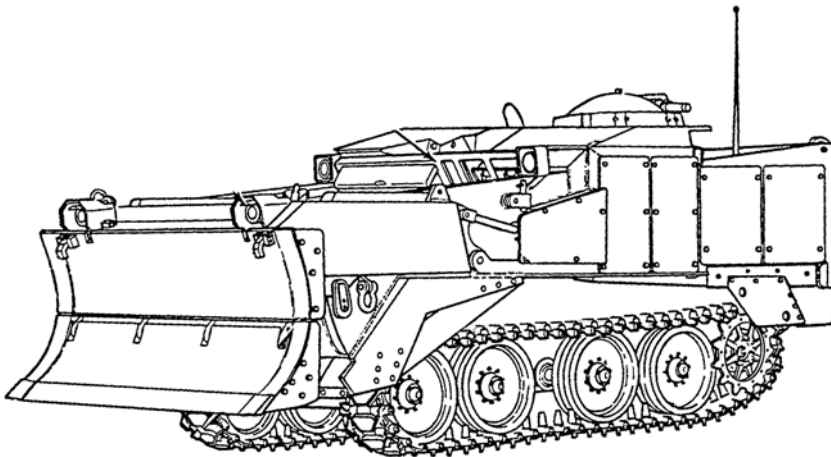


# TM 5-2350-262-34\*

## TECHNICAL MANUAL

### DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

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### ARMORED COMBAT EARTHMOVER (ACE), M9 [NSN 2350-00-808-7100]

\* This manual supersedes TM 5-2350-262-34, dated October 1990, and all related changes.

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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JANUARY 1997



# **WARNING**

## **CARBON MONOXIDE POISONING CAN BE DEADLY**

CARBON MONOXIDE IS A COLORLESS, ODORLESS, DEADLY, POISONOUS GAS WHICH, WHEN BREATHED, DEPRIVES THE BODY OF OXYGEN AND CAUSES SUFFOCATION. EXPOSURE TO AIR CONTAMINATED WITH CARBON MONOXIDE CAUSES HEADACHE, DIZZINESS, LOSS OF MUSCULAR CONTROL, AND DROWSINESS. 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 ENSURE THE SAFETY OF PERSONNEL WHENEVER THE PERSONNEL HEATER, MAIN ENGINE, OR AUXILIARY ENGINE OF ANY VEHICLE IS OPERATED FOR MAINTENANCE PURPOSES OR TACTICAL USE.

1. DO NOT operate heater or engine of vehicle in an enclosed area, unless it is ADEQUATELY VENTILATED.
2. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in personnel compartments.
3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed, unless necessary for maintenance purposes.
4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration.

### **THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.**

- Fuel vapors are toxic. Avoid prolonged exposure or breathing of fumes. Work in a well-ventilated area. Failure to comply may result in severe injury to personnel.
- Always wear goggles when using hammer and drift. Failure to comply may result in severe injury to personnel.
- Compressed air can injure you and others. Do not aim compressed air hose at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.
- Drycleaning solvent is flammable and will not be used near open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.

## **WARNING - CONTINUED**

- Do not work in bowl area unless ejector lock is engaged. Failure to comply may result in severe injury to personnel.
- Spilled hydraulic oil is very slippery. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.
- Do not work under vehicle unless hull is blocked. Failure to comply may result in severe injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.
- Fuel is a combustible material. Do not smoke or allow open flames or sparks into areas where fuel is present. Failure to comply may result in severe injury to personnel.
- Keep hands and arms away from fan blade and drivebelts while engine is running. Failure to comply may result in severe injury or death to personnel.
- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.
- Handling of heated components can cause serious burns. Always wear gloves when handling heated parts. Failure to comply may result in severe injury to personnel.
- Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.
- Do not attempt to disconnect any hydraulic hose or tube until all hydraulic pressure is relieved from the accumulator. Failure to comply may result in severe injury to personnel.
- Ensure hydraulic pressure is relieved after pushing ejector forward. Pressure may build up and cause ejector to retract. Failure to comply may result in severe injury to personnel.
- Hub must be used as a counterweight when removing or installing final drive. Two persons should handle sling. Failure to comply may result in severe injury to personnel.
- Ensure power package is securely blocked. Power package is top-heavy and can easily tip over, causing severe injury or death to personnel.
- Do not remove access port cap from shipping/storage container to release pressure. Cap will fly off and may cause injury to personnel.
- Do not use refrigerant 134A near open fire. Always wear protective clothing, rubber gloves, and safety glasses when using refrigerant. Failure to comply may result in injury to personnel.



## **WARNING - CONTINUED**

- Do not disconnect UNSPRUNG warning switch unless hydraulic pressure has been relieved. Failure to comply may result in severe injury to personnel.
- Fuel tanks must be entirely free of flammable liquid, vapor, and gases prior to repair. Welding, or other work producing heat, flame, or sparks must be preceded by cleaning. Failure to comply may result in damage to equipment or serious injury to personnel.
- Hot exhaust system components can cause serious burns. Do not work on exhaust system until it is cool. Failure to comply may result in injury to personnel.



CHANGE

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DEPARTMENT OF THE ARMY  
WASHINGTON, D. C. 27 JULY 2007

No. 3

**DIRECT SUPPORT AND GENERAL SUPPORT  
MAINTENANCE MANUAL  
ARMORED COMBAT EARTHMOVER  
(ACE), M9  
(NSN 2350-00-808-7100)**

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## DIRECT SUPPORT AND GENERAL SUPPORT

## MAINTENANCE MANUAL

## ARMORED COMBAT EARTHMOVER

(ACE), M9

(NSN 2350-00-808-7100)

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**DIRECT SUPPORT AND GENERAL SUPPORT**

**MAINTENANCE MANUAL**

**ARMORED COMBAT EARTHMOVER**

**(ACE), M9**

**(NSN 2350-00-808-7100)**

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**DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL**

**ARMORED COMBAT EARTHMOVER (ACE), M9  
(2350-00-808-7100)**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can 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 DA Form 2028, (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The internet address is <https://aeps.ria.army.mil>. The DA Form 2028 is located under the Public Applications Section in the AEPS Public Home Page. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or email your letter or DA Form 2028 direct to: AMSTA-LC-LMIT/TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, IL 61299-7630. The email address is [TACOM-TECH-PUBS@ria.army.mil](mailto:TACOM-TECH-PUBS@ria.army.mil). The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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\* This manual supersedes TM 5-2350-262-34, dated October 1990, and all related changes.

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# HOW TO USE THIS MANUAL

---

## GENERAL

This manual contains direct support and general support maintenance procedures for the M9 vehicle.

Chapter 1 contains general information.

Chapter 2 contains the following:

- Special tools list
- Checklists for vehicle services, adjustments, final inspections, and road tests
- General maintenance procedures

Chapter 3 contains troubleshooting procedures.

Chapter 4 contains instructions for direct support and general support maintenance of M9 components.

Appendix A contains references, such as technical manuals and other publications, to which you may need to refer.

Appendix B contains a list of special tools and equipment.

Appendix C contains a list of expendable/durable supplies and materials you will need.

Appendix D contains wiring schematic diagrams.

Appendix E contains an illustrated list of manufactured/fabricated items.

Appendix F contains torque limit data for screws and nuts used on M9 vehicles.

## IMPORTANT

Read and be sure you understand the entire maintenance procedure before beginning any maintenance task.

Also, read the general information in Chapter 1 and general repair methods (p 2-8).

## SAMPLE PROBLEM NO. 1

How do I repair the apron hydraulic cylinder?

- Look at the Table of Contents (p a) for Group AP, Bolted Hull Assembly Installation.
- Turn to the page listed (p 4-88). There you will find a table of contents for group AP. Locate apron hydraulic cylinder in this table.
- Turn to the page listed (p 4-89). Follow the repair instructions.

**SAMPLE PROBLEM NO. 2**

The engine stalls out. How do I find what is wrong?

- A** Turn to the Symptom Index (p 3-28). Find the symptom that best describes the malfunction (ABNORMAL ENGINE OPERATION).
- B** Find the problem with the item (ROUGH IDLING OR STALLING).
- C** Turn to the page referenced for troubleshooting (p 3-32).
- D** Follow the troubleshooting steps until you find what is wrong (e.g., CHECK FOR A MISFIRING CYLINDER).
- E** Follow instructions to correct the problem (REPLACE TIMING GEARS).

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# CHAPTER 1 INTRODUCTION

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## Section I. GENERAL INFORMATION

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### SCOPE

Type of Manual: Direct Support and General Support Maintenance.

Model Number and Equipment Name: M9, Armored Combat Earthmover (ACE).

Purpose of Equipment: A combat engineer vehicle, used for dozing, grading, hauling, and defilade preparation.

### MAINTENANCE FORMS, RECORDS, AND REPORTS

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

### DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

When the tactical situation requires that Army materiel be abandoned, refer to TM 750-244-6, Procedures for Destruction of Tank-automotive Equipment to Prevent Enemy Use.

### PREPARATION FOR STORAGE OR SHIPMENT

Instructions for storage and shipment are found in TM 55-2350-262-14, Transportability Guidance, Armored Combat Earthmover, M9.

**REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)**

If your M9 ACE vehicle 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  
U.S. Army Tank-automotive and Armaments Command  
Attn: AMSTA-TR-E/MPA  
Warren, MI 48397-5000

## Section II. EQUIPMENT DESCRIPTION AND DATA

### EQUIPMENT DESCRIPTION

The M9, Armored Combat Earthmover (ACE), is a multipurpose, full-tracked vehicle capable of earth hauling, dozing, scraping, and rough grading. It may be used to perform the tasks of a dump truck, cargo carrier, and a prime mover. The vehicle can ford streams up to a depth of 36 in. (91.4 cm). The vehicle can travel over rough terrain, climb up to to 60 percent grades, and travel over level ground at 30 mph (48 km/h). Refer to TM 5-2350-262-10 and TM 5-2350-262-20-1 for a detailed description of the vehicle and proper operating cautions, warnings, and procedures.

### EQUIPMENT DATA

#### CAPACITIES

Radiator	
Refill .....	79 qt (74.8 L)
Capacity (total system) .....	94 qt (88.9 L)
Transmission, Steer Unit, Transfer Case, Oil Cooler, and Lines — (initial fill) .....	78 qt (73.8 L)
Fuel Tank .....	134 gal. (507 L)
Crankcase and Filters .....	34 qt (32.2 L)
Hydraulic Oil (initial fill) .....	128 qt (121 L)
Roadwheel Hub (each) .....	1 pt (0.5L)
Winch .....	4 qt (3.8L)

#### ENGINE

Manufacturer .....	Cummins Engine Company, Inc.
Model .....	V903C
Type .....	Diesel
Cycle .....	4
Cylinders .....	8
Displacement .....	903 cu in. (14.8 L)
Horsepower (at 2,600 rpm) .....	295

#### AIR CLEANER

Part Number .....	12325739
Type .....	Dry, replaceable element

#### TRANSMISSION

Part number .....	12331877
Type .....	Torque converter
Ranges forward .....	6
Ranges reverse .....	2

#### SCAVENGER PUMP

Part number .....	1919A4B1L
Type .....	Gear
Capacity .....	40 gpm at 50 psi (151 Lpm at 345 kPa)

**EQUIPMENT DATA – CONTINUED**

**TRANSFER CASE**

Part number . . . . . 13211E8750  
 Type . . . . . Spur gear

**FINAL DRIVE**

Part number . . . . . 12412198  
 Type . . . . . Planetary

**GEARED STEER UNIT**

Part number . . . . . 13215E6600  
 Type . . . . . Geared steer, clutch brake steer  
 Drive positions . . . . . GS—Geared Steer, CB—Clutch Brake

**SERVICE BRAKE VALVE**

Part number . . . . . 13214E2103  
 Type . . . . . Foot pedal operated  
 Operating pressure (max. travel) . . . . . 60 psi (414 kPa) min., 125 psi (862 kPa) max.

**TRAILER BRAKE VALVE**

Part number . . . . . 7010-05  
 Initial pressure . . . . . 5 psi (34.5 kPa)  
 Final pressure . . . . . 75-85 psi (515-586 kPa)

**SUSPENSION SYSTEM**

**Track Adjusting Cylinder**

Part number . . . . . (Grease) 12325842  
 . . . . . (Hydraulic) 12466272  
 Type . . . . . Double acting  
 Stroke . . . . . 9 in. (22.9 cm)

**Actuator Accumulator**

Part number . . . . . 0860166001 Rev B  
 Type . . . . . Piston type, inert gas  
 Working pressure . . . . . 673 psi (4,640 kPa) max.  
 Gas volume . . . . . 93 cu in. (1.52 L)

**Bump Stop Cylinder**

Part number . . . . . 12325845  
 Stroke . . . . . 1.62 in. (4.1 cm)  
 Operating pressure . . . . . 3,000 psi (20,682 kPa)  
 Operating force . . . . . 5,280 lb (23,485 N)

**Corner Actuator**

Part number . . . . . 13204E2560  
 Type . . . . . Vane  
 Operating pressure . . . . . 6,000 psi (41,370 kPa)  
 Surge pressure . . . . . 15,000 psi (103,425 kPa)  
 Weight . . . . . 260 lb (118 kg)



**EQUIPMENT DATA – CONTINUED**

**HYDRAULIC SYSTEM**

**Accumulator**

Part number . . . . . 13211E8870  
 Type . . . . . Inert gas charged  
 Capacity (max. oil volume) . . . . . 578 cu in. (9.47 L)

**Main Hydraulic Pump**

Part number . . . . . 13214E2568  
 Type . . . . . Piston  
 Rated pressure . . . . . 4,000 psi (27,580 kPa)  
 Capacity (at 2,400 rpm and rated pressure) . . . . . 13 gpm (49.2 Lpm) (each port)

**Compensating Pump**

Part number . . . . . 13214E2784  
 Type . . . . . Piston  
 Rated Pressure . . . . . 3,000 psi (20,685 kPa)  
 Capacity (at 2,400 rpm and rated pressure) . . . . . 13.4 gpm (50.7 Lpm)

**Hydraulic Valve Bank**

Part number . . . . . 13204E2502

**Relief Valve**

Part number . . . . . 13214E2766  
 Flow Rate . . . . . 25 gpm (94.6 Lpm)  
 Pressure relief setting . . . . . 3,800 psi (26,201 kPa)

**Apron Cylinder**

Part number . . . . . 12325843  
 Type . . . . . Double acting  
 Length (fully retracted) . . . . . 33.19 in. (84.3 cm)  
 Length (fully extended) . . . . . 50.94 in. (1.29 m)  
 Operating pressure (max.) . . . . . 4,000 psi (27,580 kPa)

**Ejector Cylinder**

Part Number . . . . . 12325844  
 Type . . . . . Double acting  
 Length (fully retracted) . . . . . 88.5 in. (2.25 m)  
 Length (fully extended) . . . . . 159 in. (4.04 m)  
 Operating pressure . . . . . 4,000 psi (27,580 kPa)

# CHAPTER 2

## DIRECT SUPPORT AND GENERAL SUPPORT INTEGRATED MAINTENANCE INSTRUCTIONS

---

**OVERVIEW**

This chapter contains a list of components removed and installed at unit maintenance, a vehicle services checklist, a vehicle adjustments checklist, a final inspection and road test checklist, the repair parts, special tools, TMDE, and support equipment necessary to service and maintain the vehicle, and general repair methods for the vehicle.

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## Section I. UNIT MAINTENANCE COMPONENTS REPLACEMENT

---

Refer to (TM5-2350-262-20-1) and (TM5-2350-262-20-2) for procedures covering the following items:

- Air Purifier Replacement
- Air Reservoir Replacement
- Apron and Dozer Replacement
- Apron Hydraulic Cylinder Replacement
- Batteries Replacement
- Brake Chamber Replacement
- Cooling System Fan Assembly and Shroud Replacement
- Directional Control Valve Bank Replacement
- Dozer Blade Replacement
- Deleted
- Driver's Hatch Replacement
- Deleted
- Driveshaft Replacement
- Drive Sprockets Replacement
- Ejector Hydraulic Cylinder Replacement
- Ejector Replacement
- Exhaust System Replacement
- Exterior Armor Replacement
- Fan Belts Replacement
- Fixed (Halon or Dry Powder) Fire Extinguisher Replacement
- Fuel Tank Replacement
- Fuel/Water Separator Replacement
- Headlights, Stoplight/Taillights, and Floodlights Replacement
- Hydraulic Compensating Pump Replacement
- Hydraulic Filters Replacement
- Hydraulic Intermediate Manifolds Replacement
- Main Hydraulic Accumulator Replacement
- Portable Fire Extinguisher Replacement
- Radiator Replacement
- Roadwheel Arm Replacement
- Roadwheel Hub Replacement
- Roadwheel Replacement
- Scavenger Pump Replacement
- Seat Assembly Replacement
- Smoke Grenade Launcher Replacement
- Track Adjusting Cylinder Replacement
- Water Pump Belts Replacement
- Deleted



## Section II. VEHICLE SERVICES

---

### OVERVIEW

This section lists the services to be performed after assembly of the vehicle. Do not operate the vehicle before doing the following services. It is not always necessary to service all listed items. Use good judgment and service only the items which were affected by the repair.

- A** Fill engine cooling system with coolant (TM5-2350-262-10). Check for leaks. Tighten connectors if required.
- B** Fill hydraulic tank with oil (TM5-2350-262-10). Check for leaks. Tighten connectors, if required.
- C** Check transmission, steer unit, and transfer case oil level. Add oil, if required (TM5-2350-262-10).
- D** Check engine oil level. Add oil, if required (TM5-2350-262-10).
- E** Fill fuel tank with fuel (TM5-2350-262-10). Check drain plugs and low-pressure fuel lines and tighten if required.
- F** Check batteries for full charge (TM5-2350-262-20-1). Charge, if required (TM 9-6140-200-14).
- G** Check fire extinguishers for proper dry powder charge (TM 5-2350-262-10). Change dry powder fire extinguishers in accordance with local procedures.

## Section III. VEHICLE ADJUSTMENTS

---

### OVERVIEW

This section lists the adjustments to be made before operating the vehicle.

- A** Refer to (TM5-2350-262-10) to adjust the track tension.
- B** Refer to (TM5-2350-262-20-1) and (TM5-2350-262-20-2) to perform the following adjustments:
  - Steering Wheel and Linkage
  - CB/GS Steer Selector Lever and Linkage
  - Brake Lever and Linkage
  - Shifting Controls and Linkage
  - Throttle Controls and Linkage
  - Hydraulic Compensating Pump
  - Hydraulic Relief Valves
  - Hydraulic Control Levers and Linkages
  - Transmission Selector Lever and Linkage

## Section IV. FINAL INSPECTIONS AND ROAD TEST

---

### OVERVIEW

- A** This section contains the final inspections and road test which are required after performing major repair work. The inspections and test ensure that all components are adjusted and functioning properly.
- B** It is not always necessary to inspect or test all listed items. Use good judgment and inspect and test only the components which are affected by the repair.
- C** Troubleshoot any defects and make repairs or adjustments as necessary for proper operation.

### FINAL INSPECTIONS AND ROAD TEST

#### Note

Refer to (TM5-2350-262-10) for all vehicle operating instructions.

#### **A Starting system**

Start engine. Check for slow starting of engine or slow cranking speed.

#### **B Switch and instrument panels**

Observe all indicator lights and gauges for normal readings.

#### **C Tachometer and speedometer**

Observe that tachometer and speedometer operate properly.

#### **D Lights**

Check operation of domelight, floodlights, headlights, taillights, stoplights, and blackout lights.

#### **E Engine idle**

With engine at operating temperature and transmission in neutral, engine should idle smoothly at 750 rpm to 850 rpm.

#### **F Engine/transmission**

Drive vehicle through all gear ranges to ensure transmission and linkages operate smoothly. Check for normal acceleration in each range.

#### **G Steering**

Turn vehicle right and left through full steering range. Check for proper vehicle response. Operating at normal speeds with steering wheel centered, observe tendency of vehicle to wander or pull to one side.

<b>FINAL INSPECTIONS AND ROAD TEST — CONTINUED</b>
--

**H Brakes**

With vehicle moving at 20 mph (32 km/h), apply brakes. Observe that vehicle stops effectively and does not pull to one side. Stop vehicle on a hill, set parking brake, and shift transmission to neutral. Observe that brakes hold.

**I Ejector**

Observe that ejector, ejector cylinder, and control operate smoothly.

**J Apron**

Raise and lower apron to the limits of its travel. Observe that cylinders and controls operate smoothly.

**K Suspension**

Raise and lower each side of vehicle. Drive vehicle in SPRUNG and UNSPRUNG modes. Check for proper operation of controls and suspension.

**L Winch**

Pay in and pay out winch. Check for smooth operation.

**M Bilge pump**

Operate bilge pump. Check for proper operation.

**N Wheel hubs**

Immediately after road test, check all roadwheel hubs for excessive heating.

**O Leaks**

Inspect interior and exterior of vehicle for evidence of coolant, fuel, or hydraulic fluid leaks.

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

---

### OVERVIEW

Repair parts, special tools, and support equipment are issued for maintaining the vehicle. Tools and equipment should not be used for purposes other than those prescribed. When not in use, they should be properly stored.

### COMMON TOOLS AND EQUIPMENT

Standard and commonly used tools and equipment that have general application to this materiel are authorized for issue by tables of allowance and modified tables of organization and equipment. Refer to the tables applicable to your unit for common tools and equipment.

### SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools and equipment necessary to perform the maintenance described in this manual are listed for your information. Refer to Appendix B. Special tools and equipment are listed in TM 5-2350-262-24P, which is the authority for requisitioning replacements.

### REPAIR PARTS

Repair parts are issued for the replacement of parts that have become worn, broken, or otherwise unserviceable. Repair parts are listed in TM 5-2350-262-24P, which is the authority for requisitioning replacements.

### FABRICATED TOOLS

The fabrication of certain tools is necessary for certain procedures. Raw materials, specifications, and diagrams are listed for your information in Appendix E.

## Section VI. GENERAL REPAIR METHODS

---

### OVERVIEW

This section contains general repair methods and cleaning procedures. Special repair and cleaning procedures are provided, as required, in the individual maintenance instructions.

### REPAIR METHODS

- A** Complete disassembly is not always necessary to make a repair. Exercise good judgment to keep disassembly and assembly to a minimum.
- B** Repair or replace unserviceable parts and hardware. Always replace packings, gaskets, seals, lockwashers, locknuts, self-locking screws, and cotter pins with new parts.
- C** Remove burrs with a stone or file. Remove burrs on closely fitted mating surfaces by lapping the surfaces with abrasive ground compound.
- D** Remove corrosion or rust with sandblasting, vapor blast cleaning, or crocus cloth. Use the method that will not damage the surface being cleaned. Crocus cloth should be used to remove corrosion and rust from polished surfaces. Make sure that critical dimensions are not changed when using crocus cloth.
- E** Repair damaged threads with a thread chaser, or by chasing in a lathe or die.
- F** When welding is authorized, procedures in TM 9-237 and General Welding Procedures (p 2-21) must be followed. Welds must be inspected in accordance with TM 9-237, MIL-STD-372, and MIL-STD-1946A.
- G** Bearings should be inspected and maintained in accordance with TM 9-214.
- H** Deleted

## CLEANING

- A** Wire brush metal parts to remove rust and corrosion.

### WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Prolonged exposure to solvent can cause skin irritation. Failure to comply may result in severe injury to personnel or damage to equipment.

- B** Clean metal parts with drycleaning solvent. Metal or fiber brushes may be used to apply cleaning solvent and to remove softened or dissolved material. Hand-scraping with metal scrapers may be used to remove soft coatings or deposits.
- C** Soak very oily or greasy metal parts in a tank containing drycleaning solvent. The amount of time parts must be soaked in solvent varies with the type and amount of material to be removed.
- D** Do not use solvent to clean electrical insulation, wires, cables, or wiring harnesses. Clean these parts by wiping with a damp cloth. Use a mild soap solution if necessary. Dry immediately with clean, dry cloths. Clean contact points with flint abrasive paper and dust thoroughly after cleaning.
- E** Do not use solvent to clean rubber parts. Clean rubber parts by washing with mild solution of soap and water.

### WARNING

Compressed air can injure you and others. Do not aim compressed air hose at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

- F** Dry parts by blowing with low-pressure compressed air or wiping with clean, lint-free cloths.
- G** Bearing should be cleaned by procedures in TM 9-214.
- H** Paint metal surfaces after repair, as required. Sand and paint damaged areas. Apply epoxy primer and allow to dry. Apply non-slip deck covering compound to non-skid areas. Paint with polyurethane to match existing color. Use white, tan, or forest green polyurethane.

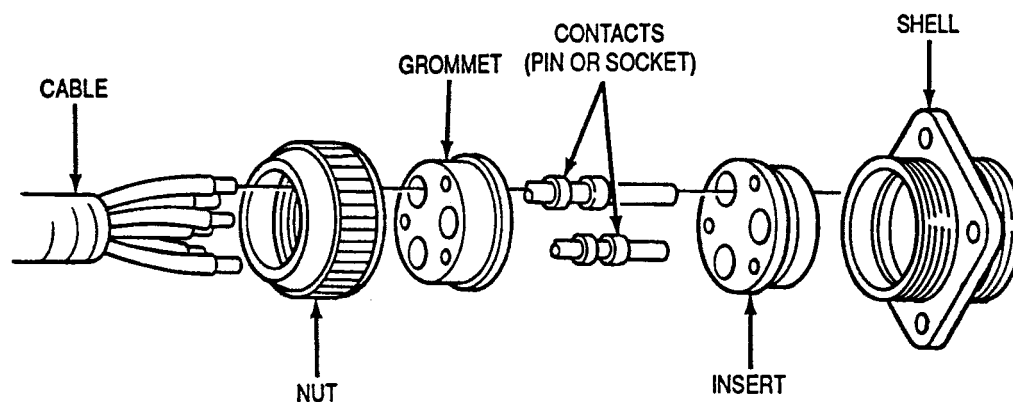
## LUBRICATION

Keep a light coat of lubricating oil on parts during repair procedures to prevent rusting. Lubricate parts during repair and assembly as required in accordance with TM 5-2350-262-10.

## GENERAL ELECTRICAL SYSTEM REPAIR

Repair of wiring harnesses and cables consists of replacement of defective connectors, shells, and terminals, or taping damaged or worn insulation and exposed wire conductors. Pages 2-10 through 2-13 show exploded views of typical harnesses and cable connectors used on the vehicle, and give procedures for disassembly and assembly of connectors. When soldering is required, procedures in TB SIG 222 must be followed. If multiple pin connectors are disassembled, tag or label all wires and cables to ensure that correct connections are made at time of assembly.

## TYPICAL PANEL MOUNTING RECEPTACLE: DISASSEMBLY AND ASSEMBLY



### DISASSEMBLY

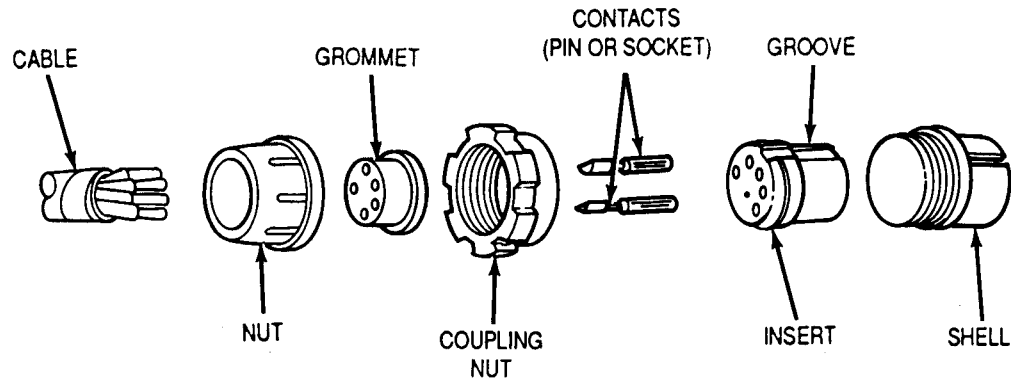
- A** Remove nut from shell assembly and slide back on cable leads.
- B** Push grommet back on cable leads.
- C** Drive contacts out through rear of insert with pin extractor.
- D** Push insert out through rear of shell.
- E** Unsolder cable leads from contacts.

### ASSEMBLY

- A** Strip cable insulation equal to depth of solder wells of contacts.
- B** Slide nut back over cable leads.
- C** Slide grommet over cable leads.
- D** Insert cable leads into solder wells of contacts and solder.
- E** Push insert into shell from rear until seated. Groove in insert must be aligned with guide in shell to ensure proper fit.
- F** Push contacts into insert from rear until seated.
- G** Push grommet down cable leads and over solder wells of contacts.
- H** Install nut onto shell assembly.



## TYPICAL PLUG: DISASSEMBLY AND ASSEMBLY



### DISASSEMBLY

- A** Remove nut from shell assembly and slide back on cable leads.
- B** Slide grommet back on cable leads.
- C** Slide coupling nut off shell assembly.
- D** Drive contacts out through rear of insert with pin extractor.
- E** Push insert out through rear of shell.
- F** Unsolder cable leads from contacts.

### ASSEMBLY

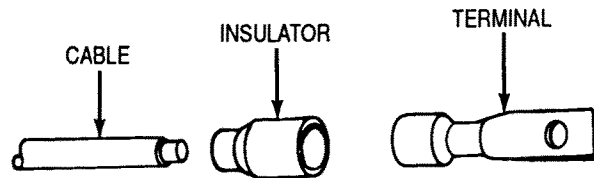
- A** Strip cable insulation equal to depth of solder wells of contacts.
- B** Slide nut back over cable leads.
- C** Slide grommet back over cable leads.
- D** Insert cable leads into solder wells of contacts and solder.
- E** Push insert into shell from rear until seated. Groove in insert must be aligned with guide in shell to ensure proper fit.
- F** Push contacts into insert from rear until seated.
- G** Slide coupling nut onto shell assembly.
- H** Push grommet down cable leads and over solder wells of contacts.
- I** Install nut onto shell assembly.

---

## CABLE TERMINALS AND CONNECTORS REPLACEMENT

---

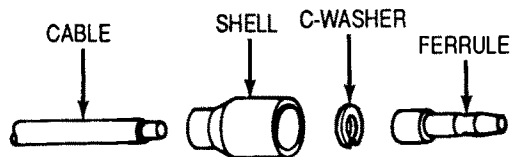
### TERMINAL-TYPE CABLE CONNECTOR



- A** Strip cable insulation equal to depth of terminal well.
- B** Slide insulator over cable.
- C** Insert cable into terminal well and crimp.
- D** Slide insulator over crimped end of terminal.

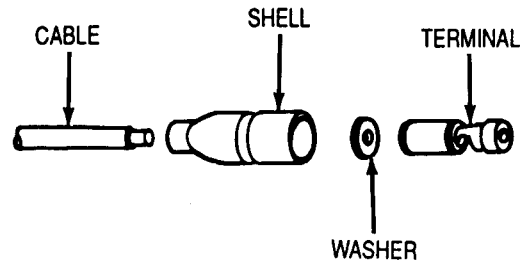
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### MALE CABLE CONNECTOR



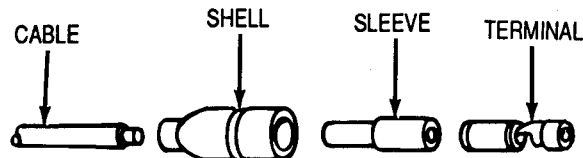
- A** Strip cable insulation equal to depth of ferrule well.
- B** Slide shell over cable.
- C** Insert cable into ferrule well and crimp.
- D** Slide C-washer over cable at crimped junction and slide shell over C-washer and ferrule.

**FEMALE CABLE CONNECTOR (WITH WASHER)**



- A** Strip cable insulation approximately 1/8 in. (3 mm).
- B** Slide shell and washer over cable.
- C** Place cable in cylindrical end of terminal and crimp.
- D** Place shell and washer over terminal.

**FEMALE CABLE CONNECTOR (WITH SLEEVE)**



- A** Strip cable insulation approximately 1/8 in. (3 mm).
- B** Slide shell and sleeve over cable.
- C** Place cable in cylindrical end of terminal and crimp.
- D** Slide shell and sleeve over terminal.

## GENERAL HYDRAULIC SYSTEM REPAIR

### WARNING

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless the hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.
- Main hydraulic pump weighs approximately 130 lb (59 kg). Severe injury to personnel could result if pump is not handled with caution.
- Before performing any hydraulic troubleshooting in the bowl, move the ejector forward and disable it by disconnecting the ejector cylinder or by engaging the ejector cylinder. Failure to comply may result in severe injury to personnel.
- Spilled hydraulic oil is very slippery. Be careful when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.

### CAUTION

- ALWAYS clean around fittings before disconnecting or connecting hoses or fittings. Make sure area is clean before installing hydraulic components. Failure to comply may result in damage to equipment.
- Cover, cap, or plug all openings, ports, and tube or hose ends when they are disconnected. Failure to comply may result in damage to equipment.
- Ensure that you mate only fittings designed to be mated with each other. Never depend on trial and error. Just because two fittings will screw together is no guarantee that the connection will not leak. See illustrations of fitting types on pages 2-15 and 2-16. Failure to comply may result in damage to equipment.
- Fittings must be installed and hand tightened. If a fitting cannot be hand tightened, it may be cross-threaded or have damaged threads. Use wrench only for final tightening. Failure to comply may result in damage to equipment.
- Do not use TEFLON tape as a sealer on any fittings. It can separate from the fittings and cause control valves, relief valves, and actuators to become contaminated and fail.
- It is possible to screw a male National Pipe Thread (NPT) into a female straight thread, but the fitting will leak. Learn to recognize the very slight taper which an NPT has (p 2-15, para. A). Do not attempt to connect NPT and female straight threads.
- Do not apply sealant to the first threads of NPT fittings. If sealant enters the hydraulic system, it may cause components to fail (p 2-15, para A).
- When connecting NPTs, care must be exercised. If overtightened, the female pipe thread will split. Replace it. If a connection leaks, disconnect and apply thread sealant. Reconnect the threads and snug up with an open-end wrench. Failure to comply may result in damage to equipment.
- Be careful when installing preformed packings. Sharp threads can nick the packing, causing it to leak. If fitting leaks, check packing for nicks or cuts and replace if necessary.

## CAUTION — CONTINUED

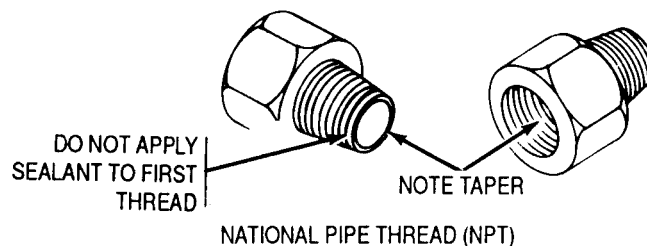
- Do not overtighten a flareless connection (p 2-16, para D). Observe torque values on page 2-18. Overtightening can cause leakage, requiring replacement of entire tube assembly.
- When connecting a hose to a fitting, ALWAYS USE TWO WRENCHES. Use one wrench to turn the swivel nut onto the fitting, and use another wrench to keep the hose from rotating. If the hose rotates, it can loosen the other end of the hose, or loosen the fitting at the other end.

The following information is provided to familiarize personnel with the various types of hydraulic fittings. Refer to this section and the warnings and cautions on the previous pages when working on hydraulic systems.

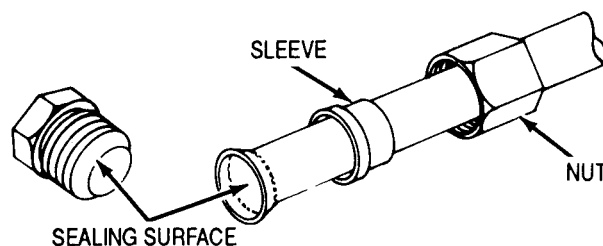
- A** National Pipe Thread (NPT) is commonly found in hydraulic systems. It differs from other fittings because it is tapered. In order to obtain a proper seal with this thread, you must use a sealant. The sealant should be applied to the male fitting. Torque value guide, page 2-18, is NOT to be used.

## CAUTION

Do not apply sealant to the leading edge or the first thread of hydraulic fitting, or sealant may get into the hydraulic system and contaminate it. Failure to comply may result in damage to equipment.



- B** The 37° flare termination has a male straight thread that mates with a female straight thread. The sealing surface for this termination is the angled nose at the end of the male fitting. This nose mates with a similar surface in the female 37° flare fitting. These sealing surfaces must be free of nicks and scratches in order to seal properly. If nicked or scratched, item must be replaced. For torque requirements, see guide on page 2-18.

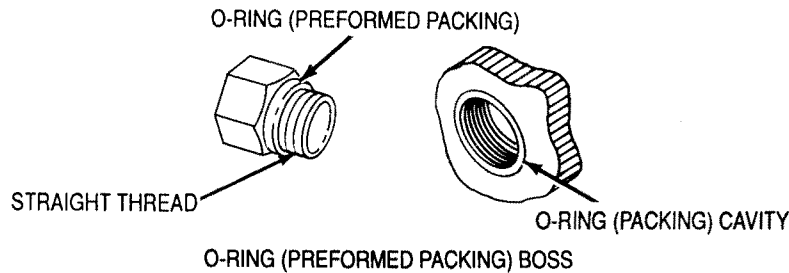


**GENERAL HYDRAULIC SYSTEM REPAIR – CONTINUED**

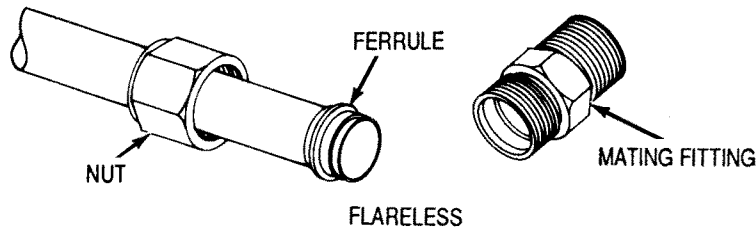
**CAUTION**

Packing must be located fully into groove and not on threads. Failure to comply may result in damage to equipment.

- C** An O-ring (preformed packing) boss has a straight thread. The seal for this termination is a preformed packing that fits at the top of the threads on the male fitting. This packing is squeezed into the extra space at the top of the threads of the female fitting and seals the connection. The installed packing must be free of nicks and cuts to seal properly. If packing is nicked or cut, it must be replaced.



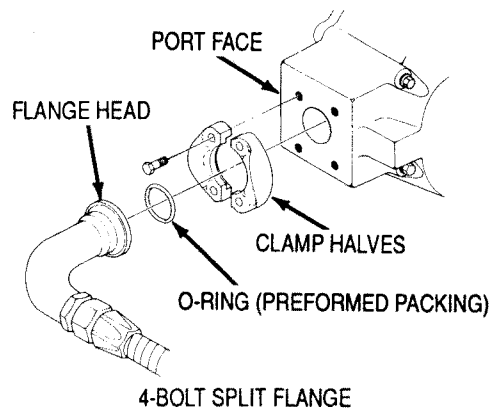
- D** A flareless fitting uses a straight thread. The female fitting contains a ferrule that mates with a cavity in the male fitting. Use recommended torque values on page 2-18 to tighten nut. If this fitting is overtightened, the ferrule will be deformed and the fitting will leak.



**CAUTION**

Replace or repair parts with nicks, cuts, or scratches. Failure to comply may result in damage to equipment.

- E** A four-bolt split flange has a flange head that is clamped to a smooth face. The flange head uses a preformed packing that is squeezed between the head and the face. The face and the end of flange head must be free of nicks and scratches to seal properly. The packing must also be free of nicks and cuts, or the connection will leak.



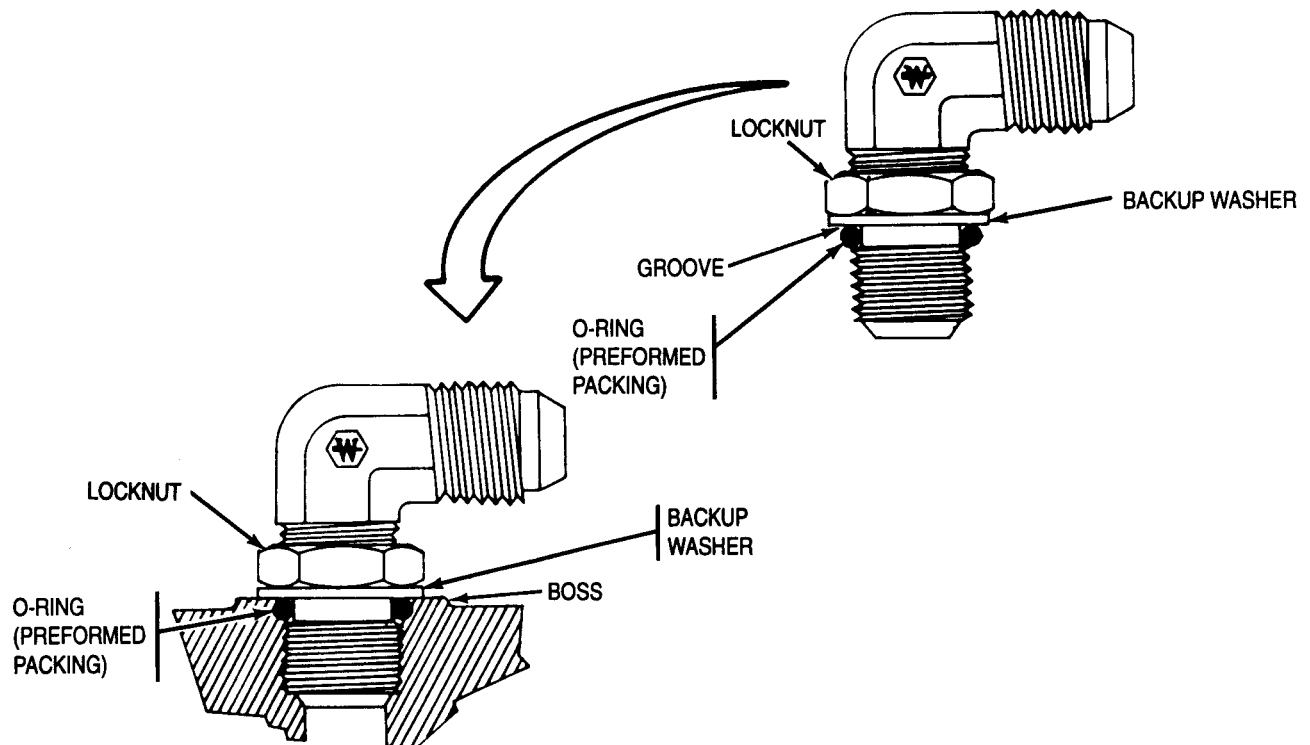
## INSTALLATION OF ADJUSTABLE FITTINGS

- A** Apply light weight oil (OE/HDO-10) to O-ring (preformed packing).

### CAUTION

Packing must be positioned fully into groove and not on threads. Failure to comply may result in damage to equipment.

- B** Gently push backup washer and O-ring all the way into groove.
- C** Turn locknut down until locknut contacts backup washer.
- D** Install fitting on boss until backup washer contacts face of boss.
- E** Position fitting to desired position by backing out fitting up to 1 full turn. Hold fitting in desired position, and tighten locknut.
- F** Connect tube to fitting after fitting is properly positioned and tightened.



## CAUTION

Do not use table for assembly of NPT fittings. Failure to comply may result in damage to equipment.

### TORQUE VALUE GUIDE FOR HYDRAULIC FITTINGS

Size	Torque in Pound-Inches	Torque in Pound-Feet
-2 (5/16—24 Thread)	40-50	3-4
-3 (3/8—24 Thread)	90-100	7-8
-4 (7/16—20 Thread)	135-150	11-12
-5 (1/2—20 Thread)	180-200	15-16
-6 (9/16—18 Thread)	270-300	22-25
-8 (3/4—16 Thread)	450-500	37-41
-10 (7/8—14 Thread)	650-700	54-58
-12 (1-1/6—12 Thread)	900-1000	75-83
-14 (1-3/16—12 Thread)	1050-1200	87-100
-16 (1-5/16—12 Thread)	1200-1400	100-116
-20 (1-5/8—12 Thread)	1900-2100	158-175
-24 (1-7/8—12 Thread)	2700-3000	225-250
-32 (2-1/2—12 Thread)	4000-4500	333-375

**Note 1.** Torquing requirements are extracted from MIL-F-18866D, Table III.

**Note 2.** Torque to be used on hose fittings, tube fittings, straight thread fittings, and SAE/AN ports.

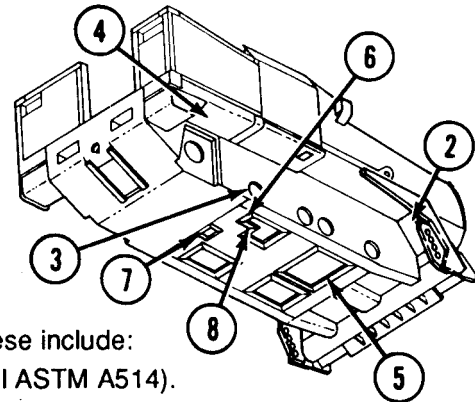
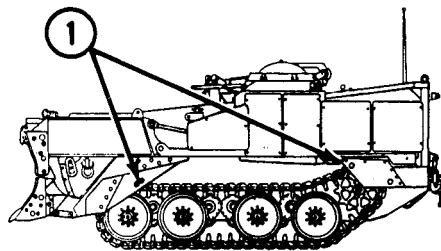


## Section VII. GENERAL HULL REPAIR METHODS

The following section describes general hull repair methods and specific repair procedures for the M9 hull by direct support and general support maintenance personnel. This section will identify parts of the M9 hull that can be returned to service even if there is no authorized repair on these parts. A list of topics in this section is shown below:

General .....	2-19
General Inspection and Repair Methods .....	2-21
General Welding Procedures .....	2-21
Screw Thread Inserts Replacement Methods .....	2-23
Thread Insert (P/N MS51830 and MS51831 Series) Replacement .....	2-24
Thread Insert (P/N SR621L) Replacement .....	2-26
Broken Screws Repair .....	2-28
Rear Track Retainer Plate Inserts Repair Methods .....	2-28
Front Hull Slope Repair Methods .....	2-31
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Hull Access Cover Mounting Area Minor Repair Methods .....	2-33
Hull Access Cover Frame Repair Methods .....	2-34
Hull Underside and Sponson Area Repair Methods .....	2-35
Dozer Blade Repair Methods (Steel) .....	2-36
Apron Arm Block Repair Methods .....	2-37
Apron Top Lockplate Repair Methods .....	2-38
Apron Uplock Bracket Repair Methods .....	2-39
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Headlamp Guard Repair Methods .....	2-40
Floodlight Guard Repair Methods .....	2-40
Fuel Tank Angle Repair Methods .....	2-41
Fuel Tank Pad Repair Methods .....	2-41
Welding Procedure Specifications .....	2-42
Screw Thread Inserts .....	2-59
Welding Rods .....	2-60

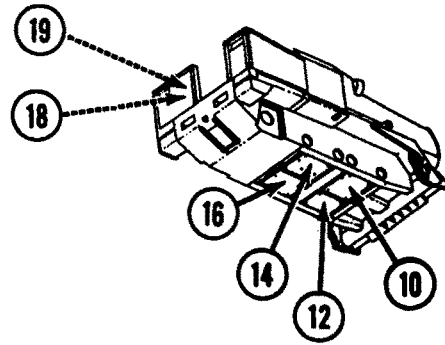
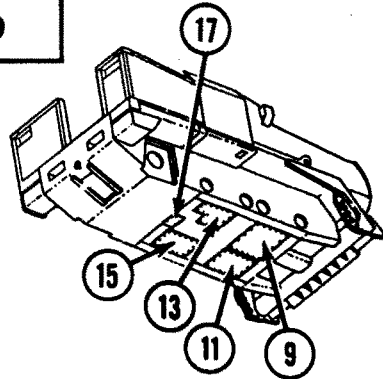
**GENERAL**



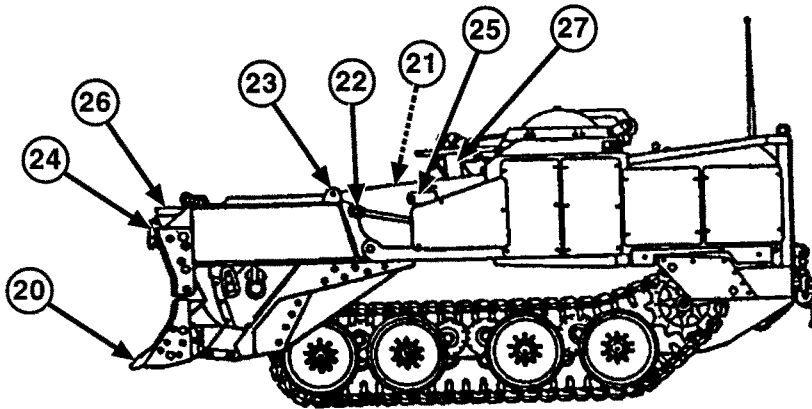
Many parts of the M9 hull can be damaged during operation. These include:

- (1) Front and rear track retainer plates (high-strength alloy steel ASTM A514).
- (2) Front hull slope areas (aluminum alloy 5083 or 5456, temper H321).
- (3) Rotary acuator mounting areas (aluminum alloy 5083 or 5456, temper H321).
- (4) Hull underside and sponson areas (aluminum alloy 5083 or 5456, temper H321).
- (5) 12332144 floor plate extrusion (aluminum 5083, 5086, 5456, temper H111, 6061, or T6).
- (6) 12332147 floor plate extrusion (aluminum 5083, 5086, 5456, temper H111, 6061, or T6).
- (7) 12332245 floor plate extrusion (aluminum 5083, 5086, 5456, temper H111, 6061, or T6).
- (8) 12332246 floor plate extrusion (aluminum 5083, 5086, 5456, temper H111, 6061, or T6).

**GENERAL - CONTINUED**



- (9) 12352551 hull access cover (aluminum alloy 2219, temper T87).
- (10) 12412117 hull protective plate (.25-inch steel).
- (11) 12352552 hull access cover (aluminum alloy 2219, temper T87).
- (12) 12412219 hull protective plate (.25-inch steel).
- (13) 12352550 hull access cover (aluminum alloy 2219, temper T87).
- (14) 12412121 hull protective plate (.25-inch steel).
- (15) 12352549 hull access cover (aluminum alloy 2219, temper T87).
- (16) 12412120 hull protective plate (.25-inch steel).
- (17) 12335460 hull access cover (aluminum alloy 2014, temper T6 and T641).
- (18) 12335359 angle (fuel tank) (aluminum alloy 5083, temper H111 or H112).
- (19) 12332394/12332398 pads (fuel tank) (aluminum alloy 5083, 5086, 5456, or temper 6061, H111 or T6).



- (20) 115M2091 Steel Dozer Blade.
- (21) 13204E3942 LH arm block (aluminum alloy forging, temper 6061 or T6).
- (22) 13204E3943 RH arm block (aluminum alloy forging, temper 6061 or T6).
- (23) 12335022 top lock plates (1-inch aluminum MIL-A-46027).
- (24) 12412090 apron uplock brackets (aluminum alloy 6061, temper T6, T6510, or T6511).
- (25) 12332077 apron lock brackets (aluminum 5083, 5086, 5456, or temper H111, 6061, T6, or T6511).
- (26) 12335270 headlamp guards (aluminum alloy 5083, temper H323 or H343).
- (27) 12332314 floodlight guards (aluminum alloy 5083, temper H111, H112, H116, or H321).

These parts have no authorized repair, but can be returned to service by straightening, grinding, and welding.

## GENERAL INSPECTION AND REPAIR METHODS

Inspecting parts before beginning any hull repair can save time. General inspection criteria are given in TM 5-2350-262-20-1, but not all criteria are given. Use your best judgment. It may be easier and less expensive to replace a part instead of repairing it. If you're not sure, ask your supervisor.

Perform all straightening operations with a press, if possible.

Each M9 hull may be slightly different because of welding variance. Some grinding or shimming of components may be necessary.

Keep grinding and shimming to a minimum. Do not grind or cut into welds unless necessary for repair. Always cut, grind, or shim equally to both sides of an assembly. Use a single thick shim instead of several thin ones.

Refer to General Welding Procedures for welding aluminum alloy. Besides the parts listed at the beginning of this section, the following parts can also be repaired by welding, but are not specifically covered in this section. Welding Procedure Specifications are also given to cover specific applications.

- Radiator and engine compartment armor shroud (alloy steel, SAE 4340).
- Rear door (aluminum alloy 5083, 5086, or 5456, temper H111; or alloy 6061, temper T61).
- Driver's compartment floor (aluminum alloy 5083 or 5456, temper H321, H323, or H343; alloy 5083 or 5456, temper H116, ASTM B209; alloy 5086, temper H32, H34, or H116, ASTM B209; alloy 6061, temper T6 or T651, ASTM B209).
- Rear floor plates supports (aluminum alloy 5083, temper H111 or H112; alloy 5086, temper H111 or H112; alloy 5456, temper H111 or H112; alloy 6061, temper T6, T62, T6510, or T6511; or alloy 6061, temper T6, ASTM B308).
- Fuel tank armor (armor in accordance with MIL-A-46027).
- Radio box (armor in accordance with MIL-A-46027).

## GENERAL WELDING PROCEDURES

Most welding on the M9 is to repair parts composed of aluminum alloy. Surface and edge preparation, welding processes, filler metal, and general safety instructions are the same for welding ballistic and non-ballistic aluminum alloy.

When welding the M9 hull or other vehicle components, refer to General Welding Procedures and TM 9-237 to set up equipment and prepare welding surfaces. Weld dimensions and other specific welding data are contained in the Welding Procedure Specification called out for each repair. Repair to the M9 hull includes welding of cracks and breaks, replacement of damaged brackets and hull sections, and filling gouges, holes, and cracks. Small holes, 1/4 in. (6.4 mm) or smaller, need not be repaired unless detrimental to the fit of components.

## GENERAL WELDING PROCEDURES — CONTINUED

Repair damaged hole threads by preparing and welding the hole, and drilling and tapping the hole back to the original threads.

Replacement sections can be spliced to existing plates to repair unauthorized holes, distortions, bulges, or sags.

Welding of high-strength steel alloy is covered in TM 9-237.

Weld repair of armor plate is limited to the use of the gas metal-arc welding (GMAW) process. The use of the gas tungsten-arc welding (GTAW) process may also be used to repair weld holes, attach the rear grab rails, and splice hull sections together.

Argon or helium-and-argon mixture will be used as the shielding gas when welding aluminum.

### SURFACE PREPARATION

Cleanness of the surface to be welded cannot be overemphasized. Surfaces must be clean of all grease, oil, paint, and any other material detrimental to the welding of the part.

## WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Prolonged exposure to solvent can cause skin irritation. Use only in well-ventilated places. Failure to comply may result in severe injury to personnel or damage to equipment.

Clean welding surfaces thoroughly with drycleaning solvent.

### EDGE PREPARATION

Edges should be shaped or cut using mechanical means: chipping, grinding, filing, or sawing. Lightly file sheared edges to remove cutting blade contaminants. Files must be clean and used only for aluminum. Shaping specifications are covered in Welding Procedure Specifications (WPS).

Brush surfaces with a stainless steel wire brush to remove oxide film immediately before beginning welding process. All foreign material must be removed from the welding surfaces for at least 1 in. (2.5 cm) around the edges to be welded.

The work area temperature and components to be welded will be at a minimum 60°F (16°C). Components shall be dry and have reached equilibrium or be warmer than the actual weld area temperature before welding. This will prevent condensation and moisture formation on the components.

Under normal circumstances, no preheating is necessary when using the gas metal-arc welding (GMAW) process; but if the metal conducts heat away too rapidly to ensure proper fusion, preheating may be applied locally with oxyacetylene torches. If preheating is used, lightly brush preheated area with stainless steel wire brush immediately before welding to remove any oxide film.

Interpass temperature should not exceed 200°F (93°C).

Filler metal for aluminum welding will be Type ER5356, conforming to ANSI/AWSA 5.10-80. When not in use, wire must be stored in a cool, dry place and covered to keep out moisture, dirt, and grease. National Stock Numbers for filler metal for high-strength alloy steel welding will be used in accordance to specifications in TM 9-237.

## WORKMANSHIP AND TECHNIQUE

The sequence of welding passes may be changed to control distortion. Care should be taken to avoid arc strikes.

Weld joints must be free of moisture, oxides, greases, oil, and protective coatings. Contaminants or surface defects shall be removed from each bead by wire brushing, chipping, or grinding to sound metal before continuing welding operation.

Tack weld should not form part of the finished weld and must be chipped out before completing the weld. Tack welds greater than 1 in. (2.5 cm) long shall be complete fusions. The starts and stops of such welds shall be tapered by grinding so that the initial pass can properly consume the tacks.

Temporary backup bars, when used, are to be clean steel or stainless steel, and should be warm to the touch. This will prevent condensation and possible defective welds. Copper bars are not to be used on aluminum. Ceramic backup tape may also be used.

Permanent backup bars, when used, shall be made of compatible material with the material of the joints to be welded.

Craters in welds must be completely filled to the nominal size of weld.

## INSPECTION

Inspection criteria for finished welds are contained in TM 9-237, MIL-STD-372, and MIL-STD-1946A.

## JOINT REPAIR

Cracked or damaged weld areas can be repaired by completely removing the damaged area by chipping, grinding, or other mechanical means, and then welding over the damaged area.

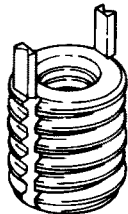
Remove the defective weld material only (or remove the defective weld material to the original joint metal). Excavations should be flared 30° minimum to 60° maximum gradually to the bottom, with a flat or slightly rounded bottom and gradual transition into the sides and ends of the excavation.

Use dye penetrant to ensure cracks have been removed completely. Immediately after dye penetrant inspection, preheat the excavation to at least 150°F (66°C).

Areas adjacent to the repair welds should be clean and free of paint, grease, oil, and all other contaminants for at least 4 in. (10 cm). The 1 in. (2.5 cm) area around repair weld will be lightly brushed with a clean stainless steel brush immediately before welding.

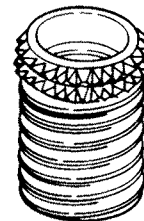
## SCREW THREAD INSERTS REPLACEMENT METHODS

There are two types of screw thread inserts used on the M9 hull:



### KEY-LOCKED INSERT

- Key-locked thread inserts (MS51830 and MS51831-series) are locked into place when keys, part of the thread inserts, are driven down between the outer wall of the thread inserts and the tapped hole.
- Serrated locking inserts are locked into place when the serrated ring on the top of the insert is driven into the counterbore in the surrounding mounting surface.



### SERRATED LOCKRING INSERT

See tables 2-1 and 2-2 on page 2-59, which will show locations and specifications of thread inserts.

## THREAD INSERT (P/N MS51830 AND MS51831 SERIES) REPLACEMENT

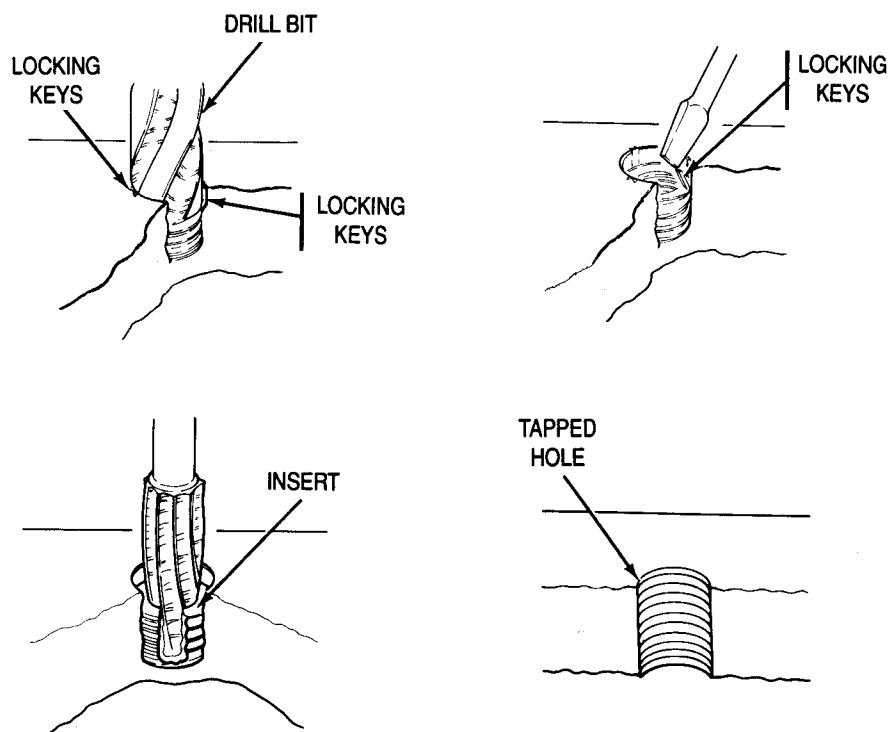
If thread inserts become damaged or unserviceable, use the following general replacement procedures. This section also contains specific procedures for repairing and retapping damaged mounting holes for thread inserts where rear track retainers mount.

The following special tools can be utilized by direct support maintenance to aid in removal of broken screws and inserts.

DESCRIPTION	NSN
Drill set, twist (cobalt)	5133-01-247-4746

For repair of broken screws, refer to TM 9-243.

### REMOVAL



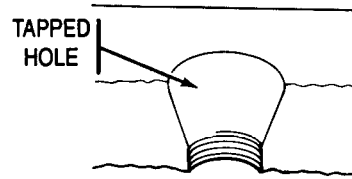
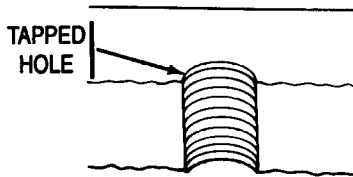
### Note

- This procedure is for replacement of MS51830 and MS51831 series inserts only.
- Insert replacement kit is part of 4940-00-294-9518, Shop Equipment, Contact Maintenance, Truck Mounted.

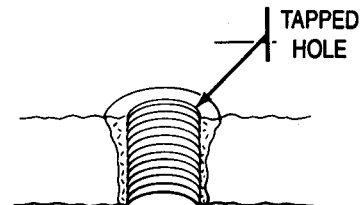
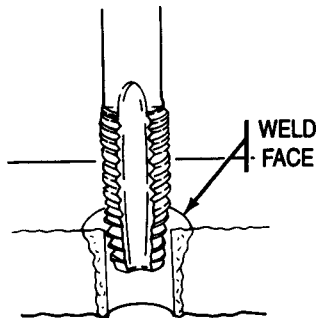
- A** Select drill bit of same diameter as distance between locking keys.
- B** Drill insert material from between locking keys.
- C** Use a punch or flat-tipped screwdriver to bend or break off locking keys.
- D** Using screw extractor or "easy-out," remove insert.
- E** Clean debris from tapped hole, taking care not to damage threads.



**INSTALLATION**



- A** Inspect tapped hole. If threads are damaged, perform steps B through G. If threads are not damaged, go to step H.
- B** Chip material away from damaged tapped hole.
- C** Prepare surface for welding, in accordance with TM 9-237 and General Welding Procedures (p 2-21).
- D** Fill-weld damaged tapped hole in accordance with Welding Procedures Specification No. 1 (p 2-42).
- E** Grind weld face flush with surrounding surface.

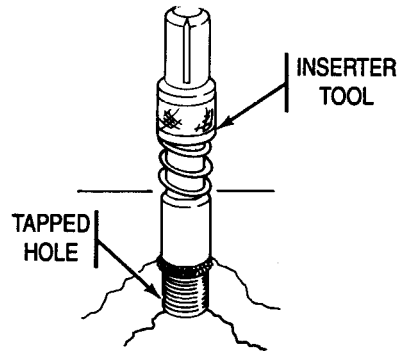
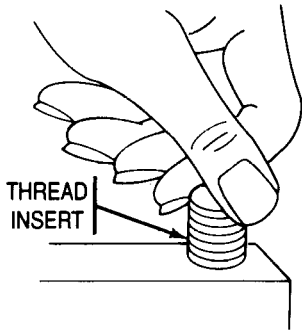


**CAUTION**

Use dry film lubricant when tapping aluminum. Failure to comply may result in damage to equipment.

- F** Select proper drill bit, counterbore, starter, and bottom tap from table 2-3 on page 2-60, and drill and tap new hole in surface.
- G** Inspect tapped hole for porosity, pockets, or other signs of unsuitable welds. If unsuitable, repeat steps B through F. If tapped hole is undamaged, go to step H.

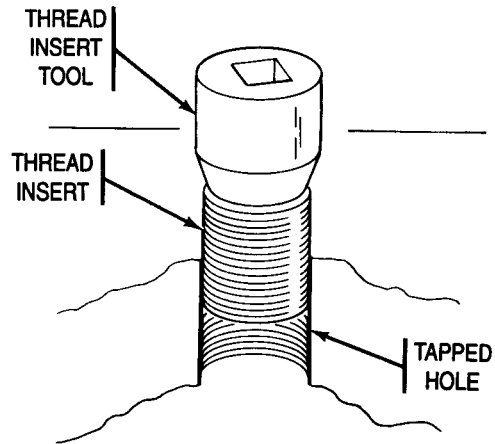
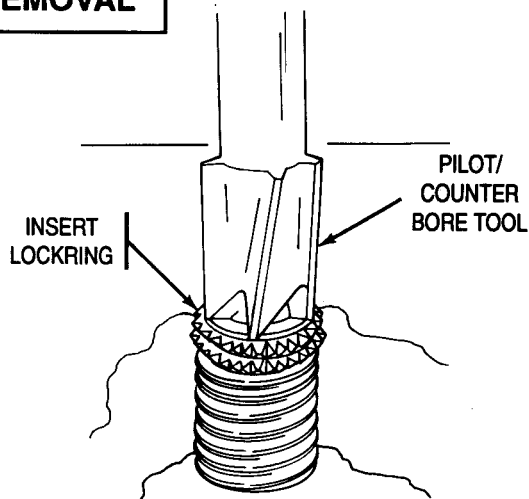
**THREAD INSERT (P/N MS51830 AND MS51831 SERIES) REPLACEMENT – CONTINUED**



- H** Coat threads of new thread insert with lubricating oil. Install new thread insert on new tapped hole until flush or slightly below mounting surface.
- I** Select appropriate inserter tool from table 2-3 on page 2-60. Place inserter tool on new thread inserts.
- J** Drive inserter tool until tool bottoms out on surface.
- K** Remove inserter tool. Keys of thread inserts should now be imbedded in mounting surface.

**THREAD INSERT (P/N SR621L) REPLACEMENT**

**REMOVAL**



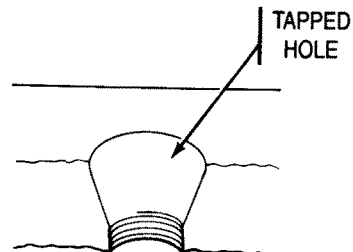
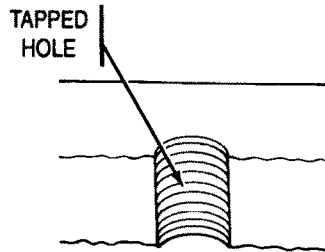
**Note**

- This procedure is for SR-series inserts only.
- Insert kit 5190-00-157-1105 is required for replacement of SR-series inserts.

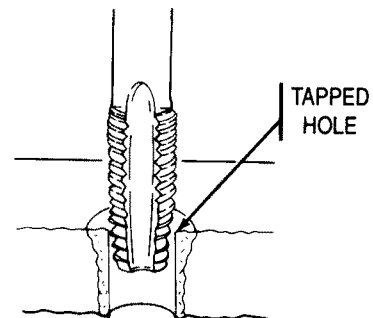
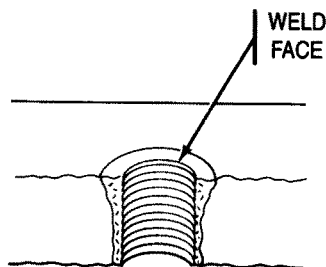
- A** Drill out insert locking with pilot/counter bore tool to a depth of .016 in. (.41 mm). If all of locking is not drilled out, remove with flat-tipped tool.
- B** Remove thread insert using drive wrench.
- C** Clean debris from tapped hole.



## INSTALLATION



- A** Inspect tapped hole. If threads are damaged, go to step B. If threads are not damaged, go to step H.
- B** Chip material away from damaged tapped hole.
- C** Prepare surface for welding, in accordance with TM 9-237 and General Welding Procedures (p 2-21).
- D** Fill-weld damaged tapped hole in accordance with Welding Procedures Specification No. 1 (p 2-42).
- E** Grind weld face flush with surrounding surface.

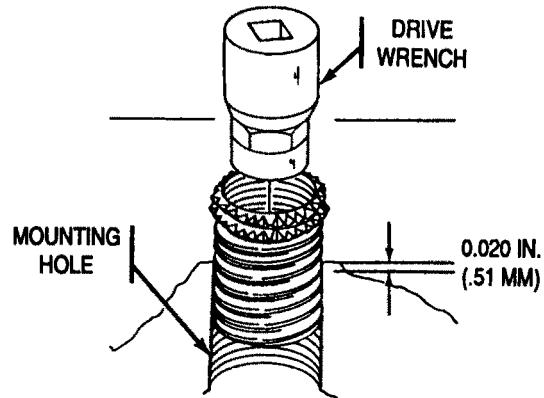
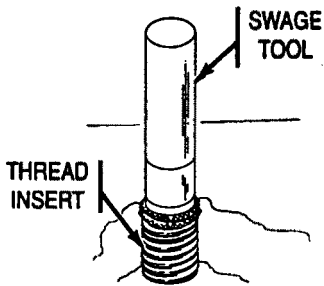


## CAUTION

Use dry film lubricant when tapping aluminum. Failure to comply may result in damage to equipment.

- F** Select proper drill bit, counterbore, starter, and bottom tap from table 2-3 on page 2-60, and drill and tap new hole in surface.
- G** Inspect tapped hole for porosity, pockets, or other signs of unsuitable welds. If unsuitable, repeat steps B through F. If undamaged, go to step H.

**THREAD INSERT (P/N SR621L) REPLACEMENT – CONTINUED**



- H** Coat threads of new thread insert with lubricating oil.
- I** Install new thread insert on mounting hole using drive wrench. Top of new thread insert should be 0.020 in. (.51 mm) below surface.
- J** Place swage tool in insert. Drive swage tool until it bottoms out on surface. Remove swage tool. Insert should be locked in place.

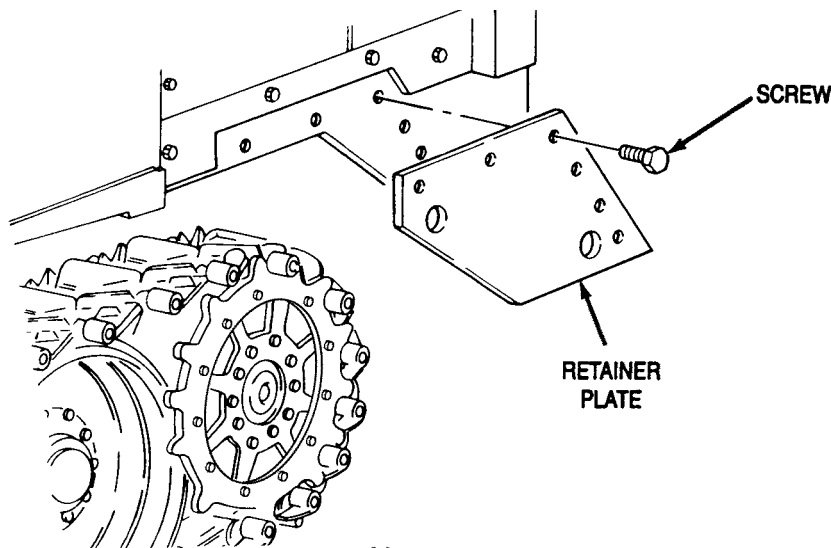
**BROKEN SCREWS REPAIR**

Use drill set, twist (5133-01-247-4746) to aid in removal of broken screws in accordance with TM 9-243.

**REAR TRACK RETAINER PLATE INSERTS REPAIR METHODS**

Use the procedures and tools listed below to replace damaged screw thread inserts where rear track retainer plates mount.

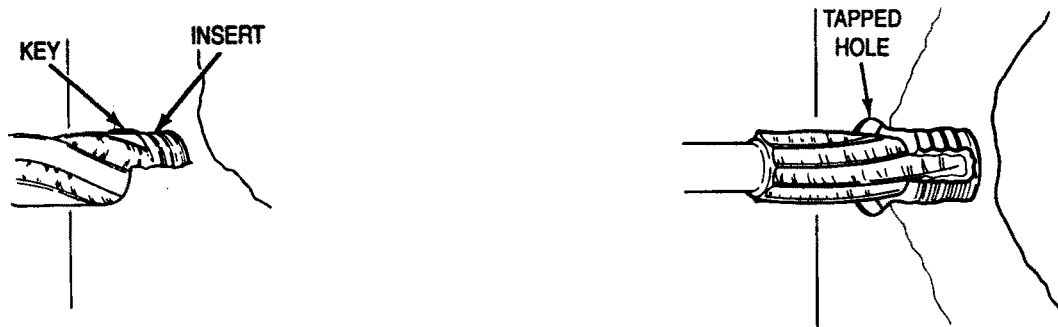
**REMOVAL**



**Note**

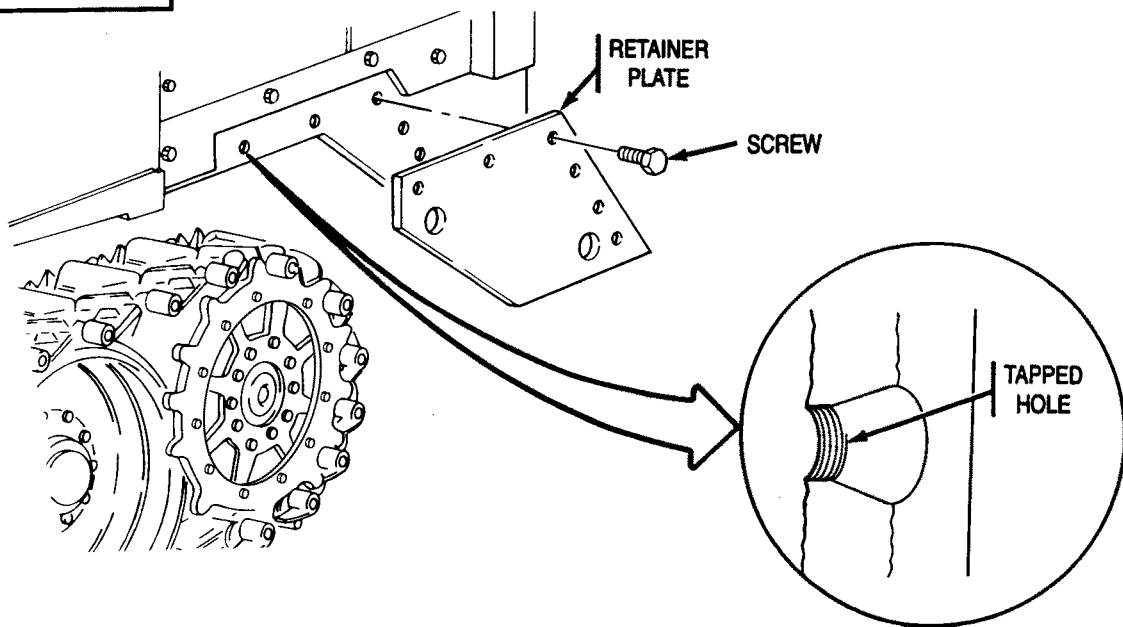
Obtain one .75-in. (1.91-cm) drill bit, one 1.046-in. (2.657-cm) drill bit, and one steel bushing, 1.031-in. OD x .812-in. ID, (2.62-cm OD x 2.06-cm ID) in addition to tools required for threaded insert replacement.

- A** If installed, remove six screws and rear track retainer plate (TM 5-2350-262-20-1). Retain mounting hardware.



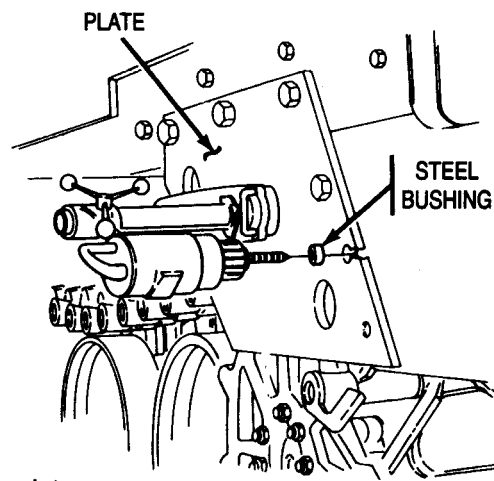
- B** Using 1.069-in. (2.715-cm) drill bit, drill out material between keys of insert.
- C** Use punch or flat-tipped screwdriver to bend or break off keys.
- D** Remove insert, using screw extractor or "easy-out."
- E** Clean any debris from tapped hole, taking care not to damage threads.

**INSTALLATION**

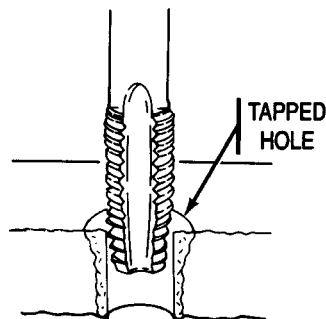


- A** Inspect tapped hole. If threads are undamaged, refer to Screw Thread Inserts Replacement Methods (p 2-23) to install new thread inserts. If threads are damaged, go to step B.
- B** Prepare surface in accordance with General Welding Procedures (p 2-21) and TM 9-237. Fill-weld damaged tapped hole. Refer to Welding Procedures Specification No. 1 (p 2-42) for specific procedures.
- C** Obtain rear track retainer plate to use as template.
- D** Drill out corresponding holes in plate to 1.046 in. (2.657 cm).
- E** Install plate on vehicle with the six existing serviceable screws from removal of plate. Tighten screws to 205-227 lb-ft (278-308 N-m).

## REAR TRACK RETAINER PLATE INSERTS REPAIR METHODS – CONTINUED



- F** Install steel bushing in plate.
- G** Using available drilling equipment (drill bit not to exceed 0.75 in. (1.91 cm)), drill into hull to a maximum depth of 2.5 in. (6.4 cm).
- H** Remove bushing from plate. Using 1.046-in. (2.657-cm) drill bit, drill into hull to a maximum depth of 2.5 in. (6.4 cm).



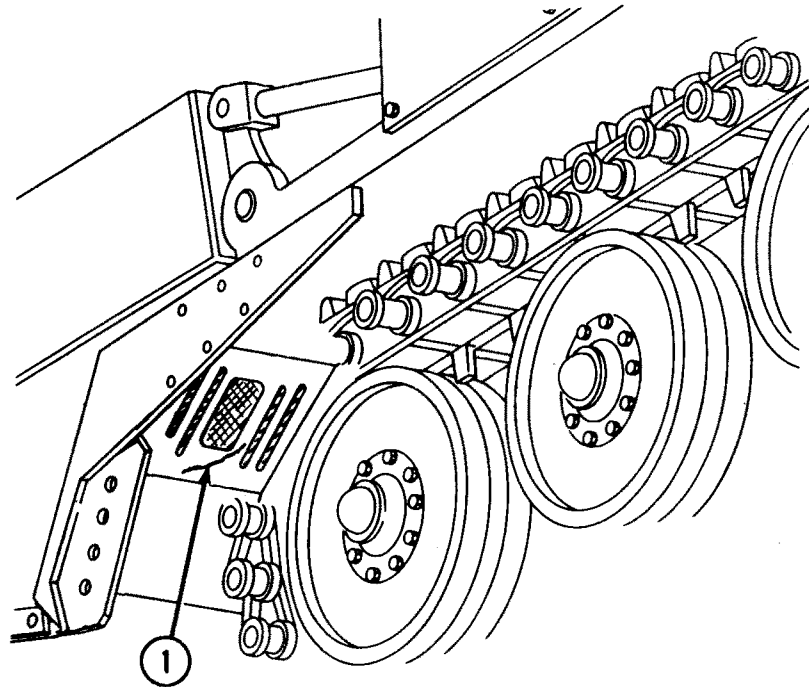
- I** Inspect hole for suitability for tapping. If hole is unsuitable, repeat steps B through H.

### CAUTION

Failure to use dry film lubricant when tapping aluminum will result in excessive wear to tapping equipment.

- J** Tap hole using 1.125-in. (2.858-cm) –12 UNF starter tap at least 1.5-in. (3.8-cm) deep.
- K** Complete tapping hole using 1.125-in. (2.858-cm) –12 UNF bottom tap.
- L** Refer to Screw Thread Inserts Replacement Methods (p 2-23) to install new MS51831A109L insert.
- M** Install rear track retainer plate (TM 5-2350-262-20-1).

## FRONT HULL SLOPE REPAIR METHODS



### Note

Obtain 3431-00-691-1415, Shop Equipment, Welding, Field Maintenance Tool Kit to perform this task.

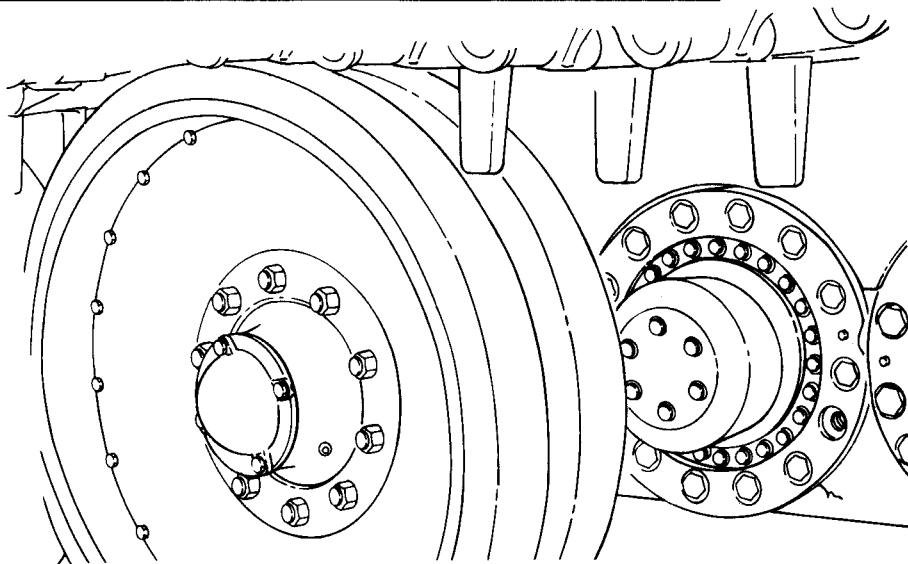
## REPAIR

- A** Remove front track retainer plate (TM 5-2350-262-20-1).
- B** Remove No. 1 roadwheel (TM 5-2350-262-20-2).
- C** Set vehicle on support stands (TM 5-2350-262-20-1).
- D** Use scraper or wire brush to remove all dirt and debris from area of gouge (1).
- E** Use straight edge and 6-in. (15-cm) ruler to measure depth of gouge (1).
- F** Follow General Welding Procedures (p 2-21) and TM 9-237 to prepare surface.
  - If front hull slope is worn through, cut away worn area and weld backing plate over area, using Welding Procedures Specification No. 2 (p 2-43).
  - If front hull slope is worn 1/2 in. (1.3 cm) or more, fill-weld using Welding Procedures Specification No. 2 (p 2-43).
  - If front hull slope is worn less than 1/2 in. (1.3 cm), no maintenance action is required at this time.

## FRONT HULL SLOPE REPAIR METHODS – CONTINUED

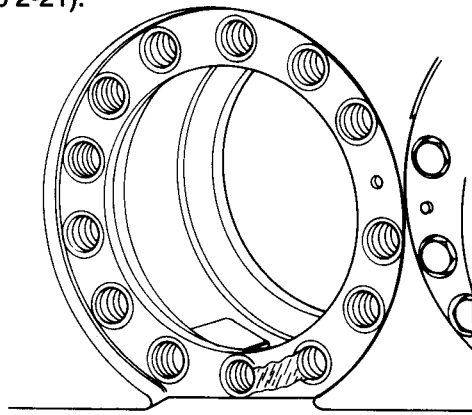
- G** Remove support stands (TM 5-2350-262-20-1).
- H** Install No. 1 roadwheel (TM 5-2350-262-20-2).
- I** Install front track retainer plate (TM 5-2350-262-20-1).

## ROTARY ACTUATOR MOUNTING AREA REPAIR METHODS



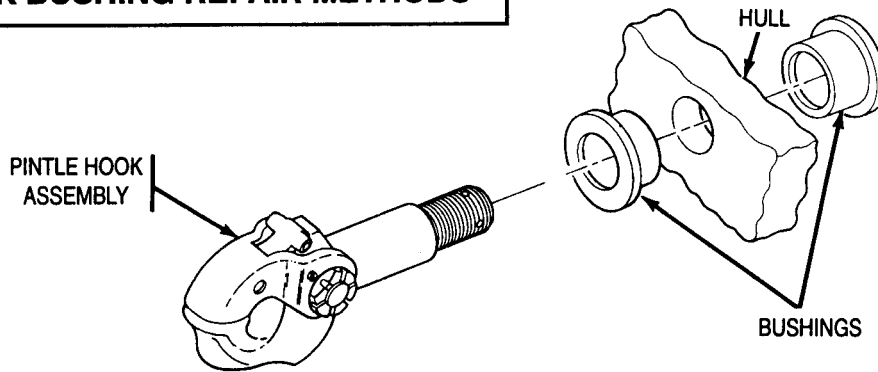
### REPAIR

- A** Remove affected actuator (see Alphabetical Index for page numbers).
- B** Inspect area for cracks, gouges, and other damage.
- C** Remove dirt, debris, and paint from area to be welded. Prepare surface in accordance with TM 9-237 and General Welding Procedures (p 2-21).



- D** Weld area in accordance with Welding Procedures Specification No. 3 (p 2-44).
- E** Grind weld area flush with surrounding surface.
- F** Inspect threaded inserts near welded area. Replace any that have been damaged or distorted by welding (refer to serrated locking threaded insert replacement procedures on p 2-26).
- G** Install affected actuator (see alphabetical index for page numbers).

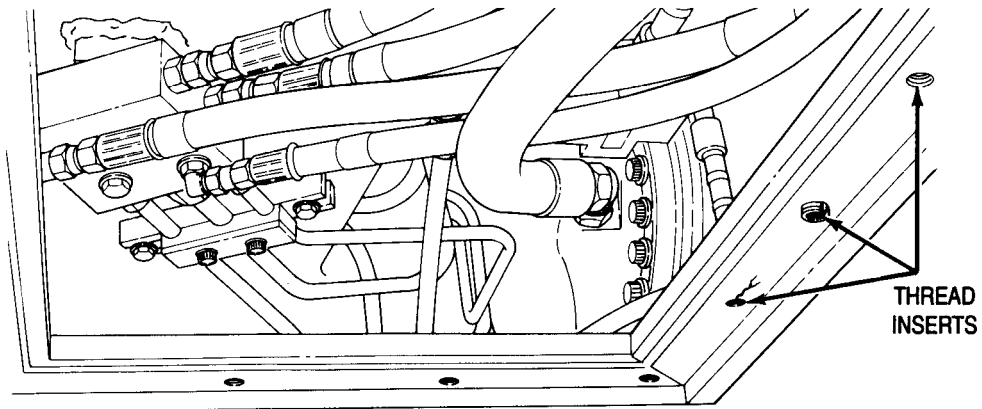
**PINTLE HOOK BUSHING REPAIR METHODS**



**REPAIR**

- A** Remove pintle hook assembly (TM 5-2350-262-20-1).
- B** Remove bushings from hull and discard.
- C** Clean any debris from hole.
- D** Install new bushings.
- E** Install pintle hook assembly (TM 5-2350-262-20-2).

**HULL ACCESS COVER MOUNTING AREA MINOR REPAIR METHODS**

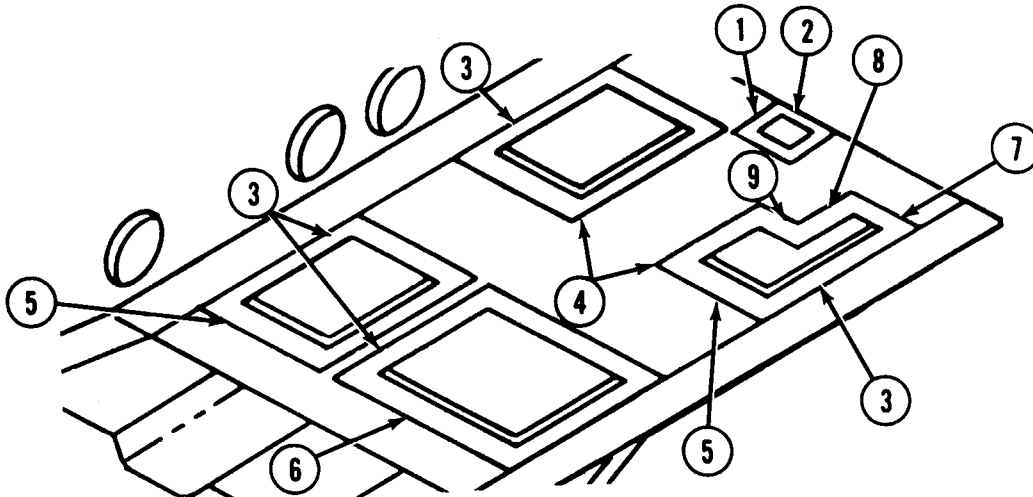


**REPAIR**

- A** Remove hull access cover and hull protective plate, if necessary (TM 5-2350-262-20-1).
- B** Inspect area for cracks, gouges, or other damage.
- C** Remove all dirt, debris, and paint from surfaces to be welded. Prepare surface in accordance with TM 9-237 and General Welding Procedures (p 2-21).
- D** Weld area in accordance with Welding Procedures Specification No. 4 (p 2-45).
- E** Grind weld area flush with surrounding surface.
- F** Inspect thread inserts near welded area. Replace inserts that have been damaged or distorted by welding (refer to key-locked thread inserts replacement procedures, p 2-23).
- G** Install hull access cover and hull protective plate (TM 5-2350-262-20-1).

**HULL ACCESS COVER FRAME REPAIR METHODS**

**REPAIR**

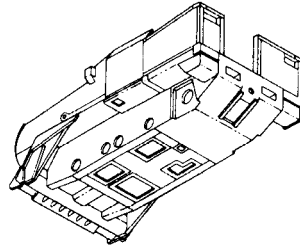


- A** Remove hull protective plates and access covers (TM 5-2350-262-20-1).
- B** Inspect area for cracks, gouges, or other damage.
- C** Cut away damaged frame.
- D** Remove all burrs and sharp edges from surfaces to be welded.
- E** Refer to listing below for access cover frame sizes.
- F** Remove all dirt, debris, and paint from surfaces to be welded. Prepare surface in accordance with TM 9-237 and General Welding Procedure No. 6 (p 2-21).
- G** Weld area in accordance with Welding Procedures Specification No. 6 (p 2-48).
- H** Grind weld area flush with surrounding surface.
- I** Install hull access covers and protective plates (TM 5-2350-262-20-1).

ITEM NO.	SIZE (LENGTH)
1	7.85 - 7.88 in. (199 - 200 mm)
2	10.85 - 10.88 in. (275 - 276 mm)
3	27.19 - 27.25 in. (691 - 692 mm)
4	17.94 - 18.00 in. (456 - 457 mm)
5	20.50 - 20.56 in. (521 - 522 mm)
6	32.88 - 32.94 in. (835 - 837 mm)
7	13.94 - 14.00 in. (354 - 356 mm)
8	12.07 - 12.13 in. (307 - 308 mm)
9	9.38 - 9.44 in. (238 - 240 mm)



## HULL UNDERSIDE AND SPONSON AREA REPAIR METHODS

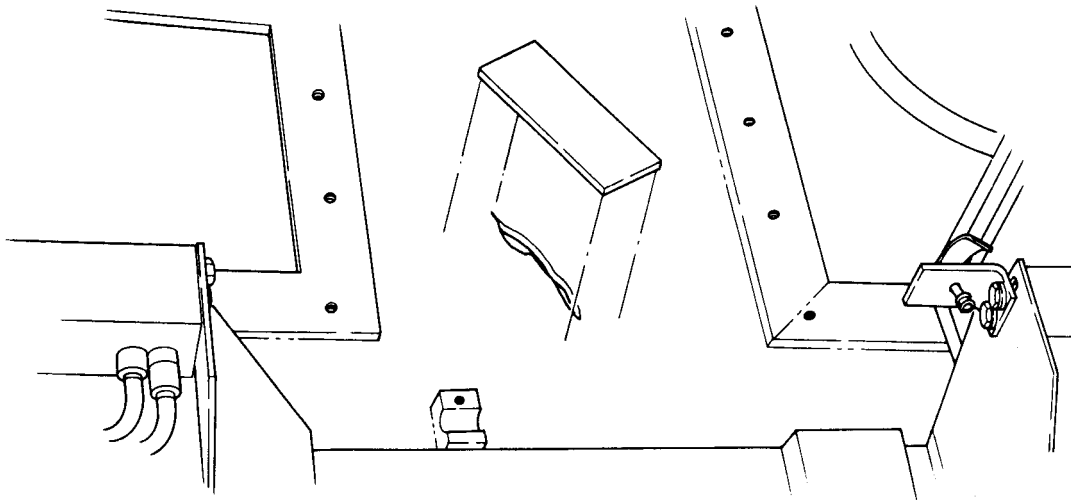


### REPAIR

#### Note

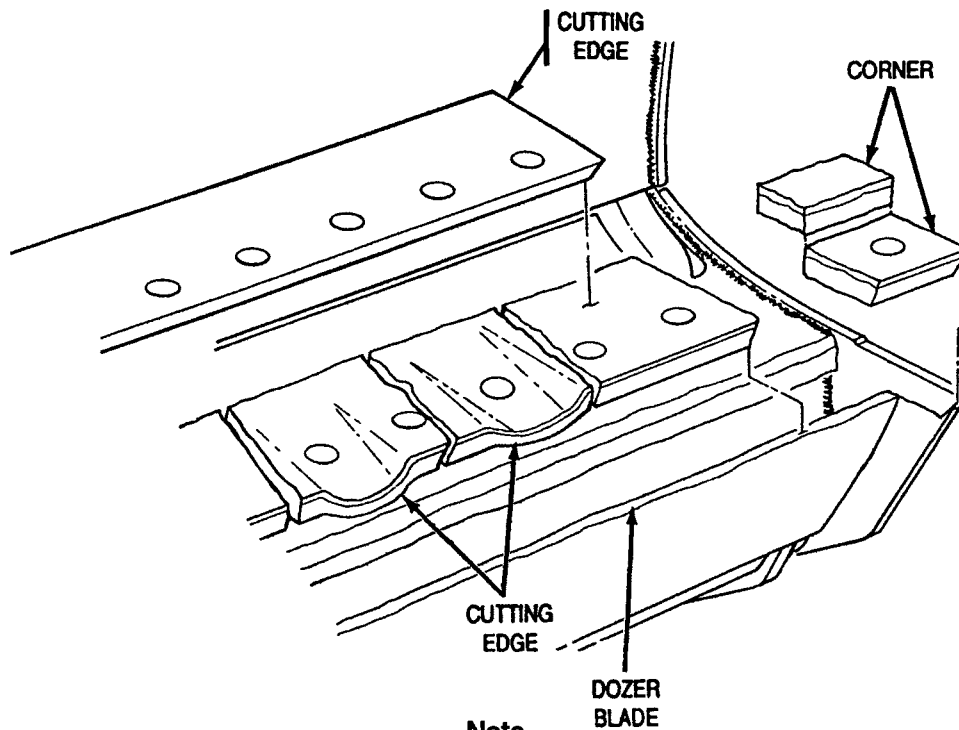
A large crack through the hull underside or spsonson may require removal of internal and external components.

- A** Remove necessary components around damaged area. Refer to TM 5-2350-262-20-1, List of Tasks, or Alphabetical Index, for procedures.



- B** Remove dirt, debris, and paint from surface to be welded. Prepare surface in accordance with TM 9-237 and General Welding Procedures (p 2-21).
- C** Weld replacement section in damaged area in accordance with Welding Procedures Specification No. 5 (p 2-46).
- D** Inspect weld to ensure it is watertight.
- E** Install components that were removed.

## DOZER BLADE REPAIR METHODS

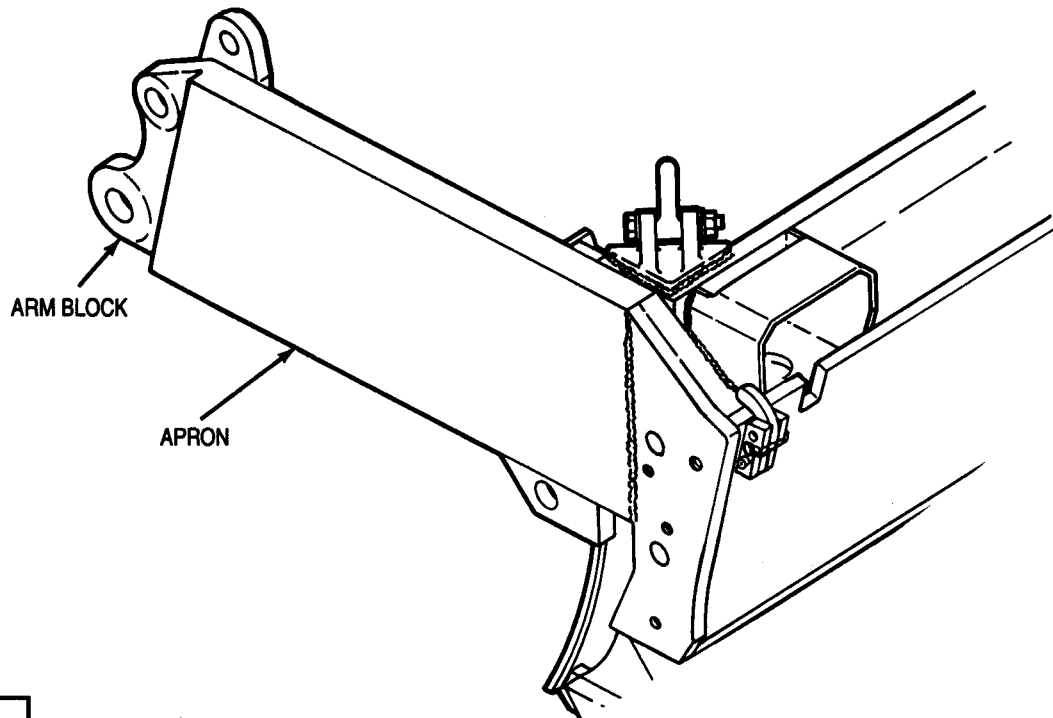


**Note**  
NEW PRODUCTION vehicles are equipped with a steel dozer blade and extensions. Follow General Welding Procedures (p 2-21), Welding Procedures Specification No. 7.1 (p 2-49) and TM 9-237 to repair steel dozer blade and extensions.

## REPAIR

- A** Remove dozer blade extensions (TM 5-2350-262-20-1).
- B** If installed, remove ripper blade assemblies (TM 5-2350-262-20-2).
- C** Using circular saw with 40-toothed carbide tip blade, cut away damaged cutting edge.
- D** Using circular saw with 40-toothed carbide tip blade, cut out corners of cutting edge.
- E** Remove all burrs and sharp edges from surfaces to be welded.
- F** Ensure welding surfaces are free of dirt, grease, and paint.
- G** Position new cutting edge on dozer blade (4).
- H** Refer to Welding Procedures Specification No. 7 (p 2-49) and TM 9-237 to weld new cutting edge to blade.
- I** Install ripper blade assemblies (TM 5-2350-262-20-2).
- J** Install dozer blade extensions (TM 5-2350-262-20-1).

## APRON ARM BLOCK REPAIR METHODS



### REPAIR

- A** Remove apron and dozer assembly (TM 5-2350-262-20-1).

#### **Note**

Perform step B for left side removal.

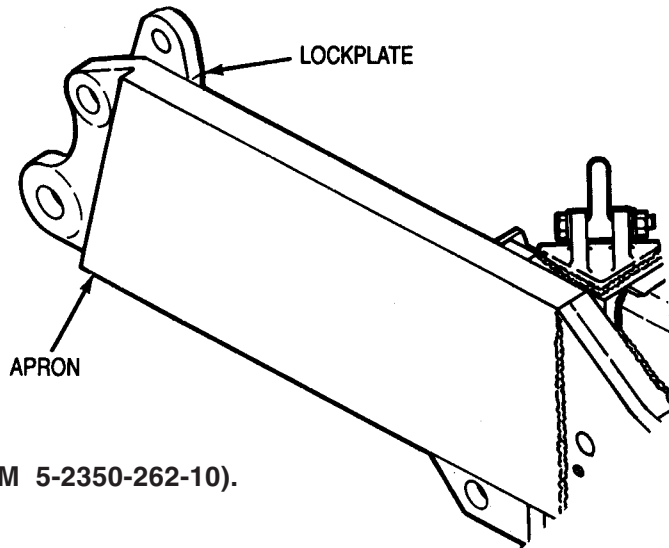
- B** Remove apron wiring harness (TM 5-2350-262-20-1).
- C** Cut away damaged arm block.
- D** Remove all burrs and sharp edges from surfaces to be welded.
- E** Ensure welding surfaces are free of dirt, grease, and paint.
- F** Position new arm block on apron.
- G** Refer to Welding Procedures Specification No. 8 (p 2-51) and TM 9-237 to weld arm block to apron.

#### **Note**

Perform step H for left side installation.

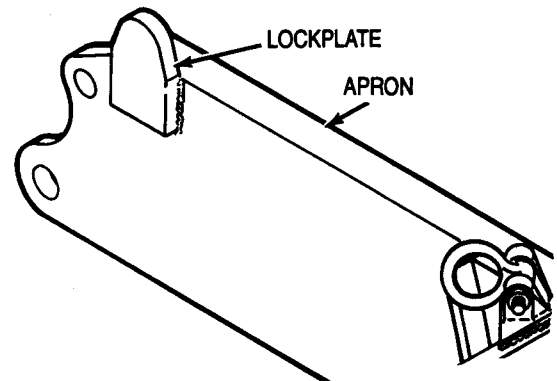
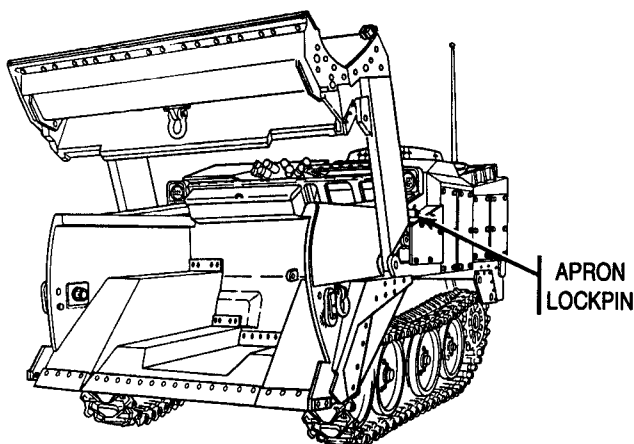
- H** Install apron wiring harness (TM 5-2350-262-20-1).
- I** Install apron and dozer assembly (TM 5-2350-262-20-1).

## APRON TOP LOCKPLATE REPAIR METHODS



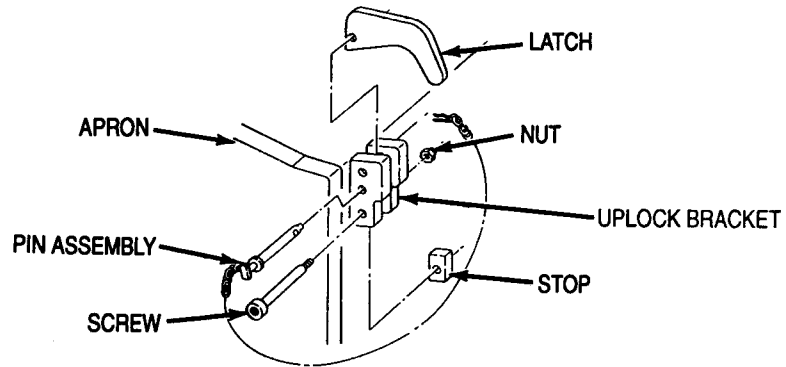
### REPAIR

- A** Lower apron and dozer assembly (TM 5-2350-262-10).
- B** Cut away damaged lockplate.
- C** Remove all burrs and sharp edges from surfaces to be welded.
- D** Ensure welding surfaces are free of dirt, grease, and paint.
- E** Position new lockplate on apron.
- F** Refer to Welding Procedures Specification No. 9 (p 2-52) and TM 9-237 to weld lockplate to apron.



- G** Raise apron and dozer assembly (TM 5-2350-262-10). Install apron lockpin on opposite side of new lockplate.
- H** Locate and mark hole in new lockplate.
- I** Lower apron and dozer assembly (TM 5-2350-262-10).
- J** Drill hole in lockplate.
- K** Raise apron and dozer assembly (TM 5-2350-262-10).

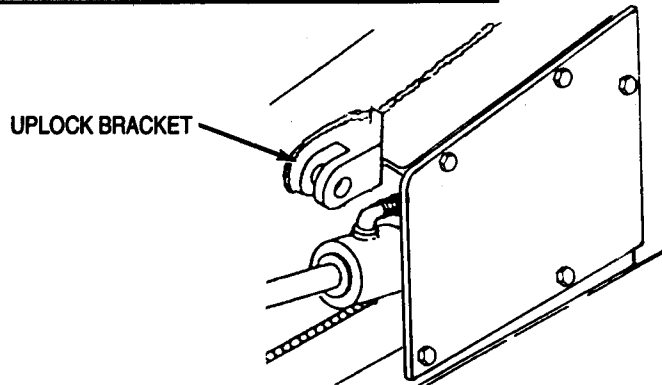
**APRON UPLOCK BRACKET REPAIR METHODS**



**REPAIR**

- A** Remove pin assembly, latch, screw, nut, and stop from uplock bracket.
- B** Cut away damaged uplock bracket.
- C** Remove all burrs and sharp edges from surfaces to be welded.
- D** Ensure welding surfaces are free of dirt, grease, and paint.
- E** Position new uplock bracket on apron.
- F** Refer to Welding Procedures Specification No. 10 (p 2-53) and TM 9-237 to weld uplock bracket to apron.
- G** Install stop, screw, nut, latch, and pin assembly on uplock bracket.

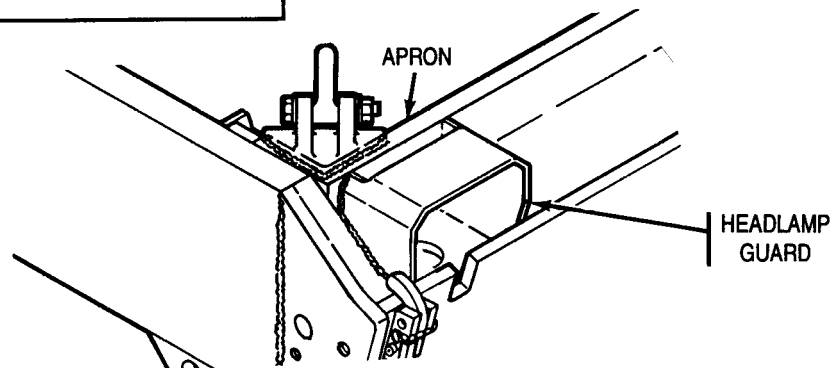
**APRON LOCK BRACKET REPAIR METHODS**



**REPAIR**

- A** Lower apron and dozer assembly (TM 5-2350-262-10).
- B** Remove apron lockpin (TM 5-2350-262-10).
- C** Cut away damaged uplock bracket.
- D** Remove all burrs and sharp edges from surfaces to be welded.
- E** Ensure welding surfaces are free of dirt, grease, and paint.
- F** Position new uplock bracket on hull.
- G** Refer to Welding Procedures Specification No. 11 (p 2-54) and TM 9-237 to weld uplock bracket to hull.

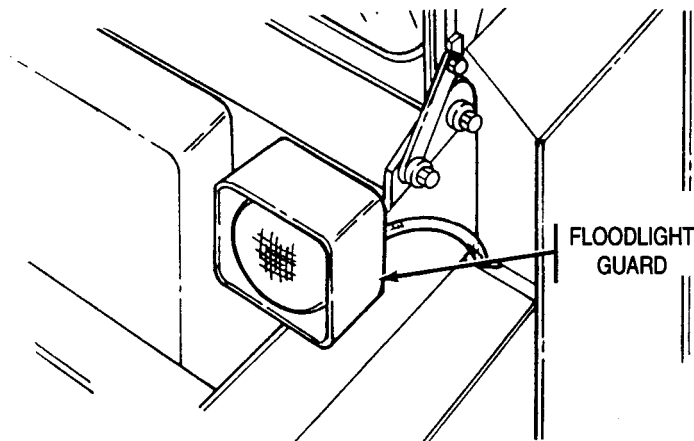
## HEADLAMP GUARD REPAIR METHODS



### REPAIR

- A** Cut away damaged headlamp guard from apron.
- B** Remove all burrs and sharp edges from surfaces to be welded.
- C** Ensure welding surfaces are free of dirt, grease, and paint.
- D** Cut .25 in. (6.4 mm) aluminum alloy to required length.
- E** Position new headlamp guard on apron.
- F** Refer to Welding Procedures Specification No. 12 (p 2-55) and TM 9-237 to weld headlamp guard to apron.

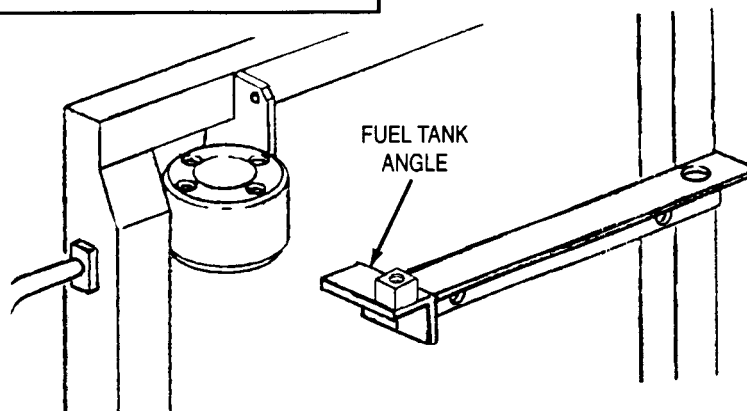
## FLOODLIGHT GUARD REPAIR METHODS



### REPAIR

- A** Cut away damaged floodlight guard from hull.
- B** Remove all burrs and sharp edges from surfaces to be welded.
- C** Ensure welding surfaces are free of dirt, grease, and paint.
- D** Cut .25 in. (6.4 mm) aluminum alloy to required length.
- E** Heat and bend strip into proper shape.
- F** Position new floodlight guard on hull.
- G** Refer to Welding Procedures Specification No. 13 (p 2-56) and TM 9-237 to weld floodlight guard to hull.

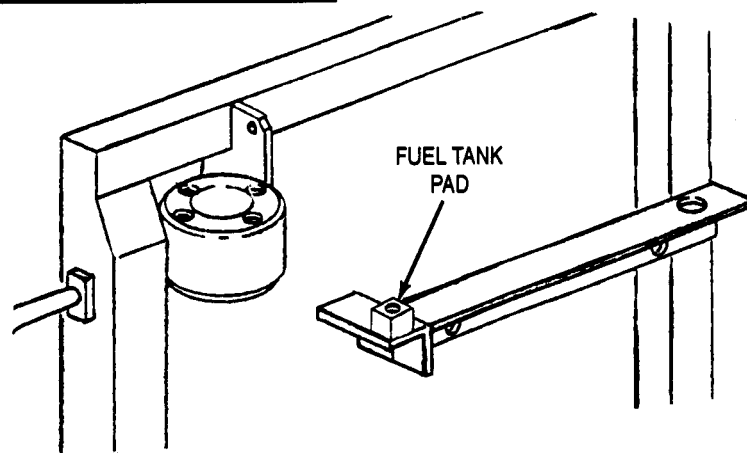
## FUEL TANK ANGLE REPAIR METHODS



### REPAIR

- A** Remove fuel tank (TM 5-2350-262-20-1).
- B** Cut away damaged angle from hull.
- C** Remove all burrs and sharp edges from surfaces to be welded.
- D** Ensure welding surfaces are free of dirt, grease, and paint.
- E** Position new angle on hull.
- F** Refer to Welding Procedures Specification No. 14 (p 2-57) and TM 9-237 to weld angle to hull.
- G** Install fuel tank (TM 5-2350-262-20-1).

## FUEL TANK PAD REPAIR METHODS



### REPAIR

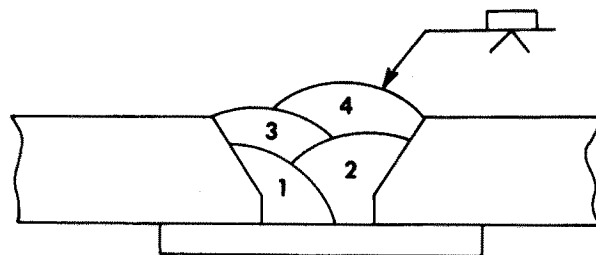
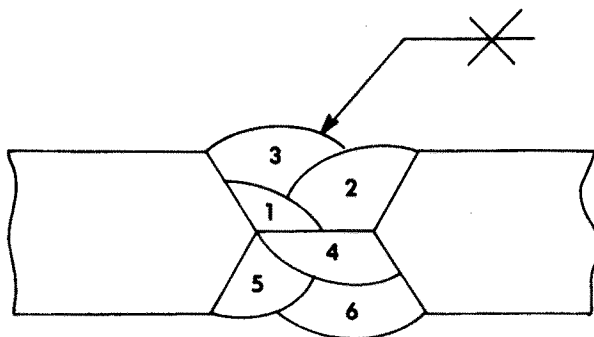
- A** Remove fuel tank (TM 5-2350-262-20-1).
- B** Cut away damaged pad from hull.
- C** Remove all burrs and sharp edges from surfaces to be welded.
- D** Ensure welding surfaces are free of dirt, grease, and paint.
- E** Position new pad on hull.
- F** Refer to Welding Procedures Specification No. 15 (p 2-58) and TM 9-237 to weld pad to hull.
- G** Install fuel tank (TM 5-2350-262-20-1).

## WELDING PROCEDURES SPECIFICATION NO. 1

This procedure specification covers welding of damaged mounting holes for threaded inserts.

Base Metal	AA 5083, 5086 (see p 2-19)
Base Metal Thickness	1.000 in. (2.5 cm)
Welding Process	GTAW
Filler Metal	ER 5356
Filler Metal Size	.063 through .125 in. (.160 through .318 cm)
GTAW Electrode Type and Size	EWZ <sub>n</sub> .125 in. (.318 cm)
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	20 CFH/.375 in. (.953 cm)
Weld Passes	4-6
Amperage	130-230
Voltage	18-21
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	Stainless Steel or Aluminum
Pre/Post Heating/Interpass Temperature	60°F (16°C) min/200°F (93°C) max.
Cleaning	See General Welding Procedures

### OUTSIDE OF VEHICLE IF APPLICABLE



**BACKUP CAN BE USED WHEN  
WELDING FIRST SIDE**



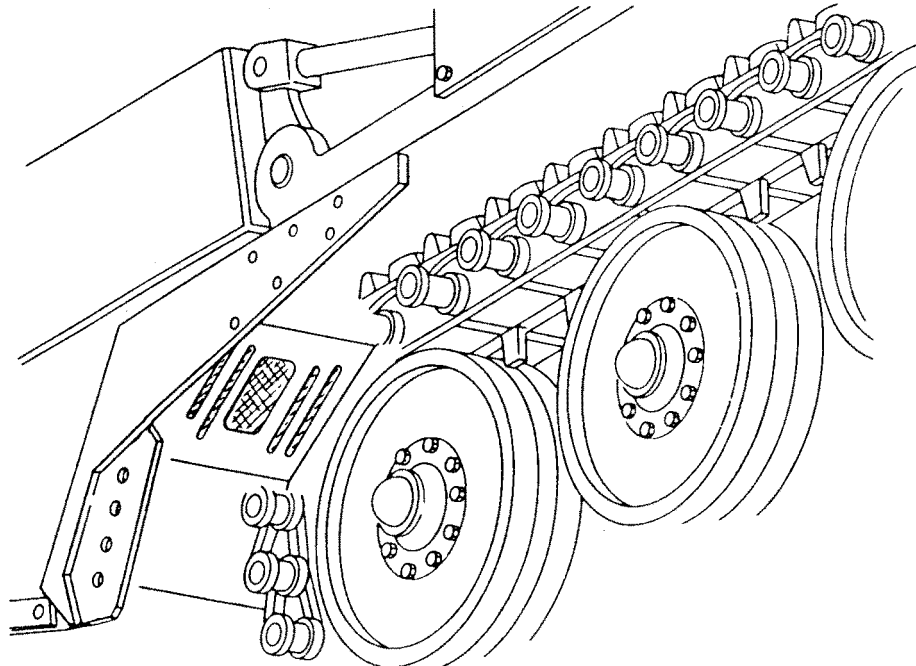
## WELDING PROCEDURES SPECIFICATION NO. 2

This procedure specification covers welding of the front hull slope. This procedure specification is the same for both sides. The left side is shown here.

Base Metal	AA 5083 (see p 2-19)
Base Metal Thickness	1.000 in. (2.5 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.160 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note 1)
Amperage	See Note 2
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note 1: The number of passes may vary with each weld.

Note 2: Welding amperage may vary with each welding pass.

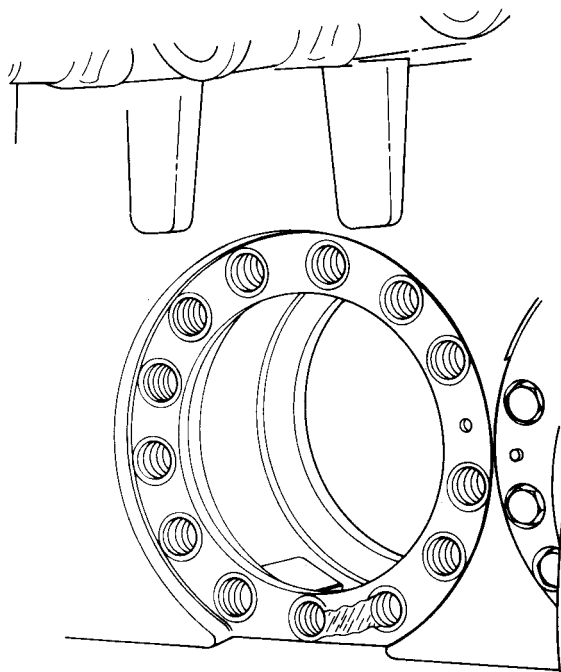


## WELDING PROCEDURES SPECIFICATION NO. 3

This procedure specification covers welding the rotary actuator mounting area. This procedure specification is the same for both sides. The left side is shown here.

Base Metal	AA 6061, 5086 (see p 2-19), 5083 (see p 2-20)
Base Metal Thickness	1 in. (2.5 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.160 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

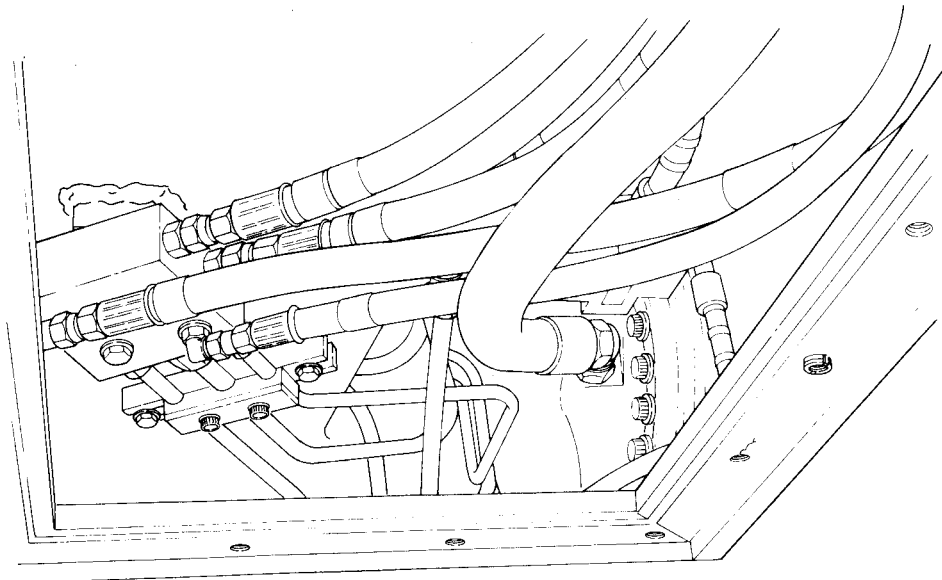
Note: The number of passes may vary with each weld.



## WELDING PROCEDURES SPECIFICATION NO. 4

This procedure specification covers welding the hull access cover mounting area. The procedure specification is the same for all hull access covers.

Base Metal	AA 6061 (see p 2-20)
Base Metal Thickness	.375 in. (.953 cm); .625 in. (1.588 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	1
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures



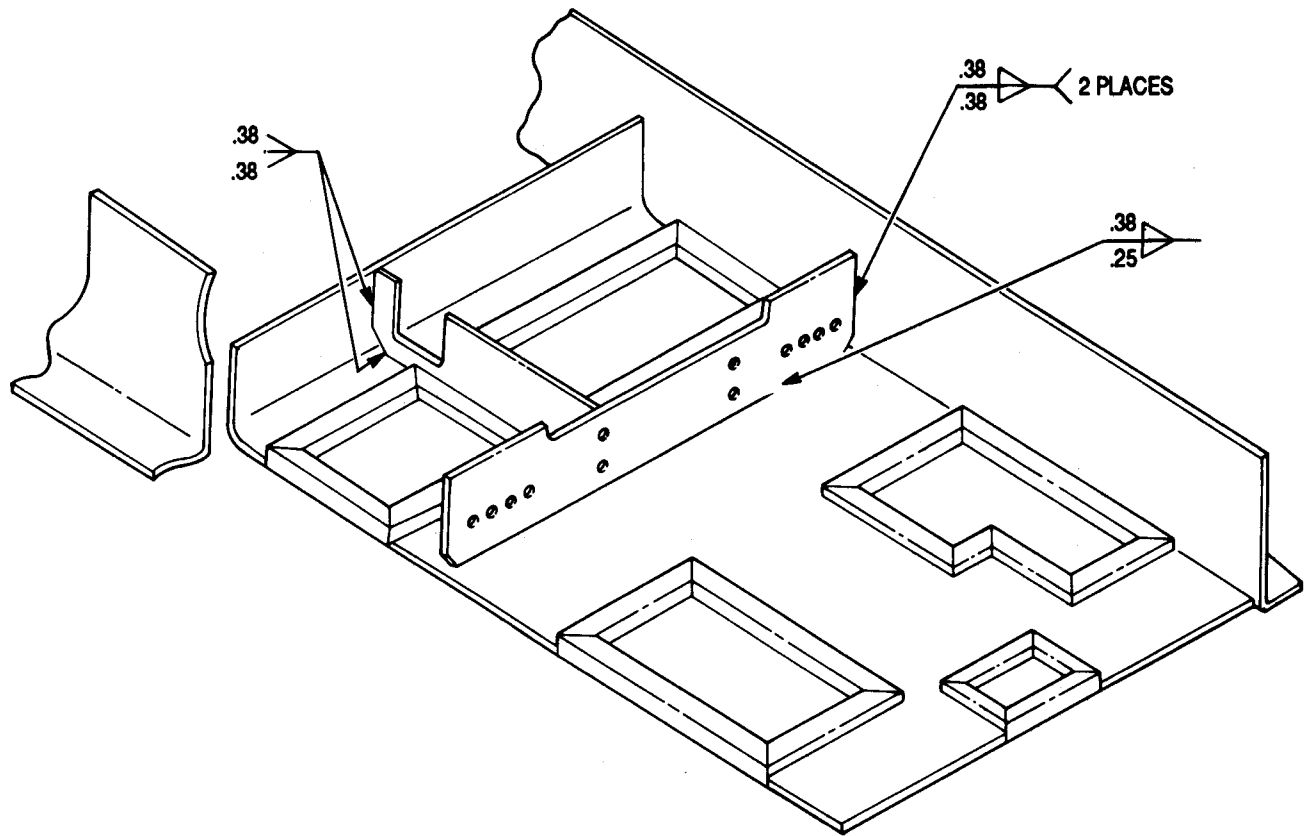
## WELDING PROCEDURES SPECIFICATION NO. 5

This procedure specification covers welding the hull underside and sponson areas. The procedure specification is the same for the sponsons on both sides. The left side is shown here.

Base Metal	AA 6061 (see p 2-20)
Base Metal Thickness	.375 in. (.953 cm); .25 in. (.635 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note: The number of passes may vary with each weld.

# WELDING PROCEDURES SPECIFICATION NO. 5 – CONTINUED

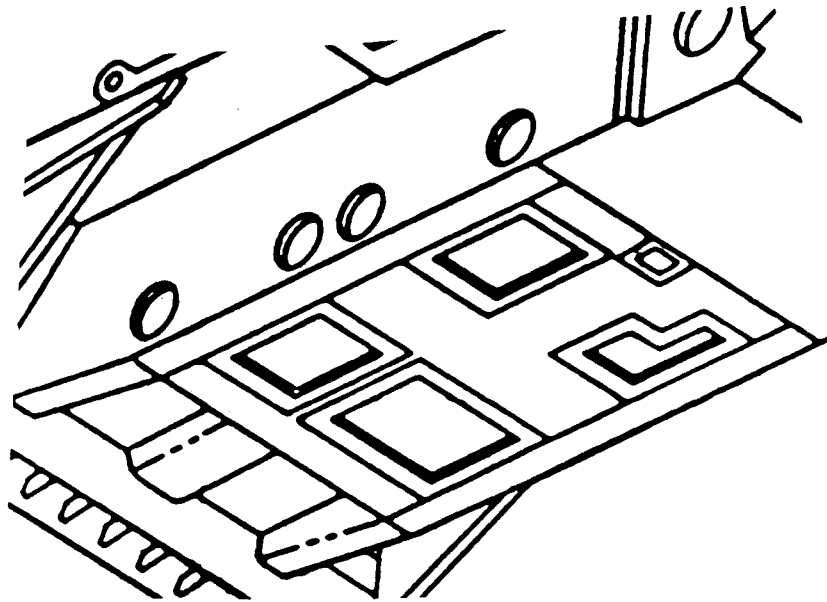


FLOOR PLATE

## WELDING PROCEDURES SPECIFICATION NO. 6

This procedure specification covers welding the hull access cover frames. The procedure specification is the same for all frames.

Base Metal	A 5083, 5086, 5456 (see p 2-20)
Base Metal Thickness	1.12 in. (2.84 cm); .62 in. (1.57 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	1
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures



## WELDING PROCEDURES SPECIFICATION NO. 7

This procedure specification covers welding the steel dozer blade.

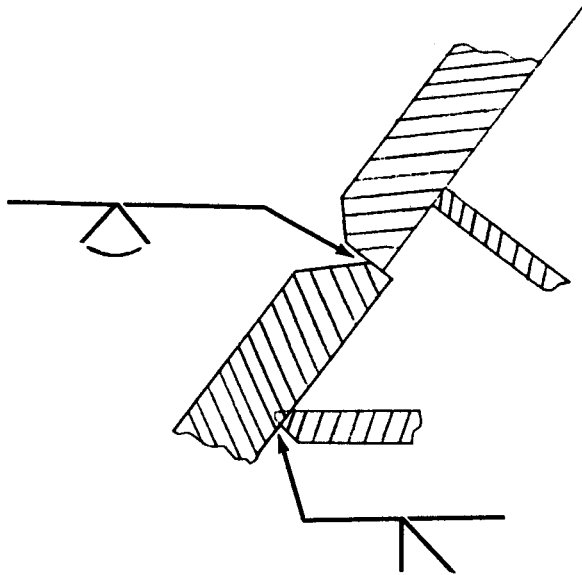
<b>Base Metal</b>	High Strength Low Alloy Steel 145 KSI - 180 KSI Yield
<b>Base Metal Thickness</b>	0.25 IN. (0.64 cm)
<b>Welding Process</b>	FCAW
<b>Filler Metal</b>	AWS E70T-1
<b>Filler Metal Size</b>	1/16
<b>GTAW Electrode Type and Size</b>	N/A
<b>Position</b>	Flat
<b>Shielding Gas Type</b>	CO <sub>2</sub>
<b>Gas Flow/Nozzle Size</b>	3/4
<b>Weld Passes</b>	Variable (see Note 1)
<b>Amperage</b>	275
<b>Voltage</b>	26
<b>Travel Speed</b>	Variable
<b>Edge Preparation</b>	See General Welding Procedures, Steel
<b>Back Gouging</b>	See General Welding Procedures, Steel
<b>Backing</b>	N/A
<b>Pre/Post Heating/Interpass Temperature</b>	60°F (16°C) min./200°F (93°C) max.
<b>Cleaning</b>	See General Welding Procedures

Note 1: The number of passes may vary with each weld.

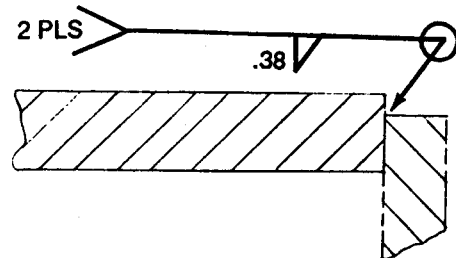
# WELDING PROCEDURES SPECIFICATION NO. 7 – CONTINUED

Note

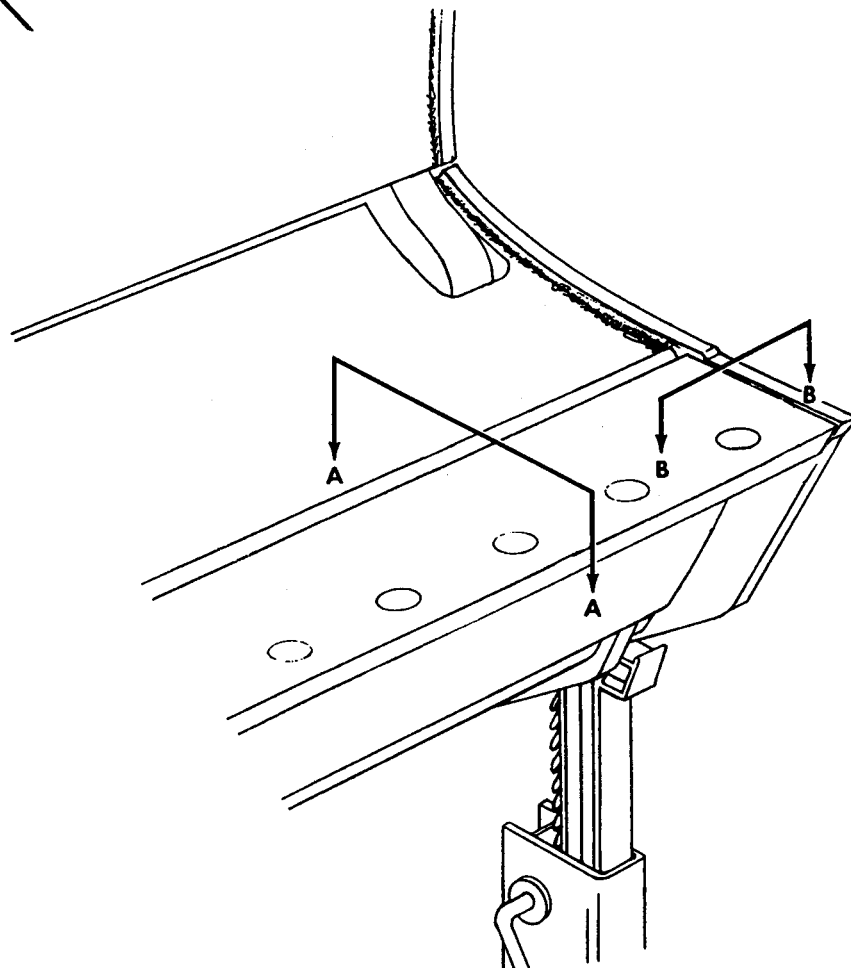
For steel dozer blades.



**SECTION A-A**



**SECTION B-B  
BOTH SIDES**



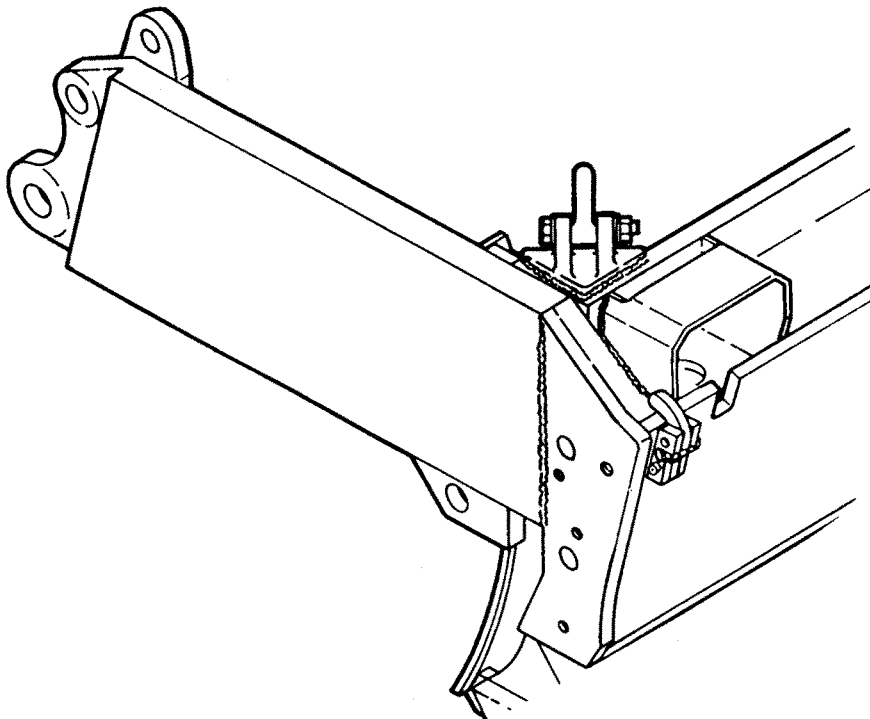


## WELDING PROCEDURES SPECIFICATION NO. 8

This procedure specification covers welding the apron arm block. The procedure specification is the same for the arm blocks on both sides. The right side is shown here.

Base Metal	AA Forging (see p 2-20)
Base Metal Thickness	(RH) 3.75 in. (9.525 cm); (LH) 5.37 in. (13.64 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note: The number of passes may vary with each weld.



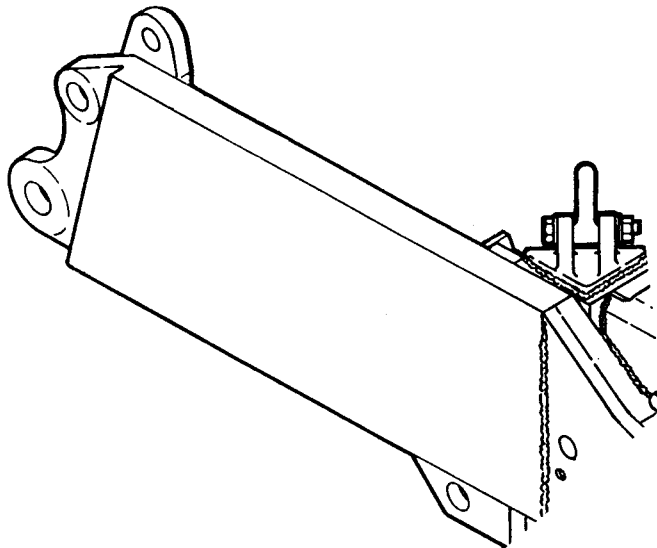
## WELDING PROCEDURES SPECIFICATION NO. 9

This procedure specification covers welding the apron top lockplate. The procedure specification is the same for the top lockplate on both sides. The right side is shown here.

Base Metal	Aluminum (see p 2-20)
Base Metal Thickness	1 in. (2.540 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note 1)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note 1: The number of passes may vary with each weld.

Note 2: The hole must be drilled in the top lockplate after it is installed.

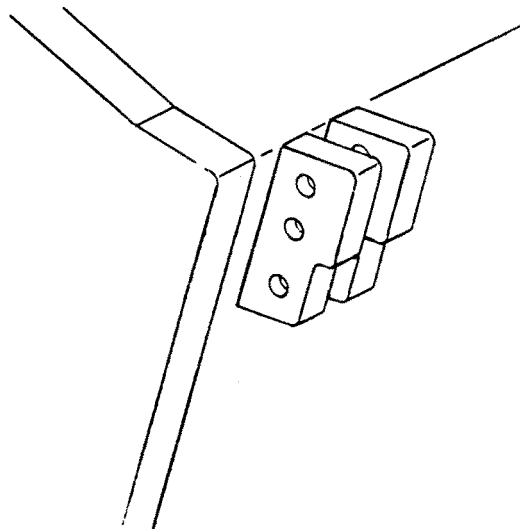


## WELDING PROCEDURES SPECIFICATION NO. 10

This procedure specification covers welding the apron uplock brackets. The procedure specification is the same for the uplock bracket on both sides. The right side is shown here.

Base Metal	AA 6061 (see p 2-20)
Base Metal Thickness	.8 in. (2.03 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note: The number of passes may vary with each weld.

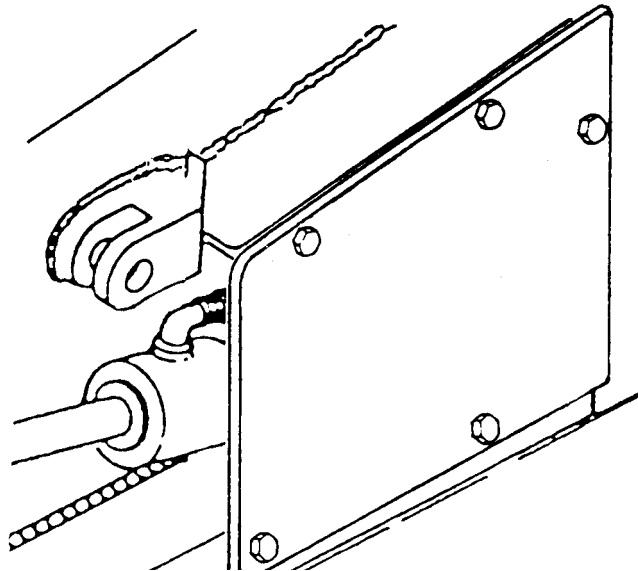


## WELDING PROCEDURES SPECIFICATION NO. 11

This procedure specification covers welding the apron lock brackets. The procedure specification is the same for the lock bracket on both sides. The left side is shown here.

Base Metal	A 5083, 5086, 5456 (see p 2-20)
Base Metal Thickness	4 in. (10.16 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

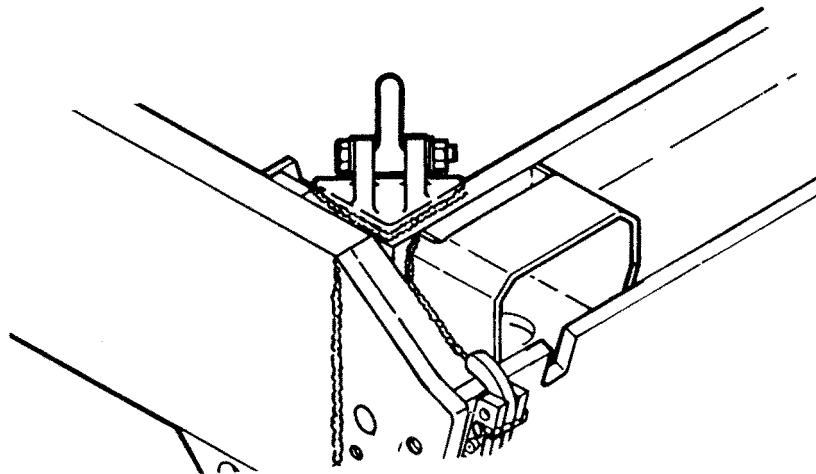
Note: The number of passes may vary with each weld.



## WELDING PROCEDURES SPECIFICATION NO. 12

This procedure specification covers welding the headlamp guards. The procedure specification is the same for the headlamp guard on both sides. The right side is shown here.

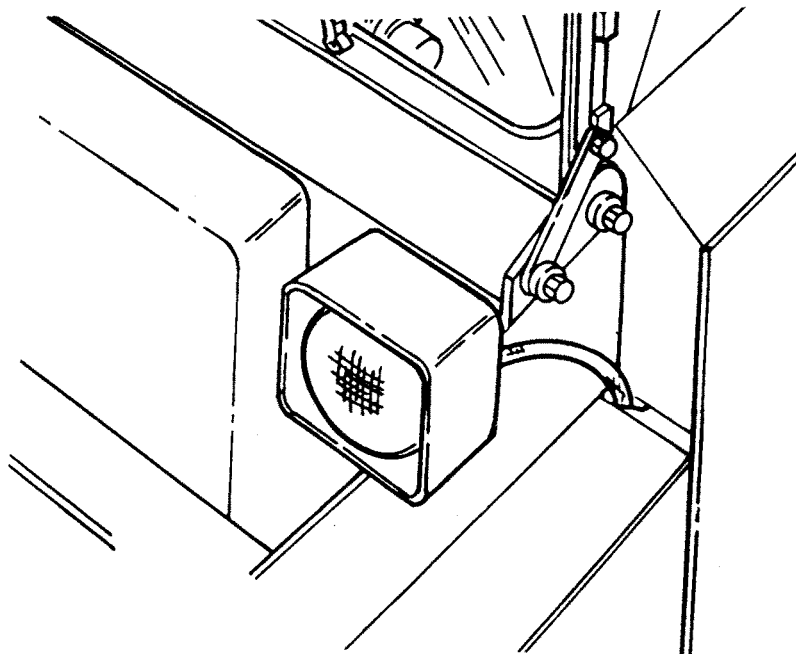
Base Metal	AA 5083 (see p 2-20)
Base Metal Thickness	.25 in. (.635 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	1
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures



## WELDING PROCEDURES SPECIFICATION NO. 13

This procedure specification covers welding the floodlight guards. The procedure specification is the same for the floodlight guard on both sides. The left side is shown here.

Base Metal	AA 5083 (see p 2-20)
Base Metal Thickness	.25 in. (.635 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	1
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

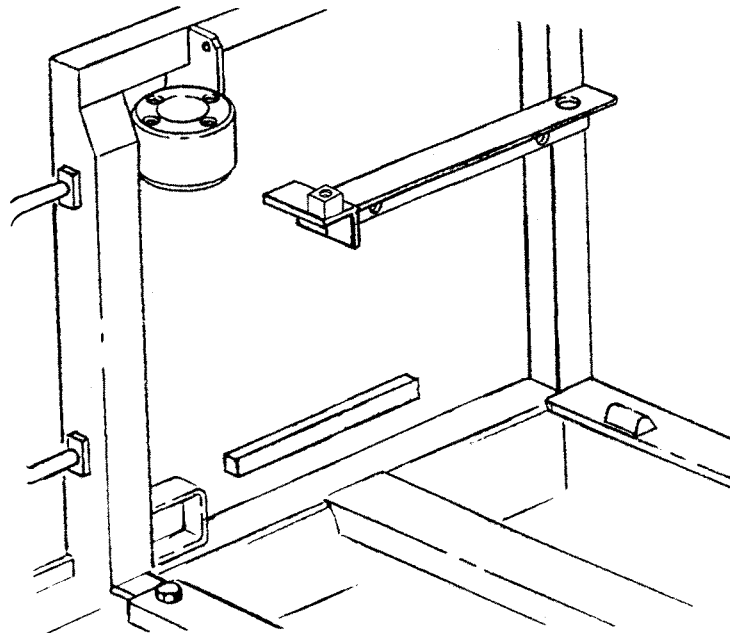


## WELDING PROCEDURES SPECIFICATION NO. 14

This procedure specification covers welding the fuel tank angle.

Base Metal	AA 5083 (see p 2-20)
Base Metal Thickness	.44 in. (1.12 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note: The number of passes may vary with each weld.

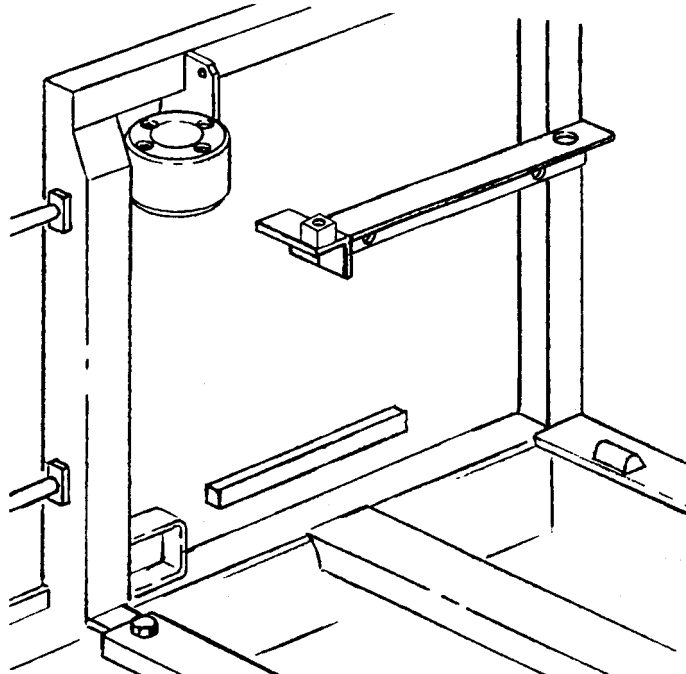


## WELDING PROCEDURES SPECIFICATION NO. 15

This procedure specification covers welding the fuel tank pads. The procedure specification is the same for all pads.

Base Metal	AA 5083, 5086, 5456 (see p 2-20)
Base Metal Thickness	1 in. (2.54 cm); .625 in. (1.59 cm)
Welding Process	GMAW
Filler Metal	ER 5356
Filler Metal Size	.063 in. (.16 cm)
GTAW Electrode Type and Size	N/A
Position	Flat, Horizontal
Shielding Gas Type	Argon
Gas Flow/Nozzle Size	55 CFH/.625 in. (1.588 cm)
Weld Passes	Variable (see Note)
Amperage	270-310
Voltage	27-29
Travel Speed	Variable
Edge Preparation	See General Welding Procedures
Back Gouging	See General Welding Procedures
Backing	N/A
Pre/Post Heating/Interpass Temperature	60°F (16°C) min./200°F (93°C) max.
Cleaning	See General Welding Procedures

Note: The number of passes may vary with each weld.





**TABLE 2-1  
HULL SCREW THREAD INSERTS**

<b>PART NUMBER</b>	<b>NATIONAL STOCK NUMBER</b>	<b>INTERNAL THREAD SIZE</b>	<b>EXTERNAL THREAD SIZE</b>	<b>LOCATION/APPLICATION</b>
MS51830A108L	5340-01-284-8285	3/8 - 16 -UNJC-3B	1/2-13UNC-2A	Underside of hull/hull access covers mounting.
MS51831A104L	5340-01-132-4684	3/8 -16UNJC-3B	9/16 -12UNC-2A	Under front hull access covers/front hydraulic manifold mounting.
MS51831A106L	5340-01-285-7868	1/2 -13 UNJC-3B	11/16 -11NS-2A	Bowl area/intermediate hydraulic manifold mounting.
MS51831A109L	5340-01-285-5586	3/4 -10UNJC-3B	1-1/8 -12UNF-2A	Bowl area/power package mounting. Left, right sides/rear track retainer mounting.
MS51831A203L	5340-01-093-6225	5/16 -24UNJF-3B	1/2 -13UNC-2A	Under front access covers/bump stop cylinder access cover mounting.
M45932/1-39L	5325-01-113-5615	5/8 -11UNC-3B	3/4 -16UNF-3A	Sides of vehicle/rotary actuator mounting.
MS51831A111	5340-01-255-4140	1-8UNJC-3B	1-3/8-12UNF-2A	Rear of vehicle/winch mounting.

**TABLE 2-2  
TRANSFER CASE SCREW THREAD INSERTS**

<b>PART NUMBER</b>	<b>NATIONAL STOCK NUMBER</b>	<b>INTERNAL THREAD SIZE</b>	<b>EXTERNAL THREAD SIZE</b>	<b>LOCATION</b>	<b>INSERTER TOOL NSN</b>
MS51830A109	5340-01-284-9894	7/16 -14UNJC-3B	9/16 -12 UNC-2A	Clamps, caps, and mounting surfaces	5120-01-030-8983
MS51830A110	5340-01-284-8286	1/2 -13 UNJC-3B	5/8 -11UNC-2A	Compensating pump mounting	5120-01-030-8984
MS51831A109	5340-01-286-7321	3/4 -10UNJC-3B	1-1/8 -12UNF-2A	Main hydraulic pump mounting	5120-01-031-3152

**TABLE 2-3**  
**HULL SCREW THREAD INSERT REPLACEMENT SPECIFICATIONS**

PART NUMBER	NATIONAL STOCK NUMBER	EXTERNAL THREAD SIZE	SIZE OF DRILL FOR TAPPED HOLE	COUNTERBORE		INSERTER TOOL NSN
				DIAMETER	DEPTH	
MS51830A108L	5340-01-284-8285	1/2-13UNC-2A	.4219 in.	.51-.52	.06-.08	5120-01-030-8986
MS51831A104L	5340-01-132-4684	9/16-12UNC-2A	.484 in.	.57-.58	.06-.08	5120-01-030-8982
MS51831A106L	5340-01-285-7868	11/16-11NS-2A	.593 in.	.70-.71	.09-.11	5120-01-030-8984
MS51831A109L	5340-01-285-5586	1-1/8-12UNF-2A	1.04 in.	1.14-1.15	.09-.11	5120-01-031-3132
MS51831A203L	5340-01-093-6225	1/2-13UNC-2A	.4219 in.	.51-.52	.06-.08	5120-01-030-8981
SR621L	5340-01-113-5616	3/4-16UNF-3A	.6875 in.	.750	.156	
MS51831A111	5340-01-255-4140	1-3/8-12UNF-2A	1.312 in.	1.395	1.68	5120-01-030-8978

**TABLE 2-4**  
**NATIONAL STOCK NUMBERS FOR WELDING RODS**

PART NUMBER	NATIONAL STOCK NUMBER	DIAMETER AND QUANTITY
AWSA 5.10-80 ER5356	3439-00-803-9411	1/16 (.062 in.)/10 lb spool
AWSA 5.10-80 ER5356	3439-00-803-9498	3/64 (.047 in.)/1/2 lb spool
AWSA 5.10-80 ER5356	3439-00-806-2725	3/64 (.047 in.)/10 lb spool
5356	3439-00-873-2320	1/16 (.062 in.)/12.5 lb spool
AWSA 5.10-80 ER5356	3439-00-885-3638	3/64 (.047 in.)/12.5 lb spool
AWSA 5.10-69 ER5356	3439-01-012-3285	3/32 (.094 in.)/1 lb
AWSA 5.10-69 ER5356	3439-01-012-6661	1/32 (.031 in.)/10 lb spool

# CHAPTER 3 TROUBLESHOOTING

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**OVERVIEW**

This section contains troubleshooting, testing, and repair information to fix the vehicle. ensure the problem is real. Ensure electrical or hydraulic power is on when needed. These procedures should be referred to before you start troubleshooting, and during troubleshooting when these procedures are referenced in the troubleshooting tables. A list of procedures contained in this section is shown below:

	<b>Page</b>
Preliminary Troubleshooting Procedures .....	3-2
Suspending the M9 for Suspension System Checks .....	3-3
Relieving Hydraulic System Pressure .....	3-3
Directional Control Valve Identification .....	3-4
Hose and Tube Marker Bands Identification .....	3-5
Symptom Index by System .....	3-28
Alphabetical Symptom Index .....	3-29
Troubleshooting Tables .....	3-30

## PRELIMINARY TROUBLESHOOTING PROCEDURES

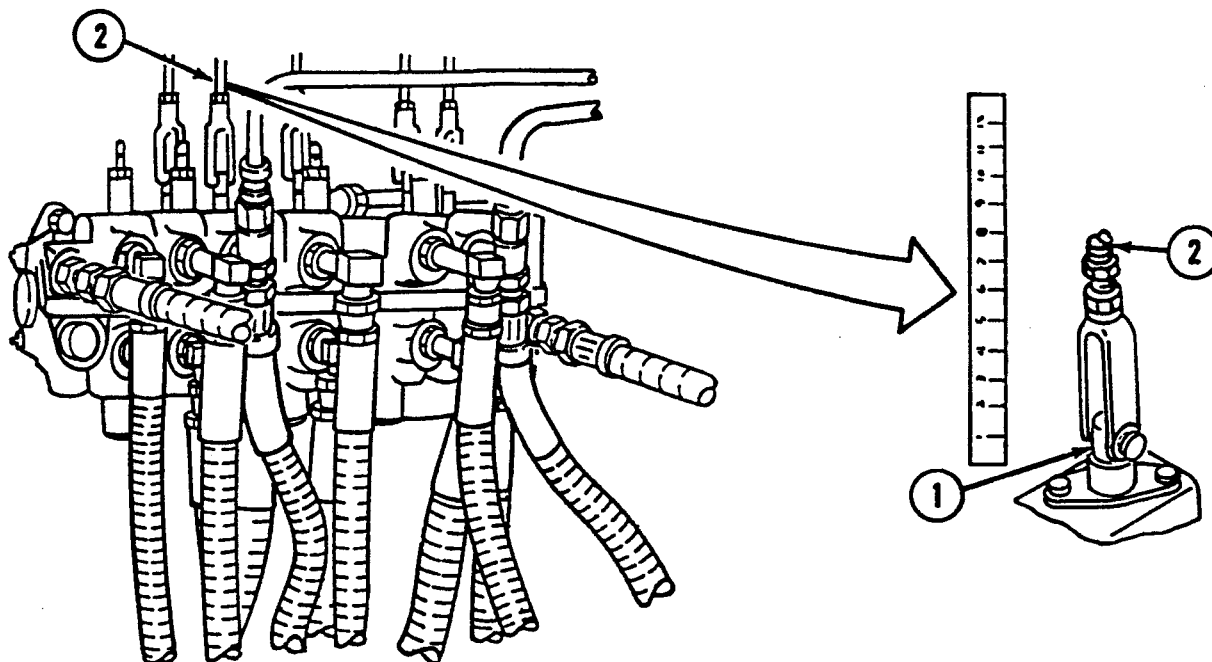
### Note

Fluid leaks are classified as either Class I, Class II, or Class III.

- 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 or observed.
- Class III Leakage of fluid great enough to form drops that fall from the item being checked or observed.

Before starting any specific troubleshooting procedures, perform the following procedures:

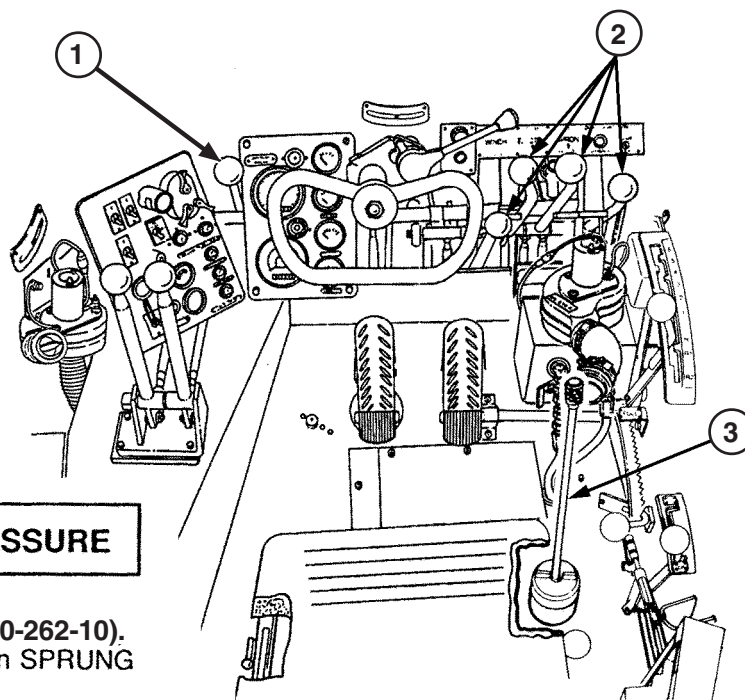
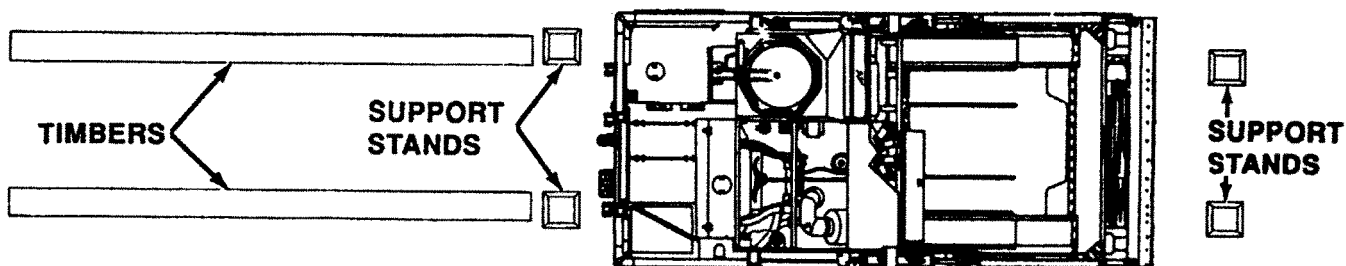
- Visually check for ruptured oil hoses or tubes, and for Class II or Class III leaks.
- Check for mechanical jamming or binding caused by rocks or other foreign matter.
- • Check oil level in hydraulic tank (TM 5-2350-262-10) and service as necessary.
- Check temperature of hydraulic oil at hydraulic oil temperature gauge in driver's compartment (TM 5-2350-262-10). Temperature should not be more than 180°F (82°C).
- Check operation and adjustment (TM 5-2350-262-20-2) of each hydraulic control and valve plunger (1). Plungers should move 0.28 in. (7.1 mm) above or below neutral position when control rod (2) is operated. (Bilge pump and SPRUNG/UNSPRUNG plungers only move up.)



## SUSPENDING THE M9 FOR SUSPENSION SYSTEM CHECKS

While troubleshooting the hydraulic components of the suspension system, the pressure tests are more reliable if the vehicle is supported by the suspension. If conditions do not permit this, pressure tests should be rechecked to insure accurate readings. If suspension must be supported, perform the following procedure:

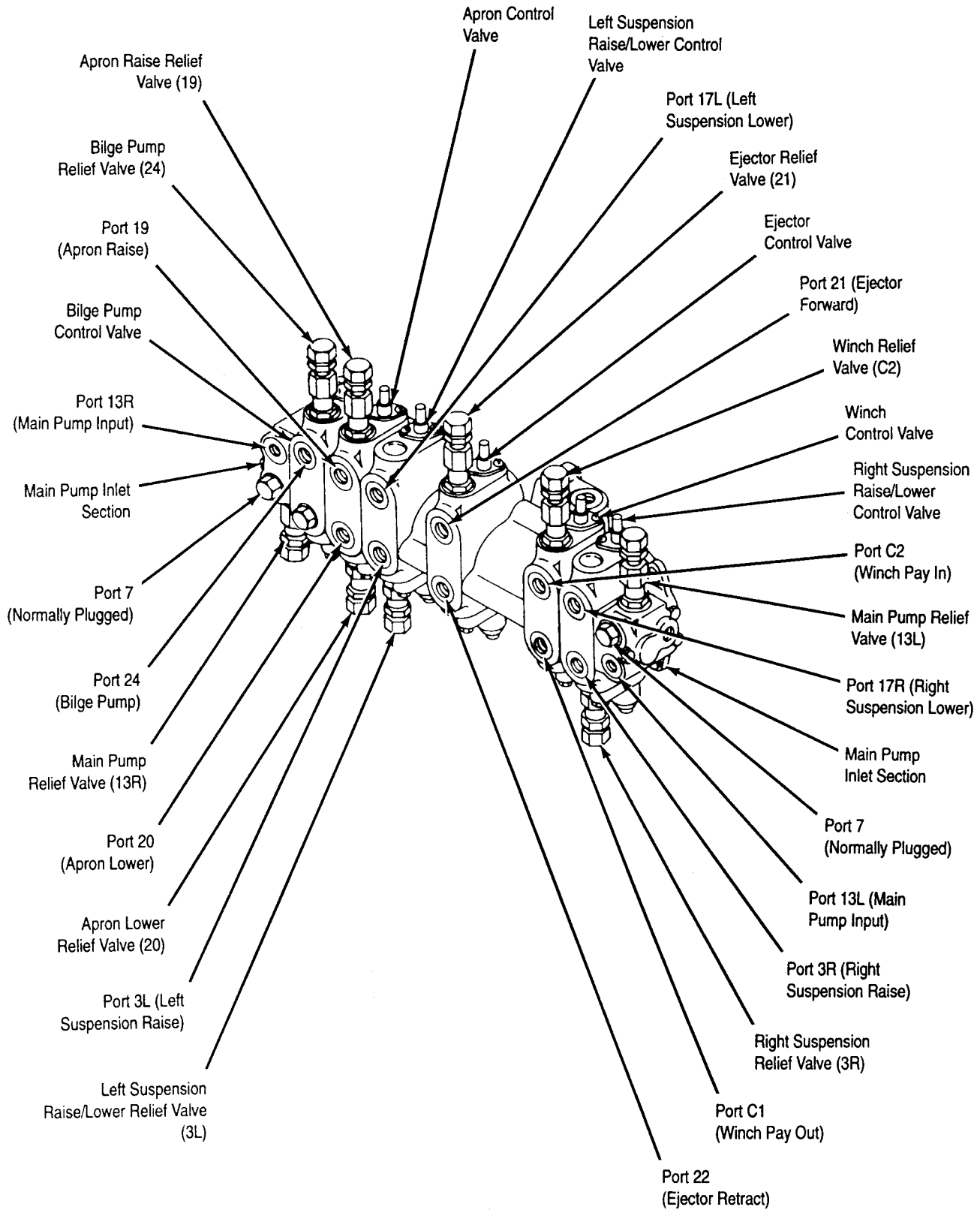
Place the vehicle on support stands to allow a safe working area under the vehicle while performing procedures that require working through hull access plate openings. If vehicle support stands are not available, use two long, parallel timbers, or similar supports, between 12 and 18 in. (30 and 46 cm) high.



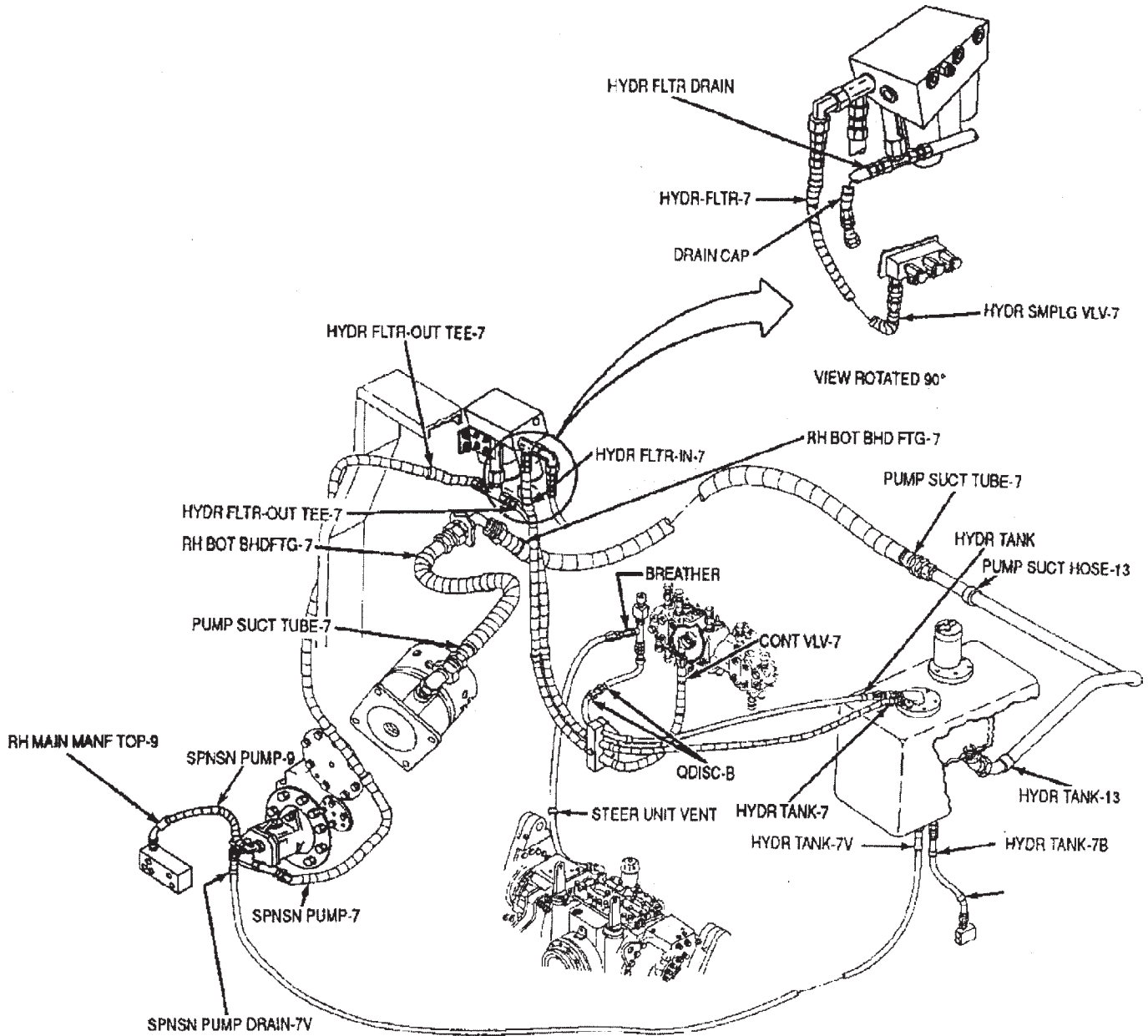
## RELIEVING HYDRAULIC SYSTEM PRESSURE

- A** If necessary, stop vehicle engine (TM 5-2350-262-10). Place SPRUNG/UNSPRUNG control lever (1) in SPRUNG position.
- B** Relieve pressure from main accumulator by slowly moving SPRUNG/UNSPRUNG control lever (1) toward UNSPRUNG position until a hissing sound can be heard. Hold in that intermediate position until hissing ceases, then place lever (1) in SPRUNG position.
- C** Operate each of the four control levers (2) several times, through all positions, to relieve any residual pressure in hydraulic subsystems.
- D** Loosen hydraulic tank dipstick (3) to allow air pressure to escape. Tighten dipstick (3).

