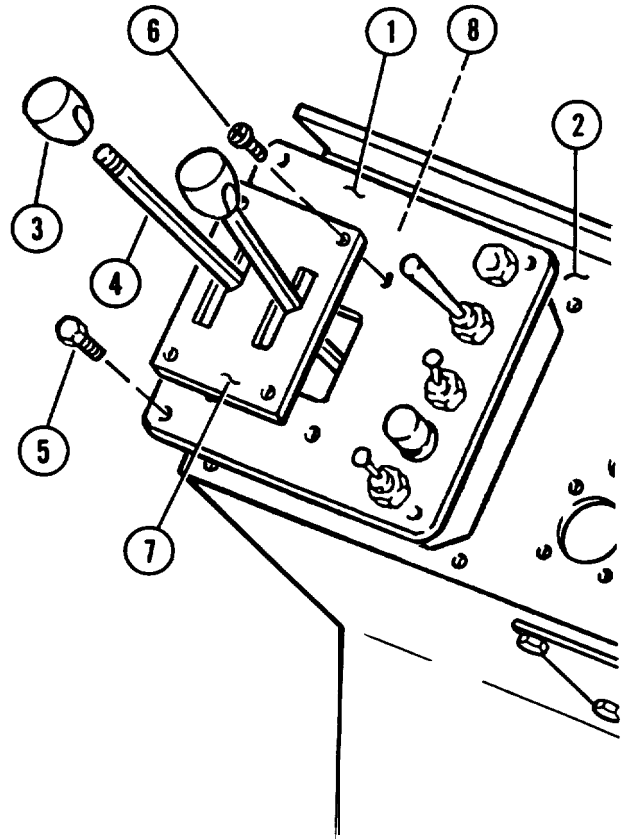
- a. Lower and align panel (1) on console (2).
- b. Position panel (7) on panel (1). Secure panel (7), to panel (1) and lever housing (8) with four phillips head screws (6).

NOTE

Apply Loctite 242 to threads of capscrews (5).

- c. Secure panel (1) to console (2) with four capscrews (5).
- d. Install new knobs (3) on shift levers (4) by pushing knobs (3) onto shift levers (4).

5. CONNECT NEGATIVE BATTERY CABLE,
PARA. 8-44.



8-7. GAUGES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Starwashers (8) (10)

Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected,
para 8-44.

NOTE

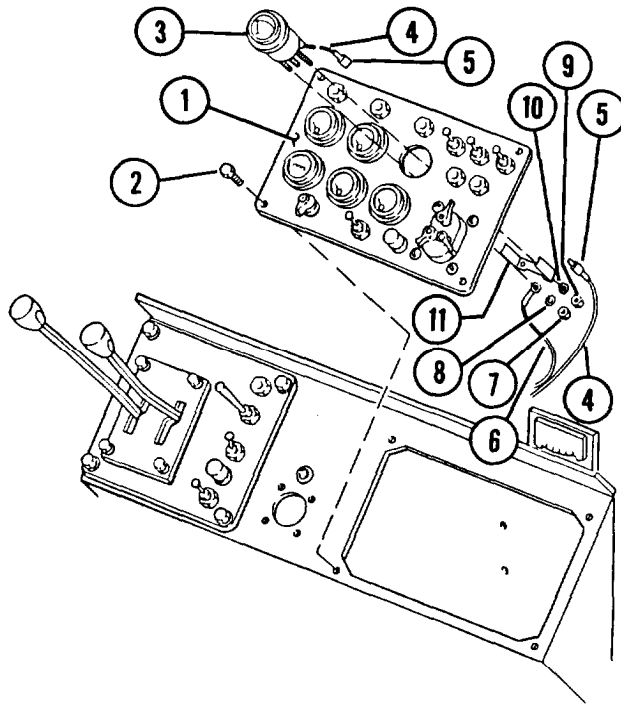
Replacement procedures for all panel mounted gauges except the hourmeter are essentially similar.

Removal of the transmission oil temperature gauge is shown in this paragraph.

For hourmeter replacement, refer to para. 8-11.

Removal

1. RAISE RIGHT-HAND INSTRUMENT PANEL (1).
 - a. Remove four capscrews (2) from right-hand instrument panel (1).
 - b. Raise panel (1) to provide access to rear of meter (3) to be replaced.
2. DISCONNECT ELECTRICAL LEADS AT METER (3).
 - a. Tag and disconnect meter light electrical lead (4) at spade connectors (5).

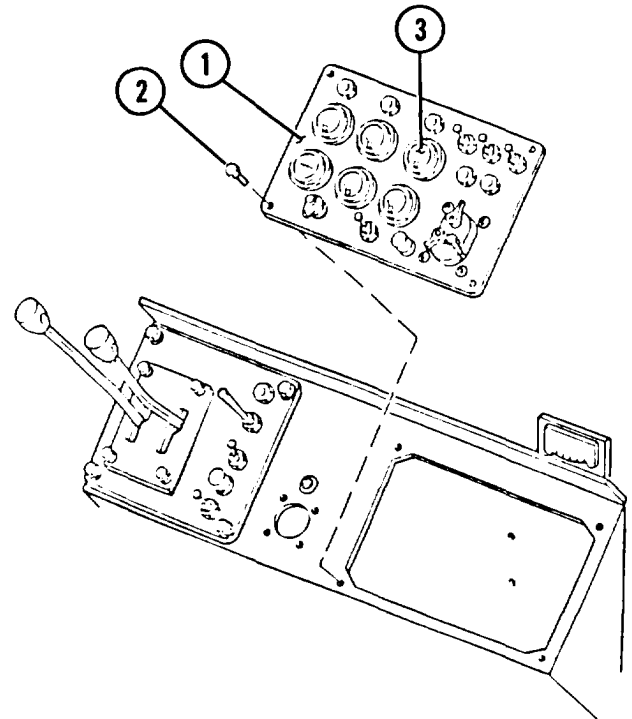


8-7. GAUGES - REPLACE (Cont'd)

- b. Tag meter electrical leads (6) at terminals of meter (3) as required.
- c. Remove nuts (7), starwashers (8) and meter electrical leads (6) from terminals of meter (3) as required.

3. REMOVE METER (3) FROM INSTRUMENT PANEL (1).

- a. Remove two nuts (9) , two starwashers (10) and clamp (11) from instrument panel (1).
- b. Slide meter (3) out of mounting hole on instrument panel (1).



INSTALLATION

1. INSTALL METER (3) TO INSTRUMENT PANEL (1).

- a. Slide meter (3) in through mounting hole on instrument panel (1).
- b. Position clamp (11) on instrument panel (1) and secure with two new starwashers (10) and two nuts (9).

2. CONNECT ELECTRICAL LEADS AT METER (3).

- a. Position meter electrical leads (6) on terminals of meter (3) as tagged.
- b. Secure meter electrical leads (6) to meter (3) with new starwashers (8) and nuts (7).
- c. Connect meter light electrical lead (4) at spade connectors (5).

- a. Lower and align right-hand instrument panel (1).

NOTE

Apply Loctite 242 to threads of capscrews (2) .

- b. Secure right-hand instrument panel (1) with four capscrews (2).

3. LOWER AND SECURE RIGHT-HAND INSTRUMENT PANEL (1).

4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

8-8. TOGGLE AND PUSHBUTTON SWITCHES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected,
para 8-44.
Left and/or right-hand instrument
panel removed as required.

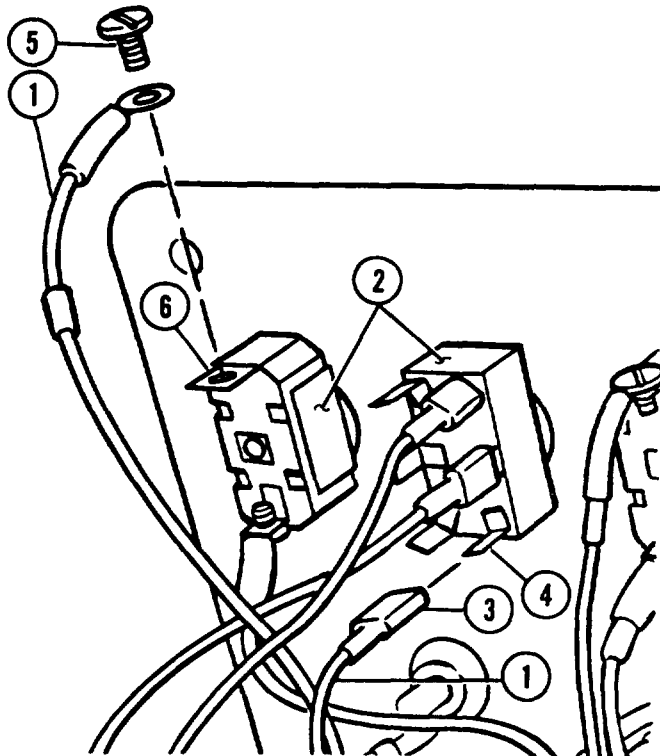
NOTE

Replacement procedures for all panel
mounted toggle and pushbutton switches
are essentially similar.

For ignition switch replacement, refer
to para. 8-9.

REMOVAL

1. TAG AND REMOVE ELECTRICAL LEADS (1)
FROM SWITCH (2).
 - a. For switches with spade type
terminals, tag electrical leads
(1).
 - b. Pull and remove female connectors
(3) of electrical leads (1) from
male terminals (4) of switch (2).
 - c. For switches with screw type
terminals, remove screws (5)
securing electrical leads (1) to
terminals (6) of switch (2).
 - d. Tag and remove electrical leads (1)
from terminals (6) of switch (2).



8-8. TOGGLE AND PUSHBUTTON SWITCHES - REPLACE (Cont'd)

2. REMOVE SWITCH (2) FROM INSTRUMENT PANEL (7).

- a. For pushbutton switches, remove nut and rubber cover assembly (8) from switch (2) at face of instrument panel (7).
- b. Slide switch (2) out of mounting hole on instrument panel (7).

NOTE

Note orientation of toggle switches for use during installation.

- c. For toggle switches, remove nut (9) from switch (2) at face of instrument panel (7).
- d. Slide switch (2) out of mounting hole on instrument panel (7).

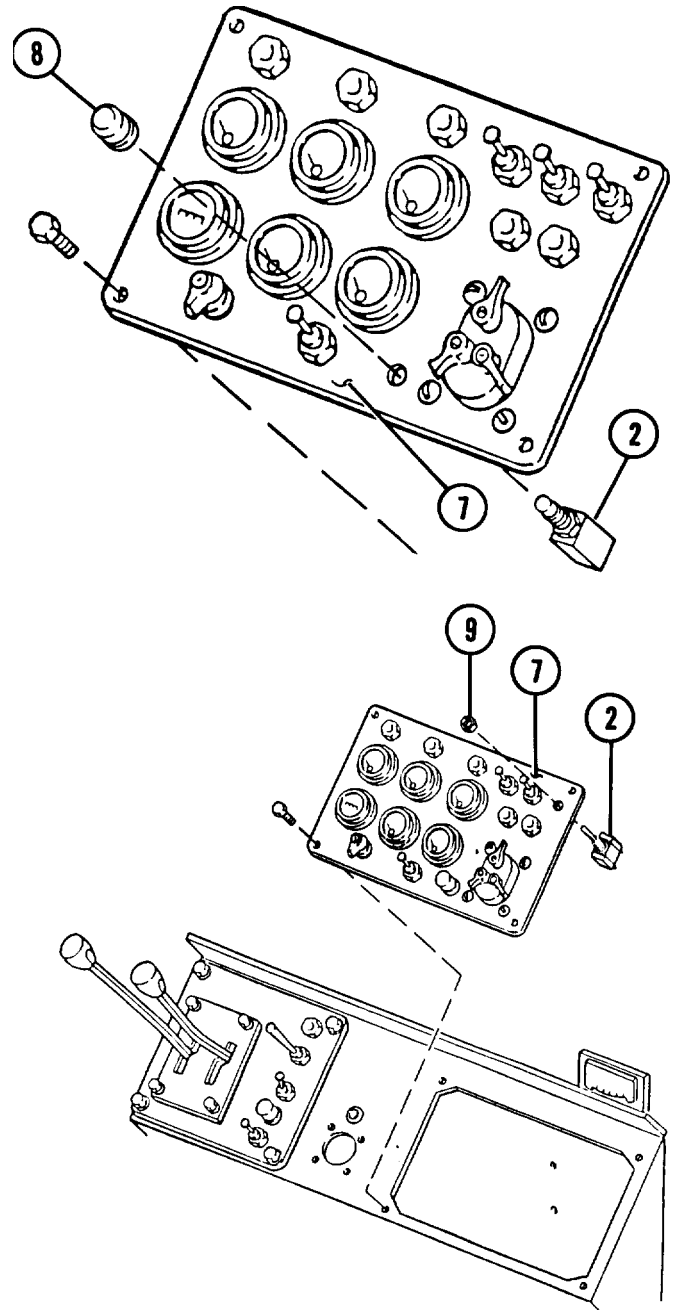
INSTALLIATION

1. INSTALL SWITCH (2) TO INSTRUMENT PANEL (7).

NOTE

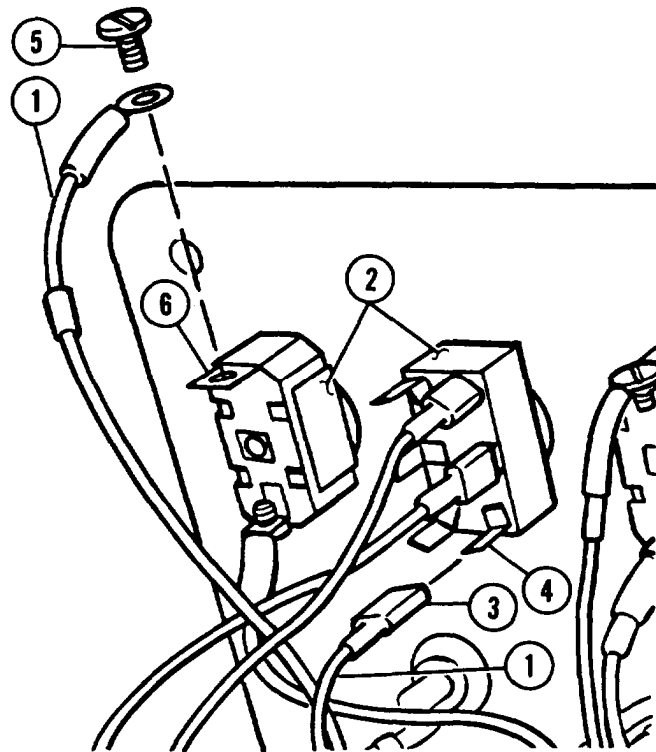
Position toggle switches as noted during removal.

- a. Slide switch (2) in through mounting hole on instrument panel (7).
- b. Secure switch (2) at face of instrument panel (7) with nut (9).
- c* For pushbutton switches, slide switch (2) in through mounting hole on instrument panel (7).
- d. Secure switch (2) at face of instrument panel (7) with nut and rubber cover assembly (8).



8-8. TOGGLE AND PUSHBUTTON SWITCHES - REPLACE (Cont'd)

2. CONNECT ELECTRICAL LEADS (1) TO SWITCH (2) AS TAGGED.
 - a. For switches with screw type terminals, position electrical leads (1) on terminals (6) of switch (2) as tagged, and secure with screws (5).
 - b. For switches with spade type terminals, push female connectors (3) of electrical leads (1) on male terminals (4) of switches (2) as tagged.
3. INSTALL LEFT AND/OR RIGHT-HAND INSTRUMENT PANEL, PARA. 8-6.
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-9. STARTER SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Mechanics

Equipment Condition

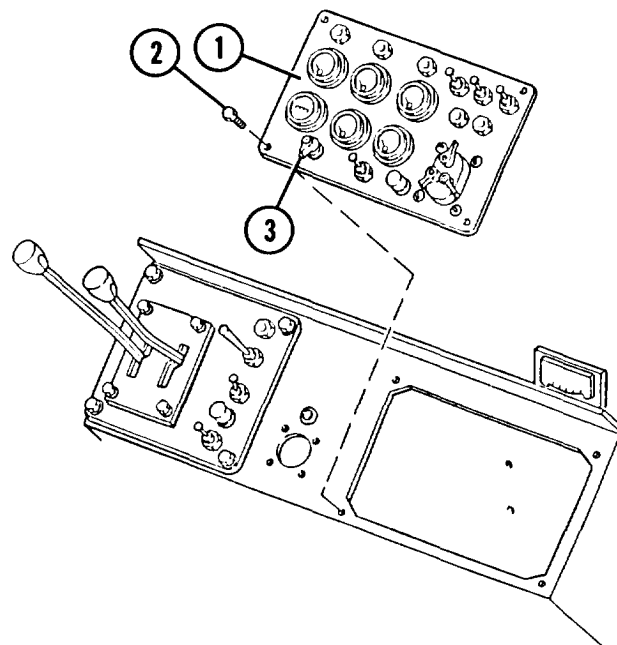
Vehicle parked on level ground.
Negative battery cable disconnected,
para 8-44.

Materials/Parts

Lockwashers (6)
Loctite 242 (App. C, Item 39)

REMOVAL

1. RAISE RIGHT-HAND INSTRUMENT PANEL (1).
 - a. Remove four capscrews (2) from right-hand instrument panel (1).
 - b. Raise panel (1) to provide access to rear of starter switch (3).



8-9 1 STARTER SWITCH - REPLACE (Cont'd)

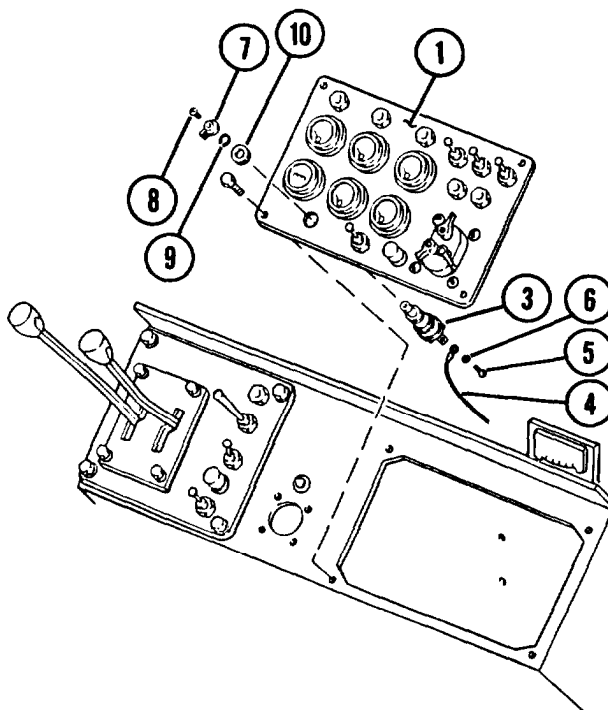
2. TAG AND REMOVE ELECTRICAL LEADS (4) FROM STARTER SWITCH (3).

- a. Tag electrical leads (4) connected to switch (3).
- b. Remove five screws (5) and lockwashers (6) securing electrical leads (4). Remove electrical leads (4) from switch (3). Discard lockwashers (6).

3. REMOVE STARTER SWITCH (3) FROM INSTRUMENT PANEL (1).

Note orientation of starter switch (3) and starter switch knob (7) for use during installation.

- a. Remove screw (8) and knob (7) from switch (3).
- b. Remove retaining ring (9) and nut (10) securing switch (3) to instrument panel (1).
- c. Slide switch (3) out through mounting hole on instrument panel (1).



2. CONNECT ELECTRICAL LEADS (4) TO STARTER SWITCH (3) AS TAGGED.

- a. Position electrical leads (4) on switch (3) as tagged.
- b. Secure electrical leads (4) to switch (3) with five new lockwashers (6) and five screws (5).

3. LOWER AND SECURE RIGHT-HAND INSTRUMENT PANEL (1).

- a. Lower and align right-hand instrument panel (1).

Apply Loctite 242 to threads of capscrews (2) 1

- b. Secure right-hand instrument panel (1) with four capscrews (2).

4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

INSTALLATION

1. INSTALL STARTER SWITCH (3) TO INSTRUMENT PANEL (1).

Position starter switch (3) and starter switch knob (7) as noted during removal.

- a. Slide switch (3) in through mounting hole on instrument panel (1).
- b. Secure switch (3) to instrument panel (1) with nut (10) and retaining ring (9).
- c. Position knob (7) on switch (3). and secure with screw (8).

8-10. WARNING LIGHTS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

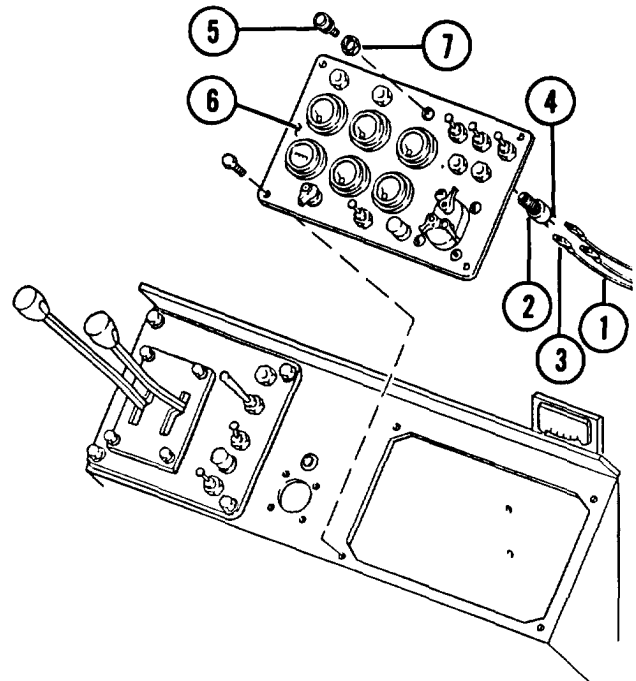
Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.
 Left and/or right-hand instrument
 panel removed as required, para. 8-6.

NOTE

Replacement procedures for all panel mounted warning lights are essentially similar.

REMOVAL

1. TAG AND REMOVE THREE ELECTRICAL LEADS (1) FROM WARNING LIGHT SOCKET (2).
 - a. Tag three electrical leads (1) at warning light socket (2).
 - b. Pull three female connectors (3) of electrical leads (1) from three male terminals (4) of warning light socket (2).
2. REMOVE WARNING LIGHT LENS/BULB ASSEMBLY (5) AND WARNING LIGHT SOCKET (2) FROM INSTRUMENT PANEL (6).
 - a. Remove warning light lens/bulb assembly (5) from warning light socket (2) at face of instrument panel (6).
 - b. Remove nut (7) at face of instrument panel (6) securing warning light socket (2).



8-10. WARNING LIGHTS - REPLACE (Cont'd)

- c. Slide warning light socket (2) out through mounting hole on instrument panel (6).

INSTALLATION

1. INSTALL WARNING LIGHT SOCKET (2) AND WARNING LIGHT LENS/BULB ASSEMBLY (5) TO INSTRUMENT PANEL (6).
 - a. Slide warning light socket (2) in through mounting hole on instrument panel (6).
 - b. Secure warning light socket (2) with nut (7) at face of instrument panel (6).
 - c. Screw warning light lens/bulb assembly (5) into warning light socket (2) at face of instrument panel (6).
2. INSTALL THREE ELECTRICAL LEADS (1) TO WARNING LIGHT SOCKET (2).

Push three female connectors (3) of wire leads (1) on three male terminals (4) of warning light socket (2) as tagged.
3. INSTALL INSTRUMENT PANEL(S),
PARA. 8-6.
4. CONNECT NEGATIVE BATTERY CABLE,
PARA. 8-44.

8-11. HOURMETER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Loctite 242 (APP. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected-
para. 8-44.

NOTE

For replacement of other panel mounted gauges, refer to para. 8-7.

1. RAISE RIGHT-HAND INSTRUMENT PANEL (1).

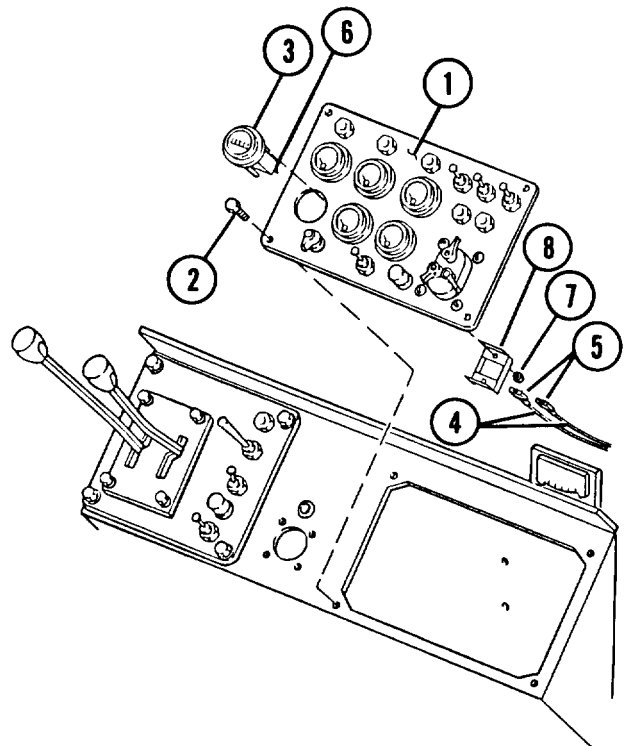
Remove four capscrews (2) from right-hand instrument panel (1) and carefully raise panel (1) to provide access to rear of hourmeter (3).

2. TAG AND REMOVE TWO ELECTRICAL LEADS (4) FROM HOURMETER (3).

- a. Tag two electrical leads (4) connected to hourmeter (3).
- b. Pull two female connectors (5) of electrical leads (4) from two male terminals (6) of hourmeter (3).

3. REMOVE HOURMETER (3) FROM INSTRUMENT PANEL (1).

- a. Remove two nuts (7) and one clamp (8) securing hourmeter (3) to instrument panel (1).
- b. Slide hourmeter (3) out of mounting hole on instrument panel (1).



8-11. HOURMETER - REPLACE (Cont'd)

INSTALLATION

1. INSTALL HOURMETER (3) TO INSTRUMENT PANEL (1).
 - a. Slide hourmeter (3) in through mounting hole on instrument panel (1).
 - b. Secure hourmeter (3) to instrument panel (1) with clamp (8) and two nuts (7).
2. CONNECT TWO ELECTRICAL LEADS (4) TO HOURMETER (3) AS TAGGED.

Push two female connectors (5) of electrical leads (4) onto two male terminals (6) of hourmeter (3).

3. LOWER AND SECURE RIGHT-HAND INSTRUMENT PANEL (1).

NOTE

Apply Loctite 242 to threads of capscrews (2).

Carefully lower and align right-hand instrument panel (1). Secure panel (1) with four capscrew (2).

4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

8-12. CIRCUIT BREAKERS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected,
para. 8-44.

Materials/Parts

Lockwashers (5)
Lockwashers (11)
Loctite 242 (App. C, Item 39)

NOTE

The circuit breakers are reached through the access hole at the base of the operator's console.

All ten circuit breakers are installed and removed in the same manner.

NOTE

The circuit breakers protect the entire electrical system except for the power circuit to the emergency steer pump.

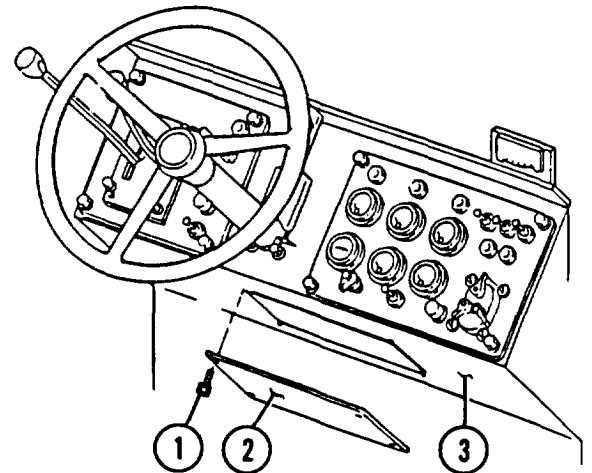
The circuit breakers will trip if there is a shorted or grounded wire.

The circuit breakers will automatically reset after cooling. They cannot be reset manually.

Under normal operating conditions, circuit breakers should never require replacement. However, if a circuit breaker does not reset after it has cooled, the circuit breaker is defective and must be replaced.

REMOVAL

1. REMOVE FOUR CAPSCREWS (1) AND ACCESS COVER (2) AT BASE OF OPERATOR'S CONSOLE (3)

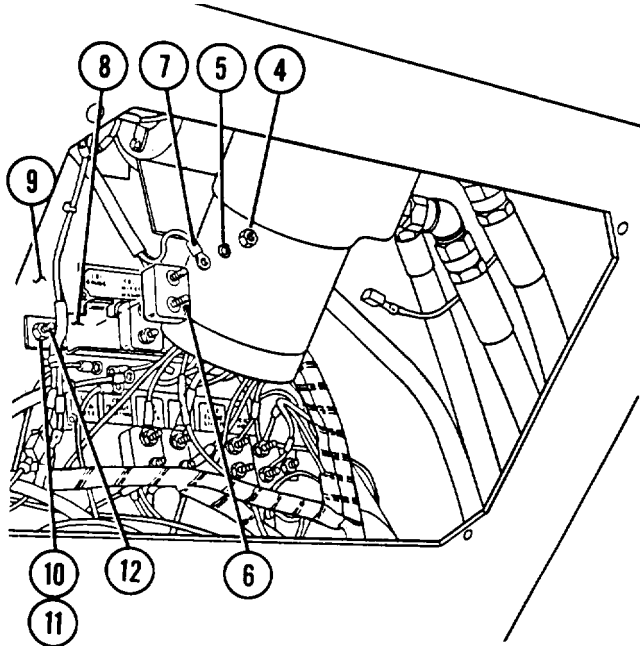


8-12. CIRCUIT BREAKERS - REPLACE (Cont'd)

NOTE

Tag all wire leads and circuit breaker terminals for use during installation.

2. REMOVE TWO NUTS (4) AND TWO LOCKWASHERS (5) FROM CIRCUIT BREAKER (6). REMOVE WIRE LEADS (7) FROM CIRCUIT BREAKER (6). DISCARD LOCKWASHERS (5).
3. REMOVE CIRCUIT BRBAKER (6) BY PULLING CIRCUIT BRBAKER (6) STRAIGHT OUT OF BRACKBT (8).
4. IF NECESSARY, RBMOVE BRACKET (8) FROM CAB (9).
 - a. Tag and remove all circuit breakers (6) from bracket (8) to be removed. Refer to steps 3 and 4, above.
 - b. Remove two nuts (10) and two lockwashers (11) securing each end of bracket (8). Remove bracket (8). Discard lockwashers (11).
 - c. From outside of cab (9) remove two screws (12).

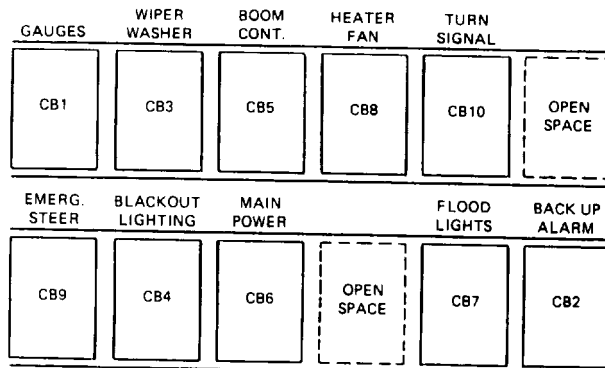


INSTALLATION

NOTE

The circuit breakers are arranged as shown in the figure at right.

CIRCUIT BREAKER	AMPS
CB1	6
CB2	6
CB3	6
CB4	15
CB5	6
CB6	40
CB7	10
CB8	10
CB9	6
CB10	10

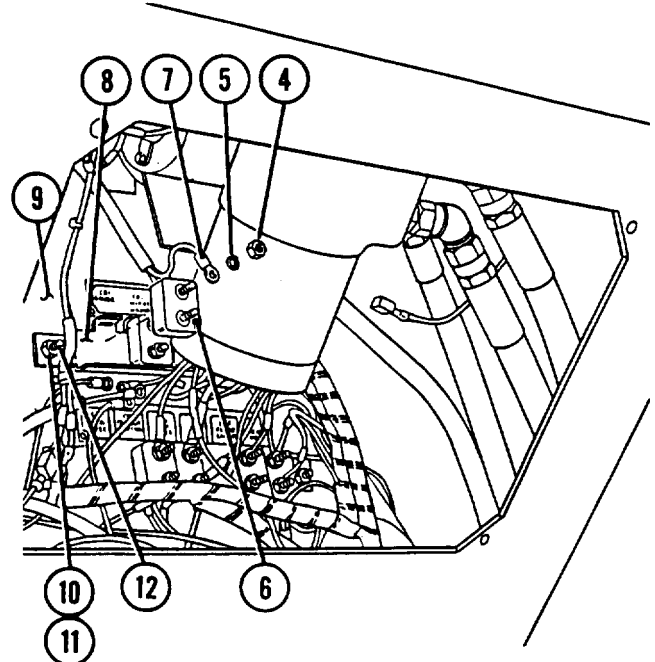


8-12. CIRCUIT BREAKERS - REPLACE (Cont'd)

1. IF REMOVED, INSTALL BRACKET (8) TO CAB (9).
 - a. From outside of cab (9), install two screws (12).

Apply Loctite 242 to threaded ends of screws (12).

- b. From inside of cab (9), position bracket (8) on threaded ends of two screws (12). Secure bracket (8) with two new lockwashers (11) and two nuts (10).
 - c. Install circuit breakers (6) to bracket (8) as tagged. Refer to steps 2 and 3, below.



2. INSTALL CIRCUIT BREAKER (6) BY PUSHING CIRCUIT BREAKER (6) STRAIGHT INTO BRACKET (8) UNTIL CIRCUIT BREAKER (6) SNAPS INTO PLACE.

NOTE

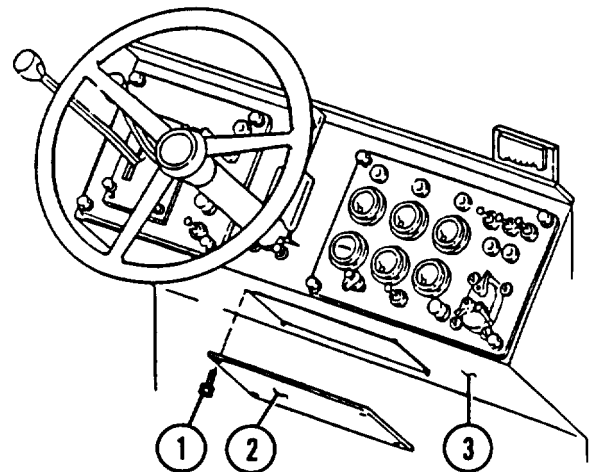
Install wire leads to circuit breaker terminals as tagged.

3. POSITION WIRE LEADS (7) ONTO CIRCUIT BREAKER (6). SECURE WITH TWO NUTS (4) AND TWO NEW LOCKWASHERS (5).

NOTE

Apply Loctite 242 to threads of capscrews (1).

4. POSITION ACCESS COVER (2) ON BASE OF OPERATOR'S CONSOLE (3) AND SECURE WITH FOUR CAPSCREWS (1).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-13. TURN SIGNAL SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

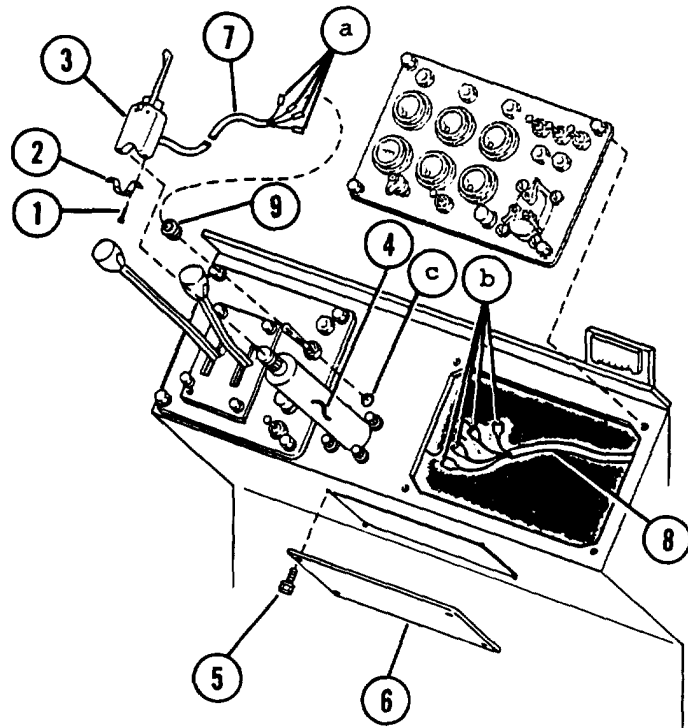
Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

1. REMOVE TWO SCREWS (1), AND CLAMP (2), SECURING SWITCH (3), TO STEERING COLUMN (4).
2. DISCONNECT WIRING.
 - a. Remove screw (5) and access cover (6).
 - b. Follow switch cable (7) as it passes through dashboard.
 - c. Tag and disconnect four male Connectors (a) on cable (7) from four female connectors (b) on vehicle wiring harness (8).
3. REMOVE SWITCH CABLE (7) AND SWITCH (3) AS AN ASSEMBLY.
 - a. Support turn signal switch (3) so it does not drop during cable (7) removal.
 - b. From top of dashboard, pull switch cable (7) through dashboard and remove turn signal switch (3) and cable (7) as an assembly.
 - c. If necessary, remove grommet (9) at hole (c).



8-13. TURN SIGNAL SWITCH - REPLACEMENT (Cont'd)

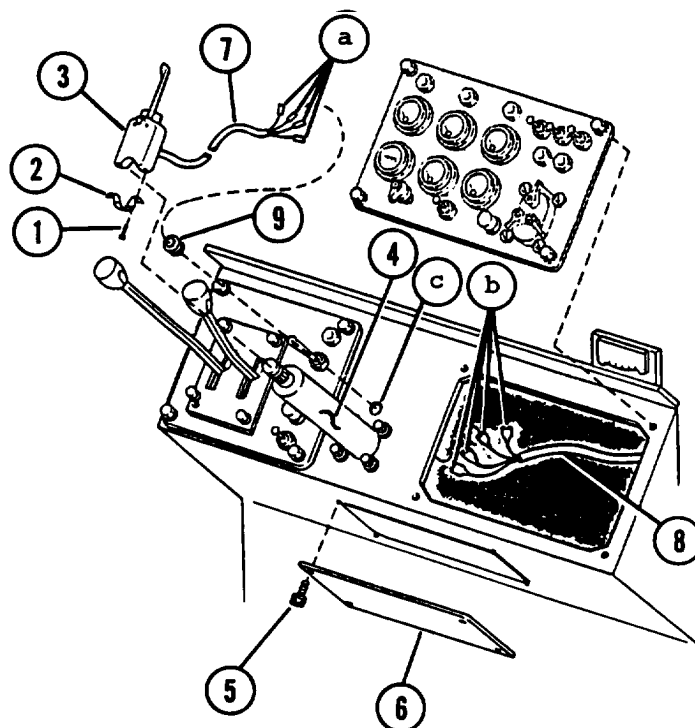
INSTALLATION

1. PUSH TURN SIGNAL SWITCH CABLE (7) THROUGH HOLE (C) IN DASHBOARD.
 - a. If removed, install grommet (9).
 - b. From top of dashboard, push turn signal switch cable (7) through hole (c) in dashboard.
2. CONNECT WIRING.
 - a. Connect male connectors (a) of cable (7) to female connectors (b) of vehicle wiring harness (8) as tagged during removal.

NOTE

Apply Loctite 242 to threads of screws (5).

- b. Secure dashboard access cover (6) with four screws (5).
3. SECURE TURN SIGNAL SWITCH (3) TO STEERING COLUMN (4).
 - a. Position and support turn signal switch (3) on steering column (4).
 - b. Secure switch (3) with clamp (2) and two screws (1).
4. VERIFY THAT TURN SIGNALS ARE WORKING PROPERLY.
 - a. Connect negative battery cable, para. 8-44.
 - b. Turn ignition switch to the "on" position, but do not start the engine.
 - c. Move turn signal switch lever to the left. Check that turn signals on both front and rear left-hand fenders are flashing.
 - d. Move turn signal switch lever to the right. Check that turn signals on both front and rear right-hand fenders are flashing.
 - e. Turn ignition switch off.



8-14. BLACKOUT/SERVICE LIGHT SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

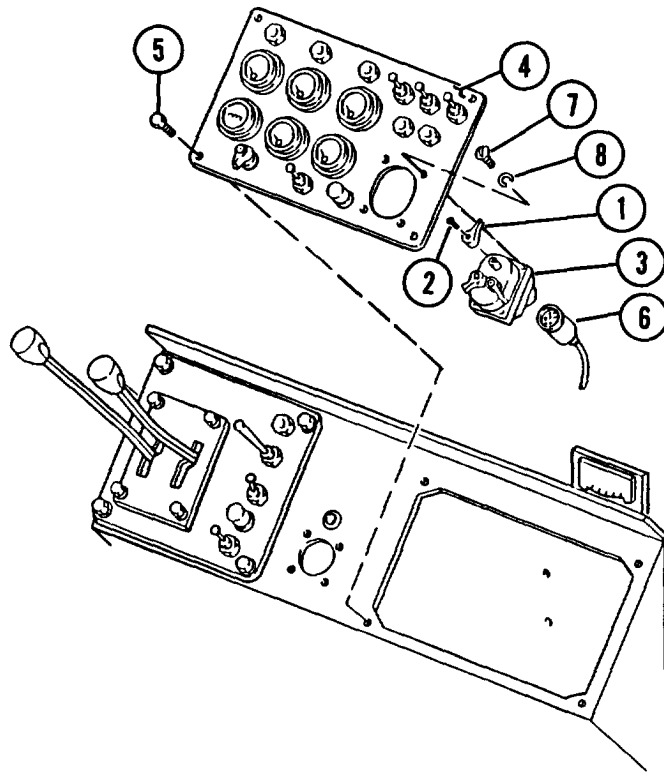
Lockwashers (8)
Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected-
para. 8-44.

REMOVAL

1. REMOVE HANDLES (1).
Remove three screws (2) securing three handles (1) to light switch (3).
2. RAISE INSTRUMENT PANEL (4).
a. Remove four capscrews (5) from instrument panel (4).
b. Raise instrument panel (4) to provide access to rear of blackout/service light switch (3).
3. REMOVE BLACKOUT/SERVICE LIGHT SWITCH (3).
a. Disconnect harness plug (6) from rear of blackout service light switch (3).
b. Remove screws (7) and lockwashers (8) to separate switch from instrument panel (4). Discard lockwasher (8).



8-14. BLACKOUT/SERVICE LIGHT SWITCH - REPLACE (Cont'd)

INSTALLATION

1. INSTALL BLACKOUT SERVICE LIGHT SWITCH (3).
 - a. Install screws (7) and new lockwashers (8) to secure switch to instrument panel (4).
 - b. Connect harness plug (6) to rear of blackout/service light switch (3).
2. INSTALL INSTRUMENT PANEL (4).

NOTE

Apply Loctite 242 to threads of capscrews (5).

Position instrument panel (4) and install four capscrews (5) to secure panel.

3. INSTALL HANDLES (1).

Position three handles (1) and secure with three screws (2).
4. CONNECT NEGATIVE BATTERY CABLE, para. 8-44.

8-15. ENGINE OIL PRESSURE SWITCH - REPLACE/TEST

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwasher (3)
Loctite 59241 (App. C, Item 42)

Equipment Condition

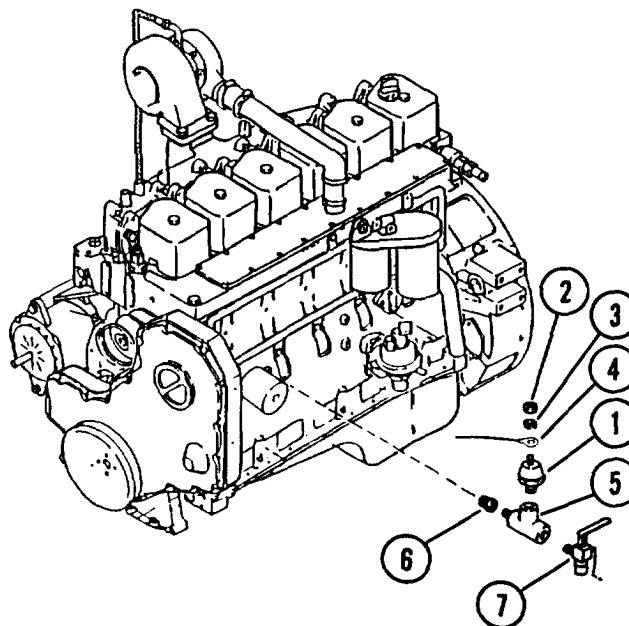
Vehicle parked on level ground.
Negative battery cable disconnected,
para. 8-44.

REMOVAL

NOTE

The engine oil pressure switch (1) is reached through the right-hand engine access door.

1. REMOVE NUT (2), LOCKWASHER (3) AND ELECTRICAL LEAD (4). DISCARD LOCKWASHER (3).
2. UNSCREW AND REMOVE ENGINE OIL PRESSURE SWITCH (1) FROM TEE (5).
3. IF NECESSARY, REMOVE TEE (5), ADAPTER (6), AND VALVE (7).



INSTALLATION

1. IF REMOVED, INSTALL TEE (5), ADAPTER (6), AND VALVE (7).
2. APPLY LOCTITE 59241 TO THREADS OF SWITCH (1).
3. SCREW SWITCH (1) INTO TEE (5).
4. SECURE ELECTRICAL LEAD (4) TO SWITCH (1) WITH NEW LOCKWASHER (3) AND NUT (2).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

TEST

MONITOR ENGINE OIL PRESSURE WITH STE/ICE, PARA. 2-13. VERIFY THAT OIL PRESSURE IS WITHIN ACCEPTABLE LIMITS.

8-16. ENGINE WATER TEMPERATURE SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwasher (3) .

Loctite 59241 (App. C, Item 42) .

Equipment Condition

Vehicle parked on level ground.

Negative battery cable disconnected,
para. 8-44.

REMOVAL

NOTE

The engine temperature switch (1) is reached through the right-hand engine access door.

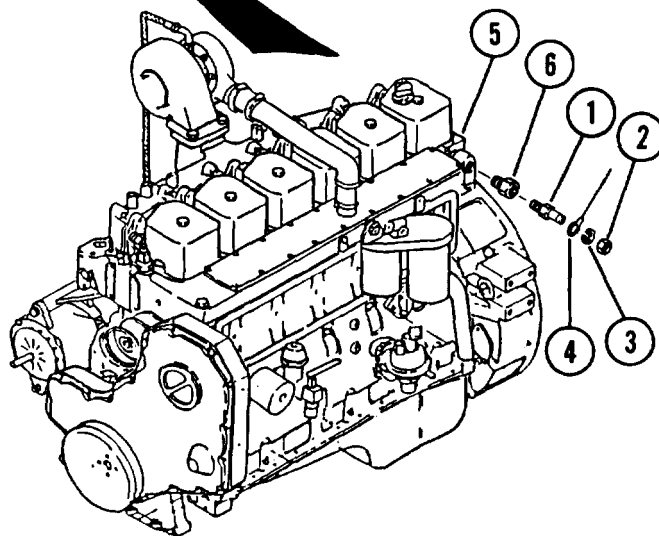
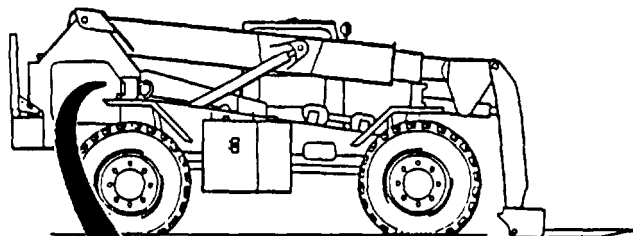
1. REMOVE NUT (2), LOCKWASHER (3), AND ELECTRICAL LEAD (4), FROM ENGINE TEMPERATURE SWITCH (1). DISCARD LOCKWASHER (3).

- 2* REMOVE SWITCH (1) FROM ENGINE (5).

3. IF NECESSARY, REMOVE BUSHING (6).

INSTALLATION

1. IF REMOVED, INSTALL BUSHING (6).
2. APPLY LOCTITE 59241 TO THREADS OF ENGINE WATER TEMPERATURE SWITCH (1).
3. SCREW SWITCH (1) INTO ENGINE (5).
4. SECURE ELECTRICAL LEAD (4) TO SWITCH (1) WITH NEW LOCKWASHER (3) AND NUT (2).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-17. TRANSMISSION TEMPERATURE SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Negative battery cable removed,
para. 8-44.

Materials/Parts

Container, 6 Gal.
Lockwasher (5)
Loctite 59241 (App. C, Item 42)
Transmission Oil (App. C, Item 36)

NOTE

The transmission temperature switch is located under the vehicle on the transmission.

REMOVAL

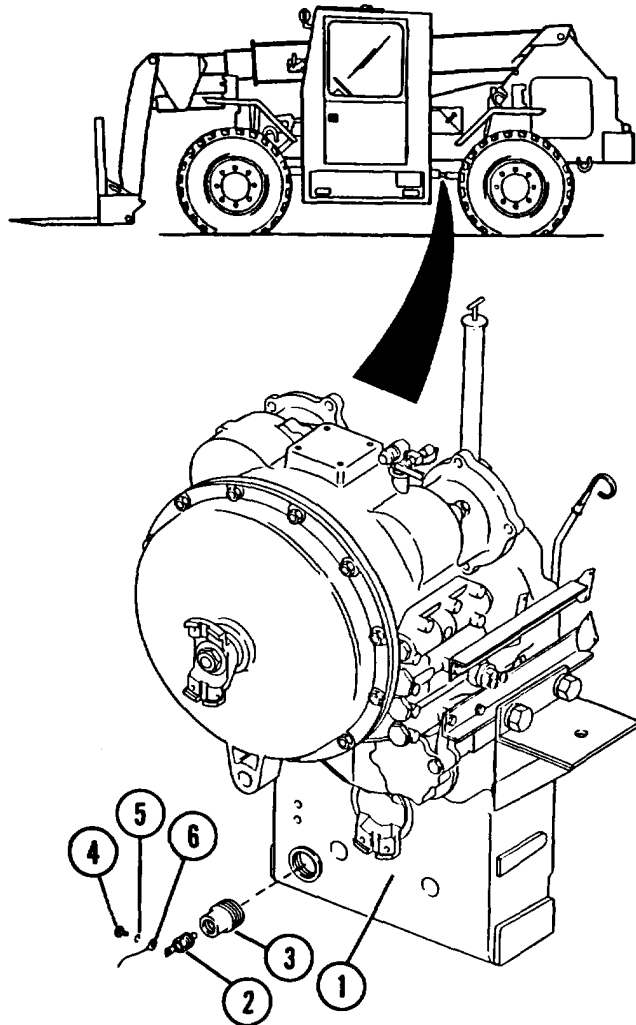
NOTE

Oil will spill out of transmission (1) when temperature switch (2) is unscrewed from reducer (3).

1. PLACE SUITABLE CONTAINER UNDER TRANSMISSION (1) TO CATCH TRANSMISSION OIL.
2. REMOVE SCREW (4), LOCKWASHER (5), AND ELECTRICAL LEAD (6) FROM SWITCH (2). DISCARD LOCKWASHER (5).
3. REMOVE SWITCH (2) FROM REDUCER (3).
4. IF NECESSARY, REMOVE REDUCER (3) FROM TRANSMISSION (1).

INSTALLATION

1. IF REMOVED, INSTALL REDUCER (3) TO TRANSMISSION (1).



8-17. TRANSMISSION TEMPERATURE SWITCH - REPLACE (Cont'd)

2. APPLY LOCTITE 59241 TO THREADS OF SWITCH (2).
3. INSTALL SWITCH (2) TO REDUCER (3).
4. SECURE WIRE LEAD (6) WITH NEW LOCKWASHER (5) AND SCREW (4).
5. FILL TRANSMISSION (1) WITH TRANSMISSION OIL, PARA. 9-7.

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8-18. BRAKE HYDRAULIC PRESSURE SWITCH - REPLACE/TEST

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Test Equipment

Ohmmeter

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected,
para. 8-44.

Materials/Parts

Anti-fungus Varnish (App. C, Item 54)
Container

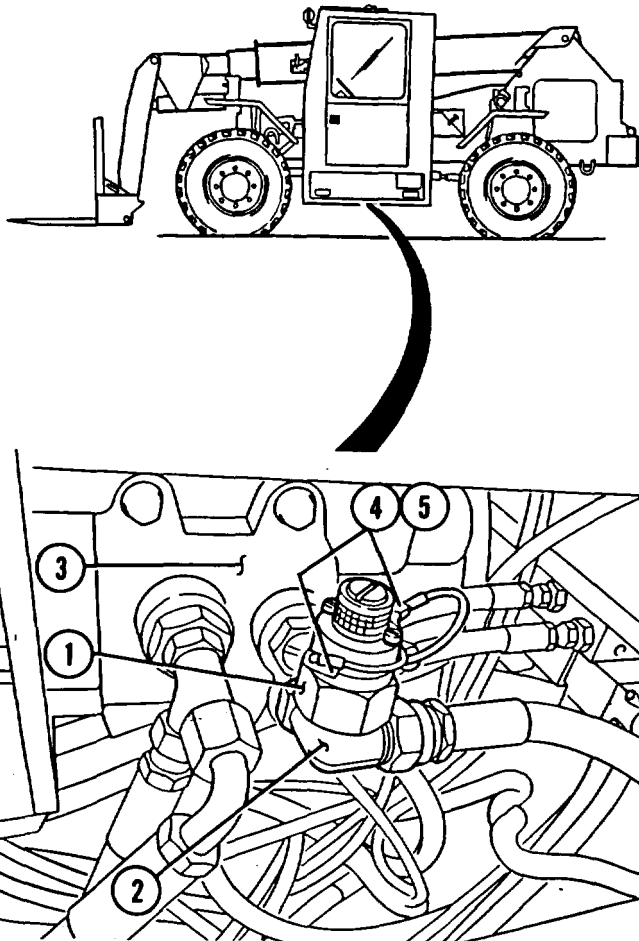
Loctite 59241 (App. C, Item 42)

REMOVAL

NOTE

The brake hydraulic pressure switch (1) is located under the vehicle cab, mounted on an elbow (2) attached to the brake control valve (3).

1. WITH THE ENGINE OFF, PUMP THE BRAKE PEDAL A MINIMUM OF 20 TIMES TO EXHAUST STORED PRESSURE IN THE BRAKE SYSTEM.
2. REMOVE SWITCH (1).
 - a. Tag and disconnect two female connectors (4) of vehicle wiring harness from two male connectors (5) at brake hydraulic pressure switch (1).
 - b. Place a suitable container to catch hydraulic oil that will briefly spill out of elbow (2) after switch (1) is removed.



8-18. BRAKE HYDRAULIC PRESSURE SWITCH - REPLACE/TEST (Cont'd)

WARNING

Be certain that step 1 of REMOVAL has been performed before performing step 2c, below. Serious injury from hydraulic oil under pressure can result if step 1 is not performed before removing switch (1) in step 2c.

- c. Remove brake hydraulic pressure switch (1) from elbow (2) at brake control valve (3).

INSTALLATI~

1. APPLY LOCTITE 59241 TO THREADS OF SWITCH (1).
2. SCREW SWITCH (1) INTO ELBOW (2).
3. CONNECT TWO FEMALE CONNECTORS (4) FROM VEHICLE WIRING HARNESS TO TWO MALE CONNECTORS (5) ON SWITCH (1). APPLY ANTI-FUNGUS VARNISH TO CONNECTORS (4) AND (5).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

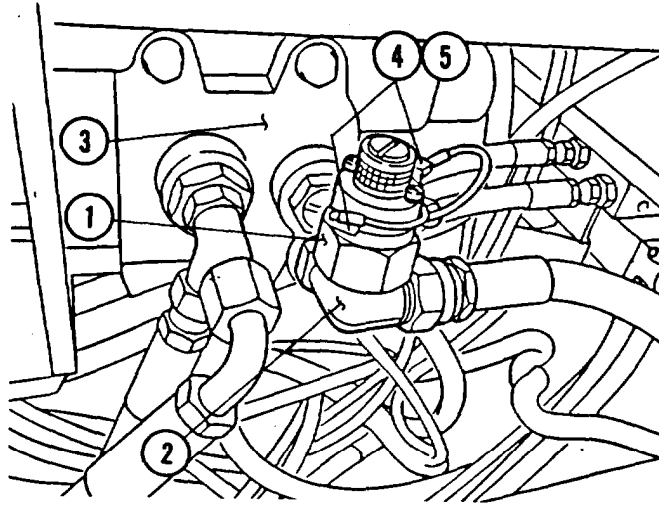
TESTING

1. TAG AND REMOVE TWO FEMALE CONNECTORS (4) FROM MALE CONNECTORS (5) AT BRAKE HYDRAULIC PRESSURE SWITCH (1).
2. CONNECT AN OHMMETER ACROSS MALE CONNECTORS (5) OF SWITCH (1).
3. TEST SWITCH (1) FOR PROPER OPERATION.
 - a. With the engine off, pump the brake pedal a minimum of 20 times to exhaust stored pressure in the brake system.
 - b. Observe the ohmmeter. It should indicate continuity.
 - c. Start the vehicle to allow the brake system accumulator to charge. The ohmmeter should indicate no continuity"

8-18. BRAKE HYDRAULIC PRESSURE SWITCH - RBPLACE/TEST (Cont'd)

If switch (1) does not pass the continuity tests, the brake hydraulic system is malfunctioning and must be repaired.

- e. If the brake hydraulic pressures are within the normal range, switch (1) is defective. Replace switch (1) as described in removal and installation sections of this paragraph.



8-19. ELECTRIC JOYSTICK AND HARNESS ASSEMBLY - TEST/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Materials/Parts

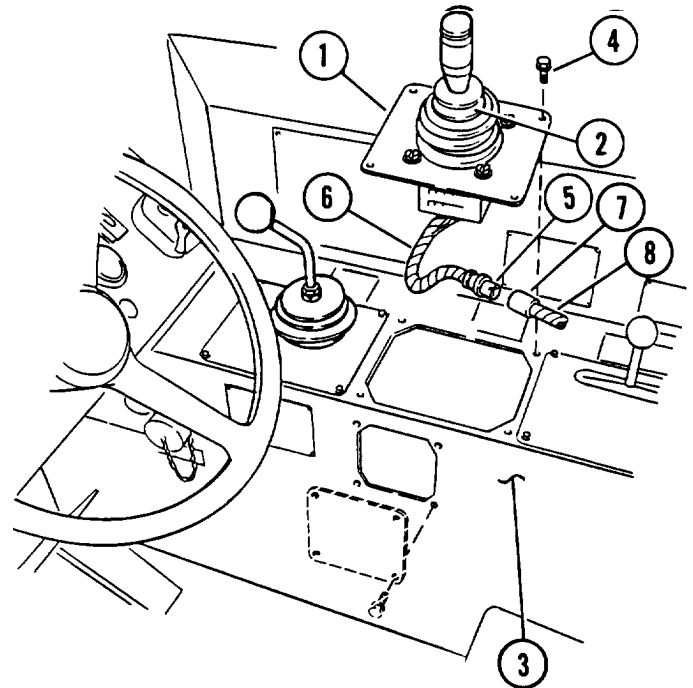
Loctite 242 (App. C, Item 39)
Nylon Washers (11)

Equipment Condition

Vehicle parked on level ground.
Engine off.
Batteries disconnected, para. 8-44.

REMOVAL

1. REMOVE COVER PLATE (1) AND JOYSTICK (2) AS AN ASSEMBLY FROM THE SIDE CONSOLE (3).
 - a. Remove four capscrews (4) from cover plate (1).
 - b. Lift cover plate (1) and joystick (2) from side console (3) as an assembly.
 - c. Unplug male plug (5) of joystick harness (6) from female plug (7) of vehicle wiring harness (8).
 - d. Remove cover plate (1) and joystick (2) from side console (3) as an assembly.



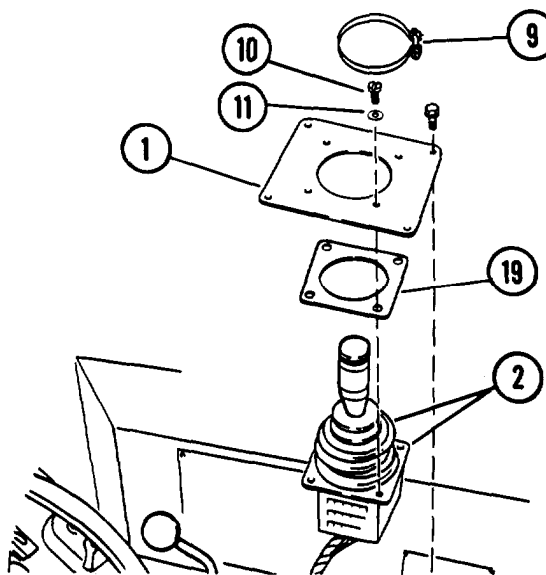
8-19. ELECTRIC JOYSTICK AND HARNESS ASSEMBLY - TEST/REPLACE (Cont'd)

2. IF NECESSARY, REMOVE COVER PLATE (1) FROM JOYSTICK (2).

- a. Remove clamp (9).
- b. Remove four screws (10) and four nylon washers (11) securing joystick (2) and gasket (19) to cover plate (1). Discard nylon washers (11).
- c. Separate joystick (2) from cover plate (1).

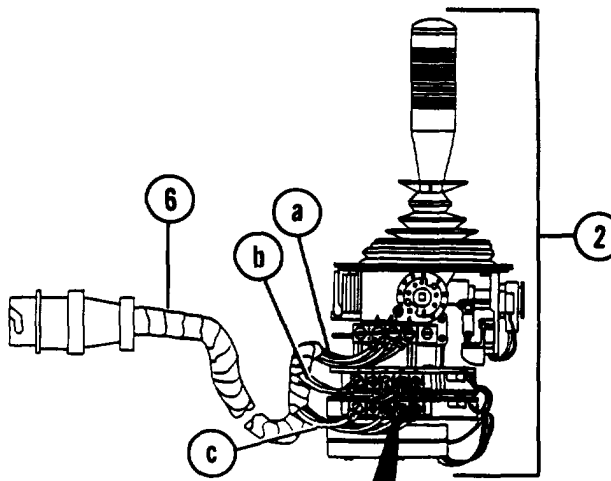
NOTE

Tag all leads as removed during steps 3a through 3c. Note location of all leads for use during installation. Refer to figure at right as required.



3. IF NECESSARY, DISCONNECT JOYSTICK HARNESS (6) FROM JOYSTICK (2).

- a. Disconnect leads 52, 51, and 2 (a) from top terminal strip of joystick (2).
- b. Disconnect leads 54, 2, 50, and 53 (b) from middle terminal strip of joystick (2).
- c. Disconnect leads 56, 2, 50, and 55 (c) from bottom terminal strip of joystick (2).



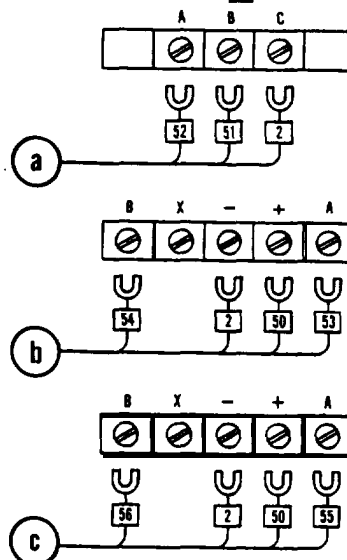
INSTALLATION

CAUTION

Connect all leads as described in steps 1a through 1c. Refer to figure at right as necessary. Failure to properly connect leads may result in serious damage to joystick or electrical system.

1. IF REMOVED, CONNECT JOYSTICK HARNESS (6) TO JOYSTICK (2).

- a. Connect leads 52, 51, and 2 (a) to top terminal strip of joystick (2).
- b. Connect leads 54, 2, 50, and 53 (b) to middle terminal strip of joystick (2).
- c. Connect leads 56, 2, 50, and 55 (c) to bottom terminal strip of joystick (2).



8-19. ELECTRIC JOYSTICK AND HARNESS ASSEMBLY - TEST/REPLACE (Cont'd)

2. IF REMOVED, SECURE JOYSTICK (2) TO COVER PLATE (1) .

- a. Position joystick (2) so that wide side of cover plate (1) is on same side as electrical terminals of joystick (2).

NOTE

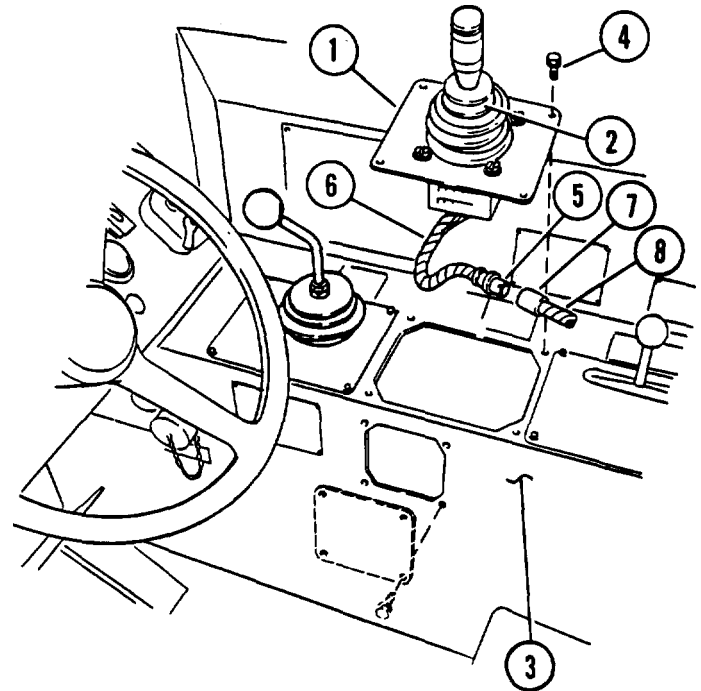
Apply Loctite 242 to threads of screws (10) .

- b. Secure joystick (2) and gasket (19) to cover plate (1) with four new nylon washers (11) and four screws (10).
 - c. Install and tighten hose clamp (9) .
3. INSTALL COVER PLATE (1) AND JOYSTICK (2) AS AN ASSEMBLY TO THE SIDE CONSOLE (3)0
- a. Support joystick (2) and cover plate (1) as an assembly over side console (3).
 - b. Plug male plug (5) of joystick harness (6) into female plug (7) of vehicle wiring harness (8).
 - c. Position cover plate (1) and joystick (2) as an assembly into side console (3). Make sure wide side of cover plate (1) is towards driver.

NOTE

Apply Loctite 242 to threads of capscrews (4).

- d. Install four capscrews (4) to secure cover plate (1) to side console (3).
4. CONNECT BATTERIES, PARA. 8-44.



8-19. ELECTRIC JOYSTICK AND HARNESS ASSEMBLY - TEST/REPLACE (Cont'd)

TESTING

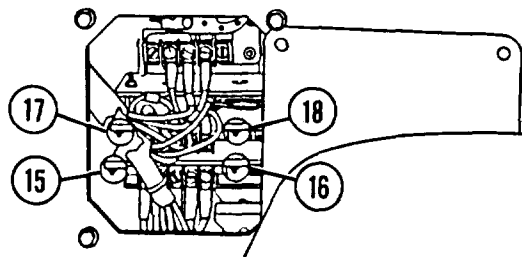
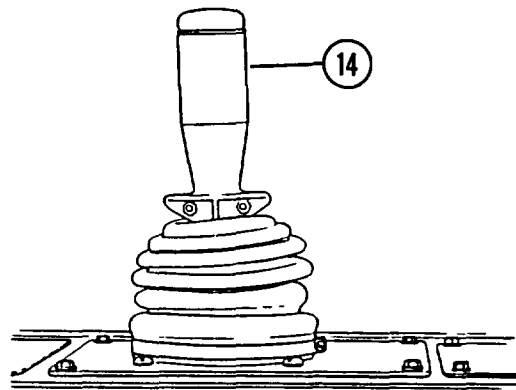
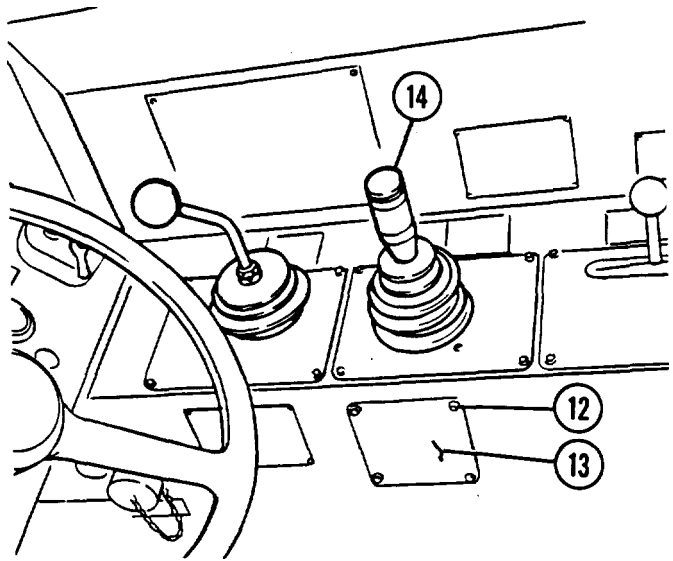
NOTE

Do not operate the engine while performing this test.

NOTE

The following test can be performed without removing the joystick from the vehicle.

1. REMOVE FOUR CAPSCREWS (12) AND PLATE (13).
2. TURN THE IGNITION SWITCH TO THE "ON" POSITION BUT DO NOT START THE ENGINE.
3. PERFORM OPERATION TEST OF ELECTRIC JOYSTICK.
 - a. Move the electric joystick handle (14) fully forward and hold it in this position. Indicator light (15) should be on.
 - b. Move the electric joystick handle (14) fully rearward and hold it in this position. Indicator light (16) should be on.
 - c* Move the electric joystick handle (14) fully to the right and hold it in this position. Indicator light (17) should be on.
 - d. Move the electric joystick handle (14) fully to the left and hold it in this position. Indicator light (18) should be on.
4. IF INDICATOR LIGHTS (15), (16), (17), OR (18) FAIL TO ILLUMINATE AS DESCRIBED IN THE ABOVE STEPS. REPLACE THE ELECTRIC JOYSTICK AS DESCRIBED IN THE "REMOVAL" SECTION OF THIS PARAGRAPH.
5. AFTER TESTING IS COMPLETED, TURN THE IGNITION SWITCH TO THE OFF POSITION.
6. INSTALL FOUR CAPSCREWS (12) AND PLATE (13).



8-20. FORK AUTOLEVELER CIRCUIT BOARD - TEST/REPLACE

This task covers:

- a. Testing of Fork Autoleveler Switch and Circuit Board
- b. Removal
- c. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Template Level

Protractor, Circular

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Locknuts (16)

Lockwashers (12)

TESTING OF FORK AUTOLEVELER SWITCH AND CIRCUIT BOARD

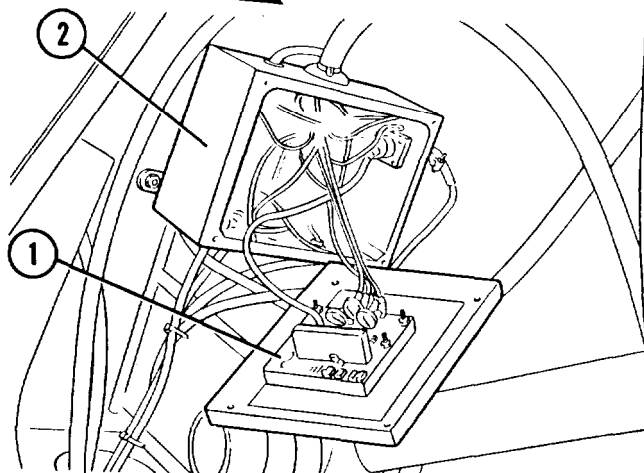
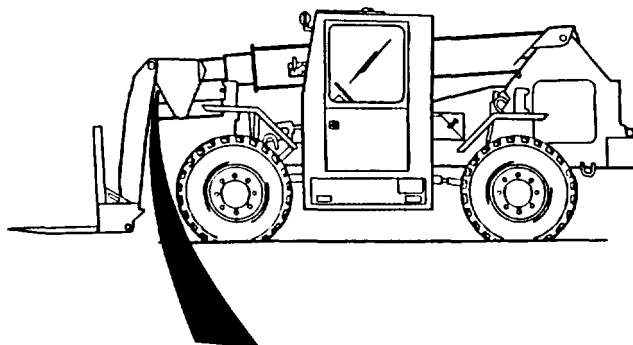
NOTE

The autoleveler circuit board (1) is located at the top of the MLRS attachment, inside the boom electrical box (2).

NOTE

potentiometers labeled "Hi A", "Hi B", "LO" and "RMP" on autoleveler circuit board (1) are preset at the factory. Do not attempt to adjust them.

1. START ENGINE. RAISE FORKS APPROXIMATELY ONE FOOT OFF GROUND . STOP ENGINE.



8-20. FORK AUTOLEVELER CIRCUIT BOARD - TEST/REPLACE (Cont'd)

2. LOOSEN FOUR SCREWS (3) AND SEPARATE COVER (4) FROM BOOM ELECTRICAL BOX (2) TO PROVIDE ACCESS TO AUTOLEVELER CIRCUIT BOARD (1).

CAUTION

Support cover (4) as required so that weight of cover (4) and circuit board (1) is not supported by electrical leads (5) to board (1).

NOTE

There are two LED indicators on the autoleveler circuit board (1). One is labeled "Hi A" (6) and the other is labeled "Hi B" (7).

3. CHECK FOR PROPER ADJUSTMENT OF AUTOLEVELER SWITCH.

- a. Start engine.
- b. Turn off autoleveler control in cab.
- c. Place level on forks.
- d. Raise forks to approximately a +6 degree inclination and observe "Hi A" LED indicator (6).

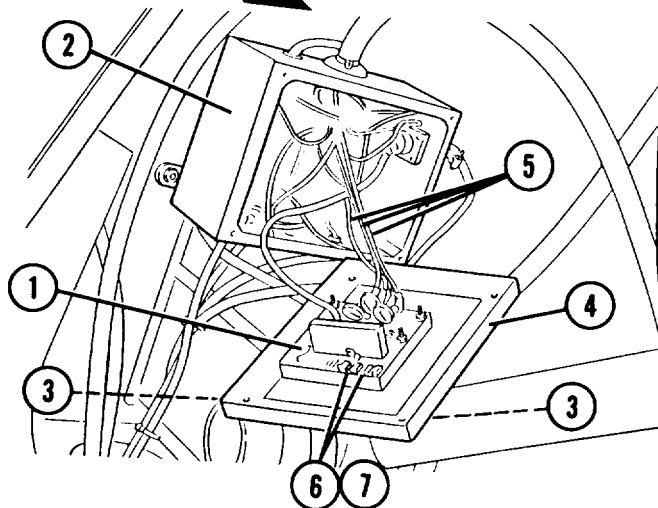
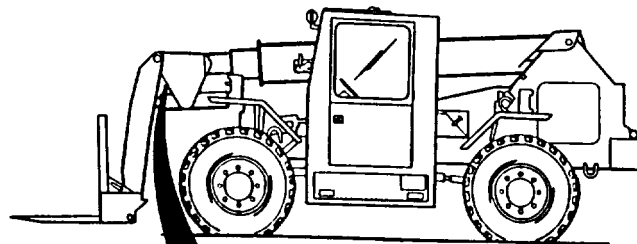
NOTE

The "Hi A" LED indicator (6) should be illuminated after forks are raised.

- e. Turn on autoleveler control in cab and observe "Hi A" LED indicator (6).

NOTE

The "Hi A" LED indicator (6) should remain illuminated as forks are lowering and go out when forks are level.



8-21. FORK AUTOLEVELER CIRCUIT BOARD - TEST/REPLACE (Cont'd)

- f. Turn off autoleveler control in cab and lower forks to approximately a -6 degree inclination. Observe "Hi B" LED indicator (7).

NOTE

The "Hi B" LED indicator (7) should be illuminated after forks are lowered.

- g. Turn on autoleveler control in cab and observe "Hi B" LED indicator (7).

NOTE

The "Hi B" LED indicator (7) should remain illuminated as forks are raising and go out when forks are level.

- h. If either LED indicator (6) or (7) remains illuminated when forks are level, fork autoleveler switch needs adjustment. Refer to Para. 8-21.
- i. Remove level from forks.

NOTE

If neither LED indicator (6) or (7) illuminates during the tests above, check for voltage across "VS" and "GND" terminals on circuit board (1). If 24 w is not present, wiring supplyin9 power to board (1) is open.

NOTE

If voltage is present across "VS" and "GND" terminals, and neither LED indicator illuminates, the autoleveler switch and/or circuit board (1) is defective.

8-20. FORK AUTOLEVELER CIRCUIT BOARD - TEST/REPLACE (Cont'd)

Refer to REMOVAL and INSTALLATION sections of this paragraph for replacement of fork autoleveler circuit board. Refer to Para. 8-21 for replacement of fork autoleveler switch.

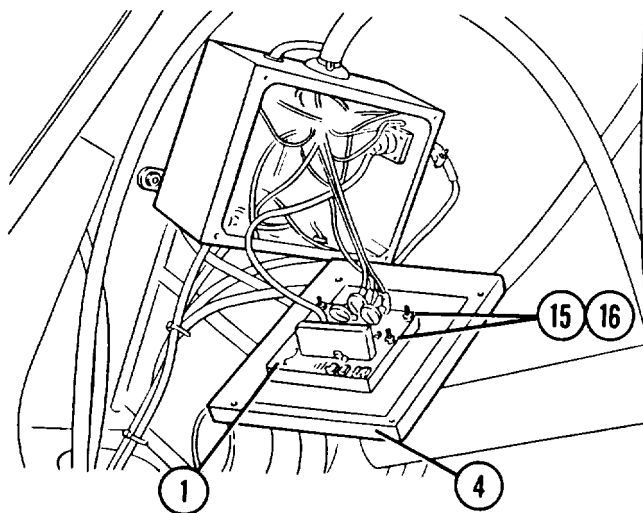
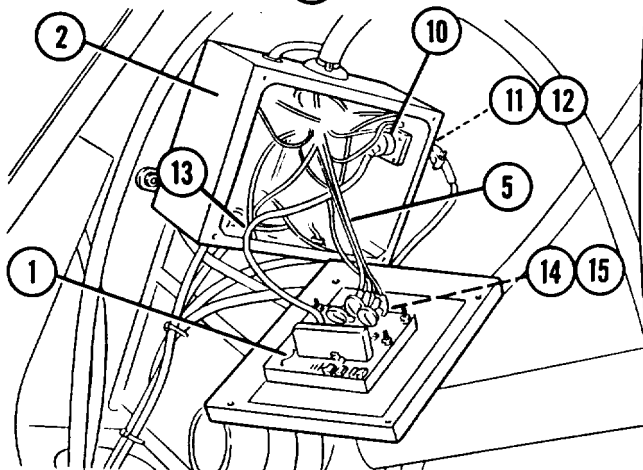
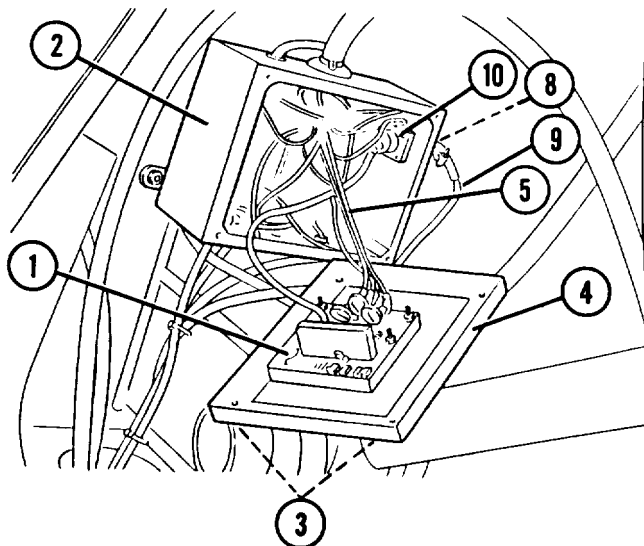
REMOVAL

1. DISCONNECT BATTERIES, PARA. 8-44.
2. LOOSEN FOUR SCREWS (3) AND PULL COVER (4) FROM BOX (2).

CAUTION

Support cover (4) so that weight of cover (4) and circuit board (1) is not supported by electrical leads (5) attached to board (1).

3. UNSCREW COLLAR (8) ON AUTOLEVELER CABLE (9) AT BOX (2) AND REMOVE AUTOLEVELER CABLE (9) FROM CONNECTOR (10).
4. REMOVE FOUR SCREWS (11) AND FOUR LOCKWASHERS (12) SECURING CONNECTOR (10) AND ELECTRICAL CABLE (13) TO BOX (2). DISCARD LOCKWASHERS (12).
- 5* TAG FOUR ELECTRICAL LEADS (5) AT TERMINAL STRIP (14) OF CIRCUIT BOARD (1). LOOSEN FOUR SCREWS (15) ON TERMINAL STRIP (14) AND REMOVE LEADS (5) FROM TERMINAL STRIP (14).
6. IF NECESSARY, REMOVE FOUR SCREWS (15) AND FOUR LOCKNUTS (16) SECURING CIRCUIT BOARD (1) TO COVER (4). REMOVE BOARD (1) FROM COVER (4). DISCARD LOCKNUTS (16).



8-20. FORK AUTOLEVELER CIRCUIT BOARD - TEST/REPLACE (Cont'd)

INSTALLATION

1. IF REMOVED, PLACE CIRCUIT BOARD (1) ON COVER (4) AND SECURE WITH FOUR NEW LOCKNUTS (16), AND FOUR SCREWS (15).

CAUTION

Support cover (4) during steps 2 and 3 so that weight of cover (4) and circuit board (1) is not supported by electrical leads (5).

2. PLACE FOUR ELECTRICAL LEADS (5) ON TERMINAL STRIP (14) OF CIRCUIT BOARD (1) AS TAGGED. SECURE LEADS (5) TO TERMINAL STRIP (14) WITH FOUR SCREWS (15) .
3. SECURE CONNECTOR (10) AND ELECTRICAL CABLE (13) TO BOX (2) WITH FOUR NEW LOCKWASHERS (12) AND FOUR SCREWS (11) 1
4. CONNECT PLUG OF AUTOLEVELER CABLE (9) TO CONNECTOR (10) ON BOX (2) AND SECURE WITH COLLAR (8).
5. PLACE COVER (4) ON BOX (2) AND SECURE WITH FOUR SCREWS (3).
6. CONNECT BATTERIES, PARA 8-44.

8-21. FORK AUTOLEVELER SWITCH - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjustment of fork autoleveler switch

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Template Level

Materials/Parts

Lockwashers (11) (20) (25) (29) (33)

Tie Straps (13) (15) (16) (17)

Loctite 242 (App. C, Item 39)

Equipment Condition

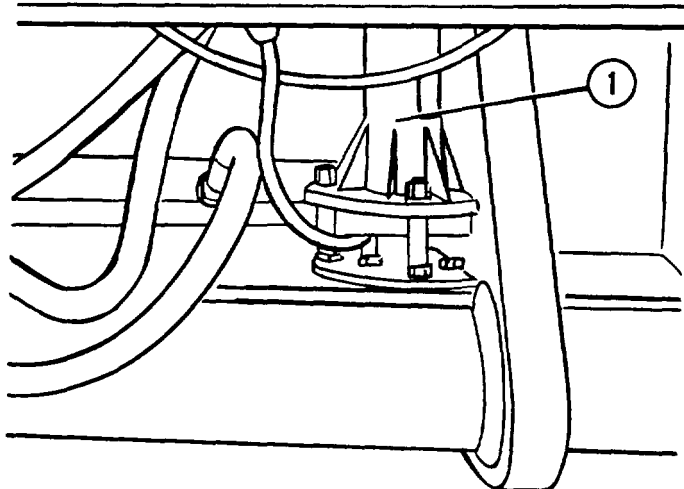
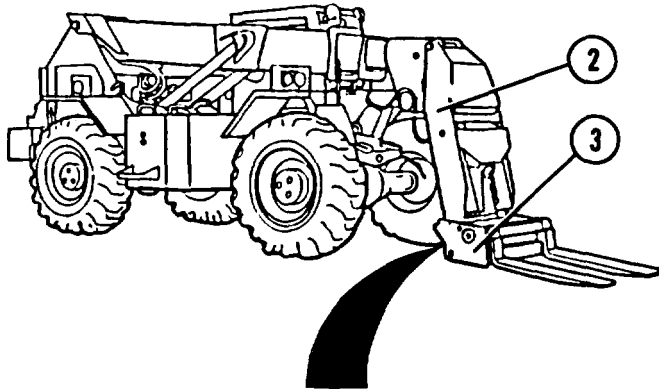
Vehicle parked on level ground.

Negative battery cable disconnected,
para. 8-44.

REMOVAL

NOTE

The fork autoleveler switch (1) is located at the base of the MLRS attachment (2), on the carriage assembly (3).



(NOTE: COVER REMOVED FROM
SWITCH IN THIS VIEW)

8-21. FORK AUTOLEVELER SWITCH - REPLACE/ADJUST (Cont'd)

NOTE

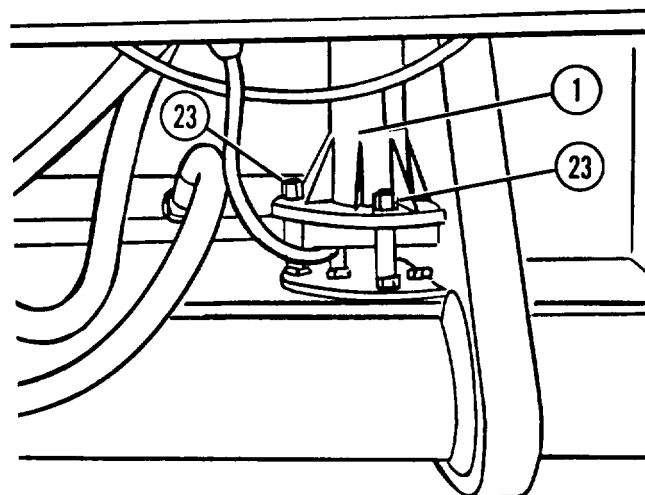
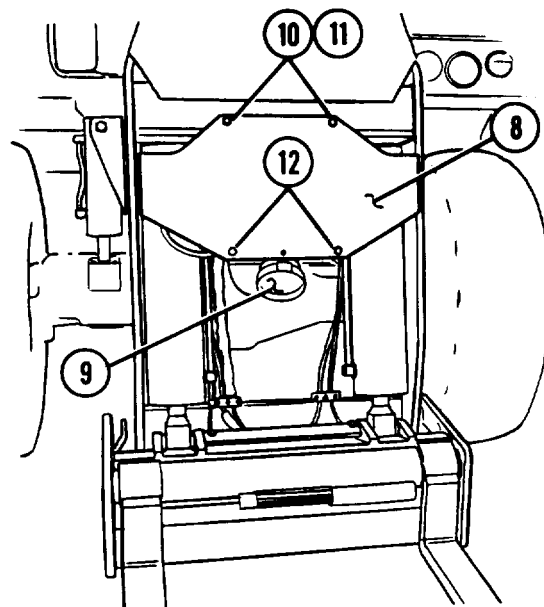
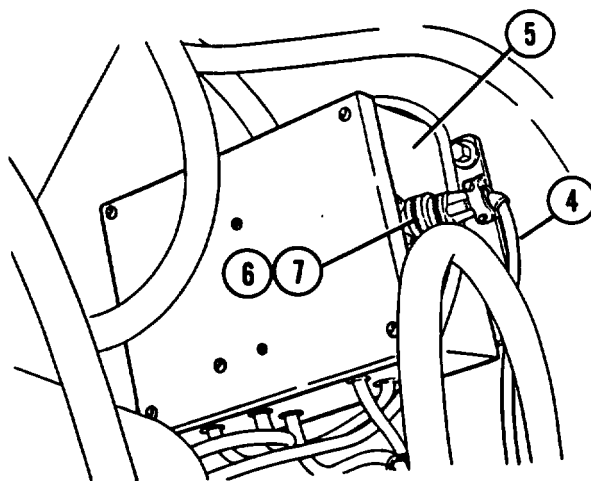
Be sure ignition switch is placed in the OFF position before removing autoleveler switch cable (4) from boom electrical box (5).

1. UNSCREW COLLAR (6) AND REMOVE AUTOLEVELER SWITCH CABLE (4) FROM CONNECTOR (7) AT BOOM ELECTRICAL BOX (5).
2. REMOVE MLRS ATTACHMENT VALVE COVER (8) .
 - a. Tag and unplug two male plugs of vehicle wiring harness from two female plugs of light (9).
 - b. Remove two capscrews (10), two lockwashers (11), two nuts (12), and cover (8). Discard lockwashers (11) 1
3. REMOVE FORK AUTOLEVELER SWITCH (1) AND CABLE (4) FROM CARRIAGE ASSEMBLY (3).

NOTE

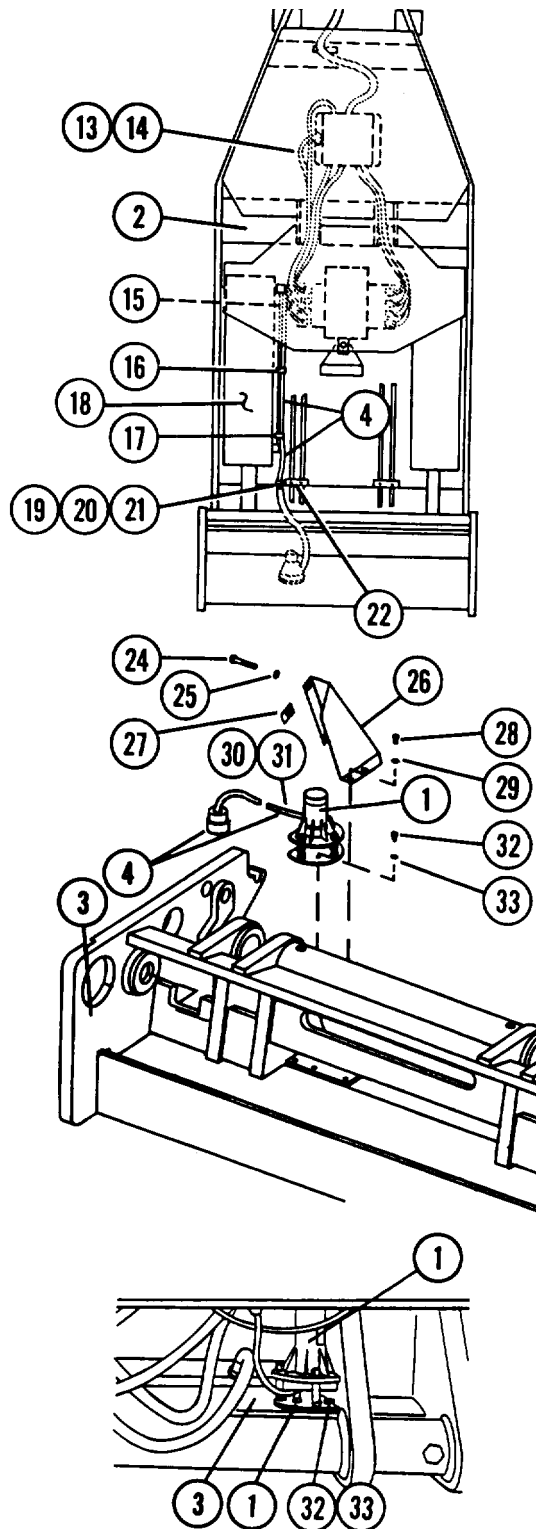
Do not turn adjusting nuts (23) on top of autoleveler switch (1).

- a. Remove and discard two tie straps (13) securing autoleveler cable (4) to MLRS attachment valve cables (14) .
- b. Remove and discard tie straps (15)/ (16), and (17) securing autoleveler cable (4) to tube of fork tilt cylinder (18).
- c. Remove capscrew (19) 1 lockwasher (20), and cable clamp (21) securing autoleveler cable (4) to clamp halves (22). If necessary, remove cable clamp (21) from autoleveler cable (4).



8-21. FORK AUTOLEVELER SWITCH - REPLACE/ADJUST (Cont'd)

- d. Remove two bolts (24) and two lockwashers (25) from switch cover (26). Discard lockwashers (25). If necessary, remove two retainer nuts (27) from switch cover (26).
- e. Remove two capscrews (28) and two lockwashers (29) from switch cover (26). Remove switch cover (26) from carriage assembly (3). Discard lockwashers (29).
- f. Carefully remove autoleveler switch cable (4) and grommet (30) from notch in switch cover (26). If necessary, remove conduit (31) from autoleveler cable (4).
- g. Remove four capscrews (32) and four lockwashers (33) securing switch (1) to carriage assembly (3). Remove switch (1) from carriage assembly (3).



INSTALLATION

WARNING

Failure to route autoleveler cable (4) as described, may result in damage to vehicle or its load due to malfunctioning of autoleveler system.

NOTE

Autoleveler cable (4) is part of autoleveler switch (1) and is non-repairable. If autoleveler cable (4) is damaged, entire autoleveler switch (1) must also be replaced.

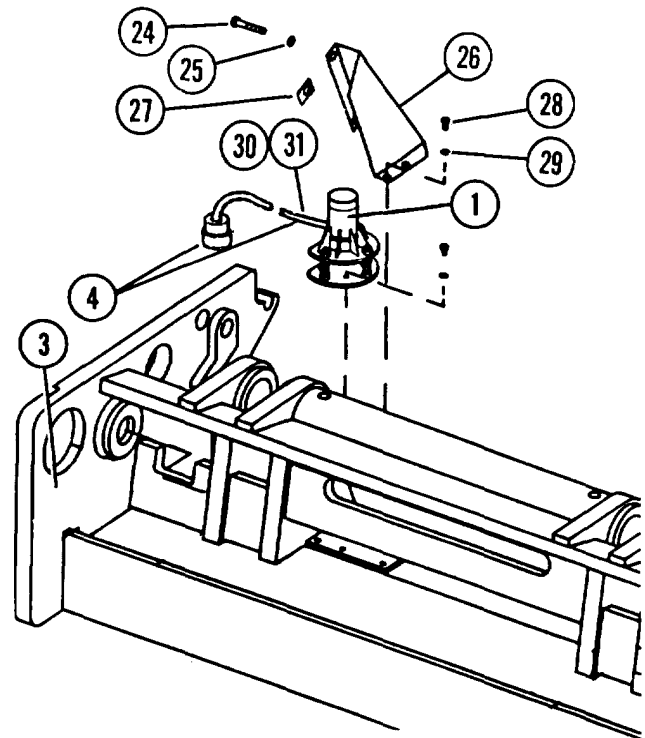
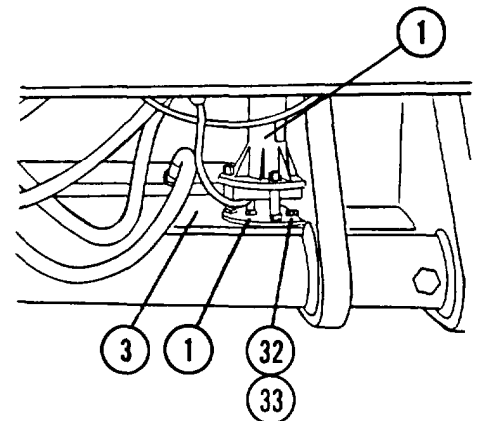
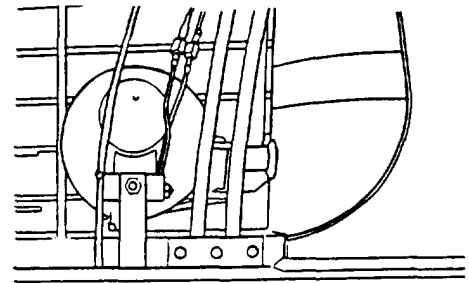
8-21. FORK AUTOLEVELER SWITCH - REPLACE/ADJUST (Cont'd)

NOTE

Apply Loctite 242 to all capscrews and bolts as they are installed.

1. INSTALL FORK AUTOLEVELER SWITCH (1) AND CABLE TO CARRIAGE ASSEMBLY (3).

- a. Start engine. Position carriage assembly (3) in a down position so that carriage tilt cylinders are fully extended. Stop engine.
- b. Position switch (1) on carriage assembly (3) and secure with four new lockwashers (33) and three capscrews (32).
- c. Carefully position autoleveler cable (4) and grommet (30) through notch in switch cover (26). If removed, install conduit (31) to autoleveler cable (4).
- d. Position switch cover (26) on carriage assembly (3) and secure with two new lockwashers (29), two capscrews (28), two retainer nuts (27), two new lockwashers (25), and two bolts (24).
- e. If removed, install cable clamp (21) to autoleveler cable (4). Install, but do not tighten, capscrew (19) and new lockwasher (20).
- f. Slide conduit (31) on autoleveler cable (4) so it is positioned between cable clamp (21) and cable grommet (30).
- g. Route autoleveler cable (4) through cable clamp (21) and pull cable (4) tight from top. Tighten capscrew (19) and lockwasher (20) to secure cable clamp (21) and autoleveler cable (4) to clamp halves (22).



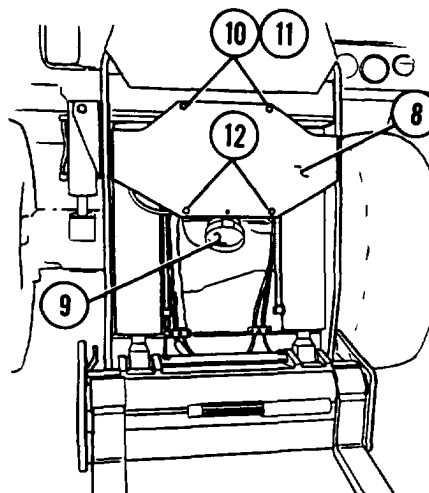
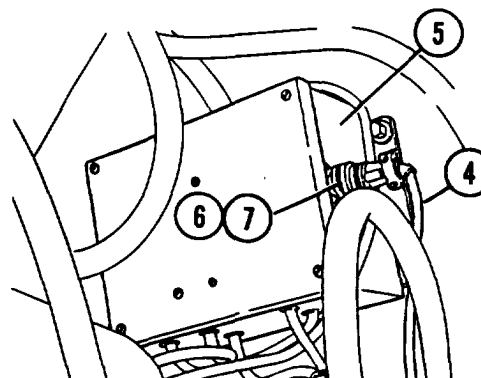
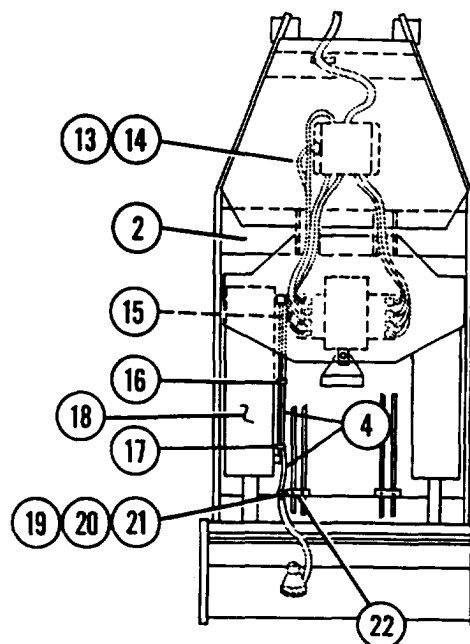
8-21. FORK AUTOLEVELER SWITCH - REPLACE/ADJUST (Cont'd)

- h. Pull autoleveler cable (4) tight from top and secure autoleveler cable (4) to tube of fork tilt cylinder (18) with new tie straps (15), (16) and (17).
- i. Secure autoleveler cable (4) to MLRS attachment valve cables (14) with two tie straps (13).

NOTE

Any slack in autoleveler cable (4) must be located at boom electrical box end of cable.

2. INSTALL MLRS ATTACHMENT VALVE COVER (8).
 - a. Secure cover (8) with two capscrews (10), two new lockwashers (11), and two nuts (12).
 - b. Plug two male plugs of vehicle wiring harness into two female plugs of light (9) as tagged.
3. INSERT PLUG ON AUTOLEVELER CABLE (4) INTO CONNECTOR (7) ON BOOM ELECTRICAL BOX (5). TURN COLLAR (6) UNTIL CABLE (4) IS SECURE.
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
5. ADJUST AUTOLEVELER SWITCH (1). REFER TO "ADJUSTMENT OF FORK AUTOLEVELER SWITCH" SECTION OF THIS PARAGRAPH.



ADJUSTMENT OF FORK AUTOLEVELER SWITCH

1. REMOVE SWITCH COVER FROM CARRIAGE ASSEMBLY AS DESCRIBED IN "REMOVAL" SECTION OF THIS PARAGRAPH.
2. START ENGINE.
3. ADJUST AUTOLEVELER SWITCH (1).
 - a. Turn on fork autoleveler control in cab.

8-21. FORK AUTOLEVELER SWITCH - REPLACE/ADJUST (Cont'd)

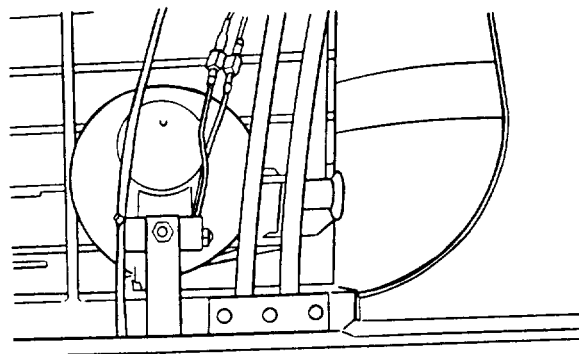
- b. Raise forks approximately 24" above ground.
- c. Place level on forks and note level reading.

NOTE

Level reading should be within ± 2 degrees of zero if switch (1) is properly adjusted. If necessary, refer to step 4 of this section to adjust switch (1).

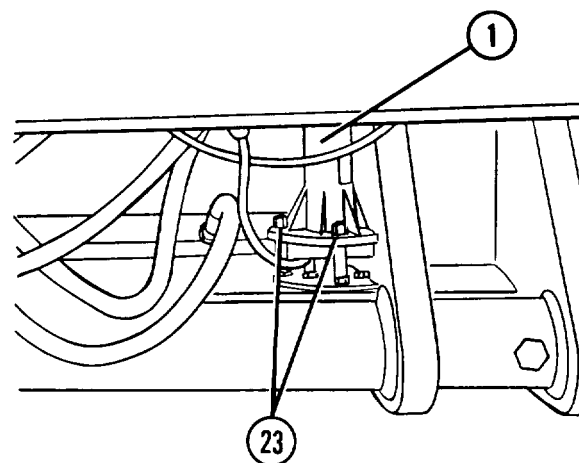
4. ADJUST AUTOLEVELER SWITCH (1).

- a. Turn three adjustment nuts (23) on switch (1), as required, until 0 degree reading is obtained on level.
- b. Turn off fork autoleveler control in cab and manually tilt carriage assembly up or down.
- c. Turn on fork autoleveler control in cab and note level reading after forks have leveled.

**NOTE**

Reading will be within ± 2 degrees of zero if switch is properly adjusted-

- d. If necessary, repeat steps a through c of step 4, as required until switch (1) is properly adjusted.



5. STOP ENGINE.
6. INSTALL SWITCH COVER TO CARRIAGE ASSEMBLY AS DESCRIBED IN "INSTALLATION" SECTION OF THIS PARAGRAPH .

8-22. STARTER RELAY - REPPLEACE/TEST

This task covers:

- a. Removal
- b. Installation
- C. Testing

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Test Equipment

Ohmmeter

Materials/parts

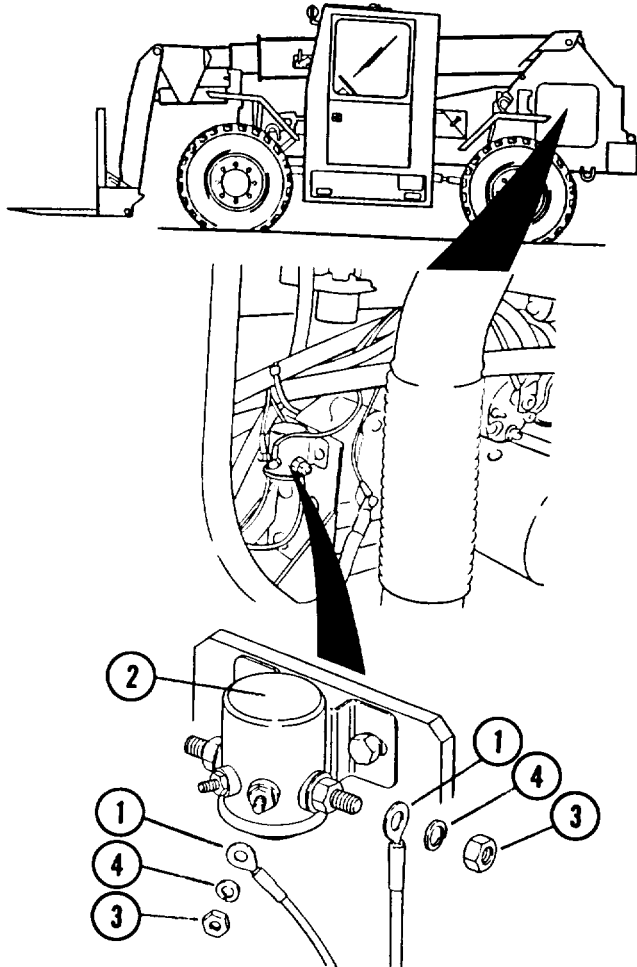
Lockwashers (4)
Starwasher (7)
Starwasher (12)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected,
Para. 8-44.

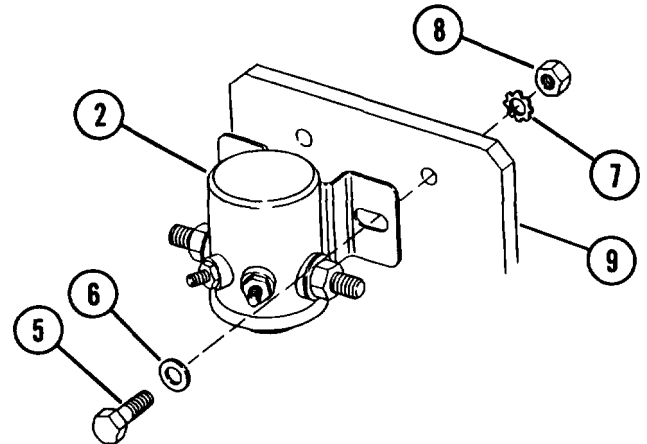
REMOVAL

1. TAG FOUR ELECTRICAL LEADS (1) AT STARTER RELAY (2).
2. REMOVE FOUR NUTS (3), FOUR LOCKWASHERS (4), AND DISCONNECT FOUR ELECTRICAL LEADS (1) FROM STARTER RELAY (2). DISCARD LOCKWASHERS (4).



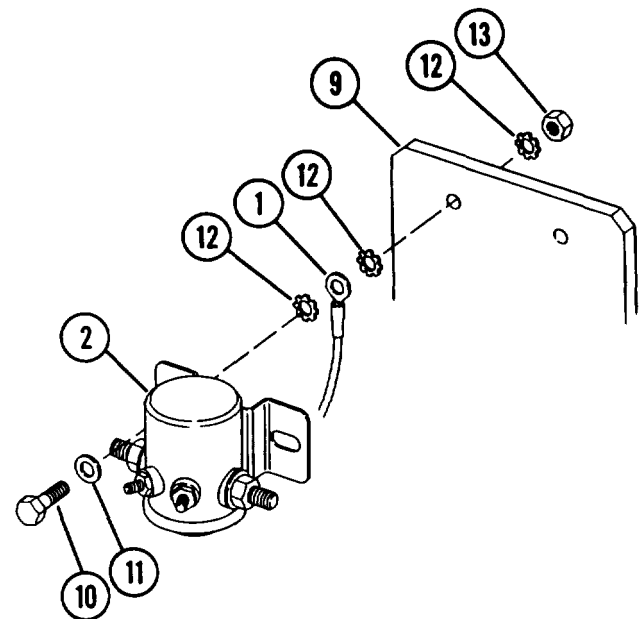
8-22. STARTER RELAY - REPLACE/TEST (Cont'd)

3. REMOVE BOLT (5), FLATWASHER (6), STARWASHER (7), AND NUT (8) SECURING RIGHT-HAND SIDE OF RELAY (2) TO ENGINE MOUNT (9). DISCARD STARWASHER (7).
4. REMOVE BOLT (10), FLATWASHER (11), THREE STARWASHERS (12), AND NUT (13) SECURING ELECTRICAL LEAD (1) AND LEFT-HAND SIDE OF RELAY (2) TO ENGINE MOUNT (9). DISCARD STARWASHERS (12).
5. REMOVE RELAY (2) FROM ENGINE MOUNT (9).



INSTALLATION

1. POSITION RELAY (2) ON ENGINE MOUNT (9).
2. SECURE ELECTRICAL LEAD (1) AND LEFT-HAND SIDE OF RELAY (2) TO ENGINE MOUNT (9) WITH NUT (13), THREE NEW STARWASHERS (12), FLATWASHER (11), AND BOLT (10).
3. SECURE RIGHT-HAND SIDE OF RELAY (2) TO ENGINE MOUNT (9) WITH NUT (8), NEW STARWASHERS (7), NEW FLATWASHER (6), AND BOLT (5).
4. CONNECT FOUR ELECTRICAL LEADS (1), AS TAGGED, TO STARTER RELAY (2) AND SECURE WITH FOUR NEW LOCKWASHERS (4), AND FOUR NUTS (3).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-22. STARTER RELAY - REPLACE/TEST (Cont'd)

TESTING

1. DISCONNECT ELECTRICAL LEADS FROM STARTER RELAY AS DESCRIBED IN "REMOVAL" SECTION OF THIS PARAGRAPH.

2. TEST RELAY FOR PROPER SOLENOID OPERATION.

a. Apply 24 volts DC to terminals (b) and (c).

b. Listen for "click" when voltage is applied. If no "click" is heard, relay is defective and must be replaced. Refer to REMOVAL and INSTALLATION sections in this paragraph.

3. TEST RELAY FOR CONTINUITY.

a. Apply 24 volts DC to terminals (b) and (c) of relay.

b. Connect an ohmmeter across terminals (a) and (d) of relay.

c. Ohmmeter should indicate continuity across terminals (a) and (d).

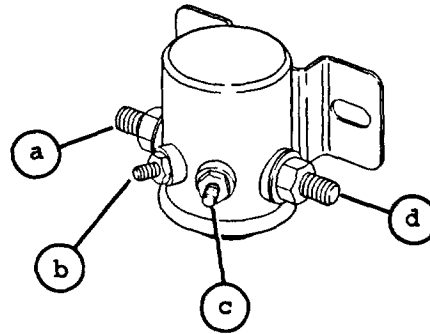
d. Remove 24 volts DC from terminals (b) and (c).

e. Ohmmeter should indicate no continuity across terminals (a) and (d).

f. Replace relay if continuity requirements are not met in tests 3c and 3e. Refer to REMOVAL and INSTALLATION sections of this paragraph.

4. CONNECT ELECTRICAL LEADS TO STARTER RELAY AS DESCRIBED IN "INSTALLATION" SECTION OF THIS PARAGRAPH.

5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-23. EMERGENCY STEER PUMP RELAY (PUMP

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup

Tools
 Tool Kit, Automotive Mechanics

Materials/Parts
 Lockwashers (4)
 Lockwasher (6)

Test Equipment
 Ohmmeter

Equipment Condition
 Vehicle parked on level ground.
 Negative battery cable disconnected,
 Para. 8-44.

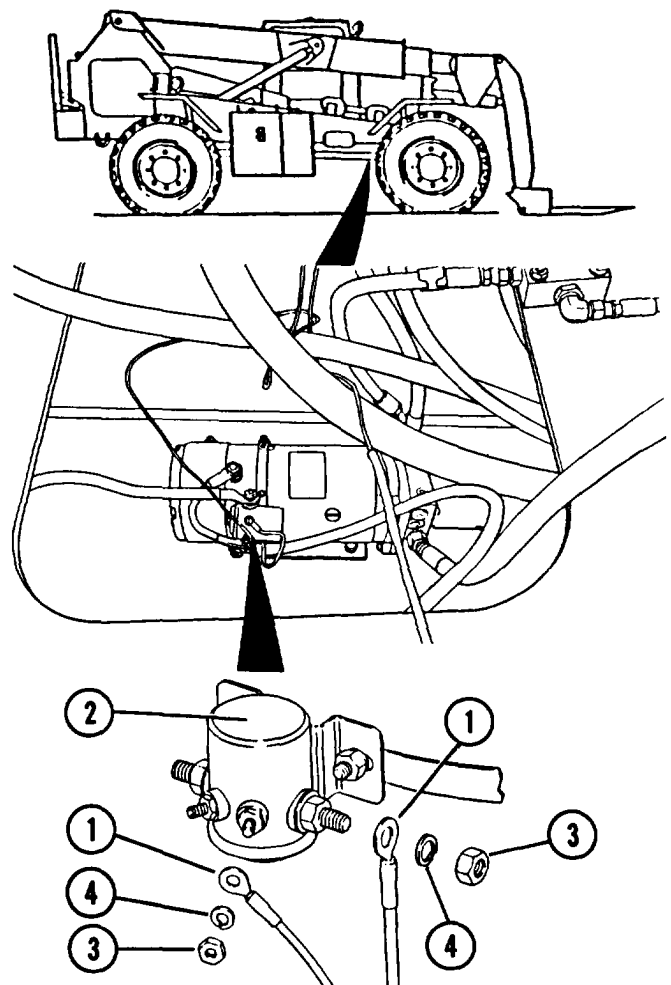
NOTE

There are two emergency steer pump relays. One is mounted under the vehicle on the emergency steer pump. The other is mounted inside the cab front console.

For removal and testing of the console mounted relay, refer to para. 8-24.

REMOVAL

1. TAG ELECTRICAL LEADS AND CABLES (1) AT RELAY (2).
2. REMOVE FOUR NUTS (3), FOUR LOCKWASHERS (4), AND DISCONNECT ELECTRICAL LEADS AND CABLES (1) FROM RELAY (2). DISCARD LOCKWASHERS (4).

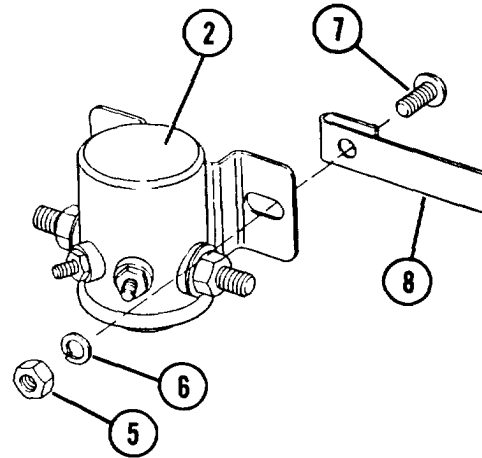


8-23. EMERGENCY STEER PUMP RELAY (PUMP-MOUNTED - TEST/RBPLACE (Cont'd)

3. REMOVE TWO NUTS (5), TWO LOCKWASHERS (6), AND TWO SCREWS (7) SECURING CLAMP (8) AND RELAY (2) TO EMERGENCY STEER PUMP . DISCARD LOCKWASHERS (6).
4. REMOVE CLAMP (8) AND RELAY (2) FROM PUMP AS AN ASSEMBLY.

INSTALLATION

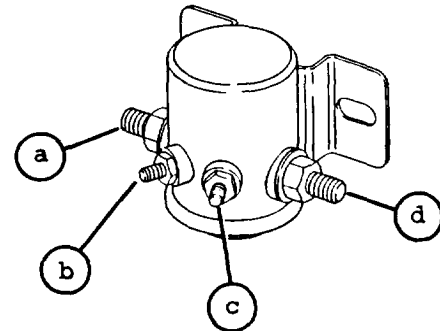
1. POSITION CLAMP (8) AND RELAY (2) ON EMERGENCY STEER PUMP AS AN ASSEMBLY.
2. SECURE CLAMP (8) AND RELAY (2) TO EMERGENCY STEER PUMP WITH TWO NUTS (5), TWO NEW LOCKWASHERS (6), AND TWO SCREWS (7) .
3. CONNECT ELECTRICAL LEADS AND CABLES (1) TO RELAY (2) AND SECURE WITH FOUR NEW LOCKWASHERS (4) AND FOUR NUTS (3).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-23. EMERGENCY STEER PUMP RELAY (PUMP-MOUNTED) - TEST/REPLACE (Cont'd)

TESTING

1. DISCONNECT ELECTRICAL LEADS AND CABLES FROM RELAY AS DESCRIBED IN "REMOVAL" SECTION OF THIS PARAGRAPH.
2. TEST RELAY FOR PROPER SOLENOID OPERATION.
 - a. Apply 24 volts DC to terminals (b) and (c).
 - b. Listen for "click" when voltage is applied. If no "click" is heard, relay is defective and must be replaced. Refer to REMOVAL and INSTALLATION sections in this paragraph.
3. TEST RELAY FOR CONTINUITY.
 - a. Apply 24 volts DC to terminals (b) and (c).
 - b. Connect an ohmmeter across terminals (a) and (d).
 - c. Ohmmeter should indicate continuity across terminals (a) and (d).
 - d. Remove 24 volts dc from terminals (b) and (c).
 - e. Ohmmeter should indicate no continuity across terminals (a) and (d).
 - f. Replace relay if continuity requirements are not met in tests 3c and 3e. Refer to REMOVAL and INSTALLATION sections of this paragraph.
4. CONNECT ELECTRICAL LEADS AND CABLES TO RELAY AS DESCRIBED IN "INSTALLATION" SECTION OF THIS PARAGRAPH.
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-24. CONSOLE MOUNTED RELAYS - TEST/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Test Equipment

Ohmmeter

Materials/Parts

Lockwashers (11)
 Lockwasher (9)
 Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

NOTE

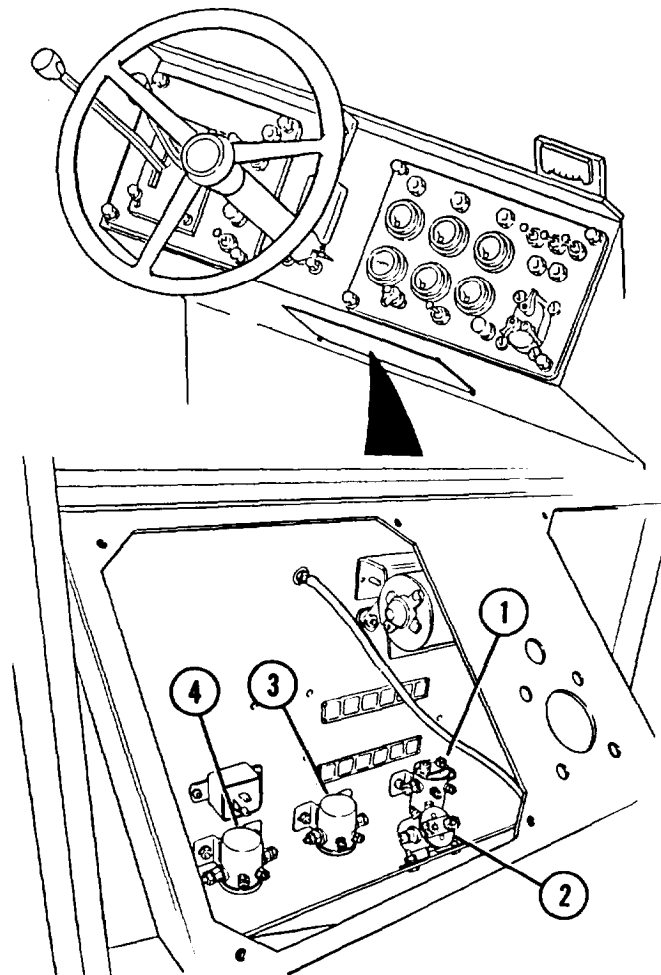
There are four relays mounted inside the front console. These include two blackout headlight relays (1) and (2), one engine run relay (3), and one emergency steer pump relay (4)

Relays (1) and (2) have six electrical terminals. Relays (3) and (4) have four electrical terminals.

NOTE

A second emergency steer pump relay is mounted on the emergency steer pump, under the vehicle.

For removal and testing of the pump-mounted relay, refer to para. 8-23.



8-24. CONSOLE MOUNTED RELAYS - TEST/REPLACE (Cont'd)

REMOVAL

NOTE

Removal of blackout headlight relay (1) is shown. Removal and installation procedures for all four relays are essentially similar.

1. REMOVE FOUR CAPSCREWS (5) AND ACCESS PANEL (6).

NOTE

Tag all electrical leads (7) at relay (1) prior to removal. Tag electrical terminals of relay (1) as electrical leads (7) are removed.

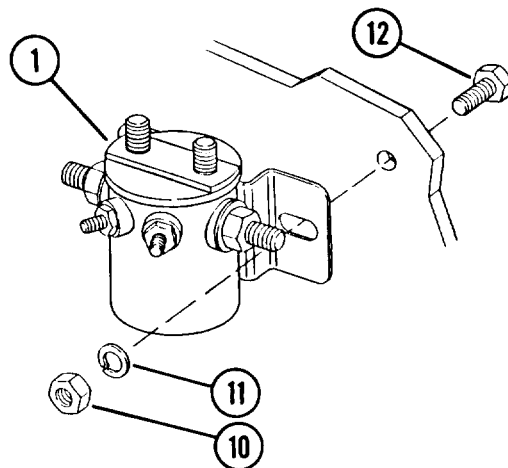
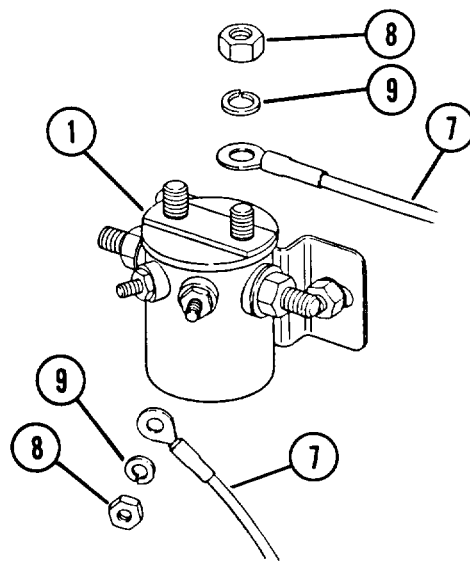
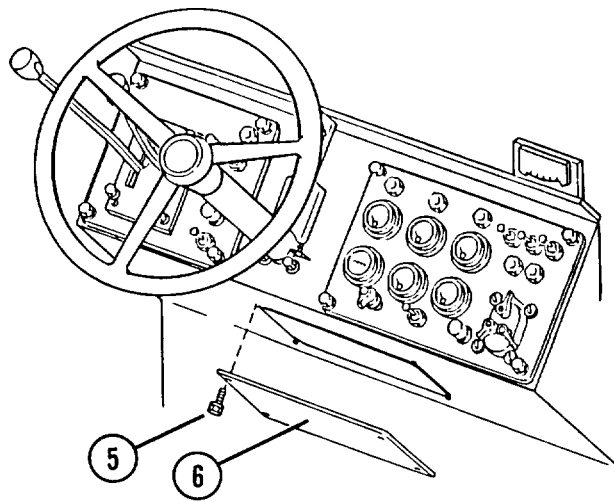
2. REMOVE SIX NUTS (8), SIX LOCKWASHERS (9), AND DISCONNECT ELECTRICAL LEADS (7) FROM RELAY (1). DISCARD LOCKWASHER (9).
3. REMOVE TWO NUTS (10), TWO LOCKWASHERS (11), AND TWO SCREWS (12) SECURING RELAY (1) TO VEHICLE. REMOVE RELAY (1) FROM VEHICLE. DISCARD LOCKWASHERS (11).

INSTALLATION

NOTE

Apply Loctite 242 to screws (12) as installed.

1. POSITION RELAY (1) ON VEHICLE AND SECURE WITH TWO SCREWS (12), TWO NEW LOCKWASHERS (11), AND TWO NUTS (10).
2. CONNECT ELECTRICAL LEADS (7) TO TERMINALS OF RELAY (1) AS TAGGED AND SECURE WITH SIX NEW LOCKWASHER (9) AND SIX NUTS (8).
3. SECURE ACCESS PANEL (6) WITH FOUR CAPSCREWS (5).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-24. CONSOLB MOUNTED RELAYS - TEST/REPLACE (Cont'd)

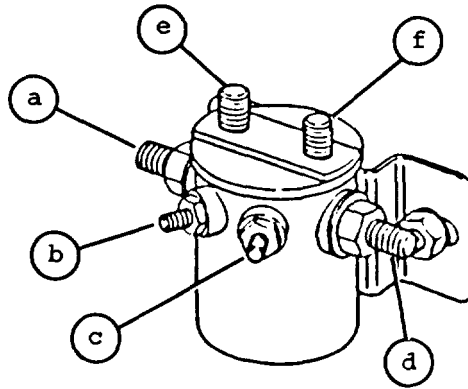
TESTING

NOTE

Testing procedures for all relays covered in this paragraph are essentially similar.

NOTE

Terminals (a), (b), (c), and (d) are present on all relays tested in this section. Terminals (e) and (f) appear only on the two blackout headlight relays.



1. DISCONNECT ELECTRICAL LEADS FROM RELAY AS DESCRIBED IN "REMOVAL" SECTION OF THIS PARAGRAPH.
2. TEST RELAY FOR PROPER SOLENOID OPERATION.
 - a. Apply 24 volts DC to terminals (b) and (c).
 - b. Listen for "click" when voltage is applied. If no "click" is heard, relay is defective and must be replaced. Refer to REMOVAL and INSTALLATION sections in this paragraph.
3. TEST RELAY FOR CONTINUITY.
 - a. Apply 24 volts DC to terminals (b) and (c).
 - b. Ohmmeter should indicate continuity across terminals (a) and (d).
 - c. Ohmmeter should indicate no continuity across terminals (e) and (f).
 - d. Remove 24 volts DC from terminals (b) and (c).
- e. Ohmmeter should indicate no continuity across terminals (a) and (d).
- f. Ohmmeter should indicate continuity across terminals (e) and (f).
9. Replace relay if continuity requirements are not met in tests 3a through 3f. Refer to REMOVAL and INSTALLATION sections of this paragraph.
4. CONNECT ELECTRICAL LEADS TO RELAY AS DESCRIBED IN "INSTALLATION" SECTION OF THIS PARAGRAPH.
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

8-25. TURN SIGNAL FLASHER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Mechanics

Materials/Parts

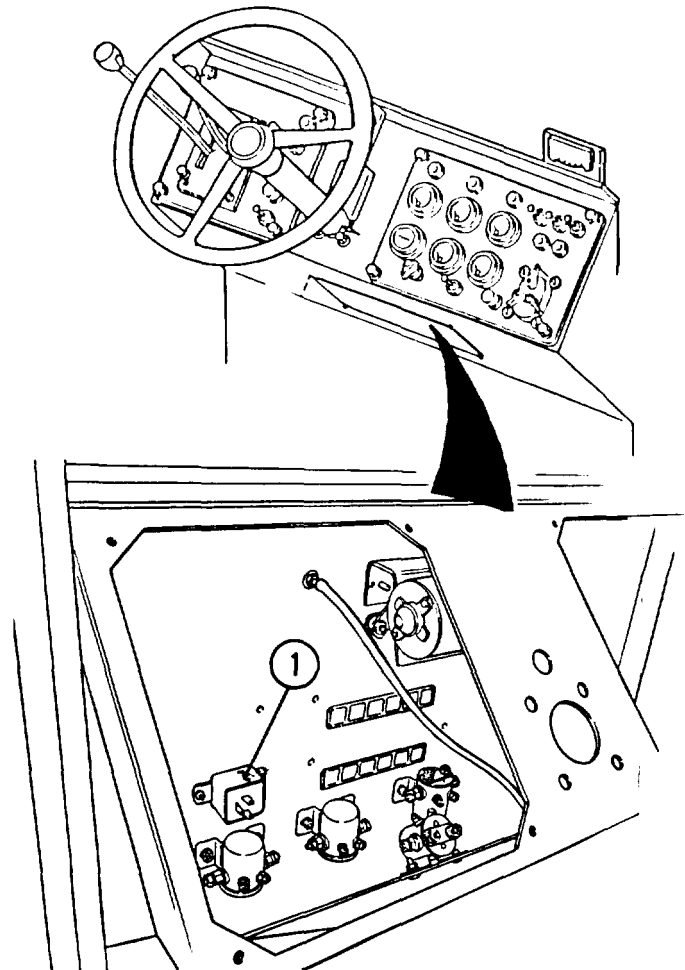
Locknuts (5)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected
para. 8-44.

NOTE

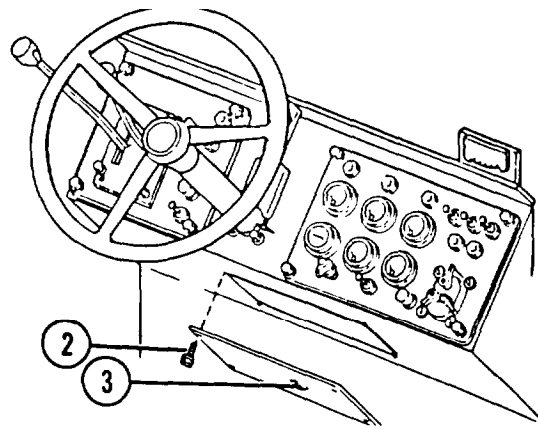
The turn signal flasher (1) is mounted inside the cab front console.



8-25. TURN SIGNAL FLASHER - REPLACE (Cont'd)

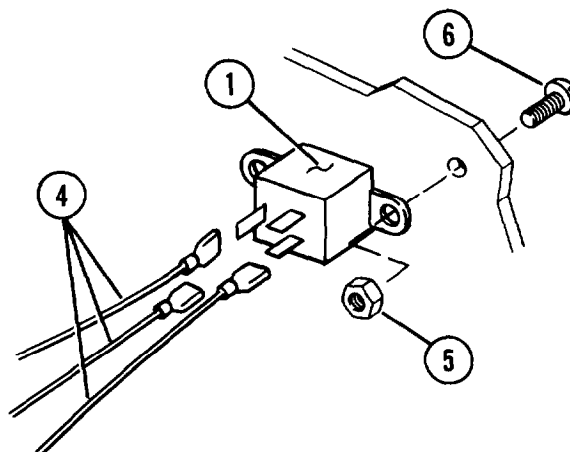
REMOVAL

1. REMOVE FOUR CAPSCREWS (2) AND ACCESS PANEL (3) FROM FRONT CONSOLE.
2. TAG AND DISCONNECT THREE ELECTRICAL LEADS (4) FROM FLASHER (1) AT SPADE CONNECTORS.
3. REMOVE TWO LOCKNUTS (5) , AND TWO SCREWS (6) SECURING FLASHER (1) TO CAB. REMOVE FLASHER (1) FROM CAB . DISCARD LOCKNUTS (5).



INSTALLATION

1. POSITION FLASHER (1) ON CAB AND SECURE WITH TWO SCREWS (6), AND TWO NEW LOCKNUTS (5).
2. CONNECT THREE ELECTRICAL LEADS (4) TO FLASHER (1) AT SPADE CONNECTORS AS TAGGED .
3. SECURE ACCESS PANEL (3) TO FRONT CONSOLE WITH FOUR CAPSCREWS (2).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-26. BOOM ELECTRICAL JUNCTION BOX ASSEMBLY - REPLACE

- This task covers:
- a. Removal
 - b. Installation

Initial Setup

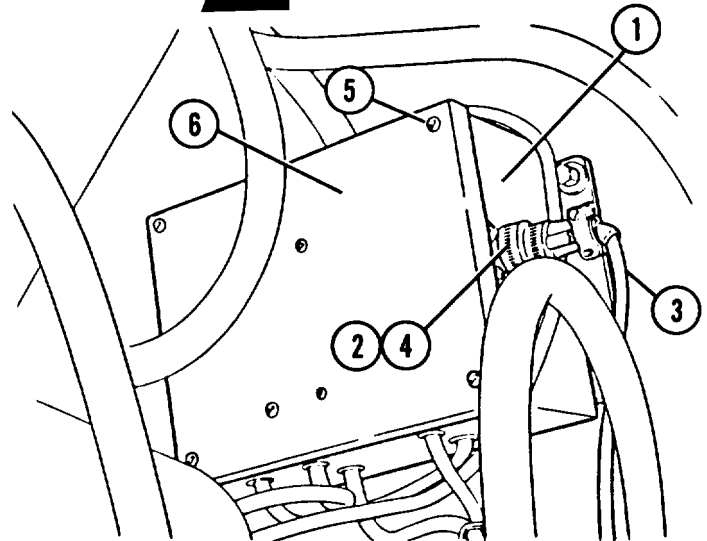
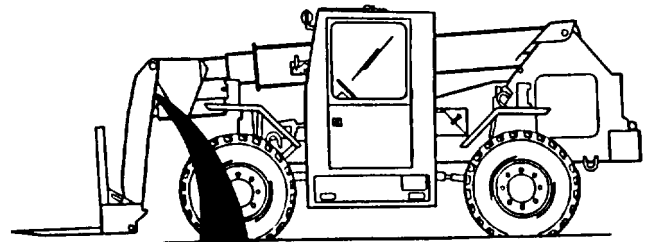
Tools
 Tool Kit, Automotive Mechanics

Materials/Parts
 Lockwashers (24)
 Lockwashers (30)
 Tie Straps (16)
 Loctite 242 (App. C, Item 39)

Equipment Condition
 Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

1. EXTEND BOOM AS REQUIRED TO ALLOW ACCESS TO THE BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1).
2. UNSCREW COLLAR (2) ON AUTOLEVELER CABLE (3) AT BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1) AND REMOVE AUTOLEVELER CABLE (3) AT CONNECTOR (4).
3. LOOSEN FOUR SCREWS (5) AND SEPARATE COVER (6) FROM BOOM ELECTRICAL JUNCTION BOX ASSEMBLY ASSEMBLY (1).



8-26. BOOM ELECTRICAL JUNCTION BOX ASSEMBLY - REPLACE (Cont'd)

CAUTION

Support cover (6) so that weight of cover (6) and autoleveling circuit board (7) is not supported by electrical leads (8) or cable (9) connected to board (7).

4. TAG AND DISCONNECT FOUR ELECTRICAL LEADS (8) AT AUTOLEVELER CIRCUIT BOARD (7).

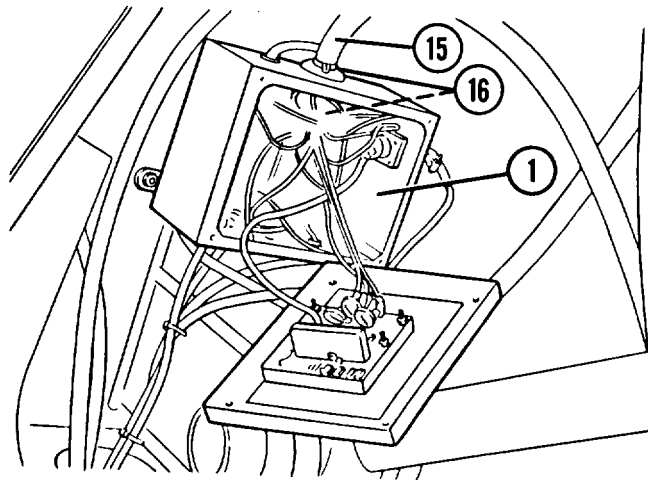
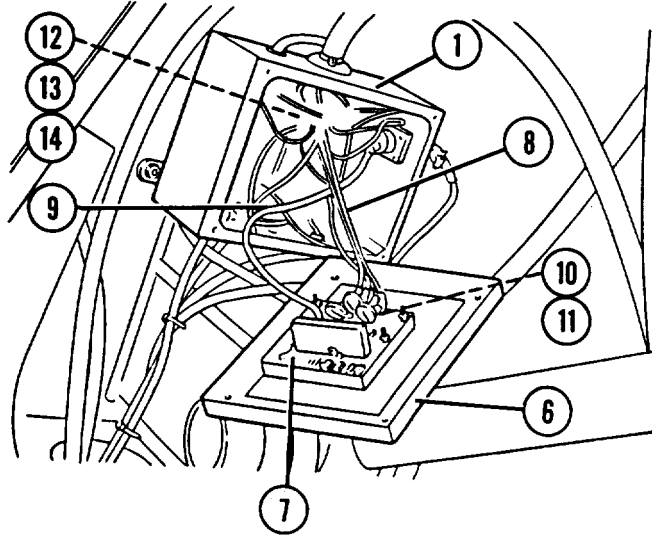
- a. Tag four electrical leads (8) at terminal strip (10) of board (7).
- b. Loosen four screws (11) on terminal strip (10) and remove four electrical leads (8).

5. TAG AND DISCONNECT ELECTRICAL LEADS (12) AT BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1).

- a. Tag leads (12) at terminal strips (13) inside box assembly (1).
- b. Loosen screws (14) on terminal strips (13) and remove electrical leads (12).

6. REMOVE BOOM ELECTRICAL CABLE (15) AT BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1).

- a. Cut two tie straps (16) on boom electrical cable (15) where cable (15) enters box assembly (1). Discard tie straps (16).
- b. Carefully pull cable (15) from box assembly (1).

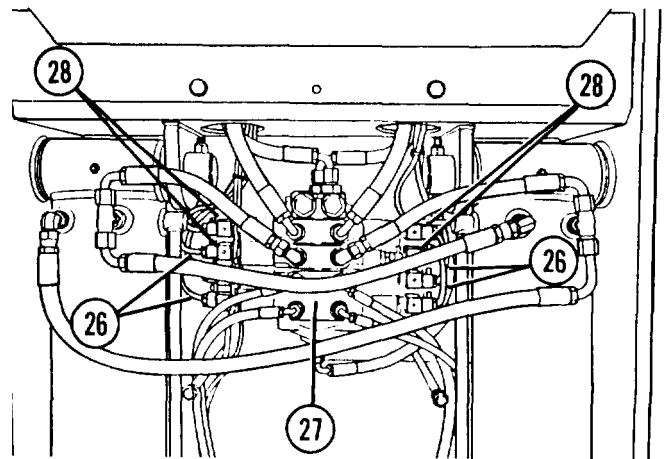
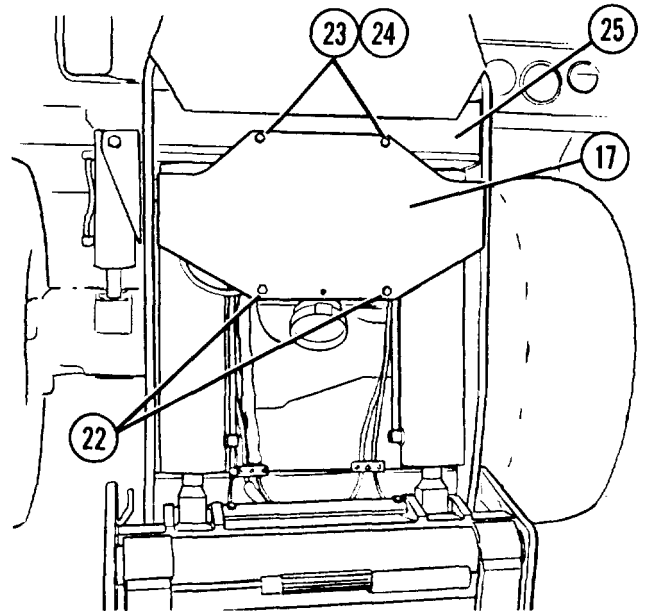
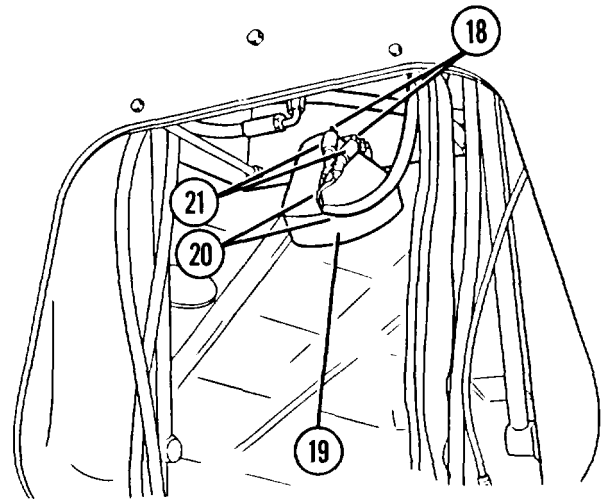


8-26. BOOM ELECTRICAL JUNCTION BOX ASSEMBLY - REPLACE (Cont'd)

7. REMOVE THE MLRS CONTROL VALVE COVER (17).

- a. Tag and disconnect two electrical leads (18) of headlight (19) from wiring harness (20) at plugs (21).
- b. Remove two nuts (22), two capscrews (23), and two lockwashers (24) securing MLRS control valve cover (17) to MLRS attachment frame (25). Discard lockwashers (24).

8. TAG AND REMOVE EIGHT ELECTRICAL CABLES (26) FROM MLRS CONTROL VALVE (27) AT PLUGS (28).

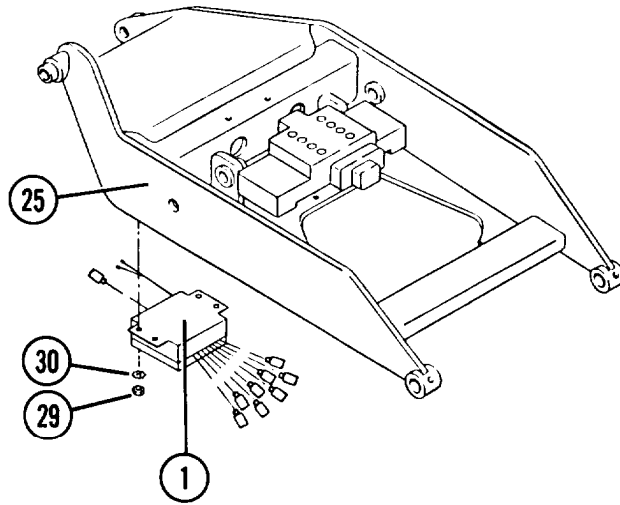


8-26. BOOM ELECTRICAL JUNCTION BOX ASSEMBLY - REPLACE (Cont'd)

9. REMOVE FOUR NUTS (29), FOUR LOCKWASHERS (30), AND REMOVE BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1) FROM MLRS ATTACHMENT FRAME (25). DISCARD LOCKWASHERS (30).

INSTALLATION

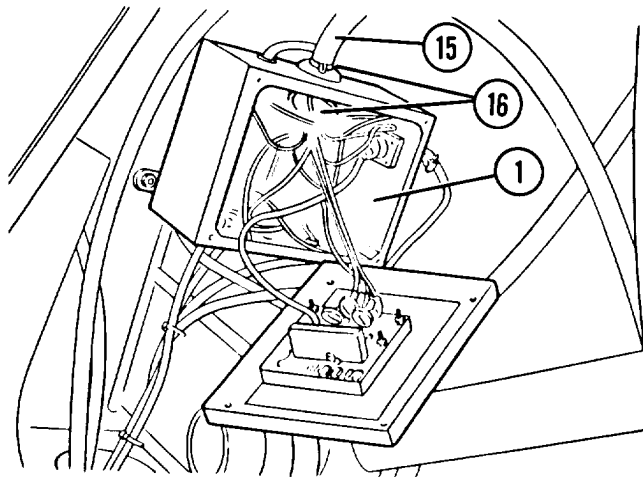
1. POSITION BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1) ON MLRS ATTACHMENT FRAME (25) AND SECURE WITH FOUR NEW LOCKWASHERS (30) AND FOUR NUTS (29).
2. CONNECT EIGHT ELECTRICAL CABLES (26), AS TAGGED, TO MLRS CONTROL VALVE (27) AT PLUGS (28).
3. INSTALL THE MLRS CONTROL VALVE COVER (17).



NOTE

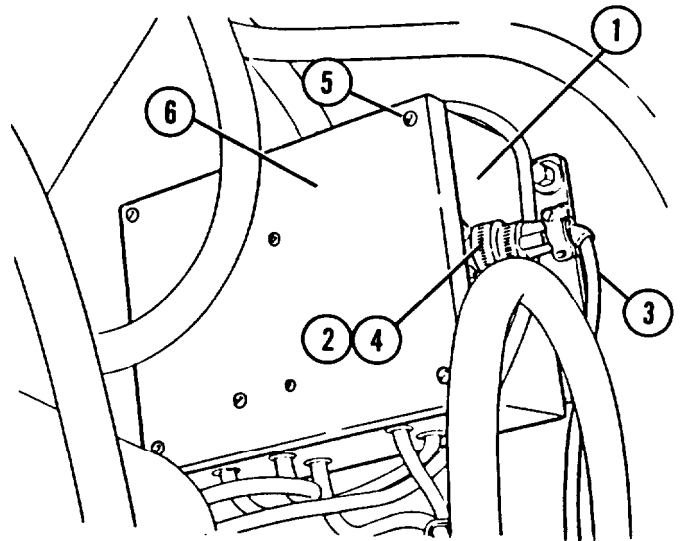
Apply Loctite 242 to threads of capscrews (23).

- a. Position MLRS control valve cover (17) on MLRS attachment frame (25) and secure with two nuts (22), two capscrews (23), and two new lockwashers (24).
 - b. Connect two electrical leads (18) of headlight (19) to wiring harness (20) at plugs (21).
4. INSTALL BOOM ELECTRICAL CABLE (15) TO BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1).
 - a. Carefully position cable (15) through hole in box assembly (1).
 - b. Secure cable on both sides of hole with two new tie straps (16).



8-26. BOOM ELECTRICAL JUNCTION BOX ASSEMBLY - REPLACE (Cont'd)

5. CONNECT ELECTRICAL LEADS (12) AT BOOM ELECTRICAL JUNCTION BOX ASSEMBLY (1) AS TAGGED.
 - a. Place leads (12) , as tagged, on terminal strips (13) inside box assembly (1).
 - b. Tighten screws (14) on terminal strips (13) to secure leads (12).
6. CONNECT FOUR ELECTRICAL LEADS (8) AT AUTOLEVELER CIRCUIT BOARD (7).
 - a. Place four leads (8), as tagged, on terminal strip (10) inside box assembly (1).
 - b. Tighten four screws (11) on terminal strip (10) to secure leads (8).
7. PLACE COVER (6) ON BOOM ELECTRICAL BOX (1) AND SECURE BY TIGHTENING FOUR SCREWS (5).
8. INSERT PLUG ON AUTOLEVELER CABLE (3) INTO CONNECTOR (4) AT BOOM ELECTRICAL BOX (1). TWIST COLLAR (2) UNTIL AUTOLEVELER CABLE (3) IS SECURE.
9. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
10. CHECK ALL MLRS ATTACHMENT AND FORK AUTOLEVELER FUNCTIONS FOR PROPER OPERATION.



8-27. STE/ICE RESISTOR ASSEMBLY - REPLACE

This task covers:
a. Removal
b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

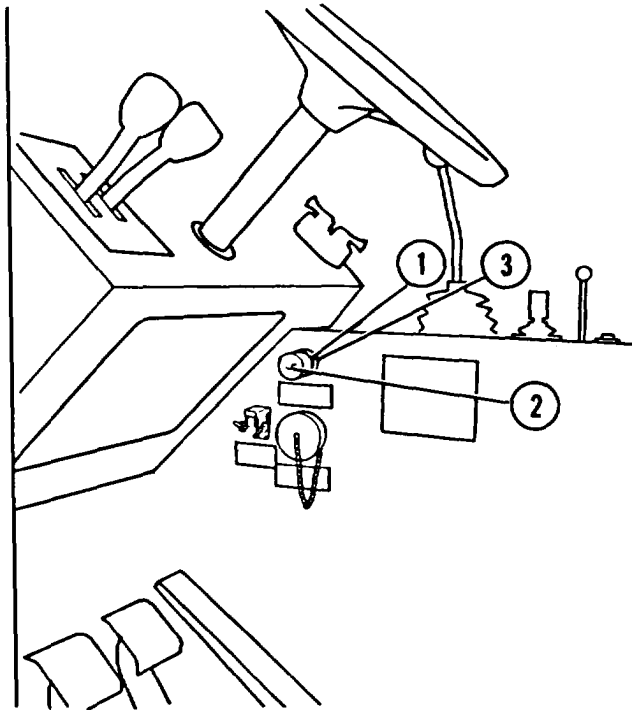
Vehicle parked level ground.
Negative battery cable disconnected,
para. 8-44.

REMOVAL

1. TURN LOCKING COLLAR (1) SECURING RESISTOR ASSEMBLY (2) TO RECEPTACLE (3).
2. PULL RESISTOR ASSEMBLY (2) FROM RECEPTACLE (3) TO REMOVE.

INSTALLATION

1. PUSH RESISTOR ASSEMBLY (2) INTO RECEPTACLE (3).
2. TURN LOCKING COLLAR (1) TO SECURE RESISTOR ASSEMBLY (2) TO RECEPTACLE (3) .
3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-28. STE/ICB FUEL PRESSURE SENDER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Materials/Parts

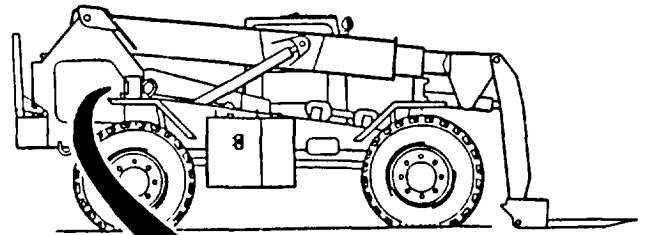
Loctite 59241 (App. C, Item 42).

Equipment Condition

Vehicle parked on level ground.
 Battery negative cable disconnected,
 para. 8-44.

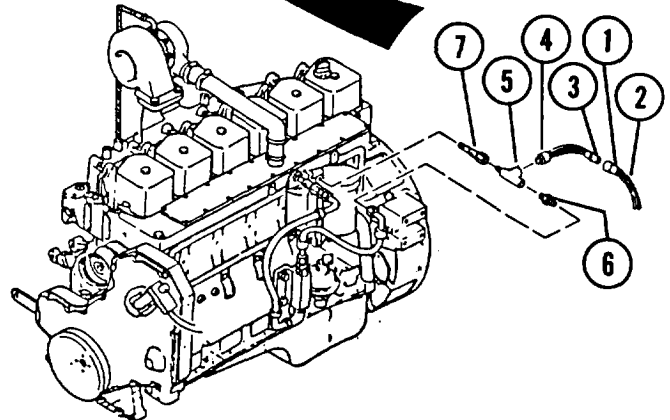
REMOVAL

1. PULL AND REMOVE FEMALE PLUG (1) OF VEHICLE WIRING HARNESS (2) FROM MALE PLUG (3) OF FUEL PRESSURE SENDER (4).
2. UNSCREW SENDER (4), FROM TEE (5).
3. IF NECESSARY, REMOVE ADAPTER (6), TEE (5), AND FLUID PASSAGE BOLT (7).


INSTALLATION
NOTE

During step 1, apply Loctite 59241 to threaded end of tee (5) that screws into fluid passage bolt (7). Also apply Loctite 59241 to threaded end of adapter (6) that screws into tee (5).

2. APPLY LOCTITE 59241 TO THREADS OF FUEL PRESSURE SENDER (4).
3. SCREW SENDER (4) INTO TEE (5).
4. INSERT MALE PLUG (3) OF FUEL PRESSURE SENDER (4) INTO FEMALE PLUG (1) OF VEHICLE WIRING HARNESS (2).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-29. STE/ICE FUEL FILTER DIFFERENTIAL PRESSURE SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

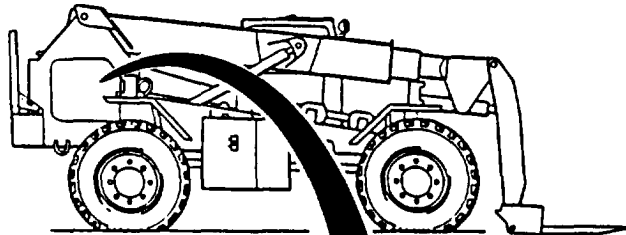
Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

Materials/Parts

Container
 Lockwashers (12)
 Loctite 59241 (App. C, Item 42)
 Starwashers (13)
 Tie Straps (9)

REMOVAL

1. PLACE A SUITABLE CONTAINER UNDER TWO FUEL LINES (1) AND (2) TO CATCH FUEL THAT MAY SPILL OUT OF LINES.
2. TAG AND UNSCREW TWO FUEL LINES (1) AND (2) FROM ELBOW (3) AND ADAPTER (4) AT FUEL PRESSURE DIFFERENTIAL PRESSURE SWITCH (5).

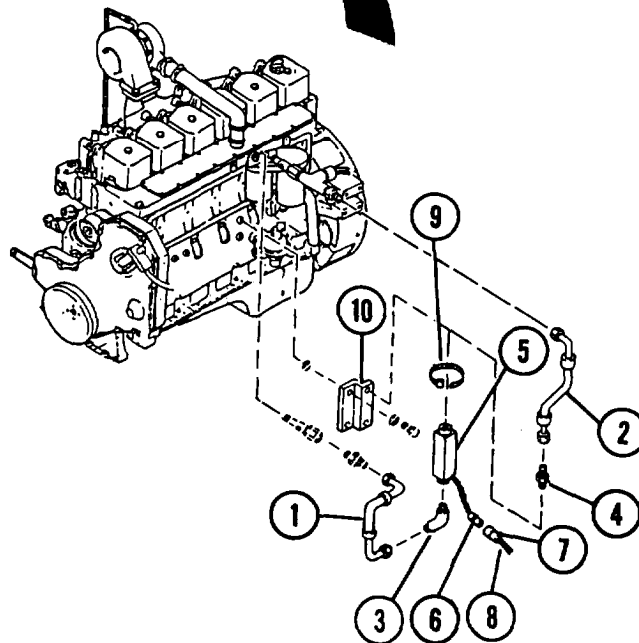


PULL AND REMOVE MALE PLUG (6) OF SWITCH (5) FROM FEMALE PLUG (7) OF VEHICLE WIRING HARNESS (8).

NOTE

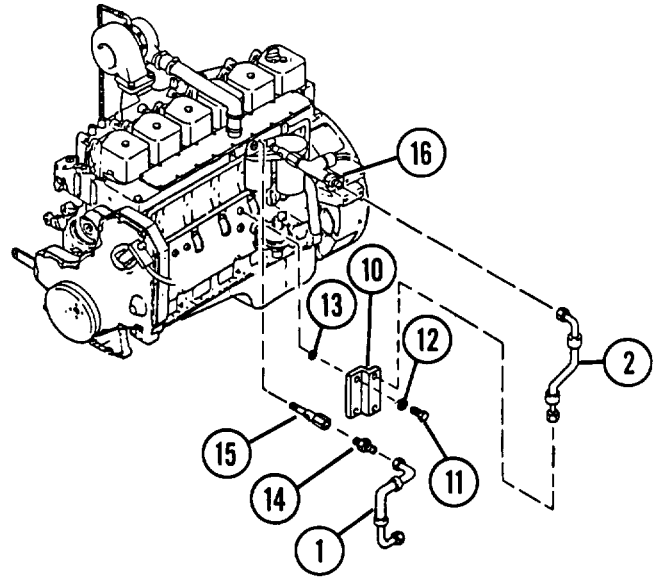
Note orientation of switch (5) for use during removal.

4. CUT TWO TIE STRAPS (9) SECURING SWITCH (5) TO BRACKET (10). REMOVE SWITCH (5) FROM BRACKET (10).
5. IF NECESSARY, REMOVE ELBOW (3) AND ADAPTER (4) FROM SWITCH (5).



8-29. STB/ICE FUEL FILTER DIFFERENTIAL PRESSURE SWITCH - REPLACE (Cont'd)

6. IF NECESSARY, REMOVE TWO SCREWS (11), TWO LOCKWASHERS (12) , BRACKET (10) , AND TWO STARWASHERS (13). DISCARD LOCKWASHERS (12) AND STARWASHERS (13).
7. IF NECESSARY, REMOVE HOSE (1), ADAPTER (14) AND FLUID PASSAGE BOLT (15) FROM ENGINE.
8. IF NECESSARY, REMOVE HOSE (2) AT ADAPTER (16).



INSTALLATION

1. IF REMOVED, INSTALL HOSE (2) AT ADAPTER (16).

NOTE

During step 2, apply Loctite 59241 to threaded end of adapter (14) that screws into fluid passage bolt (15).

2. IF REMOVED, INSTALL FLUID PASSAGE BOLT (15), ADAPTER (14) AND HOSE (1).
3. IF REMOVED, POSITION BRACKET (10) ON ENGINE AND SECURE WITH TWO NEW STARWASHERS (13), TWO NEW LOCKWASHERS (12), AND TWO SCREWS (11).