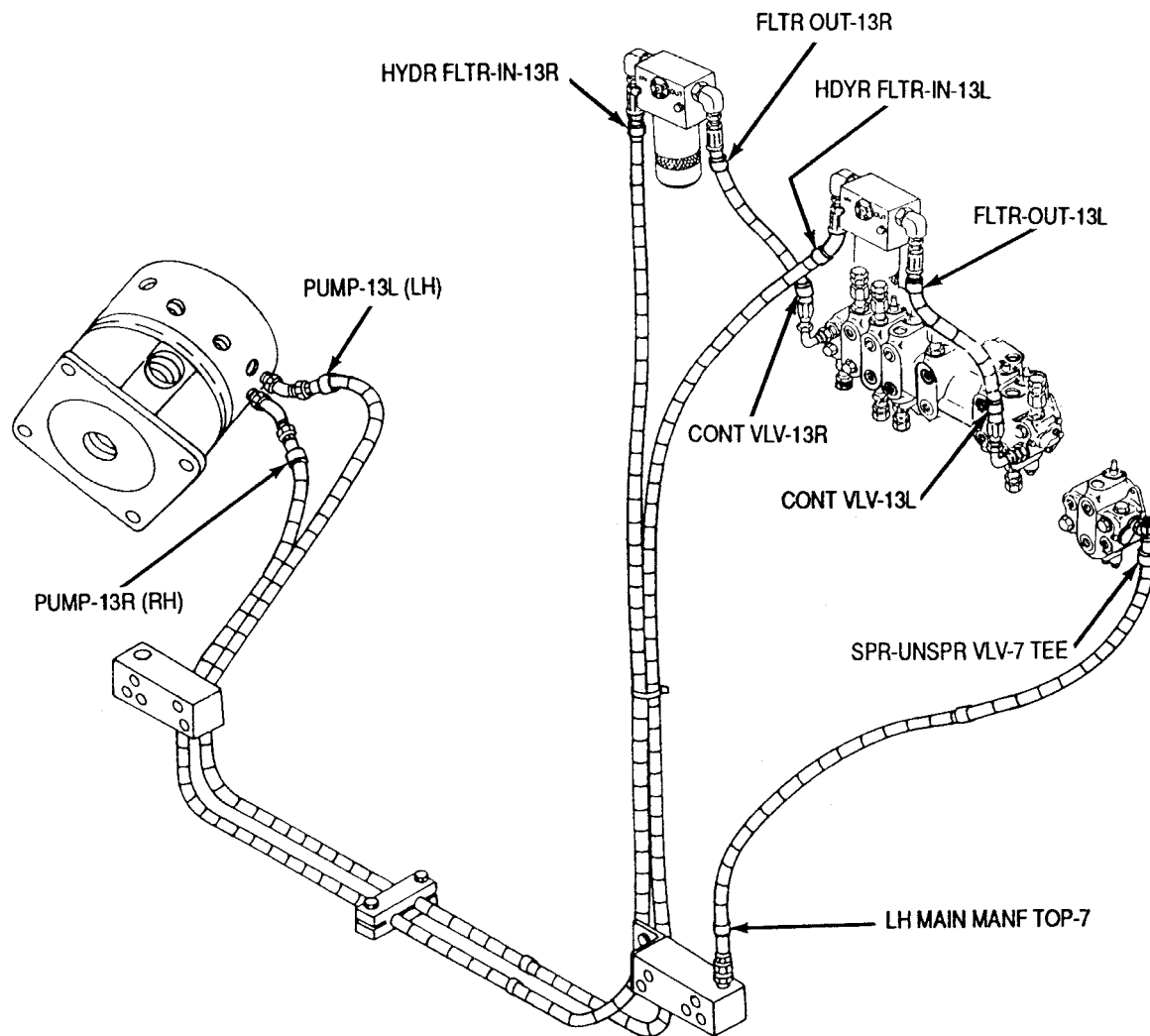
**DIRECTIONAL CONTROL VALVE IDENTIFICATION**



# HOSE AND TUBE MARKER BANDS IDENTIFICATION

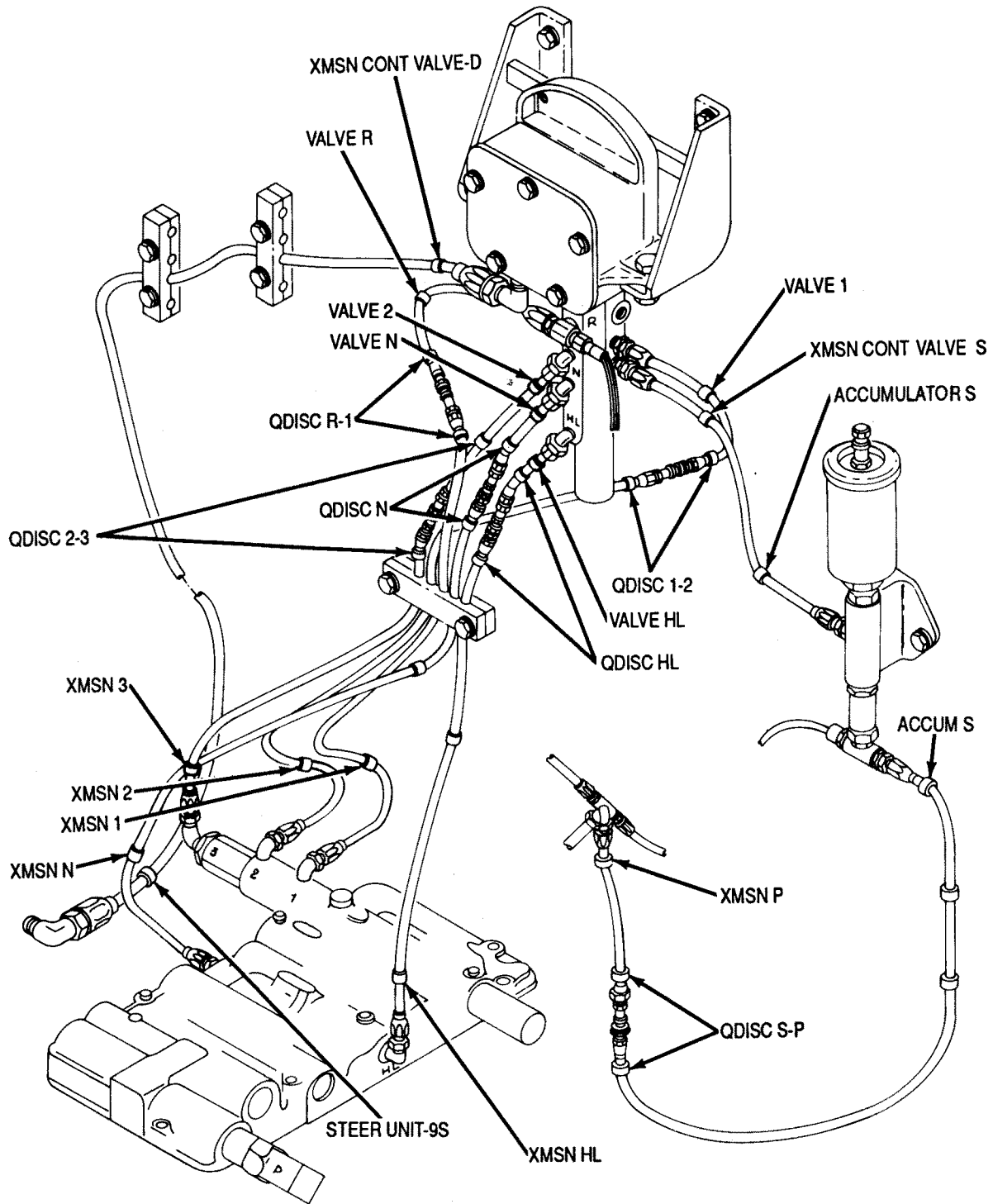


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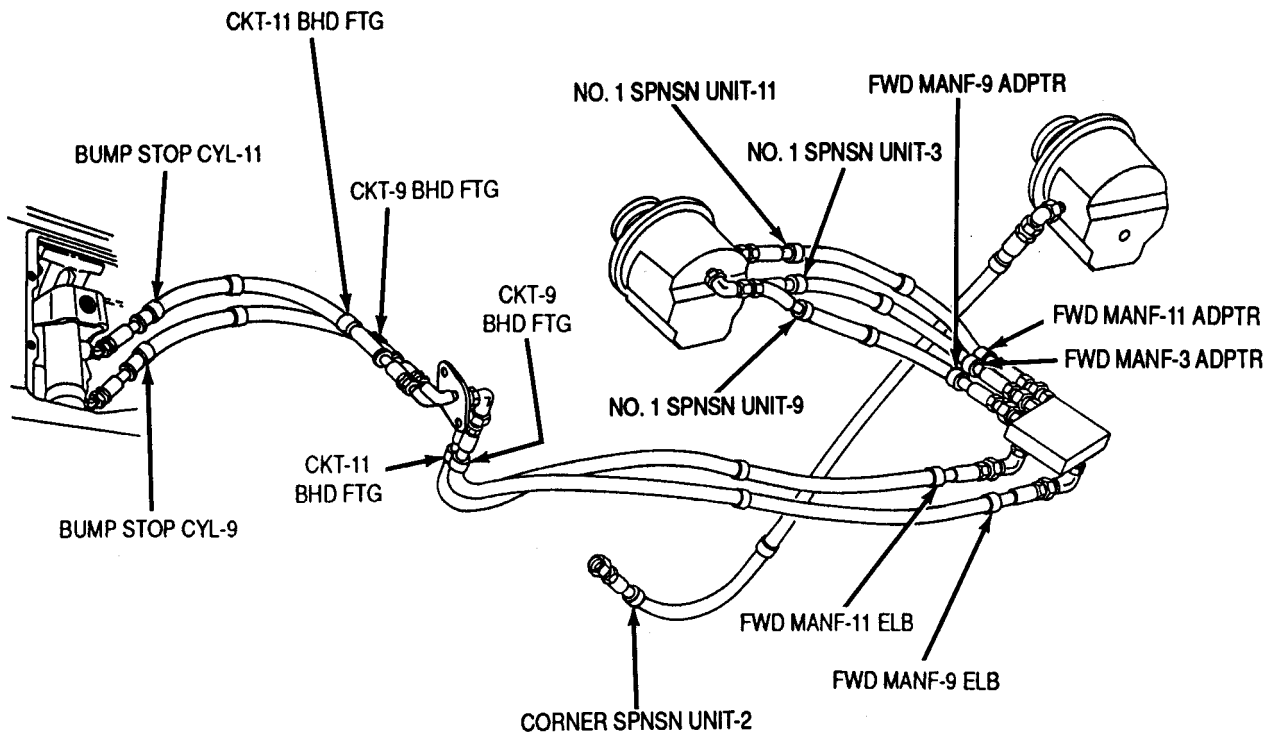




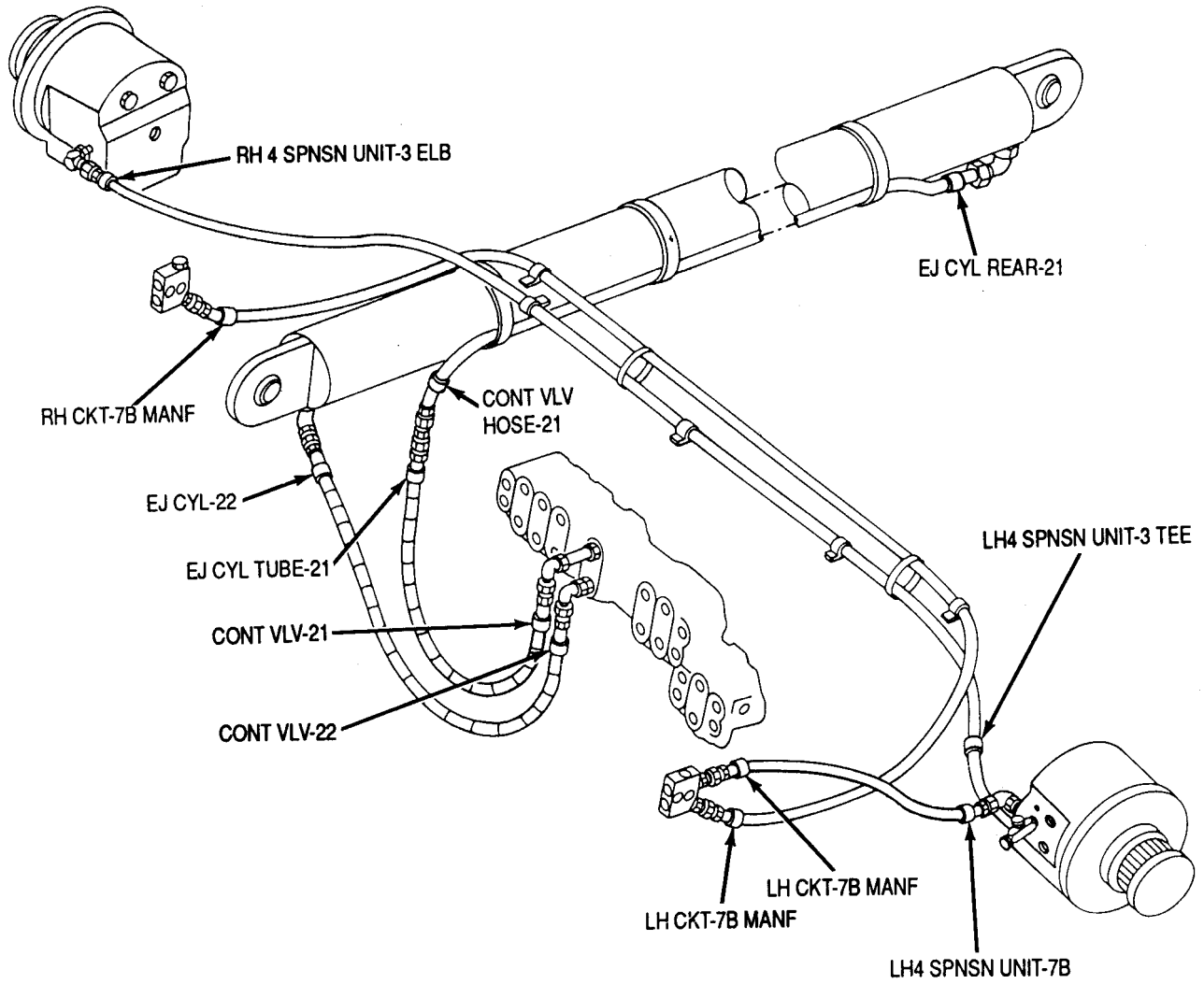
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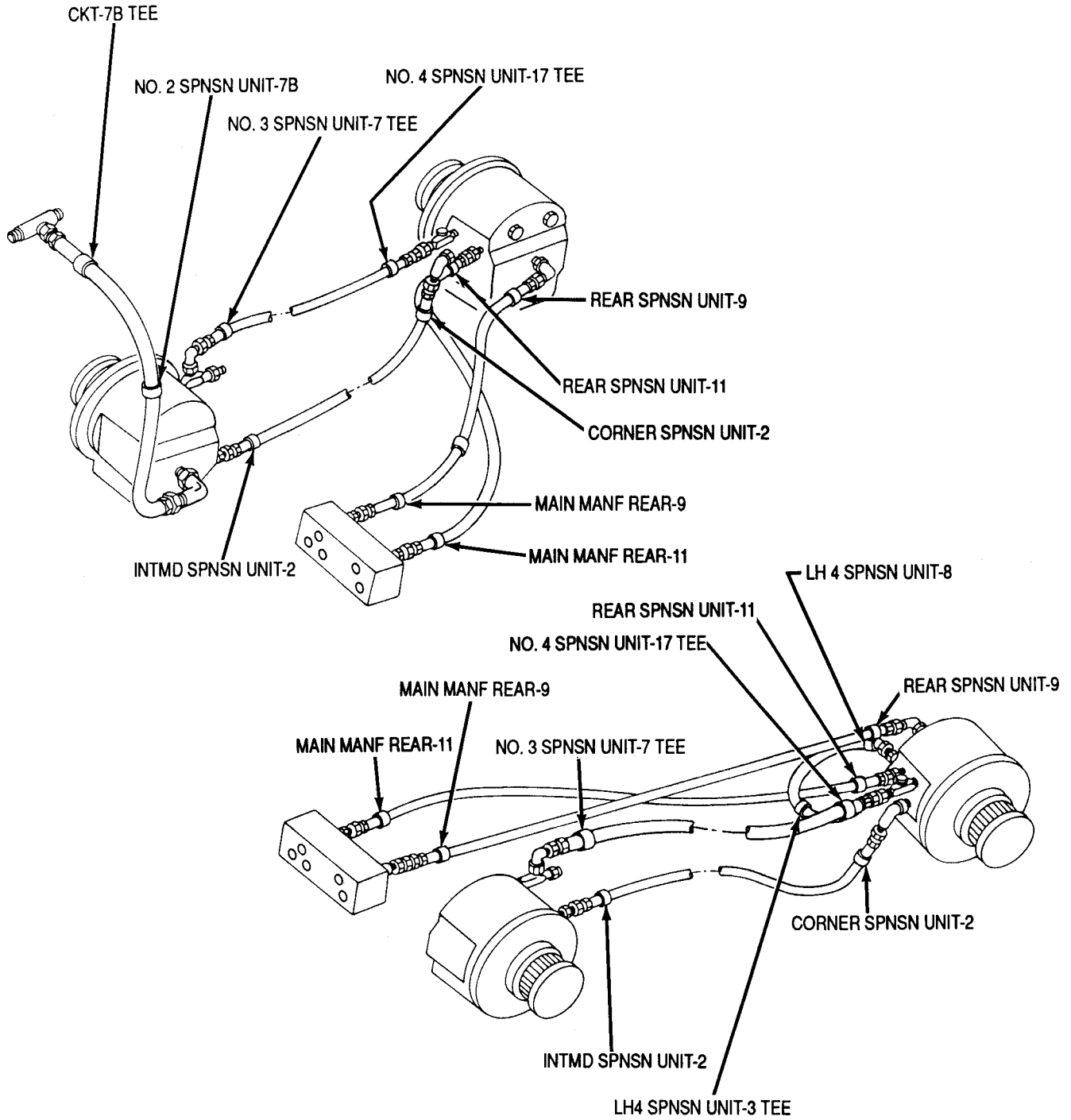
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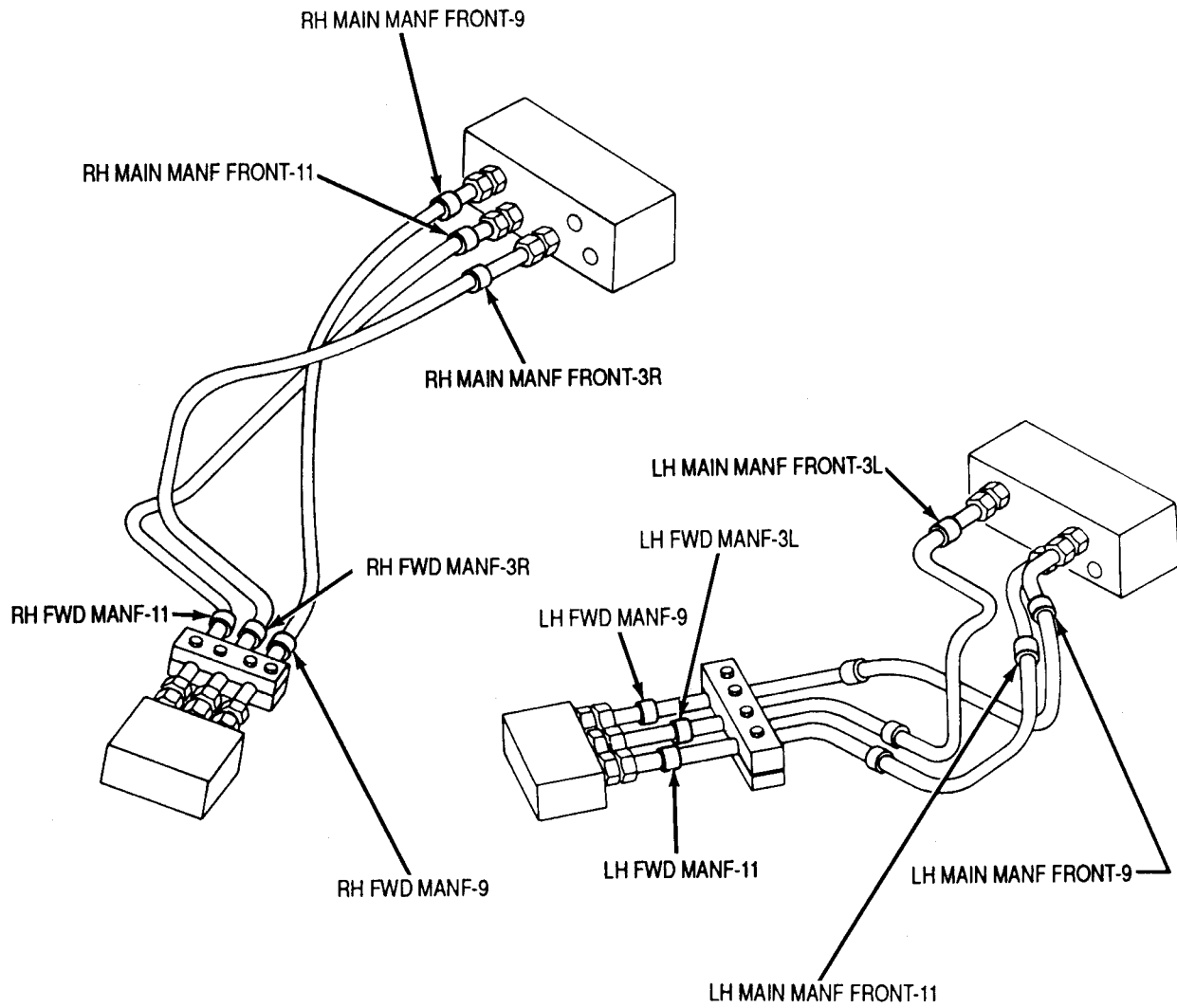
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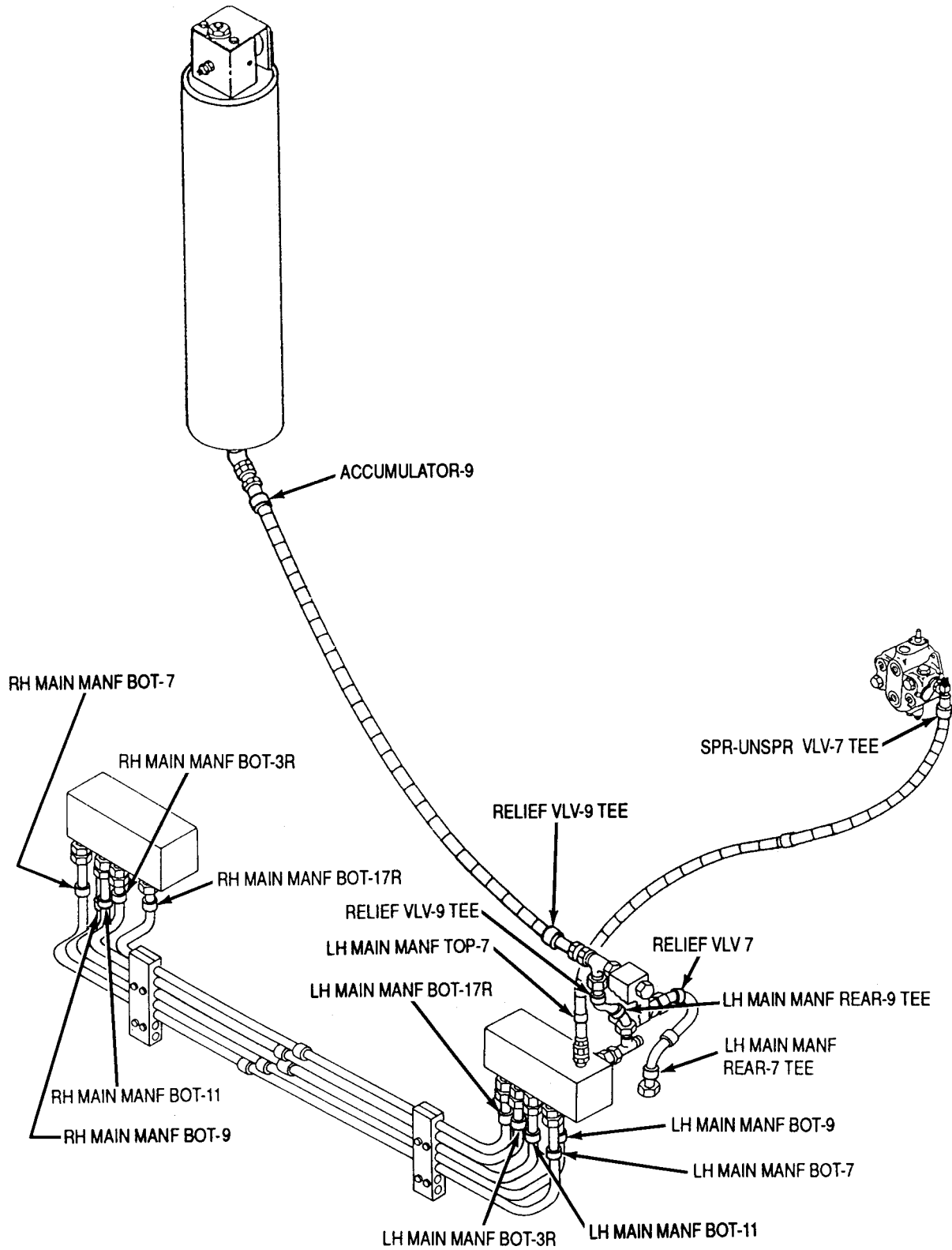
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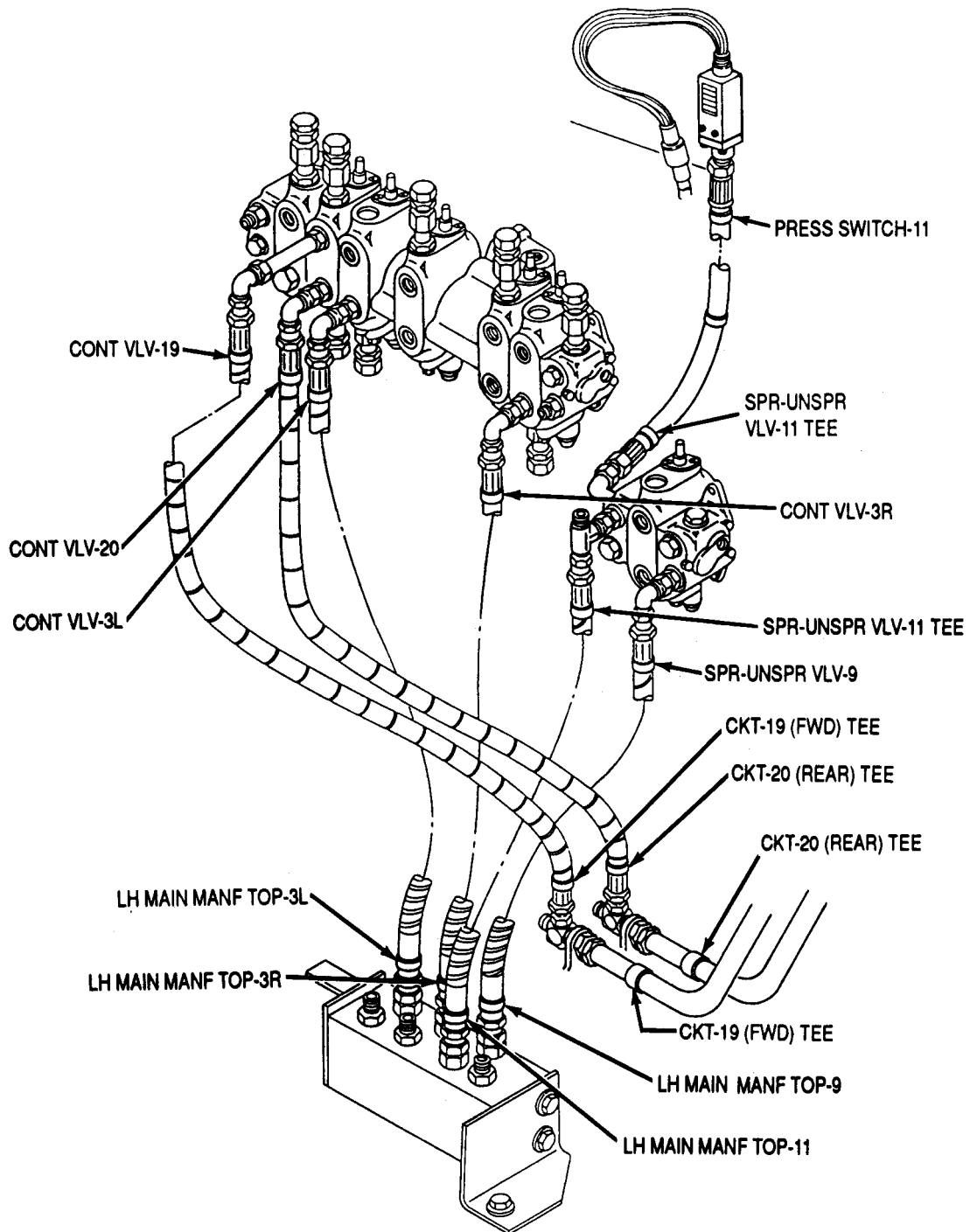
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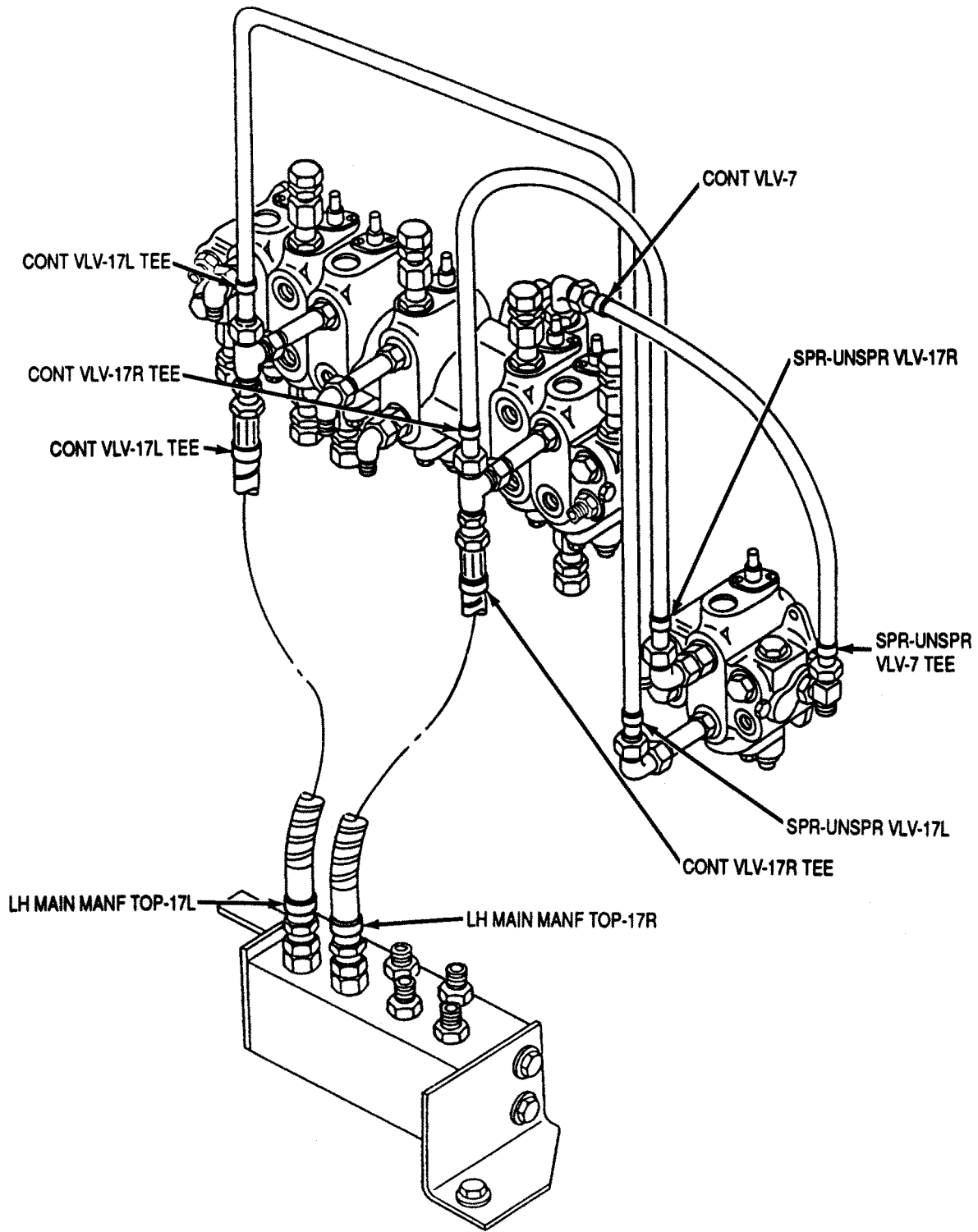
**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**



**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**

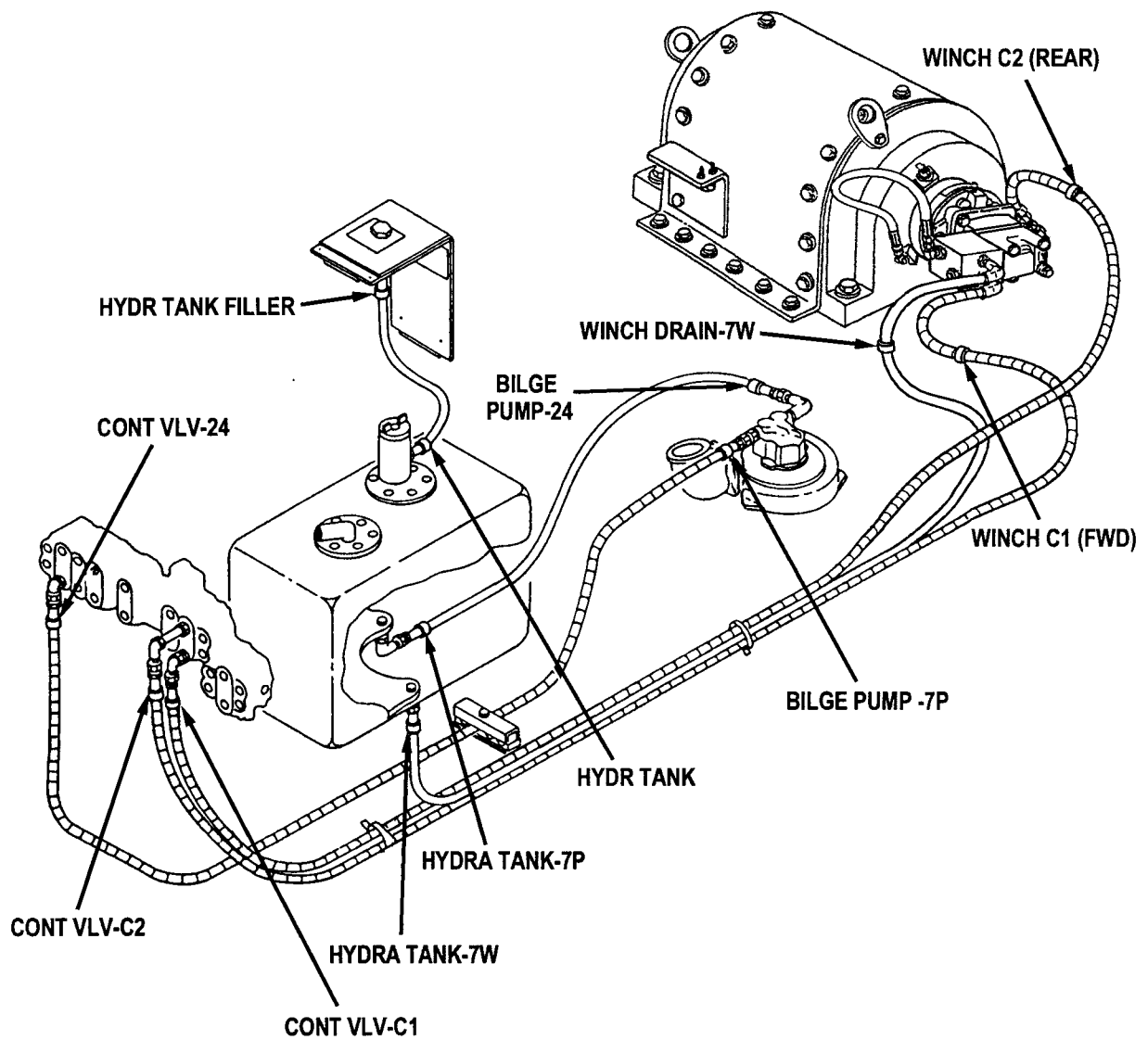


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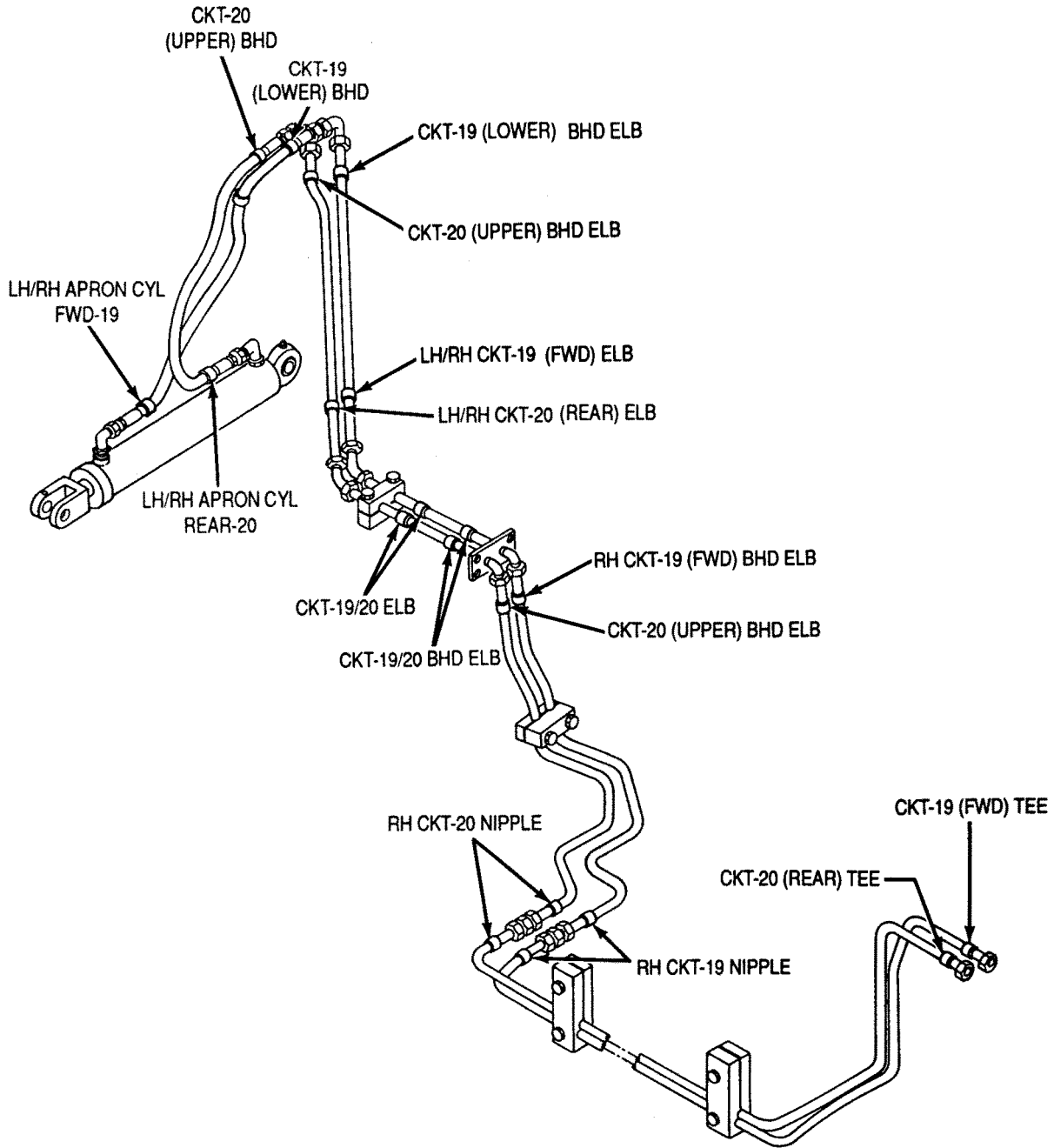




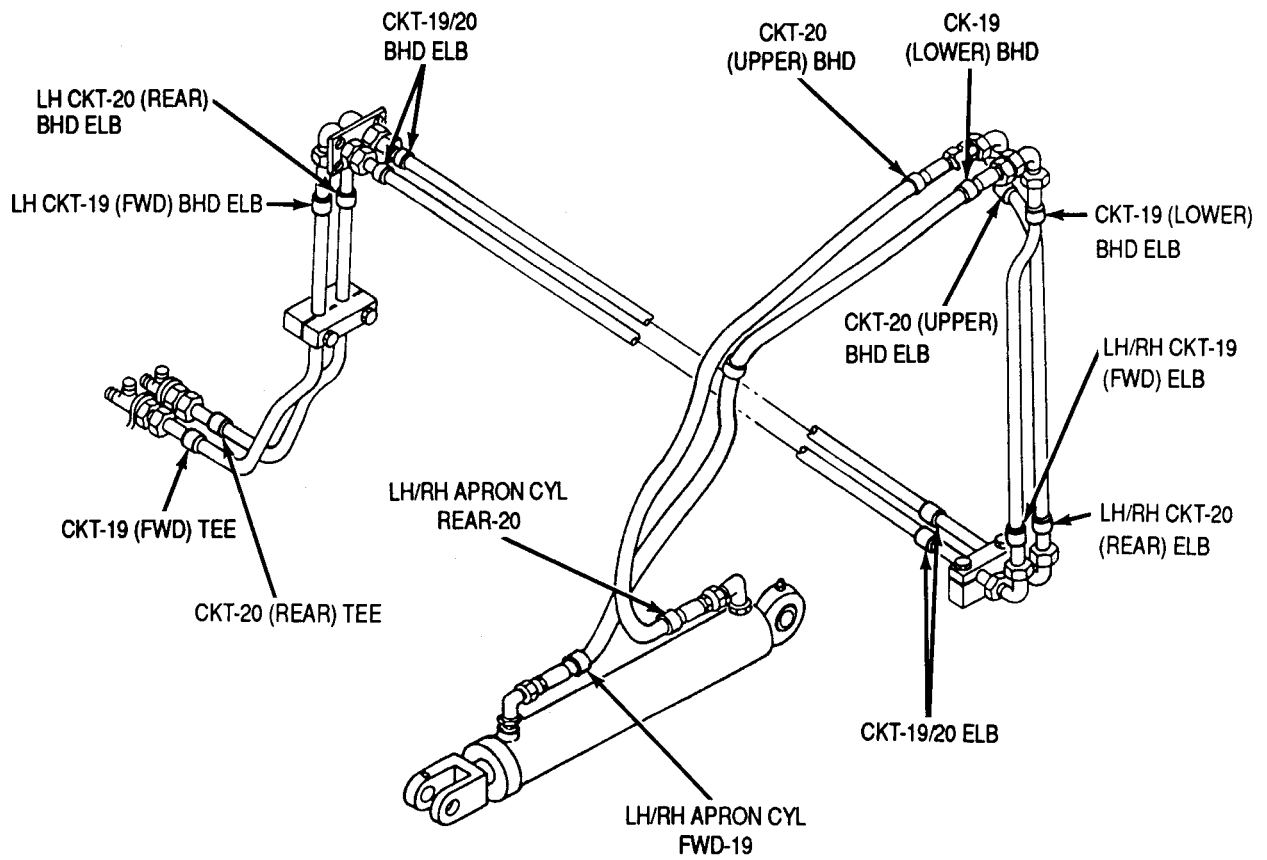
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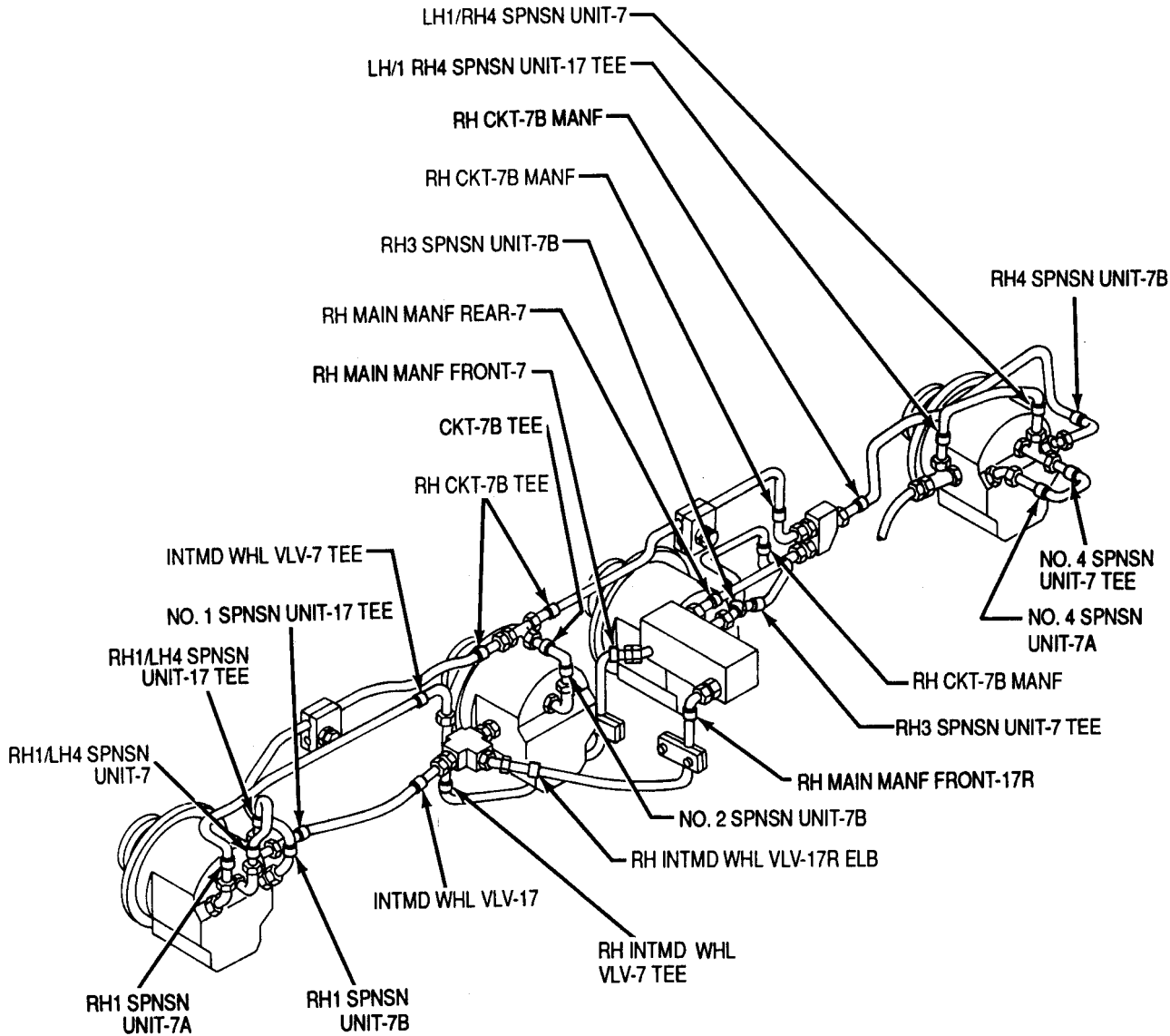
**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**



**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**

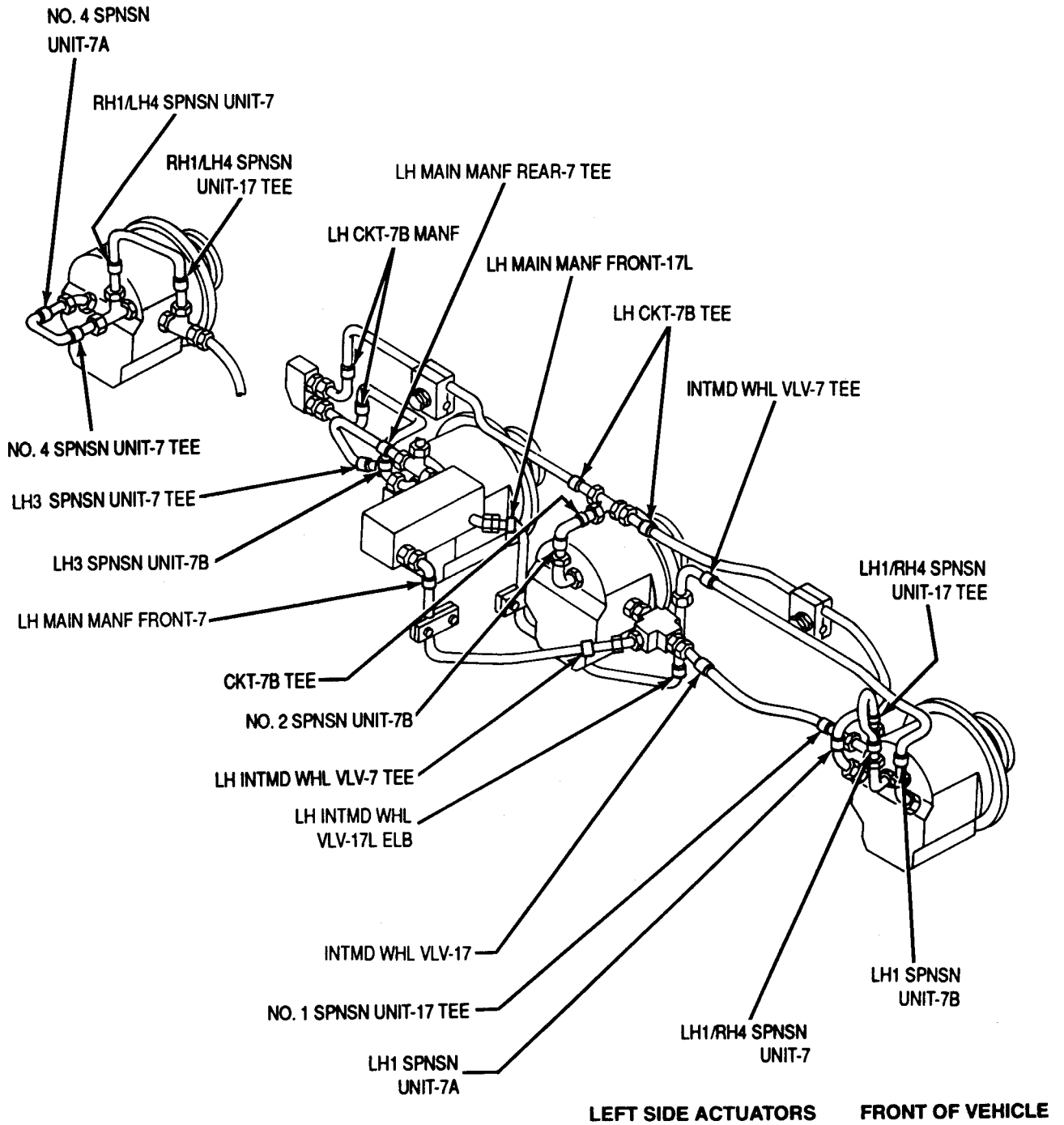


**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**

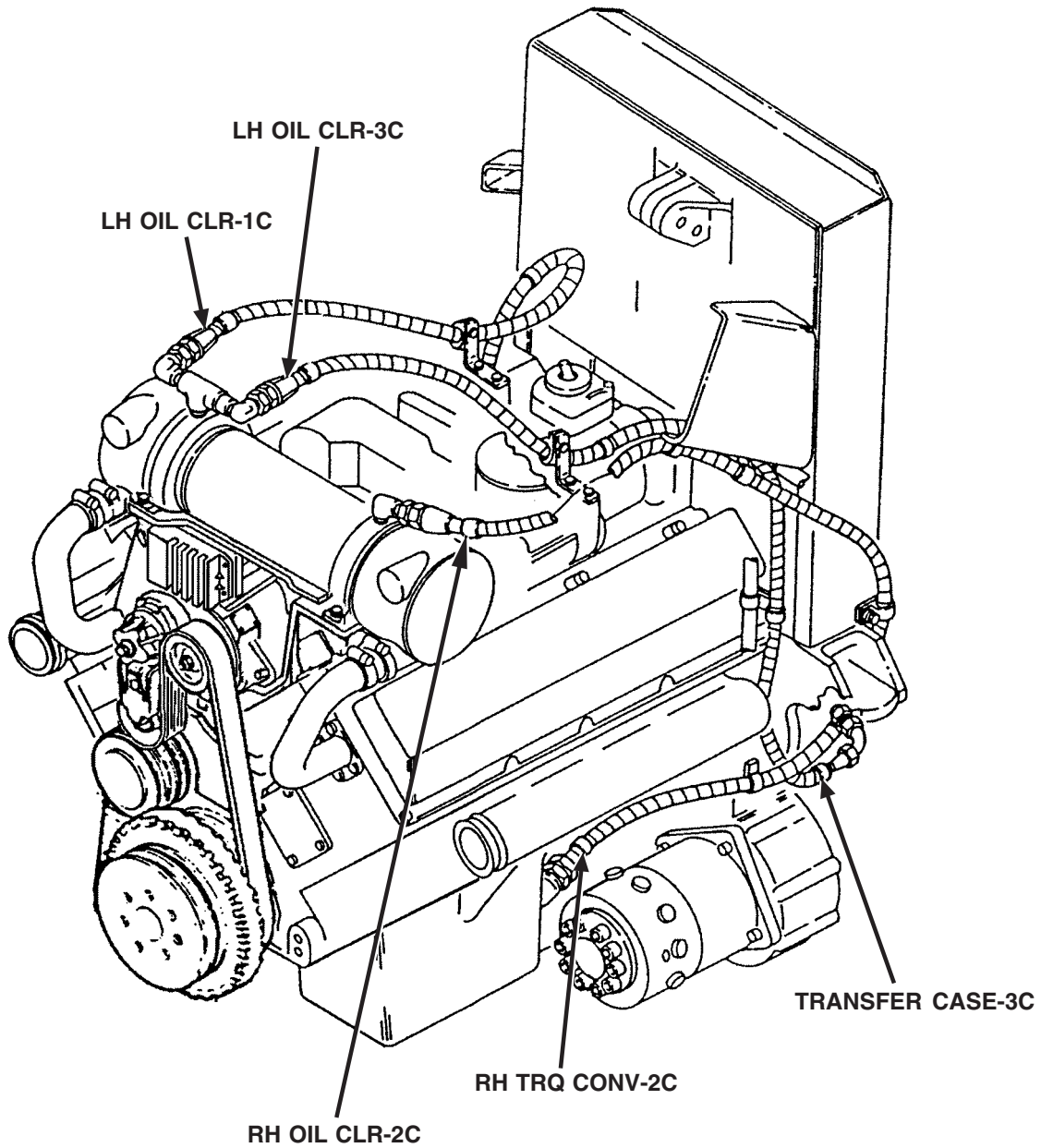


**FRONT OF VEHICLE      RIGHT SIDE ACTUATORS**

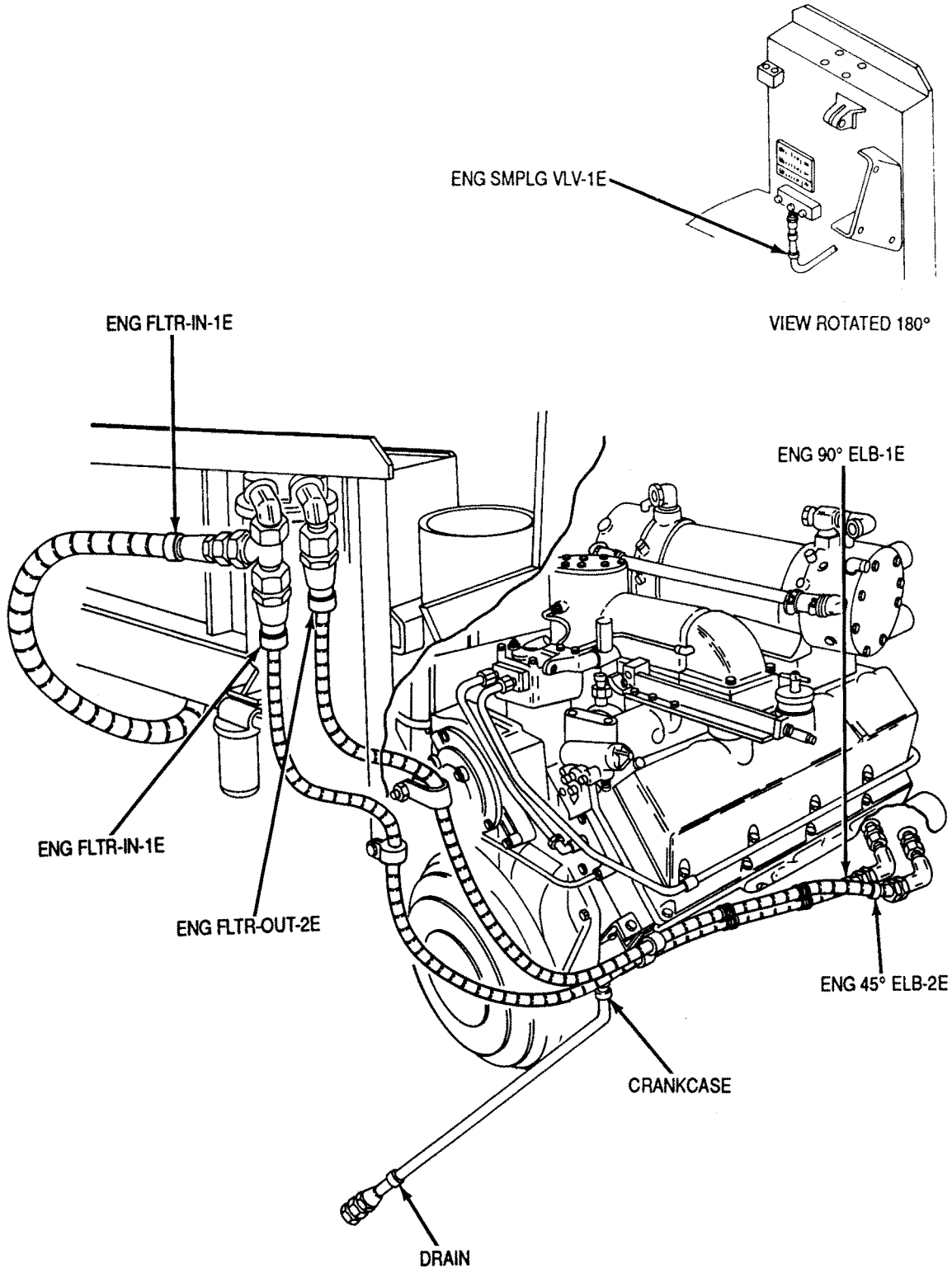
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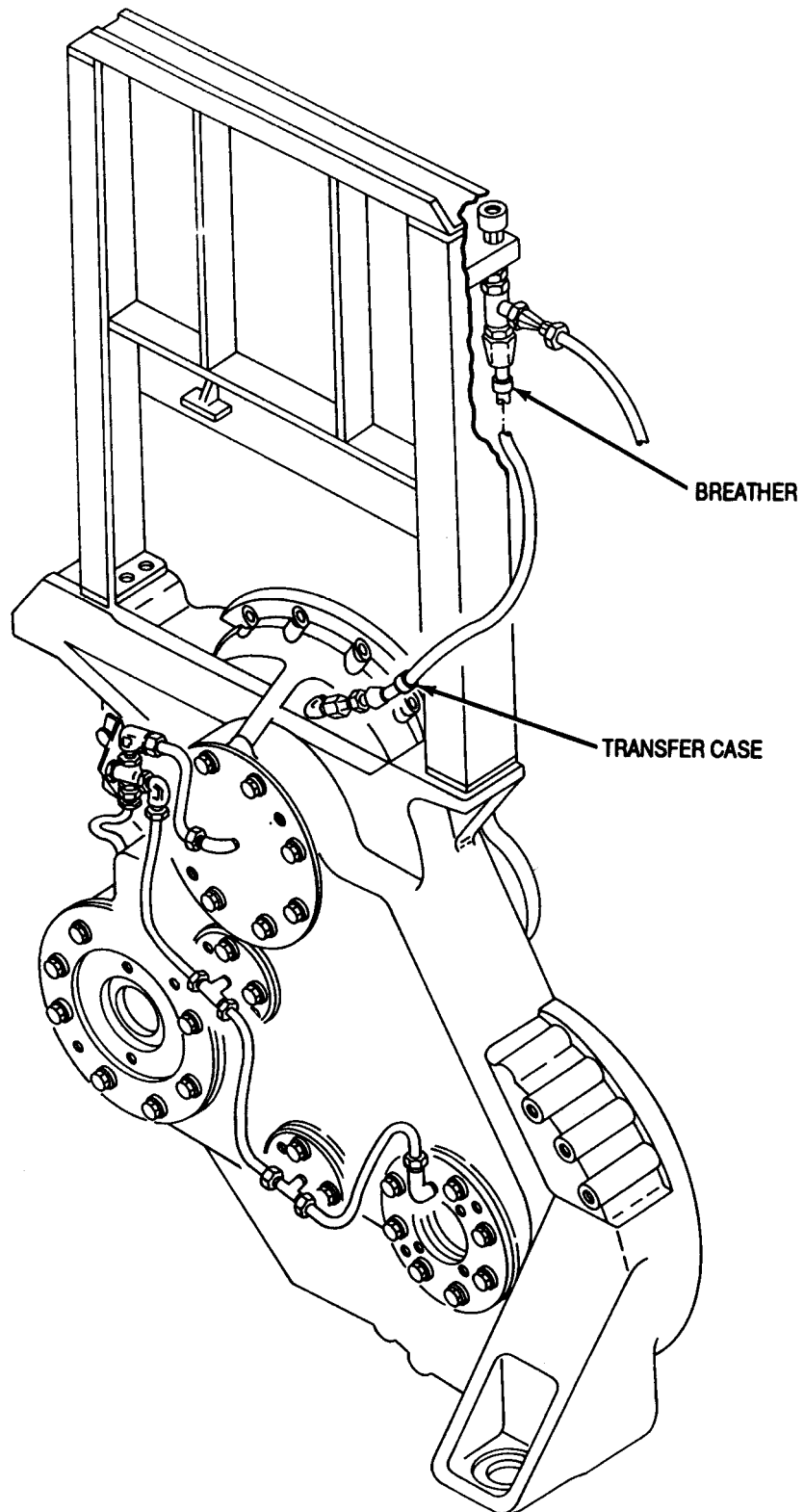
HOSE AND TUBE MARKER BANDS IDENTIFICATION - CONTINUED



**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**

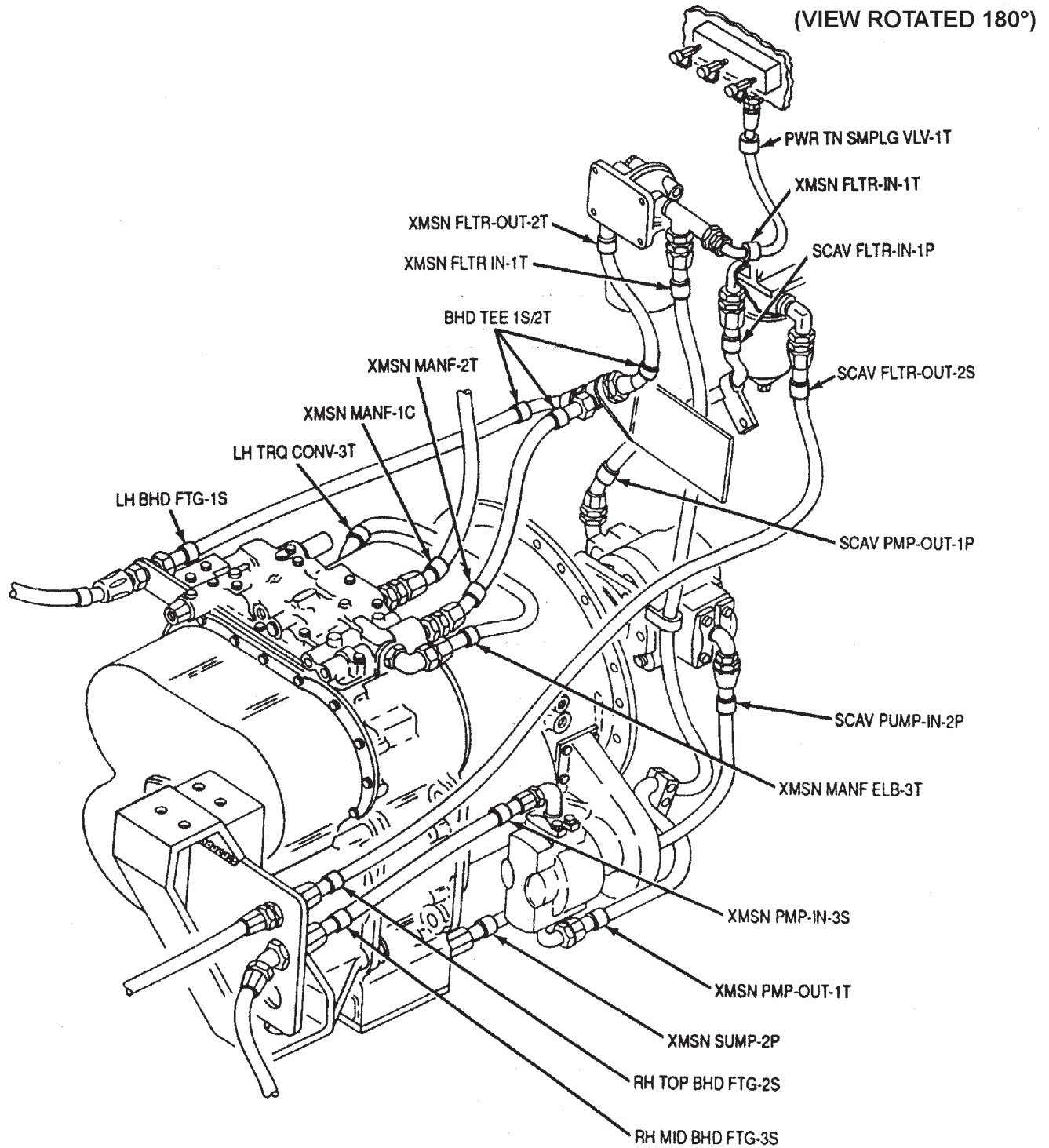


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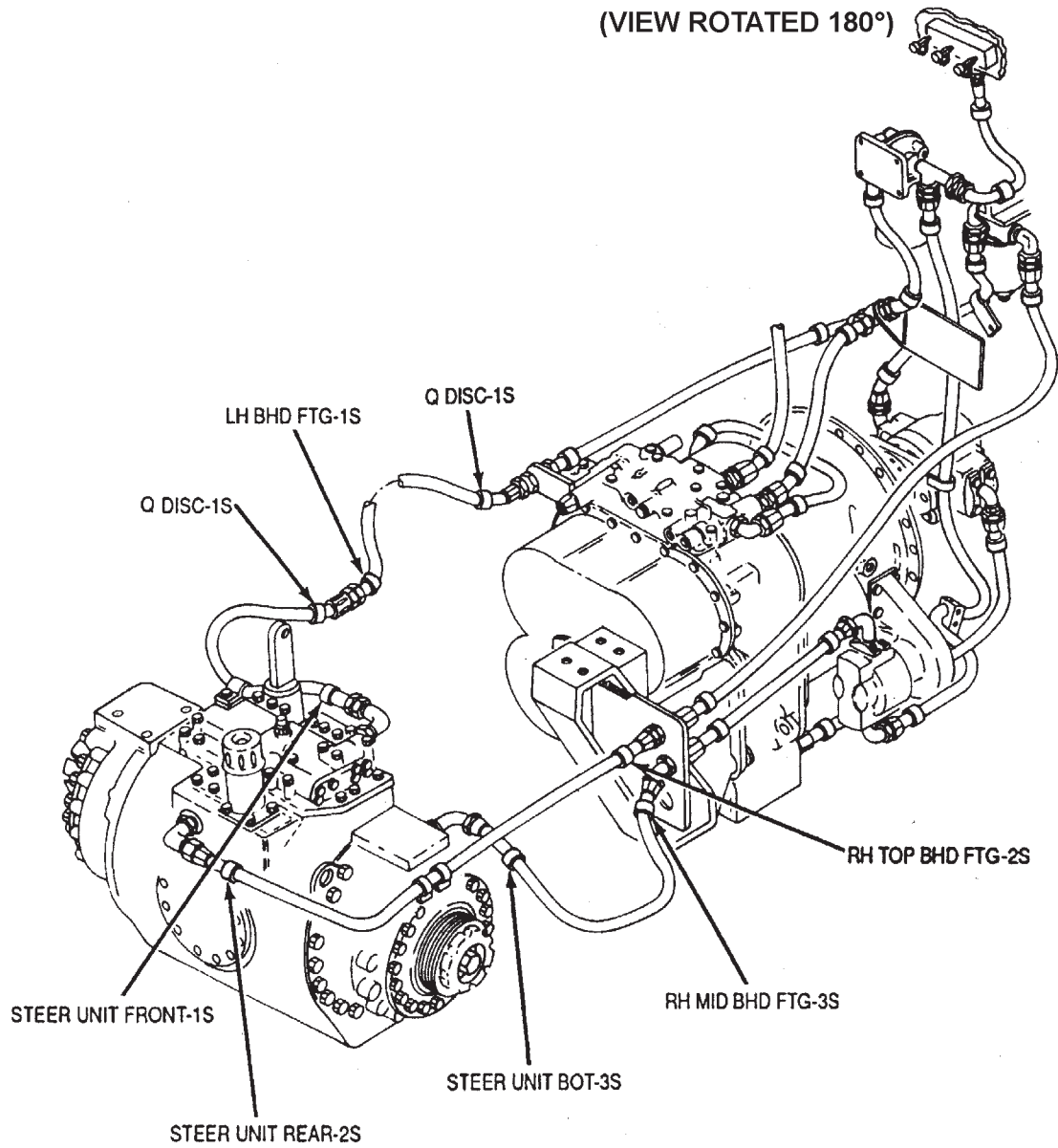




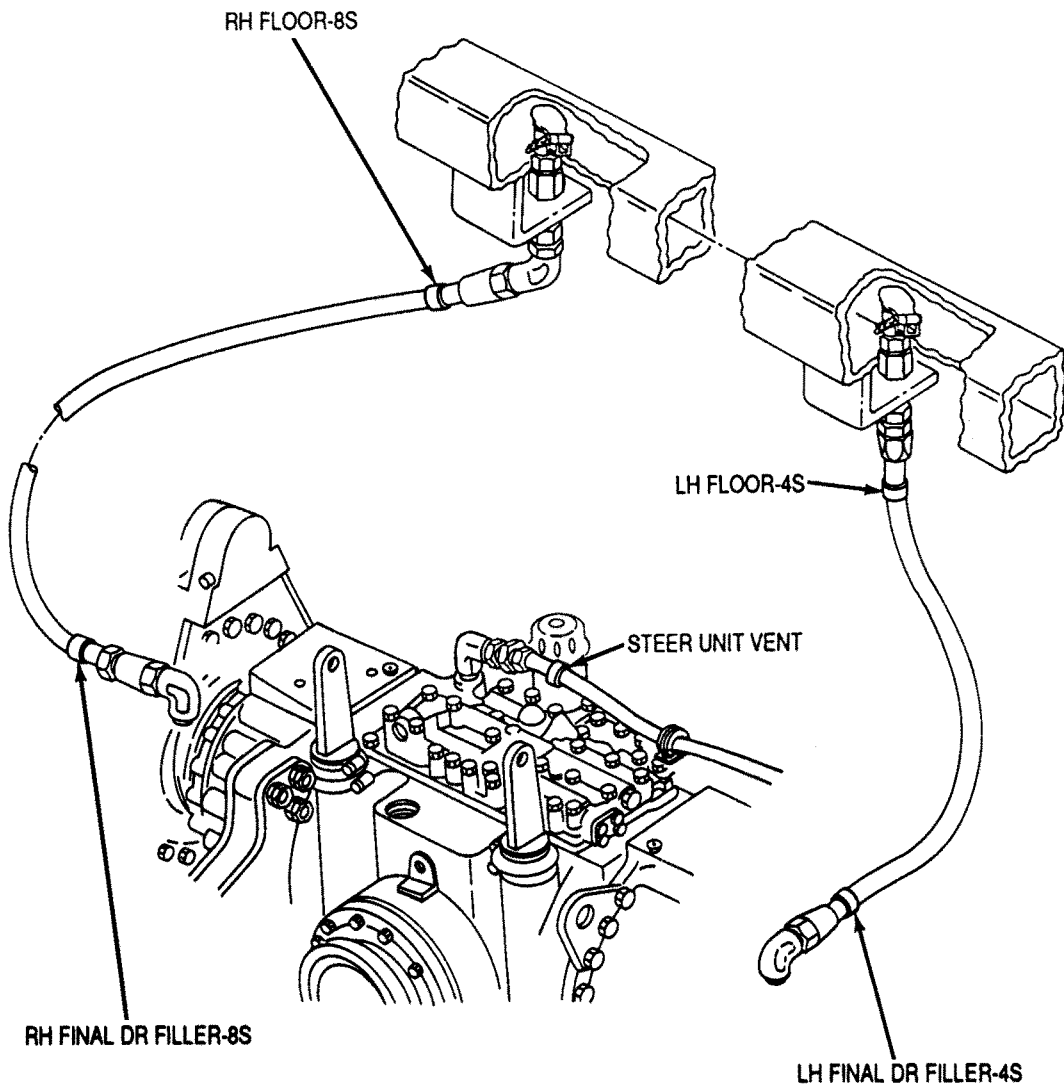
**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**



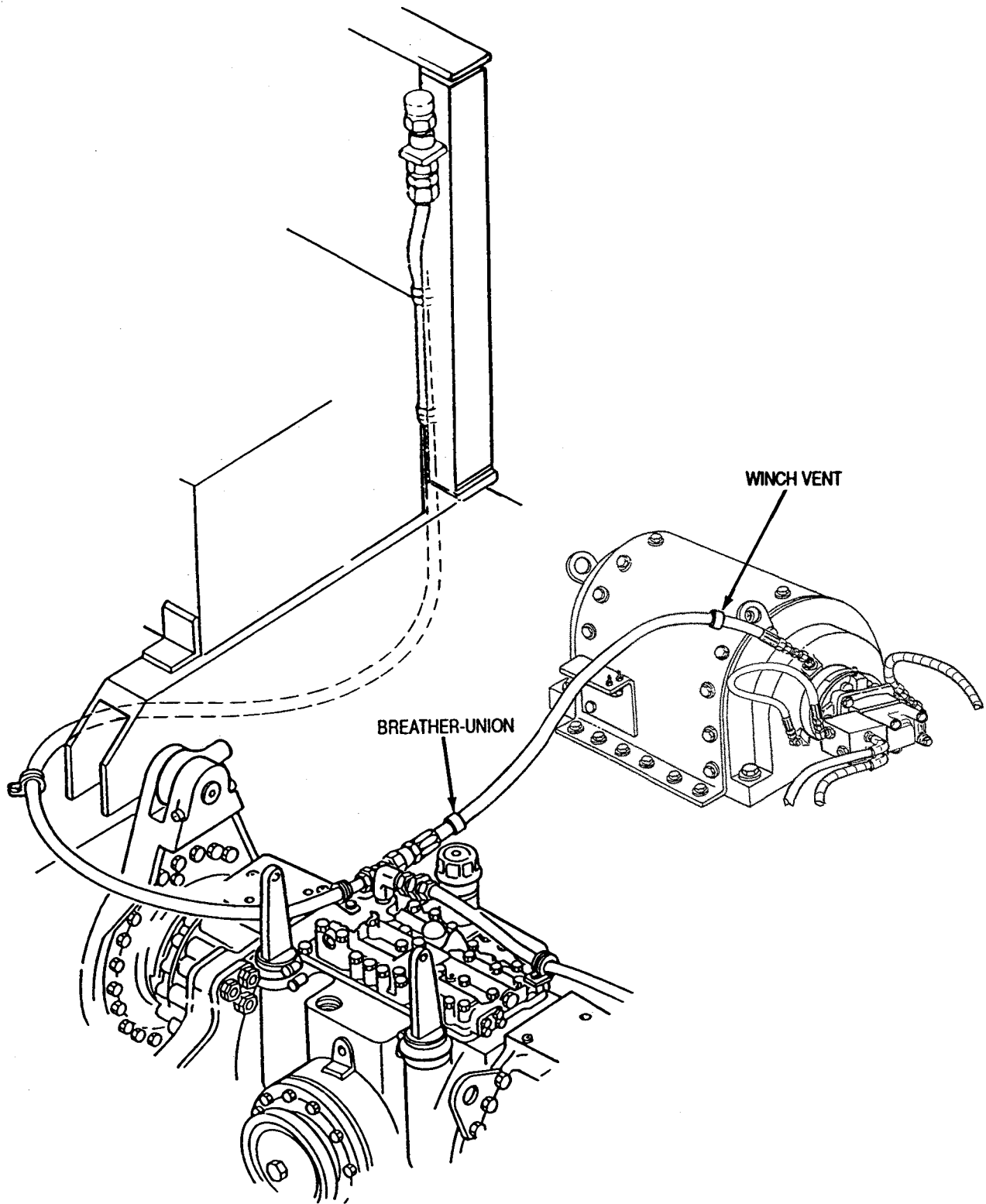
**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**



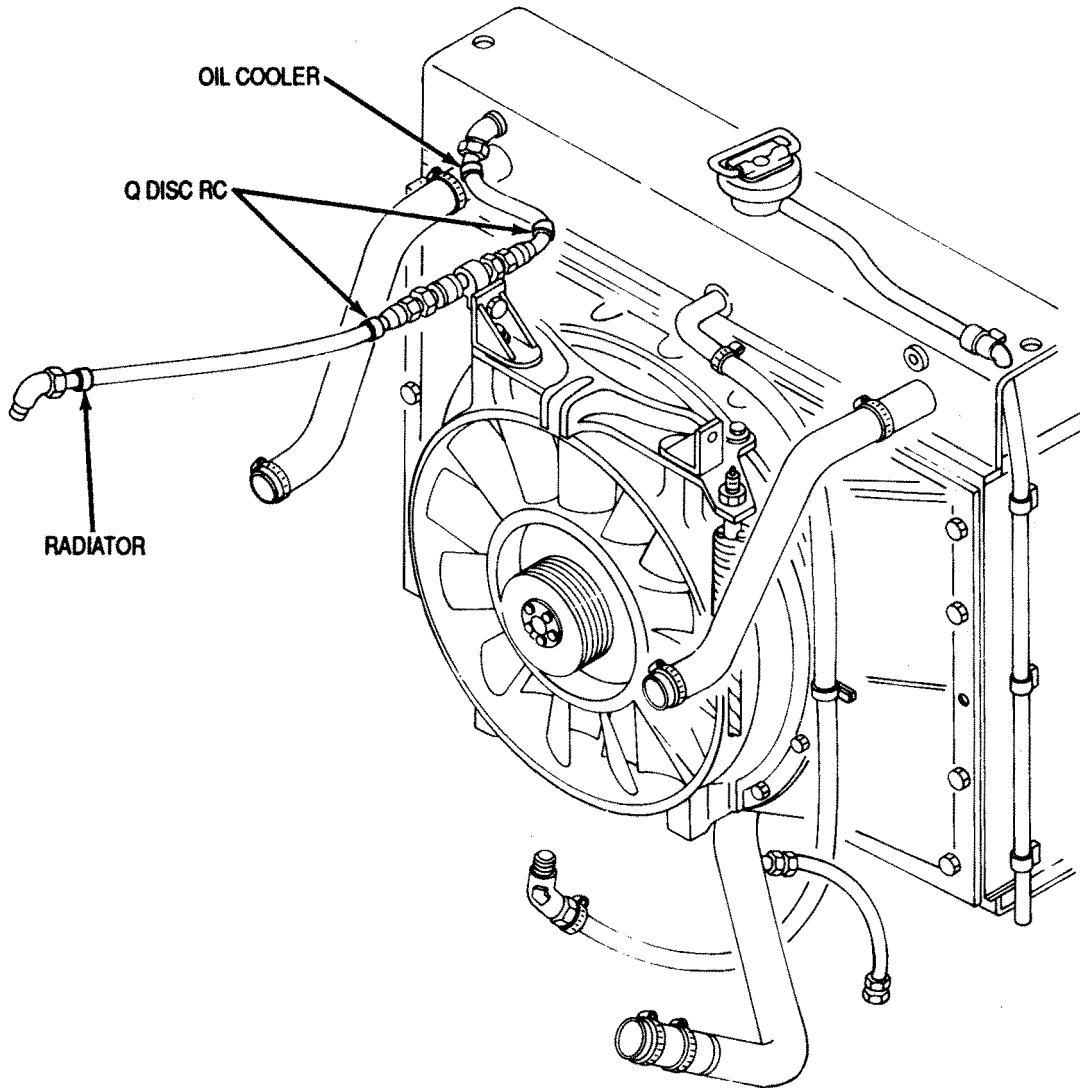
**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**



**HOSE AND TUBE MARKER BANDS IDENTIFICATION - CONTINUED**



**HOSE AND TUBE MARKER BANDS IDENTIFICATION – CONTINUED**



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## ALPHABETICAL SYMPTOM INDEX

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**TROUBLESHOOTING TABLES**

Find the symptom in the Alphabetical Symptom Index (p 3-29) or the Symptom Index By System (p3-28). Go to the page referenced for that symptom. All possible malfunctions cannot be listed. If the specific symptom is not listed in this section, refer to the Vehicle Hydraulic System Schematic Diagram (TM 5-2350-262-20-3), Vehicle Electrical System Schematic Diagram (p FP-3), or the Operator’s and Unit Maintenance Manual, Including Repair Parts and Special Tools List and Simplified Test Equipment for Internal Combustion Engine (TM 9-4910-571-12&P for additional information or reference data.

When trying to isolate a fault, review the past maintenance record of the affected vehicle. Although it doesn't happen often, an incompletely or poorly performed maintenance task may lead to another problem. Also, repeat troubleshooting steps from (TM5-2350-262-20-1) to confirm that a fault exists.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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**HARD STARTING OF ENGINE**

**1. ENGINE WILL NOT ROTATE**

**CAUTION**

Engine rotates clockwise (facing vibration damper). Do not attempt to rotate the engine counterclockwise. Failure to comply may result in damage to equipment.

Step 1. Check for internal seizure.

Install a 3/4-in. drive breaker bar in square hole in vibration damper. See if engine will rotate clockwise.

If engine rotates, refer to MALFUNCTION 2.

If engine does not rotate, remove engine from vehicle (p 4-147) and install engine on maintenance stand (TM 5-2815-240-34&P) Go to step 2.

Step 2. Inspect engine flywheel and transfer case for damaged or missing gears.

If damaged, replace transfer case (p 4-185) or engine flywheel (TM5-2815-240-34&P).

If no damage is evident, but condition persists, disassemble engine and replace damaged components (TM5-2815-240-34&P).



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MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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## HARD STARTING OF ENGINE – CONTINUED

### 2. ENGINE CRANKS, BUT WILL NOT START

#### CAUTION

Do not crank engine for longer than 20 seconds at one time. Failure to comply may result in damage to equipment.

- Step 1.** Remove rocker covers (TM 5-2350-262-20-2). Crank engine and observe valve train operation.
- Replace any damaged or malfunctioning valve train component (TM 5-2815-240-34&P).
- If no damage is evident, go to step 2.
- Step 2.** Check fuel injector adjustment.
- Adjust fuel injectors (TM 5-2815-240-34&P).
- Replace injectors that cannot be adjusted (TM 5-2815-240-34&P).
- If condition persists, go to step 3.
- Step 3.** Check for proper valve train and timing adjustments.
- Adjust valve train and timing (TM5-2815-240-34&P). If valve train cannot be adjusted, inspect pushrods, rocker arms, and valve stems for bent or broken parts or missing or sticking components.
- Replace damaged parts (TM 5-2815-240-34&P).
- If timing cannot be adjusted, remove engine from vehicle (p 4-147) and place on stand (TM 5-2815-240-34&P). Remove rear cover and inspect gear teeth (TM 5-2815-240-34&P) for slipping, broken, or missing teeth.
- Replace damaged parts (TM 5-2815-240-34&P).
- If condition persists, go to step 4.
- Step 4.** Check for damaged cylinder head gaskets.
- Inspect area around cylinder heads for signs of coolant, engine oil, or fuel being forced past a damaged head gasket.
- Replace head gasket (TM 5-2815-240-34&P).
- If no damage is evident, go to step 5.

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

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## **HARD STARTING OF ENGINE – CONTINUED**

### **2. ENGINE CRANKS, BUT WILL NOT START – CONTINUED**

Step 5. Check for damaged cylinder heads and cylinder liners.

Remove engine from vehicle (p 4-147) and install on stand (TM 5-2815-240-34&P). Remove cylinder heads (TM 5-2815-240-34&P). Inspect heads and cylinder liners for cracks, burned, or worn areas.

Replace damaged components (TM 5-2815-240-34&P).

## **ABNORMAL ENGINE OPERATION**

### **3. ROUGH IDLING OR STALLING**

Step 1. Check for white exhaust smoke.

If there is white exhaust smoke, refer to MALFUNCTION 13.

If exhaust smoke is not white, go to step 2.

Step 2. Check for proper fuel flow.

### **WARNING**

Fuel vapors are toxic. Avoid prolonged exposure or breathing of fumes. Work in a well-ventilated area. Failure to comply may result in severe injury to personnel.

Disconnect fuel supply lines from the rear of cylinder heads. Place ends of lines in graduated containers. Crank engine for 15 seconds and measure amount of fuel expelled. Multiply quantity expelled by four to convert to gallons per minute (gpm).

If flow is .8 gpm (3 Lpm), go to step 3.

If flow is not .8 gpm (3 Lpm), inspect supply lines for kinks, bends, or flattened spots causing obstruction to fuel flow. Replace any damaged supply lines (TM 5-2815-240-34&P). If fuel lines are undamaged, replace fuel pump (TM 5-2815-240-34&P).

Step 3. Check intake and exhaust manifolds for obstructions.

Remove any obstructions, or replace damaged intake or exhaust manifolds (TM 5-2815-240-34&P).

If no damage is evident, go to step 4.

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**MALFUNCTION  
TEST OR INSPECTION  
CORRECTIVE ACTION**

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**ABNORMAL ENGINE OPERATION – CONTINUED**

**3. ROUGH IDLING OR STALLING – CONTINUED**

- Step 4. Check engine idle speed adjustment.  
Adjust engine idle speed (p 4-159).  
If condition persists, go to step 5.

**CAUTION**

Do not crank engine for longer than 20 seconds at one time. Failure to comply may result in damage to equipment.

- Step 5. Check for proper valve train operation.  
Remove rocker covers (TM 5-2350-262-20-2). Crank engine and observe valve train operation. Replace any damaged components (TM 5-2815-240-34&P).  
If no damage is evident, go to step 6.
- Step 6. Check for proper valve train adjustment.  
Adjust valve train (TM 5-2815-240-34&P).  
If condition persists, go to step 7.
- Step 7. Check timing.  
Adjust timing (TM 5-2815-240-34&P).  
If condition persists, install rocker covers (TM 5-2350-262-20-2) and go to step 8.
- Step 8. Check for a misfiring cylinder.  
Start engine (TM 5-2350-262-10) and set hand throttle to keep engine running without stalling. Using a thermometer, measure temperature of exhaust manifold at exhaust ports of cylinders. The temperature of the manifold at the exhaust port of a misfiring cylinder will be significantly lower, 100° to 200°F (38° to 93°C), than the temperature of the manifold at the exhaust port of a properly firing cylinder.  
If a misfiring cylinder is found, go to step 9.  
If no misfiring cylinder is found, remove engine from vehicle (p 4-147) and place on stand (TM 5-2815-240-34&P). Remove rear cover (TM 5-2815-240-34&P) and replace timing gears (TM 5-2815-240-34&P).
- Step 9. Remove fuel injector from misfiring cylinder (TM 5-2815-240-34&P). Hold injector over a cloth and press shaft of injector to expel any residual fuel. Inspect injector for clogs, burned or damaged tip, or other damage.  
Replace damaged injector (TM 5-2815-240-34&P).  
If no damage is evident, go to step 10.

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

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**ABNORMAL ENGINE OPERATION – CONTINUED**

**3. ROUGH IDLING OR STALLING – CONTINUED**

Step 10. Check cylinder compression.

Disconnect fuel supply lines from cylinder heads, and cap the lines. Crank engine briefly to expel any fuel in the lines. Remove a fuel injector (TM 5-2815-240-34&P) from a cylinder adjacent to the misfiring cylinder. Secure cylinder compression gauge in good cylinder. Crank engine for 15 seconds and record highest reading. Remove gauge from good cylinder and install in misfiring cylinder. Crank engine for 15 seconds, and record highest reading.

This should confirm that compression in misfiring cylinder is low, compared to other cylinder. Remove cylinder head (TM 5-2815-240-34&P) and check for pitted or scored cylinder liner, damaged piston or piston rings, stuck valves, or cracked valve seats. Replace any damaged components (TM 5-2815-240-34&P).

**4. ENGINE DOES NOT REACH FULL POWER**

**Note**

For engine cranking tests, hold fuel solenoid bypass switch open to prevent engine from starting.

**CAUTION**

Do not crank engine for longer than 20 seconds at one time. Failure to comply may result in damage to equipment.

Step 1. Remove rocker covers (TM 5-2350-262-20-2). Crank engine (TM 5-2350-262-10) and observe valve train operation.

Replace any damaged or malfunctioning valve train component (TM 5-2815-240-34&P).

If no damage is evident, go to step 2.

Step 2. Check for proper fuel injector adjustment.

Adjust fuel injectors (TM 5-2815-240-34&P).

If condition persists, go to step 3.

Step 3. Check for proper valve train adjustment.

Adjust valve train (TM 5-2815-240-34&P).

If condition persists, go to step 4.

Step 4. Check for proper engine timing.

Adjust timing (TM 5-2815-240-34&P). If timing cannot be adjusted, remove engine (p 4-147) and place on stand. Remove rear cover (TM 5-2815-240-34&P) and replace damaged timing gears.

If problem persists, install engine (p 4-155) and go to step 5.

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<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
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**ABNORMAL ENGINE OPERATION – CONTINUED****4. ENGINE DOES NOT REACH FULL POWER – CONTINUED**

Step 5. Check for a misfiring cylinder.

Start engine (TM 5-2350-262-10) and run at idle speed, 750 to 850 rpm. Using a thermometer, measure temperature of exhaust manifold at exhaust ports of cylinders. The temperature of the manifold at exhaust port of a missing cylinder will be significantly lower, 100° to 200°F (38° to 93°C), than the temperature of the manifold at the exhaust port of a properly operating cylinder.

If a misfiring cylinder is found, go to step 6.

If no misfiring cylinder is found, go to step 8.

Step 6. Remove fuel injector from misfiring cylinder (TM 5-2815-240-34&P). Hold injector over a cloth and press shaft of injector to expel any residual fuel. Inspect injector for clogs, burned or damaged tips, or other damage.

Replace damaged injector (TM 5-2815-240-34&P).

If no damage is evident, go to step 7.

Step 7. Check cylinder compression.

Disconnect fuel supply lines from cylinder heads and cap the lines. Crank engine briefly to expel any fuel in the lines. Remove a fuel injector from a cylinder adjacent to the misfiring cylinder. Secure cylinder compression gauge in good cylinder. Crank engine for 15 seconds and record highest reading. Remove gauge from good cylinder and install in misfiring cylinder. Crank engine for 15 seconds and record highest reading.

This should confirm that compression in misfiring cylinder is low compared to other cylinders. Remove cylinder head (TM 5-2815-240-34&P) and check for pitted or scored cylinder liners, damaged piston or piston rings, stuck valves, or cracked valve seats. Replace any damaged components (TM 5-2815-240-34&P).

Step 8. Perform a fuel flow test (MALFUNCTION 3, step 2).

If flow is .8 gpm (3 Lpm), earlier step led to a false conclusion. Return to step 5.

If flow is less than .8 gpm (3 Lpm), inspect fuel supply lines for kinks, bends, or flattened spots causing obstruction to flow. Replace any damaged supply lines (TM 5-2815-240-34&P). If lines are undamaged, replace fuel pump (TM 5-2815-240-34&P).

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**MALFUNCTION  
TEST OR INSPECTION  
CORRECTIVE ACTION**

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**ABNORMAL ENGINE OPERATION – CONTINUED**

**5. ENGINE KNOCKS**

Step 1. Check for low oil pressure.

If oil pressure is low, refer to MALFUNCTION 8.

If oil pressure is normal, go to step 2.

**CAUTION**

Do not crank engine for longer than 20 seconds at one time. Failure to comply may result in damage to equipment.

Step 2. Remove rocker covers (TM 5-2350-262-20-2). Crank engine and observe valve train operation.

Replace any damaged or malfunctioning valve train component (TM 5-2815-240-34&P).

If no damage is evident, go to step 3.

Step 3. Check for misfiring cylinder (MALFUNCTION 4, step 5).

If a misfiring cylinder is found, go to step 4.

If no misfiring cylinder is found, go to step 6.

Step 4. Remove fuel injector from misfiring cylinder (TM 5-2815-240-34&P). Hold injector over cloth, and press shaft of injector to expel any residual fuel. Inspect injector for clogs, burned or damaged tips, or other damage.

Replace damaged injector (TM 5-2815-240-34&P).

If no damage is evident, go to step 5.

Step 5. Check cylinder compression (MALFUNCTION 4, step 7) and follow appropriate maintenance action.

If condition persists, go to step 6.

Step 6. Remove rear cover (TM 5-2815-240-34&P). Inspect timing gears for loose mounting hardware, rounded or missing teeth, or other damage.

Tighten loose mounting hardware or replace damaged timing gears (TM 5-2815-240-34&P).

If gears are undamaged, go to step 7.

Step 7. Remove cylinder heads (TM 5-2815-240-34&P). Inspect cylinder heads and cylinders for damaged or loose parts.

Tighten loose mounting hardware or replace damaged components (TM 5-2815-240-34&P).

If no damage is evident, internal engine damage is indicated. Disassemble engine and replace damaged components (TM 5-2815-240-34&P).

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MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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### ABNORMAL ENGINE OPERATION – CONTINUED

#### 6. ENGINE VIBRATES EXCESSIVELY

#### CAUTION

Do not run engine without radiator for more than 20 seconds. Failure to comply may result in damage to equipment.

Check rotation of vibration damper.

Remove radiator (TM 5-2350-262-20-2). Tightly cover coolant ports on transmission oil cooler and supply tube from water pump to radiator. Start engine (TM 5-2350-262-10), and observe operation of vibration damper pulley.

If pulley wobbles, check for loose, missing, or damaged mounting hardware. Tighten loose hardware, replace missing or damaged mounting hardware, or replace damaged vibration damper pulley (TM 5-2815-240-34&P).

If pulley is undamaged, internal damage is indicated. Disassemble engine and replace damaged components.

#### 7. VEHICLE FAILS COMPRESSION UNBALANCE TEST

Step 1. Visually inspect head gasket for leaks or other damage.

Replace leaking head gasket (TM 5-2815-240-34&P).

If no damage is evident, go to step 2.

#### CAUTION

Do not crank engine for longer than 20 seconds at one time. Failure to comply may result in damage to equipment.

Step 2. Remove rocker covers (TM 5-2815-240-34&P). Crank engine, and observe valve train operation.

Replace any damaged or malfunctioning valve train component (TM 5-2815-240-34&P).

If no damage is evident, go to step 3.

Step 3. Check for proper valve train adjustment.

Adjust valve train (TM 5-2815-240-34&P).

If valve train cannot be adjusted, repair valve train (TM 5-2815-240-34&P).

If condition persists, go to step 4.

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

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## **ABNORMAL ENGINE OPERATION – CONTINUED**

### **7. VEHICLE FAILS COMPRESSION UNBALANCE TEST – CONTINUED**

Step 4. Check for sticking exhaust and intake valves.

To check intake valves, remove intake manifold (TM 5-2815-240-34&P) and crank engine. A distinct snapping or hissing sound will be heard from the cylinder port with the defective valves.

To check exhaust valves, place a piece of pipe on the exhaust manifold at each cylinder port. As the engine cranks, listen through the pipe for a distinct snapping or hissing sound from the cylinder port.

Replace damaged or sticking valves (TM 5-2815-240-34&P).

If no defective valves are found, go to step 5.

### **CAUTION**

Use a remote power source to power starter while checking cylinder compression. Failure to comply may result in damage to batteries.

Step 5. Check cylinder compression.

Remove fuel injectors (TM 5-2815-240-34&P). Disconnect fuel supply lines from cylinder heads and cap the lines. Crank engine briefly to expel any fuel in the lines. Secure cylinder compression gauge in cylinder. Crank engine for 15 seconds and record highest reading. Repeat procedure for each cylinder.

The cylinder with the lowest gauge reading, compared to the other cylinders, is allowing excessive leakage around the piston rings. Replace the rings on the piston (TM 5-2815-240-34&P).

## **LUBRICATING SYSTEM**

### **8. LOW OIL PRESSURE**

Step 1. Check oil pressure bypass valve in oil cooler.

If defective, replace bypass valve (TM 5-2815-240-34&P).

If no damage is evident, go to step 2.



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

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## LUBRICATING SYSTEM – CONTINUED

### 8. LOW OIL PRESSURE – CONTINUED

- Step 2.** Check oil pressure regulator valve in oil pump.
- If defective, replace oil pressure regulator valve (TM 5-2815-240-34&P).
- If no damage is evident, go to step 3.
- Step 3.** Check oil pump intake screen.
- Remove engine (p 4-147) and place on maintenance stand (TM 5-2815-240-34&P).  
Remove oil pan (TM 5-2815-240-34&P) and inspect oil intake and screen for blockage.
- Clean obstructions from screen.
- If no obstructions are found, go to step 4.
- Step 4.** Check oil pump pick-up piping for blockage, leaks, or other damage.
- Clean or replace oil pick-up piping (TM 5-2815-240-34&P).
- If no damage or obstructions are found, go to step 5.
- Step 5.** Check oil pump for missing or damaged parts.
- Repair oil pump (TM 5-2815-240-34&P).
- If no damage is evident, go to step 6.
- Step 6.** Check for missing crankshaft galley plugs (TM 5-2815-240-34&P).
- Replace missing galley plugs (TM 5-2815-240-34&P).
- If no galley plugs are missing, check for and replace any worn bearings (TM 5-2815-240-34&P).

### 9. HIGH OIL PRESSURE

- Step 1.** Perform STE/ICE-R compression unbalance test (TM 5-2350-262-20-1).
- If vehicle fails test, go to MALFUNCTION 7.
- If vehicle passes test, go to step 2.

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

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**LUBRICATING SYSTEM – CONTINUED**

**9. HIGH OIL PRESSURE – CONTINUED**

- Step 2. Check engine oil cooler for obstructions or other damage.
- Remove engine oil cooler (TM 5-2815-240-34&P). Inspect oil pressure bypass valve for damage and check cooler core for obstructions, bent tubes, or other damage.
- Replace engine oil cooler (TM 5-2815-240-34&P).
- If no damage is evident, go to step 3.
- Step 3. Check for clogged oil passages in cylinder heads.
- Remove cylinder heads (TM 5-2815-240-34&P). Inspect heads and engine block for oil passage obstructions.
- Remove any obstructions.

**10. ODOR OF FUEL IN ENGINE OIL**

- Step 1. Check for proper valve train operation.
- Remove rocker covers (TM 5-2350-262-20-2). Crank engine and observe valve train operation.
- Replace any damaged or malfunctioning valve train component (TM 5-2815-240-34&P).
- If no damage is evident, go to step 2.
- Step 2. Check fuel injector and valve train adjustments and engine timing.
- Adjust fuel injectors, valve train, and engine timing (TM 5-2815-240-34&P).
- If condition persists, go to step 3.
- Step 3. Remove fuel injectors (TM 5-2815-240-34&P) and inspect injectors for clogging or other damage.
- Replace damaged or clogged fuel injectors (TM 5-2815-240-34&P).
- If no damage is evident, go to step 4.
- Step 4. Check for broken piston rings.
- Remove pistons (TM 5-2815-240-34&P) and inspect piston rings for damage and cylinder liners for scoring, scratching, or other damage.
- Replace piston rings (TM 5-2815-240-34&P).
- Replace cylinder liners (TM 5-2815-240-34&P).

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

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**FUEL SYSTEM****11. BLUE EXHAUST SMOKE**

Check for worn oil rings on pistons by removing pistons (TM 5-2815-240-34&P).

Replace worn oil rings or scratched cylinder liners (TM 5-2815-240-34&P).

**12. BLACK EXHAUST SMOKE**

Step 1. Check for proper fuel injector timing.

Adjust fuel injector timing (TM 5-2815-240-34&P).

If condition persists, go to step 2.

Step 2. Check for proper valve train adjustment.

Adjust valve train (TM 5-2815-240-34&P).

If condition persists, go to step 3.

Step 3. Check for faulty, sticking, or burned fuel injectors.

Replace damaged fuel injectors (TM 5-2815-240-34&P).

**13. WHITE EXHAUST SMOKE**

Step 1. Remove rocker covers (TM 5-2350-262-20-2). Crank engine and observe valve train operation.

Replace any defective or malfunctioning valve train component (TM 5-2815-240-34&P).

If no damage is evident, go to step 2.

Step 2. Check for proper engine timing.

Adjust engine timing (TM 5-2815-240-34&P).

If condition persists, go to step 3.

Step 3. Check for a misfiring cylinder (MALFUNCTION 3, step 8).

Isolate faulty fuel injector (MALFUNCTION 3, step 9) or low cylinder compression (MALFUNCTION 3, step 10), and correct problem (TM 5-2815-240-34&P).

If no misfiring cylinder is found, go to step 4.

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<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
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### **FUEL SYSTEM – CONTINUED**

#### **13. WHITE EXHAUST SMOKE – CONTINUED**

- Step 4. Check for damaged cylinder head gasket.
- Replace head gasket (TM 5-2815-240-34&P).
- If no damage is evident, go to step 5.
- Step 5. Remove cylinder heads (TM 5-2815-240-34&P). Check for head gasket leaks between cylinders, scored or leaking cylinder liners, or scored or damaged pistons.
- Replace defective components (TM 5-2815-240-34&P).

### **TRANSMISSION**

#### **14. TRANSMISSION OIL TEMPERATURE TOO HIGH**

- Step 1. Remove steer unit (p 4-209) and strainer body (p 4-216). Check strainer and strainer body for obstructions or other damage.
- Clean or replace strainer and strainer body (p 4-216).
- If strainer and strainer body are undamaged, go to step 2.
- Step 2. Verify that drive chain or transmission charging pump is not broken and turns pump when torque converter turns. Remove transmission charging pump and housing (p 4-195). Check drive chain, housing, and pump for damage.
- Replace damaged drive chain, housing, or pump (p 4-200).

### **TRANSFER CASE**

#### **15. TRANSFER CASE MALFUNCTIONS**

- Step 1. Remove transfer case input gear (TM 5-2350-262-20-2). Inspect input gear and crankshaft adapter for rounded, cracked, or missing teeth or other damage.
- Replace transfer case input gear.
- Replace crankshaft adapter (TM 5-2815-240-34&P).
- If no damage is evident, install input gear (TM 5-2350-262-20-2) and go to step 2.

---

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

---

### TRANSFER CASE – CONTINUED

#### 15. TRANSFER CASE MALFUNCTIONS – CONTINUED

- Step 2. Shift transmission to neutral. Disconnect driveshaft from transmission (TM 5-2350-262-20-2). Turn output flange on transmission.
- If flange will not turn, replace transmission (p 4-203).
- If flange will turn, go to step 3.
- Step 3. Remove power package (p 4-123). Check to see if a frozen hydraulic or scavenger pump is binding the transfer case.
- Remove the compensating pump (TM 5-2350-262-20-2) and main hydraulic pump (p 4-117) and bar over engine (MALFUNCTION 1, step 1). If engine bars over, check the pumps for damage, and replace or repair as necessary.
- If engine still does not bar over, remove the scavenger pump (TM 5-2350-262-20-2) and try again. If the engine now bars over, replace scavenger pump.
- If engine still will not bar over, replace transfer case (p 4-186).

### STEERING

#### 16. VEHICLE STEERS TO ONE SIDE ONLY

- Step 1. Disconnect final drives (TM 5-2305-262-20-2). Shift transmission to neutral and turn driveshaft. Observe steer unit output coupling on affected side.
- If coupling does not turn, go to step 2.
- If coupling turns, go to step 3.
- Step 2. Check steer unit output coupling screw.
- If screw is broken, replace screw (p 4-225).
- If screw is not broken, replace steer unit (p 4-211).
- Step 3. Disconnect track on affected side (TM 5-2305-262-20-2). Clear track from drive sprocket and rotate drive sprocket.
- If sprocket will not rotate, replace final drive (p 4-240).
- If sprocket rotates, check screw in final drive sprocket.
- Tighten or replace screw (p 4-228).

---

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

---

**STEERING – CONTINUED**

**17. FINAL DRIVES LEAKING OIL**

If leak appears to be behind drive sprocket, check final drive seal for damage and replace as necessary (p 4-250).

If leak appears to be between hull and final drive, check final drive for loose or missing mounting hardware. Tighten or replace as necessary (p 4-250). If condition persists, remove final drive and replace damaged packing or thrust washer (p 4-250).

# CHAPTER 4 MAINTENANCE INSTRUCTIONS

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**OVERVIEW**

This chapter contains maintenance procedures for the M9 ACE.

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## Section I. GROUP AJ, ELECTRICAL INSTALLATION

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<b>TASKS</b>	<b>PAGE</b>
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STE/ICE-R Interface Resistor Box Repair .....	4-3



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## STE/ICE-R INTERFACE RESISTOR BOX REPAIR

---

This task covers:

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

**INITIAL SETUP**

Tools:

5180-00-754-0655 Tool Kit, Automotive Fuel and Electrical System Repair

4910-00-754-0714 Shop Equipment, Fuel and Electrical System Engine: Field Maintenance, Basic, Less Power

Parts:

- Gasket (5)
- Locknut (16)
- Lockwasher (20)
- Tiedown Strap

Parts Reference:

TM-5-2350-262-24P    Group AJ

Personnel Required:

Fuel and Electrical Repairer 63G10

Reference:

TM-5-2350-262-20-1

TB SIG-222

Troubleshooting Reference:

TM-5-2350-262-20-1

Equipment Condition:

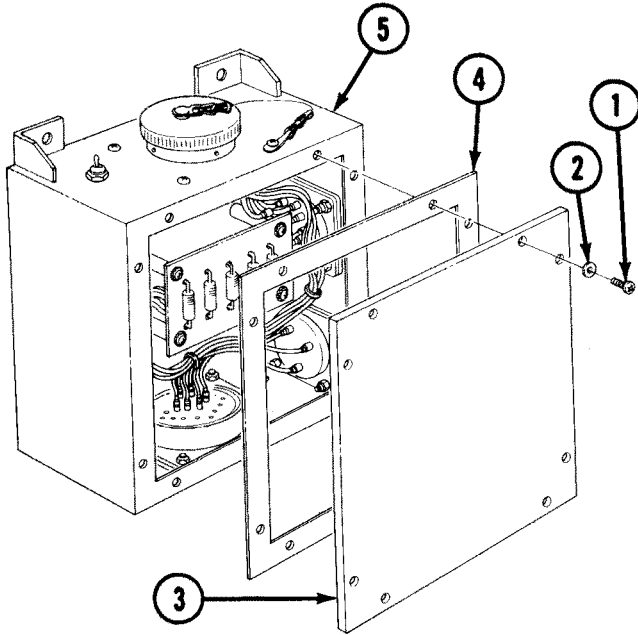
Reference

TM-5-2350-262-20-1

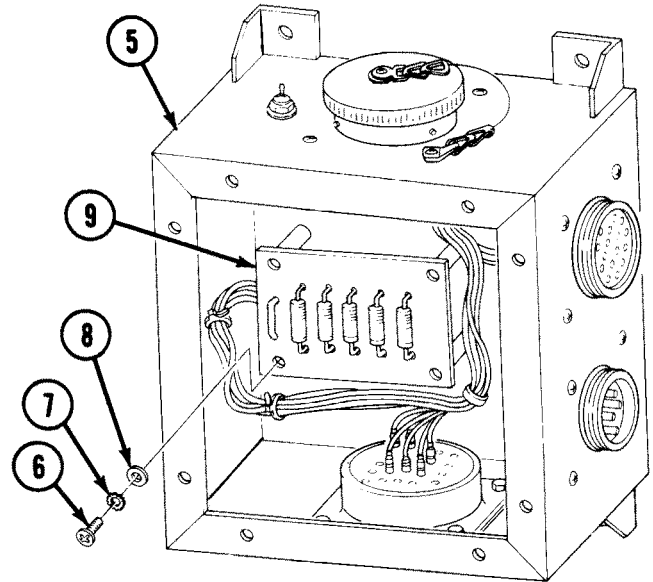
Condition Description

STE/ICE-R Resistor Box Removed

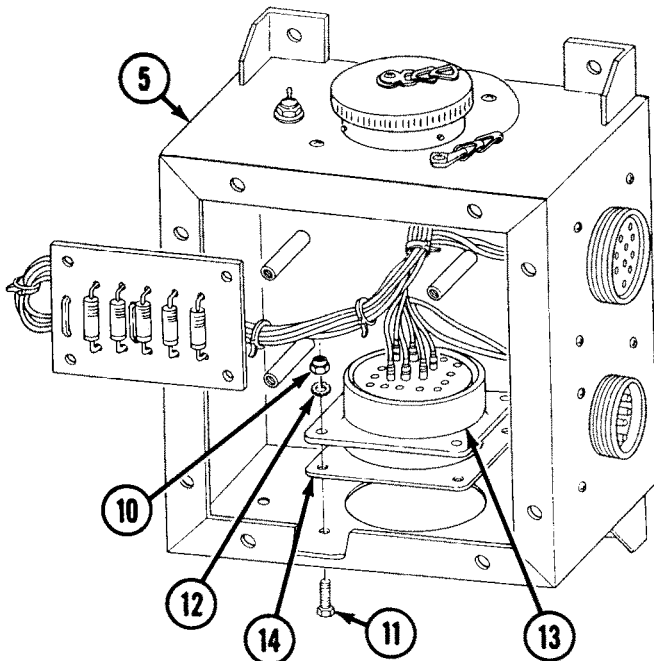
**DISASSEMBLY**



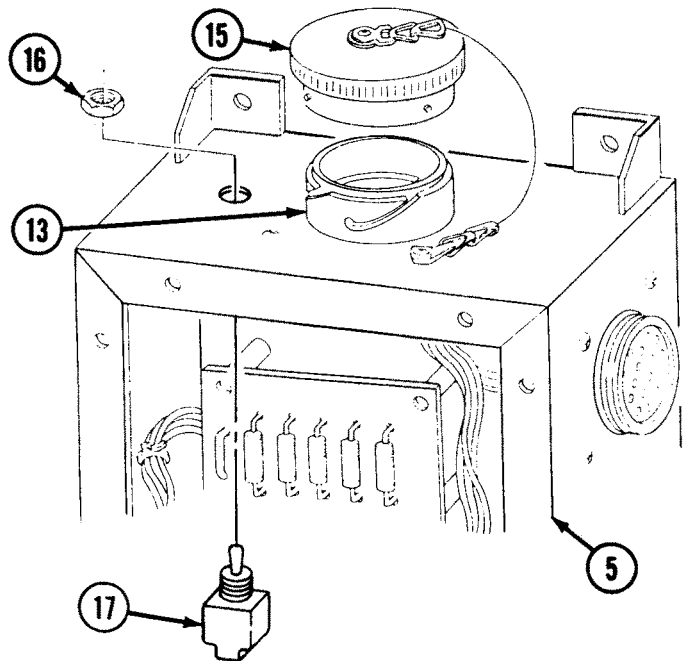
**A** Remove eight screws (1), washers (2), cover (3), and gasket (4) from resistor box (5). Discard gasket (4).



**B** Remove four screws (6), lockwashers (7), washers (8), and circuit board (9) from resistor box (5). Discard lockwashers (7).

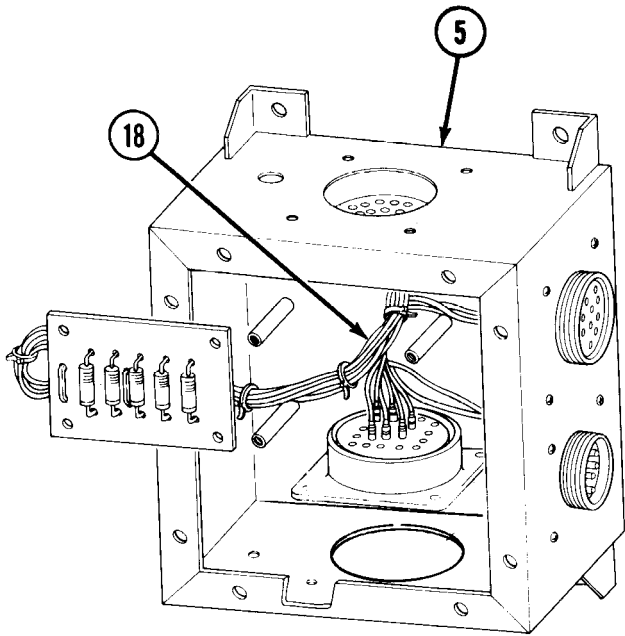


**C** Remove sixteen locknuts (10), screws (11), and lockwashers (12) securing four connectors (13), and gaskets (14) to resistor box (5). Discard locknuts (10), lockwashers (12), and gaskets (14).

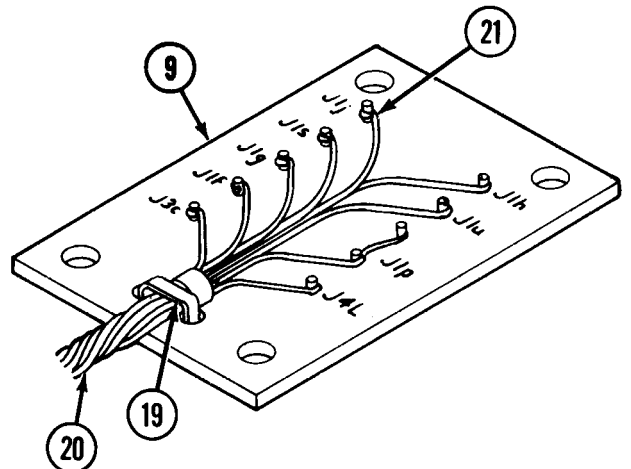


**D** Remove cap (15) from connector (13).

**E** Remove nut (16) from switch (17). Remove switch (17) from resistor box (5).



**F** Remove wiring harness (18) from resistor box (5).

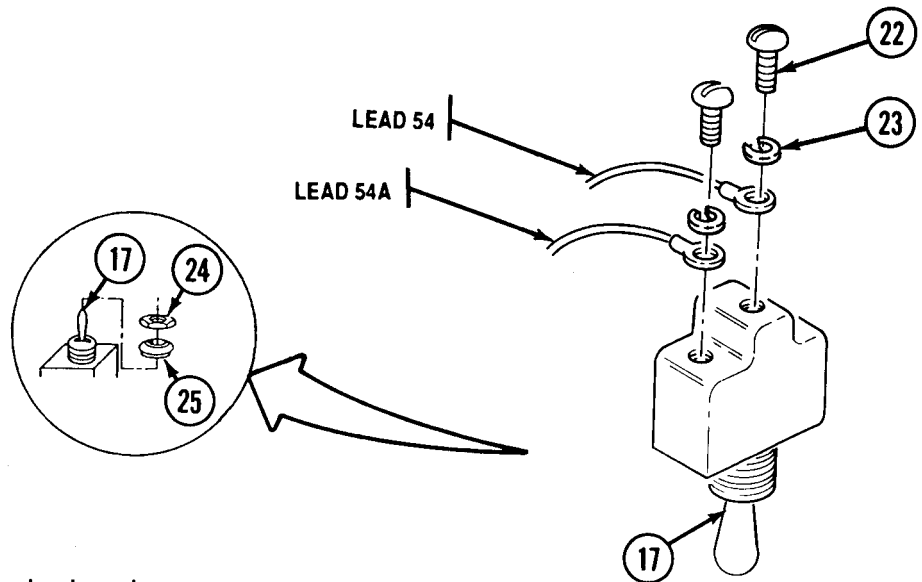


**Note**

Tag and number all leads prior to disassembly to aid in assembly.

**G** Remove tiedown strap (19) securing wiring harness (20) to circuit board (9). Discard strap (19).

**H** Desolder nine leads (21) connecting wiring harness (20) to circuit board (9) (refer to TB SIG-222).



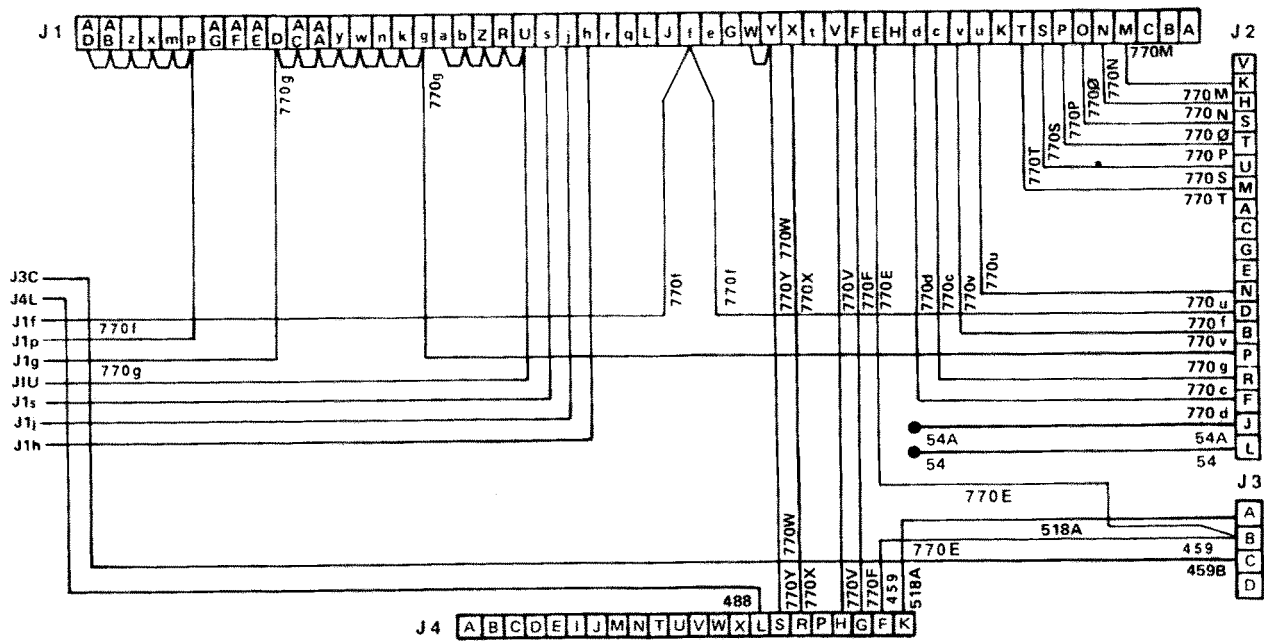
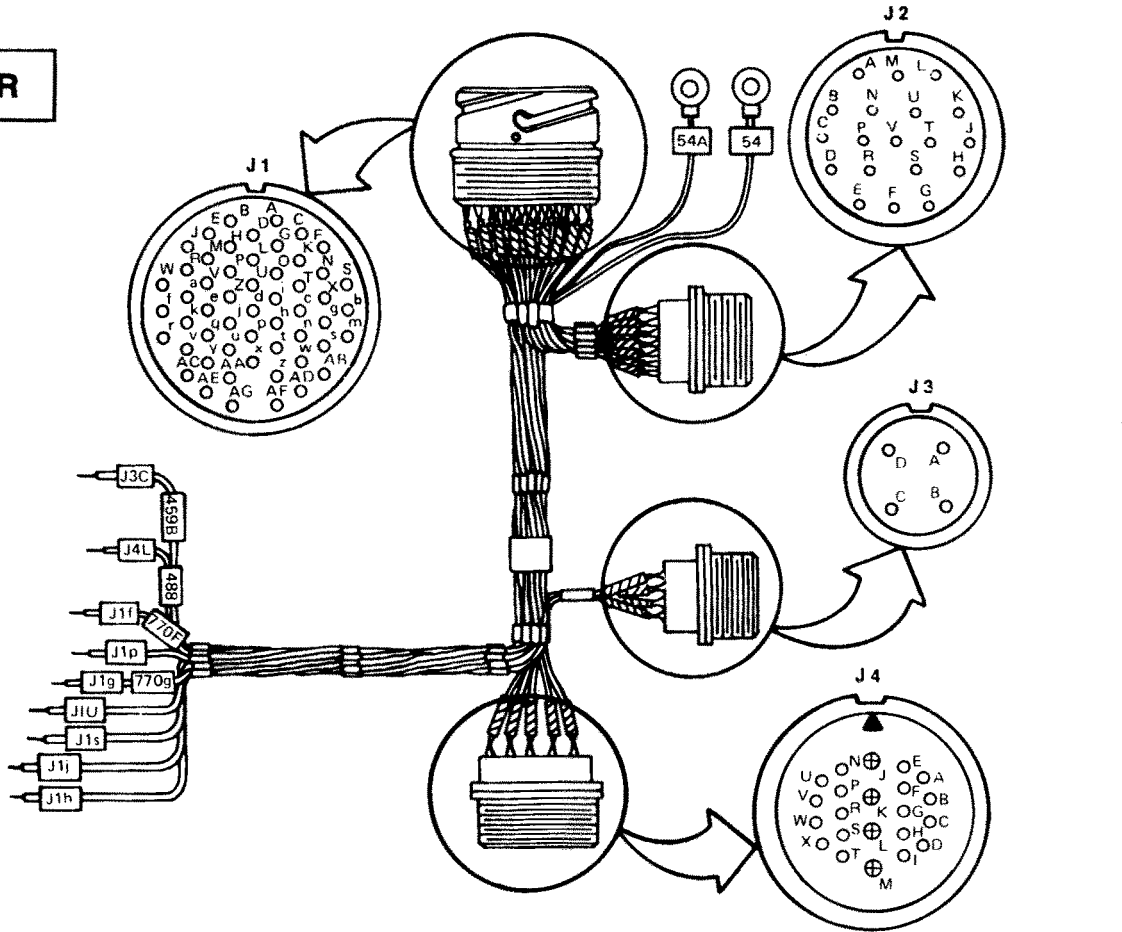
**Note**

Do not discard lockwashers. Lockwashers can be obtained only by ordering switch.

**I** Remove two screws (22), lockwashers (23), and leads 54 and 54A from switch (17).

**J** Remove nut (24) and dust and moisture boot (25) from switch (17).

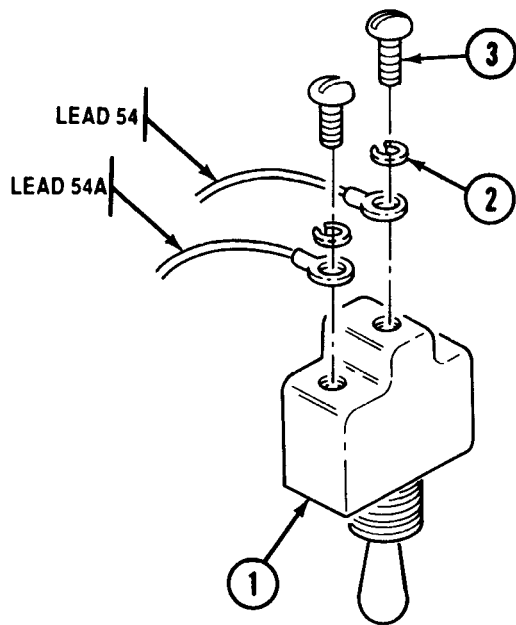
**REPAIR**



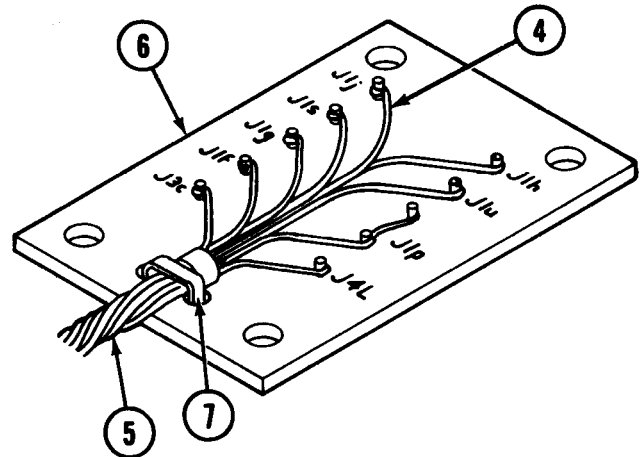
WIRING DIAGRAM

Refer to page 2-10 to repair the resistor box wiring harness.

**ASSEMBLY**



**A** Connect leads 54 and 54A to switch (1) with two lockwashers (2) and screws (3).

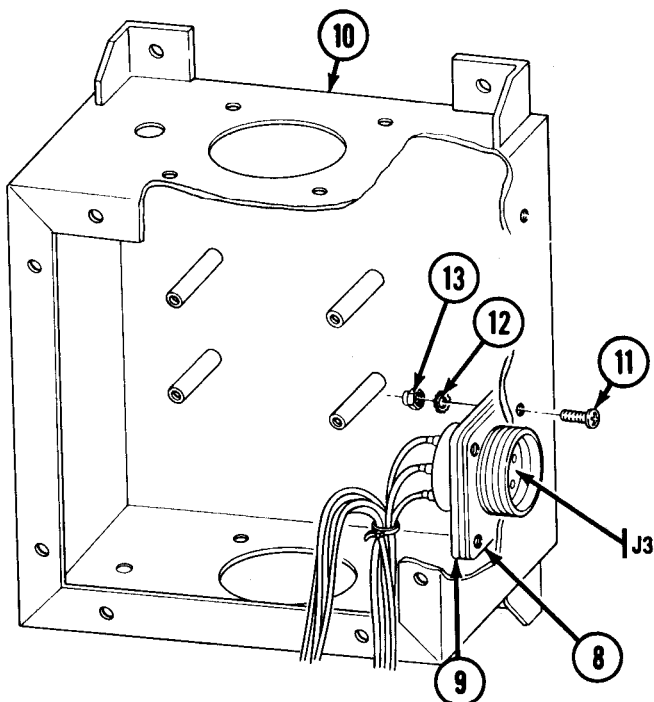


**Note**

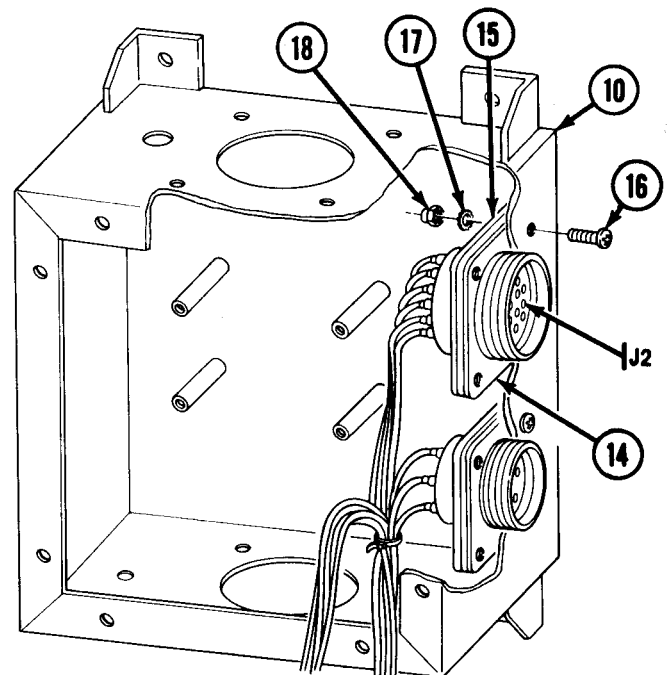
Ensure terminal numbers on leads match those on circuit board.

**B** Solder nine leads (4) of wiring harness (5) to circuit board (6) (refer to TB SIG-222).

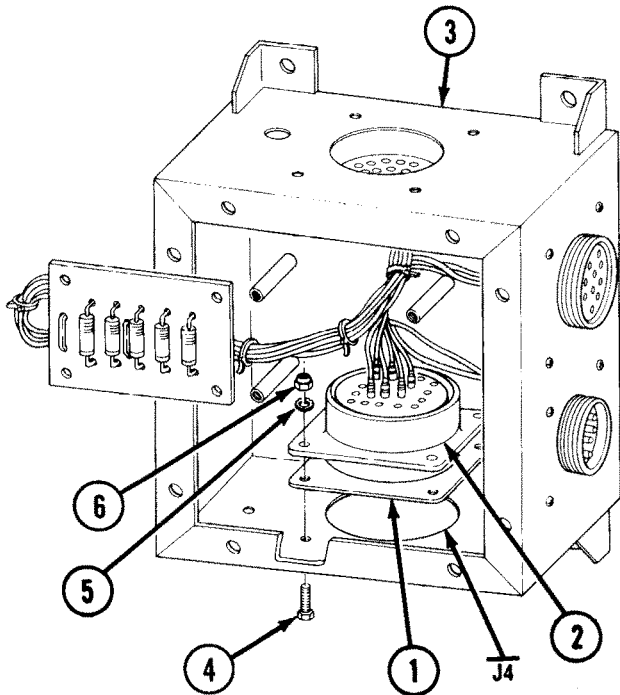
**C** Secure wiring harness (5) to circuit board (6) with tiedown strap (7).



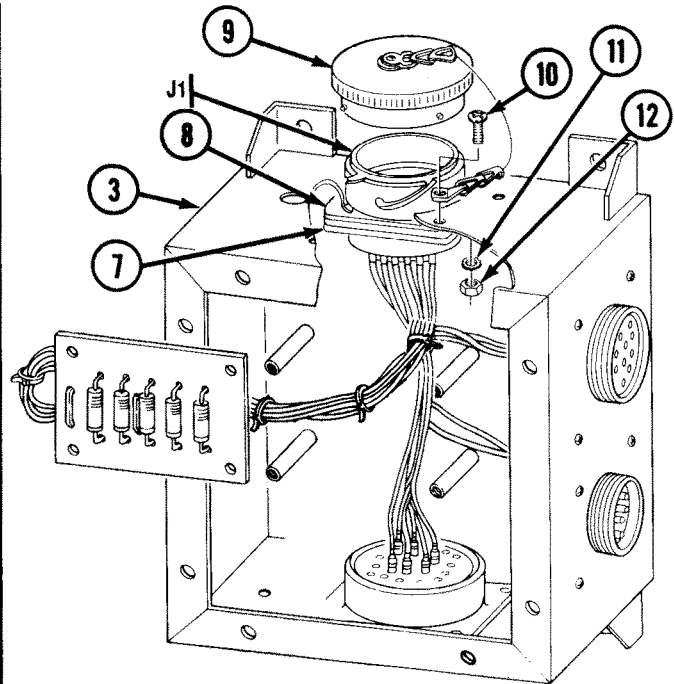
**D** Install gasket (8) and 4-pin connector (9) on resistor box (10) in hole marked "J3" and secure with four screws (11), lockwashers (12), and locknuts (13).



**E** Install gasket (14) and 19-pin connector (15) on resistor box (10) in hole marked "J2" and secure with four screws (16), lockwashers (17), and locknuts (18).



**F** Install gasket (1) and 22-pin connector (2) on resistor box (3) in hole marked "J4" and secure with four screws (4), lockwashers (5), and locknuts (6).



**G** Install gasket (7), 54-pin connector (8), and cap (9) on resistor box (3) in hole marked "J1" and secure with four screws (10), lockwashers (11), and locknuts (12).

**H** Install dust and moisture boot (13) and nut (14) on switch (15).

**Note**

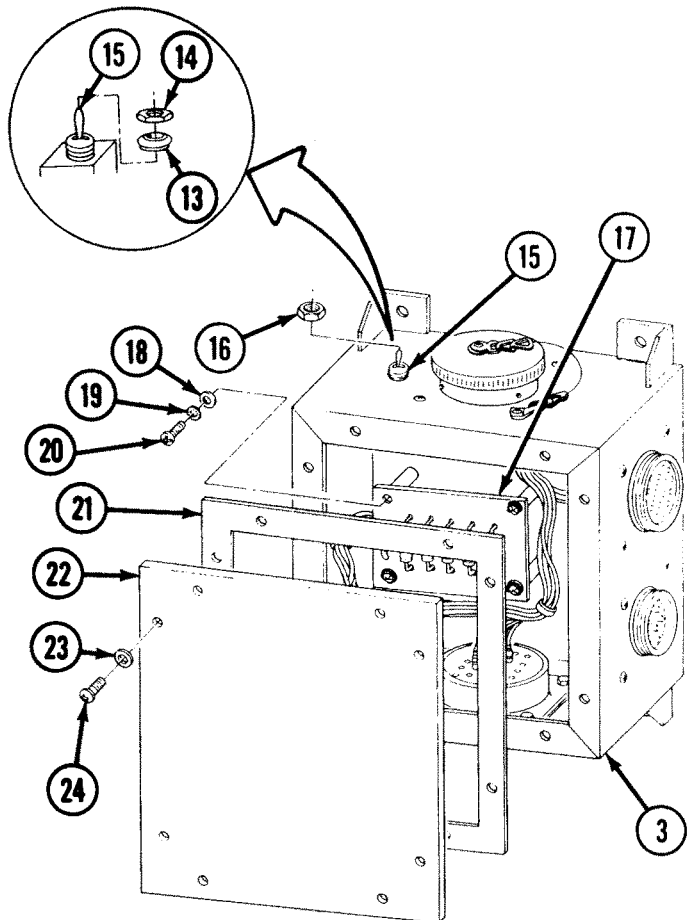
If installing new replacement switch, discard locking key washer MS25081-4 (included as part of switch).

**I** Secure switch (15) to resistor box (3) with nut (16).

**J** Secure circuit board (17) in resistor box (3) with four washers (18), lockwashers (19), and screws (20).

**K** Install gasket (21) and cover (22) on resistor box (3) and secure with eight washers (23) and screws (24).

**FOLLOW-ON TASK:**  
Install STE/ICE-R resistor box (TM-5-2350-262-20-1).



# BATTERY BOX RELAY WIRING HARNESS REPLACEMENT AND REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Parts:

Lockwasher (9)

Self-locking Screw (4)

Parts Reference:

TM 5-2350-262-24P Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-10

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Ejector Forward
TM 5-2350-262-20-1	Fuel Tank Armor Removed
TM 5-2350-262-20-1	Rear Floor Plate Supports Removed
TM 5-2350-262-20-2	Seat Assembly Removed
TM 5-2350-262-20-1	Negative Battery Cables Disconnected

General Safety Instructions:

**WARNING**

Disconnect batteries at the negative terminals before working on the electrical system.



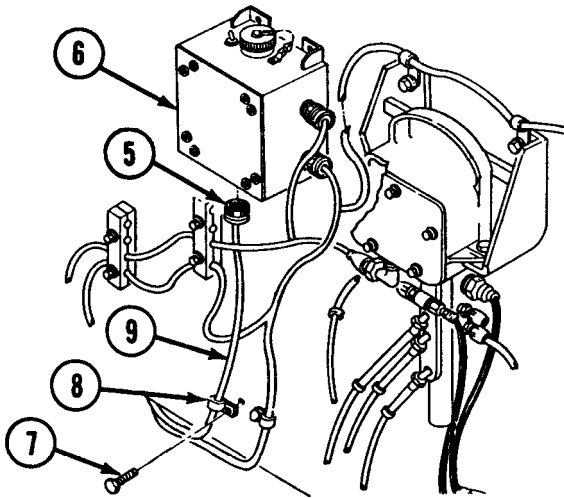
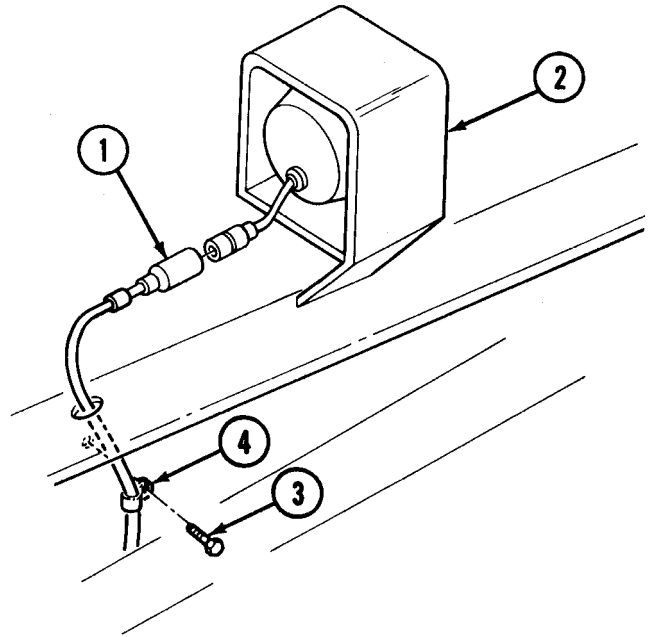
**REMOVAL**

**WARNING**  
 Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.

**Note**

Tag all leads prior to removal for installation.

- A** Disconnect lead 518A (1) from RH front floodlight (2).
- B** Remove eleven screws (3) and clamps (4) securing lead 518A (1) to hull.

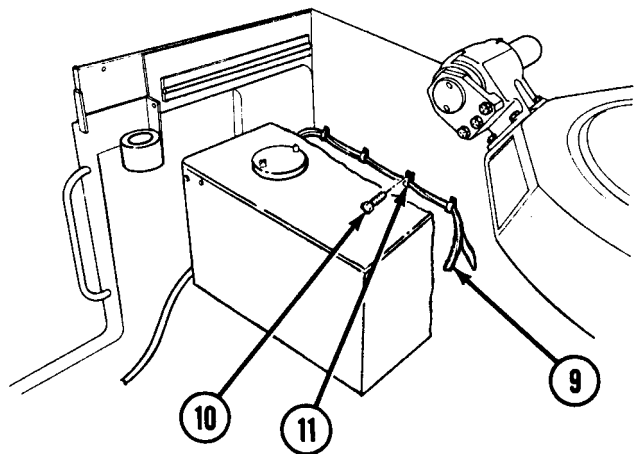


- C** Remove battery box relay wiring harness bulkhead connector (5) from STE/ICE-R resistor box (6).

**Note**

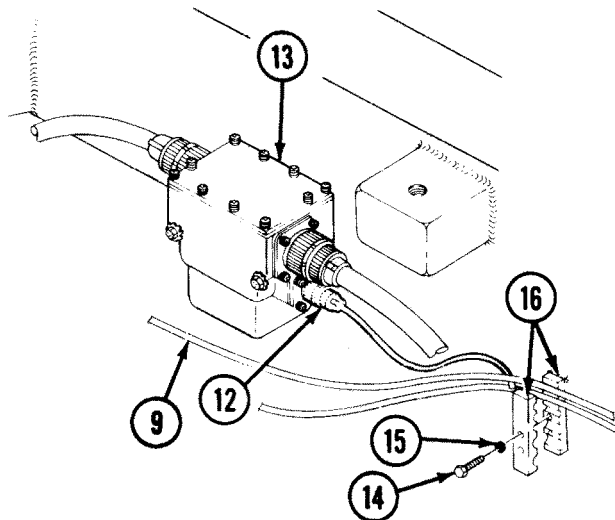
Location of clamp may vary.

- D** Remove screw (7) and clamp (8) securing battery box relay wiring harness (9) to driver's compartment wall.

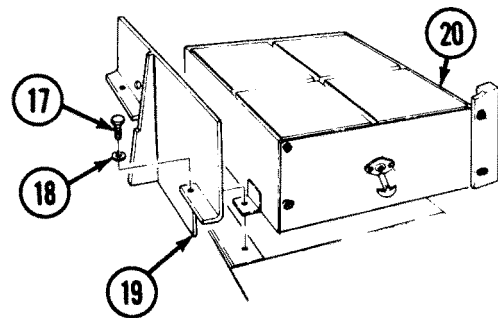


- E** Remove six screws (10) and clamps (11) securing battery box relay wiring harness (9) to hull. Remove battery box relay wiring harness (9) from clamps (11).

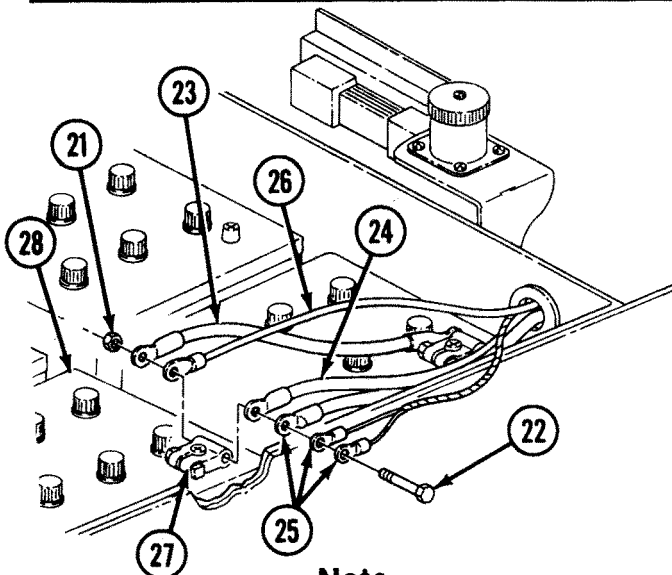




- F** Remove lead 488 cannon plug (12) from master relay (13).
- G** Remove six screws (14) and lockwashers (15) from bar clamps (16). Discard lockwashers (15).
- H** Separate battery box relay wiring harness (9) from bar clamps (16). Do not separate any other lines from clamps (16).



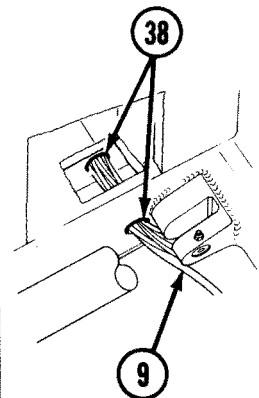
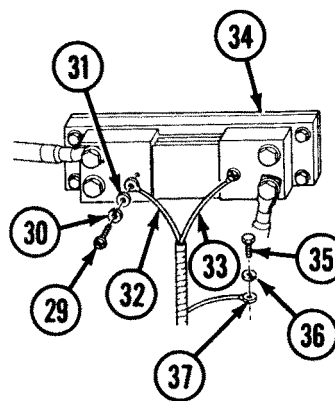
- I** Remove four self-locking screws (17) and washers (18) securing bottom deflector plate (19) and battery box (20) to hull. Discard self-locking screws (17).
- J** With tanker bar, pry battery box (20) forward to gain access to leads.



**Note**

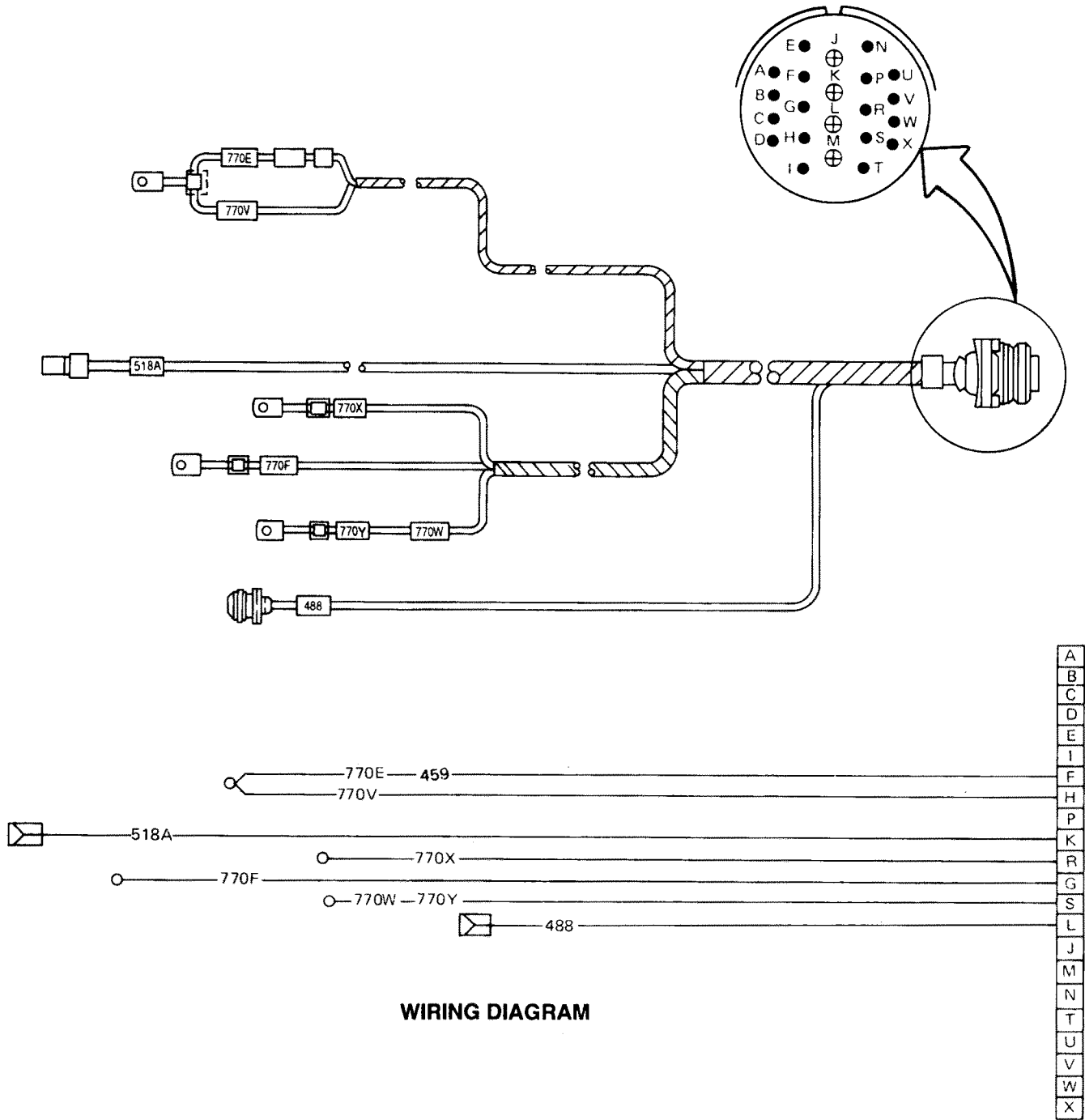
Location of cables on terminal clamp may vary.

- K** Remove nut (21) and screw (22) securing cables 68A (23), 6A (24), 770E, 459, 770V (25), and 48 (26) to terminal clamp (27) on left forward battery (28).
- L** Secure cables 68A (23) and 6A (24) to terminal clamp (27) with screw (22) and nut (21).



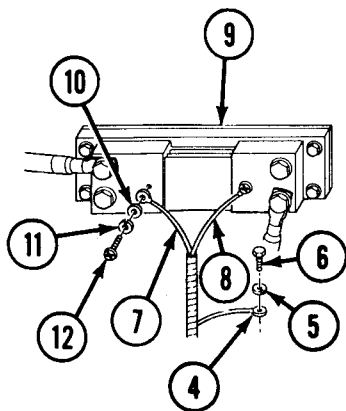
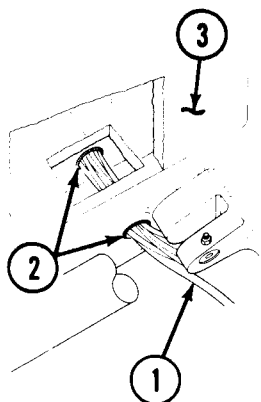
- M** Remove two screws (29), lockwashers (30), and washers (31) securing leads 770X (32) and 770Y/770W (33) to STE/ICE-R shunt (34). Discard lockwashers (30).
- N** Remove screw (35) and lockwasher (36) securing ground lead 770F (37) to hull. Discard lockwasher (36).
- O** Pull battery box relay wiring harness (9) through two grommets (38) and remove from vehicle. If damaged, remove two grommets (38) from hull.

**REPAIR**

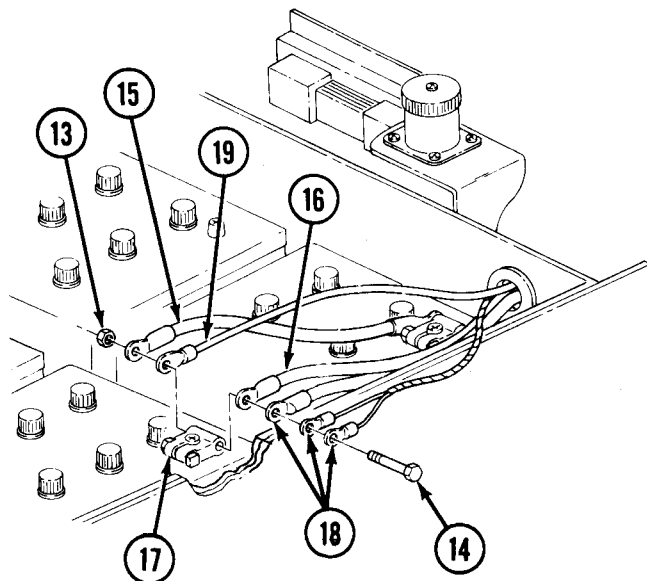


Refer to page 2-10 to repair the battery box wiring harness.

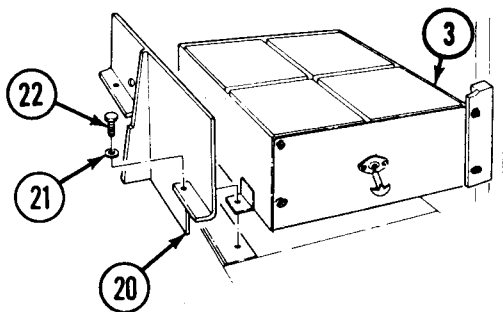
**INSTALLATION**



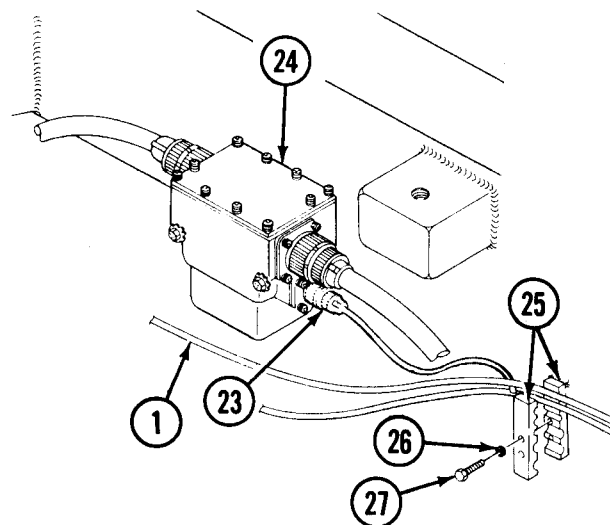
- A** Pull battery box relay wiring harness (1) through two grommets (2) into battery box (3).
- B** Secure ground lead 770F (4) to hull with lockwasher (5) and screw (6).
- C** Secure leads 770X (7) and 770Y/770W (8) to STE/ICE-R shunt (9) with two washers (10), lockwashers (11), and screws (12).



- D** Remove nut (13) and screw (14) securing cables 68A (15) and 6A (16) to terminal clamp (17).
- E** Secure cables 68A (15), 6A (16), 770E, 459, 770V (18), and 48 (19) to terminal clamp (17) with screw (14) and nut (13).



- F** With tanker bar, pry battery box (3) back to its original position.
- G** Secure battery box (3) and bottom deflector plate (20) to hull with four washers (21) and self-locking screws (22).



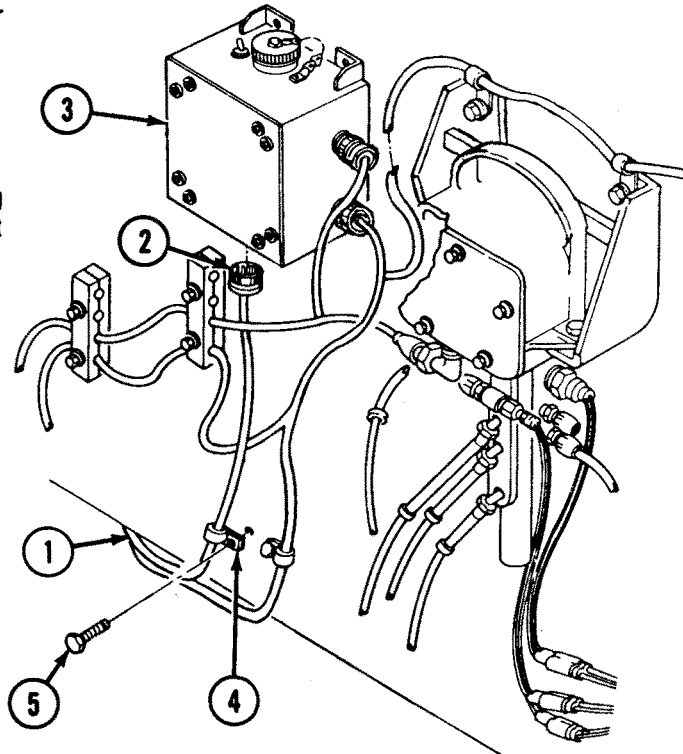
- H** Connect lead 488 cannon plug (23) to master relay (24).
- I** Install bar clamps (25) on battery box relay wiring harness (1) and secure with six lockwashers (26) and screws (27).

- J** Route battery box relay wiring harness (1) through vehicle and connect bulkhead connector (2) to STE/ICE-R resistor box (3).

**Note**

Location of clamp may vary.

- K** Install clamp (4) on battery box relay wiring harness (1) and secure to driver's compartment wall with screw (5).



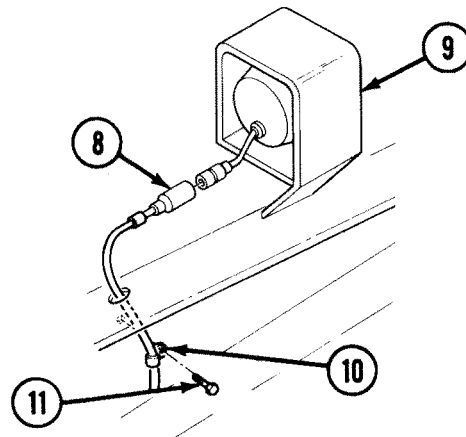
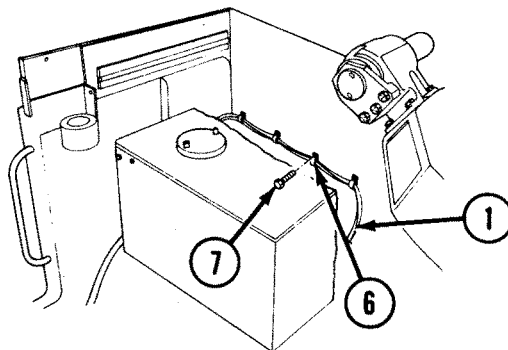
- L** Route battery box relay wiring harness (1) through six clamps (6) and secure clamps (6) to hull with six screws (7).

- M** Connect lead 518A (8) to RH front floodlight (9).

- N** Secure lead 518A (8) to hull with eleven clamps (10) and screws (11).

**FOLLOW-ON TASKS:**

- Connect negative battery terminals (TM 5-2350-262-20-1).
- Install seat assembly (TM 5-2350-262-20-2).
- Install rear floor plate supports (TM 5-2350-262-20-1).
- Install fuel tank armor (TM 5-2350-262-20-1).
- Retract ejector (TM 5-2350-262-10).



# REAR WIRING HARNESS REPLACEMENT AND REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

Parts:

Lockwasher (7)

Self-locking Screw (3)

Tiedown Strap (AR)

Parts Reference:

TM 5-2350-262-24P Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-10

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Ejector Forward
TM 5-2350-262-20-1	Fuel Tank Armor Removed
TM 5-2350-262-20-1	Driver's Compartment Floor Plate Removed
TM 5-2350-262-20-1	Battery Box Removed
TM 5-2350-262-20-1	Trailer Receptacle Removed

General Safety Instructions:

### WARNING

Disconnect batteries at the negative terminals before working on the electrical system.

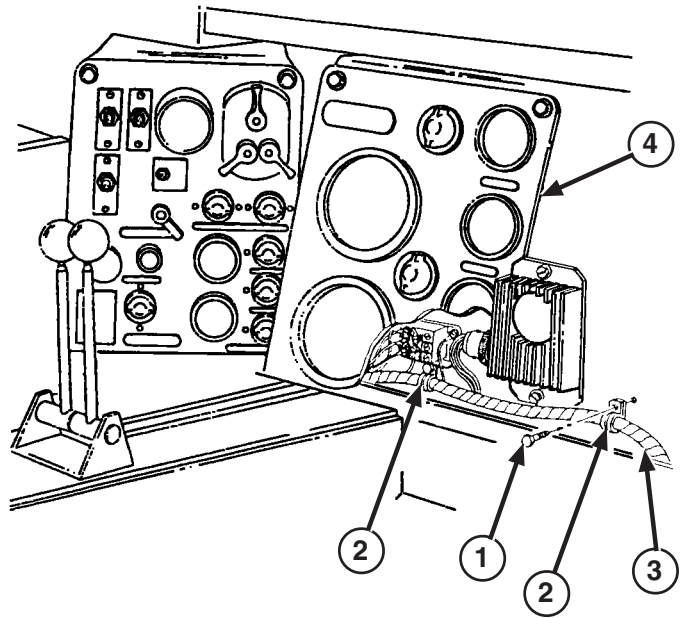
**REMOVAL**

**WARNING**  
 Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.

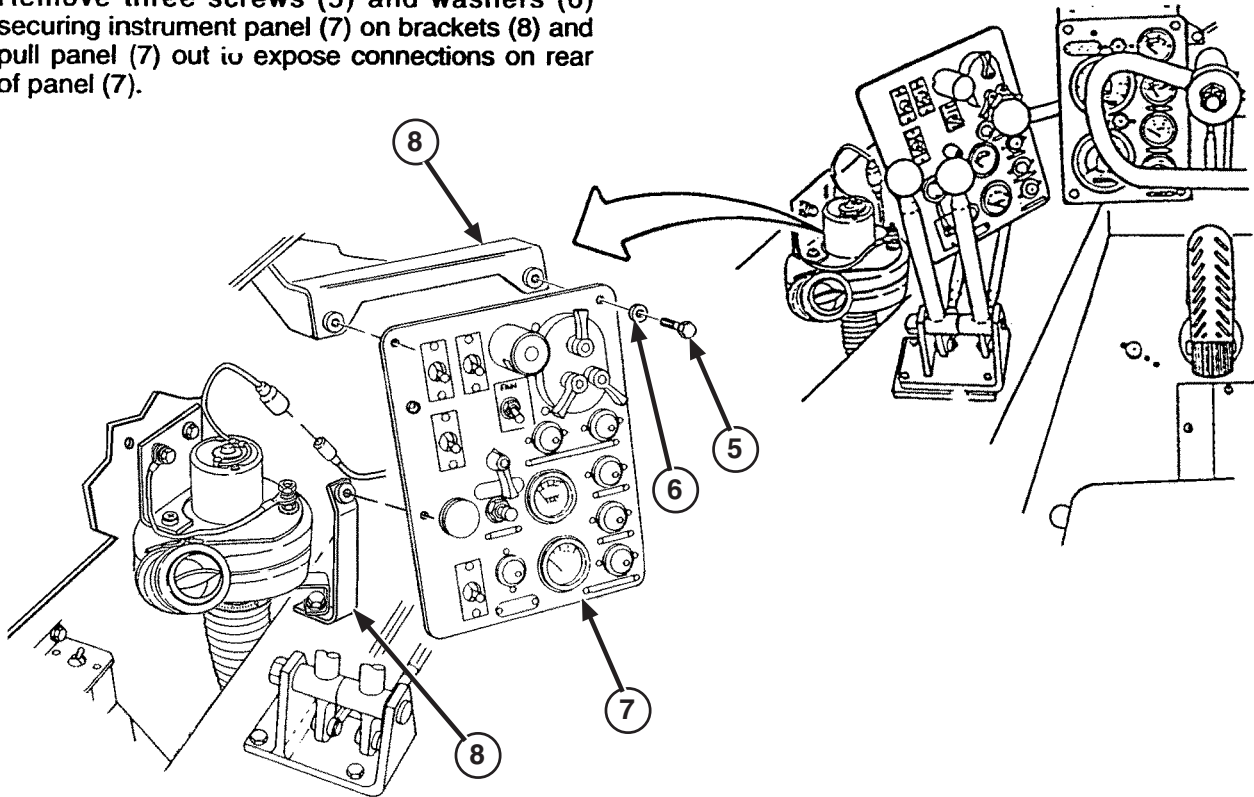
**Note**

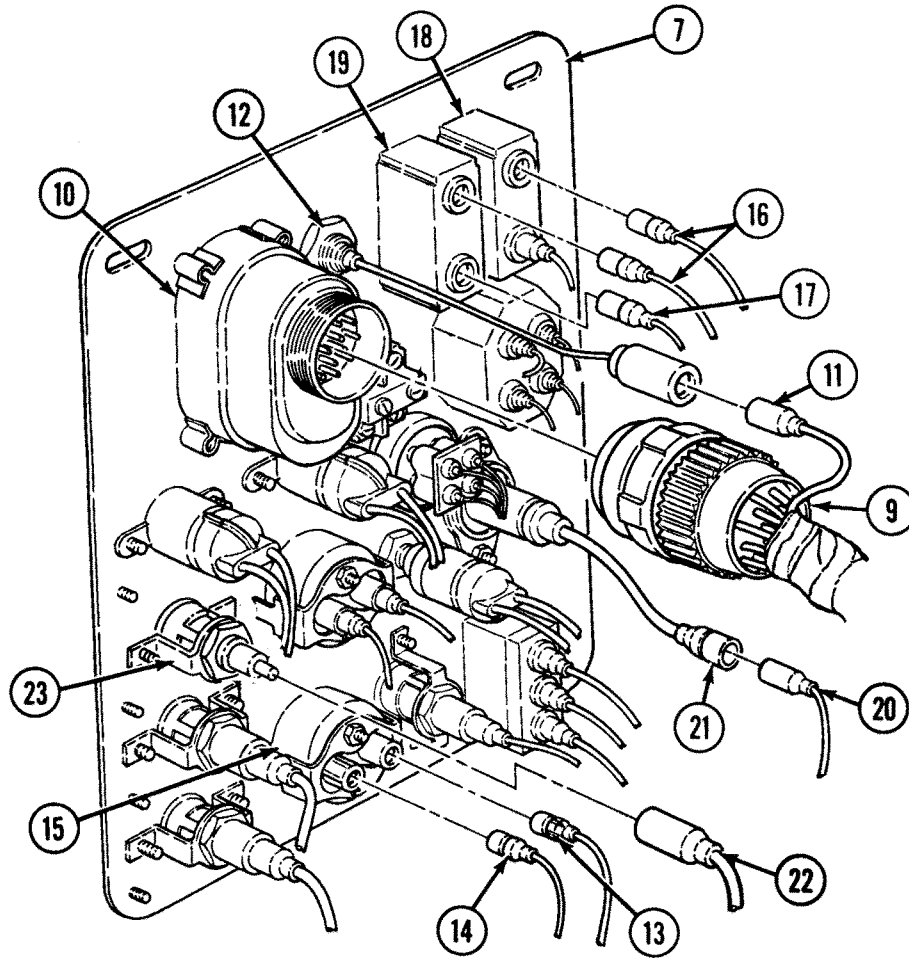
Tag all leads prior to removal for installation.

- A** From inside driver's compartment, remove two screws (1) and clamps (2) securing rear wiring harness (3) to driver's compartment wall behind gauge panel assembly (4).



- B** Remove three screws (5) and washers (6) securing instrument panel (7) on brackets (8) and pull panel (7) out to expose connections on rear of panel (7).

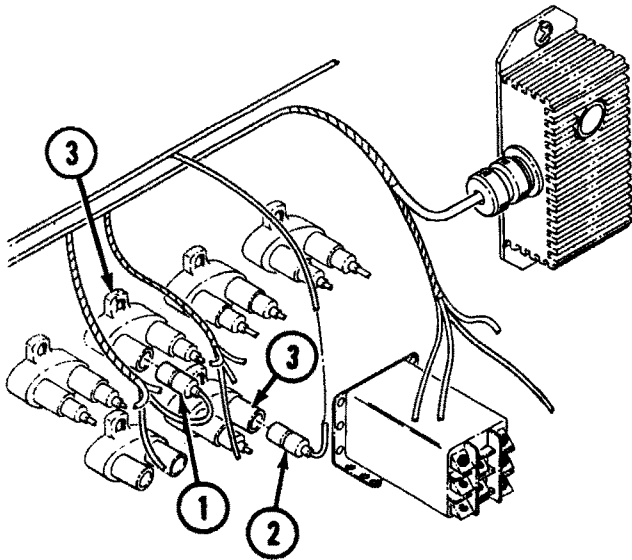




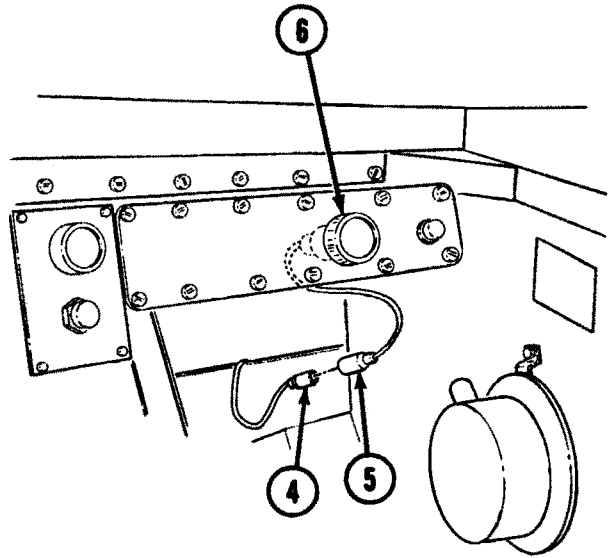
- C** From behind panel (7), disconnect cannon plug (9) from light switch (10).
- D** Disconnect lead 40 (11) from instrument panel light (12).
- E** Disconnect leads 27 (13) and 28 (14) from fuel level gauge (15).

- F** Disconnect two leads 518 (16) and leads 518B (17) from front floodlight switch (18) and rear floodlight switch (19).
- G** Disconnect lead 137 (20) from utility outlet (21).
- H** Disconnect lead 519 (22) from high-beam indicator light (23).

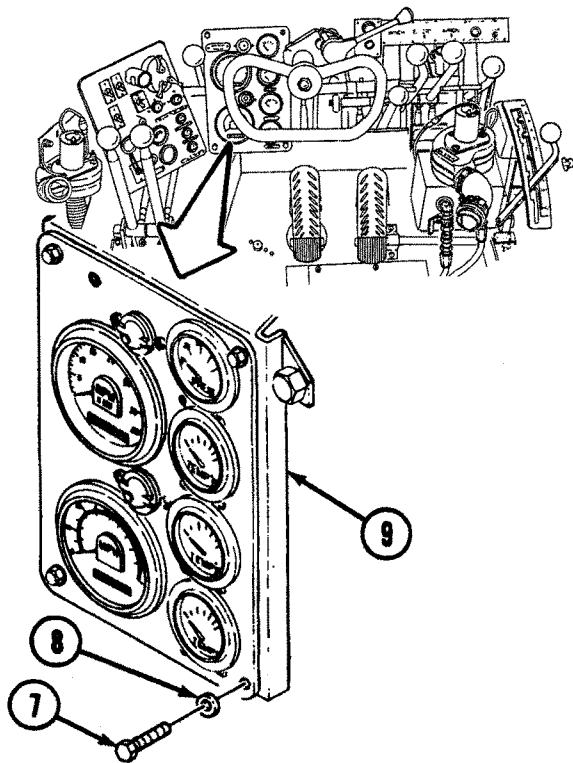




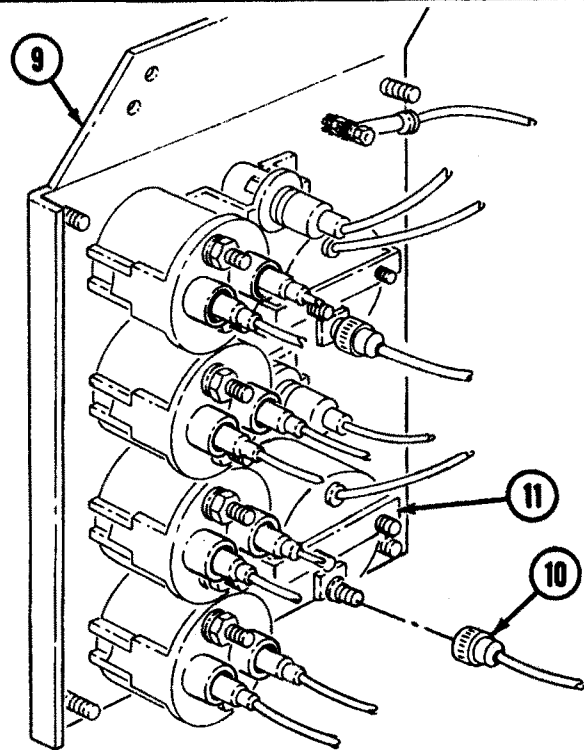
**I** Disconnect two leads 137/37 (1) and 15/27/381/431/999 (2) from two circuit breakers (3).



**J** Disconnect lead 38 (4) from connector (5) of domelight dimmer switch (6).



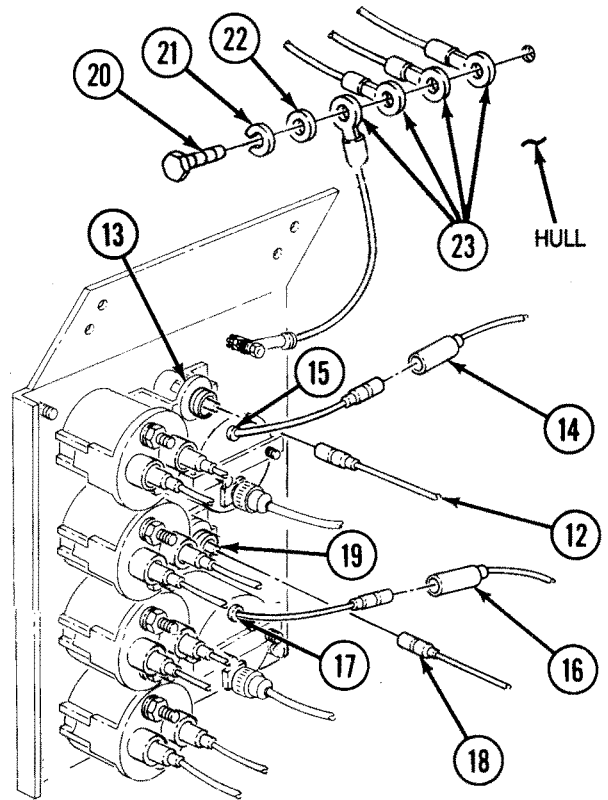
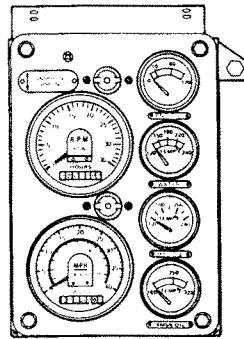
**K** Remove four screws (7) and washers (8) from gauge panel assembly (9).



**L** From behind gauge panel assembly (9), disconnect cannon plug (10) from speedometer (11).



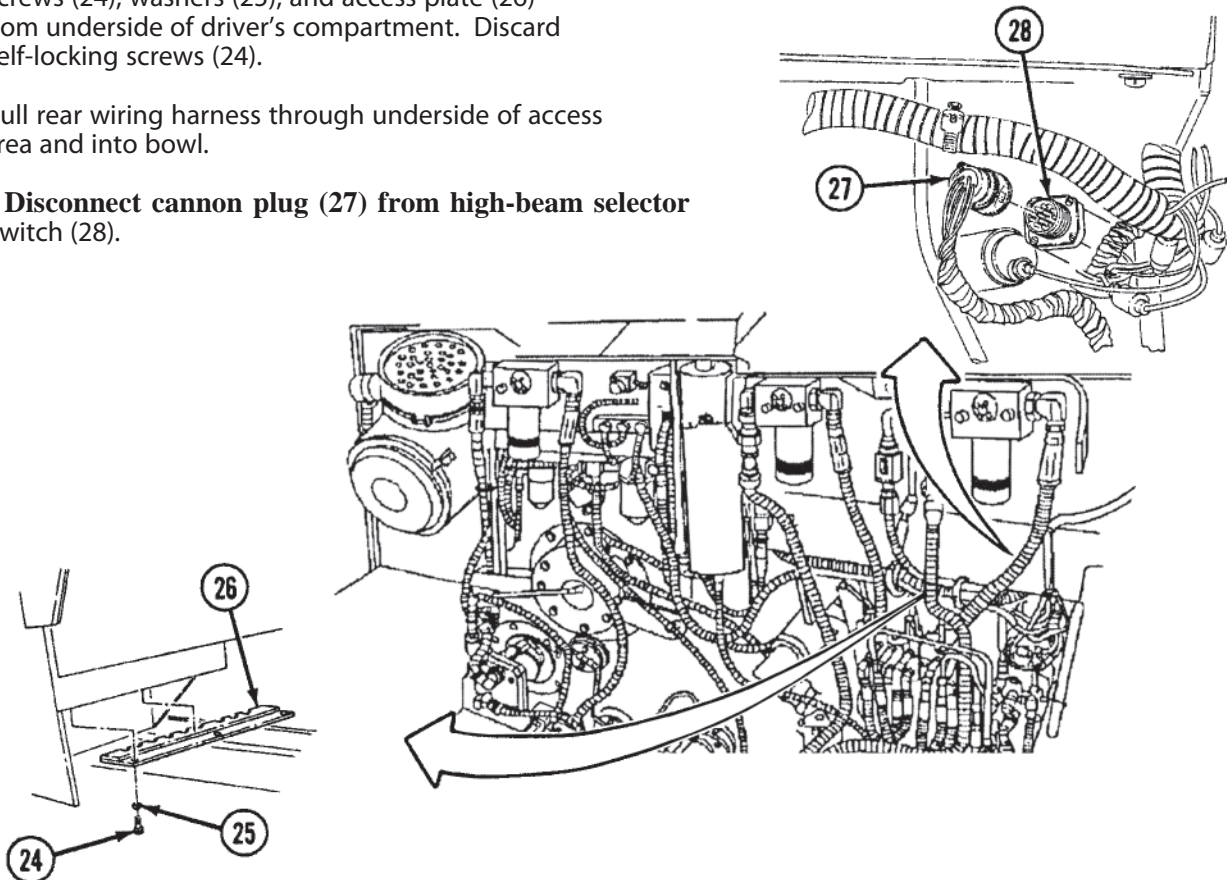
- M** Disconnect lead 40 (12) from top gauge panel light (13).
- N** Disconnect lead 40 (14) from tachometer light lead (15).
- O** Disconnect lead 40 (16) from speedometer light lead (17).
- P** Disconnect lead 40 (18) from bottom gauge panel light (19).
- Q** Remove screw (20), lockwasher (21), washer (22), and four ground wires (23) from hull. Discard lockwasher (21).

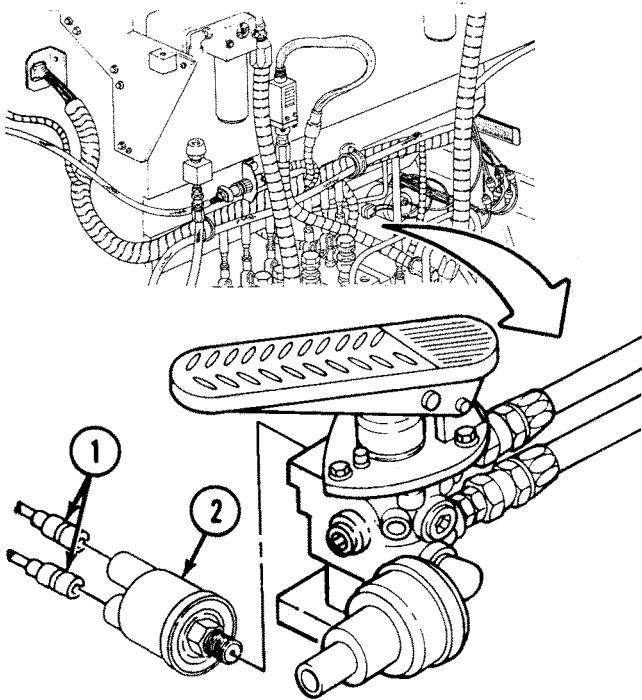


**R** From inside bowl, remove three self-locking screws (24), washers (25), and access plate (26) from underside of driver's compartment. Discard self-locking screws (24).

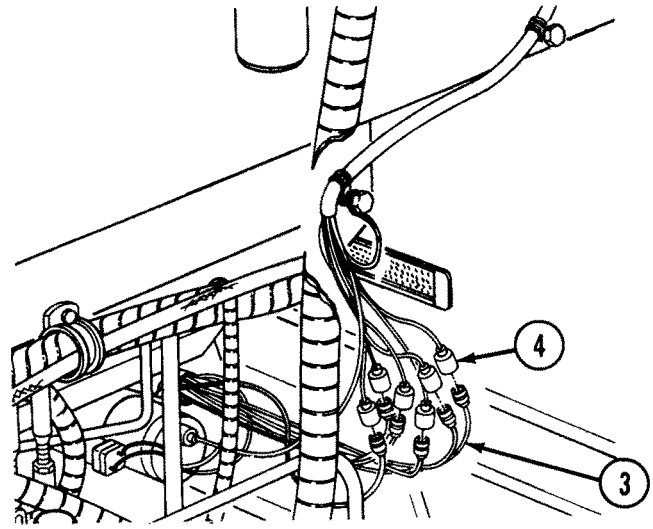
**S** Pull rear wiring harness through underside of access area and into bowl.

**T** Disconnect cannon plug (27) from high-beam selector switch (28).

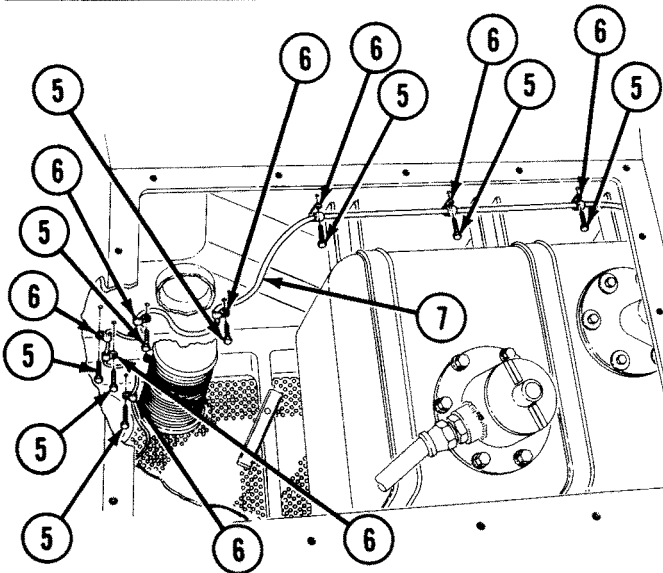




**U** Disconnect two electrical leads 75 (1) from stoplight switch (2).



**V** Disconnect rear wiring harness leads 17, 18, 19, 20, 514, and 515 (3) from wiring harness connectors (4).

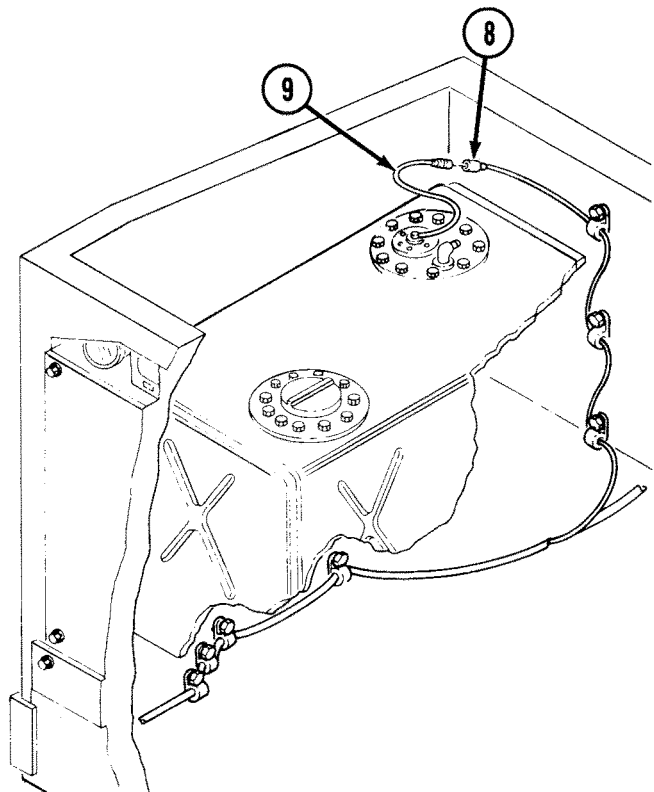


**Note**

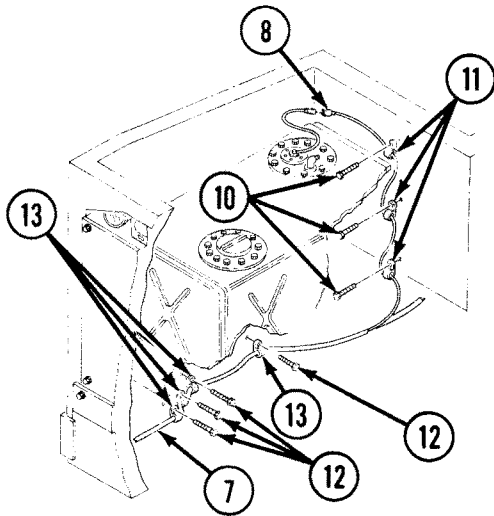
Do not remove hose assembly and battery box relay wiring harness from clamps.

**W** From inside driver's compartment, remove eight screws (5) and loop clamps (6) through floor access.

**X** Pull rear wiring harness (7) through floor access into driver's compartment.

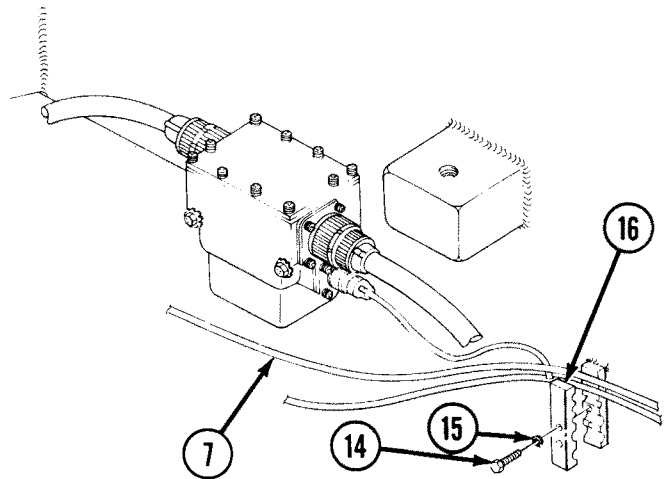


**Y** Disconnect lead (8) from fuel tank sending unit lead (9).



**Z** Remove three screws (10) and clamps (11) securing lead (8) to driver's compartment wall.

**AA** Remove four screws (12) and clamps (13) securing rear wiring harness (7) to hull.



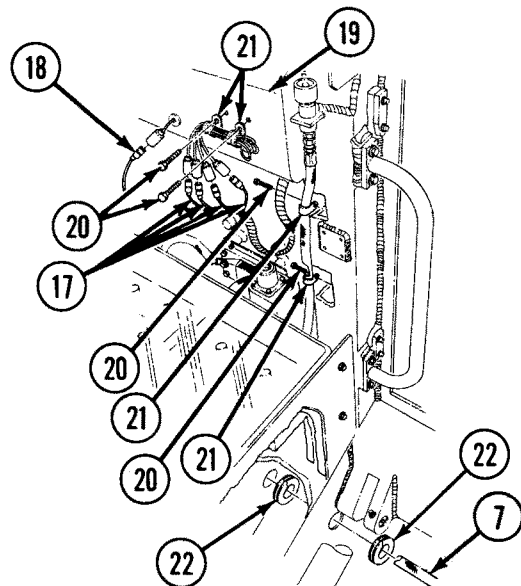
**AB** Remove six screws (14) and lockwashers (15) from three bar clamps (16). Discard lockwashers (15).

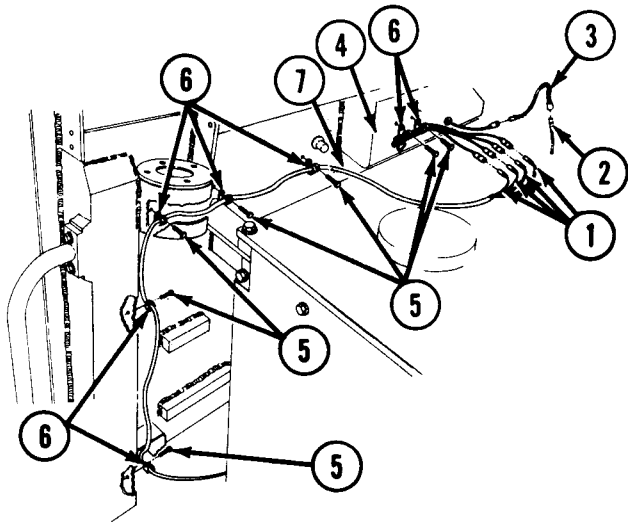
**AC** Separate rear wiring harness (7) from bar clamps (16). Do not separate any of the other lines from clamps (16).

**AD** Disconnect leads 21, 22, 23, and 24 (17) and lead 518B (18) from RH rear light assembly (19).

**AE** Remove four screws (20) and clamps (21) securing rear wiring harness (7) to hull and RH rear light assembly (19).

**AF** Pull rear wiring harness (7) through two grommets (22) into rear of vehicle. If damaged, remove two grommets (22).



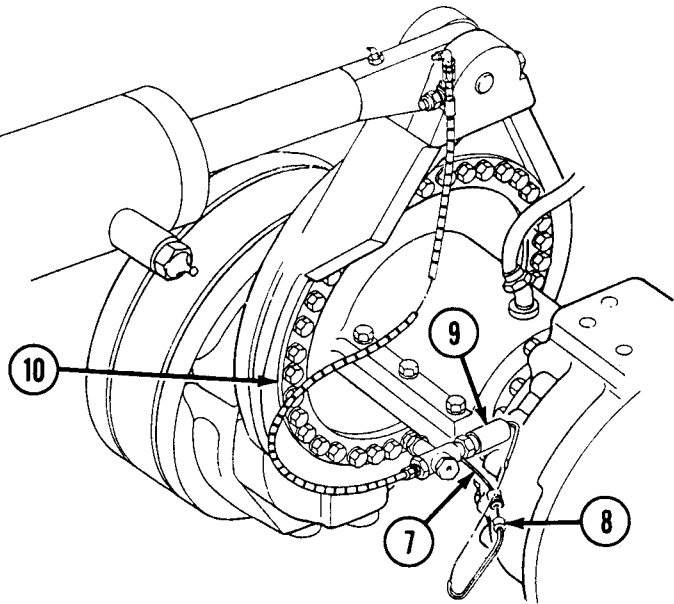


**AG** Disconnect leads 21, 22, 23, and 24 (1), lead 518B (2), and extension wire (3) from LH rear light assembly (4).

**Note**

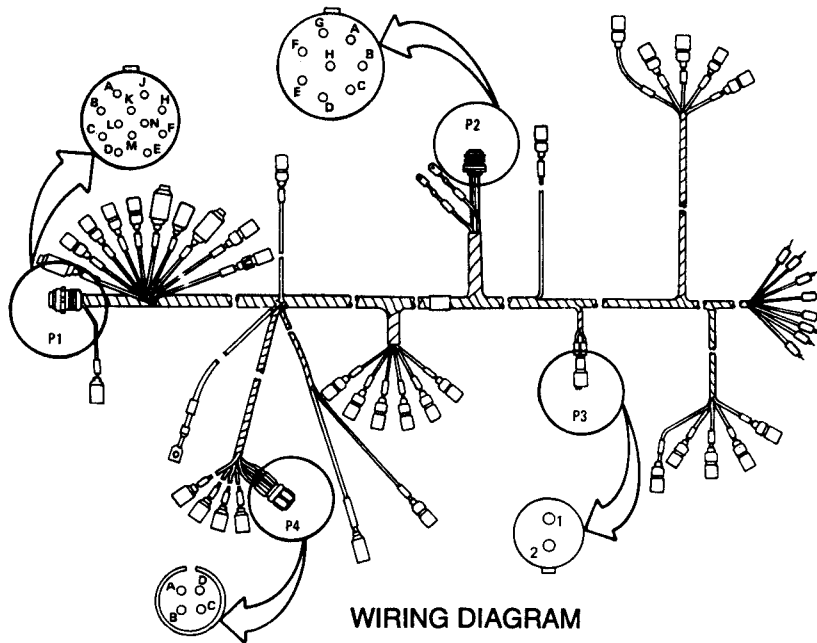
Remove baffle plate if vehicle has MCS unit installed (TM 5-2350-262-20-2).

**AH** Remove seven screws (5) and clamps (6) securing rear wiring harness (7) to hull and LH rear light assembly (4).

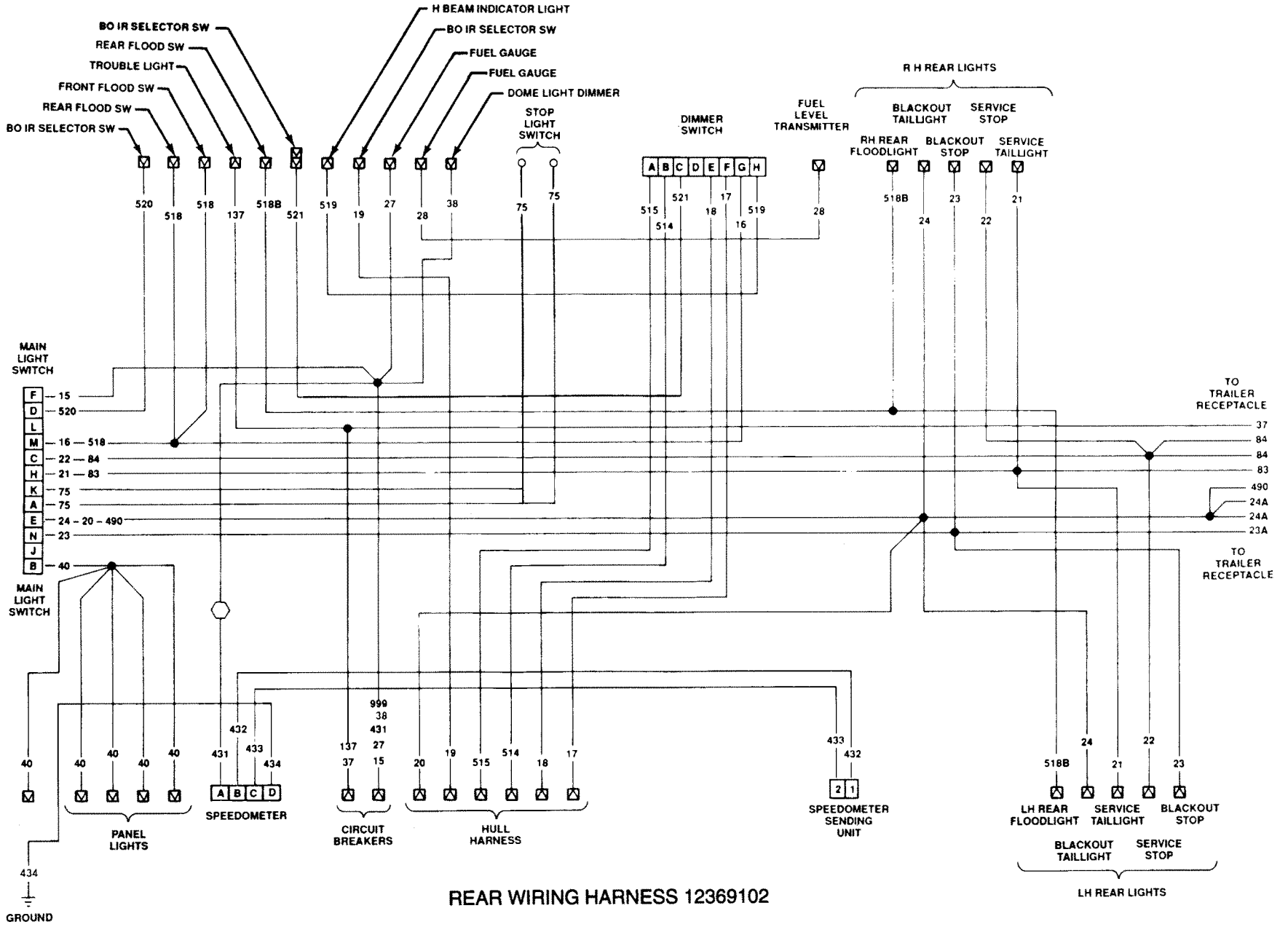


**AI** Disconnect electrical lead (8) from adapter (9) on track adjusting flange (10). Remove rear wiring harness (7) from vehicle.

**REPAIR**

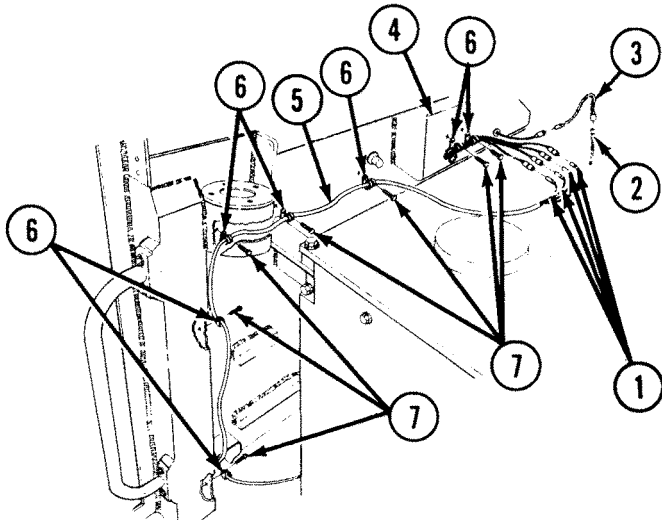


Refer to page 2-10 to repair the rear wiring harness.



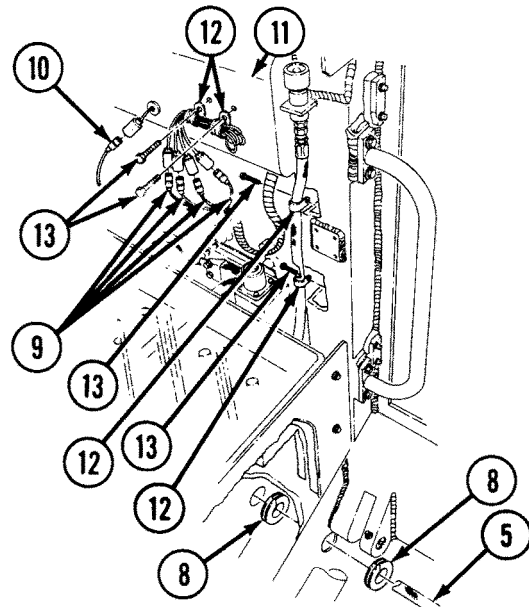


**INSTALLATION**



**A** Connect leads 21, 22, 23, and 24 (1), lead 518B (2), and extension wire (3) to LH rear light assembly (4).

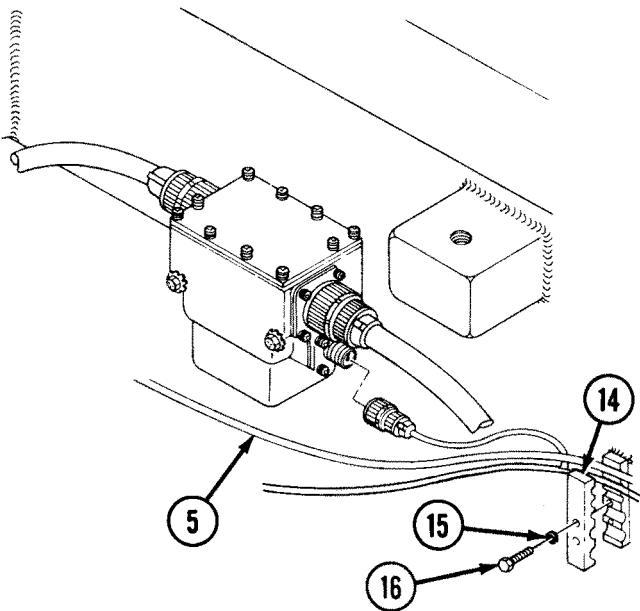
**B** Secure rear wiring harness (5) to hull and LH rear light assembly (4) with seven clamps (6) and screws (7).



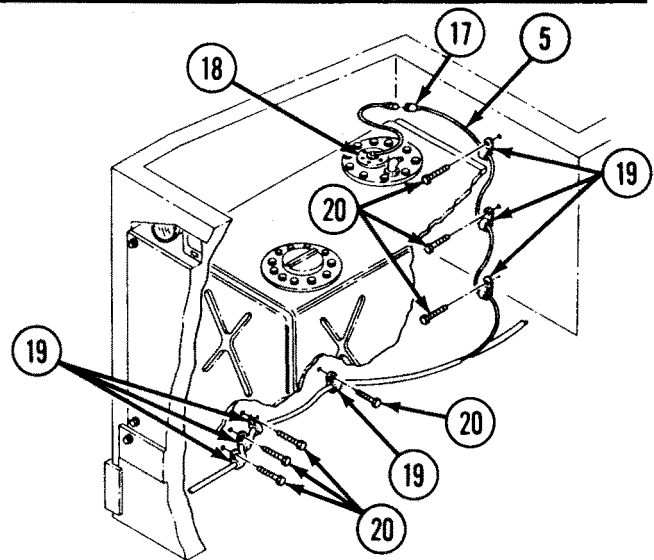
**C** If removed, install two grommets (8) on hull. Route rear wiring harness (5) through grommets (8).

**D** Connect leads 21, 22, 23, and 24 (9) and lead 518B (10) to RH rear light assembly (11).

**E** Secure rear wiring harness (5) to hull and RH rear light assembly (11) with four clamps (12) and screws (13).



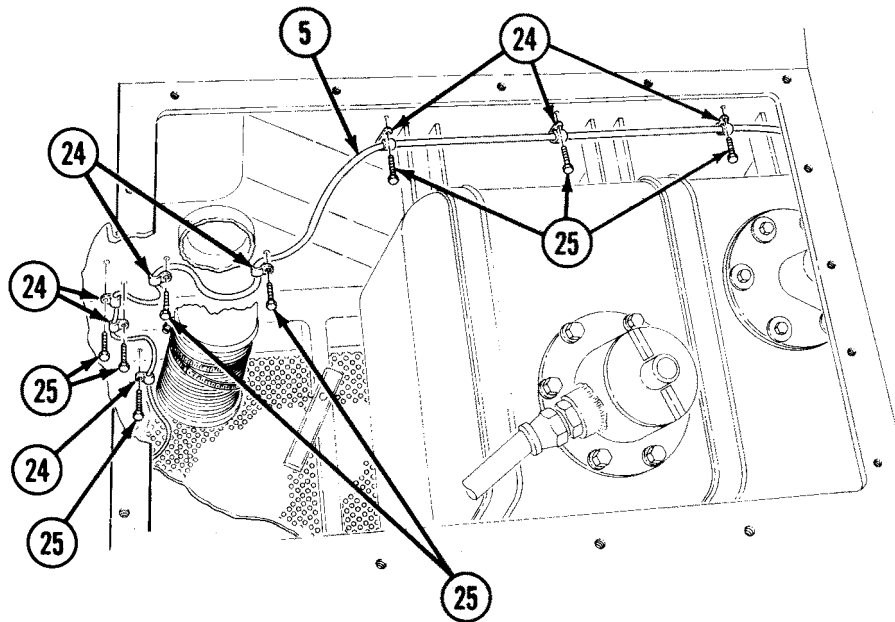
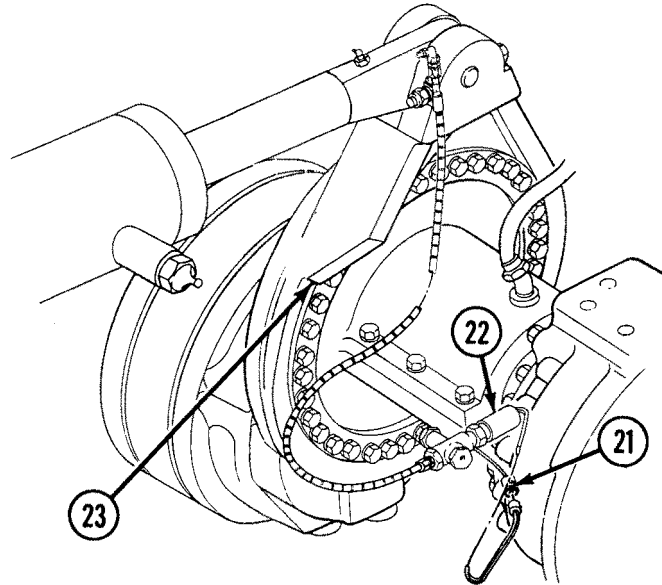
**F** Place rear wiring harness (5) in three bar clamps (14) and secure with six lockwashers (15) and screws (16).



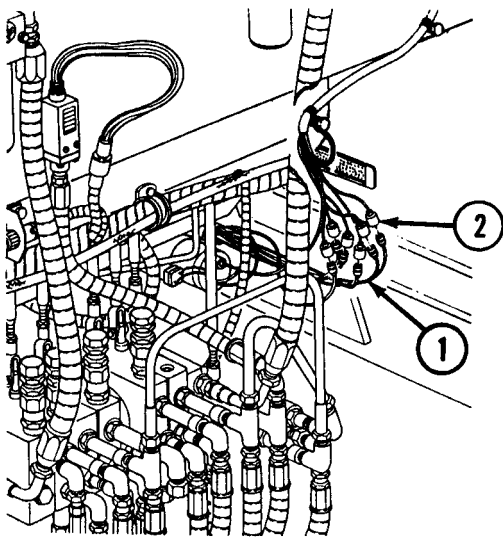
**G** Route rear wiring harness (5) forward and connect lead (17) to fuel tank sending unit lead (18).

**H** Secure rear wiring harness (5) to hull with seven loop clamps (19) and screws (20).

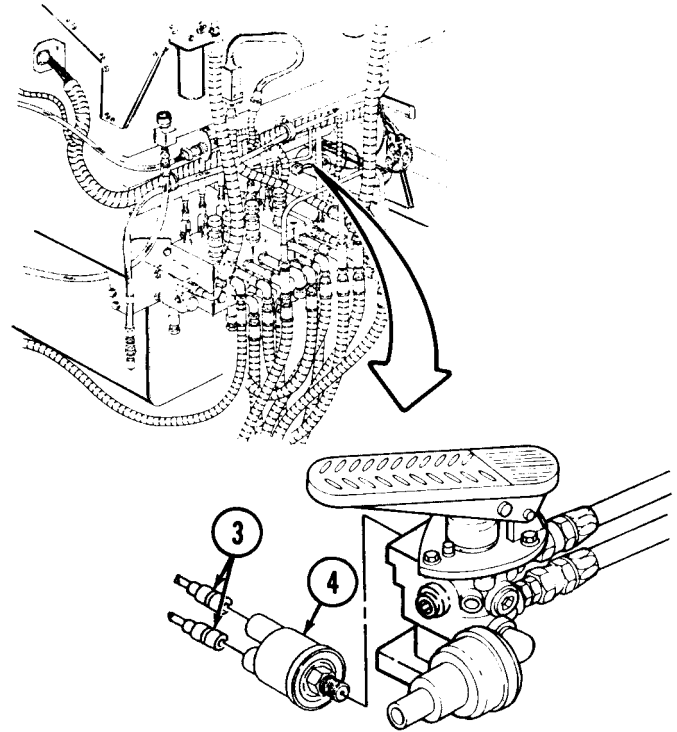
- I Connect electrical lead (21) to adapter (22) on track adjusting flange (23).



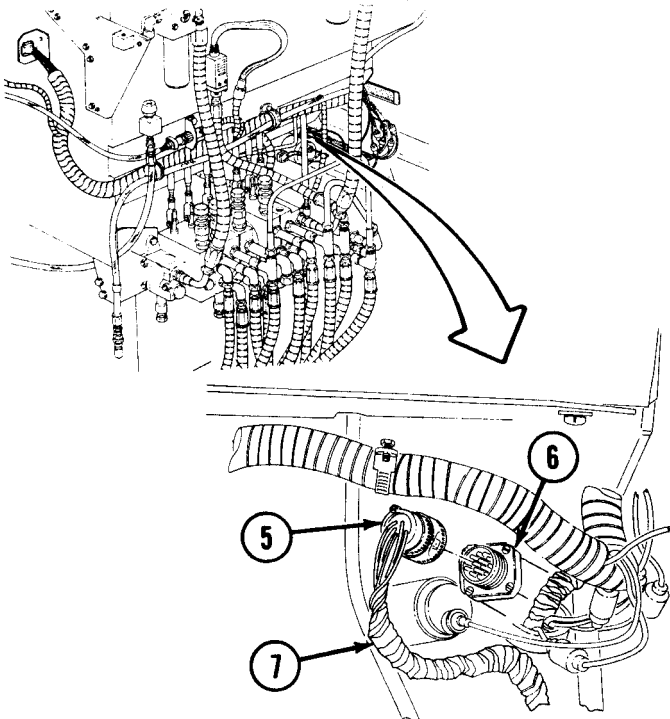
- J From inside driver's compartment, pull rear wiring harness (5) through floor access and push wiring harness (5) forward into bowl.
- K Secure rear wiring harness (5) to hull with eight clamps (24) and screws (25).



**L** From inside bowl, connect rear wiring harness leads 17, 18, 19, 20, 514, and 515 (1) to wiring harness connectors (2).

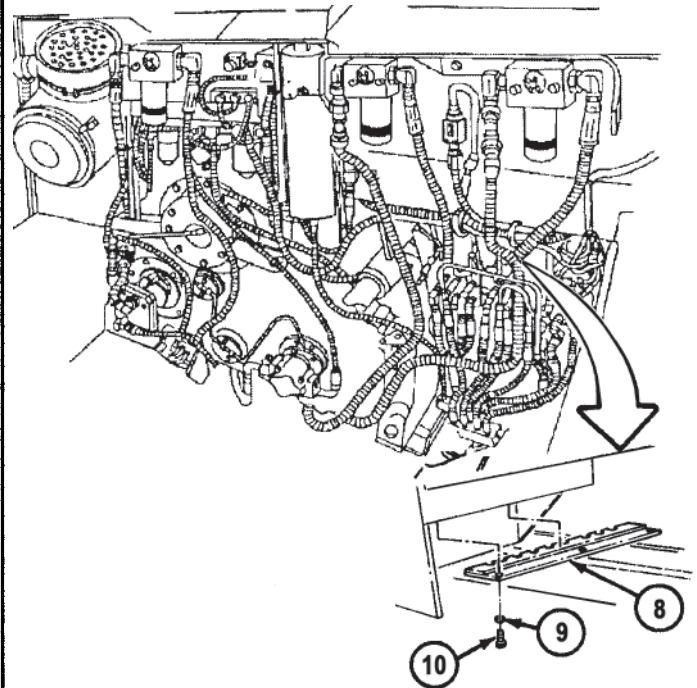


**M** Connect two electrical leads 75 (3) to stoplight switch (4).



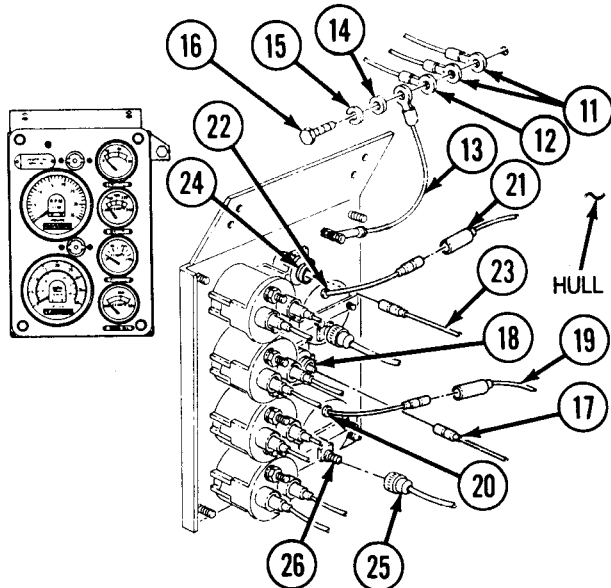
**N** Connect canon plug (5) to high-beam selector switch (6).

**O** Push rear wiring harness (7) into driver's compartment through floor access.

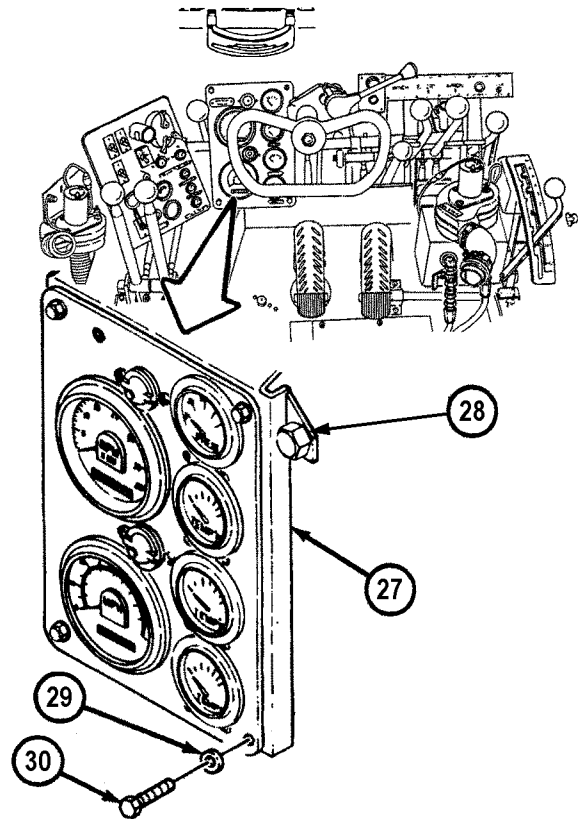


**P** Secure access plate (8) to underside of driver's compartment with three washers (9) and self-locking screws (10).

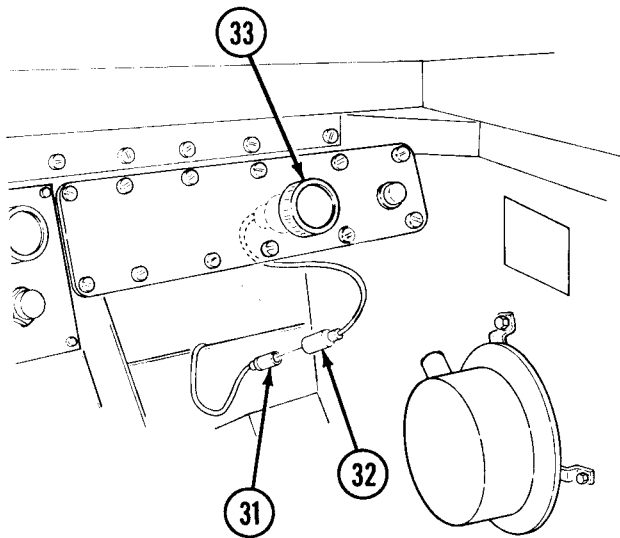




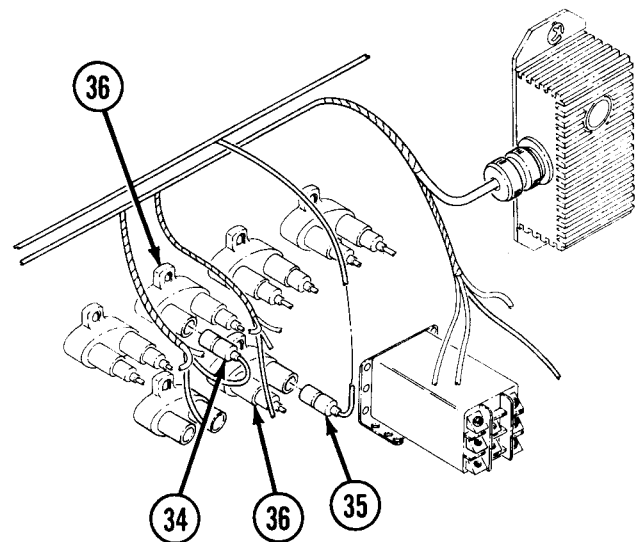
- Q** Connect two ground wires 139E (11), ground wire 434 (12), and ground wire 57 (13) to hull with washer (14), lockwasher (15), and screw (16).
- R** Connect lead 40 (17) to bottom gauge panel light (18).
- S** Connect lead 40 (19) to speedometer light (20).
- T** Connect lead 40 (21) to tachometer light (22).
- U** Connect lead 40 (23) to top gauge panel light (24).
- V** Connect cannon plug (25) to speedometer (26).



- W** Secure gauge panel assembly (27) to bracket (28) with four washers (29) and screws (30).

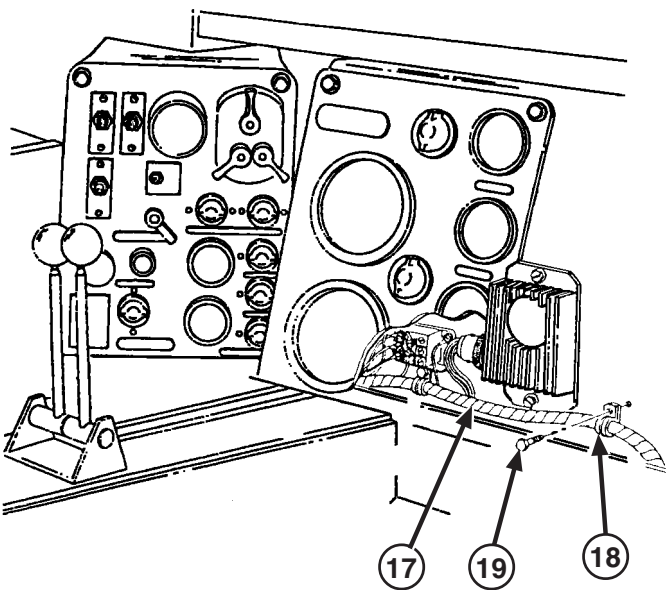
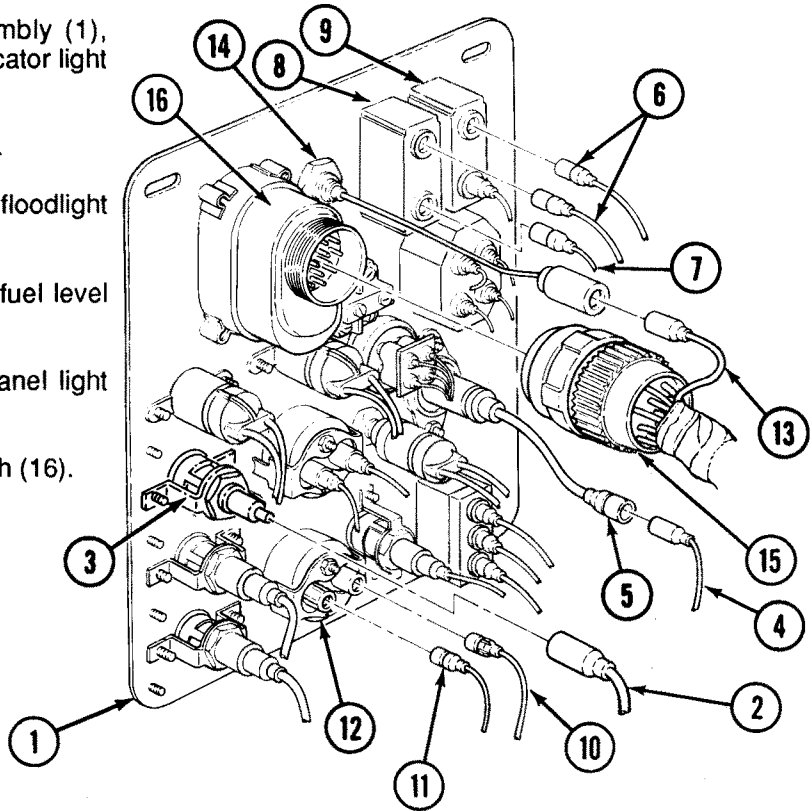


- X** Connect lead 38 (31) to lead (32) of domelight dimmer switch (33).

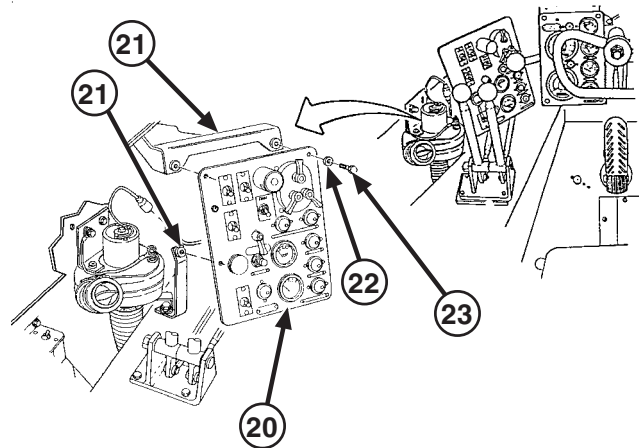


- Y** Connect two leads 137/37 (34) and 15/27/381/-431/999 (35) to two circuit breakers (36).

- Z** From behind instrument panel assembly (1), connect lead 519 (2) to high-beam indicator light (3).
- AA** Connect lead 137 (4) to utility outlet (5).
- AB** Connect leads 518 (6) and 518B (7) to floodlight switches (8) and (9).
- AC** Connect leads 27 (10) and 28 (11) to fuel level gauge (12).
- AD** Connect lead 40 (13) to instrument panel light (14).
- AE** Connect cannon plug (15) to light switch (16).



- AF** Secure rear wiring harness (17) to driver's compartment wall with two clamps (18) and screws (19).



- AG** Secure instrument panel (20) to brackets (21) with three washers (22) and screws (23).

**FOLLOW-ON TASKS:**

- Install trailer receptacle (TM 5-2350-262-20-1).
- Install battery box (TM 5-2350-262-20-1).
- Install fuel tank armor (TM 5-2350-262-20-1).
- Install driver's compartment floor plate (TM 5-2350-262-20-1).
- Retract ejector (TM 5-2350-262-20-1).

# CONTROL WIRING HARNESS REPLACEMENT AND REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Materials:

Tape, Electrical                      Item 40  
Appendix C

Parts:

- Lockwasher (17)
- Self-locking Screw (3)
- Tiedown Strap (AR)

Parts Reference:

TM 5-2350-262-24P      Group AJ

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

- TM 5-2350-262-10
- TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Ejector Forward
TM 5-2350-262-20-1	Air Pressure Relieved
TM 5-2350-262-20-1	Hydraulic Pressure Relieved
TM 5-2350-262-20-1	Engine Intake Grilles and Covers Removed
TM 5-2350-262-20-1	Negative Battery Cables Disconnected
TM 5-2350-262-20-1	Driver's Floor Plate Removed

General Safety Instructions:

### WARNING

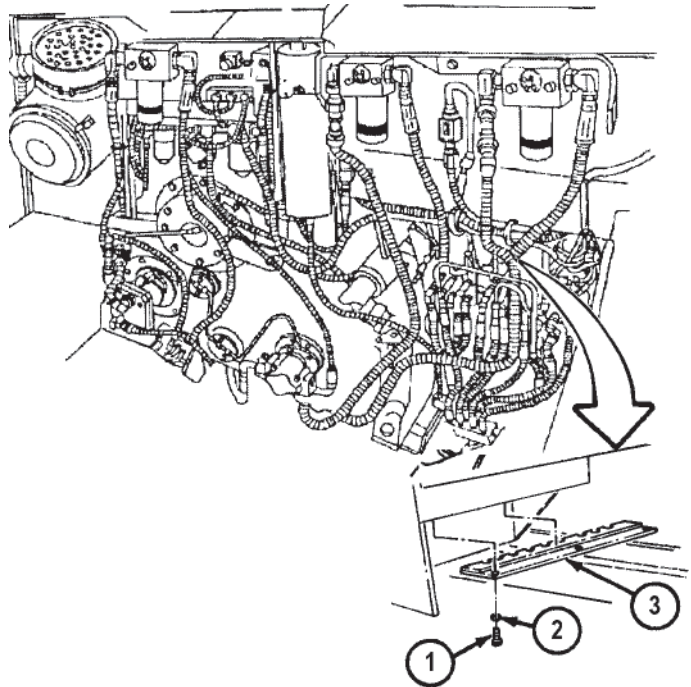
- Disconnect batteries at the negative terminals before working on the electrical system.
- Do not disconnect LOW-AIR pressure warning switch unless air pressure has been relieved.
- Do not disconnect UNSPRUNG warning switch unless hydraulic pressure has been relieved.

**REMOVAL**

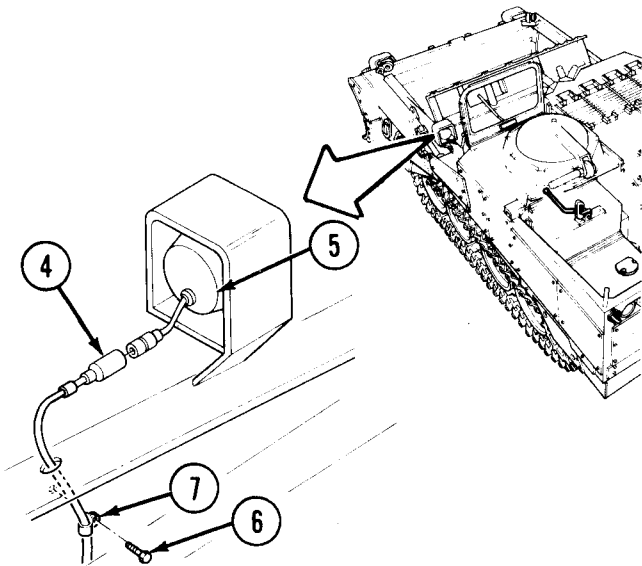
**WARNING**  
 Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.

**Note**

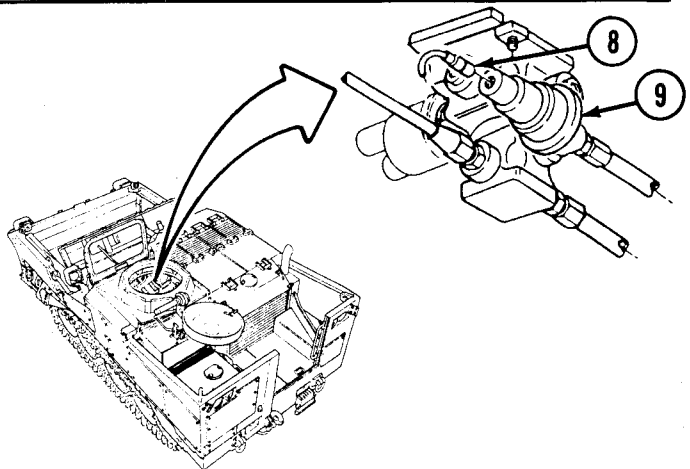
- Mechanic No. 1 should perform steps A through O. Mechanic No. 2 should begin at step P.
- Tag all electrical leads prior to removal for installation.
- If identification tags are not legible, refer to vehicle electrical system schematic diagram (FP-3).



**A** From bowl area, remove three self-locking screws (1), washers (2), and access plate (3) from underside of driver's compartment. Discard self-locking screws (1).

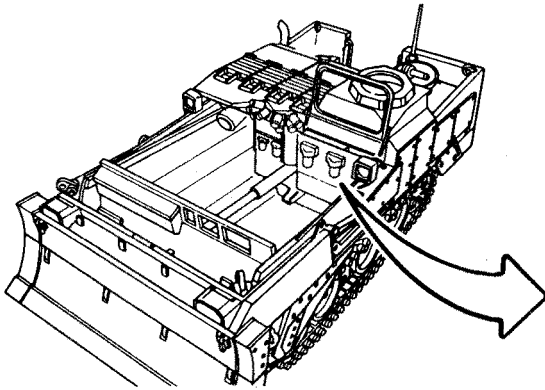


- B** Disconnect lead 518A (4) from LH front floodlight (5).
- C** Remove four screws (6) and clamps (7) securing lead 518A (4) to hull. Remove lead 518A (4) from clamps (7).



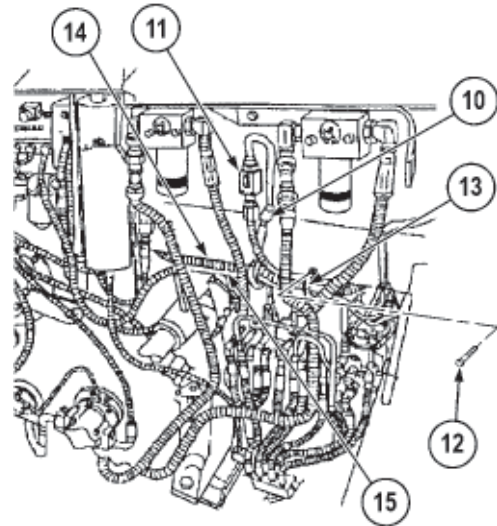
**WARNING**  
 Do not disconnect LOW-AIR pressure warning switch unless air pressure has been relieved. Failure to comply may result in severe injury to personnel.

**D** Disconnect lead 85 (8) from LOW-AIR pressure switch (9).

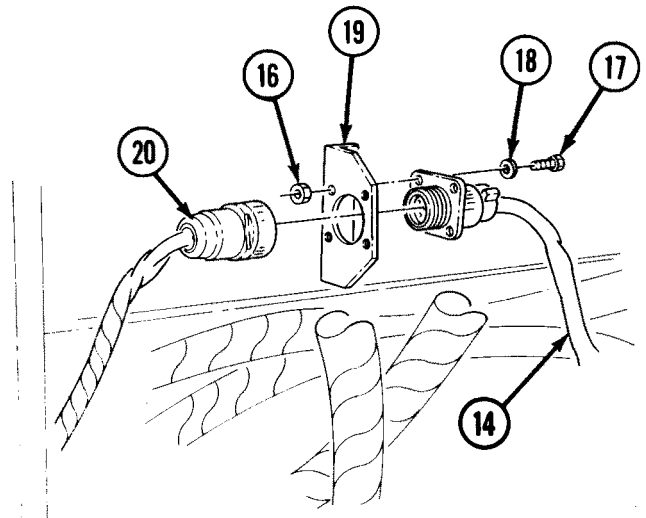
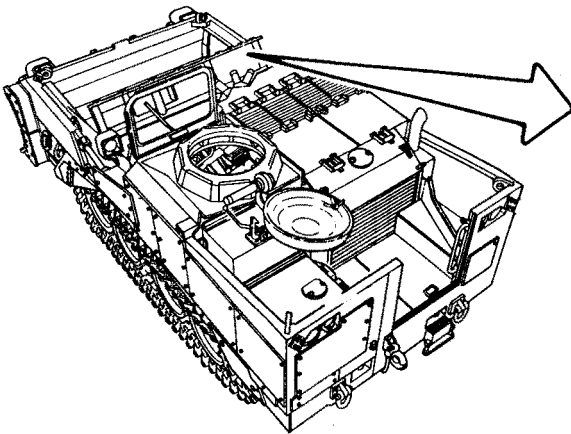


**WARNING**

Do not disconnect UNSPRUNG warning switch unless hydraulic pressure has been relieved. Failure to comply may result in severe injury to personnel.

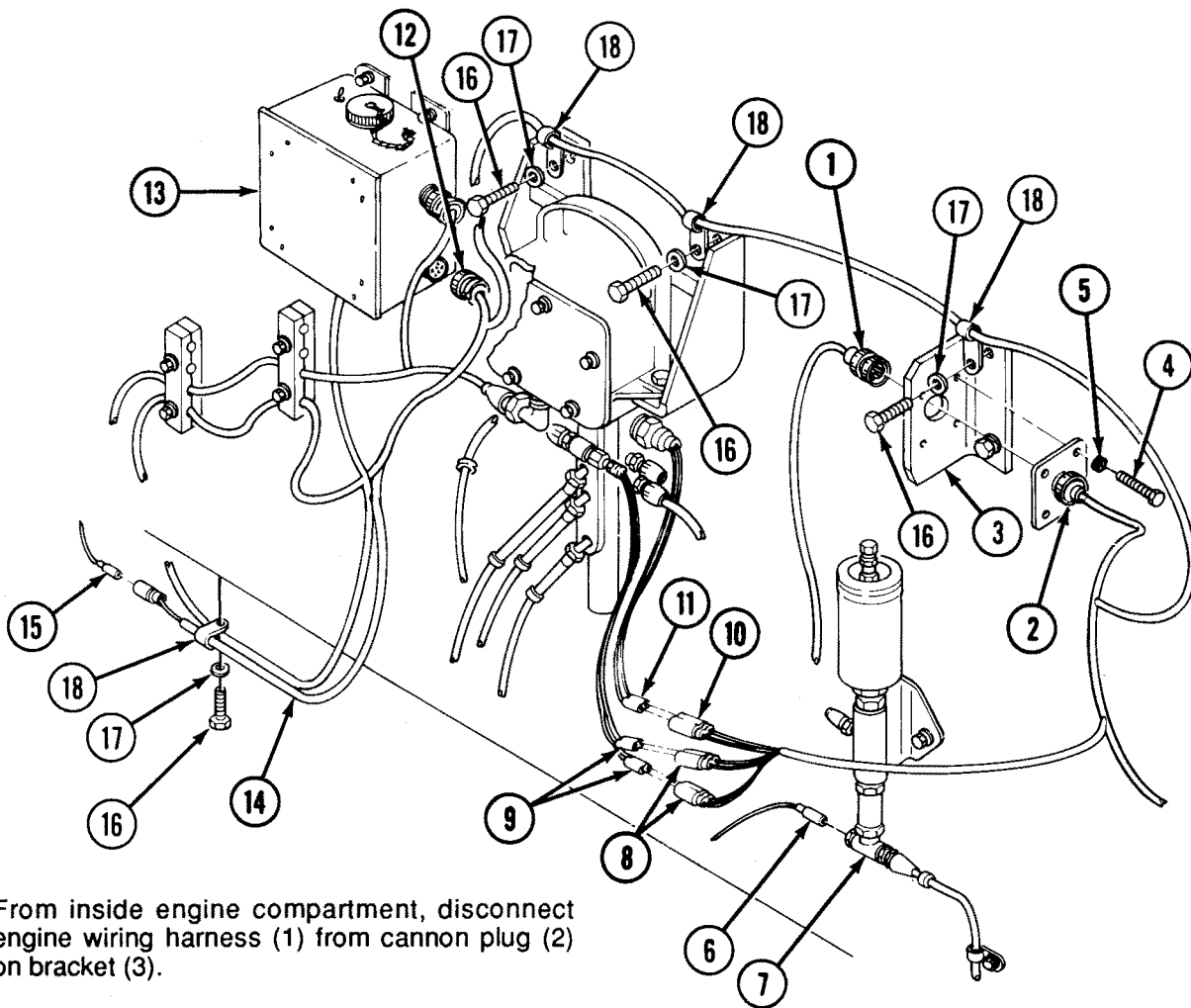


- E** Disconnect lead 509/509B/509C (10) from UNSPRUNG pressure switch (11).
- F** Remove three screws (12) and clamps (13) securing control wiring harness (14) and air lines (15) to hull. Remove control wiring harness (14) from clamps (13).



- G** Remove four nuts (16), screws (17), lockwashers (18), and control wiring harness (14) from bracket (19) and smoke grenade wiring harness cannon plug (20). Discard lockwashers (18). Remove control wiring harness (14).



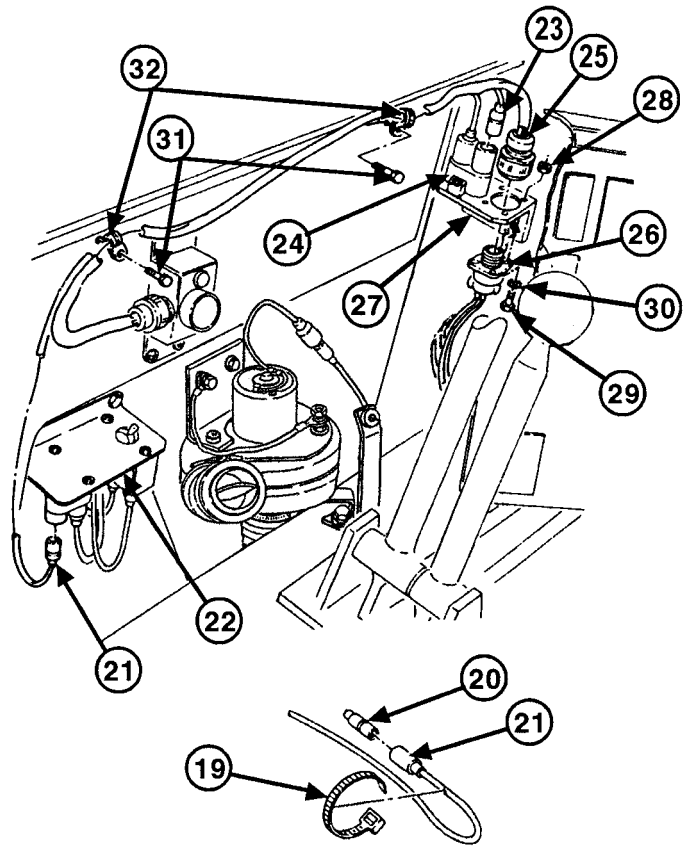


- H** From inside engine compartment, disconnect engine wiring harness (1) from cannon plug (2) on bracket (3).
- I** Remove four screws (4), lockwashers (5), and cannon plug (2) from bracket (3). Discard lockwashers (5).
- J** Disconnect lead 72 (6) from low transmission oil pressure sending unit (7).
- K** Disconnect leads 509B/509C and 509D/509F (8) from reverse alarm switch leads (9).
- L** Disconnect lead 11A/11B/509H (10) from neutral safety switch leads (11).
- M** Disconnect cannon plug (12) from STE/ICE-R resistor box (13).
- N** Disconnect control wiring harness (14) at connector (15).
- O** Remove four screws (16), washers (17), and clamps (18) securing control wiring harness (14) to hull.

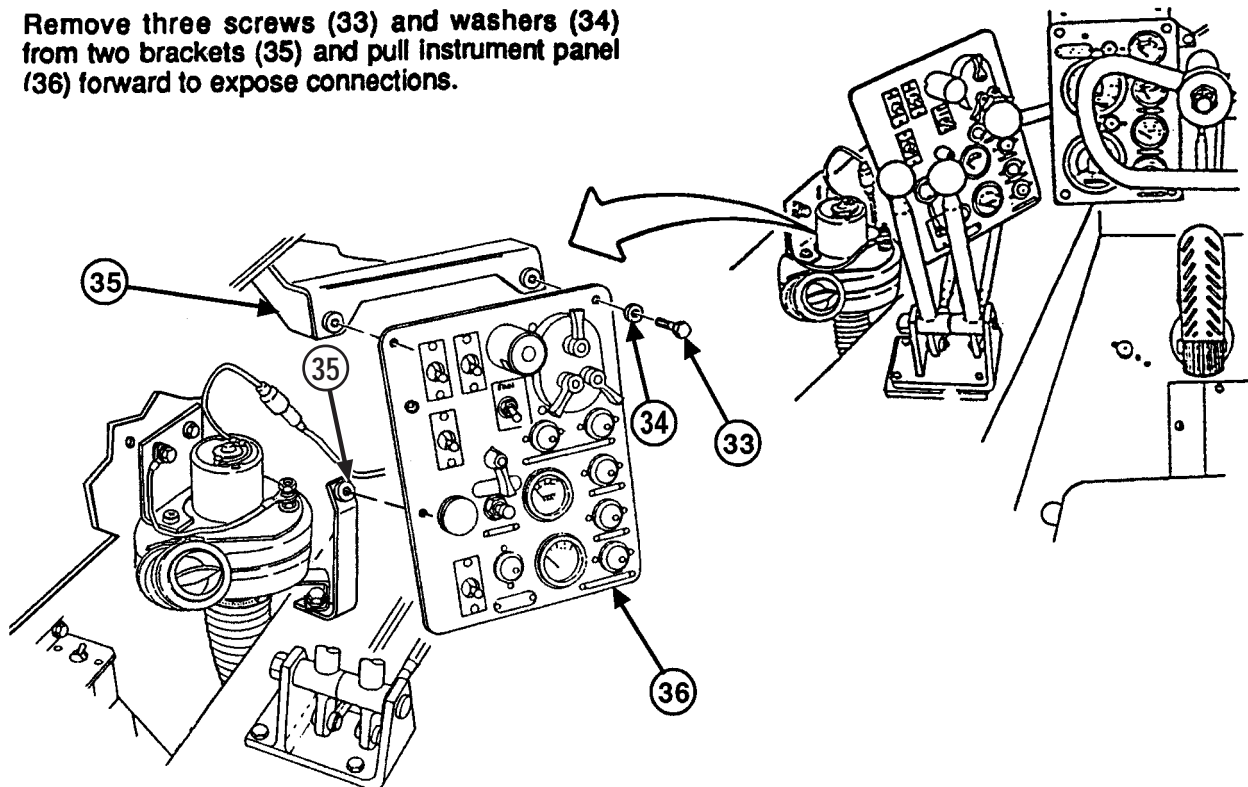
**Note**

- The air purifier switch assembly is removed on vehicles with MCS unit installed. Perform step P on vehicles with MCS unit installed, and perform step Q on vehicles with air purifier switch.
- Circuit 10 is a common power circuit. Tag all electrical leads prior to removal for installation.

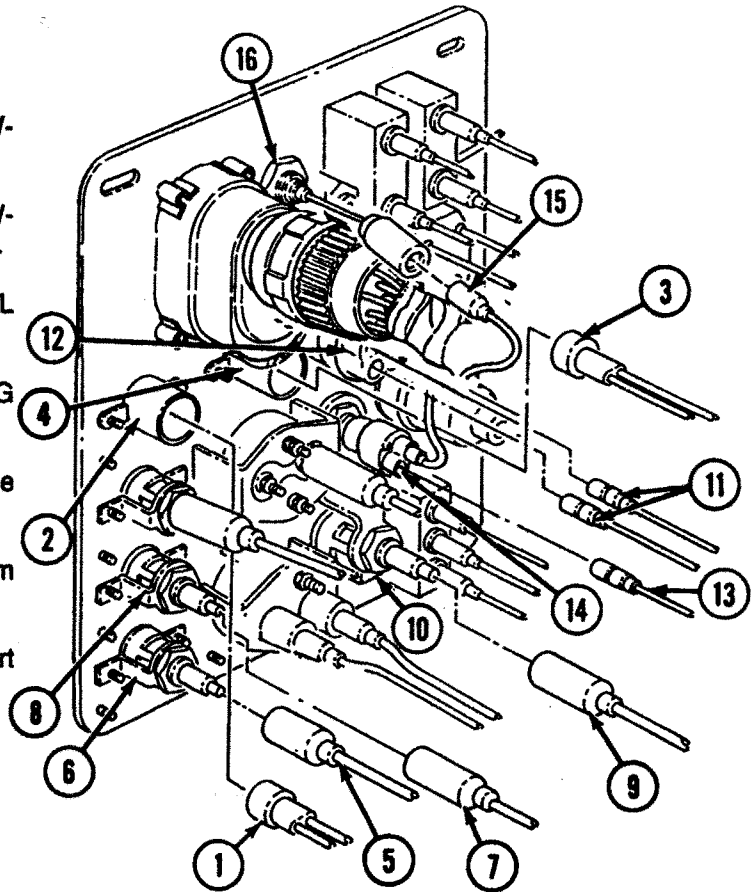
- P** Remove tiedown strap (19) and plug (20) from lead 10 (21). Discard tiedown strap (19).
- Q** From inside driver's compartment, disconnect lead 10 (21) from air purifier switch (22).
- R** Disconnect lead 10 (23) from circuit breaker (24).
- S** Disconnect cannon plug (25) from lead 139A/798 (26) and bracket (27).
- T** Remove four nuts (28), screws (29), lock-washers (30), and lead 139A/798 (26) from bracket (27). Discard lockwashers (30).
- U** Remove two screws (31), clamps (32), and lead 10 (21) from driver's compartment wall. Remove clamps (32) from lead 10 (21).



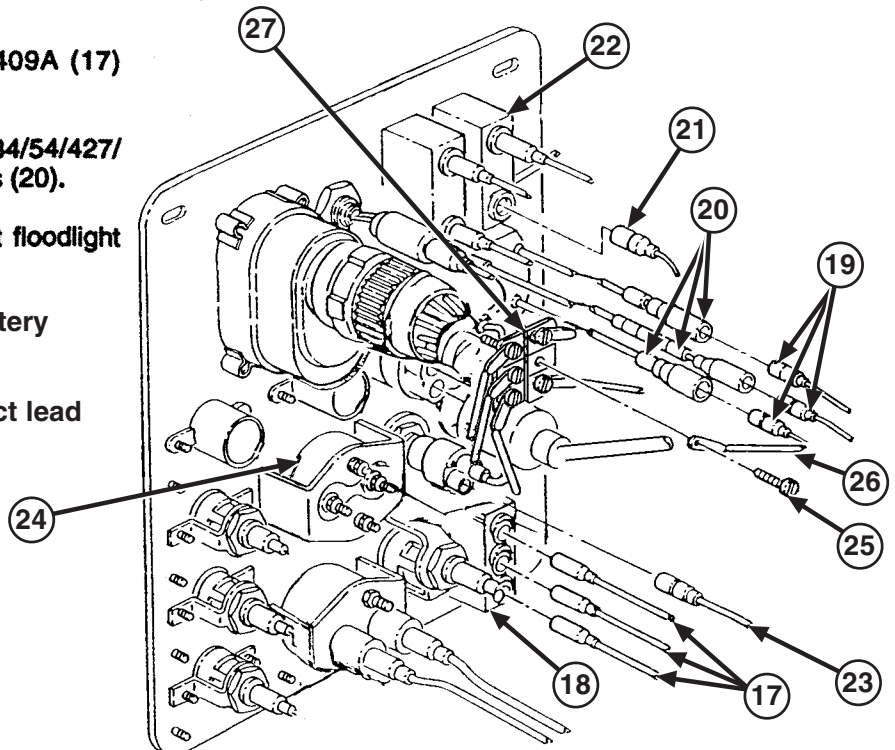
- V** Remove three screws (33) and washers (34) from two brackets (35) and pull instrument panel (36) forward to expose connections.



- W** Disconnect leads 509 and 85 (1) from LOW-AIR pressure warning light (2).
- X** Disconnect leads 509 and 72 (3) from LOW-TRANSMISSION oil pressure warning light (4).
- Y** Disconnect lead 34A (5) from LOW-OIL pressure warning light (6).
- Z** Disconnect lead 509E (7) from UNSPRUNG warning light (8).
- AA** Disconnect lead 509K (9) from parking brake warning light (10).
- AB** Disconnect leads 11B and 11C (11) from ignition switch (12).
- AC** Disconnect leads 14A and 14B (13) from start switch (14).
- AD** Disconnect lead 40 (15) from panel light (16).

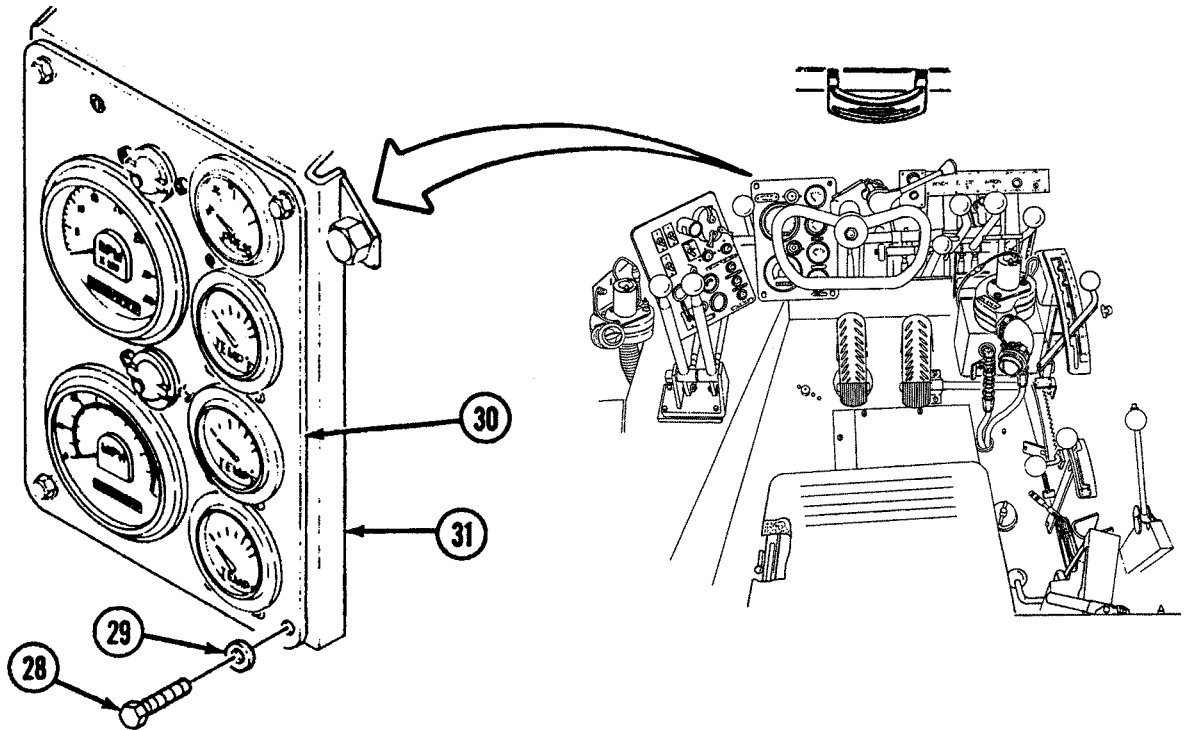


- AE** Disconnect leads 409B, 400, and 409A (17) from driver's heater switch (18).
- AF** Disconnect leads 459A, 459B and 34/54/427/568/569 (19) from master switch leads (20).
- AG** Disconnect lead 518A (21) from front floodlight switch (22).
- AH** Disconnect lead 567 (23) from battery gauge (24).
- AI** Remove screw (25) and disconnect lead 411A (26) from fan switch (27).





**AJ** Remove four screws (28), washers (29), and gauge panel assembly (30) from bracket (31).



**Note**

Circuit 27A is a common power circuit. Tag all electrical leads prior to removal for installation.

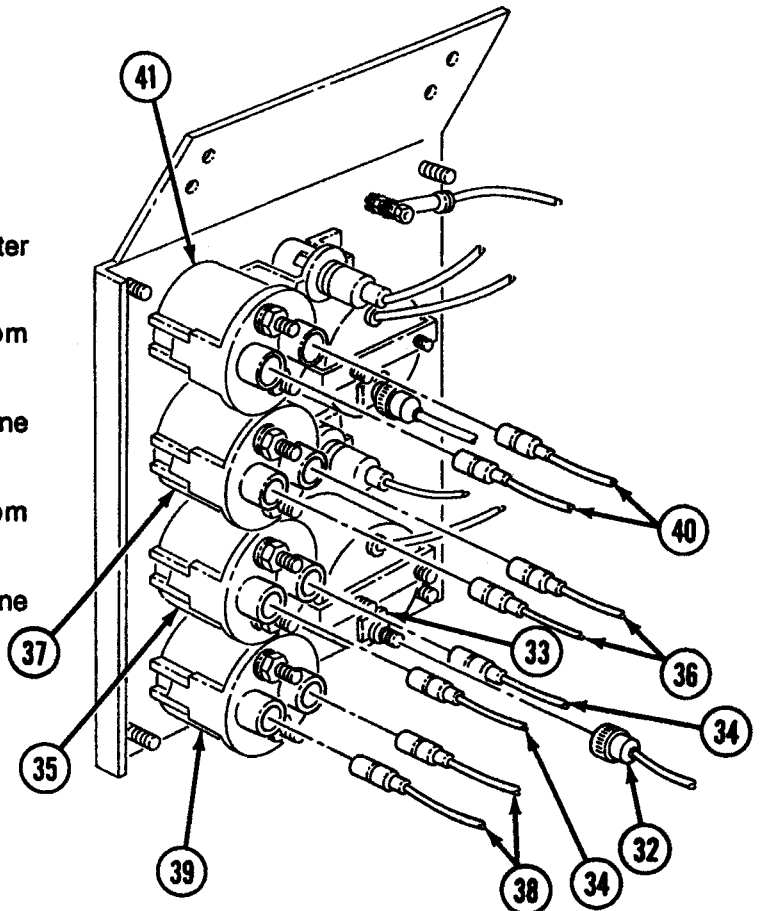
**AK** Disconnect cannon plug (32) from speedometer (33).

**AL** Disconnect leads 27A and 664 (34) from hydraulic oil temperature gauge (35).

**AM** Disconnect leads 27A and 33 (36) from engine water temperature gauge (37).

**AN** Disconnect leads 27A and 324 (38) from transmission oil temperature gauge (39).

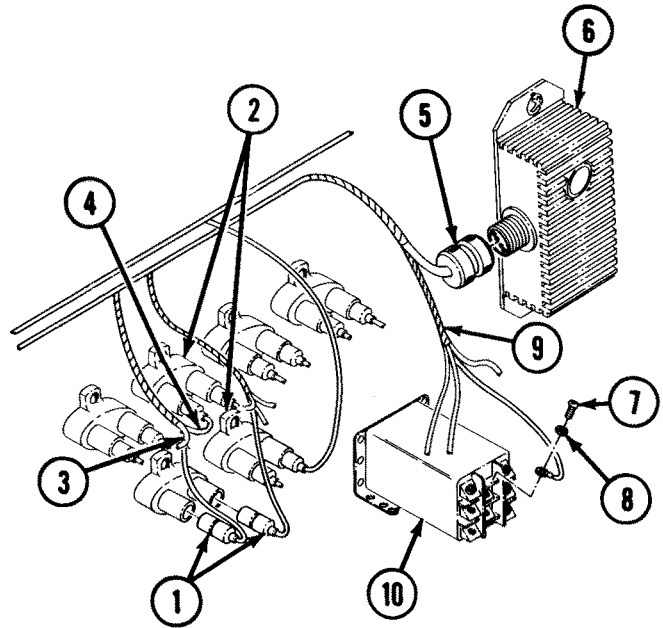
**AO** Disconnect leads 27A and 36 (40) from engine oil pressure gauge (41).



**AP** Disconnect all leads (1) from circuit breakers (2), except leads 15/27/38/431/999 (3) and lead 37/137/5 (4).

**AQ** Disconnect cannon plug (5) from warning buzzer (6).

**AR** Remove five screws (7) and lockwashers (8), and disconnect relay leads 509G, 509J, 509H, 139C, and 430 (9) from relay (10). Discard lockwashers (8).



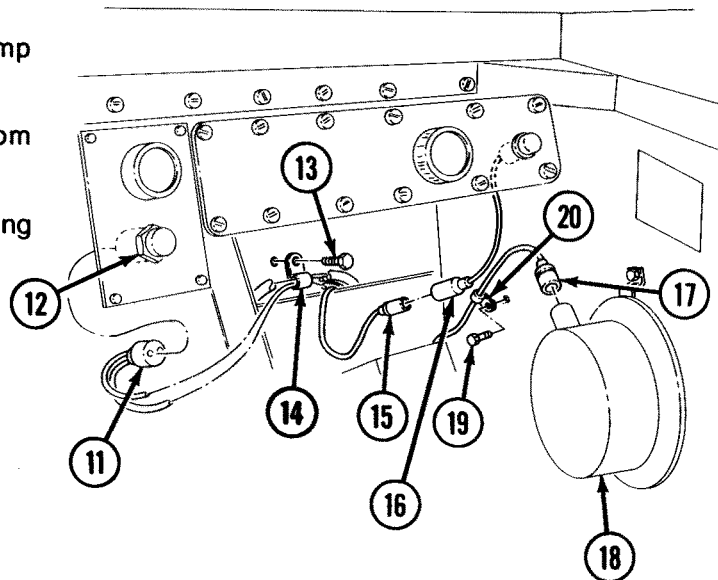
**AS** Disconnect leads 569 and 588 (11) from start-aid switch (12).

**AT** Remove screw (13) and clamp (14) securing leads 569 and 588 (11) to driver's compartment. Remove clamp (14) from leads (11).

**AU** Disconnect lead 450 (15) from bilge pump indicator light connector (16).

**AV** Disconnect lead 34B/509F/509J (17) from warning buzzer (18).

**AW** Remove screw (19) and clamp (20) securing lead (17) to driver's compartment wall.

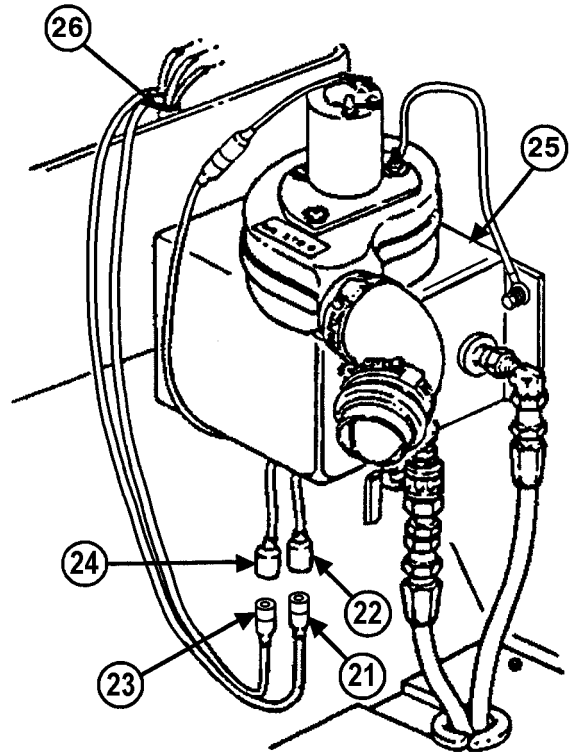


**AX** Disconnect lead 409A (21) from heater lead 56 (22), and lead 409B (23) from heater lead 57 (24) at driver's heater (25).

**Note**

Some leads may have to be disconnected to free control wiring harness. Connect these leads immediately after harness is freed.

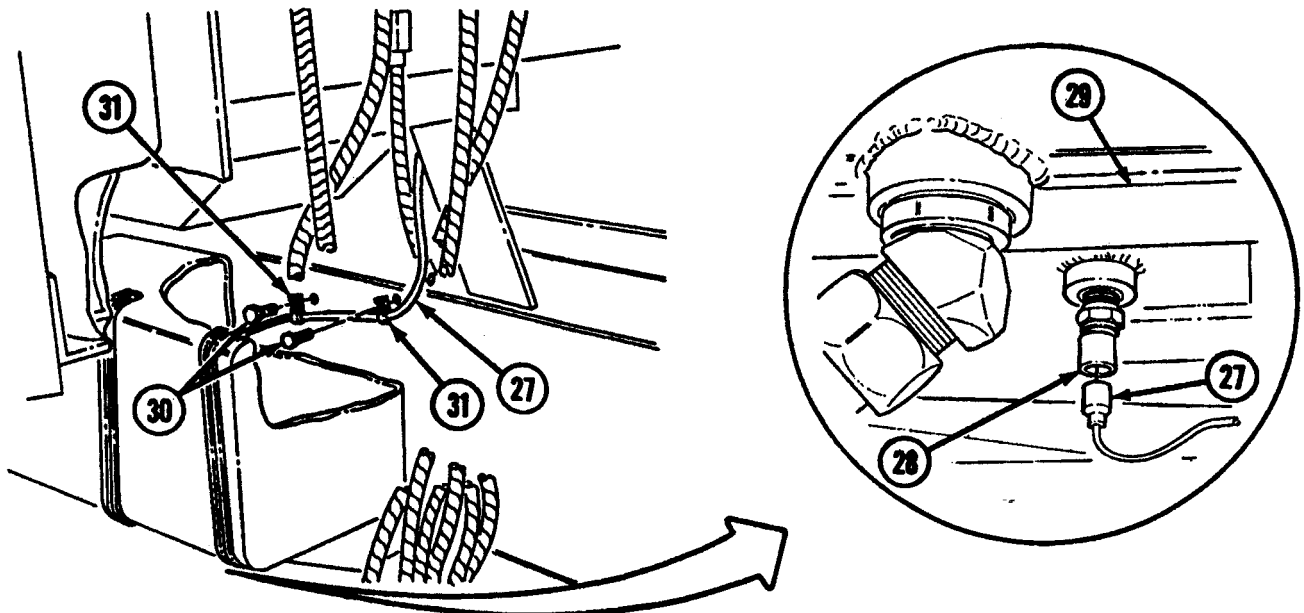
**AY** Cut electrical tape to free control wiring harness (26) from other wires and harnesses. Remove control wiring harness (26) from driver's compartment, noting its position for installation.



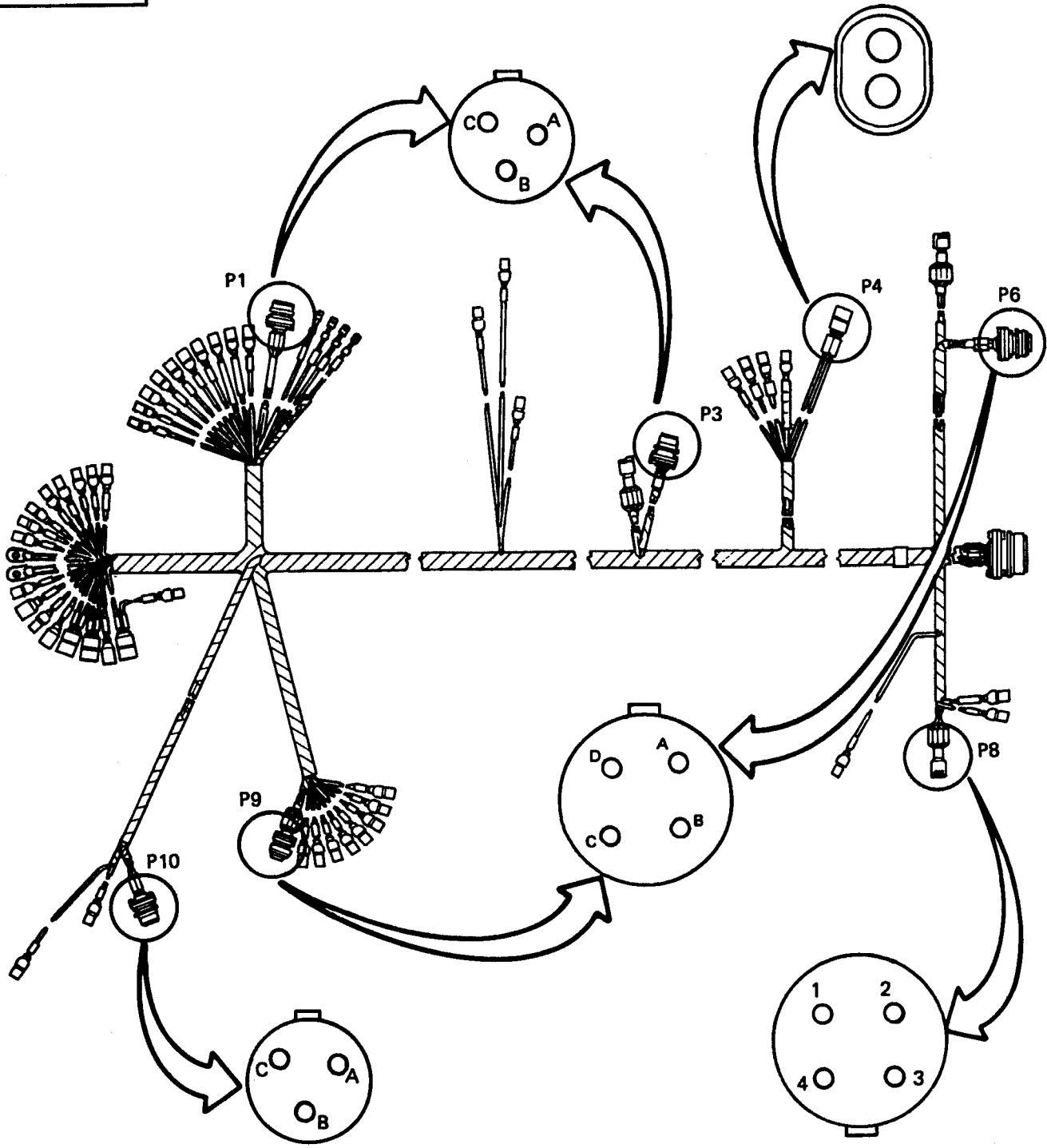
**AZ** Disconnect lead 664 (27) from hydraulic oil temperature sending unit (28) beneath hydraulic reservoir (29).

**BA** Remove two screws (30) and clamps (31) securing lead 664 (27) to hull.

**BB** Remove control wiring harness from vehicle.

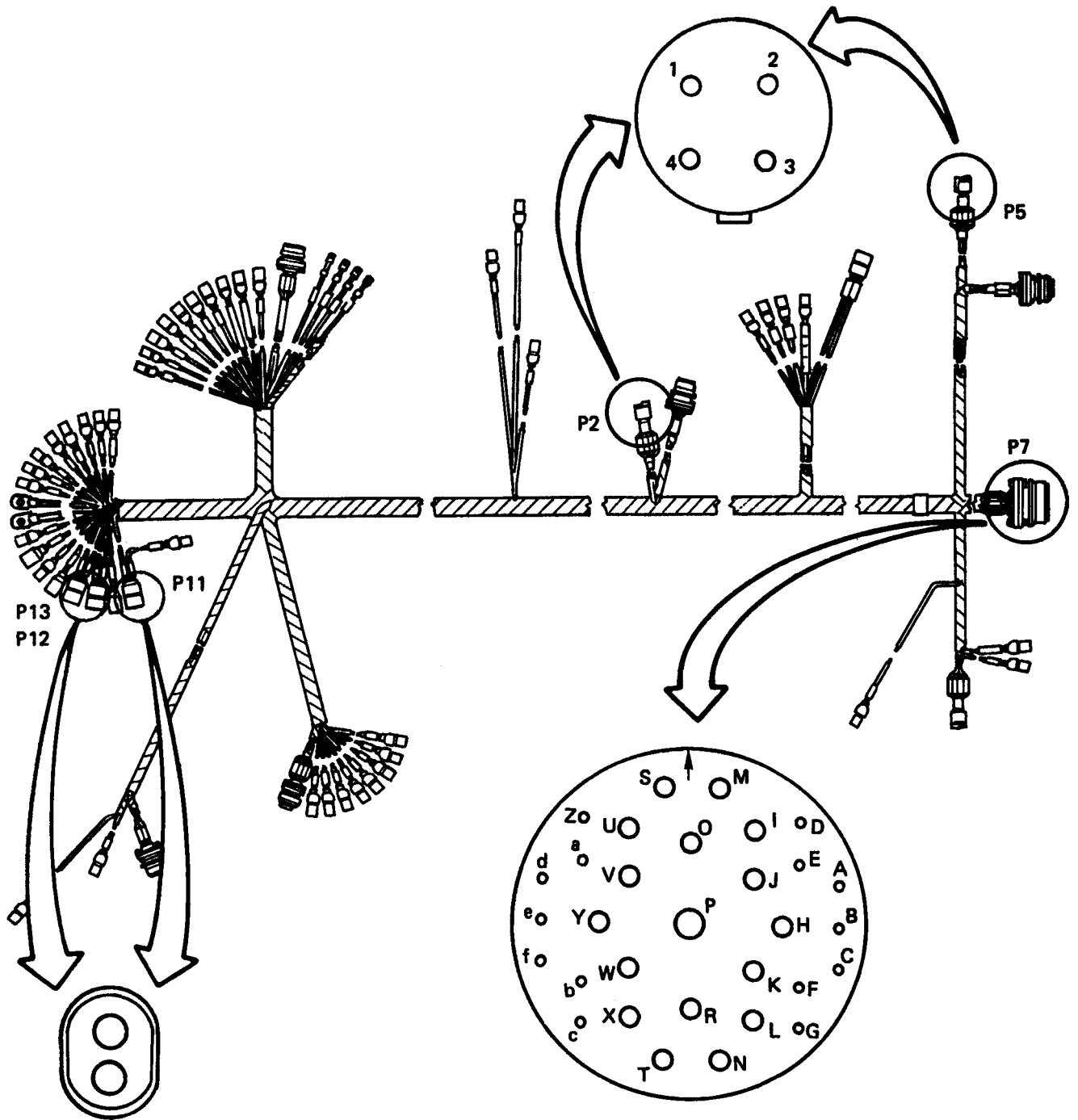


**REPAIR**

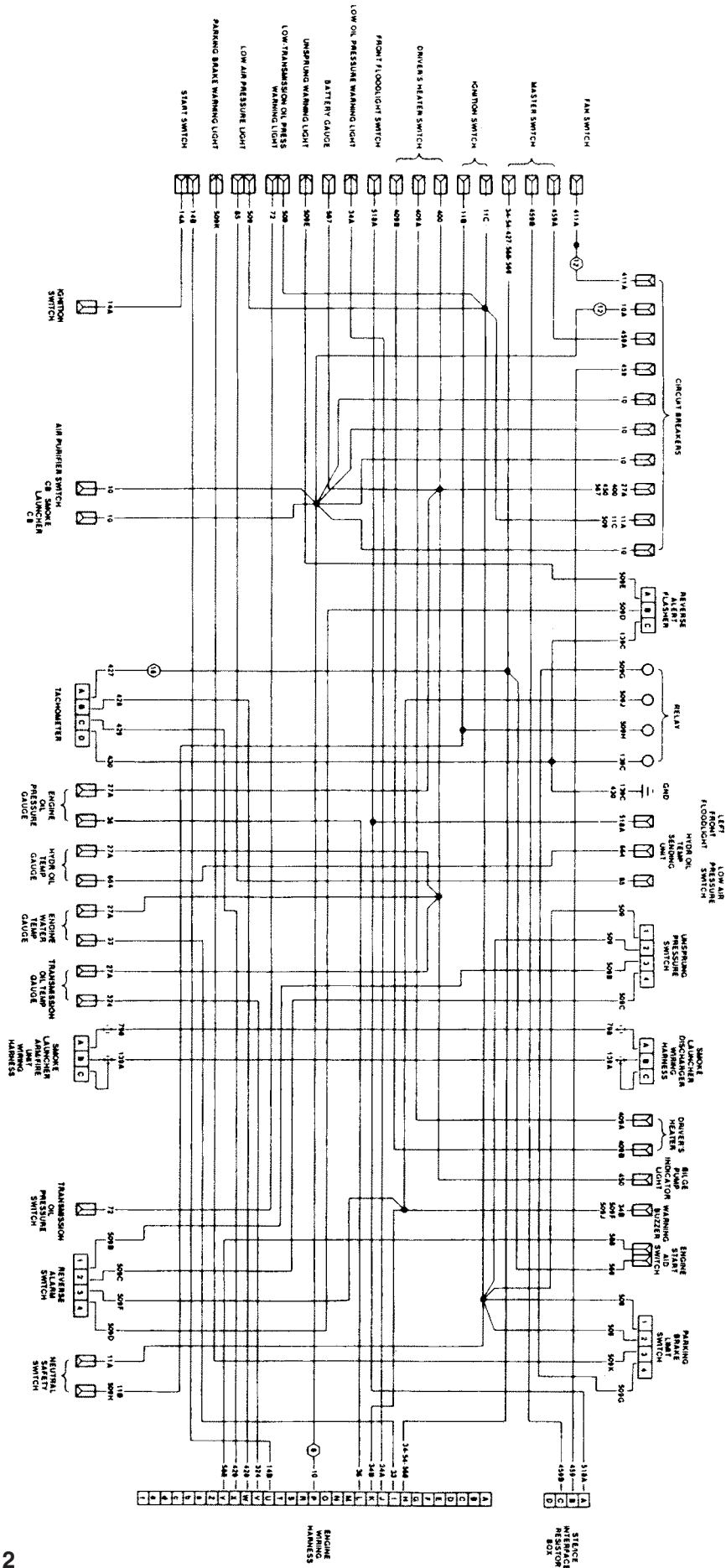


**WIRING DIAGRAM**

Refer to page 2-10 to repair the control wiring harness.



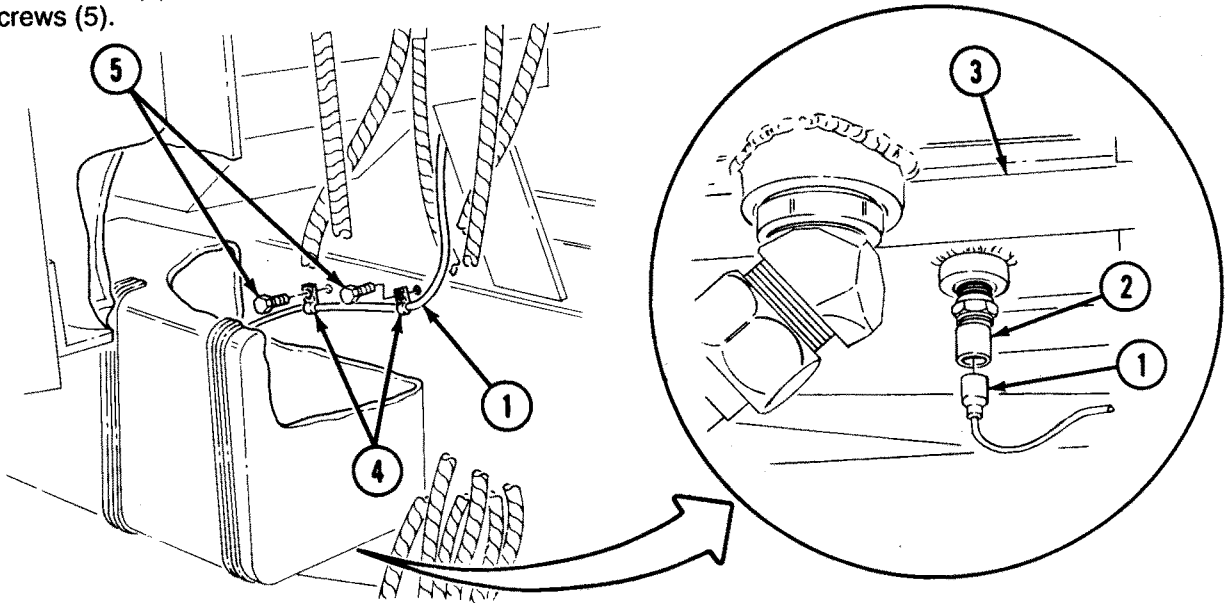
WIRING DIAGRAM



CONTROL WIRING HARNESS 12357211

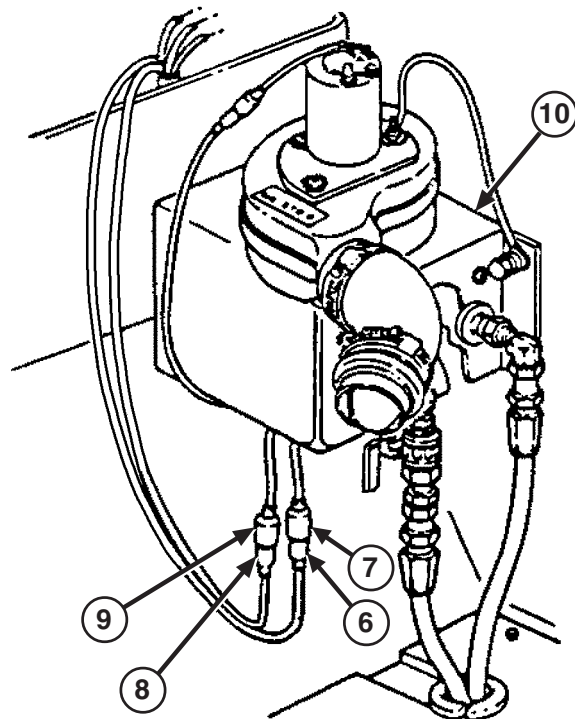
**INSTALLATION**

- A** Connect lead 664 (1) to hydraulic oil temperature sending unit (2) beneath hydraulic reservoir (3).
- B** Secure lead 664 (1) to hull with two clamps (4) and screws (5).



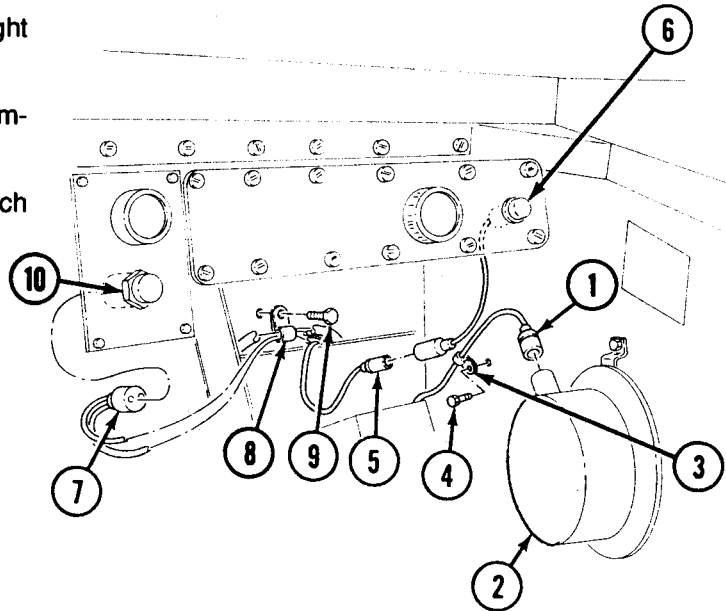
**Note**

- Mechanic No. 2 should perform steps C through AK. Mechanic No. 1 should begin at step AM.
  - Some leads may have to be disconnected to install control wiring harness. Connect these leads immediately after harness is in place.
  - Tape harnesses together after connecting leads 409A and 409B.
- C** Connect lead 409A (6) to heater lead 56 (7), and lead 409B (8) to heater lead 57 (9) on driver's heater (10).





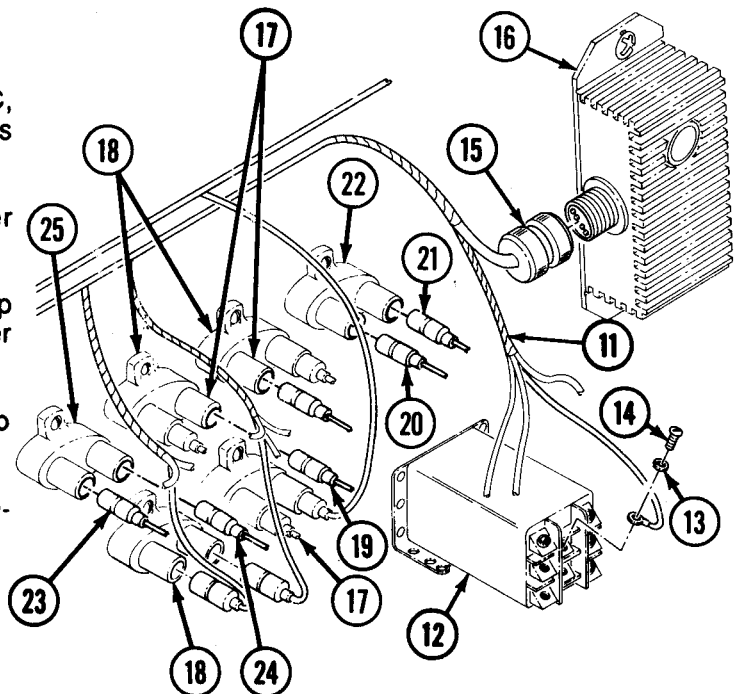
- D** Connect lead 34B/509F/509J (1) to warning buzzer (2).
- E** Secure lead 34B/509F/509J (1) to hull with clamp (3) and screw (4).
- F** Connect lead 450 (5) to bilge pump indicator light connector (6).
- G** Secure leads 569 and 588 (7) to driver's compartment with clamp (8) and screw (9).
- H** Connect leads 569 and 588 (7) to start-aid switch (10).



**Note**

- Circuit breakers are marked with amperage ratings.
- Circuit 10 is a common power circuit.

- I** Connect relay leads 509G, 509J, 509H, 139C, and 430 (11) to relay (12) with five lockwashers (13) and screws (14).
- J** Connect cannon plug (15) to warning buzzer (16).
- K** Connect four 10 leads (17) to three 15-amp circuit breakers (18) and 20-amp circuit breaker (19).
- L** Connect leads 459 (20) and 459A (21) to 15-amp circuit breaker (22).
- M** Connect lead 411 (23) and lead 10A (24) to 30-amp circuit breaker (25).

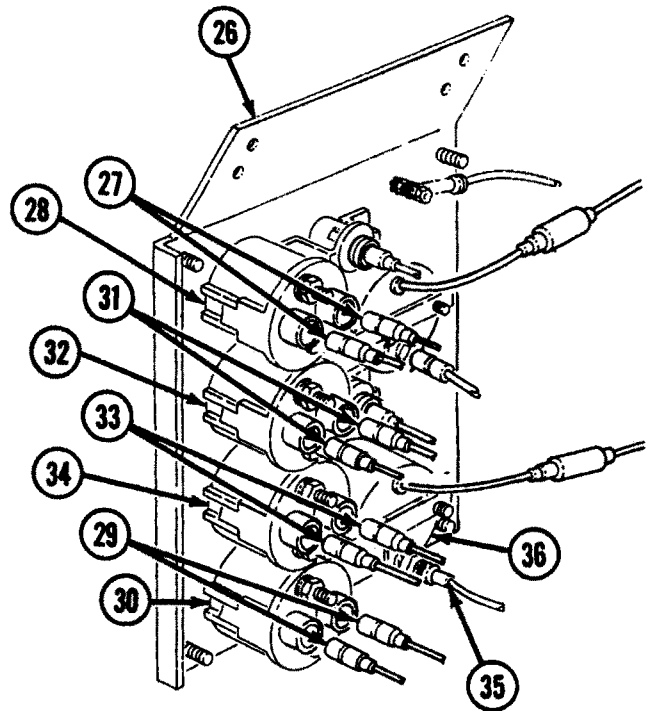




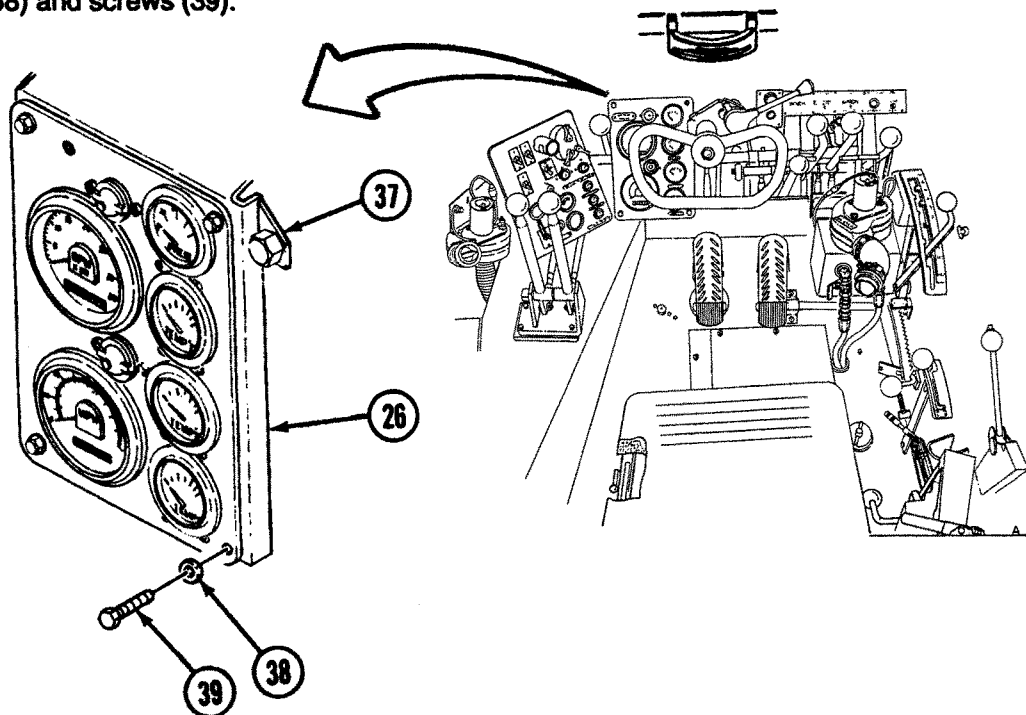
**Note**

Circuit 27A is a common power circuit.

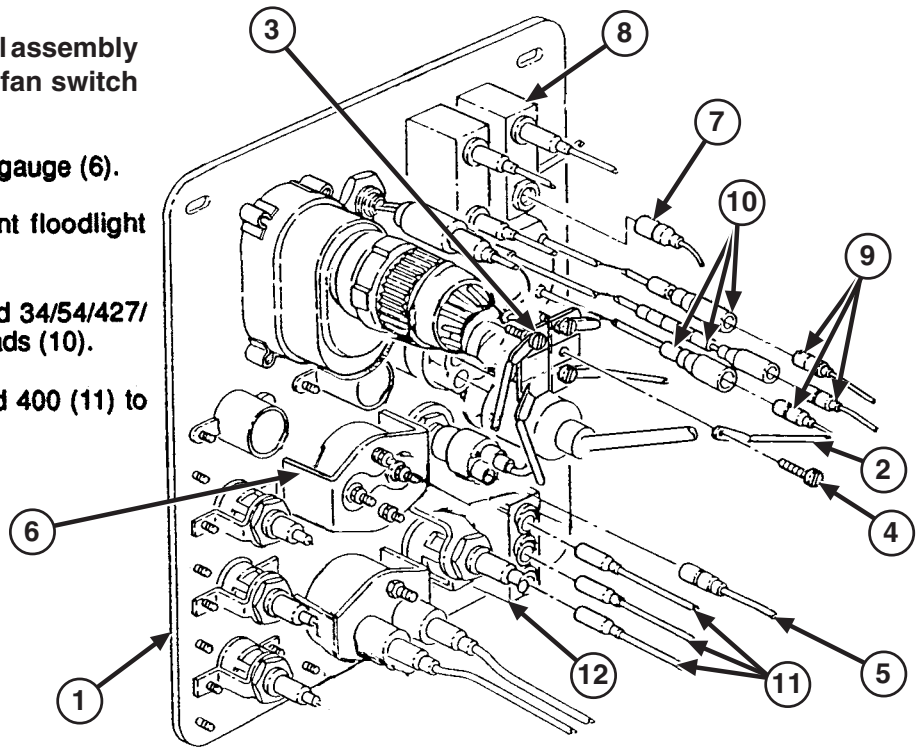
- N** From behind gauge panel assembly (26), connect leads 27A and 36 (27) to engine oil pressure gauge (28).
- O** Connect leads 27A and 324 (29) to transmission oil temperature gauge (30).
- P** Connect leads 27A and 33 (31) to engine water temperature gauge (32).
- Q** Connect leads 27A and 664 (33) to hydraulic oil temperature gauge (34).
- R** Connect cannon plug (35) to speedometer (36).



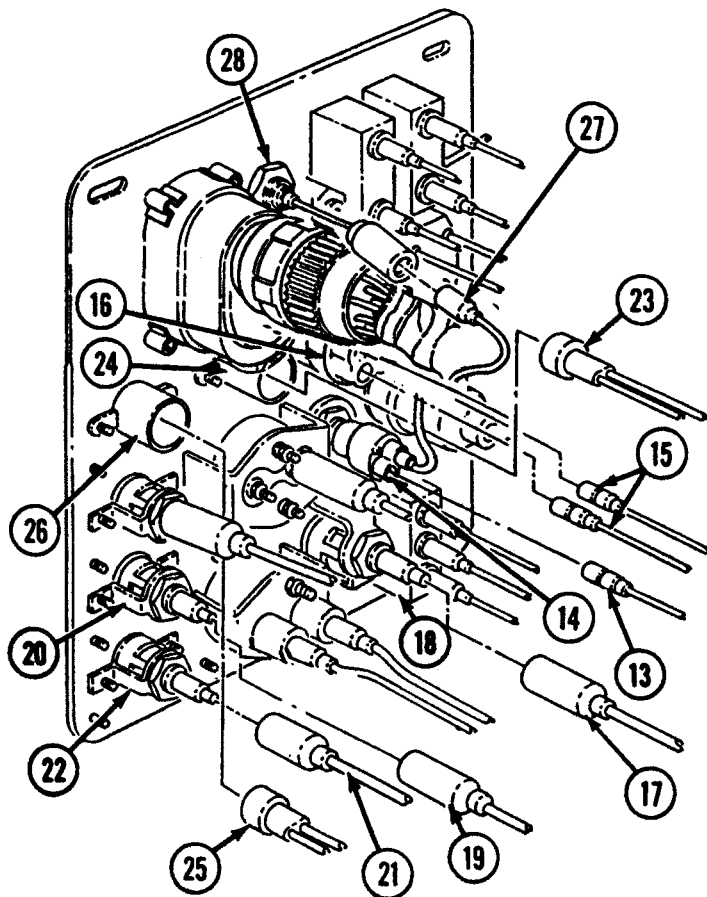
- S** Install gauge panel (26) on bracket (37) with four washers (38) and screws (39).



- T** From behind instrument panel assembly (1), connect lead 411A (2) to fan switch (3) with screw (4).
- U** Connect lead 567 (5) to battery gauge (6).
- V** Connect lead 518A (7) to front floodlight switch (8).
- W** Connect leads 459A, 459B, and 34/54/427/568/569 (9) to master switch leads (10).
- X** Connect leads 409A, 409B, and 400 (11) to driver's heater switch (12).



- Y** Connect leads 14B and 14A (13) to start switch (14).
- Z** Connect leads 11B and 11C (15) to ignition switch (16).
- AA** Connect lead 509K (17) to parking brake warning light (18).
- AB** Connect lead 509E (19) to UNSPRUNG warning light (20).
- AC** Connect lead 34A (21) to LOW-OIL pressure warning light (22).
- AD** Connect leads 509 and 72 (23) to LOW-TRANSMISSION oil pressure warning light (24).
- AE** Connect leads 509 and 85 (25) to LOW-AIR pressure warning light (26).
- AF** Connect lead 40 (27) to panel light (28).



**AG** Install leads 139A/798 (29) on bracket (30) with four lockwashers (31), screws (32), and nuts (33).

**AH** Connect cannon plug (34) to leads 139A/798 (29).

**Note**

Circuit 10 is a common power circuit.

**AI** Connect lead 10 (35) to circuit breaker (36).

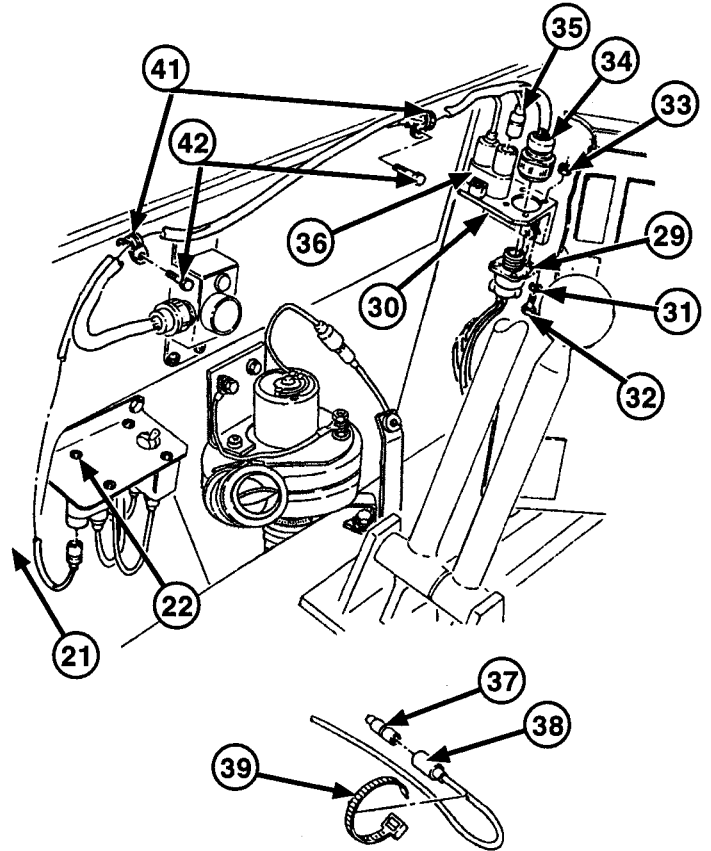
**Note**

The air purifier switch assembly is removed on vehicles with MCS unit installed. Perform step AJ on vehicles with MCS unit installed, and perform step AK on vehicles with air purifier switch.

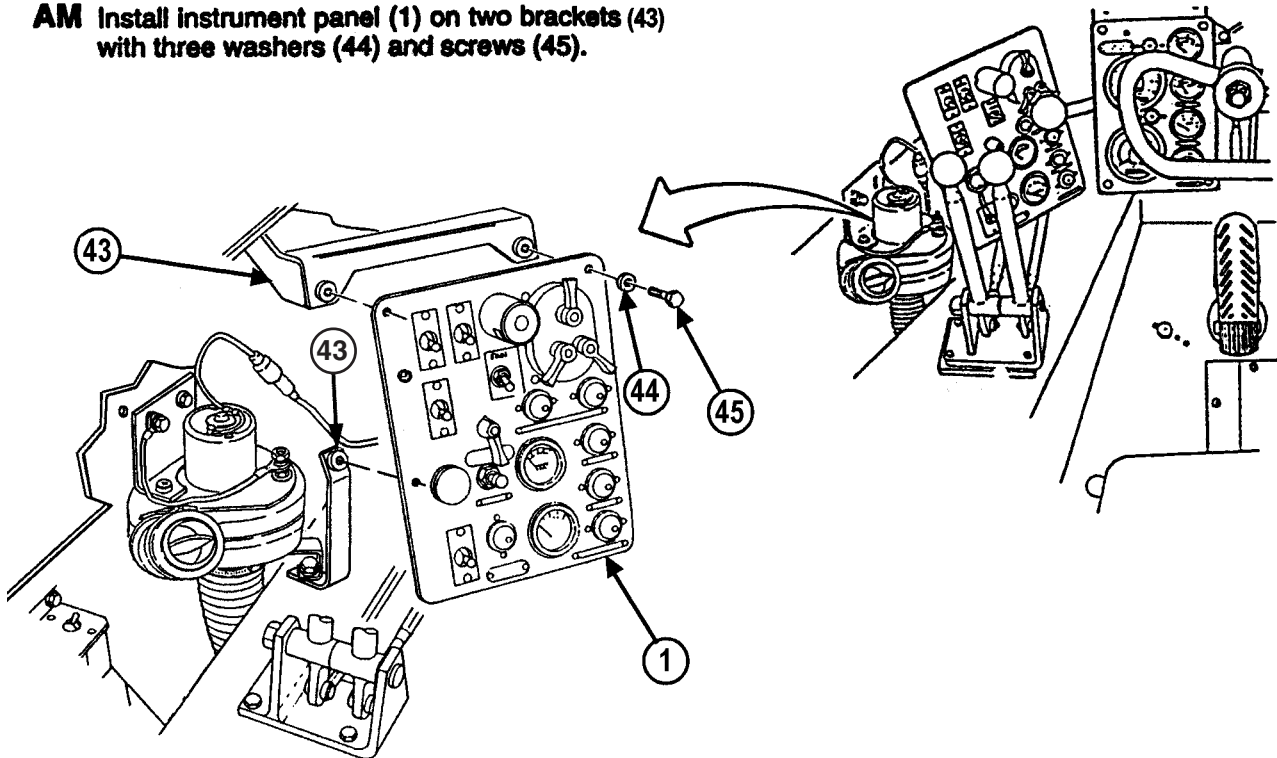
**AJ** Install plug (37) on lead 10 (38), and tie back lead 10 (38) with tiedown strap (39).

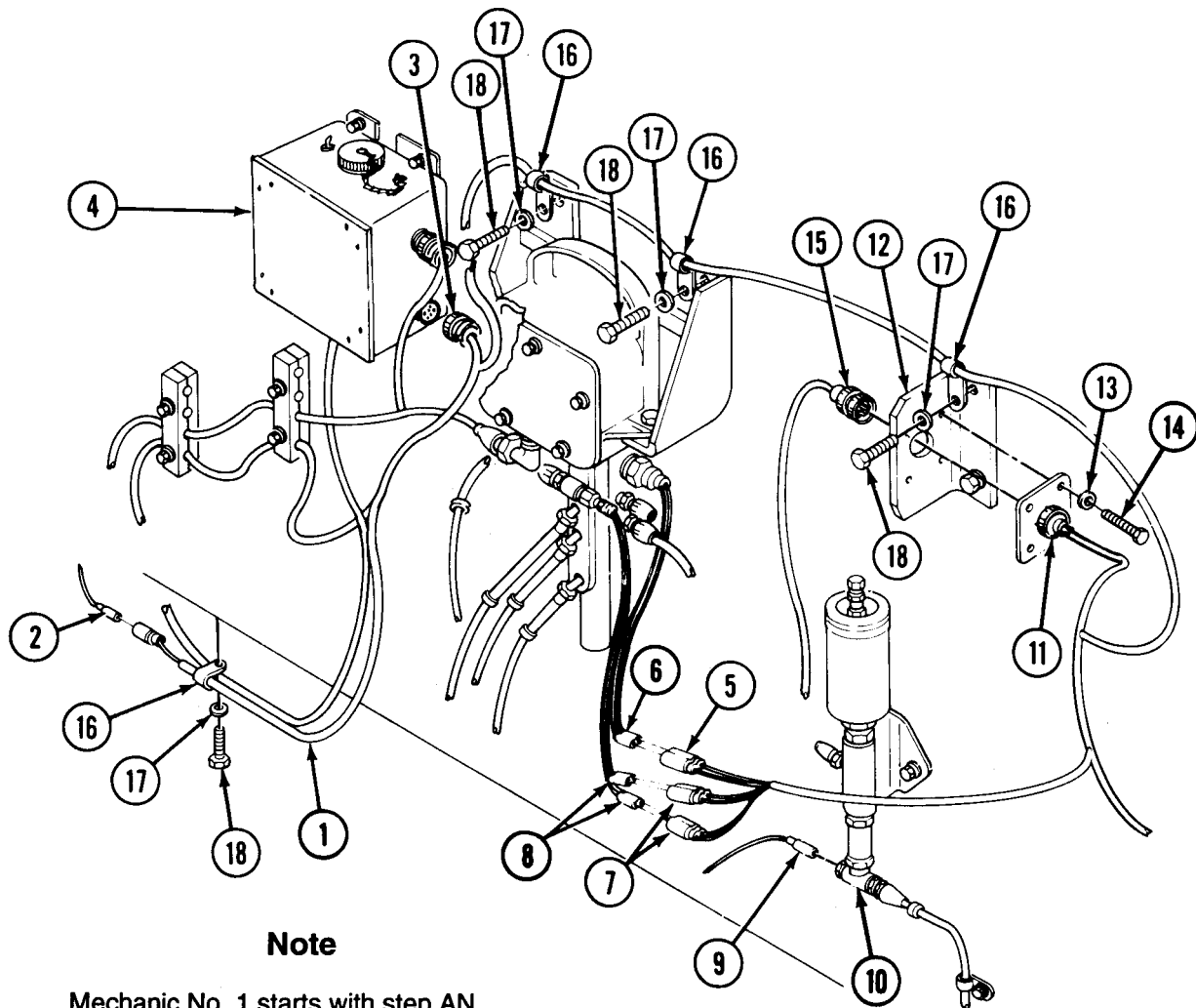
**AK** Connect lead 10 (38) to air purifier switch (40).

**AL** Secure lead 10 (38) to driver's compartment wall with two clamps (41) and screws (42).



**AM** Install instrument panel (1) on two brackets (43) with three washers (44) and screws (45).



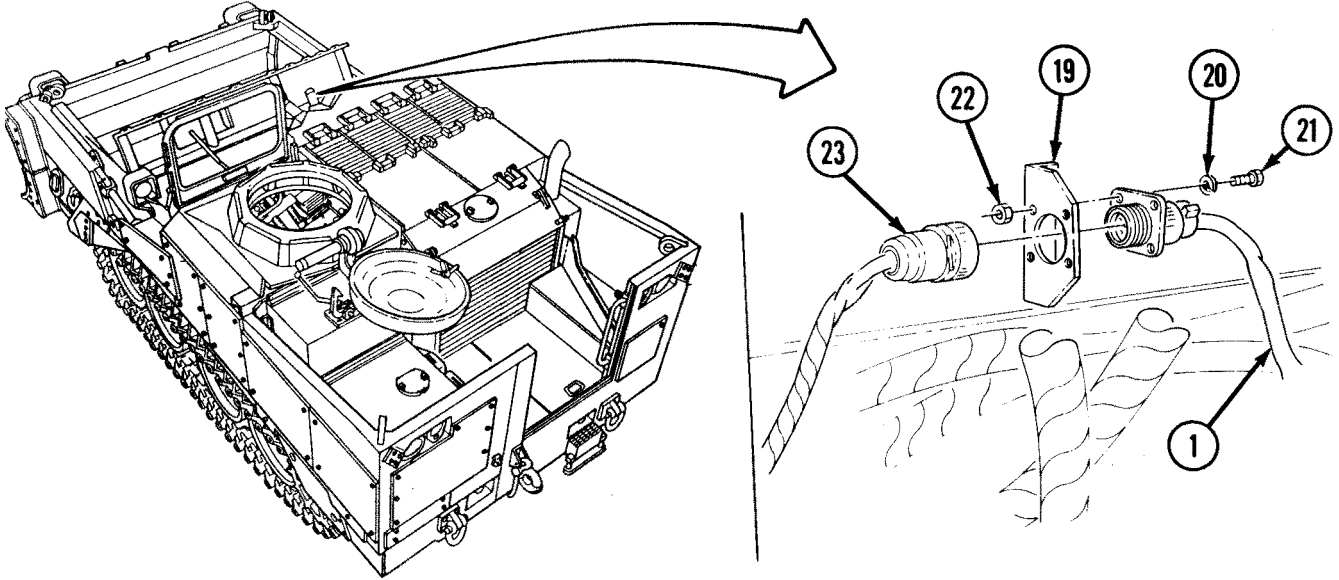


**Note**

Mechanic No. 1 starts with step AN.

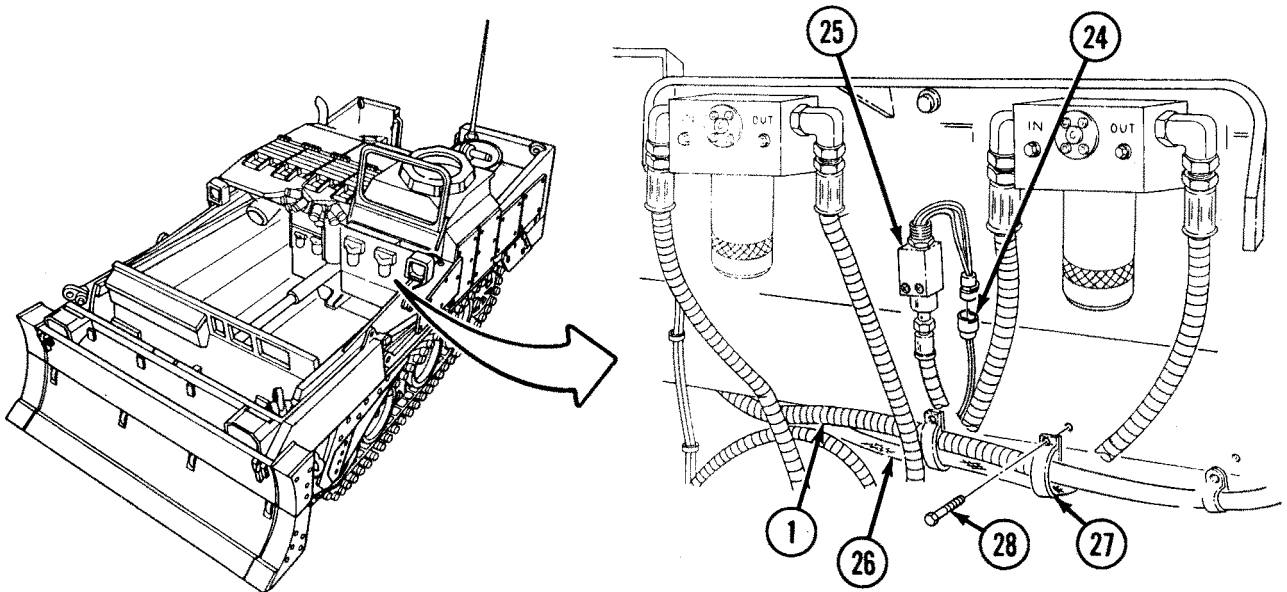
- AN** From inside engine compartment, connect control wiring harness (1) to connector (2).
- AO** Connect cannon plug (3) to STE/ICE-R resistor box (4).
- AP** Connect leads 11A/11B/509H (5) to neutral safety switch leads (6).
- AQ** Connect leads 509B/509C and 509D/509F (7) to reverse alarm switch leads (8).
- AR** Connect lead 72 (9) to low transmission oil pressure sending unit (10).
- AS** Secure cannon plug (11) to bracket (12) with four lockwashers (13) and screws (14).
- AT** Connect engine wiring harness (15) to cannon plug (11).
- AU** Secure control wiring harness (1) to hull with four clamps (16), washers (17), and screws (18).

**AV** Install control wiring harness (1) on bracket (19) with four lockwashers (20), screws (21), and nuts (22). Connect smoke grenade wiring harness cannon plug (23) to control wiring harness (1).

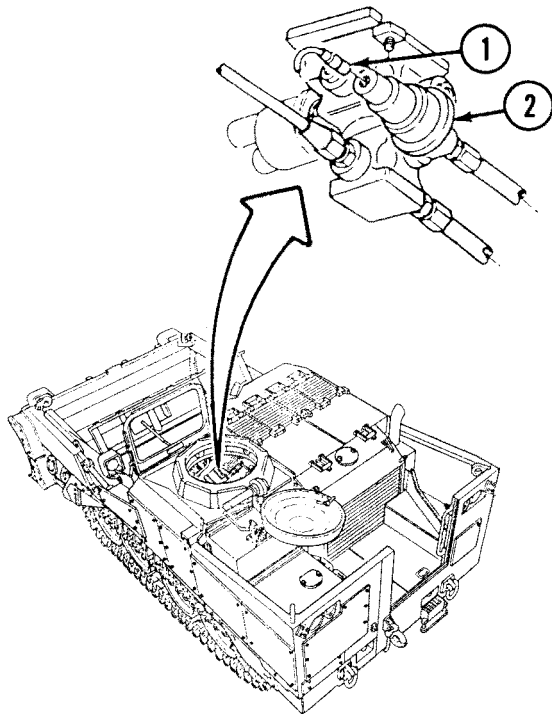


**AW** Connect lead 509/509B/509C (24) to UNSPRUNG pressure switch (25).

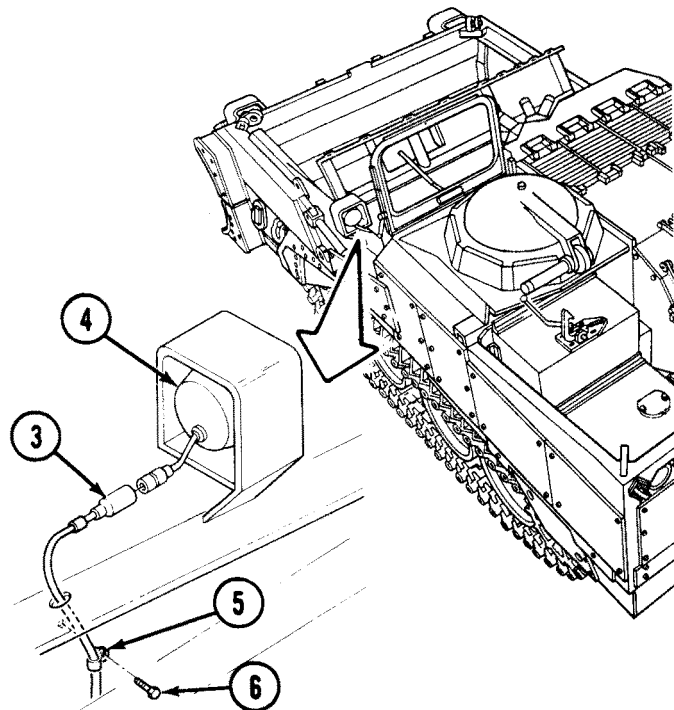
**AX** Secure control wiring harness (1) and air lines (26) to hull with three clamps (27) and screws (28).





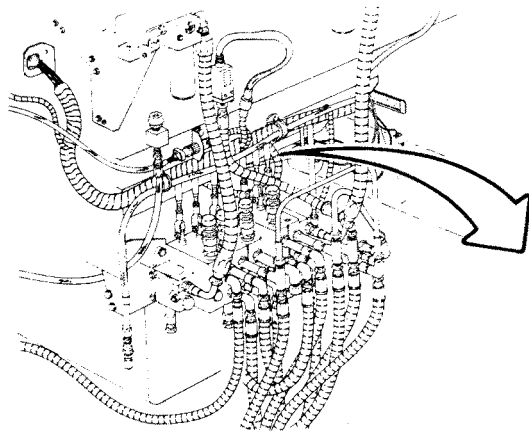


**AY** Connect lead 85 (1) to LOW-AIR pressure switch (2).



**AZ** Connect lead 518A (3) to LH front floodlight (4).

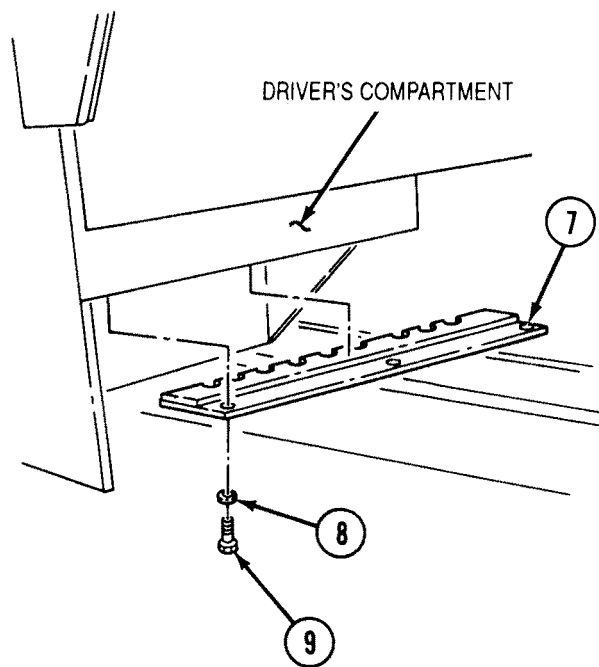
**BA** Secure lead 518A (3) to hull with four clamps (5) and screws (6).



**BB** Install access plate (7) on underside of driver's compartment with three washers (8) and self-locking screws (9).

**FOLLOW-ON TASKS:**

- Install driver's floor plate (TM 5-2350-262-20-1).
- Connect negative battery cables (TM 5-2350-262-20-1).
- Install engine intake grilles and covers (TM 5-2350-262-20-1).
- Retract ejector (TM 5-2350-262-10).



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# ELECTRICAL BRACKETS REPLACEMENT

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This task covers:

- a. Removal
  - b. Installation
- 

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Parts:

Lockwasher (16)  
Self-locking Screw (4)

Parts Reference:

TM 5-2350-262-24P    Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-10  
TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Ejector Forward
TM 5-2350-262-20-1	Disconnect Negative Battery Cables

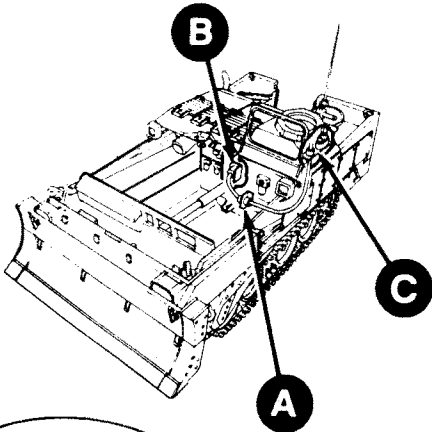
General Safety Instructions:

## WARNING

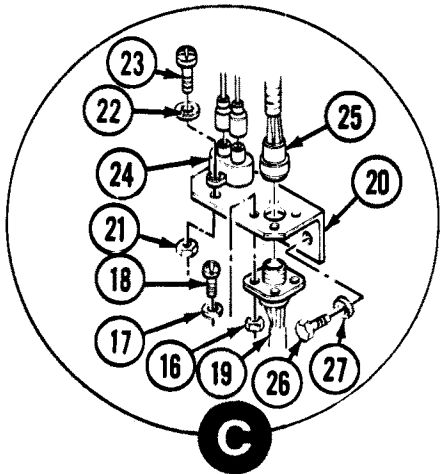
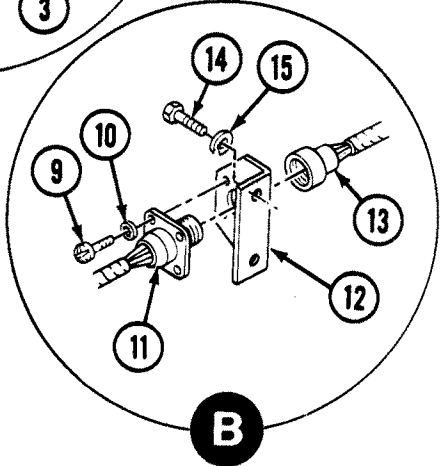
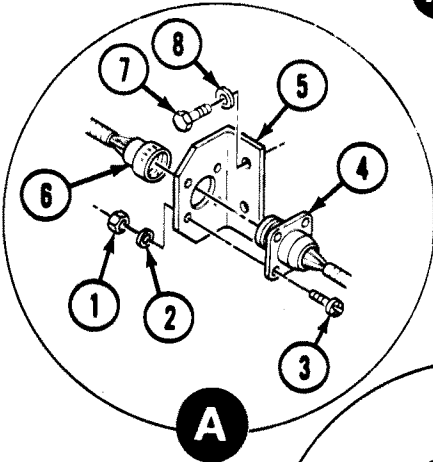
Disconnect batteries at the negative terminals before working on the electrical system.

**REMOVAL**

**WARNING**  
 Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.



- A** Remove four nuts (1), lockwashers (2), and screws (3) securing control wiring harness connector (4) to bracket (5). Discard lockwashers (2).
- B** Disconnect control wiring harness connector (4) from smoke grenade discharger wiring harness connector (6).
- C** Remove two self-locking screws (7), washers (8), and bracket (5) from outside front of driver's compartment. Discard self-locking screws (7).
- D** Remove four screws (9) and lockwashers (10) securing control wiring harness connector (11) to bracket (12). Discard lockwashers (10).
- E** Disconnect control wiring harness connector (11) from engine wiring harness connector (13).
- F** Remove two screws (14), lockwashers (15), and bracket (12) from right side of driver's compartment. Discard lockwashers (15).
- G** Remove four nuts (16), lockwashers (17), and screws (18) securing arming/firing unit wiring harness connector (19) to bracket (20). Discard lockwashers (17).
- H** Remove two nuts (21), lockwashers (22), screws (23), and circuit breaker (24) from bracket (20). Discard lockwashers (22).
- I** Disconnect arming/firing unit wiring harness connector (19) from control wiring harness connector (25).
- J** Remove two self-locking screws (26), washers (27), and bracket (20) from left side of driver's compartment. Discard self-locking screws (26).



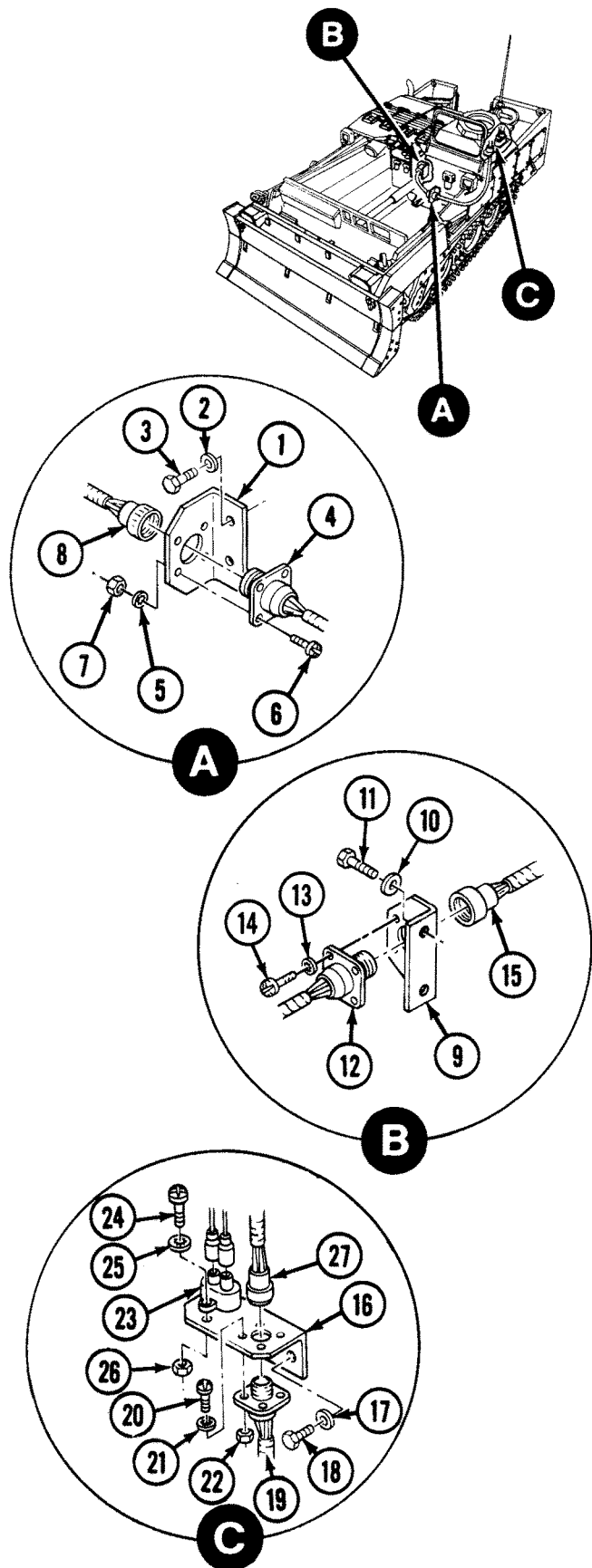


**INSTALLATION**

- A** Secure bracket (1) to front of driver's compartment with two washers (2) and self-locking screws (3).
- B** Secure control wiring harness connector (4) to bracket (1) with four lockwashers (5), screws (6), and nuts (7).
- C** Connect smoke grenade discharger wiring harness connector (8) to control wiring harness connector (4).
- D** Secure bracket (9) to right side of driver's compartment with two lockwashers (10) and screws (11).
- E** Secure control wiring harness connector (12) to bracket (9) with four lockwashers (13) and screws (14).
- F** Connect engine wiring harness connector (15) to control wiring harness connector (12).
- G** Secure bracket (16) to left side of driver's compartment with two washers (17) and self-locking screws (18).
- H** Secure arming/firing unit wiring harness connector (19) to bracket (16) with four screws (20), lockwashers (21), and nuts (22).
- I** Secure circuit breaker (23) to bracket (16) with two screws (24), lockwashers (25), and nuts (26).
- J** Connect control wiring harness connector (27) to arming/firing unit wiring harness connector (19).

**FOLLOW-ON TASKS:**

- Connect negative battery cables (TM 5-2350-262-20-1).
- Retract ejector (TM 5-2350-262-10).



# ENGINE WIRING HARNESS REPLACEMENT AND REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Wrench Set, Crowfoot 5120-01-302-4387

Parts:

Lockwasher (9)

Parts Reference:

TM 5-2350-262-24P Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-10

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Ejector Forward
TM 5-2350-262-20-1	Engine Intake Grilles and Covers Removed
TM 5-2350-262-20-1	Disconnect Negative Battery Cables
TM 5-2350-262-20-1	Engine Oil Pressure Sending Unit Removed
TM 5-2350-262-20-1	Tachometer Sending Unit Removed
TM 5-2350-262-20-2	Transmission Oil Cooler Removed

General Safety Instructions:

### WARNING

Disconnect batteries at the negative terminals before working on the electrical system.

**REMOVAL**

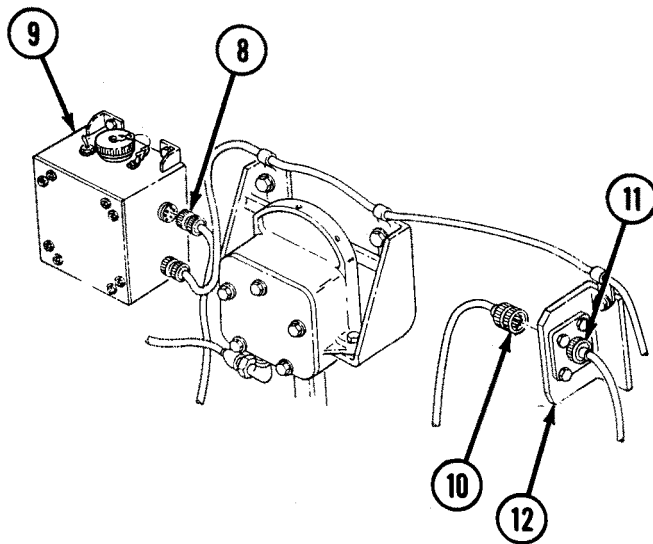
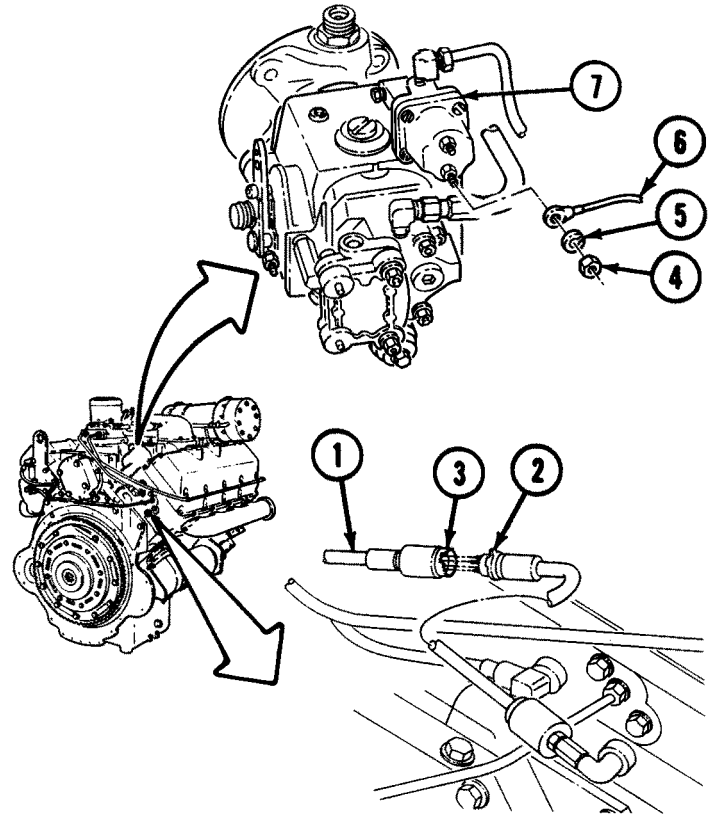
**WARNING**

Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.

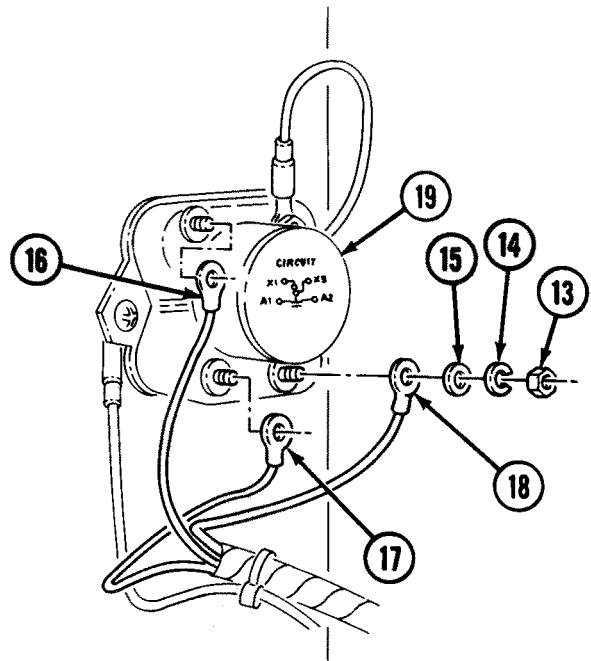
**Note**

Tag all electrical leads prior to removal for installation.

- A** Disconnect STE/ICE-R fuel pressure transducer leads 770U/770F/770G/770V (1) from STE/ICE-R fuel pressure transducer (2) at quick-disconnect (3).
- B** Remove nut (4) and lockwasher (5) securing fuel shutdown valve lead 54A (6) to fuel solenoid (7). Discard lockwasher (5).

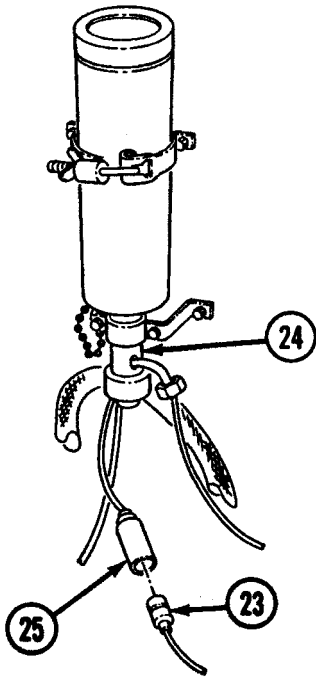
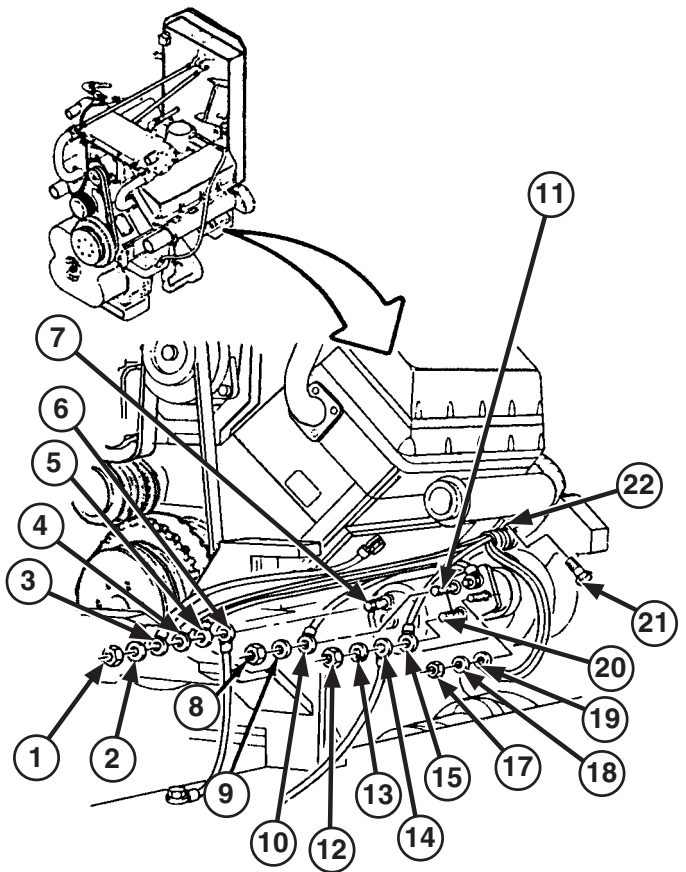


- C** Disconnect top cannon plug (8) from STE/ICE-R resistor box (9).
- D** Disconnect engine wiring harness cannon plug (10) from connector (11) on bracket (12).

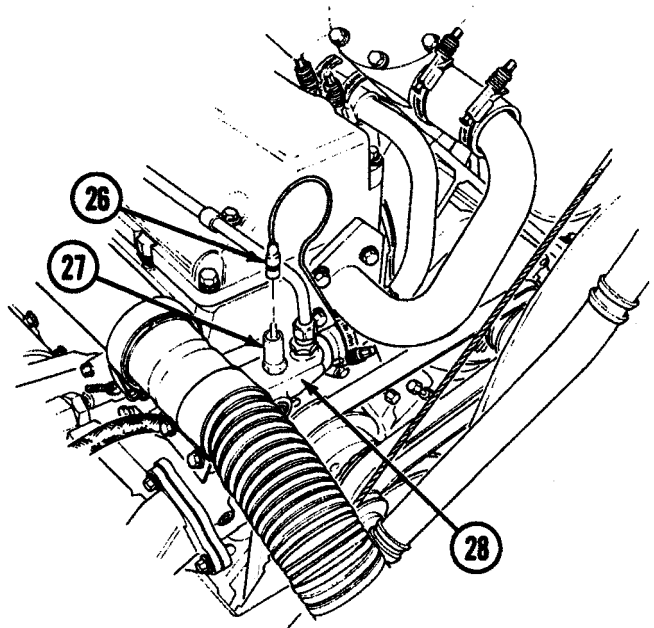


- E** Remove three nuts (13), lockwashers (14), and washers (15) securing three leads 14B (16), 14D (17), and 14E (18) to starter relay (19). Discard lockwashers (14).

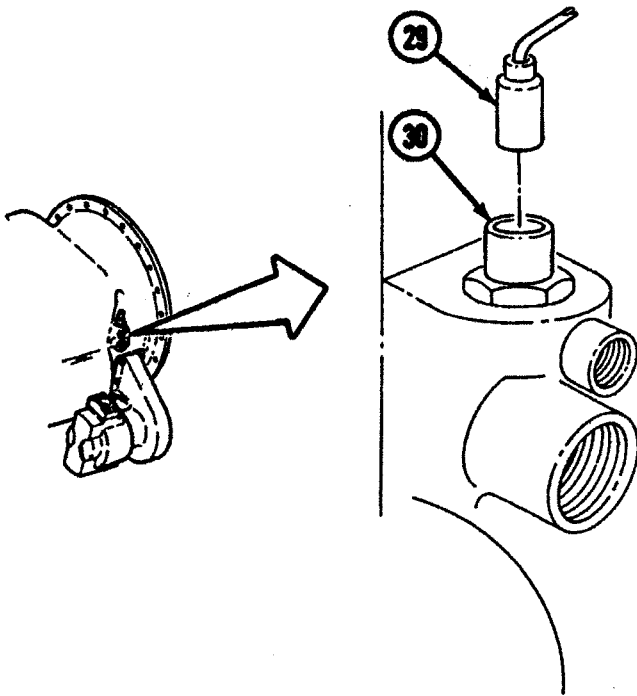
- F** Remove nut (1), washer (2), and leads (3), (4), (5), and (6) from starter negative terminal (7).
- G** Remove nut (8), washer (9), and lead 770T (10) from solenoid terminal (11).
- H** Remove nut (12), lockwasher (13), lead 6B (14), and lead 2/10/14D (15) from solenoid positive terminal (16). Discard lockwasher (13).
- I** Remove nut (17), washer (18), and leads 14E and 770S (19) from solenoid terminal (20).
- J** Remove screw (21), clamp (22) and engine wiring harness leads from starter motor area.



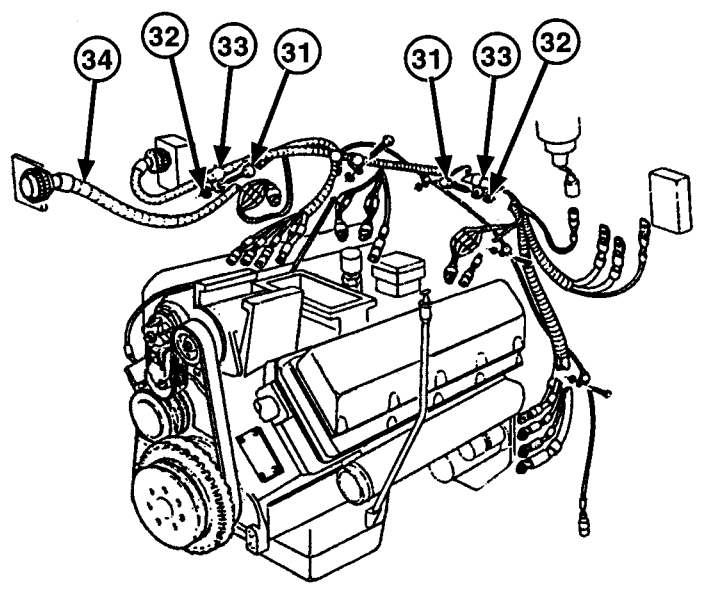
- K** Disconnect lead 588 (23) from start-aid valve (24) at connector (25).



- L** Disconnect lead 33 (26) from engine water temperature sending unit (27) on water pump (28).



**M** Disconnect lead 324 (29) from transmission oil temperature transmitter (30).



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**N** Remove six screws (31), washers (32), and loop clamps (33) securing engine wiring harness (34) to engine.

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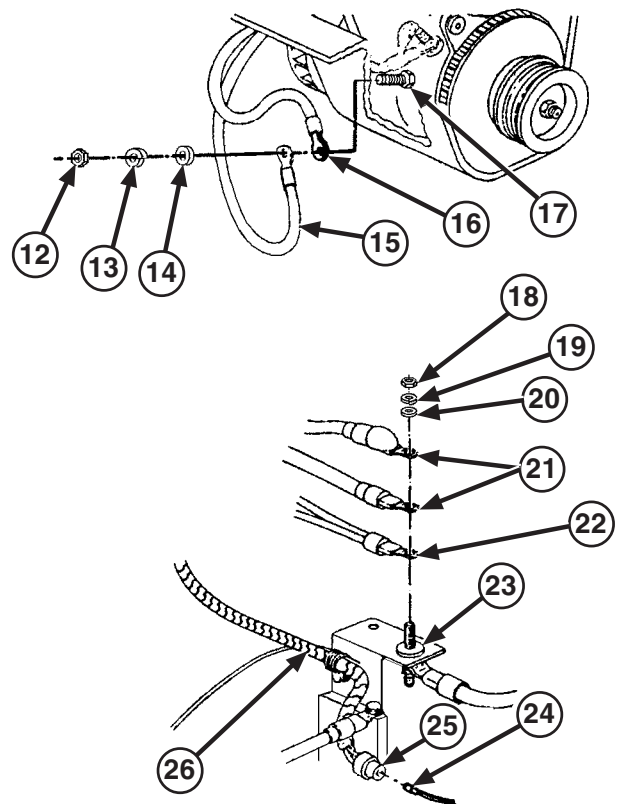
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**V** Remove nut (12), lockwasher (13), washer (14), electrical lead 770P (15) and ground lead 3 (16) from alternator ground terminal (17). Discard lockwasher (13).

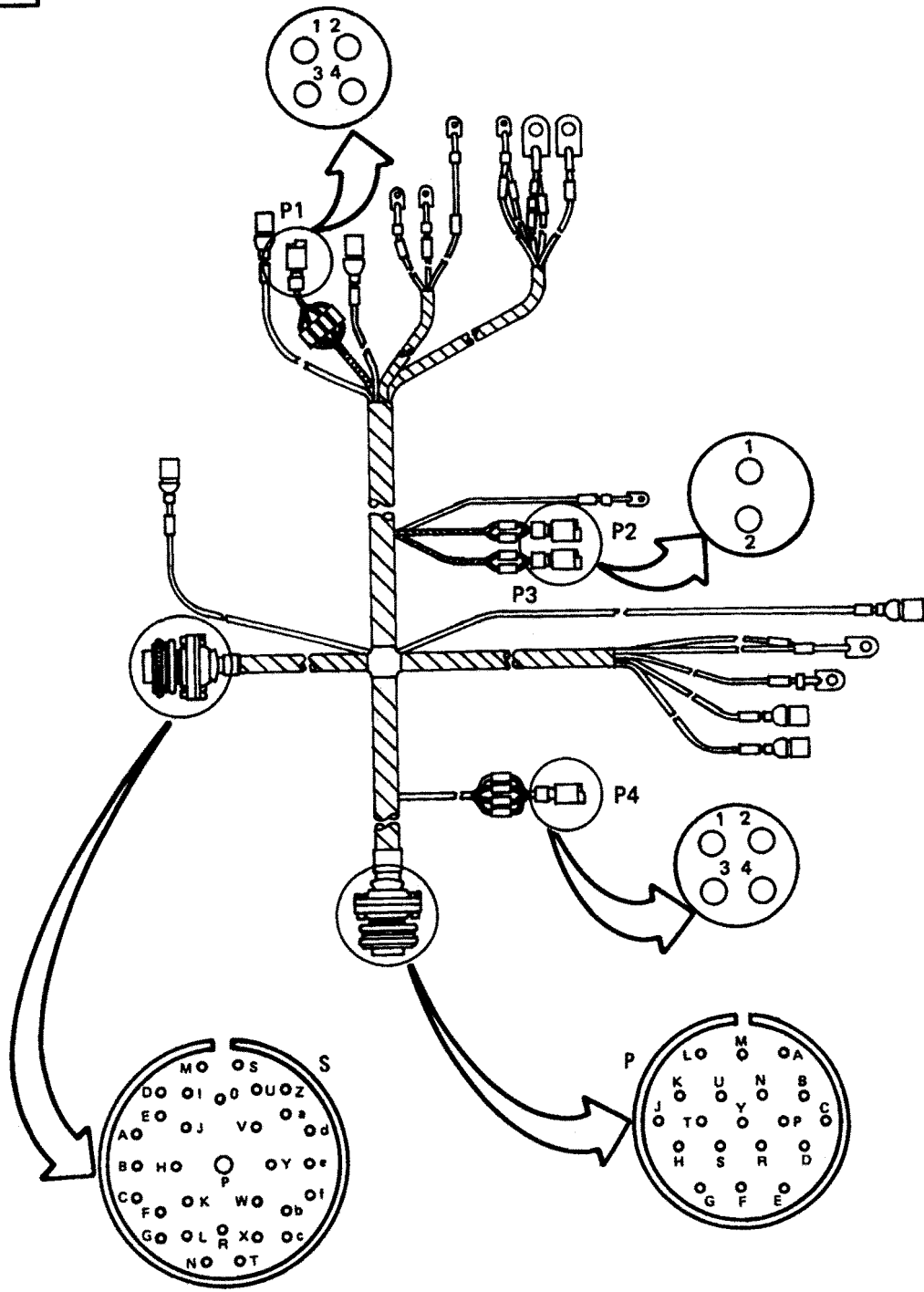
**W** Remove nut (18), lockwasher (19), washer (20), two electrical leads 2A (21), and leads 770N/2A/14D (22) from terminal bracket assembly (23). Discard lockwasher (19).

**X** Disconnect ground lead (24) from adapter (25) on engine wire harness (26).

**Y** Remove engine wiring harness from vehicle.



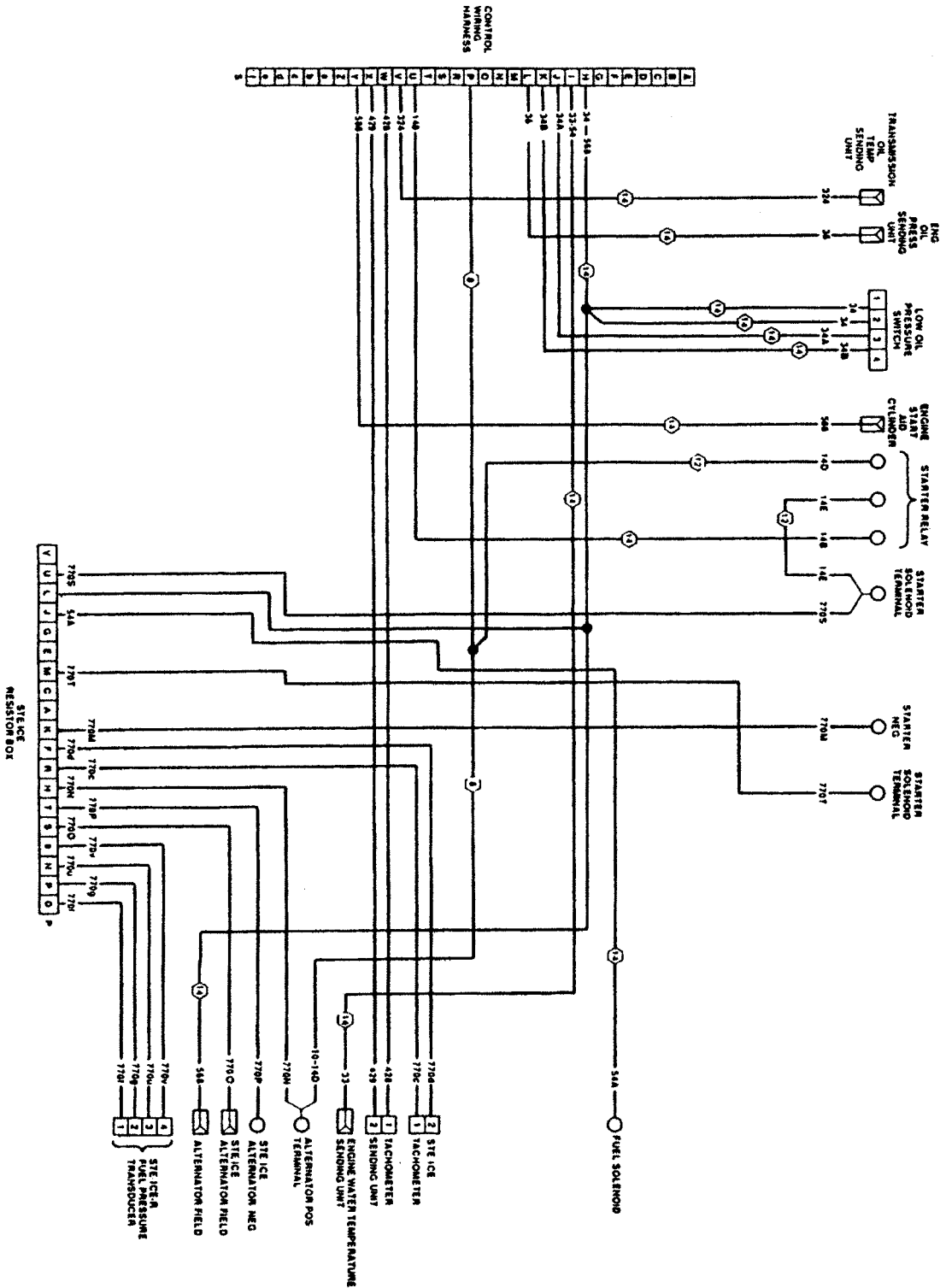
**REPAIR**



**WIRING DIAGRAM**

Refer to page 2-10 to repair the engine wiring harness.

ENGINE WIRING HARNESS 12412174



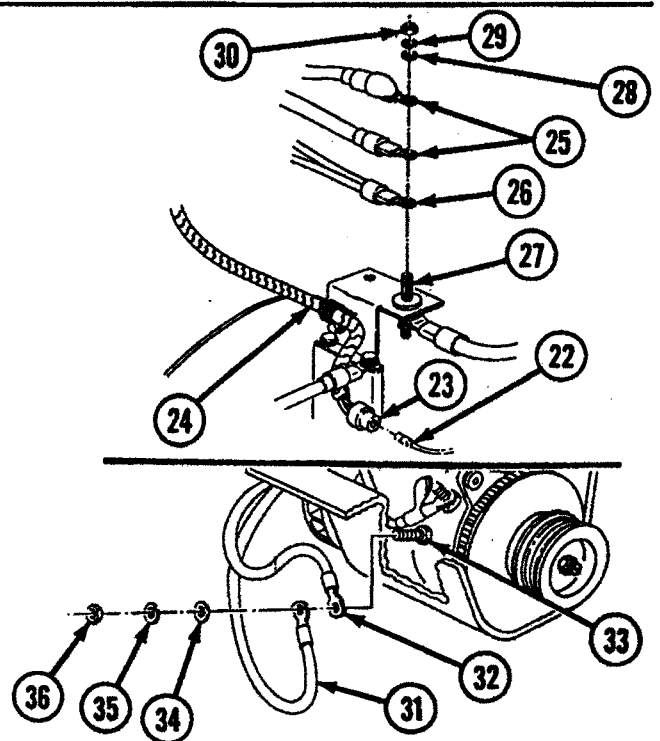


# INSTALLATION

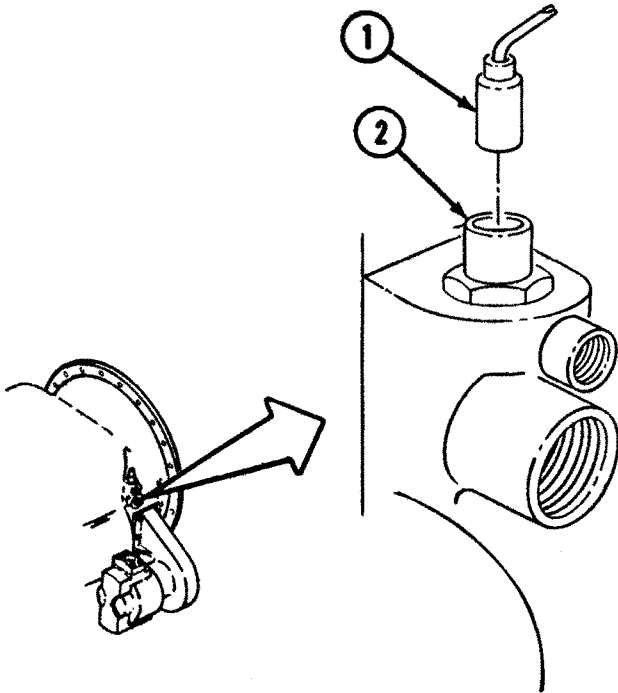
- A** Place engine wiring harness into vehicle for installation.

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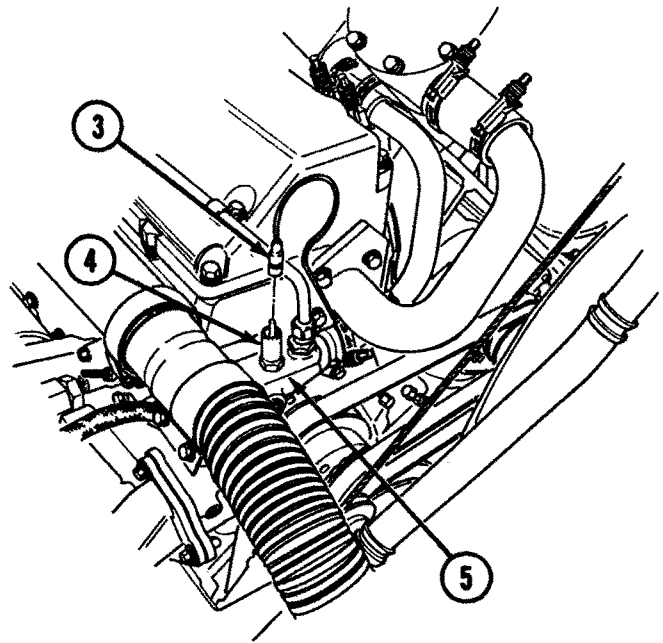
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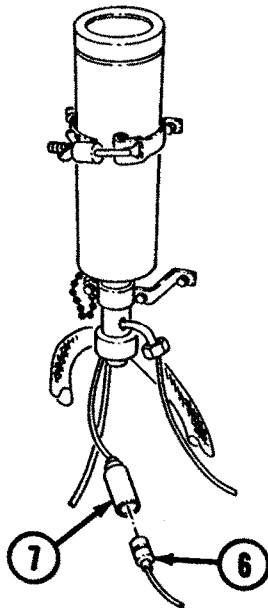
- J** Connect ground lead (22) to adapter (23) on engine wiring harness (24).
- K** Secure two electrical leads 2A (25) and lead 770N/2/14D (26) to terminal bracket assembly (27) with washer (28), lockwasher (29), and nut (30).
- L** Secure electrical lead 770P (31) and ground lead 3 (32) to alternator ground terminal (33) with washer (34), lockwasher (35), and nut (36).



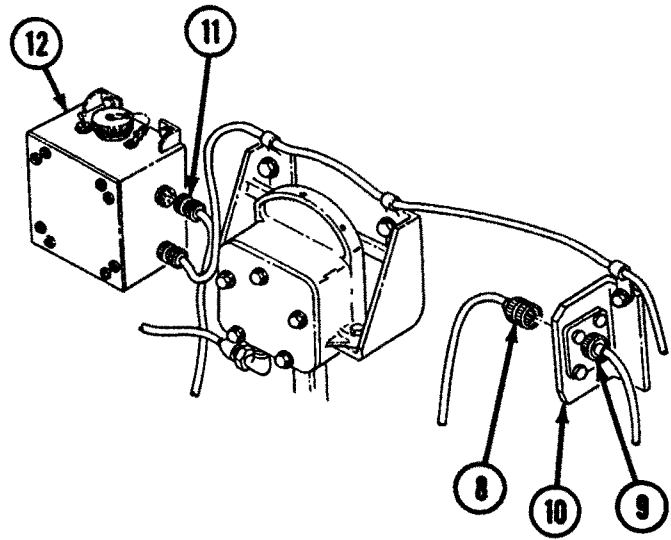
**M** Connect lead 324 (1) to transmission oil temperature transmitter (2).



**N** Connect lead 33 (3) to engine water temperature sending unit (4) on water pump (5).



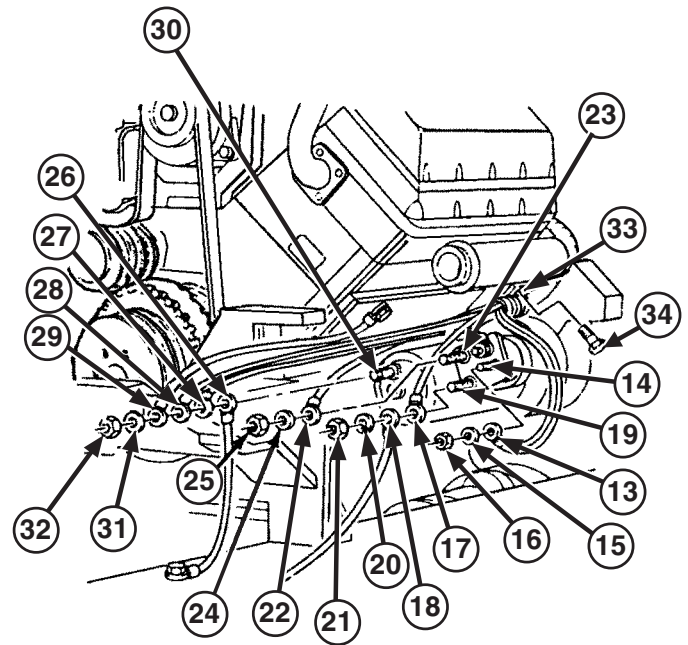
**O** Connect lead 588 (6) to start-aid valve connector (7).



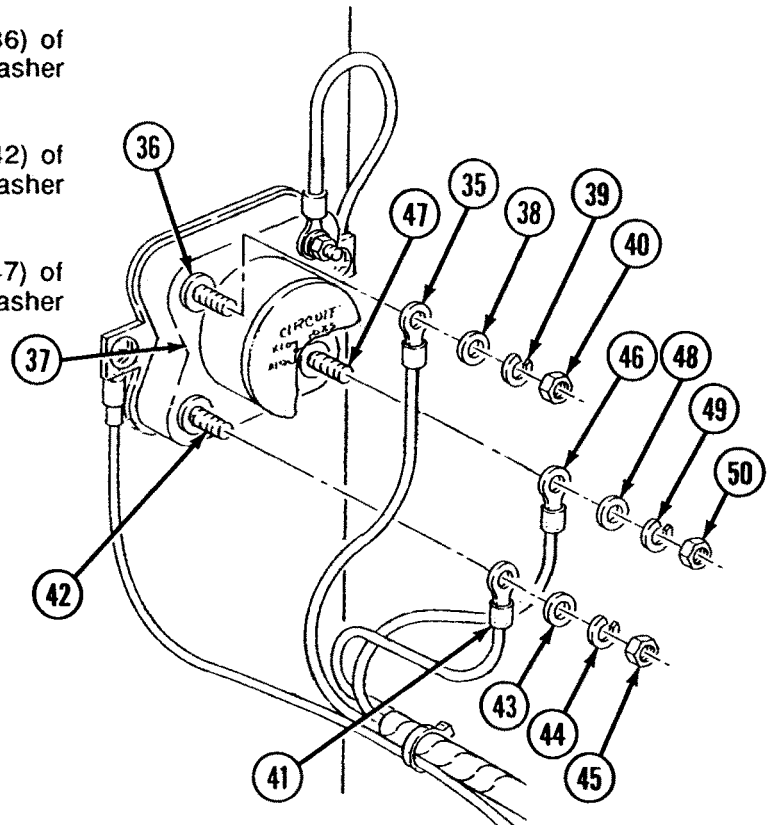
**P** Connect engine wiring harness cannon plug (8) to connector (9) on bracket (10).

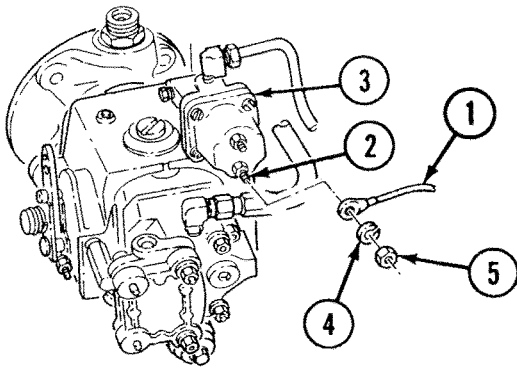
**Q** Connect top cannon plug (11) to STE/ICE-R resistor box (12).

- R** Connect leads 14E and 770S (13) to solenoid terminal (14) with washer (15) and nut (16).
- S** Connect leads 2/10/14D (17) and 6B (18) to solenoid positive terminal (19) with lockwasher (20) and nut (21).
- T** Connect lead 770T (22) to solenoid terminal (23) with washer (24) and nut (25).
- U** Connect ground leads 7A (26), (27), lead 770M (28), and engine ground lead 7B (29) to starter negative terminal (30) with washer (31) and nut (32).
- V** Secure engine wiring harness leads to engine with clamp (33) and screw (34). Tighten screw (34) to 30-35 lb-ft (41-47 N·m).

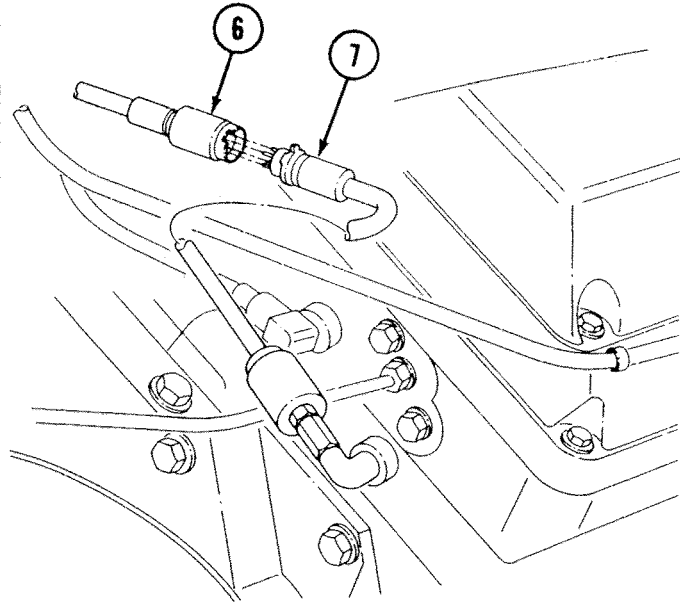


- W** Connect lead 14B (35) to terminal X1 (36) of starter relay (37) with washer (38), lockwasher (39), and nut (40).
- X** Connect lead 14D (41) to terminal A1 (42) of starter relay (37) with washer (43), lockwasher (44), and nut (45).
- Y** Connect lead 14E (46) to terminal A2 (47) of starter relay (37) with washer (48), lockwasher (49), and nut (50).





**Z** Connect fuel shutdown valve lead 54A (1) to terminal (2) of fuel solenoid (3) with lockwasher (4) and nut (5).



**AA** Connect STE/ICE-R fuel pressure transducer leads 770U/770F/770G/770V (6) to STE/ICE-R fuel pressure transducer (7).

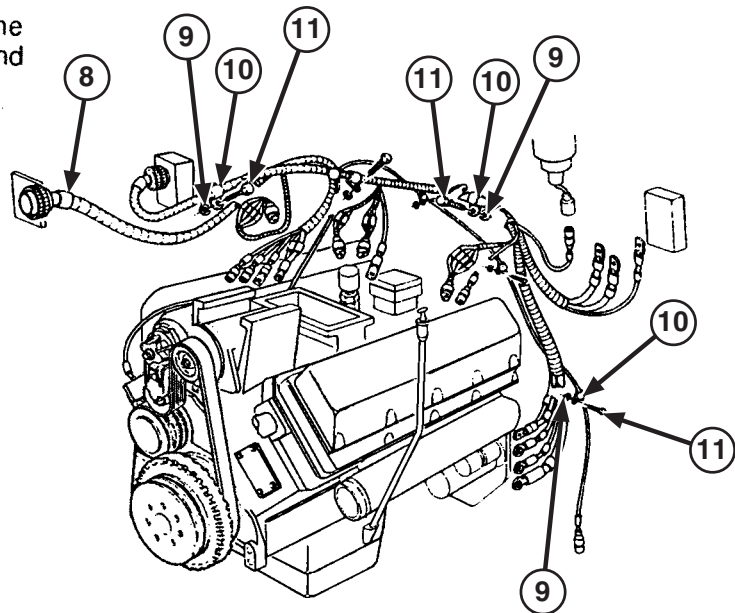
**Note**

Deleted

**AB** Secure engine wiring harness (8) to engine with six washers (9), loop clamps (10), and screws (11).

**FOLLOW-ON TASKS:**

- Install transmission oil cooler (TM 5-2350-262-20-2).
- Install tachometer sending unit (TM 5-2350-262-20-1).
- Install engine oil pressure sending unit (TM 5-2350-262-20-1).
- Connect negative battery cables (TM 5-2350-262-20-1).
- Install engine intake grilles and covers (TM 5-2350-262-20-1).
- Retract ejector (TM 5-2350-262-10).



---

# HEADLIGHT INTERMEDIATE WIRING HARNESS REPLACEMENT AND REPAIR

---

This task covers:

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

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Parts Reference:

TM 5-2350-262-20-1 Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-10

TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

Reference

TM 5-2350-262-10

TM 5-2350-262-20-1

TM 5-2350-262-20-1

Condition  
Description

Ejector Forward

Armor Plate  
Removed

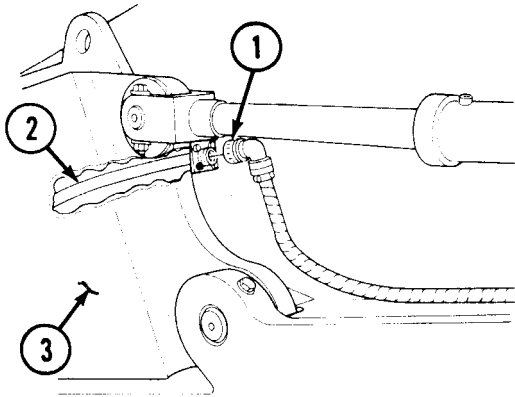
Negative Battery  
Cables Discon-  
nected

General Safety Instructions:

## WARNING

Disconnect batteries at the negative terminals before working on the electrical system.

**REMOVAL**

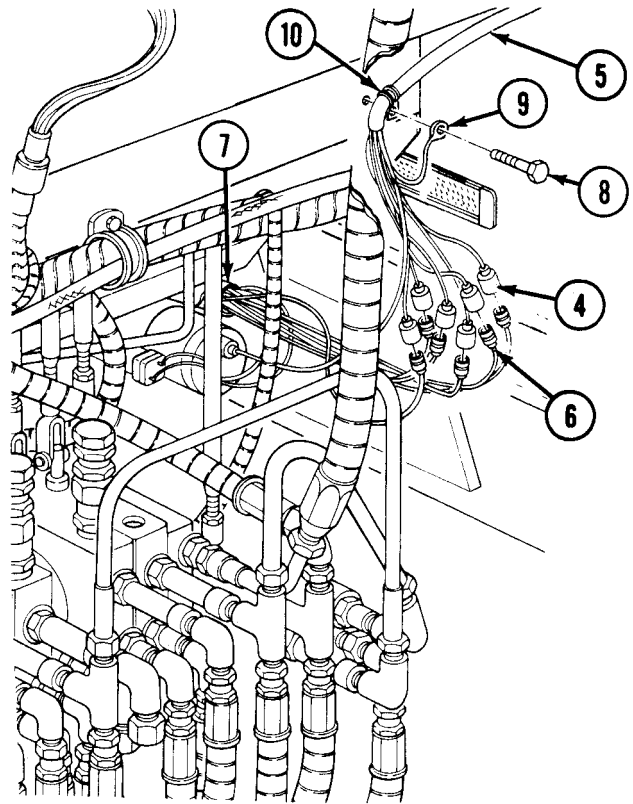


**WARNING**  
 Disconnect batteries at the negative terminals before working on the electrical system. A direct short may result, causing instant heating of tools, damage to equipment, and severe injury to personnel.

**Note**

Replacement procedures for the headlight intermediate wiring harness are the same for both sides of the vehicle. The left side is shown here.

**A** Disconnect headlight intermediate wiring harness cannon plug (1) from apron wiring harness (2) on apron (3).

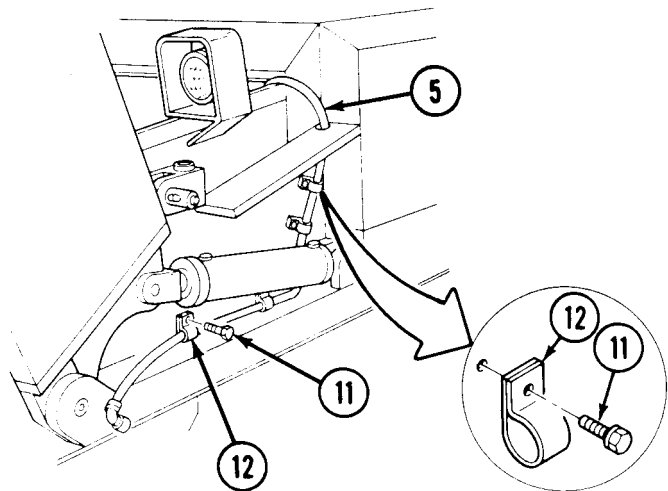


**B** Disconnect six leads (4) of headlight intermediate wiring harness (5) from leads (6) of rear wiring harness (7).

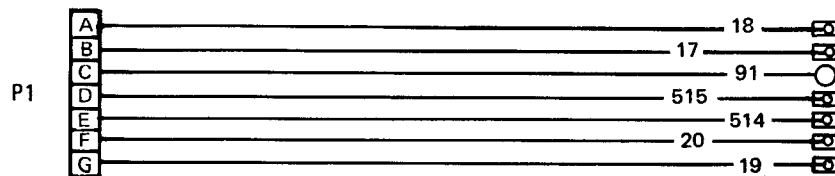
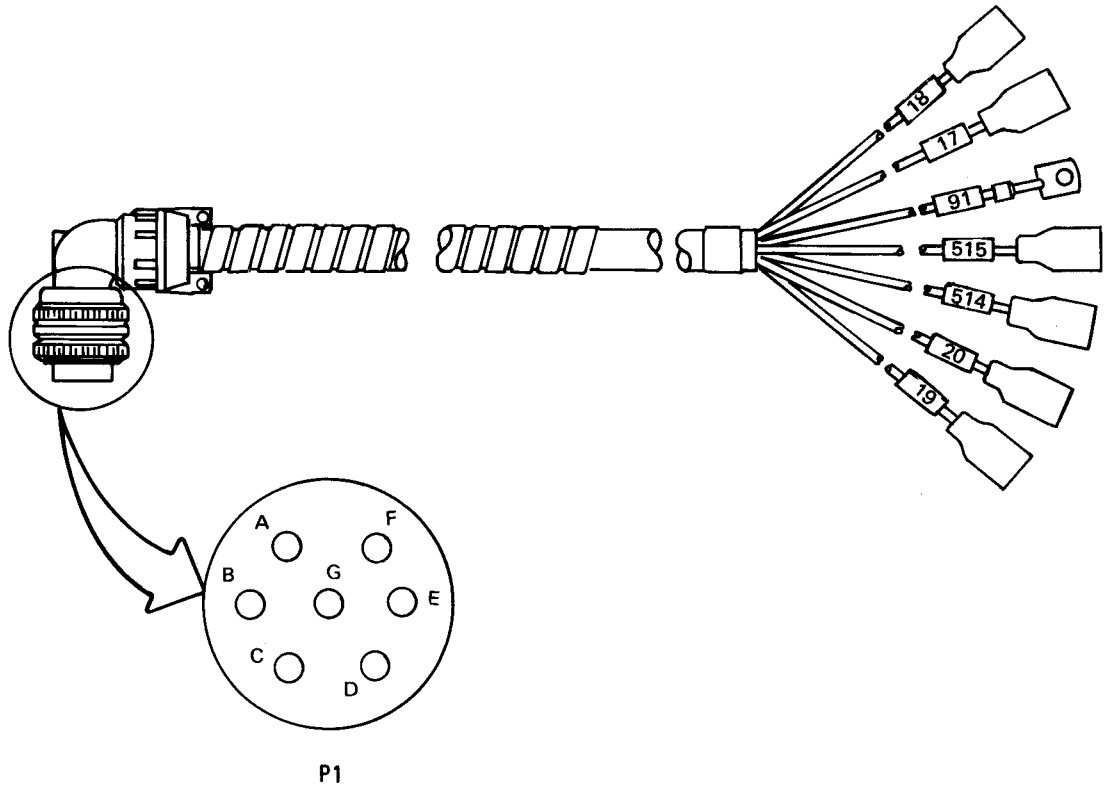
**C** Remove screw (8) and lead 91 (9) from clamp (10).

**D** Remove six screws (11) and clamps (12) securing headlight intermediate wiring harness (5) to hull.

**E** Remove headlight intermediate wiring harness (5) from vehicle.



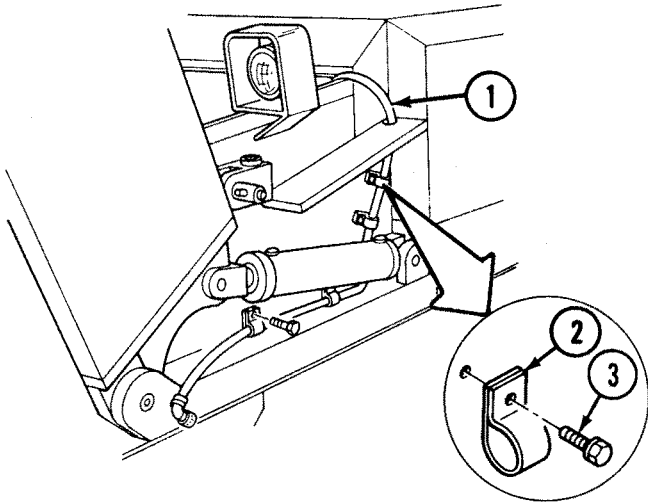
**REPAIR**



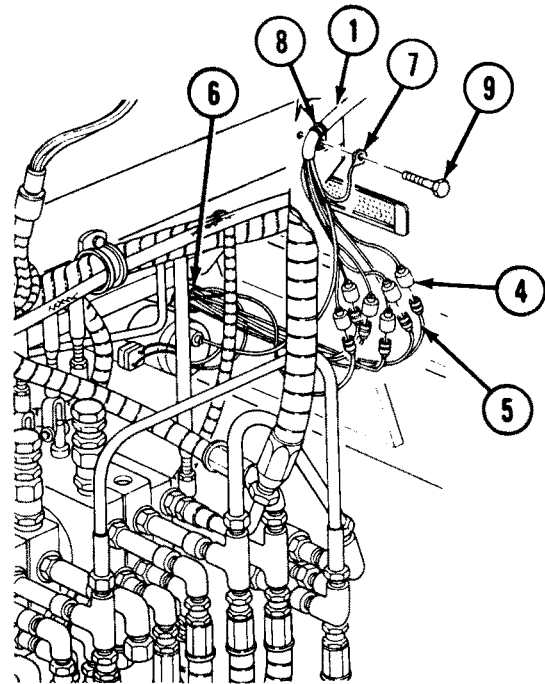
**WIRING DIAGRAM**

Refer to page 2-10 to repair the headlight intermediate wiring harness.

**INSTALLATION**



- A** Place headlight intermediate wiring harness (1) into position on vehicle.
- B** Install headlight intermediate wiring harness (1) on vehicle with six clamps (2) and screws (3).

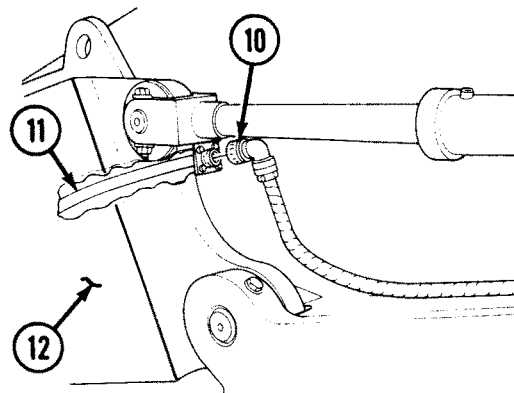


- C** Connect six leads (4) of headlight intermediate wiring harness (1) to leads (5) of rear wiring harness (6).
- D** Install lead 91 (7) on clamp (8) with screw (9).

- E** Connect headlight intermediate wiring harness cannon plug (10) to apron wiring harness (11) on apron (12).

**FOLLOW-ON TASKS:**

- Install armor plate (TM 5-2350-262-20-1).
- Connect negative battery cables (TM 5-2350-262-20-1).
- Retract ejector (TM 5-2350-262-10).





---

# APRON WIRING HARNESS REPLACEMENT

---

This task covers:

- a. Removal
  - b. Installation
- 

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Tape, Electrical	Item 40 Appendix C
Wire, Non-electrical	Item 41 Appendix C

Parts:

Gasket

Parts Reference:

TM 5-2350-262-24P    Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

Reference

Page 4-73

Condition  
Description

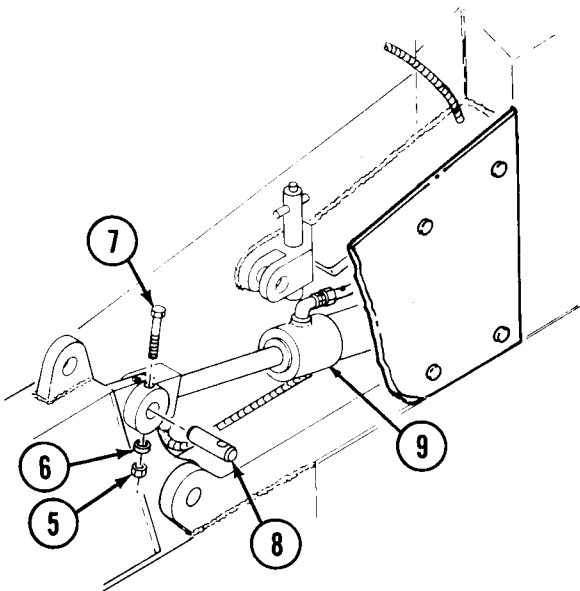
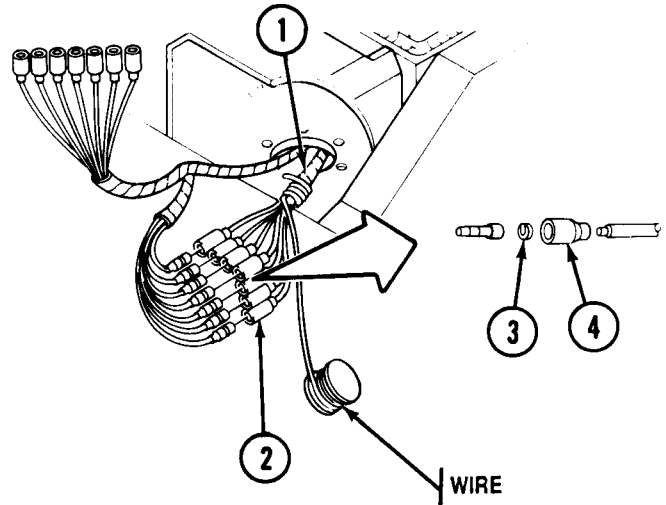
LH Headlight Base  
Assembly Removed

**REMOVAL**

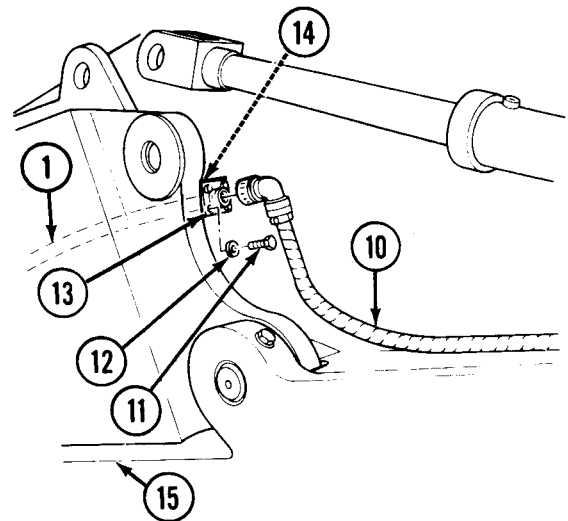
**Note**

Tag all electrical leads prior to removal for installation.

- A** Pull apron wiring harness (1) through access hole and disconnect seven connectors (2).
- B** Remove seven slotted washers (3) and connector shells (4) from apron wiring harness (1).
- C** Securely attach at least 10 ft (3.05 m) of wire to apron wiring harness (1). Tape loose ends together.

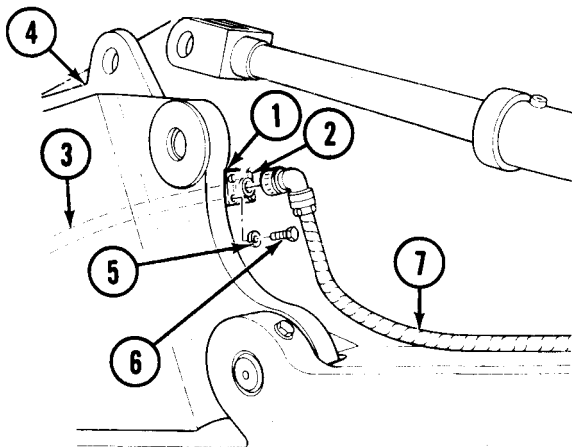


- D** Remove nut (5), washer (6), screw (7), and pin (8) from forward end of apron hydraulic cylinder (9).
- E** Remove forward end of apron hydraulic cylinder (9) and lift out of way.

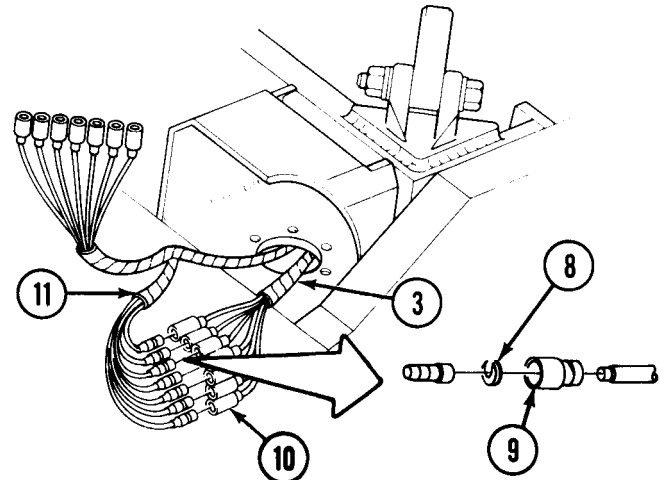


- F** Disconnect wiring harness (10) from apron wiring harness (1).
- G** Remove four screws (11) and washers (12) from connector base (13).
- H** Remove apron wiring harness (1) and gasket (14) from apron (15). Remove wire from harness (1). Leave wire in apron (15) for use during installation. Discard gasket (14).

**INSTALLATION**



- A** Install gasket (1) on connector base (2). Connect wire to apron wiring harness (3) and pull through apron (4).
- B** Install four washers (5) and screws (6) on connector base (2). Remove wire.
- C** Connect wiring harness (7) to apron wiring harness (3).



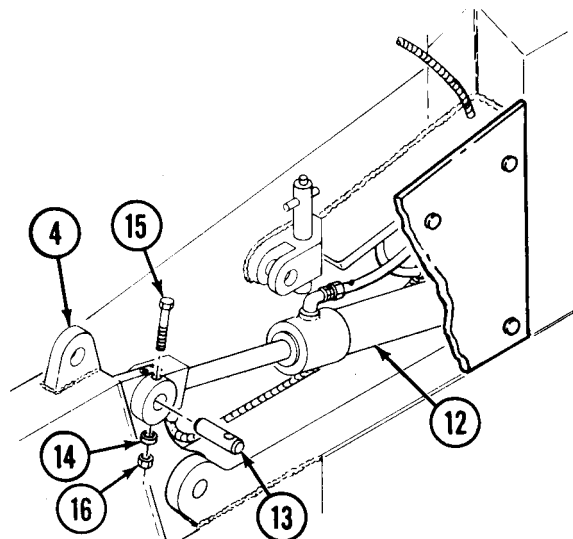
**Note**

Seven shells and seven washers must be assembled on apron wiring harness after installation in apron opening.

- D** Install seven slotted washers (8) and connector shells (9) on apron wiring harness (3).
- E** Remove tape and connect seven connectors (10) to headlight wiring harness (11).

- F** Install forward end of apron hydraulic cylinder (12) on apron (4) with pin (13).
- G** Secure apron hydraulic cylinder (12) with washer (14), screw (15), and nut (16).

**FOLLOW-ON TASK:**  
Install LH headlight base assembly (p 4-73).



---

## HEADLIGHT WIRING HARNESS REPLACEMENT

---

This task covers:

- a. Removal
  - b. Installation
- 

<b>INITIAL SETUP</b>
----------------------

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Wire, Non-electrical      Item 41  
Appendix C

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

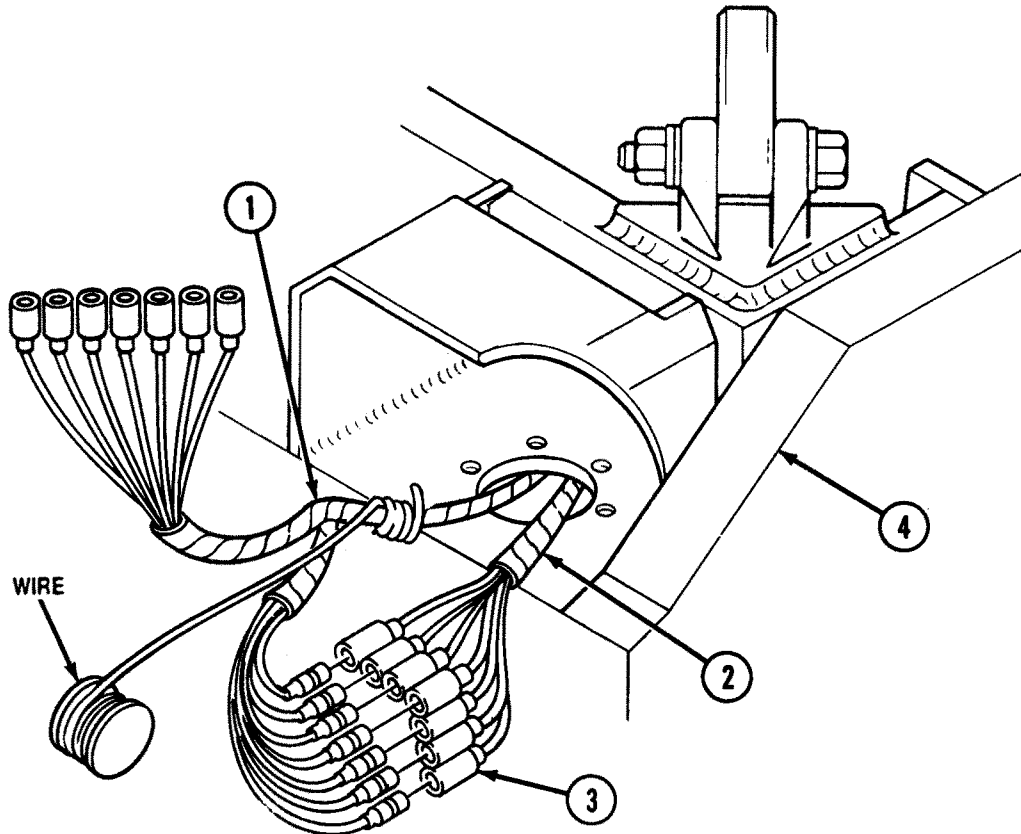
Equipment Condition:

Reference

Page 4-73

Condition  
Description

LH and RH Head-  
light Base Assem-  
blies Removed



**REMOVAL**

**Note**

Tag all electrical leads prior to removal for installation.

- A** Disconnect headlight wiring harness (1) from apron wiring harness (2) at terminals (3).
- B** Securely attach at least 10 ft (3.05 m) of wire to wiring harness (1).
- C** Remove headlight wiring harness (1) from right side of apron (4). Remove wire from headlight wiring harness (1). Leave wire in apron (4) for use during installation.

**INSTALLATION**

- A** Connect wire to headlight wiring harness (1).
- B** Pull other end of wire until the left side of headlight wiring harness (1) appears from right side of apron (4). Remove wire.
- C** Connect headlight wiring harness (1) to apron wiring harness (2) at terminals (3).

**FOLLOW-ON TASK:**

Install LH and RH headlight base assemblies (p 4-73).

---

## HEADLIGHT BASE ASSEMBLY REPLACEMENT

---

This task covers:

- a. Removal
  - b. Installation
- 

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Parts:

Gasket

Parts Reference:

TM 5-2350-262-24P      Group AJ

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

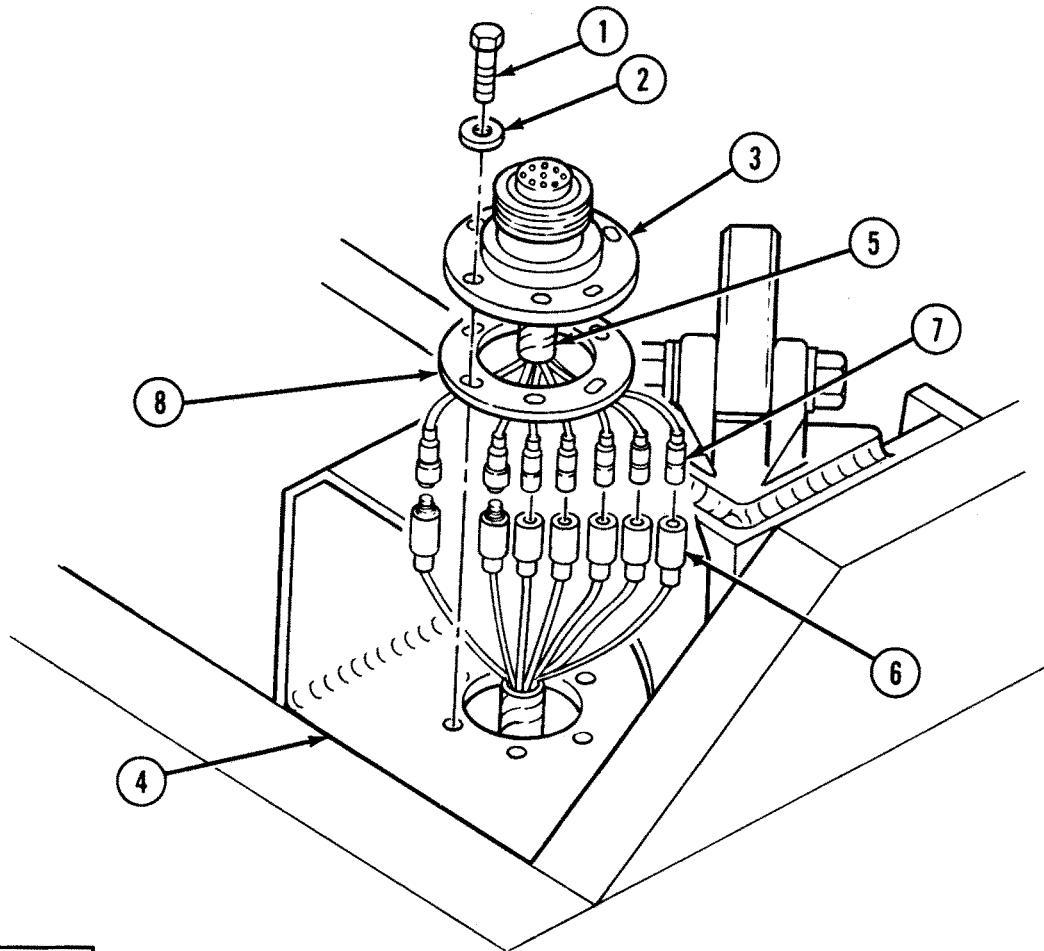
TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Headlights Removed
TM 5-2350-262-20-1	Headlight Assembly Removed



## REMOVAL

### Note

- Tag all electrical leads prior to removal for installation.
- The right-hand headlight base assembly has four connectors attached. The left-hand headlight base assembly has five connectors attached. This procedure covers the left headlight base assembly.

- A** Remove six screws (1) and washers (2) securing headlight base (3) to apron (4).
- B** Pull wiring harness (5) through access hole and disconnect five connectors (6) from connectors (7) on wiring harness (5). Remove headlight base (3) and gasket (8). Discard gasket (8).

## INSTALLATION

- A** Place gasket (8) over connectors (7) of headlight base (3).
- B** Connect five connectors (6) to connectors (7) of headlight wiring harness (5).
- C** Install gasket (8) and headlight base (3) on apron (4) with six washers (2) and screws (1).

### FOLLOW-ON TASKS:

- Install headlight assembly (TM 5-2350-262-20-1).
- Install headlights (TM 5-2350-262-20-1).

---

## HEADLIGHT BASE ASSEMBLY REPAIR

---

This task covers:

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

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Parts:

Lockwasher (2)

Seal

Parts Reference:

TM 5-2350-262-24P      Group AJ

Personnel Required:

Fuel and Electrical Repairer 63G10

Reference:

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

Reference

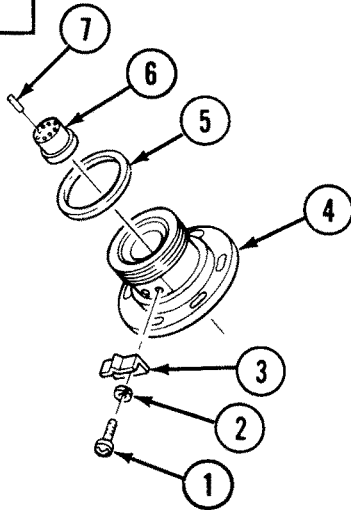
Page 4-73

Condition  
Description

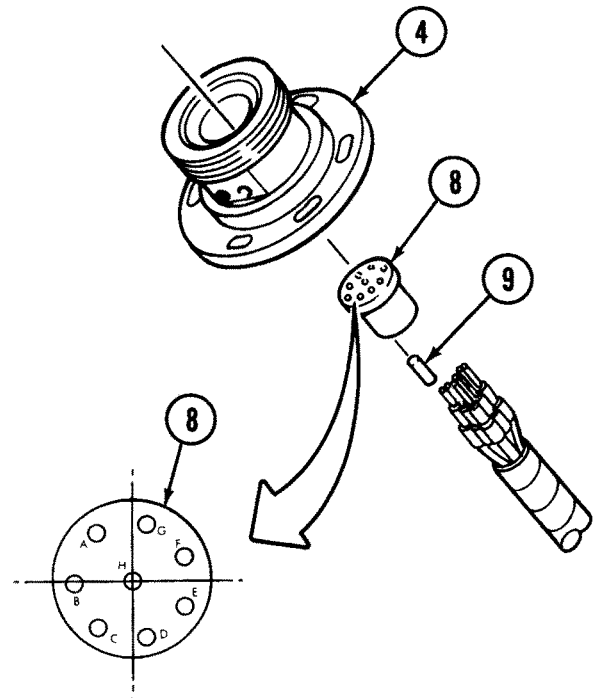
Headlight Base  
Assembly Removed



**DISASSEMBLY**

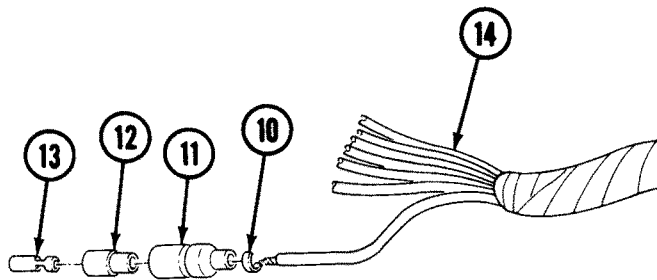


- A** Remove two screws (1), lockwashers (2), and spring tension clip (3) from headlight base (4). Discard lockwashers (2).
- B** Remove seal (5) from top of base (4). Discard seal (5).
- C** Pull grommet (6) from base (4) and remove seven contacts (7) from grommet (6).

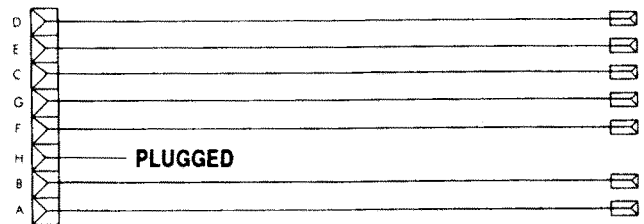


- D** Pull out insert (8) from base (4) and remove rod (9) from insert (8).

**REPAIR**



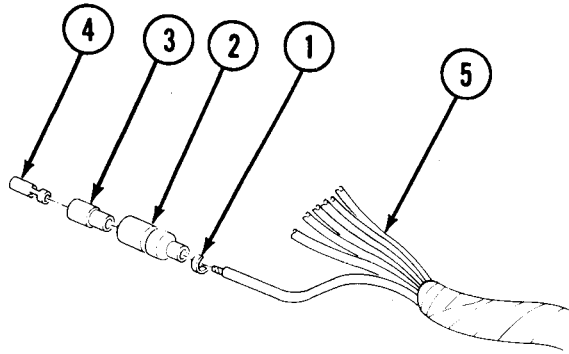
- E** To disassemble marker bands (10), shells (11), sleeves (12), and terminals (13) from headlight wires (14), refer to General Connector Repair (p 2-12).



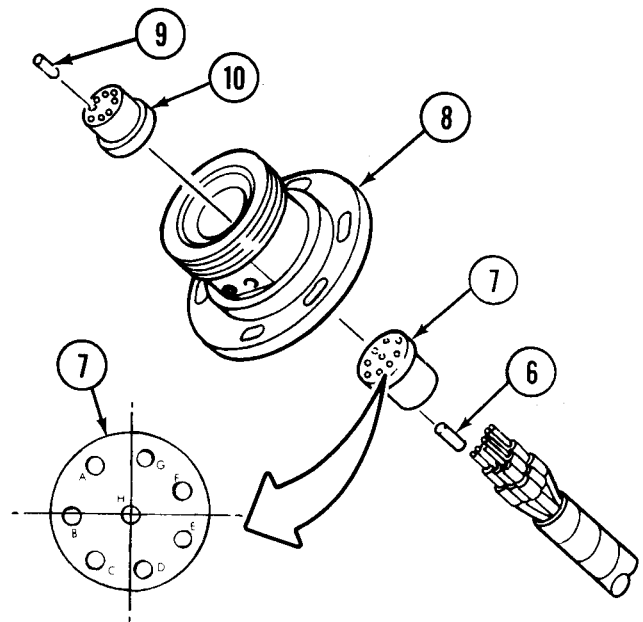
WIRING SCHEMATIC

Refer to p 2-10 to repair headlight base wiring harness. Replace any unserviceable parts.

**ASSEMBLY**



**A** To assemble marker bands (1), shells (2), sleeves (3), and terminals (4) to headlight wires (5), refer to General Connector Repair (p 2-12).



**B** Install rod (6) on insert (7), and plug insert (7) into headlight base (8).

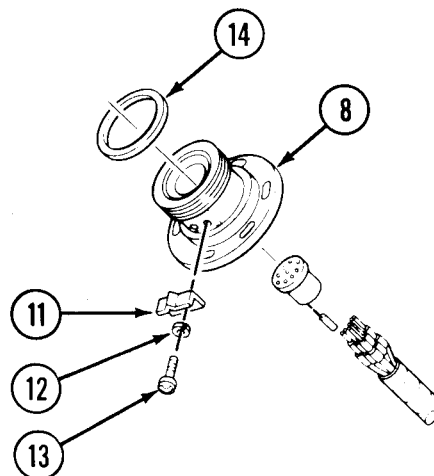
**C** Install seven contacts (9) on grommet (10), and plug grommet (10) into base (8).

**D** Install spring tension clip (11), two lockwashers (12), and screws (13) on base (8).

**E** Install seal (14) on base (8).

**FOLLOW-ON TASK:**

Install headlight base assembly (p 4-73).