NOTE

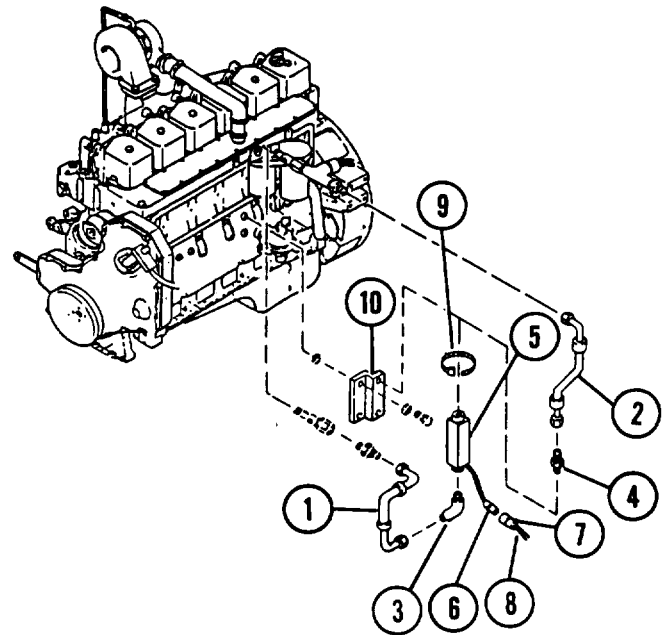
During step 4, apply Loctite 59241 to threaded end of adapter (4) and elbow (3) that screws into switch (5).

4. IF REMOVED, INSTALL ELBOW (3) AND ADAPTER (4) TO SWITCH (5).

NOTE

Position switch (5) on bracket (10) as noted during removal.

5. POSITION SWITCH (5) ON BRACKET (10) AND SECURE WITH TWO NEW TIE STRAPS (9) .
6. INSERT MALE PLUG (6) OF SWITCH (5) INTO FEMALE PLUG (7) OF VEHICLE WIRING HARNESS (8).



7. INSTALL TWO FUEL LINES (1) AND (2) TO ELBOW (3) AND ADAPTER (4) AT SWITCH (5) AS TAGGED.

8. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

8-30. STE/ICE PULSE TACHOMETER AND DRIVE ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Gasket (6)

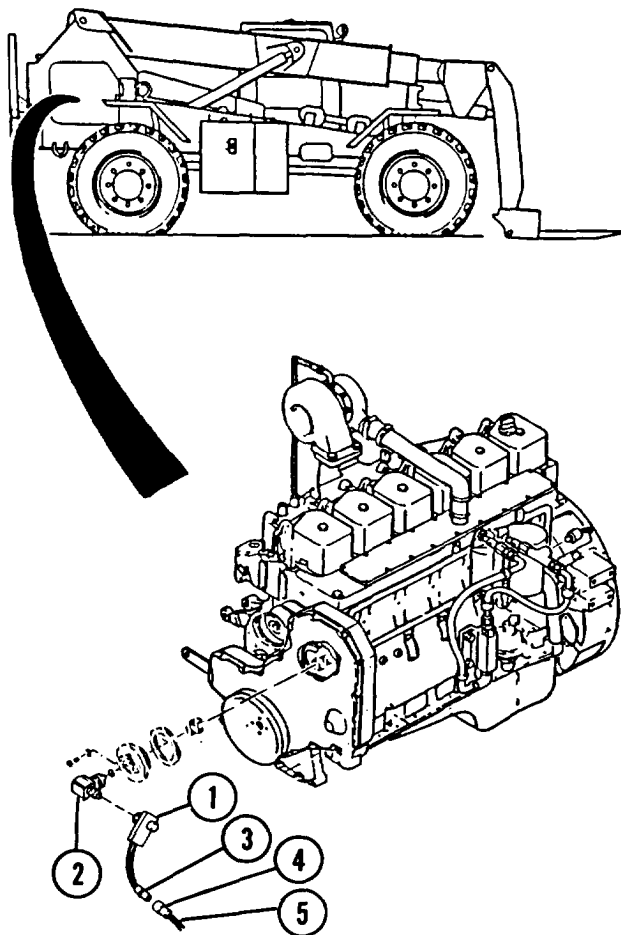
Gasket (8)

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

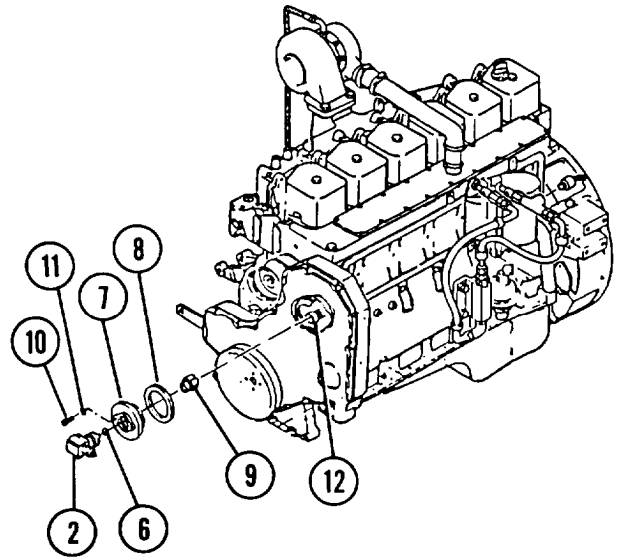
1. REMOVE PULSE TACHOMETER (1) FROM TACHOMETER DRIVE (2).
 - a. Pull and remove male connector (3) of pulse tachometer (1) from female connector (4) of vehicle wiring harness (5).
 - b. loosen nut on pulse tachometer (1) and remove pulse tachometer (1) from tachometer drive (2).



8-30. STE/ICE PULSE TACHOMETER AND DRIVE ASSEMBLY - REPLACE (Cont'd)

2. IF NECESSARY , REMOVE TACHOMETER DRIVE (2) AND MOUNTING COMPONENTS (PARTS 6 - 9) FROM ENGINE.

- a. Remove right-hand fan guard, para. 7-8.
- b. Remove two screws (10) and two flatwashers (11) securing drive (2), and mounting components (parts 6 - 9) to engine.
- c. Remove drive (2), gasket (6), cover (7), and gasket (8) from engine as an assembly. Discard gasket (8).
- d. If necessary, remove hub (9) from shaft (12).
- e. If necessary, remove drive (2) from cover (7). Discard gasket (6).


INSTALLATION
1. IF REMOVED, INSTALL TACHOMETER DRIVE (2) AND MOUNTING COMPONENTS (PARTS 6 - 9) TO ENGINE.

- a. If removed, install drive (2) and new gasket (6) to cover (7).
- b. If removed, install hub (9) onto shaft (12).
- c. Position new gasket (8) on cover (7) and install gasket (8), cover (7), gasket (6) and drive (2) to engine as an assembly.
- d. Secure mounting components (parts 6 - 9) to engine with two screws (10) and two flatwashers (11).
- e. Install right-hand fan guard, para. 7-8.

2. INSTALL PULSE TACHOMETER (1) TO TACHOMETER DRIVE (2).

- a. Insert pulse tachometer (1) into tachometer drive (2). Hand tighten nut on pulse tachometer (1) and then further tighten nut 1/4 to 1/2 additional turn.
- b. Insert male connector (3) of pulse tachometer (1) into female connector (4) of vehicle wiring harness (5).

3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

8-31. STE/ICE SHUNT - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

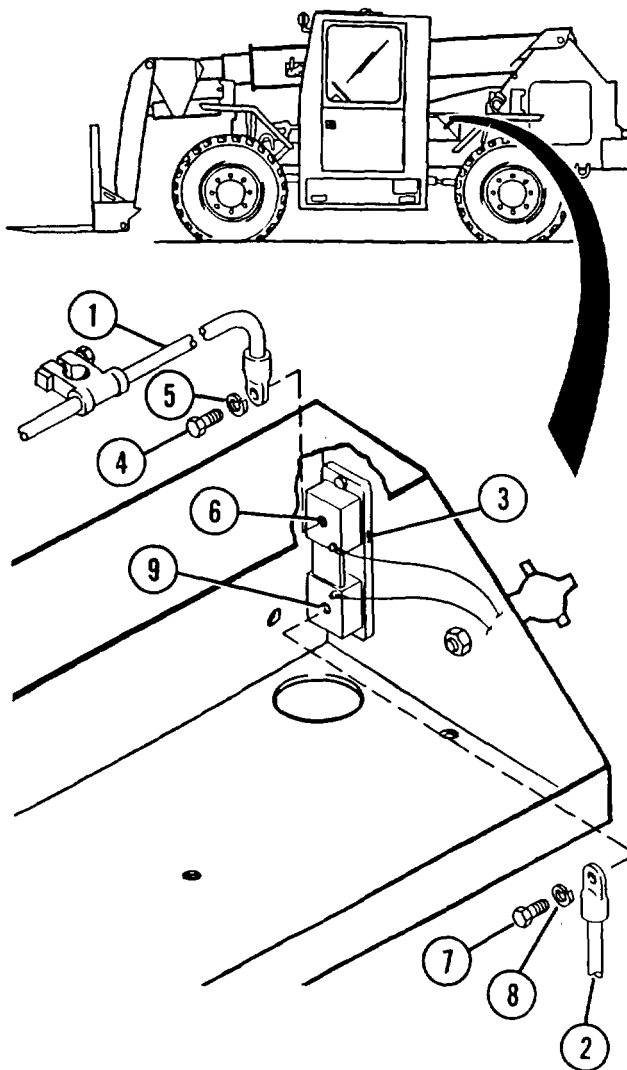
Materials/Parts

Lockwashers (21)
Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
Batteries removed, para. 8-43.

1. REMOVE NEGATIVE BATTERY CABLE (1) AND GROUND CABLE (2), FROM STE/ICE SHUNT (3).
 - a. Remove capscrew (4) and lockwasher (5) securing negative battery cable (1) to terminal (6) of STE/ICE shunt (3). Tag and remove cable (1) from terminal (6).
 - b. Remove capscrew (7) and lockwasher (8) securing ground cable (2) to terminal (9) of STE/ICE shunt (3). Tag and remove cable (2) from terminal (9).



8-31. STE/ICE SHUNT - REPLACE (Cont'd)

2. REMOVE TWO STE/ICE ELECTRICAL WIRES (10) AND (11) FROM STE/ICE SHUNT (3).
 - a. Remove screw (12), lockwasher (13), flatwasher (14) and STE/ICE electrical lead (10) from terminal (15) of STE/ICE shunt (3). Tag and remove electrical lead (10) from terminal (15).
 - b. Remove screw (16), lockwasher (17), flatwasher (18) and STE/ICE electrical lead (11) from terminal (19) of STE/ICE shunt (3). Tag and remove electrical lead (11) from terminal (19).
3. REMOVE TWO CAPSCREWS (20), TWO LOCKWASHERS (21), AND TWO NUTS (22) SECURING STE/ICE SHUNT (3) TO BATTERY BOX (23). REMOVE STE/ICE SHUNT (3) FROM BATTERY BOX (23). DISCARD LOCKWASHERS (21).

INSTALLATION**NOTE**

Apply Loctite 242 to capscrews (20) as installed.

1. SUPPORT AND POSITION STE/ICE SHUNT (3) ON BATTERY BOX (23). SECURE STE/ICE SHUNT (3) TO BATTERY BOX (23) WITH TWO CAPSCREWS (20), TWO NEW LOCKWASHERS (21), AND TWO NUTS (22) .
2. INSTALL TWO STE/ICE ELECTRICAL WIRES (10) AND (11) TO STE/ICE SHUNT (3).
 - a. Position STE/ICE electrical lead (11) at terminal (19) of STE/ICE shunt (3). Secure electrical lead (11) to terminal (19) with flatwasher (18), lockwasher (17), and screw (16).

8-31. STE/ICE SHUNT - REPLACE (Cont'd)

- b. Position STE/ICE electrical lead (10) at terminal (15) of STE/ICE shunt (3). Secure electrical lead (10) to terminal (15) with flatwasher (14), lockwasher (13), and screw (12).
3. INSTALL GROUND CABLE (2) AND NEGATIVE BATTERY CABLE (1) TO STE/ICE SHUNT (3).
 - a. Position ground cable (2) at terminal (9) of STE/ICE shunt (3). Secure ground cable (2) to terminal (9) with lockwasher (8), and capscrew (7).
 - b. Position negative battery cable (1) at terminal (6) of STE/ICE shunt (3). Secure negative battery cable (1) to terminal (6) with lockwasher (5), and capscrew (4).
4. INSTALL BATTERIES, PARA. 8-43.

8-32. FLOODLIGHTS AND SPOTLIGHT - REPLACE/REPAIR

This task covers:

- a. Removal of floodlights
 - b. Installation of floodlights
 - c. Removal of cab spotlights
 - d. Installation of cab spotlights
 - e. Repair by bulb replacement of floodlights
 - f. Repair by bulb replacement of cab spotlights
-

Initial setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

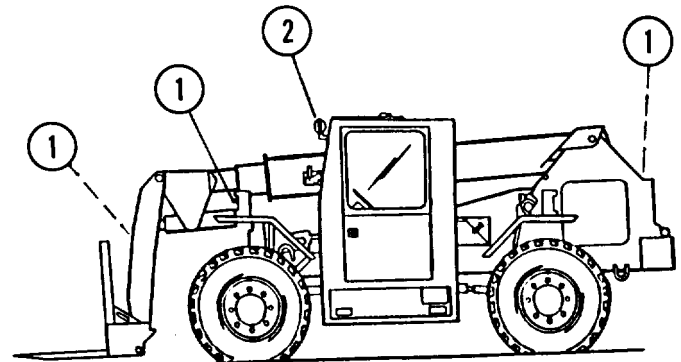
Vehicle parked on level ground.
 Negative battery cable removed, para.
 8-44.

Materials/Parts

Lockwasher (7)
 Lockwasher (15)
 Liquid Soap (App. C, Item 45)
 Loctite 242 (App. C, Item 39)

NOTE

There are a total of five floodlights (1). Two are located just above the radiator grille at the rear of the vehicle. Two are located at the front of the vehicle on each of the front fenders. One is located inside the MLRS attachment, also at the front of the vehicle.

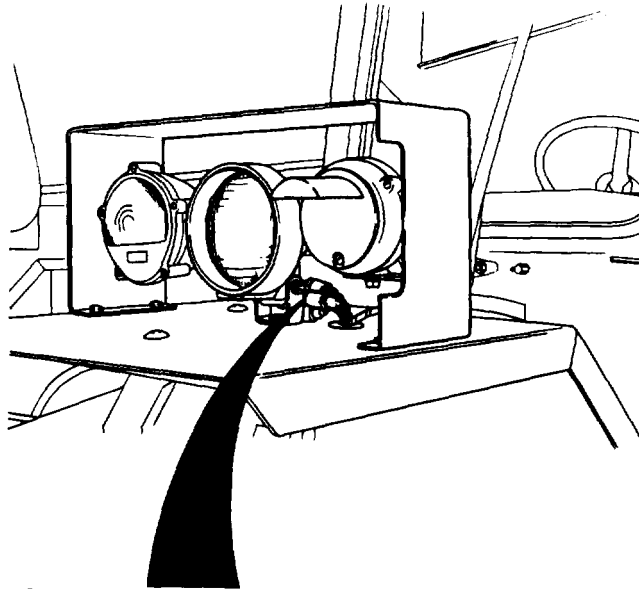


There are a total of two spotlights (2). They are located at the top front of the cab on either side of the front windshield.

8-32. FLOODLIGHTS AND SPOTLIGHTS - REPLACE/REPAIR (Cont'd)

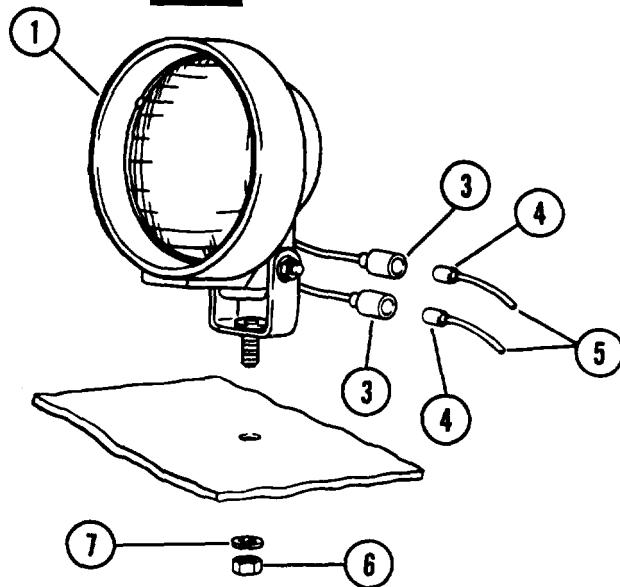
REMOVAL OF HEADLIGHTS

1. TAG AND DISCONNECT TWO FEMALE PLUGS (3) OF FLOODLIGHT (1) FROM TWO MALE PLUGS (4) OF VEHICLE WIRING HARNESS (5).
2. REMOVE FLOODLIGHT (1) AND MOUNTING HARDWARE FROM VEHICLE.
 - a. Support floodlight (1) so it does not drop when mounting hardware is removed.
 - b. Remove nut (6) and lockwasher (7), securing floodlight (1) to vehicle. Discard lockwasher (7).
 - c. Remove floodlight (1).



INSTALLATION OF FLOODLIGHTS

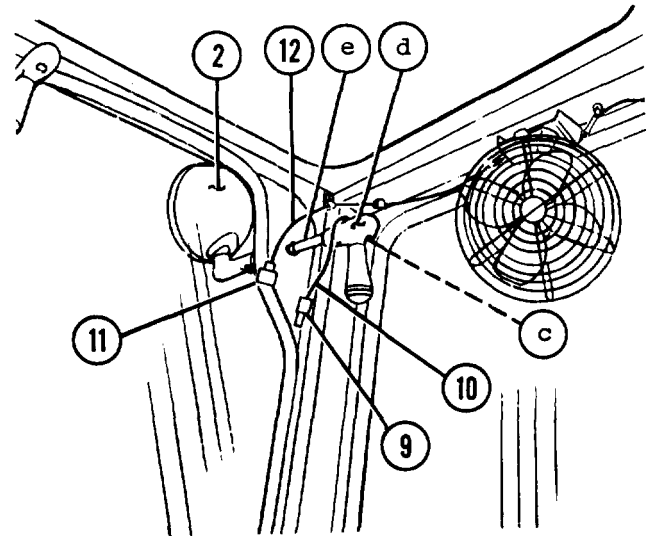
1. INSTALL FLOODLIGHT (1) AND MOUNTING HARDWARE TO VEHICLE.
 - a. Position and support floodlight (1) on vehicle.
 - b. Secure floodlight to vehicle with new lockwasher (7) and nut (6).
2. CONNECT TWO FEMALE PLUGS (3) OF FLOODLIGHT (1) TO TWO MALE PLUGS (4) OF VEHICLE WIRING HARNESS (5).
3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



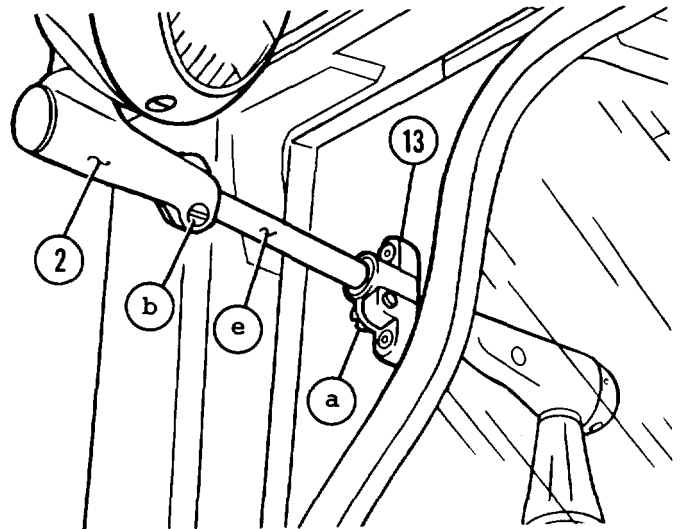
8-32. FLOODLIGHTS AND SPOTLIGHTS - REPLACE/REPAIR (Cont'd)

REMOVAL OF CAB SPOTLIGHTS

1. DISCONNECT MALE PLUG (9) OF SPOTLIGHT ELECTRICAL LEAD (10) FROM FEMALE PLUG (11) OF VEHICLE WIRING HARNESS (12) .
2. LOOSEN MOUNTING HARDWARE AND REMOVE SPOTLIGHT (2).
 - a. From outside cab, loosen setscrew (a) on bracket (13). Loosen setscrew (b) on spotlight (2).
 - b. From inside cab, loosen bolt (c), and pull handle (d) of spotlight (2) off shaft (e).
 - c. Remove spotlight (2) with shaft (e) from outside of cab as an assembly.
3. IF NECESSARY, REMOVE LIGHT BRACKET (13) AND MOUNTING HARDWARE.



- a. From inside cab, remove two nuts (14), lockwashers (15), and flatwashers (16). Discard lockwashers (15). Loosen and remove retainer (17).
- b. From outside cab, remove two screws (18) and bracket (13).



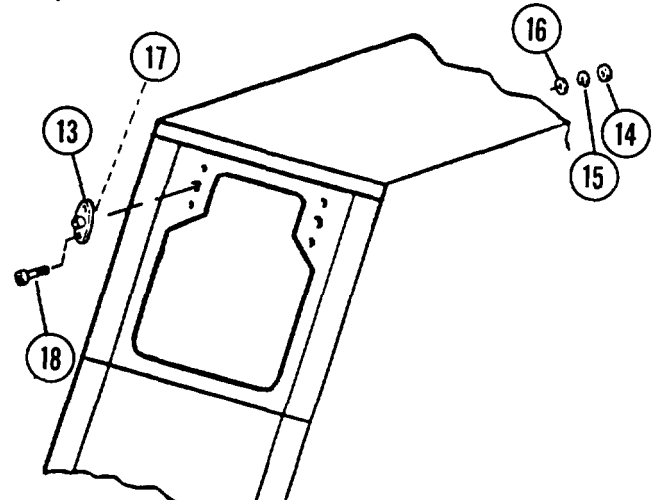
INSTALLATION OF CAB SPOTLIGHTS

1. IF REMOVED, INSTALL LIGHT BRACKET (13) AND MOUNTING HARDWARE.

NOTE

Apply Loctite 242 to threads of screws (18).

- a. Position bracket (13) and two screws (18) on outside of cab.
- b. From inside cab, secure bracket (13) with two flatwashers (16), two new lockwashers (15) and two nuts (14). Install and tighten retainer (17).



8-32. FLOODLIGHT'S AND SPOTLIGHTS - REPLACE/RBPAIR (Cont' d)

2. INSTALL SPOTLIGHT (2) AND MOUNTING HARDWARE .
 - a. From outside cab, push shaft (e) of spotlight (2) through hole in bracket (13) until shaft (e) is protruding through hole inside cab.
 - b. From inside cab, position handle assembly (d) of spotlight (2) on shaft (e). Twist handle (d) on shaft (e) until it slides into place.
 - c. Tighten bolt (c) on handle (d).
 - d. From outside cab, tighten setscrew (b) on spotlight (2). Tighten setscrew (a) on bracket (13), so that spotlight (2) is secure but movable.
3. CONNECT MALE PLUG (9) OF SPOTLIGHT ELECTRICAL LEAD (10) TO FEMALE PLUG (11) OF VEHICLE WIRING HARNESS (12).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

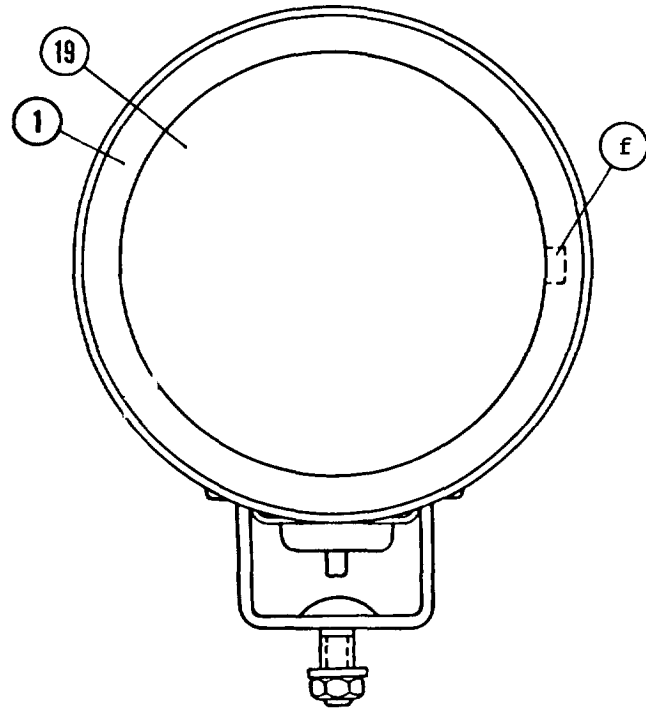
8-32. FLOODLIGHT'S AND SPOTLIGHTS - REPLACE/REPAIR (Cont' d)

WARNING

To prevent personal injury from accidental glass breakage, wear a pair of heavy leather gloves or other suitable hand protection when replacing sealed beam bulbs.

REPAIR By BULB REPLACEMENT OF FLOODLIGHTS

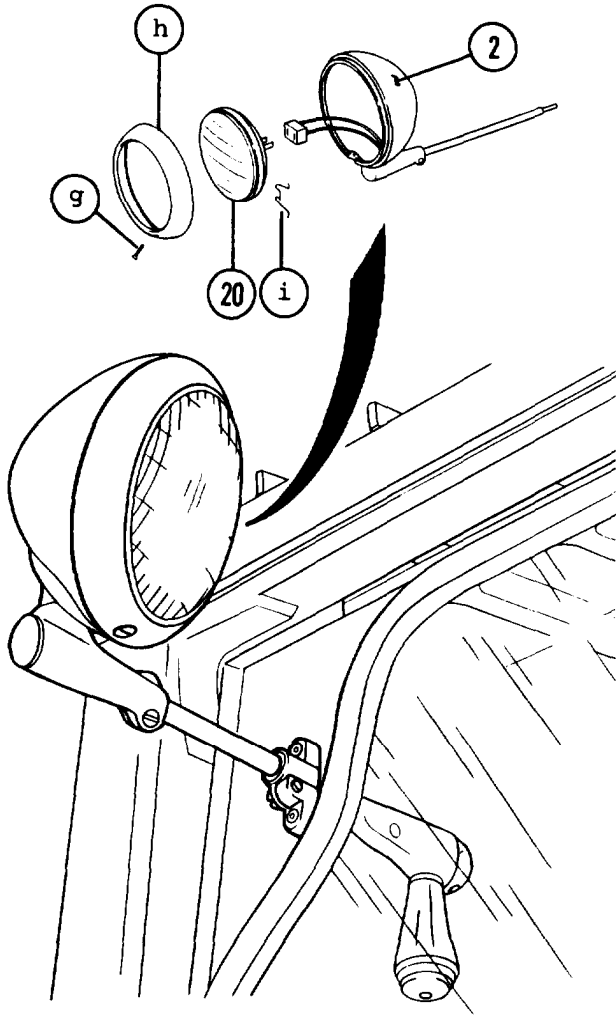
1. USING TWO SCREWDRIVERS, CAREFULLY PRY FLEXIBLE HOUSING OF FLOODLIGHT ASSEMBLY (1) FROM AROUND OLD SEALED BEAM BULB (19) UNTIL BULB (19) IS FREE OF HOUSING.
2. UNPLUG SEALED BEAM BULB (19) FROM FLOODLIGHT ASSEMBLY (1). DISCARD OLD BULB (19).
3. PLUG NEW SEALED BEAM BULB (19) INTO FLOODLIGHT ASSEMBLY (1).
4. MOISTEN EDGES OF SEALED BEAM BULB (19) AND HOUSING OF FLOODLIGHT ASSEMBLY (1) WITH SOAP AND WATER SOLUTION.
5. POSITION SEALED BEAM BULB (19) SO THAT NOTCH (f) OF BULB (19) IS ORIENTED AS SHOWN. CAREFULLY PRESS BULB (19) INTO HOUSING OF FLOODLIGHT ASSEMBLY (1) UNTIL BULB (19) IS SEATED IN PLACE.
6. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-32. FLOODLIGHTS AND SPOTLIGHTS - REPLACE/REPAIR (Cont'd)

REPAIR BY BULB REPLACEMENT OF CAB SPOTLIGHTS

1. REMOVE SCREW (g) FROM RETAINING RING (h). SEPARATE RETAINING RING (h) AND SEALED BEAM BULB (20) AS AN ASSEMBLY FROM SPOTLIGHT (2).
2. UNPLUG SEALED BEAM BULB (20) FROM SPOTLIGHT (2) .
3. REMOVE FOUR SPRING CLIPS (i) SECURING SEALED BEAM BULB (20) TO RETAINING RING (h). REMOVE AND DISCARD OLD BULB (20) .
4. PLACE NEW SEALED BEAM BULB (20) IN RETAINING RING (h) AND SECURE WITH FOUR SPRING CLIPS (i).
5. PLUG SEALED BEAM BULB (20) INTO SPOTLIGHT (2).
6. PLACE RETAINING RING (h) AND SEALED BEAM BULB (20) ON SPOTLIGHT (2) AS AN ASSEMBLY. SECURE RETAINING RING (h) TO SPOTLIGHT (2) WITH SCREW (g).
7. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-33. BLACKOUT HEADLIGHT - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Installation
- c. Repair by bulb replacement

Initial SetUp

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

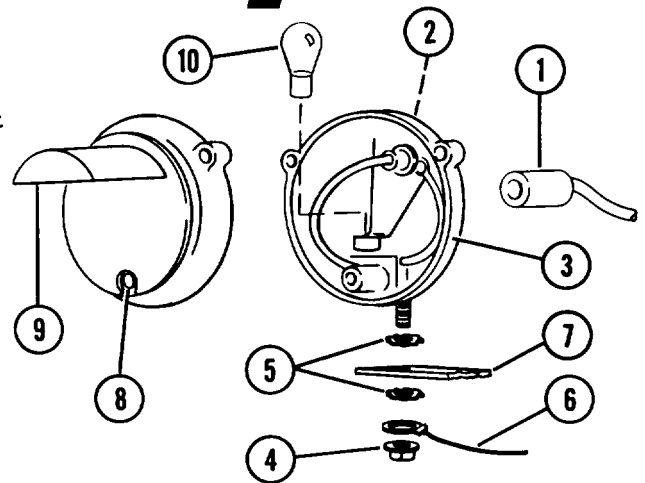
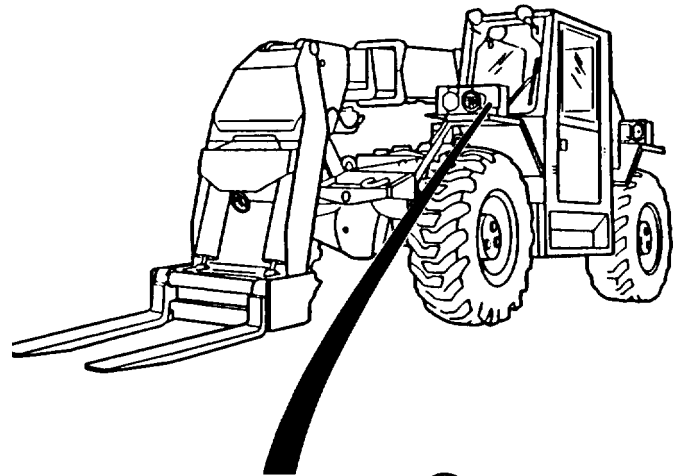
Lockwashers (5)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable removed,
para. 8-44.

REMOVAL

1. DISCONNECT FEW PLUG (1) FROM CONNECTOR (2) AT REAR OF BLACKOUT HEADLIGHT ASSEMBLY (3).
2. REMOVE MOUNTING HARDWARE AND BLACKOUT HEADLIGHT ASSEMBLY (3).
 - a. Support headlight assembly (3) so it does not drop when mounting hardware is removed.
 - b. Remove nut (4), lockwasher (5), ground lead (6), and second lockwasher (5). Discard two lockwashers (5).
 - c. Lift headlight assembly (3) from light bracket (7).



INSTALLATION

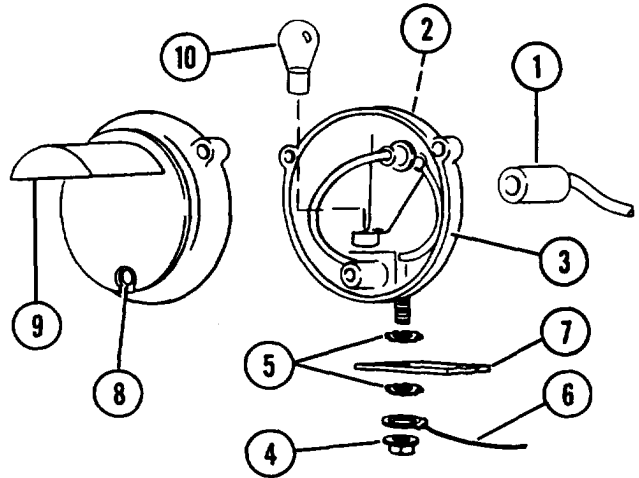
1. INSTALL BLACKOUT HEADLIGHT ASSEMBLY (3) AND MOUNTING HARDWARE.
 - a. Position and support headlight assembly (3) on light bracket (7).
 - b. Secure with new lockwasher (5) ground lead (6), second new lockwasher (5), and nut (4).

8-33. BLACKOUT READLIGHT - RBPLACE/REPAIR (Cont'd)

2. CONNECT FEMALE PLUG (1) TO CONNECTOR (2) AT REAR OF BLACKOUT HEADLIGHT ASSEMBLY (3).
3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

REPAIR BY BULB REPLACEMENT

1. LOOSEN THREE CAPTIVE SCREWS (8) AND REMOVE LENS (9) FROM HEADLIGHT ASSEMBLY (3).
2. REMOVE BULB (10).



Carefully push and twist the old bulb (10) counterclockwise until it releases from the socket. Discard the old bulb (10).

3. INSTALL NEW BULB (10).

Carefully push and twist the new bulb (10) clockwise in the socket until it locks into place.

4. INSTALL LENS (9).

Align lens (9) on headlight assembly (3) and tighten three captive screws (8).

5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

8-34. LIGHTS - REAR COMPOSITE BLACKOUT/TAIL/STOP - REPLACE/REPAIR
 FRONT COMPOSITE BLACKOUT- SIGNAL/PARKING - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Installation
- c. Repair by bulb replacement

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

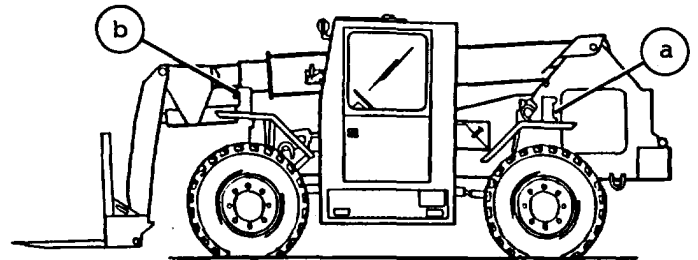
Vehicle parked on level ground.
 Negative battery cable removed,
 para. 8-44.

Materials/Parts

Loctite 242 (App. C, Item 39)
 Starwasher (6)
 Starwasher (9)
 Tie Wrap (1) (App. C, Item 53)

NOTE

Removal, installation, and repair procedures are essentially similar for the rear composite blackout/tail/stop lights (a) and the front composite blackout/turn signal/parking lights (b).

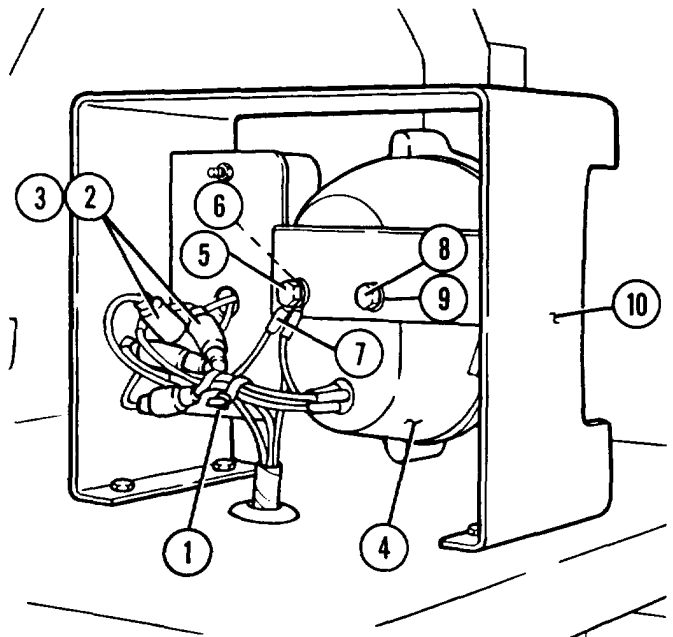


The rear composite blackout/tail/stop lights (a) have four bulbs and four female connector plugs.

The front composite blackout/turn signal/parking lights (b) have three bulbs and three female connector plugs.

REMOVAL

1. DISCONNECT ELECTRICAL LEADS AT PLUGS .
 - a. Remove and discard tie wrap (1).
 - b. Tag and disconnect male and female connector plugs (2) and (3) at rear of light assembly (4).



8-34. LIGHTS - REAR COMPOSITE BLACKOUT/TAIL/STOP - RBPLACE/REPAIR
 FRONT COMPOSITE BLACKOUT/TURN SIGNAL/PARKING - REPLACE/REPAIR (Cont'd)

2. REMOVE MOUNTING HARDWARE, GROUND LEADS , AND LIGHT ASSEMBLY.
 - a. On front light assemblies, remove capscrew (5), starwasher (6), one wire lead (7), and starwasher (6). Discard two starwashers (6).
 - b. On rear light assemblies, remove capscrew (5), starwasher (6), two wire leads (7) , and starwasher (6). Discard two starwashers (6).
 - c. Support light assembly (4) so it does not drop. Remove capscrew (8), starwasher (9) and light assembly (4) from light bracket (10). Discard starwasher (9).

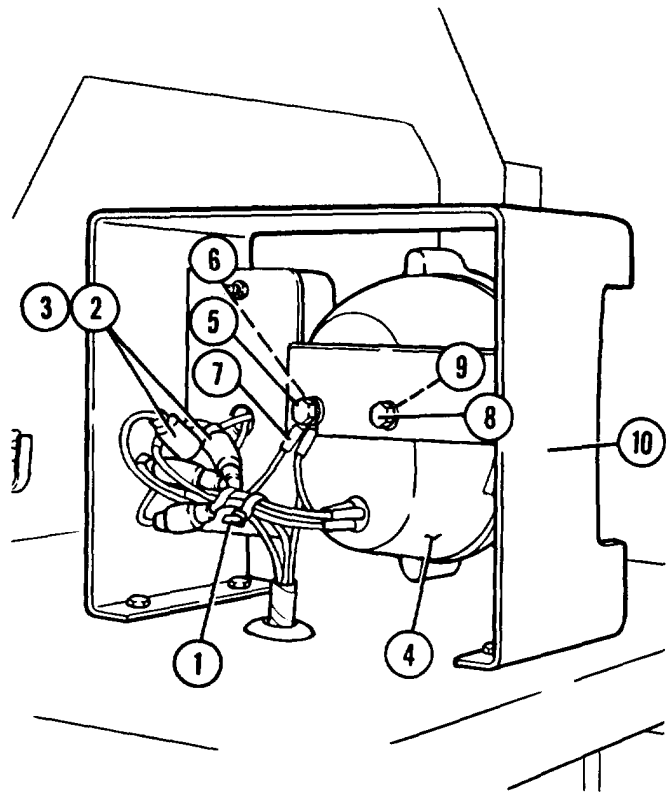
INSTALLATION

1. INSTALL LIGHT ASSMBLY, GROUND LEADS, AND MOUNTING HARDWARE.

NOTE

Apply Loctite 242 to capscrews (5) and (8) as installed.

- a. Align light assembly (4) with holes on light bracket (10). Secure with new starwasher (9) and capscrew (8).
- b. On front light assemblies, install new starwasher (6), one wire lead (7), new starwasher (6) and capscrew (5).
- c. On rear light assemblies, install starwasher (6), two wire leads (7), new starwasher (6) and capscrew (5).



**8-34. LIGHTS - REAR COMPOSITE BLACKOUT/TML/STOP - REPLACE/REPAIR
FRONT COMPOSITE BLACKOUT/TURN SIGNAL/PARKING - REPLACE/REPAIR (Cont'd)**

2. CONNECT ELECTRICAL LEADS AT PLUGS.
 - a. Connect male and female connector plugs (2) and (3) at rear of light assembly (4) as tagged.
 - b. Install new tie wrap (1).
3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

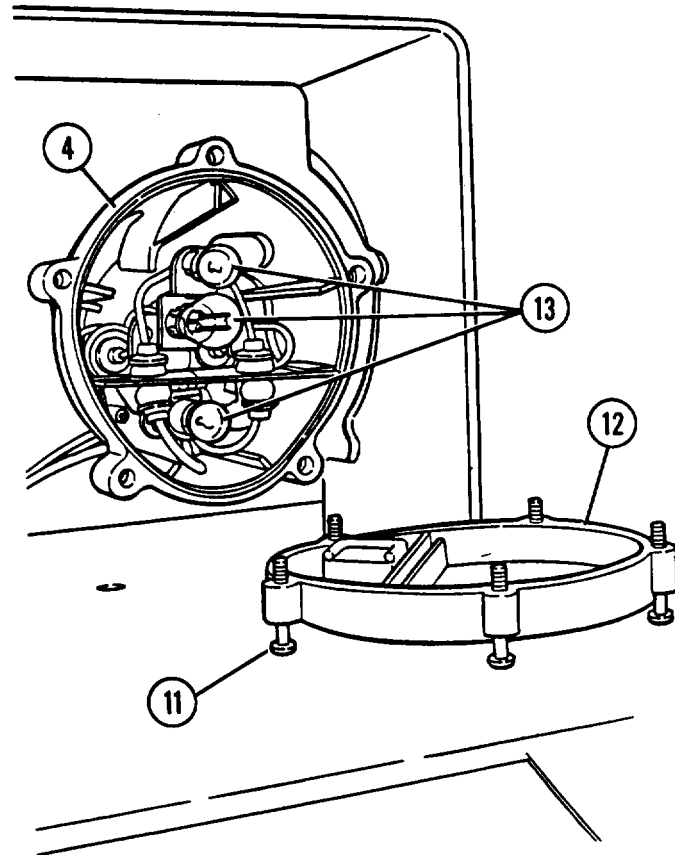
REPAIR BY BULB REPLACEMENT

1. LOOSEN FIVE SCREWS (11) AND REMOVE LENS (12) FROM LIGHT ASSEMBLY (4).

NOTE

All bulbs used in the light assemblies covered in this paragraph are removed and installed as described in steps 2 and 3, below.

2. CAREFULLY PUSH AND TWIST OLD BULB (13) COUNTERCLOCKWISE UNTIL IT RELEASES FROM SOCKET. REMOVE AND DISCARD OLD BULB (13).
3. CAREFULLY PUSH AND TWIST NEW BULB (13) INTO SOCKET UNTIL IT LOCKS INTO PLACE .
4. ALIGN LENS (12) ON LIGHT ASSEMBLY (4) AND TIGHTEN FIVE SCREWS (11).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-35. REAR TURN SIGNAL LIGHTS - REPAIR/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Repair by bulb replacement

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Negative battery cable removed,
para. 8-44.

Materials/Parts

Lockwashers (11)
Loctite 242 (App. C, Item 39)
Starwashers (9)
Tie Wrap (1) (App. C, Item 53)

Removal

1. DISCONNECT ELECTRICAL LEADS AT REAR TURN SIGNAL LIGHT.

- a. Remove and discard tie wrap (1).
- b. Tag and disconnect male plug (2) from female plug (3) connecting electrical lead (4) from vehicle wiring harness to rear turn signal light assembly (5).

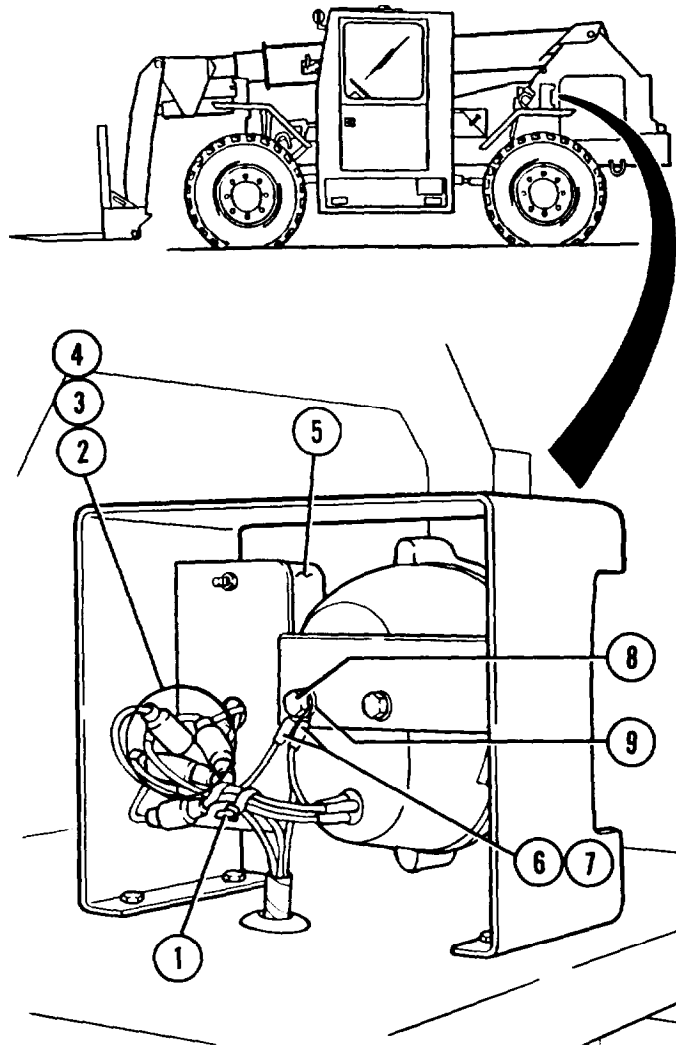
NOTE

One wire lead (6) disconnected in step "b" below is part of the rear turn signal light assembly (5). The other wire lead (7) is part of the vehicle wiring harness.

- c. Remove capscrew (8) and starwasher (9). Tag and disconnect two wire leads (6) and (7). Remove second starwasher (9). Discard two starwashers (9).

2. REMOVE MOUNTING HARDWARE, LENS, AND SOCKET PLATE ASSEMBLY.

- a. Remove two nuts (10), and two lockwashers (11). Discard two lockwashers (11).

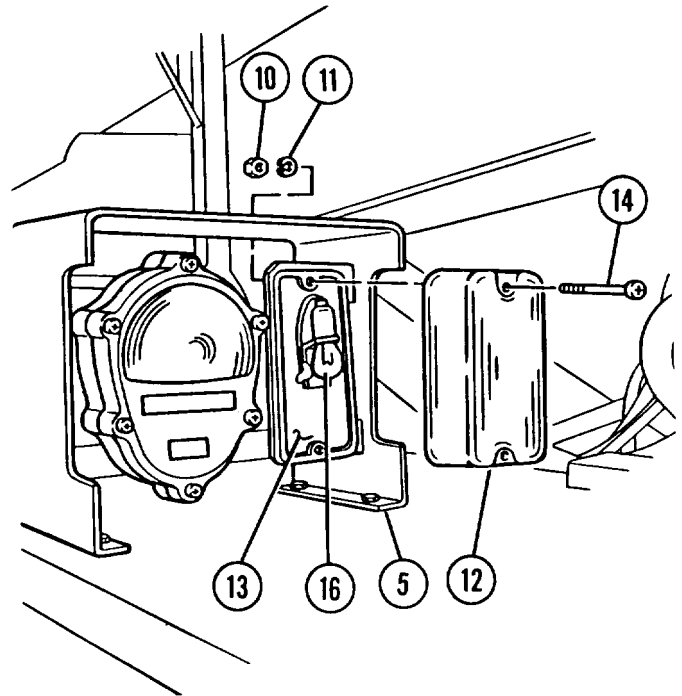


8-35. REAR TURN SIGNAL LIGHTS - REPAIR/REPLACE (Cont'd)

- b. Pull lens (12) from socket plate assembly (13). Remove two screws (14) from lens (12).
- c. Pull socket plate assembly (13) from light bracket (15).

INSTALLATION

1. INSTALL SOCKET PLATE ASSEMBLY, LENS, AND MOUNTING HARDWARE.
 - a. Position socket plate assembly (13) on light bracket (15).
 - b. Position lens (12) on socket plate assembly (13).
 - c. Secure lens (12) and socket plate assembly (13) to light bracket (15) with two screws (14), two new lockwashers (11) and two nuts (10).
2. CONNECT ELECTRICAL LEADS AT REAR TURN SIGNAL LIGHT.



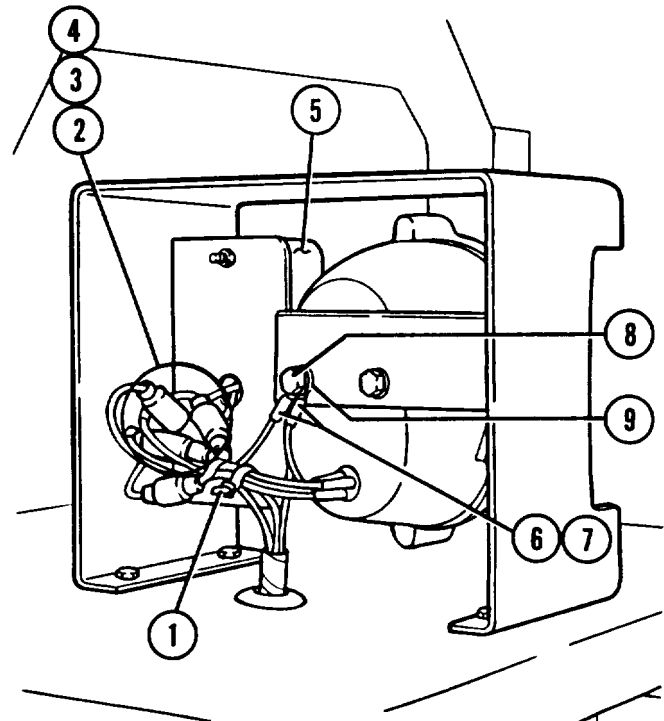
NOTE

One wire lead (6) connected in step "b" below is part of the rear turn signal light assembly (5). The other wire lead (7) is part of the vehicle wiring harness.

NOTE

Apply Loctite 242 to capscrew (8) as installed.

- a. Install new starwasher (9), two wire leads (6) and (7) as tagged, and second new starwasher (9). Secure with capscrew (8).
- b. Connect electrical lead (4) from vehicle wiring harness to rear turn signal light assembly (5) by connecting male plug (3) to female plug (2).



8-35. REAR TURN SIGNAL LIGHTS - REPAIR/RBPLACE (Cont'd)

c. Install new tie wrap (1).

3. CONNECT NEGATIVE BATTERY CABLE,
 PARA. 8-44.

REPAIR BY BULB REPLACEMENT

1. REMOVE LENS.

- a. Remove two nuts (10), and two lockwashers (11). Discard two lockwashers (11).
- b. Pull lens (12) from socket plate (13). Remove two screws (14) from lens (12).

2. REMOVE BULB.

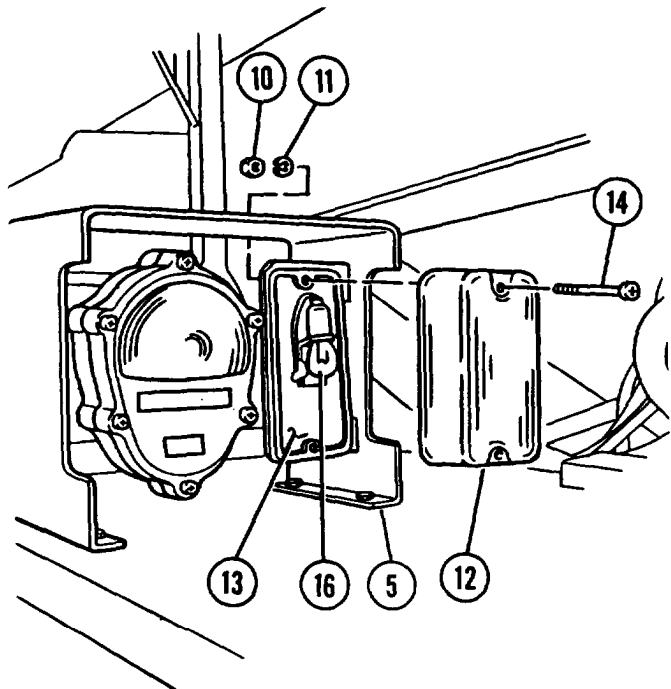
- a. Carefully push and twist the old bulb (16) counterclockwise until it releases from the socket.
- b. Remove and discard the old bulb (16).

3. CAREFULLY PUSH AND TWIST THE NEW BULB (16) CLOCKWISE IN THE SOCKET UNTIL IT LOCKS INTO PLACE.

4. INSTALL LENS.

- a. Align lens (12) on socket plate (13). Slide two screws (14) through holes on lens (12).
- b. Secure lens (12) with two new lockwashers (11) and nuts (10).

5. CONNECT NEGATIVE BATTERY CABLE,
 PARA. 8-44.



8-36. ENGINE OIL PRESSURE SENDER - TEST/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Test Equipment

OHmmeter

Equipment Condition

Negative battery cable disconnected,
para. 8-44.

Materials/Parts

Lockwasher (2)

Loctite 59241 (App. C, Item 42)

NOTE

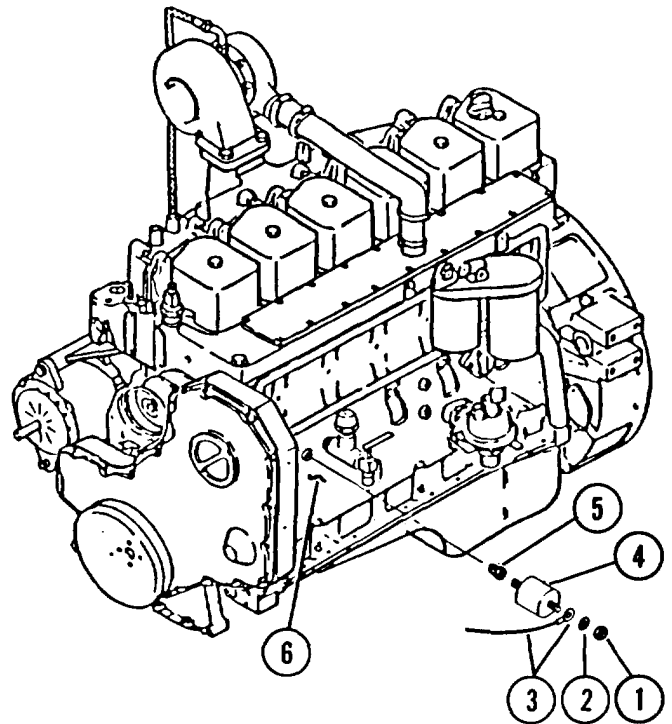
The engine oil pressure sender is accessed through the right-hand engine access door.

REMOVAL

1. REMOVE NUT (1) AND LOCKWASHER (2) TO DISCONNECT ELECTRICAL LEAD (3) AT SENDER (4). DISCARD LOCKWASHER (2).
2. REMOVE SENDER (4) FROM FITTING (5).
3. IF NECESSARY, UNSCREW FITTING (5) FROM ENGINE (6).

INSTALLATION

1. APPLY LOCTITE 59241 TO THREADS OF FITTING (5) AND SCREW FITTING (5) INTO ENGINE (6).
2. APPLY LOCTITE 59241 TO THREADS OF SENDER (4).
3. SCREW SENDER (4) INTO FITTING (5).



8-36. ENGINE OIL PRESSURE SENDER - TEST/REPLACE (Cont'd)

4. CONNECT ELECTRICAL LEAD (3) WITH NEW LOCKWASHER (2) AND NUT (1) .
5. CONNECT BATTERIES , PARA. 8-44.

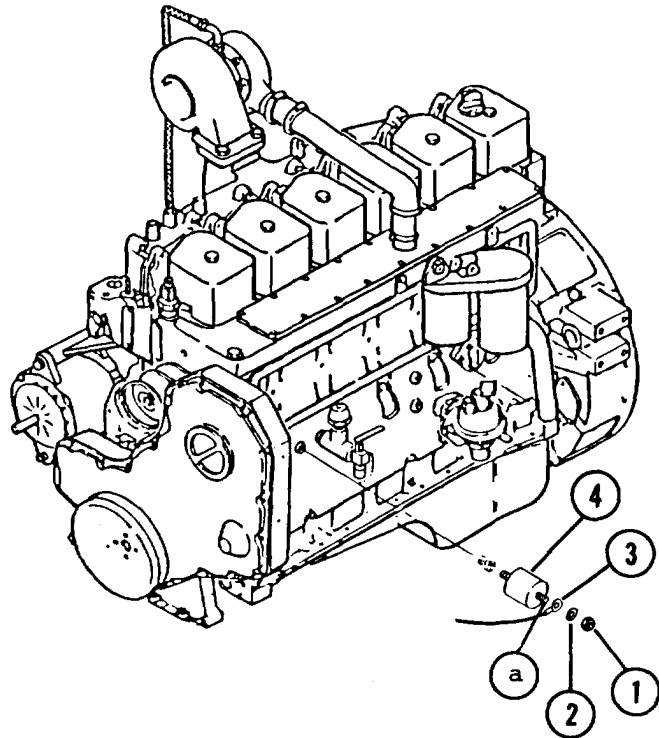
TESTING

1. REMOVE NUT (1) AND LOCKWASHER (2) TO DISCONNECT ELECTRICAL LEAD (3) AT SENDER (4) . DISCARD LOCKWASHER.

NOTE

Do not remove sender from engine.

2. CONNECT ONE OHMMETER LEAD TO THE SENDER TERMINAL (a) AND THE OTHER LEAD TO THE ENGINE GROUND.
3. USE STE/ICE TO MONITOR ENGINE OIL PRESSURE. SEE STE/ICE PROCEDURES, PARA. 2-13.
4. START THE ENGINE AND OBSERVE BOTH THE STE/ICE OIL PRESSURE READOUT AND THE OHMMETER. THE PRESSURE SENDER (4) SHOULD HAVE THE FOLLOWING RESISTANCE READINGS.



NOTE

The 0 psi reading should be done at a decreasing pressure. The 40 psi reading should be read on an increasing pressure.

<u>Oil Pressure</u>	<u>Resistance</u>
0 psi	227-257 ohms
40 psi	92-114 ohms

5. REPLACE SENDER (4) IF RESISTANCE REQUIREMENTS ARE NOT MET. SEE INSTALLATION IN THIS PARAGAPH.
6. CONNECT ELECTRICAL LEAD (3) AT SENDER (4). INSTALL NEW LOCKWASHER (2) AND NUT (1).

8-37. WATER TEMPERATURE SENDER - REPLACE-

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Maintenance

Materials/Parts

Lockwasher (2)

Loctite 59241 (App. C, Item 42)

Equipment Condition

Vehicle parked on level ground.
 Engine off and cool.
 Negative battery cable disconnected,
 para. 8-44.

NOTE

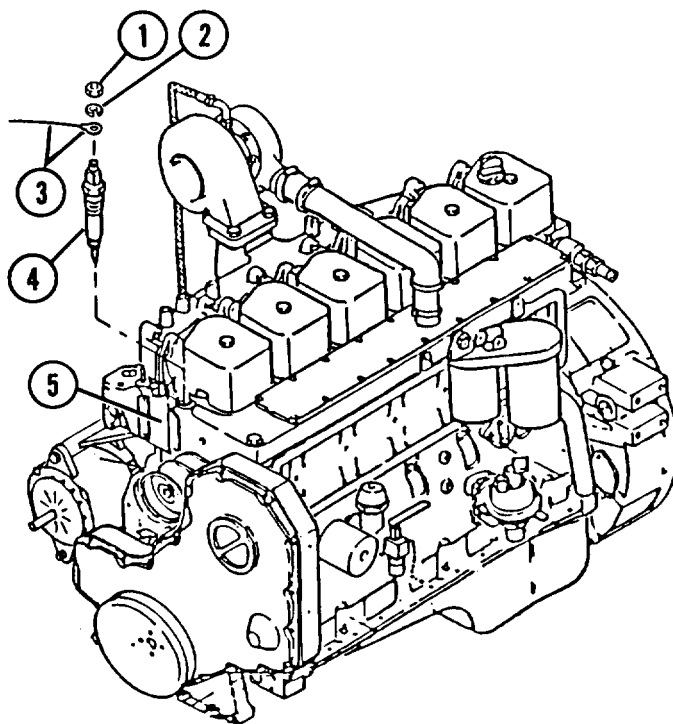
The water temperature sender is accessed through the left-hand engine access door.

REMOVAL

1. REMOVE NUT (1), LOCKWASHER (2), AND ELECTRICAL LEAD (3) FROM TEMPERATURE SENDER (4). DISCARD LOCKWASHER (2).
2. REMOVE TEMPERATURE SENDER (4), FROM ENGINE (5).

INSTALLATION

1. APPLY LOCTITE 59241 TO THREADS OF TEMPERATURE SENDER (4).
2. INSTALL TEMPERATURE SENDER (4).
3. INSTALL ELECTRICAL LEAD (3), NEW LOCKWASHER (2), AND NUT (1) ONTO TEMPERATURE SENDER (4).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-38. TRANSMISSION TEMPERATURE SENDER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwasher (2)

Loctite 59241 (App. C, Item 42)

Equipment Condition

Negative battery cable disconnected,
para. 8-44.
Transmission cover removed,
para. 16-6.

NOTE

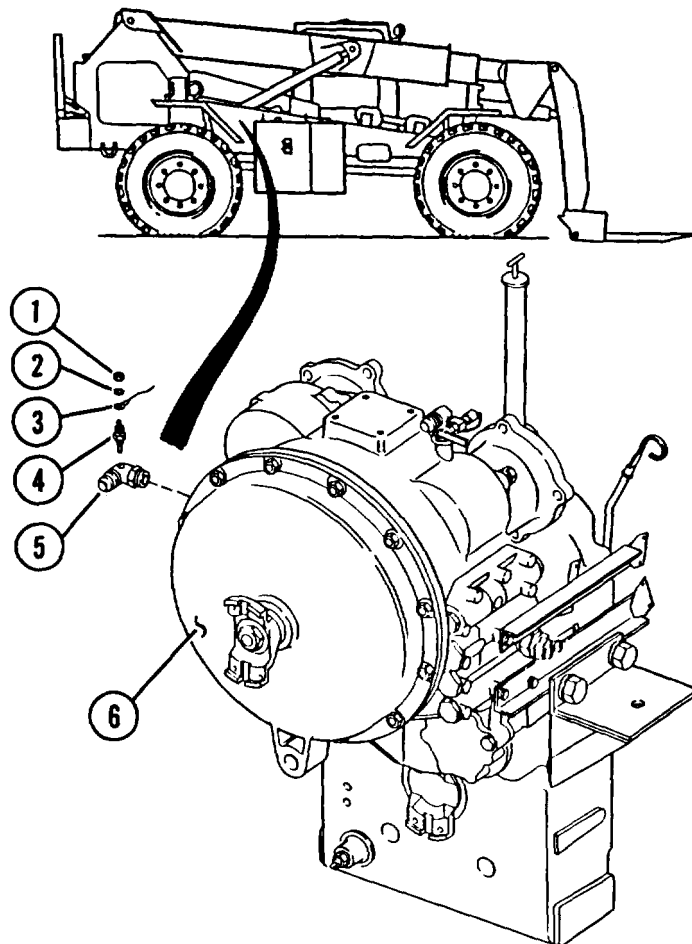
The transmission temperature sender is located on the left side of the transmission.

REMOVAL

1. REMOVE NUT (1) AND LOCKWASHER (2) TO DISCONNECT LEAD (3) AT SENDER (4). DISCARD LOCKWASHER (2).
2. UNSCREW SENDER (4) FROM ELBOW (5).
3. IF NECESSARY, REMOVE ELBOW (5) FROM TRANSMISSION (6).

INSTALLATION

1. IF NECESSARY, INSTALL ELBOW (5) TO TRANSMISSION (6).
2. APPLY LOCTITE 59241 TO THREADS OF SENDER (4).
3. SCREW SENDER (4) INTO ELBOW (5).
4. CONNECT LEAD (3) BY INSTALLING NEW LOCKWASHER (2) AND NUT (1).
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-39. FUEL LEVEL SENDER - TEST/REPLACE

This task covers:

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

Initial Setup

Tools

Shop Equipment, Automotive
 Maintenance and Repair, Common #1
 Less Power

Materials/Parts

Gasket (8)
 Lockwasher (2)
 Lockwasher (6)

Test Equipment

Ohmmeter

Equipment Condition

Negative battery cable disconnected,
 para. 8-44.

REMOVAL

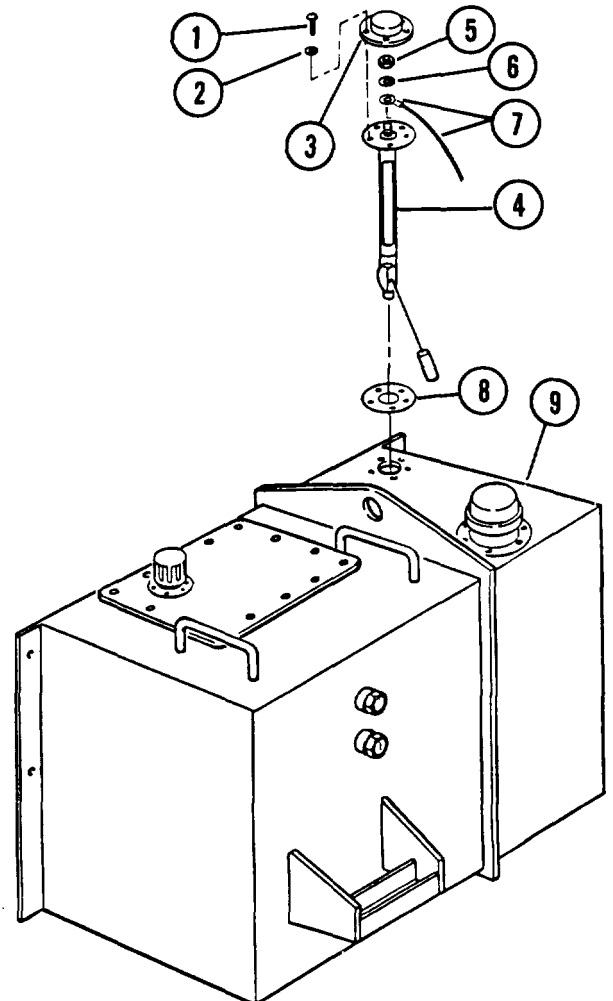
1. REMOVE FIVE CAPSCREWS (1), FIVE LOCKWASHERS (2), AND CAP (3) FROM SENDER (4). DISCARD LOCKWASHERS (2).
2. REMOVE NUT (5), LOCWASHER (6), AND LEAD (7) FROM SENDER (4). DISCARD LOCKWASHER (6).
3. REMOVE SENDER (4) AND GASKET (8) FROM FUEL TANK (9). DISCARD GASKET (8).

CLEANING

USE APPROPRIATE TOOL TO REMOVE RESIDUE OF OLD GASKET (8) FROM MATING SURFACES OF ITEMS (4) AND (9).

INSTALLATION

1. INSERT SENDER (4) WITH NEW GASKET (8) INTO FUEL TANK (9).

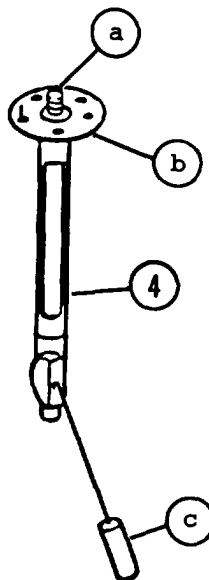


8-39. FUEL LEVEL SENDER - TEST/REPLACE (Cont'd)

2. SECURE LEAD (7) WITH NUT (5) AND NEW LOCKWASHER (6).
3. SECURE SENDER (4) AND CAP (3) WITH FIVE CAPSCREWS (1) AND FIVE NEW LOCKWASHERS (2).
4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

TESTING

1. REMOVE THE SENDER (4). SEE REMOVAL IN THIS PARAGRAPH.
2. TEST THE SENDER (4).
 - a. Connect one ohmmeter lead to the sender terminal (a) and the other lead to the metal flange of the sender (b).
 - b. Move the float (c) up and down while observing the ohmmeter.
 - c. Resistance should change from approximately 30 to 240 ohms.
 - d. Replace sender (4) if the resistance is not within specifications.
3. INSTALL THE SENDER (4). SEE INSTALLATION SECTION OF THIS PARAGRAPH.



8-40. BACK-UP ALARM - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwashers (5)

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected, para. 8-44.
 Load backrest removed from storage position, TM10-3930-660-10.

Reference

TM10-3930-660-10

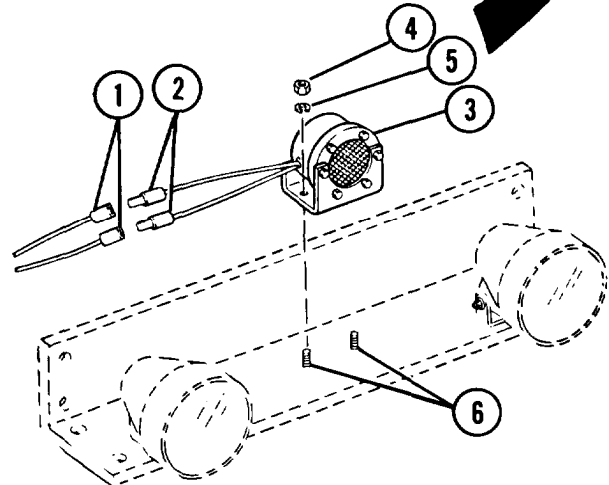
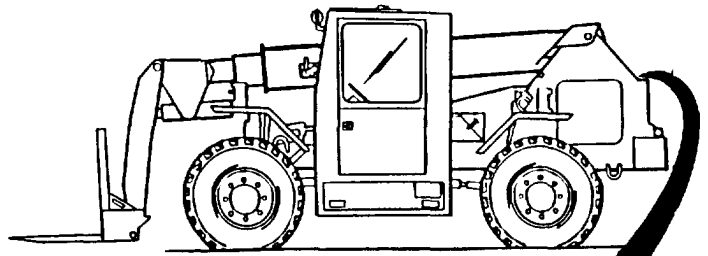
REMOVAL

1. DISCONNECT ELECTRICAL LEADS.

Disconnect two female spade connectors (1) of vehicle wiring harness from two male spade connectors (2) of back-up alarm (3).

2. REMOVE MOUNTING HARDWARE.

Remove nuts (4), lockwashers (5), and back-up alarm (3) from studs (6). Discard lockwashers (5).



INSTALLATION

1. INSTALL BACK-UP ALARM AND MOUNTING HARDWARE .

- a. Position back-up alarm (3) on studs (6).
- b. Install new lockwashers (5), and nuts (4) to secure back-up alarm (3) to studs (6).

8-40. BACK-UP ALARM - REPLACE (Cont'd)

2. CONNECT ELECTRICAL LEADS.

Insert two male spade connectors (2) of back-up alarm (3) into two female spade connectors (1) of vehicle wiring harness.

3. CONNECT NEGATIVE BATTERY CABLE,
PARA. 8-44.

4. IF REMOVED, INSTALL LOAD BACKREST
IN STORAGE POSITION ON VEHICLE,
TM10-3930-660-10.

8-41. BACK-UP ALARM SWITCH - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

Initial SetupTools

Tool Kit, Automotive Mechanics

Materials/Parts

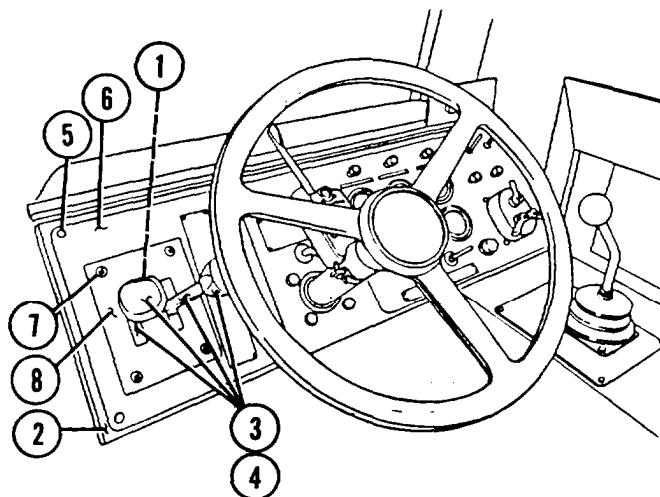
Cotter Pin (10)
Lockwasher (13)

Equipment Condition

Vehicle parked on level ground.
Batteries disconnected, para. 8-44.

REMOVAL

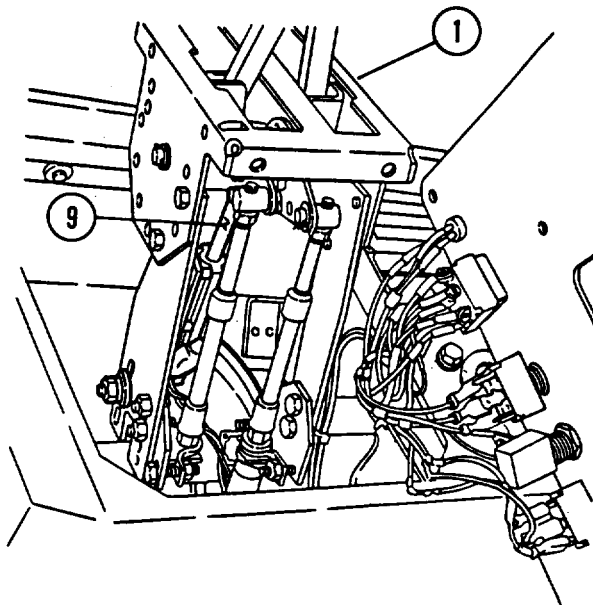
1. LIFT LEVER HOUSING (1) FROM CONSOLE (2).
 - a. Pull and remove two knobs (3) from shift levers (4).
 - b. Remove four capscrews (5) which secure panel (6) to console (2).
 - c. Remove four capscrews (7) which secure panel (8), and lever housing (1), to panel (6). Remove panel (8).
 - d. Lift up panel (6) to provide access to lever housing (1).
 - e. Lift lever housing (1) from console (2).



8-41. BACK-UP ALARM SWITCH - REPLACE/ADJUST (Cont'd)

2. REMOVE BACK-UP ALARM SWITCH (9) FROM LEVER HOUSING (1).

- a. Remove cotter pin (10), and washer (11), which secure top end of back-up alarm switch (9). Discard cotter pin (10).
- b. Remove nut (12), lockwasher (13), washer (14), switch spacer (15), capscrew (16), washer (17), and back-up alarm switch (9). Discard lockwasher (13).
- c. Tag and disconnect two electrical leads (18) connecting switch (9) to vehicle wiring harness (19).

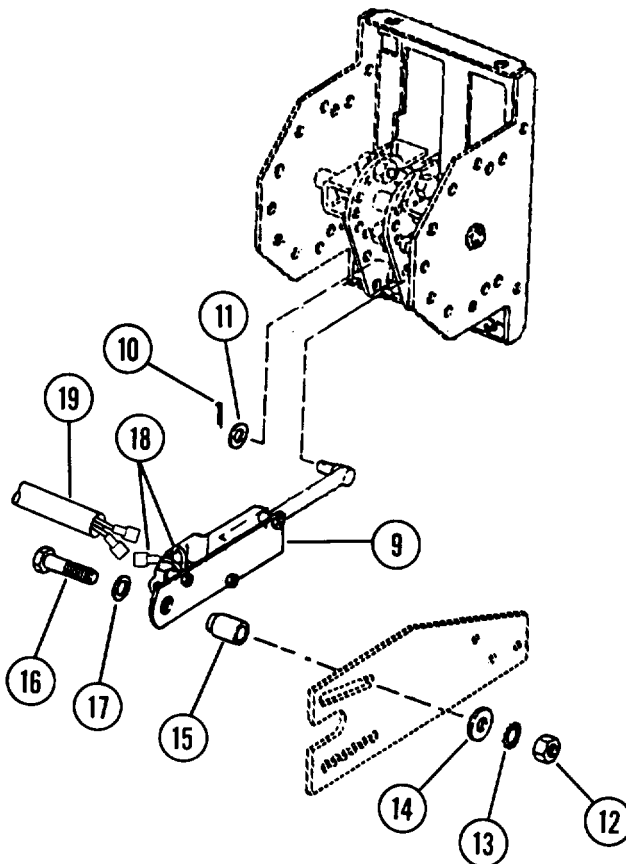


INSTALLATION

1. INSTALL BACK-UP ALARM SWITCH (9) ON LEVER HOUSING (1).

- a. Connect electrical leads (18) from switch (9) to vehicle wiring harness (19).
- b. Position back-up alarm switch (9) and switch spacer (15) on lever housing (1). Secure bottom end of switch (9) with washer (17), Capscrew (16), washer (14), new lockwasher (13), and nut (12).
- c. Secure top end of switch (9) with washer (11), and new cotter pin (10).

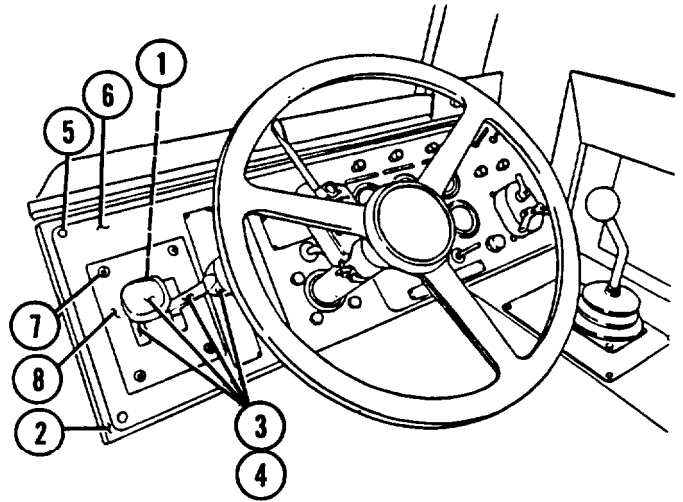
2. ADJUST BACK-UP ALARM SWITCH (9) AS DESCRIBED IN "ADJUSTMENT" SECTION, BELOW.



8-41. BACK-UP ALARM SWITCH - REPLACE/ADJUST (Cont'd)

3. SECURE LEVER HOUSING (1) TO CONSOLE (2).

- a. Position lever housing (1) inside console (2).
- b. Lower panel (6) to console (2).
- c. Position panel (8) on panel (6). Secure panel (8), and lever housing (1), to panel (6) with four capscrews (7).
- d. Secure panel (6) to console (2) with four capscrews (5).
- e. Install knobs (3) on shift levers (4).



ADJUSTMENT

NOTE

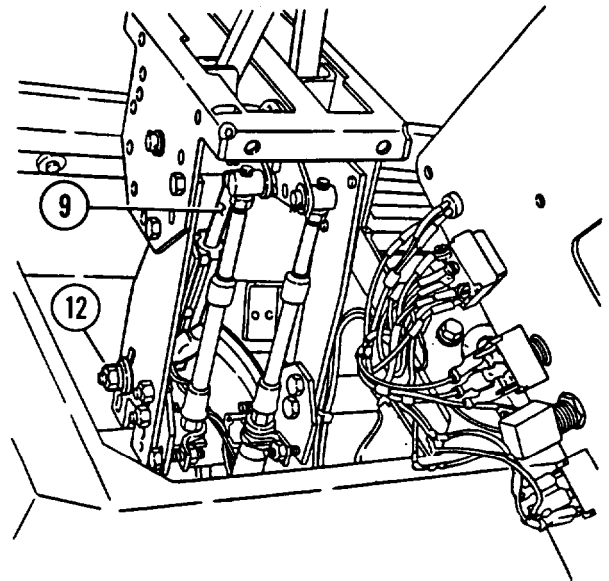
Back-up alarm switch (9) should be adjusted so that back-up alarm sounds only when travel select lever is in REVERSE position.

- 1. TURN IGNITION SWITCH TO THE "ON" POSITION, BUT DO NOT START ENGINE.

NOTE

Be sure blackout lights are switched OFF .

- 2. LOOSEN NUT (12).
- 3. MOVE BACK-UP ALARM SWITCH (9) UP OR DOWN AS REQUIRED SO THAT BACK-UP ALARM ONLY SOUNDS WHEN TRAVEL SELECT LEVER IS IN "REVERSE" POSITION.
- 4. TIGHTEN NUT (12).



8-42. HORN - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwasher (5)

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

1. DISCONNECT HORN ELECTRICAL LEADS.

Remove female connectors (1) from male connectors (2) at rear of horn (3).

2. REMOVE MOUNTING HARDWARE AND HORN.

Remove nut (4), lockwasher (5), screw (6), and horn (3) from horn bracket (7). Discard lockwasher (5).

INSTALLATION

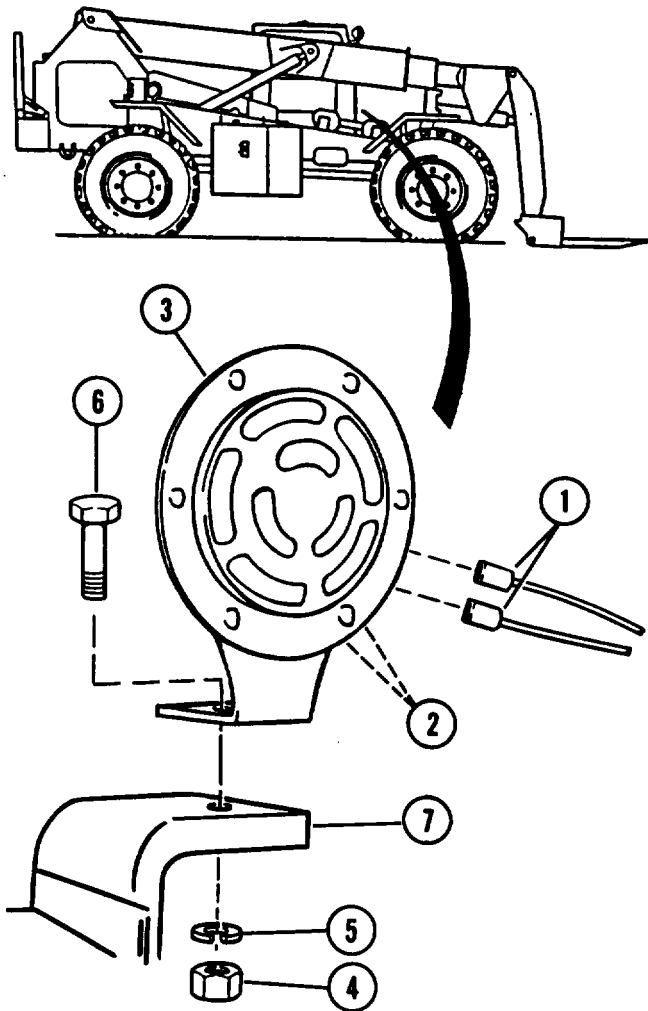
1. INSTALL HORN AND MOUNTING HARDWARE.

- a. Position horn (3) on horn bracket (7).
- b. Secure horn (3) with screw (6), new lockwasher (5), and nut (4).

2. CONNECT HORN ELECTRICAL LEADS.

Push female connectors (1) onto male connectors (2) at rear of horn (3).

3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



8-43. BATTERIES - SERVICE/TEST/REPLACE

This task covers:

- a. Service
- b. Removal
- c. Installation
- d. Testing

Initial Setup**Tools**

Tool Kit, Auto Mechanics

Wire Brush

Materials/Parts

Distilled Water (App. C, Item 55)

Soda Solution (App. C, Item 46)

Petroleum Jelly (App. C, Item 15)

Equipment Condition

Vehicle parked on level ground.

WARNING

Do not smoke or allow flame or sparks in the vicinity while servicing, removing, or installing batteries.

Batteries generate hydrogen, a highly explosive gas. Severe personal injury could result.

To avoid sparks when removing battery cables, always begin by removing the negative battery cable first.

WARNING

Batteries are filled with acid electrolyte solution. Always wear protective clothing, rubber gloves, and eye protection when servicing removing or installing batteries.

8-43. BATTERIES - SERVICE/TEST/REPLACE (Cont'd)

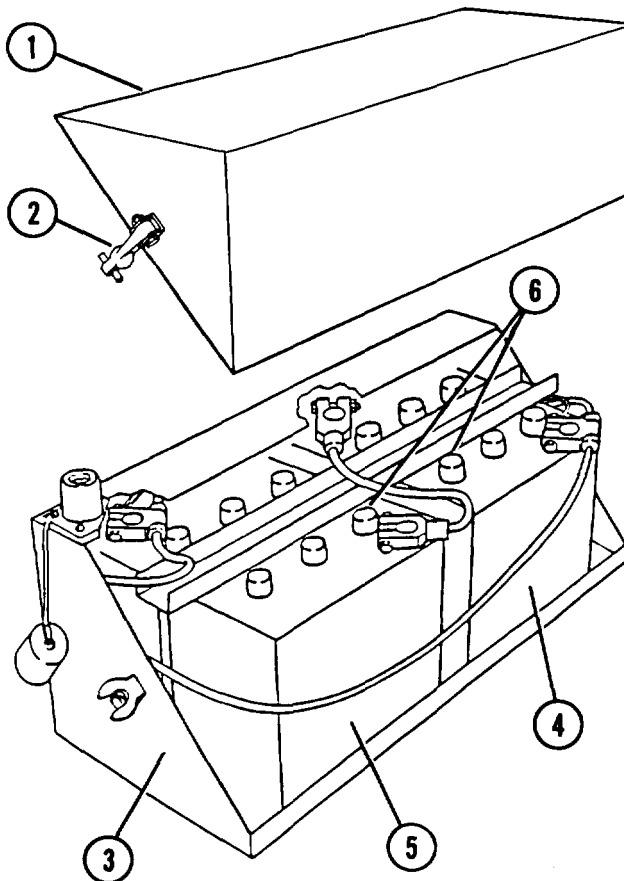
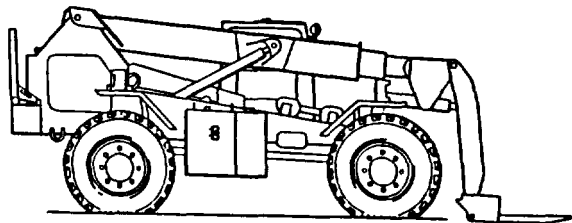
SERVICE

WARNING

Always check the electrolyte level with the engine stopped. Do not smoke when checking the battery. Do not use an exposed flame to check battery levels. Protect the eyes when checking the battery level.

Do not overfill batteries so that water splashes acid from cell openings. Battery acid can cause skin irritations or burns.

1. REMOVE BATTERY BOX COVER (1).
 - a. Remove two straps (2) securing battery box cover (1) to battery box (3).
 - b. Lift and remove battery box cover (1) from battery box (3).
2. IF NECESSARY, ADD DISTILLED WATER TO CELLS OF BATTERIES (4) AND (5).
 - a. Remove fill plugs (6) from batteries (4) and (5).
 - b. Fill each cell to top of ledge in filler neck with distilled water.
 - c. Install fill plugs (6).
3. CLEAN EXTERIOR SURFACE AND TERMINALS OF BATTERIES (4) AND (5).
 - a. Remove cables from batteries (4) and (5) as described in REMOVAL section of this paragraph.
 - b. Remove batteries (4) and (5) from vehicle as described in REMOVAL section of this paragraph.

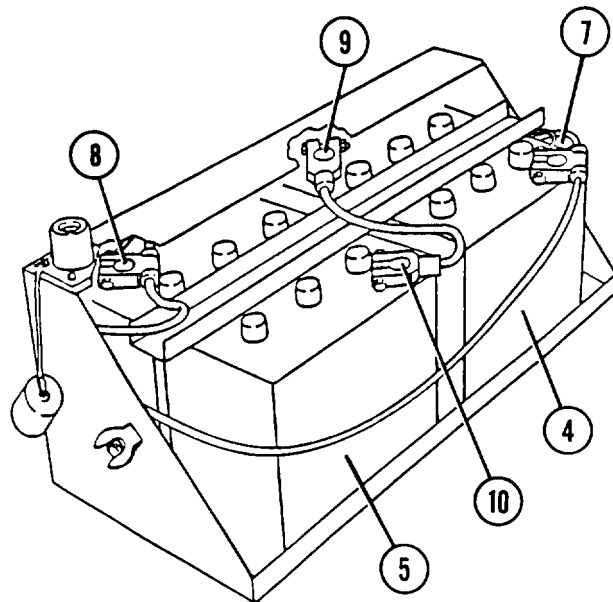


8-43. BATTERIES - SERVICE/TEST/REPLACE (cont'd)

CAUTION

Make sure baking soda and water solution does not enter cells of batteries (4) and (5) during cleaning. Be sure fill plugs (6) are installed.

- c. Clean exterior surface and terminals (7), (8), (9), and (10) of batteries (4) and (5) with baking soda and water solution.
 - d. Rinse batteries (4) and (5) with clear water.
 - e. Apply a light coating of petroleum jelly to terminals (7), (8), (9), and (10).
 - f. If removed, install batteries (4) and (5) to vehicle as described in REMOVAL section of this paragraph.
- 9* Install cables to batteries (4) and (5) as described in REMOVAL section of this paragraph.



4. INSTALL BATTERY BOX COVER (1).
 - a. Position battery box cover (1) on battery box (3).
 - b. Secure battery box cover (1) to battery box (3) with two straps (2).

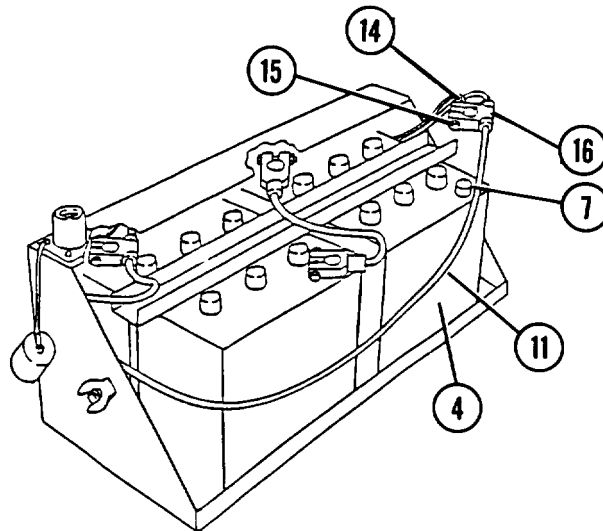
REMOVAL

1. REMOVE BATTERY BOX COVER AS DESCRIBED IN SERVICE SECTION OF THIS PARAGRAPH.

8-43. BATTERIES - SERVICE/TEST/REPLACE (Cont'd)

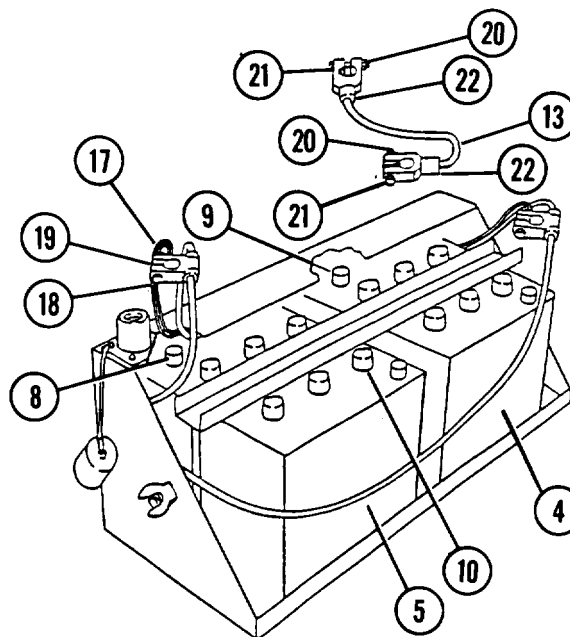
2. REMOVE BATTERY CABLES (11) , (12) , AND (13) .

a. Loosen nut (14) and capscrew (15) at clamp (16) securing negative battery cable (11) to negative terminal (7) of right-hand battery (4). Remove negative battery cable (11) from terminal (7).



b. Loosen nut (17) and bolt (18) at clamp (19) securing positive battery cable (12) to positive terminal (8) of left-hand battery (5). Remove positive battery cable (12) from terminal (8).

c. Loosen two nuts (20) and bolts (21) at two clamps (22) securing crossover battery cable (13) to positive terminal (9) of right-hand battery (4), and to negative terminal (10) of left-hand battery (5). Remove crossover battery cable (13) from terminals (9) and (10).



8-43. BATTERIES - SERVICE/TEST/REPLACE (Cont'd)

3. REMOVE THREE LOCKNUTS (23), WASHERS (24), AND RETAINING CAPSCREWS (25), SECURING THE BATTERY RETAINING BAR (26). REMOVE BATTERY RETAINING BAR (26).
4. REMOVE LEFT-HAND BATTERY (5) AND RIGHT-HAND BATTERY (4) FROM BATTERY BOX (3).

INSTALLATION

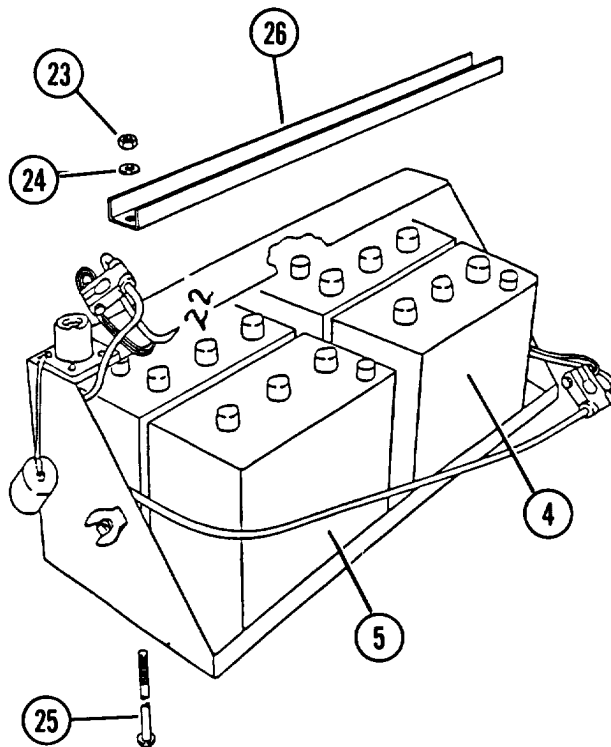
NOTE

If old batteries are to be reinstalled, clean the tops and terminals of batteries. Refer to SERVICE section of this paragraph. Use wire brush on clamps and terminals as required.

NOTE

Batteries (4) and (5) should be installed so the positive terminal (8) and (9) of each battery is oriented toward the left and front of battery box (3).

1. POSITION LEFT-HAND BATTERY (5) AND RIGHT-HAND BATTERY (4) IN BATTERY BOX (3).
2. POSITION BATTERY RETAINING BAR (26) ACROSS BATTERIES (4) AND (5). INSTALL THREE RETAINING CAPSCREWS (25) FROM UNDER THE BATTERY BOX (3). PUSH RETAINING CAPSCREW (25) UP UNTIL THREADS OF CAPSCREWS (25) ARE POSITIONED THROUGH HOLES IN BATTERY RETAINING BAR (26).
3. SECURE BATTERY RETAINING BAR (26) TO RETAINING CAPSCREW (25) WITH THREE WASHERS (24) AND THREE LOCKNUTS (23).
4. APPLY A THIN COAT OF PETROLEUM JELLY ON ALL BATTERY TERMINALS AND CLAMPS TO RETARD CORROSION.



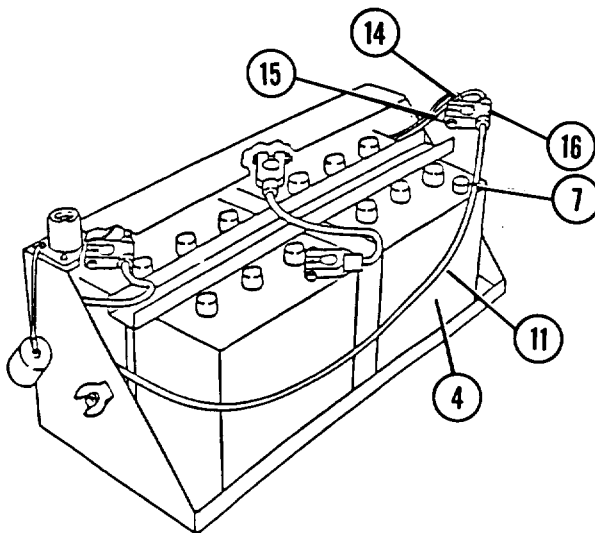
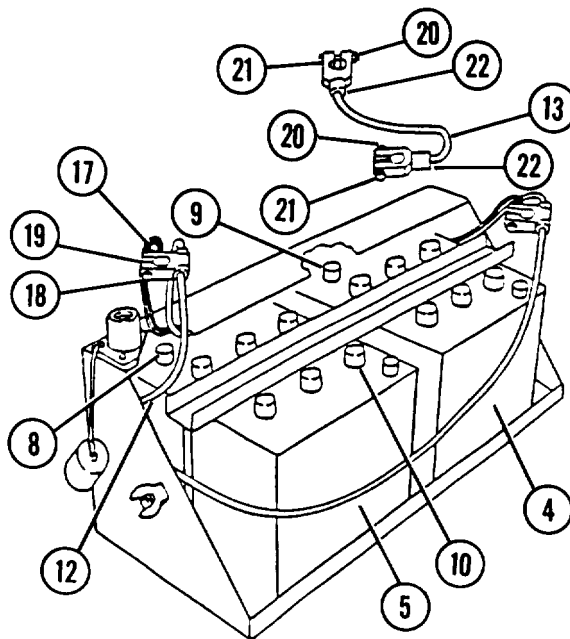
8-43. BATTERIES - SERVICE/TEST/REPLACE (Cont'd)

WARNING

To avoid sparks when installing battery cables, always install positive cable (11) last.

5. INSTALL BATTERY CABLES (11), (12), AND (13).

- a. Position two clamps (22) of crossover battery cable (13) on positive terminal (9) of right-hand battery (4) and on negative terminal (10) of left-hand battery (5).
- b. Secure crossover battery cable (13) by tightening two nuts (20) and capscrew (21) on two clamps (22).
- c. Position clamp (19) from positive battery cable (12) on positive battery terminal (8) of left-hand battery (5).
- d. Secure positive battery cable (12) by tightening nut (17), and bolt (18) on clamp (19).
- e. Position clamp (16) from negative battery cable (11) on negative terminal (7) of right-hand battery (4).
- f. Secure negative battery cable (11) by tightening nut (14) and capscrew (15) on clamp (16).



6. INSTALL BATTERY BOX COVER AS DESCRIBED IN SERVICE SECTION OF THIS PARAGRAPH.

8-43. BATTBRIES - SERVICE/TEST/RBPLACE (Cont'd)

TESTING

WARNING

Never disconnect any charging unit circuit or battery circuit cable from battery when the charging unit is operating. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released through the battery outlets. Injury to personnel can result.

NOTE

The battery voltage test can be done on the engine. If the on-engine test shows a defect, remove batteries for further testing. Refer to STE/ICE battery voltage test, para. 2-13. For additional testing requirements refer to TM9-6140-200-14.

8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE

This task covers:

- a. Service
- b. Removal
- c. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Lockwasher (39)
Starwasher (32)
Starwasher (35)
Tie Wrap (45) (App. C, Item 53)
Soda Solution (App. C, Item 46)
Petroleum Jelly (App. C, Item 15)

WARNING

do not smoke or allow flame or spark in the vicinity while servicing, removing, or installing batteries, Batteries generate hydrogen, a highly explosive gas. Severe personal injury could result,

To avoid sparks when removing cables from batteries, always begin by removing the negative battery cable first.

WARNING

Batteries are filled with acid electrolyte solution. Always wear protective clothing, rubber gloves, and eye protection when servicing, removing or installing batteries.

8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

NOTE

To disconnect batteries prior to vehicle servicing, refer to STEPS 1 and 2 of REMOVAL section in this paragraph.

To reconnect batteries after vehicle servicing is completed, refer to STEPS 9 and 10 of INSTALLATION section in this paragraph.

SERVICE

1. REMOVE BATTERY BOX COVER AND DISCONNECT CABLES FROM BATTERY TERMINALS.

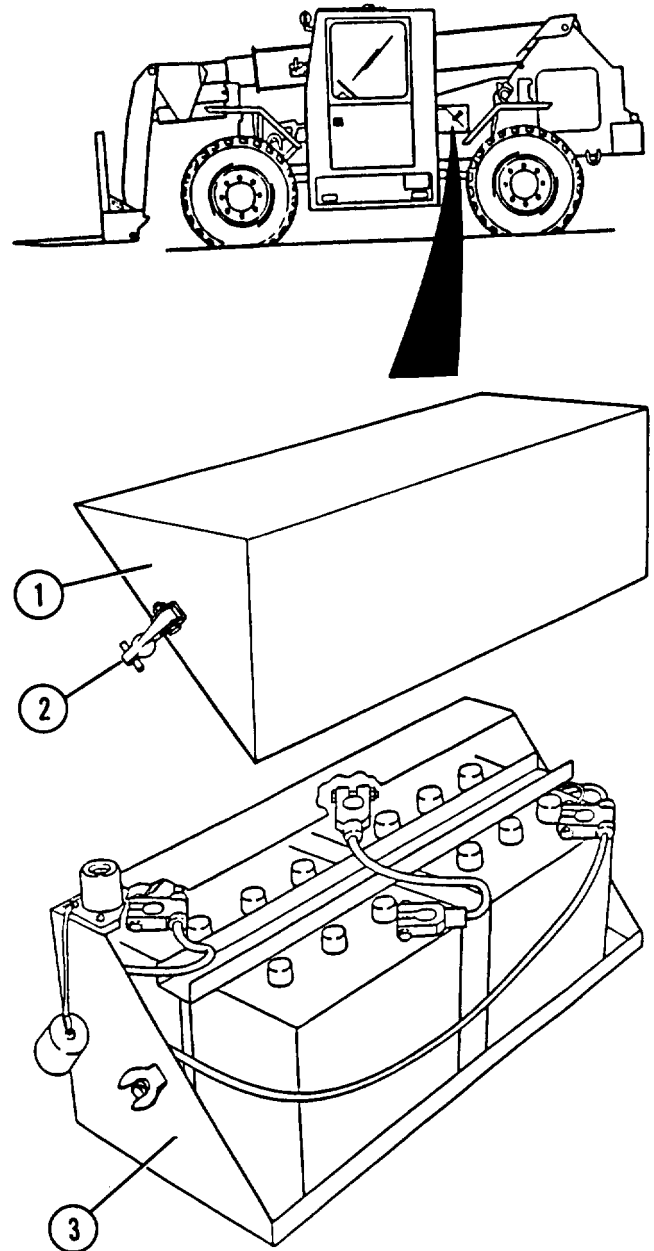
Perform steps 1, 2, 3, and 4 of REMOVAL section in this paragraph.

2. CLEAN BATTERY TERMINALS AND CABLE CLAMPS .
 - a. Use a wire brush to clean battery terminals and cable clamps. Wipe clean with a dry rag.
 - b. Apply a thin coat of petroleum jelly on battery terminals and cable clamps to retard corrosion.
3. CONNECT CABLES TO BATTERY TERMINALS AND INSTALL BATTERY BOX COVER.

See STEPS 7, 8, 9, and 10 of INSTALLATION section in this paragraph.

REMOVAL

1. REMOVE BATTERY BOX COVER (1).
 - a. Remove two straps (2) securing battery box cover (1) to battery box (3).
 - b. Lift and remove battery box cover (1) from battery box (3).

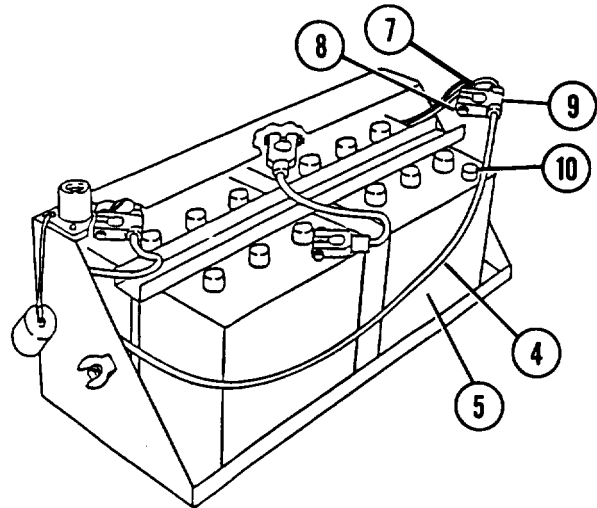


8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

2. REMOVE NEGATIVE BATTERY CABLE (4) AT BATTERY (5).

a. Loosen nut (7) and bolt (8) at clamp (9) securing negative battery cable (4) to negative terminal (10) of right-hand battery (5).

b. Remove clamp (9) from terminal (10).



3. REMOVE POSITIVE BATTERY CABLE (11) AT BATTERY (12).

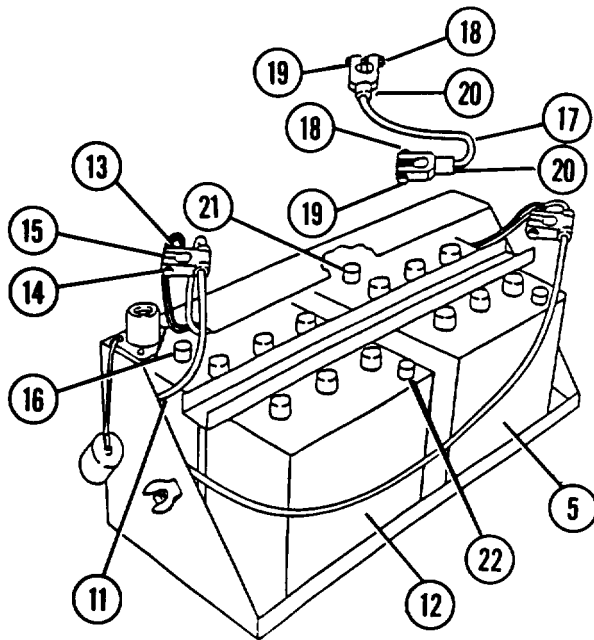
a. Loosen nut (13) and capscrew (14) at clamp (15) securing positive battery cable (11) to positive battery terminal (16) of left-hand battery (12).

b. Remove clamp (15) from terminal (16).

4. REMOVE CROSSOVER BATTERY CABLE (17) AT BATTERIES (5) AND (12).

a. Loosen two nuts (18) and capscrews (19) at two clamps (20) securing crossover battery cable (17) to positive terminal (21) of right-hand battery (5), and to negative terminal (22) of left-hand battery (12).

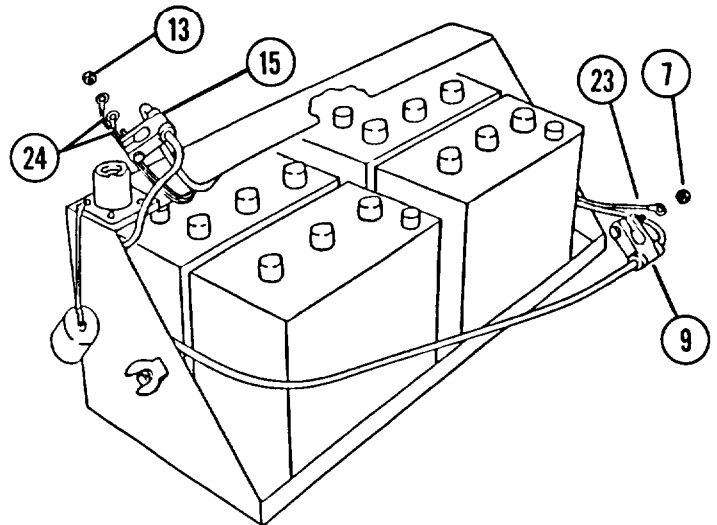
b. Remove clamps (20) from terminals (21) and (22).



8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (cont'd)

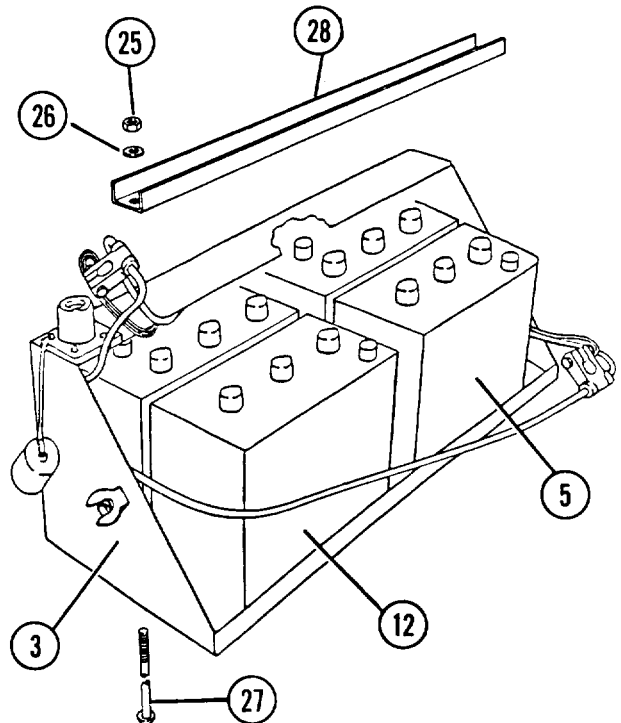
5. TAG AND REMOVE STE/ICE ELECTRICAL LEADS (23) AND (24) AT CLAMPS (9) AND (15).

- a. Remove nut (7) from clamp (9) securing STE/ICE electrical lead (23) to clamp (9).
- b. Tag and remove STE/ICE electrical lead (23) at clamp (9).
- c* Remove nut (13) at clamp (15) securing two STE/ICE electrical leads (24) to clamp (15).
- d. Tag and remove two STE/ICE electrical leads (24) at clamp (15).



6. REMOVE BATTERIES (5) AND (12) FROM BATTERY BOX (3).

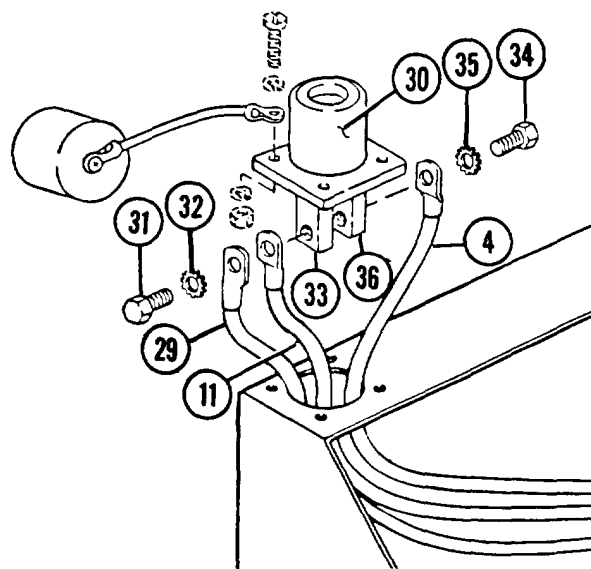
- a. Remove three nuts (25), washers (26) and retaining bolts (27) securing the battery retaining bar (28). Remove battery retaining bar (28).
- b. Remove left-hand battery (5) and right-hand battery (12) from battery box (3).



8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

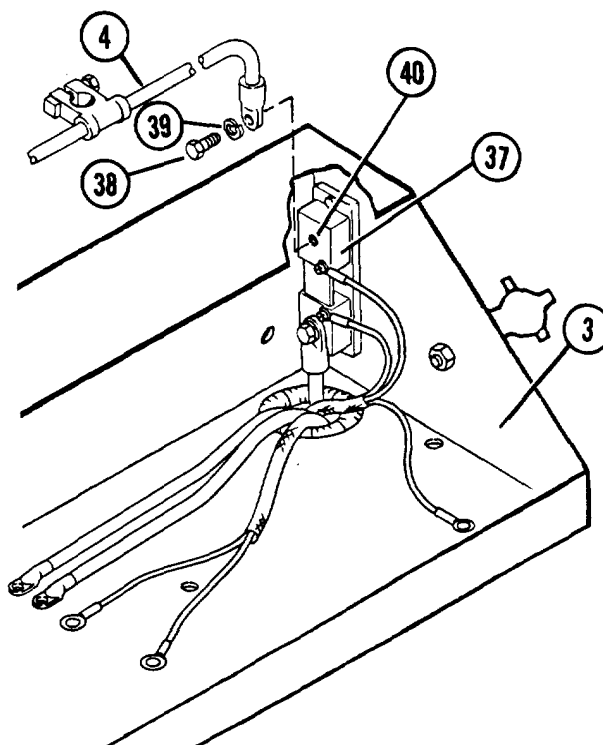
7. TAG AND REMOVE POSITIVE BATTERY CABLE (11), POSITIVE EMERGENCY STEER PUMP POWER CABLE (29), AND NEGATIVE BATTERY CABLE (4) AT SLAVE RECEPTACLE (30).

- a. Remove capscrew (31) and starwasher (32) securing positive battery cable (11) and positive emergency steer pump power cable (29) to positive terminal (33) of slave receptacle (30). Discard starwasher (32).
- b. Tag and remove cables (11) and (29) from terminal (33).
- c. Remove capscrew (34) and starwasher (35) securing negative battery cable (4) to negative terminal (36) of slave receptacle (30). Discard starwasher (35).
- d. Tag and remove cable (4) from terminal (36).



8. REMOVE NEGATIVE BATTERY CABLE (4) AT STE/ICE SHUNT (37) AND REMOVE CABLE (4) FROM VEHICLE.

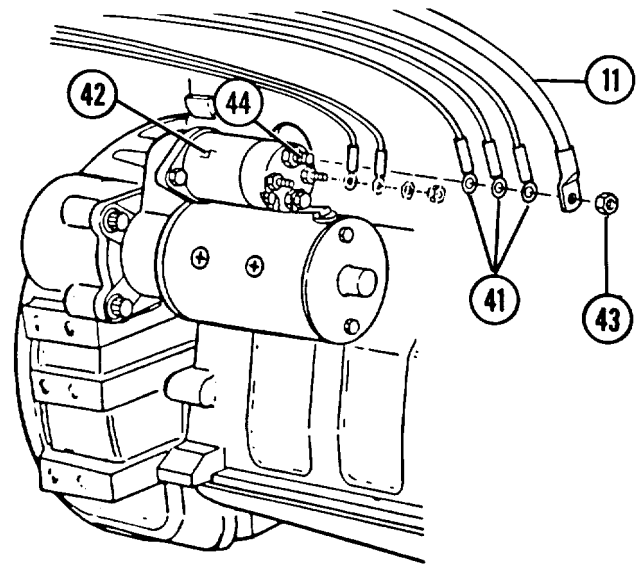
- a. Remove capscrew (38), and lockwasher (39) securing negative battery cable (4) to terminal (40) of STE/ICE shunt (37). Remove negative battery cable (4) from terminal (40). Discard lockwasher (39).
- b. Remove negative battery cable (4) from vehicle.



8-44. BATTERY CABLES AND TERMINALS- SERVICE/REPLACE (Cont'd)

9. TAG AND REMOVE POSITIVE BATTERY CABLE (11) AND THREE ELECTRICAL LEADS (41) AT STARTING MOTOR SOLENOID (42).

- a. Remove nut (43), securing positive battery cable (11), and three electrical leads (41), to terminal (44) on starting motor solenoid (42).
- b. Tag and remove positive battery cable (11), and three electrical leads (41) at terminal (44).

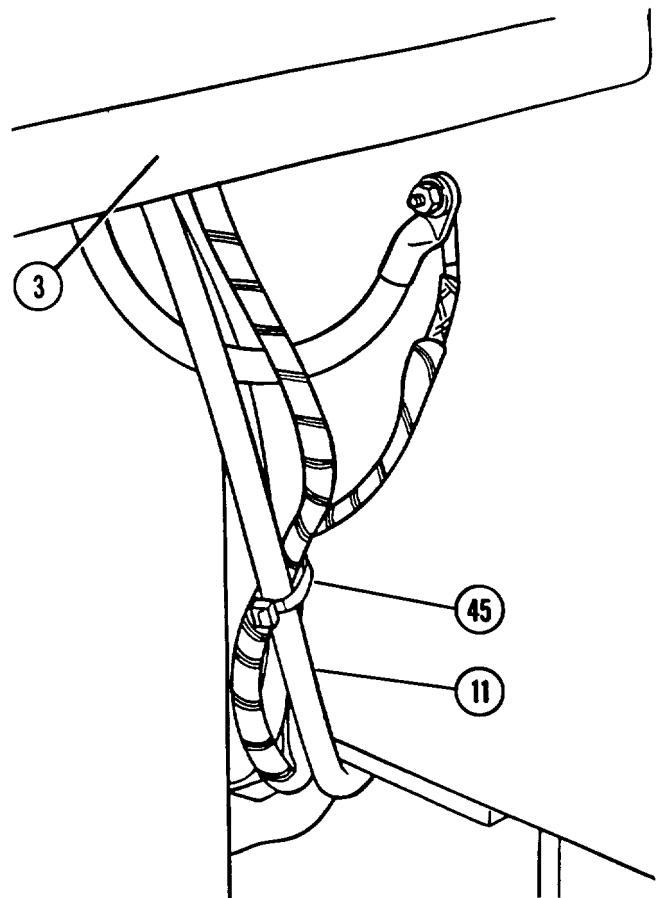

10. REMOVE POSITIVE BATTERY CABLE (11) FROM VEHICLE.

- a. Under battery box (3) cut tie wrap (45) securing positive battery cable (11) to other electrical cables.

NOTE

Note routing of positive battery cable (11) on vehicle for use during installation.

- b. Pull cable (11) out of engine compartment and battery box from underneath vehicle.



8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

INSTALLATION

NOTE

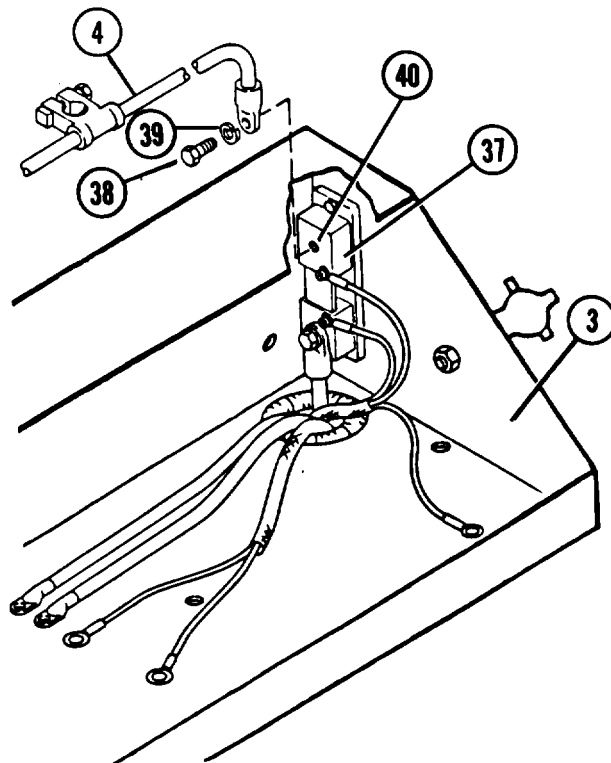
Route cable (11) on vehicle as noted during removal.

1. INSTALL POSITIVE BATTERY CABLE (11) ON VEHICLE.
 - a. Position ends of cable (11) in engine compartment and through hole at base of battery box (3).
 - b. Under battery box (3), secure positive battery cable (11) to other electrical cables with new tie wrap (45).
2. INSTALL THREE ELECTRICAL LEADS (41) AND POSITIVE BATTERY CABLE (11) AT STARTING MOTOR SOLENOID (42).
 - a. Position three electrical leads (41) and positive battery cable (11) on terminal (44) at starting motor solenoid (42) as tagged.
 - b. Secure three leads (41) and positive battery cable (11) to terminal (44) with nut (43).

8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

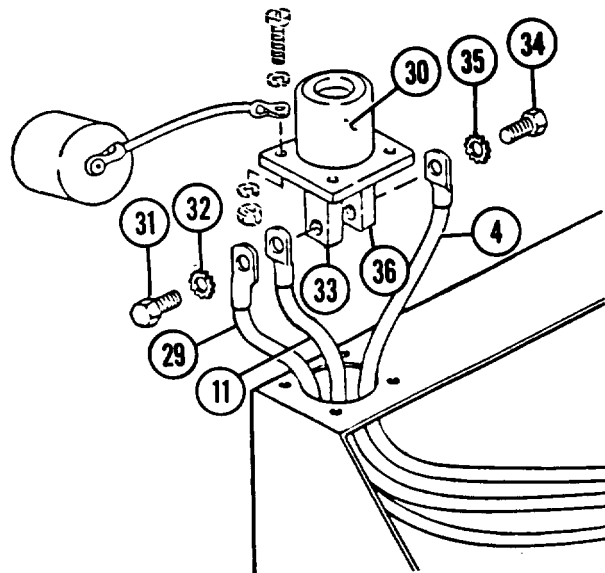
3. POSITION NEGATIVE BATTERY CABLE (4) IN BATTERY BOX (3) AND CONNECT CABLE (4) AT STE/ICE SHUNT (37).

- a. Position negative battery cable (4) inside battery box (3).
- b. Position short end of negative battery cable (4) on terminal (40) of STE/ICE shunt (37) and secure with capscrew (38) and new lockwasher (39).



4. INSTALL POSITIVE EMERGENCY STEER PUMP POWER CABLE (29), POSITIVE BATTERY CABLE (11), AND NEGATIVE BATTERY CABLE (4), AT SLAVE RECEPTACLE (30).

- a. Position negative battery cable (4) on negative terminal (36) of slave receptacle (30).
- b. Secure cable (4) to terminal (36) with capscrew (34) and new starwasher (35).
- c. Position positive emergency steer Pump power cable (29) and positive battery cable (11) on positive terminal (33) of slave receptacle (30).
- d. Secure cables (29) and (11) with capscrew (31) and new starwasher (32).



8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

NOTE

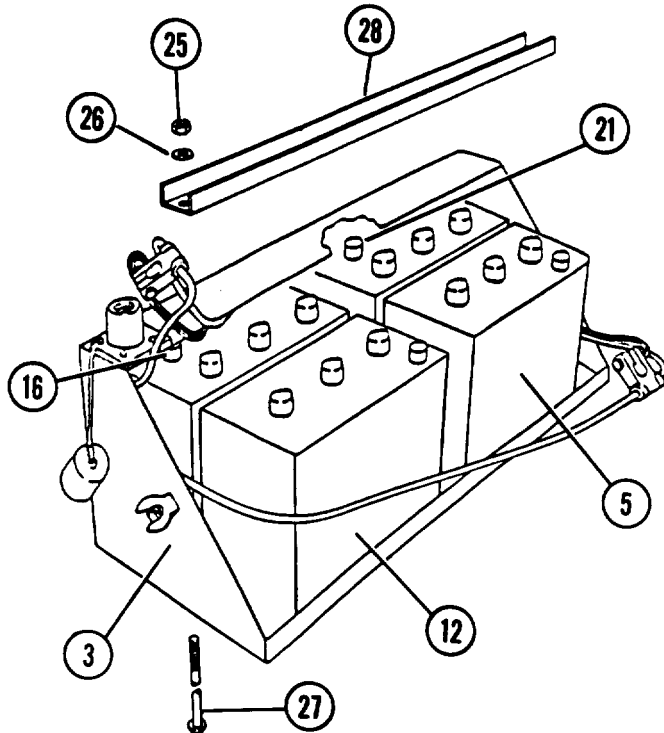
Clean battery cable clamps and terminals as required with a soda solution and wire brush.

NOTE

Batteries should be installed so the positive terminal (16) and (21) of each battery is oriented toward the left and front of battery box (3).

5. INSTALL BATTERIES (5) AND (12) IN BATTERY BOX (5).

- a. Position left-hand battery (12) and right-hand battery (5) in battery box (3).
- b. Position battery retaining bar (28) across tops of batteries (5) and (12). Install three retaining bolts (27) from under the battery box (3).



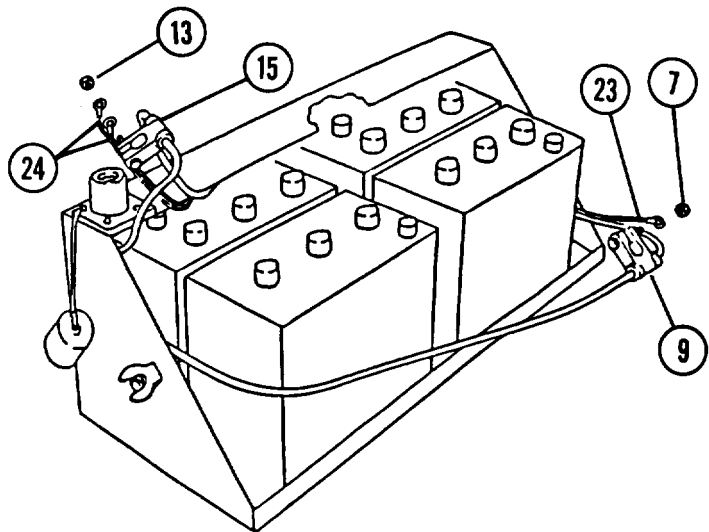
NOTE

Push retaining bolts (27) up until threads of capscrews (27) are positioned through holes in battery retaining bar (28).

- c. Secure battery retaining bar (28) to three retaining capscrews (27) with three washers (26) and nuts (25).

6. INSTALL STE/ICE ELECTRICAL LEADS (23) AND (24) AT CLAMPS (9) AND (15) AS TAGGED .

- a. Position two STE/ICE electrical leads (24) on clamp (15).
- b. Secure two STE/ICE electrical leads (24) to clamp (15) with nut (13).
- c. Position STE/ICE electrical lead (23) on clamp (9).



8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

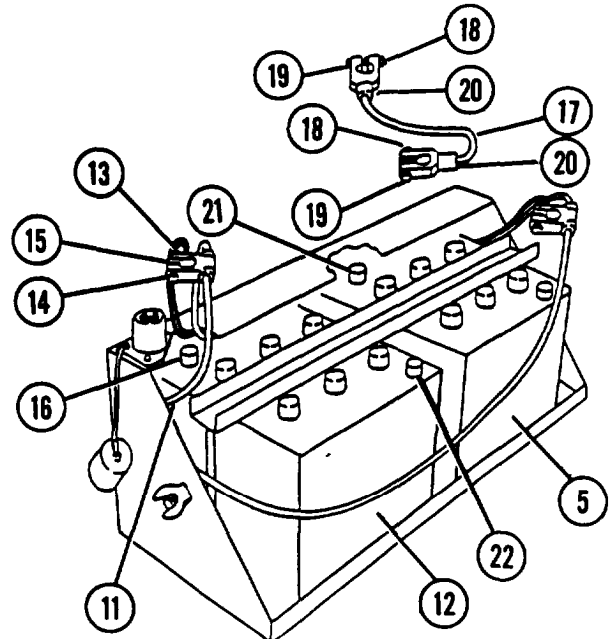
- d. Secure STE/ICE electrical lead (23) to clamp (9) with nut (7).

NOTE

To retard corrosion, apply a thin coat of petroleum jelly on all battery terminals and clamps prior to installing battery cables.

- 7. INSTALL CROSSOVER BATTERY CABLE (17) TO BATTERIES (12) AND (5).

- a. Position two clamps (20) of crossover battery cable (17) on positive terminal (21) of right-hand battery (5) and on negative terminal (22) of left-hand battery (12).
- b. Secure crossover battery cable (17) by tightening two nuts (18) and capscrews (19) on two clamps (20).

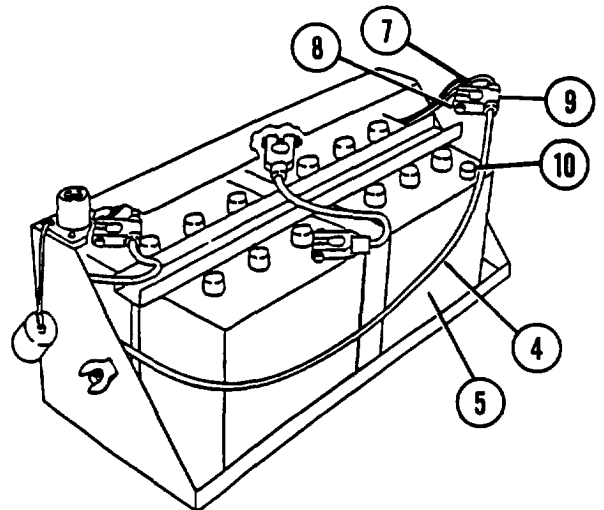


- 8. INSTALL POSITIVE BATTERY CABLE (11) TO BATTERY (12).

- a. Position clamp (15) from positive battery cable (11) on positive battery terminal (16) of left-hand battery (12).
- b. Secure positive battery cable (11) by tightening nut (13), and capscrew (14) on clamp (15).

- 9. INSTALL NEGATIVE BATTERY CABLE (4) AT BATTERY (5).

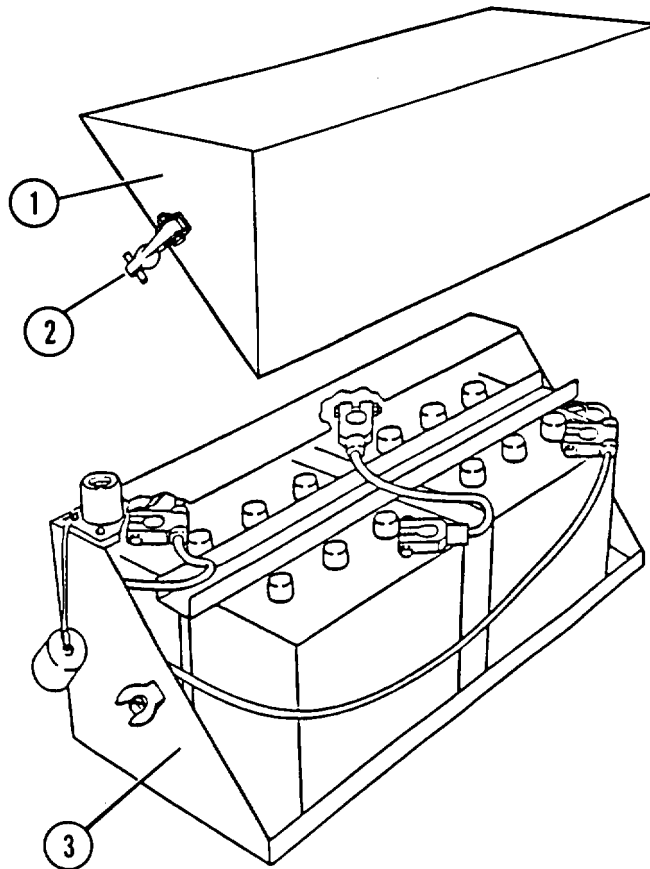
- a. Position clamp (9) from negative battery cable (4) on negative battery terminal (10) of right-hand battery (5).
- b. Secure negative battery cable (4) by tightening nut (7), and capscrew (8) on clamp (9).



8-44. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

10. INSTALL BATTERY BOX COVER (1) .

- a. Position battery box cover (1) on battery box (3).
- b. Secure battery box cover (1) to battery box (3) with two straps (2) .



8-45. BATTERY BOX AND COVER - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Batteries removed, para. 8-43.

Materials/Parts

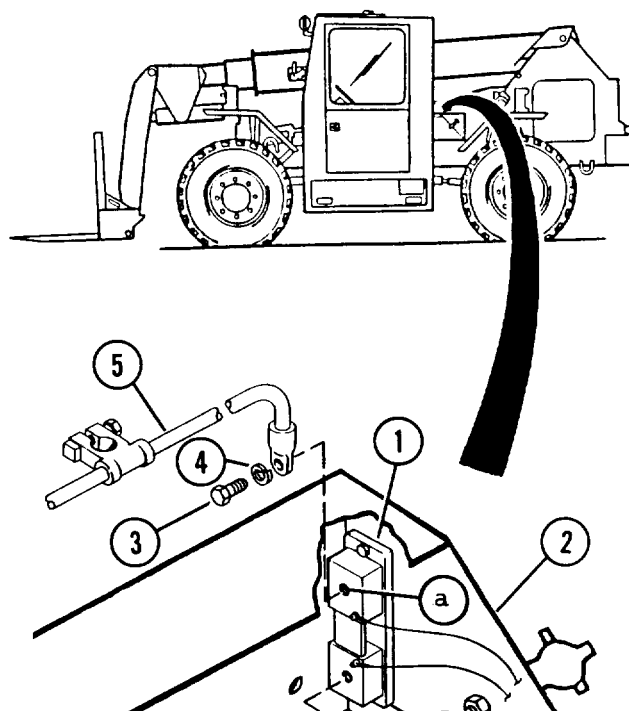
Lockwasher (4) (7) (10) (14) (31)
 Locknuts (24)
 Starwasher (21)
 Starwasher (23)

REMOVAL

NOTE

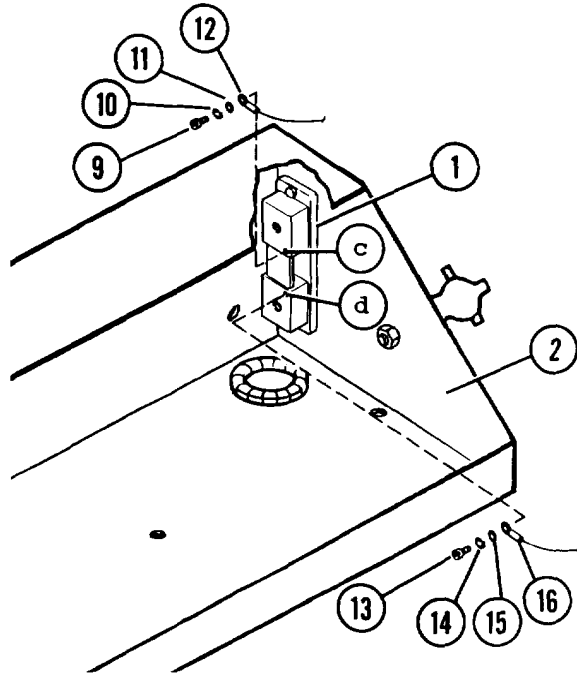
The STE/ICE shunt (1) is located inside the battery box (2), on the right-hand side.

1. TAG AND DISCONNECT WIRING AT STE/ICE SHUNT (1) INSIDE BATTERY BOX (2)
 - a. Remove capscrew (3) and lockwasher (4). Tag and remove negative battery cable (5) from terminal (a) of STE/ICE shunt (1). Discard lockwasher (4).
 - b. Remove capscrew (6) and lockwasher (7). Tag and remove ground cable (8) from terminal (b) of STE/ICE shunt (1). Discard lockwasher (7).



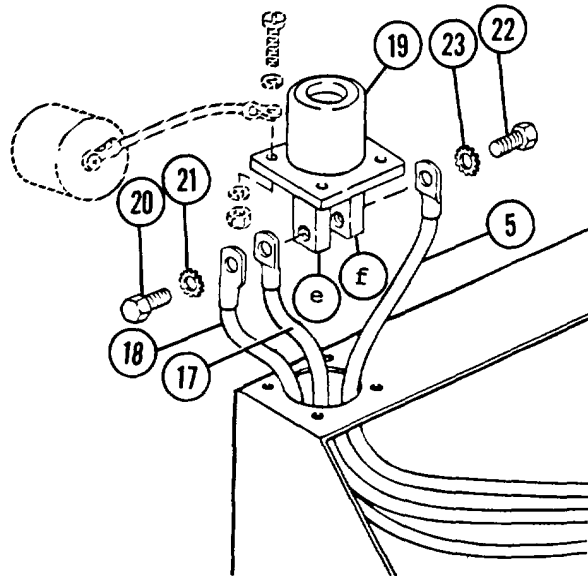
8-45. BATTERY BOX AND COVER - REPLACE (Cont'd)

- c. Remove screw (9), lockwasher (10) and flatwasher (11). Tag and remove STE/ICE electrical lead (12) from terminal (c) of STE/ICE shunt (10). Discard lockwasher (10).
- d. Remove screw (13), lockwasher (14) and flatwasher (15). Tag and remove STE/ICE electrical lead (16) from terminal (d) of STE/ICE shunt (1). Discard lockwasher (14).



2. TAG AND REMOVE POSITIVE BATTERY CABLE (17), POSITIVE EMERGENCY STEER PUMP POWER CABLE (18), AND NEGATIVE BATTERY CABLE (5) AT SLAVE RECEPTACLE (19).

- a. Remove capscrew (20) and starwasher (21) securing positive battery cable (17) and positive emergency steer pump power cable (18) to positive terminal (e) of slave receptacle (19). Discard starwasher (21).
- b. Tag and remove cables (17) and (18) from terminal (e).
- c. Remove capscrew (22) and starwasher (23), securing negative battery cable (5) to negative terminal (f) of slave receptacle (19). Discard starwasher (23).
- d. Tag and remove cable (5) from terminal (f).

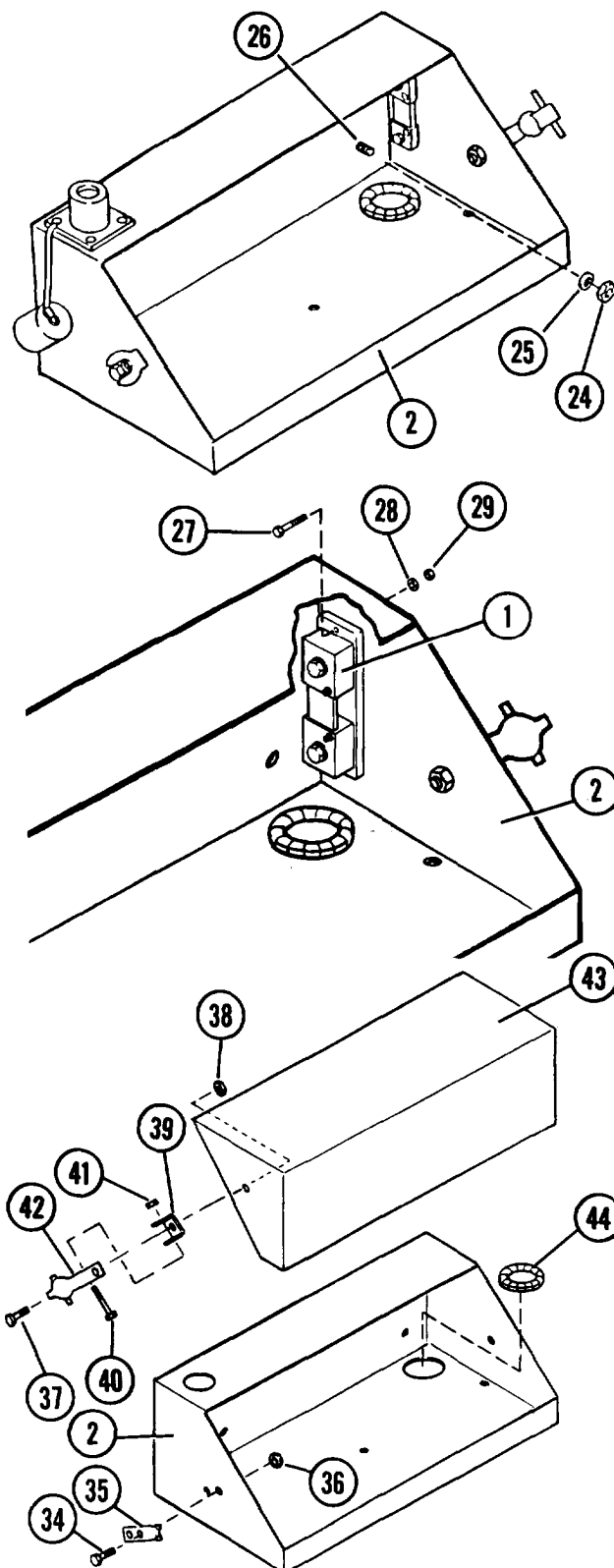


8-45. BATTERY BOX AND COVER - REPLACE (Cont'd)

NOTE

Remove all electrical leads and cables through hole at base of battery box prior to performing step 3.

3. REMOVE FOUR LOCKNUTS (24) AND WASHERS (25) SECURING BATTERY BOX (2) TO FOUR MOUNTING STUDS (26) ON BACK OF CAB. DISCARD LOCKNUTS (24).
4. REMOVE BATTERY BOX (2) FROM MOUNTING STUDS (26).
5. IF NECESSARY, REMOVE STE/ICE SHUNT (1) FROM BATTERY BOX (2).
 - a. Remove two bolts (27), two flatwashers (28) and two nuts (29) securing STE/ICE shunt (1) to battery box (2).
 - b. Remove STE/ICE shunt (1) from battery box (2).
6. IF NECESSARY, REMOVE SLAVE RECEPTACLE (19) FROM BATTERY BOX (2).
 - a. Remove four nuts (30), eight lockwashers (31), and four screws (32) securing slave receptacle (19) and cap (33) to battery box (2). Discard lockwashers (31).
 - b. Remove slave receptacle (19) and cap (33) from battery box (2).
7. IF NECESSARY, REMOVE HARDWARE (PARTS 34 THROUGH 42) FROM BATTERY BOX (2) AND BATTERY BOX COVER (43).
 - a. Remove four screws (34), two catch clamps (35) and four locknuts (36) from battery box (2). Discard locknuts (36).
 - b. Remove two bolts (37), two locknuts (38) and two brackets (39) from battery box cover (43). Discard locknuts (38).



8-45. BATTERY BOX AND COVER - REPLACE (Cont'd)

c. Remove two capscrews (40), two locknuts (41) and two retaining straps (42) from two brackets (39).

8. IF NECESSARY, REMOVE CONDUIT (44) FROM BATTERY BOX (2).

INSTALLATION

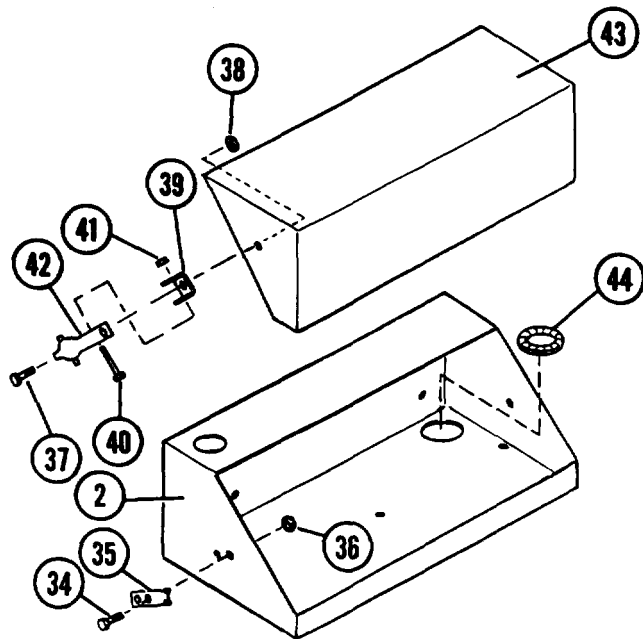
1. IF REMOVED, INSTALL CONDUIT (44) TO BATTERY BOX (2)

2. IF REMOVED, INSTALL HARDWARE (PARTS 34 THROUGH 42) TO BATTERY BOX (2) AND BATTERY BOX COVER (43).

a. Secure two retaining straps (42) to two brackets (39) with two capscrews (40) and two new locknuts (41).

b. Secure two brackets (39) to battery box cover (43) with two bolts (37) and two new locknuts (38).

c. Secure two catch clamps (35) to battery box (2) with four screws (34) and four locknuts (36).



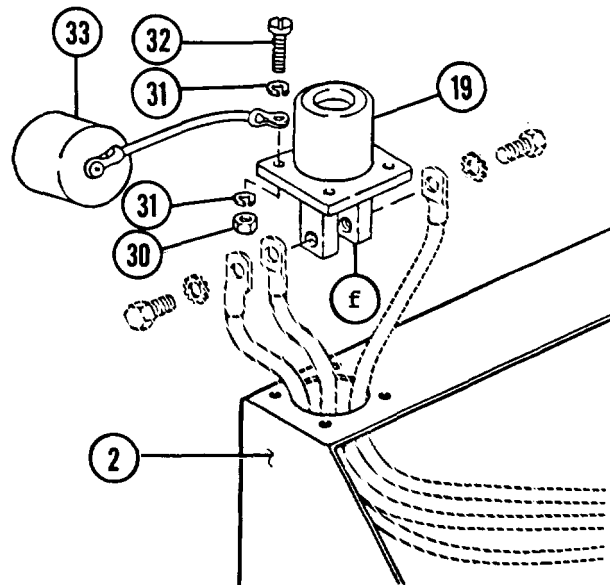
NOTE

When positioning slave receptacle (19) on battery box (2), be sure negative terminal (f) is facing toward center of vehicle.

1. IF REMOVED, INSTALL SLAVE RECEPTACLE (19) ON BATTERY BOX (2).

a. Position slave receptacle (19) on battery box (2).

b. Secure slave receptacle (19) and cap (33) to battery box (2) with four screws (32), eight new lockwashers (31) and four nuts (30).



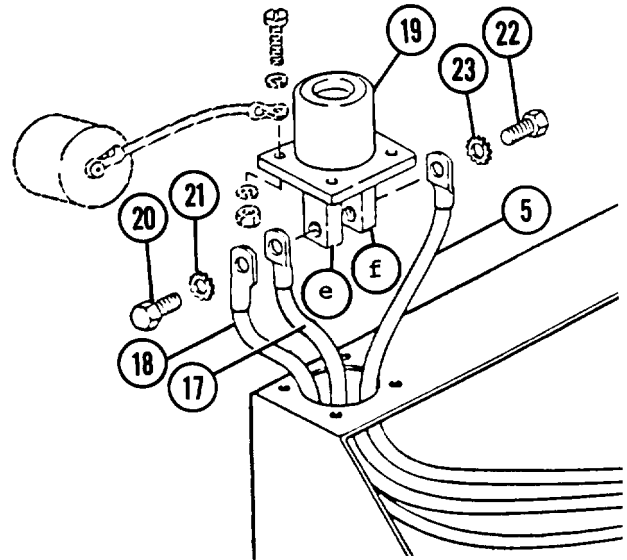
8-45. BATTERY BOX AND COVER—REPLACE (Cont'd)

2. IF REMOVED , INSTALL STE/ICE SHUNT (1)
ON BATTERY BOX (2) .
 - a. Position STE/ICE shunt (1) on
battery box (2) .
 - b. Secure STE/ICE shunt (1) to
battery box (2) with two nuts
(29) , two flatwashers (28) and two
capscrews (27) .
3. POSITION BATTERY BOX (2) ON MOUNTING
STUDS (26) AT BACK OF CAB.
4. SECURE BATTERY BOX (2) TO MOUNTING
STUDS (26) WITH FOUR WASHERS (25) AND
FOUR NEW LOCKNUTS (24) .

NOTE

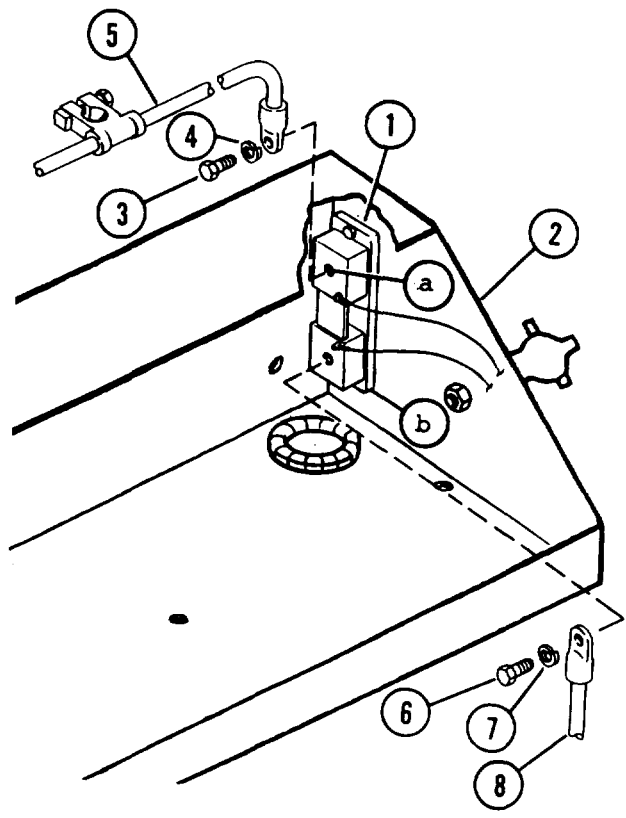
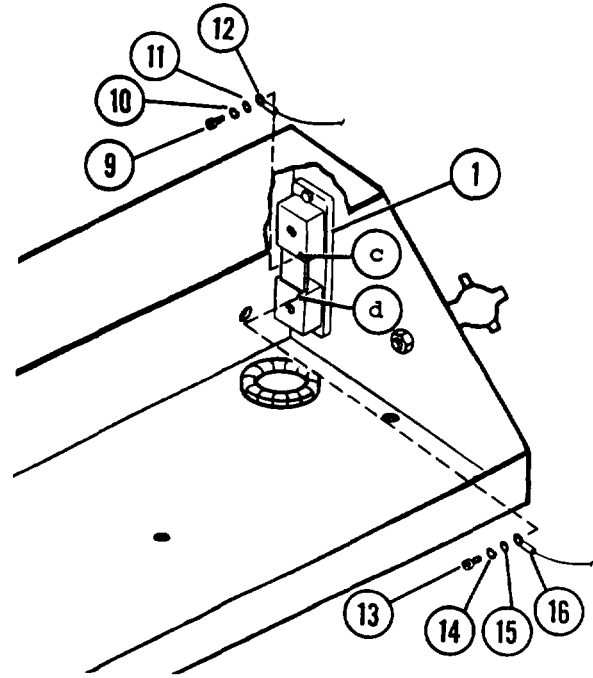
Insert electrical leads and cables
through hole at base of battery box
prior to performing step 5.

5. INSTALL NEGATIVE BATTERY CABLE (5),
POSITIVE EMERGENCY STEER PUMP POWER
CABLE (18), AND POSITIVE BATTERY
CABLE (17) AS TAGGED TO SLAVE
RECEPTACLE (19).
 - a. Position negative battery cable
(5) on negative terminal (f) of
slave receptacle (19).
 - b. Secure cable (5) to terminal (f)
with capscrew (22) and new
starwasher (23).
 - c. Position positive emergency steer
pump power cable (18) and positive
battery cable (17) on positive
terminal (e) of slave receptacle
(19) .



8-45. BATTERY BOX AND COVER - REPLACE (Cont'd)

- d. Secure cables (18) and (17) with capscrew (20) and new starwasher (21).
6. CONNECT WIRING AT STE/ICE SHUNT (1) INSIDE BATTERY BOX (2) AS TAGGED.
- a. Position STE/ICE wire on terminal (d) of STE/ICE shunt as tagged and secure with flatwasher (15), new lockwasher (14), and screw (13).
 - b. Position STE/ICE wire on terminal (c) of STE/ICE shunt as tagged and secure with flatwasher (11), new lockwasher (10), and screw (9).
 - co Position ground cable (8) on terminal (b) of STE/ICE shunt as tagged and secure with new lockwasher (7), and capscrew (6).
 - d. Position short end of negative battery cable (5) on terminal (a) of STB/ICE shunt as tagged (1) and secure with new lockwasher (4), and capscrew (3).



7. INSTALL BATTERIES, PARA. 8-43.

8-46. CAB WIRING HARNESSSES - TEST/REPAIR/REPLACE

This task covers:

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

Initial Setup**Tools**

Tool Kit, Automotive Mechanics

Materials/Parts

Electrical Tape (App. C, Item 52)
Tie Wrap (App. C, Item 53)

Test Equipment

Ohmmeter

Equipment Condition

Negative battery cable disconnected,
para. 8-44.

NOTE

The following procedures apply to cab main wiring harness, cab rear wiring harness and electric joystick controller wiring harness.

TESTING**NOTE**

Failure of an electrical device to function is more likely due to a faulty switch (actuator), or to a faulty device itself, than to a broken wire in wiring harness. Do not assume that a broken wire exists until related electrical device and actuator have been checked.

1. INSPECT WIRES FOR POOR CONNECTIONS AT TERMINALS, CUTS OR OTHER DEFECTS.
2. CHECK WIRE CONTINUITY TO DETERMINE IF HIDDEN BREAKS EXIST.
 - a. Use electrical schematic to trace path of wire. Refer to F/O-1.

8-46. CAB WIRING HARNESSSES - TEST/REPAIR/REPLACE (Cont'd)

- b. If possible, connect ohmmeter leads to ends of wire.
- c. Disconnect suspected wire and an adjacent wire. At one end of the wires, connect the two wire terminals together. At the other end of the wires, connect ohmmeter leads to terminals of these two wires. An infinite resistance reading indicates a broken wire.

REPAIR

NOTE

If 30 percent or more of the wires in a wiring harness have been repaired or replaced, replace complete harness.

1. REPLACE ANY BROKEN TERMINAL RINGS OR CONNECTORS.
2. REPLACE ANY BROKEN WIRES.
 - a. Note both connection points of broken wire. Disconnect broken wire at both ends.
 - b. Cut exposed wire and terminals from both ends of broken wire.
 - c. Cut replacement wire to required length and install proper terminals.
 - d. Route replacement wire along wiring harness, securing wire with tie wraps or electrical tape.
 - e. Connect replacement wire to original connection points.
 - f. Test circuit function.

8-46. Cab WIRING HARNSSES - TEST/REPAIR/REPLACE (Cont'd)

REMOVAL**NOTE**

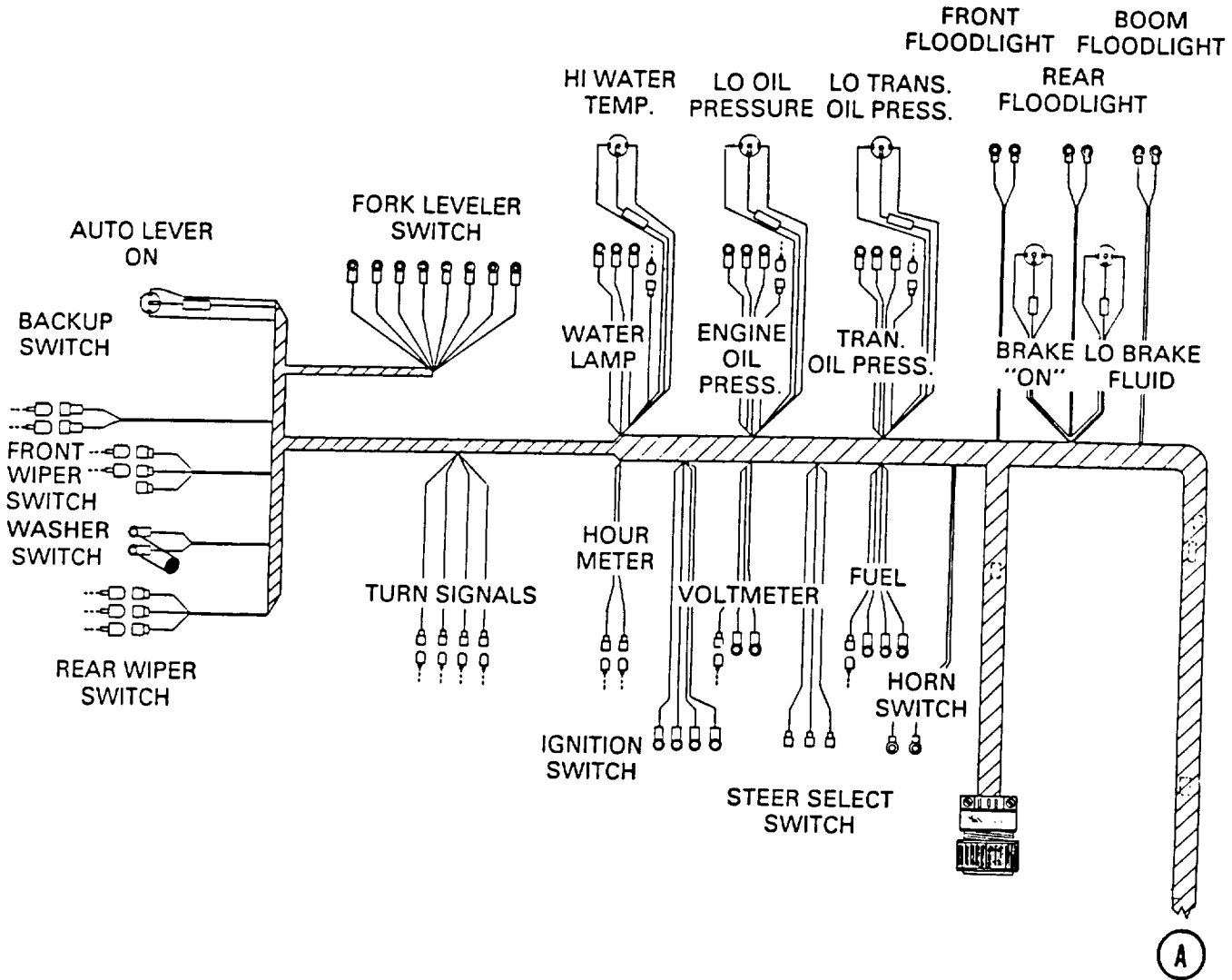
If an individual wire in a wire harness is broken, it is not necessary to replace entire wire harness. Refer to REPAIR topic for wire replacement procedure.