## Section II. GROUP AL, FIRE EXTINGUISHER INSTALLATION

---

<b>TASKS</b>	<b>PAGE</b>
Fire Extinguisher Service and Repair .....	4-78

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## **FIRE EXTINGUISHER SERVICE AND REPAIR**

---

■ Adapters NSN 4730-00-942-9147 or NSN 4730-01-157-8924 will be required to service fixed fire extinguisher bottles. Obtain adapters before servicing bottles.

Use these adapters instead of adapter NSN 5820-00-200-6089 provided in the Recharger Kit.

■ Service and repair the dry powder fire extinguisher in accordance with local procedures.

## Section III. GROUP AM, FUEL SYSTEM INSTALLATION

---

<b>TASKS</b>	<b>PAGE</b>
Fuel Tank Repair .....	4-80

# FUEL TANK REPAIR

This task covers:

- |                |             |
|----------------|-------------|
| a. Disassembly | d. Repair   |
| b. Cleaning    | e. Assembly |
| c. Inspection  |             |

## INITIAL SETUP

Tools:

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Materials:

Adhesive	Item 1 Appendix C
Methyl-ethyl-ketone	Item 25 Appendix C

Parts Reference:

TM 5-2350-262-24P Group AM

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

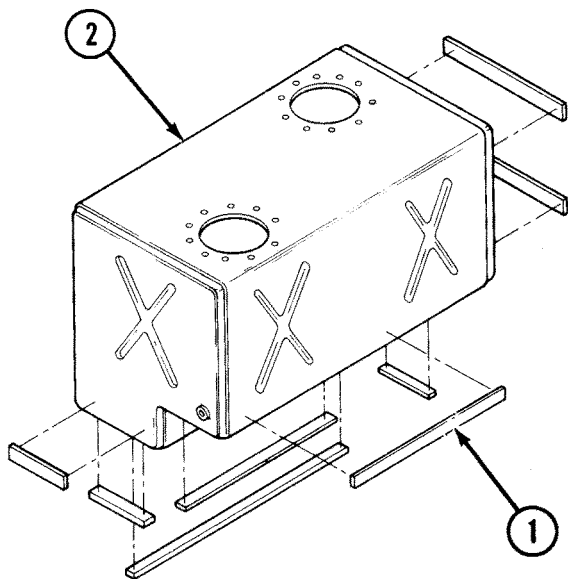
<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Fuel Tank Removed

General Safety Instructions:

**WARNING**

- Fuel tanks must be entirely free of flammable liquid, vapor, and gases prior to repair. Welding, or other work producing heat, flame, or sparks, must be preceded by cleaning.
- Fuel vapors are toxic. Avoid prolonged exposure or breathing of fumes. Work in a well-ventilated area.
- Fuel is a combustible material. Do not smoke or allow open flame or sparks into areas where fuel is present.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

**DISASSEMBLY**



Using methyl-ethyl-ketone, remove eight tank pads (1) from fuel tank (2), only if damaged.

**CLEANING**

**WARNING**

- Fuel tanks must be entirely free of flammable liquid, vapor, and gases prior to repair. Welding, or other work producing heat, flame, or sparks, must be preceded by cleaning. Failure to comply may result in severe injury or death.
- Fuel vapors are toxic. Avoid prolonged exposure or breathing of fumes. Work in a well-ventilated area. Failure to comply may result in severe injury or death.
- Fuel is a combustible material. Do not smoke or allow open flames or sparks into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.
- Compressed air can injure you and others. Do not aim compressed air hose at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

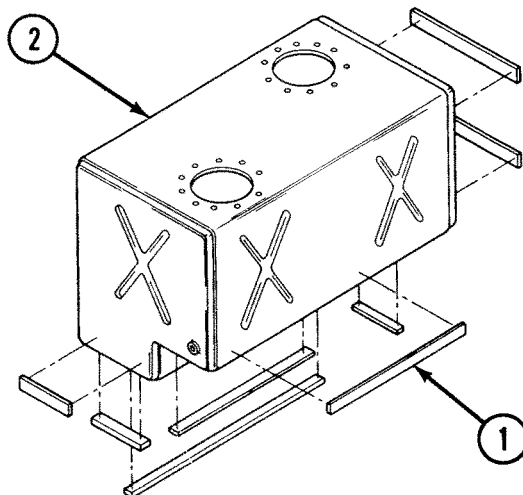
Clean inside of fuel tank with warm soapy water and rinse with warm water. Blow dry with compressed air.

**INSPECTION**

- A** Inspect for cracks and broken welds.
- B** Inspect mounting holes for stripped threads.
- C** Inspect for missing or damaged pads.

**REPAIR**

Use general repair methods to repair fuel tank (p 2-8).



**ASSEMBLY**

Using adhesive, install eight tank pads (1) on fuel tank (2), if removed.

**FOLLOW-ON TASK:**  
Install fuel tank (TM 5-2350-262-20-1).

## Section IV. GROUP AN, HEATER AND VENTILATION INSTALLATION

---

■ Deleted





## Section VI. GROUP AP, BOLTED HULL ASSEMBLY INSTALLATION

---

<b>TASKS</b>	<b>PAGE</b>
Apron Hydraulic Cylinder Repair .....	4-89
Ejector Hydraulic Cylinder Repair .....	4-95

# APRON HYDRAULIC CYLINDER REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Spanner Wrench 5120-00-157-2133

Materials:

Lubricating Oil Item 32 Appendix C

Parts:

Locknut 12412092-2

Repair Kit 57K1144

Setscrew

Parts Reference:

TM 5-2350-262-24P Group AP

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

TM 5-2350-262-20-1

TM 9-214

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Apron Cylinder Removed

General Safety Instructions:

### WARNING

Spilled hydraulic oil is very slippery. Wipe up any spilled oil immediately.

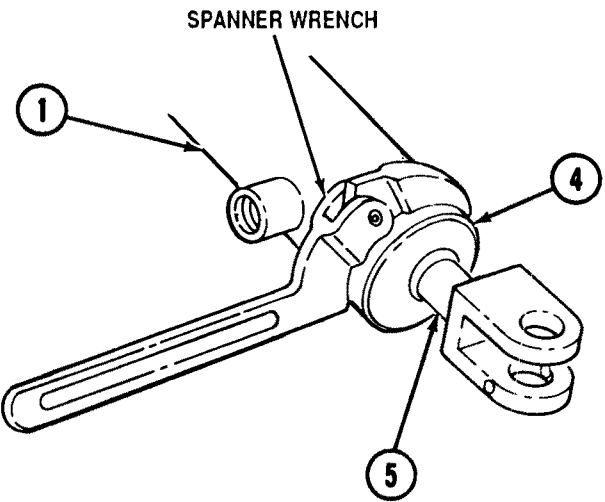
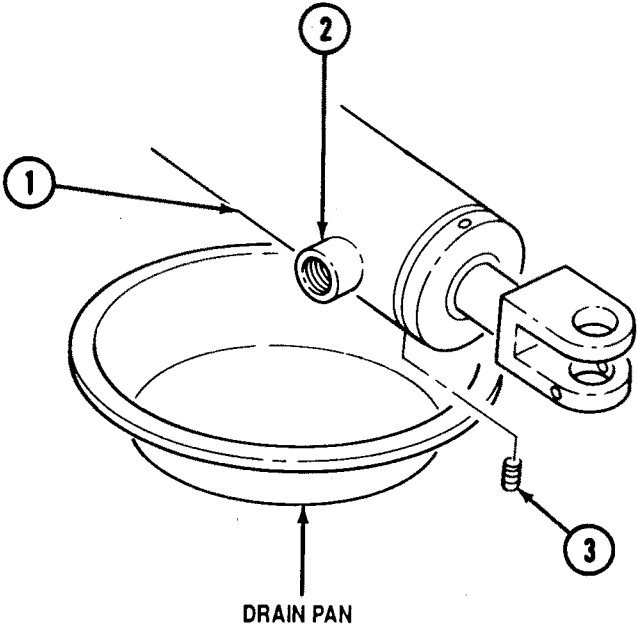
**DISASSEMBLY**

**WARNING**  
 Spilled hydraulic oil is very slippery. Wipe up spilled oil immediately. Failure to comply may result in severe injury to personnel.

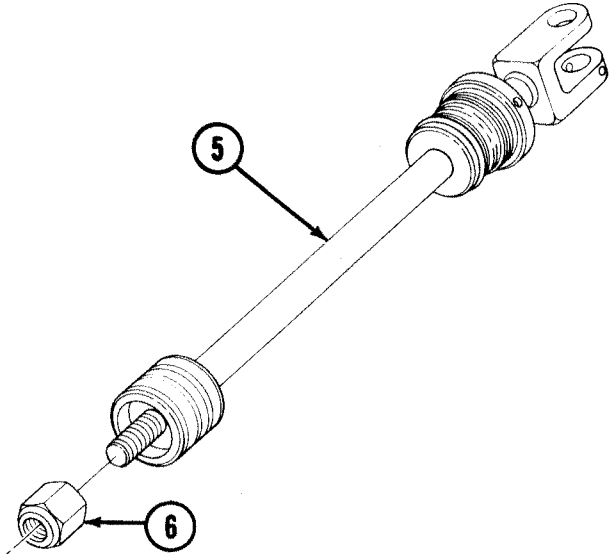
**Note**

Point oil ports down over drain pan. Oil will rush out when piston is removed.

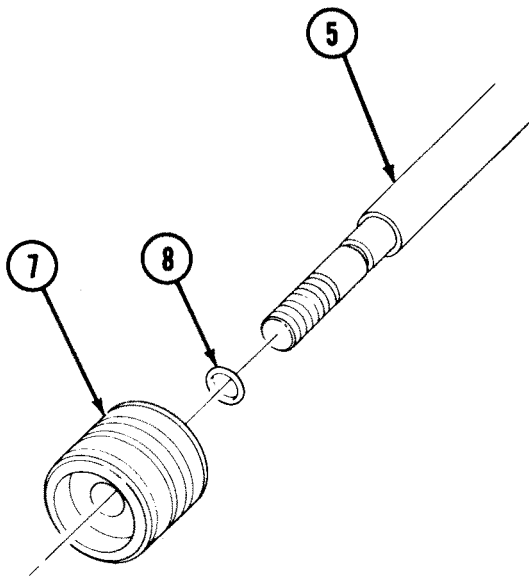
- A** With helper assisting, place cylinder (1) in vise with ports (2) over drain pan.
- B** Remove and discard setscrew (3) from cylinder (1).



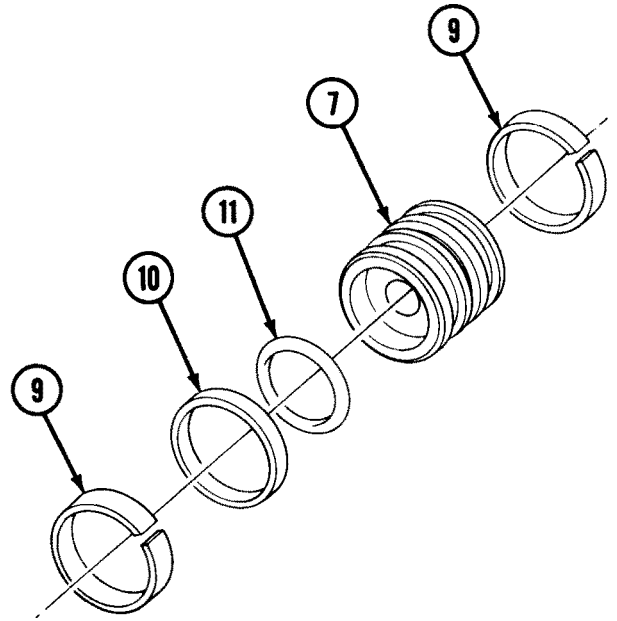
- C** Using spanner wrench, remove head (4) from cylinder (1).
- D** Slowly remove piston rod (5) from cylinder (1).



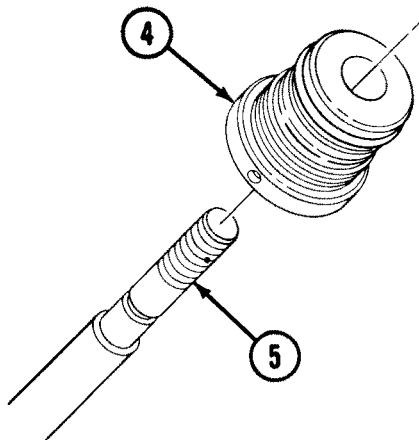
- E** Remove and discard piston locknut (6) from piston rod (5).



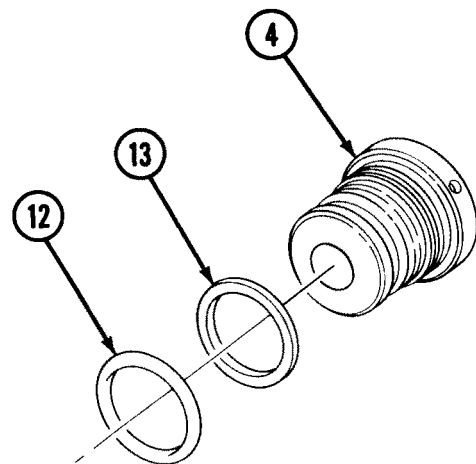
**F** Remove piston (7) and packing (8) from piston rod (5). Discard packing (8).



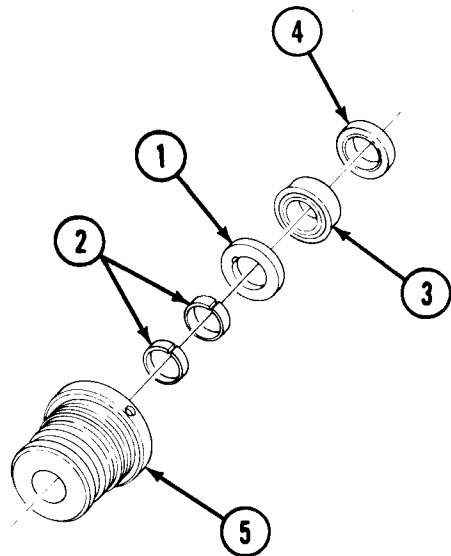
**G** Remove and discard two wear rings (9), seal (10), and packing (11) from piston (7).



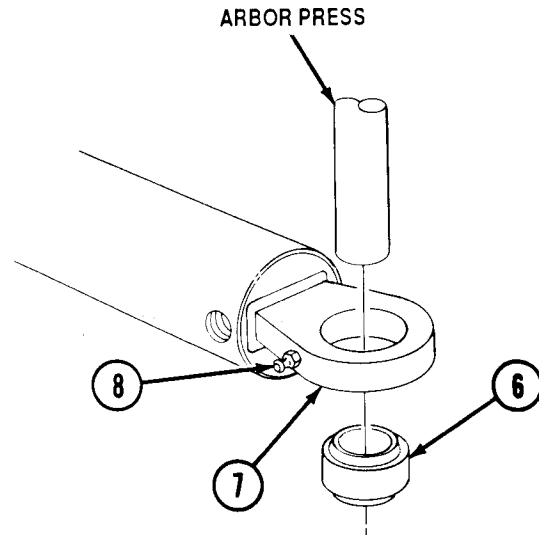
**H** Remove head (4) from piston rod (5).



**I** Remove and discard packing (12) and retainer (13) from head (4).



**J** Remove buffer ring (1), two wear rings (2), seal (3), and wiper (4) from head (5). Discard buffer ring (1).



**Note**

Do not remove bearing unless inspection shows need for replacement.

**K** Using arbor press, remove bearing (6) from cylinder eye (7).

**L** Remove lubrication fitting (8) if damaged.

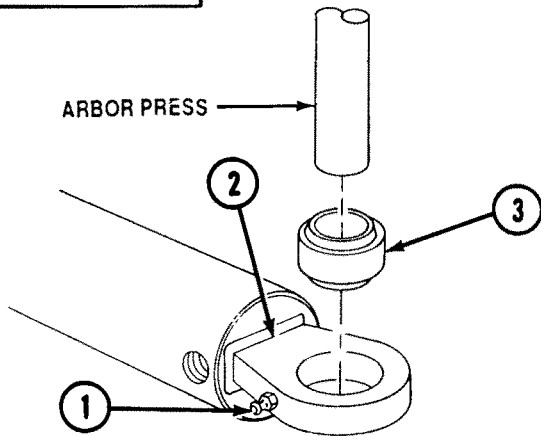
**INSPECTION**

- A** Inspect piston, rod, and interior of cylinder for scratches or scoring.
- B** Inspect threads on piston rod, piston locknut, cylinder, and head for wear or damage.
- C** Inspect bearings in accordance with TM 9-214.

**REPAIR**

- A** Use general repair methods to repair damaged parts (p 2-8).
- B** Replace broken or unserviceable parts.
- C** Use all parts contained in repair kit.

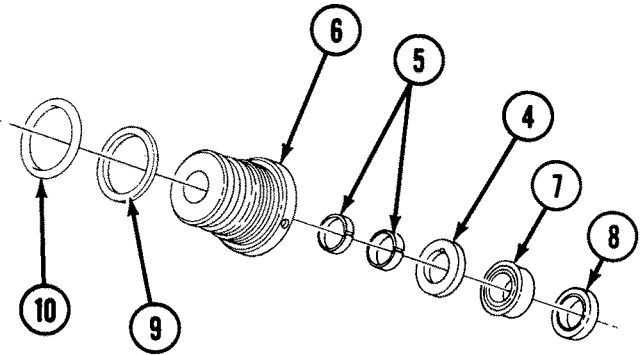
**ASSEMBLY**



**Note**

Apply coating of oil to all internal parts to ease assembly.

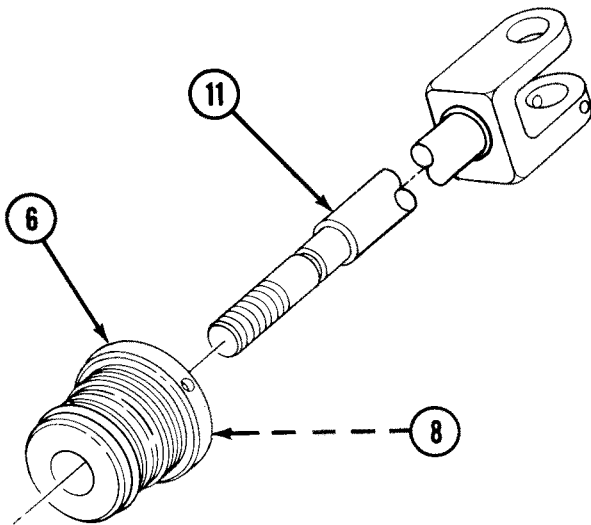
- A** If removed, install lubrication fitting (1) on cylinder eye (2).
- B** Using arbor press, install bearing (3) on cylinder eye (2).



**Note**

Ensure openings in wear rings are staggered 180°.

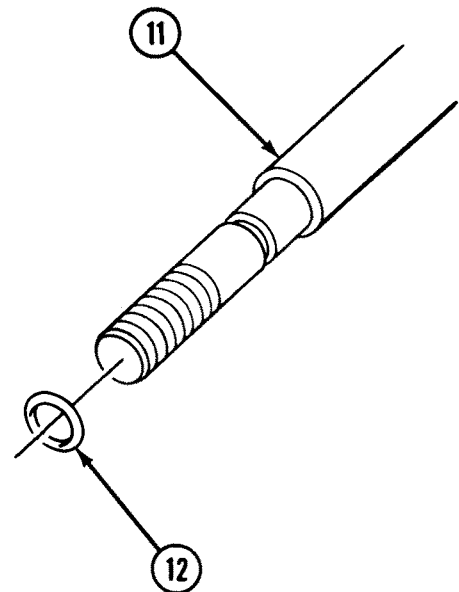
- C** Install buffer ring (4) and two wear rings (5) on head (6).
- D** Install seal (7) on head (6), ensuring grooved side of seal (7) faces toward wear rings (5).
- E** Install wiper (8) on head (6) with metal case of wiper (8) facing seal (7).
- F** Install retainer (9) and packing (10) on head (6).



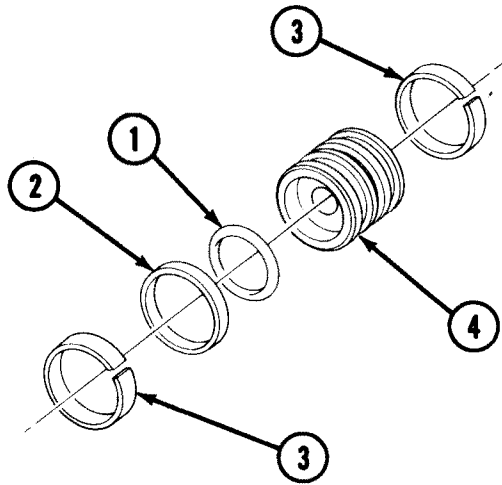
**CAUTION**

Use caution not to mar or scratch rod during installation of head.

- G** Install head (6) on piston rod (11) with wiper (8) facing yoke.



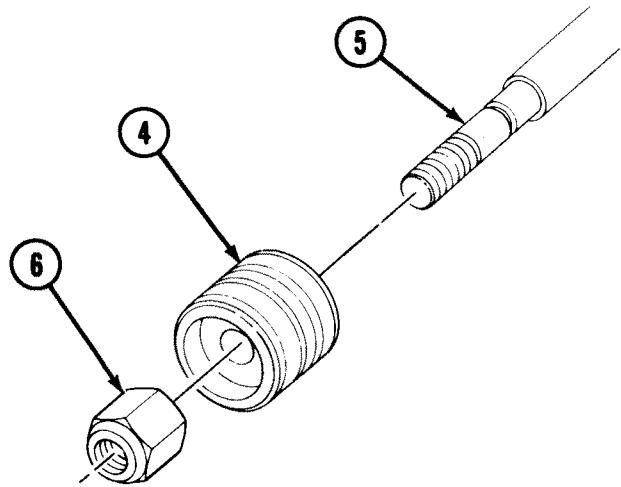
- H** Install packing (12) on piston rod (11).



**Note**

It may be necessary to compress seal with suitable compressing device long enough for seal to fit tightly on piston before installing piston on rod.

**I** Install packing (1), seal (2), and two wear rings (3) on piston (4).



**J** Install piston (4) on piston rod (5) with open end of piston (4) facing rod threads.

**K** Install piston locknut (6) on rod (5). Tighten locknut (6) to 475-525 lb-ft (644-712 N.m).

**L** Install piston rod (5) on cylinder (7).

**M** Using spanner wrench, install head (8) on cylinder (7).

**N** Using spanner wrench, tighten head (8) until head (8) just touches cylinder (7).

**O** Draw line on head (8).

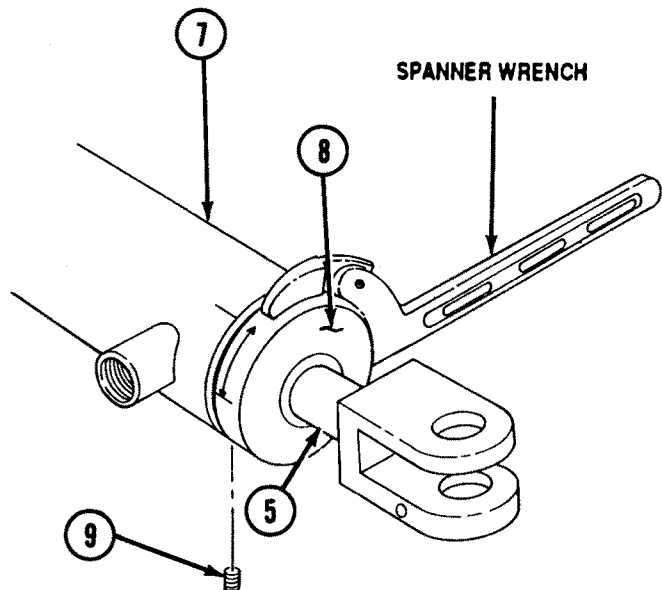
**P** Measure approximately 1.12 in. (2.84 cm) from line in clockwise direction and mark line on cylinder (7).

**Q** Tighten head (8) until line on head (8) and line on cylinder (7) meet.

**R** Secure head (8) in cylinder (7) with setscrew (9). Tighten setscrew (9) against head (8) and stake in place.

**FOLLOW-ON TASK:**

Install apron cylinder (TM 5-2350-262-20-1).





# EJECTOR HYDRAULIC CYLINDER REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Spanner Wrench      5120-00-880-4264

Materials:

Lubricating Oil      Item 32  
Appendix C

Parts:

Locknut      12412092-2

Repair Kit      57K1145

Setscrew

Parts Reference:

TM 5-2350-262-24P      Group AP

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

TM 5-2350-262-20-1

TM 9-214

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Ejector Cylinder Removed

General Safety Instructions:

### WARNING

Spilled hydraulic oil is very slippery. Wipe up any spilled oil immediately.

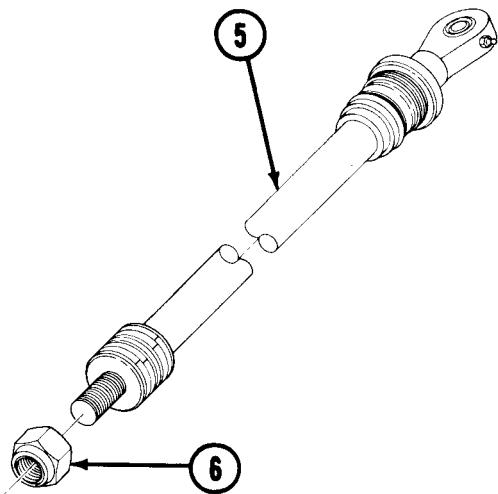
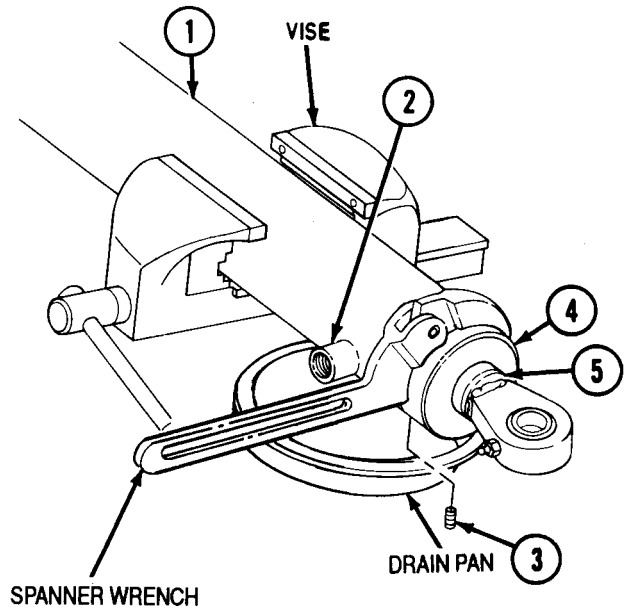
**DISASSEMBLY**

**WARNING**  
 Spilled hydraulic oil is very slippery. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.

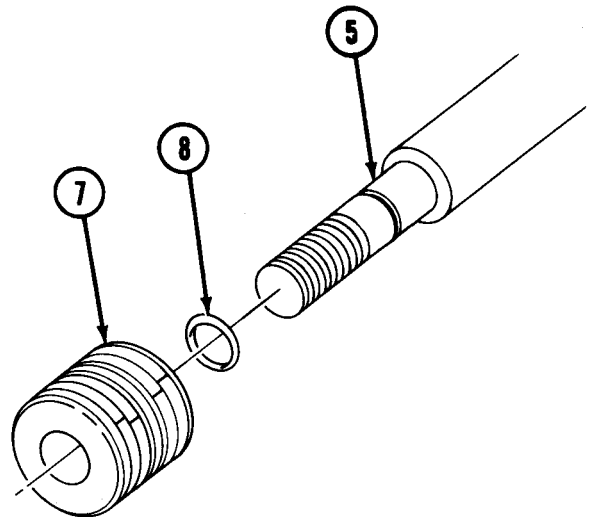
**Note**

Point oil ports down over drain pan. Oil will rush out when piston is removed.

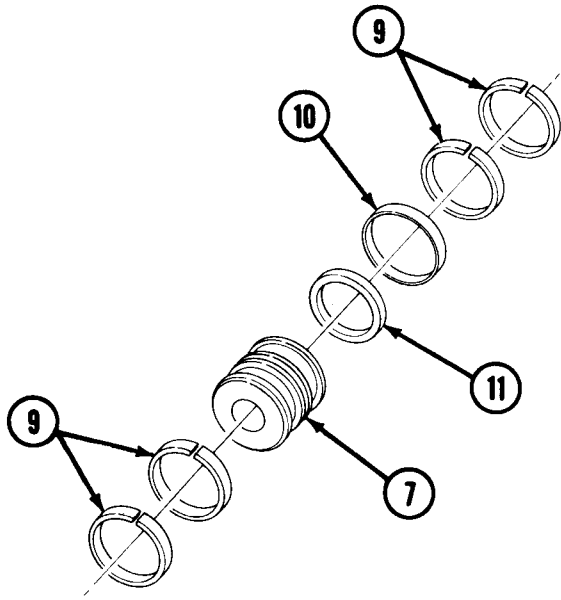
- A** Clamp ejector cylinder (1) in vise and place drain pan below oil ports (2).
- B** Remove setscrew (3) from cylinder (1). Discard setscrew (3).
- C** Using spanner wrench, remove head (4) from cylinder (1).
- D** Slowly remove piston rod (5) from cylinder (1).



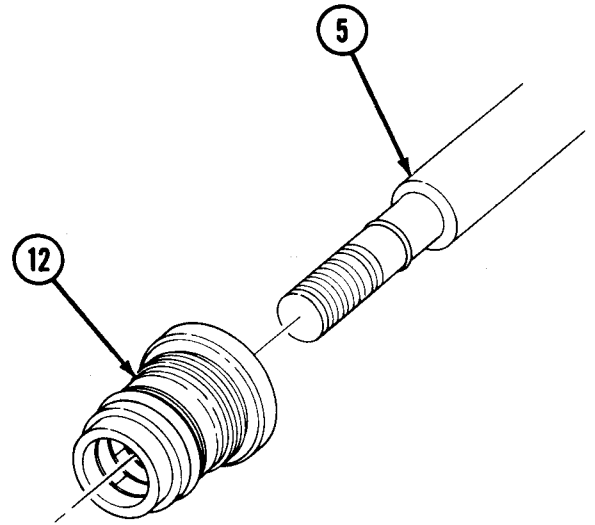
- E** Remove and discard piston locknut (6) from piston rod (5).



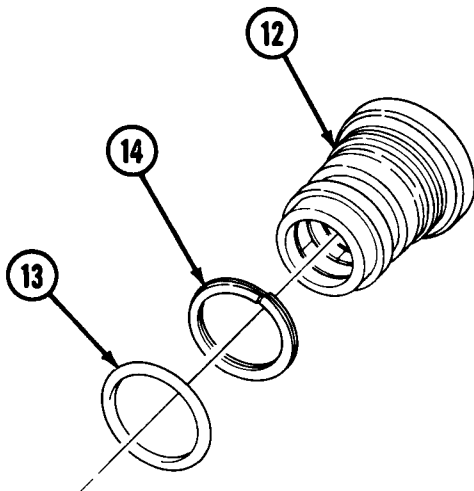
- F** Remove piston (7) and packing (8) from piston rod (5). Discard packing (8).



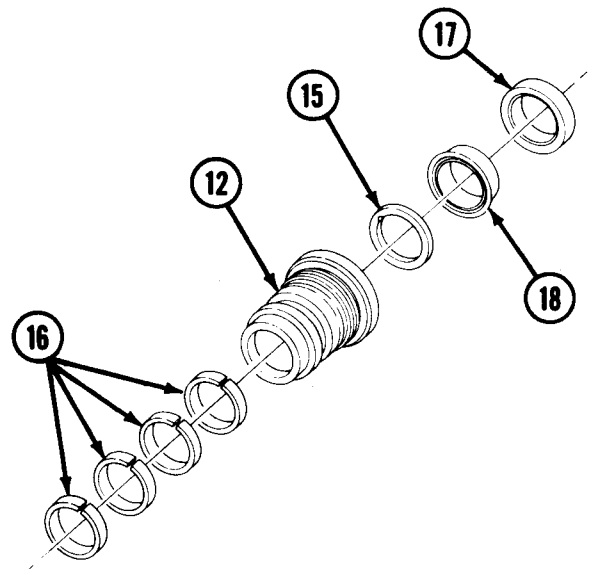
**G** Remove and discard four wear rings (9), seal (10), and packing (11) from piston (7).



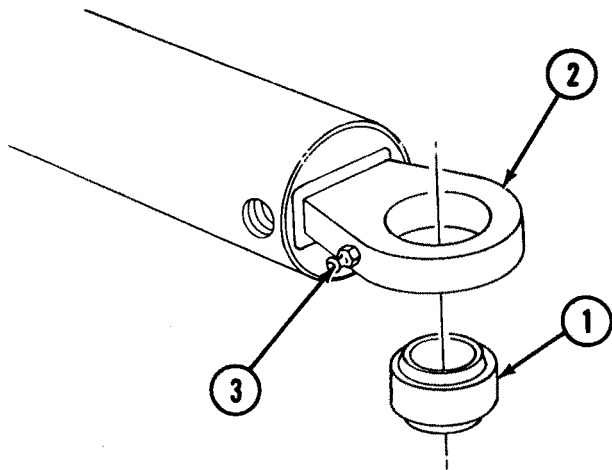
**H** Remove head (12) from piston rod (5).



**I** Remove and discard packing (13) and backup ring (14) from head (12).



**J** Remove and discard seal (15), four wear rings (16), wiper (17), and seal (18) from head (12).



**Note**

Do not remove bearings unless inspection shows need for replacement.

- K** Using arbor press, remove two bearings (1) from cylinder eye (2).
- L** Remove two lubrication fittings (3), only if damaged.

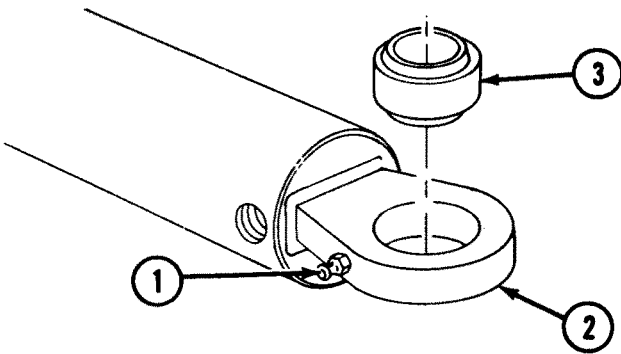
**INSPECTION**

- A** Inspect piston, rod, and interior of cylinder for scratches or scoring.
- B** Inspect threads on piston rod, piston locknut, cylinder, and head for wear or damage.
- C** Inspect bearings in accordance with TM 9-214.

**REPAIR**

- A** Use general repair methods to repair damaged parts (p 2-8).
- B** Replace broken or unserviceable parts.
- C** Use all parts contained in repair kit.

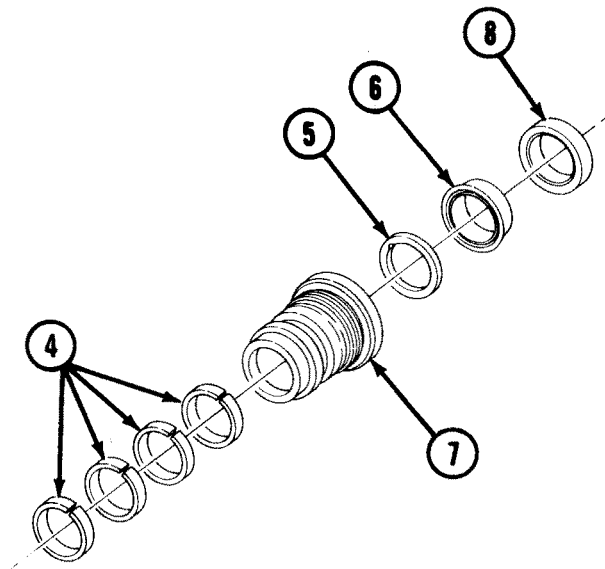
**ASSEMBLY**



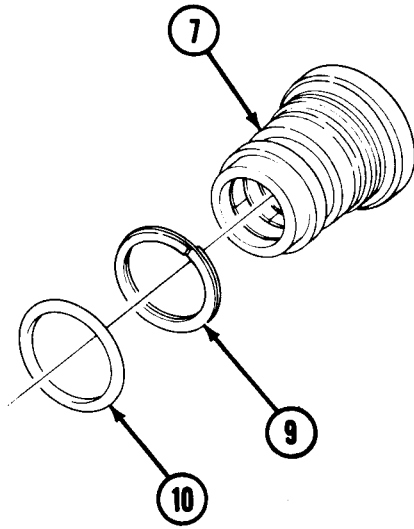
**Note**

Apply coating of oil to ease assembly.

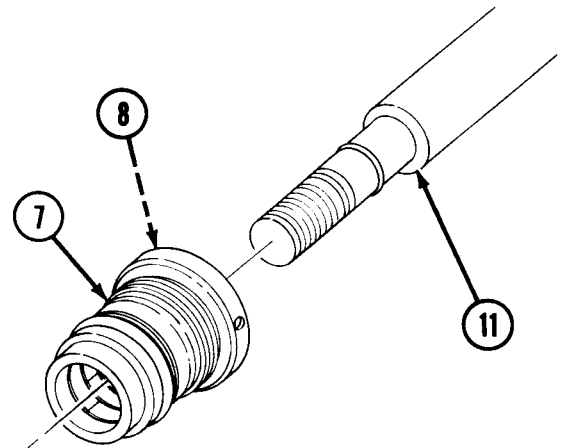
- A** If removed, install two lubrication fittings (1) on cylinder eye (2).
- B** Using arbor press, install two bearings (3) on cylinder eye (2).



- C** Install four wear rings (4), seal (5), and seal (6) on head (7).
- D** Install wiper (8) on head (7), with metal case facing away from seal (6).



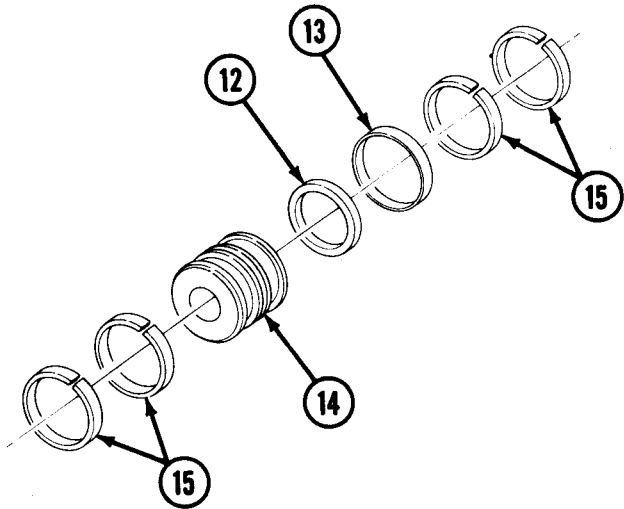
**E** Install backup ring (9) and packing (10) on head (7).



**CAUTION**

Use caution not to mar or scratch rod during installation of head.

**F** Install head (7) on piston rod (11) with wiper (8) facing eye.

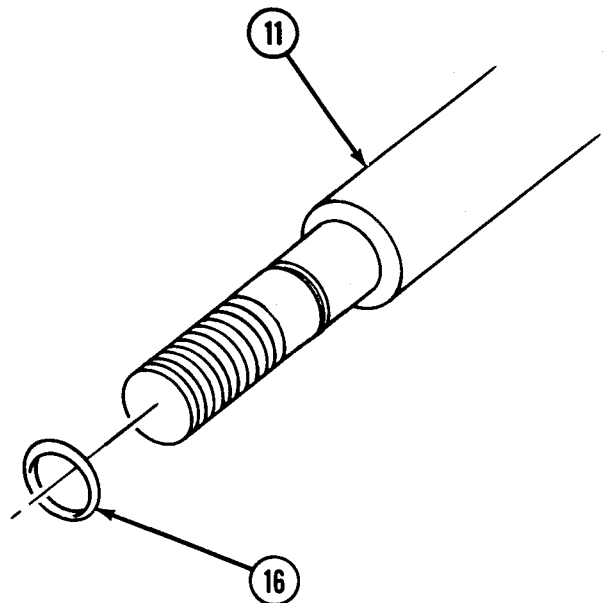


**Note**

It may be necessary to compress seal with a suitable compression device long enough for seal to fit tight on piston before installing on rod.

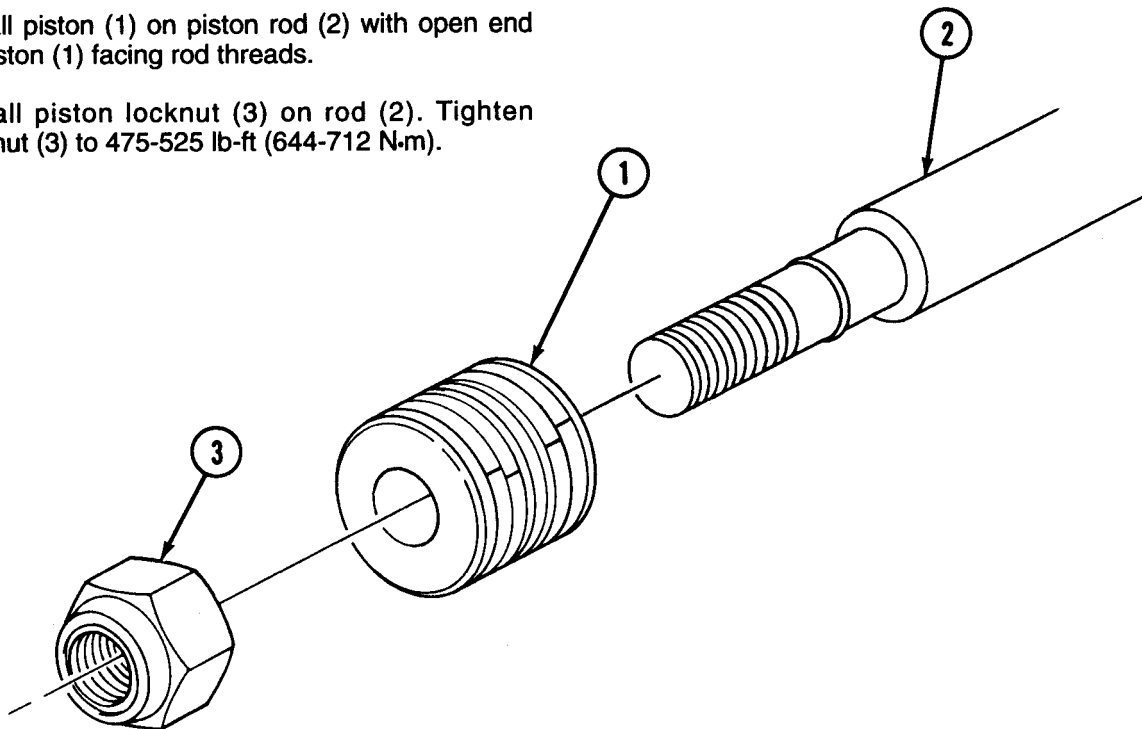
**G** Install packing (12) and seal (13) on piston (14).

**H** Install four wear rings (15) on piston (14).

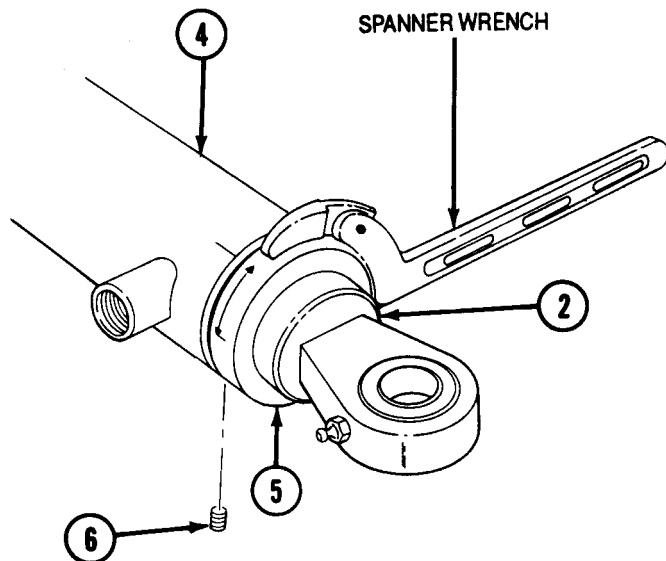


**I** Install packing (16) on piston rod (11).

- J** Install piston (1) on piston rod (2) with open end of piston (1) facing rod threads.
- K** Install piston locknut (3) on rod (2). Tighten locknut (3) to 475-525 lb-ft (644-712 N·m).



- L** Install piston rod (2) on cylinder (4).
- M** Using spanner wrench, install head (5) on cylinder (4).
- N** Using spanner wrench, tighten head (5) until head (5) just touches cylinder (4).
- O** Draw line on cylinder head (5).
- P** Measure approximately 3.62 in. (9.19 cm) from line in clockwise direction and mark line on cylinder (4).
- Q** Tighten head (5) until line on head (5) and line on cylinder (4) meet.
- R** Secure head (5) in cylinder (4) with setscrew (6). Tighten setscrew (6) against head (5) and stake in place.



**FOLLOW-ON TASK:**  
Install ejector cylinder (TM 5-2350-262-20-1).

## Section VI. GROUP AR, HYDRAULIC INSTALLATION

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<b>TASKS</b>	<b>PAGE</b>
Directional Control Valve Bank Repair .....	4-118
Hydraulic Reservoir Replacement .....	4-106
Hydraulic Reservoir Repair .....	4-110
Main Accumulator Repair .....	4-102
Main Hydraulic Pump Replacement .....	4-116

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# MAIN ACCUMULATOR REPAIR

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This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Repair
- e. Assembly

---

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Lubricating Oil                      Item 32  
Appendix C

Parts:

Repair Kit                              2530-01-179-4388

Parts Reference:

TM 5-2350-262-24P      Group AR

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-2

Troubleshooting Reference

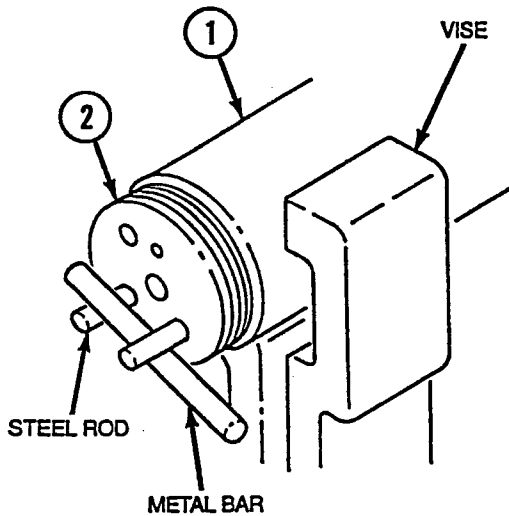
TM 5-2350-262-20-3

Equipment Condition:

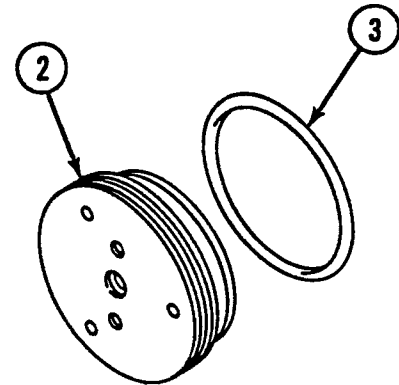
<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Main Accumulator Removed



**DISASSEMBLY**



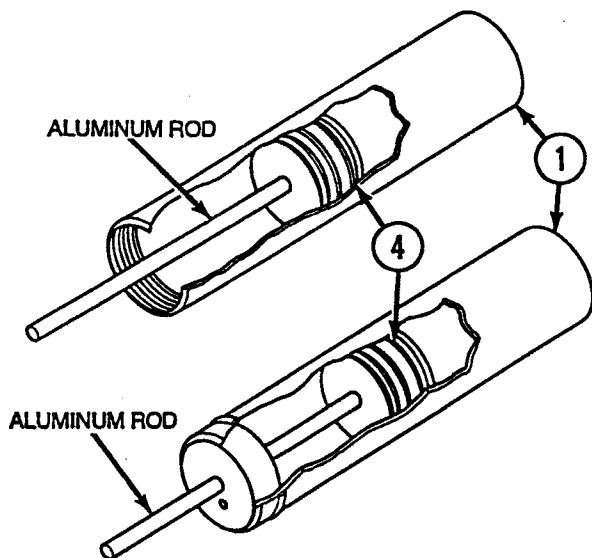
- A** Secure accumulator housing (1) in vise. Do not overtighten.
- B** Using metal bar and two pieces of .5 in. (1.3 cm) steel rod, remove gas cap (2) from accumulator housing (1).



- C** Remove packing (3) from gas cap (2). Discard packing (3).

**Note**

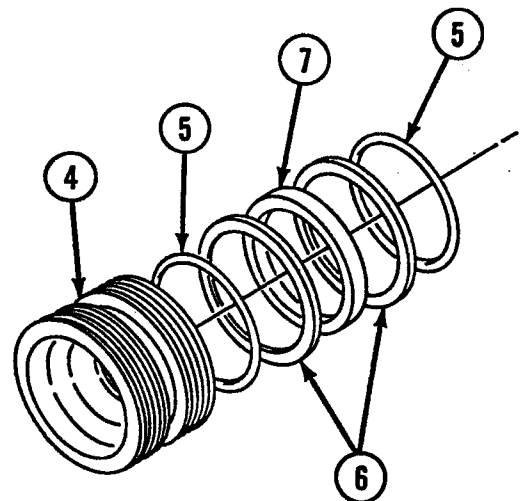
Repeat steps A, B, and C for oil cap, if so equipped.



**CAUTION**

Do not use steel rod to drive piston out of housing. Failure to comply may result in damage to piston.

- D** Using hammer and aluminum rod at least 2-1/2 ft (.76 m) long, drive piston (4) out of accumulator housing (1) from the oil end.



- E** Remove piston ring (5), backup ring (6), O-ring (7), backup ring (6), and piston ring (5) from piston (4). Discard piston rings (5), backup rings (6), and O-ring (7).

**CLEANING**

**CAUTION**

Ensure that interior of accumulator housing is free from dirt and debris. Failure to comply may result in damage to piston.

Use general cleaning methods to clean all parts (p 2-9).

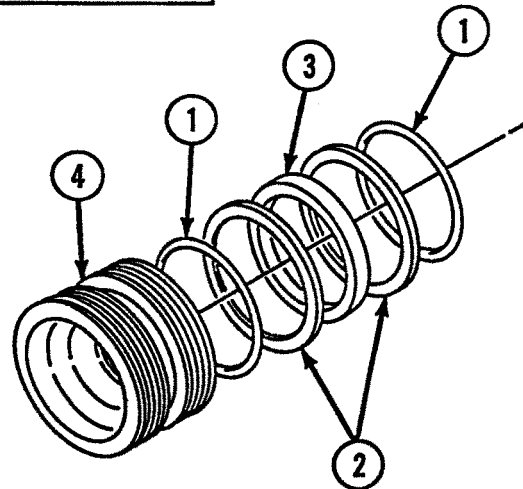
**INSPECTION**

- A Inspect piston for cracks, damage, or burrs around grooves.
- B Using a light, inspect bore of accumulator housing for scratches, scoring, and loose debris.
- C Inspect gas cap for cracks, damaged threads, or burrs around seal groove.
- D Inspect oil cap, if so equipped, for cracks, damaged threads, or burrs around seal groove.

**REPAIR**

- A Remove minor nicks, burrs, or scoring on piston with crocus cloth.
- B Dress bore of accumulator housing with crocus cloth until all nicks or scratches are removed.
- C Replace accumulator if piston, housing, or end cap is cracked.
- D Deleted.

**ASSEMBLY**



**Note**

Coat all parts and internal surfaces with oil.

- A Install piston ring (1), backup ring (2), O-ring (3), backup ring (2), and piston ring (1) on piston (4). Arrange gaps in piston rings (1) 180° apart.

**CAUTION**

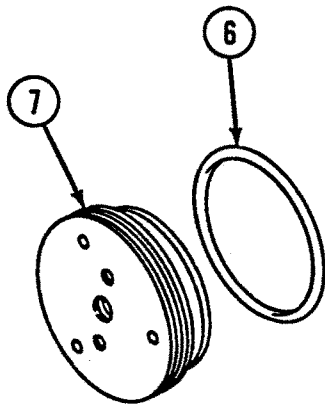
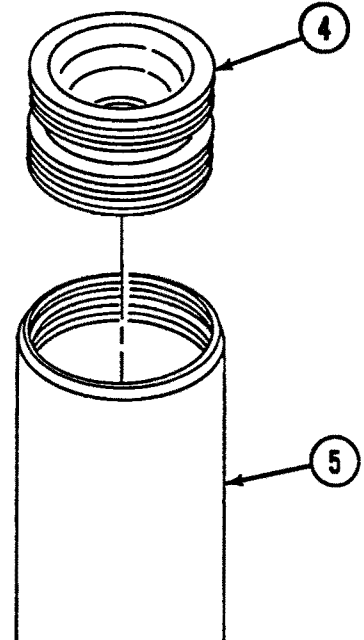
To avoid damage to O-ring, do not allow O-ring to drag on threads of accumulator housing.

- B** Install piston (4), closed end first, on gas cap end of accumulator housing (5), pressing top of piston (4) with thumbs.

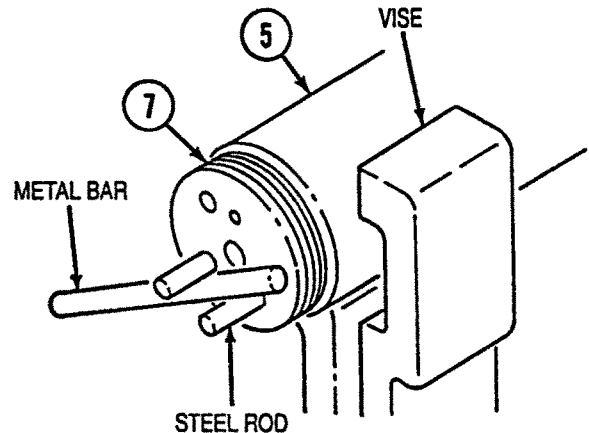
**CAUTION**

To avoid damage to O-ring, keep piston square with housing and push piston very slowly into bore.

- C** Using hammer and woodblock, tap piston (4) gently into accumulator housing (5) to a depth of approximately 2 in. (5.1 cm) below beginning of honed bore.



- D** Install packing (6) on gas cap (7).



**Note**

Gas cap will stop against chamfer leading into honed bore. Extreme tightness is not required for proper sealing.

- E** Using metal bar and two pieces of .5 in. (1.3 cm) steel rod, thread gas cap (7) into accumulator housing (5).

**Note**

Repeat steps D and E for oil cap, if so equipped.

- FOLLOW-ON TASK:**  
Install main accumulator (TM 5-2350-262-20-2).

# HYDRAULIC RESERVOIR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Caps and Plugs	Item 7 Appendix C
Sealing Compound	Item 16 Appendix C
Sealing Compound	Item 17 Appendix C

Parts:

Cotter Pin (3)  
Gasket (2)  
Locknut (3)  
Packing (8)  
Rubber Strip (AR)  
Self-locking Screw (12)

Parts Reference:

TM 5-2350-262-24P Group AR

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

TM 5-2350-262-10  
TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Hydraulic Reservoir Drained
TM 5-2350-262-20-1	Driver's Compartment Floor Plate Removed
Page 3-3	Hull Blocked
Page 4-122	Power Package Removed From Vehicle

General Safety Instructions:

### WARNING

Spilled hydraulic oil is very slippery. Be careful when entering or working in bowl area. Wipe up any spilled oil immediately.

**REMOVAL**

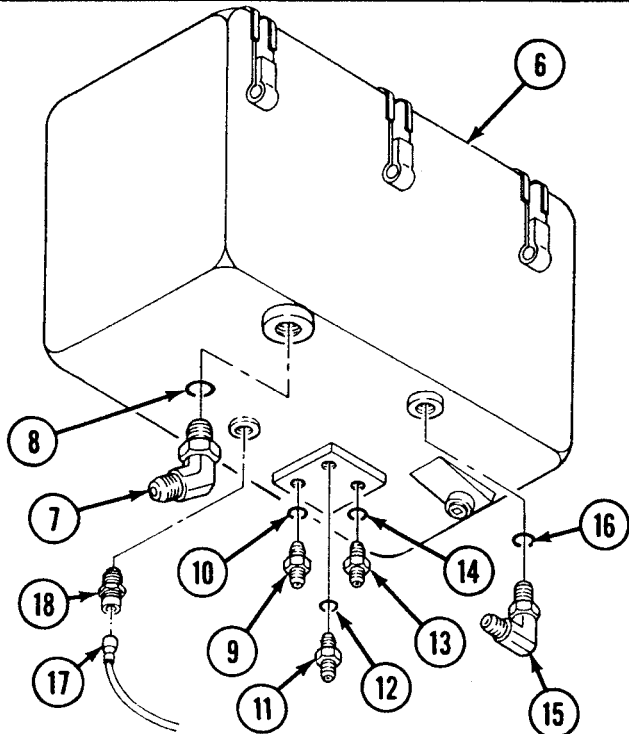
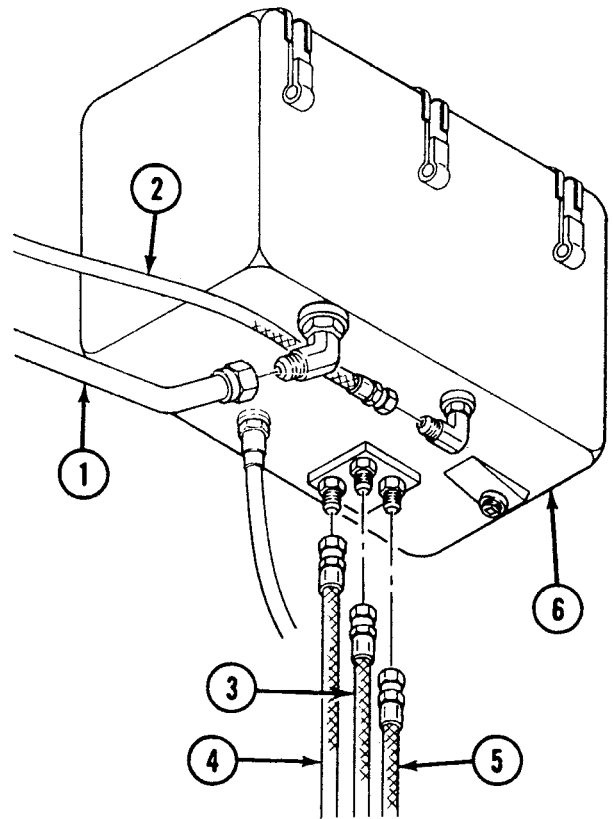
**WARNING**

Spilled hydraulic oil is very slippery. Be careful when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in injury to personnel.

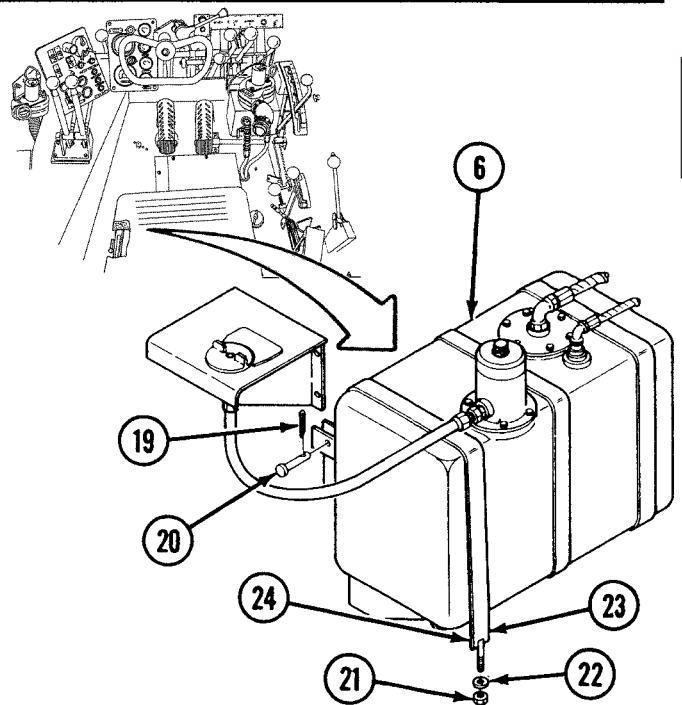
**Note**

Cap or plug all hose and tube ends to reduce oil loss and prevent oil contamination. Tag hoses to aid in identification at time of installation of hydraulic reservoir.

- A** Disconnect tube (1) and hoses (2), (3), (4), and (5) from hydraulic reservoir (6).

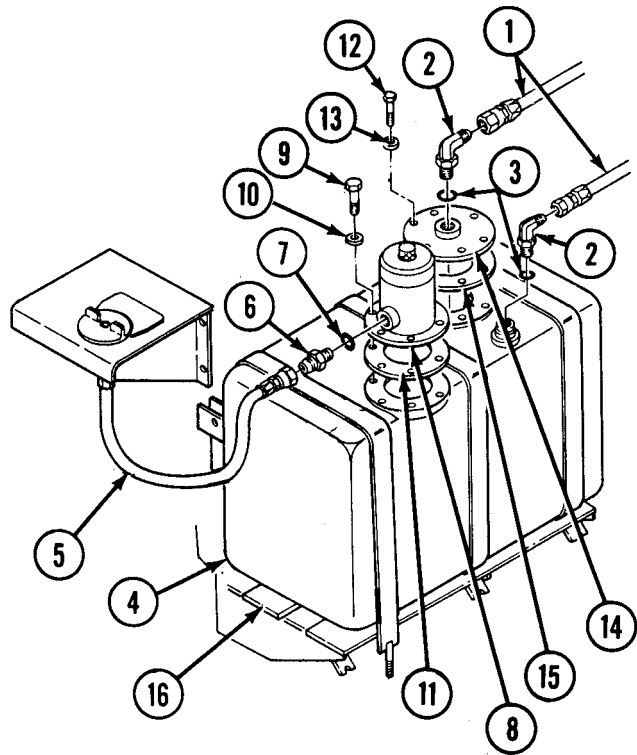


- B** Remove elbow (7), packing (8), adapter (9), packing (10), adapter (11), packing (12), adapter (13), packing (14), elbow (15), packing (16), lead (17), and sending unit (18) from hydraulic reservoir (6). Discard packings (8), (10), (12), (14), and (16).



- C** Working through driver's compartment and engine compartment, remove three cotter pins (19), straight pins (20), locknuts (21), washers (22), straps (23), and rubber strips (24) from hydraulic reservoir (6). Discard locknuts (21) and cotter pins (19). Discard rubber strips (24) if worn or damaged.

- D** Working through driver's compartment access, disconnect two hoses (1) from elbows (2).
- E** Remove two elbows (2) and packings (3) from hydraulic reservoir (4). Discard packings (3).
- F** From inside engine compartment, disconnect hose (5) from adapter (6).
- G** Remove adapter (6) and packing (7) from filler cap (8). Discard packing (7).
- H** Remove six self-locking screws (9), washers (10), filler cap (8), and gasket (11) from reservoir (4). Discard self-locking screws (9) and gasket (11).
- I** Remove six self-locking screws (12), washers (13), plate (14), and gasket (15) from reservoir (4). Discard self-locking screws (12) and gasket (15).
- J** Remove hydraulic reservoir (4) from support (16) and lift out through engine compartment.



## INSTALLATION

### WARNING

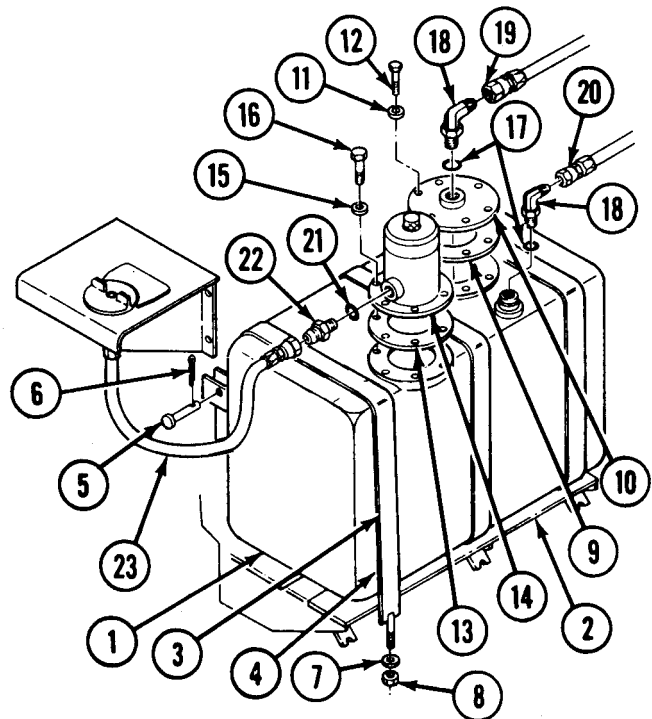
Spilled hydraulic oil is very slippery. Be careful when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.

- A** Install hydraulic reservoir (1) on support (2) below driver's compartment.
- B** Secure reservoir (1) with three straps (3), rubber strips (4), straight pins (5), cotter pins (6), washers (7), and locknuts (8).

#### Note

Coat both gaskets and mating surfaces with sealing compound prior to installation.

- C** Install gasket (9) and plate (10) on reservoir (1) and secure with six washers (11) and self-locking screws (12). Tighten self-locking screws (12) to 39-41 lb-ft (53-56 N-m).
- D** Install gasket (13) and filler cap (14) on reservoir (1) and secure with six washers (15) and self-locking screws (16). Tighten self-locking screws (16) to 11-12 lb-ft (15-16 N-m).



- E** Install two packings (17) and elbows (18) on reservoir (1).
- F** Connect HYDR TANK-7 hose (19) and HYDR TANK breather hose (20) to elbows (18).
- G** Install packing (21) and adapter (22) on filler cap (14) and connect HYDR TANK fill hose (23) to adapter (22).

**Note**

Apply sealing compound to elbows and adapters before installation.

**H** Install packing (24), elbow (25), packing (26), adapter (27), packing (28), adapter (29), packing (30), adapter (31), packing (32), and elbow (33) on hydraulic reservoir (1).

**I** Install hoses as follows:

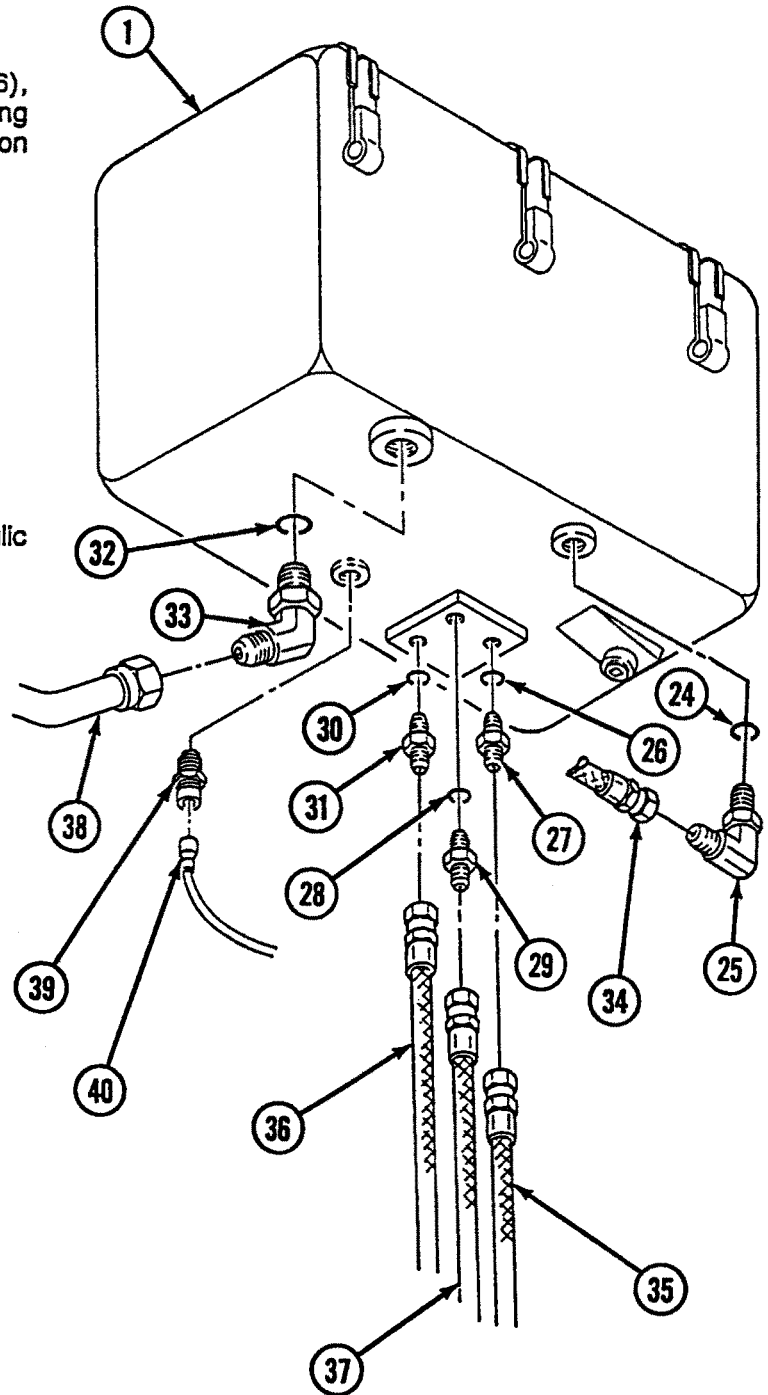
Hose	Marker band	Fitting
(34)	HYD TANK-7P	(25)
(35)	HYDR TANK-7B	(27)
(36)	HYDR TANK-7W	(31)
(37)	HYDR TANK-7V	(29)
(38)	HYDR TANK-13	(33)

**J** Install sending unit (39) and lead (40) on hydraulic reservoir (1).

**FOLLOW-ON TASKS:**

- Install power package (p 4-131).
- Unblock hull (p 3-3).
- Install driver's compartment floor plate (TM 5-2350-262-20-1).

- • Fill hydraulic reservoir (TM 5-2350-262-10).



---

# HYDRAULIC RESERVOIR REPAIR

---

This task covers:

- |                |             |
|----------------|-------------|
| a. Disassembly | d. Repair   |
| b. Cleaning    | e. Assembly |
| c. Inspection  |             |
- 

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Special Tools:

Wrench Set, Crowfoot 5120-01-302-4387

Materials:

Sealing Compound      Item 16  
Appendix C

Lubricating Oil        Item 32  
Appendix C

Parts:

Gasket (2)

Packing (5)

Self-locking Screw (12)

Parts Reference:

TM 5-2350-262-24P    Group AR

Personnel Required:

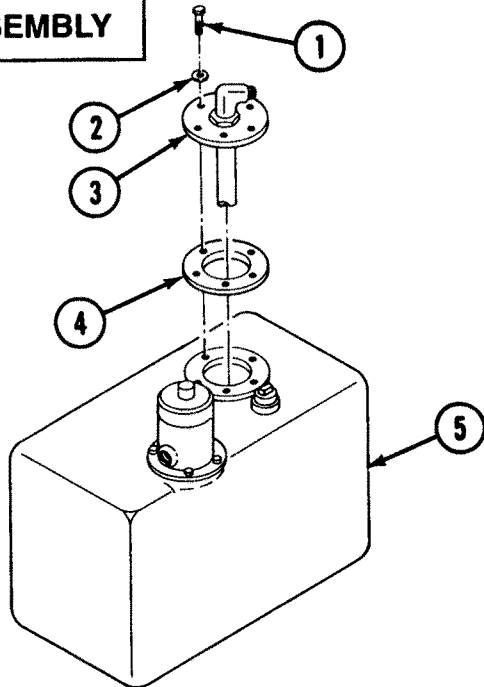
Construction Equipment Repairer 62B10

Equipment Condition:

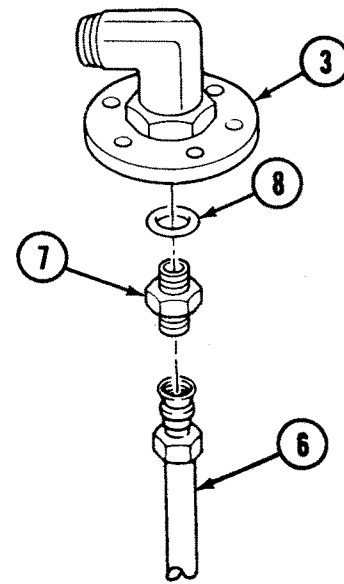
<u>Reference</u>	<u>Condition Description</u>
Page 4-108	Hydraulic Reservoir Removed



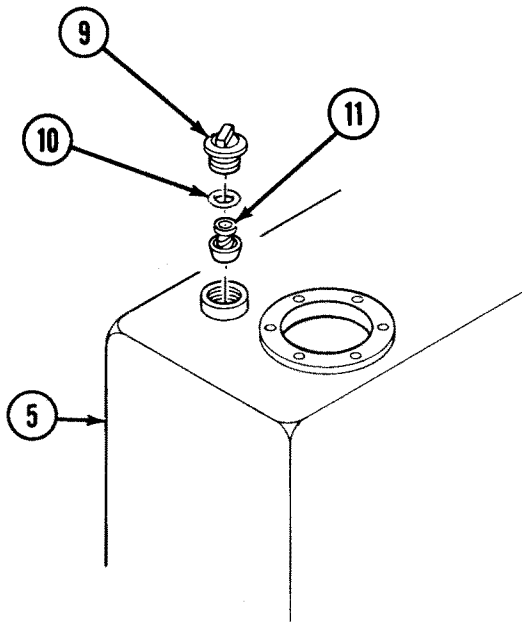
**DISASSEMBLY**



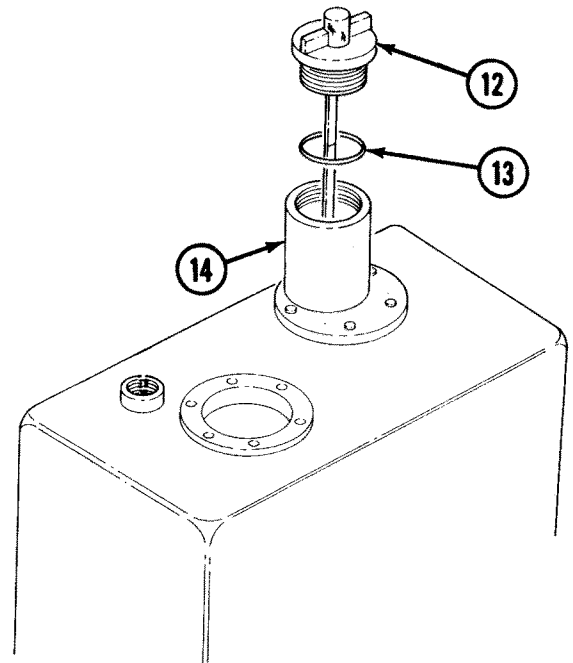
**A** Remove six self-locking screws (1), washers (2), cover plate (3), and gasket (4) from reservoir (5). Discard gasket (4) and self-locking screws (1).



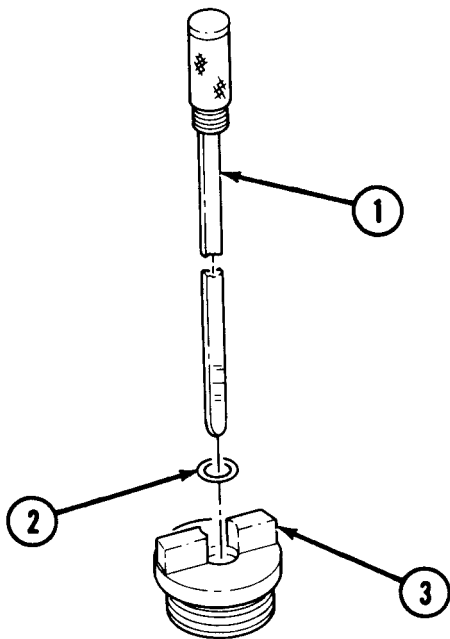
**B** Remove tube (6), adapter (7), and packing (8) from cover plate (3). Discard packing (8).



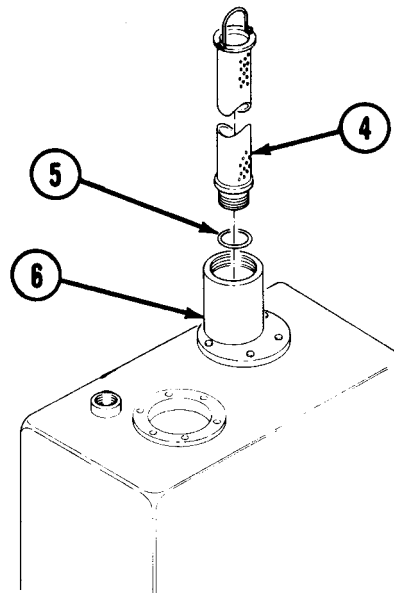
**C** Remove valve housing (9), packing (10), and valve (11) from reservoir (5). Discard packing (10).



**D** Remove cap (12) and packing (13) from housing (14). Discard packing (13).

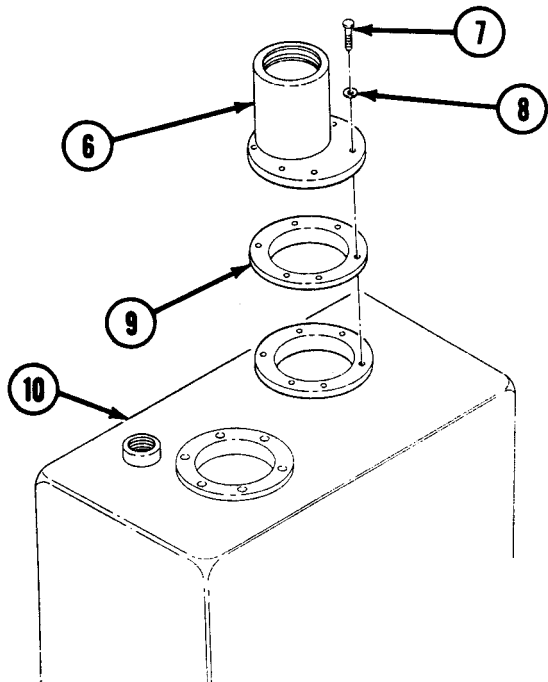


**E** Remove dipstick (1) and packing (2) from cap (3). Discard packing (2).

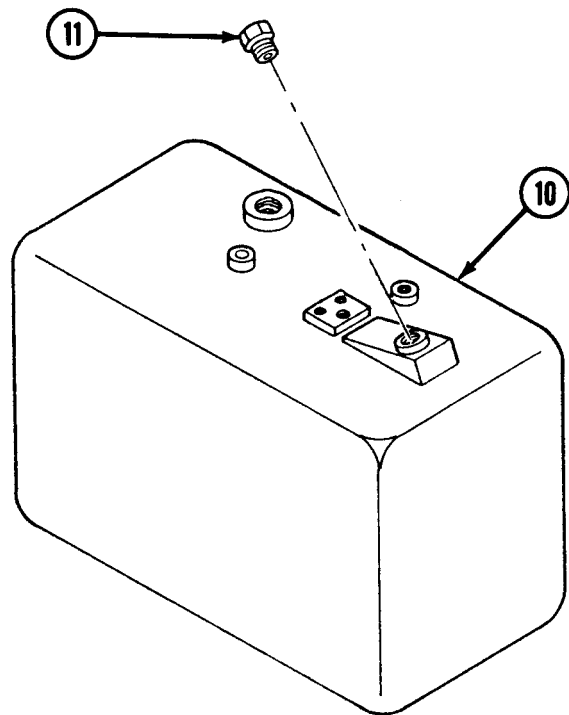


**F** Remove filter (4) and packing (5) from housing (6).

**G** Remove packing (5) from filter (4). Discard packing (5).



**H** Remove six self-locking screws (7), washers (8), housing (6), and gasket (9) from reservoir (10). Discard gasket (9) and self-locking screws (7).



**I** Remove plug (11) from reservoir (10).

**CLEANING**

Use general cleaning methods to clean hydraulic reservoir (p 2-9).

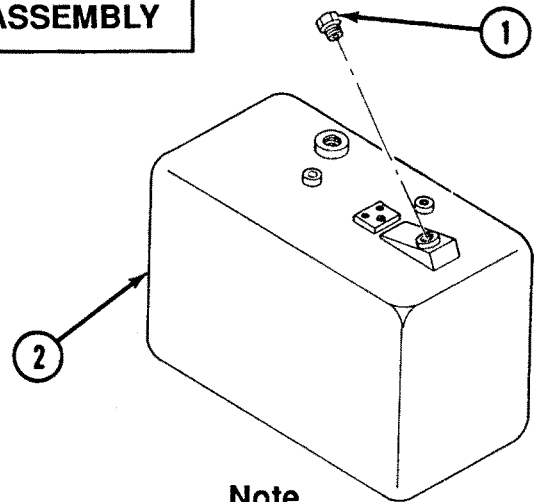
**INSPECTION**

- A** Inspect hydraulic reservoir for cracks and damage.
- B** Inspect ports and mounting holes for stripped threads.

**REPAIR**

Use general repair methods to repair hydraulic reservoir (p 2-8).

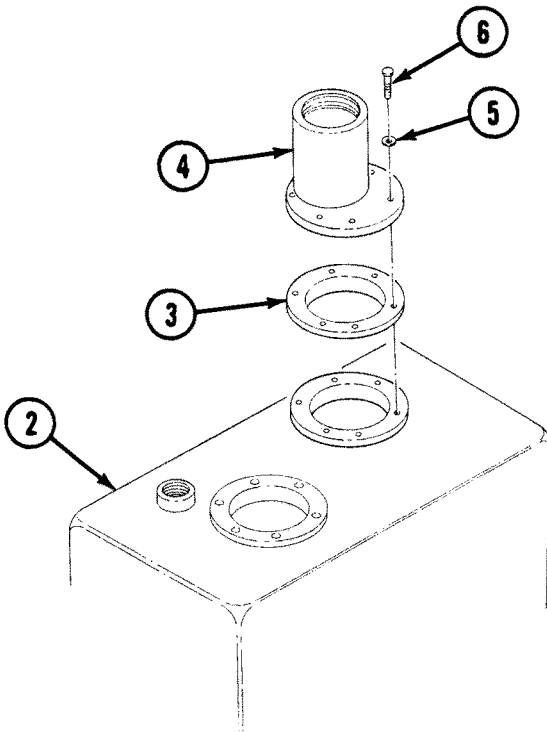
**ASSEMBLY**



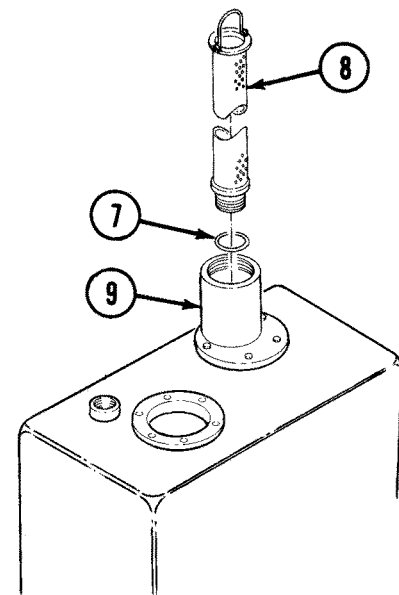
**Note**

Coat threads of plug and screws with lubricating oil prior to installation.

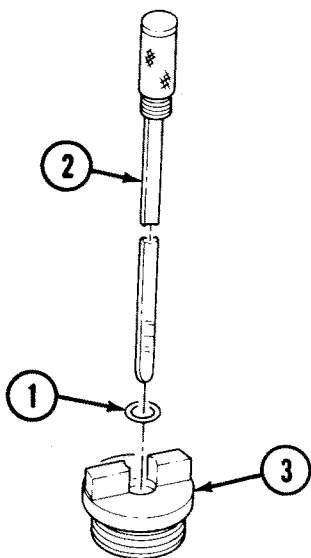
- A** Install plug (1) on reservoir (2). Tighten plug (1) to 38-41 lb-ft (52-56 N-m).



- B** Coat gasket (3) and mating surface of reservoir (2) with sealing compound.
- C** Install gasket (3) and housing (4) on reservoir (2) with six washers (5) and self-locking screws (6). Tighten self-locking screws (6) to 11-12 lb-ft (15-16 N-m).

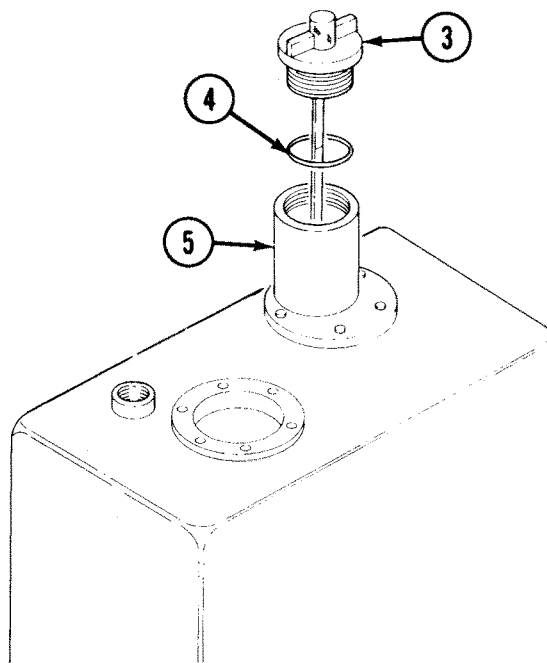


- D** Coat packing (7) with lubricating oil, and install packing (7) on filter (8).
- E** Install filter (8) in housing (9).



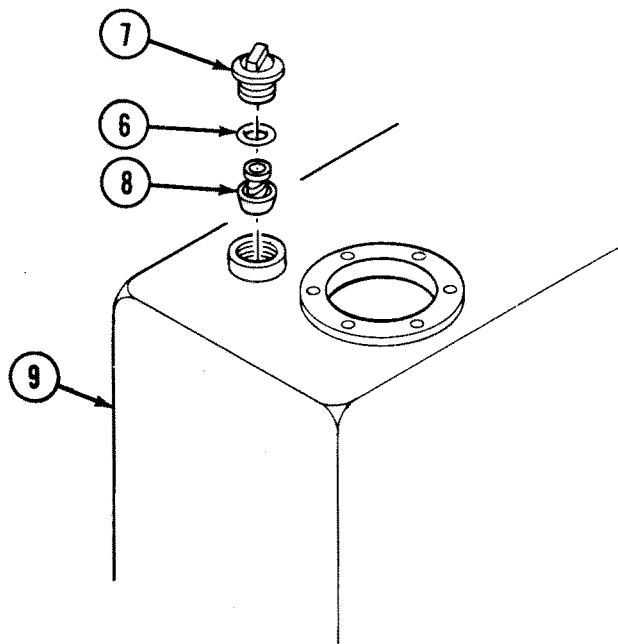
**F** Coat packing (1) with lubricating oil, and install packing (1) on dipstick (2).

**G** Install dipstick (2) on cap (3).



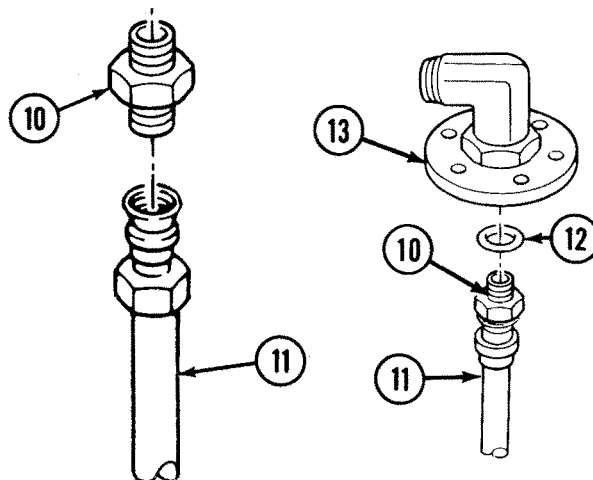
**H** Coat packing (4) with lubricating oil, and install packing (4) on cap (3).

**I** Install cap (3) on housing (5).



**J** Coat packing (6) and threads of valve housing (7) with lubricating oil, and install packing (6) on valve housing (7).

**K** Install valve (8) and valve housing (7) on reservoir (9).



**L** Coat threads of adapter (10) with lubricating oil, and install adapter (10) on tube (11). Tighten tube (11) to 158-175 lb-ft (214-237 N·m).

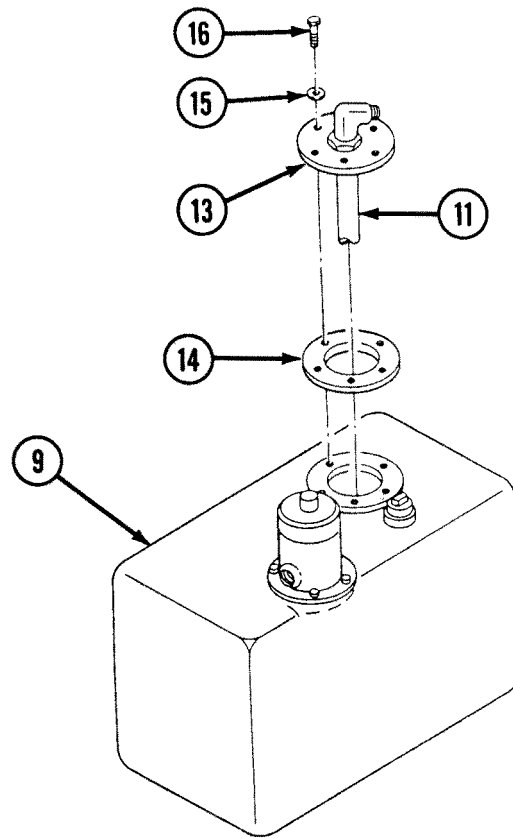
**M** Coat packing (12) with lubricating oil, and install packing (12) on end of adapter (10).

**N** Install tube (11) on cover (13).

- O** Coat gasket (14) and mating surface of reservoir (9) with sealing compound and install gasket (14), cover (13), and tube assembly (11) into reservoir (9) in position shown.
- P** Secure cover (13) on reservoir (9) with six washers (15) and self-locking screws (16). Tighten self-locking screws (16) to 39-41 lb-ft (53-56 N.m).

**FOLLOW-ON TASK:**

Install hydraulic reservoir (p 4-108).



---

# MAIN HYDRAULIC PUMP REPLACEMENT

---

This task covers:

- a. Removal
- b. Installation

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Materials:

Caps and Plugs	Item 7 Appendix C
Sealing Compound	Item 16 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

Gasket

Packing (3)

Self-locking Screw (4)

Parts Reference:

TM 5-2350-262-24P Group AR

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

TM 5-2350-262-20-1

Troubleshooting Reference:

TM 5-2350-262-20-1

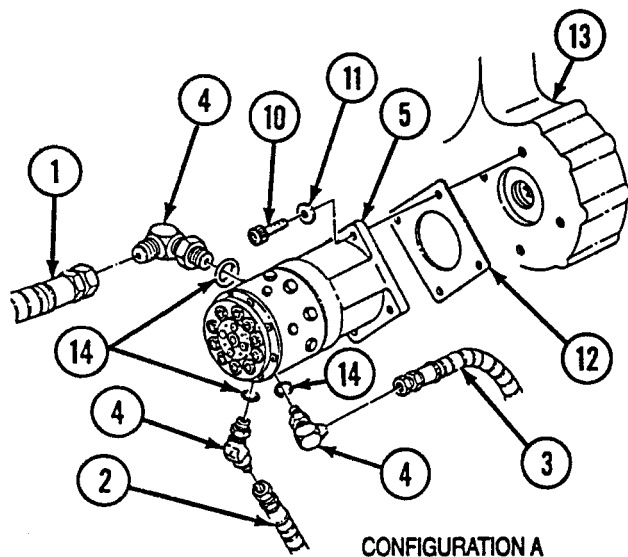
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 4-123	Power Package Removed

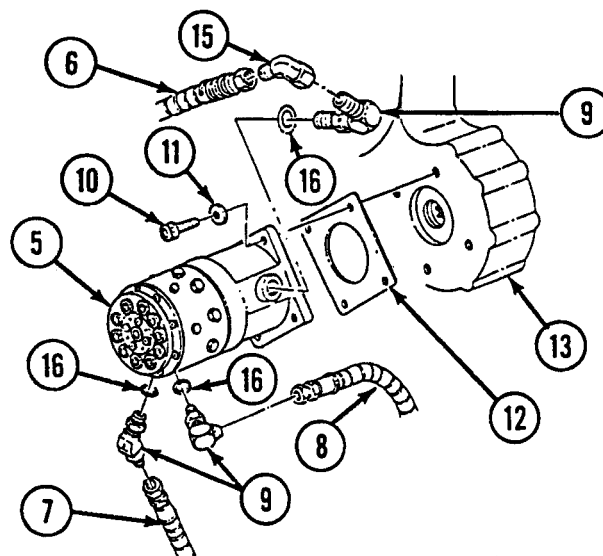
General Safety Instructions:

## WARNING

Be careful when lifting main hydraulic pump. Main hydraulic pump weighs approximately 130 lb (59 kg).



CONFIGURATION A



CONFIGURATION B

**REMOVAL**

**WARNING**  
 Be careful when lifting main hydraulic pump. Main hydraulic pump weighs approximately 130 lb (59 kg). Failure to comply may result in severe injury to personnel.

**CAUTION**  
 Cap or plug all ports and ends of hoses and tubes to prevent contamination of hydraulic oil. Failure to comply may result in damage to equipment.

**Note**

There are two configurations of main hydraulic pumps. For configuration A, perform steps A and D. For configuration B, perform steps B and E.

- A** Disconnect three hoses (1), (2), and (3) from three elbows (4) on main hydraulic pump (5).
- B** Disconnect three hoses (6), (7), and (8) from three elbows (9) on pump (5).
- C** Remove four self-locking screws (10), washers (11), gasket (12), and pump (5) from transfer case (13). Discard self-locking screws (10) and gasket (12).
- D** Remove three elbows (4) and packings (14) from pump (5). Discard packings (14).

- E** Remove elbow (15), three elbows (9), and packings (16) from pump (5). Discard packings (16).

**INSTALLATION**

**Note**

- There are two configurations of main hydraulic pumps. For configuration A, perform steps B and F. For configuration B, perform steps A and E.
- Apply sealing compound to threads of screws.

- A** Install three packings (16), elbows (9), and elbow (15) on pump (5).
- B** Install three packings (14) and elbows (4) on pump (5).
- C** Install gasket (12) and pump (5) on transfer case (13) with four washers (11) and self-locking screws (10). Tighten self-locking screws (10) to 180-220 lb-ft (244-298 N.m).
- D** Prime pump by adding lubricating oil through elbow (15) until oil is at or near top of elbow (15).
- E** Connect hoses 13R (8), 13L (7), and PUMP 7 (6) to two elbows (9) and elbow (15) on pump (5).
- F** Connect hoses 13R (3), 13L (2), and PUMP 7 (1) to three elbows (4) on pump (5).

**FOLLOW-ON TASK:**  
 Install power package (p 4-131).

---

## DIRECTIONAL CONTROL VALVE BANK REPAIR

---

This task covers:

- |                |             |
|----------------|-------------|
| a. Disassembly | d. Repair   |
| b. Cleaning    | e. Assembly |
| c. Deleted     |             |
- 

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Reference:

TM 5-2350-262-20-3  
TM 5-2350-262-20-2

Materials:

Lubricating Oil            Item 31  
   Appendix C

Troubleshooting Reference:

TM 5-2350-262-20-3

Parts:

Repair Kit                    57K1015  
Repair Kit                    57K1753

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Directional Control Valve Bank Removed

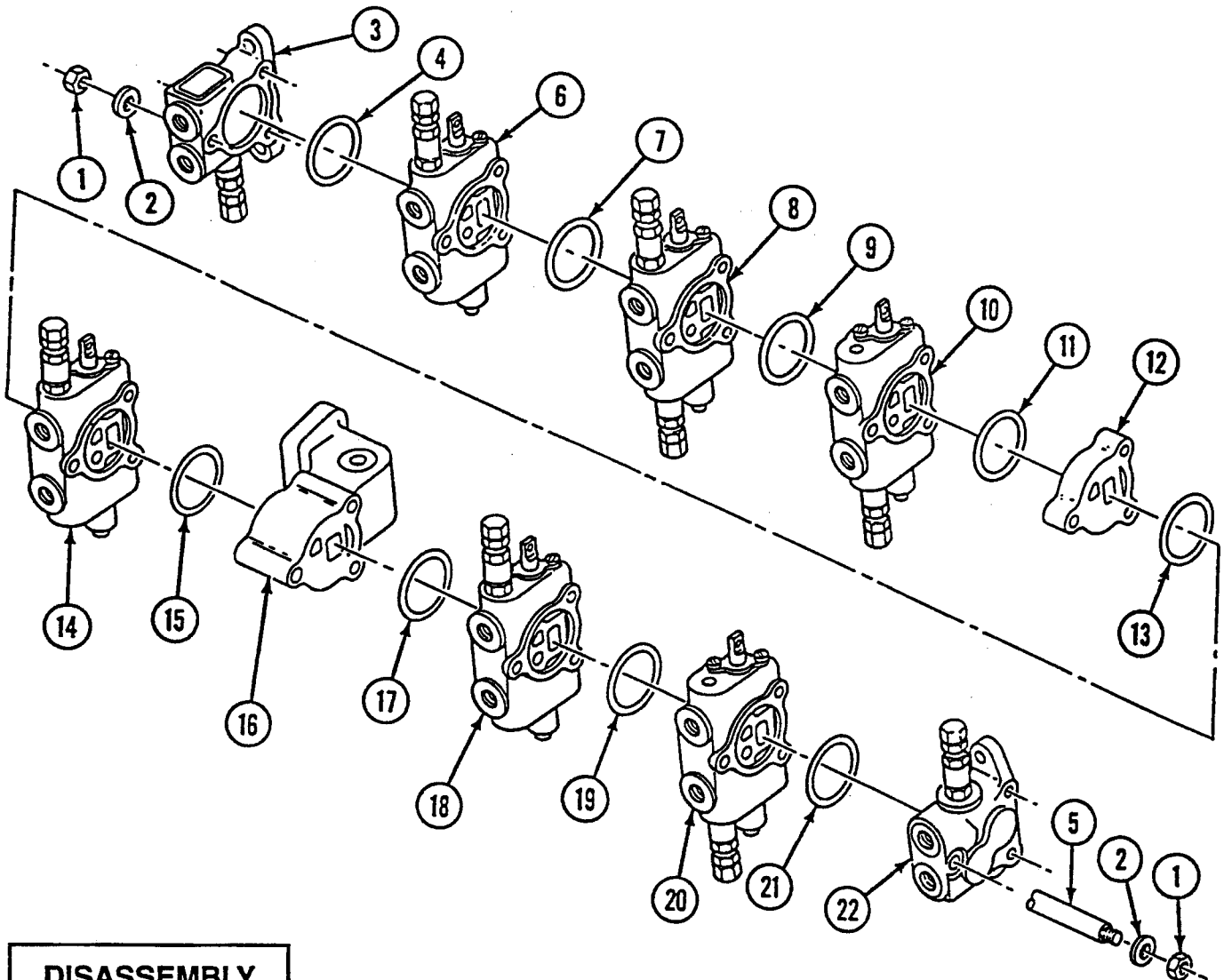
Parts Reference:

TM 5-2350-262-24P    Group AR

Personnel Required:

Construction Equipment Repairer 62B10

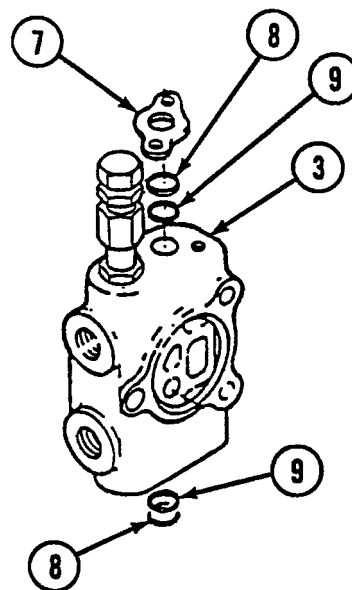
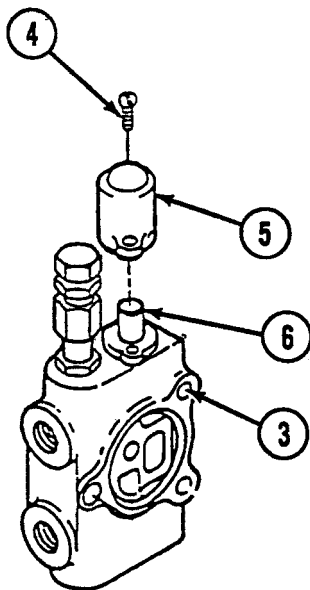
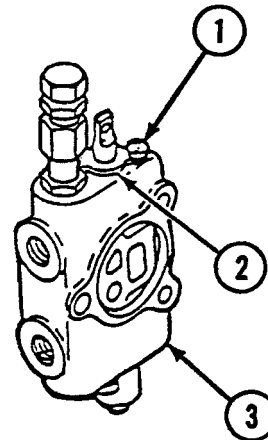




**DISASSEMBLY**

- A** Remove three nuts (1) and washers (2) from each end of the directional control valve bank assembly.
- B** Remove inlet valve (3) and packing (4) from three rods (5). Discard packing (4).
- C** Remove bilge pump valve (6) and packing (7) from three rods (5). Discard packing (7).
- D** Remove apron valve (8) and packing (9) from three rods (5). Discard packing (9).
- E** Remove LH suspension valve (10) and packing (11) from three rods (5). Discard packing (11).
- F** Remove spacer (12) and packing (13) from three rods (5). Discard packing (13).
- G** Remove ejector valve (14) and packing (15) from three rods (5). Discard packing (15).
- H** Remove flow coupler (16) and packing (17) from three rods (5). Discard packing (17).
- I** Remove winch valve (18) and packing (19) from three rods (5). Discard packing (19).
- J** Remove RH suspension valve (20) and packing (21) from three rods (5). Discard packing (21).
- K** Remove inlet valve (22) from three rods (5).

- L** Remove two screws (1) and plate (2) from top of plunger housing (3).
- M** Remove two screws (4), cap (5), and plunger (6) from bottom of plunger housing (3).
- N** Remove spacer (7), two wipers (8), and packings (9) from plunger housing (3). Discard wipers (8) and packings (9).



**CLEANING**

Use general cleaning methods to clean all parts (p 2-9).

**REPAIR**

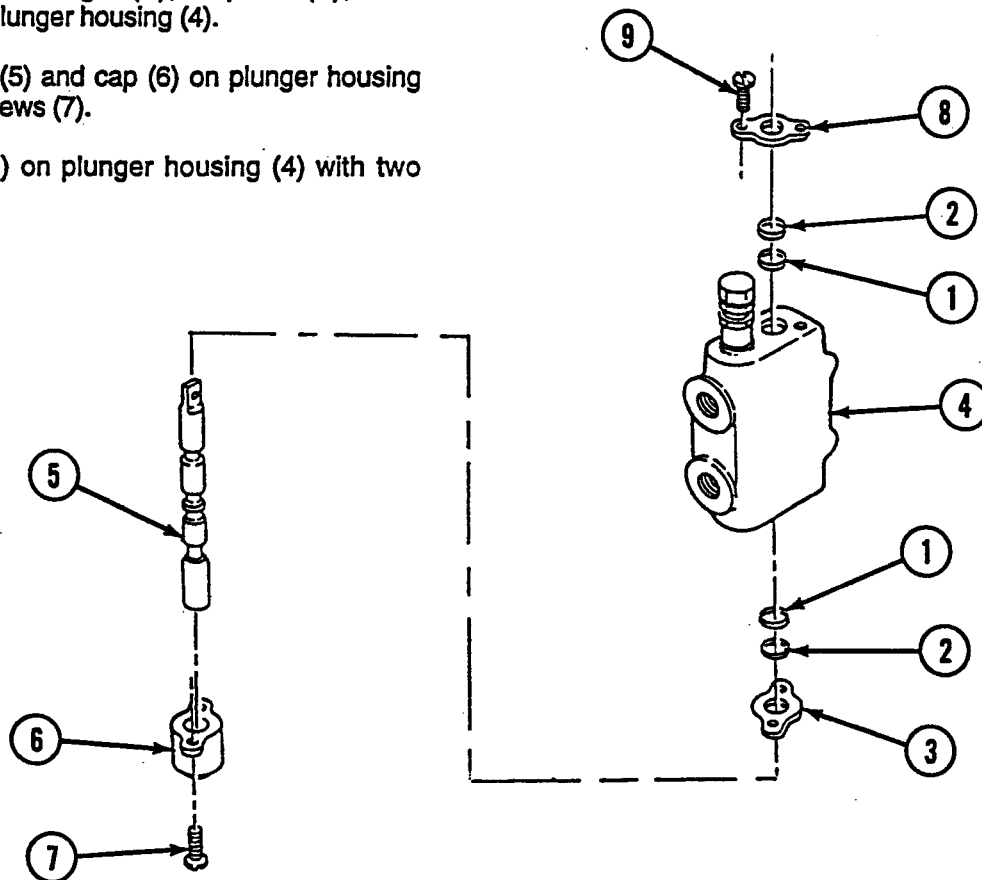
Use general repair methods (p 2-8) and install new parts using repair kits.

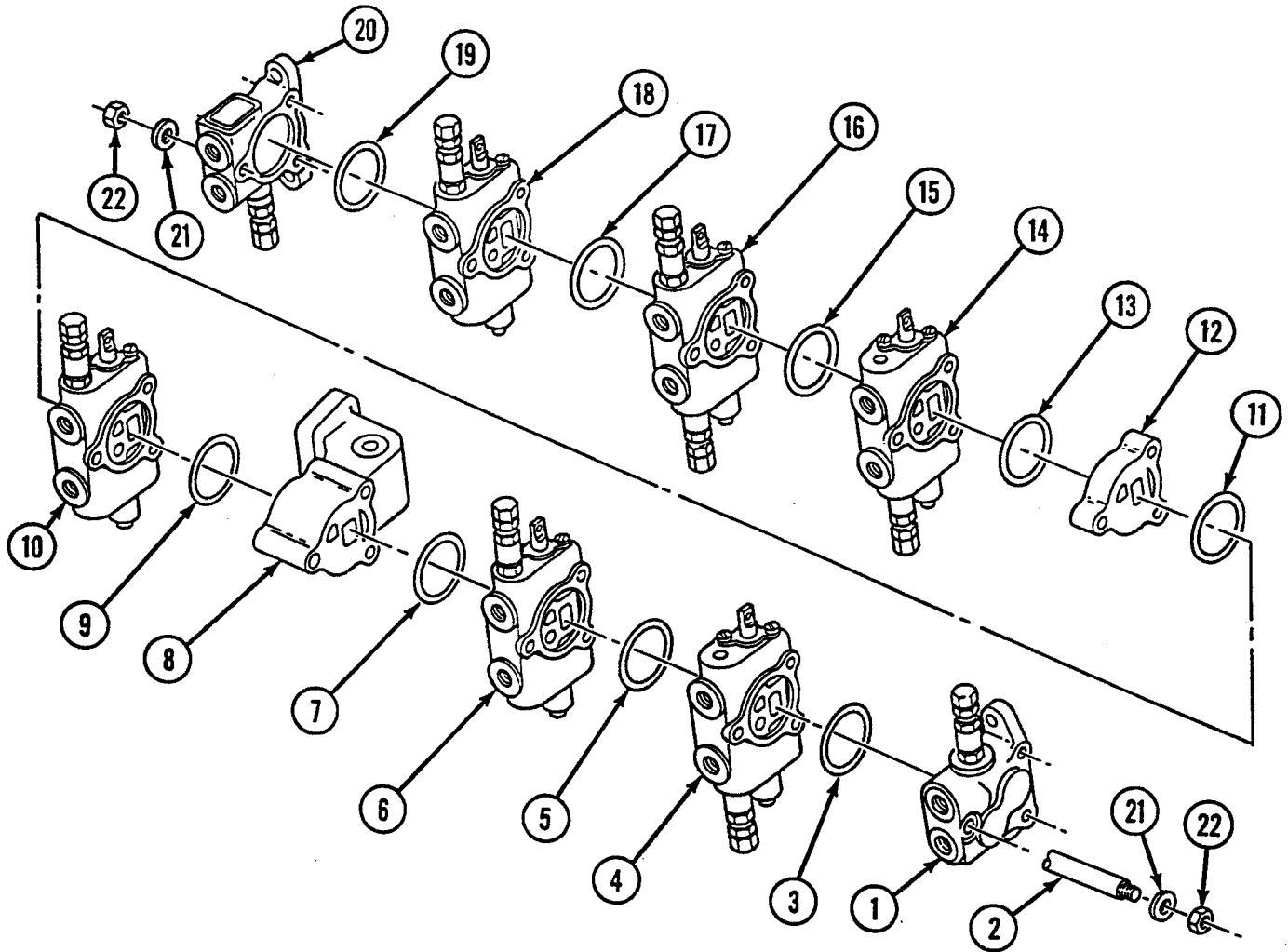
**ASSEMBLY**

**Note**

- Apply light coating of hydraulic fluid to all parts at assembly.
- When installing wipers ensure thin edge of wiper faces out.

- A** Install two packings (1), wipers (2), and spacer (3) on plunger housing (4).
- B** Install plunger (5) and cap (6) on plunger housing (4) with two screws (7).
- C** Install plate (8) on plunger housing (4) with two screws (9).





- D** Install inlet valve (1) on three rods (2).
- E** Install packing (3) and RH suspension valve (4) on three rods (2).
- F** Install packing (5) and winch valve (6) on three rods (2).
- G** Install packing (7) and flow coupler (8) on three rods (2).

**Note**

Coat packings with lubricating oil at assembly.

- H** Install packing (9) and ejector valve (10) on three rods (2).
- I** Install packing (11) and spacer (12) on three rods (2).
- J** Install packing (13) and LH suspension valve (14) on three rods (2).
- K** Install packing (15) and apron valve (16) on three rods (2).
- L** Install packing (17) and bilge pump valve (18) on three rods (2).
- M** Install packing (19) and inlet valve (20) on three rods (2).
- N** Install three washers (21) and nuts (22) on each end of directional control valve bank assembly.

**FOLLOW-ON TASK:**

Install directional control valve bank (TM 5-2350-262-20-2).

## Section VII. GROUP AU, POWERTRAIN INSTALLATION

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<b>TASKS</b>	<b>PAGE</b>
Engine idle Speed Adjustment .....	4-159
Engine Replacement .....	4-147
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Final Drive Sprocket Stud Replacement .....	4-247
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Power Package Replacement .....	4-122
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Scavenger Pump Repair .....	4-171
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Transmission Replacement in Shipping/Storage Container .....	4-192
Transmission/Transfer Case Separation .....	4-185

# POWER PACKAGE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

- 4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power
- 4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power
- 5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

- Sling, Power Pack      5120-01-222-7932
- Guide Pin (3)          5315-01-229-9007
- Plug, Hydraulic Tank   5340-01-222-7934

Materials:

- Caps and Plugs          Item 7  
Appendix C
- Grease                    Item 21  
Appendix C

Parts:

- Locknut (3)
- Lockwasher (5)
- Self-locking Screw (16)

Parts Reference:

- TM 5-2350-262-24P    Group AU
- TM 5-2815-240-34&P   Group AUA2

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Troubleshooting Reference:

- Page 3-30              Hard Starting of Engine
- Page 2-32              Abnormal Engine Operation
- Page 3-42              Transmission Malfunction
- Page 3-42              Transfer Case Malfunction

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Radiator Removed
TM 5-2350-262-20-1	Ejector Cylinder Removed
TM 5-2350-262-20-1	Cowling Removed
TM 5-2350-262-20-2	Main Accumulator Removed
TM 5-2350-262-20-1	Batteries Disconnected
TM 5-2350-262-20-1	Hull Access Cover Removed

General Safety Instructions:

**WARNING**

- Hot exhaust system components can cause serious burns. Do not work on exhaust system until it is cool.
- Lifting device must have a weight capacity greater than 6,000 lb (2,724 kg).
- Personnel must stand clear during lifting operations.
- Ensure power package is securely blocked. Power package is top-heavy and can easily tip over.

**REMOVAL**

**Note**

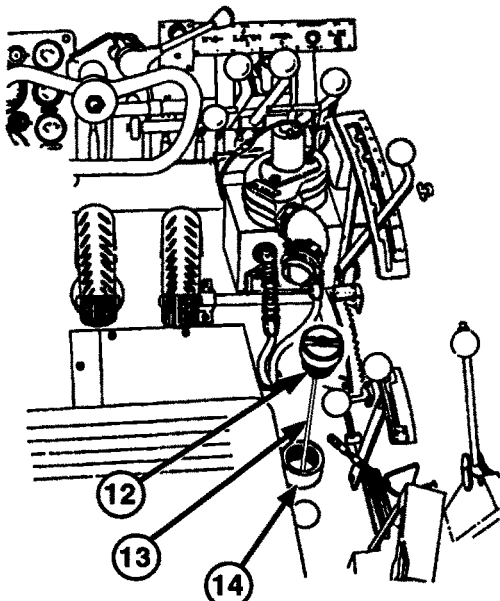
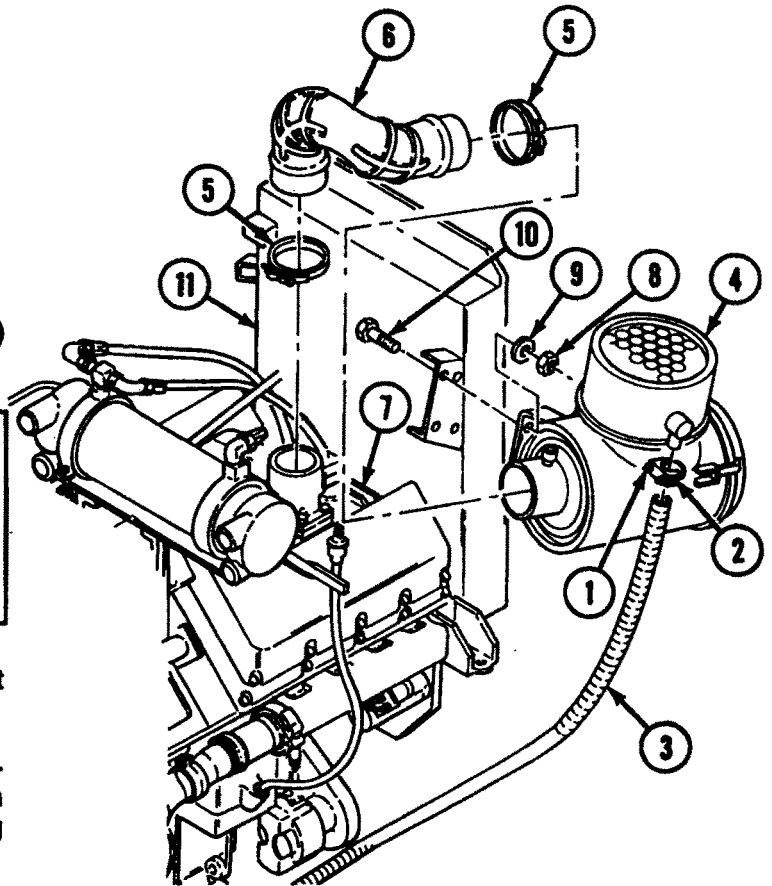
Mechanic No. 1 performs steps A through C in engine compartment. Mechanic No. 2 performs steps D through G in driver's compartment.

- A** Loosen two nuts (1) and remove clamp (2) and hose (3) from air cleaner (4).

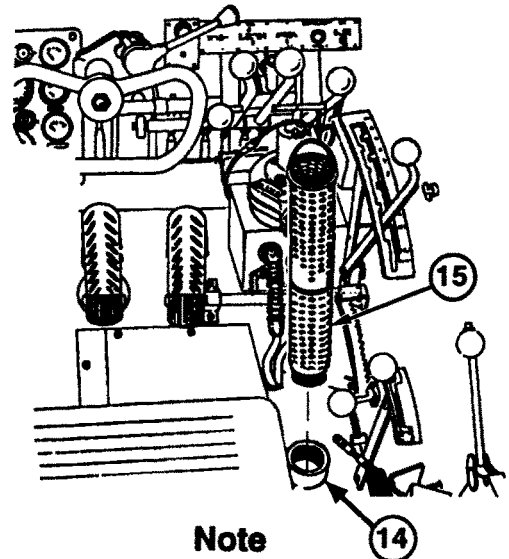
**CAUTION**

After removing air cleaner duct, cover air intake and air cleaner outlet to prevent entry of dirt. Failure to comply may result in damage to equipment.

- B** Remove two clamps (5) and air cleaner duct (6) from engine (7) and air cleaner (4).
- C** Remove four nuts (8), washers (9), self-locking screws (10), and air cleaner (4) from filter support (11). Discard self-locking screws (10).



- D** Remove hydraulic tank cap (12) and dipstick (13) from filler neck (14). Remove dipstick (13) from hydraulic tank cap (12).

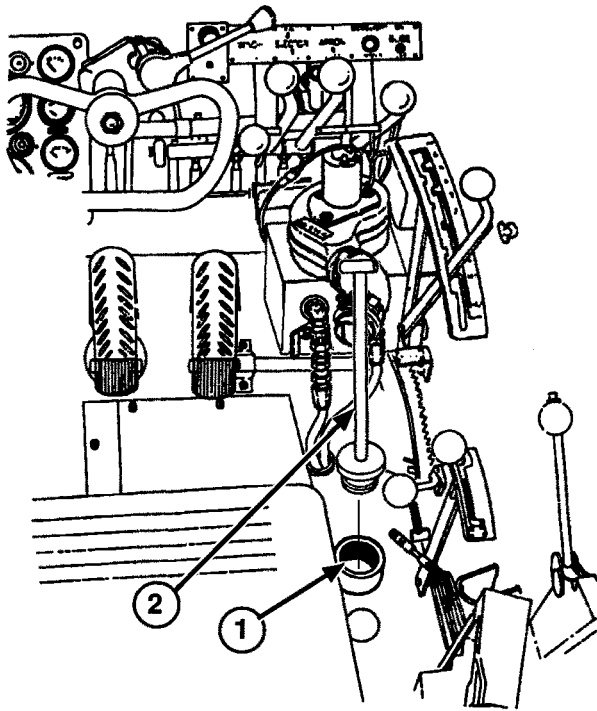


**Note**

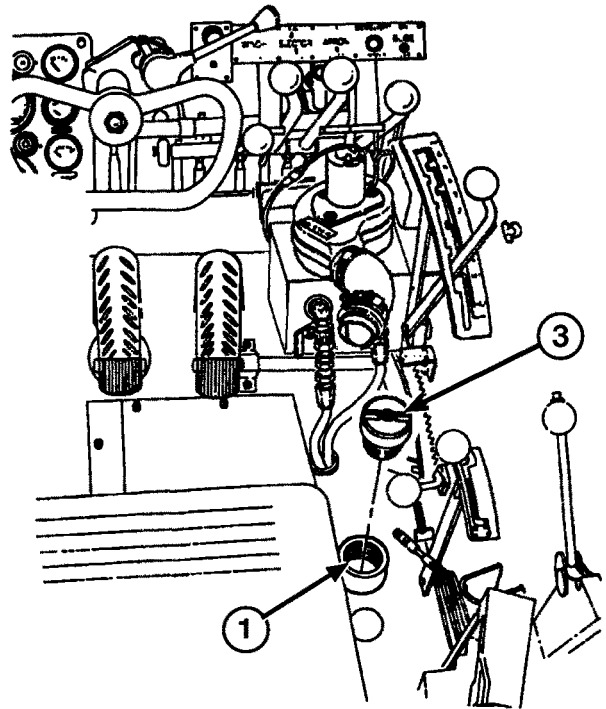
Filter is saturated with oil and will drip when removed. Catch dripping oil in suitable container.

- E** Lift filter (15) from filler neck (14).





**F** Install hydraulic tank plug (2) on filler neck (1).

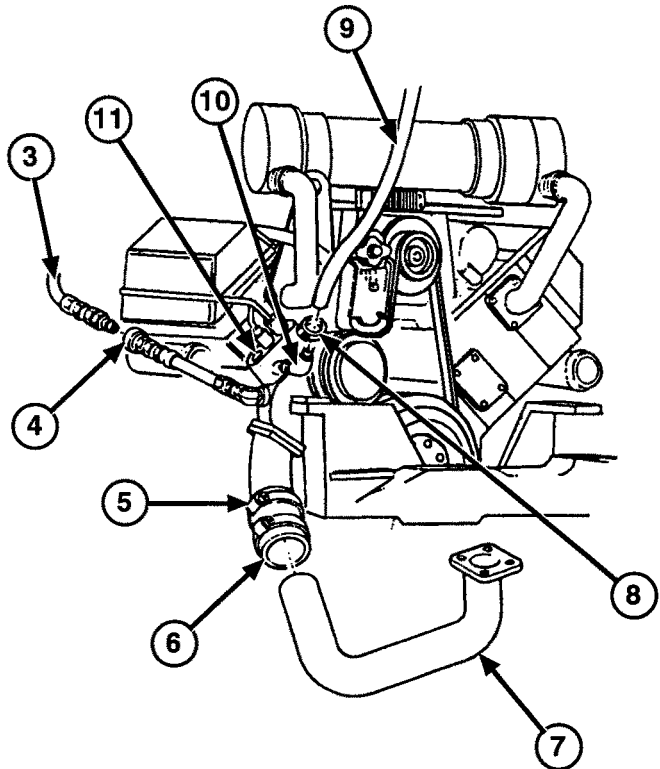


**G** Install hydraulic tank cap (3) on filler neck (1).

**Note**

Mechanic No. 1 performs steps H through N in back of engine compartment. Mechanic No. 2 performs steps O through U in front of engine compartment.

- H** Disconnect heater hose (3) at quick-disconnect (4).
- I** Loosen clamp (5) on hose (6) and remove water pump inlet tube (7) from hose (6).
- J** Loosen clamp (8) and disconnect coolant hose (9) from elbow (10) at water pump (11).

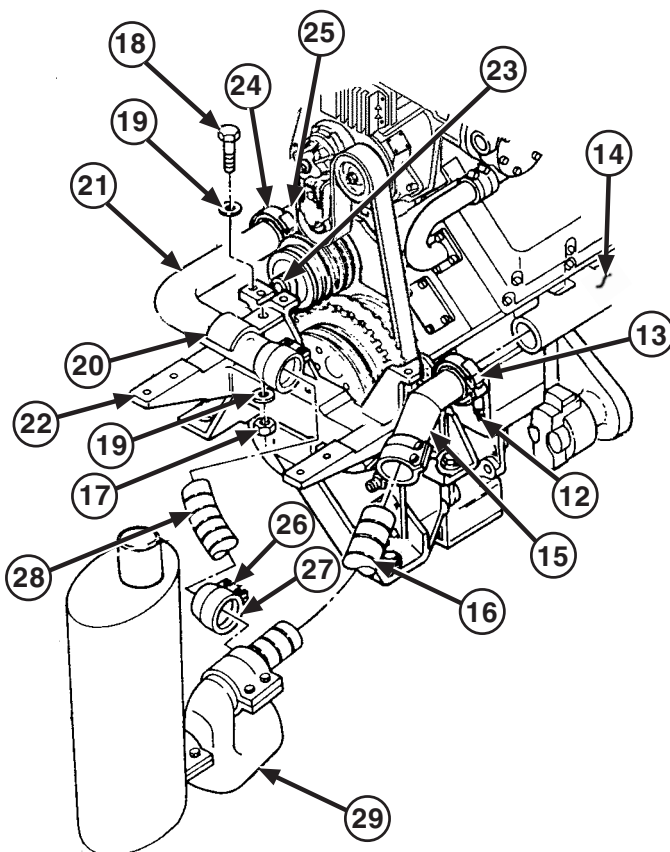




## WARNING

Hot exhaust system components can cause serious burns. Do not work on exhaust system until it is cool. Failure to comply may result in severe injury to personnel.

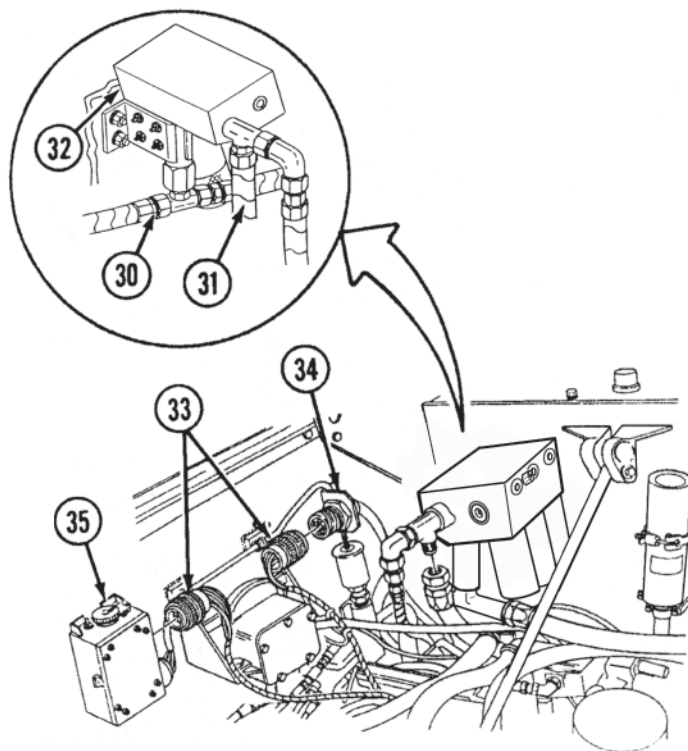
- K** Remove nut (12) from clamp (13), and remove clamp (13) from RH exhaust manifold (14). Move coupling (15) and exhaust pipe (16) out of the way.
- L** Remove nut (17), self-locking screw (18), two washers (19), and clamp (20) securing elbow (21) to radiator mount (22). Discard self-locking screw (18).
- M** Remove nut (23) from clamp (24), and remove clamp (24) from LH exhaust manifold (25). Remove elbow (21) from LH exhaust manifold (25).
- N** Loosen screws (26) on clamp (27), and remove clamp (27) and elbow (21), with exhaust pipe (28) attached, from collector (29).

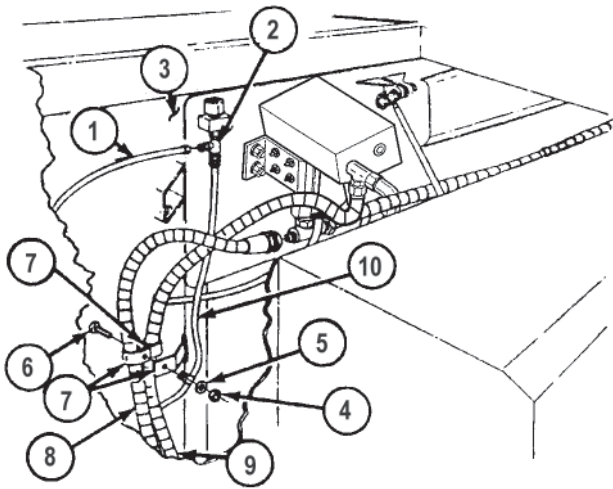


## CAUTION

Cover hose openings and fittings to prevent fluid spillage or contamination, or damage to equipment may result. Failure to comply may result in damage to equipment.

- O** Disconnect hoses (30) and (31) from hydraulic oil filter (32).
- P** Disconnect two connectors (33) of engine wiring harness from bracket (34) and STE/ICE-R interface resistor box (35).

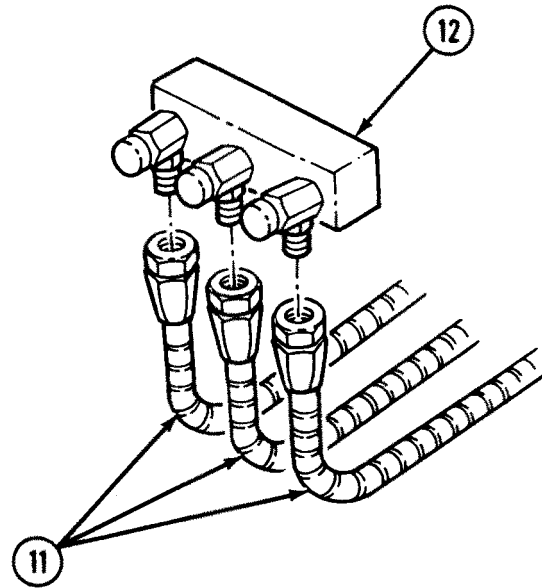




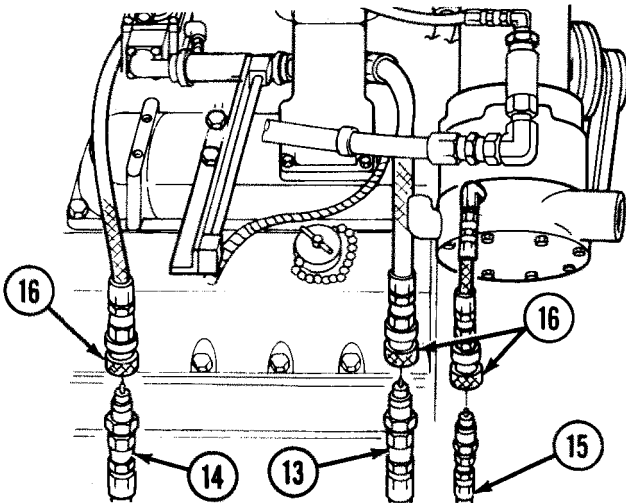
**Note**

Perform step Q for vehicles with new steer unit breather hose configuration.

- Q** Disconnect steer unit breather hose (1) from tee (2) on filter support (3).
- R** Remove nut (4), washer (5), self-locking screw (6), and three clamps (7) securing hoses (8), (9), and (10) to filter support (3). Discard self-locking screw (6).



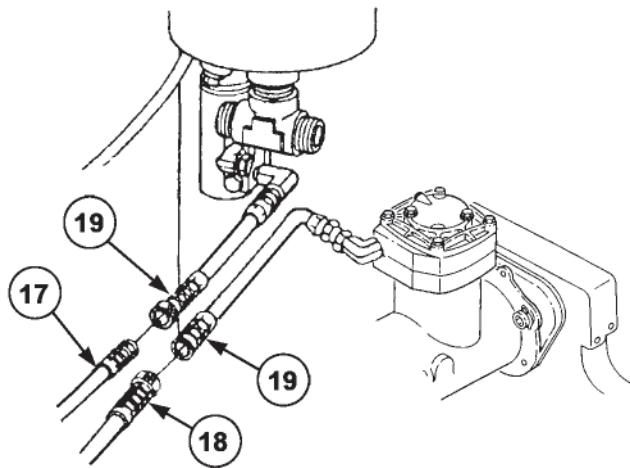
- S** Disconnect three oil sampling valve hoses (11) from oil sampling manifold (12).



**CAUTION**

Tag fuel hoses to aid in identifying them at time of installation. Failure to comply may result in damage to equipment.

- T** Disconnect fuel inlet hose (13), fuel return hose (14), and heater hose (15) at quick-disconnects (16).



- U** Disconnect air compressor governor hose (17) and air compressor hose (18) at quick-disconnects (19).

**Note**

Mechanic No. 1 performs steps V through Z in rear of vehicle. Mechanic No. 2 performs steps AA through AG in engine compartment.

**CAUTION**

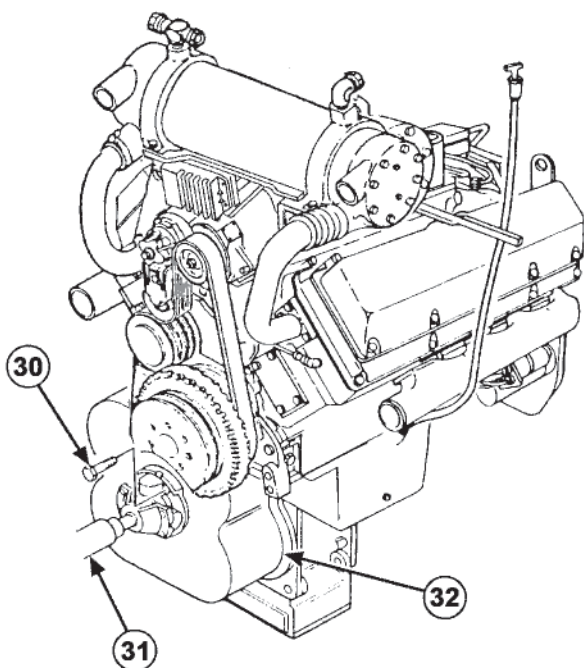
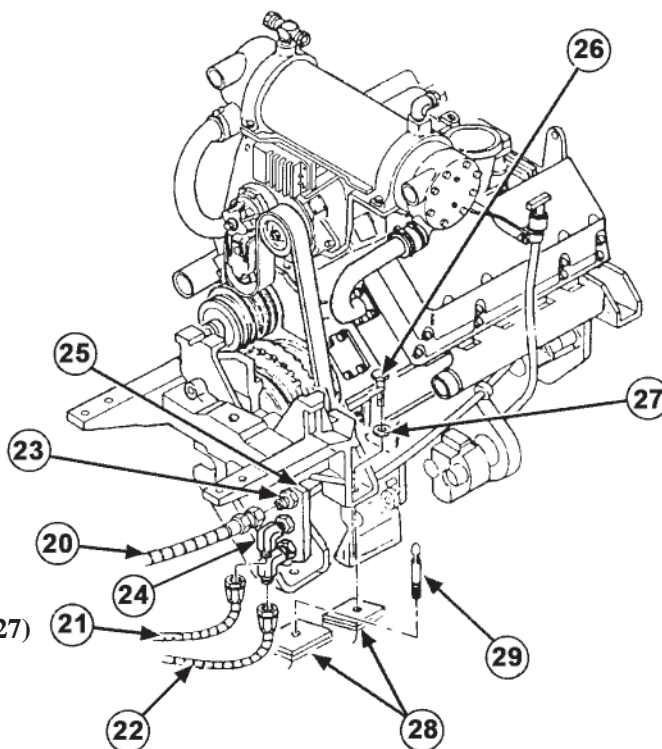
Tag fuel hoses to aid in identifying them at time of installation. Failure to comply may result in damage to equipment.

- V Disconnect hoses (20), (21), and (22) from adapter (23) and two elbows (24) at bracket (25).

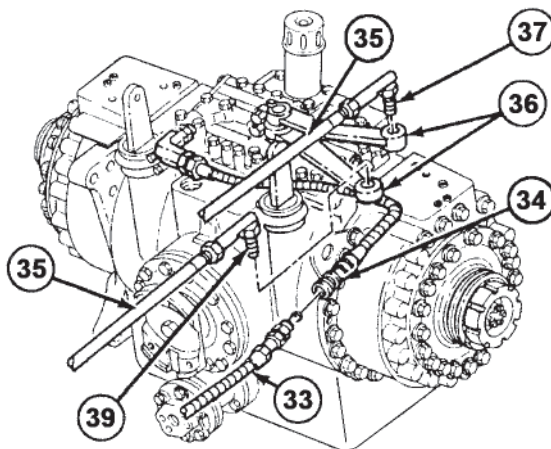
**Note**

Replace resilient mount if worn.

- W Remove one self-locking screw (26) and washers (27) from engine mounts (28). Discard self-locking screws (26), and leave guide pin (29) in place.



- X Remove four self-locking screws (30) securing driveshaft (31) to transmission (32). Discard self-locking screws (30).



- Y Disconnect steer unit hose (33) at quick-disconnect (34).

**CAUTION**

Tag rods before removal to assist with installation. Failure to comply may result in damage to equipment.

- Z Disconnect two steering rods (35) from bellcranks (36) by removing ball joints (37).

## CAUTION

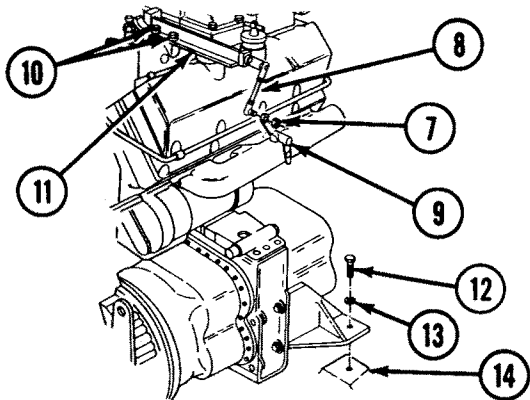
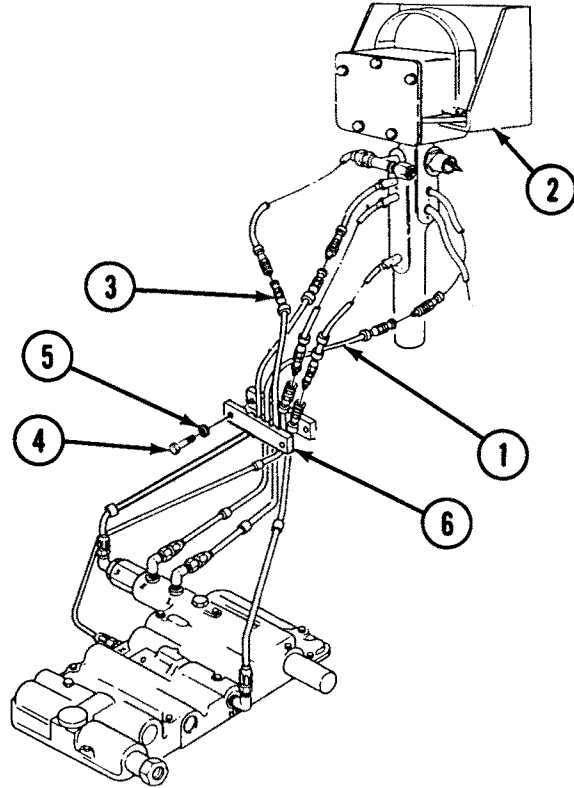
Tag transmission hoses to aid in identifying them at time of installation. Failure to comply may result in damage to equipment.

### Note

There are two configurations of shift control valve hoses. Vehicle serial Nos. 1 through 213 will have four quick-disconnects above the clamp and vehicle Nos. 214 and up will have five quick-disconnects above the clamp.

**AA** Disconnect five hoses (1) from shift control valve (2) at quick-disconnects (3).

**AB** Remove two screws (4), lockwashers (5), and clamp (6) securing hoses (1) to side of driver's compartment. Discard lockwashers (5).



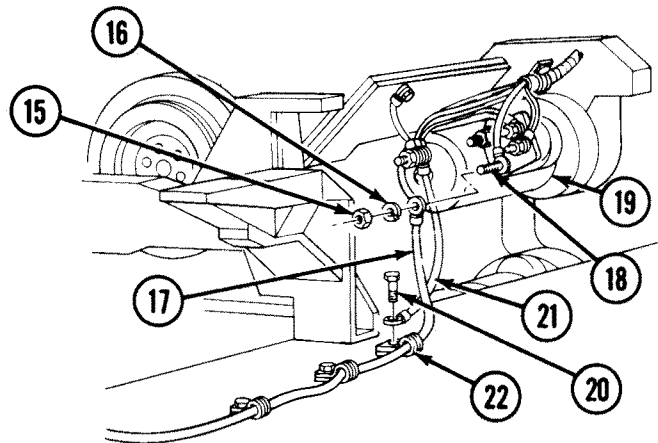
**AC** Remove locknut (7) and disconnect throttle linkage (8) from bellcrank (9). Discard locknut (7).

**AD** Remove two self-locking screws (10) from bracket (11) (on top of engine), and remove throttle linkage (8). Discard self-locking screws (10).

### Note

Replace resilient mount if worn.

**AE** Remove self-locking screw (12) and washer (13) from engine mount (14). Discard self-locking screw (12).



**AF** Remove nut (15), lockwasher (16), and lead 6 (17) from positive terminal (18) of starter (19). Discard lockwasher (16).

**AG** Remove self-locking screw (20), starter ground lead (21), and clamp (22) from hull. Discard self-locking screw (20).



**Note**

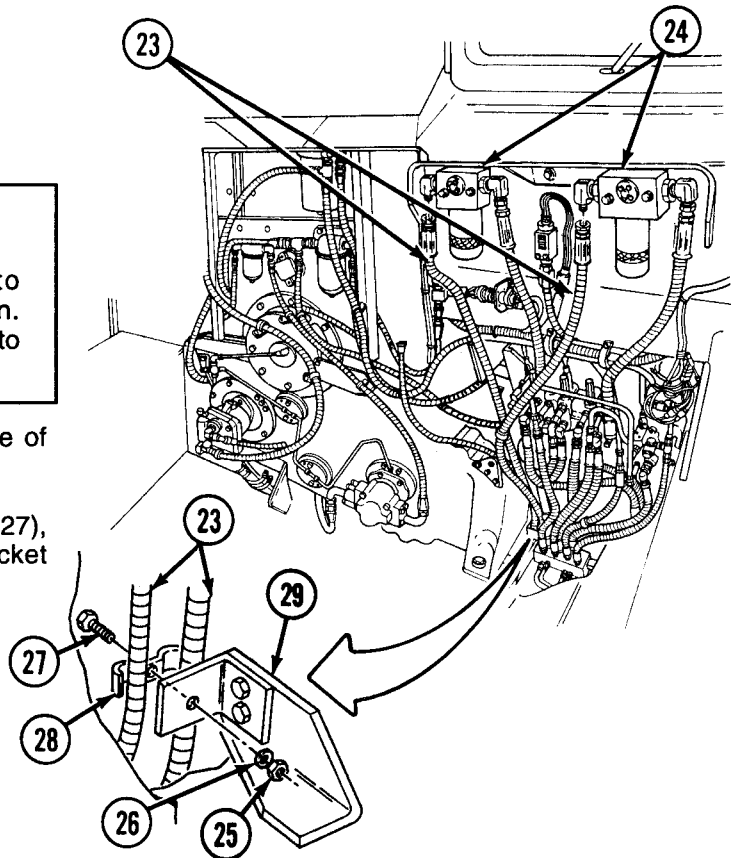
Mechanic No. 1 performs steps AH through AN in bowl.

**CAUTION**

Cover hose openings and fittings to prevent fluid spillage or contamination. Failure to comply may result in damage to equipment.

**AH** Disconnect two hoses (23) from intake side of two filters (24).

**AI** Remove locknut (25), washer (26), screw (27), clamp (28), and two hoses (23) from bracket (29). Discard locknut (25).



**AJ** Remove two screws (30), lockwashers (31), washers (32), clamp half (33), and two hoses (23) from hose clamp (34). Discard lockwashers (31).

**CAUTION**

Cover hose openings and fittings to prevent fluid spillage or contamination. Failure to comply may result in damage to equipment.

**AK** Disconnect shift accumulator hose (35) at quick-disconnect (36).

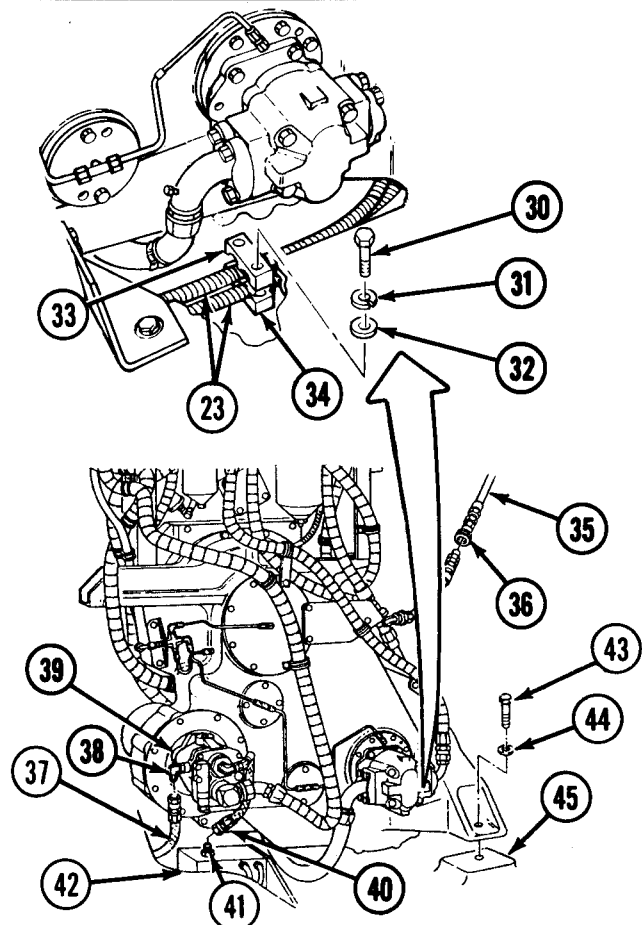
**AL** Disconnect hose (37) from elbow (38) on compensating pump (39).

**AM** Disconnect compensating pump hose (40) from adapter (41) on manifold (42).

**Note**

Replace resilient mount if worn.

**AN** Remove two self-locking screws (43) and washers (44) from engine mounts (45). Discard self-locking screws (43).



**Note**

Two mechanics perform steps AO through AS.

**AO** Connect lifting sling to lifting eyes (1) on power package (2).

**WARNING**

- Lifting device must have a weight capacity greater than 6,000 lb (2,724 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

**AP** Connect lifting sling to lifting device. Slowly raise lifting device to take up slack in chains.

**CAUTION**

Ensure all hoses are free and do not hang up during lifting of power package. Failure to comply may result in damage to equipment.

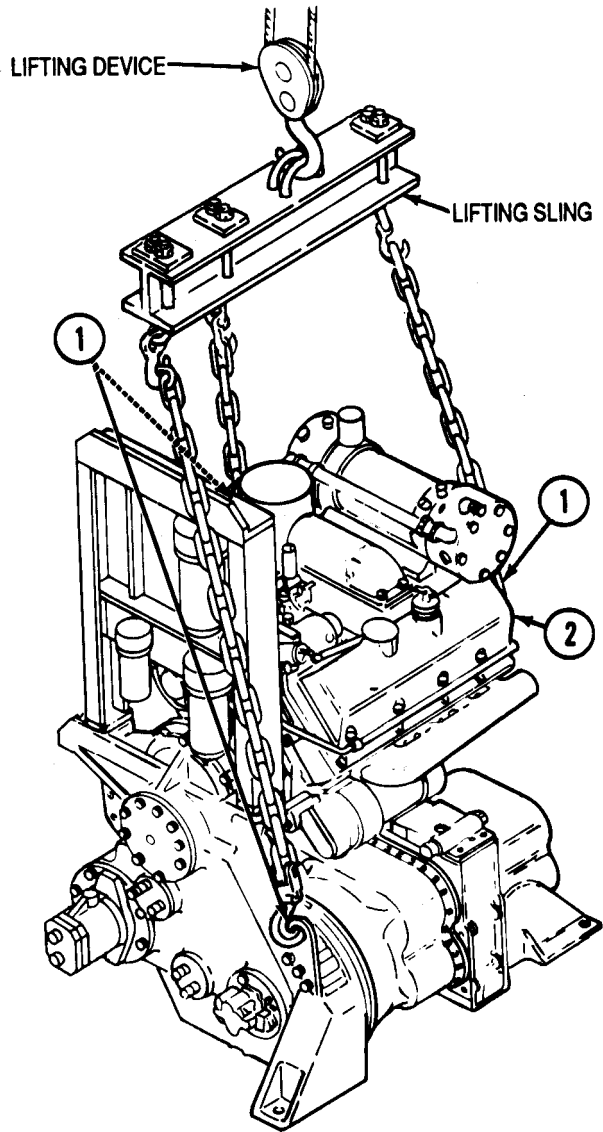
**AQ** Slowly lift power package (2), moving it toward front of vehicle approximately 2 ft (.6 m), to clear components mounted on engine side of driver's compartment.

**WARNING**

Ensure power package is securely blocked. Power package is top-heavy and can easily tip over, causing severe injury or death to personnel.

**AR** Support power package (2) on suitable stand or cribbing.

**AS** Remove sling from lifting eyes (1).



**INSTALLATION**

**Note**

- Two mechanics perform steps A through E.
- Ensure all hydraulic hoses are secured to power package. Lower power package into vehicle, retrieve hoses, and position in clamp on top of transmission.

**A** Install two guide pins on mounts (1).

**WARNING**

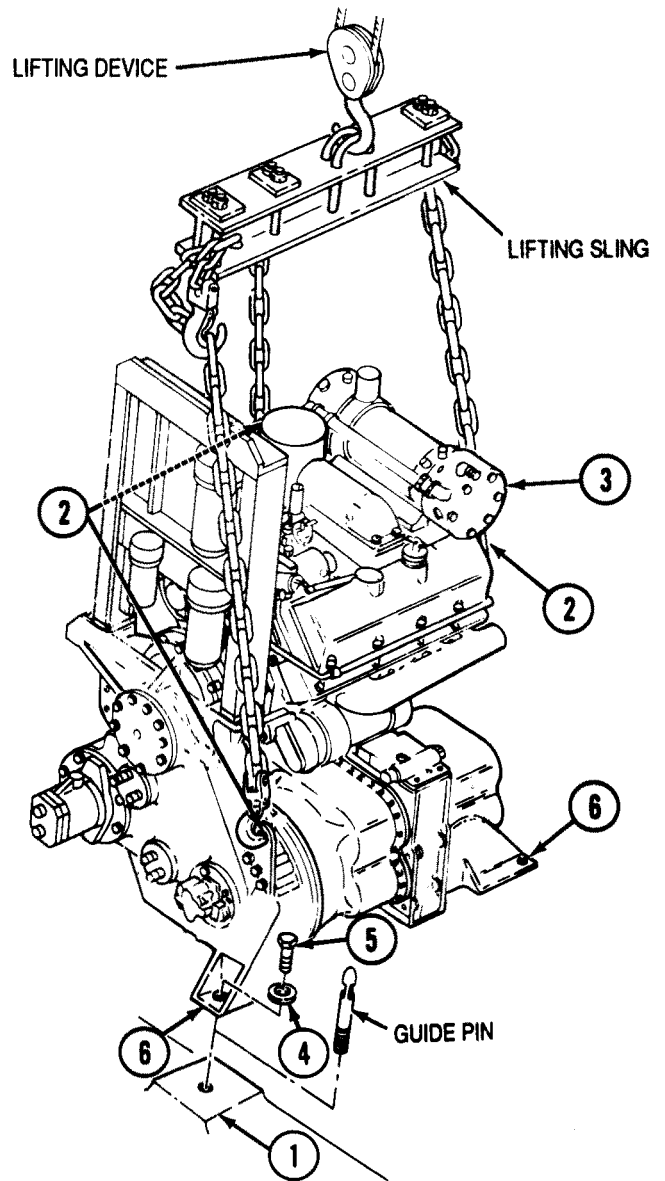
- Lifting device must have a weight capacity greater than 6,000 lb (2,724 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

**B** Connect lifting sling to lifting eyes (2) on power package (3), and connect lifting device to lifting sling. Position power package (3) above and forward of engine compartment.

**C** Keeping hoses out of the way, lower power package (3) into mounting position on guide pins. Remove guide pins after power package (3) is in position.

**D** Install four washers (4) and self-locking screws (5) on engine mounts (6) and mounts (1). Tighten four self-locking screws (5) to 180-220 lb-ft (244-298 N·m).

**E** Remove lifting sling from lifting eyes (2).



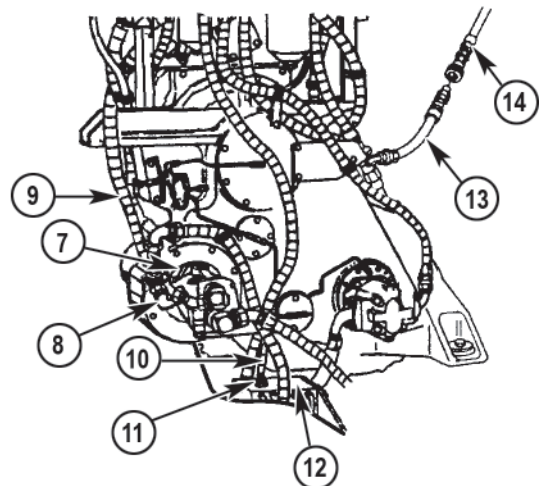
**Note**

Mechanic No. 1 performs steps F through K in bowl. Mechanic No. 2 performs steps L through Q in engine compartment.

**F** Connect SPSN PUMP DRAIN-7V hose (7) to elbow (8) on compensating pump (9).

**G** Connect RH MAIN MANF TOP-9 compensating pump hose (10) to adapter (11) on manifold (12).

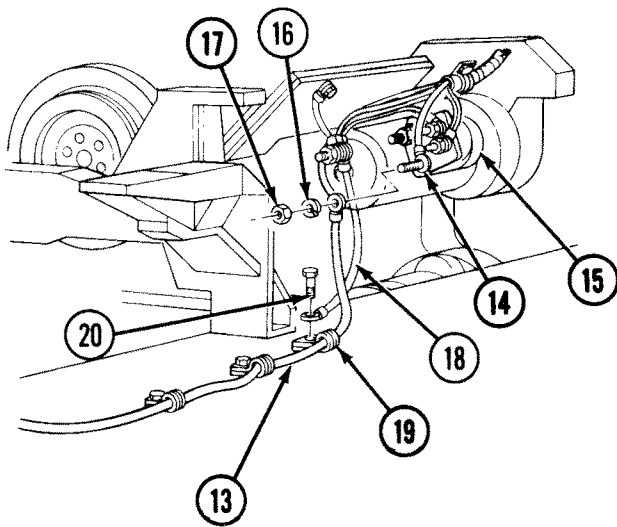
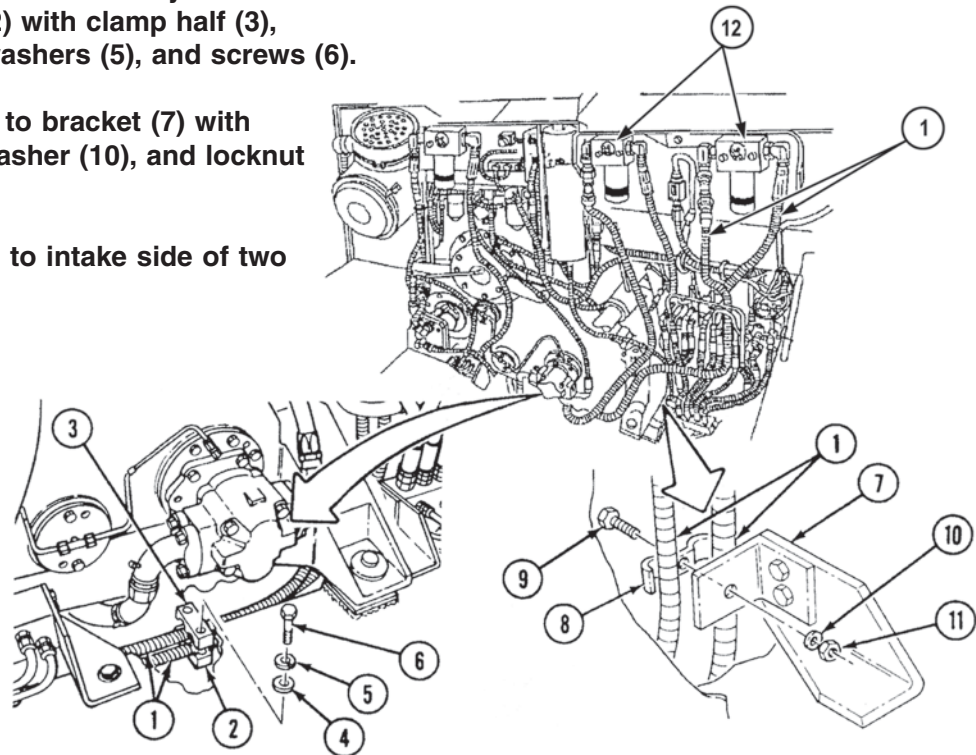
**H** Connect shift accumulator hose (13) at quick-disconnect (14).



**I** Connect two hoses (1) from main hydraulic pump to hose clamp (2) with clamp half (3), two washers (4), lockwashers (5), and screws (6).

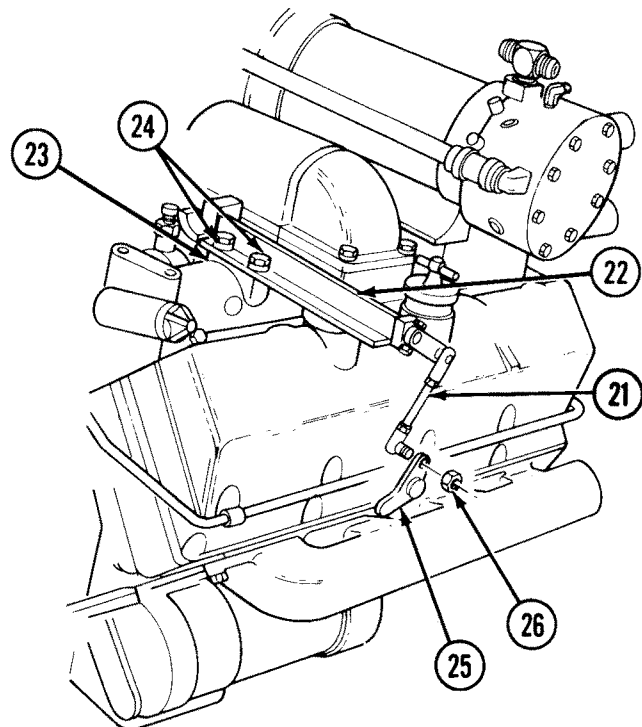
**J** Connect two hoses (1) to bracket (7) with clamp (8), screw (9), washer (10), and locknut (11).

**K** Connect two hoses (1) to intake side of two filters (12).



**L** Connect lead 6 (13) to positive terminal (14) of starter (15) with lockwasher (16) and nut (17).

**M** Connect starter ground lead (18) and lead 6 (13) to hull with clamp (19) and self-locking screw (20).



**N** Install throttle linkage (21) and bracket (22) on engine (23) with two screws (24).

**O** Slide throttle linkage (21) into bellcrank (25) and secure with locknut (26).



HOSE IDENTIFICATION SCHEMATIC		
VALVE PORT	QUICK-DISCONNECT ID BANDS	XMSN PORT
VALVE HL	QDISC HL	XMSN HL
VALVE N	QDISC N	XMSN N
VALVE R	QDISC R-1	XMSN 1
VALVE 1	QDISC 1-2	XMSN 2
VALVE 2	QDISC 2-3	XMSN 3

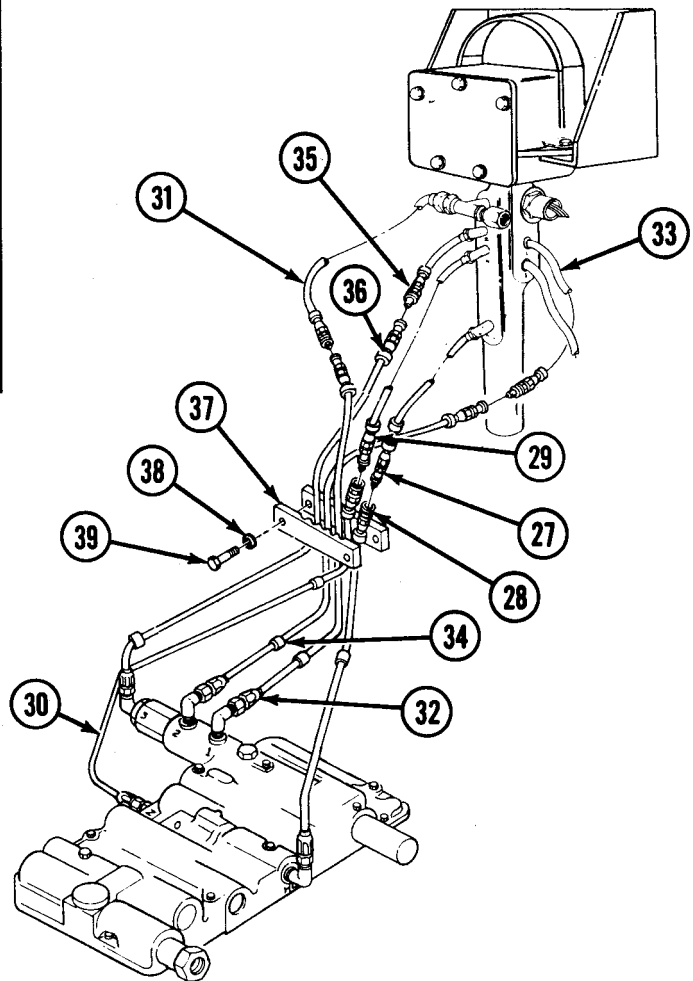
**Note**

There are two configurations of shift control valve hoses. Vehicle serial Nos. 1 through 213 will have four quick-disconnects above the clamp and vehicle Nos. 214 and up will have five quick-disconnects above the clamp.

**P** Connect shift control hoses as follows:

- Connect hose (27) from valve port HL to hose (28) from transmission port HL with quick-disconnect marked QDISC HL.
- Connect hose (29) from valve port N to hose (30) from transmission port N with quick-disconnect marked QDISC N.
- Connect hose (31) from valve port R to hose (32) from transmission port 1 with quick-disconnect marked QDISC R-1.
- Connect hose (33) from valve port 1 to hose (34) from transmission port 2 with quick-disconnect marked QDISC 1-2.
- Connect hose (35) from valve port 2 to hose (36) from transmission port 3 with quick-disconnect marked QDISC 2-3.

**Q** Secure hoses to side of driver's compartment with clamp (37), two lockwashers (38), and screws (39).



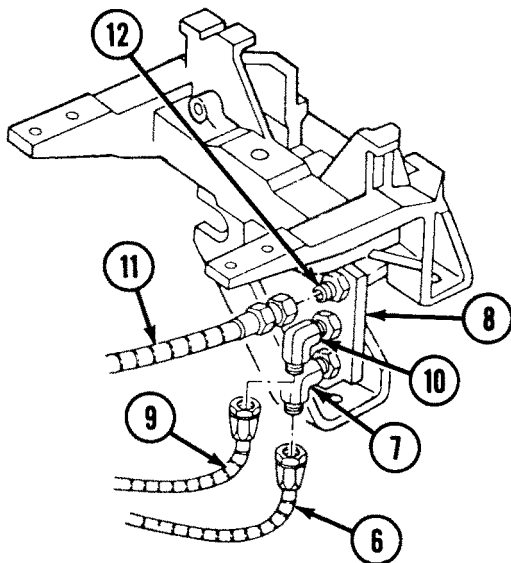
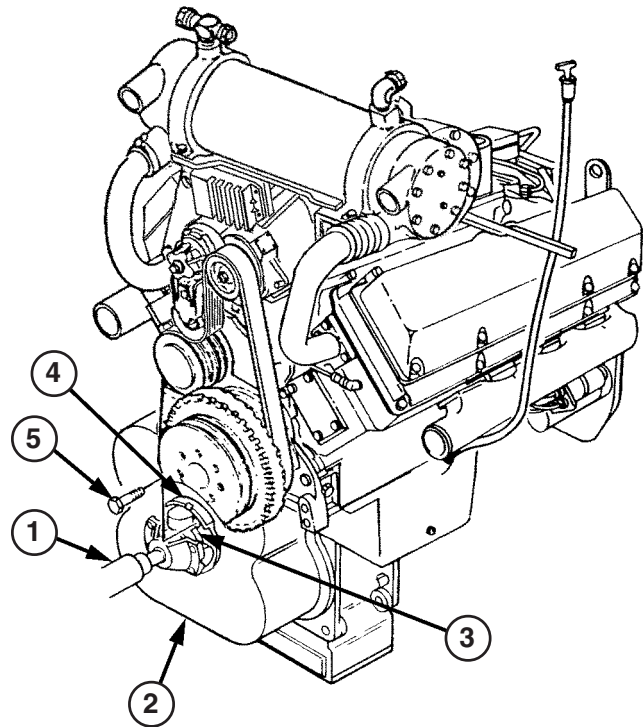
## CAUTION

Do not use mounting screws to seat driveshaft on transmission flange. Failure to comply may result in damage to equipment.

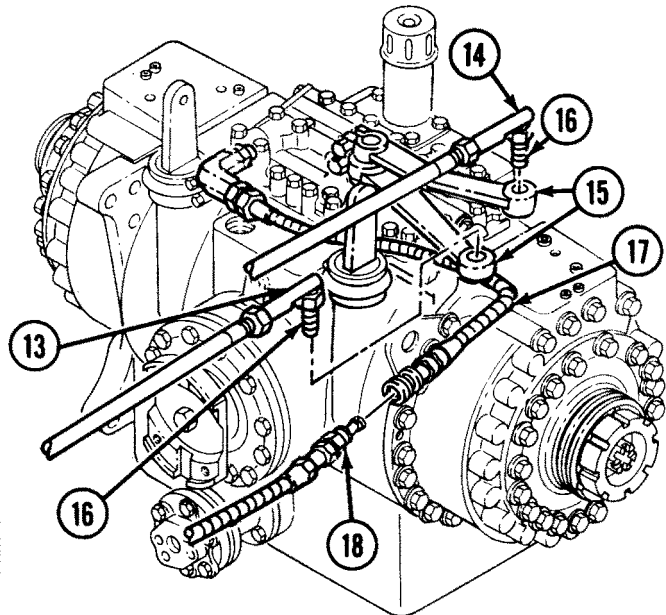
### Note

- Mechanic No. 1 performs steps R through X in rear of vehicle. Mechanic No. 2 performs steps Y through AF in engine compartment.
- Adjust torque link to align steer unit and transmission flanges.

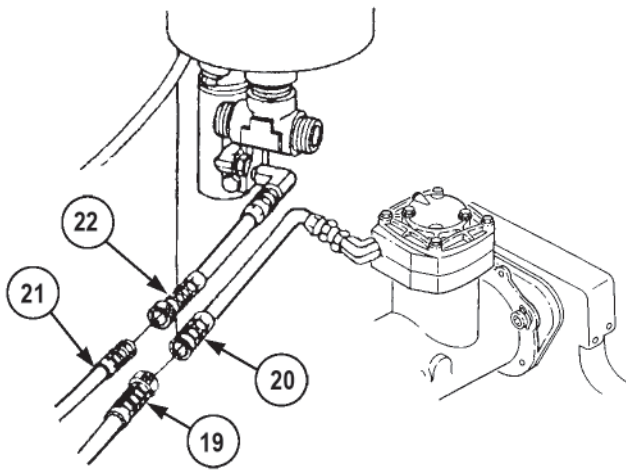
- R** Connect driveshaft (1) to transmission (2) by aligning universal joint (3) with transmission flange (4). Strike universal joint (3) with a soft hammer to seat driveshaft (1) on flange (4).
- S** Secure driveshaft (1) by installing four self-locking screws (5). Tighten self-locking screws (5) to 90-95 lb-ft (122-129 N·m).



- T** Connect RH BOT BHDFTG-13 supply tube (6) to elbow (7) on bracket (8).
- U** Connect RH MID BHD FTG-3S steer unit drain hose (9) to elbow (10) on bracket (8).
- V** Connect RH TOP BDH FTG-2S steer unit supply hose (11) to adapter (12) on bracket (8).

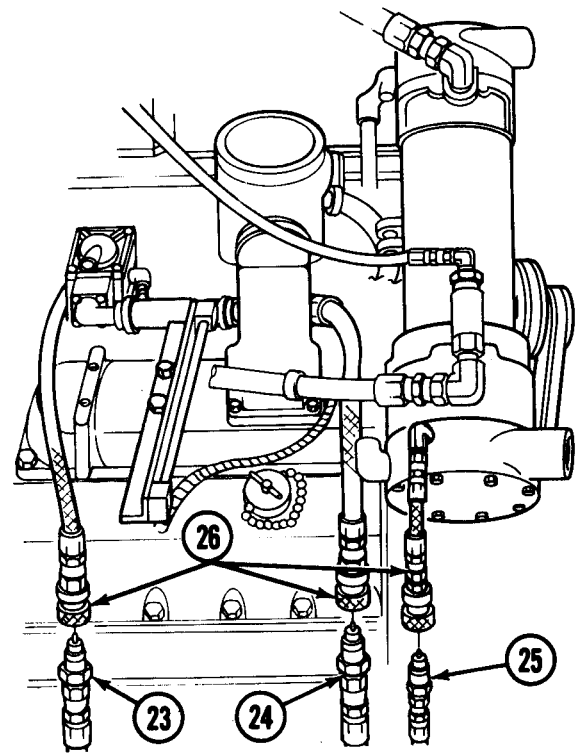


- W** Connect CB/GS steer selector rod (13) and steering linkage rod (14) to steer unit bellcranks (15) by tightening ball joints (16).
- X** Connect steer unit hose (17) at quick-disconnect (18).

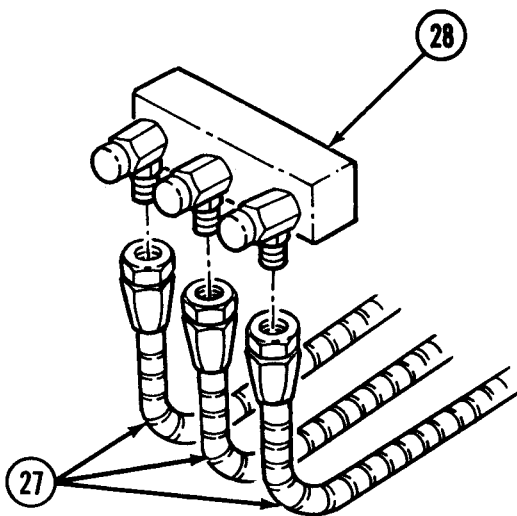


**Y** Connect air compressor line (19) at quick-disconnect (20).

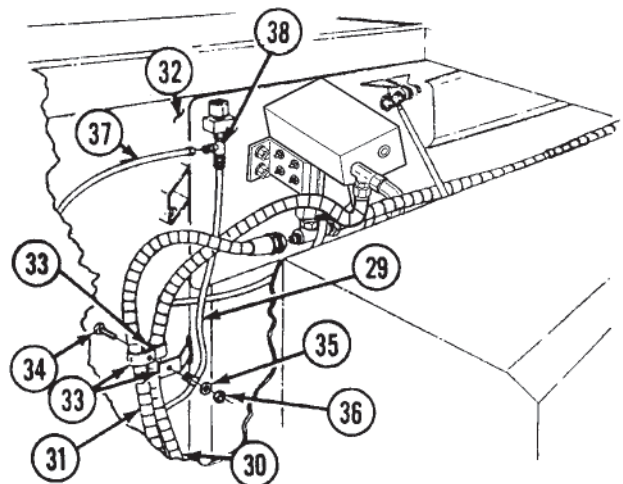
**Z** Connect fuel return line (21) at quick-disconnect (22).



**AA** Connect fuel return hose (23), fuel inlet hose (24), and heater hose (25) at quick-disconnects (26).



**AB** Connect three oil sampling valve hoses (27) to oil sampling manifold (28).



**AC** Secure hoses (29), (30), and (31) to filter support (32) with three clamps (33), self-locking screw (34), washer (35), and nut (36). Tighten self-locking screw (34) to 30-34 lb-ft (41-46 N·m).

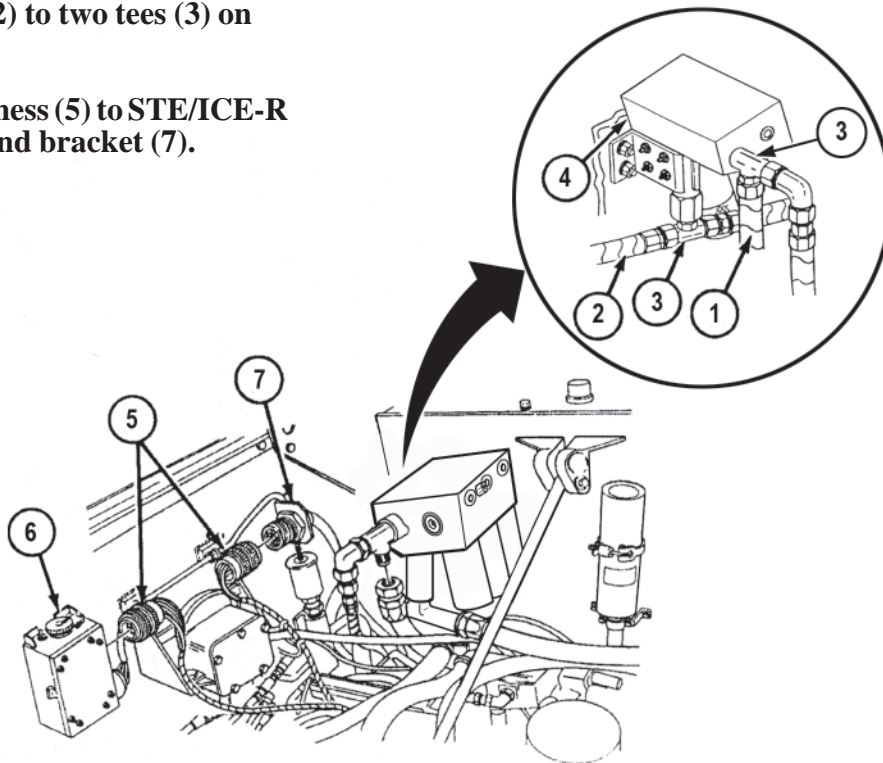
**Note**

Perform step AD for vehicles with new steer unit breather configuration.

**AD** Connect steer unit breather hose (37) to tee (38) on filter support (32).

**AE** Connect HYDR FLTR-IN-7 hose (1) and HYDR FLTR-OUT TEE-7 hose (2) to two tees (3) on hydraulic oil filter (4).

**AF** Connect engine wiring harness (5) to STE/ICE-R interface resistor box (6) and bracket (7).



**Note**

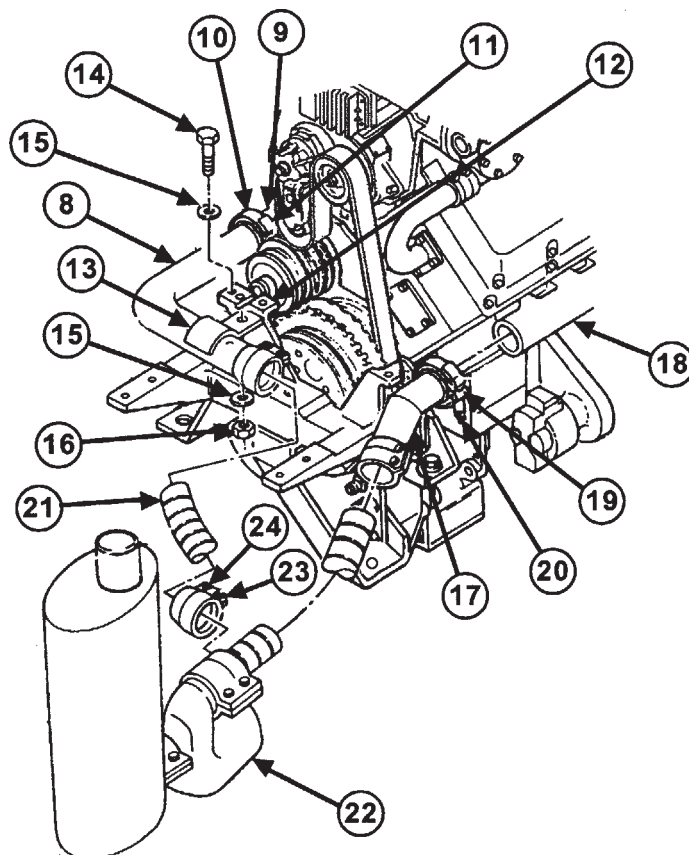
Mechanic No. 2 performs steps AG through AM in engine compartment. Mechanic No. 1 performs steps AN through AR in driver's compartment.

**AG** Connect elbow (8) to LH exhaust manifold (9) with clamp (10), and install nut (11) on clamp (10).

**AH** Secure elbow (8) to radiator mounting bracket (12) with clamp (13), self-locking screw (14), two washers (15), and nut (16).

**AI** Install coupling (17) on RH exhaust manifold (18) with clamp (19), and install nut (20) on clamp (19).

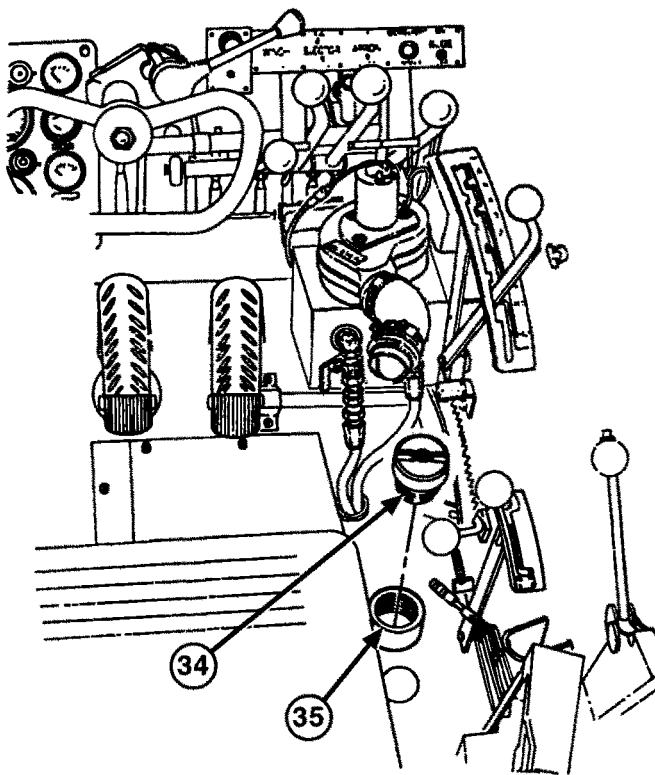
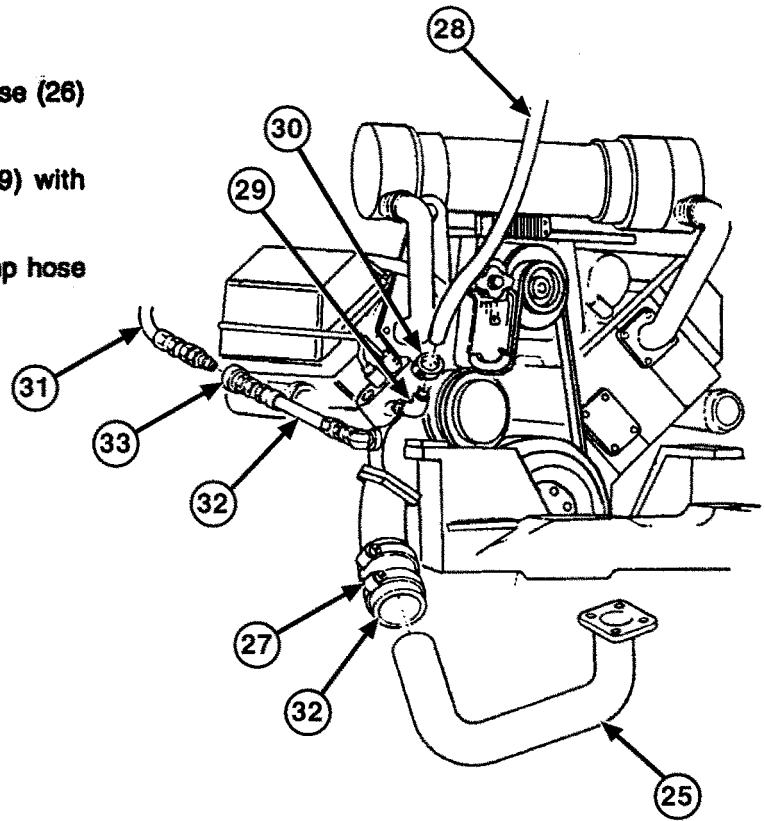
**AJ** Install exhaust pipe (21) on collector (22) with clamp (23), and tighten screws (24) on clamp (23) to 50-60 lb-ft (68-81 N-m).



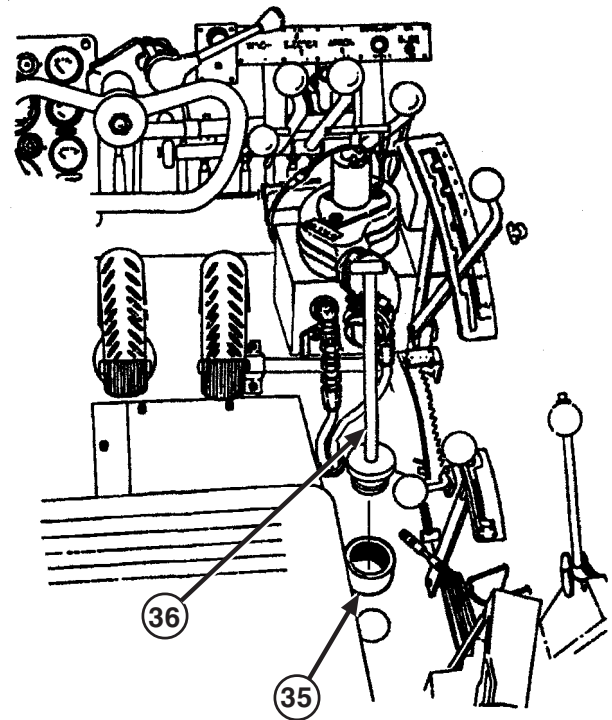
**AK** Install water pump inlet tube (25) on hose (26) with clamp (27).

**AL** Install coolant hose (28) on elbow (29) with clamp (30).

**AM** Connect heater hose (31) to water pump hose (32) at quick-disconnect (33).

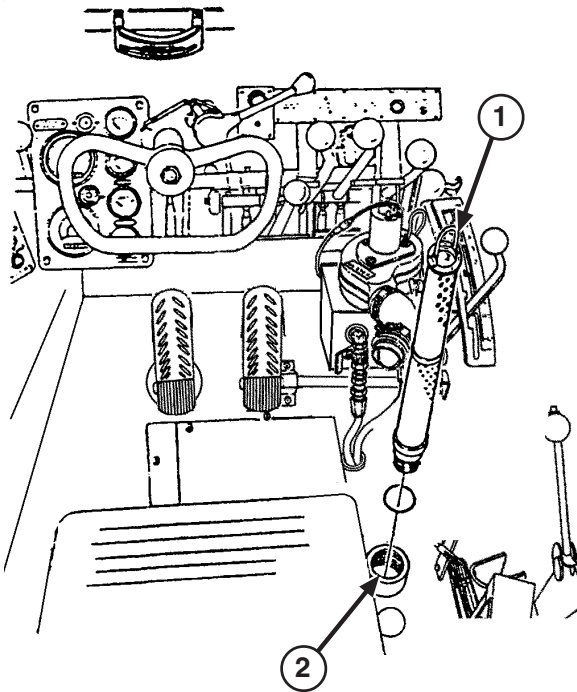


**AN** Remove hydraulic tank cap (34) from filler neck (35).

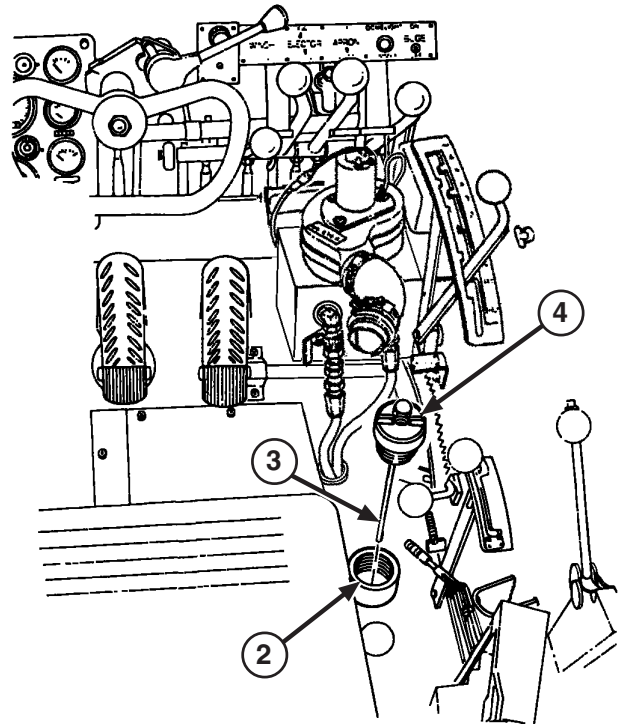


**AO** Lift hydraulic tank plug (36) from filler neck (35).





**AP** Install filter (1) on filler neck (2).



**AQ** Install dipstick (3) securely on hydraulic tank cap (4), and install hydraulic tank cap (4) on filler neck (2).

**Note**

Mechanic No. 2 performs steps AR through AT in engine compartment.

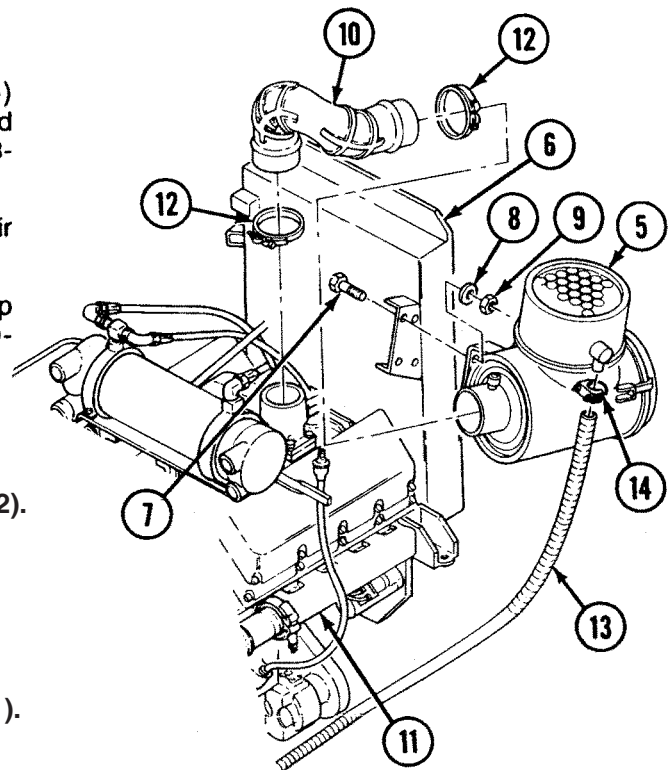
**AR** Install air cleaner (5) on filter support (6) with four self-locking screws (7), washers (8), and nuts (9). Tighten self-locking screws (7) to 18-20 lb-ft (24-27 N-m).

**AS** Install air cleaner duct (10) on engine (11) and air cleaner (5) with two clamps (12).

**AT** Connect hose (13) to air cleaner (5) with clamp (14). Tighten clamp (14) to 15-20 lb-ft (20-27 N-m).

**FOLLOW-ON TASKS:**

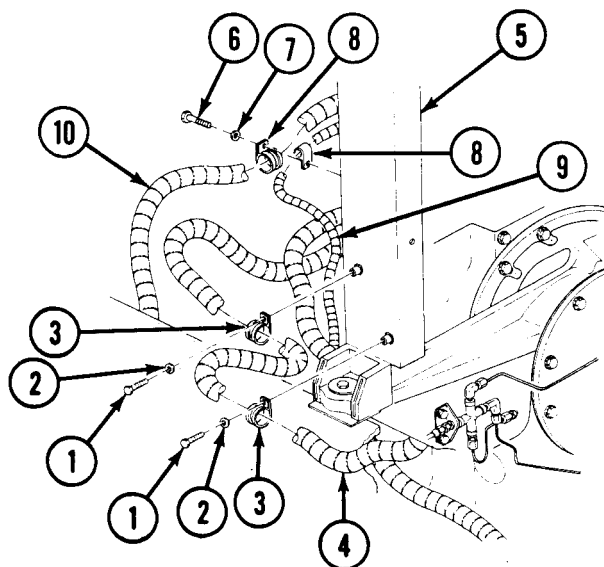
- Install ejector cylinder (TM 5-2350-262-20-1).
- Install radiator (TM 5-2350-262-20-2).
- Install main accumulator (TM 5-2350-262-20-2).
- Install cowling (TM 5-2350-262-20-1).
- Adjust CB/GS shift selector linkage
  
- Adjust accelerator and throttle linkage (TM 5-2350-262-20-1).
- Connect batteries (TM 5-2350-262-20-1).
- Install hull access cover (TM 5-2350-262-20-1).



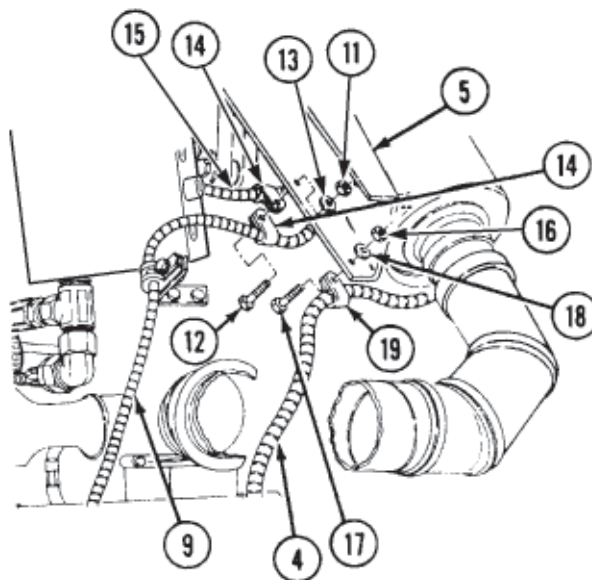


**REMOVAL**

- A** Remove two self-locking screws (1), washers (2), and clamps (3) securing hose (4) to side of filter support (5). Discard self-locking screws (1).
- B** Remove self-locking screw (6), washer (7), and two clamps (8) securing hoses (9) and (10) to rear of filter support (5). Discard self-locking screw (6).



- C** Remove nut (11), self-locking screw (12), washer (13), and two clamps (14) securing hoses (9) and (15) to top of filter support (5). Discard self-locking screw (12).
- D** Remove nut (16), self-locking screw (17), washer (18), and clamp (19) securing hose (4) to top of filter support (5). Discard self-locking screw (17).



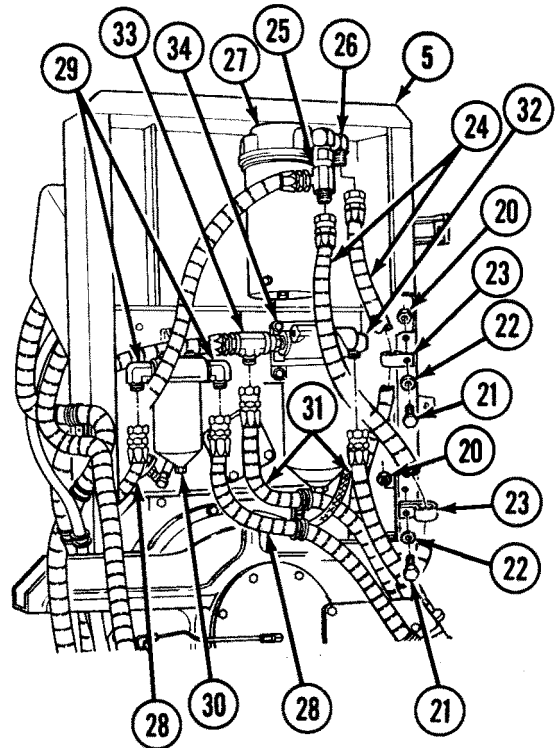


- E Remove two nuts (20), self-locking screws (21), washers (22), and clamps (23) securing hoses (24) to filter support (5). Discard self-locking screws (21).

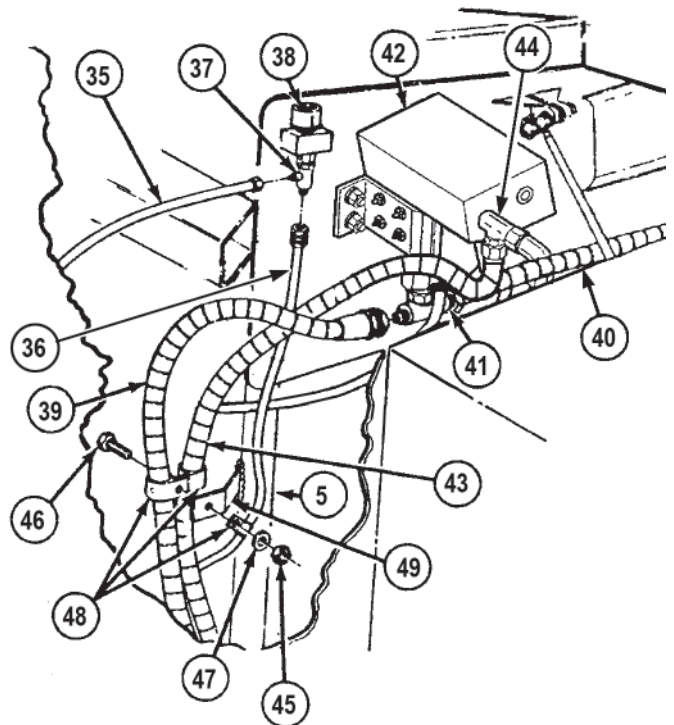
**CAUTION**

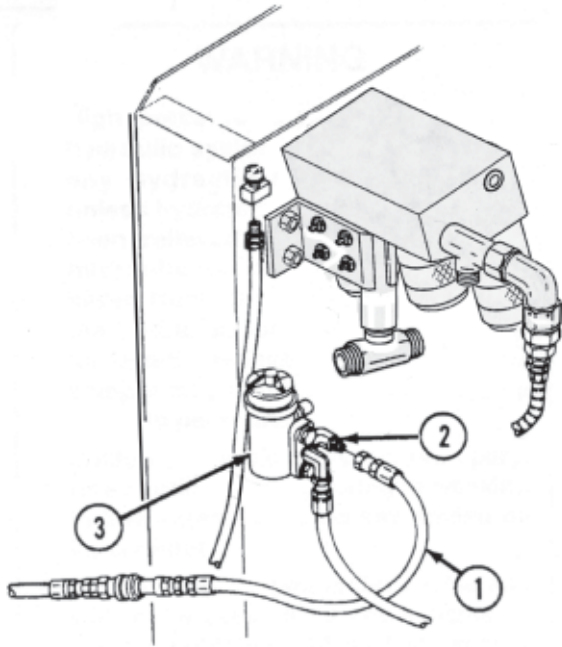
Cover hose openings and fittings to prevent fluid spillage or contamination. Failure to comply may result in damage to equipment.

- F Disconnect two hoses (24) from tee (25) and elbow (26) on engine oil filter (27).
- G Disconnect two hoses (28) from elbows (29) on scavenger pump filter (30).
- H Disconnect two hoses (31) from elbows (32) and tee (33) on transmission oil filter (34).

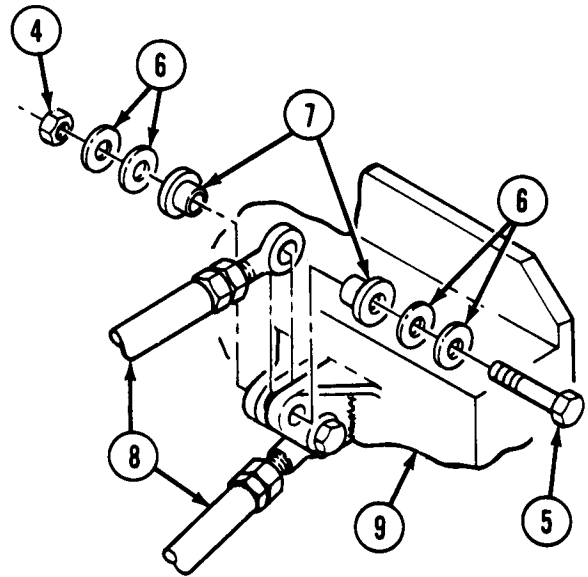


- I Disconnect hoses (35) and (36) from tee (37) on breather (38).
- J Disconnect two hoses (39) and (40) from tee (41) on hydraulic oil filter (42).
- K Disconnect hose (43) from tee (44) on hydraulic oil filter (42).
- L Remove nut (45), self-locking screw (46), washer (47), three clamps (48), and hoses (36), (39), and (43) from bracket (49) on filter support (5). Discard self-locking screw (46).

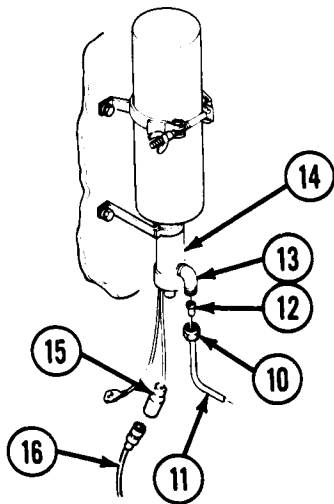




**M** Disconnect hose (1) from elbow (2) on air compressor governor (3).

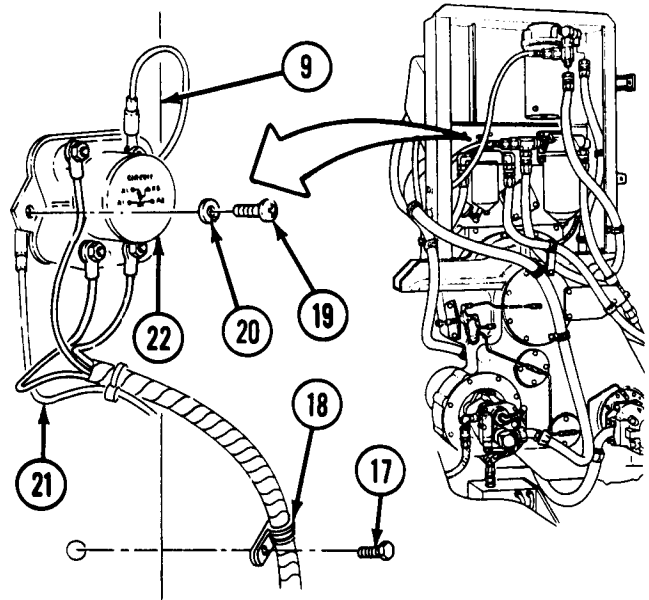


**N** Remove two nuts (4), self-locking screws (5), eight washers (6), four bushings (7), and two filter support braces (8) from filter support (9). Discard self-locking screws (4).



**O** Loosen nut (10) and remove tube (11) and sleeve (12) from elbow (13) on cold start valve (14).

**P** Disconnect cold start electrical lead (15) from harness (16).



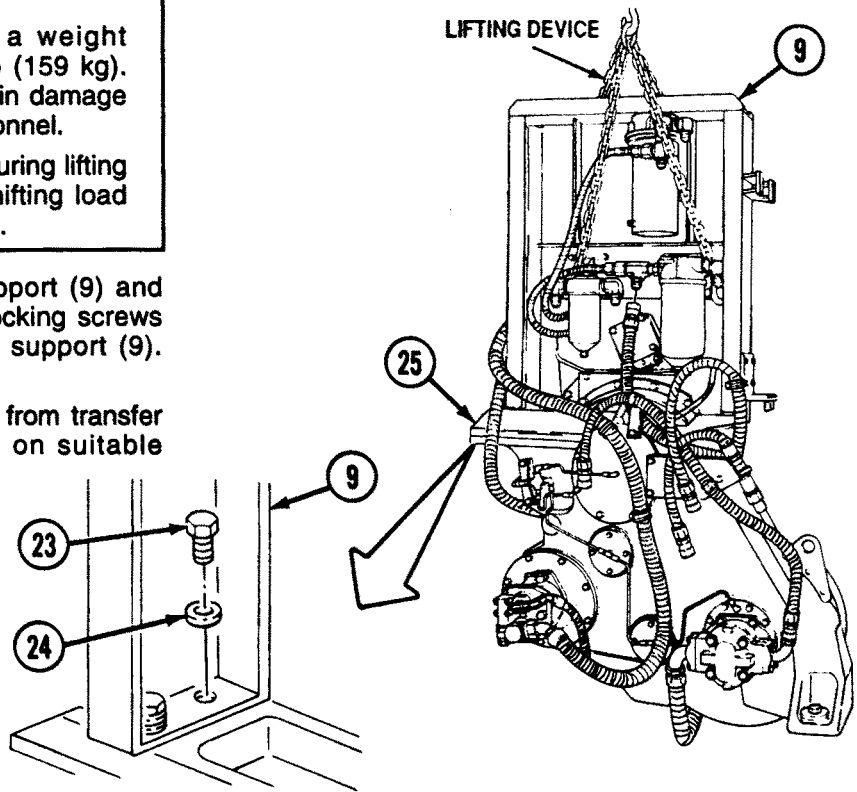
**Q** Remove screw (17) and clamp (18) from filter support (9).

**R** Remove two screws (19), lockwashers (20), ground lead (21), and starter relay (22) from filter support (9). Discard lockwashers (20).

### WARNING

- Lifting device must have a weight capacity greater than 350 lb (159 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- S** Connect lifting device to filter support (9) and take up slack. Remove four self-locking screws (23) and washers (24) from filter support (9). Discard self-locking screws (23).
- T** Carefully lift filter support (9) away from transfer case (25). Set filter support (9) on suitable supports. Remove lifting device.

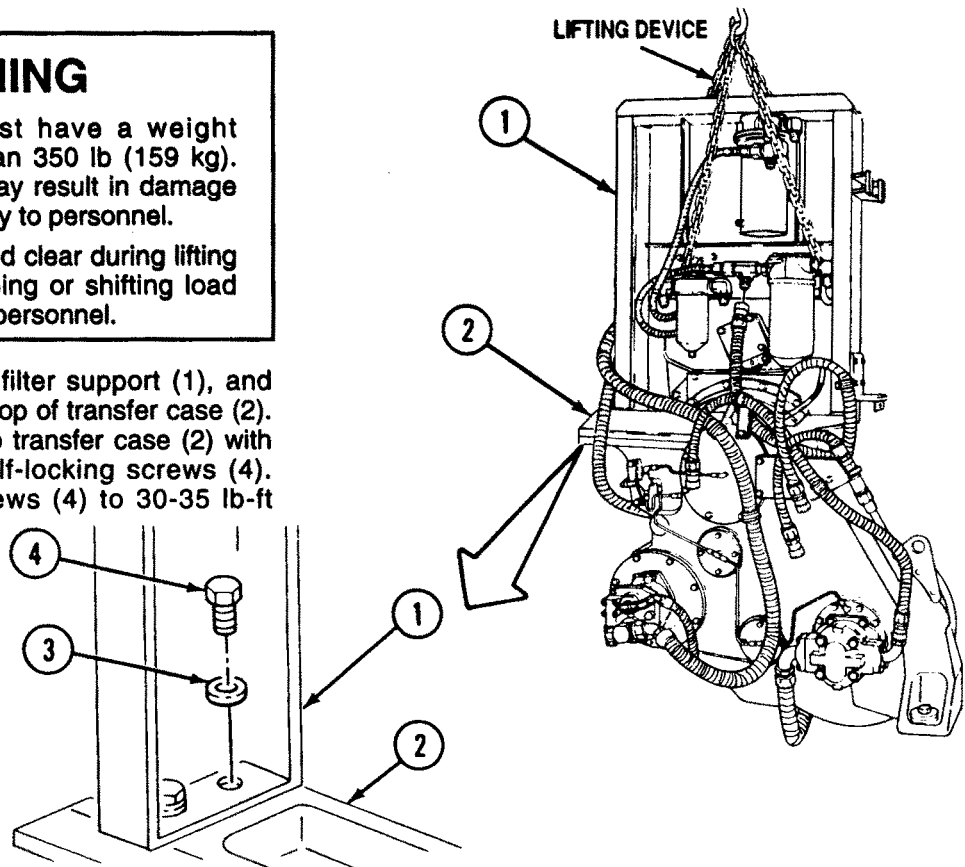


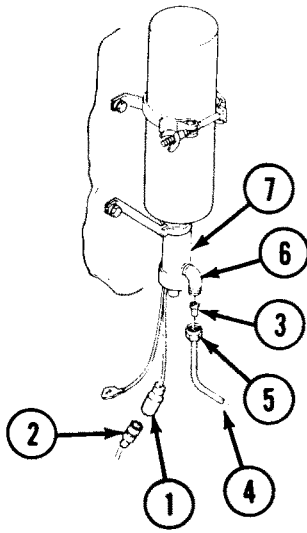
### INSTALLATION

### WARNING

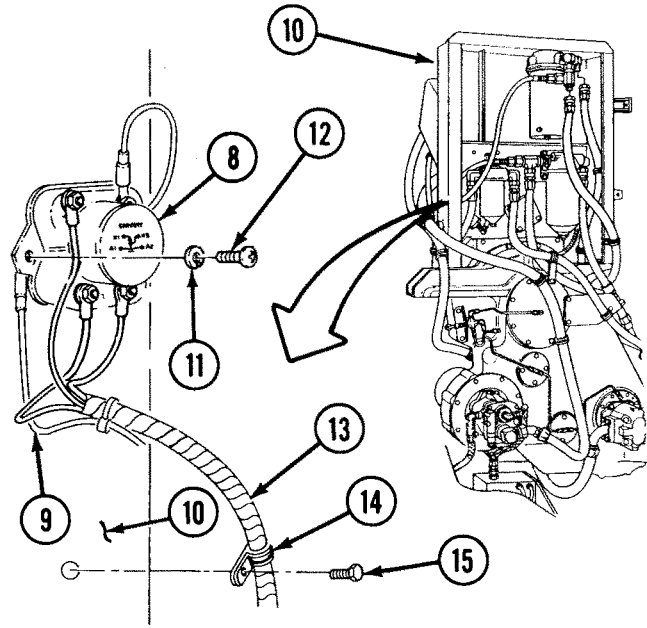
- Lifting device must have a weight capacity greater than 350 lb (159 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- A** Connect lifting device to filter support (1), and place filter support (1) on top of transfer case (2). Secure filter support (1) to transfer case (2) with four washers (3) and self-locking screws (4). Tighten self-locking screws (4) to 30-35 lb-ft (41-47 N-m).

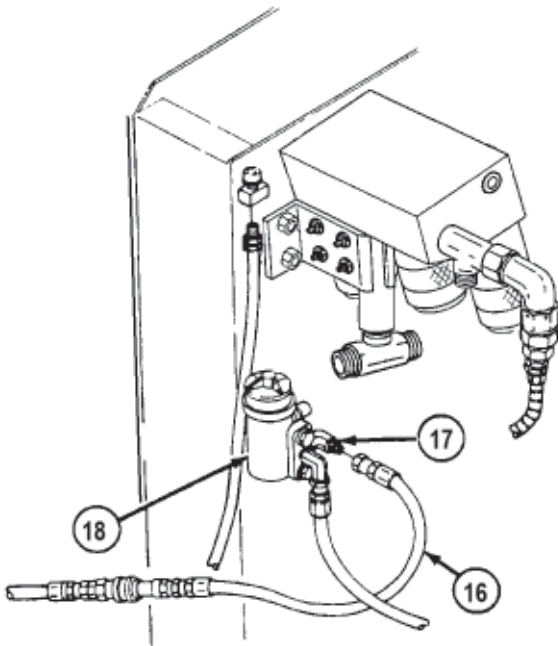




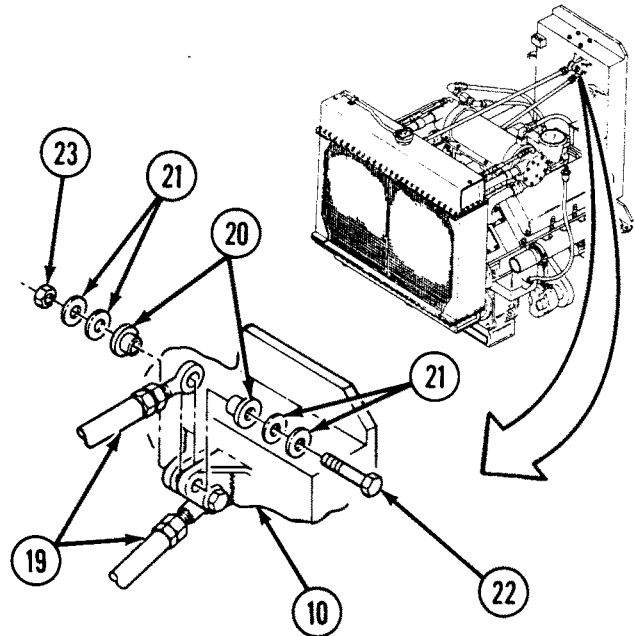
- B** Connect cold start electrical lead (1) to harness (2).
- C** Connect sleeve (3), tube (4), and nut (5) to elbow (6) on cold start valve (7).



- D** Install starter relay (8) and ground lead (9) on filter support (10) with two lockwashers (11) and screws (12).
- E** Secure wiring harness (13) to filter support (10) with clamp (14) and screw (15).

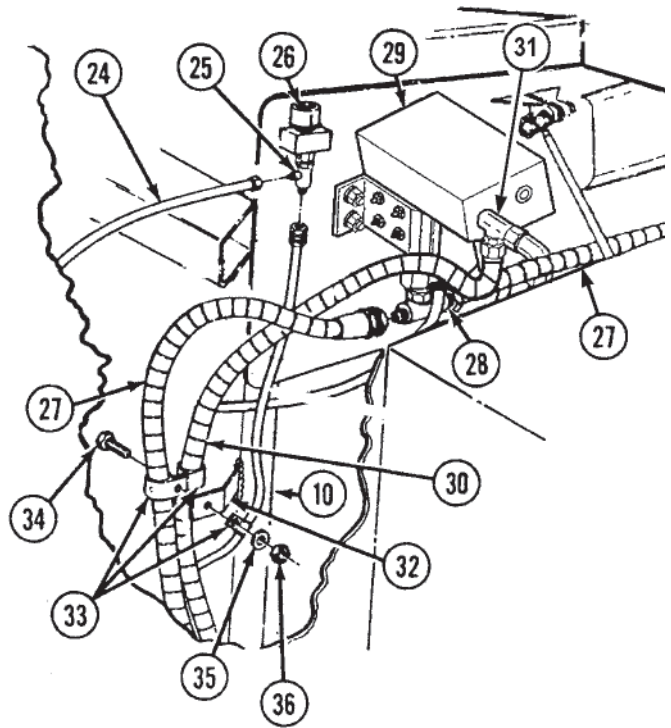


- F** Connect hose (16) to elbow (17) on air compressor governor (18).

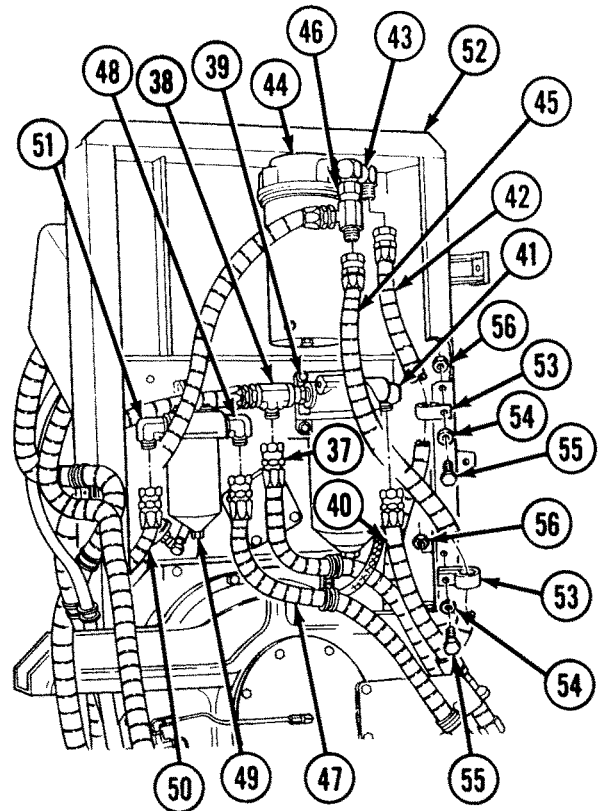


- G** Install two filter support braces (19) on filter support (10) with four bushings (20), eight washers (21), two self-locking screws (22), and nuts (23). Tighten nuts (23) to 30-35 lb-ft (41-47 N-m).

- H** Connect two BREATHER hoses (24) to tee (25) on breather (26).
- I** Connect two HYDR FLTR-OUT TEE-7 hoses (27) to tee (28) on hydraulic oil filter (29).
- J** Connect HYDR FLTR-7 hose (30) to tee (31) on hydraulic oil filter (29).
- K** Secure hoses (30) and (27) from oil cooler and hose (24) (breather) to bracket (32) on filter support (10) with three clamps (33), self-locking screw (34), washer (35), and nut (36). Tighten nut (36) to 30-34 lb-ft (41-46 N•m).



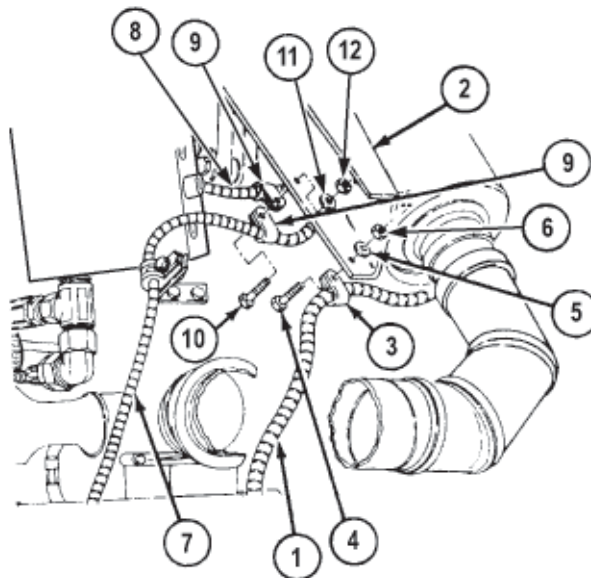
- L** Connect XMSN FLTR-IN-1T hose (37) to tee (38) on inlet side of transmission oil filter (39).
- M** Connect XMSN FLTR-OUT-2T hose (40) to elbow (41) on transmission oil filter (39).
- N** Connect ENG FLTR-OUT-2E engine oil return hose (42) to elbow (43) on outlet side of engine oil filter (44).
- O** Connect ENG FLTR-IN-1E engine oil hose (45) to tee (46) on inlet side of engine oil filter (44).
- P** Connect SCAV FLTR-IN-1P hose (47) to elbow (48) on inlet port of scavenger pump oil filter (49).
- Q** Connect SCAV FLTR-OUT-2S steer unit feed hose (50) to elbow (51) on outlet port of scavenger pump oil filter (49).
- R** Secure hoses (42) and (45) to filter support (52) with two clamps (53), washers (54), self-locking screws (55), and nuts (56). Tighten nuts (56) to 30-34 lb-ft (41-46 N•m).





**S** Secure hose (1) to top of filter support (2) with clamp (3), self-locking screw (4), washer (5), and nut (6).

**T** Secure hoses (7) and (8) to top of filter support (2) with two clamps (9), self-locking screw (10), washer (11), and nut (12).

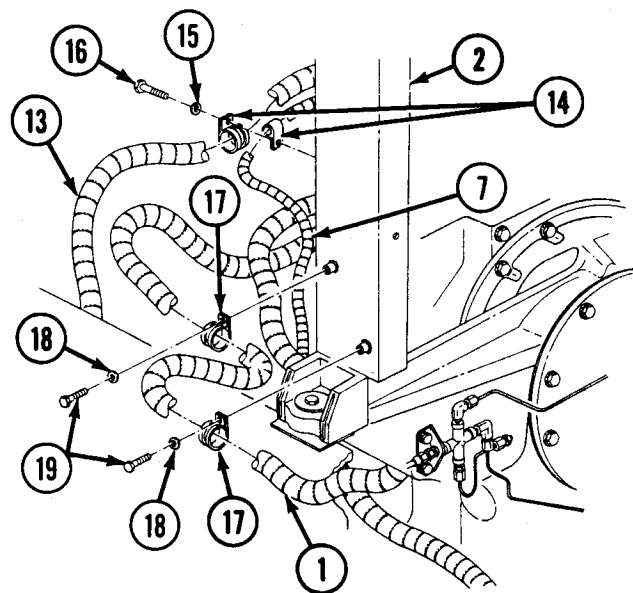


**U** Secure hoses (7) and (13) to rear of filter support (2) with two clamps (14), washer (15), and self-locking screw (16).

**V** Secure hose (1) to side of filter support (2) with two clamps (17), washers (18), and self-locking screws (19). Tighten self-locking screws (4), (10), (16), (19), and nuts (6) and (12) to 22-25 lb-ft (30-34 N.m).

**FOLLOW-ON TASKS:**

- Install cowling (TM 5-2350-262-20-1).
- Install engine intake grilles and covers (TM 5-2350-262-20-1).
- Connect negative battery cables (TM 5-2350-262-20-1).
- Install main hydraulic accumulator (TM 5-2350-262-20-2).
- Install air cleaner assembly (TM 5-2350-262-20-2).

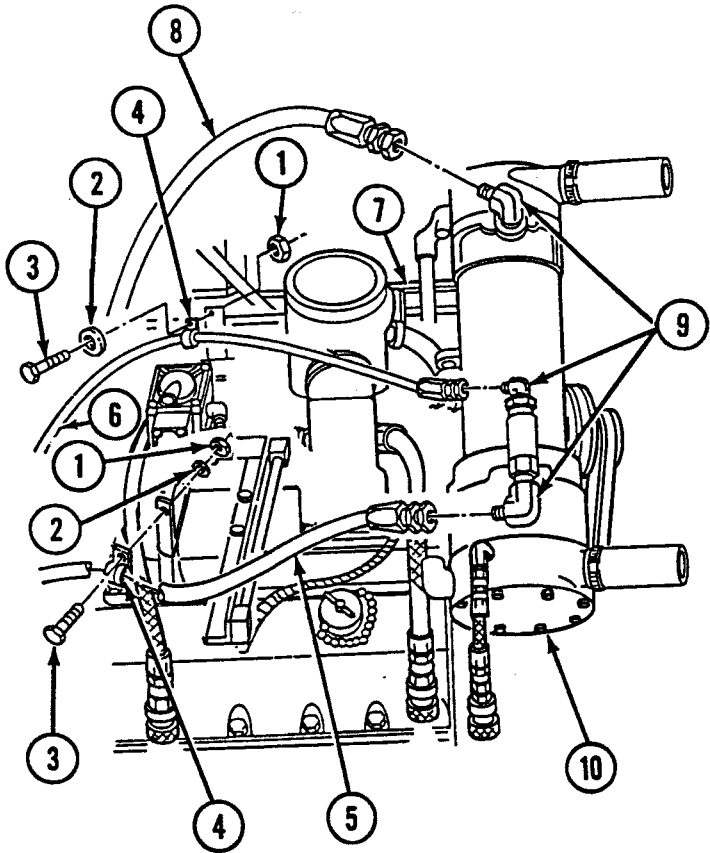




**REMOVAL**

**CAUTION**  
 Cover fittings and hose ends to prevent fluid spillage and contamination. Failure to comply may result in damage to equipment.

- A** Remove two nuts (1), washers (2), self-locking screws (3), and clamps (4) securing hoses (5) and (6) to engine (7). Discard self-locking screws (3).
- B** Disconnect hoses (5), (6), and (8) from elbows (9) on transmission oil cooler (10).

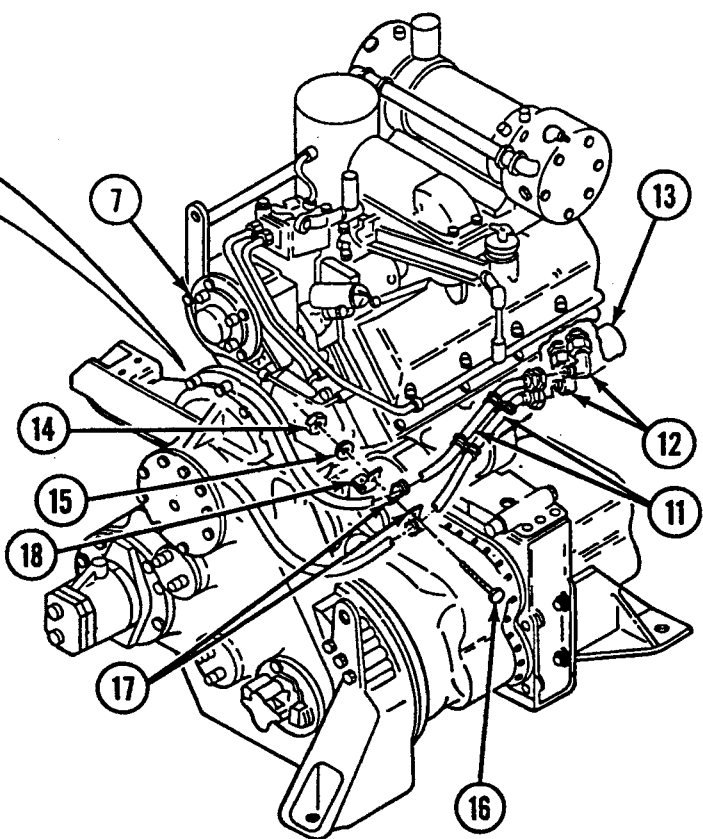


- C** Disconnect two hoses (11) from elbows (12) on engine oil cooler (13).

**Note**

Number and location of clamps may vary.

- D** Remove four nuts (14), washers (15), self-locking screws (16), and six loop clamps (17) securing hoses (11) to engine (7) and two supports (18). Discard self-locking screws (16).
- E** Disconnect engine wiring harness lead 324 (19) from sending unit (20) on transmission (21).



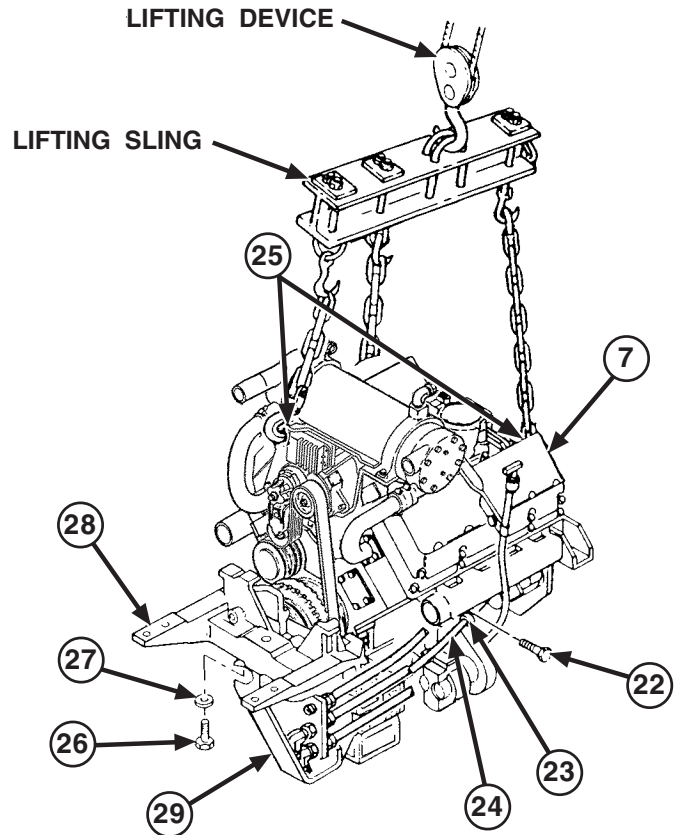


- F** Remove screw (22) securing clamp (23) to engine (7). When hose (24) is free, put screw (22) back in engine (7).

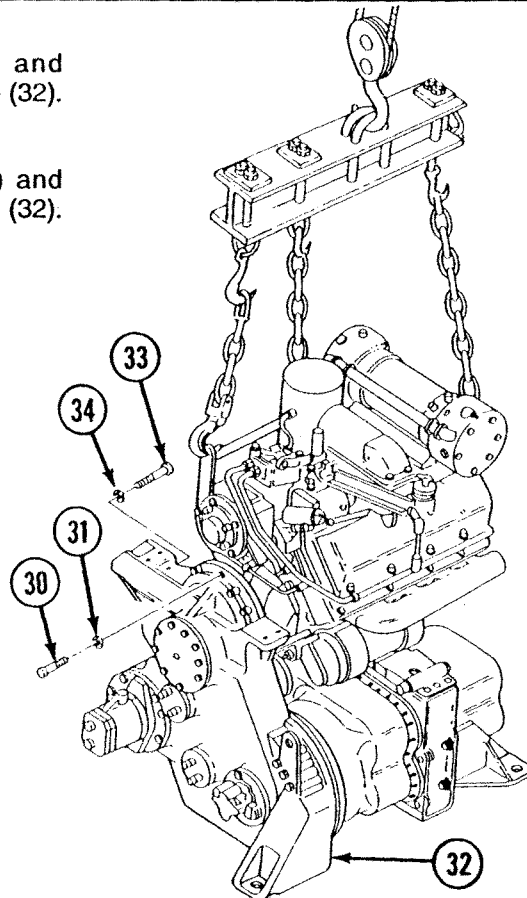
**WARNING**

- Lifting device must have a weight capacity greater than 6,000 lb (2,724 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- G** Connect lifting sling to two lifting eyes (25) on engine (7). Connect lifting device to sling and remove slack from chains.
- H** Remove four self-locking screws (26) and washers (27) securing radiator mounting bracket (28) to engine mounting bracket (29). Discard self-locking screws (26).



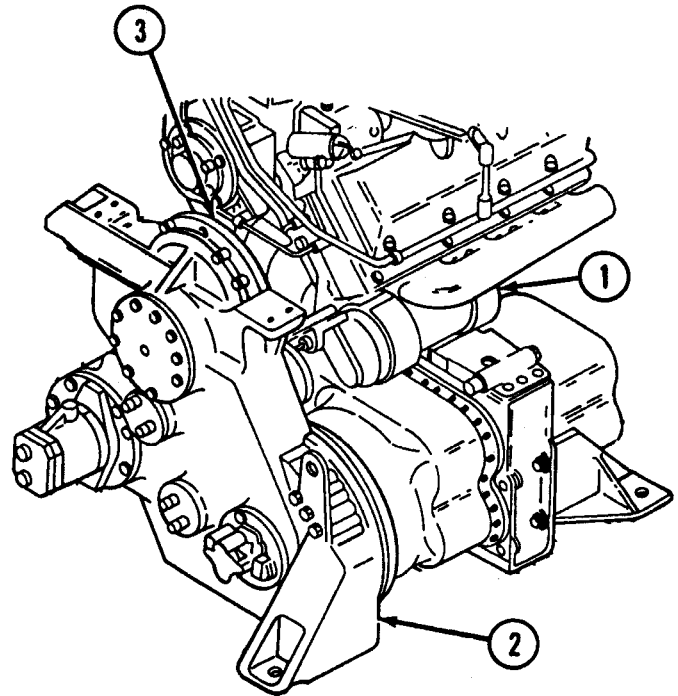
- I** Remove five self-locking screws (30) and washers (31) from front side of transfer case (32). Discard self-locking screws (30).
- J** Remove twelve self-locking screws (33) and washers (34) from rear side of transfer case (32). Discard self-locking screws (33).



## CAUTION

Ensure all hoses are free and do not hang up during lifting of engine. Failure to comply may result in damage to equipment.

- K** Carefully remove engine (1) rearward to separate from transfer case (2) and place engine (1) on suitable supports. Remove lifting device and sling.
- L** Remove and discard gasket (3) from transfer case (2).



### Note

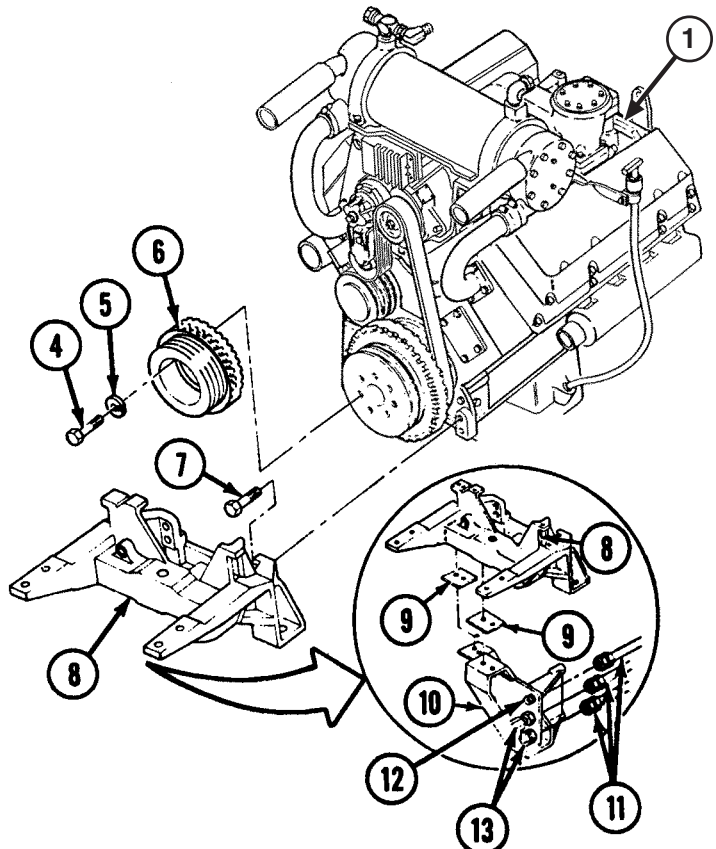
Hold crank to prevent it from turning during sheave removal.

- M** Remove seven screws (4), lockwashers (5), and sheave (6) from engine (1). Discard lockwashers (5).
- N** Remove four screws (7) and radiator mounting bracket (8) from engine (1).

### Note

Retain shims for installation.

- O** Remove shims (9) from between radiator mounting bracket (8) and engine mounting bracket (10).
- P** Remove three hoses (11) from nipple (12) and two elbows (13) on engine mounting bracket (10).

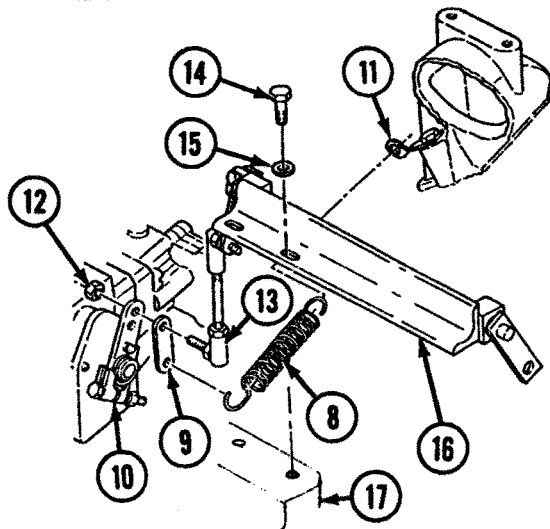
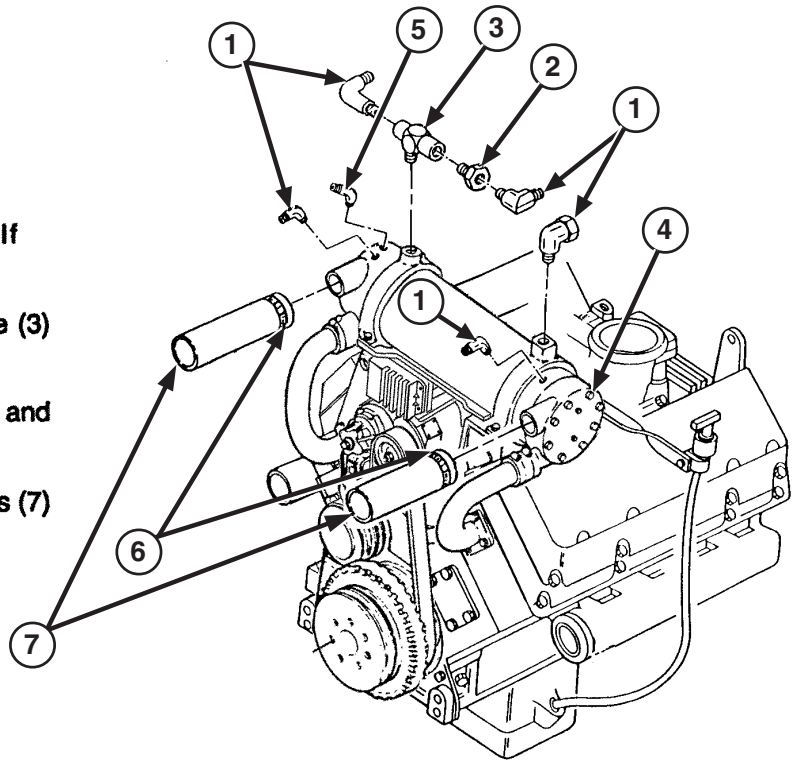


**DISASSEMBLY**

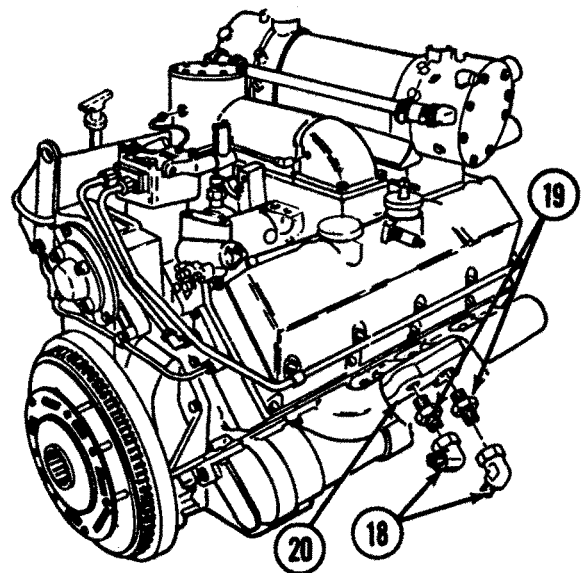
**Note**

If replacing engine, perform step A. If repairing engine, perform step B.

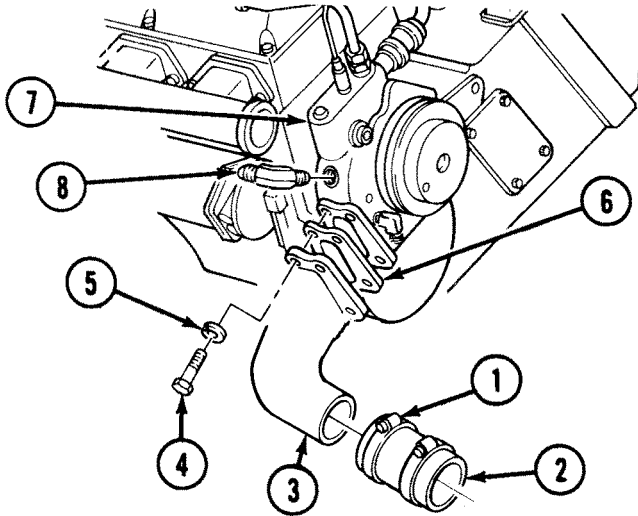
- A** Remove five elbows (1), bushing (2), and tee (3) from transmission oil cooler (4).
- B** Remove five elbows (1), bushing (2), tee (3), and elbow (5) from transmission oil cooler (4).
- C** Loosen two clamps (6) and remove two hoses (7) from transmission oil cooler (4).



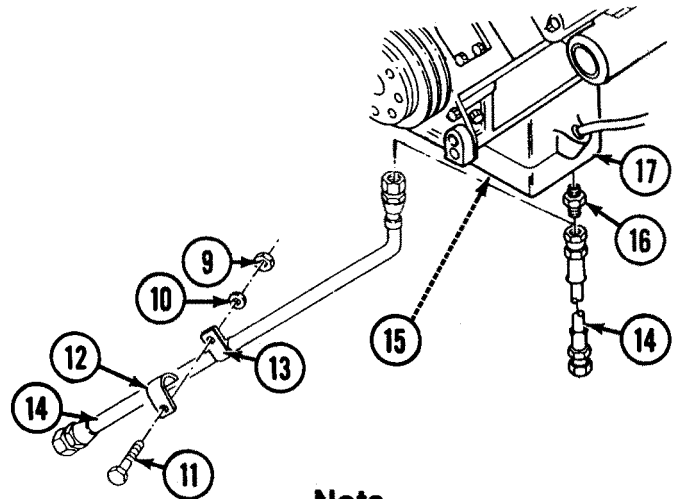
- D** Remove spring (8) from strap (9) on fuel pump throttle lever (10) and link (11).
- E** Remove locknut (12) and strap (9) from ball joint (13). Discard locknut (12).
- F** Remove two self-locking screws (14) and washers (15). Discard self-locking screws (14).
- G** Remove bracket (16) from intake manifold (17), with accelerator and throttle linkage components attached.



- H** Remove two elbows (18) from adapters (19).
- I** Remove two adapters (19) from engine oil cooler (20).



- J** Loosen clamp (1) and remove hose (2) from elbow (3).
- K** Remove two self-locking screws (4), washers (5), elbow (3), and gasket (6) from water pump (7). Discard gasket (6) and self-locking screws (4).
- L** Remove elbow (8) from water pump (7).



**Note**

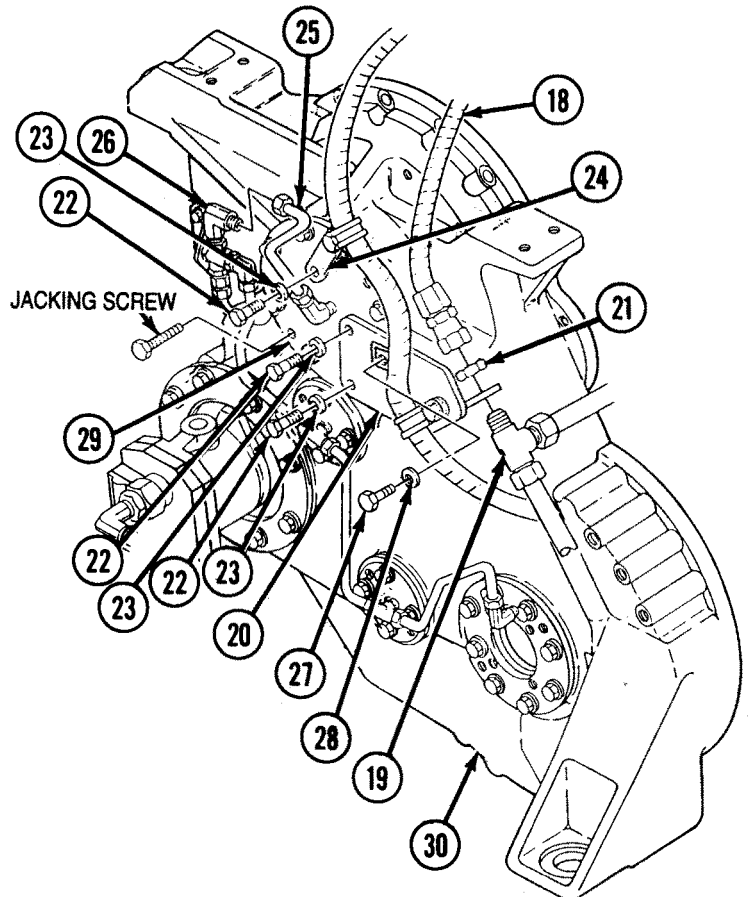
There are two configurations of engine oil drain hoses. Perform step M on vehicles with the new configuration.

- M** Remove nut (9), washer (10), screw (11), hook (12), and clamp (13) securing drain hose (14) to hose (15).
- N** Remove drain hose (14) and adapter (16) from engine oil pan (17).

**Note**

There are different configurations of hose clamps/bracket on transfer case and cap. Note location of hoses and clamps for installation.

- O** Disconnect hose (18) from tee (19) on rear of bracket (20).
- P** Remove nut (21) securing tee (19) to bracket (20).
- Q** Remove three self-locking screws (22) and washers (23) and move brackets (20) and (24) out of the way. Retain two self-locking screws (22) to be used as jacking screws in step T.
- R** Disconnect tube (25) from elbow (26).
- S** Remove five self-locking screws (27) and washers (28) securing cap (29) to transfer case (30). Discard self-locking screws (27).
- T** Install two jacking screws in threaded holes provided in cap (29). Turn screws clockwise to remove cap (29) from transfer case (30). Remove and discard two jacking screws.

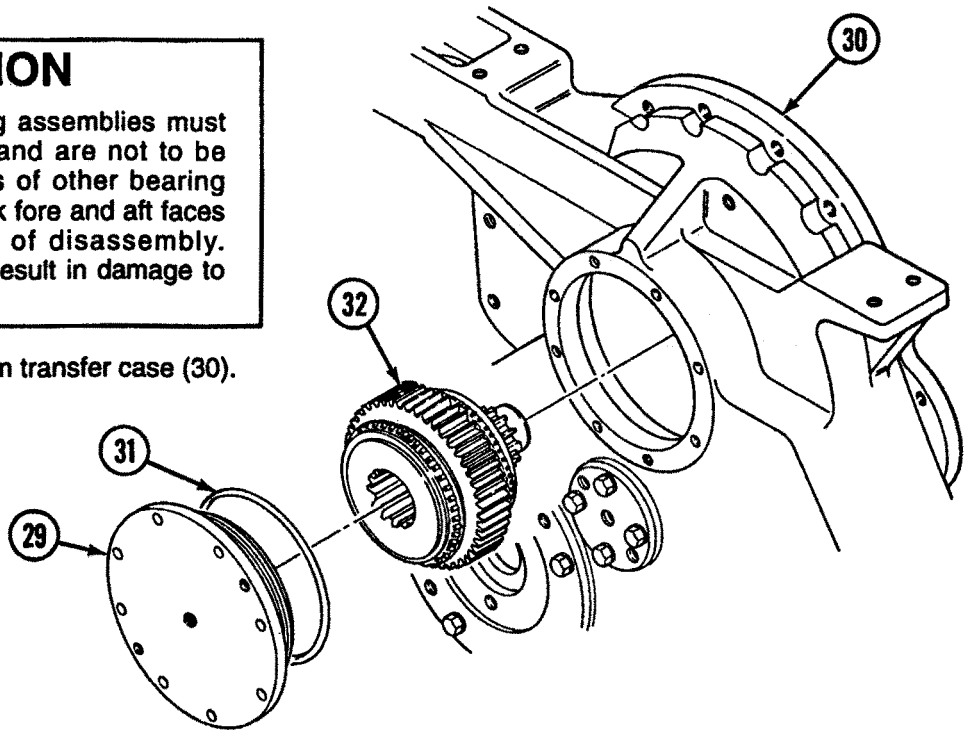


- U Remove packing (31) from cap (29). Discard packing (31).

**CAUTION**

Components of bearing assemblies must always stay together and are not to be used with components of other bearing assemblies. Tag or mark fore and aft faces of input gear at time of disassembly. Failure to comply may result in damage to equipment.

- V Remove input gear (32) from transfer case (30).



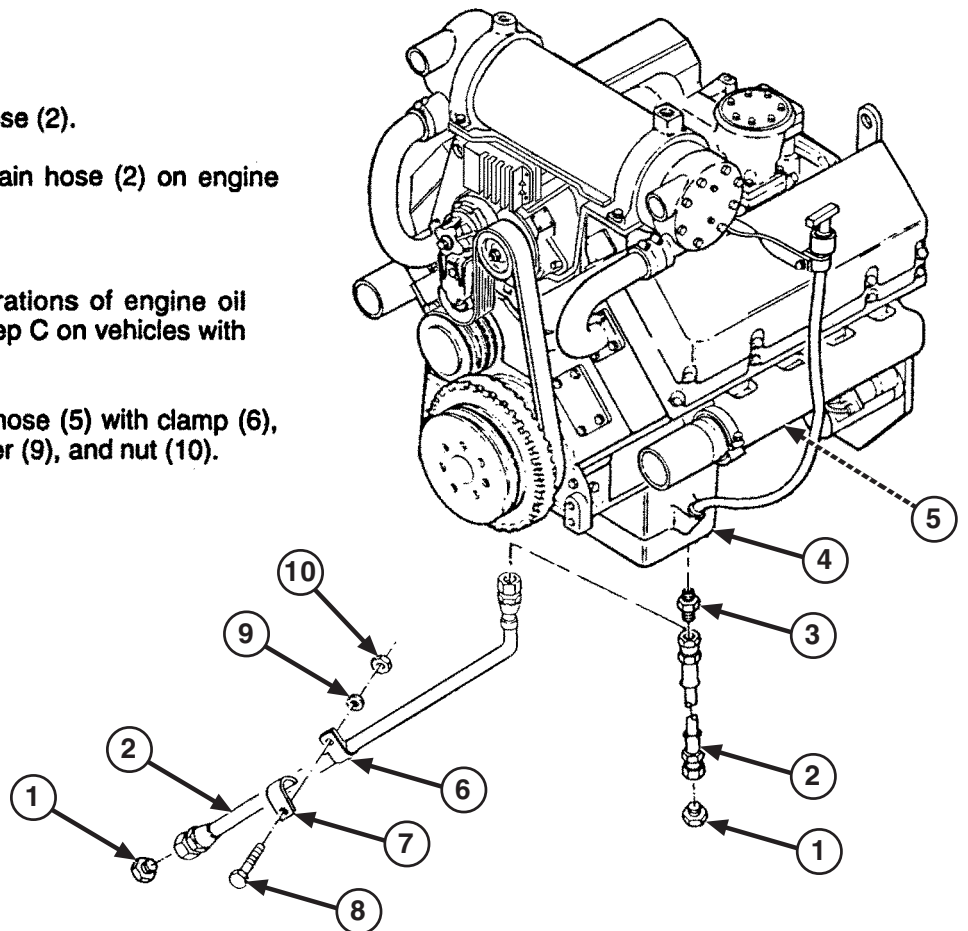
**ASSEMBLY**

- A Install plug (1) on drain hose (2).
- B Install adapter (3) and drain hose (2) on engine oil pan (4).

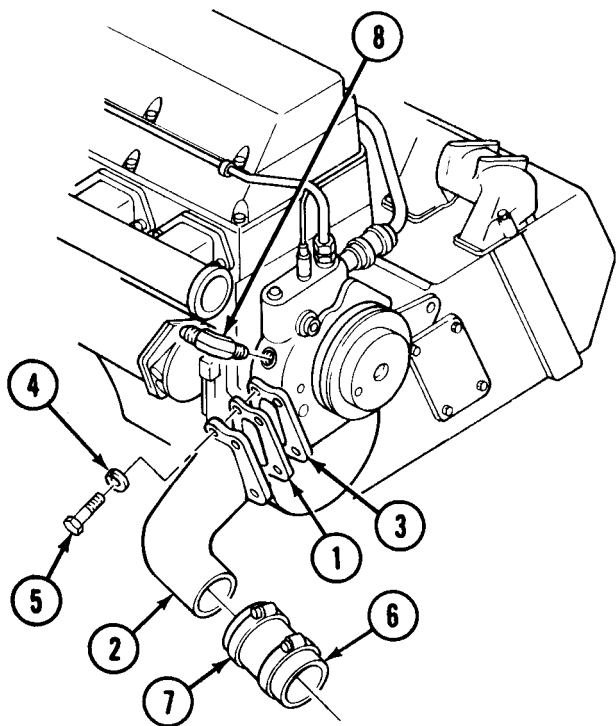
**Note**

There are two configurations of engine oil drain hoses. Perform step C on vehicles with the new configuration.

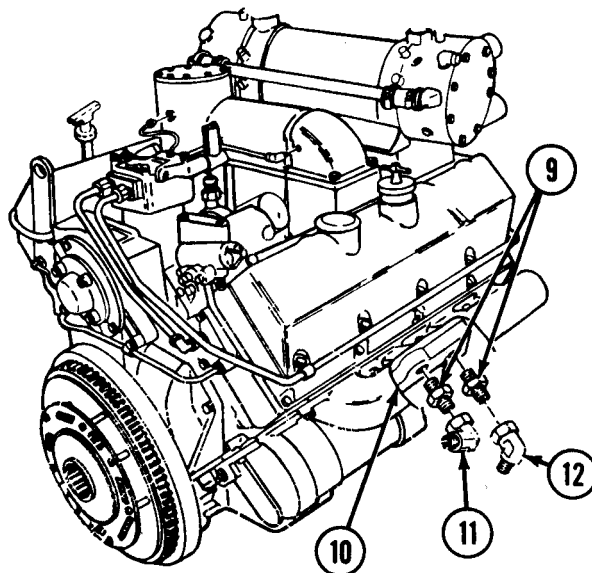
- C Secure drain hose (2) to hose (5) with clamp (6), hook (7), screw (8), washer (9), and nut (10).





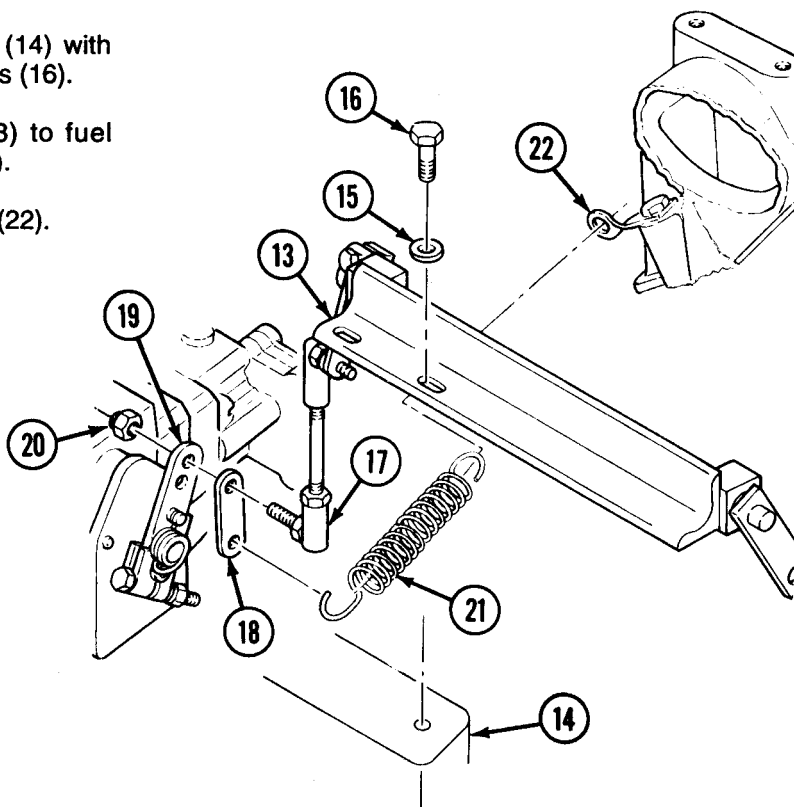


- D** Install gasket (1) and elbow (2) on flange of water pump (3) with two washers (4) and self-locking screws (5).
- E** Install hose (6) on elbow (2) with clamp (7).
- F** Install elbow (8) on water pump (3).



- G** Install two adapters (9) on engine oil cooler (10).
- H** Install 45° elbow (11) and 90° elbow (12) on two adapters (9).

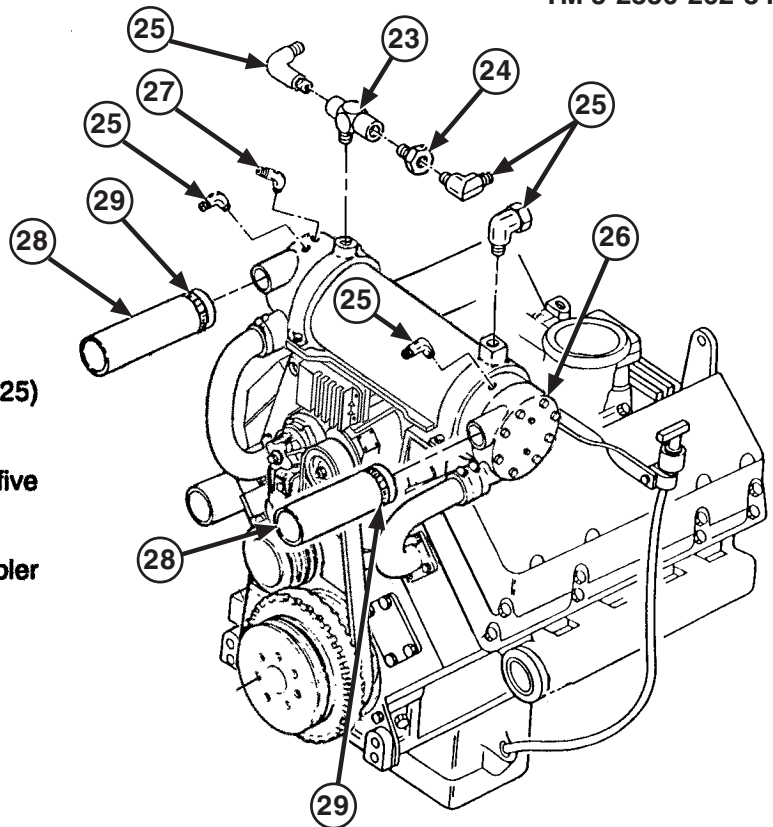
- I** Install bracket (13) on intake manifold (14) with two washers (15) and self-locking screws (16).
- J** Connect ball joint (17) and strap (18) to fuel pump throttle lever (19) with locknut (20).
- K** Install spring (21) on strap (18) and link (22).



**Note**

- If replacing engine, perform step L. If repairing engine, perform step M.
- Coat threads of elbows and bushing with sealing compound prior to installation.

- L** Install tee (23), bushing (24), and five elbows (25) on transmission oil cooler (26).
- M** Install tee (23), bushing (24), elbow (27), and five elbows (25) on transmission oil cooler (26).
- N** Install two hoses (28) on transmission oil cooler (26) with two clamps (29).



**INSTALLATION**

**CAUTION**

Do not apply sealing compound to first threads of fittings. Failure to comply may result in damage to equipment.

- A** Install amount of shims (1) required to close areas between radiator mounting bracket (2) and engine mounting bracket (3).

**Note**

Coat threads of screws with sealing compound prior to installation.

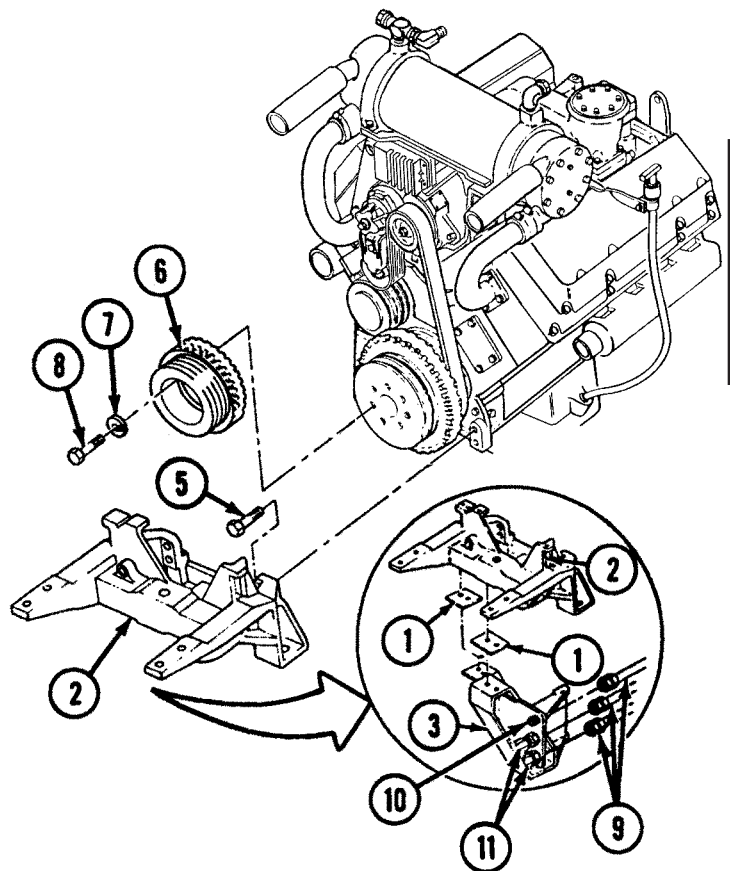
- B** Install radiator mounting bracket (2) on engine (4) with four screws (5). Tighten screws (5) to 300-315 lb-ft (407-427 N-m).

**Note**

Hold crank to prevent from turning during sheave installation.

- C** Install sheave (6) on engine (4) with seven lock-washers (7) and screws (8). Tighten screws (8) to 200-205 lb-ft (271-278 N-m).

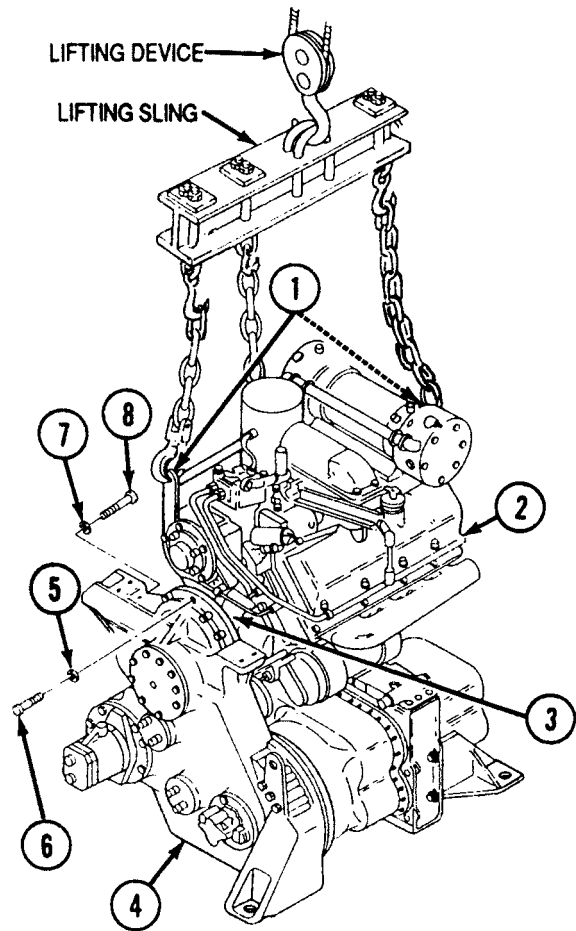
- D** Connect three hoses (9) on nipple (10) and two elbows (11) on engine mounting bracket (3).



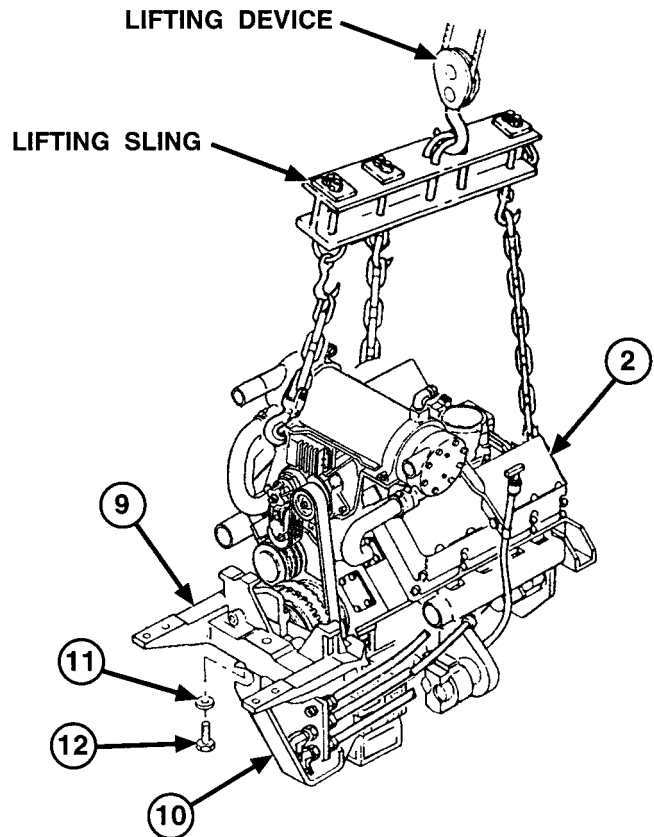
## WARNING

- Lifting device must have a weight capacity greater than 6,000 lb (2,724 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- E** Connect lifting sling to two lifting eyes (1) on engine (2). Connect lifting device to sling and lift engine (2).
- F** Install gasket (3) on engine (2).
- G** Move engine (2) forward into transfer case (4) and secure with five washers (5) and self-locking screws (6). Tighten self-locking screws (6) to 45-50 lb-ft (61-68 N-m).
- H** From rear of transfer case (4), install twelve washers (7) and self-locking screws (8) on engine (2) and transfer case (4). Tighten self-locking screws (8) to 45-50 lb-ft (61-68 N-m).



- I** Secure radiator mounting bracket (9) to engine mounting bracket (10) with four washers (11) and self-locking screws (12). Tighten self-locking screws (12) to 190-200 lb-ft (258-271 N-m).
- J** Remove lifting device and lifting sling from engine (2).





- K** Install input gear (13) on transfer case (14) over splined shaft of engine (2). Ensure face of input gear (13) marked "FORE" is facing out.

**Note**

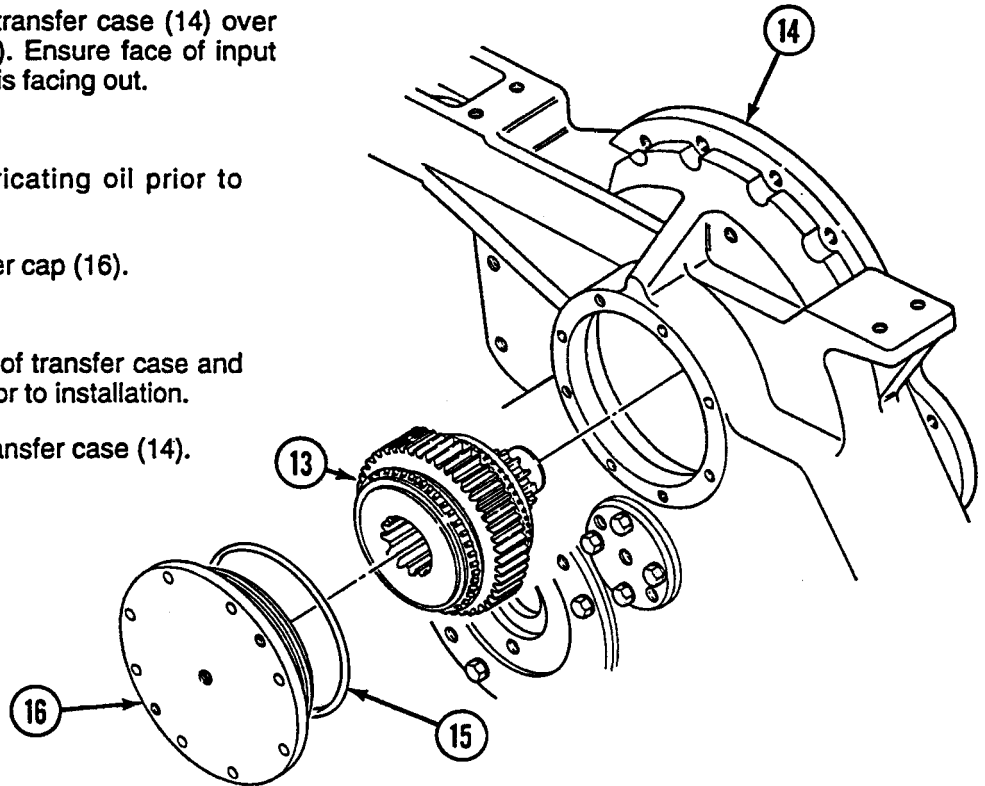
Coat packing with lubricating oil prior to installation.

- L** Install packing (15) on outer cap (16).

**Note**

Coat all mating surfaces of transfer case and outer cap with grease prior to installation.

- M** Install outer cap (16) on transfer case (14).



**Note**

- There are different configurations of hose clamps/bracket on transfer case and cap. Install in same location as noted during removal.
- Coat threads and bearing surfaces of self-locking screws with lubricating oil prior to installation.

- N** Install brackets (17) and (18) and two clamps (19) on outer cap (16) and transfer case (14) with three washers (20) and self-locking screws (21).

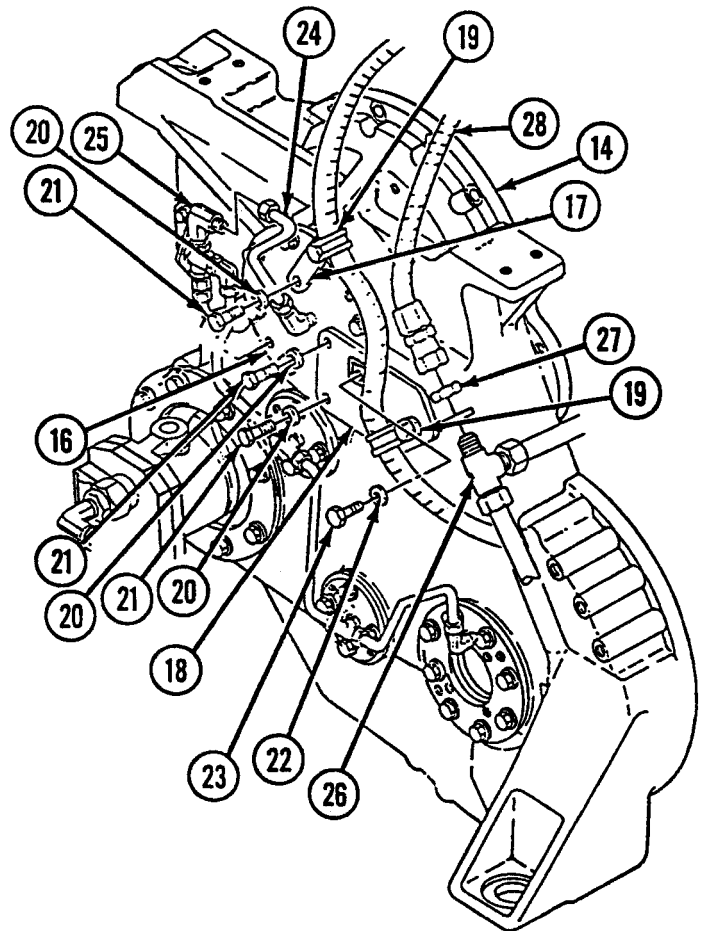
- O** Secure outer cap (16) with five washers (22) and self-locking screws (23).

- P** Tighten three self-locking screws (21) and five self-locking screws (23) to 58-62 lb-ft (79-84 N-m).

- Q** Install tube (24) on elbow (25).

- R** Connect tee (26) to bracket (18) with nut (27).

- S** Connect BHD TEE 1S/2T hose (28) to tee (26).



**T** Connect ENG 45° ELB-2E hose (1) to 45° elbow (2) on engine oil cooler (3).

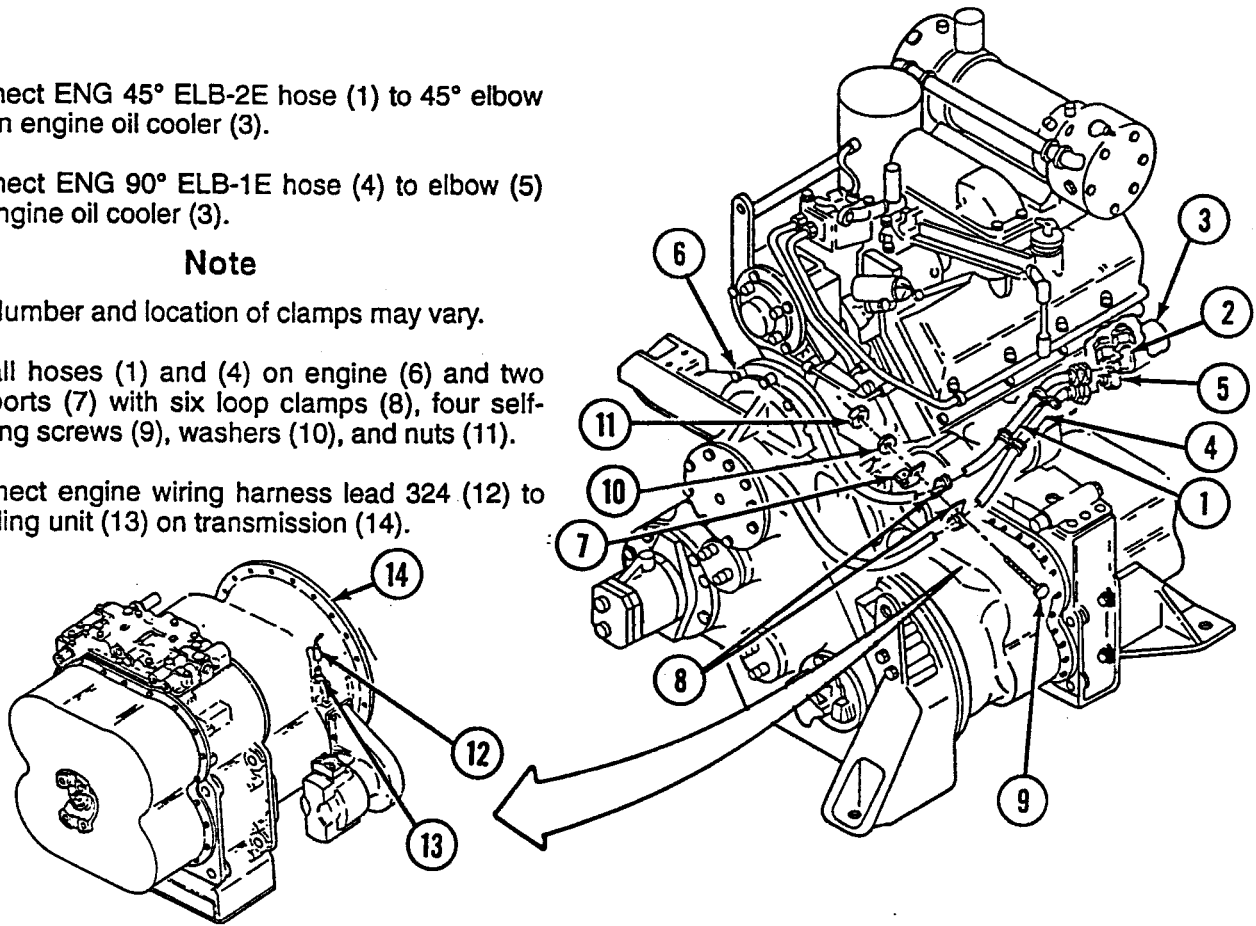
**U** Connect ENG 90° ELB-1E hose (4) to elbow (5) on engine oil cooler (3).

**Note**

Number and location of clamps may vary.

**V** Install hoses (1) and (4) on engine (6) and two supports (7) with six loop clamps (8), four self-locking screws (9), washers (10), and nuts (11).

**W** Connect engine wiring harness lead 324 (12) to sending unit (13) on transmission (14).



**X** Connect RH OIL CLR-2C hose (15) to elbow (16) on transmission oil cooler (17).

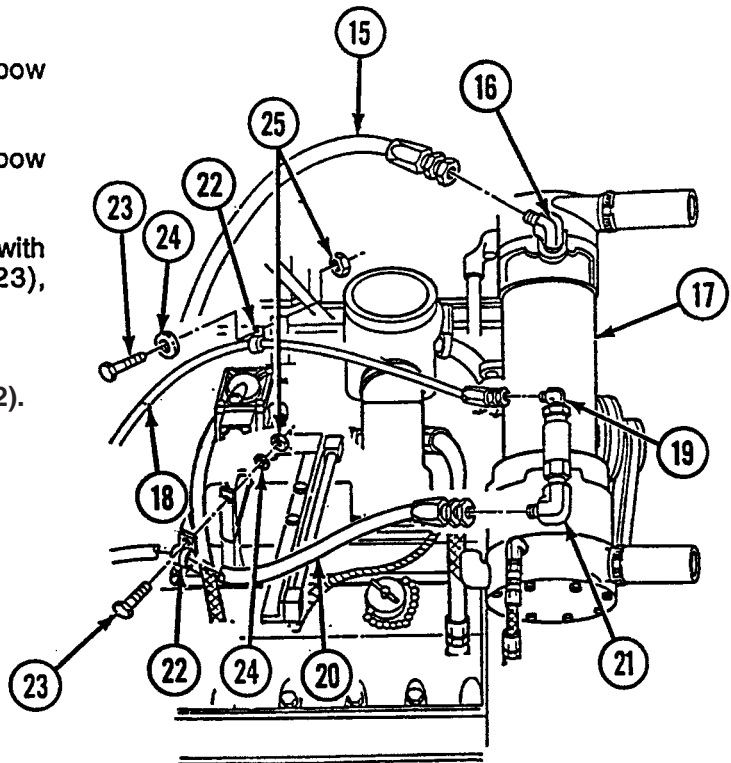
**Y** Connect LH OIL CLR-3C hose (18) to elbow (19) on transmission oil cooler (17).

**Z** Connect LH OIL CLR-1C hose (20) to elbow (21) on transmission oil cooler (17).

**AA** Secure hoses (18) and (20) to engine (6) with two clamps (22), self-locking screws (23), washers (24), and nuts (25).

**FOLLOW-ON TASKS:**

- Install starter motor (TM 5-2350-262-20-2).
- Install filter support (p 4-139).
- Install power package (p 4-122).
- Service engine oil (TM 5-2350-262-10).



# ENGINE IDLE SPEED ADJUSTMENT

This task covers:

Adjustment

## INITIAL SETUP

Tools:

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

Special Tools:

Adjusting Tool                      4910-00-150-5805

Parts:

Locknut

Parts Reference:

TM 5-2350-262-24P    Group AA

TM 5-2815-240-34&P    Group AUA2

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

TM 5-2350-262-10

Equipment Condition:

Reference

TM 5-2350-262-10

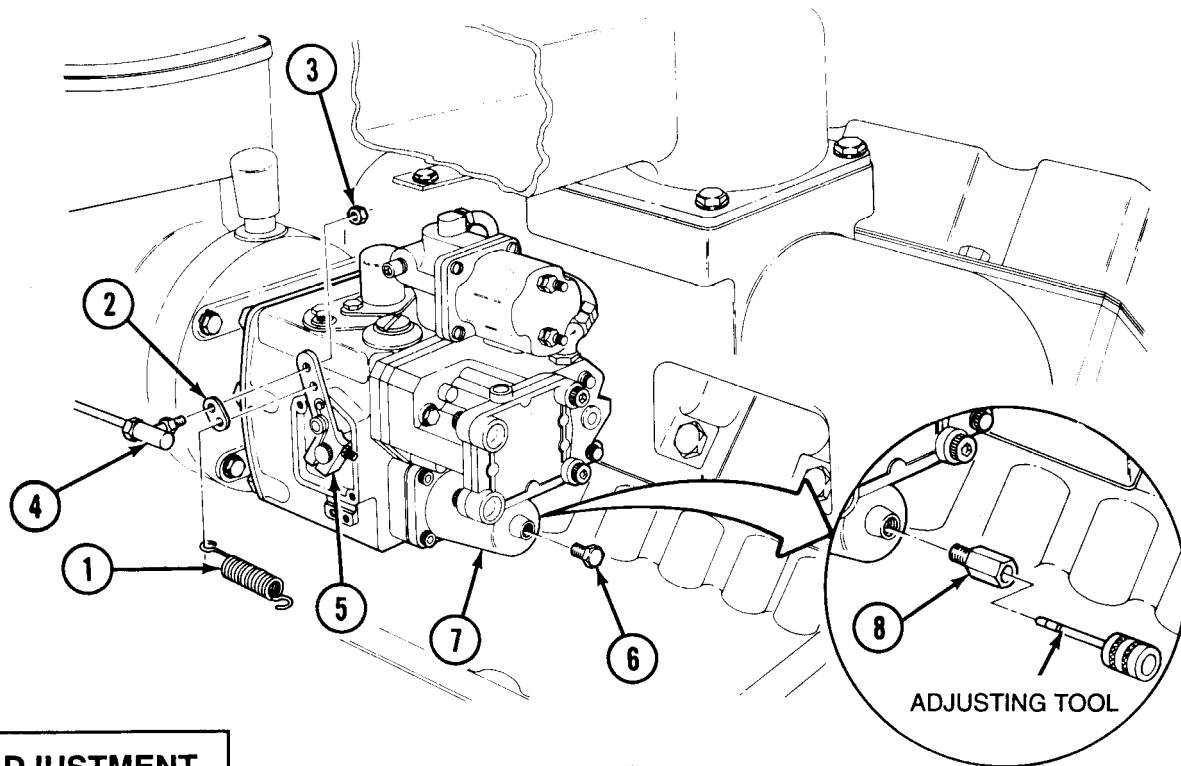
Condition Description

Engine Intake Grilles and Covers Opened

General Safety Instructions:

### WARNING

- Keep hands and arms away from fan blade and drivebelts while engine is running.
- Fuel is a combustible material. Do not smoke or allow open flames or sparks in areas where fuel is present.
- Keep hands and arms away from 200-ampere alternator impeller fan while engine is running.



**ADJUSTMENT**

**Note**

- Ensure timing, valves, and injectors are adjusted.
- Idle speed adjustment should not be made on a cold engine.

- A** Start engine (TM 5-2350-262-10) and bring engine to operating temperature.
- B** Stop engine (TM 5-2350-262-10).
- C** Remove return spring (1) from strap (2). Remove locknut (3) and strap (2) from ball joint (4) and disconnect ball joint (4). Discard locknut (3). Connect return spring (1) through top hole in fuel pump throttle lever (5).

**WARNING**

Fuel is a combustible material. Do not smoke or allow open flames or sparks in areas where fuel is present. Failure to comply may result in severe injury or death.

- D** Remove plug (6) from cover (7).
- E** Install adapter (8) on cover (7). Insert adjusting tool in adapter (8).

**WARNING**

- Keep hands and arms away from fan blade and drivebelts while engine is running, or serious injury may result.
- Keep hands and arms away from 200-ampere alternator impeller fan while engine is running. Failure to comply may result in severe injury.

- F** Start engine (TM 5-2350-262-10).
- G** Set engine idle speed to 750-850 rpm by turning adjusting tool clockwise to increase rpm or counterclockwise to decrease rpm.
- H** Stop engine (TM 5-2350-262-10).
- I** Remove adjusting tool and adapter (8) from cover (7).
- J** Install plug (6) on cover (7).
- K** Remove spring (1) from top hole in lever (5).
- L** Connect ball joint (4) and strap (2) to lever (5) with locknut (3). Connect return spring (1) to strap (2).

**FOLLOW-ON TASK:**  
Close engine intake grilles and covers (TM 5-2350-262-10).

# FAN ASSEMBLY REPAIR

This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Repair
- e. Assembly

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Fabricated Tools:

Socket (figure E-2)      **Appendix E**

Socket (figure E-3)      **Appendix E**

Materials:

Grease      **Item 21  
Appendix C**

Lubricating Oil      **Item 32  
Appendix C**

Primer Coating      **Item 36  
Appendix C**

Wire, Non-electric      **Item 42  
Appendix C**

Parts Reference:

TM 5-2350-262-24P      Group AU

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

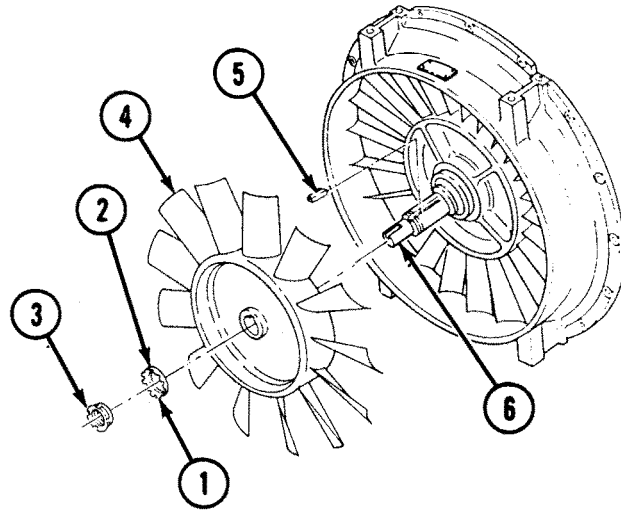
TM 5-2350-262-20-2

TM 9-214

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Cooling System Fan Assembly and Shroud Removed
TM 5-2350-262-20-2	Fan Pulley Removed

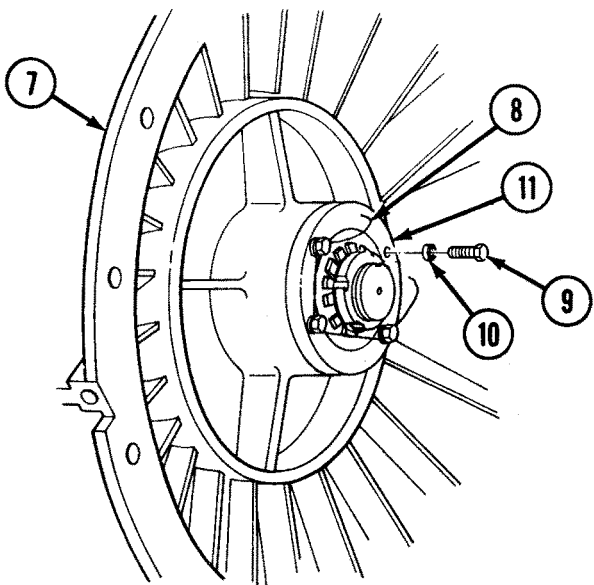
**DISASSEMBLY**



**Note**

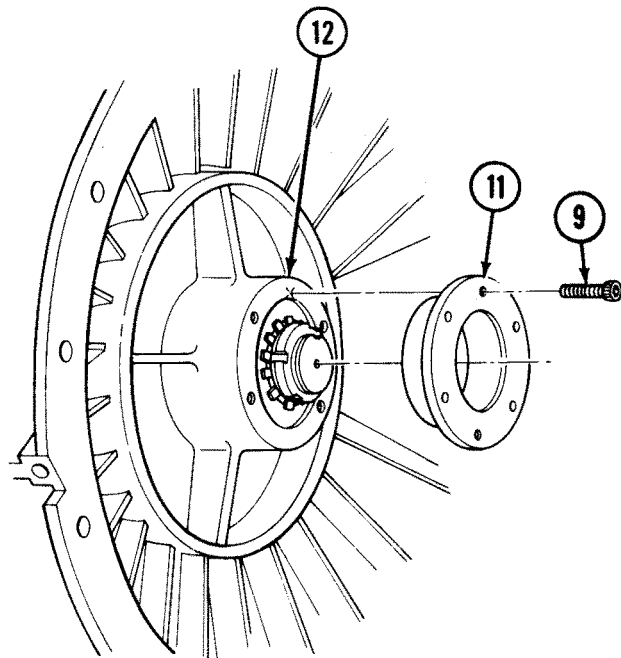
- See p E-3 for instructions to fabricate socket for impeller locking nut removal.
- Block impeller with wooden dowel while removing nut.

**A** Straighten tabs (1) of key washer (2). Using fabricated socket, remove nut (3), washer (2), impeller (4), and key (5) from fan shaft (6).

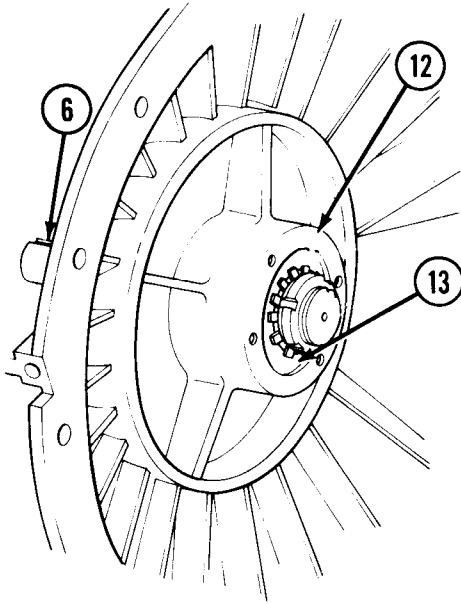


**B** Turn fan assembly (7) over and remove lockwire (8) from four screws (9). Discard lockwire (8).

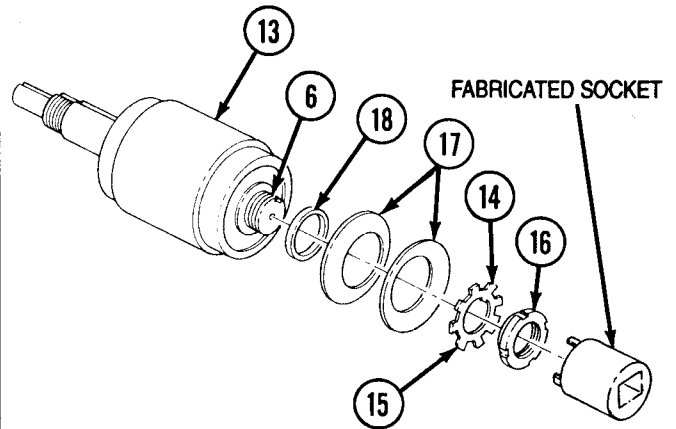
**C** Remove four screws (9) and washers (10) from bearing retainer (11).



**D** Install two screws (9) on threaded jacking holes of bearing retainer (11), and back bearing retainer (11) off housing (12). Remove two screws (9) from bearing retainer (11).



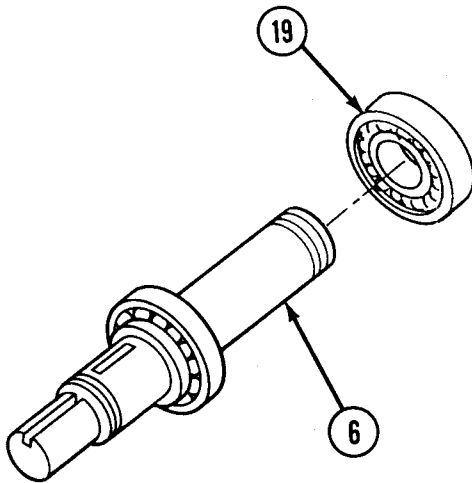
**E** Using soft hammer, tap lightly on end of fan shaft (6) until bearing carrier assembly (13) is out of housing (12).



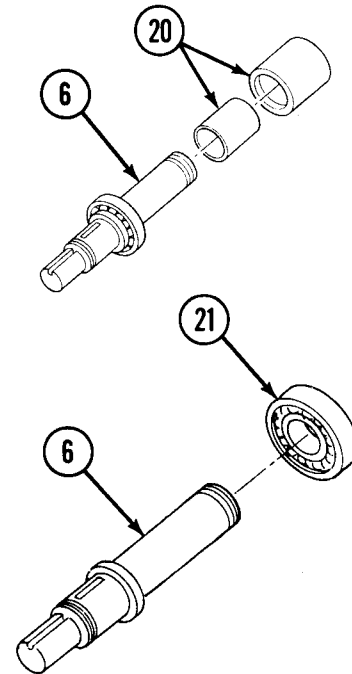
**Note**

See p E-4 for instructions to fabricate socket for bearing locking nut removal.

**F** Straighten tabs (14) on key washer (15). Using fabricated socket, remove nut (16), key washer (15), two spring washers (17), and sleeve bearing (18) from bearing carrier assembly (13) and shaft (6).



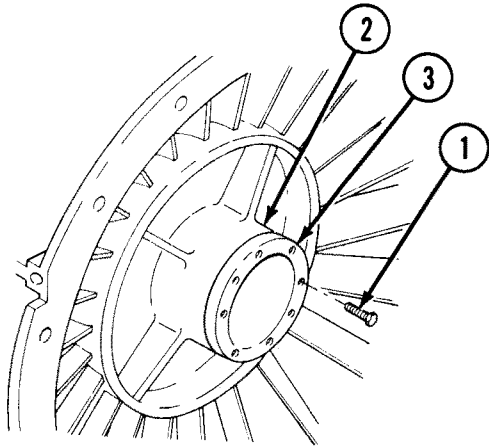
**G** Using puller, remove bearing (19) from shaft (6).



**H** Remove two spacers (20) from shaft (6).

**I** Using puller, remove bearing (21) from shaft (6).





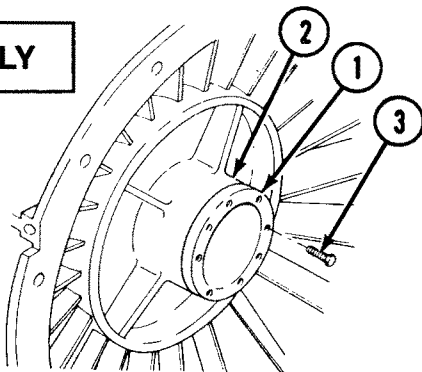
**J** Remove four screws (1) from housing (2).

**CAUTION**

Do not remove bearing gland unless inspection shows damage. Failure to comply may result in damage to equipment.

**K** Tap bearing gland (3) to loosen it and remove bearing gland (3) from housing (2).

**ASSEMBLY**



**Note**

Perform step A if bearing gland was removed.

**CAUTION**

Tighten all bearing gland mounting screws while primer is still wet. Failure to comply may result in damage to equipment.

**A** Apply coating of primer to outer diameter of bearing gland (1), and install bearing gland (1) on housing (2) with four screws (3).

**CLEANING**

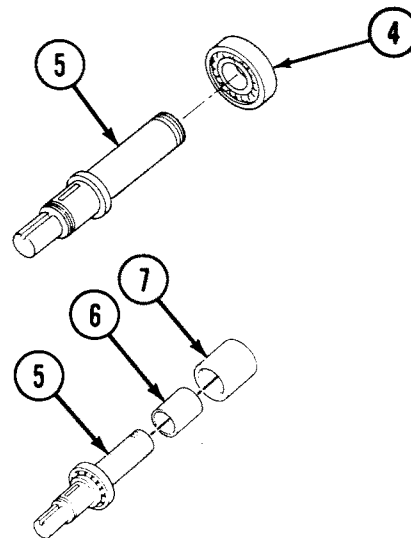
- A** Use general cleaning methods to clean all parts (p 2-9).
- B** Ensure all primer is removed from bearing gland (3).

**INSPECTION**

- A** Inspect all parts for breaks, cracks, dents, rust, and corrosion.
- B** Inspect for stripped or crossed threads.
- C** Inspect bearings in accordance with TM 9-214.

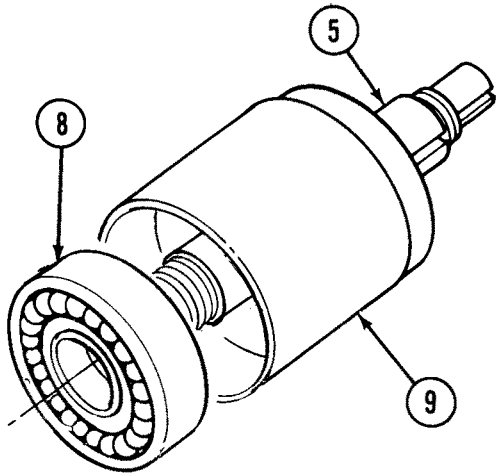
**REPAIR**

- A** Use general repair methods to repair damaged parts (p 2-8).
- B** Replace broken or unserviceable parts.

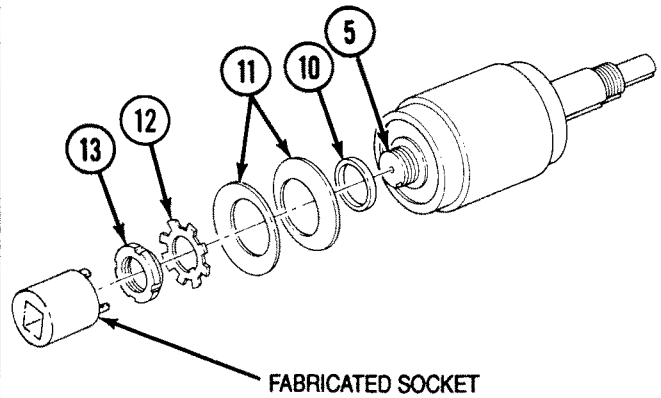


- B** If bearing (4) is not sealed, pack bearing (4) with grease.
- C** Install bearing (4) on shaft (5). If bearing (4) cannot be tapped on shaft (5), lubricate shaft (5) with oil. If fit between bearing (4) and shaft (5) is too tight, use arbor press.
- D** Install spacers (6) and (7) on shaft (5).



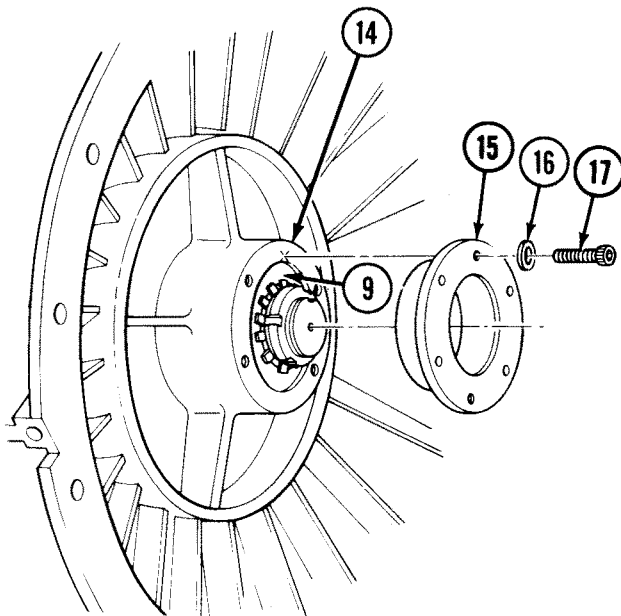


- E** If bearing (8) is not sealed, pack bearing (8) with grease.
- F** Install bearing (8) on shaft (5). Seat bearing (8) fully against bearing carrier assembly (9). Use arbor press if necessary.

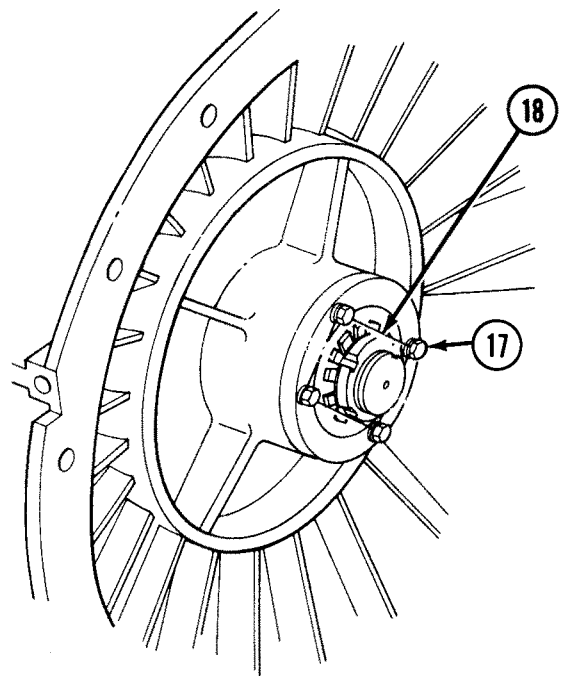


**Note**

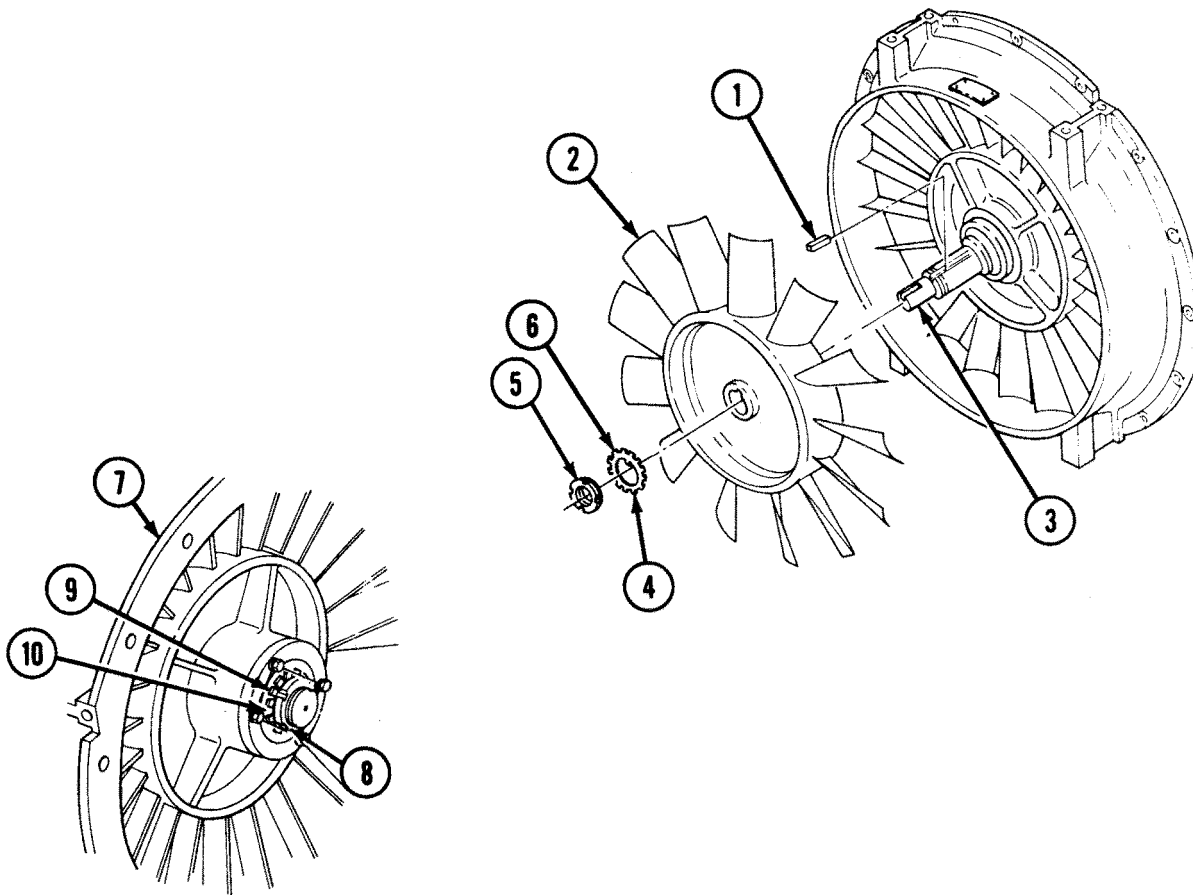
- Use fabricated tool to install nut finger-tight.
  - Ensure tapered end of inner diameters of spring washers are facing each other.
- G** Install sleeve bearing (10), two spring washers (11), key washer (12), and nut (13) on shaft (5). Do not tighten nut (13).



- H** Install bearing carrier assembly (9) on housing (14).
- I** Align screw holes in bearing retainer (15) with holes in housing (14). Using soft hammer, install bearing retainer (15) on housing (14) and secure with four washers (16) and screws (17).



- J** Secure four screws (17) with lockwire (18).



### CAUTION

For proper air flow, fan blades must be angled as shown. Failure to comply may result in damage to equipment.

#### Note

Block impeller with wooden dowel while tightening nut.

- K** Install key (1) and impeller (2) on shaft (3) and secure with key washer (4) and nut (5). Using fabricated socket, tighten nut (5) to 90-100 lb-ft (122-136 N·m). Bend one tab (6) of key washer (4) into groove on nut (5).

### CAUTION

After tightening nuts, make sure shaft rotates freely in housing. Failure to comply may result in damage to equipment.

#### Note

Block impeller with wooden dowel while tightening nut.

- L** Turn fan assembly (7) over. Using fabricated socket, tighten nut (8) to 150-180 lb-ft (203-244 N·m).
- M** Secure nut (8) by bending one locktab (9) of key washer (10) into groove on nut (8).

#### FOLLOW-ON TASK:

Install cooling system fan assembly and shroud (TM 5-2350-262-20-2).

# TRANSFER CASE OUTPUT CAP REPLACEMENT

This task covers:

- |                |                 |
|----------------|-----------------|
| a. Removal     | d. Inspection   |
| b. Disassembly | e. Assembly     |
| c. Cleaning    | f. Installation |

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Fabricated Tools:

Bearing Driver                      Appendix E

Materials:

Grease                                      Item 21  
Appendix C

Lubricating Oil                      Item 31  
Appendix C

Drycleaning Solvent                      Item 39  
Appendix C

Parts:

Packing

Self-locking Screw (8)

Parts Reference:

TM 5-2350-262-24P    Group AU

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-2

TM 9-214

Troubleshooting Reference:

Page 3-42                      Transmission Malfunctions

Page 3-42                      Transfer Case Malfunctions

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Scavenger Pump Removed

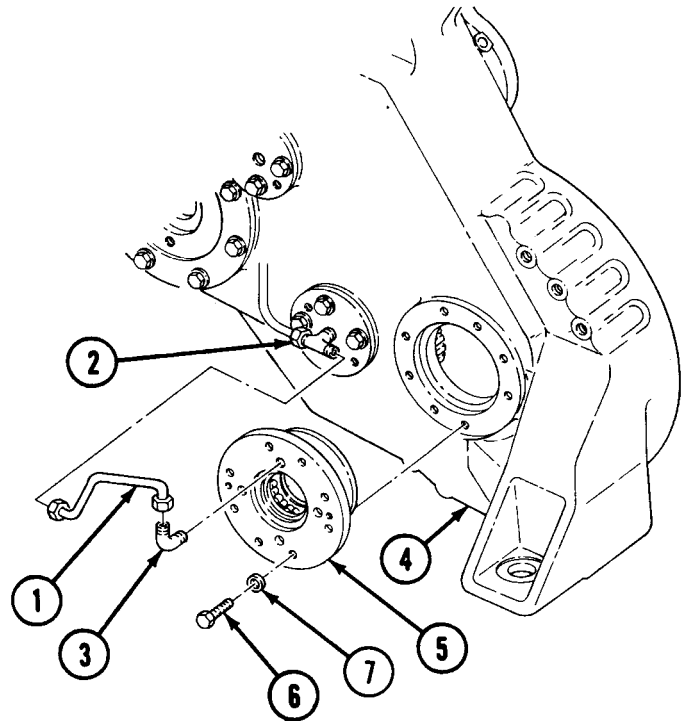
General Safety Instructions:

### WARNING

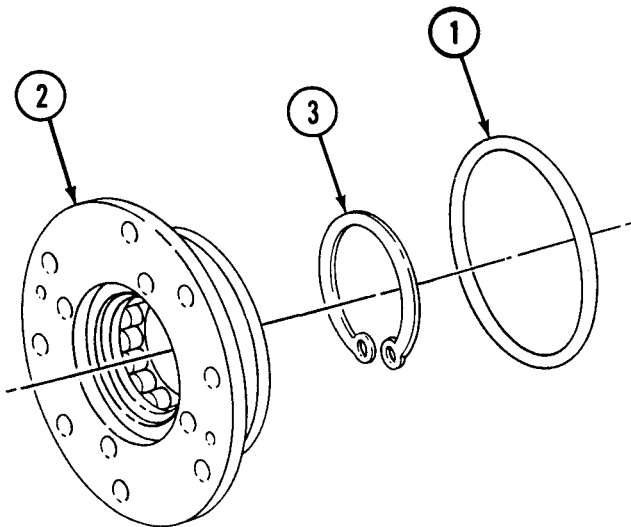
- Always wear goggles when using hammer and drift.
- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Prolonged exposure to solvent can cause skin irritation.

**REMOVAL**

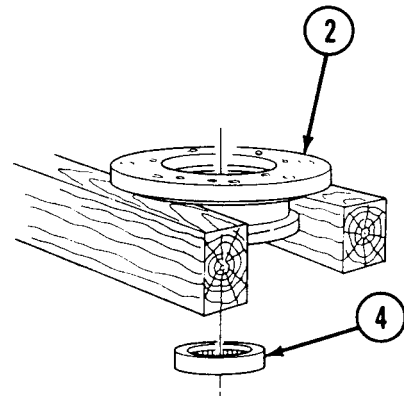
- A** Disconnect tube (1) from tee (2) and elbow (3) on front of transfer case (4).
- B** Remove elbow (3) from output cap (5).
- C** Remove eight self-locking screws (6) and washers (7) from output cap (5).
- D** Insert two screws (6) into jacking holes on output cap (5) and turn cap (5) clockwise to remove cap (5) from transfer case (4). Remove two screws (6) from cap (5). Discard eight self-locking screws (6).



**DISASSEMBLY**



- A** Remove and discard packing (1) from output cap (2).
- B** Remove retaining ring (3) from output cap (2).



**WARNING**  
 Always wear goggles when using hammer and drift. Failure to comply may result in severe injury to personnel.

- C** Place output cap (2) on wood blocks. Using hammer and drift, remove roller bearing (4) from output cap (2).

**CLEANING**

**WARNING**

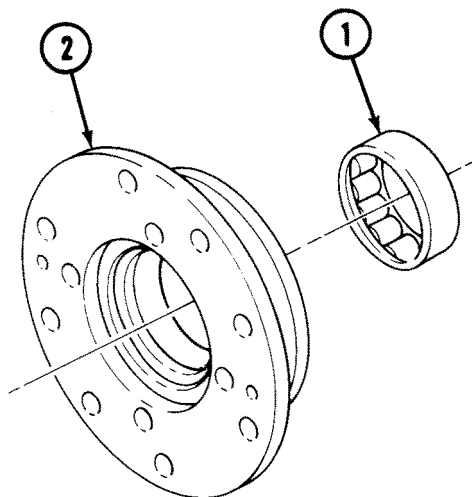
Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Prolonged exposure can cause skin irritation. Failure to comply may result in damage to equipment and injury to personnel.

Clean output gear and inside of output cap with drycleaning solvent. Clean roller bearing in accordance with TM 9-214.

**INSPECTION**

- A** Inspect roller bearing in accordance with TM 9-214. Replace if necessary.
- B** Inspect output gear for nicks on tooth flanks and tip. Remove small burrs with crocus cloth. Replace output gear if necessary.
- C** Inspect output cap thread inserts in transfer case for signs of stripping or damage. Replace stripped thread inserts in accordance with Thread Insert (MS51830 and MS51831 series) Removal and Installation procedures (p 2-24).
- D** Inspect output cap for nicks, rust, cracks, or scoring. Remove rust and small nicks with crocus cloth. Replace output cap if cracked or seriously scored.

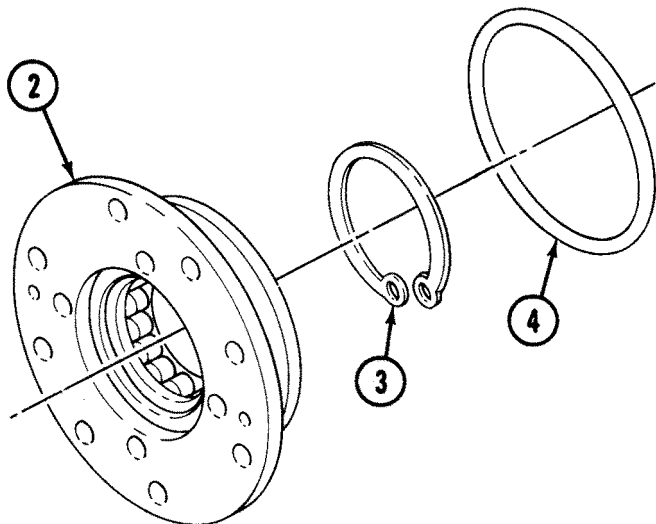
**ASSEMBLY**



**Note**

See pE-2 for instructions to fabricate bearing driver for installing roller bearing.

- A** Coat mating surfaces of roller bearing (1) and output cap (2) with grease. Using bearing driver, install bearing (1) on output cap (2).



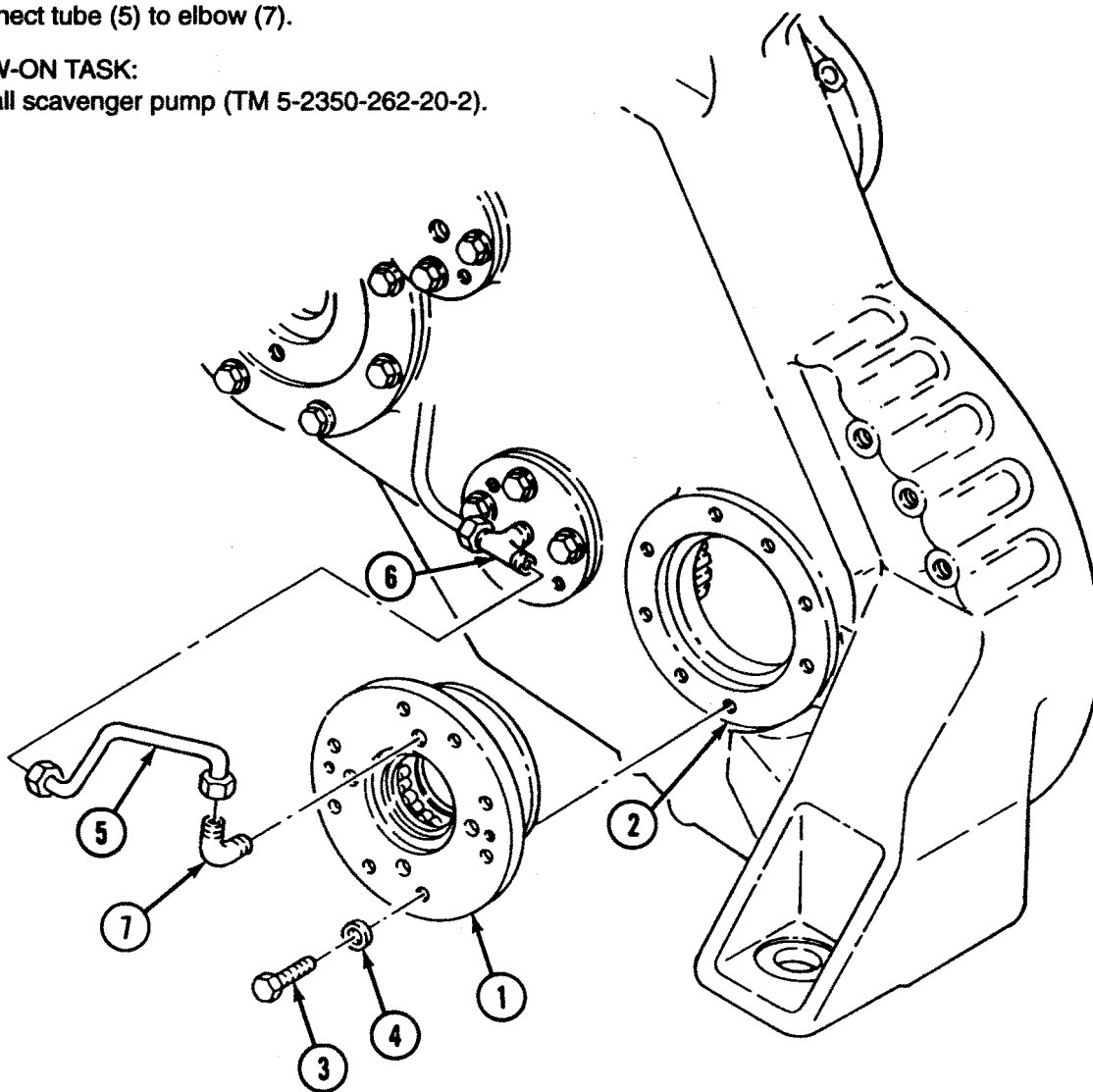
- B** Install retaining ring (3) on output cap (2).
- C** Coat packing (4) with lubricating oil, and install packing (4) on output cap (2).

## INSTALLATION

- A** Coat mating surfaces of output cap (1) and transfer case (2) with grease.
- B** Coat threads of eight self-locking screws (3) with lubricating oil. Install output cap (1) on transfer case (2) with eight washers (4) and self-locking screws (3). Tighten self-locking screws (3) to 58-62 lb-ft (79-84 N-m).
- C** Connect tube (5) to tee (6).
- D** Install elbow (7) on output cap (1).
- E** Connect tube (5) to elbow (7).

### FOLLOW-ON TASK:

Install scavenger pump (TM 5-2350-262-20-2).



# SCAVENGER PUMP REPAIR

This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Repair
- e. Assembly

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Insertor, Bearing 5120-01-227-7042

Insertor, Seal 5120-01-222-7930

Materials:

Lubricating Oil Item 32 Appendix C

Drycleaning Solvent Item 39 Appendix C

Parts:

Lockwasher (4)

Repair Kit 2520-01-188-7534

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-2

TM 9-214

Troubleshooting Reference:

Page 3-42 Transmission Malfunction

Equipment Condition:

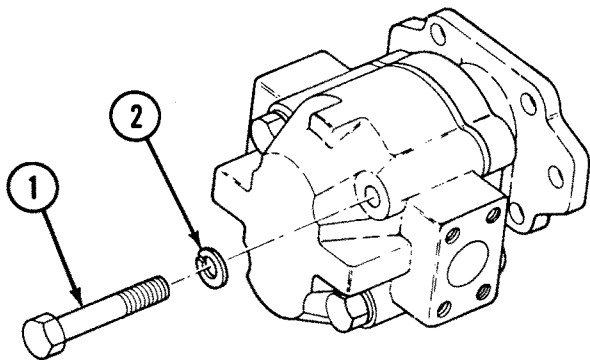
<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Scavenger Pump Removed

General Safety Instructions:

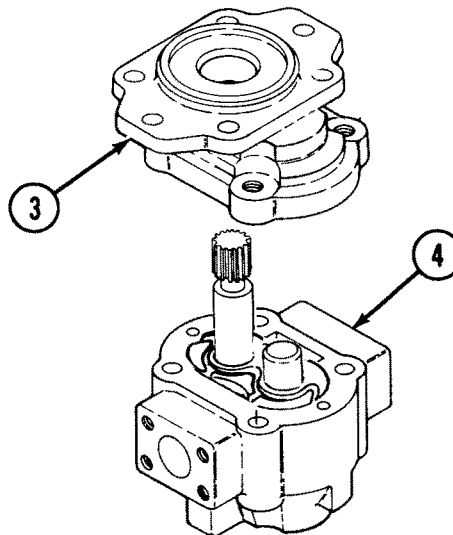
**WARNING**

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Prolonged exposure can cause skin irritation.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more than 30 psi (207 kPa). Always wear goggles.

**DISASSEMBLY**

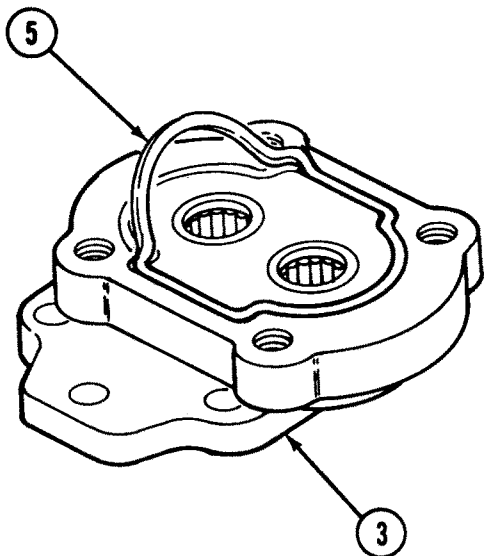


**A** Remove four screws (1) and lockwashers (2). Discard lockwashers (2).

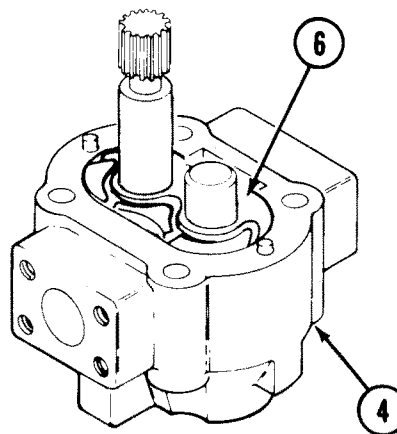


**CAUTION**  
Do not pry cover and adapter apart with screwdriver or similar tool. This can damage machined sealing surfaces.

**B** Using puller, remove adapter (3) from cover (4).

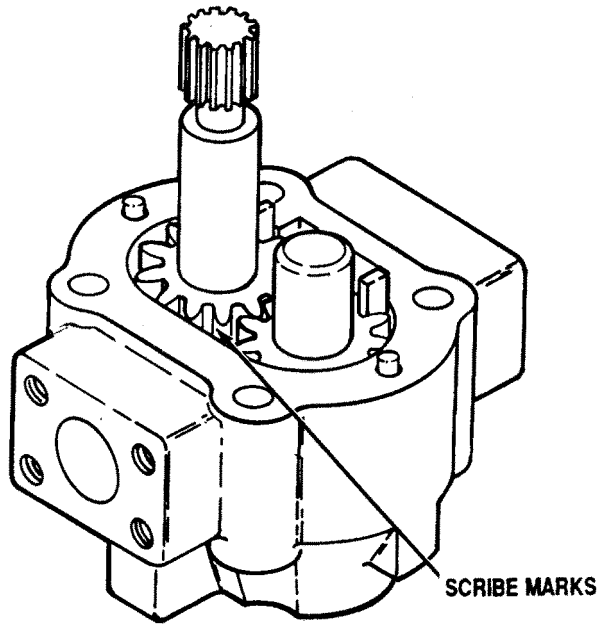


**C** Remove seal ring (5) from adapter (3). Discard seal ring (5).

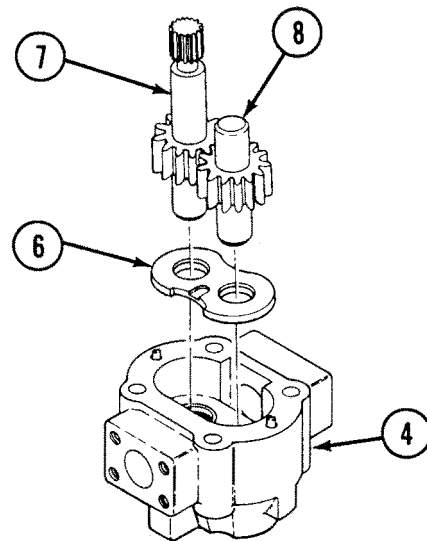


**D** Remove and discard seal plate (6) from cover (4).





**E** Scribe marks on sides of gear teeth to ensure assembly in the same position.



**F** Lift gear assemblies (7) and (8) from cover (4).

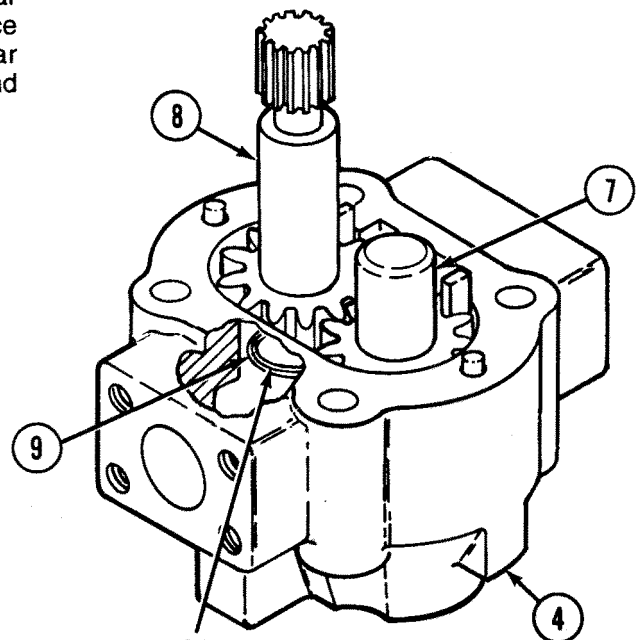
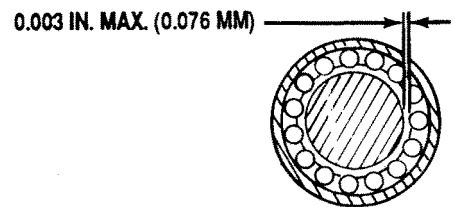
**G** Remove and discard seal plate (6).

**H** Place gear assemblies (7) and (8) back in cover (4).

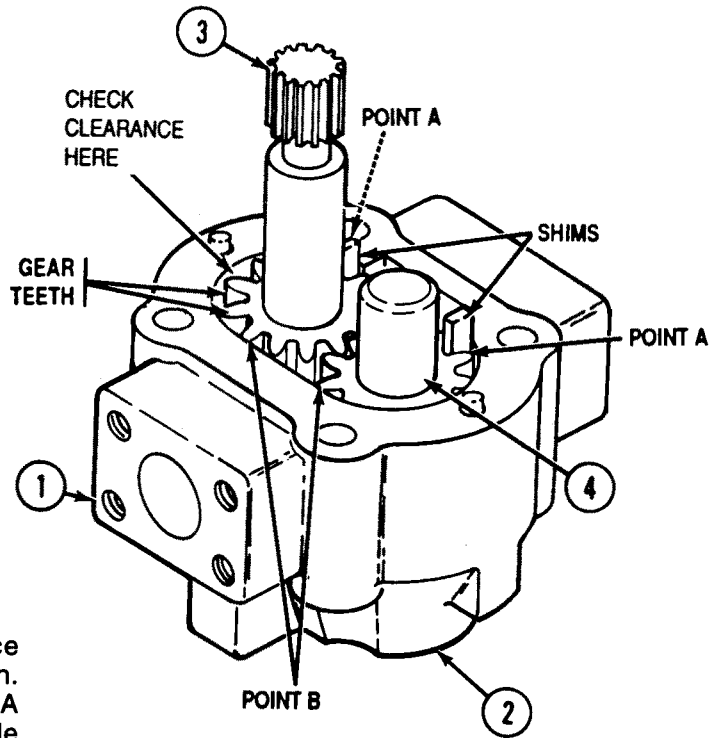
**Note**

Bearings and gear assemblies are matched sets and must be replaced in sets.

**I** Using thickness gauge, measure internal clearance of two bearings (9) and shafts of gear assemblies (7) and (8) in cover (4). If clearance exceeds 0.003 in. (0.076 mm) for either gear assembly (7) or (8), both sets of bearings (9) and gear assemblies (7) and (8) should be replaced.



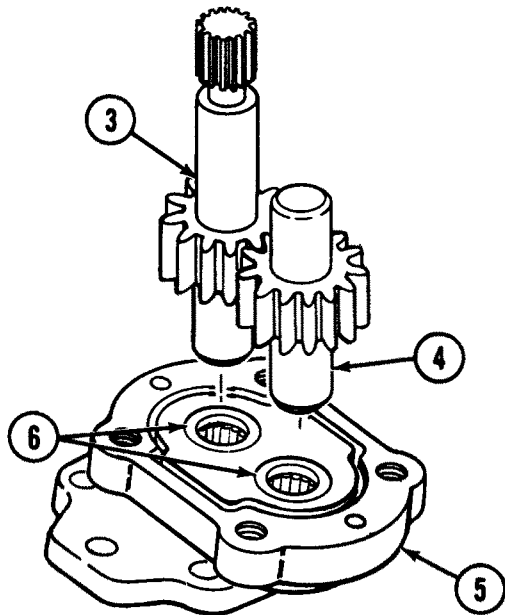
CHECK  
CLEARANCE  
HERE



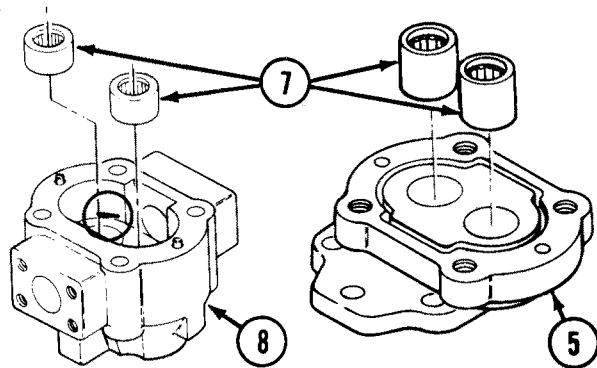
**Note**

Bearings and gear assemblies are matched sets and must be replaced in sets.

- J** Using thickness gauge, measure clearance between cover (1) and two sets of gear teeth. Place 0.005-in. (0.127-mm) shim at each point A and measure clearance at each point B while holding gear teeth against shim. If clearance exceeds 0.01 in. (0.254 mm) at either point B, both bearings (2) and gear assemblies (3) and (4) should be replaced.



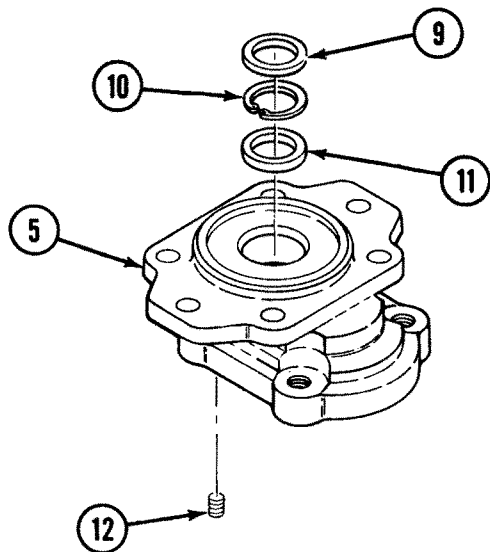
- K** Turn gear assemblies (3) and (4) over and place in adapter (5).
- L** Repeat step I to measure internal clearances of two bearings (6) in adapter (5).
- M** Remove gear assemblies (3) and (4).



**Note**

Perform steps N and O only if bearings and gear assemblies require replacement.

- N** Remove four bearings (7) from cover (8) and adapter (5).



- O** Remove dirt wiper (9), retaining ring (10), and seal (11) from adapter (5). Discard dirt wiper (9) and seal (11).
- P** Remove plug (12) from adapter (5).

## CLEANING

### WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Prolonged exposure can cause skin irritation. Failure to comply may result in damage to equipment and injury to personnel.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more than 30 psi (207 kPa). Always wear goggles. Failure to comply may result in injury to personnel.

- A** Clean bearings in accordance with TM 9-214.
- B** Clean all other parts with drycleaning solvent and dry with low-pressure compressed air.

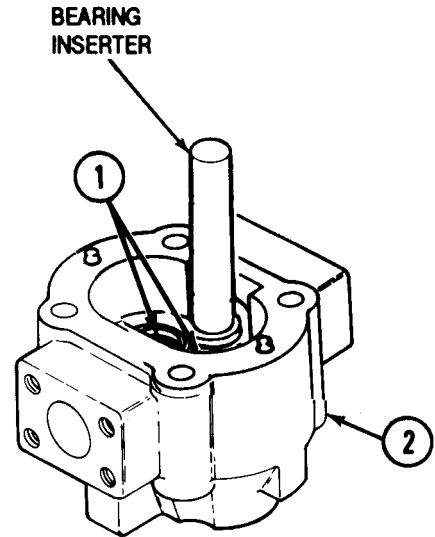
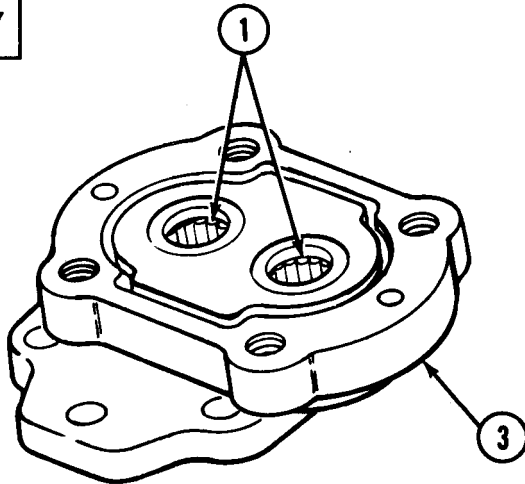
## INSPECTION

- A** Inspect gear assemblies for shaft wear, pitting, excessive gear wear, and cracks.
- B** Inspect bearings in accordance with TM 9-214.
- C** Inspect cover and adapter for burrs or cracks.
- D** Inspect for stripped or damaged threads.

## REPAIR

- A** Remove burrs and minor scratches with fine stone.
- B** Repair minor thread damage with thread chaser or tap.
- C** Replace cracked or damaged parts.
- D** Install new parts from repair kit.

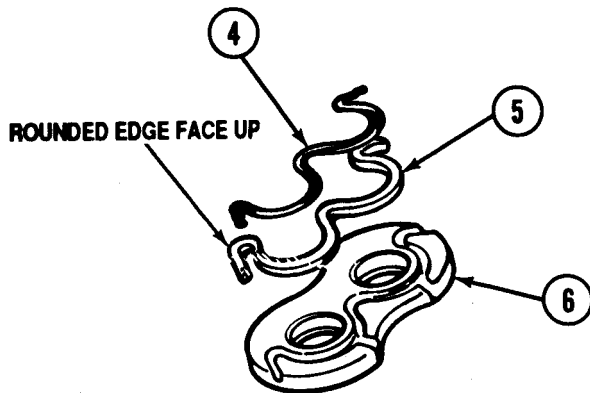
**ASSEMBLY**



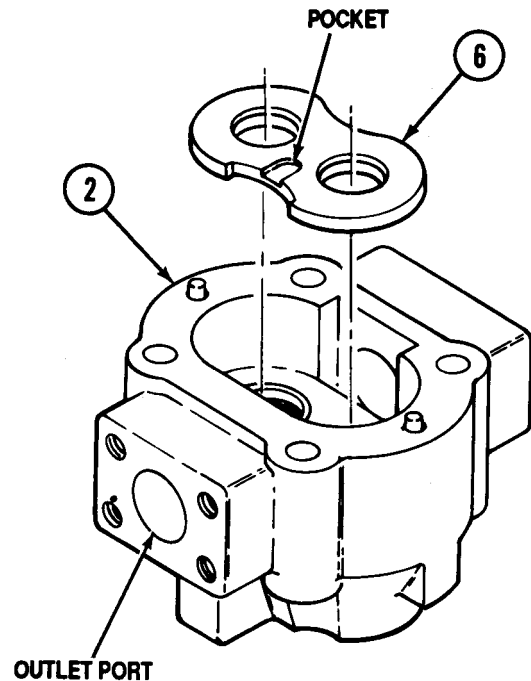
**Note**

Perform step A only if bearings were removed.

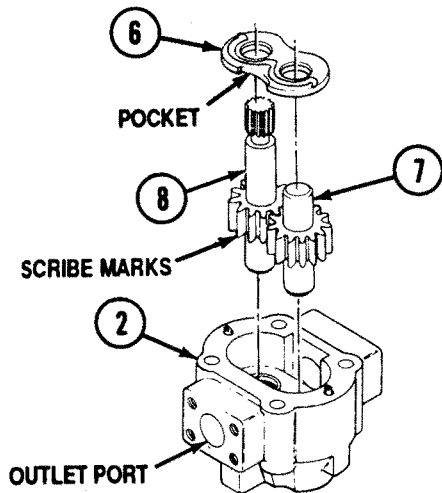
- A** Using hammer and bearing inserter, install four bearings (1) on cover (2) and adapter (3). Ensure bearings are no more than 0.005 in. (0.127 mm) below mounting faces.



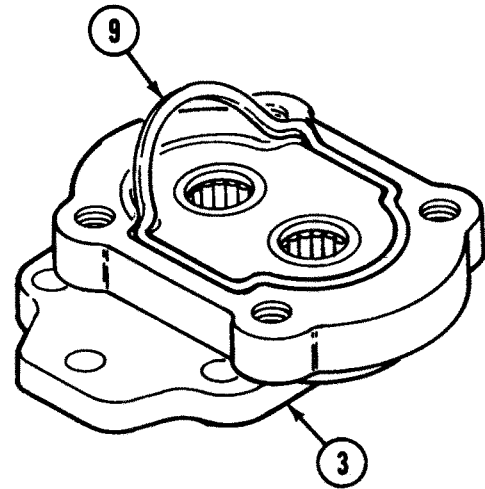
- B** Install two seals (4) and seal backup (5) on seal plates (6). Ensure rounded edge on seal backup (5) faces outside edge of groove in seal plate (6).



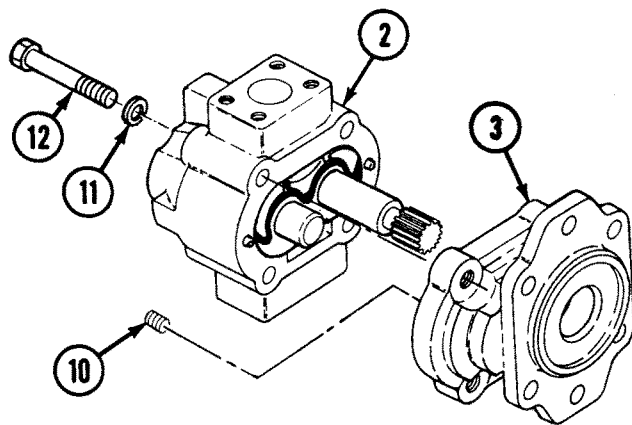
- C** Install seal plate (6) on cover (2) with bronze side up. Ensure pocket on seal plate (6) faces toward outlet port (smaller port).



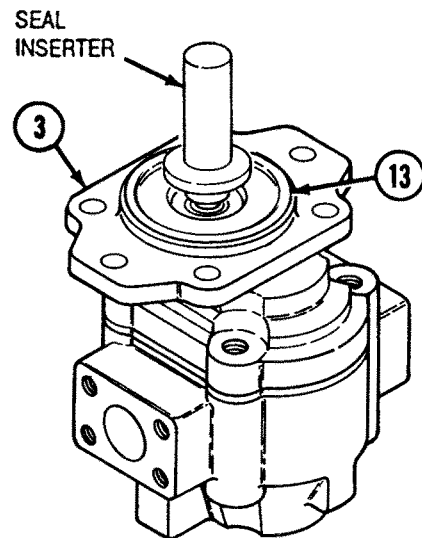
- D** Install gear assemblies (7) and (8) on cover (2). If original gear assemblies are being reused, align scribe marks made at disassembly.
- E** Install seal plate (6) on gear assemblies (7) and (8) with bronze side against gears and pocket facing toward outlet port (smaller port).



- F** Coat seal ring (9) with oil, and install seal ring (9) on groove in adapter (3).



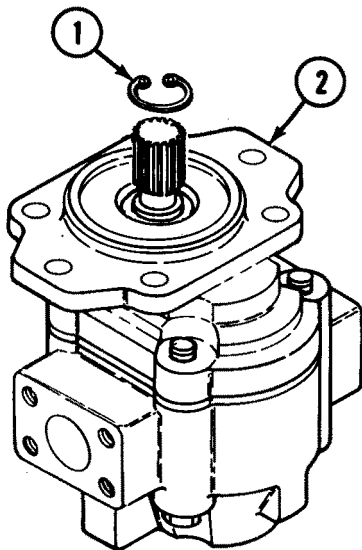
- G** Install plug (10) on adapter (3), and install adapter (3) on cover (2) with four lockwashers (11) and screws (12). Tighten screws (12) to 120 lb-ft (163 N·m).



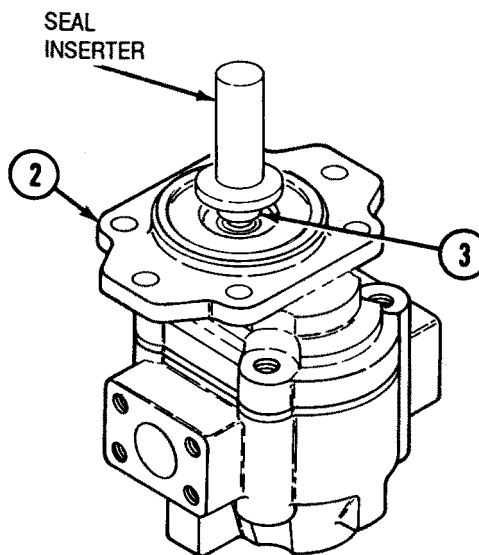
**Note**

Lubricate lip of seal with lubricating oil prior to installation.

- H** Using hammer and seal inserter, install seal (13) on adapter (3) with metal casing of seal (13) facing out.



I Install retaining ring (1) on adapter (2).



J Coat dirt wiper (3) with oil.

**Note**

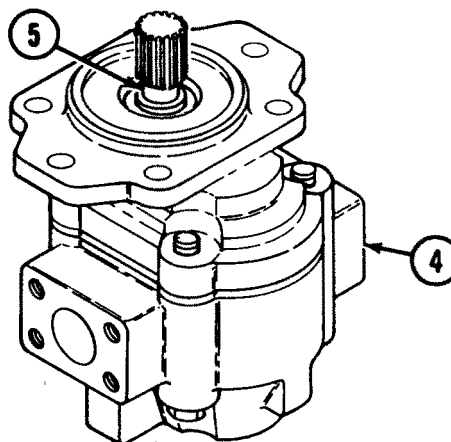
Install dirt wiper with "OUTSIDE" facing outward.

K Using hammer and seal inserter, install dirt wiper (3) on adapter (2).

L Coat interior of pump (4) generously with lubricating oil through inlet and outlet ports and rotate shaft (5) several times. If shaft (5) does not rotate smoothly, disassemble pump (4) and repair as necessary.

**FOLLOW-ON TASK:**

Install scavenger pump (TM 5-2350-262-20-2).



# HYDRAULIC SHIFT CONTROL VALVE REPAIR

This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Assembly

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Materials:

Lubricating Oil	Item 32 Appendix C
Drycleaning Solvent	Item 39 Appendix C

Parts:

Cotter Pin  
Gasket  
Lockwasher (7)  
Packing (3)  
Seal

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-1  
TM 5-2350-262-20-2  
TM 9-214

Troubleshooting Reference:

TM 5-2350-262-20-1 Transmission Does Not Shift Properly

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Hydraulic Shift Control Valve Removed

General Safety Instructions:

### WARNING

- Plug is holding spring under compression. Remove plug slowly.
- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Prolonged exposure can cause skin irritation. Use only in well-ventilated places.
- Compressed air can injure you and others. Do not point compressed air hoses at anyone. Do not use more than 30 psi (207 kPa) pressure. Always wear goggles.

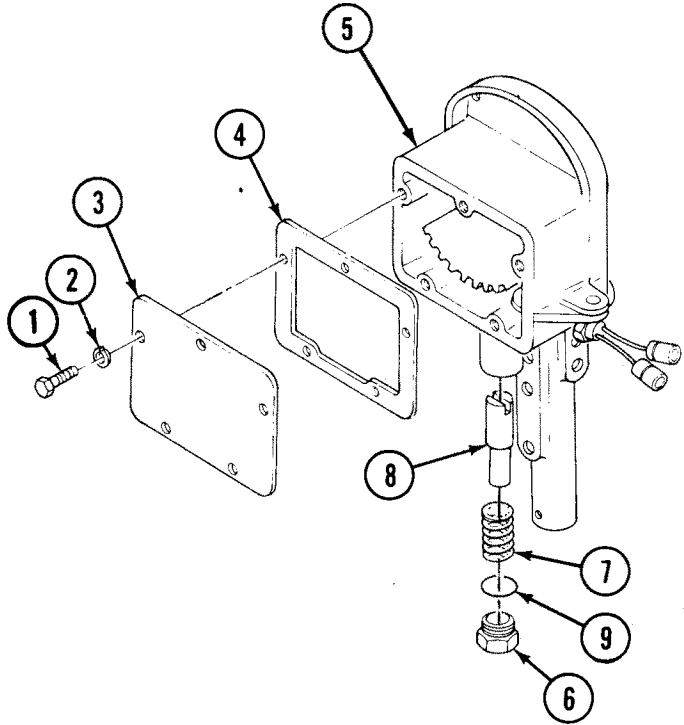
**DISASSEMBLY**

- A** Remove five screws (1), lockwashers (2), cover plate (3), and gasket (4) from housing (5). Discard lockwashers (2) and gasket (4).

**WARNING**

Plug is holding spring under compression. Remove plug slowly. Failure to comply may result in injury to personnel.

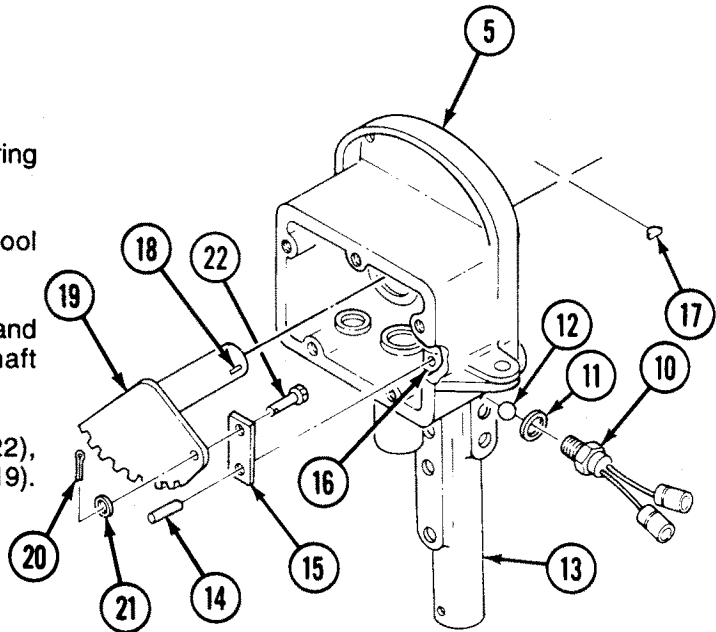
- B** Remove plug (6), spring (7), and plunger (8) from housing (5).
- C** Remove packing (9) from plug (6). Discard packing (9).



**Note**

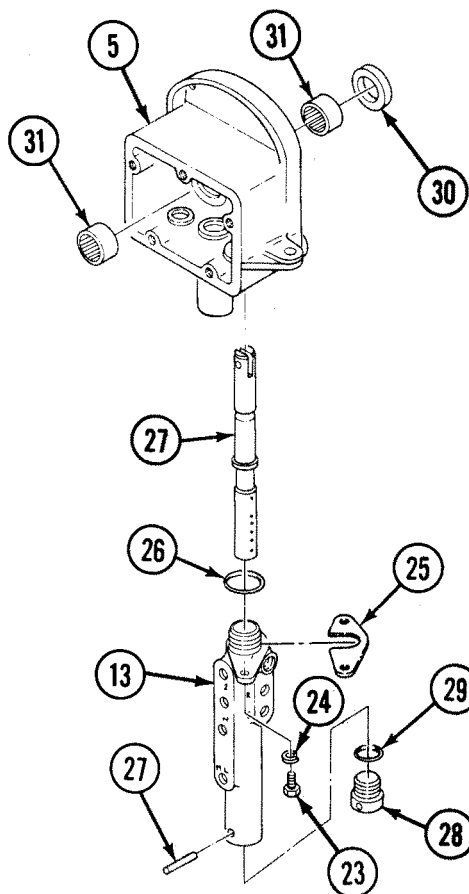
Number of shims may vary.

- D** Remove switch (10), shims (11), and ball bearing (12) from body (13).
- E** Remove pin (14) connecting link (15) to spool (16).
- F** Remove key (17) from keyway (18) of plate and shaft assembly (19). Remove plate and shaft assembly (19) from housing (5).
- G** Remove cotter pin (20), washer (21), pin (22), and link (15) from plate and shaft assembly (19). Discard cotter pin (20).





- H** Remove two screws (23), lockwashers (24), shim (25), and body (13) from housing (5). Discard lockwashers (24).
- I** Remove packing (26) and spool (27) from body (13). Discard packing (26).
- J** Remove pin (27) and stop (28) from body (13).
- K** Remove packing (29) from stop (28). Discard packing (29).
- L** Remove seal (30) and two bearings (31) from housing (5). Discard seal (30).



## CLEANING

### WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Prolonged exposure can cause skin irritation. Failure to comply may result in injury to personnel and damage to equipment.
- Compressed air can injure you and others. Do not point compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

- A** Clean all components with drycleaning solvent.
- B** Blow-dry all components, except bearings, with low-pressure compressed air. Let bearings air-dry.

- C** Varnish or gum deposits may be removed by brushing with a soft-bristle brush. Never use wire brushes, scrapers, or files.
- D** Soft copper or brass wire may be used to clean oil passages. Flush passages with oil after cleaning.

## INSPECTION

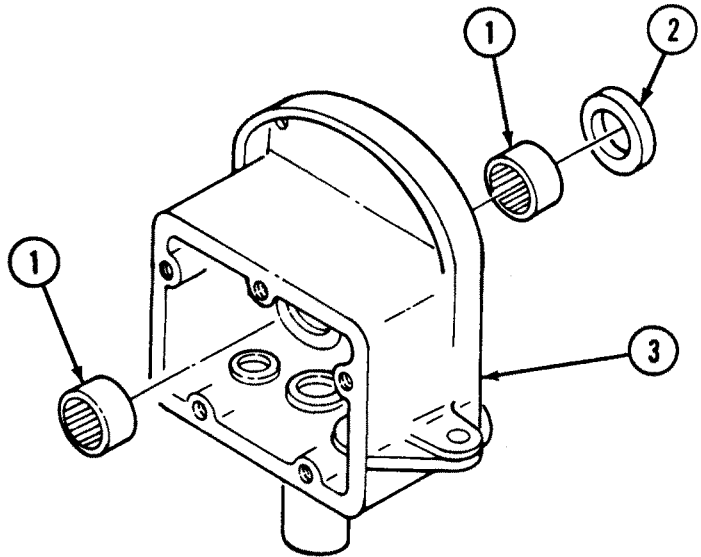
- A** Inspect housing, body, and cover plate for cracks or damage.
- B** Inspect bearings in accordance with TM 9-214.
- C** Inspect spool and bore of body for nicks or scratches.
- D** Inspect for stripped threads.

**ASSEMBLY**

**Note**

Coat internal parts with lubricating oil prior to assembly.

- A** Install two bearings (1) and seal (2) on housing (3).

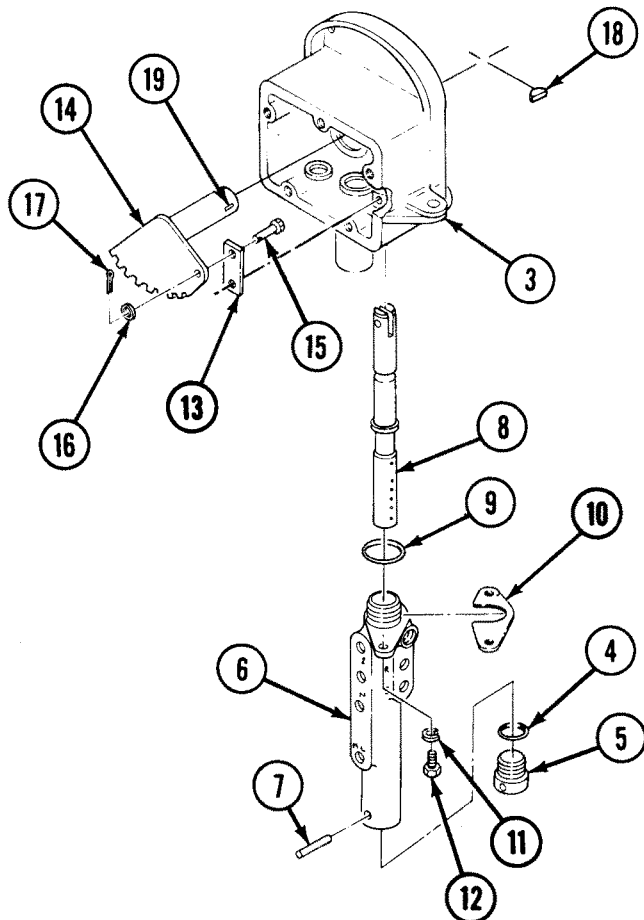


- B** Install packing (4) on stop (5).
- C** Install stop (5) on body (6) and secure with pin (7).

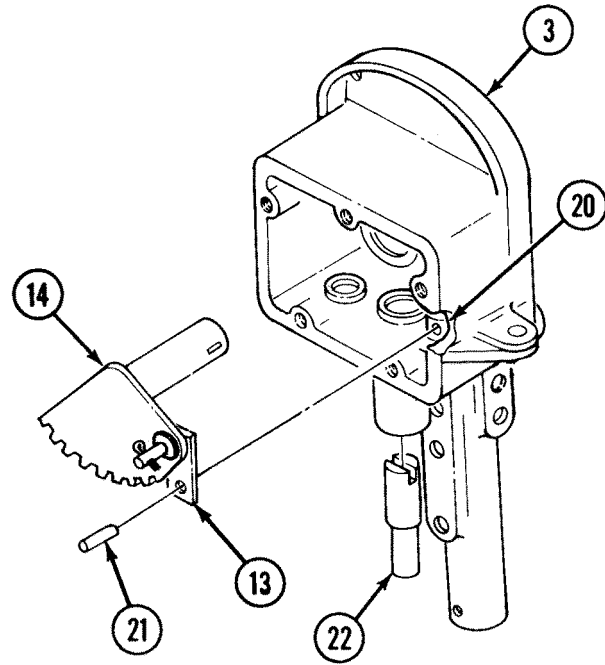
**Note**

Ensure spool has six holes on right side and five holes on left side when installing.

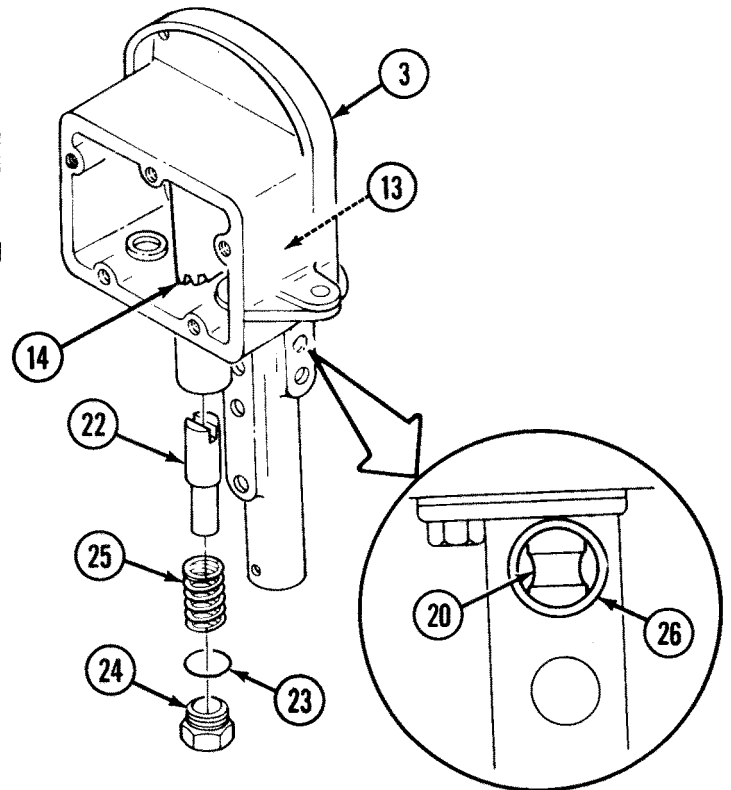
- D** Insert spool (8) on bore of body (6).
- E** Install packing (9) on body (6).
- F** Install body (6) and shim (10) on housing (3) with two lockwashers (11) and screws (12).
- G** Install link (13) on plate and shaft assembly (14) with pin (15), washer (16), and cotter pin (17).
- H** Install plate and shaft assembly (14) on housing (3). Install key (18) in keyway (19) on plate and shaft assembly (14).



- I Rotate plate and shaft assembly (14) to place link (13) in spool (20).
- J Secure link (13) on spool (20) with pin (21).
- K Install plunger (22) on housing (3), ensuring notched part of plate and shaft assembly (14) sits in slot of plunger (22).



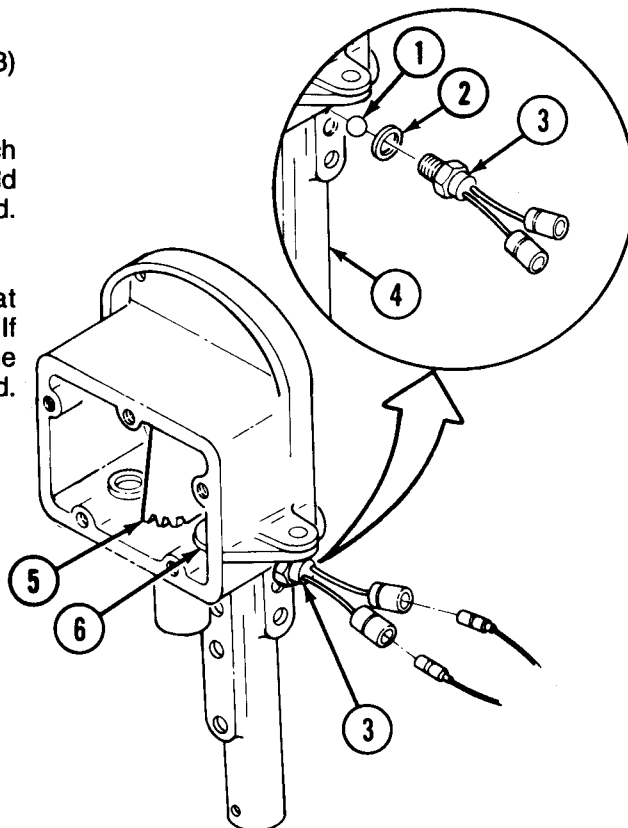
- L Install packing (23) on plug (24).
- M Install spring (25) and plug (24) on housing (3).
- N Rotate plate and shaft assembly (14) until plunger (22) rests in third notch from end opposite link (13) (neutral position).
- O Check to see that notch in spool (20) is centered in switch mounting port (26).



**P** Install ball bearing (1), shims (2), and switch (3) on body (4).

**Q** Connect probes of multimeter to leads of switch (3). If multimeter does not indicate continuity, add one or more shims (2) until continuity is indicated. If multimeter indicates continuity, go to step R.

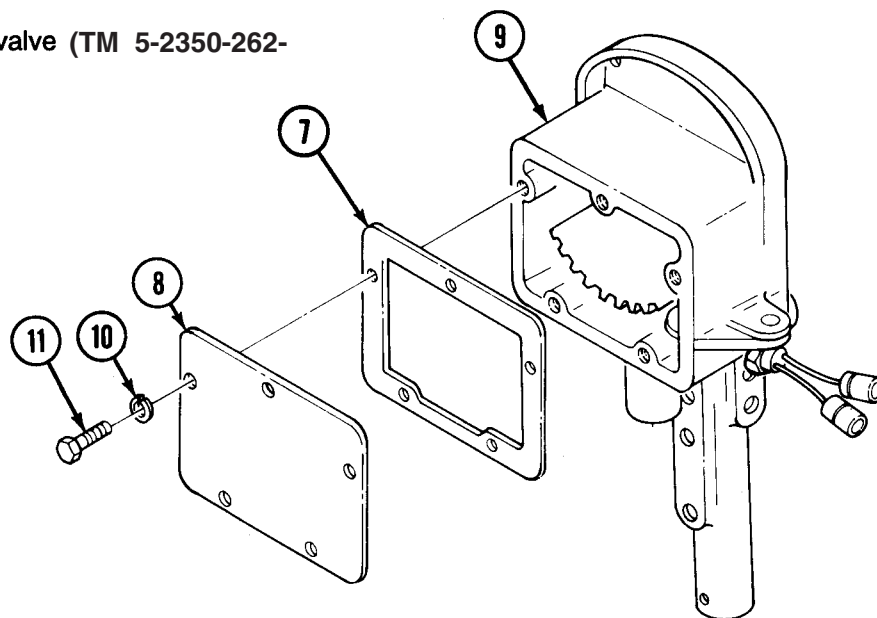
**R** Rotate plate and shaft assembly (5) so that plunger (6) rests in slot next to neutral position. If multimeter still indicates continuity, remove one or more shims (2) until continuity is not indicated. Disconnect multimeter.



**S** Install gasket (7) and cover plate (8) on housing (9) with five lockwashers (10) and screws (11).

**FOLLOW-ON TASK:**

Install hydraulic shift control valve (TM 5-2350-262-20-2).



# TRANSMISSION/TRANSFER CASE SEPARATION

This task covers:

- a. Disassembly
- b. Cleaning
- c. Assembly

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive Lifting Device

Special Tools:

Sling, Power Pack 5120-01-222-7932

Materials:

Caps and Plugs Item 7 Appendix C

Drycleaning Solvent Item 39 Appendix C

Parts:

Gasket (3)

Lockwasher (21)

Packing (4)

Self-locking Screw (49)

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

TM 5-2350-262-10

TM 5-2350-262-20-2

Troubleshooting Reference:

Page 3-42 Transmission Malfunction

Page 3-42 Transfer Case Malfunction

Equipment Condition:

Reference	Condition Description
Page 4-116	Main Hydraulic Pump Removed
Page 4-147	Engine Removed
Page 4-167	Transfer Case Output Cap Removed
TM 5-2350-262-10	Transmission and Transfer Case Oil Drained
TM 5-2350-262-20-2	Scavenger Pump Removed
TM 5-2350-262-20-2	Compensating Hydraulic Pump Removed

General Safety Instructions:

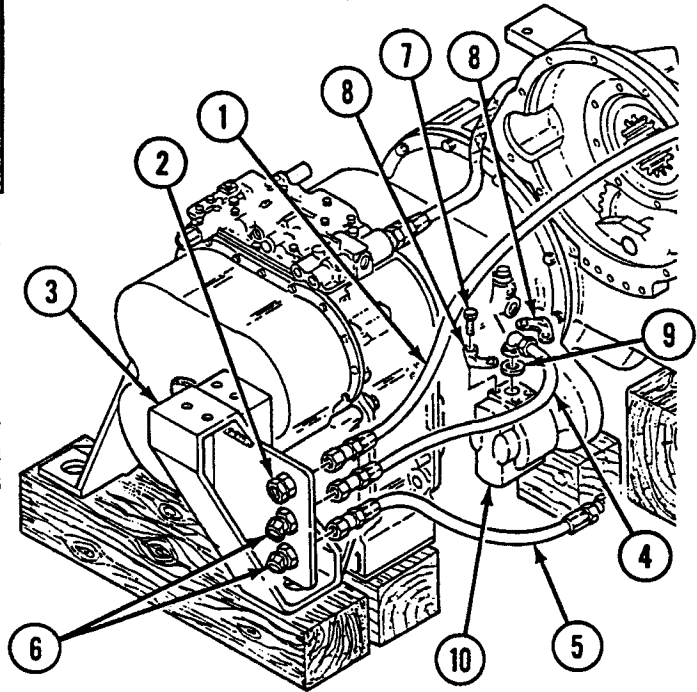
### WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby whenever the solvent is used. Use only in well-ventilated areas. Prolonged exposure can cause skin irritation.
- Compressed air can injure you and others. Do not point compressed air hoses at anyone. Do not use more than 30 psi (207 kPa). Always wear goggles.
- Lifting device must have a weight capacity greater than 400 lb (182 kg).
- Personnel must stand clear during lifting operations.

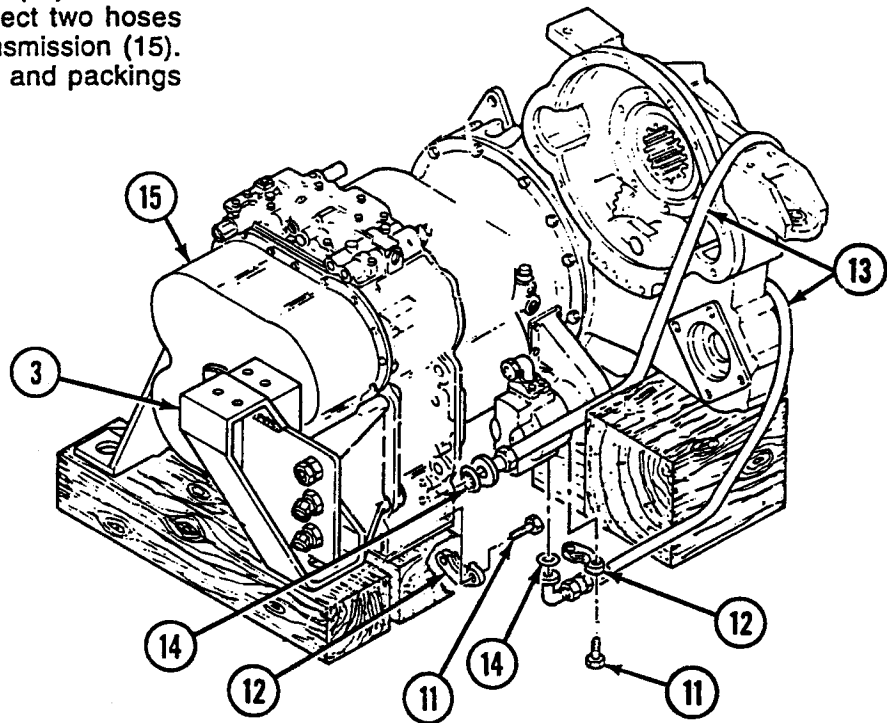
**DISASSEMBLY**

**CAUTION**  
 Cover fittings and hose ends to prevent contamination. Failure to comply may result in damage to equipment.

- A** Disconnect hose (1) from nipple (2) on engine bracket (3).
- B** Disconnect hoses (4) and (5) from two elbows (6) on engine bracket (3).
- C** Remove four self-locking screws (7), two flange fittings (8), packing (9), and hose (4) from charging pump (10). Discard self-locking screws (7) and packing (9).

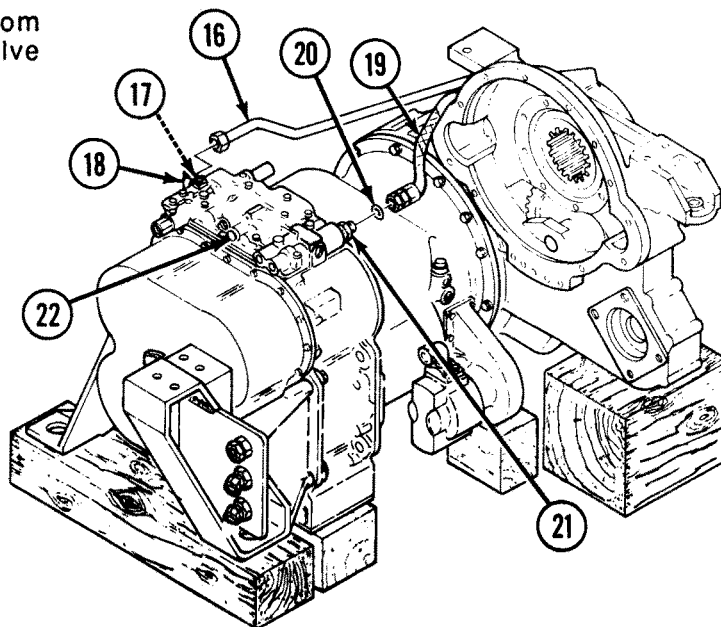


- D** Remove eight self-locking screws (11) and four flange fittings (12), and disconnect two hoses (13) and packings (14) from transmission (15). Discard self-locking screws (11) and packings (14).



**E** Disconnect tube (16) from nipple (17) on bracket (18).

**F** Disconnect tube (19) and packing (20) from adapter (21) on transmission control valve assembly (22). Discard packing (20).



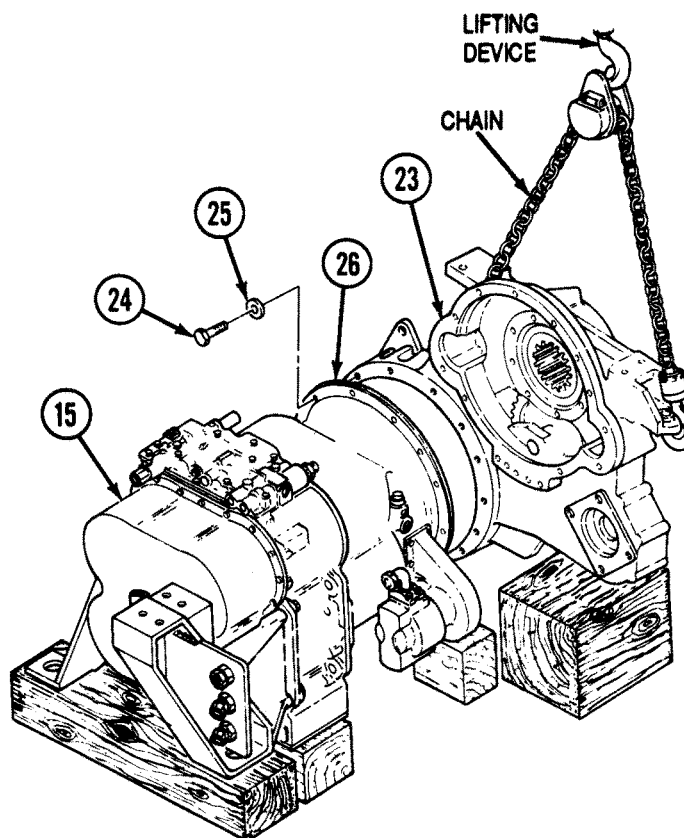
## WARNING

- Lifting device must have a weight capacity greater than 400 lb (182 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

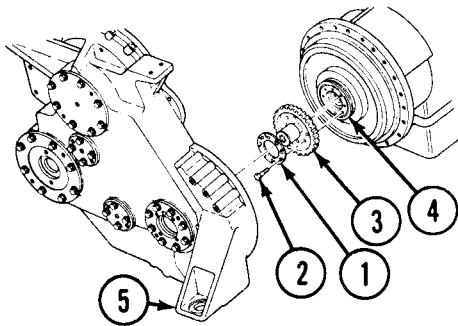
**G** With transmission (15) supported on blocks, connect chain to lifting device and transfer case (23). Raise lifting device to support transfer case (23) without lifting transmission (15) from blocks.

**H** Remove twenty-three self-locking screws (24) and washers (25) and pull transfer case (23) away from transmission (15). Discard self-locking screws (24). Remove chain and lifting device from transfer case (23).

**I** Remove and discard gasket (26).





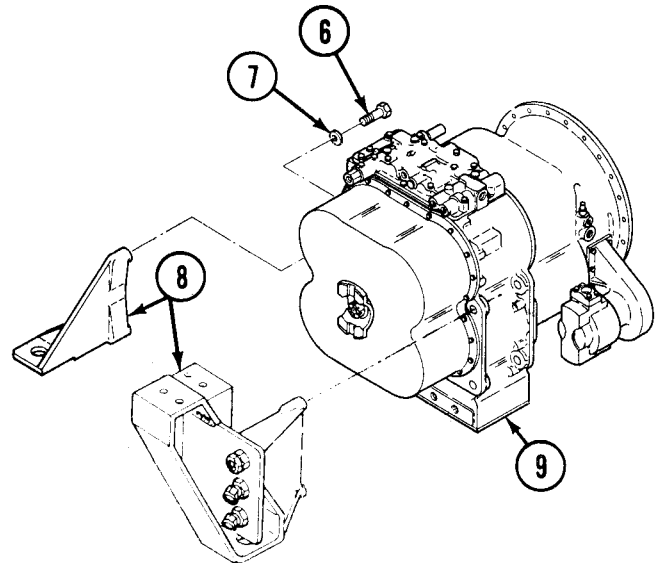


- J** Straighten tabs of locking plate (1) and remove ten self-locking screws (2) securing transfer case output gear (3) to transmission input flange (4). Discard self-locking screws (2).

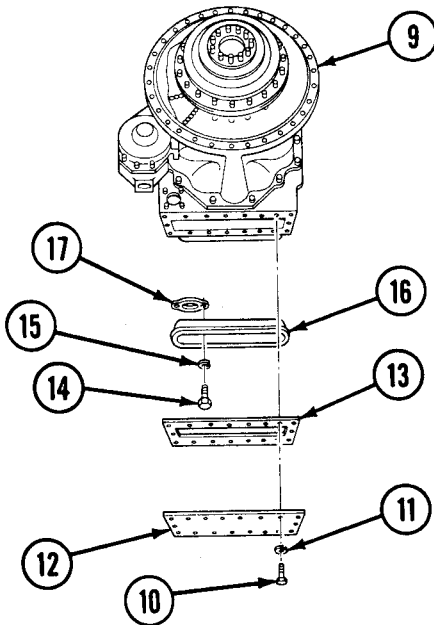
**CAUTION**

Cover openings in transfer case to prevent entry of dirt. Failure to comply may result in damage to equipment.

- K** Remove transfer case output gear (3) and secure in transfer case (5).



- L** Remove four self-locking screws (6), washers (7), and transmission supports (8) from transmission (9). Discard self-locking screws (6).



- M** Remove eighteen screws (10), lockwashers (11), access plate (12), and gasket (13) from base of transmission (9). Discard lockwashers (11) and gasket (13).

- N** Remove three screws (14), lockwashers (15), strainer (16), and gasket (17) from transmission (9). Discard lockwashers (15) and gasket (17).

**CLEANING**

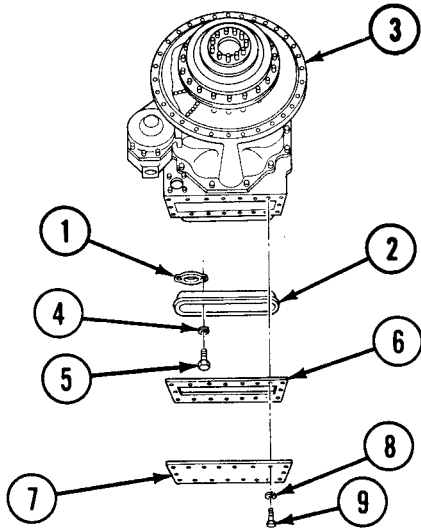
**WARNING**

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated areas. Prolonged exposure can cause skin irritation. Failure to comply may result in damage to equipment and injury to personnel.
- Compressed air can injure you and others. Do not point compressed air hoses at anyone. Do not use more than 30 psi (207 kPa). Always wear goggles. Failure to comply may result in injury to personnel.

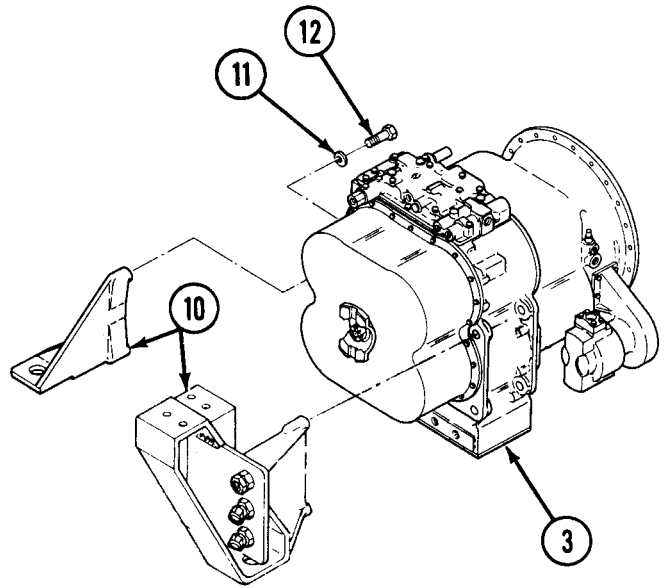
Clean strainer and access plate with drycleaning solvent. Blow dry with compressed air.



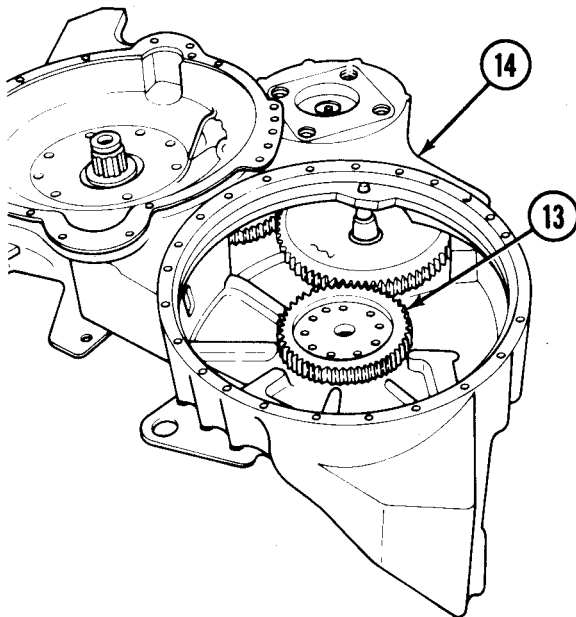
**ASSEMBLY**



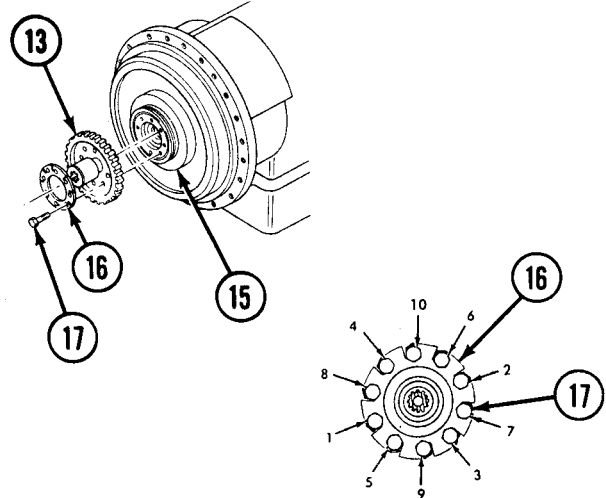
- A** Install gasket (1) and strainer (2) on transmission (3) and secure with three lockwashers (4) and screws (5).
- B** Install gasket (6) and access plate (7) on base of transmission (3) and secure with eighteen lockwashers (8) and screws (9).