1. NOTE CONNECTION POINTS OF ALL TERMINAL RINGS AND SINGLE CONNECTORS ON WIRING HARNESS. DISCONNECT TERMINAL RINGS AND SINGLE CONNECTORS .
2. DISCONNECT FOUR PLUG-TYPE CONNECTORS.
3. REMOVE ALL CLAMPS THAT SECURE WIRING HARNESS TO CAB STRUCTURE.

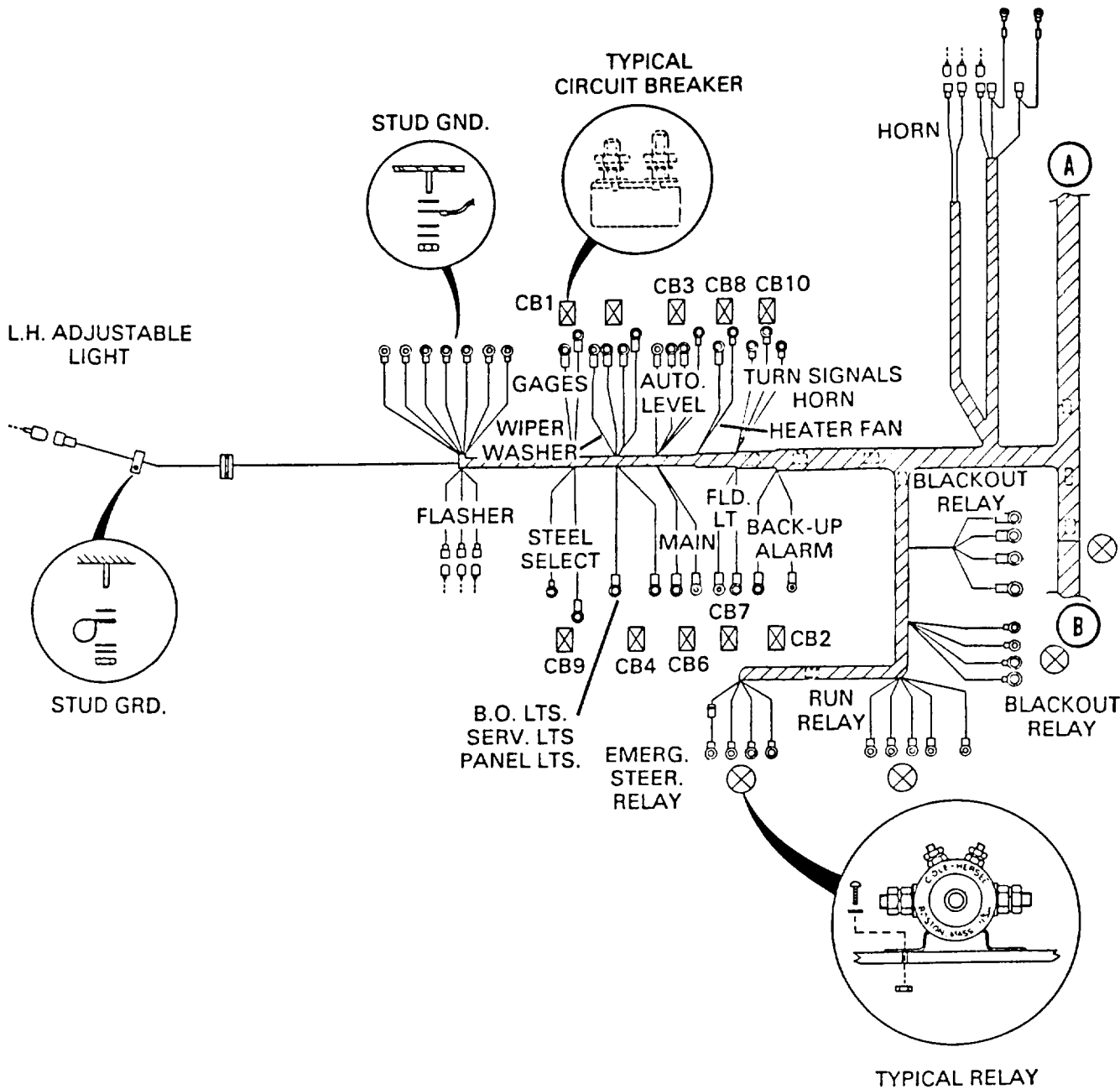
INSTALLATION

1. ROUTE NEW WIRING HARNESS IN SAME PATH AS OLD WIRING HARNESS.
2. INSTALL CABLE CLAMPS IN ORIGINAL LOCATIONS.
3. CONNECT FOUR PLUG-TYPE CONNECTORS.
4. CONNECT INDIVIDUAL TERMINAL RINGS AND SINGLE CONNECTORS ACCORDING TO NOTES TAKEN DURING REMOVAL. REFER TO SCHEMATIC DIAGRAM FOR WIRE NUMBERS AND CONNECTION POINTS.
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
6. TEST ALL CIRCUITS TO CONFIRM PROPER INSTALLATION OF WIRING HARNESS.

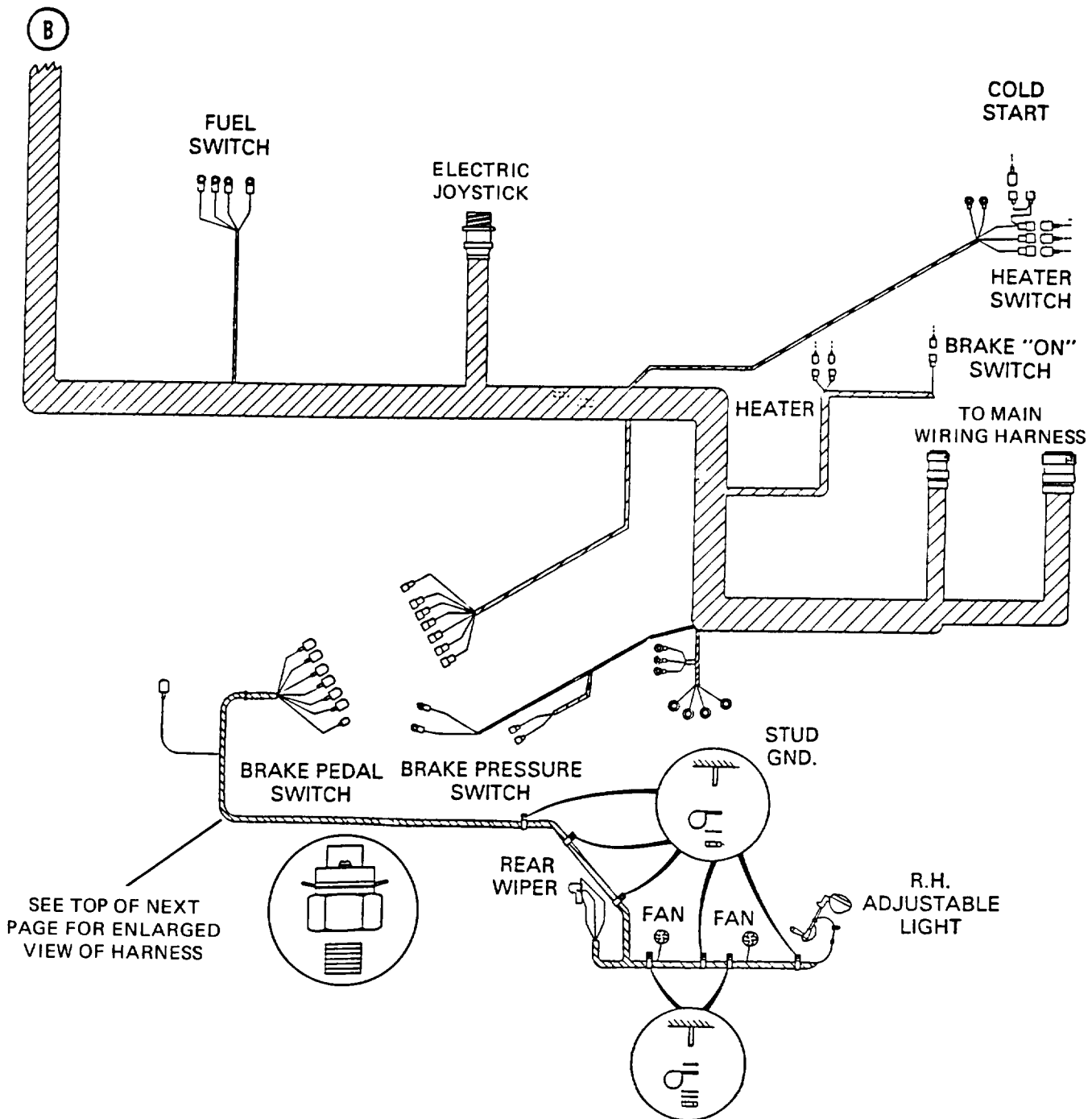
8-46. CAB WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)



8-46. CAB WIRING HARNESSSES - TEST/REPAIR/REPLACE (Cont'd)

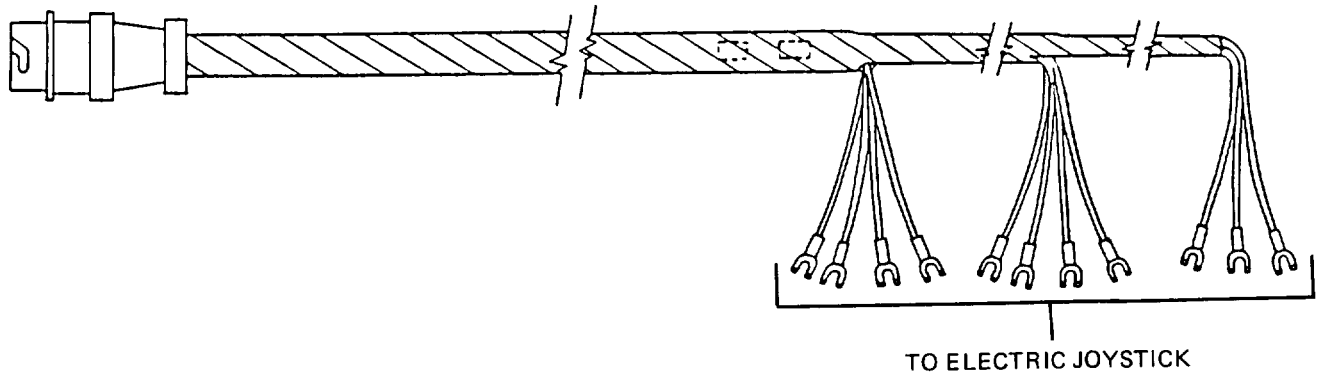
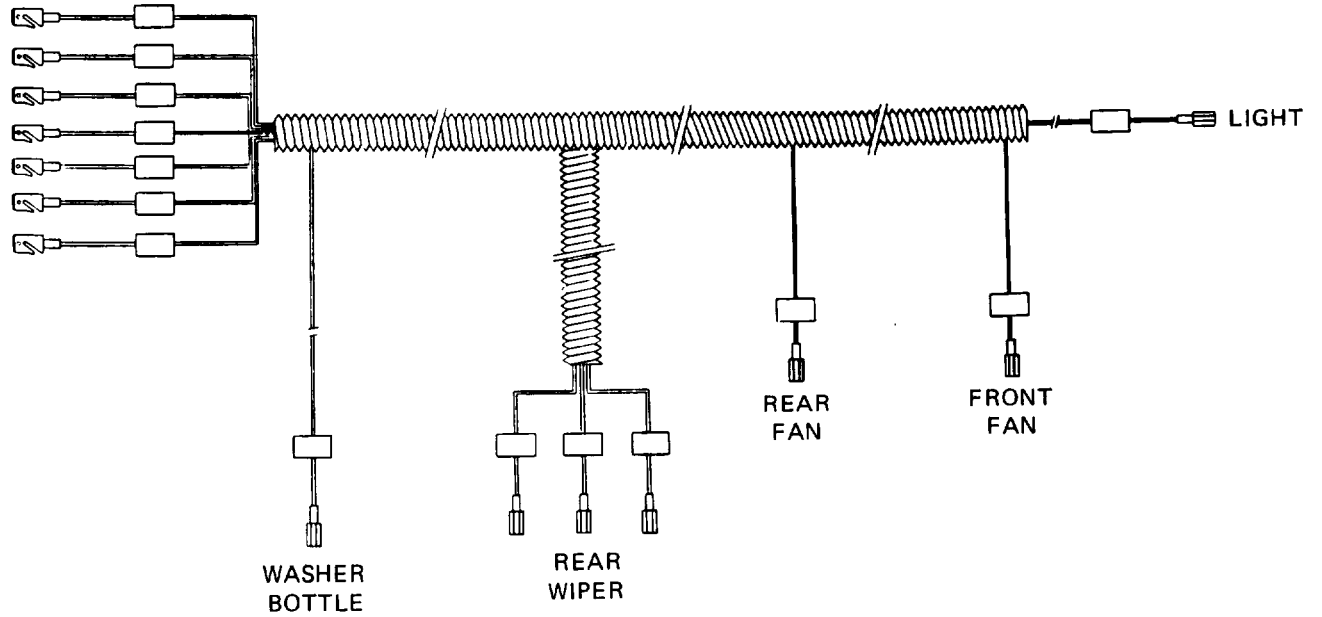


8-46. CAB WIRING HARNESSSES - TEST/REPAIR/REPLACE (Cont'd)



SEE TOP OF NEXT PAGE FOR ENLARGED VIEW OF HARNESS

8-46. CAB WIRING HARNESSSES - TEST/REPAIR/REPLACE (Cont'd)



8-47. MAIN WIRING HARNESS - TEST/REPAIR/REPLACE

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Electrical Tape (App. C, Item 52)
Tie Wrap (App. C, Item 53)

Test Equipment

Ohmmeter

Equipment Condition

Negative battery cable disconnected?
para. 8-44

TESTING

NOTE

Failure of an electrical device to function is more likely due to a faulty switch (actuator), or to a faulty device itself, than to a broken wire in wiring harness. Do not assume that a broken wire exists until related electrical device and actuator have been checked.

1. INSPECT WIRES FOR POOR CONNECTIONS AT TERMINALS, CUTS OR OTHER DEFECTS.
2. CHECK CONTINUITY OF WIRES TO DETERMINE IF HIDDEN BREAKS EXIST.
 - a. Use electrical schematic to trace path of wire.
 - b. If possible, connect ohmmeter leads to ends of wire.

8-47. MAIN WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)

- c. Disconnect suspected wire and an adjacent wire. At one end of the wires, connect the two wire terminals together. At the other end of the wires, connect ohmmeter leads to terminals of these two wires at other ends. An infinite resistance reading indicates a broken wire.

REPAIR**NOTE**

If 30 percent or more of the wires in a wiring harness have been repaired or replaced, replace complete harness.

1. REPLACE ANY BROKEN TERMINAL RINGS OR CONNECTORS.
2. REPLACE ANY FAULTY WIRES.
 - a. Note both connection points of faulty wire. Disconnect faulty wire at both ends.
 - b. Cut exposed wire and terminals from both ends of faulty wire.
 - c. Cut replacement wire to required length and install proper terminals.
 - d. Route replacement wire along wiring harness, securing wire with tie wraps or electrical tape.
 - e. Connect replacement wire to original connection points.
 - f. Test circuit function.

8-47. MAIN WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)

REMOVAL

NOTE

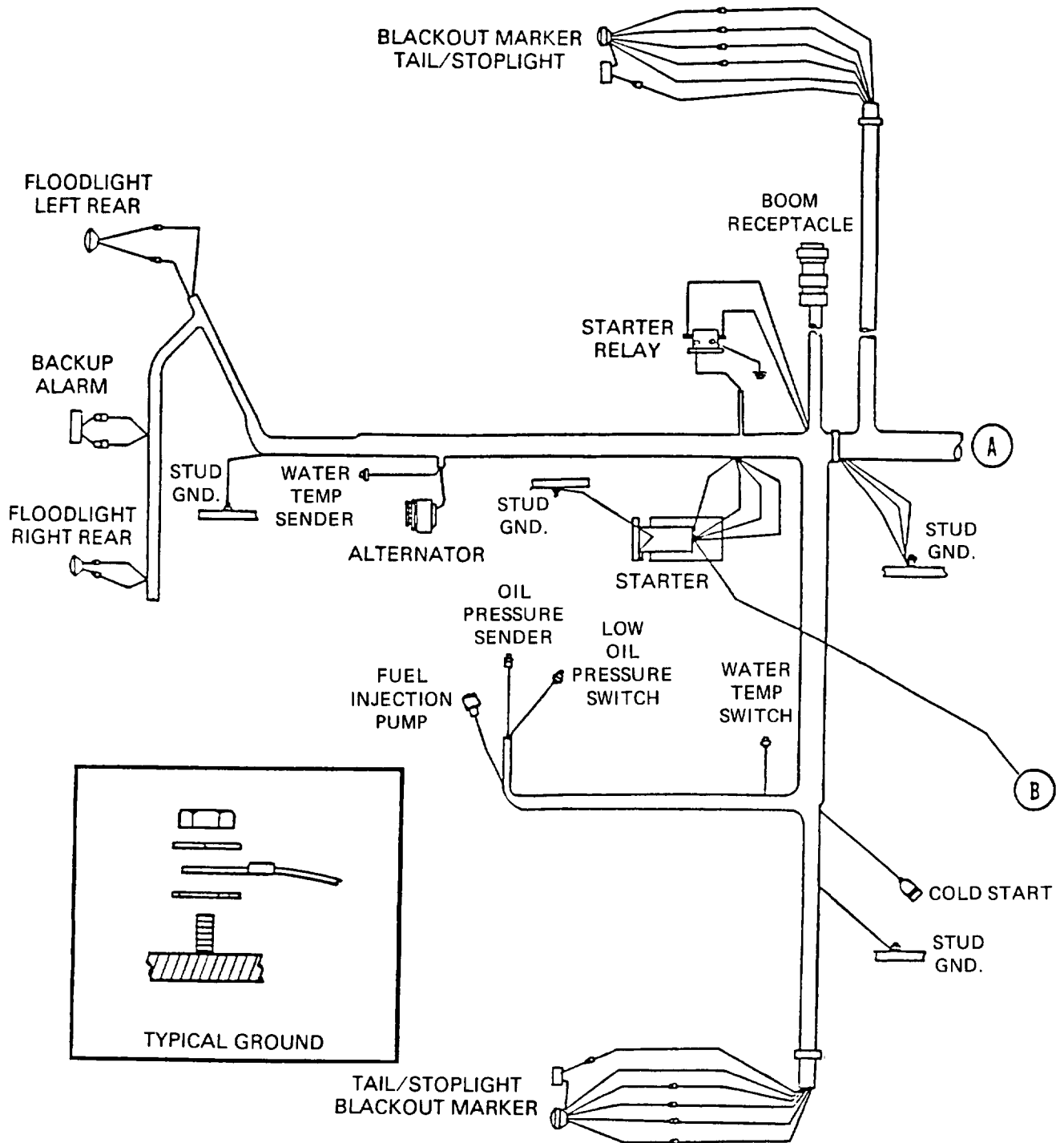
If an individual wire in a wiring harness is broken, it is not necessary to replace entire wiring harness. Refer to REPAIR topic for wire replacement procedure.

1. NOTE CONNECTION POINTS OF ALL TERMINAL RINGS AND SINGLE CONNECTORS ON WIRING HARNESS. DISCONNECT TERMINAL RINGS AND SINGLE CONNECTORS.
2. DISCONNECT THREE PLUG-TYPE CONNECTORS.
3. REMOVE ALL CLAMPS THAT SECURE WIRING HARNESS TO FRAME OR BOOM STRUCTURE.

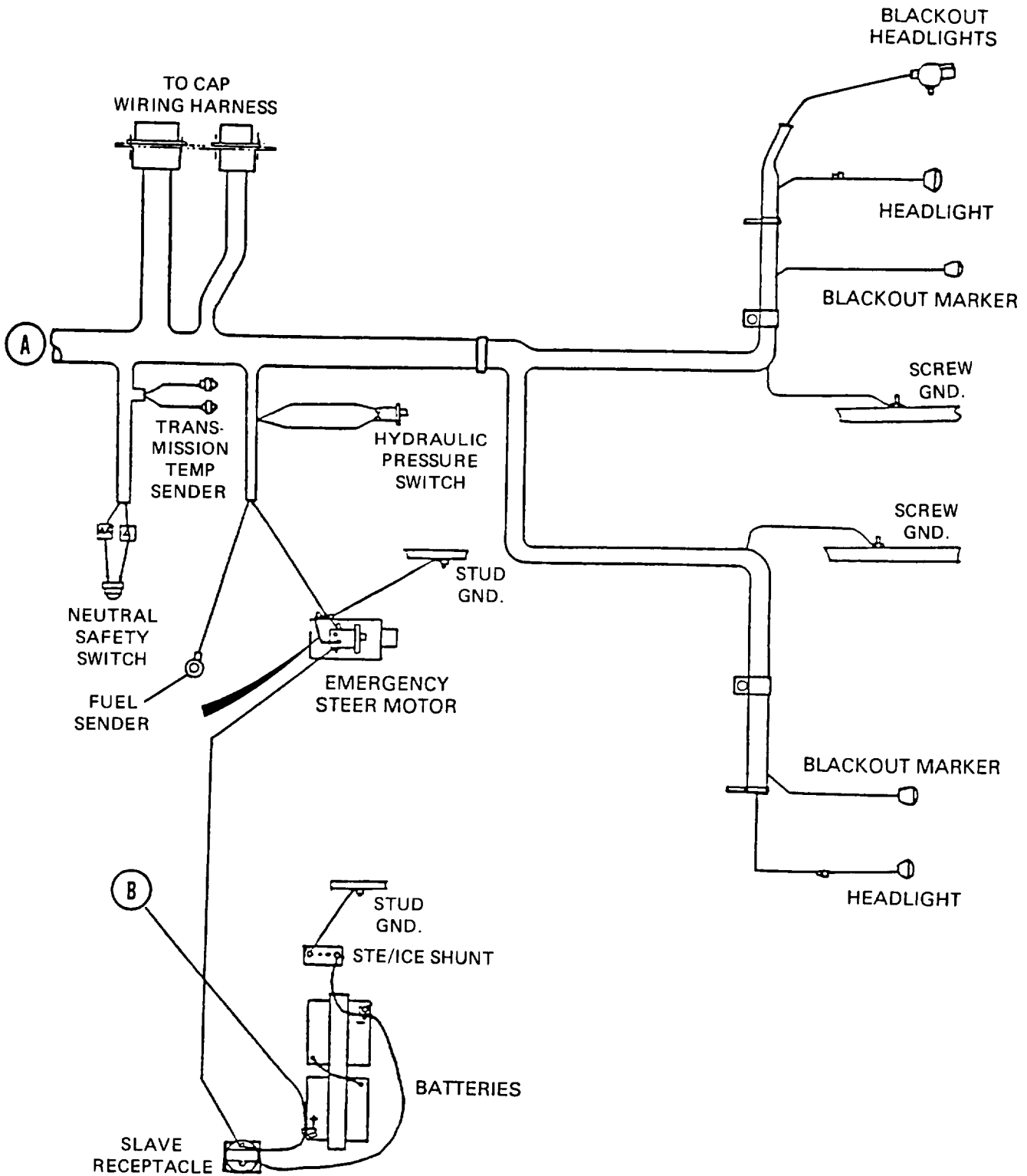
INSTALLATION

1. ROUTE NEW WIRING HARNESS IN SAME PATH AS OLD WIRING HARNESS.
2. INSTALL CABLE CLAMPS IN ORIGINAL LOCATIONS.
3. CONNECT THREE PLUG-TYPE CONNECTORS.
4. CONNECT INDIVIDUAL TERMINAL RINGS AND SINGLE CONNECTORS ACCORDING TO NOTES TAKEN DURING REMOVAL. REFER TO SCHEMATIC DIAGRAM FOR WIRE NUMBERS AND CONNECTION POINTS.
5. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
6. TEST ALL CIRCUITS TO CONFIRM PROPER INSTALLATION OF WIRING HARNESS.

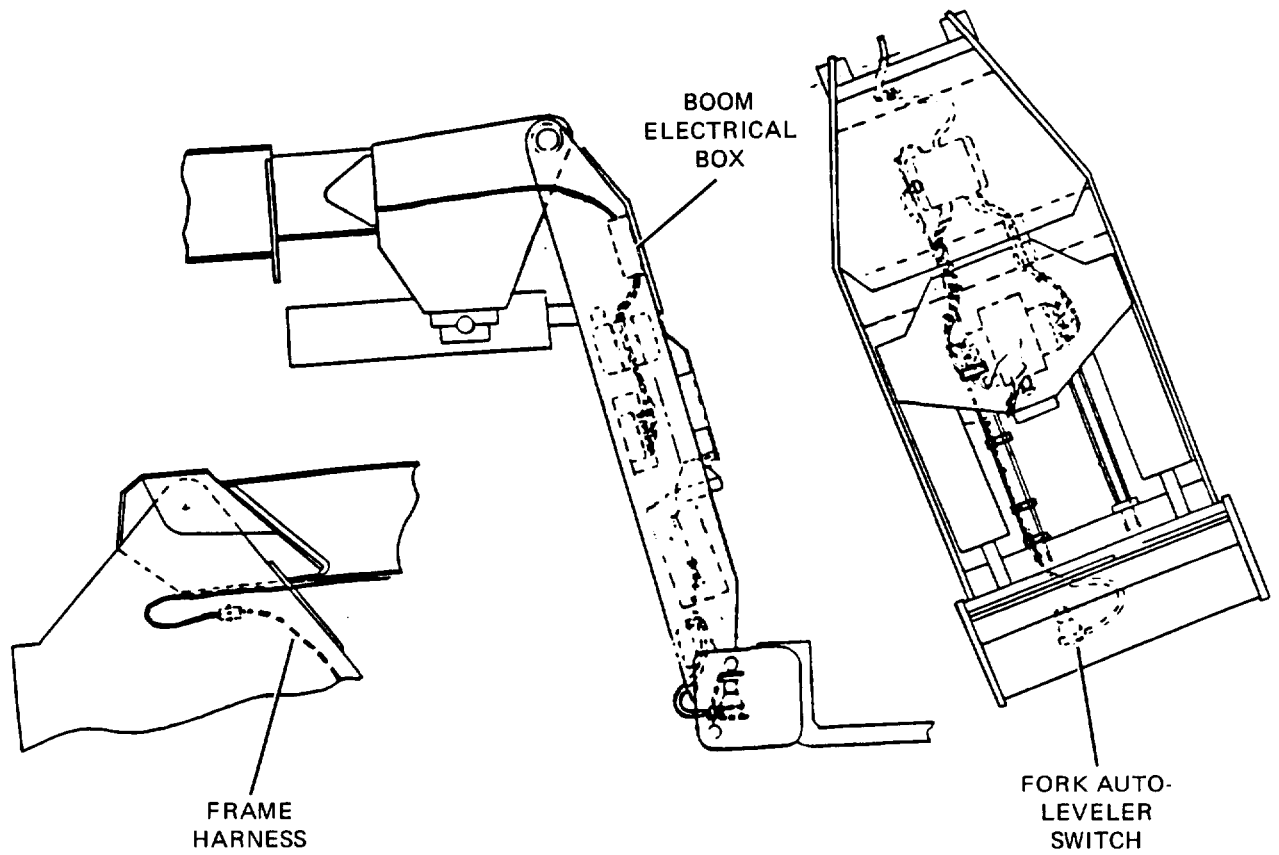
8-47. MAIN WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)



8-47. MAIN WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)



8-47. MAIN WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)



8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Test Equipment

Ohmmeter

Equipment Condition

Vehicle parked on level ground.
 Load backrest removed from MLRS attachment (if stored), TM10-3930-660-10.

Materials/Parts

Electrical Tape
 Lockwashers (16) (23) (27) (31)
 Rope, 25 ft.
 Tie Straps (13) (34)

Personnel Required

Two Personnel

TESTING

NOTE

Failure of an electrical device to function is more likely due to a faulty switch (actuator), or to a faulty device itself, than to a broken wire in wiring harness. Do not assume that a broken wire exists until related electrical device and actuator have been checked.

1. INSPECT WIRES FOR POOR CONNECTIONS AT TERMINALS, CUTS OR OTHER DEFECTS.
2. CHECK CONTINUITY OF SUSPECTED WIRES TO DETERMINE IF HIDDEN BREAKS EXIST.
 - a. Use electrical schematic to locate both terminals of suspected wire.

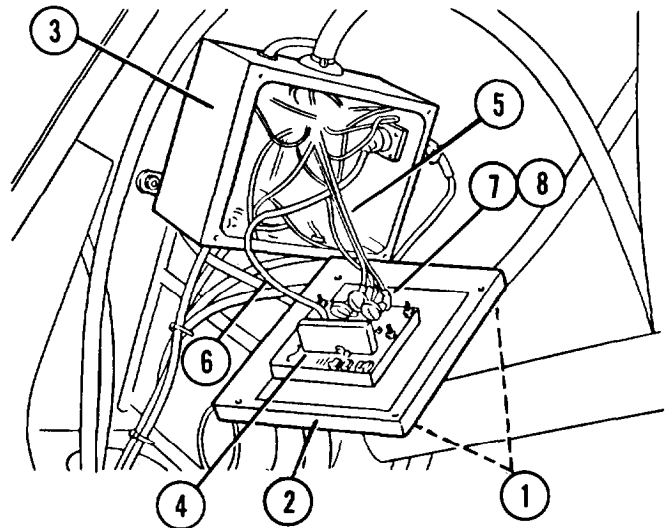
8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR (Cont'd)

- b. If possible, connect ohmmeter leads to ends of wire.
- c. Disconnect suspected wire and an adjacent wire. Tape these two wire terminals together. Then connect ohmmeter leads to the opposite ends of these two wires. An infinite resistance reading indicates a broken wire.

REMOVAL**NOTE**

If an individual wire in a wiring harness is broken, it is not necessary to discard entire wiring harness. Refer to REPAIR topic for wire replacement procedure.

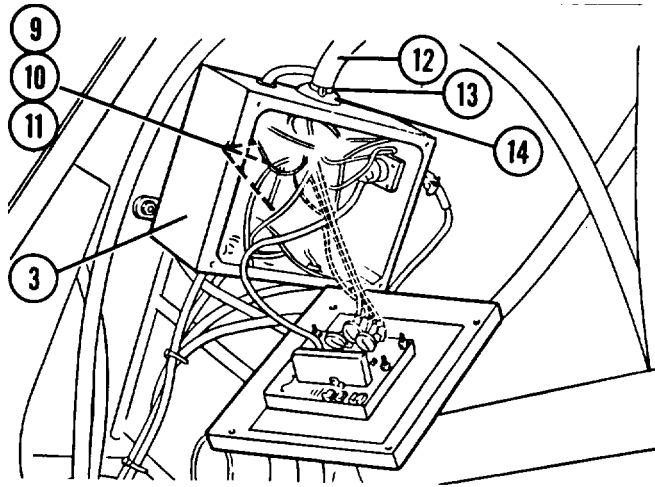
1. START ENGINE. RAISE FORKS APPROXIMATELY ONE FOOT OFF GROUND. STOP ENGINE.
2. DISCONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
3. LOOSEN FOUR SCREWS (1) AND SEPARATE COVER (2) FROM BOOM ELECTRICAL BOX ASSEMBLY (3).
4. TAG AND DISCONNECT FOUR ELECTRICAL LEADS (5) AT TERMINAL STRIP (7) OF CIRCUIT BOARD (4).
 - a. Tag four leads (5) at terminal strip (7) on circuit board (4).
 - b. Loosen four screws (8) on terminal strip (7) and remove leads (5).



8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR (Cont'd)

5. TAG AND DISCONNECT ELECTRICAL LEADS (9) INSIDE BOOM ELECTRICAL BOX ASSEMBLY (3).

- a. Tag leads (9) at terminal strips (10) inside box (3).
- b. Loosen screws (11) on terminal strips (10) and remove leads (9).

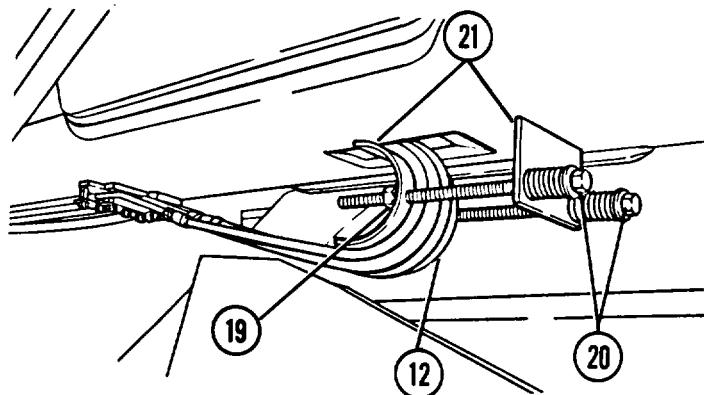
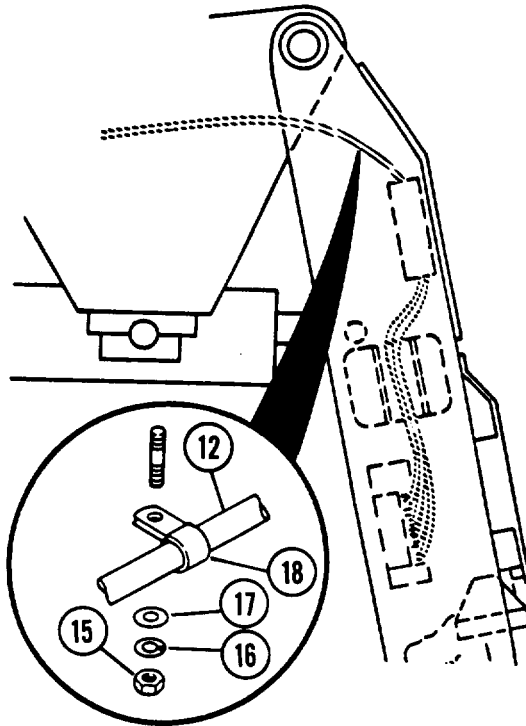


6. REMOVE BOOM ELECTRICAL CABLE (12) AT BOOM ELECTRICAL BOX ASSEMBLY (3).

- a. Cut two tie straps (13) where cable (12) enters box (3). Discard tie straps (13).
- b. Carefully pull cable (12) from box (3).

7. REMOVE NUT (15), LOCKWASHER (16), AND FLATWASHER (17) SECURING CLAMP (18) AND CABLE (12) TO MLRS ATTACHMENT. DISCARD LOCKWASHER (16).

8. LOOSEN TWO JAMNUTS (19) AND TWO CAPSCREWS (20) AT HOSE TENSIONER (21) TO RELEASE TENSION ON BOOM ELECTRICAL CABLE (12).

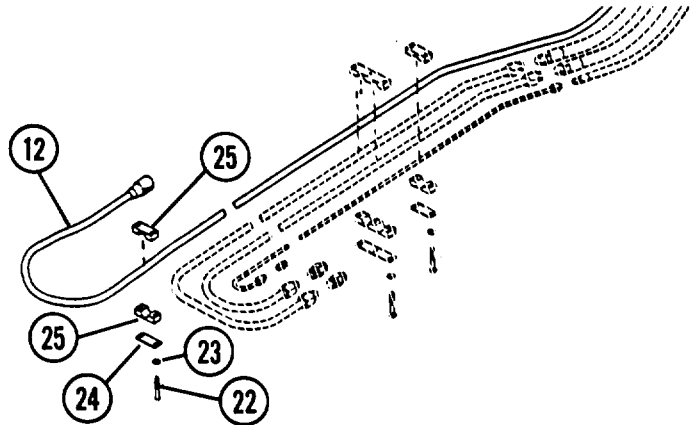


8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR (Cont'd)

9. REMOVE FOUR CLAMP ASSEMBLIES (parts 22-25) SECURING CABLE (12) TO UNDERSIDE OF OUTER BOOM.

a. Remove two capscrews (22), two lockwashers (23), and one cover plate (24) at each set of clamp halves (25). Discard lockwashers (23).

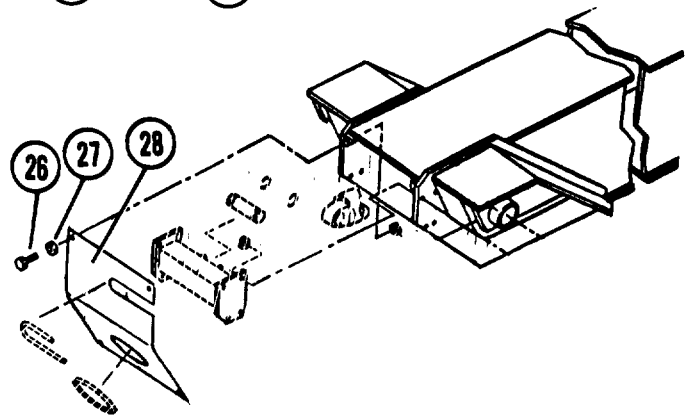
b. Remove clamp halves (25) from electrical cable (12).



10. REMOVE FOUR CAPSCREWS (26), FOUR LOCKWASHERS (27), AND COVER (28) FROM REAR OF OUTER BOOM, DISCARD LOCKWASHERS (27).

11. UNPLUG BOOM ELECTRICAL CABLE (12) AT CONNECTOR (29).

12. REMOVE TWO CAPSCREWS (30), LOCKWASHERS (31), CABLE GUIDE BRACKET (32) AND CLAMP HALVES (33) FROM BOOM ELECTRICAL CABLE (12). DISCARD LOCKWASHERS (31).



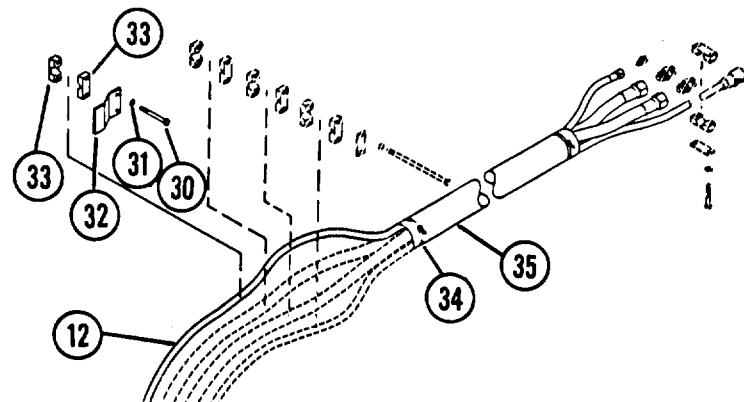
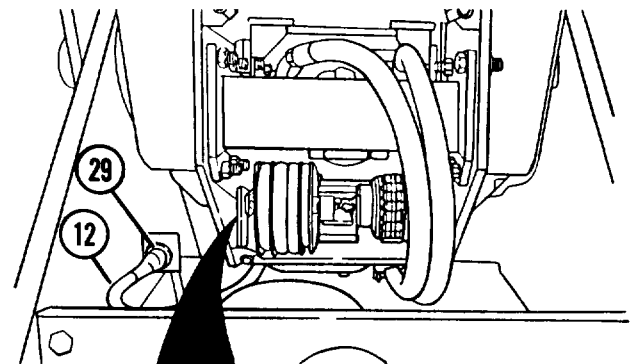
13. REMOVE TIE STRAP (34) FROM END OF SLEEVE (35) INSIDE BOOM.

14* TIE A ROPE OF SUFFICIENT LENGTH TO END OF BOOM ELECTRICAL CABLE (12) AT FRONT OF BOOM.

a. Wrap one end of rope around cable (12) several times and secure with knot.

b. Cover knot area with electrical tape to prevent knot from snagging inside boom.

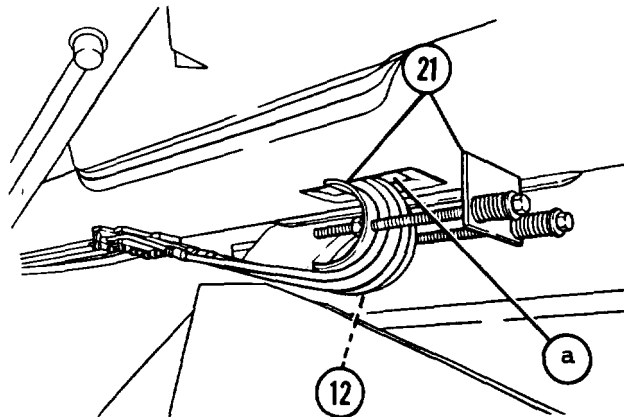
c. Tie other end of rope to MLRS attachment to prevent rope from being pulled entirely through boom during cable removal.



8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR (Cont'd)

15. REMOVE ELECTRICAL CABLE (12) FROM INSIDE BOOM.

- a. Carefully pull cable (12) at rear of boom until rope appears.
- b. Carefully pull cable (12) through access hole (a) at hose tensioner (21) until rope appears.
- c. Untie rope end from cable (12) and tie rope end to hose tensioner assembly (21).



REPAIR

NOTE

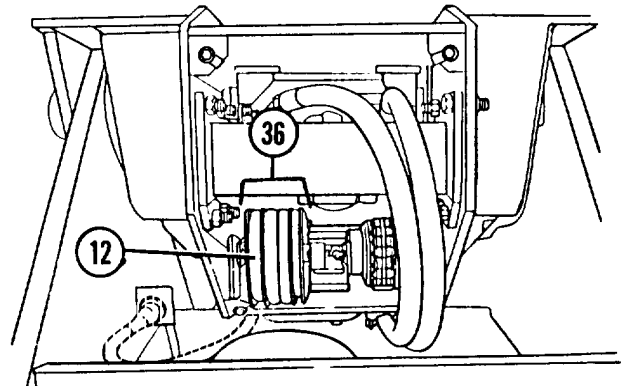
If 30 percent or more of the wires in a wiring harness have been repaired or replaced, replace complete harness.

1. REPLACE ANY BROKEN TERMINAL RINGS OR CONNECTORS.
- 2* REPLACE ANY FAULTY WIRES.
 - a. Note both connection points of faulty wire. Disconnect faulty wire at both ends.
 - b. Cut exposed wire and terminals from both ends of faulty wire.
 - c. Cut replacement wire to required length and install proper terminals.
 - d. Route replacement wire along wiring harness, securing wire with tie straps or electrical tape.
 - e. Connect replacement wire to original connection points.
 - f. Test circuit function.

8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR (Cent' d)

INSTALLATION

1. INSTALL ELECTRICAL CABLE (12) INSIDE BOOM .
 - a. Untie rope end from hose tensioner (21) and tie rope end to cable (12) . Cover knot area with electrical tape to prevent knot from snagging inside boom.
 - b. Have an assistant feed cable (12) through access hole (a) at hose tensioner (21). Pull rope from rear of boom until cable appears.

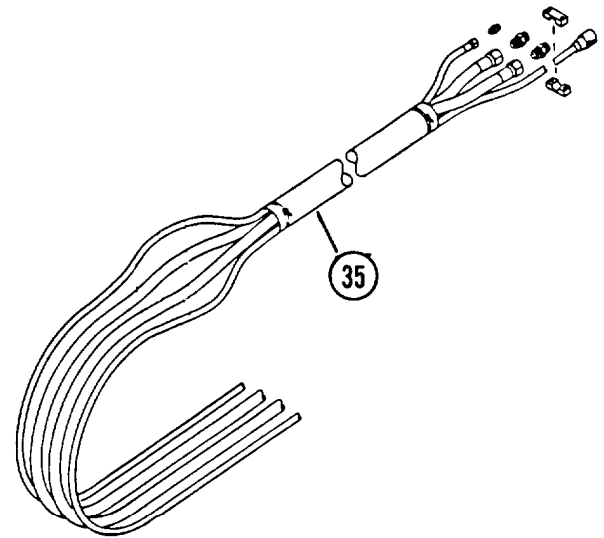


NOTE

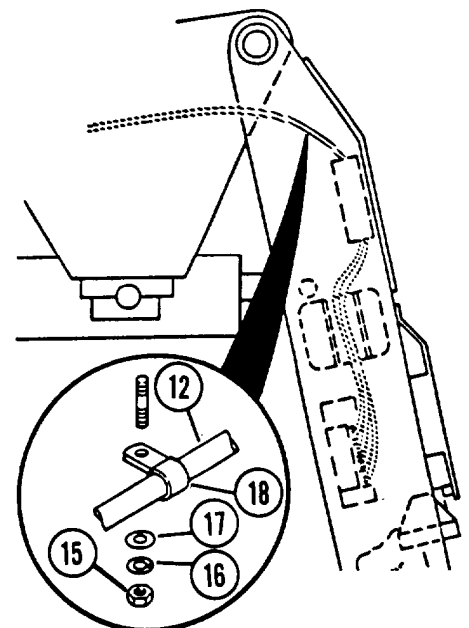
Guide cable (12) over pulley (36) at rear of boom before pulling cable (12) tight in STEP 1c. Be sure cable is properly positioned in sheave of pulley (36).

NOTE

Be sure cable (12) is positioned through sleeve (35) inside boom during STEP c.



- c. Have an assistant feed cable (12) through hole at rear of boom. Carefully pull rope at front of boom until cable (12) appears.
 - d. Untie rope at front of boom from cable (12) and MLRS attachment.
2. SECURE CLAMP (18) AND CABLE (12) TO UNDERSIDE OF MLRS ATTACHMENT WITH FLATWASHER (17), NEW LOCKWASHER (16) AND NUT (15).



8-48. BOOM ELECTRICAL CABLE - TEST/REPLACE/REPAIR (Cont'd)

3* INSTALL BOOM ELECTRICAL CABLE (12) AT BOOM ELECTRICAL BOX ASSEMBLY (3).

- a. Carefully pull cable through grommet (14) and into box (3).
- b. Secure cable (12) to box (3) with two new tie straps (13).

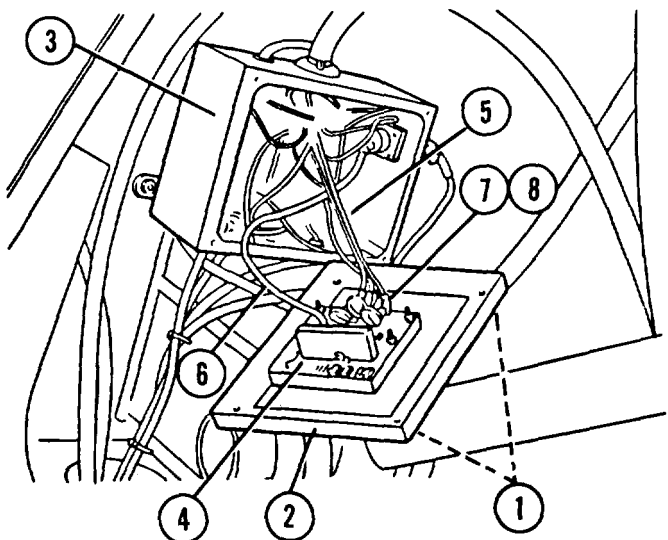
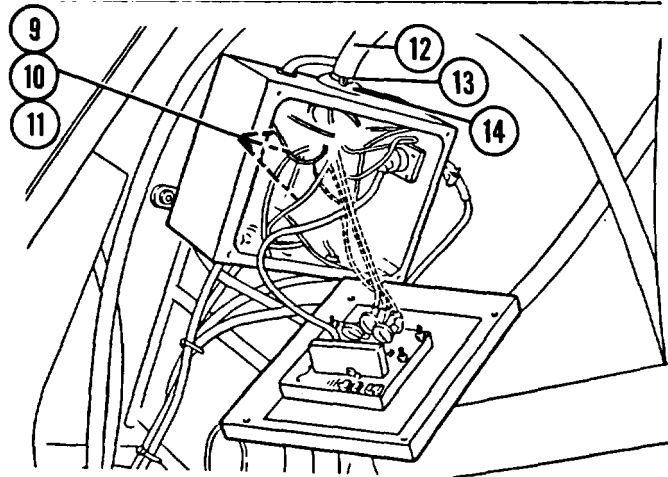
4* CONNECT BOOM CABLE LEADS (9) TO BOOM ELECTRICAL BOX ASSEMBLY (3), AS TAGGED .

- a. Place electrical leads (9), as tagged, on terminal strips (10) inside box assembly (3).
- b. Tighten screws (11) on terminal strips (10) to secure leads (9).

5* CONNECT FOUR ELECTRICAL LEADS (5) AT AUTOLEVELER CIRCUIT BOARD (4).

- a. Place four leads (8) on terminal strip (10) inside box (1), as tagged.
- b. Tighten four screws (8) on terminal strip (7) to secure leads (5).

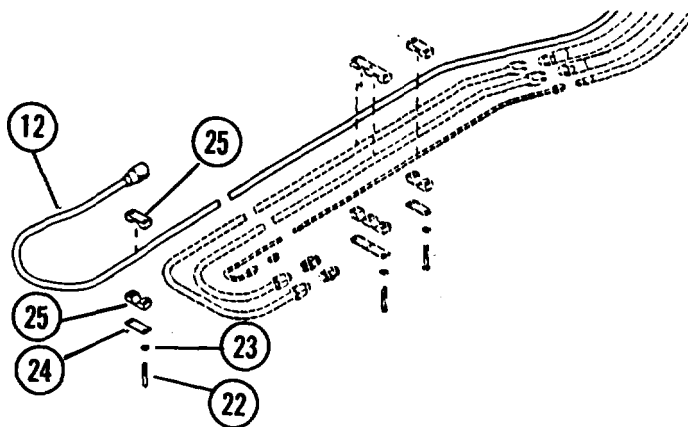
6. INSTALL FOUR CLAMP ASSEMBLIES (PARTS 22-25) TO SECURE CABLE (12) TO UNDERSIDE OF OUTER BOOM.



NOTE

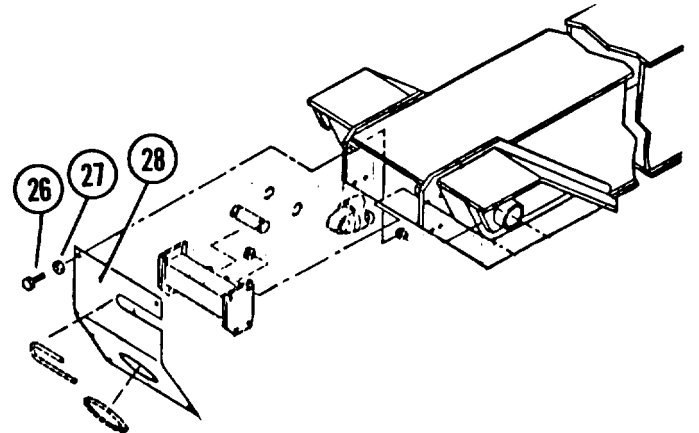
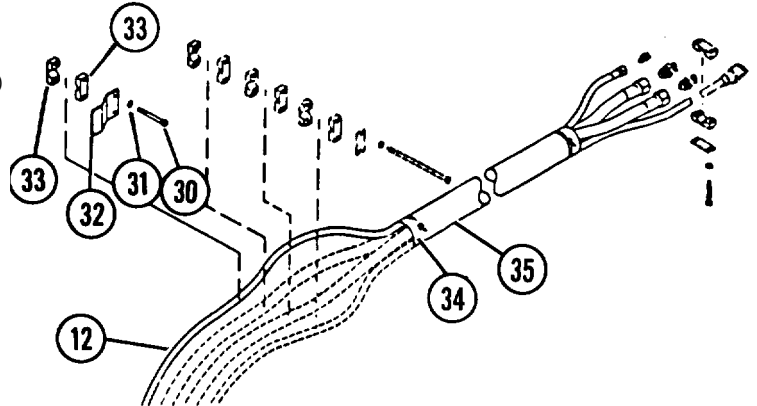
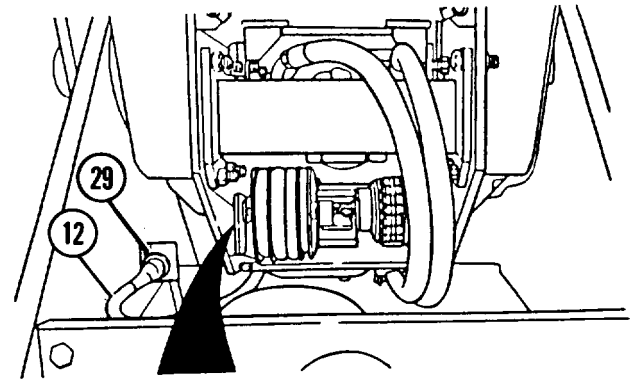
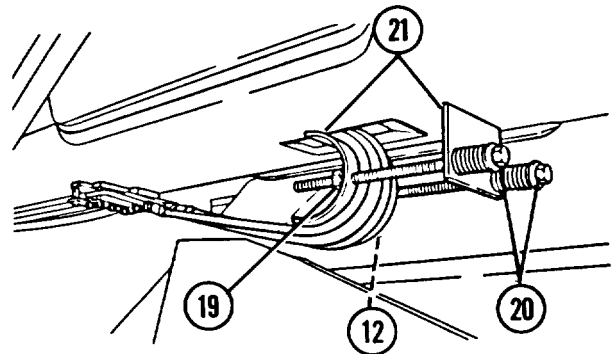
Install clamp assembly closest to hose tensioner (21) first.

- a. Have assistant pull boom cable snug, but not tight, from rear of hose tensioner (21).
- b. Have assistant continue to hold cable (12) snug.



8-48. BOOM ELECTRICAL CABLE- TEST/REPLACE/REPAIR (Cont'd)

- c. Secure cable (12) to underside of outer boom with cable clamp halves (25), cover plates (24), new lockwashers (23), and capscrews (22).
- 7. ADJUST TENSION OF CABLE (12) AT TENSIONER (21).
 - a. Adjust two capscrews (19) until length of compressed spring (x) is between 2-1/4 and 2-1/2 inches long.
 - b. Tighten two jamnuts (19) after adjusting two capscrews (20).
- 8. INSTALL NEW TIE STRAP (34) TO END OF SLEEVE (35) INSIDE BOOM.
- 9. INSTALL CLAMP HALVES (33), CABLE GUIDE BRACKET (32), TWO NEW LOCKWASHERS (31), AND TWO CAPSCREWS (30) TO SECURE CABLE (12) TO BOOM.
- 10. PLUG BOOM ELECTRICAL CABLE (12) INTO CONNECTOR (29).
- 11. CHECK FOR PROPER INSTALLATION OF BOOM ELECTRICAL CABLE (12).
 - a. Connect batteries, para. 8-44.
 - b. Start engine.
 - c. Test all boom and attachment functions to ensure proper cable installation.
 - d. Check that cable and hoses track properly in the boom.
 - e. Check boom hose and cable tension and adjust, if necessary.
- 12. POSITION COVER (28) ON REAR OF OUTER BOOM AND SECURE WITH FOUR NEW LOCKWASHERS (27) AND FOUR CAPSCREWS (26).



8-48. BOOM ELECTRICAL CABLE - TEST/RBPLACE/REPAIR (Cont'd)

13. INSTALL LOAD BACKREST TO MLRS
ATTACHMENT, IF REMOVED, TM10-3990-
660-10.
14. CONNECT NEGATIVE BATTERY CABLE,
PARA. 8-44.

8-49. STE/ICE WIRING HARNESS - TEST/REPAIR/REPLACE

This task covers:

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

Initial Setup**Tools**

Tool Kit, Automotive Mechanics

Materials/Parts

Electrical Tape (App. C, Item 52)

Lockwashers (4), (8)

Tie Wraps (App. C, Item 53)

Test Equipment

Ohmmeter

Equipment Condition

'Negative battery cable disconnected,
para. 8-44.

TESTING

1. INSPECT WIRES FOR POOR CONNECTIONS,
CUTS OR OTHER DEFECTS.
2. CHECK CONTINUITY OF WIRES.
 - a. If possible, connect ohmmeter
leads to ends of wire.
 - b. Disconnect wire and an adjacent
wire and tape two wire terminals
together. Then connect ohmmeter
leads to terminals of same wires
at other ends. An infinite
resistance reading indicates a
broken wire.

8-49. STE/ICE WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)

REPAIR

NOTE

If 30 percent or more of the wires in a wiring harness have been repaired or replaced, replace complete harness.

1. REPLACE INDIVIDUAL TERMINAL RINGS AND CONNECTORS IF CONTACT IS BROKEN.
2. REPLACE WIRES IN WIRING HARNESS.
 - a. Note both connection points of faulty wire. Disconnect faulty wire at both ends.
 - b. Cut exposed wire and terminals from both ends of faulty wire.
 - c. Cut replacement wire to required length and install proper terminals.
 - d. Route replacement wire along wiring harness, securing wire with tie wraps or electrical tape.
 - e. Connect replacement wire to original connection points.
 - f. Test circuit function.

REMOVAL

NOTE

If an individual wire is broken, it is not necessary to replace entire wiring harness. Refer to REPAIR topic for wire replacement procedure.

1. NOTE CONNECTION POINTS OF ALL TERMINAL RINGS AND SINGLE CONNECTORS ON WIRING HARNESS.

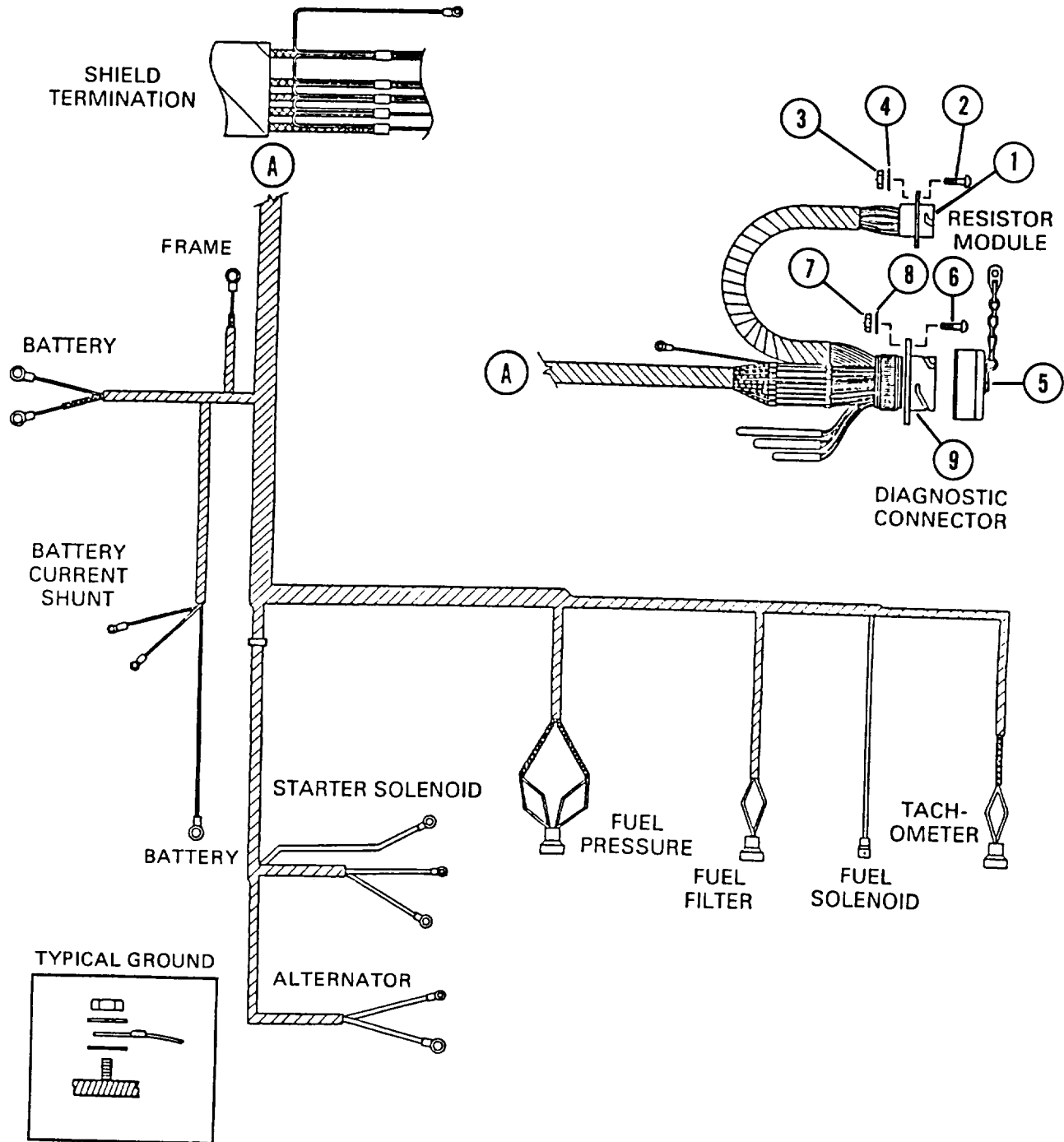
8-49. STB/ICE WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)

2. DISCONNECT TERMINAL RINGS AND SINGLE CONNECTORS.
3. DISCONNECT PLUG-TYPE CONNECTOR (1) FROM RESISTOR M3DULE. REMOVE FOUR SCREWS (2), NUTS (3) AND LOCKWASHERS (4) TO DETACH CONNECTOR (1). DISCARD LOCKWASHERS (4).
4. REMOVE CAP (5).
5. REMOVE FOUR SCREWS (6), NUTS (7) AND LOCKWASHERS (8) TO DETACH DIAGNOSTIC CONNECTOR (9). DISCARD LOCKWASHERS (8).
6. DISCONNECT PLUGS FROM FUEL PRESSURE, FUEL FILTER, FUEL SOLENOID AND TACHOMETER JACKS.
7. REMOVE 12 TIE WRAPS, AS REQUIRED, THAT SECURE WIRING HARNESS. REMOVE WIRING HARNESS. DISCARD TIE WRAPS.

INSTALLATION

1. ROUTE NEW WIRING HARNESS IN SAME PATH AS OLD WIRING HARNESS.
2. INSTALL NEW TIE WRAPS, AS REQUIRED, IN ORIGINAL LOCATIONS.
3. CONNECT FUEL PRESSURE, FUEL FILTER, FUEL SOLENOID AND TACHOMETER CONNECTORS.
4. ATTACH DIAGNOSTIC CONNECTOR (9) USING FOUR SCREWS (6), NUTS (7) AND NEW LOCKWASHERS (8). INSTALL CAP (5).
5. ATTACH PLUG-TYPE CONNECTOR (1) USING FOUR SCREWS (2), NUTS (3) AND NEW LOCKWASHERS (4).
6. CONNECT INDIVIDUAL TERMINAL RINGS AND SINGLE CONNECTORS ACCORDING TO NOTES TAKEN DURING REMOVAL.
7. RECONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
8. TEST ALL CIRCUITS TO ENSURE PROPER CONNECTION **OF** WIRING HARNESS.

8-49. STE/ICE WIRING HARNESS - TEST/REPAIR/REPLACE (Cont'd)



8-50. SLAVE RECEPTACLE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Materials/Parts

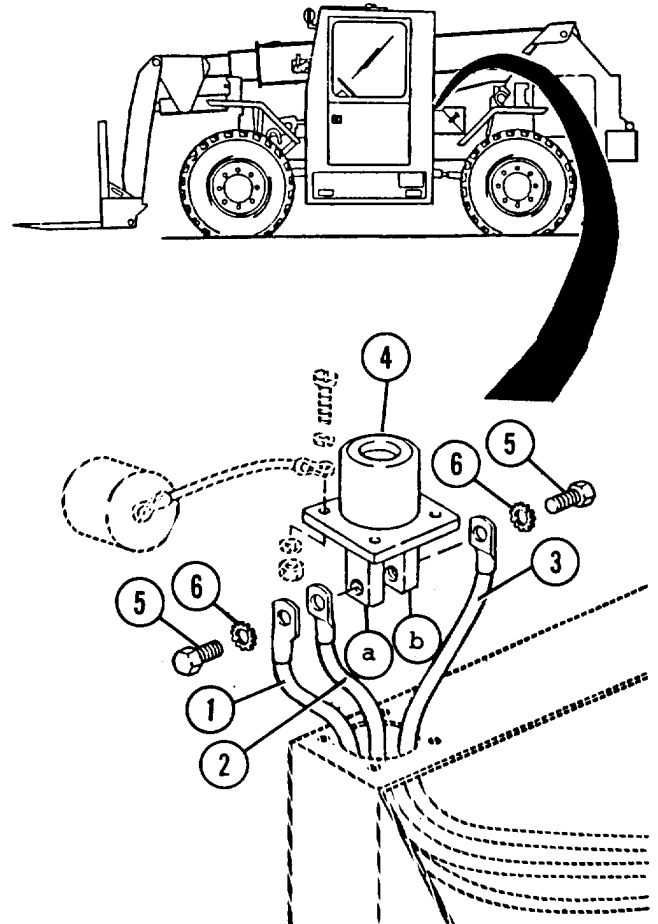
Starwashers (6)
Lockwashers (10)

Equipment Condition

Vehicle parked on level ground.
Left-hand battery removed,
para. 8-43.

REMOVAL

1. REMOVE ELECTRICAL CABLES (1), (2), AND (3) FROM SLAVE RECEPTACLE (4).
 - a. Remove capscrew (5) and starwasher (6), securing electrical cables (1) and (2) to positive terminal (a) of slave receptacle (4). Remove electrical cables (1) and (2). Discard starwasher (6).
 - b. Remove capscrew (5) and starwasher (6), securing electrical cable (3) to negative terminal (b) of slave receptacle (4). Remove electrical cable (3). Discard starwasher (6).



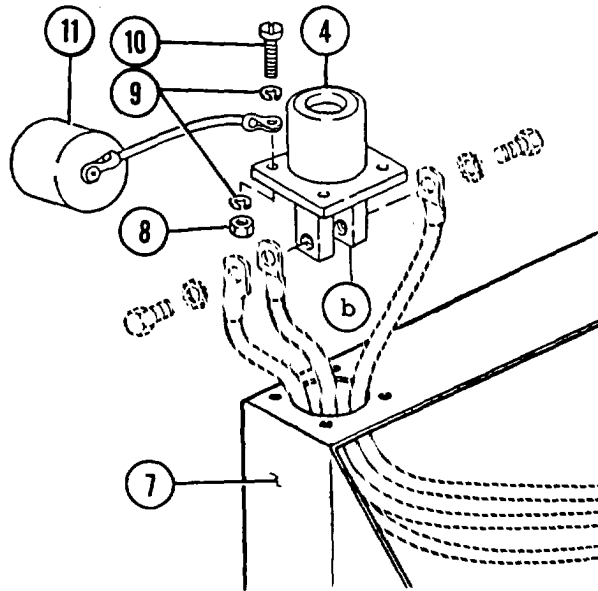
8-50. SLAVE RECEPTACLE - REPLACE (Cont'd)

2. REMOVE SLAVE RECEPTACLE (4) FROM BATTERY BOX (7) .

NOTE

Note orientation of slave receptacle (4) on battery box (7) for use during installation.

- a. Remove four nuts (8), eight lockwashers (9), and four screws (10) securing slave receptacle (4) and cap (11) to battery box (7). Discard lockwashers (9).
- b. Remove slave receptacle (4) and cap (11) from battery box (7).



INSTALLATION

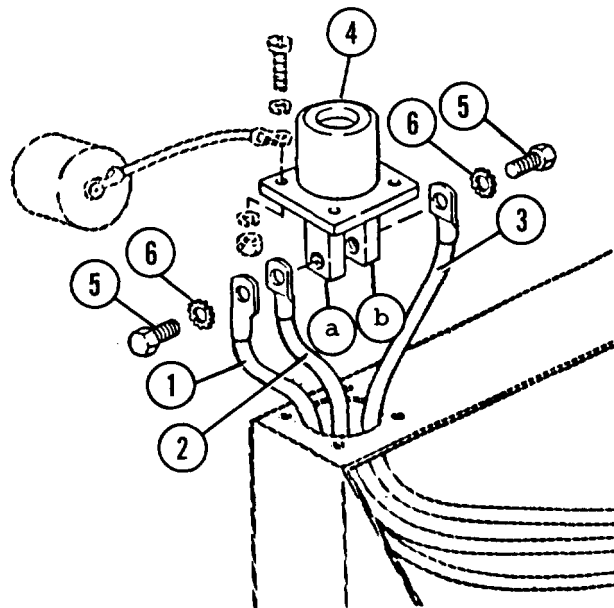
NOTE

When positioning slave receptacle (4) on battery box (7), be sure negative terminal (b) is facing toward center of vehicle.

- 1. INSTALL SLAVE RECEPTACLE (4) ON BATTERY BOX (7).
 - a. Position slave receptacle (4) on battery box (7).
 - b. Secure slave receptacle (4) and cap (11) to battery box (7) with four screws (10), eight new lockwashers (9) and four nuts (8).

8-50. SLAVE RECEPTACLE - REPLACE (Cont'd)

2. INSTALL ELECTRICAL CABLES (3), (2), AND (1) TO SLAVE RECEPTACLE (4).
 - a. Position electrical cable (3) on negative terminal (b) of slave receptacle (4). Secure electrical cable (3) to negative terminal (b) with one new starwasher (6), and one capscrew (5).
 - b. Position electrical cables (2) and (1) on positive terminal (a) of slave receptacle (4). Secure electrical cables (2) and (1) to positive terminal (a) with one new starwasher (6), and one capscrew (5).
3. INSTALL LEFT-HAND BATTERY, PARA. 8-43.



8-51. HYDRAULIC BYPASS SWITCH - REPLACE/TEST

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup

Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #2
Less Power

Cap and Plug Set

Test Equipment

Ohmmeter

Voltmeter

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Container, 1 gal.
Loctite 59241 (App. C, Item 42)

Personnel Required

Two Personnel

Reference

TM10-3930-660-10

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap out lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap out lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

8-51. HYDRAULIC BYPASS SWITCH - REPLACE/TEST (Cont'd)

REMOVAL

1. REMOVE ELECTRICAL LEADS FROM SWITCH
(1) .

NOTE

Tag all electrical leads as removed.

- a. Remove electrical lead 91 from terminal NC of switch (1).
 - b. Remove electrical lead 10 from terminal C of switch (1).
2. REMOVE SWITCH (1) FROM VEHICLE.
 - a. Remove tube assembly (2), from tee (3).
 - b. Remove tube assembly (2) adapter (4), coupling (5), and switch (1) as an assembly.
 - c. Remove switch (1) from coupling (5) .
 - d. If necessary, remove coupling (5) and tube assembly (2) from adapter (4).

INSTALLATION**NOTE**

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on switch (1) and parts (2-5) clean and dry.

1. INSTALL SWITCH (1) TO VEHICLE.

NOTE

To prevent Loctite sealant from contaminating the hydraulic system, apply sealant carefully during steps 1a and 1b.

8-51. HYDRAULIC BYPASS SWITCH - REPLACE/TEST (Cent'd)

- a. Apply Loctite 59241 to threads of switch (1) and install switch (1) to coupling (5).

NOTE

During step 1b., apply Loctite sealant only to threads of adapter (4) that mate with coupling (5). Do not apply sealant to threads that mate with tube assembly (2).

- b. If removed, apply Loctite 59241 to threads of adapter (4) and install adapter (4) to coupling (5).
- c. If removed, install tube assembly (2) to adapter (4),

NOTE

When tightening tube assembly (2) during step 1d., be sure that terminals of switch (1) are facing toward right side of vehicle.

- d. Install tube assembly (2) to tee (3).

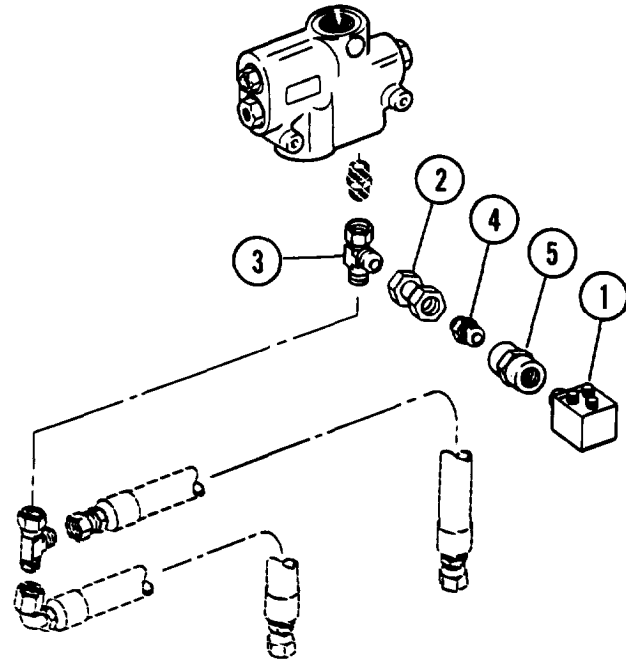
2. INSTALL ELECTRICAL LEADS TO SWITCH (1).

- a. Install electrical lead 91 to terminal NC of switch (1).
- b. Install electrical lead 10 to terminal C of switch (1).

TESTING

1. TEST FOR PROPER FUNCTIONING OF HYDRAULIC BYPASS SWITCH (1).

- a. Place emergency steer switch in the ON position, TM10-39301-660-10.
- b. Place steer select control in the "2 wheel steer" position, TM10-3930-660-10.



8-51. HYDRAULIC BYPASS SWITCH - REPLACE/TEST (Cont'd)

NOTE

Listen for the emergency steer pump during steps 1c. through 1f. The pump makes a high-pitched sound when it is running.

- c. Place starter switch in the RUN position, but do not start the engine, TM10-3930-660-10. Check that emergency steer pump is running.
- d. Turn wheels fully to both sides and check that power assistance is present. Straighten wheels.

NOTE

To hear the emergency steer pump while the engine is running it may be necessary to go under the vehicle during step 1e.

- e. Have assistant start engine, TM 10-3930-660-20. Check that emergency steer pump stops running shortly after engine is started.

NOTE

Leave starter switch in RUN position during step f.

- f. Place auxiliary fuel shut-off switch in the OFF position, TM10-3930-660-10. Check that emergency steer pump starts running after engine stops.
- g. Place starter switch in the OFF position, TM10-3930-660-10.
- h. Place auxiliary fuel shut-off switch in the ON position, TM 10-3930-660-10.

- 2. PERFORM VOLTAGE TESTS ON HYDRAULIC BYPASS SWITCH (1).

NOTE

Leave electrical leads 10 and 91 connected to switch (1) during steps 2a through 2h.

- a. Attach positive lead of voltmeter to terminal NC of switch (1).
- b. Attach negative lead of voltmeter to suitable ground.
- c. Place starter switch in RUN position but do not start the engine, TM10-3930-660-10.
- d. Voltmeter should indicate approximately 24 volts.
- e. Start engine, TM10-3930-660-10.
- f. Voltmeter should indicate approximately 0 volts.
- g. Stop engine, TM10-3930-660-10.
- h. Remove voltmeter leads.

8-51. HYDRAULIC BYPASS SWITCH - REPLACE/TEST (Cont'd)

NOTE

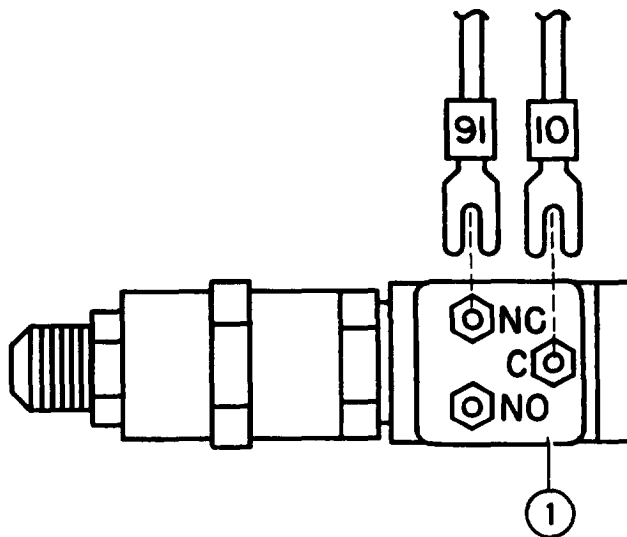
If voltage requirements are not met in steps 2a through 2f, perform continuity tests in step 3 of this section.

3. PERFORM CONTINUITY TESTS ON HYDRAULIC BYPASS SWITCH (1).

NOTE

Tag all electrical leads as removed.

- a. Remove electrical lead 91 from terminal NC of switch (1).
- b. Remove electrical lead 10 from terminal C of switch (1).
- c. Connect positive lead of ohmmeter to terminal NC of switch (1).
- d. Connect negative lead of ohmmeter to terminal C of switch (1).
- e. Ohmmeter should indicate continuity.
- f. Start engine, TM10-3930-660-10.
- g. Ohmmeter should indicate no continuity.
- h. Stop engine, TM10-3930-660-10.



NOTE

If continuity requirements are not met in steps 3a through 3h, hydraulic bypass switch is defective and must be replaced. Refer to removal and installation sections of this paragraph.

- i. Disconnect leads of ohmmeter from terminals NC and C of switch (1).
- j. Connect electrical lead 10 to terminal C of switch (1).
- k. Connect electrical lead 91 to terminal NC of switch (1).

CHAPTER 9

TRANSMISSION MAINTENANCE

9-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the transmission. To find a specific maintenance procedure, see the maintenance task summary below.

9-2. TRANSMISSION MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
9-3	Transmission Shifter - Replace/Adjust	9-2
9-4	Transmission Cable Assemblies - Replace	9-6
9-5	Transmission Disconnect and Brake Pedals - Replace/Adjust	9-8
9-6	Transmission Disconnect Master Cylinder Assembly - Replace	9-14
9-7	Transmission Assembly - Service/Test	9-17
9-8	Transmission Breather - Replace	9-19
9-9	Transmission Oil Filter Head Assembly - Replace	9-20
9-10	Transmission Oil Sampling Valve - Replace	9-23
9-11	Transmission Control Valve Linkage - Replace	9-24

9-3. TRANSMISSION SHIFTER - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

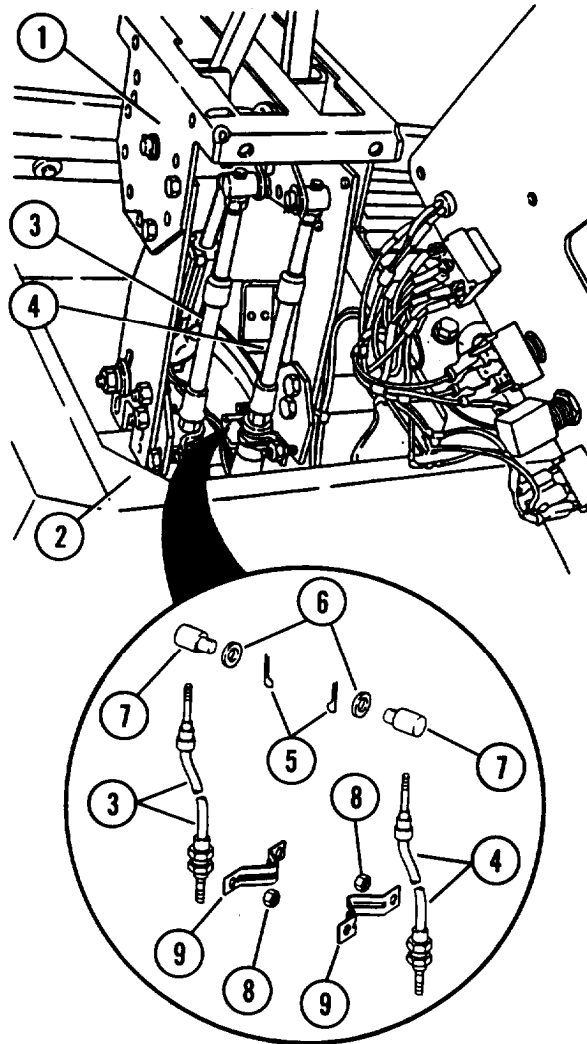
Vehicle parked on level ground.
Left-hand instrument panel separated from front console and shifter, para. 8-6.

Materials/Parts

Locknuts (8, 24)
Cotter Pins (5, 13, 34)
Grease (App. C, Item 14)
Lockwashers (20, 27, 30)
Tags (App. C, Item 51)

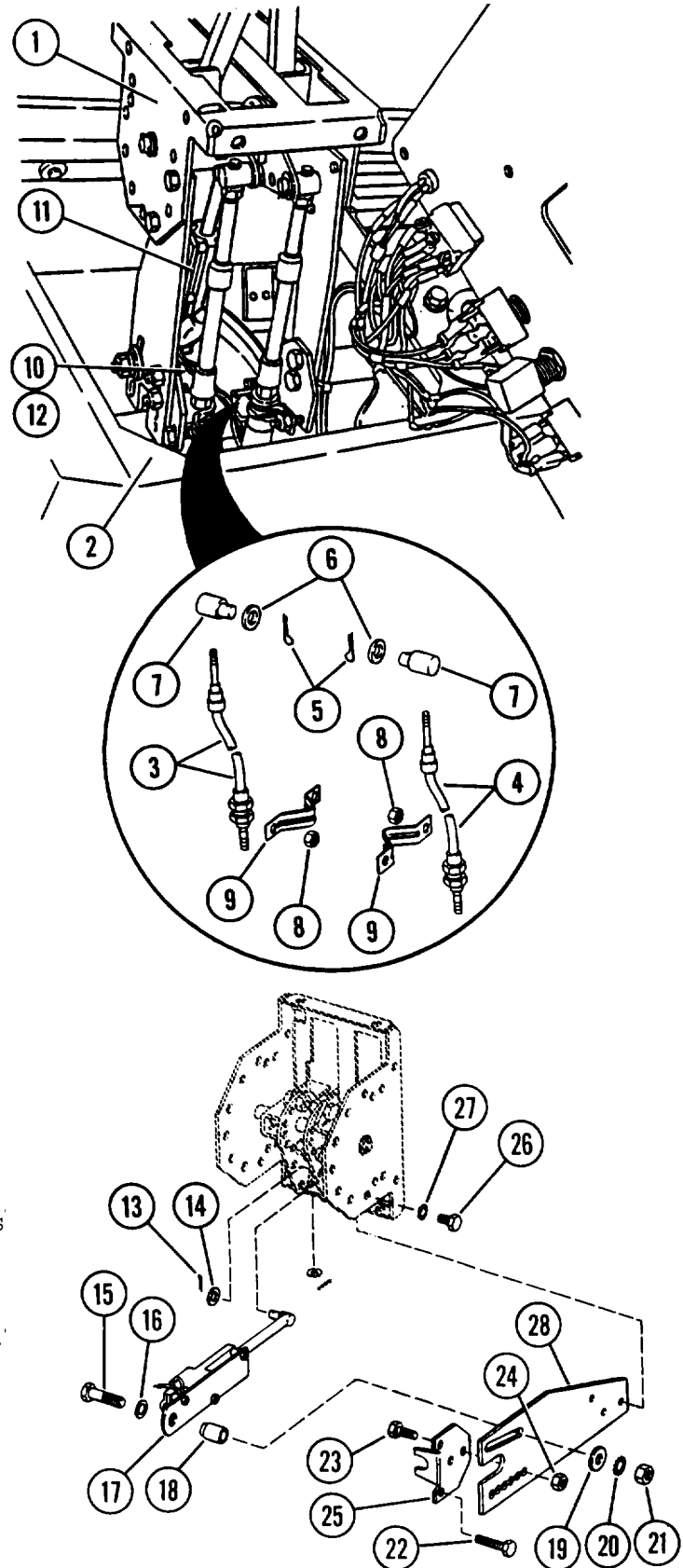
REMOVAL

1. LIFT TRANSMISSION SHIFTER (1) OUT OF FRONT CONSOLE (2).
2. REMOVE TRANSMISSION CABLE ASSEMBLIES (3) AND (4) FROM SHIFTER (1).
 - a. Remove cotter pins (5) and washers (6) securing universal swivels (7) of cable assemblies (3) and (4) to shifter (1). Discard cotter pins (5).
 - b. Remove locknuts (8) and clamps (9) securing cable assemblies (3) and (4) to shifter (1). Discard locknuts (8).
 - c. Tag and remove cable assemblies (3) and (4) from shifter (1).



9-3. TRANSMISSION SHIFTER- REPLACE/ADJUST (Cont'd)

3. TAG AND DISCONNECT TWO ELECTRICAL LEADS (10) OF BACK-UP ALARM SWITCH (11) FROM VEHICLE WIRING HARNESS (12).
4. RAISE AND REMOVE SHIFTER (1) FROM FRONT CONSOLE (2).
5. IF NECESSARY, REMOVE PARTS (13) THROUGH (42).
 - a. Remove cotter pin (13) and washer (14). Discard cotter pin (13).
 - b. Remove capscrew (15), washer (16), back-up alarm switch (17), spacer (18), washer (19), lockwasher (20), and nut (21). Discard lockwasher (20).
 - c. Remove two capscrews (22), two capscrews (23), two locknuts (24) and bracket (25). Discard locknuts (24).
 - d. Repeat step c. for other side of shifter.
 - e. Remove two capscrews (26), two lockwashers (27), and bracket (28). Discard lockwashers (27).
 - f. Remove two capscrews (29), two lockwashers (30), and bracket (31). Discard lockwashers (30).
 - g. Remove two pins (32), two washers (33), and two cotter pins (34). Discard cotter pins (34).
 - h. Remove two levers (35), two springs (36), two disks (37) and two bearings (38).
 - i. Remove knobs (39) from levers (35).
 - j. Remove four capscrews (40), four retainers (41), and plate (42).



9-3. TRANSMISSION SHIFTER - REPLACE/ADJUST (Cont'd)

INSTALLATION

1. IF NECESSARY, INSTALL PARTS (13) THROUGH (42).

- a. Secure plate (42) with four capscrews (40) and four retainers (41).
- b. Install knobs (39) to levers (35).

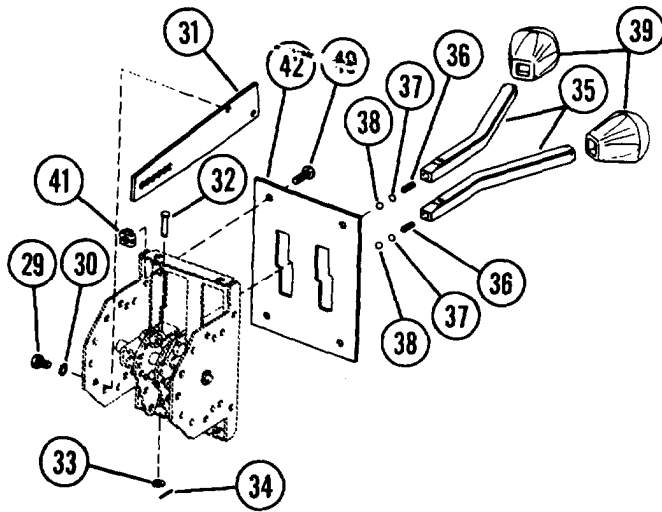
NOTE

Apply grease to items (36), (37), and (38) as installed.

- c. Install two bearings (38), two disks (37), two springs (36), and two levers (35). Secure with two pins (32), two washers (33), and two new cotter pins (34).
- d. Secure bracket (31) with two capscrews (29) and two new lockwashers (30).
- e. Secure bracket (28) with two capscrews (26) and two new lockwashers (27).
- f. Secure bracket (25) with two capscrews (23) and two new locknuts (24). Install two capscrews (22).
- 9* Repeat step f. for other side of shifter.
- h. Position back-up alarm switch (17) on shifter. Secure with capscrew (15), washer (16), spacer (18), washer (19), new lockwasher (20), and nut (21).
- i. Install washer (14) and new cotter pin (13).

2. SUPPORT AND POSITION SHIFTER (1) OVER FRONT CONSOLE (2).

3* CONNECT TWO ELECTRICAL LEADS (10) OF BACK-UP ALARM SWITCH (11) TO VEHICLE WIRING HARNESS (12) AS TAGGED.



9-3. TRANSMISSION SHIFTER - REPLACE/ADJUST (Cont'd)

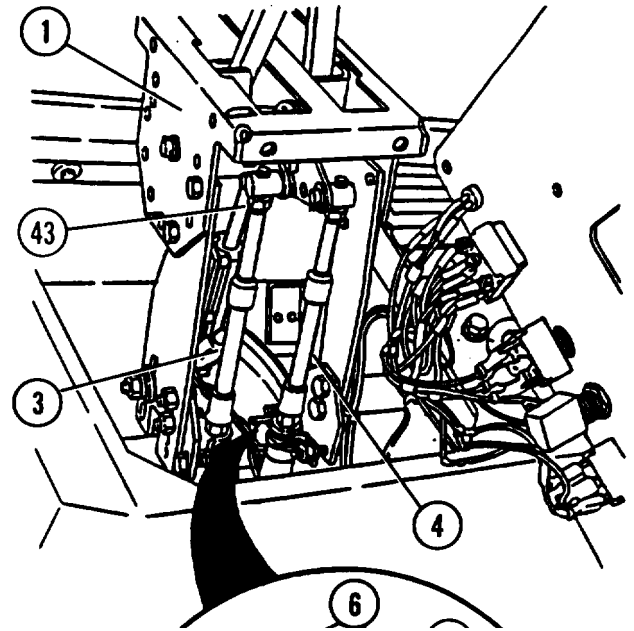
4. INSTALL TRANSMISSION CABLE ASSEMBLIES (3) AND (4) TO SHIFTER (1).

- a. Position transmission cable assemblies (3) and (4) on shifter (1) under clamps (9) as tagged.
- b. Secure cable assemblies (3) and (4) to shifter (1) with clamps (9) and new locknuts (8).
- c. Position universal swivels (7) of cable assemblies (3) and (4) on shifter (1) and secure with washers (6) and new cotter pins (5).

5. INSTALL LEFT-HAND INSTRUMENT PANEL AND TRANSMISSION SHIFTER TO FRONT CONSOLE, PARA. 8-6.
ADJUSTMENT
NOTE

Shifter adjustment procedures for the travel select cable assembly (3) and the range select cable assembly (4) are essentially similar. Adjustment of the travel select cable assembly is shown in this section.

1. REMOVE COTTER PIN (5) AND WASHER (6) FROM UNIVERSAL SWIVEL (7) OF CABLE ASSEMBLY (3). REMOVE UNIVERSAL SWIVEL (7) FROM SHIFTER (1). DISCARD COTTER PIN (5).
2. LOOSEN JAM NUT (43) AND TURN UNIVERSAL SWIVEL (7) IN OR OUT AS REQUIRED FOR PROPER ADJUSTMENT. TIGHTEN JAM NUT (13) .
3. POSITION UNIVERSAL SWIVEL (7) OF CABLE ASSEMBLY (3) ON SHIFTER (1) AND SECURE WITH WASHER (6) AND NEW COTTER PIN (5).
4. VERIFY THAT SHIFTER (1) OPERATES PROPERLY AND READJUST CABLE ASSEMBLY (3), IF NECESSARY.
5. INSTALL LEFT-HAND INSTRUMENT PANEL AND TRANSMISSION SHIFTER TO FRONT CONSOLE, PARA. 8-6.



9-4. TRANSMISSION CABLE ASSEMBLIES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Cotter Pin (4)
Tags (App. C, Item 51)

Equipment Condition

Vehicle parked on level ground.
Left-hand instrument panel removed from front console, para. 8-6.
Transmission shifter disconnected, para. 9-3.
Transmission cover removed, para. 16-6.

REMOVAL

1. DISCONNECT TRANSMISSION CABLE ASSEMBLIES (1) AND (2) FROM TRANSMISSION (3).
 - a. Remove cotter pin (4) and washer (5) from end of each cable assembly (1) and (2) at transmission (3). Discard cotter pin (4).
 - b. Remove nuts (6) and clamps (7) securing each cable assembly (1) and (2) to transmission (3). Tag and remove cable assemblies (1) and (2).

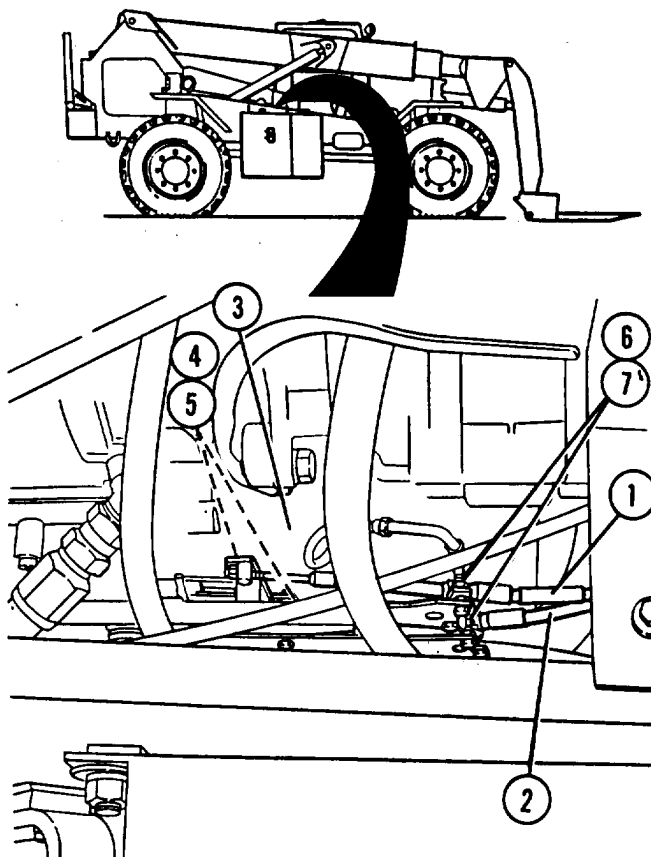
NOTE

Note routing of cable assemblies (1) and (2) through vehicle cab and frame for use during installation.

2. REMOVE CABLE ASSEMBLIES (1) AND (2) FROM CAB AND FRAME OF VEHICLE.

INSTALLATION

1. INSTALL CABLE ASSEMBLIES (1) AND (2) TO CAB AND FRAME OF VEHICLE AS NOTED DURING REMOVAL.



9-4. TRANSMISSION CABLE ASSEMBLIES - REPLACE (Cont'd)

2. CONNECT TRANSMISSION CABLE ASSEMBLIES
(1) AND (2) TO TRANSMISSION (3).
 - a. Position cable assemblies (1) and (2) on transmission (3) as tagged and secure each cable assembly with clamps (7) and nuts (6).
 - b. Position ends of cable assemblies (1) and (2) on transmission (3) and secure each cable assembly with washer (5) and new cotter pin (4).
3. INSTALL TRANSMISSION SHIFTER. VERIFY THAT SHIFTER POSITIONS CORRESPOND WITH TRANSMISSION RANGES, AND ADJUST CABLE ASSEMBLIES AT SHIFTER IF REQUIRED/
PARA. 9-3.
4. INSTALL LEFT-HAND INSTRUMENT PANEL,
PARA. 8-6.
5. INSTALL TRANSMISSION COVER,
PARA. 16-6.

9-5. TRANSMISSION DISCONNECT AND BRAKBE PBDALS - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjustment of transmission disconnect pedal linkage.
- d. Adjustment of transmission disconnect setting.
- e. Adjustment of brake pedal linkage.

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

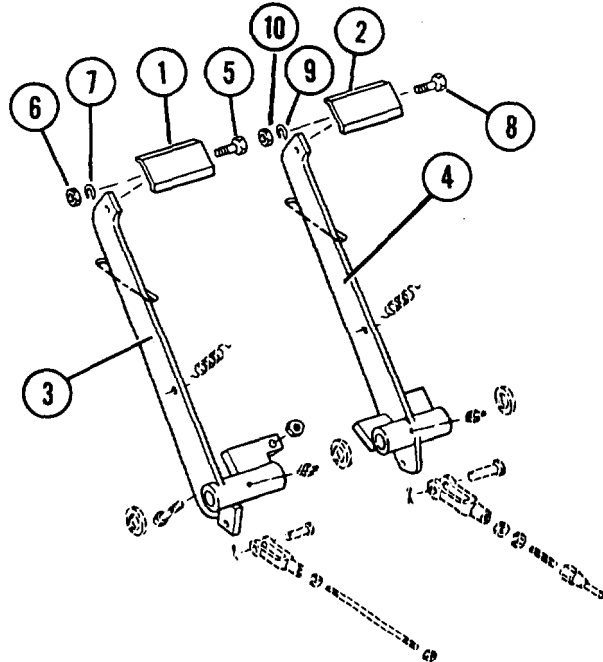
Vehicle parked on level ground.

Materials/Parts

Gasket Kit
 Lockwashers (7) (9) (21)
 Cotter Pins (17) (18)

REMOVAL

1. REMOVE PADS (1) AND (2) FROM PEDAL ARMS (3) AND (4).
 - a. Remove capscrew (5), nut (6), and lockwasher (7) securing pad (1) to pedal arm (3). Discard lockwasher (7).
 - b. Remove capscrew (8), lockwasher (9), and nut (10) securing pad (2) to pedal arm (4). Discard lockwasher (9).



9-5. TRANSMISSION DISCONNECT AND BRAKE PEDALS - REPLACE/ADJUST (Cont'd)

2. REMOVE RETURN SPRINGS (11) AND (12) FROM PEDAL ARMS (3) AND (4).

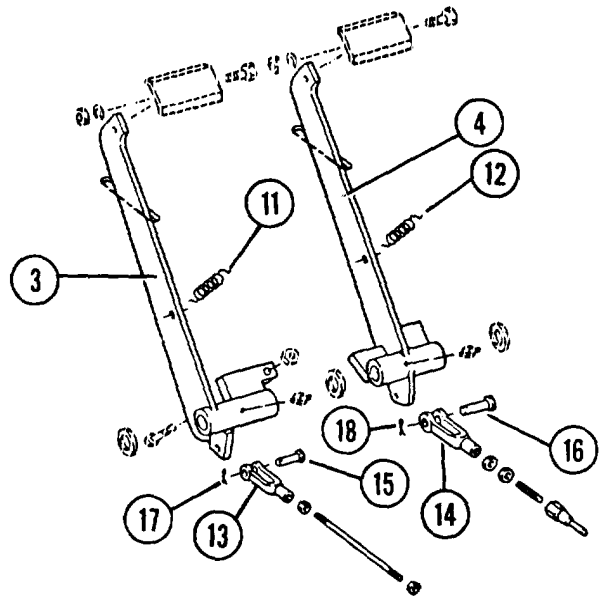
CAUTION

Be careful that clevis (13), clevis (14), and attached pedal linkages do not drop when clevis pins (15) and (16) are removed.

3. REMOVE AND DISCARD COTTER PINS (17) AND (18). REMOVE CLEVIS PINS (15) AND (16) SECURING CLEVIS (13) AND (14) TO PEDAL ARMS (3) AND (4).

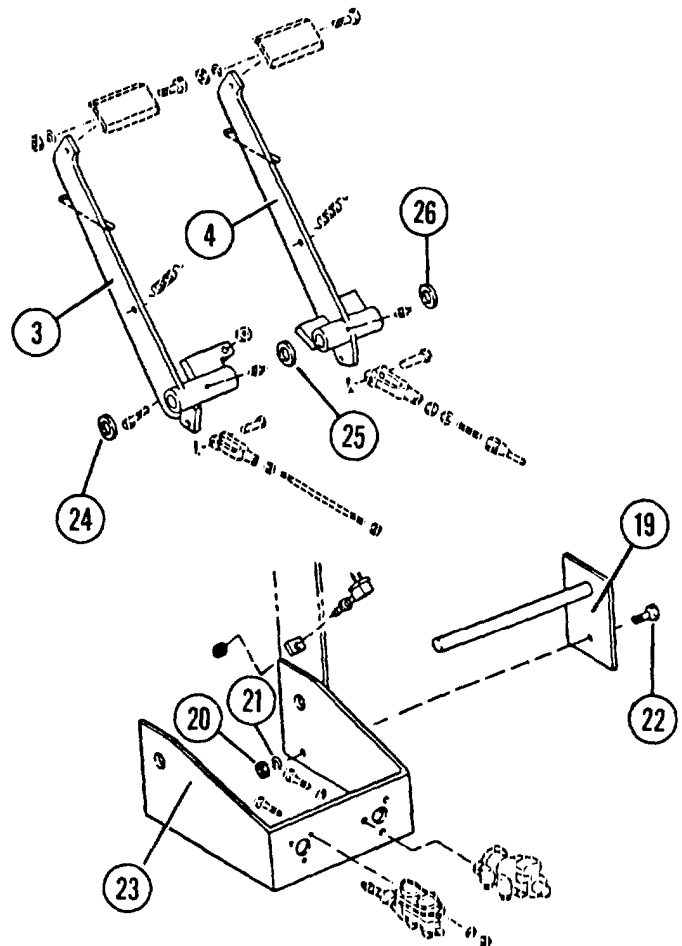
CAUTION

To prevent possible damage, do not allow pedal arms (3) and (4) to drop when shaft (19) is removed.



4. REMOVE PEDAL ARMS (3) AND (4) FROM SHAFT (19).

- a. Remove nut (20), lockwasher (21), and capscrew (22) securing shaft (19) to bracket (23). Discard lockwasher (21).
- b. Slowly slide shaft (19) toward center of vehicle and remove washer (24), pedal arm (3) and washer (25) from shaft (19).
- c. Continue sliding shaft (19) toward center of vehicle, and remove pedal arm (4) and washer (26) from shaft (19).



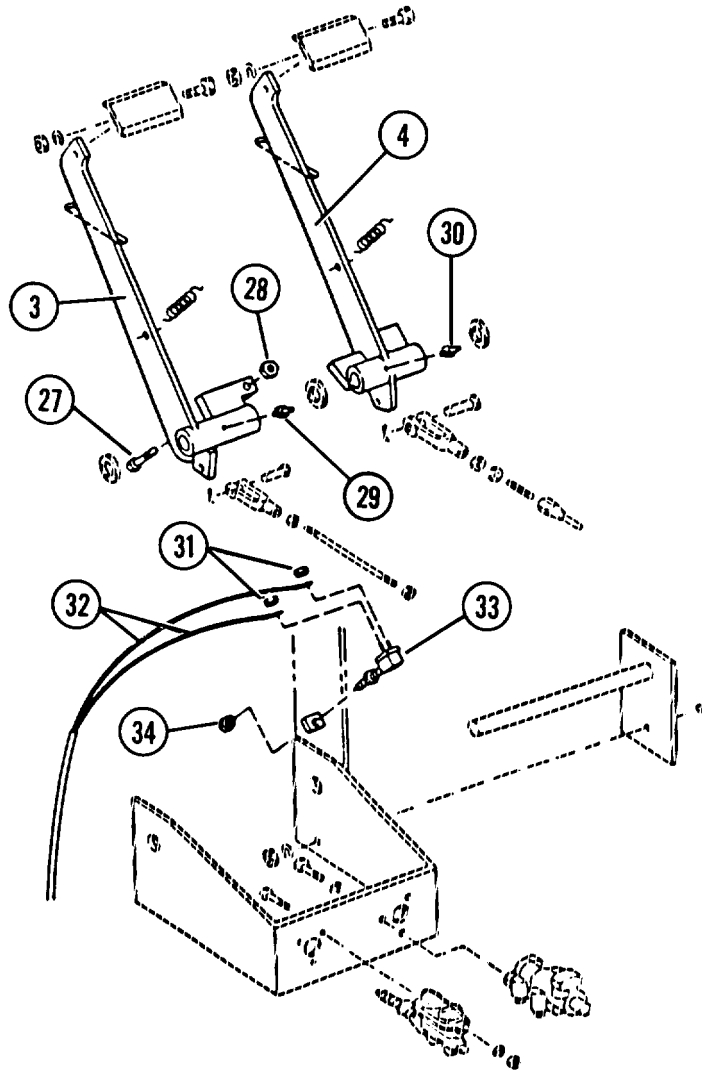
5. PULL SHAFT (19) THROUGH HOLE ON RIGHT-HAND SIDE OF BRACKET (23).

9-5. TRANSMISSION DISCONNECT AND BRAKE PEDALS- REPLACE/ADJUST (Cont'd)

6. REMOVE CAPSCREW (27), NUT (28), AND LUBRICATION FITTING (29) FROM PEDAL ARM (3).
7. REMOVE LUBRICATION FITTING (30) FROM PEDAL ARM (4).
8. REMOVE TWO NUTS (31), SECURING TWO ELECTRICAL LEADS (32) TO BRAKE LIGHT SWITCH (33). REMOVE NUT (34) AND BRAKE LIGHT SWITCH (33) FROM VEHICLE.

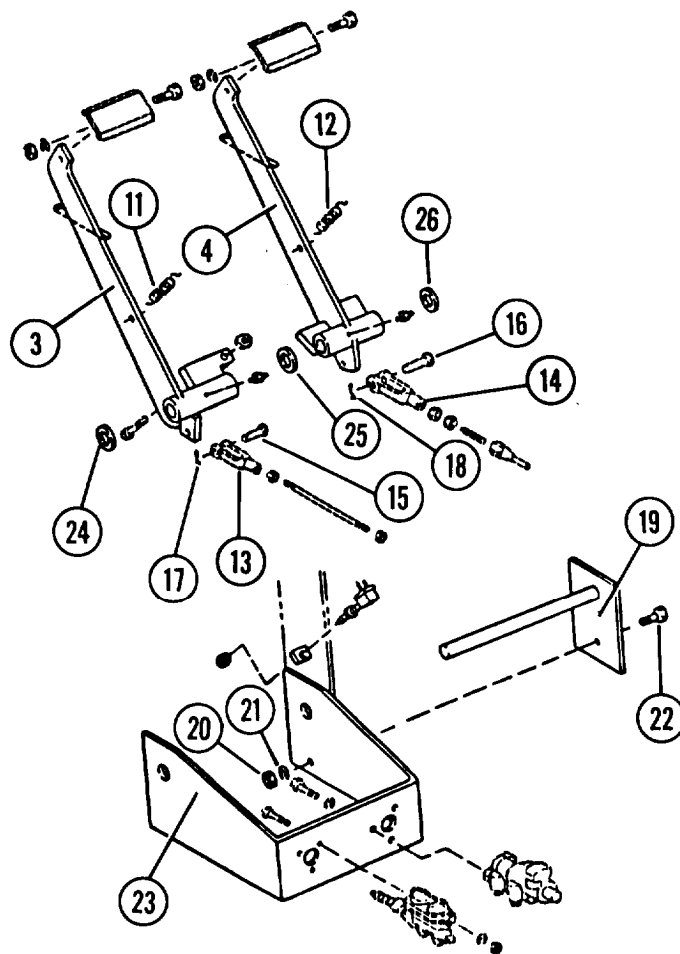
INSTALLATION

1. POSITION BRAKE LIGHT SWITCH (33) ON VEHICLE AND SECURE WITH NUT (34). POSITION TWO ELECTRICAL LEADS (32) ON BRAKE LIGHT SWITCH (33) AS TAGGED AND SECURE WITH TWO NUTS (31).
2. INSTALL LUBRICATION FITTING (30) TO PEDAL ARM (4).
3. INSTALL CAPSCREW (27), NUT (28), AND LUBRICATION FITTING (29) TO PEDAL ARM (3).



9-5. TRANSMISSION DISCONNECT AND BRAKE PEDALS - REPLACE/ADJUST (Cont'd)

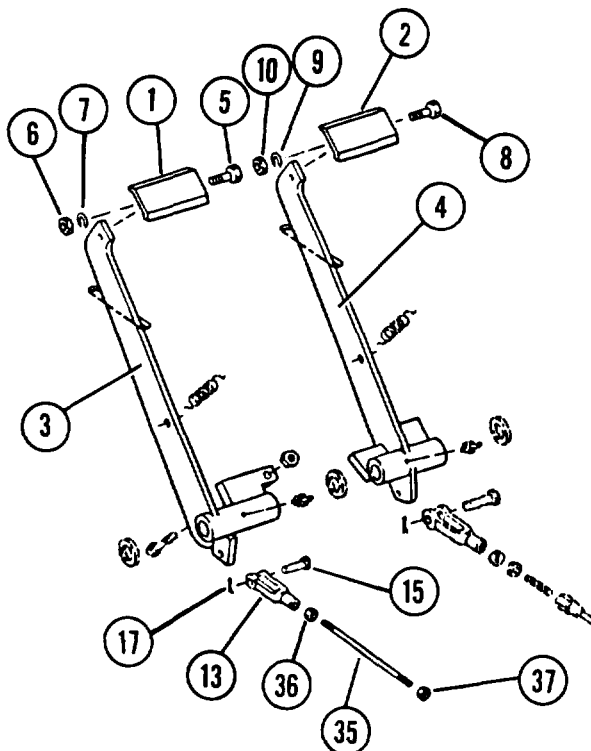
4. POSITION SHAFT (19) THROUGH HOLE ON RIGHT-HAND SIDE OF BRACKET (23).
5. INSTALL PEDAL ARMS (3) AND (4) ON SHAFT (19).
 - a. Slowly slide shaft (19) through bracket (23) and position washer (26), and pedal arm (4) on shaft (19).
 - b. Continue sliding shaft (19) through bracket (23) and position washer (25), pedal arm (3), and washer (24) on shaft (19).
 - co Position shaft (19) into hole on left-hand side of bracket (23) and secure with nut (20), new lockwasher (21), and bolt (22).
6. INSTALL CLEVIS PINS (15) AND (16) TO SECURE PEDAL ARMS (3) AND (4) TO CLEVIS (13) AND (14). INSTALL NEW COTTER PINS (17) AND (18).
7. INSTALL RETURN SPRINGS (11) AND (12) TO PEDAL ARMS (3) AND (4).



9-5. TRANSMISSION DISCONNECT AND BRAKE PEDALS - REPLACE/ADJUST (Cont'd)

8. INSTALL PADS (1) AND (2) ON PEDAL ARMS (3) AND (4).

- a. Position pad (1) on pedal arm (3) and secure with capscrew (5), new lockwasher (7), and nut (6).
- b. Position pad (2) on pedal arm (4) and secure with capscrew (8), new lockwasher (9), and nut (10).



ADJUSTMENT OF TRANSMISSION DISCONNECT PEDAL LINKAGE

ADJUST CLEVIS (13) AND PUSHROD PIN (35) SECURING PEDAL ARM (3).

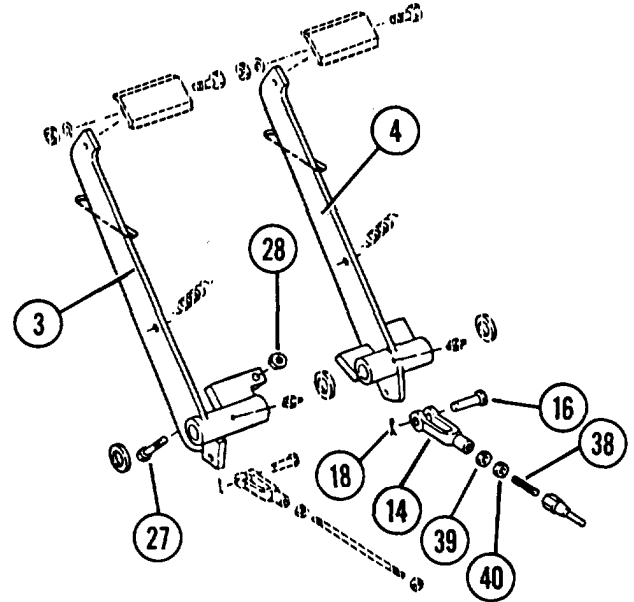
- a. Remove cotter pin (17) and clevis pin (15) securing clevis (13) to Pedal arm (3). Discard cotter pin (17).
- b. Loosen jam nuts (36) and (37) on pushrod (35).
- c* Rotate pushrod pin (35) and/or clevis (13) in or out as required until clevis pin (15) fits freely through holes on clevis (13) and pedal arm (3).
- d. Secure clevis (13) to pedal arm (3) with clevis pin (15) and new cotter pin (17).
- e. Tighten jam nuts (36) and (37).

9-5. TRANSMISSION DISCONNECT AND BRAKE PEDALS - REPLACE/ADJUST (Cont'd)

ADJUSTMENT OF TRANSMISSION DISCONNECT SETTING

CHECK TRANSMISSION DISCONNECT SETTING AND ADJUST, IF NECESSARY.

- a. With pedal arm (3) and pedal arm (4) in full up position, check for a .06 inch gap between head of capscrew (27) and pedal arm (3).
- b. If necessary, loosen nut (28) and adjust screw (27) until proper gap is achieved. Tighten nut (28) after making adjustment.



ADJUSTMENT OF BRAKE PEDAL LINKAGE

ADJUST CLEVIS (14) AND PUSHROD (38) SECURING PEDAL ARM (4).

- a. Remove cotter pin (18) and clevis pin (16) securing clevis (14) to pedal arm (4). Discard cotter pin (18).
- b. Loosen jam nuts (39) and (40) on pushrod pin (38).
- c. Rotate pushrod pin (38) and/or clevis (14) in or out, as required, until clevis pin (16) fits freely through holes on clevis (14) and pedal arm (4).
- d. Secure clevis (14) to pedal arm (4) with clevis pin (16) and new cotter pin (18).
- e. Tighten jam nuts (39) and (40).

9-6. TRANSMISSION DISCONNECT MASTER CYLINDER ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Cotter Pin (4)

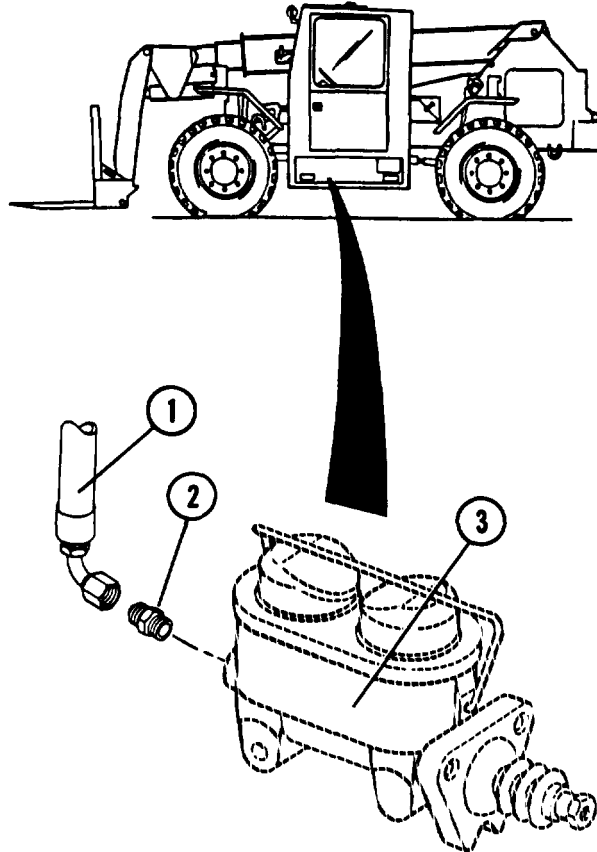
Lockwashers (9)

NOTE

The transmission disconnect master cylinder assembly is located under the cab.

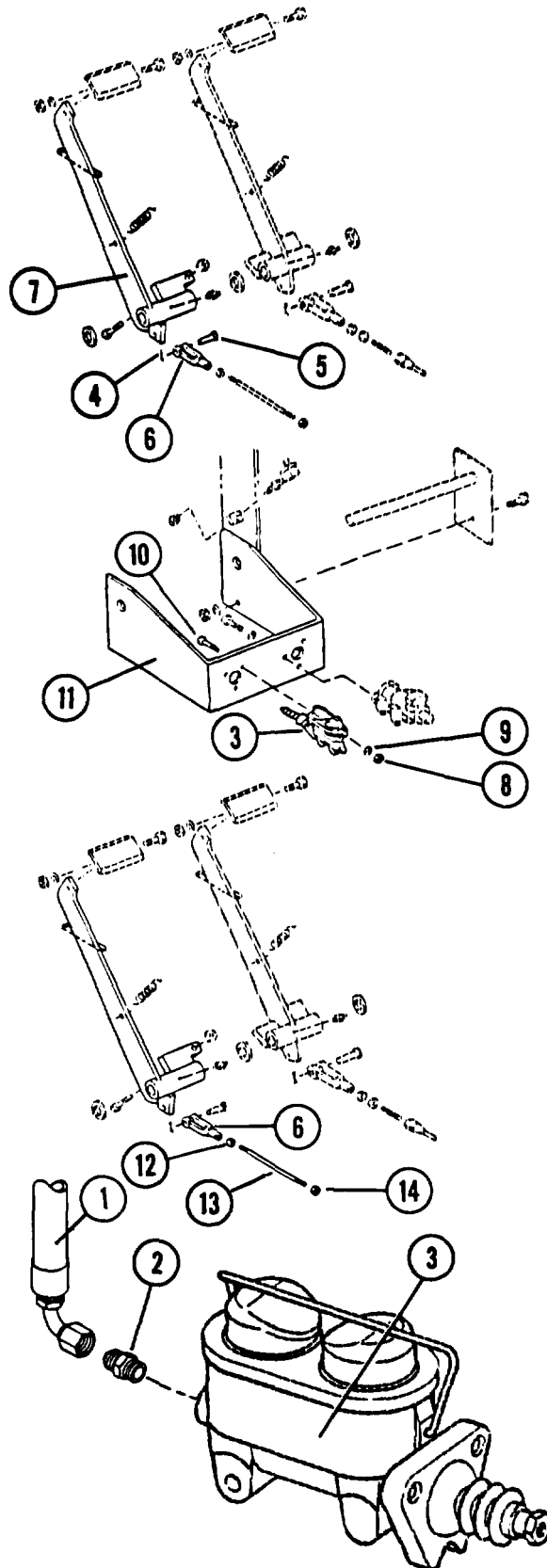
REMOVAL

1. DISCONNECT HYDRAULIC HOSE (1) AND ADAPTER (2) FROM TRANSMISSION DISCONNECT MASTER CYLINDER ASSEMBLY (3). PLUG OPEN HOLES ON MASTER CYLINDER ASSEMBLY (3) AND HOSE (1).



9-6. TRANSMISSION DISCONNECT MASTER CYLINDER ASSEMBLY - REPLACE (Cont'd)

2. REMOVE COTTER PIN (4) AND CLEVIS PIN (5) SECURING CLEVIS (6) TO PEDAL ARM (7) . DISCARD COTTER PIN (4) .
3. REMOVE THREE NUTS (8), LOCKWASHERS (9) , AND CAPSCREWS (10) , SECURING MASTER CYLINDER ASSEMBLY (3) TO BRACKET (11) , REMOVE MASTER CYLINDER ASSEMBLY (3) FROM VEHICLE . DISCARD LOCKWASHERS (9) .
4. REMOVE LINKAGE FROM MASTER CYLINDER ASSEMBLY (3) .
 - a. Loosen jam nut (12) on pushrod pin (13). Remove clevis (6) and jam nut (12) from pushrod pin (13).
 - b. Loosen jam nut (14) on pushrod pin (13) . Remove pushrod pin (13) from master cylinder assembly (3). Remove jam nut (14) from pushrod pin (13).



INSTALLATION

1. INSTALL LINKAGE TO MASTER CYLINDER ASSEMBLY (3).

NOTE

- Do not tighten parts (6), (12), (13), or (14) at this time.
- a. Install jam nut (14) on pushrod pin (13) . Install pushrod pin (13) to master cylinder assembly (3).
 - b. Install jam nut (12) and clevis (6) on pushrod pin (13).
2. POSITION MASTER CYLINDER ASSEMBLY (3) ON BRACKET (11) AND SECURE WITH THREE NUTS (8), THREE NEW LOCKWASHERS (9), AND THREE CAPSCREWS (10).
 3. REMOVE PLUGS FROM HOLES ON HOSE (1) AND MASTER CYLINDER ASSEMBLY (3). CONNECT HYDRAULIC HOSE (1) AND ADAPTER (2) TO MASTER CYLINDER ASSEMBLY (3). CHECK OIL LEVEL OF MASTER CYLINDER ASSEMBLY (3) AND ADD OIL AS REQUIRED.

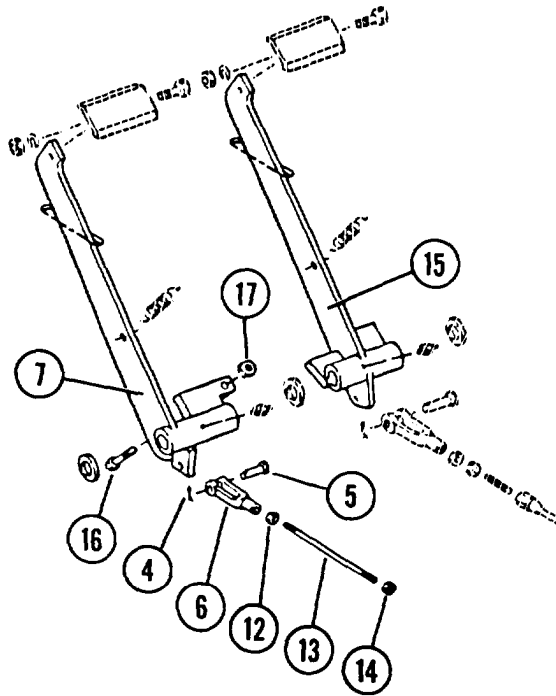
9-6. TRANSMISSION DISCONNECT MASTER CYLINDER ASSEMBLY - REPLACE (Cont'd)

4. INSTALL CLEVIS PIN (5) AND NEW COTTER PIN (4) TO SECURE CLEVIS (6) TO PEDAL ARM (7).

- a. Rotate pushrod (13) and/or clevis (6) in or out as required until clevis pin (5) fits-freely through holes on clevis (6) and pedal arm (7).
- b. Secure clevis pin (5) to clevis (6) and pedal arm (7) with new cotter pin (4).
- c. Tighten jam nuts (12) and (14).

5. CHECK TRANSMISSION DISCONNECT SETTING AND ADJUST, IF NECESSARY.

- a. With pedal (7) and pedal (15) in full up position, check for a .06 inch gap between head of capscrew (16) and pedal arm (15).
- b. If necessary, loosen nut (17) and turn capscrew (16) until proper gap is achieved. Tighten nut (17) after making adjustment.



9-7. TRANSMISSION ASSEMBLY - SERVOCE/TEST

This task covers:

- a. Service by draining and filling transmission with oil.
- b. Testing of transmission hydraulics.

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power.

Materials\Parts

Container, 6 Gal.
Gasket (3)
Transmission Oil, (APP. C, Item 36)

Equipment Condition

Vehicle parked on level ground.
Transmission cover removed, para. 16-6.

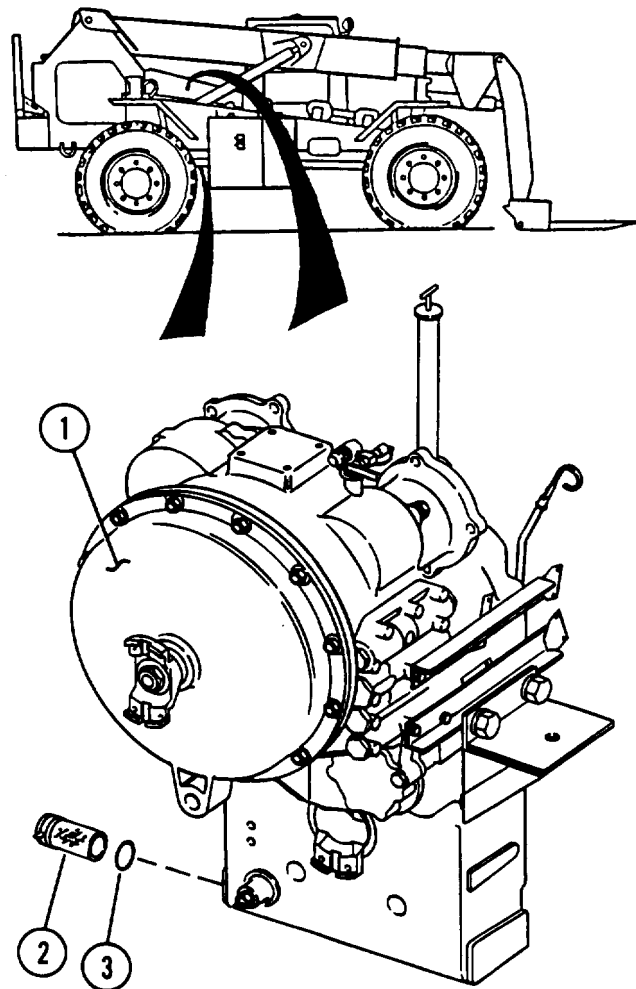
SERVICE BY DRAINING AND FILLING TRANSMISSION WITH OIL

1. START AND RUN ENGINE UNTIL TRANSMISSION TEMPERATURE IS BETWEEN 160 and 190°F. STOP ENGINE.
2. DRAIN TRANSMISSION OIL FROM TRANSMISSION (1).
 - a. Remove strainer (2) and gasket (3), from transmission (1). Discard gasket (3).

NOTE

Transmission (1) contains approximately five gallons of oil when filled.

- b. Allow transmission oil to drain from transmission (1) completely.



9-7. TRANSMISSION ASSEMBLY - SERVICE/TEST (Cont'd)

3. REPLACE TRANSMISSION OIL FILTER ELEMENT, PARA. 9-9.

4. FILL TRANSMISSION (1) WITH TRANSMISSION OIL.

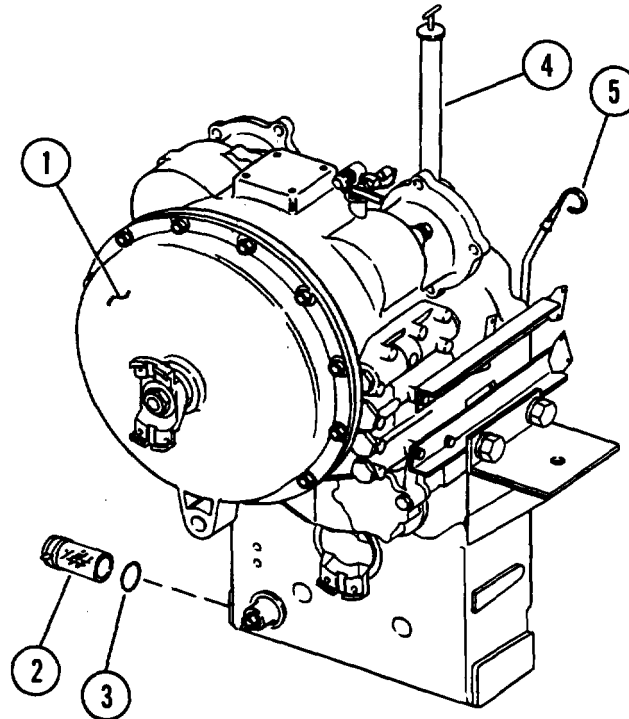
- a. Clean strainer (2). Install new gasket (3) and strainer (2). Securely tighten strainer (2).

Transmission (1) contains approximately five gallons of oil when filled.

- b. Remove cap of filler tube (4) and fill transmission (1) with four gallons of oil.

- c. Start and run engine at idle speed with transmission travel select lever in neutral for two full minutes to allow transmission hydraulic system to charge.

- d. With engine still running at idle speed, check transmission oil level of transmission (1) with dipstick (5). If oil level is low, add additional oil until level reaches full mark on dipstick.



NOTE

FULL @ 104°F is the low mark (cold).
 FULL @ 176°F is the high mark (hot).

- e. Check for leaks at strainer (2), transmission oil filter element, and at all transmission hose connections.

5. INSTALL TRANSMISSION COVER, PARA. 16-6.

TESTING OF TRANSMISSION HYDRAULICS

Refer to STE/ICE testing section, Para. 2-13.

9-8. TRANSMISSION BREATHER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Mechanics

Materials/Parts

Solvent (App. C, Item 47)

Equipment Condition

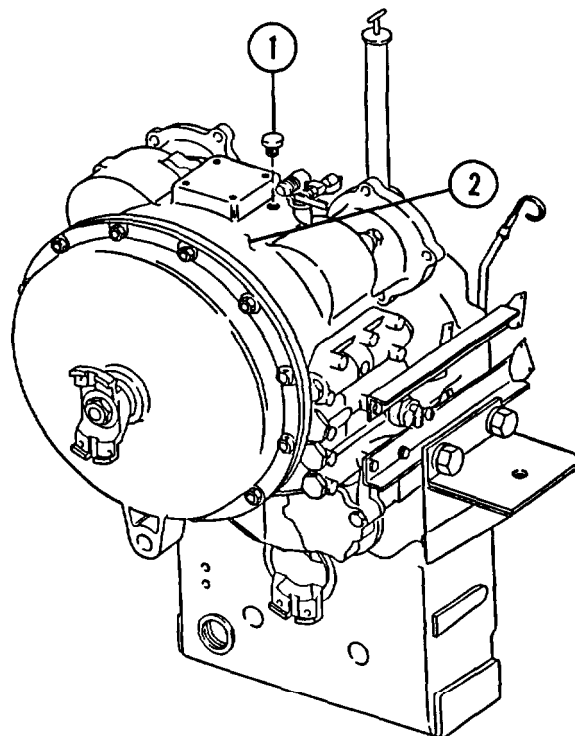
Vehicle parked on level ground.
Transmission cover removed,
para. 16-6.

REMOVAL

REMOVE BREATHER (1) FROM TRANSMISSION
(2) .

INSTALLATION

1. INSTALL BREATHER (1) TO TRANSMISSION
(2) .
 - a. If necessary, clean breather in solvent and blow-dry with air hose.
 - b. Inspect breather (1) for damage or defects. Discard and replace with new breather, if necessary.
2. INSTALL TRANSMISSION COVER,
PARA. 16-6.



9-9. TRANSMISSION OIL FILTER HEAD ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

- Tool Kit, Automotive Mechanics
- Wrench, Strap, 1-6" Capacity
- Cap and Plug Set

Materials/Parts

- Filter element (1)
- Hydraulic oil (App. C, Item 35)
- Lockwashers (8)
- Tags (App. C, Item 51)

Equipment Condition

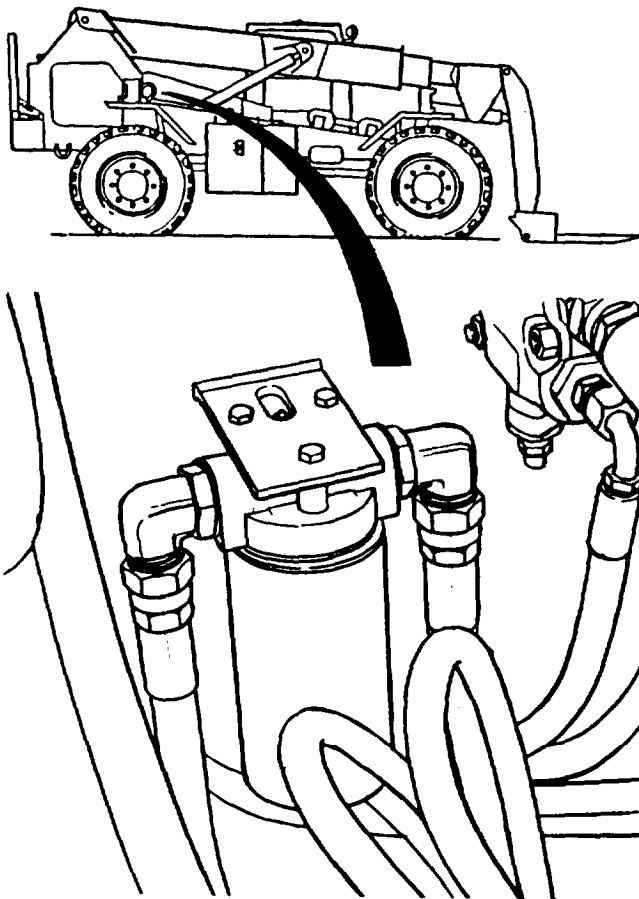
- Vehicle parked on level ground.
- Transmission cover removed,
- para. 16-6.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

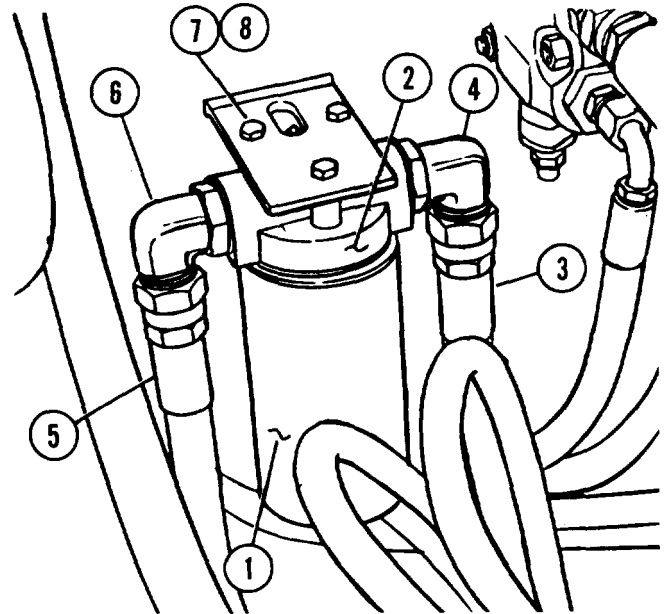
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.



9-9. TRANSMISSION OIL FILTER HEAD ASSEMBLY - REPLACE (Cont'd)

REMOVAL

1. UNSCREW AND REMOVE TRANSMISSION OIL FILTER ELEMENT (1) FROM TRANSMISSION OIL FILTER HEAD (2). DISCARD FILTER ELEMENT (1).
2. REMOVE TRANSMISSION OIL FILTER HEAD (2) FROM VEHICLE.
 - a. Remove hose (3) and elbow (4) from filter head (2).
 - b. Remove hose (5) and elbow (6) from filter head (2).
 - c. Support filter head (2) so it does not drop during hardware removal. Remove three screws (7) and lockwashers (8). Discard lockwashers (8).
 - d. Remove filter head (2) from vehicle.

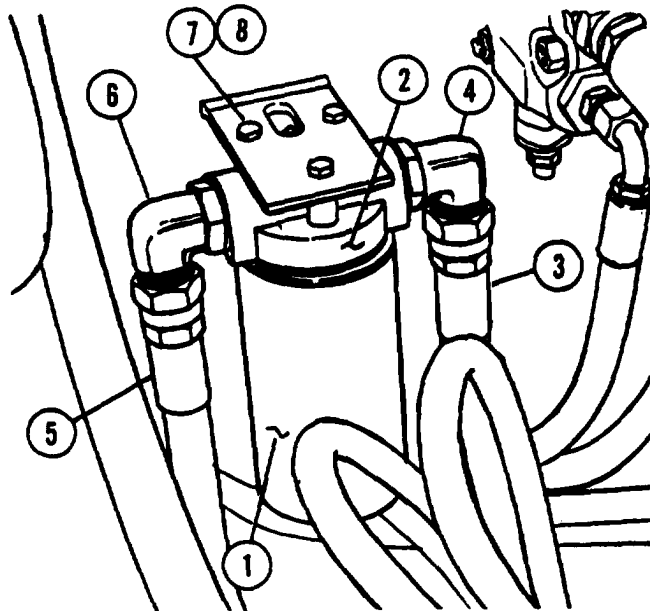


9-9. TRANSMISSION OIL FILTER HEAD ASSEMBLY - REPLACE (Cont'd)

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surface on filter head and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.



1. INSTALL TRANSMISSION OIL FILTER HEAD (2) ON VEHICLE.
 - a. Position and support filter head (2) on vehicle. Secure filter head with three new lockwashers (8) and three screws (7).
 - b. Install elbow (6) and hose (5) to filter head (2).
 - c. Install elbow (4) and hose (3) to filter head (2).

2. INSTALL TRANSMISSION OIL FILTER ELEMENT (1).
 - a. Apply a thin coating of fresh oil to the seal on the new transmission oil filter element (1) and on the threads of filter head (2).
 - b. Screw on the transmission oil filter element until seal of filter element (1) contacts filter head (2).
 - c. Tighten filter element (1) one-half turn.
 - d. Start engine and check for leaks at filter head and at hydraulic connections.

3. INSTALL TRANSMISSION COVER, PARA. 16-6.

9-10. TRANSMISSION OIL SAMPLING VALVE- REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup**Tools**

Tool Kit, Automotive Mechanics

Materials\Parts

Loctite 59241 (APP. C, Item 42)

Equipment Condition

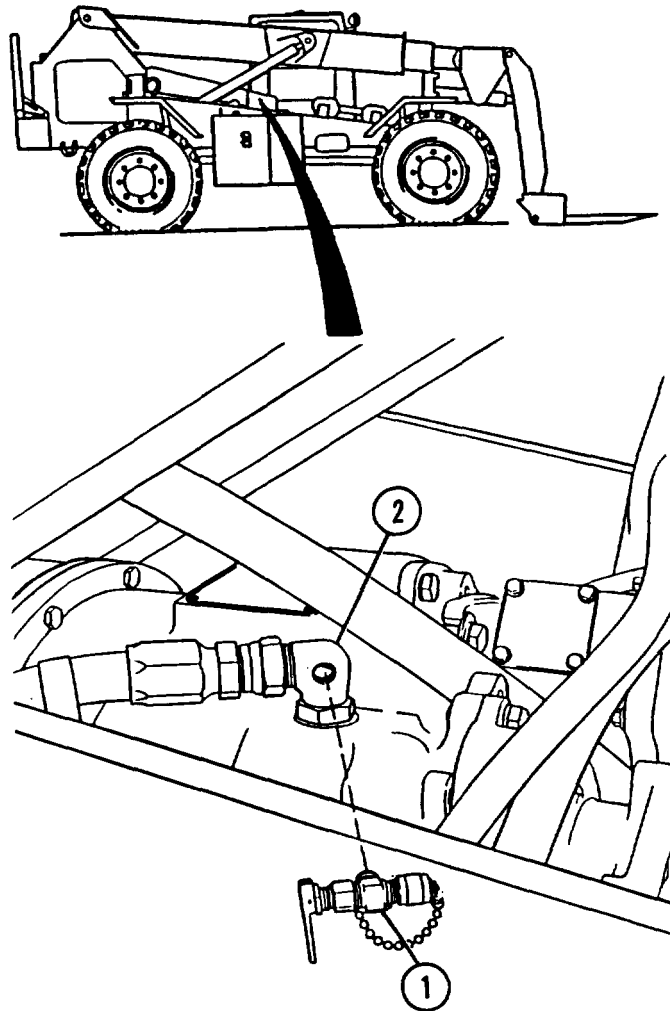
Vehicle parked on level ground.
Transmission cover removed,
para. 16-6.

REMOVAL

REMOVE SAMPLING VALVE (1) FROM FITTING
(2) 1

INSTALLATION

1. APPLY LOCTITE 59241 TO VALVE THREADS.
- 2* SCREW VALVE (1) INTO FITTING (2) WITH
DRAIN END OF VALVE FACING DOWN.
3. INSTALL TRANSMISSION COVER,
PARA. 16-6.



9-11. TRANSMISSION CONTROL VALVE LINKAGE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

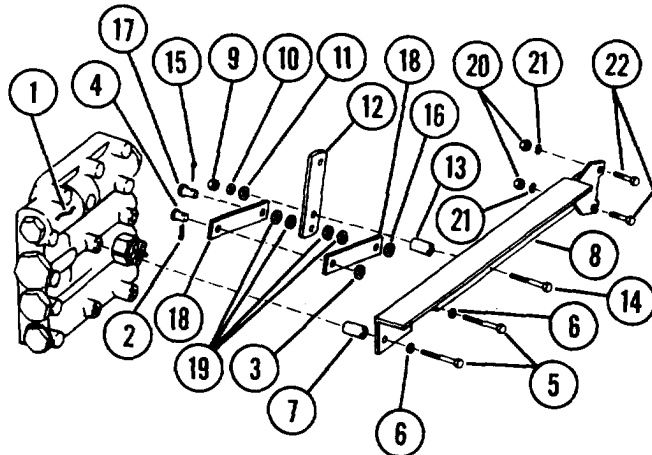
Lockwashers (6, 10, 21)

Equipment Condition

Vehicle parked on level ground.
Transmission cable assemblies removed at transmission control valve, para. 9-4.

REMOVAL

1. REMOVE PARTS (2) THROUGH (22) FROM TRANSMISSION CONTROL VALVE (1).
 - a. Remove cotter pin (2), flatwasher (3), and pin (4) from upper control valve linkage. Discard cotter pin (2).
 - b. Remove two bolts (5), two lockwashers (6), and two spacers (7) securing bracket (8).
 - c. Separate parts (8) through (22) from transmission control valve (1).
 - d. Repeat steps 1a through 1c for lower control valve linkage parts.
2. IF NECESSARY, REMOVE PARTS (9) THROUGH (14) FROM EACH BRACKET (8).
 - a. Remove nut (9), lockwasher (10), and flatwasher (11).
 - b. Remove rocker arm (12), spacer (13), and bolt (14).
3. IF NECESSARY, REMOVE PARTS (15) THROUGH (22) FROM EACH ROLLER ARM (12).
 - a. Remove cotter pin (15), flatwasher (16), and pin (17).



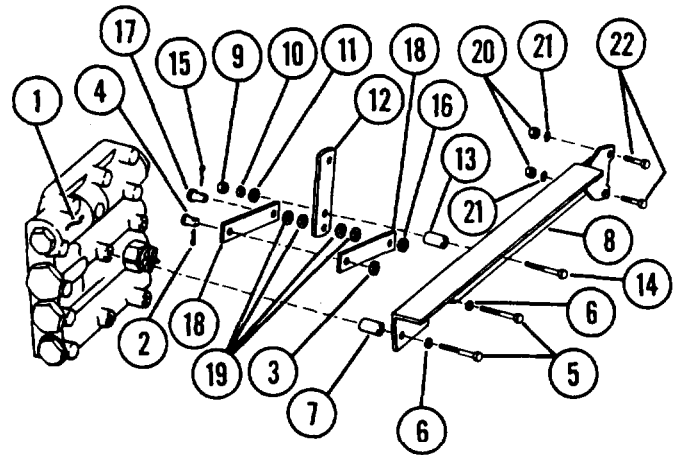
UPPER CONTROL VALVE LINKAGE SHOWN - LOWER CONTROL VALVE LINKAGE SIMILAR.

9-11. TRANSMISSION CONTROL VALVE LINKAGE - REPLACE (Cont'd)

- b. Separate two links (18), four flatwashers (19), and rocker arm (12).
- c. Remove two nuts (20), two lockwashers (21), and two bolts (22). Discard lockwashers (21).

INSTALLATION

1. IF REMOVED, INSTALL PARTS (15) THROUGH (22) TO EACH ROCKER ARM (12).
 - a. Install two bolts (22), two new lockwashers (21), and two nuts (20).
 - b. Secure two links (18), four flatwashers (19), and rocker arm (12) with pin (17), flatwasher (16), and new cotter pin (15).
2. IF REMOVED, SECURE PARTS (9) THROUGH (14) TO BRACKET (8).
 - a. Position bolt (14), spacer (13), and rocker arm (12) on bracket (8).
 - b. Secure with flatwasher (11), new lockwasher (10), and nut (9).
3. INSTALL PARTS (2) THROUGH (22) TO TRANSMISSION CONTROL VALVE (1).
 - a. Position upper control valve linkage parts (2) through (22) on transmission control valve (1).
 - b. Secure each bracket (8) with four spacers (7), four new lockwashers (6), and four bolts (5).
 - c. Install pin (4), flatwasher (3), and new cotter pin (2).
 - d. Repeat steps 3a through 3c for lower control valve linkage.
4. INSTALL TRANSMISSION CABLE ASSEMBLIES TO TRANSMISSION CONTROL VALVE, PARA. 9-4.



UPPER CONTROL VALVE LINKAGE SHOWN
LOWER CONTROL VALVE LINKAGE SIMILAR.

CHAPTER 10

PROPELLER AND DRIVE SHAFT MAINTENANCE

10-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the propeller shafts. To find a specific maintenance procedure see the maintenance task summary below.

10-2. PROPELLER AND DRIVE SHAFT MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
10-3	Propeller Shafts, Front and Rear Differential, - Replace/Repair	10-2
10-4	Drive Shaft Assembly, Transmission - Replace\Repair	10-7

10-3. PROPELLER SHAFTS, FRONT AND REAR DIFFERENTIAL - REPLACE/RRPAIR

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Equipment Condition

Vehicle parked on level ground.
Wheels blocked.
Negative battery cable disconnected,
para. 8-44.

Materials/Parts

Grease (App. C, Item 14)
Lockwashers (3)
Lockwashers (10)
Lockwashers (14)
Lockwashers (18)
Loctite 242 (App. C, Item 39)
Seal (21)

NOTE

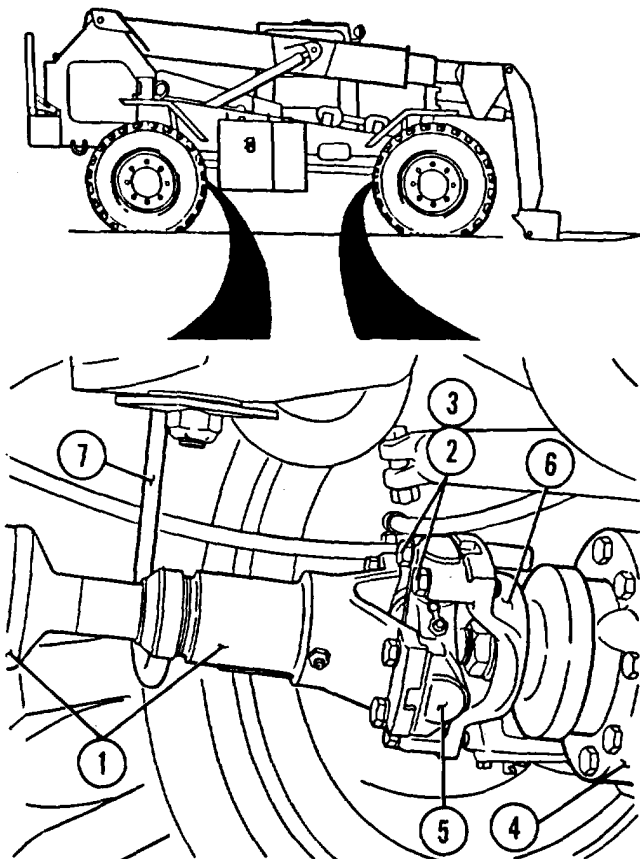
Removal, disassembly, assembly, and installation procedures are similar for both front and rear differential propeller shafts.

REMOVAL

NOTE

Support shaft (1) so it does not drop when bolts (2) and lockwashers (3) are removed.

1. REMOVE PROPELLER SHAFT (1) FROM AXLE (4) .
 - a. Remove four capscrews (2) and four lockwashers (3) securing universal joint (5) of shaft (1) to yoke (6) of axle (4). Discard lockwashers (3).
 - b. Hang axle end of shaft (1) on hook (7) of vehicle frame.

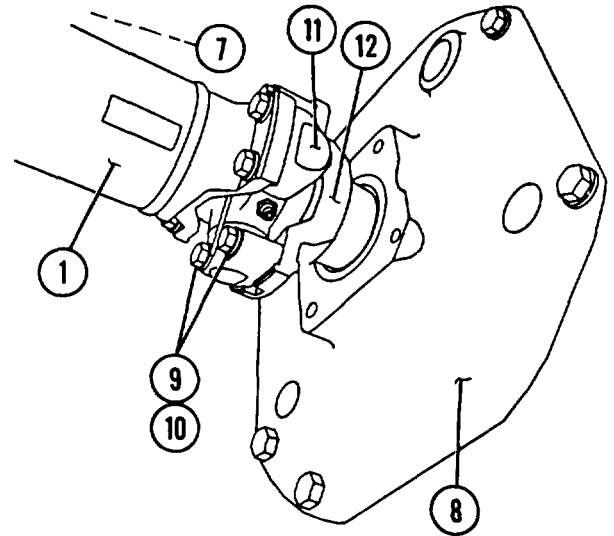


10-3. PROPELLER SHAFTS, FRONT AND REAR DIFFERENTIAL - REPLACE/REPAIR (Cont'd)

NOTE

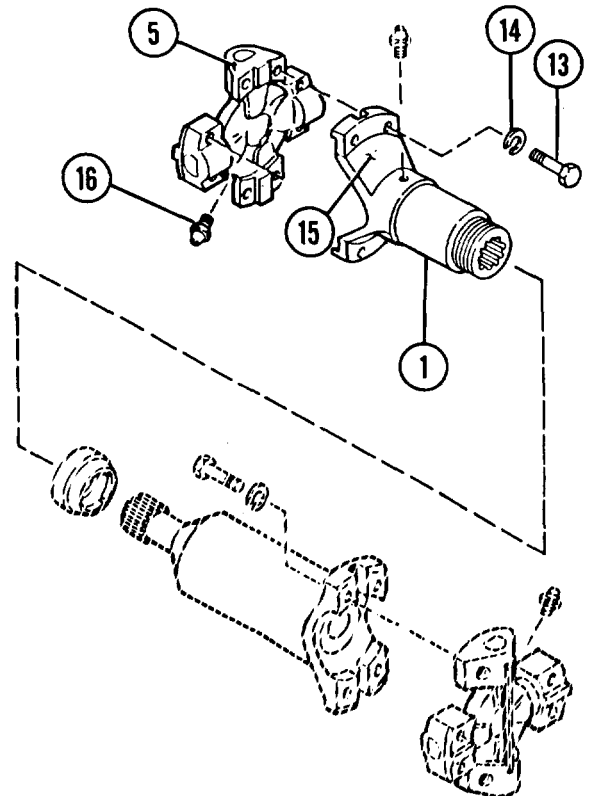
Support shaft (1) so it does not drop when capscrews (9) and lockwashers (10) are removed.

2. REMOVE PROPELLER SHAFT (1) FROM TRANSMISSION (8).
 - a. Remove four capscrews (9) and four lockwashers (10) securing universal joint (11) of shaft (1) to yoke (12) of transmission (8). Discard lockwashers (10).
 - b. Lift to remove shaft (1) from hook (7) on vehicle frame.



DISASSEMBLY

1. REMOVE UNIVERSAL JOINTS (5) AND (11) FROM PROPELLER SHAFT (1).
 - a. Remove four capscrews (13) and four lockwashers (14) securing universal joint (5) to yoke (15) on axle end of shaft (1). Discard lockwashers (14).
 - b. Separate universal joint (5) from yoke (15).
 - c. If necessary, remove lubrication cat ion fitting (16) from universal joint (5).



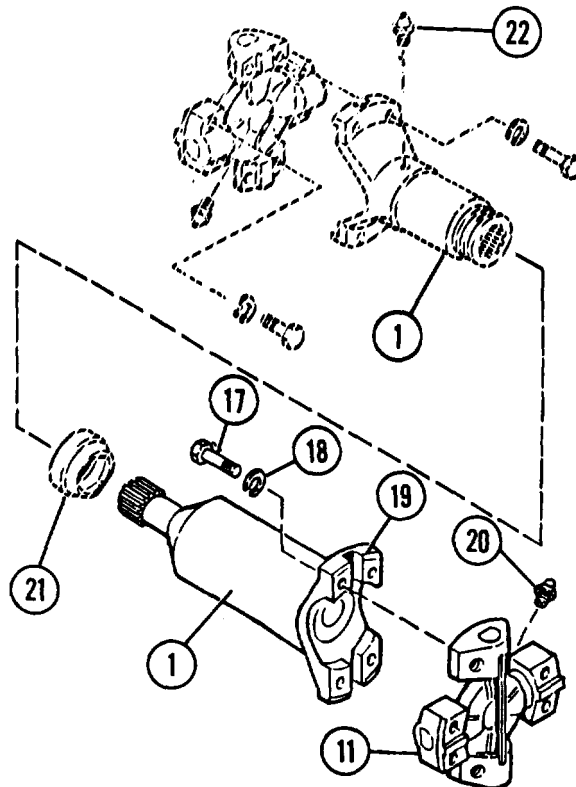
10-3. PROPELLER SHAFTS, FRONT AND REAR DIFFERENTIAL - REPLACE/REPAIR (Cont' d)

- d. Remove four capscrews (17) and four lockwashers (18) securing universal joint (11) to yoke (19) on transmission end of shaft (1). Discard lockwashers (18).
- e. Separate universal joint (11) from yoke (19).
- f. If necessary, remove lubrication fitting (20) from universal joint (11),

2. IF NECESSARY, SEPARATE AXLE AND TRANSMISSION ENDS OF PROPELLER SHAFT (1) .

- a. Turn seal (21) counterclockwise from axle end of shaft (1).
- b. Slide axle end of shaft (1) out of transmission end of shaft (1). Discard seal (21).

3. IF NECESSARY, REMOVE LUBRICATION FITTING (22) FROM AXLE END OF SHAFT (1) .

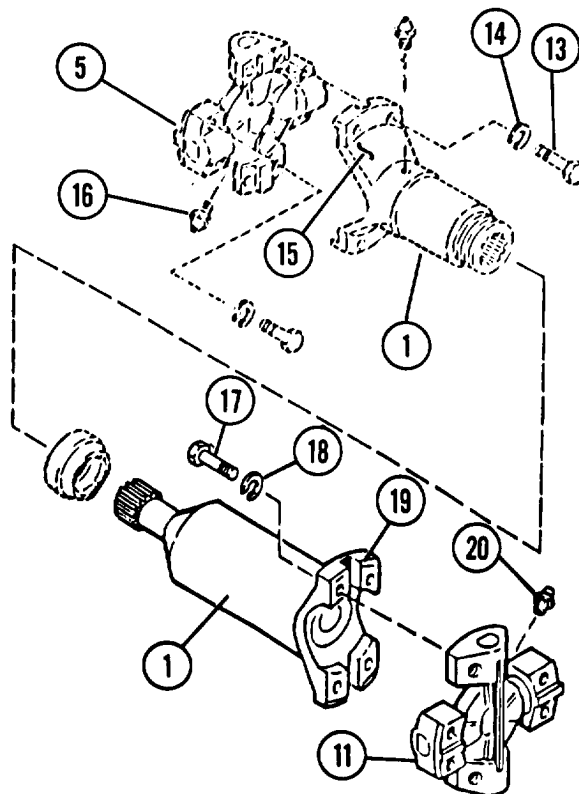


ASSEMBLY

- 1. IF REMOVED, INSTALL LUBRICATION FITTING (22) TO AXLE END OF PROPELLER SHAFT (1).
- 2. IF SEPARATED, INSERT TRANSMISSION END OF SHAFT (1) INTO AXLE END OF SHAFT (1) .
 - a. Carefully position seal (21) on transmission end of shaft (1).
 - b. Slide transmission end of shaft (1) into axle end of shaft (1).
 - c. Install seal (21) on threads of axle end of shaft (1).

10-3. PROPELLER SHAFTS, FRONT AND REAR DIFFERENTIAL - REPLACE/REPAIR (Cont'd)

3. INSTALL UNIVERSAL JOINTS (11) AND (5) To PROPELLER SHAFT (1).
- a. If removed, install lubrication fitting (20) to universal joint (11) 1
 - b. Align universal joint (11) with yoke (19) on transmission end of shaft (1).
 - c. Apply Loctite 242 to four capscrews (17). Secure universal joint (11) to yoke (19) with four new lockwashers (18) and four capscrews (17). Torque capscrews (17) to 44 lb. ft.
 - d. If removed, install lubrication fitting (16) to universal joint (5) .
 - e. Align universal joint (5) with yoke (15) on axle end of shaft (1).
 - f. Apply Loctite 242 to four capscrews (13) . Secure universal joint (5) to yoke (15) with four new lockwashers (14) and four capscrews (13). Torque capscrews (13) to 41 lb. ft.

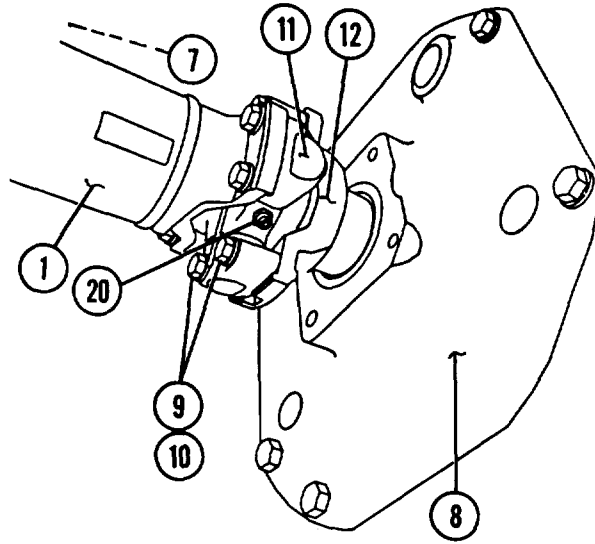


10-3. PROPELLER SHAFTS, FRONT AND REAR DIFFERENTIAL - REPLACE/REPAIR (Cont'd)

INSTALLATION

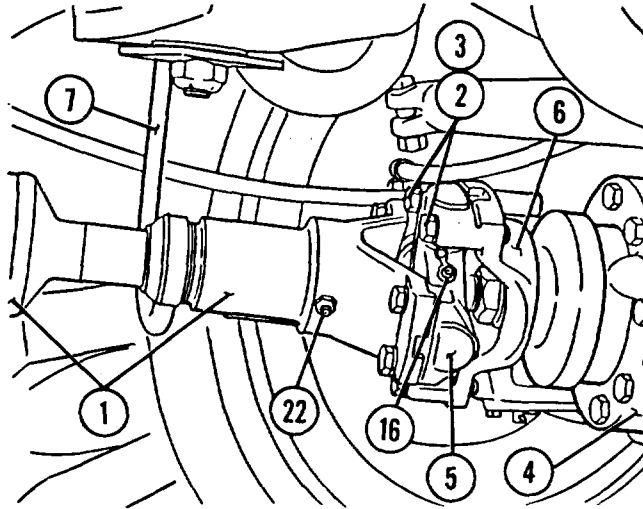
1. INSTALL PROPELLER SHAFT (1) TO TRANSMISSION (8).