- C** Install two transmission supports (10) on transmission (3) with four washers (11) and self-locking screws (12). Tighten self-locking screws (12) to 190-200 lb-ft (258-271 N-m).



- D** Remove transfer case output gear (13) from transfer case (14).



- E** Install transfer case output gear (13) on transmission input flange (15) with locking plate (16) and ten self-locking screws (17).
- F** In sequence shown, tighten ten self-locking screws (17) to 30 lb-ft (41 N-m), then to 60 lb-ft (81 N-m), and finally to 70-75 lb-ft (95-102 N-m).
- G** After tightening self-locking screws (17), bend up tabs of locking plate (16) to secure screws (17).

## WARNING

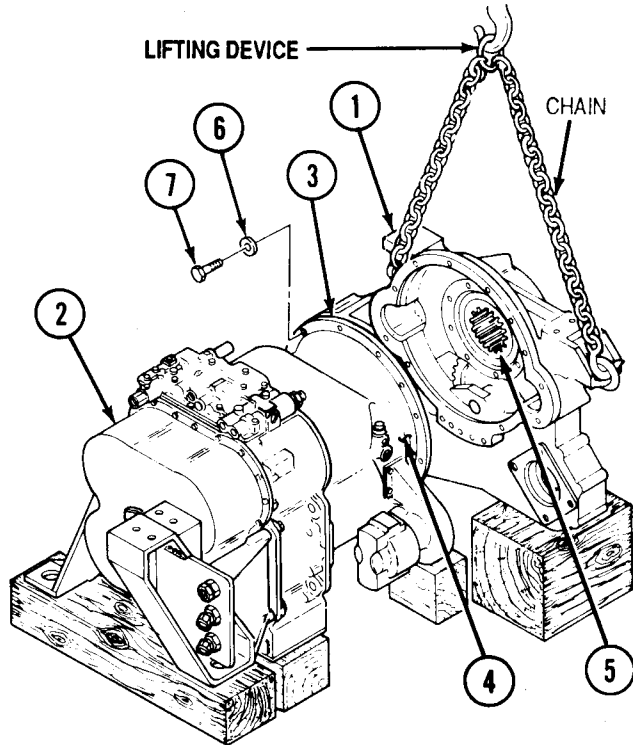
- Lifting device must have a weight capacity greater than 400 lb (182 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

**H** Connect chain and lifting device to transfer case (1). Lift transfer case (1) and position in front of transmission (2). Ensure hoses are out of the way.

**I** Install gasket (3) on transfer case (1). Turn output gear (4) through opening in transfer case (1) until gear (4) meshes with transfer case spur gear (5).

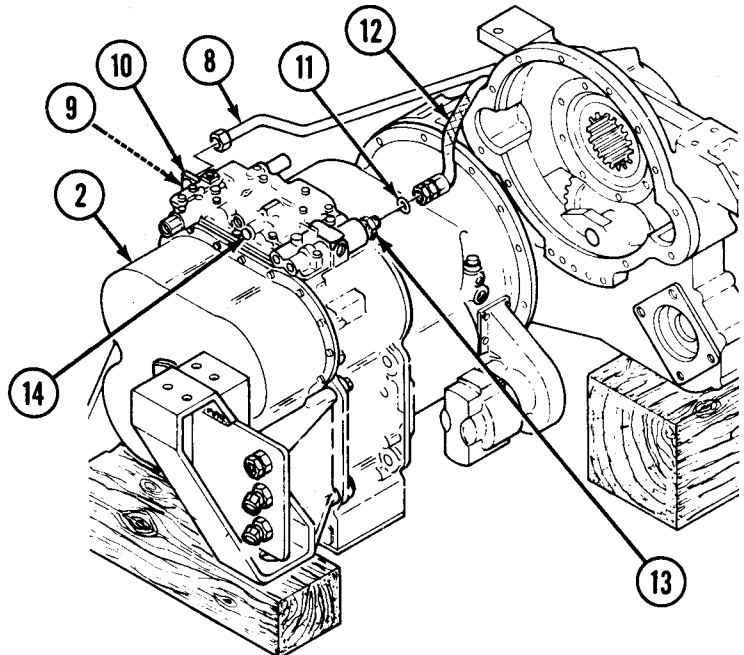
**J** Install transfer case (1) on transmission (2) with twenty-three washers (6) and self-locking screws (7). Tighten self-locking screws (7) to 25-28 lb-ft (34-38 N·m).

**K** Ensure transmission (2) and transfer case (1) are securely blocked. Remove lifting device and chain from transfer case (1).

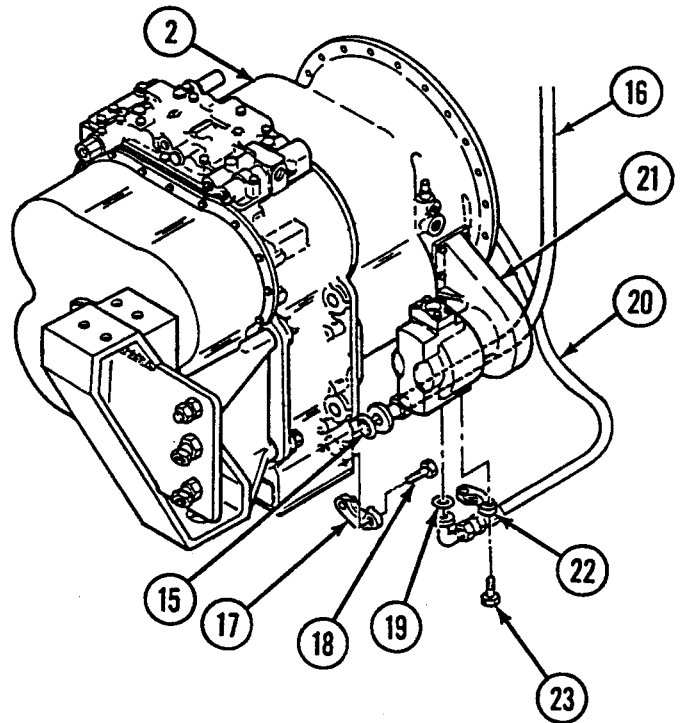


**L** Connect LH BHD FTG-15 tube (8) to nipple (9) on bracket (10).

**M** Connect packing (11) and XMSN MANF-27 tube (12) to adapter (13) on transmission control valve assembly (14).



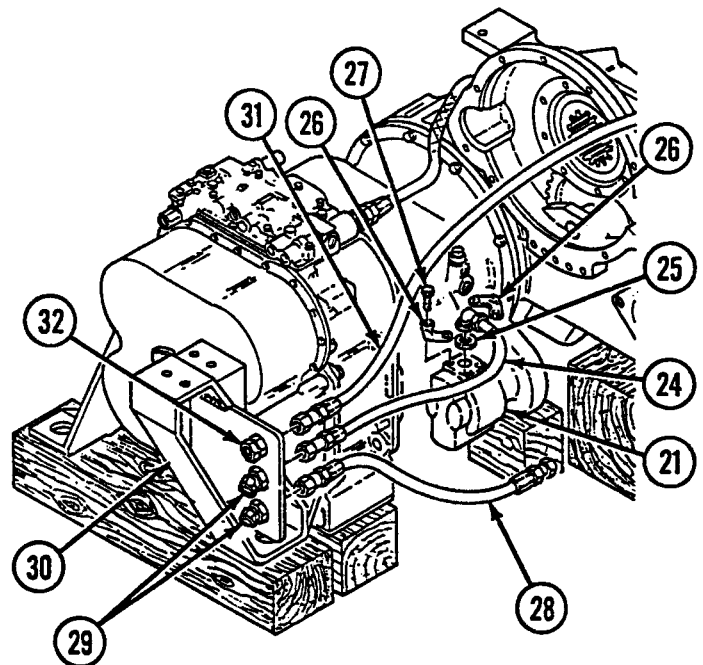
- N** Connect packing (15) and XMSN SUMP-2P hose (16) to bottom of transmission (2) with two flange half fittings (17) and four self-locking screws (18). Tighten self-locking screws (18) to 20-28 lb-ft (27-38 N.m).
- O** Connect packing (19) and XMSN PMP-OUT-1T hose (20) to transmission charging pump (21) with two flange fittings (22) and four self-locking screws (23). Tighten self-locking screws (23) to 25-28 lb-ft (34-38 N.m).



- P** Connect hose (24) to charging pump (21) with gasket (25), two flange fittings (26), and four self-locking screws (27). Tighten self-locking screws (27) to 25-28 lb-ft (34-38 N.m).
- Q** Connect two hoses (24) and (28) to elbows (29) on engine bracket (30).
- R** Connect hose (31) to nipple (32) on engine bracket (30).

**FOLLOW-ON TASKS:**

- Install hydraulic compensating pump (TM 5-2350-262-24P).
- Install transfer case output cap (p 4-167).
- Install scavenger pump (TM 5-2350-262-20-2).
- Install main hydraulic pump (p 4-116).
- Install engine (p 4-147).
- Fill transmission and transfer case (TM 5-2350-262-10).



---

# TRANSMISSION REPLACEMENT IN SHIPPING/STORAGE CONTAINER

---

This task covers:

- a. Removal
  - b. Installation
- 

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Parts:

Lockwasher (40)

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Two Construction Equipment Repairers  
62B10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 4-186	Transmission Removed

General Safety Instructions:

### WARNING

- Lifting device must have a weight capacity greater than 1,358 lb (617 kg).
- Personnel must stand clear during lifting operations.

**REMOVAL**

**Note**

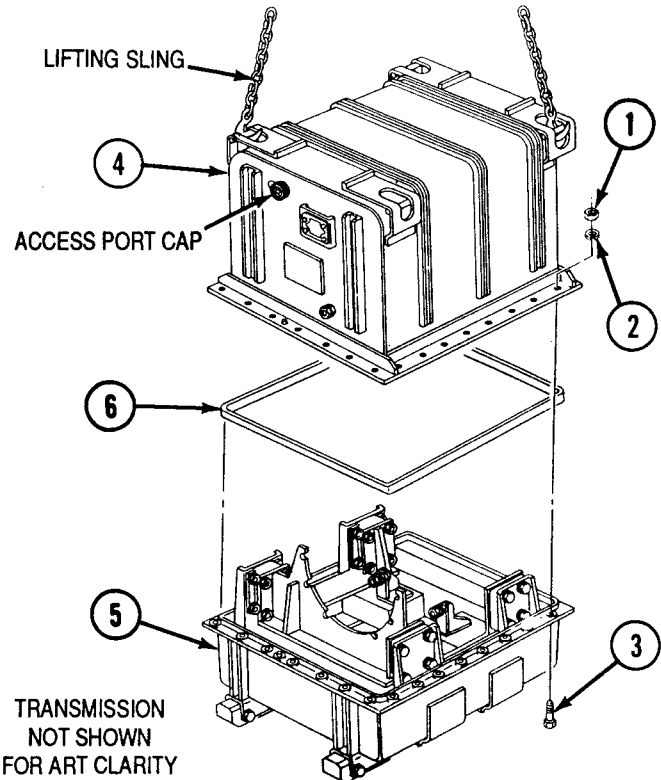
Release pressure from container prior to removing hardware by removing access port cap.

- A** Remove twenty-eight nuts (1), lockwashers (2), and screws (3) securing upper half of transmission container (4) to lower half of transmission container (5). Discard lockwashers (2).

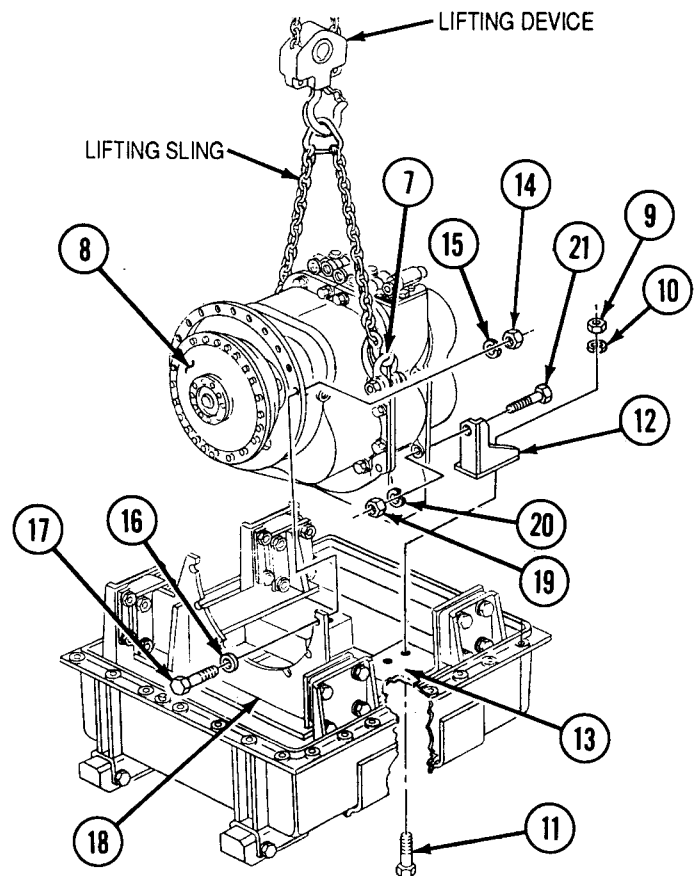
**WARNING**

- Lifting device must have a weight capacity greater than 1,358 lb (617 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- B** Connect lifting sling to upper half of transmission container (4) and lifting device. Lift upper half of container (4) up and out of the way. Remove gasket (6) from lower container (5) only if damaged.



- C** Connect two shackles (7) to transmission (8).
- D** Connect lifting sling to shackles (7) and lifting device. Raise lifting device to support weight of transmission (8).
- E** Remove four nuts (9), lockwashers (10), and screws (11) securing two rear brackets (12) to frame (13). Discard lockwashers (10).
- F** Remove six nuts (14), lockwashers (15), washers (16), and screws (17) securing transmission (8) to front bracket (18). Discard lockwashers (15).
- G** Raise transmission (8) up and out of frame (13). Support front of transmission (8) on wooden block.
- H** Remove sling from transmission (8) and from lifting device.
- I** Remove two nuts (19), lockwashers (20), screws (21), and brackets (12) from transmission (8). Discard lockwashers (20).



**INSTALLATION**

- A** Install two brackets (1) on transmission (2) with two screws (3), lockwashers (4), and nuts (5). Tighten nuts (5) to 148-175 lb-ft (201-237 N·m).
- B** Connect sling to lifting device and two shackles (6) on transmission (2).

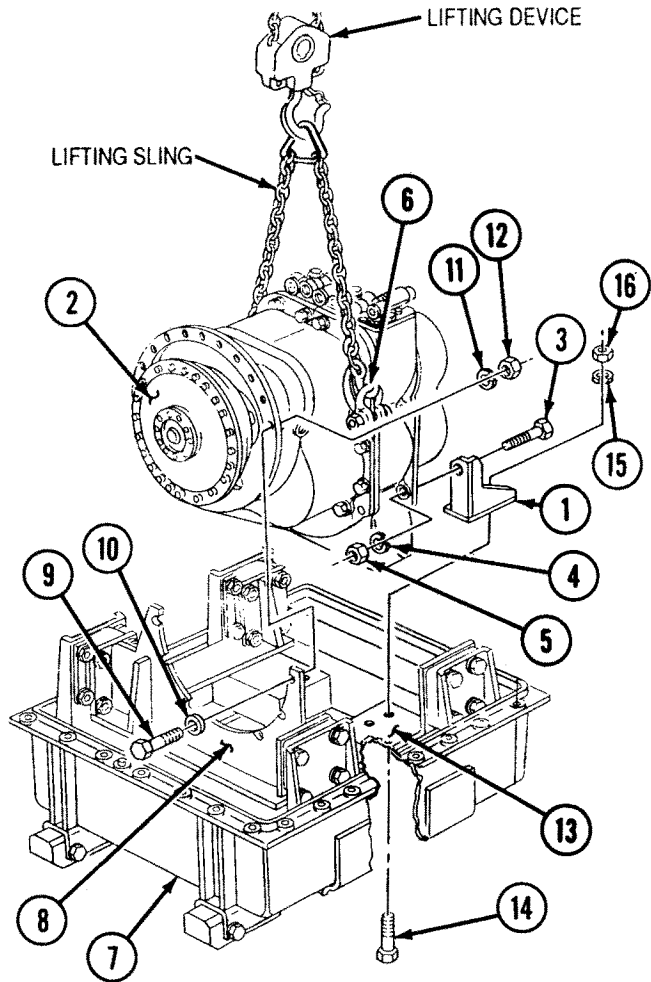
**WARNING**

- Lifting device must have a capacity greater than 1,358 lb (617 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

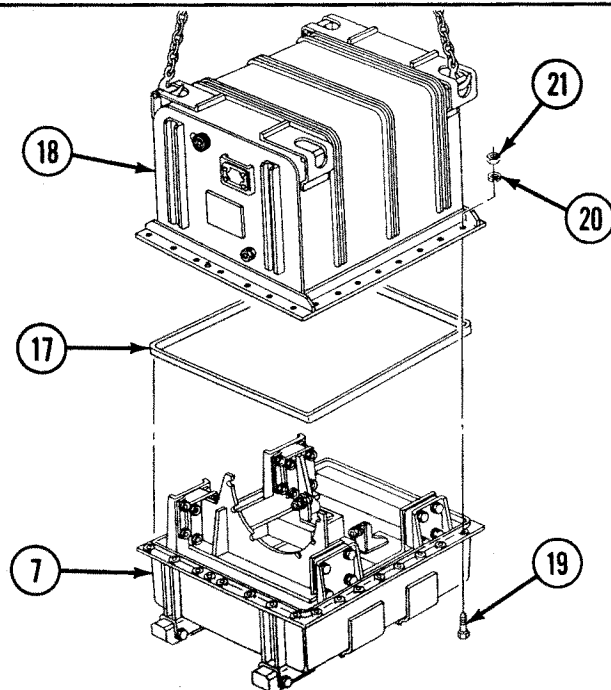
**Note**

Ensure bracket holes in front and rear of transmission are aligned.

- C** Raise transmission (2) and lower onto lower container (7).
- D** Secure transmission (2) to front bracket (8) with six screws (9), washers (10), lockwashers (11), and nuts (12). Tighten nuts (12) to 33-38 lb-ft (45-52 N·m).
- E** Remove sling from two shackles (6) on transmission (2), and from lifting device. Remove two shackles (6) from transmission (2).
- F** Install two brackets (1) on frame (13) with four screws (14), lockwashers (15), and nuts (16). Tighten nuts (16) to 148-175 lb-ft (201-237 N·m).



- G** If removed, install gasket (17) on lower container (7). Ensure gasket (17) is seated properly.
- H** Connect lifting sling to upper container (18) and lifting device.
- I** Lower upper container (18) onto lower container (7) and secure with twenty-eight screws (19), lockwashers (20), and nuts (21). Tighten nuts (21) to 71-85 lb-ft (96-115 N·m).





# TRANSMISSION CHARGING PUMP AND HOUSING REPLACEMENT

This task covers:

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

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Troubleshooting Reference:

Page 3-42

Transmission Oil  
Temperature Too  
High

Parts:

Gasket  
Lockwasher (8)

Equipment Condition:

Reference

Condition  
Description

Parts Reference:

TM 5-2350-262-24P Group AU

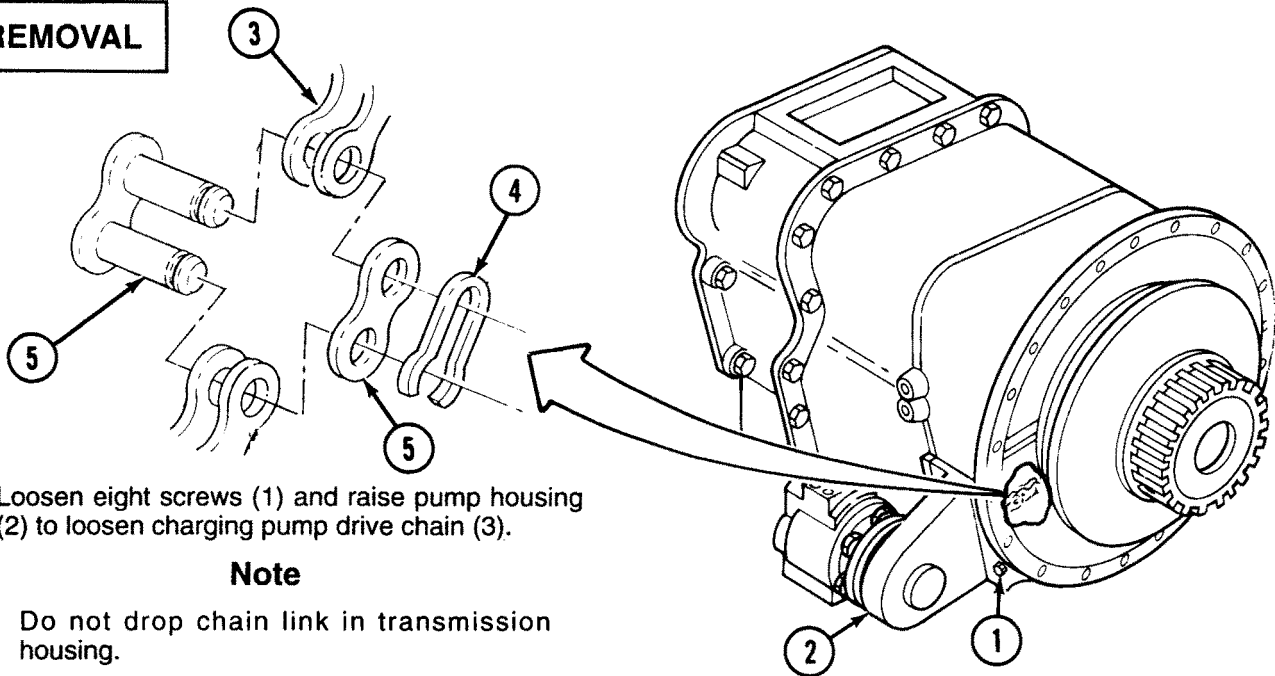
Page 4-186

Transmission  
Separated from  
Transfer Case

Personnel Required:

Construction Equipment Repairer 62B10

**REMOVAL**



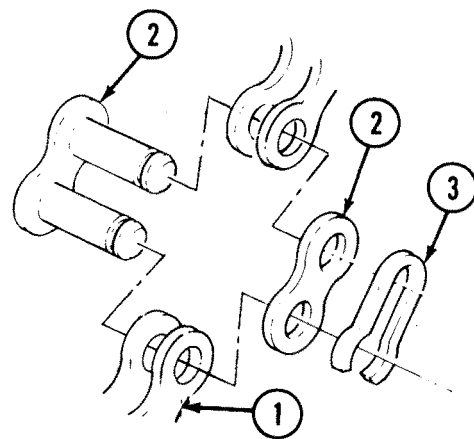
**A** Loosen eight screws (1) and raise pump housing (2) to loosen charging pump drive chain (3).

**Note**

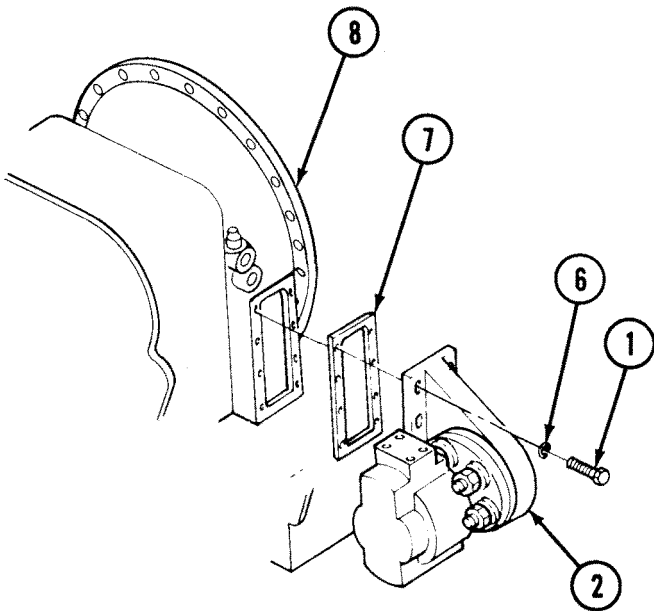
Do not drop chain link in transmission housing.

**B** Disconnect and remove charging pump drive chain (3) by removing spring clip (4) and connecting link (5).

**INSPECTION**



Inspect drive chain (1), connecting link (2), and spring clip (3). Replace damaged or worn drive chain (1), connecting link (2), or spring clip (3).



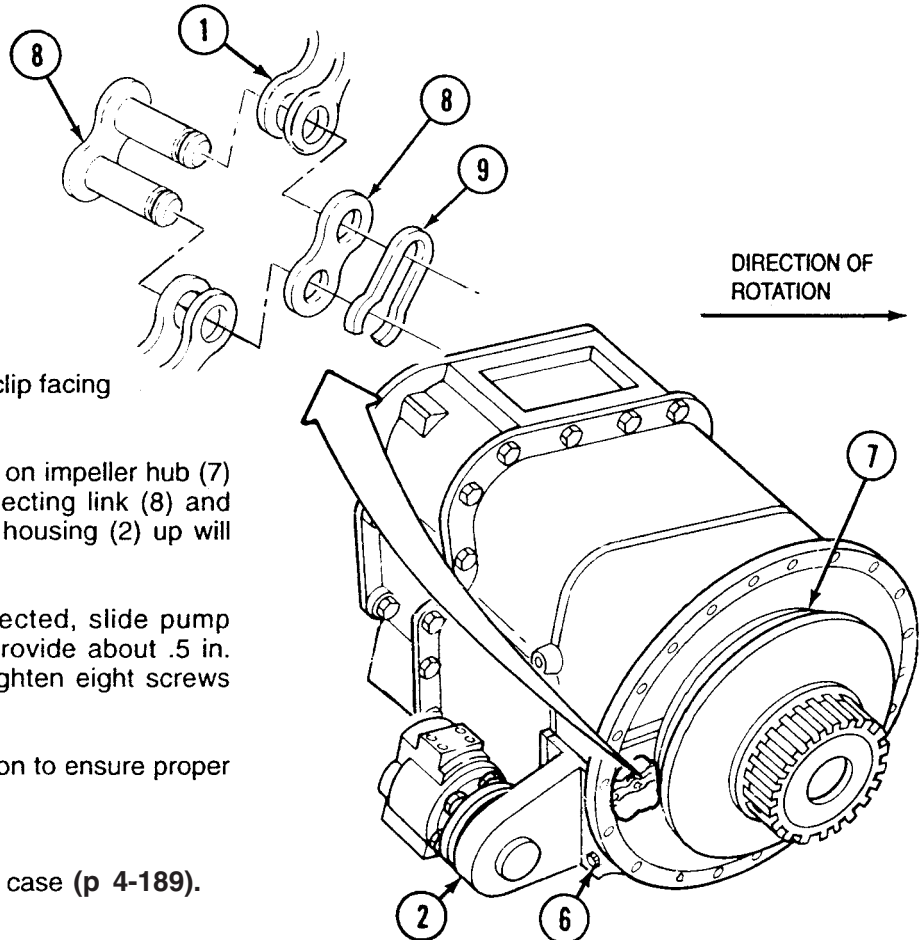
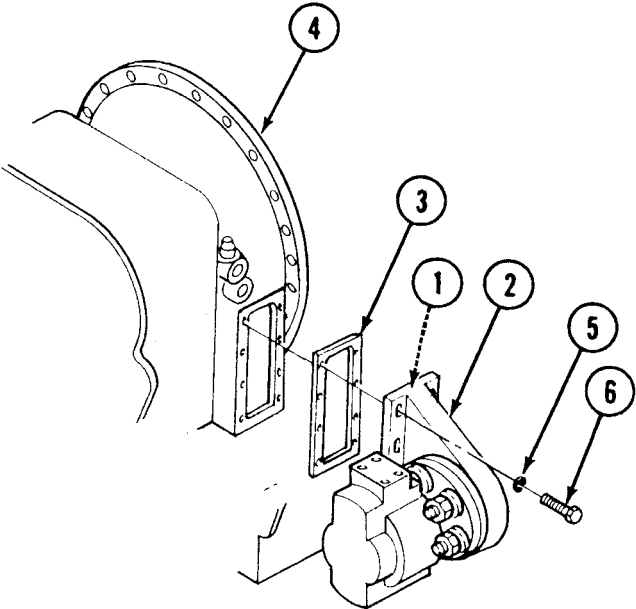
**C** Remove eight screws (1), lockwashers (6), pump housing (2), and gasket (7) from transmission (8). Discard lockwashers (6) and gasket (7).



**INSTALLATION**

**CAUTION**  
 Do not deflect roller chain with enough pressure to pull impeller from its fully installed position. Pulling the wobble out of the impeller with the roller chain during adjustment may cause binding and premature wear to the roller chain.

- A** Install chain (1) over sprocket on pump housing (2).
- B** With gasket (3) in position, install pump housing (2) on transmission (4) with eight lockwashers (5) and screws (6). Do not tighten screws (6).



**Note**

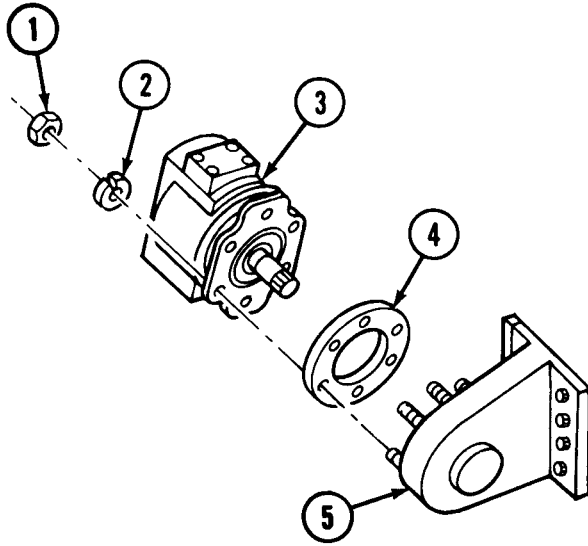
Install closed end of spring clip facing direction the chain rotates.

- C** Install chain (1) over sprocket on impeller hub (7) and connect ends with connecting link (8) and spring clip (9). Sliding pump housing (2) up will provide slack in chain (1).
- D** When chain ends are connected, slide pump housing (2) up or down to provide about .5 in. (12.7 mm) slack in chain. Tighten eight screws (6) to 23-25 lb-ft (31-34 N-m).
- E** Check the roller chain deflection to ensure proper tension.

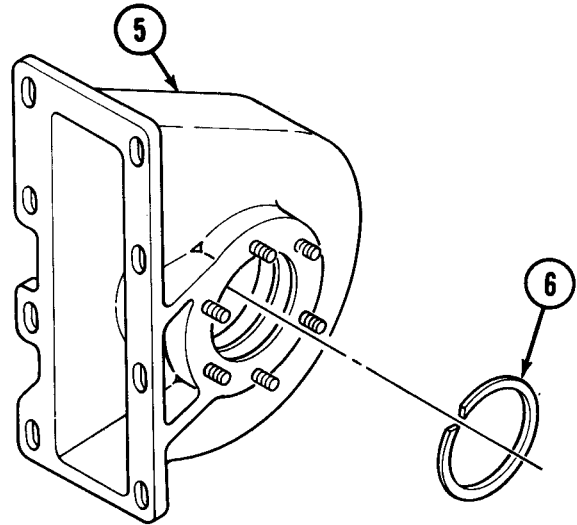
**FOLLOW-ON TASK:**  
 Install transmission on transfer case (p 4-189).



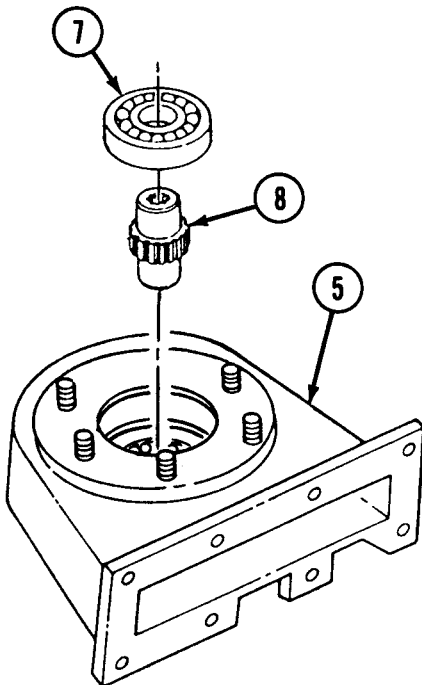
**DISASSEMBLY**



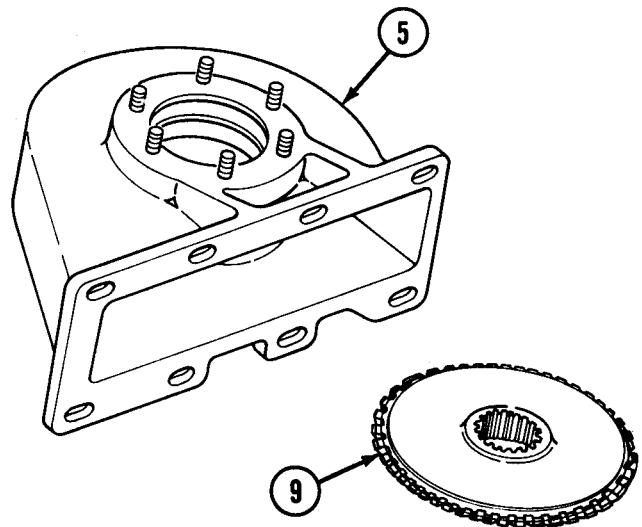
**A** Remove six nuts (1), lockwashers (2), charging pump (3), and gasket (4) from housing (5). Discard lockwashers (2) and gasket (4).



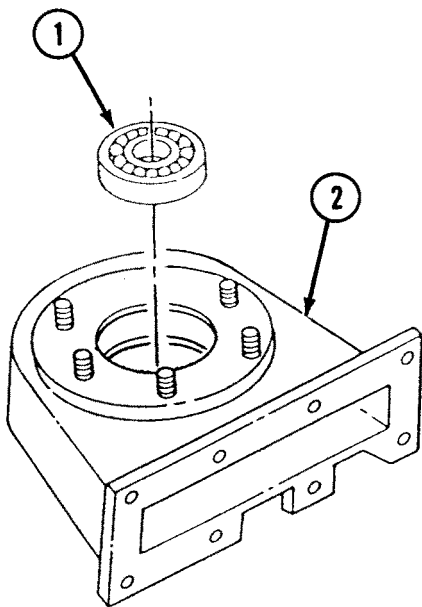
**B** Remove retaining ring (6) from housing (5).



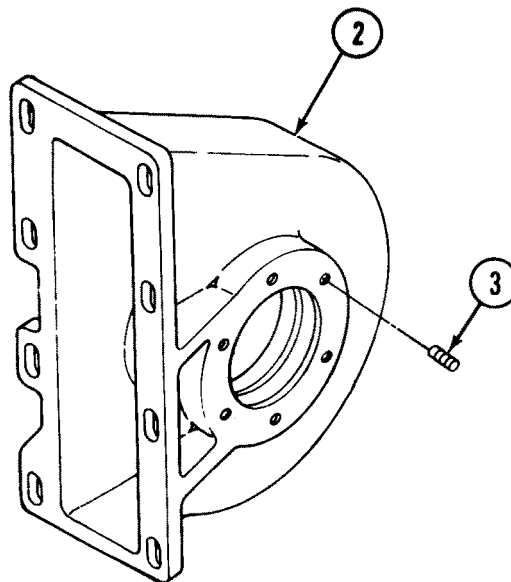
**C** Using puller, remove bearing (7) and spur gear (8) from housing (5).



**D** Remove drive sprocket (9) from housing (5).



**E** Using puller, remove bearing (1) from housing (2).



**F** Remove six studs (3) from housing (2) only if damaged or if studs (3) have started to pull out. Discard studs (3).

### CLEANING

Use general cleaning methods to clean all parts (p 2-9).

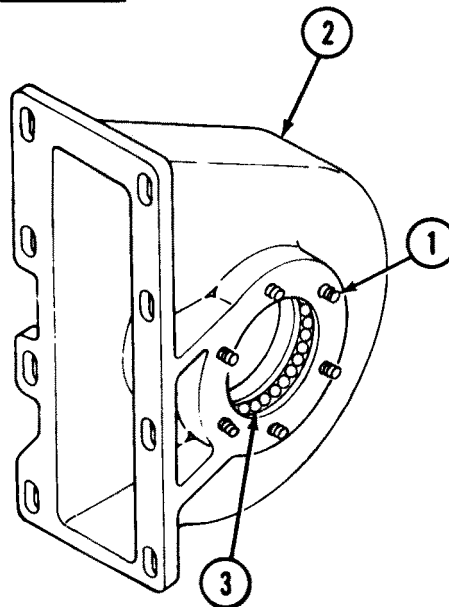
### INSPECTION

- A** Inspect sprocket for galling, cracks, and worn or broken teeth.
- B** Inspect bearings in accordance with TM 9-214.
- C** Inspect studs for stripped threads.

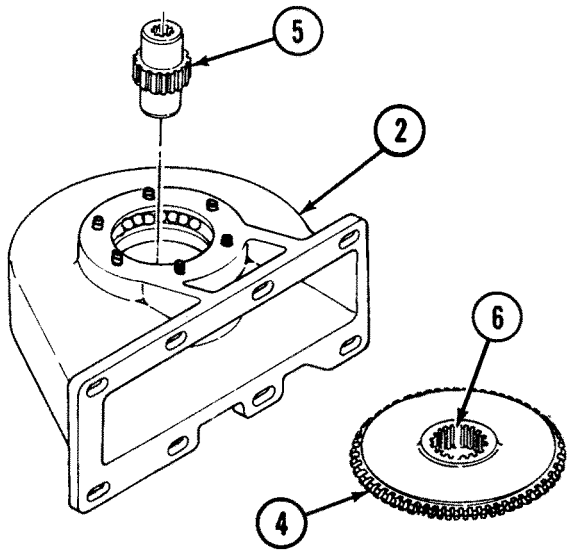
### REPAIR

Replace worn or damaged parts.

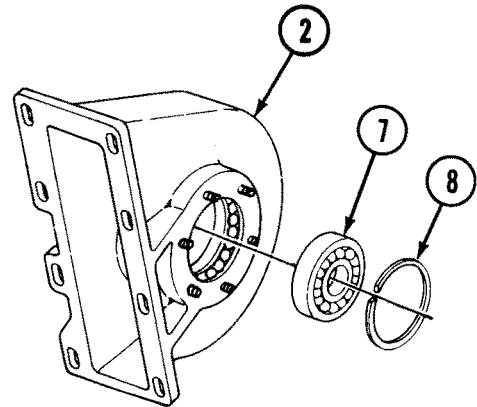
### ASSEMBLY



- A** If removed, install six studs (1) on housing (2). Install studs dry, to a free height of 0.906-0.938 in. (23-23.8 mm).
- B** Coat bearing (3) with lubricating oil, and install bearing (3) on housing (2).



**C** Position drive sprocket (4) in housing (2), and install spur gear (5) on hub (6) of drive sprocket (4).

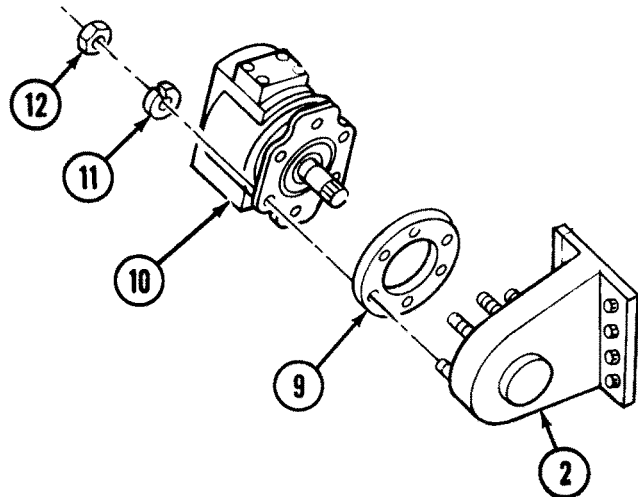


**D** Coat bearing (7) with lubricating oil, and install bearing (7) and retaining ring (8) on housing (2).

**E** Install gasket (9) and pump (10) on housing (2) with six lockwashers (11) and nuts (12). Tighten nuts (12) to 26-29 lb-ft (35-39 N-m).

**FOLLOW-ON TASK:**

Install transmission charging pump and housing (p 4-197).



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# TRANSMISSION CLUTCH COVER AND GASKET REPLACEMENT

---

This task covers:

- a. Removal
  - b. Installation
- 

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Materials:

Caps and Plugs           Item 7  
Appendix C

Sealing Compound       Item 16  
Appendix C

Grease                    Item 22  
Molybdenum Disulfide   Appendix C

Parts:

- Concave Washer (24)
- Gasket
- Packing
- Self-locking Screw (28)

Parts Reference:

TM 5-2350-262-24P   Group AU

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

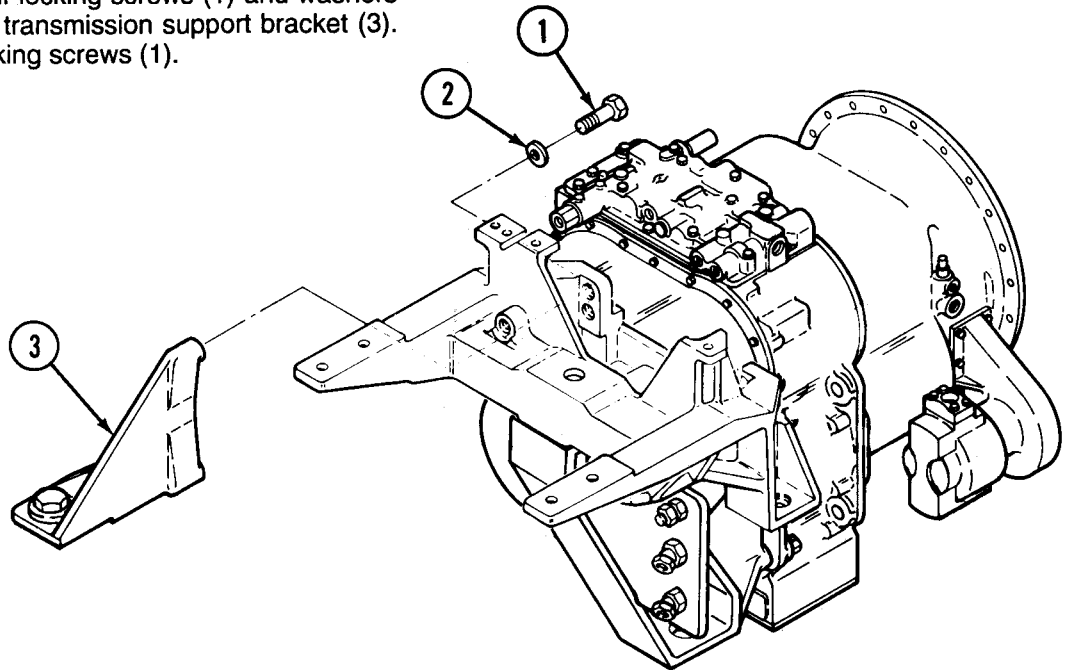
TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Transmission Output Flange Removed
Page 4-123	Power Package Removed

**REMOVAL**

**A** Remove two self-locking screws (1) and washers (2) and remove transmission support bracket (3). Discard self-locking screws (1).



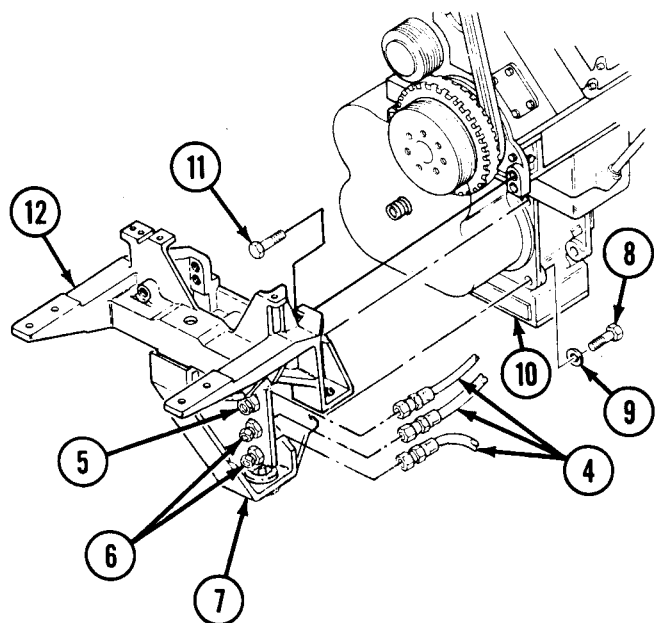
**CAUTION**

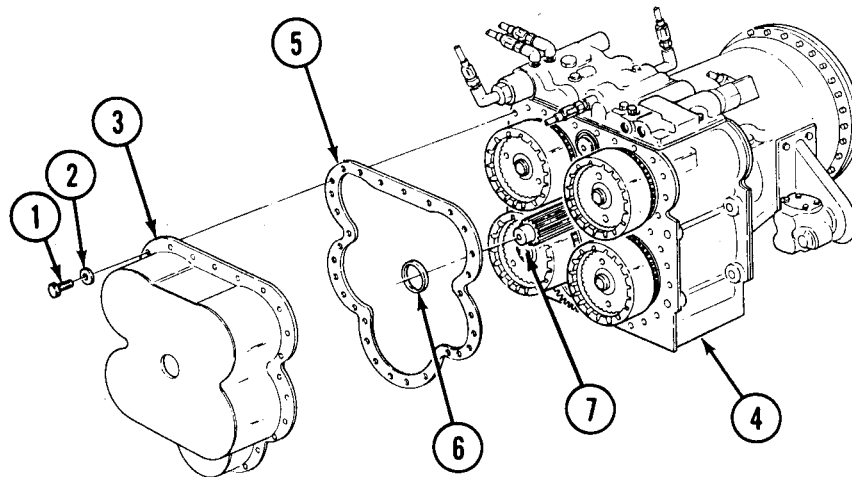
- Cover hose ends and ports to prevent contamination of oil. Failure to comply may result in damage to equipment.
- Support engine with blocks. Failure to comply may result in damage to equipment when engine bracket is removed.

**B** Remove three hoses (4) from nipple (5) and two elbows (6) on engine bracket (7).

**C** Remove two self-locking screws (8) and washers (9) from engine (10) and engine bracket (7). Discard self-locking screws (8).

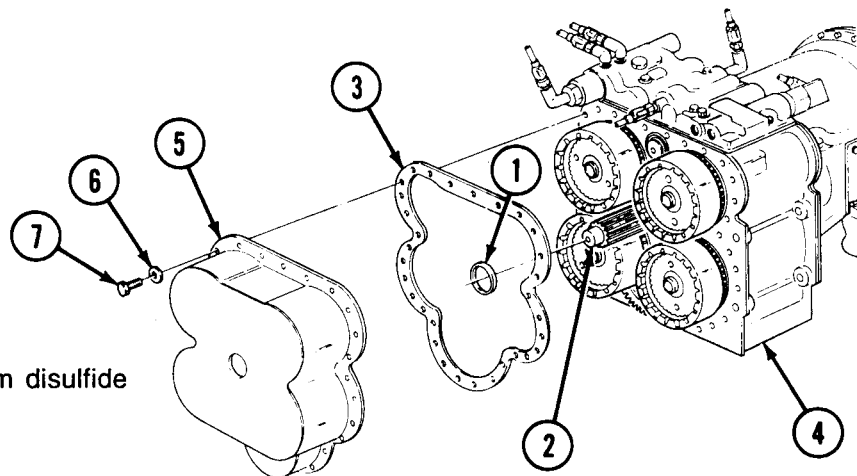
**D** Remove four screws (11) and radiator support bracket (12) and engine bracket (7) as a unit.





- E** Remove twenty-four self-locking screws (1) and concave washers (2) securing clutch cover (3) to transmission (4). Discard self-locking screws (1) and concave washers (2).
- F** Remove clutch cover (3) and gasket (5) from transmission (4). Discard gasket (5).
- G** Remove packing (6) from shaft (7). Discard packing (6).

**INSTALLATION**



**Note**

Coat packing with molybdenum disulfide grease prior to installation.

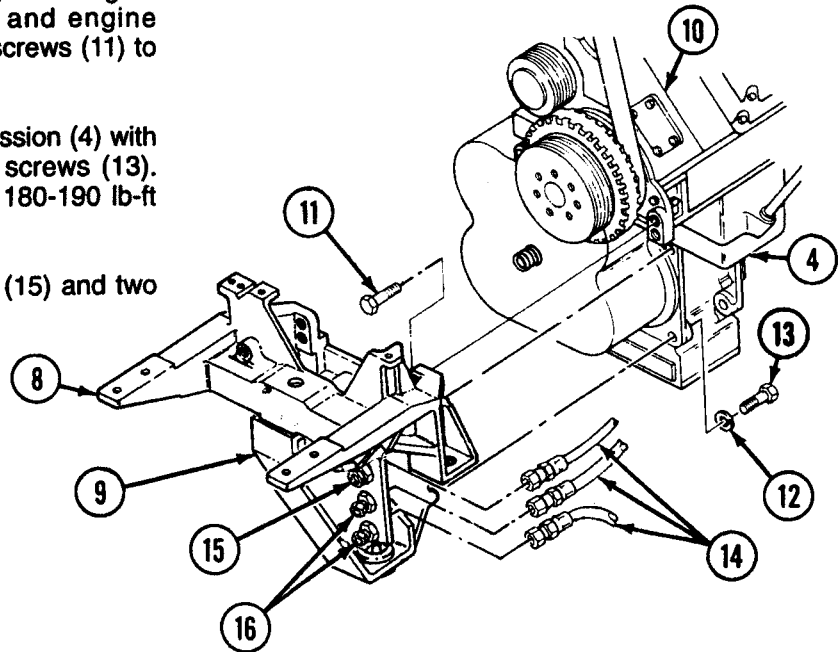
- A** Install packing (1) on shaft (2).
- Note**  
Apply sealing compound to both sides of gasket prior to installation.
- B** Install gasket (3) on transmission (4).
- C** Install clutch cover (5) on transmission (4) and secure with twenty-four concave washers (6) and self-locking screws (7). Tighten self-locking screws (7) to 23-25 lb-ft (31-34 N.m).



**Note**

Coat screws with sealing compound prior to installation.

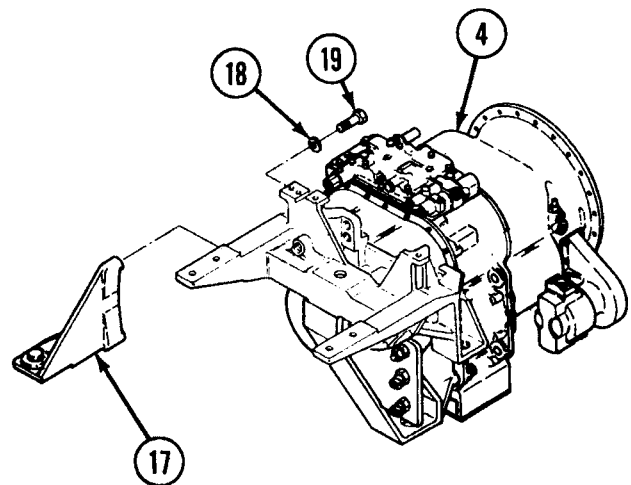
- D** Install radiator support bracket (8) and engine bracket (9) on transmission (4) and engine (10) with four screws (11). Tighten screws (11) to 300-315 lb-ft (407-427 N-m).
- E** Install engine bracket (9) on transmission (4) with two washers (12) and self-locking screws (13). Tighten self-locking screws (13) to 180-190 lb-ft (244-258 N-m).
- F** Connect three hoses (14) to nipple (15) and two elbows (16) on engine bracket (9).



- G** Install transmission support bracket (17) on transmission (4) with two washers (18) and self-locking screws (19). Tighten self-locking screws (19) to 190-200 lb-ft (257-271 N-m).

**FOLLOW-ON TASKS:**

- Install transmission output flange (TM 5-2350-262-20-2).
- Install power package (p 4-131).



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# STEER UNIT REPLACEMENT IN SHIPPING/STORAGE CONTAINER

---

This task covers:

- a. Removal
  - b. Installation
- 

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Lifting Device

Parts:

Lockwasher (38)

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Two Construction Equipment Repairers  
62B10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 4-211	Steer Unit Removed

General Safety Instructions:

### WARNING

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg).
- Ejector cylinder weighs 325 lb (148 kg).
- Personnel must stand clear during lifting operations.
- Do not disconnect hoses or fittings from ejector cylinder unless hydraulic pressure has been relieved.
- Parking brake will not hold vehicle when cable is removed or disconnected.
- Do not operate brake pedal or parking brake lever when personnel are working on brake linkage or bracket.

**REMOVAL**

**Note**

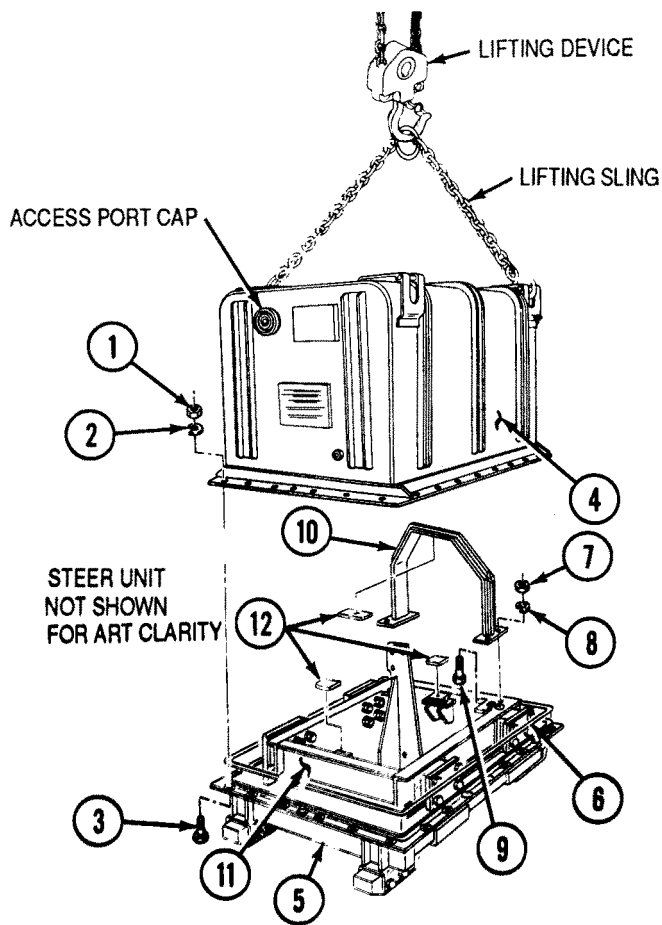
Release pressure from container by removing access port cap prior to removing hardware.

- A** Remove twenty-eight nuts (1), lockwashers (2), and screws (3) securing upper half of steer unit container (4) to lower half of steer unit container (5). Discard lockwashers (2).

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- B** Connect lifting sling to upper container (4) and lifting device. Lift upper container (4) up and move out of the way. If damaged, remove gasket (6) from lower container (5).
- C** Remove four nuts (7), lockwashers (8), and screws (9) securing clamp (10) to steer unit container frame (11). Discard lockwashers (8). Inspect rubber pads (12) and replace if damaged.

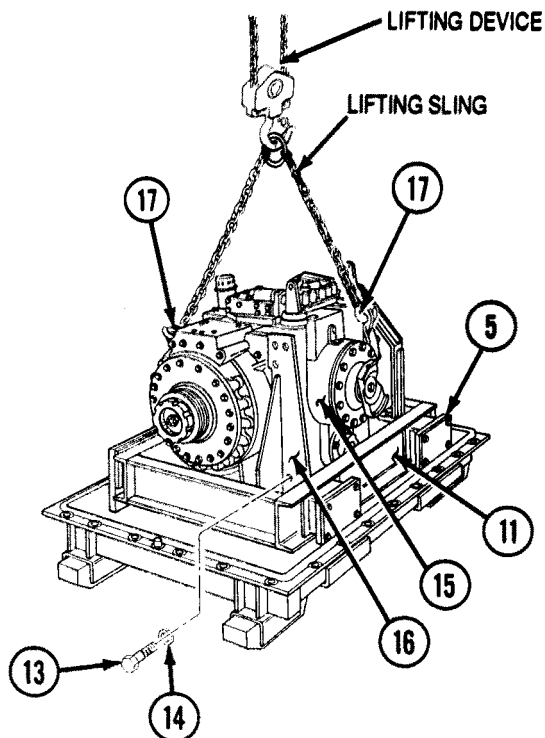


- D** Remove six screws (13) and lockwashers (14) securing steer unit (15) to bracket (16) on frame (11).
- E** Connect lifting sling to two lifting eyes (17) on steer unit (15), and connect lifting device to lifting sling. Raise lifting device to support weight of steer unit (15).

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- F** Raise steer unit (15) up and out of lower container (5). Remove sling from steer unit (15).



**INSTALLATION**

**A** Connect lifting sling to two lifting eyes (1) on steer unit (2), and connect lifting device to lifting sling.

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

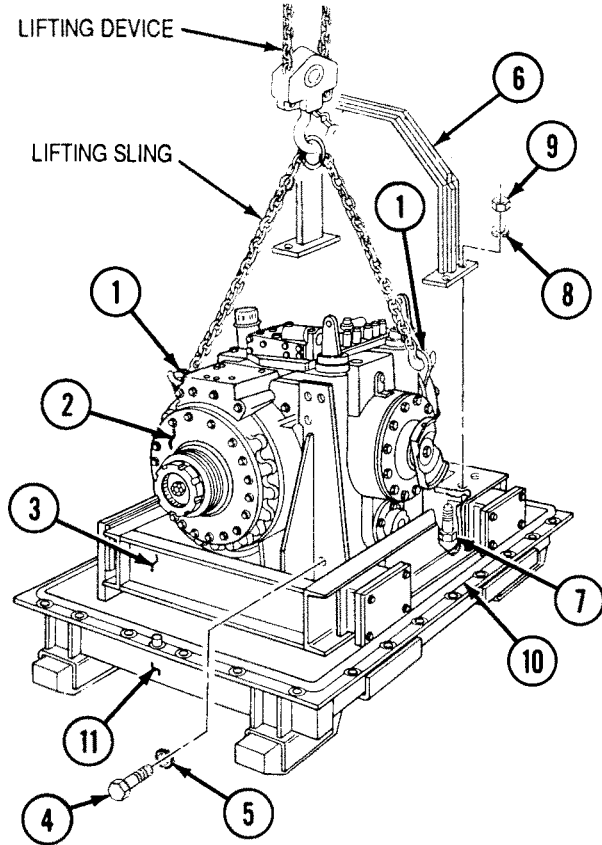
**B** Raise steer unit (2) and lower into steer unit container frame (3).

**C** Install steer unit (2) on frame (3) with six screws (4) and lockwashers (5). Tighten screws (4) to 71-83 lb-ft (96-113 N•m).

**D** Install clamp (6) on frame (3) with four screws (7), lockwashers (8), and nuts (9). Tighten nuts (9) to 32-38 lb-ft (43-51 N•m).

**E** Remove lifting sling from steer unit (2) and lifting device.

**F** If removed, install gasket (10) on lower container (11). Ensure gasket (10) is seated properly.

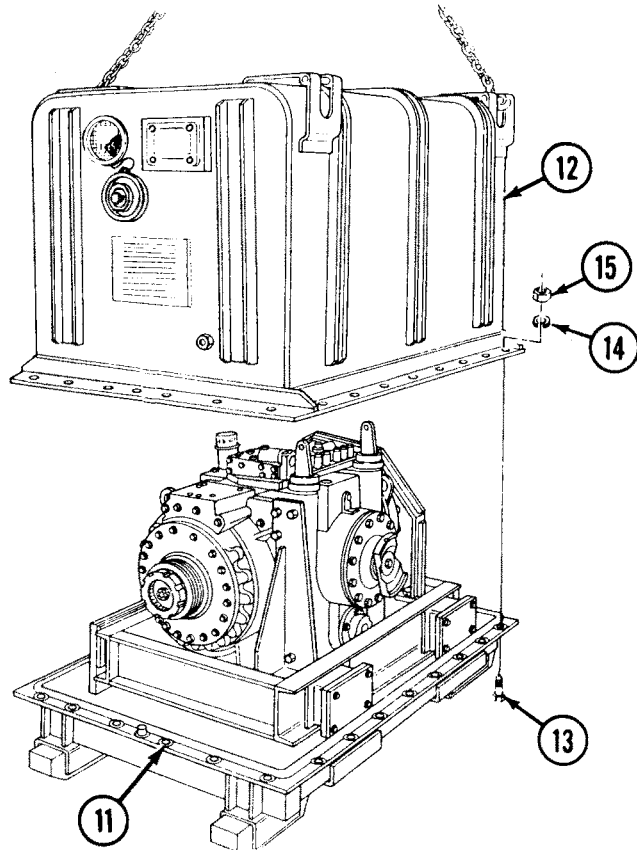


**G** Connect lifting sling to upper container (12) and lifting device.

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

**H** Lift upper container (12) onto lower container (11) and install twenty-eight screws (13), lockwashers (14), and nuts (15) on upper container (12) and lower container (11). Tighten nuts (15) to 71-83 lb-ft (96-113 N•m).



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## STEER UNIT REPLACEMENT

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This task covers:

- |                |                 |
|----------------|-----------------|
| a. Removal     | d. Inspection   |
| b. Disassembly | e. Assembly     |
| c. Cleaning    | f. Installation |
- 

### INITIAL SETUP

#### Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Lifting Device

#### Special Tools:

Kit, Hydraulic Parts      2590-01-216-8646

Adapter, Socket          5120-00-240-8702

Wrench Set,  
Crowfoot                  5120-01-302-4387

#### Materials:

Caps and Plugs            Item 7  
Appendix C

Sealing  
Compound                  Item 11  
Appendix C

Compound,  
Sealing Primer            Item 13  
Appendix C

Grease                      Item 21  
Appendix C

Lubricating  
Oil                            Item 31  
Appendix C

Drycleaning  
Solvent                      Item 39  
Appendix C

#### Parts:

Cotter Pin (3)

Gasket (3)

Locknut (3)

Lockwasher (10)

Packing (7)

Self-locking Screw (23)

#### Parts Reference:

TM 5-2350-262-24P      Group AF

TM 5-2350-262-24P      Group AM

TM 5-2350-262-24P      Group AU

#### Personnel Required:

Two Construction Equipment Repairers  
62B10

#### Reference:

TM 5-2350-262-10

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Equipment Condition:

**Note**

Move ejector forward to allow access of ejector hydraulic cylinder lines prior to performing equipment conditions.

<u>Reference</u>	<u>Condition Description</u>
Page 3-3	Hydraulic Pressure Relieved
TM 5-2350-262-20-1	Rear Floor Plate Supports Removed
TM 5-2350-262-20-1	Driver's Compartment Step Removed
TM 5-2350-262-20-1	Air Reservoir Removed
TM 5-2350-262-20-2	Radiator Removed
TM 5-2350-262-20-2	Final Drives Disconnected

General Safety Instructions:

**WARNING**

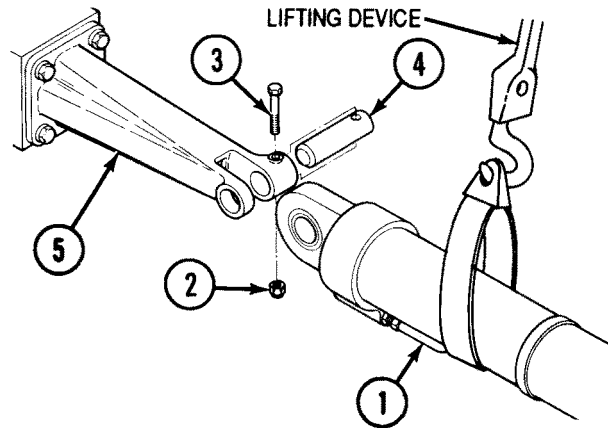
- Ejector cylinder weighs 325 lb (148 kg). Support ejector cylinder with blocks or straps while it is being disconnected or removed. Do not put hands or feet under ejector cylinder while it is being moved.
- Do not disconnect hoses or fittings from ejector cylinder unless hydraulic pressure has been relieved.
- Parking brake will not hold vehicle when cable is removed or disconnected. Block roadwheels when parking brake cable is removed or disconnected.
- Do not operate brake pedal or parking brake lever when personnel are working on brake linkage or bracket.
- Lifting device must have a weight capacity greater than 1,207 lb (548 kg).
- Personnel must stand clear during lifting operations.
- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated areas. Prolonged exposure can cause skin irritation.



**REMOVAL**

**WARNING**  
 Ejector cylinder weighs 325 lb (148 kg). Support ejector cylinder with blocks or straps while it is being disconnected or removed. Do not put hands or feet under ejector cylinder while it is being moved. Failure to comply may result in severe injury to personnel.

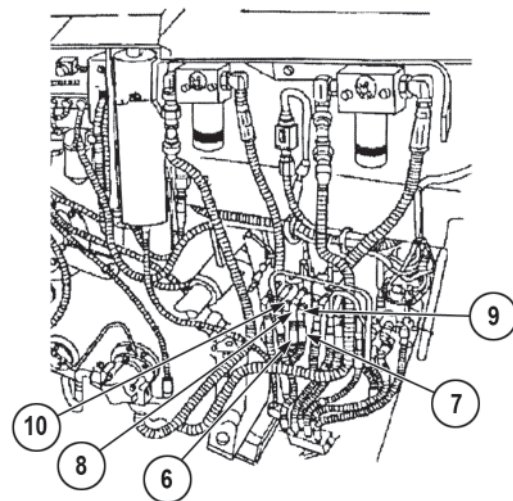
- A** Support rear end of ejector cylinder (1) with lifting device and remove locknut (2), screw (3), and pin (4) from ejector cylinder bracket (5). Discard locknut (2).



**WARNING**  
 Do not disconnect hoses or fittings from ejector cylinder unless hydraulic pressure has been relieved. Failure to comply may result in severe injury to personnel.

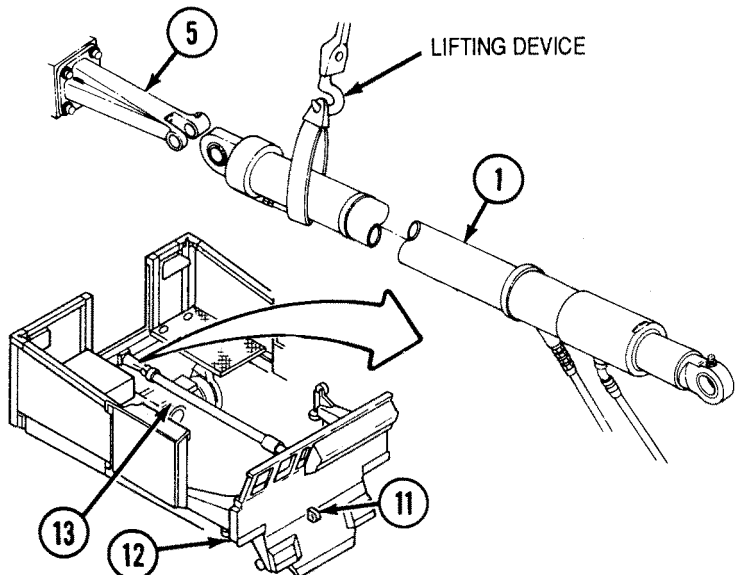
**CAUTION**  
 Cover hose ends and ports to prevent contamination of oil. Failure to comply may result in damage to equipment.

- B** Disconnect hoses (6) and (7) from two elbows (8) and (9) on directional control valve (10). Cap elbows (8) and (9). Drain oil from hoses (6) and (7) into a suitable container and plug hoses (6) and (7).



**CAUTION**  
 Ejector cylinder can damage engine and transmission hoses if it moves up or down. Keep ejector cylinder steady while moving it.

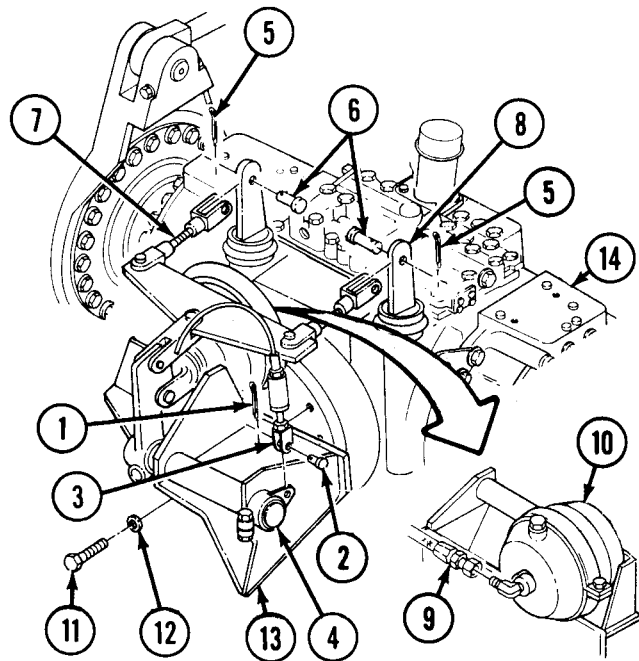
- C** Secure chain assembly to ejector eye (11) and move ejector assembly (12) forward until ejector cylinder (1) clears steer unit (13). Support ejector cylinder (1) in bowl with jackstand.



- D** Remove ejector cylinder bracket (5) (TM 5-2350-262-20-1).

## WARNING

- Parking brake will not hold vehicle when cable is removed or disconnected. Block roadwheels when parking brake cable is removed or disconnected. Failure to comply will allow vehicle to roll, and may result in severe injury to personnel, death, or damage to equipment.
- Do not operate brake pedal or parking brake lever when personnel are working on brake linkage or bracket. Failure to comply may result in severe injury to personnel.



**E** Remove cotter pin (1), headed straight pin (2), and brake cable clevis (3) from lever (4). Discard cotter pin (1).

**F** Remove two cotter pins (5), headed straight pins (6), and brake clevises (7) from brake levers (8). Discard cotter pins (5).

**G** Disconnect air line (9) from brake chamber (10).

**H** Remove six self-locking screws (11), washers (12), brake chamber (10), and bracket assembly (13) from steer unit (14). Discard self-locking screws (11).

## CAUTION

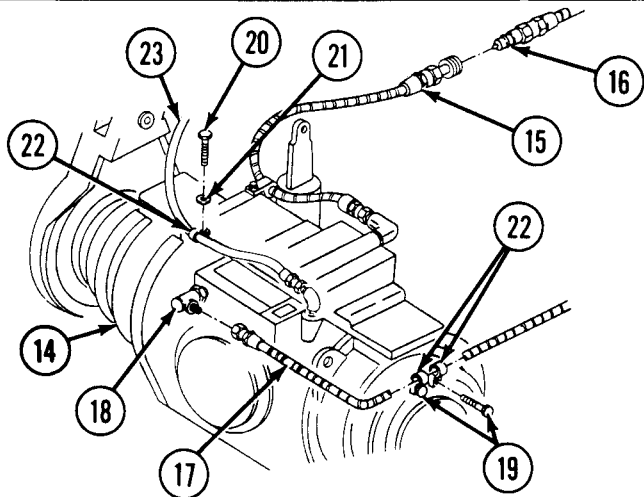
Cover fittings and hose ends to prevent contamination of oil. Failure to comply may result in damage to equipment.

### Note

Tag hoses prior to removal for installation.

**I** Disconnect hose (15) at quick-disconnect (16) and hose (17) from elbow (18) on steer unit (14).

**J** Remove two screws (19), self-locking screw (20), washer (21), and three clamps (22) securing hoses (17) and (23) to steer unit (14). Discard self-locking screw (20).

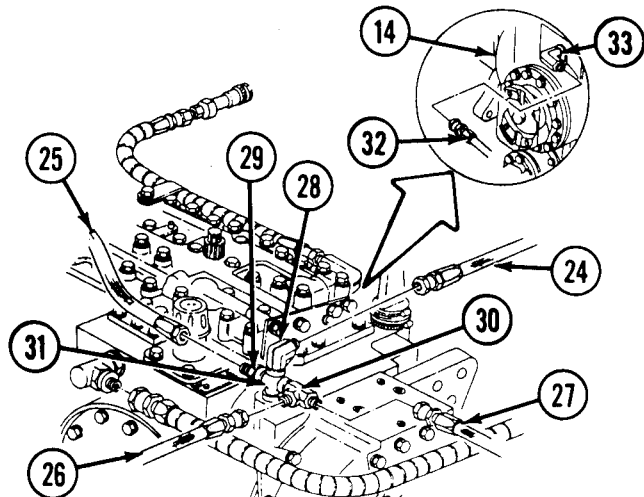


### Note

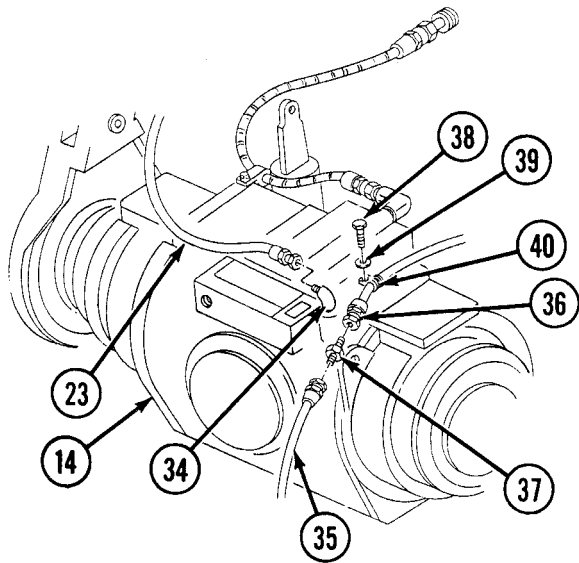
There are two configurations of breather hoses. Perform steps K and L for old configuration. Perform steps M through O for new configuration.

**K** Disconnect hoses (24), (25), (26), and (27) from elbow (28), adapter (29), and tee (30) on cross-pipe (31).

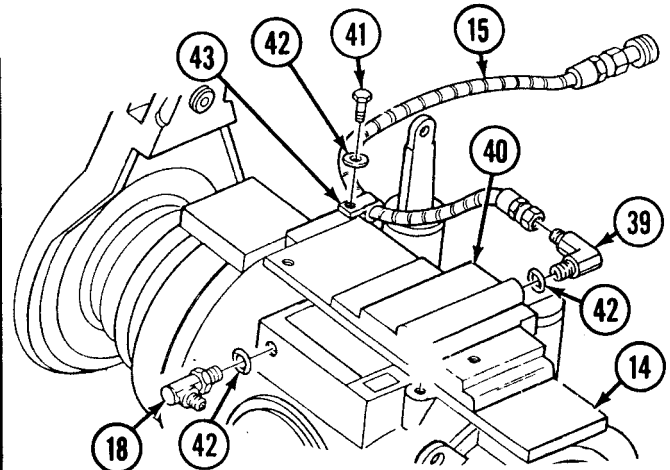
**L** Disconnect hose (32) from elbow (33) on steer unit (14).







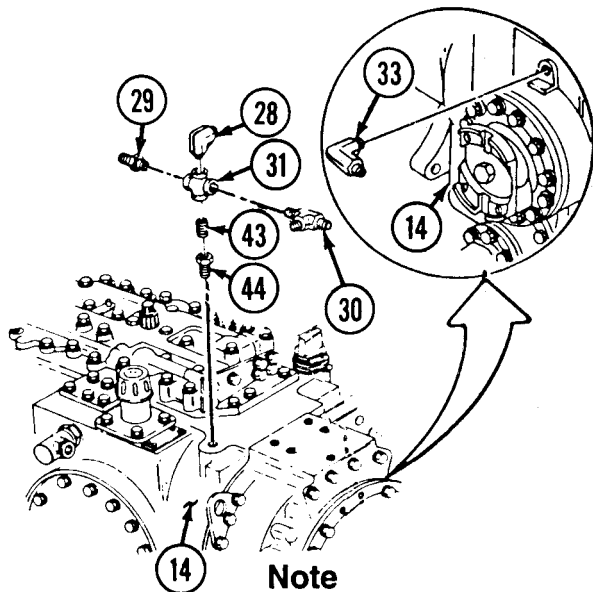
- M** Disconnect hose (23) from elbow (34) on steer unit (14).
- N** Disconnect hoses (35) and (36) from union (37).
- O** Remove self-locking screw (38), washer (39), and clamp (40) securing hose (36) to steer unit (14). Discard self-locking screw (38).



**Note**

Perform steps P through R if replacing steer unit.

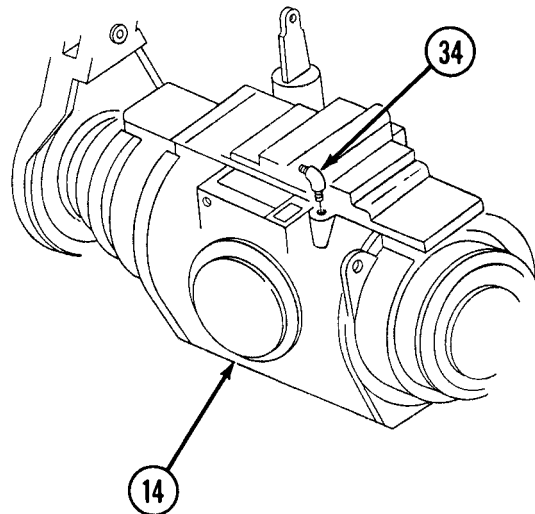
- P** Disconnect hose (15) from elbow (39) on valve body (40).
- Q** Remove self-locking screw (41), washer (42), clamp (43), and hose (15) from steer unit (14). Discard self-locking screw (41).
- R** Remove elbows (39) and (18) and two packings (42) from steer unit (14) and valve body (40). Discard packings (42).



**Note**

Perform steps S and T if replacing steer unit with old breather hose configuration.

- S** Remove elbows (28) and (33) from crosspipe (31) and steer unit (14).
- T** Remove adapter (29) and tee (30) from crosspipe (31). Remove crosspipe (31), nipple (43), and bushing (44) from steer unit (14).



**Note**

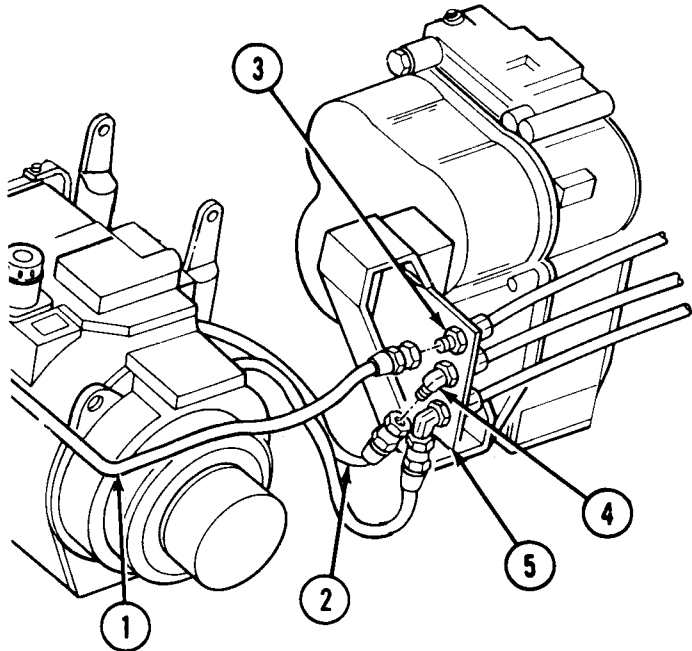
Perform step U if replacing steer unit with new breather hose configuration.

- U** Remove elbow (34) from steer unit (14).

### CAUTION

Cover fittings and hose ends to prevent contamination of oil. Failure to comply may result in damage to equipment.

- V** Disconnect hoses (1) and (2) from adapter (3) and elbow (4) on engine mounting bracket (5).



### Note

- Perform step W if steer unit has new breather configuration.
- Perform step X if steer unit has old breather configuration.

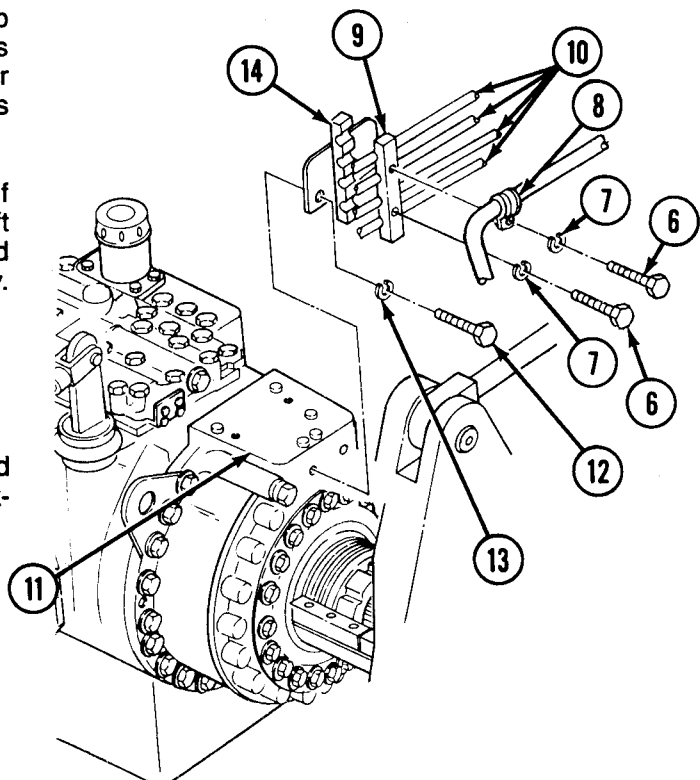
- W** Remove two screws (6), lockwashers (7), loop clamp (8), half block clamp (9), and four hoses (10) from left side of steer unit (11). Pull four hoses (10) toward left side of hull and tie hoses (10) out of way. Discard lockwashers (7).

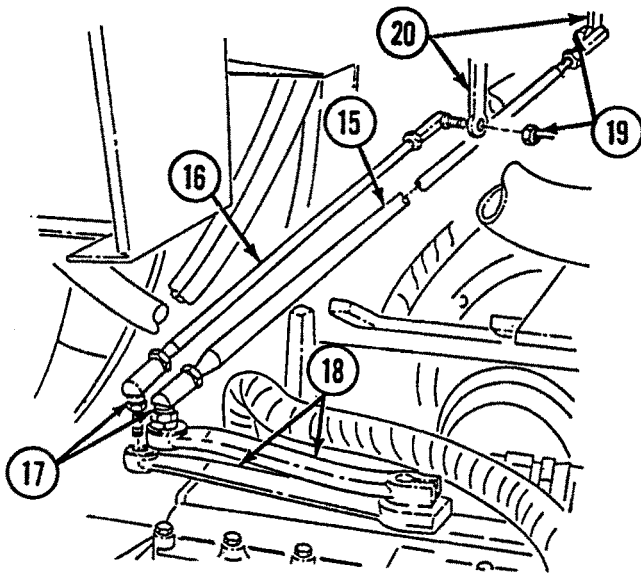
- X** Remove two screws (6), lockwashers (7), half block clamp (9), and four hoses (10) from left side of steer unit (11). Pull four hoses (10) toward left side of hull and tie hoses (10) out of way. Discard lockwashers (7).

### Note

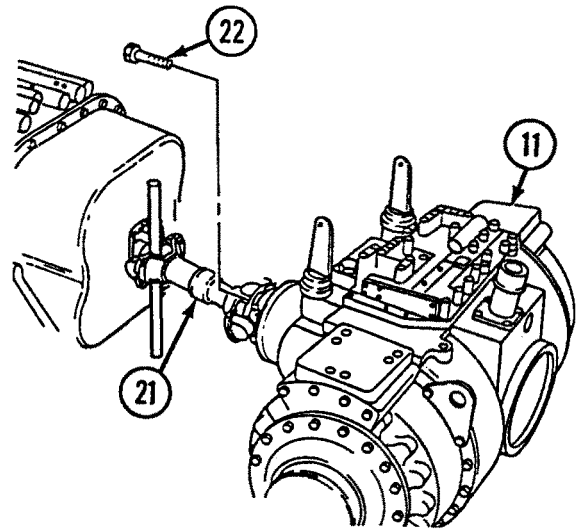
Perform step Y only if replacing steer unit.

- Y** Remove two screws (12), lockwashers (13), and loop clamp (14) from steer unit (11). Discard lockwashers (13).





- Z** Disconnect steering linkage (15) and CB/GS steer selector linkage (16) by removing two ball joints (17) from levers (18).
- AA** Disconnect steering linkage (15) and CB/GS steer selector linkage (16) by removing two locknuts (19) from bellcranks (20). Discard locknuts (19).



**CAUTION**

Driveshaft must be supported. Failure to comply may result in damage to equipment.

- AB** Disconnect driveshaft (21) from steer unit (11) by removing four self-locking screws (22). Discard self-locking screws (22).

- AC** Connect chain and lifting device to two lifting eyes on steer unit (11). Raise lifting device to take up slack.

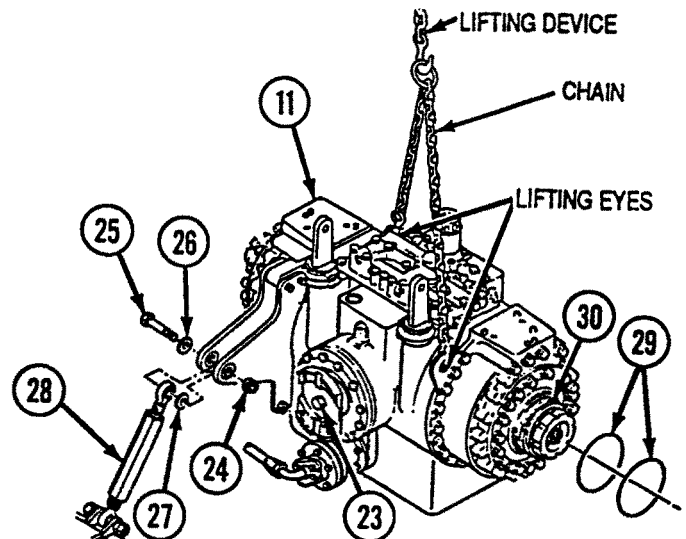
**CAUTION**

Alignment of steer unit is established by length of torque link. Do not remove or change length of torque link when removing steer unit. Failure to comply may result in damage to equipment.

- AD** Remove nut (24), self-locking screw (25), washer (26), and spacer (27) from upper end of torque link (28). Discard self-locking screw (25).

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.



**Note**

Steer unit may have to be maneuvered to the left or right to clear radiator bracket.

- AE** Lift steer unit (11) clear of vehicle by tilting input flange (23) up to clear radiator bracket. Remove chain and lifting device.
- AF** Remove four packings (29) from access covers (30) of steer unit (11). Discard packings (29).
- AG** Drain steer unit (TM 5-2350-262-10).

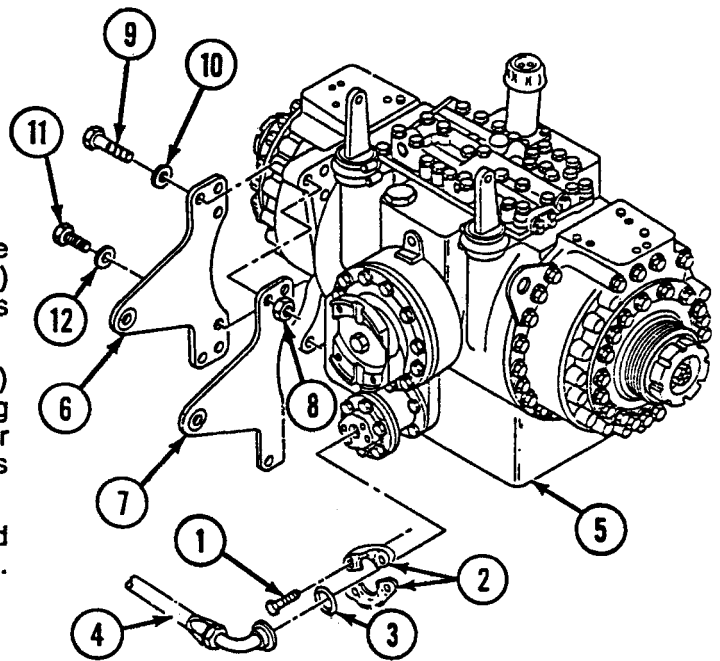
**CAUTION**

When raising or lowering steer unit, ensure all hoses and linkages are out of the way. Failure to comply may result in damage to equipment.

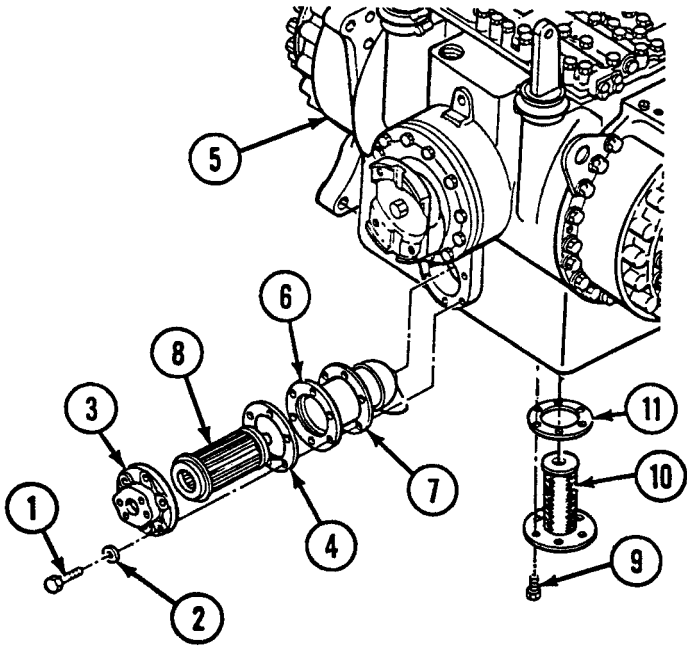
**Note**

Perform steps AH through AJ only for replacement of steer unit and after steer unit is removed.

- AH** Remove four self-locking screws (1), two-piece flanged fitting (2), packing (3), and hose (4) from steer unit (5). Discard self-locking screws (1) and packing (3).
- AI** Remove outboard (six mounting holes) plate (6) and inboard plate (four mounting holes) (7) from steer unit (5) by removing four nuts (8), self-locking screws (9), and washers (10). Discard self-locking screws (9).
- AJ** Remove two self-locking screws (11) and washers (12) from mounting holes in plate (6). Discard self-locking screws (11).



**DISASSEMBLY**



- A** Remove six screws (1), lockwashers (2), access cover (3), and gasket (4) from steer unit (5). Discard lockwashers (2) and gasket (4).
- B** Remove strainer body (6), gasket (7), and strainer (8) from steer unit (5). Discard gasket (7).
- C** Remove six screws (9), element strainer (10), and gasket (11) from steer unit (5). Discard gasket (11).

**CLEANING**

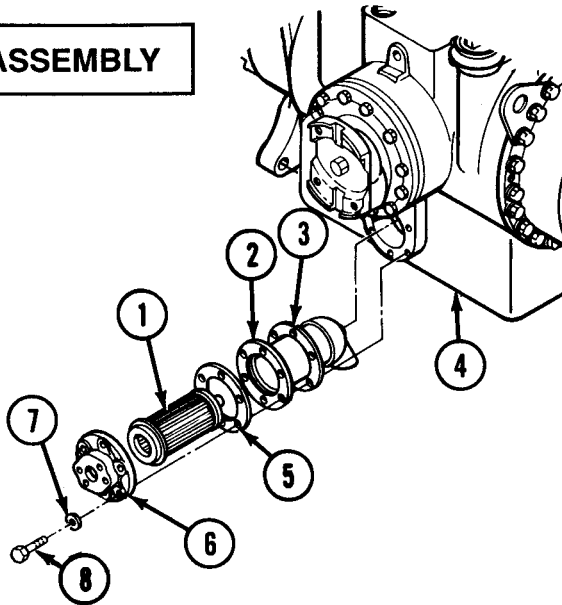
**WARNING**  
 Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated areas. Prolonged exposure can cause skin irritation. Failure to comply may result in severe injury to personnel and damage to equipment.

Clean strainer, strainer body, and access cover with drycleaning solvent. Allow to air-dry.

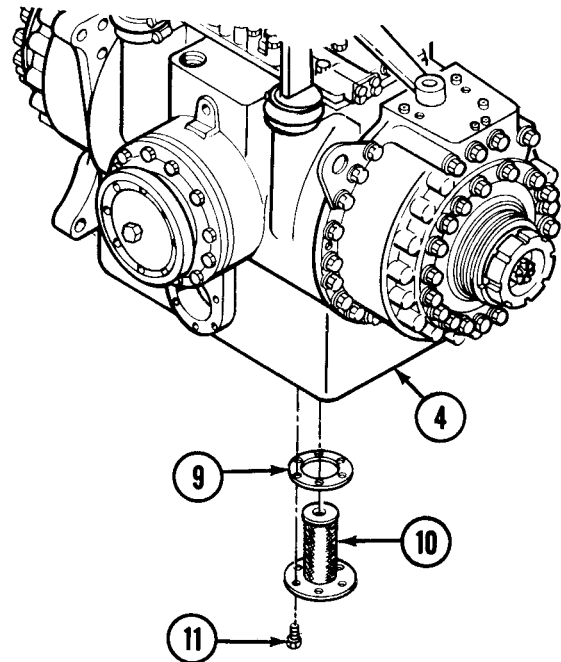
**INSPECTION**

Inspect strainer and strainer body for cracks or other damage. Replace if necessary.

**ASSEMBLY**



- A** Install strainer (1) on strainer body (2).
- B** Install strainer body (2) and gasket (3) on steer unit (4).
- C** Install gasket (5) and access cover (6) on steer unit (4) with six lockwashers (7) and screws (8).



- D** Install gasket (9) and element strainer (10) on steer unit (4) with six screws (11).

**INSTALLATION**

**Note**

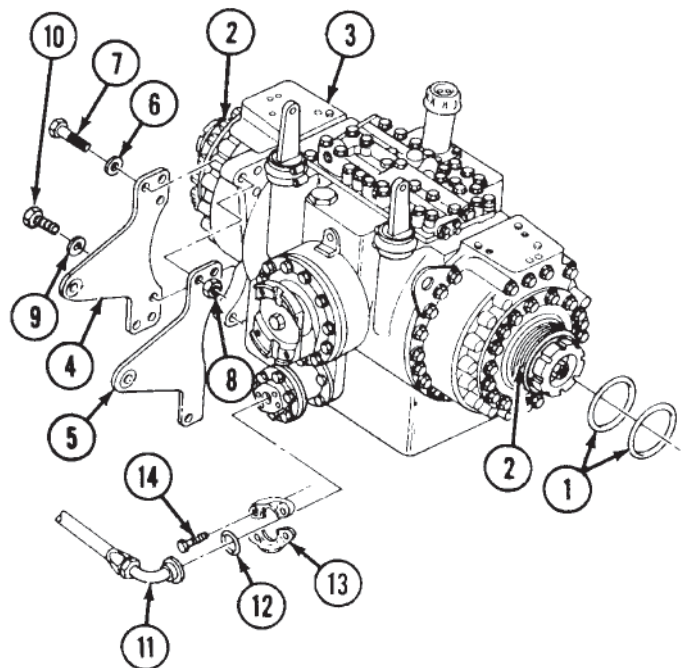
Adjust brake levers prior to installing steer unit (TM 5-2350-262-20-2).

- A** Coat four packings (1) with oil, and install four packings (1) on access covers (2) of steer unit (3).

**Note**

Perform steps B through E only for steer unit replacement.

- B** Install outboard plate (4) (six mounting holes) and inboard plate (5) (four mounting holes) on steer unit (3) with four washers (6), self-locking screws (7), and nuts (8).
- C** Install two washers (9) and self-locking screws (10) on plate (4).
- D** Tighten four self-locking screws (7) to 40-50 lb-ft (54-68 N.m) and two self-locking screws (10) to 100-110 lb-ft (136-149 N.m).
- E** Secure STEER UNIT BOT-3S hose (11) to steer unit (3) with packing (12), two-piece flanged fitting (13), and four self-locking screws (14).





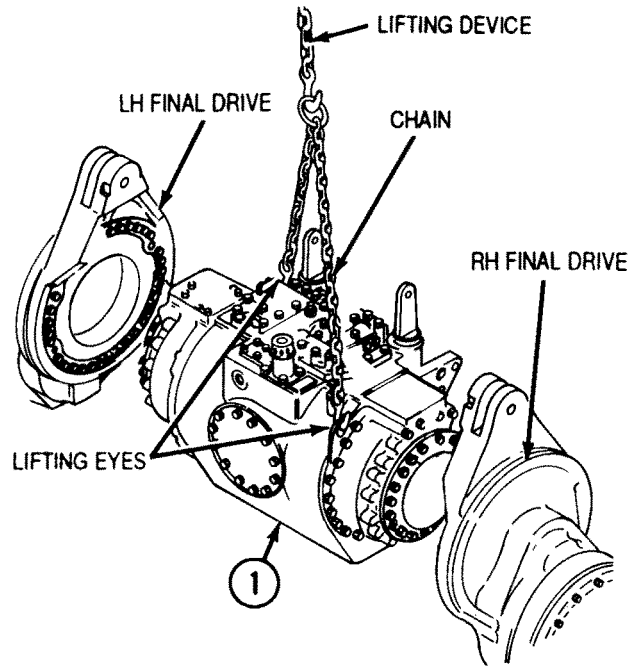
- F** Connect chain and lifting device to two lifting eyes on steer unit (1).

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

**CAUTION**

When raising or lowering steer unit, ensure all hoses and linkages are out of the way. Failure to comply may result in damage to equipment.



- G** Lift steer unit (1) and install on vehicle by resting steer unit ends on flanges of LH and RH final drives. Ensure half-ring rests in alignment groove of steer unit(1).

- H** Remove chain and lifting device from steer unit (1).

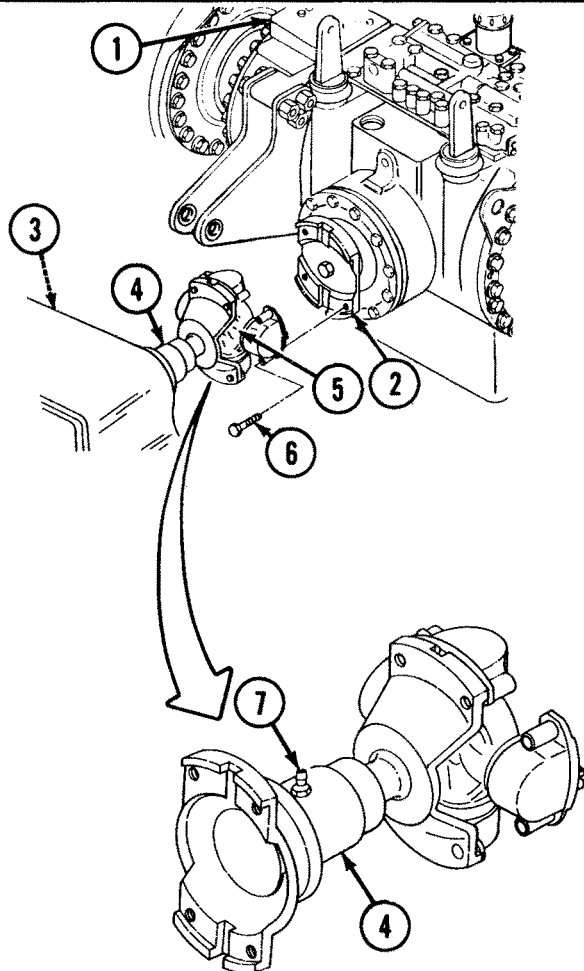
**CAUTION**

Before connecting driveshaft to steer unit, ensure driveshaft splines are not seized and that driveshaft is free to collapse and extend. Failure to comply may result in damage to equipment.

- I** Rotate steer unit flange (2) until aligned with transmission flange (3).

**CAUTION**

Do not use mounting screws to seat drive-shaft on steer unit flange. Failure to comply may result in damage to equipment.

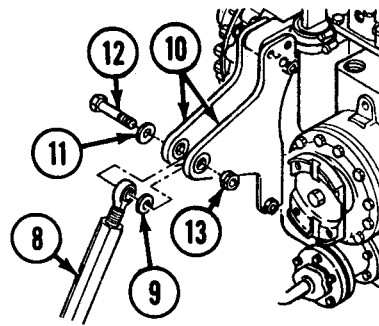


- J** Connect driveshaft (4) to steer unit (1) by connecting universal joint (5) to steer unit flange (2). Strike universal joint (5) with soft hammer to seat driveshaft (4) on flange (2).

- K** Secure driveshaft (4) by installing four self-locking screws (6). Tighten self-locking screws (6) to 90-95 lb-ft (122-129 N-m).

- L** Lubricate driveshaft (4) at grease fitting (7) with grease.

- M** Insert torque link (8) and spacer (9) between steer unit mounting plates (10). Secure with washer (11), self-locking screw (12), and nut (13).
- N** Use a straight edge or rod to check alignment of steer unit (1) and transmission (14).



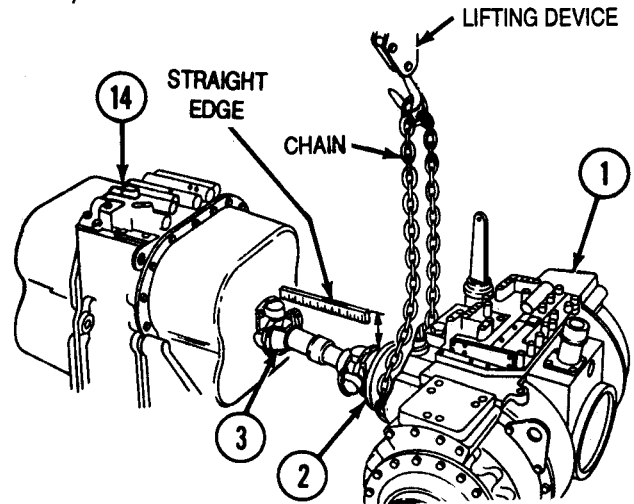
**Note**

If torque link does not require adjustment, proceed to step R.

**WARNING**

Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.

- O** If flange (2) and transmission flange (3) are not in a straight line, connect chain around flange (2). Connect lifting device to steer unit and raise to take up slack. Slowly raise steer unit (1) until flanges (2) and (3) are aligned.

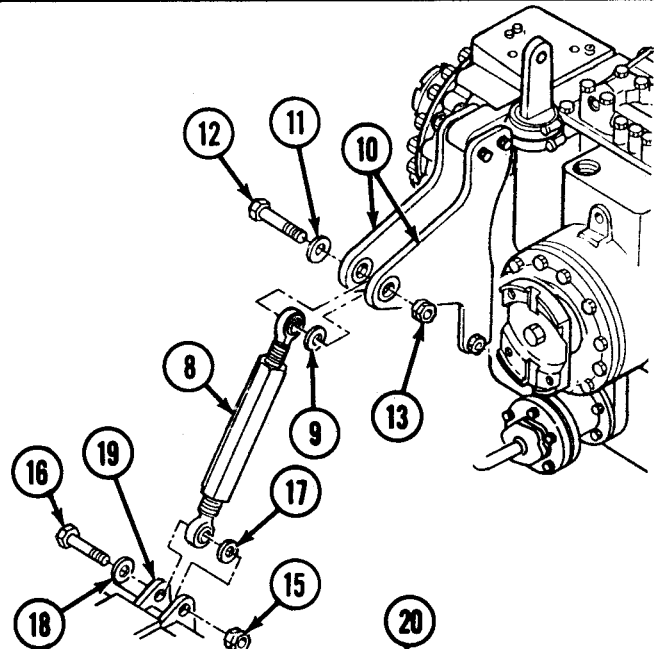


- P** Remove nuts (13) and (15), self-locking screws (12) and (16), spacers (9) and (17), washers (11) and (18), and torque link (8) from steer unit mounting plates (10) and hull bracket (19). Turn torque link (8) until it is at the proper length to align flanges (2) and (3).

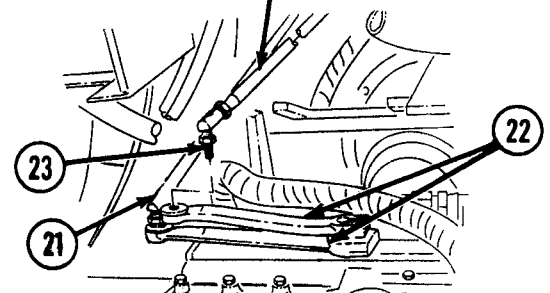
**Note**

Apply sealing compound primer and sealing compound to rod end bearings of torque link prior to installation.

- Q** Install assembled torque link (8) on steer unit mounting plates (10) and hull brackets (19) with washers (11) and (18), self-locking screws (12) and (16), spacers (9) and (17), and nuts (13) and (15). Tighten self-locking screws (12) and (16) to 100-120 lb-ft (136-163 N·m). Remove lifting device and chain from steer unit (1).



- R** Install steering linkage (20) and CB/GS steer selector linkage (21) on levers (22) with two ball joints (23).



### CAUTION

If installing a new steer unit, remove and discard the six self-locking screws from the input flange cover. Ensure the six self-locking screws are 2.25 in. (57.2 mm) or damage to the steer unit housing will result.

#### Note

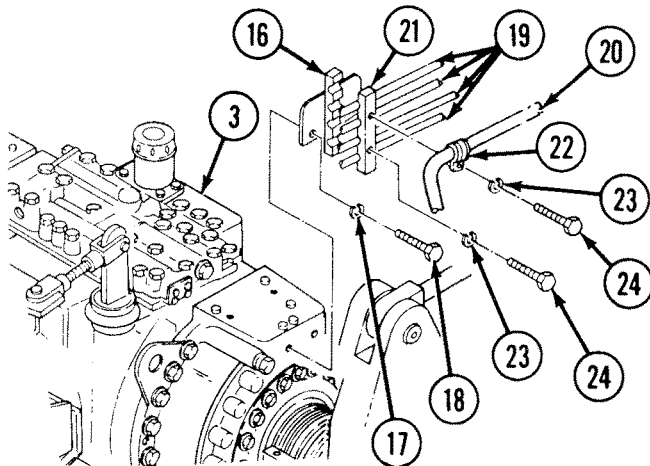
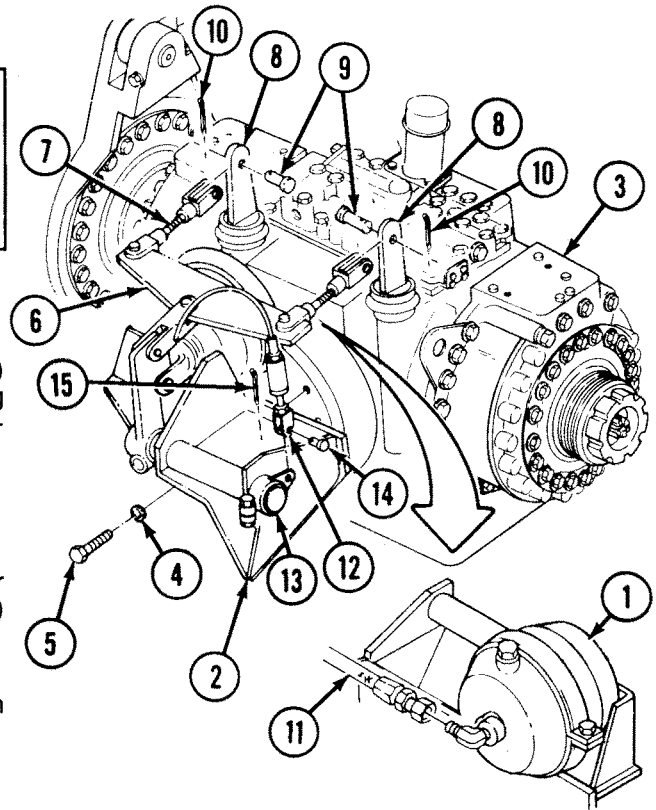
Apply lubricating oil to threads of screws prior to installation.

- S** Install brake chamber (1) and bracket assembly (2) on steer unit (3) with six washers (4) and self-locking screws (5). Tighten self-locking screws (5) to 44-46 lb-ft (60-62 N·m).

#### Note

Ensure headed straight pins are installed with heads facing inboard.

- T** Install equalizer bar (6) and two clevises (7) on steer unit brake levers (8) with two headed straight pins (9) and cotter pins (10).
- U** Connect air hose (11) to brake chamber (1).
- V** Install brake cable clevis (12) on lever (13) with headed straight pin (14) and cotter pin (15).
- W** Adjust CB/GS steer selector lever and linkage (TM 5-2350-262-20-2).



#### Note

Perform step X only if replacing steer unit.

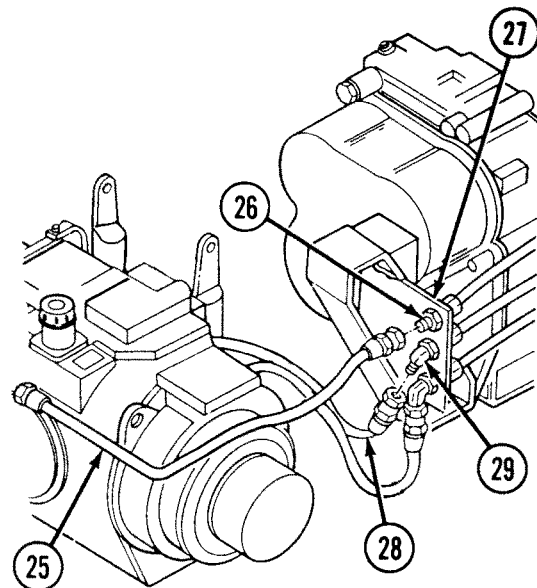
- X** Install loop clamp (16) on steer unit (3) with two lockwashers (17) and screws (18).

#### Note

- Perform step Y if steer unit has new breather hose configuration.
- Perform step Z if steer unit has old breather hose configuration.

- Y** Secure four hoses (19) and hose (20) to steer unit (3) with half block clamp (21), loop clamp (22), two lockwashers (23), and screws (24).

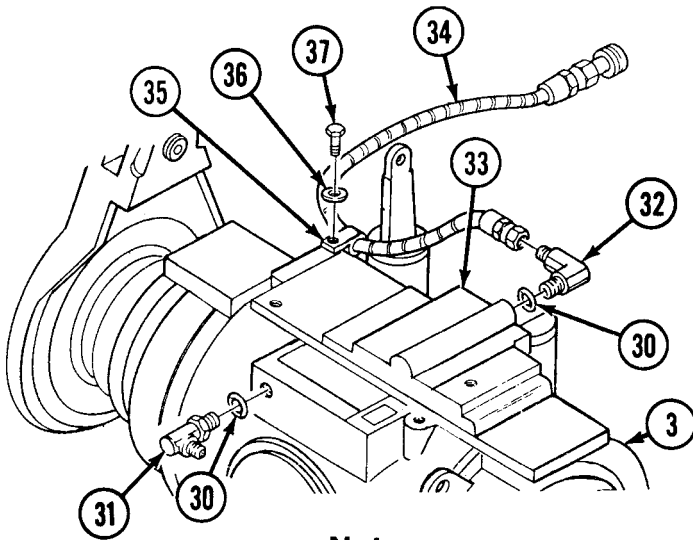
- Z** Secure four hoses (19) to steer unit (3) with half block clamp (21), two lockwashers (23), and screws (24).



- AA** Connect RH TOP BHD FTG-2S steer unit supply hose (25) to adapter (26) on engine mounting bracket (27).

- AB** Connect RH MID BHD FTG-3S steer unit drain hose (28) to elbow (29) on engine mounting bracket (27).

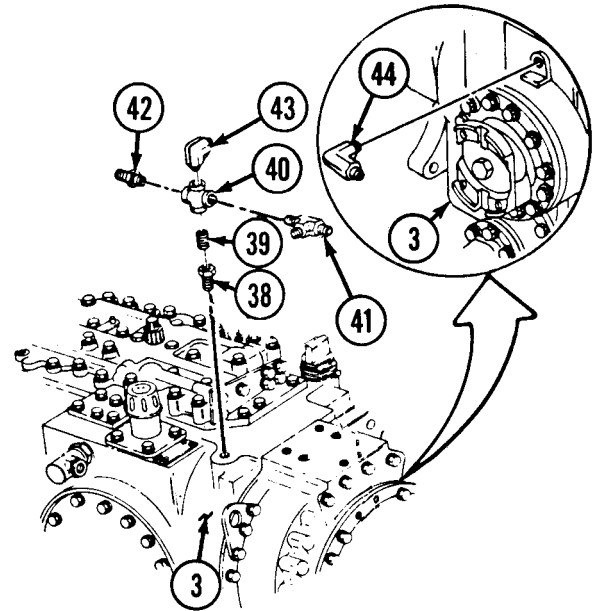




**Note**

Perform steps AC through AE if replacing steer unit.

- AC** Install two packings (30) and elbows (31) and (32) on steer unit (3) and valve body (33).
- AD** Connect XCONN 5S/6S/7S hose (34) to elbow (32) on valve body (33).
- AE** Secure hose (34) to steer unit (3) with clamp (35), washer (36), and self-locking screw (37). Tighten self-locking screw (37) to 20-23 lb-ft (27-31 N-m).



**Note**

Perform steps AF and AG if replacing steer unit with old breather hose configuration.

- AF** Install bushing (38), nipple (39), and crosspipe (40) on steer unit (3). Install tee (41) and adapter (42) on crosspipe (40).
- AG** Install two elbows (43) and (44) on crosspipe (40) and steer unit (3).

**Note**

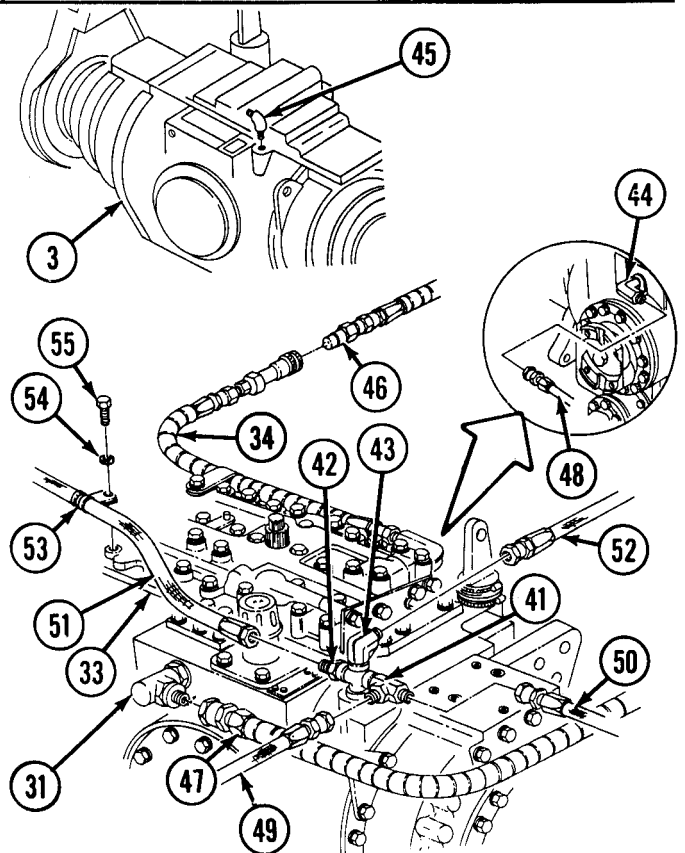
Perform step AH if replacing steer unit with new breather configuration.

- AH** Install elbow (45) on steer unit (3).
- AI** Connect hose (34) at quick-disconnect (46).
- AJ** Connect RH TOP BHD FTG-3S hose (47) to elbow (31).

**Note**

Perform steps AK through AN for old breather hose configuration. Perform steps AO through AQ for new breather hose configuration.

- AK** Connect STEER UNIT-9S hose (48) to elbow (44).
- AL** Connect WINCH VENT LINE hose (49) and RH FNL DR 7S hose (50) to tee (41).
- AM** Connect LH FNL DR-6S hose (51) and BREATHER 5S hose (52) to adapter (42) and elbow (43).
- AN** Secure hose (51) to valve body (33) with clamp (53), washer (54), and self-locking screw (55). Tighten self-locking screw (55) to 15-18 lb-ft (20-24 N-m).

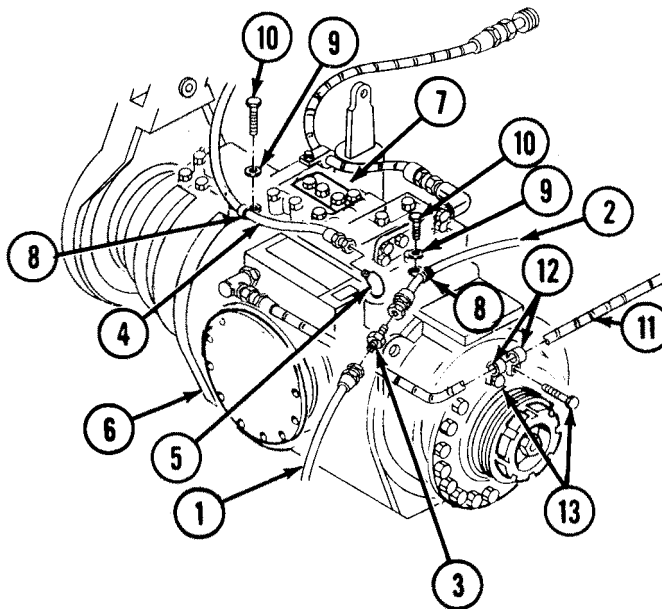


**AO** Connect hose (1) and BREATHER UNION hose (2) to union (3).

**AP** Connect STEER UNIT VENT hose (4) to elbow (5).

**AQ** Secure hoses (2) and (4) to steer unit (6) and valve body (7) with two clamps (8), washers (9), and self-locking screws (10). Tighten self-locking screws (10) to 15-18 lb-ft (20-24 N-m).

**AR** Secure hose (11) to steer unit (6) with two clamps (12) and screws (13). Tighten screws (13) to 42-50 lb-ft (57-68 N-m).

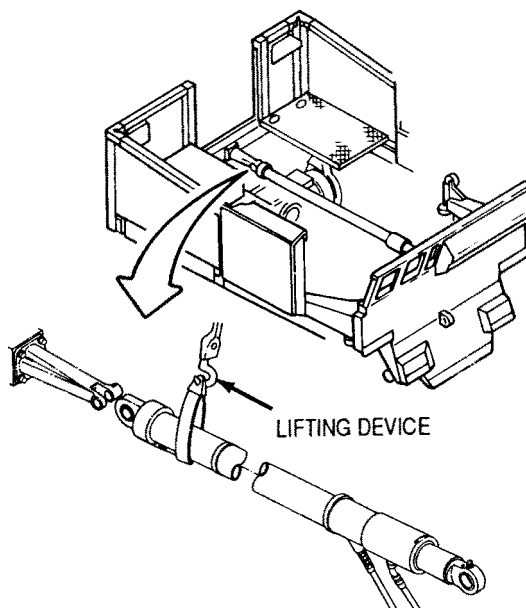


## WARNING

Ejector cylinder weighs 325 lb (148 kg). Support ejector cylinder with blocks or straps while it is being disconnected or removed. Do not put hands or feet under ejector cylinder while it is being moved. Failure to comply may result in severe injury to personnel.

**AS** Install ejector bracket (TM 5-2350-262-20-1).

**AT** Remove jackstand from bowl.



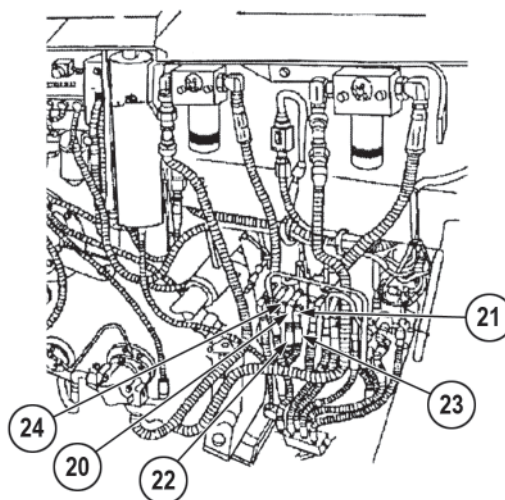
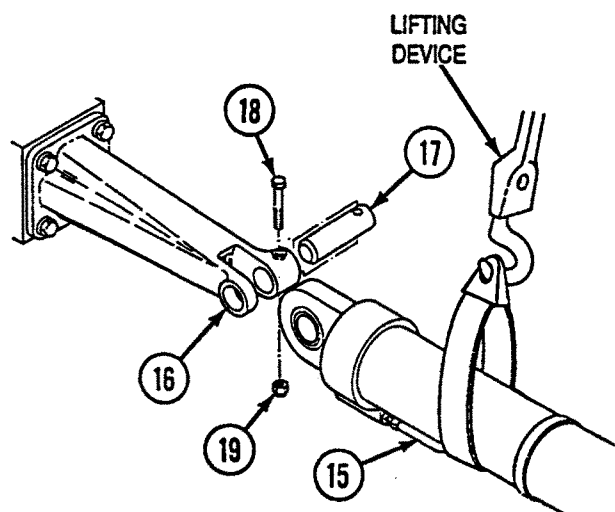
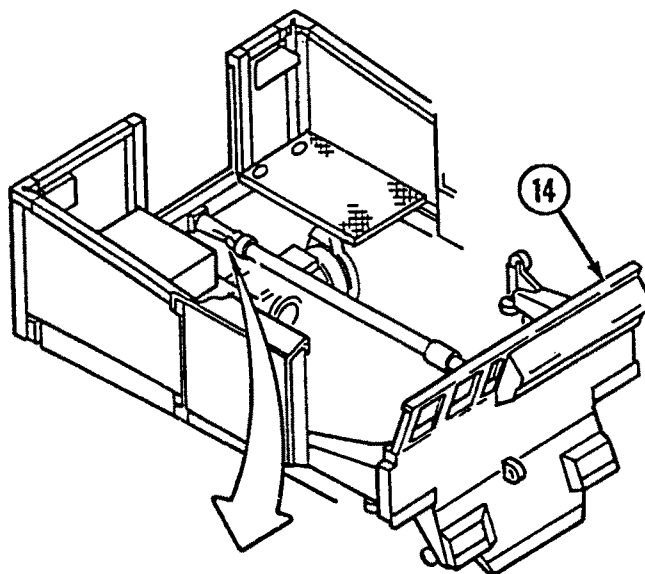
## CAUTION

Ejector cylinder can damage engine and transmission hoses if it moves up or down. Keep ejector cylinder steady while moving it. Failure to comply may result in damage to equipment.

- AU** Slowly move ejector assembly (14) back until ejector cylinder (15) aligns with ejector cylinder bracket (16).
- AV** Connect ejector cylinder (15) to ejector cylinder bracket (16) with pin (17), screw (18), and locknut (19). Remove lifting device from ejector cylinder assembly (14).
- AW** Remove caps from elbows (20) and (21) and plugs from hoses (22) and (23). Connect EJ CYL-22 (22) and EJ CYL-REAR 21 (23) hoses to elbows (20) and (21) on directional control valve (24).
- AX** Inspect engine and transmission hoses for damage.

**FOLLOW-ON TASKS:**

- Service hydraulic tank (TM 5-2350-262-10).
- Fill steer unit (TM 5-2350-262-10).
- Install air reservoir (TM 5-2350-262-20-1).
- Install driver's compartment step (TM 5-2350-262-20-1).
- Install radiator (TM 5-2350-262-20-2).
- Adjust parking brake (TM 5-2350-262-20-1).
- Connect final drives (TM 5-2350-262-20-2).
- Adjust CB/GS steer selector lever and linkage (TM 5-2350-262-20-1).
- Install rear floor plate supports (TM 5-2350-262-20-1).
- Ejector retracted (TM 5-2350-262-10).



# STEER UNIT OUTPUT COUPLING SCREW REPLACEMENT

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

J-wrench (J-38544)

Materials:

Lubricating Oil Item 31 Appendix C

Parts:

- Cotter Pin (2)
- Locknut (2)
- Lockwasher (2)
- Output Coupling Bolt
- Packing (2)
- Self-locking Screw (3)

Parts Reference:

TM 5-2350-262-24P Group AF  
Group AU

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

- TM 5-2350-262-10
- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Final Drives Drained
TM 5-2350-262-20-1	Track Blocked
TM 5-2350-262-20-2	Final Drives Disconnected

General Safety Instructions:

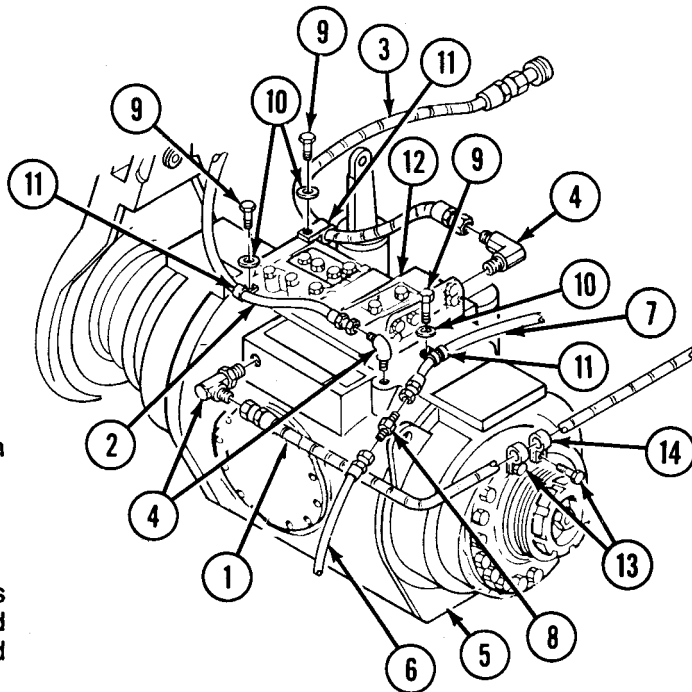
**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg).
- Personnel must stand clear during lifting operations.
- Keep hands and feet out from under steer unit while it is blocked.

**REMOVAL**

**Note**

- Ensure suspension control lever is in SPRUNG position.
- Output coupling bolt replacement is similar for both sides. This procedure shows the left side.
- There are two configurations of breather hoses. This task covers the new configuration. Refer to page 4-212 for removing breather hoses on old configuration.



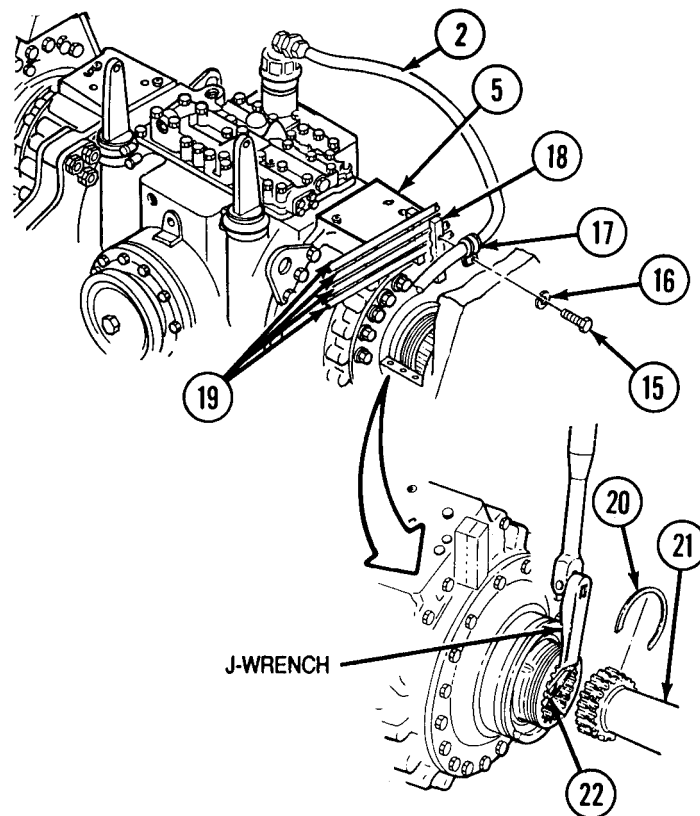
- A** Disconnect three hoses (1), (2), and (3) from elbows (4) on steer unit (5).
- B** Disconnect two hoses (6) and (7) from union (8).
- C** Remove three self-locking screws (9), washers (10), and clamps (11) securing hoses (2), (3), and (7) to steer unit (5) and valve body (12). Discard self-locking screws (9).
- D** Remove two screws (13) and clamps (14) securing hose (1) to steer unit (5).

- E** Remove two screws (15), lockwashers (16), clamp (17), and half block clamp (18) securing four hoses (19) and hose (2) to steer unit (5). Move hoses (19) to one side. Discard lockwashers (16).
- F** Remove C-clip (20) from final drive input shaft (21) and slide final drive input shaft (21) all the way into the final drive.

**Note**

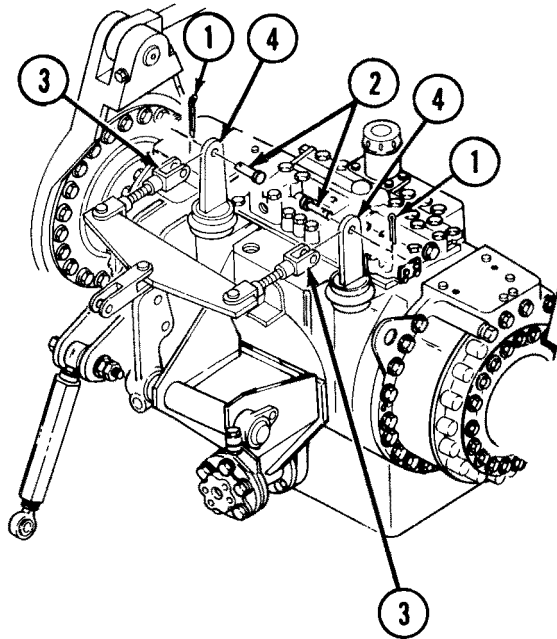
Vehicle must have sufficient air pressure to actuate service brake.

- G** With engine off, have one mechanic apply service brake (TM 5-2350-262-10) while output coupling screw (22) is loosened.
- H** Using wrench, loosen output coupling screw (22).
- I** Release service brake (TM 5-2350-262-10).

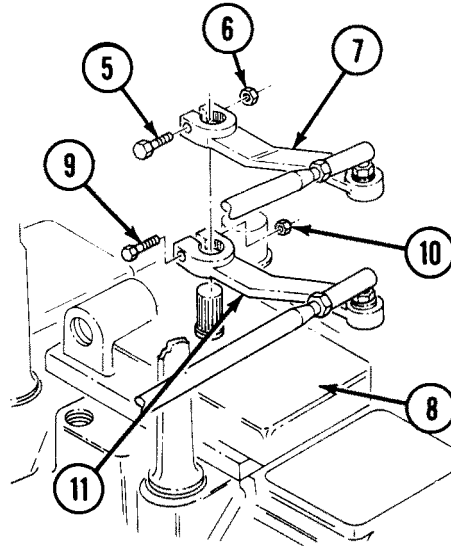


**VIEW ROTATED FOR CLARITY**





**J** Remove two cotter pins (1) and headed straight pins (2) from brake lever clevises (3). Disconnect clevises (3) from steer unit brake levers (4). Discard cotter pins (1).



**K** Remove screw (5) and locknut (6) from bellcrank (7). Remove bellcrank (7) from steer unit (8) and move to one side. Discard locknut (6).

**L** Remove screw (9) and locknut (10) from bellcrank (11). Remove bellcrank (11) from steer unit (8) and move to one side. Discard locknut (10).

**Note**

The lifting eye on the right side of steer unit will have to be removed and installed on left side if replacement is for the left side.

**M** Connect chain to steer unit (8) and lifting device. Raise lifting device to take up slack.

**WARNING**

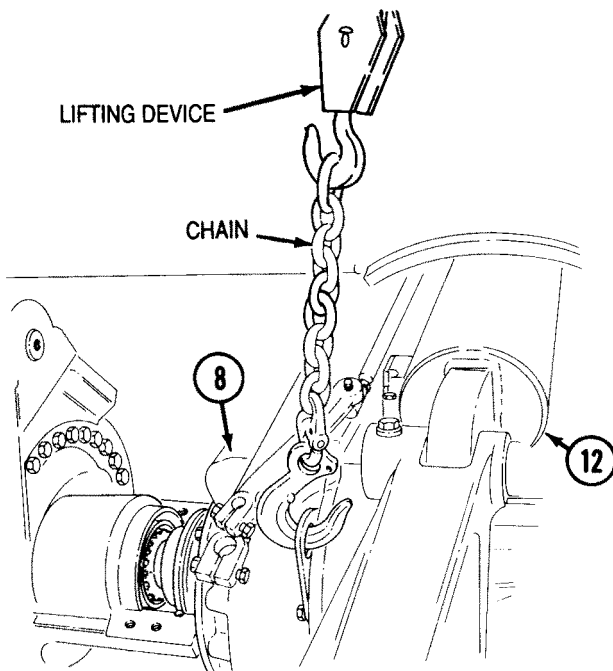
- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

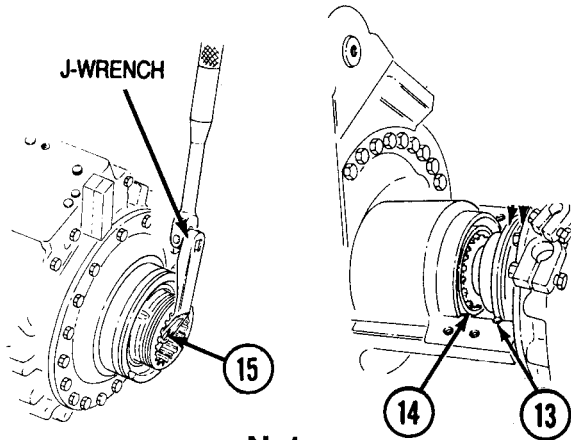
**N** Slowly raise steer unit (8) until it touches ejector cylinder (12).

**WARNING**

Keep hands and feet out from under steer unit while it is blocked. Steer unit may fall, causing severe injury to personnel.

**O** Support steer unit (8) with suitable materials.





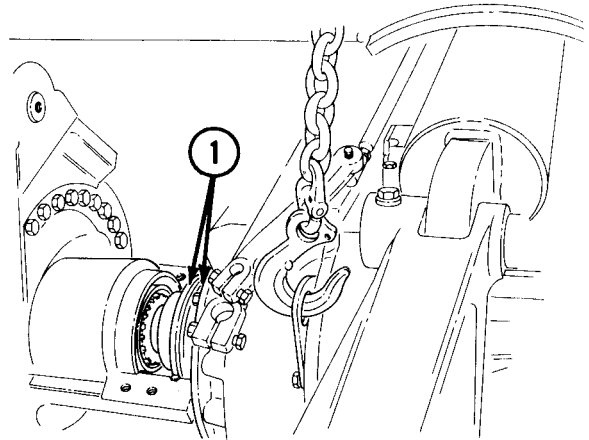
**Note**

Alignment half-ring is only on left-side track adjusting flange.

- P** Remove alignment half-ring (13) from track adjusting flange (14).
- Q** Remove steer unit output coupling screw (15). Discard output coupling screw (15).

**INSPECTION**

Inspect two packings (1) for rips, tears, or other damage. Replace if necessary.



**INSTALLATION**

- A** Install alignment half-ring (1) on track adjusting flange (2).
- B** Coat steer unit output coupling bolt (3) with lubricating oil. Install screw (3) in output coupling (4) of steer unit (5). Tighten screw (3) finger-tight.

**WARNING**

- Lifting device must have a weight capacity greater than 1,207 lb (548 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

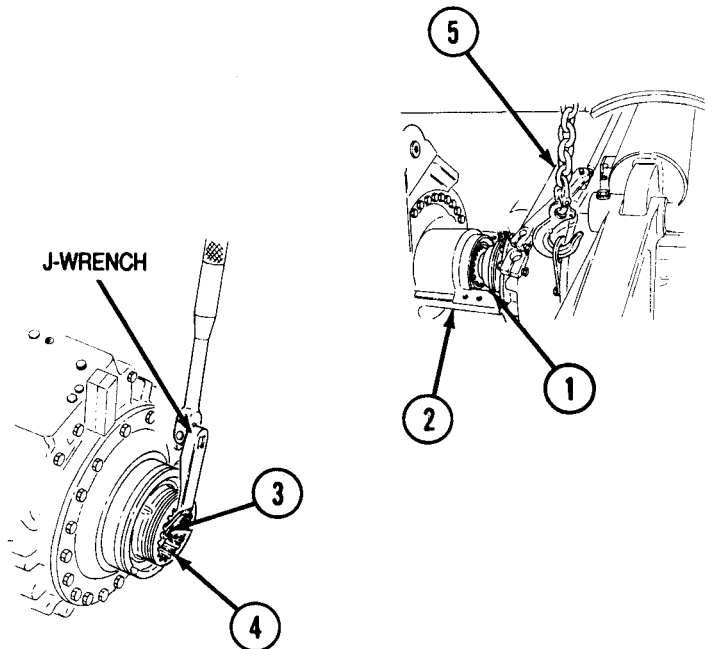
**CAUTION**

There is very little clearance between steer unit and ejector cylinder. Lift steer unit slowly. Failure to comply may result in damage to equipment.

- C** Slowly lift steer unit (5) and remove blocking material.

**Note**

Steer unit will shift to right when left side output coupling bolt is replaced. Steer unit will have to be pried over to the left to seat half-ring.

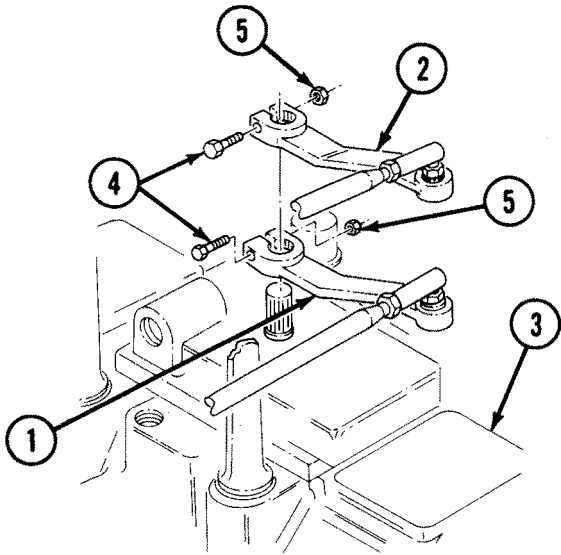


**VIEW ROTATED FOR CLARITY**

- D** Lower steer unit (5) until it rests in track adjusting flange (2). Alignment half-ring (1) should fit in groove in steer unit (5). Remove lifting device and chain assembly.

**Note**

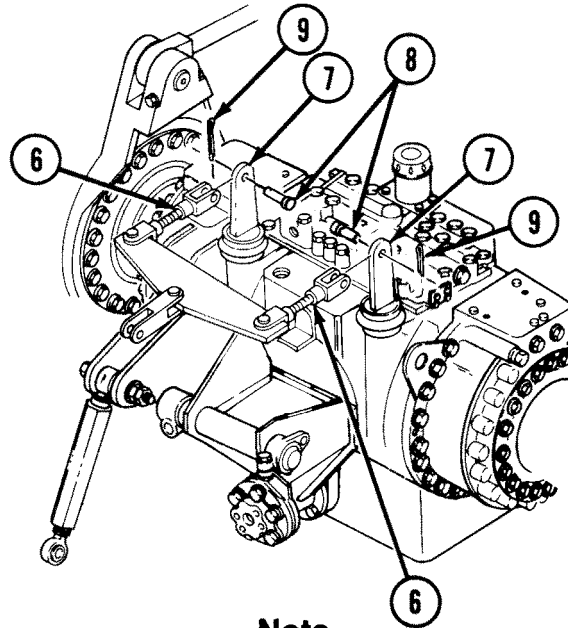
Install lifting eye on right side of steer unit, if removed.



**CAUTION**

Do not force bellcranks onto steer unit. Failure to comply may result in damage to equipment. Align blind splines.

**E** Install bellcranks (1) and (2) on steer unit (3) with two screws (4) and locknuts (5).



**Note**

Ensure headed straight pins are installed with heads facing inboard.

**F** Connect two brake lever clevises (6) to steer unit brake lever (7) with two headed straight pins (8) and cotter pins (9).

**Note**

Vehicle must have sufficient air pressure to actuate service brake.

**G** With engine off, have one mechanic apply service brake (TM 5-2350-262-10) while output coupling screw (10) is torqued.

**CAUTION**

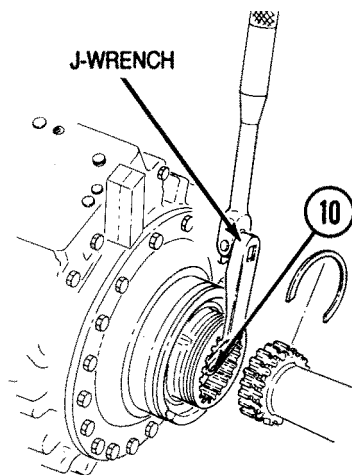
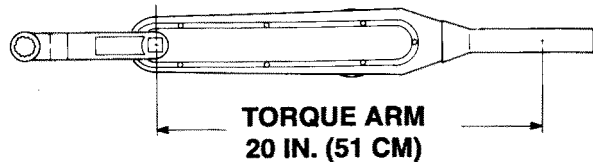
Ensure torque wrench has 20 in. (51 cm) torque arm. Torque will otherwise be incorrect. Failure to comply may result in damage to equipment.

**Note**

- Keep wrench and torque wrench aligned horizontally for proper torque.
- Apply lubricating oil to threads of screw and bearing surface prior to installation.

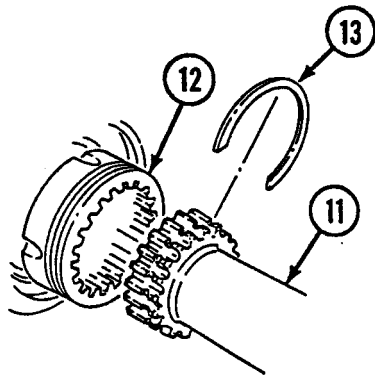
**H** Using wrench as shown, tighten output coupling screw (10) to 290-300 lb-ft (393-407 N-m).

**I** Release service brake (TM 5-2350-262-10).

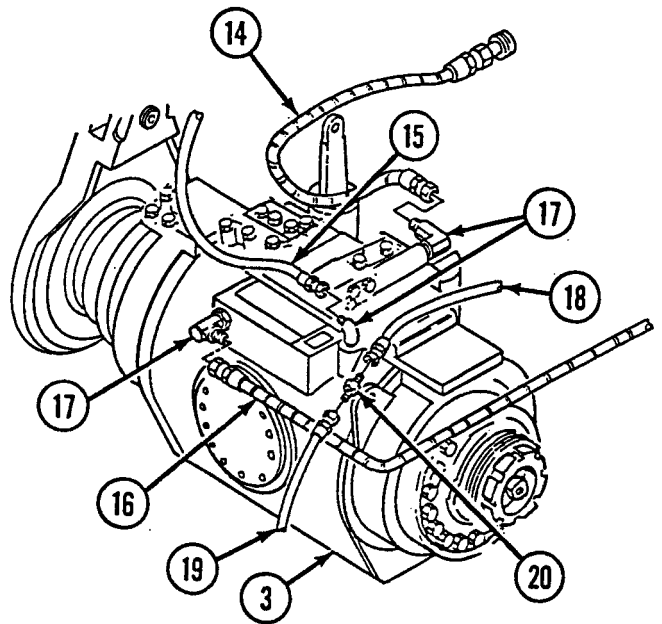


**VIEW ROTATED FOR CLARITY**



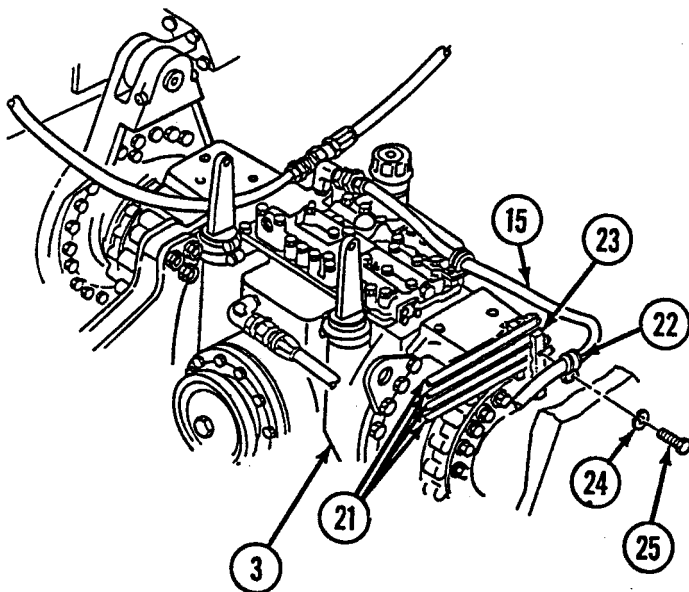


**J** Slide final drive input shaft (11) out of final drive (12) far enough to install C-clip (13). Install C-clip (13) on final drive input shaft (11).

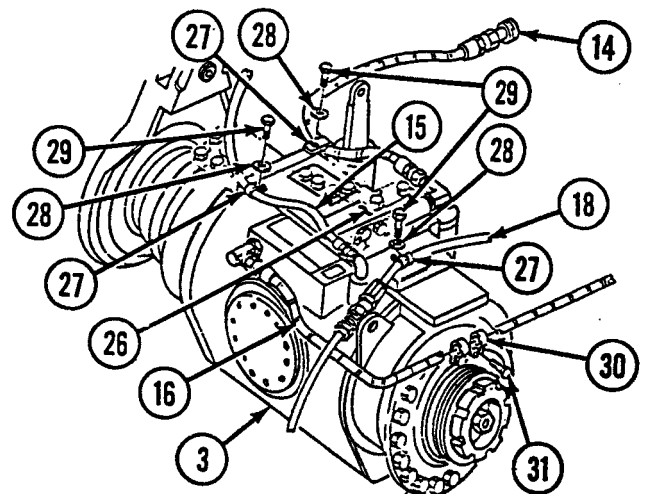


**K** Connect hoses (14), (15), and (16) to elbows (17) on steer unit (3).

**L** Connect hoses (18) and (19) to union (20).



**M** Secure four hoses (21) and hose (15) to steer unit (3) with clamp (22), half block clamp (23), two lockwashers (24), and screws (25).



**N** Secure hoses (14), (15), and (18) to steer unit (3) and valve body (26) with three clamps (27), washers (28), and self-locking screws (29).

**O** Secure hose (16) to steer unit (3) with two clamps (30) and screws (31).

**FOLLOW-ON TASKS:**

- Connect final drives (TM 5-2350-262-20-2).
- Fill final drives (TM 5-2350-262-10).
- Unblock track (TM 5-2350-262-20-1).
- Adjust CB/GS steer selector lever and linkage (TM 5-2350-262-20-2).

---

# STEER UNIT OUTPUT COUPLING ADJUSTMENT

---

This task covers:  
Adjustment

---

**INITIAL SETUP**

Tools:

3470-00-754-0708 Shop Equipment,  
Machine Shop: Field Maintenance, Basic  
Less Power

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair: Field  
Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Special Tools:

Lockplate Tool                      5340-01-083-5667

Materials:

Grease                                      Item 21  
Appendix C

Lubricating Oil                      Item 31  
Appendix C

Parts:

Self-locking Bolt (2)  
Shims

Parts Reference:

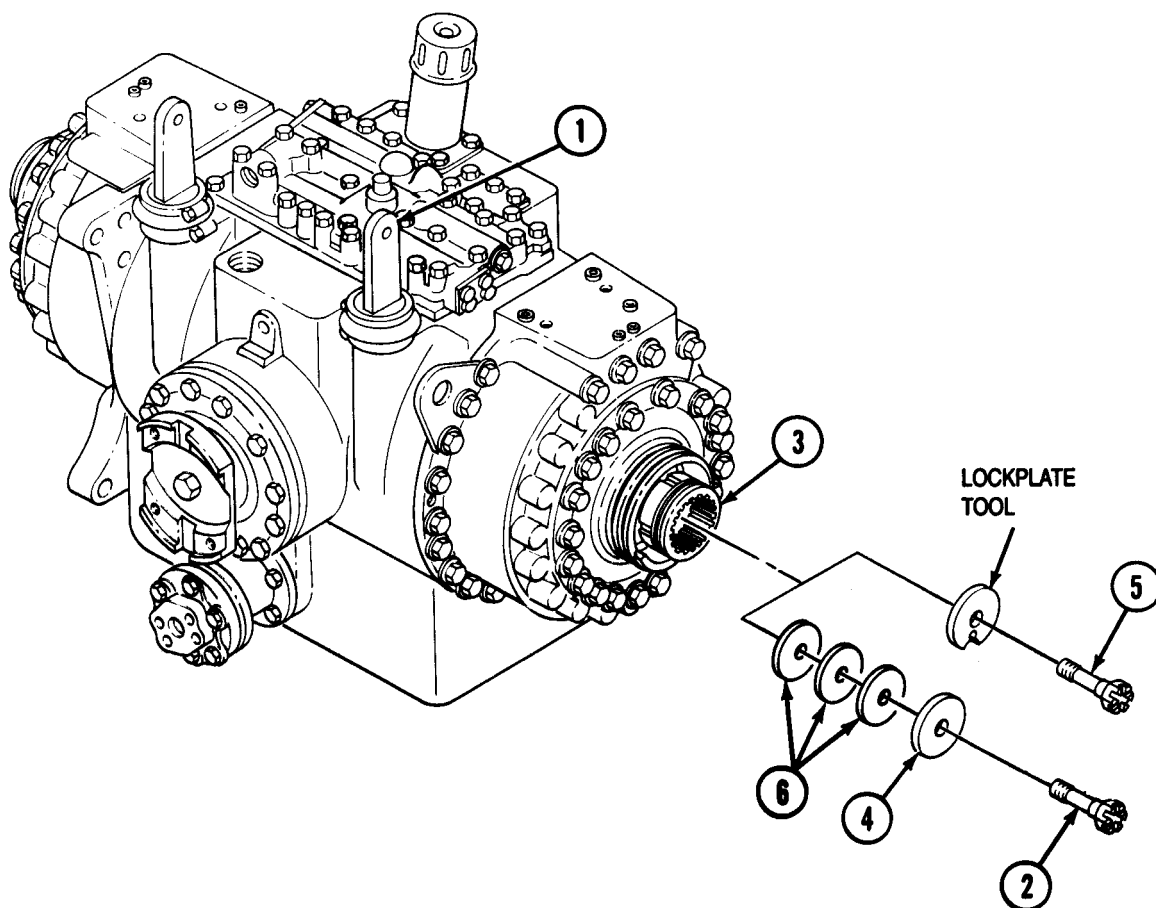
TM 5-2350-262-24P    Group AU

Personnel Required:

Two Construction Equipment Repairers  
62B10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 4-211	Steer Unit Removed



**ADJUSTMENT**

**Note**

- Left-hand and right-hand steer unit output coupling adjustment procedures are the same. This procedure covers the left-hand side.
- Apply and hold brake lever while performing steps B through G.
- Mechanical advantage (i.e., pipe) may be needed to apply brake lever.

**A** Apply brake lever (1) and hold.

**CAUTION**

Lockplate must be preloaded to obtain correct measurements. Failure to comply will result in damage to equipment.

**B** Tighten self-locking bolt (2) in steer unit output coupling (3) to 290-300 lb-ft (393-407 N-m). If self-locking screw (2) does not hold torque, perform steps C through F. If self-locking screw holds torque, go to step G.

**C** Remove self-locking screw (2) and lockplate (4). Discard self-locking screw (2).

**D** Install lockplate (4) on steer unit output coupling (3) with self-locking screw (5). Tighten self-locking screw (5) to 290-300 lb-ft (393-407 N-m).

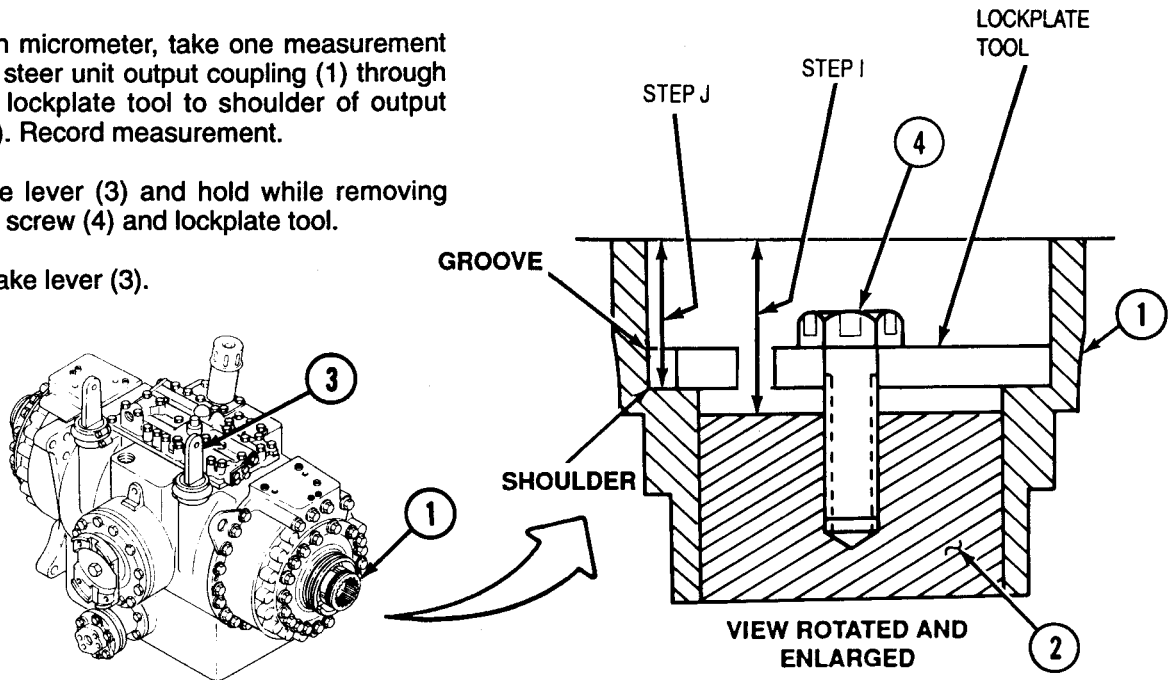
**E** Remove lockplate (4) and self-locking screw (5). Discard self-locking screw (5).

**F** Install lockplate tool and self-locking screw (5). Tighten self-locking screw (5) to 45-60 lb-ft (61-81 N-m). Proceed to step I.

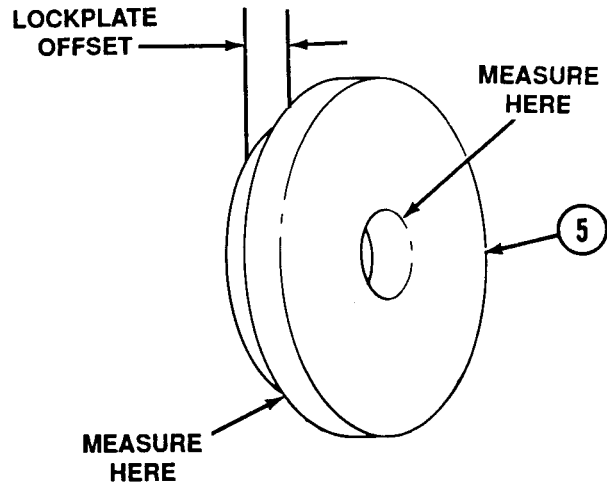
**G** Remove self-locking screw (2), lockplate (4), and shims (6). Discard self-locking screw (2).

**H** Install lockplate tool and self-locking screw (2) on steer unit output coupling (3). Tighten screw (2) to 45-60 lb-ft (61-81 N-m).

- I Using depth micrometer, take one measurement from top of steer unit output coupling (1) through hole in lockplate tool to face of carrier assembly (2). Record measurement.
- J Using depth micrometer, take one measurement from top of steer unit output coupling (1) through opening in lockplate tool to shoulder of output coupling (1). Record measurement.
- K Apply brake lever (3) and hold while removing self-locking screw (4) and lockplate tool.
- L Release brake lever (3).



- M Subtract measurement in step J from measurement in step I. Record measurement. This is the initial gap.
- N Using outside micrometer, measure thickness of lockplate (5) near shoulder. Record measurement.
- O Using outside micrometer, measure thickness of lockplate (5) near center. Record measurement.
- P Subtract measurement taken in step N from measurement taken in step O. Record measurement. This is the coupling lockplate offset.

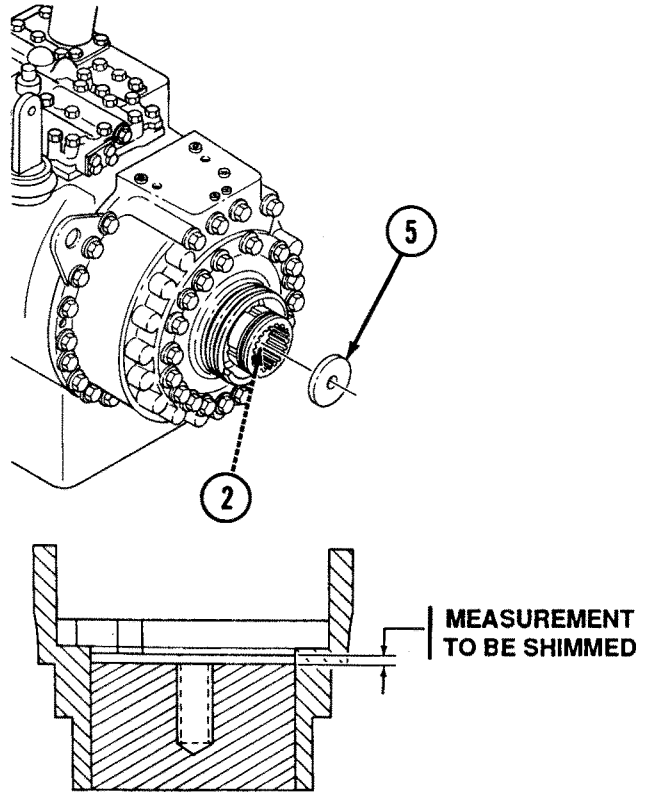


- Q** Subtract lockplate offset (from step P) from initial gap (from step M) and record. This is the gap between the lockplate (5) and carrier assembly (2).
- R** Subtract .010 in. (0.0254 cm), the desired deflection, from the gap, computed in step Q. This is the final gap measurement to be shimmed.

**CAUTION**

Do not install more than .095 in. (0.241 cm) shims or damage to equipment will occur.

- S** Round final gap to the nearest hundredth of an inch. If the final gap computed in step R is between .061 in. and .065 in. (0.1549 and 0.165 cm), round to .060 in. (0.152 cm). If the final gap in step R is between .066 in. and .0698 in. (0.1676 and 0.1773 cm), round to .070 in. (0.1778 cm).
- T** Select the combination of .010, .012, and .016 in. (0.0254, 0.0301, and 0.0406 cm) shims that will equal the final gap determined in step S.



**Note**

Ensure shims are lubricated. If shims are clean and dry, apply a light coating of lubricating oil.

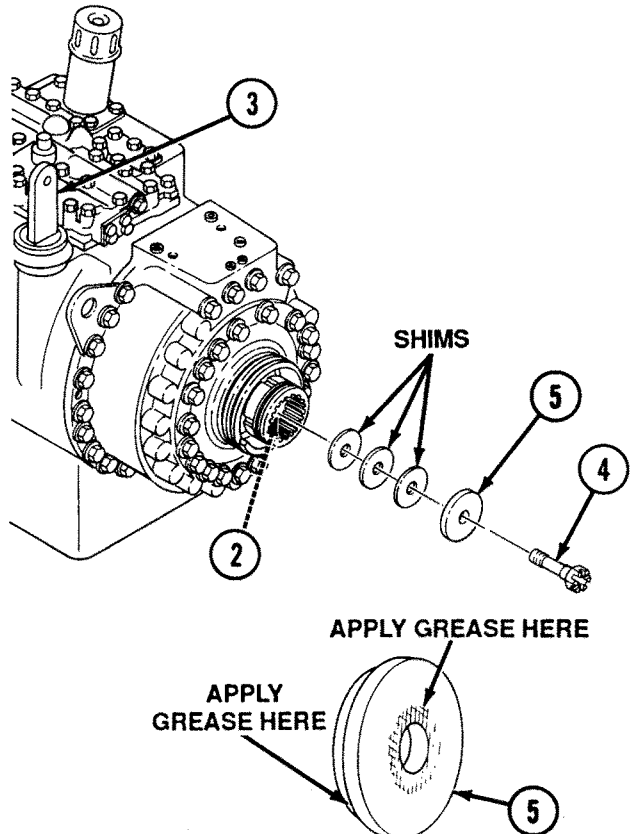
- U** Apply grease to indicated surfaces of lockplate (5).
- V** Install shims and lockplate (5) on carrier assembly (2).

**Note**

Apply lubricating oil to threads of bolt prior to installation.

- W** Install self-locking screw (4) on carrier assembly (2).
- X** Apply brake lever (3) and hold. Tighten self-locking screw (4) to 290-300 lb-ft (393-407 N-m). Release brake lever (3).

**FOLLOW-ON TASK:**  
Install steer unit (p 4-217).



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# STEER UNIT SEAL REPLACEMENT

---

This task covers:

- a. Removal
- b. Installation

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<b>INITIAL SETUP</b>
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Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Lubricating Oil	Item 31 Appendix C
-----------------	-----------------------

Parts:

Seal  
Self-locking Bolt

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Two Construction Equipment Repairers  
62B10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 4-211	Steer Unit Removed

**REMOVAL**

**Note**

- LH and RH seal replacement procedures are the same. This procedure covers the left seal replacement.
- Mechanical advantage (i.e., pipe) may be needed to apply brake lever.

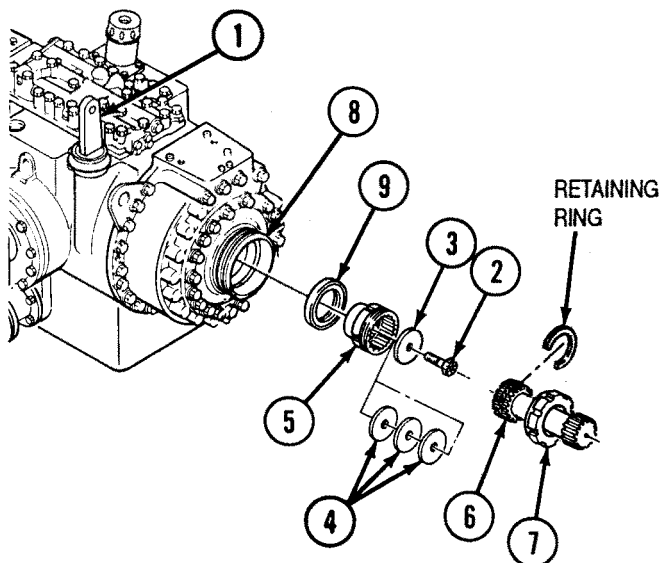
**A** Apply brake lever (1) and hold while removing self-locking screw (2), lockplate (3), and shims (4) from output coupling (5). Discard self-locking screw (2).

**Note**

- Retaining ring must be in place on final drive input shaft when attempting to remove output coupling.
- Final drive input shaft and nut must be removed from final drive to perform step B.

**B** Connect final drive input shaft (6) and nut (7) to output coupling (5).

**C** Remove output coupling (5) from access cover (8) by pulling on final drive input shaft (6). Remove final drive input shaft (6) and nut (7) from output coupling (5).



**D** Remove seal (9) from access cover (8). Discard seal (9).

**INSTALLATION**

**A** Install seal (1) on access cover (2).

**Note**

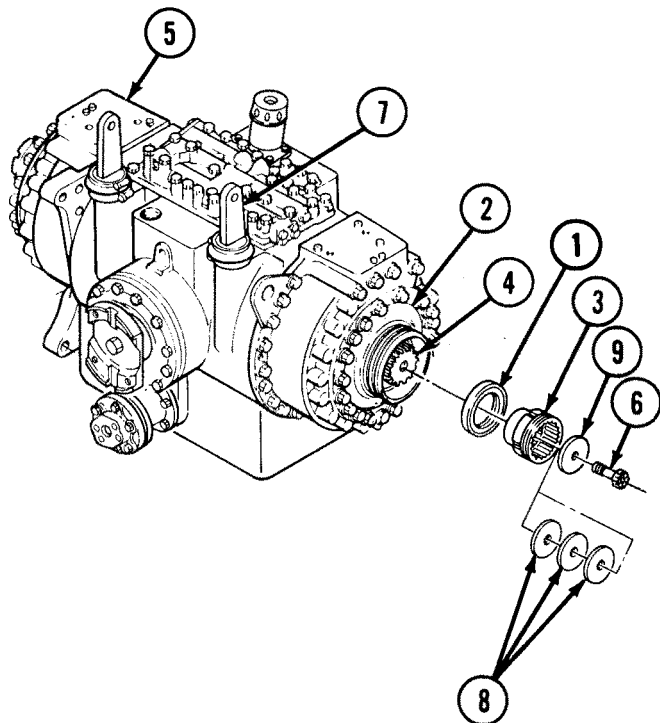
Ensure splines of steer unit carrier assembly are properly aligned with output coupling.

**B** Install output coupling (3) on carrier assembly (4) of steer unit (5).

**C** Coat threads of self-locking screw (6) with oil. Apply brake lever (7) and hold. Install shims (8), lockplate (9), and self-locking screw (6) on carrier assembly (4) through output coupling (3). Tighten self-locking screw (6) to 290-300 lb-ft (393-407 N·m).

**FOLLOW-ON TASK:**

Install steer unit (p 4-217).



# STEER UNIT INPUT FLANGE AND SEAL REPLACEMENT

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Materials:

Sealing Compound	Item 16 Appendix C
Lubricating Oil	Item 31 Appendix C
Drycleaning Solvent	Item 39 Appendix C

Parts:

- Gasket
- Seal
- Lockwasher (6)
- Self-locking Screw (4)

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Rear Floor Plate Supports Removed
TM 5-2350-262-20-2	Radiator Removed
TM 5-2350-262-20-1	Brake Linkage and Bracket Removed

General Safety Instructions:

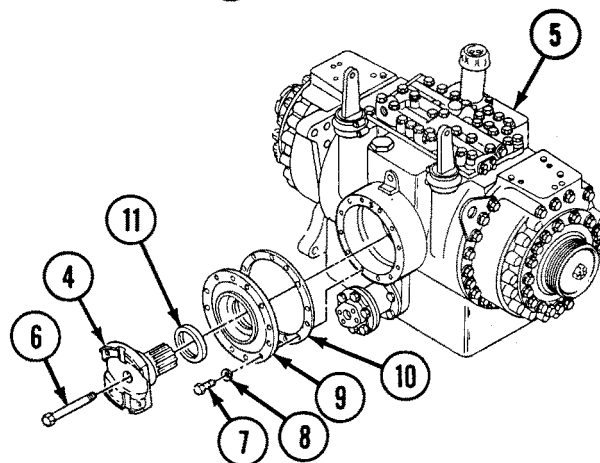
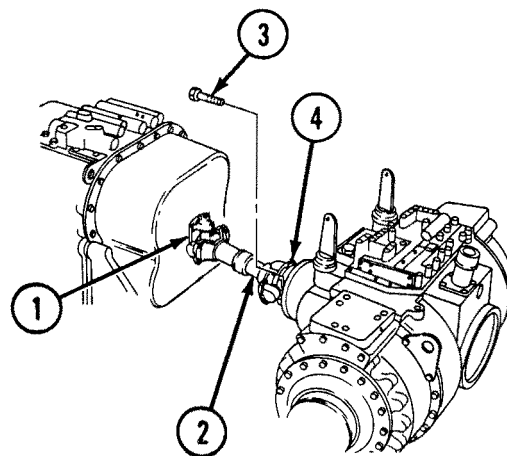
### WARNING

- Drycleaning solvent is flammable and will not be used near an open flame or sparks. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated places.
- Always wear goggles when using hammer and drift.



**REMOVAL**

- A** Place crowbar through transmission output flange (1) to keep driveshaft (2) from turning.
- B** Remove four self-locking screws (3) from steer unit input flange (4). Discard self-locking screws (3).
- C** Remove crowbar. Collapse driveshaft (2), and lay driveshaft (2) down on floor of vehicle.
- D** With input flange (4) blocked to prevent turning, and location marked on access cover of steer unit (5), remove screw (6) and input flange (4) from steer unit (5).
- E** Remove six screws (7) and lockwashers (8) from access cover (9). Discard lockwashers (8).
- F** Remove access cover (9) and gasket (10) from steer unit (5). Discard gasket (10).
- G** Turn access cover (9) over and support cover (9) on two blocks of wood.

**WARNING**

Always wear goggles when using hammer and drift. Failure to comply may result in severe injury to personnel.

- H** Using hammer and drift, remove seal (11) from access cover (9). Discard seal (11).

**CLEANING****WARNING**

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated places. Failure to comply may result in damage to equipment or injury to personnel.

Clean steer unit mounting surface and access cover with drycleaning solvent.

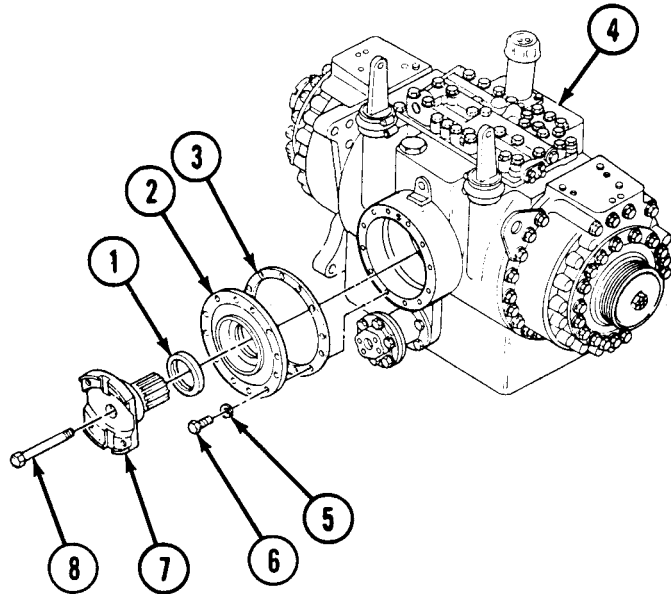
**INSTALLATION**

- A** Coat seal (1) with lubricating oil. Install seal (1) on access cover (2) with sealing lip of seal (1) facing inward.
- B** Apply sealing compound to gasket (3) and install gasket (3) and access cover (2) on steer unit (4) with six lockwashers (5) and screws (6).
- C** Locate position of input flange (7) as marked on access cover of steer unit (4), align splines of input flange (7) with steer unit (4), and install input flange (7) on steer unit (4).

**Note**

Coat threads of screw with lubricating oil prior to installation.

- D** Install screw (8) on input flange (7). With input flange (7) blocked to prevent turning, tighten screw (8) to 205-220 lb-ft (278-298 N-m).



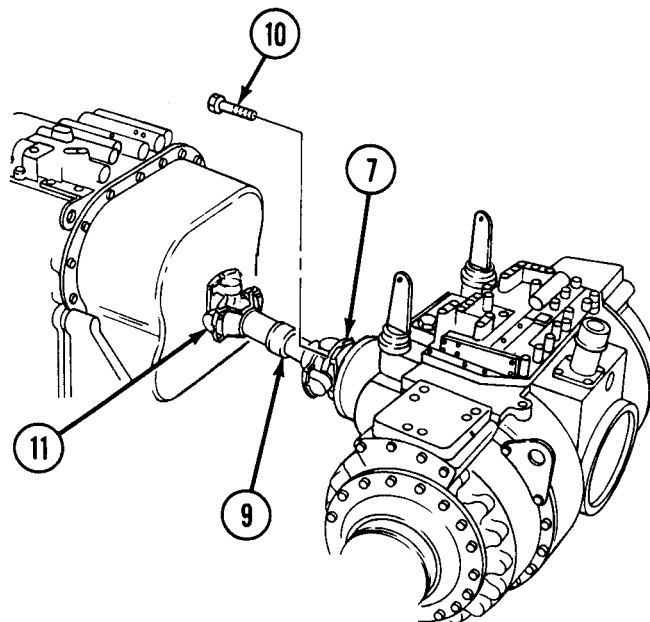
- E** Position driveshaft (9) on input flange (7). Secure driveshaft (9) on input flange (7) with four self-locking screws (10).
- F** Insert crowbar through transmission output flange (11) to keep driveshaft (9) from turning. Tighten four self-locking screws (10) to 90-95 lb-ft (122-129 N-m). Remove crowbar.

**FOLLOW-ON TASKS:**

**Note**

After brake chamber bracket is installed, tighten screws from step B to 42-50 lb-ft (57-68 N-m).

- Brake linkage and bracket installed (TM 5-2350-262-20-1).
- Radiator installed (TM 5-2350-262-20-2).
- Rear floor plate supports installed (TM 5-2350-262-20-1).



# LH OR RH FINAL DRIVE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

Sling 5120-01-222-7931

Materials:

Synthetic Rubber Adhesive Item 4 Appendix C

Silicone Compound Item 18 Appendix C

Parts:

Packing

Self-locking Screw (59)

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

- TM 5-2350-262-10
- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Final Drives Drained
TM 5-2350-262-20-2	Final Drives Disconnected
TM 5-2350-262-20-1	Rear Track Wear Plate Removed
TM 5-2350-262-20-2	Drive Sprocket Removed
TM 5-2350-262-20-2	Final Drive Dipstick Removed

General Safety Instructions:

**WARNING**

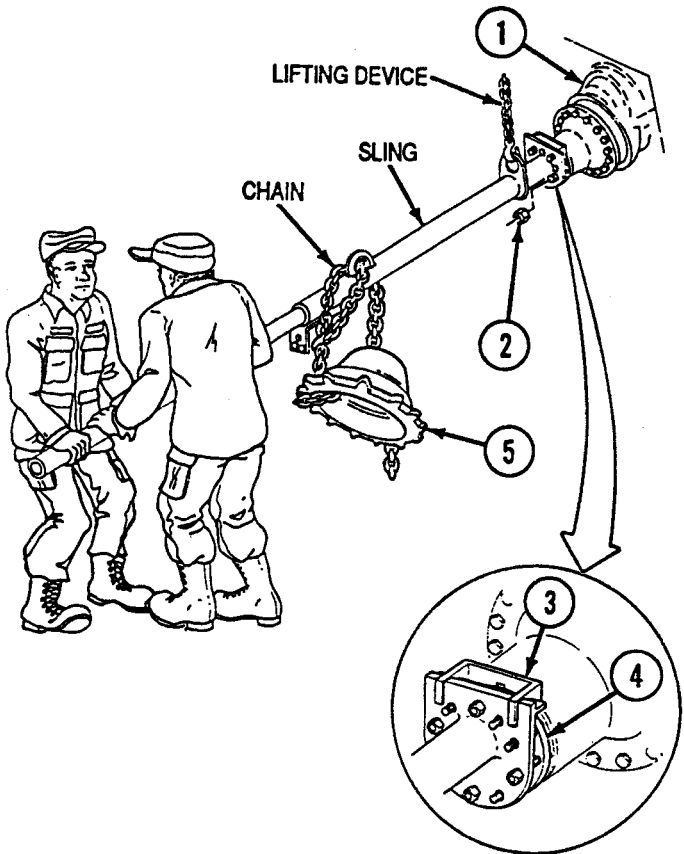
- Lifting device must have a weight capacity greater than 550 lb (250 kg).
- Hub must be used as a counterweight when removing or installing final drive. Two persons should handle sling.
- Stand clear of flange. Flange may slip and result in serious injury to personnel.

**REMOVAL**

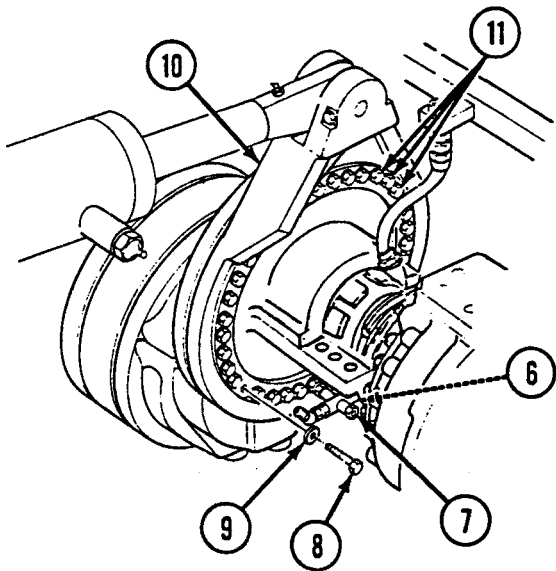
- A** Connect sling to studs of final drive (1) with four nuts (2) (previously used in securing sprocket).
- B** Move sling locking bar (3) over flange (4).

**WARNING**

- Lifting device must have a weight capacity greater than 550 lb (250 kg). Failure to comply may result in damage to equipment or injury to personnel.
- Hub must be used as a counterweight when removing final drive. Two persons should handle sling. Failure to comply may result in serious injury to personnel.

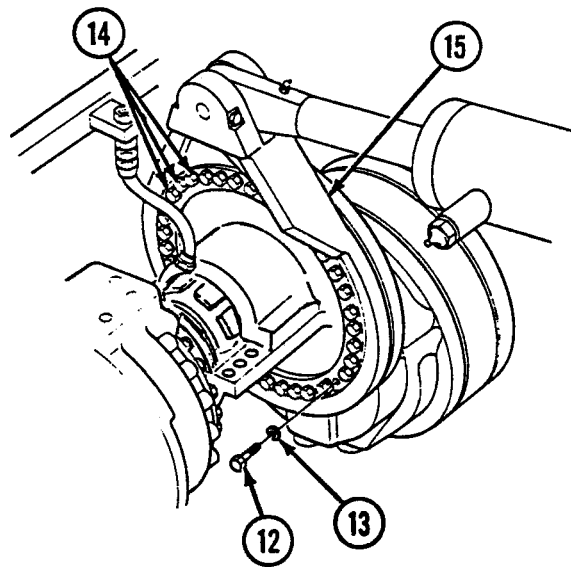


- C** Connect drive sprocket and hub (5) to sling with chain. Ensure there is no slack in chain.
- D** Connect lifting device to sling and raise to take up slack.



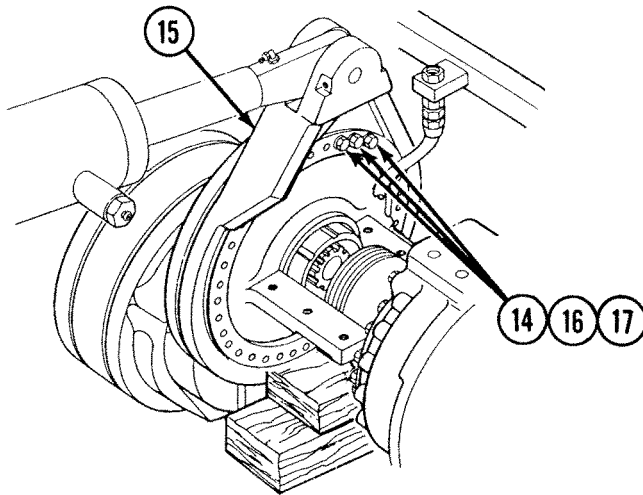
**LEFT SIDE ONLY**

- E** Disconnect electrical lead (6) from adapter (7).
- F** Remove adapter (7), and twenty-six self-locking screws (8) and washers (9) from adjusting flange (10). Discard self-locking screws (8). Leave last three screws (11) in adjusting flange (10).



**RIGHT SIDE ONLY**

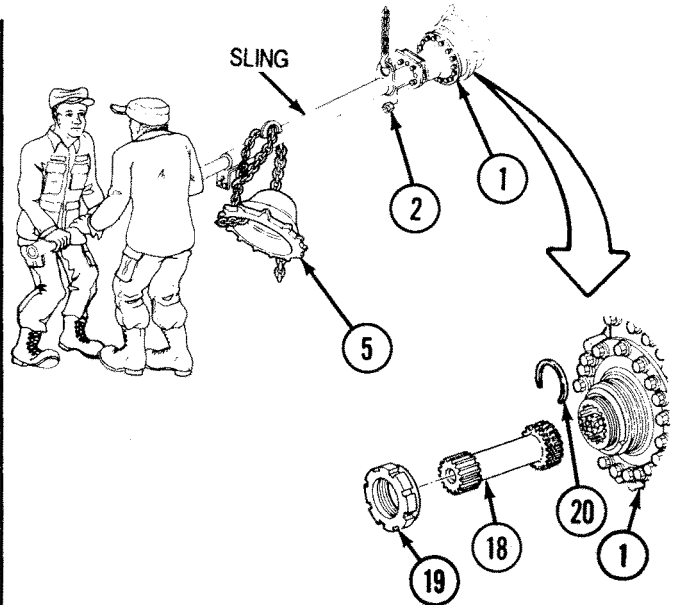
- G** Remove twenty-seven self-locking screws (12) and washers (13). Discard self-locking screws (12). Leave last three screws (14) in adjusting flange (15).



**WARNING**  
Stand clear of flange. Flange may slip and result in serious injury to personnel.

**CAUTION**  
Blocks should not rest on bilge pump screen. Failure to comply may result in damage to equipment.

- H** Support adjusting flange (15) with wood blocks.
- I** Remove three self-locking screws (14) and washers (16) or (17) from adjusting flange (15). Discard self-locking screws (14).



- J** Move sling from side to side to break final drive (1) from hull.

**WARNING**  
Hub must be used as a counterweight when removing or installing final drive. Two persons should handle sling. Failure to comply may result in serious injury to personnel.

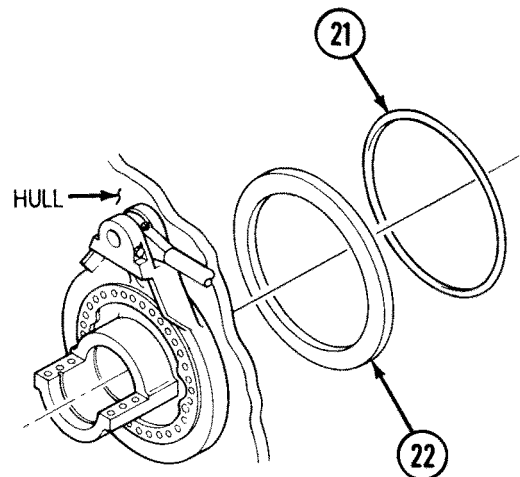
- K** Lift final drive (1) clear of vehicle. Remove sprocket and hub (5) from sling. Remove four nuts (2) and sling. If damaged, remove shaft (18), nut (19), and retaining ring (20) from final drive (1).

- L** Remove packing (21) from hull. Discard packing (21).

**Note**

Perform step M only if thrust washer was loosened or damaged during removal.

- M** Clean hull/thrust washer mating surface (p 2-9). Uniformly apply a .03 minimum layer of synthetic adhesive to the hull and the entire bonding surface of the thrust washer (22). Allow 10 minutes for the adhesive to start setting up. If installing a new thrust washer (22), remove the graphite on bonding surface. Press thrust washer (22) to hull and hold in place for a minimum of 2 hours before installing track adjusting flange.

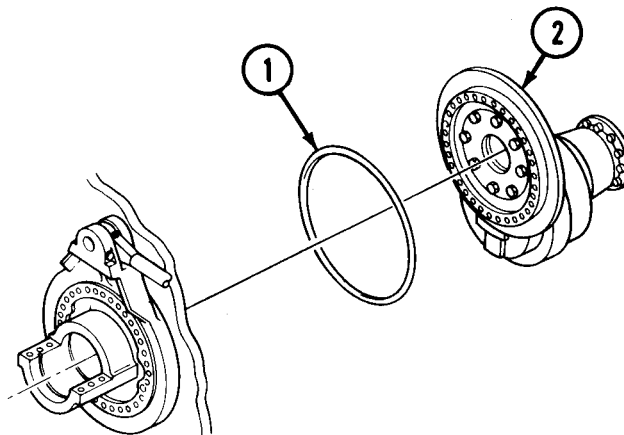


**INSTALLATION**

**Note**

Ensure final drive is lined up straight (vertically) for installation.