- a. Position shaft (1) so it is partially supported by hook (7) on vehicle frame.
- b. Apply Loctite 242 to four capscrews (9). Secure universal joint (11) of shaft (1) to yoke (12) of transmission (8) with four capscrews (9) and four new lockwashers (10). Torque capscrews (9) to 41 lb. ft.



2. INSTALL PROPELLER SHAFT (1) TO AXLE (4).

- a. Lift and remove axle end of shaft (1) from hook (7) on vehicle frame.
- b. Apply Loctite 242 to four capscrews (2). Secure universal joint (5) of shaft (1) to yoke (6) on axle (4) with four capscrews (2) and four new lockwashers (3). Torque capscrews (3) to 41 lb. ft.



30 APPLY GREASE TO LUBRICATION FITTINGS (16), (20), and (22).

4. REMOVE BLOCKING MATERIAL FROM WHEELS.

10-4. DRIVE SHAFT ASSEMBLY, TRANSMISSION - REPLACE/REPAIR

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

Grease (App. C, Item 14)
Lockwashers (4)
Lockwashers (14)
Loctite 242 (App. C, Item 39)
Seal (17)

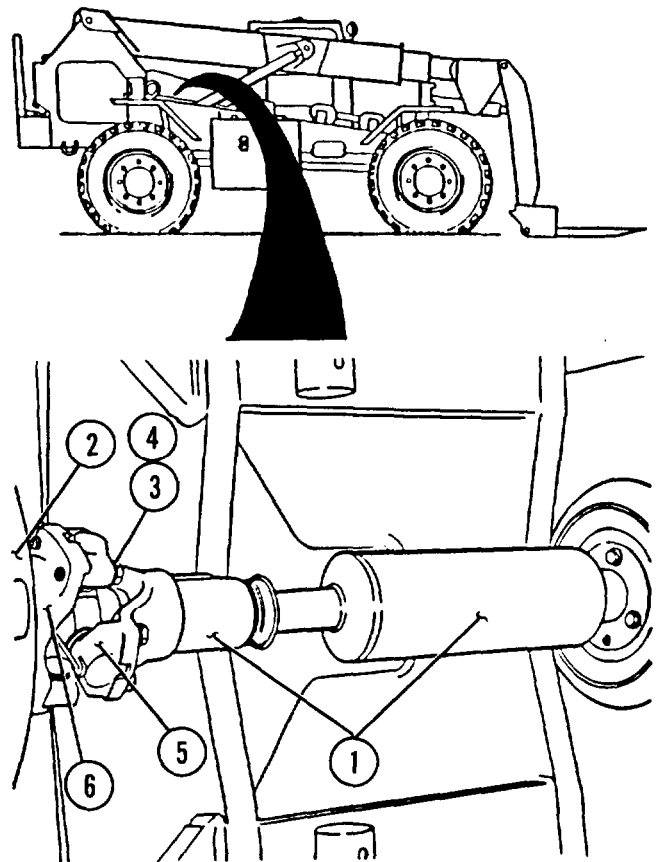
Equipment Condition

Vehicle parked on level ground.
Wheels blocked.
Transmission cover removed,
para. 16-6.
Negative battery cable disconnected,
para. 8-44.

REMOVAL

1. REMOVE DRIVE SHAFT ASSEMBLY (1) FROM TRANSMISSION (2).

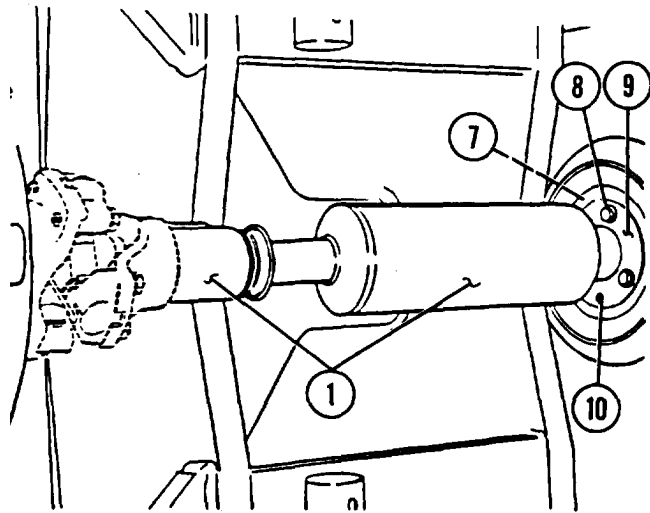
Remove four capscrews (3) and four lockwashers (4) securing universal joint (5) of shaft assembly (1) to input yoke (6) of transmission (2). Discard lockwashers (4).



10-4. DRIVE SHAFT ASSEMBLY, TRANSMISSION - REPLACE/REPAIR (Cont'd)

2. REMOVE DRIVE SHAFT ASSEMBLY (1) FROM ENGINE DAMPENER (7) .

- a. Remove three coupling (9) .
- b. Temporarily install two of the capscrews (8) removed in step 2a into two jacking holes (10) of engine coupling (9).
- c. Tighten two capscrews (8) evenly until shaft assembly (1) and engine coupling (9) separate from engine dampener (7).
- d. Remove coupling (9) and shaft assembly (1) from vehicle as an assembly.



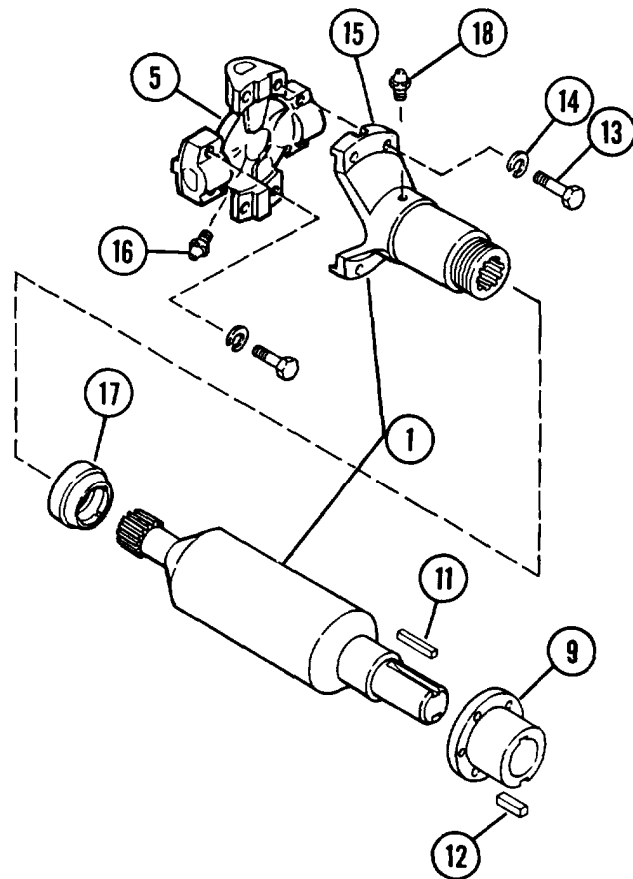
DISASSEMBLY

1. REMOVE ENGINE COUPLING (9) FROM DRIVE SHAFT ASSEMBLY (1).

- a. Remove two capscrews (8) from jacking holes (10).
- b. Tap and remove coupling (9) from shaft assembly (1).
- c. Remove key (11) from keyway of shaft assembly (1).
- d. If necessary, remove key (12) from coupling (9).

2. REMOVE UNIVERSAL JOINT (5) FROM DRIVE SHAFT ASSEMBLY (1).

- a. Remove four capscrews (13) and four lockwashers (14) securing universal joint (5) to yoke (15) of shaft assembly (1). Discard lockwashers (14) .
- b. Separate universal joint (5) from yoke (15).
- c. If necessary, remove lubrication fitting (16) from universal joint (5).



10-4. DRIVE SHAFT ASSEMBLY, TRANSMISSION - REPLACE/REPAIR (Cont'd)

3. IF NECESSARY, SEPARATE ENGINE AND TRANSMISSION ENDS OF DRIVE SHAFT ASSEMBLY (1).
 - a. Slide engine end of shaft assembly (1) out of transmission end of shaft assembly (1). Discard seal (17) .
 - b. Remove seal (17) from transmission end of shaft assembly (1).
4. IF NECESSARY, REMOVE LUBRICATION FITTING (18) FROM TRANSMISSION END OF DRIVE SHAFT ASSEMBLY (1).

ASSEMBLY

1. IF REMOVED, INSTALL LUBRICATION FITTING (18) TO TRANSMISSION END OF DRIVE SHAFT ASSEMBLY (1).
- 20 IF SEPARATED, ASSEMBLE TRANSMISSION END OF DRIVE SHAFT ASSEMBLY (1) TO ENGINE END OF DRIVE SHAFT ASSEMBLY (1) .
 - a. Position new seal (17) on engine end of shaft assembly (1).
 - b. Slide transmission end of shaft assembly (1) into engine end of shaft assembly (1).
 - c. Tighten seal (17) on threads of transmission end of shaft assembly (1) .
3. INSTALL UNIVERSAL JOINT (5) TO DRIVE SHAFT ASSEMBLY (1).
 - a. If removed, install fitting (16) to universal joint (5).
 - b. Align universal joint (5) with yoke (15) on transmission end of shaft assembly (1).

10-4. DRIVE SHAFT ASSEMBLY, TRANSMISSION - REPLACE/REPAIR (Cont'd)

- c. Apply Loctite 242 to four capscrews (13). Secure universal joint (5) to yoke (15) with four new lockwashers (14) and four capscrews (13). Torque capscrews (13) to 41 lb. ft.

4. INSTALL ENGINE COUPLING (9).

- a. Install key (11) in groove on shaft assembly (1).
- b. Push coupling (9) on shaft assembly (1).
- c. Install key (12) in groove on engine coupling (9).

INSTALLATION

1. INSTALL DRIVE SHAFT ASSEMBLY (1) TO ENGINE (7).

- a. Position engine coupling (9) with shaft assembly (1) into engine dampener (7).
- b. Apply Loctite 242 to three capscrews (8) and secure coupling (9) to engine with capscrews (8). Tighten capscrews to 25 lb. ft.

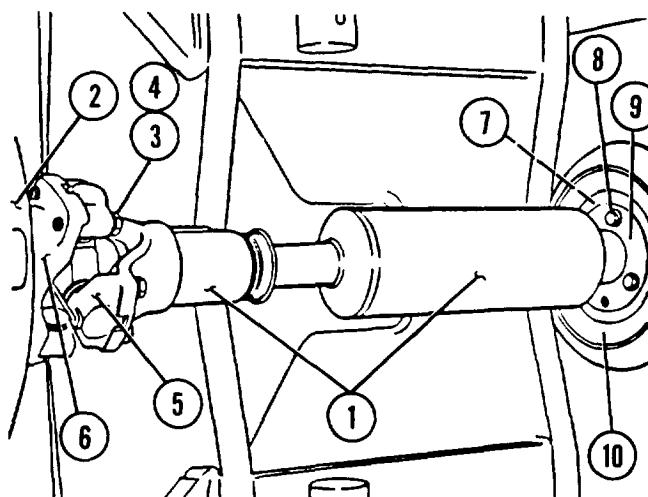
2. INSTALL DRIVE SHAFT ASSEMBLY (1) TO TRANSMISSION (2).

- a. Apply Loctite 242 to four capscrews (3). Secure universal joint (5) of shaft assembly (1) to input yoke (6) of transmission (2) with four capscrews (3) and four new lockwashers (4). Torque capscrews (3) to 41 lb. ft.

3. APPLY GREASE TO LUBRICATION FITTINGS.

4. INSTALL TRANSMISSION COVER, PARA. 16-6.

5. REMOVE BLOCKING MATERIAL FROM WHEELS.



CHAPTER 11

FRONT AND REAR AXLE ASSEMBLY MAINTENANCE

11-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the axle assemblies. To find a specific maintenance procedure, see the maintenance task summary below.

11-2. AXLE ASSEMBLIES MAINTENANCE TASK SUMMARY

TASK PARA 1	PROCEDURES	PAGE NO.
11-3	Axle Assemblies - <i>Service</i>	11-2
11-4	Planetary Wheel Ends - <i>Service</i>	11-4

11-3. AXLE ASSEMBLIES - SERVICE

This task covers:

- a. Service by checking axle oil level.
- b. Service by adding oil to axle.
- c. Service by cleaning axle venting hose.

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Container
 Gear Oil (App. C, Item 34)
 Lockwasher (7)

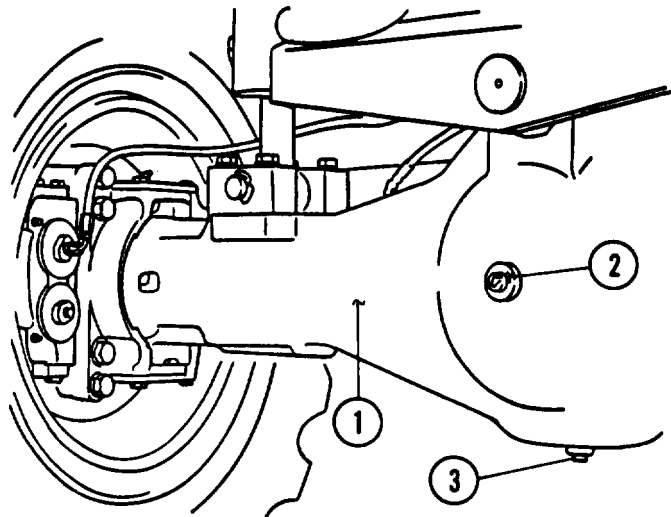
Equipment Condition

Vehicle parked on level ground.
 Wheels blocked.

NOTE

Service procedures for both front and rear axles are essentially similar.

1. CHECK OIL LEVEL OF AXLE (1) AND ADD OIL IF NECESSARY.
 - a. Remove oil level check plug (2) from axle (1).
 - b. Check that oil level is up to bottom of check plug hole. If not, add oil as described in step 2 of this section.
2. IF NECESSARY, ADD OIL TO AXLE (1).
 - a. Slowly add new oil to axle (1) through check plug hole until oil begins to flow back out of hole.
 - b. Recheck oil level and add *more* oil, if necessary, until oil level is up to bottom of check plug hole.
3. INSTALL OIL LEVEL CHECK PLUG (2) TO AXLE (1). FRONT AXLE SHOWN - REAR AXLE SIMILAR.
4. IF NECESSARY, DRAIN AND REFILL AXLE (1) WITH OIL.
 - a. Place a suitable container under axle drain plug (3).



Front axle shown - rear axle similar.

11-3. AXLE ASSEMBLIES - SERVICE (Cont'd)

- b. Remove axle drain plug (3) from the bottom of axle (1) and allow oil to drain from axle (1) completely.
 - c. Install axle drain plug (3) to axle (1).
 - d. Add oil to axle (1) as described in steps 1 through 3 of this section.
5. IF NECESSARY, CHECK AXLE VENTING HOSE (4) FOR OBSTRUCTIONS. REMOVE OBSTRUCTIONS AS REQUIRED.

NOTE

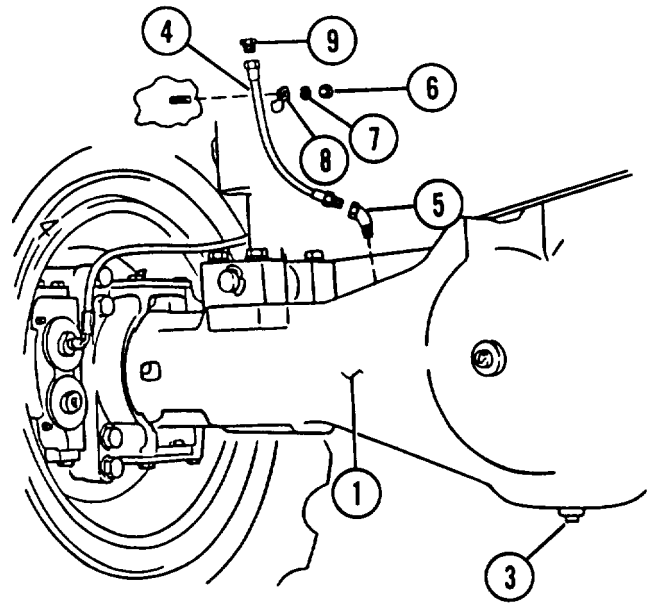
The axles are vented to release pressure caused by axle oil expansion.

A venting hole is located at the top of each axle. On the rear axle, the venting hole is on the left-hand side. On the front axle, the venting hole is on the right-hand side.

Each venting hole is connected by a hose to a frame-mounted breather.

Cleaning procedures for both front and rear axle venting hoses are essentially similar.

- a. Remove elbow (5) from axle (1).
- b. Remove nut (6), and lockwasher (7) securing hose support (8) to vehicle frame stud. Discard lockwasher (7).
- c. Remove elbow (5), hose support (8), hose (4), and breather (9) from vehicle frame stud as an assembly.
- d. Remove elbow (5), breather (9) and hose support (8) from hose (4).



Front axle shown - rear axle similar

- e. Inspect hose (4) for obstructions. If present, clear obstructions from hose (4).
 - f. Install elbow (5), breather (9) and hose support (8) to hose (4).
 - g. Position elbow (5), hose (4), hose support (8) and breather (9) as an assembly on vehicle frame stud.
 - h. Secure hose support (8) to vehicle frame stud with nut (6) and new lockwasher (7).
 - i. Install elbow (5) to axle (1).
6. REMOVE BLOCKING MATERIAL FROM WHEELS OF VEHICLE.

11-4. PLANETARY WHEEL ENDS - SERVICE

This task covers:

- Service by checking oil level and adding oil, if necessary.
- Service by draining and refilling oil.

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Container
Gear Oil (App. C, Item 34)

Equipment Condition

Vehicle parked on level ground.

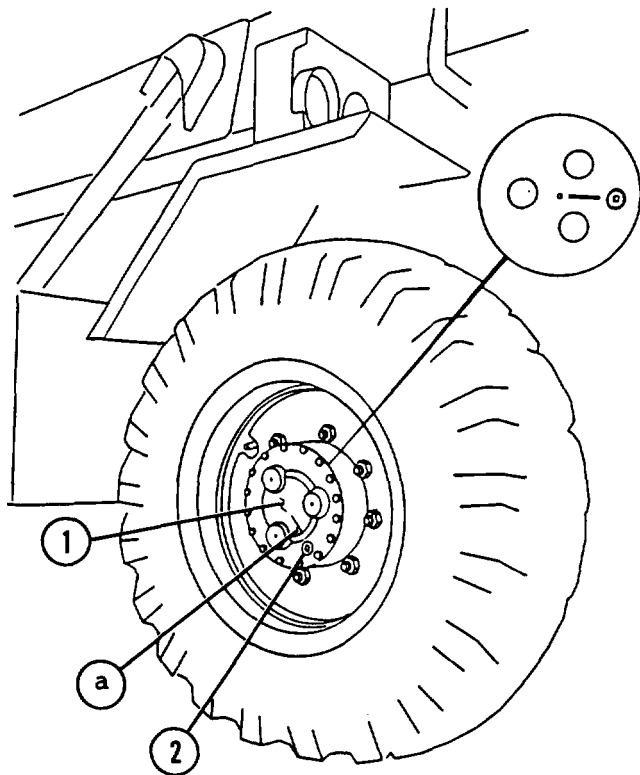
SERVICE BY CHECKING, DRAINING AND ADDING OIL

NOTE

The procedure for servicing each of the four planetary wheel ends is the same.

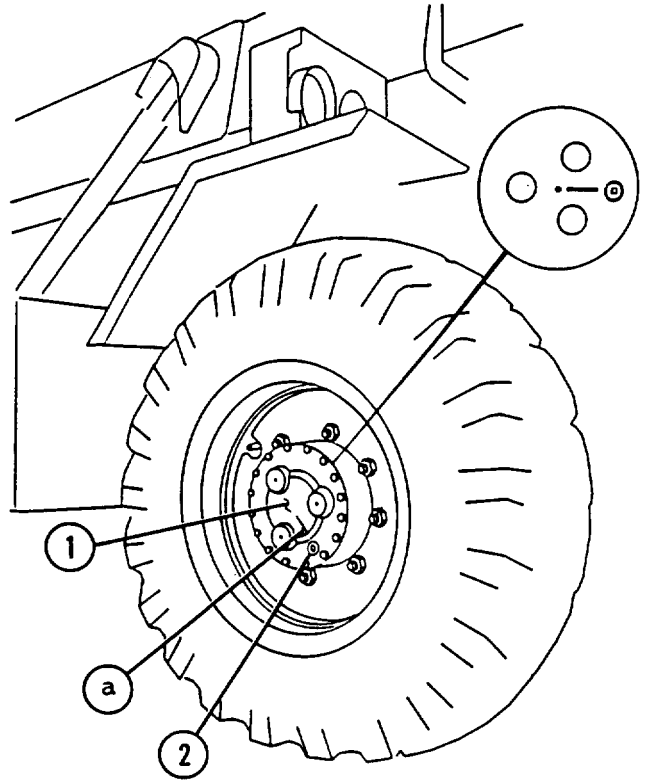
1. CHECK PLANETARY WHEEL END OIL LEVEL AND ADD OIL, IF NECESSARY.

- a. Start engine and move vehicle forward or backward, as required, until embossed oil level line (a) on planetary cover (1) is horizontal.
- b. Set parking brake and stop engine.
- c. Remove oil level check plug (2) from planetary cover (1).
- d. Check that oil level is up to bottom of check plug hole. If not, add new oil as described in step "e" of this section.
- e. If necessary, add new oil through oil level check plug hole until oil level reaches bottom of check plug hole. Do not overfill.
- f. Install oil level check plug (2) to planetary cover (1).



11-4. PLANETARY WHEEL ENDS - SERVICE (Cont'd)

2. IF NECESSARY, DRAIN AND REFILL PLANETARY WHEEL END (1) WITH OIL.
 - a. Start engine and move vehicle forward or backward, as required, until embossed oil level line (a) on planetary cover (1) is vertical.
 - b. Set parking brake and stop engine. Place a suitable container under the oil level check plug (2).
 - c. Remove oil level check plug (2) from planetary cover (1) and allow oil to drain completely.
 - d. Add oil to planetary wheel end (1) as described in step 1 of this paragraph.



CHAPTER 12

SERVICE AND PARKING BRAKE MAINTENANCE

12-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the service and parking brakes. To find a specific maintenance procedure, see the maintenance task summary below.

12-2. SERVICE AND PARKING BRAKE MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-3	Parking Brake Assembly - Replace	12-2
12-4	Parking Brake Lever and Cable - Adjust/Replace	12-5
12-5	Service Brake System - Bleeding	12-10
12-6	Service Brake Shoes - Inspect/Replace	12-12
12-7	Service Brake Control Valve - Replace/Adjust	12-15
12-8	Service Brake Hydraulic Accumulator - Replace/Repair/Test	12-22
12-9	Service Brake System Hoses, Lines, and Fittings - Replace/Repair	12-29

12-3. PARKING BRAKE ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

Cotter pin (5)
Loctite 242 (App. C, Item 39)
Rivets (13)
Seal (22)

Equipment Condition

Vehicle parked on level ground.
Wheels chocked.
Front propeller shaft removed,
para. 10-3.

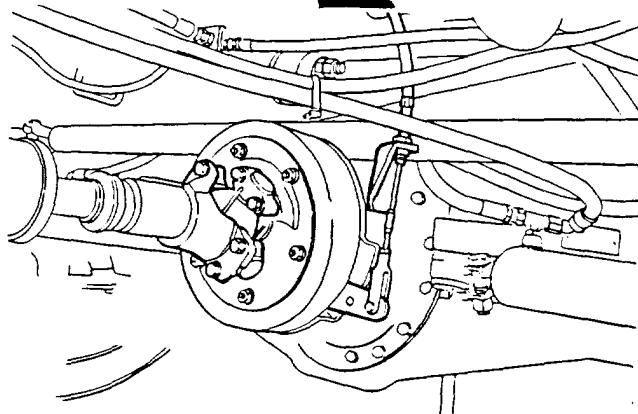
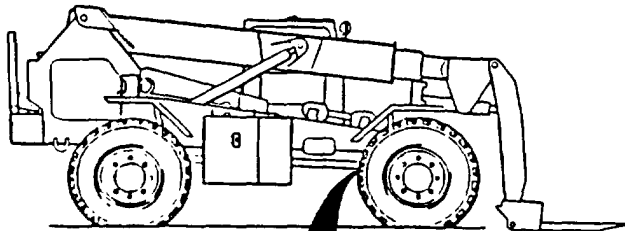
REMOVAL

WARNING

Be sure wheels are chocked before removing parking brake assembly.

NOTE

The parking brake is disassembled at removal. Parking brake cannot be removed as an assembly.



12-3. PARKING BRAKE ASSEMBLY - REPLACE (Cont'd)

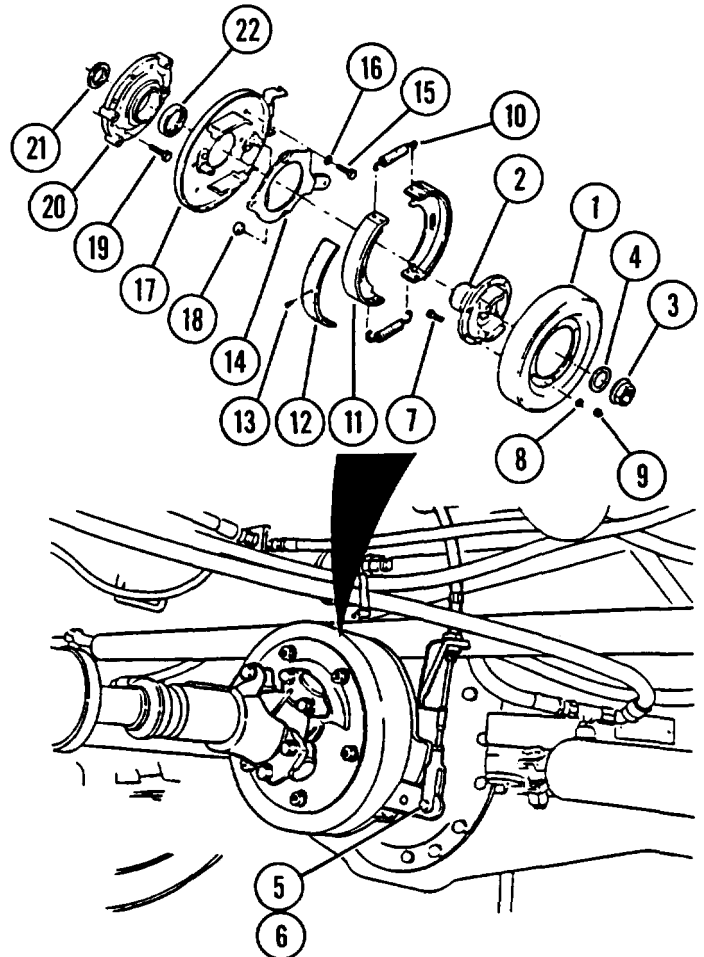
1. REMOVE AND DISASSEMBLE DRUM (1) FROM FLANGE (2).
 - a. Remove nut (3) and washer (4). Remove flange (2) and drum (1).
 - b. Release parking brake. Remove cotter pin (5) and pin (6). Discard cotter pin (5).
 - c. Remove six capscrews (7), six washers (8), and six nuts (9) from drum (1).
 - d. Separate drum (1) from flange (2).

2. REMOVE AND DISASSEMBLE PARKING BRAKE PARTS .

WARNING

Springs (10) are under tension. Always wear eyeglasses when working on springs under tension. Use care when removing springs (10) from brake shoes (11). Failure to follow these precautions could result in personal injury.

- a. Remove two shoe return springs (10).
- b. Remove two brake shoes (11) and two linings (12).
- c. If necessary, remove ten rivets (13) securing two linings (12). Discard rivets (13).
- d. Remove parking brake assembly lever (14).
- e. Remove four capscrews (15), four washers (16) and backing plate (17).
- f. Remove spacer (18).



12-3. PARKING BRAKE ASSEMBLY - REPLACE (Cont'd)

- g. Remove eight capscrews (19) and plate (20).
- h. Remove one thrust washer (21).
- i. Remove and discard seal (22).
- h. Place two brake shoes (11) and linings (12) in position. Install two shoe return springs (10) in holes closest to backing plate (17). Move lever (14), as needed, to facilitate shoe installation.

2. SECURE FLANGE (2) TO DRUM (1).

- a. Position drum (1) on flange (2).
- b. Secure drum (1) to flange (2) with six capscrews (7), six washers (8), and six nuts (9).
- c. Install pin (6) and new cotter pin (5). Set parking brake.
- d. Apply Loctite 242 to threaded area of differential pinion.
- e. Position flange (2) and drum (1) on parking brake assembly and secure with washer (4) and nut (3). Torque nut (3) to between 300 and 400 lb. ft.

INSTALLATION

1. ASSEMBLE AND INSTALL PARKING BRAKE PARTS .

- a. If removed, install new seal (22).
- b. Install thrust washer (21).
- c. Install plate (20) and secure with eight capscrews (19).
- d. Install spacer (18).
- e. Install backing plate (17) and secure with four washers (16) and four capscrews (15).
- f. Install parking brake assembly lever (14).
- g. If necessary, secure two linings (12) with ten new rivets (13).

30 INSTALL FRONT PROPELLER SHAFT, PARA. 10-3.

4. PLACE PARKING BRAKE IN ON POSITION AND REMOVE WHEEL CHOCKS.

12-4. PARKING BRAKE LEVER AND CABLE - ADJUST/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Adjustment of parking brake cable

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
 Wheels chocked.
 Negative battery cable removed,
 para. 8-44.

Materials/Parts

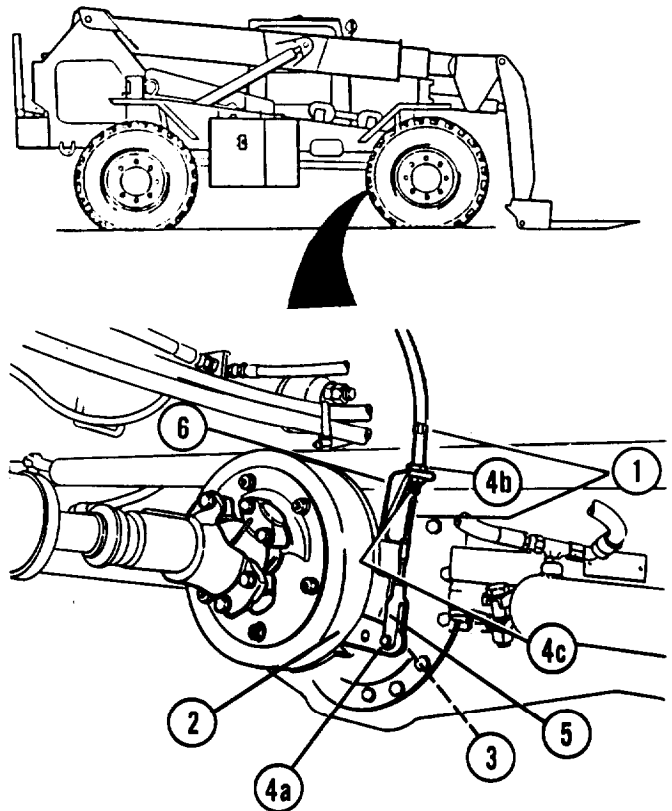
Cotter Pins (3) (8)
 Lockwashers (12) (13) (22) (23)
 Tie Straps (17)

Personnel Required

Two

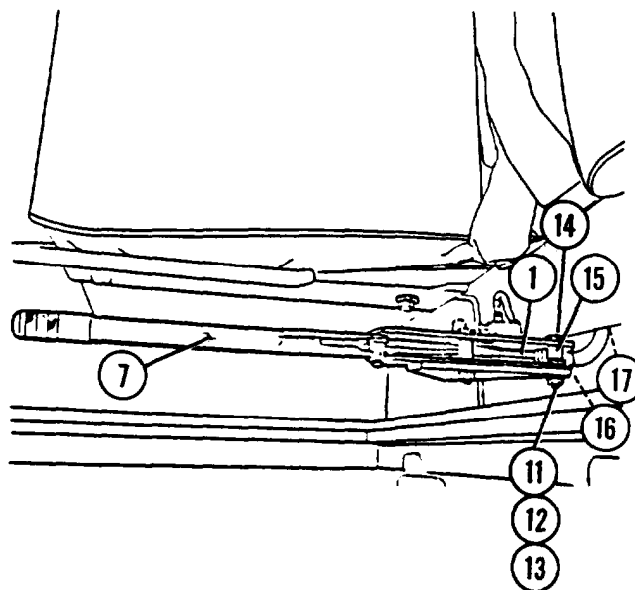
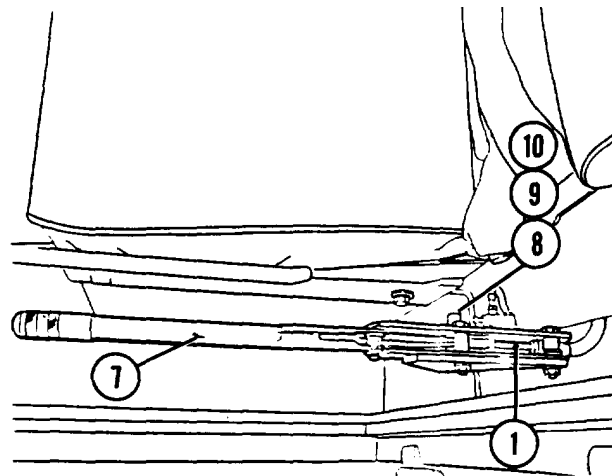
REMOVAL

1. PLACE PARKING BRAKE LEVER IN THE OFF POSITION.
2. DISCONNECT CABLE (1) FROM PARKING BRAKE ASSEMBLY (2).
 - a. Remove cotter pin (3) and clevis pin (4a) securing clevis (5) to parking brake assembly (2). Discard cotter pin (3).
 - b. Loosen nuts (4b) and (4c) pull cable (1) out of mounting bracket (6).



12-4. PARKING BRAKE LEVER AND CABLE - ADJUST/REPLACE (Cont'd)

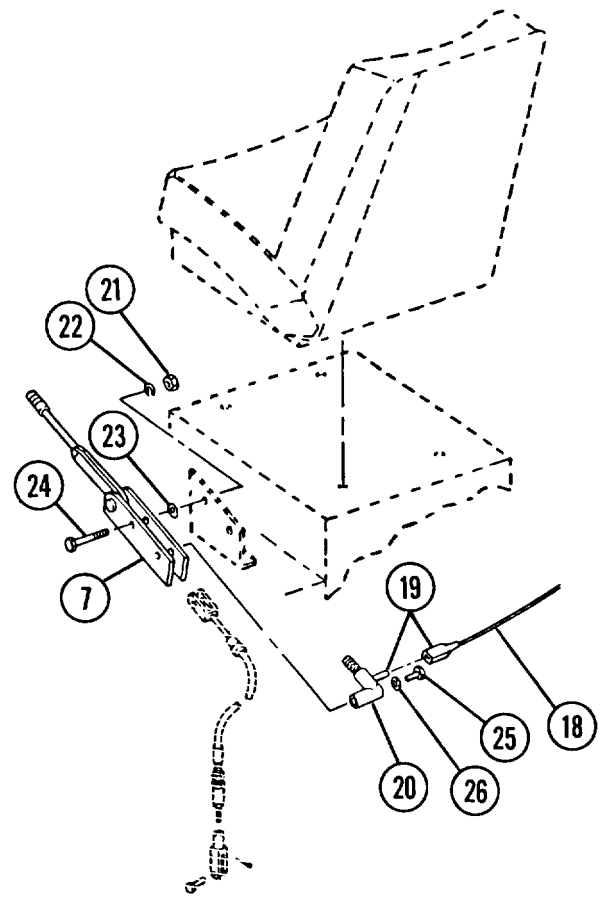
3. DISCONNECT CABLE (1) FROM LEVER (7) IN CAB.
 - a. Remove cotter pin (8), washer (9), and clevis pin (10). Discard cotter pin (8).
 - b. Remove nut (11), lockwasher (12), lockwasher (13), capscrew (14), and spacer (15) . Discard lockwashers (12) and (13).
 - c. Remove cable clamp (16) from cable (1).
4. CUT AND REMOVE TIE STRAPS (17) SECURING CABLE (1), AS NECESSARY. NOTE TIE STRAP LOCATIONS FOR USE DURING INSTALLATION.
5. NOTE ROUTING OF CABLE (1) ON VEHICLE CAB AND FRAME FOR USE DURING INSTALLATION AND REMOVE CABLE (1) FROM VEHICLE.



12-4. PARKING BRAKE LEVER AND CABLE - ADJUST/REPLACE (Cont' d)

6. REMOVE LEVER (7) FROM CAB.

- a. Remove electrical lead (18) at spade connectors (19) from switch (20).
- b. Remove two nuts (21), two lockwashers (22), two lockwashers (23) and two capscrews (24) securing lever (7) to cab. Discard lockwashers (22) and (23).
- c. If necessary, remove capscrew (25), flatwasher (26), and switch (20) from lever (7).



INSTALLATION

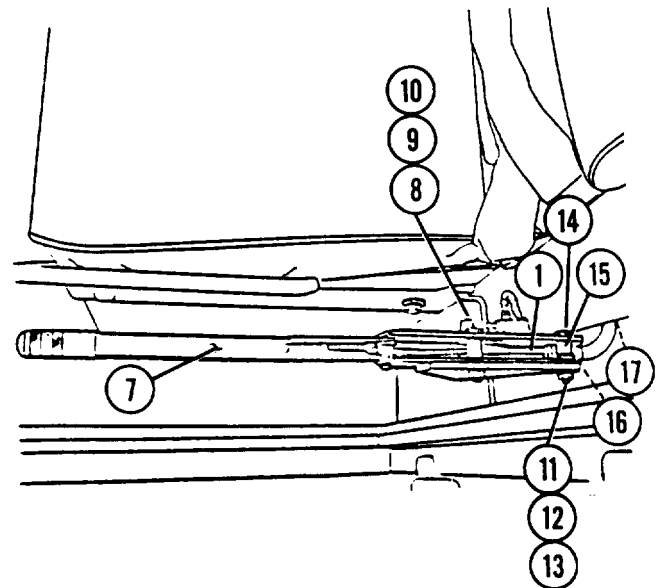
1. INSTALL LEVER (7) TO CAB.

- a. If removed, position switch (20) on lever (7) and secure with flatwasher (26) and capscrew (25).
- b. Position lever (7) on cab and secure with two capscrews (24), two new lockwashers (23), two new lockwashers (22), and two nuts (21).
- c. Connect electrical lead (18) at spade connectors (19) to switch (20).

2. POSITION CABLE (1) ON VEHICLE CAB AND FRAME AS NOTED DURING REMOVAL.

3. CONNECT CABLE (1) TO LEVER (7) IN CAB.

- a. Position cable clamp (16) on cable (1).
- b. Insert cable clamp (16) and cable (1) into lever (7). Install spacer (15), and capscrew (14) through clamp (16). Install new lockwasher (13), new lockwasher (12), and nut (11).



12-4. PARKING BRAKE LEVER AND CABLE - ADJUST/REPLACE (Cont'd)

c. Install pin (10), washer (9), and new cotter pin (8).

4. CONNECT CABLE (1) TO PARKING BRAKE ASSEMBLY (2).

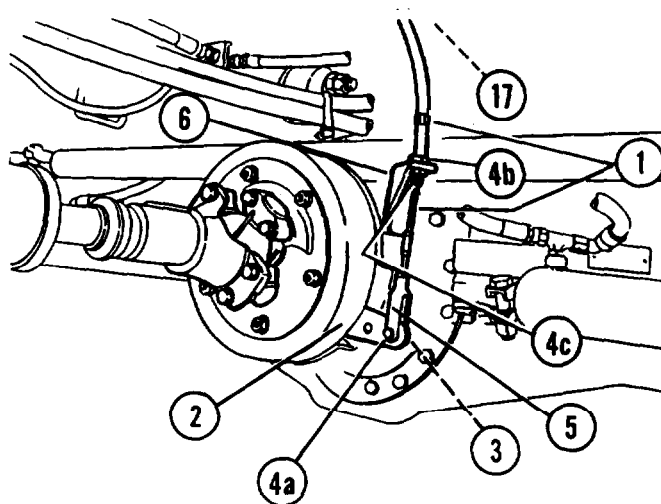
a. Secure clevis (5) to parking brake assembly (2) with clevis pin (4a) and new cotter pin (3).

b. Position cable (1) in mounting bracket (6) and tighten nuts (4b and 4c).

5. INSTALL NEW TIE STRAPS (17) AND SECURE CABLE (1) AS NOTED DURING REMOVAL.

6. ADJUST CABLE (1). REFER TO "ADJUSTMENT OF PARKING BRAKE CABLE" SECTION IN THIS PARAGRAPH.

7. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



ADJUSTMENT OF PARKING BRAKE CABLE

NOTE

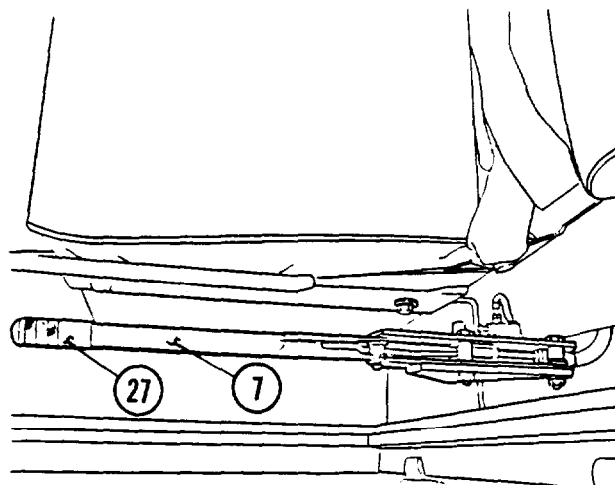
Minor adjustments of parking brake cable can be made by turning knob (27) on lever (7) in cab. A major adjustment is required if parking brake cannot be adjusted with the minor adjustment.

1. MAKE MINOR ADJUSTMENT OF PARKING BRAKE CABLE.

Turn adjustment knob (27) on end of lever (7) in or out as required until approximately 50 pounds of force is required to set the parking brake.

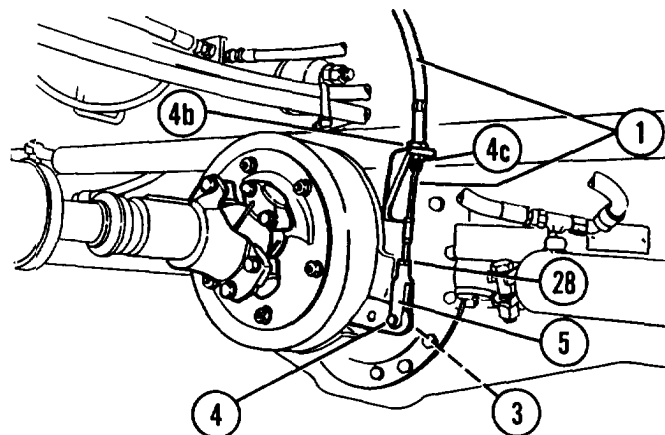
NOTE

If turning of knob (27) cannot bring parking brake cable into adjustment, perform major adjustment as described in step 2 of this section.



12-4. PARKING BRAKE LEVER AND CABLE - ADJUST/RBPM (Cont'd)

2. MAKE MAJOR ADJUSTMENT, IF NECESSARY.
 - a. Place lever (7) in the OFF position.
 - b. Turn knob (27) on lever (7) so knob (27) is approximately at middle of its full travel.
 - c. Loosen jam nut (4b) on cable (1).
 - d. Tighten adjusting nut (4c) on cable (1) approximately two turns.
 - e. Pull lever (7) to the on position. It should take about 50 lbs. of pulling force to set parking brake.
 - f. If necessary, repeat steps 2a through 2e until a 50 lb. pull on lever (7) is obtained.
 - g. Tighten jam nut (4b).
3. IF NECESSARY, ADJUST CLEVIS (5) .
 - a. Remove cotter pin (3) and clevis pin (4). Discard cotter pin (3).
 - b. Loosen locknut (28). Turn clevis in or out as required. Tighten locknut (28).
 - c. Install new cotter pin (3) and clevis pin (4).
4. PLACE PARKING BRAKE IN ON POSITION AND REMOVE WHEEL CHOCKS.



12-5. SERVICE BRAKE SYSTEM - BLEEDING

This task covers:
Brake bleeding (purging air)

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Parking brake engaged.

Materials/Parts

Clear Container, 1 Gal.
Two Hoses, 1/4 I.D. x 18 inch
Hydraulic Oil (APP. C, Item 35)

Personnel Required

Two Personnel

BLEEDING PROCEDURE

1. PLACE TRANSMISSION IN NEUTRAL AND START ENGINE.

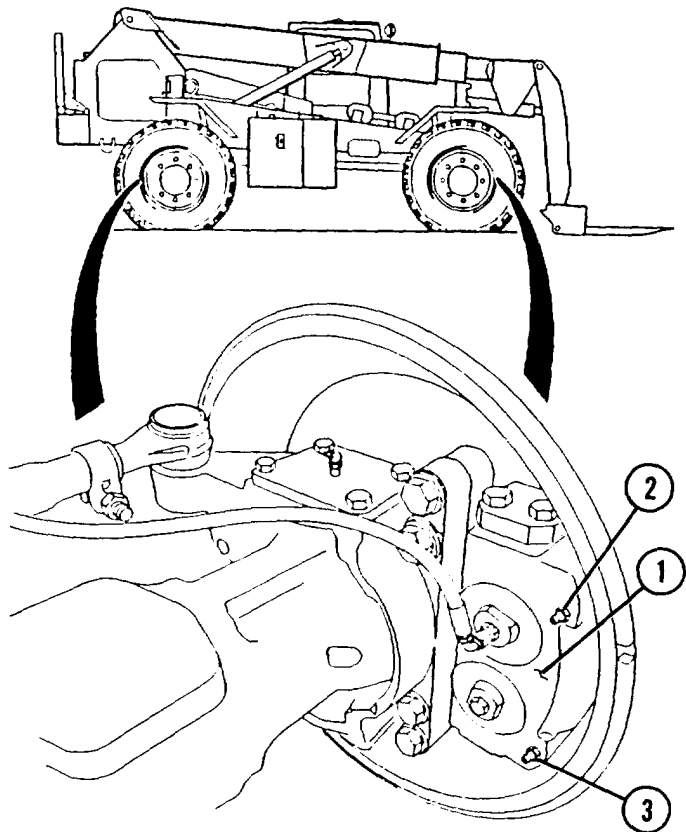
NOTE

Bleed each brake caliper (1) separately. If bleeding of more than one caliper is necessary, always begin with caliper furthest away from service brake control valve and work in to the closest.

2. INSTALL ONE TRANSPARENT HOSE OVER EACH BRAKE BLEEDER VALVE (2) AND (3). PLACE HOSE ENDS IN CLEAR CONTAINER HALF FILLED WITH HYDRAULIC OIL.

WARNING

Do not bleed brakes without bleeder hoses over brake bleeder valves (2) and (3). The vehicle is equipped with a power braking system. Without bleeder hoses attached, hydraulic oil can shoot considerable distances and cause injury. Always wear proper eye protection when bleeding brakes.



12-5. SERVICE BRAKE SYSTEM - BLEEDING (Cont'd)

3. BLEED BRAKE CALIPER (1).
 - a. Loosen each bleeder valve (2) and (3) one full turn.

NOTE

Do not release brake pedal until end of step 3c.

- b. Have an assistant depress brake pedal slowly and steadily until no air bubbles appear in oil draining from bleeder valves (2) and (3).
 - c. Tighten bottom bleeder valve (3) and top bleeder valve (2). Have assistant release brake pedal.
4. REMOVE HOSES FROM BRAKE BLEEDER VALVES (2) AND (3).
5. STOP ENGINE.
6. IF NECESSARY, REPEAT STEPS 1 THROUGH 5 AT OTHER BRAKE CALIPERS (1) ON VEHICLE, AS REQUIRED.
7. CHECK OIL LEVEL IN HYDRAULIC RESERVOIR. ADD HYDRAULIC OIL, IF NECESSARY, PARA. 5-10.

12-6. SERVICE BRAKE SHOES - INSPBCT/REPLACE

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

Denatured Alcohol (App. C, Item 2)
Loctite 271 (App. C, Item 40)
Shoes (1)
Wood Block

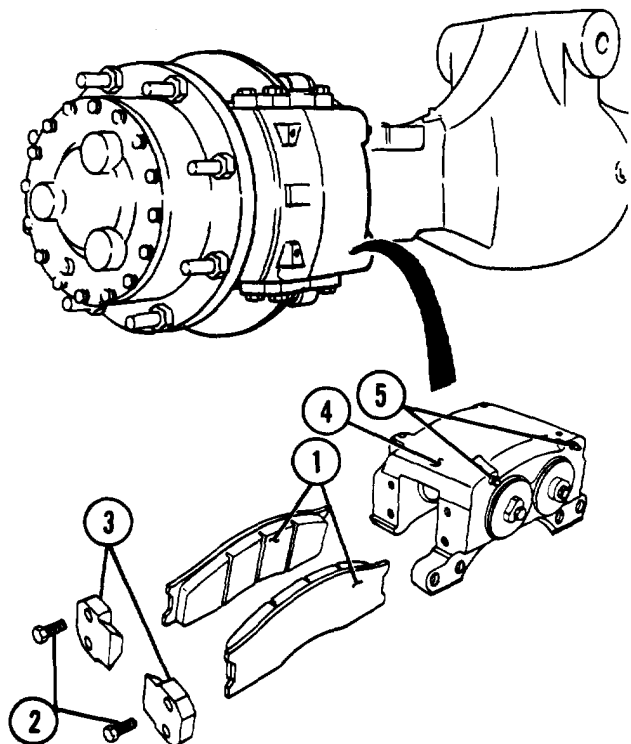
Equipment Condition

Wheel assembly removed, para. 13-3.

REMOVAL

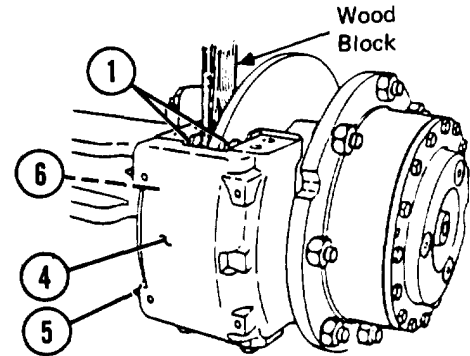
REMOVE SHOES (1).

- a. Remove four capscrews (2) and two brackets (3) from brake housing (4).
- b. Loosen bleeder valves (5) to release hydraulic pressure in brake housing (4).



12-6. SERVICE BRAKE SHOES - INSPECT/REPLCAE(Cont'd)

- c. Use a piece of wood against shoes (1) to push pistons (6) completely into brake housing (4).
- d. Tighten bleeder valves (5).
- e. Remove shoes (1) from brake housing (4).

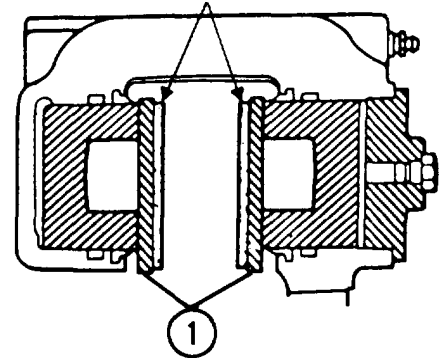


INSPECTION

INSPECT SHOES (1).

- a. Inspect shoes (1) for wear. Replace shoes (1) if thickness is less than 1/8 inch.
- b. Inspect shoes (1) for uneven wear. Replace shoes (1) if thickness varies between linings (1).

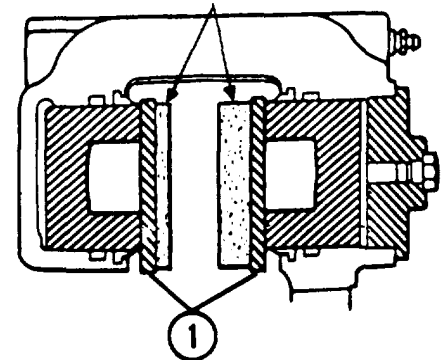
Minimum shoe thickness - 1/8 inch (3 mm) from backing plate



NOTE

If shoes (1) are worn unevenly, check pistons for correct operation. Replace pistons that are locked in the bore. Check that the disc surface is flat and parallel to the linings. Notify Direct Support Maintenance.

Uneven shoe wear



12-6. SERVICE BRAKE SHOES - INSPECT/REPLACE (Cont'd)

- c. Check shoes (1) for oil or grease. Clean shoes (1) with denatured alcohol or by burnishing. Replace shoes (1) if grease or oil cannot be removed.

NOTE

Cracks on surface of shoes (1) are normal when brakes are used under high temperature conditions.

- d. Check shoes (1) for cracks. Replace shoes (1) if necessary.

INSTALLATION

CAUTION

Always replace both shoes (1) as a set. If only one shoe is replaced, possible disc damage can occur.

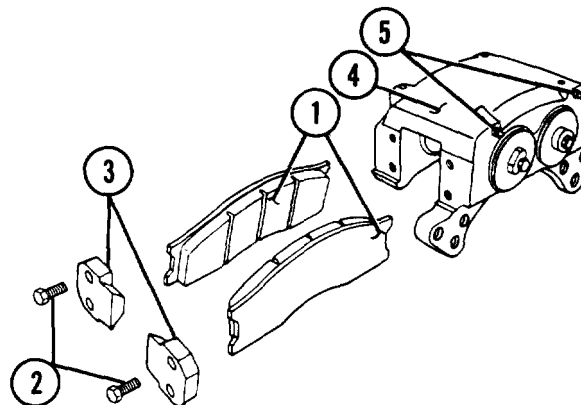
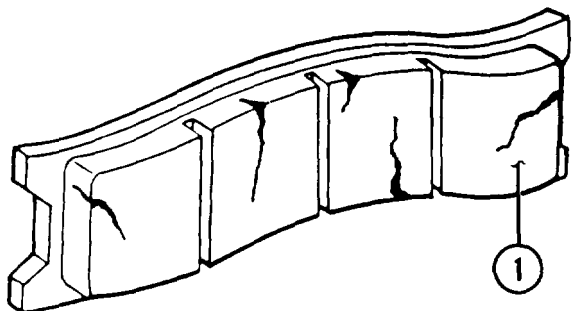
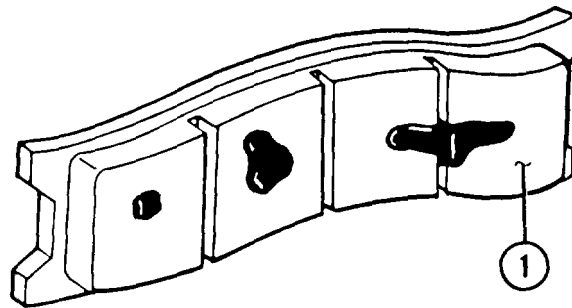
1. INSTALL SHOES (1).

- a. Position shoes (1) in brake housing (4).
- b. Position brackets (3) on brake housing (4).
- c. Apply Loctite 271 to threads of four capscrews (2) and secure brackets (3) with capscrews (2). Torque capscrews (2) to 170 lb. ft.
- d. Ensure that shoes (1) move freely in housing (4).

2. BLEED AIR FROM BRAKE SYSTEM, PARA. 12-5.

3. APPLY AND RELEASE BRAKE THREE TIMES TO ENSURE THAT BRAKE SYSTEM OPERATES CORRECTLY. CHECK FOR FLUID LEAKS. ENSURE THAT SHOES (1) MOVE FREELY IN HOUSING.

4. INSTALL WHEEL ASSEMBLY, PARA. 13-3.



12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjust Accumulator Charging Pressure

Initial Setup**Tools**

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Wheels blocked.
Brake hydraulic pressure switch disconnected, para. 8-18.
Hydraulic oil drained from fuel/hydraulic tank, para. 5-10.

Materials/Parts

Container
Cotter Pin (1)
Hydraulic Oil, (App. C, Item 36)
Lockwashers (20)
Loctite 242 (App. C, Item 39)
Tags (APP. C, Item 51)

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST (Cont' d)

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

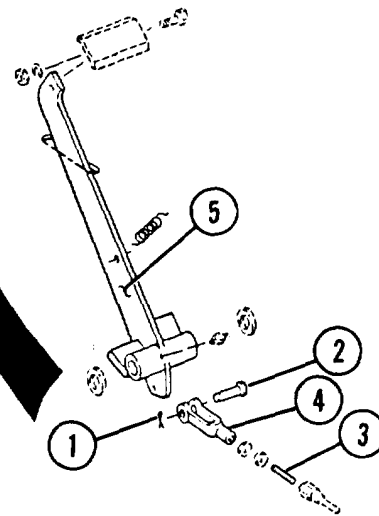
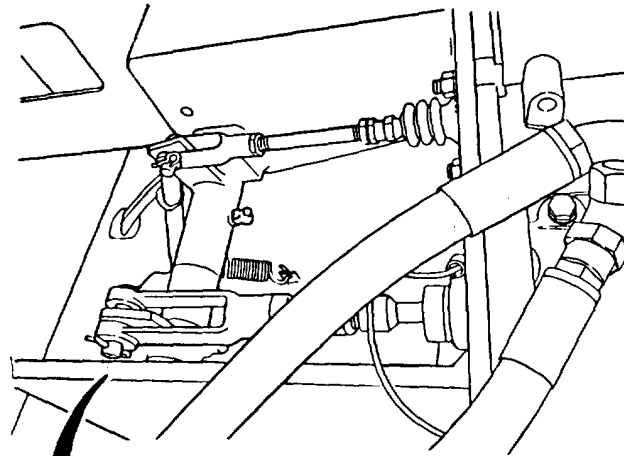
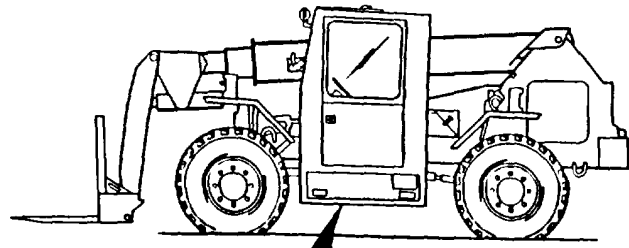
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. PUMP BRAKE PEDAL TO RELIEVE ACCUMULATOR PRESSURE.

With the engine stopped, pump the brake pedal until no power assistance is felt through the pedal. This will require approximately 20 depressions of the brake pedal.

2. DISCONNECT BRAKE PEDAL LINKAGE.

From under the cab, remove cotter pin (1) and clevis pin (2) securing push rod pin (3) and clevis (4) to the brake pedal arm (5). Remove clevis (4) from brake pedal arm (5). Discard cotter pin (1).



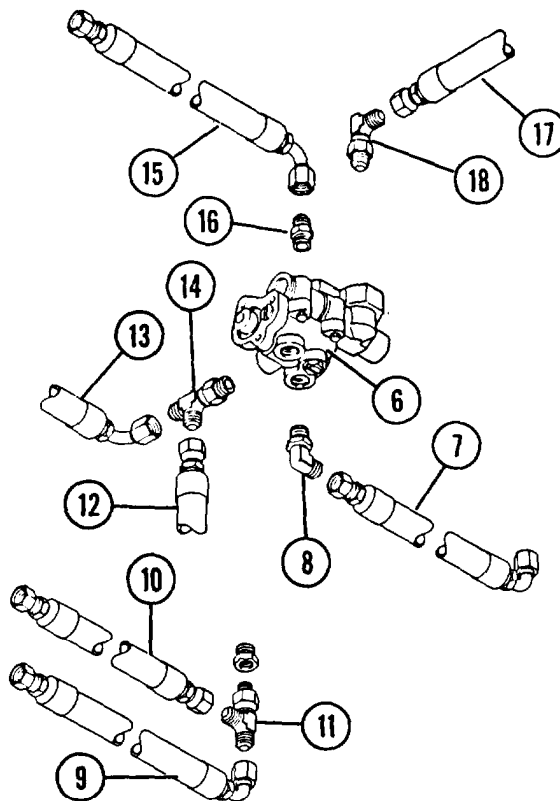
12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST (Cont'd)

NOTE

Hose (7) is connected directly to accumulator. Plug hose (7) with a #12 plug immediately after disconnecting from valve.

3. TAG AND DISCONNECT SEVEN HYDRAULIC HOSES AT THE SERVICE BRAKE CONTROL VALVE (6).

- a. Tag and disconnect hose (7) from elbow (8) on valve (6).
- b. Tag and disconnect hose (9) and hose (10) from tee (11) at valve (6).
- c. Tag and disconnect hose (12) and hose (13) from tee (14) at valve (6).
- d. Tag and disconnect hose (15) from adapter (16) at valve (6).
- e. Tag and disconnect hose (17) from elbow (18) at valve (6).



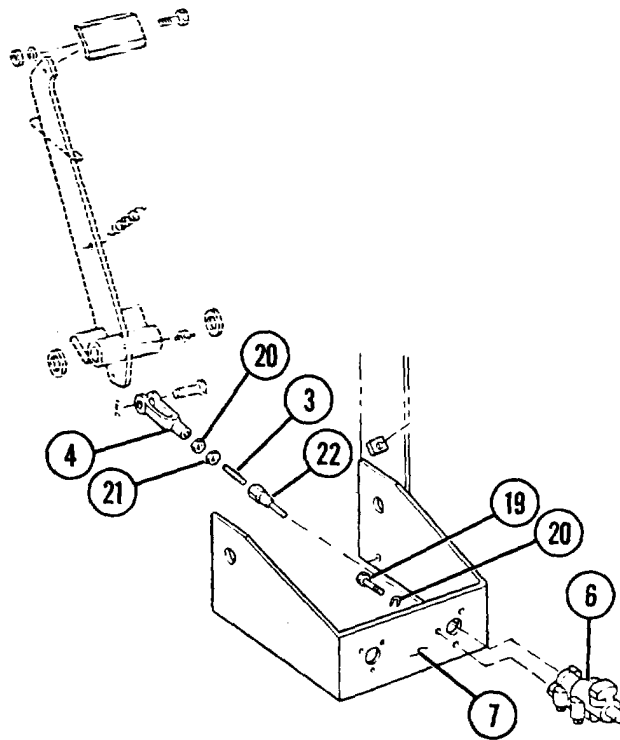
12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST (Cont'd)

4. REMOVE MOUNTING HARDWARE AND SERVICE BRAKE CONTROL VALVE (6).

NOTE

Support service brake control valve (6) so it does not drop during hardware removal.

- a. Remove three screws (19) and three lockwashers (20) securing valve (6) to bracket (7). Discard lockwashers (20).
 - b. Remove valve (6) from bracket (7).
5. IF NECESSARY, REMOVE LINKAGE FROM CLEVIS (4).
 - a. Loosen nuts (20) and (21) on pushrod pin (3).
 - b. Remove clevis (4) from pushrod pin (3).
 - c. Remove pushrod pin (3) from rod (22).
 - d. Remove nuts (20) and (21) from pushrod pin (3).
 6. IF NECESSARY, TAG AND REMOVE HYDRAULIC FITTINGS FROM SERVICE BRAKE CONTROL VALVE (6).
 - a. Tag and remove elbow (8) from valve (6).
 - b. Tag and remove tee (14) from valve (6).
 - c. Tag and remove adapter (16) from valve (6).
 - d. Tag and remove elbow (18) from valve (6).



12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST (Cont'd)

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

1. INSTALL HYDRAULIC FITTINGS TO SERVICE BRAKE CONTROL VALVE (6) AS TAGGED.

- a. Install elbow (18) to valve (6) as tagged.
- b. Install adapter (16) to valve (6) as tagged.
- c. Install tee (14) to valve (6) as tagged.
- d. Install elbow (8) to valve (6) as tagged.

2. IF REMOVED, INSTALL LINKAGE TO CLEVIS (4).

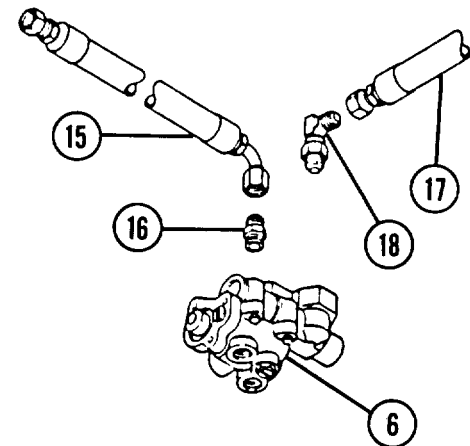
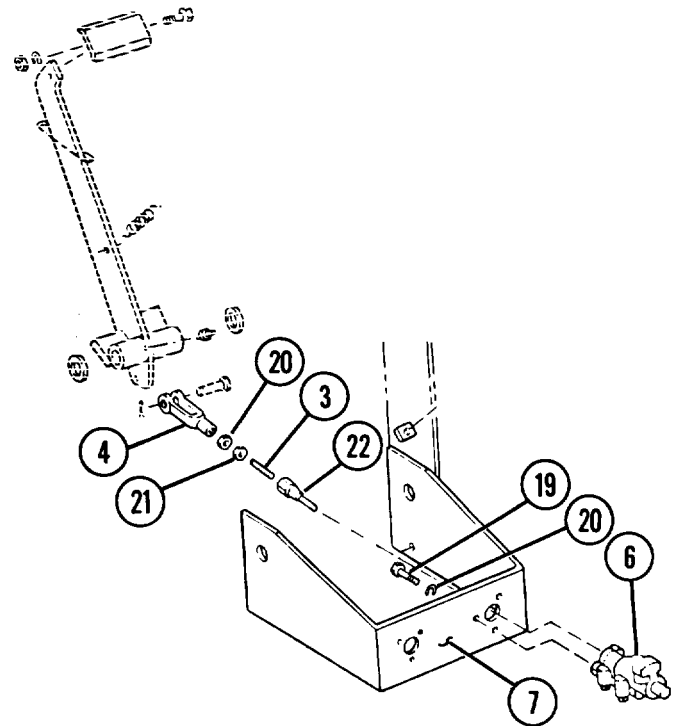
- a. Install jam nuts (20) and (21) to pushrod pin (3).
- b. Install pushrod pin (3) to rod (22).
- c. Install clevis (4) to pushrod pin (3).

3. INSTALL SERVICE BRAKE CONTROL VALVE (6) AND MOUNTING HARDWARE.

- a. Position and support valve (6) on bracket (7).

Apply Loctite 242 to threads of screws (19) 1

- b. Secure valve (6) to bracket (7) with three screws (19) and three new lockwashers (20).



4. CONNECT HYDRAULIC HOSES TO SERVICE BRAKE CONTROL VALVE (6) AS TAGGED.

- a. Connect hose (17) to elbow (18) at valve (6) as tagged.
- b. Connect hose (15) to adapter (16) at valve (6) as tagged.

12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST (Cont'd)

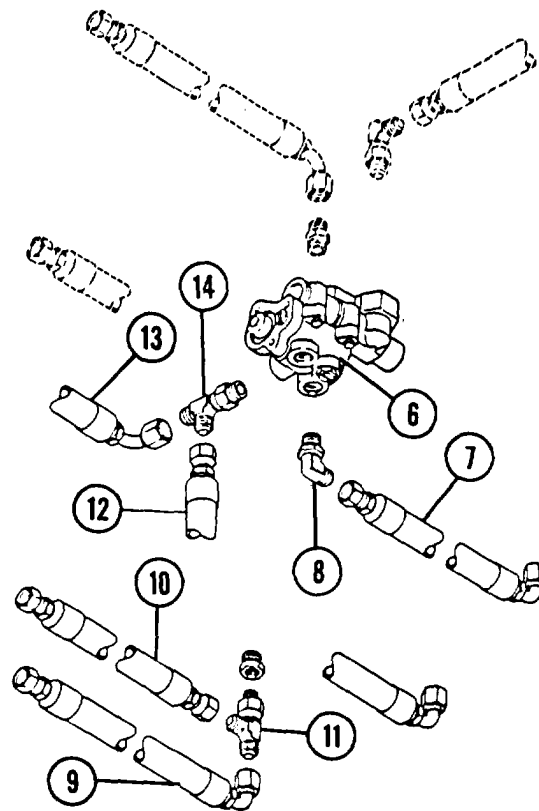
- c. Connect hose (12) and hose (13) to tee (14) at valve (6) as tagged.
- d. Connect hose (9) and hose (10) to tee (11) at valve (6) as tagged.
- e. Connect hose (7) to elbow (8) at valve (6) as tagged.

5. CONNECT BRAKE PEDAL LINKAGE.

- a. Rotate pushrod pin (3) and/or clevis (4) in or out as required until clevis pin (2) fits freely through holes on clevis (4) and brake pedal arm (5).
- b. Secure clevis (4) to brake pedal arm (5) with clevis pin (2) and new cotter pin (1).
- c. Tighten jam nuts (20) and (21) on pushrod pin (3).

6. FILL THE HYDRAULIC TANK, PARA. 5-10.

7. CONNECT THE BRAKE HYDRAULIC PRESSURE SWITCH, PARA. 8-18.

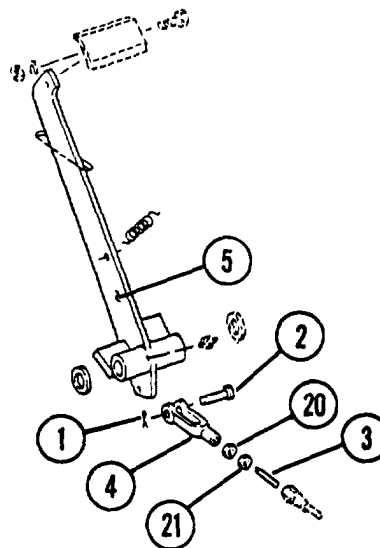


CAUTION

The brake system and hydraulic accumulator must be bled as soon as the brake control valve is installed. If this is not done, air in the system may not allow the brakes to release and may cause severe brake system damage.

8. BLEED THE HYDRAULIC ACCUMULATOR, PARA. 12-8.

9. BLEED THE BRAKE SYSTEM, PARA. 12-5.



12-7. SERVICE BRAKE CONTROL VALVE - REPLACE/ADJUST (Cont 'd)

ADJUST ACCUMULATOR CHARGING PRESSURE

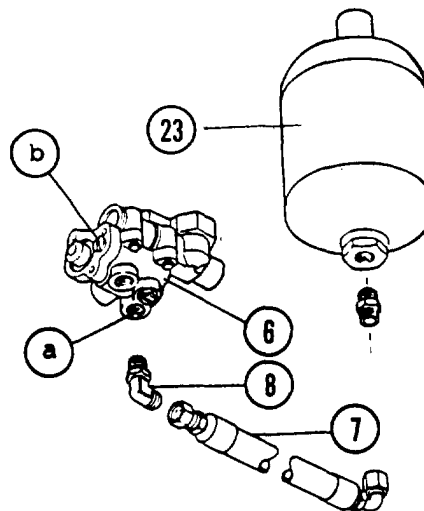
NOTE

The accumulator charging pressure is adjusted at the brake control valve.

1. PUMP THE BRAKE PEDAL TO RELIEVE PRESSURE IN ACCUMULATOR (23).

With the engine stopped, pump the brake pedal until no power assistance is felt through the pedal. This will require approximately 20 depressions of the brake pedal.

2. DISCONNECT HOSE (7) AND ELBOW (8) AT SERVICE BRAKE CONTROL VALVE (6).
3. INSTALL PRESSURE GAUGE TO ACCUMULATOR PORT (a) ON SERVICE BRAKE CONTROL VALVE (6).



NOTE

Note pressure gauge reading when click is heard in step 4.

4. START ENGINE AND LISTEN FOR CLICK CAUSED BY SHIFTING OF THE ACCUMULATOR CHARGING VALVE INSIDE SERVICE BRAKE CONTROL VALVE (6).
5. IF NECESSARY, ADJUST ACCUMULATOR CHARGING PRESSURE.
 - a. If pressure is less than 1650 +/- 25 psi at time click is heard, turn adjusting plug (b) on valve (6) clockwise until pressure is within specifications.
 - b. If pressure is greater than 1650 +/- 25 psi at time the click is heard, turn adjusting plug (b) on valve (6) counterclockwise until pressure is within specifications.
6. REMOVE PRESSURE GAUGE FROM ACCUMULATOR PORT (a) ON SERVICE BRAKE CONTROL VALVE (6).
7. CONNECT ELBOW (8) AND HOSE (7) AT SERVICE BRAKE CONTROL VALVE (6).
8. BLEED THE BRAKE SYSTEM, PARA. 12-5.

12-8. SBRVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics
Kit, Accumulator Charging
Cap and Plug Set

Materials/Parts

Container
Hydraulic Oil (App. C, Item 35)
Soap Solution (App. C, Item 45)

Equipment Condition

Vehicle parked on level ground.
All wheels blocked.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

12-8. SERVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST (Cont'd)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

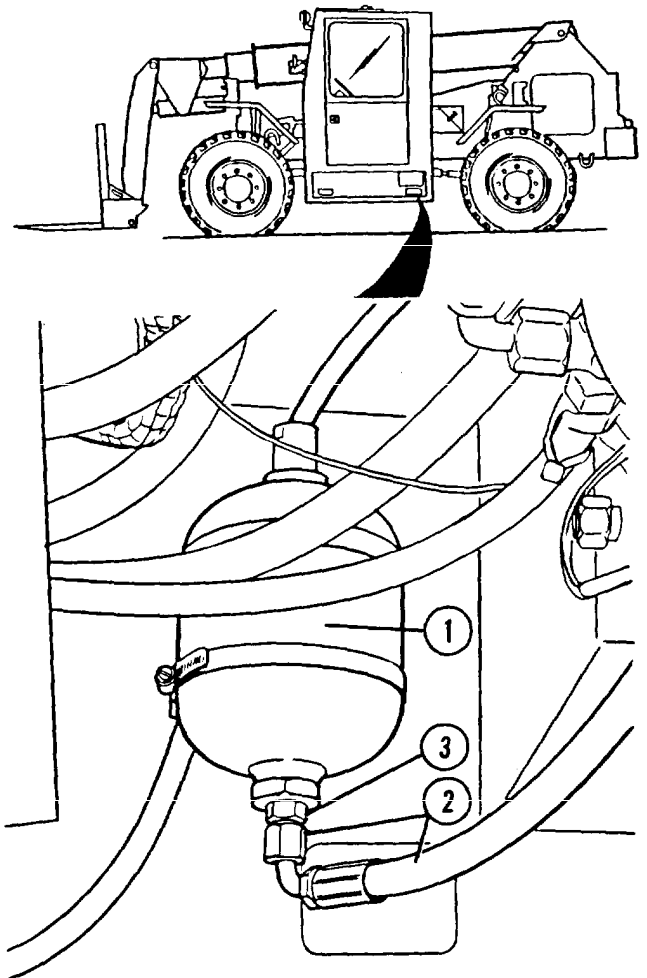
1. PUMP BRAKE PEDAL TO RELIEVE SERVICE BRAKE HYDRAULIC ACCUMULATOR PRESSURE.

With the engine stopped, pump the brake pedal until no power assistance is felt through the pedal. This will require approximately 20 depressions of the brake pedal.

NOTE

The accumulator is located under the cab, behind tool box.

2. DRAIN HYDRAULIC OIL FROM SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).
 - a. Place suitable bucket under accumulator (1).
 - b. Disconnect hydraulic hose (2) from adapter (3) at bottom of accumulator (1).
 - c. Allow accumulator (1) to drain completely.



12-8. SERVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST (Cont'd)

NOTE

Support accumulator (1) so it does not drop when clamps (4) are removed.

3. LOOSEN CLAMPS (4) SECURING SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) TO CAB AND REMOVE ACCUMULATOR (1) FROM VEHICLE.
4. IF NECESSARY, REMOVE CONNECTOR (3) FROM SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).

DISASSEMBLY

NOTE

The accumulator (1) may be repaired by replacing gas valve core (5) and caps (6) and (7). No other repairs should be attempted.

1. REMOVE OUTER GAS VALVE CAP (6) AND INNER GAS VALVE CAP (7) FROM SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).
2. REMOVE GAS VALVE CORE (5) FROM SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).

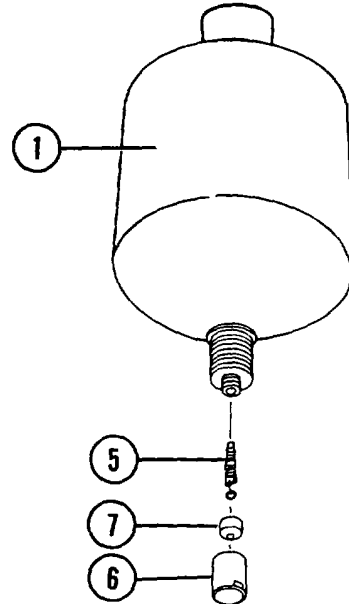
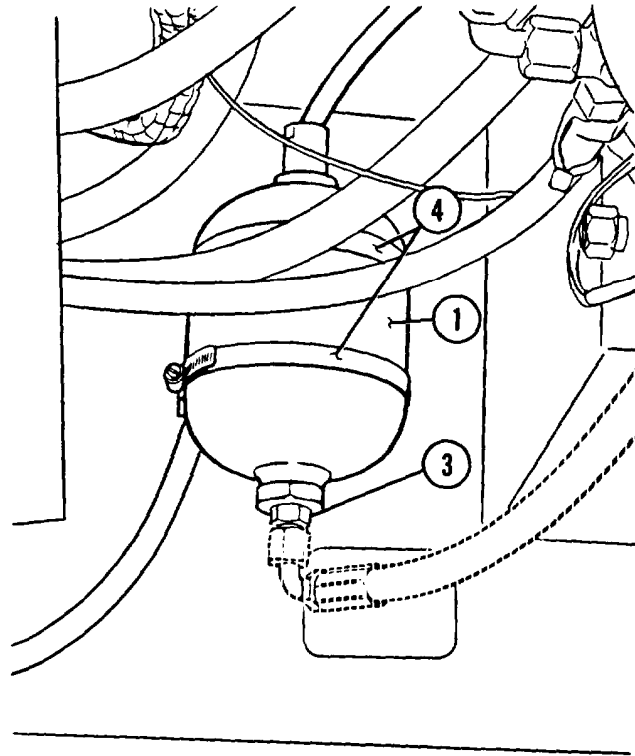
ASSEMBLY

1. INSTALL GAS VALVE CORE (5) TO SERVICE BRAKE HYDRAULIC ACCUMULATOR (1). TORQUE GAS VALVE CORE (5) TO 2.6 lb. in.

NOTE

Accumulator (1) must be precharged prior to bleeding and installation on vehicle.

2. PRECHARGE SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) WITH NITROGEN GAS AND INSTALL CAPS (6) AND (7). REFER TO "TESTING AND ADJUSTING SERVICE BRAKE HYDRAULIC ACCUMULATOR PRECHARGE PRESSURE" SECTION OF THIS PARAGRAPH.



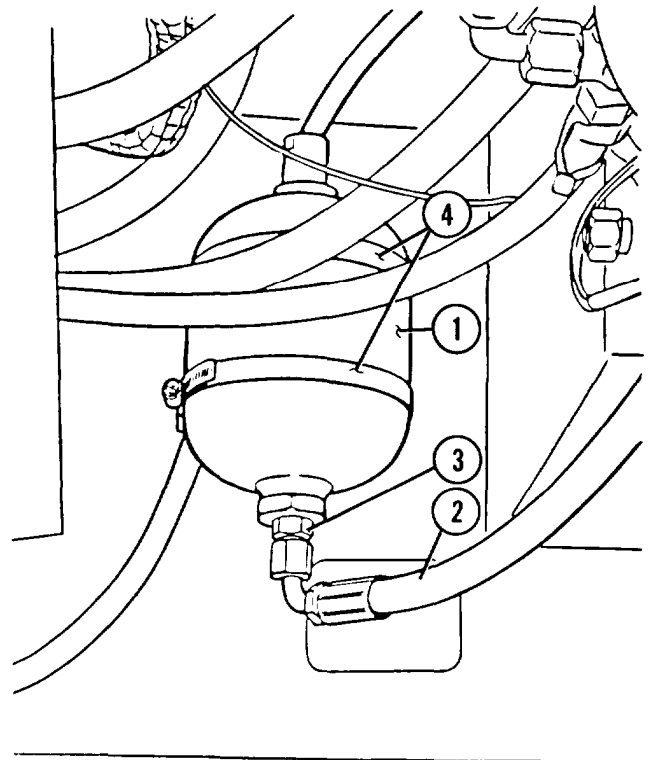
12-8. SERVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST (Cont'd)

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on hydraulic components and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

1. IF REMOVED, INSTALL CONNECTOR (3) TO SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).
2. BLEED SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).
 - a. Connect hose (2) to accumulator (1) at connector (3).
 - b. Position accumulator (1) so it is lower than brake control valve.
 - c. Start engine and allow fifteen seconds for accumulator (1) to charge. Stop engine.
 - d. Loosen hose (2) at adapter (3) and bleed accumulator (1) until pressure escapes and hydraulic oil appears. Tighten hose (2).
 - e. Repeat steps 2c through 2d two additional times.
3. POSITION SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) ON CAB AND SECURE WITH CLAMPS (4).



TESTING AND ADJUSTING SERVICE BRAKE HYDRAULIC ACCUMULATOR PRECHARGE PRESSURE

1. PUMP BRAKE PEDAL TO RELIEVE SERVICE BRAKE HYDRAULIC ACCUMULATOR PRESSURE

With the engine stopped, pump the brake pedal until no power assistance is felt through the pedal. This will require approximately 20 depressions of the brake pedal.

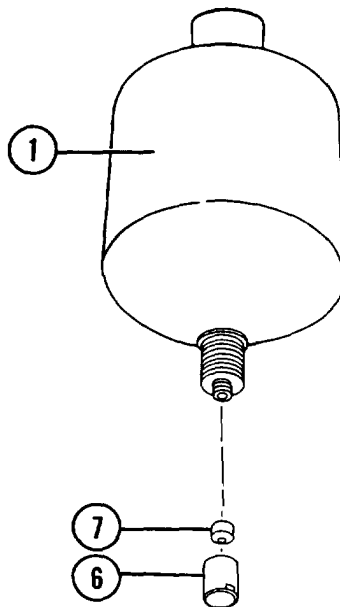
12-8. SERVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST (Cont'd)

NOTE

Support accumulator (1) so it does not drop when clamps (4) are removed.

NOTE

It is not necessary to disconnect hydraulic hose (2) from accumulator (1) when testing or adjusting accumulator precharge pressure.



2. REMOVE CLAMPS (4) SECURING SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) TO CAB AND LOWER SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) TO THE GROUND.

3. INSTALL CHARGING AND GAUGING ASSEMBLY TO SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) .

a. Remove outer gas valve cap (6) and inner gas valve cap (7) from accumulator (1).

NOTE

Do not connect nitrogen bottle to charging and gauging assembly at this time.

b. Install charging and gauging assembly in place of cap (7) on accumulator (1).

c. Open isolator valve on charging and gauging assembly by turning valve clockwise to a full stop.

4. DEPRESS AND HOLD PUSHBUTTON ON TOP OF CHARGING AND GAUGING ASSEMBLY UNTIL PRESSURE READING IS OBTAINED ON GAUGE .

NOTE

The pressure reading obtained in step 4 is the accumulator precharge pressure. This reading must be 700 psi + 50.

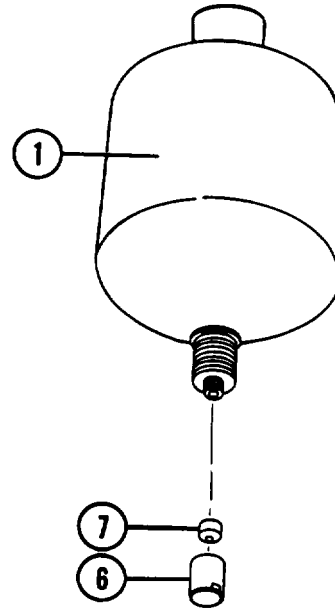
12-8. SERVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST Cont'd)

5. IF PRECHARGE PRESSURE READING OBSERVED IN STEP 4 IS TOO LOW, ADD NITROGEN TO SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) .
 - a. Connect nitrogen charging bottle to charging and gauging assembly.
 - b. Turn isolating valve on and admit nitrogen into diaphragm of accumulator (1). Do this slowly, checking the pressure gauge reading at regular intervals.
 - c. Repeat step 5b, as necessary, until precharge pressure is 700 psi \pm 50.
6. IF PRECHARGE PRESSURE READING OBSERVED IN STEP 4 IS TOO HIGH, BLEED NITROGEN FROM SERVICE BRAKE HYDRAULIC ACCUMULATOR (1).
 - a. Open bleeder valve on charging and gauging assembly to vent nitrogen from the accumulator diaphragm as required. Leave the bleeder valve open for only a short period and then close it.
 - b. Check the precharge pressure.
 - c. Repeat steps 6a and 6b, as necessary, until precharge pressure is 700 psi \pm 50.

12-8. SERVICE BRAKE HYDRAULIC ACCUMULATOR - REPLACE/REPAIR/TEST (Cont'd)

7. REMOVE CHARGING AND GAUGING ASSEMBLY FROM SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) .

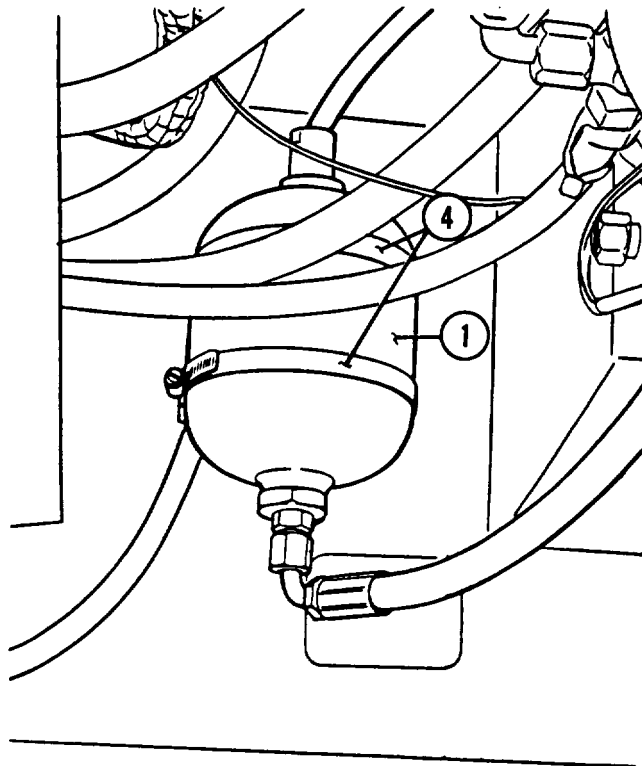
- a. Close isolator valve by turning valve counterclockwise to a full stop.
- b. Remove charging and gauging assembly from accumulator (1).
- c. Install inner gas valve cap (7) and outer gas valve cap (6) to accumulator (1). Tighten outer gas valve cap to between 15 and 30 lb. ft.
- d. Brush a soap solution on and around outer gas valve cap (6) and verify that no air bubbles are present.



NOTE

Air bubbles indicate nitrogen leakage. Correct any leakage before installing accumulator (1) to vehicle.

8. SECURE SERVICE BRAKE HYDRAULIC ACCUMULATOR (1) TO CAB WITH CLAMPS (4) .



12-9. SERVICE BRAKE SYSTEM HOSES, LINES AND FITTINGS - REPLACE/REPAIR

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
Wheels chocked.

Materials/Parts

Container

Hydraulic oil (App. C, Item 35)

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in run position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

12-9. SERVICE BRAKE SYSTEM HOSES, LINES, AND FITTINGS - REPLACE/REPAIR (Cont'd)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

NOTE

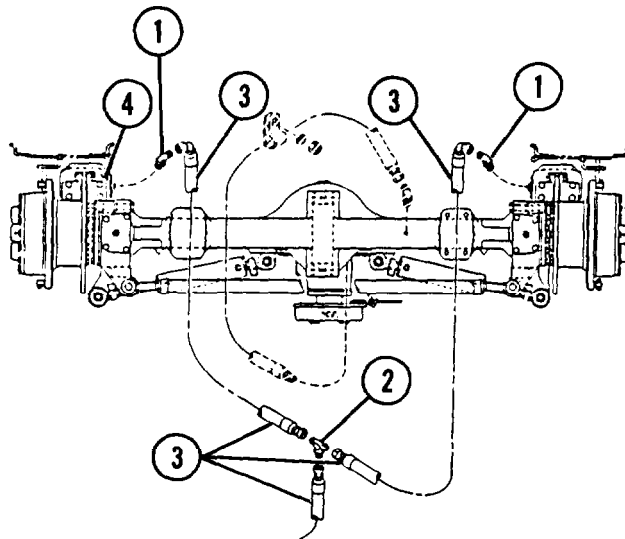
Removal and installation procedures for front and rear brake system hoses, lines, and fittings are similar.

1. REMOVE ELBOW FITTINGS (1), TEE FITTINGS (2) AND HOSES (3) AS REQUIRED .

NOTE

Note routing of hoses (3) on vehicle for use during installation.

- a. Disconnect hose (3) from elbow (1) on service brake caliper (4).
- b. Loosen and remove elbow (1) from service brake caliper (4).
- c. Loosen and remove hoses (3) from tee (2).



FRONT BRAKE CONNECTIONS SHOWN - REAR BRAKE SYSTEM CONNECTIONS ARE IDENTICAL.

12-9. SERVICE BRAKE SYSTEM HOSES, LINES, AND FITTINGS - REPLACE/REPAIR (Cont'd)

2. CAREFULLY REMOVE HOSES (3) FROM VEHICLE AS REQUIRED.

REPAIR**NOTE**

Brake system hydraulic hoses can be repaired by installing new end fittings.

Refer to TM9-4940-468-14 for instructions on how to repair hydraulic hoses.

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on brake components and hoses clean and dry. Apply film of clean hydraulic oil to all sealing surfaces as hoses are connected.

1. POSITION HOSES (3) IN FRAME AS NOTED DURING REMOVAL.
2. INSTALL ELBOW FITTINGS (1), TEE FITTINGS (2), AND HOSES (3) AS REQUIRED.
 - a. Install elbow (1) to service brake caliper (4).
 - b. Connect hose (3) to elbow (1).
 - c. Connect hoses (3) to tee (2).
3. BLEED SERVICE BRAKE SYSTEM, PARA. 12-5.
4. REMOVE WHEEL CHOCKS.

CHAPTER 13

WHEEL AND TIRE MAINTENANCE

13-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the wheel assemblies and tires. To find a specific maintenance procedure, see the maintenance task summary below.

13-2. WHEEL AND TIRE MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
13-3	Wheel Assembly - Replace/Repair	13-2
13-4	Tires - Replace	13-4

13-3. WHEEL ASSEMBLY - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Floor jack, 7,000 lb. capacity

Jackstand, 7,000 lb. capacity

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Wood Blocks

Personnel Required

Two personnel

REMOVAL

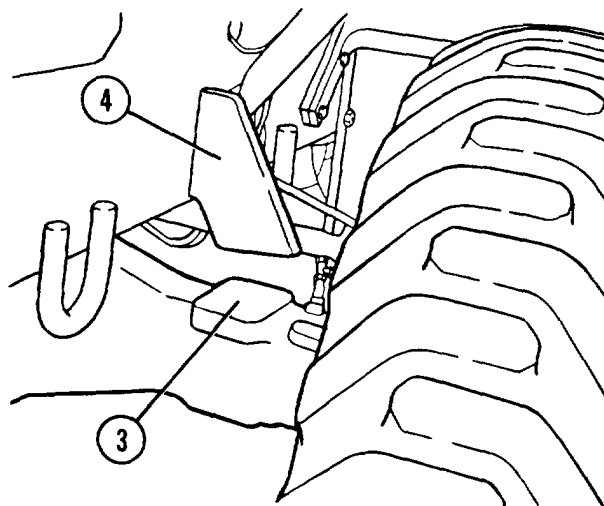
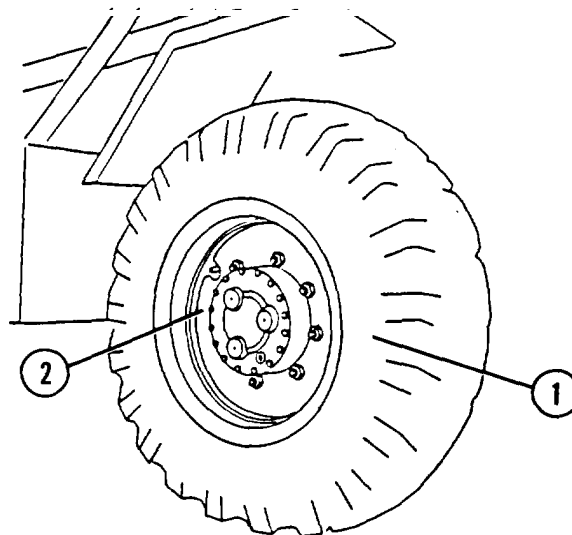
1. PLACE WHEEL CHOCKS ON TIRES (1) OF WHEEL ASSEMBLIES (2) THAT ARE NOT BEING REMOVED.

WARNING

Always place blocking material between rear axle housing (3) and frame rear axle housing stops (4) before raising vehicle with floor jack. If blocking material is not used, vehicle will tip to left or right when front axle housing is raised, possibly resulting in personal injury or damage to vehicle.

In addition, if blocking material is not used, rear axle housing (3) will oscillate on its pivot pin when rear wheel assembly is removed, possibly resulting in personal injury or damage to vehicle.

2. PLACE BLOCKING MATERIAL BETWEEN REAR AXLE HOUSING (3) AND BOTH FRAME REAR AXLE HOUSING STOPS (4).
3. LOOSEN BUT DO NOT REMOVE EIGHT WHEEL NUTS (5).



13-3. WHEEL ASSEMBLY - REPLACE/REPAIR (cont'd)

NOTE

For axle replacement, position floor jack under differential housing.

4. PLACE FLOOR JACK UNDER APPROPRIATE AXLE HOUSING, ON SAME SIDE AS WHEEL ASSEMBLY (2) TO BE REMOVED. RAISE VEHICLE UNTIL TIRE (1) IS OFF THE GROUND .

NOTE

For axle replacement, position jackstand under frame to the inside of axle being removed.

5. PLACE JACKSTAND UNDER APPROPRIATE AXLE HOUSING, ON SAME SIDE AS WHEEL ASSEMBLY (2) TO BE REMOVED.

WARNING

Two personnel are required to remove wheel assembly (2) from wheel hub (6) of vehicle. Weight of wheel assembly (2) is approximately 465 lbs. Failure to follow this instruction could result in serious injury or death.

6. REMOVE EIGHT WHEEL NUTS (5) AND WHEEL ASSEMBLY (2) FROM WHEEL HUB (6).
7. LOWER VEHICLE WITH FLOOR JACK UNTIL AXLE HOUSING IS SUPPORTED BY JACKSTAND.

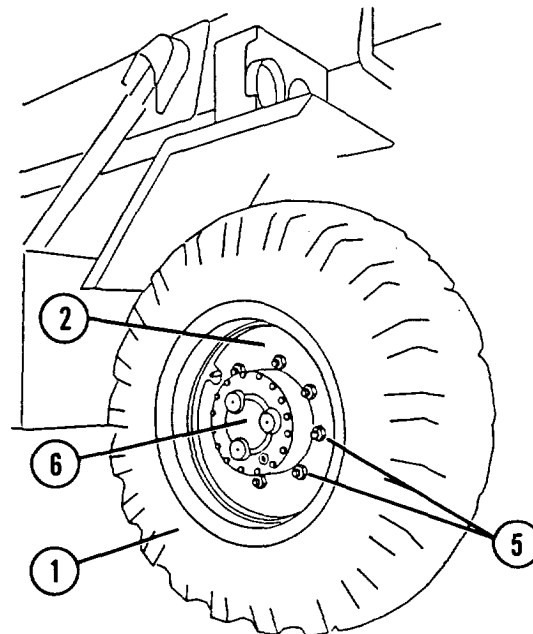
NOTE

Repair of wheel assembly (2) is limited to replacing valve stem and valve core. Refer to Para. 13-4 for valve stem and valve core replacement procedures.

INSTALLATION

NOTE

Two personnel are required to position wheel assembly (2) on wheel hub (6) of vehicle.



1. PLACE FLOOR JACK UNDER APPROPRIATE AXLE HOUSING, ON SAME SIDE AS WHEEL ASSEMBLY (2) TO BE INSTALLED. RAISE VEHICLE AS REQUIRED UNTIL APPROPRIATE AXLE IS OFF OF JACKSTAND AND WHEEL HUB (6) IS HIGH ENOUGH FOR INSTALLATION OF WHEEL ASSEMBLY (2).
2. PLACE WHEEL ASSEMBLY (2) ON WHEEL HUB (6). INSTALL BUT DO NOT TIGHTEN EIGHT WHEEL NUTS (5) UNTIL NUTS ARE SEATED .
- 3* REMOVE JACKSTAND FROM UNDER AXLE.
4. LOWER VEHICLE WITH FLOOR JACK UNTIL TIRE (1) IS JUST RESTING ON GROUND.
5. TORQUE WHEEL NUTS (5) TO 470 LB. FT.
6. COMPLETELY LOWER VEHICLE WITH FLOOR JACK.
7. REMOVE BLOCKING MATERIAL FROM BETWEEN REAR AXLE HOUSING (3) AND BOTH FRAME STOPS (4).
8. REMOVE WHEEL CHOCKS FROM TIRES (1) AS REQUIRED.

13-4. TIRES - REPLACE

This task covers:

- a. Remounting tire from wheel assembly.
- b. Mounting tire on wheel assembly.

Initial Setup

Tools

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Airhose and Gauge for Safety Cage
Use

Tire Iron, Curved Bead Breaker

Tire Iron, Lockring

Tire iron, Flat

Valve core extractor

Safety Cage

Materials/Parts

Lockscrew (10)
Lubricant, Ru-Glide Rubber
(App. C, Item 16)
O-ring (9)
Rubber Grommet (12)

Reference

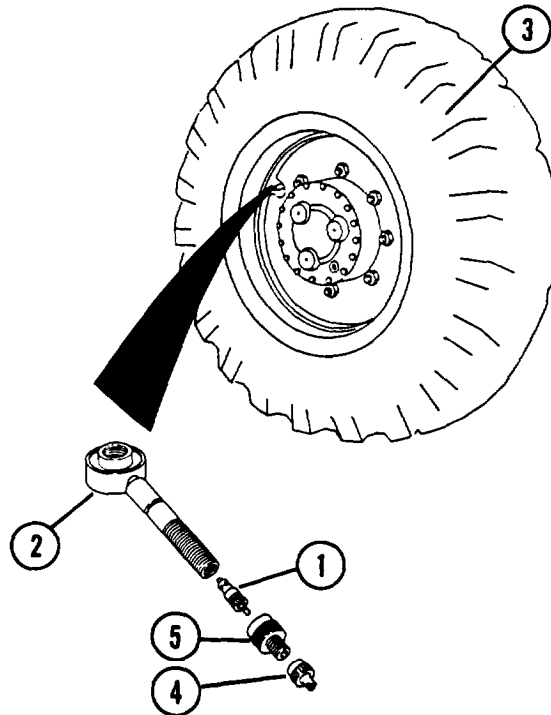
TM9-2610-200-24

Equipment Condition

Wheel assembly and tire removed
from vehicle, Para. 13-3.

DEMOUNTING TIRE FROM WHEEL ASSEMBLY

1. REMOVE VALVE CORE (1) FROM VALVE STEM (2) AND DEFLATE TIRE (3) COMPLETELY.
 - a. Remove cap (4) from adapter (5).
 - b. Remove reducer (5) from valve stem (2).
 - c. Completely deflate tire (3) by removing valve core (1) from valve stem (2) with valve core extractor.
 - d. Install reducer (5) onto valve stem (2) finger tight to protect threads of valve stem (2).
 - e. Install head (4) onto reducer (5) finger tight to protect threads of reducer (5).



13-4. TIRES - REPLACE (Cont'd)

2. REMOVE TIRE (3) FROM WHEEL ASSEMBLY (6).

- a. Place wheel assembly (6) and tire (3) flat on floor with aligning ring (7) facing up.

WARNING

When dislodging tire beads, lock rings (8), or aligning rings (7) be absolutely certain no air pressure remains in tire (3). Serious injury or loss of life could result.

CAUTION

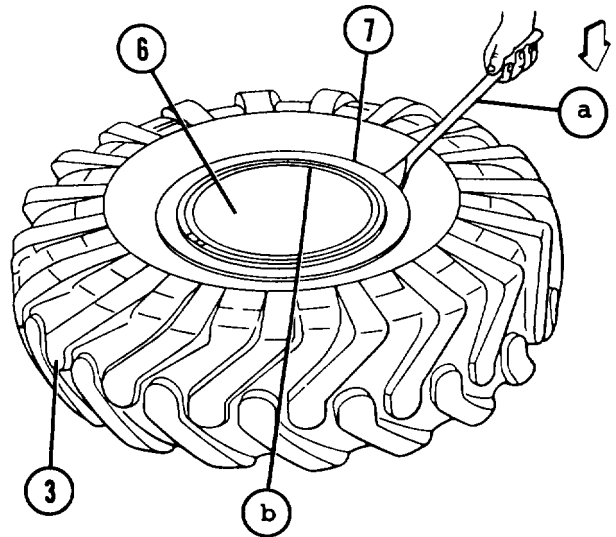
Use care when remounting tires (3) to avoid damaging tire beads or bead seats.

- b. Loosen outer tire bead from aligning ring (7) by inserting curved bead breaker tire iron (a) between tire bead and aligning ring (7).

NOTE

Rim (b) is part of wheel assembly (6).

- c. Work progressively around rim (b) rotating tire iron (a) down, until tire bead is completely free of aligning ring (7).

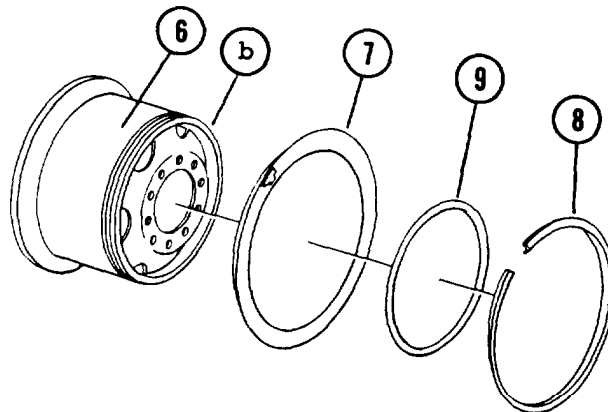
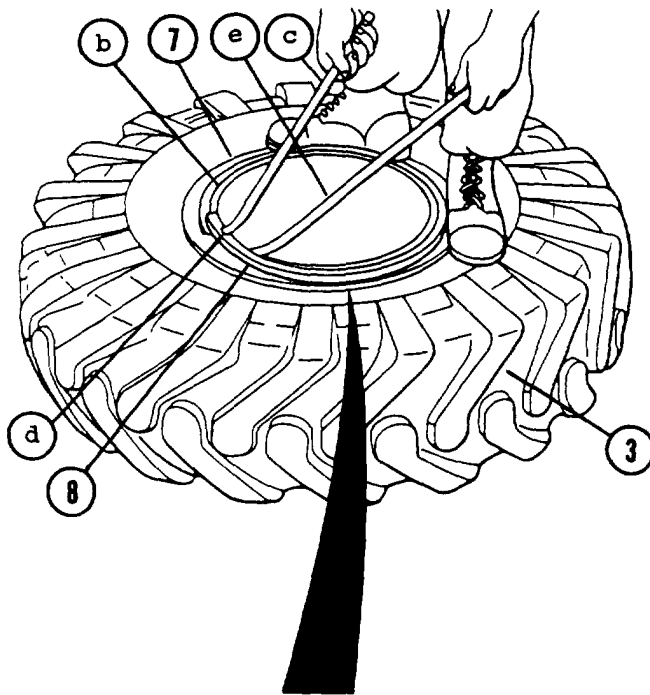


13-4. TIRES - REPLACE (Cont'd)

NOTE

The aligning ring (7) bears on lock ring (8) that prevents its removal. An O-ring (9) positioned between aligning ring (7) and rim (b) creates an airtight seal.

- d. Force outer tire bead and aligning ring (7) down towards center of wheel assembly (6) by standing on tire (3) and aligning ring (7).
- e. Remove lock ring (8) by inserting lock ring tire iron (c), curved side up, into prying notch (d) on lock ring (8) and gutter of rim (b).
- f. Pry lock ring (8) out enough to insert flat tire iron (e), adjacent to tire iron (c), between lock ring (8) and base of rim (b).
- g. Work both tire irons (c and e) progressively around rim (b) until lock ring (8) is completely removed.
- h. With lock ring (8) removed, hold aligning ring (7) down to remove and discard O-ring (9) from rim (b).



NOTE

If aligning ring (7) becomes cocked on rim (b), its removal will be difficult.

- i. Slide aligning ring (7) off rim (b) by lifting flange of aligning ring (7) straight up.

13-4. TIRES - REPLACE (Cont'd)

NOTE

Rim flange (f) is an integral part of wheel assembly (6).

j. Turn tire (3) and wheel assembly (6) over and loosen inner tire bead from rim flange (f) by inserting a curved bead-breaker tire iron (a) between tire bead and rim flange (f).

k. Work progressively around rim flange (f), rotating tire iron (a) down, until inner tire bead is completely free of rim flange (f).

l. Lift wheel assembly (6) completely out of tire (2).

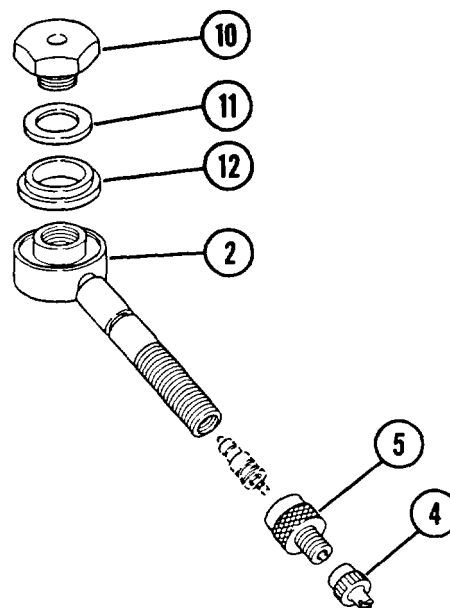
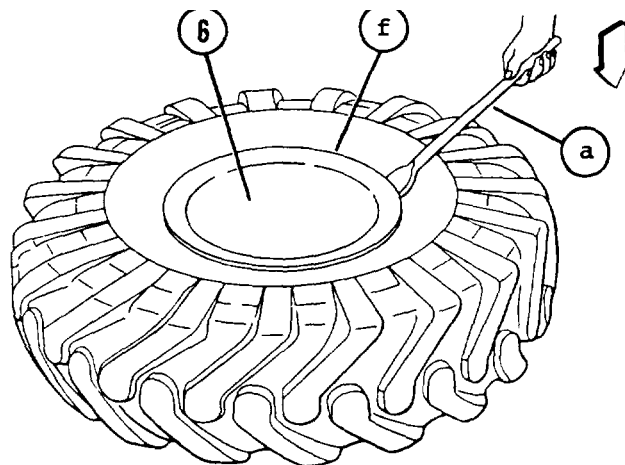
3. IF NECESSARY, REMOVE VALVE STEM (2) FROM WHEEL ASSEMBLY (6).

a. Remove cap (4) from adapter (5).

b. Remove reducer (5) from valve stem (2).

c. Remove lockscrew (10) and spacer (11) securing valve stem (2) to wheel assembly (6). Remove valve stem (2). Discard lockscrew (10).

d. If necessary, remove and discard rubber grommet (12) from valve stem (2).



MOUNTING TIRE ON WHEEL ASSEMBLY

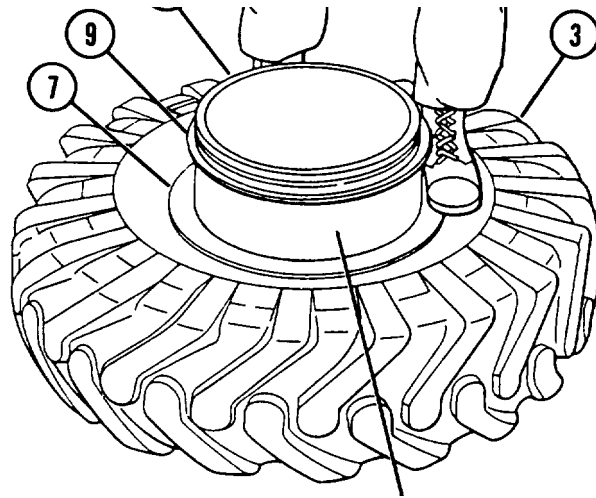
1. IF NECESSARY, INSTALL VALVE STEM (2) TO WHEEL ASSEMBLY (6).

a. If removed, install new rubber grommet (12) to valve stem (2).

b. Position valve stem (2) on wheel assembly (6) and secure with spacer (11) and new lockscrew (10).

13-4. TIRES - REPLACE (Cont'd)

- c. Install reducer (5) onto valve stem (2) to protect threads of valve stem (2).
 - d. Install head (4) onto adapter (5) to protect threads of adapter (5).
2. INSTALL TIRE (3) ON WHEEL ASSEMBLY (6).
- a. Place wheel assembly (6) flat on floor with remountable side facing up.
 - b. Place tire (3) with properly lubricated tire bead on wheel assembly (6).



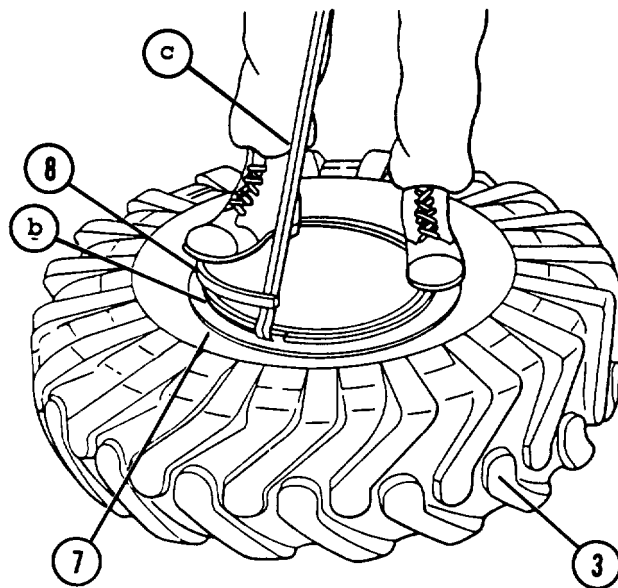
NOTE

If aligning ring (7) becomes cocked, installing the flange will be difficult.

NOTE

Rim (b) is part of wheel assembly (6).

- c. Force aligning ring (7) down towards center of rim (b) base.
- d. Hold aligning ring (7) down and install new ()-ring (9) on rim (b).
- e. Align prying notch of lock ring (8) opposite of valve stem.
- f. Install lock ring (8) by placing end without prying notch into gutter of rim (b).
- g. Using a lock ring tire iron (c), pry lock ring (8) over edge of rim (b).



13-4. TIRES - REPLACE (Cont'd)

- h. Work progressively around rim (b) prying with tire iron (c), stepping on lock ring (8) and forcing it down into gutter of rim (b) until completely installed.

CAUTION

Use care when assembling rim components to avoid dislodging the O-ring (9).

- i. Allow aligning ring (7) to come up over O-ring (9) and onto lock ring (8).
2. TEMPORARILY INFLATE TIRE (3) AND CHECK FOR PROPER SEATING OF TIRE BEADS, ALIGNING RING (7), AND LOCK RING (8).

WARNING

Always inflate tires mounted on rims with aligning rings or lock rings in an inflation safety cage, or serious injury or loss of life could result.

Improperly seated aligning rings or lock rings could blow off during inflation. Never attempt to seat aligning rings or lock rings during or after inflation. Serious injury or loss of life could result.

Never over inflate tires to seat tire beads. Serious injury or loss of life could result.

When inflating tires in a safety cage, always use an airhose and gage for safety cage use. Failure to do so could cause serious injury.

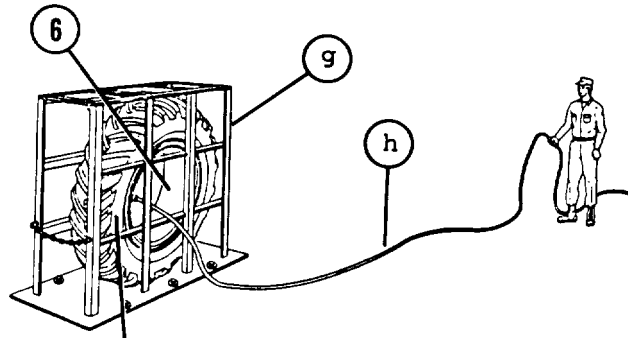
13-4. TIRES - REPLACE (Cont'd)

i. Place wheel assembly (6) and tire (3) in inflation safety cage (g).

j. Remove cap (4) from reducer (5).

k. Using an airhose and gage (h) for safety cage use, inflate tire (3) enough to seat both tire beads. Tire beads should seat before reaching maximum tire pressure of 45 psi.

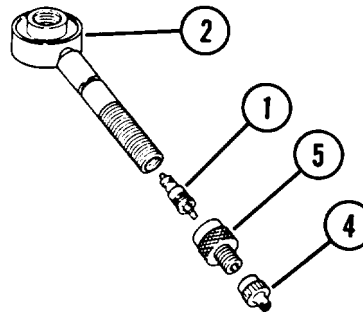
l. Remove airhose and allow tire to completely deflate. Visually inspect tire beads, aligning ring (7), and lock ring (8) to see that they are properly seated.



3. INSTALL VALVE CORE (1) TO VALVE STEM (2) AND INFLATE TIRE (3) TO PROPER PRESSURE .

a. Remove reducer (5) from valve stem (2).

b. Install valve core (1) into valve stem (2) with valve core extractor.

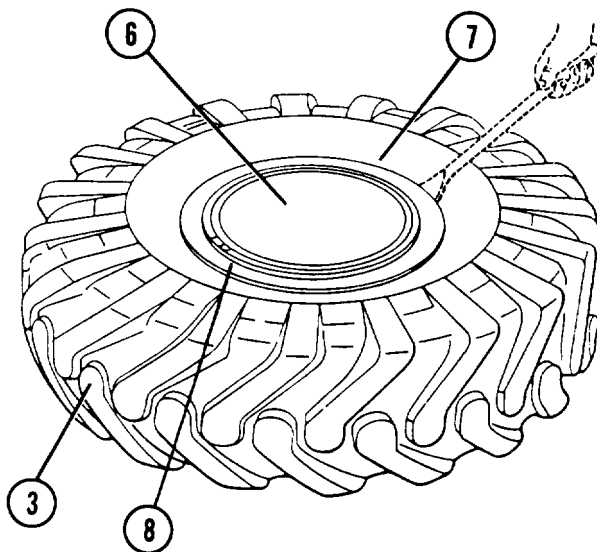


NOTE

Inflate tires for front axle to 45 psi.
Inflate tires for rear axle to 40 psi.

c. Inflate tire (3) to normal operating pressure and visually inspect tire beads, aligning ring (7), and lock ring (8) to see that they are properly seated.

d. Install cap (4) onto reducer (5) finger tight and remove wheel assembly (6) from inflation safety cage (g).



5. INSTALL WHEEL ASSEMBLY TO VEHICLE, PARA. 13-3.

CHAPTER 14

STEERING SYSTEM MAINTENANCE

14-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the steering system. To find a specific maintenance procedure, see the maintenance task summary below.

14-2. STEERING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
14-3	Steering Wheel - Replace	14-2
14-4	Steering Column - Replace	14-3
14-5	Tie Rod - Adjust	14-5
14-6	Emergency Steering Pump - Replace	14-7
14-7	Steering Hoses, Lines, and Fittings - Replace	14-11
14-8	Steering Cylinders - Replace	14-14
14-9	Steering Cylinder Ball Joint End Cap Assemblies - Replace	14-18
14-10	Steering Control Valve - Replace	14-20
14-11	Steering Select Valve - Replace/Repair/Test	14-23

14-3. STEERING WHEEL - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

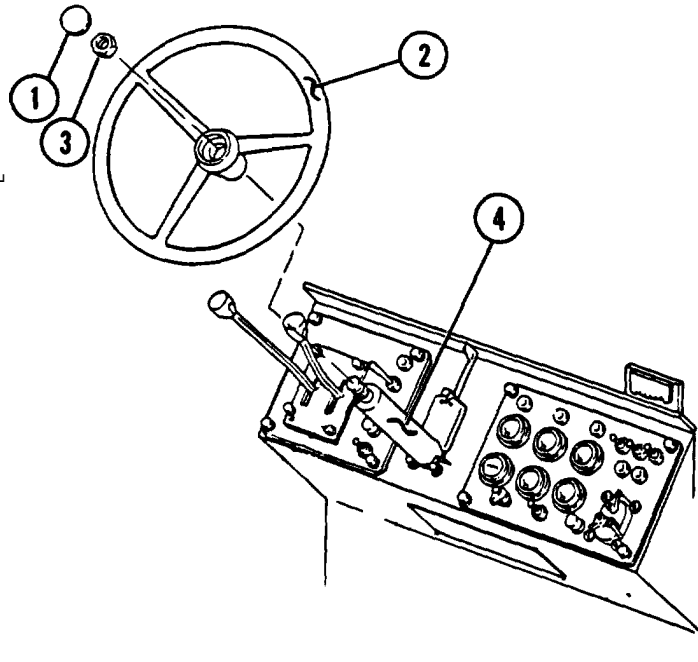
Puller, Steering Wheel

Equipment Condition

Vehicle parked on level ground.

REMOVAL

1. PRY OFF CAP (1) FROM CENTER OF STEERING WHEEL (2).
2. REMOVE NUT (3) SECURING STEERING WHEEL (2) TO STEERING COLUMN (4).
3. PULL WHEEL (2) OFF STEERING COLUMN (4) USING A PULLER



INSTALLATION

1. POSITION STEERING WHEEL (2) ON STEERING COLUMN (4).
2. SECURE STEERING WHEEL (2) WITH NUT (3). TIGHTEN NUT TO 50 lb. ft.
3. PUSH CAP (1) ONTO STEERING WHEEL (2).

14-4. STEERING COLUMN - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

Lockwashers (4)
Loctite 242 (App. C, Item 39)

Equipment Condition

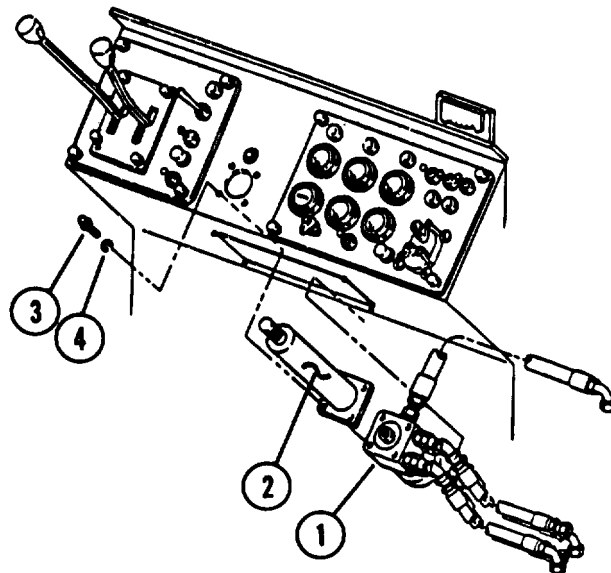
Vehicle parked on level ground.
Turn signal switch removed, para. 8-13.
Steering wheel removed, para. 14-3.

REMOVAL

NOTE

Support steering control valve (1) and steering column (2) as necessary during removal so these parts do not drop when bolts (3) and lockwashers (4) are removed.

1. REMOVE FOUR CAPSCREWS (3) AND FOUR LOCKWASHERS (4) SECURING STEERING CONTROL VALVE (1) AND STEERING COLUMN (2). DISCARD LOCKWASHERS (4).
2. SEPARATE STEERING CONTROL VALVE (1) FROM STEERING COLUMN (2). PUSH STEERING CONTROL VALVE (1) TO ONE SIDE TO PROVIDE ROOM FOR REMOVAL OF COLUMN (2).
3. REMOVE STEERING COLUMN (2) THROUGH ACCESS HOLE AT BASE OF DASHBOARD.



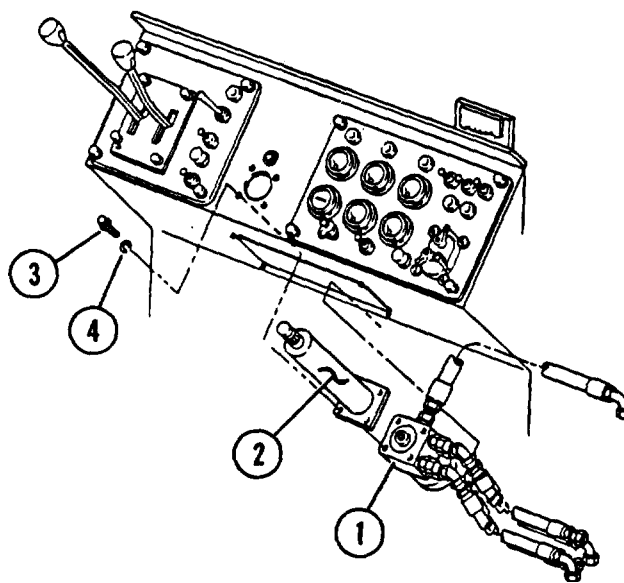
14-4. STEERING COLUMN - REPLACE (Cont'd)

INSTALLATION

NOTE

Support steering control valve (1) and steering column (2) as necessary during installation so these parts do not drop prior to installation of capscrew (3) and lockwasher (4).

1. IF NECESSARY, PUSH STEERING CONTROL VALVE (1) TO ONE SIDE TO PROVIDE ROOM FOR INSTALLATION OF STEERING COLUMN (2).
2. CAREFULLY POSITION STEERING COLUMN (2) THROUGH ACCESS HOLE AT BASE DASHBOARD AND THROUGH COLUMN HOLE ON DASHBOARD.



NOTE

Hose connections for control valve are on the right side.

3. POSITION STEERING CONTROL VALVE (1) ON STEERING COLUMN (2). TURN STEERING COLUMN SHAFT AS NECESSARY TO ENGAGE SPLINES.
4. INSTALL STEERING COLUMN (2) AND STEERING CONTROL VALVE (1).
 - a. Align capscrew holes on valve (1) and column (2).

NOTE

Apply Loctite 242 to threads of capscrews (3).

- b. Secure valve (1) and column (2) to dashboard with four new lockwashers (4) and four capscrews (3). Tighten capscrews (3) in a crisscross pattern to 180 in. lb.
5. INSTALL STEERING WHEEL, PARA. 14-3.
6. INSTALL TURN SIGNAL SWITCH, PARA. 8-13.

14-5. TIE ROD - ADJUST

This task covers:
Adjustment

Initial Setup

Tools

Tool Kit, Auto Mechanics

Equipment Condition

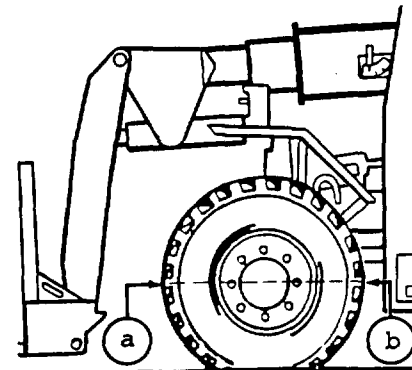
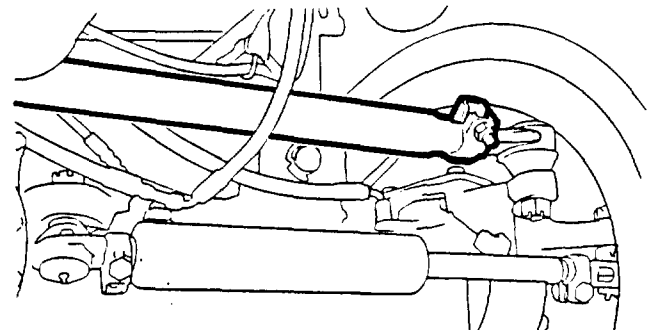
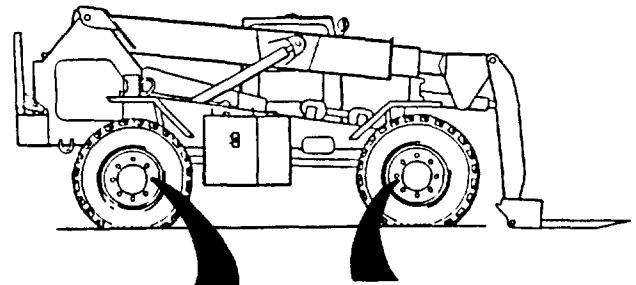
Vehicle parked on level ground.
Parking brake applied.
Wheels blocked.

NOTE

The following adjustment procedures apply to both the front and rear tie rods.

ADJUSTMENT

1. MEASURE TOE-IN OF WHEELS.
 - a. Start engine and straighten wheels on axle. Stop engine.
 - b. Mark front tread surface (a) of each tire on the axle with mark centered on tread width and at same level as distance from ground to center of axle hub.
 - c. Mark rear tread surface (b) of each tire on the axle with mark centered on tread width and at same level as distance from ground to center of axle hub.
 - d. Measure the distance (x) between the two marks on the front tread surfaces (a) of tires made in step 1b.
 - e. Measure the distance (y) between the two marks on the rear tread surfaces (b) of tires made in step 1c.



14-5. TIE ROD - MUST (Cont'd)

f. Distance (x) between marks on front of tires should measure 0 to 1/8 in. less than distance (y) between marks on rear of tires.

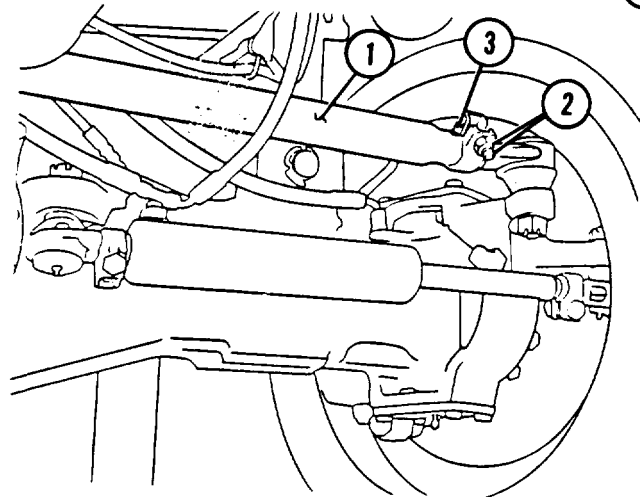
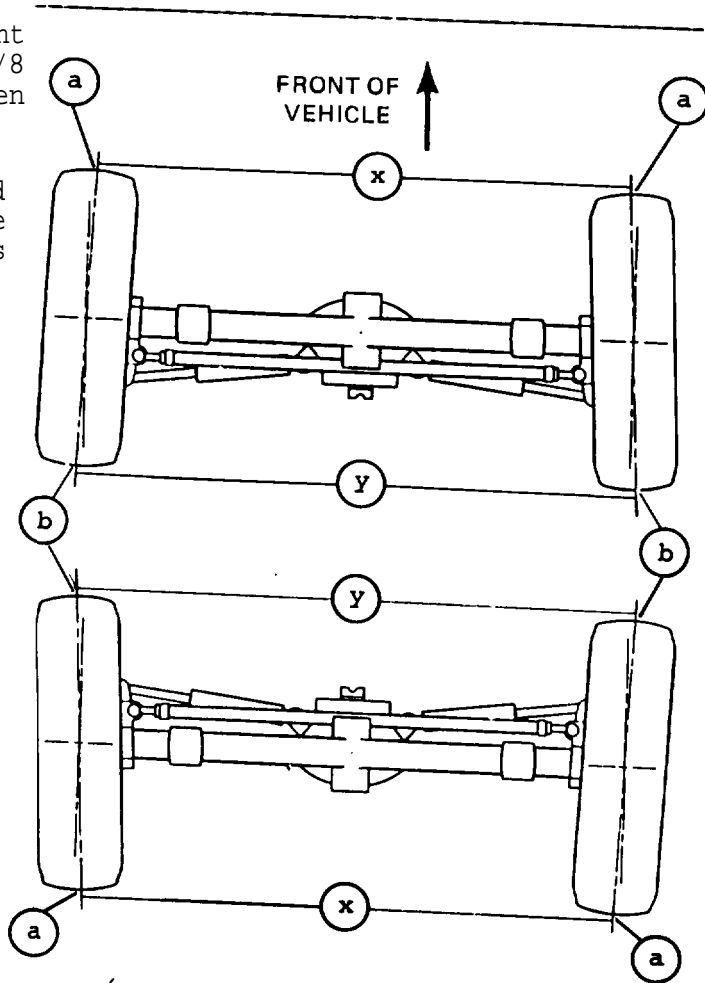
g. If toe-in specifications outlined in step 1f are not met, adjust tie rod as described in step 2 of this section.

2. IF NECESSARY, ADJUST TIE ROD (1) FOR PROPER TOE-IN measurements .

a. Loosen nut and capscrew (2) at clamps (3) on each end of tie rod (1).

b. Turn tie rod (1) as required until proper toe-in measurements are achieved, as described in step 1f of adjustment.

c. Tighten nut and capscrew (2) at clamps (3) on each end of tie rod (1) to 50-65 lb. ft.



14-6. EMERGENCY STEERING PUMP - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics
 Cap and Plug Set

Materials/Parts

Container, 6 Gal.
 Lockwashers (15)
 Tags (App. C, Item 51)

Test Equipment

Gage, Hydraulic Pressure
 Flowmeter, Hydraulic

Personnel Required

Two Personnel

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL
NOTE

The emergency steering pump is located under the vehicle frame.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

14-6. EMERGENCY STEERING PUMP - REPLACE (Cont'd)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

NOTE

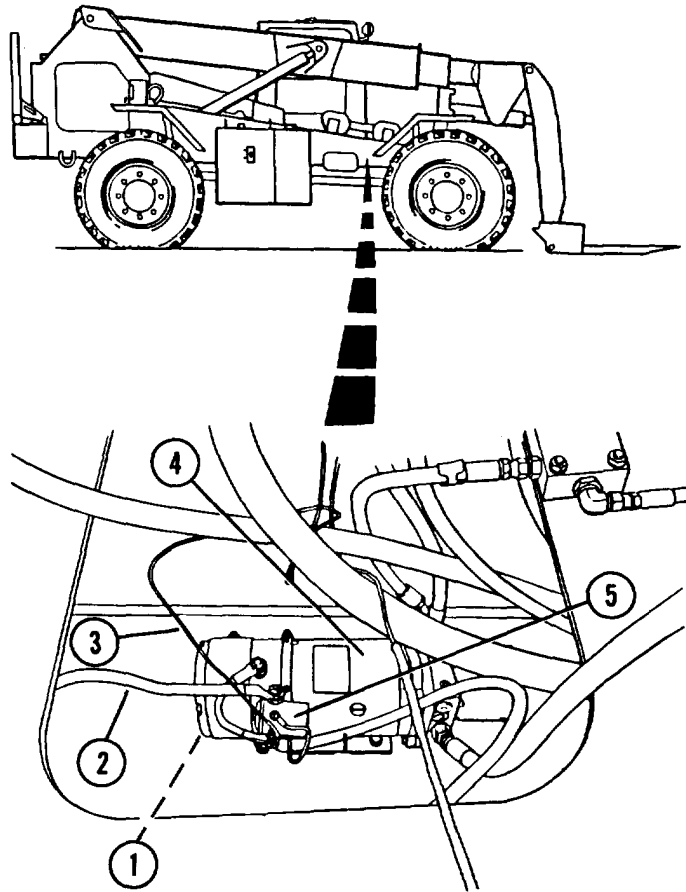
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. TAG AND DISCONNECT ELECTRICAL LEADS AND CABLES (1), (2), AND (3), AT PUMP (4) AND RELAY (5).

- a. Tag and disconnect power cable (1) and negative cable (2) from pump (4).
- b. Tag and disconnect electrical lead (3) from relay (5).

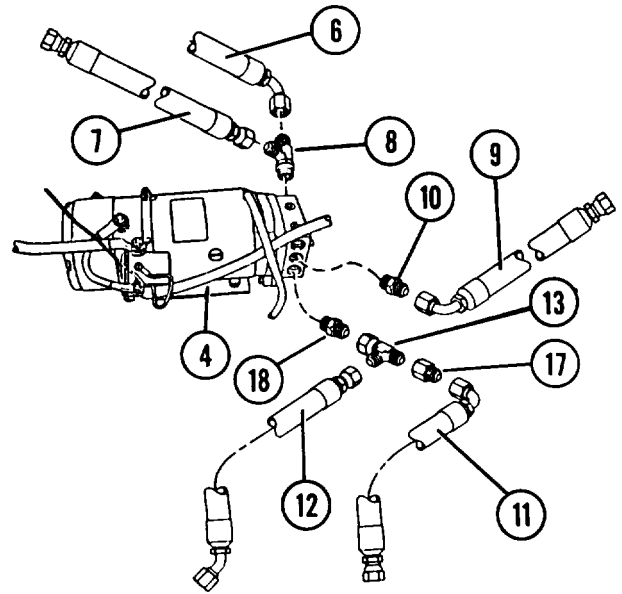
NOTE

Hose (7) is connected directly to hydraulic reservoir. When disconnecting any hose directly connected to reservoir at pump end, hose must be elevated, plugged, and tied in an up position above the level of fluid in the reservoir.



14-6. EMERGENCY STEERING PUMP - REPLACE (Cont'd)

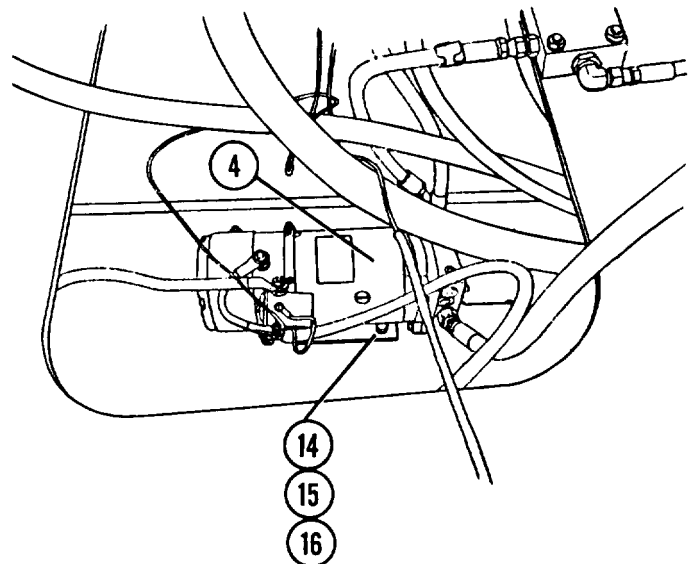
2. TAG AND DISCONNECT FIVE HYDRAULIC HOSES AT PUMP (4).
 - a. Tag, disconnect and plug hoses (6) and (7) at tee (8).
 - b. Tag, disconnect and plug hose (9) at adapter (10).
 - c. Tag, disconnect and plug hoses (11) and (12) at tee (13).



WARNING

Weight of pump (4) is 47 lbs. Have assistant support pump so it does not drop during removal of cap screws (14), lockwashers (15), and nuts (16).

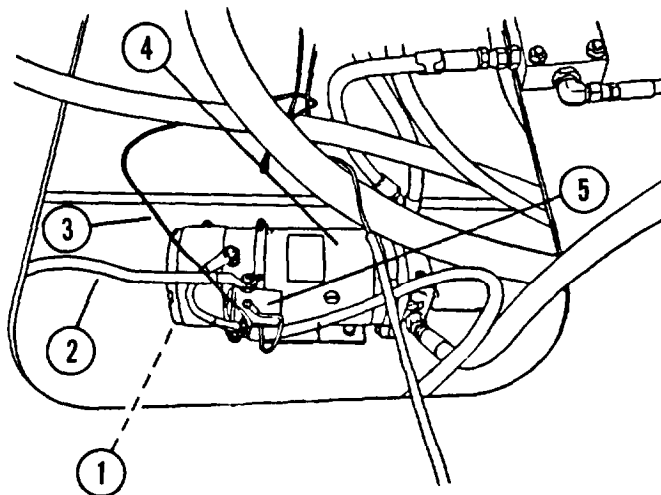
3. REMOVE FOUR CAPSCREWS (14), FOUR LOCKWASHERS (15), AND FOUR NUTS (16) AND CAREFULLY REMOVE PUMP (4) FROM VEHICLE FRAME. DISCARD LOCKWASHERS (15).
4. IF NECESSARY, REMOVE FITTINGS FROM PUMP (4).
 - a. Remove adapter (10) from pump (4).
 - b. Remove reducer (17) from hose (11) and adapter (18) from pump (4).



14-6. EMERGENCY STEERING PUMP - REPLACE (Cont'd)

INSTALLATION

1. IF NECESSARY, INSTALL FITTINGS TO PUMP (4).
 - a. Install adapter (18) to pump (4) and reducer (17) to hose (11).
 - b. Install adapter (10) to pump (4).
2. SUPPORT AND POSITION PUMP (4) ON VEHICLE FRAME AND SECURE WITH FOUR NUTS (16), FOUR NEW LOCKWASHERS (15), AND FOUR CAPSCREWS (14).
3. CONNECT FIVE HYDRAULIC HOSES AT PUMP (4) AS TAGGED.
 - a. Connect hoses (11) and (12) at tee (13) .
 - b. Connect hose (9) to adapter (10) as tagged.
 - c. Connect hoses (6) and (7) to tee (8) as tagged.
4. CONNECT ELECTRICAL LEADS AND CABLES (1), (2), AND (3) AS TAGGED AT PUMP (4) AND RELAY (5).
 - a. Connect power cable (1), and negative cable (2) to pump (4) as tagged.
 - b. Connect electrical lead (3) to relay (5) on pump (4) as tagged.
5. CONNECT BATTERIES.
6. CHECK EMERGENCY STEERING PUMP FOR PROPER OPERATION.
 - a. Move emergency steer switch to the ON position.
 - b. Turn starter switch to the ON position but do not start the engine.



- c. Turn steering wheel and verify that wheels on vehicle move from side to side.
 - d. Turn starter switch to the OFF position and move emergency steer switch to the OFF position.
7. IF NECESSARY, PURGE AIR FROM HYDRAULIC SYSTEM, PARA. 18-3.

14-7. STEERING HOSES, LINES, AND FITTINGS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Materials/Parts

Container, 6 Gal.

Tags (App. C, Item 51)

Equipment Condition

Vehicle parked on level ground.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position and MLAS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

14-7. STEERING HOSES, LINES, AND FITTINGS - REPLACE (Cont'd)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

NOTE

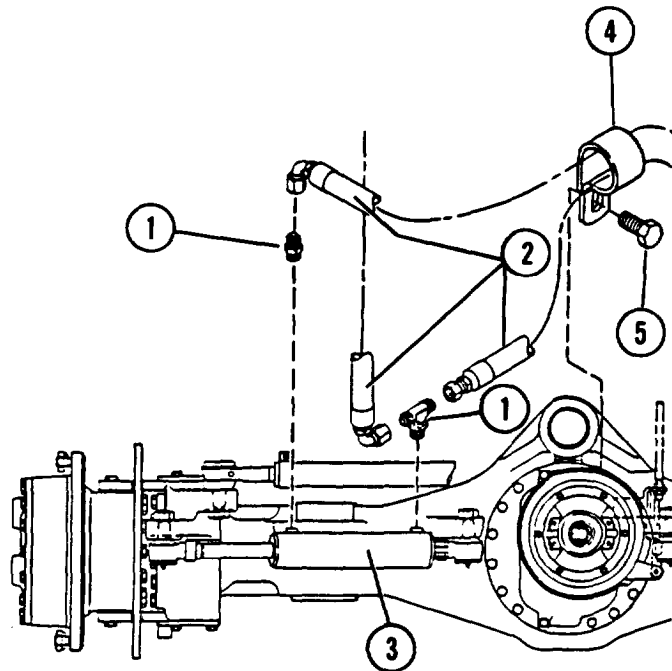
Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

1. REMOVE FITTINGS (1) AND HOSES (2) AT HYDRAULIC COMPONENTS (3) AS REQUIRED.
 - a. Loosen and remove hoses (2) from fittings (1).
 - b. Loosen and remove fittings (1), from hydraulic components (3).

NOTE

Note location of clamps (4) for use during installation.

2. REMOVE CLAMPS (4) AND MOUNTING HARDWARE (5) FROM HOSES (2) AS REQUIRED.



AXLE ASSEMBLY HOSES AND FITTINGS

14-7. STEERING HOSES, LINES AND FITTINGS REPLACE Cont'd

NOTE

Note routing of hoses (2) on vehicle for use during installation.

3. CAREFULLY REMOVE HOSES (2) FROM VEHICLE FRAME AS REQUIRED.

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on hydraulic components and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

NOTE

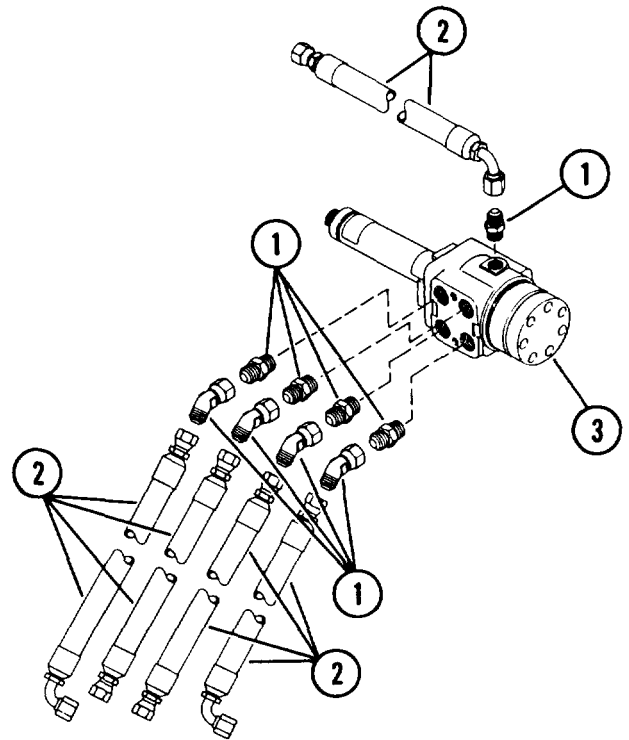
The hydraulic lines must be mounted (indexed) in such a way to allow movement of the lines during steering without rubbing, crimping, or exceeding the minimum bend radius.

1. CAREFULLY POSITION HOSES (2) ON VEHICLE FRAME AS NOTED DURING REMOVAL .
2. INSTALL FITTINGS (1) AND HOSES (2) AT HYDRAULIC COMPONENTS (3).
 - a. Install fittings (1) to hydraulic components (3).
 - b. Install hoses (2) to fittings (1).

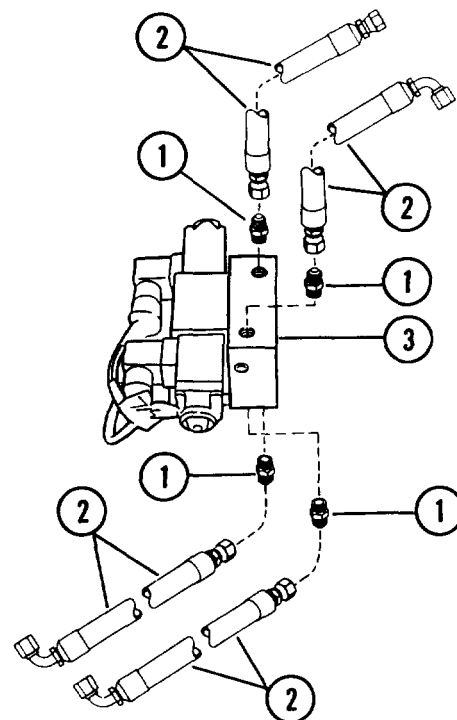
NOTE

Install clamps (4) at locations noted during removal.

3. INSTALL CLAMPS (4) AND MOUNTING HARDWARE (5) TO HOSES (2).
4. USING AN ASSISTANT, OPERATE THE FORKLIFT THROUGH THE FULL STEERING RANGE; CHECKING TO ENSURE FREEDOM OF MOVEMENT OF ALL LINES AND FITTINGS.



STEERING CONTROL VALVE HOSES AND FITTINGS



STEERING SELECT VALVE HOSES AND FITTINGS

14-8. STEERING CYLINDERS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Safety Stand

Floor Jack, 7,000 lb. capacity

Cap and Plug Set

Materials/Parts

Container, 6 Gal.
Cotter Pin (7)
Tags (App. C, Item 51)

Equipment Condition

Vehicle parked on level ground.
Parking brake applied.
Wheel removed, para. 13-3.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

WARNING

Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause injury.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

14-8. STEERING CYLINDERS - REPLACE (Cont'd)

NOTE

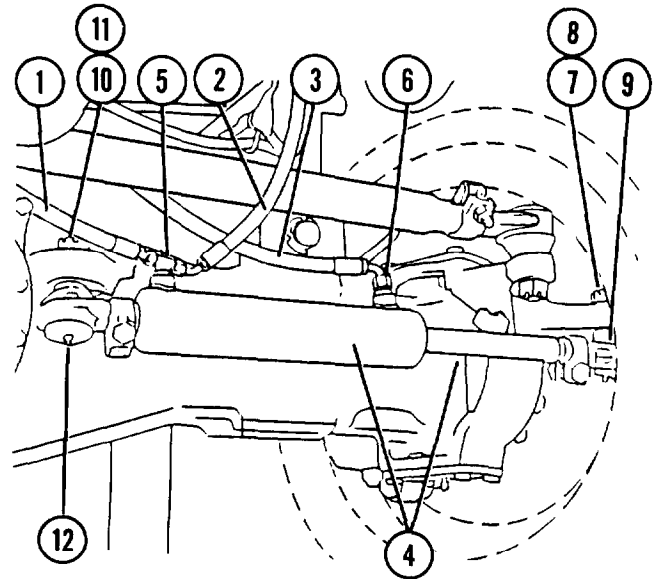
The steer cylinder must be adjusted after the knuckle is inspected or after the tie rod is moved to adjust the toe.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

REMOVAL

1. TAG AND DISCONNECT THREE HYDRAULIC HOSES (1), (2) AND (3) AT STEERING CYLINDER (4).
 - a. Remove hose (1) and hose (2) from tee (5).
 - b. Remove hose (3) from adapter (6).
 - c. Remove tee (5) and adapter (6) from ports of cylinder (4).
2. ON ONE SIDE OF VEHICLE, REMOVE COTTER PIN (7) AND NUT (8). DISCARD COTTER PIN (7).
3. USING A PICKLE FORK OR EQUIVALENT, SEPARATE STEERING CYLINDER (4) FROM BALL JOINT END CAP ASSEMBLY (9).

**CAUTION**

Do not strike nut (8) on side to remove steering cylinder (4). Damage to ball joint end cap assembly (9) may occur.

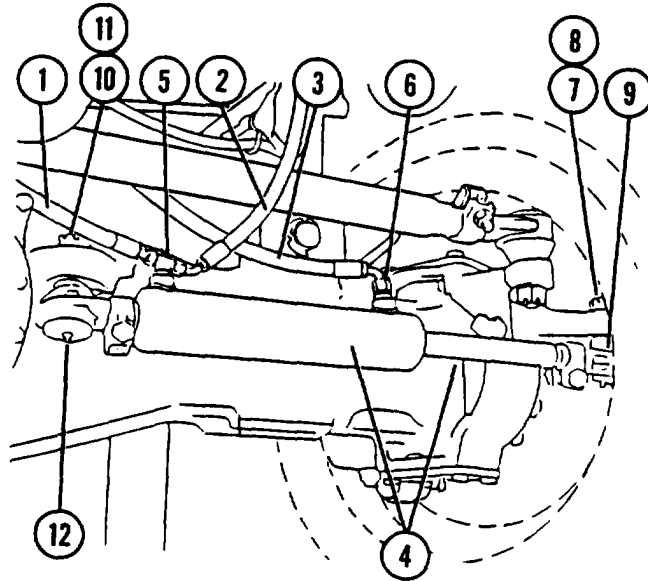
14-8. STEERING CYLINDERS - REPLACE (Cont'd)

4. REMOVE NUT (9).

5* REPEAT STEPS 2 THROUGH 4 FOR PARTS (10) THROUGH (12) AT OTHER END OF STEERING CYLINDER (4) AND REMOVE CYLINDER (4) FROM AXLE.

INSTALLATION

1. PLACE STEERING CYLINDER BALL JOINT END CAP ASSEMBLY (12) INTO TAPERED HOLE ON AXLE .
2. INSTALL NUT (11). TIGHTEN TO 250 LB. FT.
3. INSTALL NEW COTTER PIN (10). IF NECESSARY, TIGHTEN NUT UNTIL HOLES ALIGN. DO NOT LOOSEN NUT (11) TO INSTALL COTTER PIN (10).
4. PLACE STEERING CYLINDER BALL JOINT END CAP ASSEMBLY (9) INTO TAPERED HOLE AT WHEEL END.
5. INSTALL NUT (8). TIGHTEN TO 250 LB. FT.
6. INSTALL NEW COTTER PIN (7). IF NECESSARY, TIGHTEN NUT (8) UNTIL HOLES ALIGN. DO NOT LOOSEN NUT (8) TO INSTALL COTTER PIN (7).



NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on hydraulic components and hoses clean and dry.

7. CONNECT THREE HYDRAULIC HOSES (1), (2) AND (3) AT STEERING CyLINDER (4) AS TAGGED.
 - a. Install tee (5) and adapter (6) to ports of cylinder (4).
 - b. Install hose (3) to adapter (6).
 - c. Install hose (1) and hose (2) to tee (5).

14-8. STEERING CYLINDERS - REPLACE (Cont'd)

8. BLEED AIR FROM STEERING SYSTEM.
 - a. Start engine, TM10-3930-660-10.
 - b. Place steer select control in CRAB position, TM10-3930-660-10.
 - c. Turn wheels fully to one side and fully to the other side five times.
 - d. Place steer select control in 4-WHEEL position, TM10-3930-660-10.
 - e. Turn wheels fully to one side and fully to the other side five times.
 - f. Stop engine, TM10-3930-660-10.

14-9. STEERING CYLINDER BALL JOINT END CAP ASSEMBLIES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2
Less Power

Equipment Condition

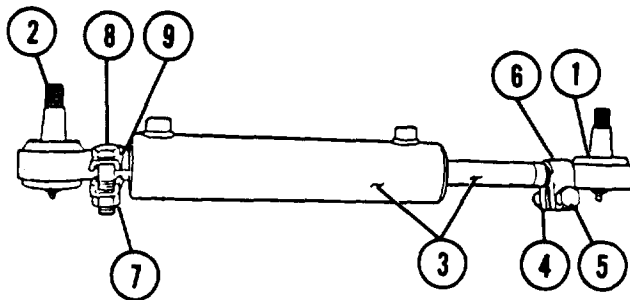
Steering cylinder removed,
para. 14-8.

Personnel Required

Two Personnel

REMOVAL

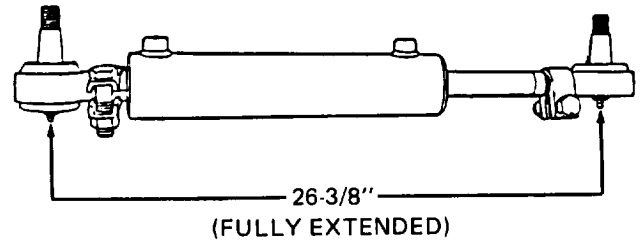
1. REMOVE BALL JOINT END CAP ASSEMBLIES (1) AND (2) FROM STEERING CYLINDER (3).
 - (1) AND (2) FROM STEERING CYLINDER (3).
 - a. Loosen nut (4) and capscrew (5) on clamp (6).
 - b. Unscrew ball joint (1) from steering cylinder (3).
 - c* Loosen nut (7) and capscrew (8) on clamp (9).
 - d. Unscrew ball joint (2) from steering cylinder (3).



14-9. STEERING CYLINDER BALL JOINT END CAP ASSEMBLIES - REPLACE (Cont'd)

INSTALLATION**1. INSTALL BALL JOINT END CAP ASSEMBLIES (1) AND (2) ON STEERING CYLINDER (3)**

- a. Install ball joint (2) on steering cylinder (3). Screw ball joint (2) onto steering cylinder (3) until it stops .
- b. Tighten nut (7) and capscrew (8) on clamp (9).
- c. Install ball joint (1) on steering cylinder (3).
- d. Pull out rod of steering cylinder (3) until it is fully extended.
- e. Rotate ball joint (1) as required until distance between grease fittings on ball joints (1) and (2) is 26-3/8 in.
- f. Tighten nut (4) and capscrew (5) on clamp (6).

2. INSTALL STEERING CYLINDER, PARA. 14-8.

14-10. STEERING CONTROL VALVE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power

Cap and Plug Set

Materials/Parts

Tags (App. C, Item 51)

Equipment Condition

Vehicle parked on level ground.
Turn signal switch removed,
para. 8-13.
Steering wheel removed, para. 14-3.
Steering column removed, para. 14-4.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF . ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

14-10. STEERING CONTROL VALVE - REPLACE (Cont'd)

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

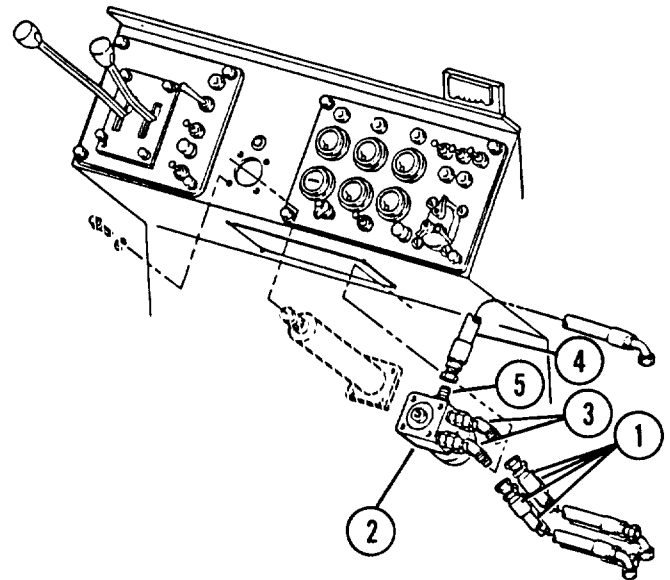
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. DISCONNECT HYDRAULIC HOSES (1) AT STEERING CONTROL VALVE (2).
 - a. Tag and remove four steering hoses (1) from four elbows (3) at valve (2).
 - b. Tag and remove pilot pressure hose (4) from adapter (5).
2. IF NECESSARY, REMOVE FOUR ELBOWS (3), FOUR ADAPTERS (6) AND ADAPTER (5) FROM STEERING CONTROL VALVE (2).

INSTALLATION

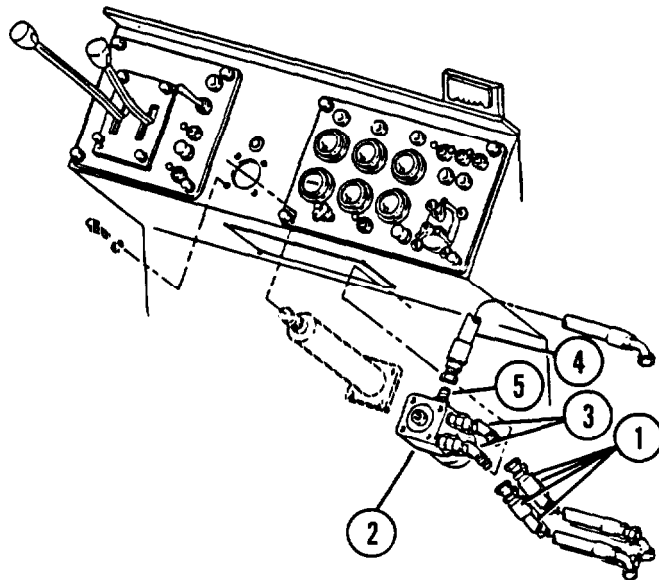
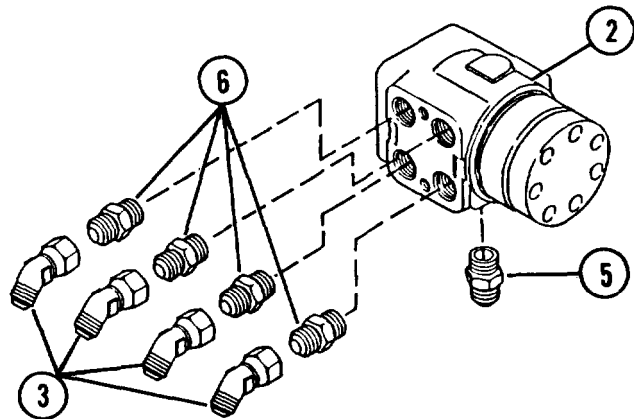
NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry. APPLY film of clean hydraulic oil to all seals as they are installed.



14-10. STEERING CONTROL VALVE - REPLACE (Cont'd)

1. IF REMOVED, INSTALL FOUR ELBOWS (3), FOUR ADAPTERS (6), AND ADAPTER (5) TO STEERING CONTROL VALVE (2).
2. CONNECT HYDRAULIC HOSES (1) TO STEERING CONTROL VALVE (2).
 - a. Connect pilot pressure hose (4) to adapter (5) at valve (2).
 - b. Connect four steering hoses (1) to four elbows (3) at valve (2).
3. INSTALL STEERING CONTROL VALVE (2) TO STEERING COLUMN (4), para. 14-4.
4. INSTALL TURN SIGNAL SWITCH, PARA. 8-13.
5. INSTALL STEERING WHEEL, para. 14-3.
6. WITH ENGINE RUNNING CYCLE STEERING WHEEL FIVE COMPLETE TURNS RIGHT AND LEFT TO BLEED AIR FROM CONTROL VALVE.



14-11. STEERING SELECT VALVE - REPLACE/REPAIR/TEST

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Testing of valve solenoids

Initial Setup
Tools

Tool Kit, Automotive Mechanics
 Cap and Plug Set

Test Equipment

Ohmmeter

Equipment Condition

Vehicle parked on level ground.
 Batteries disconnected, para. 8-44.

Materials/Parts

Container, 6 Gal.
 Hydraulic Oil (App. C, Item 35)
 Lockwashers (6, 9)
 O-rings (13, 16)
 Tags (App. C, Item 51)

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

CAUTION

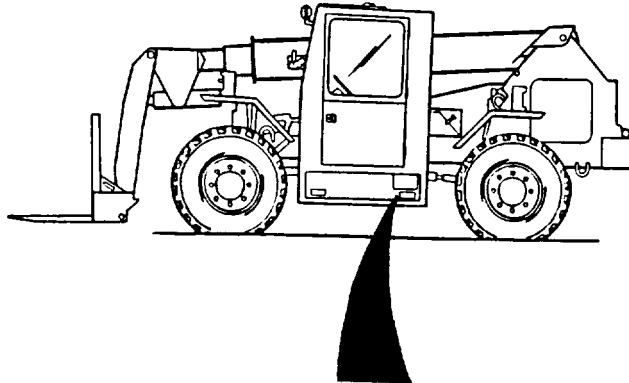
Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

14-11. STEERING SELECT VALVE - REPLACE/REPAIR/TEST (Cont'd)

NOTE

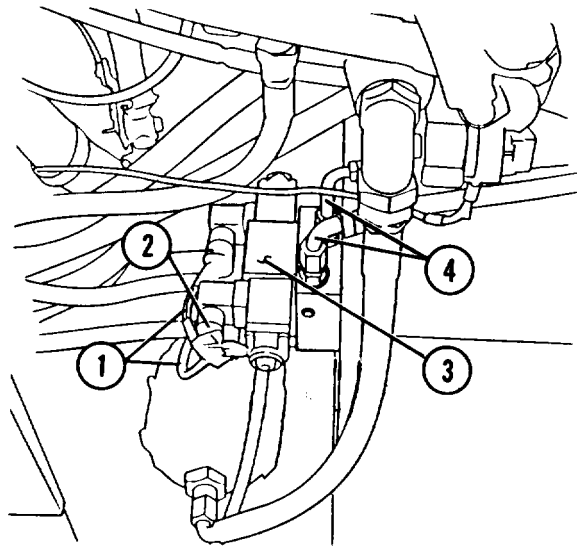
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. TAG AND REMOVE TWO ELECTRICAL LEADS (1) AT PLUGS (2) FROM STEERING SELECT VALVE (3).
 - a. Tag electrical leads (1).
 - b. Pull plugs (2) from valve (3).
2. TAG AND DISCONNECT FOUR HYDRAULIC HOSES (4) FROM VALVE (3).



NOTE

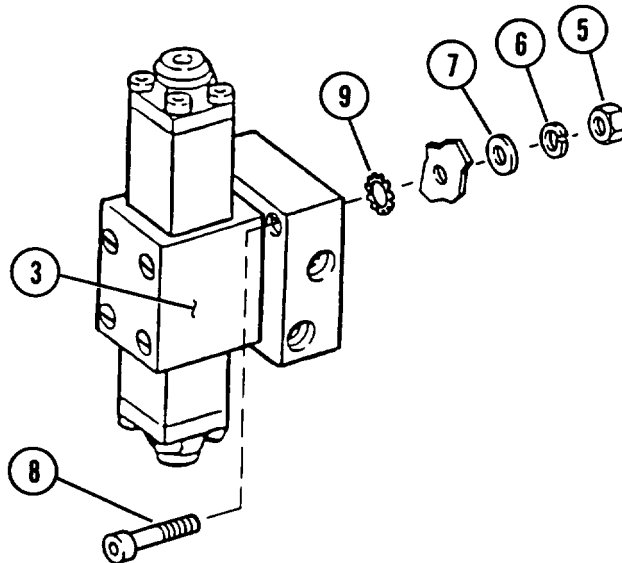
Note position of valve (3) as mounted on vehicle for use during installation.



NOTE

Note that nuts (5), lockwashers (6), and washers (7), are accessed from inside cab tool box. Lockwashers (9) are located between valve (3) and backside of cab tool box.

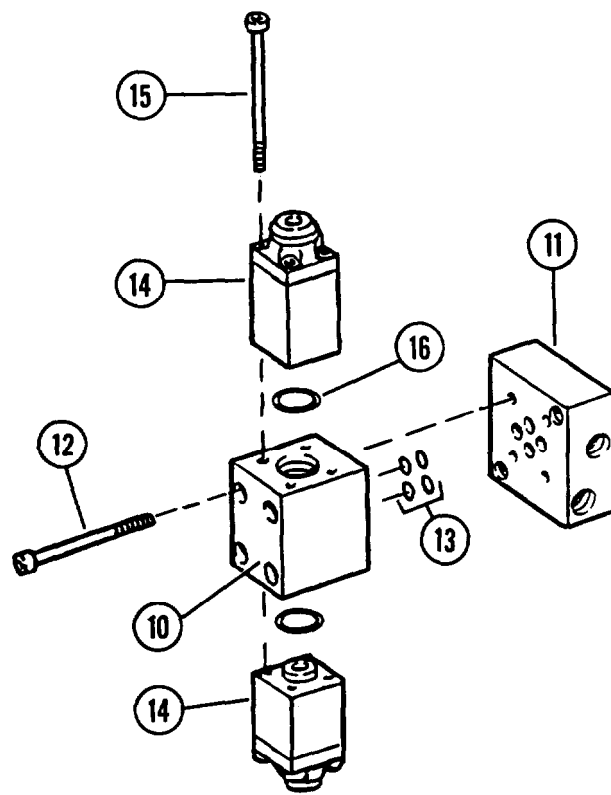
3. REMOVE THE STEERING SELECT VALVE (3) FROM VEHICLE.
 - a. Remove two nuts (5), lockwashers (6), washers (7), capscrews (8), and lockwashers (9), securing valve (3) to the vehicle. Discard lockwashers (6) and lockwashers (9).
 - b. Remove valve (3) from the vehicle.



14-11. STEERING SELECT VALVE - REPLACE/REPAIR/TEST (Cont'd)

DISASSEMBLY

1. REMOVE VALVE BODY (10) FROM VALVE PLATE (11).
 - a. Remove four capscrews (12) and separate valve body (10) from valve plate (11).
 - b. Remove and discard four O-rings (13) from between ports of valve body (10) and valve plate (11).
2. REMOVE TWO SOLENOIDS (14) FROM VALVE BODY (10).
 - a. Remove four capscrews (15) from each solenoid (14) and separate solenoids (14) from valve body (10).
 - b. Remove and discard one O-ring (16) from between each solenoid (14) and valve body (10).

**ASSEMBLY**

1. INSTALL TWO SOLENOIDS (14) TO VALVE BODY (10).
 - a. Position one new O-ring (16) between each solenoid (14) and valve body (10).
 - b. Secure each solenoid (14) to valve body (10) with four capscrews (15).
2. INSTALL VALVE BODY (10) TO VALVE PLATE (11).
 - a. Position four new O-rings (13) between ports of valve body (10) and valve plate (11).
 - b. Secure valve body (10) to valve plate (11) with four capscrews (12).

14-11. STEERING SELECT - VALVE RBPLACE/REPAIR (Cont'd)

INSTALLATION

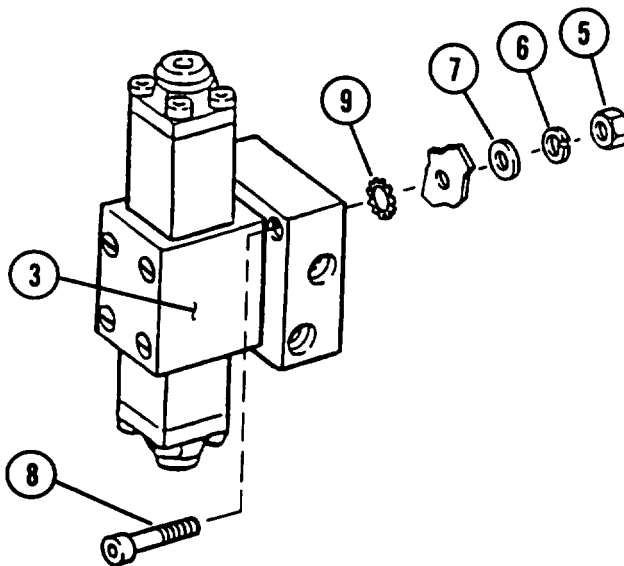
NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

NOTE

Position valve (3) on vehicle as noted during removal.

Note that nuts (5), lockwashers (6), and washers (7) are accessed from inside the cab tool box. Lockwashers (9) are located between valve (3) and backside of tool box.



1. INSTALL THE STEERING SELECT VALVE (3).
 - a. Position valve (3) on vehicle.
 - b. Secure with two lockwashers (9), two capscrews (8), two washers (7), two new lockwashers (6), and two nuts (5).

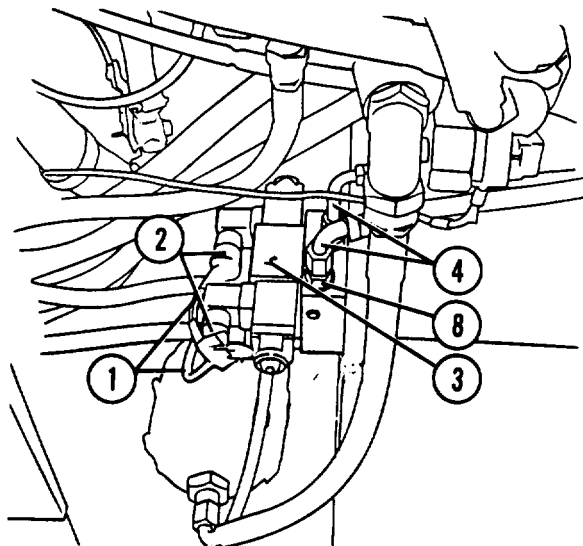
2. CONNECT FOUR HYDRAULIC HOSES (4) AS TAGGED .

3. CONNECT TWO ELECTRICAL LEADS (1) AT PLUGS (2) OF STEERING SELECT VALVE (3).

Insert plugs (2) of two electrical leads (1) into two socket terminals of steering select valve (3) as tagged.

4. CONNECT BATTERIES, PARA. 8-44.

5. BLEED THE STEERING SYSTEM HYDRAULIC CIRCUIT BY SELECTING FOUR WHEEL STEERING AND CYCLING THE STEERING CYLINDERS FIVE TIMES.



14-11. STEERING SELECT VALVE - REPLACE/REPAIR/TEST (Cont'd)

TESTING STEERING SELECT VALVE SOLENOIDS

1. TAG AND REMOVE ELECTRICAL LEAD (1) AT PLUG (2) FROM SOCKET TERMINAL OF SOLENOID (14) TO BE TESTED.

- a. Tag electrical lead (1) at solenoid (14).
- b. Pull plug (2) from socket terminal of solenoid (14).

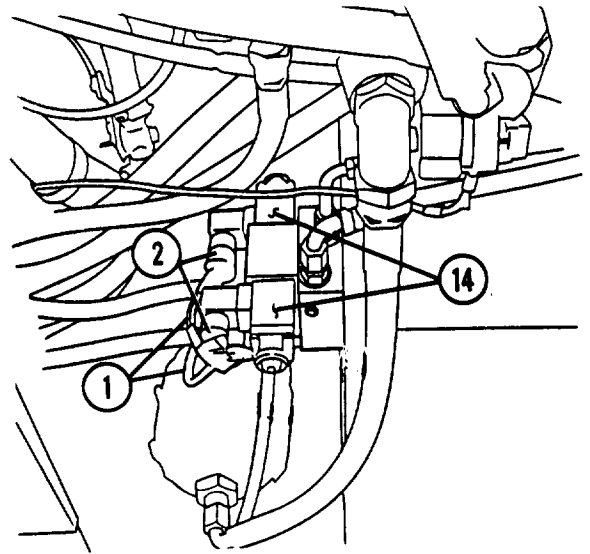
2. PERFORM CONTINUITY TEST ON SOLENOID (14) .

- a. Check for continuity with an ohmmeter between the two connections on socket terminal of solenoid (14).
- b. If continuity is not indicated, solenoid is defective and must be replaced. Refer to disassembly and assembly sections of this paragraph.

3. CONNECT ELECTRICAL LEAD (1) TO SOLENOID (14).

Insert plug (2) of electrical lead (1) into socket terminal of solenoid (14) as tagged.

4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



CHAPTER 15

FRAME AND TOWING ATTACHMENT MAINTENANCE

15-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the frame and towing attachment components. To find a specific maintenance procedure, see the maintenance task summary below.

15-2. FRAME AND TOWING ATTACHMENT MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
15-3	Counterweight - Replace	15-2
15-4	Pintle Hook - Replace/Repair	15-4

15-3. COUNTERWEIGHT - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Forklift, 4000 lb. capacity

Cable/Chain, 4000 lb. capacity

Equipment Condition

Vehicle parked on level ground.
Load backrest removed from storage position, TM10-3930-660-10.

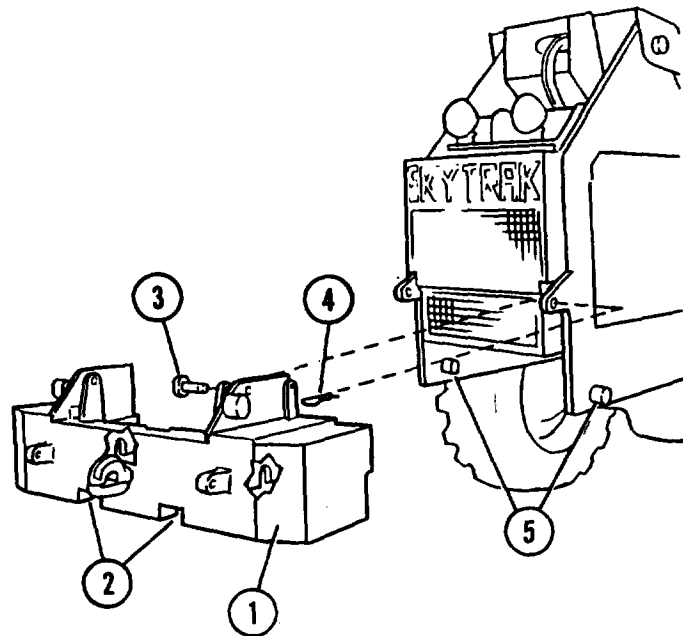
REMOVAL

WARNING

Use extreme caution when lifting counterweight (1) with a forklift. Never allow forks to tip forward. Counterweight top mount pin holes must be fastened to the lifting forklift when counterweight (1) is not supported by vehicle being worked on.

CAUTION

When placing forks in counterweight (1), tips of forks must not protrude past front of counterweight (1). Possible damage to vehicle engine from forks may result.



NOTE

Weight of counterweight (1) is 3600 lbs. (1636 kg). Use a forklift of at least 4000 lbs. capacity for lifting the counterweight (1).

- 1. POSITION FORKLIFT FORKS IN COUNTERWEIGHT POCKETS (2) AND RAISE FORKS JUST ENOUGH TO RELEASE TENSION FROM PINS (3).

- 2. REMOVE TWO LOCKPINS (4) AND TWO STRAIGHT PINS (3).
- 3. FASTEN COUNTERWEIGHT (1) TO FORKLIFT USING CHAIN OR CABLE.
- 4. LIFT COUNTERWEIGHT (1) APPROXIMATELY ONE INCH AND THEN TILT FORK TIPS UP JUST ENOUGH TO CLEAR COUNTERWEIGHT FROM VEHICLE FRAME MOUNTS (5).

 15-3. COUNTERWEIGHT - REPLACE (Cont'd)

 5. CAREFULLY REMOVE COUNTERWEIGHT (1)
 FROM THE VEHICLE.

Back lifting forklift away from the vehicle and then lower counterweight (1) to the ground.

INSTALLATION

WARNING

Use extreme care when lifting counterweight (1) with a forklift. Never allow forks to tip forward. Always tie counterweight top mount pin holes to the lifting forklift.

CAUTION

When placing forks in counterweight (1), tips of forks must not protrude past front of counterweight (1). Possible damage to vehicle engine from forks may result.

NOTE

Weight of counterweight (1) is 3600 lbs. (1636 kg). Use a forklift of at least 4000 lbs. capacity for lifting the counterweight.

1. SECURE COUNTERWEIGHT (1) TO LIFTING FORKLIFT.
 - a. Position forklift forks in pockets (2) of counterweight (1).
 - b. Use a chain or cable to fasten counterweight top mount pin holes to forklift.
2. POSITION THE COUNTERWEIGHT (1) ON VEHICLE.

CAUTION

Make sure the counterweight bottom mount pockets fully engage around vehicle frame mounting pins (5) at the rear of the vehicle.

- a. Carefully lift the counterweight (1) and move it to rear of vehicle to which counterweight is to be attached.
 - b. Align the counterweight (1) with the vehicle frame.
 - c. Raise the counterweight until the pin holes in counterweight top mounts are approximately 3 inches (7.6 cm) above pin holes in vehicle frame top mounts.
 - d. Carefully move the counterweight toward the vehicle until the counterweight pockets are directly over vehicle frame mounting pins (5).
 - e. Carefully lower the counterweight (1) until the counterweight pockets engage vehicle frame mounting pins (5).
 - f. Remove chain or cable securing counterweight to the lifting forklift.
3. INSTALL TWO STRAIGHT PINS (3), AND TWO LOCKPINS (4) TO SECURE COUNTERWEIGHT (1) TO VEHICLE.
 4. CAREFULLY LOWER AND REMOVE FORKS OF LIFTING FORKLIFT FROM UNDER COUNTERWEIGHT (1).
 5. IF NECESSARY, INSTALL LOAD BACKREST TO STORAGE POSITION, TM10-3930-660-10.

15-4. **PINTLE HOOK - REPLACE/REPAIR**

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Cotter pins (1,7)

Equipment Condition

Vehicle parked on level ground.
Load backrest removed from storage position, (if stored)
TM10-3930-660-10.

Reference

TM10-3930-660-10

REMOVAL

1. REMOVE COTTER PIN (1) AND CASTLE NUT (2) SECURING PINTLE HOOK (3) IN COUNTERWEIGHT (4). DISCARD COTTER PIN (1).

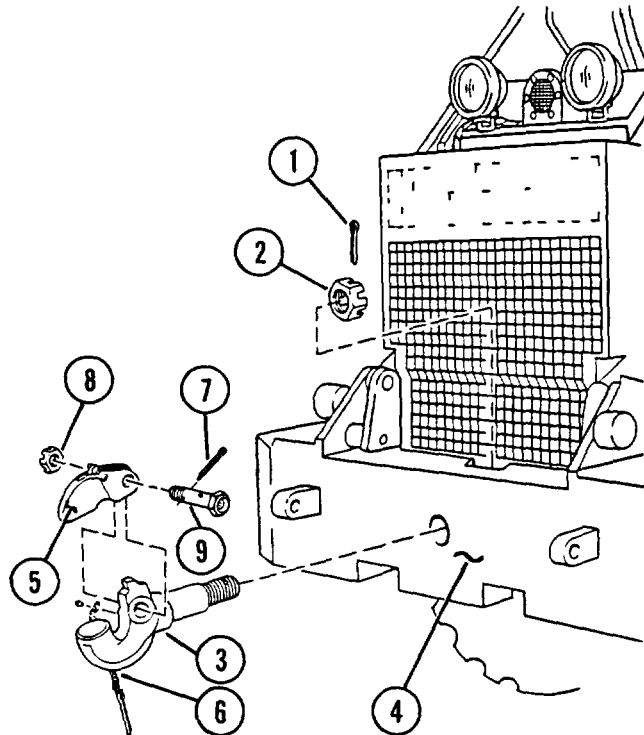
WARNING

Pintle hook (3) weighs 36 pounds. Use caution when removing from counterweight (4) to avoid personal injury or damage to equipment.

2. SLIDE PINTLE HOOK (3) OUT OF COUNTERWEIGHT (4).

DISASSEMBLY

1. REMOVE LATCH (5) FROM PINTLE HOOK (3).
 - a. Remove chain and pin assembly (6) from latch (5).
 - b. Pull cotter pin (7) out of castle nut (8) and bolt (9). Discard cotter pin (7).



15-4. PINTLE HOOK - REPLACE/REAIR (Cont'd)

- c. Remove castle nut (8) and bolt (9) and latch (5) from pintle hook (3).
2. IF NECESSARY, REMOVE SCREW (10) AND CHAIN AND PIN ASSEMBLY (6) FROM LATCH (5).

ASSEMBLY

1. IF NECESSARY, SECURE CHAIN AND PIN ASSEMBLY (6) WITH SCREW (10).
2. INSTALL LATCH (5) ON PINTLE HOOK (3) .
 - a. Place latch (5) in position on pintle hook (3) and insert bolt (10) .
 - b. Secure bolt (10) and latch (5) with castle nut (9) and new cotter pin (7) .

INSTALLATION**WARNING**

Pintle hook (3) weighs 36 pounds. Use caution when installing in counterweight (4) to avoid personal injury or damage to equipment.

1. SLIDE PINTLE HOOK (3) INTO HOLE ON COUNTERWEIGHT (4).
 2. SECURE PINTLE HOOK (3) IN COUNTERWEIGHT (4) WITH CASTLE NUT (2) AND NEW COTTER PIN (1).
- 30 IF NECESSARY, INSTALL LOAD BACKREST IN STORAGE POSITION,
TM10-3930-660-10.

CHAPTER 16

BODY AND CAB MAINTENANCE

16-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the body and cab components. To find a specific maintenance procedure, see the maintenance task summary below.

16-2. BODY AND CAB MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
16-3	Engine Covers - Replace	16-2
16-4	Radiator Cover - Replace	16-4
16-5	Engine Door Panels - Replace	16-5
16-6	Transmission Cover - Replace	16-7
16-7	Cab Doors - Service/Replace	16-8
16-8	Fenders - Replace	16-12
16-9	Fender Braces - Replace	16-14
16-10	Cab Windows, Front Windshield, Right-Hand Window, and Upper Door Window - Replace	16-16
16-11	Cab Skylight Guard and Window - Replace	16-18
16-12	Cab Rear Window - Replace	16-21
16-13	Seat - Replace	16-23
16-14	Seat Belts - Replace	16-25
16-15	Accessories Storage Box - Replace	16-26
16-16	Fire Extinguisher Bracket - Replace	16-27
16-17	Tool Box Door Latch - Replace	16-28

16-3. ENGINE COVERS-REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwashers (7)
 Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
 Air cleaner intake removed, Para. 5-6.
 Air cleaner assembly removed, Para. 5-5.
 Air cleaner restriction indicator tube removed from underside of front engine cover, para. 19-4.
 Load backrest removed from storage position, TM10-3930-660-10.

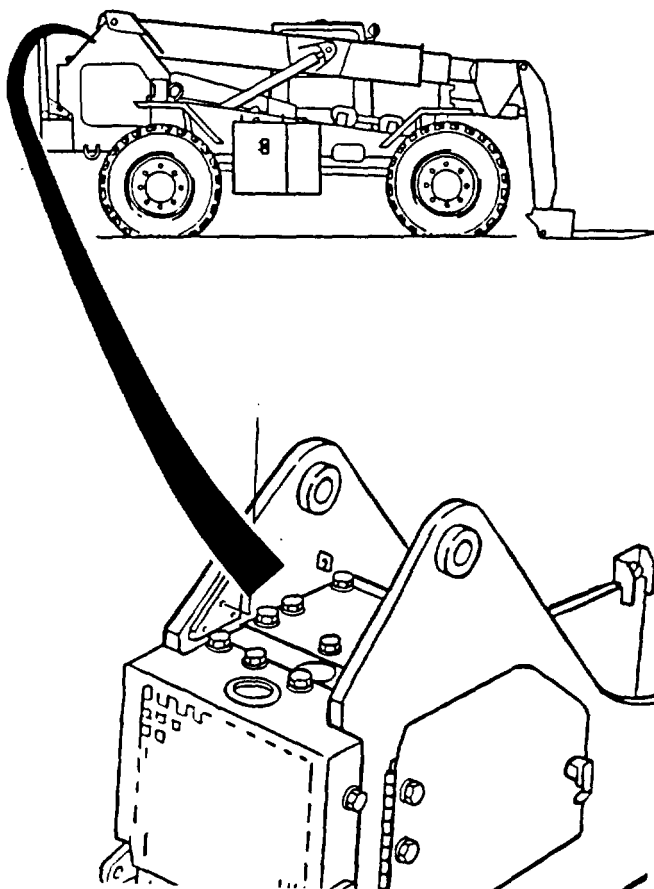
REMOVAL

1. REMOVE MOUNTING HARDWARE SECURING FRONT ENGINE COVER (1) AND REAR ENGINE COVER (2).

NOTE

Two capscrews (3) are longer than other capscrews used to secure engine covers (1) and (2). Note location of capscrews (3) for use during installation.

- a. Remove two capscrews (3), two lockwashers (4) and two flatwashers (5) securing left-hand side of front engine cover (1). Discard lockwashers (4).
- b. Remove remaining twelve capscrews (6), twelve lockwashers (4), and twelve flatwashers (5), securing front and rear engine covers (1) and (2) to each other, to vehicle frame, and to radiator cover (7). Discard lockwashers (4).



16-3. ENGINE COVERS - REPLACE (Cont'd)

2. REMOVE FRONT ENGINE COVER (1), AND REAR ENGINE COVER (2) FROM VEHICLE FRAME.
3. IF NECESSARY, REMOVE FOURTEEN RETAINER NUTS (8) FROM VEHICLE FRAME AND REAR ENGINE COVER (7).

INSTALLATION

1. IF REMOVED, INSTALL FOURTEEN RETAINER NUTS (8) TO VEHICLE FRAME AND REAR ENGINE COVER (7).
2. POSITION FRONT ENGINE COVER (1), AND REAR ENGINE COVER (2) ON VEHICLE FRAME .

NOTE

Capscrews (3) are longer than other capscrews used to secure engine covers (1) and (2). Install capscrews (3) as noted during removal.

NOTE

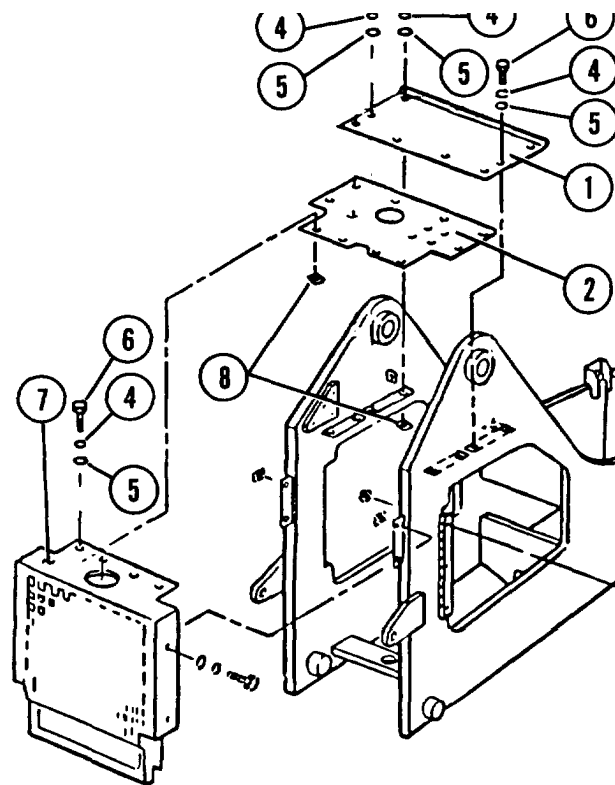
Apply Loctite 242 to capscrews (3) as installed.

- a. Install two capscrews (3), two new lockwashers (4) and two flatwashers (5) on left-hand side of front engine cover (7).

NOTE

Apply Loctite 242 to capscrews (6) as installed.

- b. Install remaining twelve capscrews (6), twelve new lockwashers (4), and twelve flatwashers (5), to secure front and rear engine covers (1) and (2) to each other, to vehicle frame, and to radiator cover (7).
3. INSTALL AIR CLEANER ASSEMBLY, PARA.



4. INSTALL AIR CLEANER RESTRICTION INDICATOR TUBE, PARA. 19-4.
5. INSTALL AIR CLEANER INTAKE, PARA 5-6.
6. INSTALL LOAD BACKREST IN STORAGE POSITION, IF NECESSARY. REFER TO TM10-3930-660-10.

16-4. RADIATOR COVER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwashers (2)

Equipment Condition

Load backrest removed from storage position, TM10-3930-660-10.

REMOVAL

REMOVE COVER (4).

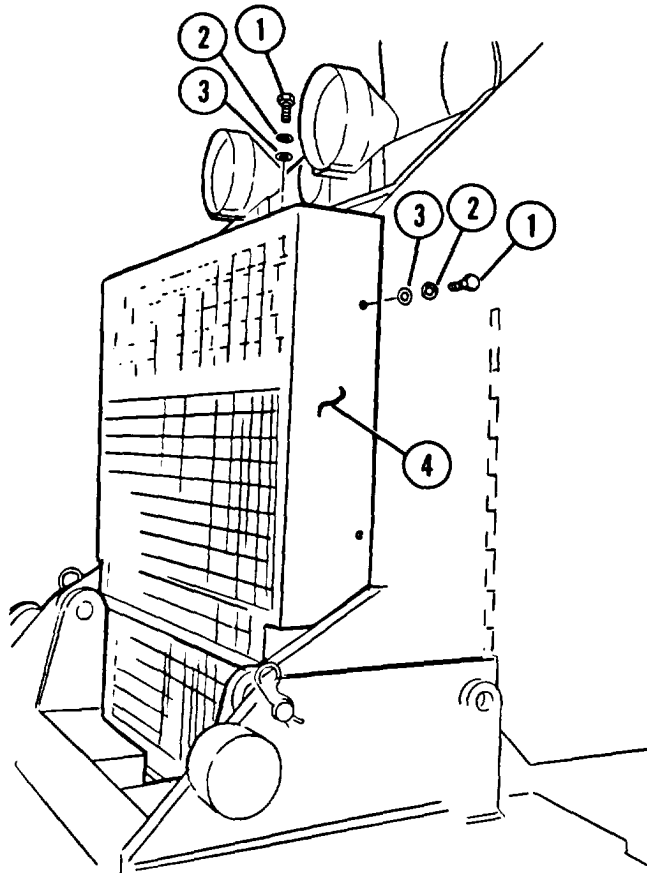
- a. Remove eight capscrews (1), eight lockwashers (2), and eight flatwashers (3) securing the radiator cover (4). Discard lockwashers (2).
- b. Remove the radiator cover (4).

INSTALLATION

1. INSTALL COVER (4).

- a. Position radiator cover (4) on the vehicle.
- b. Install eight capscrews (1), eight new lockwashers (2), and eight flatwashers (3) on cover (4).

2. INSTALL LOAD BACKREST IN STORAGE POSITION IF NECESSARY. REFER TO TM10-3930-660-10.



16-5. ENGINE DOOR PANELS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Lockwashers (3)
 Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.

REMOVAL

NOTE

Procedure can be used to remove right or left side engine door panels.

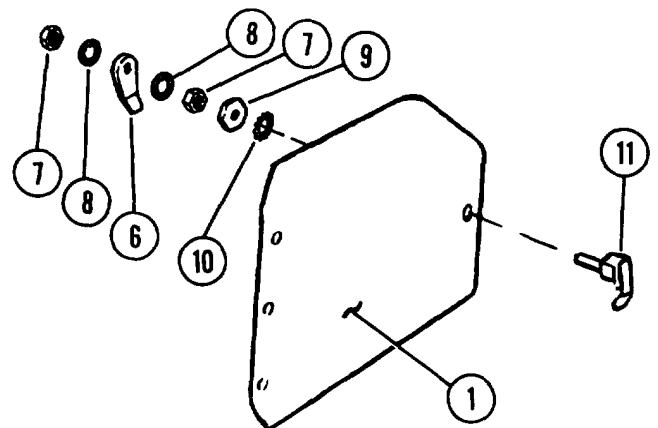
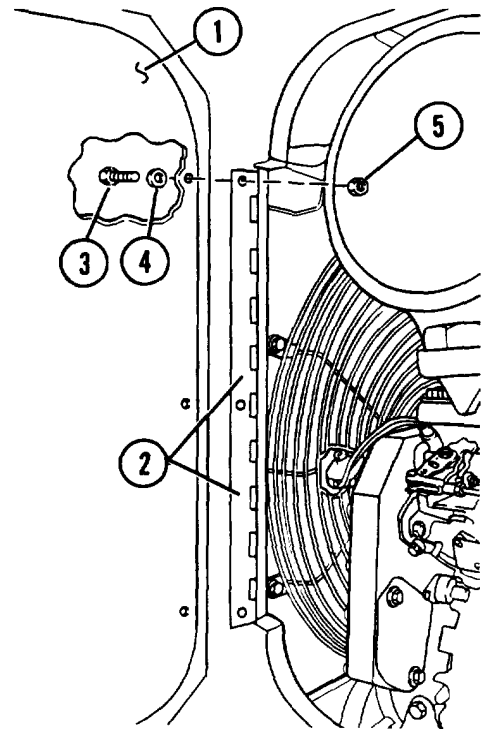
1. OPEN ENGINE DOOR PANEL (1) TO BE REMOVED .

NOTE

Support engine door panel (1) so door does not drop when mounting hardware is removed.

2. REMOVE ENGINE DOOR PANEL (1) FROM HINGE (2) BY REMOVING THREE CAPSCREWS (3), THREE LOCKWASHERS (4), AND THREE NUTS (5). DISCARD LOCKWASHERS (4).
3. IF NECESSARY, REMOVE DOOR LATCH (PARTS 6 THROUGH 11).

- a. Measure position of latching lever (6) on shaft. Record measurement for reference during installation.
- b. Remove jam nut (7), lockwasher (8), latching lever (6), second lockwasher (8), and second jam nut (7) .
- c. Remove hex nut (9), lockwasher (10), and handle (11).

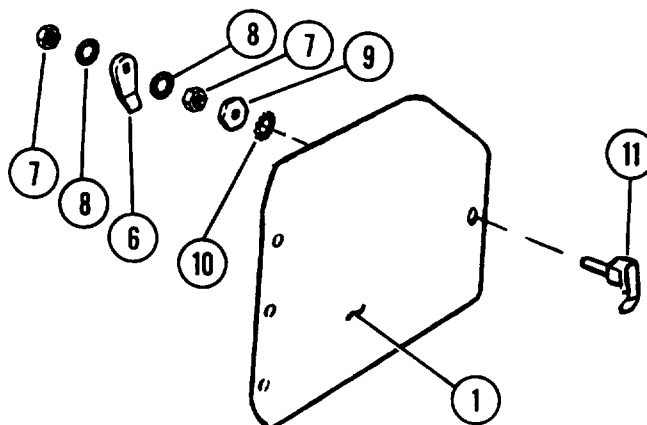


16-5. ENGINE DOOR PANELS - REPLACE (Cont'd)

INSTALLATION

1. IF REMOVED, INSTALL DOOR LATCH (PARTS 6 THROUGH 11) TO TOOL BOX DOOR (1).

a. Secure handle (11) with lockwasher (10) and hex nut (9).



NOTE

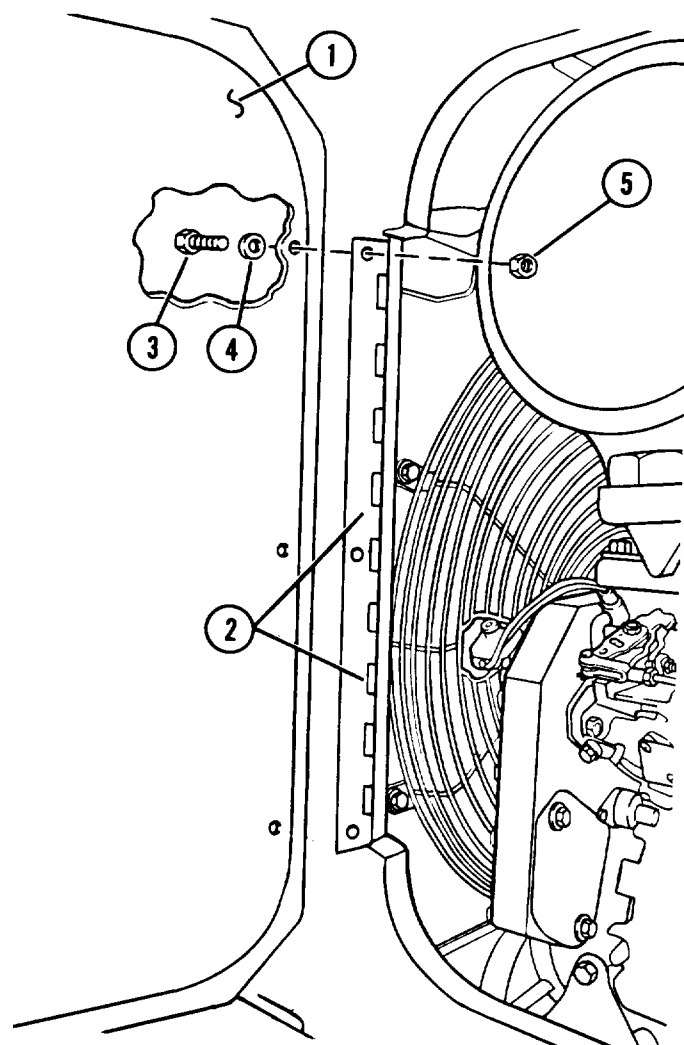
Install jam nuts (7) so that latching lever (6) is properly positioned on shaft. Refer to measurement taken in step 2 of installation.

b. Install jam nut (7), lockwasher (8), latching lever (6), second lockwasher (8), and second jam nut (7).

NOTE

Apply Loctite 242 to threads of capscrews (3).

2. POSITION ENGINE DOOR PANEL (1) ON HINGE (2) AND SECURE WITH THREE CAPSCREWS (3), THREE NEW LOCKWASHERS (4), AND THREE NUTS (5).



16-6. TRANSMISSION COVER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Lockwashers (2)
 Loctite 242 (App. C, Item 39)

REMOVAL

1. REMOVE SIX CAPSCREWS (1), SIX LOCKWASHERS (2), AND SIX FLATWASHERS (3) WHICH SECURE TRANSMISSION COVER (4). DISCARD LOCKWASHERS (2)
2. LIFT COVER (4) OFF OF FRAME (5).
3. IF NECESSARY, REMOVE MOLDINGS (PARTS 6 THROUGH 10) FROM COVER (4).

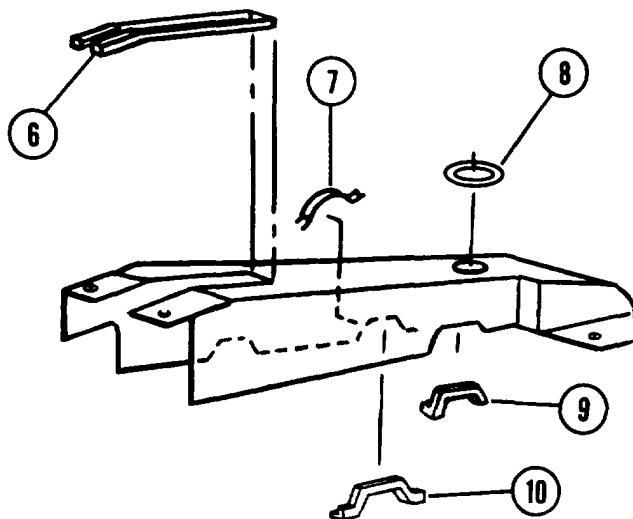
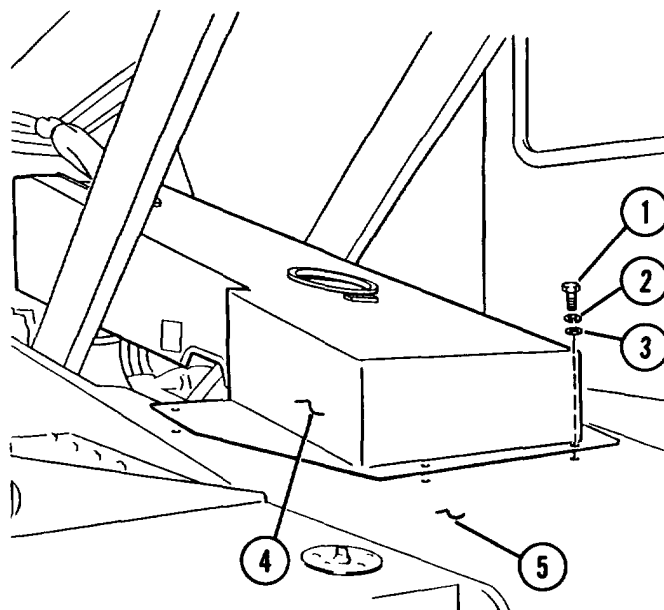
INSTALLATION

1. IF NECESSARY, INSTALL MOLDINGS (PARTS 6 THROUGH 10) TO COVER (4).
2. POSITION COVER (4) ON THE FRAME (5).

NOTE

Apply Loctite 242 to threads of capscrews (1).

3. SECURE COVER (4) USING SIX FLATWASHERS (3), SIX NEW LOCKWASHERS (2), AND SIX CAPSCREWS (1).



16-7. CAB DOORS - SERVICE/REPLACB

This task covers:

- a. Service by Adjusting Door Latches
- b. Removal
- c. Installation
- d. Repair by Removal of Door Latches

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

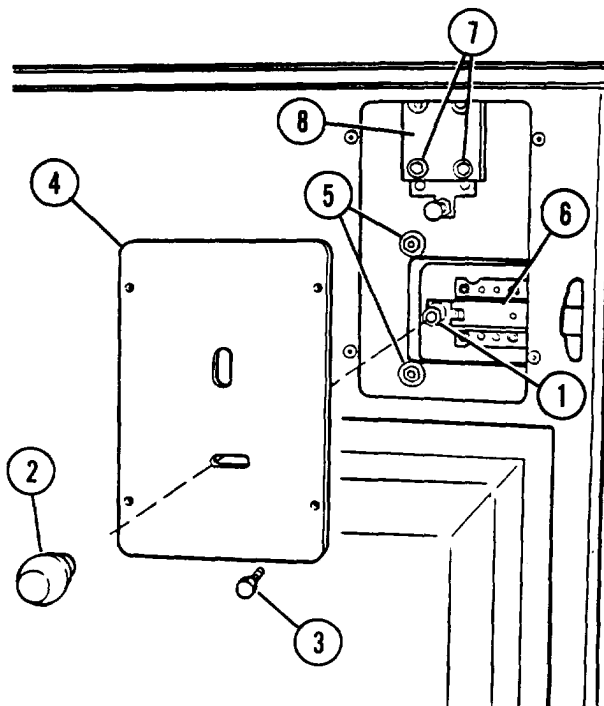
Lockwashers (23)
Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.

SERVICE BY ADJUSTING DOOR LATCHES

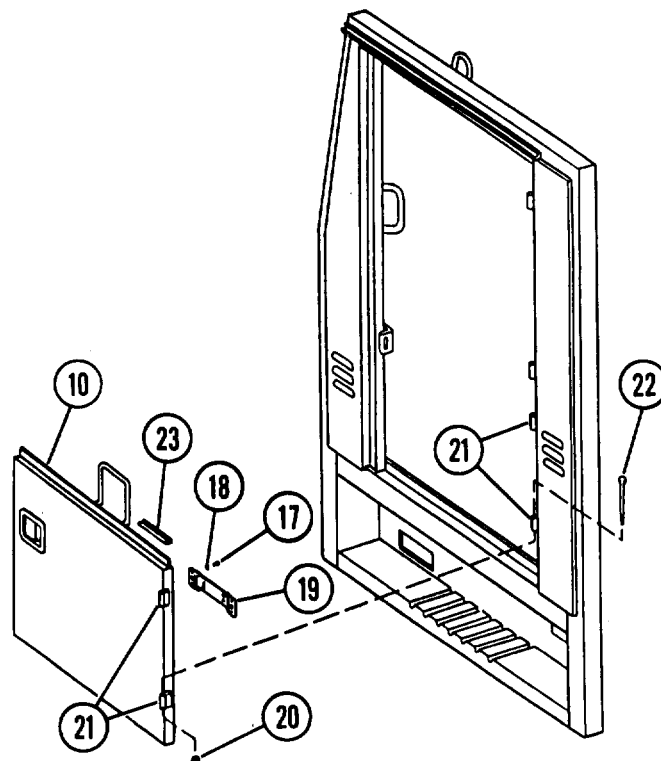
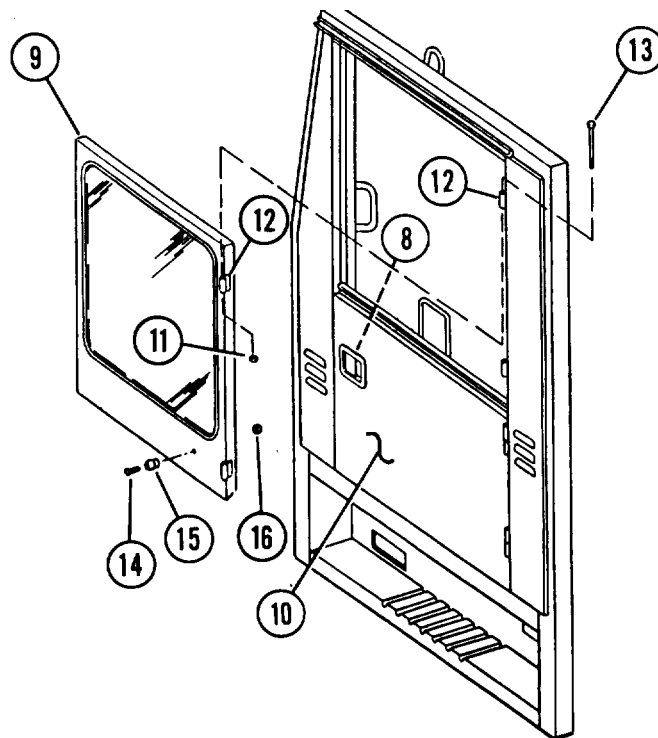
1. LOOSEN NUT (1) AND REMOVE KNOB (2) FROM STUD.
2. REMOVE FOUR SCREWS (3) AND REMOVE ACCESS COVER (4).
3. LOOSEN FOUR NUTS (5) AND REPOSITION LOWER DOOR LATCH (6) AS REQUIRED. TIGHTEN NUTS (5).
4. LOOSEN FOUR SCREWS (7) AND REPOSITION UPPER DOOR LATCH (8) AS REQUIRED. TIGHTEN **SCREWS** (7).
5. ALIGN COVER PLATE (4) AND INSTALL FOUR SCREWS (3).
6. APPLY LOCTITE #242 TO STUD AND INSTALL NUT (1) TO KNOB (2).



16-7. CAB DOORS - SERVICE/REPLACE (Cont' d)

REMOVAL

1. REMOVE UPPER DOOR (9).
 - a. Trip door latch (8) which secures upper door (9) to the lower door (10).
 - b. Remove two nuts (11) on upper door hinges (12).
 - c. Swing upper door (9) open and lift door (9) up to remove door (9).
 - d. Remove capscrews (13).
 - e. If necessary, remove Capscrew (14), nut (16) and door holder (15).
2. REMOVE LOWER DOOR (10).
 - a. Remove two capscrews (17), two flatwashers (18), and holding strap (19) from lower door (10).
 - b. Remove two nuts (20) on lower door hinges (21).
 - c. Swing lower door (10) open, lift door up, and remove lower door (10),
 - d. Remove capscrews (22).
 - e. If necessary, remove weatherstripping (23).

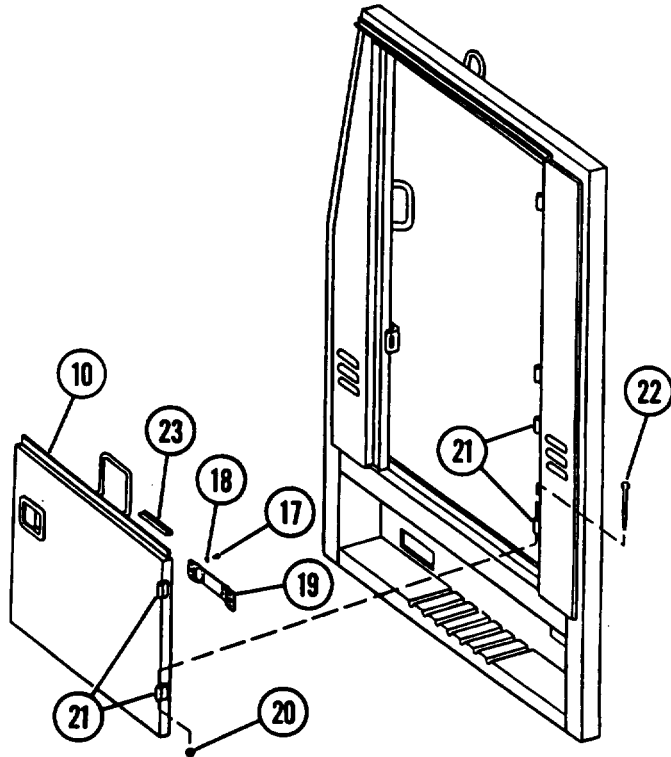


16-7. CAB DOORS - SERVICE/REPLACE (Cont'd)

INSTALLATION

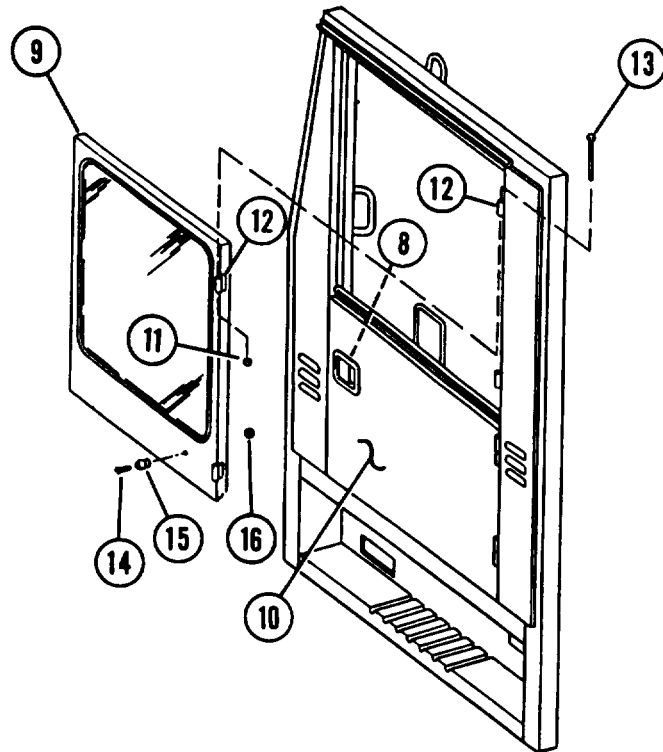
1. INSTALL LOWER DOOR (10).

- a. Position lower door (10) on lower door hinges (21) and install capscrews (22).
- b. Install two nuts (20).
- c* Secure holding strap (19) with two capscrews (17) and two flatwashers (18).
- d. If necessary, install weatherstripping (23).



2. INSTALL UPPER DOOR (9).

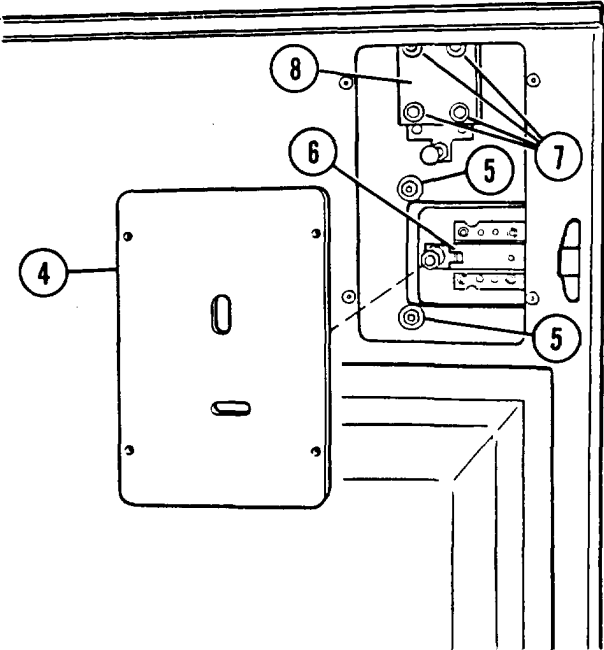
- a. Position upper door (9) on upper door hinges (12) and install capscrews (13).
- b. Install two nuts (11).
- c. Latch upper door (9) and lower door (10) together.
- d. If necessary, install door holder (15) with screw (14) and nut 16.



16-7. CAB DOORS - SERVICE/REPLACE (Cont'd)

REPAIR BY REMOVAL OF DOOR LATCHES

1. TO REMOVE UPPER (8) OR LOWER (6) DOOR LATCH , FIRST REMOVE THE ACCESS COVER (4) AS DESCRIBED IN THE "SERVICE BY ADJUSTING DOOR LATCHES" SECTION OF THIS PARAGRAPH.
2. TO REMOVE UPPER DOOR LATCH (8), REMOVE FOUR SCREWS (7) AND PULL LATCH OUT THROUGH ACCESS HOLE.
3. TO REMOVE LOWER DOOR LATCH (6), REMOVE FOUR NUTS (5) AND REMOVE LATCH FROM OUTSIDE OF LOWER DOOR .
4. TO INSTALL LOWER DOOR LATCH (6), POSITION LATCH (6) ON DOOR AND SECURE WITH FOUR NUTS (5).
5. TO INSTALL UPPER DOOR LATCH, POSITION LATCH (8) ON DOOR AND SECURE WITH FOUR NUTS (7).
6. ADJUST UPPER AND LOWER DOOR LATCHES (8) AND (6) AS DESCRIBED IN THE "SERVICE BY ADJUSTING DOOR LATCHES" SECTION OF THIS PARAGRAPH.
7. INSTALL ACCESS COVER AS DESCRIBED IN THE "SERVICE BY ADJUSTING DOOR LATCHES" SECTION OF THIS PARAGRAPH.



16-8. FENDERS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Materials/Parts

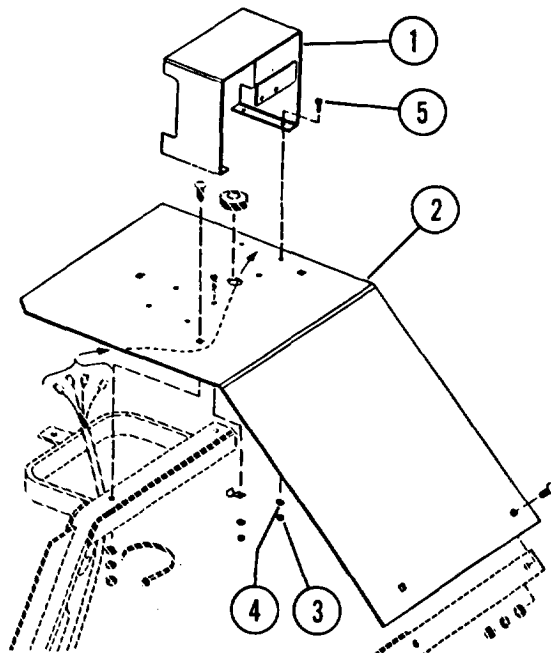
Lockwashers (4, 8, 16)
Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.
Blackout headlight assembly removed
(if required), para. 8-33.
Front headlights removed (as
required), para. 8-32.
Rear turn signal lights removed (as
required), para. 8-35.
Rear blackout/tail/stop lights
removed (as required), para. 8-34.
Front blackout/turn signal/parking
lights removed (as required), para.
8-34.

REMOVAL

1. REMOVE LIGHT BRACKET (1) FROM FENDER
(2) .
 - a. Remove four nuts (3), lockwashers
(4), and capscrews (5). Discard
lockwashers (4).
 - b. Remove light bracket (1) from
fender (2).
2. REMOVE WIRING HARNESS (6) AND MOUNTING
HARDWARE .
 - a. Remove nut (7), lockwasher (8),
capscrew (9), and clamp (10),
securing wiring harness (6) to
underside of fender (2). Discard
lockwasher (8).



16-8. FENDERS - REPLACE (Cont'd)

b. Pull harness (6) out of grommet (11). Remove grommet (11).

3. REMOVE FENDER (2) FROM BRACES (12) AND (13).

a. Remove five carriage bolts (14), five flatwashers (15), five lockwashers (16), and five nuts (17). Discard lockwashers (16).

b. Remove fender (2) from braces (12) and (13).

INSTALLATION

1. INSTALL FENDER (2) ON BRACES (12) AND (13).

a. Position fender (2) on braces (12) and (13).

NOTE

Apply Loctite 242 to threads of carriage bolts (14).

b. Install five carriage bolts (14), five flatwashers (15), and five new lockwashers (16). Install five nuts (17) and torque to 30-35 lb. ft.

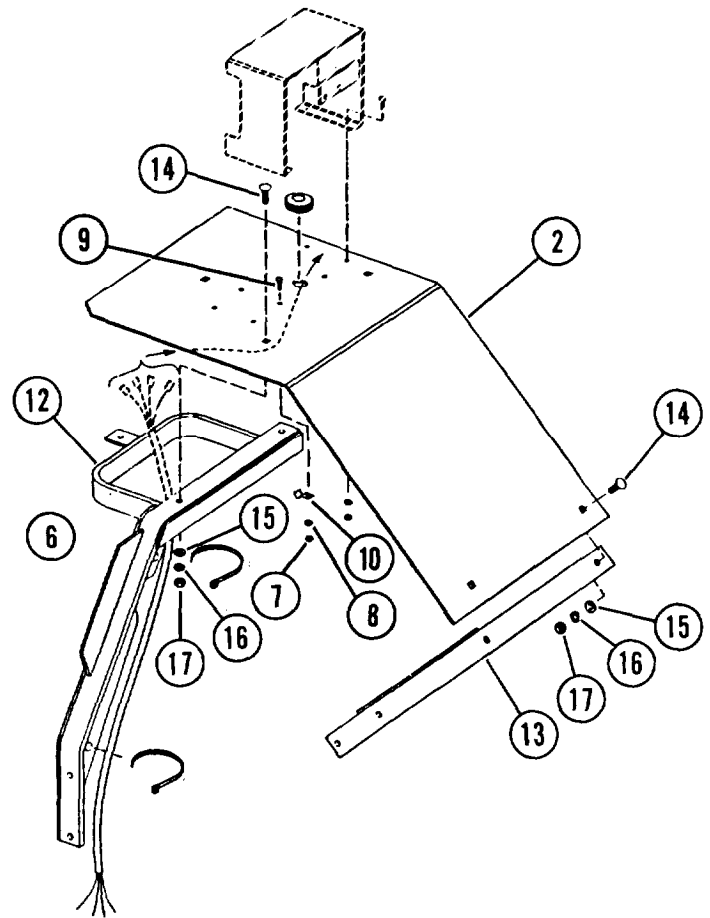
2. INSTALL WIRING HARNESS (6) AND MOUNTING HARDWARE

a. Install grommet (11), and feed harness (6), through grommet (11).

b. Position clamp (10) under fender (2) on wiring harness (6). Secure clamp (10) with capscrew (9), new lockwasher (8), and nut (7).

3. POSITION LIGHT BRACKET ON FENDER.

a. Position light housing (1) on fender (2).



LEFT REAR FENDER SHOWN - OTHER FENDERS SIMILAR

NOTE

Apply Loctite 242 to threads of capscrews (5).

b. Secure light housing (1) with four capscrews (5), four new lockwashers (4), and four nuts (3).

4. INSTALL LIGHT ASSEMBLIES AS REQUIRED.

Refer to Equipment Condition heading for paragraph numbers of light assembly removal/installation procedures.

16-9. FENDER BRACES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Fender removed,
para. 16-8.

Materials/Parts

Lockwashers (5 and 7)
Tie Straps (2)
Vibration Pads (9)

REMOVAL

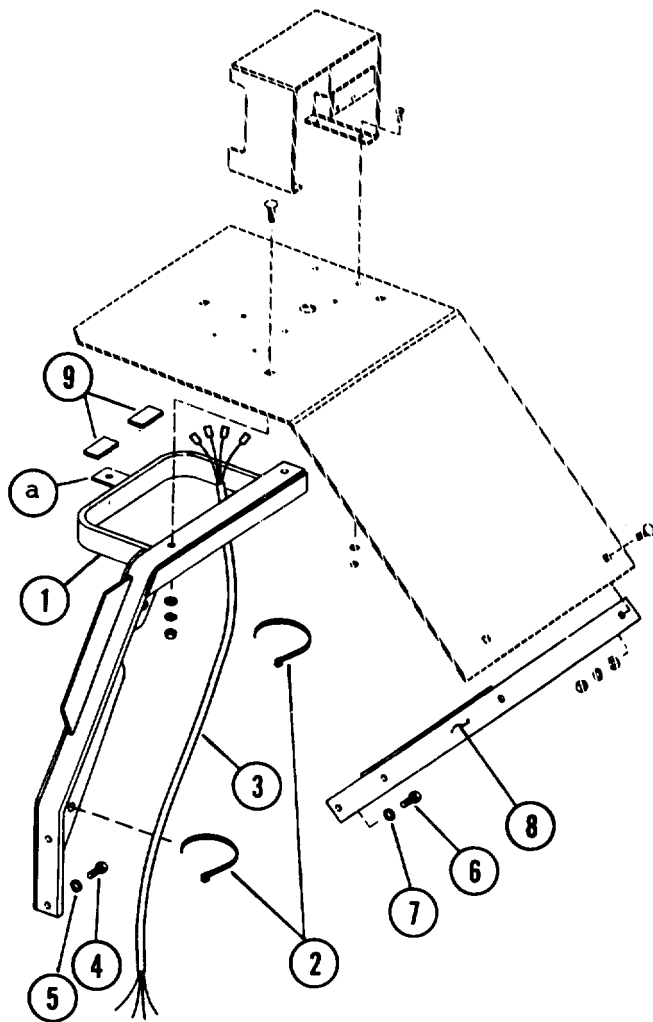
1. REMOVE FENDER BRACE (1).
 - a. Remove and discard two tie straps (2) securing wire harness (3) to fender brace (1).
 - b. Remove two capscrews (4) and two lockwashers (5) to remove fender brace (1). Discard lockwashers (5).
2. REMOVE TWO CAPSCREWS (6) AND TWO LOCKWASHERS (7) TO REMOVE FENDER BRACE (8). DISCARD LOCKWASHERS (7).
3. ON REAR FENDER BRACES ONLY, REMOVE AND DISCARD VIBRATION PADS (9) IF DAMAGED OR WORN.

INSTALLATION

NOTE

Apply Loctite 242 to threads of all capscrews before installation.

1. INSTALL FENDER BRACE (8) WITH TWO LOCKWASHERS (7) AND TWO CAPSCREWS (6).
2. INSTALL FENDER BRACE (1).
 - a. Position brace (1) on vehicle and secure with two new lockwashers (5) and two capscrews (4).



**LEFT REAR FENDER BRACES
SHOWN - OTHERS SIMILAR.**

16-9. FENDER BRACES - REPLACE (Cont'd)

- b. Install two new tie Straps (2) securing wire harness (3) to fender brace (1).
3. IF NECESSARY, INSTALL NEW VIBRATION PADS (9) ON REAR FENDER BRACES (1) ONLY .
 - a. Remove plastic backing from back of pads (9).
 - b. Install two pads (9) on each rear brace, one on each side of mounting tab (a).
4. INSTALL FENDER, PARA. 16-8.

16-10. CAB WINDOWS, FRONT WINDSHIELD, RIGHT WINDOW,
AND UPPER DOOR WINDOW - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Liquid Soap (App. C, Item 45)

Silicone Grease (App. C, Item 14)

REMOVAL

WARNING

To avoid possible injury, replace broken window glass carefully. Wear a pair of heavy leather gloves or other suitable hand protection. Support window glass during removal and installation as required so it does not drop.

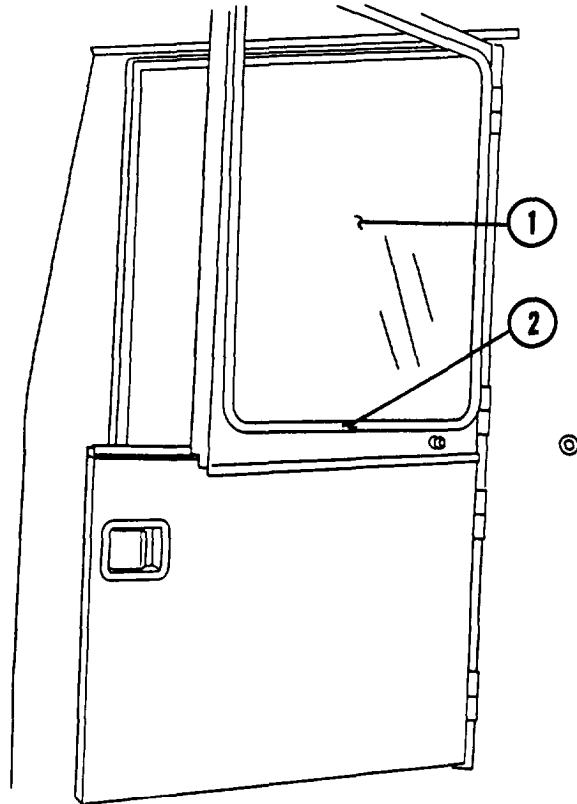
NOTE

Removal and installation procedures for cab front windshield, cab right-hand window, and cab upper door window are essentially similar.

NOTE

The window seal does not need to be removed from window opening when removing window glass.

1. CAREFULLY REMOVE WINDOW (1) FROM SEAL (2).
 - a. Separate halves of seal (2) at base of window opening where seal (2) ends meet and begin opening seal (2).



**UPPER DOOR WINDOW SHOWN,
OTHER WINDOWS SIMILAR**

16-10. CAB WINDOWS , FRONT WINDSHIELD, RIGHT-HAND WINDOW,
AND UPPER DOOR WINDOW - REPLACE (Cont'd)

- b. Open seal (2) around entire perimeter of window (1).
 - c. Carefully remove window (1) from seal (2).
2. IF NECESSARY, REMOVE SEAL (2) FROM WINDOW OPENING OF CAB OR CAB DOOR.

INSTALLATION

1. IF REMOVED, INSTALL SEAL (2) IN WINDOW OPENING OF CAB OR CAB DOOR. BE SURE ENDS OF SEAL (2) MEET AT BOTTOM OF WINDOW OPENING.
2. APPLY A LIGHT COATING OF SILICONE GREASE, OR SOAPY WATER TO THE INSIDE OF SEAL (2).
3. INSTALL WINDOW (1) IN SEAL (2).
 - a. Carefully position window (1) in seal (2).
 - b. Press inner part of window seal (2) against glass around entire perimeter of window (1). Start at split at bottom center of seal (2), and work outward.
 - c. Begin closing window seal (2) at one of the seal ends.

16-11. CAB SKYLIGHT GUARD AND WINDOW - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

- Ammonia Water (App. C, Item 3)
- Clear Silicone Caulk (App. C, Item 8)
- Lockwashers (6)
- Metal Primer (App. C, Item 38)
- Ribbon Sealer (App. C, Item 44)
- Seal (7)
- Sealing Washers (5)

REMOVAL

WARNING

To avoid injury, replace broken window glass carefully. Wear a pair of heavy leather gloves or other suitable hand protection. Support window glass during removal and installation, as required, so it does not drop.

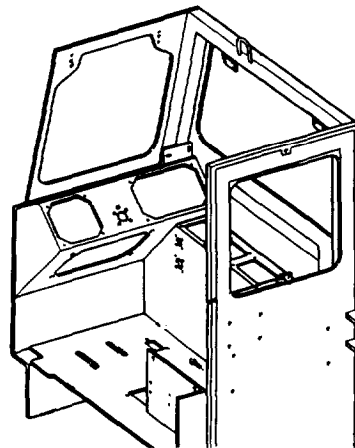
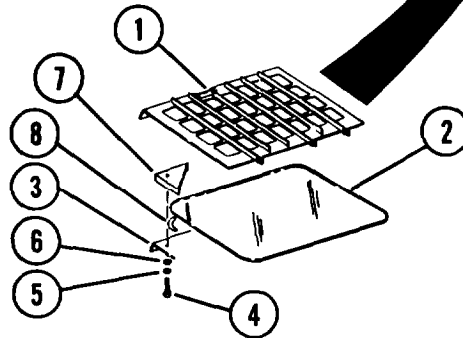
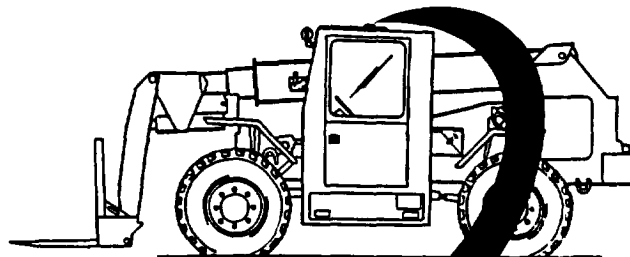
NOTE

Perform steps 1 and 2 for skylight window removal. Perform step 3 for skylight window guard removal.

REMOVAL

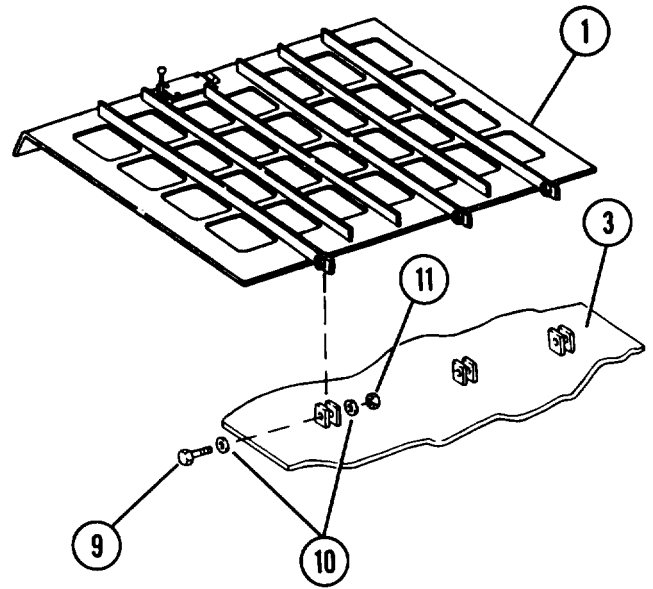
1. UNLATCH AND OPEN SKYLIGHT WINDOW GUARD (1).
2. REMOVE HARDWARE SECURING SKYLIGHT WINDOW (2) TO CAB (3).

Remove four Capscrews (4), four sealing washers (5), four lockwashers (6) and four window frames (7) securing skylight window (2) to cab (3). Discard sealing washers (5) and lockwashers (6).



16-11. CAB SKYLIGHT GUARD AND WINDOW - REPLACE (Cont'd)

3. CAREFULLY REMOVE SKYLIGHT WINDOW (2) AND TAPE SEAL (8) FROM CAB (3).
4. IF NECESSARY, REMOVE SKYLIGHT WINDOW GUARD (1) FROM CAB (3).
 - a. To prevent guard (1) from falling during removal, place guard (1) over skylight window opening.
 - b. Remove three capscrews (9), six flatwashers (10), and three nuts (11) securing guard (1) to cab (3).
 - c. Remove guard (1) from cab (3).

**INSTALLATION****NOTE**

Perform steps 2 through 4 for skylight window installation. Perform step 1 for skylight window guard installation.

1. IF REMOVED, INSTALL SKYLIGHT WINDOW GUARD (1) TO CAB (3).
 - a. Place guard (1) over skylight window opening.
 - b. Secure guard (1) to cab (3) with three nuts (11), six flatwashers (10), and three capscrews (9).
2. CLEAN AND PREPARE SURFACE OF CAB (3) AND SKYLIGHT WINDOW (2).
 - a. If necessary, remove pieces of old tape seal (8) from surface of cab (3) around skylight window opening. Be sure surface is clean and dry.
 - b. Apply metal primer with brush to surface around skylight window opening of cab. Allow ten minutes for primer to dry.
 - c. Thoroughly clean skylight window (2) with ammonia water.
 - d. Apply ribbon sealer to skylight window (2) even with the outside edge of glass.

16-11. CAB SKYLIGHT GUARD AND WINDOW - REPLACE (Cont'd)

3. INSTALL SKYLIGHT WINDOW (2) TO CAB (3).

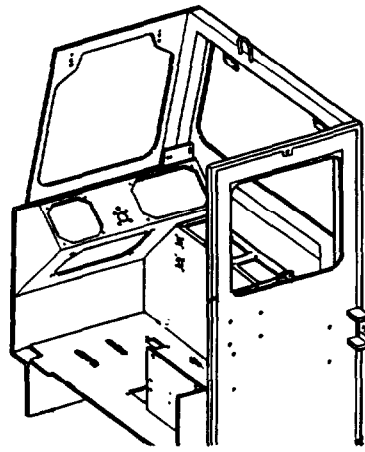
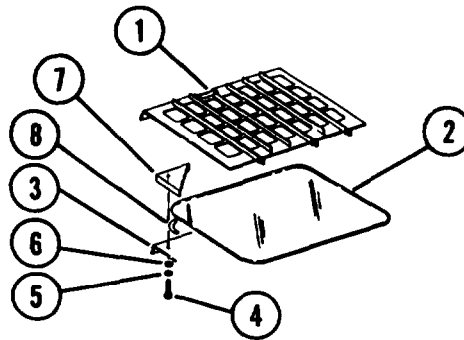
- a. Place new tape seal (8) around skylight window opening of cab (3). Place skylight window (2) on tape seal (8).

CAUTION

To avoid breakage of skylight window (2), do not overtighten capscrews (4).

- b. Install four window frames (7), four new lockwashers (6), four new sealing washers (5), and four capscrews (4) to secure skylight window (2) to cab (3).
- c. Apply clear silicone caulk around capscrews (4) and around perimeter of skylight window (2).

4. PLACE SKYLIGHT WINDOW GUARD OVER SKYLIGHT WINDOW (2), AND LOCK GUARD IN PLACE.



16-12. CAB REAR WINDOW - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Locknuts (3, 12)
Lockwashers (14)

Equipment Condition

Vehicle parked on level ground.
Rear window assembly unlocked.

Personnel Required
Two Personnel

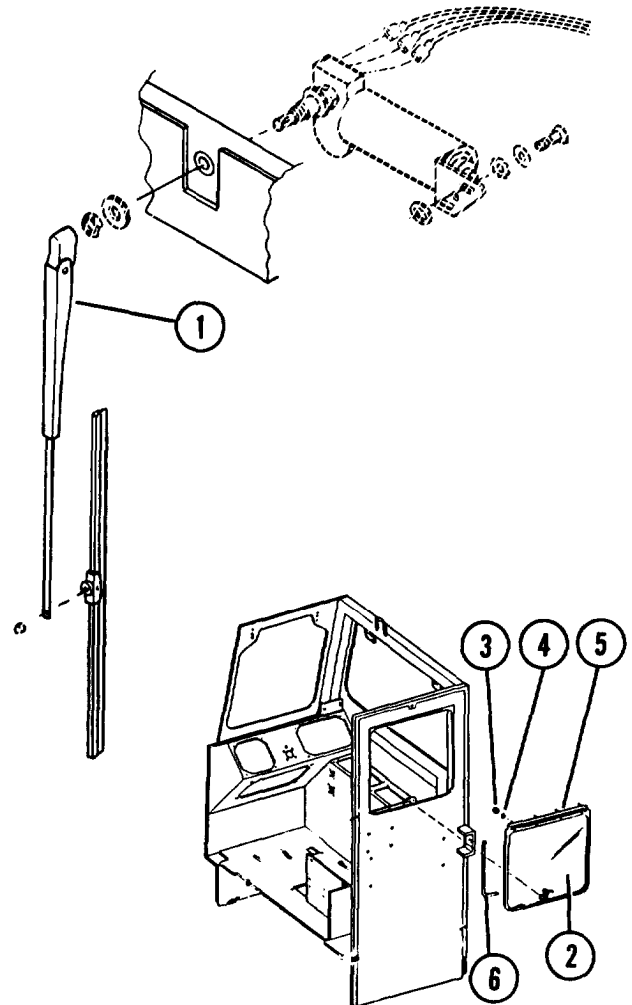
REMOVAL

1. PRY REAR WIPER ARM (1) FROM SHAFT OF WIPER MOTOR.
2. LIFT REAR WINDOW (2) APPROXIMATELY 30° AND SLIDE WINDOW TO THE LEFT TO REMOVE WINDOW.

WARNING

To avoid possible injury, replace broken window glass carefully. Wear a pair of heavy leather gloves or other suitable hand protection.

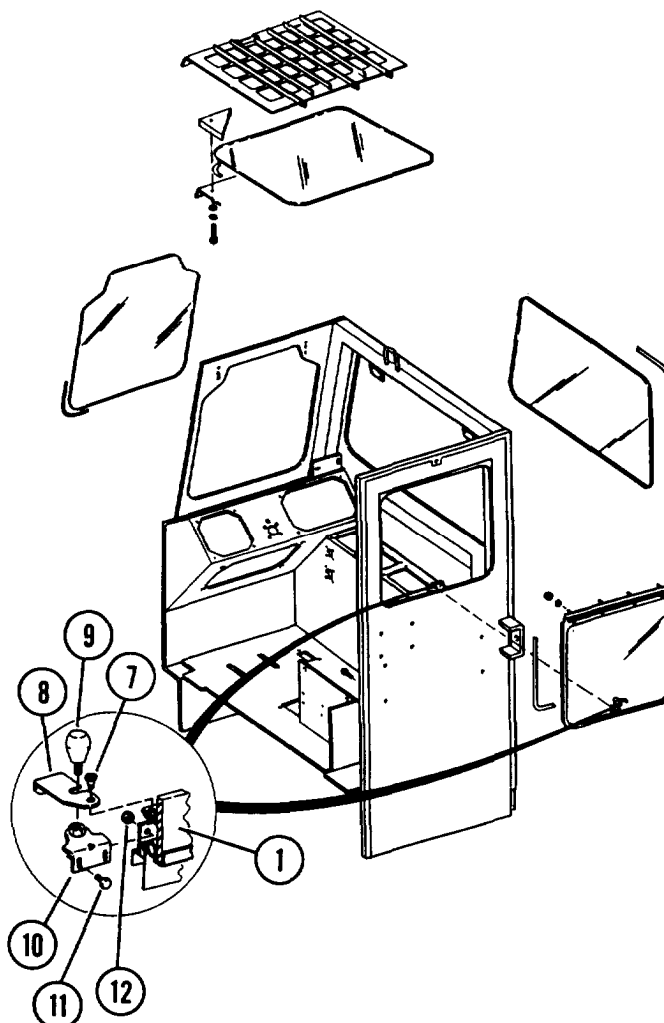
3. REMOVE AND DISCARD FOUR LOCKNUTS (3) AND FOUR LOCKWASHERS (4) SECURING REAR WINDOW HINGE (5) TO CAB.
4. IF NECESSARY, REMOVE SEAL (6) FROM CAB OPENING.



16-12. CAB REAR WINDOW - REPLACE (Cont'd)

5. IF NECESSARY, REMOVE LATCH, PARTS (7) THROUGH (12).

- a. Remove shoulder bolt (7) to remove window catch (8).
- b. Remove knob (9) from bracket (10).
- c. Remove two screws (11), locknuts (12) and bracket (10) from cab. Discard locknuts (12).



INSTALLATION

1. IF REMOVED, INSTALL LATCH, PARTS (7) THROUGH (12).

- a. Position bracket (10) on cab and secure with two screws (11) and two new locknuts (12).
- b. Install knob (9) on bracket (10).
- c* Position window catch (8) on window (1) and secure with shoulder bolt (7).

2. IF REMOVED, INSTALL SEAL (6) TO CAB OPENING.

3. INSTALL FOUR NEW LOCKWASHERS (4) AND FOUR NEW LOCKNUTS (3) TO SECURE REAR WINDOW HINGE (5) TO CAB.

4. HOLD REAR WINDOW (1) TO LEFT OF CAB OPENING AT APPROXIMATELY 30°. SLIDE TOP OF WINDOW INTO HINGE (5).

5. LOCK REAR WINDOW (2).

6. INSTALL REAR WIPER ARM (1) ON SHAFT OF WIPER MOTOR.

16-13. SEAT - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Loctite 242 (App. C, Item 39)
Lockwashers (3, 7)

Equipment Condition

Vehicle parked on level ground.

REMOVAL

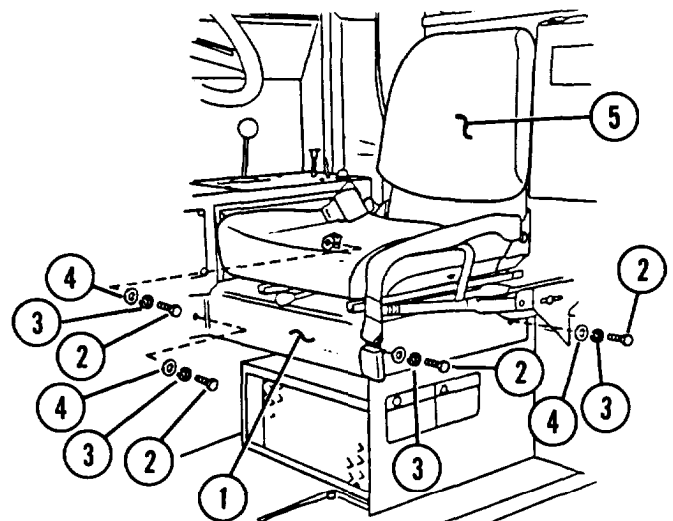
1. REMOVE SEAT DECK (1).

- a. Remove four capscrews (2), four lockwashers (3), and four flatwashers (4) that secure seat deck (1) to cab. Discard lockwashers (3).

- b. Remove seat deck (1) and seat (5) from the cab as an assembly.

2. REMOVE SEAT (5) FROM SEAT DECK (1).

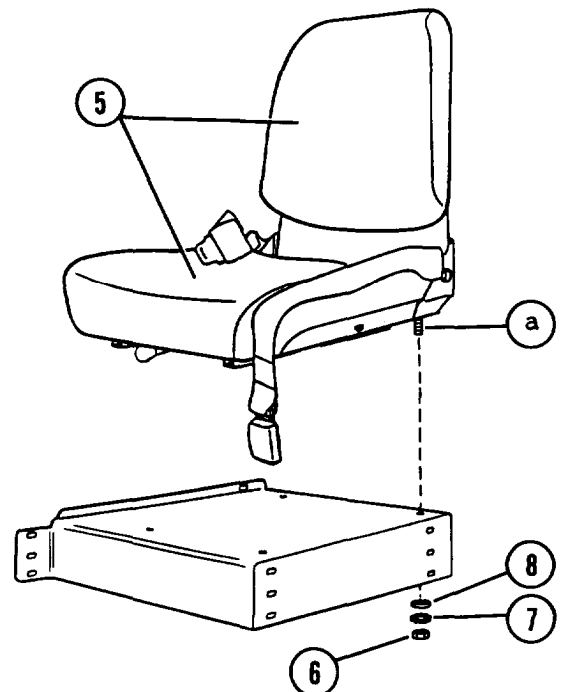
Remove four nuts (6), four lockwashers (7), and four flatwashers (8) securing-seat (5) to seat deck (1). Discard lockwashers (7).



INSTALLATION

1. INSTALL SEAT (5) ON SEAT DECK (1).

- a. Position seat deck (1) on mounting studs (a) of seat (5).
- b. Apply Loctite 242 to four nuts (6).
- c. Install four nuts (6), four new lockwashers (7), and four flatwashers (8) to secure seat (5) to seat deck (1).



16-13. SEAT - REPLACE (Cont'd)

2. INSTALL SEAT DECK (1).

- a. Position seat deck (1) and seat (5) as an assembly inside cab.
- b. Apply Loctite 242 to four capscrews (2).
- c. Install four flatwashers (4), four new lockwashers (3), and four capscrews (2) to secure seat deck (1) to cab.

16-14. SEAT BELTS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools
Tool Kit, Automotive Mechanics

Materials/Parts
Lockwashers (3)

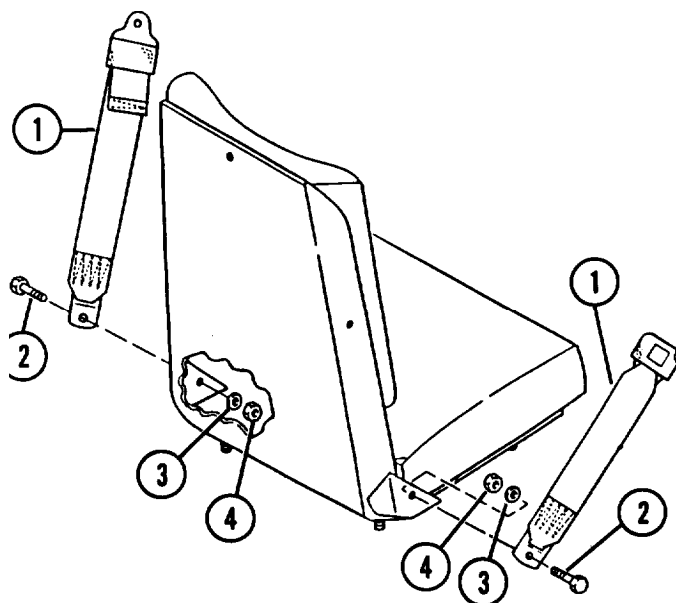
Equipment Condition
Vehicle parked on level ground.

REMOVAL

REMOVE SEAT BELTS (1) BY REMOVING TWO CAPSCREWS (2), TWO LOCKWASHER (3) AND TWO NUTS (4) WHICH RETAIN THE BELTS (1). DISCARD LOCKWASHER (3).

INSTALLATION

INSTALL SEAT BELTS (1) USING TWO CAPSCREWS (2), TWO NEW LOCKWASHES (3) AND TWO NUTS (4).



16-15. ACCESSORIES STORAGE BOX - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Locknuts (3)
Loctite 242 (App. C, Item 39)

Equipment Condition

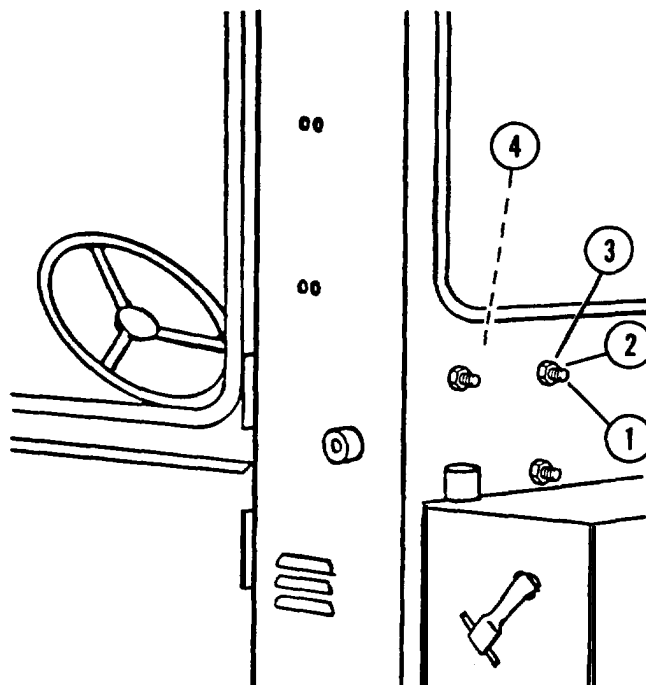
Accessories removed from storage box .

REMOVAL

1. REMOVE FOUR SCREWS (1), FOUR FLATWASHERS (2) AND FOUR LOCKNUTS (3) THAT ATTACH ACCESSORIES STORAGE BOX (4) TO BACK WALL OF CAB. DISCARD LOCKNUTS (3).
2. REMOVE ACCESSORIES STORAGE BOX (4).

INSTALLATION

1. POSITION ACCESSORIES STORAGE BOX (4) AGAINST INSIDE BACK WALL OF CAB.
2. APPLY LOCTITE 242 TO THREADS OF SCREWS (1).
3. ALIGN FOUR MOUNTING HOLES AND INSTALL FOUR SCREWS (1), FOUR FLATWASHERS (2) AND FOUR NEW LOCKNUTS (3).
4. PLACE ACCESSORIES IN STORAGE BOX.



16-16. FIRE EXTINGUISHER BRACKET - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Locknuts (2)
Loctite 242 (App. C, Item 39)

Equipment Condition

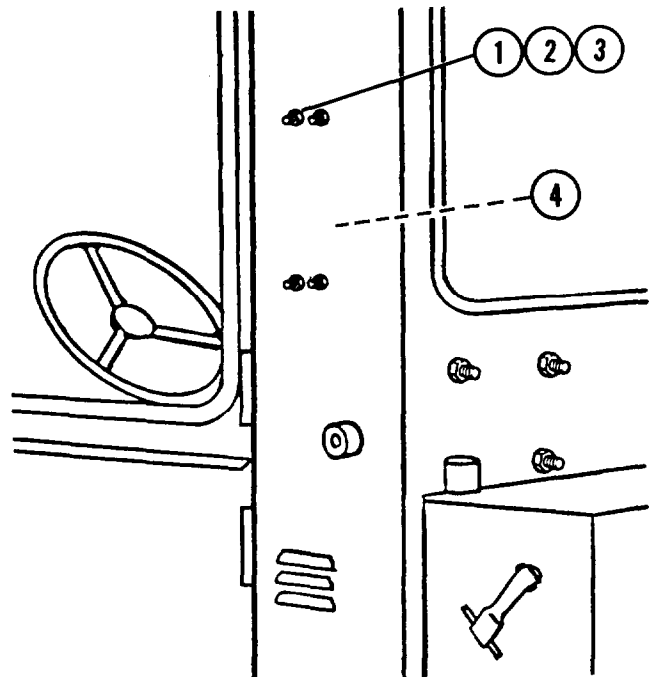
Fire extinguisher removed from bracket.

REMOVAL

1. REMOVE FOUR SCREWS (1) AND FOUR LOCKNUTS (2). DISCARD LOCKNUTS (2).
2. REMOVE FIRE EXTINGUISHER BRACKET (4) FROM WALL OF CAB.

INSTALLATION

1. POSITION FIRE EXTINGUISHER BRACKET (4) ON LEFT, REAR CORNER OF CAB.
2. APPLY LOCTITE TO THREADS OF SCREWS (1).
3. INSTALL FOUR SCREWS (1) AND FOUR NEW LOCKNUTS (2).



16-17. TOOL BOX DOOR LATCH - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

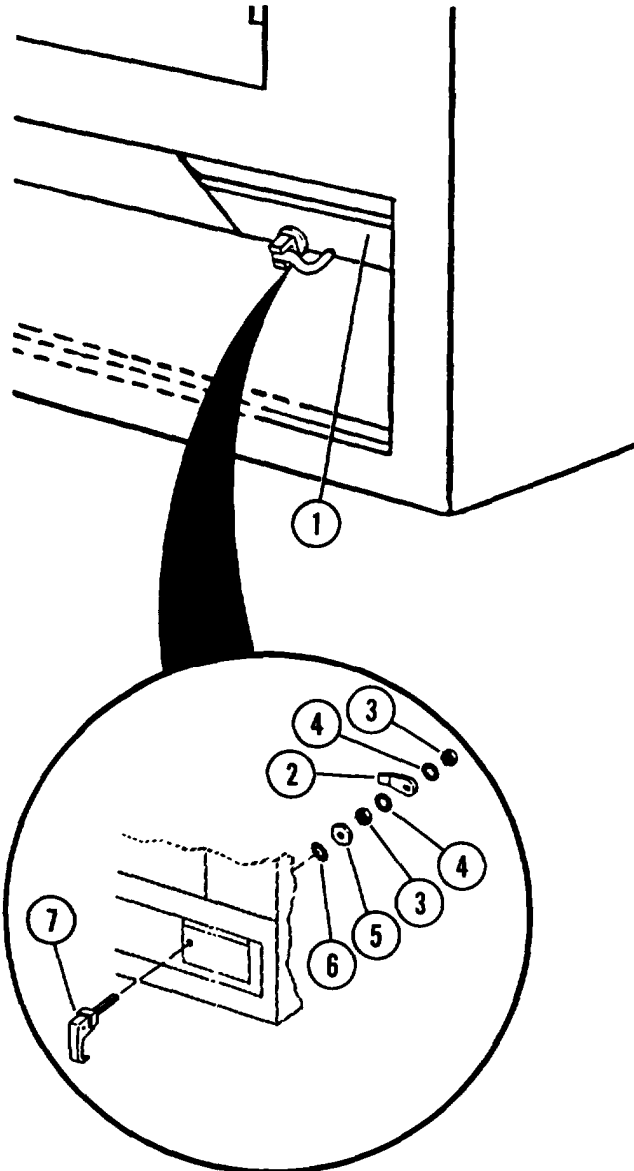
Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.

REMOVAL

1. OPEN TOOL BOX DOOR (1).
2. MEASURE POSITION OF LATCHING LEVER (2) ON SHAFT. RECORD MEASUREMENT FOR REFERENCE DURING INSTALLATION.
3. REMOVE TOOL BOX LATCH (PARTS 2 THROUGH 7) FROM TOOL BOX DOOR (1).
 - a. Remove jam nut (3), lockwasher (4), latching lever (2), second lockwasher (4), and second jam nut (3).
 - b. Remove hex nut (5), lockwasher (6), and handle (7).



INSTALLATION

1. INSTALL TOOL BOX LATCH (PARTS 2 THROUGH 7) TO TOOL BOX DOOR (1).
 - a. Secure handle (7) with lockwasher (6) and hex nut (5).

NOTE

Install nuts (3) so that latching lever (2) is properly positioned on shaft. Refer to measurement taken in step 2 of removal.

- b. Install jam nut (3), lockwasher (4), latching lever (2), second lockwasher (4), and second jam nut (3).
3. REMOVE TOOL BOX LATCH (PARTS 2 THROUGH 7) FROM TOOL BOX DOOR (1).

CHAPTER 17

BODY AND CHASSIS ACCESSORIES MAINTENANCE

17-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the body and chassis accessories. To find a specific maintenance procedure, see the maintenance task summary below.

17-2. BODY AND CHASSIS ACCESSORIES MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
17-3	Front Windshield Wiper Assembly - Replace/Repair	17-2
17-4	Rear Windshield Wiper Assembly - Replace	17-8
17-5	Windshield Washer Assembly - Service/Replace	17-10
17-6	Mirror - Replace	17-15
17-7	Cab Defroster Fans - Replace	17-19
17-8	Cab Heater - Replace	17-21
17-9	Heater Temperature Control Valve and Cable - Replace	17-23
17-10	Heater Hoses, Lines, and Fittings - Replace	17-26
17-11	Data Plates - Replace	17-29
17-12	Cab Floor Mat - Replace	17-30

17-3. FRONT WINDSHIELD WIPER ASSEMBLY - REPLACE/REPAIR

This task covers:

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

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Batteries disconnected, para. 8-44.

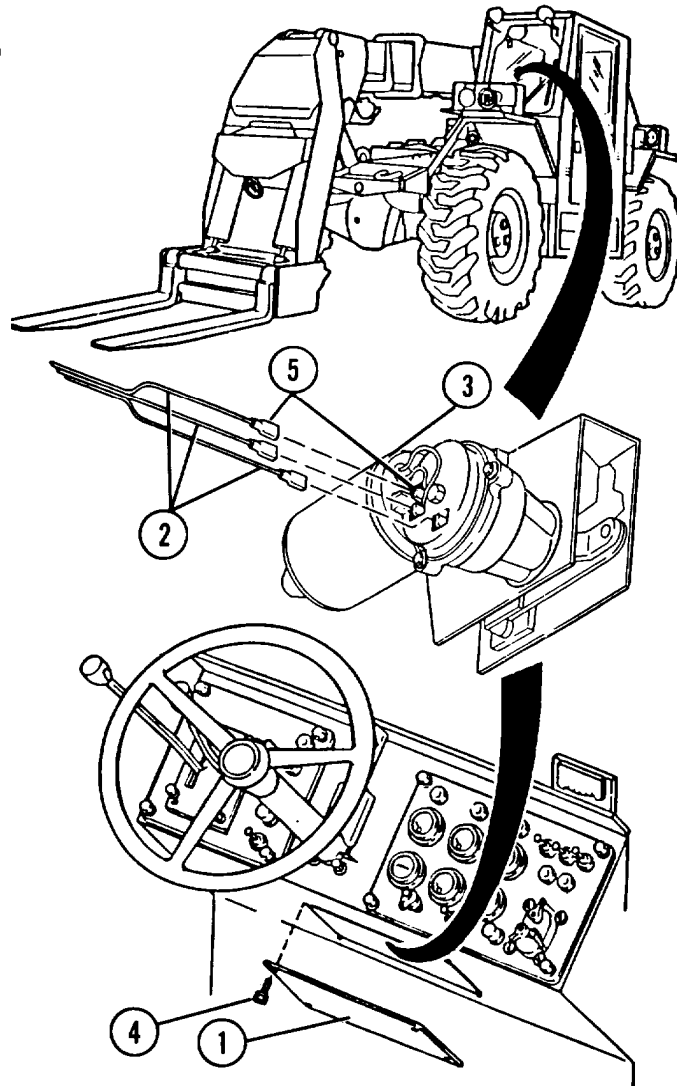
Materials/Parts

Gasket (25)
Lockwashers (9, 26, 34)
Loctite 242 (App. C, Item 39)
Tags (App. C, Item 51)

REMOVAL

1. REMOVE ACCESS PANEL (1) AND DISCONNECT THREE ELECTRICAL LEADS (2) AT FRONT WIPER MOTOR ASSEMBLY (3).

- a. Remove four screws (4), and access Panel (1).
- b. Through access hole, tag and disconnect three electrical leads (2) at spade terminals (5).



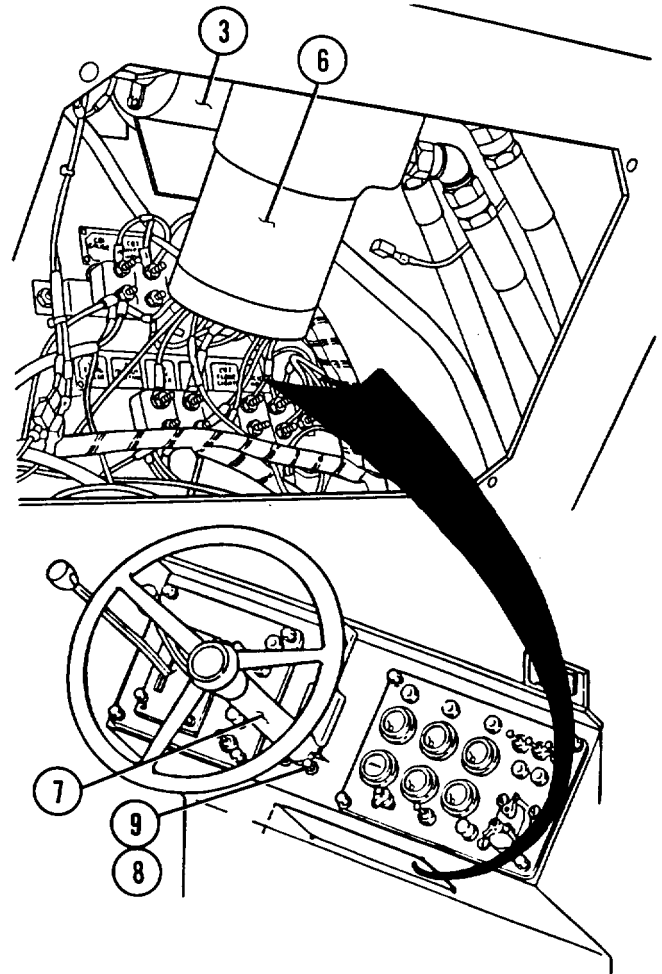
17-3. FRONT WINDSHIELD WIPER ASSEMBLY - REPLACE/REPAIR (Cont'd)

2. REMOVE STEERING CONTROL VALVE (6) FROM STEERING COLUMN (7) TO PROVIDE ROOM FOR REMOVAL OF FRONT WIPER MOTOR ASSEMBLY (3).

NOTE

Do not remove hydraulic hoses from valve (6).

- a. Remove four capscrews (8), and four lockwashers (9), securing steering control valve (6) and steering column (7). Discard lockwashers (9).
- b. Separate steering control valve (6) from steering column (7). Push steering control valve (6) aside to provide room for removal of front wiper assembly (3).

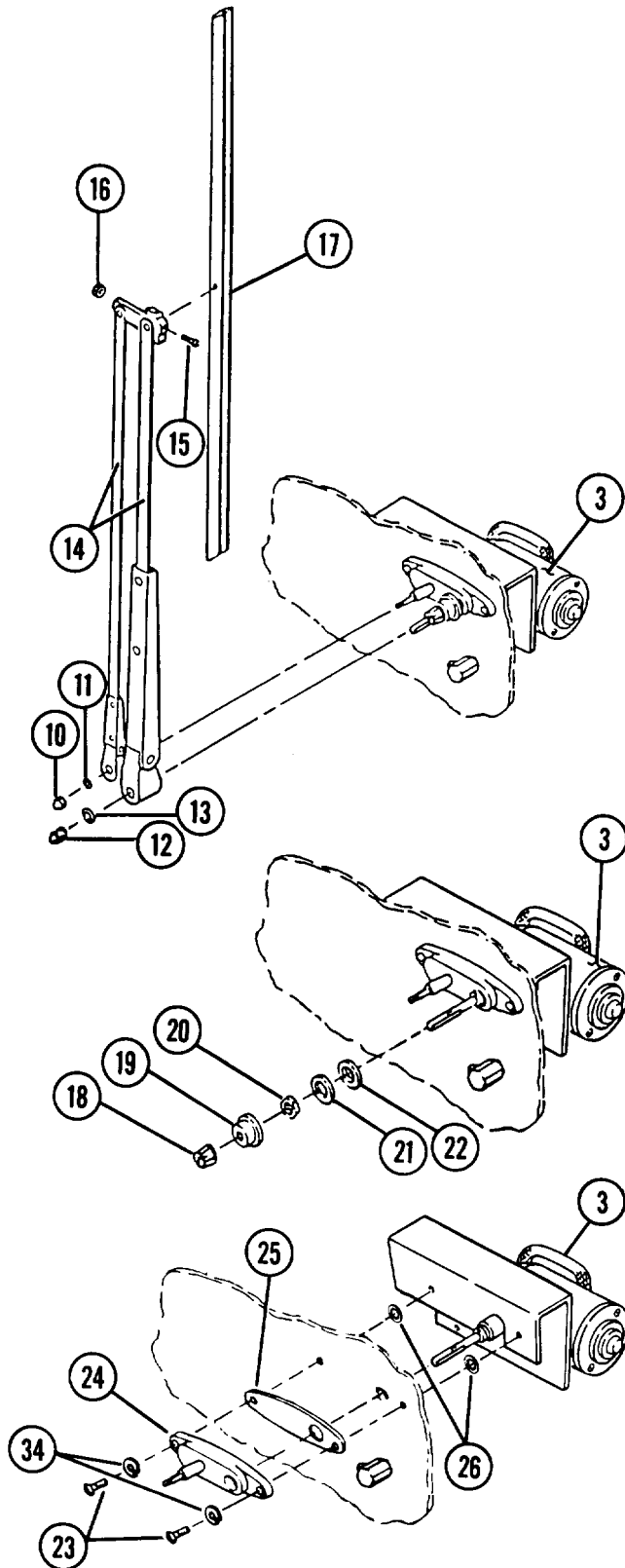


17-3. FRONT WINDSHIELD WIPER ASSEMBLY - REPLACE/REPAIR (Cont'd)

3. REMOVE PARTS (10) THROUGH (26) FROM WIPER MOTOR ASSEMBLY (3) .

- a. Remove capnut (10), washer (11), capnut (12), and washer (13). Remove wiper arms (14).
- b. Remove screw, (15), nut (16), and wiper blade (17) from wiper arms (14) .
- c. Pry off collar (18), and remove cap (19), nut (20), washer (21), and washer (22).
- d. Remove two screws (23), two lockwashers (34), base (24), gasket (25), and lockwashers (26). Discard gasket (25) and lockwashers (26 and 34).

4. REMOVE FRONT WIPER ASSEMBLY (3) FROM CAB THROUGH ACCESS HOLE AT BASE OF DASHBOARD .

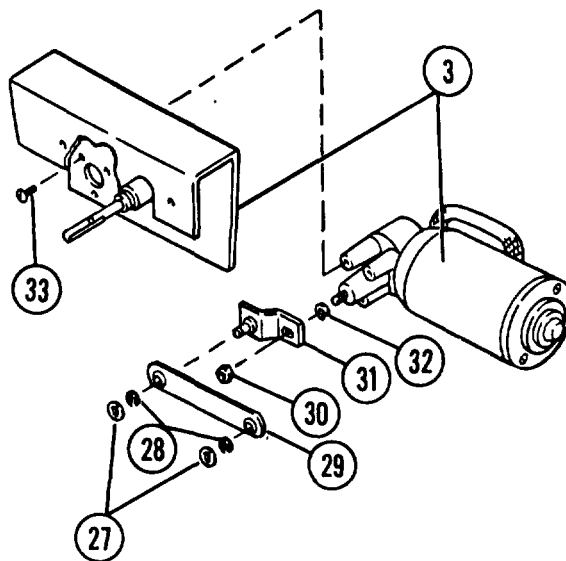


 17-3. FRONT WINDSHIELD WIPER ASSEMBLY - REPLACE/REPAIR (Cont'd)

DISASSEMBLY

REMOVE PARTS (27) THROUGH (33) FROM FRONT WIPER MOTOR ASSEMBLY (3).

- a. Remove two spring clips (27), two spacing washers (28) and connecting link (29).
- b. Remove nut (30), drive arm (31), and washer (32).
- c. Remove three screws (33) and separate motor and bracket components.



ASSEMBLY

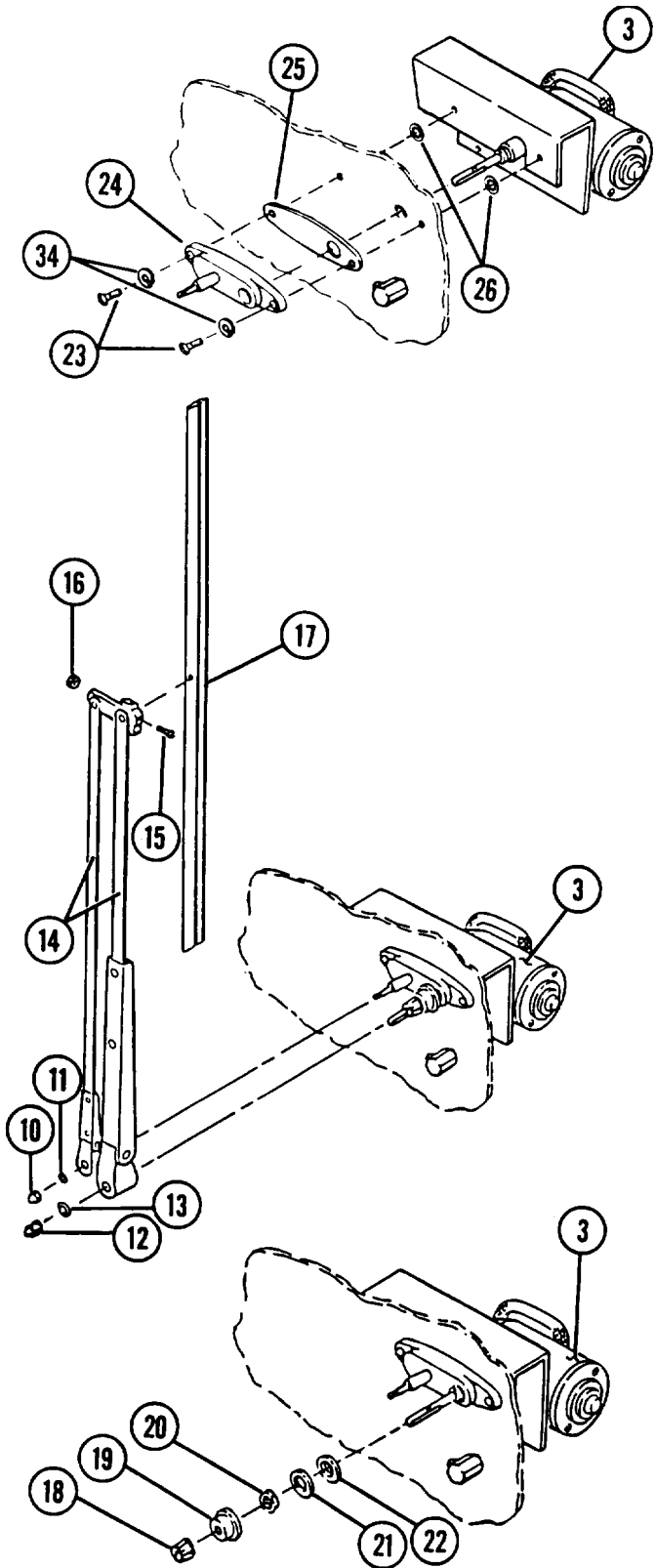
INSTALL PARTS (27) THROUGH (33) TO FRONT WIPER MOTOR ASSEMBLY (3).

- a. Position bracket and motor components of wiper motor assembly (3) together, and secure with three screws (33).
- b. Install washer (32), and drive arm (31) . Secure with nut (30).
- c. Install connecting link (29) and secure with two spacing washers (28) and spring clips (27).

17-3. FRONT WINDSHIELD WIPER ASSEMBLY - RBPLACE/REPAIR (Cont'd)

INSTALLATION

1. POSITION FRONT WIPER ASSEMBLY (3) ON CAB.
2. INSTALL PARTS (6) THROUGH (26) ON WIPER MOTOR ASSEMBLY (3).
 - a. Position new gasket (25) and base (24) on cab. Secure with two new lockwashers (26), two new lockwashers (34), and two screws (23).
 - b. Install washer (22), washer (21), nut (20), cap (19), and collar (18).
 - c. If removed, position wiper blade (17) on wiper arms (14) and secure with nut (16) and screw (15).
 - d. Secure wiper arms (14) with washer (13), capnut (12), washer (11), and capnut (10).

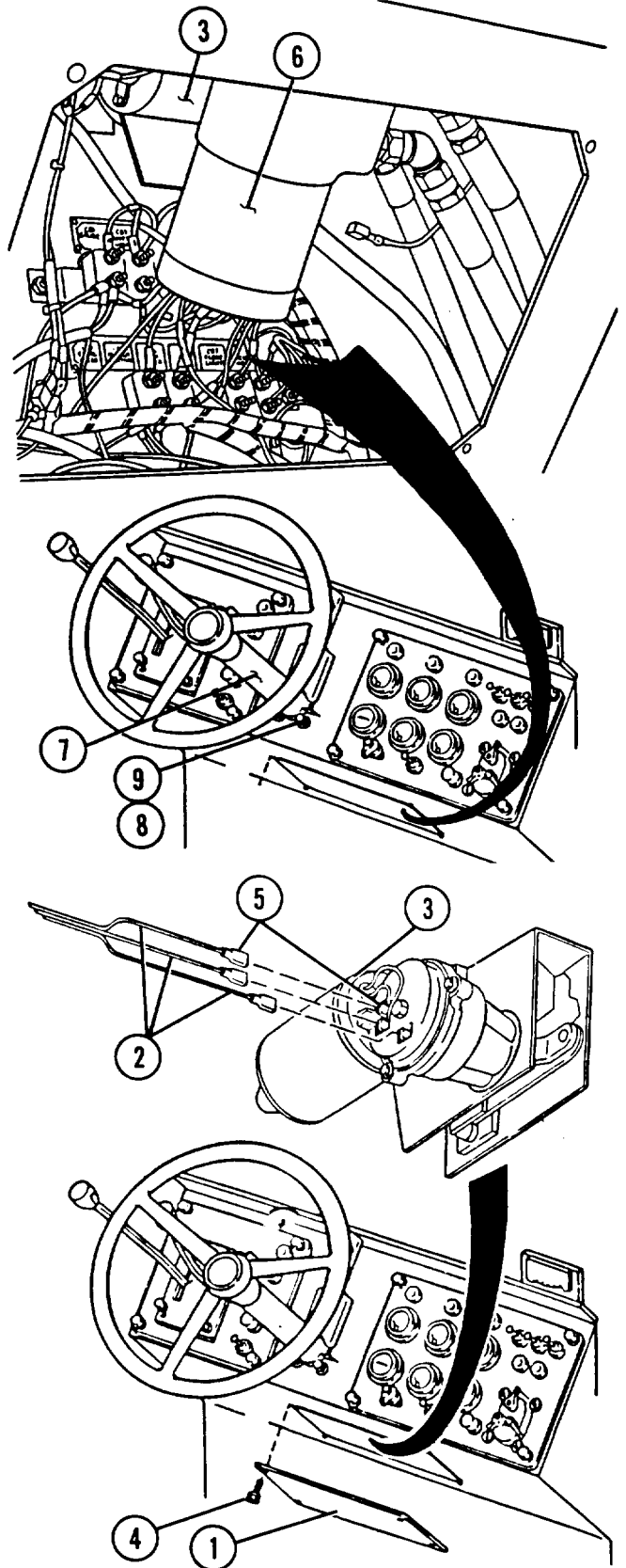


17-3. FRONT WINDSHIELD WIPER ASSEMBLY - REPLACE/AIR (cont'd)

3. INSTALL STEERING CONTROL VALVE (6) TO STEERING COLUMN (7) .
 - a. Position steering control valve (6) on steering column (7). Turn steering wheel until steering shaft engages with steering control valve (6).
 - b. Install steering control valve (6) and steering column (7) with four new lockwashers (9) and four capscrews (8).
4. CONNECT THREE ELECTRICAL LEADS (2) TO FRONT WIPER MOTOR ASSEMBLY (3) AS TAGGED AND INSTALL ACCESS PANEL (1).
 - a. Through access hole, connect three leads (2) from vehicle wiring harness to wiper motor assembly (3) at spade connectors (5) as tagged.
 - b. Position access panel (1) and secure with four screws (4).
5. CONNECT BATTERIES, PARA. 8-44.

NOTE

Apply Loctite 242 to threads of screws (4).



17-4. REAR WINDSHIELD WIPER ASSEMBLY - REPLACE

This task covers:

- a. Removal
- c. Installation

Initial Setup

Tools

Tool Kit, Automatic Mechanics

Materials/Parts

Lockwasher (10)

Equipment Condition

Vehicle parked on level ground.
Negative battery cable disconnected,
Para. 8-44.

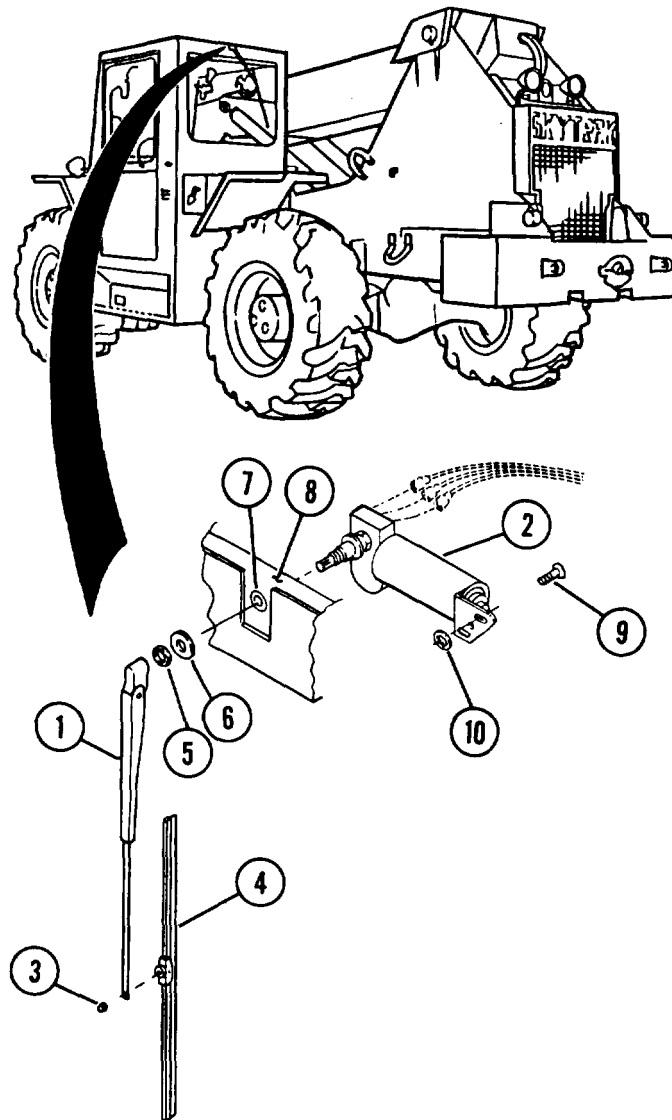
REMOVAL

1. REMOVE REAR WIPER ARM (1) AND REAR WIPER MOTOR (2) MOUNTING HARDWARE.
 - a. Pry and remove wiper arm (1) from shaft of motor (2).
 - b. If necessary, remove nut (3) and wiper blade (4) from wiper arm (1).
 - c. Remove hex nut (5), and washer (6). Leave fiber washer (7) on cab (8).

NOTE

Support motor (2) so it does not drop when mounting hardware in step "d" is removed.

- d. Remove screw (9) and lockwasher (10) from motor (2). Discard lockwasher (10).
2. REMOVE REAR WIPER MOTOR (2) FROM CAB (8) AND DISCONNECT ELECTRICAL WIRING.
 - a. Remove motor (2) from cab (8).



17-4. REAR WINDSHIELD WIPER ASSEMBLY - REPLACE (Cont'd)

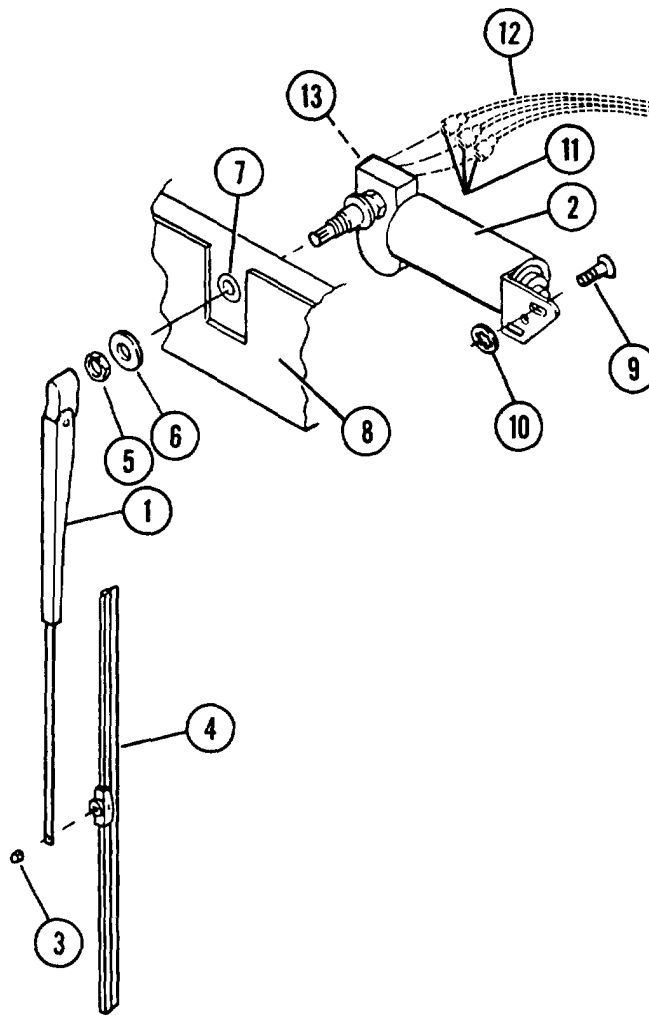
- b. Disconnect three female spade connectors (11) of vehicle wiring harness (12) from three male spade connectors (13) on shaft side of motor (2).
- c. Remove motor (2) from vehicle.

INSTALLATION

NOTE

Electrical connections to motor (2) must be made before mounting motor (2) on cab (8).

1. CONNECT ELECTRICAL WIRING AND POSITION REAR WIPER MOTOR (2) ON CAB (8).
 - a. Connect three female spade connectors (11) of vehicle wiring harness (12) to three male spade connectors (13) on shaft side of motor (2).
 - b. Position and support motor (2) on cab (8).
2. INSTALL REAR WIPER MOTOR (2) MOUNTING HARDWARE AND REAR WIPER ARM (1).
 - a. Install new lockwasher (10), and screw (9) to secure motor (2) to cab (8).
 - b. Install washer (6) and hex nut (5).
 - c. If removed, secure wiper blade (4) to wiper arm (1) with nut (3).
 - d. Push wiper arm (1) on shaft of rear wiper motor (2).
3. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



17-5. WINDSHIELD WASHER ASSEMBLY - SERVICE/REPLACE

This task covers:

- a. Service by adding washer fluid.
- b. Removal
- c. Installation

Initial Setup

Tools

Tool Kit, Automatic Mechanics

Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected, para. 8-44.
 Electric joystick removed, para. 8-19.

Materials/Parts

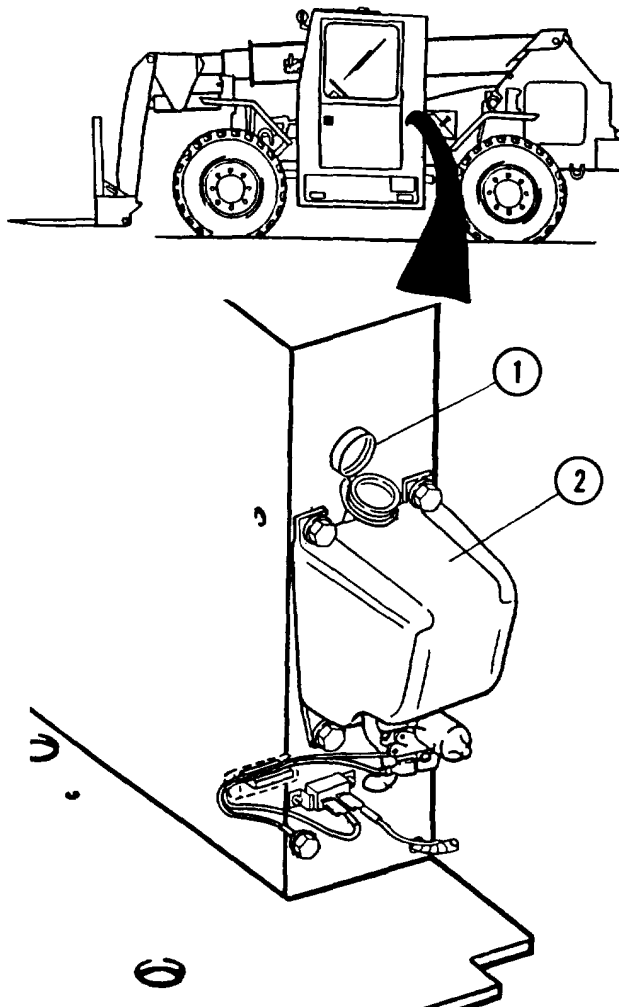
Lockwasher (11)
 Locknuts (13)
 Loctite 242 (App. C, Item 39)
 Rubber Washer (22)
 Starwashers (7, 21)
 Windshield Washer Fluid
 (App. C, Item 10)
 Tags (App. C, Item 51)

NOTE

The windshield washer reservoir assembly is located to the right of the operator's seat, at the rear of the side console.

SERVICE

1. OPEN CAP (1) OF RESERVOIR ASSEMBLY (2).
2. ADD WASHER FLUID, AS REQUIRED, UNTIL FLUID LEVEL REACHES FILLER NECK OF RESERVOIR ASSEMBLY (2).
- 3* CLOSE CAP (1) OF RESERVOIR ASSEMBLY (2).



17-5. WINDSHIELD WASHER ASSEMBLY - SERVICE/REPLACE (Cont'd)

REMOVAL

1. REMOVE RESERVOIR ASSEMBLY (2) FROM SIDE CONSOLE (3).

NOTE

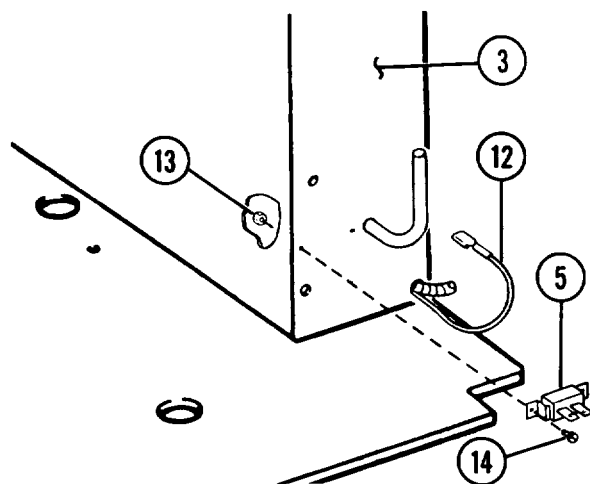
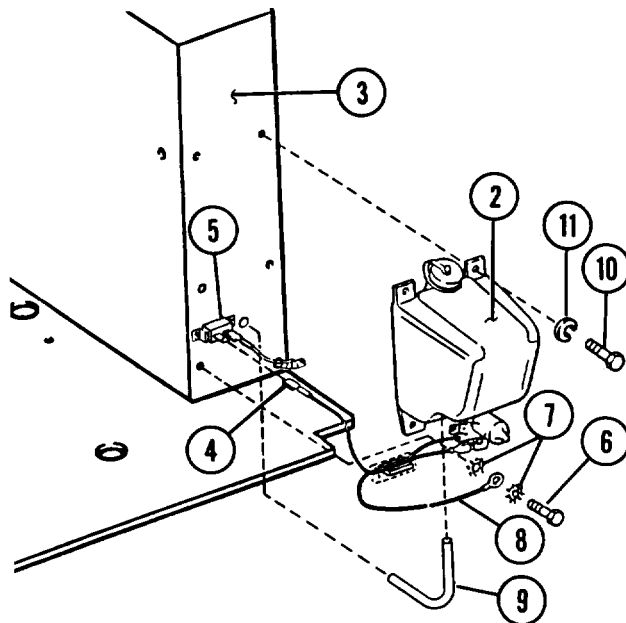
To prevent spillage of washer fluid, be sure reservoir assembly (2) is emptied of fluid before removal.

- a. Tag and disconnect female spade connector of electrical lead (4) from male spade connector on resistor assembly (5).
- b. Remove capscrew (6), starwasher (7), electrical lead (8) and second starwasher (7) from side console (3). Discard starwasher (7).
- c. Pull hose (9) from fitting at bottom of reservoir assembly (2)

NOTE

Support reservoir assembly (2) so it does not drop when screws (10) and lockwashers (11) are removed.

- d. Remove four screws (10), four lockwashers (11), and reservoir assembly (2) from side console (3). Discard lockwashers (11).
2. IF NECESSARY, REMOVE RESISTOR ASSEMBLY (5) FROM SIDE CONSOLE (3).
 - a. Tag and disconnect female spade connector of electrical lead (12) from male spade connector on resistor assembly (5).



17-5. WINDSHIELD WASHER ASSEMBLY - SERVICE/REPLACE (Cont'd)

NOTE

Nuts (13) are accessed through opening in side console (3) created by removal of electric joystick.

- b. Remove two locknuts (13), two screws (14) and resistor assembly (5) from side console (3). Discard locknuts (13).

3. REMOVE WASHER NOZZLE (15) FROM CAB (16).

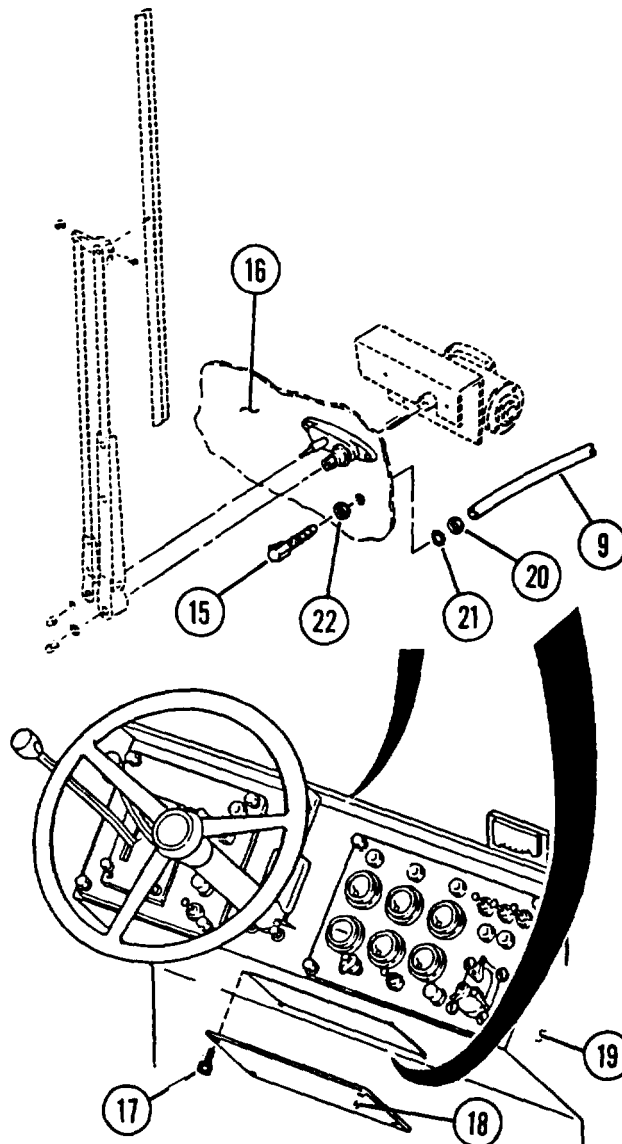
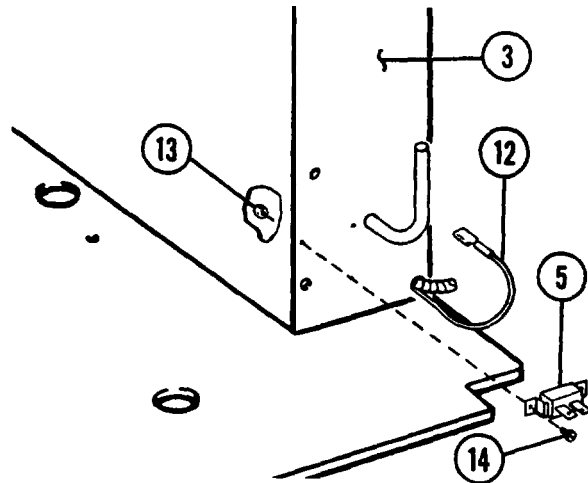
NOTE

The washer nozzle (15) is located on the cab (16) below the base of the front windshield wiper.

- a. Remove four capscrews (17) and dashboard access panel (18) from front console (19).
- b. From inside front console (19), pull and remove hose (9) from washer nozzle (15). Remove nut (20) and starwasher (21) from washer nozzle (15).
- c. From outside vehicle, remove washer nozzle (15) and rubber washer (22) from cab (19). Discard rubber washer (22).

4. IF NECESSARY, REMOVE HOSE (9) FROM SIDE CONSOLE (3).

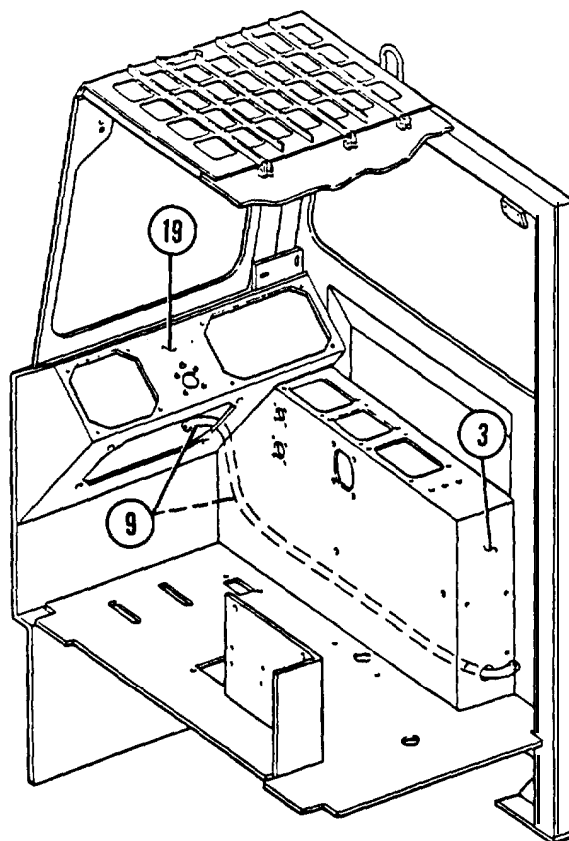
Pull hose (9) out of side console (3) from hole at rear of side console (3).



17-5. WINDSHIELD WASHER ASSEMBLY - SERVICE/REPLACE (Cont'd)

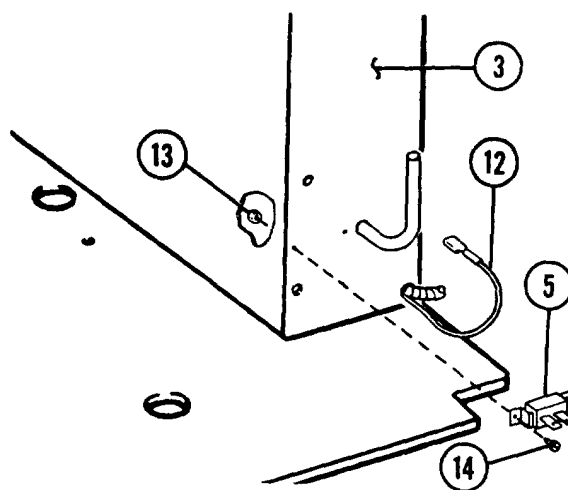
INSTALLATION

1. IF REMOVED, POSITION HOSE (9) INSIDE SIDE CONSOLE (3).
 - a. Push hose (9) into side console (3) through hole at rear of side console (3).
 - b. Continue to push hose (9) through side console (3) until end of hose (9) appears inside front console (19).
2. IF REMOVED, INSTALL WASHER NOZZLE (15) TO CAB (16).
 - a. From outside vehicle, position washer nozzle (15) and new rubber washer (22) on cab (16).
 - b. From inside dashboard, secure washer nozzle (15) with new starwasher (21) and nut (20). Push hose (9) onto washer nozzle (15).
 - c. Secure dashboard access panel (18) to front console (19) with four capscrews (17).
3. IF REMOVED, INSTALL RESISTOR ASSEMBLY (5) TO SIDE CONSOLE (3).



NOTE
Apply Loctite 242 to screws (14) as installed.

- a. Position resistor assembly (5) on side console (3) and secure with two new locknuts (13) and two screws (14).
- b. Connect female spade connector of electrical lead (12) to male spade connector on resistor assembly (5) as tagged.



17-5. WINDSHIELD WASHER ASSEMBLY - SERVICE/REPLACE (Cont'd)

4. INSTALL RESERVOIR ASSEMBLY (2) TO SIDE CONSOLE (3).

NOTE

Apply Loctite 242 to threads of screws (10).

- a. Position reservoir assembly (2) on side console (3) and secure with four new lockwashers (11) and four screws (10).
- b. Push hose (9) on fitting at bottom of reservoir assembly (2).

NOTE

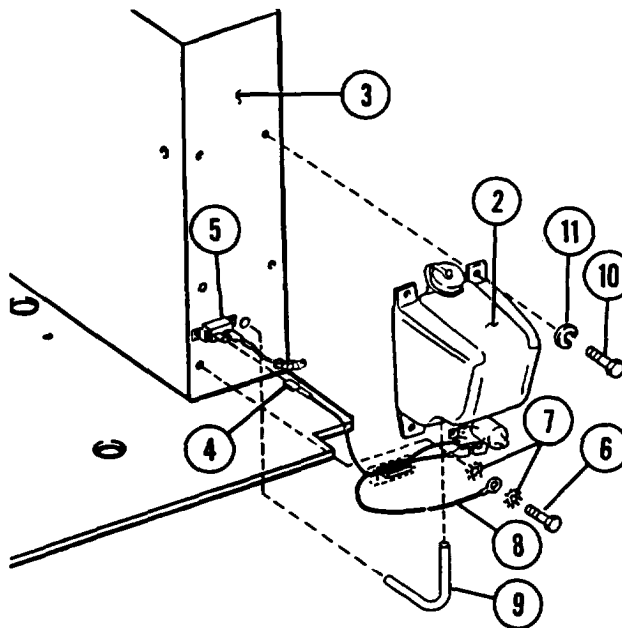
Apply Loctite 242 to threads of capscrew (6).

- c. Secure electrical lead (8) to side console (3) with two new starwashers (7) and capscrew (6).
- d. Connect female spade connector of electrical lead (8) to male spade connector on resistor assembly (5) as tagged.

5. FILL RESERVOIR ASSEMBLY (2) WITH WASHER FLUID AS DESCRIBED IN SERVICE SECTION OF THIS PARAGRAPH.

6. INSTALL ELECTRIC JOYSTICK, PARA. 8-19.

7. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



17-6. MIRROR - REPLACE

This task covers:

- a. Removal of Mirror Assembly
- b. Installation of Mirror Assembly
- c. Removal of Mirror Face
- d. Installation of Mirror Face

Initial Setup

Tools

Tool Kit, Auto Mechanics

Equipment Condition

Vehicle parked on level ground.

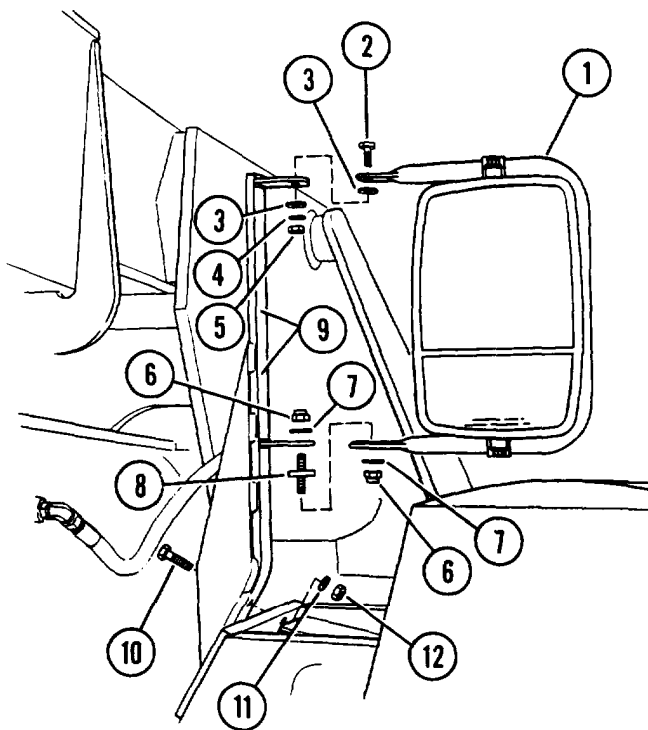
Materials/Parts

Locknuts (5) (6) (20)
 Lockwashers (15) (11)
 Loctite 242 (App. C, Item 39)
 Nylon Washers (3)

REMOVAL OF MIRROR ASSEMBLY

1. REMOVE MOUNTING HARDWARE AT TOP OF MIRROR BRACKET (1).

Remove capscrew (2), two nylon washers (3), flatwasher (4), and locknut (5). Discard nylon washers (3), and locknut (5).



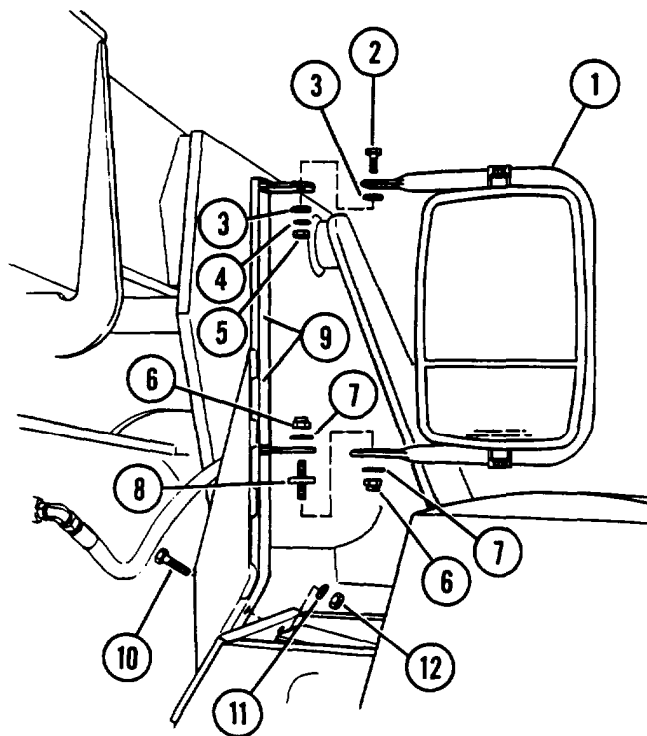
17-6. MIRROR - REPLACE (Cont'd)

2. REMOVE MOUNTING HARDWARE AT BOTTOM OF MIRROR BRACKET (1).

- a. Support mirror assembly so it does not drop during removal of bottom mirror mounting hardware.
- b. Remove two locknuts (6), two flatwashers (7), and locking device (8).
- c. Remove mirror bracket (1) from vehicle bracket (9).

3. IF NECESSARY, REMOVE VEHICLE MOUNTING BRACKET (9) FROM VEHICLE.

Remove two capscrews (10), two lockwashers (11), and two nuts (12). Discard lockwashers (11).



INSTALLATION OF MIRROR ASSEMBLY

1. IF REMOVED, INSTALL VEHICLE MOUNTING BRACKET (9) TO VEHICLE.

Install two capscrews (10), two new lockwashers (11), and two nuts (12).

2. INSTALL MOUNTING HARDWARE AT BOTTOM OF MIRROR BRACKET (1).

- a. Align mirror assembly on vehicle mounting bracket (9). Support mirror assembly so it does not drop during installation of bottom mirror mounting hardware.

17-6. MIRROR - REPLACE (Cont'd)

b. Install locking device (8), two flatwashers (7), and two new locknuts (6).

3. INSTALL MOUNTING HARDWARE AT TOP OF MIRROR BRACKET (1).

Install new locknut (5), flatwasher (4), two new nylon washers (3), and capscrew (2).

17-6. MIRROR - REPLACE (Cont'd)

REMOVAL OF MIRROR FACE

NOTE

Support mirror face (13) so it does not drop during step 1.

1. Remove two capscrews (14), two lockwashers (15), two flatwashers (16), and two spacers (17). Discard lockwashers (15).
2. If necessary, remove two capscrews (18), two flatwashers (19), two locknuts (20), two slotted brackets (21), and two clamps (22). Discard locknuts (20).

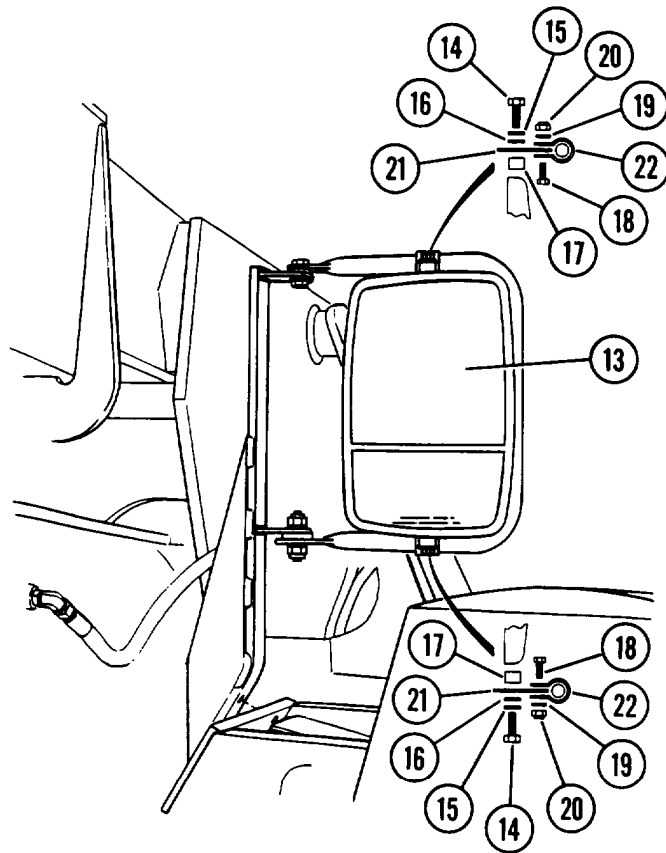
INSTALLATION OF MIRROR FACE

1. IF REMOVED, INSTALL TWO CLAMPS (22), TWO SLOTTED BRACKETS (21), TWO NEW LOCKNUTS (20), TWO FLATWASHERS (19) AND TWO CAPSCREWS (18) .

NOTE

Check that mirror face (13) is properly positioned before tightening capscrews (14) in step 2.

2. SECURE MIRROR FACE (13) WITH TWO SPACERS (17), TWO FLATWASHERS (16), TWO NEW LOCKWASHERS (15), AND TWO CAPSCREWS (14).



17-7. CAB DEFROSTER FANS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automatic Mechanics

Materials/Parts

Lockwashers (6, 9, 10)
 Loctite 242 (App. C, Item 39)

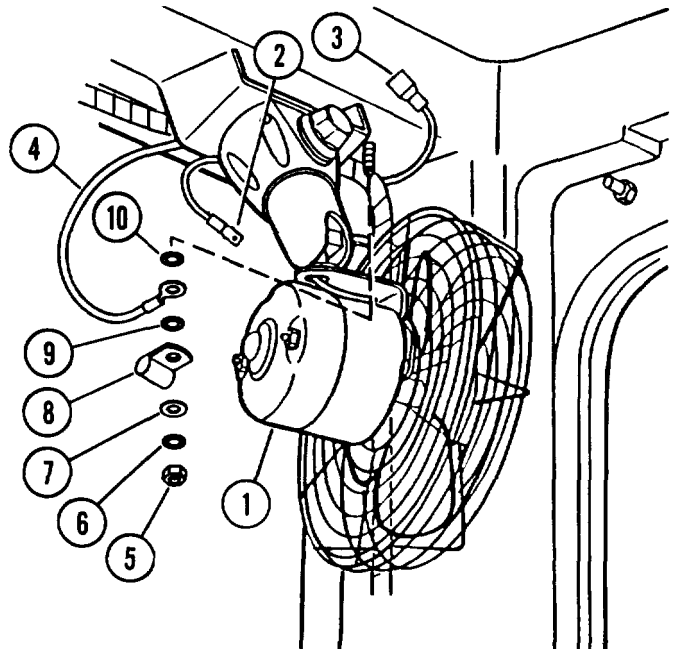
Equipment Condition

Vehicle parked on level ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

1. REMOVE FAN (1) WIRING.

- a. Disconnect male connector (2) from cab harness female connector (3).
- b. Disconnect fan ground wire (4) by removing nut (5), lockwasher (6), flatwasher (7), clamp (8), lockwasher (9), ground wire (4), and lockwasher (10).



17-7. CAB DEFROSTER FANS - REPLACE (Cont'd)

2. REMOVE FOUR SCREWS (11), AND FAN (1) FROM FAN MOUNT (12).

3. IF NECESSARY, REMOVE GROMMET (13).

INSTALLATION

1. IF REMOVED, INSTALL GROMMET (13).

NOTE

Apply Loctite 242 to threads of screws (11) 1

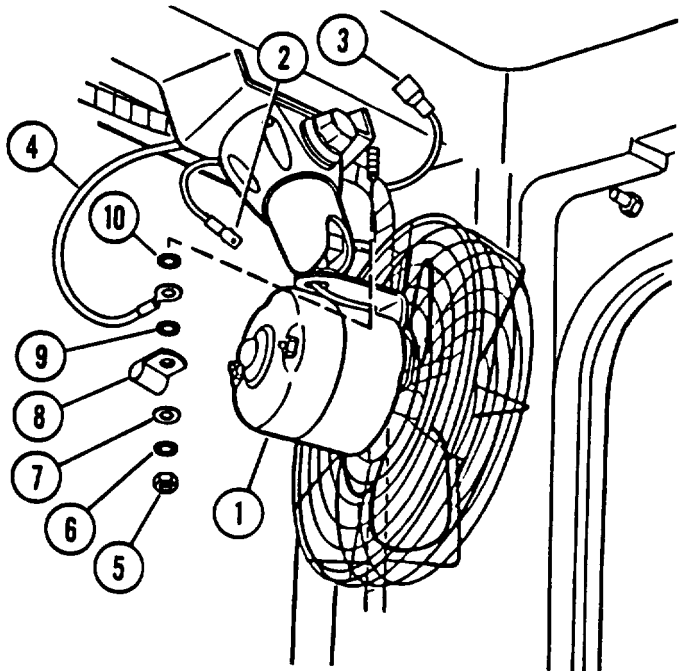
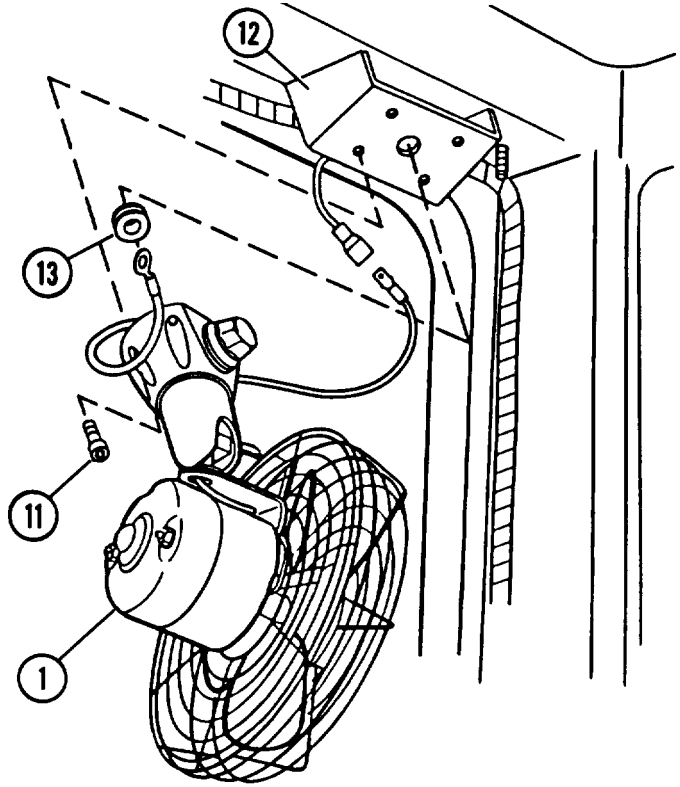
2. INSTALL FAN (1) ON FAN MOUNT (12) AND SECURE WITH FOUR SCREWS (11).

3. CONNECT FAN (1) WIRING.

a. Install lockwasher (10), ground wire (4), lockwasher (9), clamp (8), flatwasher (7), lockwasher (6), and secure with nut (5).

b. Connect male connector (2) to cab harness female connector (3).

4. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.



17-8. CAB HEATER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automatic Mechanics

Equipment Condition

Vehicle parked on level ground.
 Seat removed, para. 16-13.
 Negative battery cable disconnected,
 para. 8-44.
 Engine coolant drained, para. 7-3.

Materials/Parts

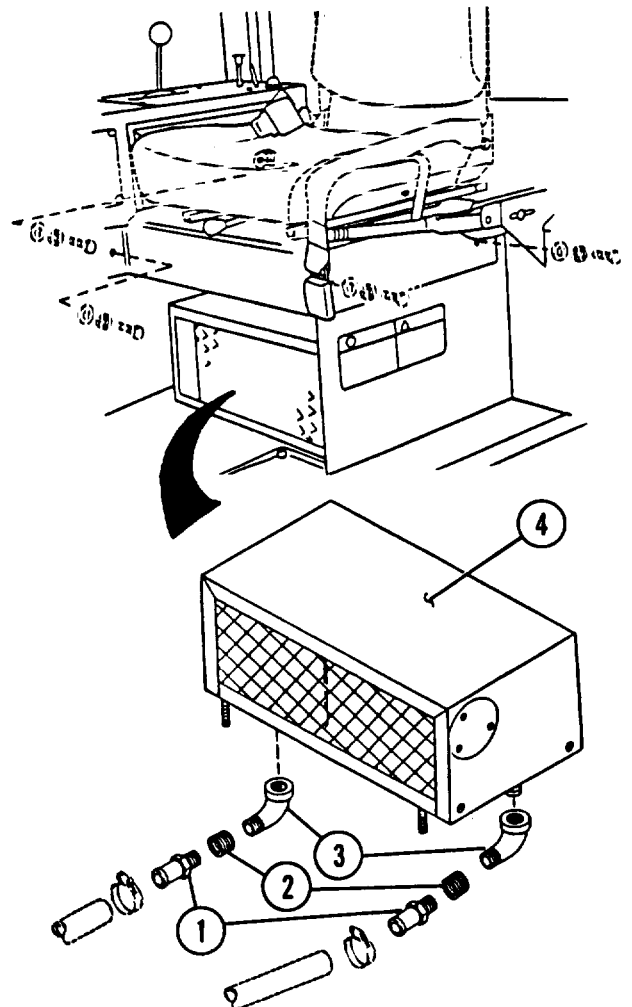
Lockwasher (8, 10)
 Loctite 59241 (App. C, Item 42)
 Starwasher (6)
 Tags (App. C, Item 51)

NOTE

The cab heater is located inside the cab under the seat. Heater hoses and attaching hardware are accessed from under the cab.

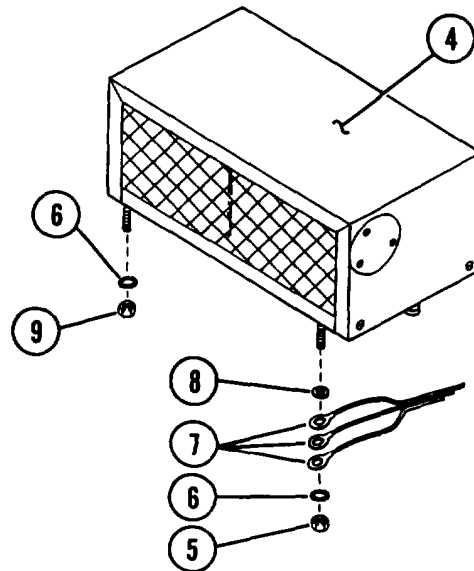
REMOVAL

1. REMOVE TWO CONNECTORS (1)/ TWO CONNECTOR BUSHINGS (2) AND TWO ELBOWS (3) FROM PORTS OF HEATER (4) UNDER CAB.



17-8. CAB HEATER - REPLACE (Cont'd)

2. REMOVE NUT (5) , LOCKWASHER (6) , THREE GROUND LEADS (7) , AND FLATWASHER (8) FROM LEFT-FRONT MOUNTING STUD OF HEATER (4) . DISCARD LOCKWASHER (6) .
3. REMOVE NUTS (9) AND LOCKWASHERS (6) AT THREE REMAINING MOUNTING STUDS OF HEATER (4) . DISCARD LOCKWASHERS (6) .
4. TAG AND DISCONNECT TWO ELECTRICAL LEADS (10) OF HEATER (4) AT SPADE CONNECTORS (11) INSIDE CAB.
5. LIFT AND REMOVE HEATER (4) FROM CAB FLOOR.

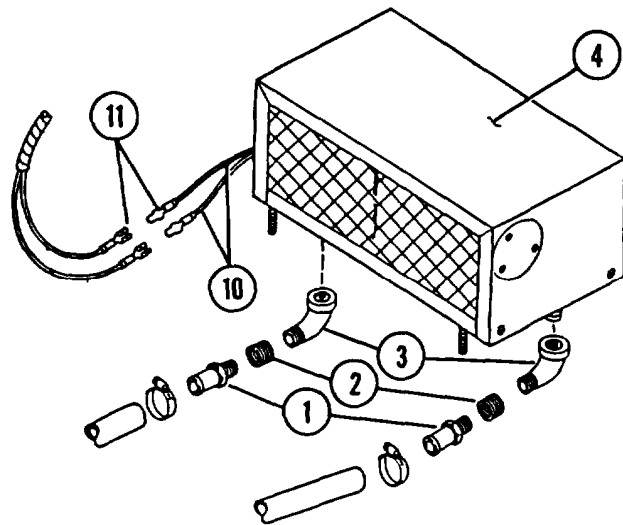


INSTALLATION

NOTE

Apply Loctite 59241 to male threads of connectors (1), elbows (3), and heater (4) during installation.