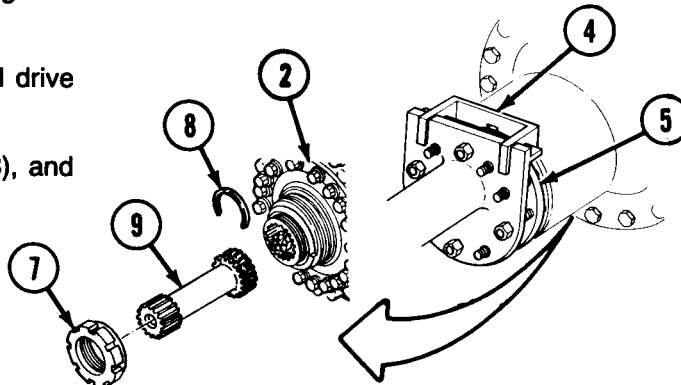
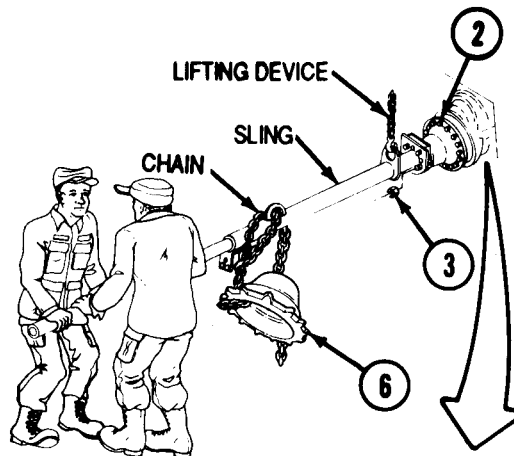
- A Coat packing (1) with silicone compound, and install packing (1) on final drive (2).



**WARNING**

Hub must be used as a counterweight when removing or installing final drive. Two persons should handle sling. Failure to comply may result in serious injury to personnel.

- B Connect sling to studs of final drive (2) with four nuts (3) (previously used in securing sprocket).
- C Move sling locking bar (4) over final drive flange (5).
- D Connect drive sprocket and hub (6) to sling with chain. Ensure there is no slack in chain.
- E Connect lifting device to sling and lift final drive (2) into position.
- F If removed, install nut (7), retaining ring (8), and shaft (9) on final drive (2).



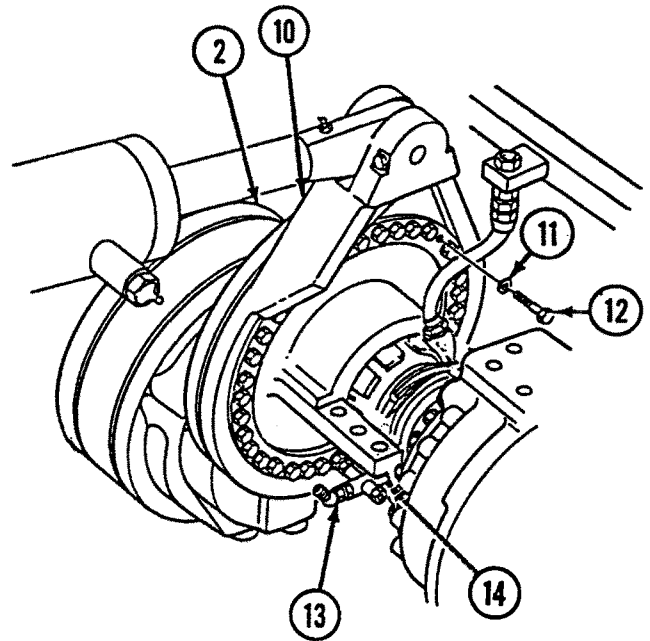


## CAUTION

When new or repaired final drive is installed, operate vehicle at less than 5 mph (8 km/h) for first 3 miles (4.8 km) to ensure proper packing break-in.

### LEFT SIDE ONLY

- G** Install final drive (2) on hull and adjusting flange (10) with twenty-nine washers (11) and self-locking screws (12). Tighten self-locking screws (12) to 160-180 lb-ft (217-244 N-m).
- H** Install adapter (13) on adjusting flange (10).
- I** Connect electrical lead (14) to adapter (13).

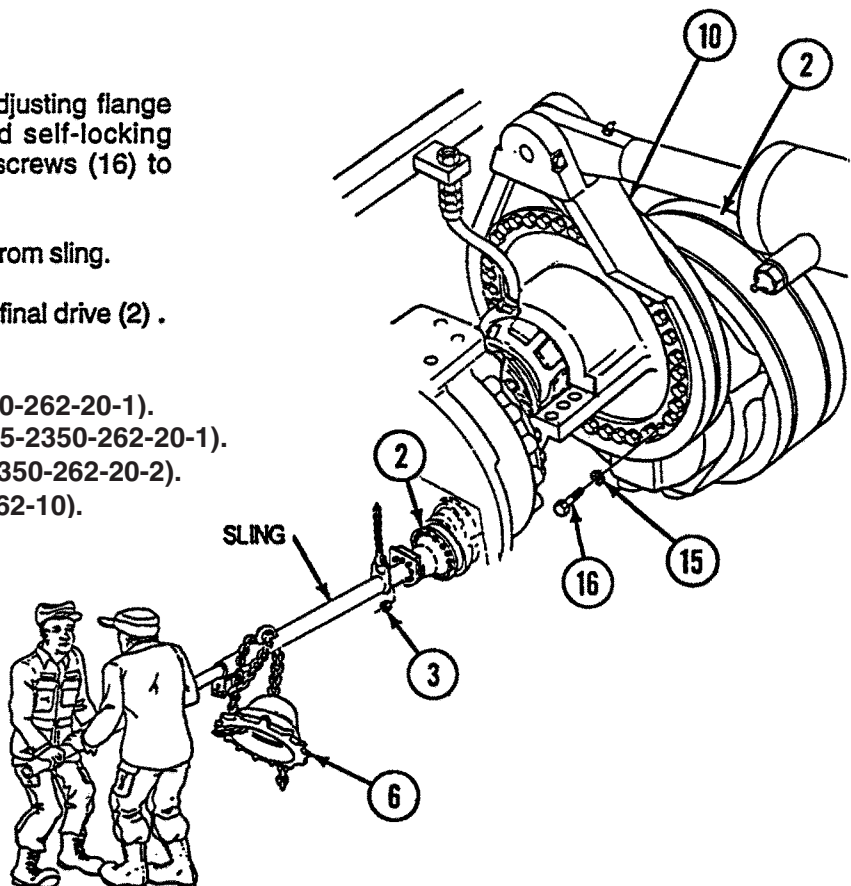


### RIGHT SIDE ONLY

- J** Install final drive (2) on hull and adjusting flange (10) with thirty washers (15) and self-locking screws (16). Tighten self-locking screws (16) to 160-180 lb-ft (217-244 N-m).
- K** Remove drive sprocket and hub (6) from sling.
- L** Remove four nuts (3) and sling from final drive (2).

#### FOLLOW-ON TASKS:

- Install drive sprocket (TM 5-2350-262-20-1).
- Install rear track wear plate (TM 5-2350-262-20-1).
- Connect final drives (TM 5-2350-262-20-2).
- Fill final drives (TM 5-2350-262-10).



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# TRACK ADJUSTING FLANGE REPLACEMENT

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This task covers:

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

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Reference:

TM 5-2350-262-20-2

Materials:

Synthetic Rubber Adhesive	Item 4 Appendix C
Silicone Compound	Item 18 Appendix C

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Track Adjusting Cylinder Removed
Page 4-211	Steer Unit Removed
Page 4-240	Final Drives Removed

Parts:

Alignment Pin (2)  
  
Half-ring  
  
Oil Barrier  
  
Packing

General Safety Instructions:

## WARNING

Always wear goggles when using  
hammer and drift.

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Construction Equipment Repairer 62B10



**REMOVAL**

**Note**

LH and RH track adjusting flange removal and disassembly procedures are the same. This procedure covers the left side.

- A** Remove track adjusting flange (1) and packing (2). Discard packing (2).

**Note**

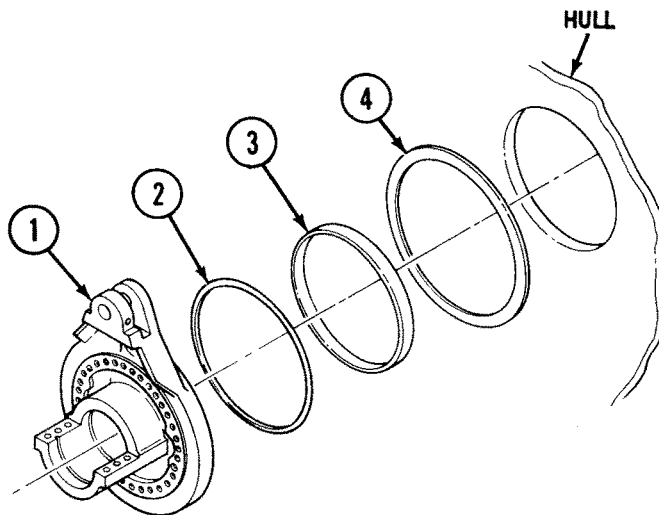
Perform step B only if packing retainer is damaged.

- B** Remove packing retainer (3). Coat packing retainer (3) with silicone compound, and install packing retainer (3) on hull.

**Note**

Perform step C only if thrust washer is loose from hull or damaged.

- C** Clean hull/thrust washer mating surface (p 2-9). Uniformly apply a .03 in. minimum layer of synthetic rubber adhesive to the hull and the entire bonding surface of the thrust washer (4). Allow 10 minutes for the adhesive to start setting up. If installing a new thrust washer (4), remove the graphite on bonding surface. Press thrust washer (4) to hull and hold in place for a minimum of 2 hours before installing track adjusting flange.



**DISASSEMBLY**

- A** If damaged, remove two alignment pins (1) from flange (2).

**WARNING**

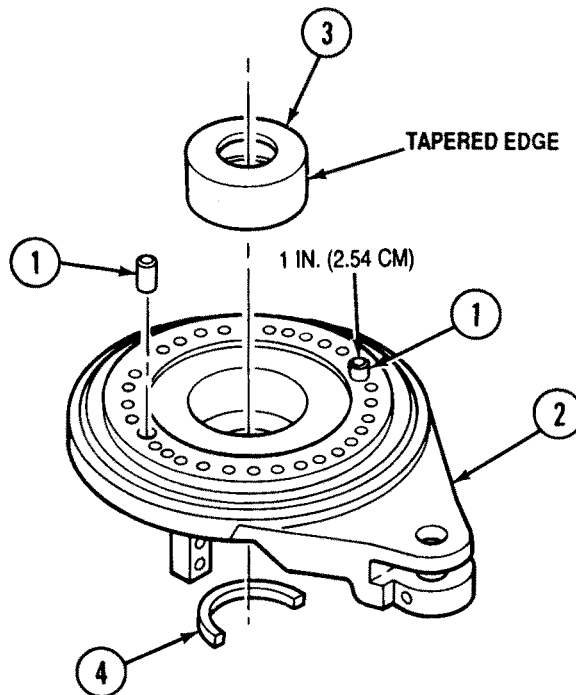
Always use goggles when using hammer and drift. Failure to comply may result in severe injury to personnel.

- B** Using hammer and drift, remove oil barrier (3) from flange (2). Discard oil barrier (3).

**Note**

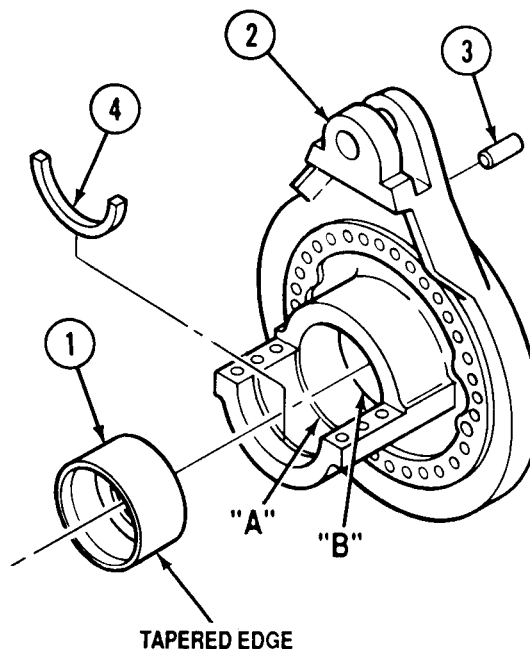
Left-hand track adjusting flange contains an alignment half-ring.

- C** If damaged, remove alignment half-ring (4) from left-hand track adjusting flange (2). Discard half-ring (4).



## ASSEMBLY

- A** Using hammer and block of wood, install oil barrier (1) in flange (2), ensuring tapered edge of oil barrier (1) is facing down. Ensure ends of oil barrier (1) align with ridges "A" and "B" in flange (2).
- B** If removed, install two alignment pins (3) on flange (2), leaving 1 in. (2.54 cm) of pin exposed.
- C** If removed, install alignment half-ring (4) on left-hand track adjusting flange (2).



## INSTALLATION

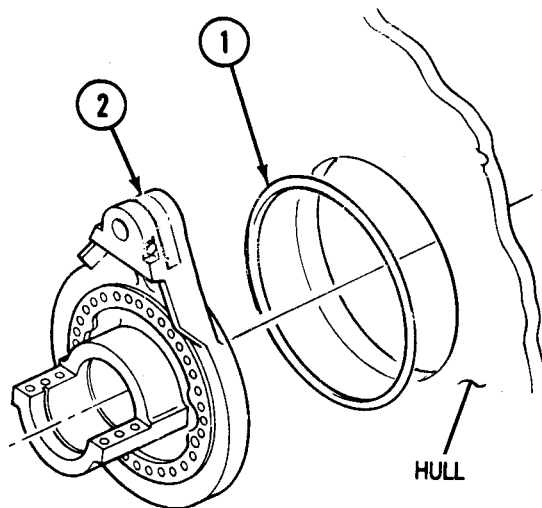
### Note

- It may be necessary to line up alignment pins on flange while installing final drive.
- Mark location of alignment pins inside hull before installation.

- A** Coat packing (1) with silicone compound, and install packing (1) on track adjusting flange (2).
- B** Install track adjusting flange (2) in hull.

### FOLLOW-ON TASKS:

- Install steer unit (p 4-217).
- Install final drives (p 4-242).
- Install track adjusting cylinder (TM 5-2350-262-20-2).



# FINAL DRIVE SPROCKET STUD REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Lubricating Oil                      Item 31  
Appendix C

Parts:

Packing  
Plug  
Seal

Parts Reference:

TM 5-2350-262-24P    Group AU

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-10  
TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Final Drives Drained
TM 5-2350-262-20-2	Drive Sprocket Removed

**REMOVAL**

- A Remove screw (1), washer (2), packing (3), and sprocket shaft (4) from final drive (5). Discard packing (3).
- B Remove plug (6) from screw (1). Discard plug (6).

**Note**

When seal is removed, inspect shims. Replace if damaged with thinnest shim toward bearing.

- C Remove and discard seal (7) from sprocket shaft (4).
- D Support sprocket shaft (4) on blocks of wood and drive out any damaged studs (8) with arbor press. Discard damaged studs (8).

**INSTALLATION**

- A Using arbor press, install studs (8) on sprocket shaft (4).

**Note**

Do not remove plastic retainer from seal assembly.

- B Clean oil from indicated surfaces of seal (7).
- C Install seal (7) on sprocket shaft (4) with retaining lip facing inboard.
- D Install sprocket shaft (4) on final drive (5).

**Note**

Plug should protrude no more than .015 in. (0.381 mm) after performing step E.

- E Install plug (6) on screw (1).

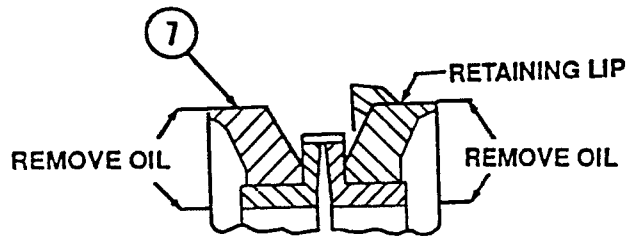
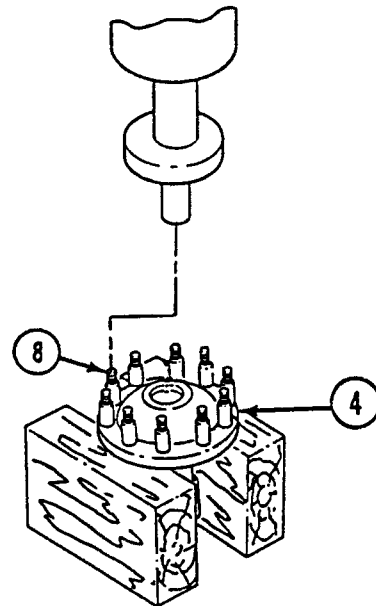
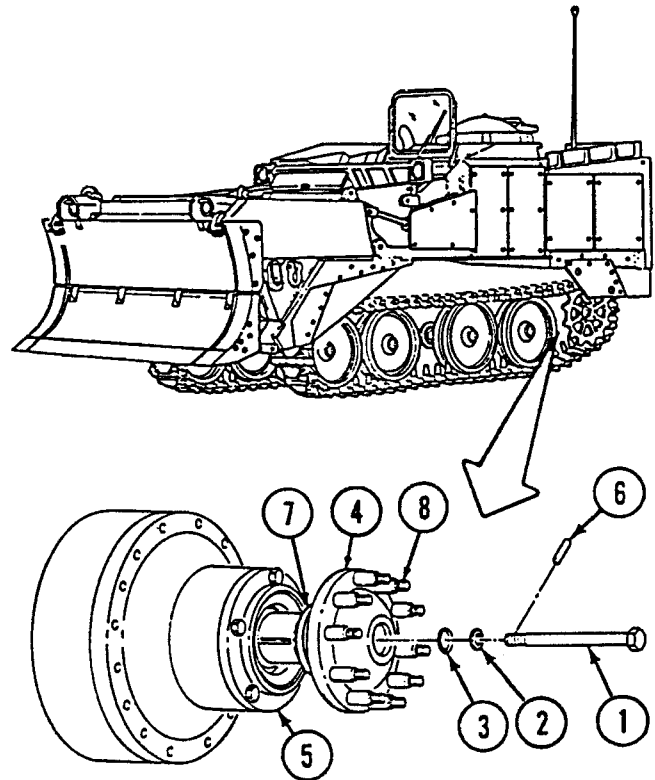
**Note**

Coat packing and threads of screw with lubricating oil prior to installation.

- F Secure sprocket shaft (4) on final drive (5) with packing (3), washer (2), and screw (1). Tighten screw (1) to 270-295 lb-ft (366-400 N-m).

**FOLLOW-ON TASKS:**

- Fill final drives (TM 5-2350-262-10).
- Install drive sprocket (TM 5-2350-262-20-2).



# FINAL DRIVE SEAL REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Reference:

TM 5-2350-262-10  
 TM 5-2350-262-20-2

Equipment Condition:

Materials:

Lubricating Oil	Item 31 Appendix C
Drycleaning Solvent	Item 39 Appendix C

Reference

TM 5-2350-262-10  
 TM 5-2350-262-20-2

Condition Description

Final Drives Drained  
 Drive Sprocket Removed

Parts:

Packing (2)  
 Plug  
 Seal

General Safety Instructions:

### WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated areas. Prolonged exposure can cause skin irritation.

Parts Reference:

TM 5-2350-262-24P Group AU

Personnel Required:

Construction Equipment Repairer 62B10

**REMOVAL**

**Note**

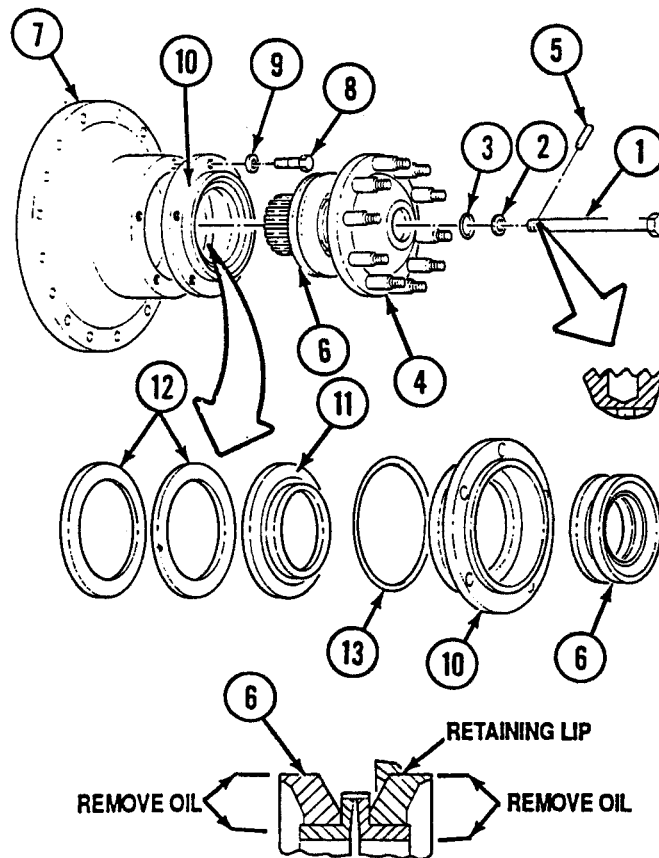
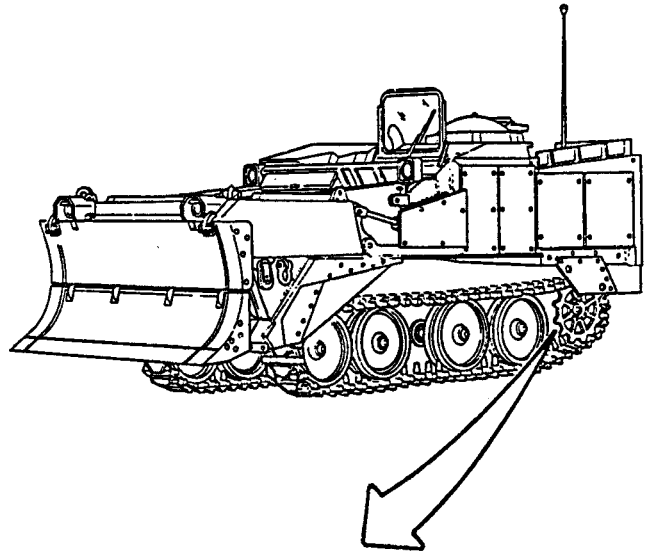
Have container ready for draining oil.

- A** Remove screw (1), washer (2), and packing (3) from sprocket shaft (4). Discard packing (3).
- B** Remove plug (5) from screw (1). Discard plug (5).
- C** Remove sprocket shaft (4) and seal (6) from cover (7). Discard seal (6).
- D** Remove five screws (8), washers (9), and retainer (10) from cover (7).

**Note**

Inspect shims. Replace if damaged, with thinnest shim toward bearing.

- E** If shoulder washer (11) and shims (12) come out with retainer (10), note their positions.
- F** Remove packing (13) from retainer (10). Discard packing (13).



**INSTALLATION**

**WARNING**

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when the solvent is used. Prolonged exposure can cause skin irritation. Use only in well-ventilated areas. Failure to comply may result in severe injury to personnel and damage to equipment.

- A** Clean bores of sprocket shaft (1) and retainer (2) with drycleaning solvent.
- B** If removed, install shims (3) and shoulder washer (4) on cover (5).

**Note**

Coat threads of screws and packing with lubricating oil prior to installation.

- C** Install packing (6) on retainer (2).

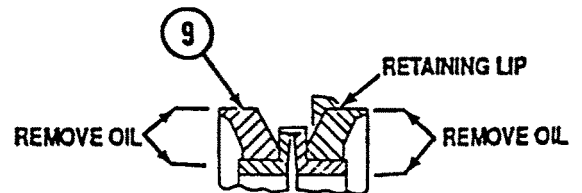
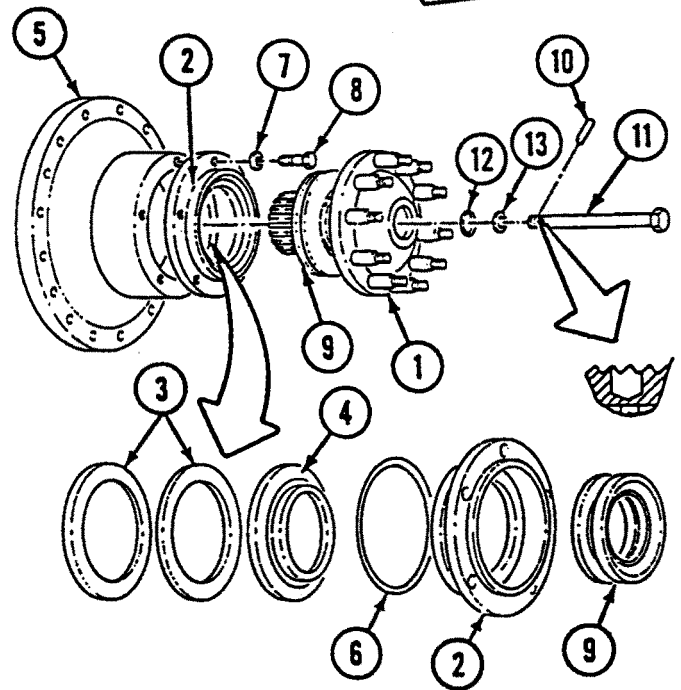
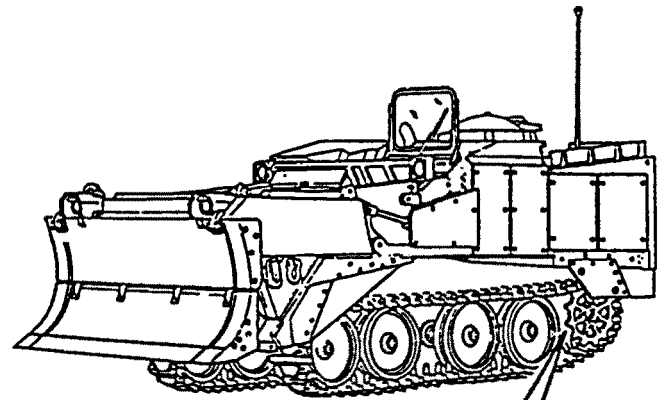
**Note**

Do not remove plastic retainer from seal assembly.

- D** Install retainer (2) on cover (5) with five washers (7) and screws (8). Tighten screws (8) to 32-34 lb-ft (43-46 N-m).
- E** Clean oil from indicated surfaces of seal (9).
- F** Install seal (9) on sprocket shaft (1) with retaining lip facing inboard.
- G** Install sprocket shaft (1) on cover (5).
- H** Install plug (10) on screw (11). Plug (10) may protrude no more than a maximum of .015 in. (0.381 mm).
- I** Install packing (12), washer (13), and screw (11) on sprocket shaft (1). Tighten screw (11) to 270-295 lb-ft (366-400 N-m).

**FOLLOW-ON TASKS:**

- Fill final drives (TM 5-2350-262-10).
- Install drive sprocket (TM 5-2350-262-20-2).



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## **RADIATOR TESTING**

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Refer to TM 750-254 for procedures on testing the radiator.



## Section VIII. GROUP A3, SUSPENSION INSTALLATION

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TASKS	PAGE
Actuator Accumlator Replacement .....	4-310
Actuator Mounting Ring Replacement .....	4-312.1
Actuator Replacement in Shipping/Storage Container .....	4-254
Front Bump Stop Cylinder Repair .....	4-320
Left Front Actuator Replacement .....	4-257
Left Front Intermediate Actuator Replacement .....	4-300
Left Rear Actuator Replacement .....	4-265
Left Rear Intermediate Actuator Replacement .....	4-296
Right Front Actuator Replacement .....	4-274
Right Front Intermediate Actuator Replacement .....	4-290
Right Rear Actuator Replacement .....	4-282
Right Rear Intermediate Actuator Replacement .....	4-306
Track Adjusting Cylinder Repair .....	4-313

# ACTUATOR REPLACEMENT IN SHIPPING/STORAGE CONTAINER

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

Sling 5120-01-222-7931

Parts:

Lockwasher (24)

Parts Reference:

TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers 62B10

Equipment Condition:

Reference

Page 4-258 to Page 4-307

Condition Description

Corner or Intermediate Actuator Removed

General Safety Instructions:

### WARNING

- Do not remove access port cap from shipping/storage container to release pressure.
- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling.
- Personnel must stand clear during lifting operations.

**REMOVAL**

**WARNING**  
 Do not remove access port cap from shipping/storage container to release pressure. Cap will fly off and may cause injury to personnel.

**Note**

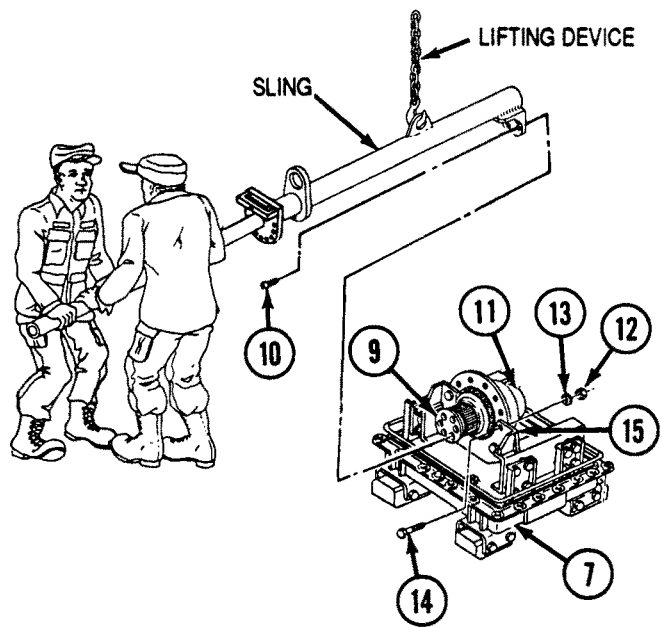
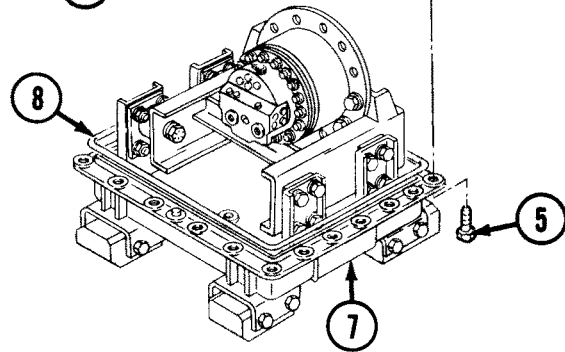
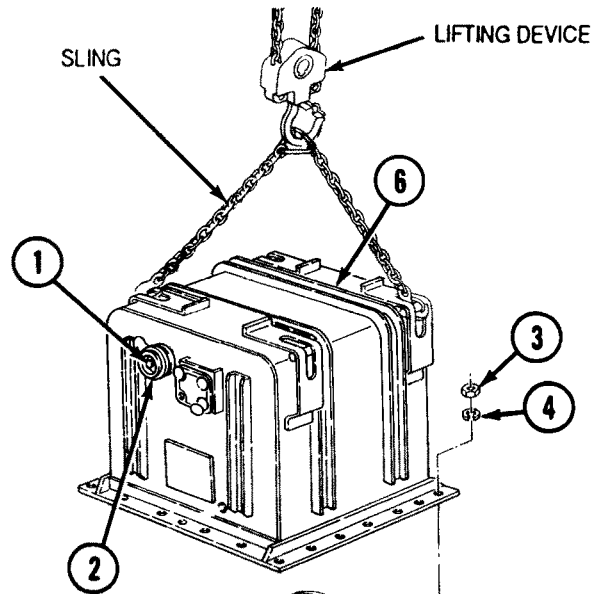
Removal and installation for corner and intermediate actuators are the same. This task covers the intermediate actuator.

- A** Release pressure from container prior to removing hardware by depressing valve (1) on access port cap (2).
- B** Remove twenty nuts (3), lockwashers (4), and screws (5) securing upper container (6) to lower container (7). Discard lockwashers (4).

**WARNING**

- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

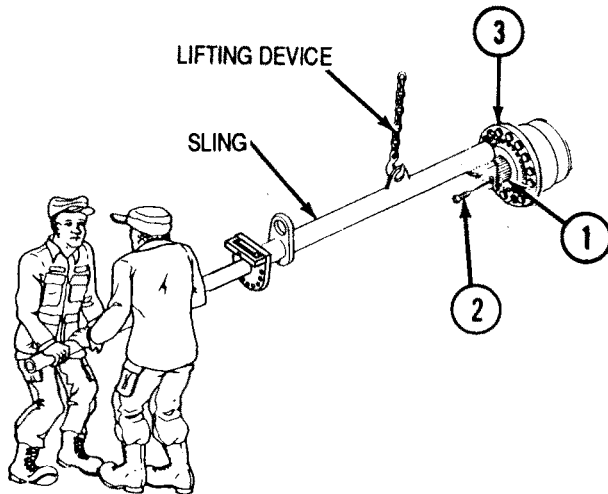
- C** Connect sling to upper container (6) and lifting device. Lift upper container (6) up and move out of the way.
- D** If damaged, remove gasket (8) from lower container (7). Discard gasket (8).
- E** Install sling on wingshaft (9) using six screws (10) (previously used in securing road arm).
- F** Connect lifting device to sling and take up slack.
- G** Extend handle of sling to aid in balancing weight of actuator (11).
- H** Remove four nuts (12), lockwashers (13), and screws (14) securing actuator (11) to frame (15). Discard lockwashers (13).
- I** While supporting actuator (11) at end of sling, lift actuator (11) up and out of lower container (7).



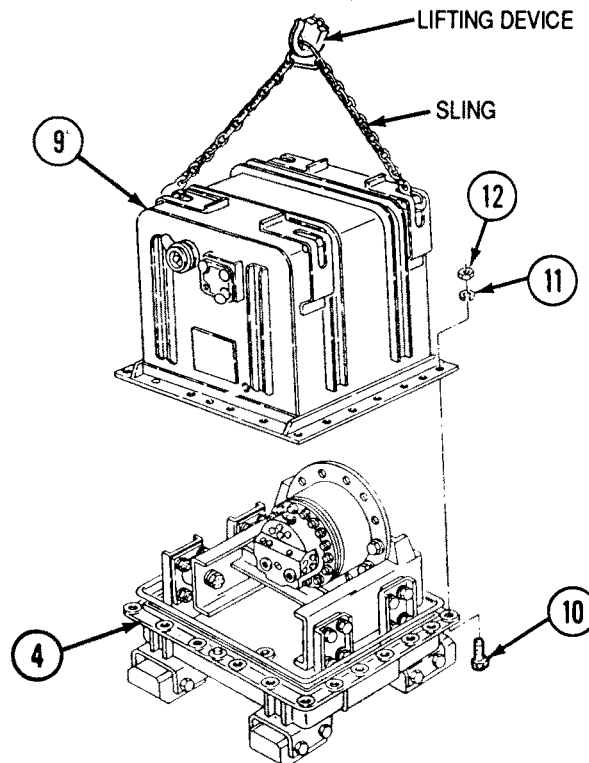
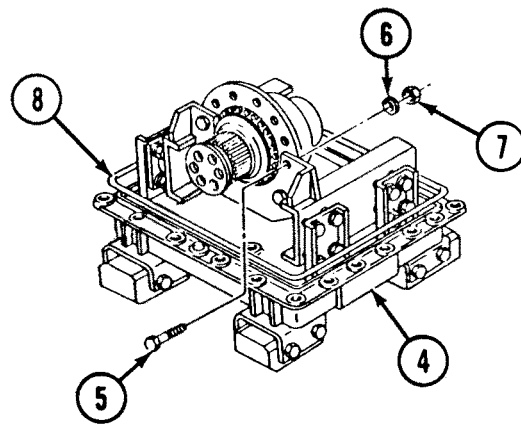
**INSTALLATION**

**WARNING**

- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.



- A** Connect sling to wingshaft (1) with six screws (2) (previously used in securing road arm) and connect lifting device to sling.
- B** Extend handle of sling to aid in balancing actuator (3).
- C** Lift actuator (3) into lower container (4) and secure with four screws (5), lockwashers (6), and nuts (7). Tighten nuts (7) to 71-83 lb-ft (96-113 N·m).
- D** Remove six screws (2) (previously used in securing road arm) securing sling to wingshaft (1). Discard screws (2).
- E** If removed, install gasket (8) on lower container (4). Ensure gasket (8) is seated properly.
- F** Connect lifting sling to upper container (9) and lifting device. Install upper container (9) on lower container (4) and secure with twenty screws (10), lockwashers (11), and nuts (12). Tighten nuts (12) to 71-83 lb-ft (96-113 N·m).



# LEFT FRONT ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive Lifting Device

Special Tools:

Adapter	5120-00-240-8702
Socket Wrench Socket Set	5120-01-195-0640
Sling	5120-01-222-7931
Wrench, Cam Adjustment	5120-01-222-7933
Wrench, Crowfoot	5120-01-228-3162
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Screw, Jacking (2)	5305-00-071-2074
Guide Pin (4)	5315-01-229-9703

Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

Packing (8)

Self-locking Screw (14)

Parts Reference:

TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Hull Access Plate Removed
TM 5-2350-262-20-2	Left No. 2 Road-wheel Removed

**Note**

Retain six self-locking screws from retainer removal.

TM 5-2350-262-20-2	Left Front Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

General Safety Instructions:

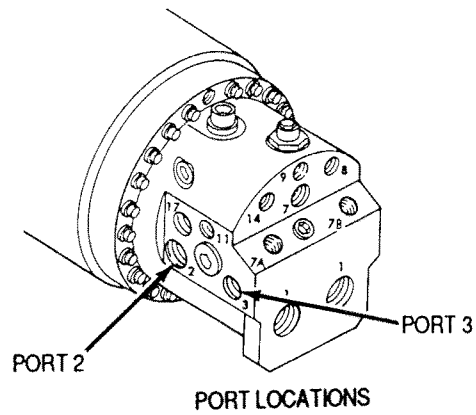
**WARNING**

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling.

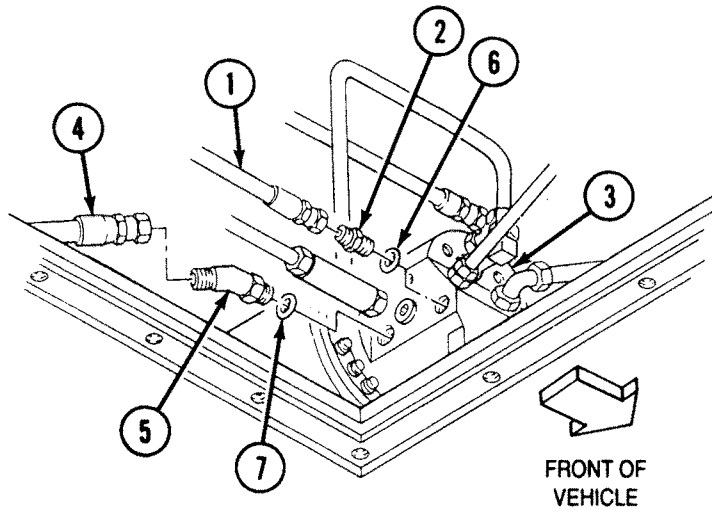
**REMOVAL**

**WARNING**  
 High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

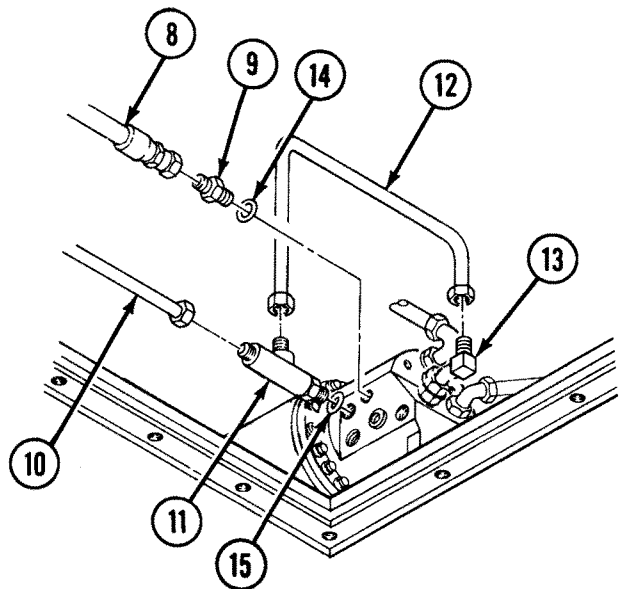
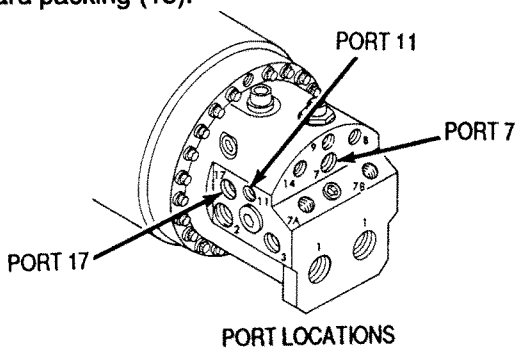
**CAUTION**  
 Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.



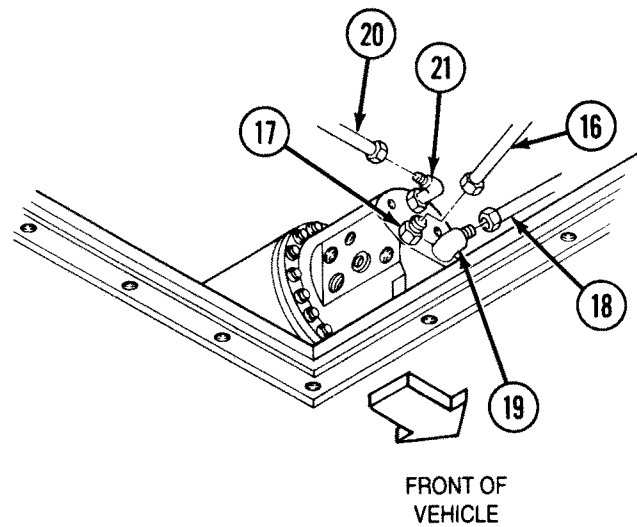
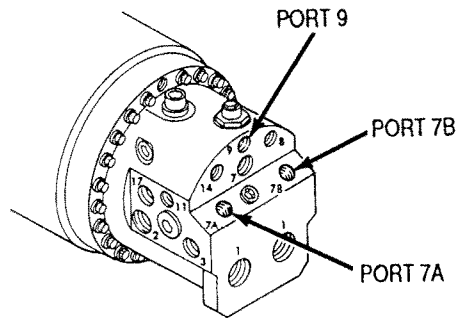
- A** Disconnect hose (1) from adapter (2) in port 3 of actuator (3).
- B** Disconnect hose (4) from elbow (5) in port 2.
- C** Remove adapter (2) and packing (6) from port 3. Discard packing (6).
- D** Remove elbow (5) and packing (7) from port 2. Discard packing (7).



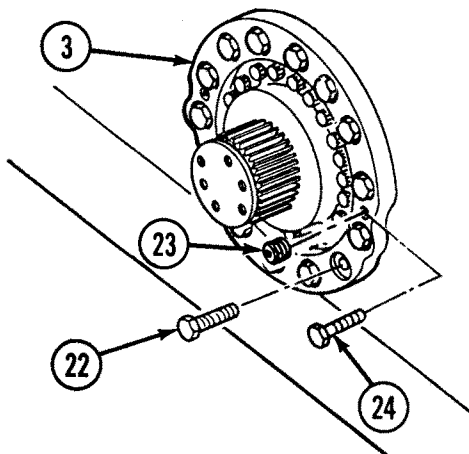
- E** Disconnect hose (8) from adapter (9) in port 11.
- F** Disconnect tube (10) from tee (11) in port 17.
- G** Remove tube (12) from tee (11) and elbow (13) in port 7.
- H** Remove adapter (9) and packing (14) from port 11. Discard packing (14).
- I** Remove tee (11) and packing (15) from port 17. Discard packing (15).



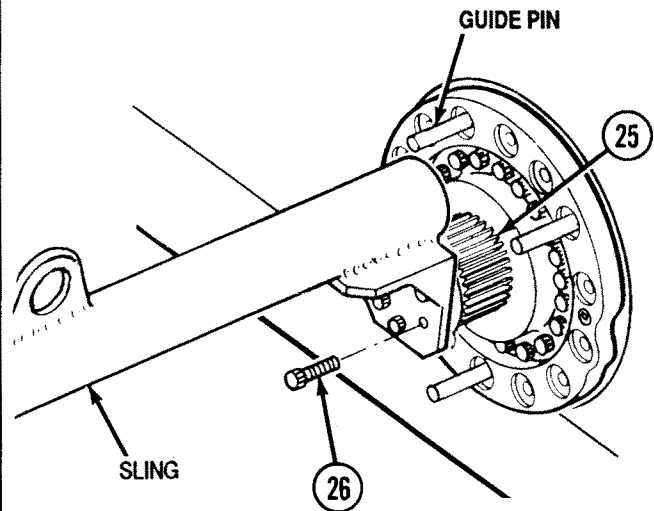
- J** Disconnect tube (16) from adapter (17) in port 7A.
- K** Disconnect tube (18) from elbow (19) in port 7B.
- L** Disconnect hose (20) from elbow (21) in port 9.



PORT LOCATIONS



- M** Remove fourteen self-locking screws (22) from flange of actuator (3). Discard self-locking screws (22).
- N** Remove two setscrews (23) from flange of actuator (3).
- O** Install two jacking screws (24) on flange of actuator (3). Tighten jacking screws (24) clockwise to break actuator (3) away from hull.



- P** Install four guide pins on hull at 90° intervals.
- Q** Install sling on wingshaft (25) with six self-locking screws (26) (previously used in securing roadwheel arm).

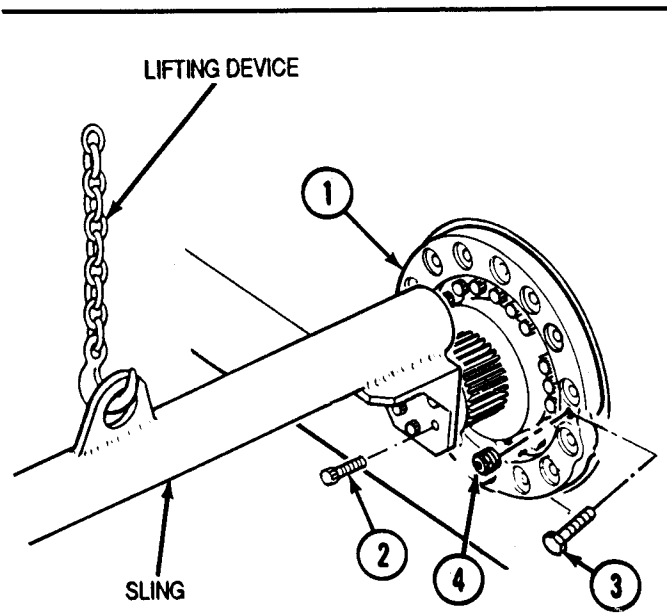
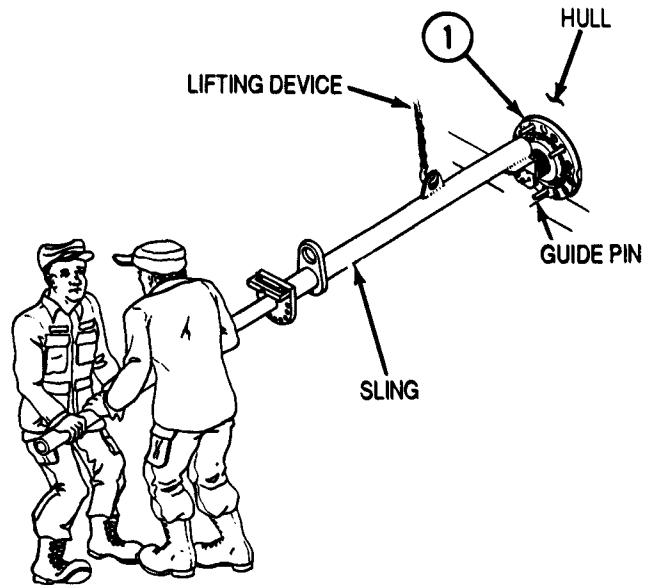


- R** Connect lifting device to sling and take up slack.
- S** Extend handle of sling to aid in balancing weight of actuator (1).

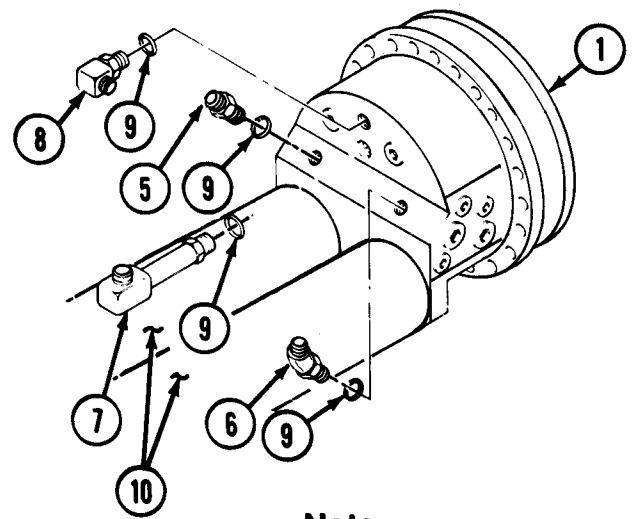
**WARNING**

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- T** Remove actuator (1) from four guide pins and hull while supporting actuator (1) on end of sling.



- U** Remove six self-locking screws (2), sling, and lifting device from actuator (1). Retain self-locking screws (2) for installation.
- V** Remove two jacking screws (3) and install two setscrews (4) in flange of actuator (1). Tighten setscrews (4) to 15-20 lb-ft (20-27 N-m).



**Note**

Perform steps W and X only if replacing actuator.

- W** Remove adapter (5), elbows (6), (7), and (8), and four packings (9) from actuator (1). Discard packings (9).
- X** Refer to page 4-311 to remove two actuator accumulators (10) from actuator (1).



**INSTALLATION**

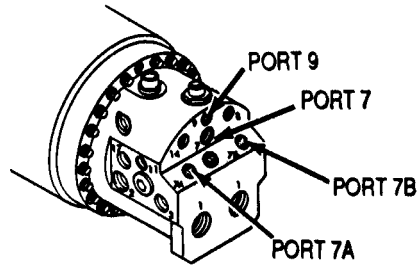
**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

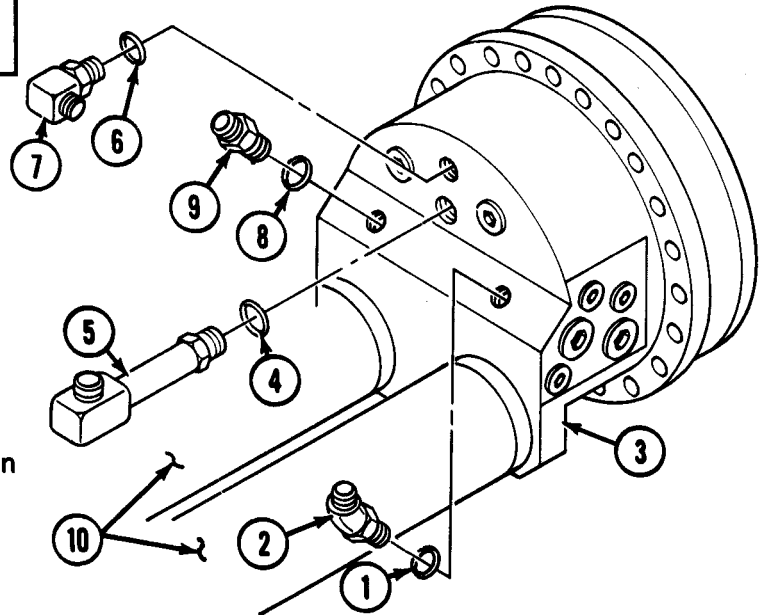
**Note**

- Perform steps A through E only if installing a new actuator.
- Coat all packings with lubricating oil prior to installation.
- When replacing actuator, remove shipping plugs from new actuator, and install plugs on faulty actuator.

- A** Install packing (1) and elbow (2) on port 7B in actuator (3).
- B** Install packing (4) and elbow (5) on port 7.
- C** Install packing (6) and elbow (7) on port 9.
- D** Install packing (8) and adapter (9) on port 7A.



PORT LOCATIONS

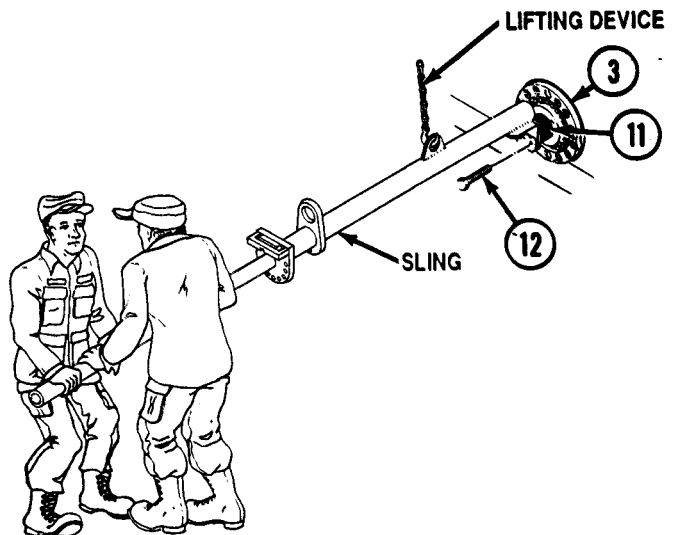


- E** If removed, refer to page 4-311 to install two actuator accumulators (10) on actuator (3).

**WARNING**

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

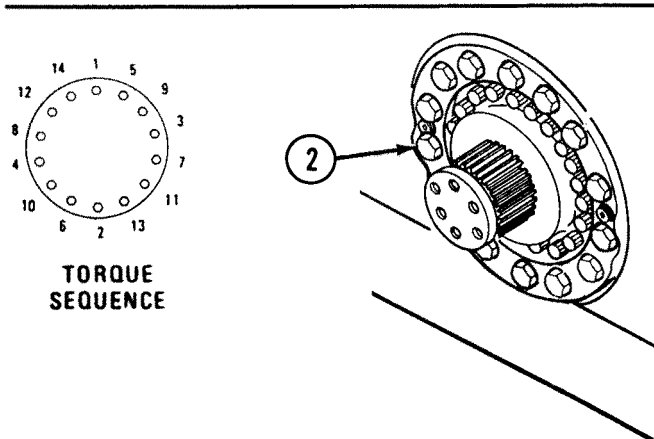
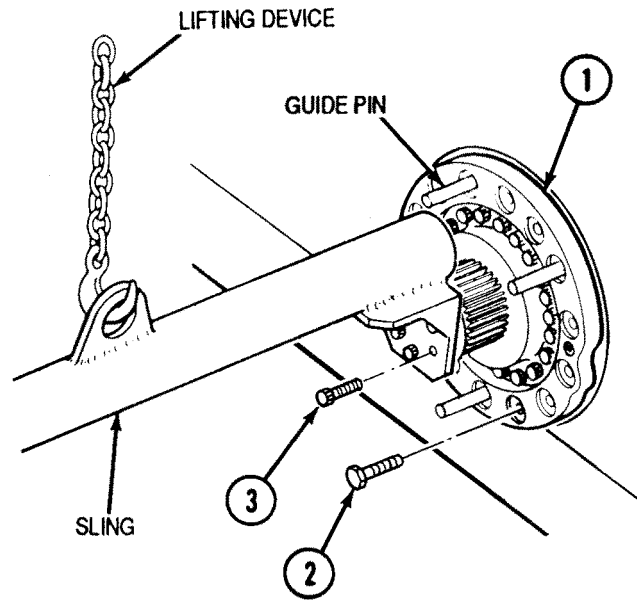
- F** Install sling on wingshaft (11) with six self-locking screws (12) (previously used in securing roadwheel arm).
- G** Connect lifting device to sling and take up slack.
- H** Extend handle of sling to aid in balancing weight of actuator (3).



**Note**

Coat threads of screws with lubricating oil prior to installation.

- I Install actuator (1) on hull, remove four guide pins, and secure actuator (1) with fourteen self-locking screws (2).
- J Remove six self-locking screws (3), sling, and lifting device from actuator (1). Discard self-locking screws (3).

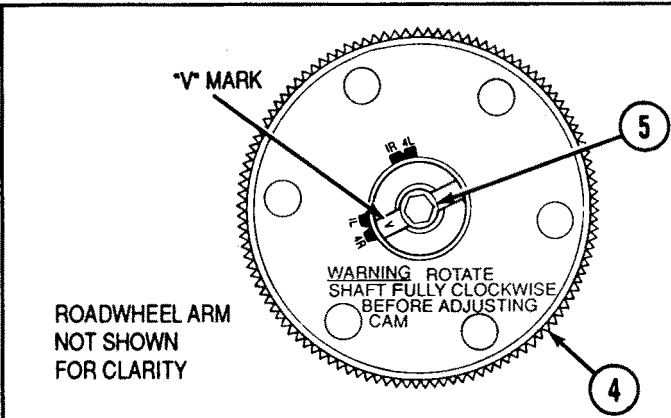


- K In sequence shown, tighten fourteen self-locking screws (2) to approximately 140 lb-ft (190 N-m).
- L Following tightening sequence, tighten fourteen self-locking screws (2) to 170-190 lb-ft (230-258 N-m).

**Note**

Do not install retainer until step W.

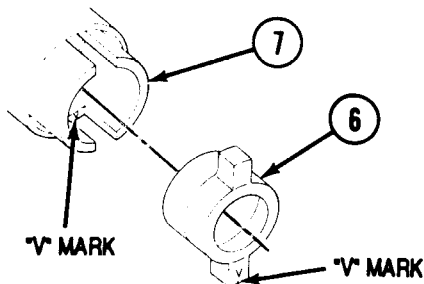
- M Install left front roadwheel arm (TM 5-2350-262-20-2).



**Note**

- Perform steps N through V for left front actuator leveling cam adjustment.
- The wingshaft may require up to 300 lb-ft (407 N-m) torque to rotate.
- When wingshaft is rotated fully clockwise, the marking, "Warning, rotate shaft fully clockwise before adjusting cam," will be in the horizontal position.

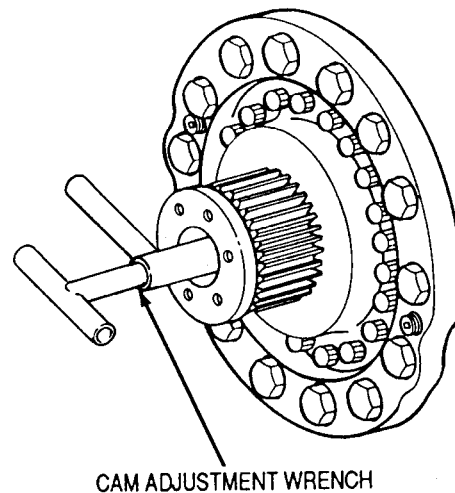
- N Rotate wingshaft (4) fully clockwise.
- O Remove screw (5).



**CAUTION**

If key is 180° out of position, cam adjustment setting will not be correct. Damage to actuator may result.

**P** Temporarily remove index key (6) and observe location of "V" mark on index key (6) and at bottom side of one of the key slots in camshaft (7). Reinstall index key (6) in camshaft (7) so "V" mark on camshaft (7) is under "V" mark on index key (6).



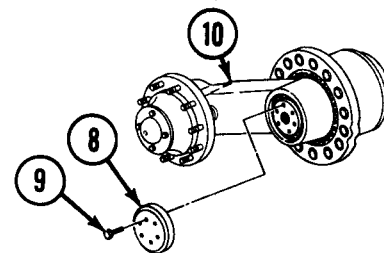
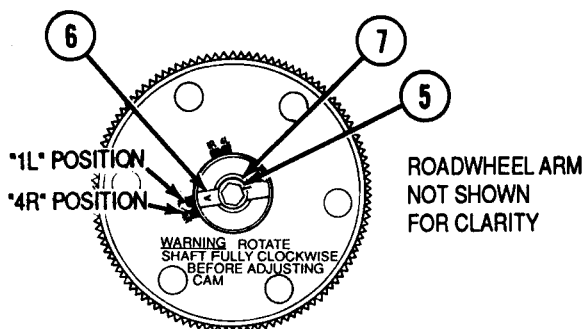
**Q** Position threaded portion of cam adjustment wrench in place of screw and rotate approximately four turns.

**R** Disengage camshaft (7) by pushing on end of cam adjustment wrench or by tapping lightly with a hammer. When fully disengaged, place cam adjustment wrench handle on index key (6) and turn camshaft (7) freely.

**S** Make initial setting at the "4R" position prior to the final setting at "1L." Turn the index key (6) and camshaft (7) with the cam adjustment wrench. As the "V" mark on the index key (6) approaches the "4R" index mark, pull the tee-handle towards you with moderate force. When the proper "4R" position is reached, you will feel the camshaft (7) fall approximately 11/32 in. (9 mm) into the detent. Confirm that the camshaft (7) is engaged by ensuring that the wrench can no longer be rotated.

**CAUTION**

Ensure camshaft is fully engaged after setting or damage to actuator assembly will result.



**T** Disengage camshaft (7) by pushing on end of tee-handle or by tapping lightly with hammer. Slowly rotate camshaft (7) with wrench toward the "1L" position while pulling on the tee-handle until the "1L" position is reached. You will feel the camshaft (7) fall approximately 11/32 in. (9 mm) into detent at the "1L" position. Confirm that the camshaft (7) is engaged by ensuring that the wrench can no longer be turned.

**V** Remove cam adjustment wrench and install screw (5). Tighten screw (5) to 10-12 lb-ft (14-16 N·m).

**U** Visually inspect to be sure the camshaft (7) appears to be in a different setting than it was when set at "4R."

**W** Install retainer (8) and six self-locking screws (9) on roadwheel arm (10). Tighten self-locking screws (9) to 98-106 lb-ft (133-144 N·m). Wait at least 15 minutes and tighten self-locking screws (9) to 98-106 lb-ft (133-144 N·m).

- X** Connect LH1 SPNSN UNIT-7B tube (1) to elbow (2) in port 7B.
- Y** Connect NO. 1 SPNSN UNIT-9 hose (3) to elbow (4) in port 9.

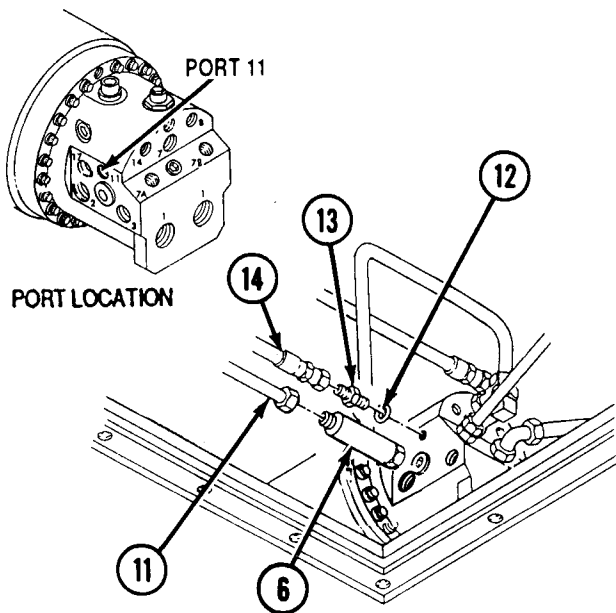
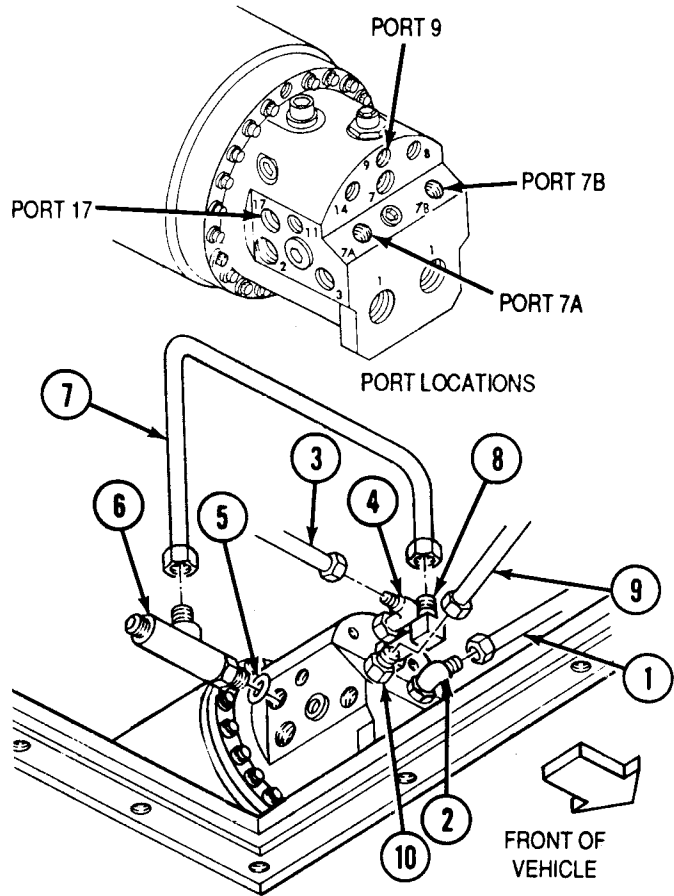
**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

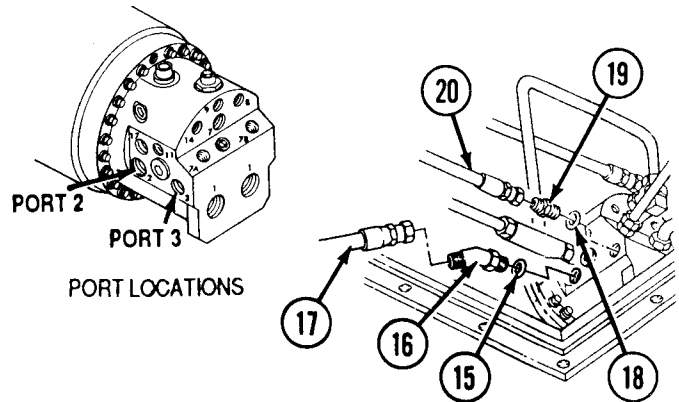
**Note**

Coat all packings with lubricating oil prior to installation.

- Z** Install packing (5) and tee (6) on port 17.
- AA** Install tube (7) on elbow (8) and tee (6) (elbow end marked LH1/RH4 SPNSN UNIT-7 and tee end marked LH1/RH4 SPNSN UNIT-7 TEE).
- AB** Connect LH1 SPNSN UNIT-7A tube (9) to adapter (10) in port 7A.



- AC** Connect NO. 1 SPNSN UNIT-17 TEE tube (11) to tee (6).
- AD** Install packing (12) and adapter (13) on port 11.
- AE** Connect NO. 1 SPNSN UNIT-11 hose (14) to adapter (13).



- AF** Install packing (15) and elbow (16) on port 2.
- AG** Connect CORNER SPNSN UNIT-2 hose (17) to elbow (16).
- AH** Install packing (18) and adapter (19) on port 3.
- AI** Connect NO. 1 SPNSN UNIT-3 hose (20) to adapter (19).

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install left No. 2 roadwheel (TM 5-2350-262-20-2).

# LEFT REAR ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

### Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

### Special Tools:

Adapter	5120-00-240-8702
Socket Wrench Socket Set	5120-01-195-0640
Sling	5120-01-222-7931
Wrench, Cam Adjustment	5120-01-222-7933
Wrench, Crowfoot	5120-01-228-3162
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Screw, Jacking (2)	5305-00-071-2074
Guide Pin (4)	5315-01-229-9703

### Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

### Parts:

Packing (9)

Self-locking Screw (14)

### Parts Reference:

TM 5-2350-262-24P Group A3

### Personnel Required:

Two Construction Equipment Repairers 62B10

### Reference:

TM 5-2350-262-20-1

TM 5-2350-262-20-2

### Troubleshooting Reference:

TM 5-2350-262-20-1

### Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Hull Access Plate Removed
TM 5-2350-262-20-2	Left No. 3 Road-wheel Removed

### **Note**

Retain six self-locking screws from retainer removal.

TM 5-2350-262-20-2	Left Rear Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

### General Safety Instructions:

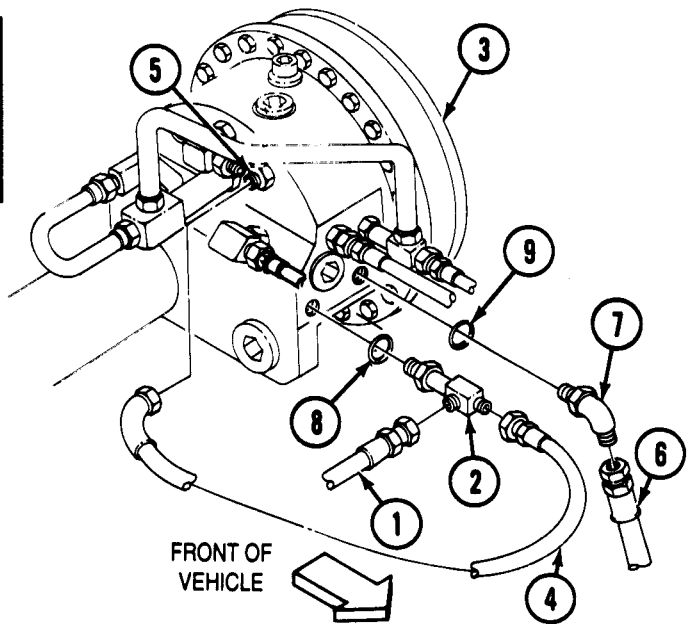
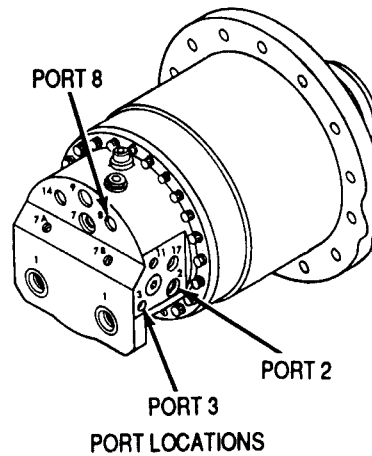
## WARNING

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling.

**REMOVAL**

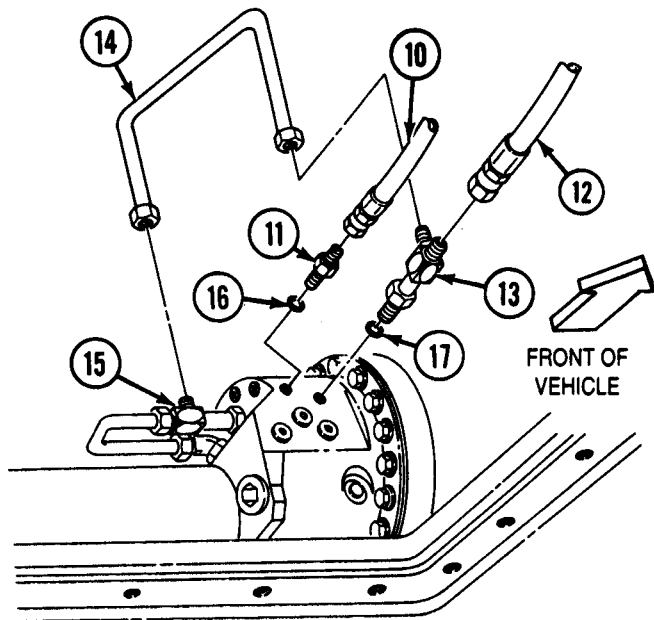
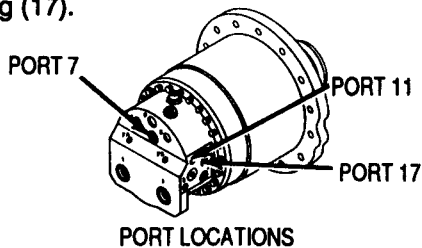
**WARNING**  
 High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

**CAUTION**  
 Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.



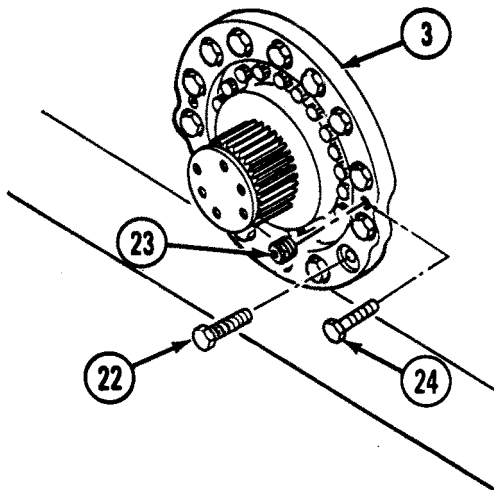
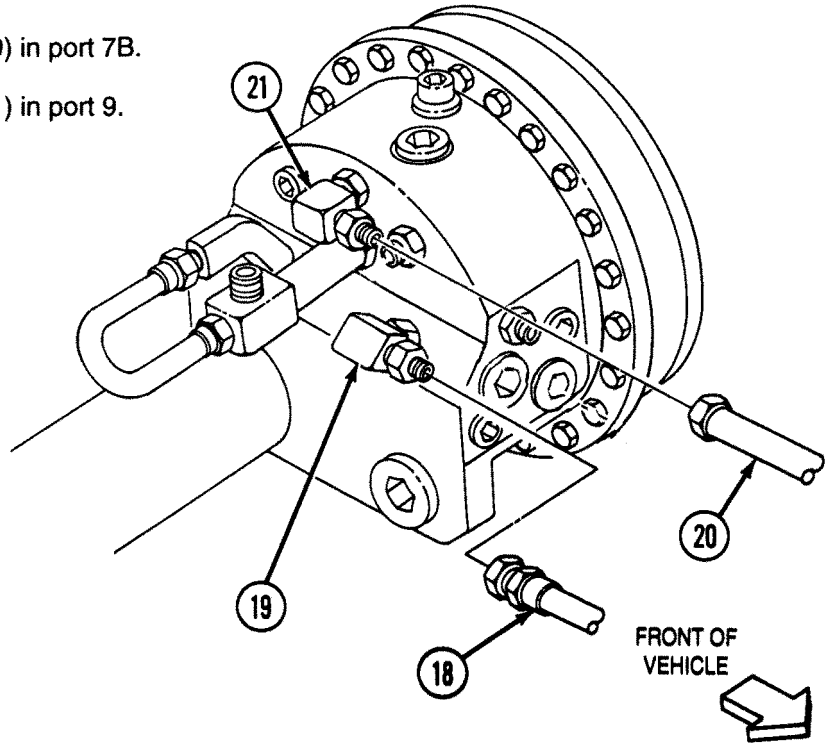
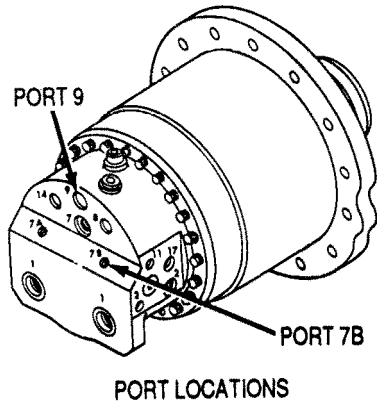
- A** Disconnect hose (1) from tee (2) in port 3 of actuator (3).
- B** Disconnect hose (4) from tee (2) and checkvalve (5) in port 8.
- C** Disconnect hose (6) from elbow (7) in port 2.
- D** Remove tee (2) and packing (8) from port 3. Discard packing (8).
- E** Remove elbow (7) and packing (9) from port 2. Discard packing (9).

- F** Disconnect hose (10) from adapter (11) in port 11.
- G** Disconnect hose (12) from tee (13) in port 17.
- H** Remove tube (14) from tee (13) and tee (15) in port 7.
- I** Remove adapter (11) and packing (16) from port 11. Discard packing (16).
- J** Remove tee (13) and packing (17) from port 17. Discard packing (17).

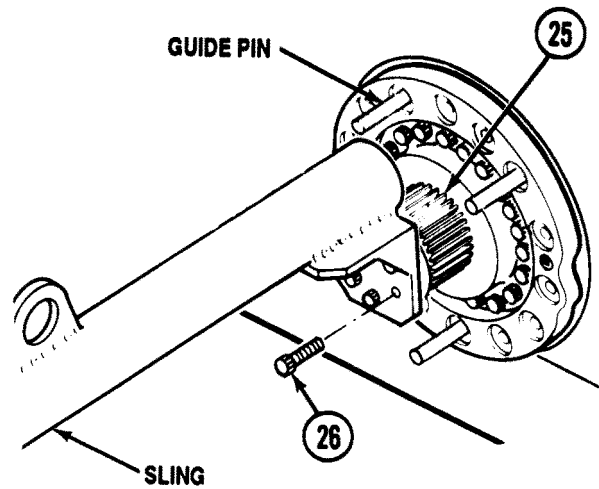




- K** Disconnect hose (18) from elbow (19) in port 7B.
- L** Disconnect hose (20) from elbow (21) in port 9.



- M** Remove fourteen self-locking screws (22) from flange of actuator (3). Discard self-locking screws (22).
- N** Remove two setscrews (23) from flange of actuator (3).
- O** Install two jacking screws (24) on flange of actuator (3). Tighten jacking screws (24) clockwise to break actuator (3) away from hull.

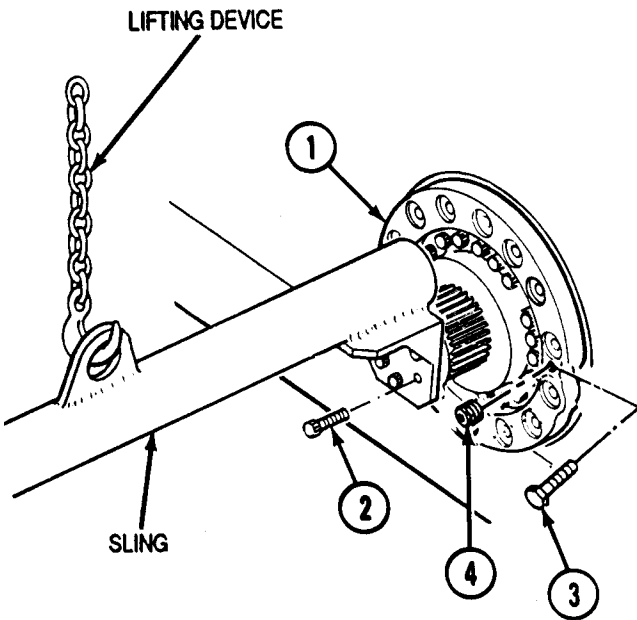
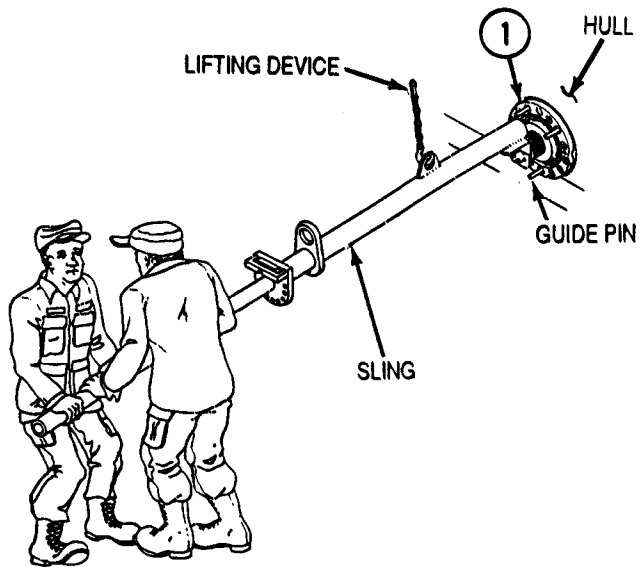


- P** Install four guide pins on hull at 90° intervals.
- Q** Install sling on wingshaft (25) with six self-locking screws (26) (previously used in securing roadwheel arm).

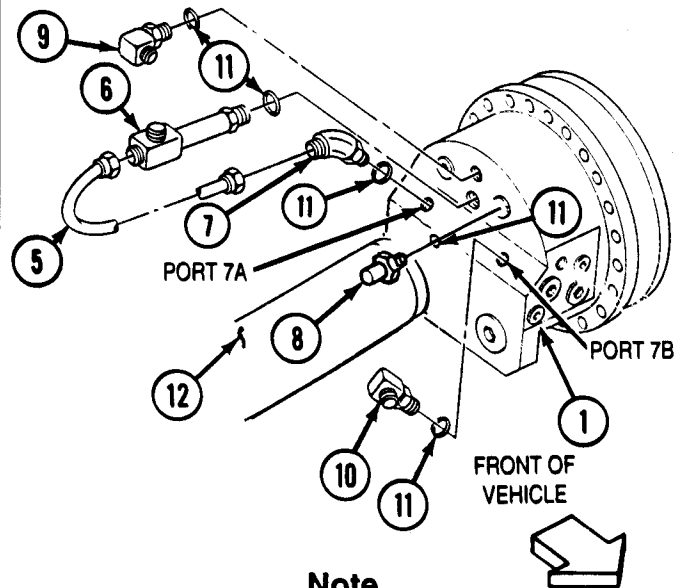
## WARNING

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- R** Connect lifting device to sling and take up slack.
- S** Extend handle of sling to aid in balancing weight of actuator (1).
- T** Remove actuator (1) from four guide pins and hull while supporting actuator (1) on end of sling.



- U** Remove six self-locking screws (2), sling, and lifting device from actuator (1). Retain self-locking screws (2) for installation.
- V** Remove two jacking screws (3) and install two setscrews (4) in flange of actuator (1). Tighten setscrews (4) to 15-20 lb-ft (20-27 N-m).



### Note

Perform steps W through Y, only if replacing actuator.

- W** Remove tube (5) from tee (6) and elbow (7) at port 7A.
- X** Remove tee (6), checkvalve (8), elbows (7), (9), and (10), and five packings (11) from actuator. Discard packings (11).
- Y** Refer to page 4-311 to remove actuator accumulator (12) from actuator (1).

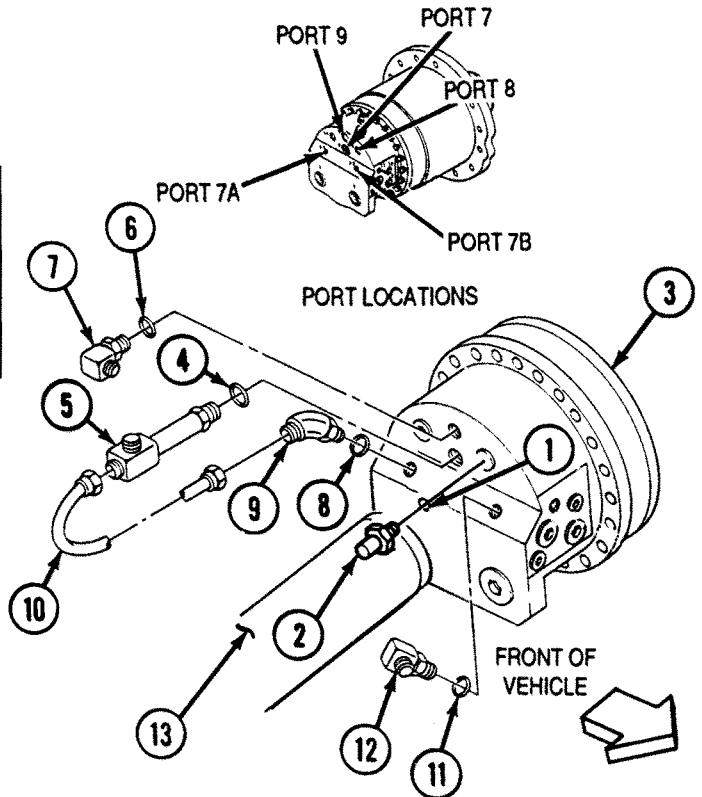


**INSTALLATION**

**CAUTION**  
 Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

**Note**

- Perform steps A through G only if installing a new actuator.
- Coat all packings with lubricating oil prior to assembly.
- When replacing actuator, remove shipping plugs from new actuator and install plugs on faulty actuator.
- Install checkvalve with arrows on hex flats pointing away from actuator.



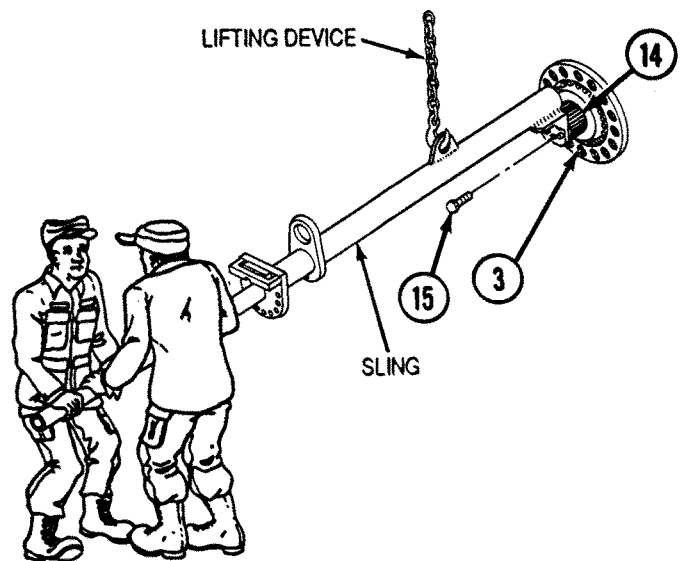
- A** Install packing (1) and checkvalve (2) on port 8 of actuator (3).
- B** Install packing (4) and tee (5) on port 7.
- C** Install packing (6) and elbow (7) on port 9.
- D** Install packing (8) and elbow (9) on port 7A.

- E** Install tube (10) on tee (5) and elbow (9) (tee end marked NO. 4 SPNSN UNIT-7 and elbow end marked NO. 4 SPNSN UNIT-7A).
- F** Install packing (11) and elbow (12) on port 7B.
- G** If removed, refer to page 4-311 to install actuator accumulator (13) on actuator (3).

- H** Install sling on wingshaft (14) with six self-locking screws (15) (previously used in securing roadwheel arm).

**WARNING**  
 Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

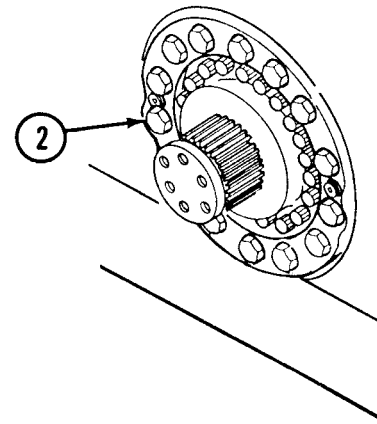
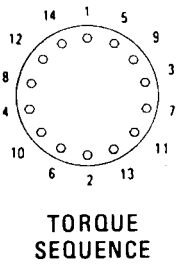
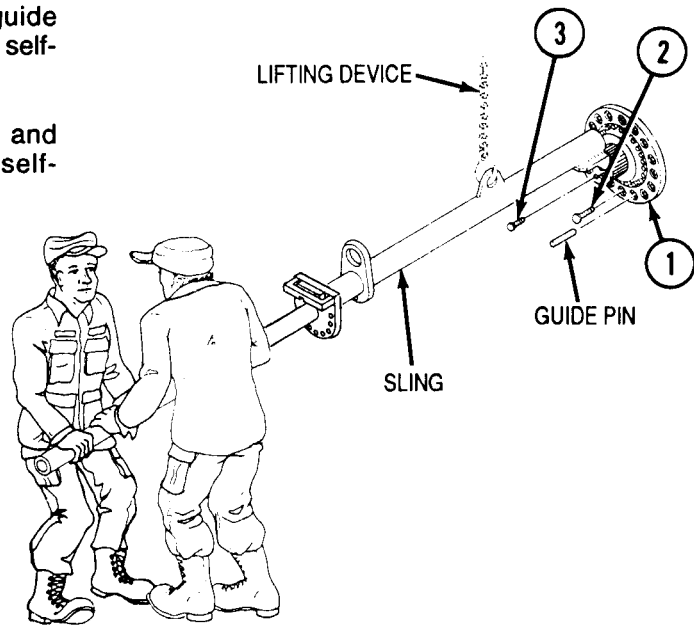
- I** Connect lifting device to sling and take up slack.
- J** Extend handle of sling to aid in balancing weight of actuator (3).



**Note**

Coat threads of screws with lubricating oil prior to assembly.

- K** Install actuator (1) on hull, remove four guide pins, and secure actuator (1) with fourteen self-locking screws (2).
- L** Remove six self-locking screws (3), sling, and lifting device from actuator (1). Discard self-locking screws (3).

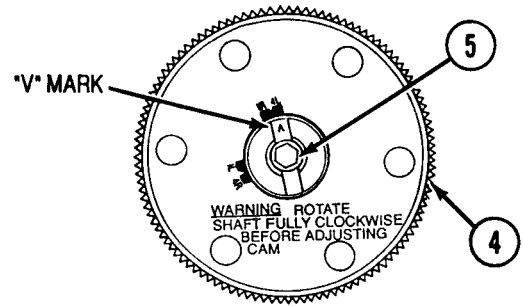


- M** In sequence shown, tighten fourteen self-locking screws (2) to approximately 140 lb-ft (190 N·m).
- N** Following tightening sequence, tighten fourteen self-locking screws (2) to 170-190 lb-ft (230-258 N·m).

**Note**

Do not install retainer until step Y.

- O** Install left rear roadwheel arm (TM 5-2350-262-20-2).

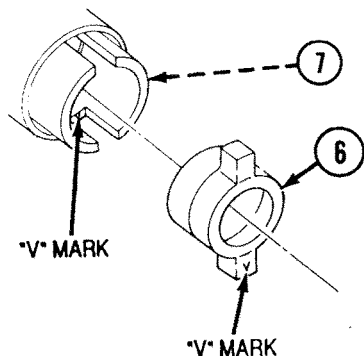


ROADWHEEL ARM NOT SHOWN FOR CLARITY

**Note**

- Perform steps P through X for left rear actuator leveling camshaft adjustment.
- The wingshaft may require up to 300 lb-ft (407 N·m) torque to rotate.
- When wingshaft is rotated fully clockwise, the marking, "Warning, rotate shaft fully clockwise before adjusting cam," will be in the horizontal position.

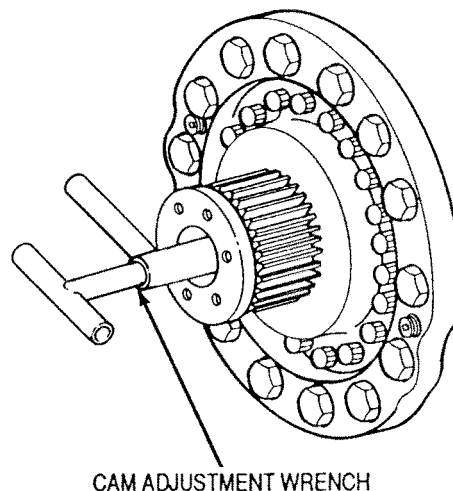
- P** Rotate wingshaft (4) fully clockwise.
- Q** Remove screw (5).



**CAUTION**

If index key is 180° out of position, cam adjustment setting will not be correct. Damage to actuator may result.

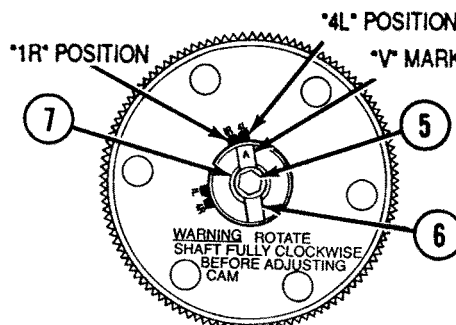
**R** Temporarily remove index key (6) and observe location of "V" mark on index key (6) and at bottom side of one of the key slots in camshaft (7). Reinstall index key (6) in camshaft (7) so "V" mark on camshaft (7) is under "V" mark on index key (6).



**S** Position threaded portion of cam adjustment wrench in place of screw and rotate for approximately four turns.

**T** Disengage camshaft (7) by pushing on end of cam adjustment wrench or by tapping lightly with a hammer. When fully disengaged, place cam adjustment wrench handle on index key (6) and turn camshaft (7) freely.

**U** Make initial setting at the "1R" position prior to the final setting at "4L." Turn the index key (6) and camshaft (7) with the cam adjustment wrench. As the "V" mark on the index key (6) approaches the "1R" index mark, pull the tee-handle towards you with moderate force. When the proper "1R" position is reached, you will feel the camshaft (7) fall approximately 1/16 in. (2 mm) into the detent. Confirm that the camshaft (7) is engaged by ensuring that the wrench can no longer be rotated.



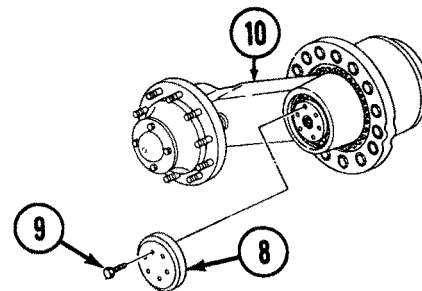
ROADWHEEL ARM NOT SHOWN FOR CLARITY

**CAUTION**

Ensure camshaft is fully engaged after setting or damage to actuator assembly will result.

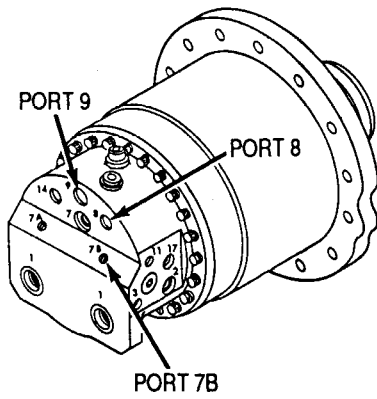
**V** Disengage camshaft (7) by pushing on end of tee-handle or by tapping lightly with a hammer. Slowly rotate camshaft (7) with wrench toward the "4L" position while pulling on the tee-handle until the "4L" position is reached. You will feel the camshaft (7) fall approximately 1/16 in. (2 mm) into the detent at the "4L" position. Confirm that the camshaft (7) is engaged by ensuring that the wrench can no longer be turned.

**W** Visually inspect to be sure the camshaft (7) appears to be in a different setting than it was when set at "1R."

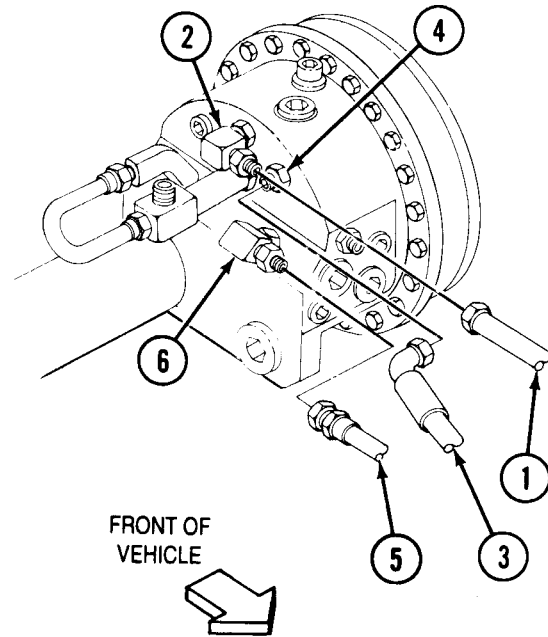


**X** Remove cam adjustment wrench and install screw (5). Tighten screw (5) to 10-12 lb-ft (14-16 N-m).

**Y** Install retainer (8) and six self-locking screws (9) on roadwheel arm (10). Tighten six self-locking screws (9) to 98-106 lb-ft (133-144 N-m). Wait at least 15 minutes and tighten self-locking screws (9) to 98-106 lb-ft (133-144 N-m).



PORT LOCATIONS



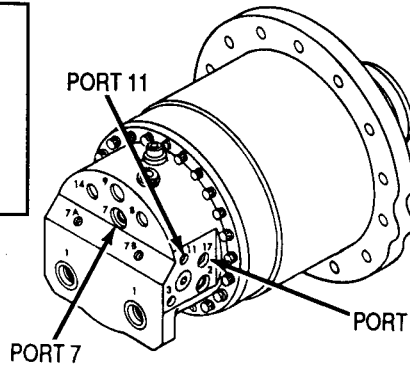
- Z** Connect REAR SPNSN UNIT-9 hose (1) to elbow (2) in port 9.
- AA** Connect elbow end of LH4 SPNSN UNIT-8 hose (3) to checkvalve (4) in port 8.
- AB** Connect LH 4SPNSN UNIT-7B hose (5) to elbow (6) in port 7B.

### CAUTION

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

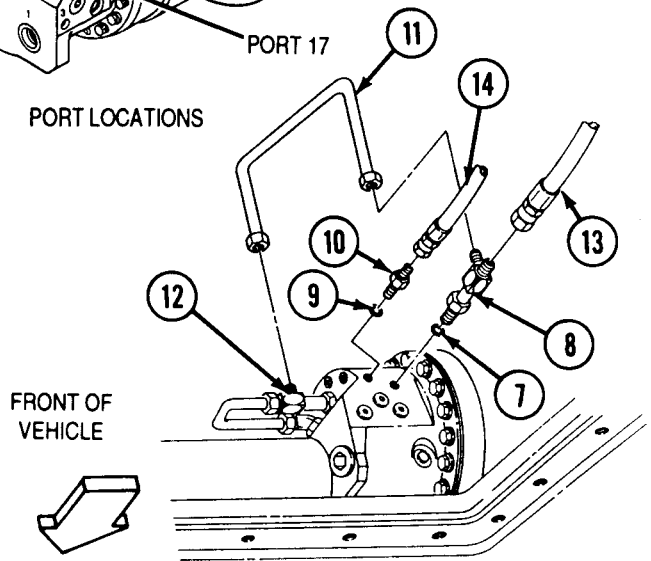
### Note

Coat all packings with lubricating oil prior to assembly.



PORT LOCATIONS

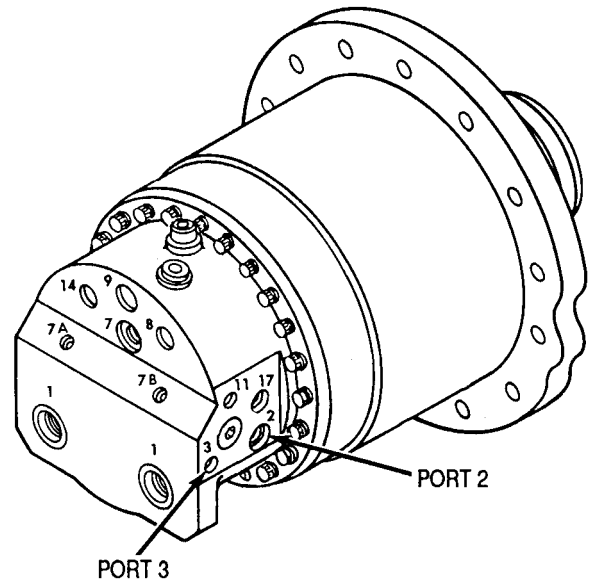
- AC** Install packing (7) and tee (8) on port 17.
- AD** Install packing (9) and adapter (10) on port 11.
- AE** Install tube (11) on tee (8) and tee (12) on port 7 (forward end marked LH1/RH4 SPNSN UNIT-17 TEE and aft end marked LH1/RH4 SPNSN UNIT-7).
- AF** Connect NO. 4 SPNSN UNIT-17 TEE hose (13) to tee (8).
- AG** Connect REAR SPNSN UNIT-11 hose (14) to adapter (10) in port 11.



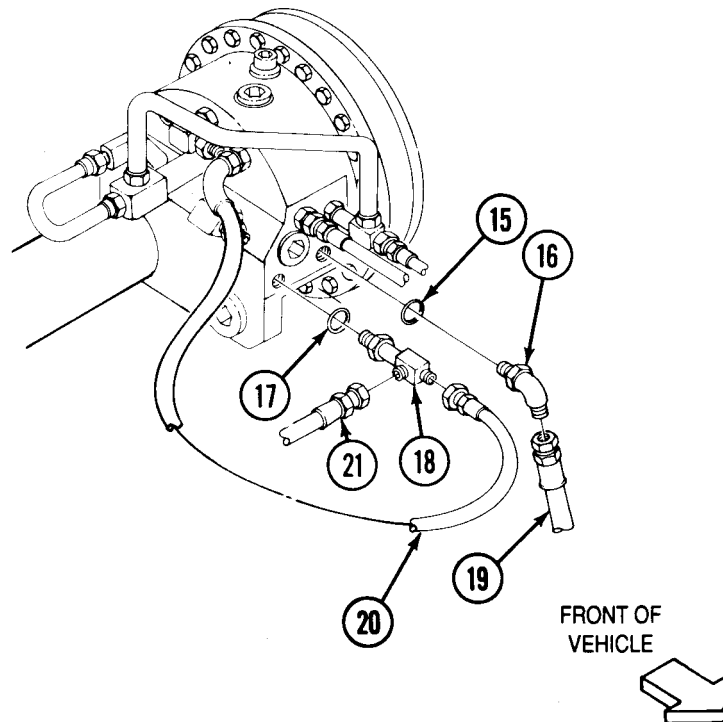
- AH** Install packing (15) and elbow (16) on port 2.
- AI** Install packing (17) and tee (18) on port-3.
- AJ** Connect CORNER SPNSN UNIT-2 hose (19) to elbow (16).
- AK** Connect LH4 SPNSN UNIT-3 TEE hose (20) to tee (18).
- AL** Connect LH4 SPNSN UNIT-3 TEE hose (21) to tee (18).

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install left No. 3 roadwheel (TM 5-2350-262-20-2).



PORT LOCATIONS



# RIGHT FRONT ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

Adapter	5120-00-240-8702
Socket Wrench	5120-01-195-0640
Socket Set	
Sling	5120-01-222-7931
Wrench, Cam Adjustment	5120-01-222-7933
Wrench, Crowfoot	5120-01-228-3162
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Screw, Jacking (2)	5305-00-071-2074
Guide Pin (4)	5315-01-229-9703

Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

- Packing (8)
- Self-locking Screw (14)

Parts Reference:

TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Hull Access Plate Removed
TM 5-2350-262-20-2	Right No. 2 Road-wheel Removed
<b>Note</b>	
	Retain six self-locking screws from retainer removal.
TM 5-2350-262-20-2	Right Front Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

General Safety Instructions:

**WARNING**

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling.

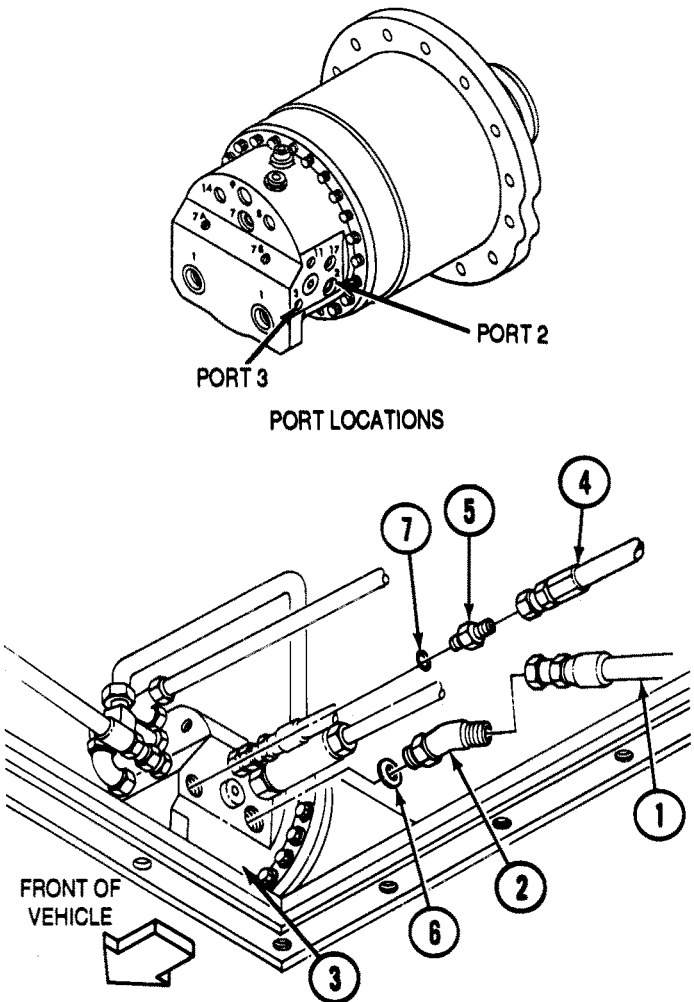


**REMOVAL**

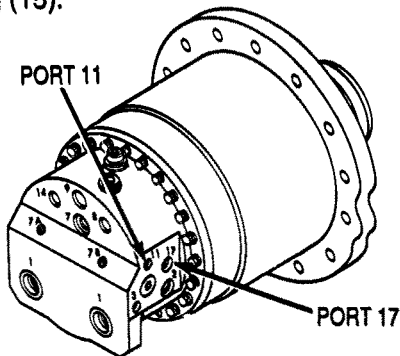
**WARNING**  
 High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

**CAUTION**  
 Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.

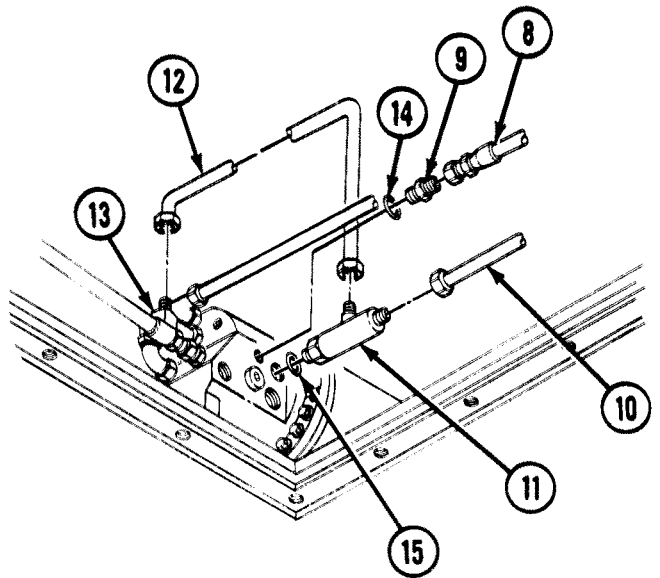
- A** Disconnect hose (1) from elbow (2) in port 2 of actuator (3).
- B** Disconnect hose (4) from adapter (5) in port 3.
- C** Remove elbow (2) and packing (6) from port 2. Discard packing (6).
- D** Remove adapter (5) and packing (7) from port 3. Discard packing (7).



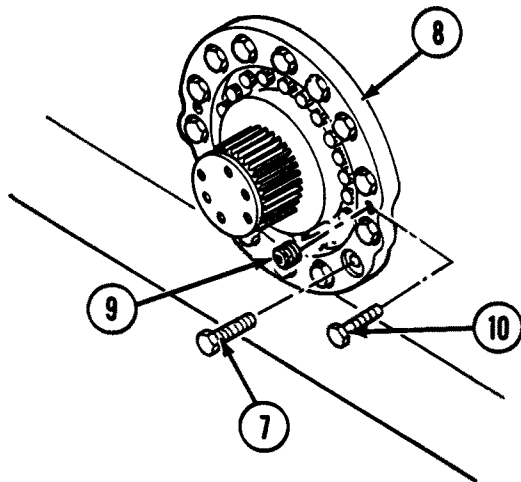
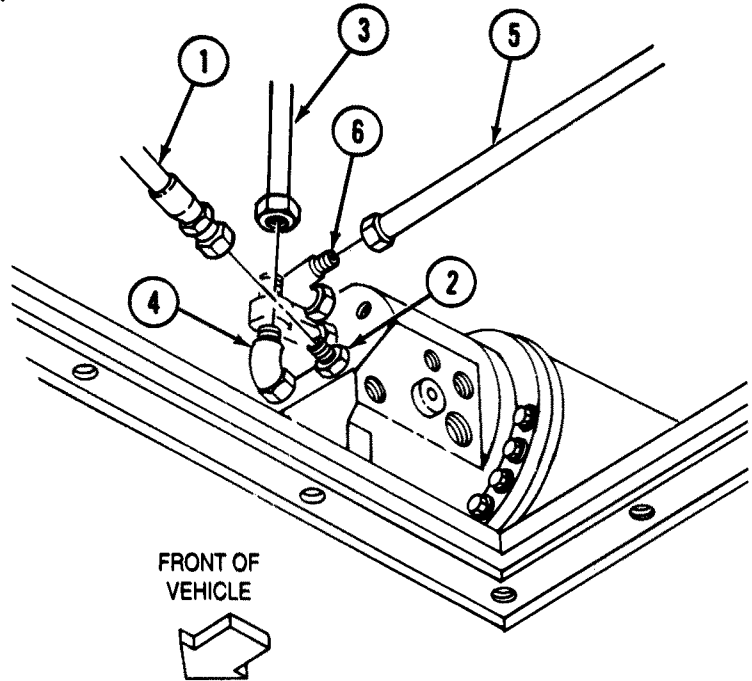
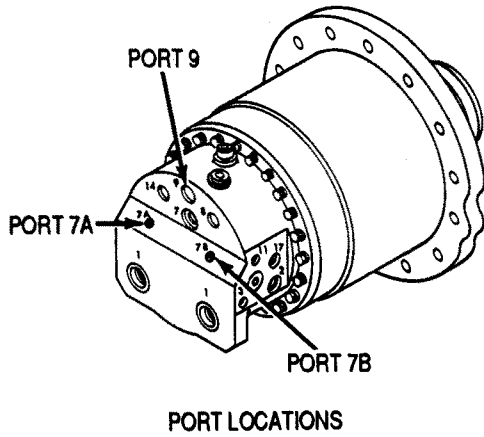
- E** Disconnect hose (8) from adapter (9) in port 11.
- F** Disconnect tube (10) from tee (11) in port 17.
- G** Remove tube (12) from tee (11) and elbow (13).
- H** Remove adapter (9) and packing (14) from port 11. Discard packing (14).
- I** Remove tee (11) and packing (15) from port 17. Discard packing (15).



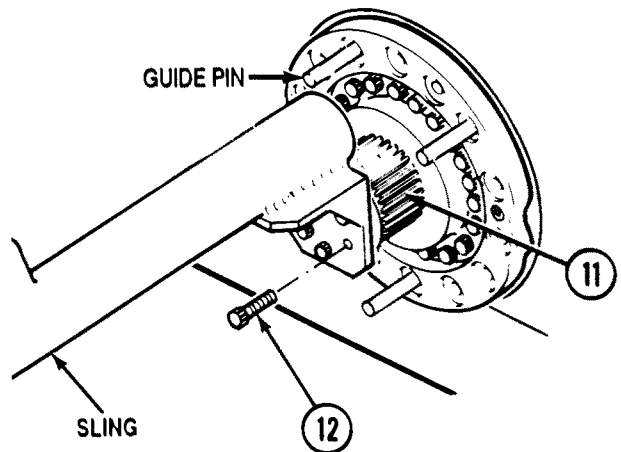
PORT LOCATIONS



- J** Disconnect tube (1) from adapter (2) in port 7B.
- K** Disconnect tube (3) from elbow (4) in port 7A.
- L** Disconnect hose (5) from elbow (6) in port 9.



- M** Remove fourteen self-locking screws (7) from flange of actuator (8). Discard self-locking screws (7).
- N** Remove two setscrews (9) from flange of actuator (8).
- O** Install two jacking screws (10) on flange of actuator (8). Tighten jacking screws (10) clockwise to break actuator (8) away from hull.



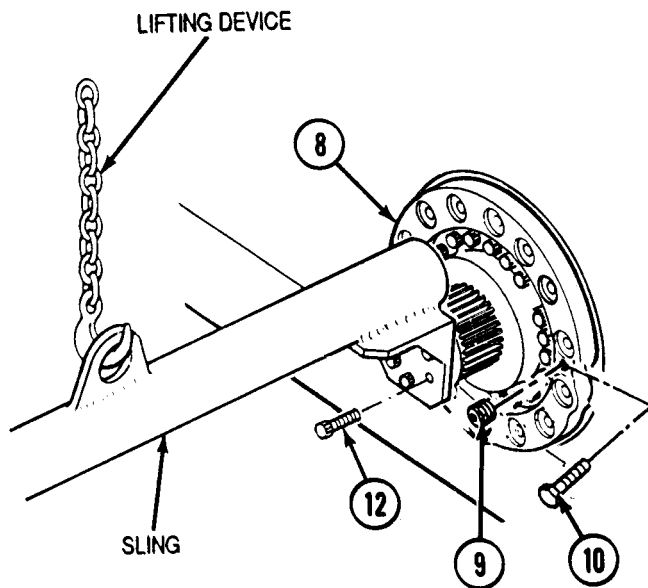
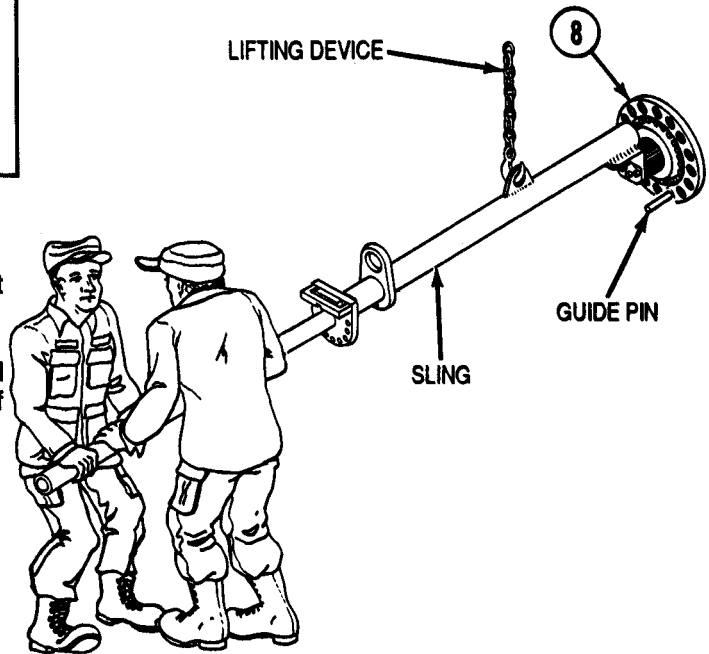
- P** Install four guide pins on hull at 90° intervals.
- Q** Install sling on wingshaft (11) with six self-locking screws (12) (previously used in securing roadwheel arm).



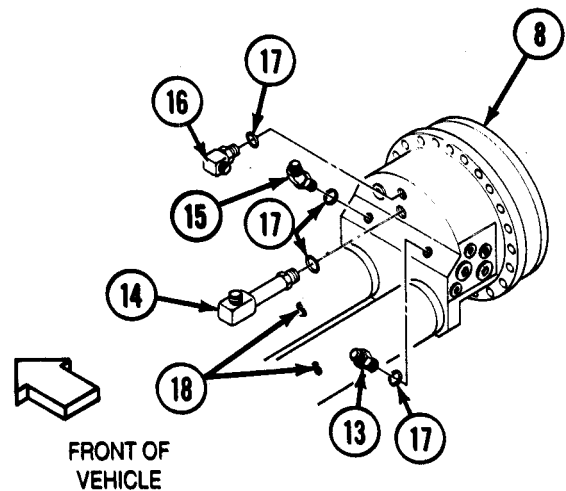
## WARNING

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- R** Connect lifting device to sling and take up slack.
- S** Extend handle of sling to aid in balancing weight of actuator (8).
- T** Remove actuator (8) from four guide pins and hull while supporting actuator (8) on end of sling.



- U** Remove six self-locking screws (12), sling, and lifting device from actuator (8). Retain self-locking screws (12) for installation.
- V** Remove two jacking screws (10) and install two setscrews (9) on flange of actuator (8). Tighten setscrews (9) to 15-20 lb-ft (20-27 N-m).



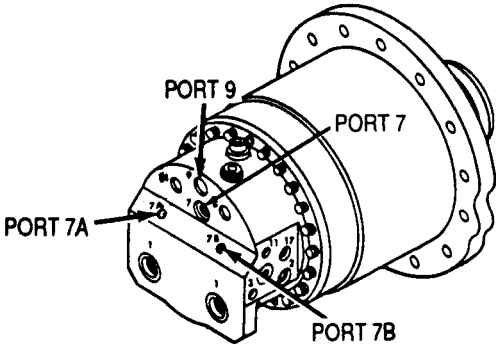
### Note

Perform steps W and X only if replacing actuator.

- W** Remove adapter (13), elbows (14), (15), and (16), and four packings (17) from actuator (8). Discard packings (17).
- X** Refer to page 4-311 to remove two actuator accumulators (18) from actuator (8).

**INSTALLATION**

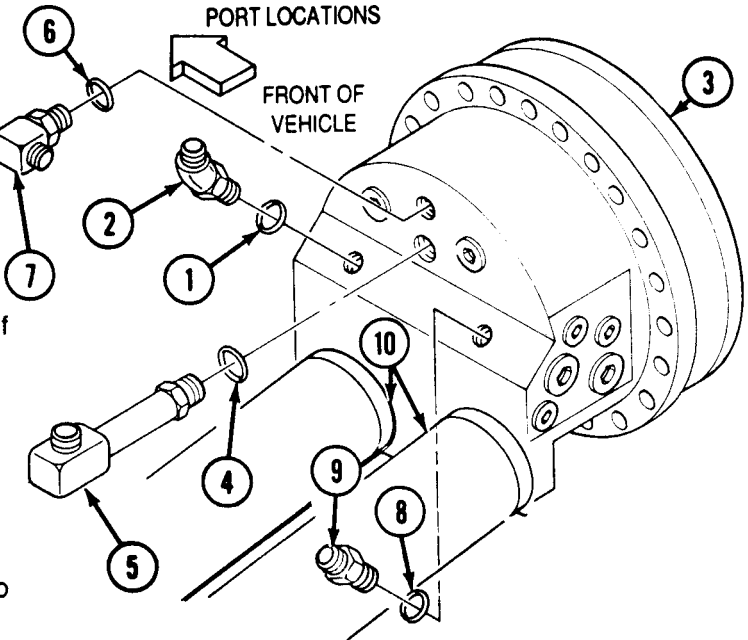
**CAUTION**  
 Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.



**Note**

- Perform steps A through E only if installing a new actuator.
- Coat all packings with lubricating oil prior to assembly.
- When replacing actuator, remove shipping plugs from new actuator, and install plugs on faulty actuator.

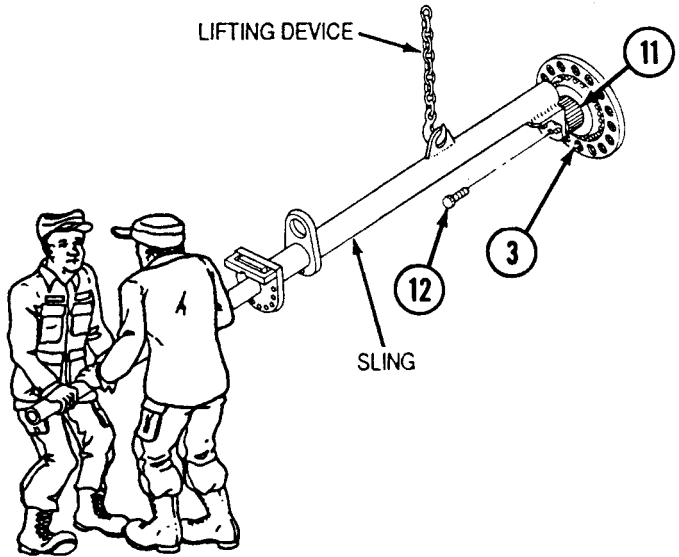
- A** Install packing (1) and elbow (2) on port 7A of actuator (3).
- B** Install packing (4) and elbow (5) on port 7.
- C** Install packing (6) and elbow (7) on port 9.
- D** Install packing (8) and adapter (9) on port 7B.
- E** If removed, refer to page 4-311 to install two actuator accumulators (10) on actuator (3).



- F** Install sling on wingshaft (11) with six self-locking screws (12) (previously used in securing roadwheel arm).

**WARNING**  
 Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

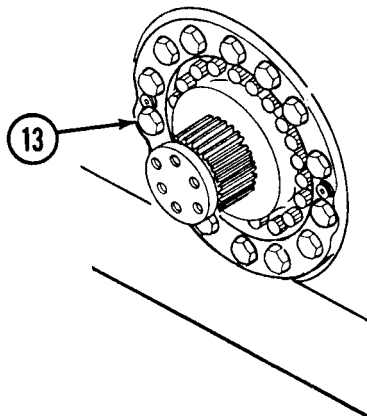
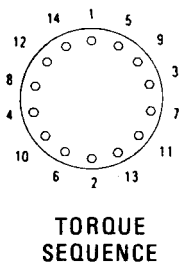
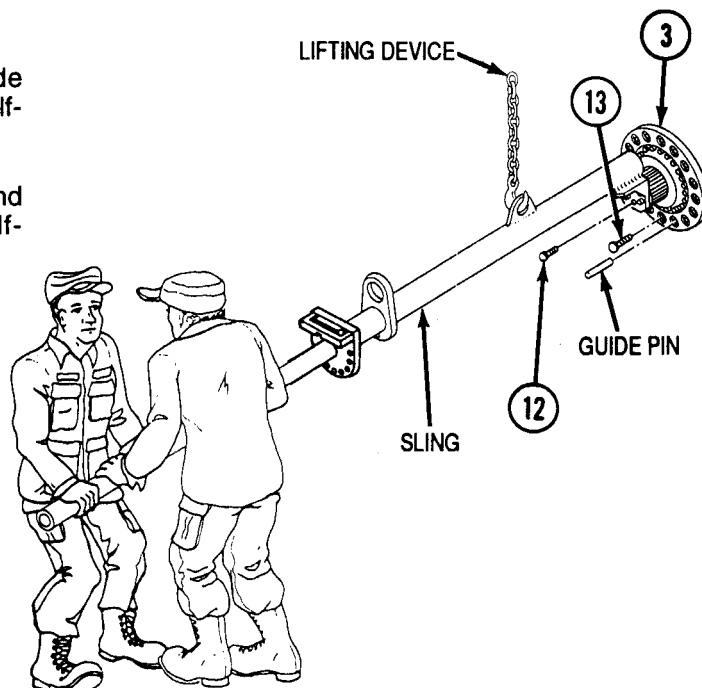
- G** Connect lifting device to sling and take up slack.
- H** Extend handle of sling to aid in balancing weight of actuator (3).



**Note**

Coat threads of screws with lubricating oil prior to assembly.

- I Install actuator (3) on hull, remove four guide pins, and secure actuator (3) with fourteen self-locking screws (13).
- J Remove six self-locking screws (12), sling, and lifting device from actuator (3). Discard self-locking screws (12).

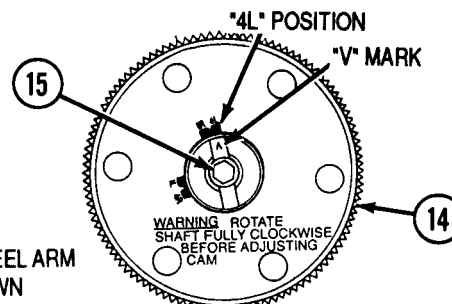


- K In sequence shown, tighten fourteen self-locking screws (13) to approximately 140 lb-ft (190 N-m).
- L Following tightening sequence, tighten fourteen self-locking screws (13) to 170-190 lb-ft (230-258 N-m).

**Note**

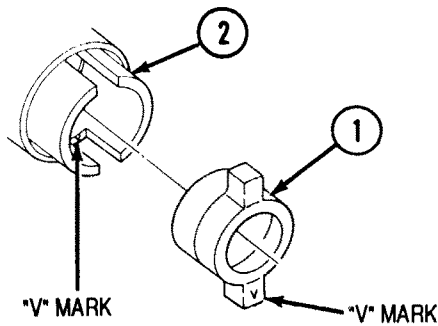
Do not install retainer until step W.

- M Install right front roadwheel arm (TM 5-2350-262-20-2).



**Note**

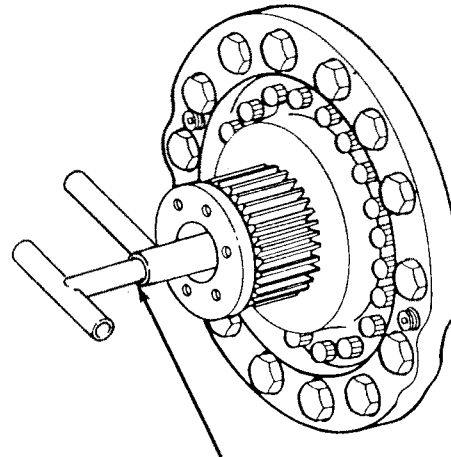
- Perform steps N through V for right front actuator leveling cam adjustment.
  - The wingshaft may require up to 300 lb-ft (407 N-m) torque to rotate.
  - When wingshaft is rotated fully clockwise, the marking, "Warning, rotate shaft fully clockwise before adjusting cam," will be in the horizontal position.
- N Rotate wingshaft (14) fully clockwise.
  - O Remove screw (15).



**CAUTION**

If key is 180° out of position, cam adjustment setting will not be correct. Damage to actuator may result.

**P** Temporarily remove index key (1) and observe location of "V" mark on index key (1) and at bottom side of one of the key slots in camshaft (2). Reinstall index key (1) in camshaft (2) so "V" mark on camshaft (2) is under "V" mark on index key (1).



CAM ADJUSTMENT WRENCH

**Q** Position threaded portion of cam adjustment wrench in place of screw and rotate approximately four turns.

**R** Disengage camshaft (2) by pushing on end of cam adjustment wrench or by tapping lightly with a hammer. When fully disengaged, place cam adjustment wrench handle on index key (1) and turn camshaft (2) freely.

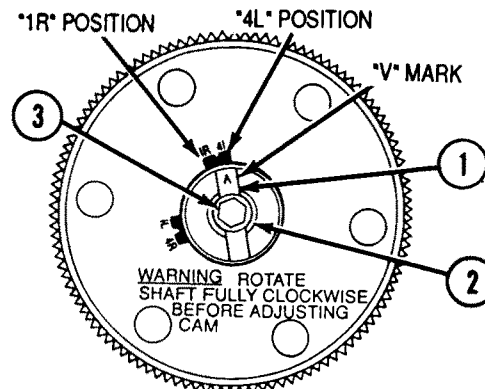
**S** Make initial setting at the "4L" position prior to the final setting at "1R." Turn the index key (1) and camshaft (2) with the cam adjustment wrench. As the "V" mark approaches the "4L" index mark, pull the tee-handle towards you with moderate force. When the proper "4L" position is reached, you will feel the camshaft (2) fall approximately 1/16 in. (2 mm) into the detent. Confirm that the camshaft (2) is engaged by ensuring that the wrench can no longer be rotated.

**CAUTION**

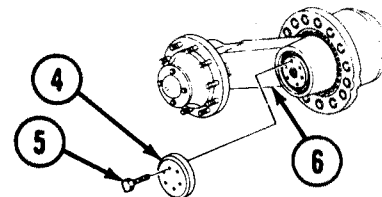
Ensure camshaft is fully engaged after setting or damage to actuator assembly will result.

**T** Disengage camshaft (2) by pushing on end of tee-handle or by tapping lightly with a hammer. Slowly rotate camshaft (2) with wrench toward the "1R" position while pulling on the tee-handle until the "1R" position is reached. You will feel the camshaft (2) fall approximately 1/16 in. (2 mm) into the detent at the "1R" position. Confirm that the camshaft (2) is engaged by ensuring that the wrench can no longer be turned.

**U** Visually inspect to be sure the camshaft (2) appears to be in a different setting than it was when set at "4L."



ROADWHEEL ARM  
NOT SHOWN  
FOR CLARITY



**V** Remove cam adjustment wrench and install screw (3). Tighten screw (3) to 10-12 lb-ft (14-16 N·m).

**W** Install retainer (4) and six self-locking screws (5) on roadwheel arm (6). Tighten six self-locking screws (5) to 98-106 lb-ft (133-144 N·m). Wait at least 15 minutes and tighten self-locking screws (5) to 98-106 lb-ft (133-144 N·m).

- X** Connect RH1 SPNSN UNIT-7A tube (7) to elbow (8) in port 7A.
- Y** Connect NO. 1 SPNSN UNIT-9 hose (9) to elbow (10) in port 9.
- Z** Connect RH1 SPNSN UNIT-7B tube (11) to adapter (12) in port 7B.

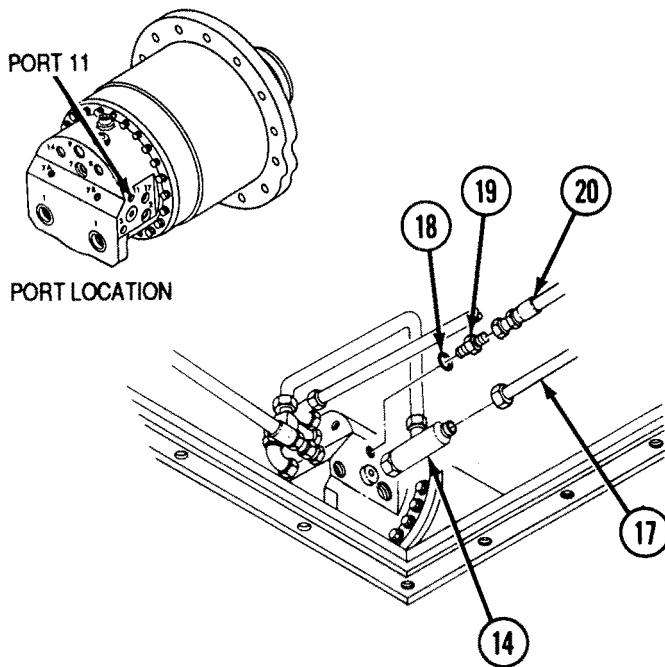
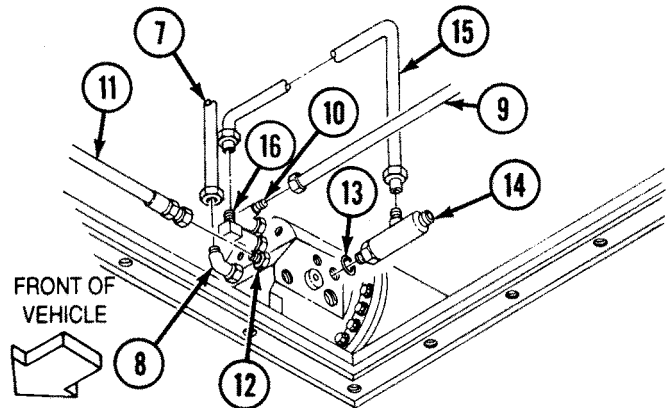
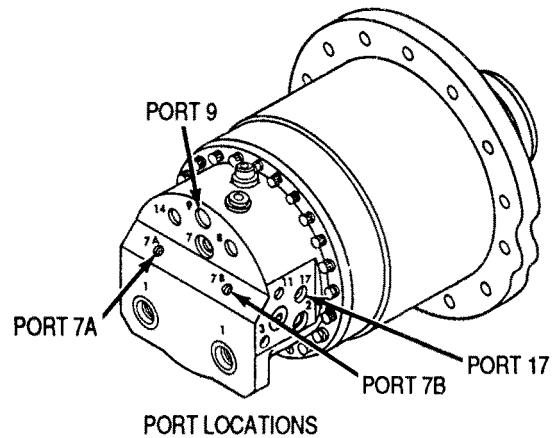
**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

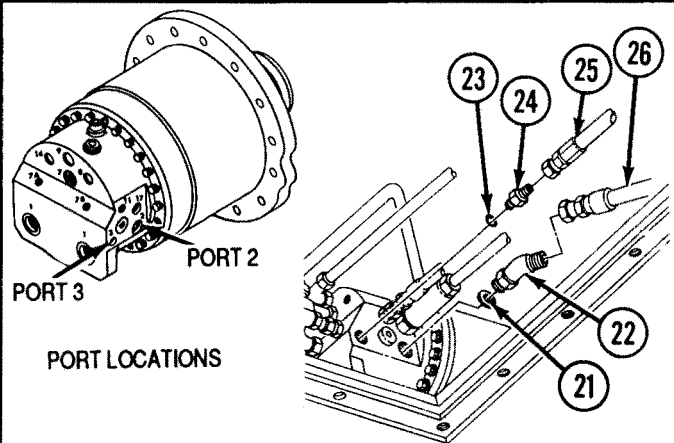
**Note**

Coat packings with lubricating oil prior to installation.

- AA** Install packing (13) and tee (14) on port 17.
- AB** Install tube (15) on elbow (16) and tee (14) (elbow end marked RH1/LH4 SPNSN UNIT-7 and tee end marked LH1/RH4 SPNSN UNIT-17 TEE).



- AC** Install NO. 1 SPNSN UNIT-17 TEE tube (17) on tee (14).
- AD** Install packing (18) and adapter (19) on port 11.
- AE** Connect NO. 1 SPNSN UNIT-11 hose (20) to adapter (19).



- AF** Install packing (21) and elbow (22) on port 2.
  - AG** Install packing (23) and adapter (24) on port 3.
  - AH** Connect CORNER SPNSN UNIT-2 hose (25) to elbow (22).
  - AI** Connect NO. 1 SPNSN UNIT-3 hose (26) to adapter (24).
- FOLLOW-ON TASKS:**
- Install hull access plate (TM 5-2350-262-20-1).
  - Install right No. 2 roadwheel TM 5-2350-262-20-2).

# RIGHT REAR ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

### Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

### Special Tools:

Adapter	5120-00-240-8702
Socket Wrench Socket Set	5120-01-195-0640
Sling	5120-01-222-7931
Wrench, Cam Adjustment	5120-01-222-7933
Wrench, Crowfoot	5120-01-228-3162
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Screw, Jacking (2)	5305-00-071-2074
Guide Pin (4)	5315-01-229-9703

### Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

### Parts:

- Packing (8)
- Self-locking Screw (14)

### Parts Reference:

TM 5-2350-262-24P Group A3

### Personnel Required:

Two Construction Equipment Repairers  
62B10

### Reference:

- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

### Troubleshooting Reference:

- TM 5-2350-262-20-1

### Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Hull Access Plate Removed
TM 5-2350-262-20-2	Right No. 3 Road-wheel Removed

### **Note**

Retain six self-locking screws from retainer removal.

TM 5-2350-262-20-2	Right Rear Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

### General Safety Instructions:

## WARNING

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling.



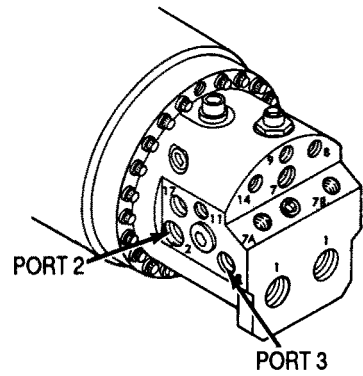
**REMOVAL**

**WARNING**

High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

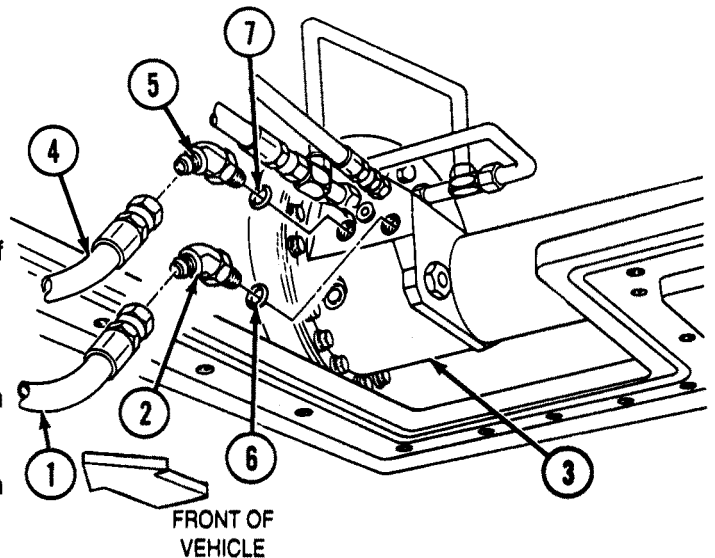
**CAUTION**

Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.

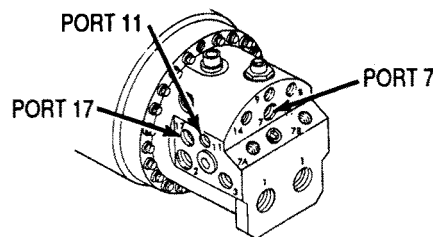


PORT LOCATIONS

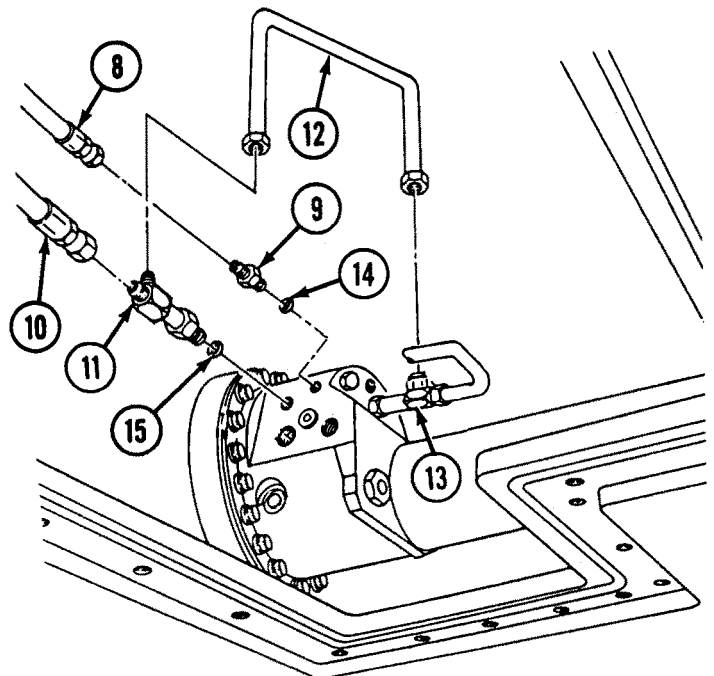
- A** Disconnect hose (1) from elbow (2) in port 3 of actuator (3).
- B** Disconnect hose (4) from elbow (5) in port 2.
- C** Remove elbow (2) and packing (6) from port 3. Discard packing (6).
- D** Remove elbow (5) and packing (7) from port 2. Discard packing (7).



- E** Disconnect hose (8) from adapter (9) in port 11.
- F** Disconnect hose (10) from tee (11) in port 17.
- G** Remove tube (12) from tee (11) in port 17 and tee (13) in port 7.
- H** Remove adapter (9) and packing (14) from port 11. Discard packing (14).
- I** Remove tee (11) and packing (15) from port 17. Discard packing (15).

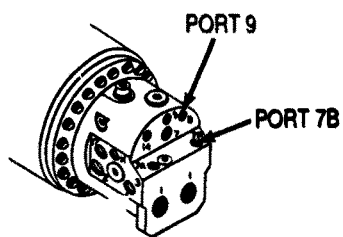


PORT LOCATIONS

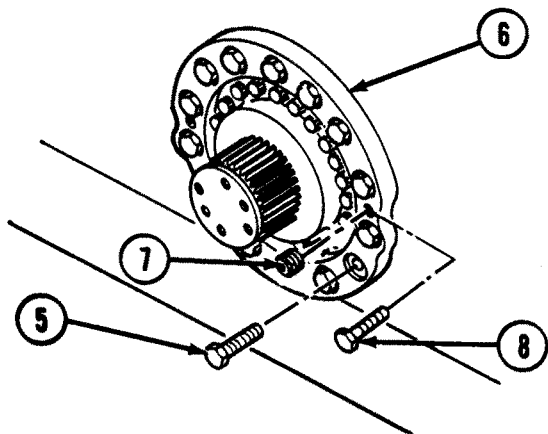
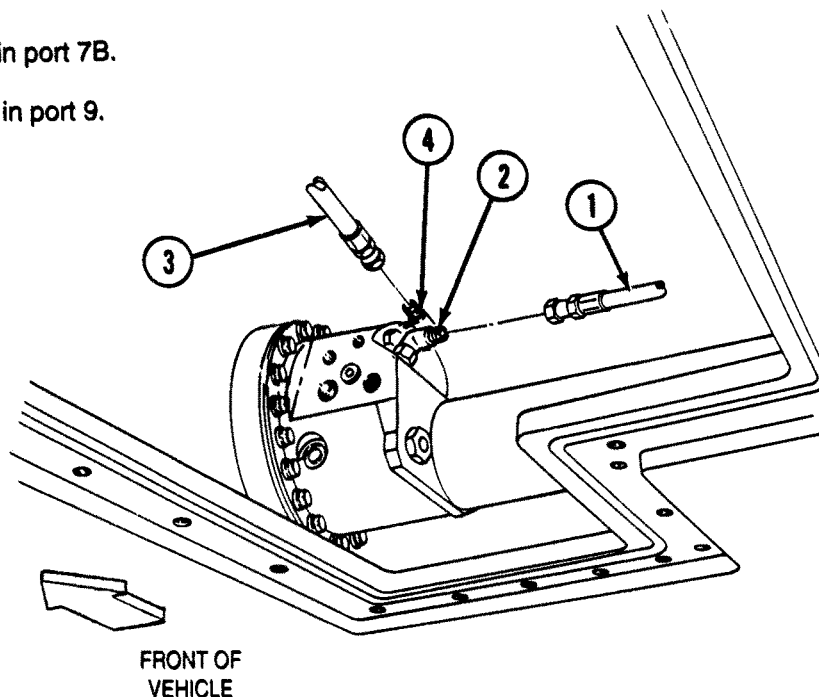


**J** Disconnect tube (1) from elbow (2) in port 7B.

**K** Disconnect hose (3) from elbow (4) in port 9.



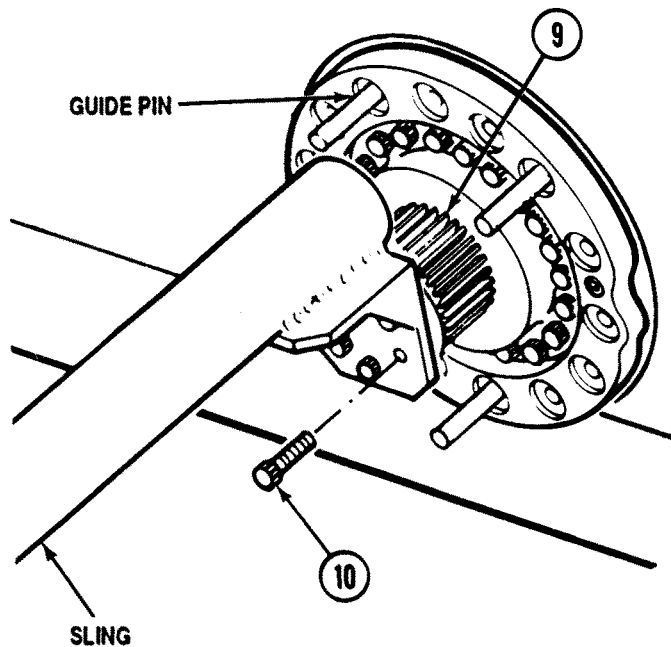
PORT LOCATIONS



**L** Remove fourteen self-locking screws (5) from flange of actuator (6). Discard self-locking screws (5).

**M** Remove two setscrews (7) from flange of actuator (6).

**N** Install two jacking screws (8) on flange of actuator (6). Tighten jacking screws (8) clockwise to break actuator (6) away from hull.



**O** Install four guide pins on hull at 90° intervals.

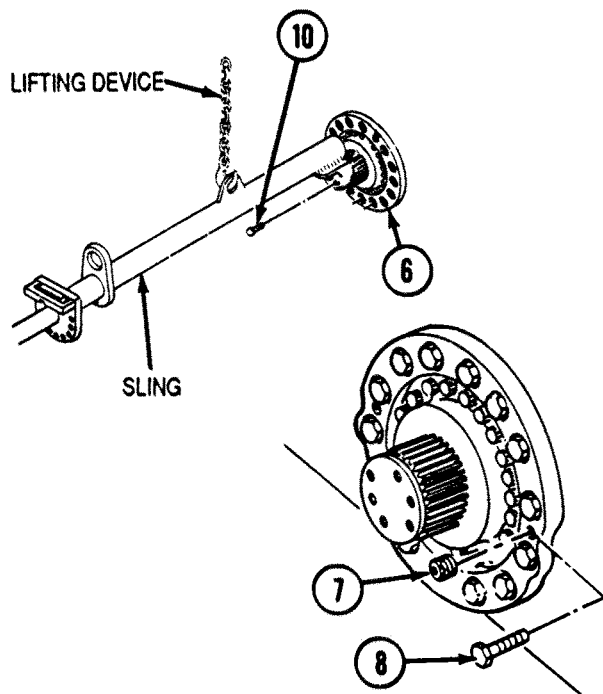
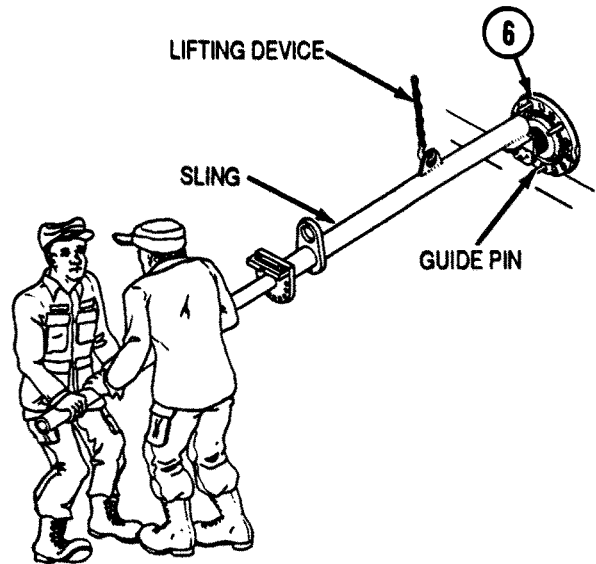
**P** Install sling on wingshaft (9) with six self-locking screws (10) (previously used in securing roadwheel arm).



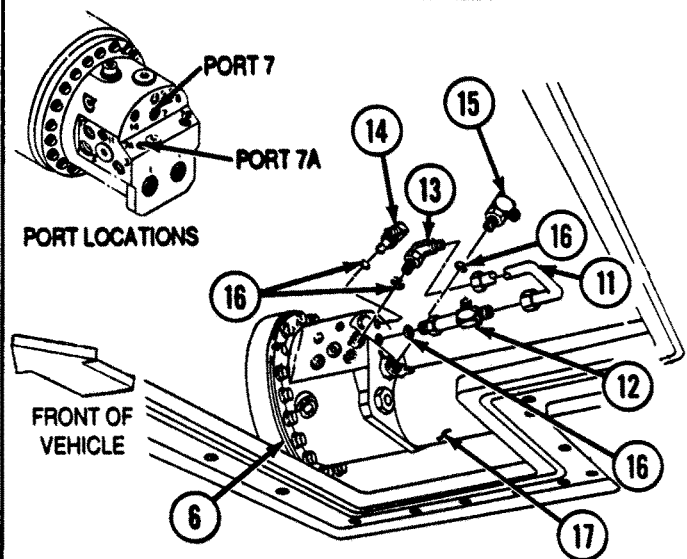
## WARNING

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- Q** Connect lifting device to sling and take up slack.
- R** Extend handle of sling to aid in balancing weight of actuator (6).
- S** Remove actuator (6) from four guide pins and hull while supporting actuator (6) on end of sling.



- T** Remove six self-locking screws (10), sling, and lifting device from actuator (6). Retain self-locking screws (10) for installation.
- U** Remove two jacking screws (8) and install two setscrews (7) on flange of actuator (6). Tighten setscrews (7) to 15-20 lb-ft (20-27 N-m).



### Note

Perform steps V through X only if replacing actuator.

- V** Remove tube (11) from tee (12) at port 7 and elbow (13) at port 7A.
- W** Remove tee (12), elbows (13), (14), and (15), and four packings (16) from actuator (6). Discard packings (13).
- X** Refer to page 4-311 to remove actuator accumulator (17) from actuator (6).

**INSTALLATION**

**CAUTION**  
 Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

**Note**

- Perform steps A through F only if installing a new actuator.
- Coat all packings with lubricating oil prior to assembly.
- When replacing actuator, remove shipping plugs from new actuator, and install plugs on faulty actuator.

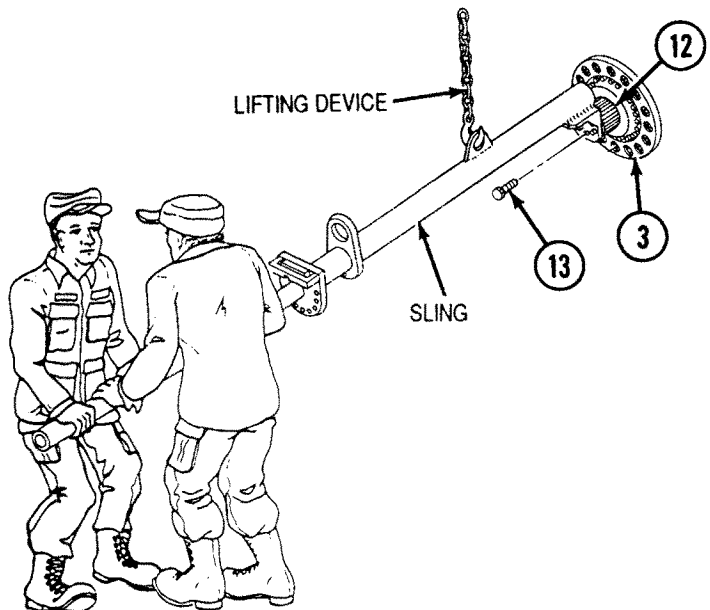
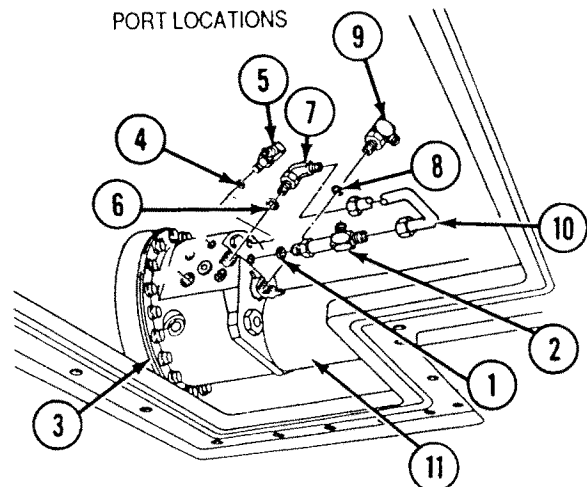
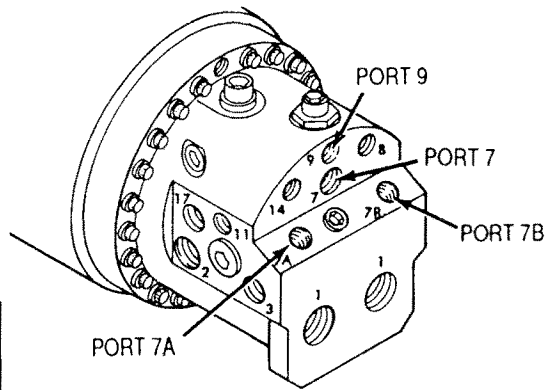
- A** Install packing (1) and tee (2) on port 7 of actuator (3).
- B** Install packing (4) and elbow (5) on port 9.
- C** Install packing (6) and elbow (7) on port 7A.
- D** Install packing (8) and elbow (9) on port 7B.

- E** Install tube (10) on tee (2) and elbow (7) in port 7A (tee end marked NO. 4 SPNSN UNIT-7 TEE and elbow end marked NO. 4 SPNSN UNIT-7A).
- F** If removed, refer to page 4-311 to install actuator accumulator (11) on actuator (3).

- G** Install sling on wingshaft (12) using six self-locking screws (13) (previously used in securing roadwheel arm).

**WARNING**  
 Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

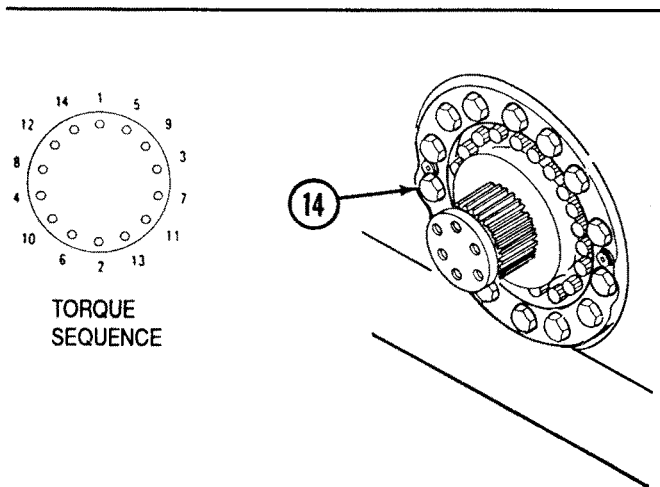
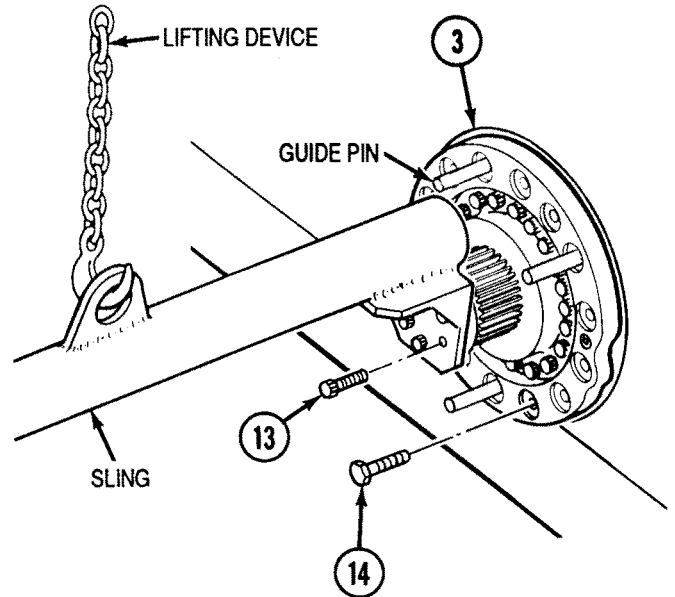
- H** Connect lifting device to sling and take up slack.
- I** Extend handle of sling to aid in balancing weight of actuator (3).



**Note**

Coat threads of screws with lubricating oil prior to assembly.

- J** Install actuator (3) on hull, remove four guide pins, and secure actuator (3) with fourteen self-locking screws (14).
- K** Remove six self-locking screws (13), sling, and lifting device from actuator (3). Discard self-locking screws (13).



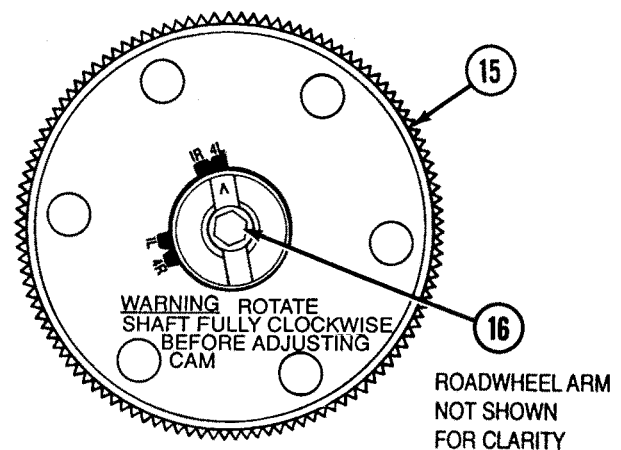
TORQUE SEQUENCE

- L** In sequence shown, tighten fourteen self-locking screws (14) to approximately 140 lb-ft (190 N-m).
- M** Following tightening sequence, tighten fourteen self-locking screws (14) to 170-190 lb-ft (230-258 N-m).

**Note**

Do not install retainer until step X.

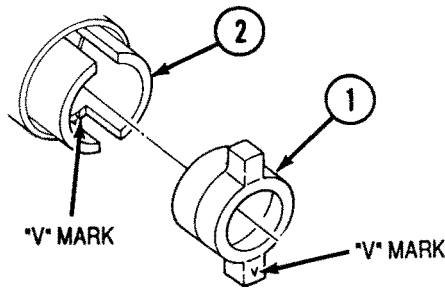
- N** Install right rear roadwheel arm (TM 5-2350-262-20-2).



**Note**

- Perform steps O through W for right rear actuator leveling cam adjustment.
- The wingshaft may require up to 300 lb-ft (407 N-m) torque to rotate.
- When wingshaft is rotated fully clockwise, the marking, "Warning, rotate shaft fully clockwise before adjusting cam," will be in the horizontal position.

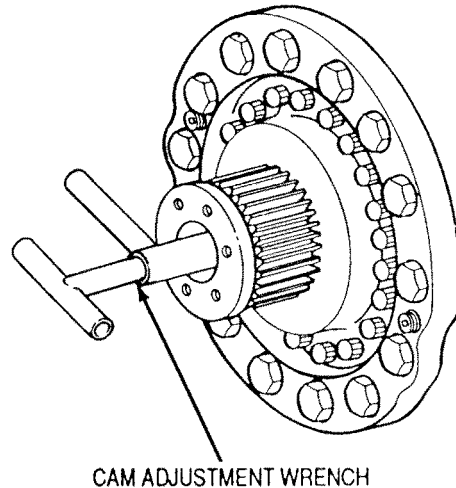
- O** Rotate wingshaft (15) fully clockwise.
- P** Remove screw (16).



**CAUTION**

If index is 180° out of position, cam adjustment setting will not be correct. Damage to actuator may result.

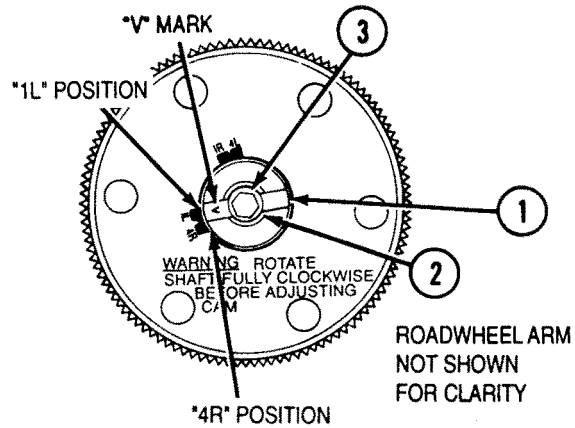
**Q** Temporarily remove index key (1) and observe location of "V" mark on index key (1) and at bottom side of one of the key slots in camshaft (2). Reinstall index key (1) in the camshaft (2) so "V" mark on camshaft (2) is under "V" mark on index key (1).



**R** Position threaded portion of cam adjustment wrench in place of screw and rotate approximately four turns.

**S** Disengage camshaft (2) by pushing on end of cam adjustment wrench or tapping lightly with a hammer. When fully disengaged, place cam adjustment wrench handle on index key (1) and turn camshaft (2) freely.

**T** Make initial setting at the "1L" position prior to the final setting at "4R." Turn the index key (1) and camshaft (2) with the cam adjustment wrench. As the "V" mark on the index key (1) approaches the "1L" index mark, pull the tee-handle towards you with moderate force. When the proper "1L" position is reached, you will feel the camshaft (2) fall approximately 11/32 in. (9 mm) into the detent. Confirm that the camshaft (2) is engaged by ensuring that the wrench can no longer be rotated.

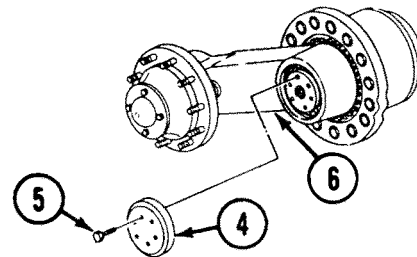


**CAUTION**

Ensure camshaft is fully engaged after setting or damage to actuator assembly will result.

**U** Disengage camshaft (2) by pushing on end of tee-handle or by tapping lightly with a hammer. Slowly rotate camshaft (2) with wrench toward the "4R" position while pulling on the tee-handle until the "4R" position is reached. You will feel the camshaft (2) fall approximately 11/32 in. (9 mm) into the detent at the "4R" position. Confirm that the camshaft (2) is engaged by ensuring that the wrench can no longer be turned.

**V** Visually inspect to be sure the camshaft (2) appears to be in a different setting than it was when set at "1L."

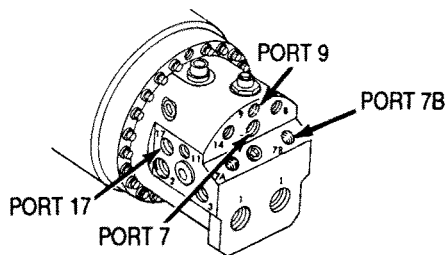


**W** Remove cam adjustment wrench and install screw (3). Tighten screw (3) to 10-12 lb-ft (14-16 N·m).

**X** Install retainer (4) and six self-locking screws (5) on roadwheel arm (6). Tighten six self-locking screws (5) to 98-106 lb-ft (133-144 N·m). Wait at least 15 minutes and tighten self-locking screws (5) to 98-106 lb-ft (133-144 N·m).

**Y** Connect RH4 SPNSN UNIT-7B tube (7) to elbow (8) in port 7B of actuator (9).

**Z** Connect REAR SPNSN UNIT-9 hose (10) to elbow (11) in port 9.



PORT LOCATIONS

**CAUTION**

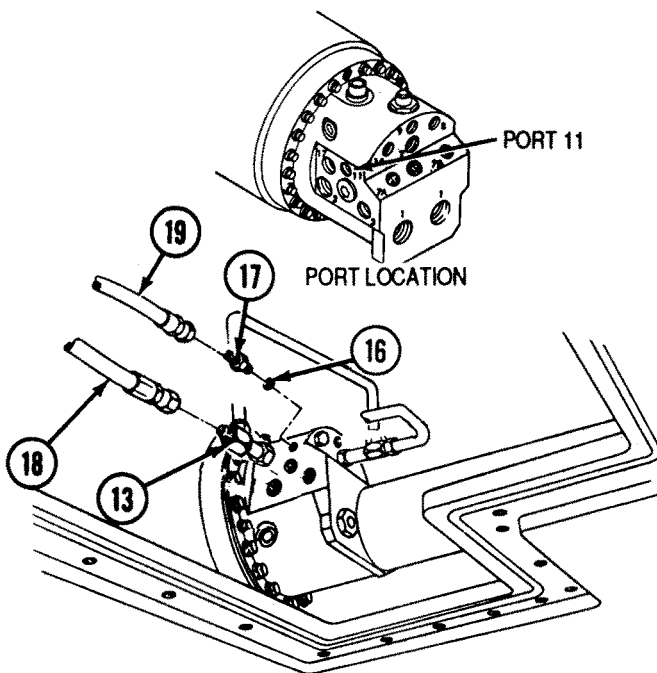
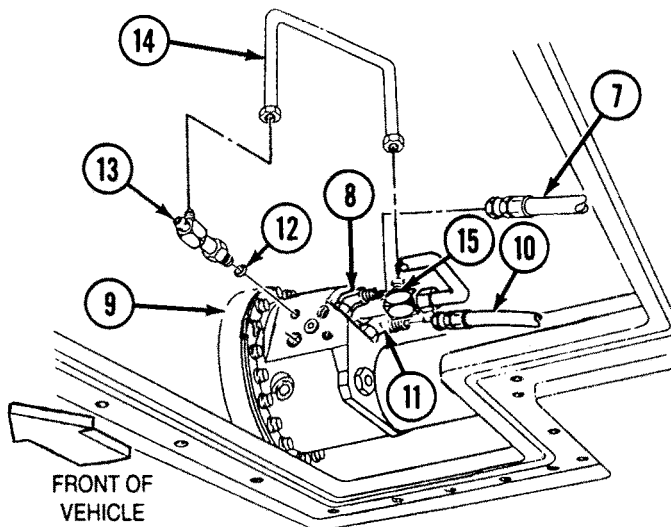
Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

**Note**

Coat all packings with lubricating oil at assembly.

**AA** Install packing (12) and tee (13) on port 17.

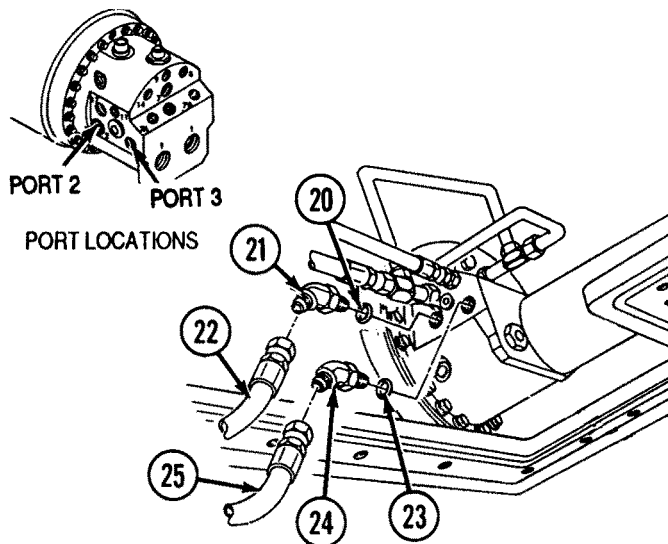
**AB** Install tube (14) on tee (13) and tee (15) at port 7 (end of tube on tee at port 17 is marked LH1/RH4 SPNSN UNIT-17 TEE, and end of tube on tee at port 7 is marked LH1/ RH4 SPNSN UNIT-7).



**AC** Install packing (16) and adapter (17) on port 11.

**AD** Install NO. 4 SPNSN UNIT-17 TEE hose (18) on tee (13).

**AE** Install REAR SPNSN UNIT-11 hose (19) on adapter (17).



**AF** Install packing (20) and elbow (21) on port 2.

**AG** Connect CORNER SPNSN UNIT-2 hose (22) to elbow (21).

**AH** Install packing (23) and elbow (24) on port 3.

**AI** Connect RH4 SPNSN UNIT-3 ELB hose (25) to elbow (24).

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install right No. 3 roadwheel (TM 5-2350-262-20-2).



# RIGHT FRONT INTERMEDIATE ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive Lifting Device

Special Tools:

Socket Wrench Socket Set	5120-01-195-0640
Sling	5120-01-222-7931
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Guide Pin (4)	5315-01-229-9703
Screw, Jacking (2)	5305-00-071-2074

Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

Packing (7)

Self-locking Screw (14)

Parts Reference:

TM 5-2350-262-24P Group AR

TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Hull Access Plate Removed
<b>Note</b>	
	Retain six self-locking screws from retainer removal.
TM 5-2350-262-20-2	Right No. 2 Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

General Safety Instructions:

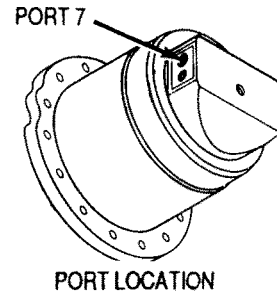
**WARNING**

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling.

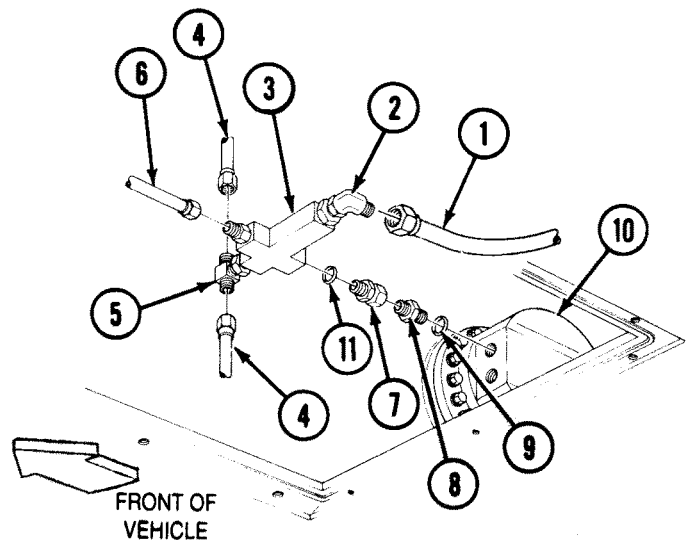
**REMOVAL**

**WARNING**  
 High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

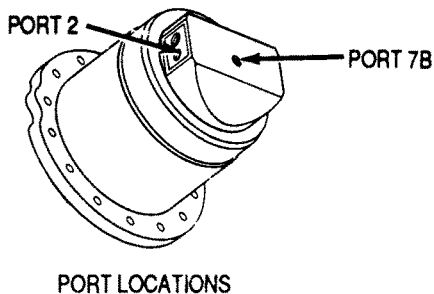
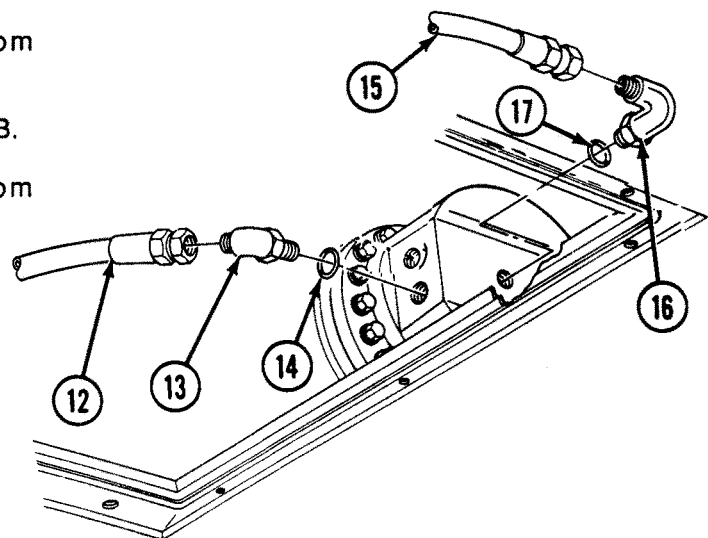
**CAUTION**  
 Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.

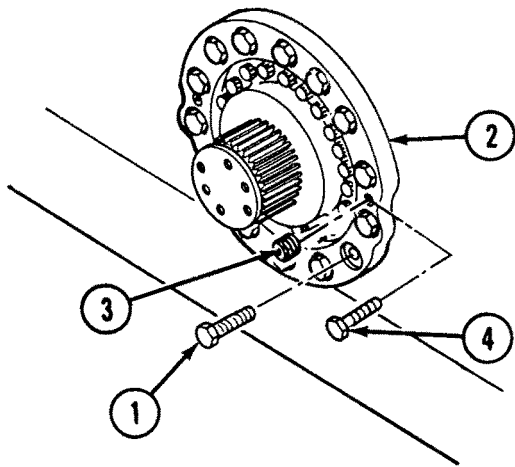


- A** Disconnect tube (1) from elbow (2) in valve (3).
- B** Disconnect two tubes (4) from tee (5) in valve (3).
- C** Disconnect tube (6) from valve (3).
- D** Disconnect union (7) from adapter (8) and remove valve (3).
- E** Remove adapter (8) and packing (9) from port 7 of actuator (10). Discard packing (9).
- F** Remove union (7) and packing (11) from valve (3). Discard packing (11).

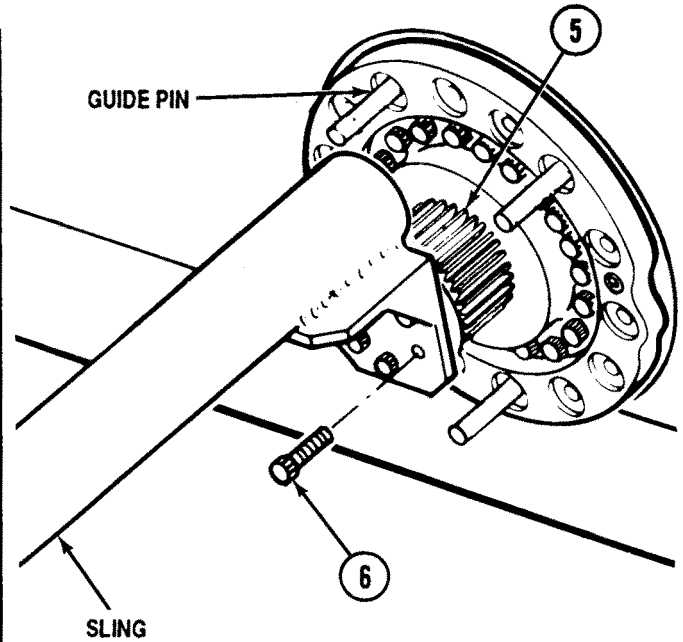


- G** Disconnect hose (12) from elbow (13) in port 2.
- H** Remove elbow (13) and packing (14) from port 2. Discard packing (14).
- I** Disconnect hose (15) from elbow (16) in port 7B.
- J** Remove elbow (16) and packing (17) from port 7B. Discard packing (17).





- K** Remove fourteen self-locking screws (1) from flange of actuator (2). Discard self-locking screws (1).
- L** Remove two setscrews (3) from flange of actuator (2).
- M** Install two jacking screws (4) on flange of actuator (2). Tighten jacking screws (4) clockwise to break actuator (2) away from hull.

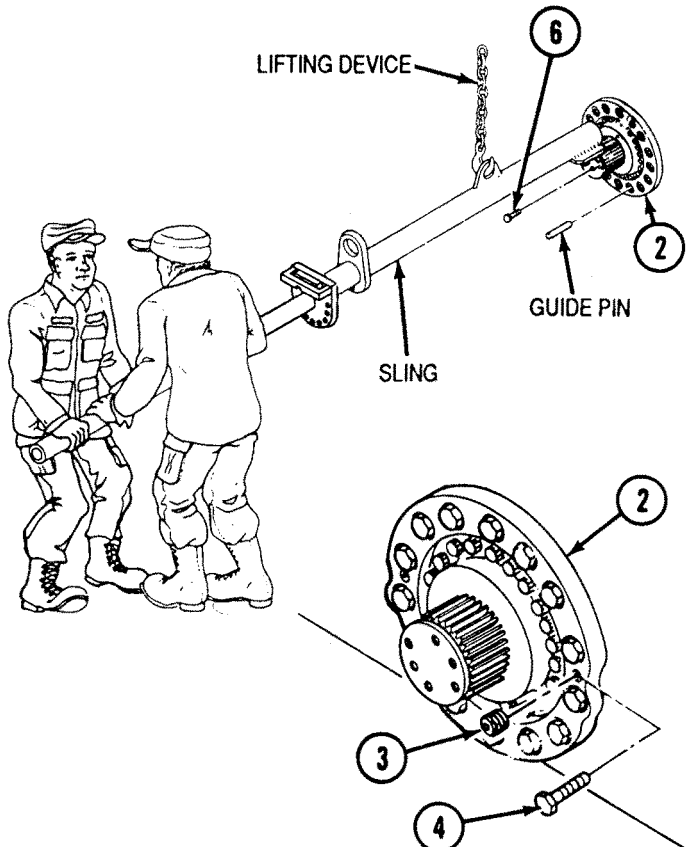


- N** Install four guide pins on hull at 90° intervals.
- O** Install sling on wingshaft (5) with six self-locking screws (6) (previously used in securing roadwheel arm).

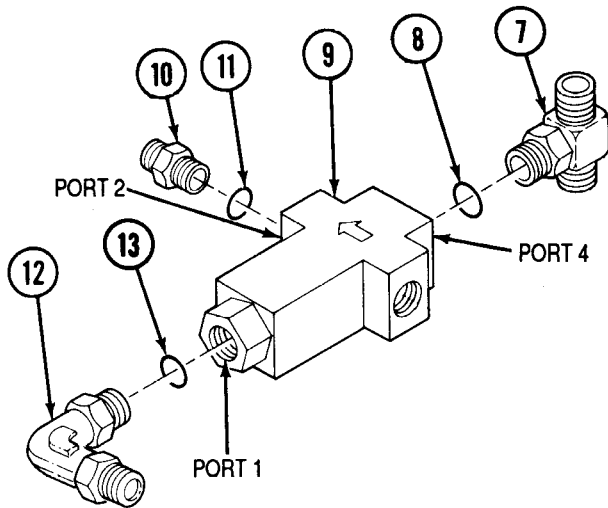
### WARNING

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- P** Connect lifting device to sling and take up slack.
- Q** Extend handle of sling to aid in balancing weight of actuator (2).
- R** Remove actuator (2) from four guide pins and hull while supporting actuator (2) on end of sling.
- S** Remove six self-locking screws (6), sling, and lifting device from actuator (2). Retain self-locking screws (6) for installation.
- T** Remove two jacking screws (4) and install two setscrews (3) in flange of actuator (2). Tighten setscrews (3) to 15-20 lb-ft (20-27 N·m).

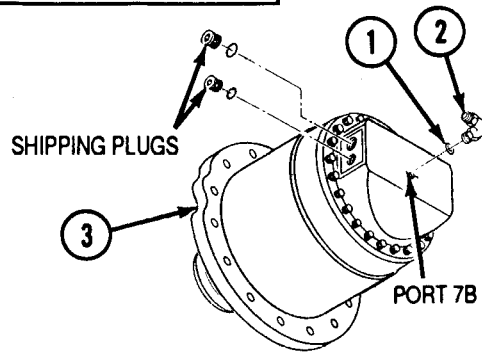






- U** Remove tee (7) and packing (8) from port 4 of valve (9). Discard packing (8).
- V** Remove adapter (10) and packing (11) from port 2. Discard packing (11).
- W** Remove elbow (12) and packing (13) from port 1. Discard packing (13).

**INSTALLATION**



**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

**Note**

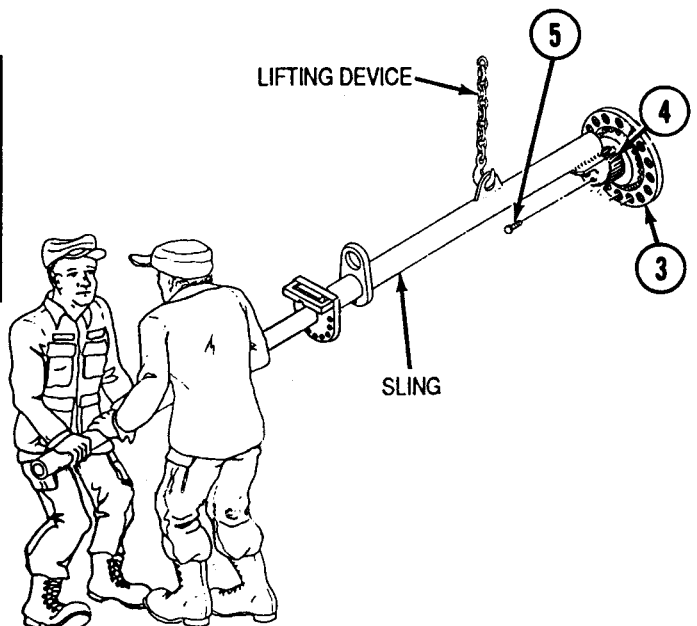
- Coat all packings with lubricating oil prior to assembly.
  - When replacing actuator, remove shipping plugs from new actuator and install plugs on faulty actuator.
  - Intermediate actuators do not require a leveling cam adjustment.
- A** Install packing (1) and elbow (2) on port 7B of actuator (3).

- B** Install sling on wingshaft (4) with six self-locking screws (5) (previously used in securing road-wheel arm).

**WARNING**

Lifting device must have a weight capacity greater than 360 lb (163 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

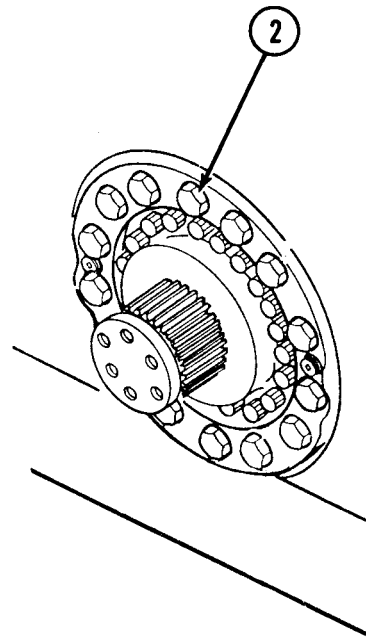
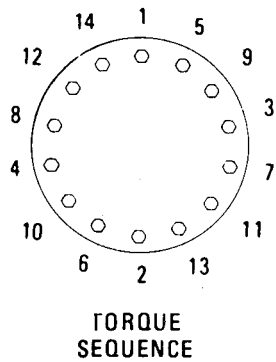
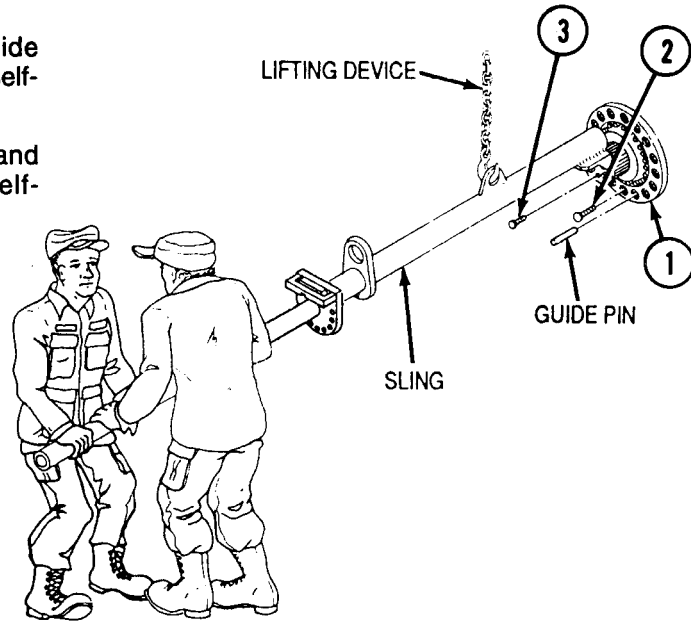
- C** Connect lifting device to sling and take up slack.
- D** Extend handle of sling to aid in balancing weight of actuator (3).



**Note**

Coat threads of screws with oil at assembly.

- E** Install actuator (1) on hull, remove four guide pins, and secure actuator (1) with fourteen self-locking screws (2).
- F** Remove six self-locking screws (3), sling, and lifting device from actuator (1). Discard self-locking screws (3).

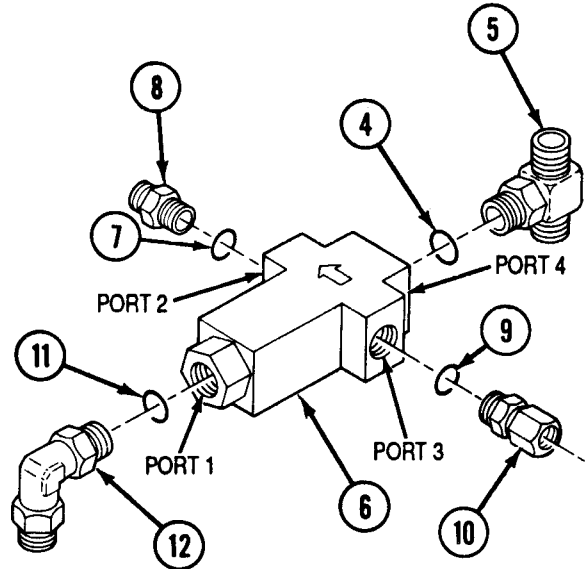


- G** In sequence shown, tighten fourteen self-locking screws (2) to approximately 140 lb-ft (190 N-m).
- H** Following tightening sequence, tighten fourteen self-locking screws (2) to 170-190 lb-ft (230-258 N-m).

### CAUTION

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

- I Install packing (4) and tee (5), with smaller nipple up, on port 4 of valve (6).
- J Install packing (7) and adapter (8) on port 2.
- K Install packing (9) and union (10) on port 3.
- L Install packing (11) and elbow (12) on port 1.



- M Install packing (13) and adapter (14) on port 7 of actuator (1).
- N Install packing (15) and elbow (16) on port 2.

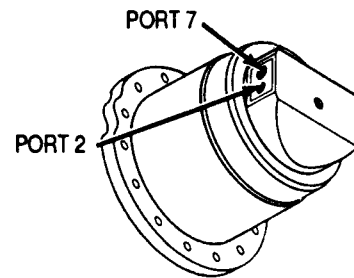
### CAUTION

Install valve with flow arrow pointing forward. Failure to comply may result in damage to equipment.

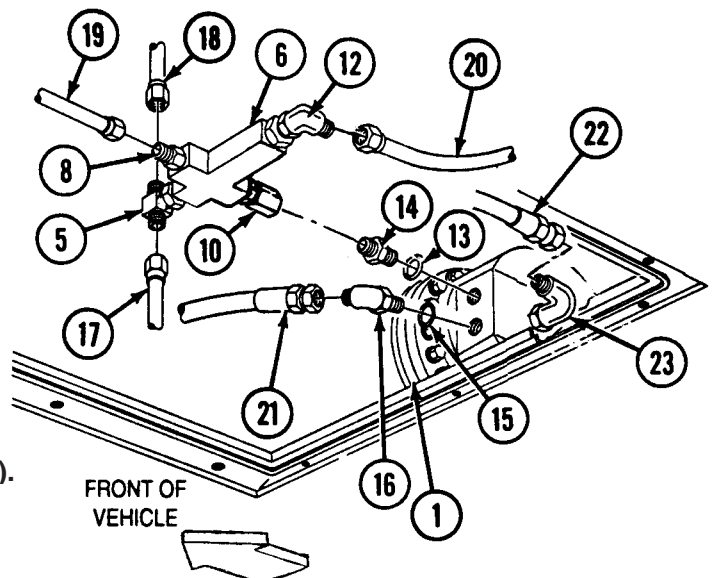
- O Install union (10) and valve (6) on adapter (14) with tee (5) facing outboard.
- P Connect LH INTMD WHL VLV-7 TEE tube (17) to lower nipple of tee (5) and INTMD WHL VLV-7 TEE tube (18) to upper nipple of tee (5).
- Q Connect INTMD WHL VLV-17 tube (19) to adapter (8).
- R Connect LH INTMD WHL VLV-17L ELB tube (20) to elbow (12).
- S Connect INTMD SPNSN UNIT-2 hose (21) to elbow (16).
- T Connect NO. 2 SPNSN UNIT-7B hose (22) to elbow (23).