1. POSITION HEATER (4) SO THAT MOUNTING STUDS FIT THROUGH HOLES IN CAB FLOOR.
2. CONNECT TWO ELECTRICAL LEADS (10) OF HEATER (4) AT SPADE CONNECTORS (11) INSIDE CAB, AS TAGGED.
3. POSITION NEW FLATWASHER (8) , THREE GROUND LEADS (7) , AND NEW LOCKWASHER (6) ON LEFT-FRONT MOUNTING STUD OF HEATER (4) UNDER CAB. SECURE WITH NUT (5) .
4. INSTALL NUTS (9) AND NEW LOCKWASHERS (6) ON THREE REMAINING MOUNTING STUDS OF HEATER (4) .
5. INSTALL TWO CONNECTORS (1) , CONNECTOR BUSHINGS (2) AND ELBOWS (3) TO PORTS OF HEATER (4) .
6. FILL ENGINE COOLING SYSTEM WITH COOLANT, PARA. 7-3.



7. CONNECT BATTERIES, PARA. 8-44.
8. INSTALL SEAT, PARA. 16-13.

17-9. HEATER TEMPERATURE CONTROL VALVE AND CABLE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Clamps (5)
Loctite 242 (App. C, Item 39)

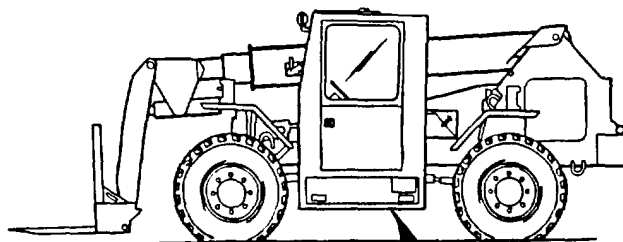
Equipment Condition

Vehicle parked on level ground.
Engine coolant drained, para. 7-3.

NOTE

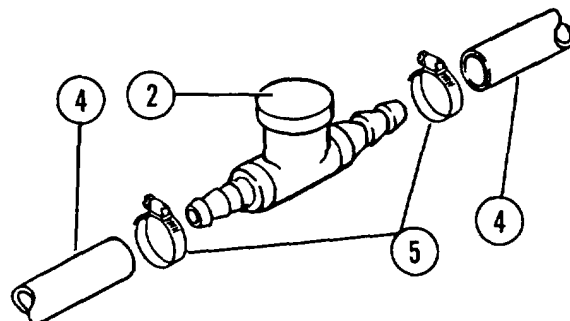
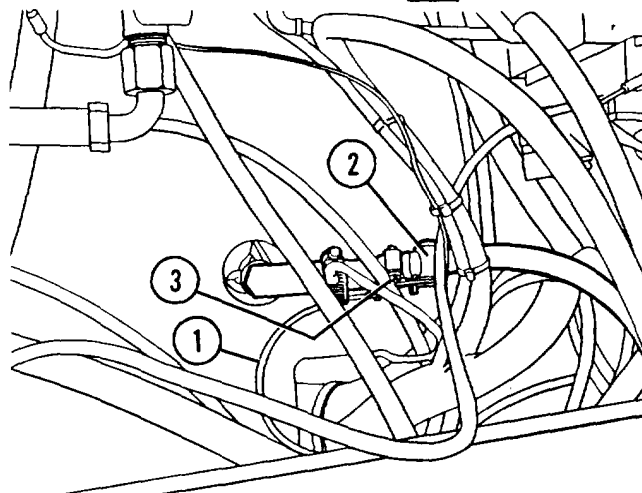
The heater control valve is located under the cab.

The heater control valve cable is mounted in the side console.



REMOVAL

1. REMOVE HEATER CONTROL VALVE CABLE (1) FROM HEATER CONTROL VALVE (2).
 - a. Loosen setscrew (3) securing cable (1) to valve (2).
 - b. Pull end of cable (1) from valve (2).
2. REMOVE HEATER CONTROL VALVE (2) FROM HEATER HOSES (4).
 - a. Remove clamps (5) securing heater hoses (4) to ends of valve (2). Discard clamps (5).
 - b. Remove hoses (4) from ends of valve (2).



17-9. HEATER TEMPERATURE CONTROL VALVE AND CABLE - REPLACE (Cont'd)

3. IF NECESSARY, REMOVE HEATER CONTROL CABLE (1) FROM SIDE CONSOLE (6).

- a. Remove electric joystick to provide access to nut (7), para. 8-19.
- b. Remove nut (7) securing cable (1) to side console (6).
- c. Pull cable (1) out through hole in console (6).

INSTALLATION

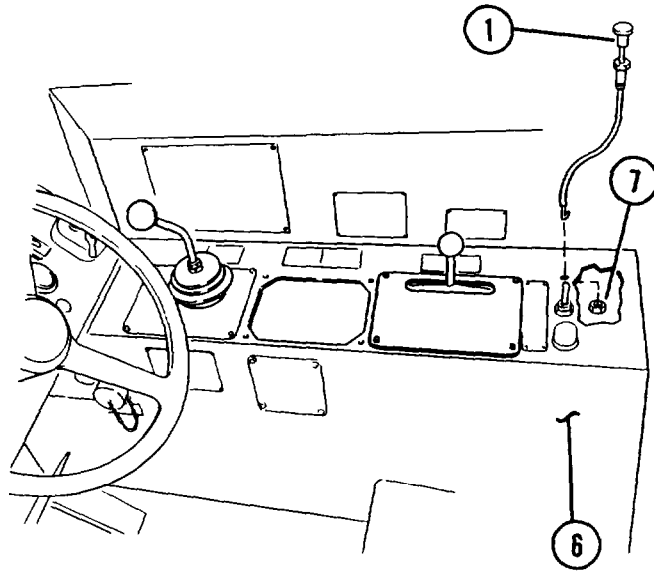
1. IF REMOVED, INSTALL HEATER CONTROL VALVE CABLE (1) TO SIDE CONSOLE.

- a. Push end of cable (1) through hole in side console (6) and through center of nut (7).
- b. Push cable (1) through hole in cab floor above heater control valve (2).

NOTE

Apply Loctite 242 to threads of nut (7).

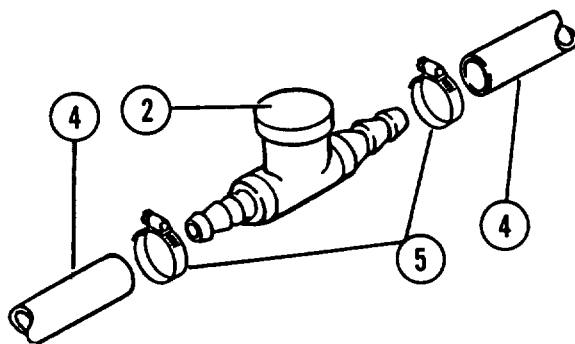
- c. Secure cable (1) to side console (6) with nut (7).
- d. Install electric joystick, para. 8-19.



17-9. HEATER TEMPERATURE CONTROL VALVE AND CABLE - REPLACE (Cont'd)

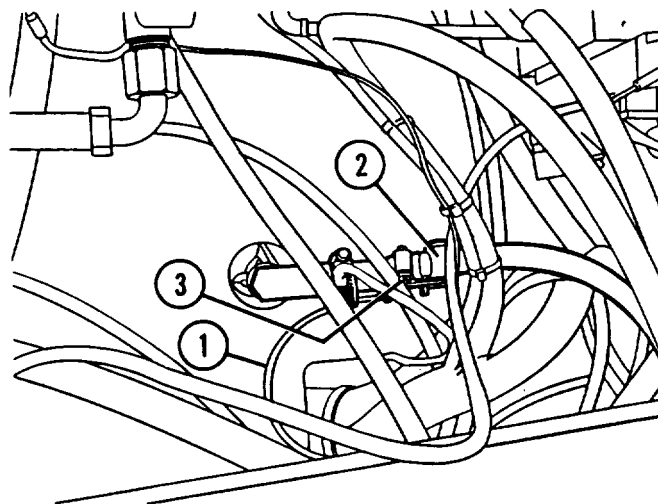
2. INSTALL HEATER HOSES (4) TO HEATER CONTROL VALVE (2).

- a. Position hoses (4) on ends of valve (2).
- b. Secure hoses (4) to valve (2) with new clamps (5).



3. INSTALL HEATER CONTROL CABLE (1) TO HEATER CONTROL VALVE (2).

- a. Position end of cable (1) on valve (2).
- b. Tighten setscrew (3) to secure cable (1) to valve (2).



4. FILL ENGINE COOLING SYSTEM WITH COOLANT, PARA. 7-3.

17-10 1 HEATER HOSES, LINES, AND FITTINGS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Engine cooling system drained,
para. 7-3.

Materials/Parts

Clamp (1, 4, 7, 9, 11, 13)
Loctite 59242 (App. C, Item 42)
Tie Wrap (App. C, Item 53)

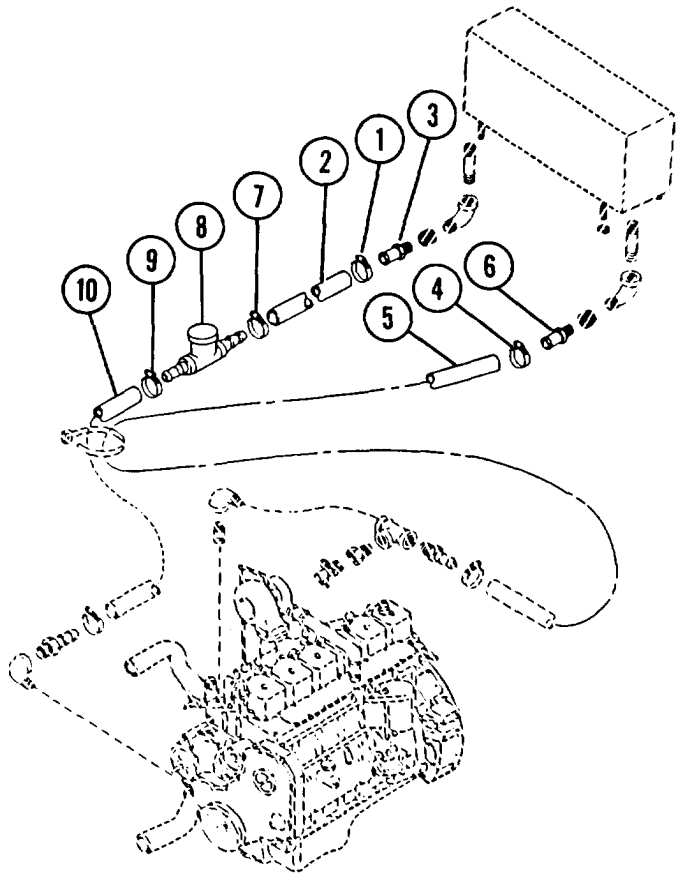
REMOVAL

NOTE

Remove tie wrap around heater hoses as required. Note location of tie wrap for use during installation.

1. REMOVE HEATER HOSES AS REQUIRED.

- a. Remove clamp (1) and hose (2) at connector (3). Discard clamp (1).
- b. Remove clamp (4) and hose (5) at connector (6). Discard clamp (4).
- c. Remove clamp (7) and hose (2) at heater control valve (8). Discard clamp (7).
- d. Remove clamp (9) and hose (10) at heater control valve (8). Discard clamp (9).

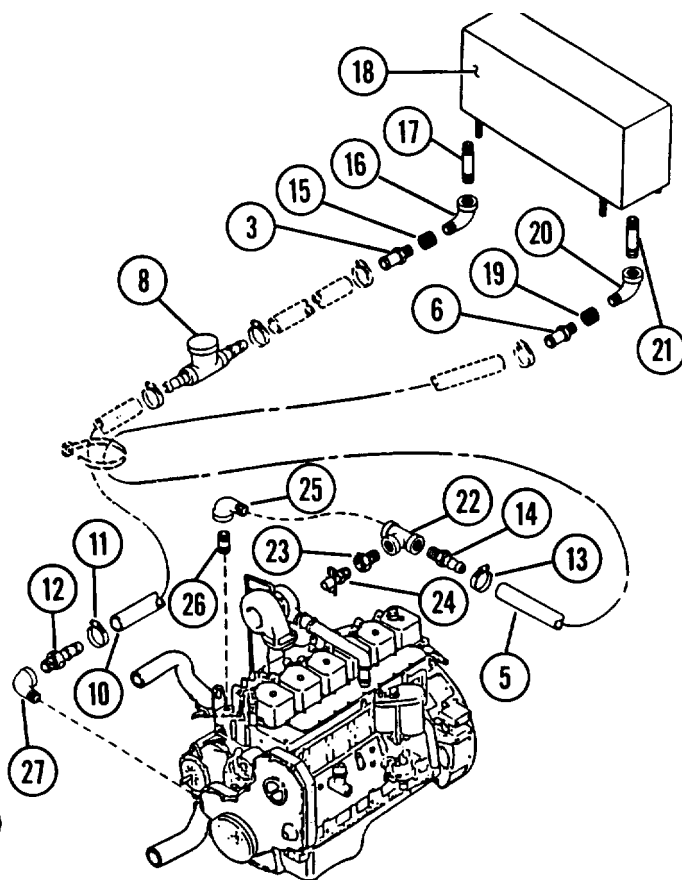


17-10. HEATER HOSES, LINES AND FITTINGS - REPLACE (Cont'd)

- e. Remove clamp (11) and hose (10) at adapter (12). Discard clamp (11).
- f. Remove clamp (13) and hose (5) at adapter (14). Discard clamp (13).

2. REMOVE FITTINGS AS REQUIRED.

- a. Remove connector (3), bushing (15), elbow (16), and nipple (17) at heater (18).
- b. Remove connector (6), bushing (19), elbow (20), and nipple (21) at heater (18).
- c. Remove cable from heater control valve (8) and remove heater control valve (8).
- d. Remove adapter (14), tee (22), bushing (23), drain cock (24), elbow (25) and nipple (26) at engine.
- e. Remove adapter (12) and elbow (27) at engine.



17-10. HEATER HOSES, LINES, AND FITTINGS - REPLACE (Cont'd)

INSTALLATION

NOTE

Apply Loctite 59-241 to male threads on fittings as installed.

NOTE

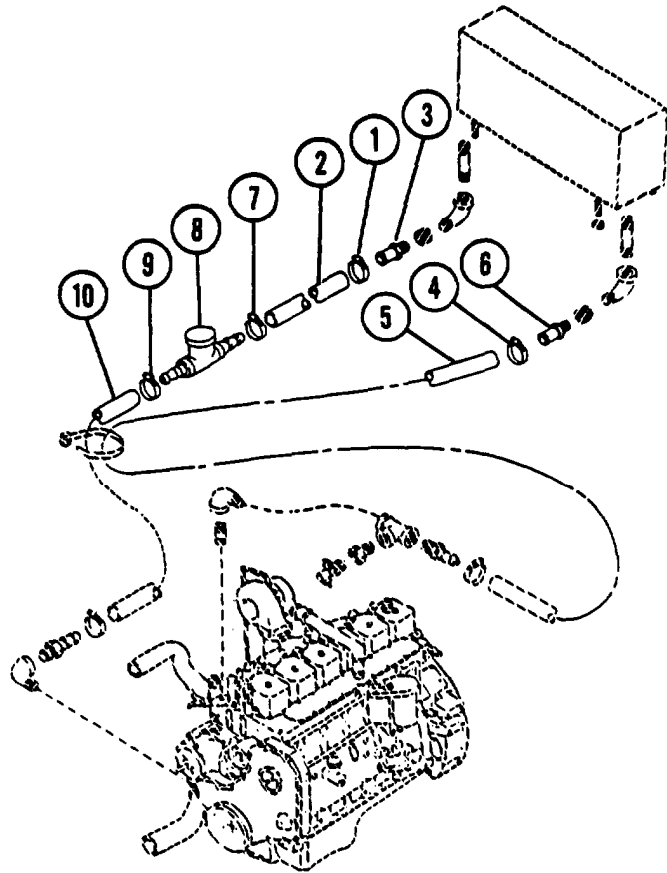
Install new tie wrap around heater hoses as noted during removal.

1. INSTALL FITTINGS AS REQUIRED.

- a. Install elbow (27), and adapter (12) at engine.
- b. Install nipple (26), elbow (25), drain cock (24), bushing (23), tee (22), and adapter (14) at engine.
- c. Position heater control valve (8) under vehicle and connect cable to valve (8).
- d. Install nipple (21), elbow (20), bushing (19), and connector (6) at heater (18).
- e. Install nipple (17), elbow (16), bushing (15), and connector (3).

2. INSTALL HEATER HOSES.

- a. Position hose (5) on adapter (14) and secure with new clamp (13).
- b. Position hose (10) on adapter (12) and secure with new clamp (11).
- c. Position hose (10) on heater control valve (8) and secure with new clamp (9).
- d. Position hose (2) on heater control valve (8) and secure with new clamp (7).
- e. Position hose (5) on connector (6) and secure with new clamp (4).



- f. Position hose (2) on connector (3) and secure with new clamp (1).

3. FILL ENGINE COOLING SYSTEM WITH COOLANT, PARA 7-3.
4. RUN ENGINE AND CHECK HEATER HOSES, LINES, AND FITTINGS FOR LEAKS.

17-11. DATA PLATES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools
 Shop Equipment, Automotive
 Maintenance, Cmmmon #2 Less Power

Materials/Parts

Adhesive (App. C, Item 1)
 Tacks (1)

Equipment Condition

Vehicle parked on level ground.

NOTE

This is a general procedure that applies to data plates mounted with drive pins on vehicle.

REMOVAL

1. USE DRILL TO REMOVE DRIVE PINS (1) SECURING DATA PLATE (2).
2. REMOVE DATA PLATE (2) FROM VEHICLE.

INSTALLATION

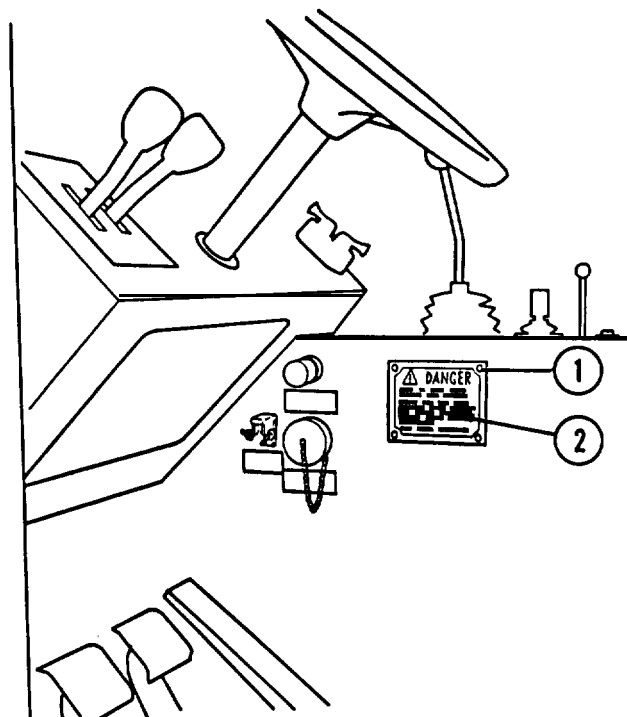
NOTE

Be sure vehicle mounting surface and back of data plate (2) are clean and dry.

NOTE

Data plate on fuel tank adjacent to fuel filler has self-adhesive back and does not require additional adhesive for installation.

1. APPLY ADHESIVE TO BACK OF DATA PLATE (2).
2. POSITION DATA PLATE (2) ON VEHICLE.
- 3* SECURE DATA PLATE (2) TO VEHICLE WITH NEW DRIVE PINS (1).



17-12. CAB FLOOR MAT - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

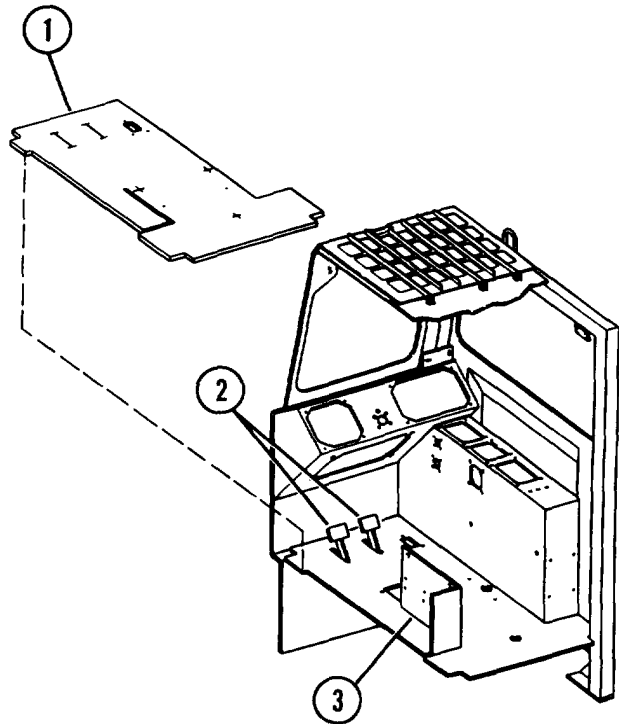
Cab heater removed, para. 17-8.
Accelerator pedal removed, para.
5-22.

REMOVAL

1. REMOVE MAT (1) FROM AROUND TRANSMISSION DISCONNECT AND BRAKE PEDALS (2).
2. REMOVE MAT FROM AROUND SEAT BASE WELDMENT (3).

INSTALLATION

1. PLACE MAT (1) AROUND SEAT BASE WELDMENT (3).
2. PLACE MAT AROUND TRANSMISSION DISCONNECT AND BRAKE PEDALS (2).
3. CHECK THAT MAT (1) IS POSITIONED PROPERLY ON CAB FLOOR. SMOOTH OUT ANY WRINKLES.
4. INSTALL ACCELERATOR PEDAL, PARA. 5-22.
5. INSTALL CAB HEATER, PARA. 17-8.



CHAPTER 18

HYDRAULIC SYSTEM MAINTENAMCE

18-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the hydraulic system. To find a specific maintenance procedure, see the maintenance task summary below.

18-2. HYDRAULIC SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
18-3	Hydraulic System - Service	18-2
18-4	Tandem Gear Pump - Test/Replace	18-6
18-5	Piston Pump - Test/Replace	18-11
18-6	Main Control Valve Assembly - Adjust/Replace	18-17
18-7	MLRS Attachment Control Valve Assembly - Replace	18-29
18-8	Priority Valve - Replace	18-34
18-9	Relief Valve, Frame Tilt/Brakes - Test/Replace	18-37
18-10	Shuttle Valve - Replace	18-42
18-11	Frame Tilt Valve - Replace	18-45
18-12	Hydraulic Joystick Control Valve - Replace	18-48
18-13	Boom Cylinder Flow Control Valve - Replace	18-51
18-14	Frame Tilt Cylinder - Replace	18-54
18-15	Carriage Tilt Cylinder - Replace	18-58
18-16	MLRS Attachment Cylinder - Replace	18-63
18-17	Forks - Replace	18-67
18-18	Fork Bushings - Replace	18-71
18-19	MLRS Attachment - Replace	18-73
18-20	Boom Pivot Pins - Service	18-81
18-21	Boom Wear Pads - Inspect	18-82
18-22	Boom Hose Pulley - Replace	18-84
18-23	Boom Chain Pulleys - Replace	18-90
18-24	Boom Extend and Retract Chains - Inspect/Adjust	18-94
18-25	Boom Hydraulic Hose and Electrical Cable Tension - Adjust	18-96
18-26	Hydraulic Hoses, Lines, and Fittings - Replace/Repair	18-100
18-27	Hydraulic Tubing - Replace	18-113
18-28	Hydraulic Oil Sampling Valve - Replace	18-115
18-29	Hydraulic Oil Strainers - Service/Replace	18-117
18-30	Hydraulic Oil Filter - Replace	18-119
18-31	Fork Sideshift Cylinders - Replace	18-121
18-32	Boom Hoist Cylinders - Replace	18-126

18-3. HYDRAULIC SYSTEM - SERVICE

This task covers:

- a. Purging air from piston pump.
- b. Purging air from tandem gear pump.

Initial Setup

Tools

Tool Kit, Automotive Mechanics
 Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
 Transmission cover removed, para. 16-6.
 Wheels chocked.

Materials/Parts

Container, 1 Gal.
 Hydraulic Oil (App. C, Item 36)
 Tags (App. C, Item 51)

Personnel Required

Two personnel

Reference

TM10-3930-660-10

WARNING

Hydraulic Oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on hydraulic components and hoses clean and dry. Apply film of clean hydraulic oil to all seals, if present, as they are installed.

NOTE

Purging air from the piston pump or tandem gear pump is normally necessary only under the following conditions:

When hoses between pumps and the hydraulic reservoir are disconnected.

When the hydraulic reservoir is drained and refilled.

When it is suspected that air in pump cavities is causing hydraulic system malfunction.

18-3. HYDRAULIC SYSTEM - SERVICE (Cont'd)

PURGING AIR FROM PISTON PUMP

CAUTION

To prevent internal damage to piston pump (1) be sure pump housing is filled with oil before beginning purging procedures.

NOTE

The piston pump (1) supplies hydraulic pressure to the MLRS attachment cylinder assembly, to the carriage tilt cylinders, and to the fork sideshift cylinders.

1. PURGE AIR FROM PUMP (1).
 - a. Loosen but do not remove hose (2) from reducer (3) at tee (4).

NOTE

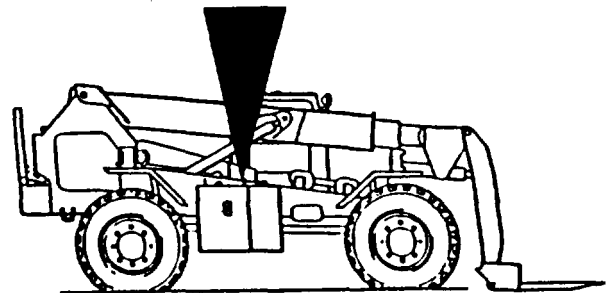
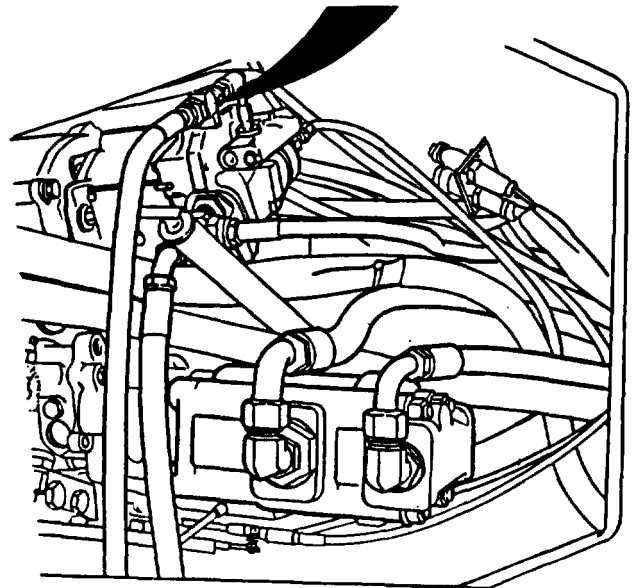
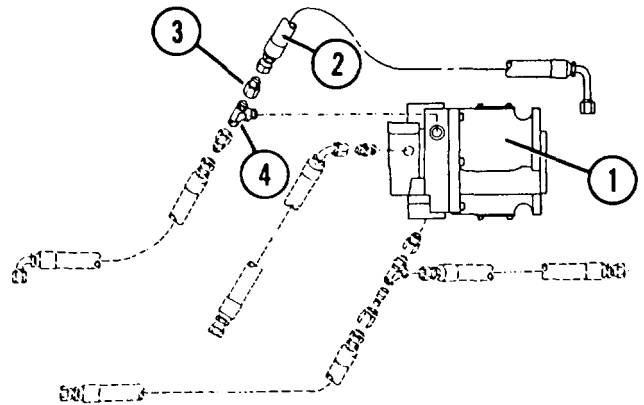
place suitable container under pump (1) to catch any oil lost during the purging process.

- b. Place auxiliary fuel shut-off switch in the "off" position, TM10-3930-660-10.

NOTE

A solid stream of fluid will flow out of loosened hose (2) when air is purged from pump (1).

- c. Crank engine until solid stream of fluid is flowing from hose (2) at reducer (3). While continuing to crank engine, have assistant tighten hose (2).
- d. Stop cranking engine. Place auxiliary fuel shut-off switch the "on" position, TM10-3930-660-10.



18-3. HYDRAULIC SYSTEM - SERVICE (Cont'd)

NOTE

If pump (1) will not pump oil after purging, further troubleshooting is required.

- 2. CHECK HYDRAULIC OIL LEVEL, FILL HYDRAULIC RESERVOIR AS REQUIRED, AND CHECK FOR LEAKS, LO10-3930-660-12.

PURGING AIR FROM TANDEM GEAR PUMP

CAUTION

Do not attempt to purge sections (a) and (b) separately. Always purge both sections of pump whenever purging is necessary. Failure to purge pump as directed in this section may result in severe damage to pump.

NOTE

The hydraulic tandem gear pump (5) has two sections, large and small.

The large section (a) supplies hydraulic pressure to the boom extend cylinder, boom hoist cylinder, and steering system.

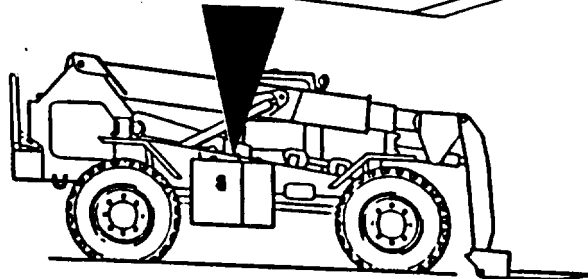
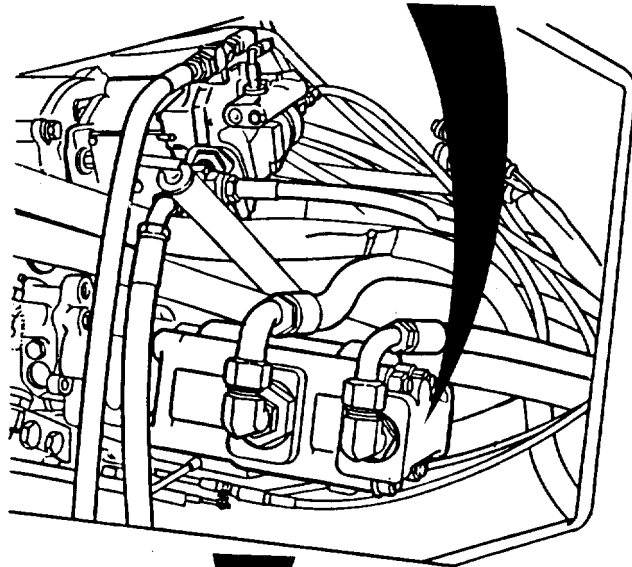
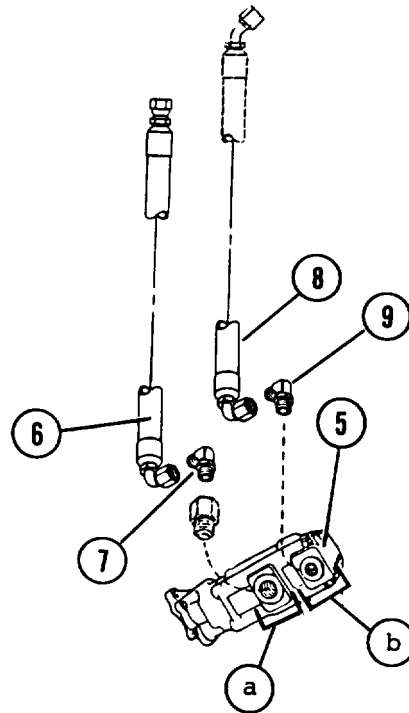
The small section (b) supplies hydraulic pressure to the brake system and the frame tilt cylinder.

1. PURGE AIR FROM PUMP (5).

- a. Loosen but do not remove hose (6) at elbow (7).
- b. Loosen but do not remove hose (8) at elbow (9).

NOTE

Place suitable container under pump (5) to catch any oil lost during purging process.



18-3. HYDRAULIC SYSTEM - SERVICE (Cont'd)

- c. Place auxiliary fuel shut-off switch in the "off" position, TM10-3930-660-10.

NOTE

A solid stream will flow out of both loosened hoses (6) and (8) when air is purged from pump (1).

- d. Crank engine until solid stream of fluid is flowing from both hoses (6) and (8). While continuing to crank engine, have assistant tighten hoses (6) and (8).
- e. Stop cranking engine. Place auxiliary fuel shut-off switch in the "ON" position, TM10-3930-660-10.

NOTE

If pump (5) will not pump oil after purging, further troubleshooting is required, para. 2-12.

2. CHECK HYDRAULIC OIL LEVEL, FILL HYDRAULIC RESERVOIR AS REQUIRED, AND CHECK FOR LEAKS, LO10-3930-660-12.

18-4. TANDEM GEAR PUMP - TEST/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup

Tools

- Tool Kit, Auto Mechanics
- Lifting Device, 5 Ton Capacity

Test Equipment

- In-Line Flowmeter
- STE/ICE Test Set
- Test Hose

Equipment Condition

- Vehicle parked on level ground with wheels blocked.
- Boom raised and blocked.
- Transmission cover removed, para. 16-6.

Materials/Parts

- Caps and Plugs
- Container
- Hydraulic oil (App. C, Item 35)
- Lockwashers (11)
- O-ring (13)
- Tags (App. C, Item 51)

Reference

TM10-3930-660-10

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

WARNING

When working under the boom, always use blocks or other supports. Combined weight of boom and MLRS attachment is approximately 6300 pounds. Failure to adequately support the boom could result in severe injury or death.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

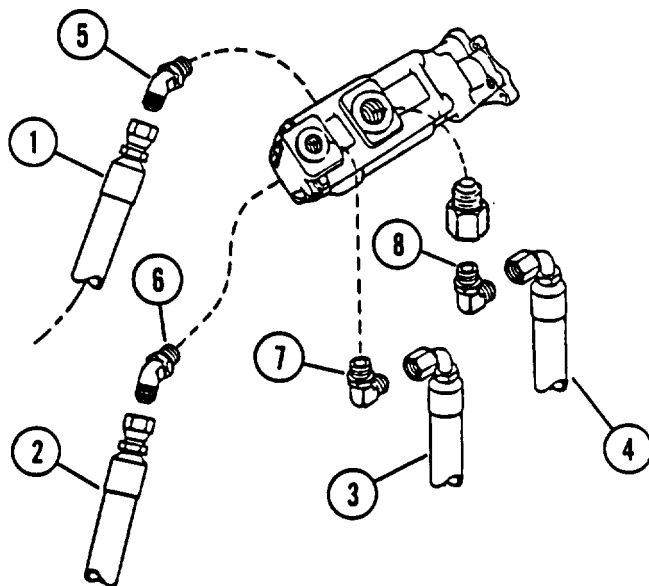
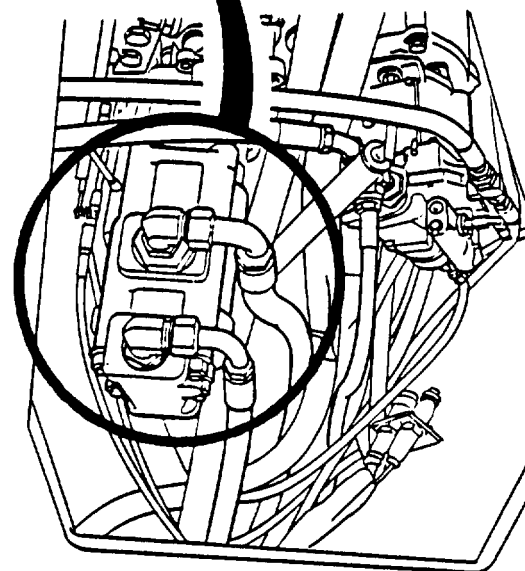
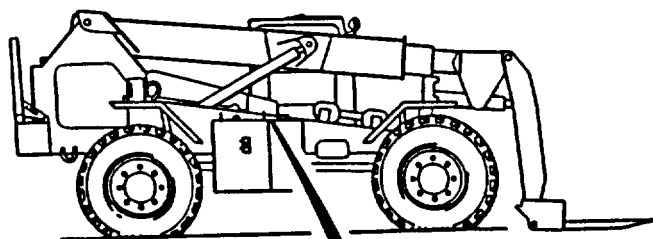
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

18-4. TANDEM GEAR PUMP - TEST/REPLACE (Cont'd)

REMOVAL

1. DISCONNECT HYDRAULIC HOSES (1).

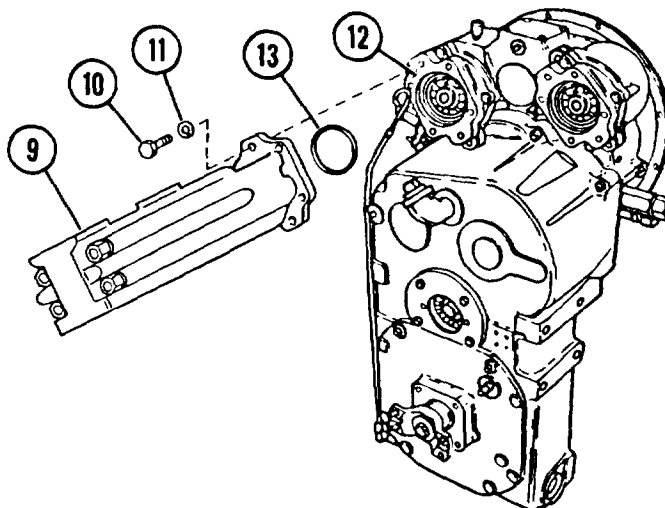
- a. Tag four hydraulic hoses (1), (2), (3), and (4) for use during installation.
- b. Remove four hydraulic hoses (1), (2), (3), and (4) from elbow (5), (6), (7), and (8).
- c. Cap or plug all hydraulic lines or openings.



18-4. TANDEN GEAR PUMP - TEST/REPLACE (Cont'd)

2. REMOVE PUMP (9).

- a. Remove two capscrews (10) and two lockwashers (11) and remove pump (9) from transmission mounting (12) . Discard lockwashers (11).
- b. Remove and discard mounting O-ring (13).



3. IF NECESSARY, REMOVE ELBOWS (5) (6), (7), AND (8), AND REDUCER (14), FROM PUMP (9) .

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

1. INSTALL PUMP (9).

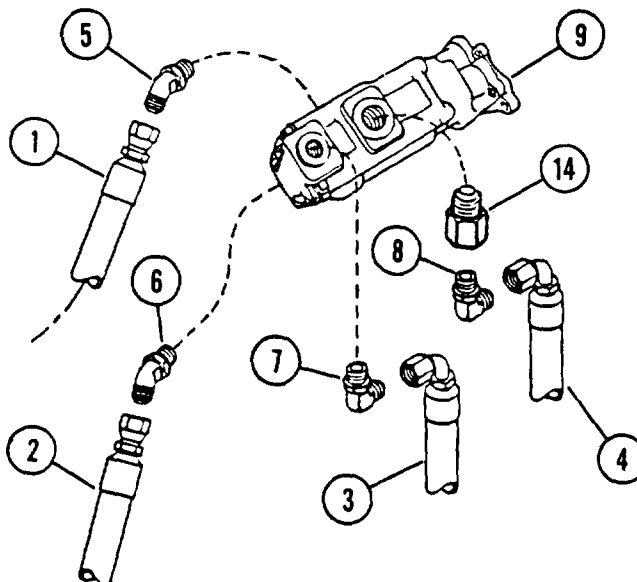
- a. If necessary, install reducer (14), and elbows (5), (6), (7) and (8), to pump (9).
- b. Install new mounting O-ring (13).

NOTE

Apply Loctite 242 to threads of capscrews (10).

- c. Position pump (9) on transmission mounting (12) and secure with two new lockwashers (11) and two capscrews (10).

2. CONNECT FOUR HYDRAULIC HOSES (1), (2), (3), AND (4) TO ELBOWS (5), (6), (7), AND (8) AS TAGGED.



18-4. TANDEM GEAR PUMP TEST/REPLACE (Cont'd)

CAUTION

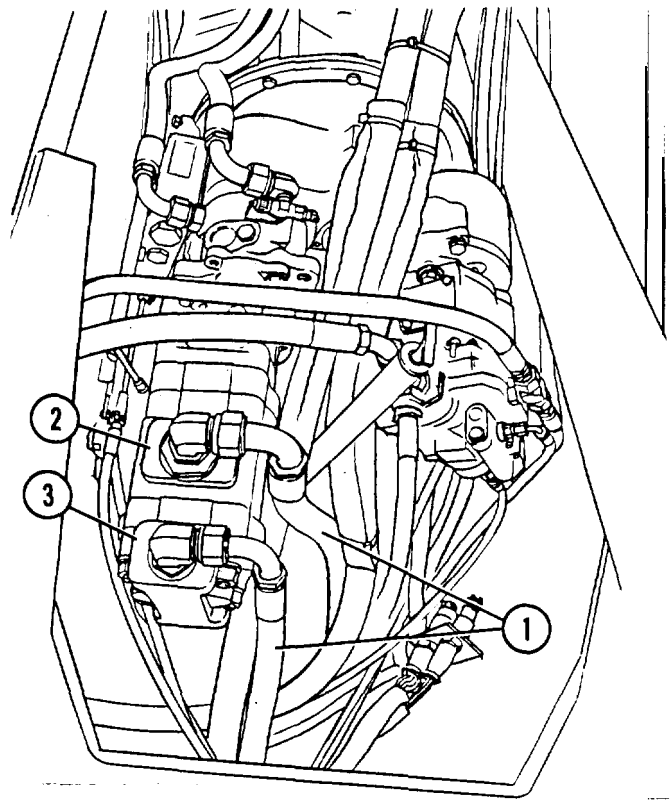
Tandem gear pump must be purged of air before engine is started. Refer to para. 18-3 for purging instructions. Failure to purge air as directed may result in severe damage to tandem gear pump.

3. PURGE AIR FROM THE TANDEM GEAR PUMP, PARA. 18-3.
4. INSTALL TRANSMISSION ACCESS COVER, PARA. 16-6.

TESTING**NOTE**

Both the large pump section and the small pump section of the tandem gear pump are tested in the same manner.

1. REMOVE TRANSMISSION COVER, PARA. 16-6.
2. PREPARE AND SET UP THE IN-LINE FLOWMETER FOR TESTING.
3. DISCONNECT PUMP OUTLET HOSE (1) FROM THE PUMP SECTION BEING TESTED.
4. CONNECT A TEST HOSE FROM THE OUTLET SIDE OF THE SECTION BEING TESTED TO THE INLET PORT OF THE FLOWMETER.
5. CONNECT THE HYDRAULIC HOSE (1) REMOVED IN STEP 3. TO THE OUTLET PORT OF THE FLOWMETER.

**NOTE**

Use the STE/ICE kit to monitor engine speed. The hydraulic pumps are tested at specific engine rpms.

6. START THE ENGINE, TM10-3930-660-10.
7. IF THE LARGE PUMP SECTION (2) IS BEING TESTED, ADJUST THE ENGINE SPEED TO 2400 RPM, ADJUST PRESSURE TO 2500 PSI, AND READ THE FLOW IN GPM .

18-4. TANDEM GEAR PUMP - TEST/REPLACE (Cont'd)

8. IF THE SMALL PUMP SECTION (3) IS BEING TESTED , ADJUST ENGINE SPEED TO 1800 RPM, ADJUST PRESSURE TO 2500 PSI , AND READ THE FLOW IN GPM.
9. THE HYDRAULIC PUMP SECTIONS MUST MEET THE FOLLOWING SPECIFICATIONS :
 - LARGE PUMP SECTION - 36.3 GPM AT 2400 RPM
 - SMALL PUMP SECTION - 13.5 GPM AT 1800 RPM
10. REPLACE PUMP IF EITHER SECTION FAILS TO MEET OR EXCEED THE SPECIFICATIONS GIVEN IN STEP 9. REFER TO THE REMOVAL AND INSTALLATION SECTIONS OF THIS PARAGRAPH FOR REPLACEMENT INSTRUCTIONS.
11. TURN ENGINE OFF, TM10-3930-660-10. ALLOW HYDRAULIC SYSTEM TO COOL DOWN BEFORE PROCEEDING.
12. DISCONNECT TEST HOSE FROM OUTLET SIDE OF SECTION TESTED AND FROM INLET PORT OF FLOWMETER.
13. DISCONNECT HYDRAULIC HOSE (1) FROM OUTLET PORT OF FLOWMETER AND CONNECT HOSE (1) TO OUTLET SIDE OF SECTION TESTED .

CAUTION

Tandem gear pump must be purged of air before engine is started. Refer to para. 18-3 for purging instructions. Failure to purge air as directed may result in severe damage to tandem gear pump.

14. PURGE AIR FROM THE TANDEM GEAR PUMP, PARA 18-3.
15. INSTALL TRANSMISSION ACCESS COVER, PARA. 16-6.

 18-5. PISTON PUMP - TEST/REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Testing

Initial Setup
Tools

Tool Kit, Automotive Mechanics
 Lifting Device, Capacity 5 ton.
 Cup and Plug Set

Materials/Parts

Container, 6Gal.
 Hydraulic Oil (App. C, Item 36)
 Lockwasher (19)
 o-ring (21)
 Tags (App. C, Item 51)

Reference

TM10-3930-660-10

Test Equipment

In-line Flowmeter
 Test Tee
 Hydraulic Hose

Equipment Condition

Vehicle parked on level ground.
 Boom raised and blocked.
 Transmission cover removed,
 para. 16-6.

W A R N I N G

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

18-5. PISTON PUMP - TEST/REPLACE (Cont'd)

WARNING

When working under the boom always use blocks or other supports. Combined weight of boom and MLRS attachment is approximately 6300 pounds. Failure to adequately support the boom could result in severe injury or death.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

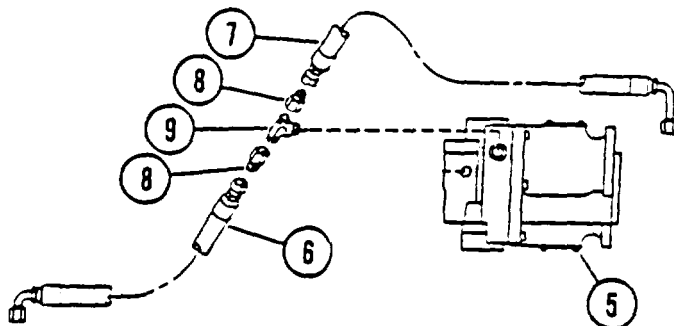
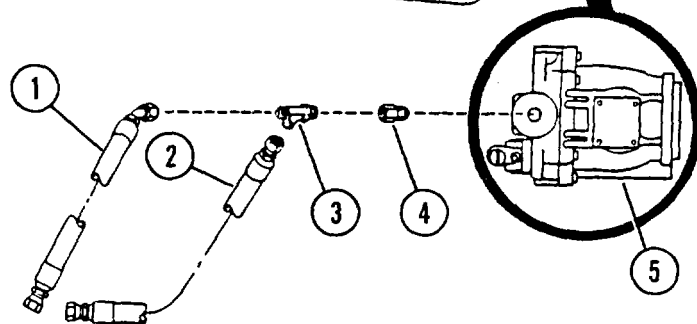
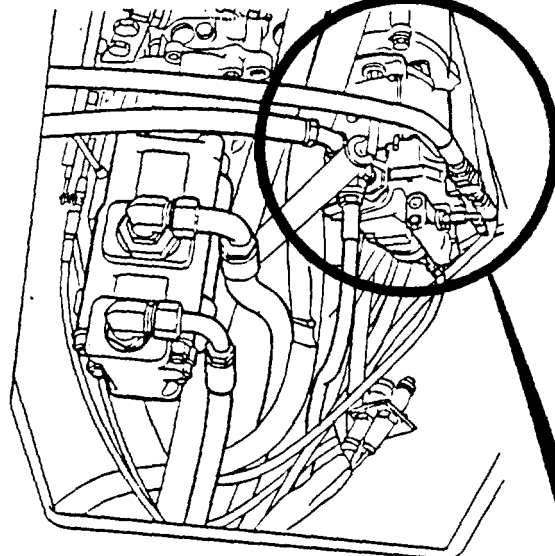
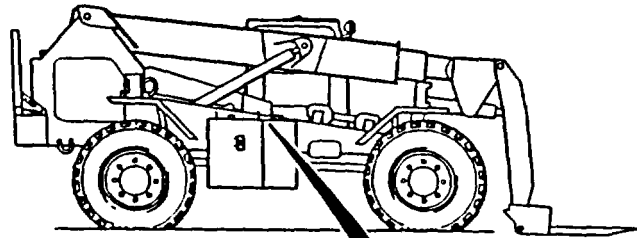
NOTE

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

REMOVAL

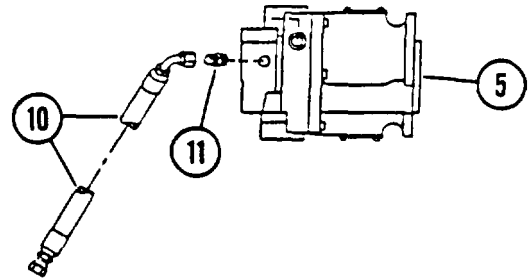
1. DISCONNECT HYDRAULIC HOSES.

- a. Tag and disconnect hose (1) and hose (2), from tee (3). Leave tee (3) and reducer (4) assembled to pump (5).
- b. Tag and disconnect hoses (6) and (7) from two reducers (8). Leave tee (9) and reducers (8) assembled to pump (5).



18-5. PISTON PUMP - TEST/REPLACE (Cont'd)

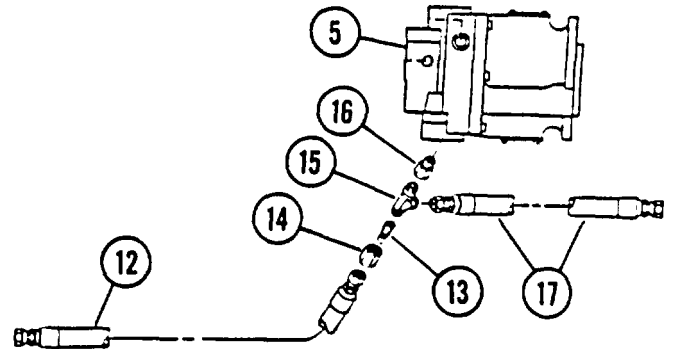
c. Tag and disconnect hose (10) from adapter (11). Leave adapter (11), assembled to pump (5).



d. Tag and disconnect hose (12) from reducer (13). Leave nut (14), reducer (13), tee (15), and reducer (16) assembled to valve (5).

e. Tag and disconnect hose (17) from tee (15).

f. Cap or plug all hydraulic openings.



2. REMOVE PISTON PUMP (5).

a. Support pump (5) and remove two bolts (18), lockwashers (19), and flatwashers (20). Discard lockwashers (19).

b. Remove pump (5) from the vehicle.

c. Remove and discard O-ring (21).

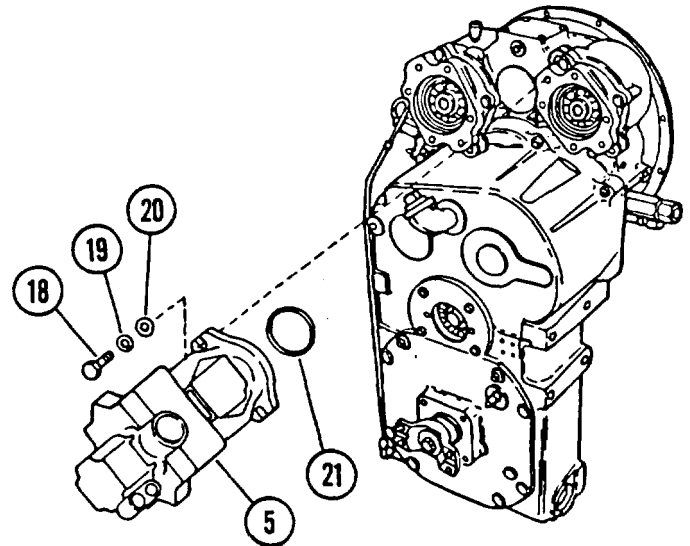
3. IF NECESSARY, REMOVE FITTINGS FROM PUMP (5).

a. Remove tee (3) and reducer (4).

b. Remove two reducers (8), and tee (9).

c. Remove adapter (11).

d. Remove reducer (13), nut (14), tee (15), and reducer (16).



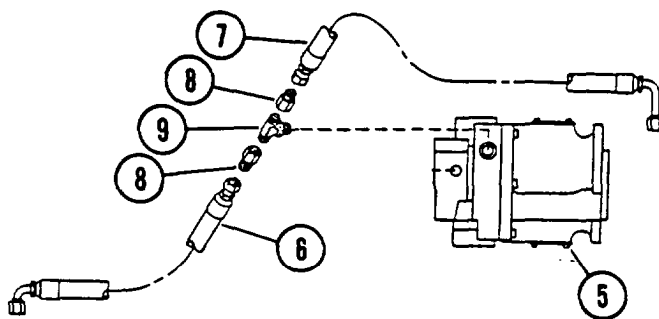
18-5. PISTION PUMP - TEST/REPLACE (Cont'd)

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

1. IF REMOVED, INSTALL FITTINGS ON PUMP (5).
 - a. If necessary, install tee (3) and reducer (4).
 - b. Install two reducers (8) and tee (9).
 - c. Install adapter (11).
 - d. Install reducer (13), nut (14), tee (15), and reducer (16).
2. INSTALL PISTON PUMP (5).
 - a. Install new O-ring (21).
 - b. Position pump (5) on the transmission and secure with two bolts (18), two new lockwashers (19), and two flat washers (20).
3. CONNECT HYDRAULIC HOSES AS TAGGED
 - a. Connect hose (17) to tee (15).
 - b. Connect hose (12) to reducer (13).
 - c. Connect hose (10) to adapter (11).
 - d. Connect hoses (6), and (7) to two reducers (8).
 - e. Connect hose (1), and hose (2), to tee (3).



18-5. PISTON PUMP- TEST/REPLACE (Cont'd)

4. REMOVE BLOCKING MATERIAL FROM BOOM.
5. INSTALL TRANSMISSION COVER, PARA. 16-6.

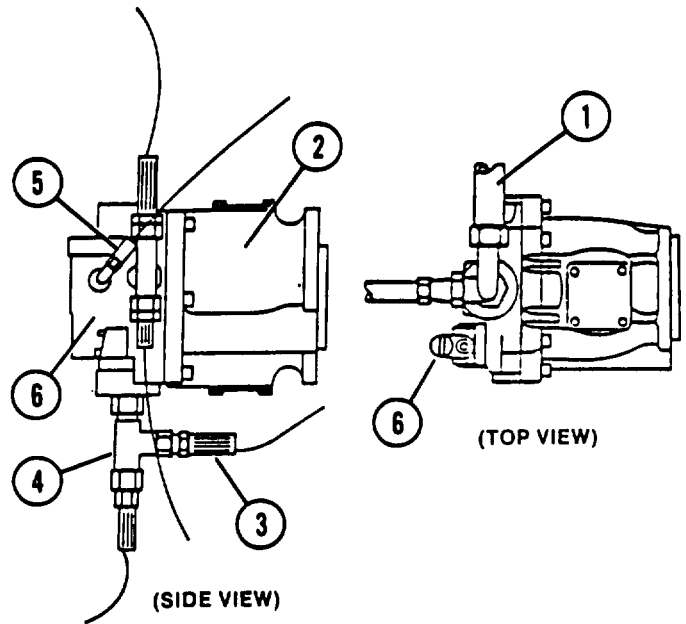
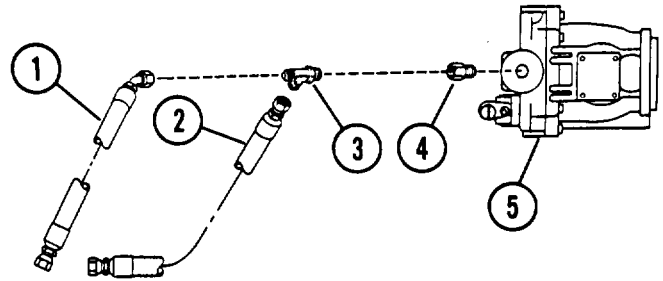
CAUTION

Piston pump must be purged of air before engine is started. Refer to para. 18-3 for purging instructions. Failure to purge air as directed may result in severe damage to piston pump.

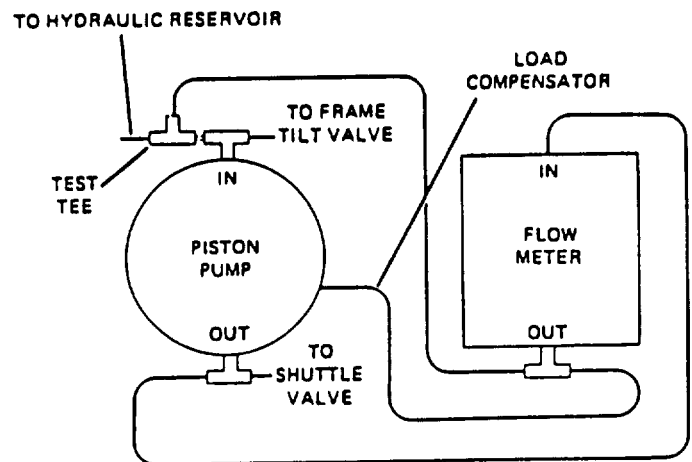
6. PURGE AIR FROM THE PISTON PUMP, PARA. 18-3.

TESTING

1. PREPARE AND SET-UP THE IN-LINE FLOWMETER. A TEST TEE SHOULD BE INCLUDED WITH THE FLOWMETER.
2. MAKE HYDRAULIC CONNECTIONS TO FLOWMETER.
 - a. Tag and disconnect inlet hose (1). Install test tee fitting from flow meter in place of inlet hose (1) at pump (2).
 - b. Connect the inlet hose (1) to one side of the flowmeter test tee.
 - c* Connect the other side of the flowmeter test tee to a hydraulic hose.
 - d. Connect the other end of hydraulic hose to the fitting on the outlet port of flowmeter.
 - e. Tag and disconnect the pump output hose (3) from the tee (4) on the pump (2). Plug output hose (3) to prevent dirt from entering the hose.
 - f. Connect a test hose from tee (4) to a tee at the inlet port of the flowmeter.



TEST SCHEMATIC



18-5. PISTON PUMP - TEST/REPLACE (Cont'd)

g. Tag, disconnect, and plug the load compensator line (5) at the load compensator (6) .

h. Connect a test hose from the tee fitting on the inlet port of the flowmeter to the load compensator (6) .

3. CHECK THAT THE TEST CONNECTIONS MATCH THOSE SHOWN ON THE TEST SCHEMATIC IN THIS PARAGRAPH.

4. CHECK FOR PROPER FLOW.

a. Start and run the engine at full throttle, TM10-3930-660-10.

b. Adjust the flowmeter to 2500 psi.

NOTE

To ensure accurate flow readings, the flowmeter should be installed as close as possible in the hydraulic circuit to the pump (2), and with as few connections as possible.

c. The flow should be within 20 to 26 gpm. If the flow is less than 20 gpm, replace hydraulic pump (2). Refer to removal and installation sections of this paragraph for pump replacement instructions.

d. Stop engine, TM10-3930-660-10.

5. REMOVE FLOWMETER.

After testing is completed, remove the hydraulic flowmeter, test hoses, and test tee. Connect hydraulic hoses (1) and (3) to pump (2) as tagged.

CAUTION

Piston pump must be purged of air before engine is started. Refer to para. 18-3 for purging instructions. Failure to purge air as directed may result in severe damage to piston pump.

6. PURGE AIR FROM THE PISTON PUMP.
PARA. 18-3.

7. INSTALL TRANSMISSION COVER,
PARA. 16-6.

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACB

This task covers:

- a. Removal
- b. Installation
- c. Adjust

Initial Setup

Tools

Tool Kit, Automotive Mechanics
 Cap and Plug Set
 Lifting Device, 5 Ton Capacity

TEST EQUIPMENT

Pressure Gauge

Equipment Condition

Vehicle parked on level ground.
 Boom placed in horizontal position
 and supported with rigid blocking.
 Transmission cover removed,
 para. 16-6.

Materials/Parts

Container, 1 Gal.
 Lockwashers (5)
 Loctite 242 (App. C, Item 39)
 Tags (App. C, Item 51)

Personnel Required

Two

Reference

TM10-3930-660-10

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

WARNING

When working underneath the boom, always support the boom using blocks, jackstands, or other rigid and stable supports. Combined weight of boom and MLRS attachment is approximately 6300 pounds. Failure to adequately support the boom could result in severe injury or death.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

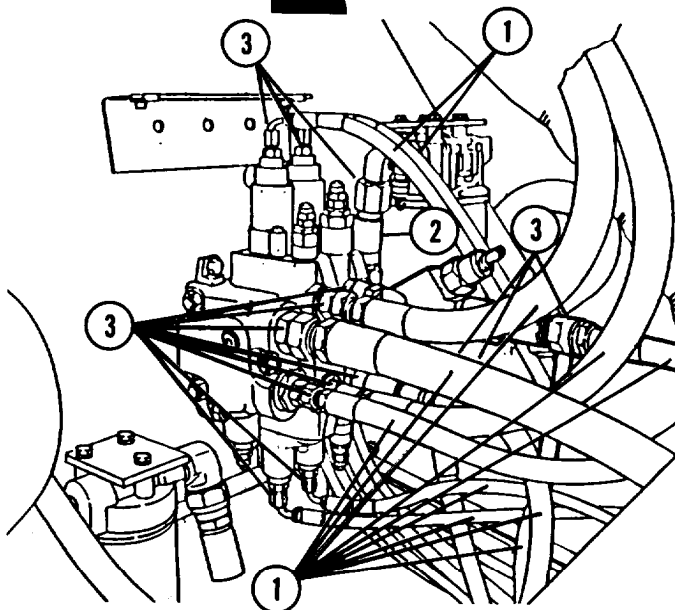
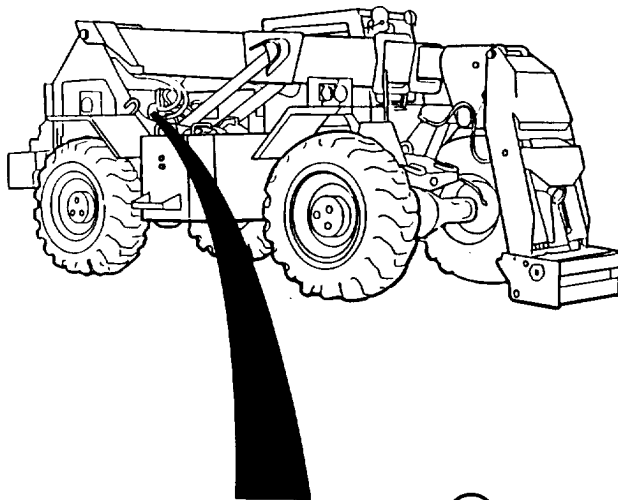
If more than one hydraulic line is to be removed, identify lines to assure proper installation.

1. DISCONNECT HYDRAULIC HOSES AND TUBE.

- a. Tag thirteen hydraulic hoses (1) and one tube (2) for use during installation.
- b. Unscrew thirteen hydraulic hoses (1) and one tube (2) at fittings (3).

2. CAP HYDRAULIC HOSES AND TUBE.

Cap hydraulic hose and tube fittings (3).



18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

3. REMOVE MOUNTING HARDWARE.

NOTE

Main control valve weighs 60 pounds. When performing the following procedure, grasp the valve so it does not drop when fasteners are removed.

- a. Remove three nuts (6), three lockwashers (5), and three capscrews (4) that secure valve. Discard lockwashers (5).
- b. Remove valve.

INSTALLATION

1. INSTALL VALVE.

- a. Position valve on compartment wall.

Apply Loctite 242 to threads of capscrews (4).

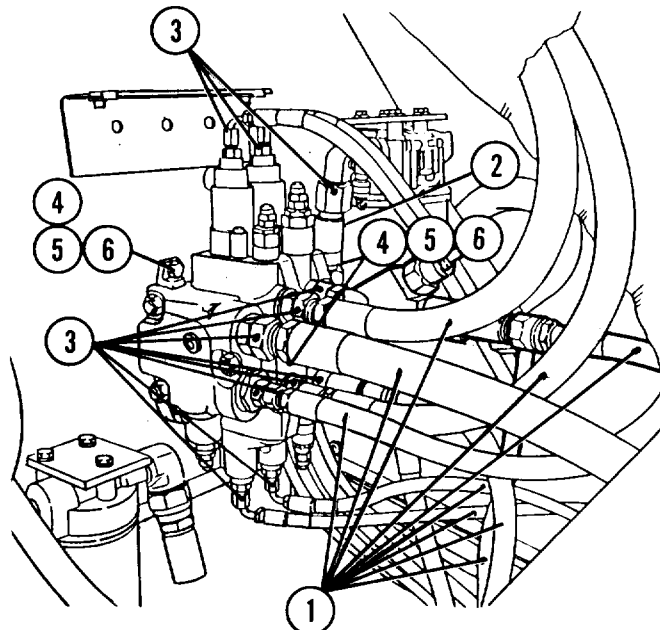
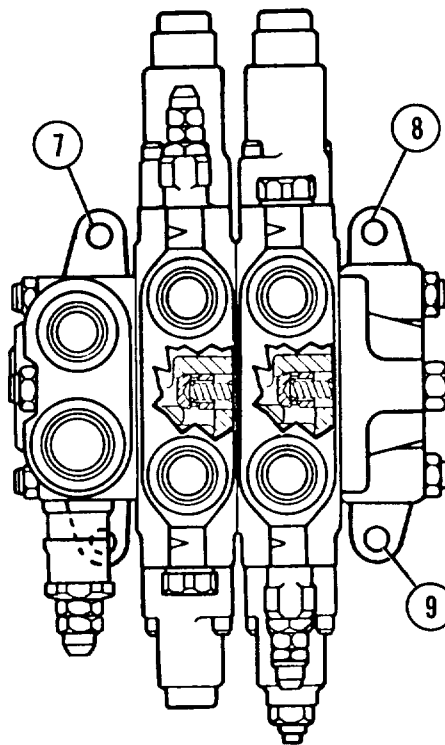
- b. Place a capscrew (4) through compartment wall and valve flange (7). Place a new lockwasher (5) and a nut (6) on end of bolt. Hand tighten nut.
- c. Place remaining two capscrews through compartment wall and valve flanges (8), (9) and secure with new lockwashers (5) and nuts (6).
- d. Tighten all nuts (6) securely with wrench.

2. REMOVE CAPS FROM HOSES AND TUBE.

Remove caps from hydraulic hoses (1) and tube (2).

3. CONNECT HYDRAULIC HOSES AND TUBE.

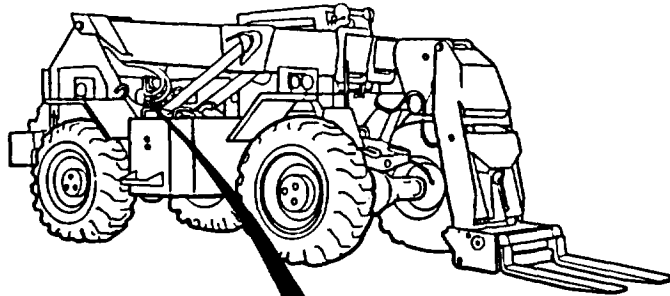
Connect thirteen hydraulic hoses (1) and one tube (2) to fittings (3) as tagged.



18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

4. PURGE AIR FROM HYDRAULIC CIRCUIT.

- a. Start engine, TM10-3930-660-10.
- b. Cycle boom hoist and extend functions five times.
- c. Shut off engine and check for leaks, TM10-3930-10.



5. INSTALL TRANSMISSION COVER, PARA. 16-6.

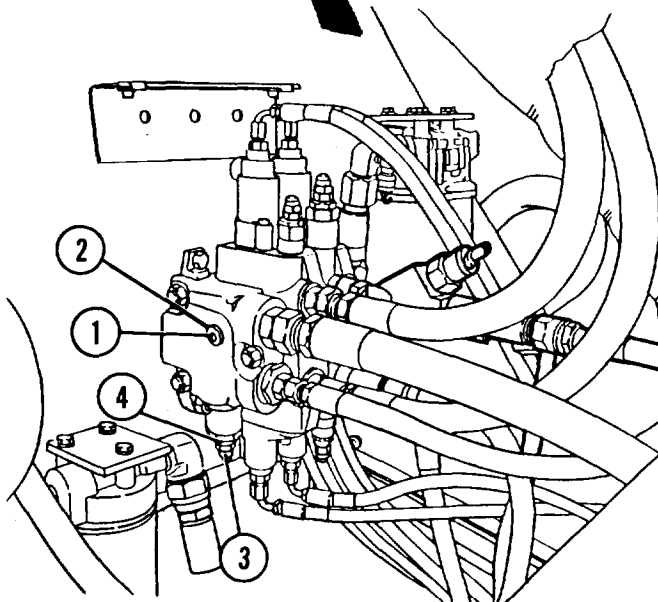
ADJUSTMENT - MAIN RELIEF VALVE

NOTE

Adjustment of main control valve assembly is limited to adjustment of relief valves. There are a total of four relief valves on the main control valve assembly.

1. CONNECT PRESSURE GAUGE TO VALVE PORT.

- a. Remove main relief valve plug assembly (1).
- b. Connect 0 to 5000 psi pressure gauge to plug assembly port (2).
- c. Start engine. TM10-3930-660-10.
- d. Operate boom hoist, lower, extend, or retract function until cylinder bottoms out and hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.



NOTE

Engine may be operated at idle or full throttle when performing tests/adjustments.

2. READ RELIEF VALVE PRESSURE ON GAUGE. PRESSURE RANGE IS 2,750 to 2,850 psi.

IF RELIEF VALVE PRESSURE IS NOT WITHIN SPECIFICATIONS, ADJUST AS FOLLOWS:

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

- a. Remove acorn nut (3) covering slotted head adjusting screw.
 - b. While holding adjusting screw, loosen and back off jam nut (4) which secures adjusting screw.
 - c. To increase relief pressure, turn adjusting screw clockwise (in). To decrease pressure, turn adjusting screw counterclockwise (out) .
 - d. When desired relief pressure is obtained, hold adjusting screw in position and tighten jam nut (4). Install acorn nut (3).
3. STOP ENGINE, TM10-3930-660-10.
 4. REMOVE PRESSURE GAUGE.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve Pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

Unscrew pressure gauge from main relief valve plug assembly port (2).

5. INSTALL MAIN RELIEF VALVE PLUG ASSEMBLY .

Screw main relief valve plug assembly (1) into port (2) and tighten.

6. Replace transmission cover, para. 16-6.

ADJUSTMENT - BOOM EXTEND RELIEF VALVE

1. CONNECT PRESSURE GAUGE TO VALVE PORT.

The main relief valve pressure must be adjusted above normal operating pressure to permit the boom extend relief valve pressure to be adjusted. Main relief valve pressure is then returned to normal operating pressure at the end of this procedure.

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

- a. Unscrew main relief valve plug assembly (1).
 - b. Connect 0 to 5000 psi pressure gauge to plug assembly port (2).
 - c. Remove acorn nut (3) covering slotted head adjusting screw.
 - d. While holding adjusting screw, loosen and back off jam nut (4) which secures adjusting screw.
2. ADJUST MAIN RELIEF VALVE PRESSURE TO 3,100 psi.

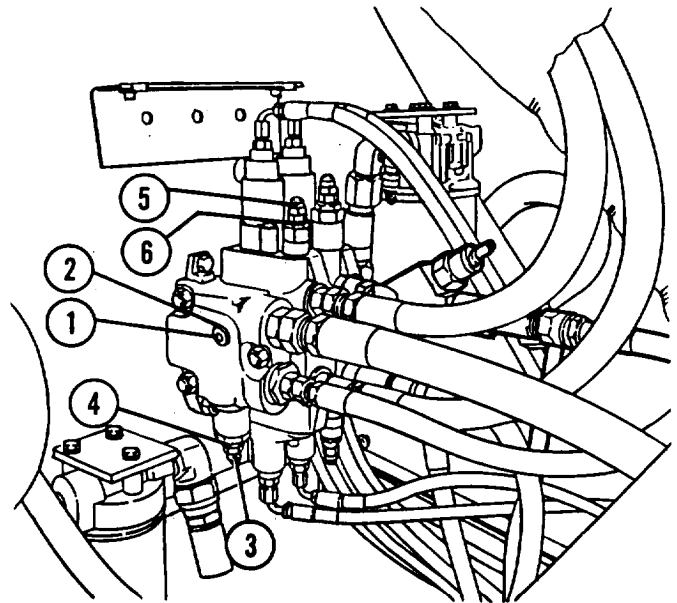
NOTE

Engine may be operated at idle or full throttle when performing pressure tests.

- a. Start engine, TM10-3930-660-10.
 - b. Operate boom extend, retract, hoist or lower function until hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.
 - c. Turn adjusting screw clockwise (in) until pressure on gauge reads 3,100 psi.
 - d. Release hydraulic function lever.
3. ADJUST BOOM EXTEND RELIEF VALVE PRESSURE BETWEEN 2,950 AND 3,050 psi.
- a. Remove acorn nut (5) covering slotted head adjusting screw.
 - b. While holding adjusting screw, loosen and back off jam nut (6) which secures adjusting screw.

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

- c. Operate boom extend function until boom is fully extended. Continue to hold boom control lever in extend position so hydraulic oil passes over relief valve.
- d. Read relief valve pressure on pressure gauge.
- e. To increase relief pressure, turn adjusting screw clockwise (in). To decrease pressure, turn adjusting screw counterclockwise (out).
- f. When desired relief pressure is obtained, release boom extend lever.
- g. Hold adjusting screw in position and tighten jam nut (6).
- h. Install acorn nut (5).



4. ADJUST MAIN RELIEF VALVE BETWEEN 2,750 AND 2,850 psi

- a. Operate boom extend, retract, hoist or lower function until hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.
- b. Turn main relief valve adjusting screw counterclockwise (out) until pressure on gauge reads between 2,750 and 2,850 psi.
- c. Release hydraulic function lever.
- d. Hold adjusting screw in position and tighten jam nut (4). Install acorn nut (3).

5. STOP ENGINE, TM10-3930-660-10.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

6. REMOVE PRESSURE GAUGE.

Unscrew pressure gauge from main relief valve plug assembly port (2).

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont' d)

7. INSTALL MAIN RELIEF VALVE PLUG ASSEMBLY.

Screw main relief valve plug assembly (1) into port (2) and tighten.

8. REPLACE TRANSMISSION COVER, PARA. 16-6.

ADJUSTMENT - BOOM HOIST RELIEF VALVE

1. CONNECT PRESSURE GAUGE TO VALVE PORT.

NOTE

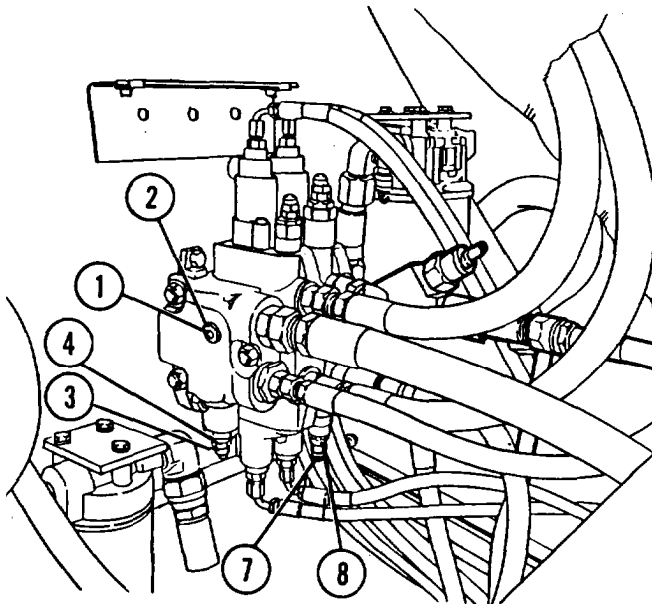
The main relief valve pressure must be adjusted above normal operating pressure to permit the boom hoist relief valve pressure to be adjusted. Main relief valve pressure is then returned to normal operating pressure at the end of this procedure.

- a. Remove main relief valve plug assembly (1).
- b. Connect 0 to 5000 psi pressure gauge to plug assembly port (2).
- c. Remove acorn nut (3) covering slotted head adjusting screw.
- d. While holding adjusting screw, loosen and back off jam nut (4) which secures adjusting screw.

2. ADJUST MAIN RELIEF VALVE PRESSURE TO 3,100 psi.

NOTE

Engine may be operated at idle or full throttle when performing pressure tests.



18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

- a. Start engine, TM10-3930-660-10.
 - b. Operate boom extend, retract, hoist or lower function until hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.
 - c. Turn adjusting screw clockwise (in) until pressure on gauge reads 3,100 psi.
 - d. Release hydraulic function lever.
3. ADJUST BOOM HOIST RELIEF VALVE
PRESSURE BETWEEN 2,950 AND 3,050 psi.
- a. Remove acorn nut (7) covering slotted head adjusting screw.
 - b. While holding adjusting screw, loosen and back off jam nut (8) which secures adjusting screw.
 - c. Operate boom hoist function until boom is fully raised. Continue to hold boom control lever in position so hydraulic oil passes over relief valve.
 - d. Read relief valve pressure on Pressure gauge.
 - e. To increase relief pressure, turn adjusting screw clockwise (in). To decrease pressure, turn adjusting screw counterclockwise (out) .
 - f. When desired relief pressure is obtained, release boom hoist lever.
 - g. Hold adjusting screw in position and tighten jam nut (8). Install acorn nut (7).

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont' d)

4. ADJUST MAIN RELIEF VALVE PRESSURE BETWEEN 2,750 AND 2,850 psi.
 - a. Operate boom extend, retract, hoist or lower function until hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.
 - b. Turn adjusting screw counter-clockwise (out) until pressure on gauge reads between 2,750 and 2,850 psi.
 - c. Release hydraulic function lever.
 - d. Hold adjusting screw in position and tighten jam nut (4). Install acorn nut (3).
5. STOP ENGINE, TM10-3930-660-10.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure, Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

6. REMOVE PRESSURE GAUGE.

Unscrew pressure gauge from main relief valve plug assembly port (2).

7. INSTALL MAIN RELIEF VALVE PLUG ASSEMBLY .

Screw main relief valve plug assembly (1) into port (2) and tighten.

8. REPLACE TRANSMISSION COVER, PARA. 16-6.

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

ADJUSTMENT - BOOM LOWER RELIEF VALVE

NOTE

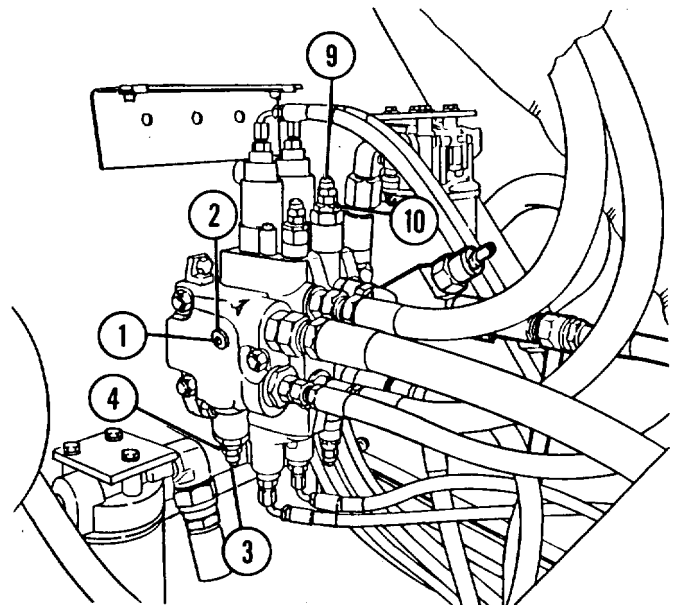
The main relief valve pressure must be adjusted above normal operating pressure to permit the boom lower relief valve pressure to be adjusted. Main relief valve pressure is then returned to normal operating pressure at the end of this procedure.

1. CONNECT PRESSURE GAUGE TO VALVE PORT.
 - a. Remove main relief valve plug assembly (1).
 - b. Connect 0 to 5000 psi pressure gauge to plug assembly port (2).
 - c* Remove acorn nut (3) covering slotted head adjusting screw.
 - d. While holding adjusting screw, loosen and back off jam nut (4) which secures adjusting screw.
2. ADJUST MAIN RELIEF VALVE PRESSURE TO 3,100 psi.

NOTE

Engine may be operated at idle or full throttle when performing pressure tests.

- a. Start engine, TM10-3930-660-10.
- b. Operate boom extend, retract, hoist or lower function until hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.
- c. Turn adjusting screw clockwise (in) until pressure on gauge reads 3,100 psi.
- d. Release hydraulic function lever.



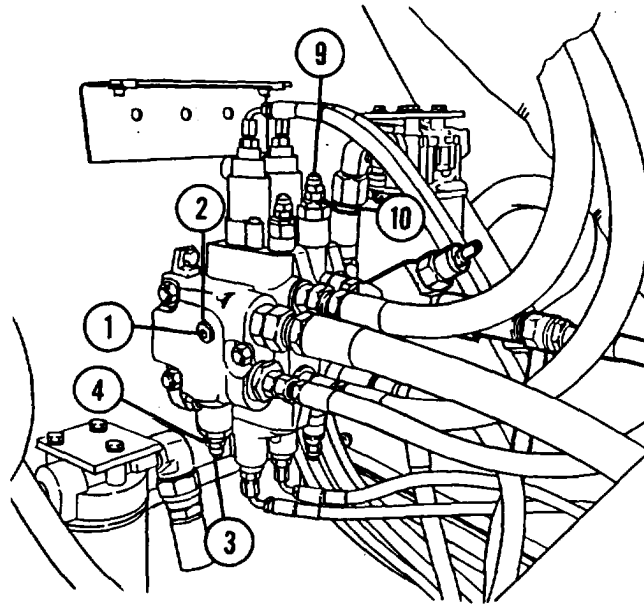
3. ADJUST BOOM LOWERING RELIEF VALVE PRESSURE BETWEEN 1000 AND 1100 psi.
 - a. Remove acorn nut (9) covering slotted head adjusting screw.
 - b. While holding adjusting screw, loosen and back off jam nut (10) which secures adjusting screw.
 - c. Operate boom lower function until boom is fully lowered. Continue to hold boom control lever in position so hydraulic oil passes over relief valve.
 - d. Read relief valve pressure on pressure gauge.
 - e. To increase relief pressure, turn adjusting screw clockwise (in). To decrease pressure, turn adjusting screw counterclockwise (out).

18-6. MAIN CONTROL VALVE ASSEMBLY - ADJUST/REPLACE (Cont'd)

- f. When desired relief pressure is obtained, release boom hoist lever.
- g. Hold adjusting screw in position and tighten jam nut (10). Install acorn nut (9).

4. ADJUST MAIN RELIEF VALVE TO BETWEEN 2,750 AND 2,850 psi.

- a. Operate boom extend, retract, hoist or lower function until hydraulic oil is passing over relief valve. Continue to hold hydraulic lever in that position so oil passes over relief valve during relief valve adjustment.
- b. Turn adjusting screw counter-clockwise (out) until pressure on gauge reads between 2,750 and 2,850 psi.
- c. Release hydraulic function lever.
- d. Hold adjusting screw in position and tighten jam nut (4). Install acorn nut (3).



5. STOP ENGINE, TM10-3930-660-10.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

6. REMOVE PRESSURE GAUGE.

Unscrew pressure gauge from main relief valve plug assembly port (2).

7. INSTALL MAIN RELIEF VALVE PLUG ASSEMBLY.

Screw main relief valve plug assembly (1) into port (2) and tighten.

8. REPLACE TRANSMISSION COVER, PARA. 16-6.

18-7. MLRS ATTACHMENT CONTROL VALVE ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Materials/Parts

Lockwashers (4) and (15)
 Loctite 242 (App. C, Item 39)
 Tags (App. C, Item 51)

Reference

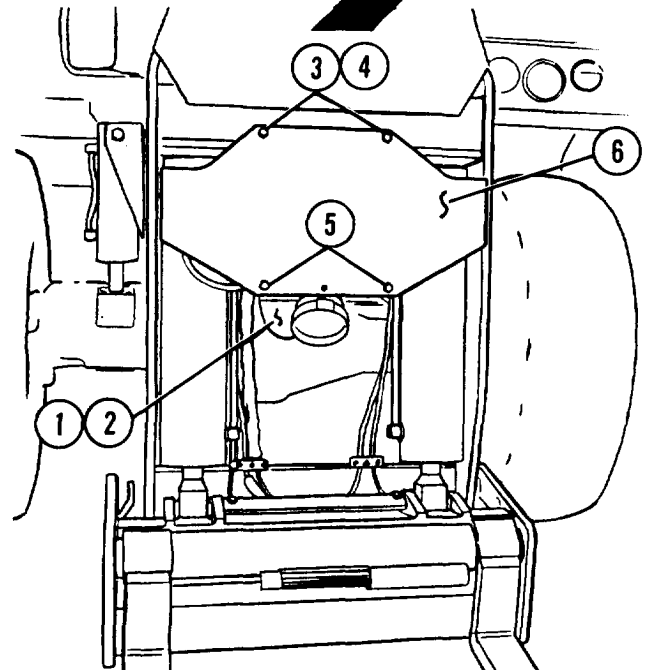
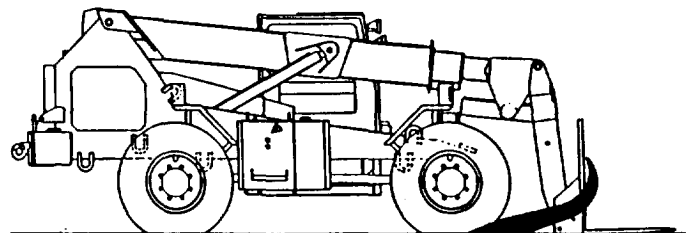
TM10-3930-660-10

Equipment Condition

Vehicle parked on level ground.
 Parking brake set, wheels chocked.
 MLRS attachment fully lowered.
 Forks level and resting on ground.
 Negative battery cable disconnected,
 para. 8-44.

REMOVAL

1. TAG AND DISCONNECT ELECTRICAL LEADS TO FLOODLIGHT.
 - a. Tag floodlight electrical leads (1) and (2).
 - b. Disconnect floodlight electrical leads (1) and (2) at plugs.
2. REMOVE VALVE COVER.
 - a. Remove two capscrews (3), two lockwashers (4), and two nuts (5) that secure attachment valve cover (6). Discard lockwashers (4).
 - b. Remove attachment cover (6).



18-7. MLRS ATTACHMENT CONTROL VALVE ASSEMBLY - REPLACE (Cont'd)

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF . ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic Oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

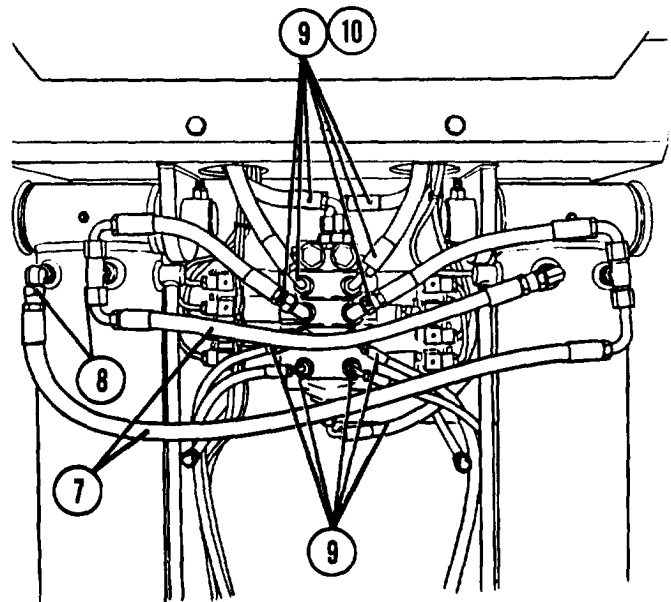
Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

18-7. MLRS ATTACHMENT CONTROL VALVE ASSEMBLY - REPLACE (Cont'd)

3. TAG AND REMOVE CROSSOVER HOSES.
 - a. Tag both crossover hoses (7).
 - b. Unscrew crossover hoses at fittings (8) and remove crossover hoses (7).
4. TAG AND REMOVE ELEVEN HYDRAULIC HOSES FROM CONTROL VALVE.
 - a. Tag eleven hydraulic hoses (9).
 - b. Unscrew eleven hydraulic hoses (9) at fittings (10) and remove from valve.
5. TAG AND DISCONNECT EIGHT ELECTRICAL CONNECTORS.
 - a. Loosen eight connector retaining screws (11).
 - b. Tag eight electrical connectors (12).



NOTE

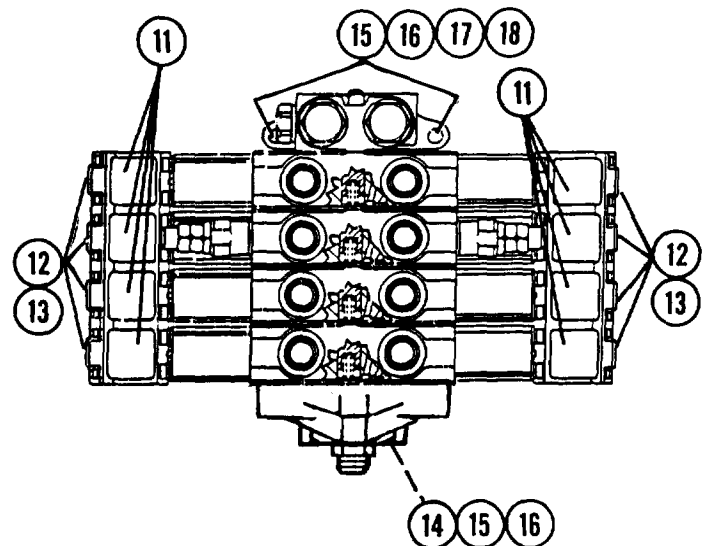
Gaskets (13) placed between connectors (11) and valve may drop out when connectors are unplugged.

- c. Unplug eight electrical connectors (12) from valve.
6. REMOVE MOUNTING HARDWARE AND VALVE.

NOTE

Secure valve during the following procedure so it does not drop.

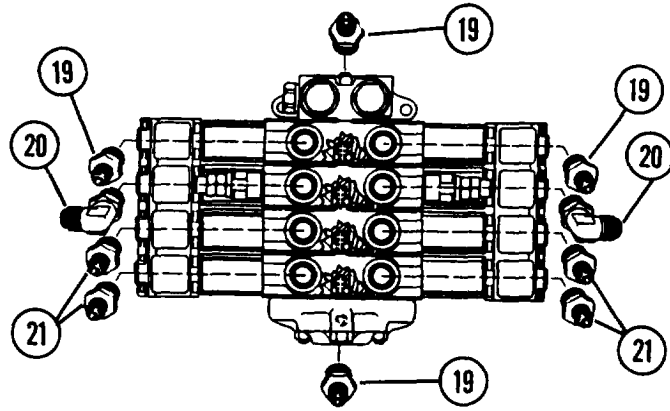
- a. Remove bottom capscrew (14), lockwasher (15), and spacer (16). Discard lockwasher (15).
- b. Remove top two hex nuts (17), lockwashers (15), spacers (16), and capscrews (18). Discard lockwashers (15).
- c. Remove valve.



18-7. MLRS ATTACHMENT CONTROL VALVE ASSEMBLY - REPLACE (Cont'd)

7. IF NECESSARY, REMOVE FITTINGS FROM VALVE .

- a. Remove four adapters (19) from valve.
- b. Remove two elbows (20) from valve.
- c. Remove four adapters (21) from valve.
- d. Remove adapter (22) from valve.



INSTALLATION

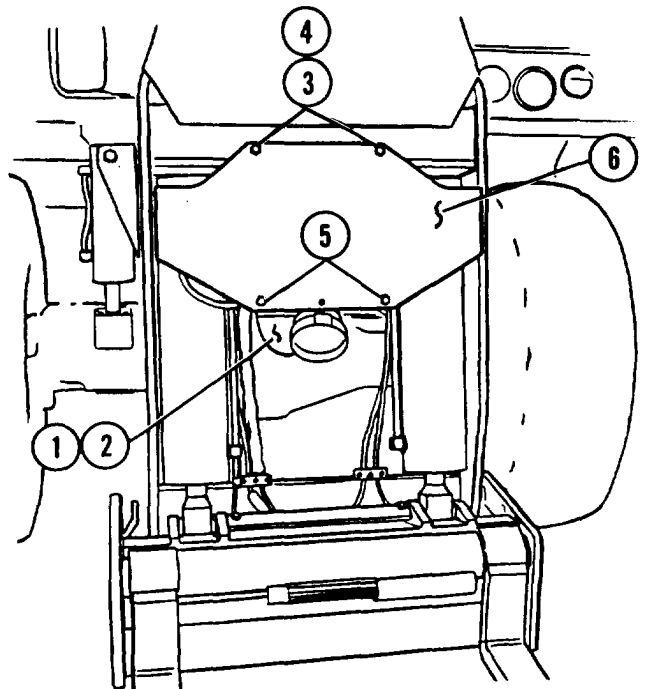
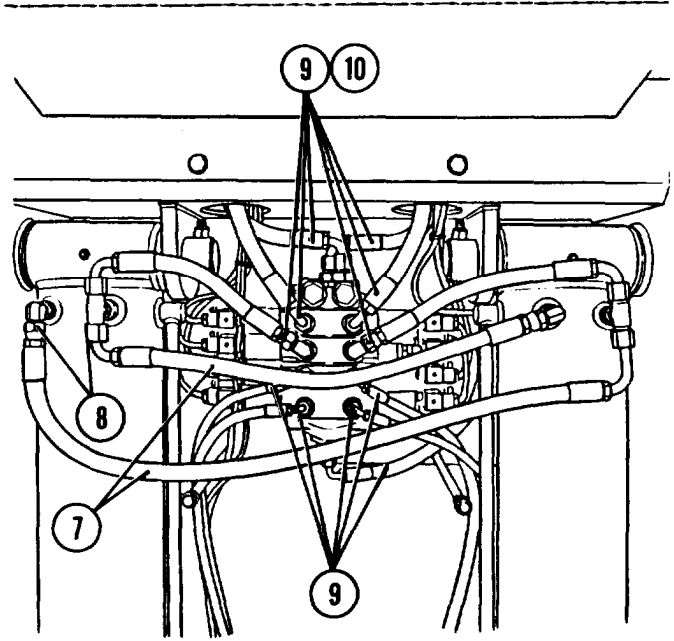
1. IF REMOVED, INSTALL FITTINGS TO VALVE.
 - a. Install adapter (22) to valve.
 - b. Install four adapters (21) to valve.
 - c. Install two elbows (20) to valve.
 - d. Install three adapters (19) to valve.
2. SECURE VALVE WITH MOUNTING HARDWARE.
 - a. Position and support valve on vehicle.
 - b. Apply Loctite 242 to two capscrews (18). Install two spacers (16), two capscrews (18) , two new lockwashers (15) and two nuts (17).
 - c. Apply Loctite 242 to capscrew (14). Install spacer (16), new lockwasher (15) and capscrew (14).
3. CONNECT AND SECURE EIGHT ELECTRICAL CONNECTORS TO VALVE AS TAGGED.

NOTE

Install gasket (13) on each electrical connector (11) before installing connector (12) to valve.

18-7. MLRS ATTACHMENT CONTROL VALVE ASSEMBLY - REPLACE (Cont' d)

- a. Connect eight electrical connectors (12) as tagged.
 - b. Tighten eight connector retaining screws (11) to secure electrical connectors (12).
4. CONNECT HYDRAULIC HOSES TO VALVE AND FRAME TILT CYLINDERS AS TAGGED.
- a. Connect eleven hydraulic hoses (9) to valve fittings (10) as tagged.
 - b. Connect two crossover hoses (7) to carriage tilt cylinder fittings (8) as tagged.
5. SECURE VALVE COVER.
- a. Position cover (6) over valve and align mounting holes.
 - b. Apply Loctite 242 to two capscrews (3) and two nuts (5).
 - c. Secure cover (6) with two nuts (5), two capscrews (3), and two lockwashers (4).
6. CONNECT FLOODLIGHT ELECTRICAL LEADS (1) AND (2) AS TAGGED.



White lead of floodlight connects to lead 71 of vehicle wiring harness. Black lead of floodlight connects to lead 02 of vehicle wiring harness.

- 7. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
- 8. PURGE AIR FROM HYDRAULIC SYSTEM BY CYCLING EACH MLRS ATTACHMENT FUNCTION FIVE TIMES, TM10-3930-660-10.

Excessive air in hydraulic system may temporarily prevent MLRS attachment functions from operating. Attempt to operate MLRS attachment functions as

required until each function operates smoothly and completely.

18-8. PRIORITY VALVE - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
Parking brake set, wheels chocked.

Materials/Parts

Container, 1 Gal.

Lockwashers (6)

Loctite 242 (App. C, Item 39)

Tags (App. C, Item 51)

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

NOTE

The priority valve is located under the vehicle toward the rear of the cab mounting shelf.

18-8. PRIORITY VALVE - REPLACE (Cont'd)

REMOVAL

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. DISCONNECT ELECTRICAL LEADS AT HYDRAULIC BYPASS SWITCH (1).
 - a. Remove electrical lead 91 from terminal NC of switch (1).
 - b. Remove electrical lead 10 from terminal C of switch (1).
2. TAG AND DISCONNECT SIX HYDRAULIC HOSES (2).
 - a. Tag six hydraulic hoses (2).
 - b. Remove six hydraulic hoses (2) at fittings (3) of valve (4).

NOTE

Cap or plug all open hydraulic fittings.

3. REMOVE MOUNTING HARDWARE.

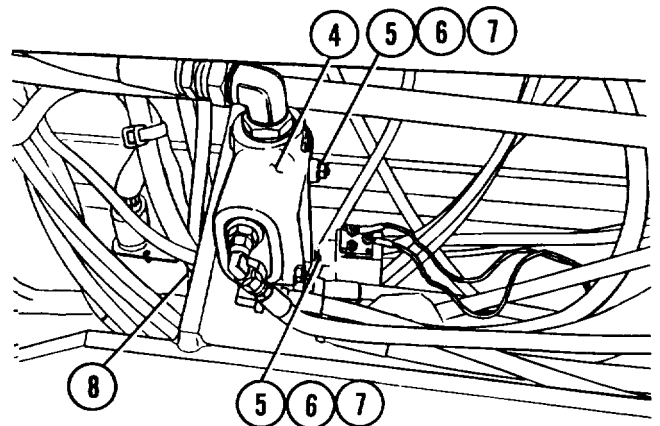
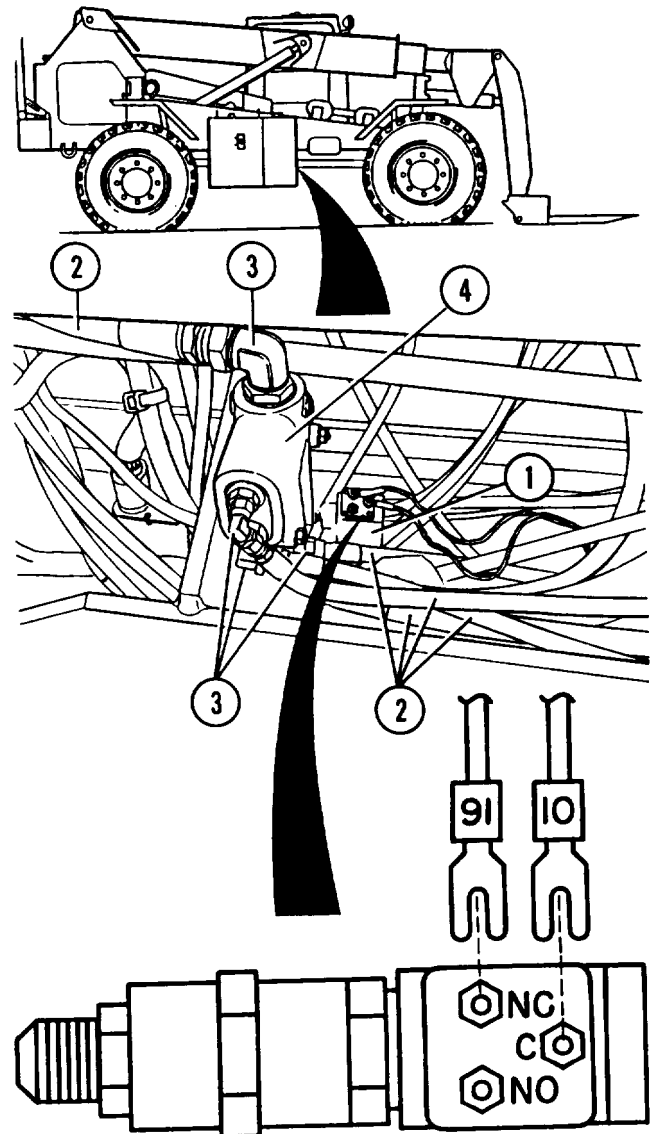
NOTE

Note orientation of valve (4) before removing it.

NOTE

When performing the following procedure, grasp the valve (4) so it does not drop when fasteners are removed.

- a. Unscrew two nuts (5).
- b. Remove and discard two lockwashers (6).
- c. Remove two bolts (7) from bracket holes (8).



18-8. PRIORITY VALVE - REPLACE (Cont'd)

4. REMOVE PRIORITY VALVE (4).
5. IF NECESSARY, REMOVE HYDRAULIC BYPASS SWITCH (1) FROM PRIORITY VALVE (4), PARA. 8-51.

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

1. IF REMOVED, INSTALL HYDRAULIC BYPASS SWITCH (1) TO VALVE (4), PARA. 8-51.
2. SECURE PRIORITY VALVE (4) WITH MOUNTING HARDWARE.
 - a. Position valve (4) on mounting bracket.
 - b. Install two bolts (7) through holes (8) on mounting bracket and push bolts through valve body.
 - c. Place a new lockwasher (6) on end of each bolt (7).

NOTE

Apply Loctite 242 to bolts (7) as nuts (5) are installed.

- d. Place a nut (5) on end of each bolt (7). Tighten both nuts (5) to secure valve.
3. CONNECT SIX HYDRAULIC LINES (2) AT FITTINGS (3) OF PRIORITY VALVE (4).
4. CONNECT ELECTRICAL LEADS AT HYDRAULIC BYPASS SWITCH (1).
 - a. Connect electrical lead 10 to terminal C of switch (1).
 - b. Connect electrical lead 91 to terminal NC of switch (1).

18-9. RELIEF VALVE, FRAME TILT/BRAKES - TEST/REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Adjustment
-

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2, Less power

Materials/Parts

Container, 1 Gal.
Lockwashers (4)
Loctite 242 (App. C, Item 39)

Test Equipment

Gauge, Hydraulic Pressure

Flowmeter, Hydraulic

Test Tee

Cap and Plug Set

Reference

TM10-3930-660-10

Equipment Condition

Vehicle parked on level ground.
Parking brake set.
Wheels chocked.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

18-9. RELIEF VALVE, FRAME TILT/BRAKES - TEST/REPLACE (Cont'd)

WARNING

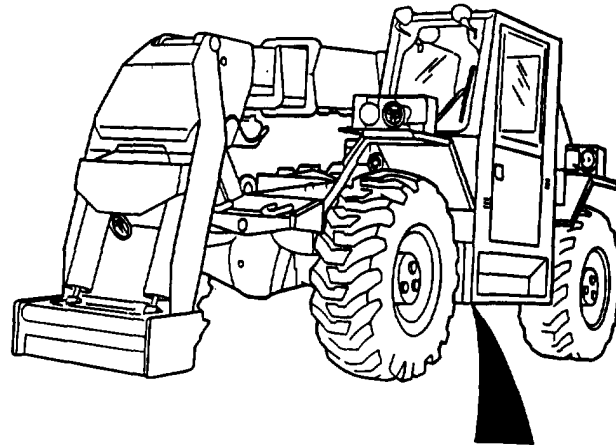
At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

NOTE

The relief valve is located under the vehicle, near the forward end of the cab.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

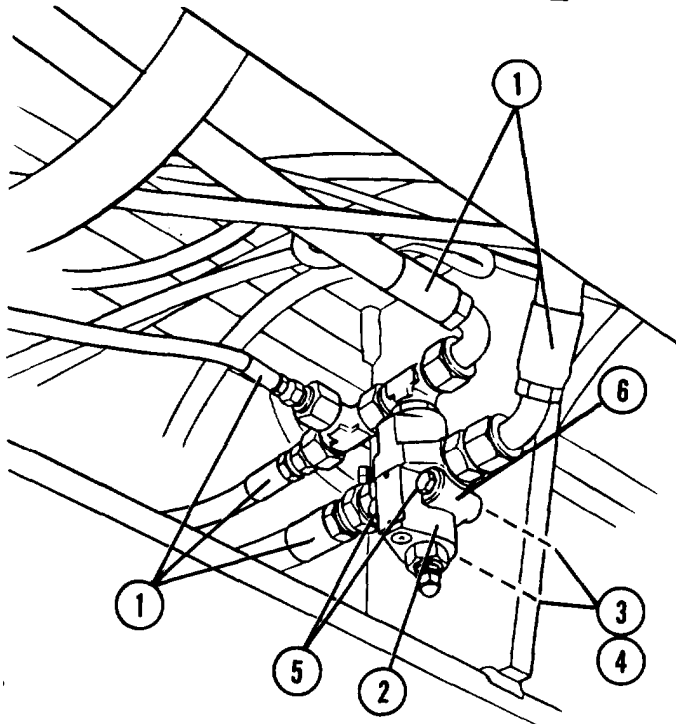


1. TAG AND DISCONNECT FIVE HYDRAULIC HOSES .
 - a. Tag and disconnect five hydraulic hoses (1) from relief valve (2).
 - b. Cap open hydraulic hose fittings.
2. REMOVE FASTENING HARDWARE AND VALVE.

NOTE

Secure valve so it does not fall when mounting hardware is removed.

- a. Remove two nuts (3), two lockwashers (4), and two capscrews (5) that secure relief valve (2) to mounting bracket. Discard lockwashers (4).
- b. Remove relief valve (2) from vehicle.



18-9. RELIEF VALVE, FRAME TILT/BRAKES - TEST/REPLACE (Cont'd)

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

1. POSITION RELIEF VALVE ON MOUNTING BRACKET AND SECURE WITH MOUNTING HARDWARE .
 - a. Position relief valve (2) so holes on valve flange (6) line up with mounting bracket holes,

NOTE

Apply Loctite 242 to threads of all capscrews (5) as installed.

- b. Place mounting capscrews (5) through valve flange (6) and mounting bracket hole.
 - c. Place new lockwasher (4) and nuts (3) on capscrew (5) and hand tighten.
 - d. Place remaining capscrews (5) through valve body flange and mounting bracket hole.
 - e. Place new lockwasher (4) and nuts (3) on capscrews (5) and hand tighten.
 - f. Tighten mounting nuts (3) securely.
 2. CONNECT FIVE HYDRAULIC HOSES AS TAGGED .
 - a. Connect five hydraulic hoses (1) to relief valve (2) as tagged.
 - b. Tighten all hydraulic fittings securely.
 3. BLEED AIR FROM FRAME TILT AND BRAKE HYDRAULIC CIRCUIT.

18-9. RELIEF VALVE, FRAME TILT/BRAKES - TEST/REPLACE (Cont'd)

- a. Start engine, TM10-3930-660-10.
- b. Operate frame tilt function and tilt vehicle from side to side five times.
- c. Stop engine and relieve hydraulic pressure by operating frame tilt controls, TM10-3930-660-10.

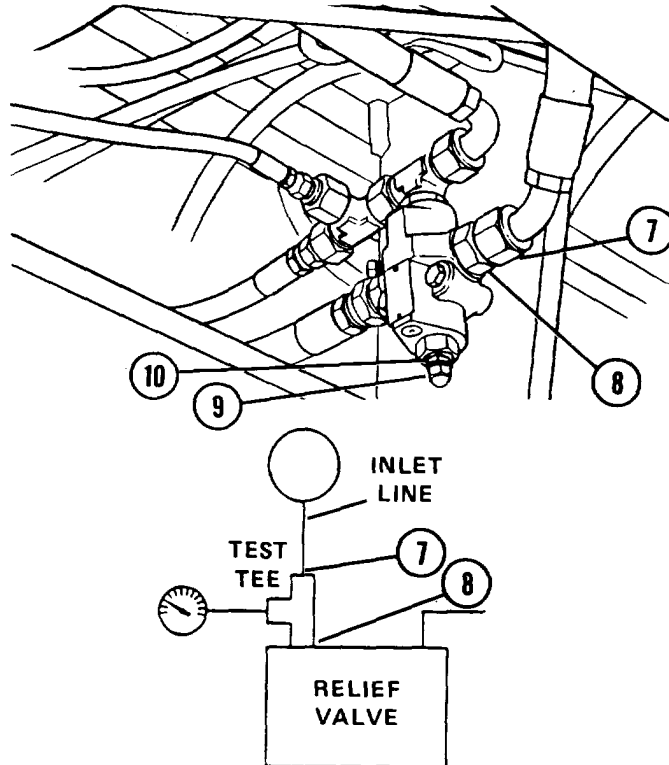
ADJUSTMENT

1. REMOVE RELIEF VALVE INLET LINE AND INSTALL A TEST TEE.
 - a. Remove relief valve inlet line (7).
 - b. Connect a test tee to inlet line (7).
 - c. Connect other side of test tee to relief valve inlet port (8).
- 2* CONNECT 0 TO 5000 PSI PRESSURE GAUGE TO TEST TEE.
3. START ENGINE, TM10-3930-660-10.

NOTE

Engine may be operated at idle or full throttle when performing pressure tests.

4. READ RELIEF VALVE PRESSURE ON GAUGE. PRESSURE RANGE IS 1,700 TO 1,800 PSI. IF RELIEF VALVE PRESSURE IS NOT WITHIN SPECIFICATIONS, ADJUST AS FOLLOWS :
 - a. Remove acorn nut (9) covering slotted head adjusting screw.
 - b. While holding adjusting screw, loosen and back off jam nut (10) which secures adjusting screw.
 - c. To increase relief pressure, turn adjusting screw clockwise (in).
To decrease pressure, turn adjusting screw counterclockwise (out) .



18-9. RELIEF VALVE, FRAME TILT/BRAKES - TEST/REPLACE (Cont'd)

- d. When desired relief pressure is obtained, hold adjusting screw in position and tighten jam nut (10). Install acorn nut (9).
5. STOP ENGINE.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

6. REMOVE PRESSURE GAUGE, TM10-3930-660-10.

Remove pressure gauge from test tee.

7. REMOVE TEST TEE.

- a. Remove test tee from relief valve.
- b. Remove inlet hydraulic hose from test tee.

8. CONNECT INLET HYDRAULIC HOSE TO RELIEF VALVE.

Screw inlet hydraulic hose (7) onto relief valve. Tighten securely.

9. PURGE AIR FROM SYSTEM.

- a. Start engine, TM10-3930-660-10.
- b. Operate frame tilt function and tilt vehicle from side to side five times.
- c. Stop engine and relieve hydraulic pressure by operating frame tilt controls, TM10-3930-660-10.

NOTE

Any time the hydraulic oil has been drained and changed or maintenance has been done on the hydraulic system, it is possible that the hydraulic pumps have air in the pump cavities. This air must be purged from the cavity before the pump will operate. If necessary, refer to paragraph 18-3.

18-10. SHUTTLE VALVE - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Materials/Parts

Container, 1 Gal.
Lockwashers (5), (7)
Loctite 242 (App C, Item 39)
Tags (App. C, Item 51)

Equipment Condition

'Vehicle parked on level ground.
Wheels chocked.
Parking brake set.

REMOVAL

WARNING

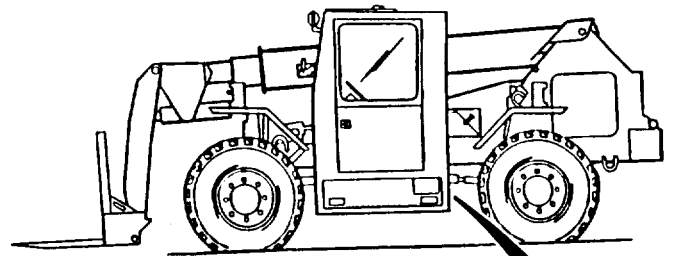
Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

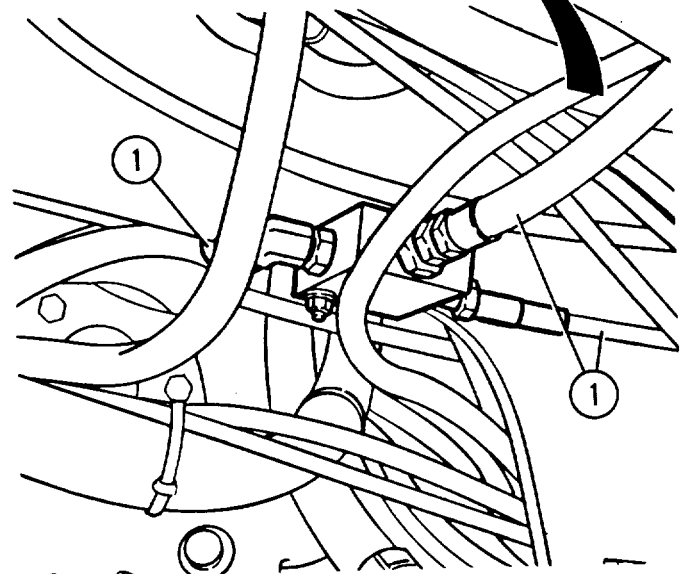
18-10. SHUTTLE VALVE - REPLACE (Cont'd)

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

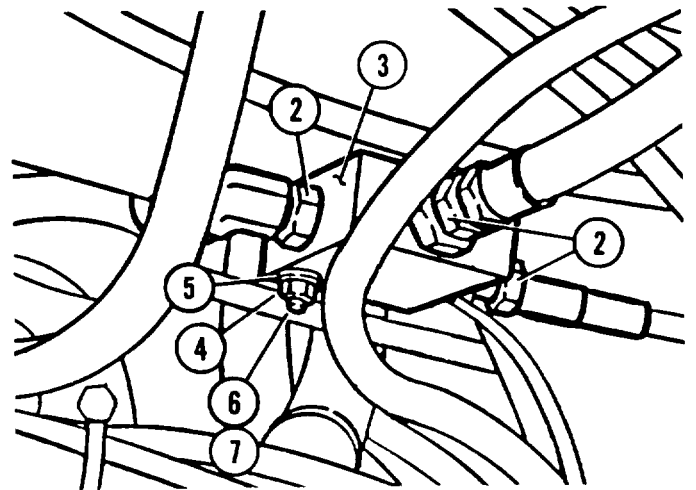


The shuttle valve is located on the vehicle frame, forward of the transmission.

1. DISCONNECT HYDRAULIC LINES.
 - a. Tag three hydraulic lines (1).
 - b. Unscrew three hydraulic line fittings (2) at shuttle valve (3).
2. CAP ALL OPEN HYDRAULIC FITTINGS (2).
3. NOTE ORIENTATION OF SHUTTLE VALVE FOR USE DURING INSTALLATION.
4. REMOVE TWO NUTS (4), TWO LOCKWASHERS (5), TWO BOLTS (6), TWO LOCKWASHERS (7), AND SHUTTLE VALVE (3). DISCARD LOCKWASHERS (5) AND (7).



Grasp valve so it does not drop when mounting hardware is removed.



18-10. SHUTTLE VALVE - REPLACE (Cont'd)

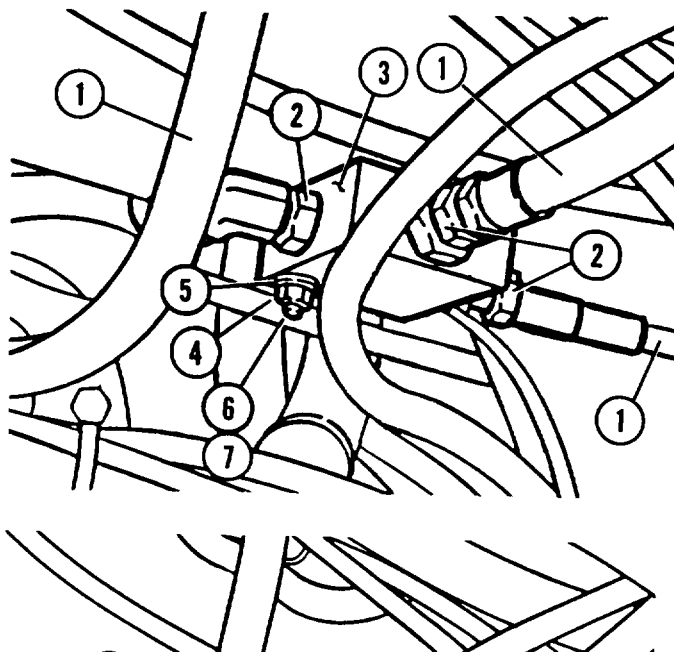
INSTALLATION

1. SECURE SHUTTLE VALVE (3) TO BRACKET.

NOTE

Apply Loctite 242 to threads of bolts (6).

- a. Position valve (3) as noted during installation.
 - b. Secure valve (3) with two bolts (6), two new lockwashers (7), two new locwashers (5), and two nuts (4).
2. REMOVE PLUGS FROM HYDRAULIC LINE FITTINGS (2).
 3. ATTACH THREE HYDRAULIC LINES (1) TO SHUTTLE VALVE (3) AS TAGGED.
 4. TIGHTEN HYDRAULIC FITTINGS (2) SECURELY.



18-11. FRAME TILT VALVE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
 Parking brake set.
 Wheels chocked.

Materials/Parts

Container, 1 Gal.

Lockwashers (10)

Loctite 242 (App. C, Item 39)

Tags (App. C, Item 51)

Reference

TM10-3930-660-10

WARNING

Hydraulic oil, in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

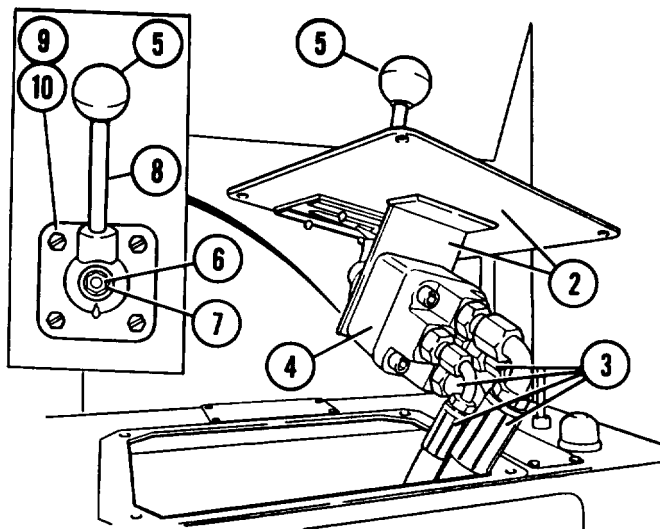
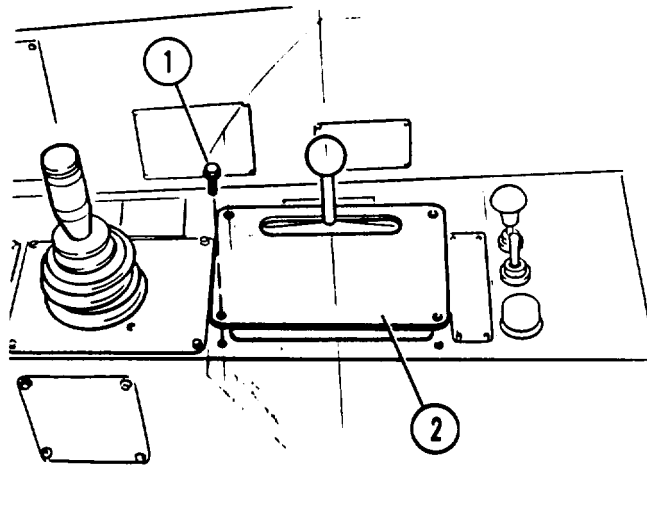
NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

18-11. FRAME TILT VALVE - REPLACE (Contd)

REMOVAL

1. DISCONNECT HYDRAULIC HOSES.
 - a. Remove four capscrews (1) which secure cover (2).
 - b. Lift cover (2) to access hoses (3).
 - c. Tag four hoses (3) for use during installation.
 - d. Remove hoses (3) at valve (4).
2. REMOVE VALVE (4).
 - a. Remove knob (5) and remove nut (6), washer (7) and handle (8).
 - b. Remove four screws (9) and lockwashers (10) to remove valve (4) from cover (2). Discard lockwashers (10).
 - c. To remove fittings, remove two adapters (11), adapter (12) and elbow (13) from valve (4).



INSTALLATION

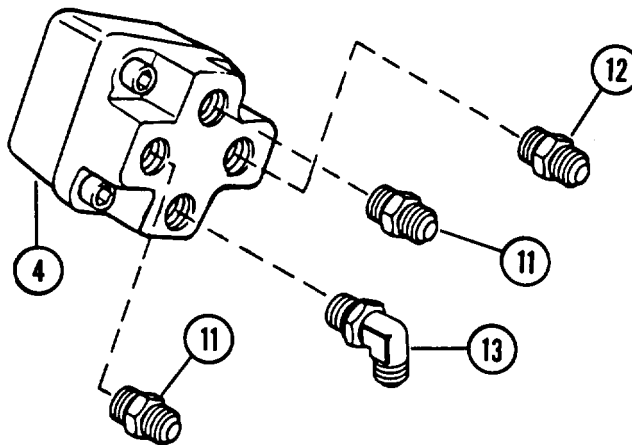
Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

1. TO INSTALL FITTINGS, INSTALL ELBOW (13), TWO ADAPTERS (11) AND ADAPTER (12), VALVE (4).

20 INSTALL VALVE (4) ON COVER (2).

Apply Loctite 242 to screws (9) as installed.

- a. Position valve (4) on cover (2) and secure with four new lockwashers (10) and four screws (11).



18-11. FRAME TILT VALVE - REPLACE (Con'd)

- b. Secure handle (8) to valve (4) with nut (6) and washer (7).
- c. Screw knob (5) onto end of handle (8).

3. CONNECT HYDRAULIC HOSES (3).

- a. Connect four hoses (3) as tagged to valve (4).

Apply Loctite 242 to threads of capscrews (1).

- b. Lower cover (2) and secure to cab with four capscrews (1).

**4. BLEED AIR FROM SYSTEM BY OPERATING FRAME TILT FUNCTION FIVE TIMES/
TM10-3930-660-10.**

18-12. HYDRAULIC JOYSTICK CONTROL VALVE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Equipment Condition

Vehicle parked on level ground.
Transmission cover removed,
para. 16-6.

Materials/Parts

Container, 6 Gal.
Lockwashers (10)
Loctite 242 (App. C, Item 39)
Tags (App. C, Item 51)

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil reservoir by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe area clean around all hydraulic connections to be opened during removal. Cap lines and plug openings after removing lines. Contamination of hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

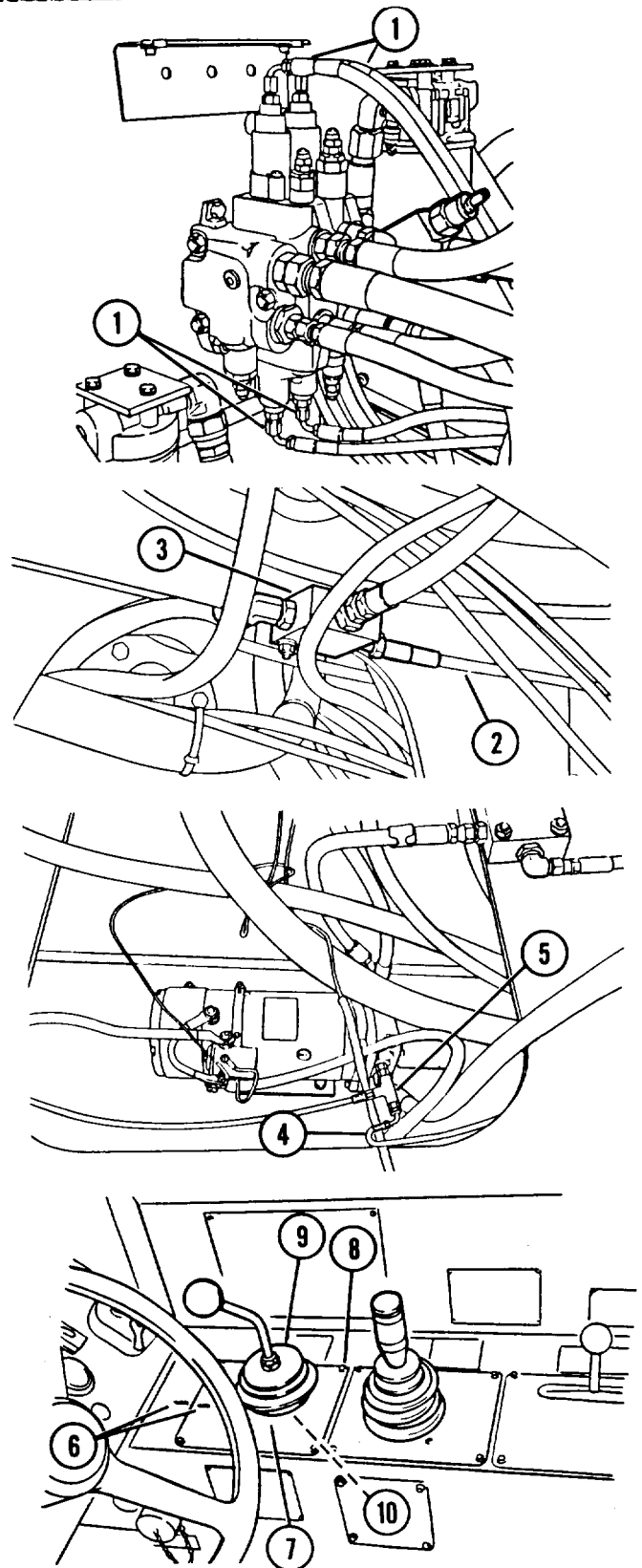
18-12. HYDRAULIC JOYSTICK CONTROL VALVE - REPLACE (Cont'd)

1. DISCONNECT PILOT LINES FROM MAIN CONTROL VALVE.
 - a. Remove transmission cover, para. 16-6.
 - b. Tag all four pilot lines (1) to ensure correct installation.
 - c. Disconnect four pilot lines (1). Allow hydraulic oil to drain from lines into a suitable container as lines are disconnected.
 - d. Cap lines and plug openings to prevent contamination.

2. DISCONNECT LINE (2) FROM SHUTTLE VALVE (3). ALLOW HYDRAULIC OIL TO DRAIN FROM LINE INTO A SUITABLE CONTAINER AS LINE IS DISCONNECTED.

3. DISCONNECT LINE (4) FROM EMERGENCY STEERING PUMP TEE FITTING (5). ALLOW HYDRAULIC OIL TO DRAIN FROM LINE INTO A SUITABLE CONTAINER AS LINE IS DISCONNECTED.

4. REMOVE HYDRAULIC JOYSTICK CONTROL VALVE .
 - a. Place marks (6) on joystick mounting plate (7) and on shelf so joystick can be installed in same orientation.



18-12. HYDRAULIC JOYSTICK CONTROL VALVE - REPLACE (Cont'd)

- b. Remove four screws (8) attaching mounting plate (7) to shelf.
- c. Lift mounting plate (7) off of shelf and disconnect six hydraulic lines from ports on bottom of joystick control valve (9). Tag each line as it is disconnected, to ensure correct installation.
- d. Match mark joystick control valve assembly (9) and mounting plate (7) to ensure proper orientation during installation.
- e. Remove four screws, nuts and lockwashers (10) and separate joystick assembly (9) from mounting plate (7). Discard lockwashers (10).

- b. Connect six hydraulic lines to ports on bottom of joystick control valve assembly (9). Note tags placed prior to disconnecting lines.
- c. Position joystick assembly (9) and mounting plate (7) on shelf, using marks (6) for orientation.

NOTE

Apply Loctite 242 to threads of screws (8).

- d. Install and tighten four screws (8).

- 2. CONNECT LINE (4) TO EMERGENCY STEERING PUMP TEE FITTING (5).
- 3. CONNECT LINE (2) TO SHUTTLE VALVE (3).
- 4. CONNECT FOUR PILOT LINES (1) TO MAIN CONTROL VALVE PORTS, AS TAGGED DURING REMOVAL.
- 5. INSTALL TRANSMISSION COVER, PARA. 16-6.

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

- 1. INSTALL JOYSTICK CONTROL VALVE ASSEMBLY (9).
 - a. Attach joystick control valve assembly (9) to mounting plate (7) using four screws, nuts and new lockwashers (10). Observe match marks made during removal STEP 4d.

18-13. BOOM CYLINDER FLOW CONTROL VALVE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
 Boom fully lowered and MLRS
 attachment resting on ground.
 Transmission cover removed,
 para. 16-6.

Materials/Parts

Container, 1 Gal.

Tags (App. C, Item 51)

Reference

TM10-3930-660-10

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

WARNING

When working underneath the boom, always support the boom using blocks, jackstands, or other rigid and stable supports. Combined weight of boom and MLRS attachment is approximately 6300 pounds. Failure to adequately support the boom could result in severe injury or death.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap out lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

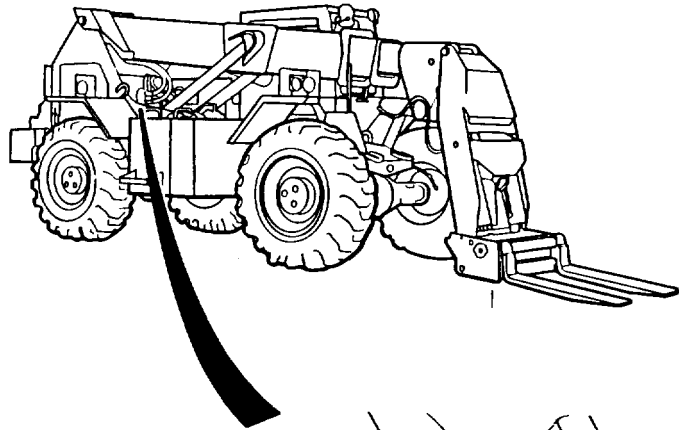
18-13. BOOM CYLINDER FLOW CONTROL VALVE - REPLACE (Cont'd)

NOTE

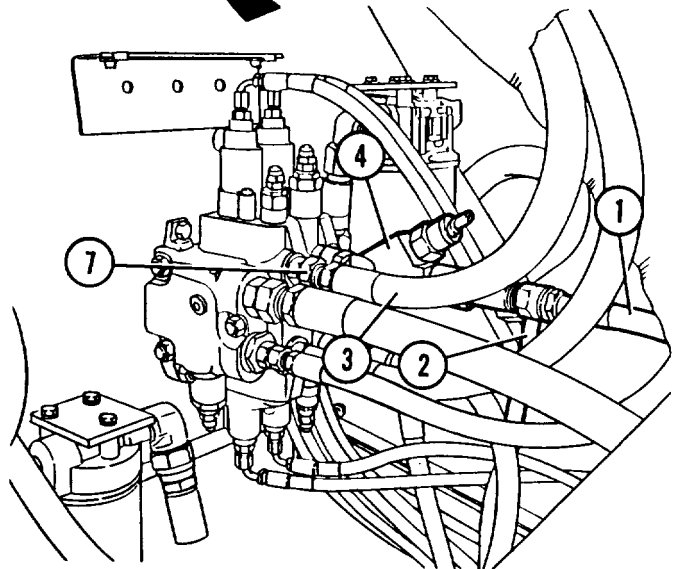
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

NOTE

The flow control valve is mounted on the main boom control valve.



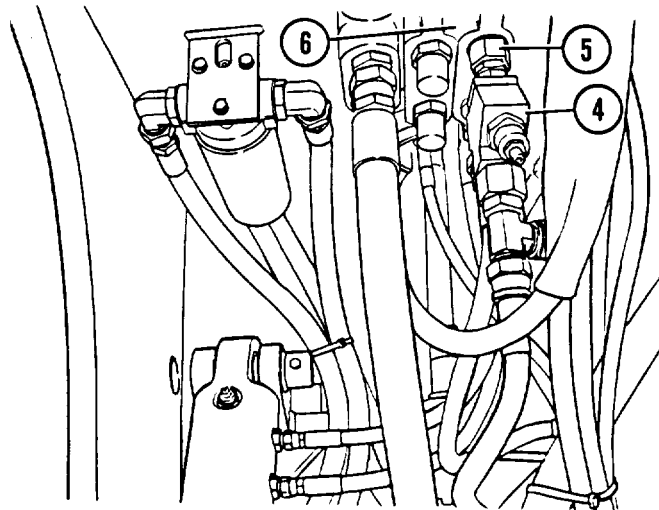
1. TAG AND DISCONNECT TWO HYDRAULIC HOSES (1 AND 2).
 - a. Tag hydraulic hoses (1) and (2).
 - b. Unscrew hydraulic hoses (1) and (2) from flow control valve (4).



2. REMOVE HYDRAULIC HOSES (3) TO GAIN ACCESS TO FLOW CONTROL VALVE (4).

Remove hydraulic hose (3) from fitting (7).
3. REMOVE VALVE (4) FROM MAIN CONTROL VALVE (6).

Retain reducer (5) and remove flow control valve (4) from main control valve (6).



18-13. BOOM CYLINDER FLOW CONTROL VALVE - REPLACE (Cont'd)

INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

1. SCREW FLOW CONTROL VALVE (4) INTO REDUCERS.

Screw flow control valve (4) into reducer (5) of main control valve (6) and tighten securely.

2. CONNECT HYDRAULIC HOSES (3) AS TAGGED.

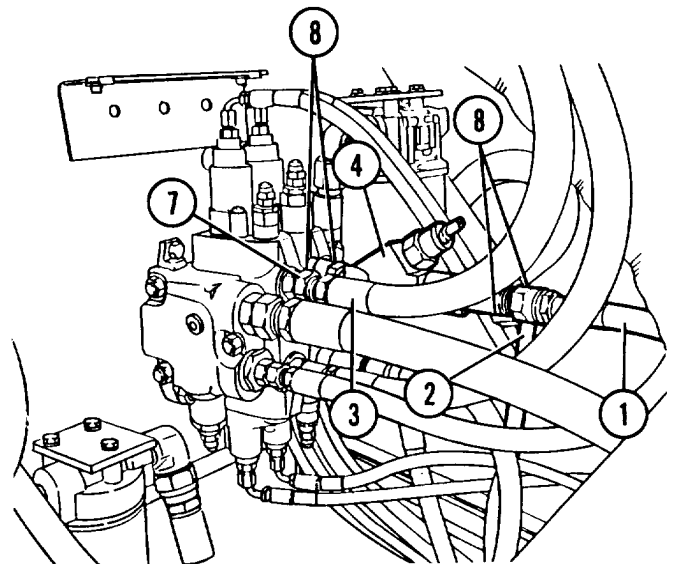
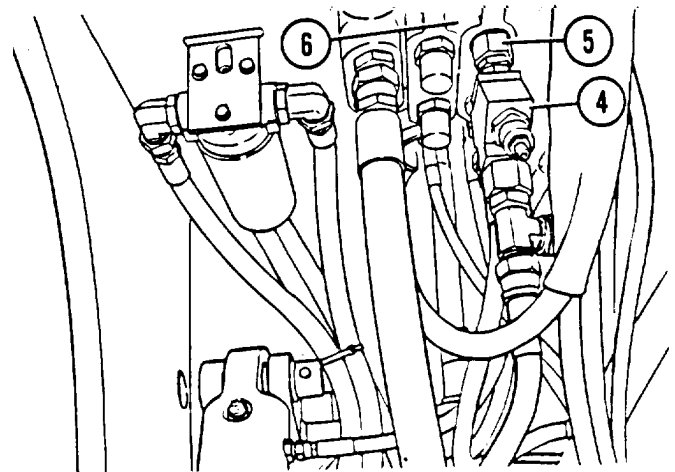
- a. Connect hydraulic hose (3) to fitting (7).
- b. Connect hoses (1) and (2) to flow control valve (4).
- c. Tighten all fittings (8) securely.

3. INSTALL TRANSMISSION COVER, PARA 16-6.

It is possible that the hydraulic pumps have air in the pump cavities. This air must be purged from the cavity before the pump will operate.

4. PURGE BOOM HYDRAULIC CIRCUIT.

- a. Start engine, TM10-3930-660-10.
- b. Purge air from hydraulic circuit by raising and lowering boom five times.
- c. Stop engine and relieve hydraulic pressure by operating boom raise and lower controls, TM10-3930-660-10.



18-14. FRAME TILT CYLINDER REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
Parking brake set.
Wheels chocked.

Materials/Parts

Anti-seize Compound (App. C, Item 9)
Lockwashers (10)
Tags (App. C, Item 51)
Wood blocks

Personnel Required

Two Personnel

Reference

TM10-3930-660-10

REMOVAL

- 1. LEVEL VEHICLE FRAME,

Use frame tilt function to level the vehicle.

- 2. INSERT BLOCKING BETWEEN BOTH FRAME TILT STOP PADS (1) REAR AXLE HOUSING.

NOTE

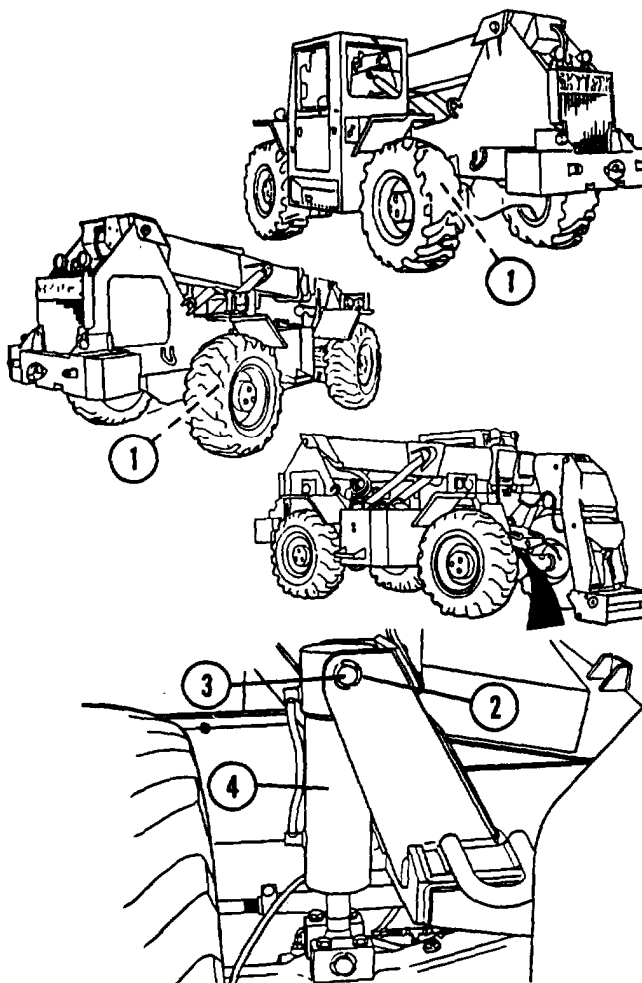
Frame tilt stop pads are located on each side of the rear axle.

Insert blocking between both rear frame tilt stop pads (1) and rear axle housing.

- 3. REMOVE RETAINING RING (2).

- a. Remove retaining ring (2) from base pivot pin (3).
- b. Using an assistant, support cylinder (4) and remove base pivot pin (3).

- 4. RETRACT CYLINDER (4).



18-14. FRAME TILT CYLINDER - REPLACE (Cont'd)

- a. Start engine and retract frame tilt cylinder by moving frame control to the right.
- b. Stop the engine.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

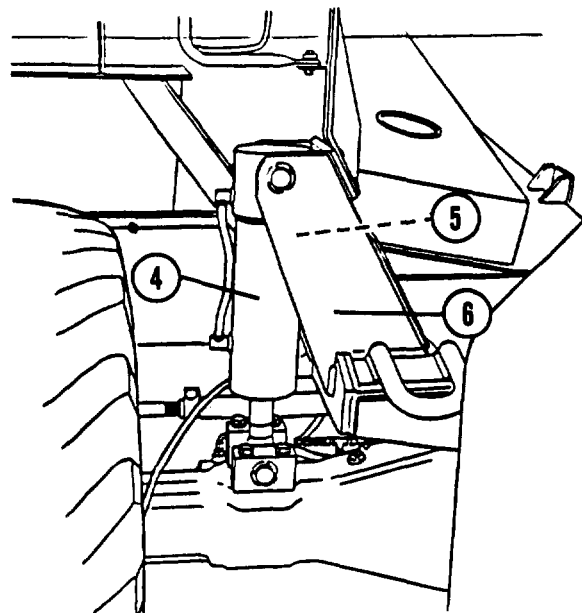
NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

5. TAG AND DISCONNECT TWO HYDRAULIC LINES (5).

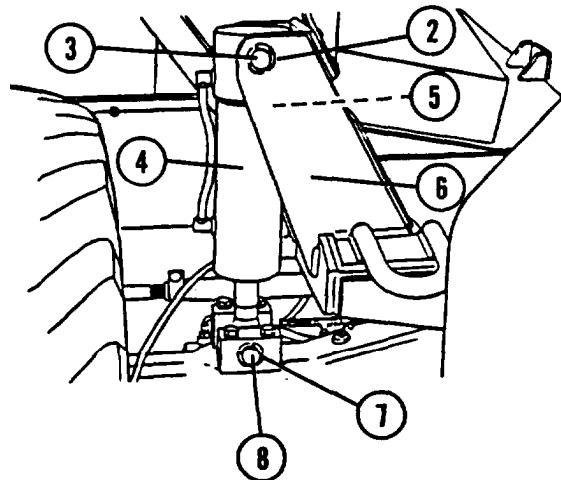
NOTE

Hydraulic lines are located between the frame tilt cylinder (4) and cylinder support bracket (6).



18-14. FRAME TILT CYLINDER - REPLACE (Cont'd)

6. REMOVE CYLINDER (4) FROM VEHICLE.
 - a. Remove retaining ring (7).
 - b. Using an assistant, support cylinder and remove rod pivot pin (8).
 - c. Remove frame tilt cylinder (4) from vehicle.
7. IF NECESSARY, REMOVE FOUR CAPSCREWS (9), FOUR LOCKWASHERS (10), AND TWO BRACKETS (11) FROM AXLE.



INSTALLATION

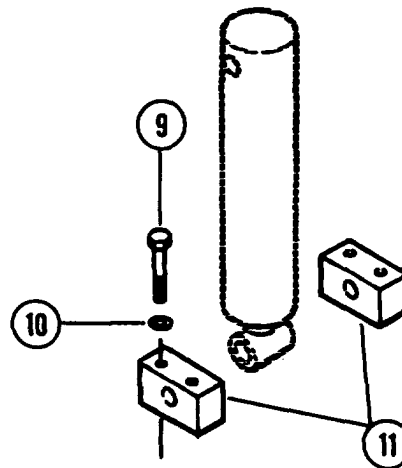
1. IF REMOVED, SECURE TWO BRACKETS (11) TO AXLE WITH FOUR NEW LOCKWASHERS (10) AND FOUR CAPSCREWS (9).

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on cylinder and hoses clean and dry.

2. ATTACH CYLINDER (4) TO VEHICLE.
 - a. Position frame tilt cylinder (4) on vehicle so holes for rod pivot pin line up.

NOTE



Apply anti-seize compound to rod pivot pin (8) as installed.

- b. Install rod pivot pin (8).
 - c. Install retaining ring (7) on rod pivot pin (8).
3. CONNECT HYDRAULIC HOSES (5).

Connect two hydraulic hoses (5) to frame tilt cylinder (4) as tagged.
4. ALIGN AND CONNECT BASE PIVOT PIN (3).
 - a. Start engine, TM10-3930-660-10.

18-14. FRAME TILT CYLINDER - REPLACE(Cot'd)

- b. Extend frame tilt cylinder (4) to align rod end hole and upper bracket hole.
- c. Stop engine, TM10-3930-660-10.

NOTE

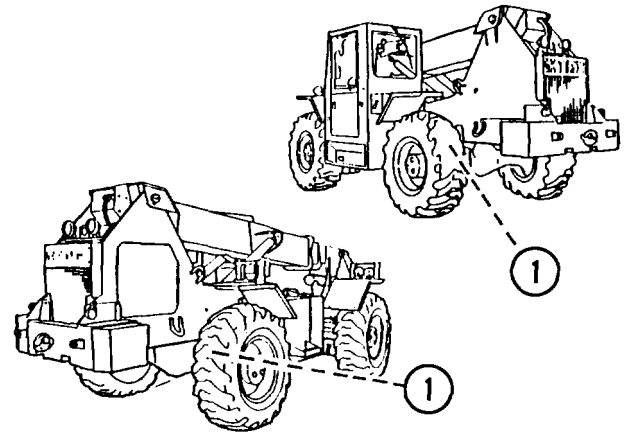
Apply anti-seize compound to base pivot pin (3) as installed.

- d. Install base pivot pin (3).
 - e. Install retaining ring (2).
5. REMOVE BLOCKING.

Remove blocking from between both rear frame tilt stop pads (1) and rear axle housing.

6. PURGE AIR.

- a. Start engine, TM10-3930-660-10.
- b. Purge air from frame tilt cylinder hydraulic circuit by operating frame tilt function five times.
- c. Stop engine and relieve hydraulic pressure by operating frame tilt controls, TM10-3930-660-10.



18-15. CARRIAGE TILT CYLINDER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

- Tool Kit, Automotive Mechanics
- Lifting Device, 200 Lb. Capacity
- Cap and Plug set

Equipment Condition

- Vehicle parked on level ground.
- Parking brake set.
- Wheels blocked.

Materials/parts

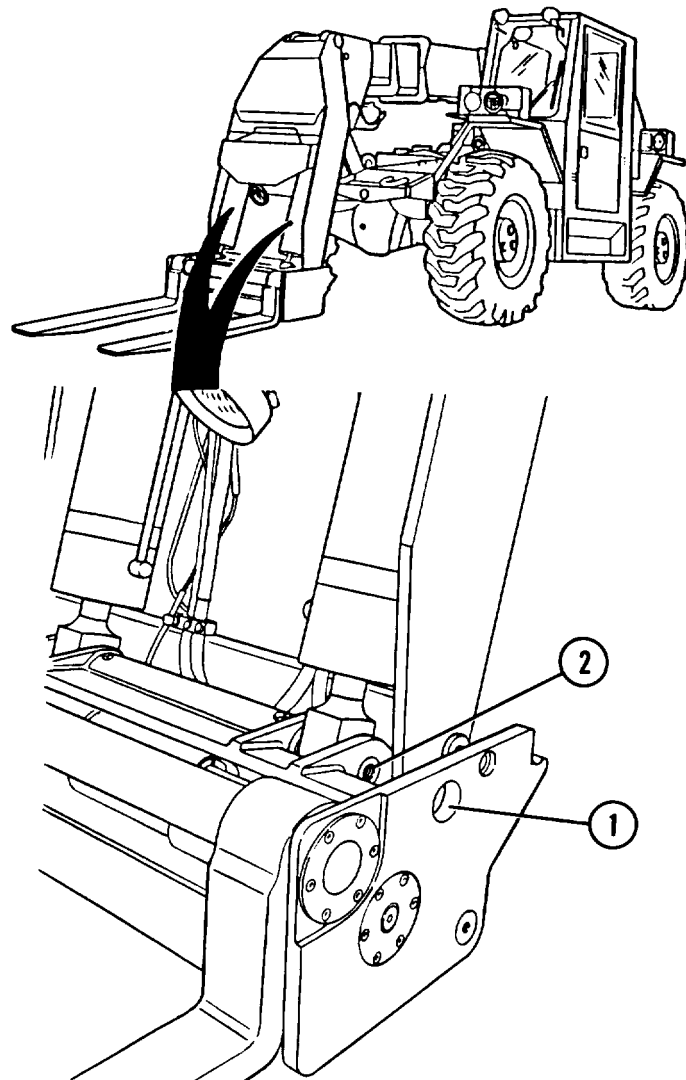
- Anti-seize Compound (App. C, Item 9)
- Container, 1 Gal.
- Locknut (9, 14)
- Lockwashers (5)
- Loctite 242 (App. C, Item 39)
- Tags (App. C, Item 51)

Reference

TM10-3930-660-10

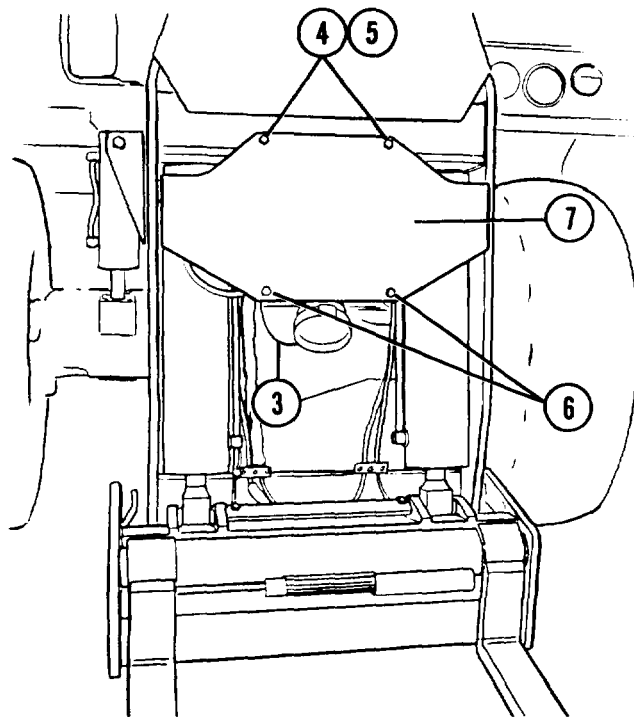
REMOVAL

1. PLACE MLRS ATTACHMENT IN FULLY LOWERED POSITION.
2. LOWER BOOM UNTIL FORKS ARE APPROXIMATELY THREE FEET OFF GROUND.
3. TILT FORKS DOWN FOR ACCESS TO TILT CYLINDER ROD PIVOT PIN (2).
 - a. Tilt forks down so access hole (1) lines up with cylinder rod pivot pin (2).



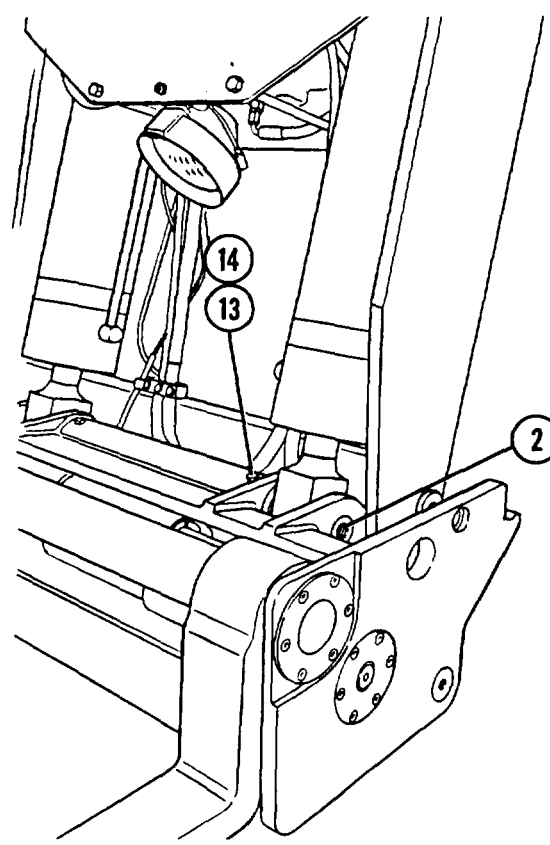
18-15. CARRIAGE TILT CYLINDER - REPLACE (Cont'd)

4. REMOVE MLRS CONTROL VALVE COVER (7).
 - a. Disconnect two light wires (3).
 - b. Remove two bolts (4), two lockwashers (5), and two nuts (6) which secure MLRS control valve cover (7). Discard lockwashers (5).
 - c. Remove MLRS cover (7).



5. DETERMINE WHICH CYLINDER TO REMOVE
- Determine which carriage tilt cylinder is to be removed.

6. REMOVE ROD PIVOT PIN (2).
 - a. Remove bolt (13) and locknut (14) which secure cylinder rod pivot pin (2). Discard locknut (14).
 - b. Remove pivot pin (2).



7. RETRACT CARRIAGE TILT CYLINDER
- Move MLRS joystick to carriage "up" position to retract cylinder.

NOTE

Return joystick to neutral position as soon as disconnected cylinder is fully retracted. This will prevent the carriage from being tilted by the other attached cylinder.

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

18-15. CARRIAGE TILT CYLINDER - REPLACE (Cont'd)

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

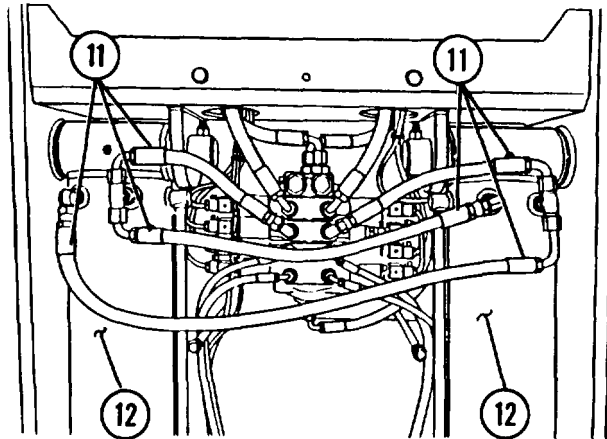
CAUTION

Always retract a hydraulic cylinder prior to removal. This will protect the cylinder rod.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

8. TAG AND DISCONNECT THREE HYDRAULIC HOSES (11).
 - a. Tag three hydraulic hoses (11).
 - b. Disconnect three hydraulic hoses (11) from carriage tilt cylinder (12) to be removed.
9. SUPPORT BASE END OF CARRIAGE TILT CYLINDER WITH A HOIST AND SLING.



18-15. CARRIAGE TILT CYLINDER - REPLACE (Cont' d)

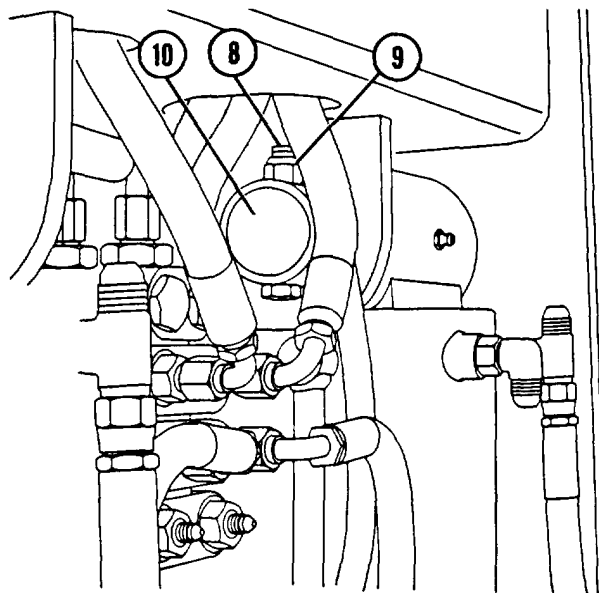
10. REMOVE RETAINING BOLT (8) AND LOCKNUT (9).

Remove locknut (9) and retaining bolt (8) from carriage tilt cylinder base pin (10). Discard locknut (9).

11. CAREFULLY DRIVE PIN (10) THROUGH CYLINDER BASE MOUNTING POINT AND ACCESS HOLE.

Carefully drive pin (10) from inside MLRS attachment, through cylinder base mounting point and through access hole on side of MLRS attachment.

12. REMOVE CYLINDER.



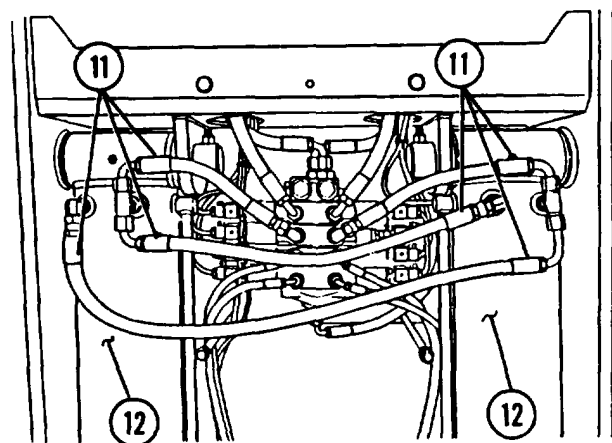
INSTALLATION

1. POSITION CARRIAGE TILT CYLINDER IN MLRS CARRIAGE USING HOIST AND SLING.
2. INSTALL CYLINDER RETAINING PIN (10), NEW LOCKNUT (9), AND BOLT (8).
 - a. Install cylinder base retaining pin (10).
 - b. Install retaining bolt (8).
 - c. Install new locknut (9).

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

3. CONNECT THREE HYDRAULIC LINES (11).

Connect three hydraulic lines (11) to hydraulic cylinder (12) as tagged.



18-15. CARRIAGE TILT CYLINDER - REPLACE (Cont'd)

4. EXTEND CYLINDER TO ALIGN PIN HOLE.

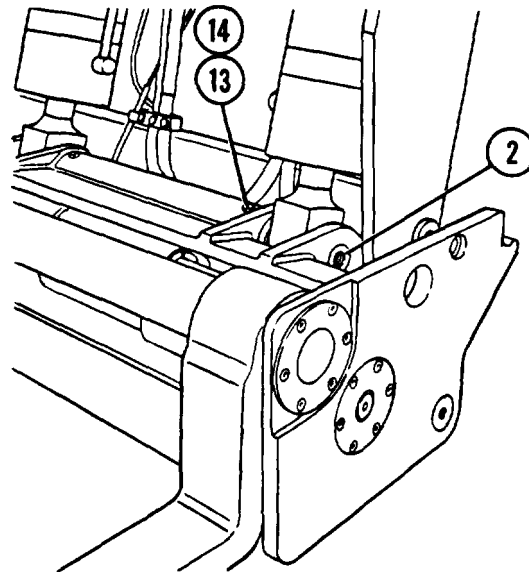
Start vehicle and extend tilt cylinder to align cylinder rod eye and pin access hole.

5. INSTALL CYLINDER ROD PIVOT PIN (2).

NOTE

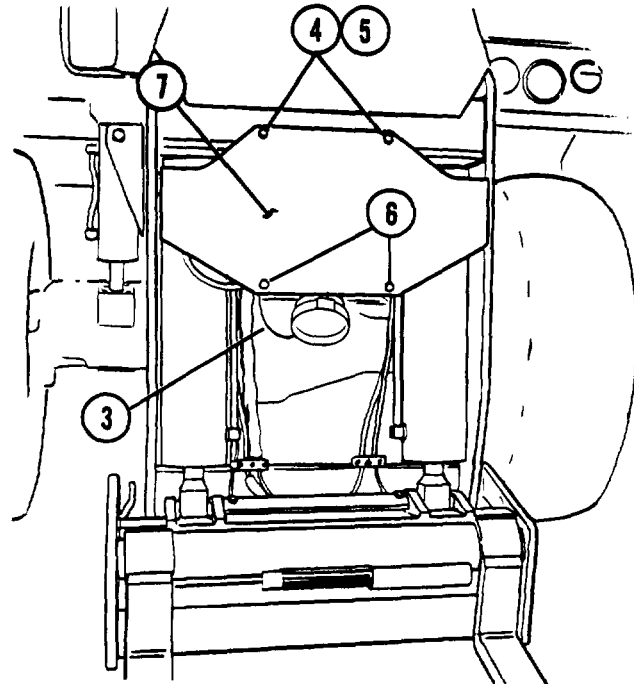
Apply anti-seize compound to pin (2) as installed.

- a. Install cylinder rod pivot pin (2).
- b. Install retaining bolt (13) and new locknut (14).



6. SECURE MLRS VALVE COVER.

- a. Position MLRS valve cover on attachment.
- b. Apply Loctite 242 to nut (6) threads.
- c. Place new lockwashers (5) over bolts (4).
- d. Secure cover with nuts (6) and bolts (4).



7. CONNECT FLOODLIGHT

Connect wires (3) to MLRS floodlight as tagged.

8. PURGE AIR BY CYCLING CARRIAGE TILT FUNCTION FIVE TIMES.

- a. Start engine, TM10-3930-660-10.
- b. Purge air from carriage tilt cylinder hydraulic circuit by operating carriage tilt function five times.
- c. Stop engine and relieve hydraulic pressure by operating carriage tilt controls, TM10-3930-660-10.

NOTE

Anytime the hydraulic oil has been drained and changed or maintenance has been done on the hydraulic system, it is possible that the hydraulic pumps have air in the pump cavities. This air must be purged from the cavity before the pump will operate, para. 18-3.

18-16. MLRS ATTACHMENT CYLINDER - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Lifting Device, 2 Ton Capacity

Cap and Plug Set

Materials/Parts

Anti-seize Compound (App. C, Item 9)
Container, 1 Gal.
Locknut (9)
Lockwashers (2, 4, 12)
Loctite 242 (App. C, Item 39)
Tags (App. C, Item 51)

Personnel Required

Three Personnel

Equipment Condition

Vehicle parked on level ground.
Parking brake set.
Wheels blocked.
Boom extended approximately three feet.
MLRS attachment cylinder in fully retracted position.
MLRS attachment forks level.
MLRS attachment approximately 2" off ground.

Reference

TM10-3930-660-10

REMOVAL

WARNING

Hydraulic oil, in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

18-16. MLRS ATTACHMENT CYLINDER - REPLACE (Cont'd)

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. REMOVE CAPSCREW (1), LOCKWASHER (2), CLAMP (3), AND LOCKWASHER (4) FROM EACH OF THE TWO BEARING CAPS (5). DISCARD LOCKWASHERS (2) AND (4).
2. TAG AND DISCONNECT TWO HYDRAULIC LINES (6). PLUG AND/OR CAP ALL HYDRAULIC FITTINGS.
3. SUPPORT REAR PORTION OF MLRS ATTACHMENT CYLINDER (7) USING A HOIST AND SLING OR EQUIVALENT SUPPORTING DEVICE .

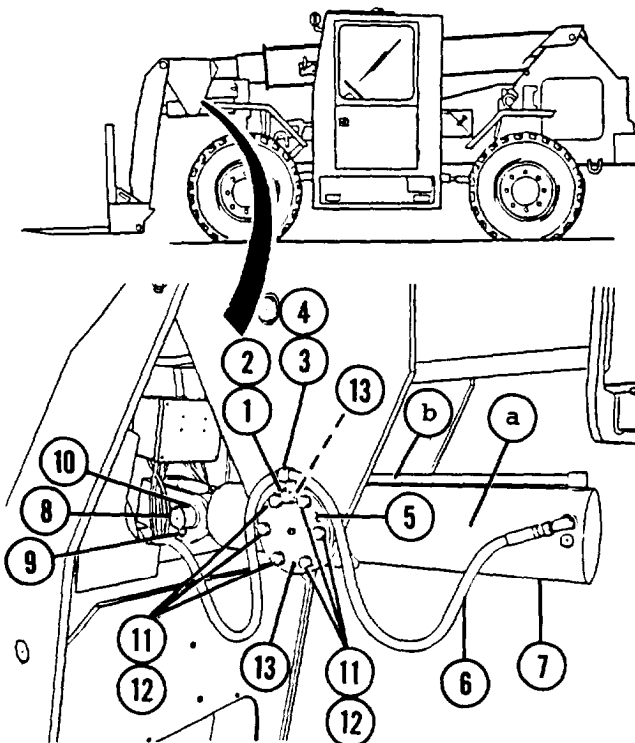
WARNING

Failure to support rear portion (a) of MLRS attachment cylinder (7) when removing pivot pin (8) may cause severe personal injury and damage to cylinder (7) .

4. REMOVE LOCKNUT (9) AND BOLT (10). DISCARD LOCKNUT (9).
5. REMOVE PIVOT PIN (8).
6. SUPPORT MLRS ATTACHMENT CYLINDER (7) USING TWO PEOPLE.

NOTE

If desired, use a hoist with slings of appropriate length in place of personnel to support cylinder (7) in steps 7 and 8. Slings must be long enough to lower cylinder (7) to ground without interference from boom.



18-16. MLRS ATTACHMENT CYLINDER - REPLACE (Cont'd)

7. REMOVE TWO BEARING CAPS (5).
 - a. Remove six bolts (11) and six lockwashers (12). Discard lockwashers (12).
 - b. Temporarily insert two bolts (11) into two jack bolt holes (13).
 - c. Tighten two bolts (11) evenly until bearing cap (5) is loosened.
 - d. Remove two bolts (11) from jack bolt holes (13).
 - e. Remove bearing cap (5) using a small pry bar.
 - f. Repeat steps a-e for other bearing cap (5).
8. REMOVE MLRS ATTACHMENT CYLINDER (7).
IF NECESSARY, LIFT MLRS ATTACHMENT AWAY FROM FORWARD END OF MLRS ATTACHMENT CYLINDER (6).

INSTALLATION**NOTE**

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

1. SUPPORT MLRS ATTACHMENT CYLINDER (7) USING TWO PEOPLE.

NOTE

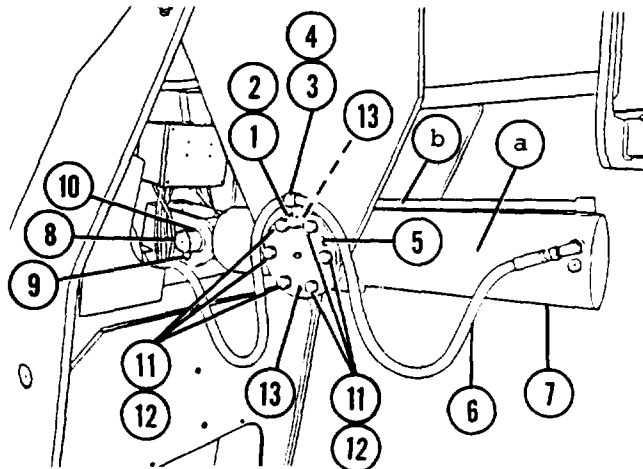
If desired, use a hoist with slings of appropriate length in place of personnel to support cylinder (7) in steps 2 and 3. Slings must be long enough to lower cylinder (7) to ground without interference from boom.

18-16. MLRS ATTACHMENT CYLINDER - REPLACE (Cont'd)

2. INSTALL TWO BEARING CAPS (5) AND MLRS ATTACHMENT CYLINDER (7).

NOTE

Install bearing caps (5) so that jack bolt holes (13) are positioned as-shown. Position cylinder (7) with the rod end oil feed tube (b) up.



- a. Apply Loctite 242 to six bolts (11).
- b. Install six bolts (11) and six new lockwashers (12).
- c. Repeat steps a-b for other bearing cap (5).

3. SUPPORT REAR PORTION OF MLRS ATTACHMENT CYLINDER (7) USING A HOIST AND SLING OR OTHER SUITABLE LIFTING DEVICE.

WARNING

Failure to support rear portion (a) of MLRS attachment cylinder (7) when installing pivot pin (8) may cause personal injury and damage to cylinder (7).

NOTE

Apply anti-seize compound to pivot pin (8).

4. INSTALL PIVOT PIN (8).
 - a. Secure pivot pin (8) with bolt (10) and new locknut (9).
 - b. Raise or lower MLRS attachment cylinder (7) as needed to ease pivot pin (8) installation.

5. INSTALL TWO HYDRAULIC LINES (6). USE TAGS TO IDENTIFY CONNECTIONS.

6. INSTALL NEW LOCKWASHER (4), CLAMP (3), NEW LOCKWASHER (2) AND CAPSCREW (1) TO EACH OF THE TWO BEARING CAPS (5).

NOTE

Position hydraulic lines (6) in clamps (3) so cylinder (6) can fully extend.

7. CYCLE MLRS ATTACHMENT CYLINDER (7) FIVE TIMES TO BLEED ANY AIR IN HYDRAULIC SYSTEM, TM10-3930-660-10.

NOTE

Excessive air in hydraulic system may temporarily prevent cylinder (7) from operating. Attempt to cycle cylinder (7) as required until its operation is smooth and it fully extends and retracts.

18-17. FORKS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Mechanics
 Lifting Device, 5 Ton Capacity
 Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.
 Parking brake set.
 Wheels blocked.
 Forks level and waist high.

Materials/Parts

Cotter Pins (1)
 Loctite 242 (App. C, Item 39)

Personnel Required

Two

Reference

TM10-3930-660-10

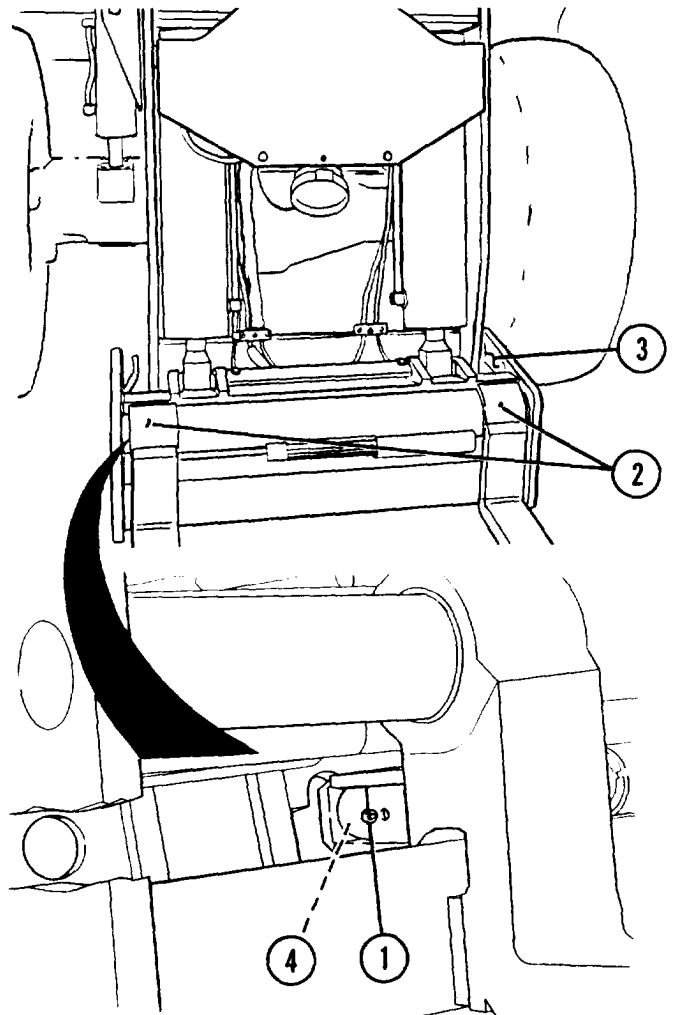
REMOVAL**WARNING**

When working under the boom, always use blocks, jackstands or other rigid and stable supports. Combined weight of boom and MLRS attachment is approximately 6300 pounds. Failure to adequately support the boom could result in severe injury or death.

1. REMOVE AND DISCARD COTTER PINS (1).
 - a. Start engine, TM10-3930-660-10.
 - b. Sideshift both forks (2) until they are approximately one foot from sides of fork carriage (3).
 - c. Stop engine, TM10-3930-660-10.
 - d. Remove cotter pins (1) which secure fork attaching pins (4) to forks (2). Discard cotter pins (1).

NOTE

Fork autoleveler switch must be removed first if right-hand fork is to be removed, para. 8-21.



18-17. FORKS - REPLACE (Cont'd)

2. SIDESHIFT FORKS FOR ACCESS TO ATTACHING PINS (4). REMOVE ATTACHING PINS (4).

- a. Start engine, TM10-3930-660-10.
- b. Sideshift right fork until pin (4) in right fork is aligned with access hole in fork carriage.
- C. Stop engine, TM10-3930-660-10.
- d. Use a slide hammer to remove pin (4), from rear of fork carriage, through the access hole.

NOTE

The thread size of hole in end of pin is 1/4-20.

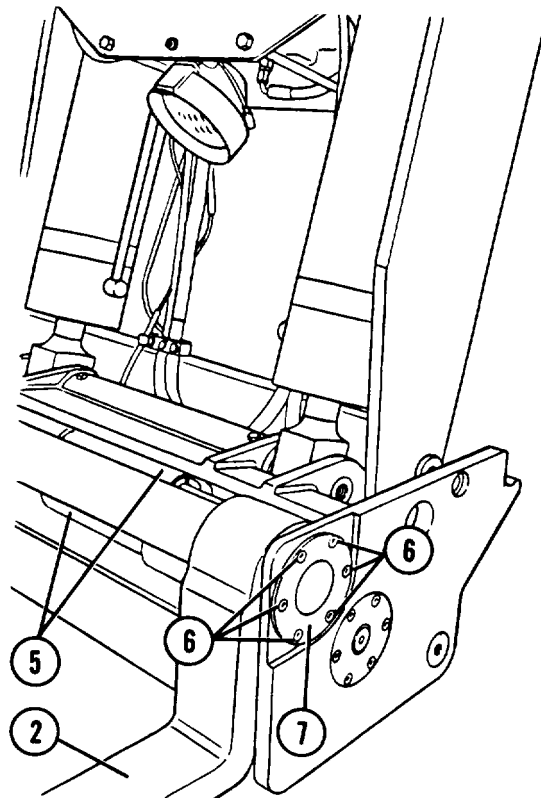
- e. Start engine, TM10-3930-660-10.
- f. Sideshift left fork to align left fork (2) with left notch in fork carriage (3).
- g. Stop engine, TM10-3930-660-10.
- h. Remove pin (4) from left fork sideshift cylinder.

3. RETRACT SIDESHIFT CYLINDERS (5) AND LOWER FORKS (2).

- a. Start engine, TM10-3930-660-10.
- b. Retract sideshift cylinders (5) by actuating electric joystick.
- c. Lower forks (2) until they are touching the ground but not supporting weight of MLRS attachment.
- d. Stop engine, TM10-3930-660-10.

4. REMOVE SIX SOCKET HEAD SCREWS (6).

5. REMOVE FORK SHAFT CAP (7).



18-17. FORKS - REPLACE (Cont'd)

WARNING

Two personnel are required for fork removal. Each fork weighs 125 lbs. Failure to use an assistant and a two point lift when removing forks could result in serious personal injury.

CAUTION

Use care not to damage finish on fork shaft (8) during removal.

6. REMOVE FORK SHAFT (8).
 - a. Slide fork shaft (8) partially out of fork carriage (3).
 - b. Support fork shaft (8) with hoist and sling. Completely remove fork shaft (8) from fork carriage (3) and place on suitable supports.
7. REMOVE FORKS (2) FROM FORK CARRIAGE (3).

NOTE

Remove forks (2) one at a time.

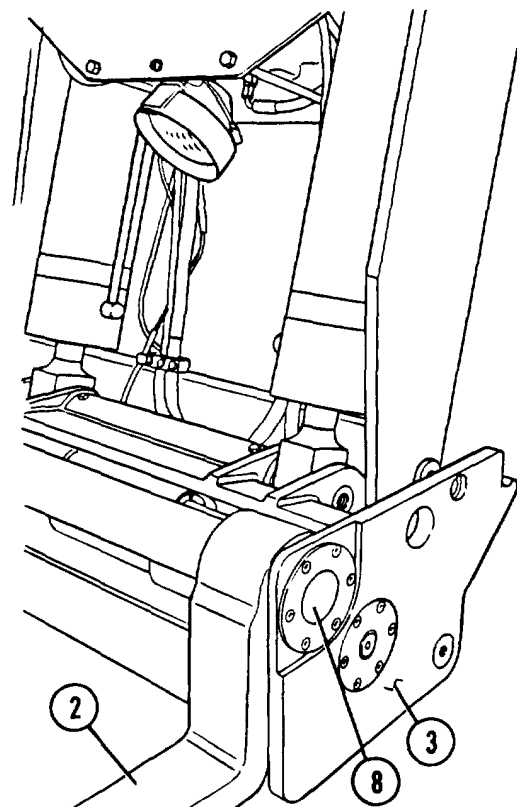
- a. Attach hoist and sling to fork (2).
- b. Lift fork (2) straight up and out of fork carriage (3).

INSTALLATION

WARNING

Two personnel are required for fork installation. Each fork weighs 125 lbs. Failure to use an assistant and a two point lift when installing forks could result in serious personal injury.

1. POSITION FORKS (2) ON FORK CARRIAGE (3).



18-17. FORKS - REPLACE (Cont'd)

NOTE

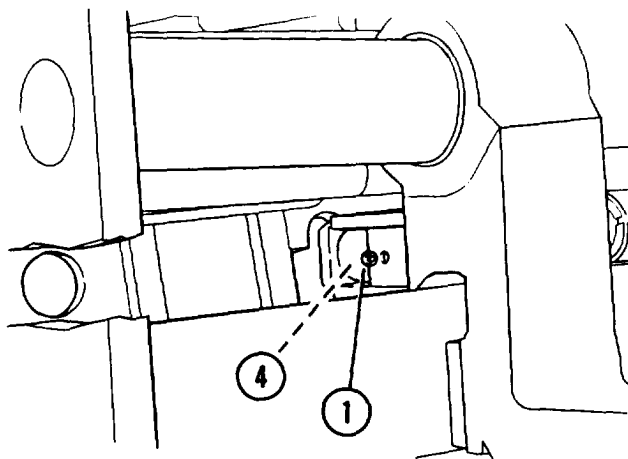
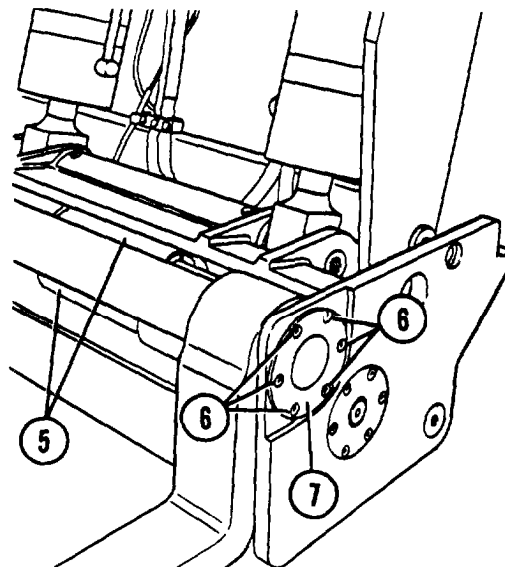
Install forks (2) one at a time.

- a. Attach hoist and sling to fork (2).
 - b. Raise fork (2) over fork carriage (3). Lower fork (2) straight into fork carriage (3).
2. ALIGN HOLES ON FORKS (2) WITH HOLE AT LEFT-HAND SIDE OF FORK CARRIAGE (3)

CAUTION

Use care not to damage finish on fork shaft (8) during installation.

- 3. INSERT FORK SHAFT (8) THROUGH FORK CARRIAGE (3) AND FORK HOLES.
 - a. Support fork shaft (8) with hoist and sling. Align end of shaft (8) with hole on left-hand side of fork carriage (3).
 - b. Insert fork shaft (8) through fork carriage (3) and fork holes.
- 4. SECURE FORK SHAFT CAP (7).
 - a. Apply Loctite 242 to six socket head screws (6).
 - b. Secure fork shaft cap (7) with six socket head screws (6).
- 5. SECURE FORKS (2) TO FORK SIDESHIFT CYLINDERS (5) WITH ATTACHING PINS (4).
 - a. Using hoist and sling, align left-hand fork (2) with left notch in fork carriage (3).
 - b. Using hoist and sling, position right-hand fork (2) so attaching pin (4) hole in fork is aligned with access hole in fork carriage.
 - c. Secure forks (2) to fork sideshift cylinders (5) with attaching pins (4).



- 6. INSTALL NEW COTTER PINS (1).
 - a. Start engine, TM10-3930-660-10.
 - b. Sideshift both forks (2) until they are approximately one foot from sides of fork carriage (3).
 - c. Install new cotter pins (1) to secure attaching pins (4).
 - d. Stop engine, TM10-3930-660-10.
- 7. INSTALL FORK AUTOLEVELER SWITCH IF RIGHT-HAND FORK (2) WAS REMOVED, PARA. 8-21.

18-18. FORK BUSHINGS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power

Materials/Parts

#80 grit emery paper (App. C, Item 37)
 Chlorinated Solvent (APP. C, Item 47)
 Loctite #609 (App. C, Item 43)

Equipment Condition

Forks removed, para. 18-17.

REMOVAL

1. REMOVE BUSHING (1) FROM FORK BORE (2).

Carefully and slowly apply hydraulic pressure to push fork bushing (1) from fork bore (2).

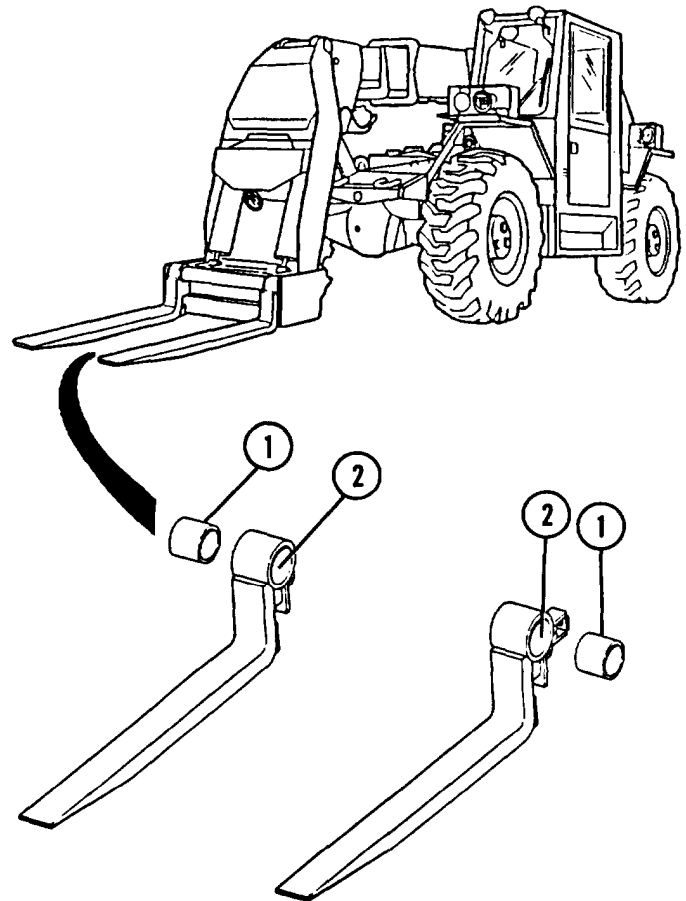
INSTALLATION

1. ROUGH TINNED OUTSIDE DIAMETER OF FORK BUSHING (1).

Using #80 grit emery paper, rough up tinned outside diameter of fork bushing (1).

WARNING

Cleaning solvents are potentially dangerous to personnel and property. Avoid skin contact by wearing rubber gloves. Avoid prolonged inhalation. Make sure work area provides adequate ventilation. Do not use near open flame.



18-18. FORK BUSHINGS - REPLACE (Cont'd)

2. CLEAN INSIDE DIAMETER OF FORK BORE (2).

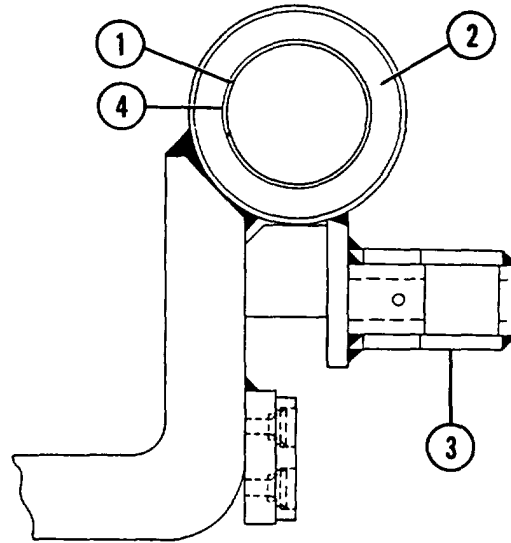
Using chlorinated solvent, clean inside diameter of fork bore (2).

3. CLEAN OUTSIDE DIAMETER OF FORK BUSHING.

Using chlorinated solvent, clean outside diameter of fork bushing (1).

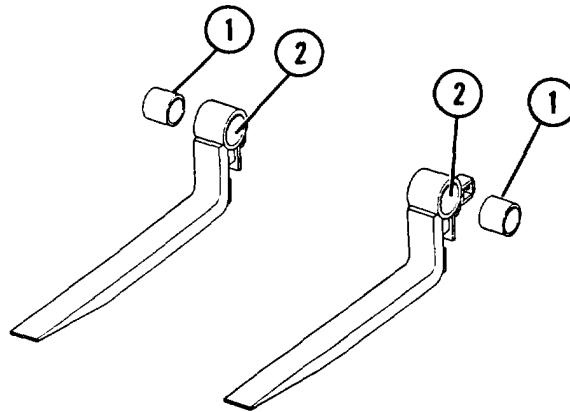
4. ALIGN AND LEVEL FORK BORE (2) IN HYDRAULIC PRESS.

Align and level fork bore (2) in a hydraulic press with cylinder rod weldment (3) facing down.



5. APPLY LOCTITE #609.

- a. Apply a 1/8 inch wide bead of Loctite #609 around the center of the inside diameter of the fork bore (2).
- b. Apply a 1 inch wide bead of Loctite #609 at the lead edge of fork bushing (1).
- c. Apply a 1/2 inch wide bead of Loctite #609 around the outside diameter of fork bushing (1) at the center of the bushing.



6. ALIGN AND LEVEL FORK BUSHING (1) ON FORK BORE (2) AND INSERT APPROPRIATE MANDREL.

NOTE

Prior to inserting fork bushing (1) into fork bore (2), position bushing so that bushing gap is oriented to fork (4).

NOTE

When inserting fork bushing (1) into fork bore (2), continue to apply pressure until the lead edge of the bushing is 3/16 inch below the face of the fork bore.

7. PRESS FORK BUSHING (1) INTO FORK BORE (2).

Carefully and slowly apply hydraulic pressure to push fork bushing (1) into fork bore (2) in one continuous motion. Do not skew or cock bushing.

8. WIPE EXCESS LOCTITE FROM FORK BUSHING (1) AND FORK BORE (2).

CAUTION

Do not load fork for 72 hours after installation of fork bushing.

9. INSTALL FORKS, PARA. 18-17.

18-19. MLRS ATTACHMENT - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial SetupTools

Tool Kit, Automotive Mechanics
 Lifting Device, 5 ton capacity
 Lifting Chain, capacity 300 lbs.
 Cap and Plug set

Equipment Condition

Boom extended approximately 3 ft.
 Negative battery cable disconnected,
 para. 8-44.

Materials/Parts

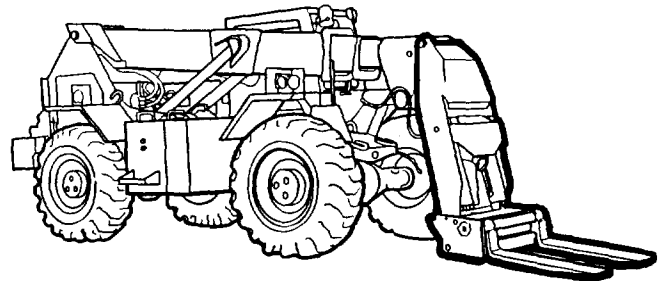
Anti-seize Compound (App. C, Item 9)
 Container, 1 Gal.
 Locknut (23, 25)
 Lockwashers (17), (19), (30)
 Loctite 242 (App. C, Item 39)
 Tie straps (10)

Personnel Required

Two Personnel

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve Pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

**WARNING**

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

18-19. MLRS ATTACHMENT - REPLACE (Cont'd)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure. Use metal caps when specified.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on hydraulic components and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

REMOVAL

1. DISCONNECT BOOM ELECTRICAL CABLE LEADS (1) AT JUNCTION BOX (2) AND REMOVE BOOM ELECTRICAL CABLE (3).

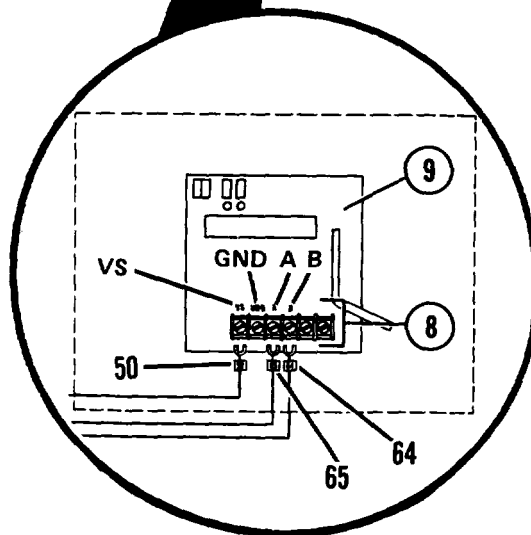
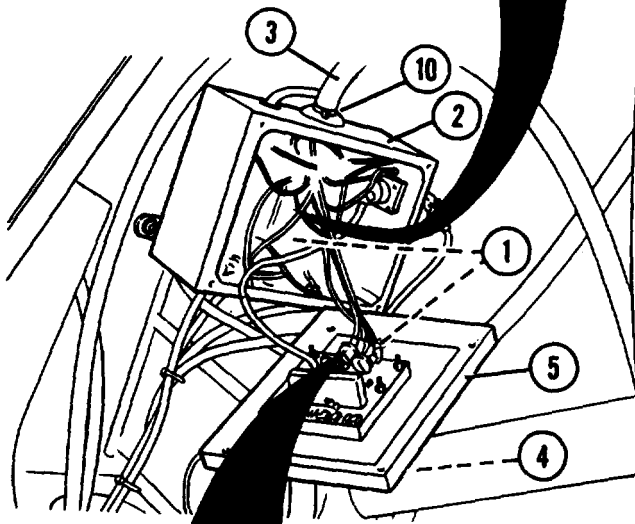
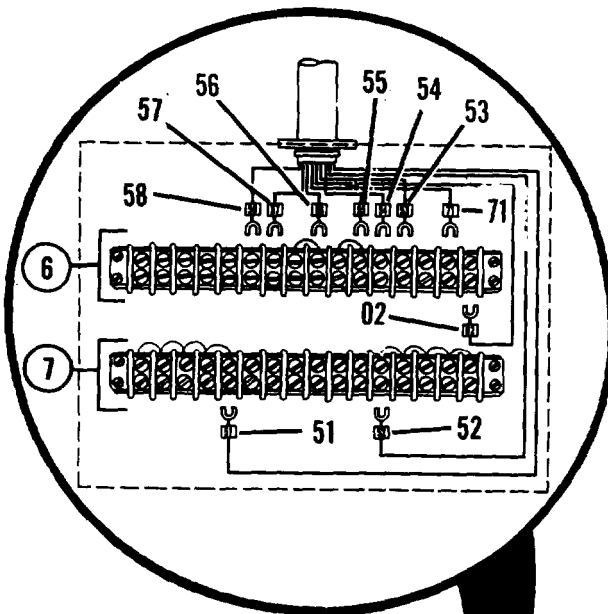
a. Loosen four screws (4) and separate cover (5) from box (2).

NOTE

Only disconnect electrical leads of boom electrical cable (3) during steps 1b through 1d. Do not disconnect any other electrical leads inside box during these steps.

NOTE

Tag screw terminals on terminal strips as electrical leads are removed for use during installation. Note that terminals on strips (6) and (7) are not marked.



18-19. MLRS ATTACHMENT - REPLACE (Cont'd)

- b. Tag electrical leads 58, 57, 56, 55, 54, 53 and 71 at top terminal strip (6) of box (2). Loosen screws on strip (6) and remove leads.
- c. Tag electrical lead 02 at bottom of terminal strip (6). Loosen screw on strip (6) and remove lead 02.
- d. Tag electrical leads 51 and 52 at bottom terminal strip (7) of box (2). Loosen screws on strip (7) and remove leads 51 and 52.
- e. Tag electrical leads 64, 65, and 50 at terminal strip (8) on autoleveler circuit board (9). Loosen screws on strip (8) and remove leads 50, 64, and 65.
- f. Cut two tie straps (10) where cable (3) enters box (2). Discard tie straps (10).
- g. Remove nut (29), lockwasher (30), washer (31), and clamp (32). Move hoses (14) out of the way. Discard lockwasher (30).
- h. Carefully pull cable (3) from box (2).
- i. Secure cover (5) to box (2) by tightening four screws (4).

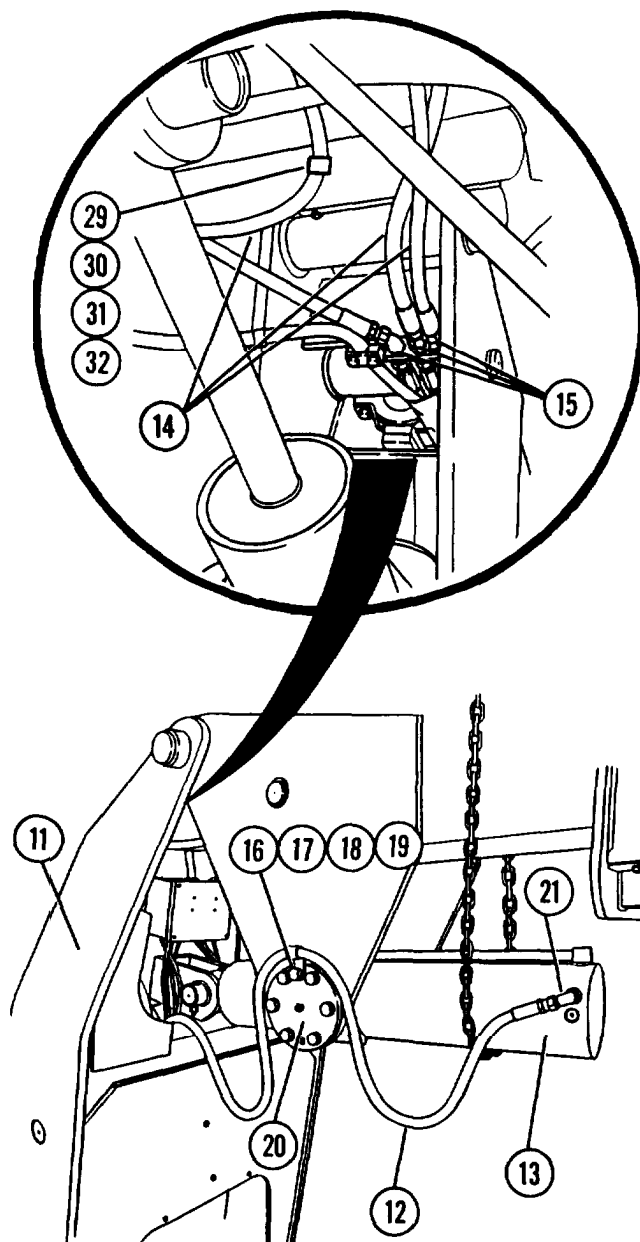
2. SUPPORT MLRS ATTACHMENT (11) USING LIFTING DEVICE.

NOTE

MLRS attachment weighs approximately 2500 lbs. when all components, including forks, remain installed.

NOTE

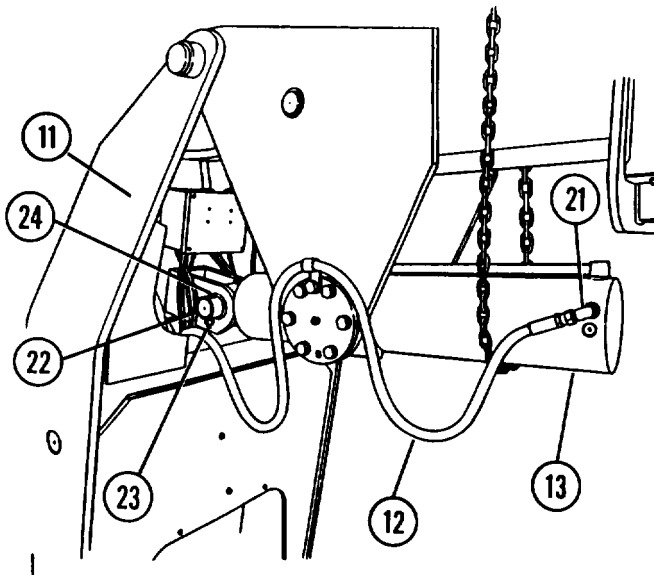
Place container under disconnected hoses to catch hydraulic oil.



18-19. MLRS ATTACHMENT - REPLACE (Cont'd)

3. DISCONNECT TWO HYDRAULIC HOSES (12) AT MLRS ATTACHMENT HOIST CYLINDER (13) AND THREE HYDRAULIC HOSES (14) AT BOOM FITTINGS (15).

- a. Remove bolt (16), lockwasher (17), clamp (18), and lockwasher (19) securing each hose (12) to each endplate (20). Discard lockwashers (17) and (19).
- b. Disconnect two hoses (12) from two elbows (21) on cylinder (13).
- c. Disconnect three hydraulic hoses (14) from boom fittings (15) at front of boom. Cap open boom fittings (15) with metal caps.



WARNING

Support rear of cylinder (13) with chain prior to removing pivot pin (22). Failure to do so may cause personal injury and damage to cylinder.

NOTE

Adjust lifting device as required to take weight off of pivot pin (22) during removal.

4. REMOVE LOCKNUT (23) CAPSCREW (24) AND PIVOT PIN (22) SECURING MLRS ATTACHMENT HOIST CYLINDER (13) TO MLRS ATTACHMENT (11). DISCARD LOCKNUT (23).

CAUTION

Be certain that metal caps are installed on fittings (15) at front of boom as instructed in step 3c. Failure to do so could result in personal injury caused by pressurized hydraulic oil spraying out of open fittings (15) when engine is started.

18-19. MLRS ATTACHMENT - REPLACE (Cont'd)**5. REMOVE MLRS ATTACHMENT (11) FROM BOOM.**

- a. Remove locknut (25), capscrew (26), pivot pin (27), and two spacer rings (28) securing attachment (11) to boom. Discard locknut (25).

NOTE

Spacer rings (28) are used as required and may not be present on all vehicles.

- b. Start engine and carefully move vehicle rearward to separate attachment (11) from boom. Stop engine.
- c. Place attachment (11) on suitable supports and remove lifting device.

INSTALLATION**NOTE**

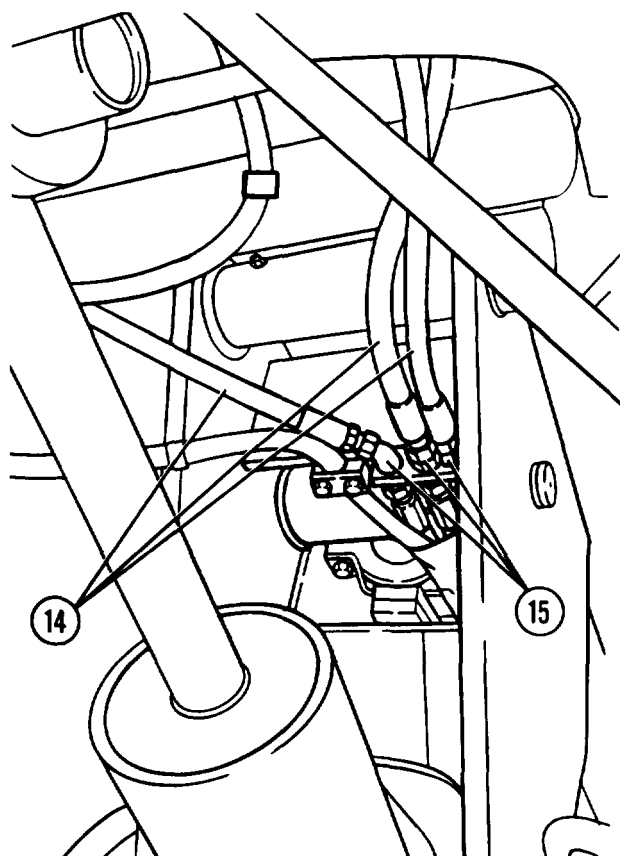
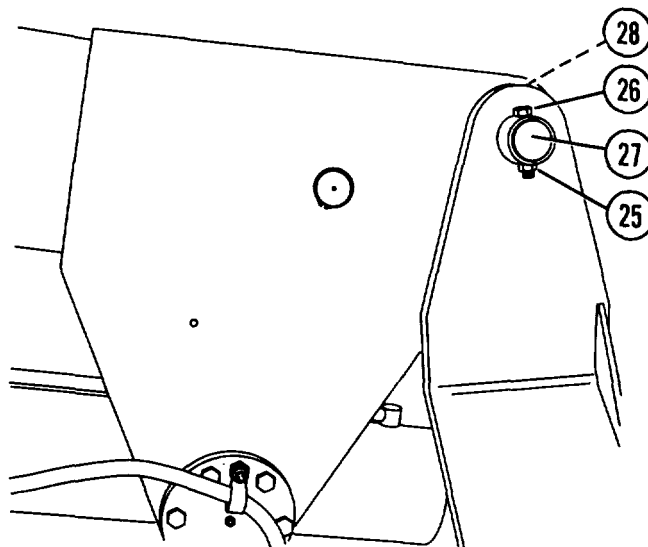
MLRS attachment weighs approximately 2500 lbs. when all components, including forks, remain installed.

1. ATTACH MLRS ATTACHMENT (11) TO BOOM.

- a. Attach lifting device to attachment (11) and raise attachment (11) to height required to align mounting holes of attachment (11) with holes in boom.

CAUTION

Be certain that metal caps are installed on fittings (15) at front of boom as instructed in step 3c of removal. Failure to do so could result in personal injury caused by pressurized hydraulic oil spraying out of open fittings (15) when engine is started.



18-19. MLRS ATTACHMENT - REPLACE (Cont'd)

WARNING

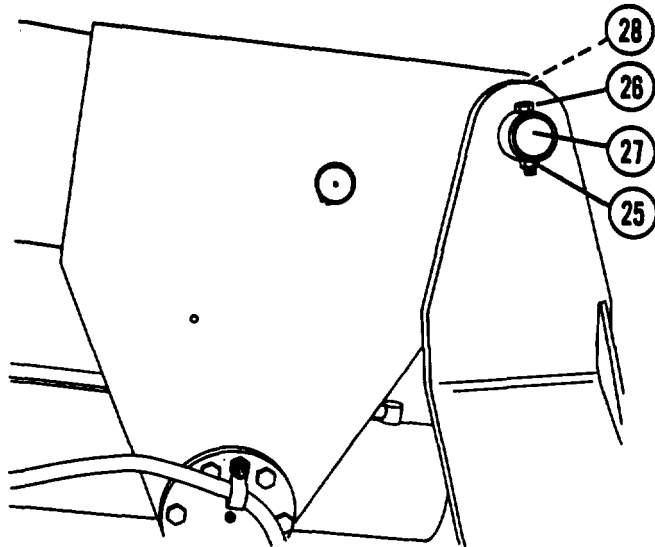
Support rear of cylinder (13) with chain prior to installing MLRS attachment (11). Failure to do so may cause personal injury and damage to cylinder (13).

- b. Start engine and carefully move vehicle toward MLRS attachment (11). Stop engine when mounting holes are aligned. Stop engine.

NOTE

Spacer rings (28) are used as required and may not be present on all vehicles. Install spacer rings (28) only if removed during removal.

- c. Secure attachment (11) to boom with two spacer rings (28), pivot pin (27), capscrew (26) and new locknut (25).



WARNING

Continue to support rear of cylinder (13) with chain until pivot pin (22) is installed. Failure to do so may cause personal injury and damage to cylinder (13).

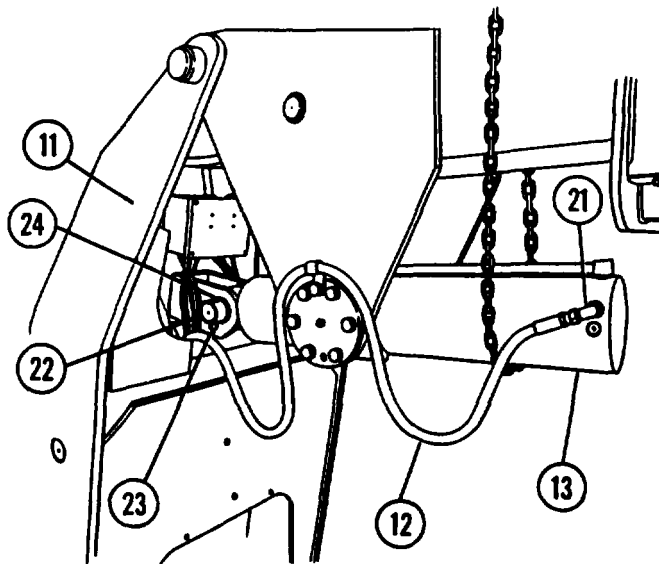
NOTE

Adjust lifting device as required to take weight off of pivot pin (22) during installation.

NOTE

Apply anti-seize compound to pin (22) as installed.

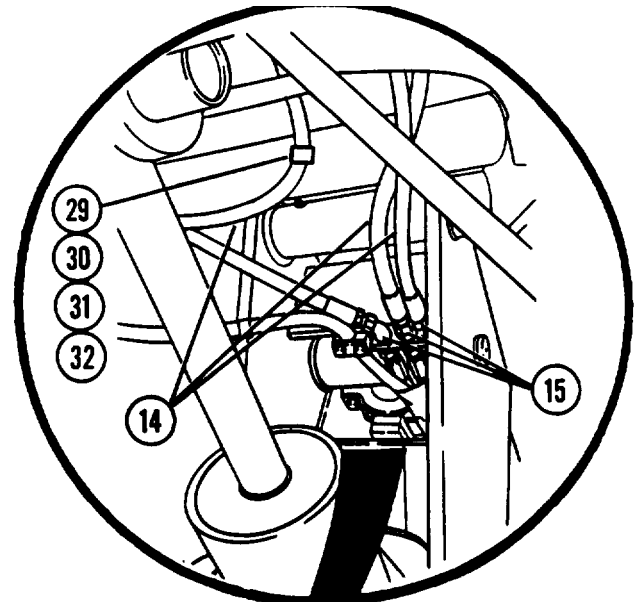
- 2. INSTALL PIVOT PIN (22), CAPSCREW (24) AND NEW LOCKNUT (23) TO SECURE MLRS ATTACHMENT HOIST CYLINDER (13) TO MLRS ATTACHMENT (11).



18-19. MLRS ATTACHMENT - REPLACE (Cont'd)

3. CONNECT TWO HYDRAULIC HOSES (12) AT MLRS ATTACHMENT HOIST CYLINDER (13) AND THREE HYDRAULIC HOSES (14) AT BOOM FITTINGS (15).

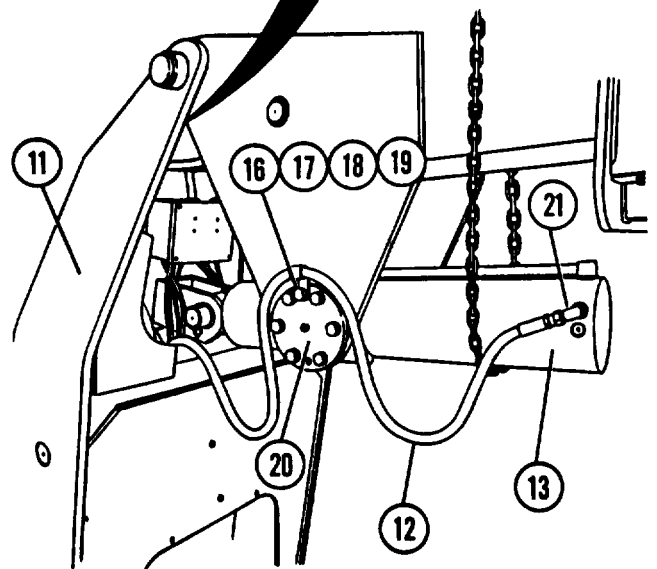
- a. Uncap boom fittings (15) and connect three hydraulic hoses (14) at front of boom as tagged.
- b. Connect two hoses (12) to two elbows (21) on cylinder (13) as tagged.
- c. Apply loctite 242 to bolts (16). Secure each hose (12) to each endplate (20) with new lockwasher (19), clamp (18), new lockwasher (17), and bolt (16).



4. REMOVE LIFTING DEVICE FROM ATTACHMENT (10)

5. INSTALL BOOM ELECTRICAL CABLE (3) AND CONNECT ELECTRICAL LEADS (1) AT ELECTRICAL JUNCTION BOX (2).

- a. Loosen four screws (4) and separate cover (5) from box (2).
- b. Carefully position cable (3) through hole in box (2).



CAUTION

Connect electrical leads (1) to autoleveler circuit board (9) as described in step 5c through 5e. Failure to follow instructions in these steps may result in damage to circuit board (9).

- c. Connect electrical lead 50 to terminal VS of autoleveler circuit board (9). Tighten screw on strip (8) to secure lead 50.
- d. Connect electrical lead 65 to terminal A of autoleveler circuit board (9). Tighten screw on strip (8) to secure lead 65.

- e. Connect electrical lead 64 to terminal B of autoleveler circuit board (9). Tighten screw on strip (8) to secure lead 64.

18-19. MLRS ATTACHMENT - REPLACE (Cont'd)

NOTE

Terminals on (16) and (7) are not marked. Refer to tags on terminal screws when installing electrical leads (1) to terminal strips (6), and (7).

- f. Connect electrical leads 51 and 52 (1) at bottom terminal strip (7) of box (2). Tighten screws on strip (7) to secure leads.
- g. Connect electrical lead 02 at bottom terminal strip (6) of box (2). Tighten screw on strip (6) to secure lead 02.
- h. Connect electrical leads 58, 57, 56, 55, 54, 53, and 71, at top terminal strip (6) of box (2). Tighten screws on strip (6) to secure leads.
- i. Secure cuble (3) to MLRS attachment (11) with clamp (32), washer (31), new lockwasher (30) and nut (29).
- j. Attach two new tie straps (10) where cable (3) enters box (2).
- k. Position cover (5) on box (2) and secure by tightening four screws (4).

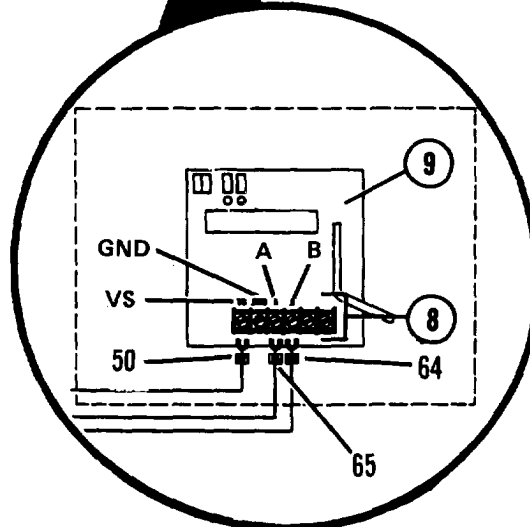
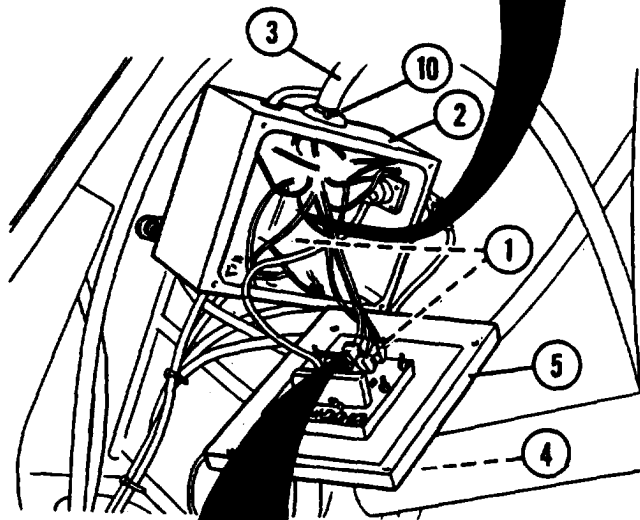
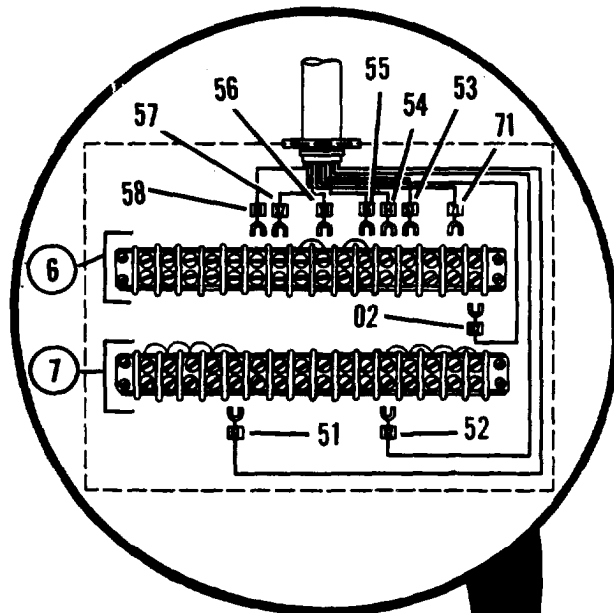
6. PURGE AIR FROM MLRS ATTACHMENT HOIST CYLINDER AND LINES.

- a. Start engine, TM10-3930-660-10.
- b. Cycle MLRS attachment hoist cylinder five times.

NOTE

Excessive air in hydraulic system may temporarily prevent MLRS attachment functions from operating. Attempt to operate MLRS attachment functions as required until each function operates smoothly and completely.

- c. Stop engine and relieve hydraulic pressure by operating MRLS attachment hoist controls, TM10-3930-660-10.



18-20. BOOM PIVOT PINS - SERVICE

This task covers:

Lubrication of boom pivot pins.

Initial Setup

Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less power.

Materials/Parts

Grease (App. C, Item 14)

Equipment Condition

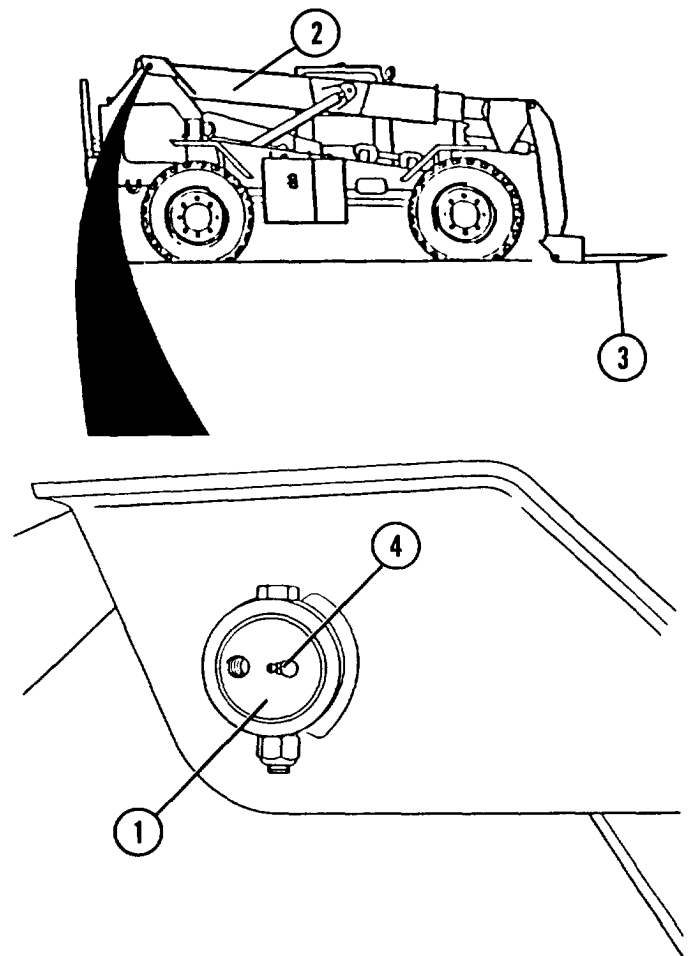
Vehicle parked on level ground.

LUBRICATION OF BOOM PIVOT PINS

CAUTION

To ensure adequate lubrication of boom pivot pins (1), be sure that steps 1 and 2 are performed prior to applying lubrication. Inadequate lubrication of boom pivot pins could result in excessive wear and damage to vehicle or load.

1. FULLY RETRACT BOOM (2).
2. POSITION FORKS (3) SO THEY ARE RESTING ON THE GROUND.
3. APPLY LUBRICATION TO TWO GREASE FITTINGS (4), ONE ON EACH BOOM PIVOT PIN (1).



18-21. BOOM WEAR PADS - INSPECT

This task covers:

Inspection of boom wear pads.

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Lifting Device, 5 Ton Capacity

Equipment Condition

Vehicle parked on level ground.

Materials/Parts

Lockwashers (7)

Loctite 242 (App. C, Item 39)

Reference

TM10-3930-660-10

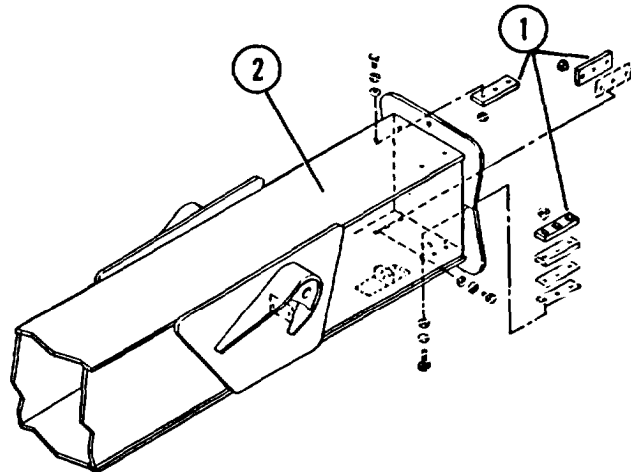
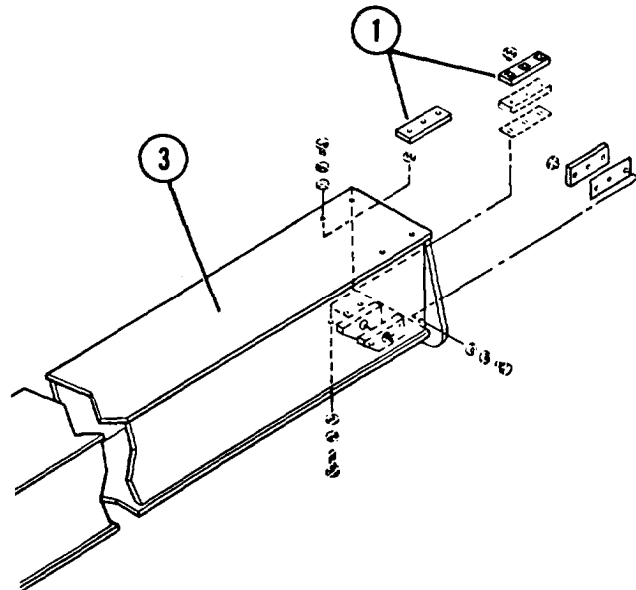
INSPECTION OF BOOM WEAR PADS

NOTE

All boom wear pads must be at least 3/8 inch thick. Any boom wear pads under 3/8 inch thick must be replaced. Refer to direct support maintenance.

1. INSPECT WEAR PADS (1) AT FRONT OF OUTER BOOM (2) AND INTERMEDIATE BOOM (3).
 - a. Start engine, TM10-3930-660-10.
 - b. Move boom sections in or out as required to provide access.
 - c. Stop engine, TM10-3930-660-10.
 - d. Measure thickness of wear pads (1).

2. INSPECT WEAR PADS (4) AT REAR OF INTERMEDIATE BOOM (3) AND INNER BOOM (5).
 - a. Start engine, TM10-3930-660-10.
 - b. Fully retract boom sections.
 - c. Stop engine, TM10-3930-660-10.
 - d. Remove four screws (6), four lockwashers (7), and boom cover (8) from outer boom (2) to provide access. Discard lockwashers (7).



18-21. BOOM WEAR PADS - INSPECT (Cont'd)

- e. Measure thickness of wear pads (4).

NOTE

Apply Loctite 242 to threads of screws (6).

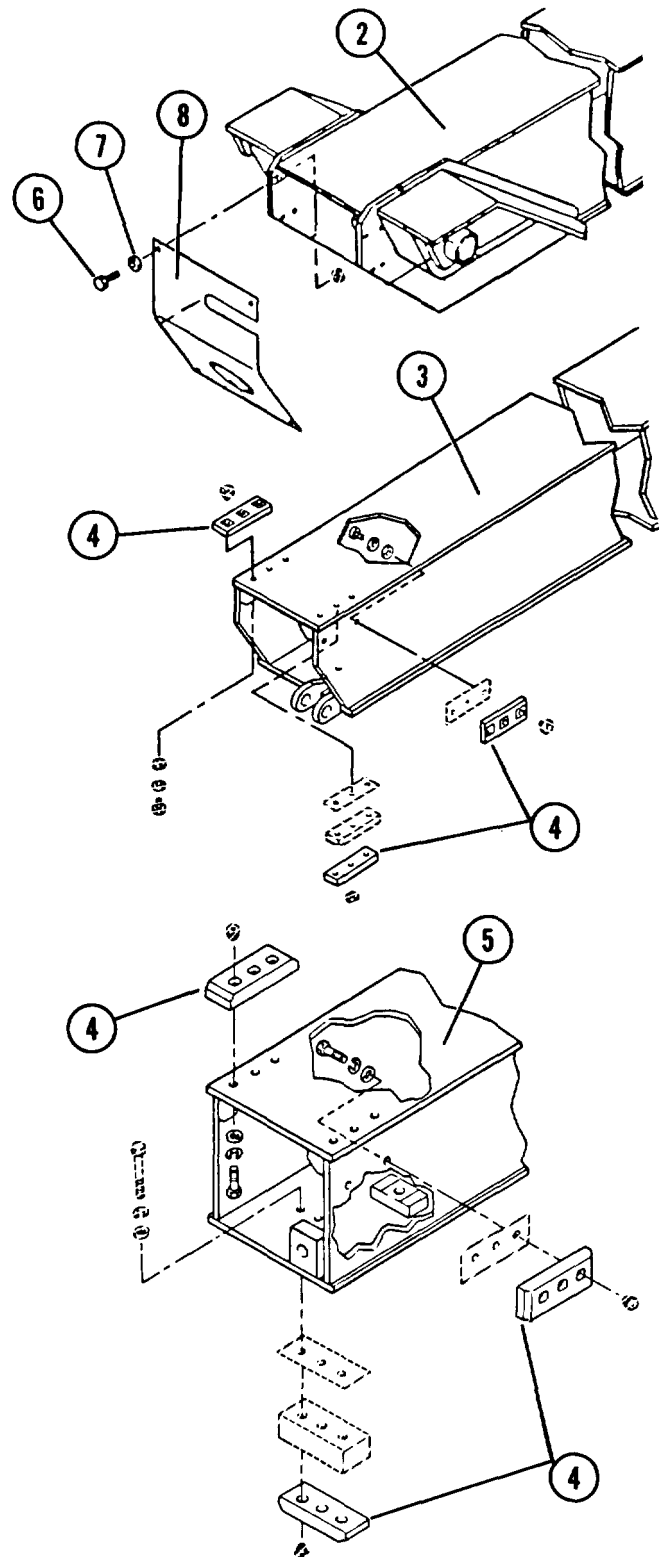
- f. Secure cover (8) to outer boom with four new lockwashers (7) and four screws (6).

3. IF NECESSARY, CHECK FOR PROPER WEAR PAD CLEARANCES.

- a. Start engine, TM10-3930-660-10.
- b. Fully extend inner boom (5).
- c. Stop engine, TM10-3930-660-10.
- d. Use lifting device to move inner boom (5) up and down and from side to side. Check for clearance of 0.01 to 0.13 inch between wear pads and surfaces of inner and intermediate booms. Remove lifting device after measuring clearance.
- e. Start engine, TM10-3930-660-10.
- f. Fully extend intermediate boom (3).
- g. Stop engine, TM10-3930-660-10.
- h. Use lifting device to move intermediate boom (3) up and down and from side to side. Check for clearance of 0.01 to 0.13 inch between wear pads and surfaces of intermediate and outer booms.

NOTE

If clearances measured in steps 3b and 3d are not within limits, wear pads are worn or quantity of wear pad shims is incorrect. Refer to direct support maintenance.



18-22. BOOM HOSE PULLEY - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial SetupTools

Shop Equipment, Automotive
Maintenance and Repair, Common
#1 Less Power

Materials/Parts

Locknuts (22, 26)
Lockwasher (8, 17, 28, 32)
Loctite 242 (App. C, Item 39)
Rope, 20 Ft.

Equipment Condition

Vehicle parked on level ground.

Reference

TM10-3930-660-10

WARNING

Hydraulic oil, in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

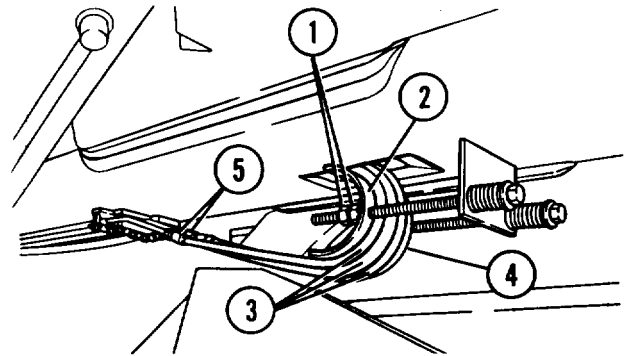
NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

18-22. BOOM HOSE PULLEY - REPLACE (Cont'd)

REMOVAL

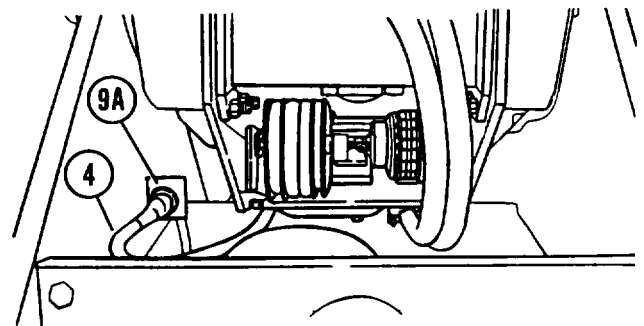
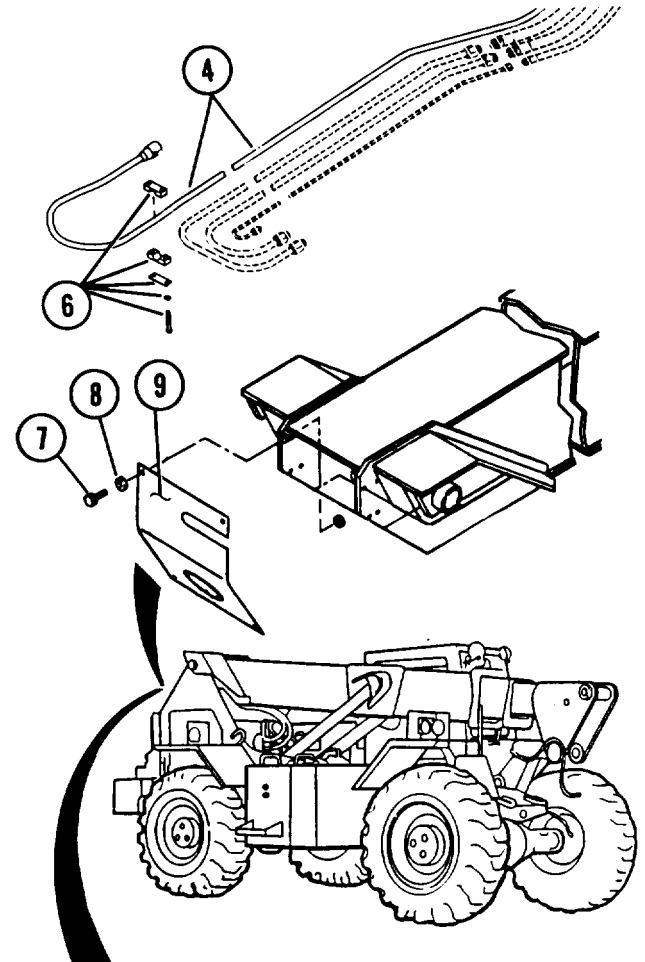
1. FULLY RETRACT, THEN EXTEND BOOM SEVERAL INCHES, TM10-3930-660-10.
2. DISCONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.
3. LOOSEN JAM NUTS (1) AT TENSIONER (2) TO RELIEVE TENSION ON THREE HYDRAULIC HOSES (3) AND BOOM ELECTRICAL CABLE (4).
4. DISCONNECT THREE HYDRAULIC HOSES (3) AT FITTINGS (5) BEHIND TENSIONER (2).



NOTE

Rope will be used to pull hoses (3) out of boom during installation.

5. TIE A ROPE AROUND ENDS OF DISCONNECTED HYDRAULIC HOSES (3).
6. REMOVE FOUR CLAMP ASSEMBLIES (6) SECURING BOOM ELECTRICAL CABLE (4) TO UNDERSIDE OF BOOM.
7. REMOVE FOUR CAPSCREWS (7), FOUR LOCKWASHERS (8), AND ACCESS COVER (9). DISCARD LOCKWASHERS (8).
8. DISCONNECT BOOM ELECTRICAL CABLE (4) AT PLUG (9A).



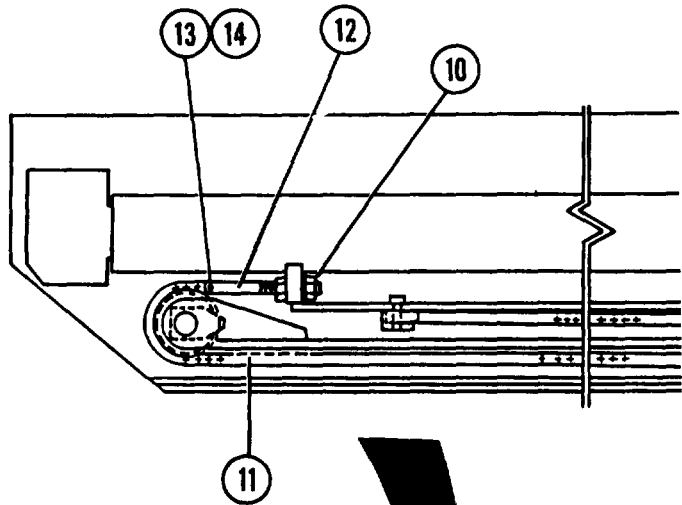
18-22. BOOM HOSE PULLEY - REPLACE (Cont'd)

NOTE

Loosen nut (10) as needed during Step 9.

9. SEPARATE EXTEND CHAIN (11) FROM CLEVIS (12) TO CREATE WORK ROOM.

- a. Remove two retainer rings (13) and clevis pin (14) from clevis (12).
- b. Separate extend chain (11) from clevis (12).

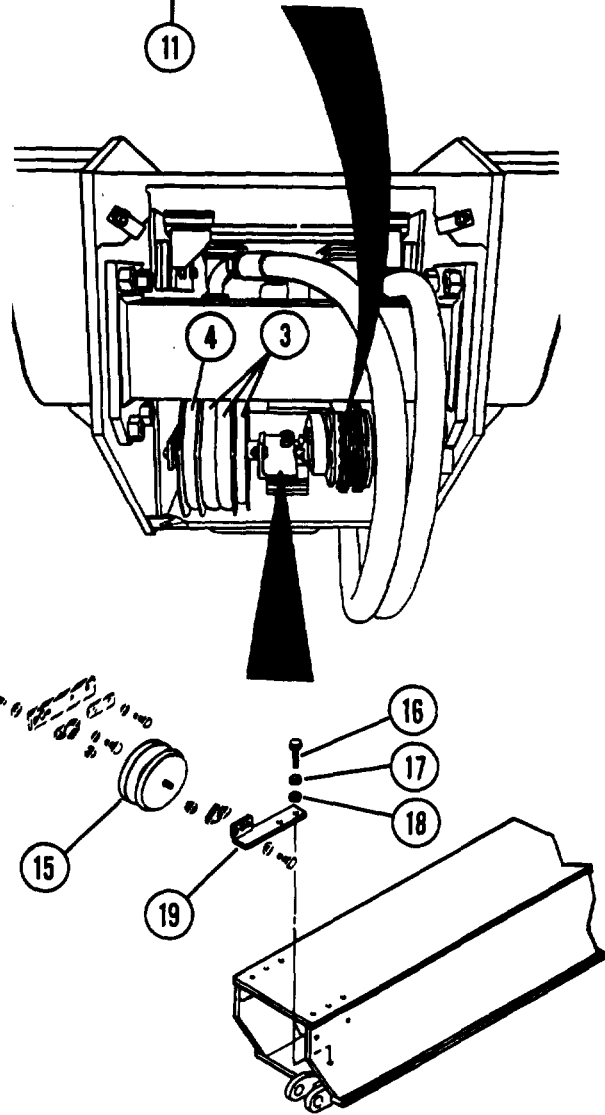


NOTE

Loosen hoses (3) and boom electrical cable (4) as required during removal of pulley (15).

10. REMOVE BOOM HOSE PULLEY (15).

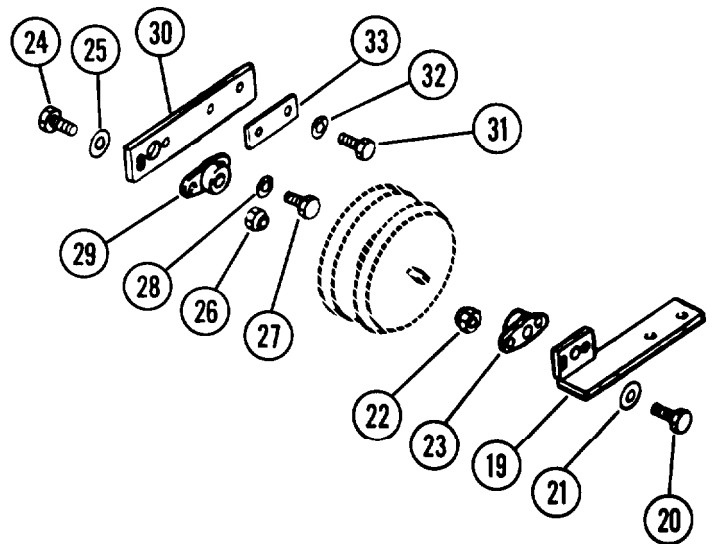
- a. Remove two capscrews (16), two lockwashers (17), and two flatwashers (18).
- b. Remove pulley support (19) and pulley (15).



18-22. BOOM HOSE PULLEY - REPLACE (Cont' d)

11. IF NECESSARY, REMOVE PARTS (20) THROUGH (33).

- a. Remove two capscrews (20) , two flatwashers (21) , and two locknuts (22) from bearing (23) . Discard locknuts (22).
- b. Remove bearing (23) from pulley support (19).
- c. Remove capscrew (24) , flatwasher (25), and locknut (26). Discard locknut (26).
- d. Remove capscrew (27), lockwasher (28), and bearing (29) from pulley support (30). Discard lockwasher (28) .
- e. Remove two capecrews (31), two lockwashers (32), spacer (33), and pulley support (30).


INSTALLATION
1. IF REMOVED, INSTALL PARTS (20) THROUGH (33).

- a. Install two capscrews (31), two new lockwashers (32), spacer (33), and pulley support (30).
- b. Install capscrew (27), new lockwasher (28), and bearing (29) to pulley support (30).
- c. Install capscrew (24), flatwasher (25), and new locknut (26).
- d. Secure bearing (23) to pulley support (19) with two capscrews (20), two flatwashers (21), and two new locknuts (22).

18-22. BOOM HOSE PULLEY - REPLACE (Cont'd)

2. INSTALL BOOM HOSE PULLEY.

NOTE

Apply Loctite 242 to threads of capscrews (16).

- a. Position pulley (15) and pulley support (19) on boom.

NOTE

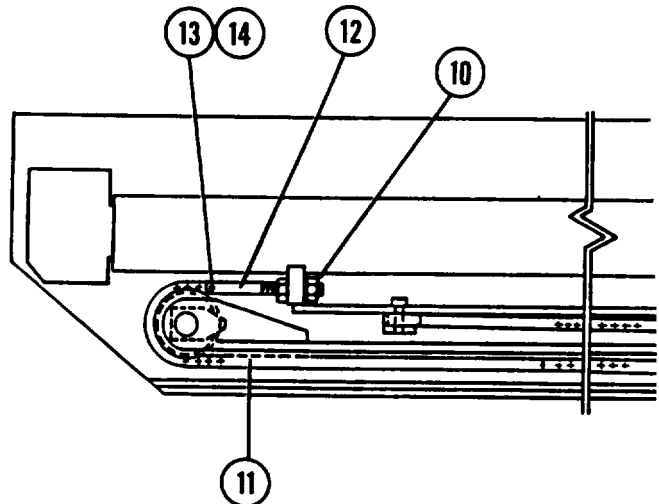
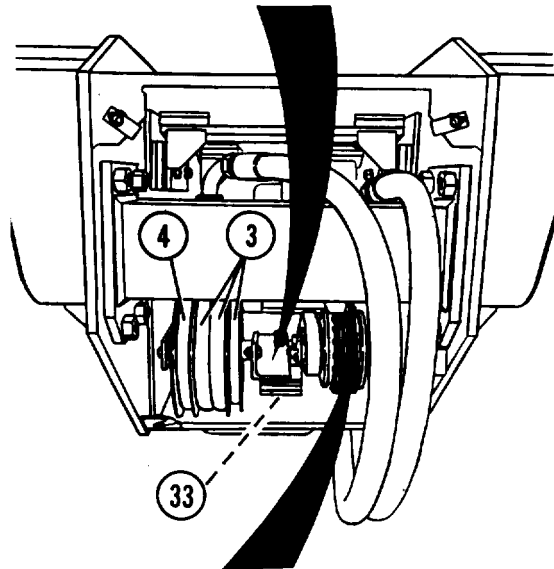
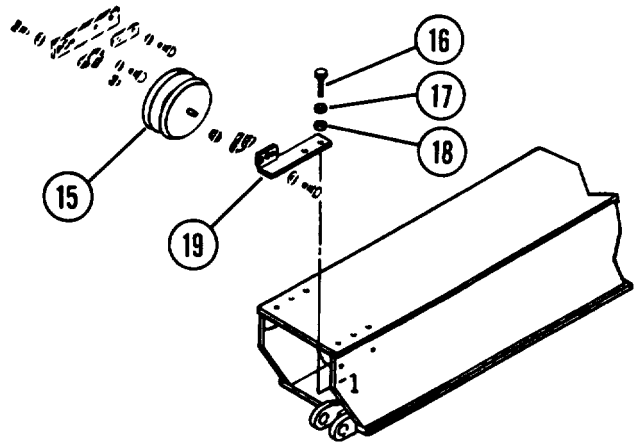
Capscrews (16) fasten to wear pad on underside of intermediate boom section. Align wear pad (33) as required during Step 2b.

- b. Secure with two capscrews (16), two new lockwashers (17), and two flatwashers (18).

- 3. USING ROPE, PULL THREE HYDRAULIC HOSES (3) AND BOOM ELECTRICAL CABLE (4) THROUGH OPENING AT TENSIONER (2) UNTIL THEY ARE SNUG AROUND BOOM HOSE PULLEY (15). REMOVE ROPE FROM HOSES (3).

- 4. ATTACH CHAIN (11) TO CLEVIS (12).

- a. Align extend chain (11) with clevis (12).
- b. Secure extend chain (11) to clevis (12) with clevis pin (14) and two retainer rings (13).



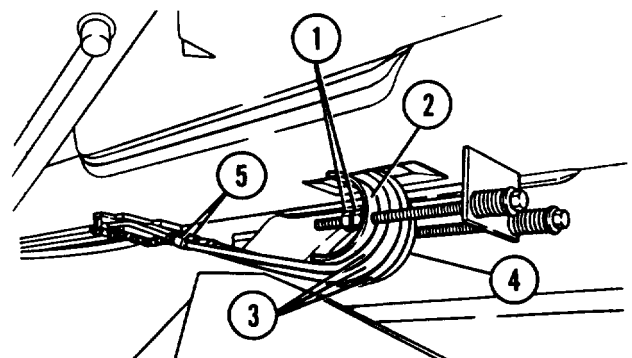
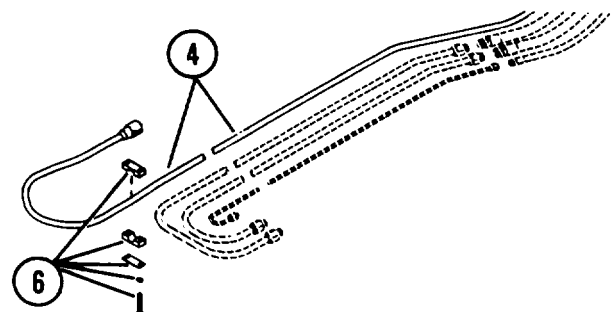
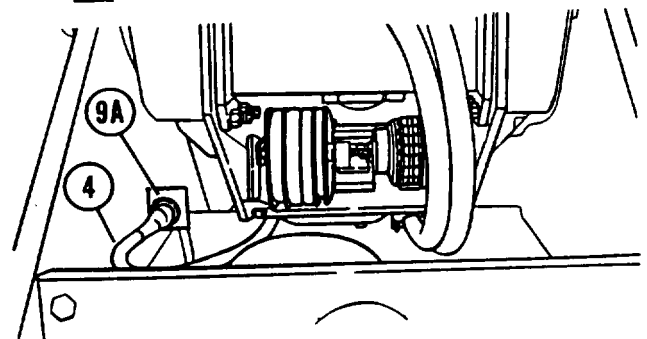
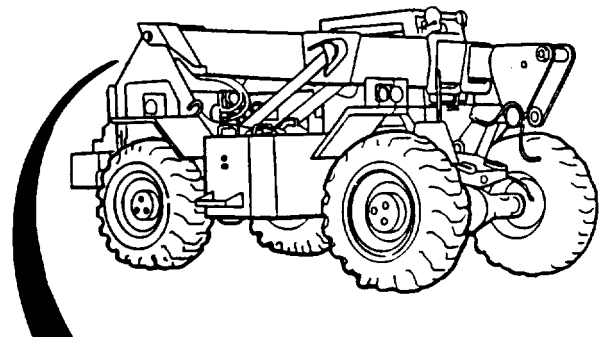
18-22. BOOM HOSE PULLEY- REPLACE (Cont'd)

5. CONNECT BOOM ELECTRICAL CABLE (4) AT PLUG (9A).
6. INSTALL FOUR CLAMP ASSEMBLIES (6) TO SECURE BOOM ELECTRICAL CABLE (4) TO UNDERSIDE OF BOOM.
7. CONNECT THREE HYDRAULIC HOSES (3) AT FITTINGS (5) BEHIND TENSIONER (2).
8. CONNECT NEGATIVE BATTERY CABLE, PARA. 8-44.

CAUTION

Always check adjustment of chains, boom electrical cable, and boom hoses whenever boom hose pulley is replaced. Refer to para. 18-24 and 18-25. Failure to follow this instruction will result in damage to boom electrical cable or hydraulic hoses.

9. CHECK/ADJUST CHAIN ADJUSTMENT, PARA. 18-24.
10. CHECK/ADJUST TENSION OF HYDRAULIC HOSES AND BOOM ELECTRICAL CABLE, PARA. 18-25.



18-23. BOOM CHAIN PULLEYS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance, Common #2 Less
Power

Materials/Parts

Lockwashers (6, 8, 21, 26)
Loctite 242 (App. C, Item 39)

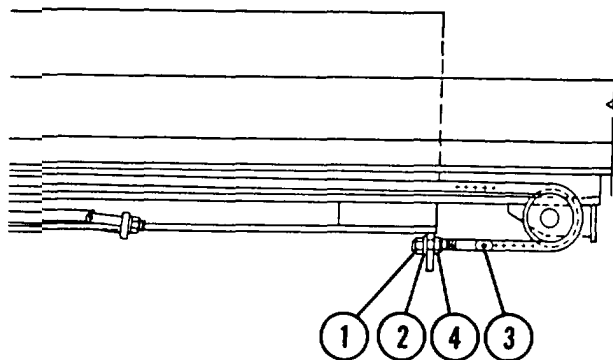
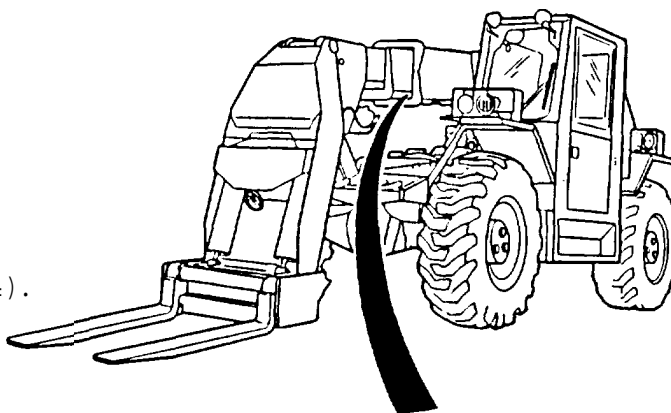
Reference
TM10-3930-660-10

Equipment Condition

Vehicle parked on level ground.
Boom lowered/retracted.

REMOVAL - RETRACT CHAIN PULLEY

1. FULLY RETRACT BOOM, TM10-3930-660-10.
2. REMOVE CHAIN CLEVIS (3).
 - a. Remove nut (1) and washer (2).
 - b. Remove retract chain clevis (3). DO not change the position of locknut (4).



18-23. BOOM CHAIN PULLEYS - REPLACE (Cont'd)

3. REMOVE CAPSCREW (5) AND LOCKWASHER (6). DISCARD LOCKWASHER (6).

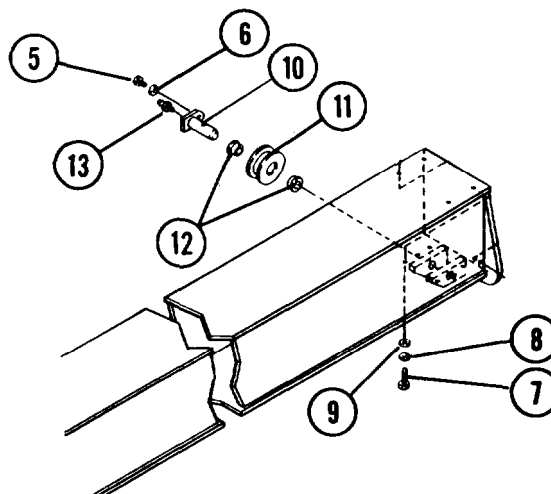
4. REMOVE BOTTOM WEAR PAD FASTENERS ON INTERMEDIATE BOOM.

Remove capscrews (7), lockwashers (8), and washers (9) securing bottom wear pad at front of intermediate boom. Discard lockwashers (8).

5. REMOVE PULLEY PIN (10).

6. REMOVE CHAIN PULLEY (11) AND BUSHINGS (12).

7. REMOVE LUBRICATION FITTING (13), IF NECESSARY.


INSTALLATION - RETRACT CHAIN PULLEY

1. INSTALL LUBRICATION FITTING (13), IF REMOVED .

2. INSTALL CHAIN PULLEY (11), WITH BUSHINGS (12) ON THE BOOM AND INSTALL THE PULLEY PIN (10).

NOTE

Apply Loctite 242 to capscrew (5) as installed.

3. SECURE PULLEY PIN WITH (NEW) LOCKWASHER (6) AND CAPSCREW (5).

4. SECURE INTERMEDIATE BOOM BOTTOM WEAR PAD .

NOTE

Apply Loctite 242 to threads of capscrews (7).

Install capscrews (7), new lockwashers (8), and washers (9) to secure bottom wear pad at front of intermediate boom.

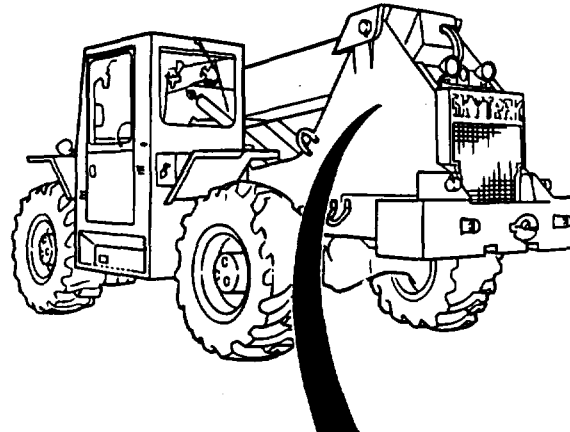
18-23. BOOM CHAIN PULLEYS - REPLACE (Cent'd)

5. SECURE RETRACT CHAIN CLEVIS (3).

Secure retract chain clevis (3) with washer (2) and nut (1). Tighten nut (1) until locknut (4) is tight against boom.

6. CHECK/ADJUST CHAIN ADJUSTMENT , PARA. 18-24.

7. CHECK/ADJUST HYDRAULIC HOSES AND ELECTRICAL CABLE , PARA. 18-25.



REMOVAL - EXTEND CHAIN PULLEY

1. FULLY RETRACT, THEN EXTEND BOOM SEVERAL INCHES .

NOTE

Loosen locknut (14) as needed to reduce chain tension during clevis pin removal.

2. REMOVE RETAINER RINGS (15) AND CLEVIS PIN (16); SEPARATE CHAIN FROM CLEVIS (17).

a. Remove retainer rings (15) and clevis pin (16) from extend chain clevis (17).

b. Separate chain (18) from clevis (17).

3. LOOSEN HOSE TENSION.

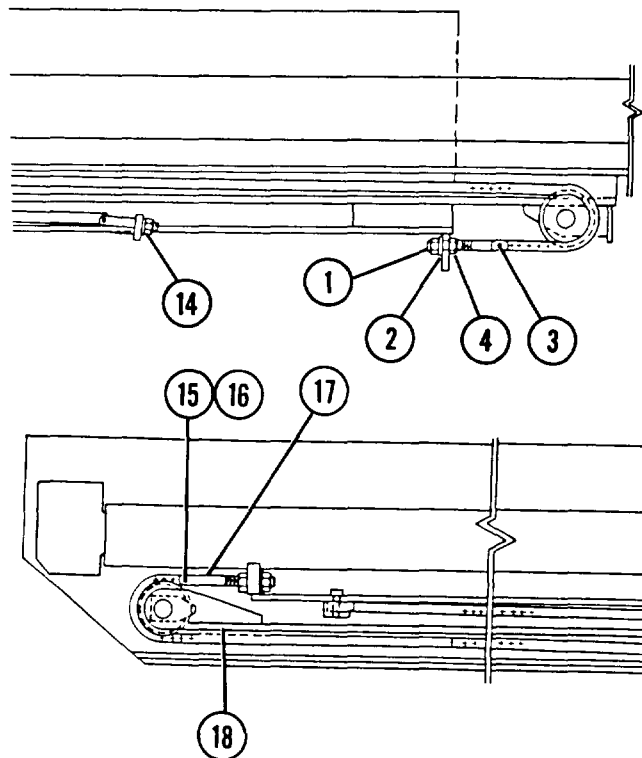
Loosen jamnuts (19).

4. REMOVE TWO CAPSCREWS (20), TWO LOCKWASHERS (21), TWO FLATWASHERS (22), PULLEY SUPPORT (23), AND PULLEY (24).

a. Remove two Capscrews (20) , two lockwashers (21), and two flatwashers (22). Discard lockwashers (21).

b. Remove pulley support (23), and pulley (24) to provide workroom.

5. REMOVE CAPSCREW (25) AND LOCKWASHER (26). DISCARD LOCKWASHER (26).



18-23. BOOM CHAIN PULLEYS - REPLACE (Cont'd)

6. SUPPORT CHAIN PULLEY (27). REMOVE PULLEY PIN (28).
7. REMOVE CHAIN PULLEY (27) AND BUSHINGS (29).
8. REMOVE LUBRICATION FITTING (30) , IF NECESSARY .

INSTALLATION - EXTEND CHAIN PULLEY

1. INSTALL LUBRICATION FITTING (30), IF REMOVED .
2. INSTALL PULLEY (27) AND BUSHINGS (29). SECURE WITH PULLEY PIN (28) , NEW LOCKWASHER (26) , AND CAPSCREW (29) .
 - a. Position chain pulley (27) with bushings (29) on the boom.
 - b. Install pulley pin (28).

NOTE

Apply Loctite 242 to threads of capscrew (25) as installed.

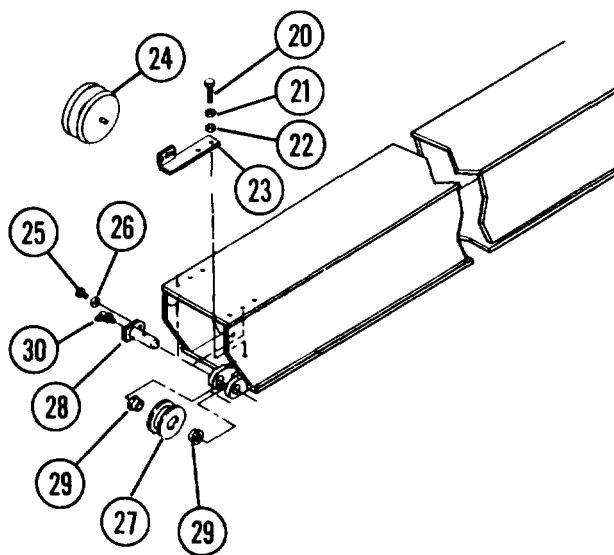
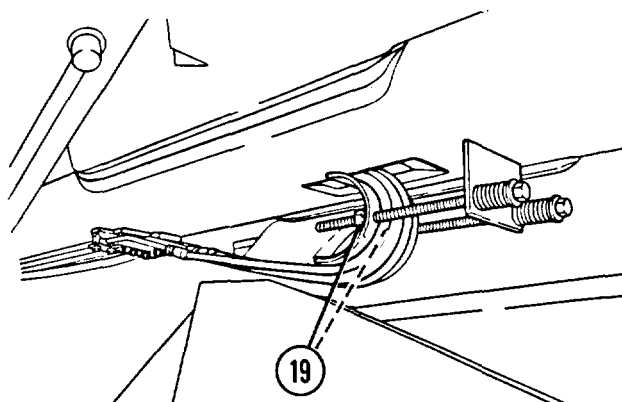
- c. Secure pulley pin (28) with new lockwasher (26) and capscrew (25).

NOTE

Apply Loctite 242 to threads of capscrews (20).

- 3* INSTALL PULLEY (24) AND PULLEY SUPPORT (23) WITH TWO FLATWASHERS (22), TWO NEW LOCKWASHERS (21), AND TWO CAPSCREWS (20).

- a. Install pulley (24) and pulley support (23) on boom.
- b. Install two flatwashers (22), two new lockwashers (21), and two capscrews (20).



4. CHECK/ADJUST CHAIN ADJUSTMENT, PARA. 18-24.
5. CHECK/ADJUST HYDRAULIC HOSES AND ELECTRICAL CABLE PARA. 18-25.

18-24. BOOM EXTEND AND RETRACT CHAINS - INSPECT/ADJUST

This task covers:

- a. Inspect/Adjust

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Reference

TM10-3930-660-10

Equipment Condition

Vehicle parked on level ground.

INSPECT/ADJUST

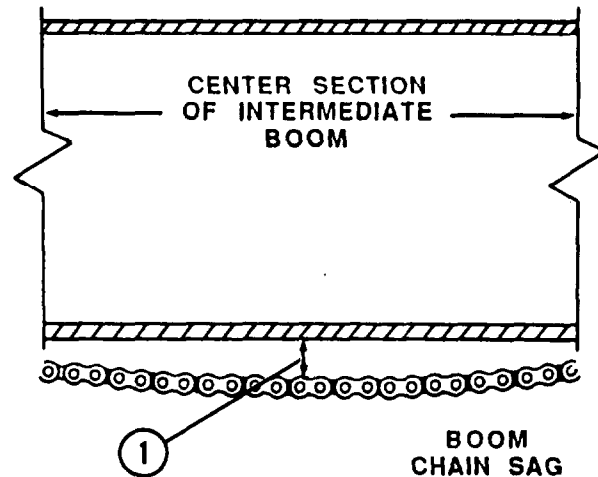
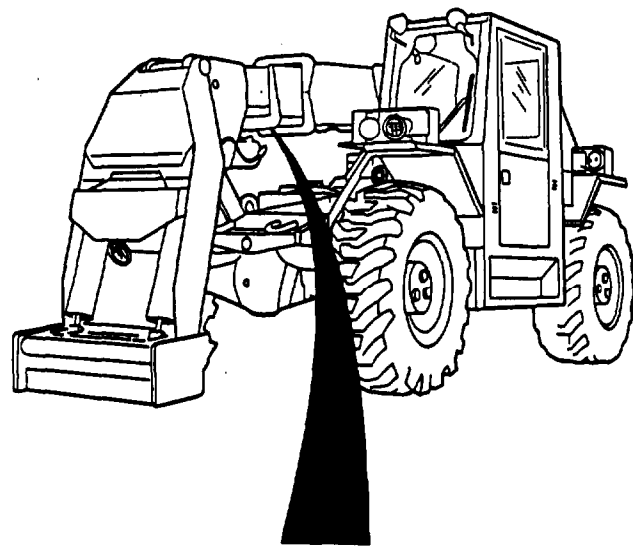
1. FULLY EXTEND BOOM, TM10-3930-660-10.
2. PLACE BOOM IN HORIZONTAL POSITION.

NOTE

Adjusting the tension of the boom retract chain will also adjust the tension in the boom extend-chain.

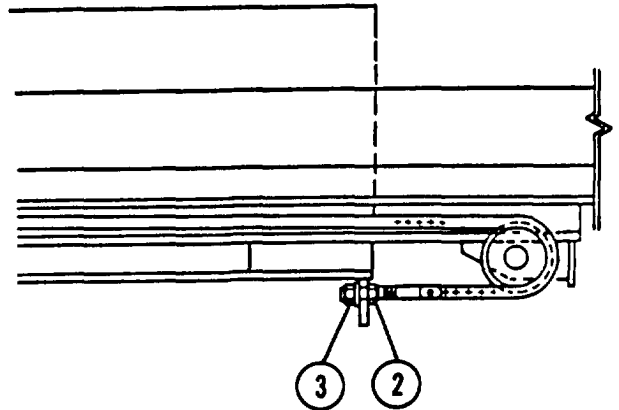
3. MEASURE RETRACT CHAIN SAG (1) AT MIDDLE OF INTERMEDIATE BOOM SECTION.

Chain sag (1) should be approximately 3-1/4 to 3-1/2 inches (83 to 89 mm) from top of chain to bottom of boom.



18-24. BOOM EXTEND AND RETRACT CHAINS - INSPECT/ADJUST (Cont'd)

4. LOOSEN OR TIGHTEN ADJUSTING LOCKNUT (2) UNTIL CHAIN IS WITHIN SPECIFICATIONS.
 - a. Loosen jamnut (3).
 - b. Loosen or tighten adjusting locknut (2) until chain sag (1) is within specifications.
 - c. Tighten jamnut (3).
5. RETRACT AND EXTEND BOOM SEVERAL TIMES.
6. RECHECK CHAIN SAG (1).
 - a. Chain sag (1) should be approximately 3-1/4 to 3-1/2 inches (83 to 89 mm) from top of chain to bottom of boom.
7. CHECK TENSION OF HYDRAULIC HOSES AND BOOM ELECTRICAL CABLE, PARA. 18-25.



18-25. BOOM HYDRAULIC HOSE AND ELECTRICAL CABLE TENSION - ADJUST

This task covers:

Checking and adjusting tension of boom hydraulic hoses and electrical cable.

Initial setup

Tools

Tool Kit, Automotive Mechanics

Materials/parts

Lockwashers (2)

Loctite 242 (App. C, Item 39)

Equipment Condition

Vehicle parked on level ground.

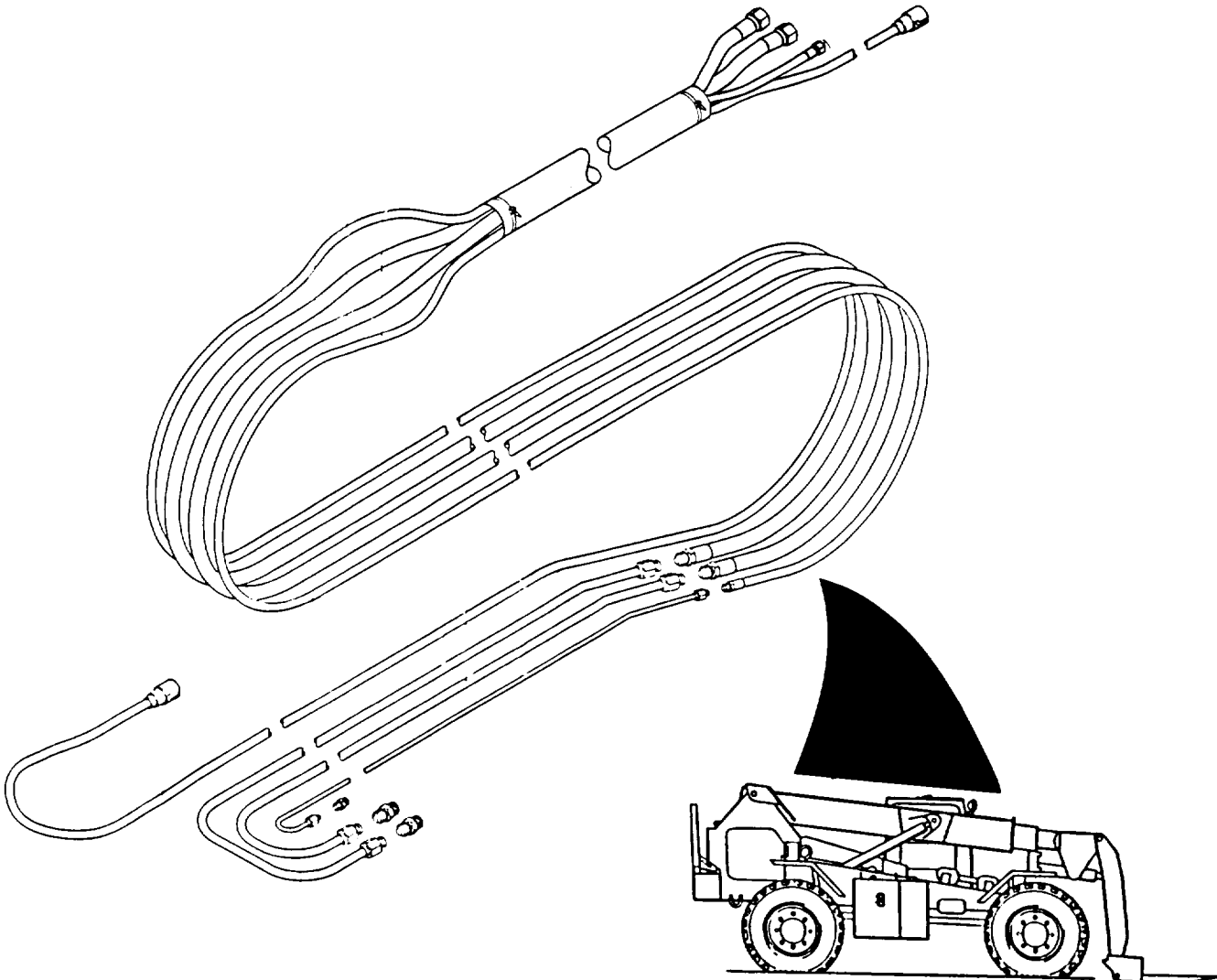
Boom extend and retract chain

sag adjusted to within

specifications, Para. 18-24.

Reference

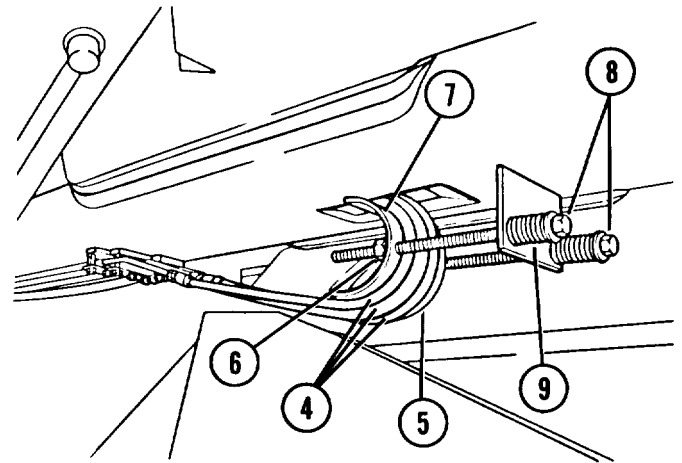
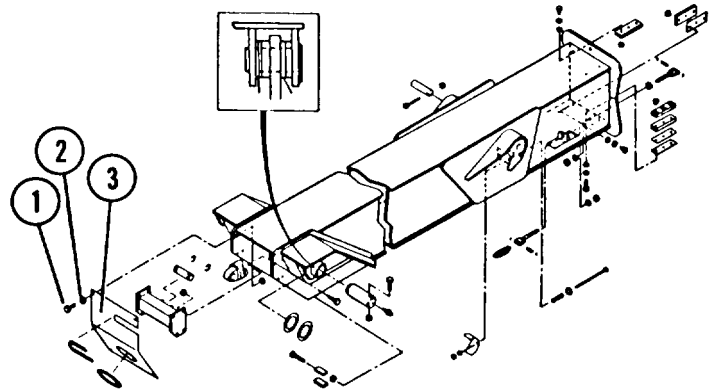
TM10-3930-660-10



18-25. BOON HYDRAULIC HOSE AND ELECTRICAL CABLE TENSION - ADJUST (Cont'd)

**CHECKING AND ADJUSTING TENSION OF BOOM
HYDRAULIC HOSES AND ELECTRICAL CABLE**

1. FULLY EXTEND BOOM AND PLACE IN HORIZONTAL POSITION, TM10-3930-660-10.
2. REMOVE FOUR BOLTS (1), FOUR LOCKWASHERS (2), AND BOOM COVER (3) FROM REAR OF BOOM. DISCARD LOCKWASHERS (2).
3. CHECK TENSION OF BOOM HYDRAULIC HOSES (4) AND ELECTRICAL CABLE (5).
 - a. Loosen two jamnuts (6) at hose tension plate (7).
 - b. Adjust hose tension bolts (8) at hose tension plate (7) until compressed length of hose tension springs (9) is 2-1/4 to 2-1/2 inches long.

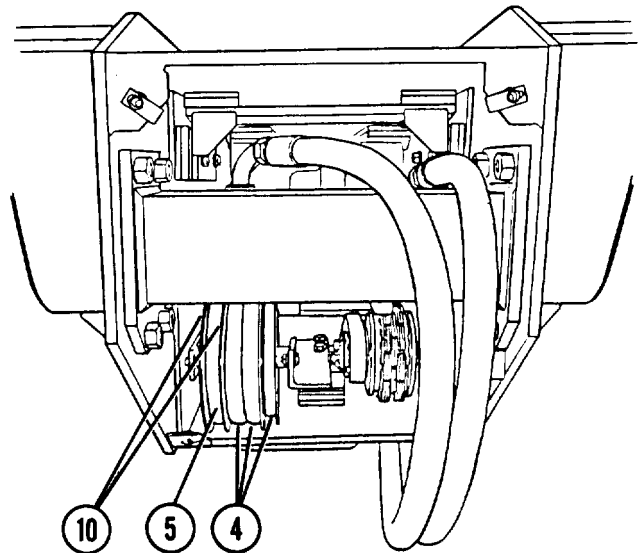

NOTE

Ensure that boom hydraulic hoses (4) and boom electrical cable (5) are routed properly over hose tension plate (7) and over pulley assembly (10) at rear of boom.

NOTE

Two of the three hydraulic hoses (4) are identical in size. Ensure that these hoses are not crossed inside the boom.

- c. Pull on hydraulic hoses (4) at pulley assembly (10) and at hose tension plate (7) to check for slack in hoses (4).
- d. Pull on boom electrical cable (5) at pulley assembly (10) and at tension plate (7) to check for slack in cable (5).
- e. If slack is found in steps 3c and/or 3d, refer to step 4 of this procedure for adjustment.



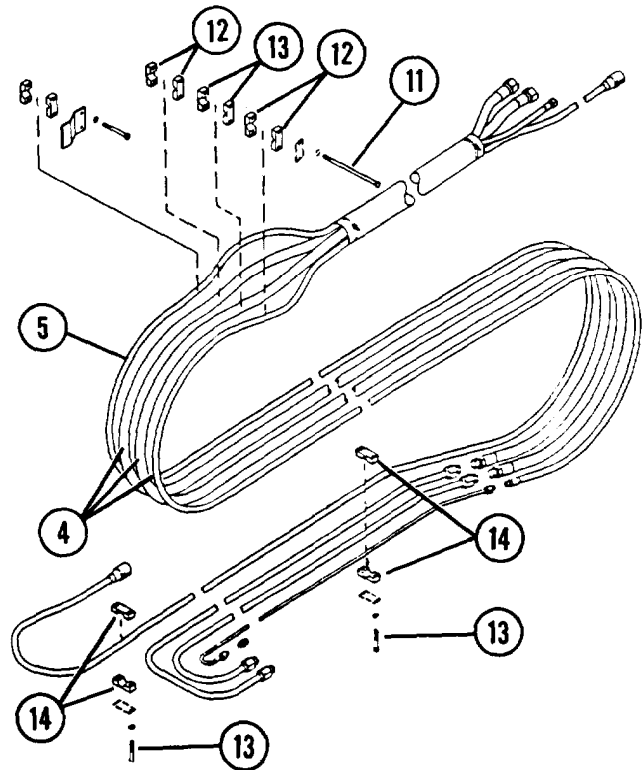
18-25. BOOM HYDRAULIC HOSE AND ELECTRICAL CABLE TENSION - ADJUST (Cont'd)

4. IF NECESSARY, ADJUST TENSION OF BOOM HYDRAULIC HOSES (4) AND BOON ELECTRICAL CABLE (5).

NOTE

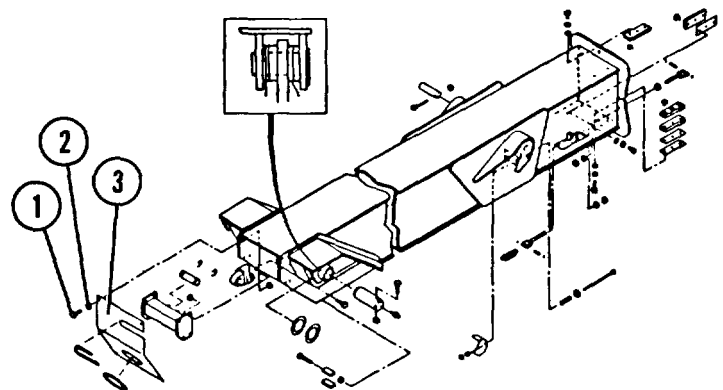
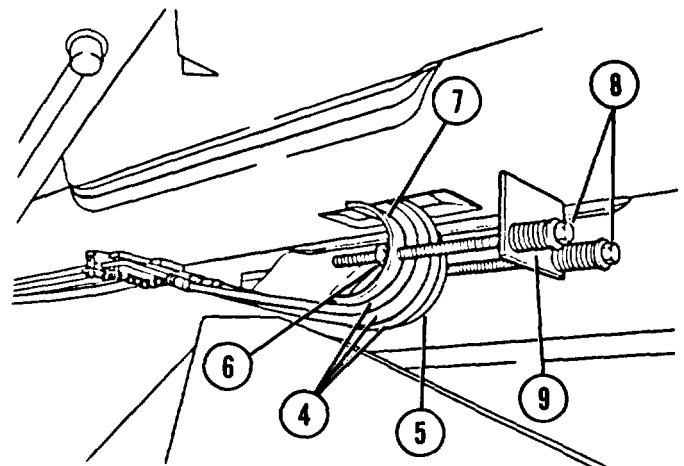
Loosen hose tension bolts (8) at hose tension plate (7) as required to temporarily relieve tension on boom hydraulic hoses (4) during steps 4a through 4c.

- a. Loosen capscrews (11) on clamp halves (12) securing boom hydraulic hoses (1) inside boom.
- b. Pull boom hydraulic hoses (4) forward of clamp halves (12) until hoses (4) are snug against pulley assembly (10) and hose tension plate (7).
- c. Tighten capscrews (11) on clamp halves (12) to secure hydraulic hoses (4) inside boom.
- d. Check for proper routing of hydraulic hoses (4) around pulley assembly (10) and hose tension plate (7).
- e. Adjust hose tension bolts (8) at hose tension plate (7) until length of hose tension springs (9) is 2-1/4 to 2-1/2 inches long.
- f. Loosen capscrews (13) securing four sets of clamp halves (14) and boom electrical cable (5) to underside of boom.
- g. Pull boom electrical cable (2) rearward at set of clamp halves (14) closest to hose tension plate (7) until cable (2) is snug against pulley assembly (10) and hose tension plate (7).



18-25. BOOM HYDRAULIC HOSE AND ELECTRICAL CABLE TENSION - ADJUST (cont'd)

- h. Tighten capscrews (13) on set of clamp halves (14) closest to hose-tension plate (7).
 - i. Check for proper routing of boom hydraulic hoses (4) and boom electrical cable (5) around pulley assembly (10) and hose tension plate (7).
 - j. Check that length of hose tension springs (9) at hose tension plate (7) is 2-1/4 to 2-1/2 inches long. If necessary, readjust hose tension bolts (8) as required.
 - k. Tighten two jamnuts (6) at hose tension plate (7).
 - l. Pull boom electrical cable (2) rearward at set of clamp halves (14) farthest from hose tension plate (7) until cable (5) is snug.
 - m. Secure boom electrical cable (5) to underside of boom by tightening capscrews (13) on remaining three sets of clamp halves (14).
5. APPLY LOCTITE 242 TO FOUR BOLTS (1). POSITION BOOM COVER (3) ON REAR OF BOOM AND SECURE WITH FOUR NEW LOCKWASHERS (2) AND FOUR BOLTS (1).
6. RETRACT BOOM, TM10-3930-660-10.



18-26. HYDRAULIC HOSES , LINES AND FITTINGS - REPLACE/RRPAIR

This task covers:

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

Initial Setup

Tools

- Tool Kit, Automotive Mechanics
- Tool Kit, Machinists: Post, Camp and Station
- Tool Outfit, Hydraulic System Test and Repair (HSTRU)
- Cap and Plug Set

Materials/Parts

- Container, 1 Gal.
- Hydraulic (App. C, Item 36)
- Lockwashers (277)
- Oil, Lubricating, (App. C, Item 35)
- Tags (App. C, Item 51)
- Tie Wraps (185, 194, 243)

Equipment Condition

- Vehicle parked on level ground.
- Wheels chocked.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil reservoir by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

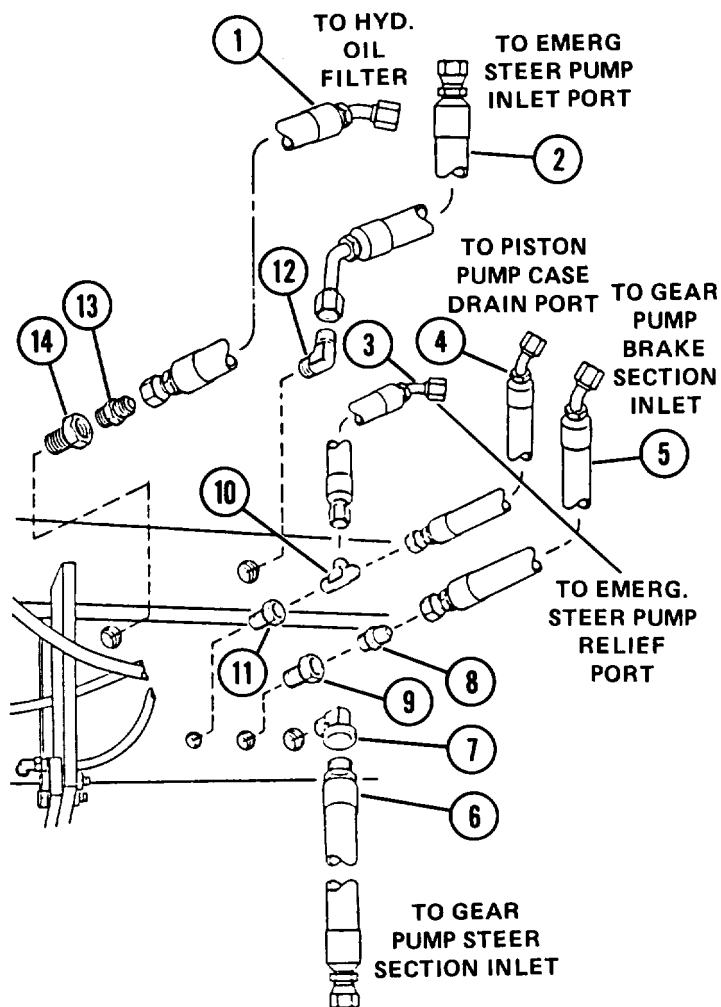
At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow oil to cool before disconnecting any hydraulic lines.

18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

CAUTION

Wipe area clean around all hydraulic connections to be opened during removal. Cap lines and plug openings after removing lines. Contamination of hydraulic system could result in premature failure.

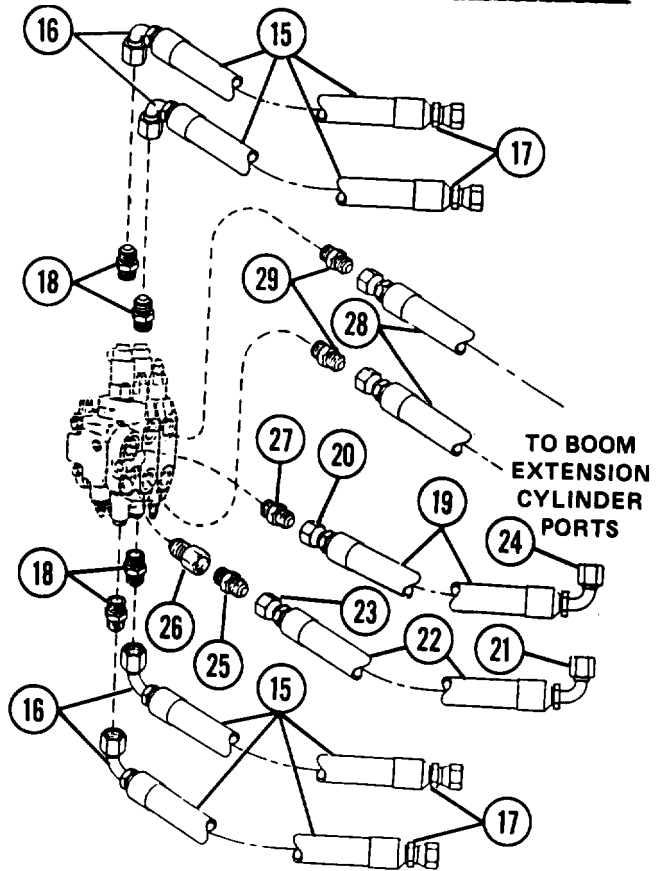
1. RESERVOIR SUCTION AND RETURN LINES AND FITTINGS.
 - a. Drain reservoir, para. 5-10.
 - b. Disconnect hose assemblies (1 through 6), as applicable.
 - c* Remove fittings (7 through 14), as necessary.



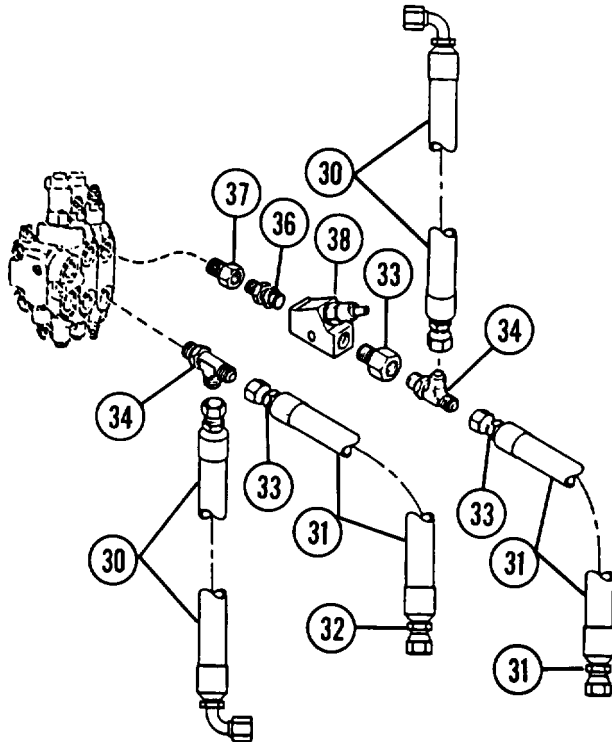
18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

2. MAIN CONTROL VALVE LINES AND FITTINGS.

- a. Disconnect four pilot circuit hose assemblies (15), as applicable.
- b. Remove fittings (18), as necessary.
- c. Remove two inlet section lines (19 and 22), as applicable.
- d. Remove fittings (25, 26 and 27), as necessary.
- e. Remove two boom extension control section hoses (28) and fittings (29), as necessary. Refer to para. 18-6.



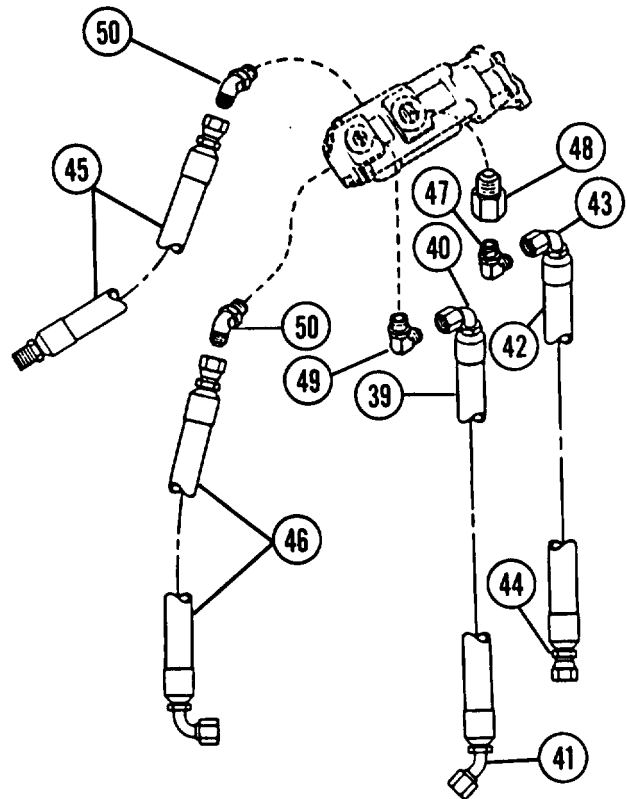
- f. Remove two hose assemblies (30) and two hose assemblies (31) from main control valve boom hoist section, as applicable.
- g. Remove fittings (34 through 37) and flow control valve (38), as necessary.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

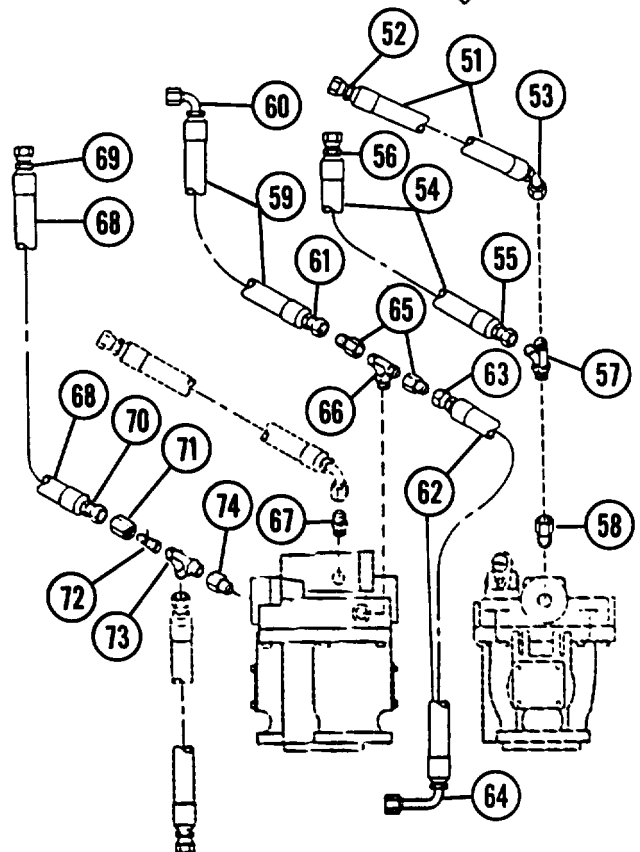
3. DUAL GEAR PUMP SUCTION AND DISCHARGE LINES AND FITTINGS.

- a. Drain reservoir, para. 5-10.
- b. Disconnect hose assemblies (39, 42, 45 and 46), as applicable.
- c. Remove fittings (47 through 50), as necessary. Refer to para. 18-4.



4. PISTON PUMP SUCTION AND DISCHARGE LINES AND FITTINGS.

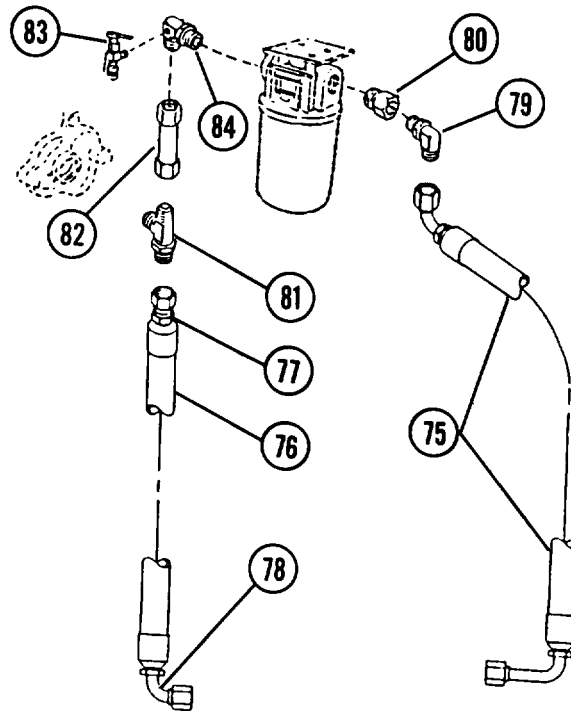
- a. Drain reservoir, para. 5-10.
- b. Disconnect hose assemblies (51 and 54), as applicable.
- c. Remove fittings (57 and 58), as necessary.
- d. Disconnect hose assemblies (59 and 62), as applicable.
- e. Remove fittings (65, 66 and 67), as necessary.
- f. Disconnect hose assembly (68).
- g. Remove fittings (71 through 74), as necessary. Refer to para. 18-5.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

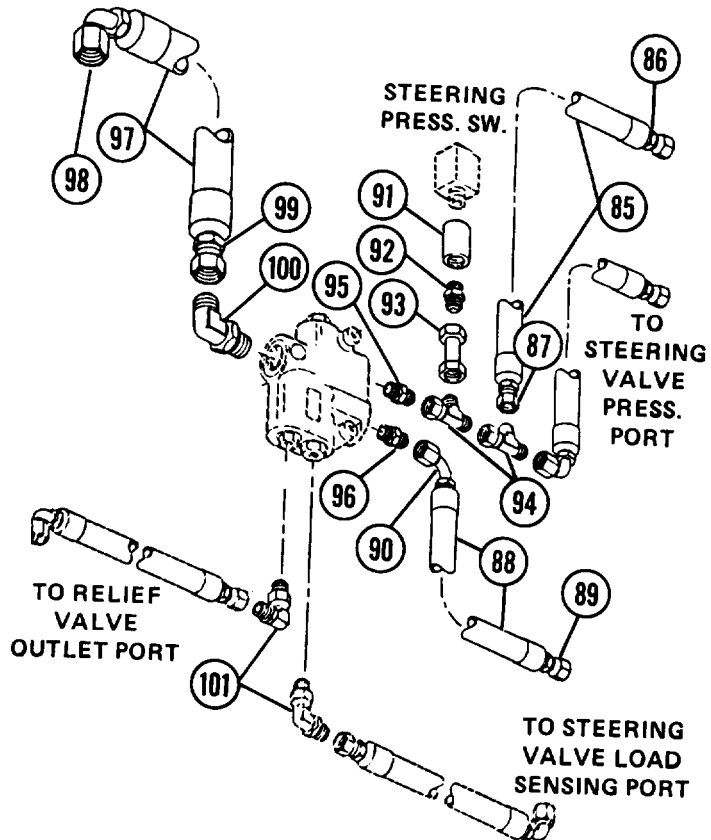
5. HYDRAULIC OIL FILTER INLET AND OUTLET LINES AND FITTINGS.

- a. Disconnect hose assemblies (75 and 76).
- b. Remove fittings (79 through 84), as necessary. Refer to para. 18-30.



6. PRIORITY VALVE LINES AND FITTINGS.

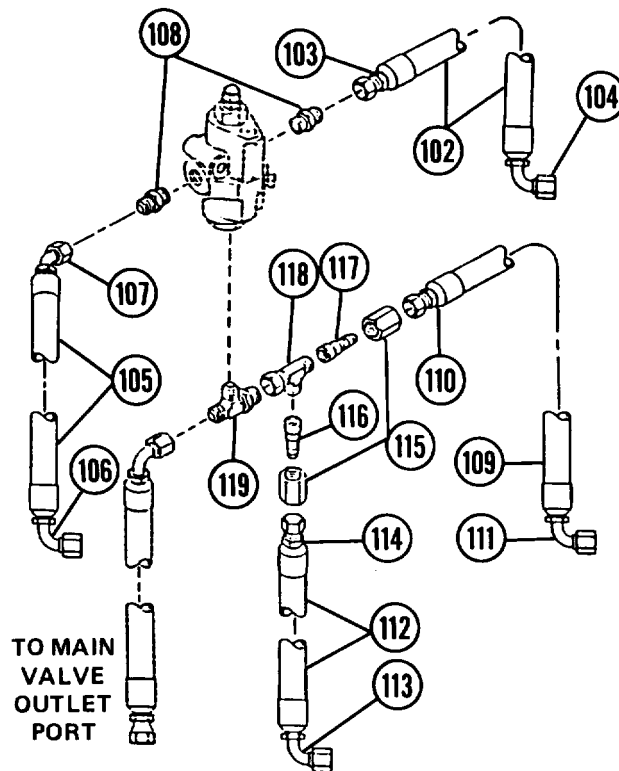
- a. Disconnect hose assemblies (85 and 88), as applicable.
- b. Remove fittings (91 through 96), as necessary.
- c. Disconnect hose assembly (97).
- d. Remove fittings (100 and 101), as necessary. Refer to para. 18-8.



18-26. HYDRAULIC HOSES , LINES AND FITTING - REPLACE/REPAIR (Cont'd)

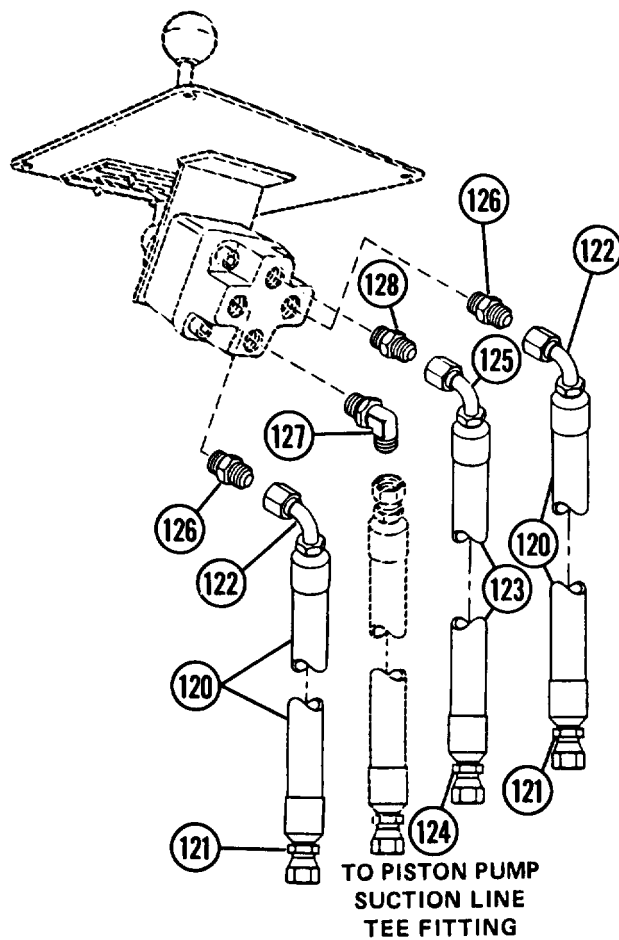
7. RELIEF VALVE LINES AND FITTINGS.

- a. Disconnect hose assemblies (102 and 105).
- b. Remove fittings (108), as necessary.
- c. Disconnect hose assemblies (109 and 114).
- d. Remove fittings (115 through 119), as necessary. Refer to para. 18-9.



8. FRAME TILT VALVE LINES AND FITTINGS.

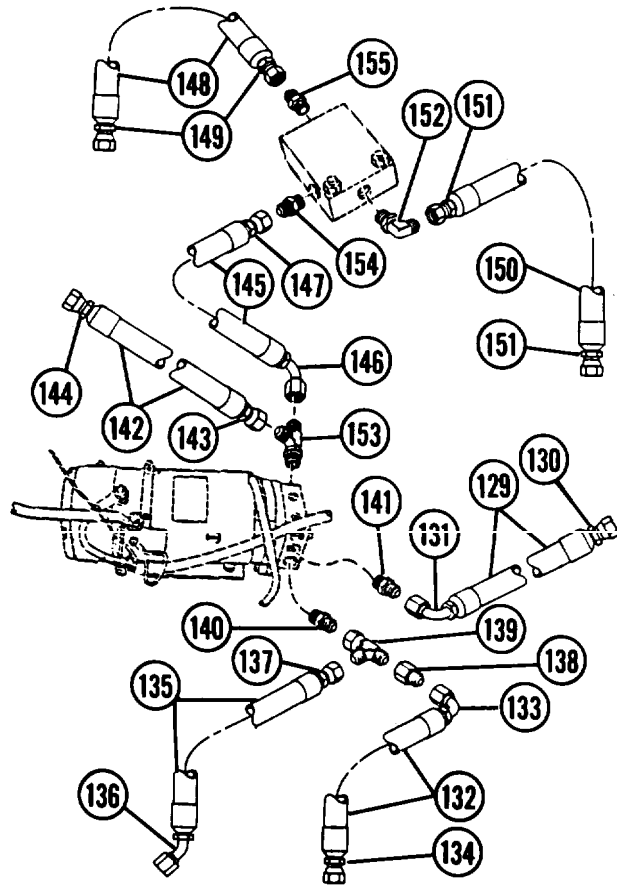
- a. Disconnect hose assemblies (120 and 123).
- b. Remove fittings (126, 127 and 128), as necessary. Refer to para. 18-11.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

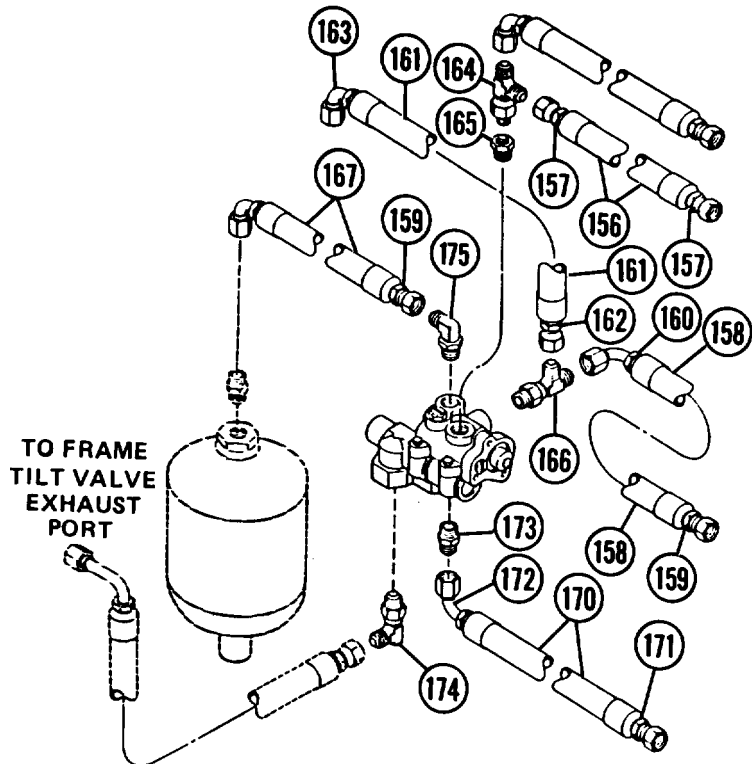
9. EMERGENCY STEERING PUMP AND SHUTTLE VALVE LINES AND FITTINGS.

- a. Disconnect hose assemblies (129, 132 and 135) from emergency steering pump.
- b. Remove fittings (138 through 141), as necessary.
- c. Disconnect hose assemblies (142, 145, 148, and 150) from shuttle valve.
- d. Remove fittings (152 through 155), as necessary. Refer to para. 14-6.



10. BRAKE VALVE AND ACCUMUATOR LINES AND FITTINGS.

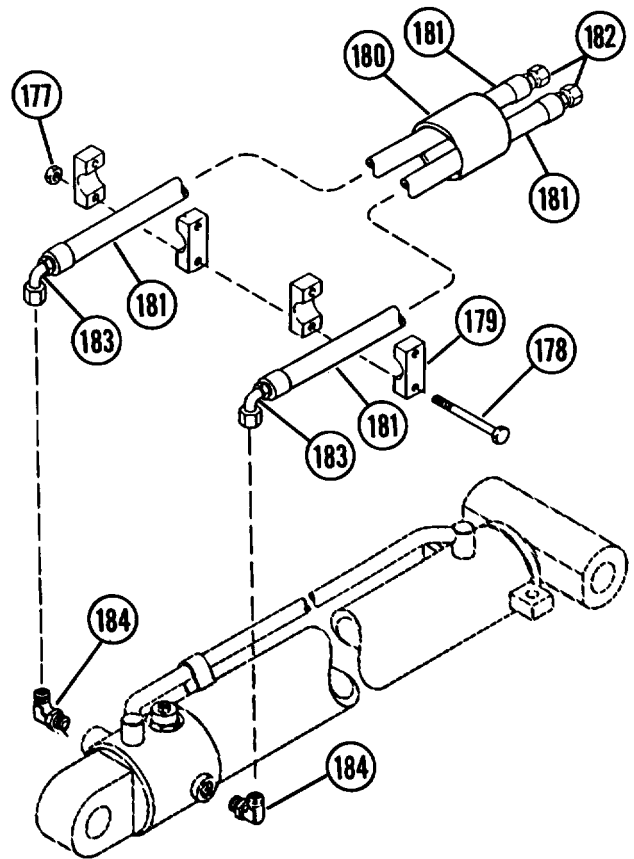
- a. Disconnect hose assemblies (156, 158 and 161).
- b. Remove fittings (164, 165 and 166), as necessary.
- c. Disconnect hose assemblies (167 and 170).
- d. Remove fittings (173, 174 and 175), as necessary. Refer to Para. 12-7.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/-AIR (Cont 'd)

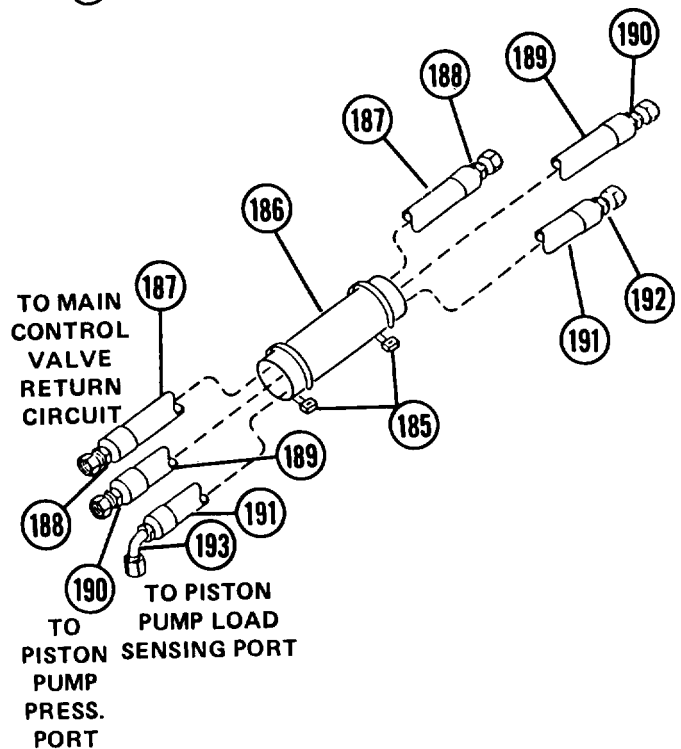
11. BOOM EXTENSION CYLINDER LINES AND FITTINGS .

- a. Remove two nuts (177), two capscrews (178) and four clamp halves (179) .
- b. Remove tie wraps (not shown) and protective sleeve (180). Discard tie wraps.
- c. Remove two hose assemblies (181) and two elbows (184). Refer to Boom Hydraulic Hoses, para. 18-25.



12. MLRS ATTACHMENT LINES TO BOOM BULKHEAD.

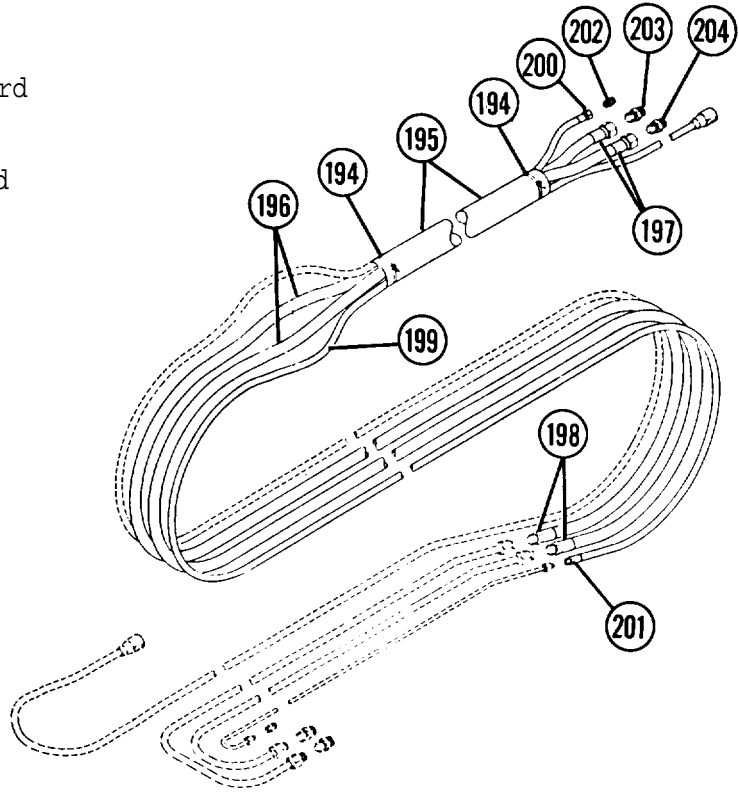
- a. Remove two tie wraps (185) and Protective sleeve (186). Discard tie wraps (185).
- b. Remove hose assemblies (187, 189 and 191), as necessary.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

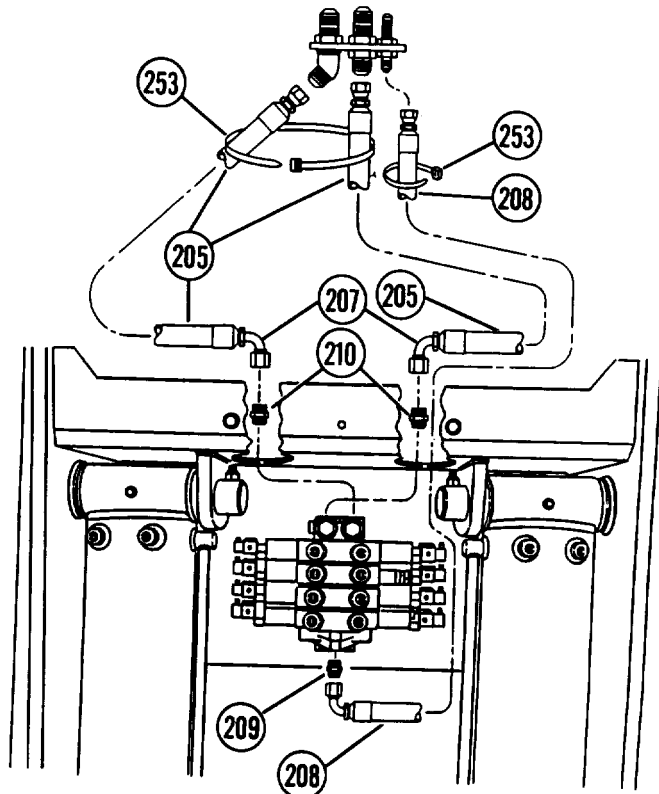
13. BOOM HYDRAULIC LINES AND FITTINGS.

- a. Remove two tie wraps (194) and protective sleeve (195). Discard tie wraps (194).
- b. Remove hose assemblies (196 and 199), as necessary.
- c. Remove fittings (202, 203 and 204), as necessary.



14. BOOM TO ATTACHMENT CONTROL VALVE HYDRAULIC LINES AND FITTINGS.

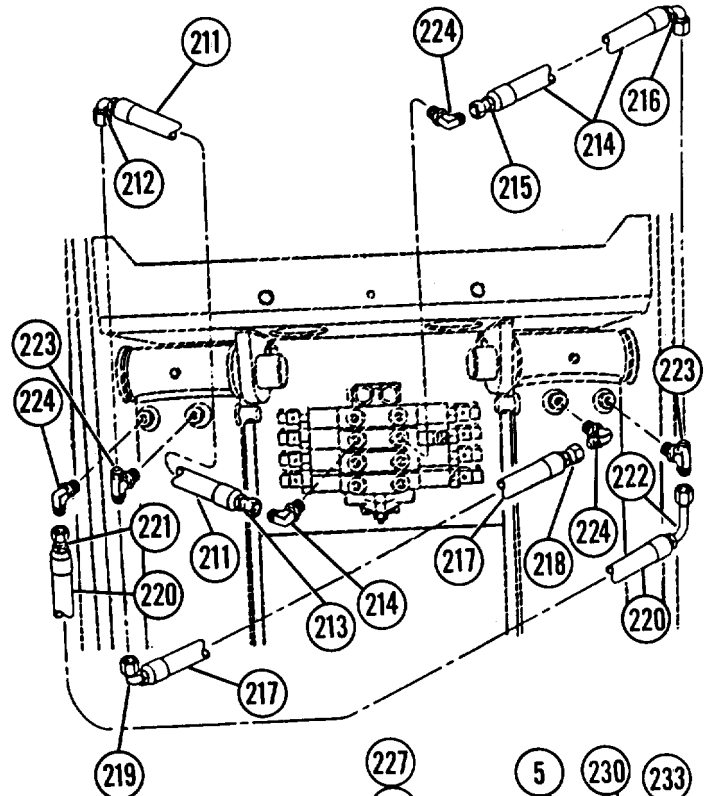
- a. Remove and discard two tie wraps (253).
- b. Remove hose assemblies (205 and 208), as applicable.
- c. Remove fittings (209 and 210) as necessary. Refer to para. 18-7.



18-26. HYDRAULIC HOSES LINES AND FITTINGS - REPLACE/REPAIR Cont'd)

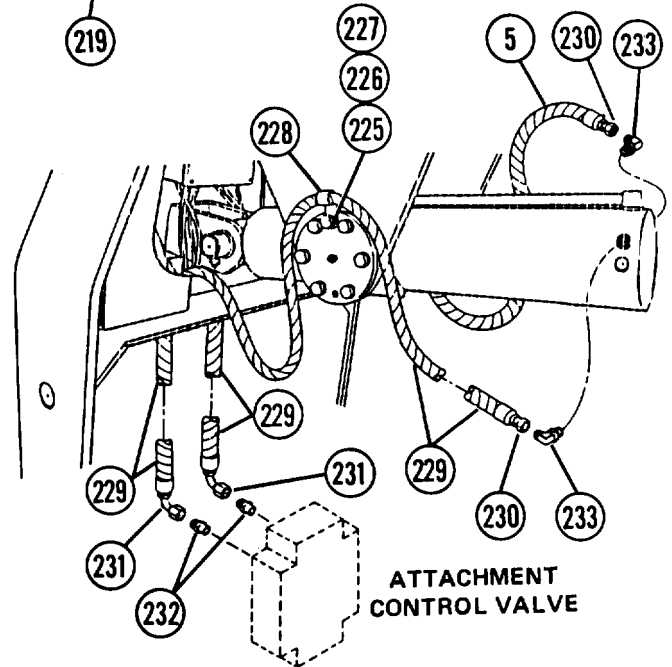
15. FORK TILT CYLINDERS TO ATTACHMENT CONTROL VALVE HYDRAULIC LINES AND FITTINGS .

- a. Remove hose assemblies (211, 214, 217 and 220), as applicable.
- b. Remove two tee fittings (223) and four elbows (224), as necessary. Refer to para. 18-15.



16. ATTACHMENT TILT CYLINDER HYDRAULIC LINES AND FITTINGS.

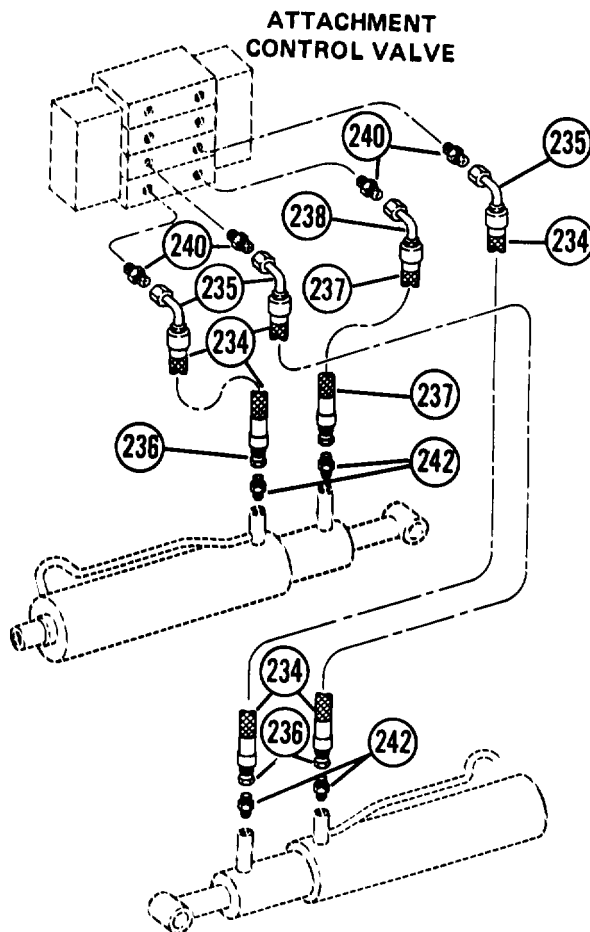
- a. Remove two capscrews (225), two flatwashers (226), two lockwashers (227) and two hose supports (228). Discard lockwashers (227).
- b. Remove hose assemblies (229).
- c. Remove fittings (232 and 233), as necessary. Refer to para. 18-33.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

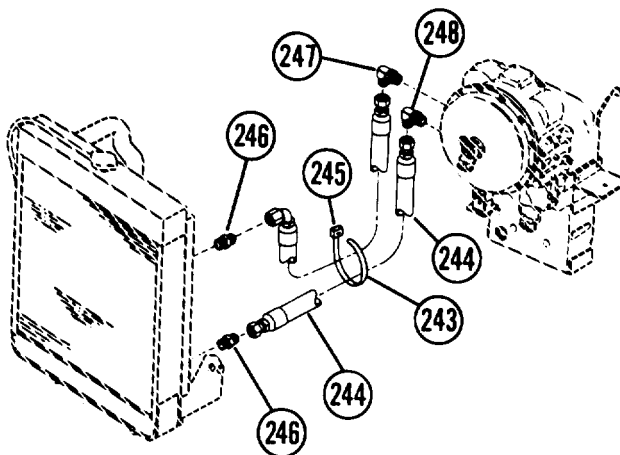
17. FORK SIDESHIFT CYLINDERS HYDRAULIC LINES AND FITTINGS.

- a. Remove three hose assemblies (234) and hose assembly (237).
- b. Remove fittings (240, 241 and 242), as necessary. Refer to para. 18-31.



18. TRANSMISSION OIL COOLER LINES AND FITTINGS.

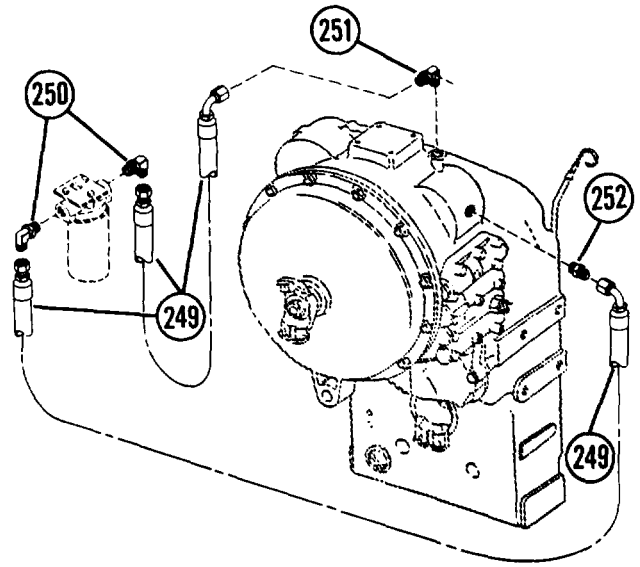
- a. Remove and discard tie wraps (243).
- b. Remove two hose assemblies (244 and 245).
- c. If necessary, remove two adapters (246), and two elbows (247) and (248).



10-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

19. TRANSMISSION OIL FILTER LINES AND FITTINGS.

- a. Remove two hose assemblies (249).
- b. If necessary, remove two elbows (250), elbow (251), and adapter (252).


20. TRANSMISSION DISCONNECT LINE AND FITTINGS.

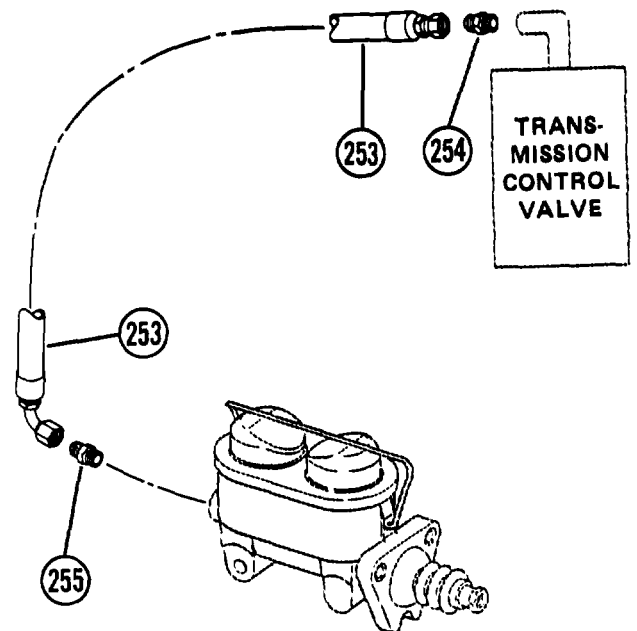
- a. Remove hose assembly (253) at transmission control valve.
- b. Remove hose assembly (253) at transmission disconnect master cylinder.
- c. If necessary remove fittings (254) and (255).