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install right No. 2 roadwheel arm (TM 5-2350-262-20-2).



PORT LOCATIONS



# LEFT REAR INTERMEDIATE ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

Socket Wrench	5120-01-195-0640
Socket Set	
Sling	5120-01-222-7931
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Guide Pin (4)	5315-01-229-9703
Screw, Jacking (2)	5305-00-071-2074

Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

- Packing (3)
- Self-locking Screw (14)

Parts Reference:

- TM 5-2350-262-24P Group AR
- TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Troubleshooting Reference:

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Hull Access Plate Removed
<b>Note</b>	
	Retain six self-locking screws from retainer removal.
TM 5-2350-262-20-2	Left No. 3 Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

General Safety Instructions:

### WARNING

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling.

**REMOVAL**

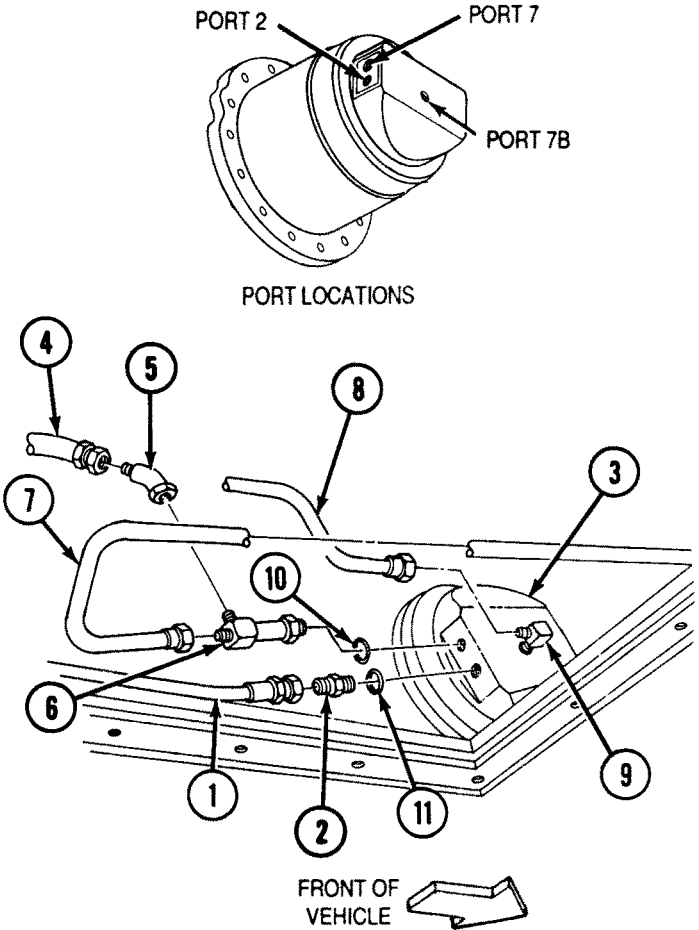
**WARNING**

High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

**CAUTION**

Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.

- A** Disconnect hose (1) from adapter (2) in port 2 of actuator (3).
- B** Disconnect hose (4) from elbow (5) on tee (6) in port 7. Remove elbow (5) from tee (6).
- C** Disconnect tube (7) from tee (6) in port 7.
- D** Disconnect tube (8) from elbow (9) in port 7B.
- E** Remove tee (6) and packing (10) from port 7. Discard packing (10).
- F** Remove adapter (2) and packing (11) from port 2. Discard packing (11).



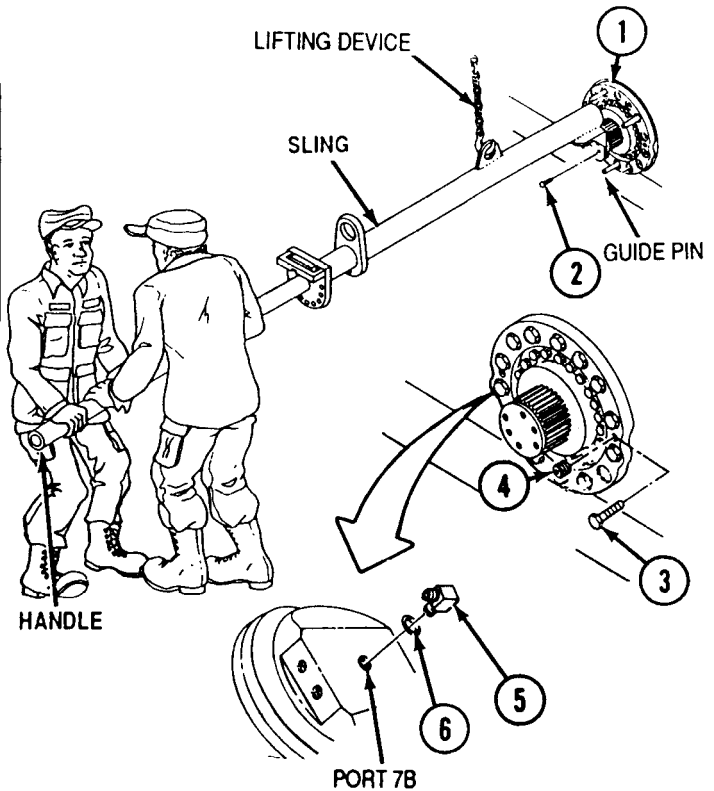
- 
- This diagram shows the actuator flange (3) being prepared for removal. It includes labels for self-locking screws (12), setscrews (13), and jacking screws (14).
- G** Remove fourteen self-locking screws (12) from flange of actuator (3). Discard self-locking screws (12).
  - H** Remove two setscrews (13) from flange of actuator (3).
  - I** Install two jacking screws (14) on flange of actuator (3). Tighten jacking screws (14) clockwise to break actuator (3) away from hull.

- 
- This diagram shows the final removal steps. It includes labels for a GUIDE PIN, SLING, and a wingshaft (15). It also shows the installation of self-locking screws (16) used to secure the roadwheel arm.
- J** Install four guide pins at 90° intervals.
  - K** Install sling on wingshaft (15) using six self-locking screws (16) (previously used in securing roadwheel arm).

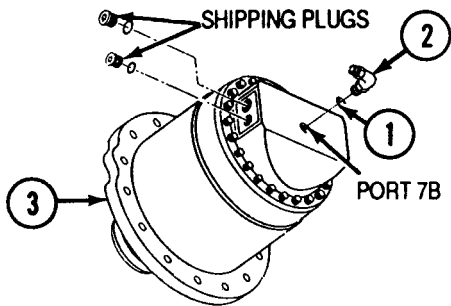
### WARNING

Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- L** Connect lifting device to sling and take up slack.
- M** Extend handle of sling to aid in balancing weight of actuator (1).
- N** Remove actuator (1) from four guide pins and hull while supporting actuator (1) on end of sling.
- O** Remove six self-locking screws (2), sling, and lifting device from actuator (1). Retain self-locking screws (2) for installation.
- P** Remove two jacking screws (3) and install two setscrews (4) in flange of actuator (1).
- Q** Remove elbow (5) and packing (6) from port 7B. Discard packing (6).



### INSTALLATION

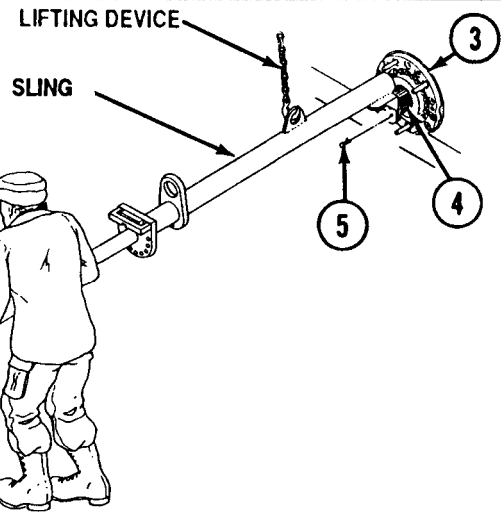


### CAUTION

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

#### Note

- Coat all packings with lubricating oil prior to assembly.
  - When replacing actuator, remove shipping plugs from new actuator and install plugs on faulty actuator.
  - Intermediate actuators do not require cam adjustment.
- A** Install packing (1) and elbow (2) on port 7B of actuator (3).



- B** Install sling on wingshaft (4) with six self-locking screws (5) (previously used in securing road-wheel arm).

### WARNING

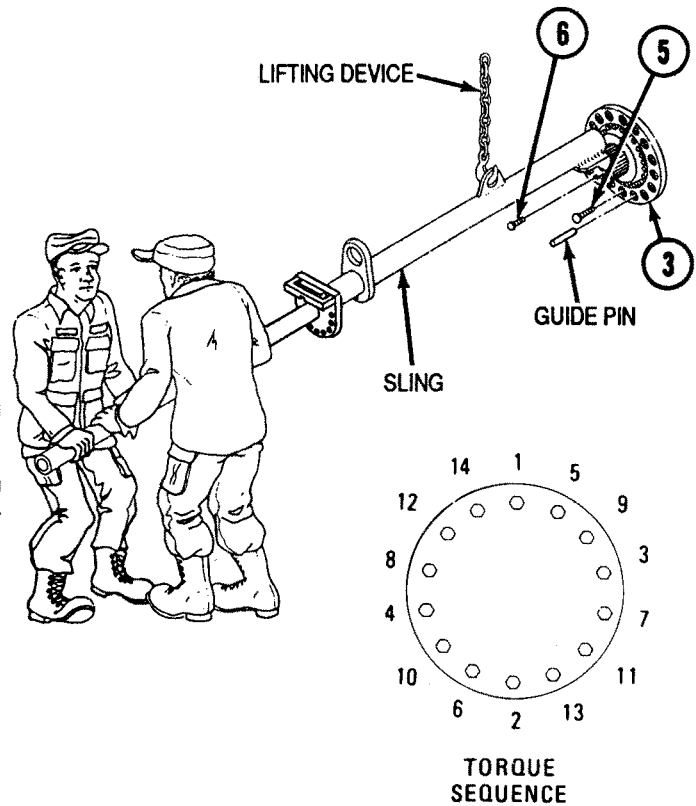
Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- C** Connect lifting device to sling and take up slack.
- D** Extend handle of sling to aid in balancing weight of actuator (3).

**Note**

Coat threads of screws with lubricating oil prior to assembly.

- E** Install actuator (3) on hull, remove four guide pins, and secure actuator (3) with fourteen self-locking screws (6).
- F** Remove six self-locking screws (5), sling, and lifting device from actuator (3). Discard self-locking screws (5).
- G** In sequence shown, tighten fourteen self-locking screws (6) to approximately 140 lb-ft (190 N-m).
- H** Following tightening sequence, tighten fourteen self-locking screws (6) to 170-190 lb-ft (230-258 N-m).



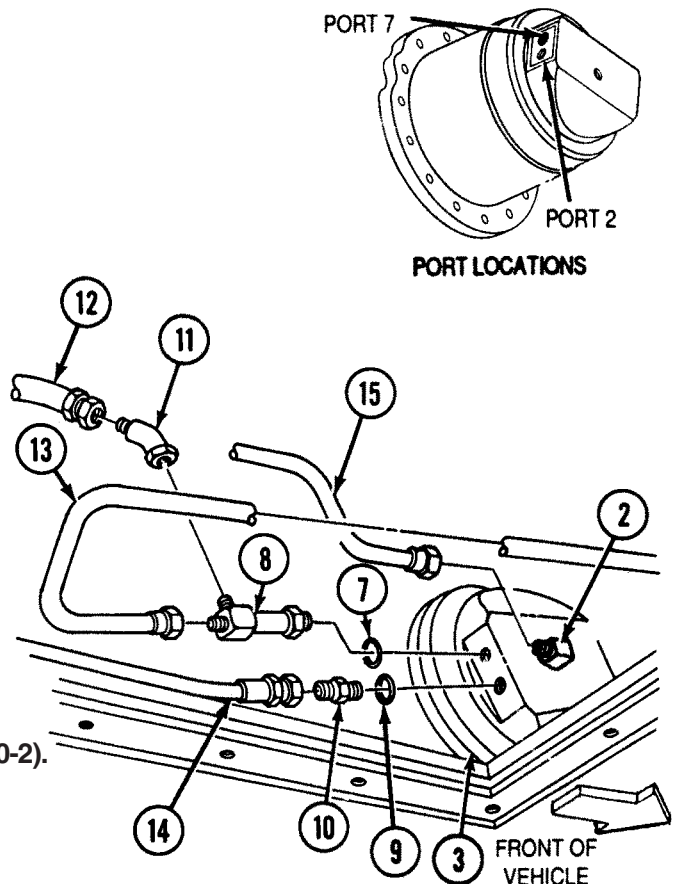
**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

- I** Install packing (7) and tee (8) on port 7 in actuator (3).
- J** Install packing (9) and adapter (10) on port 2.
- K** Install elbow (11) on tee (8) and connect NO. 3 SPNSN UNIT-7 TEE hose (12) to elbow (11).
- L** Connect LH3 SPNSN UNIT-7 TEE tube (13) to tee (8).
- M** Connect INTMD SPNSN UNIT-2 hose (14) to adapter (10).
- N** Connect LH3 SPNSN UNIT-7B tube (15) to elbow (2).

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install left No. 3 roadwheel arm (TM 5-2350-262-20-2).





# LEFT FRONT INTERMEDIATE ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Lifting Device

Special Tools:

Socket Wrench Socket Set	5120-01-195-0640
Sling	5120-01-222-7931
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Guide Pin (4)	5315-01-229-9703
Screw, Jacking (2)	5305-00-071-2074

Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

- Packing (7)
- Self-locking Screw (14)

Parts Reference:

TM 5-2350-262-24P	Group AR
TM 5-2350-262-24P	Group A3

Personnel Required:

Two Construction Equipment Repairers  
62B10

Reference:

- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Troubleshooting Reference:

- TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-1	Hull Access Plate Removed
<b>Note</b>	
	Retain six self-locking screws from retainer removal.
TM 5-2350-262-20-2	Left No. 2 Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

General Safety Instructions:

**WARNING**

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling.

**REMOVAL**

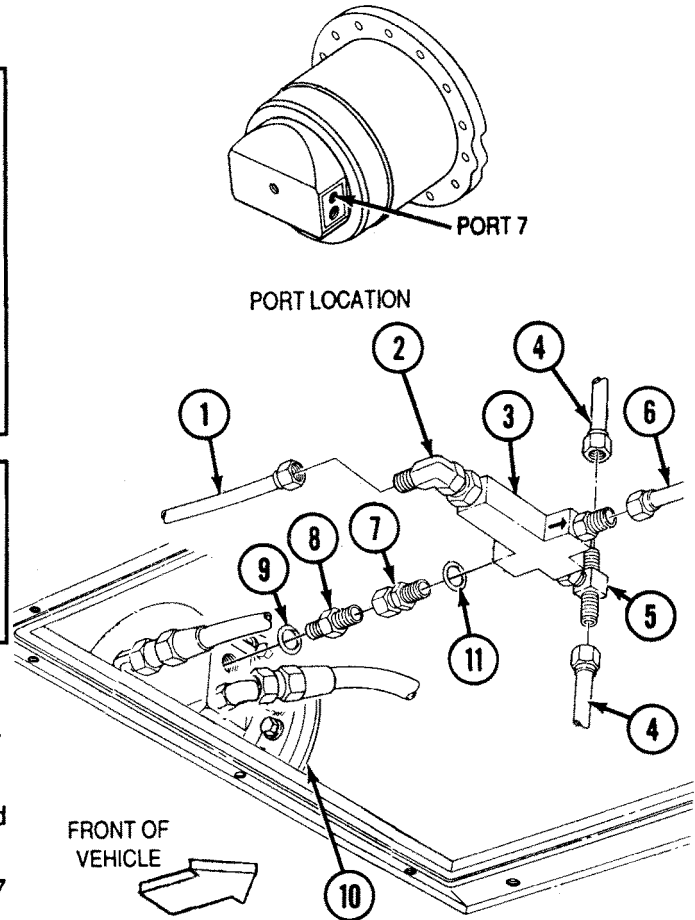
**WARNING**

High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

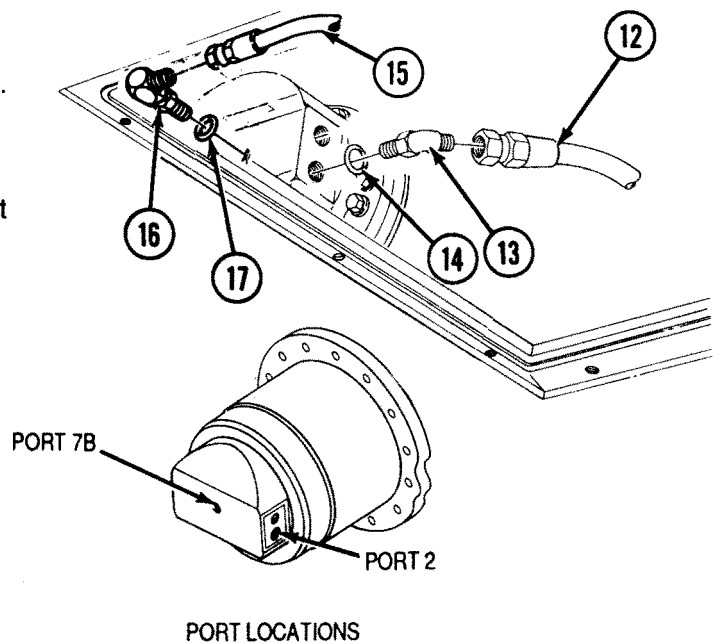
**CAUTION**

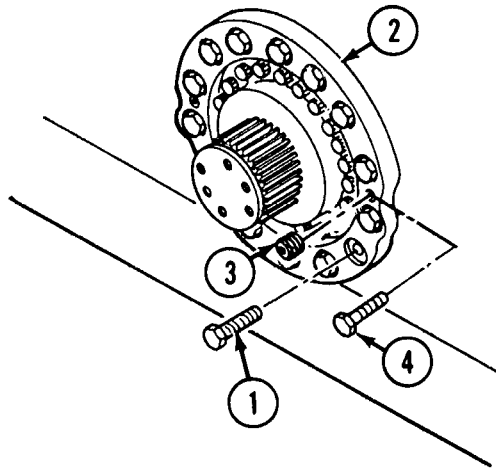
Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.

- A** Disconnect tube (1) from elbow (2) in valve (3).
- B** Disconnect two tubes (4) from tee (5) in valve (3).
- C** Disconnect tube (6) from valve (3).
- D** Disconnect union (7) from adapter (8) and remove valve (3).
- E** Remove adapter (8) and packing (9) from port 7 of actuator (10). Discard packing (9).
- F** Remove union (7) and packing (11) from valve (3). Discard packing (11).

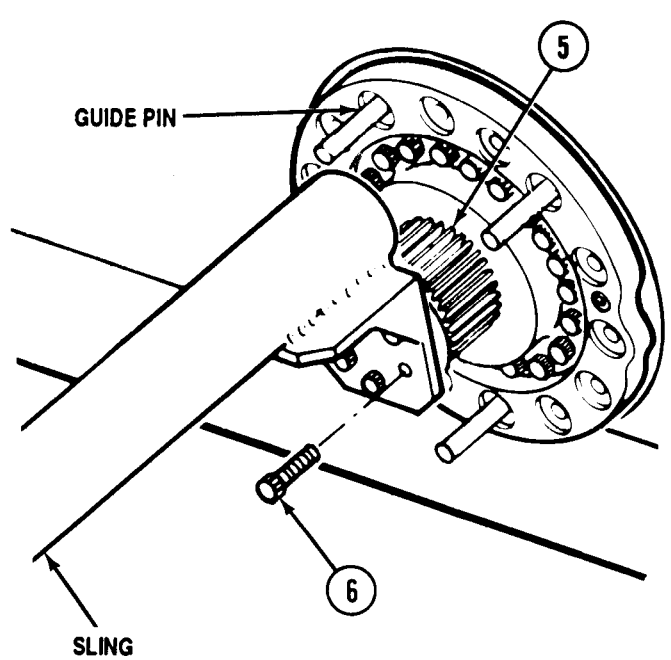


- G** Disconnect hose (12) from elbow (13) in port 2.
- H** Remove elbow (13) and packing (14) from port 2. Discard packing (14).
- I** Disconnect hose (15) from elbow (16) in port 7B.
- J** Remove elbow (16) and packing (17) from port 7B. Discard packing (17).





- K** Remove fourteen self-locking screws (1) from flange of actuator (2). Discard self-locking screws (1).
- L** Remove two setscrews (3) from flange of actuator (2).
- M** Install two jacking screws (4) on flange of actuator (2). Tighten jacking screws (4) clockwise to break actuator (2) away from hull.

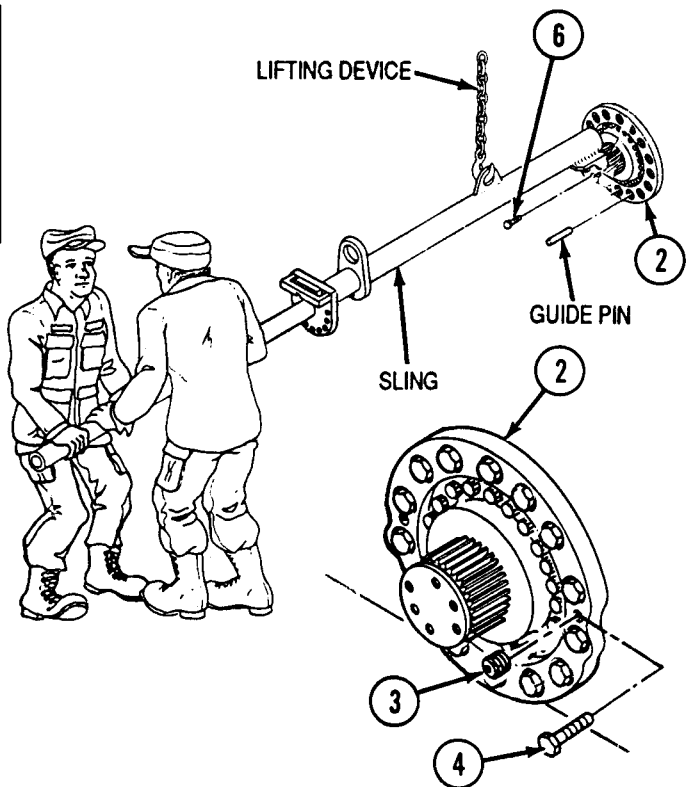


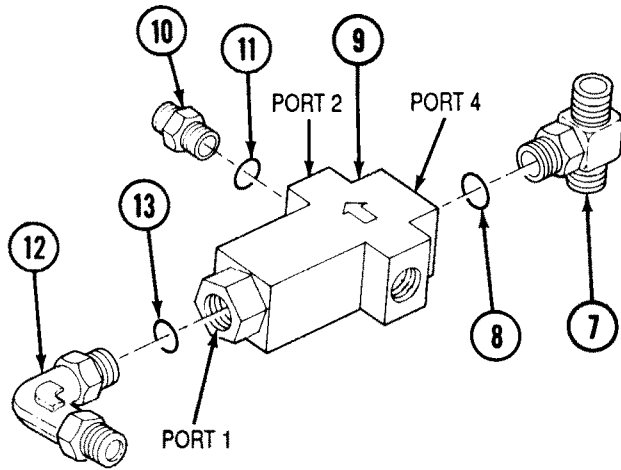
- N** Install four guide pins on hull at 90° intervals.
- O** Install sling on wingshaft (5) with six self-locking screws (6) (previously used in securing roadwheel arm).

### WARNING

Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

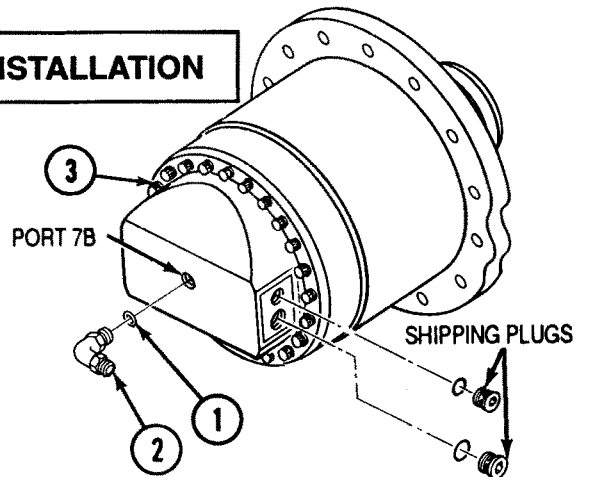
- P** Connect lifting device to sling and take up slack.
- Q** Extend handle of sling to aid in balancing weight of actuator (2).
- R** Remove actuator (2) from four guide pins and hull while supporting actuator (2) on end of sling.
- S** Remove six self-locking screws (6), sling, and lifting device from actuator (2). Retain self-locking screws (6) for installation.
- T** Remove two jacking screws (4) and install two setscrews (3) in flange of actuator (2). Tighten setscrews (3) to 15-20 lb-ft (20-27 N-m).





- U** Remove tee (7) and packing (8) from port 4 of valve (9). Discard packing (8).
- V** Remove adapter (10) and packing (11) from port 2. Discard packing (11).
- W** Remove elbow (12) and packing (13) from port 1. Discard packing (13).

**INSTALLATION**



**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

**Note**

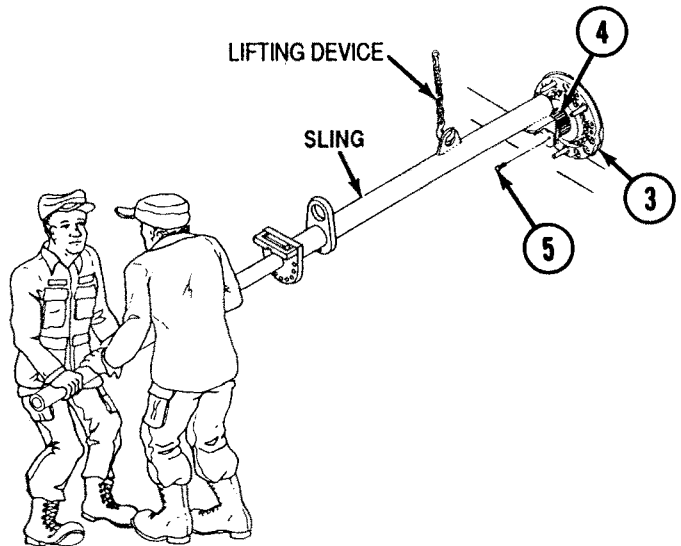
- Coat all packings with lubricating oil prior to assembly.
  - When replacing actuator, remove shipping plugs from new actuator and install plugs on faulty actuator.
  - Intermediate actuators do not require cam adjustment.
- A** Install packing (1) and elbow (2) on port 7B of actuator (3).

- B** Install sling on wingshaft (4) with six self-locking screws (5) (previously used in securing road-wheel arm).

**WARNING**

Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

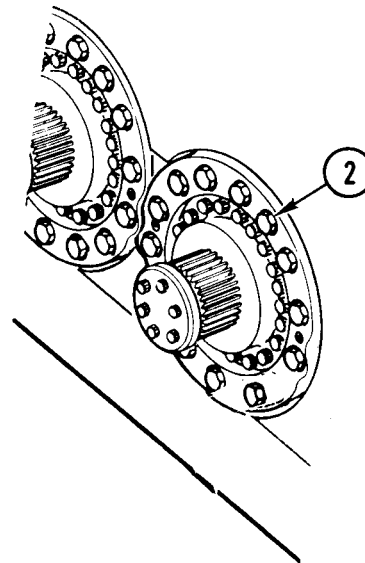
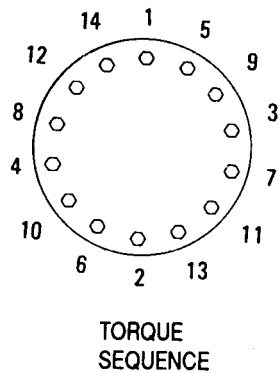
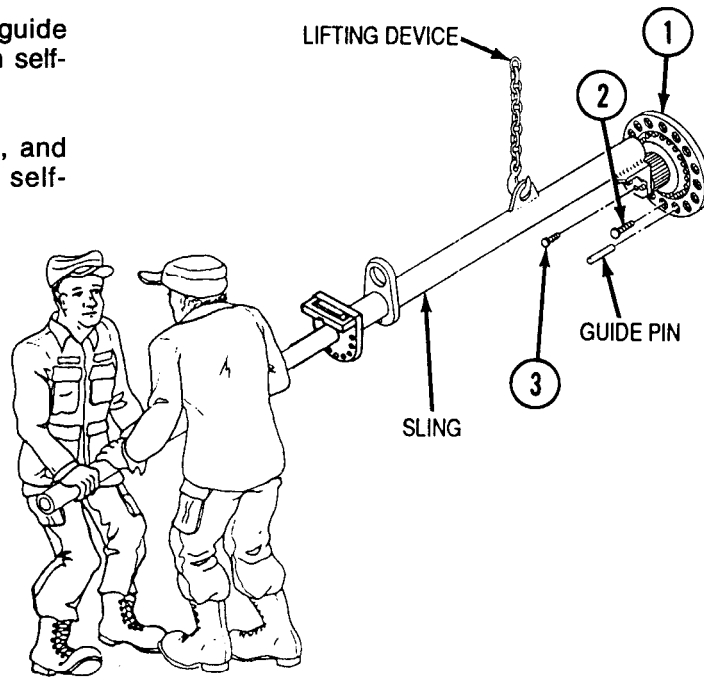
- C** Connect lifting device to sling and take up slack.
- D** Extend handle of sling to aid in balancing weight of actuator (3).



**Note**

Coat threads of screws with lubricating oil prior to assembly.

- E** Install actuator (1) on hull, remove four guide pins, and secure actuator (1) with fourteen self-locking screws (2).
- F** Remove six self-locking screws (3), sling, and lifting device from actuator (1). Discard self-locking screws (3).

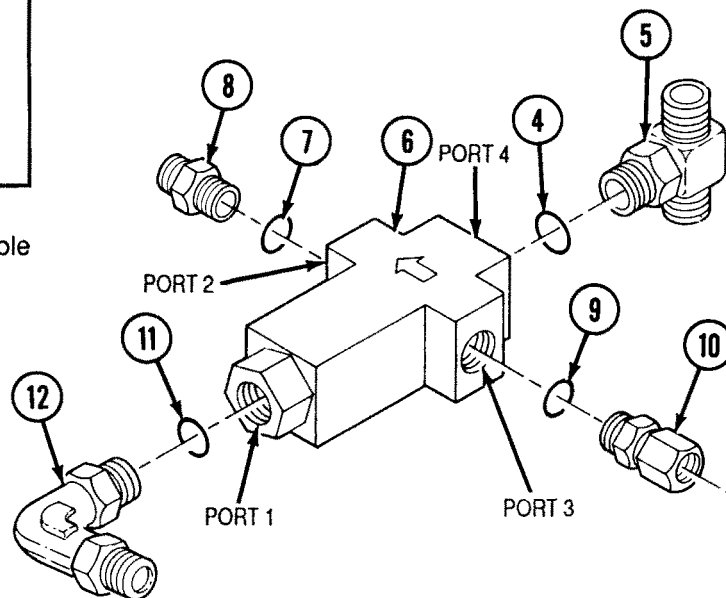


- G** In sequence shown, tighten fourteen self-locking screws (2) to approximately 140 lb-ft (190 N-m).
- H** Following tightening sequence, tighten fourteen self-locking screws (2) to 170-190 lb-ft (230-258 N-m).

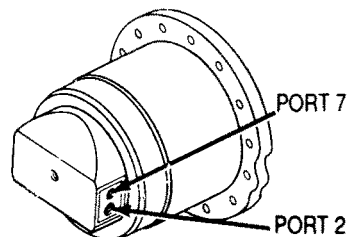
### CAUTION

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

- I Install packing (4) and tee (5), with smaller nipple up, on port 4 of valve (6).
- J Install packing (7) and adapter (8) on port 2.
- K Install packing (9) and union (10) on port 3.
- L Install packing (11) and elbow (12) on port 1.



- M Install packing (13) and adapter (14) on port 7 of actuator (1).
- N Install packing (15) and elbow (16) on port 2.
- O Connect INTMD SPNSN UNIT-2 hose (17) to elbow (16).
- P Connect NO. 2 SPNSN UNIT-7B hose (18) to elbow (19).



PORT LOCATIONS

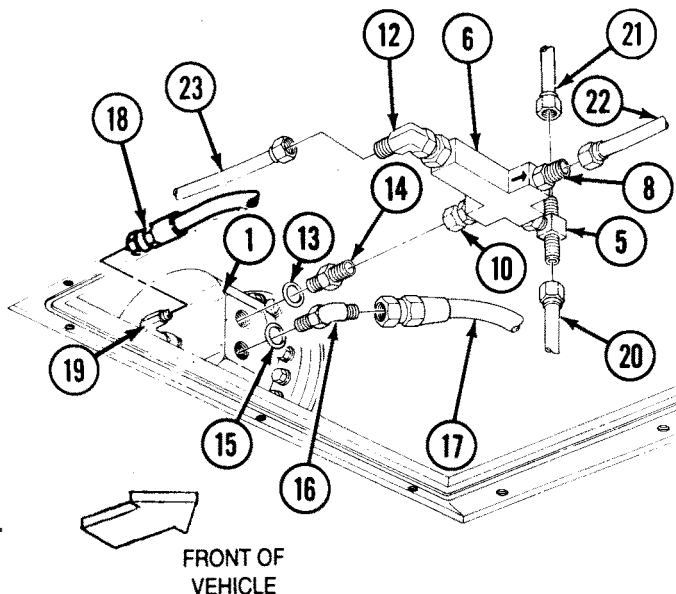
### CAUTION

Install valve with flow arrow pointing forward. Failure to comply may result in damage to equipment.

- Q Install union (10) and valve (6) on adapter (14) with tee (5) facing outboard.
- R Connect RH INTMD WHL VLV-7 TEE tube (20) to lower nipple of tee (5) and INTMD WHL VLV-7 TEE tube (21) to upper nipple of tee (5).
- S Connect INTMD WHL VLV-17 tube (22) to adapter (8).
- T Connect RH INTMD WHL VLV-17R ELB tube (23) to elbow (12).

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install left No. 2 roadwheel arm (TM 5-2350-262-20-2).



# RIGHT REAR INTERMEDIATE ACTUATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive Lifting Device

Special Tools:

Socket Wrench Socket Set	5120-01-195-0640
Sling	5120-01-222-7931
Wrench Set	5120-01-301-5783
Wrench Set	5120-01-302-4387
Guide Pin (4)	5315-01-229-9703
Screw, Jacking (2)	5305-00-071-2074

Materials:

Caps and Plugs	Item 7 Appendix C
Lubricating Oil	Item 31 Appendix C

Parts:

Packing (3)  
Self-locking Screw (14)

Parts Reference:

TM 5-2350-262-24P Group AR  
TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers 62B10

Reference:

TM 5-2350-262-20-1  
TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Hull Access Plate Removed
<b>Note</b>	
	Retain six self-locking screws from retainer removal.
TM 5-2350-262-20-2	Right No. 3 Road-wheel Arm Removed
Page 3-3	Hydraulic Pressure Relieved

General Safety Instructions:

### WARNING

- High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting.
- Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling.



**REMOVAL**

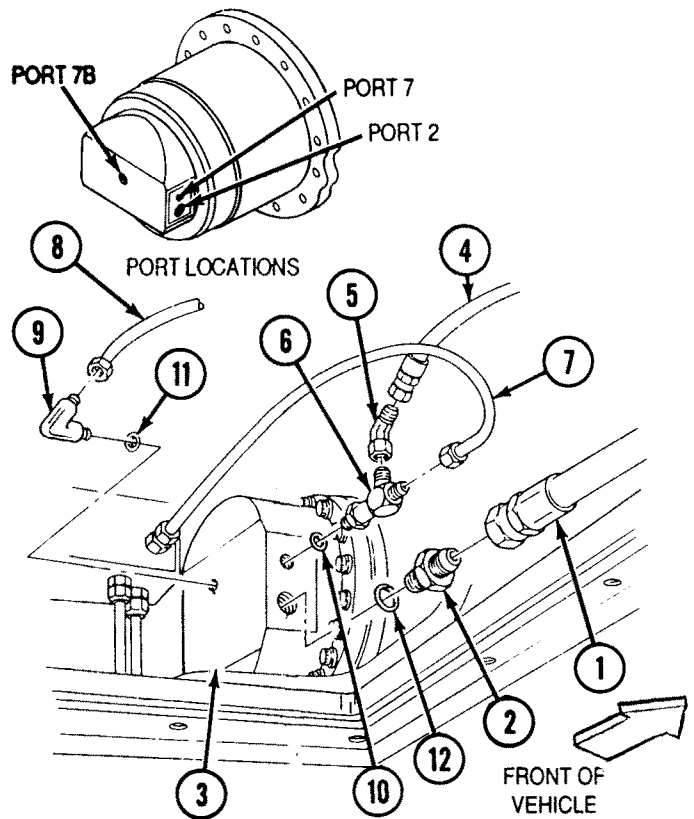
**WARNING**

High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. After hydraulic system has been relieved, wait at least four minutes before disconnecting any hose or fitting. Failure to comply may result in severe injury to personnel.

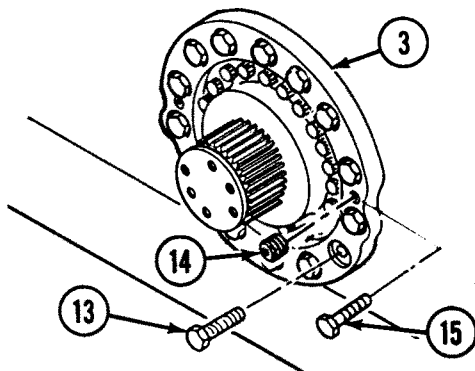
**CAUTION**

Cover ports and hose or tube ends to prevent contamination. Failure to comply may result in damage to equipment.

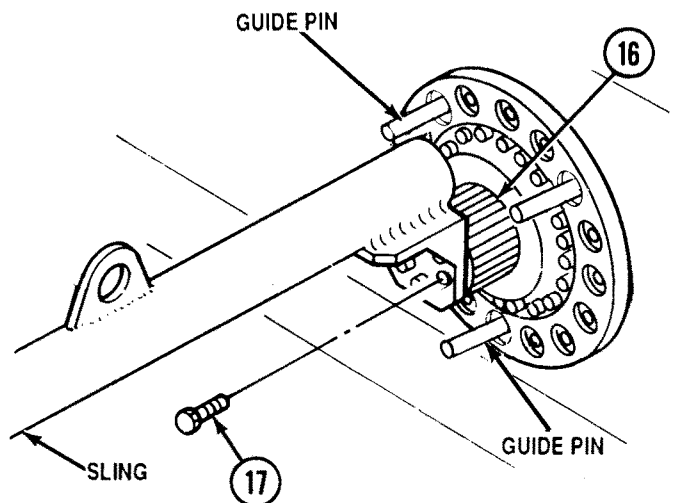
- A** Disconnect hose (1) from adapter (2) in port 2 of actuator (3).
- B** Disconnect hose (4) from elbow (5). Remove elbow (5) from tee (6).
- C** Disconnect tube (7) from tee (6) in port 7.
- D** Disconnect tube (8) from elbow (9) in port 7B.
- E** Remove tee (6) and packing (10) from port 7. Discard packing (10).



- F** Remove elbow (9) and packing (11) from port 7B. Discard packing (11).
- G** Remove adapter (2) and packing (12) from port 2. Discard packing (12).



- H** Remove fourteen self-locking screws (13) from flange of actuator (3). Discard self-locking screws (13).
- I** Remove two setscrews (14) from flange of actuator (3).
- J** Install two jacking screws (15) on flange of actuator (3). Tighten jacking screws (15) clockwise to break actuator (3) away from hull.

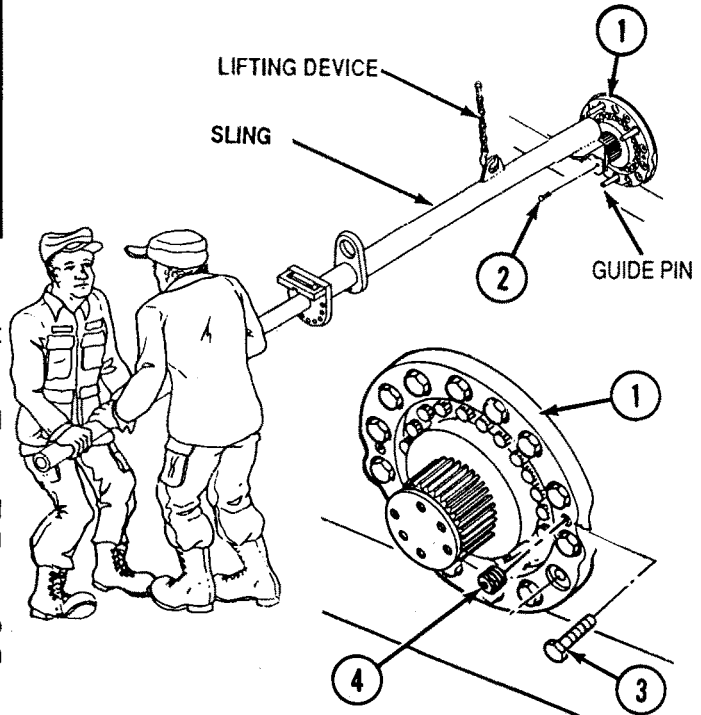


- K** Install four guide pins at 90° intervals.
- L** Install sling on wingshaft (16) with six self-locking screws (17) (previously used in securing roadwheel arm).

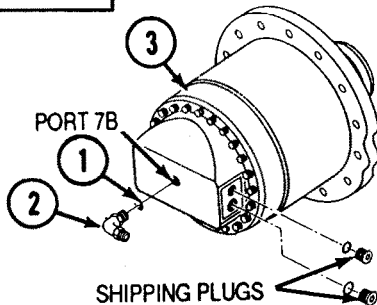
### WARNING

Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- M** Connect lifting device to sling and take up slack.
- N** Extend handle of sling to aid in balancing weight of actuator (1).
- O** Remove actuator (1) from four guide pins and hull while supporting actuator (1) on end of sling.
- P** Remove six self-locking screws (2), sling, and lifting device from actuator (1). Retain self-locking screws (2) for installation.
- Q** Remove two jacking screws (3) and install two setscrews (4) in flange of actuator (1). Tighten setscrews (4) to 15-20 lb-ft (20-27 N.m).



### INSTALLATION

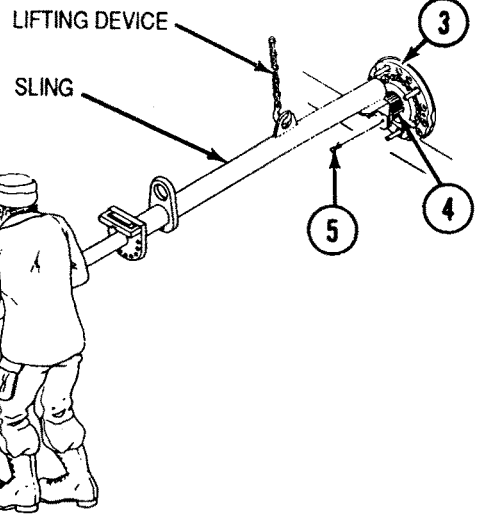


### CAUTION

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

#### Note

- Coat all packings with lubricating oil prior to assembly.
  - When replacing actuator, remove shipping plugs from new actuator, and install plugs on faulty actuator.
  - Intermediate actuators do not require cam adjustment.
- A** Install packing (1) and elbow (2) on port 7B of actuator (3).



### WARNING

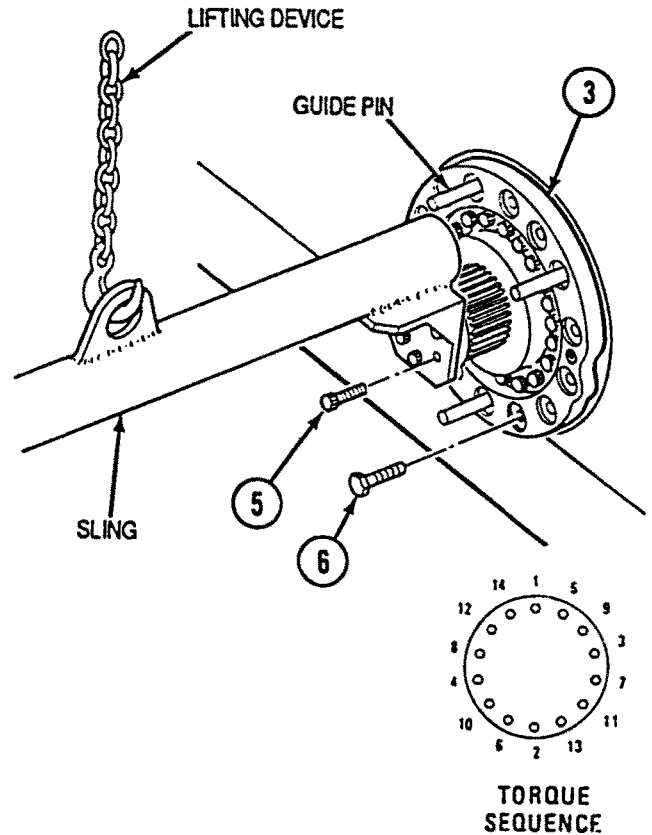
Lifting device must have a weight capacity greater than 325 lb (138 kg). Two personnel are required at end of sling. Failure to comply may result in damage to equipment or injury to personnel.

- B** Install sling on wingshaft (4) with six self-locking screws (5) (previously used in securing road-wheel arm).
- C** Connect lifting device to sling and take up slack.
- D** Extend handle of sling to aid in balancing weight of actuator (3).

**Note**

Coat threads of screws with lubricating oil prior to assembly.

- E** Install actuator (3) on hull, remove four guide pins, and secure actuator (3) with fourteen self-locking screws (6).
- F** Remove six self-locking screws (5), sling, and lifting device from actuator (3). Discard self-locking screws (5).
- G** In sequence shown, tighten fourteen self-locking screws (6) to approximately 140 lb-ft (190 N-m).
- H** Following tightening sequence, tighten fourteen self-locking screws (6) to 170-190 lb-ft (230-258 N-m).



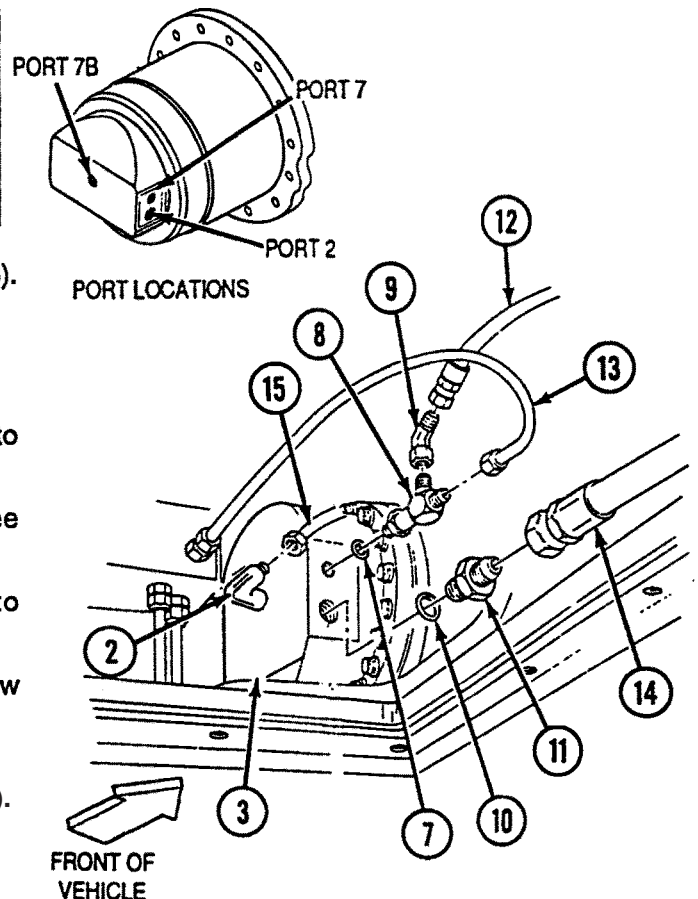
**CAUTION**

Nicked or cut packings can cause leakage. Ensure packings are not damaged during installation. Failure to comply may result in damage to equipment.

- I** Install packing (7) and tee (8) on port 7 of actuator (3).
- J** Install elbow (9) on tee (8).
- K** Install packing (10) and adapter (11) on port 2.
- L** Connect NO. 3 SPNSN UNIT-7 TEE hose (12) to elbow (9).
- M** Connect RH3 SPNSN UNIT-7 TEE tube (13) to tee (8).
- N** Connect INTMD SPNSN UNIT-2 hose (14) to adapter (11).
- O** Connect RH3 SPNSN UNIT-7B tube (15) to elbow (2) in port 7B.

**FOLLOW-ON TASKS:**

- Install hull access plate (TM 5-2350-262-20-1).
- Install right No. 3 roadwheel arm (TM 5-2350-262-20-2).



# ACTUATOR ACCUMULATOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Wrench, Spanner      5120-01-229-9135

Materials:

Antiseize Compound	Item 20 Appendix C
Lubricating Oil	Item 31 Appendix C
Screw: Spanner Wrench Attachment (2)	Item 38 Appendix C
Wire, Non-electrical	Item 41 Appendix C

Parts:

Packing

Parts Reference:

TM 5-2350-262-24P Group A3

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-3

Equipment Condition:

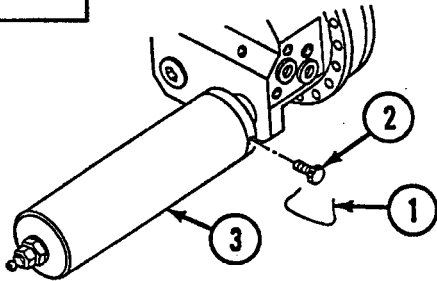
<u>Reference</u>	<u>Condition Description</u>
Page 4-257	Left Front Actuator Removed

General Safety Instructions:

### WARNING

High-pressure nitrogen gas is used in this equipment. Keep face and hands away from valves and hose ends.

**REMOVAL**

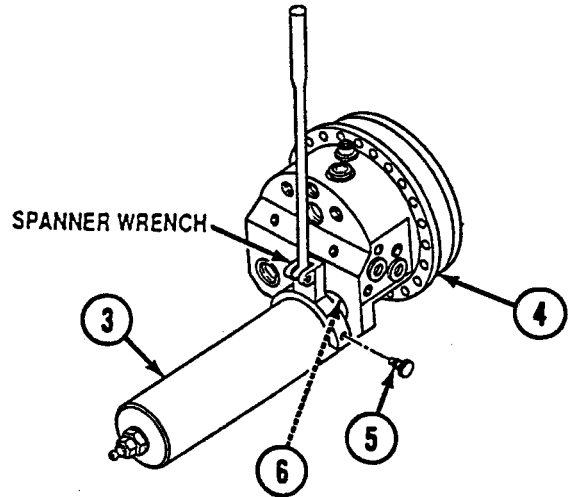


**WARNING**  
 High-pressure nitrogen gas is used in this equipment. Keep face and hands away from valves and hose ends. Failure to comply may result in severe injury to personnel.

**Note**

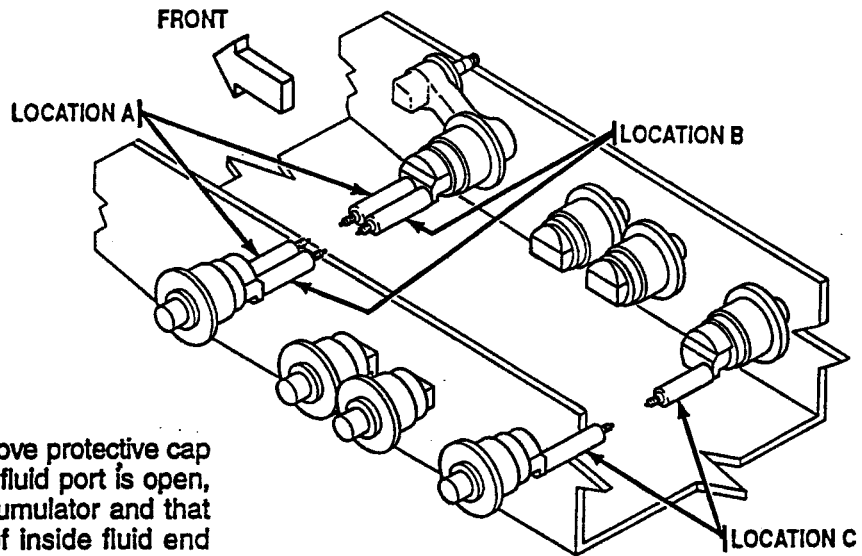
All actuator accumulators are removed the same way. This procedure covers removal of an actuator accumulator from a front actuator.

- A** Remove lockwire (1) and screw (2) from accumulator (3). Discard lockwire (1).



- B** Place actuator (4) in vise or other holding device. Secure spanner wrench to accumulator (3) with two screws (5). Using spanner wrench and breaker bar, remove accumulator (3) from actuator (4).
- C** Remove and discard packing (6) from accumulator (3). Remove two screws (5) and spanner wrench from accumulator (3). Remove actuator (4) from vise.

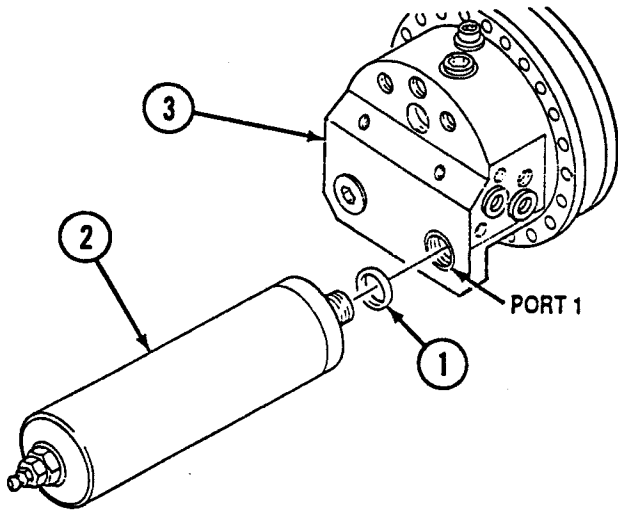
**INSTALLATION**



**Note**

On new accumulators, remove protective cap from fluid end. Ensure the fluid port is open, there isn't any fluid in accumulator and that piston is within 1/8 inch of inside fluid end cap. Piston can be seen through fluid end port.

- A** Determine accumulator location on vehicle to establish charge pressure requirements. Charge accumulator in accordance with (TM 5-2350-262-20-2).



**Note**

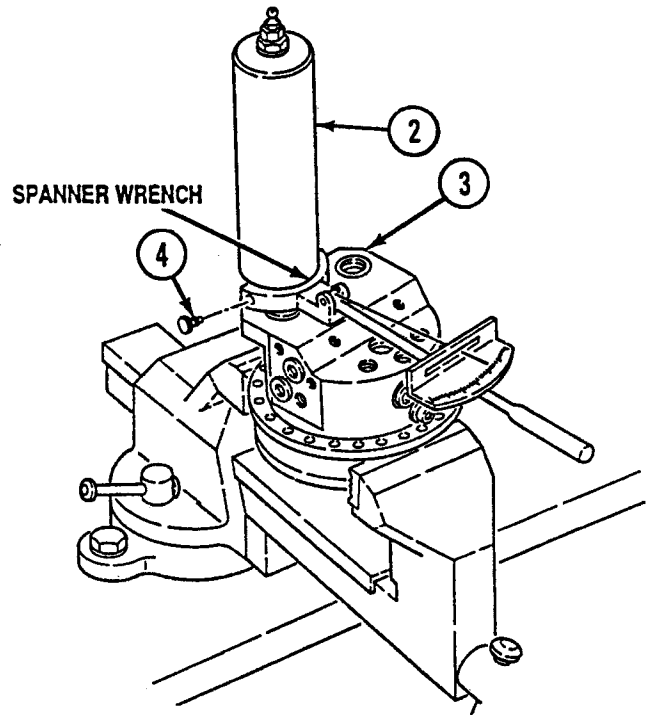
Coat packing with lubricating oil prior to installation.

- B** Install packing (1) on accumulator (2).

**Note**

Apply antiseize compound to interface area between accumulator and actuator.

- C** Thread accumulator (2) into port 1 of actuator (3).



- D** Place actuator (3) in vise or other holding device and secure spanner wrench to accumulator (2) with two screws (4). Using spanner wrench and torque wrench, tighten accumulator (2) to 169-187 lb-ft (229-254 N.m).

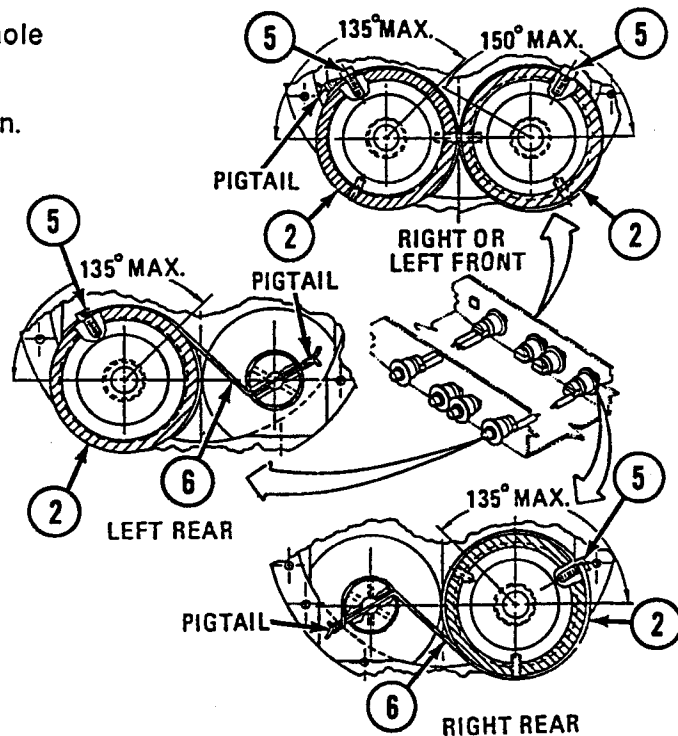
- E** Remove two screws (4) and spanner wrench from accumulator (2). Remove actuator (3) from vise.

- F** Install screw (5) on accumulator (2) in hole located within area shown.

- G** Install lockwire (6) with pigtail located as shown.

**FOLLOW-ON TASK:**

Install corner actuator (p 4-61).



# ACTUATOR MOUNTING RING REPLACEMENT

This task covers:

- a. Removal
- b. Installation

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment,  
Automotive Maintenance and Repair:  
Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Reference:

TM 5-2350-262-20-1

Parts:

Self-locking Screw (2)

Parts Reference:

TM 5-2350-262-24P Group A3

Personnel Required:

Two Construction Equipment Repairers  
62B10

Equipment Condition:

Reference

TM 5-2350-262-20-1

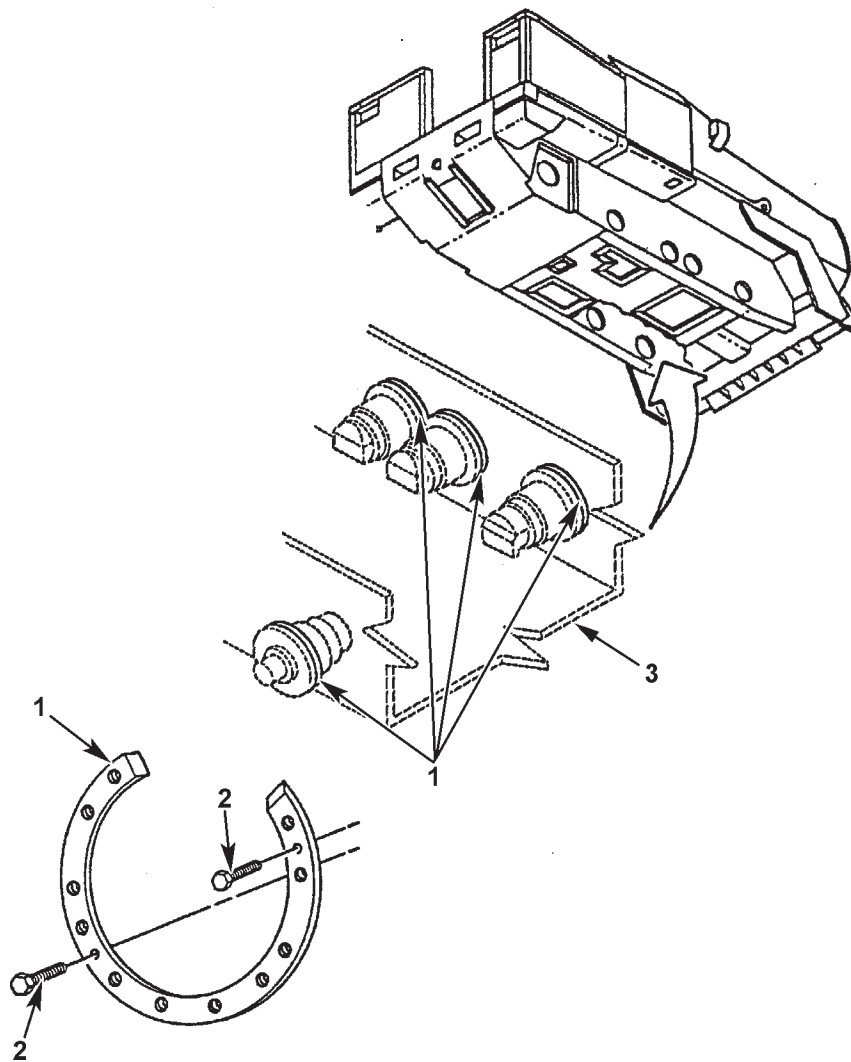
Page 4-253

Condition  
Description

Hull Access Plate  
Removed

Actuator Removed





**REMOVAL**

**Note**

Replacement of actuator mounting ring is the same for all actuator positions. No. 1 left position shown.

Remove two self-locking capscrews (1) and actuator mounting ring (2) from hull (3). Discard self-locking capscrews (1).

**INSTALLATION**

**Note**

Ensure inner surface of hull in actuator mounting area holes are clean and free of paint and foreign material.

Install actuator mounting ring (2) on hull (3) with two self-locking capscrews (1).

**FOLLOW-ON TASK:**

Install actuator (p 4-253).

# TRACK ADJUSTING CYLINDER REPAIR

This task covers:

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

## INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Wrench, Spanner 5120-00-157-2133

Materials:

Compound, Thread Locking Item 14 Appendix C

Deleted

Lubricating Oil Item 31 Appendix C

Parts:

Lubricating Fitting (2) M515003-6  
 Nut 12412092-1  
 Pipe Plug (2) WW-P-471ACABCA  
 Repair Kit 4320-01-183-6826  
 Setscrew

Parts Reference:

TM 5-2350-262-24P Group A3

Personnel Required:

Track Vehicle Repairer 63H10

Reference:

TM 5-2350-262-20-1

TM 5-2350-262-20-2

TM 9-214

Troubleshooting Reference:

TM 5-2350-262-20-1

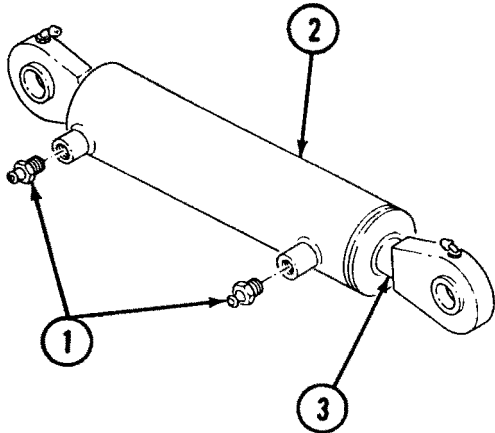
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Track Adjusting Cylinder Removed

**DISASSEMBLY**

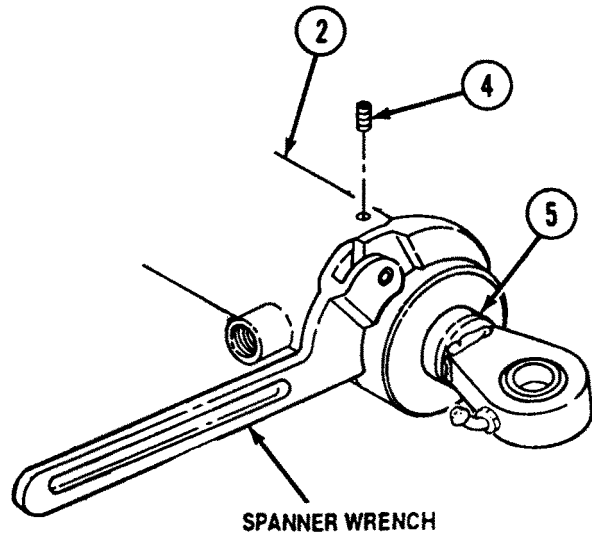
**Note**

NEW PRODUCTION vehicles are equipped with hydraulic track adjusting cylinders. Repair is accomplished in the same way.



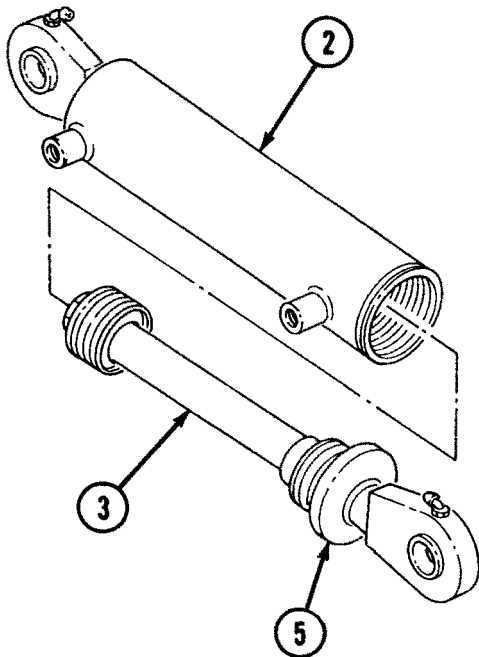
**A** Remove two valves (1) from ports in cylinder (2).

**B** Invert cylinder (2) over pan to catch grease and work piston rod (3) in and out of cylinder (2) to expel grease.

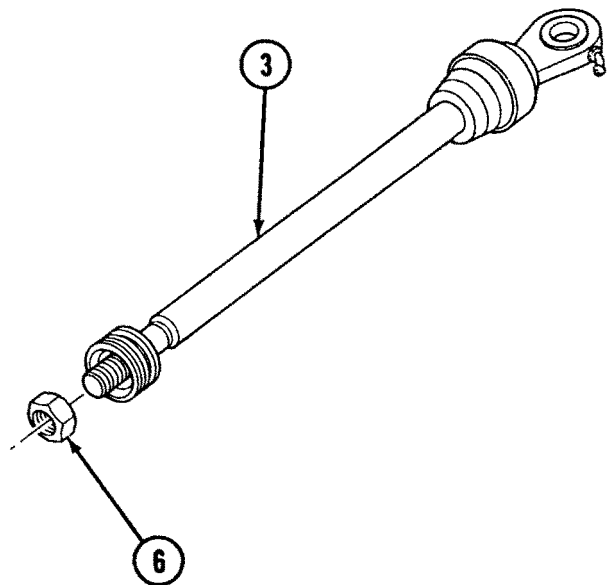


**C** Remove setscrew (4) from cylinder (2). Discard setscrew (4).

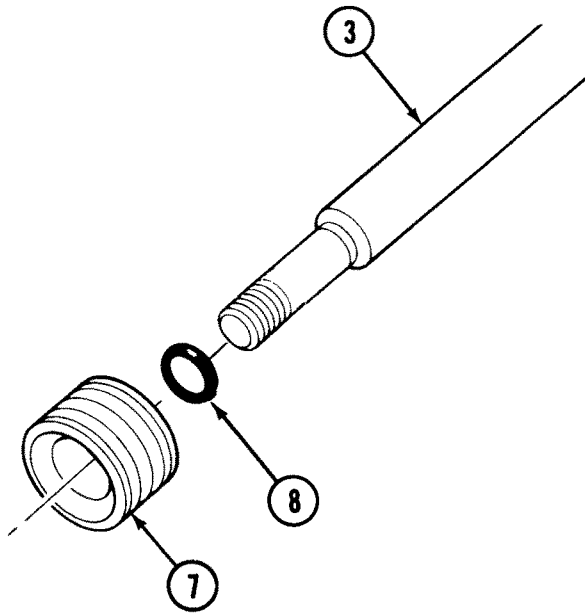
**D** Using spanner wrench, loosen head (5) on cylinder (2).



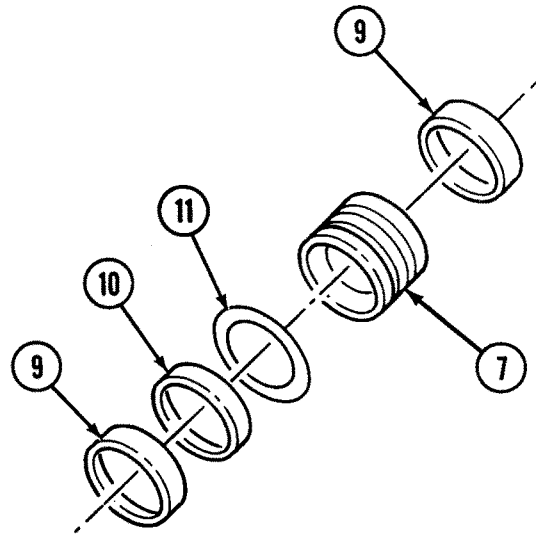
**E** Remove piston rod (3), with head (5), from cylinder (2).



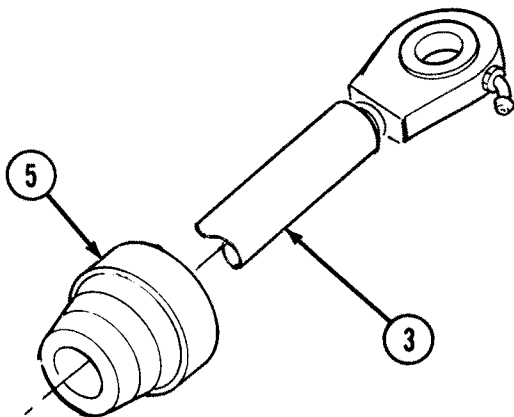
**F** Remove piston nut (6) from piston rod (3). Discard piston nut (6).



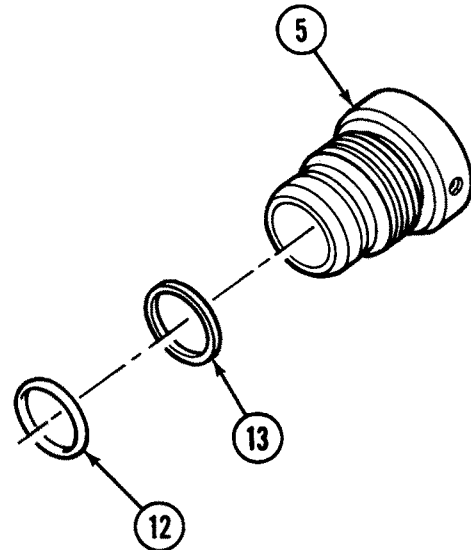
**G** Remove piston (7) and packing (8) from piston rod (3). Discard packing (8).



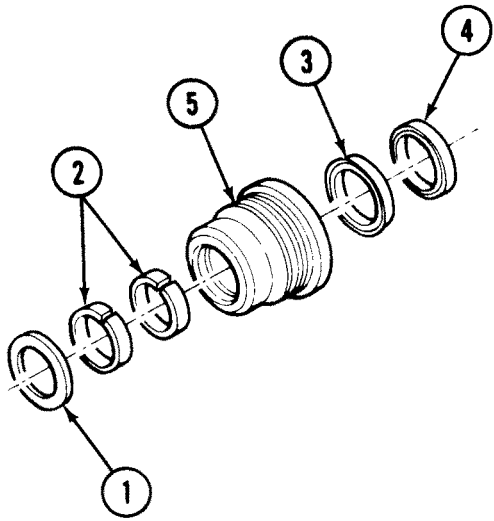
**H** Remove and discard two wear rings (9), seal (10), and packing (11) from piston (7).



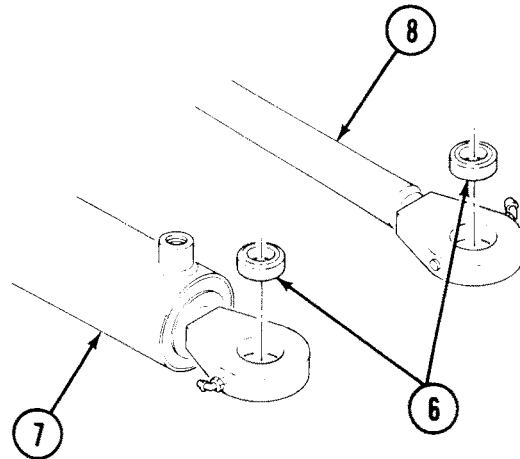
**I** Remove head (5) from piston rod (3).



**J** Remove and discard packing (12) and retainer (13) from head (5).



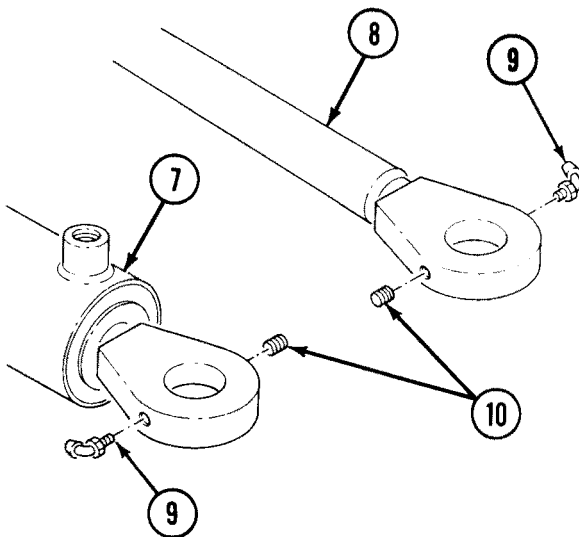
**K** Remove and discard seal (1), two wear rings (2), seal (3), and wiper (4) from head (5).



**Note**

Perform step L only if bearings require replacement.

**L** Using press, remove two bearings (6) from eyes of cylinder (7) and piston rod (8).



**Note**

Perform steps M and N if lubrication fittings are damaged or leaking.

**M** Remove two 90° lubrication fittings (9) from ends of piston rod (8) and cylinder (7). Discard lubrication fittings (9).

**N** Remove two pipe plugs (10) from ends of piston rod (8) and cylinder (7). Discard pipe plugs (10).

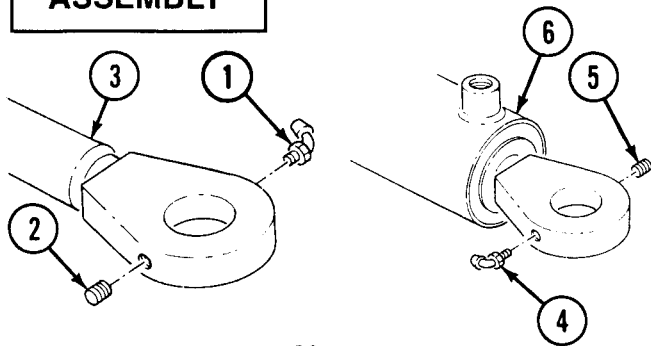
**INSPECTION**

- A** Inspect piston, piston rod, and interior of cylinder for scratches or scoring.
- B** Inspect threads on piston rod, piston nut, cylinder, and head for wear or damage.
- C** Inspect bearings in accordance with TM 9-214.

**REPAIR**

- A** Use general repair methods to repair damaged parts (p 2-8).
- B** Replace broken or unserviceable parts.
- C** Use all parts supplied in repair kit.

**ASSEMBLY**

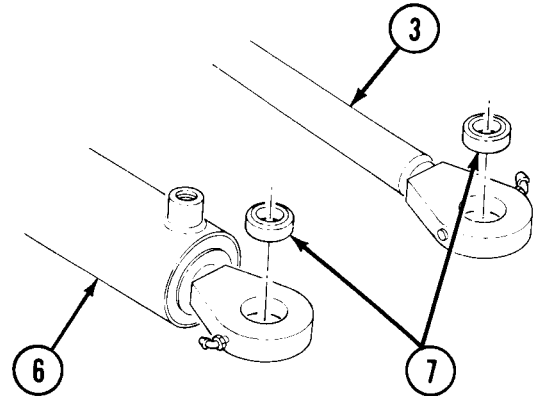


**Note**

- Coat all internal parts and inside of cylinder with oil.
- Perform steps A and B if lubrication fittings were removed.

**A** Install 90° lubrication fitting (1) and pipe plug (2) on end of piston rod (3).

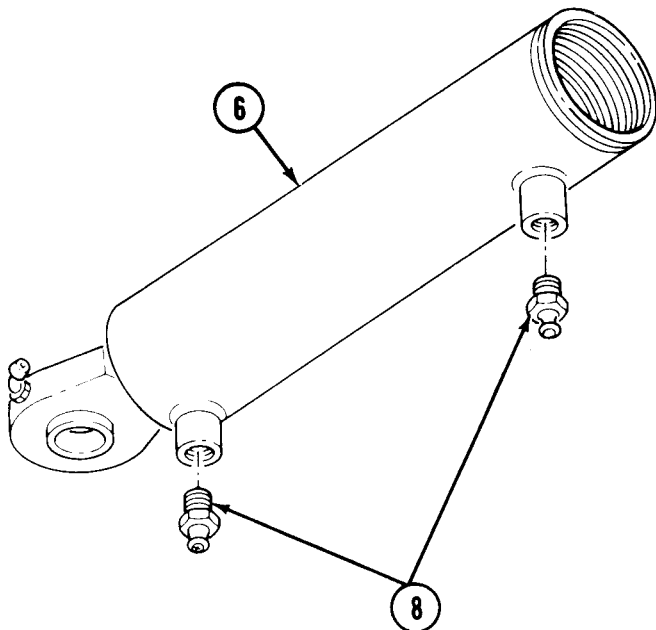
**B** Install 90° lubrication fitting (4) and pipe plug (5) on end of cylinder (6). Do not tighten fitting (4) or pipe plug (5).



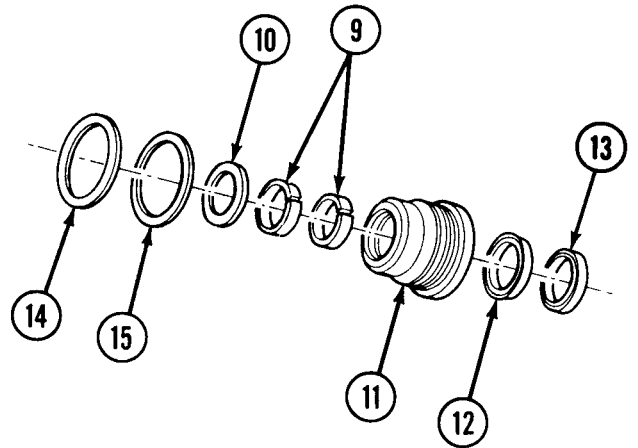
**Note**

Perform step C only if bearings were removed.

**C** Using press, install two bearings (7) on eyes of cylinder (6) and piston rod (3).



**D** Install two valves (8) on ports of cylinder (6).

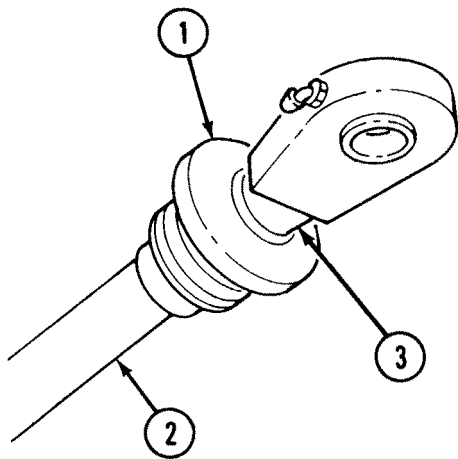


**E** Install two wear rings (9) and seal (10) on head (11).

**F** Install seal (12) on head (11), ensuring grooved side of seal (12) faces wear rings (9).

**G** Install wiper (13) on head (11) with metal case of wiper (13) facing seal (12).

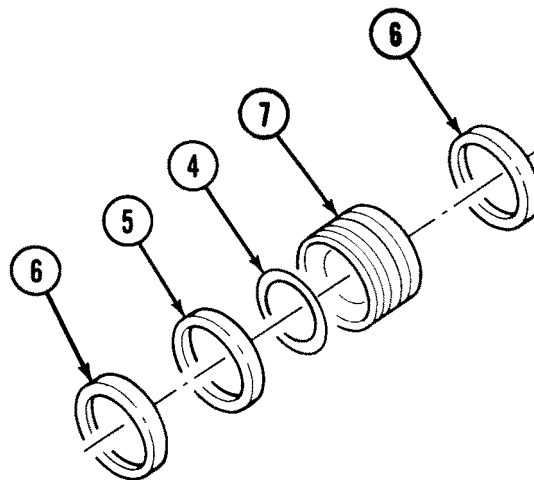
**H** Install packing (14) and retainer (15) on head (11).



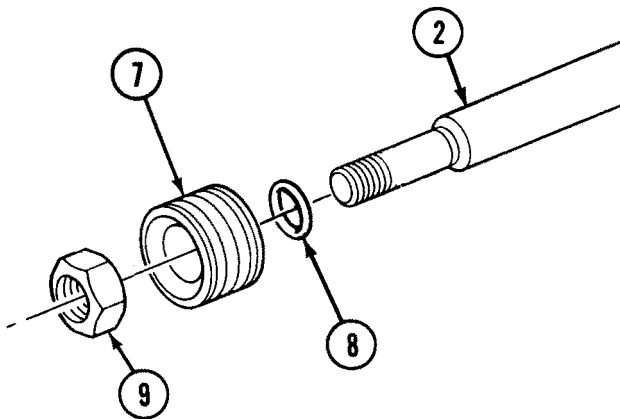
**CAUTION**

Use care not to mar or scratch rod during installation of head. Failure to comply may result in damage to cylinder.

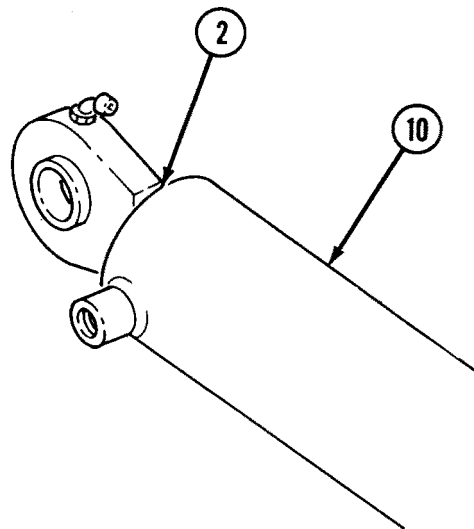
- I** Install head (1) on piston rod (2) with wiper (3) facing eye.



- J** Install packing (4), seal (5), and two wear rings (6) on piston (7).



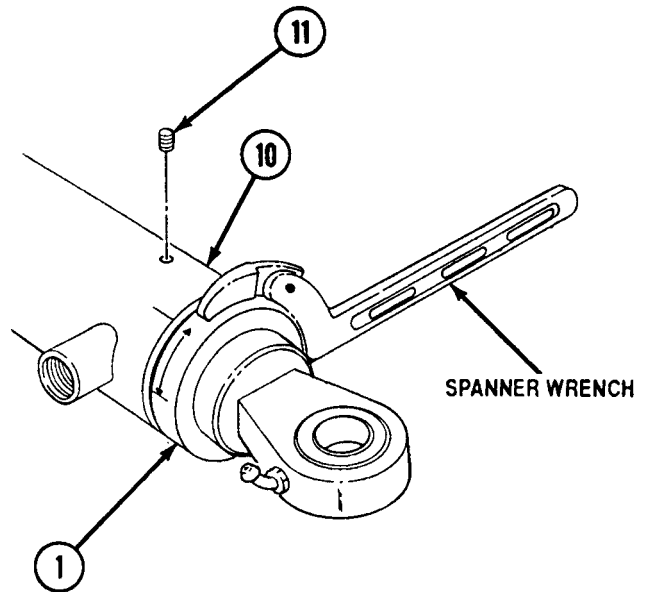
- K** Install packing (8) on piston rod (2).
- L** Install piston (7) on piston rod (2) with open end of piston (7) facing rod threads.
- M** Install piston nut (9) on piston rod (2). Tighten piston nut (9) to 500 lb-ft (678 N-m).



- N** Install piston rod (2) on cylinder (10).



- O** Using spanner wrench, install head (1) on cylinder (10) until cylinder (10) and head (1) touch.
- P** Draw line on cylinder head (1).
- Q** Measure approximately 1.50 in. (3.81 cm) from line in clockwise direction and mark line on cylinder (10).
- R** Tighten head (1) until lines on head (1) and cylinder (10) meet.
- S** Secure head (1) on cylinder (10) with setscrew (11). Tighten setscrew (11) against head (1) and stake in place.




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**T** Deleted

**U** Deleted

**FOLLOW-ON TASK:**

Install track adjusting cylinder  
(TM 5-2350-262-20-2).

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# FRONT BUMP STOP CYLINDER REPAIR

---

This task covers:

- |                |             |
|----------------|-------------|
| a. Disassembly | d. Repair   |
| b. Cleaning    | e. Assembly |
| c. Inspection  |             |

**INITIAL SETUP**

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Special Tools:

Wrench, Spanner                      5120-01-224-3063

Materials:

Lubricating Oil                      Item 31  
Appendix C

Parts:

Repair Kit                              2350-01-183-6825

Setscrew (2)

Parts Reference:

TM 5-2350-262-24P    Group A3

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Troubleshooting Reference:

TM 5-2350-262-20-1

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Bump Stop Cylinder Removed

General Safety Instructions:

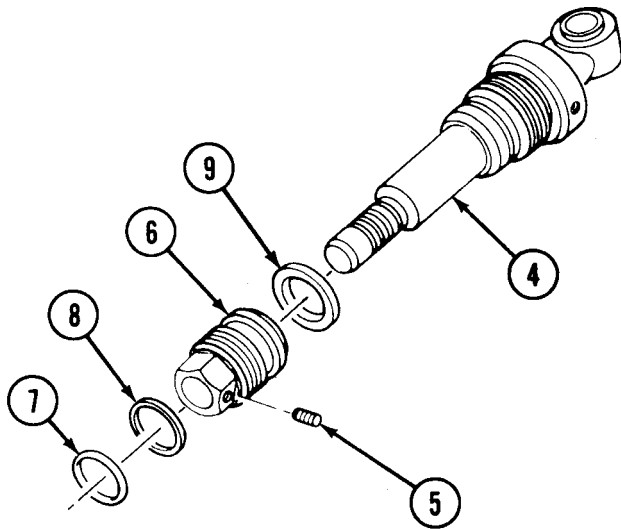
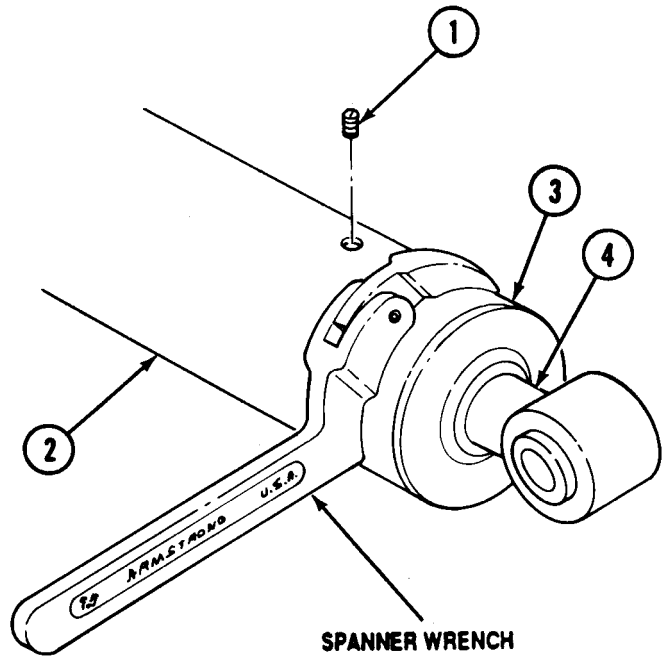
## WARNING

Spilled hydraulic oil is very slippery. Wipe up any spilled oil immediately.

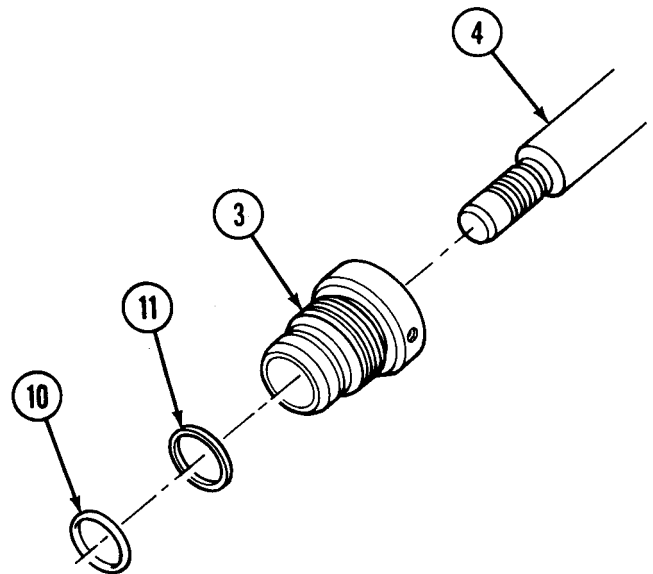
**DISASSEMBLY**

**WARNING**  
 Spilled hydraulic oil is very slippery.  
 Wipe up any spilled oil immediately.  
 Failure to comply may result in injury  
 to personnel.

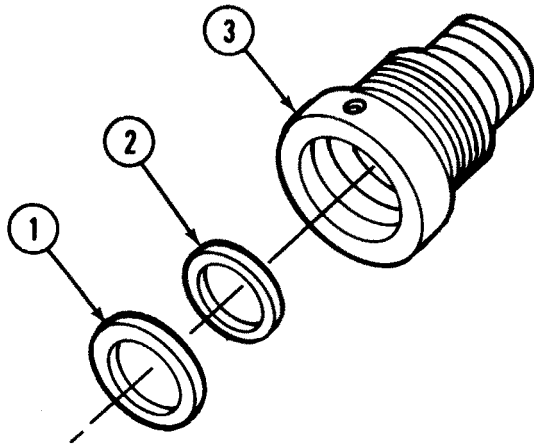
- A** Remove setscrew (1) from cylinder (2). Discard setscrew (1).
- B** Using spanner wrench, remove head (3) from cylinder (2).
- C** Remove head (3) and piston rod (4) from cylinder (2).



- D** Remove setscrew (5) from piston (6). Discard setscrew (5).
- E** Remove and discard piston seal (7) and packing (8) from piston (6).
- F** Remove piston (6) and wear ring (9) from piston rod (4). Discard wear ring (9).



- G** Remove head (3) from piston rod (4).
- H** Remove and discard packing (10) and retainer (11) from head (3).



I Remove and discard seal (1) and wiper (2) from head (3).

**CLEANING**

Use general cleaning methods to clean all parts (p 209).

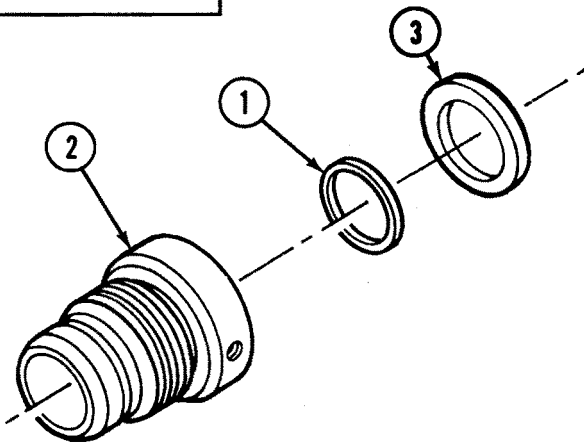
**INSPECTION**

- A Inspect piston rod and interior of cylinder for scratches or scoring.
- B Inspect threads on piston rod, head, and cylinder for wear or damage.

**REPAIR**

- A Use general repair methods to repair damaged parts
- B Use all parts supplied in repair kit.

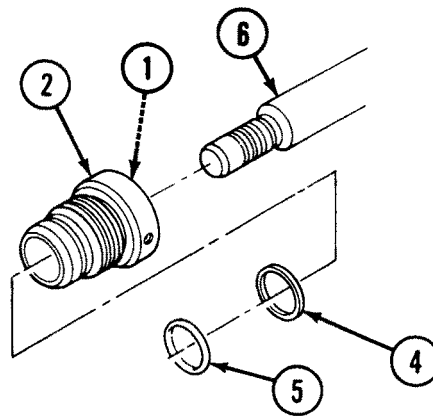
**ASSEMBLY**



**Note**

Apply coating of lubricating oil to parts for assembly.

- A Install wiper (1) on head (2) with open end of wiper facing away from threads.
- B Install seal (3) on head (2) with open end of seal facing away from wiper (1).



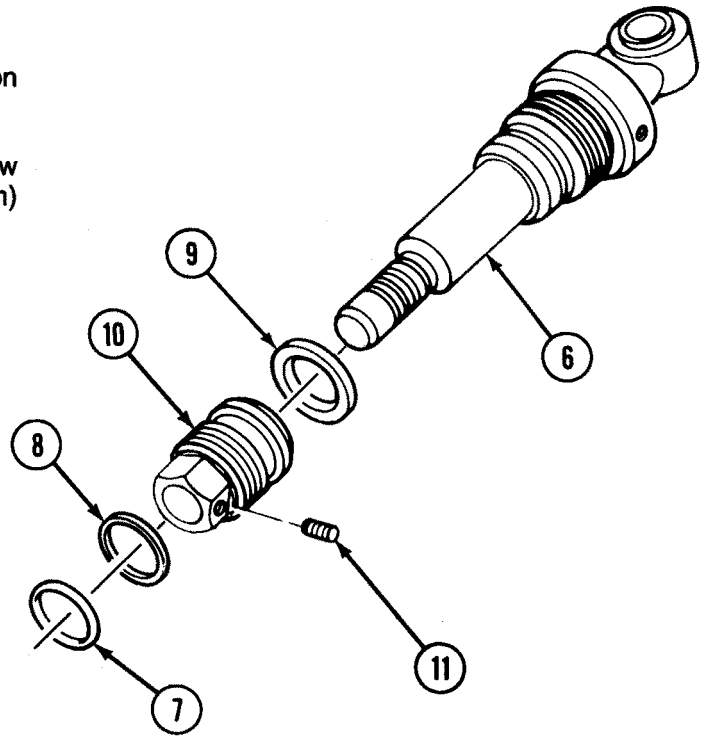
C Install retainer (4) and packing (5) on head (2).

**CAUTION**

Use care not to mar or scratch rod during installation of head. Failure to comply may result in damage to cylinder.

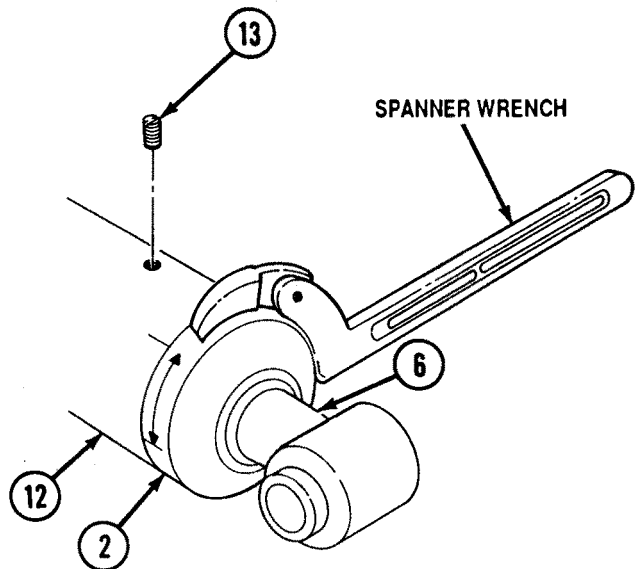
D Install head (2) on piston rod (6) with wiper (1) facing eye.

- E** Install seal (7), packing (8), and wear ring (9) on piston (10).
- F** Install piston (10) on piston rod (6). Tighten piston (10) to 75 lb-ft (102 N-m).
- G** Secure piston (10) to piston rod (6) with setscrew (11). Tighten setscrew (11) to 36 lb-in. (4 N-m) and stake in place.



- H** Install piston rod (6) on cylinder (12).
- I** Using spanner wrench, install head (2) on cylinder (12).
- J** Using spanner wrench, tighten head (2) until head (2) just touches cylinder (12).
- K** Draw line on cylinder head (2).
- L** Measure approximately .38 in. (.97 cm) from line in clockwise direction and mark line on cylinder (12).
- M** Tighten head (2) until lines on head (2) and cylinder (12) meet.
- N** Secure head (2) on cylinder (12) with setscrew (13). Tighten setscrew (13) against head (2) and stake in place.

**FOLLOW-ON TASK:**  
Install bump stop cylinder (TM 5-2350-262-20-2).



## Section IX. GROUP A5, WINCH INSTALLATION

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### TASKS

### PAGE

Deleted Winch Shift Control Assembly Repair .....	4-325
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# WINCH SHIFT CONTROL ASSEMBLY REPAIR

---

This task covers:

- |                |             |
|----------------|-------------|
| a. Disassembly | d. Repair   |
| b. Cleaning    | e. Assembly |
| c. Inspection  |             |
- 

**INITIAL SETUP**

Tools:

5180-00-177-7033 Tool Kit, General  
Mechanic's: Automotive

Materials:

Thread Locking Compound	Item 19 Appendix C
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Antiseize Compound	Item 20 Appendix C
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Parts Reference:

TM 5-2350-262-24P Group A5

Personnel Required:

Construction Equipment Repairer 62B10

Reference:

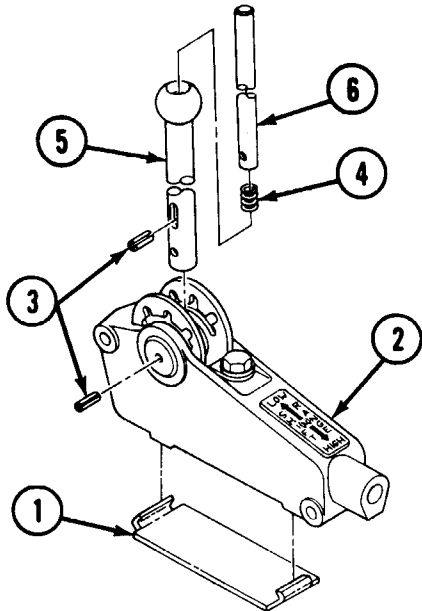
TM 5-2350-262-20-2

Equipment Condition:

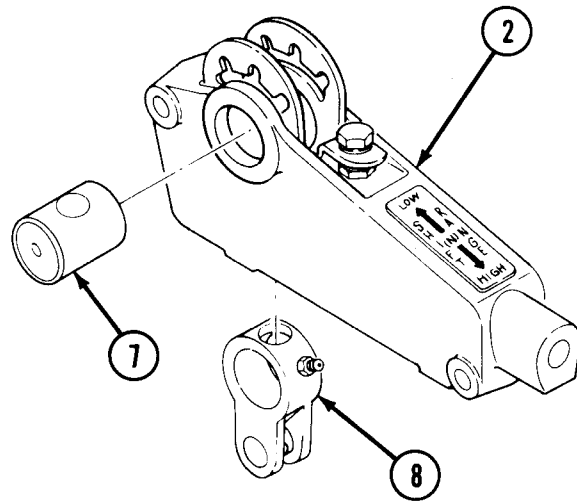
<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Winch Shift Control Assembly Removed



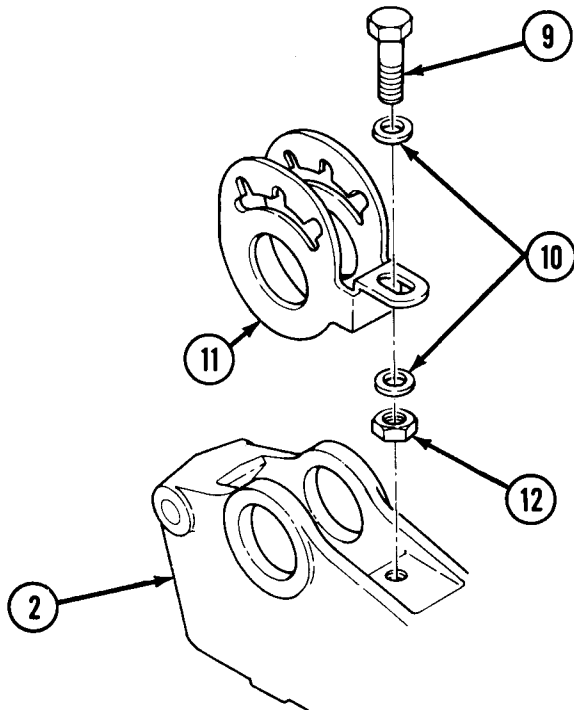
**DISASSEMBLY**



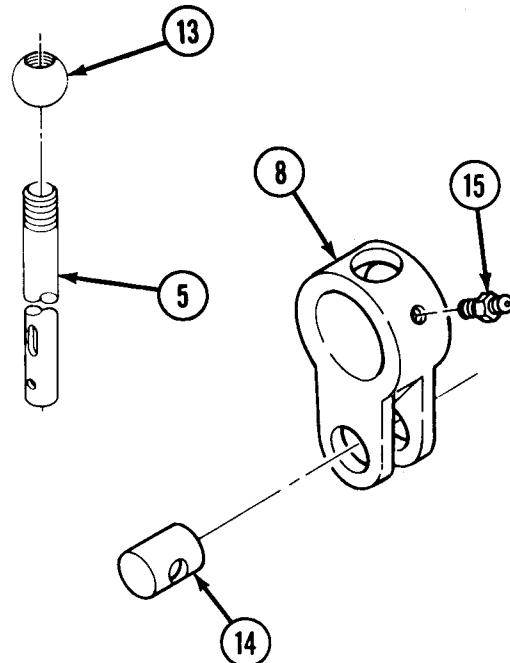
- A** Remove plate (1) from shift control housing (2).
- B** Remove two pins (3), spring (4), handle (5), and rod (6) from housing (2).



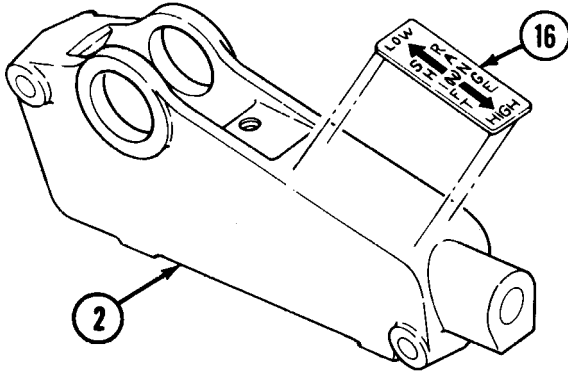
- C** Remove pin (7) and lever (8) from housing (2).



- D** Remove screw (9), two washers (10), clip (11), and nut (12) from housing (2).



- E** Remove ball (13) from handle (5).
- F** Remove pin (14) and grease fitting (15) from lever (8).



**Note**

Perform step G only if housing is being replaced.

**G** Remove data plate (16) from housing (2).

**CLEANING**

Use general cleaning methods to clean winch shift control assembly (p 2-9).

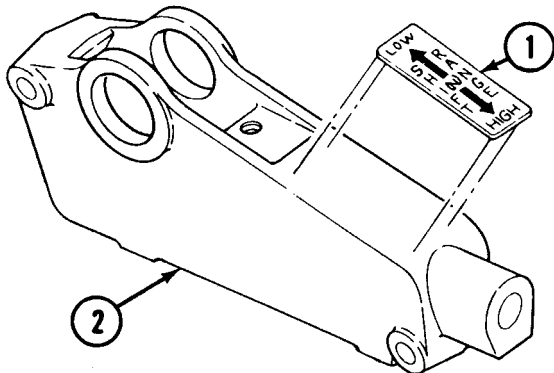
**INSPECTION**

- A** Inspect all parts for cracks, breaks, corrosion, or wear.
- B** Inspect for damaged threads.

**REPAIR**

Use general repair methods to repair winch shift control assembly (p 2-8).

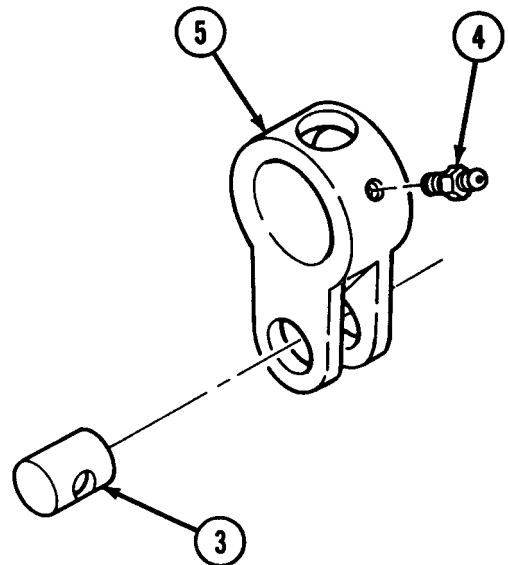
**ASSEMBLY**



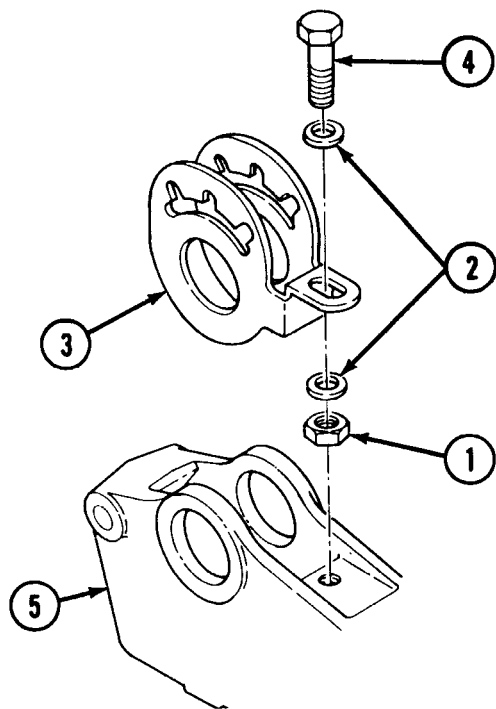
**Note**

Perform step A if data plate was removed.

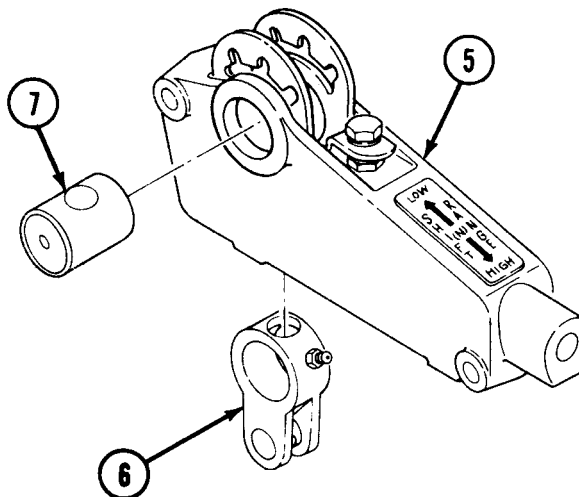
**A** Install data plate (1) on shift control housing (2).



**B** Install pin (3) and grease fitting (4) on lever (5).



**C** Install nut (1), two washers (2), clip (3), and screw (4) on housing (5).



**D** Install lever (6) and pin (7) on housing (5).

**Note**

Coat threads of ball with thread locking compound at installation.

**E** Install ball (8) on handle (9), and secure handle (9) on housing (5) with pin (10).

**Note**

Coat rod with antiseize compound prior to installation.

**F** Install spring (11) and rod (12) on handle (9).

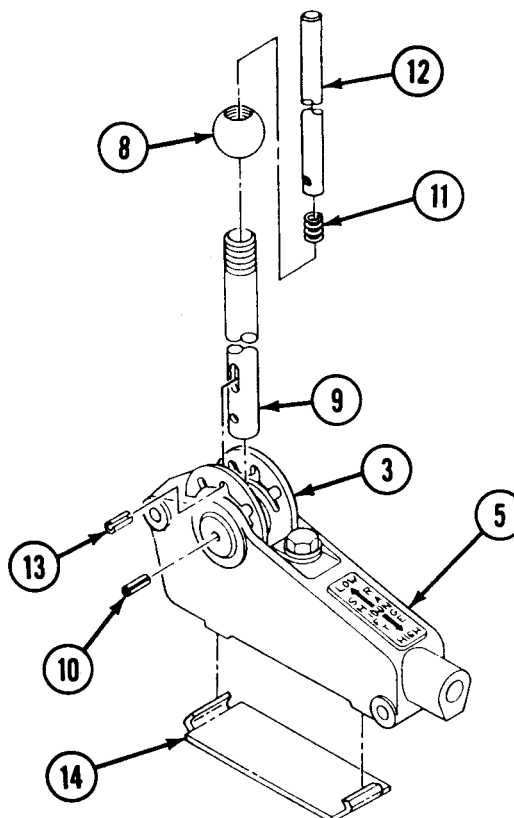
**G** Push rod (12) into handle (9) until holes in rod (12) and handle (9) align.

**H** Install pin (13) on clip (3), handle (9), and rod (12).

**I** Install plate (14) on housing (5).

**FOLLOW-ON TASK:**

Install winch shift control assembly (TM 5-2350-262-20-2).



# APPENDIX A REFERENCES

## A-1. SCOPE

This appendix lists Army regulations, forms, field manuals, technical manuals, and other publications referenced in this manual which apply to Direct Support and General Support maintenance of the M9 ACE.

## A-2. ARMY REGULATIONS

Report of Transportation Discrepancies in Shipments . . . . .	AR 55-38
Dictionary of United States Army Terms . . . . .	AR 310-5
Authorized Abbreviations and Brevity Codes . . . . .	AR 310-50
DA Supplement to DOD 5200.1-R "Information Security Program Regulation". . . . .	AR 380-5
Accident Reporting and Records . . . . .	AR 385-40
Fire Prevention and Protection . . . . .	AR 420-90
Packing of Army Materiel Equipment for Shipping and Storage . . . . .	AR 746-1

## A-3. DEPARTMENT OF THE ARMY PAMPHLETS

Consolidated Index of Army Publications and Forms . . . . .	DA Pam 25-30
The Army Maintenance Management System (TAMMS). . . . .	DA Pam 738-750

## A-4. FORMS

Quality Deficiency Report . . . . .	SF Form 368
Recommended Changes to Equipment Technical Manuals. . . . .	DA Form 2028-2

## A-5. FIELD MANUALS

NBC Protection . . . . .	FM 3-4
NBC Decontamination. . . . .	FM 3-5
Camouflage, Basic Principles and Field. . . . .	FM 5-20
Operation and Maintenance of Army Materiel in Extreme Cold Weather (0° to -65°F) . . . . .	FM 9-207
General Fabric Repair. . . . .	FM 10-16
Metal Body Repairs and Related Operations . . . . .	FM 43-2

## A-6. LUBRICATION ORDER

Lubrication Order for Armored Combat Earthmover (ACE), M9 . . . . .	TM 5-2350-262-10
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## A-7. TECHNICAL BULLETINS

Solder and Soldering. . . . .	TB SIG-222
Calibration Procedure for Multimeters (General) . . . . .	TB 9-6625-2147-35
Calibration and Repair Requirement for the Maintenance of Army Materiel. . . . .	TB 43-180
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems. . . . .	TB 750-651

**A-8. TECHNICAL MANUALS**

Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Decontaminating Apparatus, Portable, DS2, 1-1/2 quart, ABC M11 .....	TM 3-4230-204-12&P
Direct Support Maintenance Manual (Including Repair Parts and Special Tools Lists): Purifier, Air: M2A1 (NSN 4240-00-307-7805), Purifier Air: M2A2 (NSN 4240-00-868-7806) and Precleaner and Particulate Filter Assembly: M1A1-19 (NSN 4240-01-026-3112) .....	TM 3-4240-276-30&P
Operator's Manual: Mask, Chemical-Biological, Aircraft, ABC-M24 and Accessories; Mask, Chemical-Biological, Tank, M25 and Accessories; Mask, Chemical-Biological, Tank M25A1 and Accessories .....	TM 3-4240-280-10
List of Applicable Publications (LOAP) 12 and 20 CFM Gas- Particulate Filter Units .....	TM 3-4240-282-L
Operator's Manual: Training Set, Chemical Agent identification: Simulants, M72A2 .....	TM 3-6910-227-10
Operator's Manual for M9, Armored Combat Earthmover .....	TM 5-2350-262-10
Unit Maintenance Manual for M9, Armored Combat Earthmover.....	TM 5-2350-262-20
Unit, Direct Support and General Support Maintenance Repair Parts and Special Tools List for M9, Armored Combat Earthmover .....	TM 5-2350-262-24P
Engine, Diesel, Fuel Injected, Liquid Cooled "V" Type, 8-Cylinder .....	TM 5-2815-240-34&P
Operator's and Organizational and Direct Support Maintenance Manual including Repair Parts and Special Tools List for Recharger, Fire Extinguisher, Monobromotrifluoromethane, Skid Mounted, Electric Motor Driven Model RHA-101-M, Part No. 350501-001, S/N 3505-1 to 3505-368 (4210-01-176-3511).....	TM 5-4210-218-13&P
Inspection, Care, and Maintenance of Antifriction Bearings .....	TM 9-214
Operator's Manual: Welding Theory and Application .....	TM 9-237
Use and Care of Hand Tools and Measuring Tools .....	TM 9-243
Organizational, Direct Support, and General Support Maintenance Manual Standards for Inspection and Classification of Tracks, Track Components, and Solid Rubber Tires.....	TM 9-2530-200-24
Deleted	
Operator and Organizational Maintenance Manual, including Repair Parts and Special Tools List, Simplified Test Equipment for Internal Combustion Engines (STE/ICE-R) (4910-00-124-2554) .....	TM 9-4910-571-12&P
Operator's, Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries: 4HN, 24V, MS775047-1; 2HN, 12 V; 6 TN, 12V .....	TM 9-6140-200-14
Operator's and Organizational Maintenance Manual: Radio Sets AN/VRC 53, AN/VRC 64, AN/VRC 125, and AN/VRC 160 .....	TM 11-5820-498-12
Operator's Manual for SINCARS Radio AN/VRC-87 .....	TM 11-5820-890-10-3
Hand Receipt Manual Covering End Item/Components of End Item (COEI), Basic Issue Items (BII), and additional Authorization List (AAL) for SINCARS Radio AN/VRC-87 .....	TM 11-5820-890-10-HR
Army Equipment Data Sheets, Chemical Defense Equipment .....	TM 43-0001-26-1
Destruction of Equipment to Prevent Enemy Use .....	TM 43-0002-24
Painting Instructions for Field Use (FSC 2530) .....	TM 43-0139
Transportability Guidance, Armored Combat Earthmover, M9.....	TM 55-2350-262-14
Administrative Storage.....	TM 740-90-1
Procedures for Destruction of Tank-automotive Equipment to Prevent Enemy Use .....	TM 750-244-6
Cooling Systems: Tactical Vehicles.....	TM 750-254

**A-9. SPECIFICATIONS**

Non-Slip Deck Covering Compound .....	DOD-C-24667
Colors .....	FED-ST-595
Antiseize Compound, High Temperature .....	MIL-A-907
Aluminum Alloy Armor Plate, Weldable .....	MIL-A-46027
Adhesive-Sealant, Silicone, RTV, General Purpose .....	MIL-A-46106
Cleaning Compound With Conditioner and Inhibitor for Engine Cooling Systems .....	MIL-C-10597
Cables, Special Purpose, Low-Tension, Heavy-Duty, Single- Conductor, and Multiconductor .....	MIL-C-13486
Extinguisher, Fire, Carbon Dioxide, Portable, Permanent Shutoff, Hand and Wheeled Types .....	MIL-E-468
Hydraulic Fluid, Petroleum Base for Preservation and Testing .....	MIL-H-6083
Insulation Tape, Electrical, Pressure Sensitive Adhesive and Pressure Sensitive Thermosetting .....	MIL-I-15126
Oil Lubricating, Internal Combustion Engine .....	MIL-L-2104
Primer Coating, Zinc Chromate, Low-Moisture-Sensitivity .....	MIL-P-8585
General Specifications for Soldering Process .....	MIL-S-6872
Sealing Compound, Polysulfide Rubber, Electrical Connectors and Electric Systems, Chemically Cured .....	MIL-S-8516
Sealing, Locking, and Retaining Compounds .....	MIL-S-22473
Sealing Compound, Electrical, Silicone Rubber, Accelerator Required .....	MIL-S-23586
Sealing Compound, Gasket, Hydrocarbon Fluid and Water Resistant .....	MIL-S-45180
Identification Marking of U.S. Military Property .....	MIL-STD-130
Painting Procedures, Tactical Vehicles (Tracked and Wheeled) .....	MIL-STD-193
Welding, Gas Metal-Arc and Gas Tungsten-Arc, Aluminum Alloys, Readily Weldable for Structures, Excluding Armor .....	MIL-STD-372
Standard General Requirement for Electronic Equipment .....	MIL-STD-454
Welding, Aluminum Alloy Armor .....	MIL-STD-1946A
Twine: Impregnated, Lacing and Tying .....	MIL-T-713
Terminal Lug; Splice Conductor (Electrical, Solderless for Automotive Use) .....	MIL-T-13513
Metal to Metal Structural Bonding Adhesive, Epoxy Resin .....	MMM-A-134
General Purpose Adhesive, Rubber Base .....	MMM-A-1617
Solder: Tin Alloy, Lead-Tin Alloy, and Lead Alloy .....	QQ-S-571
Enamel, Alkyd, Gloss .....	TT-E-489
Enamel, Alkyd, Semigloss .....	TT-E-529
Primer-Surfacer, Synthetic Tints and Whites .....	TT-P-659

**A-10. OTHER SPECIFICATIONS**

Army Medical Department Expendable/Durable Items .....	CTA 8-100
Expendable/Durable Items (Except medical, Class V, Repair Parts, and Heraldic Items) .....	CTA 50-970
Vehicular Radio Sets and Authorized Installations .....	SB-11-131-2
CBR Decontamination, Unit Level, MCB Proficiency .....	TF 3-4899



# APPENDIX B

## SPECIAL TOOLS AND EQUIPMENT

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### **B-1. GENERAL**

Repair parts, special tools, and support equipment are issued for maintaining the vehicle. Tools and equipment should not be used for purposes other than those prescribed. When not in use, they should be properly stowed.

### **B-2. COMMON TOOLS AND EQUIPMENT**

Standard and commonly used tools and equipment that have general application to this material are authorized for issue by tables of allowances and modified tables of organization and equipment. Refer to the tables applicable to your unit for common tools and equipment.

### **B-3. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT**

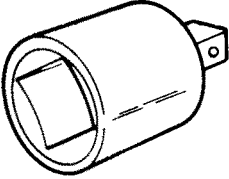
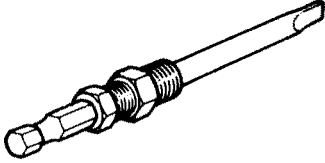
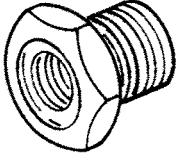
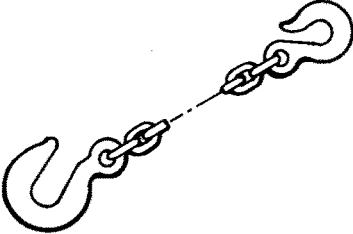
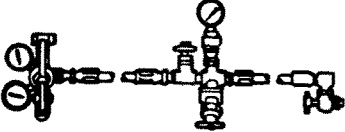
Special tools and equipment necessary to perform the maintenance described in this manual are listed for your information. Special tools and support equipment are also listed in (TM 5-2350-262-24P), which is the authority for requisitioning replacements.

### **B-4. REPAIR PARTS**

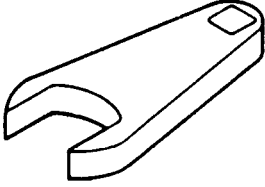
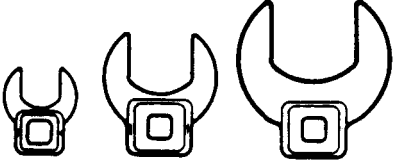
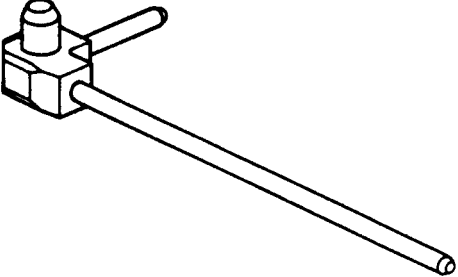
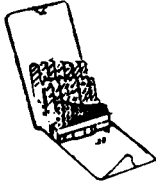

Repair parts are issued for the replacement of parts that have become worn, broken, or are otherwise unserviceable. Repair parts are listed in (TM 5-2350-262-24P), which is the authority for requisitioning replacements.



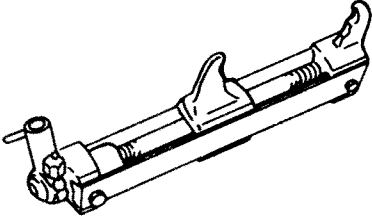
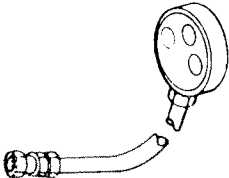


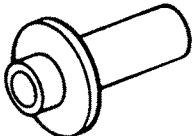
## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 <p>ADAPTER, SOCKET WRENCH</p>	<p>5120-00-240-8702 (GAX-1)</p>	<p>For use with crowfoot wrenches</p>
 <p>ADJUSTING TOOL (FUEL PUMP)</p>	<p>4910-00-150-5805 (3375981)</p>	<p>To adjust engine idle speed</p>
 <p>BUSHING, PIPE</p>	<p>4730-00-873-0110 (C3109X6X2)</p>	<p>To adapt gauge, 4940-00-595-5720, to charging device, 4933-01-046-7109</p>
 <p>CHAIN ASSEMBLY</p>	<p>4010-01-185-0406 (13211E9331)</p>	<p>For ejector blade operations and folding/unfolding dozer/ripper blade</p>
 <p>CHARGING KIT, PRESSURE</p>	<p>4933-01-046-7109 (12252157)</p>	<p>For charging accumulators</p>

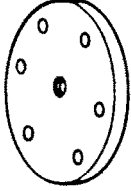
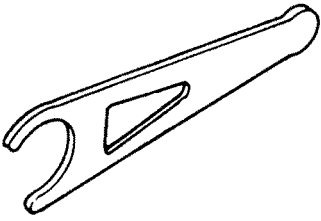
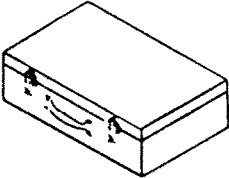



## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 <p style="text-align: center;">(WRENCH) CROWFOOT ATTACHEMENT</p>	5120-01-228-3162 (12355452)	To remove and install actuators
 <p style="text-align: center;">CROWFOOT WRENCH SET</p>	5120-01-302-4387 (5705566)	To disconnect and connect miscellaneous hydraulic lines
 <p style="text-align: center;">DRIFTPIN, TRACK</p>	2530-01-075-8292 (2590157)	To remove and install track shoes and track
 <p style="text-align: center;">DRILL SET, TWIST</p>	5133-01-247-4746 (DBC299)	To aid in removal of broken bolts and screws
 <p style="text-align: center;">EYEBOLT</p>	5036-00-017-6143 (MS51937-7)	To remove driver's hatch

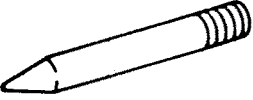

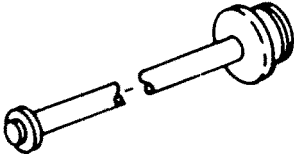
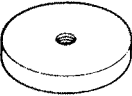
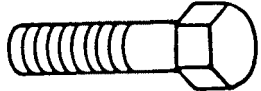
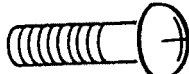
## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 FIXTURE, TRACK CONNECTING	5120-00-605-3926 (8741739)	To remove and install track shoes and track
 HYDRAULIC TESTER (GAUGE)	4940-00-595-5720 (GS-5)	For charging accumulators
 INSERTER, BEARING	5120-01-222-7938 (12355511-4)	To install roadwheel hub bearing cup
 INSERTER, BEARING	5120-01-227-7042 (12355441)	To install bearings in scavenger pump housings
<p style="text-align: center;"><b>Deleted</b></p>		
 INSERTER, SEAL	5120-01-222-7930 (12355515)	To install seal in scavenger pump

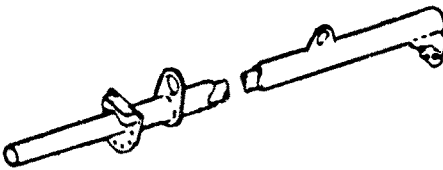
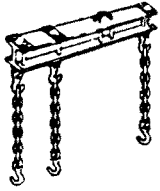
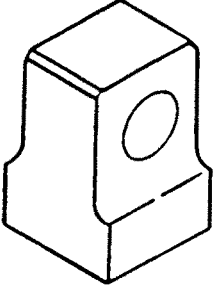
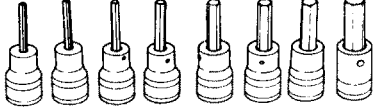

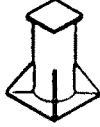
## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 INSERTER, SEAL	5120-01-227-7044 (12355437)	To install roadwheel hub seal
 JACK, ROADWHEEL	2590-01-224-9241 (12355582)	To remove roadwheels
 KIT, HYDRAULIC PARTS	2590-01-216-8646 (5705562)	For troubleshooting hydraulic system
 LOCKPLATE TOOL	5340-01-083-5667 (12379458)	To adjust steer unit output coupling
 PAD, REMOVER	5365-01-230-0200 (12355436)	To remove roadwheel arm
 PIN, STRAIGHT	5315-01-186-7991 (12332340)	To remove and install armor plates

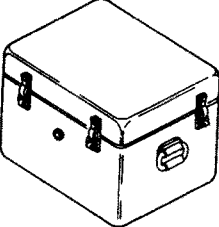
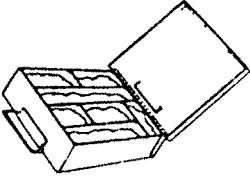
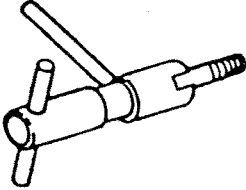
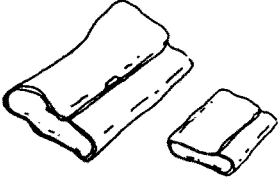

## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 PIN, STRAIGHT (GUIDE)	5315-01-229-9007 (12355348)	To align power pack mounting holes at installation
 PIN, STRAIGHT (GUIDE)	5315-01-229-9703 (12355519)	To align bolt mount holes in rotary actuators during installation
<p><b>Deleted</b></p>		
 PLUG, PROTECTIVE (HYDRAULIC TANK)	5340-01-222-7934 (12355501)	To plug hydraulic tank outlet to prevent drainage when hydraulic lines are disconnected
 REPLACER	5120-01-222-7939 (12355511-5)	To install roadwheel hub bearing cup
 SCREW, JACKING	5305-00-071-2074 (B1821BH050C275N)	To remove drive sprockets and actuators
 SCREW, JACKING	5305-00-995-3441 (MS35207-269)	To remove MCS compressor pulley

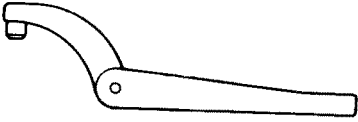
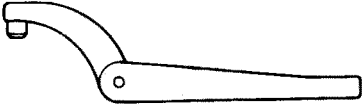
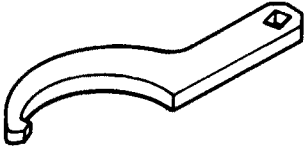
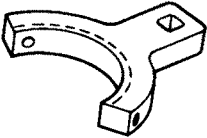

## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 SLING, ACTUATOR	5120-01-222-7931 (13214E1988)	To remove and install final drives and actuators
 SLING, POWER PACK	5120-01-222-7932 (12379498)	To remove and install power package
 SOCKET, SQUARE PLUG	5120-01-227-8480 (12355451)	To remove hull access plug
 SOCKET SET, SOCKET WRENCH	5120-01-195-0640 (208FA)	To torque screws on track wear plates
 SPACER, PLATE	5365-01-186-8009 (13211E8658)	Used to hold final drive components apart when disconnected
 STAND, VEHICLE SUPPORT	2590-01-228-5802 (12355345)	To support hull during maintenance

## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 STE/ICE-R	4910-01-222-6589 (2389409)	For electrical and engine trouble-shooting
 TOOL KIT, SCREW THREAD	5190-00-157-1105 (K4-621-621L)	To repair thread inserts
 WRENCH, CAM ADJUSTMENT	5120-01-222-7933 (12355536)	To adjust leveling cam in corner actuators
<p style="text-align: center;"><b>Deleted</b></p>		
 WRENCH SET, OPEN END	5120-01-301-5783 (5705565)	To disconnect and connect various oil lines
 WRENCH, SPANNER	5120-00-157-2133 (0474)	To disassemble and assemble track adjustment and apron cylinders

## APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT – CONTINUED

ITEM	NUMBER	USE
 <p style="text-align: center;">WRENCH, SPANNER</p>	<p style="text-align: center;">5120-00-880-4264 (11602326)</p>	<p style="text-align: center;">To disassemble and assemble ejector cylinder</p>
 <p style="text-align: center;">WRENCH, SPANNER</p>	<p style="text-align: center;">5120-01-224-3063 (APS357)</p>	<p style="text-align: center;">To disassemble and assemble bump stop cylinder</p>
 <p style="text-align: center;">WRENCH, SPANNER</p>	<p style="text-align: center;">5120-01-229-9134 (12355454)</p>	<p style="text-align: center;">To disconnect and connect final drive</p>
 <p style="text-align: center;">WRENCH, SPANNER</p>	<p style="text-align: center;">5120-01-229-9135 (12355559)</p>	<p style="text-align: center;">To remove and install wheel accumulator</p>
 <p style="text-align: center;">WRENCH, SPANNER</p>	<p style="text-align: center;">5120-01-086-1602 (12282495)</p>	<p style="text-align: center;">To remove and install roadwheel hubs</p>





# APPENDIX C

## EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

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### SECTION I. INTRODUCTION

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#### **C-1. SCOPE**

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the M9 vehicle. This listing is for informational purposes and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

#### **C-2. EXPLANATION OF COLUMNS**

- a. Column (1) Item Number. This number is assigned to the entry in the listing and is referenced in the initial setup to identify the material.
- b. Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (enter as applicable).
  - C – Operator/Crew
  - O – Unit Maintenance
  - F – Direct Support Maintenance
  - H – General Support Maintenance
- c. Column (3) National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.
- d. Column (4) Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.
- e. Column (5) Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by an alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

**Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	8040-01-036-3771	ADHESIVE: epoxy resin plastic MIL-A-8623 4 Ounce Kit	OZ
2	O	8040-01-375-0484	ADHESIVE: flexible 12370874 Kit	EA
3	O	8040-00-728-3088	ADHESIVE: silicone rubber (78500) 1199-T-3842 6 Ounce Kit	OZ
4	O	8040-00-152-0063 8040-00-152-0067	ADHESIVE: synthetic rubber (81348) MMM-A-1617 2.5 Ounce Can 6 Ounce Can	OZ OZ
5	F	8040-00-165-8614	ADHESIVE: synthetic rubber (97499) MMM-A-121 1 Quart Can	QT
6	C	6850-00-181-7929	ANTIFREEZE: ethylene glycol, glycol, and borax MIL-A-46153 1 Gallon Bottle	GAL.
7	O	5340-00-324-9158  5340-00-208-1989  5340-00-449-4491  5340-00-211-8188  5340-00-213-8881	CAPS AND PLUGS: cap, protective dust (96906) MS90376-8Y 0.413 ID, 0.438 OD  (96906) MS90376-8R 0.480 ID, 0.540 OD  (96906) MS90736-10Y 0.530 ID, 0.595 OD  (96906) MS90376-10R 0.605 ID, 0.665 OD  (96906) MS90376-12R 0.720 ID, 0.775 OD	EA  EA  EA  EA  EA

## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
7	O		CAPS AND PLUGS — Continued	
		5340-00-481-8934	(96906) MS90376-14Y 0.785 ID, 0.845 OD	EA
		5340-00-493-5835	(96906) MS90376-14R 0.850 ID, 0.905 OD	EA
		5340-00-496-5832	(96906) MS90376-16Y 0.893 ID, 0.963 OD	EA
		5340-00-200-5904	(96906) MS90376-16R 0.973 ID, 1.035 OD	EA
		5340-00-171-2436	(96906) MS90376-18Y 1.078 ID, 1.088 OD	EA
		5340-00-193-0783	(96906) MS90376-18R 1.093 ID, 1.155 OD	EA
		5340-00-051-0029	(96906) MS90376-20Y 1.150 ID, 1.215 OD	EA
		5340-00-213-8893	(96906) MS90376-20R 1.231 ID, 1.301 OD	EA
		5340-00-191-4898	(96906) MS90376-24Y 1.390 ID, 1.460 OD	EA
		5340-00-889-8677	(96906) MS90376-24R 1.463 ID, 1.533 OD	EA
		5340-00-804-1228	Plug, protective dust (81349) M5501/1-5 0.500-20-THD. 0.438 DIA.	EA
		5340-00-292-3292	(81349) M5501/1-6 0.5625-18 THD. 0.500 DIA.	EA
		5340-00-828-8802	(81349) M5501/1-8 0.750-16 THD. 0.675 DIA.	EA

## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
7	O	5340-00-804-1245	CAPS AND PLUGS — Continued (81349) M5501/1-16 1.3125-12 THD. 1.219 DIA.	EA
		5340-00-804-1238	(81349) M5501/2-4 0.4375-20 THD. 0.660 DIA.	EA
		5340-00-804-1243	(81349) M5501/2-6 0.5625-18 THD. 0.800 DIA.	EA
		5340-00-804-1241	(81349) M5501/2-8 0.750-16 THD. 1.00 DIA.	EA
		5340-01-138-2169	(81349) M5501/2-12 1.0625-12 THD. 1.28 DIA.	EA
		5340-00-804-1222	(81349) M5501/2-16 1.3125-12 THD. 1.53 DIA.	EA
		5340-01-120-9526	(81349) M5501/2-24 1.875-12 THD. 2.23 DIA.	EA
8	F	6850-00-598-7328	COMPOUND: cleaning, cooling system MIL-C-10597	EA
9	H	8030-00-067-6744	COMPOUND: sealing, grade A 08841 250 cc Bottle	CC
10	H	8030-00-088-7818	COMPOUND: sealing (81349) MIL-S-7916 8 Ounce Can	OZ
11	O	8030-00-058-5398	COMPOUND: sealing, grade B (81349) MIL-S-22473 2 cc Tube	CC

## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
12	O	8030-00-823-7917 8030-00-964-7537 8030-00-081-2330	COMPOUND: sealing, grade C or CV (81349) MIL-S-22473 50 cc Bottle 250 cc Bottle Grade C—Blue 50 cc Bottle, Grade CV	CC CC CC
13	O	8030-00-082-2508	COMPOUND: sealing, primer, grade T (81349) MIL-S-22473 4 Ounce Bottle	OZ
14	O	8030-00-148-9833	COMPOUND: Sealing, type I, grade K, course thread-locker MIL-S-46163 10 cc Bottle	CC
15	O	8030-00-275-8111	COMPOUND: sealing, type I, non-curing (81349) MIL-S-12158 1 Gallon Can	GAL.
16	O	8030-00-252-3391	COMPOUND: sealing, paste (81349) MIL-S-45180 11 Ounce Tube	OZ
17	O	8030-01-054-0740	COMPOUND: sealing, with teflon (05972) 59231 50 cc Tube	CC
18	O	6850-00-177-5094	COMPOUND: silicone MIL-S-8660 2 Ounce Tube	OZ
19	O	8030-01-063-7510	COMPOUND: thread locking, type 1, grade L MIL-S-46163 50 cc Bottle	CC

**Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Continued**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
20	F	8030-00-753-4953	COMPOUND: antiseize, MICA and oil base (81349) MIL-A-13881 1 Pound Can	LB
21	C	9150-00-065-0029 9150-00-935-1017 9150-00-190-0904 9150-00-190-0905 9150-00-190-0907	GREASE: automotive and artillery, GAA MIL-G-10924 2-1/4 Ounce Tube 14 Ounce Cartridge 1-3/4 Pound Can 6-1/2 Pound Can 35 Pound Can	OZ OZ LB LB LB
22	O	9150-00-935-4018 9150-00-965-2003	GREASE: Molybdenum Disulfide MIL-G-21164 14 Ounce Tube 35 Pound Can	OZ LB
23	F	9150-00-273-8633	GREASE: aircraft MIL-G-4343C 8 Ounce Tube	OZ
24	O	5640-01-282-5760	INSULATION: type 2FMSSZ0, 3/4 in. thick MIL-P-15280 Sheet	EA
25	F	6810-00-281-2762	METHYL-ETHYL-KETONE (81348) TT-M-261 5 Gallon Can	GAL.
26	O	6830-00-840-6578	NITROGEN: technical BB-N-411 340 CU FT cylinder	CU FT
27	C	9140-00-286-5286 9140-00-286-5287 9140-00-286-5288 9140-00-286-5289	OIL: fuel, DF-1, winter VV-F-800 Bulk 5 Gallon Can 55 Gallon Drum, 16 Gauge 55 Gallon Drum, 18 Gauge	GAL. GAL. GAL. GAL.

## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
28	C	9140-00-286-5294 9140-00-286-5295 9140-00-286-5296 9140-00-286-5297	OIL: fuel, DF-2, regular VV-F-800 Bulk 5 Gallon Can 55 Gallon Drum, 16 Gauge 55 Gallon Drum, 18 Gauge	GAL. GAL. GAL. GAL.
29	O	9150-00-257-5440 9150-00-257-5443	OIL: lubricating, gear, subzero, GEA MIL-L-10324 5 Gallon Drum 55 Gallon Drum	GAL. GAL.
30	O	9150-00-001-9395	OIL: lubricating, gear, 80W-90 MIL-L-2105 5 Gallon Can	GAL.
31	C	9150-00-189-6727 9150-00-186-6668 9150-00-191-2772	OIL: lubricating, engine, OE/HDO-10 MIL-L-2104 1 Quart Can 5 Gallon Drum 55 Gallon Drum	QT GAL. GAL.
32	C	9150-00-186-6681 9150-00-188-9858 9150-00-189-6729	OIL: lubricating, engine, OE/HDO-30 MIL-L-2104 1 Quart Can 5 Gallon Drum 55 Gallon Drum	QT GAL. GAL.
33	C	9150-00-188-9864 9150-00-188-9865 9150-00-188-9867	OIL: lubricating, engine, OE/HDO-50 MIL-L-2104 1 Quart Can 5 Gallon Drum 55 Gallon Drum	QT GAL. GAL.
34	O	9150-00-402-4478 9150-00-402-2372 9150-00-491-7197	OIL: lubricating, engine, OEA MIL-L-46167 1 Quart Can 5 Gallon Drum 55 Gallon Drum	QT GAL. GAL.



**Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Continued**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
35	F		OIL: refrigerant, icematic SW-100	QT
36	O	8010-00-145-0312	PRIMER COATING TT-P-1757 1 Pint Can	PT
37	F		REFRIGERANT: R134A (tetrafluoroethane) RS-134A; SUVA COLD MP HFC-134A	
38	F	5305-00-068-0509	SCREW: spanner wrench attachment B1821BH025C125N	EA
39	O	6850-00-331-3349 6850-00-331-3350	SOLVENT: drycleaning, SD-3 P-D-680 5 Gallon Can 55 Gallon Drum	QT GAL.
40	O	5970-00-644-2636	TAPE: insulation, electrical HH-1-595 1 Roll	EA
41	O	9505-00-293-4208	WIRE: non-electrical MS20995C-32 1 Roll	EA
42	F	9505-00-555-8648	WIRE: non-electrical MS20995C-47 1 Spool	EA
43	O	8030-00-889-3535	TAPE: antiseizing, white, MIL-T-27730, 260 in. long x 1/2 in. wide x 0.0035 in. thick, spool in snap-on shell (81755) P5025-2R 1 Roll	EA

# APPENDIX D

## SCHEMATIC DIAGRAMS

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**SCOPE**

This appendix contains the following schematics for the M9 ACE:

Deleted  
Alternator Wiring Diagram ..... FP-3  
Deleted

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## APPENDIX E

# ILLUSTRATED LIST OF MANUFACTURED/FABRICATED ITEMS

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### SCOPE

This appendix includes instructions for making items authorized to be manufactured or fabricated at direct support maintenance. These items are source coded MF and MO on the Repair Parts and Special Tools List (RPSTL) (TM 5-2350-262-24P). Electrical wiring and associated parts are not included because of the variable requirements of each repair. Refer to General Use Standardized Parts-Bulk Materials List, (TM 5-2350-262-24P).

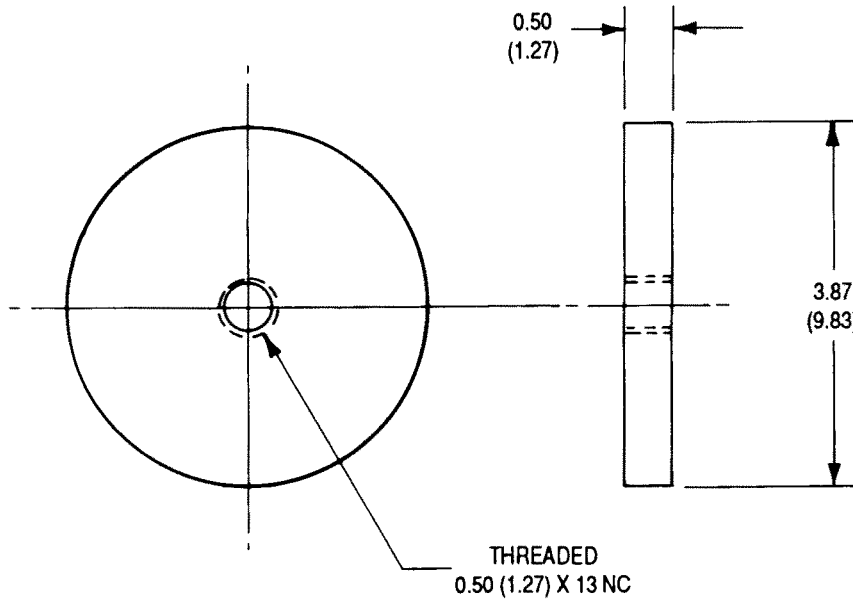
A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Part Number	Item Description	Figure Number
	Driver, Bearing	E-1
	Socket	E-2
	Socket	E-3
M13486/1-1 through 1 BAR	Cable, Electrical	E-4
MS20995E	Wire	E-5
M22759/18-10 through 26	Wire, Electric	E-6
12295791-1 through 12, 21 through 20	Insulation Sleeving, Electrical	E-7
12331918-1 and 2	Tape, Hook	E-8
12331923-1 through 32	Tape, Hook	E-9
12331924-1 through 12	Tape, Pile	E-10
Deleted		
12352558-1 and 2	Hose, Exhaust	E-12
8724762 through 8724769	Rod	E-13

**Figure E-1**

**BEARING DRIVER:** To install transfer case output cap roller bearing.

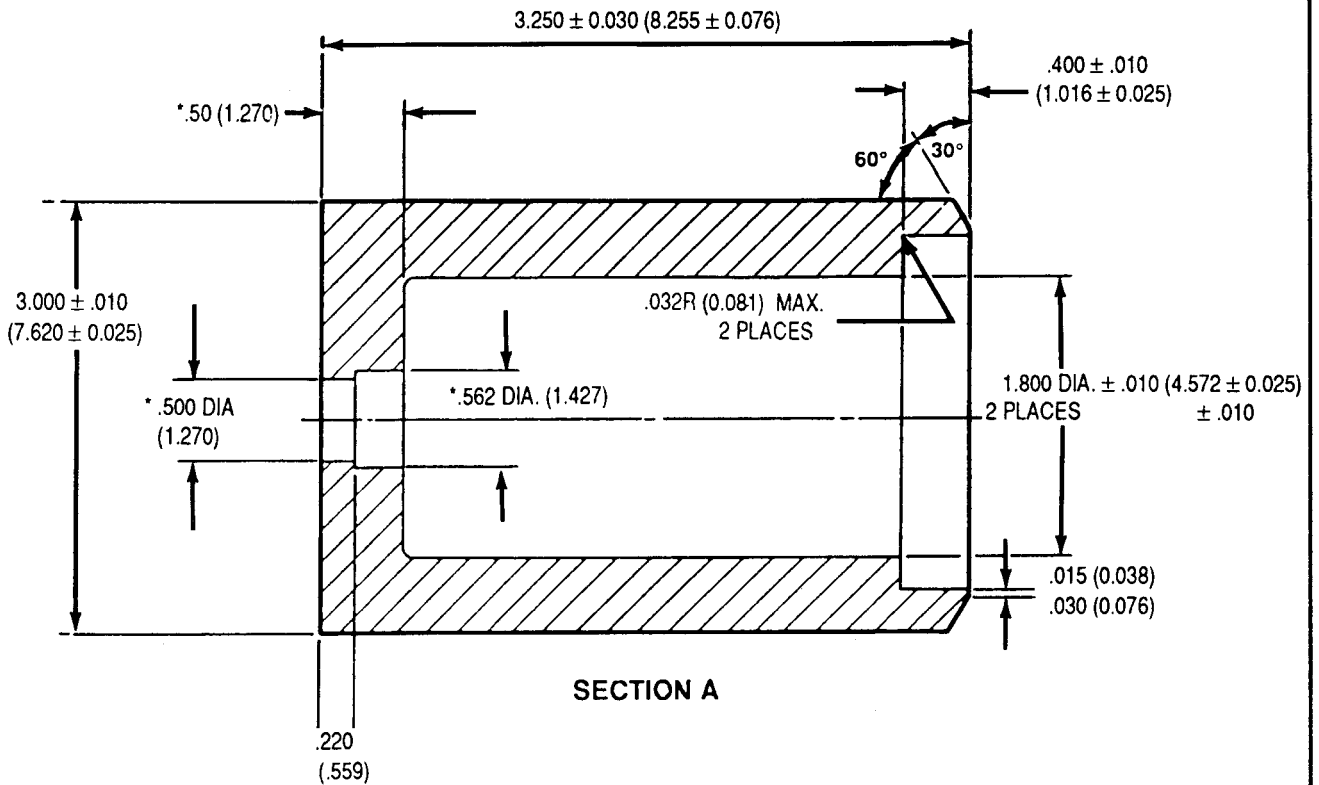


**MAKE FROM:**  
1015/1025 Steel

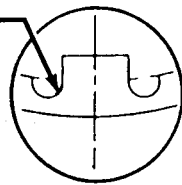
**DRIVER, BEARING**

**Figure E-2**

**SOCKET:** To remove and install fan assembly impeller locking nut.



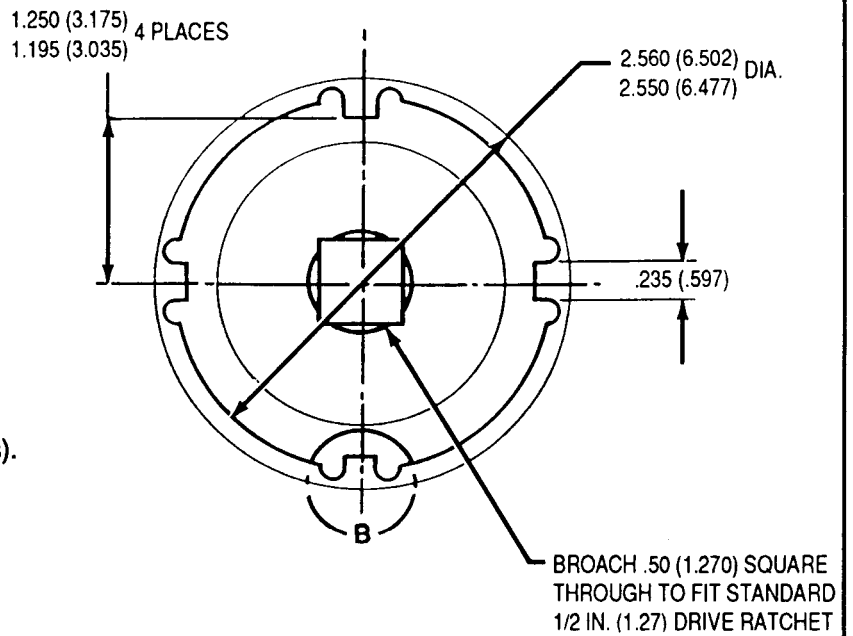
UNDERCUT .05R (.127) MAX.  
FOR SHARP CORNER RELIEF.  
TYPICAL VIEW OF 6 SIDES



**VIEW B**

**Note**

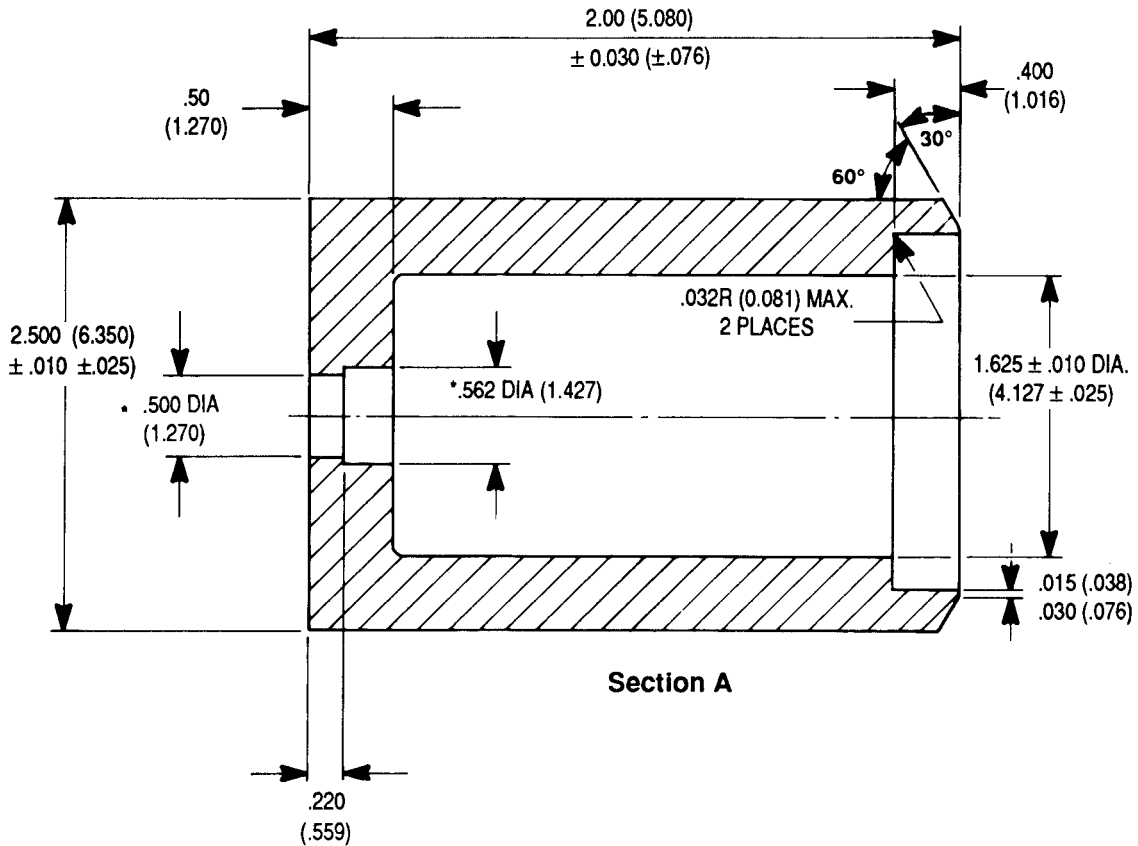
- Dimensions are before broach.
- Dimensions are in inches (centimeters).
- Remove burrs and sharp edges.
- Use A1 and A2 tool steel.
- Heat treat Rc 50-55.
- Paint or phosphate coat optional.
- Tolerance is ± .03 in. (.076 cm), ± .010 in. (0.025 cm), ± 2°.



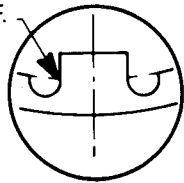
**SOCKET**

**Figure E-3**

**SOCKET:** To remove and install fan assembly bearing locking nut.



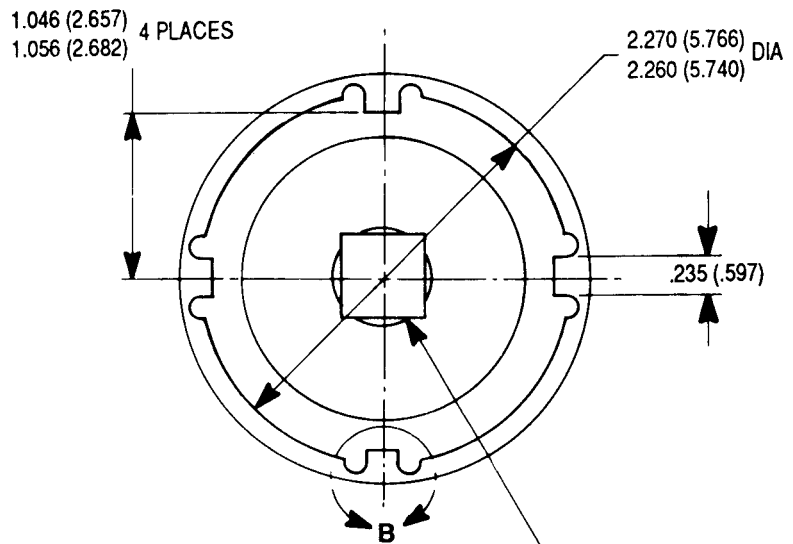
UNDERCUT .05R (.127) MAX.  
FOR SHARP CORNER RELIEF.  
TYPICAL VIEW OF 6 SIDES



**VIEW B**

**Note**

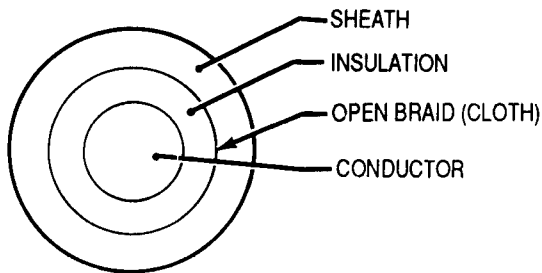
- Dimensions are before broach.
- Dimensions are in inches (centimeters).
- Remove burrs and sharp edges.
- Use A1 and A2 tool steel.
- Heat treat Rc 50-55.
- Paint or phosphate coat optional.
- Tolerance is ± .03 in. (.076 cm), ± .010 in. (0.025 cm), ± 2°.



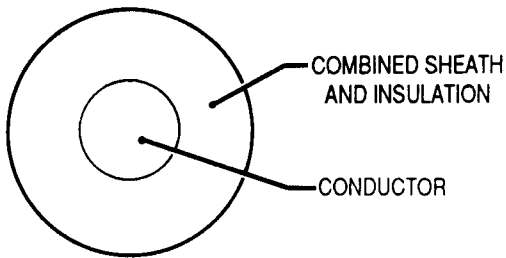
BROACH .50 (1.270) SQUARE  
THROUGH TO FIT STANDARD  
1/2 IN. (1.27) DRIVE RATCHET

**SOCKET**

**Figure E-4**



(FIGURE 1)



(FIGURE 2)  
 OPTIONAL CONSTRUCTION

**MAKE FROM:**

M13486/1 Insulation and Sheath Materials (optional construction): Chloro-Sulfinated Polyethylene.

Optional construction applicable to M13486/1-1 through 1-8.

Part Number	Conductor Size	Length
M13486/1-1AR	20	As Required
M13486/1-2AR	18	As Required
M13486/1-3AR	16	As Required
M13486/1-4AR	16	As Required
M13486/1-5AR	14	As Required
M13486/1-6AR	14	As Required
M13486/1-7AR	12	As Required
M13486/1-8AR	10	As Required

**M13486/1**

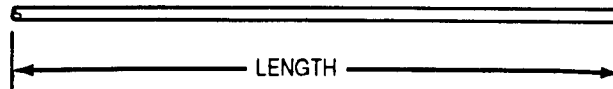
**CABLE, ELECTRICAL**

**Figure E-5**

**MAKE FROM:**

MS20995E Safety or Lock

Length: As Required



**MS20995E**

**WIRE**



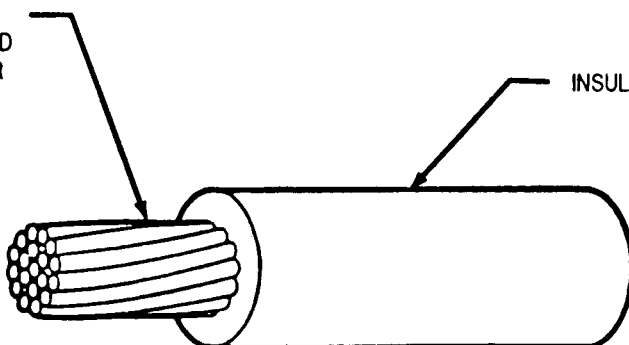
**Figure E-6**

**MAKE FROM:**

Fed Spec MIL-W-22759/18A

Wire, Electric, Fluoropolymer-Insulated,  
Extruded, Etf, Light-Weight, Tin-Coated  
Copper Conductor, 600-Volt, 150°C

"SMALL DIAMETER"  
TIN-COATED STRANDED  
COPPER CONDUCTOR



INSULATION - ETFE (EXTRUDED)

Part Number	Wire Size	Length	Diameter
M22759/18-26	26	AR	.032 ± .002 in. (.081 ± .005 cm)
M22759/18-24	24	AR	.036 ± .002 in. (.091 ± .005 cm)
M22759/18-22	22	AR	.043 ± .002 in. (.109 ± .005 cm)
M33759/18-20	20	AR	.051 ± .002 in. (.130 ± .005 cm)
M22759/18-18	18	AR	.061 ± .002 in. (.155 ± .005 cm)
M22759/18-16	16	AR	.070 ± .002 in. (.178 ± .005 cm)
M22759/18-14	14	AR	.085 ± .002 in. (.216 ± .005 cm)
M22759/18-12	12	AR	.107 ± .003 in. (.272 ± .008 cm)
M22759/18-10	10	AR	.134 ± .003 in. (.340 ± .008 cm)

**M22759/18**

**WIRE, ELECTRIC**

**Figure E-7**

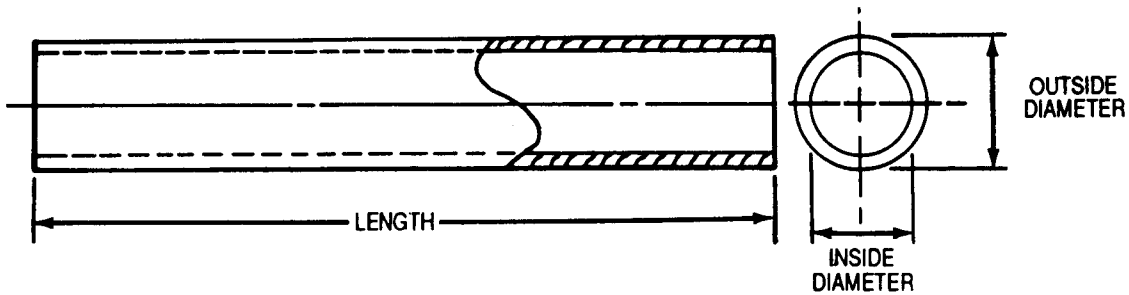
**MAKE FROM:**

Rubber, Heat Shrinkable, Black

Minimum Length:

48 in. (122 cm)

Length: As Required



Part Number	Length	Inside Diameter
12295791-21	AR	.250 in. (.635 cm)
12295791-22	AR	.375 in. (.953 cm)
12295791-23	AR	.500 in. (1.27 cm)
12295791-24	AR	.625 in. (1.59 cm)
12295791-25	AR	.750 in. (1.91 cm)
12395791-26	AR	.875 in. (2.22 cm)
12295791-27	AR	1.000 in. (2.540 cm)
12295791-28	AR	1.250 in. (3.175 cm)
12295791-29	AR	1.500 in. (3.810 cm)
12295791-30	AR	.188 in. (.478 cm)

Part Number	Length	Inside Diameter
12295791-1	AR	.047 in. (.119 cm)
12295791-2	AR	.062 in. (.157 cm)
12295791-3	AR	.094 in. (.239 cm)
12295791-4	AR	.125 in. (.318 cm)
12295791-5	AR	.188 in. (.478 cm)
12295791-6	AR	.250 in. (.635 cm)
12295791-7	AR	.375 in. (.953 cm)
12295791-8	AR	.500 in. (1.27 cm)
12295791-9	AR	.750 in. (1.91 cm)
12295791-10	AR	1.000 in. (2.540 cm)
12295791-11	AR	1.250 in. (3.175 cm)
12295791-12	AR	1.500 in. (3.810 cm)

**MIL-R-46846A**

**RUBBER, SYNTHETIC,  
HEAT-SHRINKABLE  
(HEAT RESISTANT)  
CLASS III LENGTH**

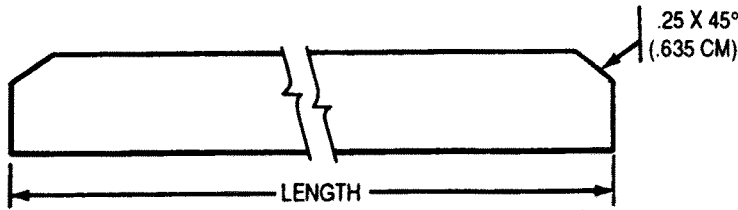
**MIL-I-23053/5B**

**ELECTRICAL,  
HEAT-SHRINKABLE  
POLYOLEFIN, FLEXIBLE,  
CROSSLINKED  
(HEAT RESISTANT) CLASS III**

**12295791**

**INSULATION SLEEVING, ELECTRICAL**

**Figure E-8**



**MAKE FROM:**

Fastener Tape, Hook Synthetic,  
Type II, Class 1

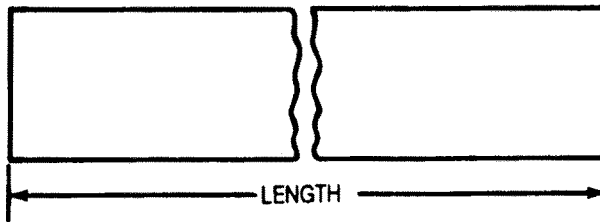
Color Green OG 106 Fed Spec,  
MIL-F-21840

Part Number	Length
12331918-1	35 in. (88.9 cm)
12331918-2	34 in. (86.4 cm)

**12331918**

**TAPE, HOOK**

**Figure E-9**



**MAKE FROM:**

Fastener Tape, Hook Synthetic,  
Type II, Class 1

Fed Spec, MIL-F-21840

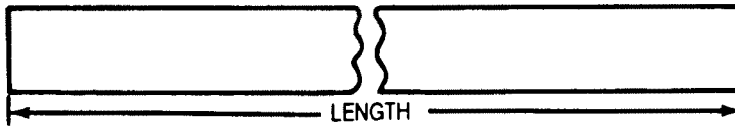
Part Number	Length
12331923-1	2.00 in. (5.08 cm)
12331923-2	33.78 in.(85.80 cm)
12331923-3	36.66 in. (93.12 cm)
12331923-4	38.05 in. (96.65 cm)
12331923-5	27.62 in. (70.15 cm)
12331923-6	3.18 in. (8.08 cm)
12331923-7	4.00 in. (10.16 cm)
12331923-8	10.25 in. (26.04 cm)
12331923-9	13.50 in. (34.29 cm)
12331924-10	3.00 in. (7.62 cm)
12331923-11	2.38 in. (6.05 cm)
12331923-12	2.88 in. (7.32 cm)
12331923-13	36.67 in. (93.14 cm)
12331923-14	32.56 in. (82.70 cm)
12331923-15	7.00 in. (17.78 cm)
12331923-16	8.00 in. (20.32 cm)

Part Number	Length
12331923-17	2.00 in. (5.08 cm)
12331923-18	33.78 in.(85.80 cm)
12331923-19	36.66 in. (93.12 cm)
12331923-20	38.05 in. (96.65 cm)
12331923-21	27.62 in. (70.15 cm)
12331923-22	3.18 in. (8.08 cm)
12331923-23	4.00 in. (10.16 cm)
12331923-24	10.25 in. (26.04 cm)
12331923-25	13.50 in. (34.29 cm)
12331924-26	3.00 in. (7.62 cm)
12331923-27	2.38 in. (6.05 cm)
12331923-28	2.88 in. (7.32 cm)
12331923-29	36.67 in. (93.14 cm)
12331923-30	32.56 in. (82.70 cm)
12331923-31	7.00 in. (17.78 cm)
12331923-32	8.00 in. (20.32 cm)

**12331923**

**TAPE, HOOK**

**Figure E-10**



**MAKE FROM:**

Fastener Tape, Pile Synthetic,  
Type II, Class 1

Fed Spec MIL-I-21840

Width: 1 in. (2.5 cm)

Part Number	Length
12331924-1	35.00 in. (88.90 cm)
12331924-2	17.00 in. (43.18 cm)
12331924-3	3.75 in. (9.53 cm)
12331924-4	9.00 in. (22.86 cm)
12331924-5	12.00 in. (30.48 cm)
12331924-6	2.00 in. (5.08 cm)
12331924-7	35.00 in. (88.90 cm)
12331924-8	17.00 in. (43.18 cm)
12331924-9	3.75 in. (9.53 cm)
12331924-10	9.00 in. (22.86 cm)
12331924-11	12.00 in. (30.48 cm)
12331924-12	2.00 in. (5.08 cm)

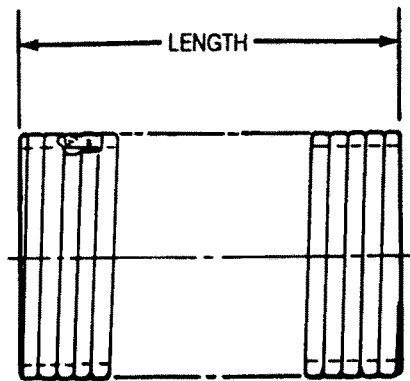
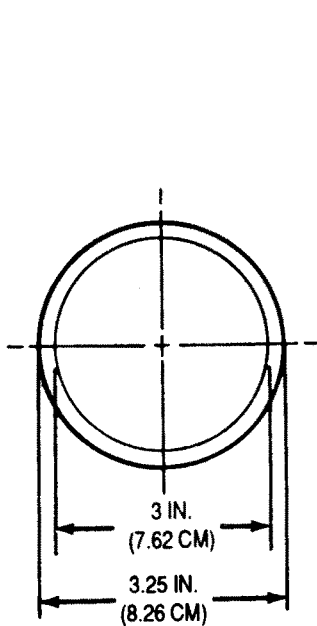
**12331924**

**TAPE, PILE**

**Figure E-11**

**Deleted**

**Figure E-12**



**MAKE FROM:**

Fed Spec WW-H-1053, Class S,  
Type I, Composition: Optional

Remove all burrs and sharp  
edges

Inside Diameter:  
3 in. (7.62 cm)

Outside Diameter:  
3.25 in. (8.26 cm)

Part Number	Length
12352558-1	37 in. (94 cm)
12352558-2	13 in. (33 cm)

**12352558**

**HOSE, EXHAUST**

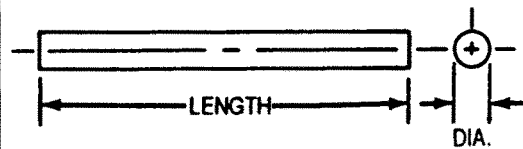
**Figure E-13**

Part Number	Dia.	Size of Hole Used In
8724762	.125 ± .010 in. (.318 ± .025 cm)	.105 in. (.267 cm)
8724763	.156 ± .010 in. (.396 ± .025 cm)	.140 in. (.356 cm)
8724764	.123 ± .010 in. (.312 ± .025 cm)	.215 in. (.546 cm)
8724765	.343 ± .020 in. (.871 ± .051 cm)	.340 in. (.864 cm)
8724766	.406 ± .020 in. (1.03 ± .051 cm)	.392 in. (.996 cm)
8724867	.453 ± .020 in. (1.15 ± .051 cm)	.415 in. (1.05 cm)
8724868	.578 ± .030 in. (1.47 ± .076 cm)	.530 in. 1.35 cm)
8724869	.640 ± .030 in. (1.63 ± .076 cm)	.652 in. (1.66 cm)

**MAKE FROM:**

Fed Spec L-P-509-C1  
Laminated, Thermosetting Rod,  
Type 1, Grade XX

Length: As Required.



**8724762**

**ROD**

# APPENDIX F

## TORQUE LIMITS

### SCOPE

This appendix provides general torque limits for screws and nuts used on M9 vehicles. Special torque limits are indicated in the maintenance procedures for applicable components. General torque limits in this appendix shall be used when special torque limits are not indicated in the maintenance procedures.

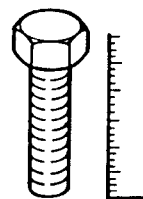
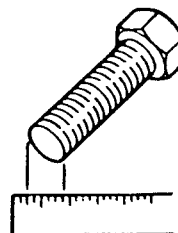
### TORQUE LIMITS

Table 1 lists dry torque limits. Dry torque limits are used on screws that have not had lubricants applied to the threads. Table 2 lists wet torque limits. Wet torque limits are used on screws that have had lubricants applied to the threads. Unless the maintenance procedure indicates otherwise, lubricate threads of screws with oil (OE/HDO-10 or OEA).

When tightening screws to torque limits of 30 lb-ft (41 N-m) and above, use the torque sequence for the component specified in the maintenance procedures or the general circular or straight sequences shown on page F-4. Tighten screws to 70 percent of their final value, then repeat the pattern until the final value is reached.

### HOW TO USE TORQUE LIMIT TABLES

- A** Measure the diameter of the screw being installed.
- B** Count the number of threads in 1 in. (2.5 cm) of screw length.
- C** Under the **SIZE** heading in tables 1 or 2, look down the left-hand column to find the diameter of the screw being installed, measured in step A. There are usually two listings.
- D** In the right-hand column under **SIZE** heading, find the number of threads per inch counted in step B.
- E** To find the grade screw being installed, match the markings on the head of the screw being installed with the correct picture in **SCREW MARKINGS** on tables 1 and 2.
- F** Look down the **SAE GRADE** column in the **TORQUE** column in tables 1 or 2 to find the correct torque limit for the screw being installed.



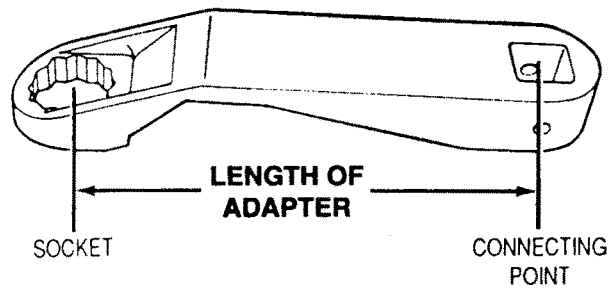
**GRADE 5**

## HOW ADAPTERS AFFECT TORQUE LIMITS

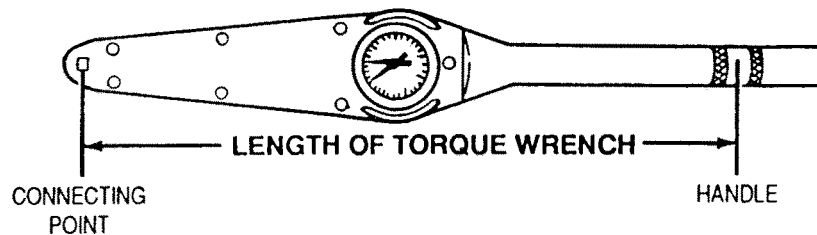
Torque wrenches have built-in devices (i.e. dials or clicks) which indicate to a mechanic when the desired torque limit has been reached. However, when adapters or extensions are used on the torque wrench that increase the length of the wrench, the torque applied will be greater than the dial reading, or preset torque limit.

Some quick mathematics will help the mechanic decide what the dial reading or preset torque limit should be to obtain the desired torque limit when an adapter or extension is used.

First, measure the length of the adapter from the center of the connecting point with the torque wrench to the center of the socket.



Then, measure the length of the torque wrench from the center of the handle to the center of the connecting point with the socket or adapter.



Calculate what the dial indicator or clicker setting should be using the following formula:

$$\text{Dial Indicator or Clicker Setting} = \frac{\text{Torque Wrench Length} \times \text{Torque Desired}}{\text{Torque Wrench Length} + \text{Extension Length}}$$

**HOW ADAPTERS AFFECT TORQUE LIMITS — CONTINUED**

For example:

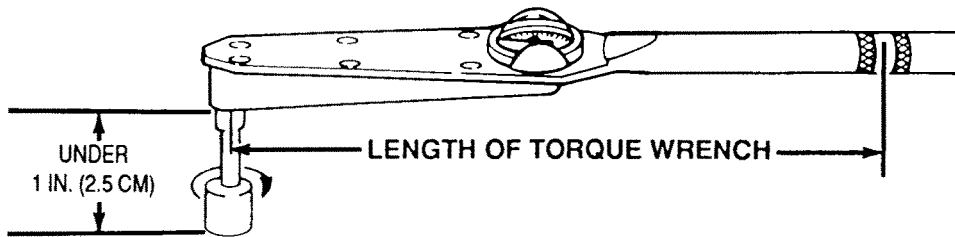
A 6-inch adapter is used on 18-inch torque wrench. The torque desired on the screw is 300 lb-ft (407 N-m). Using the formula, the dial indicator reading or clicker setting can be determined.

$$\frac{18 \times 300}{18 + 6} = \frac{5400}{24} = 225 \text{ lb-ft (305 N-m)}$$

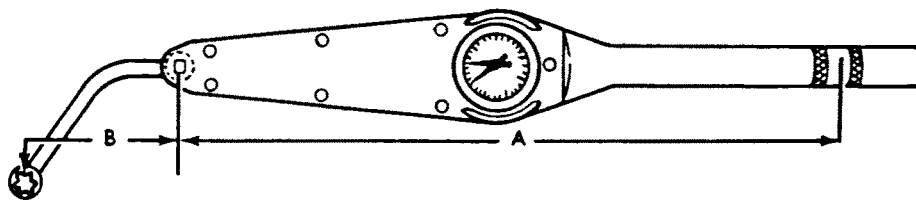
Therefore, a dial indicator reading of 225 lb-ft (305 N-m), or a clicker setting of the same level will result in the desired torque of 300 lb-ft (407 N-m) being applied.

In most cases, adapters that add 1 in. (2.5 cm) or less to the torque wrench length do not require recalculating torque. Only if the desired torque has an exceedingly tight tolerance should the new torque be calculated.

Be careful when deciding the length of the adapter.



In the example above, the extension will not affect the torque reading.



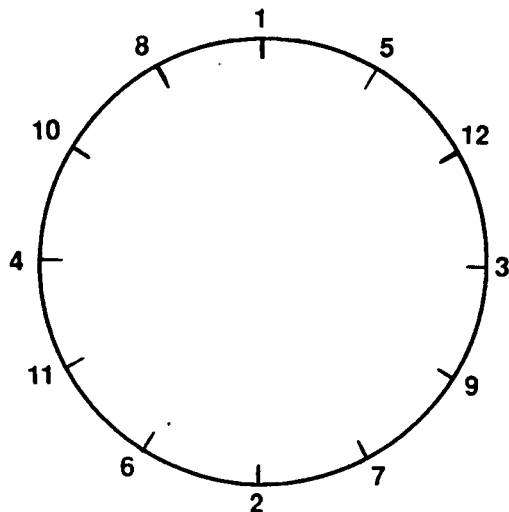
**LENGTH OF TORQUE WRENCH**

In the example above, the adapter will affect the torque. But use only the distance the wrench is extended by the adapter (B), not the actual length of the adapter, when calculating the new torque.

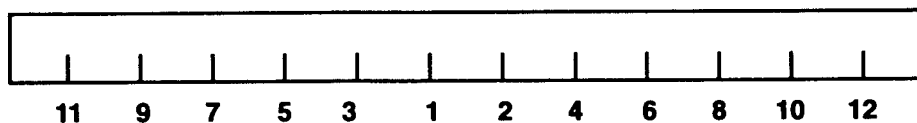


**TORQUE SEQUENCE**

If the maintenance procedures in chapter 4 do not specify a torque pattern or progressive torque sequence, use the following guidelines.



**CIRCULAR TORQUE PATTERN**



**STRAIGHT TORQUE PATTERN**

Table 1. Torque Limits for Dry Fasteners

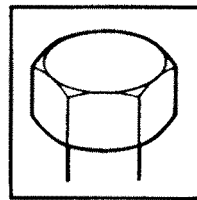
SCREW MARKINGS			TORQUE							
SIZE			SAE GRADE 2		SAE GRADE 5		SAE GRADE 6 OR 7		SAE GRADE 8	
			LB-FT	N•m	LB-FT	N•m	LB-FT	N•m	LB-FT	N•m
DIAMETER (IN.)	THREADS PER INCH	(MILLIMETERS)								
1/4	20	6.35	5	7	8	11	10	14	12	16
1/4	28		6	8	10	14	12	16	14	19
5/16	18	7.94	11	15	17	23	21	28	25	34
5/16	24		12	16	19	26	24	33	25	34
3/8	16	9.53	20	27	30	41	40	54	45	61
3/8	24		23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
7/16	20		35	47	55	75	70	95	80	108
1/2	13	12.70	50	68	75	102	95	129	110	149
1/2	20		55	75	90	122	100	136	120	163
9/16	12	14.29	65	88	110	149	135	183	150	203
9/16	18		75	102	120	163	150	203	170	231
5/8	11	15.88	90	122	150	203	190	258	220	298
5/8	18		100	136	180	244	210	285	240	325
3/4	10	19.05	110	149	260	353	320	434	380	515
3/4	16		125	170	300	407	360	488	420	570
7/8	9	22.23	140	190	400	542	520	705	600	814
7/8	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
1	12		240	325	640	868	860	1166	1000	1356
1-1/8	7	28.58	300	407	800	1085	1120	1519	1280	1736
1-1/8	12		340	461	880	1193	1260	1709	1440	1953
1-1/4	7	31.75	420	570	1120	1519	1580	2142	1820	2468
1-1/4	12		460	624	1240	1681	1760	2387	2000	2712
1-3/8	6	34.93	560	759	1470	1993	2080	2820	2380	3227
1-3/8	12		640	868	1680	2278	2380	3227	2720	3688
1-1/2	6	38.10	740	1003	1940	2631	2780	3770	3160	4285
1-1/2	12		840	1139	2200	2983	3100	4204	3560	4827

Table 2. Torque Limits for Wet Fasteners

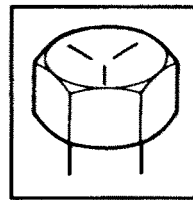
SIZE			TORQUE							
SIZE			SAE GRADE 2		SAE GRADE 5		SAE GRADE 6 OR 7		SAE GRADE 8	
DIAMETER (IN.)	THREADS PER INCH	(MILLIMETERS)	LB-FT	N•m	LB-FT	N•m	LB-FT	N•m	LB-FT	N•m
1/4	20	6.35	4	6	6	8	8	11	9	12
1/4	28		5	7	7	9	9	12	10	14
5/16	18	7.94	8	11	13	18	16	22	18	24
5/16	24		9	12	14	19	18	24	20	28
3/8	16	9.53	15	20	23	31	30	41	35	47
3/8	24		17	23	25	34	30	41	35	47
7/16	14	11.11	24	33	35	47	45	61	55	75
7/16	20		25	34	40	54	50	63	60	81
1/2	13	12.70	35	47	55	75	70	95	80	108
1/2	20		40	54	65	88	80	108	90	123
9/16	12	14.29	50	68	80	108	100	136	110	149
9/16	18		55	75	90	122	110	149	130	176
5/8	11	15.88	70	95	110	149	140	190	170	231
5/8	18		80	108	130	176	160	217	180	244
3/4	10	19.05	90	122	200	271	240	325	280	380
3/4	16		100	136	220	298	280	380	320	434
7/8	9	22.23	110	149	300	407	400	542	460	624
7/8	14		120	163	320	434	440	597	500	678
1	8	25.40	160	217	440	597	600	814	680	922
1	12		170	231	480	651	660	895	740	1003
1-1/8	7	25.58	220	298	600	814	840	1139	960	1302
1-1/8	12		260	353	660	895	940	1275	1080	1464
1-1/4	7	31.75	320	434	840	1139	1100	1492	1360	1844
1-1/4	12		360	488	920	1248	1320	1790	1500	2034
1-3/8	6	34.93	420	570	1103	1496	1560	2115	1780	2414
1-3/8	12		460	624	1260	1709	1780	2414	2040	2766
1-1/2	6	38.10	560	760	1460	1980	2080	2820	2360	3200
1-1/2	12		620	841	1640	2224	2320	3146	2660	3607

SCREW MARKINGS

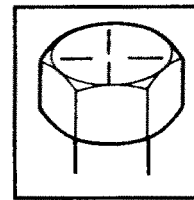
Manufacturers' marks may vary. These are all SAE Grade 5 (3-line).



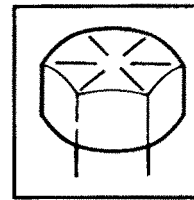
SAE GRADE 2



SAE GRADE 5



SAE GRADE 6 OR 7



SAE GRADE 8



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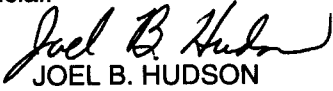
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By Order of the Secretary of the Army:

Official:



JOEL B. HUDSON

*Administrative Assistant to the  
Secretary of the Army*

03003

DENNIS J. REIMER  
*General, United States Army  
Chief of Staff*

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<b>PUBLICATION/FORM NUMBER:</b> TM X-XXXX-XXX-XXX						<b>DATE:</b> Date of the TM.	<b>TITLE:</b> Title of TM.
<b>ITEM NO.</b>	<b>PAGE NO.</b>	<b>PARA-GRAPH</b>	<b>LINE NO.</b>	<b>FIGURE NO.</b>	<b>TABLE NO.</b>	<b>RECOMMENDED CHANGES AND REASON</b> (Exact wording of recommended change must be given)	
	0019 00 1	3	1	1		Step No. 2 says to secure doors open with locking bar or hooks from where to what? The bars or hooks are not identified.	
	0019 00 4	4	1	1		Step No. 19 states to remove locking bars, pins or hooks from where to what? The bars, pins or hooks are not identified. Where are they stored?	
SAMPLE							
* Reference to line numbers within the paragraph or subparagraph.							
<b>TYPED NAME, GRADE OR TITLE</b> Doe, John, CPL				<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b> 755-1313		<b>SIGNATURE</b> CPL John Doe	



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**PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION/FORM NUMBER:</b> TM X-XXXX-XXX-XXX	<b>DATE:</b> Date of the TM.	<b>TITLE:</b> Title of TM.
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PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**SAMPLE**

**PART III - REMARKS** (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

\* Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE  Doe, John, CPL	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION  755-1313	SIGNATURE  <i>CPL John Doe</i>
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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> <b>For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.</b>						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
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<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER						DATE	TITLE
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
* Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code)	<b>FROM:</b> (Activity and location) (Include ZIP Code)	<b>DATE</b>
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**PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

PUBLICATION/FORM NUMBER			DATE	TITLE				
PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPROTED	RECOMMENDED ACTION

**PART III - REMARKS** (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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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 = 1,000 Millimeters = 39.37 Inches  
 1 Kilometer = 1,000 Meters = 0.621 Miles

### WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1,000 Grams = 2.2 Lb  
 1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1,000 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 = 1,000 Cu Millimeters = 0.06 Cu Inches  
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

### TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32.2° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $9/5 ^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

### APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches .....	Centimeters .....	2.540
Feet .....	Meters .....	0.305
Yards .....	Meters .....	0.914
Miles .....	Kilometers .....	1.609
Square Inches .....	Square Centimeters .....	6.451
Square Feet .....	Square Meters .....	0.093
Square Yards .....	Square Meters .....	0.836
Square Miles .....	Square Kilometers .....	2.590
Acres .....	Square Hectometers .....	0.405
Cubic Feet .....	Cubic Meters .....	0.028
Cubic Yards .....	Cubic Meters .....	0.765
Fluid Ounces .....	Milliliters .....	29.573
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
TO CHANGE	TO	MULTIPLY BY
Centimeters .....	Inches .....	0.394
Meters .....	Feet .....	3.280
Meters .....	Yards .....	1.094
Kilometers .....	Miles .....	0.621
Square Centimeters .....	Square Inches .....	0.155
Square Meters .....	Square Feet .....	10.764
Square Meters .....	Square Yards .....	1.196
Square Kilometers .....	Square Miles .....	0.386
Square Hectometers .....	Acres .....	2.471
Cubic Meters .....	Cubic Feet .....	35.315
Cubic Meters .....	Cubic Yards .....	1.308
Milliliters .....	Fluid Ounces .....	0.034
Liters .....	Pints .....	2.113
Liters .....	Quarts .....	1.057
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