INSPECTION

1. INSPECT ALL FITTINGS FOR DAMAGED THREADS AND FOR DAMAGED OR OTHERWISE FAULTY O-RING SEALS, IF SO EQUIPPED.
2. INSPECT HOSE ASSEMBLIES FOR CUTS, BREAKS AND FOR SIGNS OF DETERIORATION THAT COULD LEAD TO LEAKS .

REPAIR

1. SOME HYDRAULIC SYSTEM HOSES CAN BE REPAIRED BY SUBSTITUTING THREADED-TYPE FITTINGS FOR ORIGINAL FITTINGS THAT ARE DAMAGED OR OTHERWISE UNUSABLE. REPLACEMENT FITTING INFORMATION IS PROVIDED IN PARTS BOOK, TM10-3930-660-24P.
2. IF THREAD-TYPE FITTINGS ARE NOT AVAILABLE FOR A PARTICULAR HOSE ASSEMBLY, THAT HOSE ASSEMBLY MUST BE REPLACED AS A COMPLETE ASSEMBLY.



18-26. HYDRAULIC HOSES, LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

INSTALLATION

CAUTION

If removed, tighten elbow (251) and adapter (252) to 55 ft. lb. during installation. Do not overtighten. Failure to follow this instruction could result in damage to transmission hose ports.

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on hoses and components to which they connect clean and dry. Apply a film of clean hydraulic oil to all O-ring seals on fittings as fittings are installed.

1. INSTALL FITTINGS AND HOSE ASSEMBLIES (1 THROUGH 242), AS APPLICABLE.
2. IF INSTALLING A FITTING EQUIPPED WITH AN O-RING, FIRST APPLY CLEAN HYDRAULIC OIL TO O-RING.
3. IF PREVIOUSLY DRAINED, REFILL HYDRAULIC RESERVOIR TO PROPER LEVEL, PARA. 5-10.
4. START ENGINE AND OPERATE ALL HYDRAULIC SYSTEMS IN WHICH HOSE ASSEMBLIES AND/OR FITTINGS HAVE BEEN REPLACED. CHECK CAREFULLY FOR LEAKS.
5. CORRECT ANY LEAKS BY TIGHTENING CONNECTION OR PART REPLACEMENT BEFORE RESUMING VEHICLE OPERATION.

18-27. HYDRAULIC TUBING - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

Initial Setup

Tools

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Cap and Plug Set

Materials/Parts

Caps
Container, 1 Gal.
Lockwasher (5)

Equipment Condition

Vehicle parked on level ground.
Wheels chocked.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil reservoir by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

18-27. HYDRAULIC TUBING - REPLACE (Cont'd)

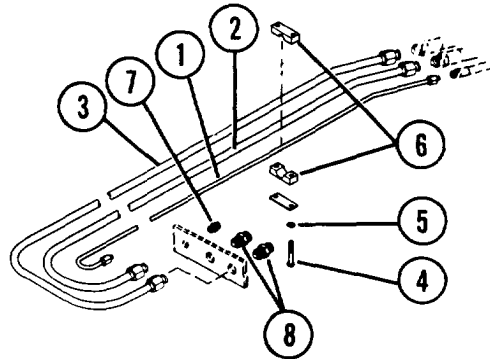
CAUTION

Wipe area clean around all hydraulic connections to be opened during removal. Cap lines and plug openings after removing lines. Contamination of hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

1. DISCONNECT TUBING ASSEMBLIES (1, 2 AND 3) FROM RESPECTIVE HOSE ASSEMBLIES.
2. DISCONNECT OPPOSITE ENDS OF TUBING ASSEMBLIES (1, 2 AND 3) FROM BULKHEAD FITTINGS (7 AND 8).
3. LOOSEN CAPSCREWS (4) AND LOCKWASHERS (5) SECURING FOUR SETS OF CLAMP HALVES (6) TO UNDERSIDE OF BOOM.
4. REMOVE TUBING ASSEMBLIES (1, 2 AND 3) FROM VEHICLE.



INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

1. LOOSELY CONNECT TUBING ASSEMBLIES (1, 2 AND 3) TO RESPECTIVE HOSE ASSEMBLIES AND TO BULKHEAD FITTINGS (7 AND 8).
2. SECURE TUBING ASSEMBLIES (1, 2, AND 3) USING CAPSCREWS (4), LOCKWASHERS (5) AND CLAMPS (6).
3. AFTER ENSURING THAT TUBING ASSEMBLIES (1, 2 AND 3) ARE NOT BINDING AT EITHER END, TIGHTEN CONNECTIONS SECURELY.

18-28. HYDRAULIC OIL SAMPLING VALVE - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Cap and Plug Set

Materials/Parts

Loctite 59241 (APP. C, Item 42)

Equipment Condition

Engine OFF and cool.
Transmission cover removed
para. 16-6.

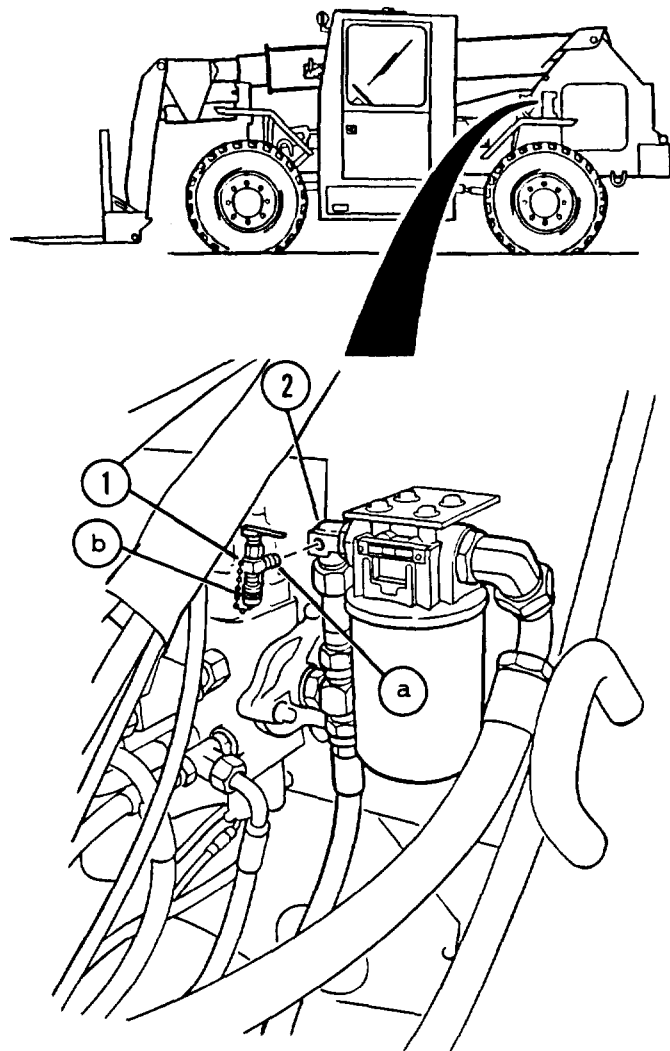
REMOVAL
WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

1. UNSCREW HYDRAULIC OIL SAMPLING VALVE (1) FROM ELBOW (2).



18-28. HYDRAULIC OIL SAMPLING VALVE - REPLACE (Cont'd)

2. PLUG OPEN HOLE IN ELBOW (2).

INSTALLATION

1. APPLY LOCTITE 59241 TO THREADS (a)
OF SAMPLING VALVE (1).
2. REMOVE PLUG FROM ELBOW (2) AND SCREW
HYDRAULIC OIL SAMPLING VALVE (1) INTO
ELBOW (2). MAKE SURE DRAIN END (b) OF
VALVE (1) IS FACING DOWN.
3. INSTALL TRANSMISSION COVER,
PARA. 16-6.

18-29. HYDRAULIC OIL STRAINERS - SERVICE/REPLACE

This task covers:

- a. Service
- b. Removal
- c. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Cleaning Solvent (APP. C, Item 48)

Gasket (8)

Lockwashers (5)

Equipment Condition

Fuel/hydraulic tank drained of hydraulic oil, para. 5-10.

SERVICE

1. REMOVE THE STRAINERS (1) AND (2). SEE REMOVAL, IN THIS PARAGRAPH.

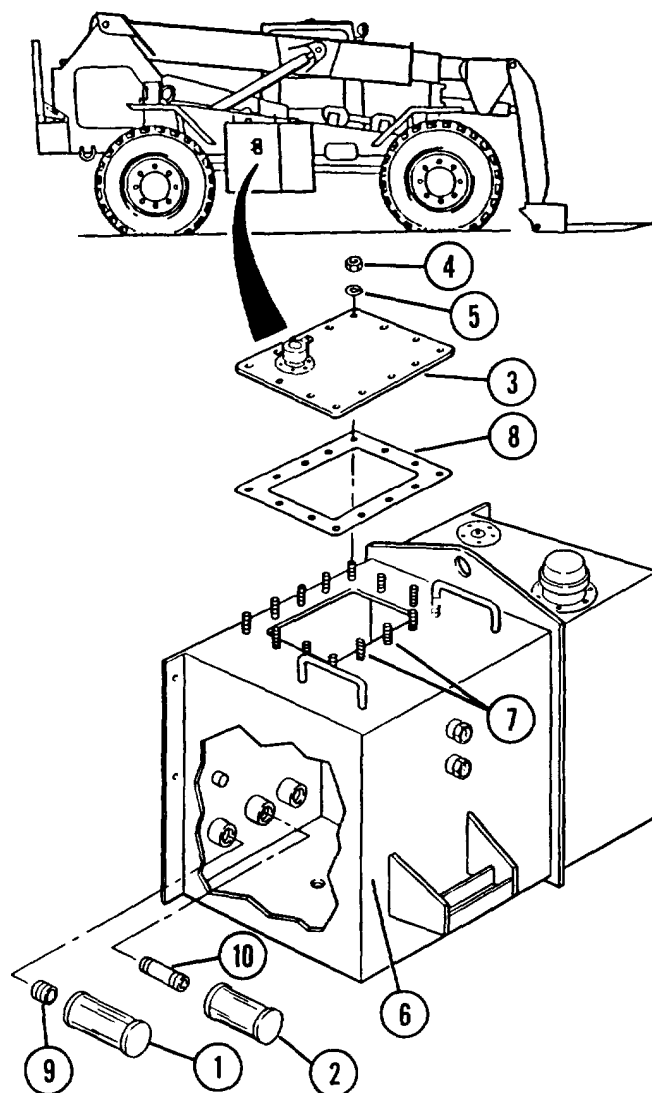
WARNING

Cleaning solvents are flammable; do not smoke or have open flames near the solvent. Do not allow solvent to come in contact with skin; it can cause irritation or burns.

2. CLEAN THE STRAINERS (1) AND (2) USING CLEANING SOLVENT.
3. INSTALL THE STRAINERS (1) AND (2). SEE INSTALLATION IN THIS PARAGRAPH.

REMOVAL

1. REMOVE ACCESS COVER (3).
 - a. Remove the fourteen nuts (4) and fourteen lockwashers (5) that secure access cover (3) to hydraulic tank (6). Discard lockwashers (5).
 - b. Lift access cover (3) off of studs (7).



18-29. HYDRAULIC OIL STRAINER - SERVICE/REPLACE (Cont 'd)

- c. Remove and discard gasket (8).
2. IF NECESSARY UNSCREW AND REMOVE STRAINERS (1) AND (2) FROM NIPPLES (9) AND (10) INSIDE TANK (6) .
3. IF NECESSARY, UNSCREW AND REMOVE NIPPLE (9) AND NIPPLE (10) FROM TANK (6).

INSTALLATION

1. IF NECESSARY, INSTALL NIPPLES (9) AND (10) BY SCREWING INTO **TANK** (6).
2. INSTALL STRAINERS (1) AND (2) BY SCREWING ONTO NIPPLES (9) AND (10).
3. INSTALL ACCESS COVER (3).
 - a. Position new gasket (8) and **cover** (3) on studs (7).
 - b. Secure cover (3) with fourteen new lockwashers (5) and fourteen nuts (4).
4. FILL FUEL/HYDRAULIC TANK WITH HYDRAULIC OIL, PARA. 5-10.

18-30. HYDRAULIC OIL FILTER - REP-

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Strap Wrench, 1-6" Capacity

Cap and Plug Set

Equipment Condition

Vehicle parked on level ground.

Transmission cover removed,
para. 16-6.

Hydraulic tank drained, para. 5-10.

Materials/Parts

Container, 1 Gal.

Hydraulic Oil (App. C, item 35)

Lockwashers (9)

Loctite 242 (App. C, Item 39)

Loctite 59241 (App. C, Item 42)

Tags (APP. C, Item 51)

WARNING

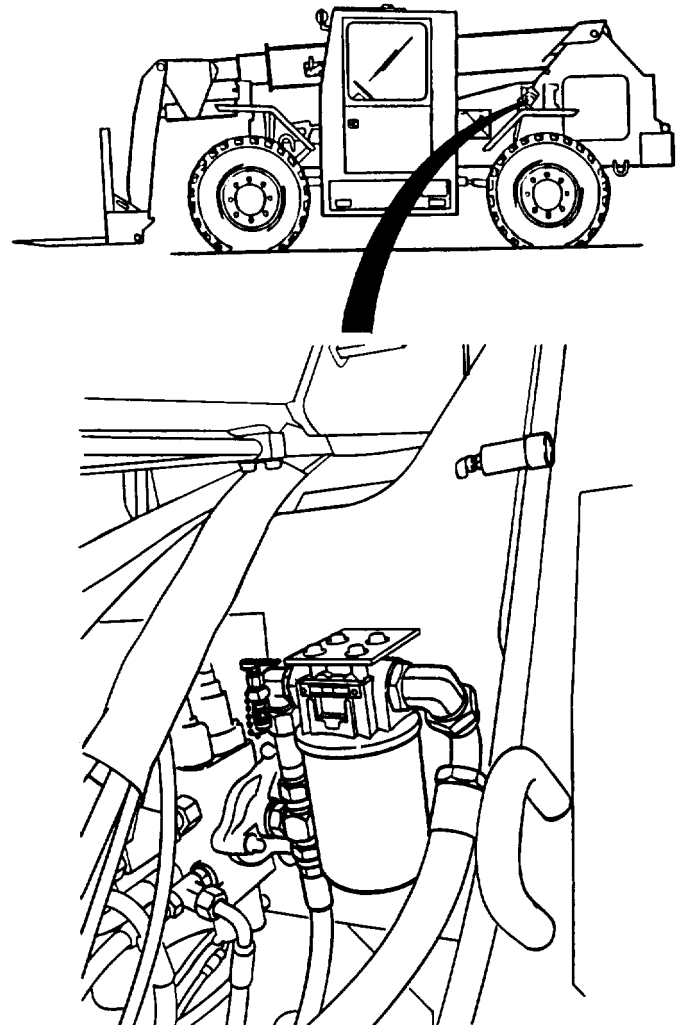
Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

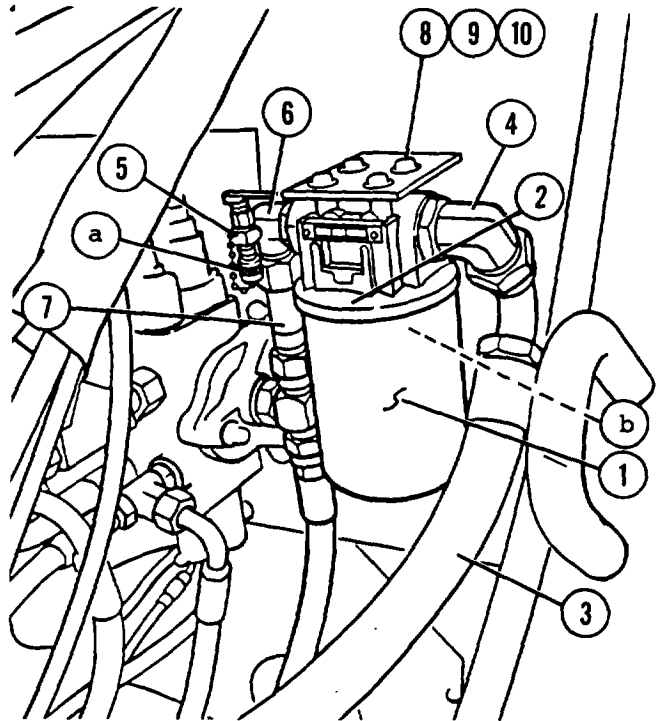
If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.



18-30. HYDRAULIC OIL FILTER - REPLACE (Cont'd)

REMOVAL

1. UNSCREW HYDRAULIC FILTER ELEMENT (1) FROM FILTER BASE (2) . DISCARD FILTER ELEMENT (1) .
2. IF NECESSARY, REMOVE HYDRAULIC FILTER BASE (2) FROM VEHICLE.
 - a. Remove hose (3) and elbow (4) from filter base (2). Plug hose (3).
 - b. Unscrew sampling valve (5) from elbow (6).
 - c. Remove elbow (6).
 - d. Remove four screws (8), lockwashers (9), and flatwashers (10). Discard lockwashers (9).
 - e. Remove filter base (2) from the vehicle.



INSTALLATION

NOTE

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry. Apply film of clean hydraulic oil to all seals as they are installed.

NOTE

Apply Loctite 242 to threads of screws (8) as installed.

1. IF REMOVED, INSTALL FILTER BASE (2) ON VEHICLE.
 - a. Support and position filter base (2) on vehicle. Install four flatwashers (10), four new lockwashers (9), and four screws (8) to secure filter base (2) to vehicle.
 - b. Install elbow (6).

c. Apply Loctite 59241 to threads of sampling valve (5) and screw sampling valve (5) into elbow (6) . Be sure drain end of valve (a) is facing down.

d. Install elbow (4) and hose (3) to filter base (2).

2. INSTALL FILTER ELEMENT (1)

a. Lubricate the seal on new filter (b) with a thin coat of fresh oil.

b. Screw new filter element (1) onto base (2).

3. START AND RUN ENGINE FOR ONE MINUTE. CHECK FOR LEAKS AT FILTER ASSEMBLY AND AT HYDRAULIC CONNECTIONS.

4. REFILL HYDRAULIC TANK, PARA. 5-10.

5. INSTALL TRANSMISSION COVER, PARA. 16-6.

18-31. FORK SIDESHIFT CYLINDERS - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics
 Cap and Plug Set
 Shop Equipment, Automotive
 Maintenance, Common #2 Less Power

Equipment Condition

Vehicle parked on level ground.
 Parking brake set.
 Wheels blocked.
 Boom in horizontal position,
 properly supported.
 Fork autoleveler switch and cover
 removed, para. 8-55.

Materials/Parts

Cotter Pins (7, 12)
 Fluid Container, 1 Gal.
 Loctite 242 (App. C, Item 39)
 Tags (App. C, Item 51)
 Thrust Bushings (15)

Personnel Required

Two Personnel

Reference

TM10-3930-660-10

REMOVAL
WARNING

Hydraulic oil, in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic

CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

18-31. FORK SIDESHIFT CYLINDERS - REPLACE (Cont'd)

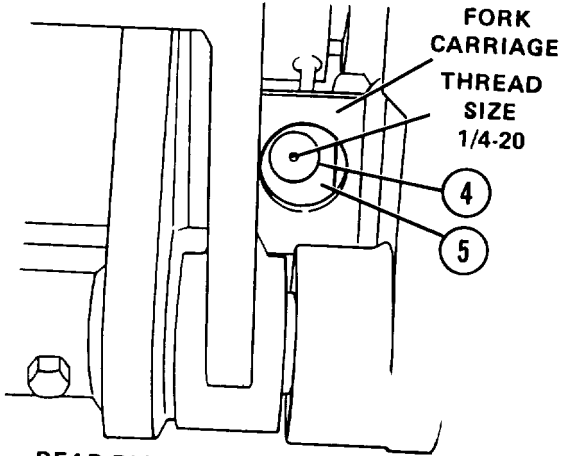
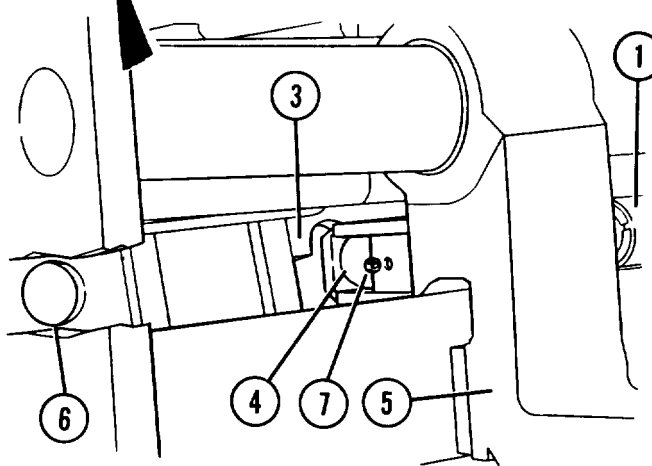
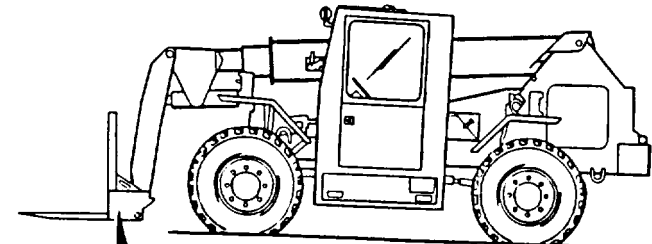
1. REMOVE RIGHT FORK SIDESHIFT CYLINDER (1).

- a. Shift left fork (2) to left side of fork carriage (3), TM10-3930-660-10.
- b. Remove cotter pin (7) from right fork sideshift cylinder (1). Discard cotter pin (7).
- c. With an assistant, align pin (4) in right fork (5) with access hole (6) in fork carriage.
- d. Use a slide hammer to remove pin (4) through access hole (6).

NOTE

The thread size of hole in end of pin is 1/4-20.

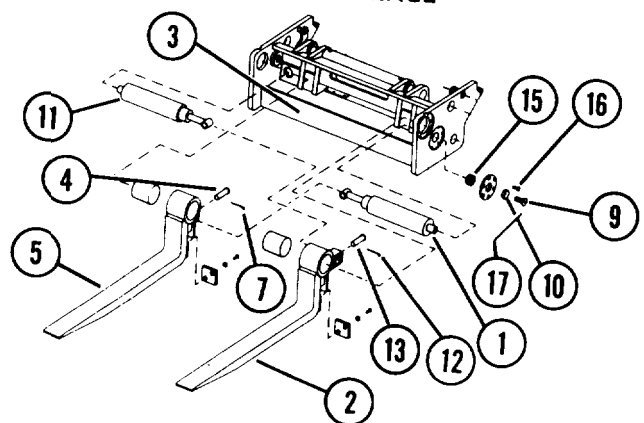
- e. Operate controls to shift right fork (5) to left side of fork carriage (3). The right fork (5) will not move but right fork sideshift cylinder (1) will be fully retracted.
- f. Tag and disconnect two hydraulic lines (8) from right fork sideshift cylinder (1). Plug and/or cap all hydraulic fittings.
- g. Remove socket head screw (9) and retainer (10) from left side of fork carriage (3).
- h. Lift right fork sideshift cylinder (1) from fork carriage (3).



REAR RIGHT SIDE VIEW OF FORK CARRIAGE

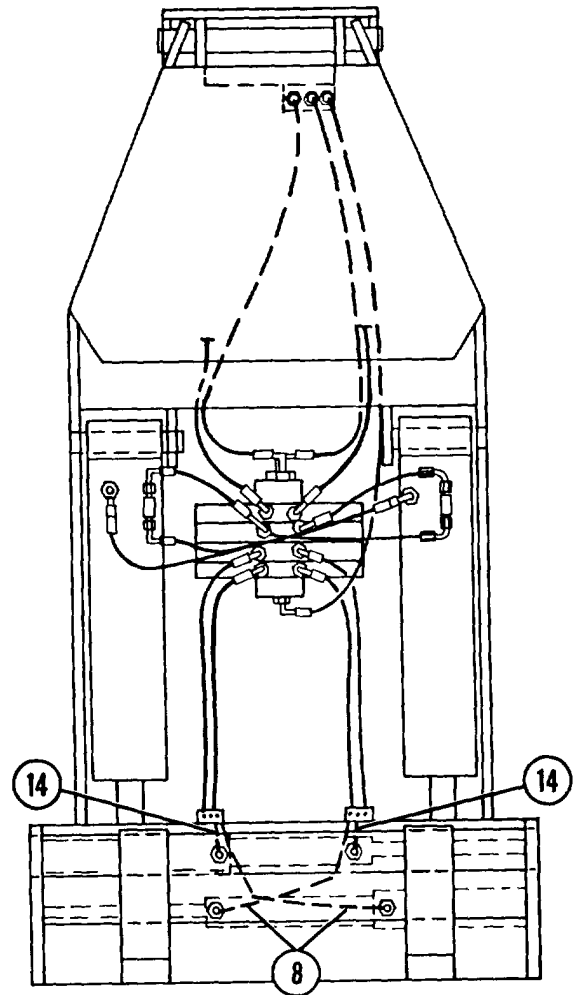
2. REMOVE LEFT FORK SIDESHIFT CYLINDER (11).

- a. Align left fork (2) with left notch in fork carriage (3).
- b. Remove cotter pin (12) and pin (13) from left fork sideshift cylinder (11). Discard cotter pin (12).



18-31. FORK SIDESHIFT CYLINDERS - REPLACE (Cont'd)

- c. operate controls to shift left fork (2) to right side of fork carriage (3). The left fork (2) will not move but left fork sideshift cylinder (11) will be fully retracted.
 - d. Tag and disconnect two hydraulic lines (14) from left fork sideshift cylinder (11). Plug and/or cap all hydraulic fittings.
 - e. Remove socket head screw (9) and retainer (10) from right side of fork carriage (3).
 - f. Lift left fork sideshift cylinder (11) from fork carriage (3).
3. IF NECESSARY REMOVE THRUST BUSHINGS (15).
 - a. Remove six screws (16).
 - b. Remove thrust bushing retainer (17).
 - c. Push thrust bushing (15) to inside of fork carriage (3) to remove.
 - d. Repeat steps a-c for other thrust bushing (15).

**INSTALLATION****NOTE**

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on valve and hoses clean and dry.

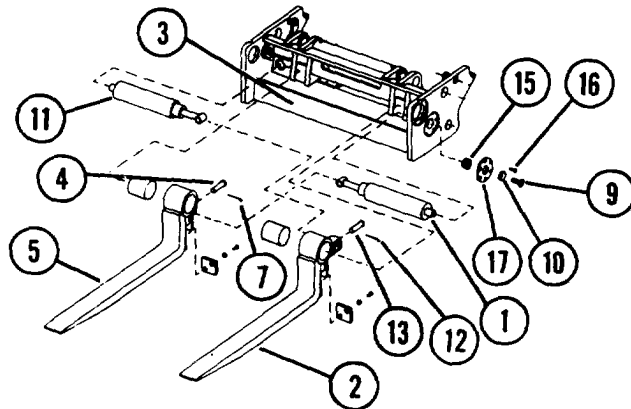
1. IF REMOVED, INSTALL THRUST BUSHINGS (15).
 - a. Press new thrust bushing (15) into position from inside of fork carriage (3).
 - b. Install thrust bushing retainer (17).

18-31. FORK SIDESHIFT CYLINDERS - REPLACE (Cont'd)

NOTE

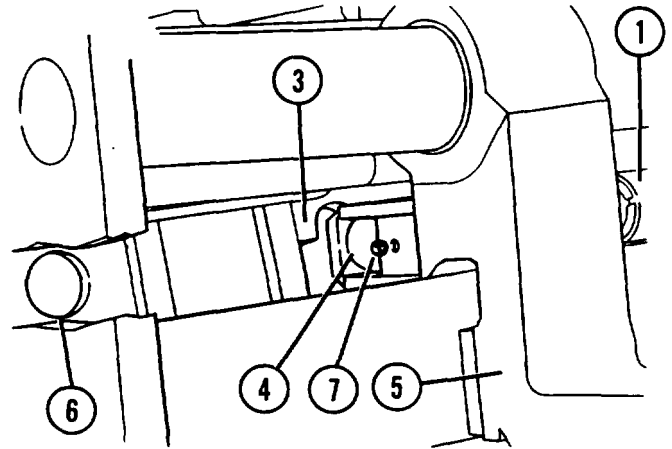
Apply Loctite 242 to threads of screws (16) as installed.

- c. Install six screws (16).
 - d. Repeat steps a-c for other thrust bushing (15).
2. INSTALL LEFT FORK SIDESHIFT CYLINDER (11) .
- a. Place left fork sideshift cylinder (11) in fork carriage (3).
 - b. Apply Loctite 242 to threads of socket head screw (9).
 - c. Install socket head screw (9) and retainer (10) in right side of fork carriage (3). Torque socket head screw (9) to 46 lb. ft.
 - d. Install two hydraulic lines (14) on left fork sideshift cylinder (11). Refer to tags for identification of hydraulic lines (14).
 - e. Align left fork (2) with left notch in fork carriage (3).
 - f. Extend left fork sideshift cylinder (11) until it aligns with left fork (2), TM10-3930-660-10.
 - g. Install pin (13) in left fork sideshift cylinder (11).
 - h. Install new cotter pin (12) in right side of pin (13).
3. INSTALL RIGHT FORK SIDESHIFT CYLINDER (1).
- a. Place right fork sideshift cylinder (1) in fork carriage (3).
 - b. Apply Loctite 242 to threads of socket head screw (9).



18-31. FORK SIDESHIFT CYLINDERS - REPLACE (Cont'd)

- c. Install socket head screw (9) and retainer (10) in left side of fork carriage (3). Torque socket head screw (9) to 46 lb. ft.
 - d. Install two hydraulic lines (8) on right fork sideshift cylinder (1). Refer to tags for identification of hydraulic lines (8).
 - e. Shift left fork (2) to left side of fork carriage (3).
 - f. Align pin (4) hole in right fork (5) with access hole (6) in fork carriage (3).
 - g. Extend right fork sideshift cylinder (1) until it aligns with access hole (6) in fork carriage end pin (4) hole in right fork (5) 1
 - h. Install pin (4) in right fork sideshift cylinder (1).
 - i. Install new cotter pin (7) in left side of pin (4).
4. INSTALL FORK AUTOLEVELER SWITCH AND COVER, PARA. 8-55.
 5. CYCLE FORK SIDESHIFT CYLINDERS FIVE TIMES TO BLEED ANY AIR IN HYDRAULIC SYSTEM, TM10-3930-660-10.
 - a. Start engine, TM10-3930-660-10.
 - b. Operate fork sideshift function and sideshift forks five times.
 - c. Stop engine and relieve hydraulic pressure by operating frame tilt controls, TM10-3930-660-10.
 6. IF NECESSARY, BLEED HYDRAULIC PUMPS, PARA. 18-3.



18-32. BOOM HOIST CYLINDERS - REPLACE

This task covers:
a. Removal
b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power

Shop Equipment, Automotive
Maintenance, Common #2 Less Power

Lifting Device, 5 ton capacity

Lifting Device, 200 Lb. Capacity

Cap and Plug Set

Materials/Parts

Anti-seize Compound (App. C, Item 9)
Container, 1 Gal.
Locknut (3, 8)
Tags (App. C, Item 51)
Wood Block, 1x4
Wood Board, 2x4

Personnel Required

Two Personnel

Reference

TM10-3930-660-10

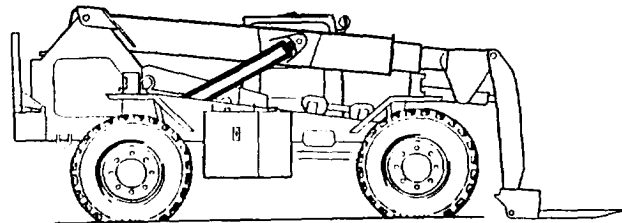
Equipment Condition

Vehicle parked on level ground.
Parking brake set and wheels
chocked.

REMOVAL

WARNING

Hydraulic oil in the system can be under pressures over 3000 psi with the engine OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil reservoir by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.



18-32. BOOM HOIST CYLINDERS - REPLACE (Cont'd)

WARNING

At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause Injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

WARNING

If inner or intermediate sections of boom have been removed, cap three hydraulic lines (a) at underside of outer boom with metal caps. If MLRS attachment has been removed, cap three hydraulic hoses (b) at front of boom with metal caps. Failure to do so may result in personal injury caused by hydraulic oil spraying out of open hoses or lines when engine is started.

CAUTION

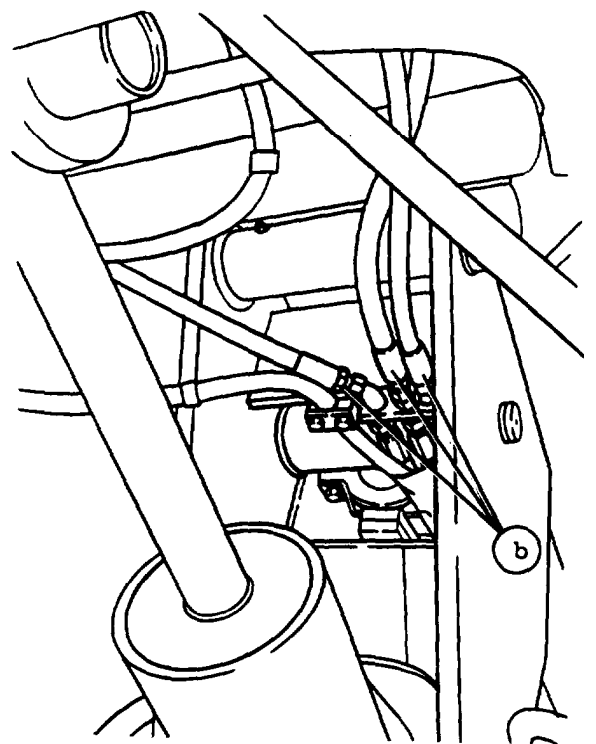
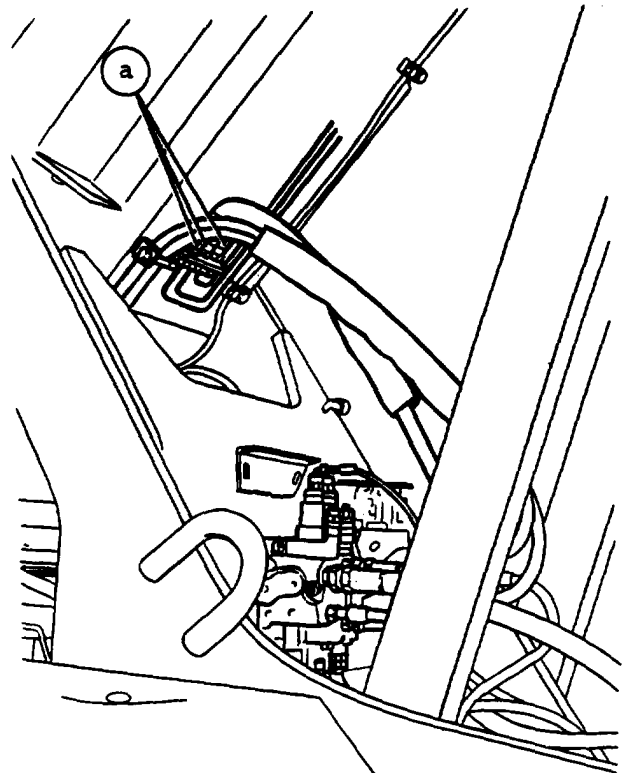
Wipe area clean around all hydraulic connections to be opened during removal. Cap lines and plug openings after removing lines. Contamination of hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper installation. Use suitable container to catch any hydraulic oil that may drain from system.

NOTE

Weight of boom assembly and MLRS attachment is approximately 6300 lbs. Weight of boom assembly alone is approximately 4100 lbs. Weight of each boom hoist cylinder is approximately 182 lbs.

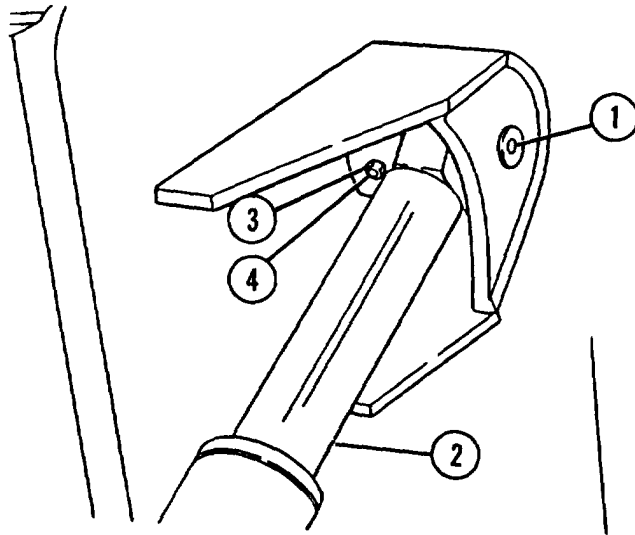


18-32. BOOM HOIST CYLINDERS - REPLACE (Cont'd)

1. START ENGINE, TM10-3930-660-10.
2. WISE BOOM SO BOOM HOIST CYLINDER UPPER PIVOT PINS (1) ARE ABOVE CAB.
3. STOP ENGINE, TM10-3930-660-10.

WARNING

Be sure boom is supported with lifting device before upper-pivot pins (1) are removed. Failure to support boom during removal of upper pivot pins (1) could result in personal injury or death. Combined weight of boom and MLRS attachment is 6300 lbs. Weight of boom alone is approximately 4100 lbs.



4. SUPPORT BOOM WITH LIFTING DEVICE.
5. REMOVE BOOM HOIST CYLINDER UPPER PIVOT PIN (1).
 - a. Place wood board behind cab on vehicle deck to support cylinder (2) when it is lowered.
 - b. Place wood block under rod eye of cylinder (2) to prevent accidental damage to cylinder rod eye during removal.
 - c. Support cylinder (2) to be removed using a suitable lifting device.
 - d. Remove locknut (3), screw (4) and pivot pin (1), using suitable pin puller. Discard locknut (3).

NOTE

If removing one cylinder (2), have assistant signal operator when cylinder (2) is fully retracted.

18-32. BOOM HOIST CYLINDERS - REPLACE (Cont't)

NOTE

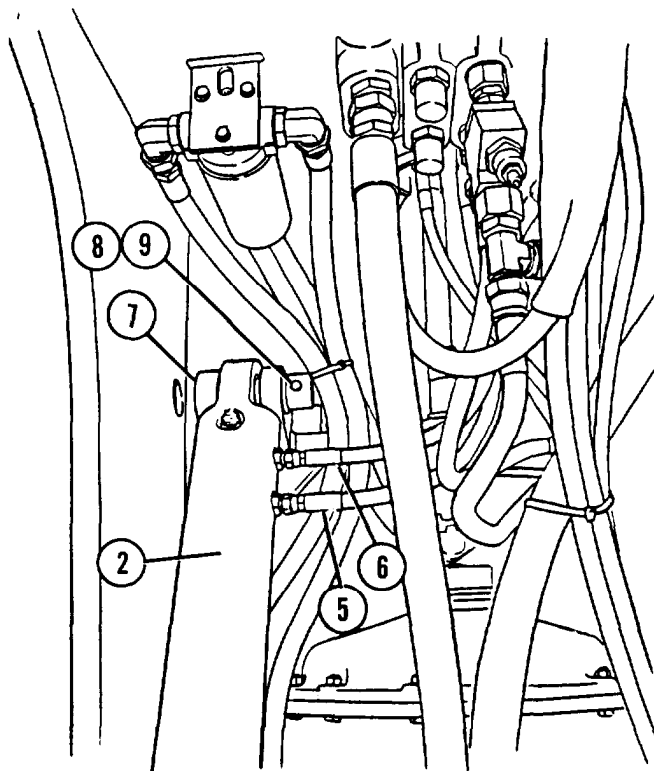
If removing both cylinders (2) at the same time, note that one cylinder (2) will fully retract before other cylinder (2) begins to retract. Have assistant signal operator when both cylinders (2) are fully retracted.

6. START ENGINE AND RUN AT FULL THROTTLE, TM10-3930-660-10.
7. USING BOOM HOIST JOYSTICK CONTROL VALVE, FULLY RETRACT CYLINDER (2).
8. STOP ENGINE, TM10-3930-660-10.
9. CAREFULLY LOWER CYLINDER (2), USING LIFTING DEVICE, UNTIL CYLINDER (2) IS RESTING ON BOARD PLACED ON MAIN DECK .
10. TAG AND DISCONNECT HYDRAULIC LINES (5 AND 6) FROM CYLINDER PORTS.
11. REMOVE BOOM HOIST CYLINDER LOWER PIVOT PIN (7).
 - a. Remove locknut (8) and screw (9). Discard locknut.
 - b. Remove lower pivot pin (7), using suitable pin puller.
12. MOVE LIFTING DEVICE TO CYLINDER'S BALANCE POINT AND CAREFULLY LIFT CYLINDER (2) OFF OF VEHICLE.

INSTALLATION**NOTE**

Remove caps and plugs as hoses are installed. Wipe all sealing surfaces on cylinder and hoses clean and dry.

1. CAREFULLY LOWER CYLINDER (2) ONTO BOARD PLACED ON MAIN DECK USING LIFTING DEVICE.



18-32. BOOM HOIST CYLINDERS - REPLACE (Cont'd)

NOTE

Apply anti-seize compound to lower pivot pin (7) as installed.

2. ALIGN CYLINDER BASE LOWER MOUNTING HOLES AND INSTALL LOWER PIVOT PIN (7), SCREW (9) AND NEW LOCKNUT (8).
3. CONNECT HYDRAULIC LINES (5 AND 6) AS TAGGED DURING CYLINDER (2) REMOVAL.
4. CAREFULLY RAISE CYLINDER (2) USING LIFTING DEVICE UNTIL ROD EYE OF CYLINDER (2) IS AIMED AT PIVOT PIN MOUNTING HOLE ON BOOM.

NOTE

Have assistant signal operator when rod eye of cylinder (2) is aligned with boom pivot pin hole.

NOTE

If installing both cylinders (2) at the same time, note that in step 5 one cylinder will extend, and the other will remain stationary.

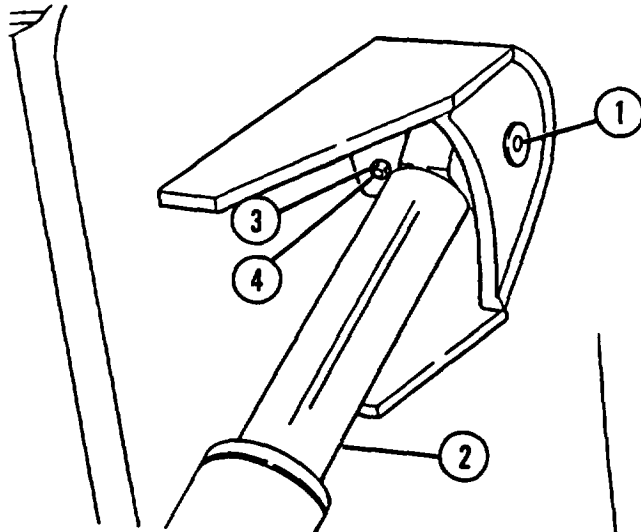
Cylinder (2) that extended must be aligned and then secured to boom with pivot pin (1).

When cylinder (2) that extended is secured to boom, other cylinder (2) will respond to controls, and can be extended as well.

5. START ENGINE AND RUN AT FULL THROTTLE, TM10-3930-660-10.
6. EXTEND CYLINDER ROD UNTIL UPPER PIVOT PIN (1) CAN BE INSTALLED. REPOSITION CYLINDER (2), AS NECESSARY, USING LIFTING DEVICE.
7. STOP ENGINE, TM10-3930-660-10.

NOTE

Apply anti-seize compound to upper pivot pin (1) as installed.



8. INSTALL UPPER PIVOT PIN (1), SCREW (4) AND NEW LOCKNUT (3).
9. DISCONNECT LIFTING DEVICE FROM CYLINDER (2) AND BOOM. REMOVE BOARD FROM ACROSS VEHICLE DECK.
10. BLEED AIR FROM HYDRAULIC SYSTEM.
 - a. Start engine, TM10-3930-660-10.
 - b. Operate boom hoist functions. Raise and lower boom five times.
 - c. Stop engine and relieve hydraulic pressure by operating boom hoist functions of hydraulic joystick, TM10-3930-660-10.
11. INSTALL TRANSMISSION COVER, PARA. 16-6.

CHAPTER 19

GAGES (NON-ELECTRICAL) MAINTENANCE

19-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the gages (non-electrical). To find a specific maintenance procedure, see the maintenance task summary below.

19-2. GAGES (NON-ELECTRICAL) MAINTENANCE TASK SUMMARY

TASK PARA .	PROCEDURES	PAGE NO.
19-3	Hydraulic Oil Sight Gages - Replace	19-2
19-4	Air Cleaner Restriction Indicator - Replace	19-3

19-3. HYDRAULIC OIL SIGHT GAGES - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup

Tools

Tool Kit, Automotive Mechanics

Materials/Parts

Loctite 59241 (App, C, Item 42)

Equipment Condition

Vehicle parked on level ground.
Hydraulic tank drained below level
of lower sight gage.

NOTE

To prevent spillage of hydraulic oil, the hydraulic tank (2) must be partially drained until the hydraulic oil level is lower than the sight gage being replaced. See para. 5-10.

REMOVAL

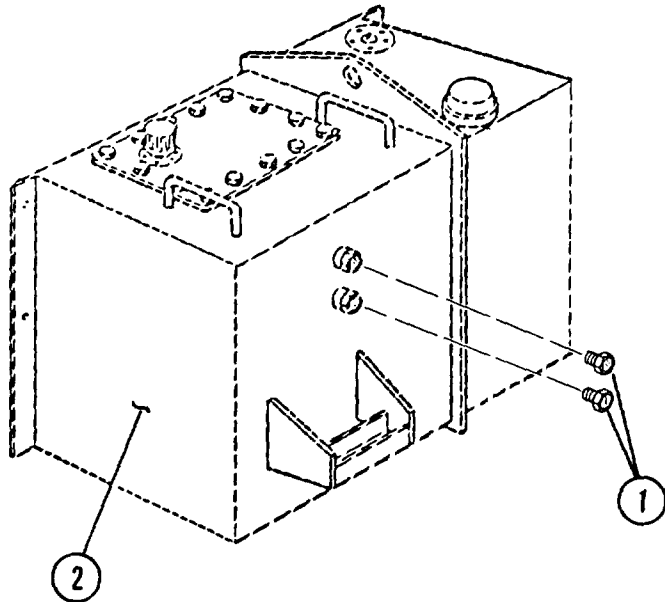
UNSCREW SIGHT GAGE(S) (1) FROM SIDE OF HYDRAULIC TANK (2).

INSTALLATION

NOTE

Apply Loctite 59241 to sight gage(s) (1) as installed.

1. SCREW SIGHT GAGE(S) (1) INTO SIDE OF HYDRAULIC TANK (2).
2. FILL HYDRAULIC TANK (2), PARA. 5-10.



19-4. AIR CLEANER RESTRICTION INDICATOR - REPLACE

This task covers:

- a. Removal
- b. Installation

Initial Setup
Tools

Tool Kit, Automotive Mechanics

Material/Parts

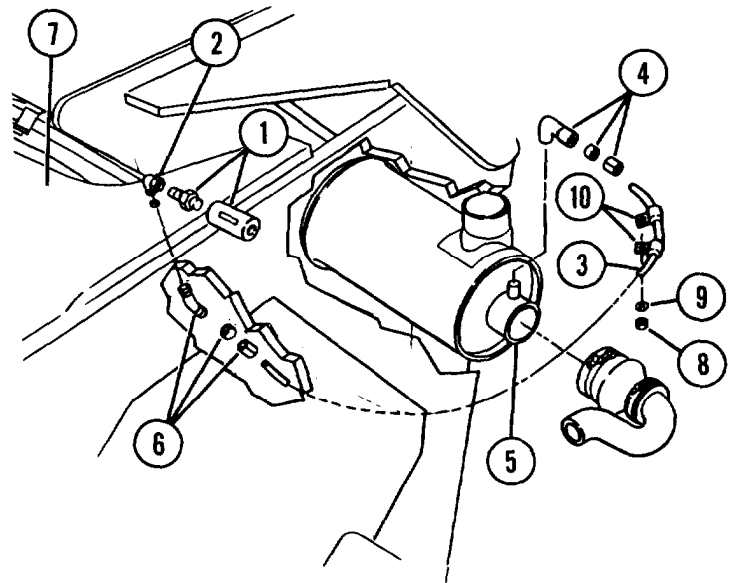
Lockwashers (9)

Equipment Condition

Vehicle parked on level ground.

REMOVAL

1. UNSCREW AIR CLEANER RESTRICTION INDICATOR (1) FROM ELBOW (2).
2. DISCONNECT TUBE (3).
 - a. Unscrew tube (3) from elbow (4) at air cleaner (5).
 - b. Unscrew tube (3) from elbow (6) on vehicle frame (7).
 - c. Remove two nuts (8) and two lockwashers (9) from two clamps (10). Discard lockwashers (9).
 - d. Remove tube (3) from clamps (10).
3. IF NECESSARY, UNSCREW ELBOW (2), AND ELBOW (6) FROM VEHICLE FRAME (7).
4. IF NECESSARY, UNSCREW ELBOW (4) FROM AIR CLEANER (5).

**INSTALLATION**

1. IF REMOVED, SCREW ELBOW (4) INTO AIR CLEANER (5).
2. IF REMOVED, SCREW ELBOW (2) AND ELBOW (6) INTO VEHICLE FRAME (7).
3. CONNECT TUBE (3).
 - a. Screw tube (3) into elbow (4) at air cleaner (5).
 - b. Screw tube (3) into elbow (6) on vehicle frame (7).
 - c. Position tube (3) in clamps (10) and secure to frame (7) with two new lockwashers (9) and two nuts (8).
4. SCREW AIR CLEANER RESTRICTION INDICATOR (1) INTO ELBOW (2).

CHAPTER 20
PREPARATION FOR STORAGE AND SHIPMENT

20-1	Preparation for Short-Term Storage	20-1
20-2	Preparation for Long-Term Storage	20-2
20-3	Preparation for Return to Service from Long-Term Storage . . .	20-3
20-4	Preparation for Return to Service from Short-Term Storage..	24-4
20-5	Preparation for Shipment.	20-4

NOTE

Refer to paragraph 20-1 if the 6KVRRTFL is to be stored for two weeks or less.
Refer to paragraph 20-2 if the 6KVRRTFL is to be stored for longer than two weeks.

20-1 1 PREPARATION FOR SHORT-TERM STORAGE

- a. Thoroughly clean the vehicle.
- b. Perform the operator preventive maintenance checks and services (PMCS) contained in TM10-3930-660-10.
- c. Perform the organizational preventive maintenance checks and services (PMCS) contained in table 2-1 of chapter 2.
- d. Perform the lubrication contained in lubrication order L05-3930-660-12.
- e. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 314.
- f. Store the vehicle indoors in a dry, protected area with the boom lowered and retracted and with the forks resting on the ground. Cycle the controls after engine shutdown to relieve any pressure in the hydraulic circuits.
- g. When moderate temperatures are expected, the batteries may be left in place. If extreme cold is expected, remove the batteries and store them in a protected area.
- h. Use an accurate hydrometer to check engine coolant. Make sure the coolant has the proper mixture for expected temperatures. Refer to table 2-1 on page 20-2.
- i. Seal all openings in the engine including the air intake, exhaust outlet, and crankcase breather tube.
- j. Fill the fuel tank completely to prevent condensation from forming. Drain water and sediment from the fuel/water separator and primary fuel filter element.
- k. Ensure that all the cab windows and doors are closed and latched.

Lowest Expected Ambient Temperature °F (°C)	Pints (Liters) of Inhibited Glycol Per Gal. (Liters) of Coolant	Compound, Antifreeze Arctic	Ethylene Coolant Solution Specific Gravity at 68° F (20° c)
+20 (+7)	1.5 (0.71)	Issued full strength and ready mixed for 0 to 45°F (-18 to -54° C) temperatures for both initial installation and replenishment of losses. DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE.	1.022
+10 (-12)	2.0 (0.95)		1.038
0 (-18)	2.75 (1.30)		1.047
-10 (-23)	3.25 (1.54)		1.055
-20 (-29)	3.50 (1.88)		1.082
-30 (-34)	4.0 (1.90)		1.073
-40 (-40)	4.25 (2.01)		
-50 (-46)	Arctic antifreeze preferred		
-60 (-51)			
-75 (-80)			

Table 20-1. Freezing Points, Composition, and Specific Gravities of Military Antifreeze Materials.

- 1. Ensure that the cab skylight guard is positioned over the cab skylight and latched.
- m. Ensure that the engine access doors are closed and latched.
- n. Fill-in DD Form 1397 completely and attach to a conspicuous part of the vehicle.

20-2. PREPARATION FOR LONG-TERM STORAGE

- a. Perform the operator preventive maintenance checks and services (PMCS) contained in TM10-3930-660-10.
- b. Perform the organizational preventive maintenance checks and services (PMCS) contained in table 2-1 of chapter 2.
- c. Perform the lubrication contained in lubrication order LO10-3930-660-12.
- d. Thoroughly clean the vehicle. Use touch-up paint where necessary to prevent rust.
- e. Coat all exposed areas of the cylinder rods with grease to protect polished surfaces.

NOTE

If the vehicle has accumulated very low miles since the last scheduled lubrication service, do not drain and refill the transmission or axles (skip step f).

- f. Drain and refill the transmission and axles with new oil.
- g. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 314*

- h. Store the vehicle indoors in a dry, protected area with the boom lowered and retracted, and with the forks resting on the ground. Cycle controls after engine shutdown to relieve any pressure in the hydraulic circuits.
- i. Completely drain the crankcase and refill with recommended oil.
- j. Completely drain the fuel tank. Mix a solution of diesel fuel and flushing oil per instructions supplied with the flushing oil. Pour the solution into the fuel tank. Run the engine for at least 10 minutes on this solution.
- k. Before stopping the engine, treat upper cylinders by spraying recommended engine oil into the air intake for about two minutes. Then open the throttle momentarily, shut the engine off, and continue spraying oil into the air intake as the engine comes to a stop.
- l. Use an accurate hydrometer to check engine coolant. Make sure the coolant has the proper mixture for expected temperatures. Refer to table 20-1 on page 20-2.
- m. Seal all openings in the engine including the air intake, exhaust **outlet**, and crankcase breather tube.
- n. Lift the fan belt tensioner and remove the engine drive belt from around the alternator pulley.
- o. Remove and thoroughly clean the batteries and ensure that they are fully charged. Store the batteries in a cool, dry place at above freezing temperatures. Periodically charge the batteries during storage.
- p. Completely drain the fuel tank.
- q. Ensure that all cab windows and doors are closed and latched.
- r. Ensure that the engine access doors are closed and latched.
- s. Ensure that the cab skylight guard is positioned over the cab skylight and latched.
- t. Place blocking under the axles to remove weight from the tires.
- u. Fill-in DD Form 1397 completely and attach to a conspicuous part of the vehicle.

20-3. PREPARATION FOR RETURN TO SERVICE FROM LONG TERM STORAGE

- a. Inflate the tires to the recommended pressures and remove blocking from under axles.
- b. Fill the fuel tank with fuel. Check the oil level in the crankcase, axles, transmission, hydraulic reservoir, and wheel ends.
- c* Check the radiator coolant level.

- d. install fully charged batteries.
- e. Lift the fan belt tensioner and position the engine drive belt around the alternator pulley. Ensure that the belt is properly positioned around all other pulleys.
- f. Remove the seals from all engine openings, including the air intake, exhaust outlet, and crankcase breather tube.
- g. Crank the engine with the auxillary fuel shut-off switch in the off position until the oil pressure gauge registers oil pressure. Place the auxillary fuel shut-off switch in the on position.
- h. Bleed the fuel lines and start the engine. Allow the engine to idle for a few minutes and ensure that it is receiving lubrication.
- i. Drive the vehicle without load and check the engine, transmission, brakes, and steering for proper operation. Check all hydraulic functions and electrical accessories for proper operation.

20-4. PREPARATION FOR RETURN TO SERVICE FROM SHORT-TERM STORAGE

- a. Remove the seals from all engine openings, including the air intake, exhaust outlet, and crankcase breather tube.
- b. If removed, install batteries.
- c. Fill the fuel tank with fuel. Check the oil level in the crankcase, axles, transmission, hydraulic reservoir, and wheel ends.
- d. Check the radiator coolant level.
- e. Crank the engine with the auxillary fuel shut-off switch in the off position, until the oil pressure gauge registers oil pressure. Place the auxillary fuel shut-off switch in the on position.
- f. Start the engine. Allow the engine to idle for a few minutes and ensure that it is receiving lubrication.
- g. Drive the vehicle without a load and check the engine, transmission, brakes, and steering for proper operation. Check all hydraulic functions and electrical accessories for proper operation.

20-5. PREPARATION FOR SHIPMENT

- a. Block the trailer or rail car wheels before loading. Carefully back the vehicle on the trailer or rail car.
- b. Move the travel select lever to neutral and set the parking brake.
- c. Block the wheels and secure the vehicle with tie-downs. Use as many of the tie down locations as possible. Refer to figure 20-1 on page 20-5.

- d. Seal all openings in the engine including the air intake, exhaust outlet, and crankcase breather tube.
- e. Use an accurate hydrometer to check engine coolant. Make sure the coolant has the proper mixture for expected temperatures. Refer to table 20-1 on page 20-2.
- f. Check state and local laws governing weight, width, and length of load.

WARNING

Check travel route for overpass clearances. Ensure that there will be adequate clearance.

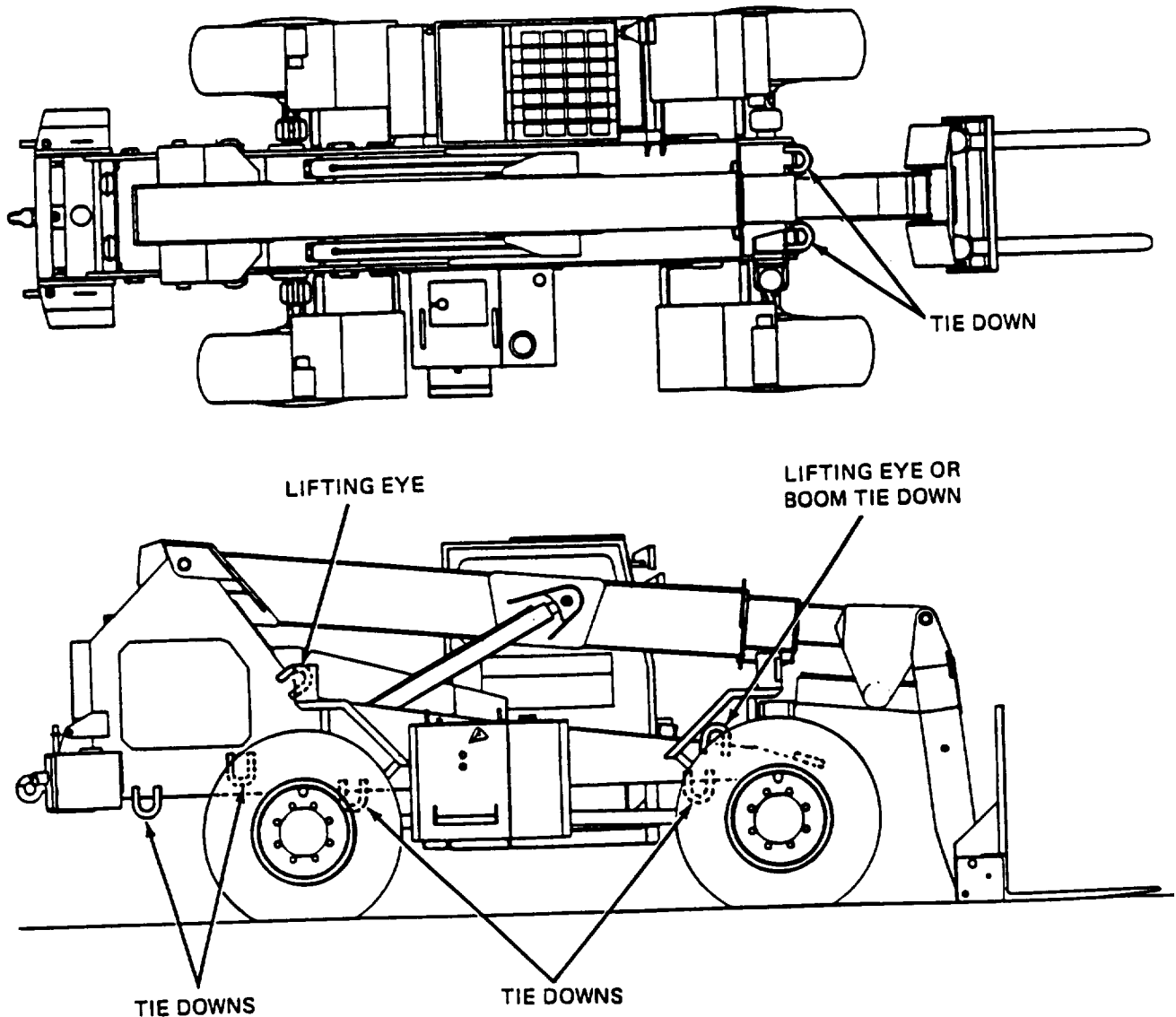


Figure 20-1. Lifting and Tie-Down Locations

APPENDIX A

REFERENCES

A-1. scope.

This appendix lists forms, field manuals, technical manuals, and other publications referenced in this manual and which apply to unit maintenance of the 6KVRRTFL.

A-2. Department of the Army Pamphlets.

Consolidated Index of Army Publications and Blank Forms DA Pam 25-30

The Army Maintenance Management System (TAMMS) DAPam 738-750

A-3. Forms.

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 DA Form 314

Processing and Reprocessing Record for Shipment, Storage, and
Issue of Vehicles and Spare Engines DD Form 1397

Product Quality Deficiency Report (NSN 7540-00-105-0078) SF 368

A-4. Field Manuals.

Camouflage FM5-20

First Aid for Soldiers FM 21-11

Basic Cold Weather Manual FM 31-70

Northern Operations FM 31-71

Mountain Operations (How To night) FM 90-6

A-5. Lubrication Order.

Truck, Forklift, 6,000 lbs., Variable Reach, Rough
Terrain L010-3930-660-12

A-6. Technical Bulletins.

- Warranty Program for Truck, Forklift, 6,000 lbs.,
Variable Reach, Rough Terrain TB10-3930-660-15
- Occupational and Environmental Health: Hearing Conservation TB MED 501
- Equipment Improvement Report and Maintenance
Digest (US Army Tank-Automotive Command)
Tank-Automotive Equipment. TB 430001-39 series
- Non aeronautical Equipment Army Oil Analysis Program (AOAP) TB 43-0210

A-7. Technical Manuals.

- Operator's Manual for Truck, Forklift, 6,000 lbs.,
Variable Reach, Rough Terrain TM10-3930-660-10
- Hand Receipt for Components of End Item (COEI),
Basic Issue Items (BII), and Additional
Authorized List (AAL) for Operator's Manual
for Truck, Forklift, 6,000 lbs., Variable Reach,
Rough Terrain. TM10-3930-660-10HR
- Unit Maintenance, Intermediate Direct Support, and
Intermediate General Support Maintenance Repair
Parts and Special Tools List (Including Depot
Maintenance Repair Parts and Special Tools List)
for Truck, Forklift, 6,000 lbs., Variable Reach,
Rough Terrain., TM10-3930-660-24P
- Operator and Organizational Maintenance Manual
Including Repair Parts and Special Tools List
Simplified Test Equipment for Internal
Combustion Engines (STE-ICE) (4910-00-124-2554) TM9-4910-571-12&P
- Operator's, Organizational, Direct Support, and
General support Maintenance Manual for Lead-Acid
Storage Batteries; 4HN, 24V, (NSN 6140-00-069-
3528) MS75047-1; 2HN, 12 V (6140-00-057-2553) MS
35000-1; 6TN, 12V (6140-00-057-2554) MS35000-3 TM9-6140-200-14
- Painting Instructions for Field Use TM43-0139
- Procedures for Destruction of Equipment to Prevent
Enemy Use (Mobility Equipment Command) TM 750-244-3
- Tool Outfit, Hydraulic Systems Test and Repair (HSTRU)
(4940-01-036-5784) TM9-4940-468-14

A-8. Specifications and Standards.

- Dry Cleaning Solvent Fed Spec P-D-680
- Methyl Ethyl Ketone, Technical TT-M-261

A-9. Other Publications.

Expendable/Durable Items (Except Medical, Class V,
Repair Parts, and Heraldic Items) CTA-50-970

Army Medical Department Expendable/Durable Items CTA 8-100

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

a. Section I, Introduction. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. Section II, Maintenance Allocation Chart. This section contains the Maintenance Allocation Chart (MAC) and 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 categories.

c* Section III, Tool and Test Equipment Requirements. This section 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, Remarks. This section contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. Maintenance Functions. Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

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

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

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

i. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions 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 (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. Explanation Of Columns In The Maintenance Allocation Chart, Section II.

a. Column 1, Group Number. This column lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

b. Column 2, Component/Assembly. This column contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. This column lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. This column specifies, by the listing of a work time figure in the appropriate subcolumn(s), the highest category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance categories are as follows:

SYMBOL	MAINTENANCE CATEGORY
C	Operator or Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

e. Column 5, Tools and Equipment. This column specifies, by code, those common tool sets (not individual tools) and special tools, test, measurement and diagnostic equipment (TMDE) , and support equipment required to perform the designated function.

f. Column 6, Remarks. This column will, when applicable, contain a reference letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. Explanation Of Columns In Tool And Test Equipment Requirements, Section III.

a. Column 1, Reference Code. This column lists the correlates with a code used in the MAC, Column 5, Section II.

b. Column 2, Maintenance Category. This column lists the lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. This column lists the Federal item name or identification of the tool or test equipment.

d. Column 4, National/NATO Stock Number. This column lists the NSN of the tool or test equipment, if available.

e. Column 5, Tool Number. This column lists the manufacturer's part number for the tool or test equipment.

f. Column 6, Federal Supply Code For Manufacturers (FSCM). This column lists the FSCM for the manufacturer of the tool or test equipment, if available.

B-5. Explanation Of Columns In Remarks, Section IV.

a. Column 1, Reference Code. This column lists the reference letter code that correlates with the code recorded in the MAC, Column 6, Section II.

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

Section II. MAINTENANCE ALLOCATION CHART
FOR
6000 LB VARIABLE REACH ROUGH TERRAIN FORKLIFT

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL				TOOLS & EQUIP (5)	REMARKS (6)	
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT			DEPOT
			C	O	F	H			D
01	ENGINE							A	
0100	Engine Assembly:	Inspect Service Test Replace Repair Overhaul	0.1 0.1	1.5 1.0	7.0	20.0	40.0	1,3 4,11 4,5 5,6 5,6	C,I B
	Engine Mounts	Inspect Replace		0.1	2.0			1,4	
	Lifting Bracket	Replace			1.0			1	
0101	Crankcase, Cylinder Block, Cylinder Head:								
	Cylinder Block	Replace Repair				30.0 8.0		1 5,6	
	Cylinder Head Assembly with Valves	Adjust Replace Repair		2.0	2.0	8.0		1,4 1,4 5,6	D
0102	Crankshaft:								
	Crankshaft	Replace Repair				8.0	8.0	1 4,5	
	Crankshaft Main Bearings	Replace				6.0		1,4,5	E
	Oil Seals	Replace				4.0		1,5,7	
	Vibration Damper	Replace				4.0		1,4	
0103	Flywheel Assembly:								
	Flywheel	Replace			4.0			1,4,6	
	Flywheel Housing and Cover	Replace			4.0			1,4	
0104	Pistons, Connecting Rods:								
	Pistons, Piston Pins, and Rings	Replace				10.0		1,4,6	
	Connecting Rods and Bearings	Replace				10.0		1,4,6	
0105	Valves, Camshaft and Timing System:								
	Rocker Arm Covers	Replace		1.0				1,4	
	Rocker Arm Assembly	Replace Repair			4.0 2.0			1 4,6	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)	
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT			
			C	O	F	H	D			
0105 (Cont)	Tappet, Valve	Replace			4.0			4		
	Camshaft and Timing Gears	Replace				24.0		4		
	Front Housing and Cover	Replace			6.0			1,4		
0106	Push Rod Cover	Replace			1.0			1		
	Engine Lubrication System:									
	Oil Pan	Inspect Replace	0.1		4.0			3	F	
	Oil Pump Inlet Tube	Replace			1.0			1,4		
	Engine Oil Pump	Replace			1.0			1,4		
	Oil Filter	Replace		0.2				15		
	Oil Filter Base	Replace			0.5			1,4		
	Oil Level Gage	Replace		0.1				1		
	Oil Filler	Replace		0.1				1		
	Oil Sampling Valve	Service Replace	0.1					4 1		
	Oil Cooler	Replace			1.0			2		
	0108	Manifolds:								
		Exhaust Manifold	Replace	1.0					1	
		Intake Manifold Cover	Replace	1.0					1	
03	FUEL SYSTEM									
0301	Fuel Injector:									
	Injector	Test Replace			0.5 1.0			6,20 3		
0302	Fuel Pumps:									
	Fuel Injection Pump	Test Adjust Replace Overhaul			1.0		0.5 2.0 8.0	2 2 1,2,4 4,5,6	G	
	Fuel Shutoff Valve	Test Replace	0.1		0.5			1 1		
0304	Fuel Transfer Pump	Test Replace	0.5 1.0					11 1,4		
	Air Cleaner:									
	Air Cleaner Assembly	Replace Repair	0.7 1.0					1 1,4		

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0304 (Cent)	Air Cleaner Elements	Service Replace	0.2	0.2 0.2				1,4	H
	Air Inlet Cap	Replace		0.2				1	
	Air Inlet Tubing	Replace		0.5				1,4	
0305	Turbocharger:								
	Turbocharger Assembly	Replace Repair		2.0		4.0		1,4 1,4	
	Turbocharger Air Lines	Replace		1.0				1	
	Turbocharger Oil Line	Replace		0.2				1,4	
0306	Tanks, Lines and Fittings:								
	Fuel/Hydraulic Tank	Inspect Service Replace Repair	0.1 0.2	1.5		2.0 2.0		1 1 7,9	I J
	Fuel Strainer	Inspect Service Replace	0.1	0.5 0.5				1 1	
	Fuel Lines and Fittings	Inspect Replace	0.1	1.0				1,4	F
	Water Separator Assembly	Service Replace	0.1	0.5				1	
	Fuel Filter Assemblies	Replace		0.5				1	
0311	Engine Starting Aids:								
	Ether Start Kit	Replace Repair		0.7 1,0				1 1	
0312	Ether Cylinder	Replace		0.2				1	
	Thermostat, Ether Start	Test Replace		1.0 1,0				3 1	
	Bracket, Mounting	Replace		0.3				1	
	Accelerator Controls:								
	Accelerator Cable	Adjust Replace		0.5 2.0				1 1	K
	Accelerator Pedal and Linkage	Inspect Replace Repair	0.1	2.0 1.0				1 1	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
04	EXHAUST SYSTEM								
	Muffler	Replace		0.7				1	
	Tail Pipe	Replace		0.5				1	
	Exhaust Pipe	Replace		0.3				1	
05	COOLING SYSTEM								
0501	Radiator:								
	Radiator Assembly	Inspect	0.1						
		Test		0.5				2	
		Service		0.5				2	
		Replace		2.0				2	
		Repair			2.0			1.6	
	Coolant Overflow Tank	Replace		0.5				1	
0503	Water Manifold, Headers, Thermostats, Housing Gasket:								
	Thermostat	Replace		0.5				1,4	
	Housing	Replace		1.0				1	
	Radiator Hoses	Inspect	0.1						
		Replace		0.5				1	
	Water Outlet	Replace		0.5				1,4	
0504	Water Pump	Replace		2.0				1,4	
0505	Fan Assembly:								
	Fan Blade and Spacer	Inspect	0.1						
		Replace		1.5				1	
	Fan Guard	Inspect	0.1						
		Replace		1.0				1	
	Drive Belt	Inspect	0.1					1	
		Replace		1.0				1,4	
06	ELECTRICAL SYSTEM								
0601	Alternator:								
	Alternator and Alternator Connections	Replace		0.4				1,4	
		Repair			4.0			6	
	Pulley	Replace		1.0				1,4	
0602	Tachometer and Drive Assembly	Replace		0.5				1,2	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0603	Starter:								
	Starting Motor	Replace Repair		0.4	4.0			1 6	
	Neutral Safety Switch	Inspect Replace		0.2 0.5				1	
	0607 Instrument Panel:								
	Instrument Panel	Replace		4.0				1	
	Gages, Switches, Lights	Inspect Replace	0.1	0.5				1	
	Circuit Breakers	Replace		0.2				1	
	Turn Signal Flasher	Replace		0.5				1	
0608	Miscellaneous Electrical Components:								
	Blackout/Service Light Switch	Inspect Replace	0.1	0.5				1	
	Temperature and Pressure Switches	Test Replace		0.5 0.2				1 1	
	Hydraulic Bypass Switch	Test Replace		0.5 0.2				4 4	
	Electric Joystick Assembly	Adjust Test Inspect Replace Repair		0.3	0.5 0.5			4 1	R
	Fork Autoleveler Switch	Inspect Adjust Test Replace	0.1	1.0 1.0 1.0	2.0			1 1,24 1,24 1	
	Fork Autoleveler Circuit Board	Test Replace		0.3 0.5				1,12,24 1	
	Relays	Test Replace		0.5 0.2				1 1	
	Boom Electrical Box Assembly	Inspect Replace Repair	0.1	2.0	2.0			1 1	
	STE/ICE Electrical Components	Test Replace		0.5 0.2				3,11 1	B
0609	Lights:								
	Headlights/Floodlights	Inspect Replace Repair	0.1	0.5 1.0				1 1	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0609 (Cont)	Blackout Headlights	Inspect	0.1						
		Replace		0.5				1	
		Repair		1.0				1	
	Stop and Blackout Taillights	Inspect	0.1						
Replace Repair			0.5 0.5				1 1		
Blackout Marker Lights	Inspect	0.1							
	Replace Repair		0.5 0.5				1 1		
Turn Signal Lights	Inspect	0.1							
	Replace Repair		0.5 0.5				1 1		
0610	Sending Units and Warning Switches:								
	Oil Pressure Sender	Test		0.5				1	
		Replace		0.1				1	
	Water Temperature Sender	Replace		0.1				1	
	Transmission Temperature Sender	Replace		0.1				1	
Fuel Level Sender	Test		0.5				3		
	Replace		0.7				3		
0611	Horn, Siren:								
	Back-up Alarm	Inspect	0.1						
		Replace		0.1				3	
	Back-up Switch	Test	0.1						
Replace			1.0				3		
Horn	Inspect	0.1							
	Replace		0.1				1		
0612	Batteries:								
	Batteries	Inspect	0.1						
		Test		0.5				1	
		Service		0.5				1	
		Replace		0.5				1	
	Battery Cables	Service	0.1		0.1				
		Inspect Replace		0.2				1 1	
Battery Boxes	Replace		0.5				1		
	Repair				0.5		1,4		

Section II MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL				TOOLS & EQUIP (5)	REMARKS (6)	
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT			DEPOT
			C	O	F	H			D
0613	Wiring Harnesses:								
	Cab Wiring Harness	Test Replace Repair		0.5	8.0 2.5			1 1 1,3	
	Main Wiring Harness	Inspect Test Replace Repair	0.1	0.5 2.0	8.0			1 1 1	
	Boom Electrical Cable	Test Adjust Replace Repair		0.5 0.1 4.0 0.5				1 1 1 1	
	STE/ICE Harness	Test Replace Repair		0.5 4.0 0.5				1 1 1	
	Electric Joystick Harness	Test Replace Repair		0.5 1.0 0.5				1 1 1	
	Slave Receptacle	Replace		0.3				1	
07	TRANSMISSION								
0705	Transmission Shifting Components:								
	Transmission Shifter	Adjust Replace		1.0 2.5				1 1	
	Transmission Cables	Replace		2.0				1	
	Transmission Disconnect Pedal	Adjust Replace		1.0 2.0				1 1	
	Transmission Disconnect Master Cylinder	Replace		2.0				1,26	
0708	Torque Converter	Replace Repair Overhaul			8.0	6.0	8.0	1,4 1,4 2,3,5	
0710	Transmission: Transmission Assembly	Inspect Service Test Replace Repair Overhaul	0.1 0.1	0.5 0.5	8.0	8.0	40.0	1,3 17 3,26 3,13,26 3,5,6,13,26	F C,J

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
0710 (Cont)	Mounting Brackets	Replace			2.0			3	
	Front Cover Assembly	Replace			2.0			1,4	
		Repair				1.0		1,4	
	Clutch Packs	Replace				4.0		5,13	
		Repair				3.0		5,6	
	Output Shaft	Replace				4.0		1	
		Repair				3.0		1,4	
	Front Housing	Replace				2.0		3	
Repair					2.0		3		
Input Shaft	Replace				4.0		1		
	Repair				1.0		1,4		
Case and Covers	Replace				8.0		5		
	Repair				4.0		3,5		
0714	Servo Unit:								
	Control Valve	Replace			2.0			1	
		Repair				4.0		5,6	
0721	Coolers, Pumps, Motors:								
	Transmission Oil Pump	Replace			4.0			1	
		Repair				1.5		4,26	
	Breather	Replace		0.5				1	
	Oil Filter	Replace		0.2				1,15,26	
	Valve, Oil Sampling	Service	0.1					4	
		Replace		0.1				1	
09	PROPELLER AND PROPELLER SHAFTS								
0900	Front and Rear Propeller Shafts	Service		0.1				3	
		Replace		0.3				1,4	
		Repair		0.3				1,4	
	Transmission Propeller Shaft	Service		0.1				3	
		Replace		1.0				1,4	
		Repair		1.0				1,4	
10	FRONT AXLE								
1000	Front Axle Assembly	Inspect						1	
		Service		0.1	2.0			1,4,26	
		Replace				8.0		1,4,5,26	
		Repair					14.0	3,5,6	
		Overhaul							

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)	
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT			
			C	O	F	H	D			
1000 (Cont)	Pin, Axle Carrier	Service Replace		0.1	0.7			3 1,4		
1002	Front Differential Carrier Assembly	Service Replace Repair		0.3	4.0		2.0	3 1,4 1,4,5,23	M	
1003	Front Planetary Wheel Ends	Service Replace Repair		0.3	1.0		4.0	3 1,4 1,5,28		
11	REAR AXLE									
1100	Rear Axle Assembly	Inspect Service Replace Repair Overhaul	0.1	0.1	2.0		8.0	14.0	1 1,4,26 1,4,5,26 3,5,6	
	Pin, Axle Carrier	Service Replace		0.1	0.7			3 3		
1102	Rear Differential Carrier Assembly	Service Replace Repair		0.3	4.0		2.0	1,3 1,3,5 3,23	M	
1103	Rear Planetary Wheel Ends	Service Replace Repair		0.3	1.0		4.0	3 1,4,5 1,4,5,28	M	
12	BRAKES									
1201	Hand Brakes: Parking Brake Assembly	Inspect Adjust Replace Repair	0.1	1.0 1.0 1.0				1 1,4 1,4	S	
	Lever and Cable	Inspect Adjust Replace	0.1	1.0 1.0				1 1		
1202	Service Brakes: Disc Brake Assembly	Service Replace Repair		0.5	1.0 1.5			1 1,4,26 5		
	Brake Lining	Inspect Replace		0.5 1.0				1,4		
1204	Hydraulic Brake System: Brake Control Valve	Replace Repair		1.0	1.5			1 1,4		
	Accumulator	Test Replace Repair		0.2 0.5 0.5				1,26 1,19		

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
1204 (Cont)	Lines and Fittings	Inspect Replace	0.1	1.0				1,26	
13	WHEELS AND TRACKS								
1311	Wheel Assembly	Inspect Replace Repair	0.1	1.0 1.0				1,4 1,4	
1313	Tire	Inspect Service Replace	0.1 0.1	1.0				3 1,4	
14	STEERING								
1401	Steering Gear Assembly:								
	Steering Wheel	Replace		0.5				1,4	
	Steering Column	Replace		1.0				1,4	
	Steering Knuckle	Service Adjust Replace		0.2	1.0 2.0			3 1 4	P
	Tie Rod	Service Adjust Replace		0.2 0.5	1.5			3 1 1,4	
	Universal (Cardan) Steering Joints	Replace		1.5				1,4	
1410	Hydraulic Pump:								
	Emergency Steering Pump	Test Replace Repair	0.1	0.2 1.0	2.0			17,18 1,26 3	
1411	Hoses, Lines, Fittings	Inspect Replace Repair	0.1	0.5	0.5			1,26 3,10	
1412	Hydraulic Cylinders:								
	Steering Cylinders	Inspect Service Replace	0.2	0.1 1.0				3 1,4,26	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
1414	Steering System Valves:								
	Steering Valve, Control	Replace Repair		1.0	1.5			3,26 4	
	Valve, Steering Select, Solenoid	Test Replace		0.5 1.0				1 1,26	
15	FRAME, TOWING ATTACHMENTS, AND DRAWBARS								
1501	Frame Assembly	Repair				2.0		1,7,9	
1502	Counterweight	Replace		0.3				1	
1503	Pintle Hook	Inspect Service Replace Repair	0.1	0.1 0.3 0.5				3 1 1	
18	BODY, CAB, HOOD AND HULL								
1801	Body, Cab, Hood and Hull Assemblies:								
	Engine Covers	Replace		0.3				1	
	Radiator Cover	Replace		0.5				1	
	Engine Door Panel	Replace		0.1				1	
	Transmission Cover	Replace		0.1				1	
	Cab Assembly with ROPS/FOPS	Inspect Replace Repair	0.2		8.0 1.5			1,4,26 4,7,9	N L
	Sound Suppression Panels	Replace			1.0			1	
	Doors	Service Replace Repair		0.1 0.2	1.0			1 1 3,7,9	L
	Accessories Storage Box	Replace		0.1				1	
	Fire Extinguisher Bracket	Replace		0.1				1	
	Tool Box Door Latch	Replace		0.1				1	
	Cab Floor Mat	Replace		1.0				1	
1802	Fenders, Running Boards, Windshield Glass:								
	Fenders	Replace		0.2				1,4	
	Fender Braces	Replace		0.6				1	
	Cab Windows	Replace		2.0				1	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
1806	Seat:								
	Seat Assembly	Inspect Replace Repair	0.1	1.0	1.0			1 1,4	
	Seat Belts	Inspect Replace	0.1	0.2				1	
22	BODY, CHASSIS AND HULL, AND ACCESSORY ITEMS								
2202	Accessory Items:								
	Wiper Assemblies	Inspect Replace Repair	0.1	1.0 0.5				1 1	
	Windshield Washer Assembly	Inspect Service Replace Repair	0.1	0.2 0.5 0.5				1 1 1	
	Mirror	Inspect Replace	0.1	0.5				1	
	Fans, Ventilation	Inspect Replace	0.1	0.5				1	
2207	Winterization Equipment:								
	24V Heater Assembly	Inspect Replace Repair	0.1	1.0	1.5			1 1	
	Temperature Control Valve	Inspect Replace	0.1	1.0				1	
	Heater Hose, Lines and Fittings	Inspect Replace	0.1	1.0				1	
2210	Data Plates	Replace		0.2				4	
24	HYDRAULIC AND FLUID SYSTEMS								
2401	Drive Pump Assemblies:								
	Tandem Gear Pump	Service Test Replace Repair	0.5 0.5 1.5		2.0			1 11,17,18 1 3,21	
	Piston Pump	Service Test Replace Overhaul	0.5 0.5 1.0 2.0					1 17,18 1,26 3,22	

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
2402	Control Valves								
	Main Control Valve Assembly	Adjust		0.5					1,17
		Replace		2.0					1,26
		Repair			2.0				1,4
	MLRS Attachment Control Valve Assembly	Replace		1.0		2.0			1,26
		Repair							1,4
	Priority Valve	Replace		0.5					1,26
		Repair			1.0				1
	Relief Valve, Frame Tilt/ Brakes	Test		0.5					17,18,26
		Replace		0.5					1,4,26
Repair				1.0				1,4	
Shuttle Valve	Replace		0.5					1,26	
	Repair				1.5			1,26	
Frame Tilt Valve	Replace		0.5					1,4,14	
	Repair							1,26	
Boom Cylinder Flow Control Valve	Replace		0.4					1,26	
	Repair							1	
Hydraulic Joystick	Replace		1.0		1.5			3	
	Repair								
2404 Tilt Cylinder:	Frame Tilt Cylinder	Service		0.3				3	
		Replace		0.7				1,4,26	
	Repair			1.0				1,4,14	
Carriage Tilt Cylinder	Service		0.3					3	
	Replace		1.0		1.0			1,26	
Repair								1,4,14	
2405 Attachment:	Carriage Assembly	Inspect	0.1					3	
		Service		0.3				1,26	
		Replace			1.5		2.0	3	
	Forks	Inspect	0.1					1,26	
		Replace		1.0					
	Fork Bushings	Inspect	0.1					1,3	
Replace			0.5						
MLRS Lifting Tool	Inspect	0.1					1		
	Replace	0.2	0.2					Q	
MLRS Attachment	Inspect	0.1					3		
	Service		0.3				1,26		
Replace			0.5			2.0	7,9		
Repair									

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
2405 (Cont)	Backrest	Inspect	0.1						
		Replace	0.1	0.1				1	Q
		Repair			1.0			7,9	L
	Boom Assembly	Inspect		0.5				3	
		Service		0.2				1,3,4,26	
	Boom Pivot Pins	Replace			5.0			3,4	
		Repair			8.0				
	Wear Pads	Inspect	0.1					3	
		Service		0.1				1,4	
	Pulley	Replace		0.5		1.0		1	
Replace				8.0			1,4,9	O	
Sheave	Replace		1.0				3		
	Replace		1.0				1,4		
Extend and Retract Chains	Inspect		0.1				1		
	Adjust		0.5				1		
2406	Strainers, Filters, Lines and Fittings:	Replace			4.0				
		Inspect							
		Replace							
	Hoses, Lines and Fittings	Inspect	0.1					1	F
		Adjust		1.0				1,26	
	Tubing	Replace		1.0				10	
		Repair			0.5				
	Oil Sampling Valve	Inspect	0.1	0.5				1,4,26	
		Replace						4	
	Strainer	Service	0.1	0.1				1,26	
Replace			0.2				1		
Oil Filter	Replace		0.5				1		
	Replace		0.2				1,15,26		
2407	Hydraulic Cylinders:	Inspect	0.2						
									Replace
	Repair								
Boom Extend Cylinder							Inspect	0.2	
	Replace	0.2							
Fork Sideshift Cylinders							Inspect	0.2	
	Replace	0.2							
Repair									
	Fork Sideshift Cylinders	Inspect	0.2						
Replace							0.2		
	Repair								
Fork Sideshift Cylinders							Inspect	0.2	
	Replace	0.2							
Repair									
	Fork Sideshift Cylinders	Inspect	0.2						
Replace							0.2		
	Repair								

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER (1)	COMPONENT/ASSEMBLY (2)	MAINTENANCE FUNCTION (3)	(4) MAINTENANCE LEVEL					TOOLS & EQUIP (5)	REMARKS (6)
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
2407 (Cont)	Boom Hoist Cylinders	Inspect Service Replace Repair	0.2	0.1 1.0	1.5			4 1,4,26 4,14	
	MLRS Attachment Cylinder	Inspect Service Replace Repair	0.2	0.1 1.5	1.5			4 1,4,26 1,3,14	
31	BASIC ISSUE ITEMS, MANUFACTURER INSTALLED								
3100	Basic Issue Items: Emergency Boom Lift Kit	Replace		0.2				1	
47	GAGES (NON-ELECTRICAL)								
4702	Gages, Mountings, Lines and Fittings:								
	Sight Gages	Inspect Replace	0.1	0.5				1	
	Air Cleaner Restriction Indicator	Inspect Replace	0.1	0.5				1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER	FSCM
1	0	Tool Kit, Auto Mechanics SC5180-90-CL-N26	5180-00-177-7033	#W33004	50980
2	0,F	Tool Kit, General Mechanics SC5180-90-CL-N05	5180-00-699-5273	#W45060	50980
3	0	Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power SC4910-95-CL-A74	4910-00-754-0654	#W32593	19204
4	0	Shop Equipment, Automotive Maintenance, Common #2 Less Power SC4910-95-CL-A72	4910-00-754-0650	#W32730	19204
5	F	Shop Equipment, Automotive Maintenance and Repair; Field Maintenance, Basic, Less Power SC4910-95-CL-A31	4910-00-754-0705	#T24660	
6	F	Tool Kit, Machinists: Post, Camp and Station SC5280-95-CL-A02	5280-00-511-1950	#W44512	
7	F	Shop Equipment, Machine Shop: Field Maintenance Basic, Less Power SC3470-95-CL-A02	3470-00-754-0708	#T15644	
8	F	Shop Equipment, Fuel and Electrical System Engine: Field Maintenance Basic, Less Power SC4910-95-CL-A01	4910-00-754-0714	#T30414	
9	F	Tool Kit, Body and Fender Repair SC5180-90-CL-N34	5180-00-754-0643	#W33689	
10	0	Tool Outfit, Hydraulic System Test and Repair (HSTRU) SC4940-95-CL-B07	4940-01-036-5784	13221E6850	97403
11	0	Simplified Test Equip. for Internal Combustion Engines (STE-ICE) TM9-4910-571-34&P	4910-00-124-2554		
12	0	Protractor, Circular	6675-00-599-8859	1931A6	17866
13	H	Tool Kit, Transmission Consisting of the following: Clutch Pack, Lift Bearing Driver Bearing Driver Spring Compressor Tool		8801801 8801802 8801803 8801804 8801806	3Y949 3Y949 3Y949 3Y949

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER	FSCM
14	F	Wench Set, Spanner, Consisting of the following: Spanner Wrench, Frame Tilt Cylinder Spanner Wrench, Carriage Tilt and Attachment Hoist Cylinder Spanner Wrench, Fork Sideshift Cylinder - Outer Gland Spanner Wrench, Fork Sideshift Cylinder - Inner Gland Spanner Wrench, Fork Sideshift Cylinder - Outer Piston Spanner Wrench, Boom Lift Cylinder and Boom Extend Cylinder		609911 608852 608862 608882 6608872 6608892 34-307	3Y949 3Y949 3Y949 3Y949 3Y949 59346
15	O	Wrench, Strap, 1-6" Capacity	5120-00-776-1840	W18-36	37078
16	F	Tool, Engine Barring	5120-01-285-5195	377371	15434
17	O	Gage, Hydraulic pressure	4940-01-086-8756	13221E6828	99403
18	O	Flowmeter, Hydraulic	4940-01-079-5263	13221E6829	97403
19	O	Kit, Accumulator Charging			
20	F	Wench Set, Diesel Injector	4910-00-317-8265	910359	19204
21	F	Fabricated Tools for Repair of Tandem Gear Pump: Seal Removal Tool Drive Gear Installation Tool			
22	D	Fabricated Tools for Overhaul of Piston Pump: Driveshaft/Pump Housing Bearing Removal Tool Housing Bearing Race Removal Tool Shaft Seal Driver Valve Block Bearing Race Removal Tool Driveshaft/Pump Housing Bearing Installation Tool Housing Bearing Race Installation Tool Valve Block Bearing Race Installation Tool			

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER	FSCM
23	H	Fabricated Tools for Repair of Differentials: Differential Resistance Tool Yoke Nut Tool			
24	O	Template, Level	4910-01-074-0020		
25	F	Adapter, (1/2 to 3/4 in. drive)			
26	O,F	Cap and Plug Set			
27	F	Dial Indicator			
28	F	Fabricated Tool for Repair of Wheel Ends: Planetary Hub Drag Tool			

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Engine assembly is manufactured to metric measure.
B	STE/ICE tests.
c	Service by changing oil and filter.
D	Consists of valve clearance adjustment.
E	Oversize/undersize replacement bearings are available.
F	Inspect for leakage.
G	Includes timing the injection pump using a timing pin method.
H	Consists of cleaning element with compressed air, if appropriate. Crew can remove and clean inner element.
I	Fuel and hydraulic tanks are incorporated in one assembly.
J	Crew adds oil or fuel; Organizational drains, cleans and refills the tank/reservoir.
K	Fuel control lever travel adjustment.
L	May be repaired by welding.
M	Front and rear differential carriers and planetaries are identical, except No-Spin differential is used on front axle.
N	Includes replacement of instrument panels, seat, etc.
o	Only inspect wear pads that are visible at boom ends.
P	End play adjustment.
Q	Crew can remove and install only.
R	Organizational uses built-in indicator lights to test joystick functions. Direct support tests joystick functions with ammeter.
s	Repair by replacement of downports.

APPENDIX C

EXPANDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. General. This appendix lists expendable supplies and materials you will need to operate and maintain the 6KVRRTFL. This listing is for informational purposes only and is not authorized to requisition the needed 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.

C-2. Explanation Of Columns. The following provides an explanation of the columns found in the tabular listing:

a. Item Number, Column 1. This column indicates the number assigned to the entry in the listing.

b. Level, Column 2. This column identifies the lowest level of maintenance that requires the listed item. The symbol designations for the various maintenance categories are as follows:

SYMBOL	MAINTENANCE CATEGORY
C.....	Operator or Crew
O.....	Organizational Maintenance
F.....	Direct Support Maintenance
H.....	General Support Maintenance
D.....	Depot Maintenance

c. National Stock Number (NSN), column 3. This column indicates the NSN assigned to the item, and will be used for requisitioning purposes.

d. Description, Column 4. This column indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

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

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Table C-1. Expendable Supplies and Materials List

(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	U/M
			Adhesive 3-M No. 80 (04963) (TRAK 8526038)	
	0	8010-01-260-5915	1 Can	lb.
			Denatured Alcohol	
2	0	6810-00-543-7415		qt.
			Ammonia	
3	0	6810-00-527-2476		qt.
			Anti-freeze, Permanent, Arctic, MIL-A-11755 (81349)	
	0	6850-00-174-1806	55 Gallon Drum	gal.
			Anti-freeze, Permanent, Extrylene Glycol, Inhibited MIL-A-46153 (81349)	
5	0	6850-00-181-7929	1 Gallon Can	gal.
6	0	6850-00-181-7933	5 Gallon Can	gal.
7	0	6850-00-181-7940	55 Gallon Drum	gal.
			Caulk, Silicone, Clear	
8	0	6850-01-080-2387		tu.
			Compound, Anti-seize, MIL-T-83483 (81349)	
9	o	8030-00-293-3285	1 Can	lb.
			Fluid, Windshield Washer	
10	o	6850-00-926-2276		qt.

(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	u/M
			Grease, Automotive and Artillery, GAA, MIL-G-10924 (81349) (SAE-J-310)	
11	0	9150-00-935-1017	14 oz. Cartridge	oz.
12	0	9150-00-190-0905	6 Pound Can	lb.
13	0	9150-00-190-0907	35 Pound Can	lb.
			Grease, Silicone	
14	0	9150-00-735-1800		tu.
			Jelly, Petroleum	
15	o	9150-00-250-0933		lb.
			Lubricant, Ru-Glide Rubber	
16	0	2640-00-256-5526		lb.
			Oil, Fuel, Diesel, DF-2 Regular VVF800 (81349)	
17	0	9140-00-286-5295	5 Gallon Can	gal.
18	0	9140-00-286-5296	55 Gallon Drum	gal.
19	0	9140-00-286-5294	Bulk	gal.
			Oil, Fuel, Diesel, DF-1 Winter VVF800 (81349)	
20	0	9140-00-286-5287	5 Gallon Can	gal.
21	0	9140-00-286-5288	55 Gallon Drum	gal.
22	0	9140-00-286-5286	Bulk	gal.
			Oil, Fuel, Diesel, DF-A Arctic WF800 (81349)	
23	0	9140-00-286-5282	5 Gallon Can	gal.
24	0	9140-00-286-5284	55 Gallon Drum	gal.
25	0	9140-00-286-5283	Bulk	gal.

(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	u/M
			Oil, Lubricating, Engine OE/HDO-15/40, MIL-L-2104D (81349)	
26	0	9150-01-152-4117	1 Quart Can	qt.
27	0	9150-01-152-4118	5 Gallon Can	gal.
28	0	9150-01-152-4119	55 Gallon Drum	gal.
			Oil, Lubricating, Engine Arctic OEA, MIL-L-46167 (81349)	
29	0	9150-00-402-4478	1 Quart Can	qt.
30	0	9150-00-402-2372	5 Gallon Can	gal.
31	0	9150-00-491-7197	55 Gallon Drum	gal.
			Oil, Lubricating, Gear Multipurpose (GO 80/90 MIL-L-2105D (81349)	
32	0	9150-01-035-5392	1 Quart Can	qt.
33	0	9150-01-035-5393	5 Gallon Can	gal.
34	0	9150-01-035-5394	55 Gallon Drum	gal.
			Oil, Lubricating, Transmission/Hydraulic OE/HDO-10 MIL-L-2140D (81349)	
35	0	9150-00-189-6727	1 Quart Can	qt.
36	0	9150-00-191-2772	55 Gallon Drum	gal.
			Paper, Emery, Grit #80	
37	0	5350-00-619-9167		pcs.
			Primer, Metal	
38	0	8010-00-159-4518		qt.

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
			Rags, Wiping A-A-531 (58536)	
38A	o	7920-00-205-3570		lb.
			Sealant, Loctite 242 MIL-S-46163 Type II Grade N (80244)	
39	o	8030-01-014-5869		oz.
			Sealant, Loctite 271 MIL-S-46163 Type I Grade L (80244)	
40	o	8030-01-158-6070		oz.
			Sealant, Loctite 277 MIL-S-46163 Type I Grade L (80244)	
41	o	8030-01-063-7510		oz.
			Sealant, Loctite 59241	
42	o	8030-00-204-9149		oz.
			Sealant, Loctite 609 MIL-R-46082B Type I (05962)	
43	o	8030-00-180-6150		oz.
			Sealer, Ribbon	
44	o	- - -		Oz.
			Soap, Liquid	
45	o	- - -		lb.
			Soda , Baking	
46	o	6810-00-264-6618		oz.
			Solvent, Chlorinated	
47	0	- - -		qt.

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
			Solvent, Dry Cleaning P-D-680 (81348)	
48	0	6850-00-664-5685	1 Quart Container	qt.
49	0	6850-00-281-1985	1 Gallon Container	gal.
50	0	6850-00-285-8011	1 Drum	dr.
			Tags	
51	0	- - -	1 Carton	ctn.
			Tape, Electrical	
52	0	- - -	1 Dispenser	dis.
			Tie Wraps	
53	0	- - -	1 Carton	ctn.
			Varnish, Anti-fungus	
54	0	8010-00-180-6343		qt.
			Water, Distilled	
55	0	6810-00-356-4936		gal.

National Stock Numbers and Sizes/Quantity of materials to be supplied by government for completion of Table C-1 at FDEP submittal.

APPENDIX D

ILLUSTRATED LIST OF MANUFACTURED ITEMS

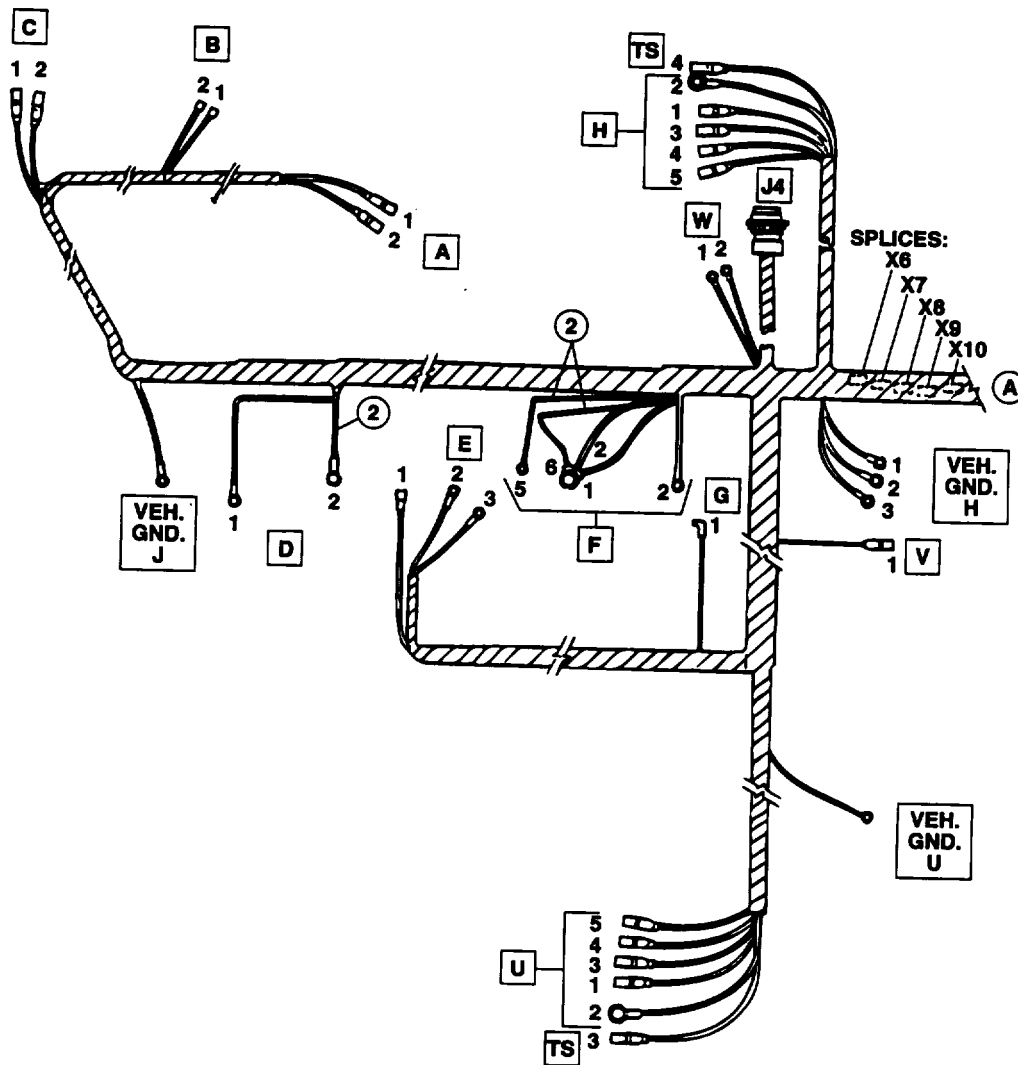
Section I. INTRODUCTION

D-1. General. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at Organizational maintenance level.

Section II. MANUFACTURED ITEMS ILLUSTRATIONS

D-2. Manufactured Items. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Figure D-1. Main Wiring Harness (Sheet 1 of 6)



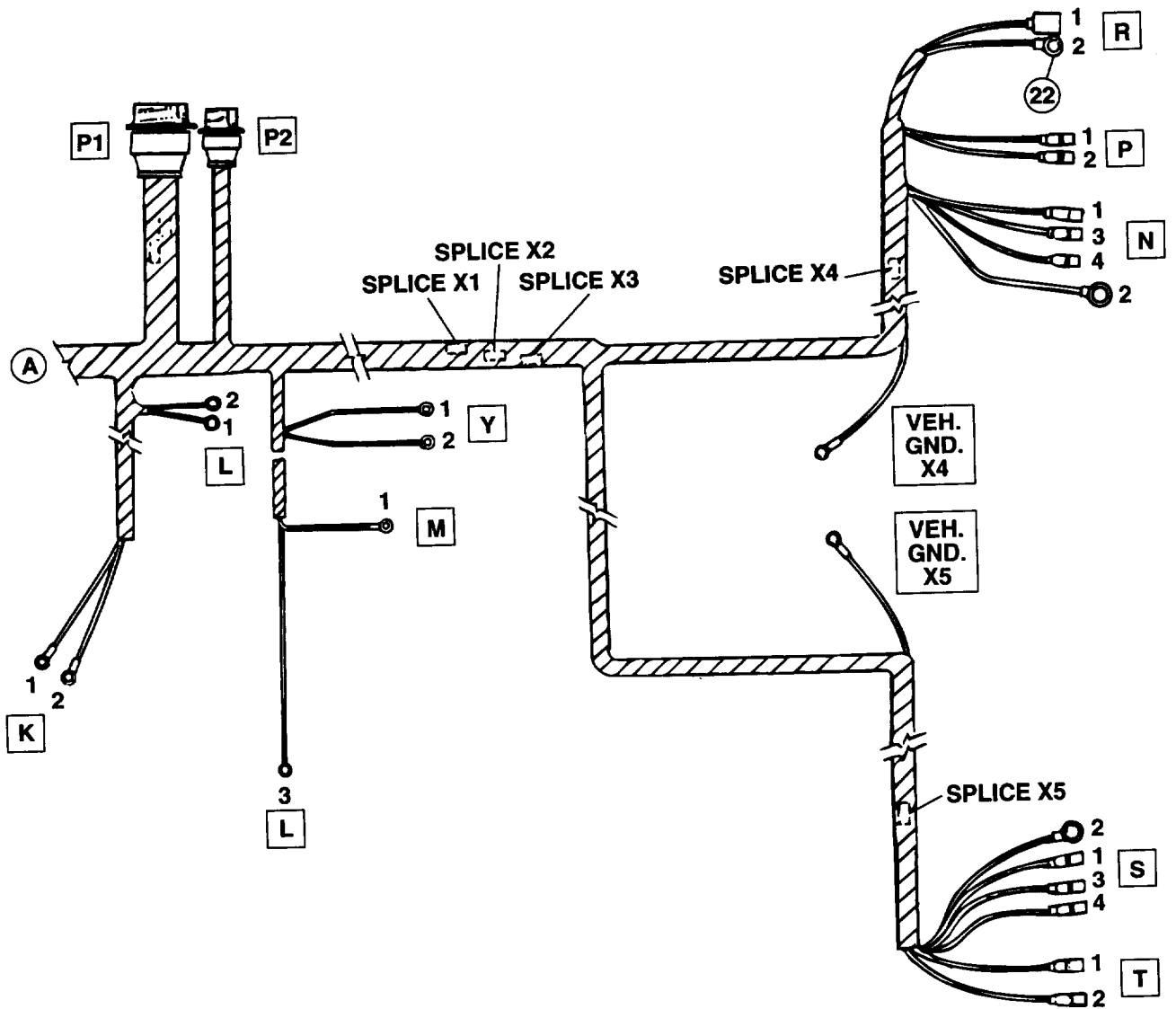
○ Item No.

□ Component Identification (see Sheet 3 of 6)

NOTE: All wires are 16 AWG (item 1) unless otherwise indicated.

ITEM	CAGE	PART NO.	DESCRIPTION	QTY.
--	3Y949	6602745	FRAME WIRING HARNESS	1
1	64488	81163S	Wire, 16 AWG	AR
2	64488	81103S	Wire, 10 AWG	AR

Figure D-1. Main Wiring Harness (Sheet 2 of 6)



○ Item No.

□ Component Identification (see Sheet 3 of 6)

NOTE: All wires are 16 AWG (item 1) unless otherwise indicated.

Figure D-1. Main Wiring Harness (Sheet 3 of 6)

COMPONENT IDENTIFICATION

- | | |
|-------------------------------------------------|-------------------------------------------------------------|
| A - Left Rear Floodlight | L-1 - Transmission Temperature Sender |
| B - Backup Alarm | L-2 - Transmission Temperature Switch |
| C - Right Rear Floodlight | L-3 - Fuel Level Sender |
| D-1 - Water Temperature Sender | M - Emergency Steering Motor |
| D-2 - Alternator | N - Left Front Blackout/Turn Signal/Parking Light Assembly |
| E-1 - Fuel ON/OFF Switch (Injector Pump) | P - Left Headlight |
| E-2 - Oil Pressure Sender | R - Blackout Headlight |
| E-3 - Low Oil Pressure Switch | S - Right Front Blackout/Turn Signal/Parking Light Assembly |
| F - Starter | T - Right Headlight |
| G - Water Temperature Switch | U - Right Rear Blackout/Tail/Stop Light Assembly |
| H - Left Rear Blackout/Tail/Stop Light Assembly | V - Cold Start Circuit |
| J4 - Boom Receptacle | W - Start Relay |
| K - Neutral Safety Switch | Y - Hydraulic Pressure Switch |

WIRE LIST

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
A-1 TO X10	73	AR
A-2 TO X13	2	AR
B-1 TO P1-19	21	177.0
B-2 TO X13	2	AR
C-1 TO X10	73	AR
C-2 TO X13	2	AR
D-1 TO P1-10	15	143.0
D-2 TO F-3	9	53.0
E-1 TO P1-17	7	151.0
E-2 TO P1-12	17	151.0
E-3 TO P1-13	16	151.0
F-1 TO P2-1	9	112.0
F-2 TO K-1	4A	124.0
F-3 TO D-2	9	53.0
F-5 TO W-1	38	29.0
F-6 TO W-2	39	AR
G-1 TO P1-11	14	128.0

Figure D-1. Main Wiring Harness (Sheet 4 of 6)

WIRE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
H-1 TO X6	45	AR
H-2 TO VEH. GND	H-2 2	73.0
H-3 TO X7	43	AR
H-4 TO X8	44	AR
H-5 TO X9	46	AR
J4		
-A TO P1-30	54	141.0
-C TO VEH. GND	H-3 2	86.0
-H TO P1-28	52	141.0
-J TO P1-29	53	141.0
-K TO P1-27	51	141.0
-L TO P1-32	56	141.0
-M TO P1-33	57	141.0
-N TO P1-37	50	141.0
-P TO P1-35	65	141.0
-R TO P1-36	64	141.0
-S TO P1-34	58	141.0
-W TO P1-25	71	141.0
-X TO P1-31	55	141.0
K-1 TO F-2	4A	124.0
K-2 TO P1-18	4	87.0
L-1 TO P1-14	19	67.0
L-2 TO P1-15	18	67.0
L-3 TO P1-16	12	96.0
M-1 TO P1-21	92	57.0
N-1 TO X2	48	AR
N-2 TO X4	2	AR
N-3 TO X1	45	AR
N-4 TO X11	27	AR
P-1 TO X3	49	AR
P-2 TO X4	2	AR
P1		
- 1 BLANK		
- 2 TO X3	49	AR
- 3 TO R-1	47	285.0
- 4 TO X2	48	AR
- 5 TO X1	45	AR
- 6 TO X7	43	AR
- 7 TO X8	44	AR
- 8 TO X9	46	AR

Figure D-1. Main Wiring Harness (Sheet 5 of 6)

WIRE LIST (CONTINUED)

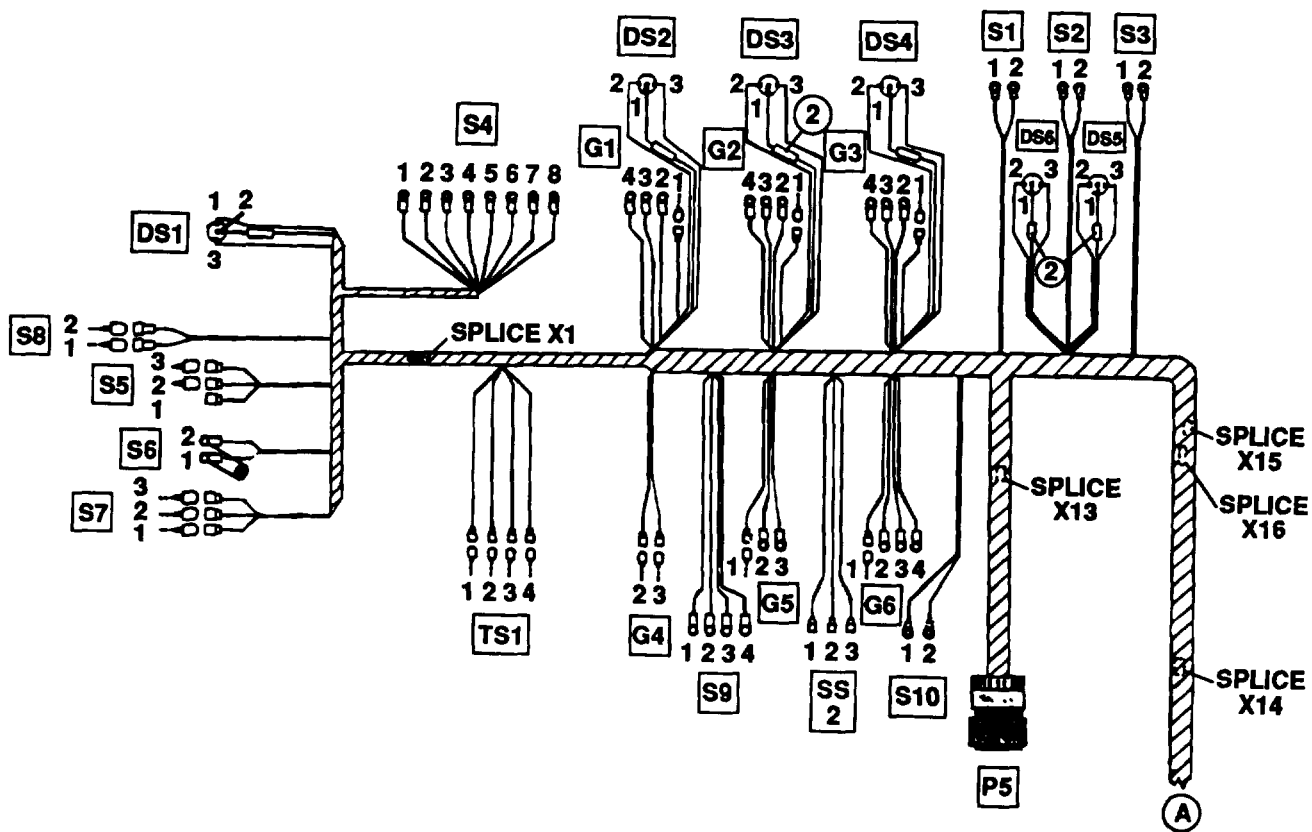
CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
P1 (CONTINUED)		
- 9 TO X11	27	AR
-10 TO D-1	15	143.0
-11 TO G-1	14	128.0
-12 TO E-2	17	151.0
-13 TO E-3	16	151.0
-14 TO L-1	19	67.0
-15 TO L-2	18	67.0
-16 TO L-3	12	96.0
-17 TO E-1	7	151.0
-18 TO K-2	4	87.0
-19 TO B-1	21	177.0
-20 TO V-1	8	111.0
-21 TO M-1	92	57.0
-22 TO Y-2	91	31.0
-23 TO Y-1	10	31.0
-24 TO X10	73	AR
-25 TO J4-W	71	141.0
-26 TO X12	28	AR
-27 TO J4-K	51	141.0
-28 TO J4-H	52	141.0
-29 TO J4-J	53	141.0
-30 TO J4-A	54	141.0
-31 TO J4-X	55	141.0
-32 TO J4-L	56	141.0
-33 TO J4-M	57	141.0
-34 TO J4-S	58	141.0
-35 TO J4-P	65	141.0
-36 TO J4-R	64	141.0
-37 TO J4-N	50	141.0
P2		
- 1 TO F-1	9	112.0
- 2 TO VEH. GND. H-1	2	84.0
- 3 BLANK		
R-1 TO P1-3	47	285.0
R-2 TO X4	2	AR
S-1 TO X2	48	AR
S-2 TO X5	2	AR
S-3 TO X1	45	AR
S-4 TO X12	28	AR
T-1 TO X3	49	AR
T-2 TO X5	2	AR

Figure D-1. Main Wiring Harness (Sheet 6 of 6)

WIRE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
TS-3 TO X12	28	AR
TS-4 TO X11	27	AR
U-1 TO X6	45	AR
U-2 TO VEH. GND. U 2		63.0
U-3 TO X7	43	AR
U-4 TO X8	44	AR
U-5 TO X9	46	AR
V-1 TO P1-20	8	111.0
W-1 TO F-5	38	29.0
W-2 TO F-6	39	
Y-1 TO P1-23	10	31.0
Y-2 TO P1-22	91	31.0
SPlice-TO-SPlice CONNECTIONS		
X1 TO X6	45	AR
SPlice-TO-VEHICLE GROUND CONNECTIONS		
X4 TO VEH. GND. X4 2		AR
X5 TO VEH. GND. X5 2		AR
X13 TO VEH. GND. J 2		AR

Figure D-2. Cab Wiring Harness (Sheet 1 of 12)

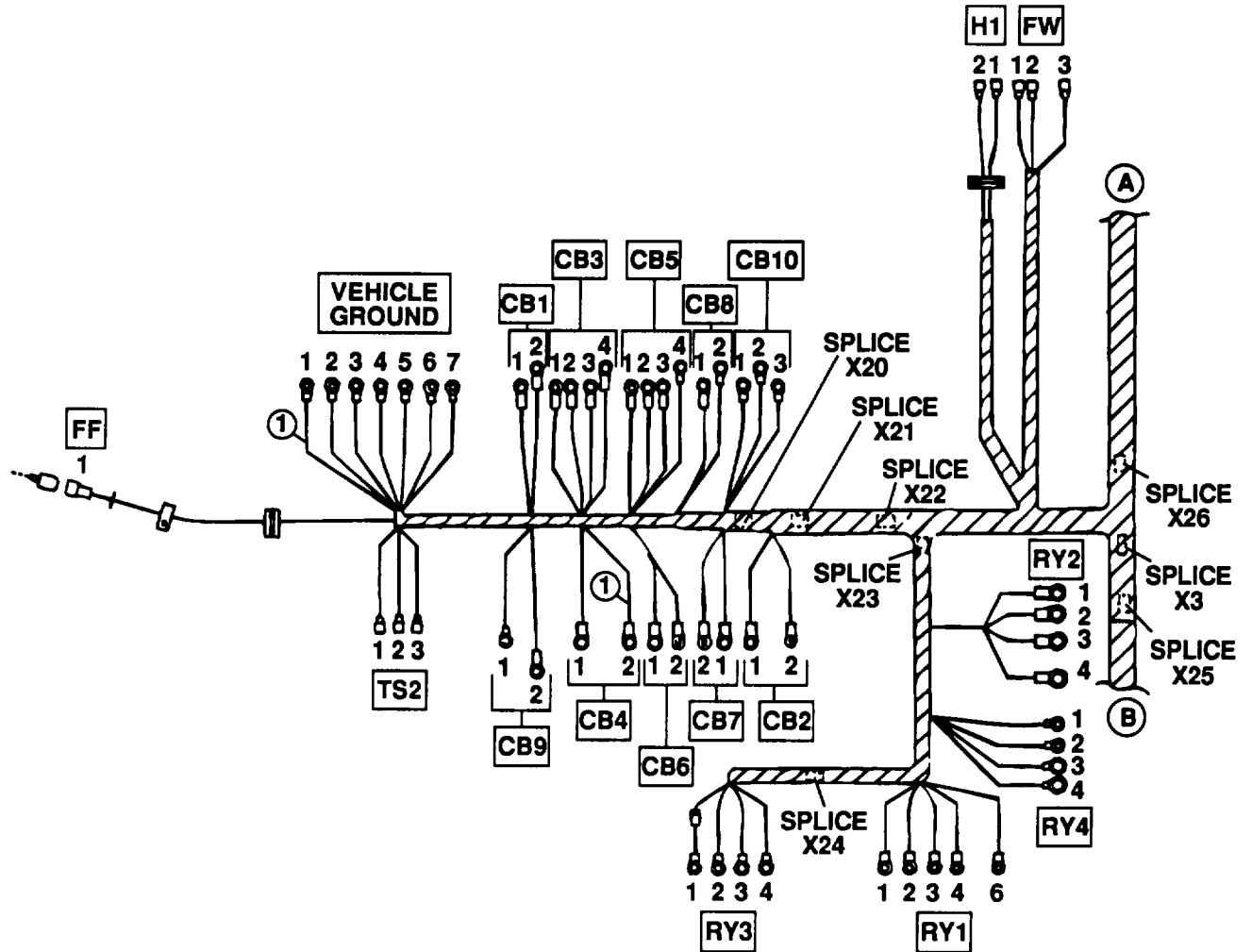


- Item No.
- Component Identification (see Sheet 5 of 12)

NOTE: All wire is 16 AWG, single conductor (item 3) unless otherwise noted.

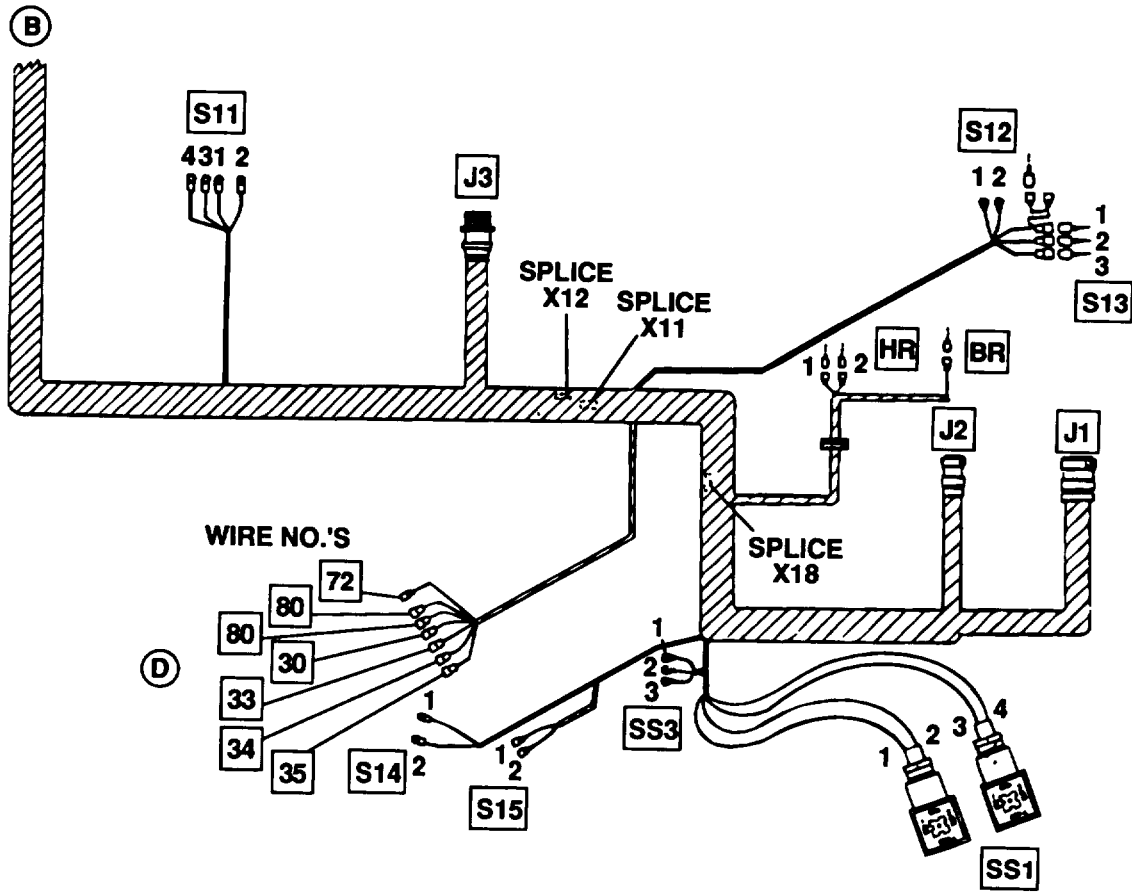
ITEM NO.	CAGE	PART NO.	DESCRIPTION	QTY .
--	3Y949	6602765	CAB WIRING HARNESS	1
1	64488	81083S	Wire, 8 AWG	AR
2	64488	81143S	Wire, 14 AWG	AR
3	64488	81163S	Wire, 16 AWG	AR

Figure D-2. Cab Wiring Harness (Sheet 2 of 12)



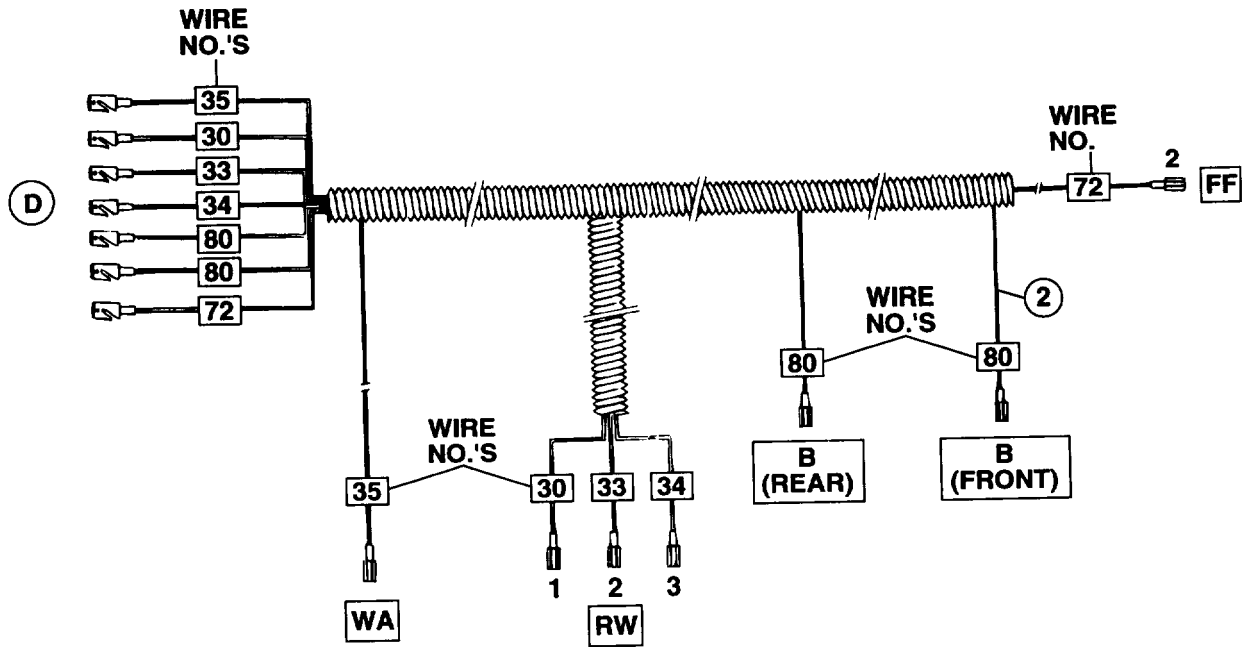
NOTE: All wires are 16 AWG (item 3) unless otherwise indicated.

Figure D-2. Cab Wiring Harness (Sheet 3 of 12)



NOTE: All wires are 16 AWG (item 3) unless otherwise indicated.

Figure D-2. Cab Wiring Harness (Sheet 4 of 12)



NOTE: All wires are 16 AWG (item 3) unless otherwise indicated.

Figure D-2. Cab Wiring Harness (Sheet 5 of 12)

COMPONENT IDENTIFICATION

- | | |
|-----------------------------------------------|----------------------------------------------|
| B - Cab Fans | RW - Rear Windshield Wiper |
| BR - Brake On Switch | |
| <u>Circuit Breakers</u> | |
| CB1 - Gages | RY1 - Run Relay |
| CB2 - Backup Alarm | RY2 - Blackout Relay |
| CB3 - Wiper/Washer | RY3 - Emergency Steering Relay |
| CB4 - Blackout/Service/Panel Lights | RY4 - Blackout Relay |
| CB5 - Auto Leveler | S1 - Front Floodlight Switch |
| CB6 - Main | S2 - Rear Floodlight Switch |
| CB7 - Floodlights | S3 - Boom Floodlight Switch |
| CB8 - Heater Fans | S4 - Fork Leveler Switch |
| CB9 - Steer Select | S5 - Front Windshield Wiper Switch |
| CB10 - Turn Signals/Horn | S6 - Windshield Washer Switch |
| | S7 - Rear Windshield Wiper Switch |
| DS1 - Fork Auto Level On Indicator | S8 - Backup Alarm Switch |
| DS2 - High Water Temperature Indicator | S9 - Ignition Switch |
| DS3 - Low Oil Pressure Indicator | S10 - Horn Switch |
| DS4 - Low Transmission Oil Pressure Indicator | S11 - Fuel Shutoff/Emergency Steering Switch |
| DS5 - Low Brake Fluid Indicator | S12 - Cold Start Switch |
| DS6 - Brake On Indicator | S13 - Heater Switch |
| | S14 - Brake Switch |
| FF - Front Floodlight | S15 - Low Brake Pressure Switch |
| FW - Front Windshield Wiper | SS1 and SS3 - Steering Select Circuit |
| G1 - Water Temperature Gage | SS2 - Steering Select-Switch |
| G2 - Engine Oil Pressure Gage | TS1 - Turn Signal Switch |
| G3 - Transmission Oil Pressure Gage | TS2 - Flasher |
| G4 - Hourmeter | |
| G5 - Voltmeter | WA - Windshield Washer |
| G6 - Fuel Gage | |
| H1 - Horn | |
| HR - Heater | |

Figure D-2. Cab Wiring Harness (Sheet 6 of 12)

WIRE LIST

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
B-1 TO X18	80	AR
B-2 TO X18	80	AR
BR TO DS6-2	23	131.5
CB1-1 TO X14	10	AR
CB1-2 TO X20	3	9.0
CB2-1 TO S8-1	20	59*5
CB2-3 TO X21	5	5.0
CB3-1 TO X1	30	AR
CB3-2 TO RW-1	30	80.0
CB3-3 TO FW-1	30	27.0
CB3-4 TO X20	3	8.0
CB4-1 TO P5-F	40	44.0
CB4-2 TO X20	3	AR
CB5-1 TO J3-1	50	70.0
CB5-2 TO DS1-1	50	58.0
CB5-3 TO J1-37	50	107.5
CB5-4 TO X20	3	7.0
CB6-1 TO J2-1	9	105.0
CB6-2 TO X22	1	9.0
CB7-1 TO X16	70	AR
CB7-2 TO X21	5	6.0
CB8-1 TO X18	80	AR
CB8-2 TO X20	3	6.0
CB9-1 TO SS2-2	83	49.5
CB9-2 TO X20	3	4.0
CB10-1 TO TS2-1	24	16.0
CB10-2 TO RY4-4	29	20.5
CB10-3 TO S10-1	20	42.5
DS1-1 TO CB5-2	50	58.0
DS1-2 TO S4-8	59	9.5
DS1-3 TO X15	2	21.0
DS2-1 TO X14	10	AR
DS2-2 TO J1-11	14	125.5
DS2-3 TO X15	2	21.0

Figure D-2. Cab Wiring Harness (Sheet 7 of 12)

WIRE LIST (CONTINUED)

CONNECTION	POINTS	WIRE NO.	LENGTH (Inches)
DS3-1	TO X14	10	AR
DS3-2	TO J1-13	16	114.5
DS3-3	TO X15	2	12.0
DS4-1	TO X14	10	AR
DS4-2	TO J1-15	18	121.5
DS4-3	TO X15	2	9.0
DS5-1	TO X14	10	AR
DS5-2	TO S15-1	11	106.5
DS5-3	TO X15	2	11.0
DS6-1	TO X14	10	AR
DS6-2	TO BR	23	131.5
DS6-3	TO X15	2	AR
FF-1	TO X26	72	AR
FF-2	TO X26	72	AR
FW-1	TO CB3-3	30	27.0
FW-2	TO FW-4	31	6.5
FW-2	TO S5-2	31	53.5
FW-3	TO FW-5	32	6.5
FW-3	TO S5-3	32	53.5
G1-1	TO X13	13	AR
G1-2	TO X14	10	AR
G1-3	TO X15	2	AR
G1-4	TO J1-10	15	123.5
G2-1	TO X13	13	AR
G2-2	TO X14	10	AR
G2-3	TO X15	2	AR
G2-4	TO J1-12	17	122.5
G3-1	TO X13	13	AR
G3-2	TO X14	10	AR
G3-3	TO X15	2	AR
G3-4	TO J1-14	19	119.5
G4-2	TO X14	10	AR
G4-3	TO X15	2	AR
G5-1	TO X13	13	AR
G5-2	TO X14	10	AR
G5-3	TO X15	2	AR

Figure D-2. Cab Wiring Harness (Sheet 8 of 12)

WISE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
G6-1 TO X13	13	AR
G6-2 TO X14	10	AR
G6-3 TO X15	2	AR
G6-4 TO J1-16	12	119.5
H1-1 TO S10-2	22	45.5
H1-2 TO VEH. GND.-5	2	32.0
HR-1 TO S13-3	82	61.0
HR-2 TO S13-2	81	61.0
J1		
- 1 BLANK		
- 2 TO P5-M	49	118.5
- 3 TO P5-D	47	118.5
- 4 TO P5-L	48	118.5
- 5 TO X3	45	AR
- 6 TO P5-C	43	118.5
- 7 TO P5-N	44	118.5
- 8 TO P5-H	46	118.5
- 9 TO TS1-3	27	129.5
-10 TO G1-4	15	123.5
-11 TO DS2-2	14	125.5
-12 TO G2-4	17	122.5
-13 TO X25	16	AR
-14 TO G3-4	19	118.5
-15 TO DS4-2	18	121.5
-16 TO G6-9	12	119.5
-17 TO S11-1	7	84.5
-18 TO S9-3	9	126.0
-19 TO S8-2	21	137.5
-20 TO S12-1	8	70.5
-21 TO S11-4	92	84.5
-22 TO X24	91	AR
-23 TO X14	10	AR
-24 TO S2-1	73	117.0
-25 TO S3-1	71	115.5
-26 TO TS1-4	28	129.5
-27 TO J3-8	51	61.5
-28 TO J3-5	52	61.5
-29 TO X12	53	AR
-30 TO X11	54	AR
-31 TO J3-9	55	61.5
-32 TO J3-6	56	61.5
-33 TO S4-5	57	135.5
-34 TO S4-2	58	135.5
-35 TO S4-3	65	135.5

Figure D-2. Cab Wiring Harness (Sheet 9 of 12)

WIRE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
J1 (Continued)		
-36 TO S4-6	64	135.5
-37 TO CB5-3	50	107.5
J2		
- 1 TO CB6-1	9	105.0
- 2 TO VEH. GND-1	2	111.0
J3		
- 1 TO CB5-1	50	70.0
- 2 BLANK		
- 3 TO VEH. GND.-2	2	60.0
- 4 To X11	54	AR
- 5 TO J1-28	52	61.5
- 6 TO J1-32	56	61.5
- 7 To X12	53	AR
- 8 TO J1-27	51	61.5
- 9 TO J1-31	55	61.5
P5		
- A To S14-1	41	117.0
- B To X13	13	AR
- c To J1-6	43	118.5
- D TO J1-3	47	118.5
- E To X3	45	AR
- F To CB4-1	40	44.0
- H To J1-8	46	118.5
- J BLANK		
- K S14-2	42	117.0
- L J1-4	48	118.5
- M J1-2	49	118.5
- N J1-7	44	118.5
RW-1 TO CB3-2	30	80.0
RW-2 TO S7-2	33	105.5
RW-3 To S7-3	34	105.5
RY1-1 TO X22	1	11.0
RY1-2 TO X20	3	15.0
RY1-3 TO S9-2	6	49.5
RY1-4 To S12-2	6	44.0
RY1-6 TO X23	2	12.0
RY2-1 TO X20	3	11.0
RY2-2 TO X21	5	11.0
RY2-3 TO X3	45	AR
RY2-4 TO X23	2	9.0

Figure D-2. Cab Wiring Harness (Sheet 10 of 12)

WIRE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
RY3-1 TO X25	16	23.5
RY3-2 TO X24	91	12.0
RY3-3 TO X14	10	36.0
RY3-4 TO X24	91	12.0
RY4-1 TO VEH. GND.-7	2	27.5
RY4-2 TO X3	45	AR
RY4-3 TO X22	1	AR
RY4-4 TO CB10-2	29	20.5
S1-1 TO X26	72	AR
S1-2 TO X16	70	AR
S2-1 TO J1-24	73	117.0
S2-2 TO X16	70	AR
S3-1 TO J1-25	71	115.5
S3-2 TO X16	70	AR
S4-1 TO X11	54	AR
S4-2 TO J1-34	58	135.5
S4-3 TO J1-35	65	135.5
S4-4 TO X12	53	AR
S4-5 TO J1-33	57	135.5
S4-6 TO J1-36	64	135.5
S4-7 TO VEH. GND.-4	2	64.5
S4-8 TO DS1-2	59	9.5
S5-1 TO X1	30	AR
S5-2 TO FW-2	31	53.5
S5-3 TO FW-3	32	53.5
S6-1 TO X1	30	AR
S6-2 TO WA	35	104.0
S7-1 TO X1	30	AR
S7-2 TO RW-2	33	105.5
S7-3 TO RW-3	34	105.5
S8-1 TO CB2-1	20	59.5
S8-2 TO J1-19	21	137.5
S9-1 TO X22	1	40.0
S9-2 TO RY1-3	6	49.5
S9-3 TO J1-18	4	126.0
S9-4 TO S11-2	36	75.5

Figure D-2. Cab Wiring Harness (Sheet 11 of 12)

WIRE LIST (CONTINUED)

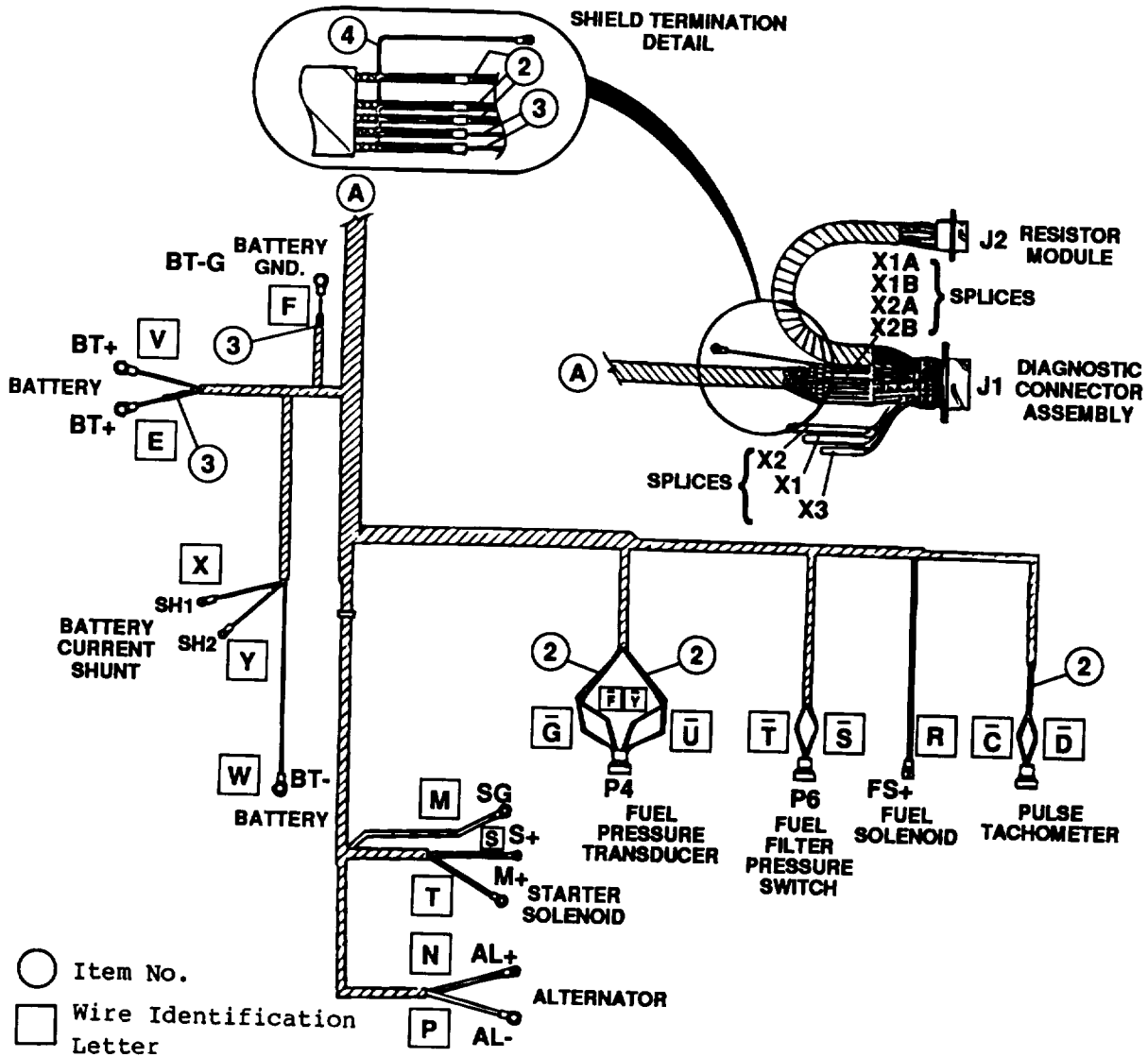
CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
S10-1 TO CB10-3	20	42.5
S10-2 TO H1-1	22	45.5
S11-1 TO J1-17	7	84.5
S11-2 TO S9-4	36	75.5
S11-3 TO X24	91	60.0
S11-4 TO J1-21	92	84.5
S12-1 TO J1-20	8	70.5
S12-2 TO RY1-4	6	44.0
S13-1 TO X18	80	AR
S13-2 TO HR-2	81	61.0
S13-3 TO HR-1	82	61.0
S14-1 TO P5-A	41	117.0
S14-2 TO P5-K	42	117.0
S15-1 TO DS5-2	11	106.5
S15-2 TO SS3-1	2	40.0
SS1-1 TO SS2-1	84	110.5
SS1-2 TO SS3-2	2	16.0
SS1-3 TO SS2-3	85	110.5
SS1-4 TO SS3-3	2	16.0
SS2-1 TO SS1-1	84	110.5
SS2-2 TO CB9-1	83	49.5
SS2-3 TO SS1-3	85	110.5
SS3-1 TO S15-2	2	40.0
SS3-2 TO SS1-2	2	16.0
SS3-3 TO SS1-4	2	16.0
TS1-1 TO TS2-2	25	60.0
TS1-2 TO TS2-3	26	60.0
TS1-3 TO J1-9	27	129.5
TS1-4 TO J1-26	28	129.5
TS2-1 TO CB10-1	24	16.0
TS2-2 TO TS1-1	25	60.0
TS2-3 TO TS1-2	26	60.0

Figure D-2. Cab Wiring Harness (Sheet 12 of 12)

WIRE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
VEHICLE GROUND (VEH. GND.)		
-1 TO J2-2	2	111.0
-2 TO J3-3	2	60.0
-3 TO X15	2	AR
-4 TO S4-7	2	64.5
-5 TO H1-2	2	32.0
-6 TO X23	2	AR
-7 TO RY4-1	2	27.5
WA TO S6-2	35	104.0

Figure D-3. Ste/Ice Wiring Harness (Sheet 1 of 4)



NOTE: All wire letters with a bar over them are lower case letters; i.e., A = a.

NOTE: All wire is 16 AWG, single conductor (item 1) unless otherwise noted.

ITEM NO.	CAGE	PART NO.	DESCRIPTION	QTY .
--	3Y949	6602045	STE/ICE WIRE HARNESS	1
1	64488	81163S	Wire, 1-Conductor, 16 AWG	AR
2			Wire, 2-Conductor Shielded, 16 AWG	AR
3			Wire, 1-Conductor Shielded, 16 AWG	AR
4	64488	81203S	Wire, 1-Conductor, 20 AWG	AR

Figure D-3. Ste\Ice Wiring Harness (Sheet 2 of 4)

NOTE: All wire numbers (letters) with a bar over them are lower case letters; i.e., A = a.

WIRE LIST

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
ALTERNATOR		
ALT+ TO J1-N	N	162.0
ALT- TO J1-P	P	162.0
BATTERY		
BT+ TO J1-V	V	114.0
BT+ TO J1-E	E	114.0
BT- TO J1-W	W	99.0
BT-G TO J1-F	F	91.0
BATTERY CURRENT SHUNT		
SH1 TO J1-X	x	95.0
SH2 TO J1-Y	Y	95.0
FUEL SOLENOID		
FS+ TO J1-R	R	176.0
STARTER SOLENOID		
M+ TO J1-T	T	144.0
S+ TO J1-S	S	144.0
SG TO J1-M	M	144.0
J1		
-A TO X3	\bar{A}	6.0
-AA TO X1	AA	7.0
-AB TO X2	AB	8.0
- AC TO X1	AC	7.0
-AD TO X2	AD	8.0
- B TO X3	\bar{B}	6.0
- C TO P5-1	\bar{C}	182.0
- D TO J2-H	D-H	18.0
- D TO P5-2	\bar{D}	182.0
- E TO BT+	E	114.0
- F TO BT-G	F	91.0
- F TO X1B	\bar{F}	3.0
- G TO X1	\bar{G}	7.0
- H TO J2-D	\bar{H} -D	12.0
- J TO J2-E	\bar{J} -E	12.0
K TO X1	\bar{K}	7.0
- M TO SG	M	144.0

Figure D-3. Ste/Ice Wiring Harness (Sheet 3 of 4)

WIRE LIST (CONTINUED)

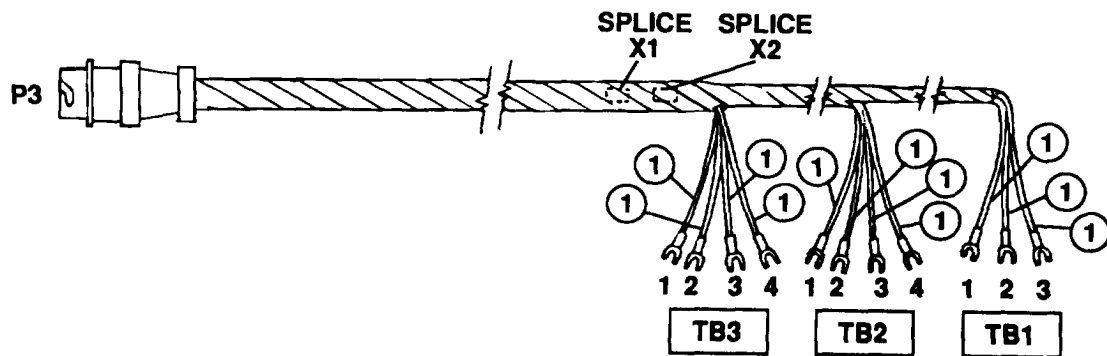
CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
J1 (CONTINUED)		
- M TO X2	<u>M</u>	8.0
- N TO ALT +	<u>N</u>	162.0
-N TO X1	<u>N</u>	7.0
- O TO X3	<u>O</u>	6.0
- P TO ALT -	<u>P</u>	162.0
-P TO X2	<u>P</u>	8.0
- R TO FS +	<u>R</u>	176.0
-S TO S +	<u>S</u>	144.0
- S TO X2A	<u>S</u>	3.0
- T TO M +	<u>T</u>	144.0
- T TO X2B	<u>T</u>	3.0
- U TO X3	u	6.0
- G TO P4-3	ii	160.0
- V TO BT +	<u>V</u>	114.0
- V TO P4-4	<u>V</u>	160.0
- W TO BT -	w	99.0
- W TO X1	W	7.0
- X TO SH-1	<u>X</u>	95.0
- X TO X2	<u>X</u>	8.0
- Y TO SH-2	<u>Y</u>	95.0
- Y TO X1	<u>Y</u>	7.0
- Z TO X3	<u>Z</u>	6.0
Z TO X2	<u>Z</u>	8.0
J2		
- A TO X1B	A	12.0
- C TO X2	c	17.0
D TO J1-H	H-D	12.0
- E TO J1-J	J-E	12.0
- F TO X2B	F	12.0
- G TO X2A	G	12.0
- H TO J1-D	D-H	18.0
- J TO X1	J	16.0
P4		
- 1 TO X1B	<u>F</u>	155.0
- 2 TO X1A	<u>G</u>	155.0
- 3 TO J1-U	<u>U</u>	160.0
- 4 TO J1-V	<u>V</u>	160.0

Figure D-3. Ste/Ice Wiring Harness (Sheet 4 of 4)

WIRE LIST (CONTINUED)

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
P5		
- 1 TO J1-C	C	182.0
- 2 TO J1-D	D	182.0
P6		
- 1 TO X2B	T	165.0
- 2 TO X2A	S	165.0
SPLICE TO SPLICE CONNECTIONS		
X1 TO XI-A	x1	6.0

Figure D-4. Electric Joystick

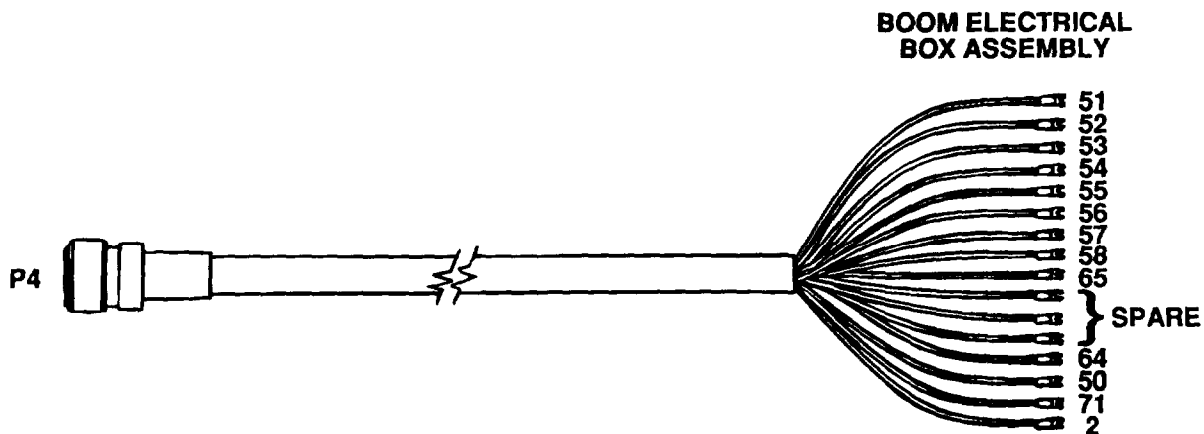


ITEM NO.	CAGE	PART NO.	DESCRIPTION	QTY.
--	3Y949	6602583	JOYSTICK WIRE HARNESS	1
1	64488	81163S	Wire, 1-Conductor, 16 AWG	AR

WIRE LIST

CONNECTION POINTS	WIRE NO.	LENGTH (Inches)	CONNECTION POINTS	WIRE NO.	LENGTH (Inches)
P3			TB1		
- 1 TO X2	50	11.0	- 1 TO X1	2	8.0
- 2 (NOT USED)			- 2 TO P3-8	51	17.0
- 3 TO X1,	2	9.0	- 3 TO P3-5	52	17.0
- 4 TO TB2-2	54	16.0			
- 5 TO TB1-3	52	17.0	TB2		
- 6 TO TB3-2	56	15.0	- 1 TO X1	2	7.0
- 7 TO TB2-3	53	16.0	- 2 TO P3-4	54	16.0
- 8 TO TB1-2	51	17.0	- 3 TO P3-7	53	16.0
- 9 TO TB3-3	55	15.0	- 4 TO X2	50	5.0
			TB3		
			- 1 TO X1	2	6.0
			- 2 TO P3-6	56	15.0
			- 3 TO P3-9F	55	15.0
			- 4 TO X2	50	4.0

Figure D-5. Boom Electrical Cable



NOTE: All wires are 18 AWG.

ITEM NO.	CAGE	PART NO.	DESCRIPTION	QTY .
--	3Y949	6602733	BOOM CABLE WIRING HARNESS	1
--	64488	81183S	Wire, 18 AWG, 16 X 0.010 strand	AR

WIRE LIST

CONNECTION POINTS		WIRE NO.	LENGTH
FROM	To		
P4			
-A	Boom Electrical Box Assy.	54	40'3"
-c	Boom Electrical Box Assy.	2	40'3"
-F	Boom Electrical Box Assy.	Spare	40'3"
-H	Boom Electrical Box Assy.	52	40'3"
-J	Boom Electrical Box Assy.	53	40'3"
-K	Boom Electrical Box Assy.	51	40'3"
-L	Boom Electrical Box Assy.	56	40'3"
-M	Boom Electrical Box Assy.	57	40'3"
-N	Boom Electrical Box Assy.	50	40'3"
-P	Boom Electrical Box Assy.	65	40'3"
-R	Boom Electrical Box Assy.	64	40'3"
-s	Boom Electrical Box Assy.	58	40'3"
-T	Boom Electrical Box Assy.	Spare	40'3"
-u	Boom Electrical Box Assy.	Spare	40'3"
-w	Boom Electrical Box Assy.	71	40'3"
-x	Boom Electrical Box Assy.	55	40'3"

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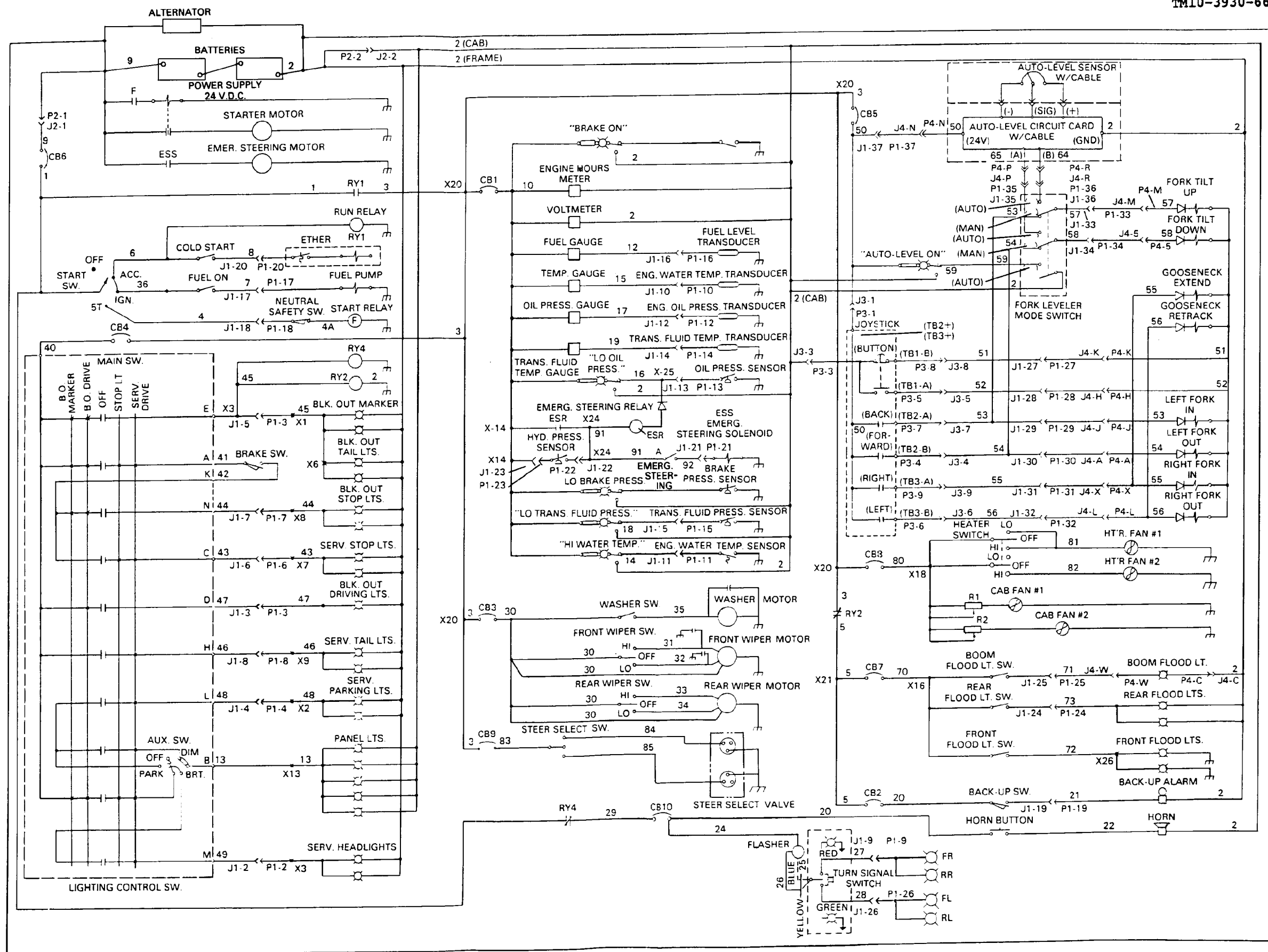
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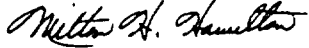
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By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
04150

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	
3		2		Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
109		51		Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.
2-8			2-1	Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.
12	1-6a			Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

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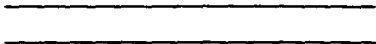
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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter=10 Millimeters=0.01 Meters=0.3937 Inches
 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

TEMPERATURE

$5/9 (^{\circ}F - 32) = ^{\circ}C$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 C + 32 = F^{\circ}$

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
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
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	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

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
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
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

